WORKSHOP MANUAL

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DORADO 66
DORADO 76
DORADO 86

Power Shuttle

INTRODUCTION

The purpose of this workshop manual is to provide instruction for repair technicians and a practical guide to improving the quality of repairs.

This manual enables repair technicians to acquire a thorough knowledge of the machine, indicating the correct methods for fault diagnosis, for working in safety and for accurate dimensional checks and visual inspections. The instructions also indicate the products to use, the tightening torques and the adjustment data.

The technical material contained in this manual is reserved for Authorised Dealers and Service Centres who will be duly informed of any technical changes to the machines in question through the issue of documents regarding modifications, updates and supplements for optional equipment.

All technicians and their colleagues are expressly forbidden from reproducing any part of this manual in any form or from communicating the contents to third parties without the express written permission of the Manufacturer, who remains the sole owner of this document with all rights reserved in accordance with applicable laws.

SAFETY NOTES

To ensure that machines entrusted to Authorised Service Centres for repair or overhaul continue to function correctly, it is very important that all repair work is carried out in the prescribed manner.

The procedures for checks and repairs indicated in this manual are safe and effective.

Some of the operations described require the use of special tools and equipment; these tools have been specifically designed for the intended purpose and may be ordered directly from the Manufacturers.

DO NOT USE MAKESHIFT TOOLS; not only is there a risk of personal injury, but such tools are rarely suited to the purpose for which they are used.

To prevent injury to operators, the symbols ⚠ and ⚠ are used in this manual to indicate the safety precautions required. The warnings accompanying these symbols must always be adhered to carefully.

In potentially hazardous situations, always give priority to personal safety and take the necessary actions to eliminate the danger.

GENERAL SAFETY RULES

1 - Even if you have a thorough knowledge of the machine as regards its components, operation and controls, always take particular care when carrying out manoeuvres; Remember that the machine you are working on is in need of repair or overhaul and consequently may not always behave as expected.

2 - Before starting work, clean the machine thoroughly to remove all mud, dust and road dirt. Also clean the cab to remove all traces of oil, snow and ice from the access steps and grab rails.

3 - When climbing up to or down from the cab, always ensure you maintain three points of contact at a time (foot or handholds) in order to keep your balance and prevent accidental falls.

4 - Always take special care when carrying out fault diagnosis operations; these operations often require two persons, who must never stand in front of the wheels when the engine is running.

5 - When carrying out checks and repairs, wear close-fitting clothing, safety goggles and protective gloves that are suitable for the task (cleaning, draining fluids, repairs).
When working near moving parts, long hair should be gathered up and secured safely under a cap to prevent the risk of entanglement and severe injury.

6 - Do not allow anyone who is not directly involved in the work to come near the machine; ensure that they remain at a safe distance.

7 - Keep well clear of moving parts; when the engine is running, some moving parts are not easily visible and therefore present a risk of entanglement, even if protected by safety guards.

8 - Ensure that the area is well ventilated before starting the engine in order to avoid the formation of dangerous concentrations of toxic gases; always connect suitable fume extraction equipment to the exhaust pipe.

9 - Do not start the engine with the safety guards removed under any circumstances; all repair and adjustment operations must be carried out with the engine stopped.

10 - Do not top up fuel, oil or coolant levels when the engine is running.

11 - Never smoke and ensure there are no naked flames nearby when topping up fuel or oil. Always remove the battery from the machine before recharging.

12 - Before checking or removing the battery, stop the engine and remove the key from the starter switch.

13 - Remove the battery and recharge in a well-ventilated area where the temperature exceeds 0°C.

14 - When checking or recharging the battery, do not smoke or allow naked flames in the vicinity as the hydrogen gas given off by the battery is highly explosive.

15 - The liquid (electrolyte) contained in the battery is very harmful if it comes into contact with the skin and the eyes; for this reason, always wear gloves and safety goggles with side shields when checking or topping up the battery.
Should any electrolyte accidentally come into contact with your skin, wash the affected parts immediately with plenty of water; if electrolyte comes into contact with your clothing, remove clothing as soon as possible.
In case of accidental ingestion of electrolyte, drink plenty of water, milk or vegetable oil and take antacids such as magnesium, bicarbonate, etc. and seek medical attention immediately.

16 - Before working on the electrical systems, always disconnect the battery terminals.

IMPORTANT!
Always disconnect the negative terminal (--) first and then the positive terminal (+); when re-connecting the battery on completion of the work, first connect the positive terminal (+) and then the negative (-).

17 - Before carrying out any arc welding (permitted only on implements attached to the machine) always disconnect the battery terminals and unplug all the connectors of the electronic control units and the alternator.

18 - When topping up lubricants, always wear suitable protective gloves.

19 - Do not wear clothing contaminated by engine or hydraulic oil; prolonged contact with the skin can be harmful and may cause allergic reactions.

20 - Used engine oil and hydraulic oil must be disposed of in a proper manner; recover used lubricants and dispose of them in accordance with the applicable regulations.

21 - Before carrying out any work on the hydraulic or pneumatic systems, discharge all residual pressure from the circuits.

22 - Before carrying out any work on the hydraulic system or engine, allow the oil and engine coolant to cool down.

23 - When removing and refitting certain assemblies, it will be necessary to support the machine; use stands, jacks or blocks capable of supporting the weight and arrange them in a triangular pattern to prevent the machine from overturning.

24 - To lift heavy components, use a hoist or crane. Check that wire ropes, chains or fibre slings are not worn and that hooks are not damaged.

25 - Always use lifting equipment of suitable capacity for the weight of the components to be removed. Ensure lifting equipment is attached correctly.

26 - When lifting or supporting an assembly or component, manoeuvre the parts slowly and carefully to avoid swinging or collision with other components.

27 - Never work on components suspended from a hoist or crane.

28 - When removing the retaining screws of a component that could fall, always leave two opposing bolts in place for safety; before removing these last two bolts, attach the component to suitable lifting equipment or position support blocks.

29 - Any oil or fuel spilled during removal or dismantling operations should be cleaned up as soon as possible to prevent the risk of slipping and fire.

30 - When refitting electrical wiring looms and wires, ensure that they are properly secured with their original retaining straps or brackets to prevent the possibility of damage caused by vibration.

31 - Never insert your fingers or hands to check the alignment between fixing holes in components; always use a suitable dowel of soft material.

32 - When refitting assemblies or components, always use the tightening torques specified in the tables; the tightening torques indicated in the paragraphs regarding assembly/refitting operations have been determined through experimentation and must be scrupulously adhered to.

33 - When refitting parts that are subject to vibration or that rotate at high speed, take particular care when carrying out final installation checks.

SAFETY PRECAUTIONS FOR REMOVAL AND REFITTING OPERATIONS

★ When removing or refitting parts, always take the following safety precautions.

1. PRECAUTIONS FOR REMOVAL OPERATIONS

- Unless otherwise indicated, lower the implement until it rests on the ground.
- After disconnecting hydraulic and fuel system pipes, always fit plugs to the open ends of the pipes to prevent ingress of dirt.
- Before removing a cylinder, fully retract the piston and secure it in this position using a retaining strap.
- Use containers of sufficient capacity when draining oil, coolant or fuel.
- Before removing a part from the machine, check for alignment markings indicating the correct assembly position. If necessary, make new markings to ensure correct assembly.
- When unplugging electrical connectors, always grip the connectors firmly to avoid pulling on the wires.
- Where necessary, label wires and pipes before removal to avoid confusion when reconnecting.
- Check the number and thickness of any shims removed and keep them together in a safe place.
- To lift the machine or any of its main components, use lifting equipment of suitable capacity.
- When using eyebolts for lifting components, first check that they are not bent or damaged; screw them fully home and then turn the screw so that the eye is aligned with the lifting hook.
- Before removing a part, clean the surrounding area and, after removing the part, cover it to protect it from dirt and dust.

2. PRECAUTIONS FOR REFITTING OPERATIONS

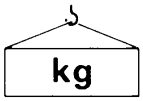
- Tighten nuts and screws to the specified tightening torques.
- When refitting flexible pipes and wires, take care not to twist or tangle them.
- Always fit new seals, O-rings, split pins and safety stop rings; make sure that the ends of the split pins are separated and bent back so that the pin cannot be withdrawn from the hole.
- Ensure that circlips are correctly installed in their seatings.
- When applying threadlocking compound, first clean the part removing all oil and grease, then cover the thread evenly applying a few drops of the compound.

- When applying sealant, first clean the surface removing all traces of oil and grease and check for dirt or indentations, then apply the sealant evenly making sure that it forms a continuous film around any fixing holes.
- Clean all parts, removing dirt, oxidation, carbon deposits, burrs and indentations.
- Coat all moving parts with a thin film of engine oil.
- When reconnecting electrical connectors, first remove all traces of oil, dust and water from the inside of the connector and then push the two halves together firmly; connectors with locking tabs should be pushed together until the tab engages the keeper.
- Bolt down flanged fittings evenly, tightening the screws gradually in a crosswise pattern.

3. PRECAUTIONS TO BE TAKEN ON COMPLETION OF REMOVAL/REFITTING OPERATIONS

- If coolant has been drained from the engine, refit the drain plug and add new coolant to the correct level. Start the engine to circulate the coolant and then check the level again and top up.
- After removing hydraulic components, top up the hydraulic oil to the specified level. Start the engine to circulate the oil in the hydraulic circuits and then recheck the level and top up as necessary.
- After having removed a variable displacement pump, connect the drain pipe and fill the pump casing with oil through the filler hole provided.
- Grease stub axle housings, cylinder pivot mountings and drive shafts thoroughly after assembly.

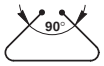
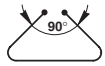
LIFTING INSTRUCTIONS



⚠ Components weighing over 25 kg or of significant size must be supported and removed using suitable lifting equipment with wire rope or polyester slings.
In the paragraphs regarding removal and refitting operations, the weight of the component or assembly to be lifted is indicated with the symbol 

WIRE ROPES - SLINGS

- Use wire ropes or polyester slings of suitable capacity for the parts to be lifted, referring to the following tables:

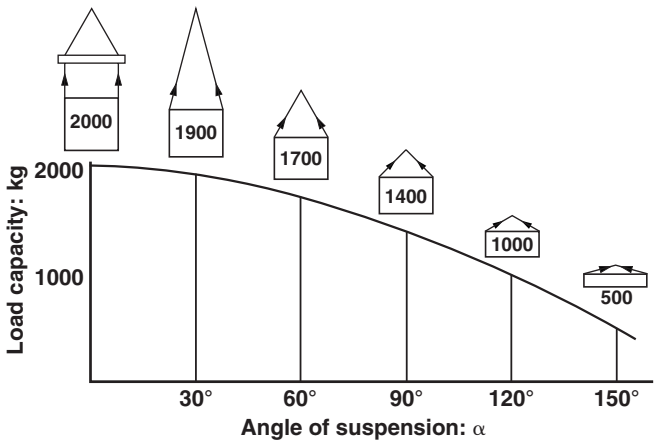
WIRE ROPES (standard twisted «S» or «Z» type)				*POLYESTER SLINGS (eye-and-eye - simple loop)*				
Ø rope mm	Capacity (kg)			Width (mm)	Capacity (kg)			
								
8	650	620	500	25	500	400	860	700
10	1000	1740	1420	50	1000	800	1730	1410
12	1450	2500	2050	62	1250	1000	2160	1760
14	2000	3460	2820	75	1400	1120	2420	1980
16	2600	4500	3670	100	2000	1600	3460	2820
18	3300	5710	4660	150	2500	2000	4330	3530

NOTE. Lifting capacities are calculated with a safety coefficient.

- The lifting hook should be attached to the central part of the rope or sling; if the hook is attached near the ends of the rope/sling, this could cause the load to slip during lifting.
- Never lift a heavy load using a single rope; always use two or more symmetrically arranged ropes.

⚠ Suspension of a load from a single rope could cause the load to start rotating and consequently cause the rope strands to untwist or the load to slip; this could lead to serious injury.

- Never lift a heavy load when the two legs of the ropes form a wide angle.
The permitted load (kg) decreases in inverse proportion to the angle of suspension; the table below indicates how the permitted load varies according to the angle of suspension for two Ø 10 mm ropes each with a load capacity of 1000 kg.



HOW THE MANUAL IS STRUCTURED

SECTION 00 Contains the general safety rules, information on how to use and update the manual, the symbols used, the products required, the standard tightening torques and a conversion table for units of measurement.

SECTION 10 Contains technical descriptions and information regarding the mechanical and hydraulic operation of machine components, the designations of the various components, hydraulic diagrams and general technical data.

SECTION 20 Contains the user guides for the software needed to configure the machine and the engine and to read any fault diagnosis.

SECTION 30 Contains the methods, checks and adjustments regarding the external components; the operations dealt with in this section do not require removal of the various assemblies that make up the tractor frame and cab.

SECTION 40 Contains information and diagrams regarding the machine's electrical and electronic systems

CAUTION!

This manual does not contain information and instructions regarding the engine, which can be found in the following manuals:

Engine 1000/3/4/6	*307.1103.1.5*	*Italian*
	307.1103.5.5	*German*
	307.1103.3.5	*English*
	307.1103.2.5	*French*
	307.1103.4.5	*Spanish*
	307.1103.7.5	*Portuguese*

HOW TO CONSULT THE MANUAL

1. Removal and refitting of assembled units

(1) For the removal or refitting of assembled units, the sequence of operations and the methods to be applied are described in the removal procedure; if the refitting sequence of operations is the exact reverse of the removal procedure, it is not described.

(2) All special techniques that apply only to the refitting procedure are indicated by the symbol [※ 1] ; this same symbol appears at the end of each major step in the removal procedure to indicate the parts for which special techniques are to be applied during refitting.

Example: *REMOVAL OF UNIT* :..... Operation heading

⚠ :..... Safety rules to be observed when carrying out the procedure described.

1 - Remove part (1):..... Step of the procedure

★: ..... Technique or important information regarding the removal operation

2 - Disconnect (2)..... [※ 1] : .....Indicates the existence of special information regarding refitting of the component in question

..... ,: ..... Recovery of oil, liquid or fuel and the quantity to be recovered

Example: *REFITTING UNIT:*..... Operation heading

• Refitting is the reverse of removal

[※ 1] :.....Technique to be applied during refitting.

★: ..... Technique or important information regarding the refitting operation.

• ..... ,: ..... Filling with oil or liquid with quantity

2. During removal and refitting operations, in addition to the general safety rules, you must also apply the specific «SAFETY PRECAUTIONS FOR REMOVAL AND REFITTING OPERATIONS».
Always adhere to these precautions.

3. List of special tools

(1) For details regarding the type, part numbers and quantity of all the tools (T1, T2, etc.) specified in the operating procedures, see the heading «SPECIAL TOOLS».

4. Tightening torques

1 - In the operating procedures, the symbol Nm denotes a specific tightening torque that has been determined experimentally and that must be adhered to.

2 - If the symbol does not appear, the torque values to be used are those indicated in the table in Section 00 of this manual.

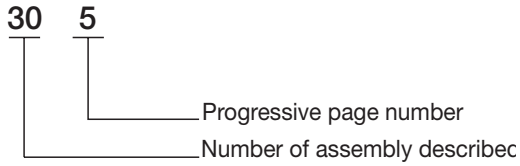
HOW TO USE AND UPDATE THE MANUAL

1. UPDATING THE MANUAL

All additions, corrections or amendments to the manual will be sent to the Authorised Service Centres.
Before starting any repair or overhaul operations, check that you have the most recent updates as these may contain supplementary data not present in previous issues.

2. INSERTING UPDATES

1- *Check* the number of the page and insert it in the appropriate section of the manual following the consecutive order of the *page numbers*. Example:



2 - *Supplementary pages:* indicated with a hyphen (-) and consecutive number after the page number. Example:

30-5
30-5-1
30-5-2 — Added pages
30-6

NOTE. The contents of supplementary pages are structured so that there is no overlap with existing pages.

3 - *Updated pages:* indicated by a consecutive number in a circle; this symbol appears below the page number. Example:

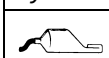
30-5
30-5-1 – Existing page
30-5-1 ① – Update page
30-5-2 – Existing page

NOTE. All supplementary and updated pages are indicated in the manual page list; a revised page list is sent with each update and supersedes the previous list.

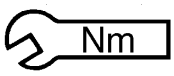
3. SYMBOLS USED IN THE MANUAL

For greater clarity, important information pertaining to operator safety and to critical stages in the working procedures is highlighted by the symbols shown in the following table.

Symbol	Meaning	Notes
	Safety	Operations requiring the application of safety measures
		Operations requiring special safety measures due to internal pressure
	Warning	Operations requiring special technical or other precautions to ensure compliance with standard values
	Weight	Weight of main assemblies. Choose lifting ropes/slings carefully; supports required, etc.

Symbol	Meaning	Notes
	Coating	Parts must be coated with adhesive, lubricant, etc.
	Oil, water	Points at which oil, water or fuel must be added and quantity required
	Drain	Points from which oil, water or fuel must be drained with quantity
	Tightening torque	Parts requiring special tightening torque during refitting or assembly

TIGHTENING TORQUES



1. SCREWS AND NUTS

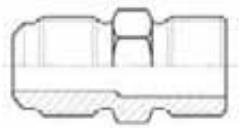
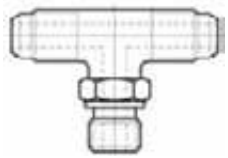
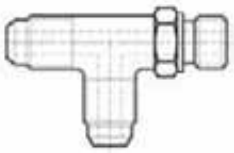
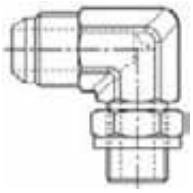
The tightening torques for certain specific components and special tightening methods are indicated in the relative assembly paragraphs.

★ The tightening torques indicated below refer to screws and nuts assembled without lubrication and, where applicable, with anaerobic threadlocking compound.
The values apply to tightening on steel or cast iron components; for soft materials such as aluminium, copper, plastic, sheet metal or panels, the indicated tightening torques must be reduced by 50%.

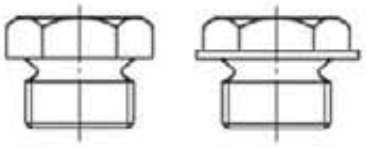
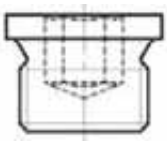
SCREW SIZE		SCREW CLASS					
		8.8		10.9		12.9	
		Nm	lb.ft.	Nm	lb.ft.	Nm	lb.ft.
COARSE THREAD	M6x1	8,0 –8,8	5.9 –6.5	11,8 – 13,0	8.7 –9.6	13,8 – 15,2	10.2 –11.2
	M8x1.25	19,4 –21,4	14.3 –15.8	28,5 – 31,5	21.0 – 23.2	33,3 – 36,9	24.5 – 27.2
	M10x1.5	38,4 – 42,4	28.3 – 31.2	56,4 – 62,4	41.6 – 46.0	67,4 – 74,4	49.7 – 54.8
	M12x1.75	66,5 – 73,5	49.0 – 54.2	96,9 – 107	71.4 – 78.9	115 – 128	84.8 – 94.3
	M14x2	106 – 117	78.1 – 86.2	156 – 172	115,0 – 126,8	184 – 204	135.6 – 150.3
	M16x2	164 – 182	120.9 – 134.1	241 – 267	117.6 – 196.8	282 – 312	207.8 – 229.9
	M18x2.5	228 – 252	168.0 – 185.7	334 – 370	246.2 – 272.7	391 – 432	288.2 – 318.4
	M20x2.5	321 – 355	236.6 – 261.6	472 – 522	347.9 – 384.7	553 – 611	407.6 – 450.3
	M22x2.5	441 – 487	325.0 – 358.9	647 – 715	476.8 – 527.0	751 – 830	553.5 – 611.7
	M24x3	553 – 611	407.6 – 450.3	812 – 898	598.4 – 661.8	950 – 1050	700.2 – 773.9
	M27x3	816 – 902	601.4 – 664.8	1198 – 1324	882.9 – 975.8	1419 – 1569	1045.8 – 1156.4
FINE THREAD	M8x1	20,8 – 23,0	15.3 – 17.0	30,6 – 33,8	22.6 – 24.9	35,8 – 39,6	26.4 – 29.2
	M10x1.25	40,6 – 44,8	29.9 – 33.0	59,7 – 65,9	44.0 – 48.6	71,2 – 78,6	52.5 – 57.9
	M12x1.25	72,2 – 79,8	53.2 – 58.8	106 – 118	78.1 – 87.0	126 – 140	92.9 – 103.2
	M12x1.5	69,4 – 76,7	51.1 – 56.5	102 – 112	75.2 – 82.5	121 – 134	89.2 – 98.8
	M14x1.5	114 – 126	84.0 – 92.9	168 – 186	123.8 – 137.1	199 – 220	146.7 – 162.1
	M16x1.5	175 – 194	129 – 143	257 – 285	189.4 – 210.0	301 – 333	221.8 – 245.4
	M18x1.5	256 – 282	188.7 – 207.8	375 – 415	276.4 – 305.9	439 – 485	323.5 – 357.4
	M20x1.5	355 – 393	261.6 – 289.6	523 – 578	385.5 – 426.0	611 – 676	450.3 – 498.2
	M22x1.5	482 – 532	355.2 – 392.1	708 – 782	521.8 – 576.3	821 – 908	605.1 – 669.2
	M24x2	602 – 666	443.7 – 490.8	884 – 978	651.5 – 720.8	1035 – 1143	762.8 – 842.4

2. FITTINGS

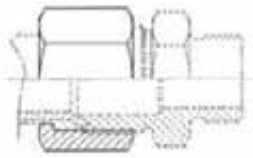
★ The tightening torques indicated below refer to fittings assembled on any material.

		Straight end fittings		"T" end fittings		"L" end fittings		90° end fittings	
									
	Thread size	Wrench	Torque Nm ±10%	Wrench	Torque Nm ±10%	Wrench	Torque Nm ±10%	Wrench	Torque Nm ±10%
METRIC THREADS	M10x1.25	17	14	14	14	14	14	14	14
		19	14	17	14	17	14		
	M12x1.25	19	30	17	30	17	30	17	30
	M14x1.5	19	40	19	40	19	40	19	40
	M16x1.5	22	48	22	48	22	48	22	48
	M18x1.5	24	58	24	58	24	58	24	58
	M20x1.5	27	65	27	65	27	65	27	65
	M22x1.5	30	73	30	73	30	73	30	73
	M26x1.5	36	95	36	95	36	95	36	95
	M27x2	36	100	36	100	36	100	36	100
	M33x2	41	160	41	160	41	160	41	160
	M42x2	50	250	50	250	50	250	50	250
	M48x2	60	305	60	305	60	305	60	305
THREADS IN INCHES	G 1/8"	17	13	14	13	14	13	14	13
		19	13						
	G 1/4"	19	37	19	37	19	37	19	37
		22	37						
	G 3/8"	24	53	24	53	24	53	24	53
	G 1/2"	27	73	27	73	27	73	27	73
		30	73						
	G 3/4"	36	100	36	100	36	100	36	100
	G 1"	41	160	41	160	41	160	41	160
		46	160						
	G 1 1/4"	50	250	50	250	50	250	50	250
	G 1 1/2"	60	305	60	305	60	305	60	305

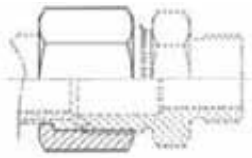
3. PLUGS

		Hex plugs		Threaded plugs with hex socket head	
					
	Thread size	Wrench	Torque Nm ±10%	Wrench	Torque Nm ±10%
METRIC THREADS	M6x1	10	10	–	–
	M8x1	13	12	–	–
	M10x1	13	14	5	14
	M10x1.25	13	14	–	–
	M10x1.5	13	14	–	–
	M12x1.25	17	30	–	–
	M12x1.5	17	30	6	30
	M12x1.75	17	30	–	–
	M14x1.5	19	40	6	40
	M14x2	19	40	–	–
	M16x1.5	22	48	8	48
	M16x2	22	48	–	–
	M18x1.5	17	58	10	58
	M18x2.5	17	58	–	–
	M20x1.5	19	65	–	–
	M22x1.5	–	–	12	73
	M24x1.5	22	80	12	80
	M24x2	22	80	–	–
	M27x2	22	100	–	–
	M28x1.5	–	–	17	110
	M30x1.5	22	130	–	–
	M32x1.5	–	–	19	150
	M35x1.5	–	–	22	180
	M40x1.5	–	–	24	225
THREADS IN INCHES	G 1/8”	14	13	–	–
	G 1/4”	19	37	–	–
	G 3/8”	22	53	–	–
	G 1/2”	19	73	–	–
	G 5/8”	22	85	–	–
	G 3/4”	22	100	–	–
	G 1”	22	160	–	–

4. FITTINGS WITH SEAL AT 37°



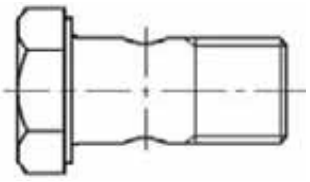
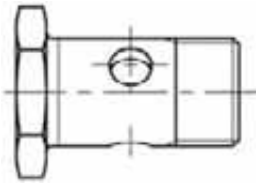
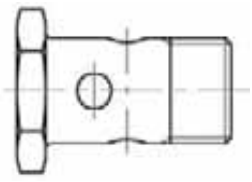
Thread size	Wrench	Torque Nm ±10%
7/16” - 20	14	13
1/2” - 20	16	19
9/16” - 18	17	28
3/4” - 16	22	47
7/8” - 14	27	76
1 1/16” - 12	32	110
	36	110



Thread size	Wrench	Torque Nm ±10%
1 3/16” - 12	36	138
1 5/16” - 12	38	155
1 5/8” - 12	50	215
1 7/8” - 12	60	290
2 1/2” - 12	75	345

5. FITTINGS FOR PIPES WITH BANJO UNION

★ These tightening torques refer to tightening the fitting with new copper sealing washers.

	Unions for one-way fittings		Unions for three-way fittings		Unions for four-way fittings	
						
Thread size	Wrench	Torque Nm ±10%	Wrench	Torque Nm ±10%	Wrench	Torque Nm ±10%
M8x1	–	–	12	14	–	–
M8x1.25	13	14	–	–	–	–
M10x1	–	–	14	20	14	20
M10x1.25	13	20	–	–	–	–
M12x1.25	17	30	–	–	–	–
M12x1.5	–	–	17	30	17	30
M14x1.5	19	40	19	40	19	40
M16x1.5	22	48	22	48	22	48
M18x1.5	22	58	24	58	24	58
M20x1.5	27	65	–	–	–	–
M22x1.5	–	–	27	73	27	73
M24x1.5	32	80	–	–	–	–
M26x1.5	–	–	32	95	32	95
M28x1.5	36	110	–	–	–	–
M30x1.5	–	–	36	130	36	130
M35x2	41	180	–	–	–	–
M38x1.5			46	200	46	200
M42x2	50	250	–	–	–	–
M45x1.5	–	–	55	280	55	280
M50x2	60	320	–	–	–	–
M52x1.5	–	–	60	320	60	320
M65x2	–	–	75	450	75	450

THREADLOCKERS, ADHESIVES, SEALANTS AND LUBRICANTS



FUNC-TION	DESIGNATION	DESCRIPTION
THREADLOCKER	Loctite 222 Colour: opaque fluorescent purple	Anaerobic product suitable for low-strength locking of retaining, adjustment and precision fasteners. All traces of lubricant must first be removed using the specific activator.
	Loctite 242 Colour: fluorescent blue	Anaerobic product that prevents loosening of all types of nut and screw; used in place of conventional mechanical locking systems. Used for medium-strength locking. All traces of lubricant must first be removed using the specific activator.
	Loctite 243 Colour: opaque fluorescent blue	Alternative product to 242; oil tolerant and so can be used on lightly lubricated surfaces without prior use of activator.
	Loctite 270 Colour: fluorescent green	Anaerobic product for high-strength locking of screws and studs that do not normally require disassembly. Parts must be heated to approximately 80°C for removal. All traces of lubricant must first be removed using the specific activator.
DEGREASERS AND ACTIVATORS	Loctite 703	Product used for degreasing and cleaning parts prior to application of Loctite anaerobic products; after drying, promotes uniform curing of threadlockers
	Loctite 747	Product used specifically for treatment of passive metals prior to use of slow-cure anaerobic threadlockers (series 5 and 6). Can also be used to increase cure speed at low temperatures or in applications where there are large gaps between the parts.
SEALANTS (for faces and fittings)	Loctite 510 Colour: Red	Super-rapid anaerobic sealant for sealing between rigid metal faces; can eliminate the need for conventional gaskets as it can fill gaps up to 0.4 mm. Does not shrink and therefore fasteners do not need re-tightening to specified torque values after curing.
	Loctite 542 Colour: Brown	Anaerobic product used as a liquid sealant for threaded fittings up to 3/4” gas; rapid curing and parts may be disassembled with ordinary tools.
	Loctite 554 Colour: Red	Anaerobic sealant and locking compound used for sealing cooling and industrial fluid circuits. Slow curing, also suitable for use on non-ferrous alloys
	Loctite 572 Colour: White	Anaerobic sealant and locking compound used for sealing pipes and threaded fittings up to 2" in diameter”. Very slow curing on most metal surfaces.
	Loctite 573 Colour: Green	Thixotropic anaerobic product used for sealing joints between metal faces. Ensures total contact between surfaces with maximum tolerance of 0.10 mm, filling microvoids caused by flatness errors. Very slow curing on most metal surfaces and requires prior application of an activator.
	Loctite 576 Colour: Brown	Anaerobic product used as a liquid thread sealant for large diameter threaded fittings (up to 2"). Very slow curing; also suitable for non-ferrous alloys and parts requiring subsequent removal.

FUNC-TION	DESIGNATION	DESCRIPTION
INSTANT ADHESIVES	*Loctite 401* Colour: Colourless	Cyanoacrylate instant adhesive suitable for bonding a wide range of acidic and porous materials including, ceramics, wood, rubber and plastic (excluding polyolefin). Curing takes place in a few seconds as an effect of the condensed humidity present on the surfaces to be bonded, and is independent of environmental conditions.
	Loctite 495 Colour: Colourless	Cyanoacrylate instant adhesive suitable for bonding rubber, plastics and metal in any combination.
SILICONE SEALANTS	*Silastic 738 (Dow Corning)* Colour: Milky white	One-part silicone adhesive/sealant, non shrinking, ready for use. Cures on exposure to air to form a rubbery solid and obviates the need for conventional seals on flexible joints, filling gaps greater than 1 mm.
	Dirko Transparent Colour: Transparent	One-part silicone adhesive/sealant, shrinking, ready for use. Cures rapidly when exposed to humidity in the air to form a rubbery solid; resistant to high temperatures.
POLYURETHANE SEALANTS	*Betaseal HV3 (Gurit Essex)* Colour: Black	Polyurethane prepolymer based adhesive/sealant, high viscosity, suitable for permanent, high-strength flexible bonding. Slow curing, used for bonding glass to frames, wire mesh, metal plates, etc. surfaces must be degreased with primer.
RETAINING COMPOUNDS	*Loctite 601* Colour: fluorescent green	Anaerobic, fast-curing, high-strength adhesive. Suitable for sealing and retaining cylindrical assemblies with gap clearances of up to 0.10 mm; used for retaining rotors, gears, bearings, pulleys, bushes etc. on shafts.
	Loctite 638 Colour: fluorescent green	Anaerobic structural adhesive, quick-curing, very high strength; suitable for bonding cylindrical parts in non-ferrous alloys.
	Loctite 648 Colour: fluorescent green	Anaerobic structural adhesive, quick-curing, high-strength; suitable for bonding cylindrical parts, permanent retention of threaded parts, sealing of refrigeration systems, retention of bearings, etc. Alternative to Loctite 601 in high-temperature applications.
	Loctite 986/AVX Colour: fluorescent red	Anaerobic sealant/retaining compound for metal cylindrical parts. Slow-curing, high-strength, heat-resistant and resistant to chemical pressure. Parts must be first treated with an activator.
LUBRICANTS	*Grease* (NLGI 2 EP ASTM D217: 265/295)	Multi-purpose Lithium grease used for lubrication of seals, to prevent oxidization and to facilitate assembly operations.
	Molikote (Dow Corning)	Anti-wear compound, contains Molybdenum bisulphate, use neat or diluted with engine oil for assembly of main engine bearings.
	Vaseline	Neutral pH compound used to protect battery terminals against oxidization and corrosion.
	Engine oil 10W - 30	Used to dilute Molikote anti-wear lubricant during assembly of main engine bearings.

CONVERSION FACTORS

CONVERSION FROM BRITISH TO METRIC UNITS

inch x 25.40	= mm
foot x 0.305	= m
yard x 0.914	
Brit.miles 1.609	= km
Sq.in. x 6.452	= cm^2
Sq.ft. x 0.093	= m^2
Sq.yard x 0.835	
Cu.in. x 16.39	= cm^3
Cu.ft. x 28.36	= m^3
Cu.yard x 0.763	
Imp.gall. x 4.547	= litres
US gall. x 3.785	
pint x 0.568	
quart x 1.137	
US.gpm x 3.785	= ,/min
oz. x 0.028	= kg
lb. x 0.454	
lb.ft. x 0.139	= kgm
lb.in. x 17.87	= kg/m
psi x 0.070	= kg/cm^2
lb./Imp.gall x 0.100	= kg/,
lb./US.gall x 0.120	
lb./cu.ft. x 16.21	= kg/m^3
lb.ft. x 1.356	= Nm
psi x 1.379	= bar

CONVERSION FROM METRIC TO BRITISH UNITS

mm x 0.0394	= inch
m x 3.281	= foot
m x 1.094	= yard
km x 0.622	= Brit.miles
cm^2 x 0.155	= Sq.in.
m^2 x 10.77	= Sq.ft.
m^2 x 1.197	= Sq.yard
cm^3 x 0.061	= Cu.in.
m^3 x 0.035	= Cu.ft
m^3 x 1.311	= Cu.yard
litres x 0.220	= Imp.gall.
litres x 0.264	= US gall.
litres x 1.762	= pint
litres x 0.880	= quart
l/min x 0.2642	= US.gpm
kg x 35.25	= oz.
kg x 2.203	= lb.
kgm x 7.233	= lb.ft.
kg/m x 0.056	= lb.in.
kg/cm^2 x 14.22	= psi
kg/l x 10.00	= lb./Imp.gal.
kg/l x 8.333	= lb./US.gal.
kg/m^3 x 0.062	= lb./cu.ft.
Nm x 0.737	= lb.ft.
bar x 14.503	= psi

SECTION 10

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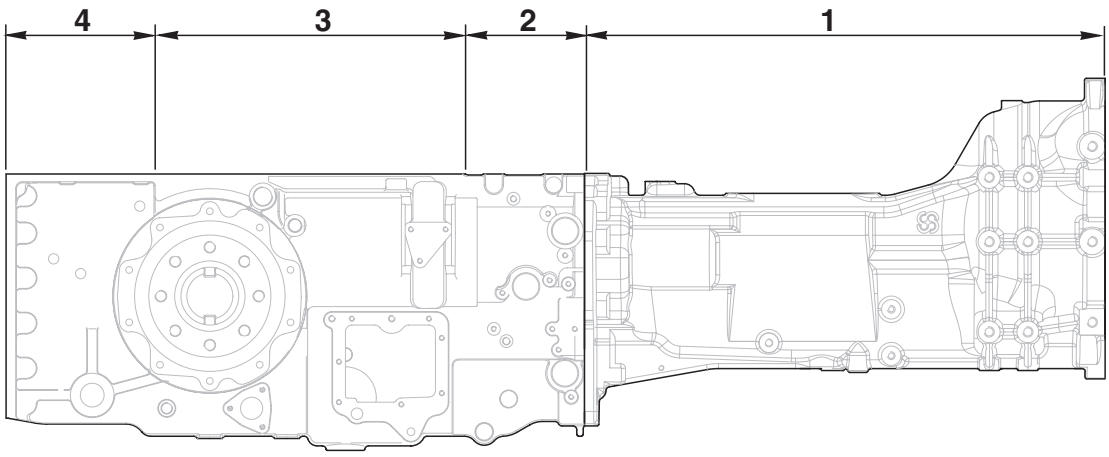
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1. TRANSMISSION

INTRODUCTION

- This tractor series can be supplied in the following versions:
  a - Transmission with 5 synchronized gears, 2 ranges and underdrive (20FWD+10REV)
  b - Transmission with 5 synchronized gears, 3 ranges and underdrive (30FWD+15REV)
  c - Transmission with 5 synchronized gears, 3 mechanical ranges and HLM (45FWD+45REV)
- The rear transmission casing also houses the drive train for the rear PTO, which is supplied in the following versions:
  a - 2-speed PTO (540 - 750E)
  b - 2-speed PTO (540 - 1000)
  c - 3-speed PTO (540 - 750E - Groundspeed)
  d - 3-speed PTO (540 - 1000 - Groundspeed)
  e - 3-speed PTO (540 - 750E - 1000)
- All the versions are mechanical with non-synchronized gears and electrohydraulic coupling control

.



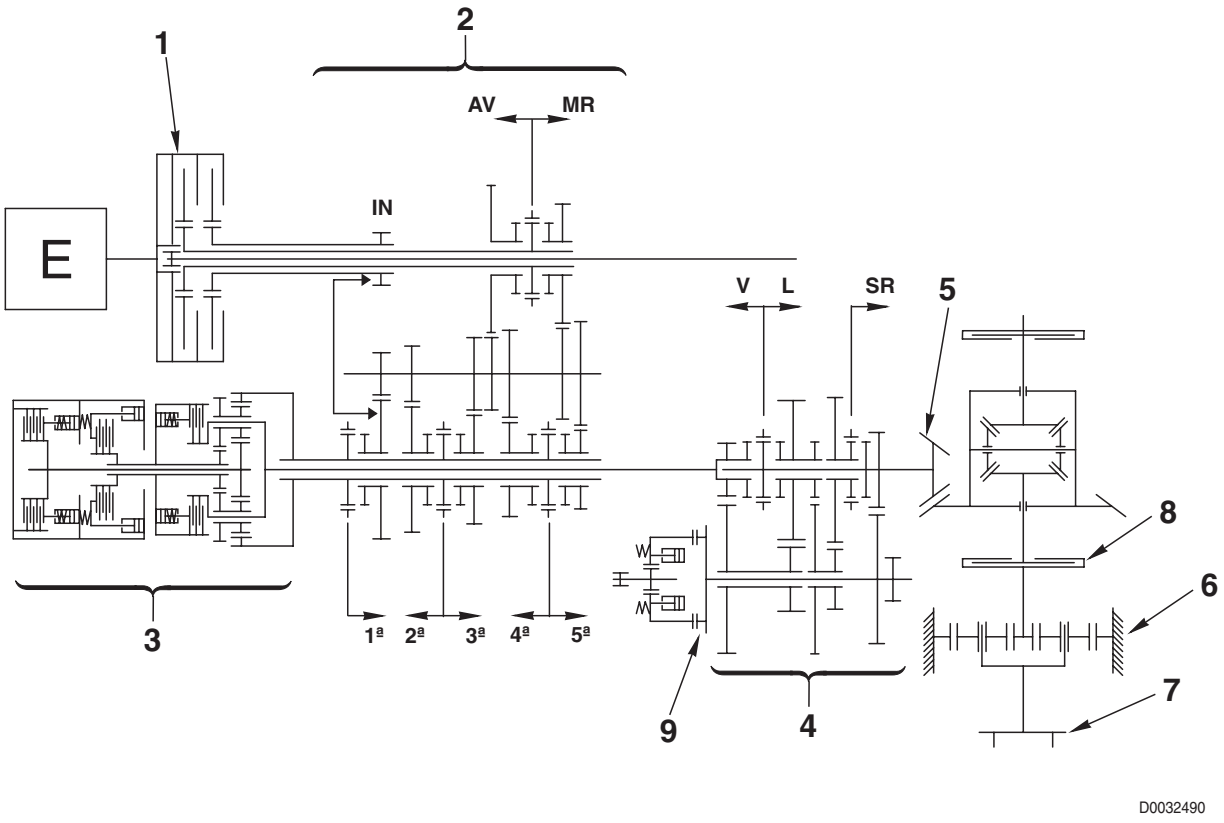
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MAIN ASSEMBLIES

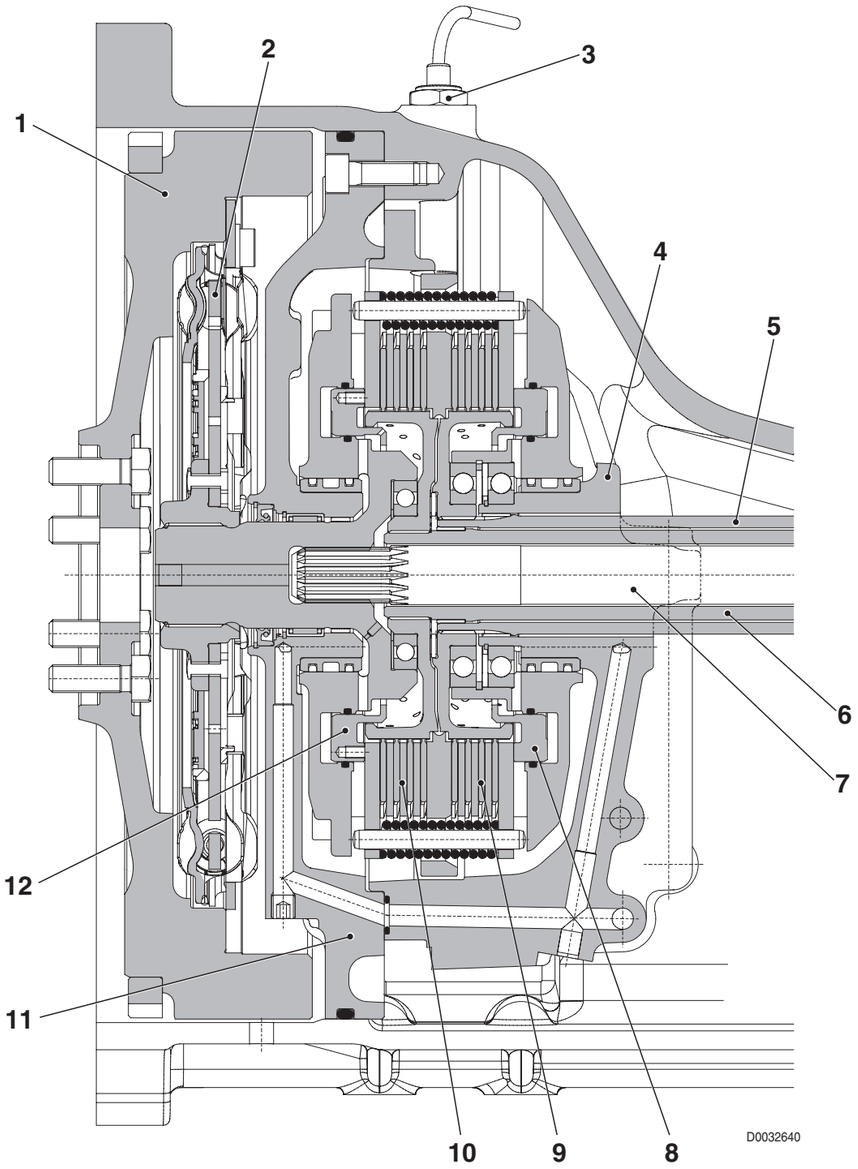
1 - Clutch housing, HML unit and shuttle unit
2 - Gearbox, shuttle and underdrive assembly
3 - Range gearbox and differential assembly
4 - Rear PTO

DESCRIPTION

- The transmission receives drive from the engine and transmits it through shuttle unit (1), gearbox and underdrive unit (2), HML unit (3), range gearbox control assembly (4) to bevel drive gears (5).
  Drive is then transmitted to final drive reduction units (6) and to wheels (7).
  There is a braking device (8) fitted between bevel drive gears (3) and final drive reduction unit (6) having the function of service brake, while the parking brake is mounted on 4WD output shaft (9).

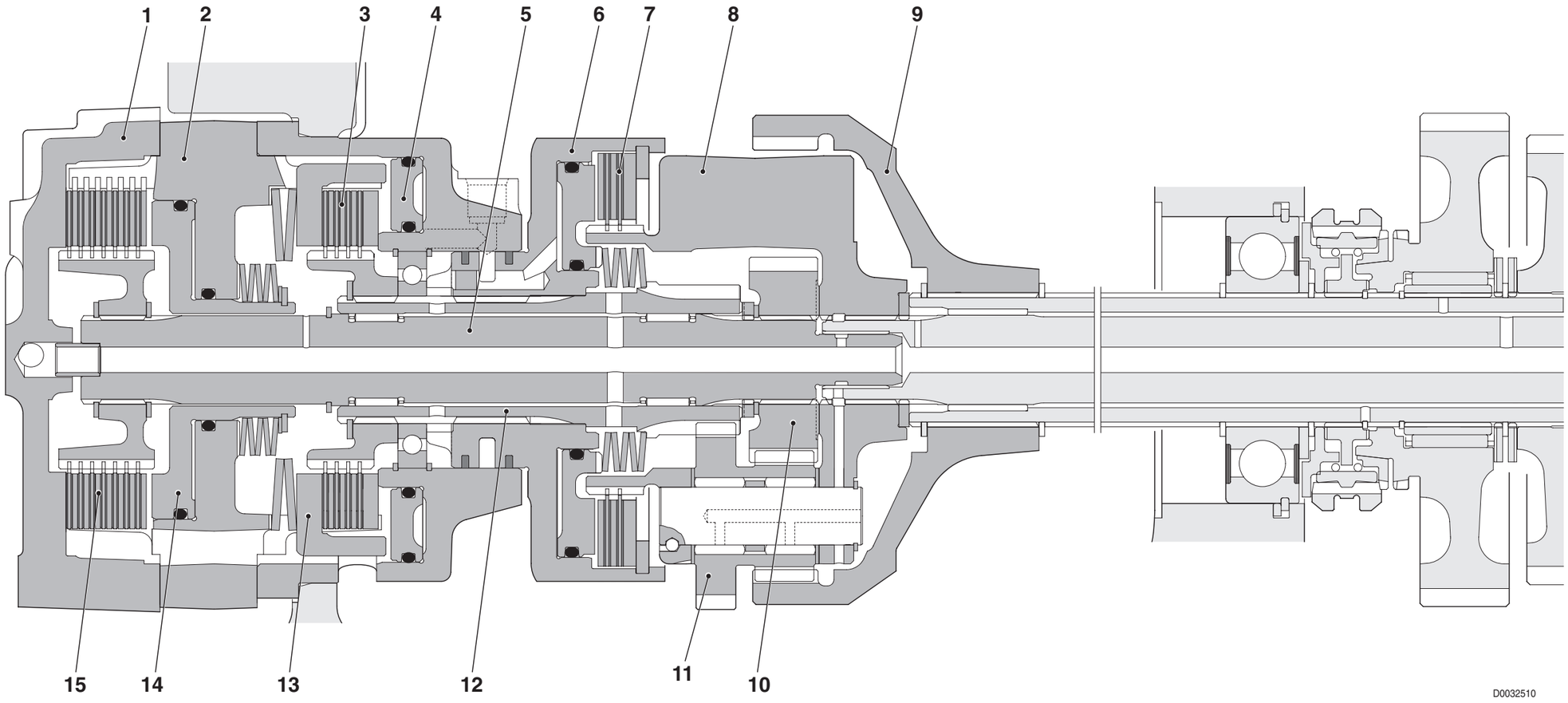


1.1 SHUTTLE UNIT



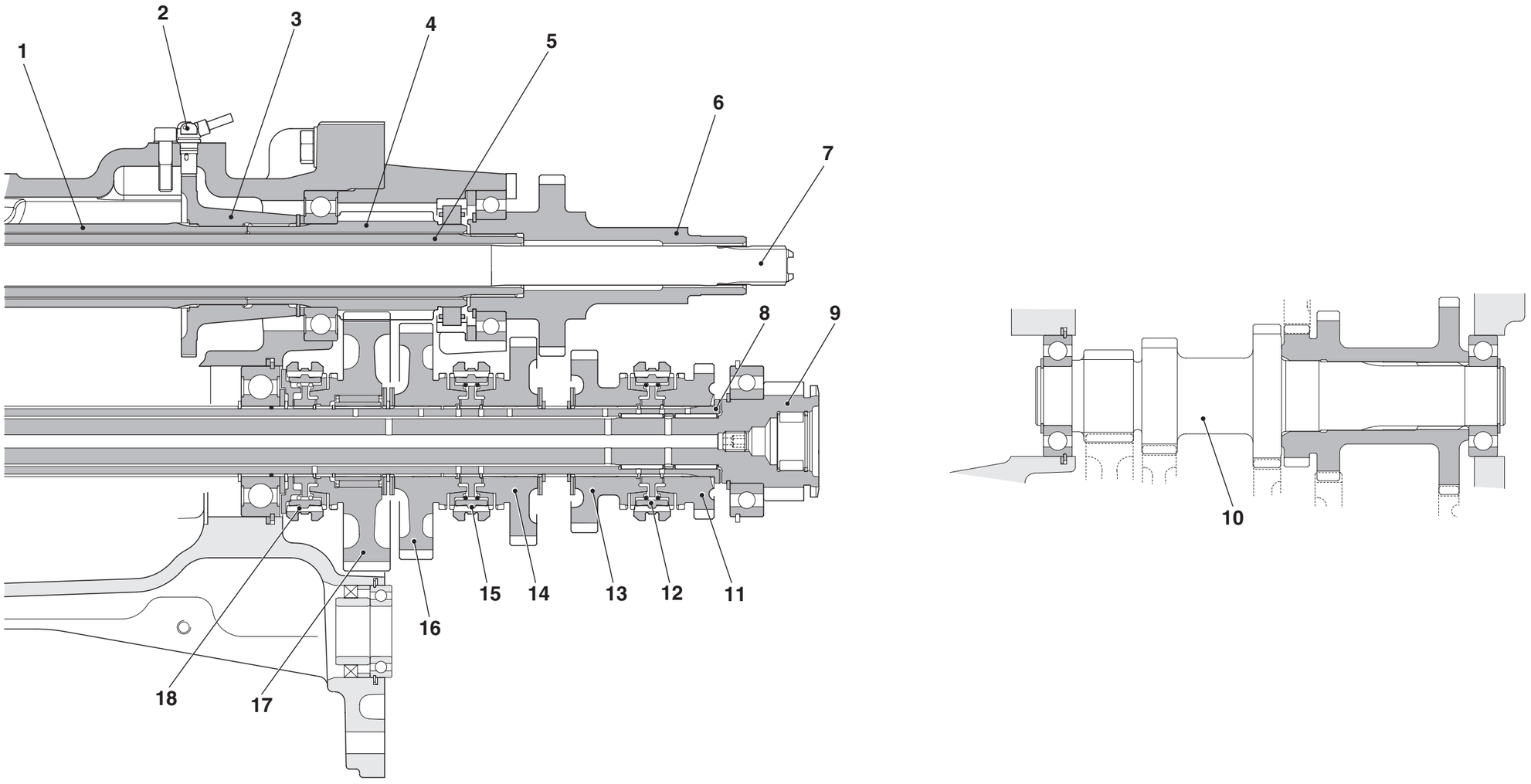
1 - Flywheel
2 - Torsional spring plate
3 - Shuttle revs sensor
4 - Support
5 - Reverse gear drive shaft
6 - Forward gear drive shaft
7 - Rear PTO drive shaft
8 - Reverse travel piston
9 - Reverse gear clutch
10 - Forward gear clutch
11 - Flange
12 - Forward gear piston

1.2 HML ASSEMBLY



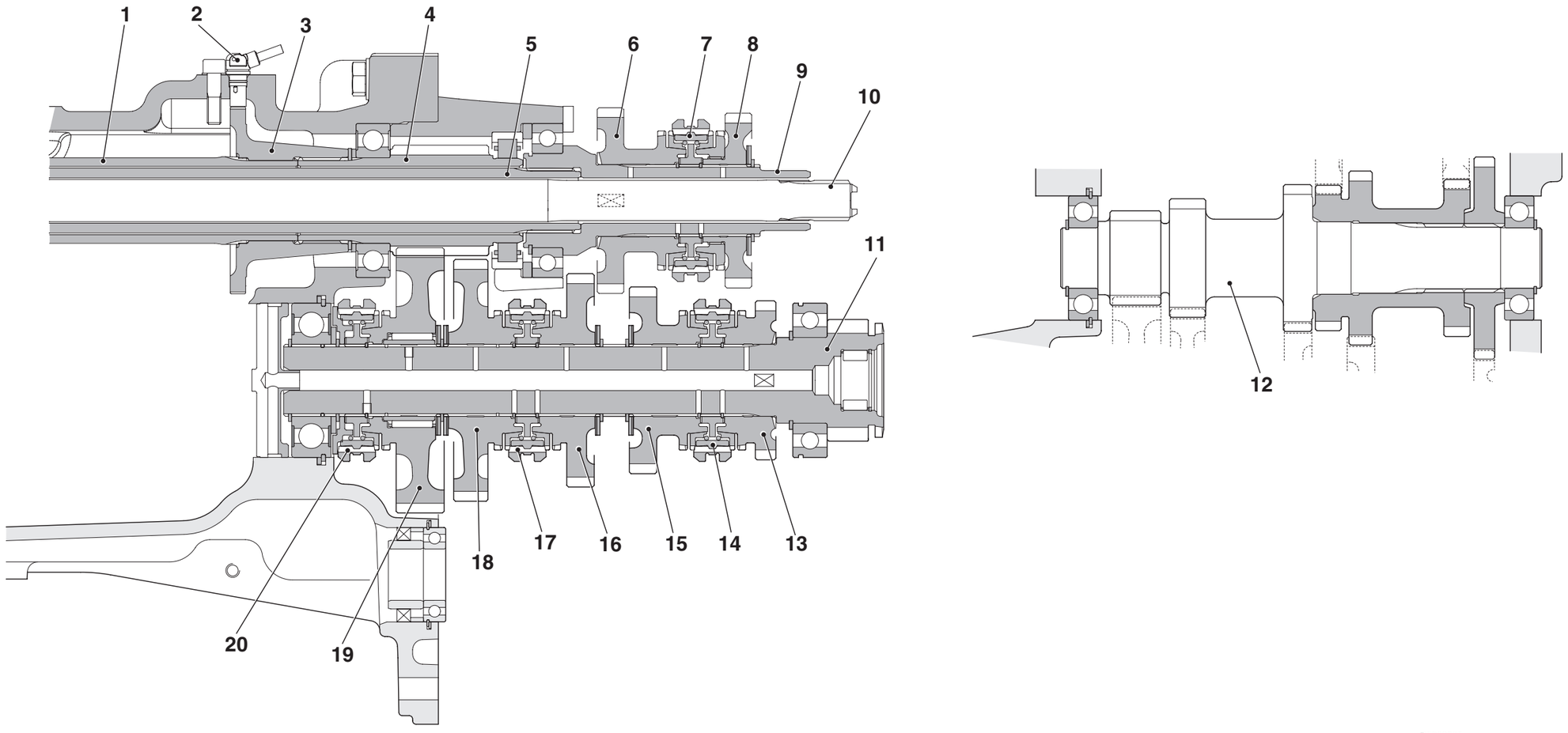
1 - Cover
2 - L speed clutch cylinder
3 - M speed clutch
4 - M speed piston
5 - Output shaft
6 - H speed clutch cylinder
7 - H speed clutch
8 - Planet carrier
9 - Ring gear
10 - Side gear
11 - Planet pinion
12 - Sleeve
13 - M speed reaction plate
14 - L speed piston
15 - L speed clutch

1.3 GEARBOX ASSEMBLY (Version with HML)



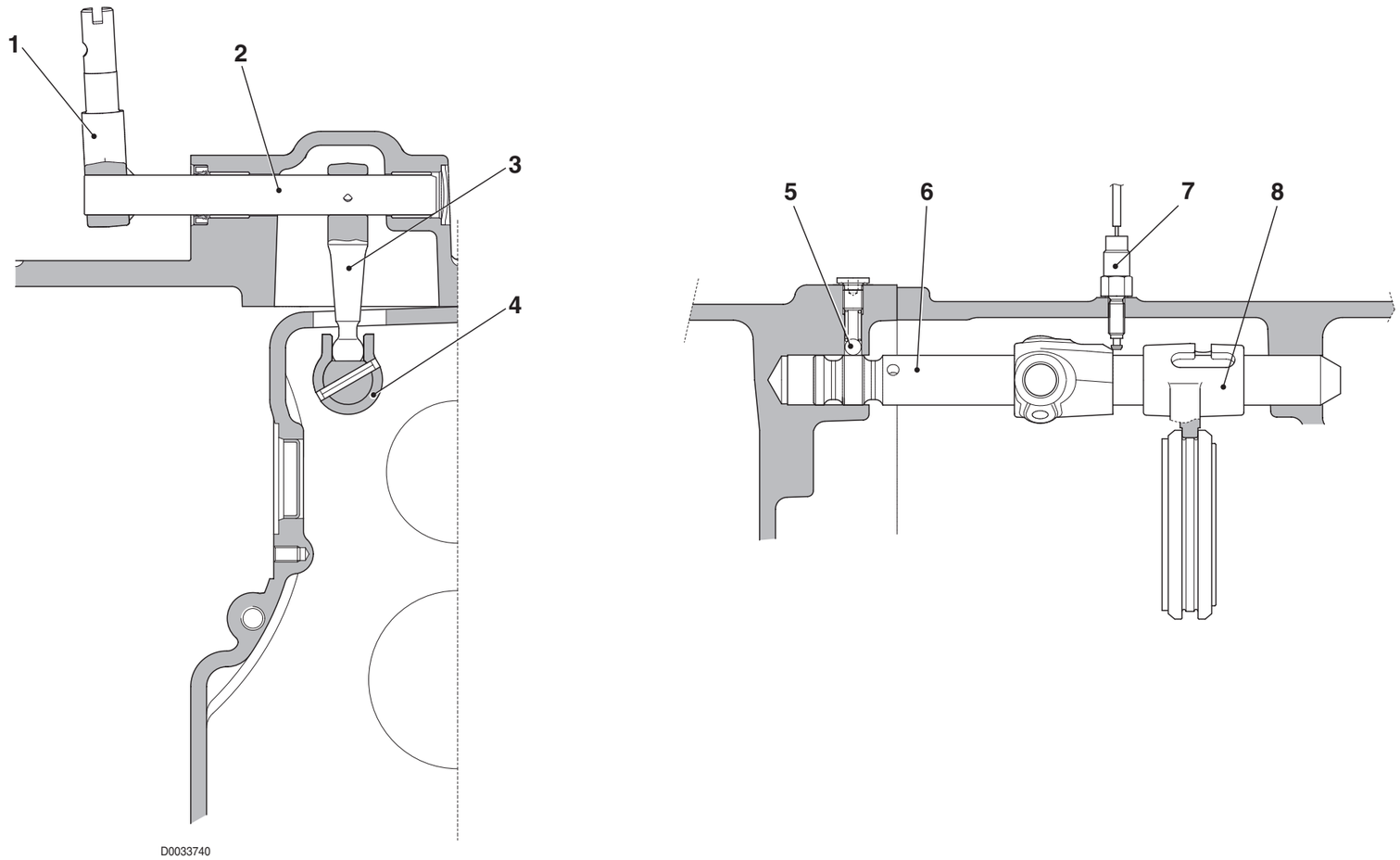
1 - Reverse gear input shaft
2 - Speed sensor
3 - Pulse wheel
4 - Reverse travel driving gear
5 - Forward travel input shaft
6 - Forward travel driving gear
7 - Rear PTO drive shaft
8 - HML gearbox output shaft
9 - HML assembly output shaft
10 - Primary shaft
11 - 5th speed driven gear
12 - 4th and 5th gear synchronizer
13 - 4th speed driven gear
14 - 3rd speed driven gear
15 - 2nd and 3rd speed synchronizer
16 - 2nd speed driven gear
17 - 1st speed driven gear
18 - 1st speed synchronizer

1.4 GEARBOX AND SHUTTLE ASSEMBLY (Version without HML)



1 - Reverse travel input shaft
2 - Speed sensor
3 - Pulse wheel
4 - Reverse travel driving gear
5 - Forward travel input shaft
6 - Forward travel driving gear
7 - Underdrive synchronizer
8 - Underdrive driving gear
9 - Gearbox input shaft
10 - Rear PTO control shaft
11 - Gearbox output shaft
12 - Primary shaft
13 - 5th speed driven gear
14 - 4th and 5th gear synchronizer
15 - 4th speed driven gear
16 - 3rd speed driven gear
17 - 2nd-3rd speed synchronizer
18- 2nd speed driven gear
19 - 1st speed driven gear
20 - 1st speed synchronizer

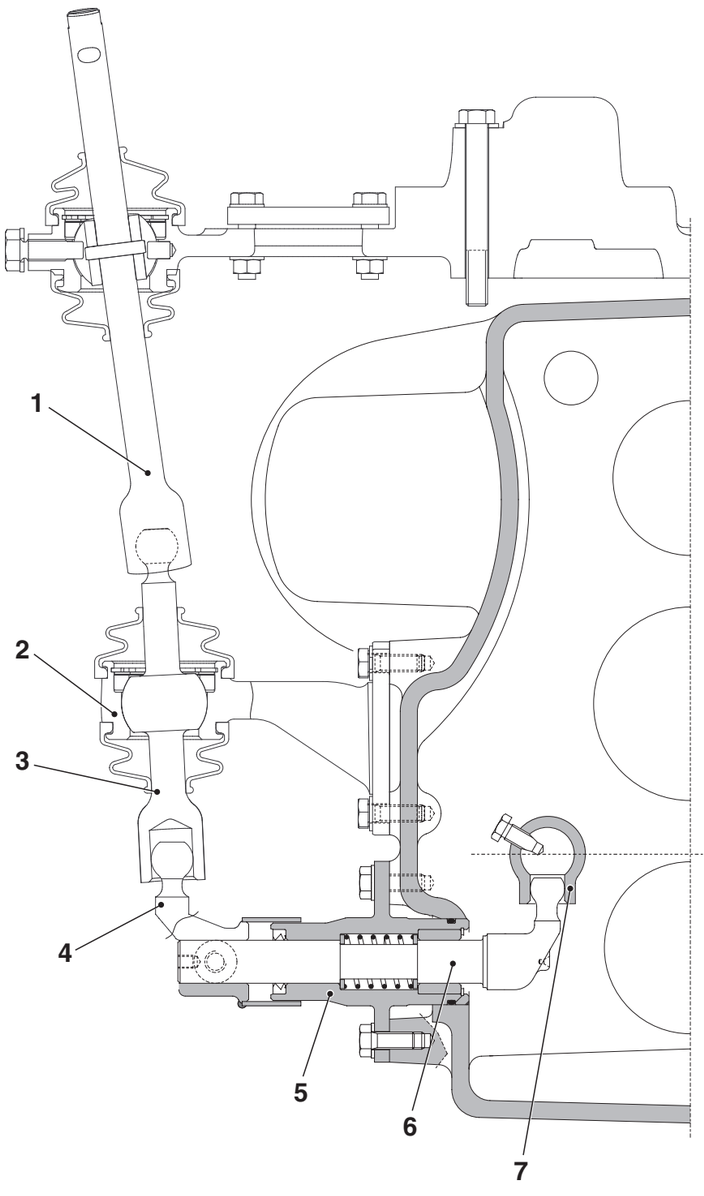
1.5 UNDERDRIVE CONTROL ROD

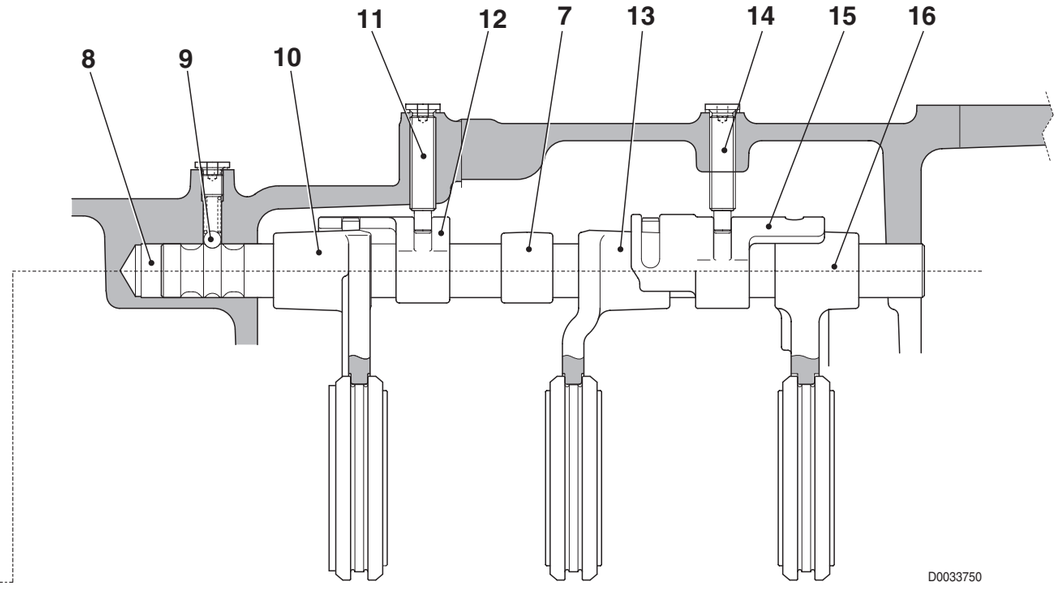


1 - Underdrive control lever
2 - Pin
3 - Underdrive link rod
4 - Sleeve
5 - Ball
6 - Forks support rod
7 - Underdrive engagement sensor
8 - Underdrive fork

1.6 GEARS ACTUATOR ROD (5-speed version)

NOTE: on the 4-speed version fork (11) is not present and spacer (5) is fitted

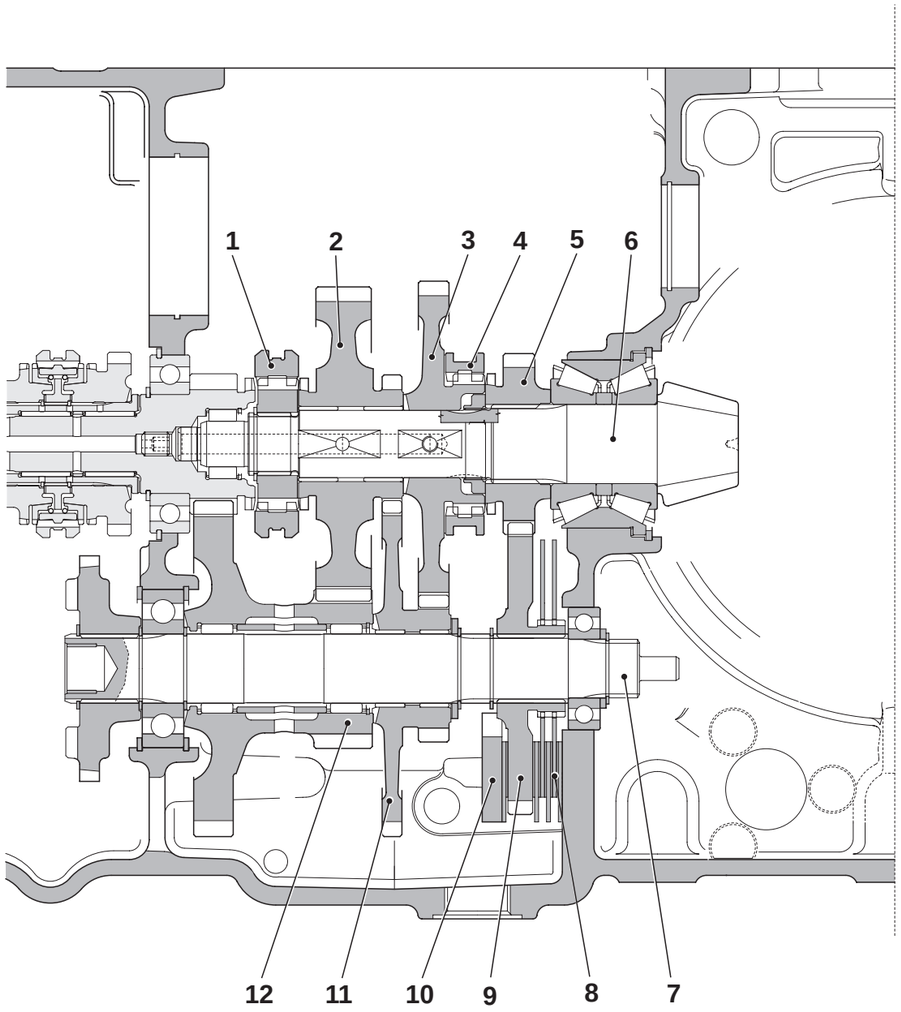




1 - Gear lever
2 - Relay lever support
3 - Relay lever
4 - Lever
5 - Support
6 - Gears relay rod
7 - Sleeve
8 - Gears actuator rod
9 - Ball
10 - 1st gear fork
11 - Screw
12 - Sleeve
13 - 2nd and 3rd gear fork
14 - Screw
15 - Sleeve
16 - 4th and 5th gear fork

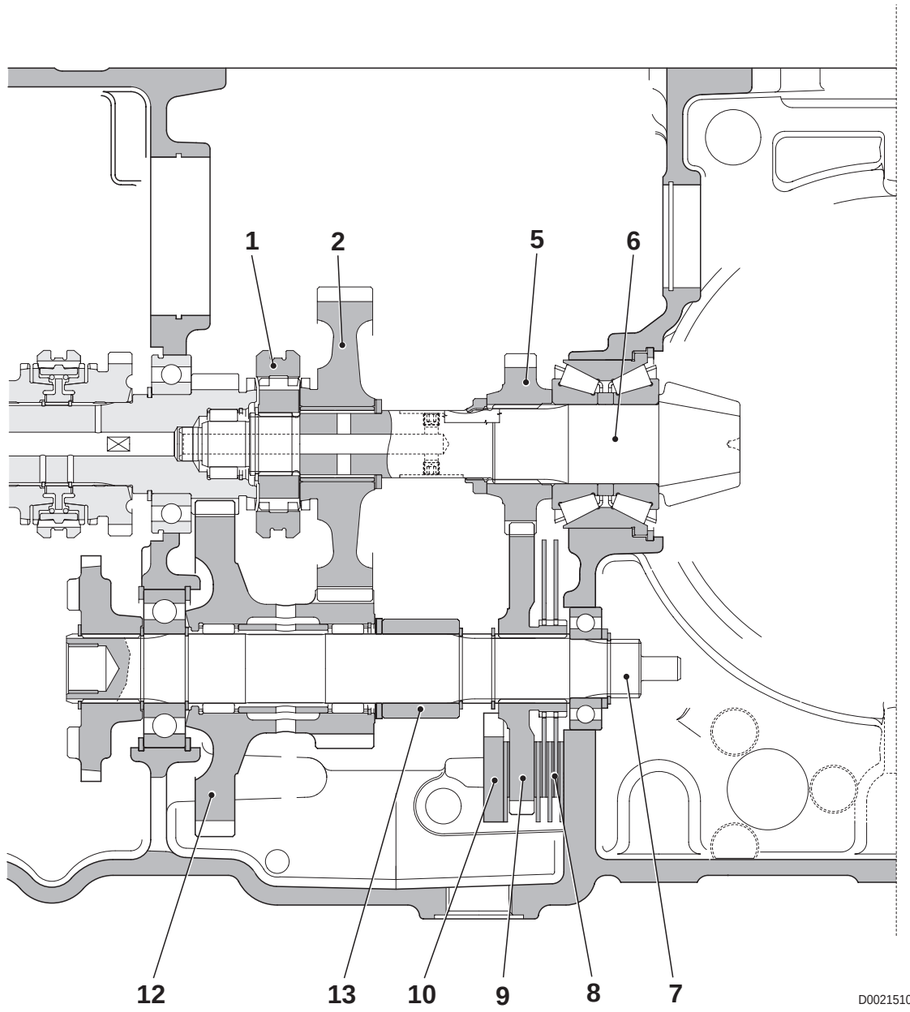
1.7 RANGE AND PARKING BRAKE ASSEMBLY

3-RANGE VERSION



1 - High-medium speed range engagement sleeve
2 - Medium speed range driven gear
3 - Low speed range driven gear
4 - Low speed range engagement sleeve
5 - Driving gear for four-wheel drive and parking brake
6 - Pinion
7 - Four-wheel drive shaft/parking brake
8 - Parking brake discs

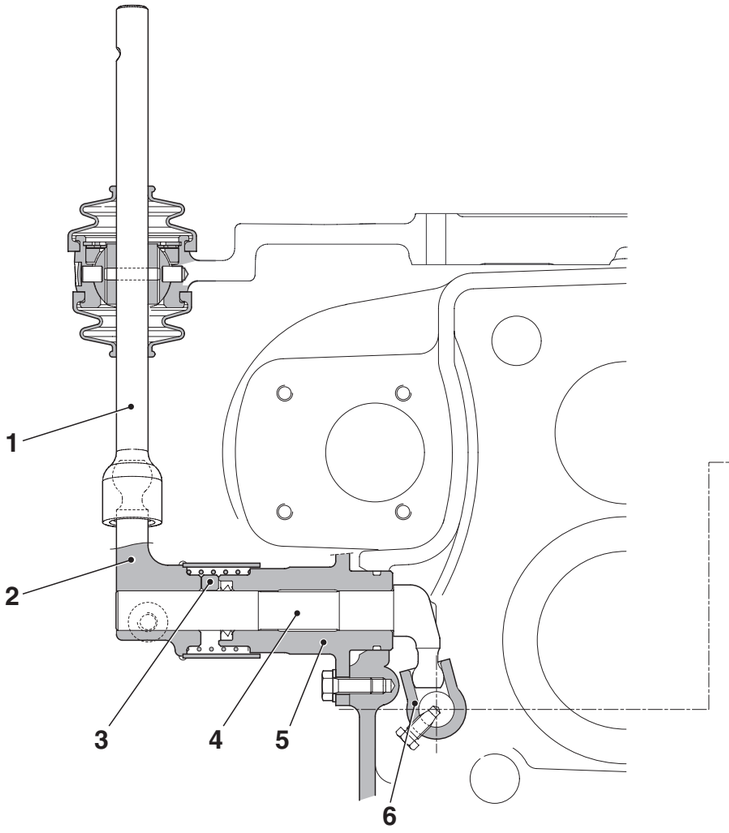
2-RANGE VERSION

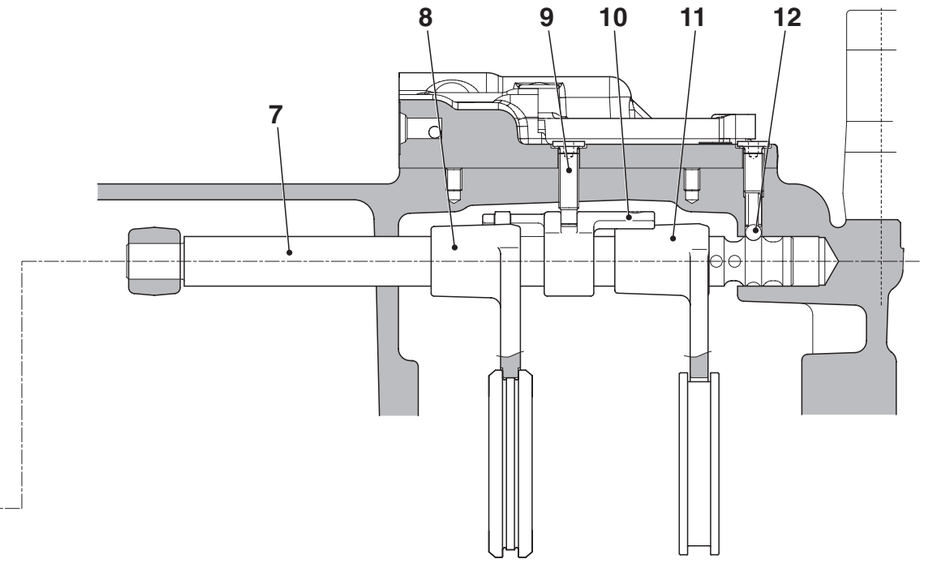


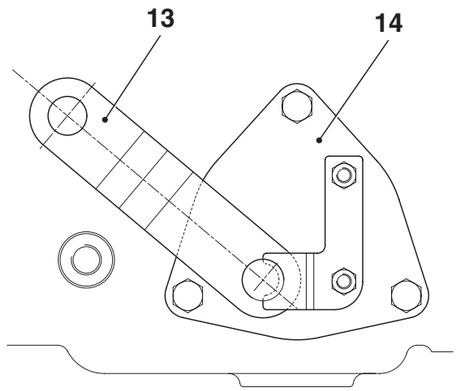
9 - Driven gear for four-wheel drive and parking brake
10 - Reaction plate
11 - Low speed range idler gear
12 - Medium speed range idler gear
13 - Spacer

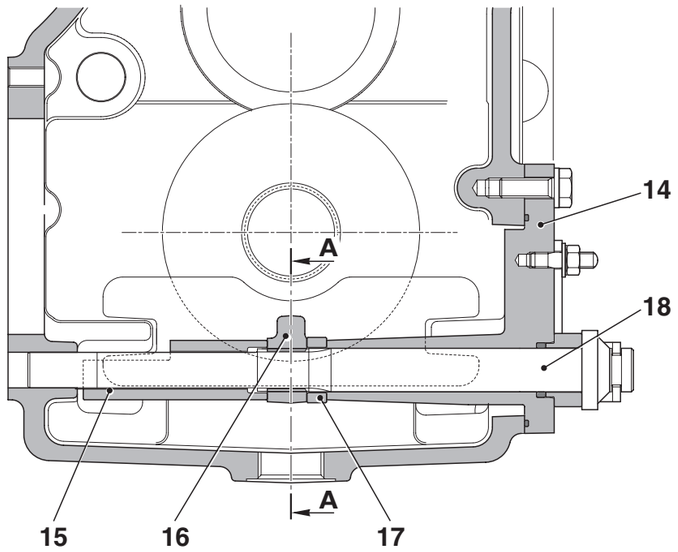
1.8 RANGE CONTROL ROD AND PARKING BRAKE LEVER

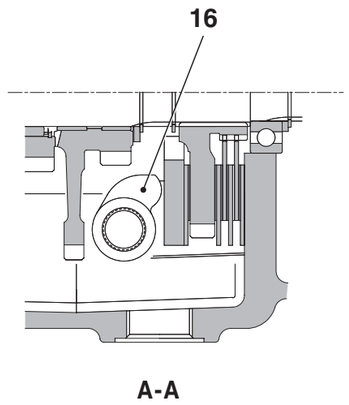
NOTE: Fork (11) is not fitted on 2-range versions, spacer (3) is fitted instead.







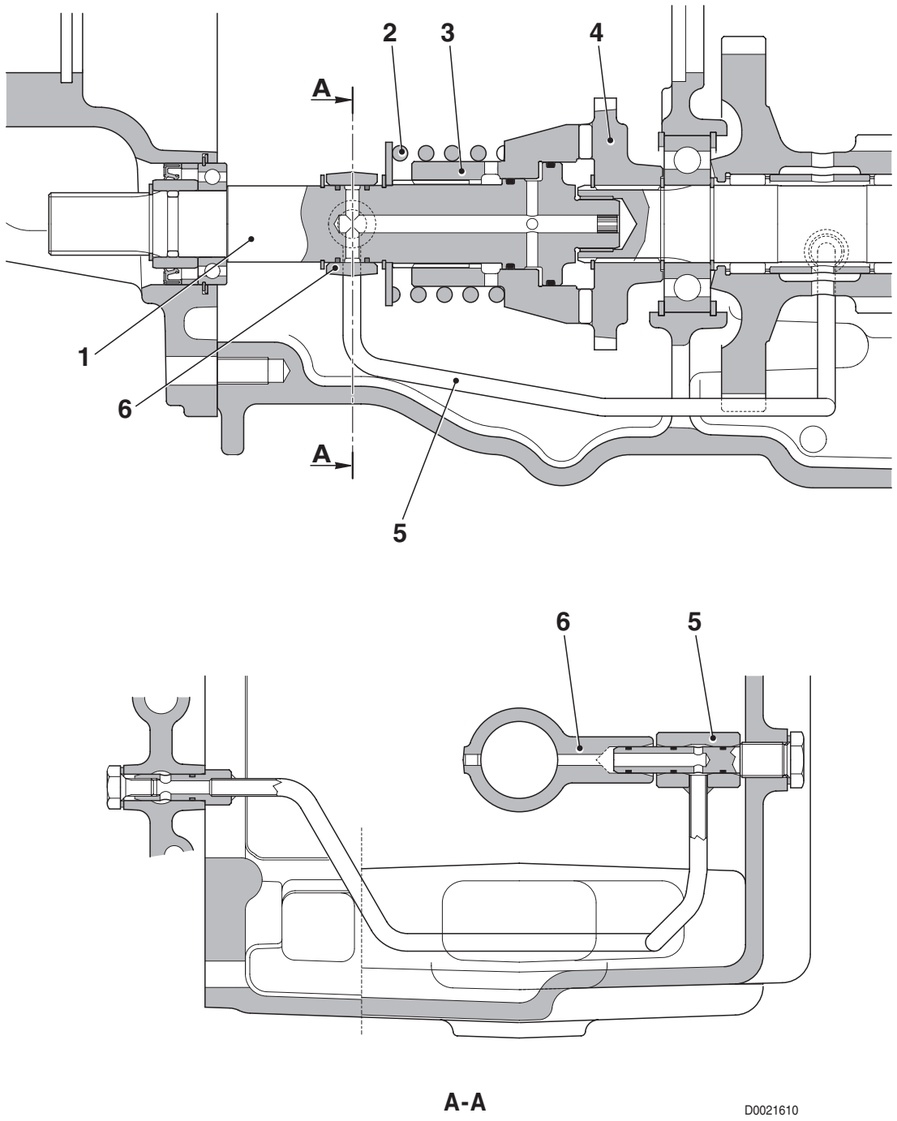




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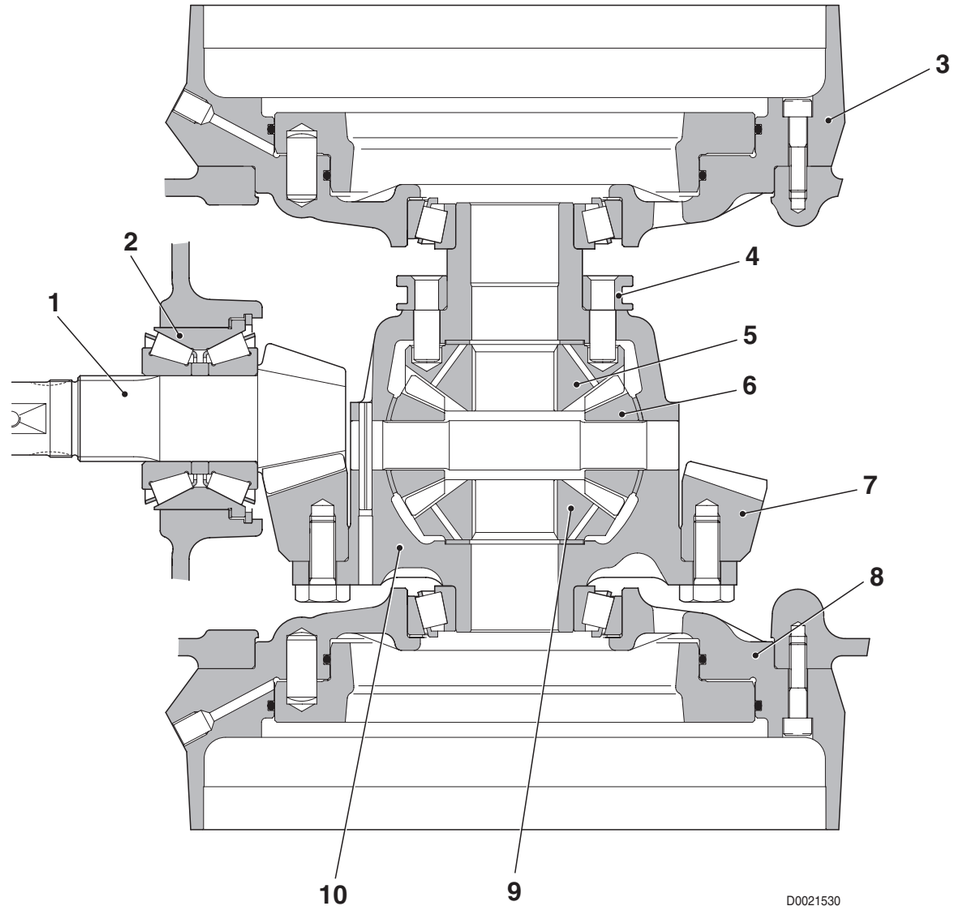
1 - Range control lever
2 - Lever
3 - Spacer
4 - Range relay rod
5 - Support
6 - Sleeve
7 - Range control rod
8 - High/medium speed range fork
9 - Screw
10 - Sleeve
11 - Low speed range fork
12 - Ball
13 - Parking brake control lever
14 - Flange
15 - Spacer
16 - Cam
17 - Spacer
18 - Parking brake control rod

1.9 FOUR-WHEEL DRIVE ENGAGEMENT ASSEMBLY



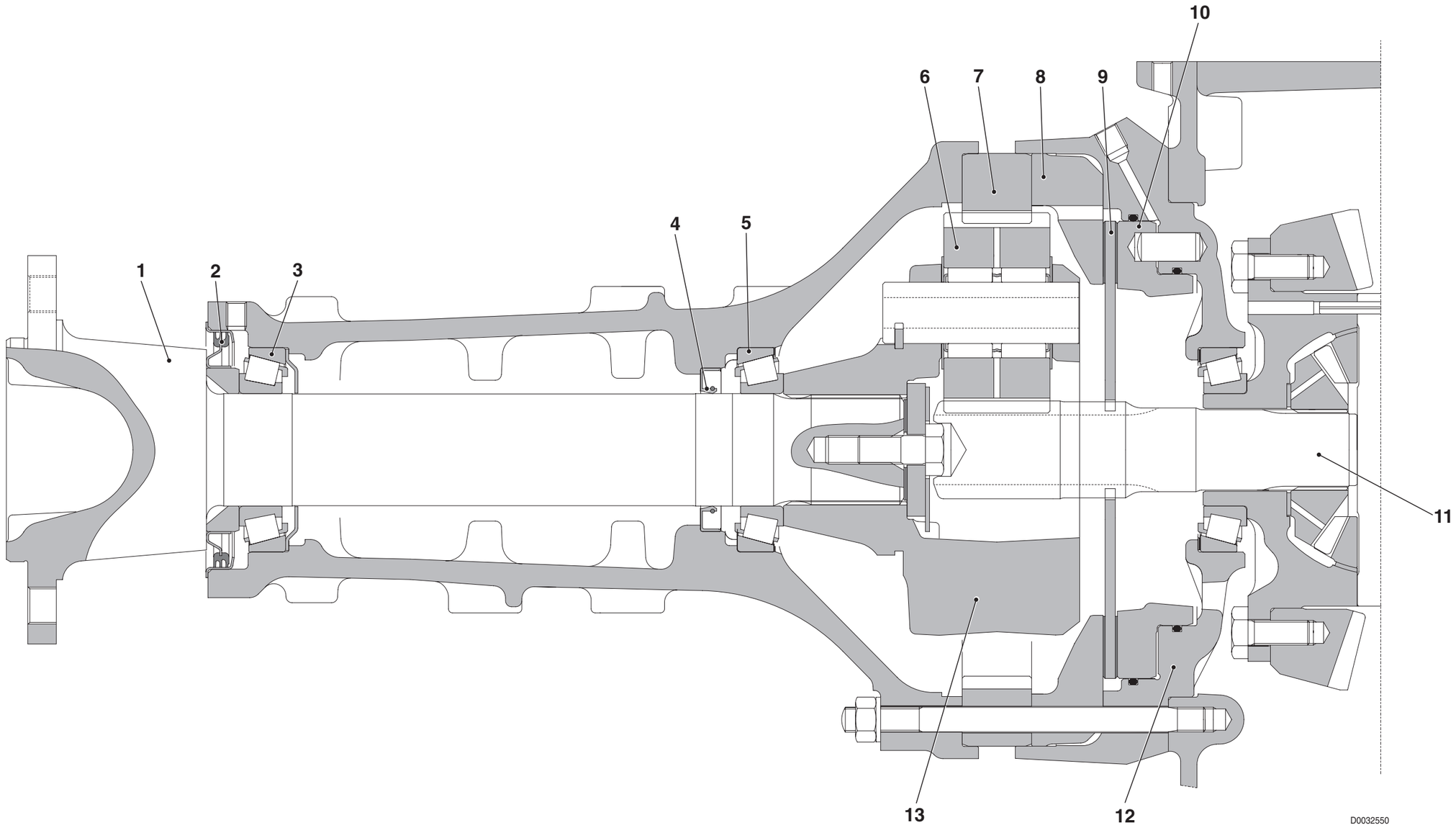
1 - Four-wheel drive output shaft
2 - Spring
3 - Sleeve
4 - Piston retainer ring
5 - Four-wheel drive control pipe
6 - Sleeve

1.10 DIFFERENTIAL ASSEMBLY



1 - Pinion
2 - Pinion bearing
3 - Differential support
4 - Differential lock sleeve
5 - Side gear
6 - Planet pinion
7 - Crown wheel
8 - Differential support
9 - Side gear
10 - Differential casing

1.11 BRAKES AND REAR AXLE ASSEMBLY



1 - Axle shaft
2 - Dust seal
3 - Bearing
4 - Oil seal
5 - Bearing
6 - Side gear
7 - Ring gear
8 - Reaction plate
9 - Friction disc
10 - Piston
11 - Axle shaft
12 - Differential support
13 - Planet carrier

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2. REAR PTO

DESCRIPTION

The rear power take-off allows drive to be transmitted to an implement at a predetermined rotation speed.

The rotary motion is taken directly from the engine and engagement of the PTO is controlled by the operator using a lever located on the right of the driving position.

The rear PTO, for 540 750 and 1000 rpm, is engaged by way of the electrohydraulic operated PTO clutch while the Groundspeed PTO (when present) is engaged by way of a mechanical control.

The rear PTO is supplied in 4 versions with two or three rotation speeds:

a - 540-750 PTO

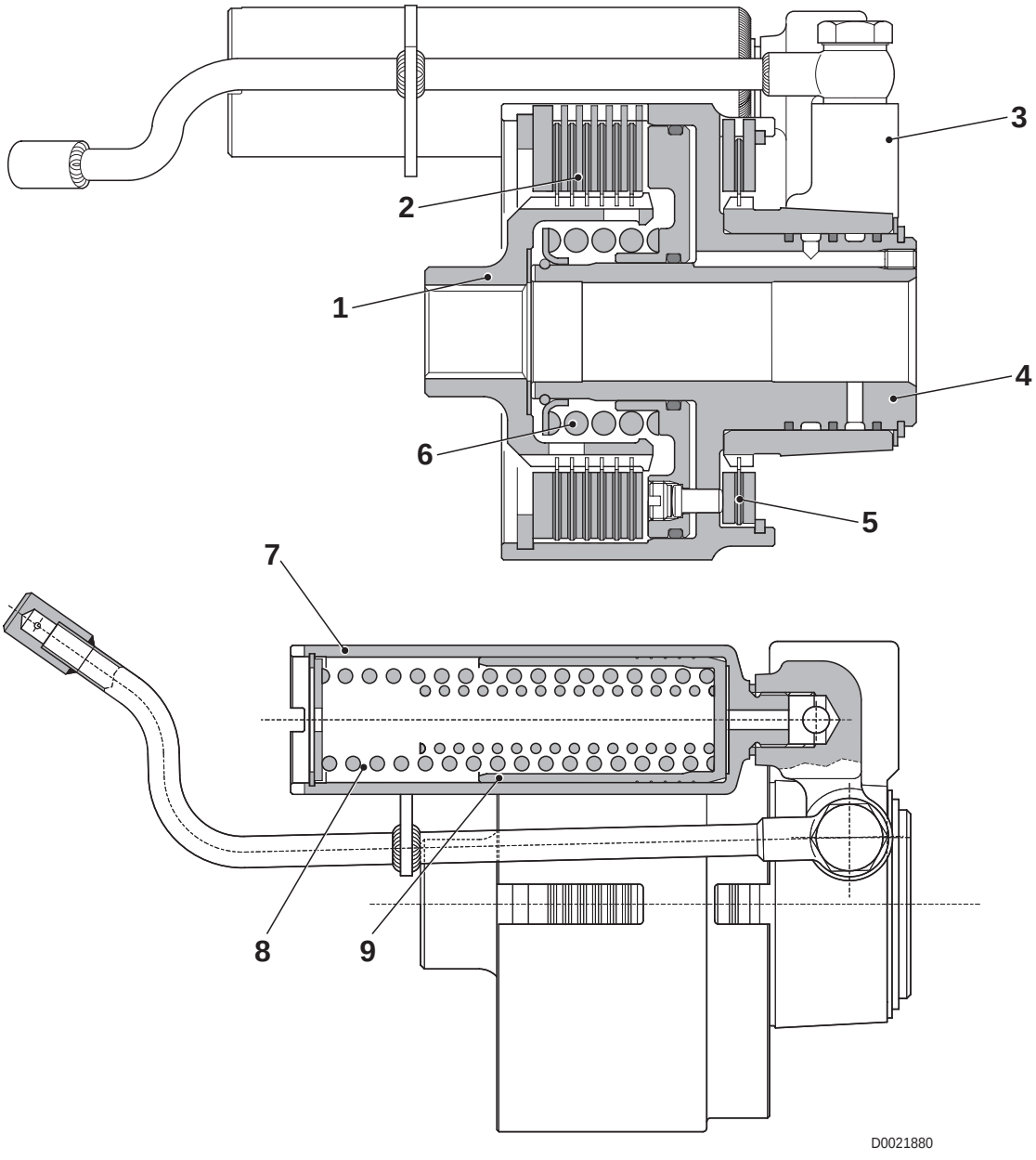
b - 540-1000 PTO

c - 540-750-Grounspeed PTO

d- 540-1000-Grounspeed PTO

The speed of the groundspeed PTO is directly proportional to the rotation speed of the rear wheels with a fixed ratio between the PTO shaft and wheel speeds.

2.1 PTO CONTROL CLUTCH ASSEMBLY

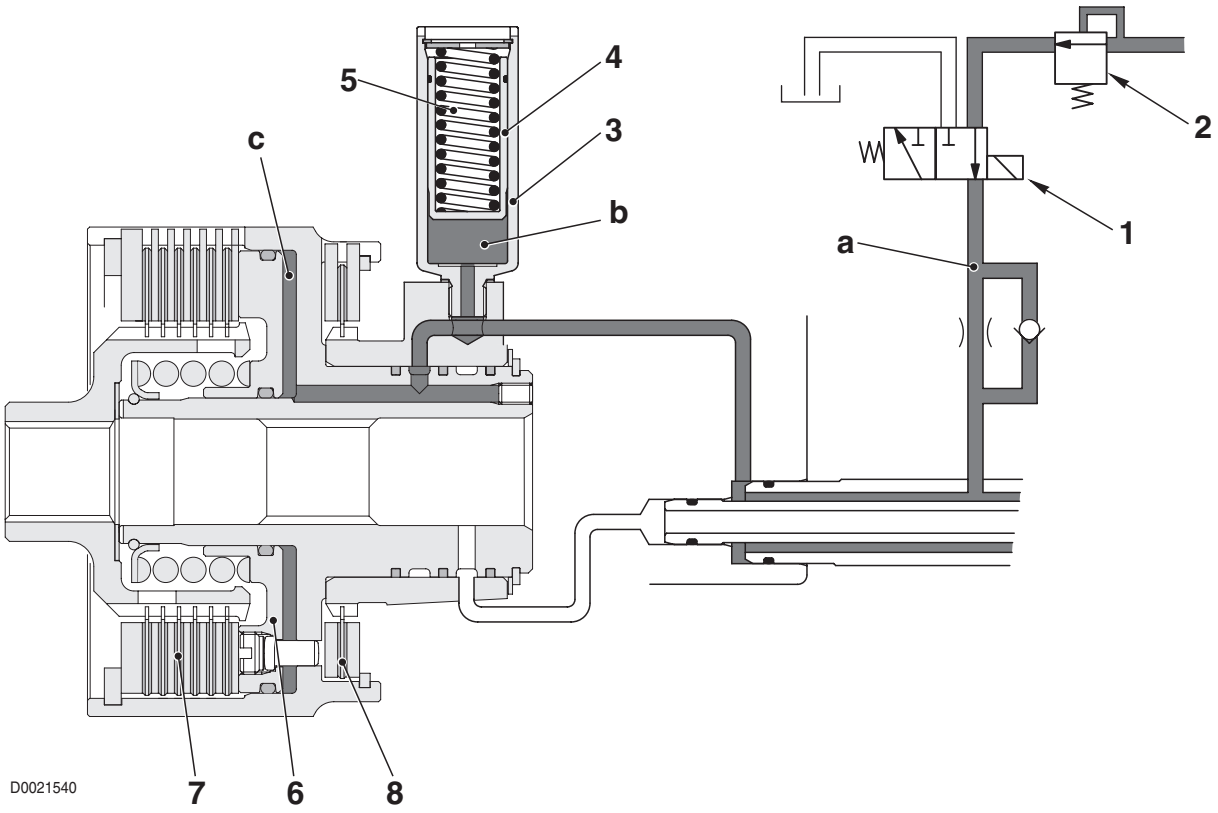


1 - Hub
2 - PTO engagement clutch
3 - Body
4 - Clutch housing
5 - PTO brake clutch
6 - Piston return spring
7 - Accumulator cylinder
8 - Accumulator spring
9 - Accumulator piston

OPERATION

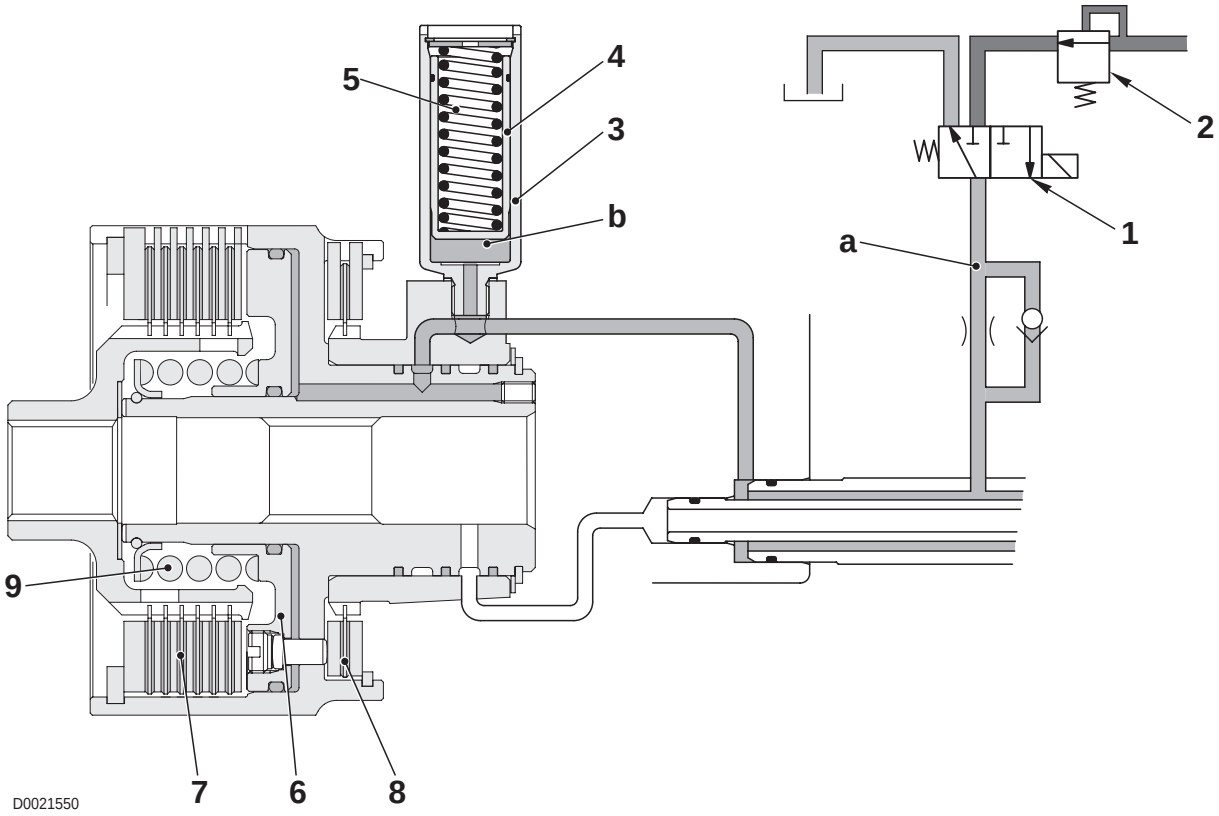
1 - When the PTO is engaged

- When the operator activates PTO engagement, solenoid valve (1) is energized and the pressurized oil from regulator valve (2) flows in line *a*.
- The pressurized oil from regulator valve (2) is thus introduced into chamber *b* of accumulator (3).
- As the pressure in chamber *b* increases, the force exerted by the pressure on piston (4) compresses spring (5). The increased stroke of piston (4) corresponds to an increase in the pressure in chamber *b* and chamber *c* of piston (6). For this reason, the clutch engagement pressure is modulated in the pressure range between 2 and 11 bar.
- The movement of piston (6) to the left, besides engaging clutch (7), causes brake (8) to disengage, thus permitting PTO rotation.

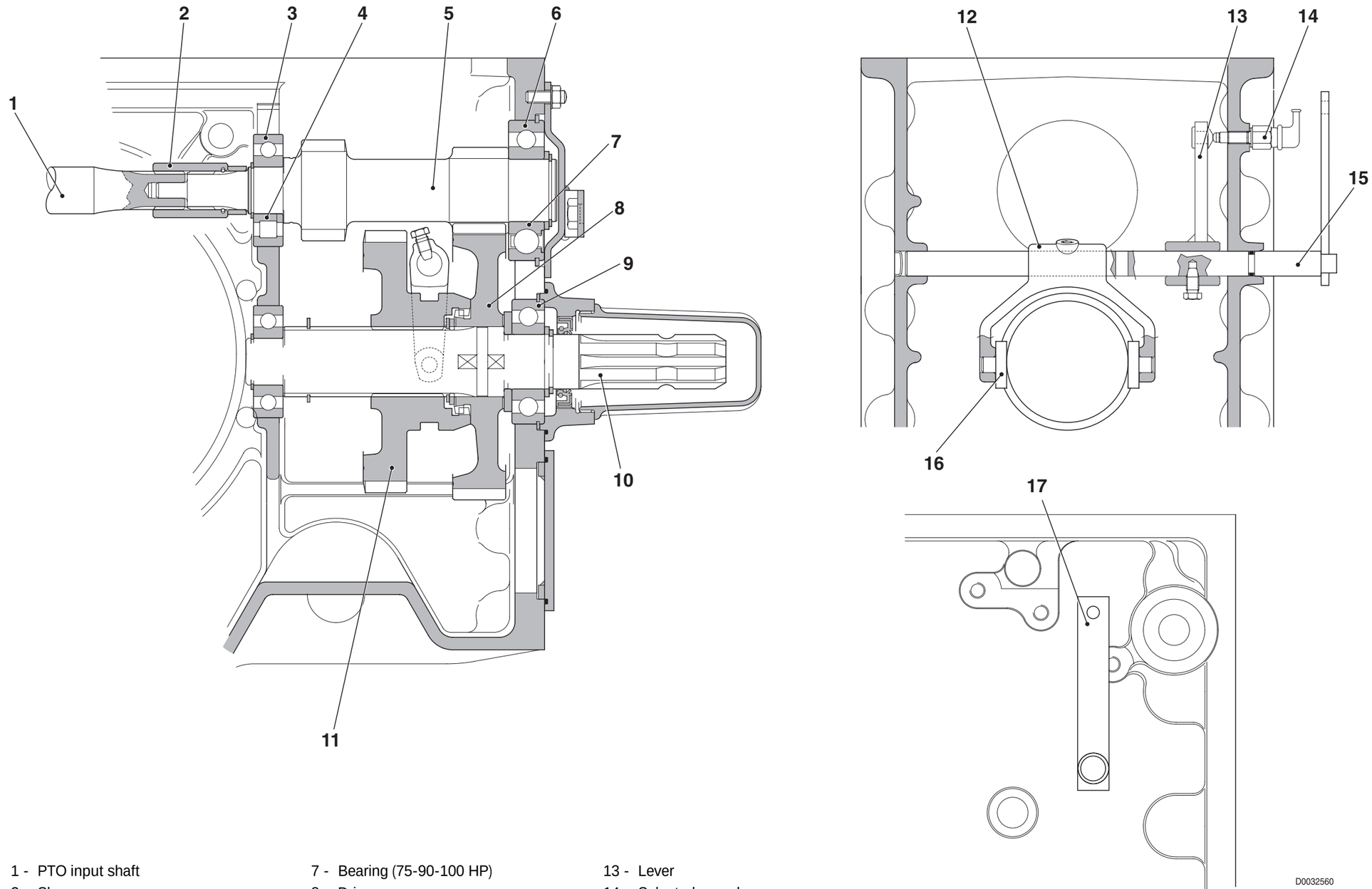


2 - When the PTO is disengaged

- The PTO is disengaged by de-energizing solenoid valve (1).
- The pressurized oil in line *a* is sent to the return circuit through solenoid valve (1).
- Because of the decrease in pressure in passage *a*, piston (3) is pushed downwards by the force of the spring and force of spring (9) pushes piston (6) to the right, bringing it to the rest position.
- At the same time, the movement of piston (6) compresses clutch (8) causing the PTO to brake.

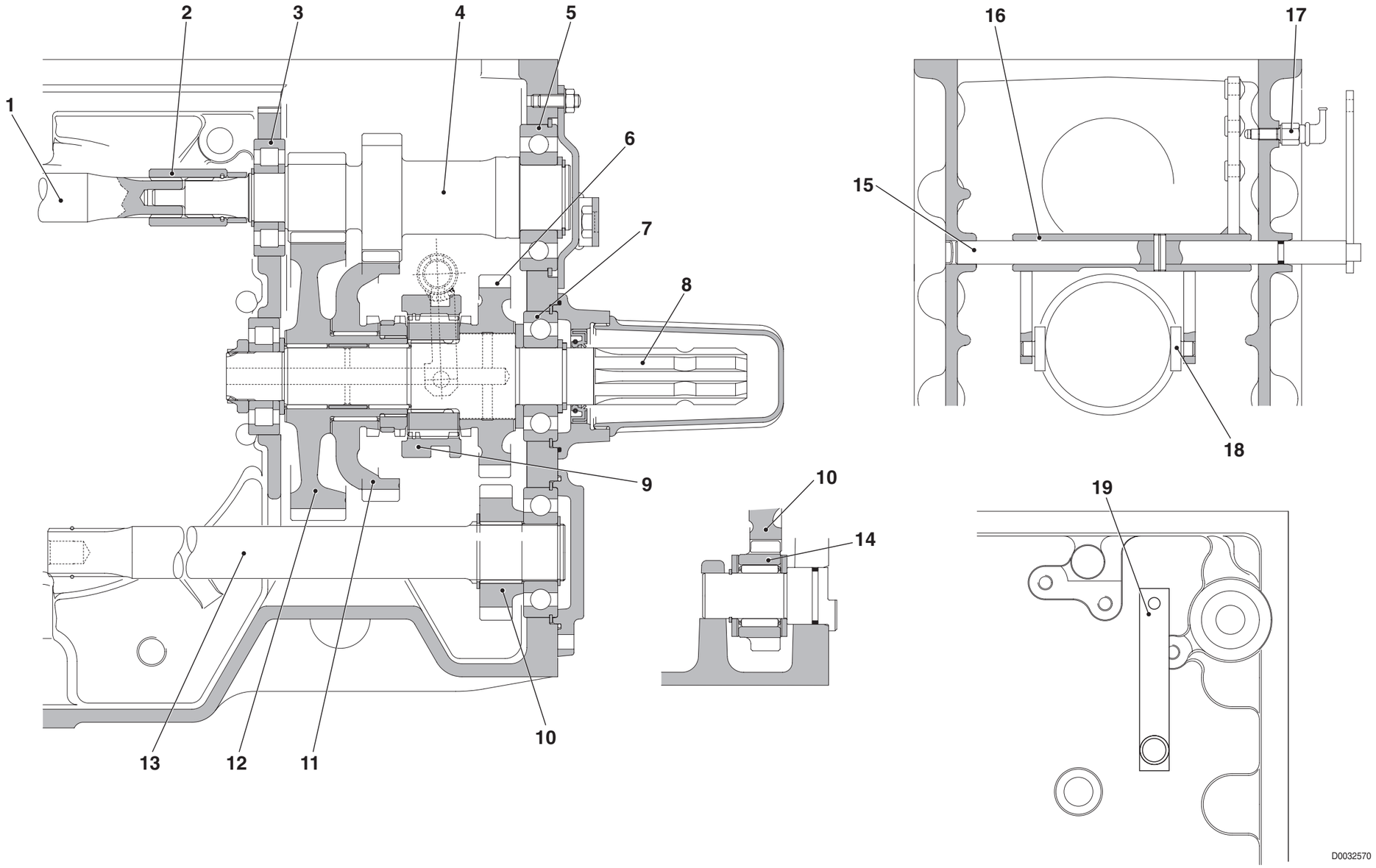


2.2 2-SPEED PTO



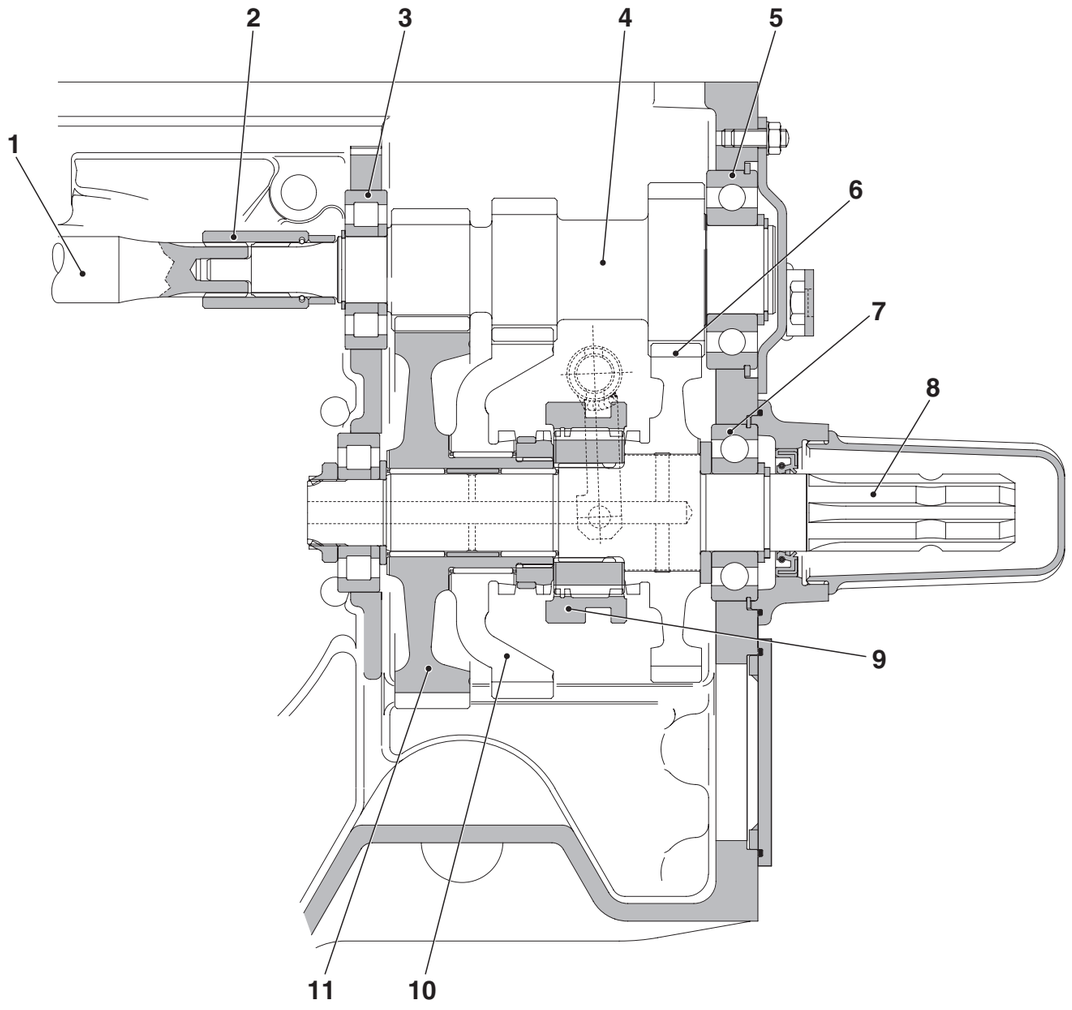
1 - PTO input shaft
2 - Sleeve
3 - Bearing (55-70 HP)
4 - Bearing (75-90-100 HP)
5 - Drive shaft
6 - Bearing (55-70 HP)
7 - Bearing (75-90-100 HP)
8 - Driven gear
9 - Bearing
10 - Output shaft
11 - Selector gear
12 - Selection fork
13 - Lever
14 - Selected speed sensor
15 - Speed selection rod
16 - Shoe
17 - Speed selection lever

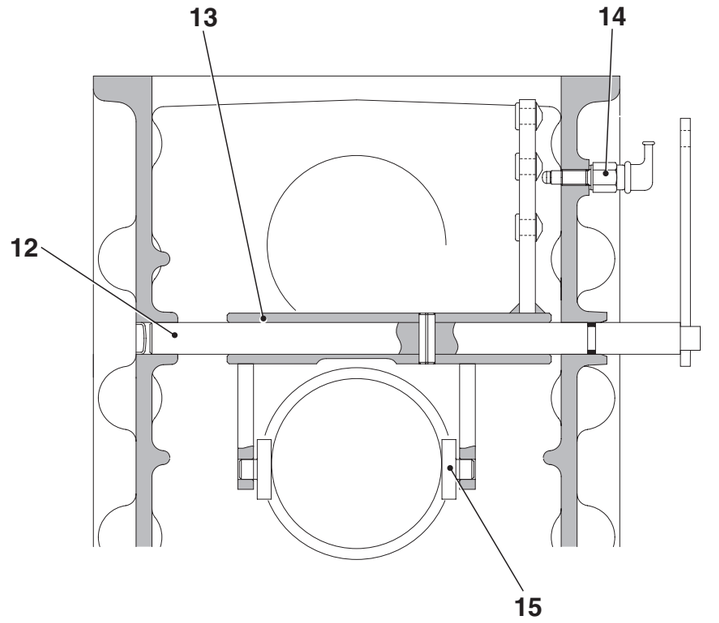
2.3 2-SPEED PTO AND GROUNDSPEED PTO

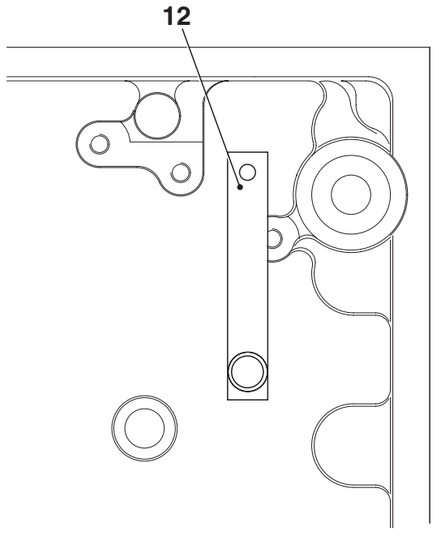


1 - PTO input shaft
2 - Sleeve
3 - Bearing
4 - Driving shaft
5 - Bearing
6 - Groundspeed PTO driven gear
7 - Bearing
8 - Output shaft
9 - Selection sleeve
10 - Groundspeed PTO driving gear
11 - Driven gear (low speed)
12 - Driven gear (high speed)
13 - Groundspeed PTO input shaft
14 - Groundspeed PTO intermediate gear
15 - Speed selection rod
16 - Fork
17 - Selected speed sensor
18 - Shoe
19 - Speed selection lever

2.4 3-SPEED PTO







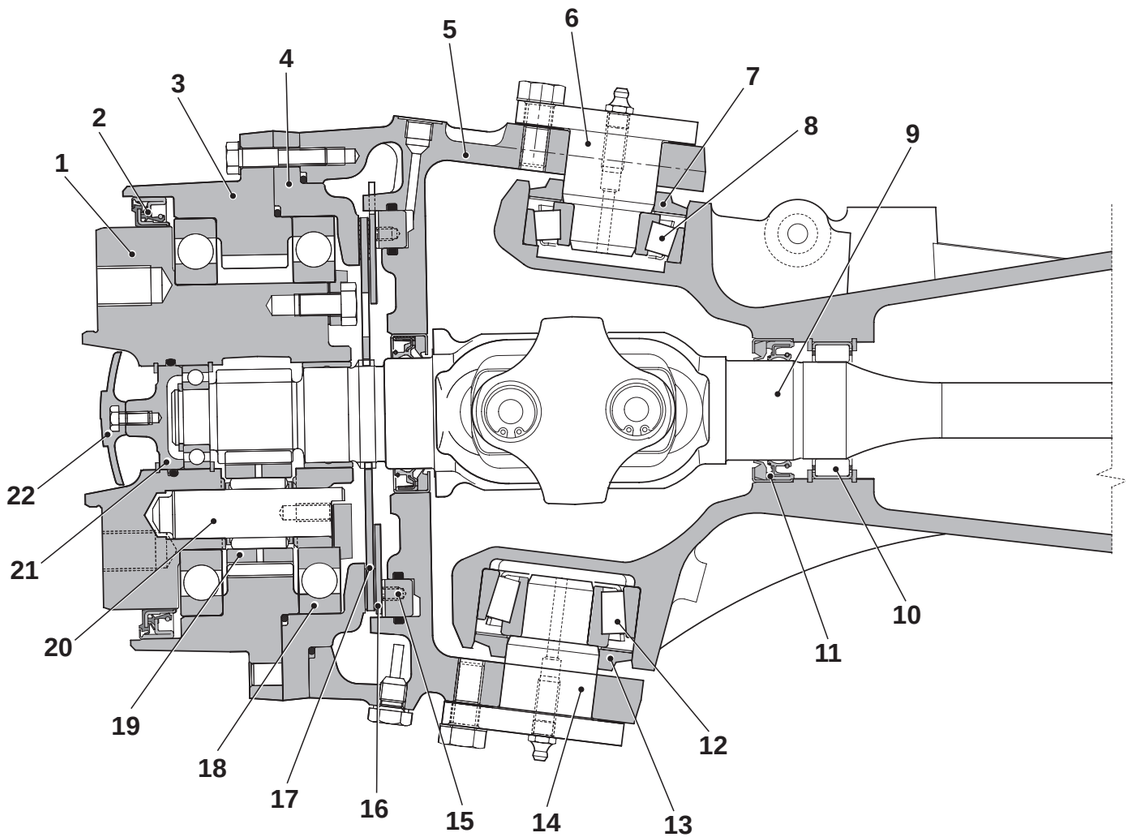
D0032580

1 - PTO input shaft
2 - Sleeve
3 - Bearing
4 - Driving shaft
5 - Bearing
6 - 1000 rpm driven gear
7 - Bearing
8 - Output shaft
9 - Selection sleeve
10 - 750 rpm driven gear
11 - 540 rpm driven gear
12 - Speed selection rod
13 - Fork
14 - Selected speed sensor
15 - Shoe

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3. FRONT AXLE

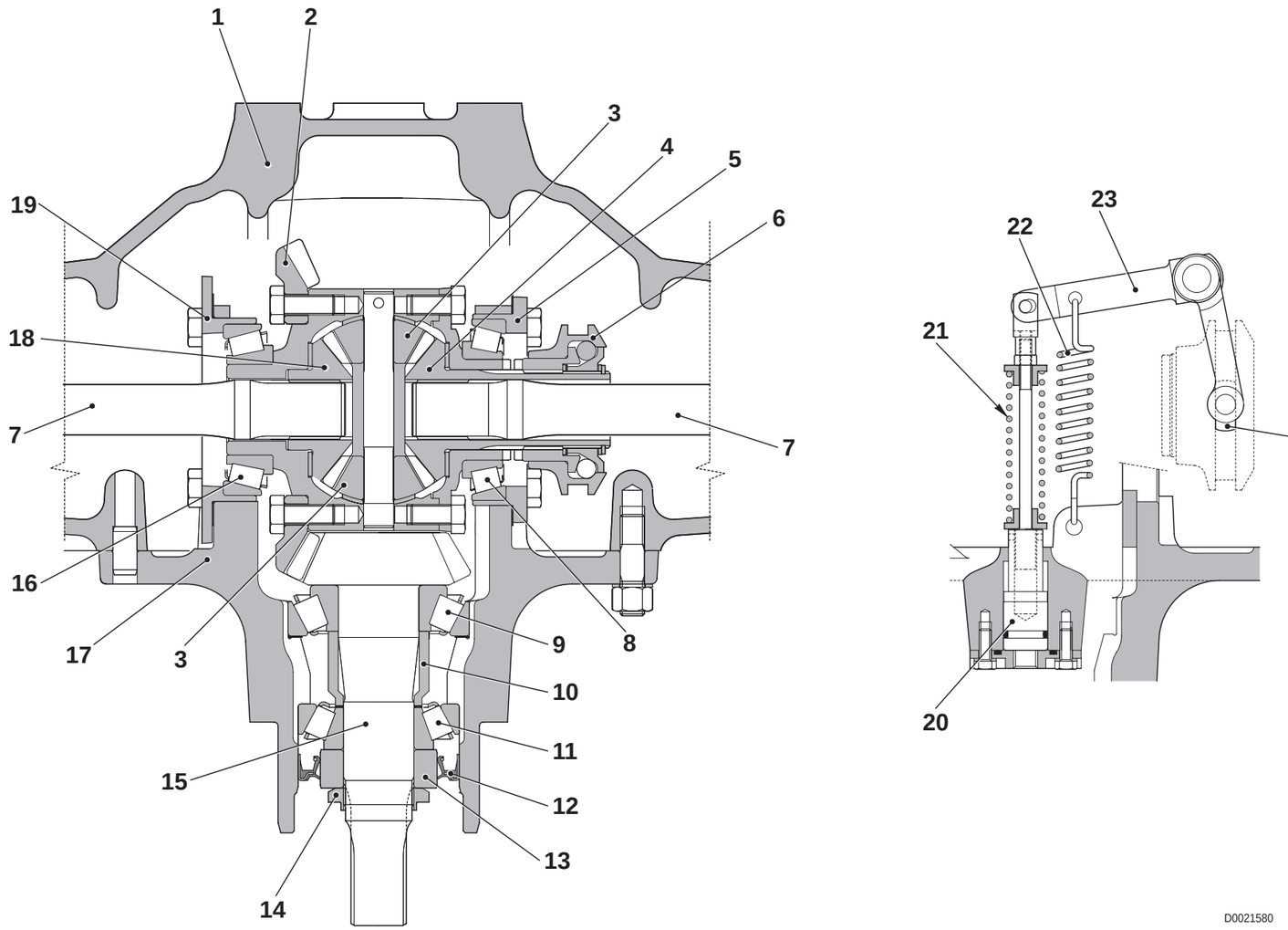
3.1 FINAL DRIVE



D0021570

1 - Planet carrier
2 - Oil seal
3 - Ring gear
4 - Brake disc
5 - Steering knuckle housing
6 - Upper pin
7 - Gasket
8 - Upper bearing
9 - Axle shaft
10 - Needle roller bearing
11 - Oil seal
12 - Lower bearing
13 - Gasket
14 - Lower pin
15 - Brake piston
16 - Steel disc
17 - Friction disc
18 - Bearing
19 - Planet gear
20 - Pin
21 - Cover
22 - Protective disc

3.2 PINION, DIFFERENTIAL AND DIFFERENTIAL LOCK



1 - Axle housing
2 - Differential crown wheel
3 - Planet pinion
4 - Sun gear
5 - Differential support
6 - Differential locking device
7 - Axle shaft
8 - Bearing
9 - Bearing
10 - Spacer
11 - Bearing
12 - Oil seal
13 - Spacer
14 - Ring nut
15 - Pinion
16 - Differential support
17 - Bearing
18 - Sun gear
19 - Differential support
20 - Piston
21 - Shock absorber spring
22 - Return spring
23 - Differential lock engagement lever
24 - Shoe

4. HYDRAULIC SYSTEM

DESCRIPTION

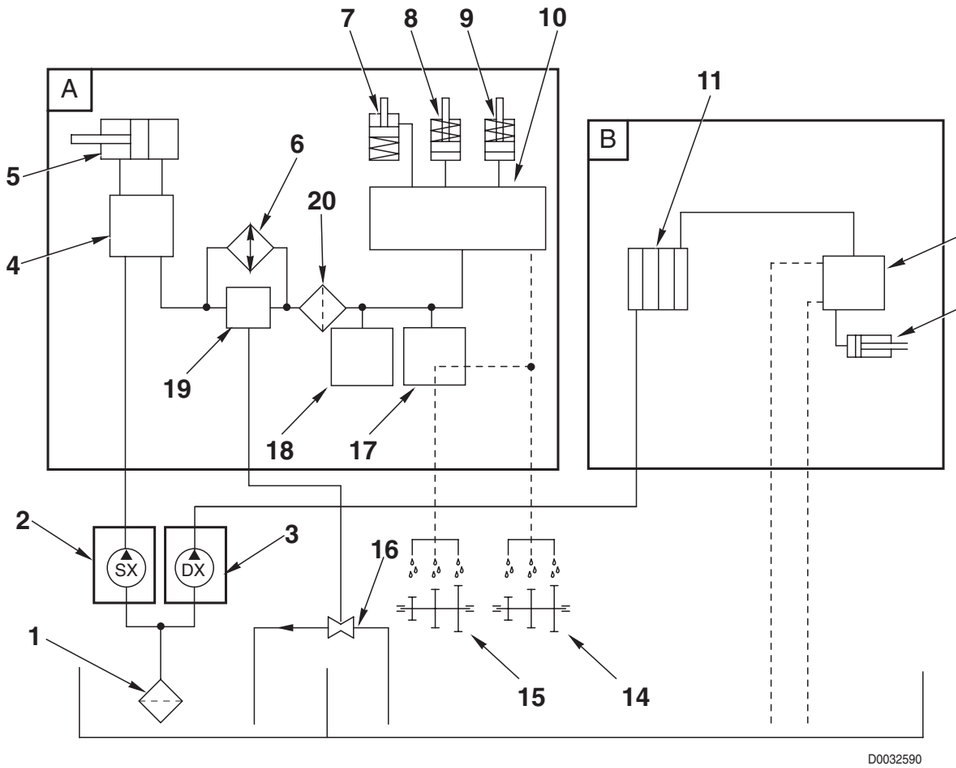
The tractors in this series are equipped with a hydraulic system that comprises two main circuits:

A - Steering and services circuit.

B - Lift and auxiliary services control valve circuit.

Each of these circuits is supplied with oil by a hydraulic gear pump that converts the power supplied by the engine into hydraulic energy.

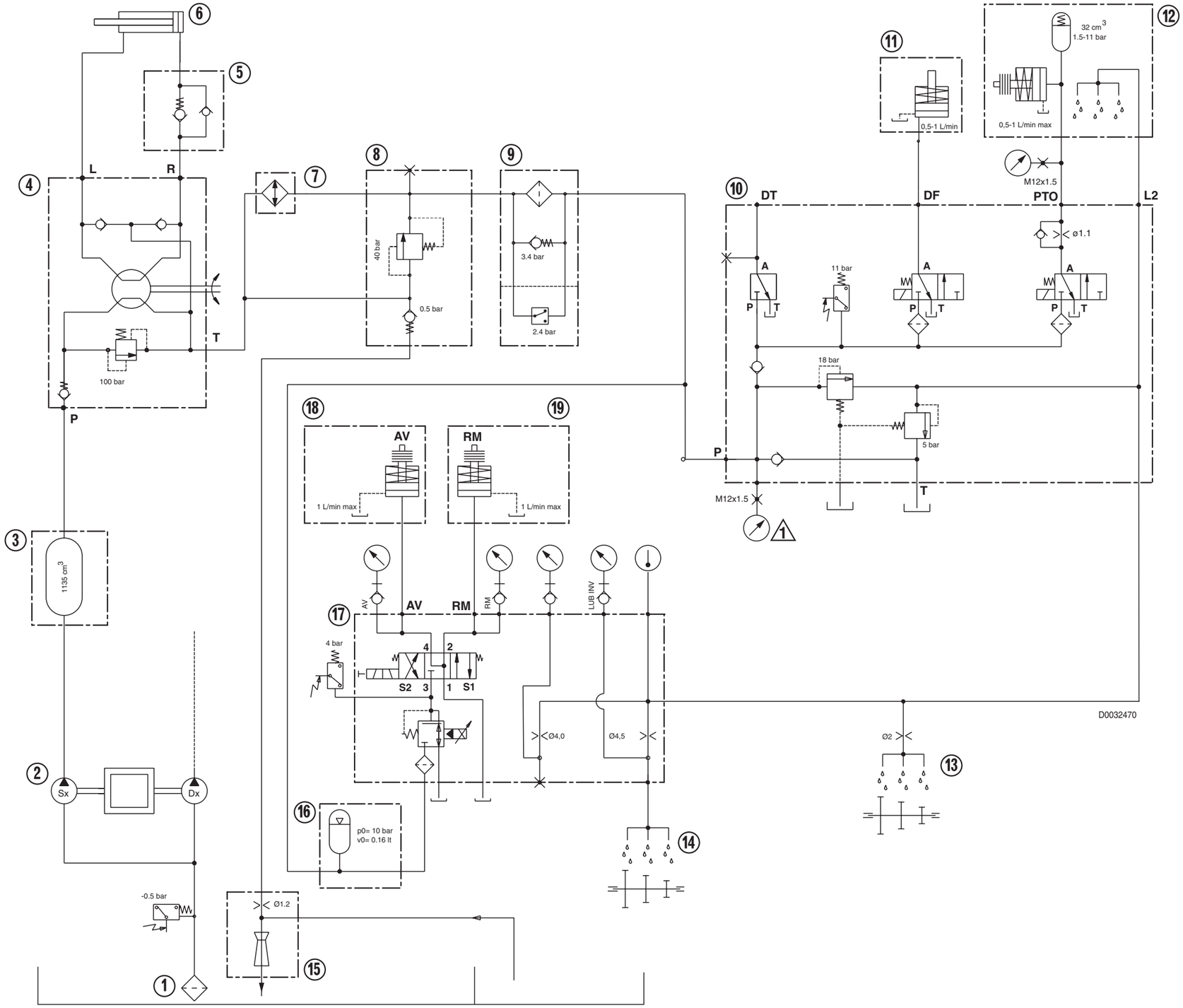
The flow from pumps is distributed to devices that control and direct the pressurized oil flow to the actuators that in turn convert hydraulic energy into mechanical energy.



1 - Suction line filter
2 - Steering circuit gear pump
3 - Lift gear pump
4 - Power steering
5 - Steering cylinder
6 - Cooler
7 - Four-wheel drive engagement control
8 - Differential lock engagement device
9 - Rear PTO engagement clutch
10 - Pressure holding valve and services solenoid valves unit
11 - Auxiliary services control valve
12- Lift control valve
13 - Lift control cylinder
14 - Secondary shaft lubrication
15 - Shuttle lubrication
16 - Ejector
17 - Shuttle solenoid valves assembly
18 - HML solenoid valve assembly
19 - Cooler bypass valve
20 - Filter

4.1 HYDRAULIC DIAGRAM (standard version) (1/2)

STEERING AND SERVICES CIRCUIT

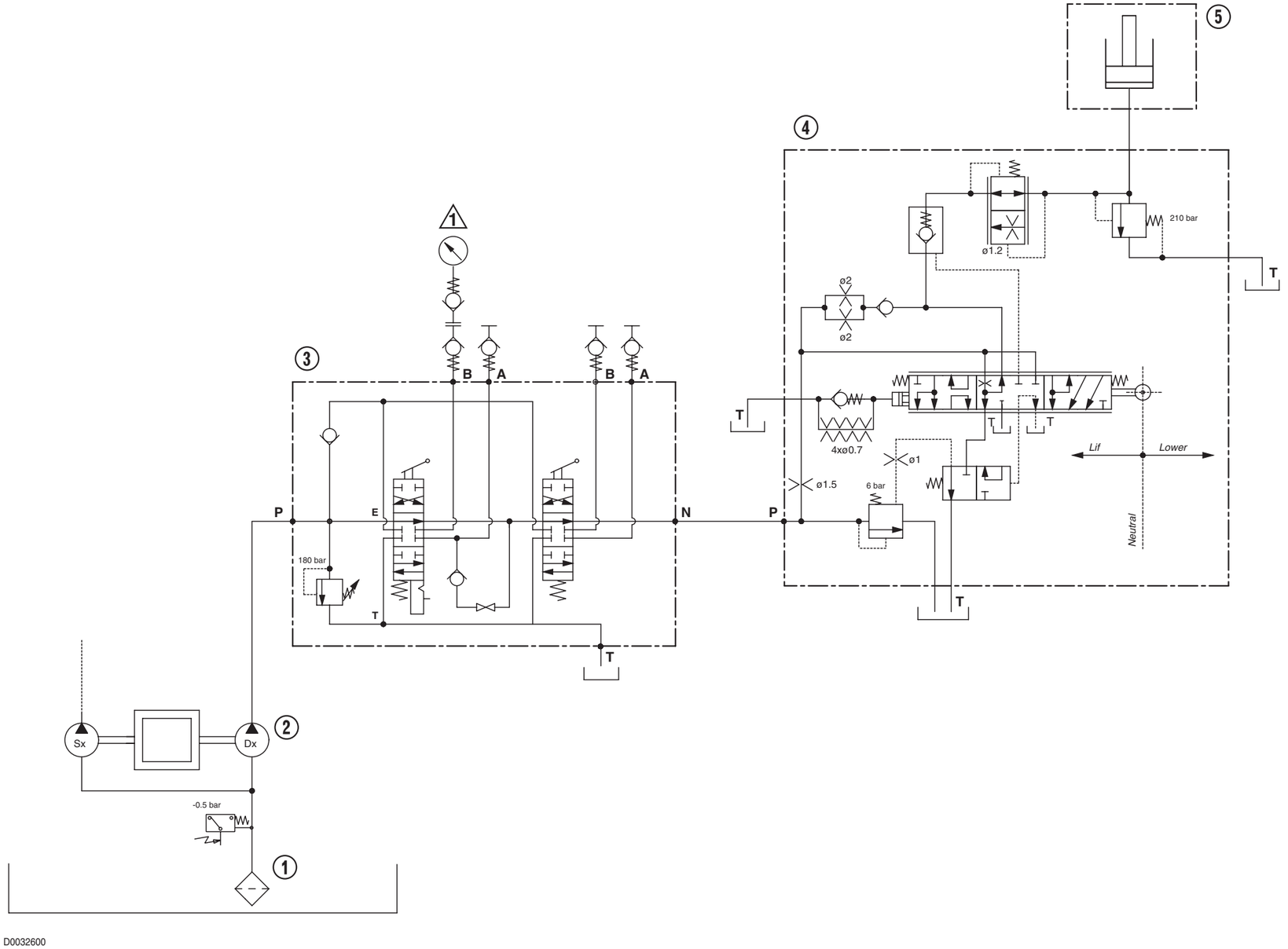


1 - Suction line filter (160 µm)
2 - Hydraulic pump (16 cc/rev)
3 - Resonator
4 - Power steering
5 - Steering compensation valve
6 - Steering cylinder
7 - Cooler
8 - Cooler bypass valve
9 - Delivery line filter (19 µm - β > 1000)
10 - Pressure holding valve and services solenoid valves unit
11 - Rear differential locking device
12 - Rear PTO clutch
13 - Secondary shaft lubrication
14 - Shuttle unit lubrication
15 - Ejector
16 - Accumulator
17 - Shuttle solenoid valves assembly
18 - Forward gear control clutch
19 - Reverse gear control clutch

⚠1 Pressure coupler - not installed on this machine

4.2 HYDRAULIC DIAGRAM (standard version) (2/2)

LIFT AND AUXILIARY SERVICES CONTROL VALVE CIRCUIT

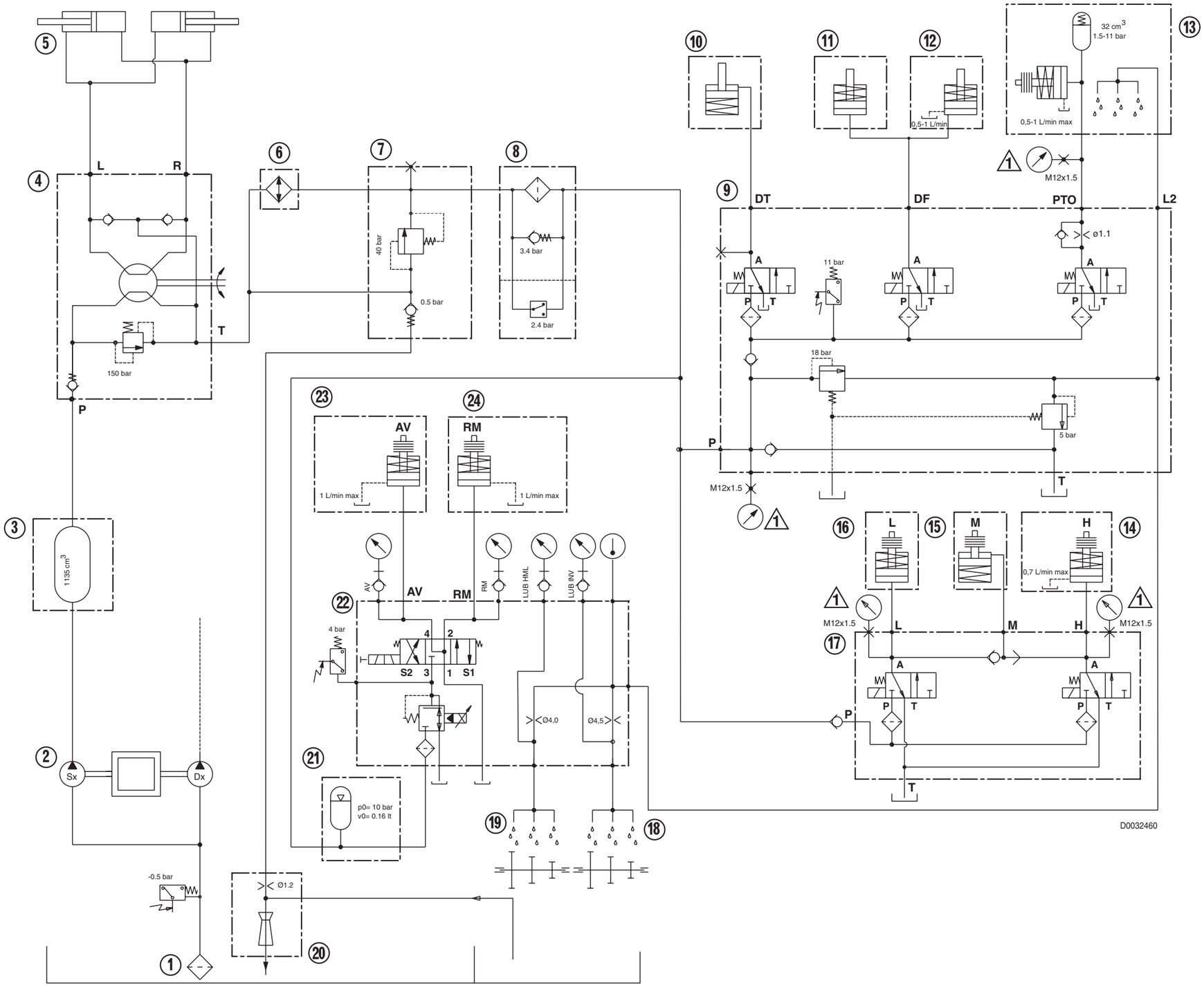


1 -Suction line filter (160 µm)
2 -Hydraulic pump (22.5 cc/rev)
3 -4-way auxiliary services control valve
4 -Lift control valve
5 -Lift control cylinder

1 Pressure coupler - not installed on this machine

4.3 HYDRAULIC DIAGRAM (full optional version) (1/2)

STEERING, SERVICES AND HML CIRCUIT

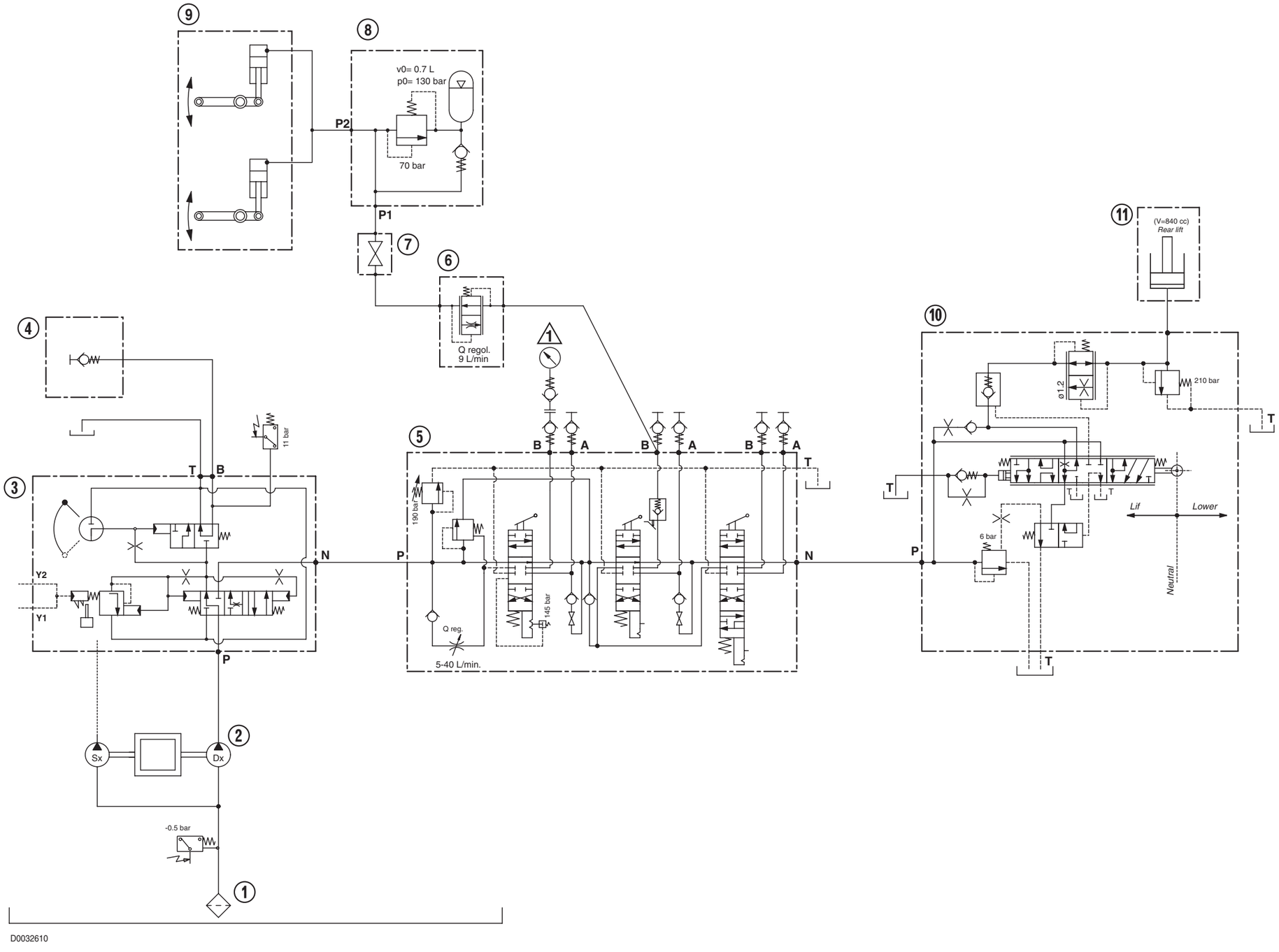


1 - Suction line filter (160 µm)
2 - Hydraulic pump (19 cc/rev)
3 - Resonator
4 - Power steering
5 - Steering cylinder
6 - Cooler
7 - Cooler bypass assembly
8 - Delivery line filter (19 µm - β > 1000)
9 - Pressure holding valve and services solenoid valves unit
10 - Four-wheel drive engagement device
11 - Front axle differential locking device
12 - Rear axle differential locking device
13 - Rear PTO clutch
14 - H speed clutch
15 - M speed clutch
16 - L speed clutch
17 - HML valve assembly
18 - HML gearbox assembly lubrication
19 - Shuttle unit lubrication
20 - Ejector
21 - Accumulator
22 - Shuttle valves assembly
23 - Forward gear control clutch
24 - Reverse gear control clutch

⚠1 Pressure coupler - not installed on this machine

4.4 HYDRAULIC DIAGRAM (full optional version) (2/2)

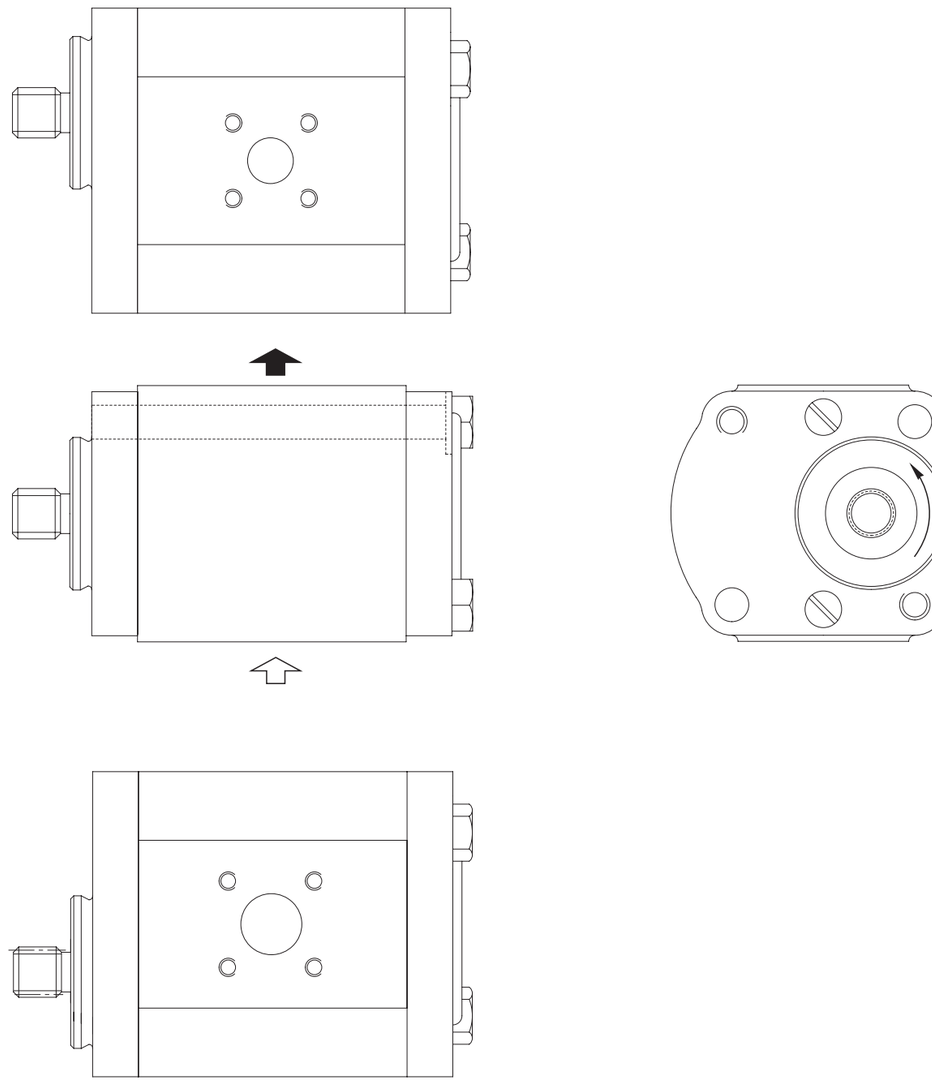
LIFT, TRAILER BRAKING AND AUXILIARY SERVICES CONTROL VALVE CIRCUIT



1 - Suction line filter (160 µm)
2 - Hydraulic pump (22.5 cc/rev)
3 - Hydraulic trailer braking valve
4 - Trailer braking coupler
5 - 6-way auxiliary services control valve
6 - Front lift down regulator valve
7 - Cock
8 - Damper valve assembly
9 - Front lift
10 - Lift control valve
11 - Lift control cylinder

⚠1 Pressure coupler - not installed on this machine

4.5 STEERING CIRCUIT GEAR PUMP



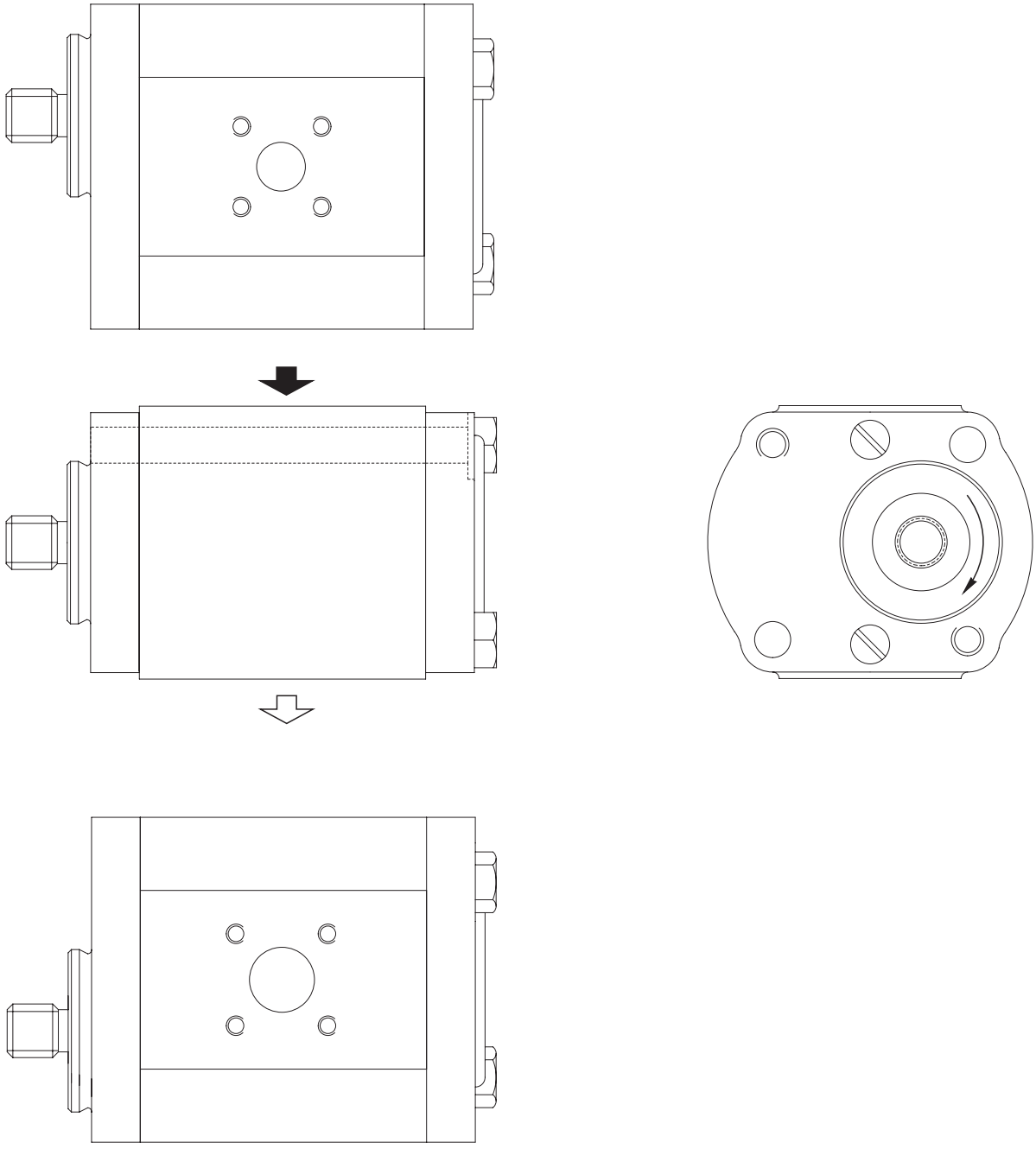
D0021760

CHARACTERISTICS

VERSION WITHOUT HML
Displacement: 16 cc/rev
Maximum operating pressure: 155 bar
Maximum flow rate: 38.1 l/min at 2200 rpm

VERSION WITH HML
Displacement: 19 cc/rev
Maximum operating pressure: 155 bar
Maximum flow rate: 45.2 l/min at 2200 rpm

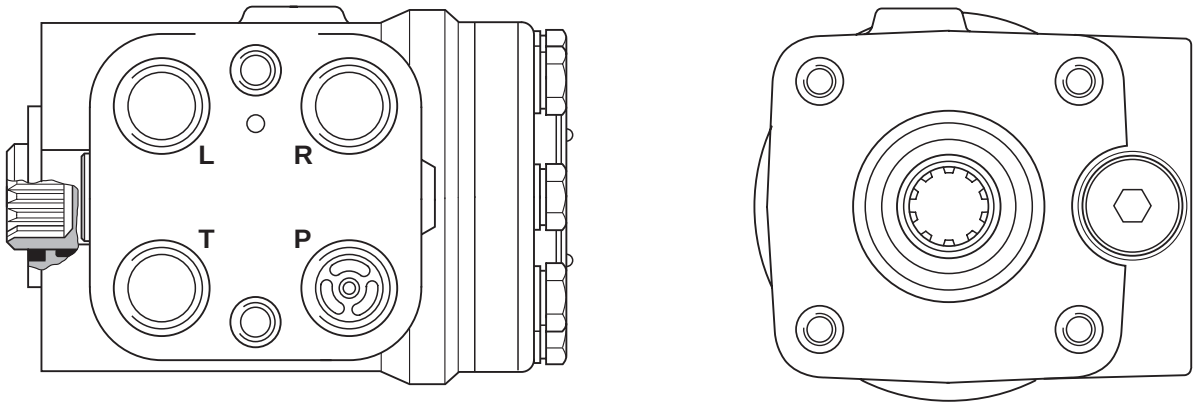
4.6 LIFT CIRCUIT GEAR PUMP



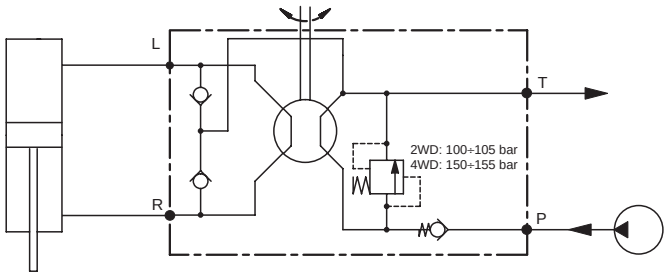
D0021770

CHARACTERISTICS
Displacement: 22.5 cc/rev
Maximum operating pressure: 190 bar
Maximum flow rate: 53.5 l/min at 2200 rpm

4.7 POWER STEERING



HYDRAULIC DIAGRAM



D0021680

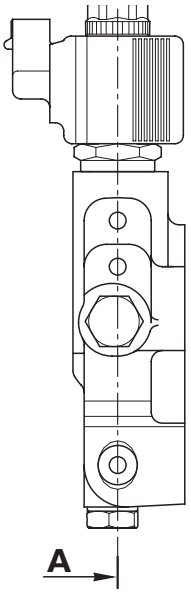
OPERATION

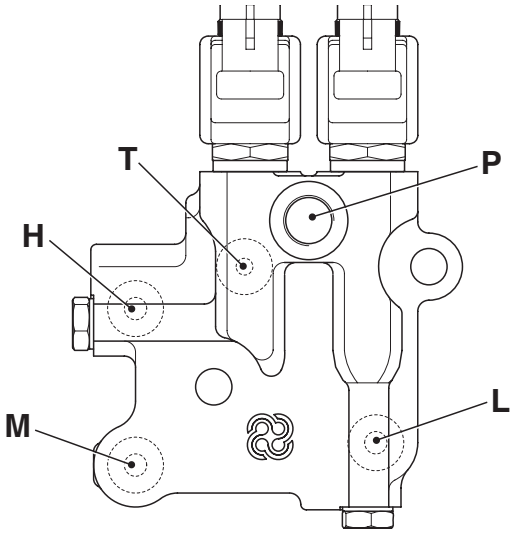
- The power steering system consists of a control valve with a rotary spool; these components feature hydrostatic operation.
- When the steering wheel is turned, the rotary spool control valve sends the oil from the pump to one side or the other of the steering cylinder.
  The rotary spool ensures that that the volume of oil delivered to the cylinder is proportional to the angle through which the steering wheel is turned.
- In the event of a malfunction of the power steering pump, the rotary spool valve automatically functions as a manual pump to ensure emergency steering.

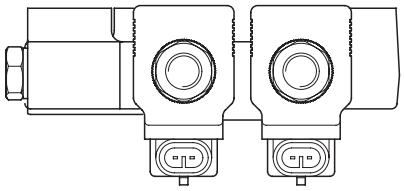
CHARACTERISTICS

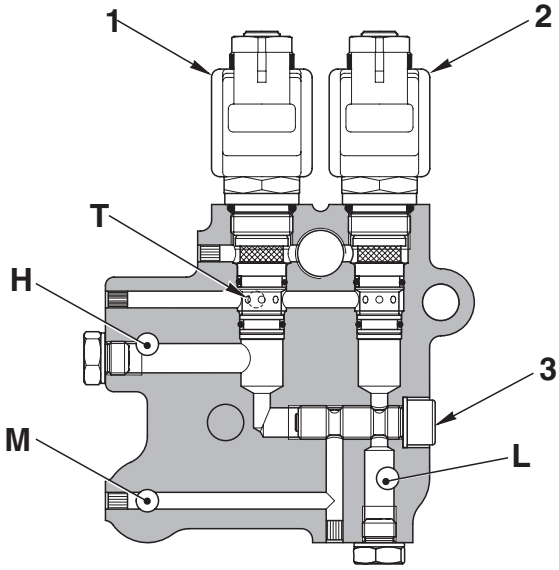
VERSION	*PRESSURE RELIEF VALVE SETTING*	*MODEL*	*DISPLACEMENT*
2WD	100÷105 bar	OSPC 80 OR	80 cc/rev
4WD	150÷155 bar	OSPC 125 OR	125 cc/rev

4.8 HML SOLENOID VALVE ASSEMBLY

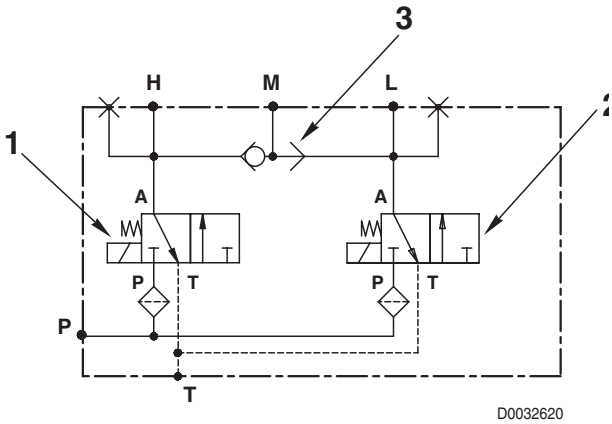








A-A



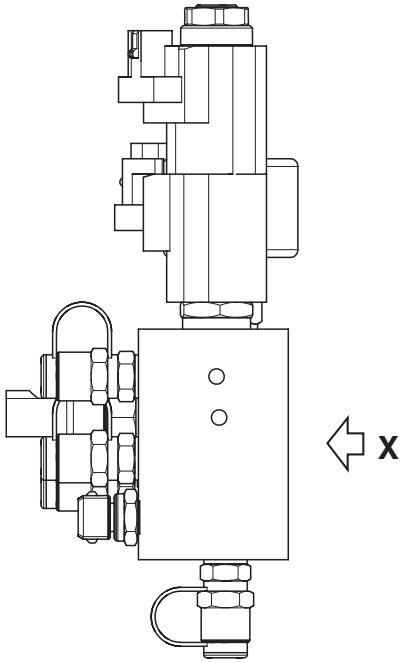
CONNECTIONS

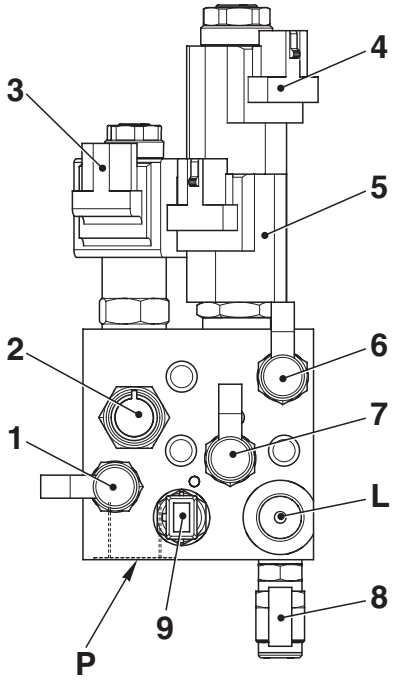
P - Supply
H - To H speed clutch
M - To M speed clutch
L - To L clutch
T - Return

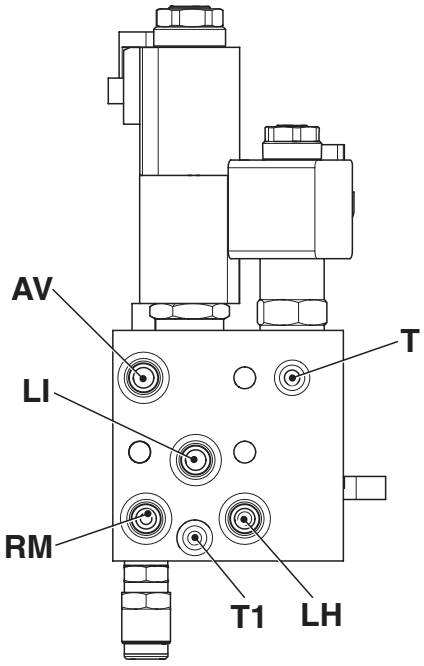
COMPONENTS

1 - H speed control solenoid valve
2 - L speed control solenoid valve
3 - Bistable pilot valve

4.9 SHUTTLE SOLENOID VALVES ASSEMBLY

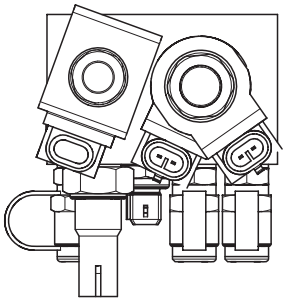


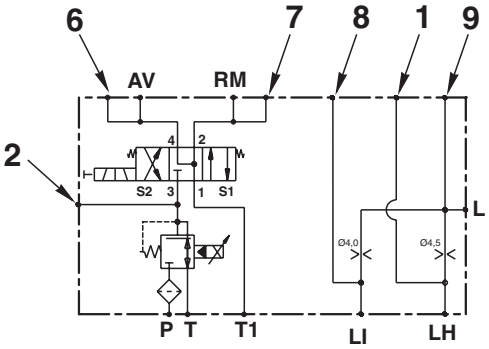




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View X





HYDRAULIC DIAGRAM

CONNECTIONS

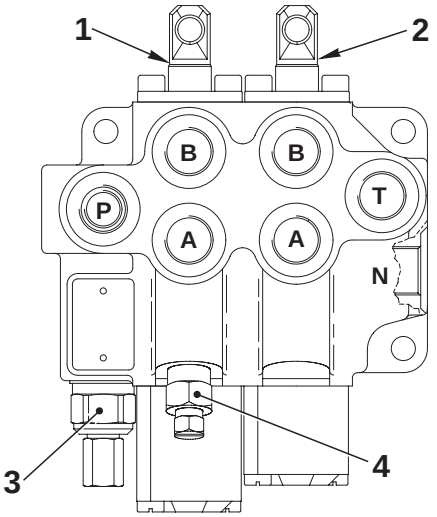
P - Supply
T - Return
LI - Shuttle lubrication
RM - To reverse gear clutch
AV - To forward gear clutch
LH - HML gearbox assembly lubrication
L - Lubrication supply

COMPONENTS

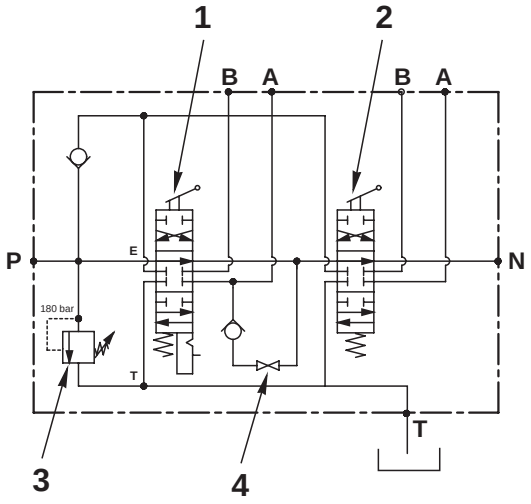
1 - HML lubrication pressure test point
2 - Pressure switch (4 bar)
3 - Proportional solenoid valve
4 - Reverse gear solenoid valve
5 - Forward gear solenoid valve
6 - Forward gear pressure test point
7 - Reverse gear pressure test point
8 - Shuttle lubrication pressure test point
9 - Temperature sensor

4.10 AUXILIARY SERVICES CONTROL VALVE

4-WAY VERSION



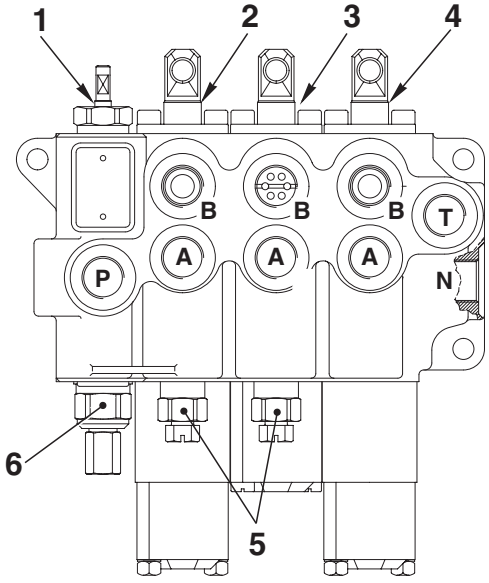
HYDRAULIC DIAGRAM



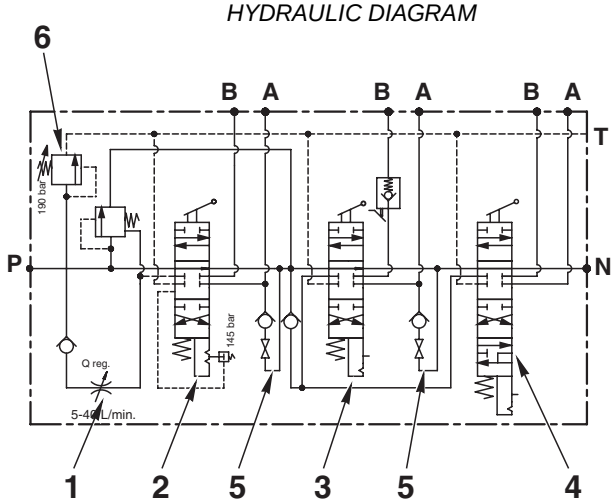
D0021860

1. Double-acting section
2. Double-acting section
3. Pressure relief valve
4. Double-/single-acting conversion screw

6-WAY VERSION



HYDRAULIC DIAGRAM



D0021870

1. Flow control
2. Double-acting section
3. Double-acting section
4. Float section
5. Double-/single-acting conversion screw
6. Relief valve

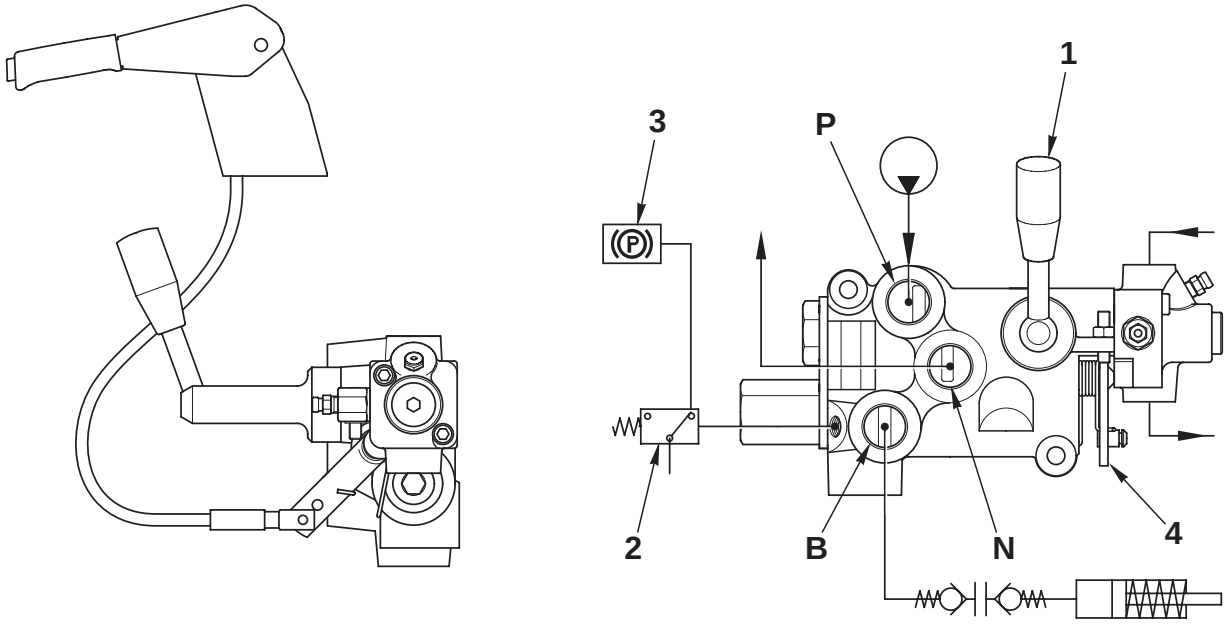
4.11 TRAILER BRAKING VALVE

ITALY VERSION

FUNCTION

The trailer braking valve is fitted when hydraulic trailer braking is required.

OPERATION



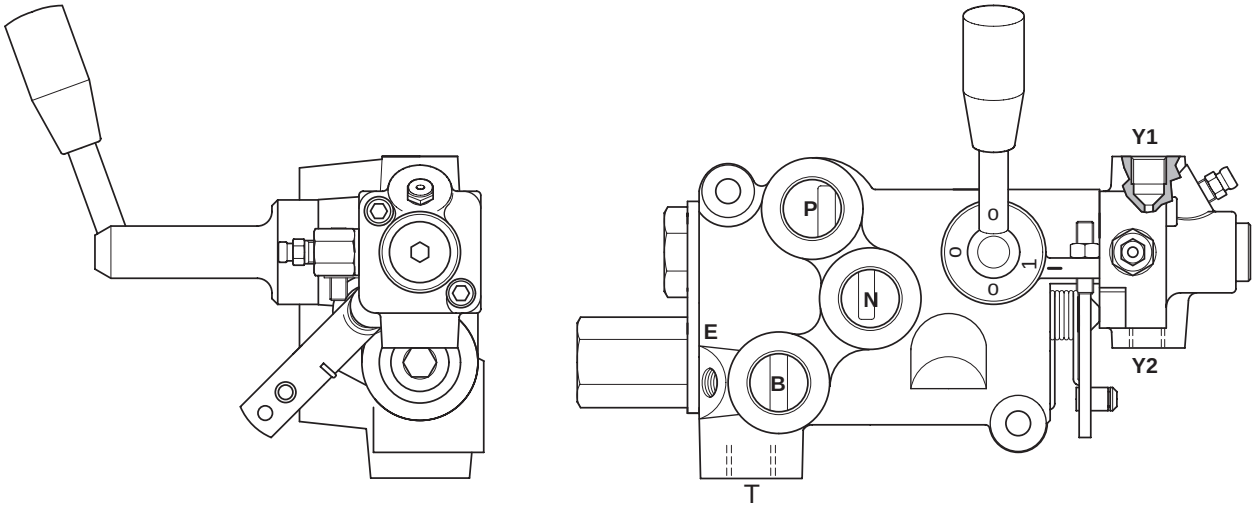
D0021840

1. *Valve control lever in position "1"*

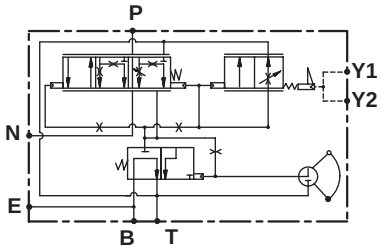
   - When lever (1) is in position "1" (valve activated) and the brake pedals are not pressed, there is a pressure of 12.5 bar (181.3 psi) available at port *B*.
   - This pressure is constantly supplied to the trailer to release the parking brake.
     In this condition, the pressure detected by pressure switch (2) is higher than the pressure setting and consequently indicator light (3) on the instrument panel remains off.
   - When the driver applies the handbrake, this operates lever (4).
     The pressure at port *B* is thus eliminated and pressure switch (2), on detecting the lack of pressure, illuminates indicator light (3) on the instrument panel.
   - The pressure at port *B* is directly proportional to the pressure present in the tractor braking circuit.

2. *Valve control lever in position "O"*

   - When lever (1) is in position "*O*" (valve deactivated), there is no pressure at port *B*.
     Pressure switch (2) detects the lack of pressure and illuminates indicator light (3) on the instrument panel.
     In this condition, the pressure at port *B* remains null regardless of the pressure in the tractor braking circuit.



HYDRAULIC DIAGRAM



D0021810

CONNECTIONS

P - Valve supply
N - To auxiliary services control valve
B - To trailer brake
T - Return
Y1-Y2 - Connection to tractor braking system
E - Parking brake pressure switch

CHARACTERISTICS

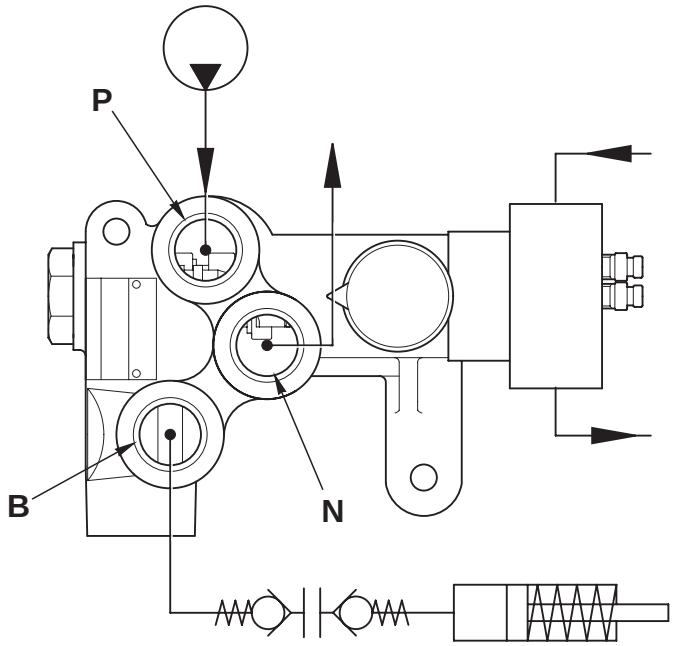
- Maximum operating pressure at port N: 200 bar (2900 psi)
- Minimum constant pressure at port B: 12.5±2 bar (181.3±29 psi)
- Maximum pressure at port B: 135±5 bar (1885±72.5 psi)
- Supply flow rate: 20÷80 l/min (5.3 – 79.7 US.gpm)

EXPORT VERSION

FUNCTION

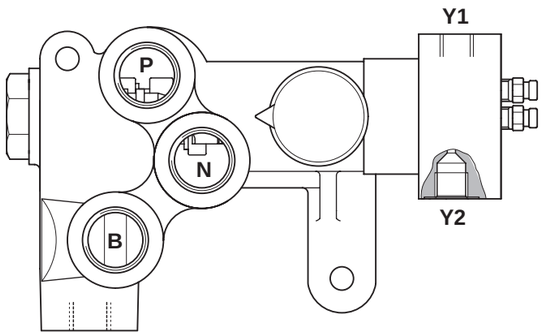
The trailer braking valve is fitted when hydraulic trailer braking is required.

OPERATION

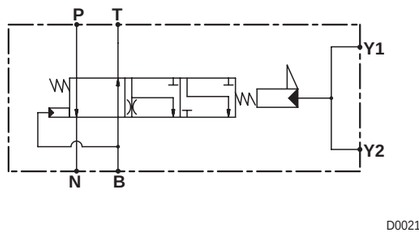


D0021820

- When the brakes are not applied there is no pressure at port *B*.
- When the driver applies the tractor brakes, the pressure in the circuit pilots the braking valve and the pressure at port *B* increases in proportion to the pressure in the tractor brakes circuit.



HYDRAULIC DIAGRAM



D0021830

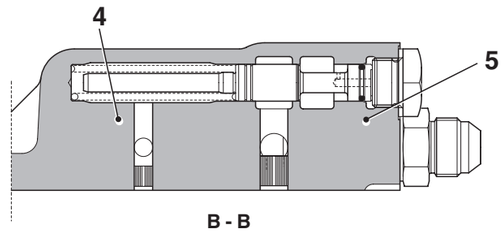
CONNECTIONS

P - Valve supply
N - To auxiliary services control valve
B - To trailer brake
T - Return
Y1-Y2 - Connection to tractor braking system
LS - Load Sensing signal

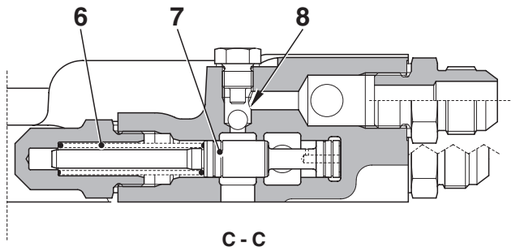
CHARACTERISTICS

- Maximum operating pressure at port N: 200 bar (2900 psi)
- Minimum constant pressure at port B: 0 bar (0 psi)
- Maximum pressure at port B: 130♀5 bar (1885♀72.5 psi)
- Supply flow rate: 20÷80 ,/min (5.3 -- 79.7 US.gpm

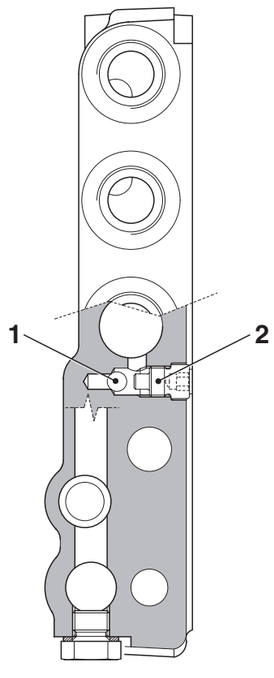
4.12 SERVICES SOLENOID VALVE ASSEMBLY



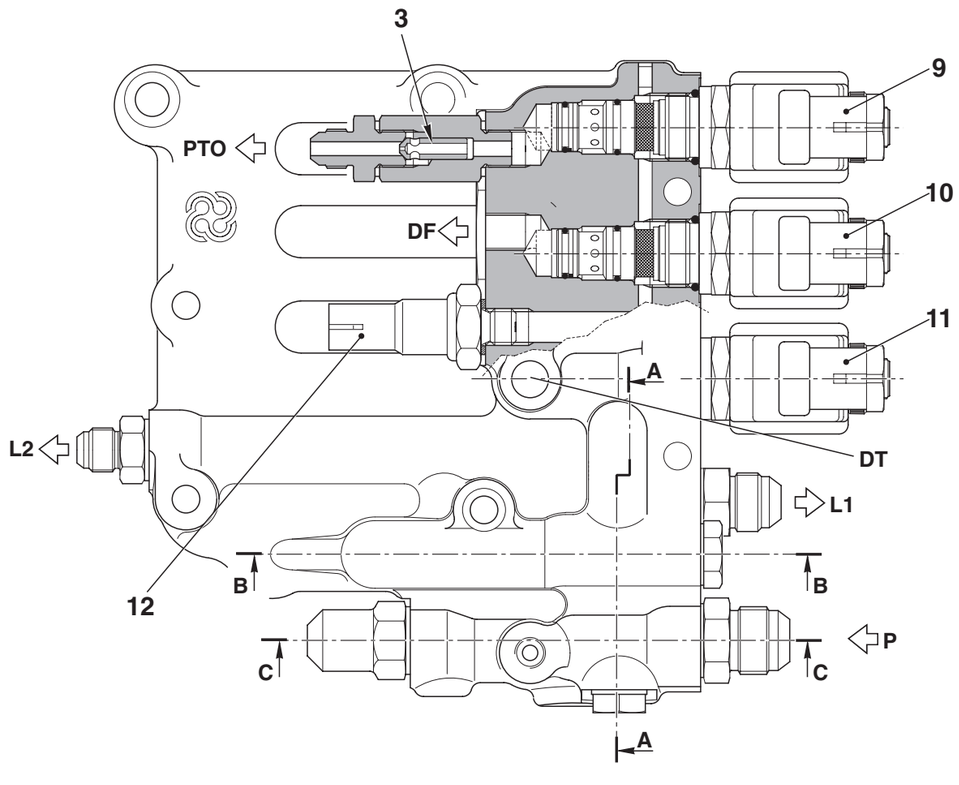
B - B



C - C

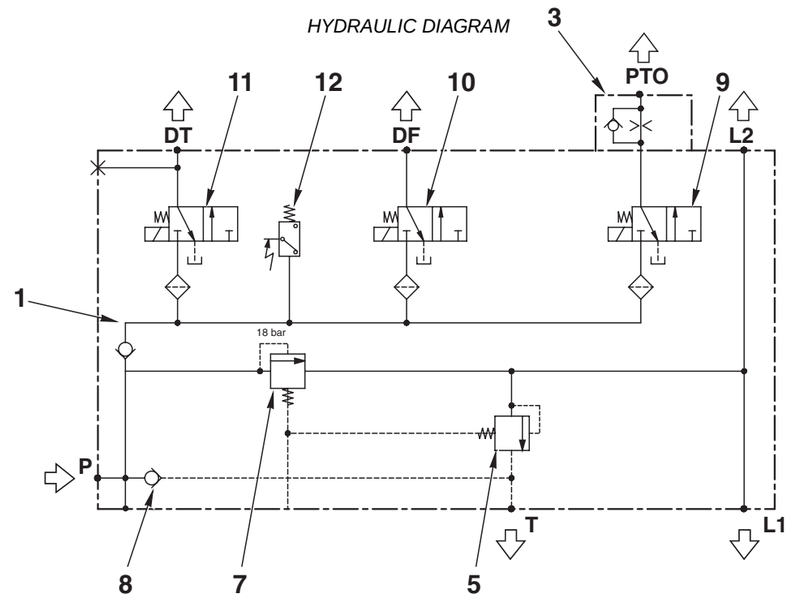


A - A



D0032630

HYDRAULIC DIAGRAM



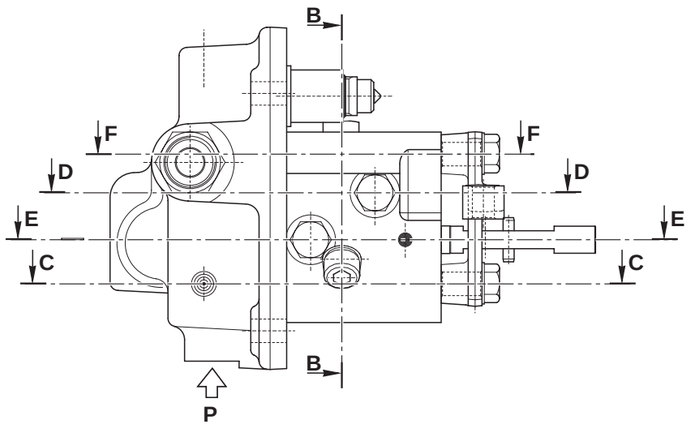
CONNECTIONS

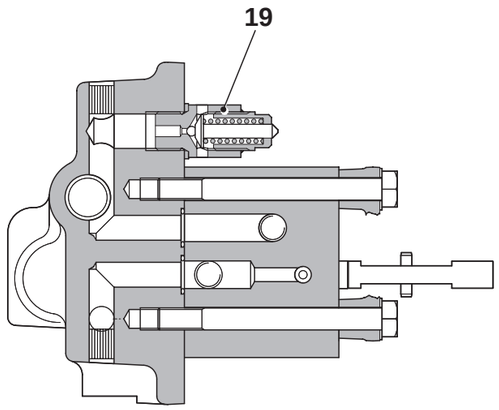
P - Supply
DT - To four-wheel drive clutch
DF - To differential lock
PTO - To rear PTO engagement clutch
L1 - To HML and secondary shaft assembly lubrication
L2 - To PTO lubrication
T - Return

COMPONENTS

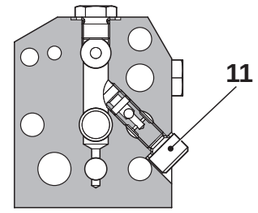
1 - Check valve
2 - Plug
3 - One-way choke valve
4 - Lubrication circuit control valve spring
5 - Lubrication circuit control valves
6 - Services pressure regulator valve spring
7 - Services pressure regulator valve
8 - Check valve
9 - PTO clutch engagement solenoid valve
10 - Differential lock engagement solenoid valve
11 - Four-wheel drive disengagement solenoid valve
12 - Services circuit pressure switch (NC Switching pressure: 11 bar)

4.13 LIFT CONTROL VALVE

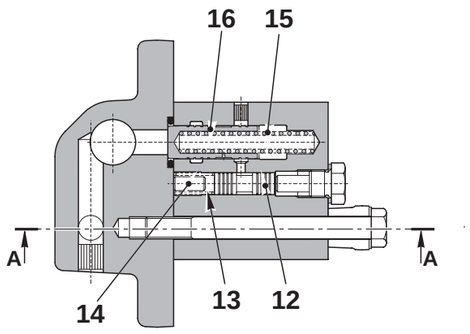




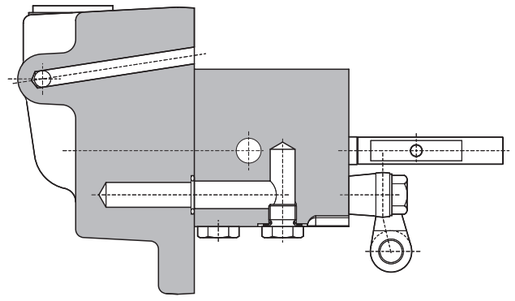
A-A



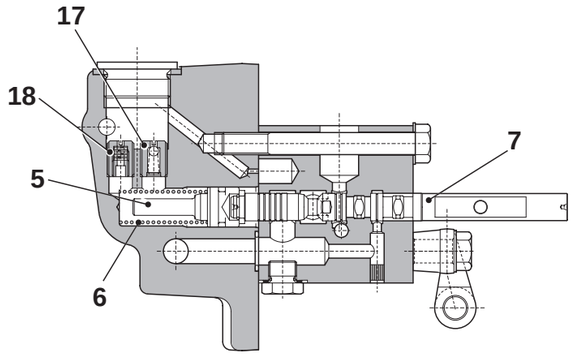
B-B



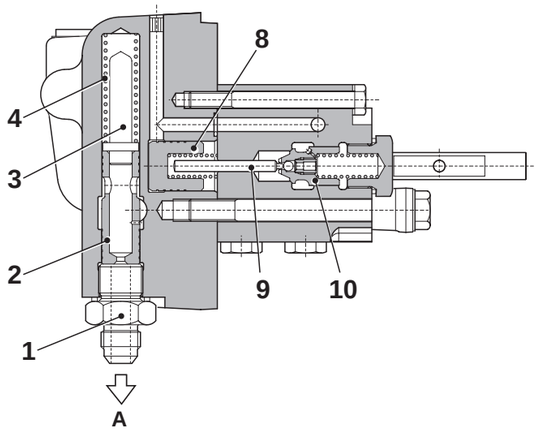
C-C



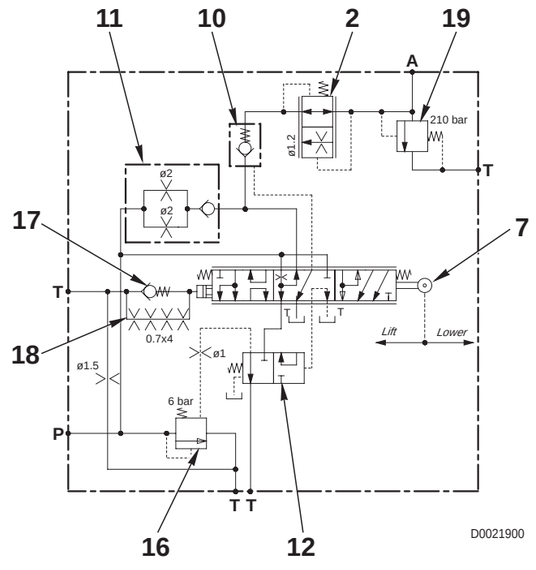
D-D



E-E



HYDRAULIC DIAGRAM



CONNECTIONS

P - Directional control valve supply
A - Lift control

COMPONENTS

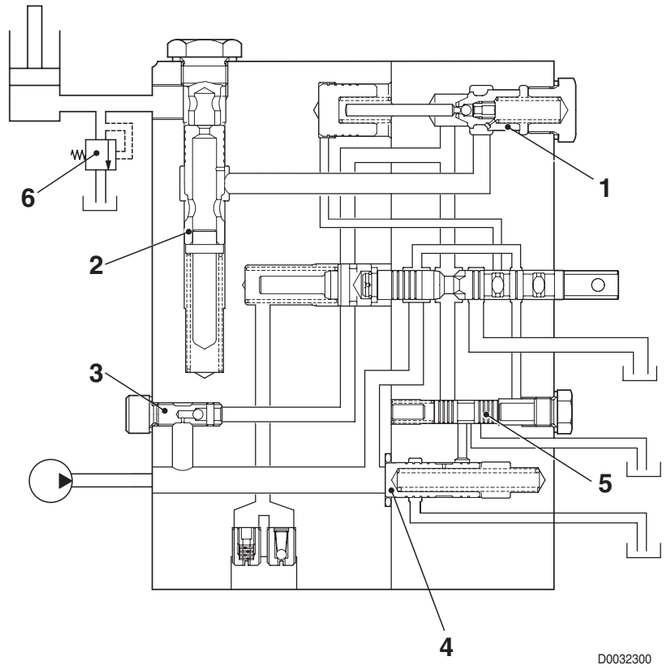
1 - Fitting
2 - Rate of drop control valve spool (Valvematic)
3 - Plunger
4 - Rate of drop control valve spring
5 - Spacer
6 - Lift control valve spool return spring
7 - Lift control valve spool
8 - One-way valve actuator piston
9 - Valve stem
10 - One-way valve
11 - Inlet valve
12 - Pilot/enabling valve
13 - Pilot/enabling valve spring
14 - Spacer
15 - Enabling valve spring
16 - Enabling valve
17 - One-way valve
18 - Choke
19 -Antishock valve

FUNCTION

The function of the lift control valve is to direct oil pressure to the lifting cylinder, thereby allowing the linkage to be raised and lowered.

It incorporates the following valves:

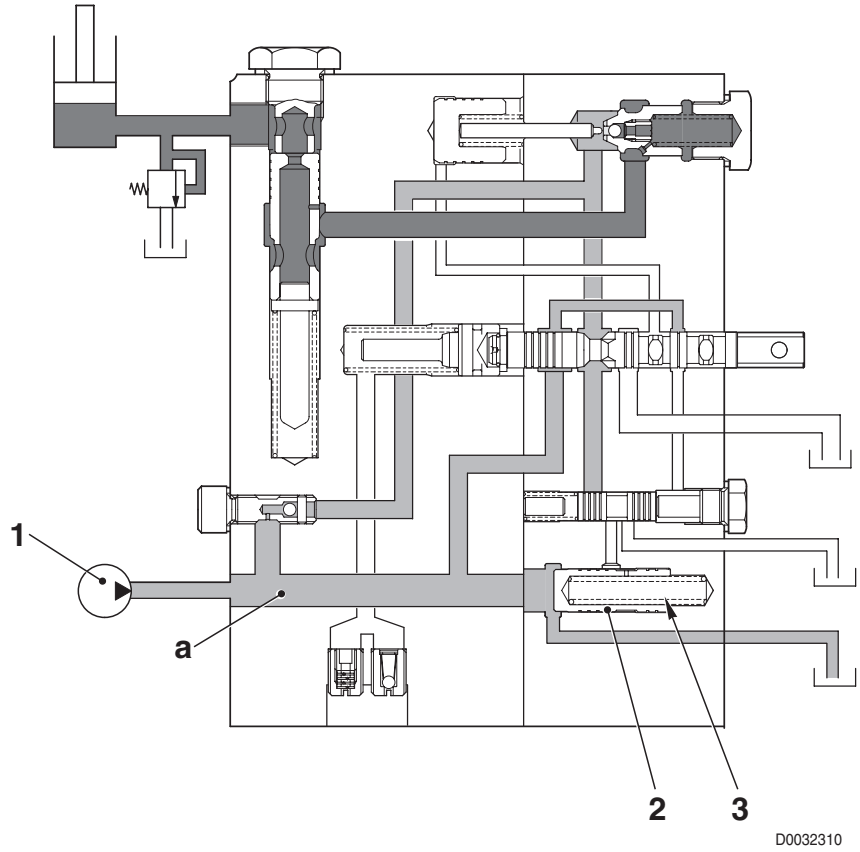
- One-way valve (1)
- Rate of drop control valve (Valvematic) (2)
- Inlet valve (3)
- Enabling valve (4)
- Pilot/enabling valve (5)
- Antishock valve (6) (210 bar)



OPERATION

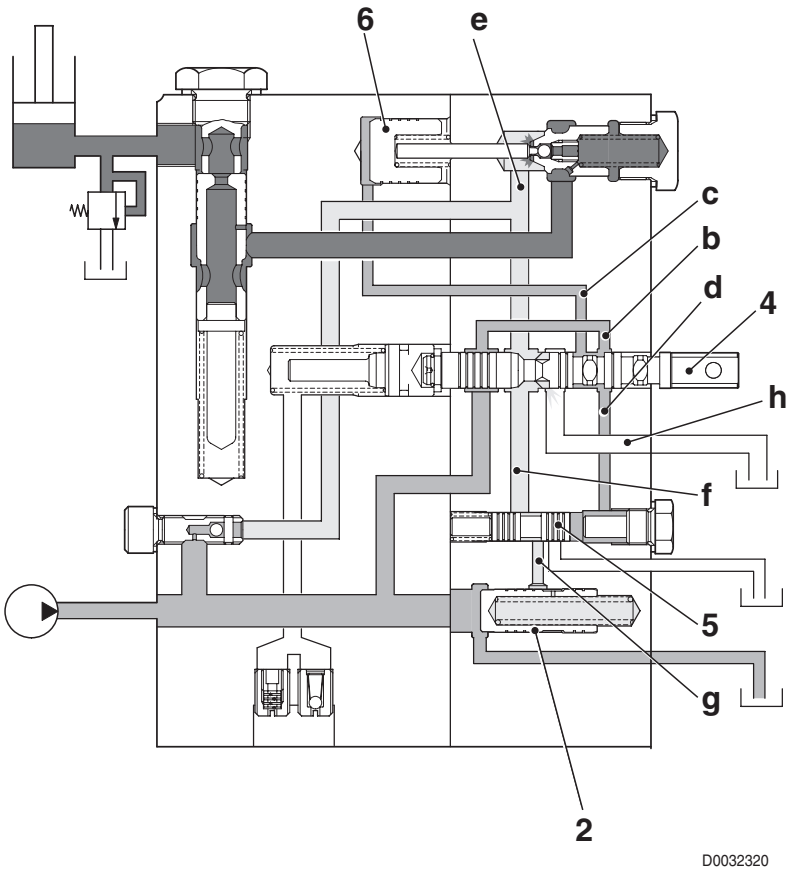
1. When the lift control is in neutral position

- The pressurised oil from pump (1) flows to line *a*.
  As all the passages are closed, the pressure increases and when the force exerted on enabling valve (2) overcomes that of spring (3), valve (2) shifts to the right to allow oil to flow to tank.



2. When the lift is lowered

- When spool (4) is shifted to the right, lift lowering begins; this can be divided into two stages:
  - *STAGE 1*
    When spool (4) is shifted to the right, this connects:
    - line *b* with line *c* thereby allowing piston (6) to move to the right.
    - line *d* to return line *h* thereby allowing the pressure in line *e* to fall.

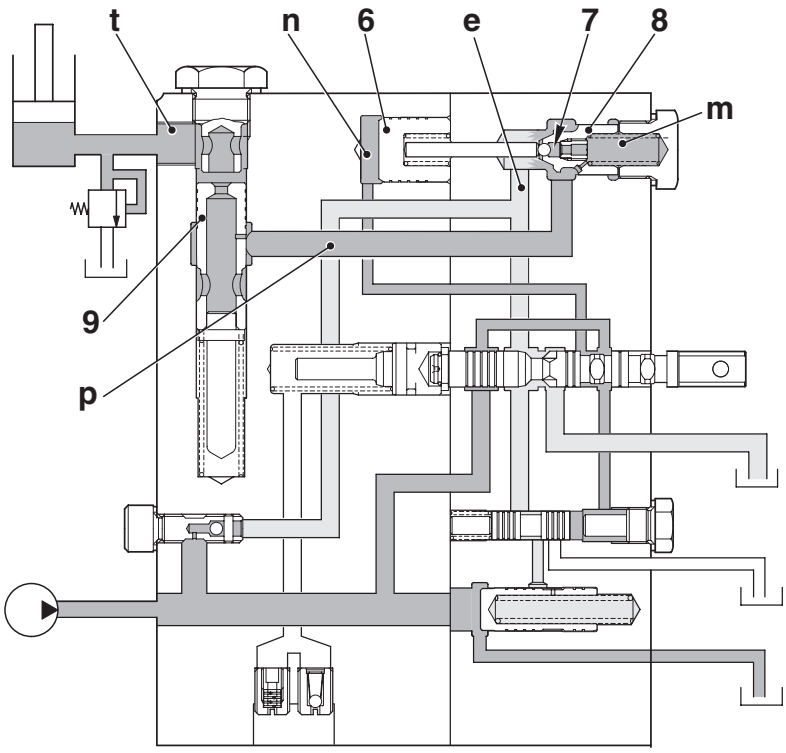


• *STAGE 2*

As piston (6) moves to the right, ball (7) is also shifted to the right, thereby connecting chamber *m* of check valve (8) with line *e*.

This reduces the pressure in chamber *m* and the force exerted on piston (6) by the pressure in chamber *n* is able to move valve (8) to the right, thus connecting line *p* with line *e* and allowing oil to flow and consequently the lift to descend.

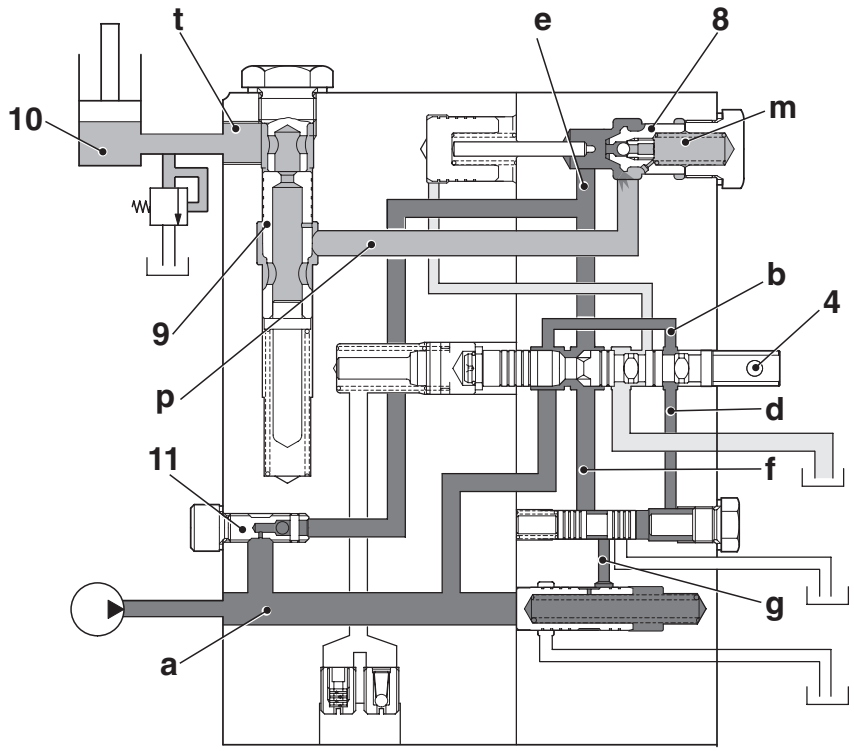
Control valve (9) serves to adjust the rate of drop; as the valve moves downwards, it limits the flow of oil between port *t* and line *p*.



D0032330

3. When the lift is raised

- When spool (4) is shifted to the left, this opens the connecting passages between lines *b* and *d*, *f* and *g*, *a* and *e*. When the force exerted by the pressure in line *e* overcomes the force exerted by the pressure in chamber *m*, valve (8) shifts to the right thereby allowing oil to flow in line *p* and from there through valve (9) to port *t* and on to lift cylinder (10).
  To increase the speed at which the lift is raised, i.e. the oil flow rate to cylinder (10), one-way valve (11), which is responsible for supplying oil exclusively during the lifting phase, is installed in parallel to spool (4).



D0032340

SECTION 20

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..... i

SECTION 20 i

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1. DIAGNOSIS TOOLS

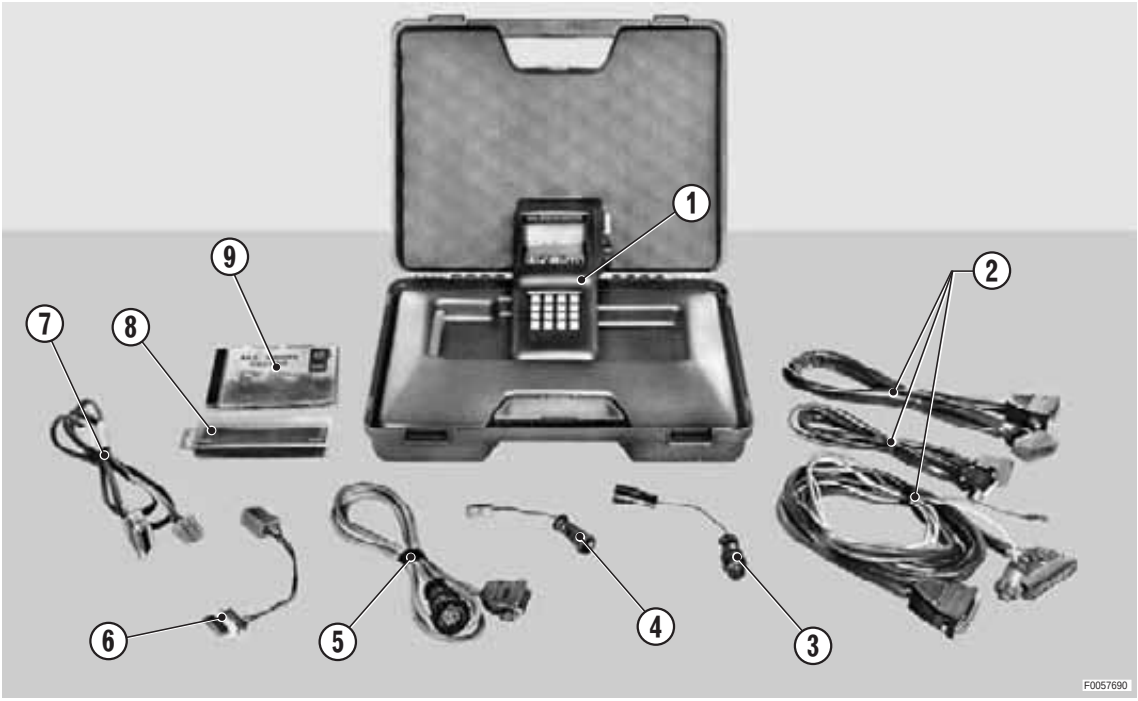
1.1 ALL ROUND TESTER

In order to be able to troubleshoot correctly, commission the tractor and check the electrical components of the lift and engine systems work properly, the Technician has an instrument called the All Round Tester (hereinafter ART).
Using the ART, the technician can:
- display errors (faults) that have occurred;
- execute the sensor calibration or set-up procedures;
- display data detected by the electronic control units (e.g. status of the sensors) managing the systems.

The ART communicates with the tractor's electronic control units via one or more of the diagnostic sockets installed on the tractor.
The ART is supplied with a number of different connection cables, which are to be selected in accordance with the type of tractor and the procedures indicated in the shop manuals or on the CD provided in the tester kit.

1.1.1 DESCRIPTION OF THE KIT

The ART is supplied to Authorised Workshops in a carrying case containing:



Pos.	Part Number	Description	Qty
	5.9030.730.6/30	Case, complete	1
1	5.9030.730.0	All Round Tester	1
2	5.9030.681.3/10	Diagnosis cable for BOSCH EHR4 rear hydraulic lift	1
		Diagnosis and programming cable of electronic regulator, original type	1
		Diagnosis cable of SBA system, original type	1
3	5.9030.681.7	Adapter cable for radar connector	1
4	5.9030.681.5	Adapter cable for wheel speed sensor connector	1
5	5.9030.681.4	Cable for diagnostic socket *	1
6	0.011.6178.4	Adapter cable for diagnosis socket on armrest	1
7	0.011.5445.4	Cable for connection to diagnosis socket in engine, gearbox, and lift control units zone	1
8	0.010.2154.2	EPROM port box	1
9	307.1056.8/60	CD ROM	1

* As from 01/01/06 the cable has been modified to allow the All Round Tester to connect to all control units. Contact the Technical Assistance Service for further information.

1.1.2 NOTES ON CORRECT USE

The ART is protected against battery polarity inversion, and positive or negative overvoltages of momentary duration (1 msec).

Do not attempt to connect the ART to non-dedicated sockets, and do not use trailing connections or extension cables.

The display features permanent backlighting in order to ensure visibility in all light conditions.

A knob on the side allows adjustment of the contrast. If no information appears on the display it may be that the knob is positioned in such a way that data displayed on the screen are not visible.

The tester operates correctly at temperatures between 0 and 40 °C, and should be switched off every 30 minutes to maximise its service life.

Before disconnecting the ART from the diagnostic socket, turn the starter key to the "*O*" (OFF) position.

1.1.3 DESCRIPTION OF THE TESTER



The ART includes:

1 - Liquid crystal display featuring permanent backlighting

2 - 16-key alphanumeric keypad

3 - Contrast adjustment knob.
To adjust contrast. If no information appears on the display it may be that the knob is positioned in such a way that data reading field on the screen is not visible.

4 - Parallel port (used to connect the ART to systems with electronic control units that do not have microprocessors).

5 - Serial port (used to connect the ART to systems with electronic control units incorporating microprocessors).

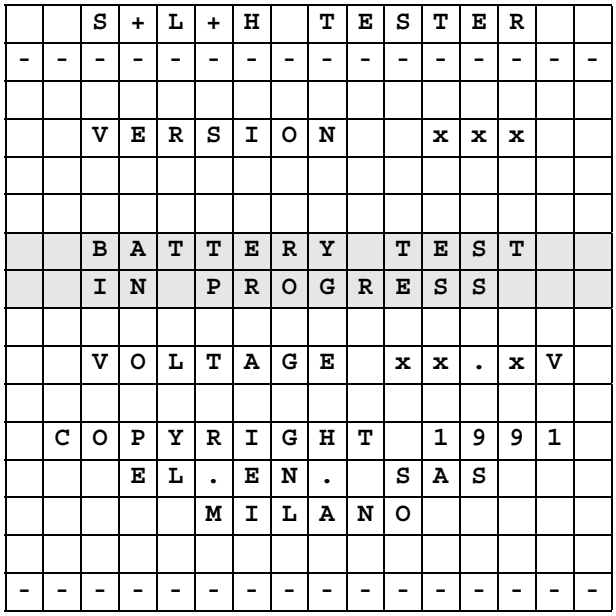
1.1.4 GENERAL NOTES ON CONNECTING AND POWERING UP THE TESTER

To connect the tester to the tractor electronic system proceed as follows :

1 - Stop the engine and remove the key from the starter switch;
2 - connect the ART to a diagnosis socket;
3 - insert the key in the starter switch and turn it to "*I*" (ON).

When the ART powers up, the screen displays an internal test to check the battery charge. If the voltage registers less than 10V, the ART does not have sufficient power to connect to the control units, whereas if the value is higher than 15Vthe instrument could be damaged.

After a few seconds, the tester attempts to connect to the electronic system and displays a page (which may vary depending on the tractor or the socket to which it is connected), from which the technician can choose to connect to a given control unit and test the operation of the components.



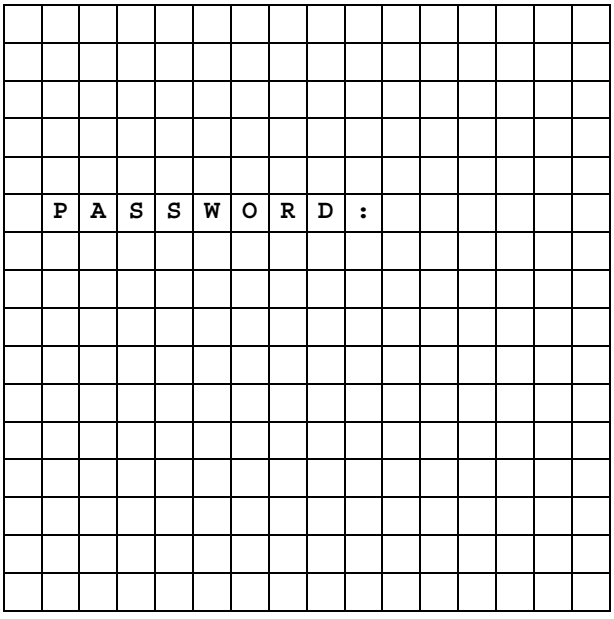
1.1.5 SELECTION OF THE DISPLAY LANGUAGE

The ART is able to display information in a number of different languages (factory setting: ITALIAN).

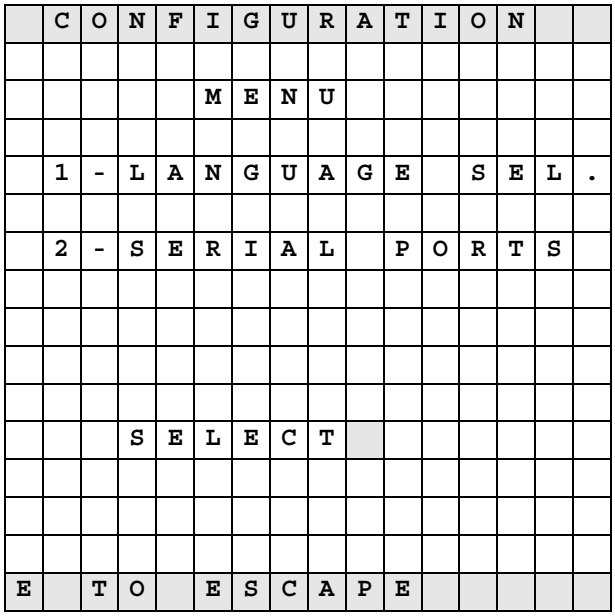
To change the display language, proceed as follows.

1 - Stop the engine and remove the key from the starter switch
2 - Connect the ART to a diagnosis socket
3 - While holding down key *A* on the keypad, turn the starter key to "*I*" (ON).

4 - Enter the password *1 2 3 F*.



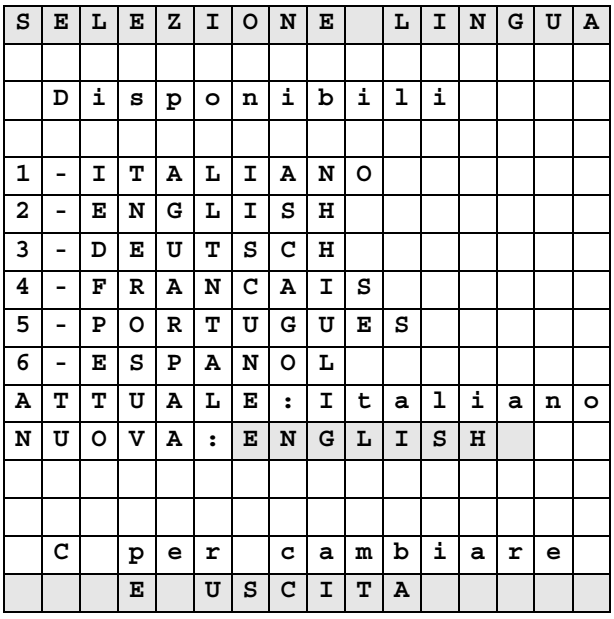
5 - Press *1.*



6 - Press *C* and then the key corresponding to the desired language.
In the example illustrated, pressing *2* selects English language.

7 - Press *E* twice to exit

8 - Turn the starter key to "*O*" (OFF) and disconnect the ART from the diagnostic socket.



1.1.6 SETTING THE SERIAL PORTS

The tractor electronic systems to which the ART can be connected are different one from another and utilize different pinouts at the diagnosis socket for interfacing purposes.

For this reason, the serial ports must first be configured so as to guarantee full compatibility of the ART with all SAME electronic systems.

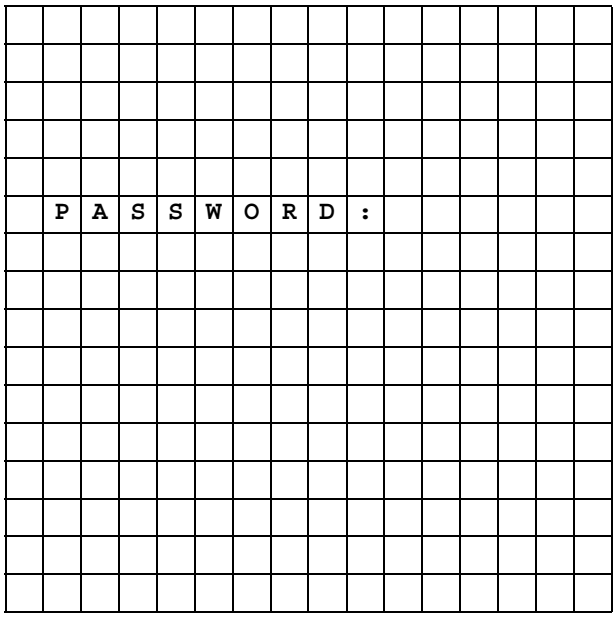
To change the serial ports configuration, proceed as follows.

1 - Stop the engine and remove the key from the starter switch

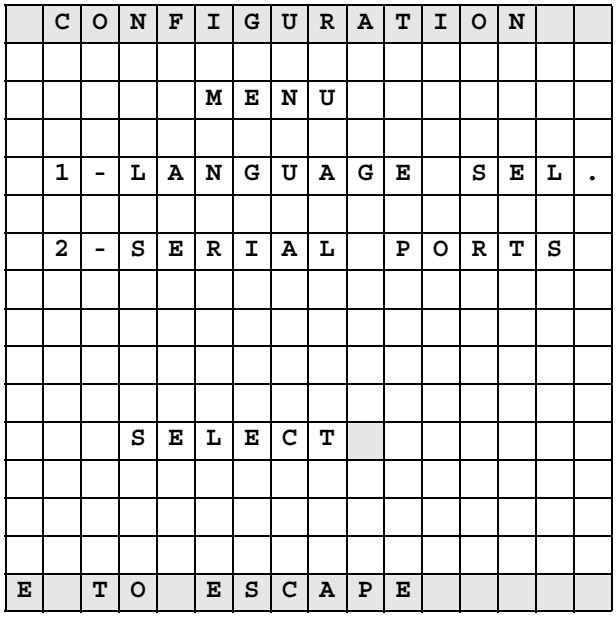
2 - Connect the ART to a diagnosis socket

3 - While holding down key A on the keypad, turn the starter key to "*I*" (ON)

4 - Enter the password *1 2 3 F*.



5 - Press *2*.



6 - Enable all the serial ports by pressing *1* seven times.
7 - Press *E* twice to exit.
8 - Turn the starter key to "*O*" (OFF) and disconnect the ART from the diagnostic socket.

	S	E	R	I	A	L	.	C	O	N	F	I	G	.	
P	r	e	s	e	n	t			1	0	0	0	1	1	1
S	e	r	i	a	l		N	r	7	6	5	4	3	2	1
N	e	w	c	o	n	f	i	g	1	1	1	1	1	1	1
1	-	S	e	r	i	a	l		p	o	r	t	O	N	
0	-	S	e	r	i	a	l		p	o	r	t	O	F	F
E		T	O		E	S	C	A	P	E					

2. CONNECTING THE TESTER TO THE ELECTRONIC CONTROL UNITS

CAUTION

Before connecting the ART®, switch off the engine and remove the key from the starter switch.

2.1 CONNECTING ART® TO THE HYDRAULIC LIFT AND ENGINE CONTROL UNITS



1 - Connect cable (1) (P/N 5.9030.861.4) to ART® (2) (P/N 5.9030.730.0).
2 - Insert connector (3) in connector X8 located inside the left-hand side console.
3 - Check that connectors (3) and X8 are firmly connected.
4 - Insert the key in the starter switch and turn it to "*I*" (ON) to switch on the tester.
5 - On power up, ART® will perform the battery level test and then display the following screen:

						T	E	S	T						
						M	E	N	U						
1	-	F	r	o	n	t		s	u	s	p	e	n		
2	-	R	e	a	r		L	i	f	t					
			C	H	O	O	S	E	_						

6 - The technician should now press the key corresponding to the control unit to be tested.

CAUTION

Do not start the engine unless this is required for subsequent operations.

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3. INTRODUCTION TO THE TRACTOR ELECTRONIC SYSTEM

The electronic system of this series includes control units by which the machine functions are managed.
Each control unit is dedicated to the control of one or more of the systems installed on the tractor.

The tractor's electronic system incorporates a socket used for calibration, diagnosis and programming of the control units; connecting the All Round Tester ® (hereinafter ART) the technician canprogram the operating parameters of the tractor according to the options available (type of engine, etc.), test the operation of the sensors and pushbutton controls, calibrate the sensors and carry out troubleshooting procedures.

With ART it is also possible to view the list of alarms saved in the form of short descriptive messages.

Through these messages, the technician can locate faults and, using the dedicated Test and Monitor menus, check the operation of system components.

3.1 ENGINE CONTROL UNIT

The engine control unit has the task of supervising the operation of the following systems:

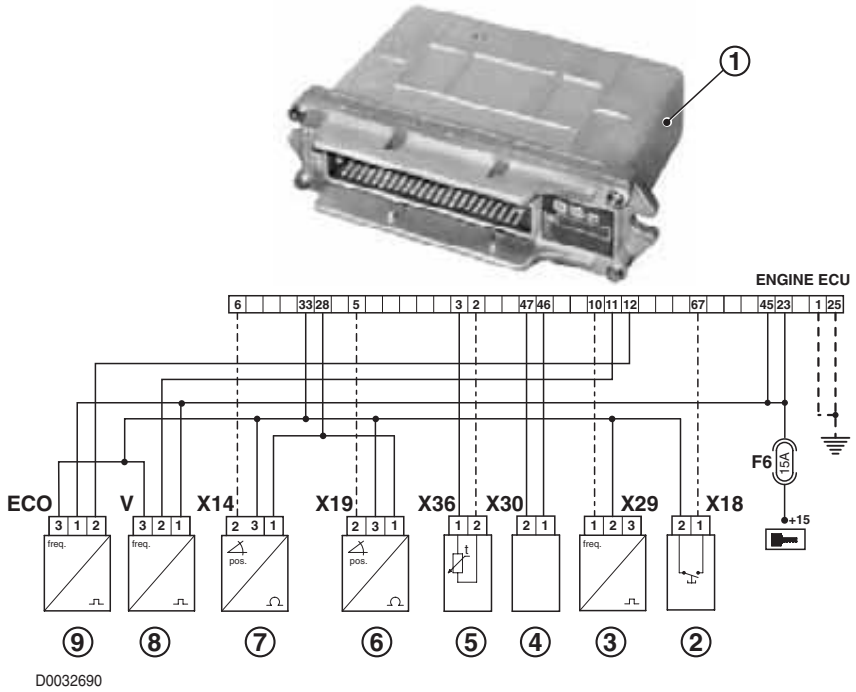
1 - Electronic engine control

2 - Electronic preheating control

The control unit signals any malfunctioning of the components it governs to the Operator by causing the “MEM” warning light to flash on the instrument panel.

3.1.1 ELECTRONIC ENGINE CONTROL SYSTEM

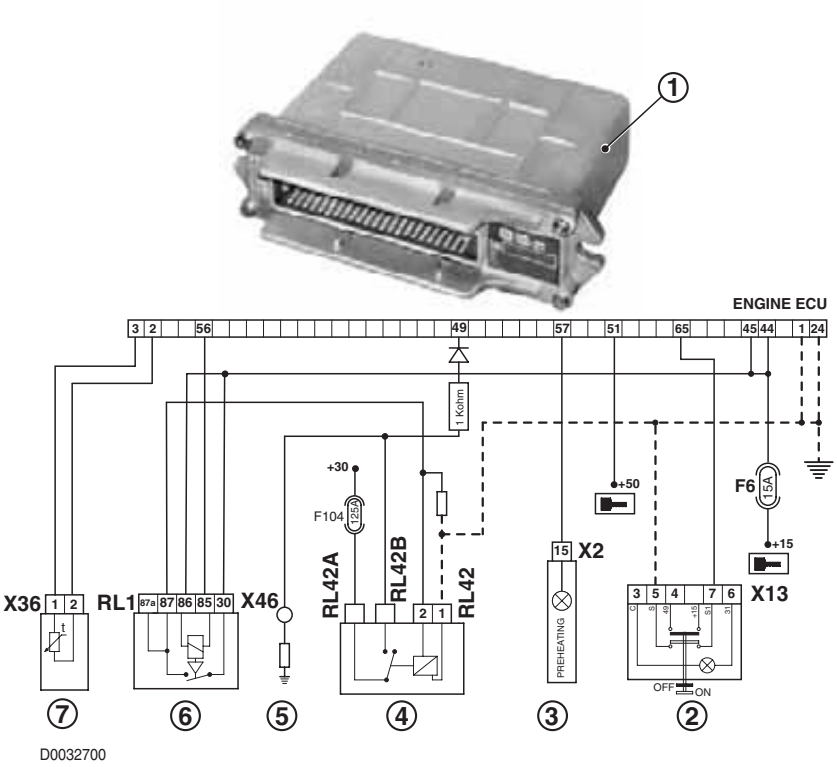
The electronic system controls the engine in accordance with the commands issued by the operator with the hand throttle or the pedal throttle and depending on the signal received from the engine speed sensor (pick up) and on the coolant temperature it governs the speed by sending a modulated voltage signal (PWM) to the actuator.



1 - Engine control unit
2 - Hold/memory button
3 - Engine speed sensor (Pick-up)
4 - Actuator
5 - Engine coolant temperature sensor
6 - Accelerator pedal
7 - Hand throttle
8 - Wheel speed sensor
9 - Speed sensor

3.1.2 ELECTRONIC PREHEATING CONTROL SYSTEM

The electronic system controls preheating in accordance with the signals transmitted to the engine control unit by the coolant temperature sensor, the preheating control button and the starter switch.



1 - Engine control unit
2 - Preheating button
3 - Instrument panel (preheating indicator lamp)
4 - Preheating device supply relay
5 - Preheating device
6 - Starting control relay
7 - Engine coolant temperature sensor

3.2 SHUTTLE CONTROL UNIT

The function of the shuttle control unit is to supervise the correct operation of the hydraulic shuttle and the HML system.

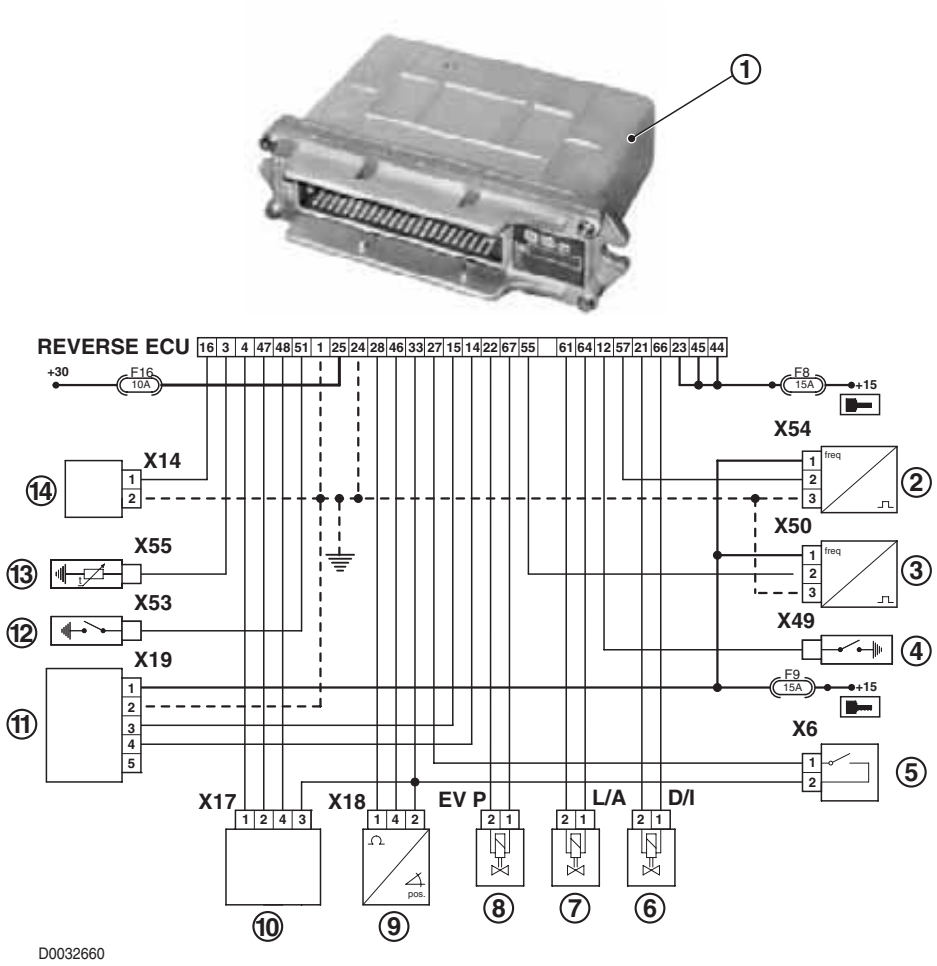
3.2.1 HYDRAULIC SHUTTLE ELECTRONIC CONTROL SYSTEM

The hydraulic shuttle system controls the engagement and disengagement of the clutch and inverts the drive direction of the gearbox input shaft automatically and in accordance with the commands received from the operator.

The control unit receives the drive direction signal from the operator control and, in accordance with the signals from the engine speed sensor and the wheel speed sensor, activates a proportional solenoid valve and a 3-position solenoid valve to engage the selected drive direction automatically.

Alternatively, the operator can override the automatic control and modulate drive engagement using the clutch pedal.

The control unit signals information regarding the operation of the system and any malfunctions on a display panel-mounted on the instrument panel.

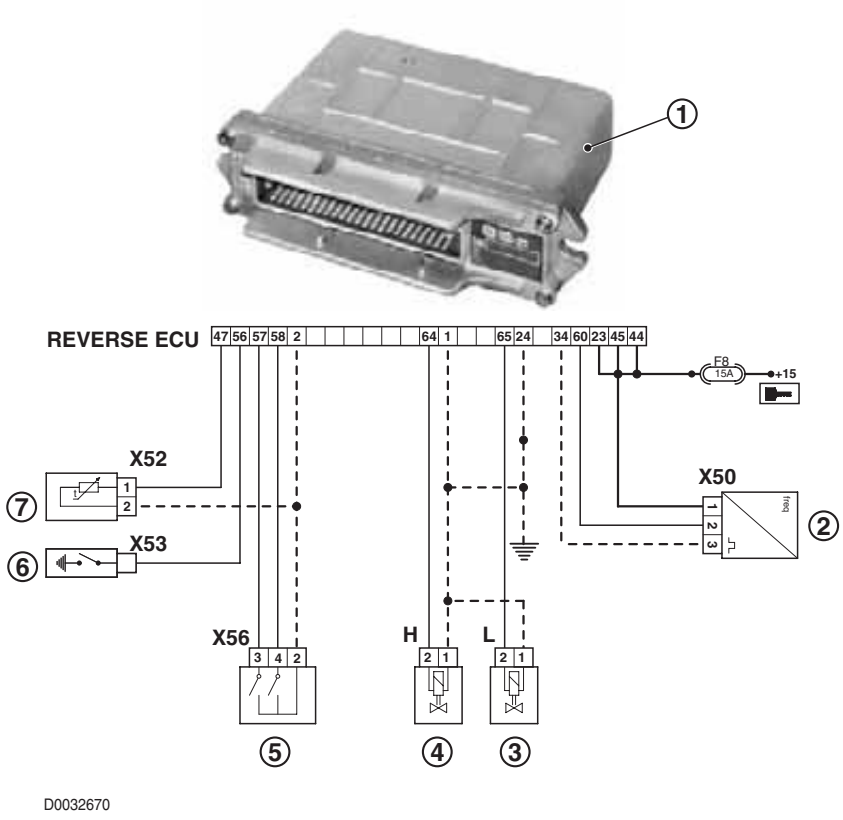


1 - Shuttle control unit
2 - Shuttle speed sensor
3 - Wheel speed sensor
4 - Services pressure switch
5 - Gear lever
6 - Direction selector solenoid valve
7 - L gear solenoid valve
8 - Shuttle engagement pilot solenoid valve
9 - Clutch pedal position sensor
10 - Shuttle levers
11 - Transmission display
12 - Proportional solenoid valve pressure switch
13 - Temperature sensor
14 - Buzzer

3.2.2 HML UNIT ELECTRONIC CONTROL SYSTEM

The electronic system controls the HML unit in accordance with the commands given by the operator via the increase and decrease speed buttons on the gear lever.

These commands determine whether the engine control unit energizes or de-energizes the H and L speed solenoid valves.



1 - Shuttle control unit
2 - Wheel speed sensor
3 - L speed solenoid valve
4 - H speed solenoid valve
5 - Gearbox lever
6 - Services pressure switch
7 - Temperature sensor

3.3 INSTRUMENT PANEL

The instrument panel installed on these tractors is designed and programmed to manage and display the information needed by the operator to control the operation of the tractor in various work conditions, displaying the performance values in real time and signal any faults detected by the ECU and transmission control unit by means of the display located on the right-hand side.

The instrument panel comprises a single unit which mounts three digital displays supplying information by means of a text message display and analogue instruments showing engine revs, fuel level, etc.

The instrument panel also features various indicator lamps signalling the operating status of various tractor systems or the presence of faults (e.g. clogged oil filter, etc.).

The instrument panel is also designed to control engine preheating when equipped with electronic governor.



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3.3.1 DESCRIPTION OF THE PREHEATING SYSTEM

The preheating system is managed by a logic system in the instrument panel housing and ensures that the engine starts correctly when the coolant temperature is below +30°C.

A special feature of the system is that the preheating cycle is enabled manually by the operator and only if the coolant temperature is below 30 °C.

The preheating cycle does not terminate with the starting of the engine, but continues for a certain time through a so-called postheating phase that heats the combustion air drawn into the engine in order to reduce the amount of white exhaust smoke typically produced during this stage.

The air drawn into the engine is preheated by a heating element (flange located on the intake manifold containing an electrical resistance).

The instrument panel, powered on when the starter key is turned, indicates the preheating operation by means of a yellow light, and ensures the system operation by means of a series of sensors and air preheating device.

The sensors connected to the control unit are as follows; the coolant temperature sensor (specific for the preheating system) and the alternator, which transmits the “W” signal, starter key (which transmits the engine start signal) and the “Preheating” pushbutton.

The preheating device is comprised of a relay feeding power to the heating element and the heating element itself.

3.3.2 OPERATION

Operation of the preheating device is manual and occurs only when the coolant temperature is below 30°C.

When the operator turns the key to "I" (ON) without starting the engine, the instrument panel reads the temperature of the coolant and, if this is less than +30°C, illuminates the yellow indicator light (flashing on)thereby alerting the operator that the engine should only be started on completion of the preheating phase.

The operator can then choose to start the engine, or press the “preheating” pushbutton and wait approximately 10 seconds for the preheating phase to terminate.

On termination of the preheating phase, the operator can start the engine and, as soon as it receives the W signal from the alternator, the control unit starts the postheating phase (flashing yellow light).

The duration of the postheating phase can vary between 35 seconds to a maximum of 320 seconds, depending on the temperature of the coolant.

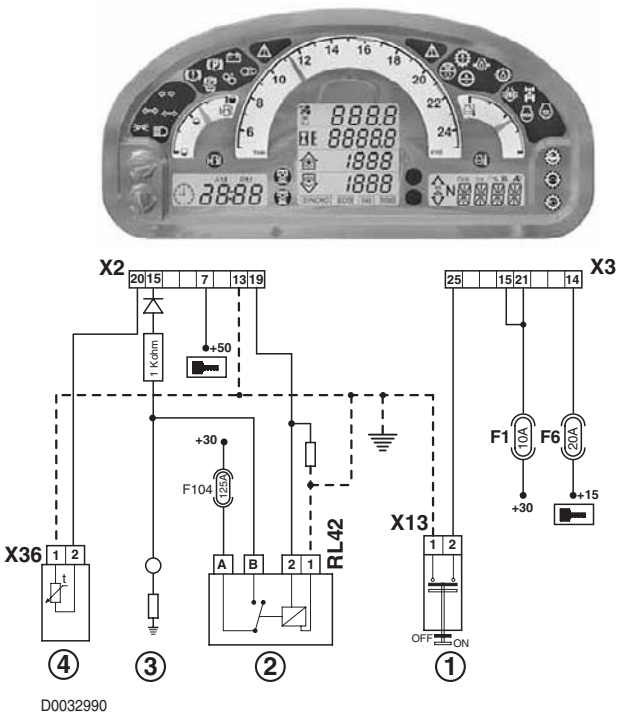
NOTE

The control unit activates the postheating phase only after receiving the engine running signal, which is associated with the battery charging warning light (W signal).

If the red battery charging warning light does not go out, due, for example, to the engine idle speed being too low, the postheating phase will not be activated.

If the engine start attempt is unsuccessful, in order to repeat the start procedure the operator must return the starter key to "*O*" (OFF) and then repeat the procedure from the beginning.

The instrument panel features a self-diagnostic function and in the event of malfunctioning of the components it manages it informs the operator of the fault by means of a coded message shown on the right-hand display.



1 - Preheating button
2 - Preheating device supply relay
3 - Preheating device
4 - Engine coolant temperature sensor.

3.4 ELECTRONIC LIFT CONTROL UNIT

The electronic system controls the lift in accordance with the commands received and the operating mode selected by the operator using the control panel on the right-hand side of the driving seat.

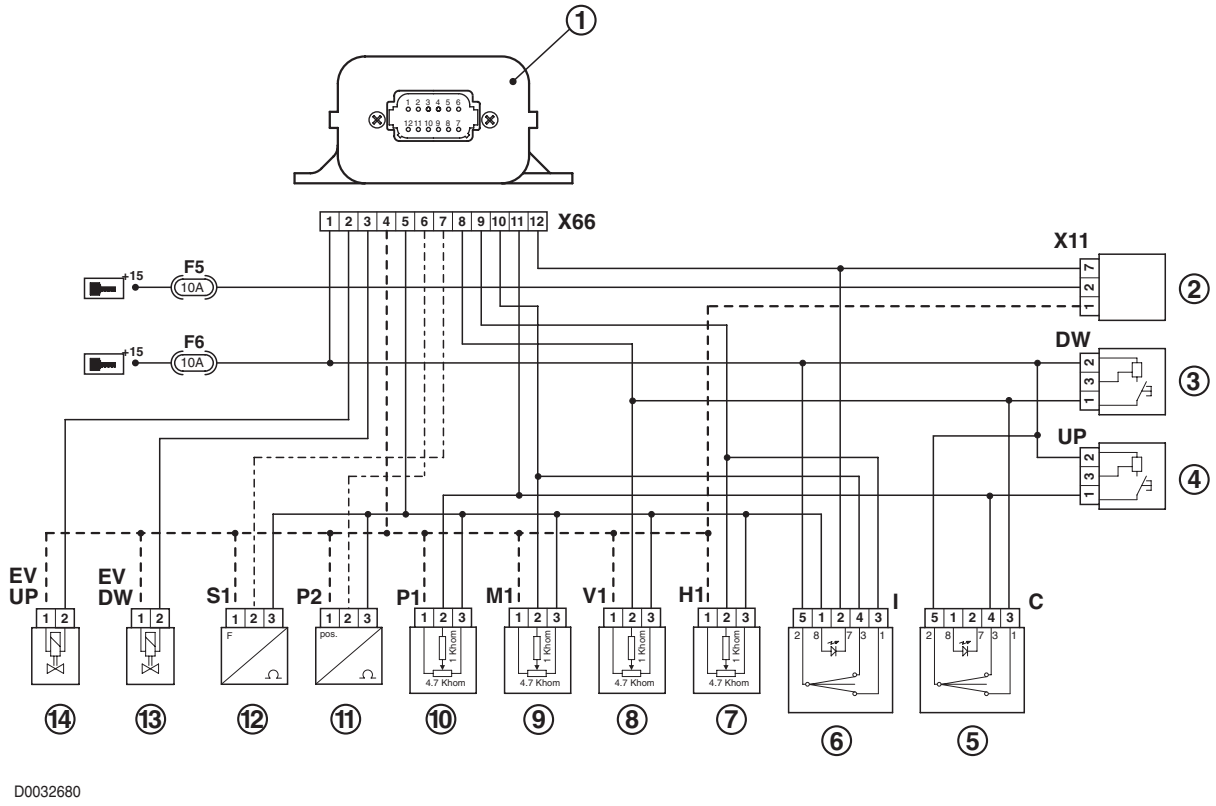
The operator can select different control types:

- position control
- draft control.

The system compares the command given by the operator with the signals received from the position sensor and draft sensor and executes the command by operating a control valve equipped with two proportional solenoid valves.

The control valve directs oil at high pressure to a hydraulic cylinder that raises or lowers the implement connected to the lift.

For more detailed information on the operation of the power lift, see the use and maintenance manual for the specific tractor.



1 - Lift control unit
2 - Diagnostic socket
3 - Lift "Down" pushbutton
4 - Lift 'Up' pushbutton
5 - Lift control pushbutton
6 - Lift up / down switch
7 - Maximum height potentiometer
8 - Rate of drop potentiometer
9 - Draft/position adjustment potentiometer
10 - Position adjustment potentiometer
11 - Position sensor
12 - Draft sensor
13 - Lift Down solenoid valve
14 - Lift Up solenoid valve

3.5 CANBUS SYSTEM

The CANBUS network is a communication system that allows information to be exchanged between two or more electronic control units in the form of "digital messages", i.e. suitably encoded information that is transmitted over the network and used by other control units to allow the relative data to be exchanged.

Some examples of the type of information sent over the CANBUS are the current draw of a solenoid, the engine rpm or, more simply, the status of a pressure switch or pushbutton.

In this way electronic management is possible of a greater number of systems using a smaller number of sensors than with a conventional system, while simplifying the wiring and making troubleshooting quicker and easier.
Each control unit is programmed so that it only reads the data related to the system it manages and disregards all other information.

On the tractors in this series, the CANBUS interconnects the following control units:

1 - transmission control unit
2 - supplementary CANBUS socket.
3 - engine control unit
4 - instrument panel

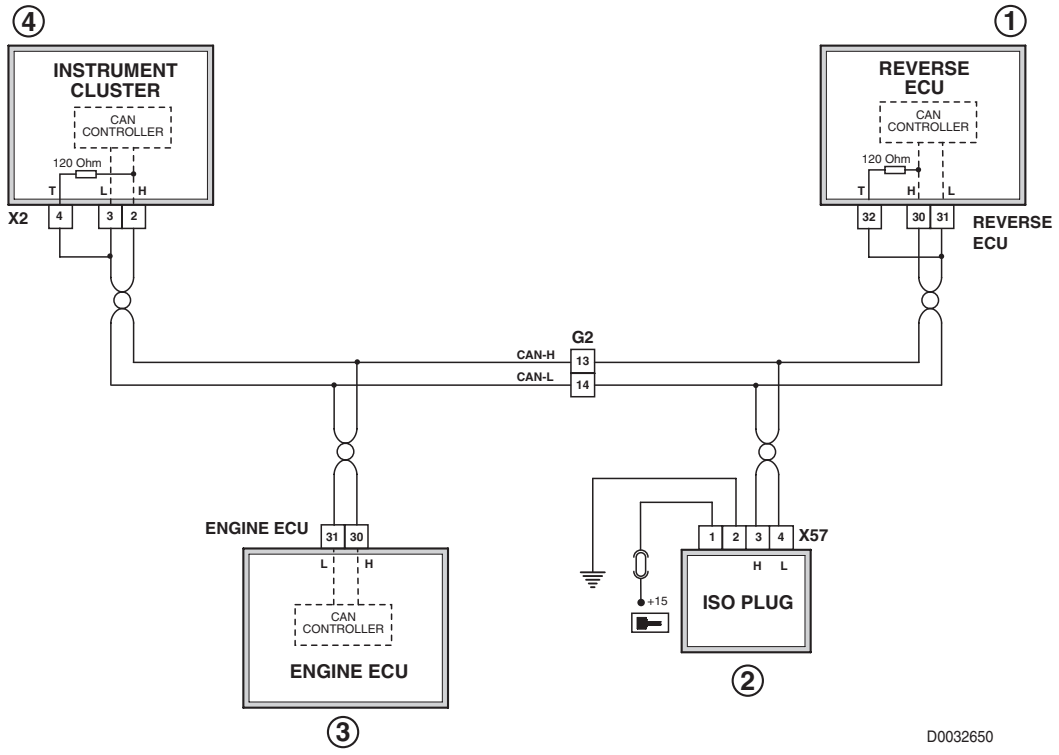
The CANBUS physically consists of a pair of twisted wires, called CAN H and CAN L, on which the digital messages are transmitted.

The digital messages are generated by a "differential" voltage system that provides a high degree of immunity to any electromagnetic interference from on-board sources.

The CANBUS wires interconnect the armrest and the instrument panel, thereby forming the basic network to which all the other control units are connected in parallel.

The armrest and the instrument panel may be designated "termination" control units (i.e. they form the "terminations" of the network). Both these control units are connected via the CANBUS wires to a 120 Ohm resistor.

The entire network therefore has a total resistance of 60 Ohm created by two 120 Ohm resistors in parallel.



4. COMMISSIONING THE TRACTOR

4.1 INTRODUCTION

This chapter contains all the information required to establish or restore correct operation of the tractor's various electronic systems.

Whenever an electronic control unit of the tractor is changed or a calibration-sensitive electronic component replaced, the tractor must be recomissioned.

The necessary procedures must be carried out by a skilled technician, who in turn must follow the instructions in the manual precisely.

4.2 RENEWAL OF ENGINE CONTROL UNIT

NOTE
These procedures refer to tractors with the EURO2 engine fitted with the control unit P/N 2.8519.054.0 with EC0054AH software version and glowplug as preheating device.

Each time the engine control unit is renewed, the Technician must carry out these operations:

1 - Set installed engine type
2 - Calibrate hand throttle
3 - Calibrate accelerator pedal
4 - Configuring of preheating type.
5 - Configuration of wheels parameter (only for machines type approved for 30 km/h)
6 - Calibrating idle speed
7 - Cancelling alarms

To perform the configuration and calibration procedures, connect the ART to the connector on the left-hand side of the instrument panel,then select the engine control unit from the “AVAILABLE TESTS” menu and proceed as described.

4.2.1 SETTING THE TYPE OF ENGINE INSTALLED

1 - From the main menu, press “*1*” to bring upthe “ENGINE” menu.

				M	A	I	N		M	E	N	U		
1		E	N	G	I	N	E							
2		H	M	L										
3		P	R	E	H	E	A	T	I	N	G			
4		A	L	A	R	M	S							
5		C	A	L	I	B	.	R	U	O	T	E		
6		W	H	E	E	L	S							
7		P	T	O										
					S	E	L	E	C	T	_			
					E		E	X	I	T				

2 - From the “ENGINE” menu, press “*1*” to bring up the “CONFIGURATION” menu.

```
                ENGINE
1 CONFIGURATION
2 CALIBRATION
3 MONITOR
                SELECT_
                E EXIT
```

3 - From the “CONFIGURATION” menu, press “*1*” to bring up the “ENGINE TYPE” menu.

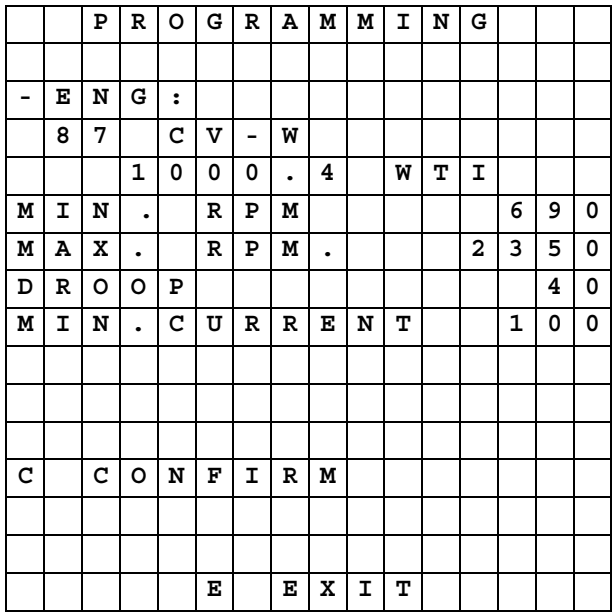
```
          CONFIGURATION
1 ENGINE TYPE
2 HAND THROT. CA
3 ACC. PEDAL CAL
4 IDLE SPEED CAL
                SELECT_
                E EXIT
```

4 - In the “ENGINE TYPE” menu, press “*0*” to reach the “*EURO 2*” engine screen, then selectthe correct engine for the tractor to be configured according to the following table.

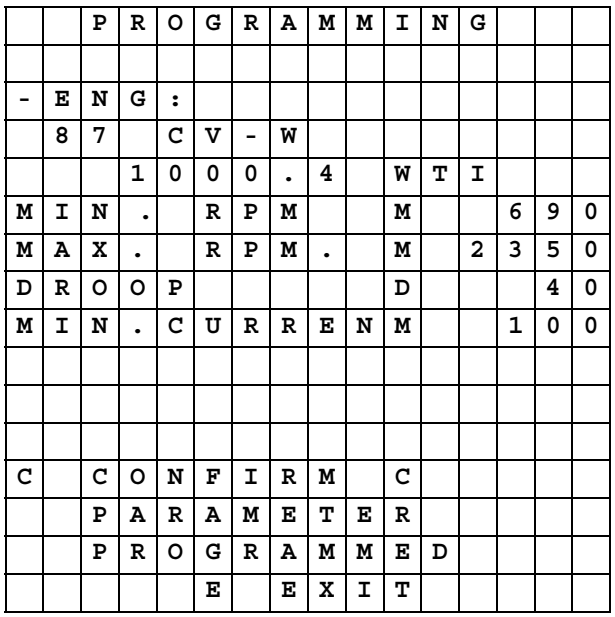
Engine Power	*Description on ART*
66 HP	66 HP (3C-D_IDR)
76 HP	74 HP (4C-BF75)
86 HP	95-84 CV (4C-D100)

```
          ENGINE TYPE
          EURO 1
1 - 55 A/W -- 60 W
2 - 63 A/63 -- W
3 - 67 CV -- A(3C)
4 - 70 CV -- W(4C)
5 - 70 CV -- W(3C)
6 - 75 AV 4C(DO)
7 - 80 CV -- W(GO)
8 - 80 CV -- W(25Y)
9 - 85 CV -- A(GO)
0 - OTHER
                SELECT_
                E EXIT
```

5 - After selecting the correct engine, a screen will appear showing the information for that type of engine. Then press "*C*" to confirm the selection or press "*E*" tocancel the operation.

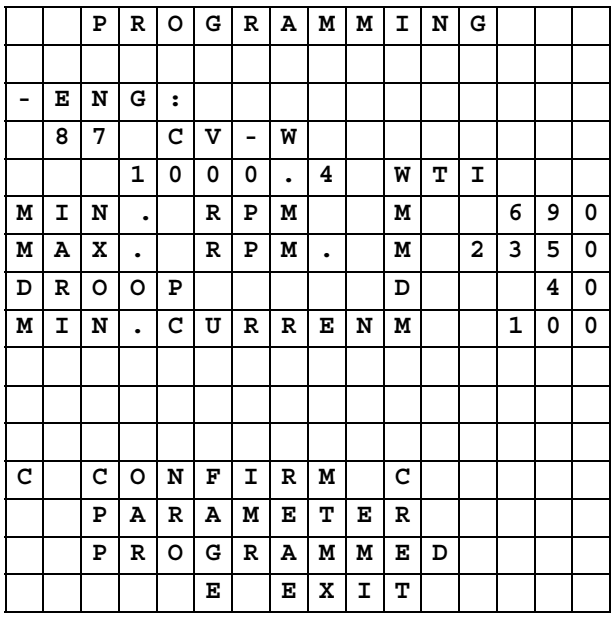


6 - If you press "*C*", a message will be displayed confirming thethe engine type information has been saved.
Press "*E*" to go back to the "CONFIGURATION" menu and proceed with calibration of the hand throttle starting from point 3.

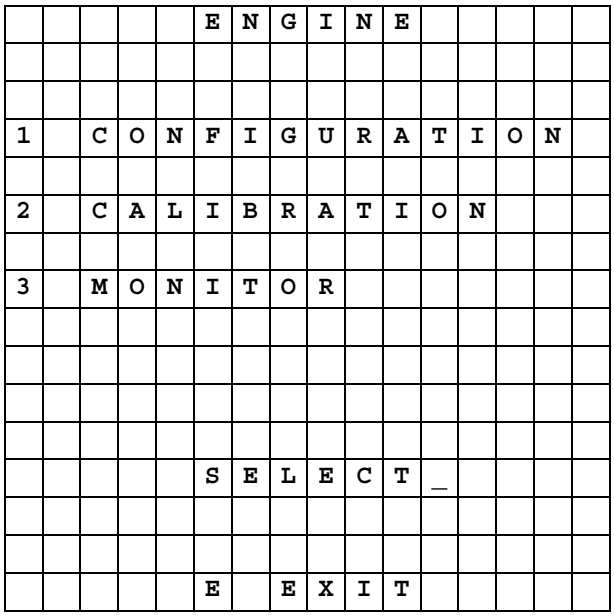


4.2.2 CALIBRATING THE HAND THROTTLE

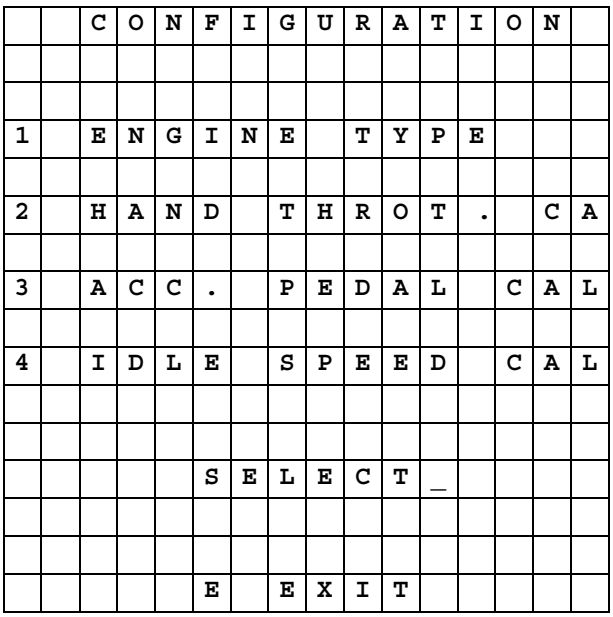
1 - From the "MAIN" menu, press "*1*" to bring up the "ENGINE" menu.



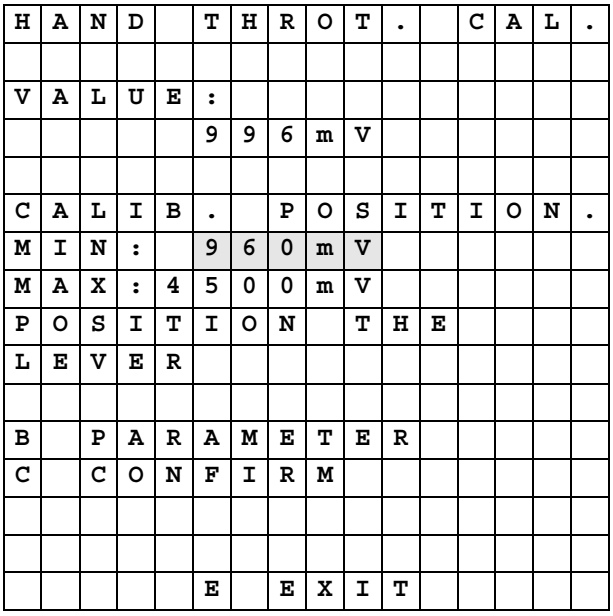
2 - From the “ENGINE” menu, press “*1*” to bring up the “CONFIGURATION” menu.



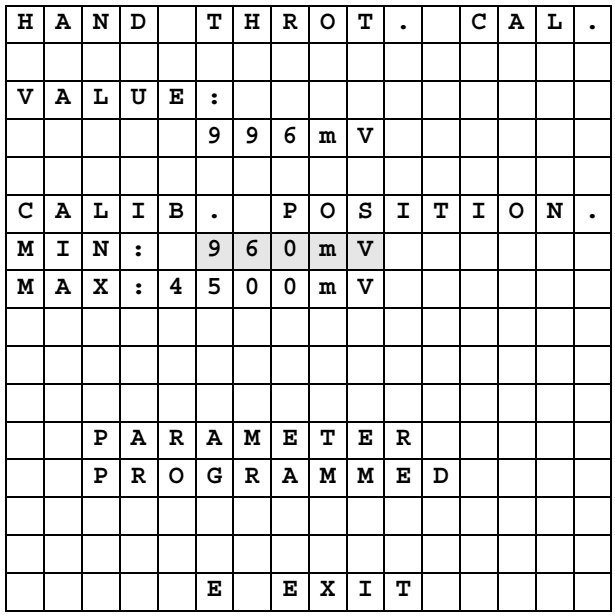
3 - From the “CONFIGURATION” menu, press “*2*” to bring up the “HAND THROTTLE CALIBRATION” menu.



4 - Press “*B*” to select the “MIN” value corresponding to the position of the throttle lever on maximum.

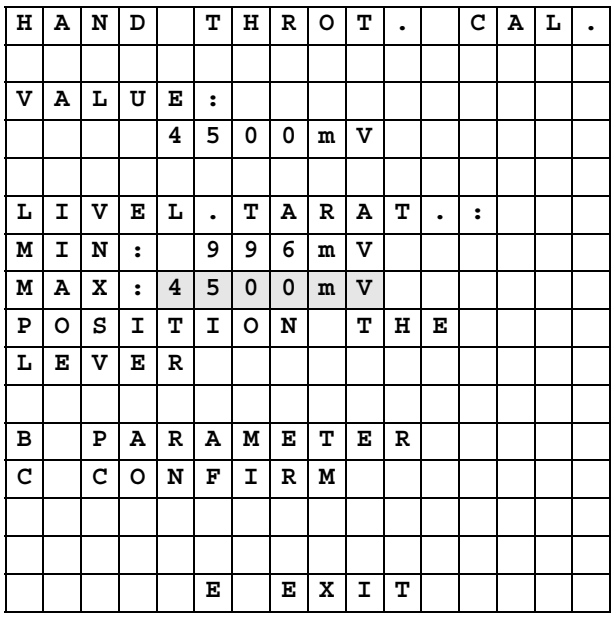


5 - Move the throttle lever to maximum and press "*C*" to confirm the value.



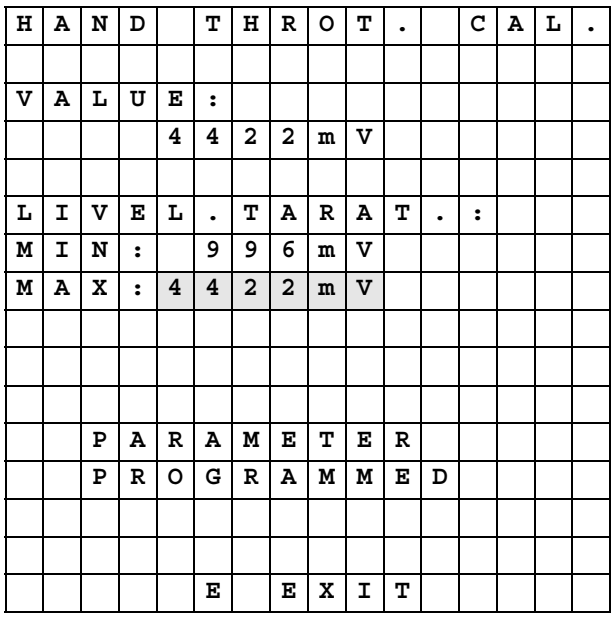
6 - Press "*B*" to select the "MAX" value corresponding to the position of the throttle lever on minimum.

NOTE.
The control unit maximum acceptable value is 4600 mV. Always set a slightly lower value.



7 - Move the throttle lever onto minimum and press "*C*" to confirm.

8 - Press "*E*" to go back to the "CONFIGURATION" menu and then calibrate the accelerator pedal starting from point 3.



4.2.3 CALIBRATING THE accelerator pedal

1 - From the “MAIN” menu, press “*1*” to bring up the “ENGINE” menu.

```
                MAIN MENU
1 ENGINE
2 HML
3 PREHEATING
4 ALARMS
5 CALIB.RUOTE
6 WHEELS
7 PTO
          SELECT_
          EXIT
```

2 - From the “ENGINE” menu, press “*1*” to bring up the “CONFIGURATION” menu.

```
               ENGINE
1 CONFIGURATION
2 CALIBRATION
3 MONITOR
          SELECT_
          EXIT
```

3 - From the “CONFIGURATION” menu, press “*3*” to bring up the “AC. PEDAL CAL” menu.

```
 CONFIGURATION
1 ENGINE TYPE
2 HAND THROT. CA
3 ACC. PEDAL CAL
4 IDLE SPEED CAL
          SELECT_
```

4 - Press "*B*" to select the "MAX." value corresponding to the position of the accelerator pedal fully pressed down.

		C	A	L	I	B	R	.	P	E	D	A	L	
V	A	L	U	E	:									
				1	1	5	2	m	V					
C	A	L	I	B	.		P	O	S	I	T	I	O	N
M	A	X	:	3	9	9	4	m	V					
M	I	N	:	1	1	9	1	m	V					
B		P	A	R	A	M	E	T	E	R				
C		C	O	N	F	I	R	M						
					E		E	X	I	T				

5 - Press the accelerator pedal fully down and press "*C*" to confirm.

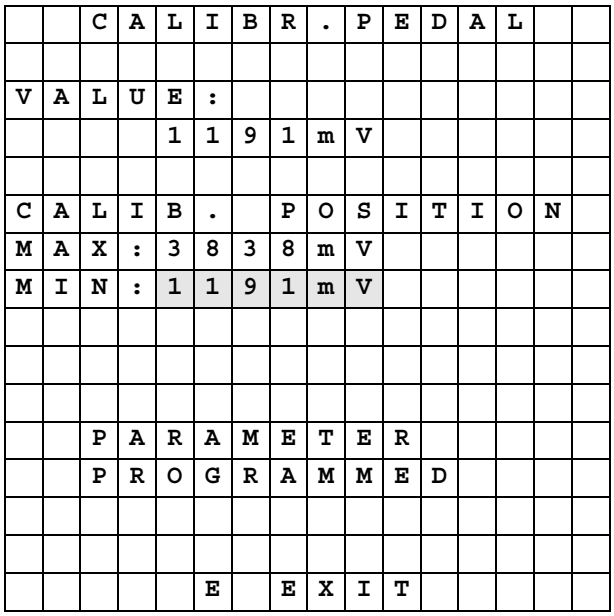
		C	A	L	I	B	R	.	P	E	D	A	L	
V	A	L	U	E	:									
				3	8	3	7	m	V					
C	A	L	I	B	.		P	O	S	I	T	I	O	N
M	A	X	:	3	8	3	7	m	V					
M	I	N	:	1	1	9	1	m	V					
		P	A	R	A	M	E	T	E	R				
		P	R	O	G	R	A	M	M	E	D			
					E		E	X	I	T				

6 - Press "*B*" to select the "MIN." value corresponding to the position of the accelerator pedal released.

		C	A	L	I	B	R	.	P	E	D	A	L	
V	A	L	U	E	:									
				1	1	5	2	m	V					
C	A	L	I	B	.		P	O	S	I	T	I	O	N
M	A	X	:	3	8	3	7	m	V					
M	I	N	:	1	1	9	1	m	V					
B		P	A	R	A	M	E	T	E	R				
C		C	O	N	F	I	R	M						
					E		E	X	I	T				

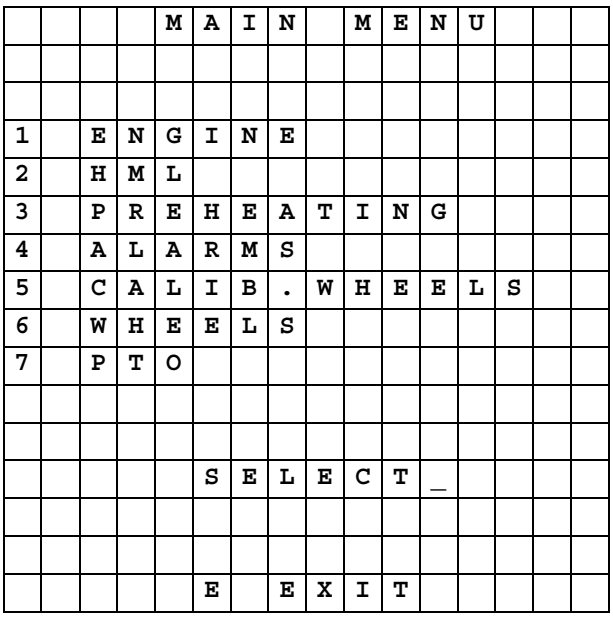
7 - Make sure the accelerator pedal is in the rest position and press "*C*" to confirm.

8 - Press "*E*" three times to go back to the "MAIN MENU" and then calibrate the idle speed starting from point 1 (see heading "4.2.6 CALIBRATING IDLE SPEED").

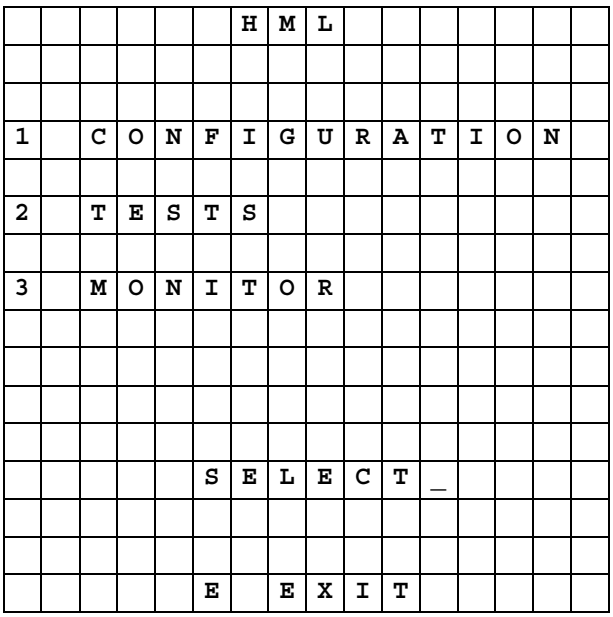


4.2.4 CONFIGURING THE TYPE OF PREHEATING

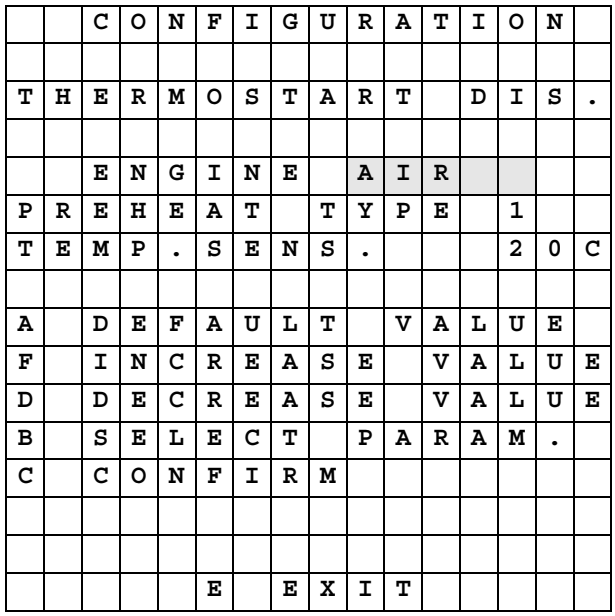
1 - From the main menu, press "*3*" to bring up the "PREHEATING" menu.



2 - From the "PRE-HEATING" menu, press "*1*" toto bring up the "CONFIGURATION" menu.

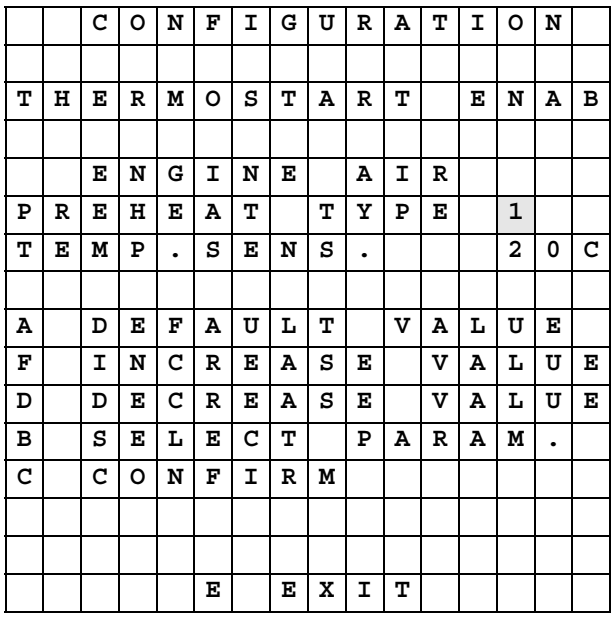


3 - Press “*B*” once to select the THERMO START parameter



4 - Press “*F*” to change the setting from DIS. to ENAB.

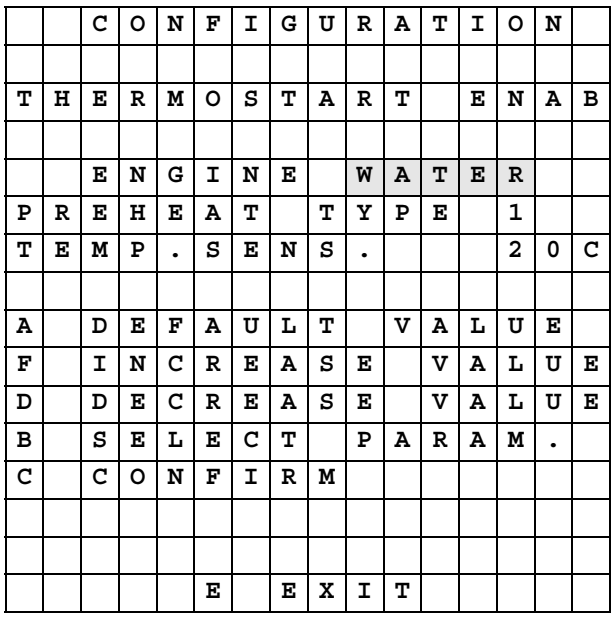
5 - Press “*C*” to confirm the configuration.



6 - Press “*B*” to select the “ENGINE” parameter”.

7 - Press “*F*” to change the setting from AIR to WATER.

8 - Press “*C*” to confirm the configuration.

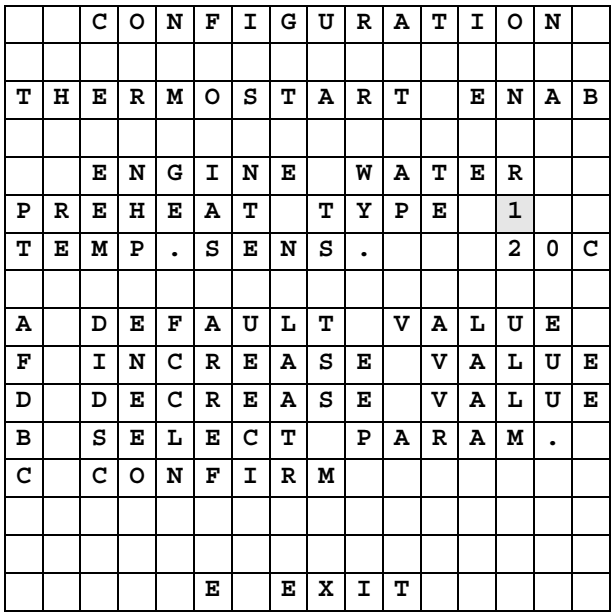


9 - When the preset type of preheating is different from 2, press "*B*" to select the "PREHEATING TYPE" parameter.

10 - Press "*F*" to change the setting from 1 to 2.

11 - Press "*C*" to confirm the configuration.

12 - Press "*E*" twice to go back to the main menu and then configure the wheels parameter (see heading "4.2.5 WHEELS PARAMETER CONFIGURATION").

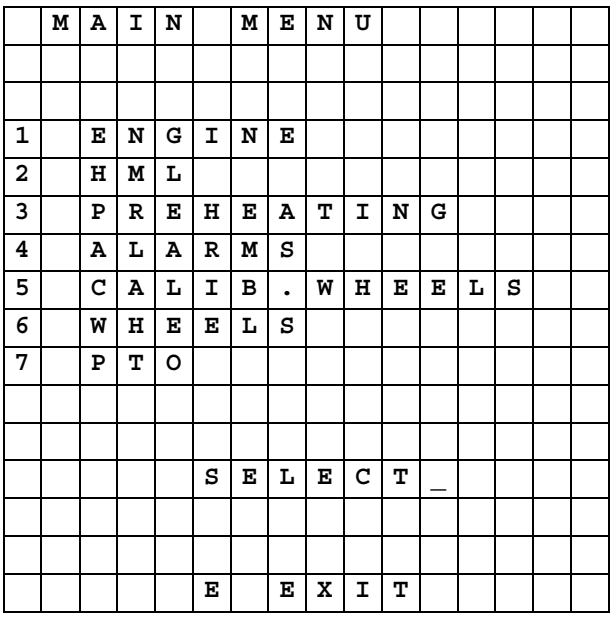


4.2.5 WHEELS PARAMETER CONFIGURATION

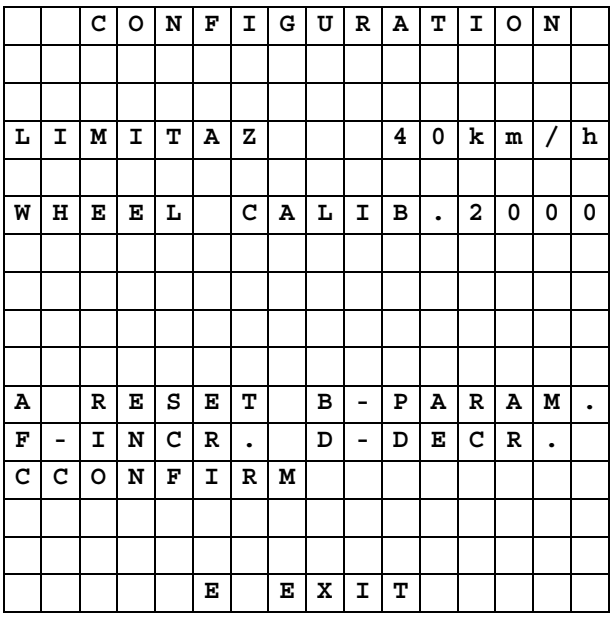
NOTE. This configuration must be made only for tractors type approved for 30 km/h.

1 - From the main menu, press "*0*" or "*5*" to bring up the "PASSWORD" menu.

2 - From the "PASSWORD" menu press in sequence "0 - 6 - 6 - 6" to display the "MAIN" menu.



3 - Press "*B*" once to select the "LIMITAZ" parameter.



4 - Press “*D*” once to change the setting from "40 km/h" to "30 km/h".

5 - Press “*C*” to confirm the parameter.

		C	O	N	F	I	G	U	R	A	T	I	O	N
L	I	M	I	T	A	Z				3	0	k	m	/	h
W	H	E	E	L		C	A	L	I	B	.	x	x	x	x
A		R	E	S	E	T		B	-	P	A	R	A	M	.
F	-	I	N	C	R	.		D	-	D	E	C	R	.	
C	C	O	N	F	I	R	M								
					E		E	X	I	T					

6 - Press “*B*” to select the “WHEEL CALIB.” parameter and press “*A*”.

		C	O	N	F	I	G	U	R	A	T	I	O	N
L	I	M	I	T	A	Z				3	0	k	m	/	h
W	H	E	E	L		C	A	L	I	B	.	x	x	x	x
A		R	E	S	E	T		B	-	P	A	R	A	M	.
F	-	I	N	C	R	.		D	-	D	E	C	R	.	
C	C	O	N	F	I	R	M								
					E		E	X	I	T					

7 - Press the “WHEELS” parameter and enter the “K” value corresponding to the tyre fitted on the rear of the tractor.

8 - Press “*C*” to confirm the parameter.

9 - Press “*E*” twice to go back to the main menu.

Tyre	*Constant (K)*
12.4R-36”	3060
13.6R-36”	2955
14.9R-28”	3309
14.9R-30”	3177
16.9R-30”	3039
420/70R-28”	3309
420/70R-30”	3177
480/70R-30”	3039
540/65R-28”	3153
540/65R-30”	3039

4.2.6 CALIBRATING IDLE SPEED

1 - Start up the engine and wait for it to reach a temperature of between 70 and 78 °C (to check the engine temperature, press "*1*" from the "MAIN" menu and then press "*3*" for the monitor screen).

2 - From the "MAIN" menu, press "*1*" to bring up the "ENGINE" menu.

```
                MAIN MENU
1 ENGINE
2 HML
3 PREHEATING
4 ALARMS
5 CALIB. WHEELS
6 WHEELS
7 PTO
                SELECT_
                EXIT
```

3 - From the "ENGINE" menu, press "*1*" to bring up the "CONFIGURATION" menu.

```
                ENGINE
1 CONFIGURATION
2 CALIBRATION
3 MONITOR
                SELECT_
                EXIT
```

4 - From the "CONFIGURATION" menu, press "*4*" to bring up the "IDLING SPEED CALIBRATION" menu.

```
          CONFIGURATION
1 ENGINE TYPE
2 HAND THROT. CA
3 ACC. PEDAL CAL
4 IDLE SPEED CAL
                SELECT_
                EXIT
```

5 - Make sure that all the electric services (lights, etc.) and hydraulic services (PTO, etc.) are turned off and that the throttle lever is on minimum.

```
   IDLE SPEED
-DEACTIVATE VALUES
-SWITCH OFF CAB
 VENTILATION
-ENGINE OIL TEMP
 70/78
C CONFIRM
---MONITOR-----
ENGINE RPM 650
RPM DIFF.  85
```

6 - Accelerate the engine a few times, then leave it idling and, when the “SPEED DELTA” value falls under “40”, press “*C*” to confirm.

NOTE.
The “SPEED DELTA” *must be* below 40.
The lower the value selected the smoother the engine will run at idle speed.

7 - Press “*E*” three times to go back to the main menu then configure for the the presence of the HML unit (see heading “4.2.4 PREHEATING TYPE CONFIGURATION”).

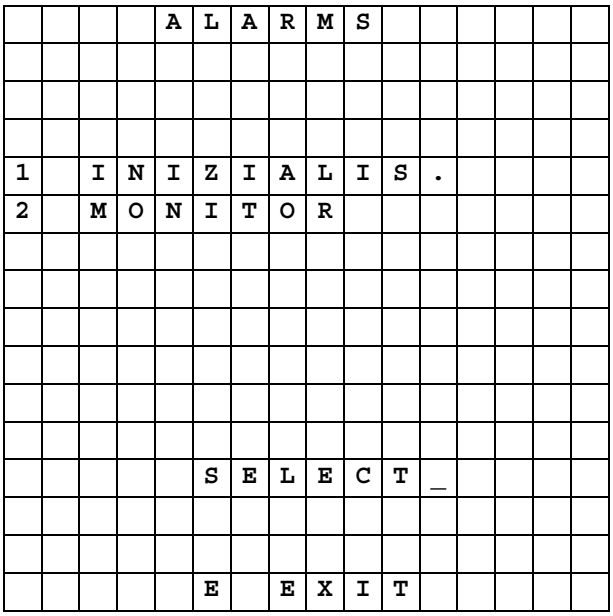
```
   IDLE SPEED
-DEACTIVATE VALUES
-SWITCH OFF CAB
 VENTILATION
-ENGINE OIL TEMP
 70/78
C CONFIRM
---MONITOR-----
ENGINE RPM 650
RPM DIFF.  27
   PARAMETER
   PROGRAMMED
   EXIT
```

4.2.7 CANCELLING ALARMS

1 - From the main menu, press “*4*” to bring up the “ALARMS” menu.

```
  MAIN MENU
1 ENGINE
2 HML
3 PREHEATING
4 ALARMS
5 BELTS
6 WHEELS
7 PTO
   SELECT_
   EXIT
```

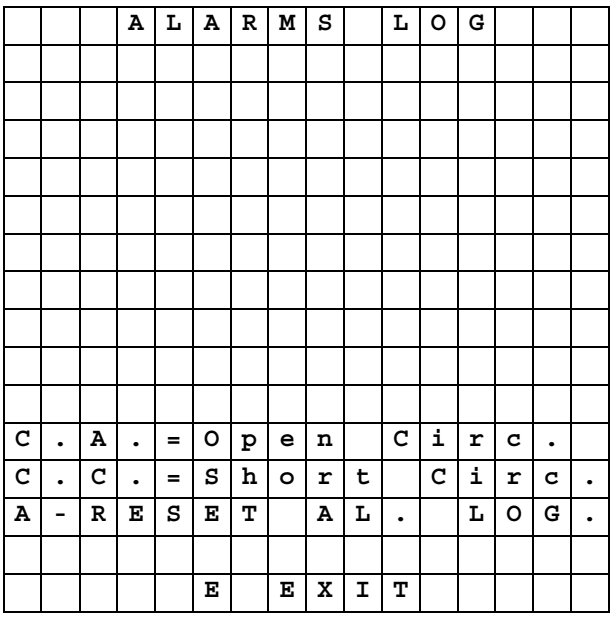
2 - From the “ALARMS” menu, press “*2*” to bring up the “ALARM LOG” menu.



3 - Press “*A*” to delete the list of alarms.

4 - Press “*E*” to go back to the main menu.

5 - Turn the starter key onto *O* (OFF) and then back onto *I* (ON) and repeat the procedure of points 3 and 4 to check whether there are still any alarms.



4.3 RENEWAL OF THE SHUTTLE CONTROL UNIT

Each time the shuttle control unit is renewed, the technician must carry out the following operations:

1 - initialization of the control unit;
2 - calibration of the clutch pedal;
3 - configuration of optional equipment;
4 - clearing alarms;
5 - automatic calibration of the shuttle clutches;
6 - manual calibration of the shuttle clutches;
7 - calibration of the HML clutches (for versions with HML only).

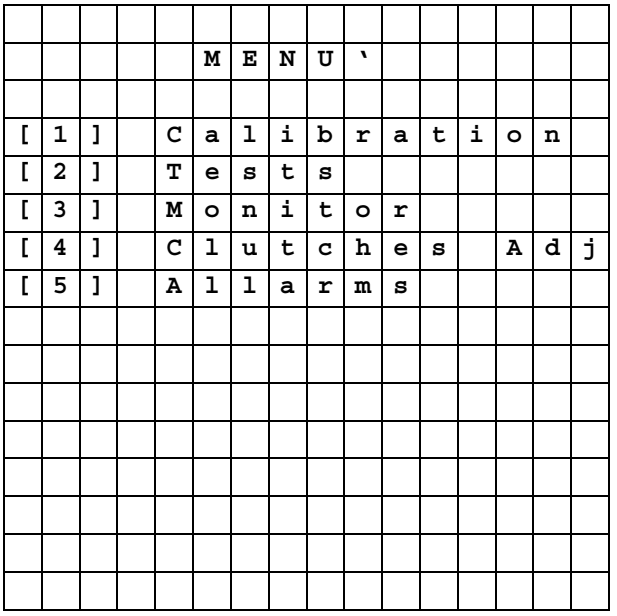
To perform these operations, connect the ART to the connector on the left-hand side of the instrument panel, select the shuttle control unit from the “AVAILABLE TESTS” menu and proceed as described below.

Initialization of the control unit, clutch pedal calibration and optional device configuration operations that are necessary following renewal of the ECU or the EPROM must be carried out with the engine stopped and the main gear and range gear levers in neutral.

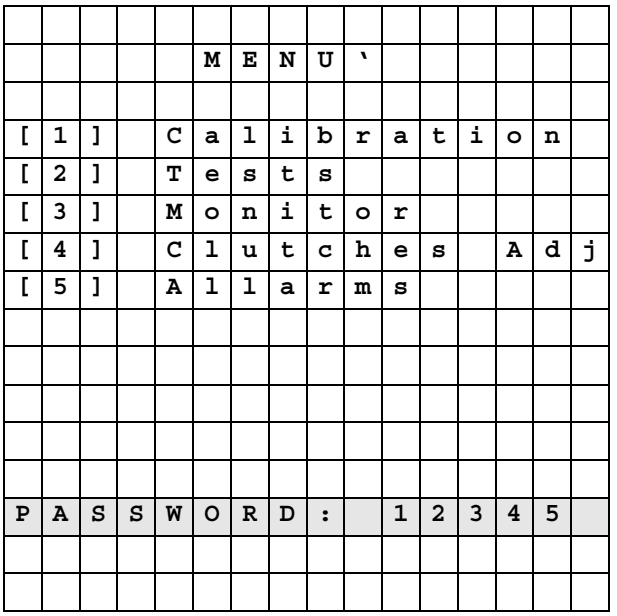
4.3.1 INITIALIZATION OF THE CONTROL UNIT

NOTE
This procedure must be carried out each time the complete control unit or the EPROM are renewed.

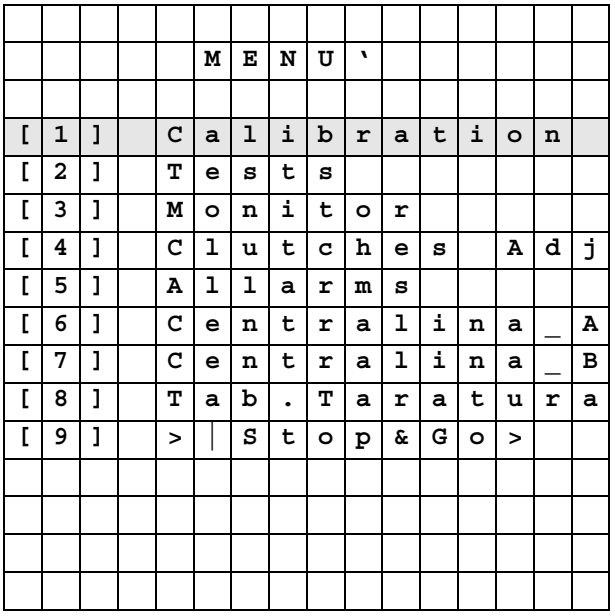
1 - From the main menu, press “*0*” to display the password prompt.



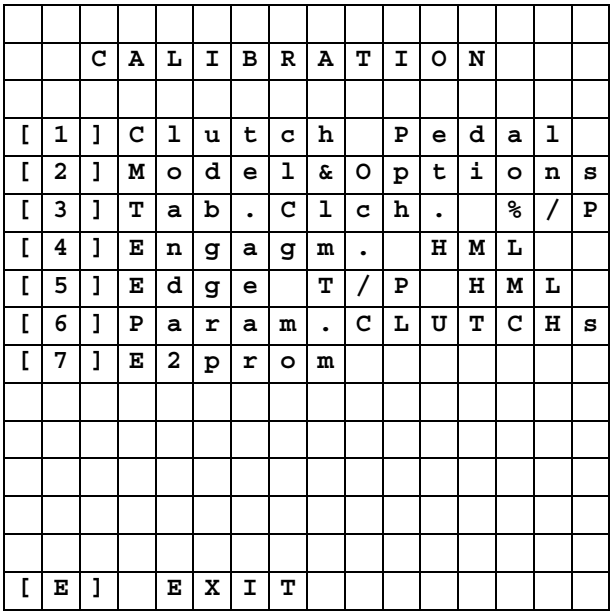
2 - Press in sequence “*1-2-3-4-5*”.



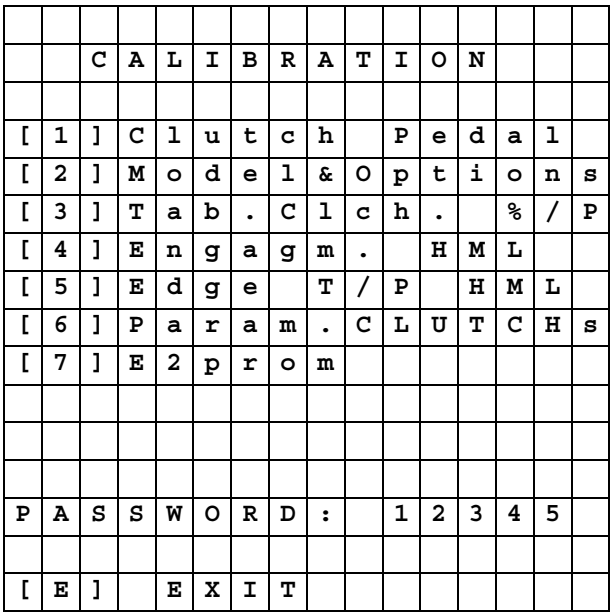
3 - Press "*1*" to access the "CALIBRATIONS" menu.



4 - From the "CALIBRATIONS" menu press "*0*" to display the password prompt.



5 - Press in sequence "*1-2-3-4-5*" and wait for the screen to be changed.
6 - Turn the starter key to "*O*" (OFF) and then back to "*I*" (ON) and proceed with the model configuration.



7 - The control unit initialization procedure was performed correctly if the value “Current – 000%” is “095” and the value “Current – 100%” is “190”.

NOTE
If the values are incorrect, it will be necessary to repeat the initialization procedure.

```
CLUTCH PED.CALIB

Push to the pedal
the [B] to store
the 0%, then the
release the pedal
and push [A] to
store the 100% !

Actual-000%-095
Mis.sensore->175
Actual-100%-190

[E] EXIT
```

4.3.2 GEARBOX TYPE CONFIGURATION

NOTE

This procedure must be carried out each time the complete control unit or the EPROM are renewed.

1 - From the main menu, press “*1*” to bring up the “CALIBRATIONS” menu.

```
MENU

[1] Calibration
[2] Tests
[3] Monitor
[4] Clutches Adj
[5] Allarms
```

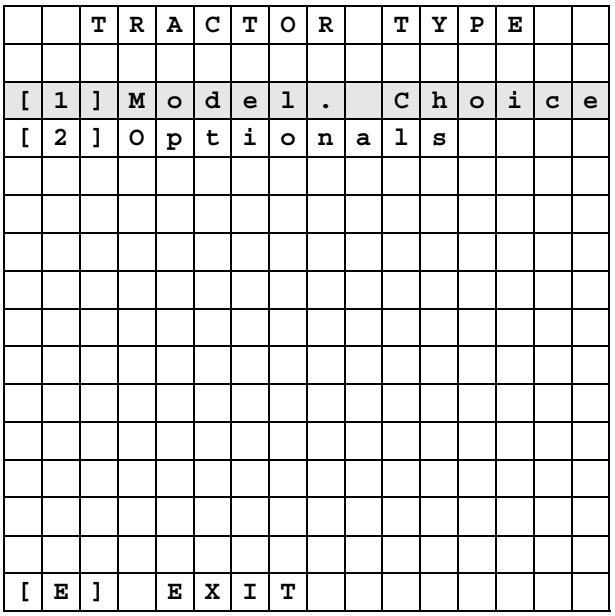
2 - From the “CALIBRATION” menu press “*2*” to bring up the “Model&Option” menu.

```
CALIBRATION

[1] Clutch Pedal
[2] Model&Options

[E] EXIT
```

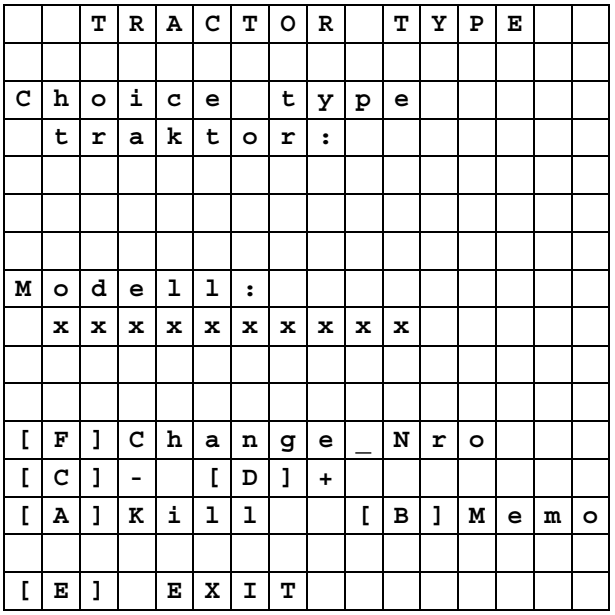
3 - From the “TRACTOR MODEL” menu press “*1*” to bring up the “Model Selection” menu.



4 - From the “Model Selection” menu press “*B*” or “*D*” to select the correct model.

Engine	*Gearbox*	*On the ART*
Mechanical Governor	20+10 speeds	5 X 2 + MINI
	30+15 speeds	5 X 3 + MINI
	45+45 speeds	5 X 3 + HML
Electronic governor	45+45 speeds	5 X 3 ECO

5 - Press “*B*” to save the data.

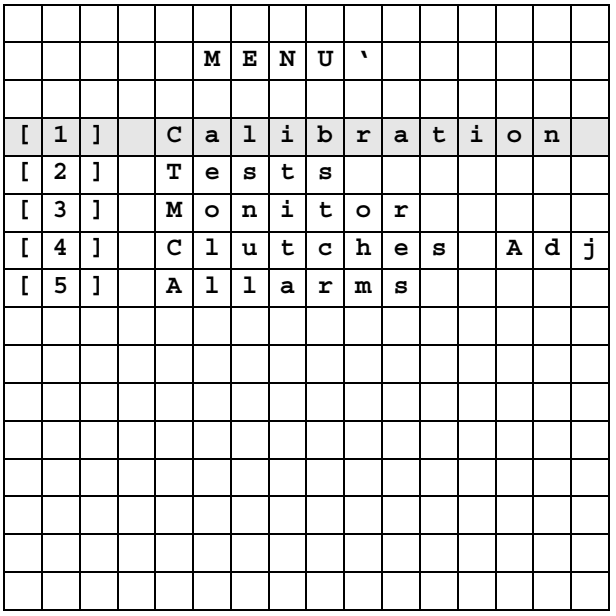


4.3.3 CLUTCH PEDAL CALIBRATION

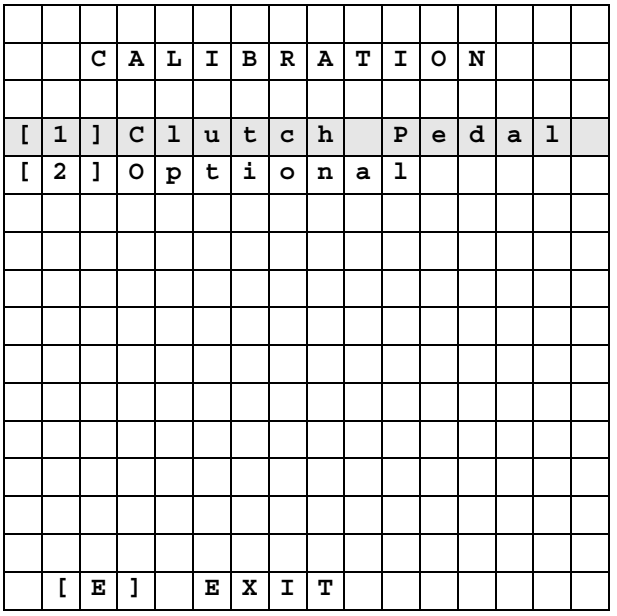
NOTE

This procedure must be carried out each time the complete control unit or the EPROM are renewed.

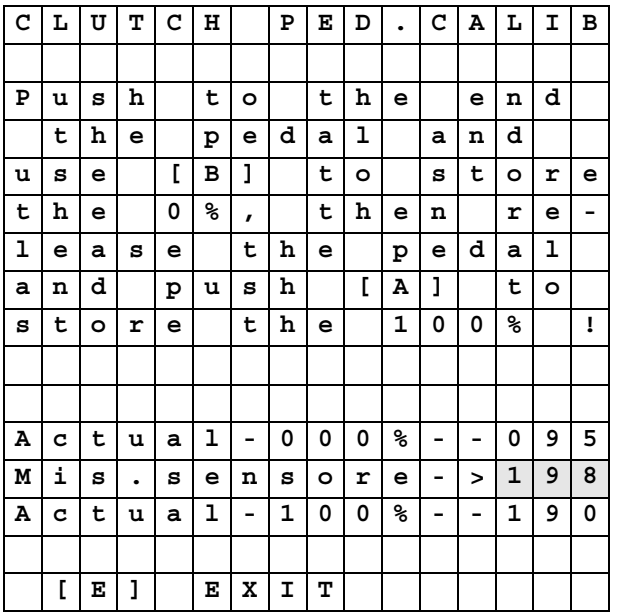
1 - From the main menu, press "*1*" to bring up the "CALIBRATIONS" menu.



2 - From the "CALIBRATIONS" menu press "*1*" to bring up the "CLUTCH PEDAL" menu.

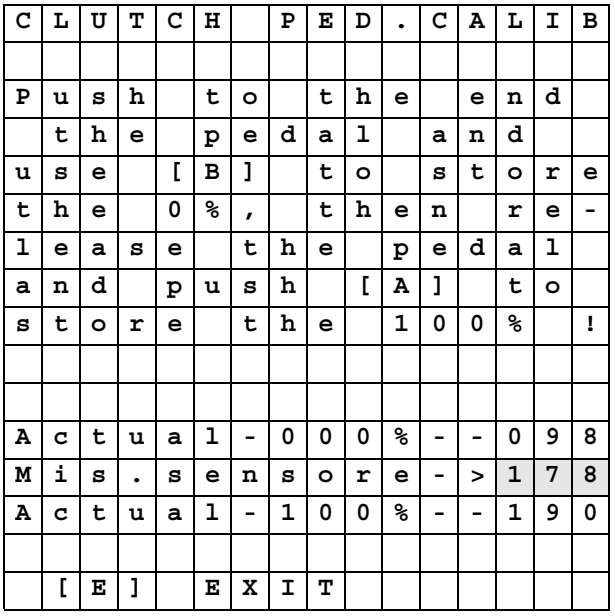


3 - Fully depress the clutch pedal and press"*B*" to save the value in the memory (as you press the pedal, the "Sensor measurement" value should decrease accordingly).



4 - Fully release the clutch pedal and press "*A*" to save the value (as the pedal is released, the "Sensor measurement" value should increase accordingly).

5 - If the EPROM or the complete control unit were renewed, proceed with the "OPTIONAL EQUIPMENT CONFIGURATION (4.3.4)" starting from point 2.

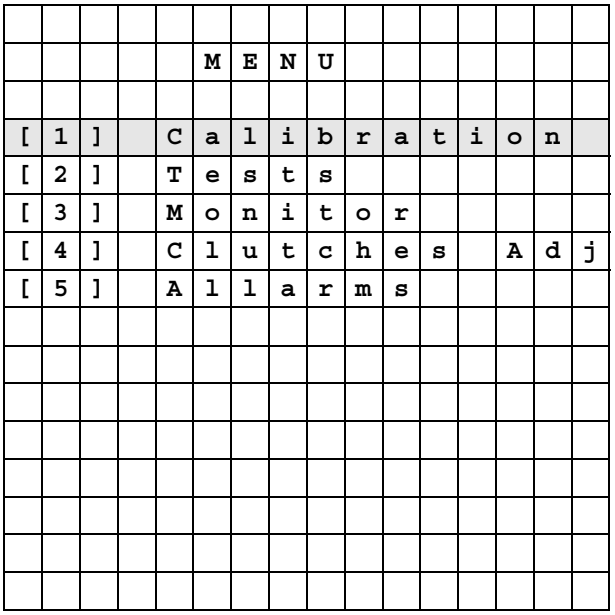


4.3.4 OPTIONAL EQUIPMENT CONFIGURATION

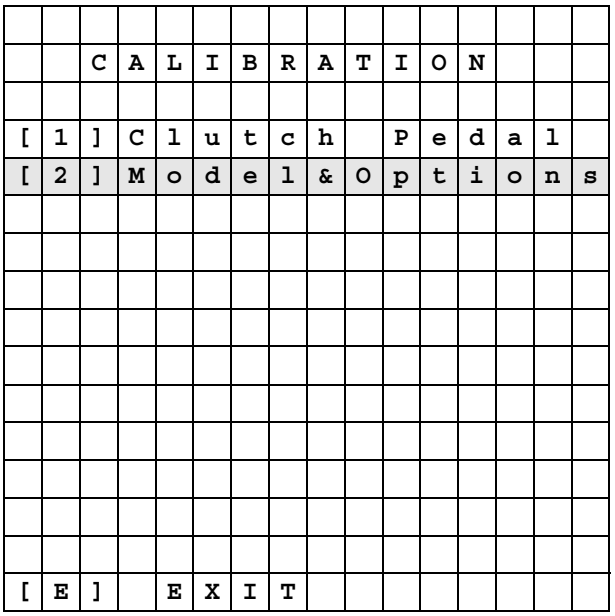
NOTE

This procedure must be carried out each time the complete control unit or the EPROM are renewed.

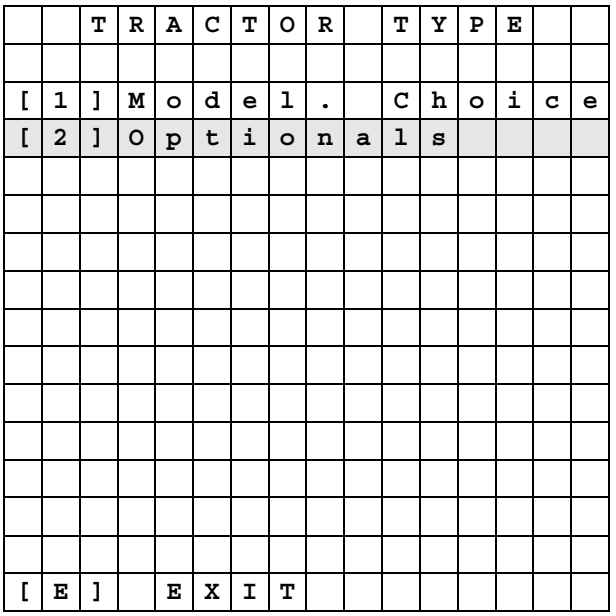
1 - From the main menu, press "*1*" to bring up the "CALIBRATIONS" menu.



2 - From the "CALIBRATION" menu press "*2*" to bring up the "Model&Option" menu.



3 - From the “TRACTOR MODEL” menu press “*2*” to bring up the “Optionals” menu.



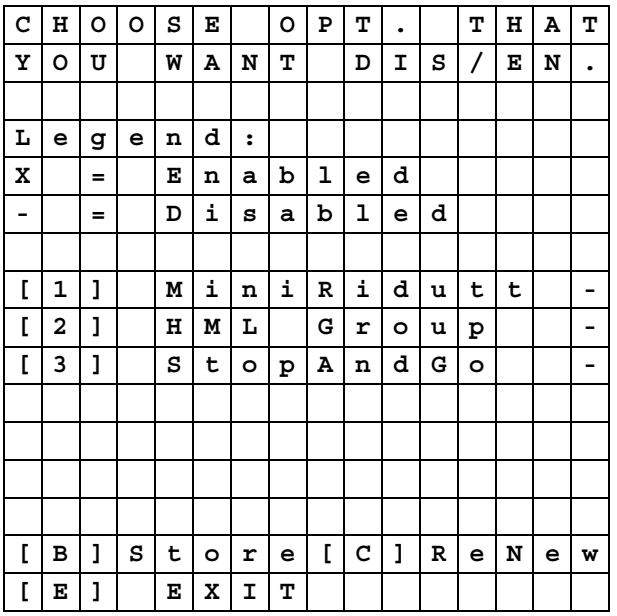
4 - Press the key corresponding to the optional item to be enabled or disabled.

CAUTION!

- *Do NOT press “C” as the control unit configuration parameters will be reset to their default values.*
- *If you accidentally press “C”proceed as follows:*
  a - Do NOT exit from the screen displayed.
  b - Turn the starter keyswitch to O (OFF).
  In this way the electronic control unit is switched off and the action of key “C” is cancelled.

NOTES

- *Enable Stop & Go function only if the control key on the front instrument panel is installed.*
- *Do not enable simultaneously HML and underdrive shaft.*

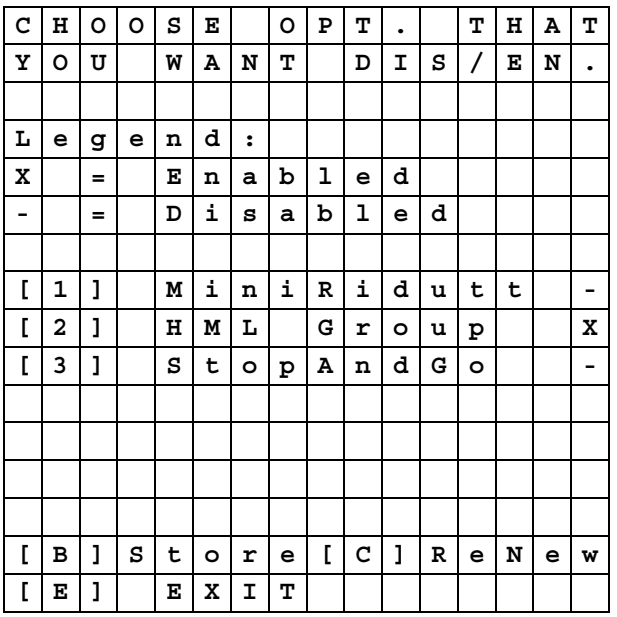


5 - Press “*B*” to save the parameters and then press “*E*” twice to go back to the main menu.

6 - Cancel the active alarms.

NOTES

- *Before exiting the current screen, always press “B” to save the values.*
- *Failure to take this precaution may compromise the control unit configuration data, in which case it will be necessary to repeat the initialization and commissioning of the control unit .*



4.3.5 DELETING ALARMS

1 - From the main menu, press "*5*" to access the "ALARMS" menu".

					M	E	N	U	'						
[	1	]		C	a	l	i	b	r	a	t	i	o	n	
[	2	]		T	e	s	t								
[	3	]		M	o	n	i	t	o	r					
[	4	]		C	l	u	t	c	h	e	s		A	d	j
[	5	]		A	l	l	a	r	m	s					

2 - From the "ALARMS" menu, press "*C*" to delete all the alarms.

3 - Turn the starter key to *0* (OFF) and then back to *I* (ON) and repeat the procedure to check that there are no active alarms.

A	L	L	A	R	M	S		L	I	S	T			-	0
	(	F	R	O	M		T	H	E		L	A	S	T	)
				N	o		A	l	l	a	r	m			
[	F	]	C	h	a	n	g	e		p	a	g	e		
[	C	]	D	e	l	e	t	e		a	l	l	.		
		[	E	]		E	X	I	T						

4.3.6 NOTES REGARDING THE CLUTCH CALIBRATION PROCEDURE

Calibration of the shuttle clutches should be carried out in the following cases:

a - After renewal of one or both shuttle clutches

b - After renewal of the proportional solenoid valve controlling engagement of the shuttle clutches

c - When, after the clutches have bedded in (in the case of a new or overhauled tractor) or after many years of use, clutch engagement or automatically controlled direction changes (without use of the clutch pedal) are either too sudden or too slow.

There are two possible types of calibration.

- *Automatic calibration*, in which the control unit independently sets the characteristic parameters for clutch engagement
- *Manual calibration*, where the technician can alter the parameter settings and thus obtain a clutch engagement curveto meet personal requirements.

In all cases, manual clutch calibration must only be performed after having first performed the automatic calibration procedure and tested the tractor.

The shuttle clutch calibration procedure (whether manual or automatic) is divided into three stages during which the “optimal” values for shuttle operation are determined automatically or manually.

The difference between the automatic and manual calibration is that during the automatic procedure the duration of the calibration stages is entirely controlled by the control unit and the technician cannot modify the parameters in any way, whereas in manual calibration, the process is entirely controlled by the technician, who can optimise shuttle operation by changing the parameter settings using the ART keypad.

The stages of the calibration procedure are as follows:

- *STAGE 0*:during this stage, the control unit registers the conditions under which the subsequent stages will be performed (e.g., the temperature of the transmission oil).
  In both the calibration procedures the phase start is controlled by the technician by moving the shuttle lever from the neutral position to the forward/reverse gear position (depending on the clutch to be calibrated).
  The end of the procedure occurs automatically after approximately 10-15 seconds, while, in manual mode, it must be interrupted by the Technician by returning the shuttle lever to the neutral position when the values “FillOilTmpK” and “FillOilRPMK” are displayed almost constantly on the ART.

- *STAGE 1*: in this stage, the control unit measures the engagement pressure of the clutch to be calibrated.
  During the automatic procedure, the technician can see the “Prx.Frz.Av” value changing automatically (or the “Prx.Frz.In” value depending on the type of clutch being calibrated), while during manual calibration the Technician can alter these values by pressing the following keys:
  - *A* to increase the engagement pressure of the forward clutch
  - *B* to reduce the engagement pressure of the forward clutch
  - *C* to increase the engagement pressure of the reverse clutch
  - *D* to reduce the engagement pressure of the reverse clutch

  In addition, the technician can perform semi-automatic calibration of the clutch by operating the shuttle lever in the corresponding direction. In this way, the control unit will automatically detect the value of the parameter, which may or may not be equal to that obtained during fully automatic calibration.

  NOTE
  We recommend that the technician engages the clutch being calibrated at least ten times, takes the average between the last 3 or 4 values obtained and enters this value manually.

- *STAGE 2*:the control unit uses this stage to measure the time taken to fill the cylinder of the clutch being calibrated.
  During the automatic procedure the technician can vary the value “Adj.Frz.Av” (or the value “Adj.Frz.In” depending on the type of clutch being calibrated) automatically, while during manual calibration the Technician can alter these values by pressing the following keys:
  - *A* to increase the filling time of the forward clutch
  - *B* to reduce the filling time of the forward clutch
  - *C* to increase the filling time of the reverse clutch
  - *D* to reduce the filling time of the reverse clutch

  In addition, the technician can perform semi-automatic calibration of the clutch by operating the shuttle leverin the corresponding direction. In this way, the control unit will automatically detect the value of the parameter, which may or may not be equal to that obtained during fully automatic calibration.

  NOTE
  We recommend that the technician engages the clutch being calibrated at least ten times, takes the average between the last 3 or 4 values obtained and enters this value manually.

4.3.7 NOTES ON CLUTCH CALIBRATION PARAMETERS

During clutch calibration in both manual and automatic mode, the following parameters are measured and displayed on the ART:

- tT
- tR
- pT
- Prx.Frz.Av and Prx.Frz.In
- Adj.Frz.Av and Adj.Frz.In

These parameters, which are not physical units (pressure, time or temperature) are constants which enable the control unit to correct the clutch engagement curves in accordance with the particular mechanical and environmental characteristics that prevail during the calibration procedure.

The ambient conditions prevailing during the calibration are identified by the parameters “tT, tR, and pT” which represent respectively the adjustment value in accordance with the theoretical temperature of the transmission oil (40°C), the deviation of the theoretical engine speed (the engine speed should be 1500 rpm) and the pressure in relation to the oil temperature. These values are registered by the control unit each time clutch calibrationis performed and allow correction of the engagement curve.

The mechanical characteristics of the clutches are identified by the parameters “Prx.Frz.Av” and “Adj.Frz.Av” for the forward clutch, and “Prx.Frz.In” and “Adj.Frz.In” for the reverse clutch.

The parameters “Prx.Frz.Av” and “Prx.Frz.In” represent the pressures at which the clutches start to transmit driving torque to the wheels.

NOTE
This value relates to pressure, but it is not a physical value; it is, in fact, a value calculated on the basis of the current transmitted to the proportional solenoid valve that controls engagement of the clutch. Any differences between the values displayed on the ART and the values indicated on a pressure gauge should not be attributed to component failure.

The parameters “Adj.Frz.Av” and “Adj.Frz.In” represent the ratio between the theoretical clutch cylinder fill time (1.00) and the actual time taken.

NOTE
This value relates to time, but it is not a physical value; it is, in fact, a value that can change in accordance with the mechanical features of the clutch components. For example, excessive piston blow-by could increase this value as it would take longer to fill the clutch cylinder.

4.3.8 NOTES ON HOW TO CHANGE PARAMETER SETTINGS DURING MANUAL CALIBRATION

When you select automatic clutch calibration, the control unit calculates the operating parameters values by applying an algorithm to define the ideal conditions.

However, in some cases these parameter values, although correct as regards hydraulic and mechanical characteristics, can lead to the tractor responding too brusquely when the clutches are engaged.

In this case, the technician can first attempt to define the type of response by performing in automatic mode (i.e without using the clutch pedal) a number of direction manoeuvres and standing starts in both directions and at various engine speeds (e.g. 1000, 1500, 2000 and max rpm) and in the calibration conditions (for details, see calibration procedures).

Possible responses are:

- *Sudden, fast engagement*.
  The tractor engages the directly selected by the Technician very rapidly and rather than pulling away gradually it starts brusquely (to get an idea, the effect would be that of a stationary car in first gear when the driver's foot slips off the clutch pedal)
- *Sudden but delayed engagement*.
  The tractor engages the direct requested by the Technician and starts moving slowly and then suddenly reaches the maximum speed corresponding to the test conditions.
- *Smooth but delayed engagement* .
  The tractor engages the direction requested by the technician but it performs the command too slowly although without sudden movements.

The corrective actions required are as follows:

- *Sudden, fast engagement*: reduce the pressure parameter value and, if necessary, increase the time parameter value.
- *Sudden but delayed engagement*: increase the pressure parameter. If engagement is still not satisfactory, slightly increase the time parameter.
- *Smooth but delayed engagement*: increase the pressure parameter.

NOTE

- *If you INCREASE the pressure value by 0.1, REDUCE the time value by 0.2.*
- *If you REDUCE the pressure value by 0.1, INCREASE the time value by 0.2.*

4.3.9 AUTOMATIC CALIBRATION OF THE SHUTTLE CLUTCHES

NOTE
This procedure should only be carried out if the technician finds during a test drive that shuttle clutch engagement is either too sudden or too slow when moving off from stationary or during direction changes without using the clutch pedal.

1 - Start the engine and bring the transmission oil level to approximately 40°C.

2 - Position the tractor on a flat asphalted track with at least 50 metres of free road ahead and proceed as follows:

a - Put the shuttle lever in neutral.

b - Take the engine revs to 1500 rpm.

c - Select 4th gear in normal range () or 2nd gear in fast range ().

d - If the HML unit is present: select speed M ().

3 - From the main menu, press "*4*" to access the "Clutch Cal." menu.

```
                    MENU '
[1] Calibration
[2] Test
[3] Monitor
[4] Clutches Adj
[5] Allarms
```

4 - From the "CALIBRATION" menu, press "*3*" to access the engaged range selection menu.

```
ADJUSTMENTS MENU
[1] Manual Adj.
[2] Self Adjust.
[3] Forza Gamma
[E] EXIT
```

5 - Press "*F*" to select the engaged range and press "*E*" to save the value and quit the menu.
VL: fast range
RD: normal range

```
[F] Toggle Gamma
      MarciMn xx
[E] EXIT
```

6 - From the "CALIBRATION" menu, press "*2*" toaccess to the clutch automatic calibration menu.

A	D	J	U	S	T	M	E	N	T	S		M	E	N	U
[	1	]		M	a	n	u	a	l		A	d	j	.	
[	2	]		S	e	l	f		A	d	j	u	s	t	.
[	3	]		F	o	r	z	a		G	a	m	m	a	
	[	E	]		E	X	I	T							

7 - Press any key on the ART.
Select the travel directionto be calibrated (e.g. FORWARD direction).

S	e	t		t	h	e		t	r	a	c	t	o	r	:
-		o	n		l	e	v	e	l						
-		1	5	0	0		R	P	M						
-		O	i	l		T	e	m	p	=	4	0	D	.	C
(	*	)	R	a	t	i	o		4	_	M	_	N	R	
(	*	)	R	a	t	i	o		2	_	M	_	V	L	
P	u	s	h		a		k	e	y	,		t	h	e	n
c	h	o	i	s	e		t	h	e		d	i	r	e	-
		d	i	r	e	c	t	i	o	n		y	o	u	
w	i	s	h		t	o		a	d	j	u	s	t		!
W	a	i	t		u	n	t	i	l		t	h	e		
e	n	d		o	f		c	a	l	i	b	r	a	-	
t	i	o	n		a	n	d		t	h	e	n		g	o
t	o		N	e	u	t	r	a	l		!				

8 - The tractor will start to move in a series of jerks, and the values shown on the display will change until the optimum values are found.
When the tractor starts moving continuously, move the shuttle lever to neutral position and press "*E*".

R	E	V	E	R	S	E	R		A	D	J	U	S	T	.
F	=	0	3	1		2		M	U	R	n		4		0
t	T	=	0	.	0	0			p	T	=	0	.	0	0
t	R	=	0	.	0	0									
P	r	x	.	C	l	t	.	F	w	.		0	0	.	0
P	r	x	.	C	l	t	.	B	w	.		0	0	.	0
A	d	j	.	C	l	t	.	F	w	.		0	.	0	0
A	d	j	.	C	l	t	.	B	w	.		0	.	0	0
C	o	r	r	e	c	t	i	o	n		X	X	X	X	X
F	i	l	l	g	.	T	i	m	e	+	0	0	0	0	0
E	v	P	-	C	u	r	r	n	t		X	X	X	X	X
[	E	]		E	X	I	T								

9 - If the calibration procedure has been performed successfully, the message “Terminata OK!” will be displayed.

NOTE

If the calibration was not successful,the message “Terminata KO!” will be displayed and the procedure must be repeated.

10 - Press “*E*” to go back to the “CALIBRATION” menu and repeat the procedure starting from point 4 for the other travel direction and range.

```
END OF ADJUSTMENT

TerminatED OK !

Prx.Clt.Fw.05.5
Prx.Clt.Bw.05.5

Adj.Clt.Fw.0.60
Adj.Clt.Bw.0.60

 [E] EXIT
```

4.3.10 SHUTTLE CLUTCH MANUAL CALIBRATION

NOTE

- *This procedure should only be carried out if the technician finds during a test drive that shuttle clutch engagement is either too sudden or too slow when moving off from stationary or during direction changes without using the clutch pedal.*
- *Before proceeding with the calibration, please read the following paragraphs carefully:*
  4.3.6 NOTES REGARDING THE CLUTCH CALIBRATION PROCEDURE
  4.3.7 NOTES ON CLUTCH CALIBRATION PARAMETERS
  4.3.8 NOTES ON HOW TO CHANGE PARAMETER SETTINGS DURING MANUAL CALIBRATION.

1 - Start the engine and bring the transmission oil level to approximately 40°C.

2 - Position the tractor on a flat asphalted track with at least 50 metres of free road ahead and proceed as follows:

a - Put the shuttle lever in neutral.

b - Take the engine revs to 1500 rpm.

c - Select 4th gear in normal range () or 2nd gear in fast range () .

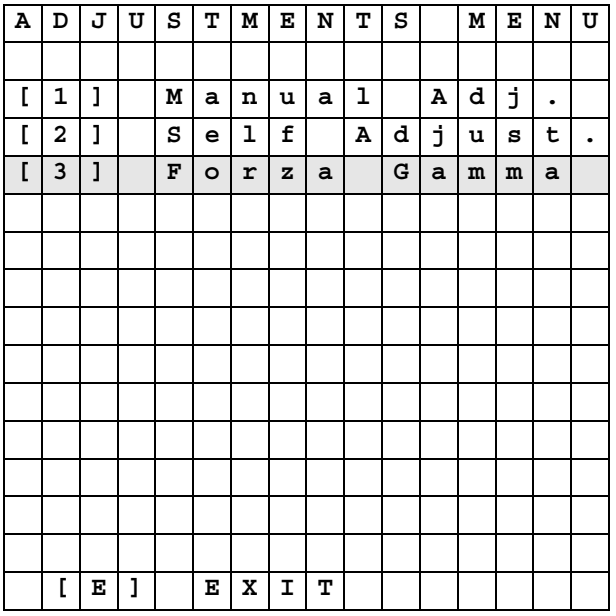
d - If the HML unit is present: select speed M ().

3 - From the main menu, press “*4*” to access the “Clutch Cal.” menu.

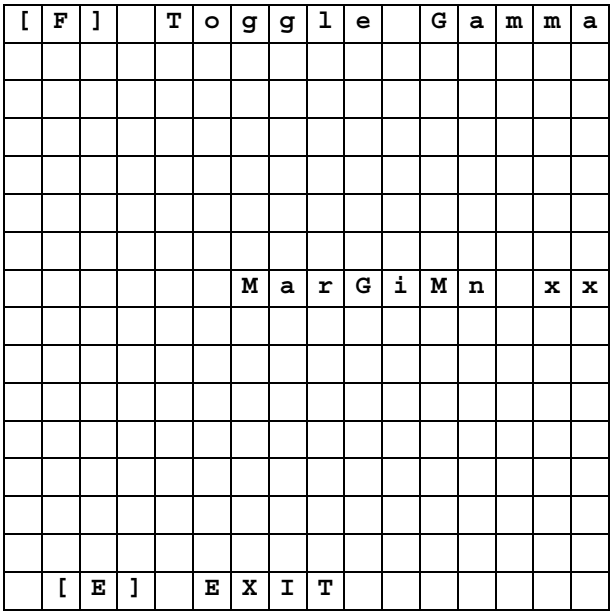
```
     MENU'

[1] Calibration
[2] Test
[3] Monitor
[4] Clutches Adj
[5] Allarms
```

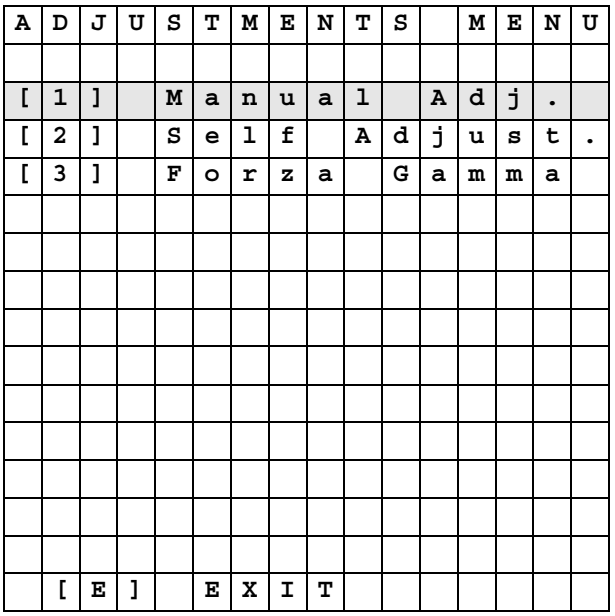
4 - From the “CALIBRATION” menu, press “*3*” to access the engaged range selection menu.



5 - Press “*F*” to select the engaged range and press “*E*” to save the value and quit the menu.
VL: fast range
RD: normal range



6 - From the “CALIBRATION” menu, press “*1*” to access the clutch manual calibration menu.



7 - Press any key to start the automatic procedure.

S	e	t		t	h	e		t	r	a	c	t	o	r	:
-		o	n		l	e	v	e	l						
-		1	5	0	0		R	P	M						
-		O	i	l		T	e	m	p	=	4	0	D	.	C
(	*	)	R	a	t	i	o		4	_	M	_	N	R	
(	*	)	R	a	t	i	o		2	_	M	_	V	L	
		[	P	u	s	h		a		k	e	y	]		

8 - Start *STAGE 0* of the calibration by moving the shuttle lever to the drive direction to be calibrated and wait for the parameters “tT, tR and pT”” to stabilize.

9 - Move the shuttle lever back to “Neutral”.

NOTE

STAGE 0 can be repeated after carrying outSTAGE 1 and STAGE 2 by moving the shuttle lever to the neutral position and pressing “0”.

R	E	V	E	R	S	E	R		A	D	J	U	S	T	.
F	=	0	0	0		0		M	U	R	n		4		0
t	T	=	0	.	0	0			p	T	=	0	.	0	0
t	R	=	0	.	0	0									
[	1	]	F	1		4	]	5	]	6	]	7	]	s	F
P	r	x	.	C	l	t	.	F	w	.		0	0	.	0
P	r	x	.	C	l	t	.	B	w	.		0	0	.	0
[	2	]	F	2						8	]	L	/	0	
A	d	j	.	C	l	t	.	F	w	.		0	.	0	0
A	d	j	.	C	l	t	.	B	w	.		0	.	0	0
[	F	]		S	t	o	r	e		d	a	t	a		
A	]	-		B	]	+			C	]	-		D	]	+
C	o	r	r	e	c	t	i	o	n		X	X	X	X	X
F	i	l	l	g	.	T	i	m	e	*	*	*	*	*	*
E	v	P	-	C	u	r	r	n	t		X	X	X	X	X
	[	E	]		E	X	I	T							

NOTE

- *Complete the calibration of one drive direction before moving to the other.*
- *Make a note of the existing parameter value before changing it.*

10 - Start *STAGE 1* for the selected direction by pressing “*1*”.

R	E	V	E	R	S	E	R		A	D	J	U	S	T	.
F	=	0	0	0		0		M	U	R	n		4		0
t	T	=	0	.	0	0			p	T	=	0	.	0	0
t	R	=	0	.	0	0									
[	1	]	F	1		4	]	5	]	6	]	7	]	s	F
P	r	x	.	C	l	t	.	F	w	.		0	0	.	0
P	r	x	.	C	l	t	.	B	w	.		0	0	.	0
[	2	]	F	2						8	]	L	/	0	
A	d	j	.	C	l	t	.	F	w	.		0	.	0	0
A	d	j	.	C	l	t	.	B	w	.		0	.	0	0
[	F	]		S	t	o	r	e		d	a	t	a		
A	]	-		B	]	+			C	]	-		D	]	+
C	o	r	r	e	c	t	i	o	n		X	X	X	X	X
F	i	l	l	g	.	T	i	m	e	*	*	*	*	*	*
E	v	P	-	C	u	r	r	n	t		X	X	X	X	X
	[	E	]		E	X	I	T							

11 - Change the parameters “Prx.Frz.Av.” or “Prx.Frz.In.” relative to the required drive direction in one of the following ways.

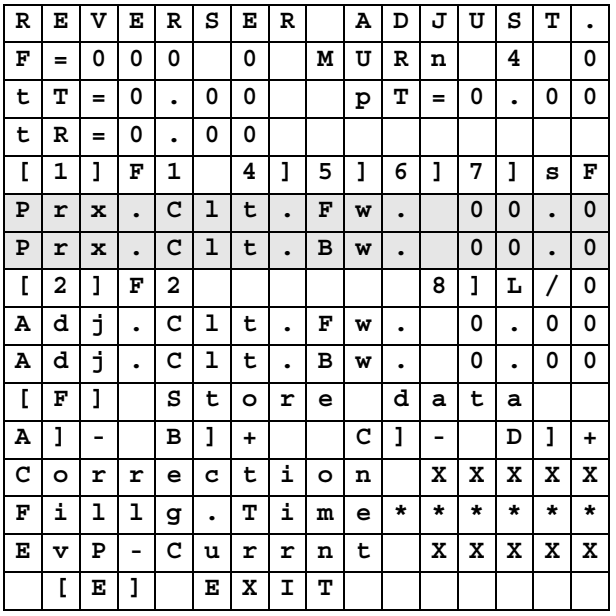
SEMIAUTOMATIC

a - Engage the direction to be calibrated and wait for the tractor to start moving and in any case for at least 15 seconds

b - Move the shuttle lever back to “Neutral”.

c - Press “*F*” to save the value in memory.

d - Press “*E*” to quit STAGE 1.



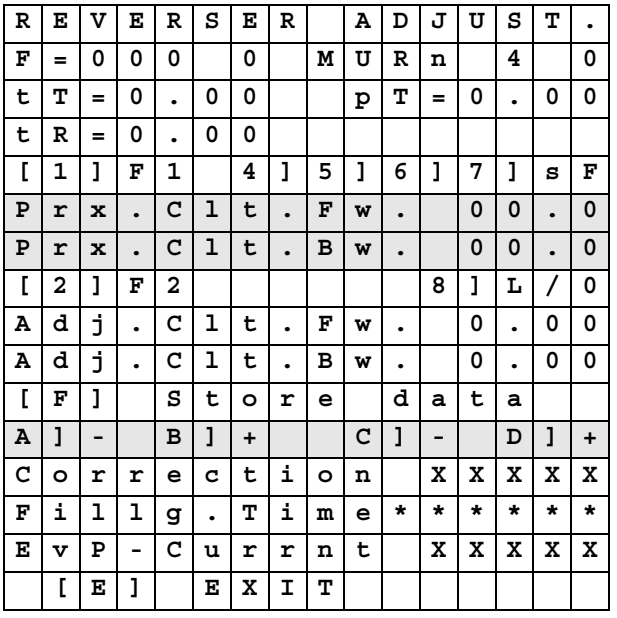
MANUAL

a - Use the following keys:

- *A* to increase the forward parameter value
- *B* to reduce the forward parameter value
- *C* to increase the reverse parameter value
- *D* to reduce the reverse parameter value

b - Press “*F*” to save the parameter value.

c - Press “*E*” to quit STAGE 1.



NOTE

- *Make a note of the existing parameter value before changing it.*

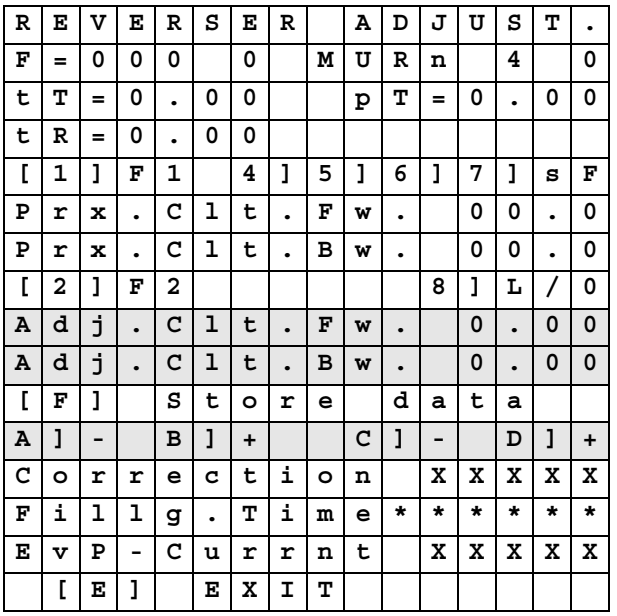
12 - Start *STAGE 2* by pressing “*2*”.

13 - Manually change the values of the “Adj.Frz.Av.” or “Adj.Frz.In” for the required direction using the following keys:

- *A* to increase the forward parameter value
- *B* to reduce the forward parameter value
- *C* to increase the reverse parameter value
- *D* to reduce the reverse parameter value

14 - Press “*F*” to save the value in the memory.

15 - Press “*E*” to quit STAGE 2.



4.4 RENEWAL OF THE INSTRUMENT PANEL

Each time the instrument panel is renewed, the Technician must carry out these operations:

1 - program the type of tractor

2 – enter the wheels constant

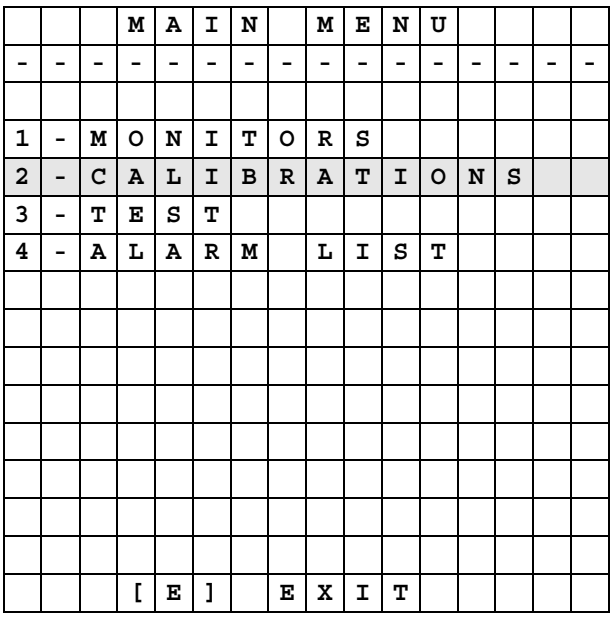
3 – set speed conversion factors

The purpose of identifying the type of tractor and setting the wheels constant is to inform the control unit of the parameters it must use to display correct information.

To perform the configuration, connect the ART to the connector on the left-hand side of the instrument panel, then select the instrument panel (CLUSTER) from the “AVAILABLE TESTS” menu and proceed as described.

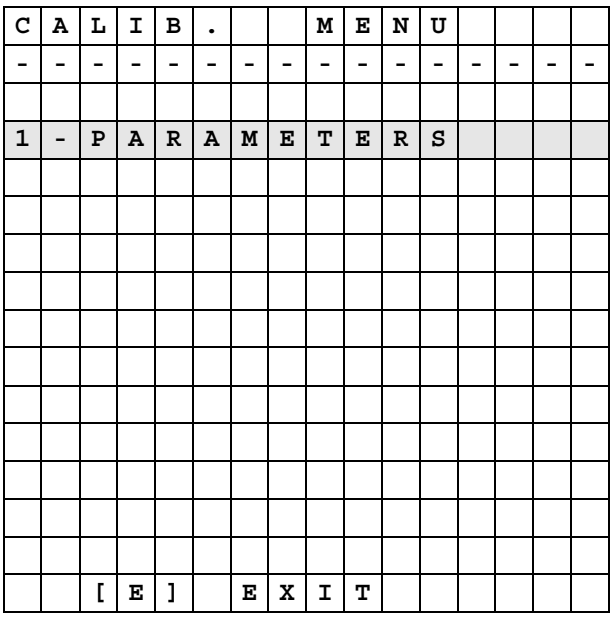
4.4.1 TRACTOR TYPE PROGRAMMING

1 - From the introduction menu press “*E*” to bring up the “MAIN MENU”.



2 - From the main menu, press “*2*” to bring up the “PARAMETERS MENU”.

3 - Press “*1*” and on the ART .



4 - Press “*3*”.

		C	A	L	I	B	R	A	T	I	O	N		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	W	H	E	E	L	[	m	m	]		X	X	X	X
2	-	A	L	A	R	M	B	E	L	T					0
3	-	A	C	T	I	V	E	C	O	N	F			0	1
4	-	V	E	L	[	1	=	M	P	H	]				0
5	-	C	L	O	C	K	[	1	=	1	2	h	]		0
6	-	M	A	X		T	E	M	P				1	0	5
			[	E	]		E	X	I	T					

5 - Enter in the parameter the value corresponding to the tractor to be configured choosing from among the values shown in the table.

TRACTOR TYPE	*VALUE*
Tractor with hydraulic shuttle and mechanical engine speed governor	1
Tractor with hydraulic shuttle and electronic engine speed governor	2

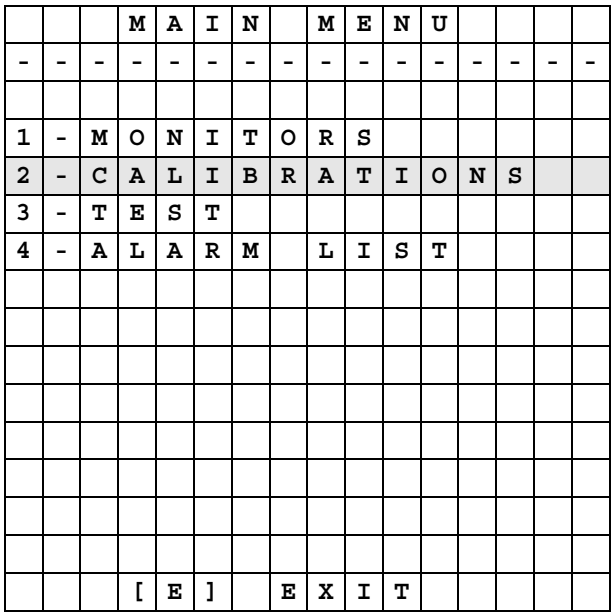
6 - Press “*E*” to save the value and “*C*” to confirm and return to the main menu.

			A	C	T	I	V	E	C	O	N	F			
A	c	t	u	a	l		:							0	1
N	e	w					:							X	X
				[	D	]	E	R	A	S	E				
				[	E	]	E	X	I	T					

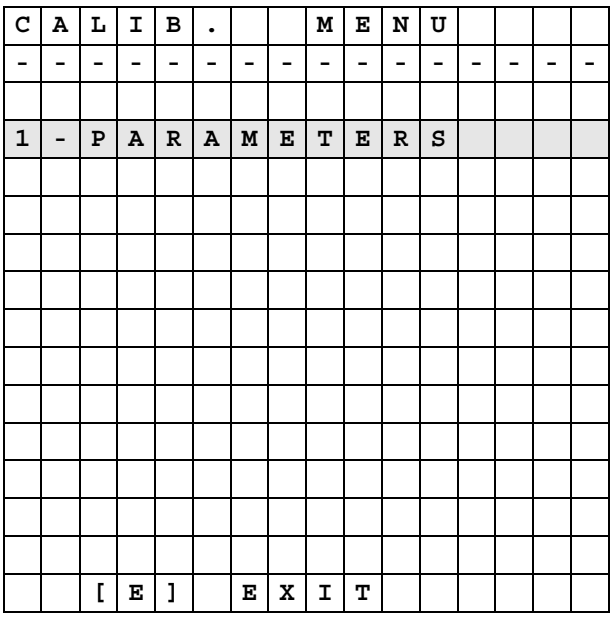
4.4.2 ENTERING THE WHEELS CONSTANT

1 - From the opening menu press “*E*” to bring up the “MAIN MENU”.

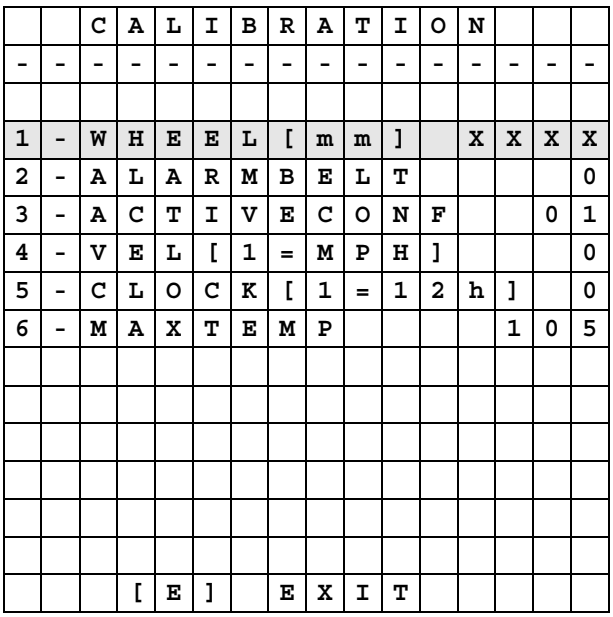
2 - From the main menu, press “*2*”.



3 - Press “*1*” .

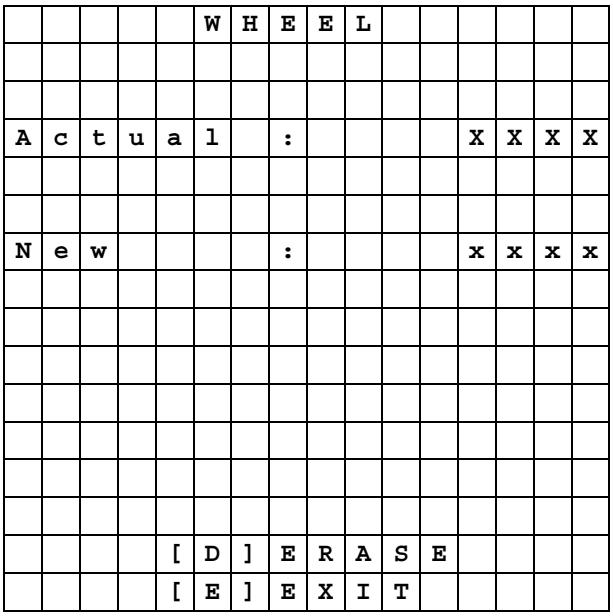


4 - Press “*1*”.



5 - Type the “WHEELS” parameter recording the value corresponding to the tyre fitted on the rear of the tractor according to the following table:

Tyre	*Constant*
12.4R-36”	3060
13.6R-36”	2955
14.9R-28”	3309
14.9R-30”	3177
16.9R-30”	3039
420/70R-28”	3309
420/70R-30”	3177
480/70R-30”	3039
540/65R-28”	3153
540/65R-30”	3039



6 - Press “*E*” to save the value and “*C*” to confirm and go back to the main menu.

4.4.3 SETTING THE SPEED CONVERSION FACTORS

1 - From the opening menu press “*E*” to bring up the “MAIN MENU”.

2 - From the main menu, press “*2*”.

```
                MAIN MENU
- - - - - - - - - - - - - - -

1 - MONITORS
2 - CALIBRATIONS
3 - TEST
4 - ALARM LIST
[E] EXIT
```

3 - Press “*1*” .

```
CALIB. MENU
- - - - - - - - - - - - - - -

1 - PARAMETERS
[E] EXIT
```

4 - Press “*4*”.

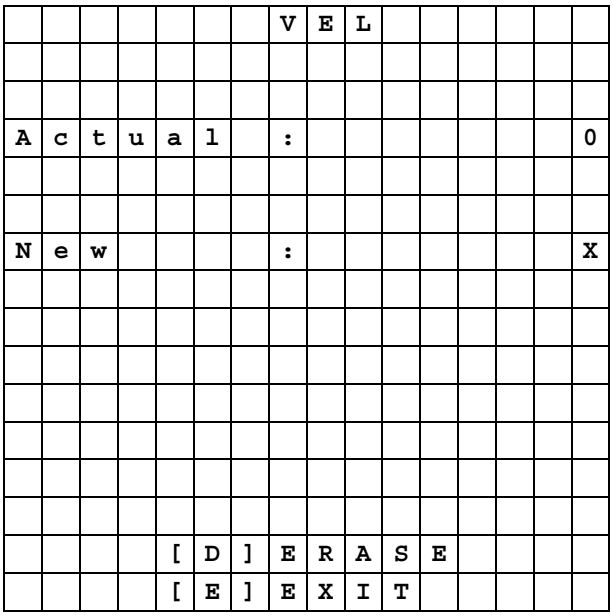
```
      CALIBRATION
- - - - - - - - - - - - - - -

1 - WHEEL [mm] XXXX
2 - ALARM\BELT 0
3 - ACTIVECONF 01
4 - VEL[1=MPH] 0
5 - CLOCK[1=12h] 0
6 - MAXTEMP 105

[E] EXIT
```

5 - Enter “*0*” to display the speed values according to the metric system (km/h) or “*1*” to display the speed values according to theImperial system (mph).

6 - Press “*E*” to save the value and “*C*” to confirm and return to themain menu.



4.5 RENEWAL OF THE LIFT CONTROL UNIT

Each time the lift control unit is renewed, the Technician must calibrate the maximum height of the lift.

To perform the calibration, connect the ART to the connector on the left-hand side of the instrument panel, then start the engine, select the lift control unit from the “AVAILABLE TESTS” menu and proceed as described.

4.5.1 CALIBRATION OF LIFT MAXIMUM HEIGHT

NOTE.
These operations must be carried out with the engine running at idle speed, the parking brake engaged and the gearbox set to neutral.

1 - From the opening menu of the control unit, press “*C*” to go to the “INITIALIZATION” menu”.

```
      LIFTL
=============
Software  1.32C
Date      dd/mm/aa

Parameters for
TRACTOR   10N

=============
=============
[C] CHANGE PARAM.
[E] CONTINUE
```

2 - Press “*2*” to select the “10S” lift and press “*C*” to continue and enter the main menu.

```
 INITIALISATION
=============
Current
Parameters
for   10X

Change
parameters

1 - Lift  for  10N

2 - Lift  for  10S

=============
[C] CONTINUE
```

3 - From the main menu, press "*1*" to select the calibrations menu.

```
  MAIN MENU
==============
1 Calibrations
2 Monitor
3 Tests
4 Allarms
SELECT_
==============
  EXIT
```

4 - From the calibrations menu, press "*1*" to select the "Max. Height" menu.

```
Calibrations Menu
==============
1 - Max. height
Personalisation
Lifting speed
2 - Lifting speed
==============
  EXIT
```

5 - Unblock the lift and turn the maximum height adjustment knob fully to the right.

6 - Using the lift button on the fender, raise the lift arms up to the limit stop.

7 - When the lift has arrived at its limit stop, press the 'Down' button until the value displayed is approximately 20÷30 units less then the value displayed at the limit stop, then press "*C*" to save the value.

```
1 - Max. Height
==============
Current: xxxx
New    : xxxx
[A] Cancel
[C] Confirm
```

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5. ALARMS

This chapter contains a list of all the alarms that can be detected by the tractor's electronic control units.

5.1 ENGINE CONTROL UNIT ALARMS (P/N 2.8519.054.0/50)

The engine control unit signals any malfunctioning of the components it governs to the operator with the display on right-hand side of the instrument panel.

Faults are indicated using a system of coded flash sequences that simply identify the device affected without specifying the nature of the fault.

For a more detailed analysis of the fault detected, connect the ART to the diagnosis socket and refer to menu “4.2 ALARM LOG”.

5.1.1 LIST OF ALARMS DISPLAYED ON THE INSTRUMENT PANEL

Flashes	*Device affected*	*Alarm description*	*Control unit response*
M1	Overspeed alarm	The control unit detects that the engine has exceeded 3200 rpm.	The control unit stops the engine
M2	Actuator	The control unit detects a problem affecting the actuator	The control unit stops the engine
M3	Accelerator pedal	The control unit detects a problem affecting the accelerator pedal	The control unit stops the engine
M4	Engine speed sensor (pick-up)	The control unit detects a problem with the engine speed sensor (Pick-up)	The control unit stops the engine
M5	EEPROM	The control unit detects a problem in the EEPROM	The engine continues to operate but with the default settings
M6	Wheel speed sensor	The control unit detects a problem with the wheel speed sensor	The engine continues to work properly, but the top speed is limited to 1500 rpm.
M7	Belt alarm	Alarm available but not utilized	
M8	Hand throttle	The control unit detects a problem affecting the hand throttle	The engine works properly
M9	HML and PTO solenoid valves	Alarm available but not utilized	
M10	Wheel speed sensor 2	The control unit detects a problem with the second wheel speed sensor	The engine continues to work properly, but the top speed is limited to 1500 rpm.
M11	Configuration error or incongruous wheel speed sensor signals	The control unit detects that the speed configuration parameter has been changed or the wheel speed sensor signals are not congruous	The engine continues to work properly, but the top speed is limited to 1500 rpm.

5.1.2 LIST OF ALARMS DISPLAYED ON THE INSTRUMENT PANEL (PREHEATING INDICATOR LIGHT)

Flashes	*Alarm description*
2	The control unit detects that the preheating device is on, even though it should be off.
3	The control unit detects that the preheating device is off, even though it should be on.

5.1.3 LIST OF ALARMS DISPLAYED ON ART

Display on ART	Code	Alarm description	ECU response	Page
Acc.manuale C.A.	M8	The control unit detects that the hand throttle potentiometer is disconnected.	The engine continues to operate but the hand throttle does not work.	20-67
Acc.manuale C.C.	M8	The control unit detects that the hand throttle potentiometer is short-circuited.	The engine continues to operate but the hand throttle does not work.	20-66
Allarme Generico		The control unit detects a hardware problem.	The engine works, but the lamps and solenoid valves are not controlled.	20-79
Attuatore C.A.	M2	The control unit detects that the actuator is not connected.	The engine fails to start.	20-62
Attuatore C.C.	M2	The control unit detects that the actuator is short-circuited.	The engine is stopped and it can no longer be started.	20-63
Blocco EV HL PTO		Alarm available but not utilized		–
Candeletta C.A.		Alarm available but not utilized		–
Candeletta1 C.A.		The control unit detects that the preheating device supply relay is faulty.	The engine continues to operate but the preheating system does not work.	20-81
Candeletta2 C.A.		Alarm available but not utilized		–
EEPROM guasta	M5	The control unit detects damage to the EEPROM.	The engine continues to operate but with the default settings.	20-79
Err.Configuraz.	M11	The control unit detects that the maximum travel speed parameter does not correspond to the tractor configuration.	The engine continues to work properly, but the top speed is fixed at 1500 rpm.	20-86
EV H C.A.		Alarm available but not utilized		–
EV H C.C.		Alarm available but not utilized		–
EV L C.A.		Alarm available but not utilized		–
EV L C.C.		Alarm available but not utilized		–
EV Pre. C.A.		Alarm available but not utilized		–
EV PTO C.A.		The control unit detects that the rear PTO control valve is disconnected.	The engine continues to run normally but it is not possible to operate the rear PTO.	20-78
EV PTO C.C.		The control unit detects that therear PTO control valve is short-circuited.	The engine continues to run normally but it is not possible to operate the rear PTO.	20-77
Flash guasta		The control unit detects a fault with the Flash memory	The control unit does not activate the systems and it is not possible to start the engine.	20-79
Lampada cin.C.A.		Alarm available but not utilized		–
Lampada M C.A.		Alarm available but not utilized		–

Display on ART	Code	Alarm description	ECU response	Page
Lampada Pre.C.A.		The control unit detects that the bulb of the “Preheating” indicator lamp is disconnected or faulty.	The engine continues to operate.	20-73
LampadaHold C.A.		The control unit detects that the connection with the instrument panel is disconnected.	The engine continues to operate.	20-70
LimitParamEEPROM.		Alarm available but not utilized		–
PedaleAccel.C.A.	M3	The control unit detects that the throttle pedal potentiometer is disconnected.	The engine is stopped and it can no longer be started.	20-69
PedaleAccel.C.C.	M3	The control unit detects that the accelerator pedal potentiometer is short-circuited.	The engine is stopped and it can no longer be started.	20-68
Press.olio bassa		Alarm available but not utilized		–
PulsantPTOguasto		The control unit detects that the rear PTO button is faulty.	The engine continues to run normally but it is not possible to operate the rear PTO.	20-87
Relay Cand. C.A.		Alarm available but not utilized		–
Relay EVPre.C.A.		Alarm available but not utilized		–
RelayCand.1 C.A.		The control unit detects that the preheating device supply relayis disconnected or faulty.	The engine continues to operate but the preheating system does not work.	20-80
RelayCand.2 C.A.		Alarm available but not utilized		–
RelayCand.Guasto		Alarm available but not utilized		–
RelayEVPreGuasto		Alarm available but not utilized		–
RelCand.1 Guasto		The control unit detects that the preheating device supply relay is faulty.	The engine continues to operate but the preheating system does not work.	20-82
RelCand.2 Guasto		Alarm available but not utilized		–
Sen.Vel.Log.Err.	M11	The control unit detects a difference in speed greater than 2 km/h betweenthe wheel speed sensors when one of the two sensors detects a travel speed greater than 5 km/h.	The engine continues to work properly, but the top speed is limited to 1500 rpm.	20-85
Sens.Vel.2 C.A.	M10	The control unit detects that the second wheel speed sensor is disconnected.	The engine continues to work properly, but the top speed is limited to 1500 rpm.	20-84
Sens.Vel.2 Inter	M10	The control unit detects that the second wheel speed sensor is faulty or the wiring is damaged.	The engine continues to work properly, but the top speed is limited to 1500 rpm.	20-83
Sensor.RPM C.A.	M4	The control unit detects that the engine speed (pick-up) sensor is disconnected.	The engine is stopped and it can no longer be started.	20-64

Display on ART	*Code*	*Alarm description*	*ECU response*	*Page*
Sensor.RPMinterm	M4	The control unit detects that the engine speed (pick-up) sensor is faulty or the wiring is damaged.	The engine is stopped and it can no longer be started.	20-65
Sensor.Vel. C.A.	M6	The control unit detects that the wheel speed sensor is disconnected.	The engine continues to work properly, but the top speed is limited to 1500 rpm.	20-71
Sensor.VelInterm	M6	The control unit detects that the second wheel speed sensor is faulty or the wiring is damaged.	The engine continues to work properly, but the top speed is limited to 1500 rpm.	20-72
SensoreTemp.C.A.		The control unit detects that the coolant temperature sensor is disconnected.	The preheating system is always turned on when the engine is started.	20-74
SensoreTemp.C.C.		The control unit detects that the coolant temperature sensor is faulty.	The preheating system is always turned on when the engine is started.	20-76
SensPosSoll C.A.		The control unit detects that it is not receiving the lift position signal.	The system inhibits the AUTO PTO function operation.	20-73
SensVel.cin.C.A.		Alarm available but not utilized		–
Sovravelocita	M1	The control unit detects that the engine has exceeded 3200 rpm.	The engine is stopped.	20-61
Strum.Temp. C.C.		Alarm available but not utilized		–

Sovravelocità

ALARM CODE: M1

DESCRIPTION

The control unit detects that the engine has exceeded 3200 rpm.

CONTROL UNIT RESPONSE

The engine is stopped.

NOTE

This alarm is activated generally when, with the tractor on a down gradient, the engine is made to operate as a brake and forced to run at higher speed.

CHECK

- Turn the starter key to “O” (OFF) and then back to “I” (ON) and restart the engine.

Attuatore C.A.

ALARM CODE: M2

DESCRIPTION

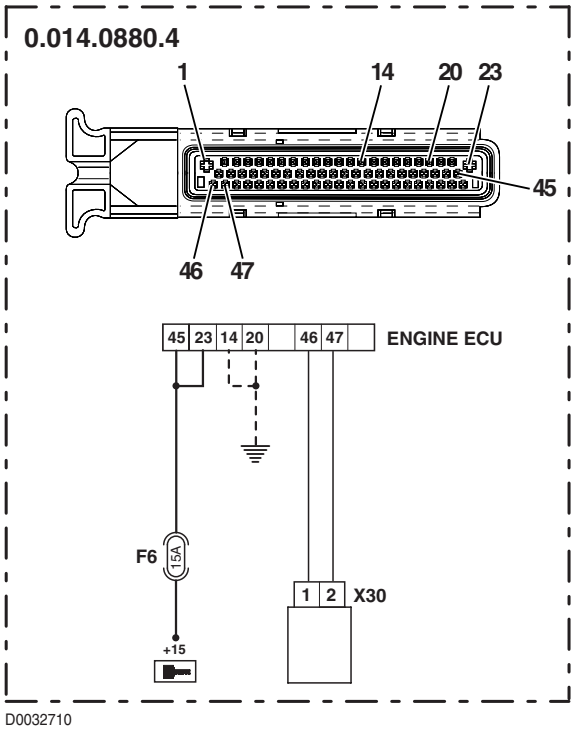
The control unit detects that the actuator is not connected.

CONTROL UNIT RESPONSE

The engine fails to start.

CHECK

- Check that the contacts on the “X30” connector of the actuator and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “X30” and to pin 46 of the“ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “X30” and to pin 47 of the“ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the actuator works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Attuatore C.C.

ALARM CODE: M2

DESCRIPTION

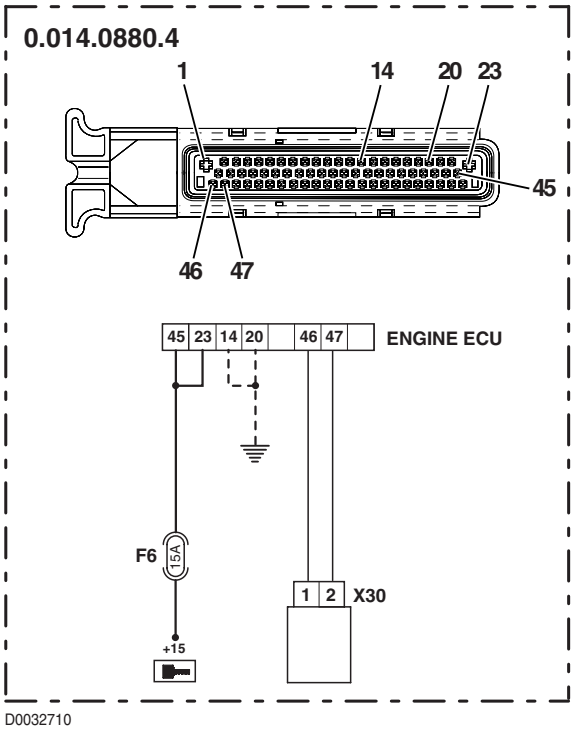
The control unit detects that the actuator is short-circuited.

CONTROL UNIT RESPONSE

The engine is stopped and it can no longer be started.

CHECK

- Check that the contacts on the “X30” connector of the actuator and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X30” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X30” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit,connect a test meter to pin 1 and pin 2 of connector “X30” and measure the resistance to check for shorts (meter reading: infinity).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X30” and check for shorts to battery positive (meter reading: 0V).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X30” and check for shorts to battery positive (meter reading: 0V).
- Check the actuator works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Sensor.RPM C.A.

ALARM CODE: M4

DESCRIPTION

The control unit detects that the engine speed (pick-up) sensor is disconnected.

CONTROL UNIT RESPONSE

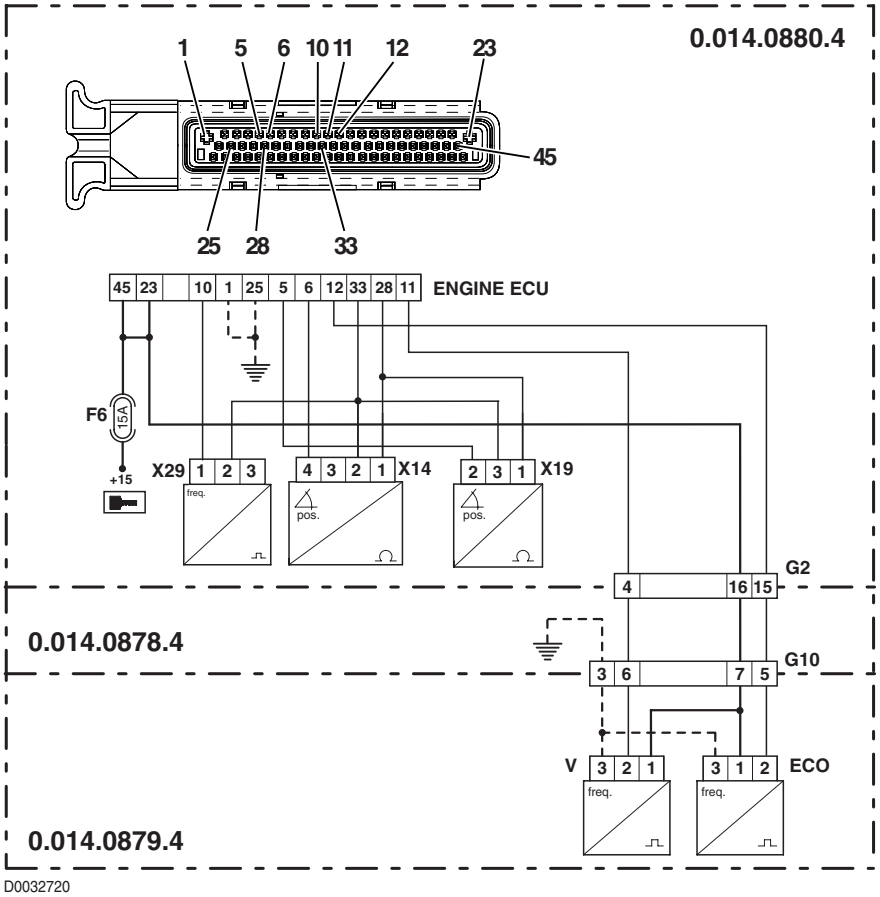
The engine is stopped and it can no longer be started.

CHECK

NOTE

If also the “RPM.Sensor O.C.”, “accelerator pedal O.C.”, “Throttle.Pedal O.C.” and “SpeedSensor. O.C.” alarms are present, the problem is to be found in a break in the cable from pin 33 of the “ENGINE ECU” connector. Furtherconfirmation of this fault could be the impossibility of changing the speed of the HML unit, if present.

- Check that the contacts on the “X29” connector of the engine rpm sensor (Pick-up) and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “X29” and to pin 10 of the“ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “X29” and to pin 33 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the engine speed sensor works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



D0032720

Sensor.RPMinterm

ALARM CODE: M4

DESCRIPTION

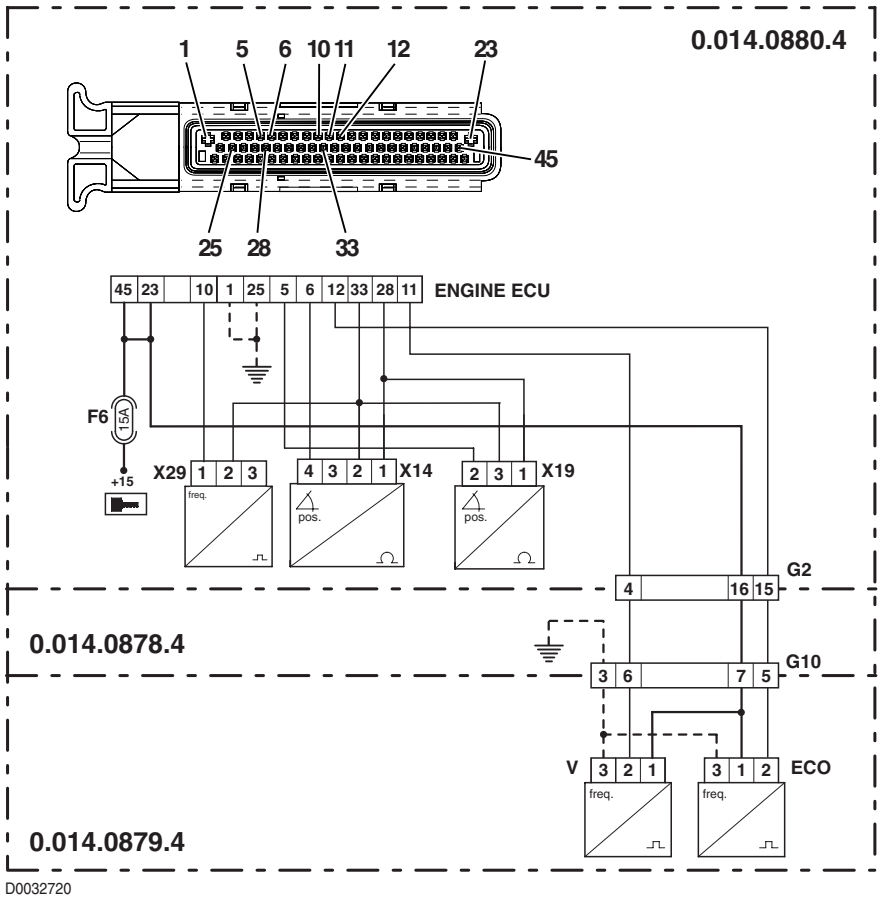
The control unit detects that the engine speed (pick-up) sensor is faulty or the wiring is damaged.

CONTROL UNIT RESPONSE

The engine is stopped and it can no longer be started.

CHECK

- Check that the contacts on the “X29” connector of the engine rpm sensor (Pick-up) and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “X29” and to pin 10 of the“ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “X29” and to pin 33 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X29” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X29” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit,connect a test meter to pin 1 and pin 2 of connector “X29” and measure the resistance to check for the absence of shorts (meter reading: infinity).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X29” and check for shorts to battery positive (meter reading: 0V).
- Check the engine speed sensor works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



D0032720

Acc.manuale C.C.

ALARM CODE: M8

DESCRIPTION

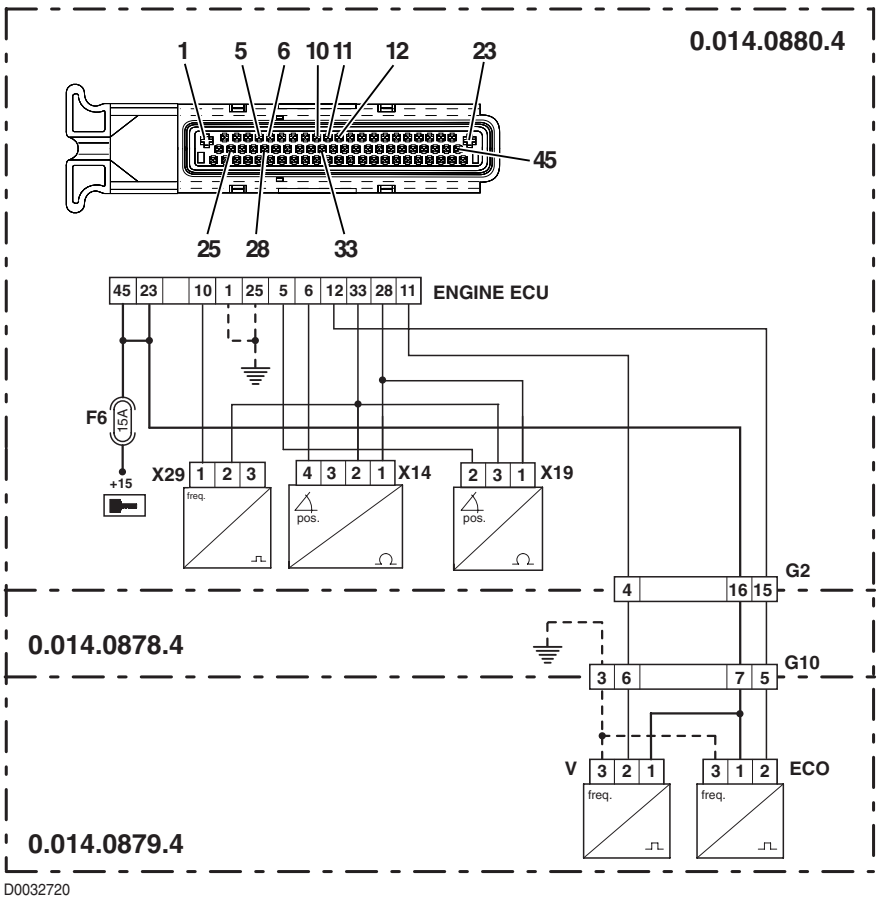
The control unit detects that the accelerator pedal potentiometer is short-circuited.

CONTROL UNIT RESPONSE

The engine continues to operate but the accelerator pedal does not work.

CHECK

- Check that the contacts on the “X14” connector of the accelerator pedal potentiometer and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the "O" (OFF) position and the “ENGINE ECU” connector disconnected from the control unit,connect a test meter to pin 4 of connector “X14” and to the earth on the tractor frame and perform a resistance test for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 4 and pin 2 of connector “X14” and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 4 and pin 1 of connector “X14” and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 4 of connector “X14” and to the earth on the tractor frame and perform a resistance test to check for shorts to battery positive (meter reading: 0V).
- Check the accelerator pedal potentiometer works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Acc.manuale C.A.

ALARM CODE: M8

DESCRIPTION

The control unit detects that the accelerator pedal potentiometer is disconnected.

CONTROL UNIT RESPONSE

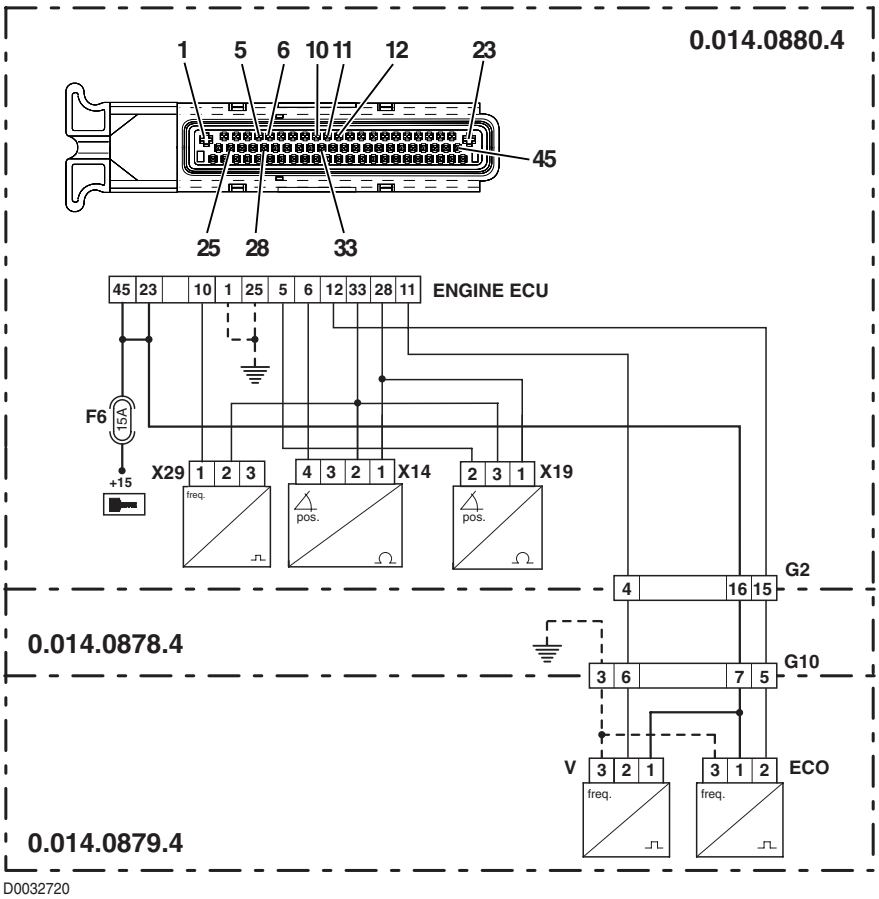
The engine continues to operate but the accelerator pedal does not work.

CHECK

NOTE

If also the “RPM.Sensor O.C.”, “RPM.Sensor O.C.”, “Throttle.Pedal O.C.” and “SpeedSensor. O.C.” alarms are present, the problem is to be found in a break in the cable from pin 33 of the “ENGINE ECU” connector. Furtherconfirmation of this fault could be the impossibility of changing the speed of the HML unit, if present.

- Check that the contacts on the “X14” connector of the accelerator pedal potentiometer and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “I” (ON) position, check that the accelerator pedal potentiometer is receiving power correctly (approx. 5 V between pin 1 (positive) and pin 2 (negative) of connector “X14”).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 4 of connector “X14” and to pin 6 of the“ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the accelerator pedal potentiometer works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



PedaleAccel.C.C.

ALARM CODE: M3

DESCRIPTION

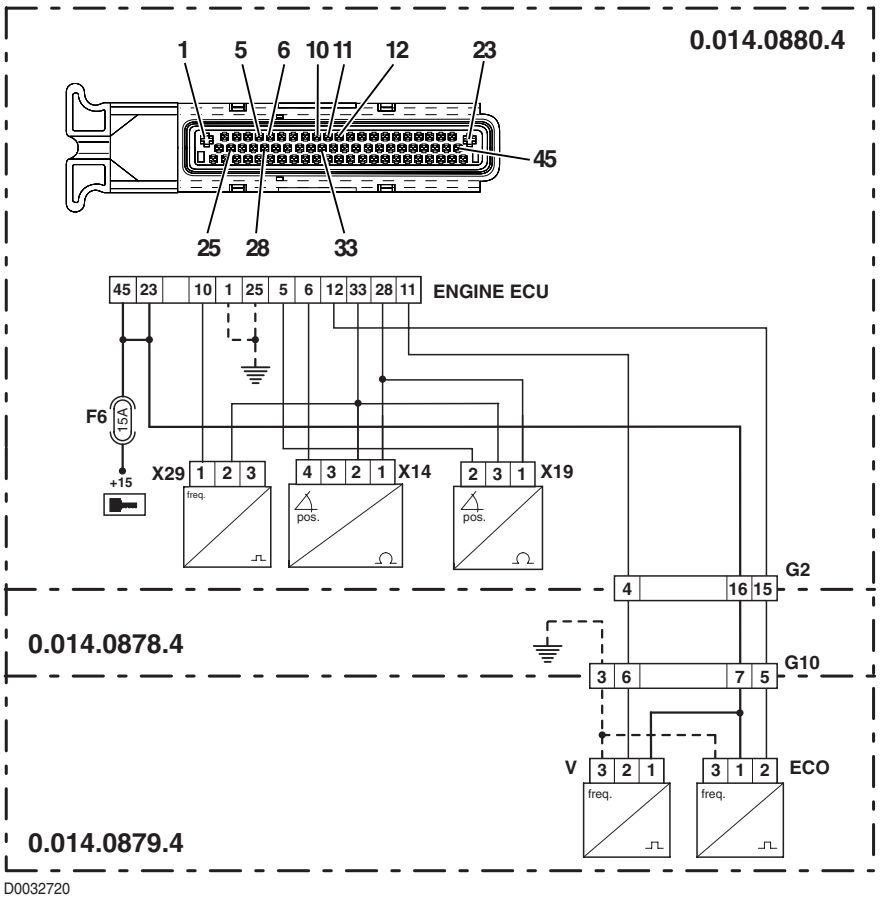
The control unit detects that the accelerator pedal potentiometer is short-circuited.

CONTROL UNIT RESPONSE

The engine is stopped and it can no longer be started.

CHECK

- Check that the contacts on the “X19” connector of the accelerator pedal potentiometer and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X19” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 and to pin 3 of connector “X19” and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 and pin 2 of connector “X19” and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X19” and to ground on the tractor frame and perform a resistance test to check for shorts to battery positive (meter reading: 0V).
- Check the accelerator pedal potentiometer works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



PedaleAccel.C.A.

ALARM CODE: M3

DESCRIPTION

The control unit detects that the accelerator pedal potentiometer is disconnected.

CONTROL UNIT RESPONSE

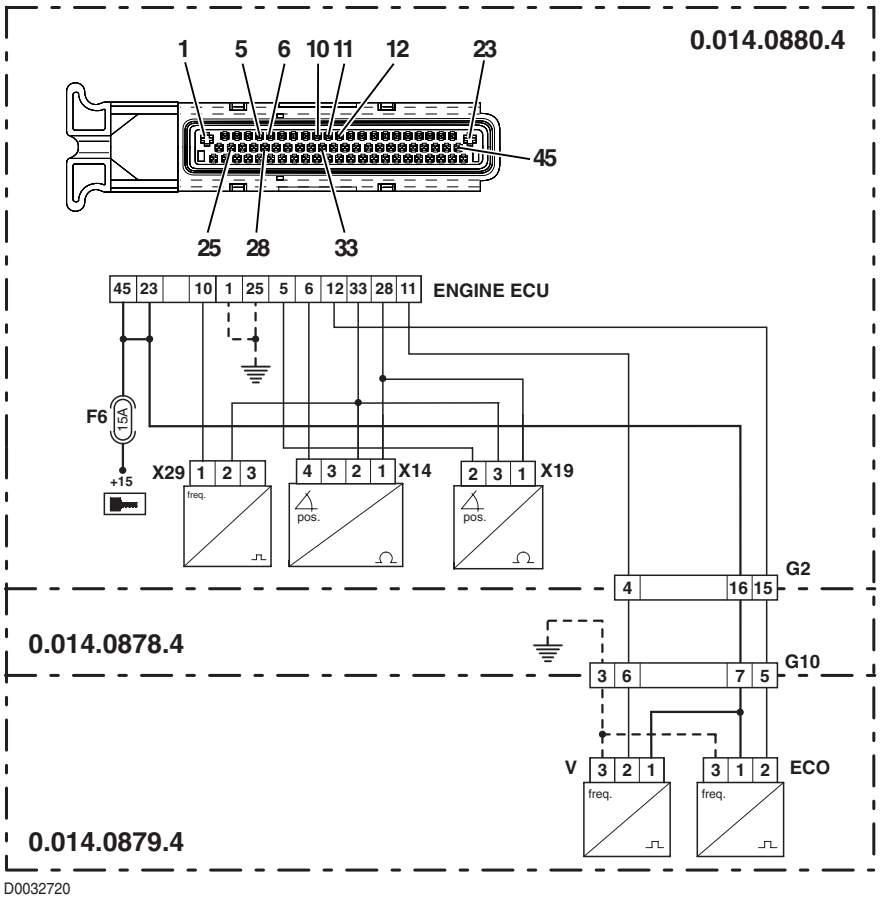
The engine is stopped and it can no longer be started.

CHECK

NOTE

If also the “RPM.Sensor O.C.”, “RPM.Sensor O.C.”, “accelerator pedal O.C.” and “SpeedSensor. O.C.” alarms are present, the problem is to be found in a break in the cable from pin 33 of the “ENGINE ECU” connector. Further confirmation of this fault could be the impossibility of changing the speed of the HML unit, if present.

- Check that the contacts on the “X19” connector of the accelerator pedal potentiometer and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “I” (ON) position, check that the accelerator pedal potentiometer is receiving power correctly (approx. 5 V between pin 1 (positive) and pin 3 (negative) of connector “X19”).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “X19” and to pin 5 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the accelerator pedal potentiometer works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



D0032720

LampadaHold C.A.

ALARM CODE: Not signalled

DESCRIPTION

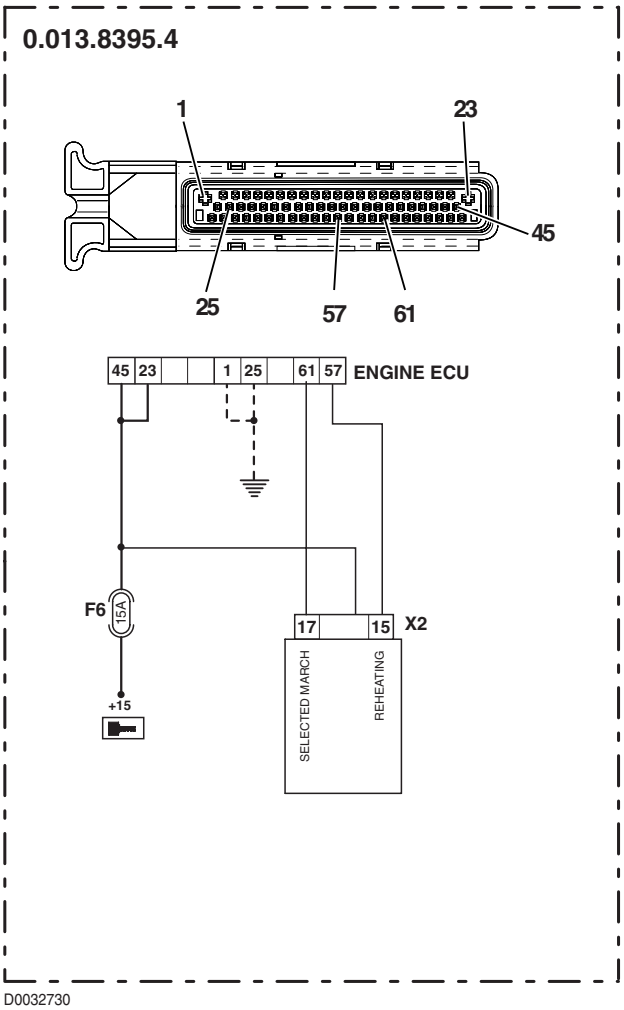
The control unit detects that the connection with the instrument panel is disconnected.

CONTROL UNIT RESPONSE

The engine continues to operate normally.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 17 of connector “X2” and to pin 61 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity.
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Sensor.Vel. C.A.

ALARM CODE: M6

DESCRIPTION

The control unit detects that the wheel speed sensor is disconnected.

CONTROL UNIT RESPONSE

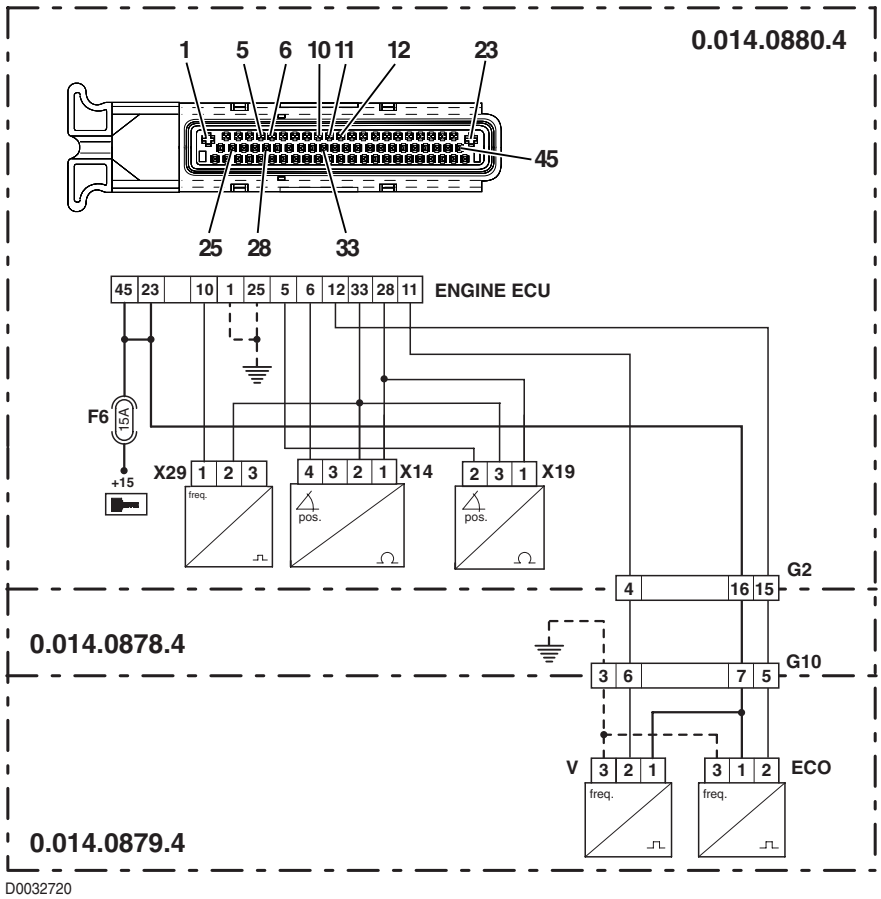
The engine continues to work properly, but top speed is limited to 1500 rpm.

CHECK

NOTE

If also the "RPM.Sensor O.C.", "RPM.Sensor O.C.", "accelerator pedal O.C." and "ThrottlePedal.O.C." alarms are present, the problem is to be found in a break in the cable from pin 33 of the "ENGINE ECU" connector. Further confirmation of this fault could be the impossibility of changing the speed of the HML unit, if present.

- Check that the contacts on the "V" connector of the wheel speed sensor and "ENGINE ECU" on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the "O" (OFF) position, connect a test meter to pin 2 of connector "V" and to pin 11 of the "ENGINE ECU" connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the "O" (OFF) position, connect a test meter to pin 3 of connector "V" and to pin 2 of the "REVERSE ECU" connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the wheel speed sensor works properly (for technical details see unit 40)
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again; if the alarm is still present the control unit must be renewed.



D0032720

Sensor.VelInterm

ALARM CODE: M6

DESCRIPTION

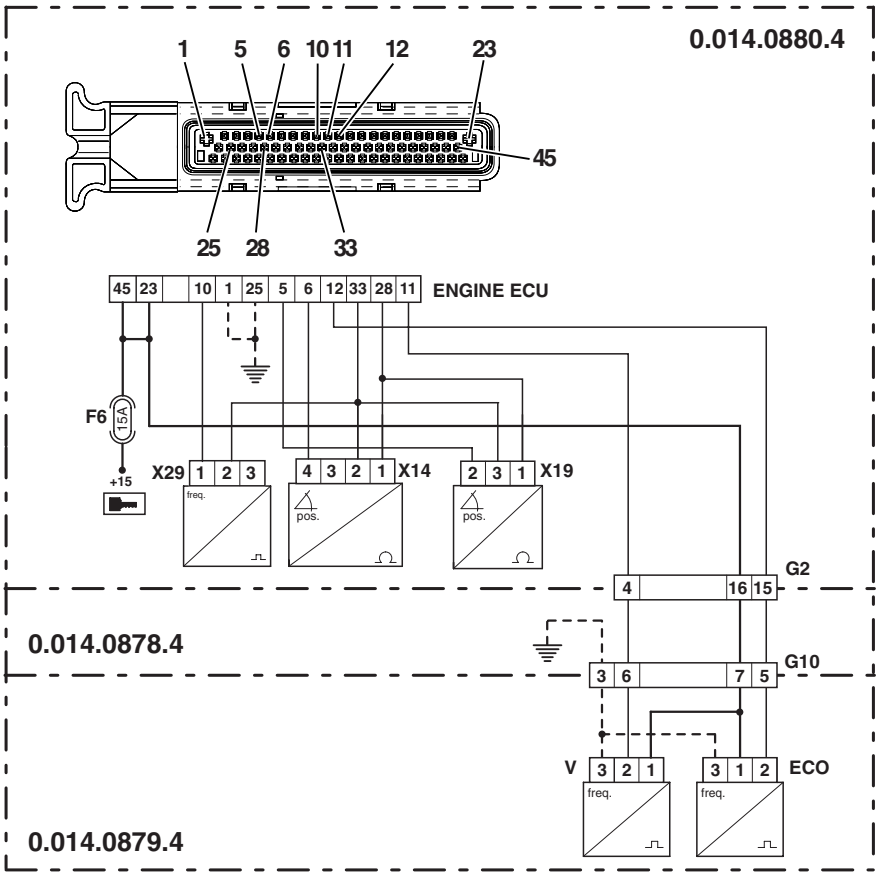
The control unit detects that the wheel speed sensor is faulty or the wiring is damaged.

CONTROL UNIT RESPONSE

The engine continues to work properly, but top speed is limited to 1500 rpm.

CHECK

- Check that the contacts on the “V” connector of the wheel speed sensor and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “V” and to pin 11 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 3 of connector “V” and to pin 2 of the “REVERSE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “V” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “V” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the "O" (OFF) position and the “ENGINE ECU” connector disconnected from the control unit,connect a test meter to pin 2 and pin 3 of connector “X29” and measure the resistance to check for shorts (meter reading: infinity).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “V” and to the earth on the tractor frame and perform a resistance test to check for shorts to battery positive (meter reading: 0V).
- Check the wheel speed sensor works properly (for technical details see unit 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



D0032720

Lampada Pre.C.A.

ALARM CODE: Not signalled

DESCRIPTION

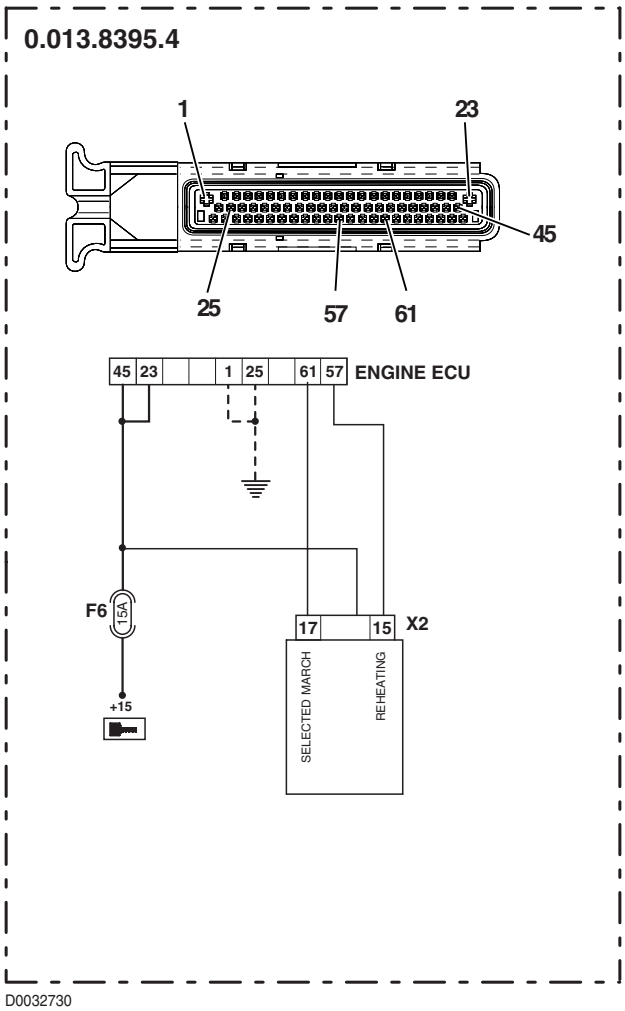
The control unit detects that the bulb of the “Preheating” indicator lamp is disconnected or faulty.

CONTROL UNIT RESPONSE

The engine continues to operate normally.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 15 of connector “X2” and to pin 57 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



SensoreTemp.C.A.

ALARM CODE: Not signalled

DESCRIPTION

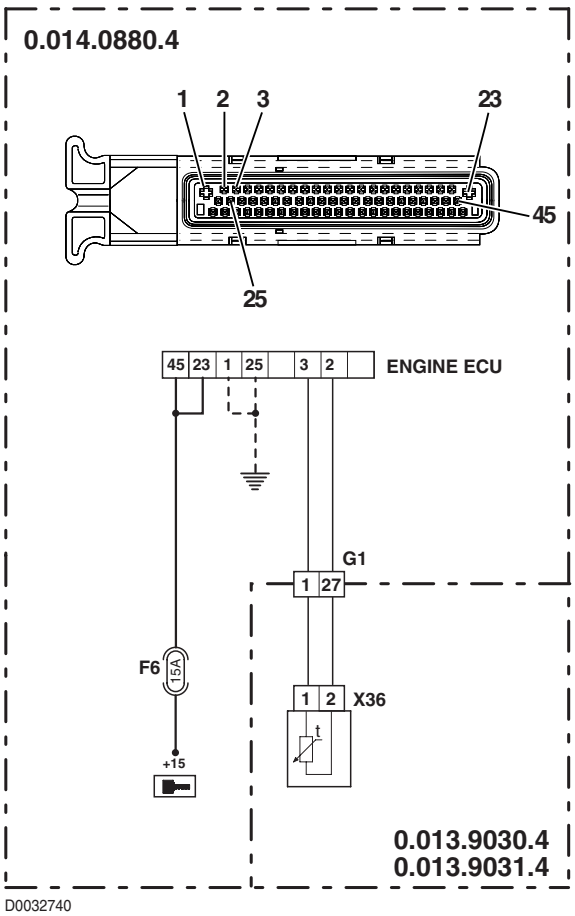
The control unit detects that the coolant temperature sensor is disconnected.

CONTROL UNIT RESPONSE

The preheating system is always turned on when the engine is started.

CHECK

- Check that the contacts on the connectors “X36” of the engine temperature sensor and "ENGINE ECU” of the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “X36” and to pin 3 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “X36” and to pin 2 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the correct operation of the sensor (for technical details, see section 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



SensPosSoll C.A.

ALARM CODE: Not signalled

DESCRIPTION

The control unit detects it that does not receive the lift position signal.

CONTROL UNIT RESPONSE

The system inhibits the AUTO PTO function operation.

NOTE

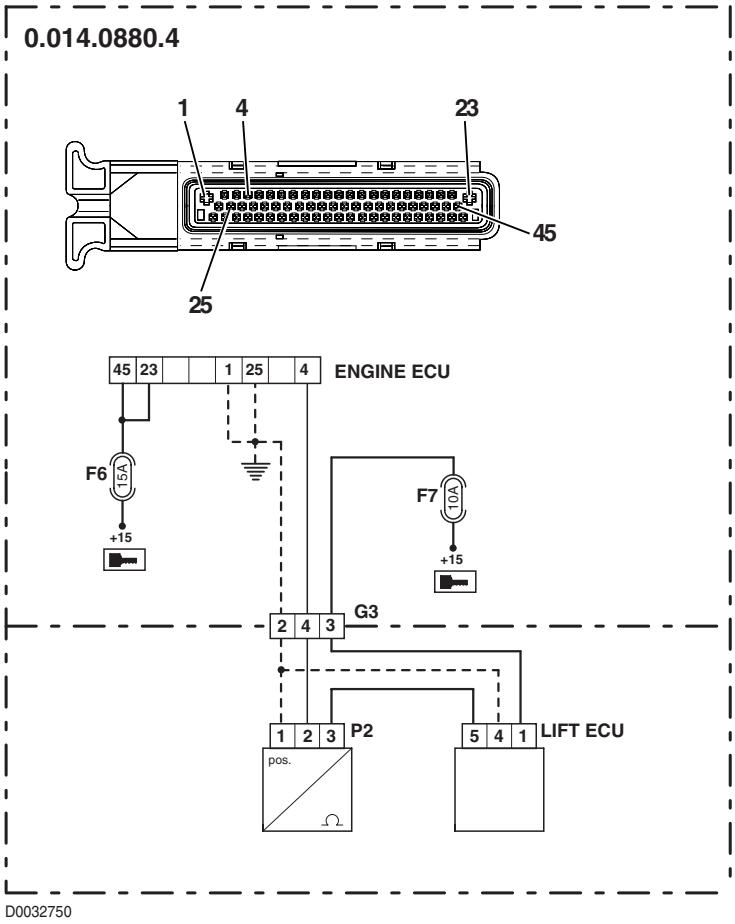
This alarm can only be displayed if the electronic lift is installed and AUTO PTO control button is present.

NOTE

If there are also the “POS.SENS.C.C.” or “POS.SENS.DIS.” on the lift control unit, first check the alarms and then proceed with this analysis.

CHECK

- Check that the contacts on the connectors “P2” of the lift position sensor and “ENGINE ECU” of the engine control unit are not oxidized and are firmly secured.
- Check the lift position sensor works properly (for technical details see unit 40).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “P2” and to pin 4 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



SensoreTemp.C.C.

ALARM CODE: Not signalled

DESCRIPTION

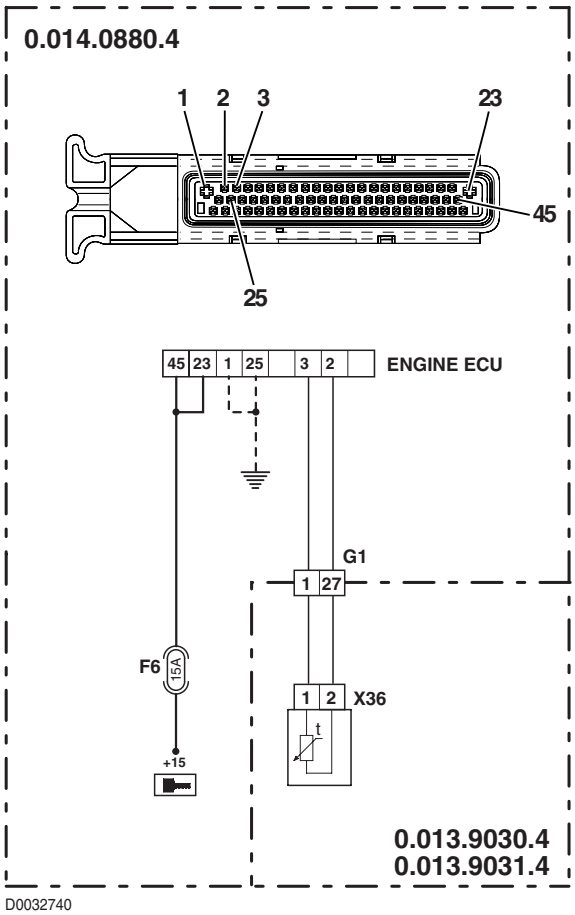
The control unit detects that the coolant temperature sensor is faulty.

CONTROL UNIT RESPONSE

The preheating system is always turned on when the engine is started.

CHECK

- Check that the contacts on the connectors “X36” of the engine temperature sensor and "ENGINE ECU” of the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 and to pin 3 of the “ENGINE ECU” connector and measure the resistance to check that the wires are not shorting together (test meter reading in accordance with the sensor technical features. For details see unit 40).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X36” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the "O" (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X36” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



EV PTO C.C.

ALARM CODE: Not signalled

DESCRIPTION

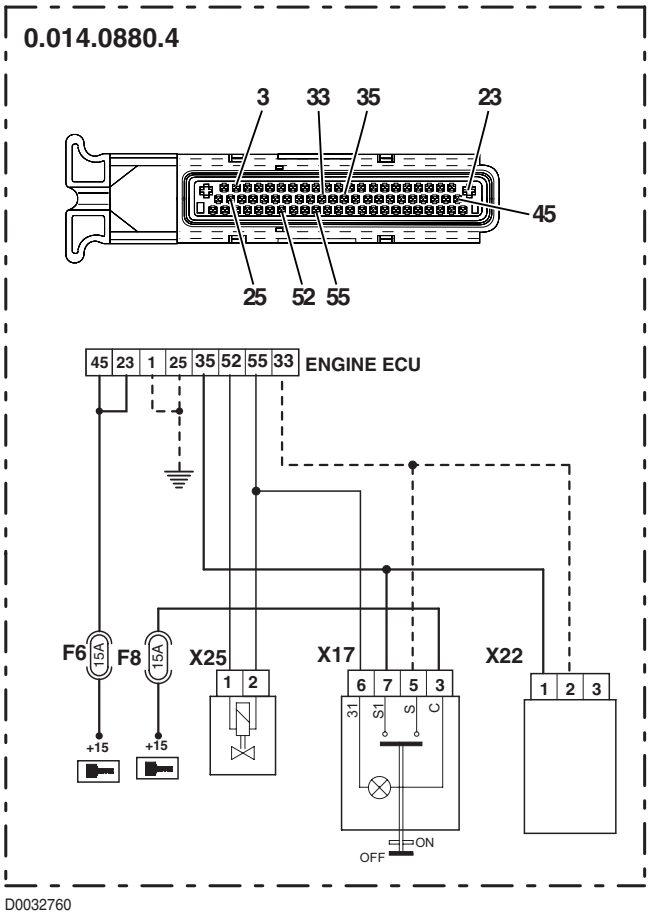
The control unit detects that the rear PTO control valve is short-circuited.

CONTROL UNIT RESPONSE

The engine continues to run normally but the rear PTO cannot be operated.

CHECK

- Check that the contacts on the “X25” connector of the actuator and “ENGINE” on the engine control unit are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for technical details, see unit 40).
- With the starter key in the "O" (OFF) position and the “ENGINE ECU” connector disconnected, connect a test meter to pin 1 and to pin 2 of connector “X25” and measure the resistance to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X25” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X25” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



EV PTO C.A.

ALARM CODE: Not signalled

DESCRIPTION

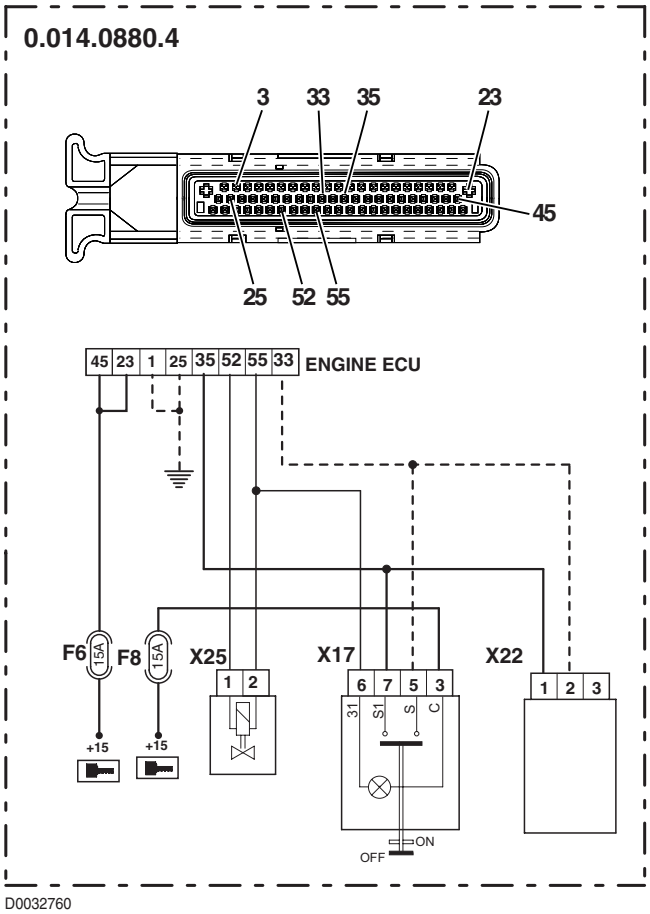
The control unit detects that the rear PTO control valve is disconnected.

CONTROL UNIT RESPONSE

The engine continues to run normally but the rear PTO cannot be operated.

CHECK

- Check that the contacts on the “X25” connector of the actuator and “ENGINE” on the engine control unit are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for technical details, see unit 40).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “X25” and to pin 52 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “X25” and to pin 55 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Flash guasta

ALARM CODE: Not signalled

DESCRIPTION
The control unit detects a fault with the Flash memory

CONTROL UNIT RESPONSE
The control unit does not activate the systems and it is not possible to start the engine.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.

EEPROM guasta

ALARM CODE: M5

DESCRIPTIONL
The control unit detects damage to the EEPROM.

CONTROL UNIT RESPONSE
The engine continues to operate but with default settings.

CHECK
- Program the control unit with the correct values, clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Allarme Generico

ALARM CODE: Not signalled

DESCRIPTION
The control unit detects a hardware problem.

CONTROL UNIT RESPONSE
The engine works, but the lamps and solenoid valves are not controlled.

CHECK
- Switch off the engine and remove the starter key for at least 1 hour.
- Turn the starter key to “I” (ON), clear all alarms, and, if the alarm is still present, the control unit must be renewed.

RelayCand.1 C.A.

ALARM CODE: Not signalled

DESCRIPTION

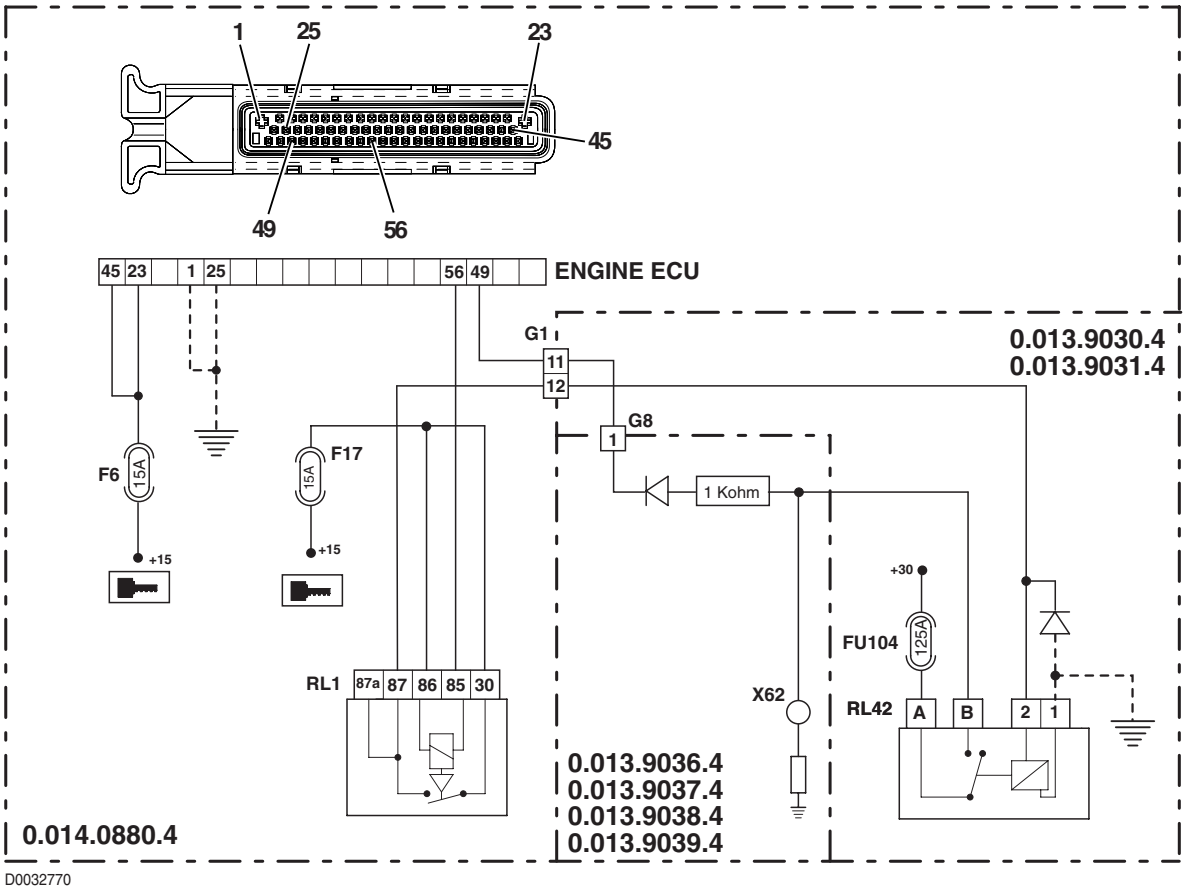
The control unit detects that the preheating device supply relay is faulty.

CONTROL UNIT RESPONSE

The engine continues to operate but the preheating system does not work.

CHECK

- Check that the contacts on the “RL1” connector of the preheating control relay, on the “RL42” connector of the preheating device supply relay and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- Check that the fuse “FU104” has not blown.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 87 of connector “RL1” and to pin 2 of the “RL42” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the "O" (OFF) position , connect a test meter to pin 1 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for electrical continuity (meter reading: 0 Ohm).
- Connect a test meter to connector “X46” of the preheating device and to pin 49 of the “ENGINE ECU” connector and, with the diodes test, check that the diode is operating (place the negative prod of the meter on pin 49 of the “ENGINE ECU” connector and the positive prod on connector “X46”).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



D0032770

Candeletta1 C.A.

ALARM CODE: Not signalled

DESCRIPTION

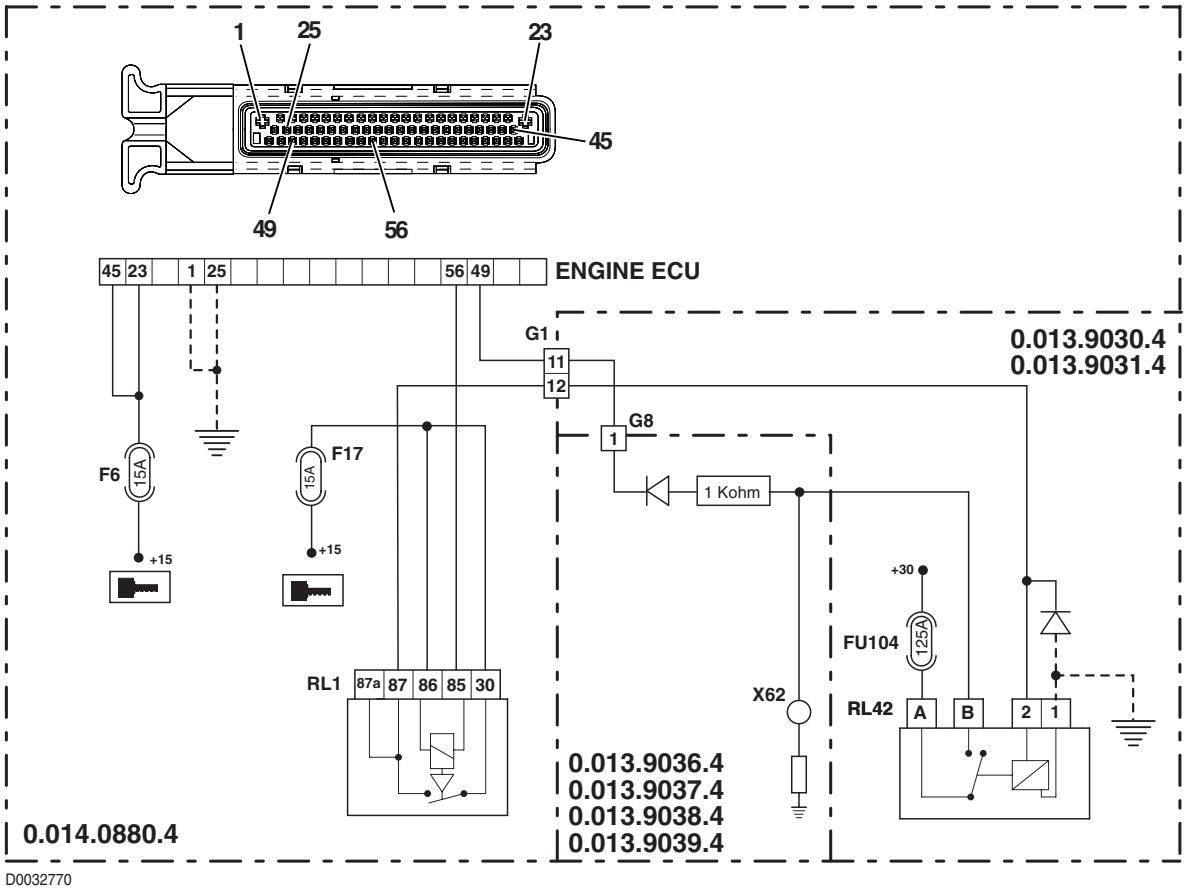
The control unit detects that the preheating device supply relay is faulty.

CONTROL UNIT RESPONSE

The engine continues to operate but the preheating system does not work.

CHECK

- Check that the contacts on the “RL1” connector of the preheating control relay, on the “RL42” connector of the preheating device supply relay and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- Check that the fuse “FU104” has not blown.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 87 of connector “RL1” and to pin 2 of the “RL42” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the "O" (OFF) position , connect a test meter to pin 1 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for electrical continuity (meter reading: 0 Ohm).
- Connect a test meter to connector “X46” of the preheating device and to pin 49 of the “ENGINE ECU” connector and, with the diodes test, check that the diode is operating (place the negative prod of the meter on pin 49 of the “ENGINE ECU” connector and the positive prod on connector “X46”).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



RelCand.1 Guasto

ALARM CODE: Not signalled

DESCRIPTION

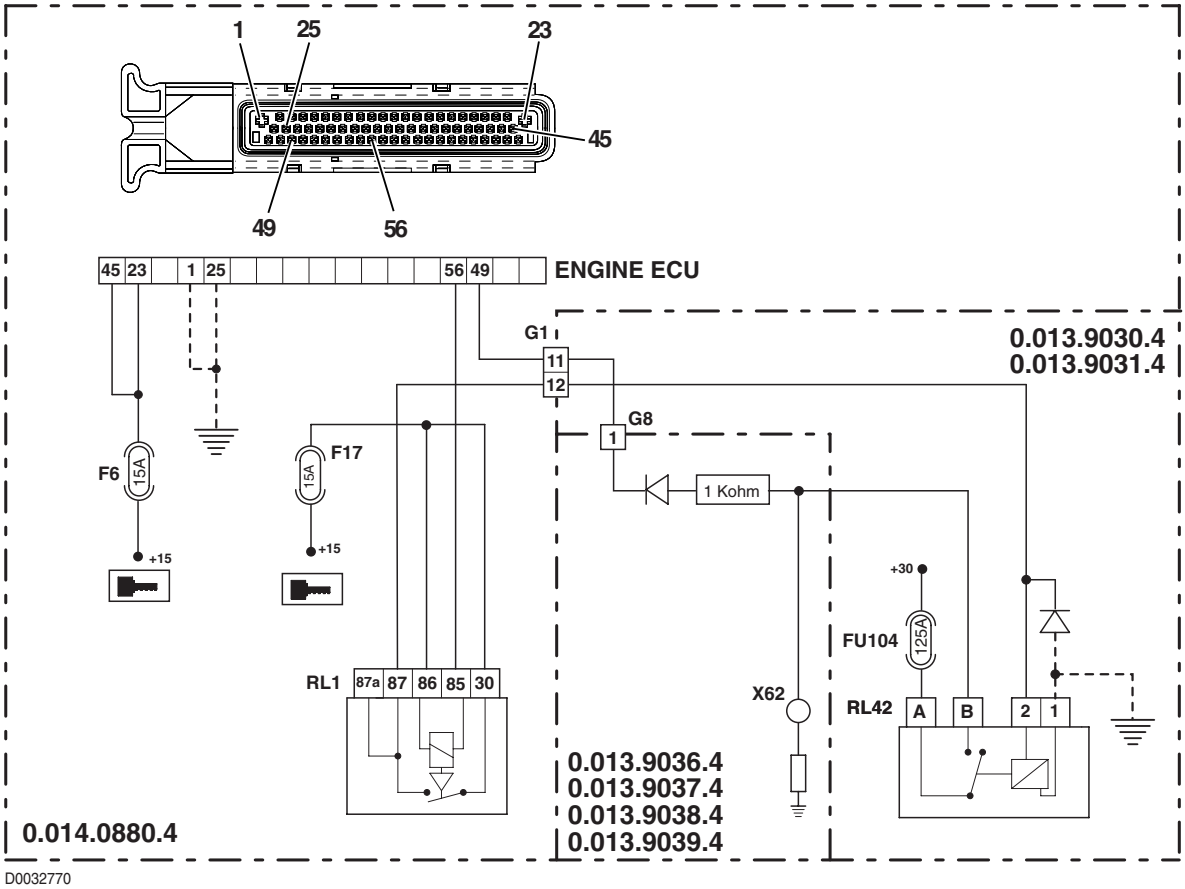
The control unit detects that the preheating device supply relay is faulty.

CONTROL UNIT RESPONSE

The engine continues to operate but the preheating system does not work.

CHECK

- Remove the “RL1” relay and, with the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 85 of connector “RL1” and to chassis ground, and measure the resistance to check for shorts to battery positive (meter reading: 0V).
- Remove the “RL1” relay, connect a test meter to pins 30 and 87 and check that the contact is open.
- Remove the “RL1” relay and, with the starter key in the “I” (ON) position, connect a test meter to pin 2 of connector “RL42” and to chassis earth, and check for shorts to battery positive (meter reading: 0V). Fit relay “RL1”.
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the "O" (OFF) position , disconnect the 2 ways connector of relay “RL42”, connect a test meter to connector “X46” of the preheating device and to the earth on the tractor frame and check for 0 voltage (meter reading: 0V).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to connector “G8” (front wiring side) and check for shorts to battery positive (meter reading: 0V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Sens.Vel.2 Inter

ALARM CODE: M10

DESCRIPTION

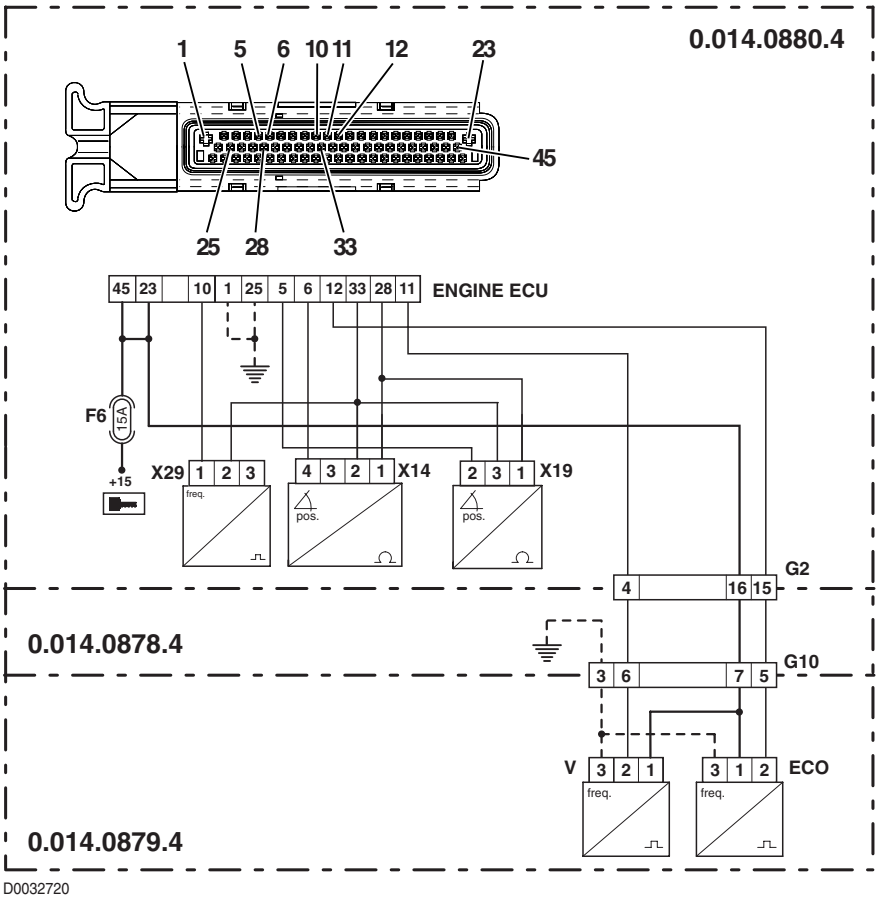
The control unit detects that the second wheel speed sensor is faulty or the wiring is damaged.

CONTROL UNIT RESPONSE

The engine continues to work properly, but top speed is limited to 1500 rpm.

CHECK

- Check that the contacts on the “ECO” connector of the second wheel speed sensor and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “I” (ON) position, check that the second wheel speed sensor is receiving power correctly (approx. 12 V between pin 1 (positive) and pin 3 (negative) of the “ECO“ connector).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “ECO” and to pin 12 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “ECO” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- With the starter key in the “O” (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 and to pin 1 of connector “ECO” and measure the resistance to check for shorts (meter reading: infinity).
- With the starter key in the "O" (OFF) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 and to pin 3 of the "ECO" connector and measure the resistance to check for shorts (meter reading: infinity).
- With the starter key in the “I” (ON) position and the “ENGINE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “ECO” and check for shorts to battery positive (meter reading: 0V).
- Check the wheel speed sensor works properly (for technical details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Sens.Vel.2 C.A.

ALARM CODE: M10

DESCRIPTION

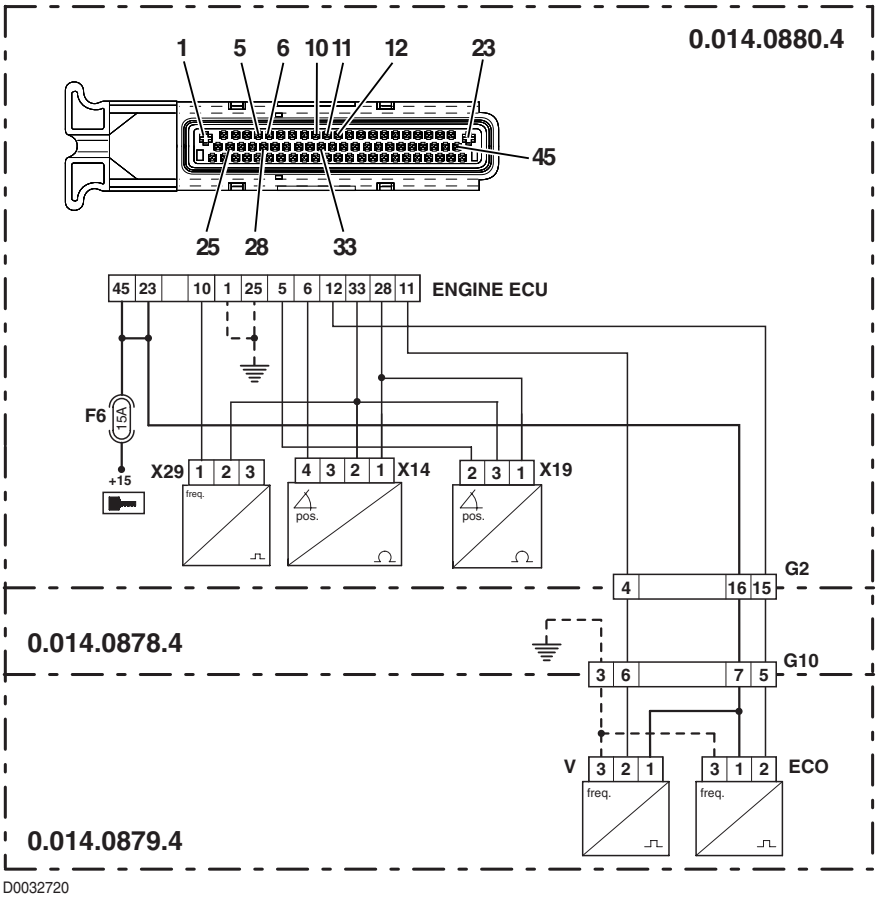
The control unit detects that the second wheel speed sensor is disconnected.

CONTROL UNIT RESPONSE

The engine continues to work properly, but top speed is limited to 1500 rpm.

CHECK

- Check that the contacts on the “ECO” connector of the second wheel speed sensor and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- With the starter key in the “I” (ON) position, check that the second wheel speed sensor is receiving power correctly (approx. 12 V between pin 1 (positive) and pin 3 (negative) of the “ECO“ connector).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “ECO” and to pin 12 of the “ENGINE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check the wheel speed sensor works properly (for technical details see unit 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Sen.Vel.Log.Err.

ALARM CODE: M11

DESCRIPTION

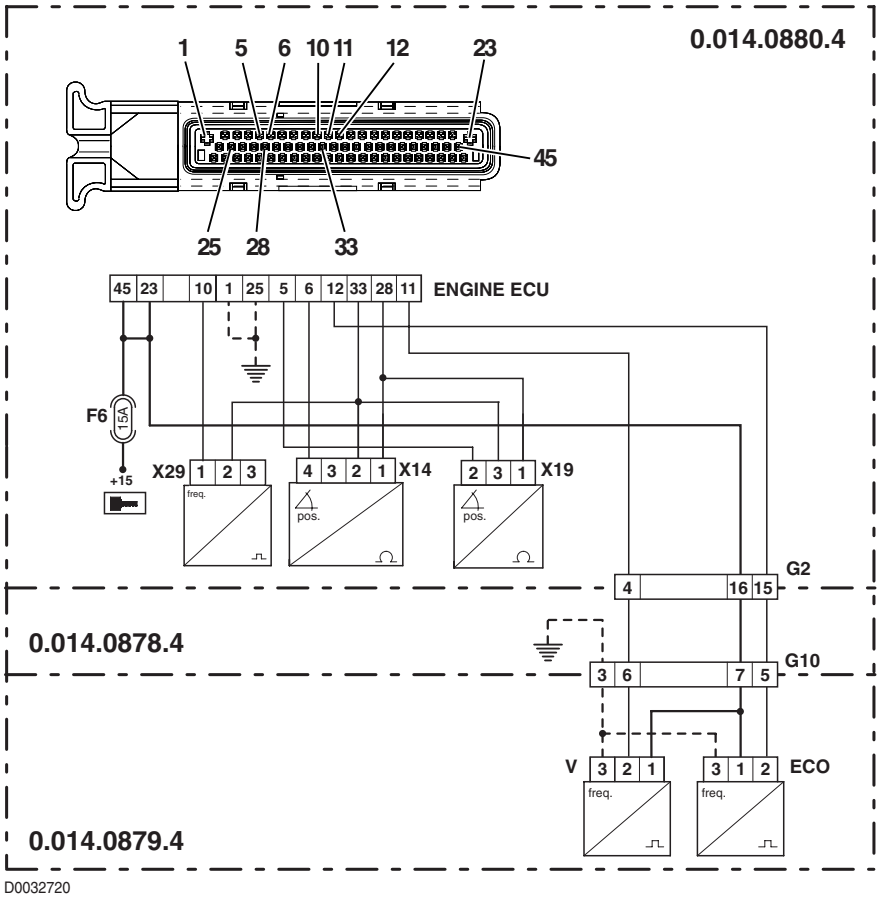
The control unit detects a difference in speed greater than 2 km/h between the wheel speed sensors when one of the two sensors detects travel speed greater than 5 km/h.

CONTROL UNIT RESPONSE

The engine continues to work properly, but top speed is limited to 1500 rpm.

CHECK

- Check that the contacts on the “V” connector of the first wheel speed sensor, “ECO” of the second wheel speed sensor and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- Check the wheel speed sensors work properly (for technical details see unit 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Err.Configuraz.

ALARM CODE: M11

DESCRIPTION

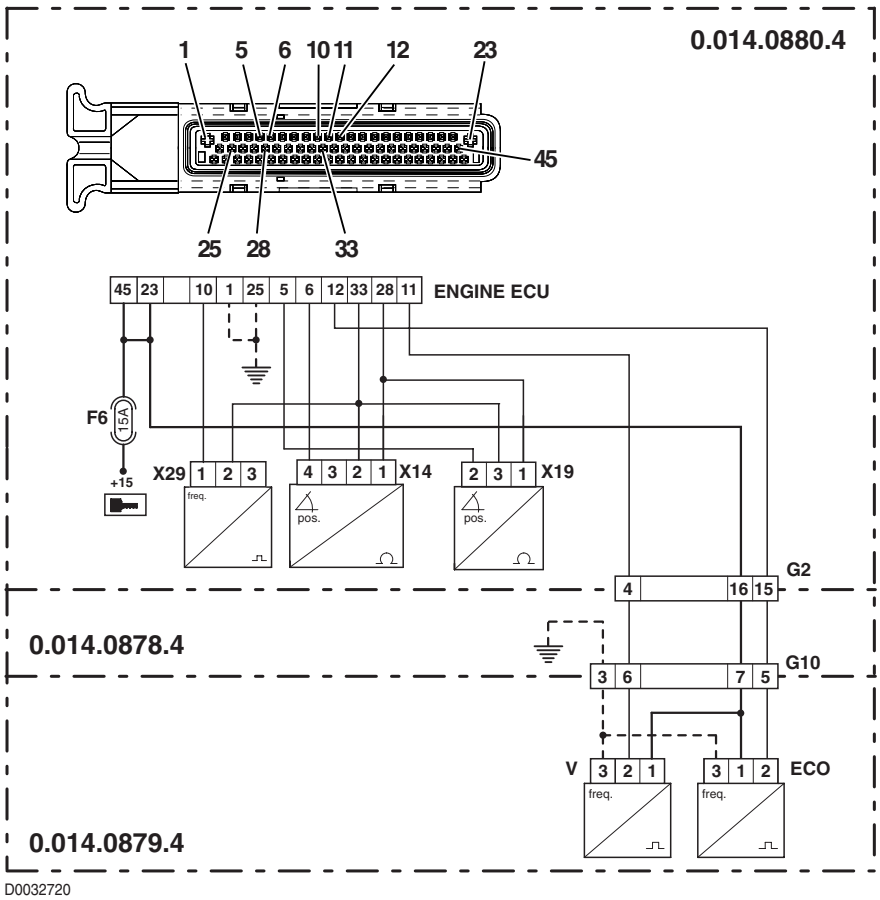
The control unit detects that the maximum travel speed parameter does not correspond to the tractor configuration.

CONTROL UNIT RESPONSE

The engine continues to work properly, but top speed is limited to 1500 rpm.

CHECK

- This alarm is displayed when the engine control unit is replaced with a new one and before commissioning the tractor. If the alarm is displayed even after the configuration, check that the two wheel speed sensors work properly and are connected correctly.
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



D0032720

PulsantPTOguasto

ALARM CODE: Not signalled

DESCRIPTION

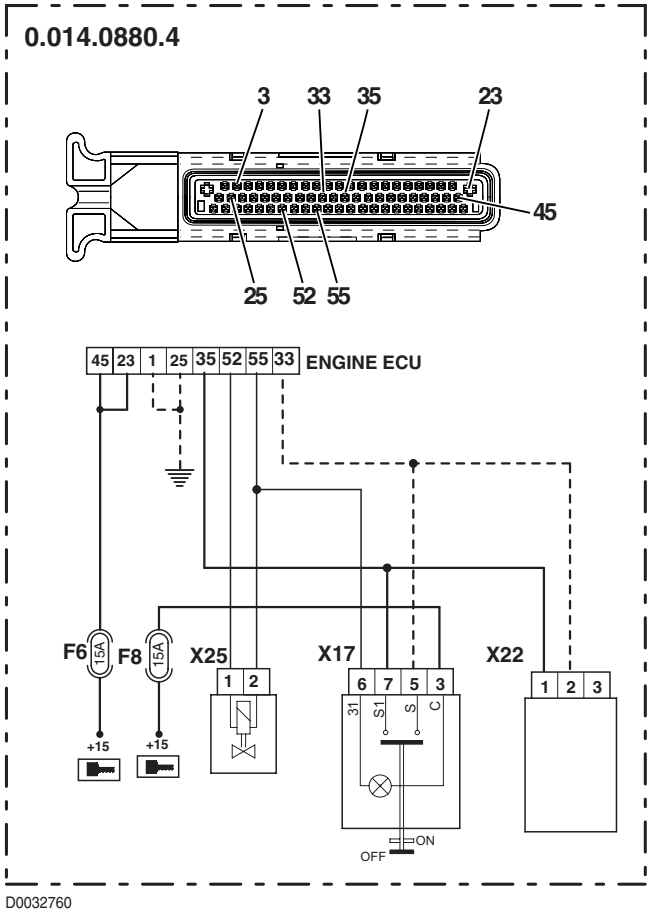
The control unit detects that the rear PTO button is faulty.

CONTROL UNIT RESPONSE

The engine continues to run normally but the rear PTO cannot be operated.

CHECK

- Check that the contacts on the “X17” connector of the rear PTO control key and “ENGINE ECU” on the engine control unit are not oxidized and are firmly secured.
- Check the rear PTO control key works properly (for technical details see unit 40)
- With the starter key in the “O” (OFF) position, connect a test meter to pin 7 of connector “X17” and to the earth on the tractor frame and perform a resistance test to check for ground faults (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



Flash guasta

DESCRIPTION
The control unit detects a fault with the Flash memory

CONTROL UNIT RESPONSE
The control unit does not activate the systems and it is not possible to start the engine.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.

EEPROM guasta

DESCRIPTION
The control unit detects damage to the EEPROM.

CONTROL UNIT RESPONSE
The engine continues to operate but with default settings.

CHECK
- Program the control unit with the correct values, clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Allarme Generico

DESCRIPTION
The control unit detects a hardware problem.

CONTROL UNIT RESPONSE
The engine works, but the lamps and solenoid valves are not controlled.

CHECK
- Switch off the engine and remove the starter key for at least 1 hour.
- Turn the starter key to “I” (ON), clear all alarms, and, if the alarm is still present, the control unit must be renewed.

5.2 SHUTTLE CONTROL UNIT ALARMS (P/N 2.8519.030.0/30)

The engine control unit signals any malfunctioning of the components it manages to the operator with the display on the instrument panel right-hand side.

Faults are indicated using a system of coded flash sequences that identify the affected device or system.

For a more detailed analysis of the fault detected, connect the ART to the diagnostics socket and refer to menu “5. ALARMS”.

5.2.1 LIST OF ALARMS DISPLAYED ON THE INSTRUMENT PANEL

Ins. Panel Code	*Display on ART*	*Alarm description*	*System reaction*	*Page*
T11	EvL Stato Non OK	The control unit detects that the status of the L speed solenoid valve is incorrect.	On versions with HML, the system inhibits operation of the HML unit.	20-97
T12	EvL Corto Circ.	The control unit detects a short-circuit in the control line of the L speed solenoid valve.	On versions with HML, the system inhibits operation of the HML unit.	20-98
T13	EvL Circ. Aperto	The control unit detects that the L speed solenoid valve is disconnected	On versions with HML, the system inhibits operation of the HML unit.	20-99
T14	Sens. RPM Aperto	The control unit detects that the engine speed sensor is disconnected.	The system inhibits all operation of the shuttle and HML unit.	20-100
T15	Sns.TmpOlio Apt.	The control unit detects that the transmission oil temperature sensor is disconnected.	The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction.	20-101
	Sns.TmpOlio C.C.	The control unit detects a short-circuit of the transmission oil temperature sensor.	The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction.	20-102
T16	DevioDirez. N.V.	The control unit detects that shuttle control lever is faulty or disconnected.	The system inhibits all operation of the shuttle and HML unit.	20-103
T17	GuastoPrxProprz.	The control unit detects that the status of the M speed solenoid valve is incorrect.	On versions with HML, the system inhibits operation of the HML unit.	20-104
T24	Sens. VEL Aperto	The control unit detects that the wheel speed sensor is disconnected.	The system continues to function, but changes in drive direction are controlled on the basis of engine rpm rather than the tractor's ground speed.	20-105
T27	PulsanteFrizione	The control unit detects that the clutch disengagement button (confort clutch) is short-circuiting to ground (equivalent to button continuously pressed).	The system continues to function, but it is not possible to use the clutch disengagement button.	20-106
T31	EvH Stato Non OK	The control unit detects that the status of the H speed solenoid valve is incorrect.	On versions with HML, the system inhibits operation of the HML unit.	20-107
T32	EvH Corto Circ.	The control unit detects a short-circuit in the control line of the H speed solenoid valve.	On versions with HML, the system inhibits operation of the HML unit.	20-108
T33	EvH Circ. Aperto	The control unit detects that the H speed solenoid valve is disconnected	On versions with HML, the system inhibits operation of the HML unit.	20-109

T34	Sens. INV Aperto	The control unit detects that the shuttle speed sensor is disconnected.	The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction	20-110
T35	Pos. Pedale Apt.	The control unit detects that the clutch pedal position sensor is disconnected.	The system inhibits all operation of the shuttle and HML unit.	20-111
	Pos.Ped.C.C./Apt	The control unit detects that the clutch pedal position sensor is shorting to ground.	The system inhibits all operation of the shuttle and HML unit.	20-112
	Pos. Pedale N.V.	The control unit detects that the clutch pedal position sensor is shorting to battery positive or is incorrectly calibrated.	The system inhibits all operation of the shuttle and HML unit.	20-113
T41	Puls.HML+premuto	The control unit detects that the shift 'up' button of the HML unit is continuously pressed.	The system continues to function but only in H speed and it is not possible to shift to M or L speeds.	20-114
T42	Puls.HML-premuto	The control unit detects that the shift 'down' button of the HML unit is continuously pressed.	The system continues to function but only in L speed and it is not possible to shift to M or H speeds.	20-115
T44	EvP Stato Non OK	The control unit detects that the status of the shuttle proportional solenoid valve is incorrect.	The system inhibits all operation of the shuttle and HML unit.	20-116
T45	Pos.Ped."B" Apt.	The control unit detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.	The system inhibits all operation of the shuttle and HML unit.	20-117
	Pos.Ped."B" C.C.	The control unit detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.	The system inhibits all operation of the shuttle and HML unit.	20-118
	Pos.Ped."B" xxxx	The control unit detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.	The system inhibits all operation of the shuttle and HML unit.	20-119
T51	EvR Stato Non OK	The control unit detects that the status of the reverse travel solenoid valve is incorrect.	The system inhibits all operation of the tractor.	20-120
T52	EvR Corto Circ.	The control unit detects a short-circuit in the control line of the reverse travel solenoid valve.	The system inhibits all operation of the tractor.	20-121
T53	EvR Circ. Aperto	The control unit detects that the direction selector solenoid valve (or the reverse travel solenoid valve on models without HML) is disconnected.	The system inhibits all operation of the tractor.	20-122
T54	EvP Corto Circ.	The control unit detects a short-circuit in the control line to the the shuttle proportional solenoid valve.	The system inhibits all operation of the tractor.	20-123

T55	Rele''HML St.N.V	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-124
	C.C. CircuitoHML	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-124
	Rele''REV St.N.V	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-124
	C.C. CircuitoREV	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-125
	Guasto REV Group	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-125
	Alim.Amplif.Opr.	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-125
	Alim.SensoreFrz.	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-126
T56	EvP Circ. Aperto	The control unit detects that the shuttle proportional solenoid valve is disconnected	The system inhibits all operation of the tractor.	20-127
T61	Manca PrxServizi	The control unit detects that there is insufficient pressure in the services circuit.	The system inhibits all operation of the tractor.	20-128
T62	Pressione Propz.	The control unit detects a conflict between the logical status and reading status of the pressure signal down-line from the shuttle proportional solenoid valve.	The system inhibits all operation of the tractor.	20-129
T63	Guasto E2PROM	The control unit detects an error in the parameters stored in the E2PROM.	The system inhibits all operation of the tractor.	20-130
T71	Sens.INV in C.C.	The control unit detects a short-circuit of the shuttle speed sensor.	If the fault is not mechanical or hydraulic in nature, the system will continue to function correctly.	20-131
T72	Sens.RPM in C.C.	The control unit detects a short-circuit of the engine speed sensor.	The system inhibits all operation of the tractor.	20-132
T73	Slitt. Friz. INV	The control unit detects excessive slipping of one of the shuttle clutches.	The system continues to function correctly but activates the buzzer intermittently.	20-133
	Manovra > 10Km/h	The control unit detects that a travel direction inversion request has been transmitted at a speed above 10 km/h.	The system continues to function correctly and the horn sounds continuously.	20-133
T74	Manca PrxProprz	The control unit detects that the services pressure switch sensor is short-circuiting to ground.	The system inhibits all operation of the tractor.	20-134
T75	Rele''HML St.N.V	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-134
T76	Rele''REV St.N.V	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-135
T77	Allarme grave	The control unit detects an unidentifiable internal fault.	The system inhibits all operation of the tractor.	20-135
T91	EVA stato non ok	The control unit detects that the status of the forward travel solenoid valve is incorrect	The system inhibits all operation of the tractor.	20-136
T92	EVA corto circ.	The control unit detects a short-circuit in the control line of the forward travel solenoid valve.	The system inhibits all operation of the tractor.	20-137

T93	EVA circ.aperto	The control unit detects that the direction selector solenoid valve (or the reverse travel solenoid valve on models without HML) is disconnected.	The system inhibits all operation of the tractor.	20-138
T94	Sens.Sedile KO	The control unit detects that the operator presence sensor (seat sensor) is faulty or disconnected.	The tractor can travel only using the clutch pedal.	20-139

5.2.2 LIST OF ALARMS DISPLAYED ON ART

Display on ART	Ins. Panel Code	Alarm description	System reaction	Page
Alim.Amplif.Opr.	T55	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-125
Alim.SensoreFrz.	T55	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-126
Allarme grave	T77	The control unit detects an unidentifiable internal fault.	The system inhibits all operation of the tractor.	20-135
C.C. CircuitoHML	T55	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-124
C.C. CircuitoREV	T55	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-125
DevioDirez. N.V.	T16	The control unit detects that shuttle control lever is faulty or disconnected.	The system inhibits all operation of the shuttle and HML unit.	20-103
EVA circ.aperto	T93	The control unit detects that the direction selector solenoid valve (or the reverse travel solenoid valve on models without HML) is disconnected.	The system inhibits all operation of the tractor.	20-138
EVA corto circ.	T92	The control unit detects a short-circuit in the control line of the forward travel solenoid valve.	The system inhibits all operation of the tractor.	20-137
EVA stato non ok	T91	The control unit detects that the status of the forward travel solenoid valve is incorrect	The system inhibits all operation of the tractor.	20-136
EvH Circ. Aperto	T33	The control unit detects that the H speed solenoid valve is disconnected	On versions with HML, the system inhibits operation of the HML unit.	20-109
EvH Corto Circ.	T32	The control unit detects a short-circuit in the control line of the H speed solenoid valve.	On versions with HML, the system inhibits operation of the HML unit.	20-108
EvH Stato Non OK	T31	The control unit detects that the status of the H speed solenoid valve is incorrect.	On versions with HML, the system inhibits operation of the HML unit.	20-107
EvL Circ. Aperto	T13	The control unit detects that the L speed solenoid valve is disconnected	On versions with HML, the system inhibits operation of the HML unit.	20-99
EvL Corto Circ.	T12	The control unit detects a short-circuit in the control line of the L speed solenoid valve.	On versions with HML, the system inhibits operation of the HML unit.	20-98
EvL Stato Non OK	T11	The control unit detects that the status of the L speed solenoid valve is incorrect.	On versions with HML, the system inhibits operation of the HML unit.	20-97
EvP Circ. Aperto	T56	The control unit detects that the shuttle proportional solenoid valve is disconnected	The system inhibits all operation of the tractor.	20-127
EvP Corto Circ.	T54	The control unit detects a short-circuit in the control line to the the shuttle proportional solenoid valve.	The system inhibits all operation of the tractor.	20-123
EvP Stato Non OK	T44	The control unit detects that the status of the shuttle proportional solenoid valve is incorrect.	The system inhibits all operation of the shuttle and HML unit.	20-116

EvR Circ. Aperto	T53	The control unit detects that the direction selector solenoid valve (or the reverse travel solenoid valve on models without HML) is disconnected.	The system inhibits all operation of the tractor.	20-122
EvR Corto Circ.	T52	The control unit detects a short-circuit in the control line of the reverse travel solenoid valve.	The system inhibits all operation of the tractor.	20-121
EvR Stato Non OK	T51	The control unit detects that the status of the reverse travel solenoid valve is incorrect.	The system inhibits all operation of the tractor.	20-120
Guasto E2PROM	T63	The control unit detects an error in the parameters stored in the E2PROM.	The system inhibits all operation of the tractor.	20-130
Guasto REV Group	T55	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-125
GuastoPrxProprz.	T17	The control unit detects that the status of the M speed solenoid valve is incorrect.	On versions with HML, the system inhibits operation of the HML unit.	20-104
Manca PrxProprz	T74	The control unit detects that the services pressure switch sensor is short-circuiting to ground.	The system inhibits all operation of the tractor.	20-134
Manca PrxServizi	T61	The control unit detects that there is insufficient pressure in the services circuit.	The system inhibits all operation of the tractor.	20-128
Manovra > 10Km/h	T73	The control unit detects that a travel direction inversion request has been transmitted at a speed above 10 km/h.	The system continues to function correctly and the horn sounds continuously.	20-133
Pos. Pedale Apt.	T35	The control unit detects that the clutch pedal position sensor is disconnected.	The system inhibits all operation of the shuttle and HML unit.	20-111
Pos. Pedale N.V.	T35	The control unit detects that the clutch pedal position sensor is shorting to battery positive or is incorrectly calibrated.	The system inhibits all operation of the shuttle and HML unit.	20-113
Pos.Ped."B" Apt.	T45	The control detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.	The system inhibits all operation of the shuttle and HML unit.	20-117
Pos.Ped."B" C.C.	T45	The control detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.	The system inhibits all operation of the shuttle and HML unit.	20-118
Pos.Ped."B" xxxx	T45	The control detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.	The system inhibits all operation of the shuttle and HML unit.	20-119
Pos.Ped.C.C./Apt	T35	The control unit detects that the clutch pedal position sensor is shorting to ground.	The system inhibits all operation of the shuttle and HML unit.	20-112
Pressione Propz.	T62	The control unit detects a conflict between the logical status and reading status of the pressure signal down-line from the shuttle proportional solenoid valve.	The system inhibits all operation of the tractor.	20-129

Puls.HML+premuto	T41	The control unit detects that the shift 'up' button of the HML unit is continuously pressed.	The system continues to function but only with H speed and it is not possible to shift to M or L speeds.	20-114
Puls.HML-premuto	T42	The control unit detects that the shift 'down' button of the HML unit is continuously pressed.	The system continues to function but only in L speed and it is not possible to shift to M or H speeds.	20-115
PulsanteFrizione	T27	The control unit detects that the clutch disengagement button (confort clutch) is short-circuiting to ground (equivalent to button continuously pressed).	The system continues to function, but it is not possible to use the clutch disengagement button.	20-106
Rele''HML St.N.V	T55	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-124
Rele''HML St.N.V	T75	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-134
Rele''REV St.N.V	T55	The control unit detects an internal fault.	The system inhibits all operation of the HML unit.	20-124
Rele''REV St.N.V	T76	The control unit detects an internal fault.	The system inhibits all operation of the tractor.	20-135
Sens. INV Aperto	T34	The control unit detects that the shuttle speed sensor is disconnected.	The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction	20-110
Sens. RPM Aperto	T14	The control unit detects that the engine speed sensor is disconnected.	The system inhibits all operation of the shuttle and HML unit.	20-100
Sens. VEL Aperto	T24	The control unit detects that the wheel speed sensor is disconnected.	The system continues to function, but changes in drive direction are controlled on the basis of engine rpm rather than the tractor's ground speed.	20-105
Sens.INV in C.C.	T71	The control unit detects a short-circuit of the shuttle speed sensor.	If the fault is not mechanical or hydraulic in nature, the system will continue to function correctly.	20-131
Sens.RPM in C.C.	T72	The control unit detects a short-circuit of the engine speed sensor.	The system inhibits all operation of the tractor.	20-132
Sens.Sedile KO	T94	The control unit detects that the operator presence sensor (seat sensor) is faulty or disconnected.	The tractor can travel only using the clutch pedal.	20-139
Slitt. Friz. INV	T73	The control unit detects excessive slipping of one of the shuttle clutches.	The system continues to function correctly but activates the buzzer intermittently.	20-133
Sns.TmpOlio Apt.	T15	The control unit detects that the transmission oil temperature sensor is disconnected.	The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction.	20-101
Sns.TmpOlio C.C.	T15	The control unit detects a short-circuit of the transmission oil temperature sensor.	The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction.	20-102

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EvL Stato Non OK

INSTRUMENT PANEL CODE: T11

DESCRIPTION

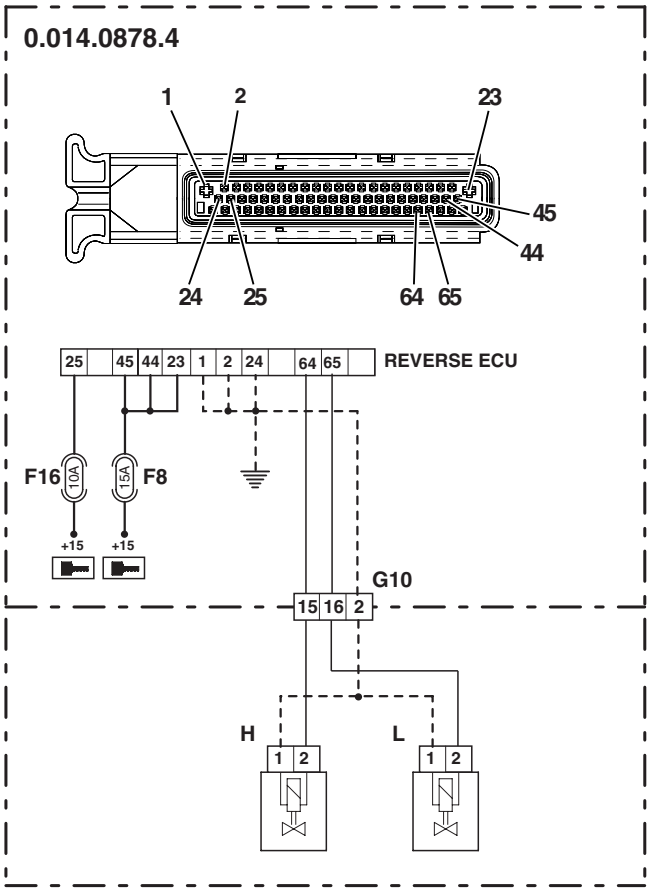
The control unit detects that the status of the L speed solenoid valve is incorrect.

CONTROL UNIT RESPONSE

On versions with HML, the system inhibits operation of the HML unit.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "L" of the L speed solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position "I" (ON) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "L" and to the ground on the tractor frame and check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvL Corto Circ.

INSTRUMENT PANEL CODE: T12

DESCRIPTION

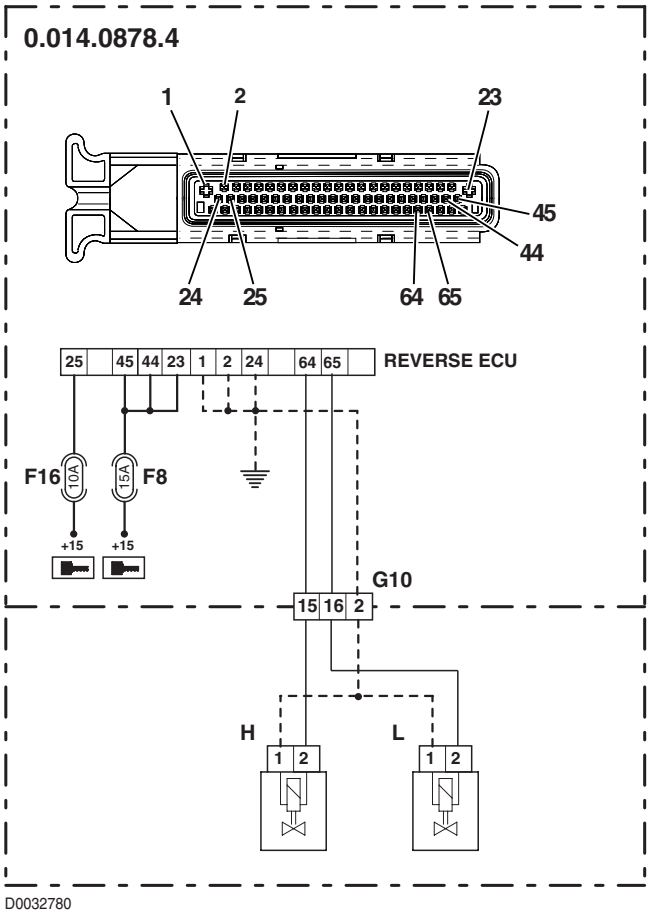
The control unit detects a short-circuit in the L speed solenoid valve control line.

CONTROL UNIT RESPONSE

On versions with HML, the system inhibits operation of the HML unit.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "L" of the L speed solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "L" and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvL Circ. Aperto

INSTRUMENT PANEL CODE:T13

DESCRIPTION

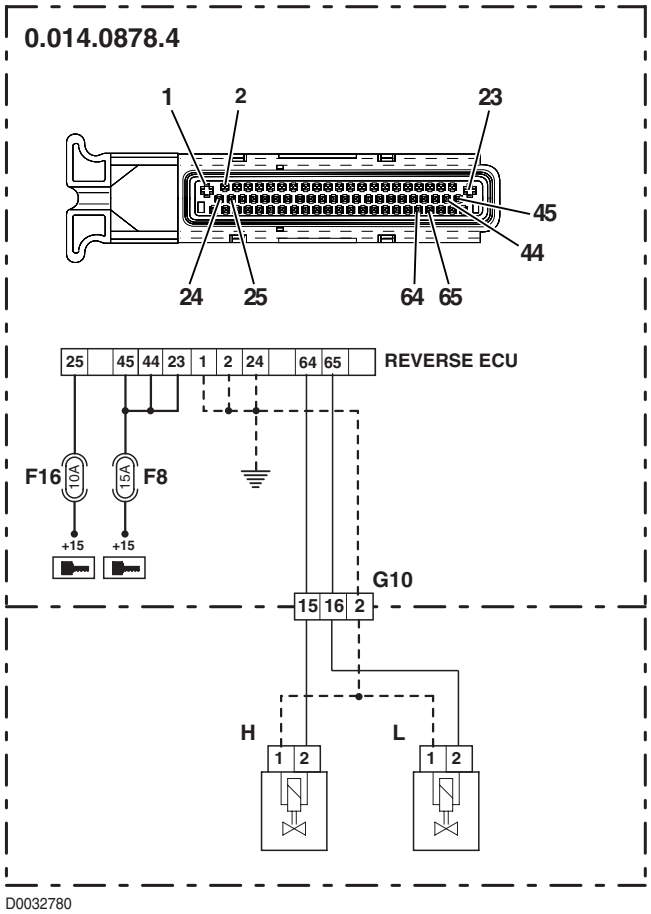
The control unit detects that the L speed solenoid valve is disconnected

CONTROL UNIT RESPONSE

On versions with HML, the system inhibits operation of the HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “L” of the L speed solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “L” and to pin 65 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Sens. RPM Aperto

INSTRUMENT PANEL CODE: T14

DESCRIPTION

The control unit detects that the engine speed sensor is disconnected.

CONTROL UNIT RESPONSE

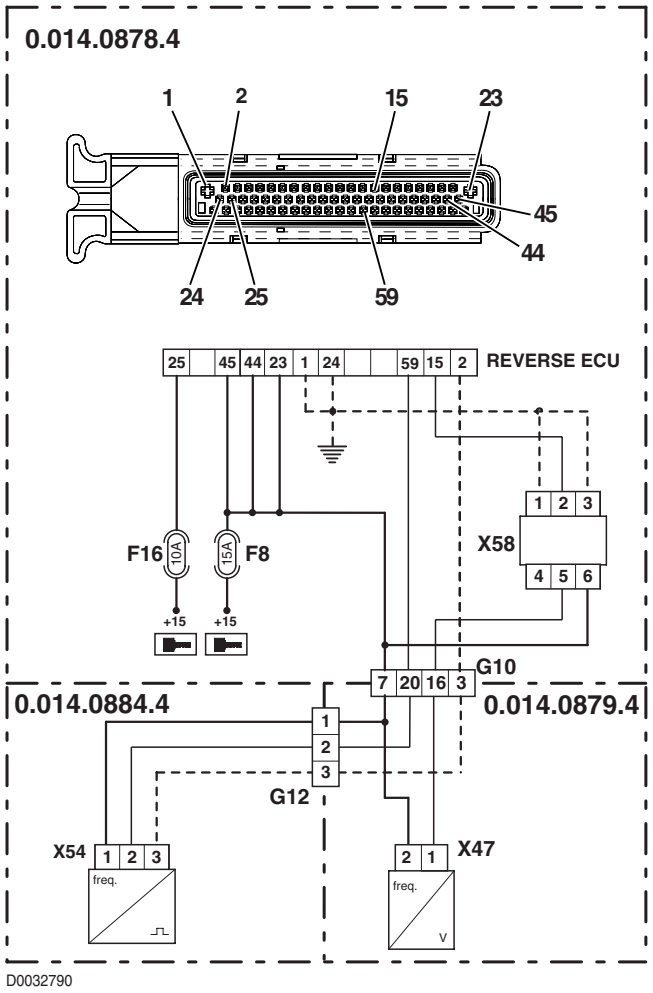
The system inhibits all operation of the shuttle and HML unit.

NOTE

If also the "Sens. INV Open" alarm is present analyse this alarm first then, if the alarm remains active, proceed with this analysis.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "X54" of the engine speed sensor are not oxidized and are firmly secured.
- Check that the engine speed sensor is functioning correctly (for details, see section 40).
- With the starter key in position "I" (ON) and the "REVERSE ECU" connector disconnected from the control unit, check that the engine speed sensor is receiving power correctly (approx. 12 V between pin 1 (positive) and pin 3 (negative) of connector "X54").
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "X54" and to pin 59 of connector "REVERSE ECU" and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



Sns.TmpOlio Apt.

INSTRUMENT PANEL CODE: T15

DESCRIPTION

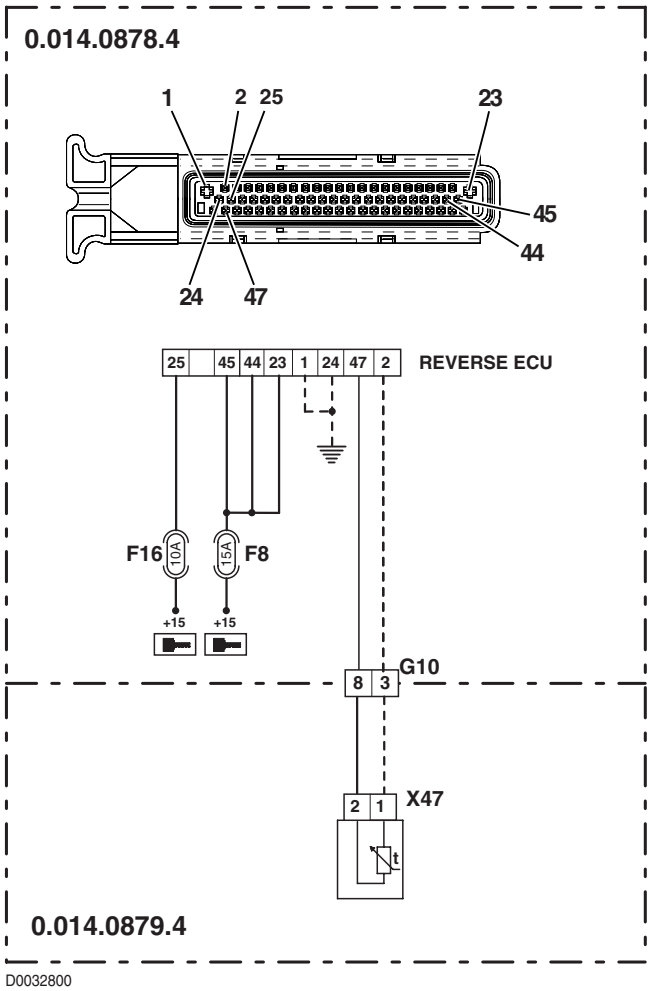
The control unit detects that the transmission oil temperature sensor is disconnected.

CONTROL UNIT RESPONSE

The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X52” of the transmission oil temperature sensor are not oxidized and are firmly secured.
- Check that the transmission oil temperature sensor is functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X52” and to pin 47 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Sns.TmpOlio C.C.

INSTRUMENT PANEL CODE: T15

DESCRIPTION

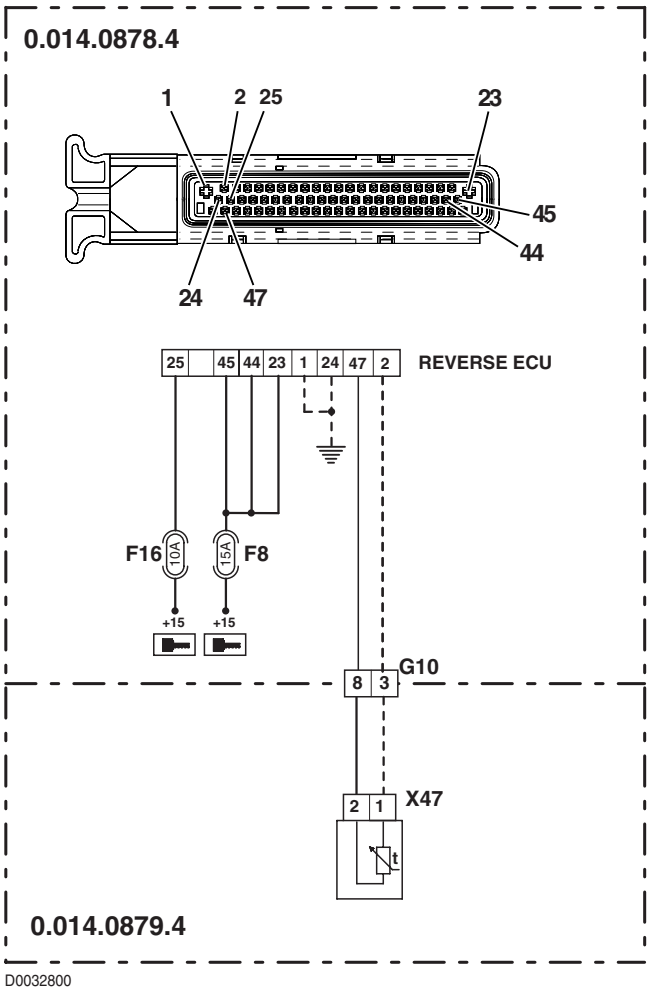
The control unit detects a short-circuit of the transmission oil temperature sensor.

CONTROL UNIT RESPONSE

The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "X52" of the transmission oil temperature sensor are not oxidized and are firmly secured.
- Check that the transmission oil temperature sensor is functioning correctly (for details, see section 40).
- With the starter key in position "I" (ON) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "X52" and to the earth on the tractor frame and check for 0 voltage (meter reading: 0 V).
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "X52" and to the earth on the transmission and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



DevioDirez. N.V.

INSTRUMENT PANEL CODE: T16

DESCRIPTION

The control unit detects that shuttle control lever is faulty or disconnected.

CONTROL UNIT RESPONSE

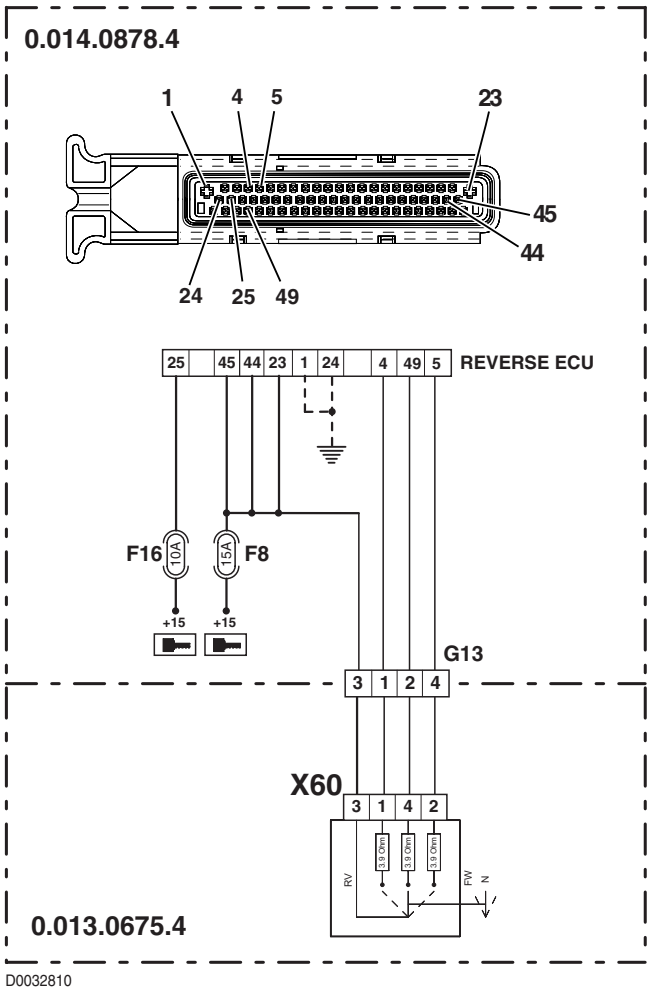
The system inhibits all operation of the shuttle and HML unit.

NOTE

If also the “Sens. INV Open” or “Sens. RPM Open” alarms are present, analyse these alarms first and then, if the alarm remains active, proceed with these analyses.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X60” of the shuttle lever are not oxidized and are firmly secured.
- Turn the starter key to “O” (OFF), move the shuttle control lever to a different position, turn the starter key back to “I” (ON), then check if the alarm is still present. If there is at least one position of the shuttle lever in which the alarm is not displayed, then the fault can be attributed to the shuttle lever.
- Check that the shuttle lever is functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X60” and to pin 4 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X60” and to pin 5 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 4 of connector “X60” and to pin 49 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



GuastoPrxProprz.

INSTRUMENT PANEL CODE: T17

DESCRIPTION

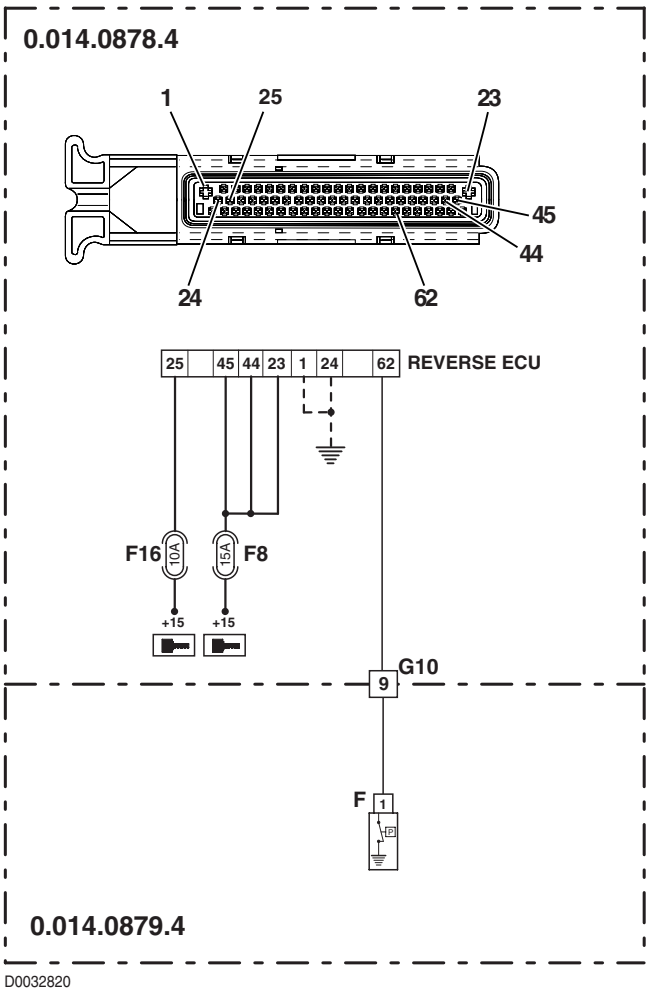
The control unit detects that the proportional solenoid valve pressure switch is short-circuiting to earth.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “F” of the proportional solenoid valve pressure switch are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF), connect a test meter to connector “F” and to the earth on the transmission and perform a resistance test to check for shorts to earth (meter reading: infinity).
- Check that the pressure switch of the proportional solenoid valve is functioning correctly (for details, see section 40).
- Renew the proportional solenoid valve.
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032820

Sens. VEL Aperto

INSTRUMENT PANEL CODE: T24

DESCRIPTION

The control unit detects that the wheel speed sensor is disconnected.

CONTROL UNIT RESPONSE

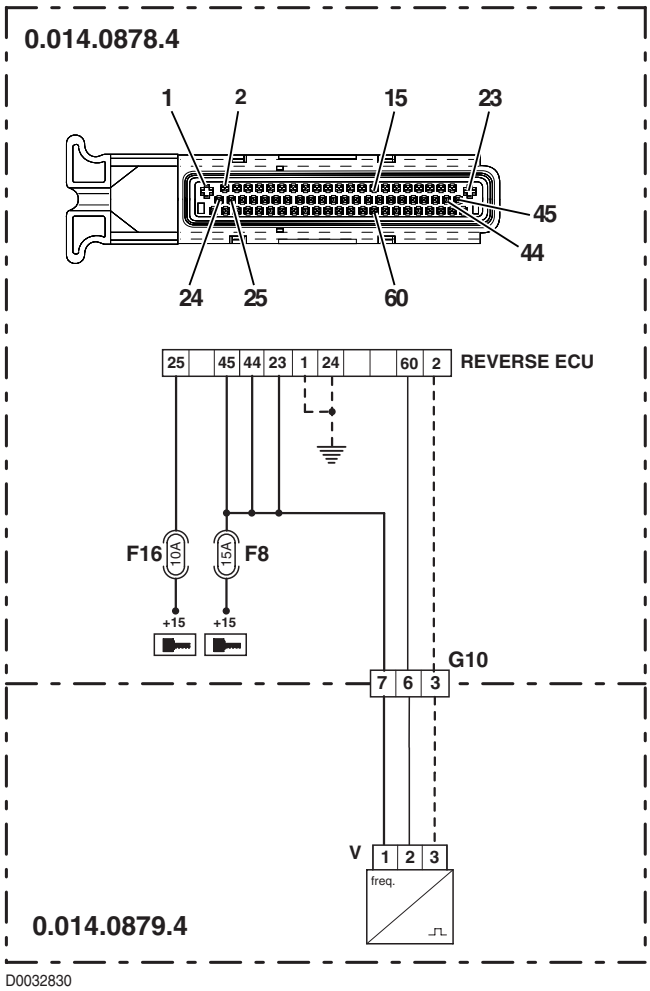
The system continues to function, but changes in travel direction are controlled on the basis of the engine rpm rather than the tractor's ground speed.

NOTE

The wheel speed sensor is also connected in parallel to the engine ECU and to the instrument panel. Before proceeding with fault analysis check for the presence of other alarms concerning the wheel speed sensor in the ECU and, if so, analyse these alarms first.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “V” of the wheel speed sensor are not oxidized and are firmly secured.
- With the starter key in position “I” (ON), check that the wheel speed sensor is receiving power correctly (approx. 12 V between pin 1 (positive) and pin 3 (negative) of connector “V“).
- With the starter key in position “O” (OFF), connect a test meter to pin 2 of connector “V” and to pin 60 of the “REVERSE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check that the wheel speed sensor is functioning correctly (for details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032830

PulsanteFrizione

INSTRUMENT PANEL CODE: T27

DESCRIPTION

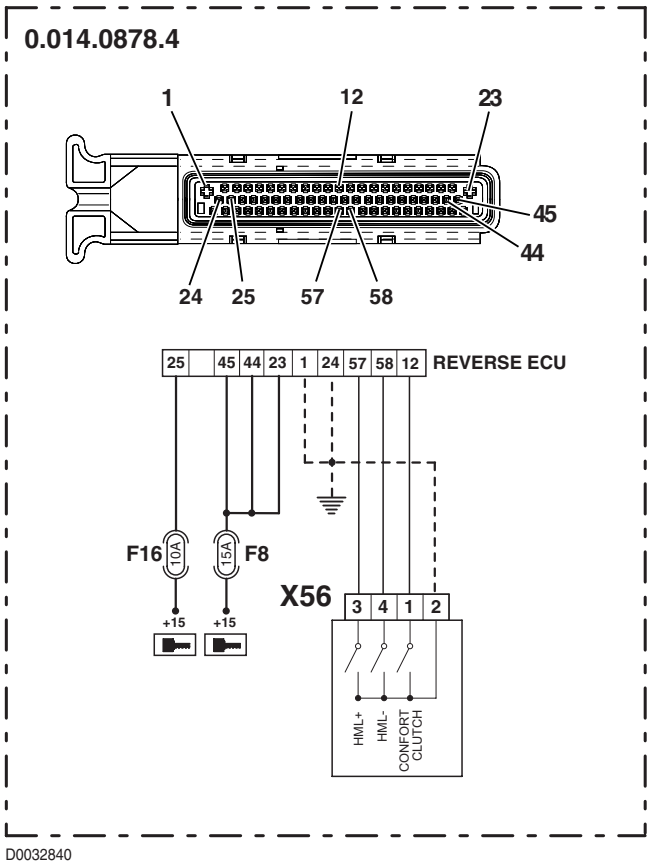
The control unit detects that the clutch disengagement button (confort clutch) is short-circuiting to earth (equivalent to button continuously pressed).

CONTROL UNIT RESPONSE

The system continues to function, but it is not possible to use the clutch disengagement button.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X56” of the gear lever are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “X56” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvH Stato Non OK

INSTRUMENT PANEL CODE: T31

DESCRIPTION

The control unit detects that the status of the H speed solenoid valve is incorrect.

CONTROL UNIT RESPONSE

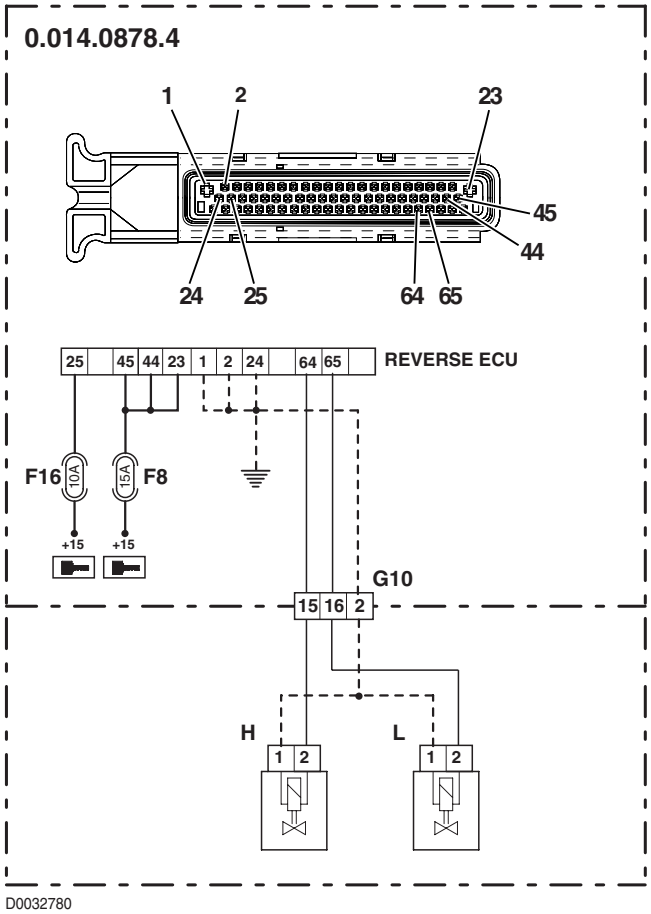
On versions with HML, the system inhibits operation of the HML unit.

NOTE

On versions without HML, this alarm should not appear.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “H” of the H speed solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “I” (ON) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “H” and to the ground on the tractor frame and check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvH Corto Circ.

INSTRUMENT PANEL CODE: T32

DESCRIPTION

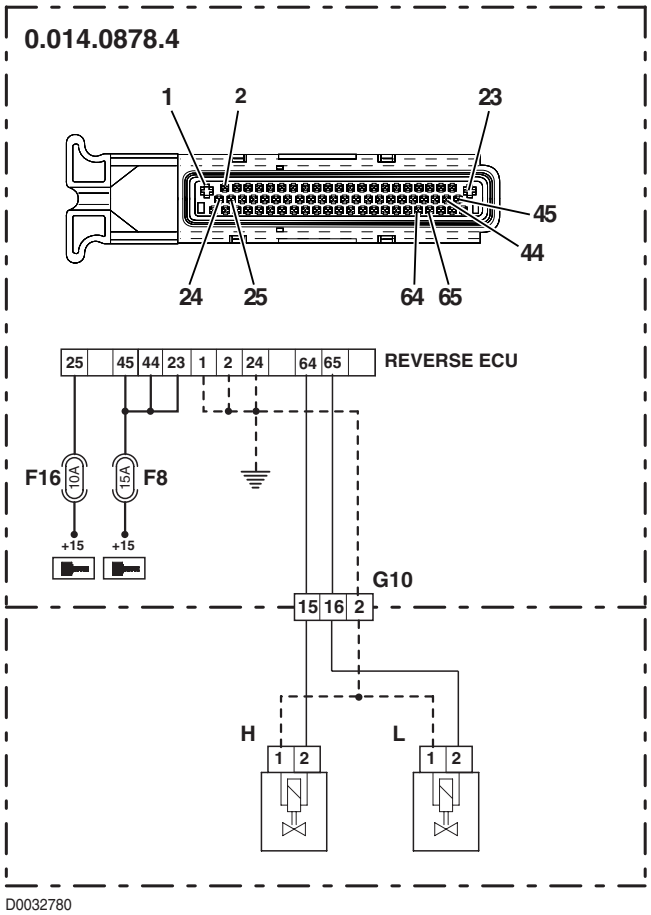
The control unit detects a short-circuit in the H speed solenoid valve control line.

CONTROL UNIT RESPONSE

On versions with HML, the system inhibits operation of the HML unit.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "H" of the M speed solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "H" and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvH Circ. Aperto

INSTRUMENT PANEL CODE: T33

DESCRIPTION

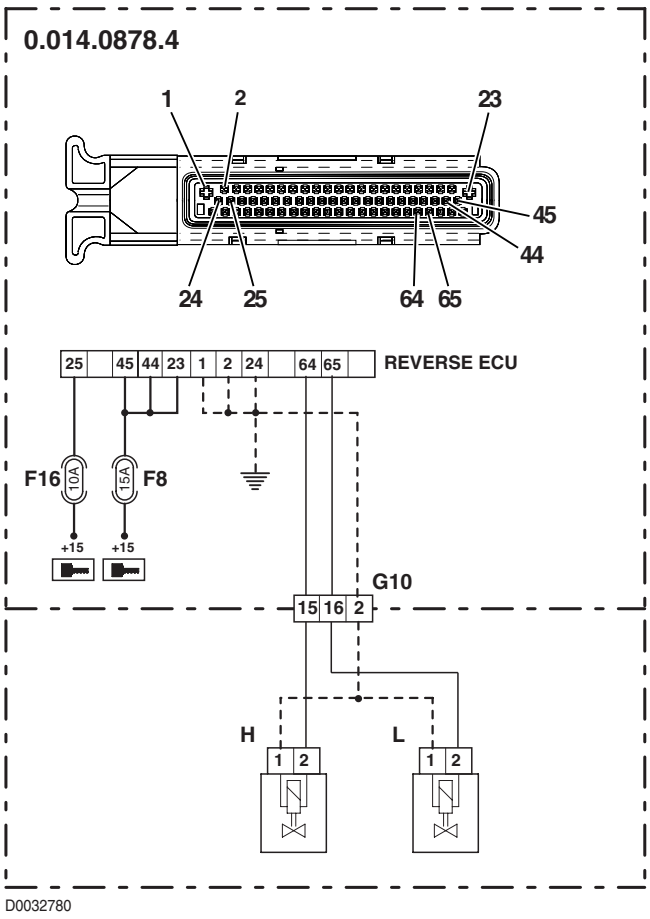
The control unit detects that the H speed solenoid valve is disconnected

CONTROL UNIT RESPONSE

On versions with HML, the system inhibits operation of the HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “H” of the M speed solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “H” and to pin 64 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Sens. INV Aperto

INSTRUMENT PANEL CODE: T34

DESCRIPTION

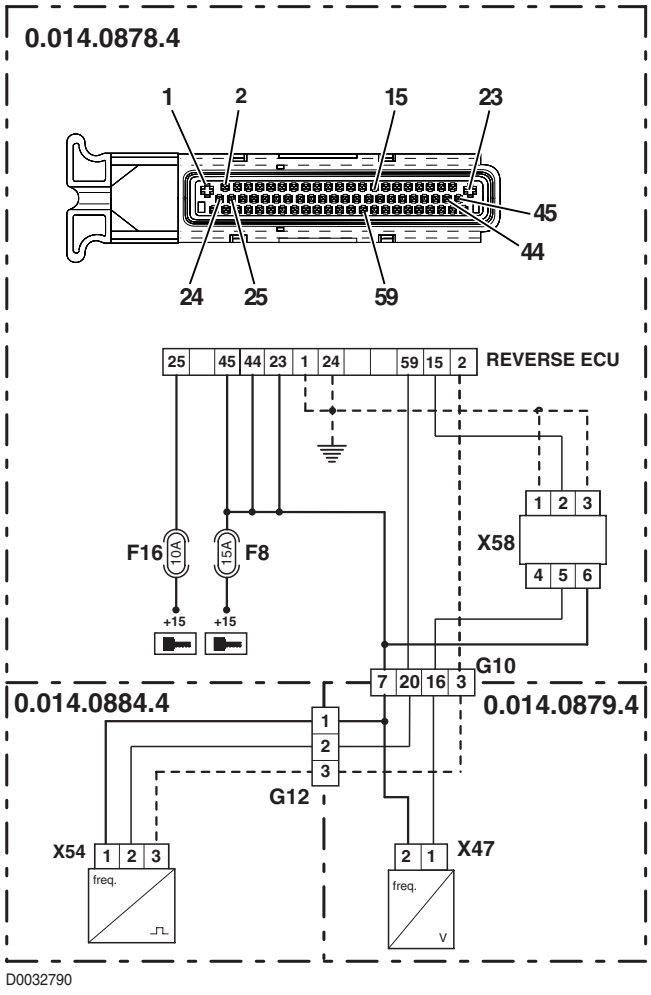
The control unit detects that the shuttle speed sensor is disconnected.

CONTROL UNIT RESPONSE

The system continues to function, but the tractor tends to move in sudden jerks when changing gear or direction

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector, “X58” of the shuttle speed signal conversion control unit, and “X47” of the shuttle speed sensor are not oxidized and are firmly secured.
- With the starter key in position “I” (ON), check that the shuttle speed signal conversion control unit is receiving power correctly (approx. 12 V between pin 6 (positive) and pins 1 and 3 (negative) of connector “X58“).
- With the starter key in position “O” (OFF), connect a test meter to pin 2 of connector “X58” and to pin 15 of the “REVERSE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in position “I” (ON), check that the wheel speed sensor is receiving power correctly (approx. 12 V between pin 2 (positive) of connector “X47” and the the earth on the transmission).
- With the starter key in position “O” (OFF), connect a test meter to pin 1 of connector “X47” and to pin 5 of connector “X58” and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check that the shuttle speed sensor is functioning correctly (for details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Pos. Pedale Apt.

INSTRUMENT PANEL CODE: T35

DESCRIPTION

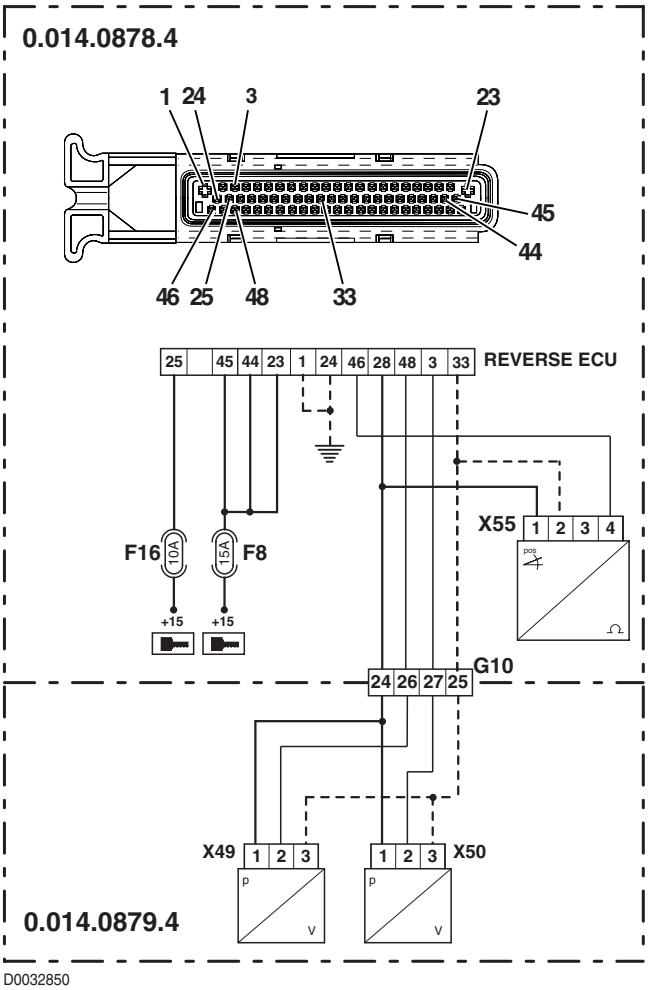
The control unit detects that the clutch pedal position sensor is disconnected.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X55” of the clutch pedal position sensor are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF), connect a test meter to pin 4 of connector “X55” and to pin 46 of the “REVERSE ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check correct operation of the clutch pedal position sensor (for details see section 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Pos.Ped.C.C./Apt

INSTRUMENT PANEL CODE: T35

DESCRIPTION

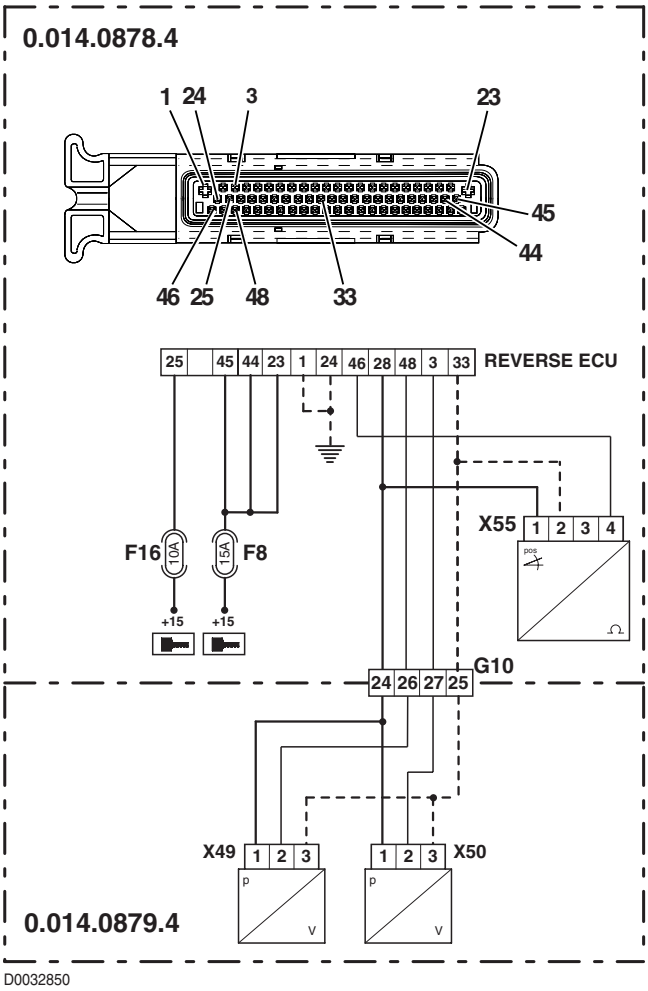
The control unit detects that the clutch pedal position sensor is shorting to earth.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X55” of the clutch pedal position sensor are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 4 of connector “X55” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 and to pin 4 of connector “X55” and perform a resistance test to check for shorts (meter reading : infinity).
- Check correct operation of the clutch pedal position sensor (for details see section 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Pos. Pedale N.V.

INSTRUMENT PANEL CODE: T35

DESCRIPTION

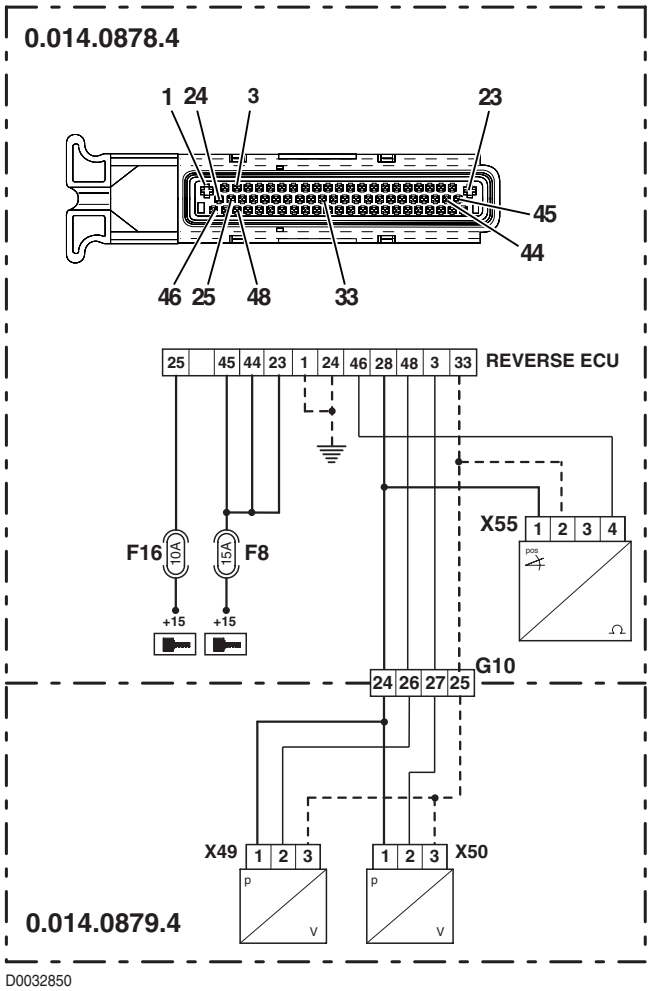
The control unit detects that the clutch pedal position sensor is shorting to battery positive or is incorrectly calibrated.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X55” of the clutch pedal position sensor are not oxidized and are firmly secured.
- With the starter key in position “I” (ON), check that the wheel speed sensor is receiving power correctly (approx. 5 V between pin 1 (positive) and pin 2 (negative) of connector “X55“).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 1 and to pin 4 of connector “X55” nd perform a resistance testt o check for shorts (meter reading: infinity).
- With the starter key in position “I” (ON) and the “REVERSE ECU” connector disconnected from the control unit,connect a test meter to pin 1 of connector “X55” and to the earth on the tractor frame and check for 0 voltage (meter reading: 0 V).
- With the starter key in position “I” (ON) and the “REVERSE ECU” connector disconnected from the control unit,connect a test meter to pin 4 of connector “X55” and to the earth on the tractor frame and check for 0 voltage (meter reading: 0 V).
- Check that the wheel speed sensor is functioning correctly (for details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Puls.HML+premuto

INSTRUMENT PANEL CODE: T41

DESCRIPTION

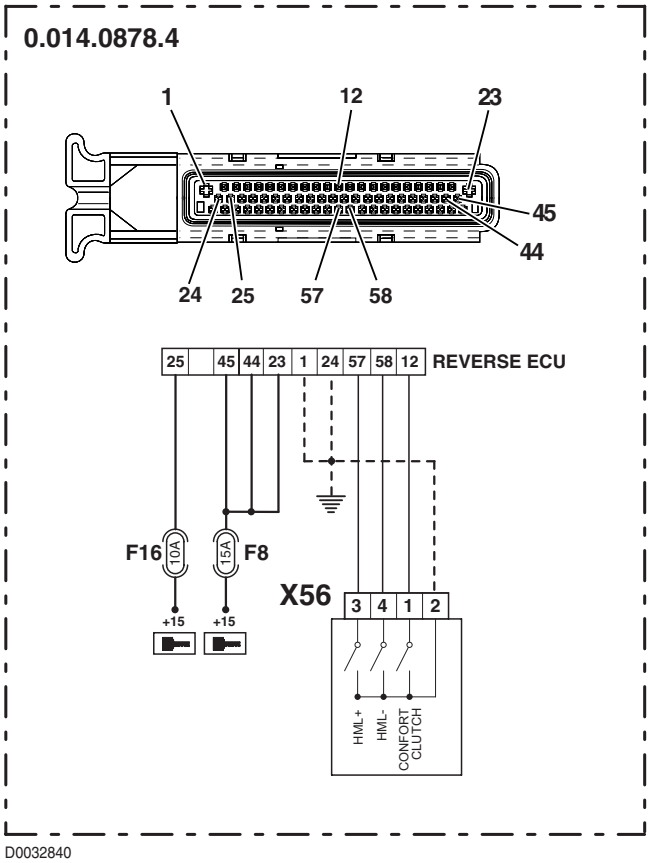
The control unit detects that the shift 'up' button of the HML unit is continuously pressed.

CONTROL UNIT RESPONSE

The system continues to function but only in H speed and it is not possible to shift to M or L speeds.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X56” of the gear lever are not oxidized and are firmly secured.
- Check that the pushbuttons on the gear lever are functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 and to pin 3 of connector “X56” and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 3 of connector “X56” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Puls.HML-premuto

INSTRUMENT PANEL CODE: T42

DESCRIPTION

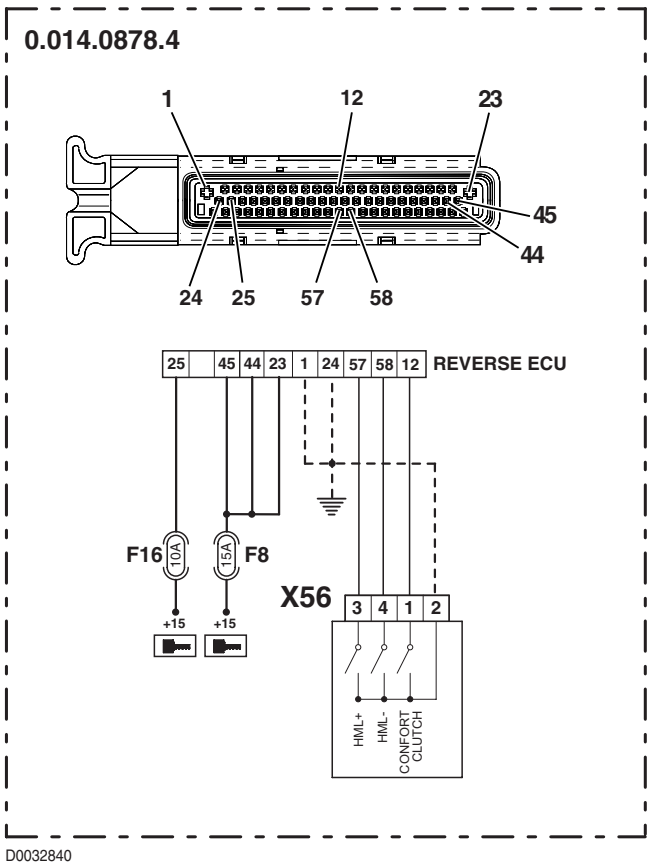
The control unit detects that the shift 'down' button of the HML unit is continuously pressed.

CONTROL UNIT RESPONSE

The system continues to function but only in L speed and it is not possible to shift to M or H speeds.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X56” of the gear lever are not oxidized and are firmly secured.
- Check that the pushbuttons on the gear lever are functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 and to pin 4 of connector “X56” and perform a resistance test to check for shorts (meter reading: infinity).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 4 of connector “X56” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvP Stato Non OK

INSTRUMENT PANEL CODE: T44

DESCRIPTION

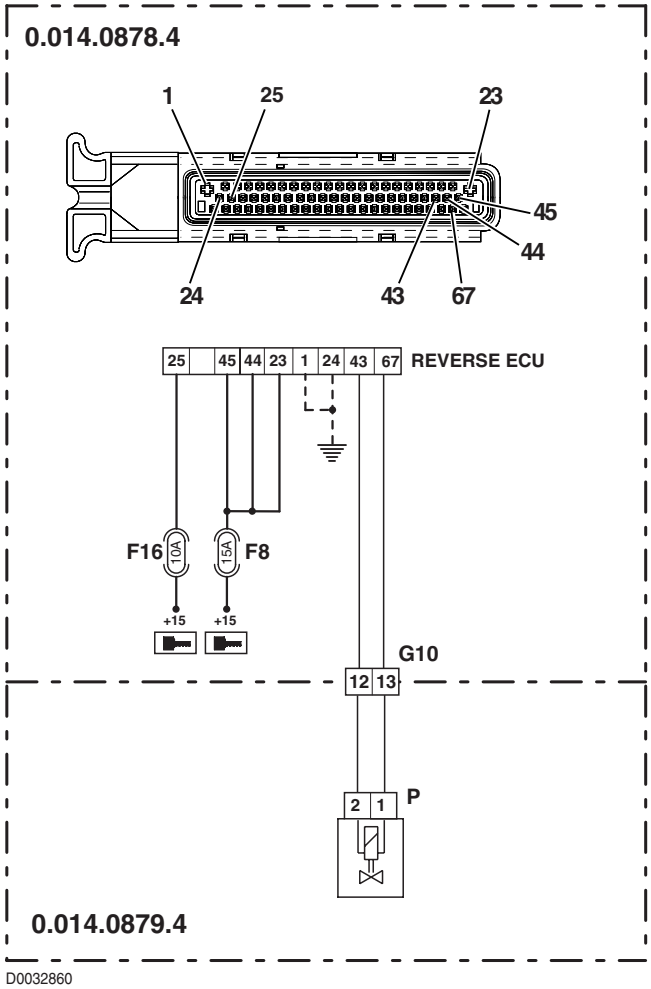
The control unit detects that the status of the shuttle proportional solenoid valve is incorrect.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “P” of the shuttle proportional solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF), connect a test meter to pin 1 of connector “P” and to the earth on the tractor frame and perform a resistance test to check for shorts to earth (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032860

Pos.Ped."B" Apt.

INSTRUMENT PANEL CODE: T45

DESCRIPTION

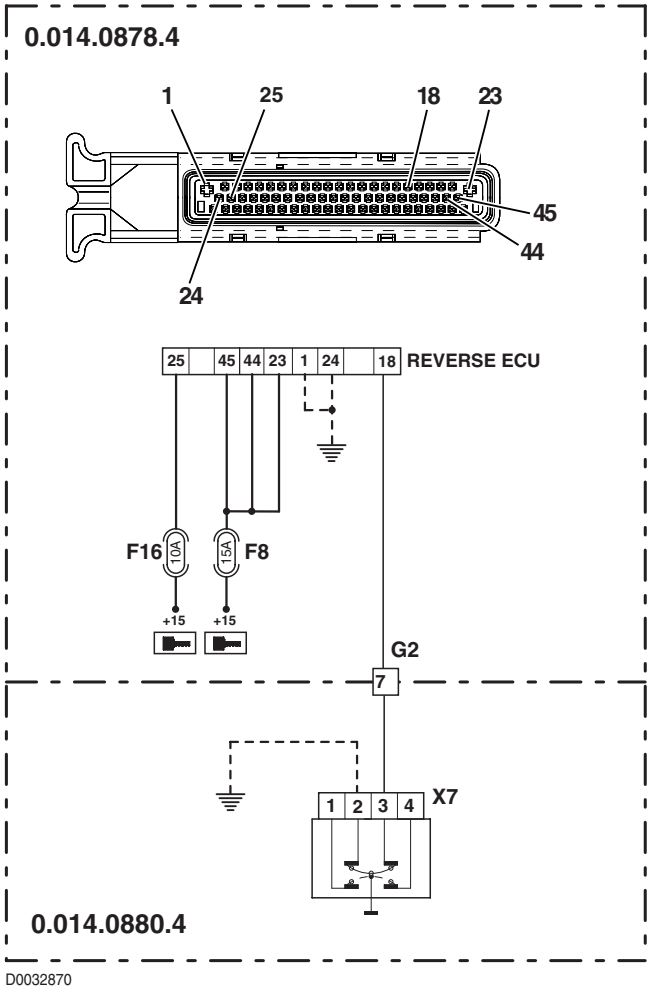
The control detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X7” of the clutch pedal depressed sensor are not oxidized and are firmly secured.
- Check correct operation of the clutch pedal depressed sensor (for details see section 40).
- With the starter key in position “O” (OFF), connect a test meter to pin 3 (black wire) of connector “X7” and to the earth on the tractor frame and perform a resistance test to check for electrical continuity (meter reading: 0 Ohm).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X7” (red/black wire) and to pin 18 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032870

Pos.Ped."B" C.C.

INSTRUMENT PANEL CODE: T45

DESCRIPTION

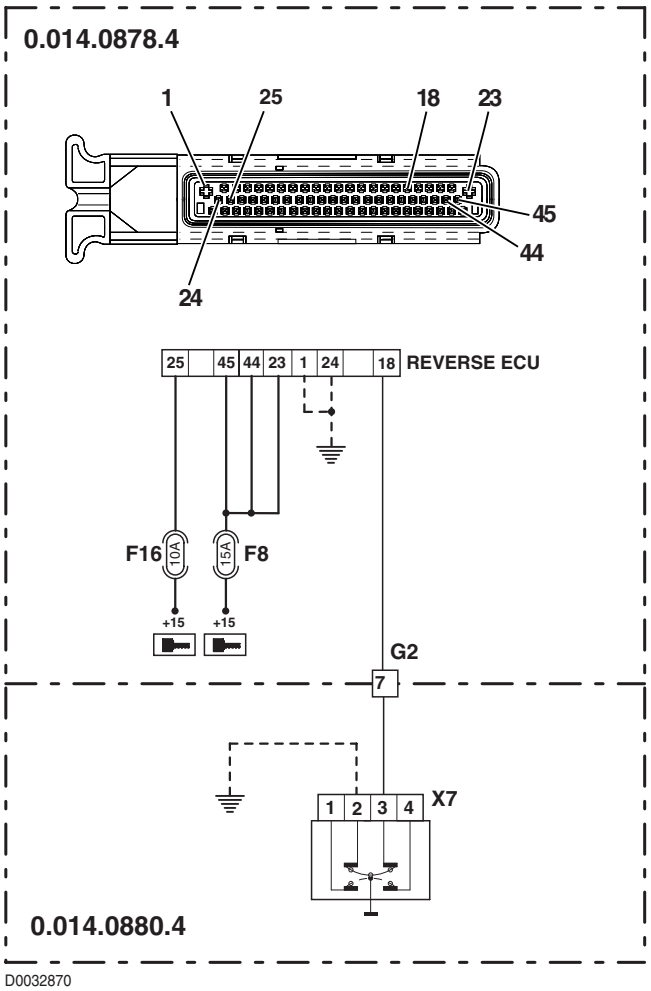
The control detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "X7" of the clutch pedal depressed sensor are not oxidized and are firmly secured.
- Check correct operation of the clutch pedal depressed sensor (for details see section 40).
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "X7" (red/black wire) and to the earth on the tractor frame and perform a resistance test to check for shorts to earth (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032870

Pos.Ped."B" xxxx

INSTRUMENT PANEL CODE: T45

DESCRIPTION

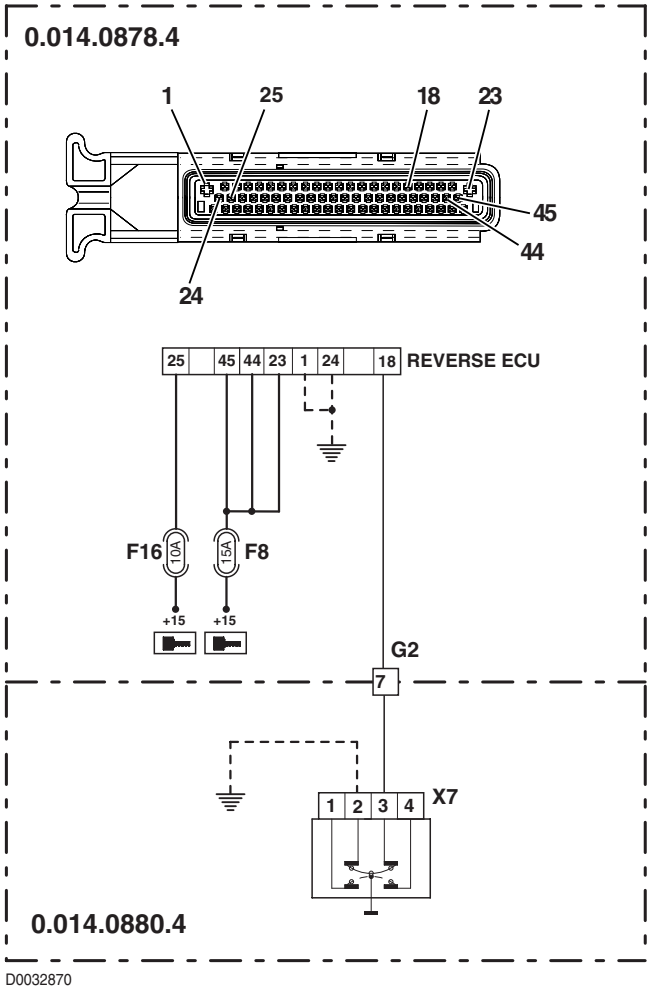
The control detects a conflict in the information received from the clutch pedal position sensor and clutch pedal depressed sensor, regarding the position of the pedal.

CONTROL UNIT RESPONSE

The system inhibits all operation of the shuttle and HML unit.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X7” of the clutch pedal depressed sensor are not oxidized and are firmly secured.
- Check correct operation of the clutch pedal depressed sensor (for details see section 40).
- With the starter key in position “O” (OFF), connect a test meter to pin 3 (black wire) of connector “X7” and to the earth on the tractor frame and perform a resistance test to check for electrical continuity (meter reading: 0 Ohm).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X7” (red/black wire) and to pin 18 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032870

EvR Stato Non OK

INSTRUMENT PANEL CODE: T51

DESCRIPTION

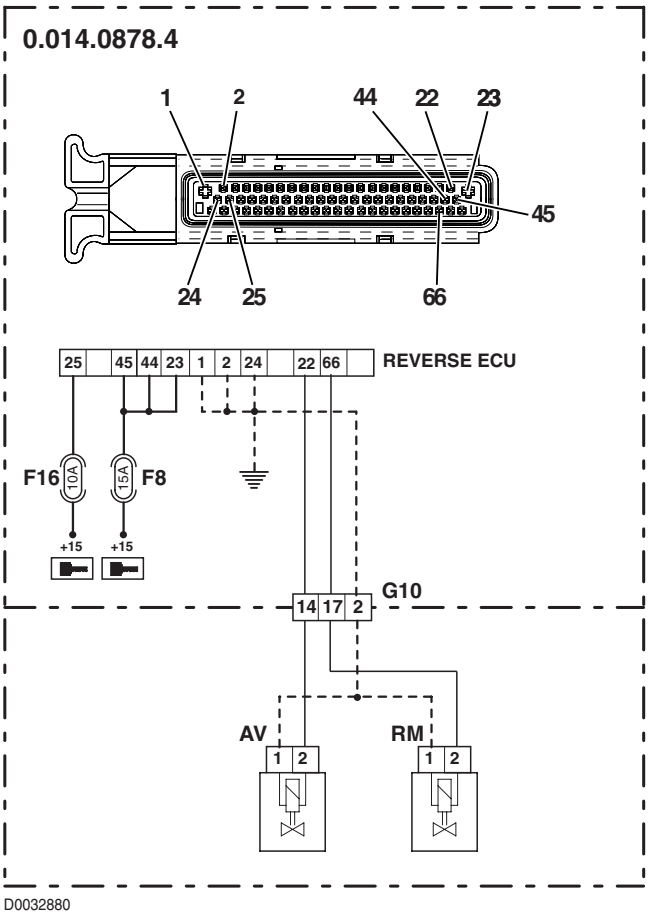
The control unit detects that the status of the reverse travel solenoid valve is incorrect.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “RM” of the reverse travel solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF), connect a test meter to pin 2 of connector “RM” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvR Corto Circ.

INSTRUMENT PANEL CODE: T52

DESCRIPTION

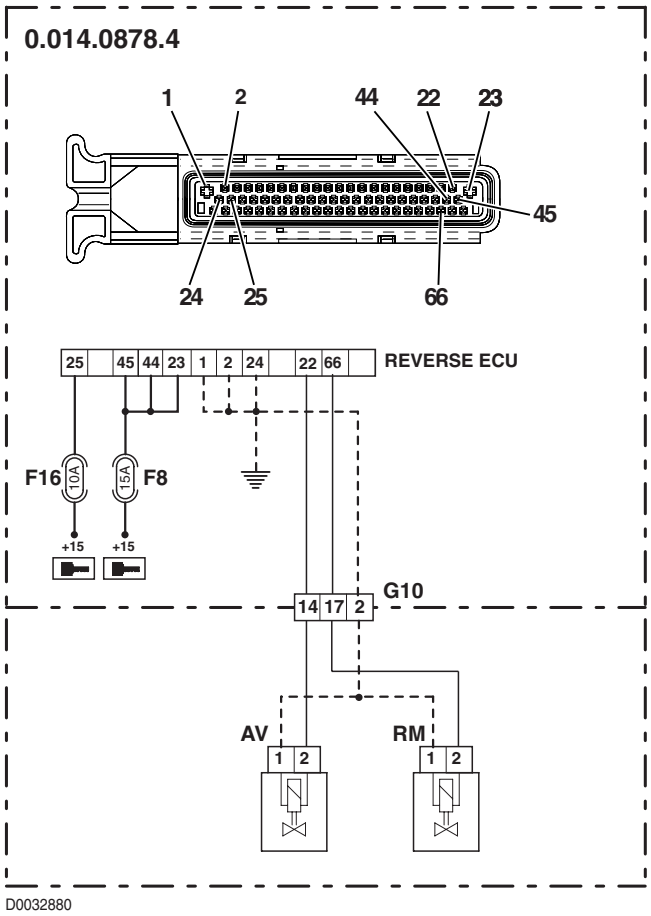
The control unit detects a short-circuit in the control line of the reverse travel solenoid valve.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "RM" of the reverse travel solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 2 of connector "RM" and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvR Circ. Aperto

INSTRUMENT PANEL CODE: T53

DESCRIPTION

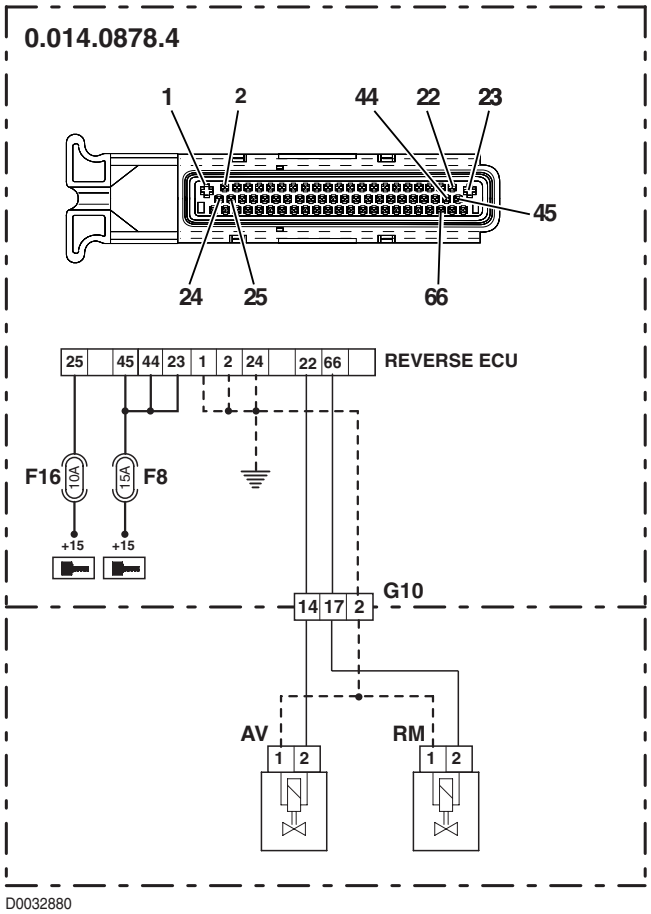
The control unit detects that the direction selector solenoid valve (or the reverse travel solenoid valve on models without HML) is disconnected

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit "REVERSE ECU" connector and "RM" of the reverse travel solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position "O" (OFF) and the "REVERSE ECU" connector disconnected from the control unit, connect a test meter to pin 1 of connector "RM" and to pin 66 of the "REVERSE ECU" connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



EvP Corto Circ.

INSTRUMENT PANEL CODE: T54

DESCRIPTION

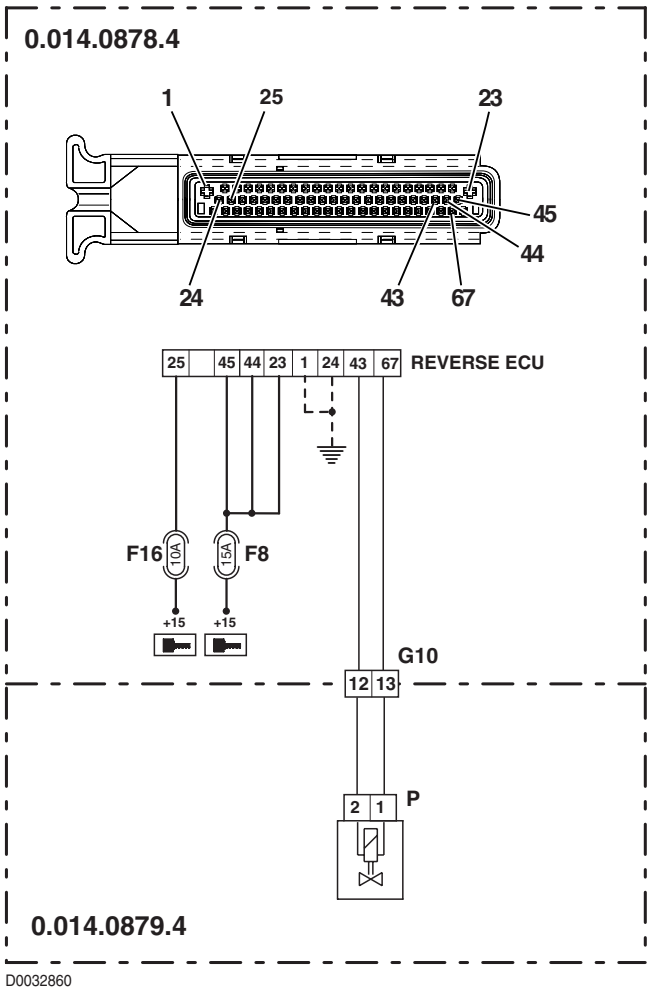
The control unit detects a short circuit in the control line to the shuttle proportional solenoid valve.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “P” of the shuttle proportional solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 1 and to pin 2 of connector “P” and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032860

Rele''HML St.N.V

INSTRUMENT PANEL CODE: T55

DESCRIPTION
The control unit detects an internal fault.

CONTROL UNIT RESPONSE
The system inhibits all operation of the HML unit.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

C.C. CircuitoHML

INSTRUMENT PANEL CODE: T55

DESCRIPTION
The control unit detects an internal fault.

CONTROL UNIT RESPONSE
The system inhibits all operation of the HML unit.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Rele''REV St.N.V

INSTRUMENT PANEL CODE: T55

DESCRIPTION
The control unit detects an internal fault.

CONTROL UNIT RESPONSE
The system inhibits all operation of the HML unit.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

C.C. CircuitoREV

INSTRUMENT PANEL CODE: T55

DESCRIPTION
The control unit detects an internal fault.

CONTROL UNIT RESPONSE
The system inhibits all operation of the tractor.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Guasto REV Group

INSTRUMENT PANEL CODE: T55

DESCRIPTION
The control unit detects an internal fault.

CONTROL UNIT RESPONSE
The system inhibits all operation of the tractor.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Alim.Amplif.Opr.

INSTRUMENT PANEL CODE: T55

DESCRIPTION
The control unit detects an internal fault.

CONTROL UNIT RESPONSE
The system inhibits all operation of the tractor.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Alim.SensoreFrz.

INSTRUMENT PANEL CODE: T55

DESCRIPTION

The control unit detects an internal fault.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

EvP Circ. Aperto

INSTRUMENT PANEL CODE: T56

DESCRIPTION

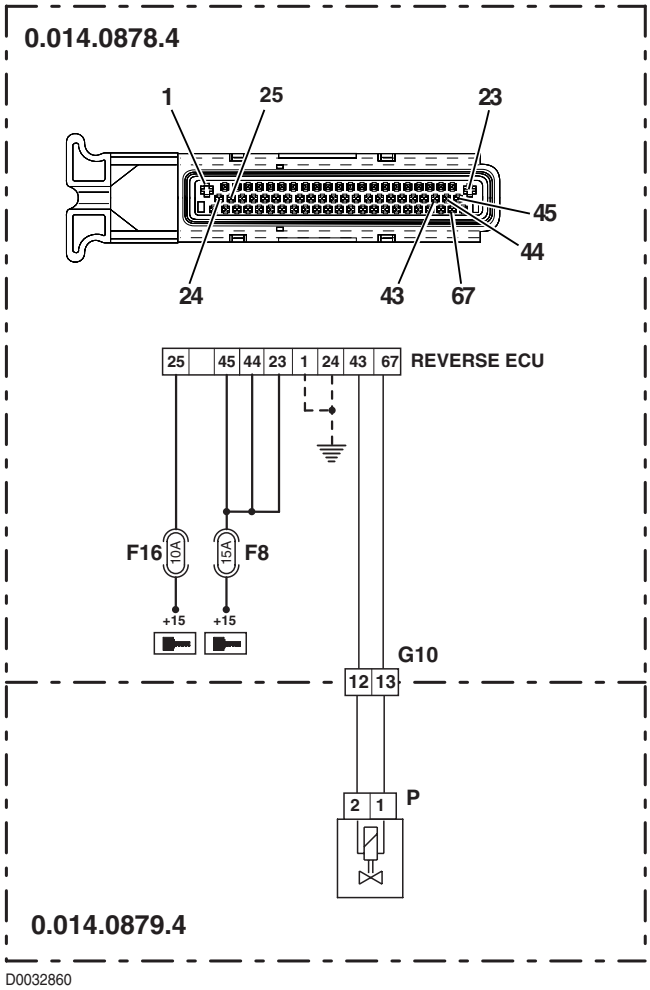
The control unit detects that the shuttle proportional solenoid valve is disconnected

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “P” of the shuttle proportional solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “EVP” and to pin 67 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of the “EVP” connector and to pin 43 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032860

Manca PrxServizi

INSTRUMENT PANEL CODE: T61

DESCRIPTION

The control unit detects that there is insufficient pressure in the services circuit.

CONTROL UNIT RESPONSE

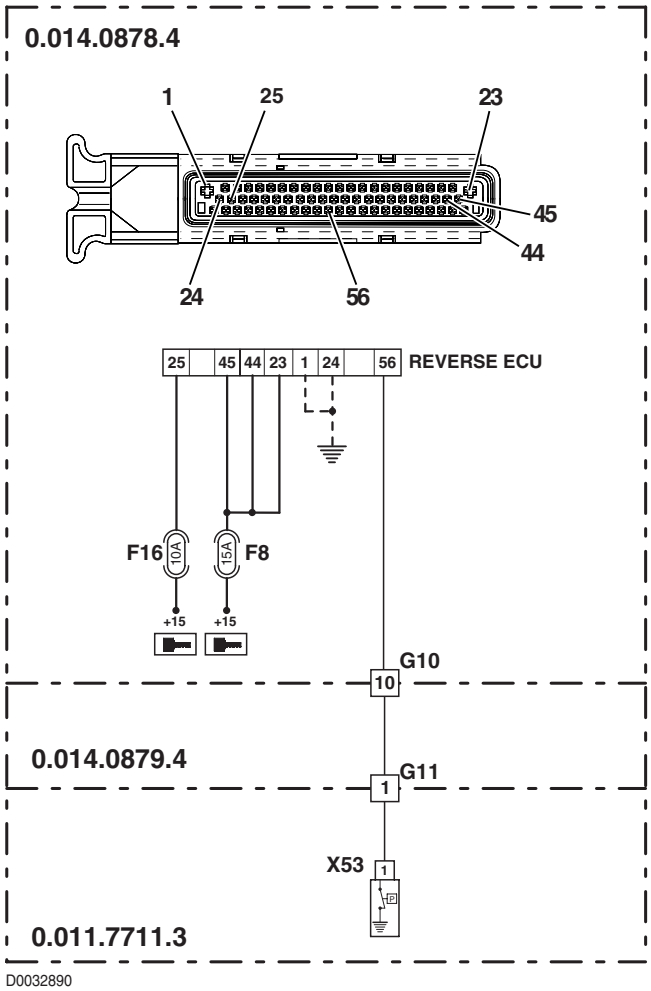
The system inhibits all operation of the tractor.

NOTE

Check whether the clogged hydraulic oil filter warning light on the instrument panel is on when the engine is running. In this case, before proceeding with electrical fault diagnosis, change the oil filter and, if necessary, check the circuit operating pressure (normal pressure: 18 bar).

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X53” of the services pressure switch are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connectors disconnected from the control unit and “X3” disconnected from the instrument panel, connect a test meter to connector “X53” and to the earth on the tractor frame and perform a resistance test to check for shorts to earth (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Pressione Propz.

INSTRUMENT PANEL CODE: T62

DESCRIPTION

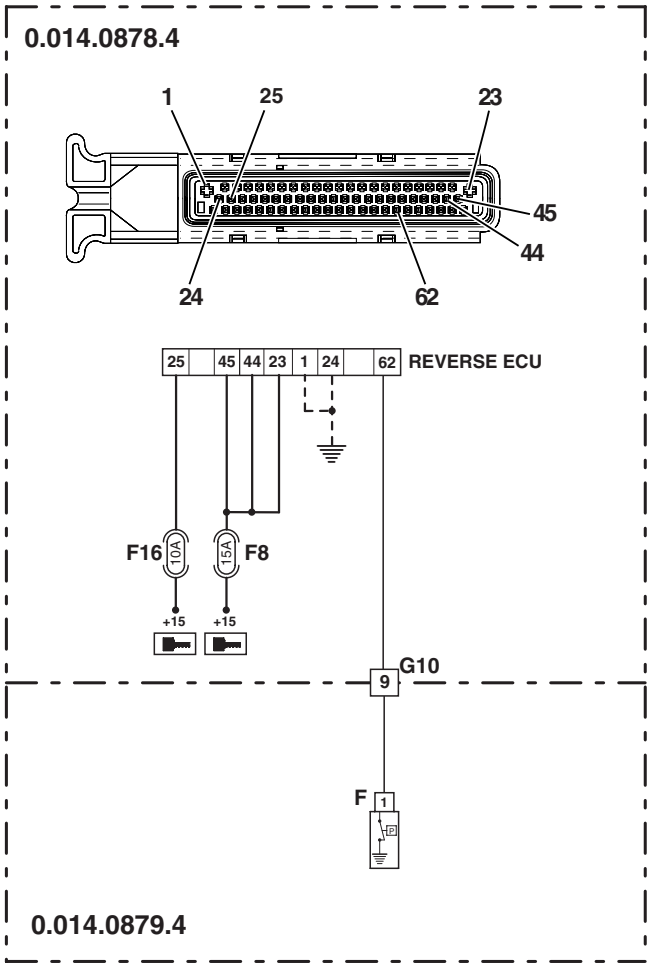
The control unit detects a conflict between the logical status and reading status of the pressure signal down-line from the shuttle proportional solenoid valve.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “F” of the proportional solenoid valve pressure switch are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF), connect a test meter to connector “F” and to pin 62 of connector “REVERSE ECU” and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- Check that the pressure switch of the proportional solenoid valve is functioning correctly (for details, see section 40).
- Renew the proportional solenoid valve.
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed



D0032820

Guasto E2PROM

INSTRUMENT PANEL CODE: T63

DESCRIPTION

The control unit detects an error in the parameters stored in the E2PROM.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Carry out the procedures for ECU initialization and the subsequent putting into service of the tractor following the instructions given in the chapter “Renewal of the shuttle control unit”.
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Sens.INV in C.C.

INSTRUMENT PANEL CODE: T71

DESCRIPTION

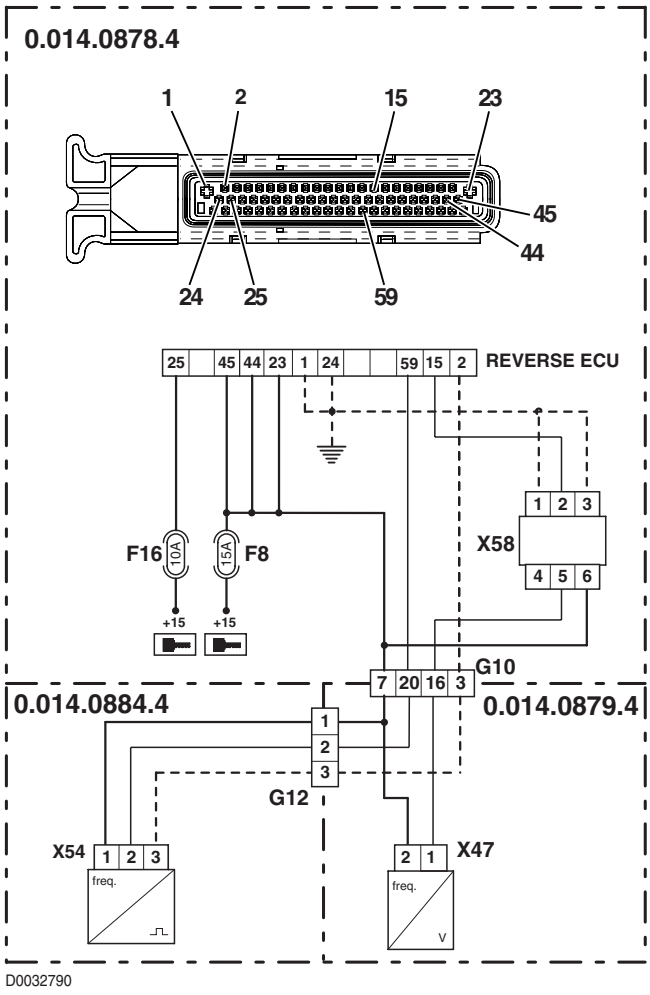
The control unit detects a short-circuit of the shuttle speed sensor.

CONTROL UNIT RESPONSE

If the fault is not mechanical or hydraulic in nature, the system will continue to function correctly.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector, “X58” of the shuttle speed signal conversion control unit, and “X47” of the shuttle speed sensor are not oxidized and are firmly secured.
- With the starter key in position “I” (ON), check that the shuttle speed signal conversion control unit is receiving power correctly (approx. 12 V between pin 6 (positive) and pins 1 and 3 (negative) of connector “X58“).
- With the starter key in position “O” (OFF), connect a test meter to pin 2 of connector “X58” and perform a resistance test to check for shorts (meter reading: infinity).
- Check that the shuttle speed sensor is functioning correctly (for details see unit 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Sens.RPM in C.C.

INSTRUMENT PANEL CODE: T72

DESCRIPTION

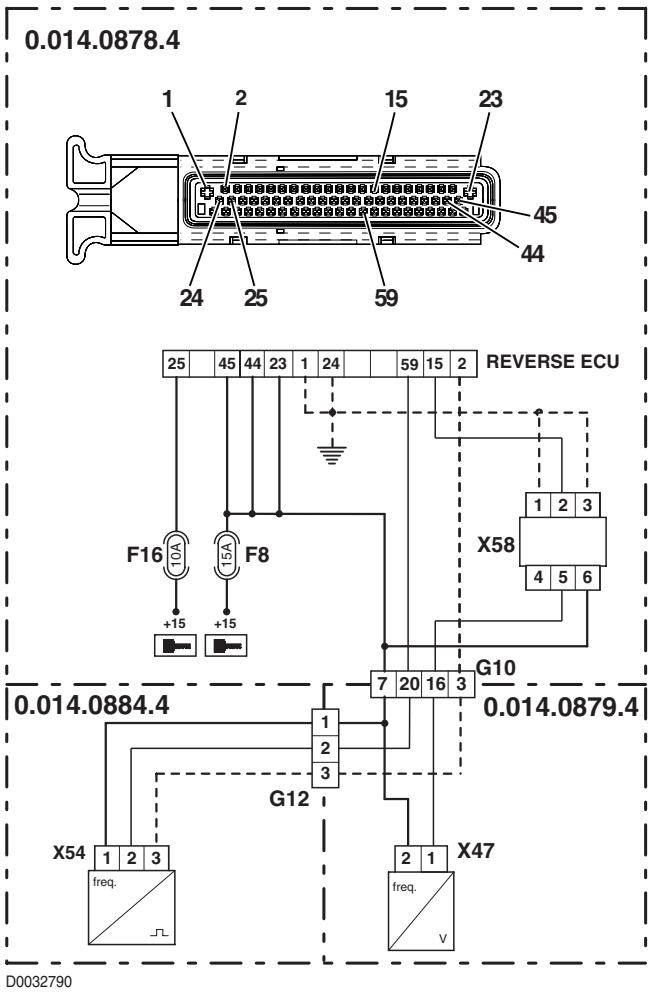
The control unit detects a short-circuit of the engine speed sensor.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X54” of the engine speed sensor are not oxidized and are firmly secured.
- Check that the engine speed sensor is functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF), connect a test meter to pin 2 of the connector “X54” and to the transmission earth and measure the resistance to check for shorts (meter reading: infinity).
- Check that the engine speed sensor is functioning correctly (for details, see section 40).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Slitt. Friz. INV

INSTRUMENT PANEL CODE: T73

DESCRIPTION

The control unit detects excessive slipping of one of the shuttle clutches.

CONTROL UNIT RESPONSE

The system continues to function correctly but activates the buzzer intermittently.

NOTE

When this alarm is detected the tractor continues to operate correctly but traction under load or travel speed can be drastically reduced.
In this case the Operator should stop the tractor as soon as possible to prevent causing serious damage to the mechanical components of the shuttle.

CHECK

- Check that the shuttle clutch operating pressures are within normal limits. If the pressures are within normal limits, renew the shuttle clutches.
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Manovra > 10Km/h

INSTRUMENT PANEL CODE: T73

DESCRIPTION

The control unit detects that a travel direction inversion request has been transmitted at a speed above 10 km/h.

CONTROL UNIT RESPONSE

The system continues to function correctly but activates the buzzer intermittently.

CHECK

- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Manca PrxProprz

INSTRUMENT PANEL CODE: T74

DESCRIPTION

The control unit detects that the services pressure switch sensor is short-circuiting to earth.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

NOTE

Check whether the clogged hydraulic oil filter warning light on the instrument panel is on when the engine is running. In this case, before proceeding with electrical fault diagnosis, change the oil filter and, if necessary, check the circuit operating pressure (normal pressure: 18 bar).

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X53” of the services pressure switch are not oxidized and are firmly secured.
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connectors disconnected from the control unit and “X3” disconnected from the instrument panel, connect a test meter to connector “X53” and to pin 56 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Rele''HML St.N.V

INSTRUMENT PANEL CODE: T75

DESCRIPTION

The control unit detects an internal fault.

CONTROL UNIT RESPONSE

The system inhibits all operation of the HML unit.

CHECK

- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Rele''REV St.N.V

INSTRUMENT PANEL CODE: T76

DESCRIPTION

The control unit detects an internal fault.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

Allarme grave

INSTRUMENT PANEL CODE:T77

DESCRIPTION

The control unit detects an unidentifiable internal fault.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

EVA stato non ok

INSTRUMENT PANEL CODE: T91

DESCRIPTION

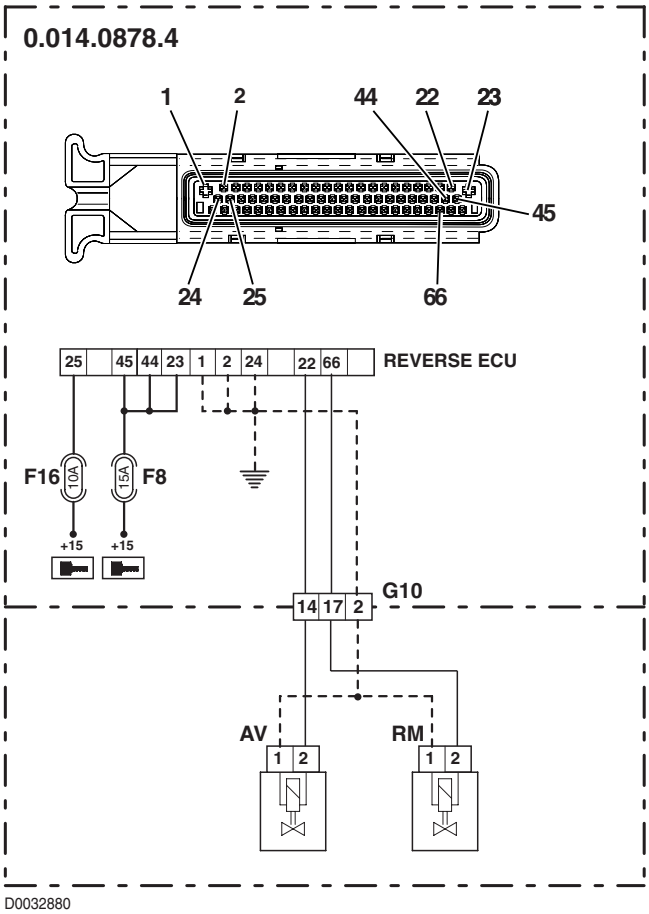
The control unit detects that the status of the forward travel solenoid valve is incorrect

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on connectors “REVERSE ECU” of the shuttle control unit and “AV” of the forward travel solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF), connect a test meter to pin 2 of connector “AV” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



EVA corto circ.

INSTRUMENT PANEL CODE: T92

DESCRIPTION

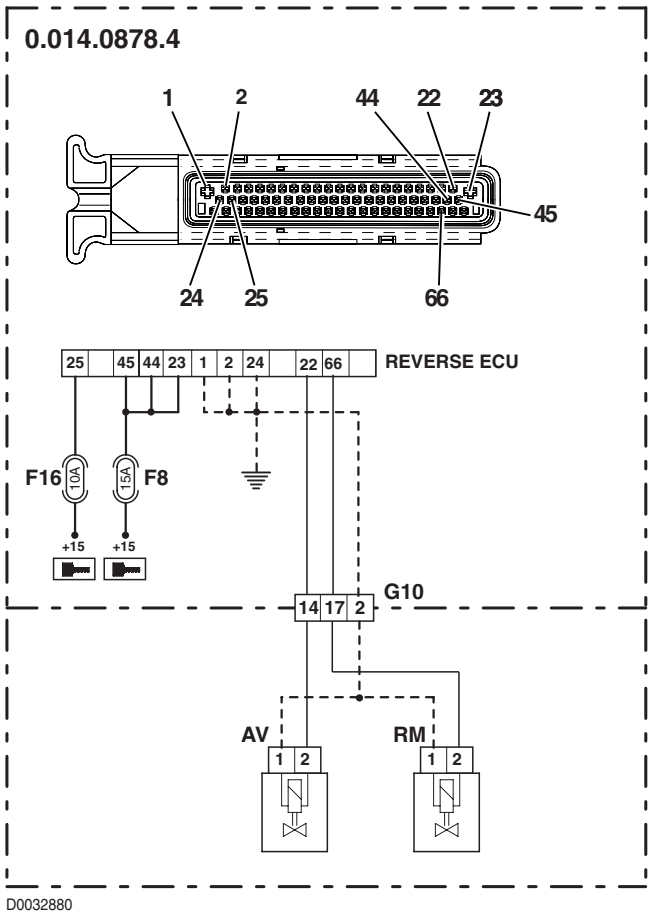
The control unit detects a short-circuit in the control line of the forward travel solenoid valve.

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on connectors “REVERSE ECU” of the shuttle control unit and “AV” of the reverse travel solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “AV” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



EVA circ.aperto

INSTRUMENT PANEL CODE: T93

DESCRIPTION

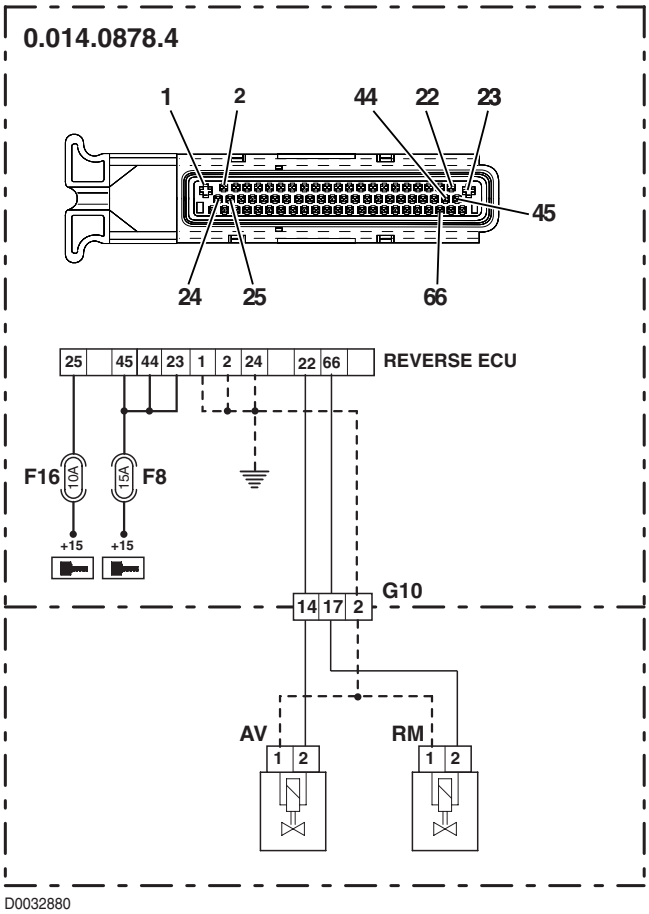
The control unit detects that the direction selector solenoid valve (or the reverse travel solenoid valve on models without HML) is disconnected

CONTROL UNIT RESPONSE

The system inhibits all operation of the tractor.

CHECK

- Check that the contacts on connectors “REVERSE ECU” of the shuttle control unit and “AV” of the forward travel solenoid valve are not oxidized and are firmly secured.
- Test the internal resistance of the solenoid (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 1 of connector “AV” and to pin 22 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



Sens.Sedile KO

INSTRUMENT PANEL CODE: T94

DESCRIPTION

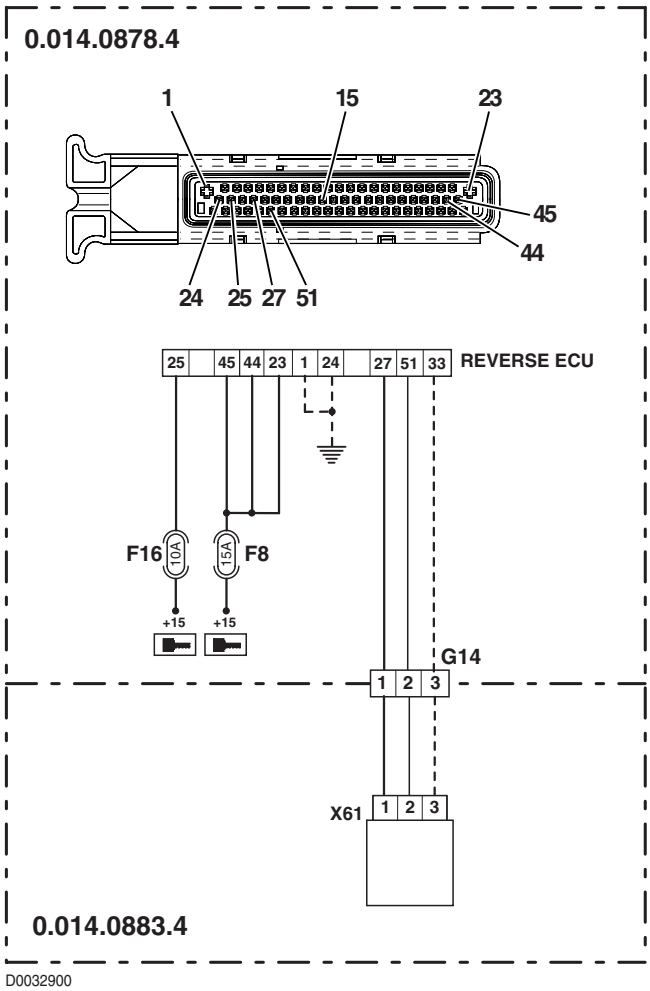
The control unit detects that the operator presence sensor (seat sensor) is faulty or disconnected.

CONTROL UNIT RESPONSE

The tractor can travel only using the clutch pedal.

CHECK

- Check that the contacts on the shuttle control unit “REVERSE ECU” connector and “X61” of the operator seat sensor are not oxidized and are firmly secured.
- Check that the engine speed sensor is functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X61” and to the earth on the tractor frame and perform a resistance test to check for shorts to earth (meter reading: infinity).
- With the starter key in position “O” (OFF) and the “REVERSE ECU” connector disconnected from the control unit, connect a test meter to pin 2 of connector “X61” and to pin 51 of the “REVERSE ECU” connector and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in position “I” (ON) and the “REVERSE ECU” connector disconnected from the control unit,connect a test meter to pin 2 of connector “X61” and to the earth on the tractor frame and check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



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5.3 INSTRUMENT PANEL ALARMS (P/N 2.8339.248.0)

The instrument panel signals any malfunctioning of the components it manages to the operator with the display on the right-hand side. Faults are indicated using a system of coded flash sequences that identify the device affected.

5.3.1 LIST OF ALARMS SIGNALLED ON THE “ALARM” LIGHT

Ins. Panel Code	*Display on ART*	*Alarm description*	*Page*
I18	18	The instrument panel indicates that the coolant temperature sensor is short-circuiting to ground.	20-143
I19	19	The instrument panel indicates that the coolant temperature sensor is short-circuiting to battery positive.	20-144
I20	20	The instrument panel indicates that the fuel level sensor is short-circuiting to battery positive.	20-145
I21	21	The instrument panel indicates that the alternator is faulty or disconnected (does not receive the “W” signal).	20-146
I22	22	Alarm available but not utilized	–
I23	23	The instrument panel indicates that the preheating control relay is disconnected.	20-147
I24	24	The instrument panel indicates that the preheating control relay is short-circuiting to ground.	20-148
I25	25	The instrument panel indicates that the preheating control relay is short-circuiting to battery positive.	20-149
I26	26	The instrument panel indicates that the preheating control relay is short-circuiting to battery positive or disconnected.	20-150
I32	32	Alarm available but not utilized	–
I33	33	Alarm available but not utilized	–
I34	34	Alarm available but not utilized	–
I35	35	Alarm available but not utilized	–
I36	36	The instrument panel indicates that the preheating device is on, even though it should be off.	20-151
I37	37	The instrument panel indicates that the preheating device is off, even though it should be on.	20-152

5.3.2 LIST OF ALARMS DISPLAYED BY ART

Display on ART	*Code on instrument panel*	*Alarm description*	*Page*
18	I18	The instrument panel indicates that the coolant temperature sensor is short-circuiting to ground.	20-143
19	I19	The instrument panel indicates that the coolant temperature sensor is short-circuiting to battery positive.	20-144
20	I20	The instrument panel indicates that the fuel level sensor is short-circuiting to battery positive.	20-145
21	I21	The instrument panel indicates that the alternator is faulty or disconnected (does not receive the “W” signal).	20-146
22	I22	Alarm available but not utilized	–
23	I23	The instrument panel indicates that the preheating control relay is disconnected.	20-147
24	I24	The instrument panel indicates that the preheating control relay is short-circuiting to ground.	20-148
25	I25	The instrument panel indicates that the preheating control relay is short-circuiting to battery positive.	20-149
26	I26	The instrument panel indicates that the preheating control relay is short-circuiting to battery positive or disconnected.	20-150
32	I32	Alarm available but not utilized	–
33	I33	Alarm available but not utilized	–
34	I34	Alarm available but not utilized	–
35	I35	Alarm available but not utilized	–
36	I36	The instrument panel indicates that the preheating device is on, even though it should be off.	20-151
37	I37	The instrument panel indicates that the preheating device is off, even though it should be on.	20-152

18

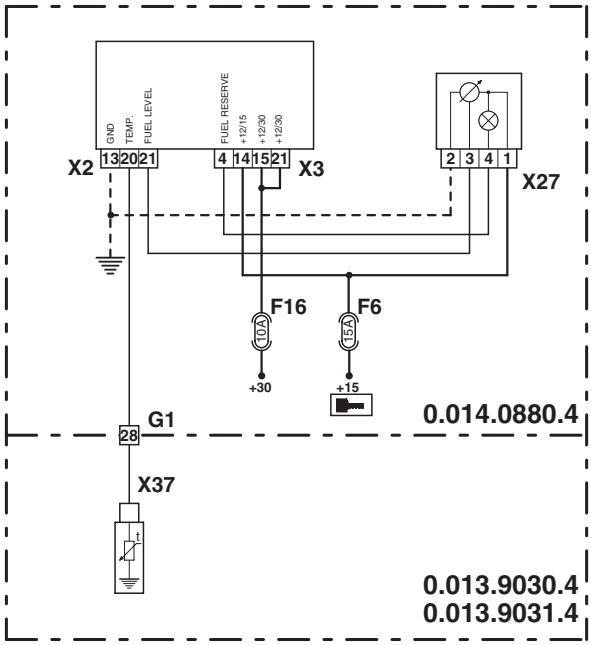
INSTRUMENT PANEL CODE: I18

DESCRIPTION

The instrument panel indicates that the coolant temperature sensor is short-circuiting to ground.

CHECK

- Check that the contacts on the "X2" connector of the instrument panel and "X37" of the coolant temperature sensor are not oxidized and are firmly secured.
- Check that the temperature sensor is functioning correctly (for details, see section 40).
- With the starter key in position "O" (OFF) and connector "X2" disconnected from the instrument panel, connect a test meter to connector "X37" and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again, and if the alarm is still present, the control unit must be renewed.



19

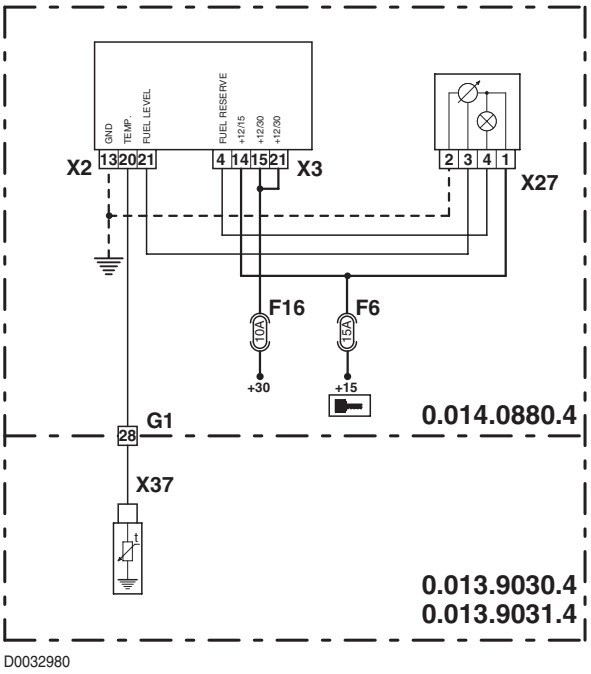
INSTRUMENT PANEL CODE: I19

DESCRIPTION

The instrument panel indicates that the coolant temperature sensor is short-circuiting to battery positive.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “X37” of the coolant temperature sensor are not oxidized and are firmly secured.
- With the starter key in position “I” (ON) and connector “X2” disconnected from the instrument panel, connect a test meter to connector “X37” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



20

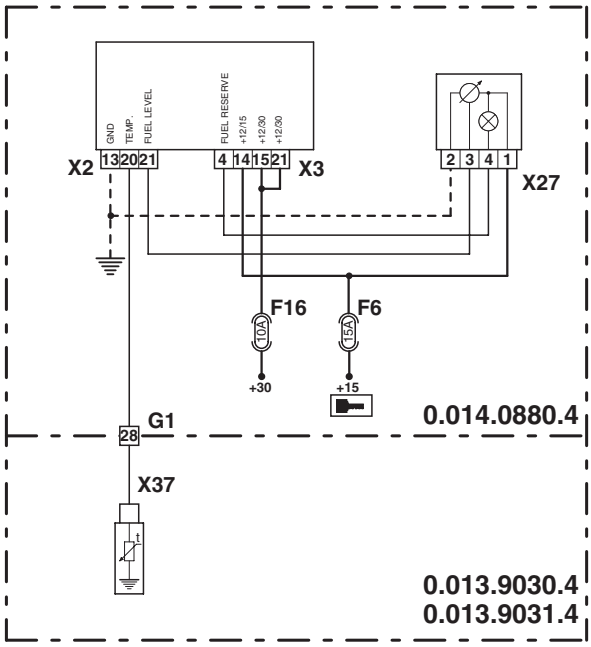
INSTRUMENT PANEL CODE: I20

DESCRIPTION

The instrument panel indicates that the fuel level sensor is short-circuiting to battery positive.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “X27” of the fuel level sensor are not oxidized and are firmly secured.
- With the starter key in position “I” (ON) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 3 of connector “X27” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



21

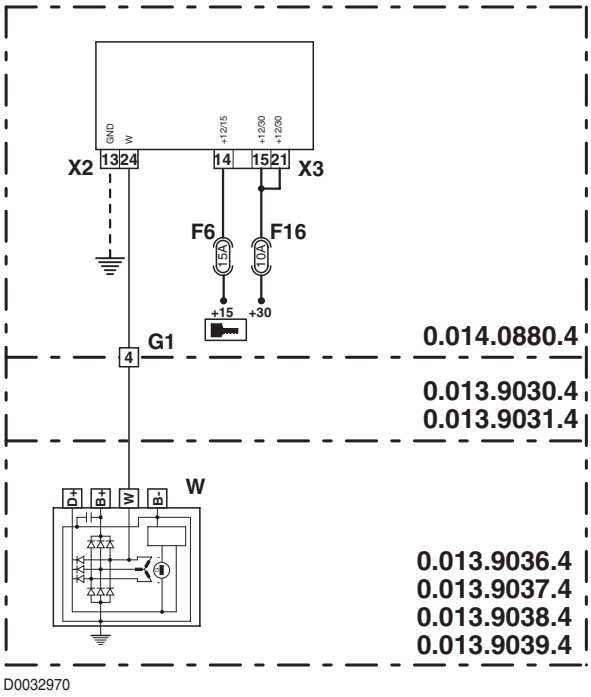
INSTRUMENT PANEL CODE: I21

DESCRIPTION

The instrument panel indicates that the alternator is faulty or disconnected (does not receive the “W” signal).

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “W” of the alternator are not oxidized and are firmly secured.
- Check that the alternator is functioning correctly.
- With the starter key in position “O” (OFF) and connector “X2” disconnected from the instrument panel, connect a test meter to connector “W” of the alternator and to pin 24 of connector “X2” and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



D0032970

23

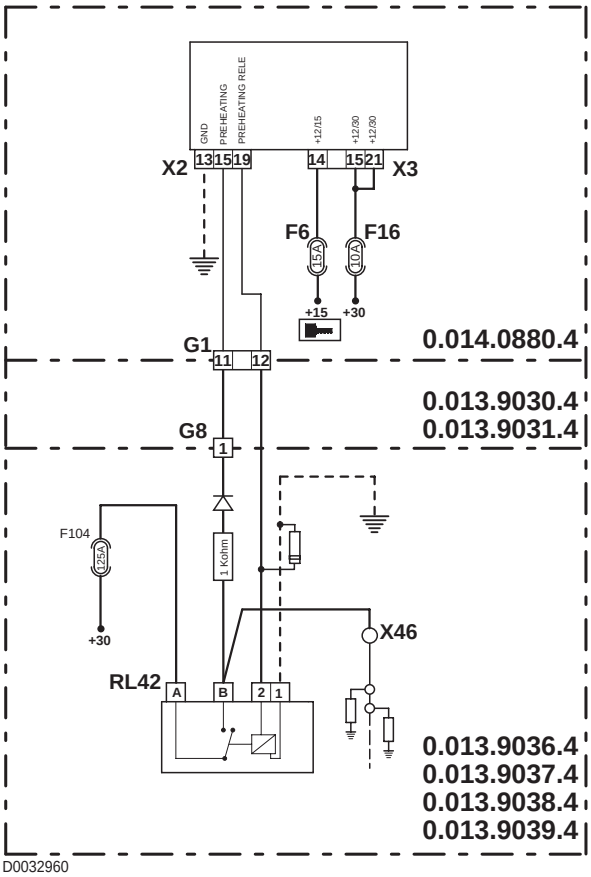
INSTRUMENT PANEL CODE: I23

DESCRIPTION

The instrument panel indicates that the preheating control relay is disconnected.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “RL42” of the preheating control relay are not oxidized and are firmly secured.
- Check that the preheating control relay is functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 2 of connector “RL42” and to pin 19 of connector “X2” and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



24

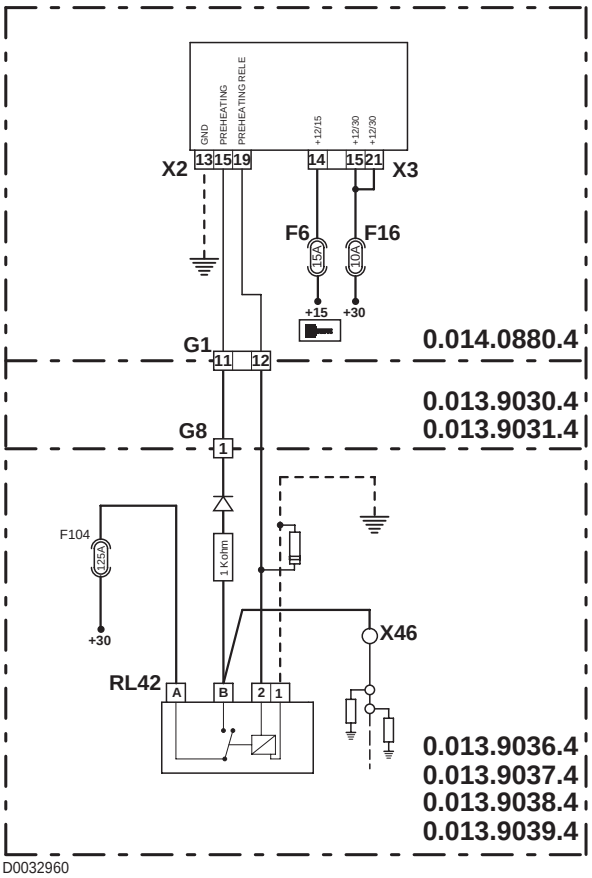
INSTRUMENT PANEL CODE: I24

DESCRIPTION

The instrument panel indicates that the preheating control relay is short-circuiting to ground.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “RL42” of the preheating control relay are not oxidized and are firmly secured.
- Check that the preheating control relay is functioning correctly (for details, see section 40).
- With the starter key in position “O” (OFF) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 2 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



25

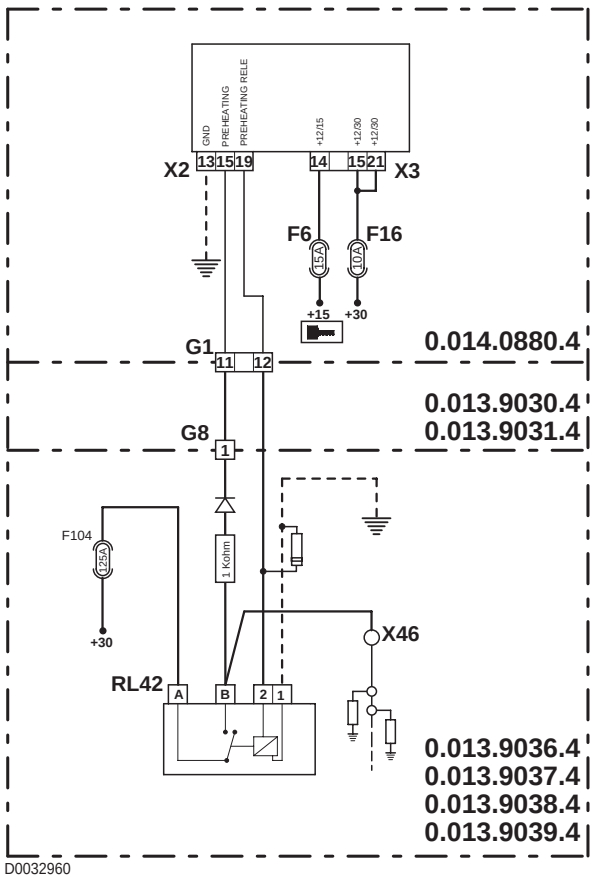
INSTRUMENT PANEL CODE: I25

DESCRIPTION

The instrument panel indicates that the preheating control relay is short-circuiting to battery positive.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “RL42” of the preheating control relay are not oxidized and are firmly secured.
- Check that the preheating control relay is functioning correctly (for details, see section 40).
- With the starter key in position “I” (ON) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 2 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



26

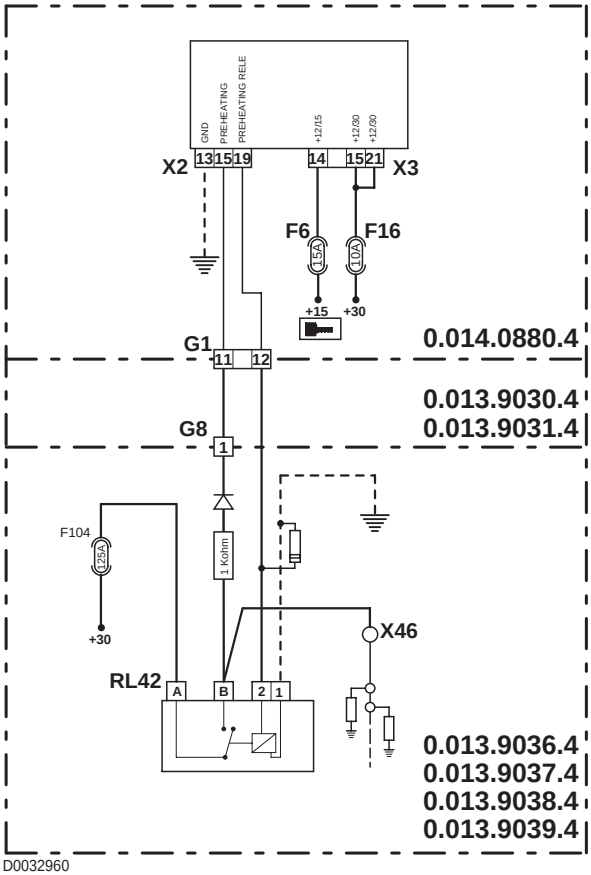
INSTRUMENT PANEL CODE: I26

DESCRIPTION

The instrument panel indicates that the preheating control relay is short-circuiting to battery positive or disconnected.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “RL42” of the preheating control relay are not oxidized and are firmly secured.
- Check that the preheating control relay is functioning correctly (for details, see section 40).
- With the starter key in position “I” (ON) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 2 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- With the starter key in position “O” (OFF) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 2 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for shorts (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



36

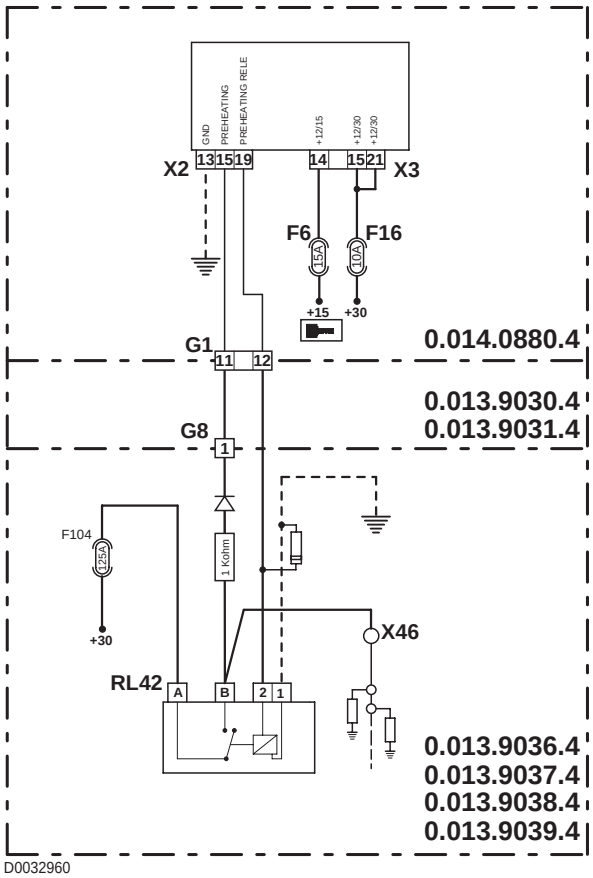
INSTRUMENT PANEL CODE: I36

DESCRIPTION

The instrument panel indicates that the preheating device is on, even though it should be off.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “RL42” and “G8“ of the preheating control relay are not oxidized and are firmly secured.
- Check that the preheating control relay is functioning correctly (for details, see section 40).
- With the starter key in position “I” (ON) and connector “X2” disconnected from the instrument panel, connect a test meter to pin 2 of connector “RL42” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- With the starter key in position “I” (ON), connector “G8” disconnected from the preheating control relay and connector “X2” disconnected from the instrument panel, connect a test meter to pin 15 of connector “X2” and to the earth on the tractor frame and perform a resistance test to check for 0 voltage (meter reading: 0 V).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.



37

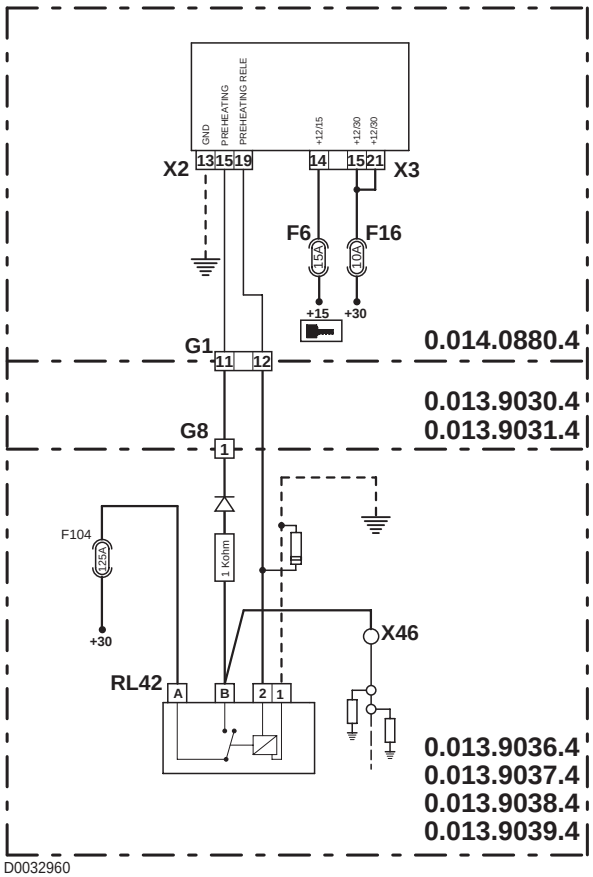
INSTRUMENT PANEL CODE: I37

DESCRIPTION

The instrument panel indicates that the preheating device is off, even though it should be on.

CHECK

- Check that the contacts on the “X2” connector of the instrument panel and “RL42” and “G8“ of the preheating control relay are not oxidized and are firmly secured.
- Check that the preheating control relay is functioning correctly (for details, see section 40).
- Connect a test meter to connector “X46” of the preheating device and to pin 15 of connector “X2” and, with the diodes test check that the diode is functioning correctly (place the negative prod on pin 15 of connector “X2” and the positive prod on connector “X46”).
- With the starter key in position “O” (OFF) and connector “X2” disconnected from the instrument panel, connect a test meter to connector “G8” of the alternator and to pin 15 of connector “X2” and perform a resistance test to check for electrical continuity (test meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

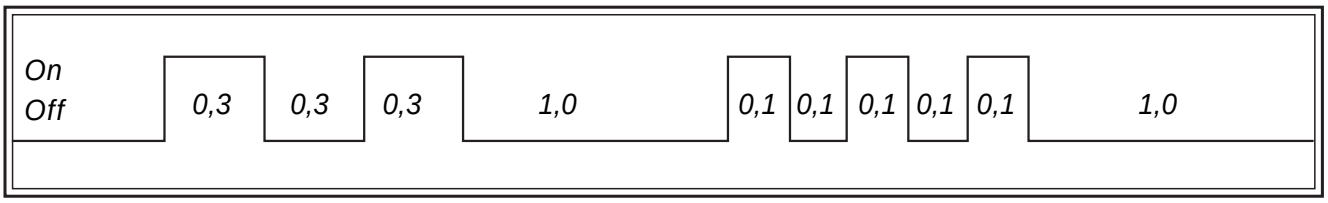


5.4 LIFT CONTROL UNIT ALARMS (P/N 0.011.2992.4/30)

The lift control unit warns the operator of any malfunction in monitored components by way of an indicator light located in the lift control button on the right-hand side of the operator seat.

Faults are indicated using a system of coded flash sequences that identify the component and type of fault exactly.

5.4.1 LIST OF ALARMS BY FLASH SEQUENCE ON LIFT CONTROL BUTTON



Flashes	Display on ART	Alarm description	System reaction	Page
11	EVUP DISCONN.	The control unit detects that the lifting solenoid valve is disconnected.	The lift does not work in automatic mode.	20-160
12	EVUP C.C.	The control unit detects that the lifting solenoid valve is short-circuited.	The lift does not work in automatic mode.	20-159
13	EVDW DISCONN.	The control unit detects that the lowering solenoid valve is disconnected.	The lift does not work in automatic mode.	20-158
14	EVDW C.C.	The control unit detects that the lowering solenoid valve is short-circuited.	The lift does not work in automatic mode.	20-157
15	EPROM CECK	The control unit detects a fault with the EPROM	The lift shuts down completely	20-164
21	POS.SENS.C.C.	The control unit detects that the position sensor is short-circuited.	The lift does not work in automatic mode.	20-162
22	POS.SENS.DIS.	The control unit detects that the position sensor is disconnected.	The lift does not work in automatic mode.	20-163
23	GEN.FAIL.CPU	The control unit detects a fault with the electronic control unit.	The lift does not work in automatic mode.	20-164
41	DRAFT SENS N.C.	The control unit detects that the draft sensor is disconnected.	The lift does not work in draft control mode.	20-156
42	DRAFT SENS C.C.	The control unit detects that the draft sensor is short-circuited.	The lift does not work in draft control mode.	20-155
45	EEPROM CHECK	The control unit detects a fault with the EPROM	The lift unit functions correctly but the operating parameters revert to the standard version.	20-164
50	NO V. SENSOR	The control unit detects that the sensor supply voltage is not correct.	The lift does not work in automatic mode.	20-161

5.4.2 LIST OF ALARMS DISPLAYED BY ART

Display on ART	Flashes	Alarm description	System reaction	Page
DRAFT SENS C.C.	42	The control unit detects that the draft sensor is short-circuited.	The lift does not work in draft control mode.	20-155
DRAFT SENS N.C.	41	The control unit detects that the draft sensor is disconnected.	The lift does not work in draft control mode.	20-156
EEPROM CHECK	45	The control unit detects a fault with the EPROM	The lift unit functions correctly but the operating parameters revert to the standard version.	20-164
EPROM CECK	15	The control unit detects a fault with the EPROM	The lift shuts down completely	20-164
EVDW C.C.	14	The control unit detects that the lowering solenoid valve is short-circuited.	The lift does not work in automatic mode.	20-157
EVDW DISCONN.	13	The control unit detects that the lowering solenoid valve is disconnected.	The lift does not work in automatic mode.	20-158
EVUP C.C.	12	The control unit detects that the lifting solenoid valve is short-circuited.	The lift does not work in automatic mode.	20-159
EVUP DISCONN.	11	The control unit detects that the lifting solenoid valve is disconnected.	The lift does not work in automatic mode.	20-160
GEN.FAIL.CPU	23	The control unit detects a fault with the electronic control unit.	The lift does not work in automatic mode.	20-164
NO V. SENSOR	50	The control unit detects that the sensor supply voltage is not correct.	The lift does not work in automatic mode.	20-161
POS.SENS.C.C.	21	The control unit detects that the position sensor is short circuited.	The lift does not work in automatic mode.	20-162
POS.SENS.DIS.	22	The control unit detects that the position sensor is disconnected.	The lift does not work in automatic mode.	20-163

DRAFT SENS S.C.

DESCRIPTION

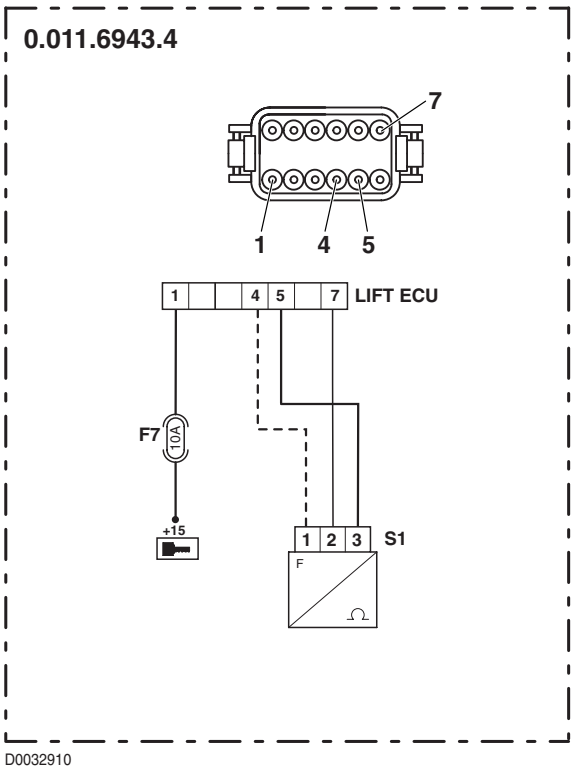
The control unit detects that the draft sensor is short-circuited.

CONTROL UNIT RESPONSE

The lift does not work in draft control mode.

CHECK

- Check that the contacts on connector “S1” of the draft sensor and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- With the starter key in the “I” (ON) position, check that the draft sensor is receiving power correctly (approx. 10 V between pin 3 (positive) and pin 1 (negative) of connector “S1“)
- With the starter key in the “I” (ON) position, connect a test meter to pin 2 of connector “S1” and to chassis earth, and check for the absence of short-circuits to battery positive (meter reading: 0V).
- Check correct operation of the sensor (for details, see section 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



DRAFT SENS N.C.

DESCRIPTION

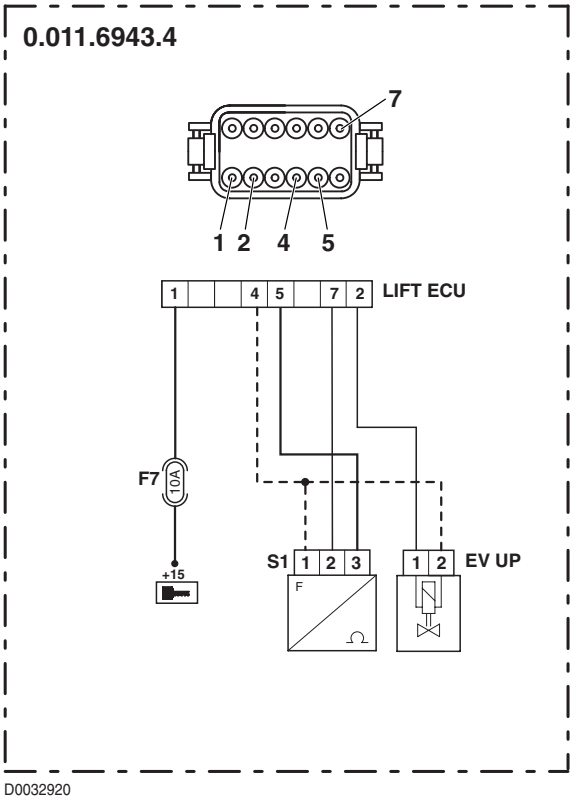
The control unit detects that the draft sensor is disconnected.

CONTROL UNIT RESPONSE

The lift does not work in draft control mode.

CHECK

- Check that the contacts on connector “S1” of the draft sensor and “LIFT ECU” of the lift control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “S1” and to pin 7 of the “LIFT control unit” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “UP SV” and to chassis earth, and measure the resistance to check for shorts to ground (meter reading: infinity).
- Check correct operation of the sensor (for details, see section 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



EVDW C.C.

DESCRIPTION

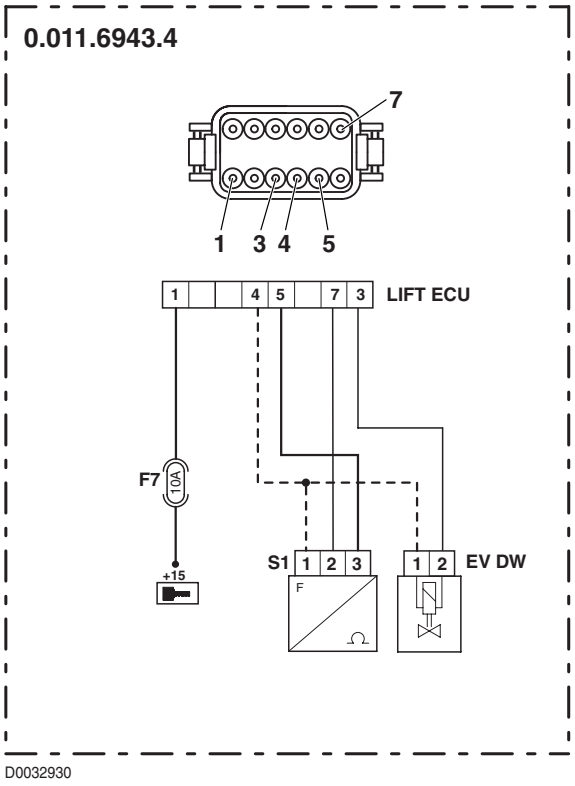
The control unit detects that the lowering solenoid valve is short-circuited.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on the "DW SV" connector and "LIFT ECU" on the lift control unit are not oxidized and are firmly secured.
- Test the internal resistance of the lift Down control solenoid (for details, see section 40).
- With the starter key in the "O" (OFF) position, connect a test meter to pin 1 of connector "DWSV" and to frame earth, and measure the resistance to check for shorts to ground (meter reading: infinity).
- Clear all alarms, turn the starter key first to "O" (OFF) and then back to the "I" (ON) position again; if the alarm is still present the control unit must be renewed.



EVDW DISCONN.

DESCRIPTION

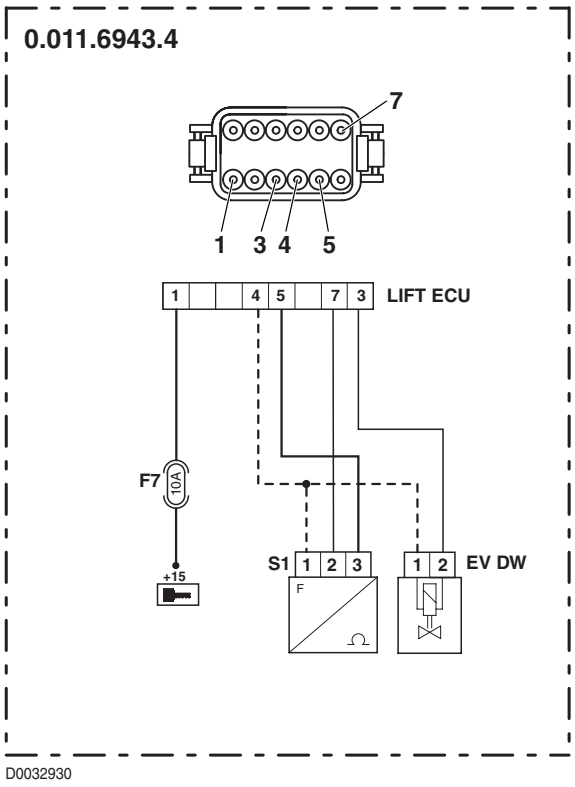
The control unit detects that the lowering solenoid valve is disconnected.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on the “DW SV” connector and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- Test the internal resistance of the lift Up control solenoid (for details, see section 40).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “DWSV” and to pin 3 of the “LIFT ECU” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “DWSV” and to chassis earth, and measure the resistance to check for electrical continuity (meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



EVUP C.C.

DESCRIPTION

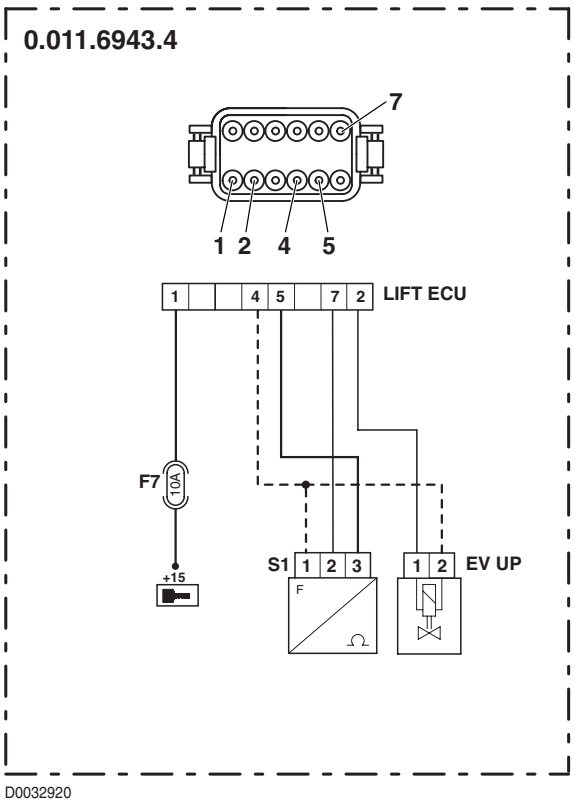
The control unit detects that the lifting solenoid valve is short-circuited.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on the “UP SV” connector and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- Test the internal resistance of the lift Down control solenoid (for details, see section 40).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “UP SV” and to chassis earth, and measure the resistance to check for shorts to ground (meter reading: infinity).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



EVUP DISCONN.

DESCRIPTION

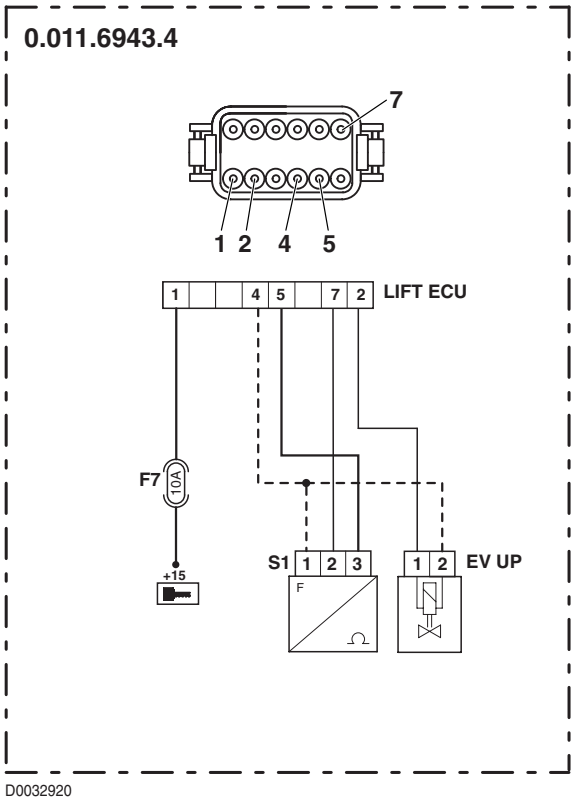
The control unit detects that the lifting solenoid valve is disconnected.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on the “UP SV” connector and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- Test the internal resistance of the lift Up control solenoid (for details, see section 40).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 1 of connector “UP SV” and to pin 2 of the “LIFT control unit” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “UP SV” and to chassis earth, and measure the resistance to check for electrical continuity (meter reading: 0 Ohm).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



NO V. SENSOR

DESCRIPTION

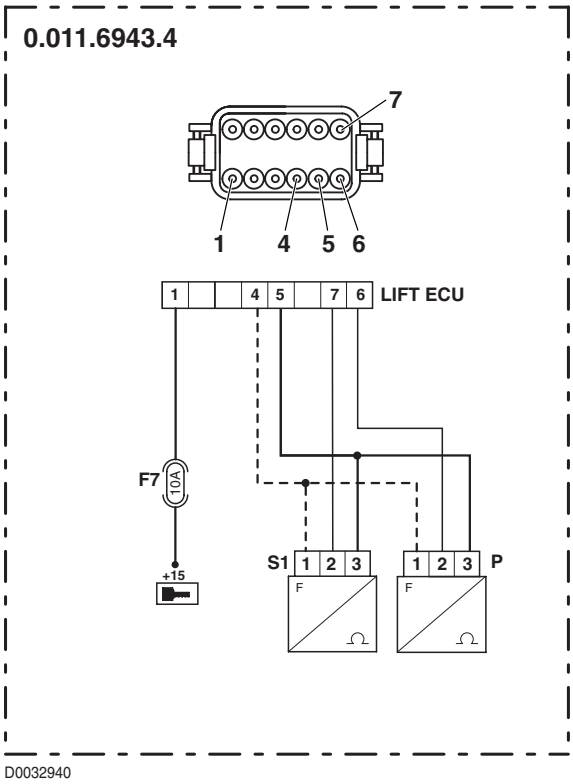
The control unit detects that the sensor supply voltage is not correct.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on connectors “P” and “S1” and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 3 of connector “P” and to chassis earth, and measure the resistance to check for shorts to ground (meter reading: infinity).
- With the starter key in the “I” (ON) position, check that the lift position sensor is receiving power correctly (approx. 10 V between pin 3 (positive) and pin 1 (negative) of connector “P”).
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



POS.SENS.C.C.

DESCRIPTION

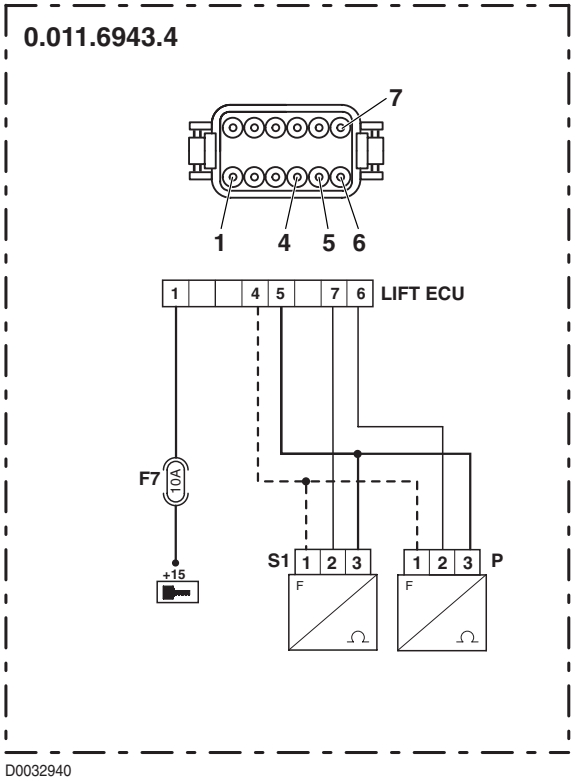
The control unit detects that the position sensor is short-circuited.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on connectors “P” of the position sensor and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- With the starter key in the “I” (ON) position, check that the position sensor is receiving power correctly (approx. 10 V between pin 3 (positive) and pin 1 (negative) of connector “S1”).
- With the starter key in the “I” (ON) position, connect a test meter to pin 2 of connector “P” and to chassis earth, and check for the absence of shorts to battery positive (meter reading: 0V).
- Check correct operation of the sensor (for details, see section 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



POS.SENS.DIS.

DESCRIPTION

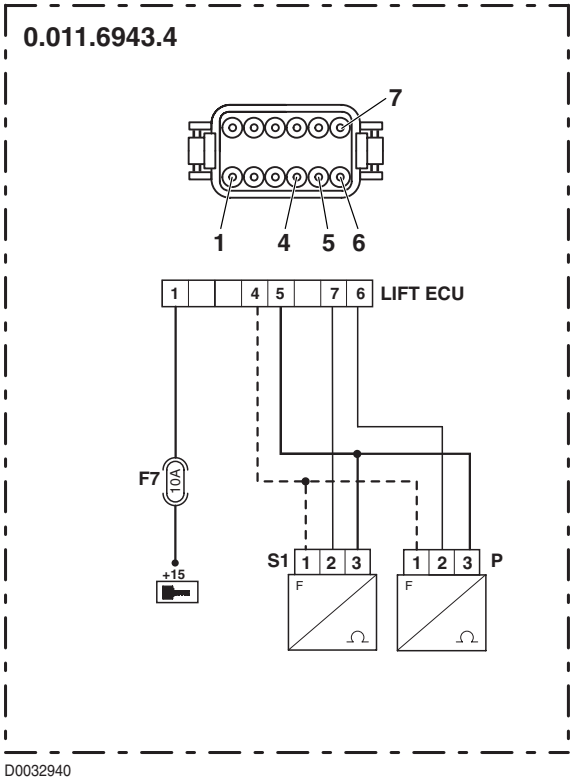
The control unit detects that the position sensor is disconnected.

CONTROL UNIT RESPONSE

The lift does not work in automatic mode.

CHECK

- Check that the contacts on connectors “P” of the draft sensor and “LIFT ECU” on the lift control unit are not oxidized and are firmly secured.
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “P” and to pin 6 of the “LIFT control unit” connector and measure the resistance to check for electrical continuity (test meter reading: 0 Ohm).
- With the starter key in the “O” (OFF) position, connect a test meter to pin 2 of connector “UP SV” and to chassis earth, and measure the resistance to check for shorts to ground (meter reading: infinity).
- Check correct operation of the sensor (for details, see section 40)
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.



EEPROM CHECK

DESCRIPTION
The control unit detects a fault with the EPROM

CONTROL UNIT RESPONSE
The lift unit functions correctly but the operating parameters revert to the standard version.

CHECK
- Clear all the alarms and calibrate the lift position sensor. Turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

EPROM CECK

DESCRIPTION
The control unit detects a fault with the EPROM

CONTROL UNIT RESPONSE
The lift shuts down completely

CHECK
- Turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again, and if the alarm is still present, the control unit must be renewed.

GEN.FAIL.CPU

DESCRIPTION
The control unit detects a fault with the electronic control unit.

CONTROL UNIT RESPONSE
The lift does not work in automatic mode.

CHECK
- Clear all alarms, turn the starter key first to “O” (OFF) and then back to the “I” (ON) position again; if the alarm is still present the control unit must be renewed.

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WHEELS

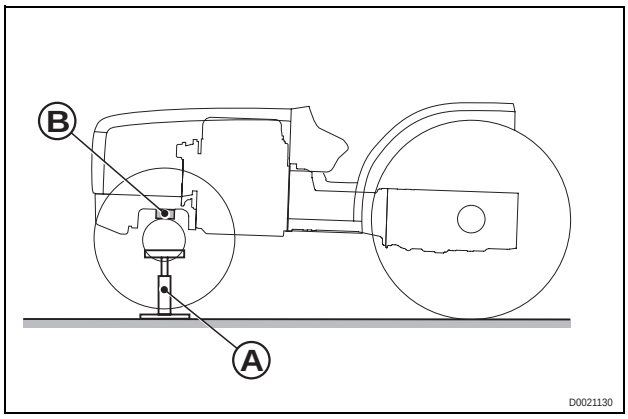
FRONT WHEELS

Removal

Remove the key from the starter switch and apply the parking brake.

1 - Raise the tractor and position two stands *"A"* under the front axle.

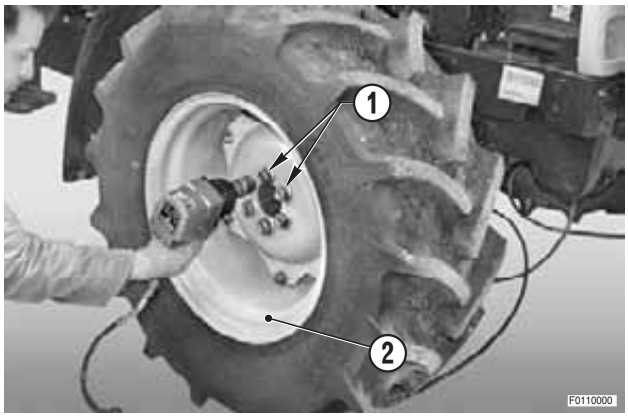
★ Drive safety wedges "*B*" between the axle and the front support.



2 - Remove all the bolts (1) except one for safety.

3 - Remove the wheel (2).

4 - Repeat the above operations for the other wheel.



Refitting

- Refitting is the reverse of removal.

REAR WHEELS

Removal

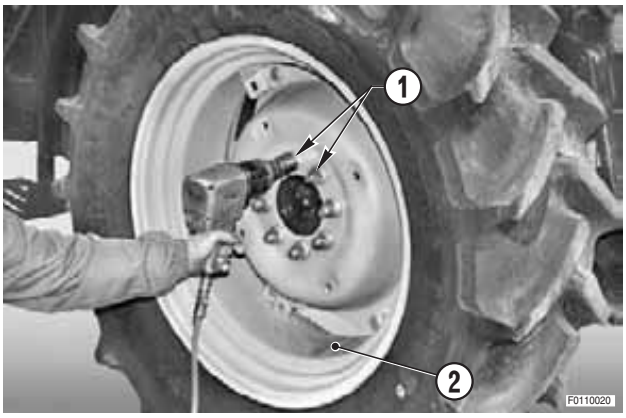
1 - Position a jack *"A"* under the rear gearbox casing.
★ Position the jack "*A*" so that is nearer to the wheel to be removed.

2 - Raise the tractor sufficiently to eliminate the flexure of the tyre wall.



3 - Remove all the bolts (1).

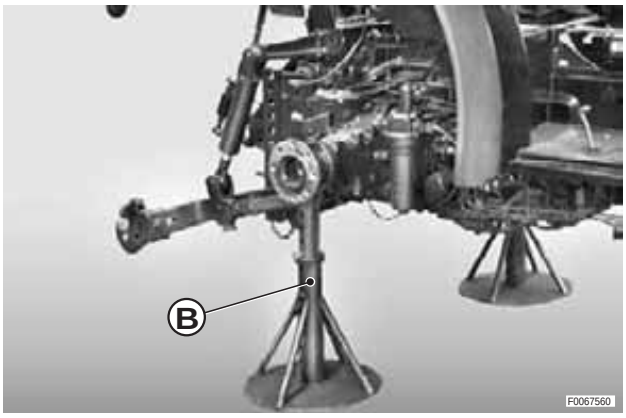
4 - Remove the wheel (2).



5 - Position a stand "*B*" with lateral retaining wings under the rear axle housing and lower the jack so that the axle rests on the stand.

6 - Check that the stand is in exactly the right position and then remove the trolley jack.

7 - Repeat the above operations to remove the other rear wheel.



Refitting

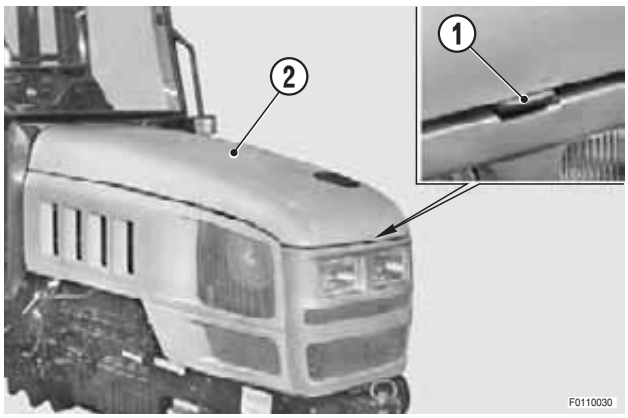
- Refitting is the reverse of removal.

FRONT HOOD AND SIDE PANELS

Removal

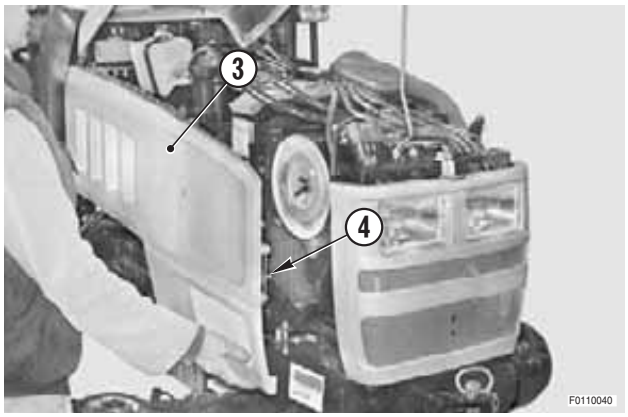
Remove the key from the starter switch and apply the parking brake.

1 - Press the release lever (1) and raise the hood (2)).

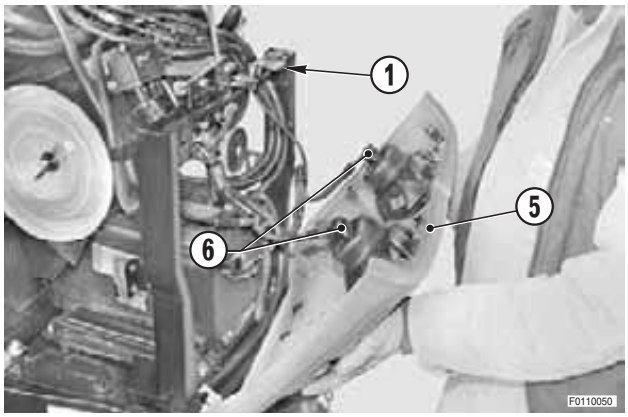


2 - Raise the side panel (3) to disengage the pin (4) from the support and remove the side panel.

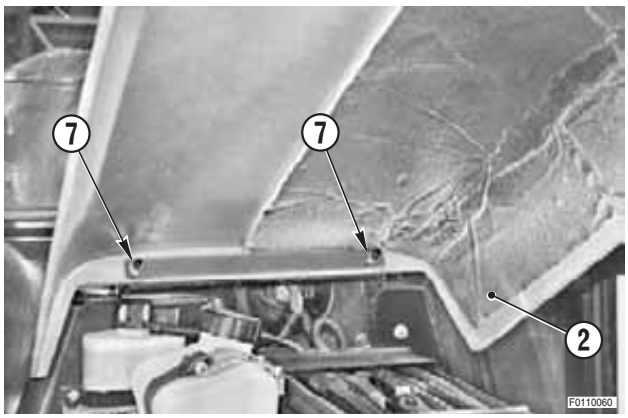
3 - Repeat the procedure on the opposite side.



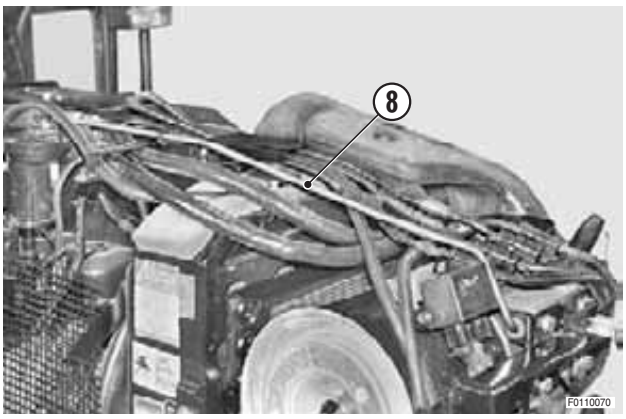
1 - Turn the release lever (4) upwards, detach the hood (5) and disconnect the headlight wiring connectors (6).



5 - Remove the nuts (7) and remove the hood (2).



6 - Remove the hood support strut (8).



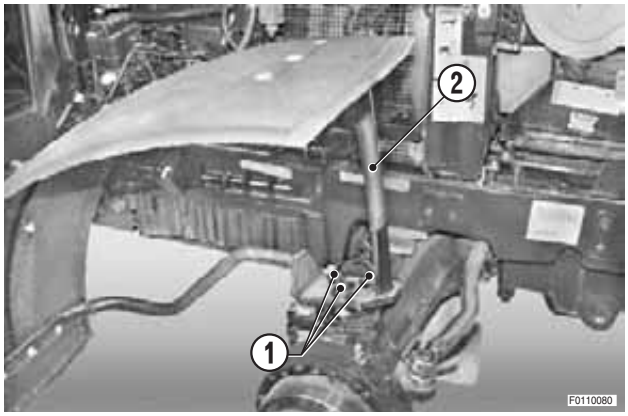
Refitting

- Refitting is the reverse of removal.

FENDERS

Removal

1 - Remove the three bolts (1) and remove the complete fender assembly (2).



Refitting

- Refitting is the reverse of removal.

RADIATOR

Removal

1 - Remove the engine hood and side panels (For details, see "FRONT HOOD AND SIDE PANELS").

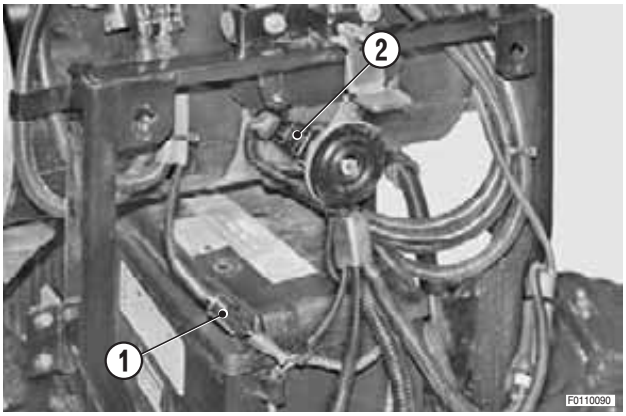
⚠ Disconnect the lead from the negative battery terminal and apply the parking brake

2 - Drain off all the engine coolant.

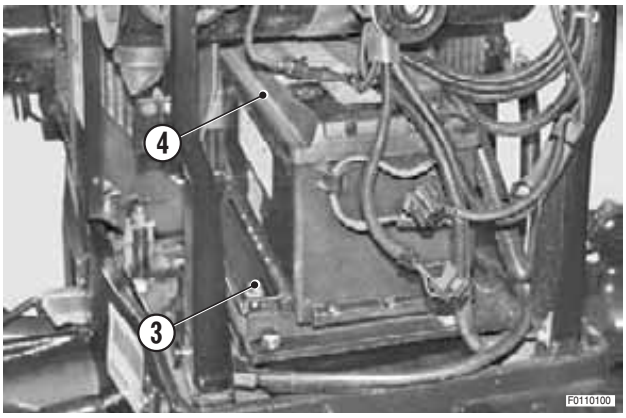
1

Coolant:
max. 11 l (3 US gall.)

3 - Disconnect the wiring connectors (1) and (2).

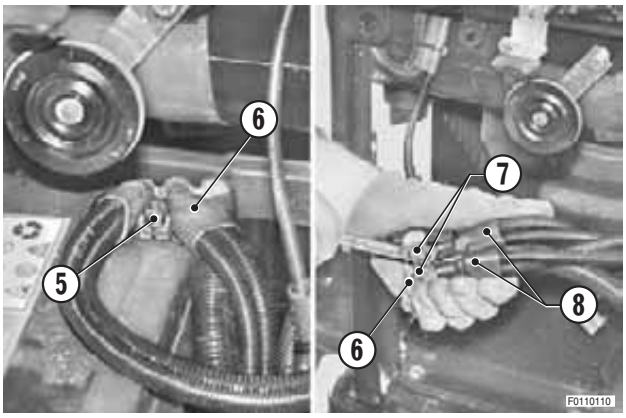


4 - Loosen the bolt (3) and move the battery (4) towards the front of the tractor.



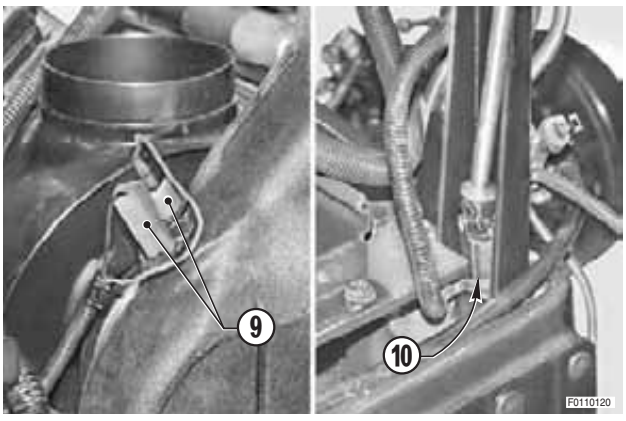
5 - Loosen the nut (5) and disconnect the terminal clamp (6) from the battery (4).

6 - Remove the screws (7) and disconnect the wires (8) from the clamp (6).

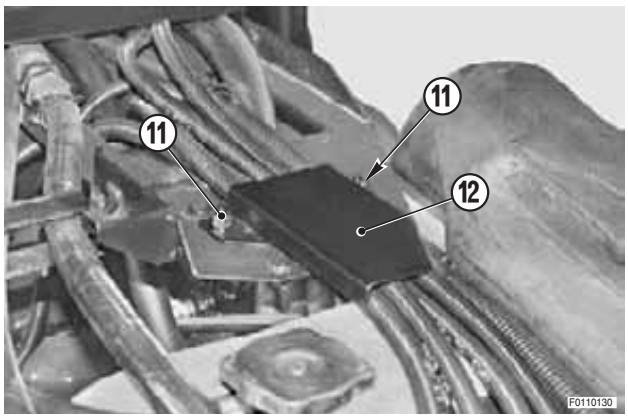


7 - Disconnect the wiring connector (9) air filter clogging sensor.

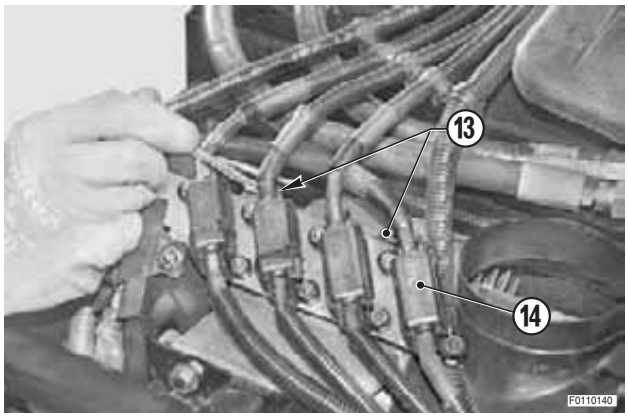
8 - Remove the nut (10) and disconnect the earth lead.



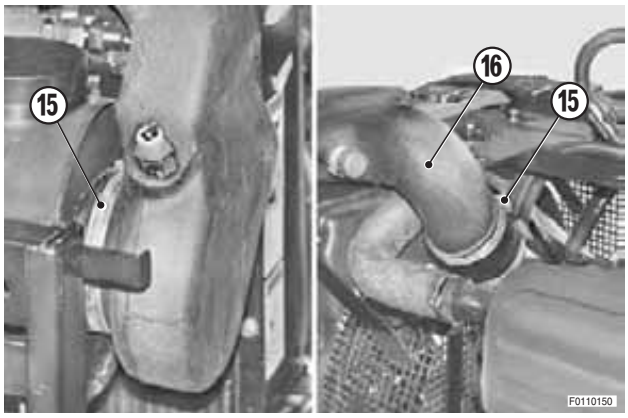
9 - Remove the nuts (11) and remove the cover (12).



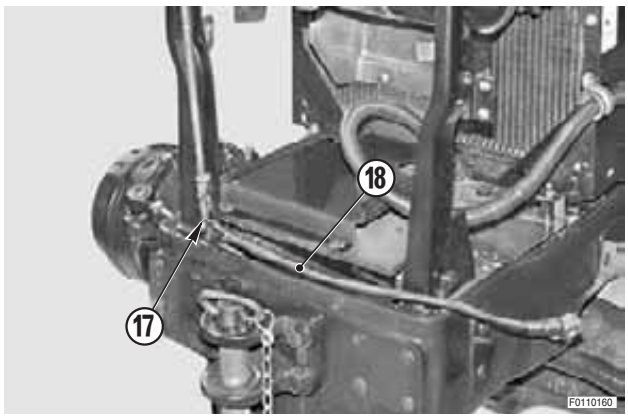
10 - Remove the nuts (13) and reposition the wiring loom (14) towards the rear of the tractor.



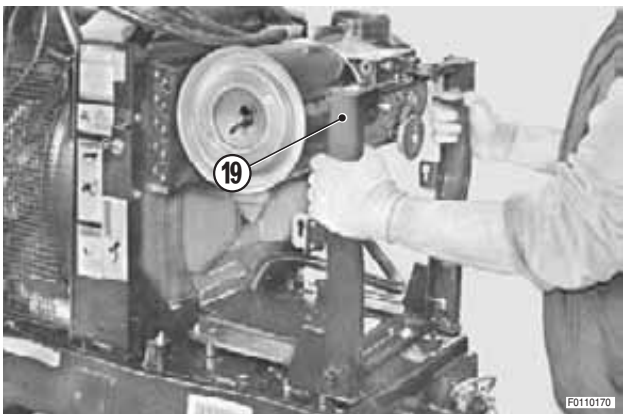
11 - Loosen the clamps (15) and remove the manifold (16).



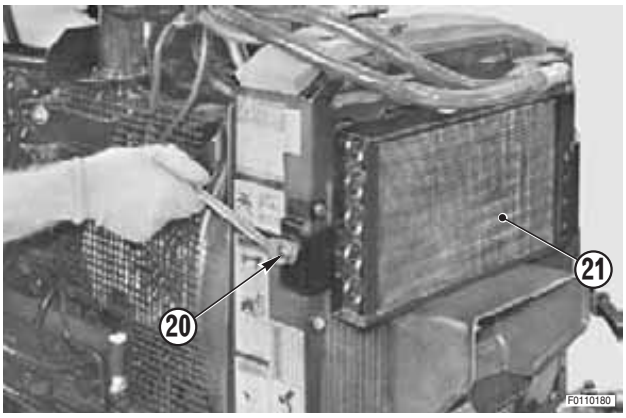
12 - Remove the nuts (17).
★ Note the position of the earth lead (18).



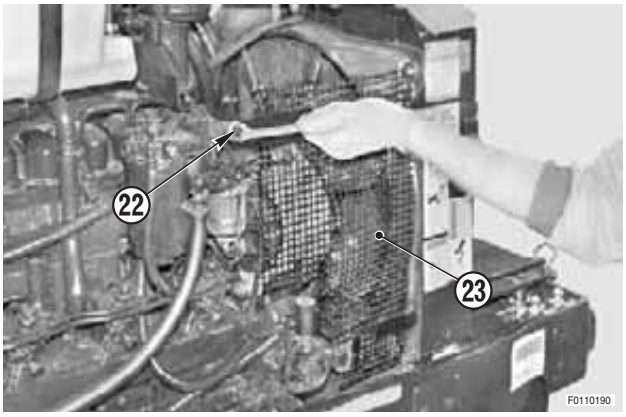
13 - Remove the air cleaner support (19).



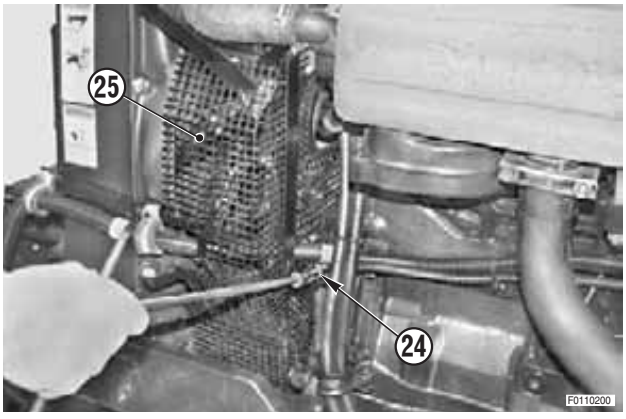
14 - Remove the bolt (20) and tilt the heat exchanger (21) towards the rear of the tractor.



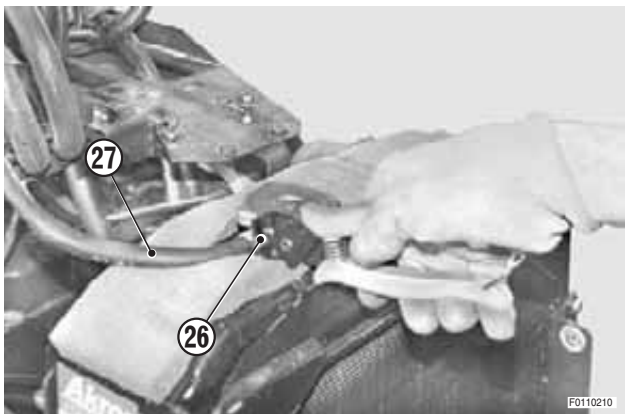
15 - Remove the nut (22) and remove the fan guard(23).



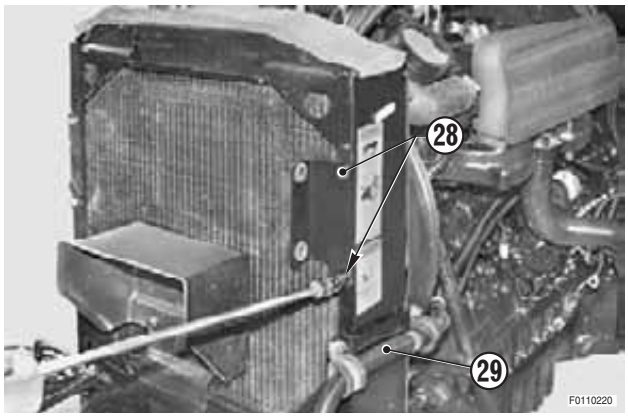
16 - Remove the bolt (24) and remove the fan guard (25).



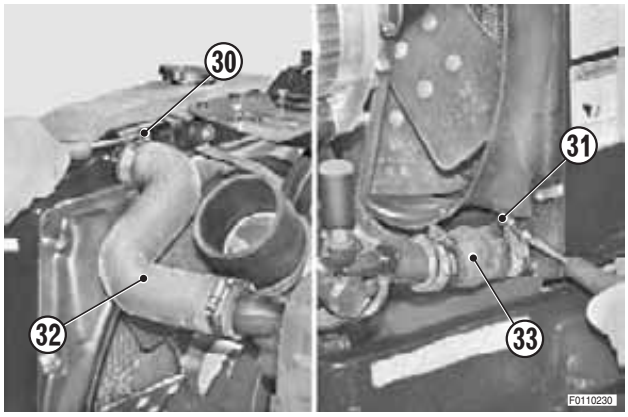
17 - Loosen the hose clamp (26) and disconnect the hose (27) from theradiator.



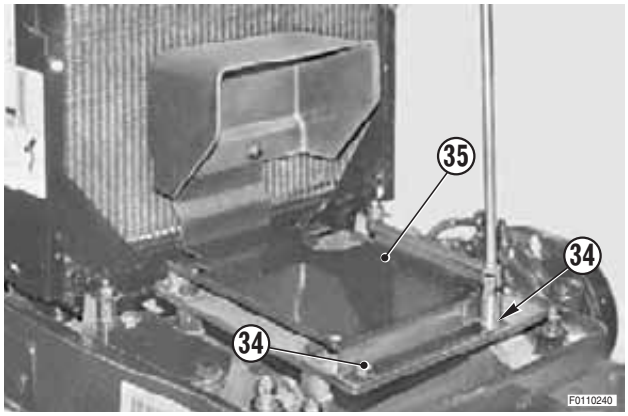
18 - Remove the screws (28) and fold the wiring loom (29) back towards the rear of the tractor .



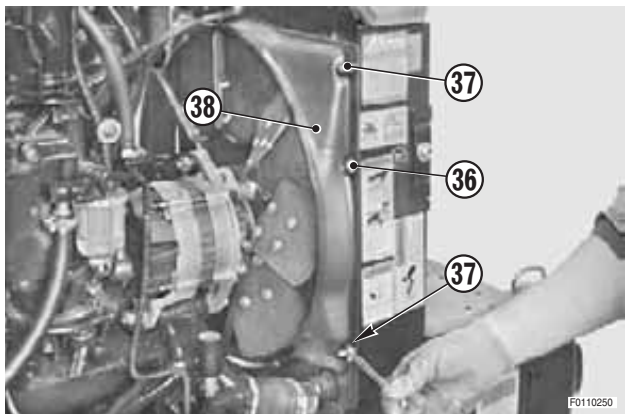
19 - Loosen the hose clamps (30) and (31) disconnect the pipes (32) and (33).



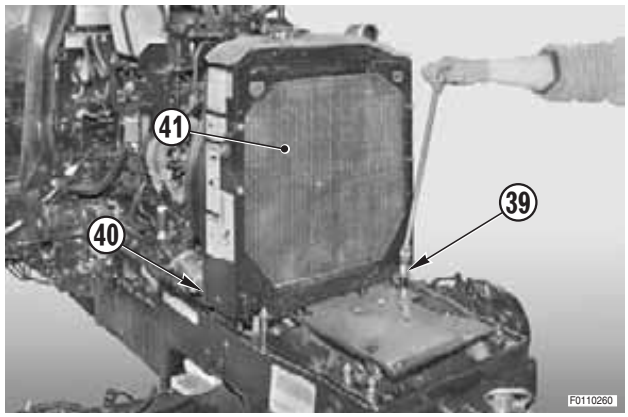
20 - Remove the bolts (34) and remove the battery support (35).



21 - Remove the bolts (36) and pins (37) and detach the-cowling (38) from the radiator.



22 - Remove the nuts (39) and bolts (40) and remove the radiator (41).



Refitting

- Refitting is the reverse of removal.

※ 1

1 - Fill the cooling system.

Coolant:
max. 11 l (3 US. gall.)

2 - Start the engine and run for few minutes to allow the coolant to circulate and then check the seals for leaks.

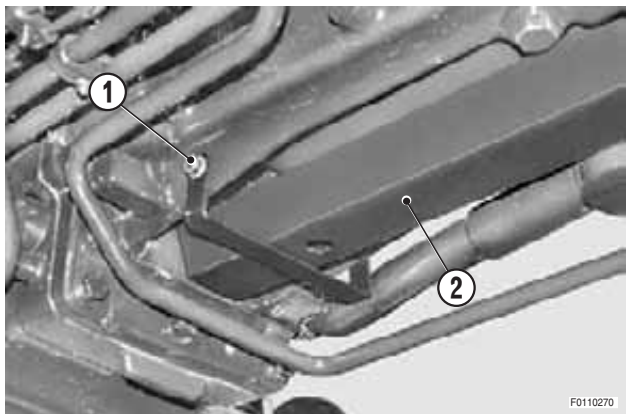
3 - Stop the engine and top up the coolant level.

FRONT AXLE DRIVE SHAFT

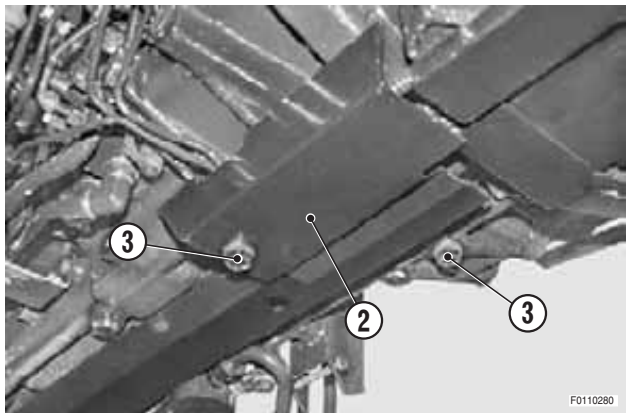
Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

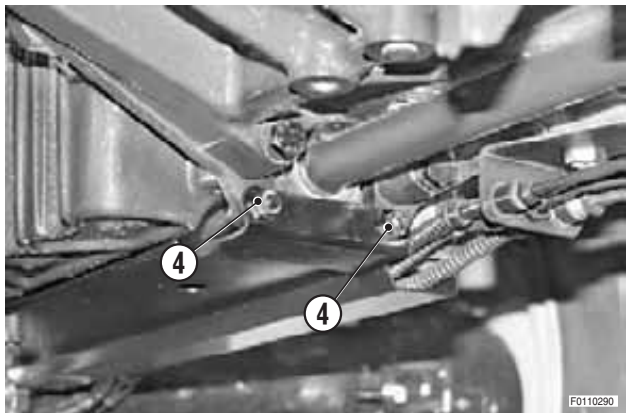
1 - Unscrew and remove the rear retaining bolts (1) of the guard (2).



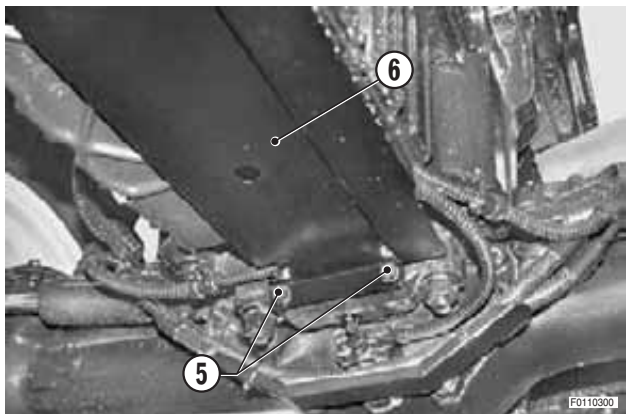
2 - Unscrew and remove the central bolts (3) and remove the guard (2).



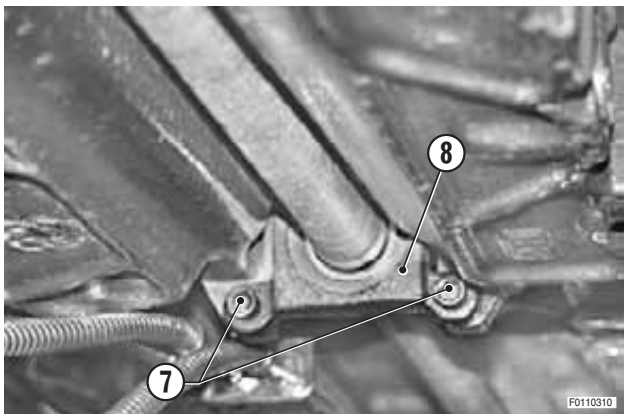
3 - Remove the nuts (4).



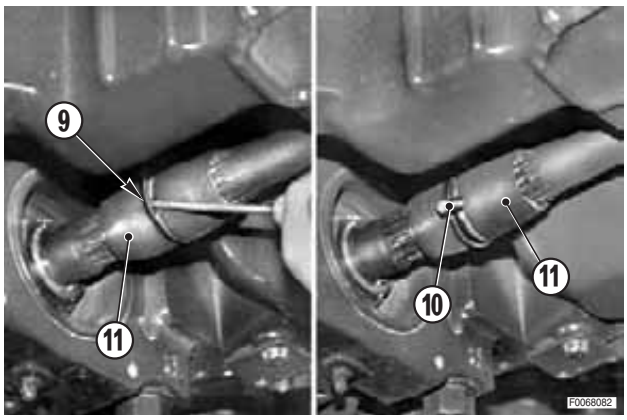
4 - Loosen and remove the front bolts (5) and remove the guard (6).



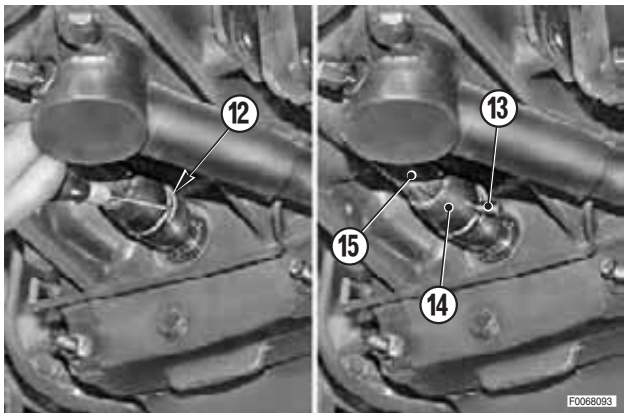
5 - Unscrew and remove the retaining bolts (7) and washer of the central support (8).



6 - Unseat the circlip (9), drive out the pin(10) and slide front drive coupling sleeve (11) towards the rear of the tractor. ※ 1



7 - Unseat the circlip (12), drive out the pin (13), slide the rear drive coupling sleeve (14) towards the front of the tractor and remove the shaft (15). ※ 1



Refitting

- Refitting is the reverse of removal.

※ 1

★ To facilitate engagement of the coupling sleeves on the pinions shafts, insert and secure the rear sleeve (14) first and then front sleeve 11).
If it proves difficult to fit the front sleeve, slightly raise the front of the tractor so that the wheels can turn.

FRONT SUPPORT

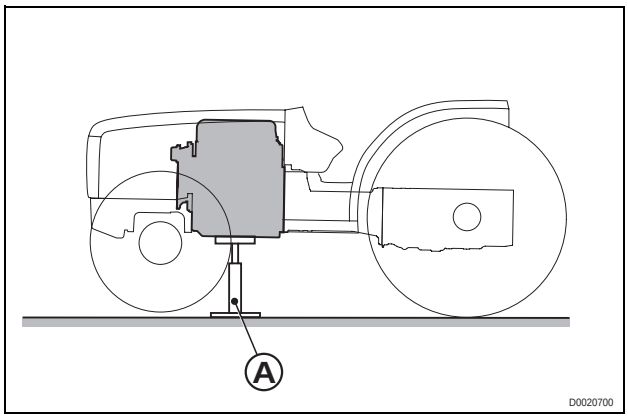
Removal

1 - Remove the engine hood and side panels (For details, see "FRONT HOOD AND SIDE PANELS").

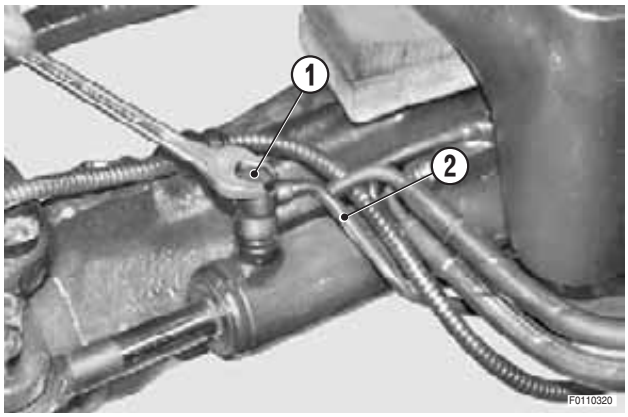
2 - Remove the radiator. (For details, see "RADIATOR").

3 - Remove the front axle drive shaft. (For details, see "FRONT AXLE DRIVE SHAFT").

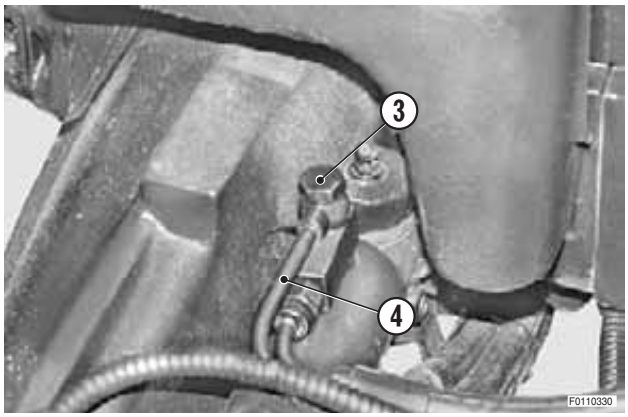
4 - Raise the front of the tractor so that the front tyres are clear of the ground and position a stand "*A*" under the engine block.



5 - Remove the union (1) and disconnect the pipe (2).
- ★ Renew the copper washers on reassembly.
- ★ Plug the pipe and port to prevent impurities getting in.

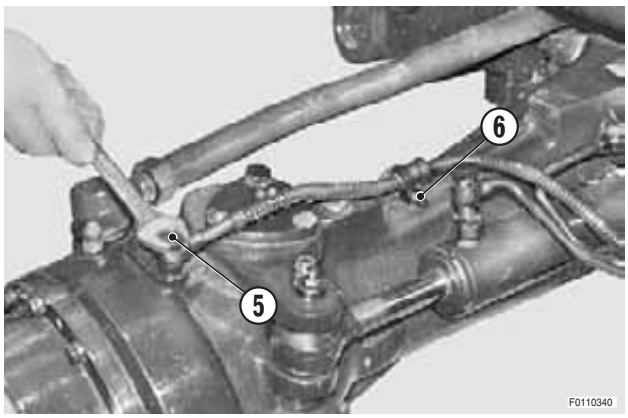


6 - Remove the fitting (3) and disconnect the pipe (4).
- ★ Renew the copper washers on reassembly.
- ★ Plug the pipe and port to prevent impurities getting in.



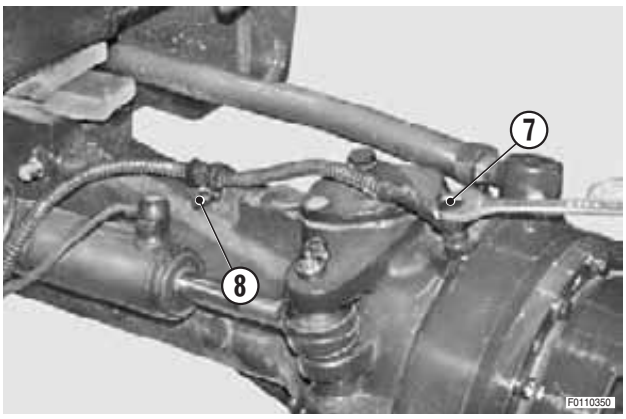
7 - Remove the union (5) of the pipe on the left-hand side.
- ★ Plug the pipe and hole to prevent the entry of impurities.

8 - Remove the bolt (6) with its nut.

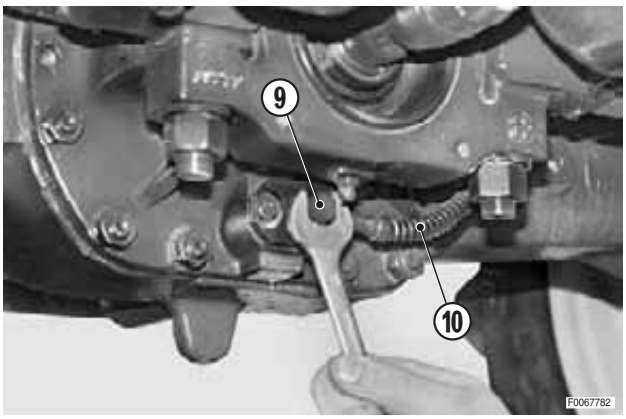


9 - Remove the union (7) of the right-hand pipe.
★ Plug the pipe and hole to prevent the entry of impurities.

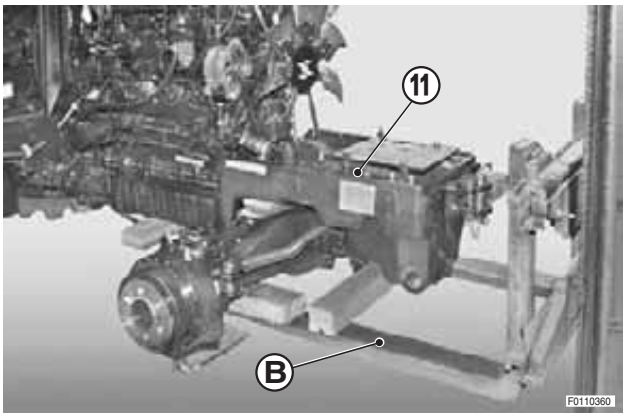
10 - Remove the bolt (8) with its nut.



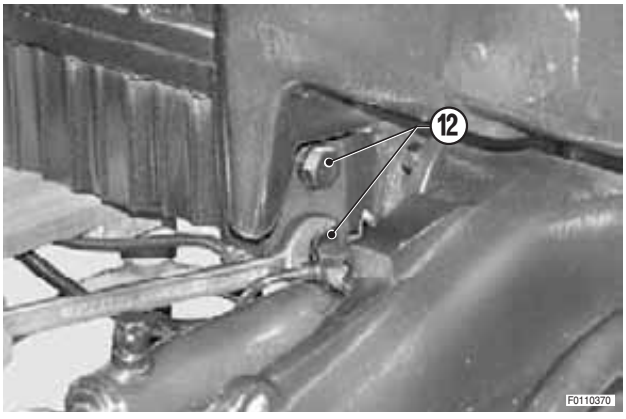
11 - Remove the union (9) and disconnect the diff lock control pipe (10).
★ Plug the pipe and hole to prevent the entry of impurities.



12 - Position a jack "*B*" under the front support (11).

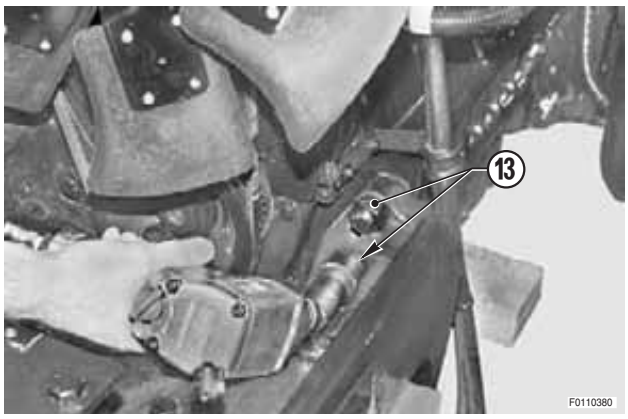


13 - Remove the four lower bolts (12). ※ 1



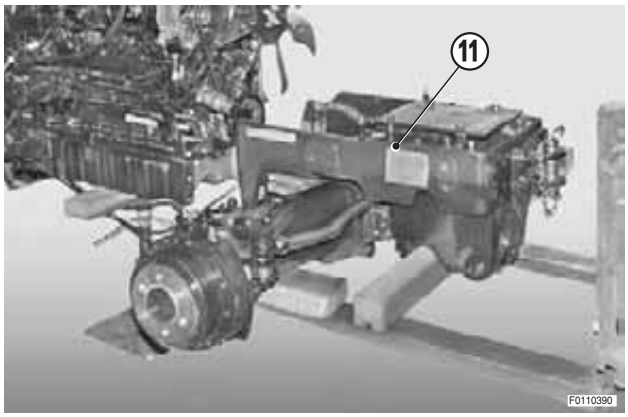
14 - Remove the four upper bolts (13).

※ 1



15 - Remove the complete front support (11).
- ★ Recover the shims installed between the front support and sump, making a note of their positions.
- ★ Keep the right and left shims separate.

※ 2



Refitting

- Refitting is the reverse of removal.

※ 1

Nm Bolts and nuts: #240±12 Nm (177±9 lb.ft.)

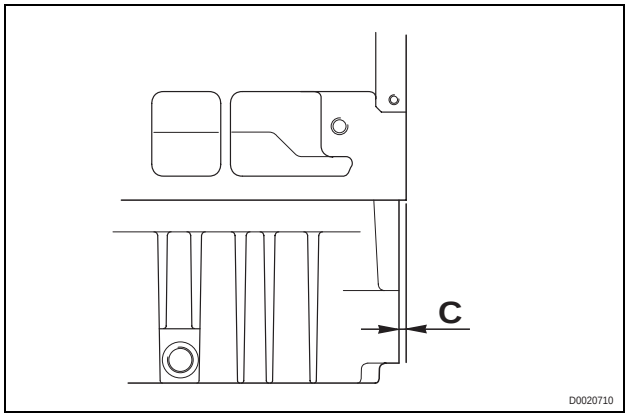
※ 2

★ If the engine or engine sump are to be renewed, or if the shims have got mixed up or lost, recalculate the shim thicknesses as follows:

1 - Before installing the front support, rest a straightedge across the engine block face and, using a feeler gauge, measure the clearance "*C*" between this face and contact face of the sump pan.

2 - Form a shim pack to obtain alignment within the tolerance limits of ±0.1 (0.004 in.).

3 - Tighten down the support bolts gradually in a crosswise pattern.



FRONT AXLE

Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the front wheel drive shaft. (For details, see "FRONT AXLE DRIVE SHAFT").

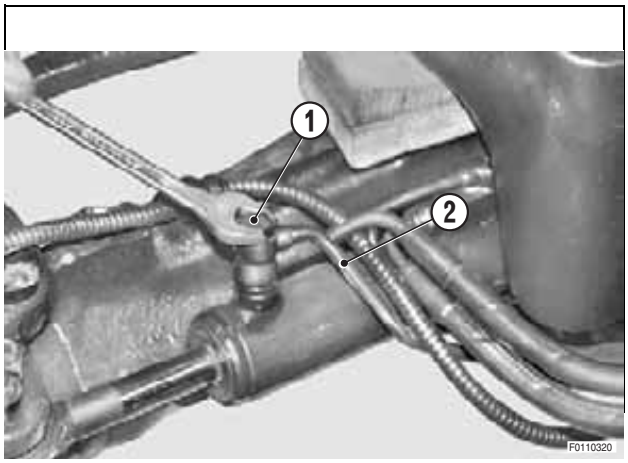
2 - Raise the front end of the tractor so that wheels are clear of the ground and position a stand "*A*" under the engine.

3 - Remove the front wheels. (For details, see "WHEELS").

4 - Remove the union (1) and connect the pipe (2).

★ Renew the copper washers on reassembly.

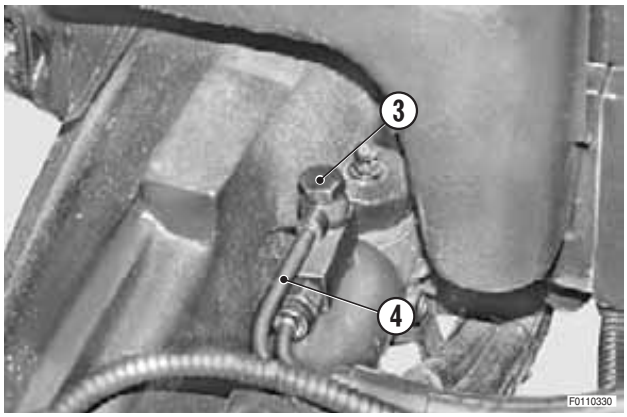
★ Plug the pipe and port to prevent impurities getting in.



5 - Remove the union (3) and disconnect the pipe (4).

★ Renew the copper washers on reassembly.

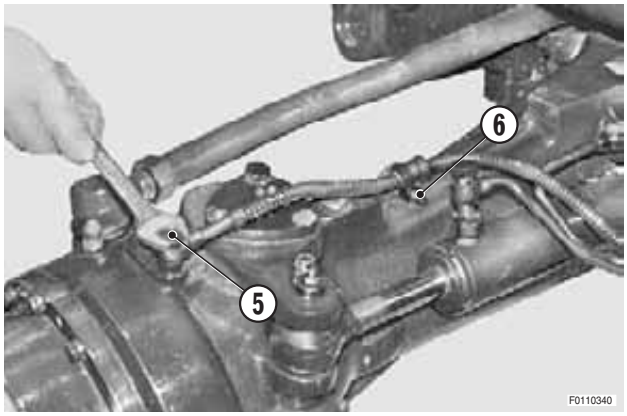
★ Plug the pipe and port to prevent impurities getting in.



6 - Remove the union (5) of the pipe on the left-hand side.

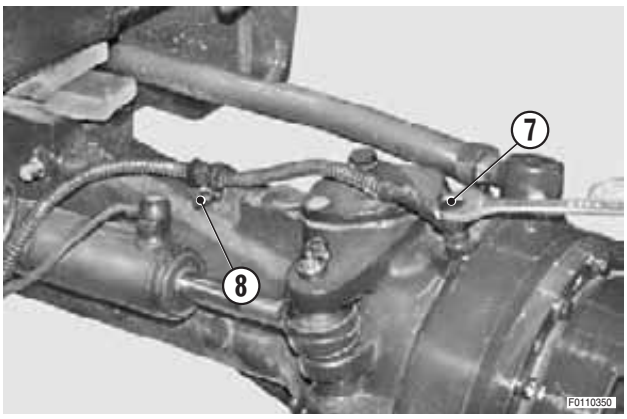
★ Plug the pipe and hole to prevent the entry of impurities.

7 - Remove the bolt (6) with its nut.

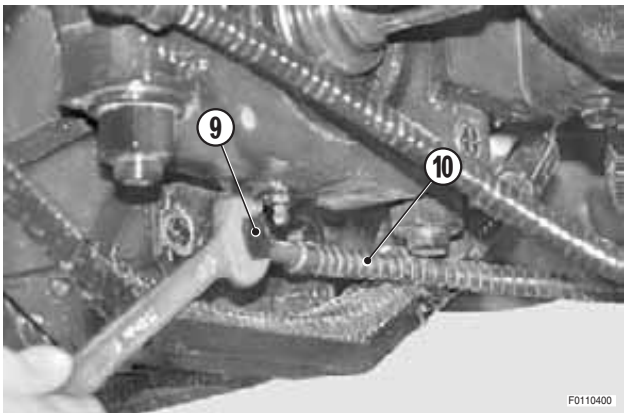


8 - Remove the union (7) of the right-hand pipe.
★ Plug the pipe and hole to prevent the entry of impurities.

9 - Remove the bolt (8) with its nut.



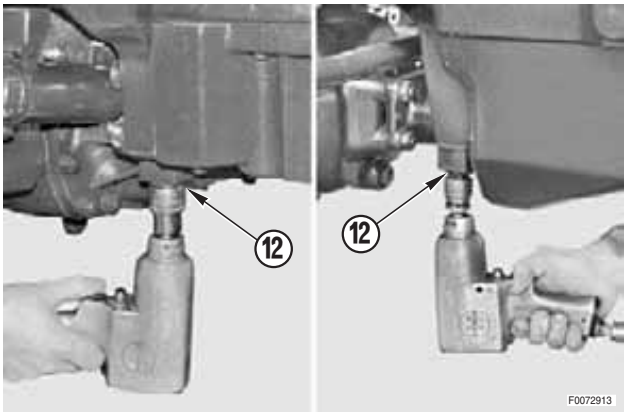
10 - Remove the union (9) and disconnect the diff lock control pipe (10).
★ Plug the pipe and hole to prevent the entry of impurities.



11 - Position a suitable jack under the axle (11).



12 - Remove the four nuts (12) and remove the complete axle. ⁘ 1



Refitting

- Refitting is the reverse of removal.

1

Nm Nuts: 184±9 Nm (135.6±6.6 lb.ft.)

1 - After installing the axle, start the engine and repeatedly turn the steering to full lock in both directions to expel any air from the steering circuit.

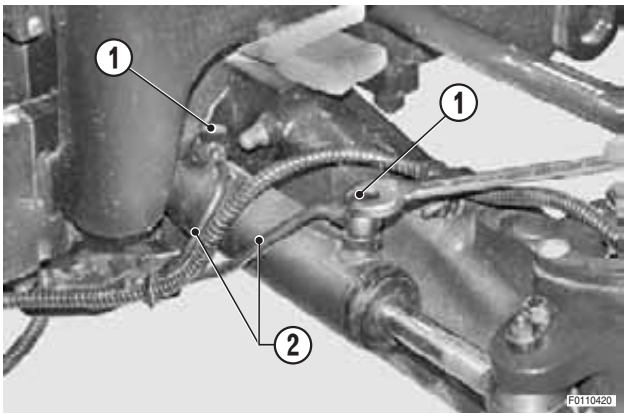
STEERING CYLINDER

Removal

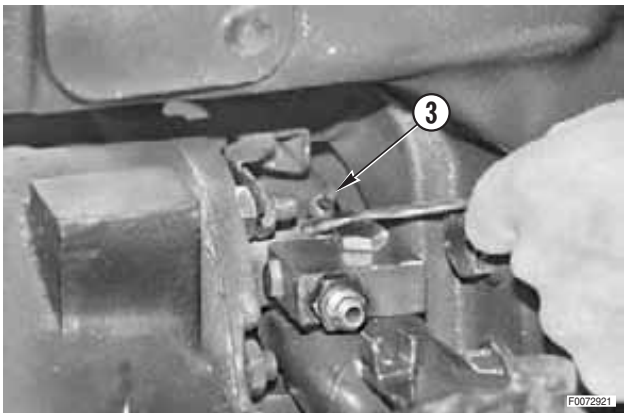
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the relative front wheel.
(For details, see "WHEELS").

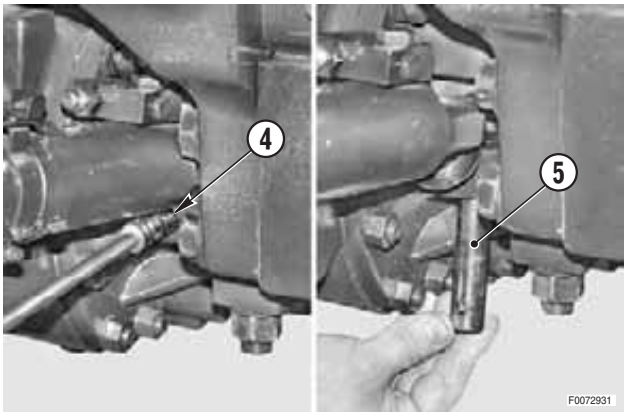
2 - Remove the unions (1) and disconnect the pipes (2).
★ Plug the pipes to prevent the entry of impurities.



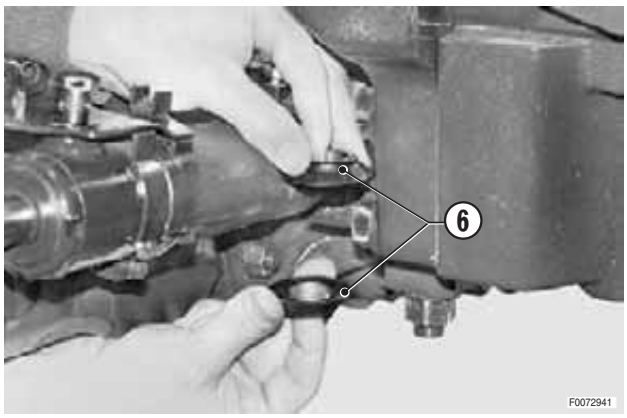
3 - Remove the grease nipple (3).



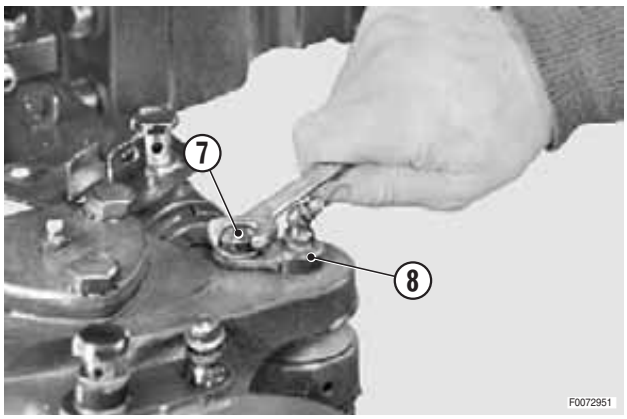
4 - Remove the screw (4) and remove the pin (5).



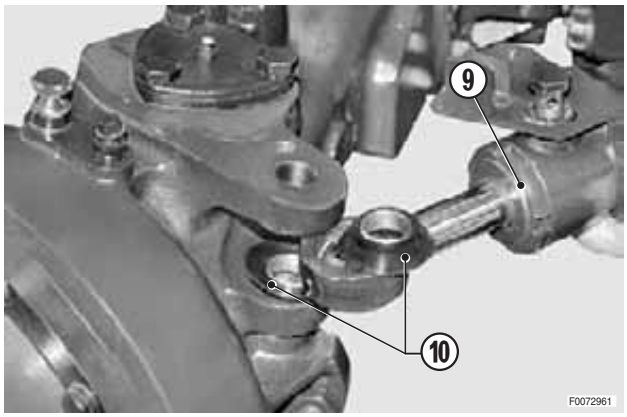
5 - Remove the seals (6).



6 - Remove the screw (7) and remove the pin (8).



7 - Remove the complete cylinder assembly (9) and recover the seals (10).



Refitting

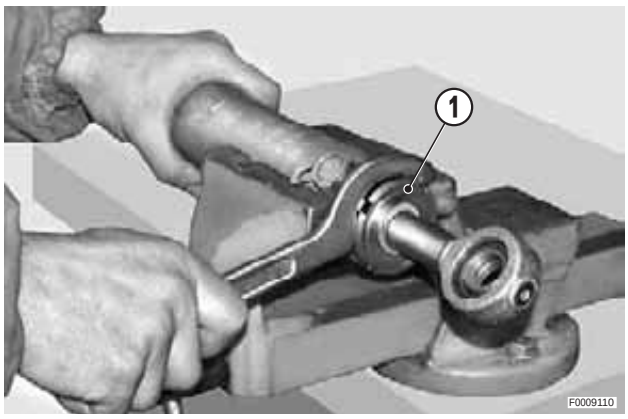
- Refitting is the reverse of removal.

1 - After installing the steering cylinder, start the engine and repeatedly turn the steering to full lock in both directions to expel any air from the steering circuit.

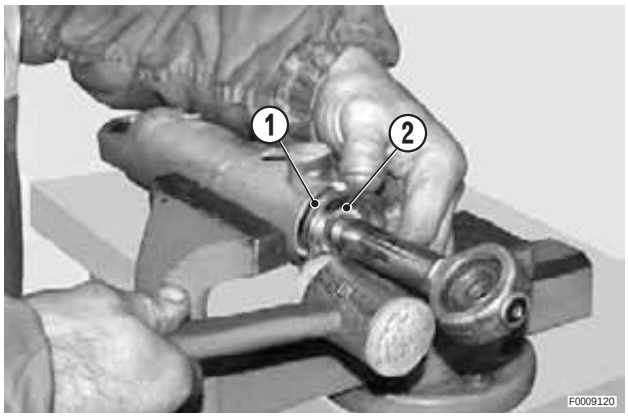
Disassembly

1 - Back off the front nut by about 5 turns (1).

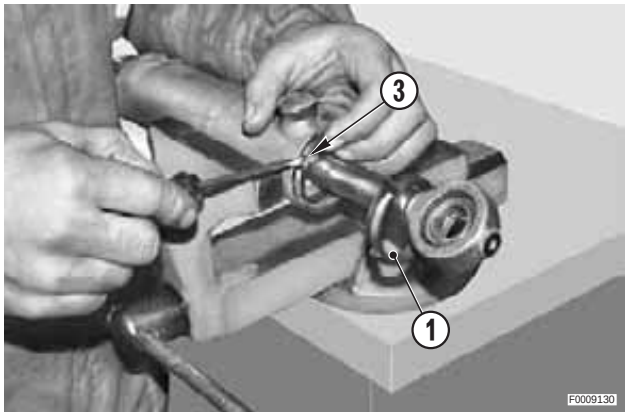
※ 1



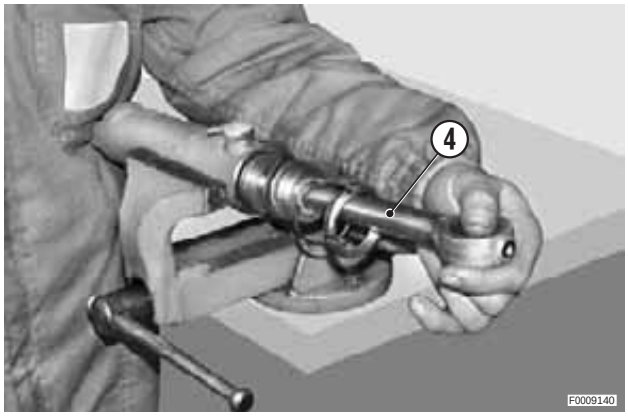
2 - With a soft mallet, lightly tap the front nut (1) to drive in the end cap (2) about 3 mm (0.118 in.).



3 - Remove the nut (1) and remove the circlip (3) securing the end cap (2).

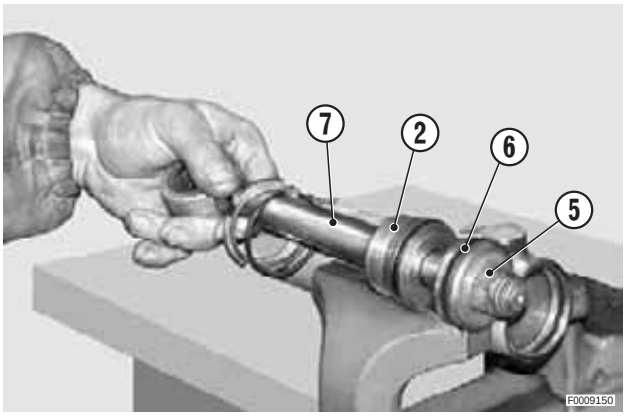


4 - Withdraw the complete piston assembly (4).

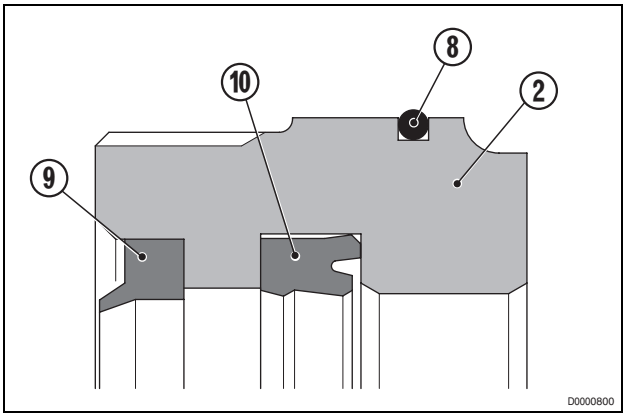


5 - Unscrew and remove the self-locking nut (5) and remove the piston (6).

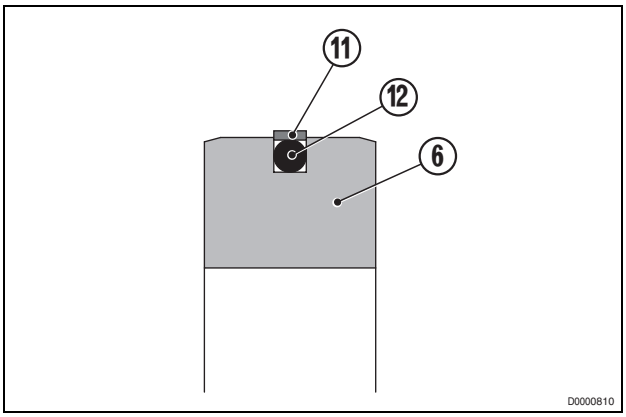
6 - Withdraw the end cap (7) from the rod (2).



7 - Remove the outer O-ring (8), rod wiper (9) and rod guide ring (10) from the end cap (2).



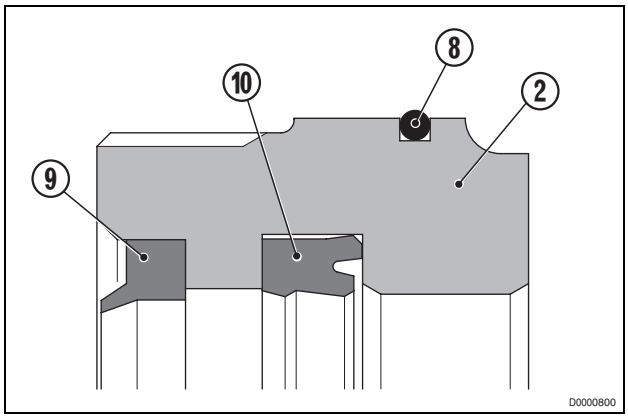
8 - Remove the outer seal (11) and inner O-ring (12) from the piston (6).



Assembly

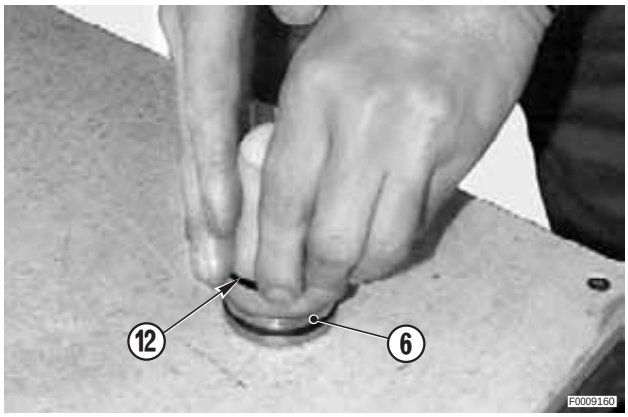
1 - Fit the rod guide (10) and the rod wiper (9) in the end cap (2).
   ★ Make sure that the guide ring (10) is installed the right way round.

2 - Fit the O-ring (8).

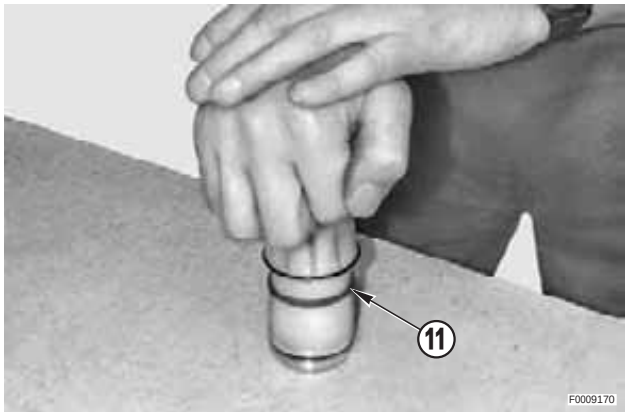


3 - Fit a suitable installation guide on the piston (6)and fit the piston the O-ring (12) by hand.

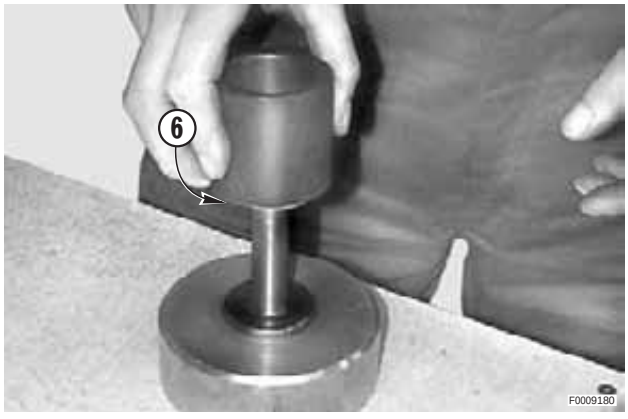
4 - Fit the outer piston seal (11) on the housing.



5 - Using a suitable installer, drive the seal into its seat (11).



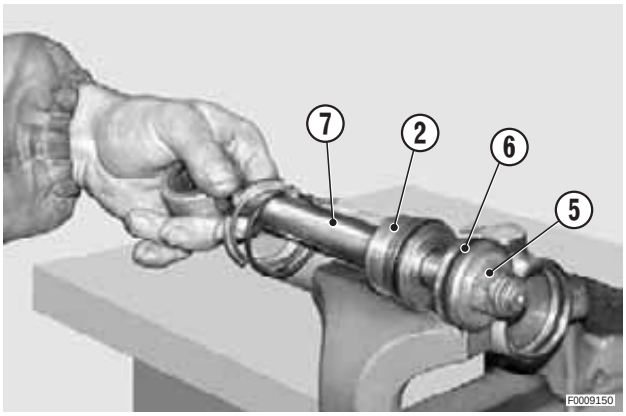
6 - Using a calibrator and suitable support, calibrate the seal (11) passing the calibrator over the full length of the piston (6).



7 - Fit the end cap (2) and the piston (6) on the rod (7); Secure the piston (6) with the self-locking nut (5).

End cap: Gearbox oil.

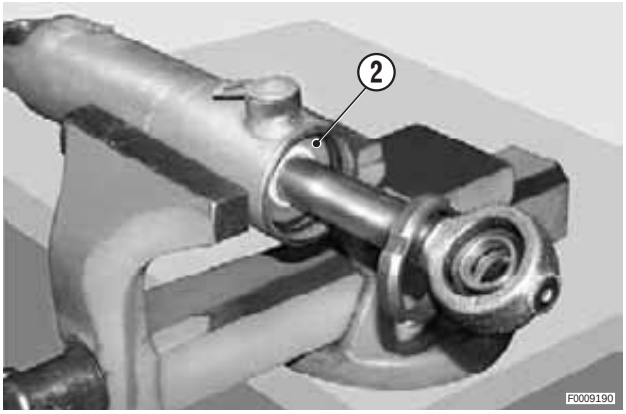
Nut: 86÷90 Nm (63.4–66.3 lb.ft.)



8 - Lubricate the seals of the piston and end cap; install the assembly in thecylinder taking care not to damage the seals.

Seals: Gearbox oil.

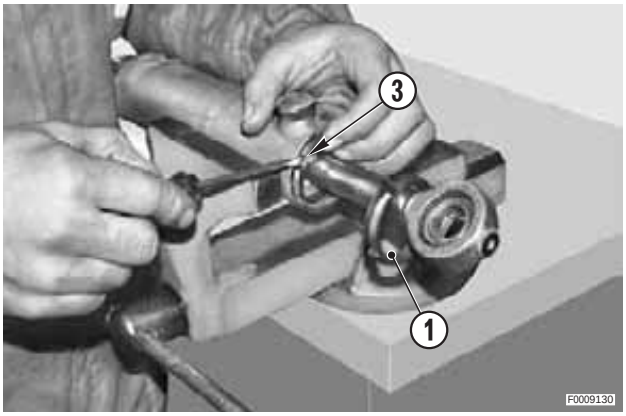
★ Insert the end cap (2) approx. 2 mm (0.08 in.) beyond the seat of the circlip (3).



9 - Fit the circlip (3) and screw on the nut (1).

Nut: 40 Nm (29.5 lb.ft.)

★ To tighten the nut pressurise the lower side of the cylinder with compressed air at 5-8 bar.



FINAL DRIVE

Removal

Disconnect the lead from the battery negative terminal () –and apply the parking brake.

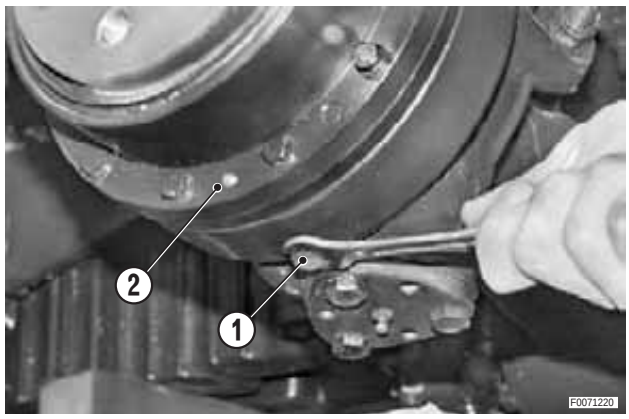
1 - Remove the wheel on the appropriate side. (For details, see "WHEELS").

2 - Remove the plug (1) and drain off all the oil from the steering knuckle housing (2).

※ 1

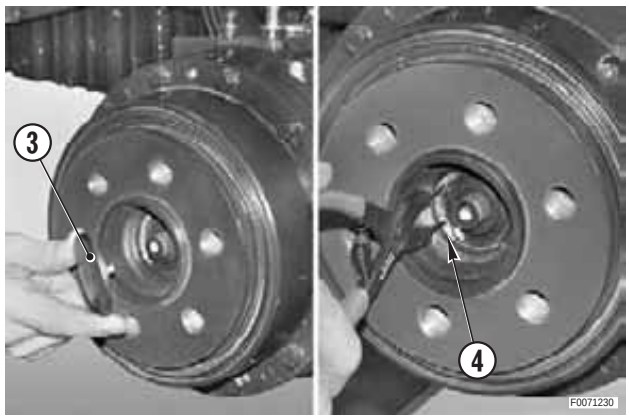
★ Renew the copper washers on reassembly.

Final drive oil: approx. 1.5 l (0.4 US.gall.)



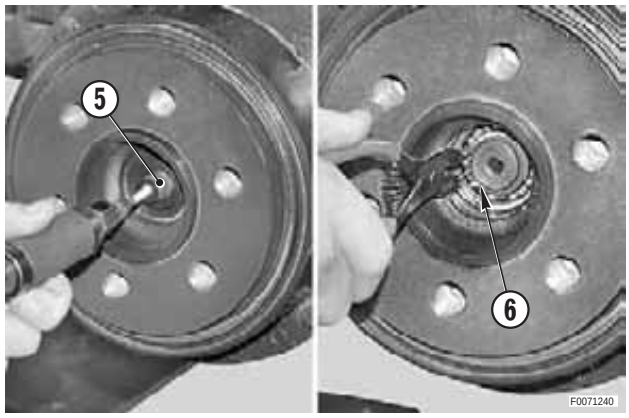
3 - Unscrew and remove the cover (3).

4 - Remove the circlip (4).



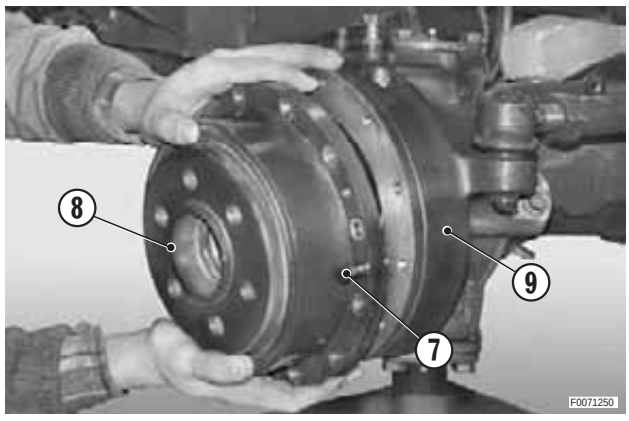
5 - Using a slide hammer puller, remove the cover (5).

6 - Remove the circlip (6).



7 - Remove all the screws (7) and, using two screws (7) as pullers, separate the final drive (8) from the steering knuckle housing (9).

※ 2



Refitting

- Refitting is the reverse of removal.

※ 1

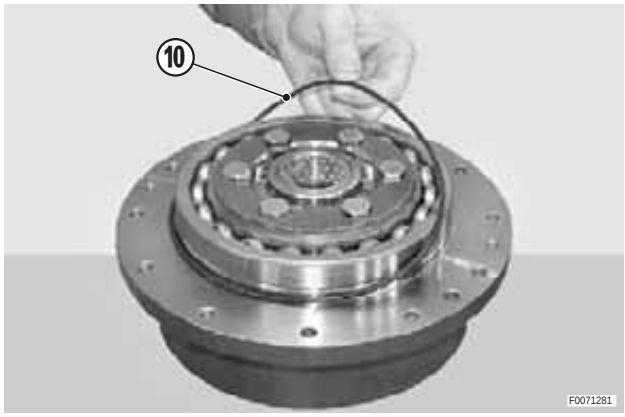
★ Fill the steering knuckle housing with oil.

Steering knuckle housing: max. 1.5 l (0.4 US gall.)

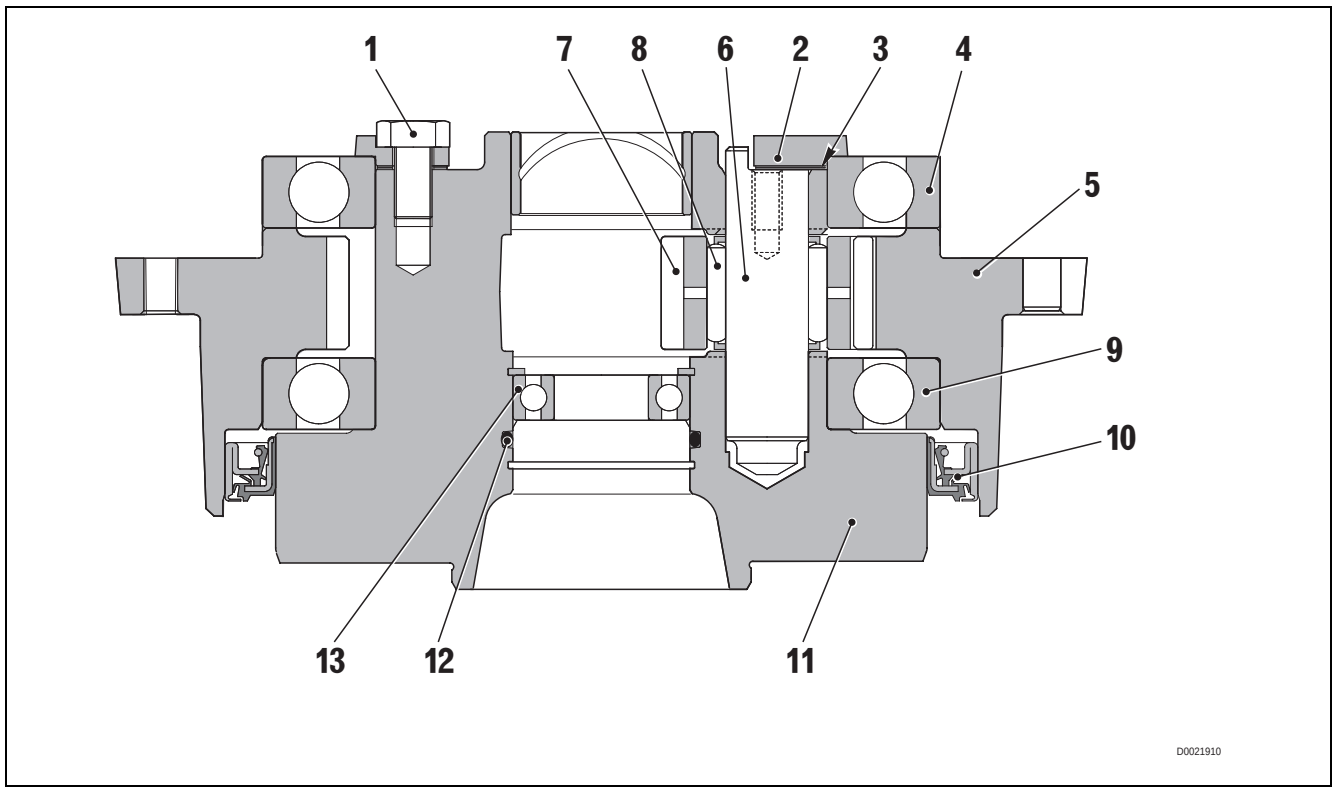
※ 2

★ Check the condition of O-ring (10) and renew if necessary.

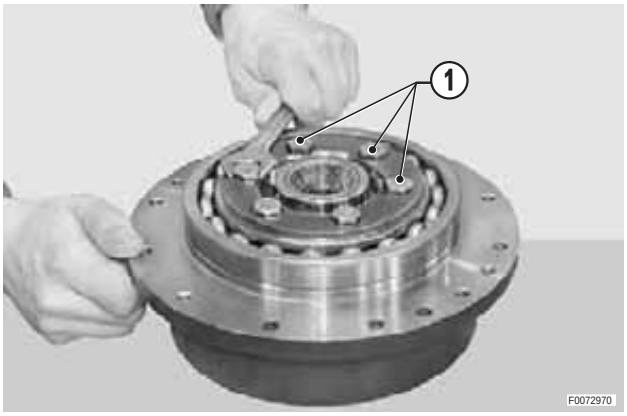
O-ring: Grease



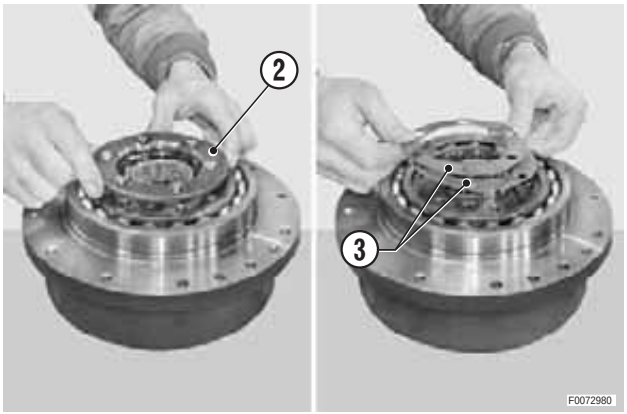
Disassembly



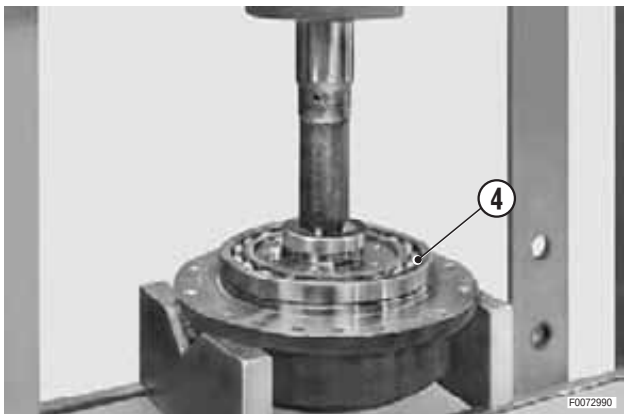
1 - Remove the screws (1). ※1



2 - Remove the disc (2) and the shims (3). ※2



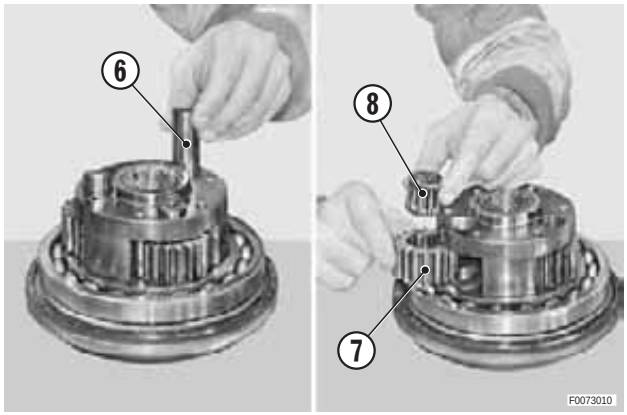
3 - Position the final drive under a press and remove the bearing (4).



4 - Remove the ring gear (5).



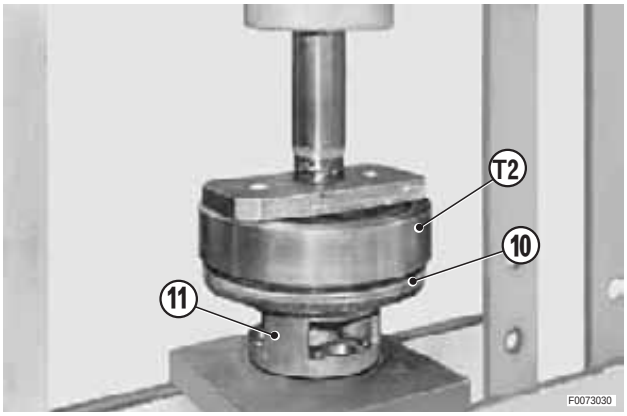
5 - Withdraw the pins (6) and remove the planet pinions (7) and the roller cages (8).



6 - Using the puller, remove the bearing (9).

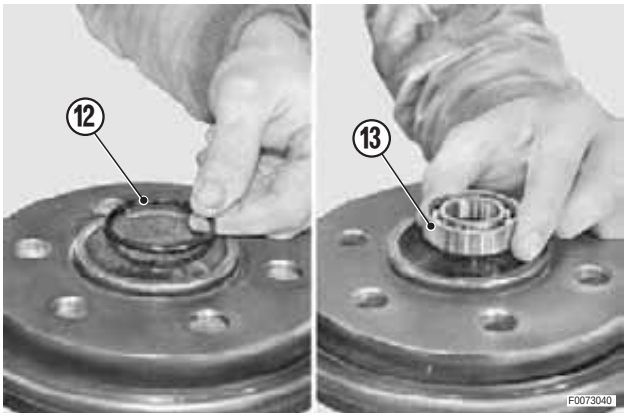


7 - Using a press and the special tool *T2* (P/N 5.9030. 969.0) remove the oil seal (10) from the planet carrier (11).



• *Only if necessary*

8 - Remove the O-ring (12) and withdraw the bearing (13).



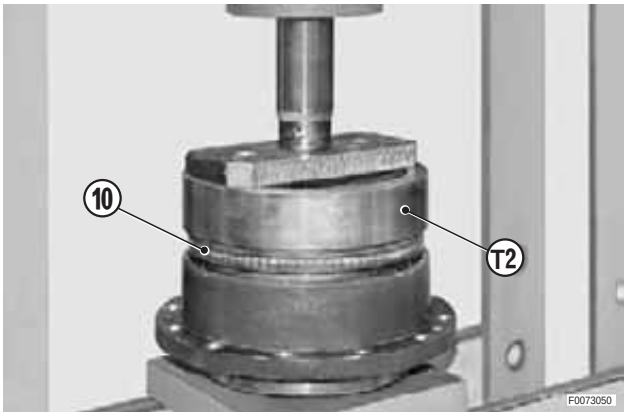
Assembly

- To assemble, follow the disassembly steps in reverse order.

⁘ 1

Nm Screws: 62÷68 Nm (45.7–50.0 lb.ft.)

★ Using a press and the special tool *T2* (P/N 5.9030. 969.0), install the oil seal (10) in the final drive.

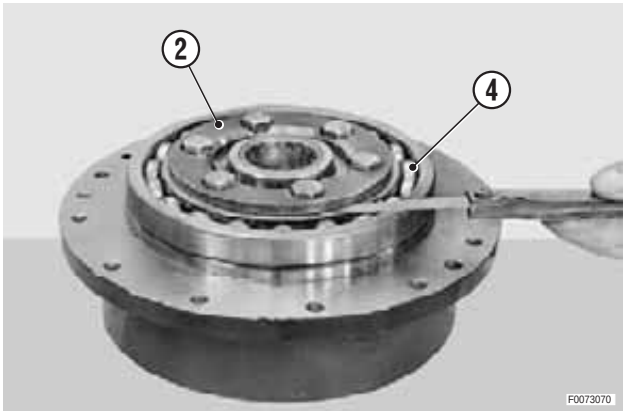


⁘ 2

1 - Install a shim pack (3) with thickness 1.5 mm in the final drive and secure it in position with the disc (2) and screws (1).



2 - Measure the clearance "*G*" between the disc (2) and the bearing (4) and calculate the thickness of the new shim pack (3) rounding the value obtained down to the nearest 0.05 mm.



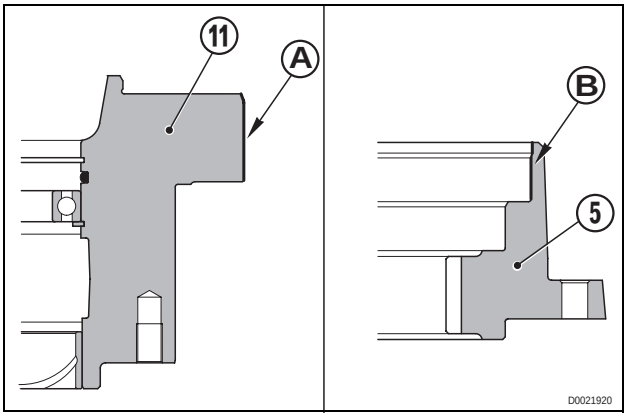
Example:

"*G*" - Thickness of installed shims: 1.5 mm
Measured backlash: 0.43 mm
Final shim pack thickness= 1.50–0.43 = 1.07 which rounded down to the nearest 0.05 is 1.05 mm.

⁘ 3

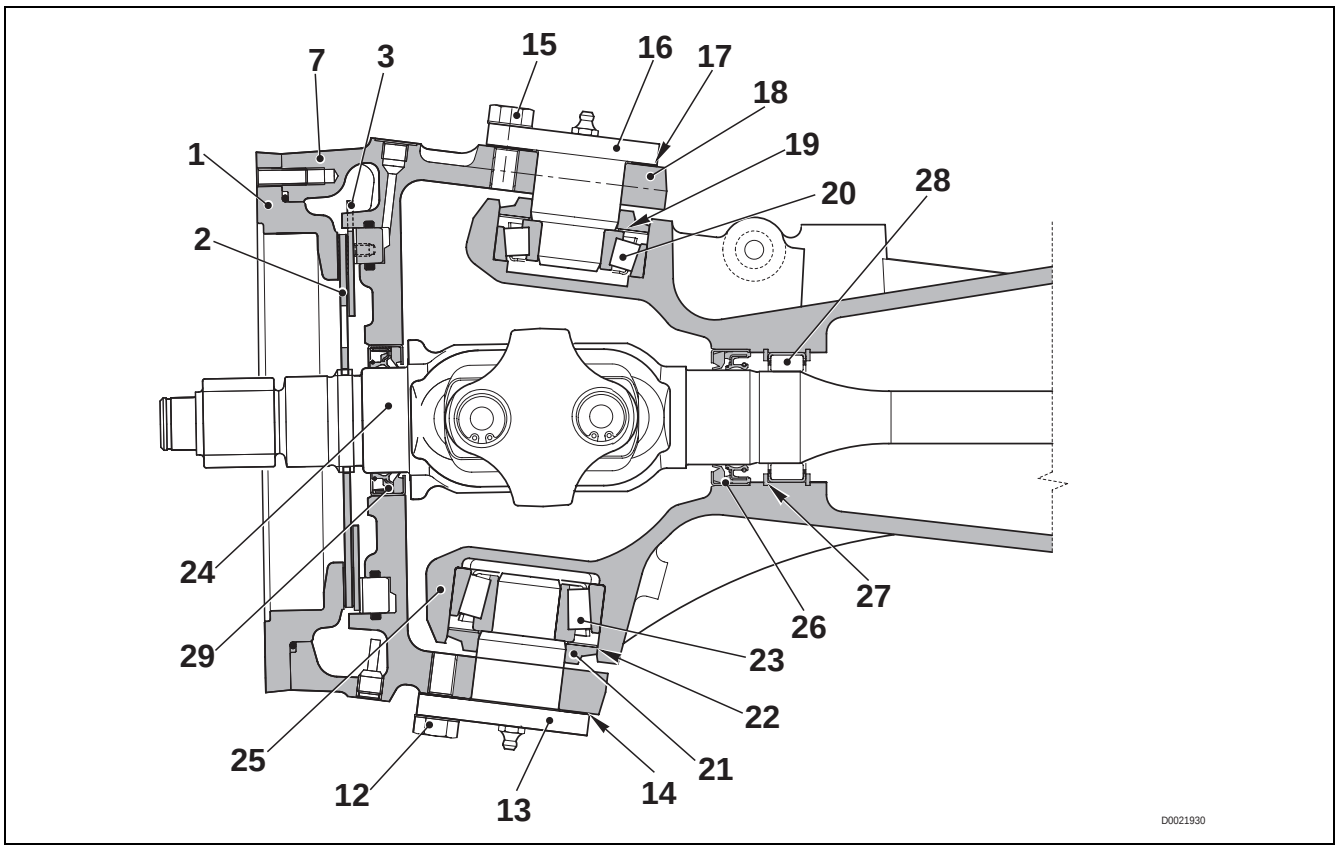
★ Do not install the oil seal at this point.

★ Remove the all traces of paint from the faces "*A*" of the planet carrier (11) and the faces "*B*" of the crown wheel (5).



STEERING KNUCKLE HOUSING AND HALFSHAFT

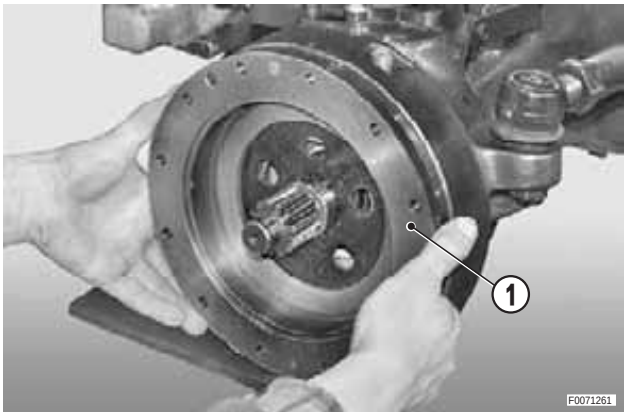
Removal



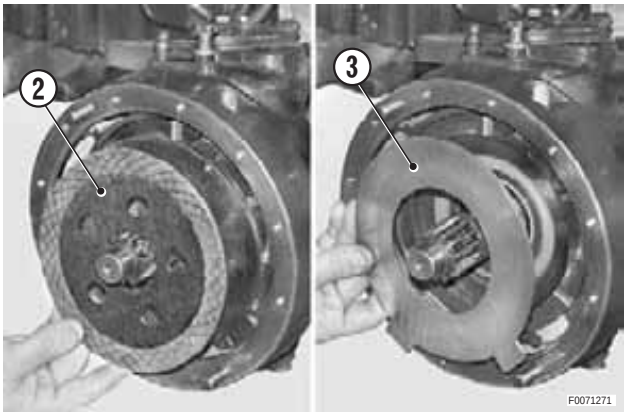
1 - Remove the final drive assembly. (For details, see "FINAL DRIVE" in this chapter).

2 - Remove the brake flange (1).

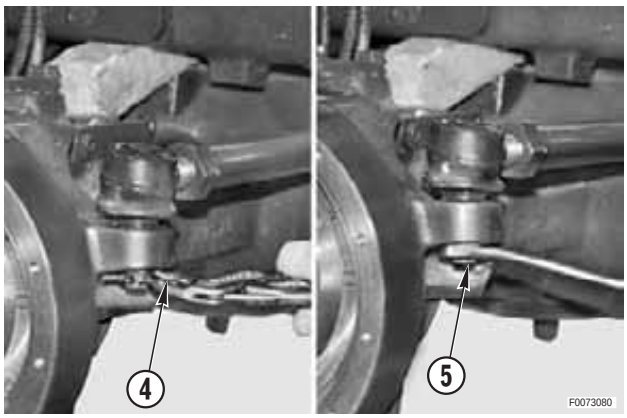
★ Check the condition of the O-ring and renew if necessary.



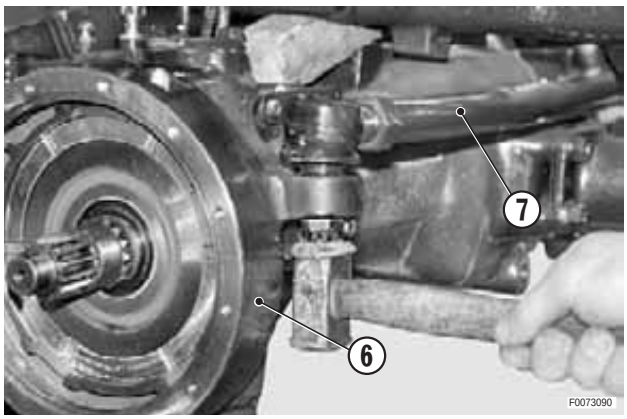
3 - Remove friction disc (2) and steel disc (3).



4 - Remove the cotter pin (4) and loosen the nut (5) without removing it. ⁘ 1



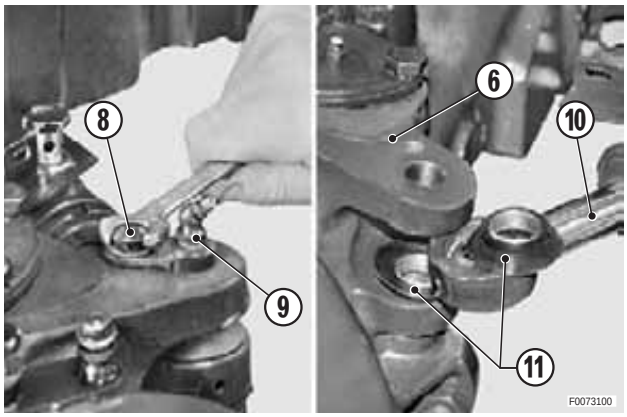
5 - Using a soft mallet, disconnect the rod (7) from the steering knuckle (6).



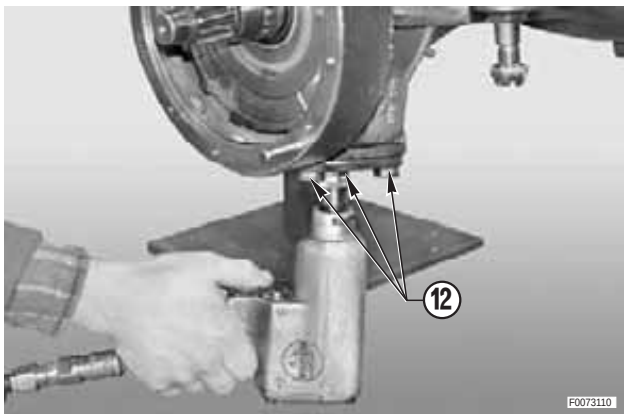
• *For left side only*

6 - Remove the screw (8) and drive out the pin (9) to disconnect the steering cylinder (10) from the steering knuckle housing(6).

★ Recover the oil seals (11).

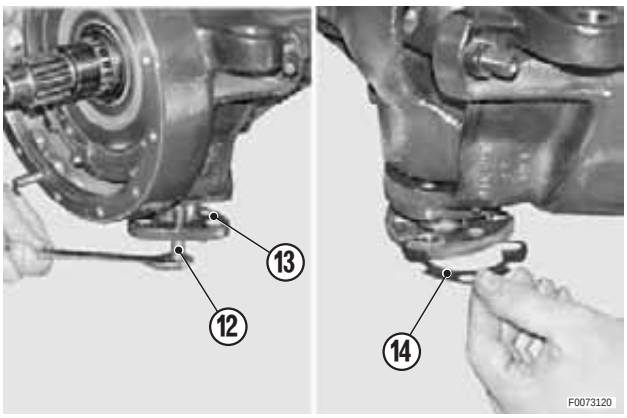


7 - Remove the screws (12).

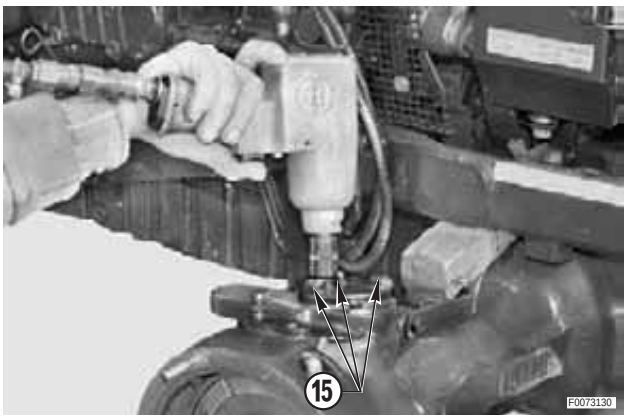


8 - Screw bolts (12) into the two holes provided to withdraw the lower pin (13).

9 - Recover the shims (14).

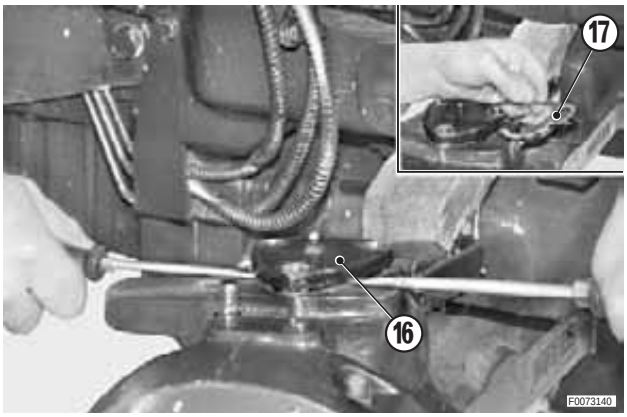


10 - Remove the screws (15).

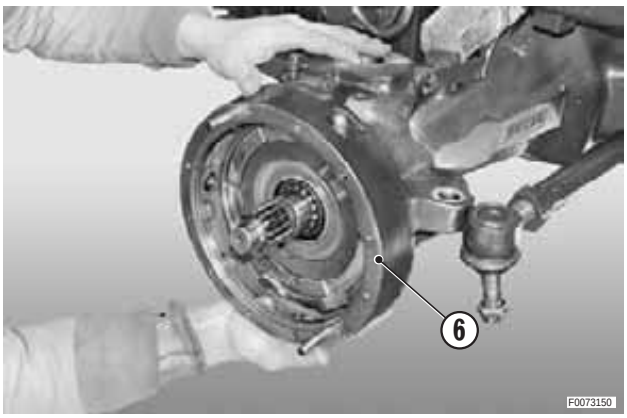


11 - Remove pin (16) and recover shims (17).

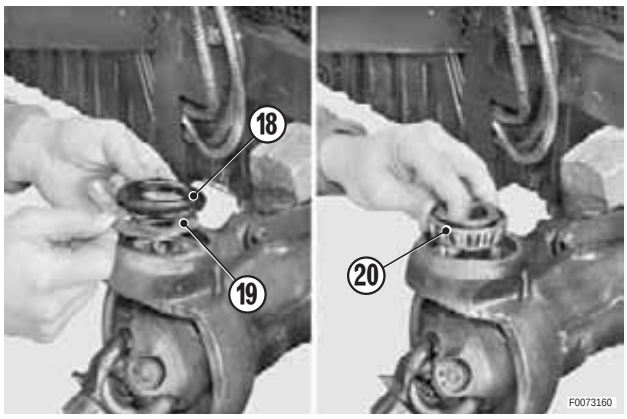
★ Note the quantity of shims installed under the upper pin.



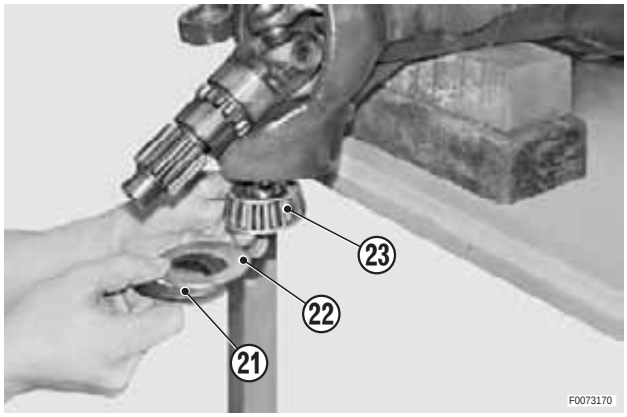
12 - Remove the complete steering knuckle housing (6).



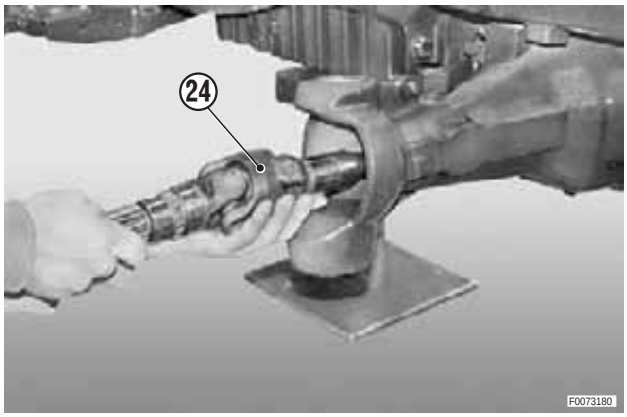
13 - Remove the seal (18) and shim (19) and remove the inner ring of the bearing (20).



14 - Remove the seal (21) and shim (22) and remove the inner ring of the bearing (23).



15 - Remove the halfshaft (24).



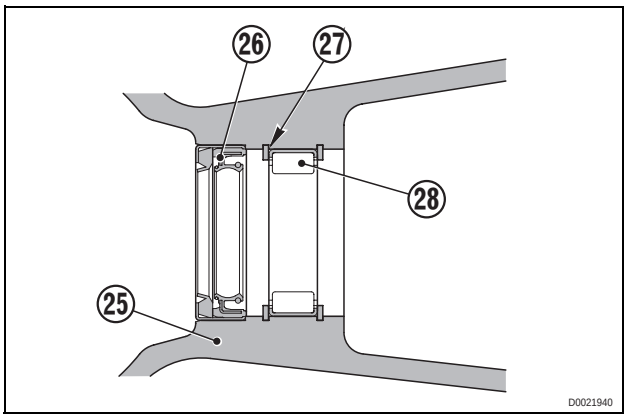
• *Only if necessary*

16 - Remove the outer rings of the bearings (20). ※ 2



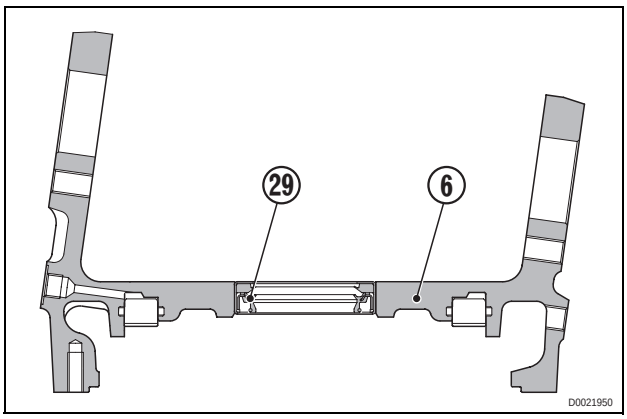
17 - Remove the oil seal (26), the circlip (27)and the roller bearing (28) from the axle housing (25).

※ 3



18 - Remove the steering knuckle housing (6) and the oil seal (29).

★ Take care to install the oil seal the right way round.



Refitting

- Refitting is the reverse of removal.

※ 1

Nm Nut: 98±5 Nm (72.2±3.7 lb.ft.)

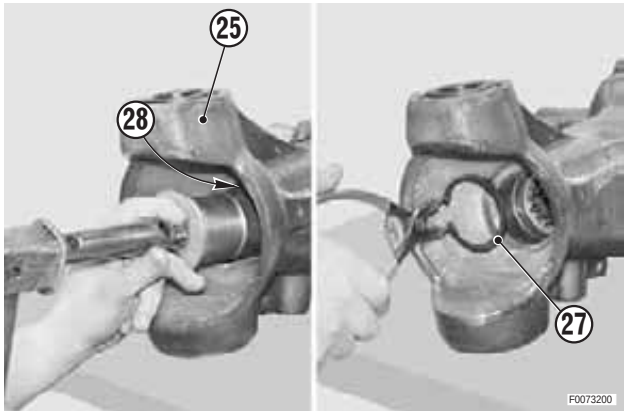
★ If the slot des not line up with the hole in the pin, tighten the nut further until they are aligned.

※ 2

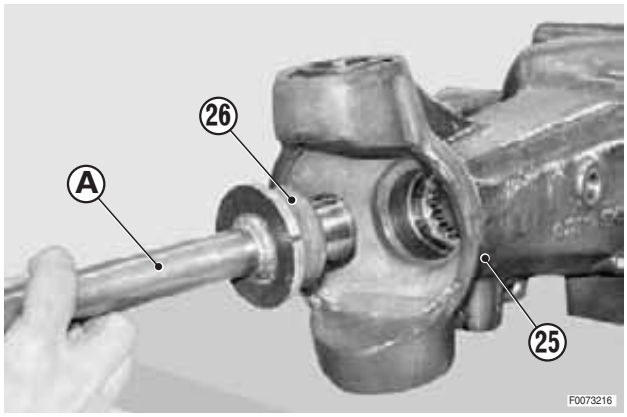
★ Only if the bearings (20) and (23) or the steering knuckle housing (6) or the axle housing (25) are renewed, adjust the bearing preload. (For details. see "Adjustment of the bearings preload" in this chapter).

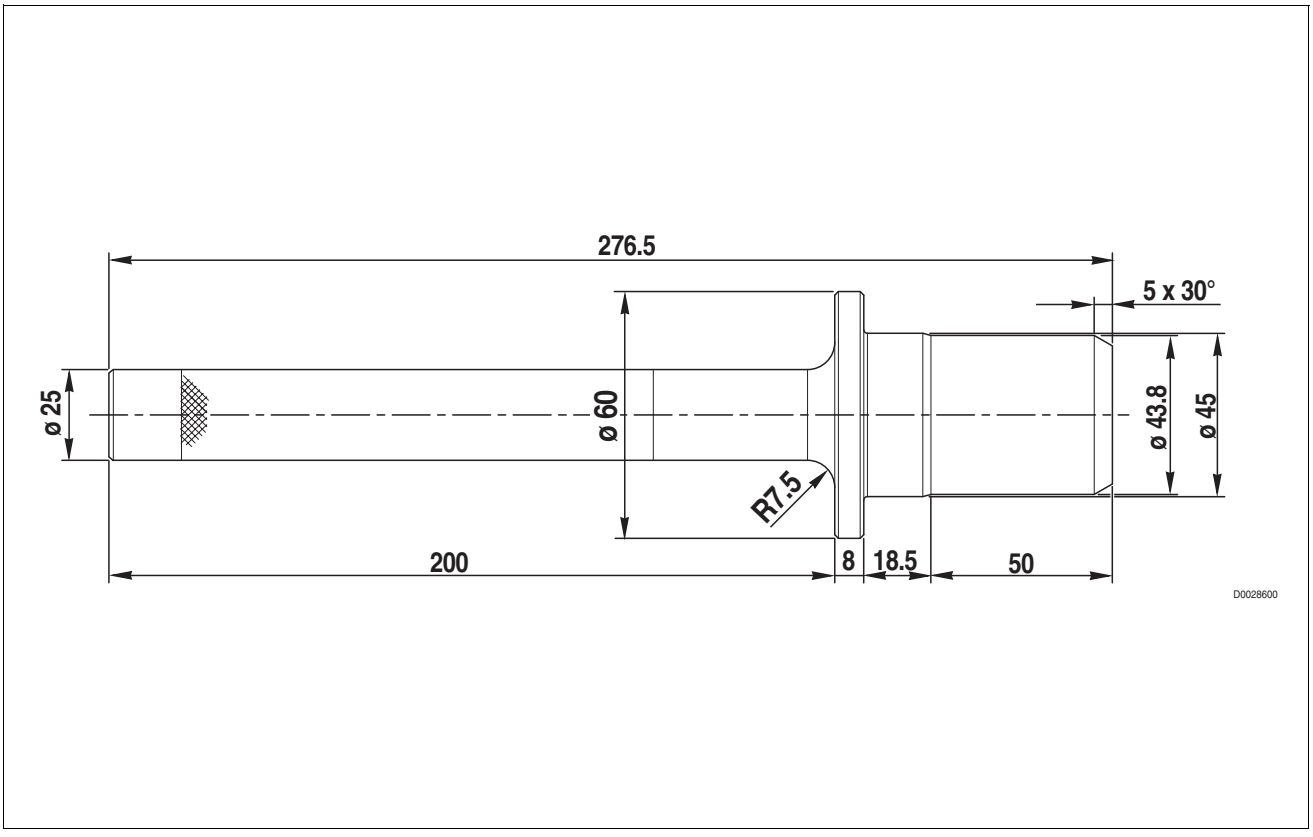
※ 3

1 - Using a suitable tool, install the roller cage (28) in the axle housing (25) and secure with the circlip (27).

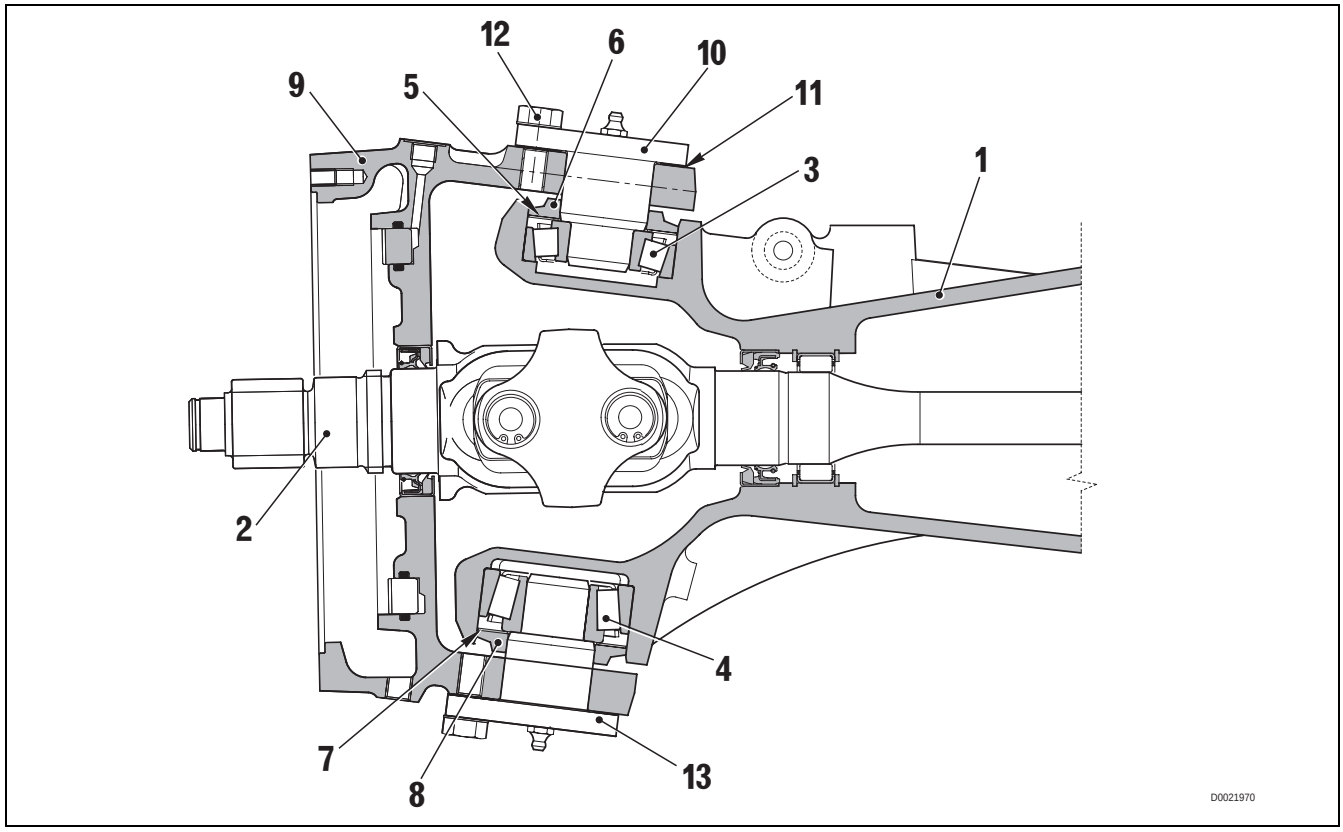


2 - Using a suitable tool "*A*" install the oil seal (26) in the axle housing (25).

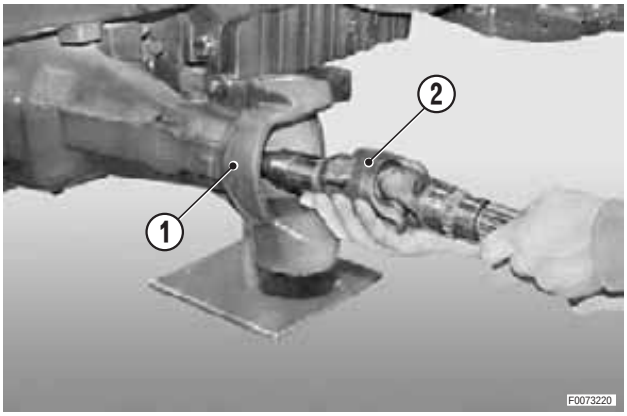




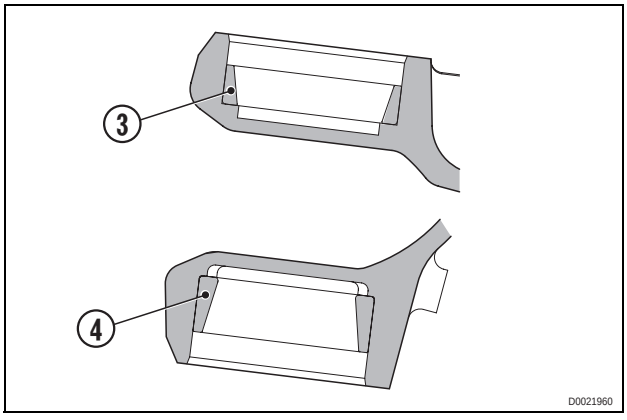
Adjustment of the bearings preload



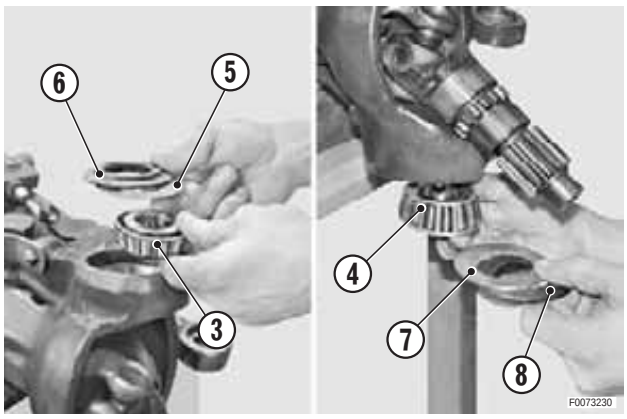
1 - Fit the halfshaft (2) in the axle housing (1).



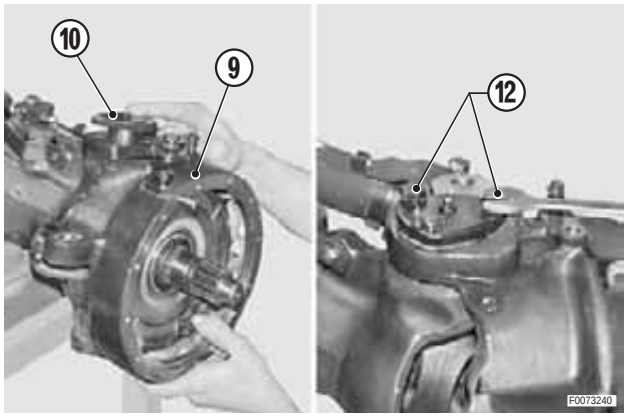
2 - Using a suitable tool, fit the outer rings of the bearings (3) and (4) in the axle housing (1).
★ Make sure that the thinner outer ring is installed in the upper hole and the thicker outer ring in the the lower hole.



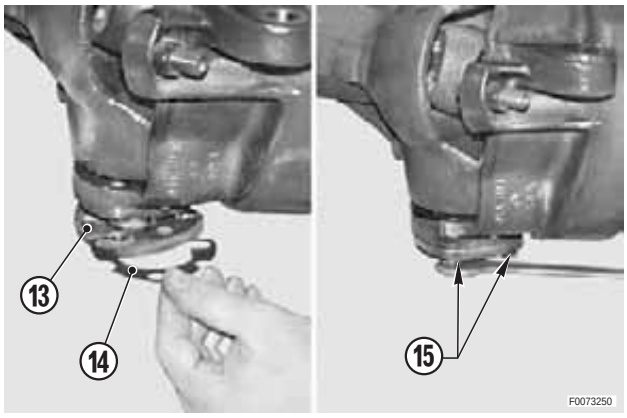
3 - Install in the axle housing (1): the inner ring of the bearing (3), shim (5) and the oil seals (6) on the upper side and the inner ring of bearing (4), shim (7) and oil seal (8) on the lower side.



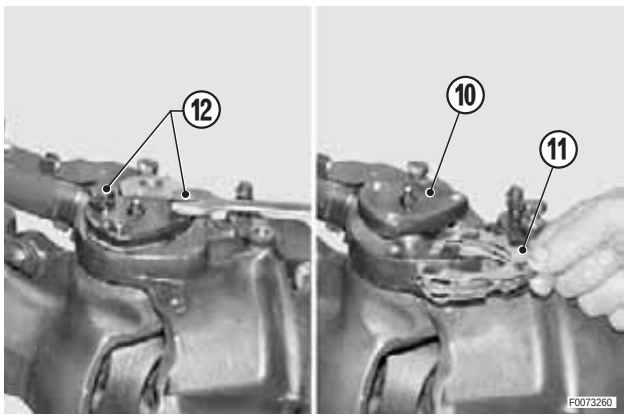
4 - Locate the steering knuckle housing (9) and secure it in position with the upper pin (10) without the shim (11) and tighten the screws (12).



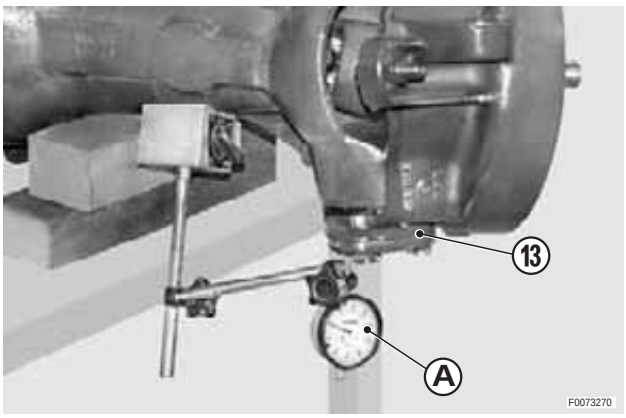
5 - Fit the lower pin (13) and a 0.5 mm shim (14) and secure it in position with screws (15).



6 - Loosen the screws (12), raise the upper pin (10) and insert a shim pack (11) approx.1.5 mm thick; retighten the screws (12).



7 - Position a dial gauge "*A*" with a magnetic stand so that the contact point is perpendicular to the lower pin (13) and preload the gauge by about 2 mm.

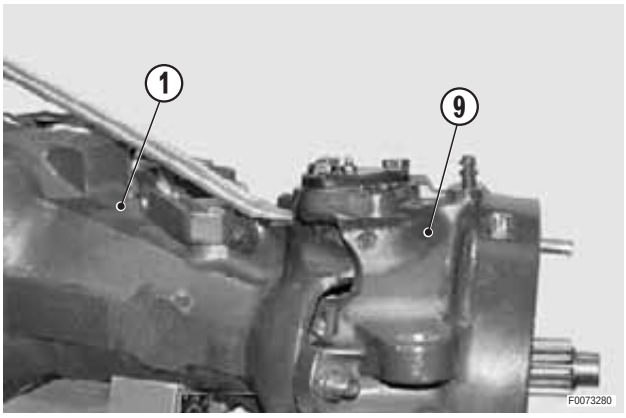


8 - Apply leverage between the axle housing (1) and the steering knuckle housing (9) and measure the play "*G*" of the bearings.

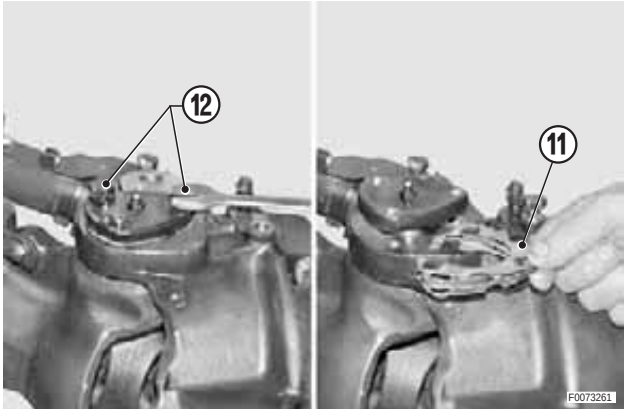
9 - Calculate the thickness of the shim pack to be inserted between the upper pin (10) and the steering knuckle housing (9) to preload the bearings by 0.10÷0.15 mm.

Example 1

- Measured play: 0.07
  Final shim pack thickness: 1.5 – 0.10 – 0.07=1.33 mm which rounds down to: 1.30 with a bearing preload of 0.13 mm
- Measured play: 0.18 mm
  Final shim pack thickness: 1.50 – 0.10 – 0.18=1.22 mm which rounds down to: 1.20 mm with a bearing preload of 0.12 mm



10 - Loosen the screws (12), adjust the shim pack (11) to the calculated thickness and finally tighten the screws (12).



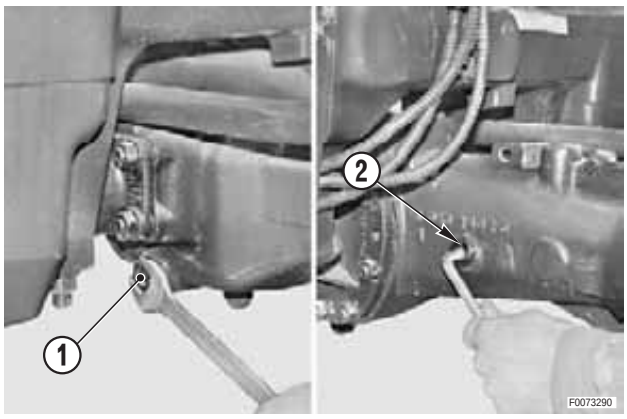
PINION-DIFFERENTIAL ASSEMBLY

Removal

1 - Remove the plugs (1) and (2) and drain off all the oil from the axle housing.

Axle oil: max. 6 , (1.6 US gall.)

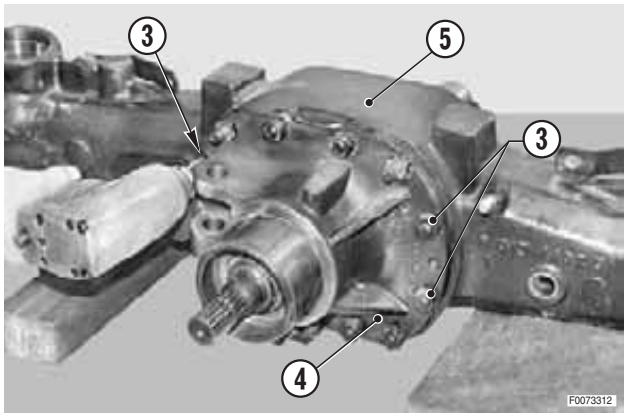
2 - Remove the final drives, the steering knuckle housings and the halfshafts on both sides. (For details, see therelative paragraphs in this chapter).



3 -Remove the axle from the tractor.(For details, see "FRONT AXLE").

4 - Remove the stub axle housings and the halfshafts on both sides.
(For details, see the relative paragraphs in this chapter)

3 - Remove the nuts (4) and remove the complete differential assembly (5) from the axle housing (5). ※ 1

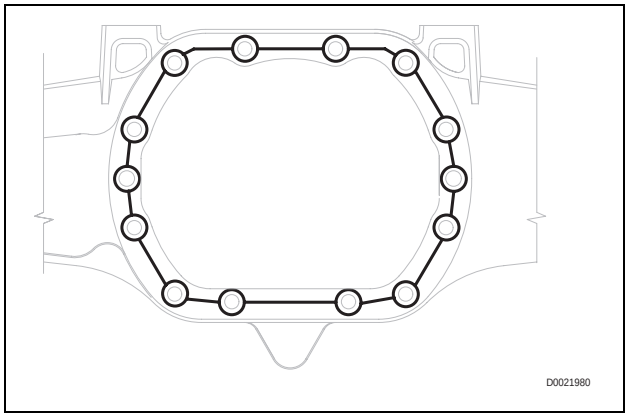


Refitting

- Refitting is the reverse of removal.

※ 1

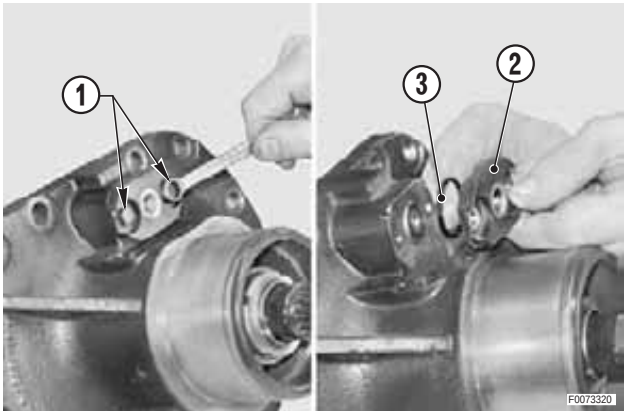
Mating face: Silastic 738



DIFFERENTIAL LOCK

Removal

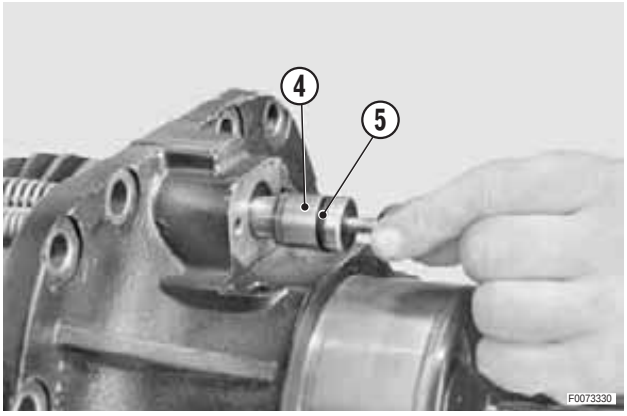
1 - Remove the screws (1) and remove the cover (2) and the O-ring (3).



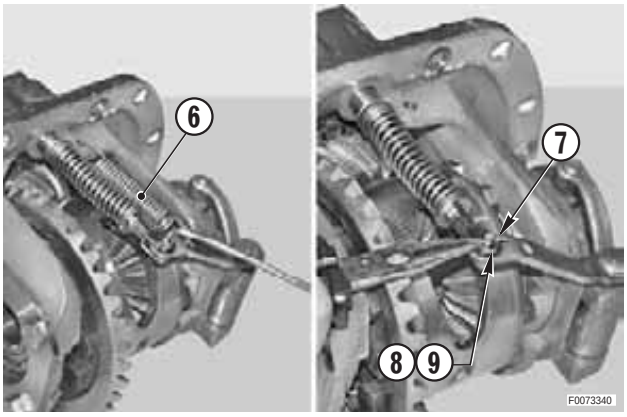
2 - Using a screw as a puller, remove the differential lock piston(4).

※1

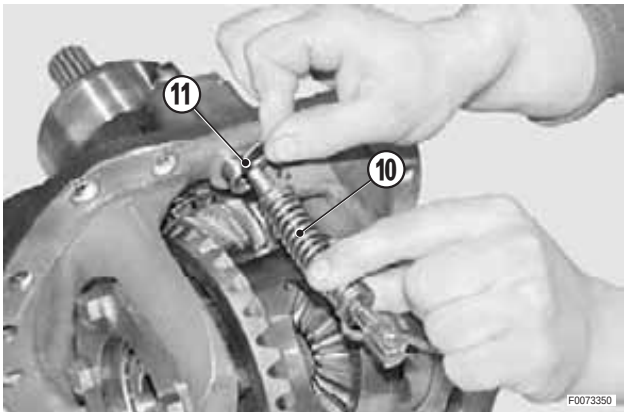
★ Check the condition of the O-ring (5) and renew it if necessary.



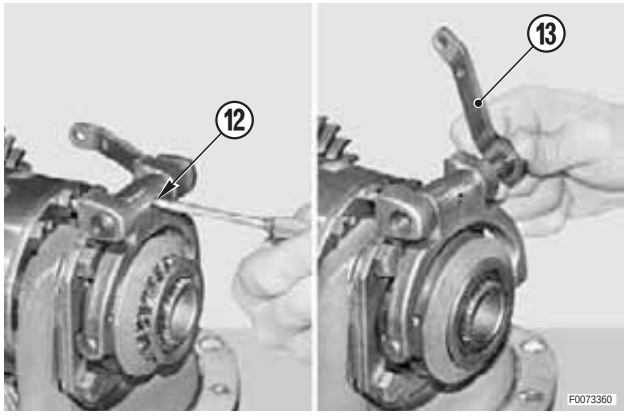
3 - Disconnect the spring (6), remove the cotter pin (7) and remove the pin (8) and the washer (9).



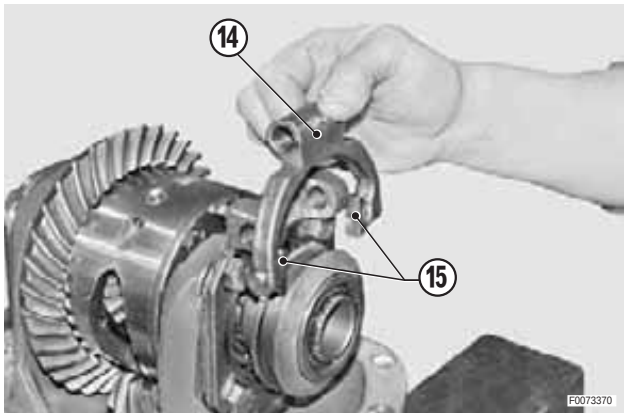
4 - Remove the control rod assembly (10) and the washer (11).



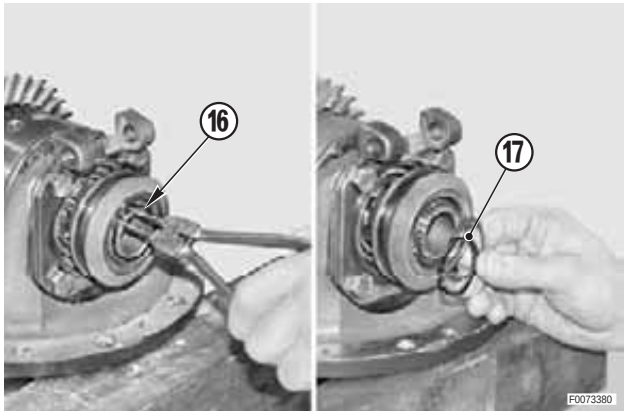
5 - Drive out the spring pin (12) and remove the lever (13).



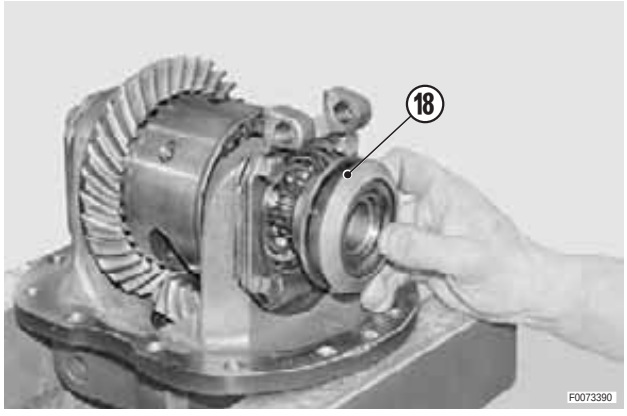
6 - Remove selector fork (14) complete with the shoes (15).



7 - Remove the circlip (16) and shims (17).
★ Note the quantity of shims (17).

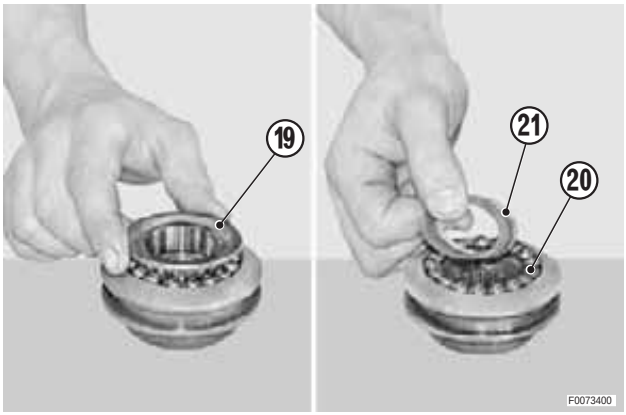


8 - Remove the complete differential lock assembly (18).

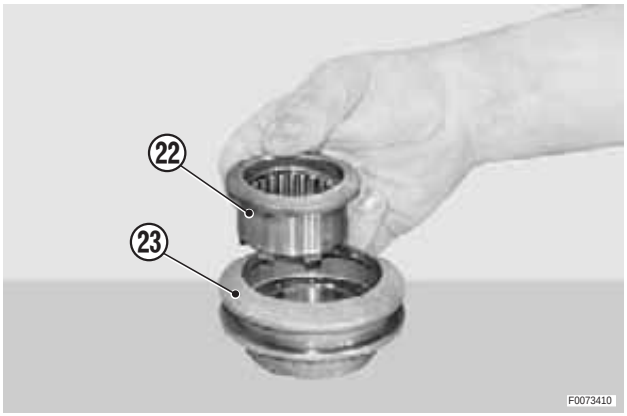


• *Only if necessary*

9 - Remove the disc (19) and remove the seventeen balls (20) and shims (21).
★ Note the quantity of shims (21).



10 - Separate the slide (22) from the sleeve (23).



Refitting

• Refitting is the reverse of removal.

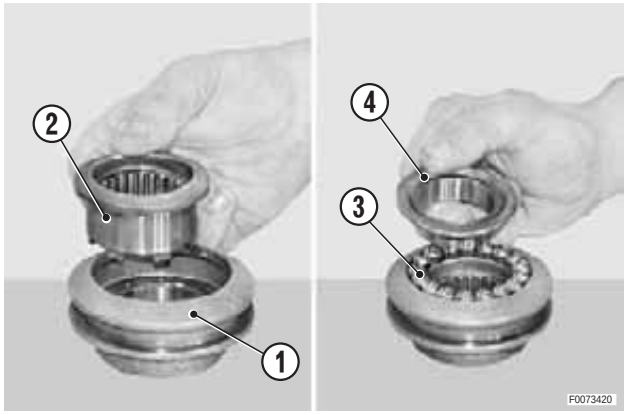
※ 1

O-ring: oil

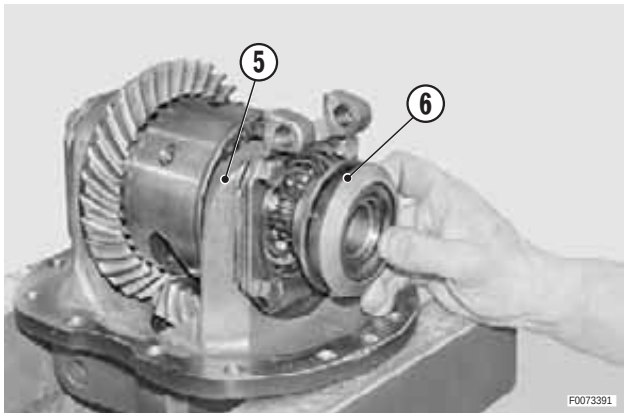
Adjustment

1 - Fit the slide (2) in the sleeve (1).

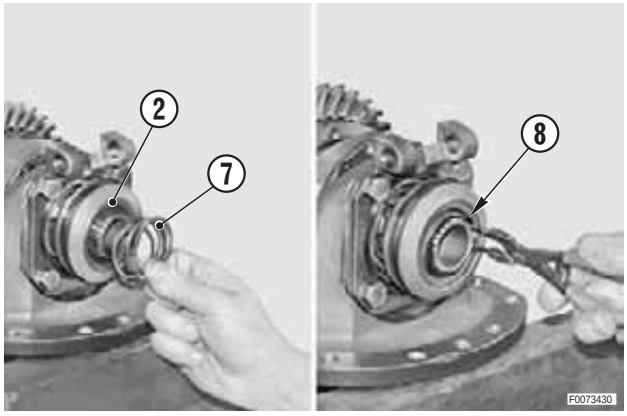
2 - Position the seventeen balls (3) and the disc (4).
★ Do not install any shims at this point.



3 - Install the differential lock (6) on the differential unit (5).

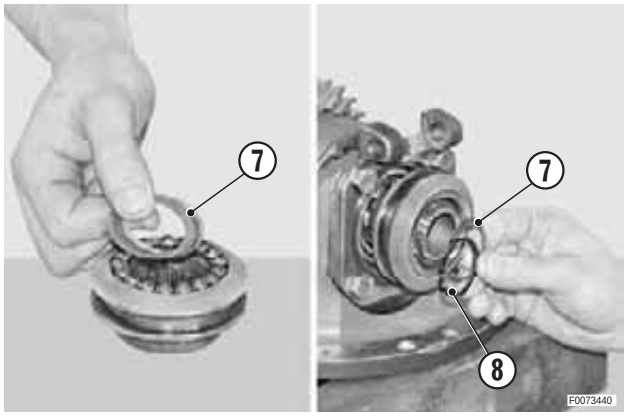


4 - Fit shims (7) of sufficient thickness to eliminate the play between the slide (2) and the circlip (8) while allowing for its installation.



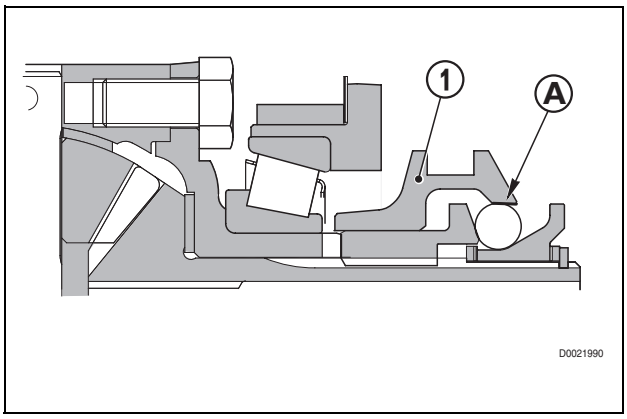
5 - Remove the differential lock (6) and fit the shims (7) one at a time between the disc (4) and the sleeve (2); refit the lock (6) to the differential (5) and secure in position with the remaining shims (7) and the circlip (8).

6 - Check that the sleeve (1) engages freely.
★ If the sleeve engages only with difficulty, continue moving shims until it slides freely.

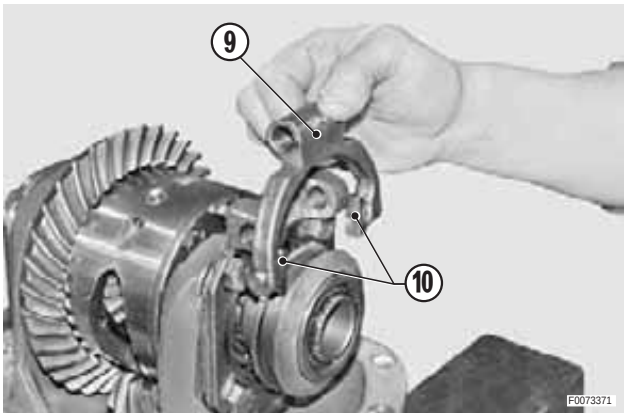


7 - With sleeve (1) moved towards the differential, check that the flat part "*A*" of the sleeve (1) is positioned on the balls (3) as shown in the figure.

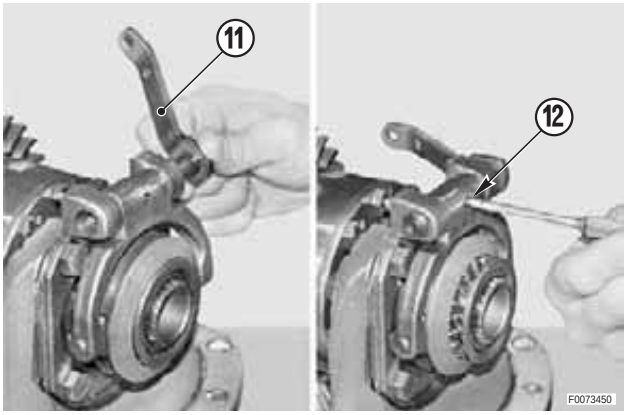
★ If the balls protrude excessively, this indicates that the adjustment has not been made correctly.



8 - Fit the selector fork (9) complete with the shoes (10).

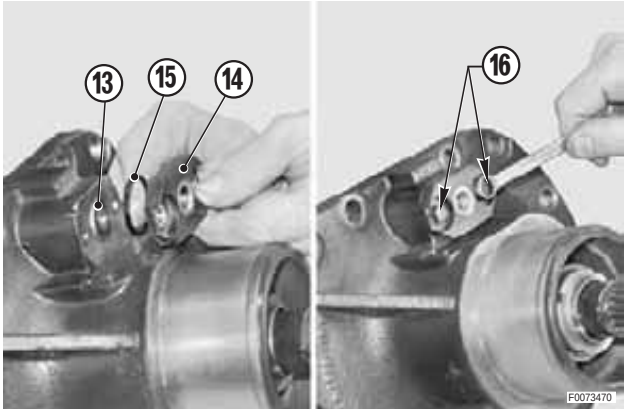


9 - Fit the lever (11) and secure with the spring pin (12).



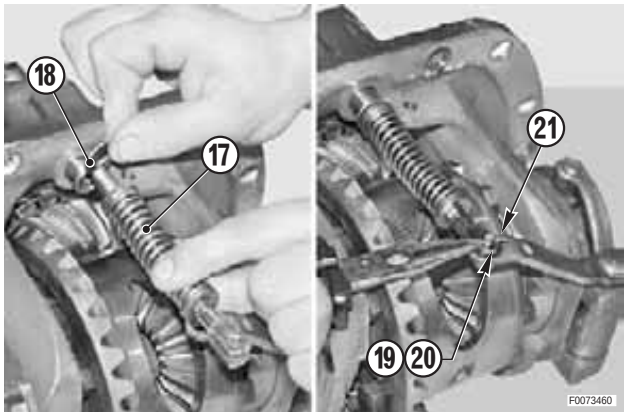
10 - Fit the control piston (13), the cover (14) and its O-ring (15) and tighten the screws (16).

O-rings: Oil

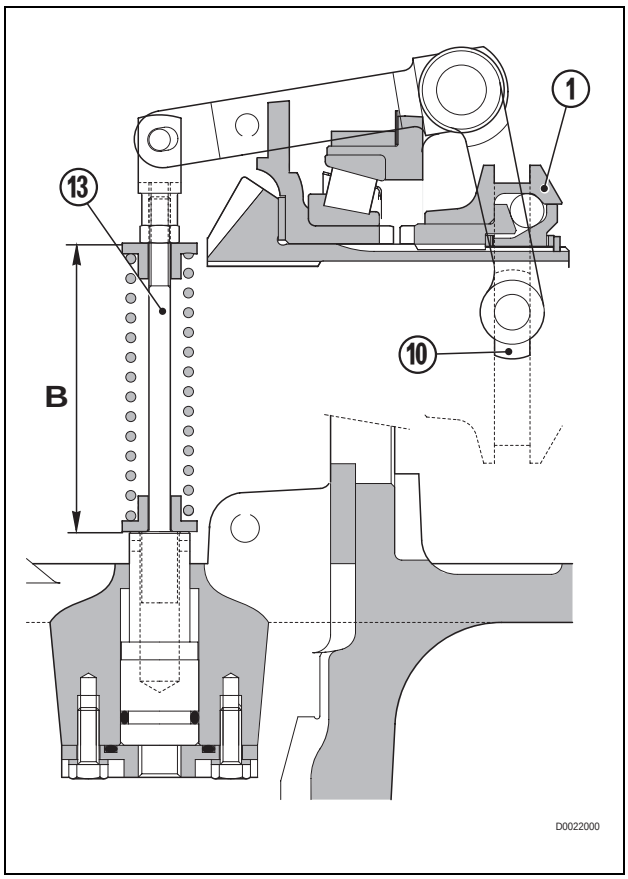


11 - Fit the control rod assembly (17) and washer (18).

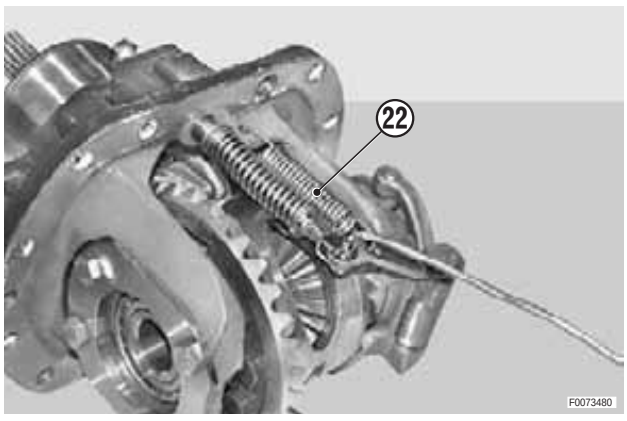
12 - Fit the pin (19) and the washer (20)and secure them in position with the split pin (21).



13 - Adjust the length "*B*" of the differential lock control rod (13) so that, when the sleeve (1) is in the position shown, the shoes (10) are not forced against it.

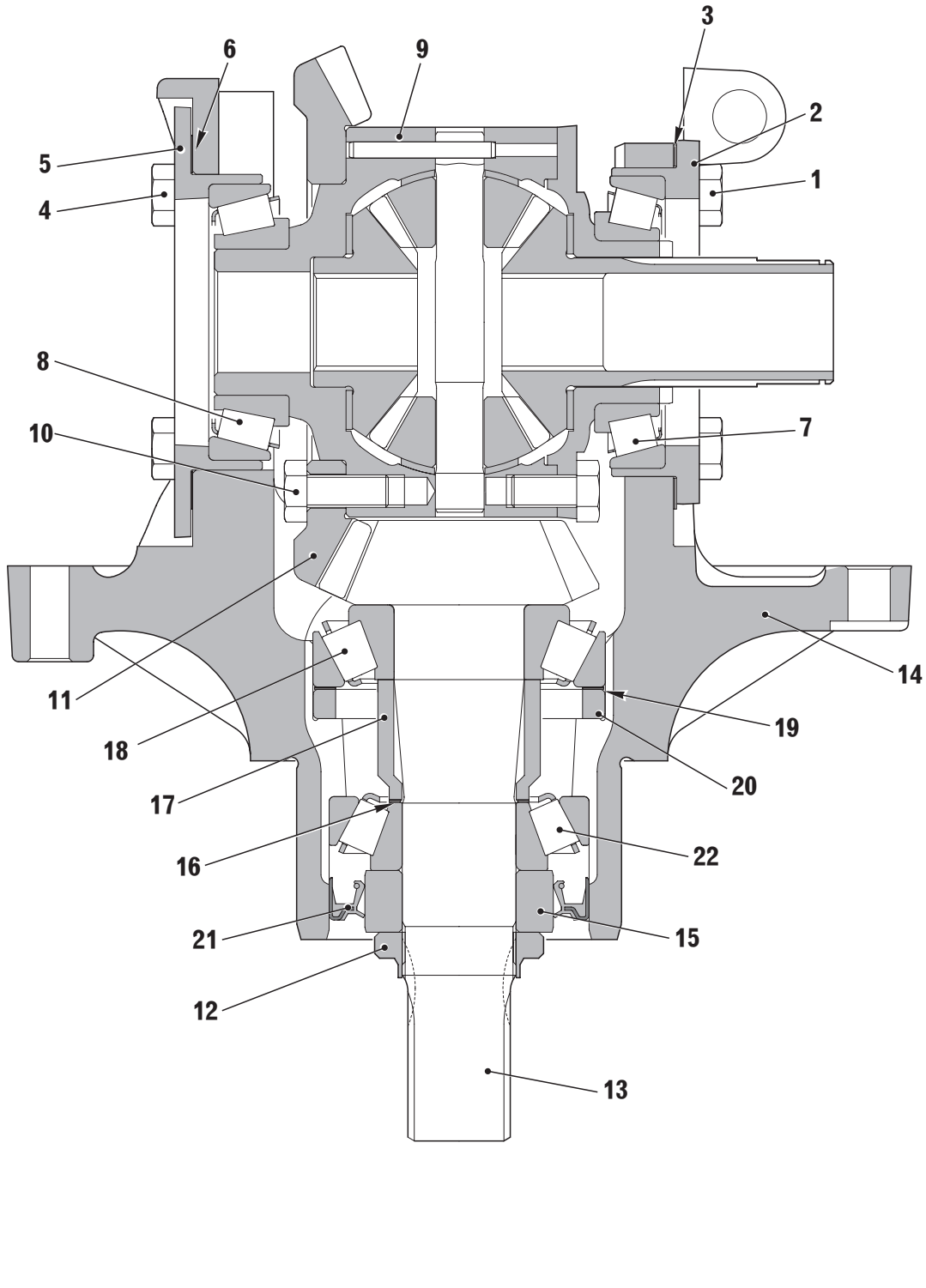


14 - Fit the spring (22).

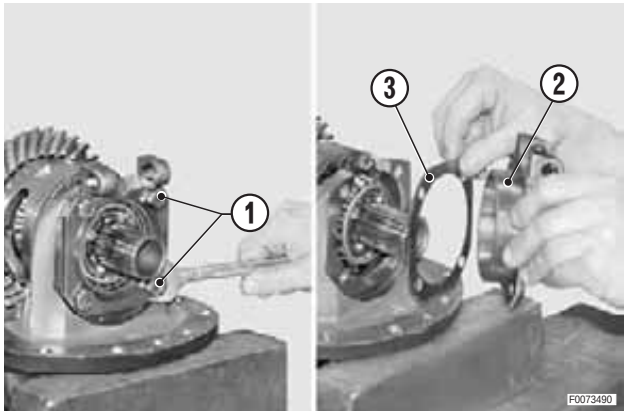


BEVEL GEAR PAIR

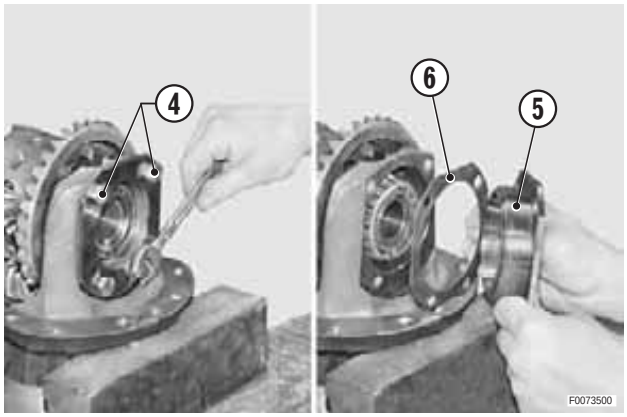
Disassembly



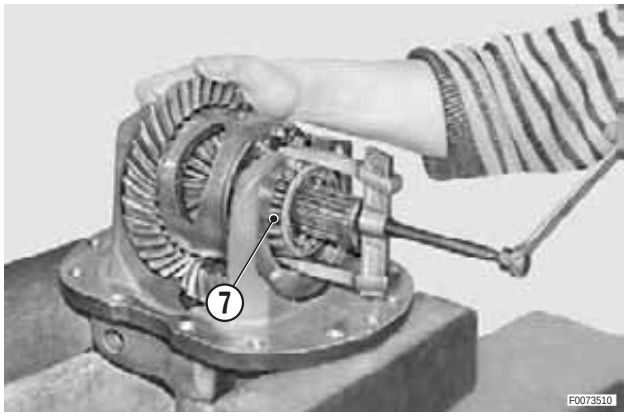
1 - Remove the screws (1) and remove the flange (2) and the shims (3). ⁘ 1



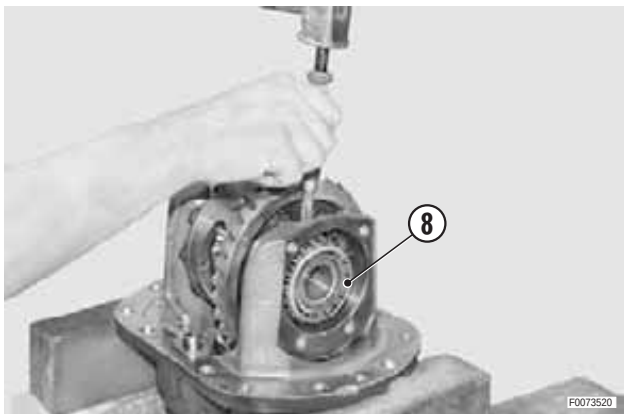
2 - Remove the screws (4) and remove the flange (5) and the shims (6). ⁘ 1



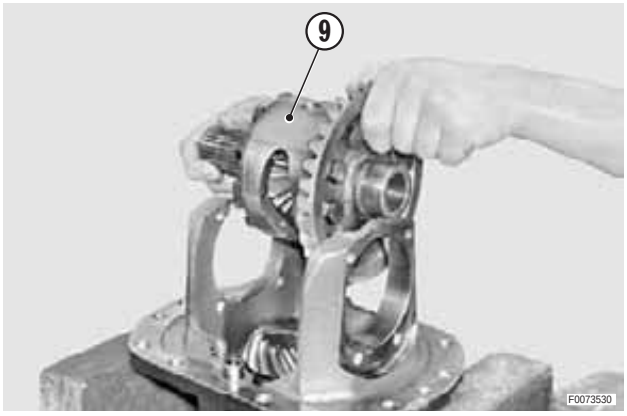
3 - Using a puller, remove the inner ring of the bearing (7).



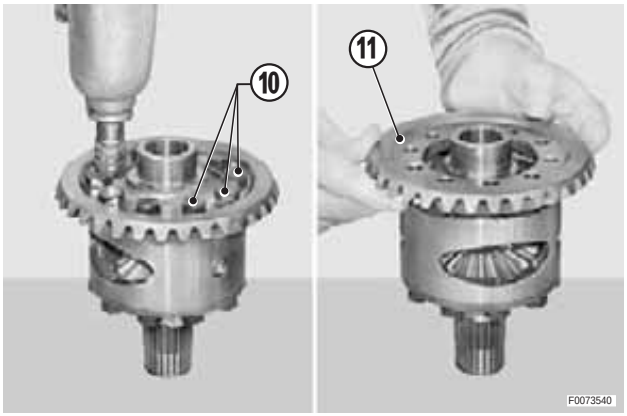
4 - Use a very thin tool to dislodge the bearing (8) and then use levers to remove it completely.



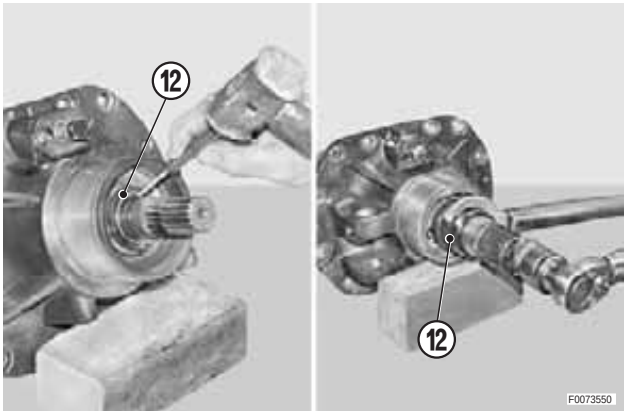
5 - Remove the differential assembly (9).



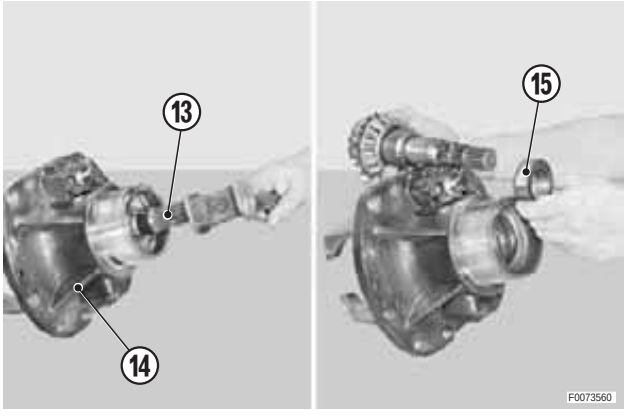
6 - Remove the screws (10) and remove the differential crown wheel (11). ※ 2



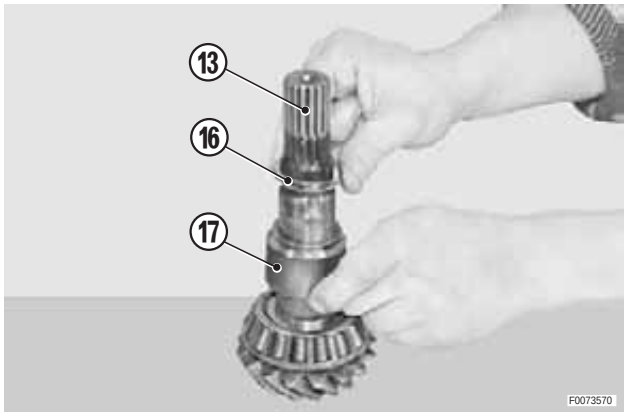
7 - Relieve the staking and remove ringnut (12).
★ To loosen the ringnut turn it clockwise.
★ Renew the ringnut (12) on reassembly. ※ 3



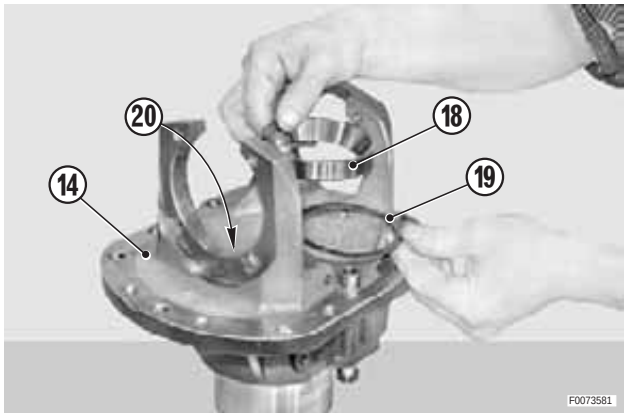
8 - Using a soft mallet, drive the pinion (13) out from differential carrier (14) and recoverthe spacer (15).



9 - Recover the shims (16) and the spacer (17) from the pinion (13).

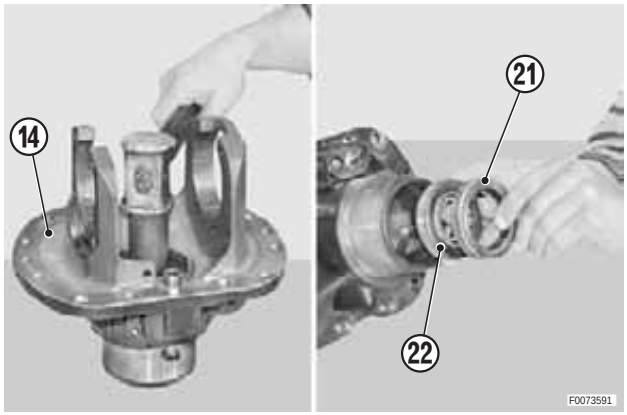


10 - Remove the outer race of bearing (18), shims (19) and spacer (20) from the differential carrier (14).



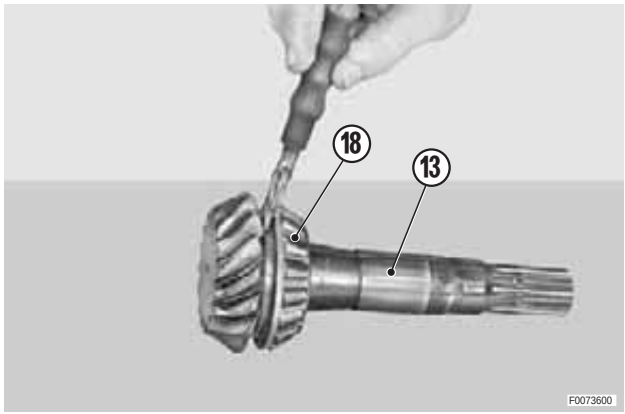
11 - Using a suitable tool, remove the oil seal (21) and the bearing (22) from the differential carrier (14).

★ Renew the oil seal on reassembly.



12 - Remove the inner ring of bearing (13) from the pinion (18).

★ Dislodge the bearing using a very thin tooland then use a puller to remove it completely.



Assembly

- Assembly is the reverse of disassembly.

★ If the bevel gear pair is renewed or the pinion or differential bearings, make the adjustments relative to the new components.
(For details see "Adjustment of the pinion position" - "Adjustment of the pinion and crown wheel" - "Adjustment of the differential preload" - "Adjustment of pinion bearings preload").

1

Nm Screws: 20 Nm (14.7 lb.ft.)

Screws: Loctite 242

2

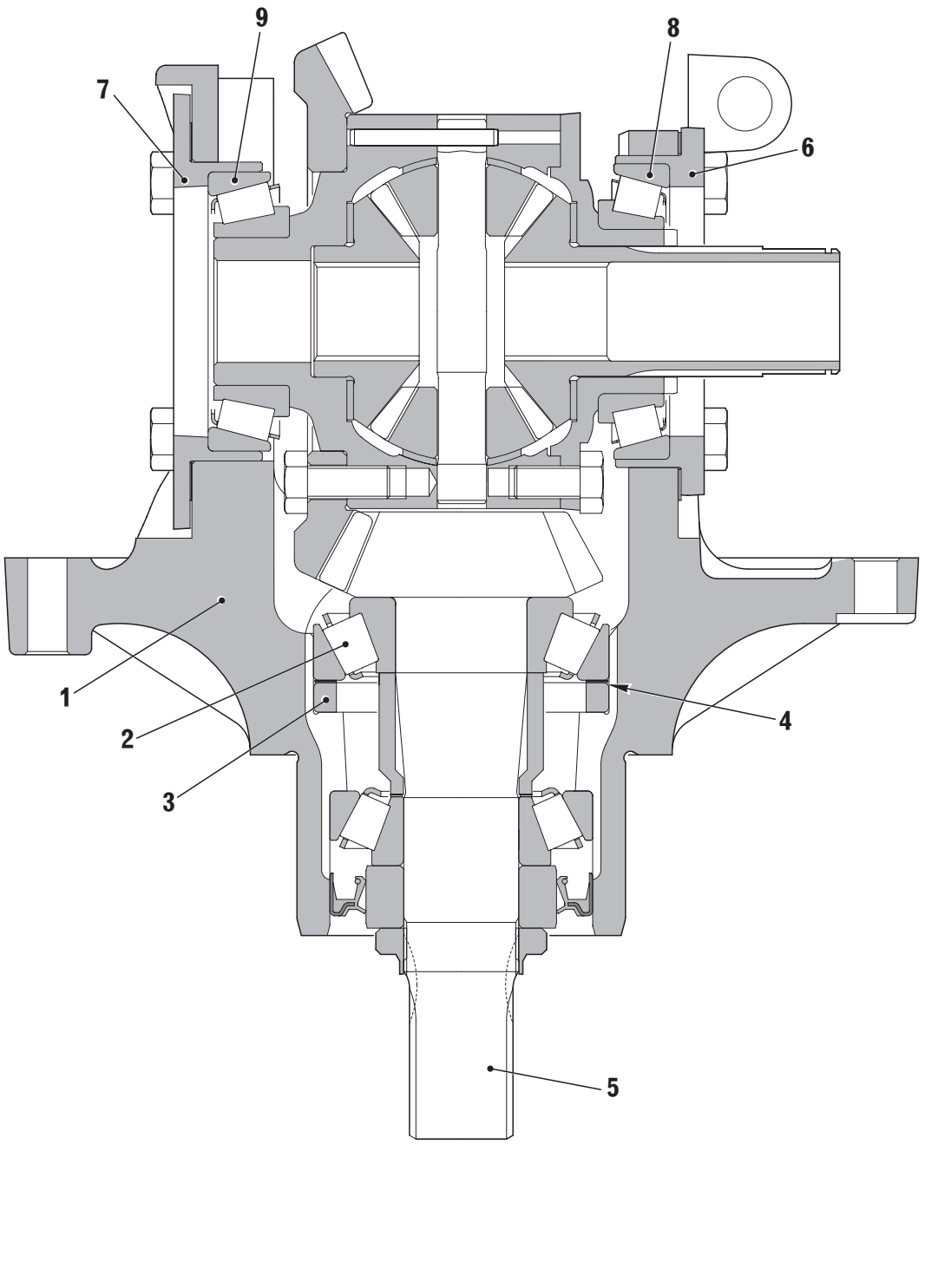
Nm Screws: 75±4 Nm (55.3±3.0 lb.ft.)

3

Nm Ringnut: 206÷216 Nm (152–159 lb.ft.)

★ Stake the ringnut at the two points corresponding to the slots in the pinion shaft.

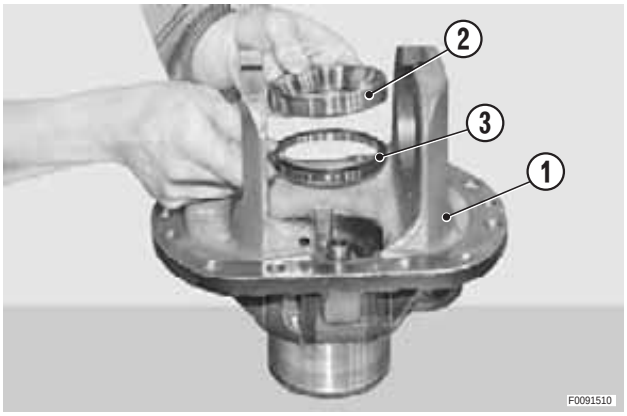
Adjustment of the pinion position



1 - Install the bearing outer race (2) and the spacer (3) in the differential carrier (1).

★ Install the bearing outer race without shims (4) .

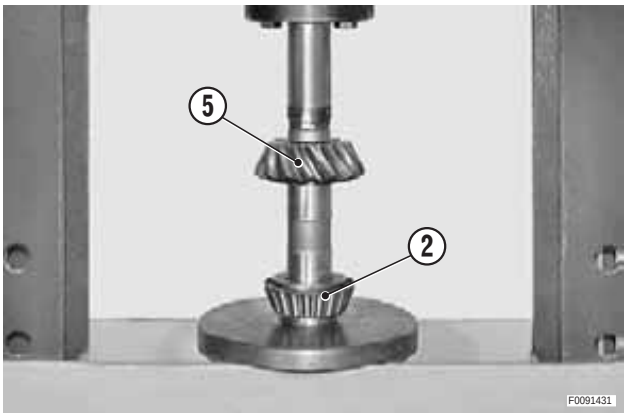
Race and support: oil



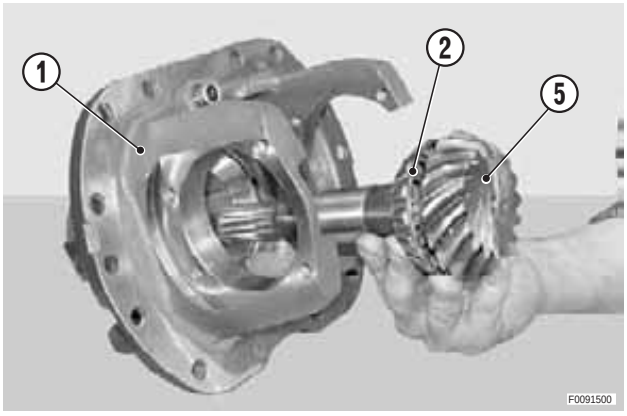
2 - Lubricate the bore of bearing (2) and use a press to install on pinion (5).

★ Alternatively, heat bearing to approximately 100 °C prior to assembly.

Bearing: oil

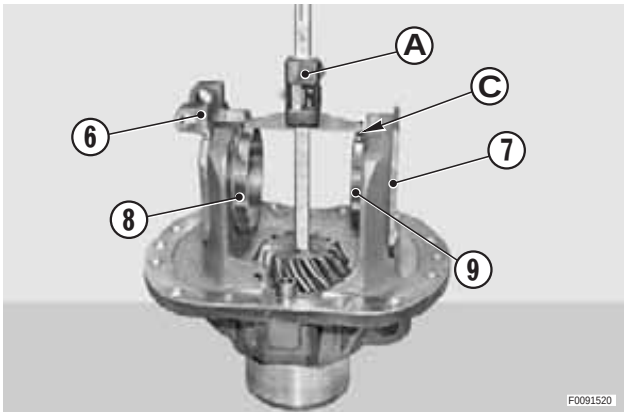


3 - Install the pinion (5) complete with the bearing (2) in differential carrier (1).



4 - Fit the flanges (6) and (7) complete with the outer races of bearings (8 and (9) in the differential carrier (1) and, using a depth gauge "*A*" measure the dimension "*X*".

★ Position a 2.5 mm cylindrical pin "*C*" (P/N 2.1651.109.0) on the outer race of bearing (9) to make up the difference between the outside diameters of bearings (8) (Ø90) and (9) (Ø85).

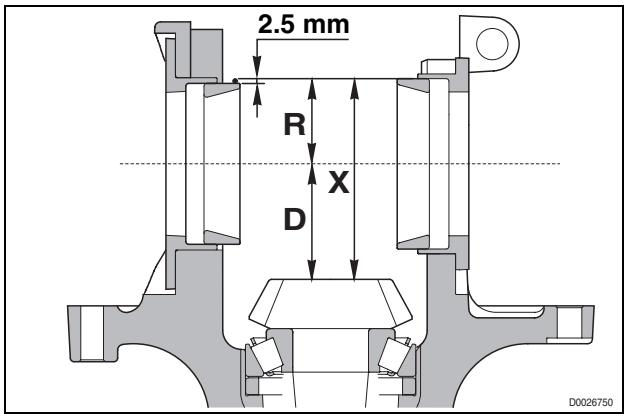


5 - Calculate the distance "*D*" of the differential axis of rotation from the end face of the pinion (5) using the following formula:

D = X – R
where
R = radius of the bearing (8)on the opposite side to the crown wheel

★ *Example*:
- Distance "*X*" = 106.75 mm
- Radius "*R*" = 45.00

D = 106.75 – 45,00 = 61.95 mm



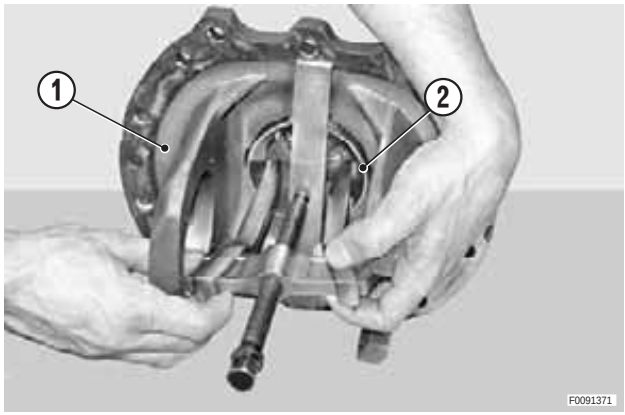
6 - Check the dimension "*E*" (in this example + 0.10) stamped on the end face of the pinion.

NOTE
Dimension "E" can be positive or negative.



7 - Remove the flange assemblies (6) and (7) and the pinion (5) from the support (1).

8 - Remove the outer race of bearing (2).

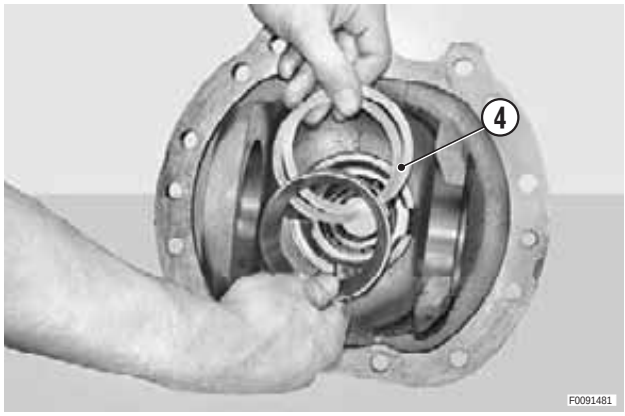


9 - Form a shim pack (4) of the thickness "*S*" required to restore the nominal dimension (set at 61 mm in project specifications), using the following formula:

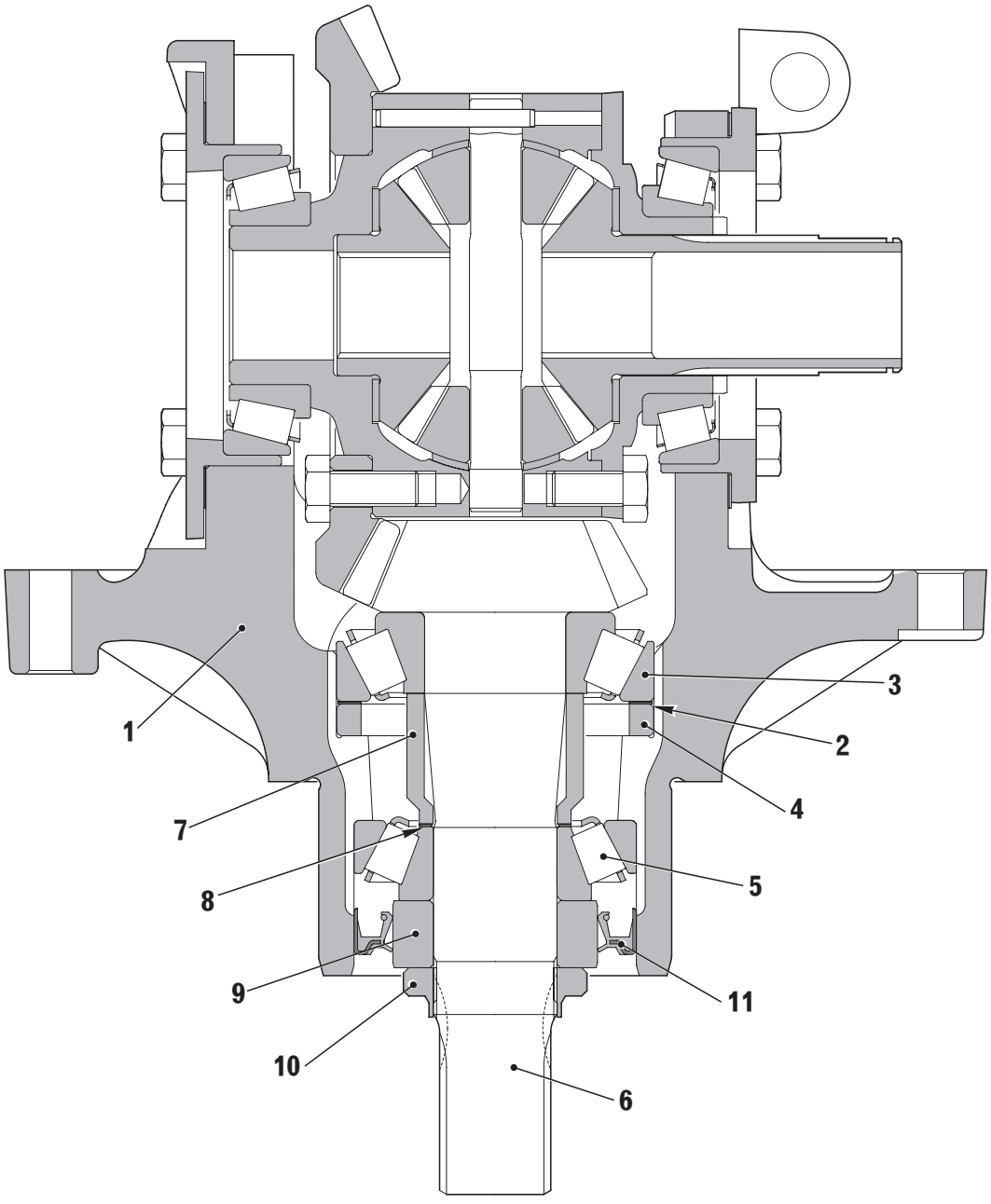
S = D –61 –E
where
S = size of shim pack
D = measurement calculated at point 7

Example 1 (dimension *E* positive)
D = 61.95 mm
E = 0.10 mm
S = 61.95– 61 – 0.10 = 0.85

Example 2 (dimension *E* negative)
D = 61.95mm
E = – 0.20 mm
S = 61.95– 61 + 0.20 = 1.15 mm

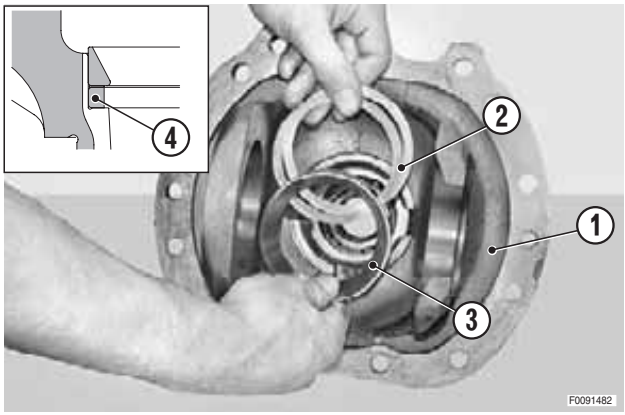


Adjustment of pinion bearings preload



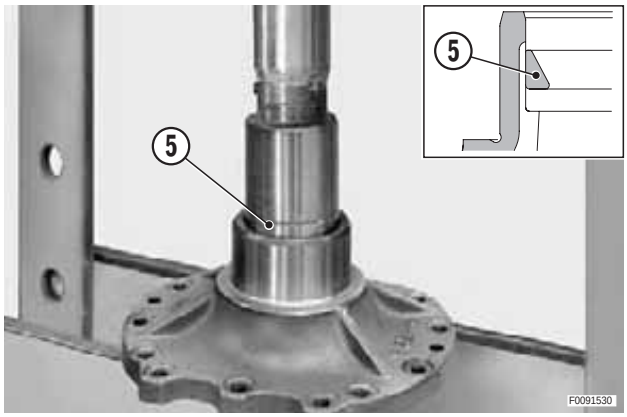
1 - Using a press, install the shim pack (2) and the bearing outer race (3) in the differential carrier (1).

★ For version with differential locking, fit also the spacer (4).



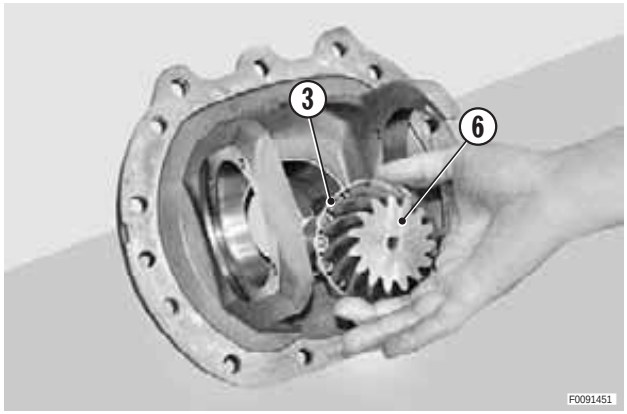
2 - Turn the differential support over and use a suitable drift to fit the outer race of the bearing (5).

★ Take care to install the oil seal the right way round.

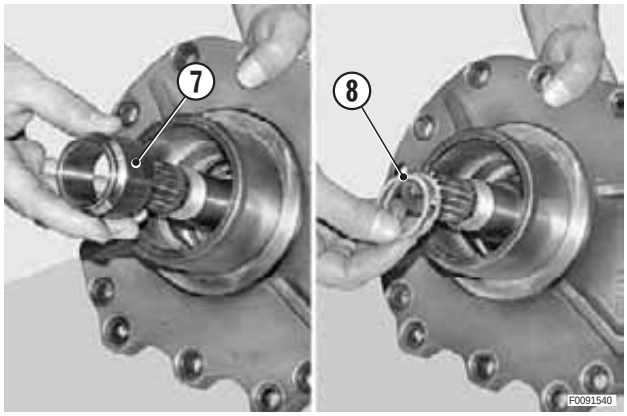


3 - Lubricate and install the pinion (6) complete with the bearing (3).

Bearing: oil

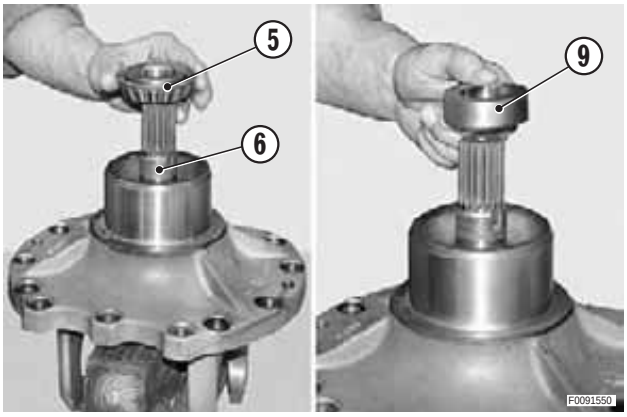


4 - Fit spacer (7) with 0.9 mm shim pack (8).



5 - Fit bearing (5) and, forcing against the head of pinion (6), press it fully home with a suitable drift.

6 - Fit spacer (9).

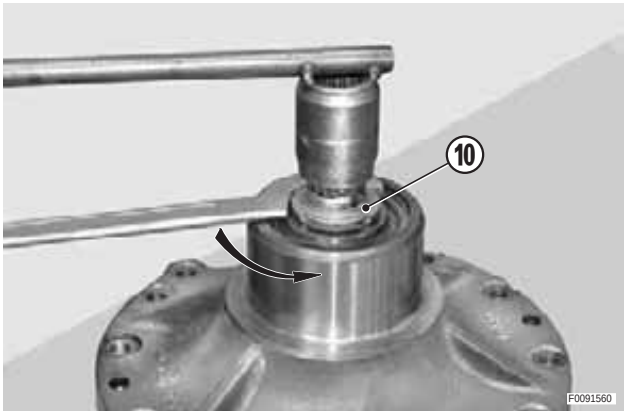


7 - Fit ring nut (10) on pinion (6) and tighten gradually to the specified torque.

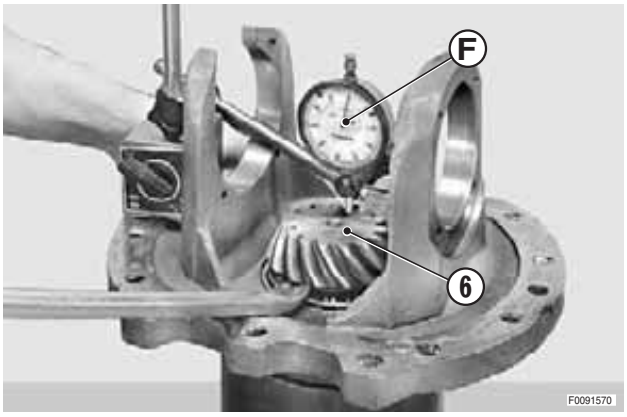
★ To tighten the ringnut, turn it counterclockwise.

★ While tightening the nut, rotate the pinion in both directions to help seat the bearings.

Nm Ringnut: 206÷216 Nm (152 – 159 lb.ft.)



8 - Position a dial gauge on a magnetic stand "*F*" as shown with the contact point is perpendicular to the end face of the pinion (6).
Preload the gauge by about 5 mm and, applying leverage on the pinion, measure the play between tapered roller bearings.

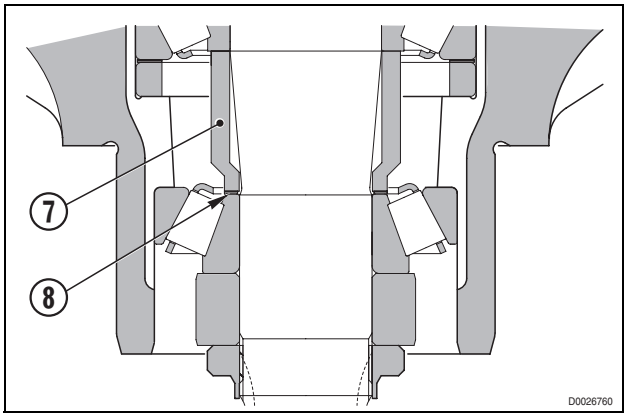


9 - Calculate the thickness "*P*" of the shim pack (8) to be installed under the spacer (7) using the following formula rounding the value down to the nearest 0.05 mm.

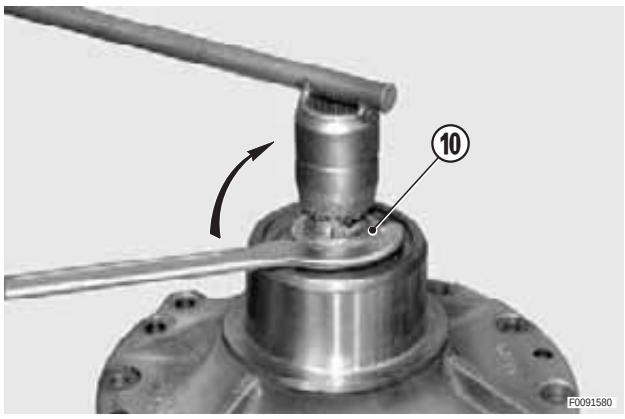
"*P*" = Thickness of installed shims – play measured

Example 1: (measured play = 0.17 mm)
P = 0.90 – 0.17 = 0.73 mm
which rounds down 0.70 mm

Example 2: (measured play = 0.13 mm)
P = 0.90 – 0.13 = 0.77 mm
which rounds down 0.75 mm



10 - Remove the ringnut (10) and withdraw the pinion assembly, the spacer (9) and the inner bearing race (5).
★ Loosen the ringnut by turning it clockwise.

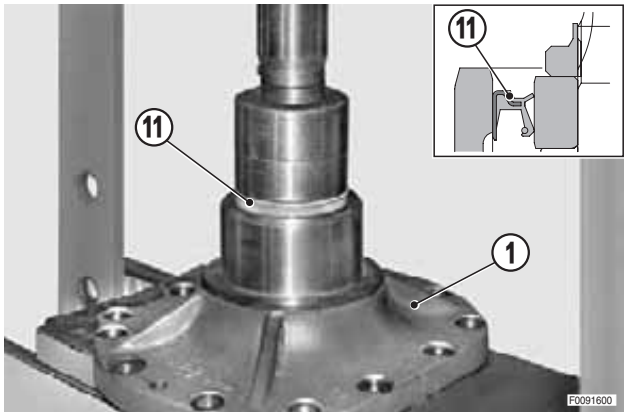


11 - Form shim pack (8) of thickness "*P*" calculated at point 9 and refit the pinion as described at points 5 - 6 and 7.
★ To tighten the ringnut, turn it anti-clockwise.
★ While tightening the ringnut, rotate the pinion in both directions to help set the bearings.

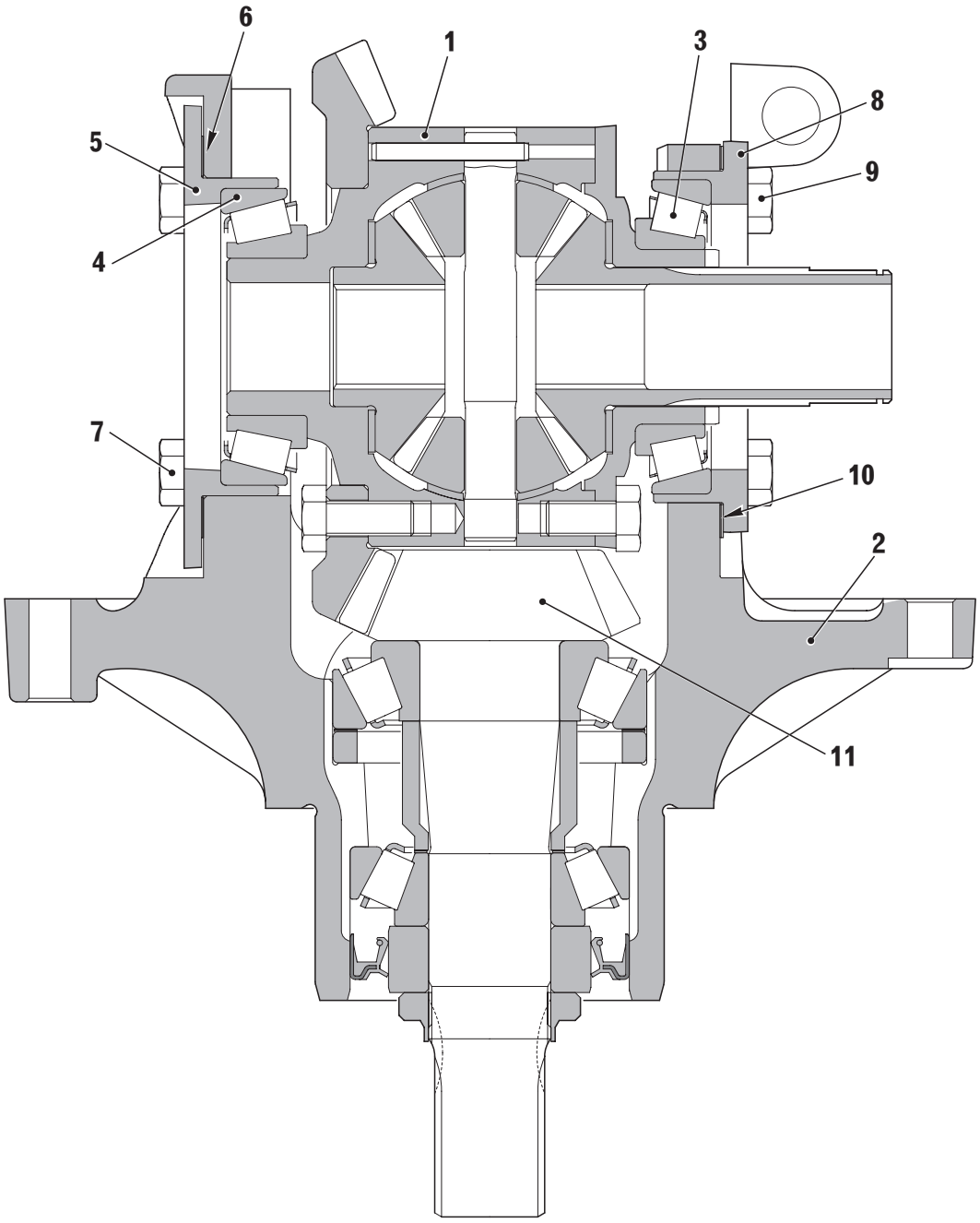
12 - Stake the ringnut (10) at the two points corresponding to the slots in the pinion shaft.



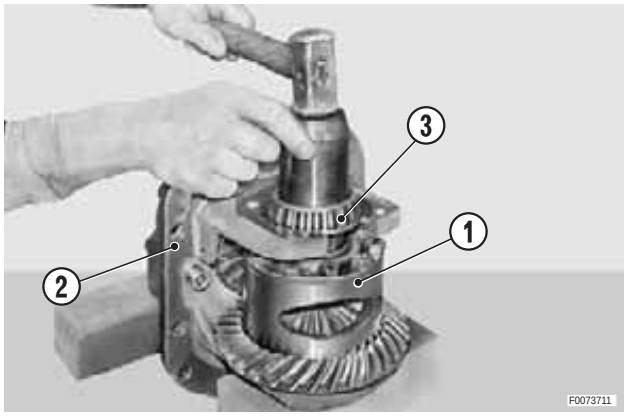
13 - Lubricate the exterior surface of oil seal (11) and use a suitable drift to install it in the support (1).
★ Take care to install the oil seal the right way round at the correct depth.



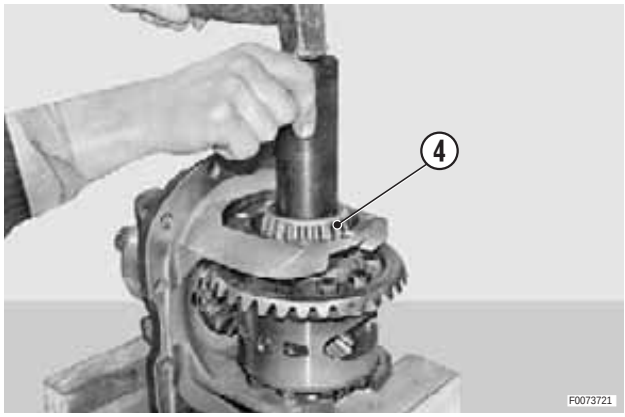
Adjustment of the differential preload



1 - Position the differential assembly (1) in the differential carrier (2) and, using a suitable tool, install the bearing (3) on the opposite side to the crown wheel.



2 - Using a suitable tool, install the bearing (4) on the crown wheel side.

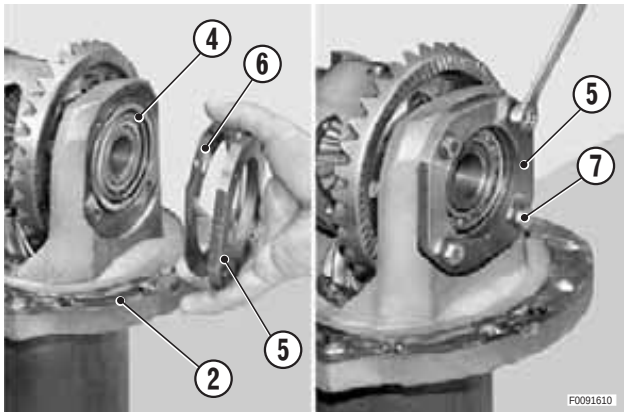


3 - Install the outer race of the crown wheel side bearing (4) in the differential carrier (2).

★ For versions with differential locking, fit the flange (5) complete with the outer race of bearing (4).

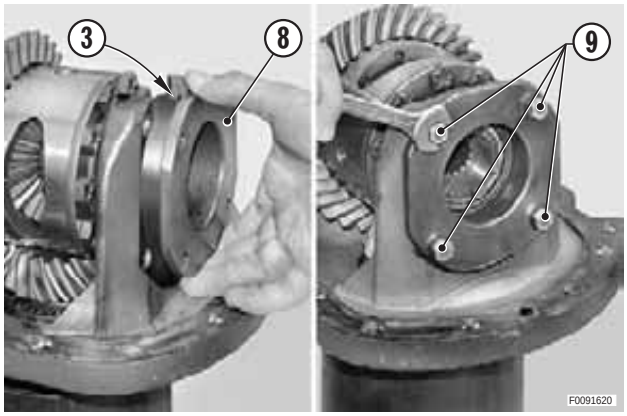
4 - Fit a 1.8 mm shim pack (6) between the differential carrier (2) and the flange (5); secure the flange with the screws (7).

Nm Screws: 20 Nm (14.7 lb.ft.)



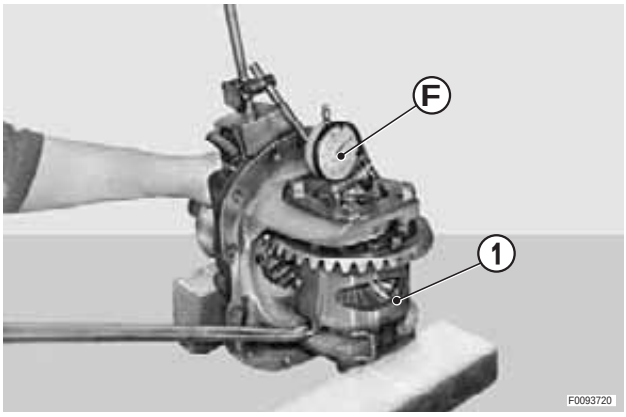
5 - Install the flange (8) on the opposite side to the crown wheel complete with the outer race of bearing (3); secure the flange with the screws (9).

Nm Screws: 20 Nm (14.7 lb.ft.)



6 - Position a dial gauge on a magnetic stand "*F*" as shown so that the contact point is perpendicular to the hub of the differential.
Preload the gauge by about 5 mm and set to zero.

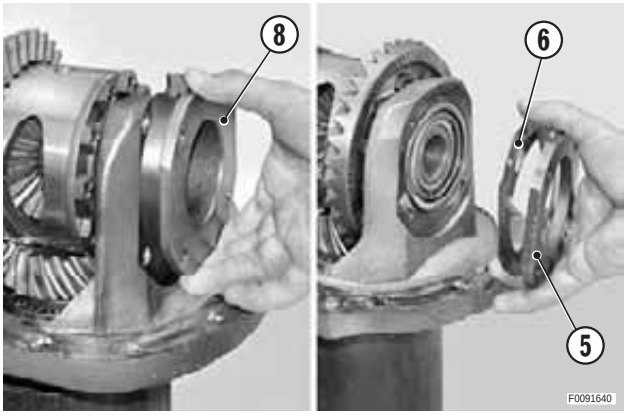
7 - Use a lever to apply force under the differential (1) and measure the play "*G*"
Example: (measured play "*G*" = 0.37 mm)



8 - Calculate the total thickness of shims "*T*" o be installed under the flanges by subtracting the measured play "*G*" from the thickness of the shims (6) installed under the flange (5); round down the value obtained to the nearest 0.05 mm .

Example:
Thickness of installed shims (6): 1.80 mm
Measured play "*G*" = 0.37 mm
Total shim thickness "*T*": 1.80 –0.37 = 1.43 mm
which rounds down to1.40 mm

9 - Remove the flanges (5) and (8).



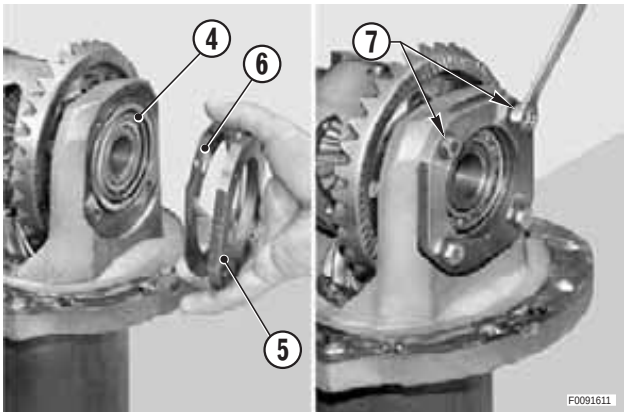
10 - Lubricate bearing (4).
Reform the shim pack (6) with thickness 1.00 mm and refit it with the flange (5).

Bearing: oil

11 - Tighten the bolts (7).

Nm Screws: 20 Nm (14.7 lb.ft.)

12 - Calculate the thickness "*H*" of the shim pack (10) by subtracting the thickness of shims installed under the flange (5) from the value "*T*", calculated in point 8.
Example: *H* = *T* – 1.00 = 1.40 –1.00 = 0.40 mm

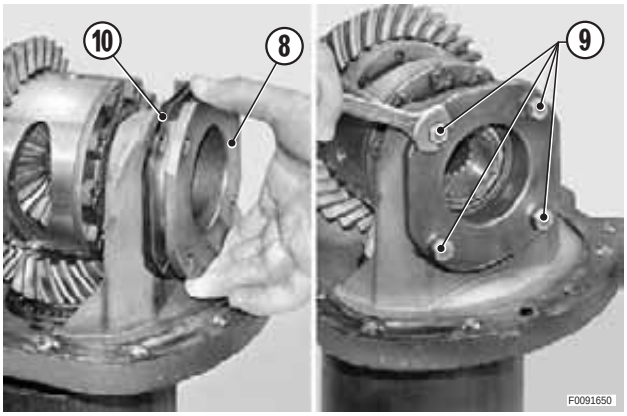


13 - Lubricate the bearing (3).
Form a shim pack (10) of thickness "*H*", and install it on the side opposite to the crown wheel with the flange (8), securing it in position with the screws(9).

★ While tightening the screws, rotate the differential to help seat bearings (3) and (4).

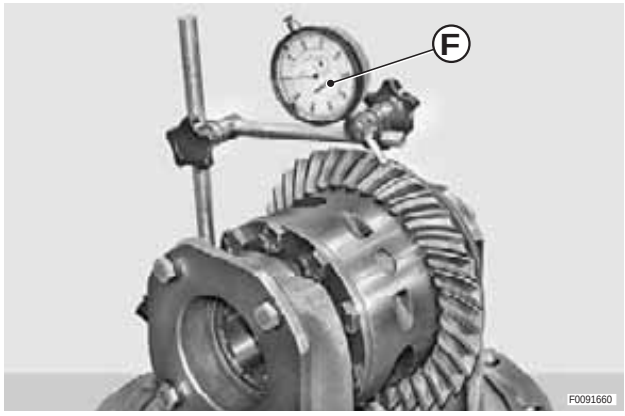
Nm Screws: 20 Nm (14.7 lb.ft.)

Bearing: oil

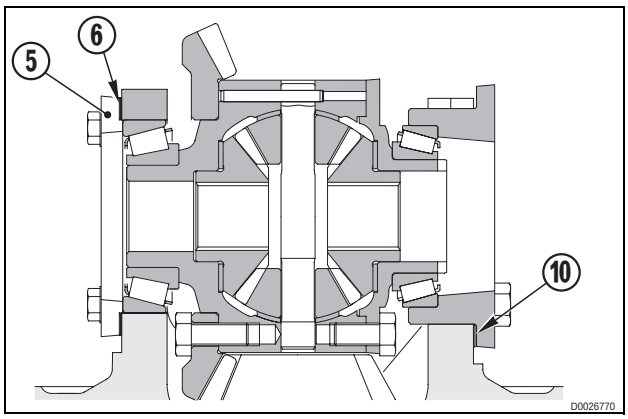


Adjustment of the pinion and crown wheel

1 - Position a dial gauge on a magnetic stand "*F*" so that the contact point is perpendicular to the side of a tooth on the crown wheel, on the external diameter.
Preload the gauge by about 2 mm and measure the backlash "*Z*" between the pinion and crown wheel by turning the differential in both directions.
★ Normal backlash "*Z*": 0.15÷0.20 mm
★ Take four measurements 90° apart and calculate the average.



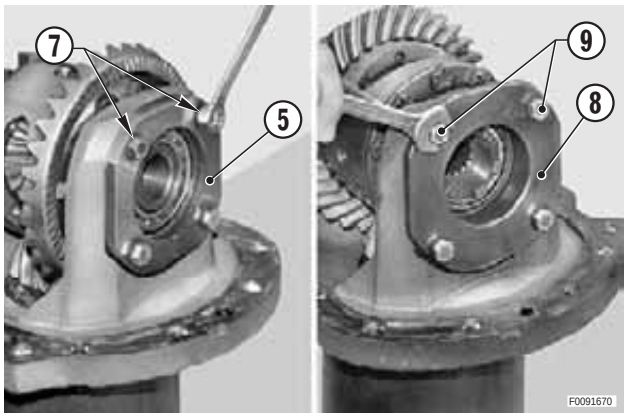
2 - If the backlash "*Z*"is less than 0.15 mm, subtract thickness from the shim pack (6) (crown wheel side) and add the same thickness tothe shim pack (10) (opposite side to crown wheel). If the backlash "*Z*" is greater than 0.20 mm, add thickness to the shim pack (6) (crown wheel side) and subtract the the same thickness from the shim pack (10) (opposite side to the crown wheel).
★ The sum total thickness of shim packs (10) and (6) should not differ from the value obtained when checking the preload of the differential bearings.
Recheck the backlash "*Z*" and, if necessary, continue to adjust the shims until the backlash is within the specified tolerance limits.



3 - Finally tighten the screws (7) and (9) securing the flanges (5) and (8).

Screws: Loctite 242

Screws: M8x1.25: 20±1 Nm (17.4±0.7 lb.ft.)



4 - Using a feeler gauge "*A*", check that dimension "*D*" between the end face of pinion (11) and differential housing (1) is correct within a tolerance limit of ±0.10 mm.

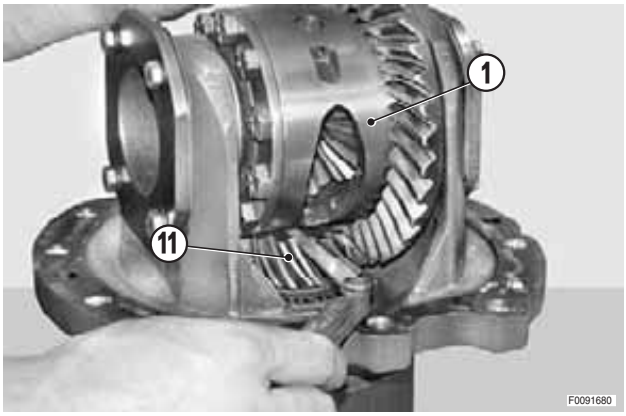
Distance "*D*" = theoretical distance + value "*K*" where:
Theoretical distance = 1.00 mm
Value K = value stamped on a tooth of the pinion.

★ *Example 1* (positive value "*K*")

Theoretical distance = 1.00 mm
K = + 0.10 mm
D = 1.00 + 0.10 = 1.10 mm
Valid values: 1.00÷1.20 mm

★ *Example 2* (negative value "*K*")

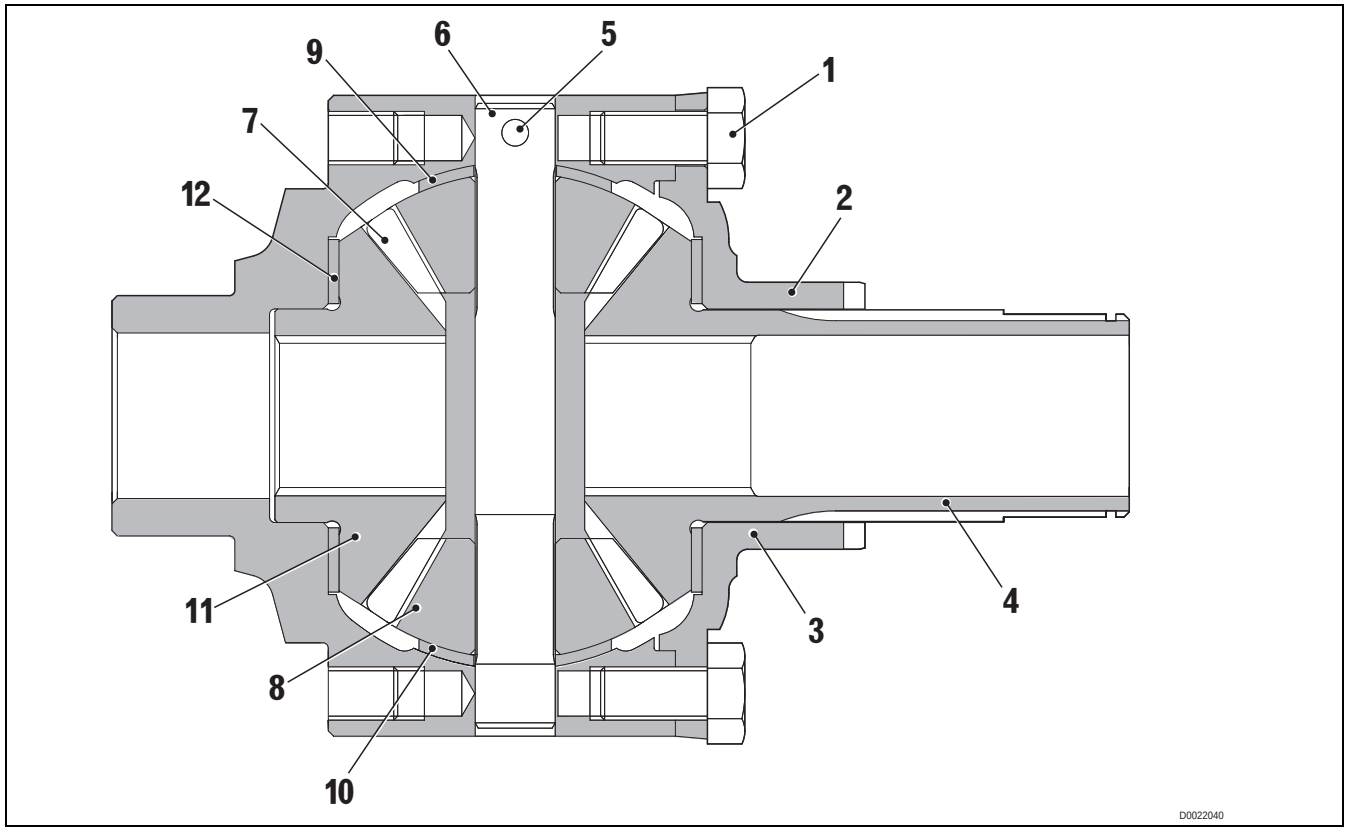
Theoretical distance = 1.00 mm
K = – 0.2 mm
D = 1.00 – 0.20 = 0.80 mm
Valid values: 0.70÷0.90 mm



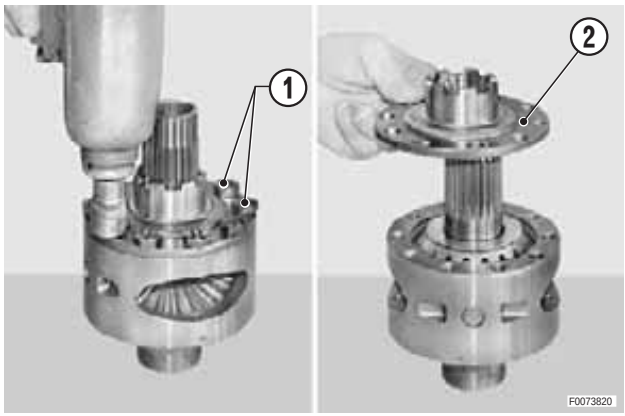


DIFFERENTIAL

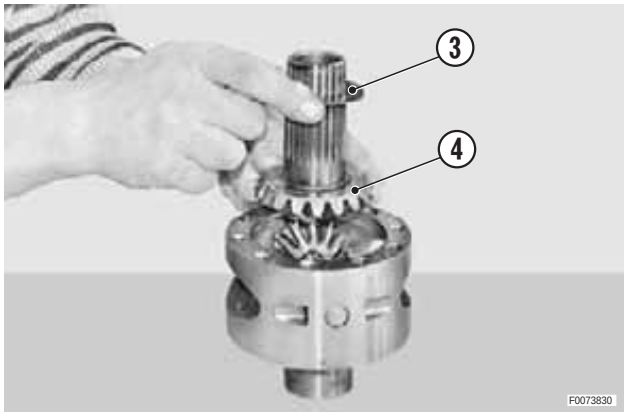
Disassembly



1 - Remove the screws (1) and remove the flange (2).

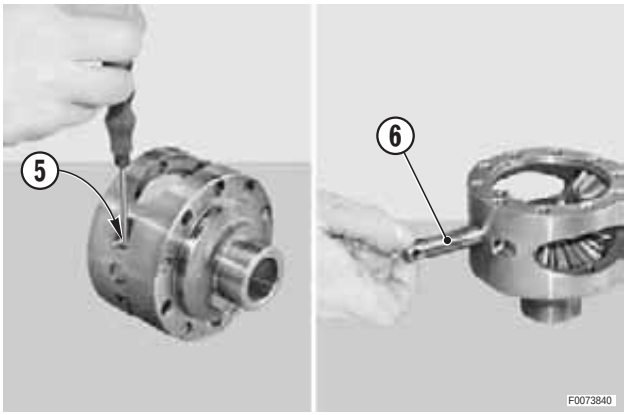


2 - Remove the thrust washer (3) and the side gear (4).
※ 1

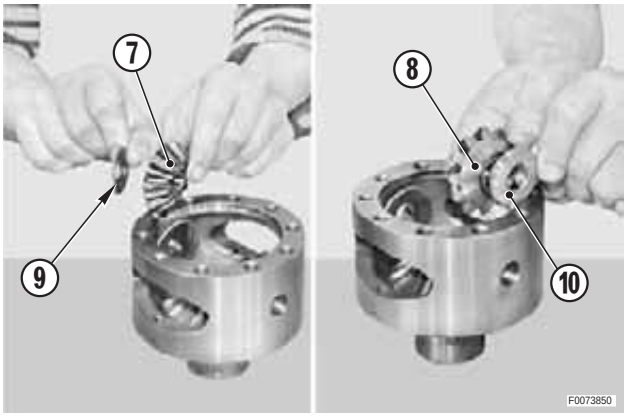


3 - Drive out the spring pin (5) and remove the pin (6).

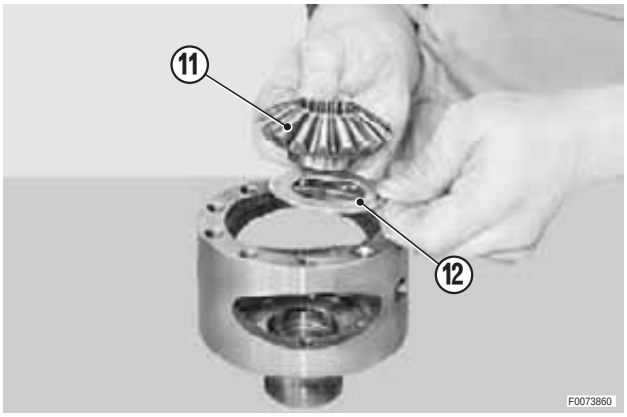
NOTE
On more recent versions the spring pin (5) is installed parallel to the differential's axis of rotation.



4 - Remove the planet pinions (7) and (8) and the relative thrust washers (9) and (10). ※ 1



5 - Remove the side gear (11) and the relative thrust washer (12). ※ 1



Assembly

- To assemble, follow the disassembly steps in reverse order.

※ 1

Thrust washers: oil

ENGINE

REMOVAL

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the front axle drive shaft.
(For details, see "FRONT AXLE DRIVE SHAFT").

2 - Remove the engine hood and side panels
(For details, see "FRONT HOOD AND SIDE PANELS").

3 - Remove the front wheels.
(For details, see "WHEELS").

4 - Remove the radiator.
(For details, see "RADIATOR").

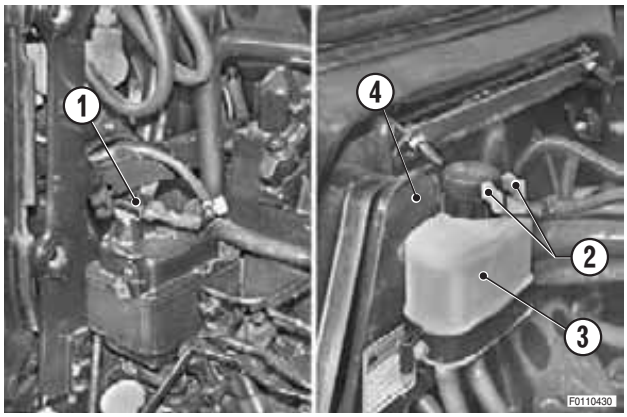
5 - Remove the front support.
(For details, see "FRONT SUPPORT").

6 - Drain off all the engine coolant.

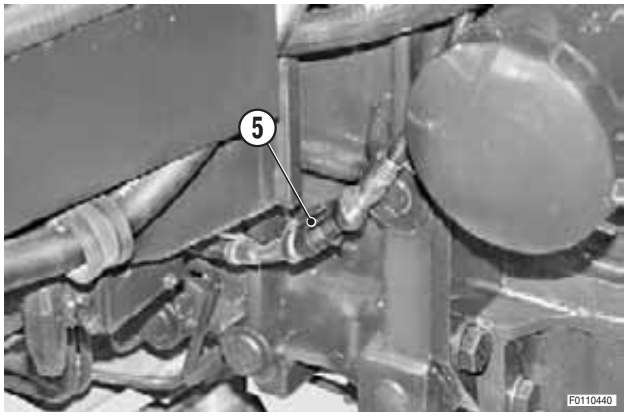
Coolant:
max. 11 l (3 US gall.)

7 - Disconnect the wiring connectors (1) and (2) of the actuator and of the brake fluid level sensor.

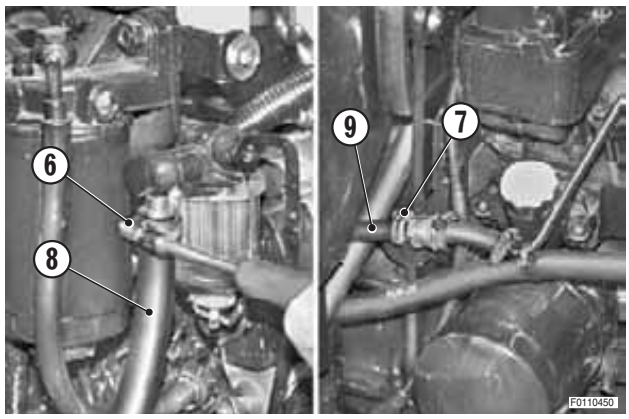
8 - Detach the brake fluid reservoir (3) from the support (4).



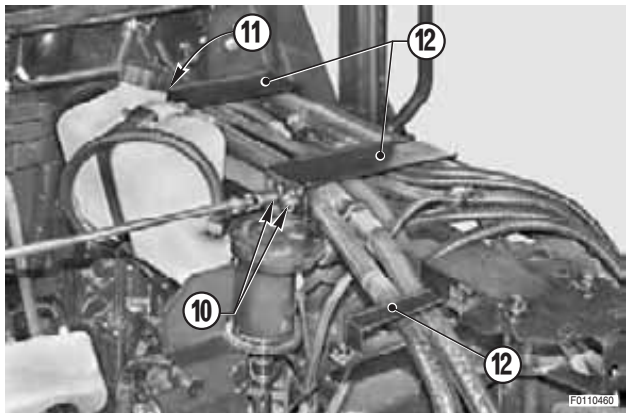
9 - Disconnect the wiring connector (5) of the shuttle speed sensor.



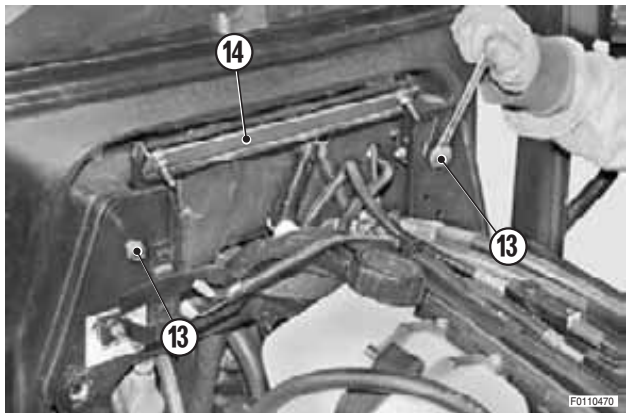
10 - Loosen the hose clamps (6) and (7) and disconnect the pipes (8) and (9).



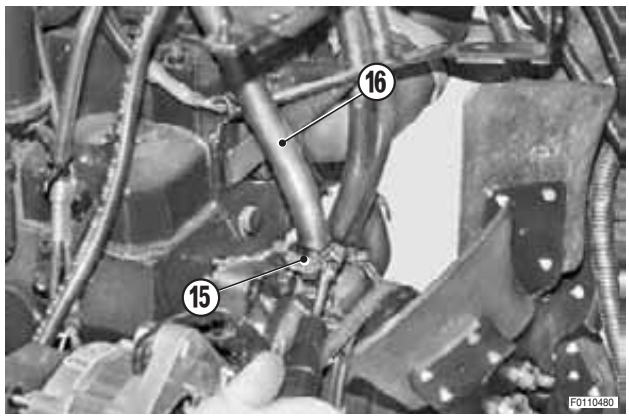
11 - Remove the nuts (10) and the bolt (11) and remove the brackets (12).



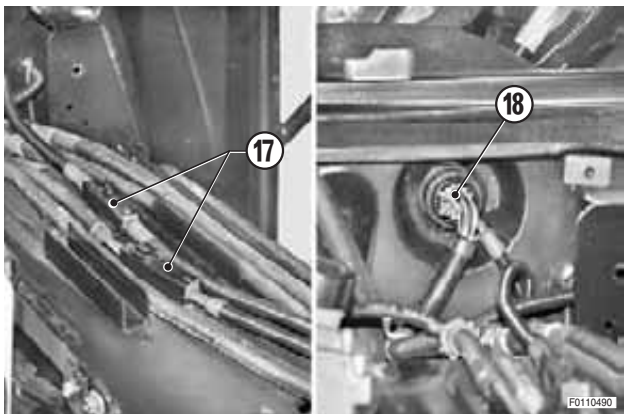
12 - Remove the screws (13) and remove the hood hinge (14).



13 - Loosen the hose clamp (15) and disconnect the heater hose (16).

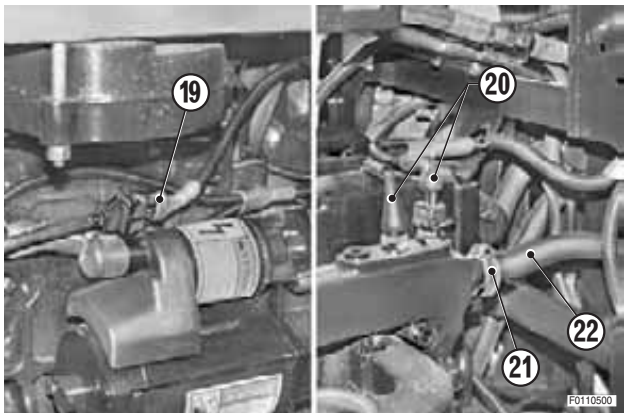


14 - Disconnect the two power supply wiring connectors (17) and the cab wiring connector (18).

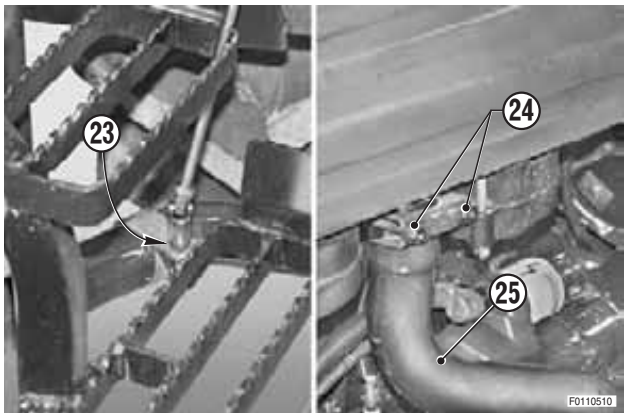


15 - Disconnect the engine speed sensor connector (19) and the temperature sensor connectors (20).

16 - Loosen the clamp (21) and disconnect the heater hose (22).



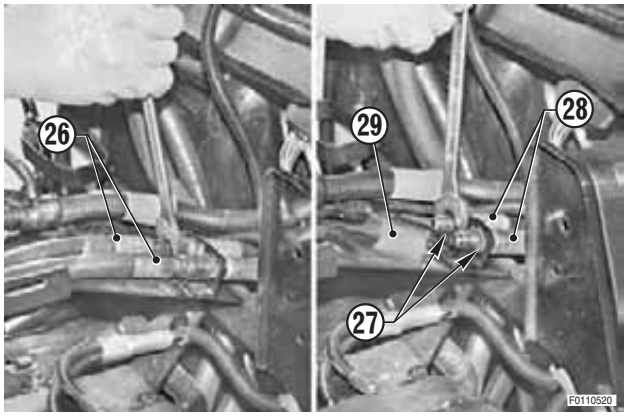
17 - Remove the bolt (23) loosen the nuts (24) and remove the exhaust pipe (25).



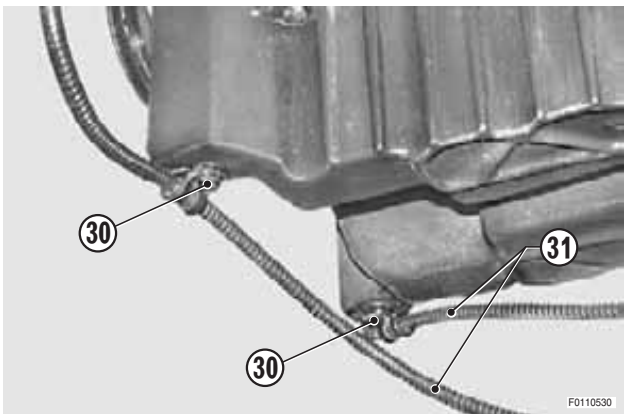
18 - Disconnect the pipes (26), remove the nuts (27) and disconnect the pipes (28) from the support (29).

★ Plug the pipes to prevent the entry of impurities.

★ Label the pipes to avoid confusion on reconnection.

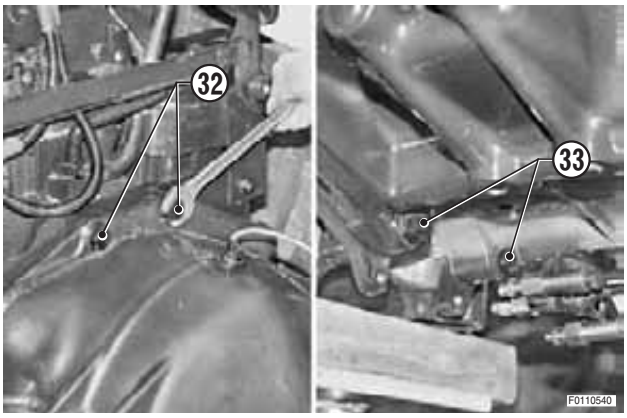


19 - Remove the screws (30) and disconnect the brake pipes (31) from the engine.

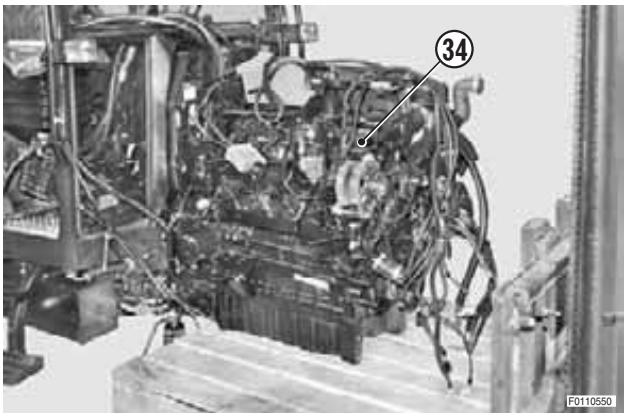


20 - Remove the upper (32) and lower screws (33).

※ 1

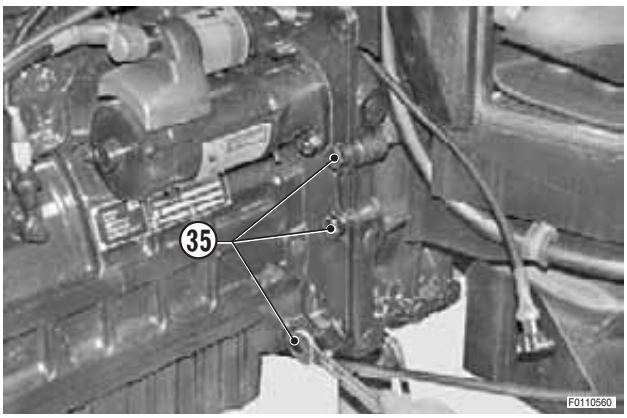


21 - Position a suitable jack under the engine (34)and apply a slight lifting force.



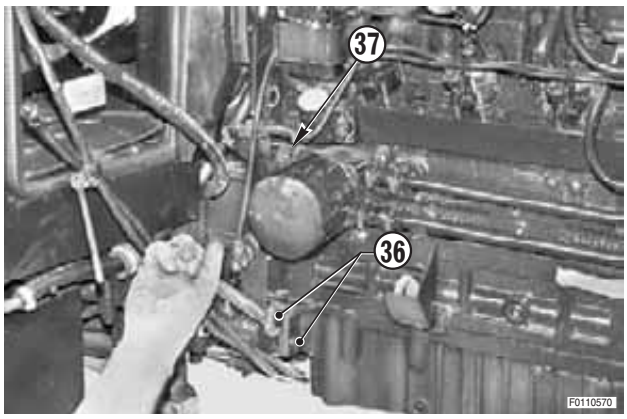
22 - Remove the three bolts (35) on the LH side.

※ 1

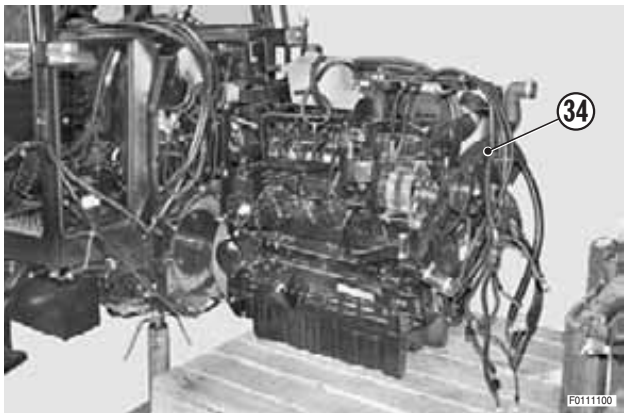


23 - Remove the three bolts (36) and the nut (37) on the right-hand side.

※ 1



24 - Remove the engine (34).



Refitting

- Refitting is the reverse of removal.

※ 1

Nm M12 bolts: 70±3.5 Nm (51.6±2.6 lb.ft.)

Nm M14 bolts: 111.5±6.5 Nm (82±4.8 lb.ft.)

★ Apply a film of lubricant to the locating dowels and mating surfaces.

Mating surfaces and dowels: oil

Separating the engine from the transmission

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the front axle drive shaft.
(For details, see "FRONT AXLE DRIVE SHAFT").

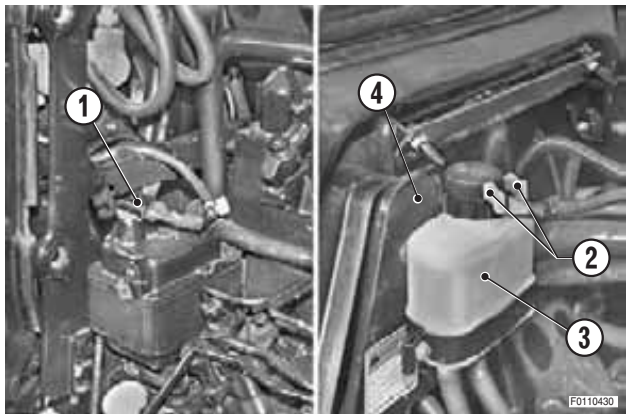
2 - Remove the engine hood and side panels
(For details, see "FRONT HOOD AND SIDE PANELS").

3 - Drain off all the engine coolant.

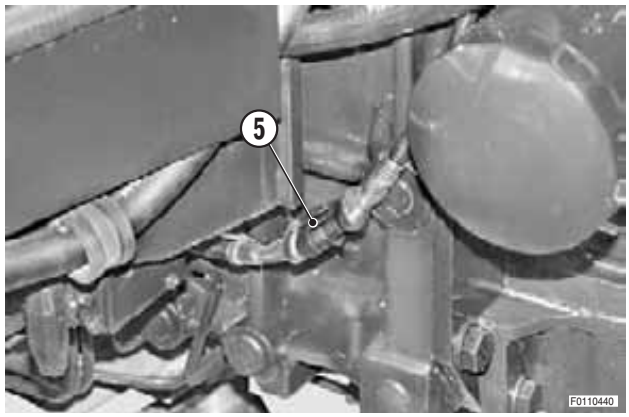
Coolant:
max. 11l (3 US gall.)

4 - Disconnect the wiring connectors (1) and (2) of the actuator and the brake fluid level sensor.

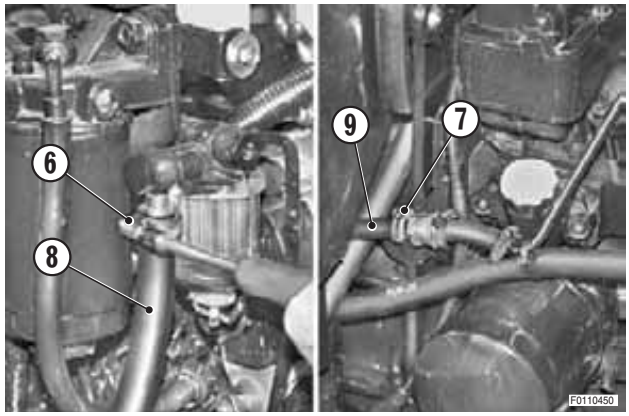
5 - Detach the brake fluid reservoir (3) from the support (4).



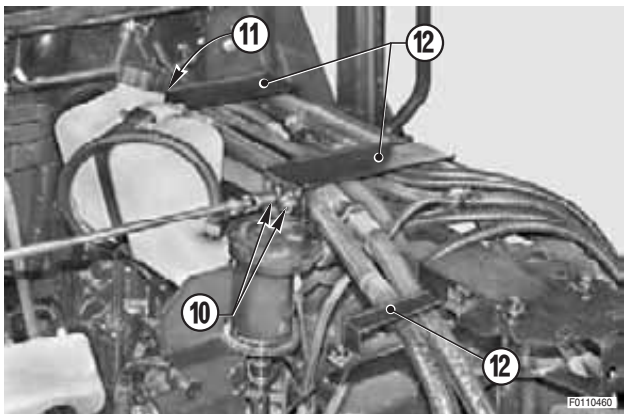
6 - Disconnect the shuttle speed sensor connector (5).



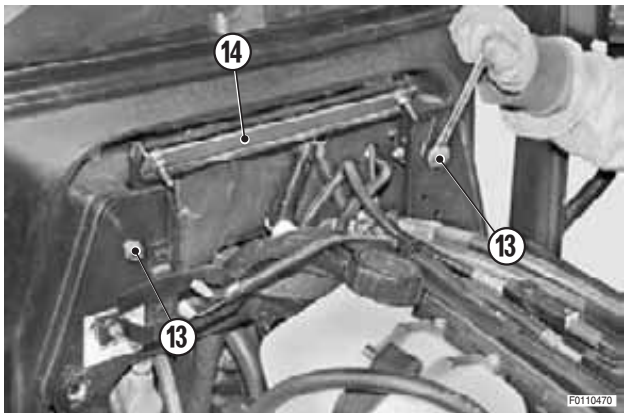
7 - Loosen the hose clamps (6) and (7) and disconnect the pipes (8) and (9).



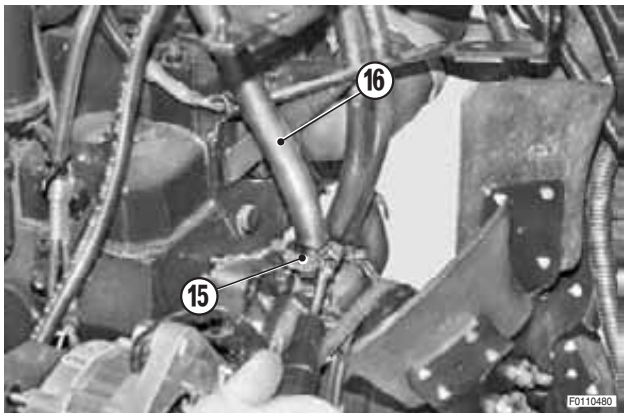
8 - Remove the nuts (10) and the bolt (11) and remove the brackets (12).



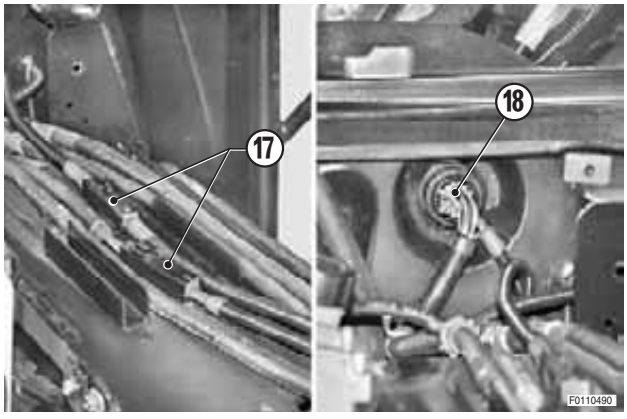
9 - Remove the screws (13) and remove the hood hinge (14).



10 - Loosen the hose clamp (15) and disconnect the heater hose (16).

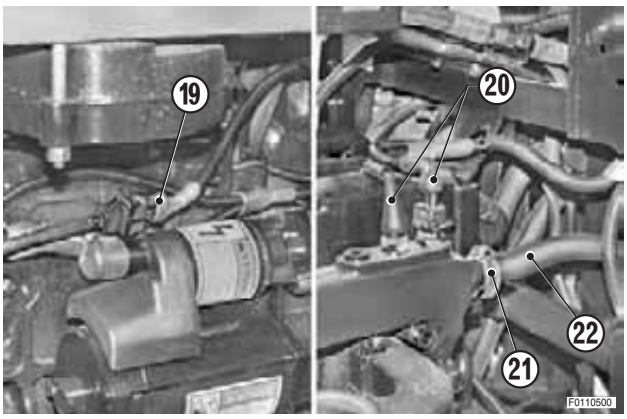


11 - Disconnect the two power supply wiring connectors (17) and the cab wiring connector (18).

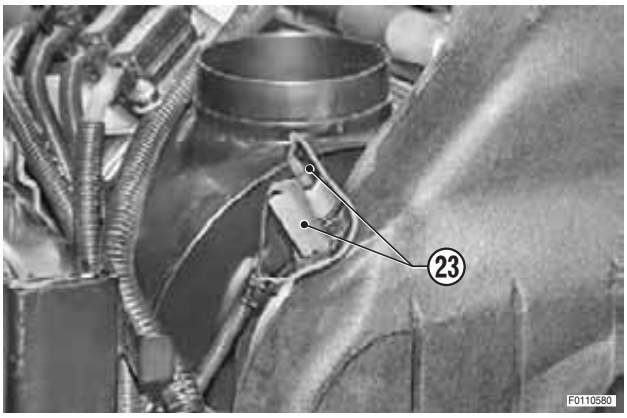


12 - Disconnect the engine speed sensor connector (19) and the temperature sensor connectors (20).

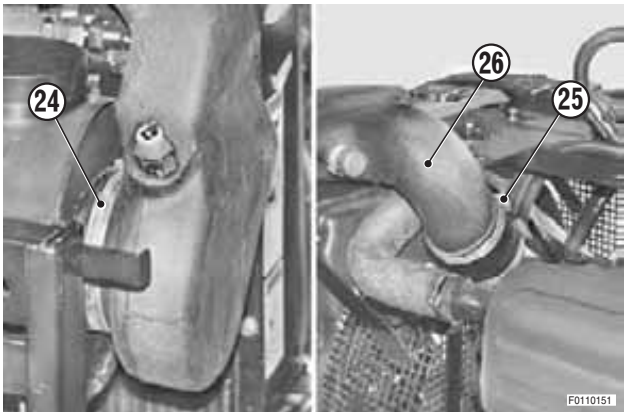
13 - Loosen the hose clamp (21) and disconnect the heater hose (22).



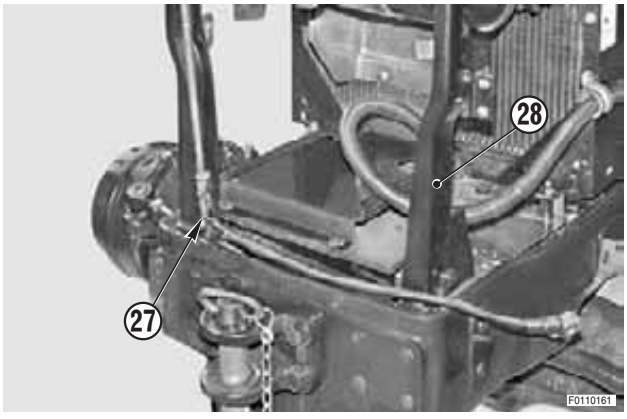
14 - Disconnect the wiring connectors (23) of the air cleaning clogging sensor.



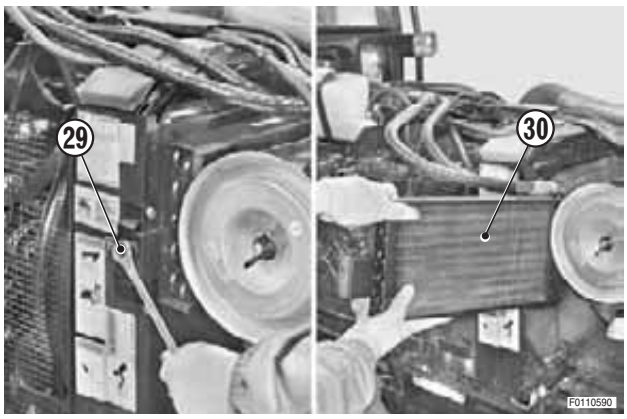
15 - Loosen the clamps (24) and (25) and remove the manifold (26).



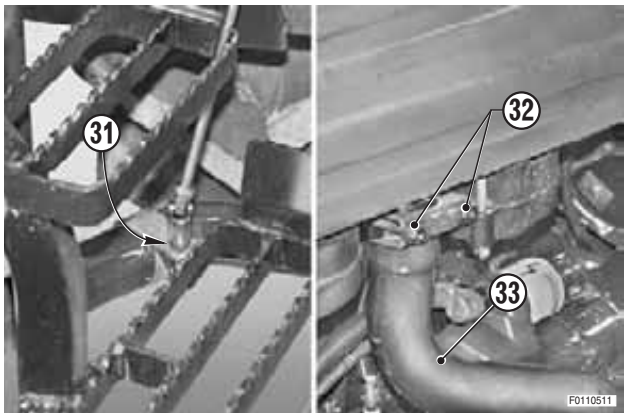
16 - Loosen all the nuts (27) securing the filter support (28).



17 - Remove the screw (29) and tilt the heat exchanger (30) towards the rear of the tractor.



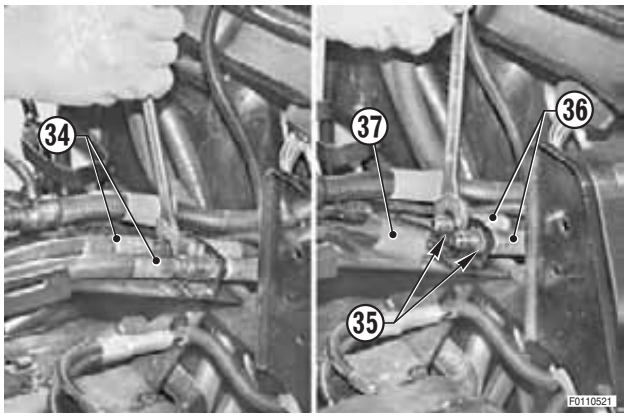
18 - Remove the bolt (31) loosen the nuts (32) and remove the exhaust pipe (33).



19 - Disconnect the pipes (34), remove the nuts (35) and disconnect the pipes (36) from the support (37).

★ Plug the pipes to prevent the entry of impurities.

★ Label the pipes to avoid confusion on reconnection.

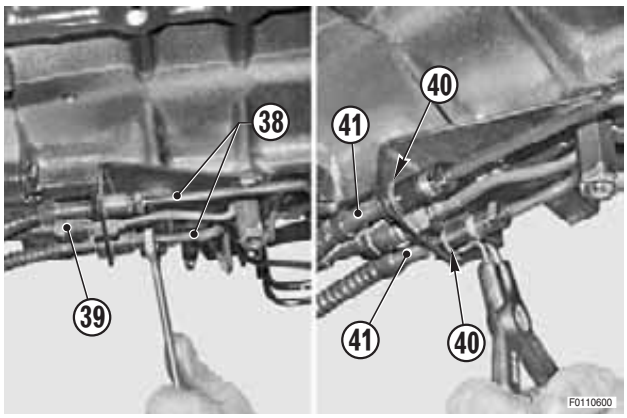


20 - Disconnect the two pipes (38) of the brakes and (39) of the diff lock.

21 - Remove the circlips (40) and withdraw the pipes (41) from the support.

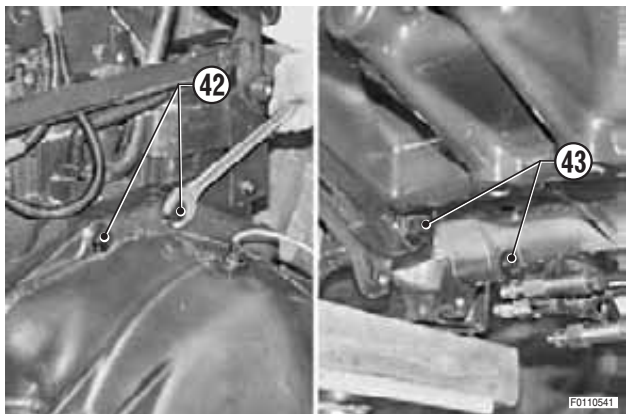
★ Plug the pipes to prevent the entry of impurities.

★ Label the pipes to avoid confusion on reconnection.

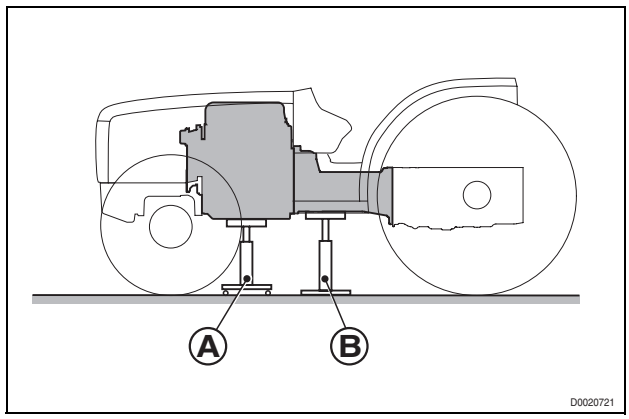


22 - Remove the upper (42) and lower (43) bolts.

※ 1

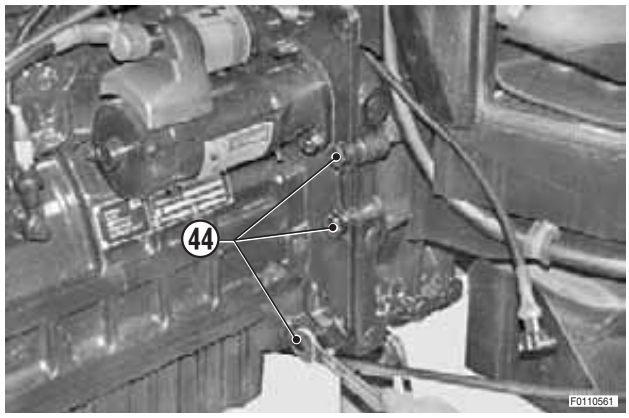


23 - Position a stand *"A"* under the engine sump and a stand *"B"* under the clutch housing".



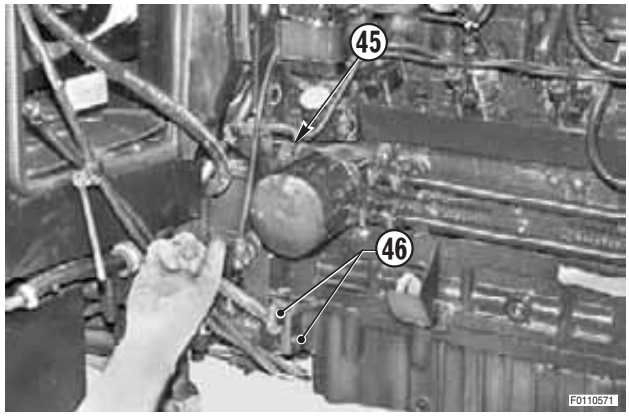
24 - Remove the three bolts (44) on the left-hand side.

※ 1

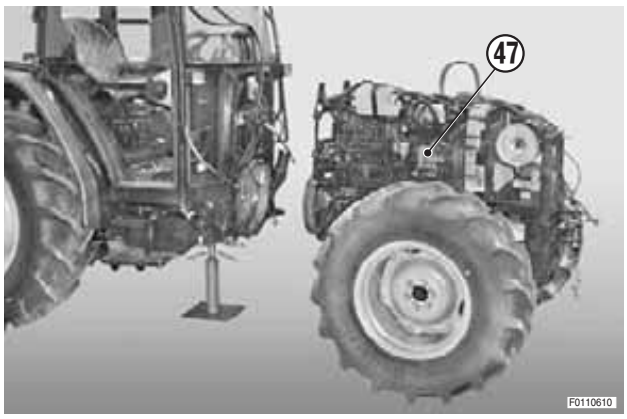


25 - Remove the three bolts (45) and the nut (46) on the right-hand side.

※ 1



26 - Separate the engine (47) from the transmission by pushing both front wheels.



Refitting

- Refitting is the reverse of removal.

1

Nm M12 bolts: 70±3.5 Nm (51.6±2.6 lb.ft.)

Nm M14 bolts: 111.5±6.5 Nm (82±4.8 lb.ft.)

★ Apply a film of lubricant to the locating dowels and-mating surfaces.

Mating surfaces and dowels: oil

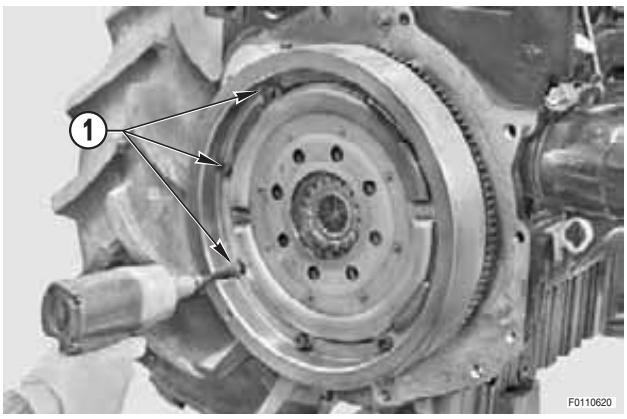
CLUTCH ASSEMBLY AND TORSIONAL SPRING PLATE

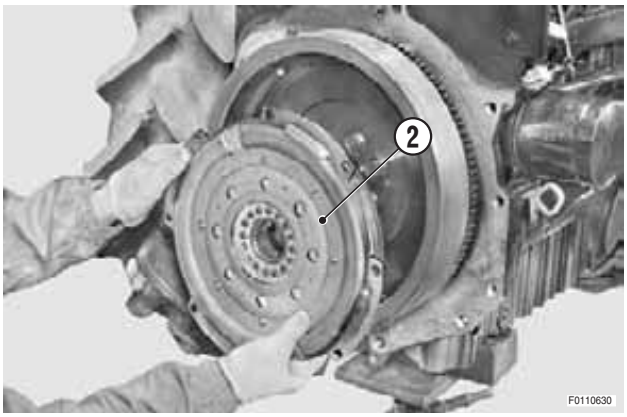
Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Separate the engine from the transmission. (For details, see "ENGINE").

2 - Remove the screws (1) and remove the torsional spring plate (2).





Refitting

- Refitting is the reverse of removal.

FUEL TANK

Removal

⚠ 1 - Do not smoke or allow naked flames in the vicinity during the removal, refitting and filling of the fuel tank.

2 - Wipe up any spilt fuel immediately before someone slips on it.

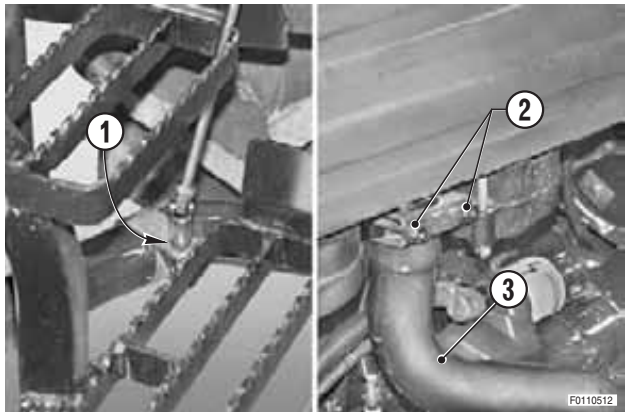
3 -Disconnect the lead from the negative terminal (–) of the battery and apply the parking brake.

1 - Drain the fuel tank completely by siphoning off the fuel.

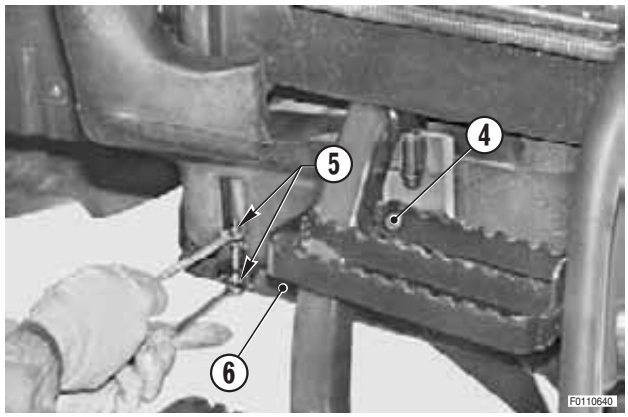
Fuel: max. 90 l (39.6 US gall.)

2 - Remove the left rear wheel.
(For details, see “WHEELS”).

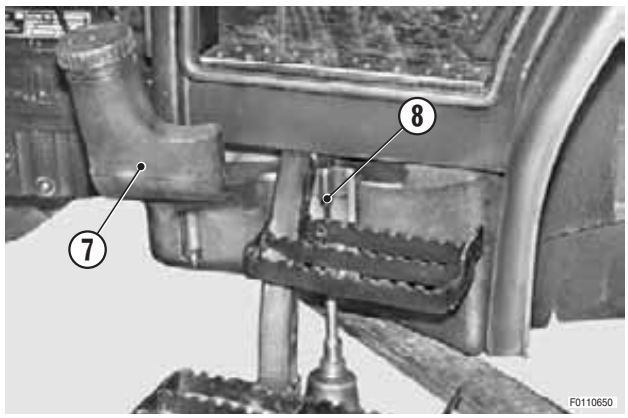
3 - Remove the bolt (1) loosen the nuts (2) and remove the exhaust pipe (3).



4 - Remove the bolt (4), fully loosen the two screws (5) and remove the cover (6).

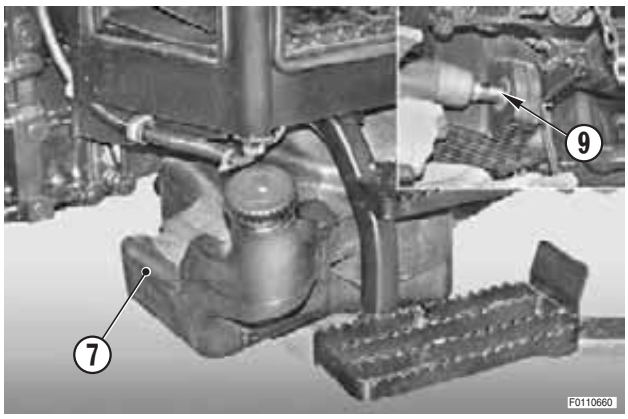


5 - Position a suitable jack under the tank (7) and remove the bolt (8).

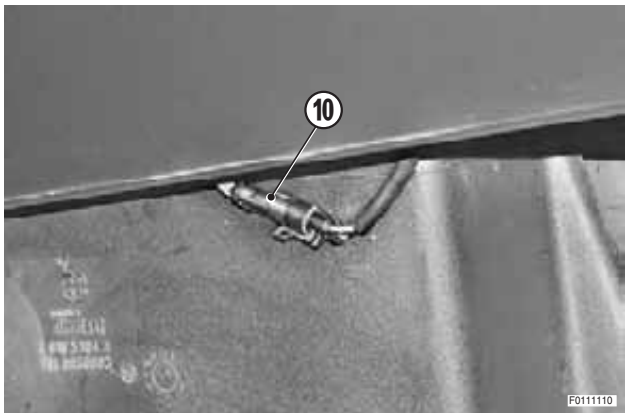


6 - Loosen but do not remove the tank retaining bolt (9) and lower the tank (7) by about 15 cm.

★ Take care not to lower that tank too much or the pipe unions will be damaged.

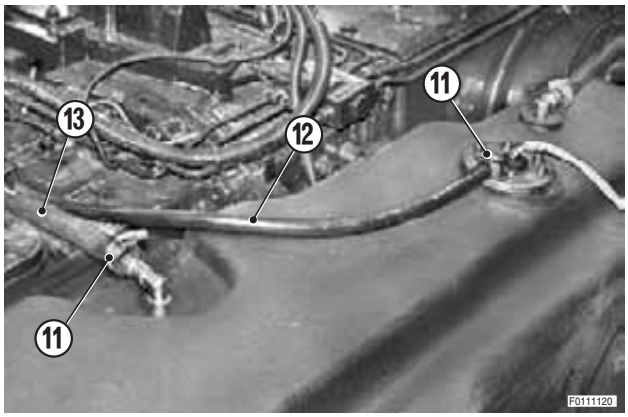


7 - Disconnect the fuel level sensor wiring connector (10).

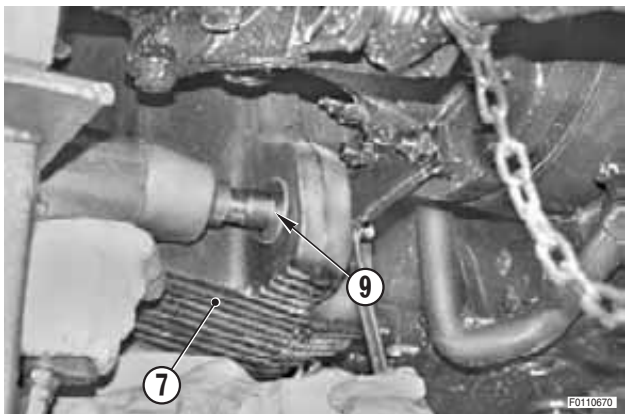


8 - Loosen the hose clamps (11) and disconnect the pipes (12) and (13) from the fuel tank.

★ Also disconnect the breather pipe from the quick couplers support.



9 - Remove the bolt (9) and remove the fuel tank (7).



Refitting

• Refitting is the reverse of removal.

CAB

Removal

Disconnect the lead from the negative terminal (-) of the battery.

1 - Remove the front hood and side panels.

2 - Remove the left rear wheel.

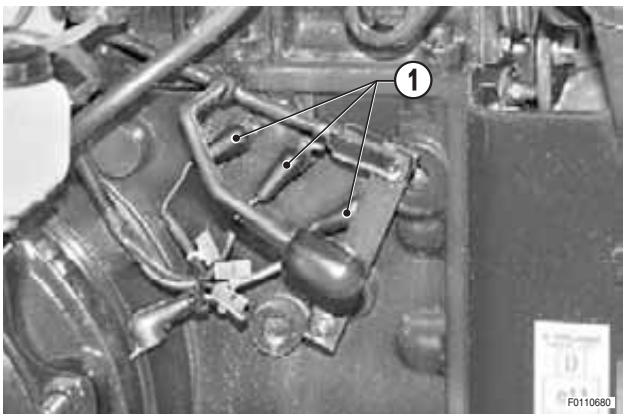
3 - Remove the fuel tank.

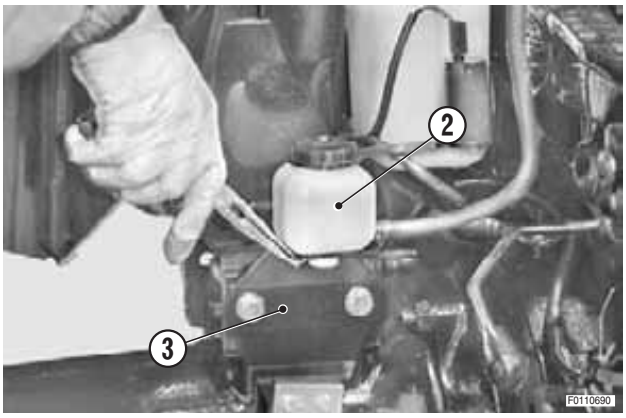
4 - Drain off all the engine coolant.

Coolant:
max. 11l (3.0 US. gall.)

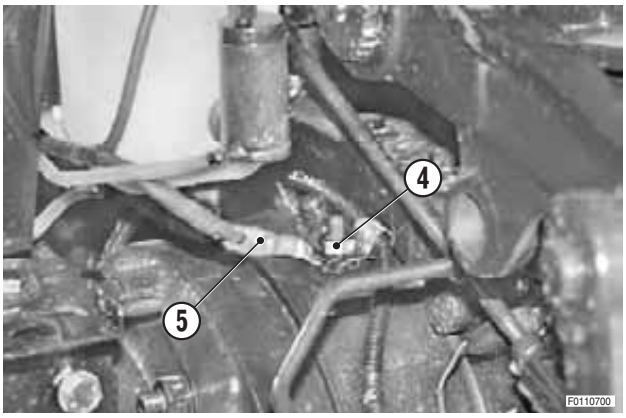
5 - Disconnect the wiring connectors (1) of the PTO speed sensors.

6 - Detach the oil drip collector (2) from the support (3).

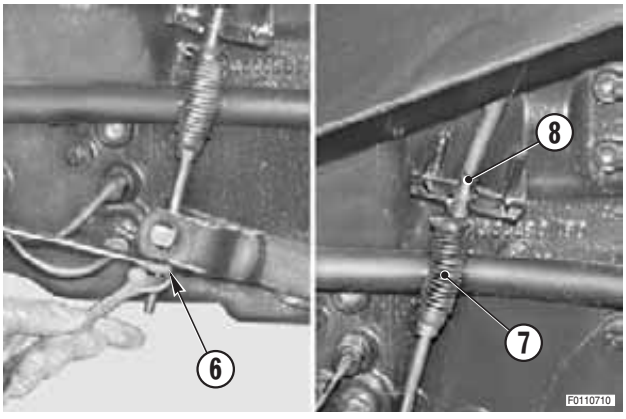




7 - Remove the nut (4) and disconnect the earth lead (5) and the wiring.

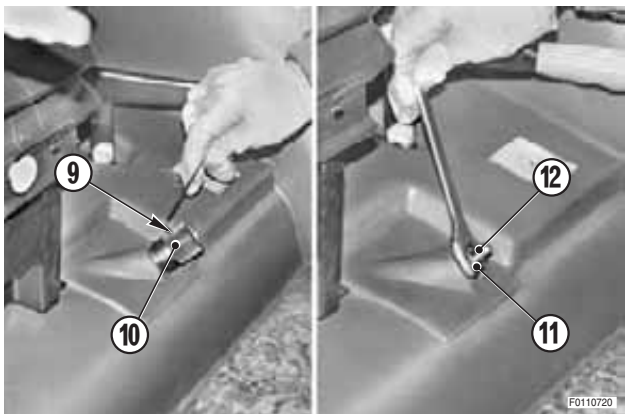


8 - Remove the nuts (6), lower the gaiter (7) and disconnectthe parking brake cable (8). ※1

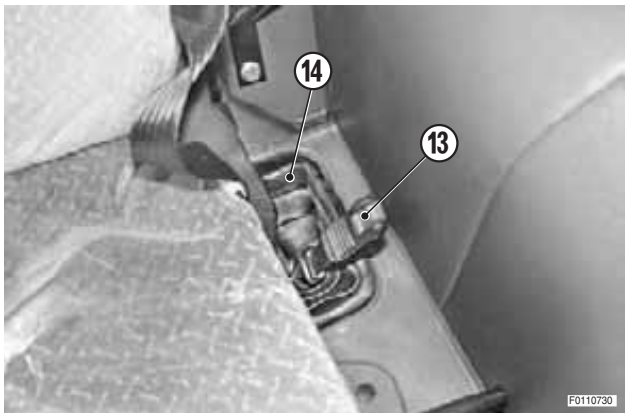


9 - Loosen the grub screw (9) and remove the knob (10).

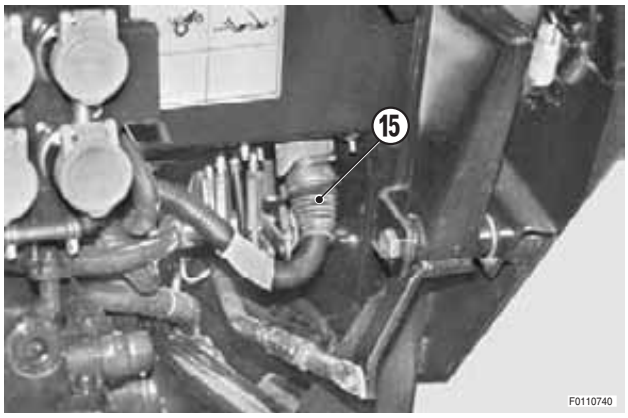
10 - Remove the nut (11) and remove the bush (12).



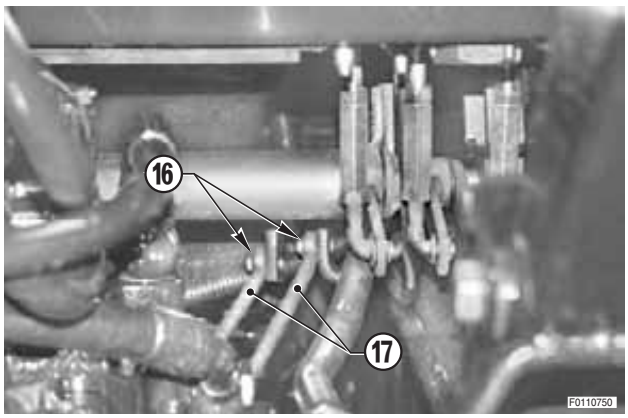
11 - Remove the knob (13) and remove the gaiter (14).



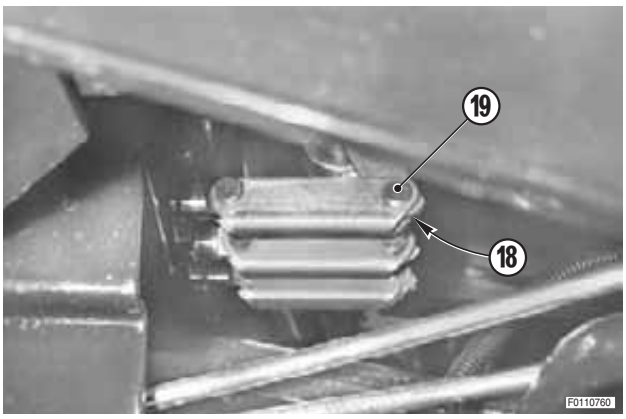
12 - Unplug the connector (15).



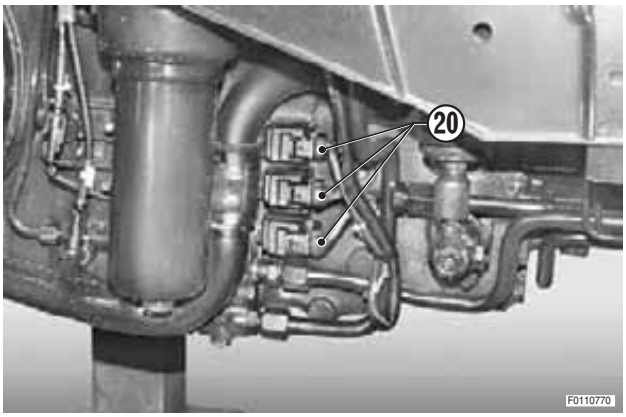
13 - Remove the circlips (16) and disconnect the lift control tie-rods (17).



14 - Remove the split pins (18) and remove the pivot pins (19).

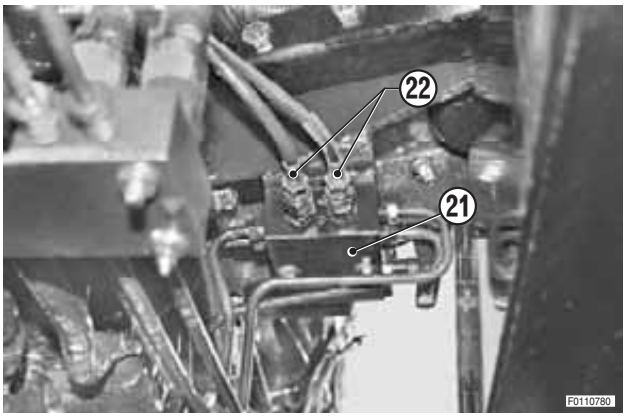


15 - Disconnect the wiring connectors (20).

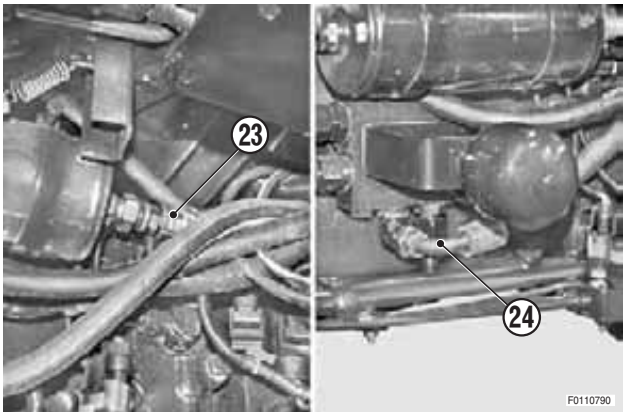


16 - Disconnect the brake pipes (22) from the “SEPARATE BRAKES” valve (21). 2

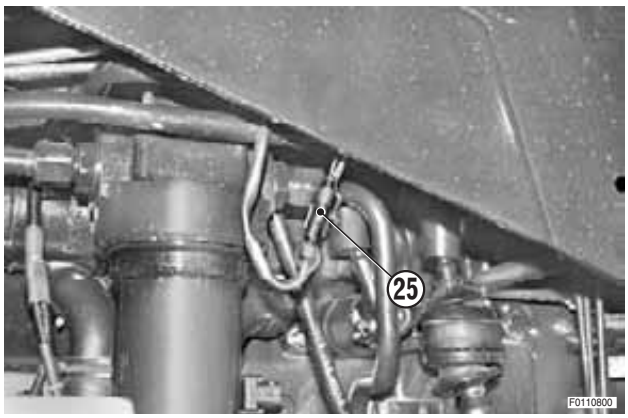
★ Label the pipes to avoid confusion on refitting.



17 - Disconnect the pipes (23) and (24).

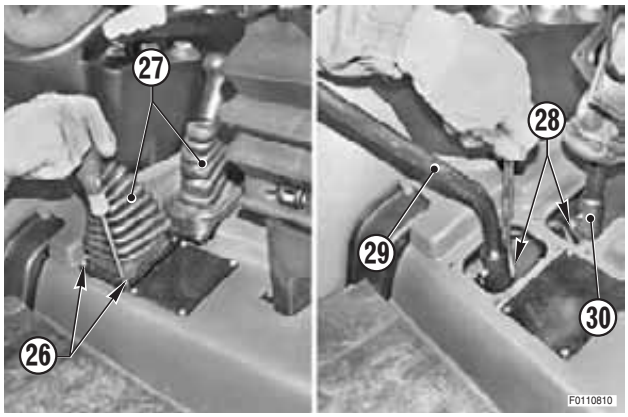


18 - Disconnect the gear lever wiring connector (25).



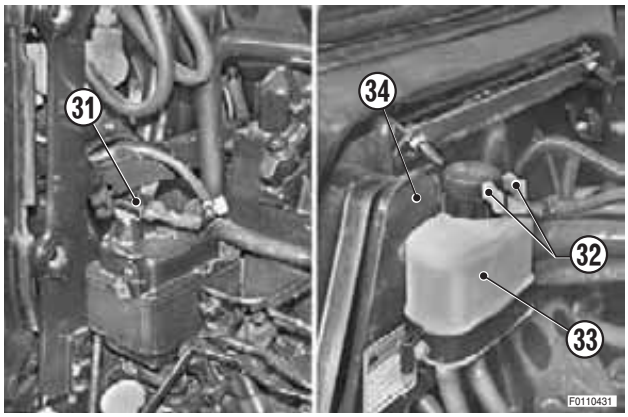
19 - Remove the screws (26) and raise the gaiters (27).

20 - Remove the screws (28) and remove the levers (29) and (30).

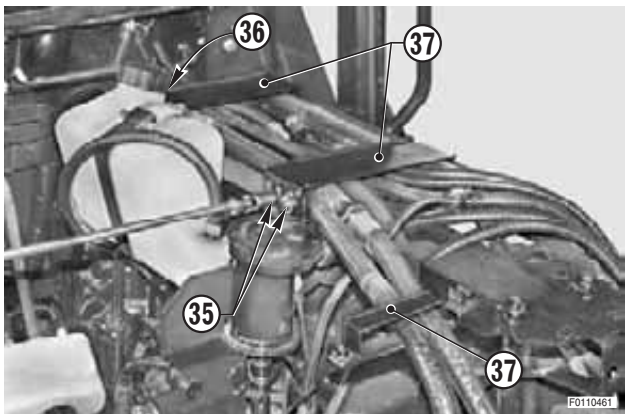


21 - Disconnect the wiring connectors (31) and (32) of the actuator and the brake fluid level sensor.

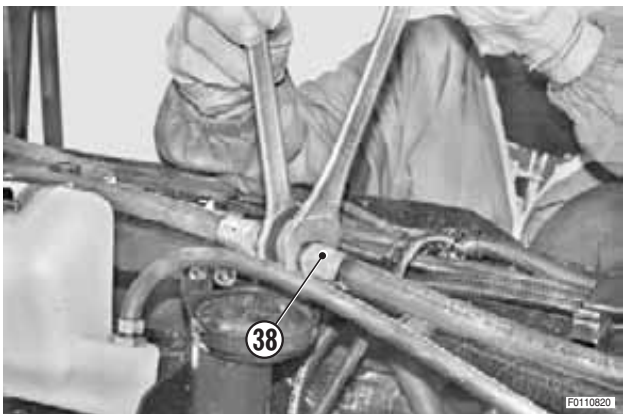
22 - Detach the brake fluid reservoir (33) from the support (34).



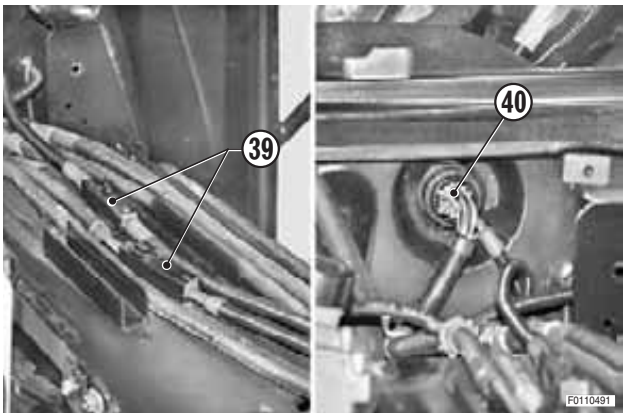
23 - Remove the nuts (35) and the bolt (36) and remove the brackets (37).



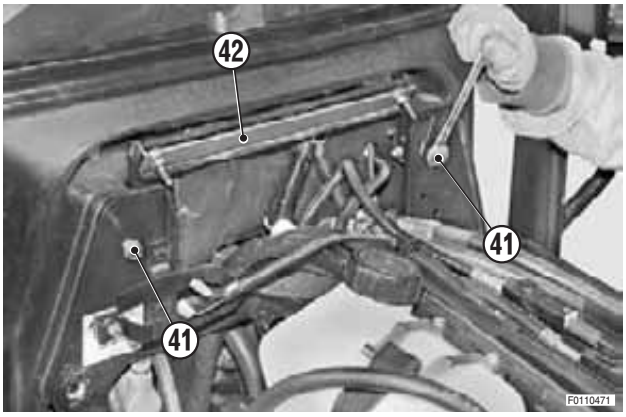
24 - Disconnect the pipe (38).
★ Plug the pipes to prevent the entry of impurities.



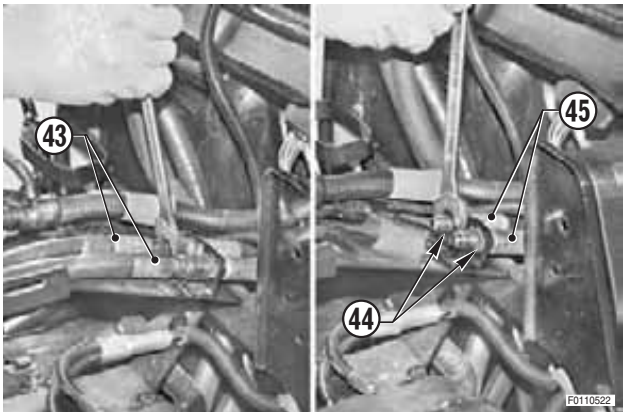
25 - Disconnect the two power supply wiring connectors (39) and the cab wiring connector (40).



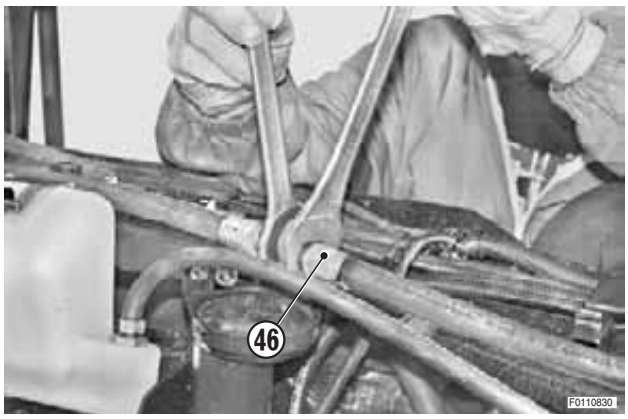
26 - Remove the screws (41) and remove the hood hinge (42).



27 Disconnect the pipes (43) remove the nuts (44) an disconnect the pipes (45) from the support.
★ Plug the pipes to prevent the entry of impurities.
★ Label the pipes to avoid confusion on refitting.

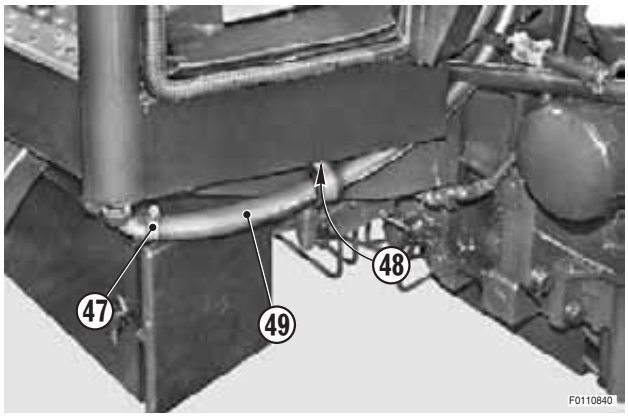


28 - Disconnect the wiring connector (46) of the engine speed sensor.

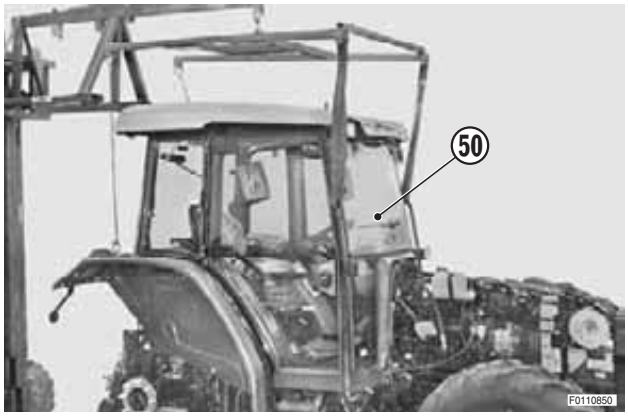


29 - Loosen the hose clamp (47), remove the screw (48) and disconnect the heater hose (49).

★ Repeat the procedure on the opposite side.

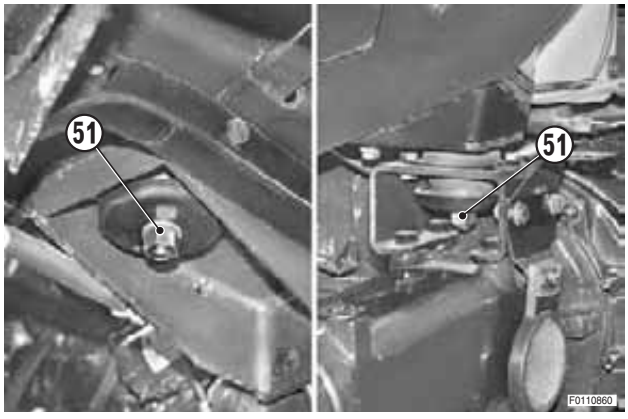


30 - Attach the cab (50) to a suitable hoist and take up the slack in the lifting ropes.

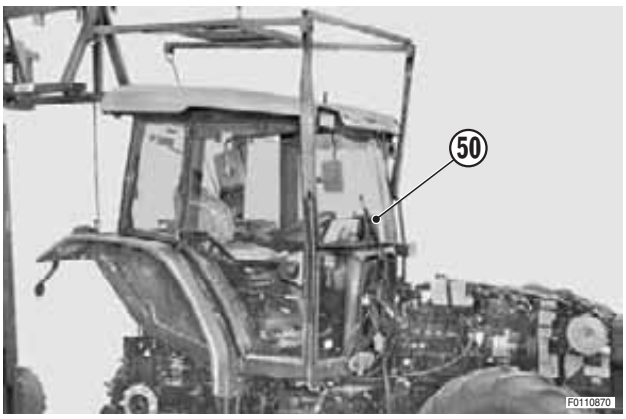


31 - Remove the front and rear nuts (51).

※ 3



32 - Remove the cab (50).



Refitting

- Refitting is the reverse of removal.

※ 1

★ Adjust the parking brake cable, if necessary.

※ 2

★ Bleed the air from the brake circuit.

※ 3

Nm Nuts: 170 Nm (125.3 lb.ft.)

SHUTTLE ASSEMBLY
COMPLETE ASSEMBLY

Removal

⚠ Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil in the transmission.

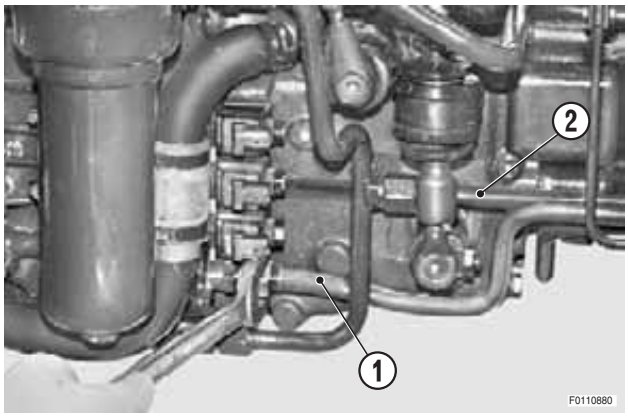
Transmission oil: max 45 l (12 US gall.)

※ 1

2 - Separate the engine from the transmission. (For details, see "ENGINE").

3 - Remove the toolbox.

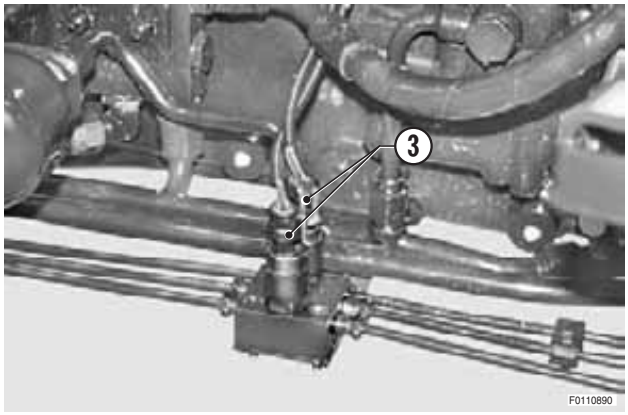
4 - Disconnect the pipes (1) and (2).



• *For versions with "Stop and go" only*

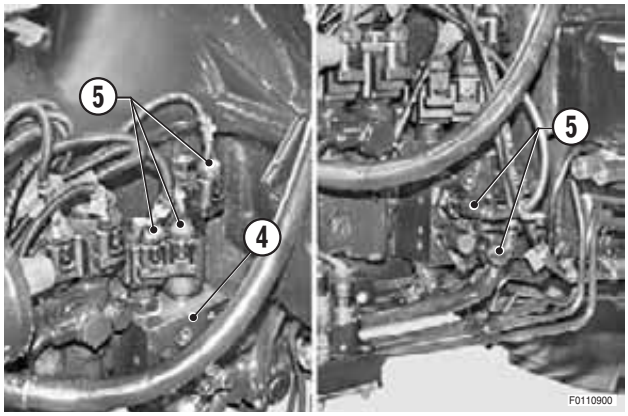
5 - Disconnect the connectors (3).

★ Label the connectors to avoid confusion on refitting.

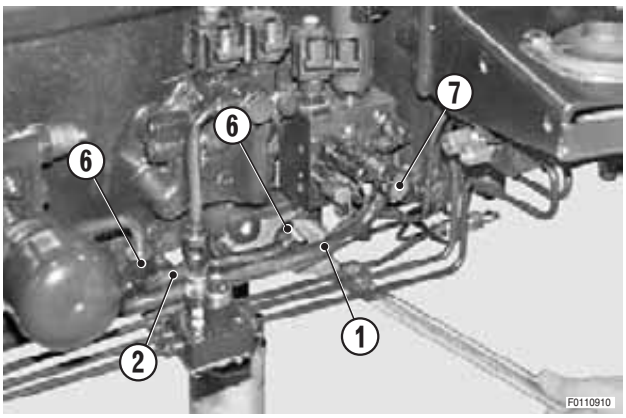


6 - Disconnect the five wiring connectors (5) from the shuttle solenoid valves (4).

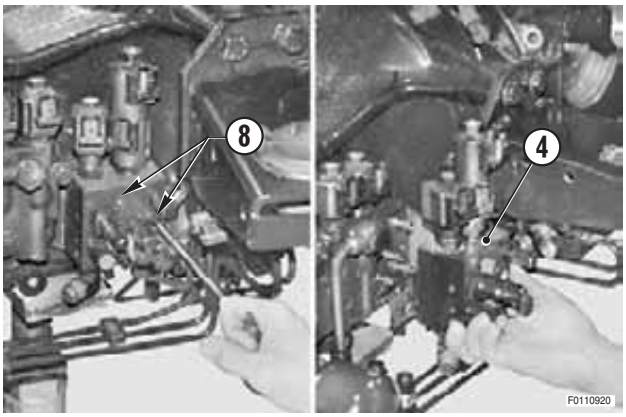
★ Label the connectors to avoid confusion on refitting.



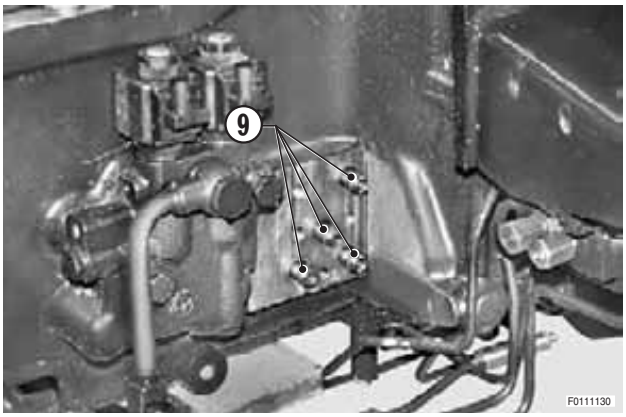
7 - Loosen the unions (6), remove the union (7) andremove the pipes (1) and (2).



8 - Remove the screws (8) and remove the valves assembly (4).

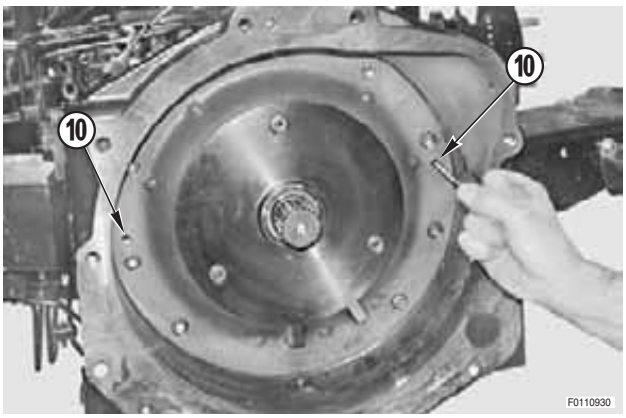


9 - Remove the connection pipes (9).

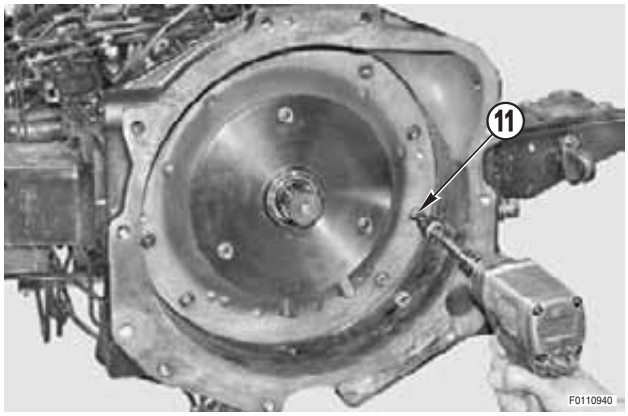


10 - Remove the dowels (10).

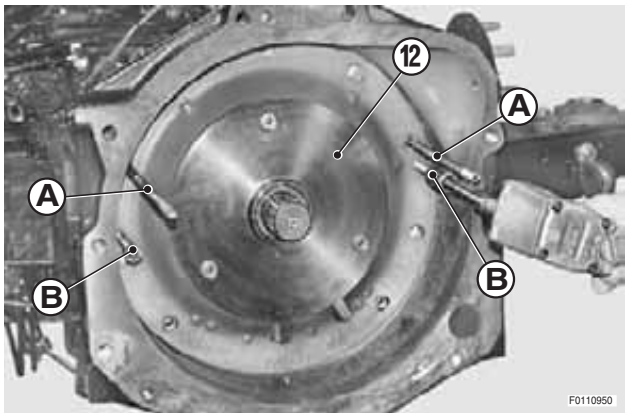
2



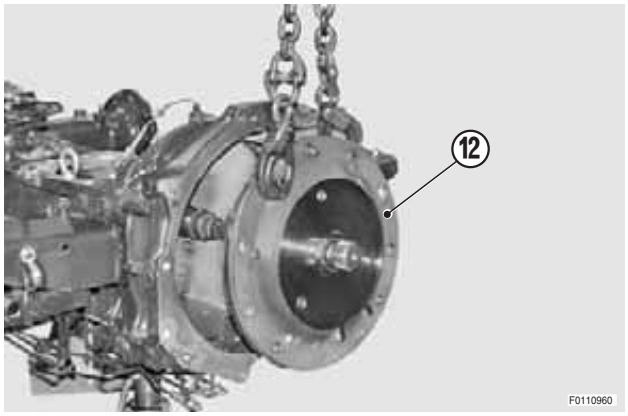
11 - Remove all the screws (11).



12 - Screw in two service stud bolts “*A*” and using two bolts *“B”* as pullers, withdraw the shuttle assembly (12).



13 - Attach the shuttle assembly (12) to a hoistand lift it clear of the tractor. ※ 3



Refitting

- Refitting is the reverse of removal.

※ 1

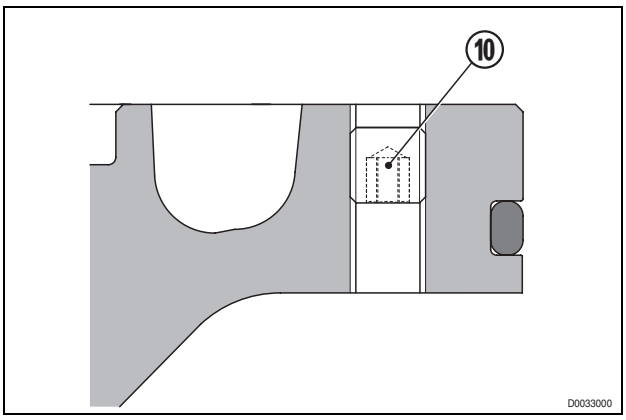
★ Fill the transmission with the required quantity of oil.

Transmission oil: approx. 45 , (12 US gall.)

※ 2

★ Fit the dowels (10) making sure they do not protrude beyond the contact surfaces.

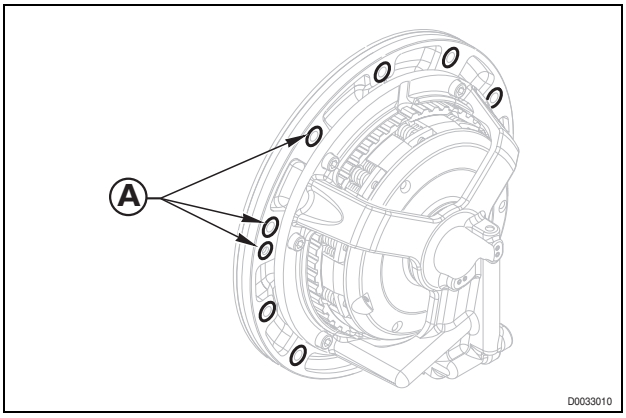
Locating dowels: Loctite 542



※ 3

★ Apply a bead of sealant al around the holes“*A*” .

Mating face: Loctite 510



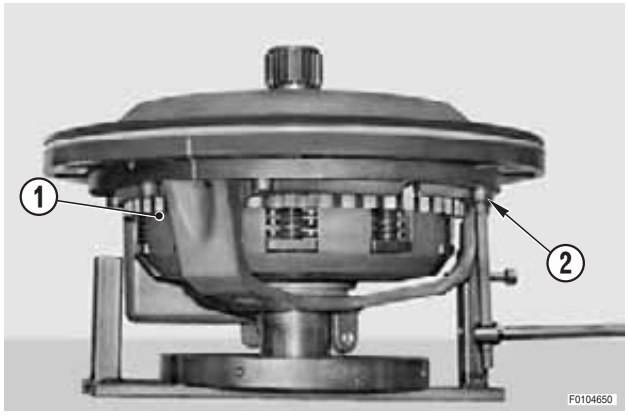
SHUTTLE ASSEMBLY

COMPLETE ASSEMBLY

Disassembly

1 - Position the shuttle assembly (1) on a suitable stand and remove the seven screws (2).

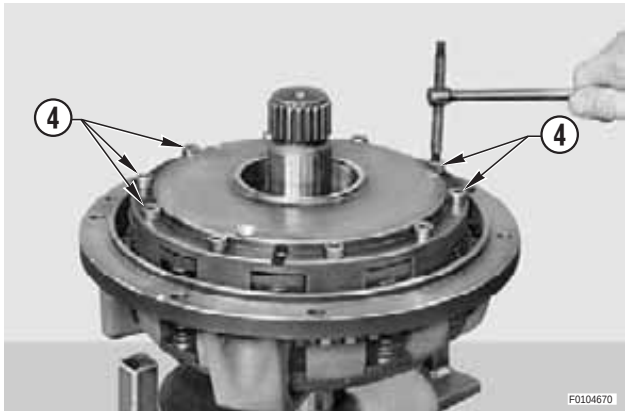
★ Mark the flange (3) and the support to facilitate re-assembly.



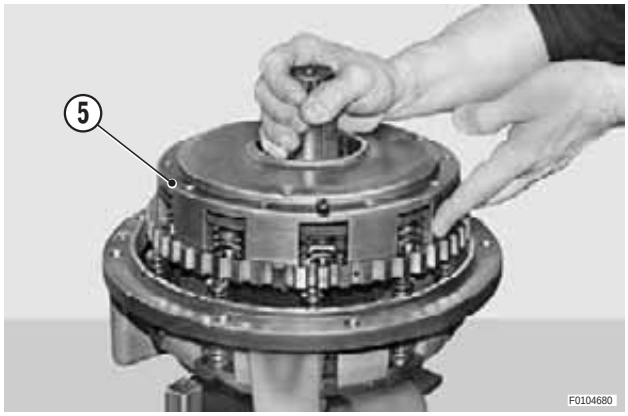
2 - Remove the flange assembly (3).



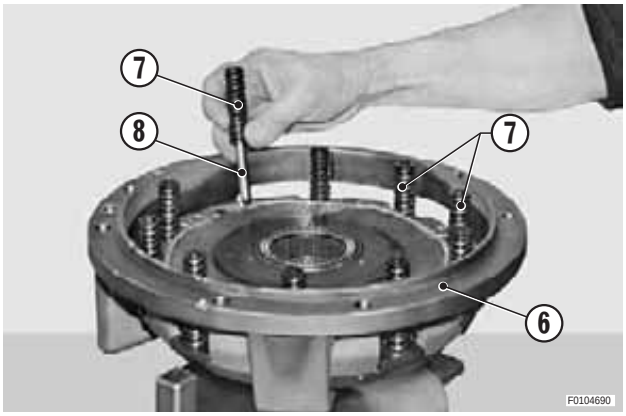
3 - Remove the ten screws (4).



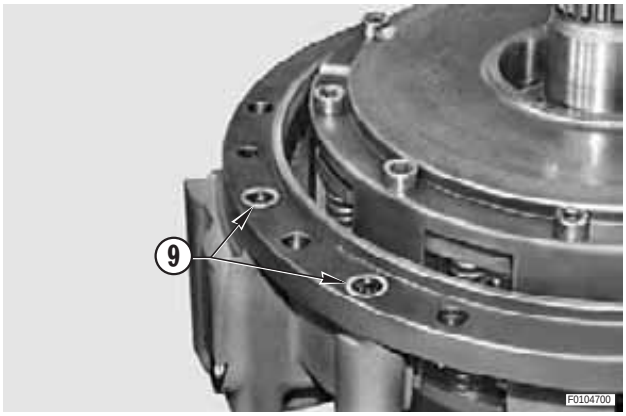
4 - Remove the forward drive clutch assembly (5).



5 - Recover the springs (7) and pins (8) from the reverse drive clutch assembly (6).

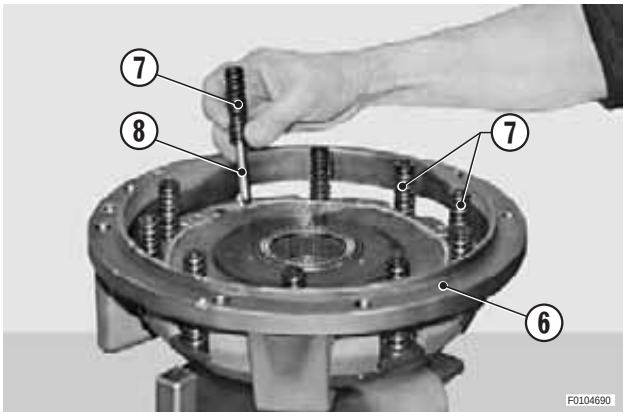


6 - Remove the O-rings (9).
★ Renew the O-rings on reassembly.

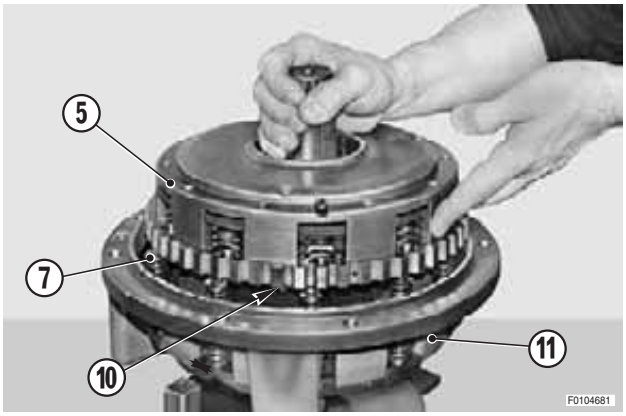


Assembly

1 - Locate the springs (7) and pins (8) in the clutch assembly (6).



2 - Position the clutch assembly (5) making sure the springs (7) locate in the holes and that the locating dowel (10) is aligned with the corresponding bore in the clutch housing (11).

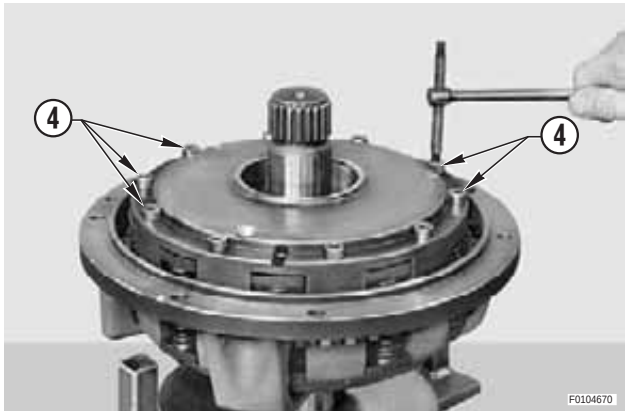


3 - Tighten the screws (4).

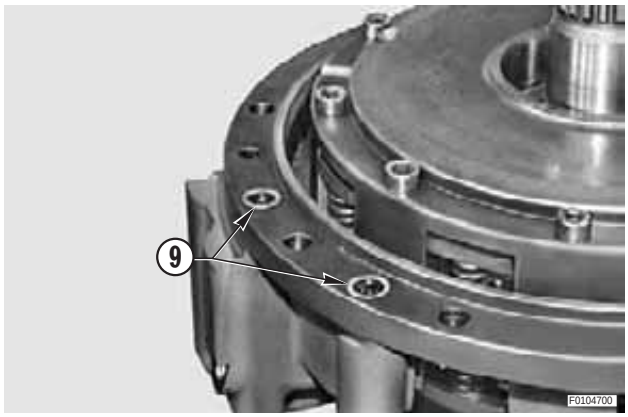
Nm Screws: 20 Nm (29.5 lb.ft.)

Screws: Loctite 242

★ Tighten the screws gradually in crosswise sequence.



4 - Fit the new O-rings (9).



5 - Position the flange (3) taking care to align the marks made during disassembly or the dowel (12).

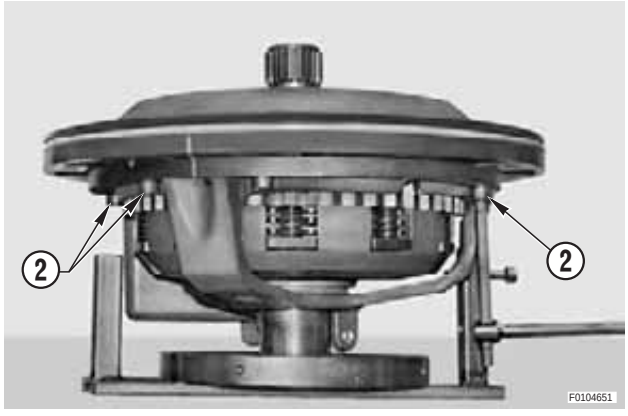
★ Lubricate the lip of the oil seal with hydraulic oil.



6 - Tighten the screws (2).

Nm Screws: 40 Nm (29.5 lb.ft.)

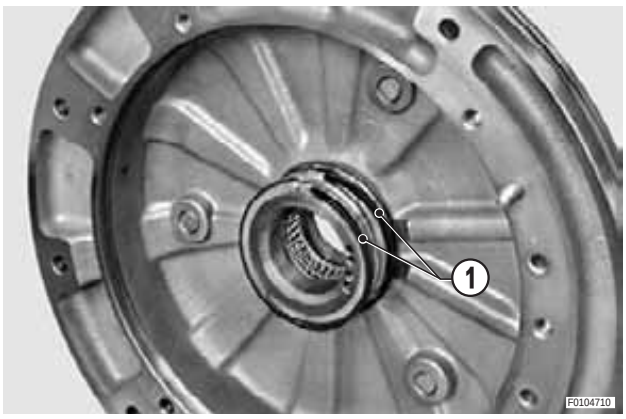
Screws: Loctite 242



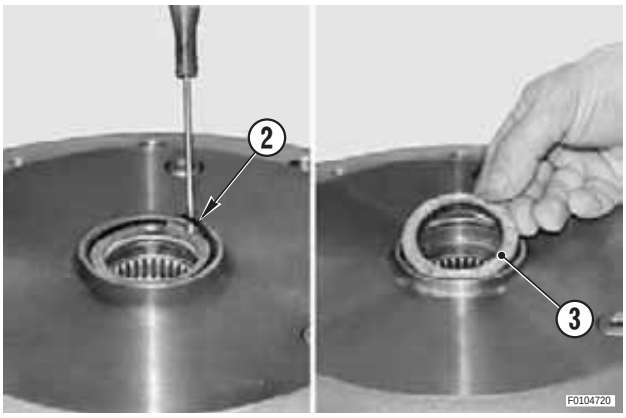
COVER ASSEMBLY

Disassembly

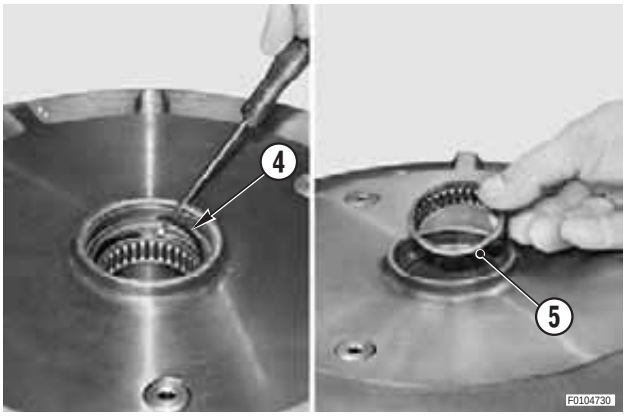
1 - Remove the seals (1). ※1



2 - Remove the circlip (2) and remove the oil seal (3).
★ Renew the oil seal on reassembly.
※2



3 - Remove the circlip (4) and , using a suitable drift or puller, remove the roller cage (5).



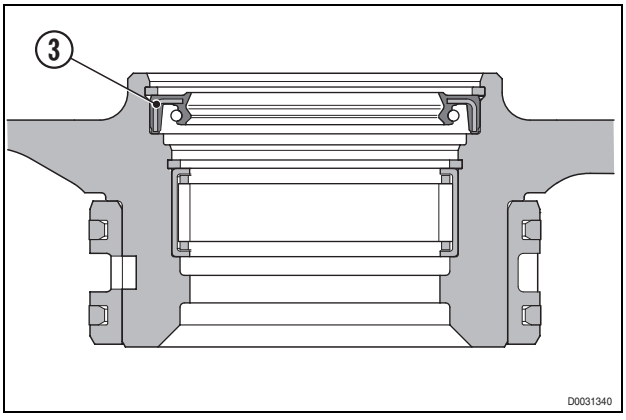
Assembly

※1

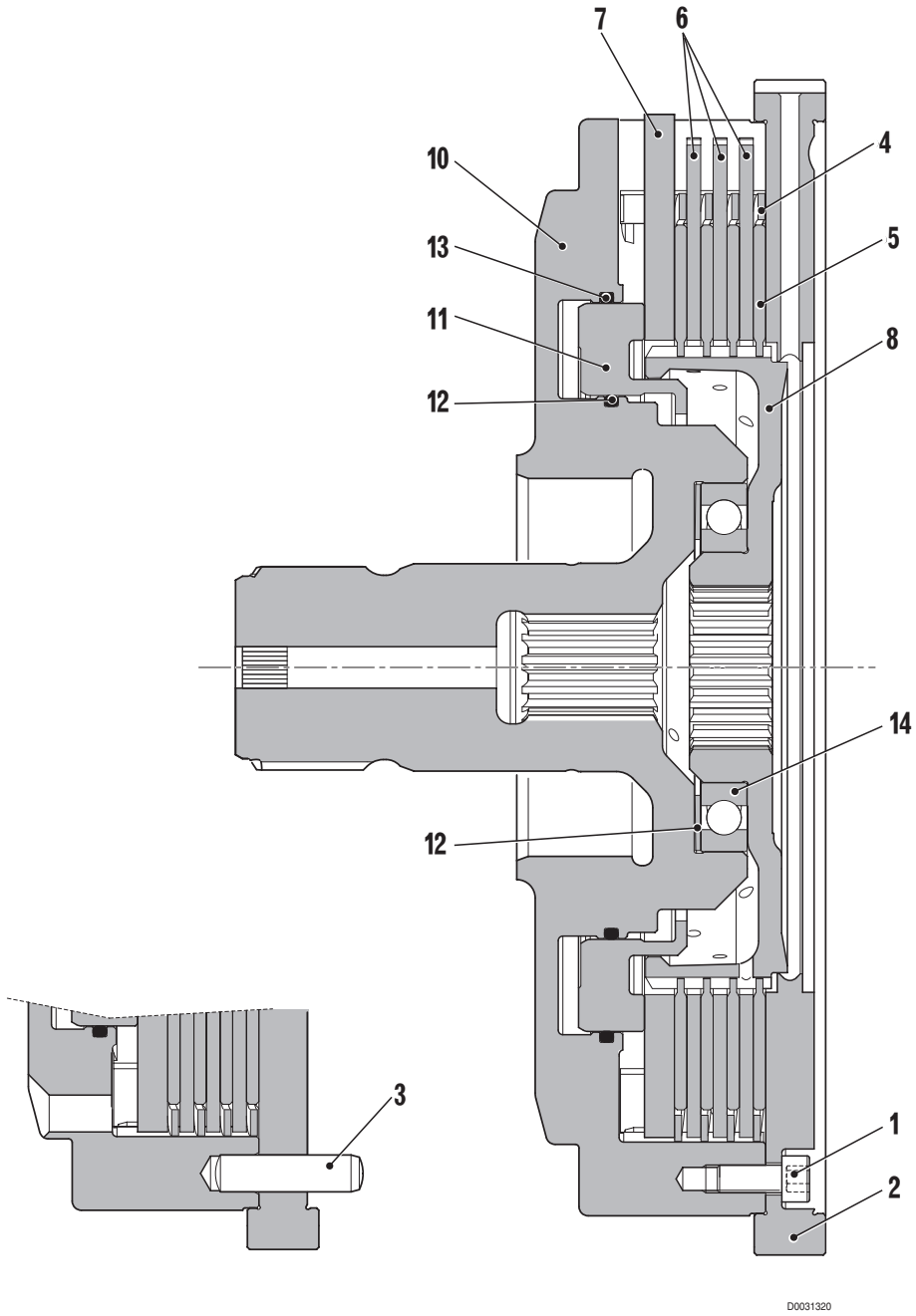
Seal rings: hydraulic oil

※2

★ Take care to install the oil seal (3) the right way round.

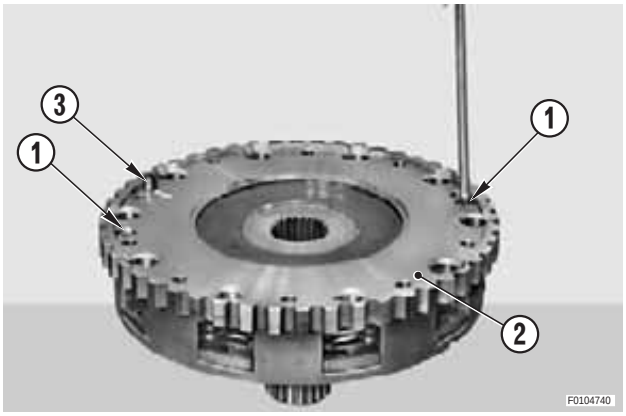


FORWARD DRIVE CLUTCH ASSEMBLY

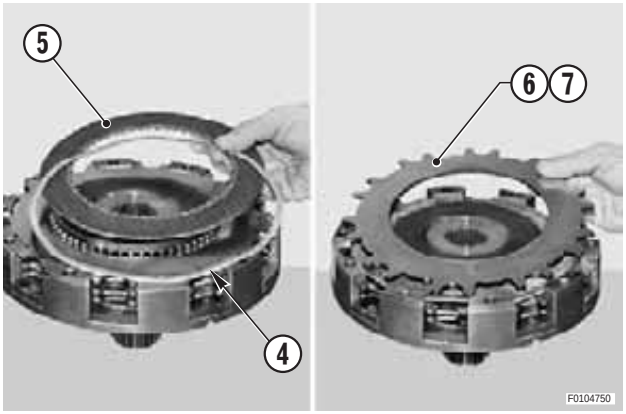


Disassembly

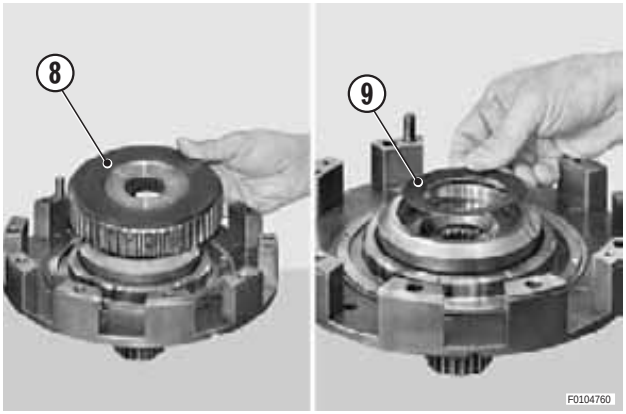
1 - Remove the two screws (1) and remove the disc (2).
★ Mark the hole for fitting the pin (3).



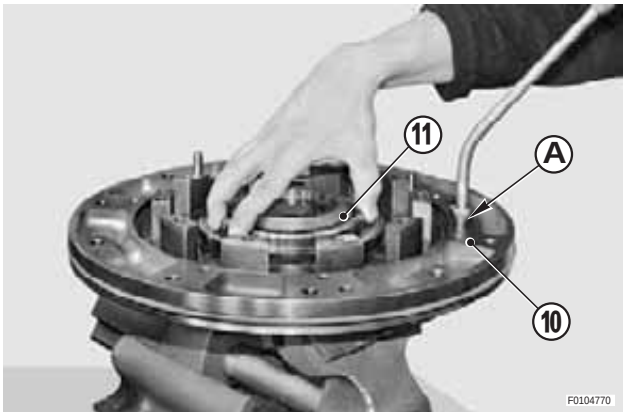
2 - Remove the clutch pack assembly, composed of four 4 corrugated springs (4), four friction plates (5), three3 mm thick steel plates (6) and one 6.5 mm thick steel plate (7).
★ Keep the friction and steel plates in the order they were removed.



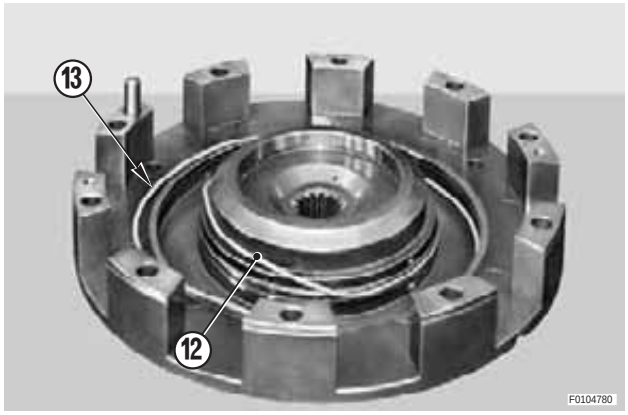
3 - Remove the hub (8) and recover the Belleville spring (9).



4 - Blow compressed air at low pressure through hole "*A*" of the clutch housing (10) to drive out the piston (11).
★ Restrain the piston (11) as it could be expelled at high speed and thus damaged.

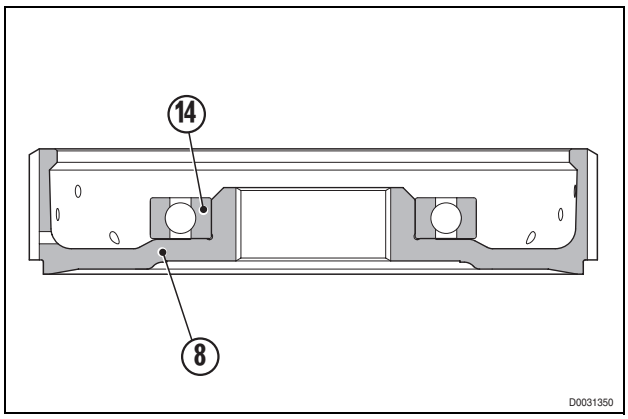


5 - Check the condition of the O-rings (12) and (13) and renew them if necessary.



• *Only if necessary*

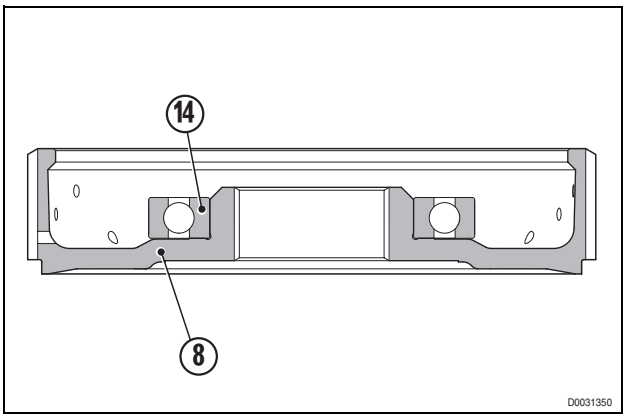
6 - Remove the bearing (14) from the hub (8).



Assembly

• *Only if removed*

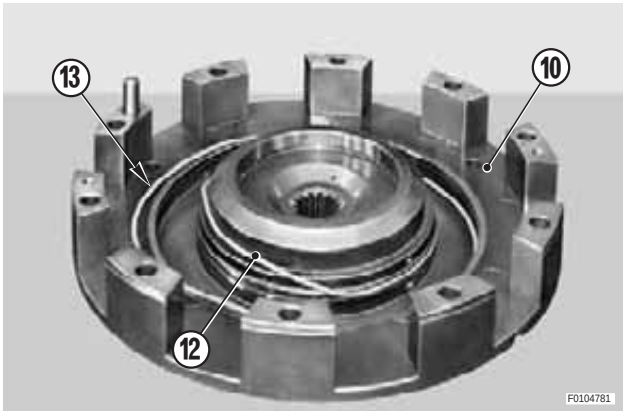
1 - Using a suitable drift, fit the bearing (14) on the hub (8).



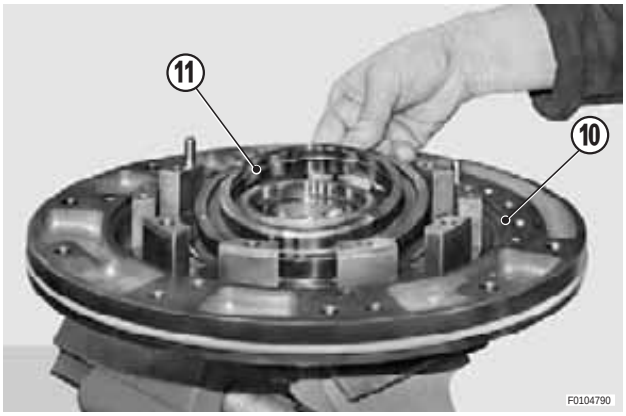
2 - Fit the O-rings (12) and (13) in the clutch housing (10).

★ To facilitate installation of the O-ring (13), stretch it slightly at various points all around the circumference so that it is held in place in its seating.

O-ring: hydraulic oil.

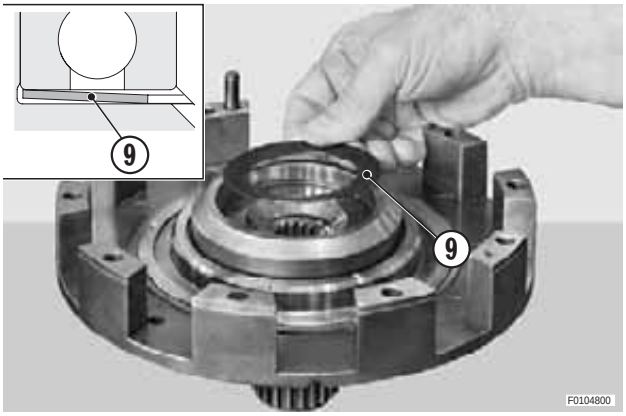


3 - Fit the piston (11) in the clutch housing (10) and make sure it is properly seated.

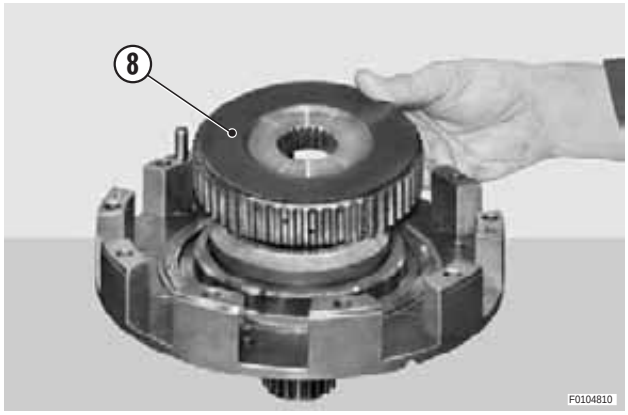


4 - Position the Belleville spring (9) in the clutch housing.

★ Take care to install the Belleville spring (9) the right way round.



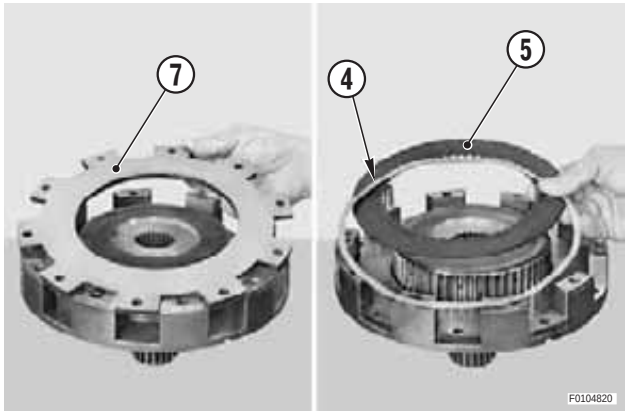
5 - Fit the hub (8) and make sure the bearing (14) is properly seated against the Belleville spring (9).



6 - Fit the first steel plate (7), the friction plate (5) and corrugated spring (4).

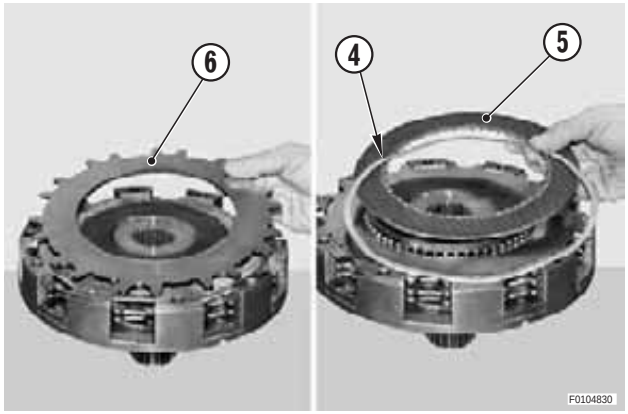
★ Make sure that steel plate (7) is 6.5 mm thick.

Friction plate: hydraulic fluid



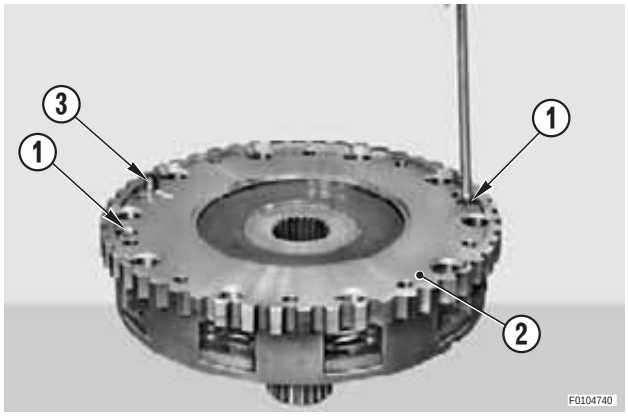
7 - Complete the clutch pack by fitting a steel plate (6), friction plate (5) and corrugated spring (4) in sequence.

Friction plates: hydraulic oil

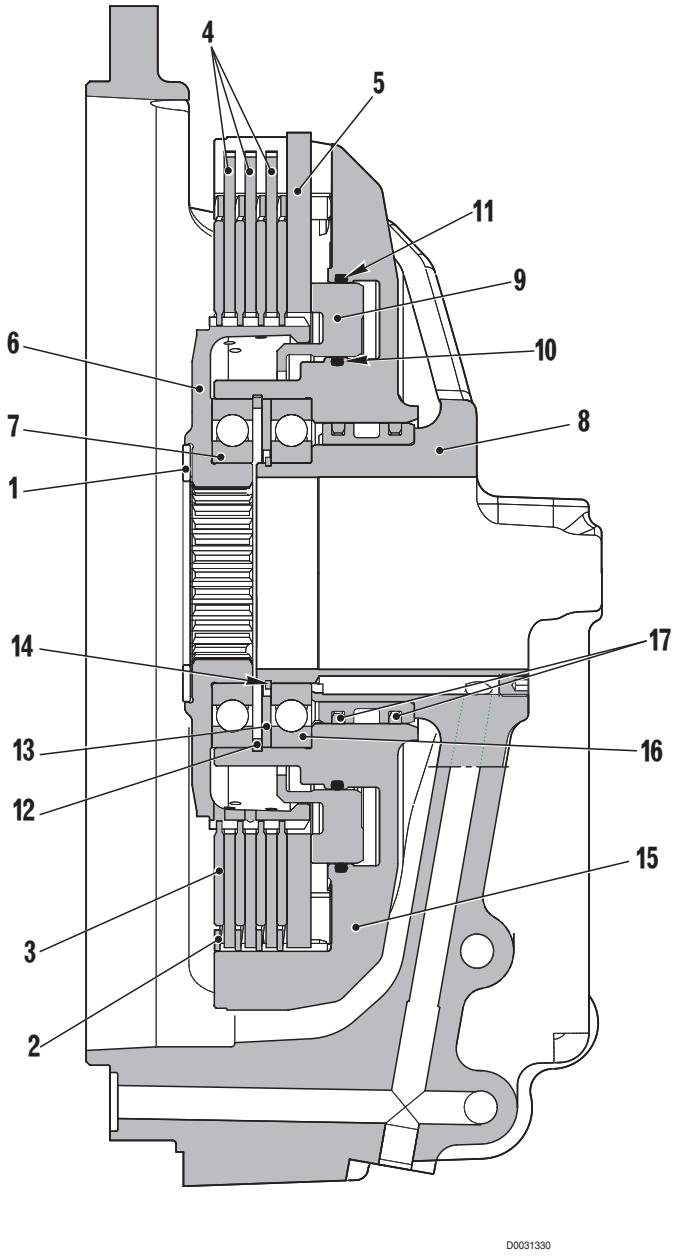


8 - Fit the plate (2) and secure it in position with the bolts (1).

★ Orient the plate so as to insert the pin (3) in the hole marked during disassembly.



REVERSE DRIVE CLUTCH ASSEMBLY



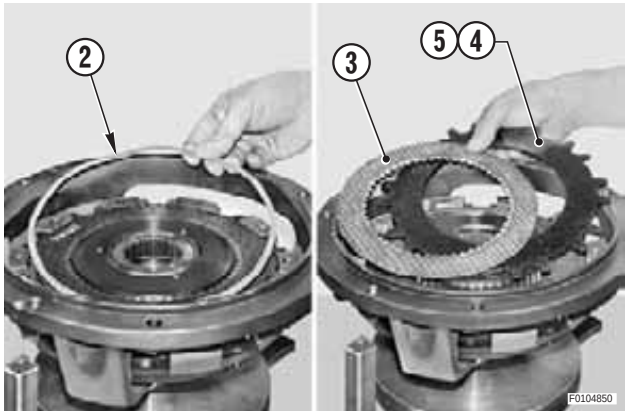
Disassembly

1 - Remove the roller cage (1).

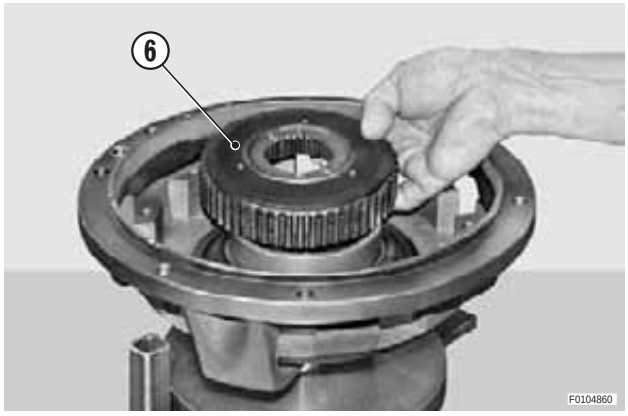


2 - Remove the clutch pack assembly, composed of four corrugated springs (2) four friction plates (3), three steel plates (4) 3 mm thick and one steel plate (5) 6.5 mm thick.

★ Keep the friction and steel plates in the order they were removed.

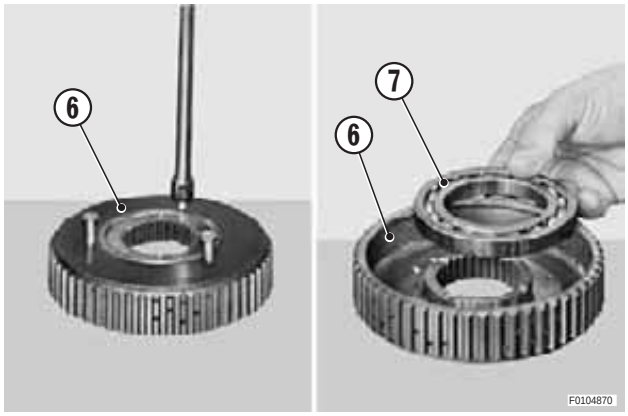


3 - Remove the hub (6)



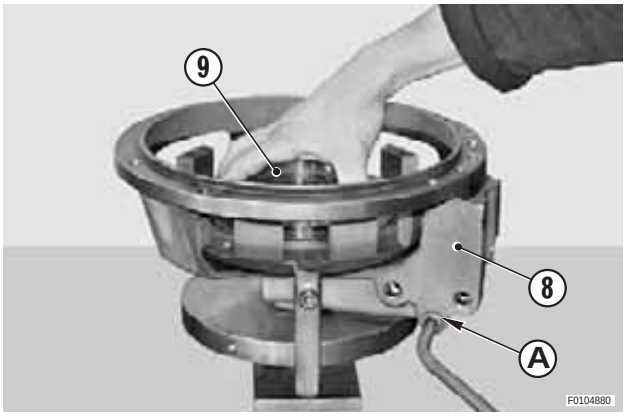
• *Only if necessary*

4 - Using three bolts as a puller, remove the bearing (7) from the hub (6).

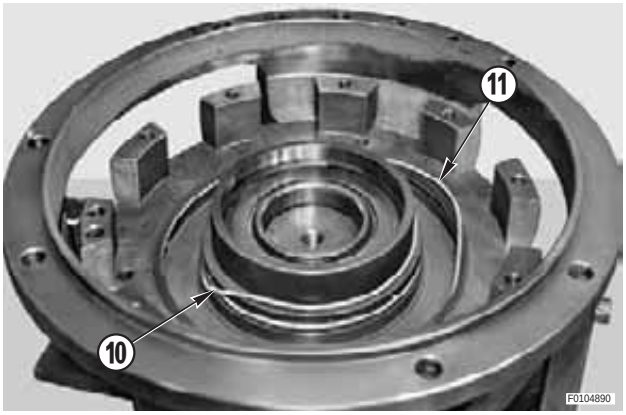


5 - Blow compressed air at low pressure through hole "*A*" of the support (8) to drive out the piston (9).

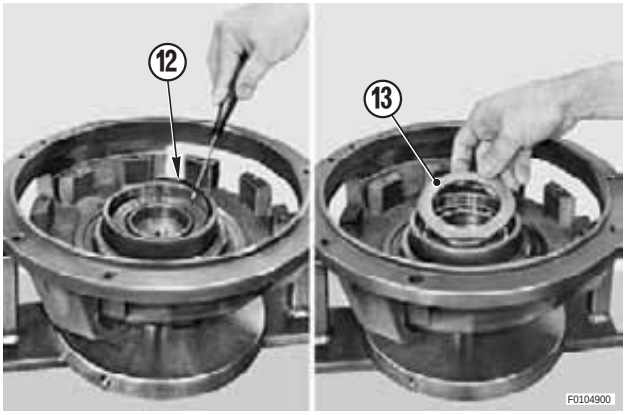
★ Restrain the piston (9) as it could be expelled at high speed and thus damaged.



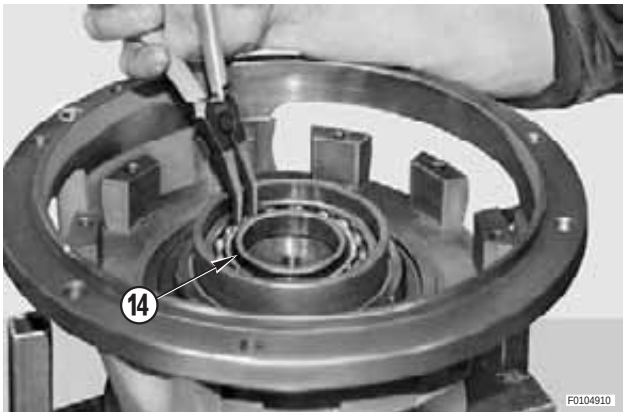
6 - Check the condition of the O-rings (10) and (11) and renew them if necessary.



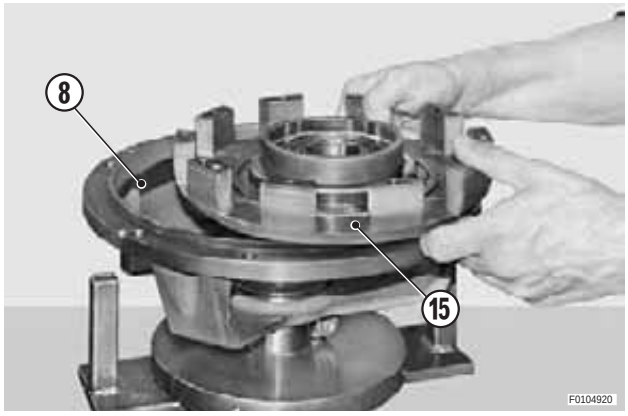
7 - Remove the circlip (12) and remove the spacer (13).



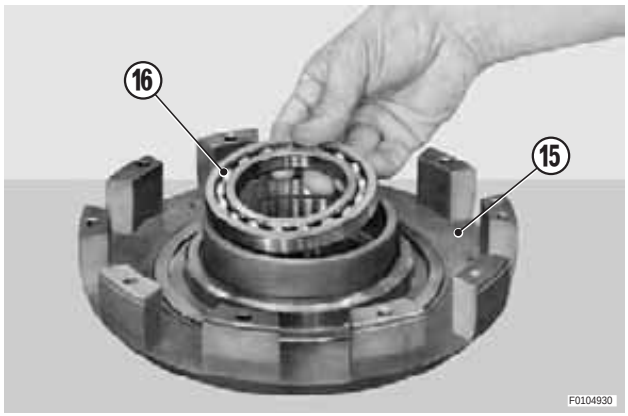
8 - Remove the circlip (14).



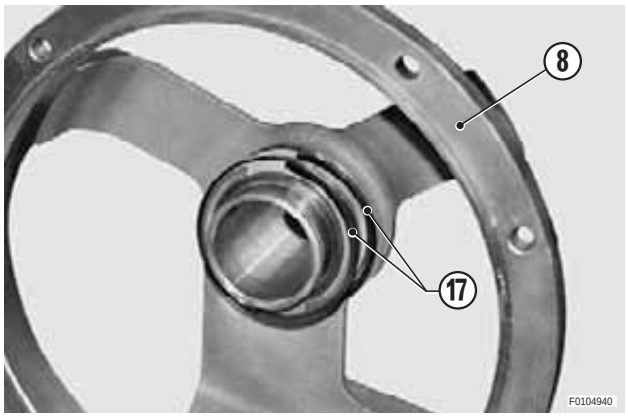
9 - Extract the clutch housing (15) from the support (8).



10 - Remove the bearing (16) from the clutch housing (15).



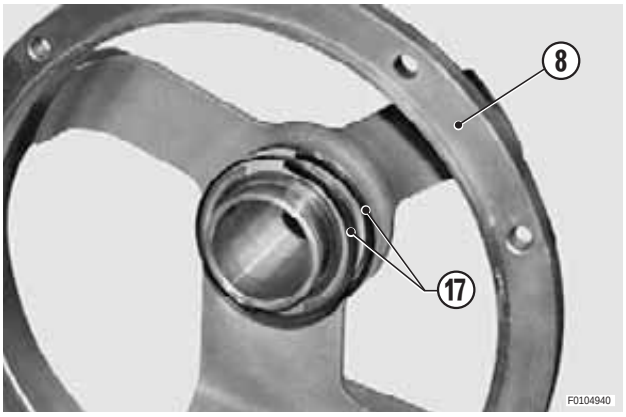
11 - Remove the sealing rings (17) from the support (8).



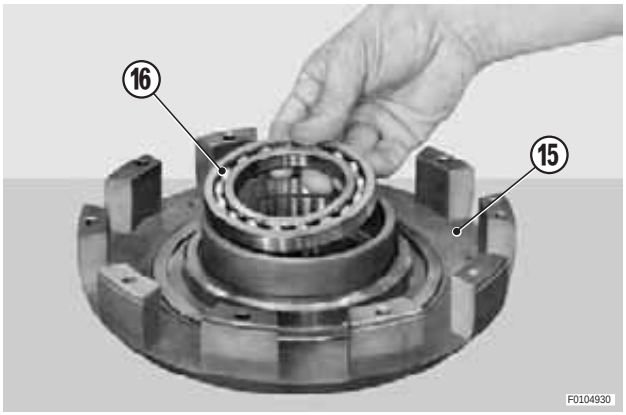
Assembly

1 - Fit the sealing rings (17) on the support (8).

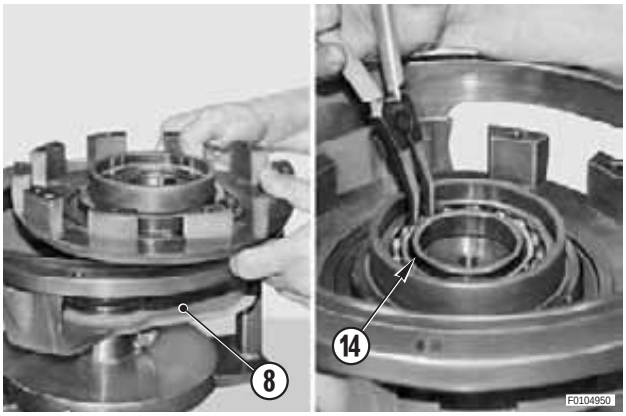
Seal rings: Hydraulic oil



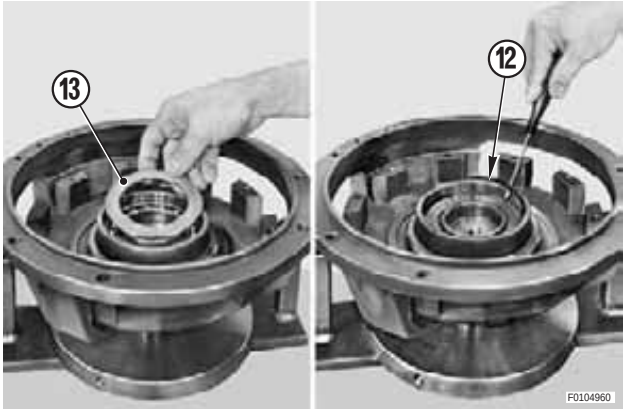
2 - Insert the bearing (15) in the clutch housing (16).



3 - Fit the clutch housing on the support (8) and secure it in position with the circlip (14).



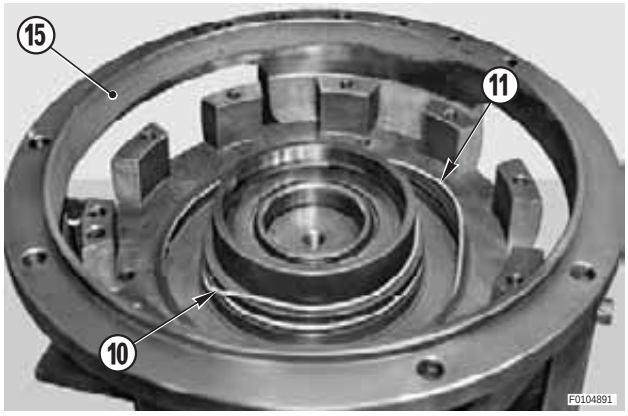
4 - Fit the spacer (13) and secure it in position with the circlip (12).



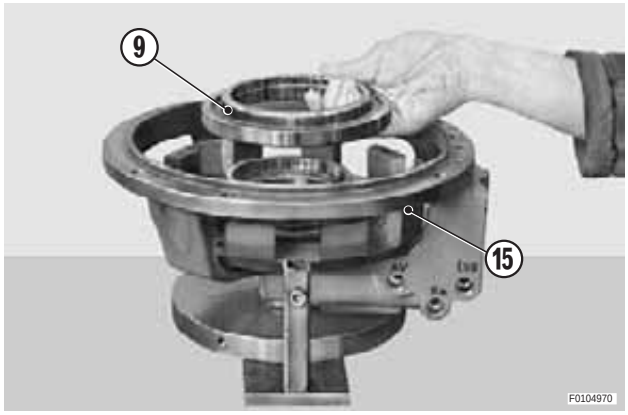
5 - Fit the O-rings (10) and (11) in the clutch housing (15).

★ To facilitate installation of the O-ring (11), stretch it slightly at various points all around the circumference so that it is held in place in its seating.

Friction plates: hydraulic oil.

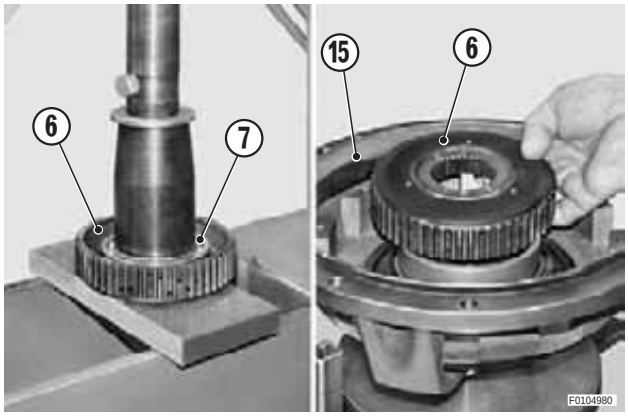


6 - Fit the piston (9) in the clutch housing (15) and make sure it is properly seated.

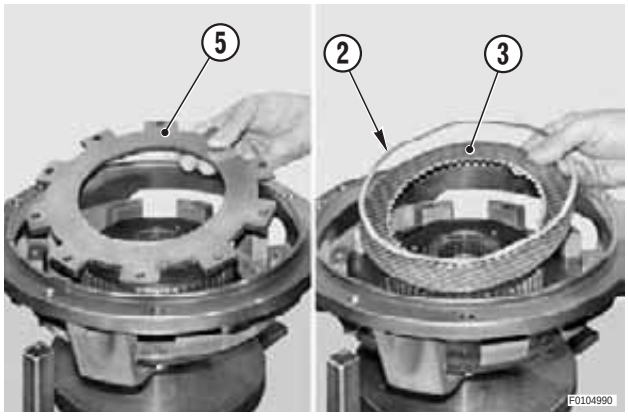


7 - Using a press and suitable drift, install the bearing (7) on the hub (6).

8 - Fit the hub (6) on the clutch housing (15).

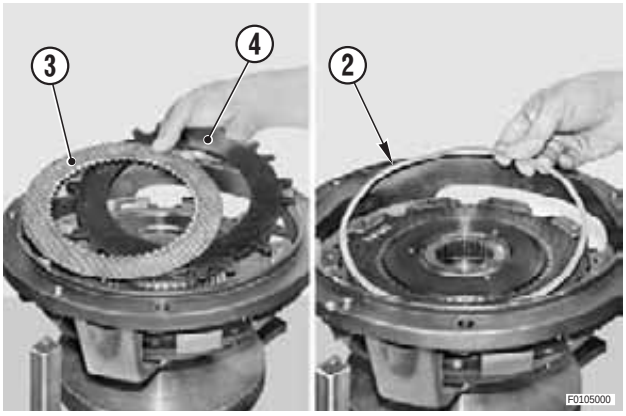


9 - Fit the first steel plate (5), the friction plate (3) and the corrugated spring (2).

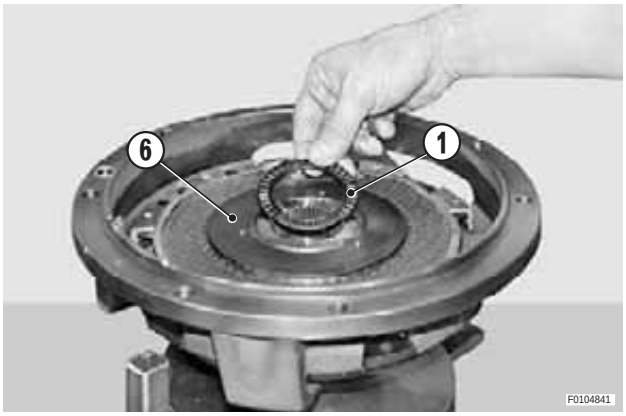


10 - Complete the clutch pack by fitting a steel plate (4), friction plate (3) and corrugated spring (2) in sequence.

Friction plates: hydraulic oil.



11 - Position the roller cage (1) on the hub (6).



HML UNIT
COMPLETE ASSEMBLY

Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil in the transmission.

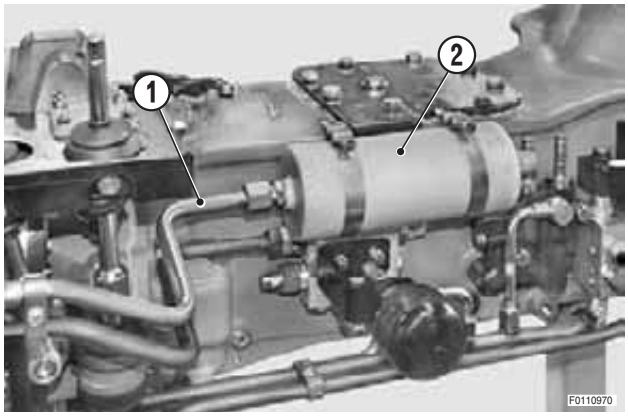
Transmission oil: approx. 45 l (12 US gall.)

2 - Remove the cab
(For details, see "CAB").

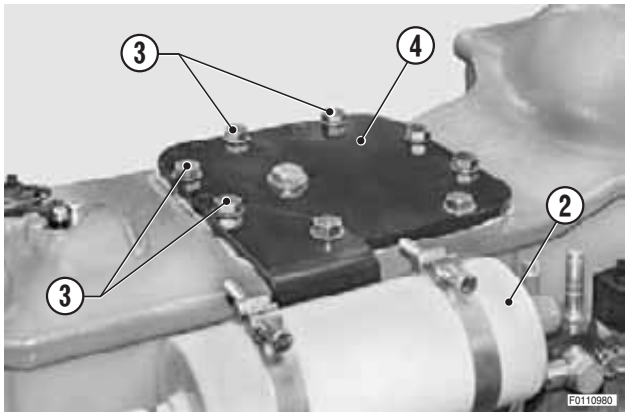
3 - Separate the engine from the transmission.
(For details, see "ENGINE").

4 - Remove the shuttle assembly.
(For details, see "SHUTTLE ASSEMBLY").

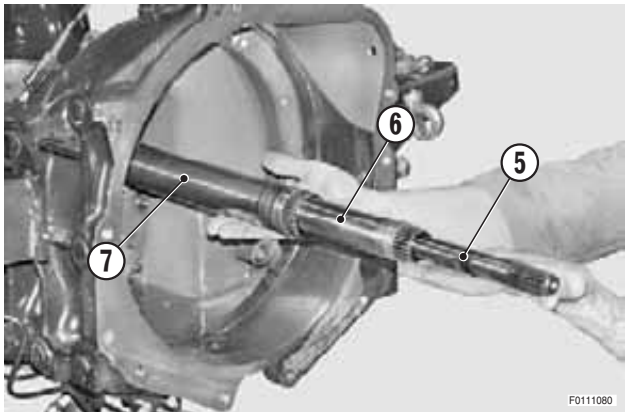
5 - Disconnect the pipe (1) from the resonator (2).



6 - Remove the screws (3) and remove the resonator (2) and the cover (4). ※ 2

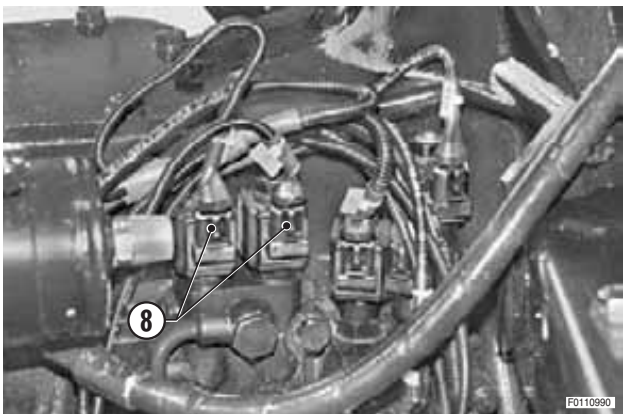


7 - Withdraw the PTO drive shafts (5), the forward gear (6) and the reverse gear (7) from the clutch housing.



8 - Disconnect the wiring connectors (8).

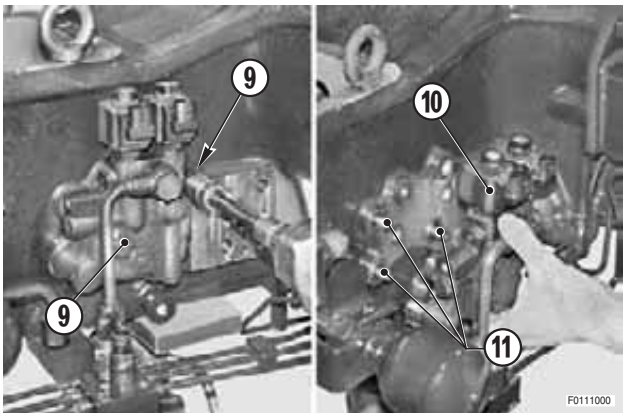
★ Label the connectors to avoid confusion on refitting.



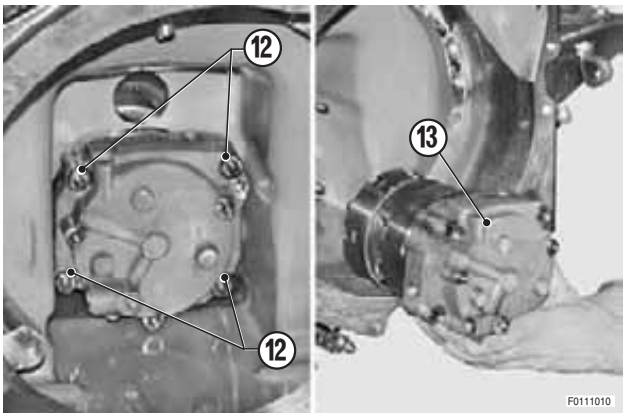
9 - Remove the screws (9) and remove the HML unit control valve (10).

10 - Remove the connection pipes (11).

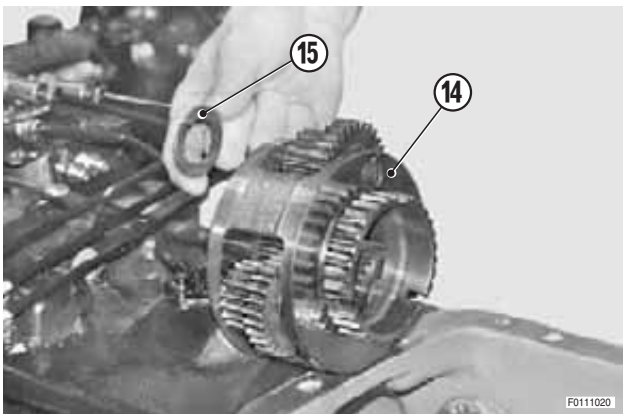
※ 3



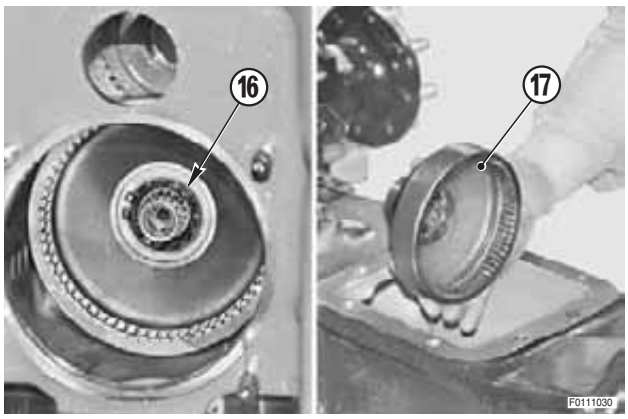
11 - Remove the nuts (12) and remove the HML (13).



12 - Remove the planet carrier (14) and the spacer (15).



13 - Remove the circlip (16) and withdraw the drum(17).



Refitting

- If the HML unit was removed in order to overhaul the clutches, refit the unit by following the removal steps in reverse order.
- In all other cases, check the end float of the reduction unit (for details, see “Checking the reduction unit end float” in this chapter) and then refit the unit by following the removal steps in reverse order.

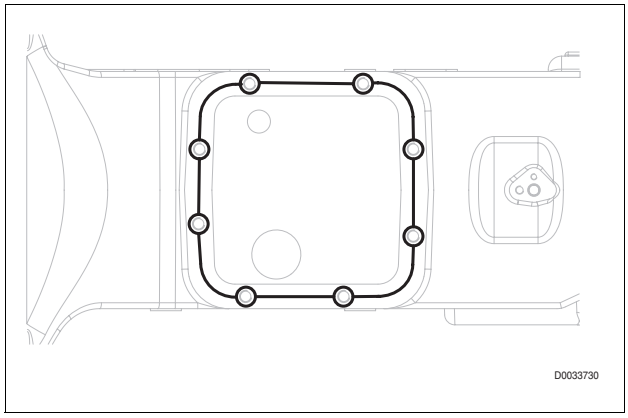
※ 1

★ Fill the transmission with the required quantity of oil.

Oil: approx. 45 l (12 US.gall.)

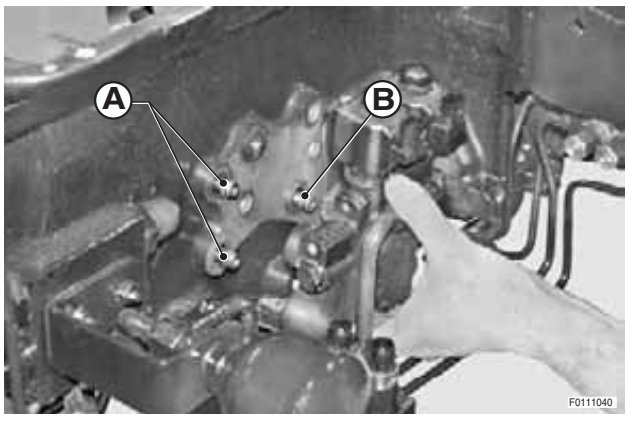
※ 2

Mating face: Loctite 510



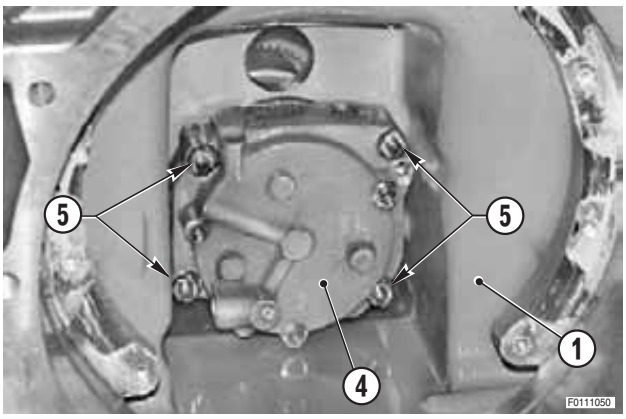
※ 3

★ Fit the pipes in the position indicated:
- Pipes “*A*”: Pipes “*B*”: length 87 mm: Length 64 mm



Checking the reduction unit end float

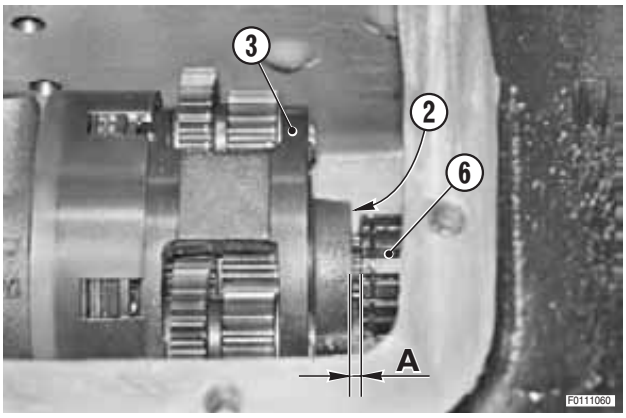
1 - Install temporarily the spacer (2), planet carrier (3) and the HML unit (4) in the clutch housing (1) , and secure them in position with the nuts (5).

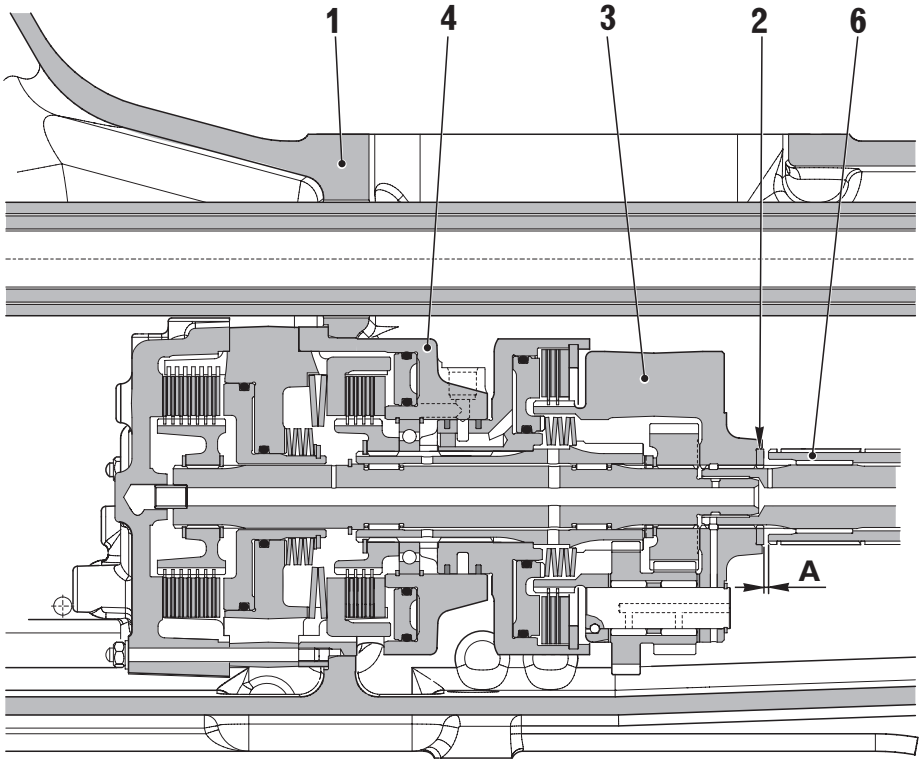


2 - With a feeler gauge, check that the residual clearance "*A*" between the spacer (2) and the secondary shaft (6) is within the specified limits

★ Normal clearance "*A*": 1 to 1.15 mm

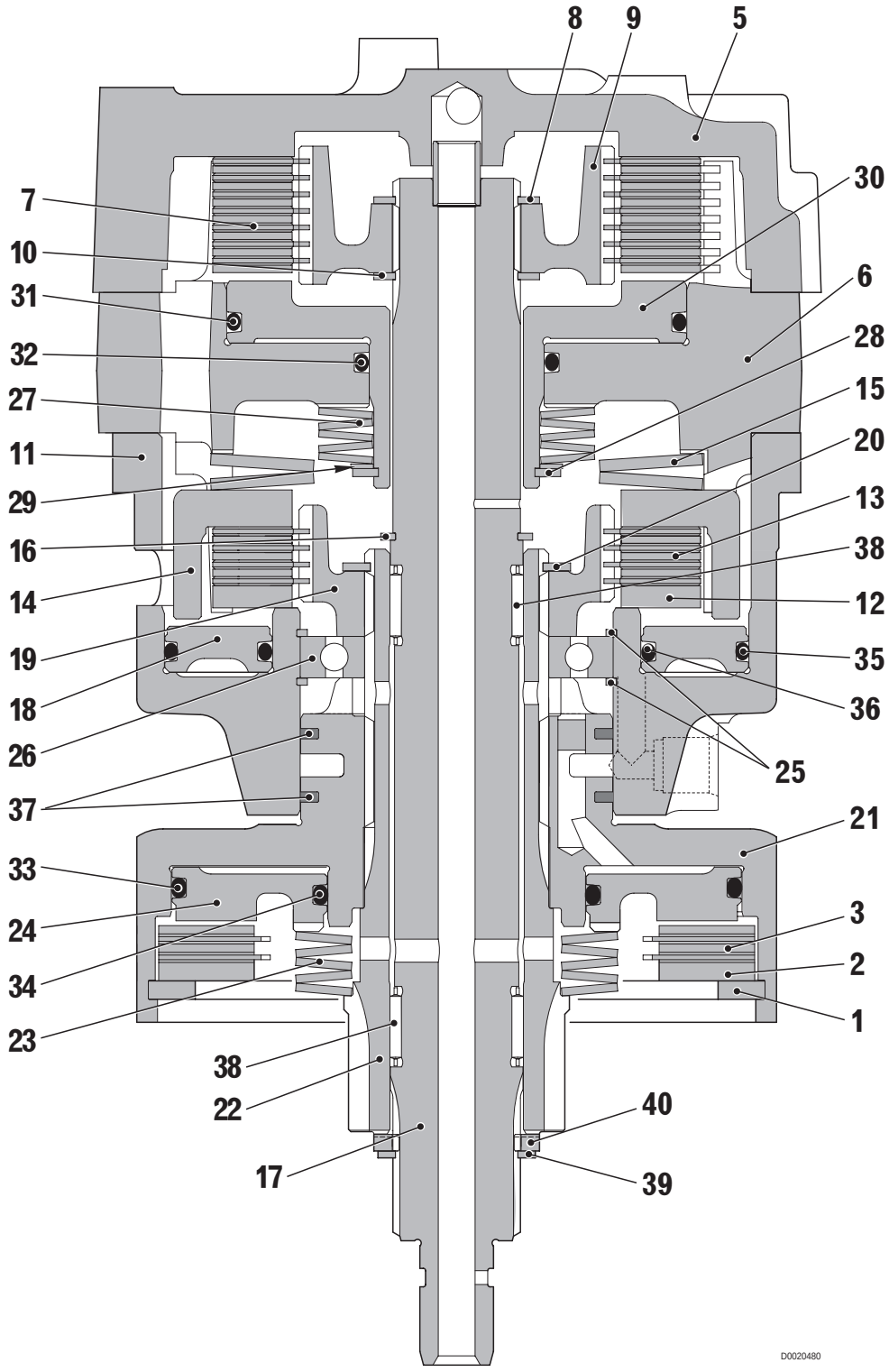
3 - If the clearance is not within the specified tolerance limits, adjust it by fitting a different spacer (2).



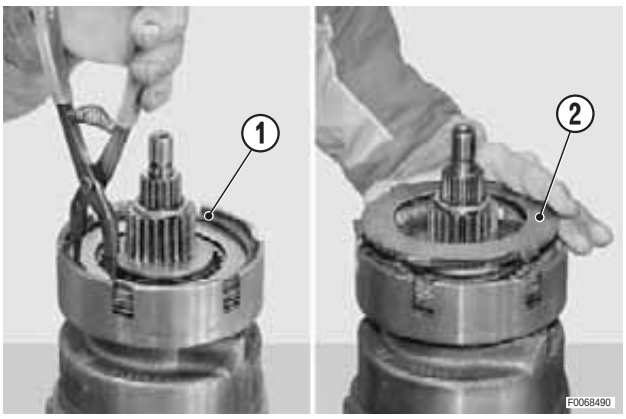


CLUTCHES ASSEMBLY

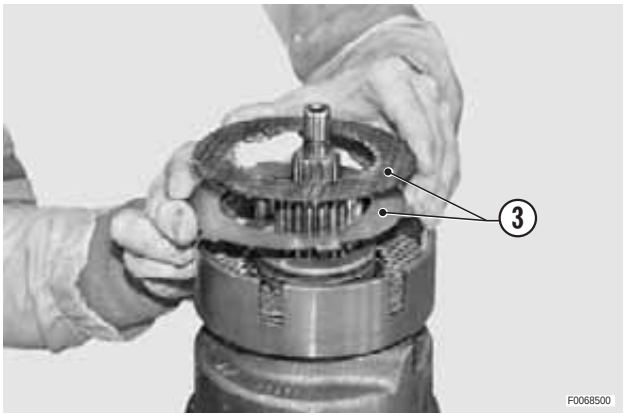
Disassembly



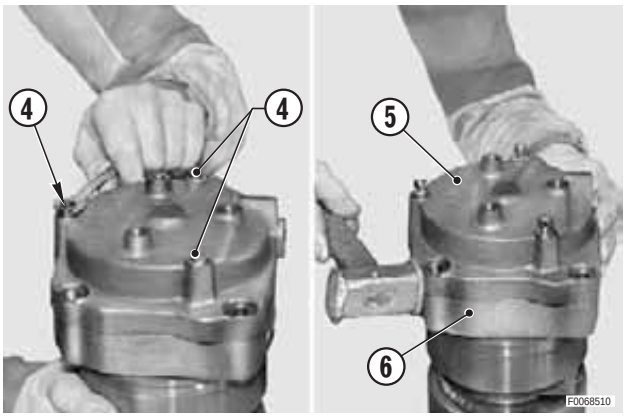
1 - Remove the circlip (1) and withdraw the steel plate (2).



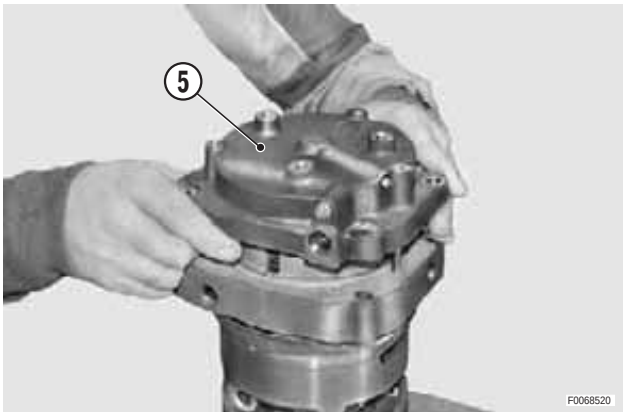
2 - Remove the H range clutch pack (3).



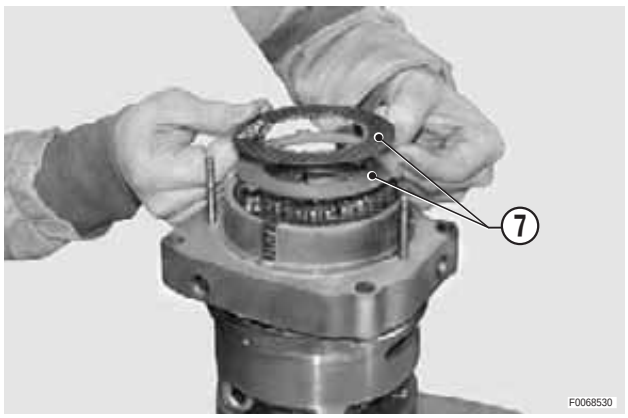
3 - Loosen the nuts (4) and, using a soft mallet, separate the cover (5) and the “L” range clutch housing (6) from the rest of the assembly.



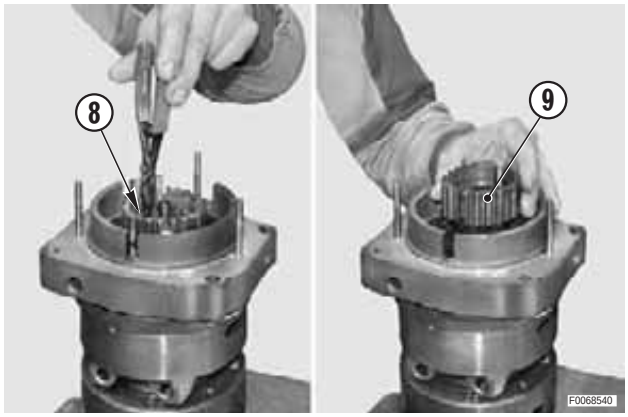
4 - Remove the nuts (4) and remove the cover (5).



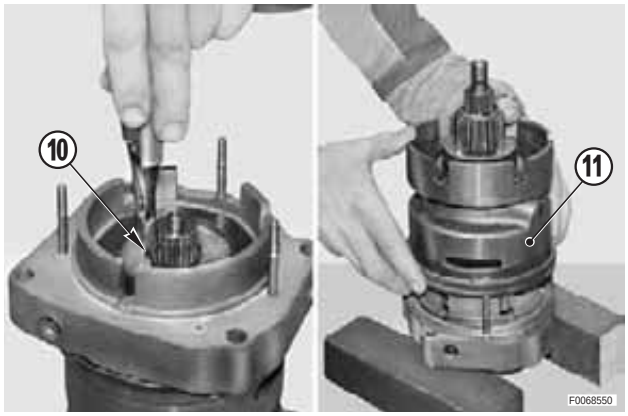
5 - Remove the “L” range clutch pack (7).



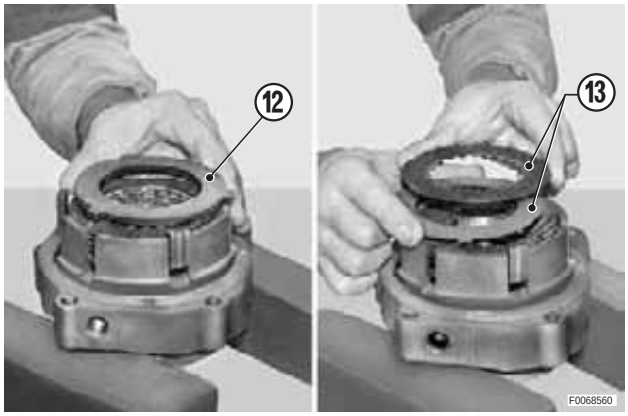
6 - Remove the circlip (8) and withdraw the hub (9).



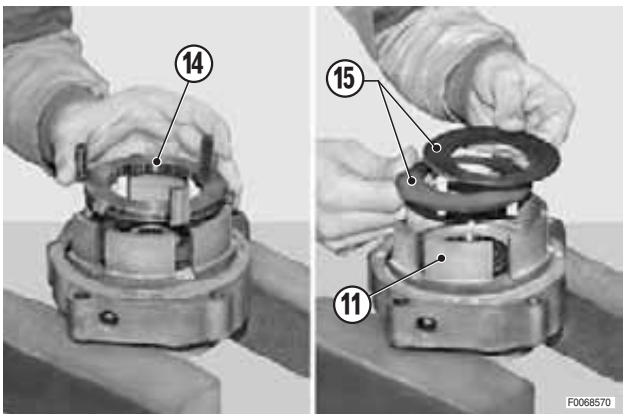
7 - Remove the circlip (10), turn the assembly over and remove the “M” range clutch housing (11).



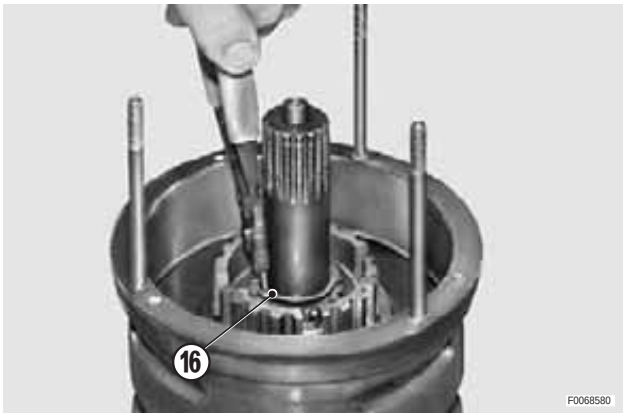
8 - Remove the steel plate (12) and remove the “M” range clutch pack (13).



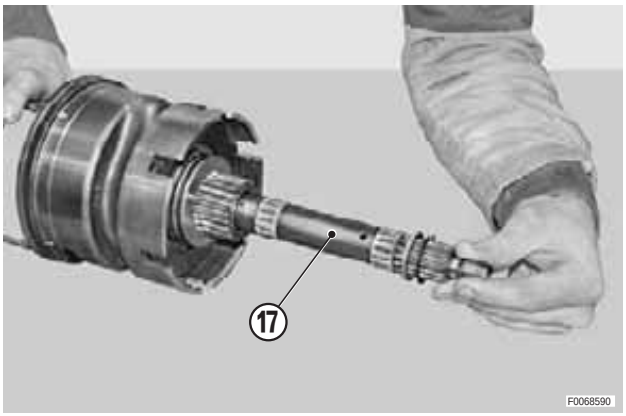
9 - Remove the retaining plate (14) and the Belleville springs (15) from the “M” clutch housing (11).



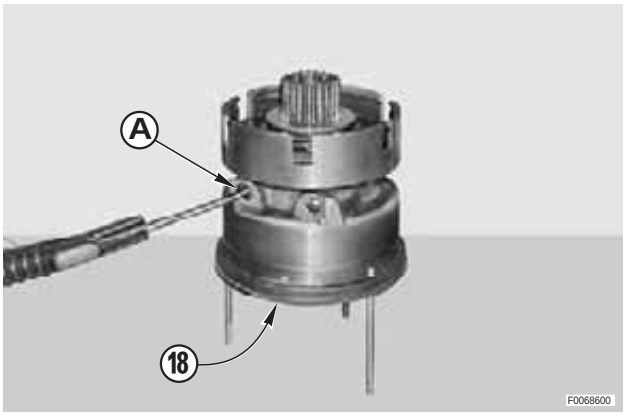
10 - Remove the circlip (16).



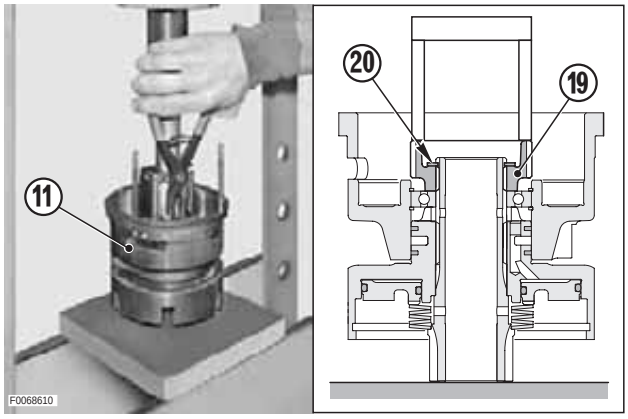
11 Withdraw the HML unit output shaft (17).



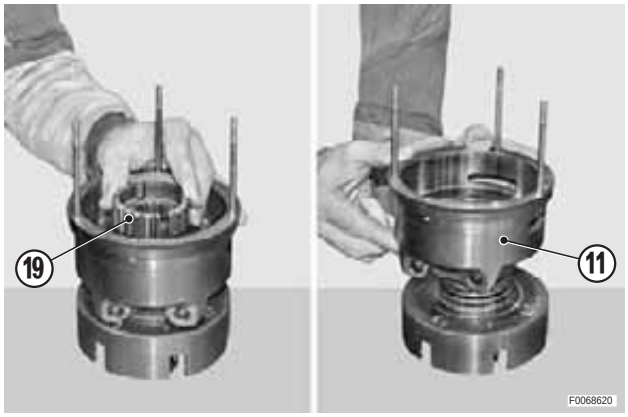
12 - Blow compressed air at low pressure through hole “*A*” to drive out the “M” range piston (18).



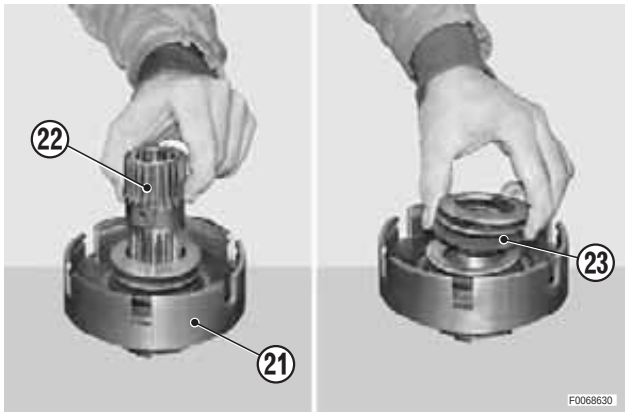
13 - Position the clutch housing (11) under the press and, using a suitable tool, slightly compress the sleeve (19) and remove the circlip (20).



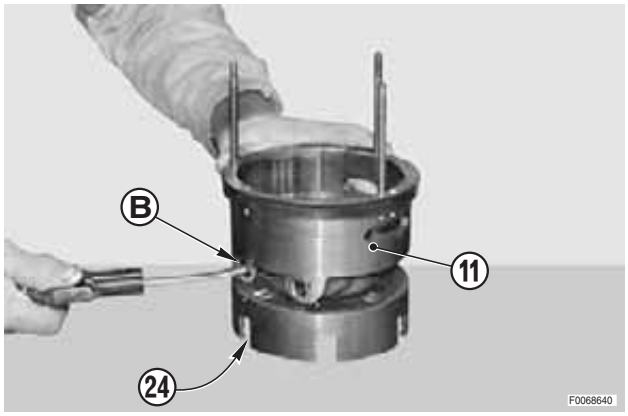
14 - Remove the sleeve (19) and remove the “M” range clutch housing (11).



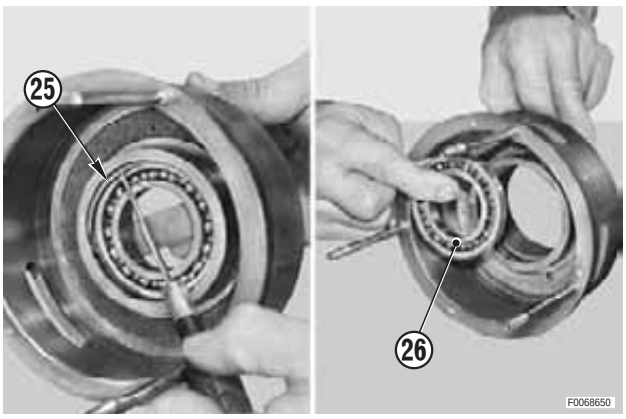
15 - Withdraw the sleeve (22) and Belleville springs (23) from the “H” range clutch housing (21).



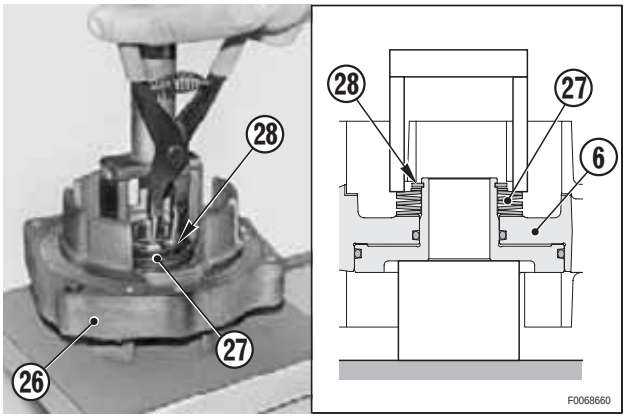
16 - Temporarily fit the “M” range clutch housing (11) and blow compressed air at low pressure through hole “*B*” o drive the piston (24) of the “H” range clutch.



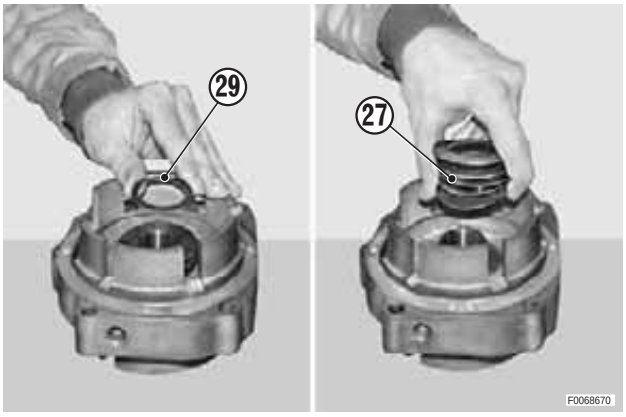
17 - Remove the circlip (25) and withdraw the steel plate (26).



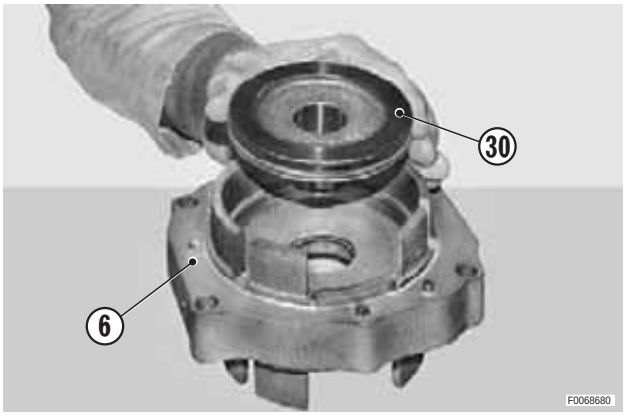
18 - Position the “L” range clutch housing (6) under the press and, using a suitable tool, slightly compress the springs (27) and remove the circlip (28).



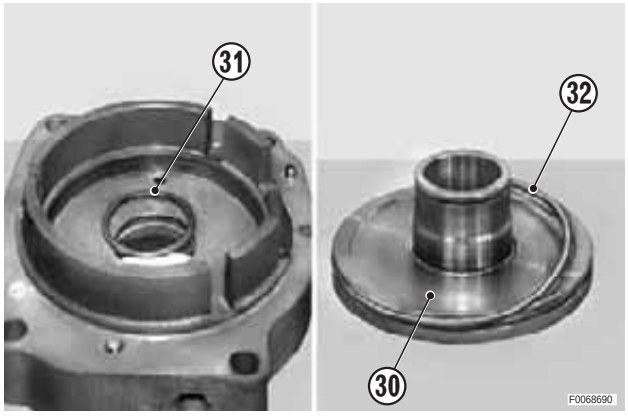
19 - Remove the shim (29) and remove the Belleville springs (27).



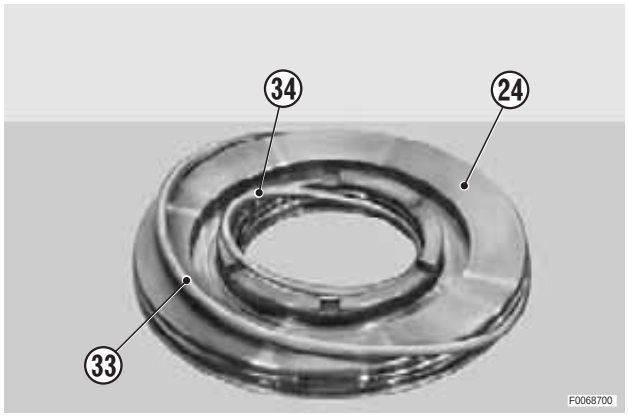
20 - Withdraw the “L” range clutch piston (30) from the clutch housing (6).



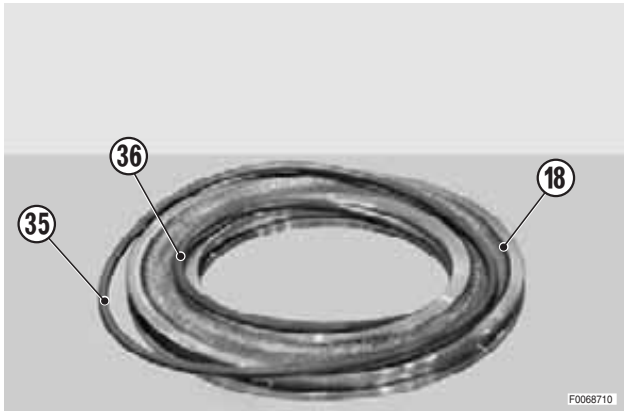
21 - Check the condition of the O-rings (31) and (32) of the “L” range piston (30) and renew them if necessary.



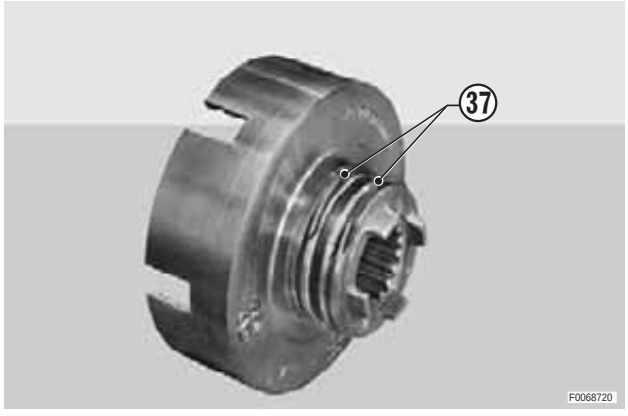
22 - Check the condition of the O-rings (33) and (34) of the “H” range piston (24) and renew them if necessary.



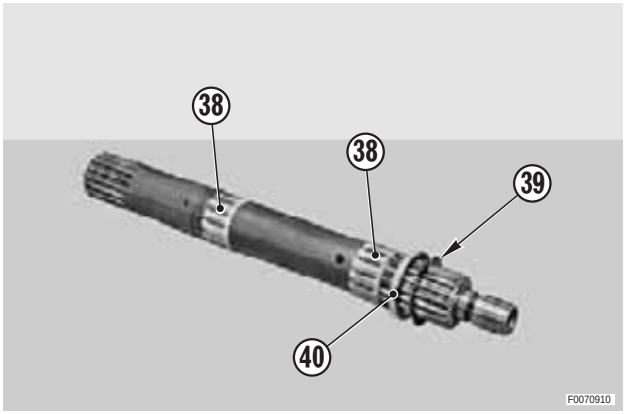
23 - Check the condition of the O-rings (35) and (36) of the “M” range piston (18) and renew them if necessary.



24 - Check the condition of the O-rings (37) and renew them if necessary.

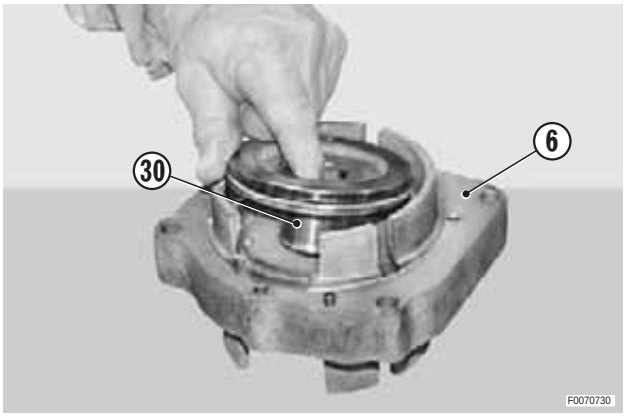


25 - Remove the roller cages (38), remove the circlip (39) and remove the spacer (40).

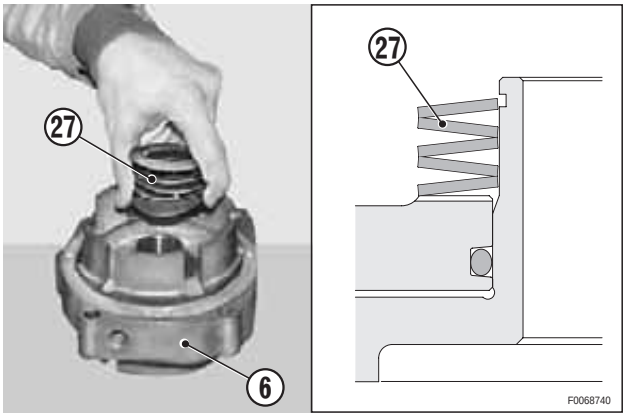


Assembly

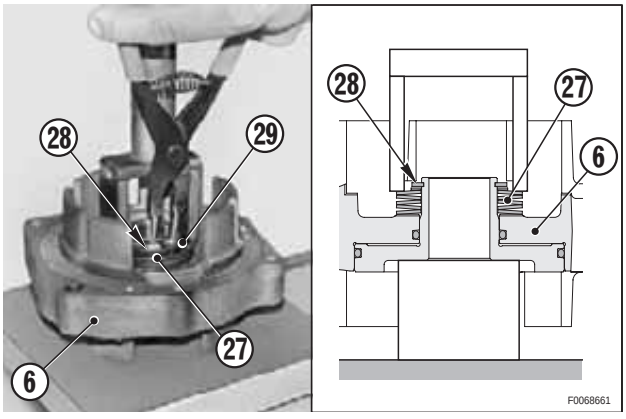
1 - Fit the piston (6) in the “L” range clutch cylinder (30).
★ Lubricate the O-rings with oil.



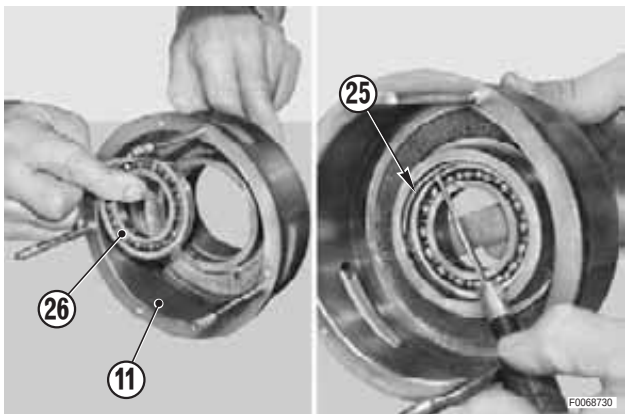
2 - Position the Belleville springs (27) on the “L” range clutch cylinder (6).
★ Take care to install the Belleville springs (27) the right way round.



3 - Position the “L” range clutch housing (6) under a press and, using a suitable tool, compress the Belleville springs (27) and fit the shim (29) and circlip (28).



4 - Install the bearing (26) in the “M” range clutch housing (11) and secure it with the circlip (25).



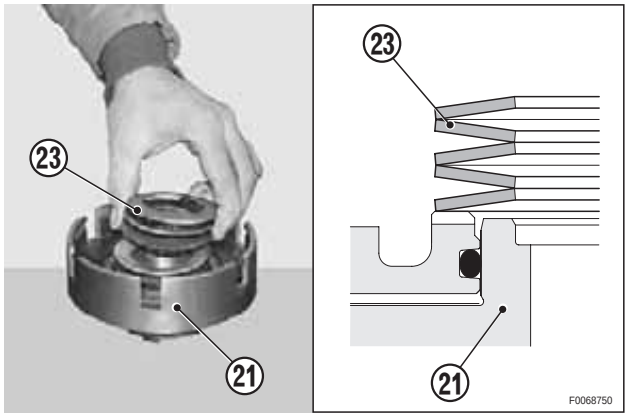
5 - Install the piston (24) in the “H” range clutch housing (21).

★ Lubricate the O-rings with oil.



6 - Position the Belleville springs (23) in the “H” range clutch housing (21).

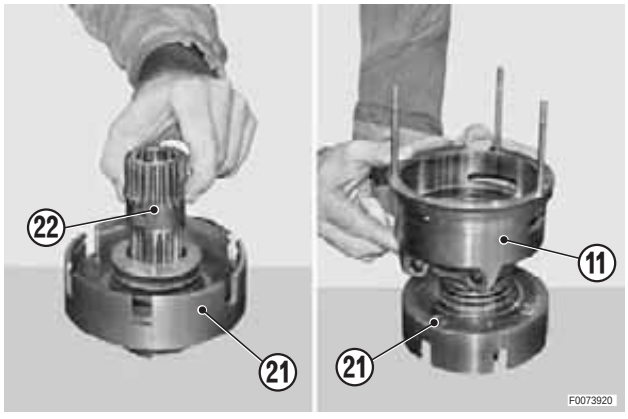
★ Take care to install the Belleville springs the right way round.



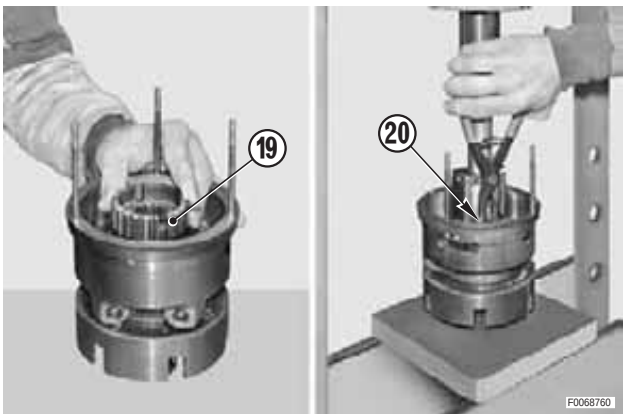
7 - Install the sleeve (22) in the clutch housing (21).

8 - Turn the clutch housing (21) over and fit the “M” range clutch housing (11).

★ Lubricate the oil seals with oil.



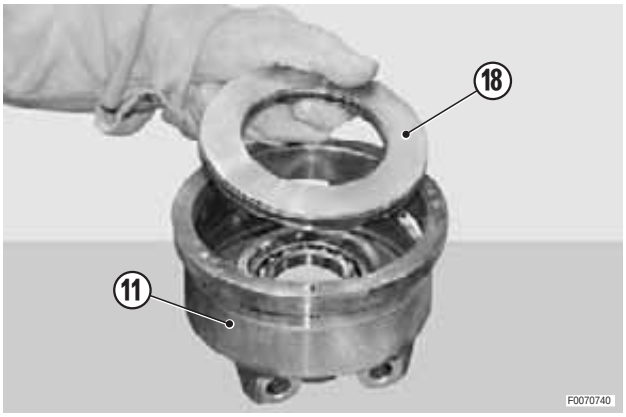
9 - Install the sleeve (19) and, using a press and a suitable tool, install the circlip (20).



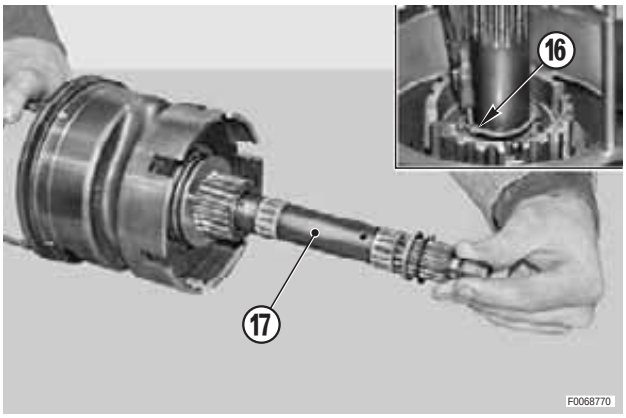
10 - Install the piston (18) in the “M” range clutch housing (11).

★ Take care to install the piston the right way round.

★ Lubricate the O-rings with oil.



11 - Install the HML unit output shaft (17) and secure it in position with the circlip (16).

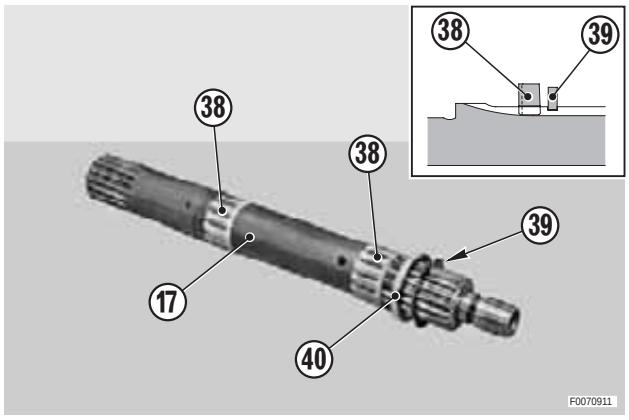


12 - Fit the spacer (40) the HML unit output shaft (17) and secure in position with the circlip (39).

★ Take care to install the spacer (40) the right way round.

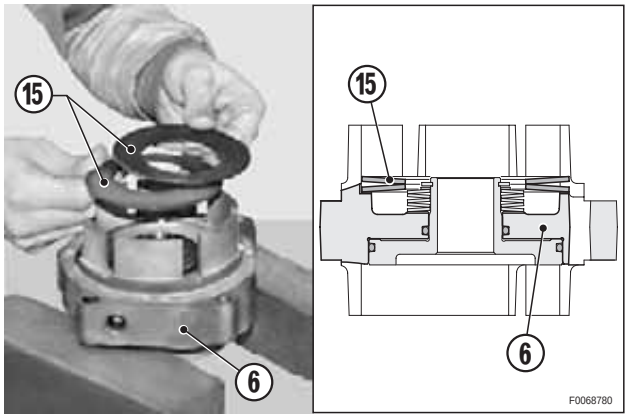
13 - Fit the roller cages (38).

Roller cages: Transmission oil



14 - Position the Belleville springs (15) in the “L” range clutch cylinder (6).

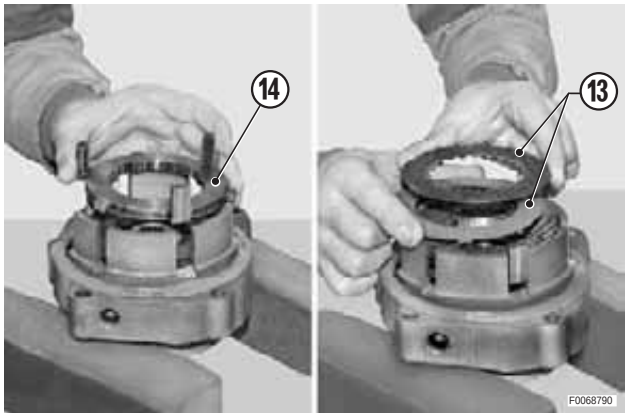
★ Take care to install the Belleville springs the right way round.



15 - Fit the retaining plate (14).

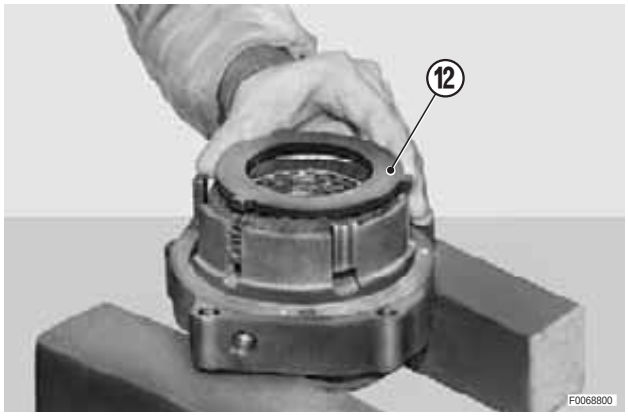
16 - Install the “M” range clutch pack (13), inserting first a friction plate and then a steel plate.
Complete the clutch pack with a friction plate.

★ Lubricate the friction plates with oil.



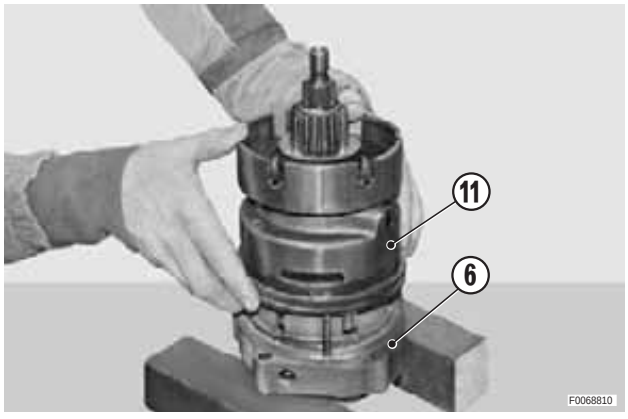
17 - Install the steel plate (12).

★ To facilitate subsequently assembly of the “M” range clutch housing, align the teeth of the friction plates in the clutch pack.

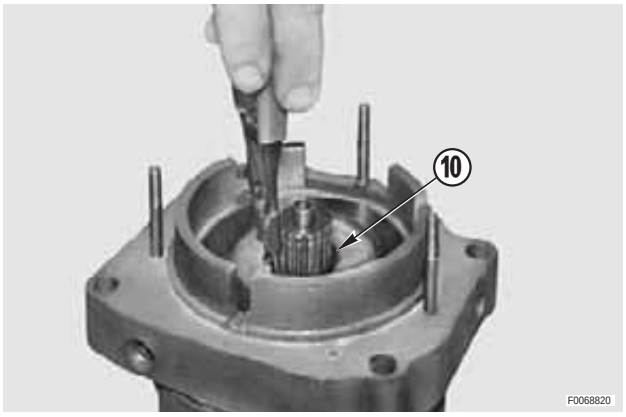


18 - Install the “M” range clutch housing (11) on the “L” range clutch cylinder (6).

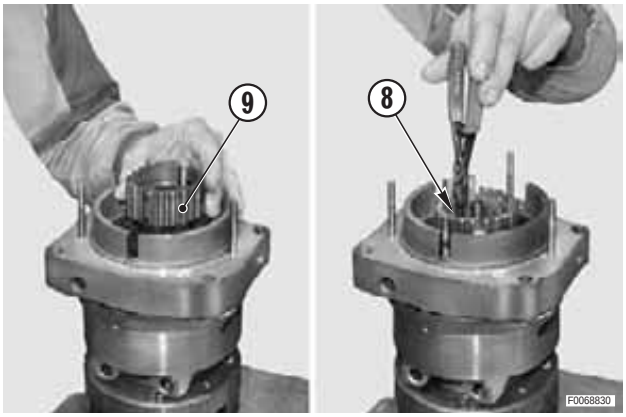
Mating face: Loctite 510



19 - Turn the unit over and fit the circlip (10).
★ Position the circlip (10) in the second groove.

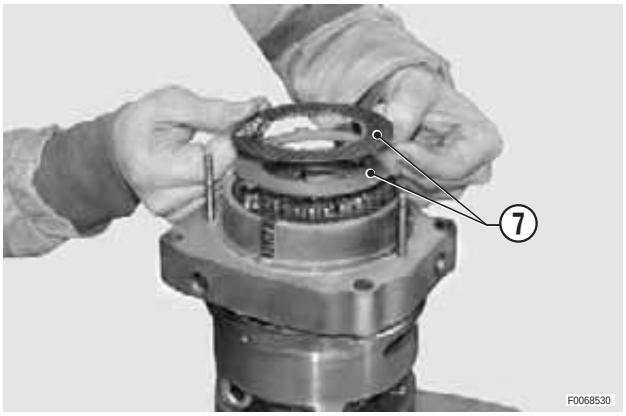


20 - Fit the hub (9) and secure it with the circlip (8).

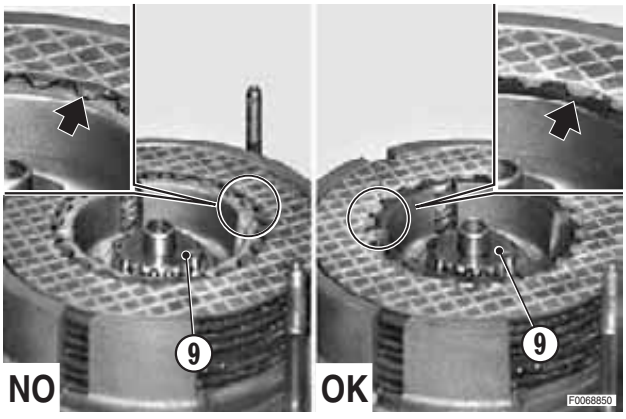


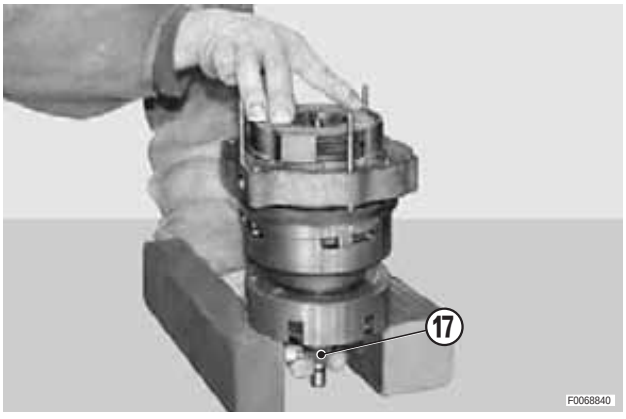
21 - Install the “L” range clutch pack (7), inserting a friction plate first followed by a steel plate.

★ Lubricate the friction plates with oil.



22 - Raise the output shaft (17) and hold it in position so that the last friction plate in the “L” range clutch pack engages the sleeve (9) correctly.



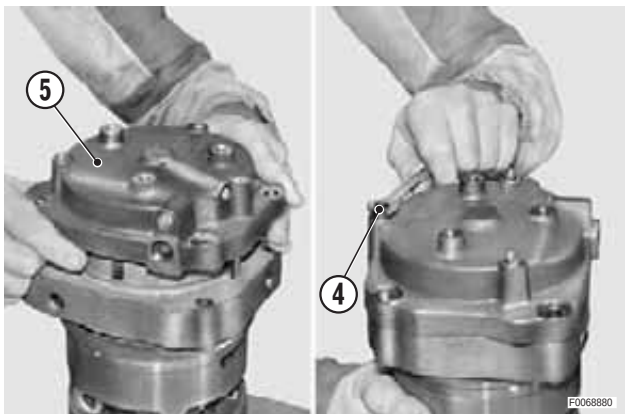


23 - Fit the cover (5) and secure it in positionby tightening the nuts (4).

★ Tighten the nuts gradually in a crosswise sequence.

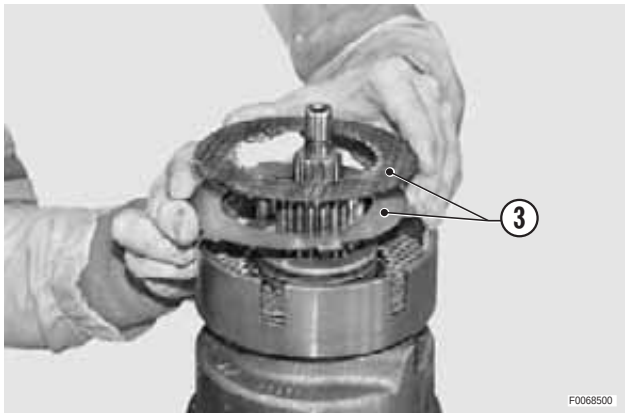
Cover mating face:
Loctite 510

Nuts: 8±0.8 Nm (5.9±0.6 lb.ft.)

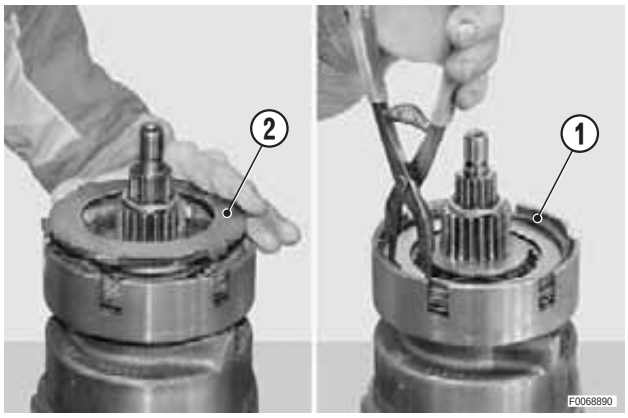


24 - Turn the unit over and install the “H” gear clutch pack (3) inserting a friction plate first followed by a steel plate.
Complete the clutch pack with a friction plate.

★ Lubricate the friction plates with oil.

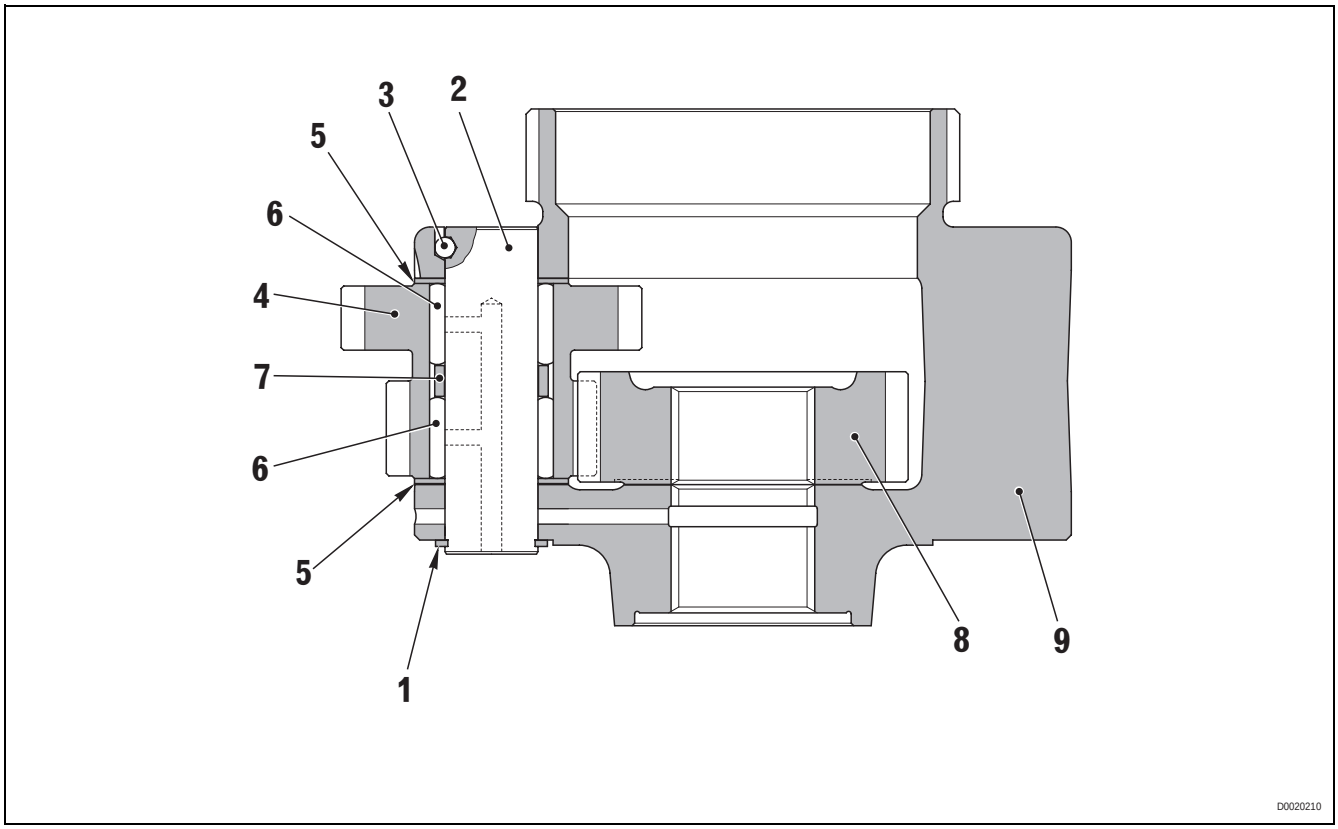


25 - Fit the steel plate (2) and the circlip (1).

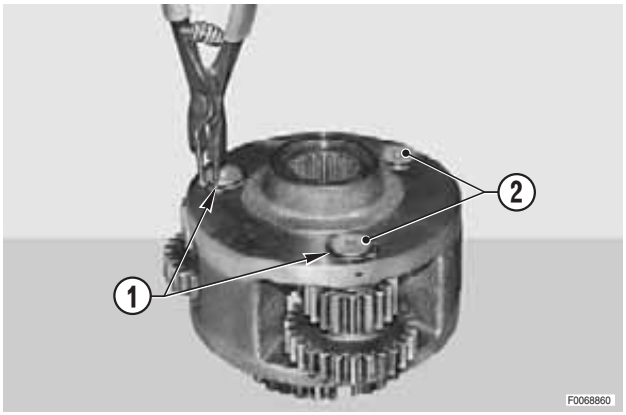


PLANET CARRIER ASSEMBLY

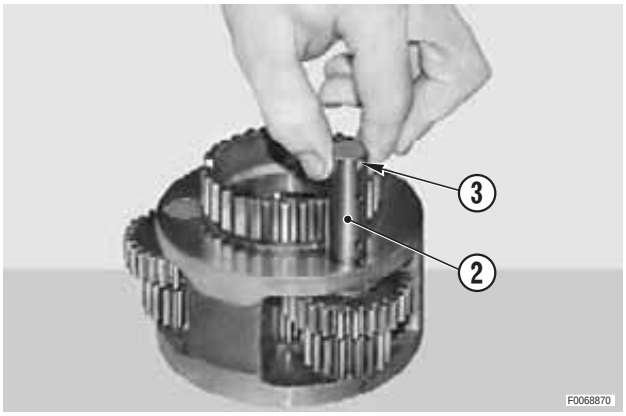
Disassembly



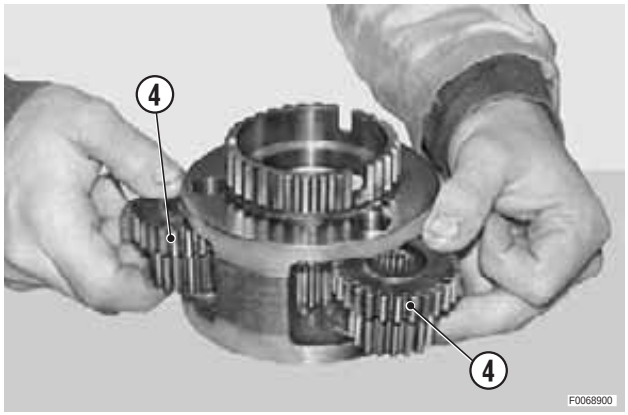
1 - Remove the circlips (1) securing the pins (2).



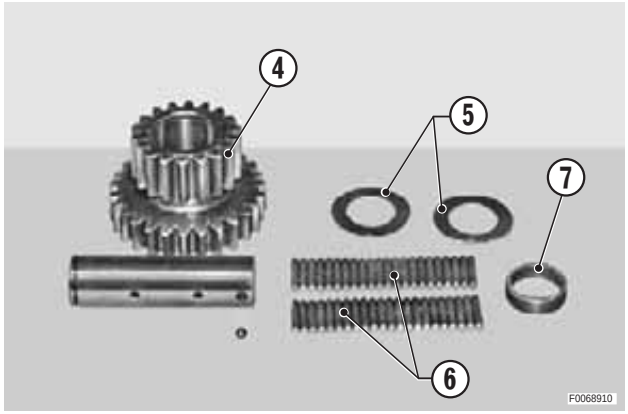
2 - Drive out the pins (2) and recover the ball (3).



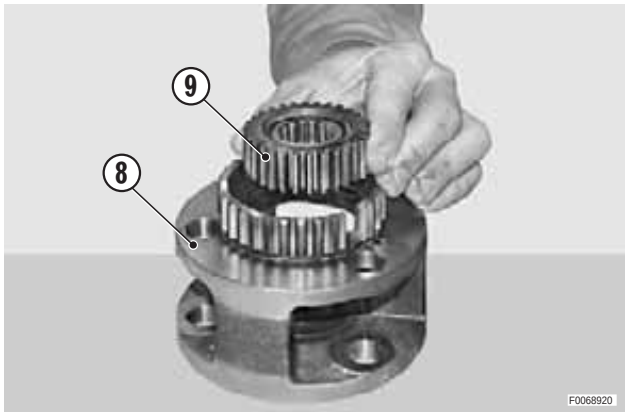
3 - Withdraw the complete planet pinions (4).



4 - Dismantle the planet pinions (4) and recover the shims (5), the rollers(6) and the thrust washer (7).

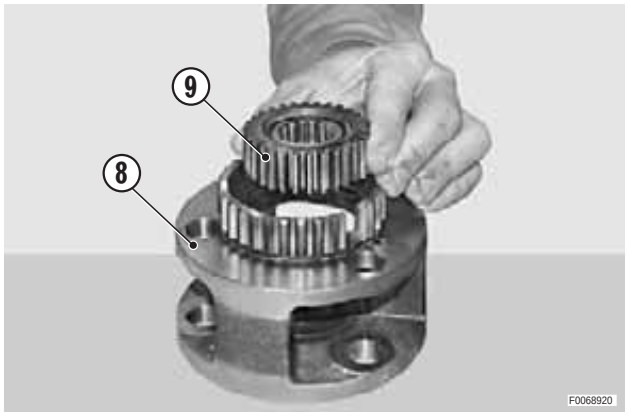


5 - Remove the sun gear (9) from the planet carrier (8).

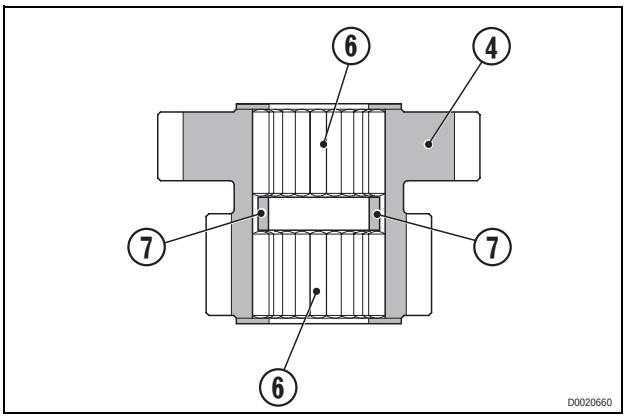


Assembly

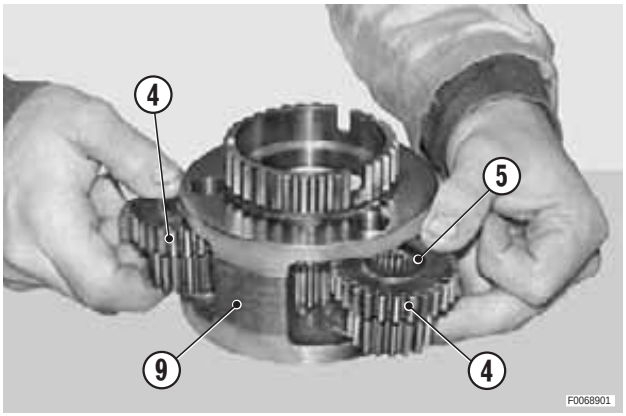
1 - Fit the sun gear (9) in the planet carrier (8).
★ Take care to install the sun gear the right way round.



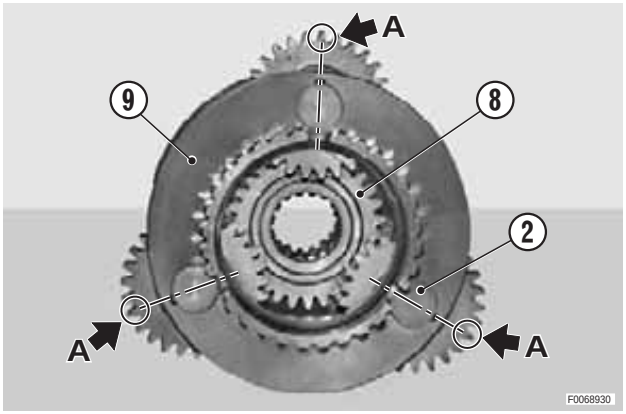
2 - Apply grease to the hole of the sun gears (4) and position the rollers (6) (22 per row) and the thrust washer (7).



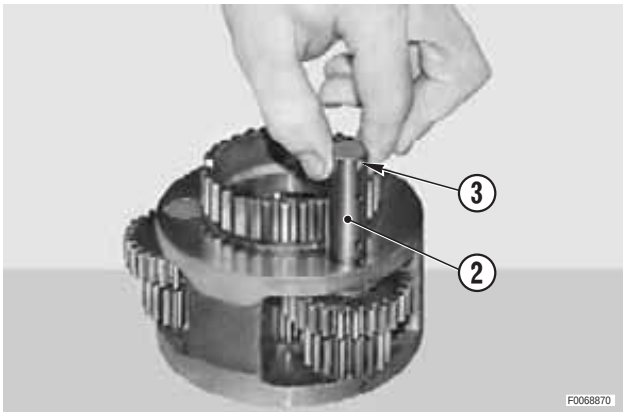
3 - Fit the sun gears (4) complete with shims (5) in the planet carrier (9).



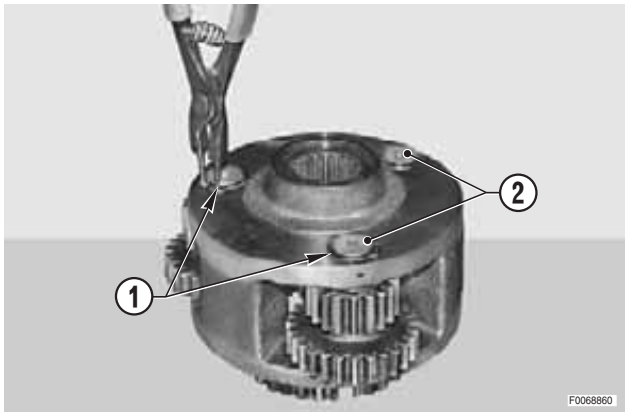
4 - Align the planet pinions so that the timing notches "*A*" are facing outwards and in line with a line joining the centre of the planet carrier (9) and the pins (2) when the sun gear (8) is positioned centrally relative to the planet carrier (9).



5 - Insert the pins (2) complete with the detent balls (3).



6 - Secure the pins (2) with the circlips (1).



GEARBOX ASSEMBLY
COMPLETE ASSEMBLY

Separating the engine from the transmission

⚠ Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

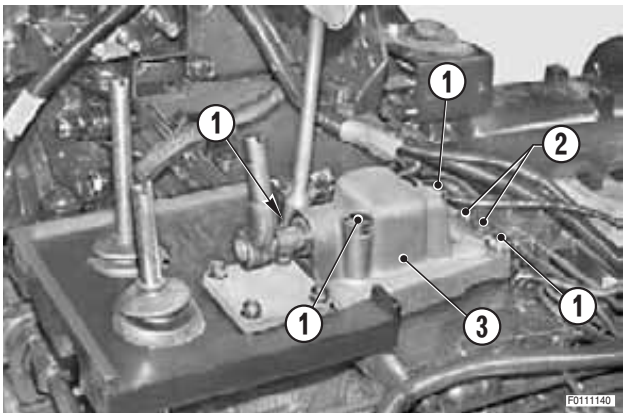
1 - Drain off all the oil in the transmission. ※ 1

Transmission oil: approx. 45 l (12 US gall.)

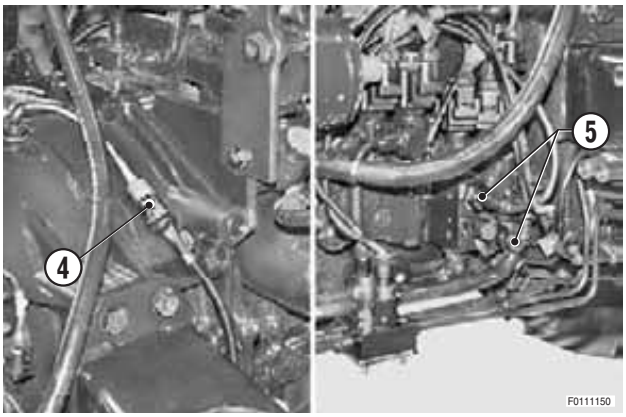
2 - Remove the cab.
(For details, see "CAB").

3 - Remove the front axle drive shaft.
(For details, see "FRONT AXLE DRIVE SHAFT").

4 - Remove the screws (1) and (2) and remove the support (3).

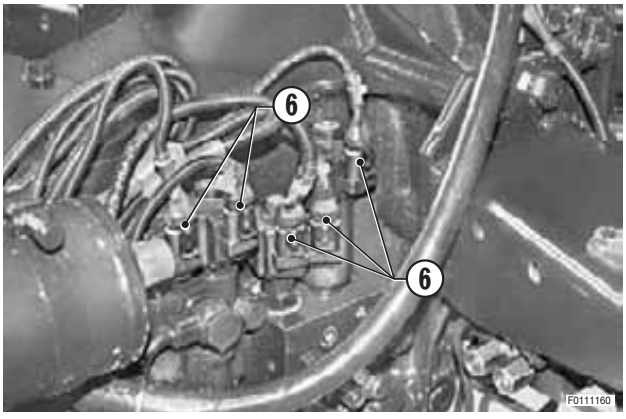


5 - Disconnect the wiring connector (4) and connectors (5).



6 - Disconnect the wiring connectors (6).

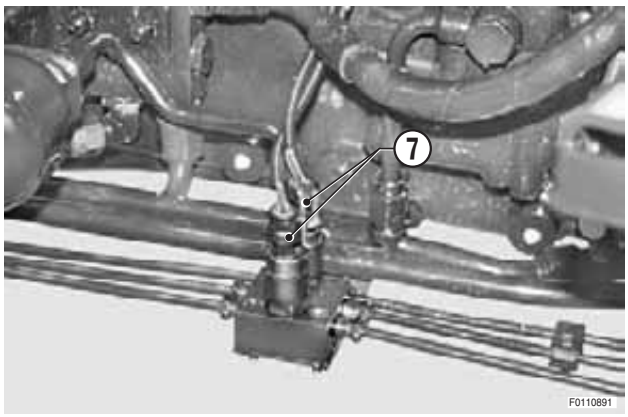
★ Label the connectors to avoid confusion on refitting.



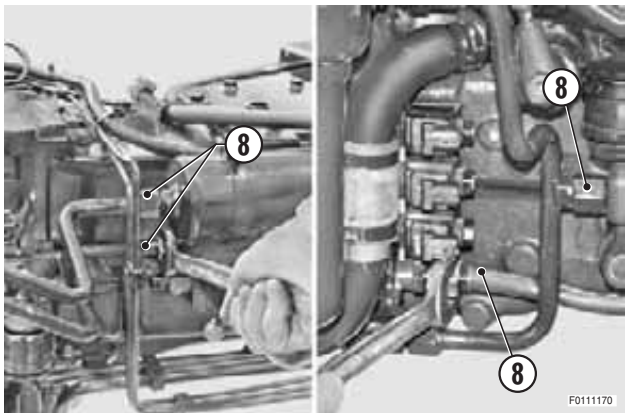
• *Versions with "Stop and go" only*

7 - Disconnect the connectors (7).

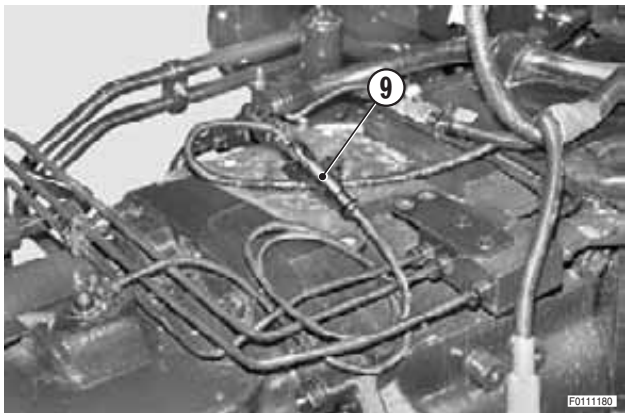
★ Label the connectors to avoid confusion on refitting.



8 - Disconnect the four pipes (8).

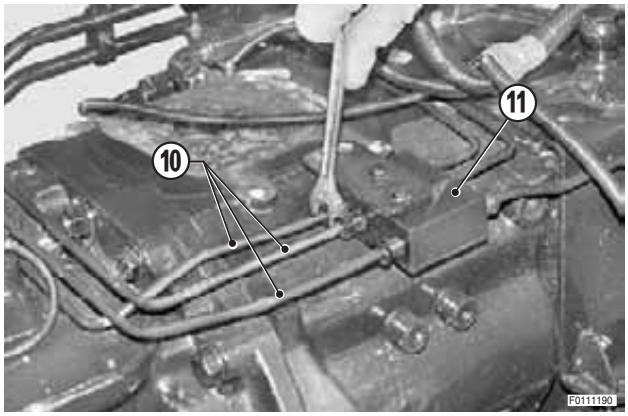


9 - Disconnect the wiring connector (9) and reposition the wiring loom towards the rear of the cab.



10 - Disconnect the brake and diff lock pipes (10) from the block (11).

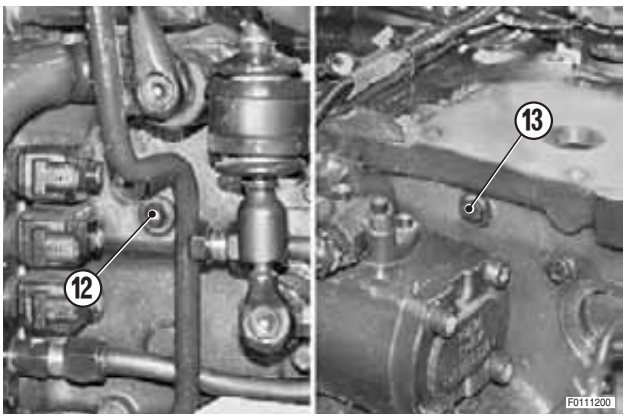
★ Plug the pipes and ports to prevent impurities getting in.



11 - Remove the pin (12).

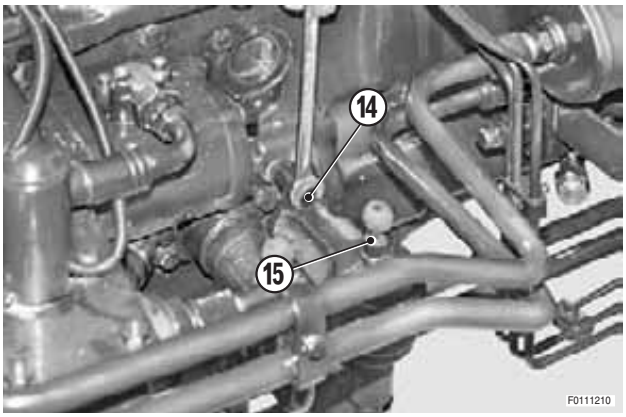
• *For versions without HML*

12 - Remove the pin (13).

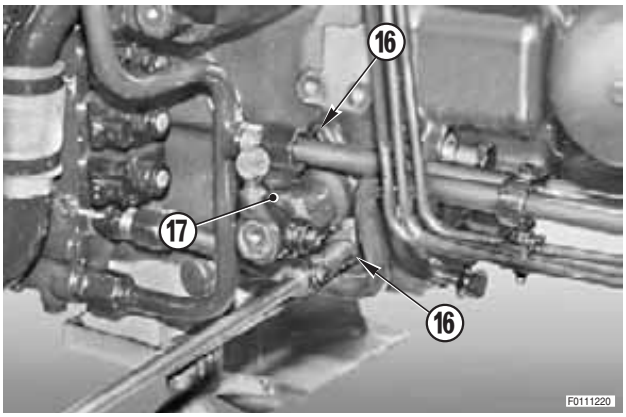


• *For all versions*

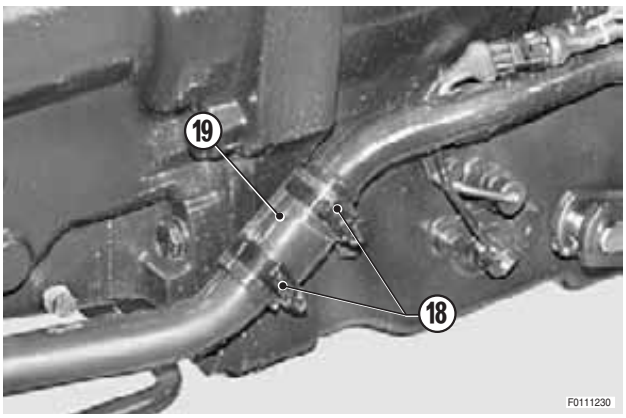
13 - Remove the screws (14) and remove the linkage (15).



14 - Remove the screws (16) and remove the gear control lever (17).

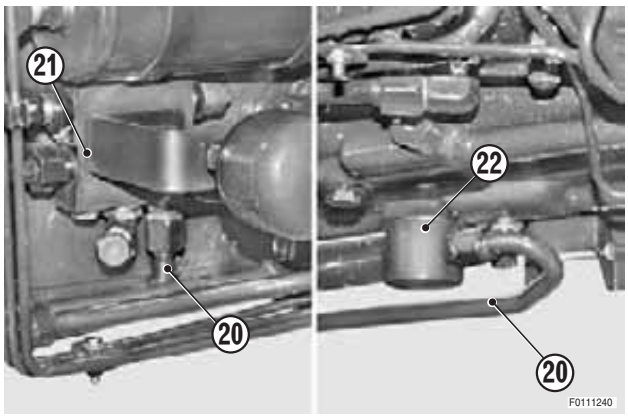


15 - Loosen the hose clamps (18) and move the hose (19) towards the rear.

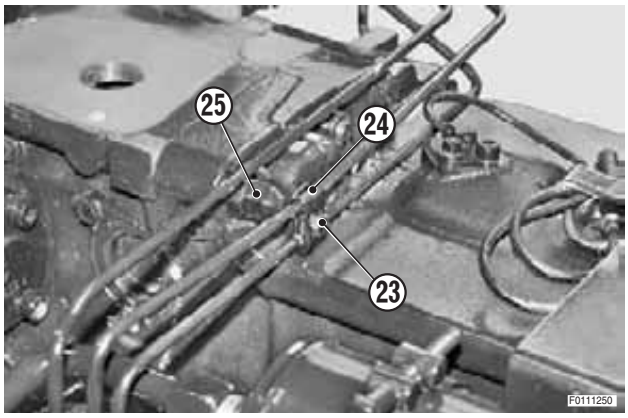


16 - Disconnect the pipe (20) from the valve (21).

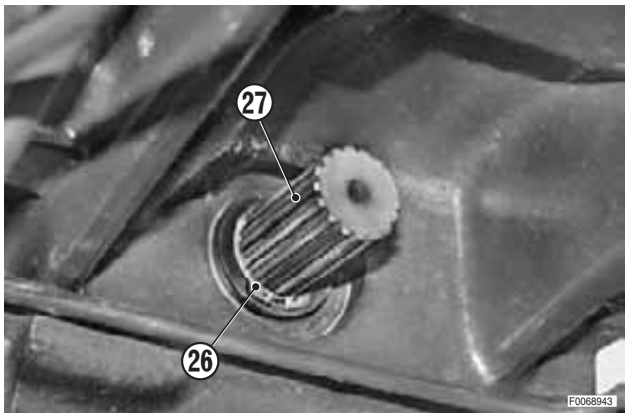
17 - Disconnect the pipe (20) from the dust discharger (22)and remove it.



18 - Remove the bolt (23) and remove the clamp (24) and the nut (25).

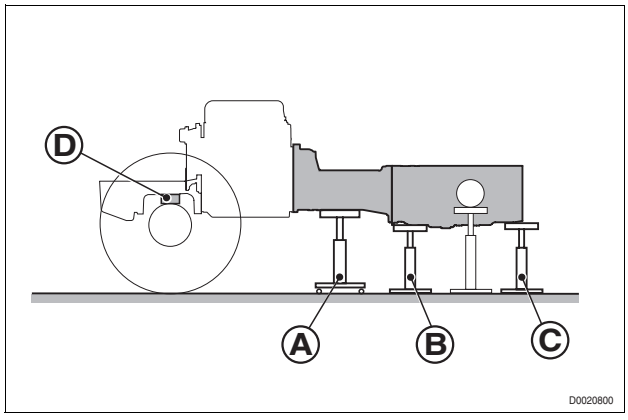


19 - Remove the circlip (26) from the 4WD drive output shaft (27) from the transmission.

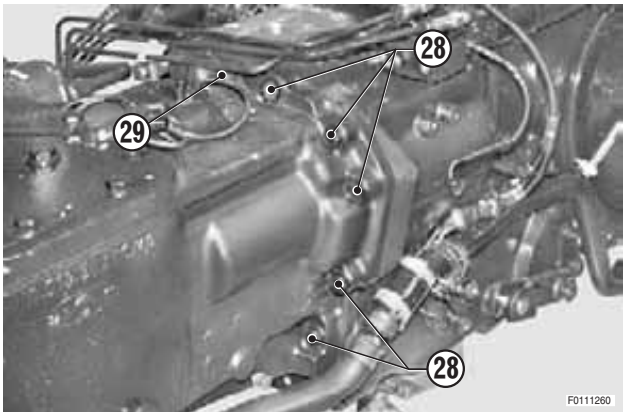


20 -Position a trolley jack *"A"* under the clutch housing and two stands *"B"* and *"C"* under the transmission".

21 - Drive two wedges "*D*" between the front support and axle to prevent the engine from tipping when it is moved.

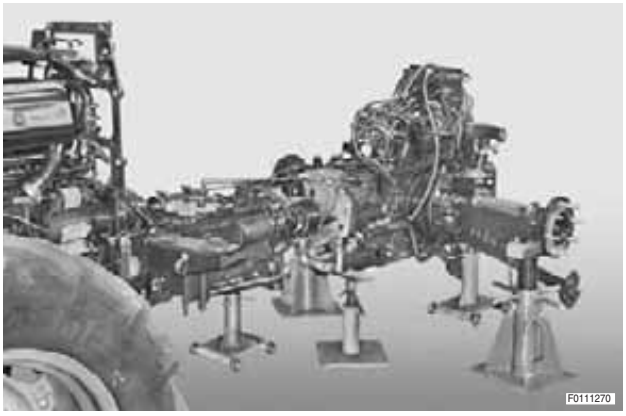


22 - Remove the ten bolts (28) and the two nuts (29).



23 - Apply force to both front wheels to move the engine assembly away from the transmission.

⁘ 2



Reassembly

- Reassembly is the reverse of separation.

⁘ 1

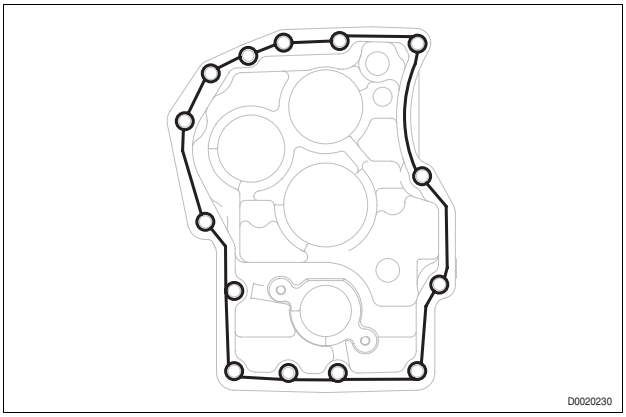
★ Fill the transmission with the required quantity of oil.

Oil: approx. 45 l (12 US.gall.)

⁘ 2

Nm Bolts and nuts: 78±4 Nm (57.5±3.0 lb.ft.)

Mating face: Loctite 510



Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil in the transmission. ※ 1

Transmission oil: approx. 45 l (12 US gall.)

2 - Remove the cab. (For details, see "CAB").

3 - Remove the front axle drive shaft."FRONT AXLE DRIVE SHAFT"(For details, see)

4 - Separate the engine from the transmission. (For details, see "ENGINE")

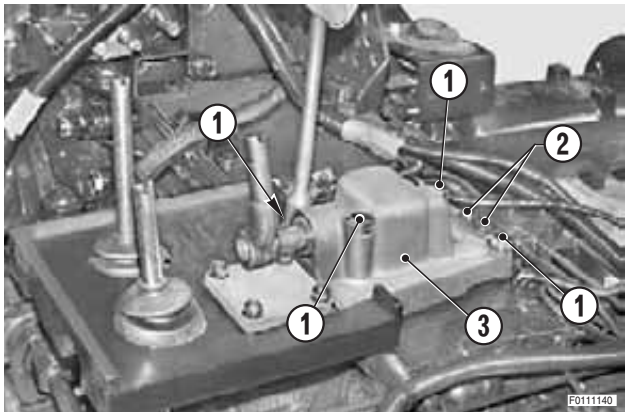
5 - Remove the shuttle assembly. (For details, see "SHUTTLE ASSEMBLY")

• *For versions with HML*

6 - Remove the complete HML assembly.

• *For all versions*

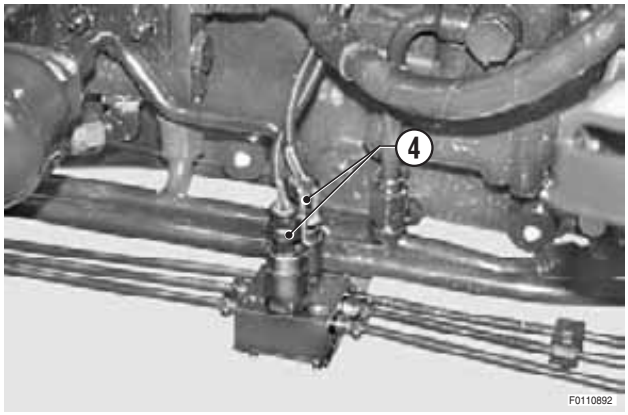
7 - Remove the screws (1) and (2) and remove the control support (3).



• *For versions with "Stop and go"*

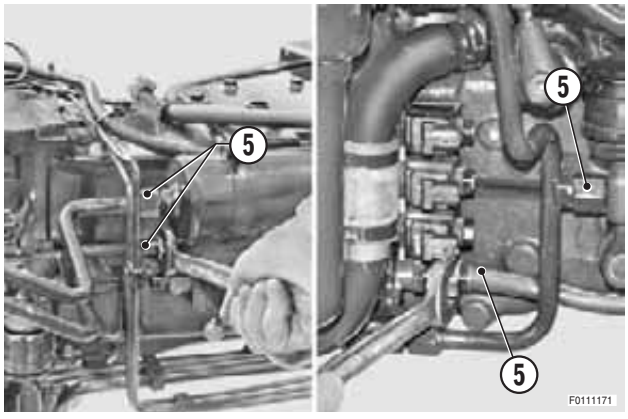
8- Disconnect the wiring connectors (4).

★ Label the connectors to avoid confusion on refitting.

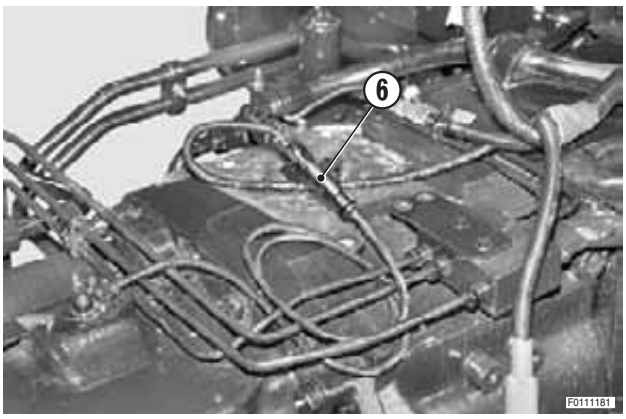


• *For all versions*

9 - Disconnect the four pipes (5).

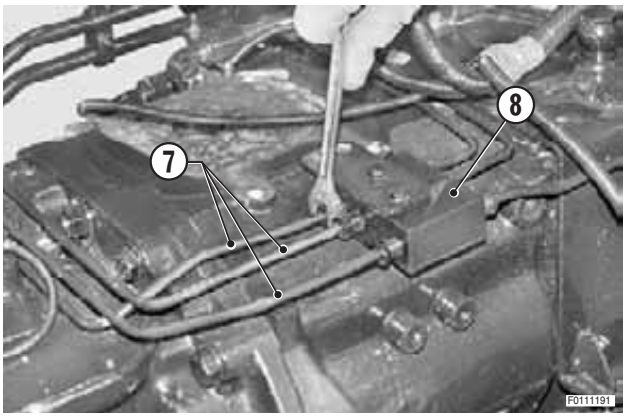


10 - Disconnect the wiring connector (6) and reposition the wiring loom towards the rear of the tractor.



11 - Disconnect the brake and diff lock pipes (7) from the block (8).

★ Plug the pipes and ports to prevent impurities getting in.

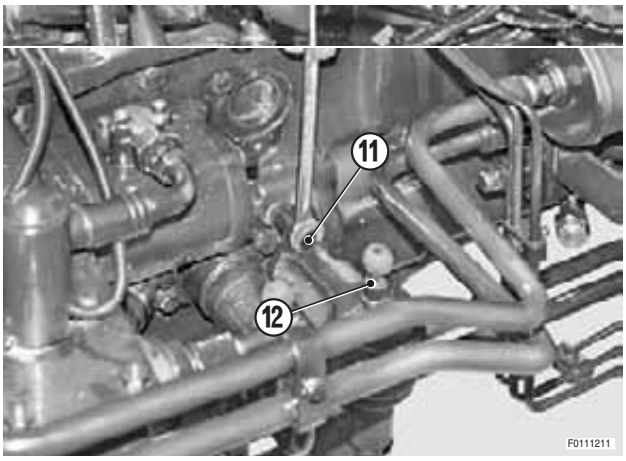


12 - Remove the pin (9).

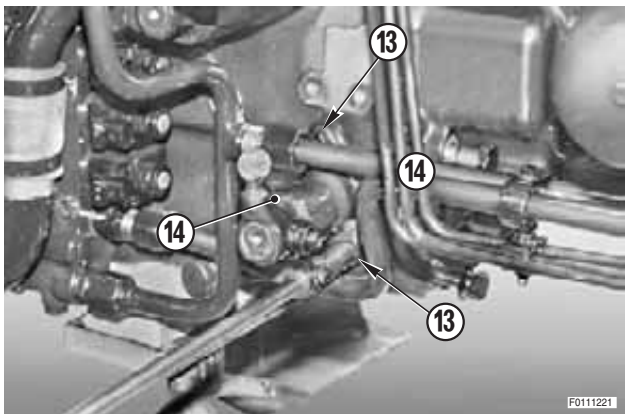
13 - Remove the pins (9) and (10).

★ On versions without HML, remove the minireduction gear sensor.

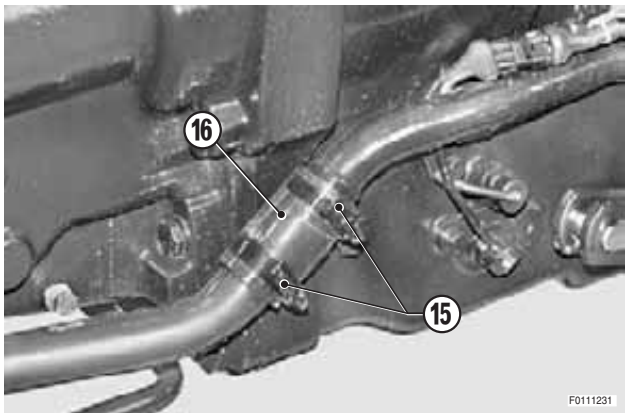
14 - Remove the screws (11) and remove the linkage (12).



15 - Remove the screws (13) and remove the gear control lever (14).

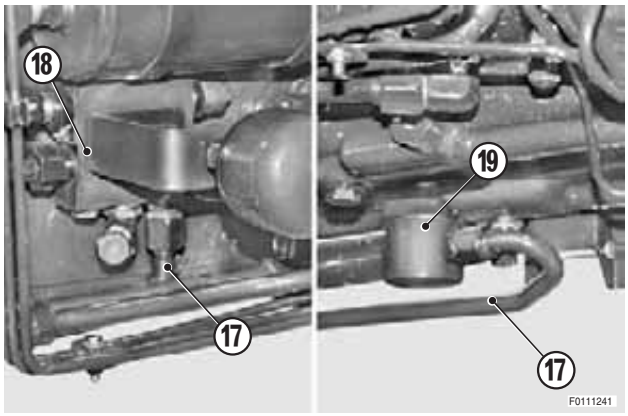


16 - Loosen the clips (15) and move the hose (16) towards the rear.

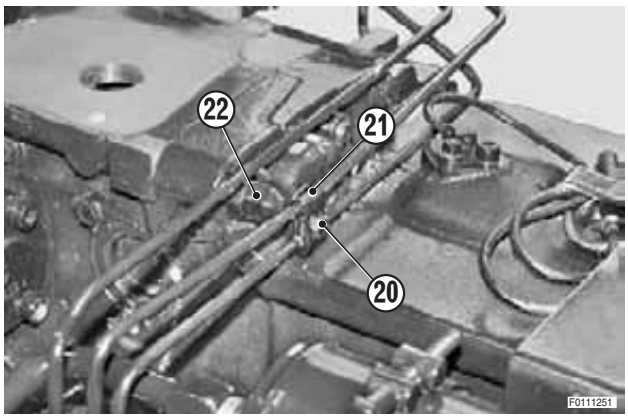


17 - Disconnect the pipe (17) from the valve (18).

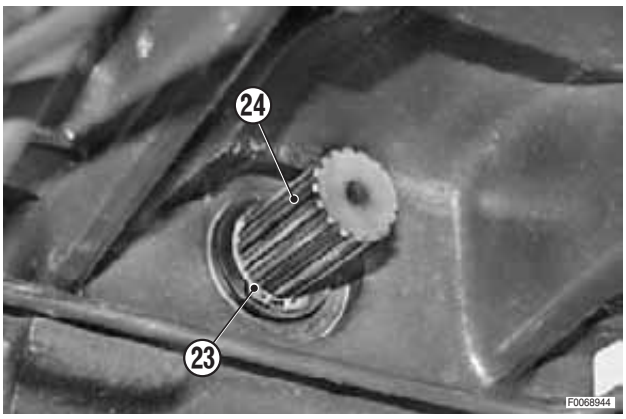
18 - Disconnect the pipe (17) from the dust discharger (19) and remove it



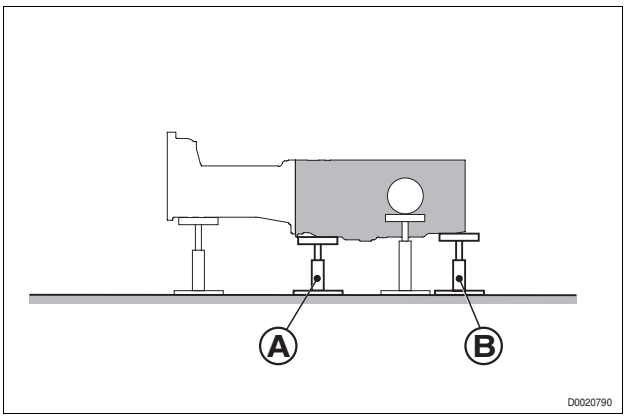
19 - Remove the bolt (20) and remove the clamp (21) and the nut (22).



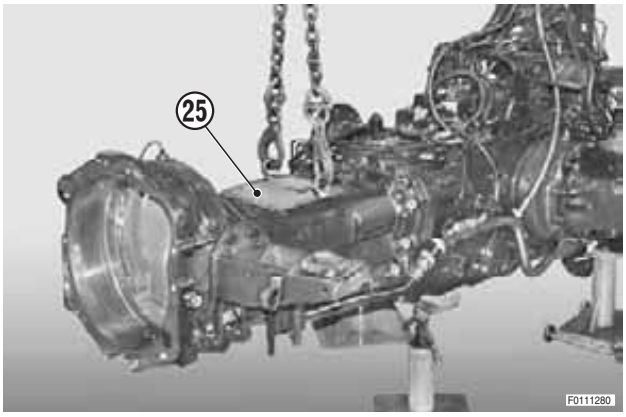
20 - Remove the circlip (23) from the 4WD drive output shaft (24) from the transmission.



21 - Position two stands “*A*” and “*B*”under the transmission casing.

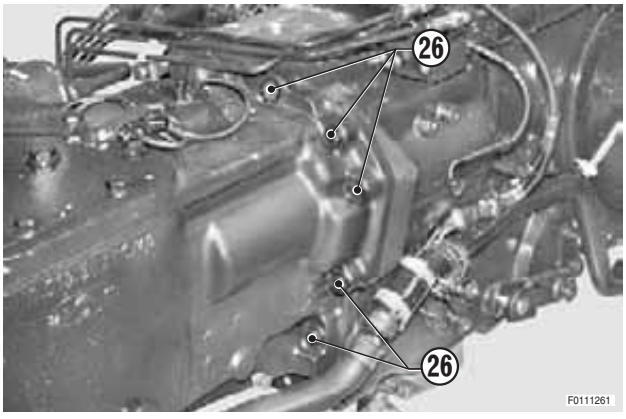


22 - Attach the clutch housing (25) to a hoist and take up the slack in the lifting sling or rope.



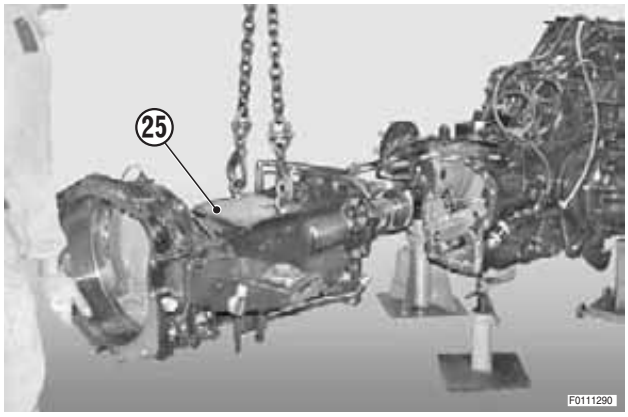
23 - Remove the ten bolts (26) and the two nuts.

2



24 - Remove the complete clutch housing assembly (25).

kg Clutch housing: 120 kg (264 lb.)



Refitting

- Refitting is the reverse of removal.

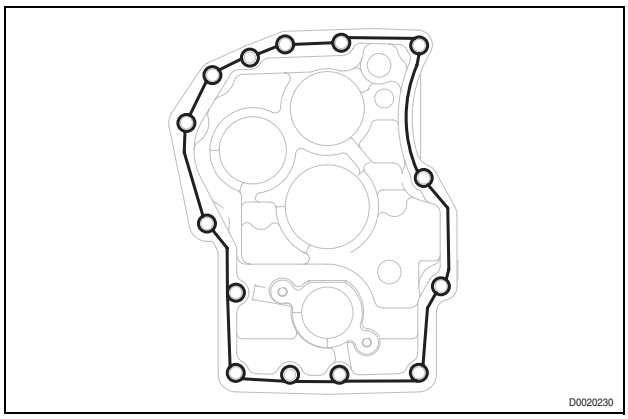
1

Oil: approx. 45 l (12 US gall.)

2

Nm Bolts and nuts: 78±4 Nm (57.5±3.0 lb.ft.)

Mating face: Loctite 510

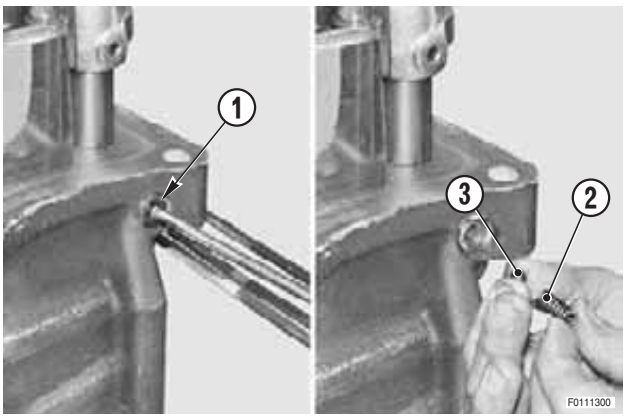


Disassembly

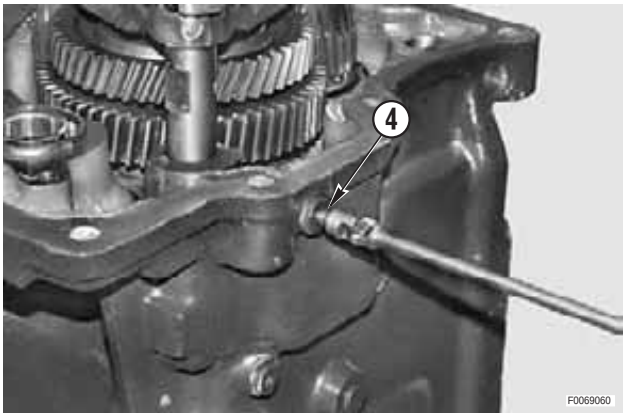
1 - Position the gearbox and shuttle assembly vertically on a flat surface.

• *For versions without HML*

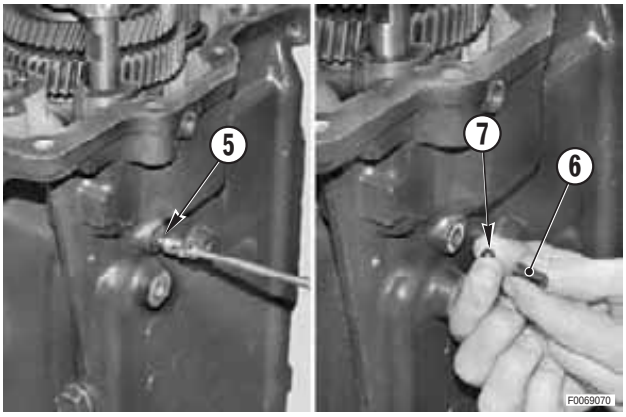
2 - Remove the plug (1) and remove the spring (2) and the ball (3).
★ Renew the copper washers on reassembly.



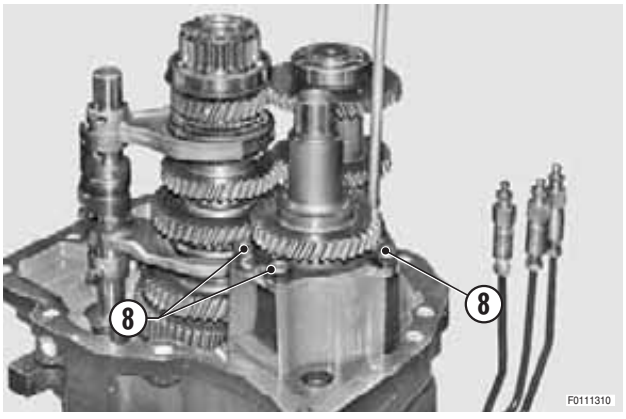
3 - Remove the stop screw (4).
★ Renew the copper washers on reassembly.



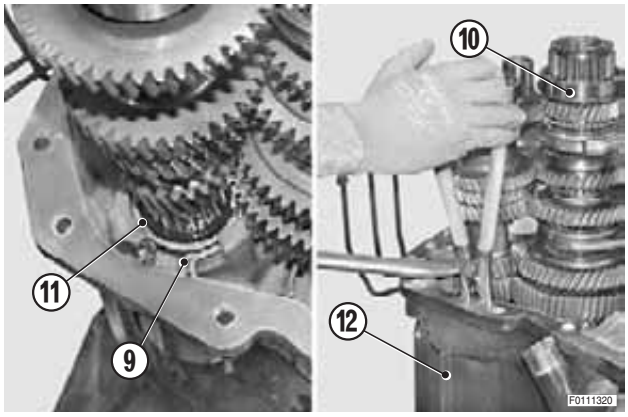
4 - Remove the plug (5) and remove the spring (6) and the ball (7).
★ Renew the copper washers on reassembly.



5 - Unscrew and remove the screws (8).

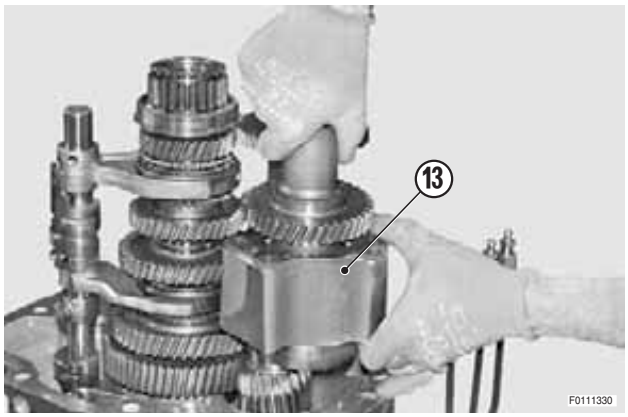


6 - Open the circlips (9) securing the shafts (10) and at the same time apply leverage to release the bearings (11) from the clutch housing (12).



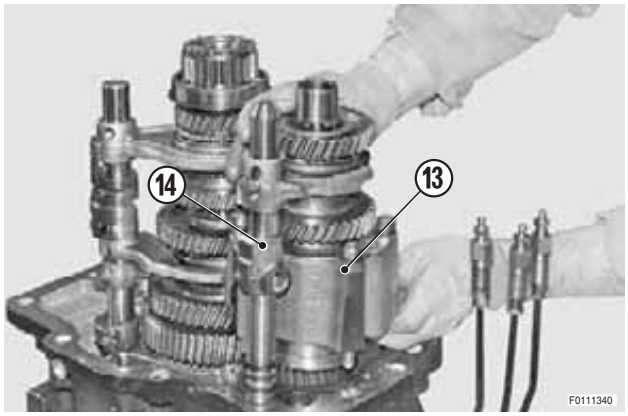
• *For versions with HML only*

7 - Remove the input shaft (13).



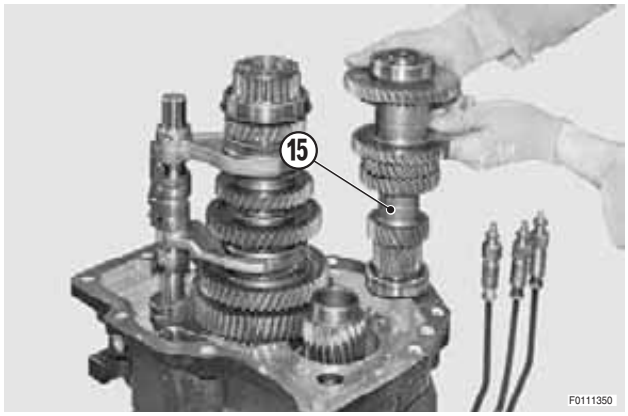
• *For versions without HML*

8 - Remove the input shaft assembly (13) and the selector rod (14).

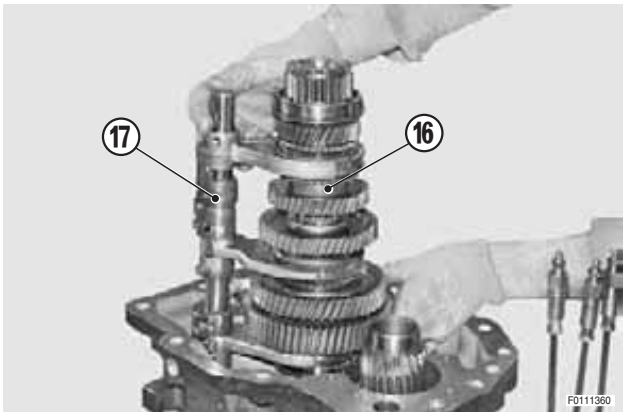


• *For all versions*

9 - Remove the primary shaft (15).

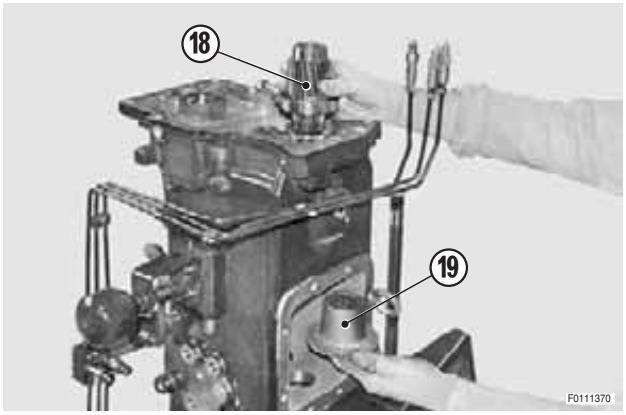


10 - Remove the secondary shaft (16) and the gear selector rod (17).



11 - Remove the gear (18) and recover the pulse wheel (19).

★ Take care as the pulse wheel (19) will fall as soon as the gear (18) is removed.



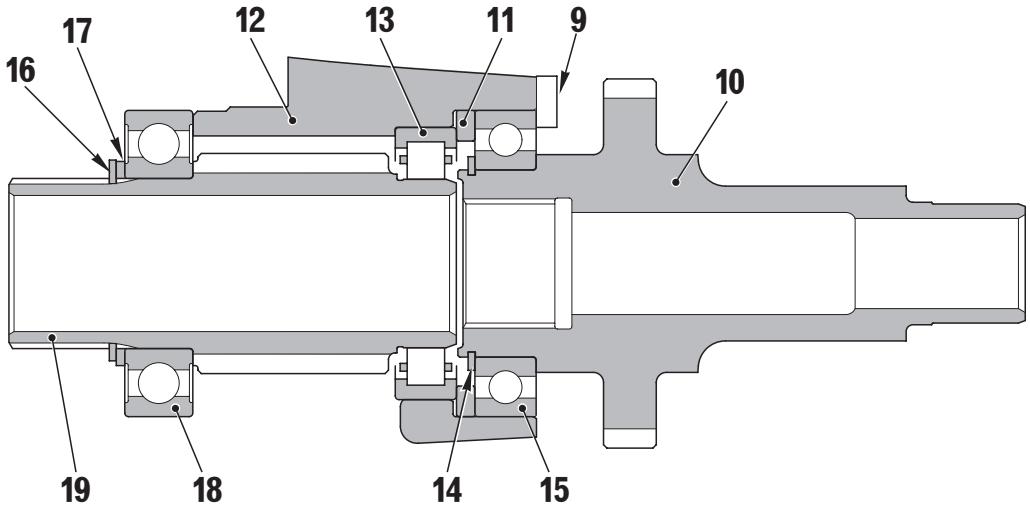
Assembly

- Assembly is the reverse of removal.

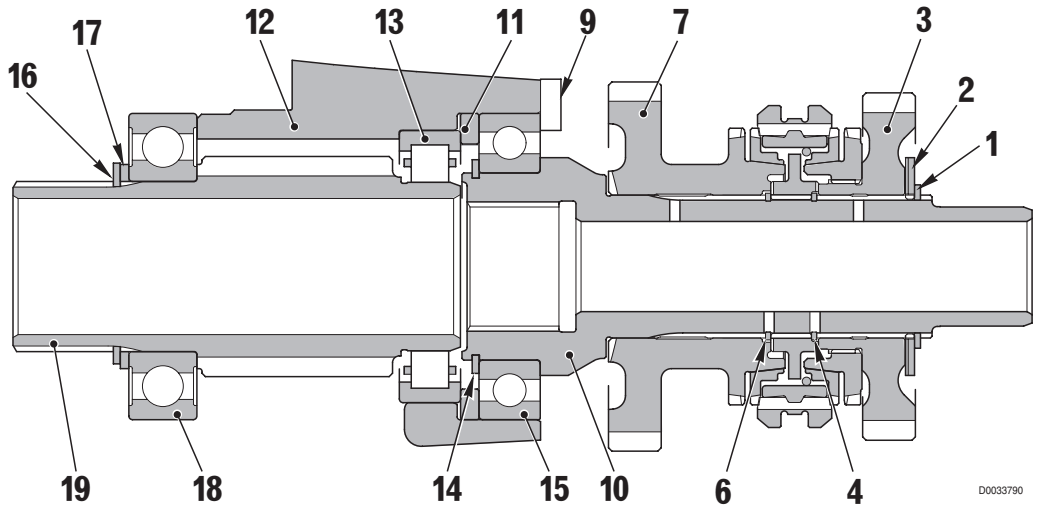
GEARBOX INPUT SHAFT

Disassembly

VERSION WITH HML

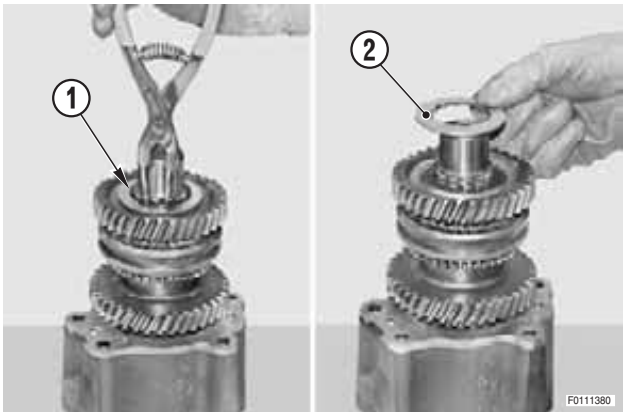


VERSION WITHOUT HML



• *For versions without HML*

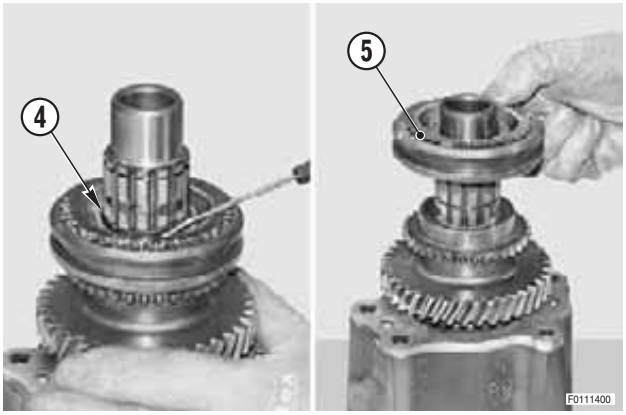
1 - Remove the circlip (1) and remove the thrust washer (2).



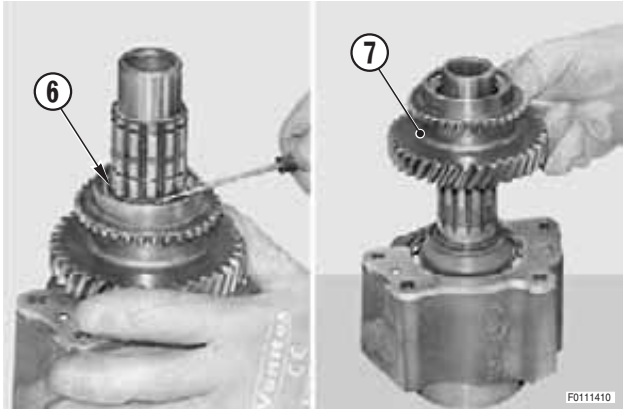
2 - Remove the gear (3).



3 - Remove the circlip (4) and remove the complete synchronizer (5).
★ Renew the circlip (4) on reassembly.



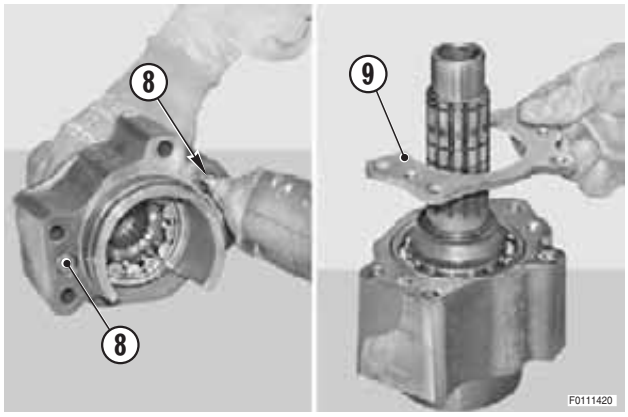
4 - Remove the circlip (6) and remove the gear (7).
★ Renew the circlip (6) on reassembly.



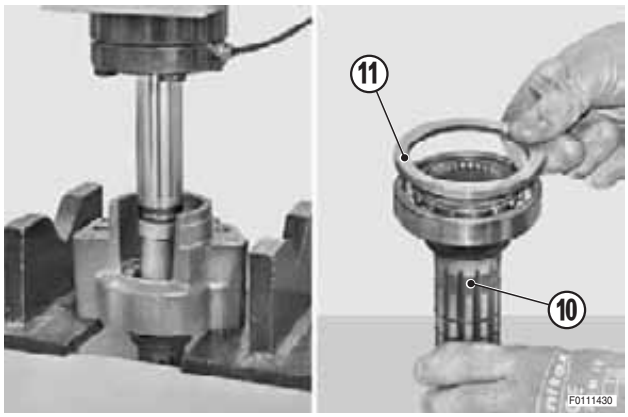
• *For all versions*

5 - Remove screws (8) and remove the plate (9).

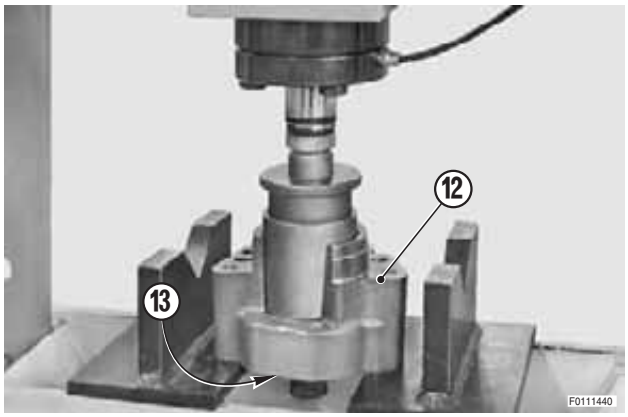
1



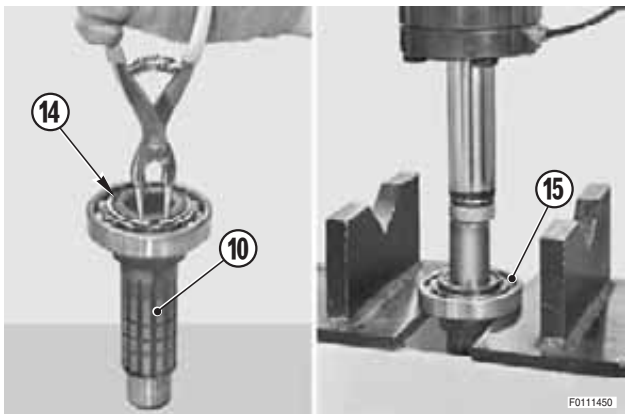
6 - Using a press and a suitable tool, drive out the shaft assembly (10) and the spacer (11).



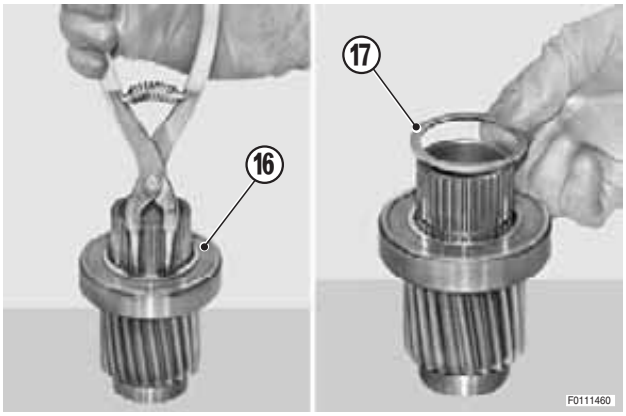
7 - Using a press and a suitable tool, drive out the bearing (13) from the support (12).



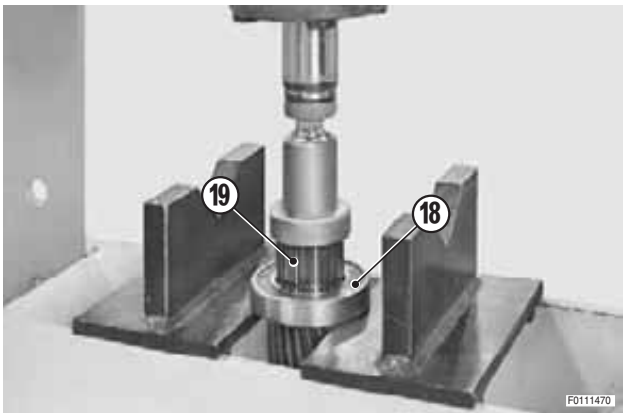
8 - Remove the circlip (14) and, using a press, remove the bearing (15) from the shaft (10).



9 - Remove circlip (16) and spacer (17).



10 - Using a press, remove the bearing (18) from the shaft (19).



Assembly

- To assemble, follow the disassembly steps in reverse order.

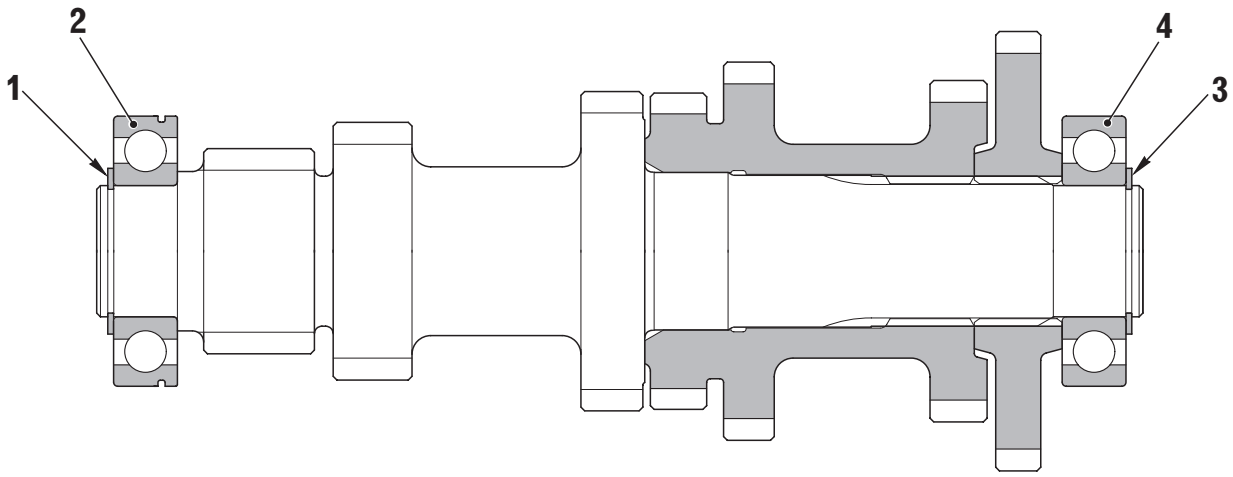
1

Nm Screws: Loctite 242

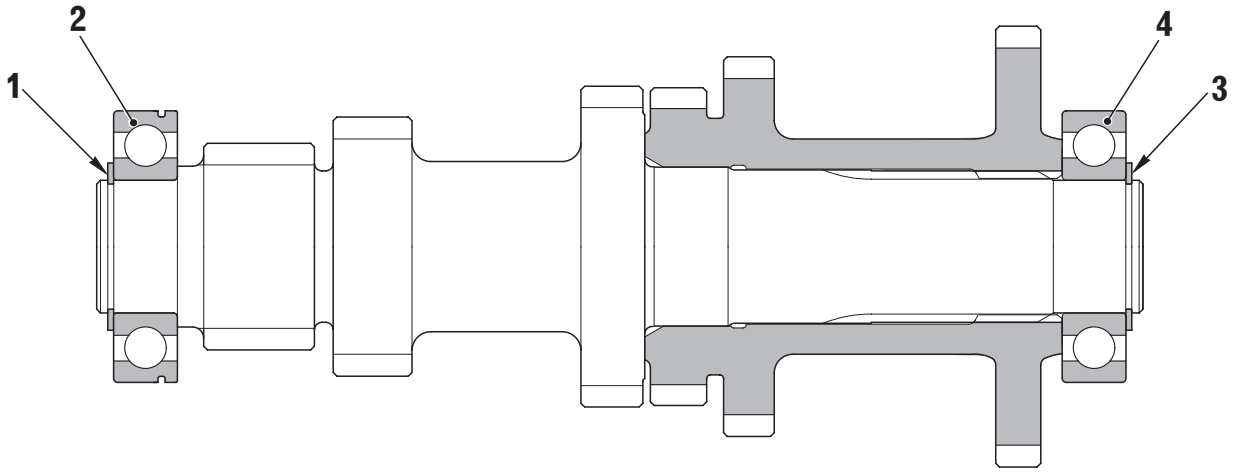
PRIMARY SHAFT

Disassembly

VERSION WITHOUT HML



VERSION WITH HML

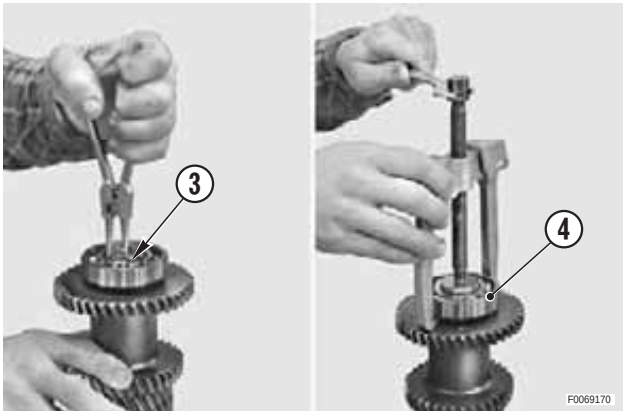


D0020490

1 - Remove the circlip (1) and remove the bearing (2).
※ 1



2 - Remove the circlip (3) and remove the bearing (4).



Assembly

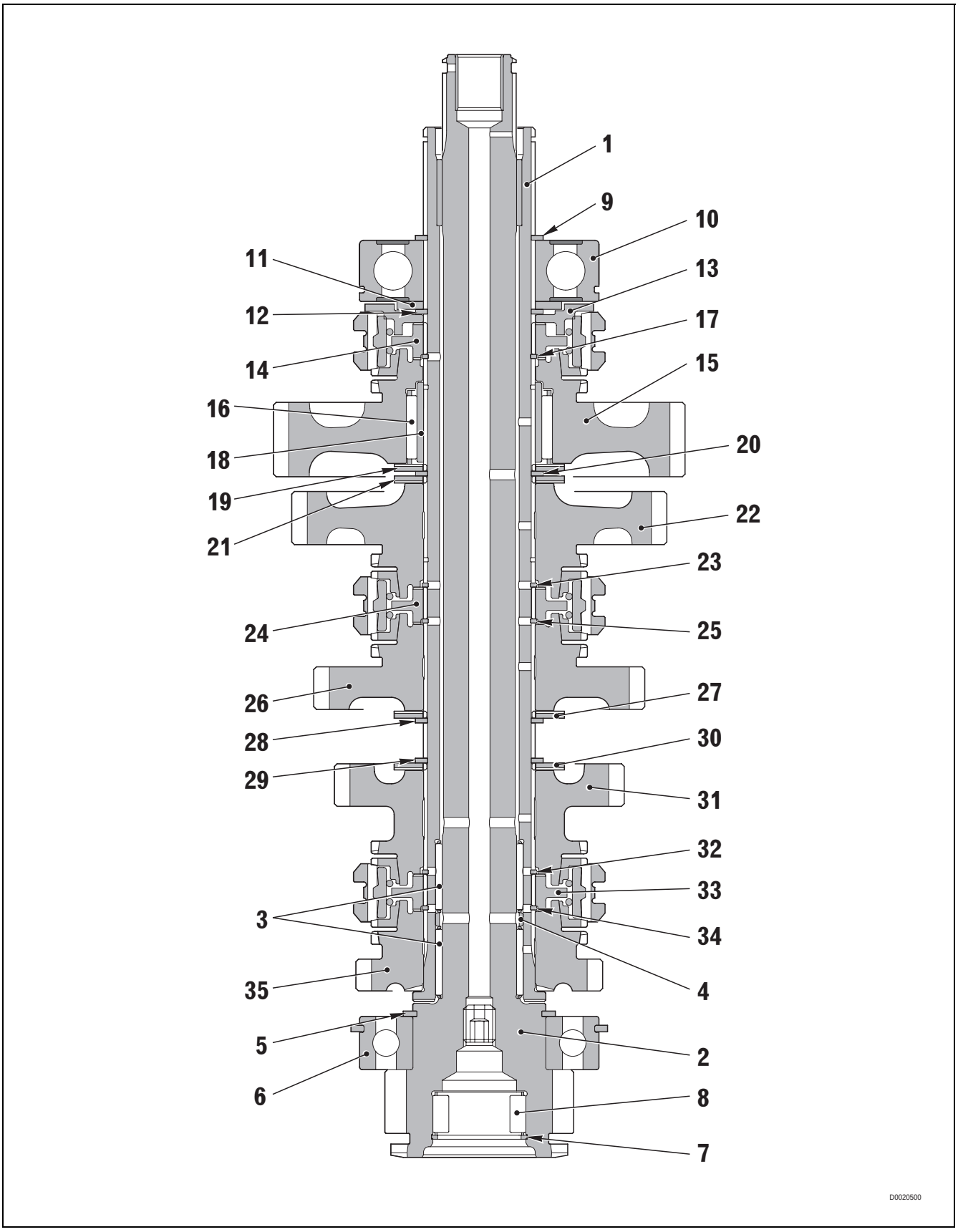
- Assembly is the reverse of disassembly.

⁘ 1

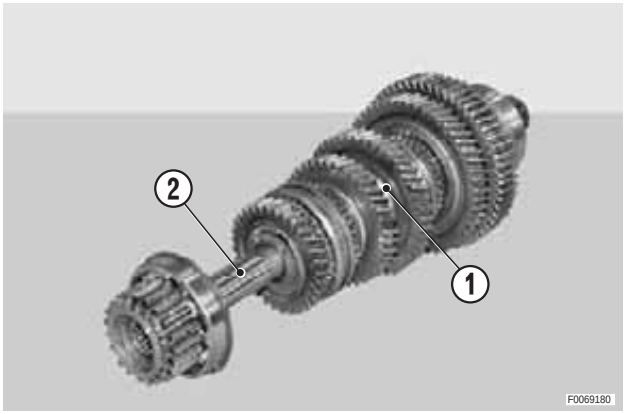
★ Take care to install the bearing (1) the right way round.

SECONDARY SHAFT
(VERSION WITH HML)

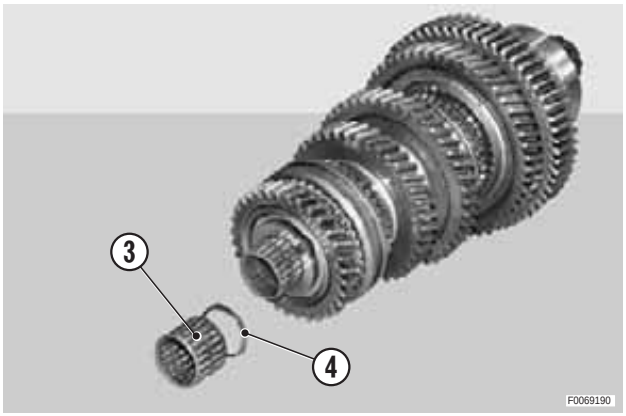
Disassembly



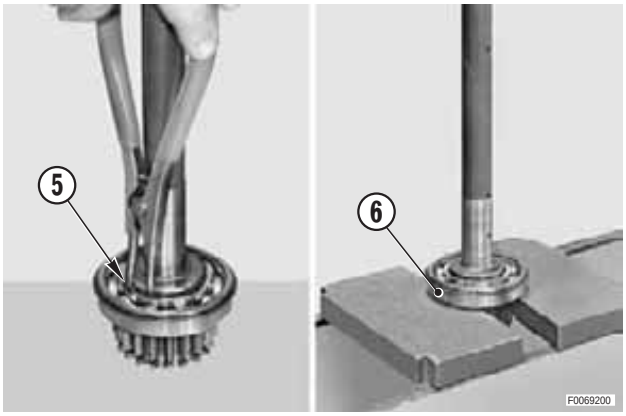
1 - Withdraw the HML unit output shaft (2) from the secondary shaft (1).



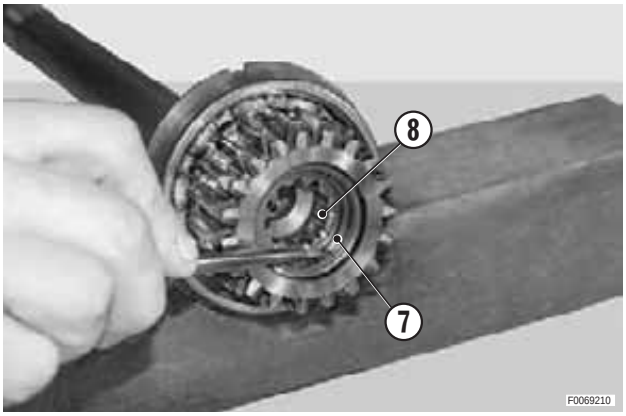
2 - Remove the roller cages (3) and the spacer (4).



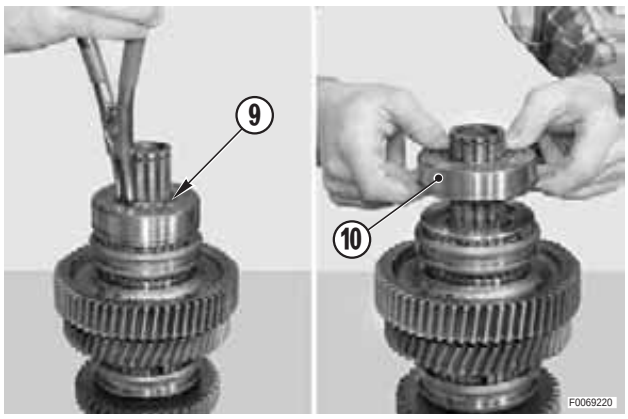
3 - Remove the circlip (5) and, using a press, remove the bearing remove the bearing (6). ⁘ 1



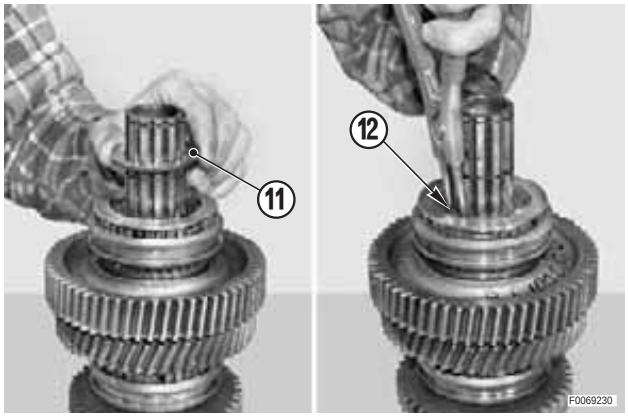
4 - Remove the circlip (7) and remove the roller cage (8).



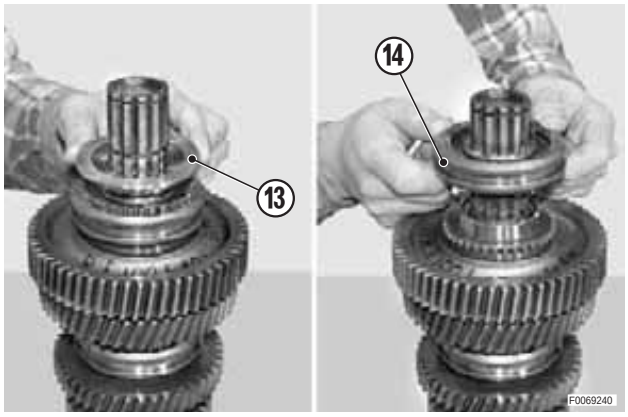
5 - Remove the circlip (9) and remove the bearing (10).



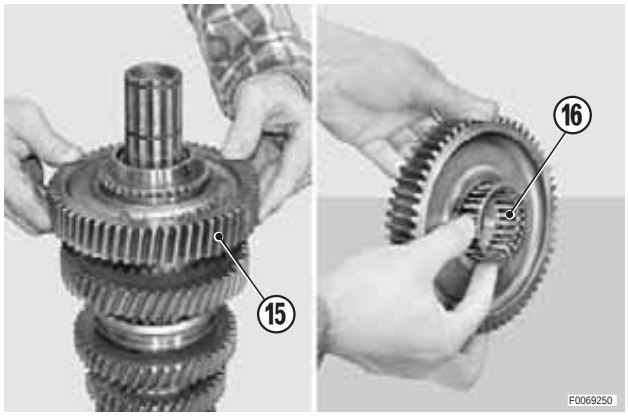
6 - Remove the spacer (11) and remove the circlip (12).



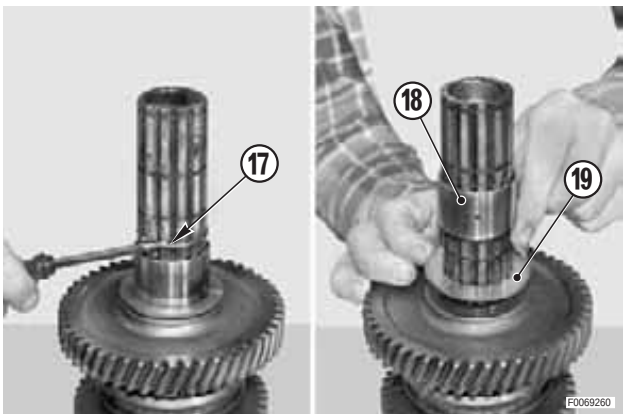
7 - Remove the thrust plate (13) and the 1st gear synchronizer (14).



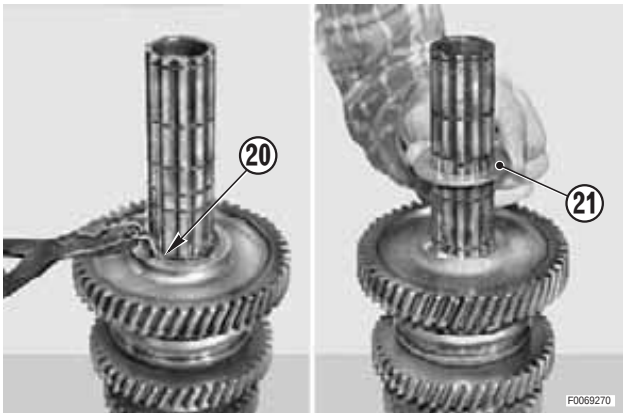
8 - Remove the 1st speed driven gear (15) and recover the roller cage (16).



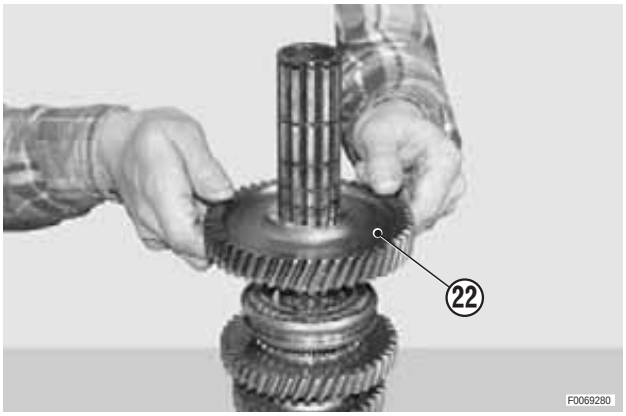
9 - Remove the circlip (17) and remove the bearing race (18) and the spacer (19).



10 - Remove the circlip (20) and the spacer (21).

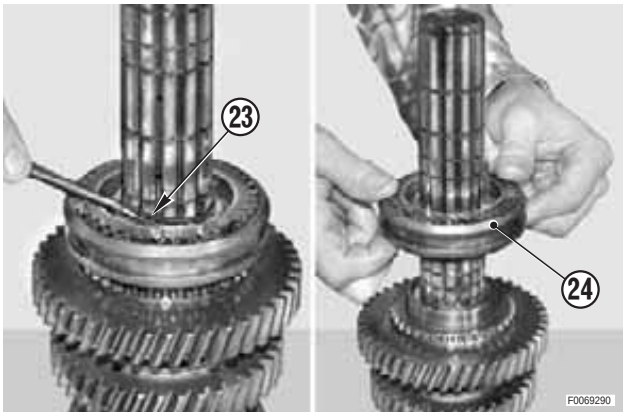


11 - Remove the 2nd speed driven gear (22).

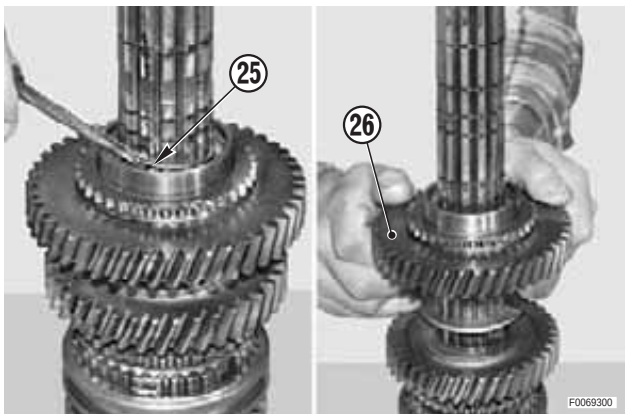


12 - Remove the circlip (23) and remove 2nd and 3rd gear synchronizer (24).

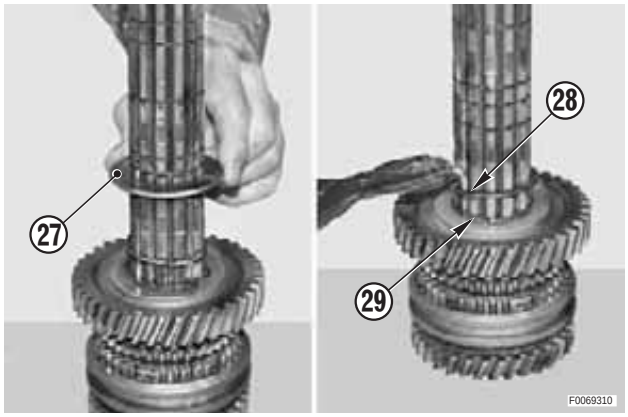
★ Renew the circlip (23) on reassembly.



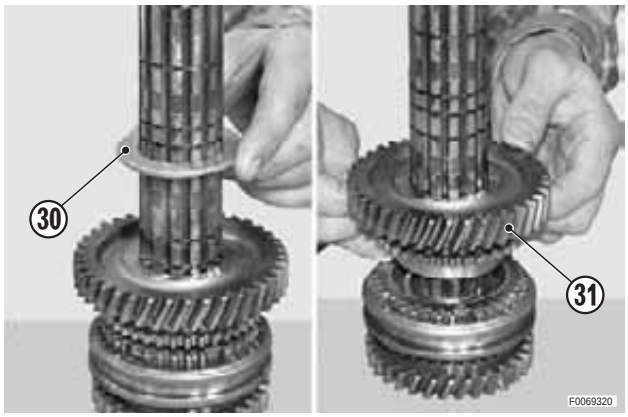
13 - Remove the circlip (25) and remove the 3rd speed driven gear (26).
★ Renew the circlip (25) on reassembly.



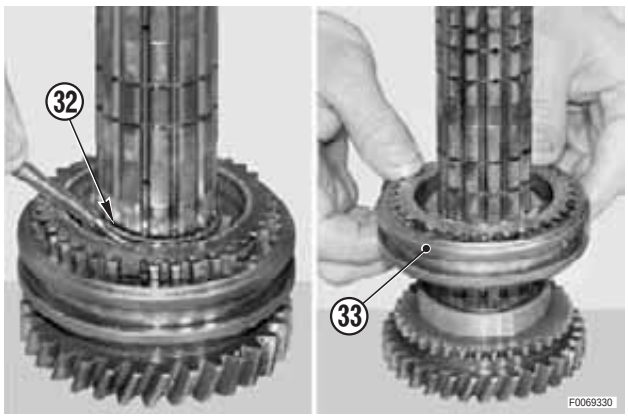
14 - Remove the spacer (27) and remove the circlips (28) and (29).



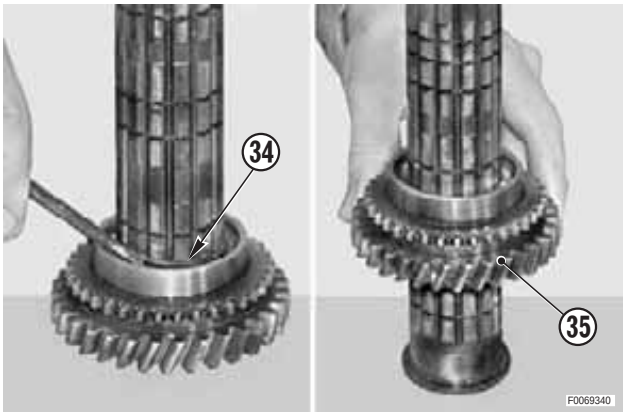
15 - Remove the spacer (30) and remove the 4th speed driven gear (31).



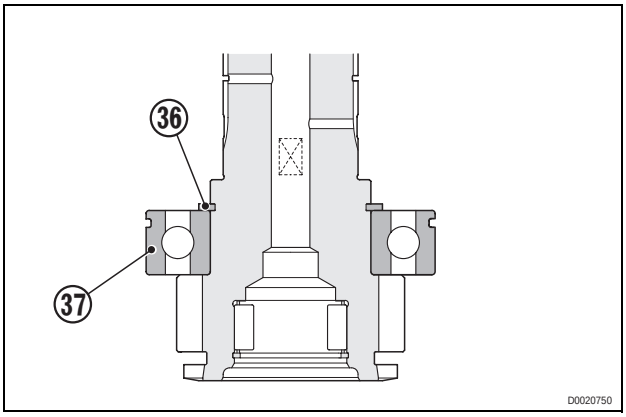
16 - Remove the circlip (32) and remove the 4th and 5th speed synchronizer (33).
★ Renew the circlip (32) on reassembly.



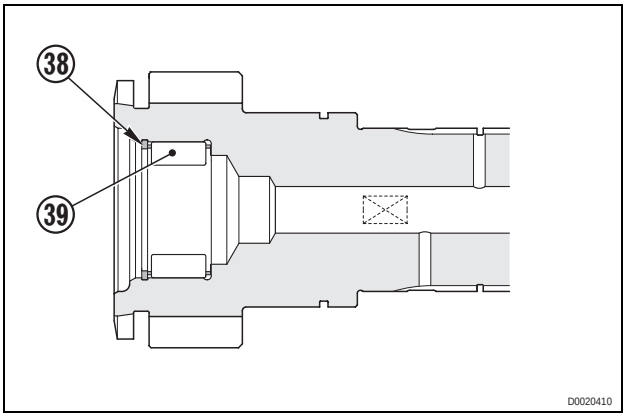
17 - Remove the circlip (34) and remove the 5th speed driven gear (35).
★ Renew the circlip (34) on reassembly.



18 - Remove the circlip (36) and, using a press, remove the bearing (37).



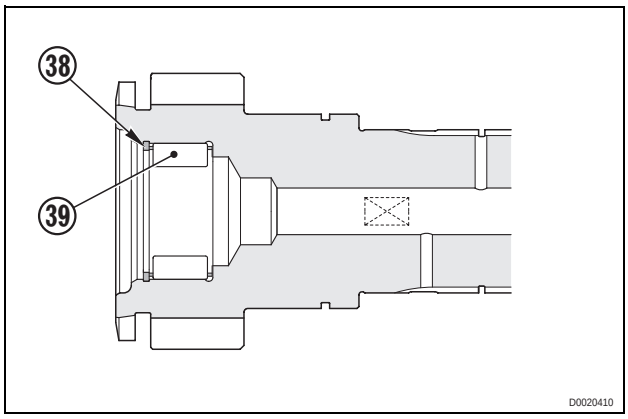
19 - Remove the circlip (38) and remove the roller cage (39).



Assembly

1 - Fit the roller cage (39) and secure in position with the circlip (38).

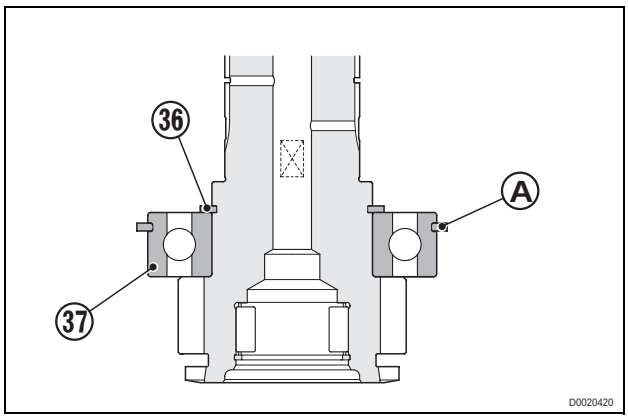
Roller cage: oil



2 - Using a press, install the bearing (37) and secure it in position with the circlip (36).

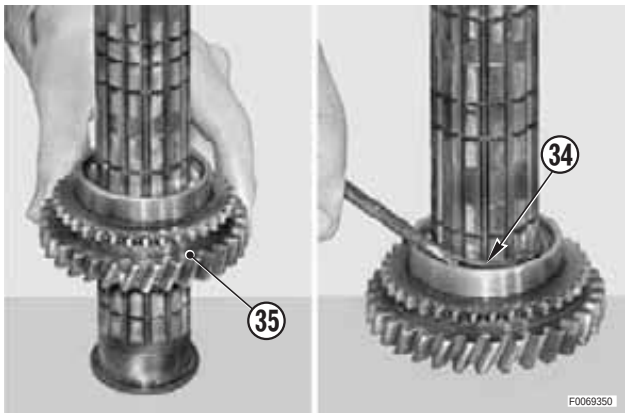
★ Take care to install the bearing (37) the right way round.

★ If a new bearing is installed, remove the old thrust washer "*A*" as the new bearing will come equipped its own thrust washer.



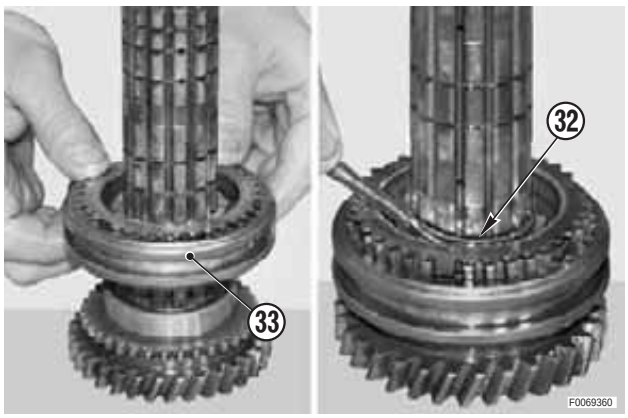
3 - Install the 5th speed driven gear (35) and secure it in position with the circlip (34).

★ Renew the circlip (34) on reassembly.

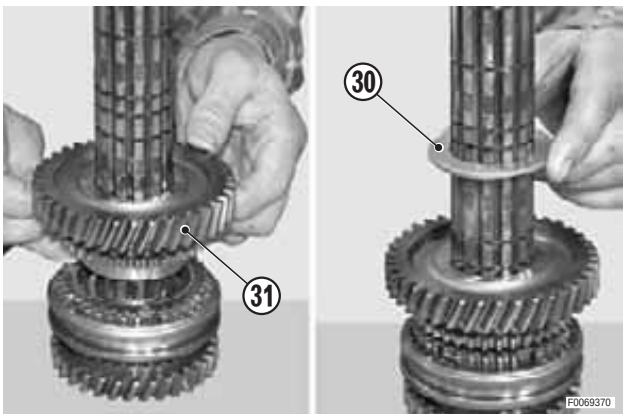


4 - Install the 4th-5th speed synchronizer (33) and secure it in position with the circlip (32).

★ Renew the circlip (32) on reassembly.



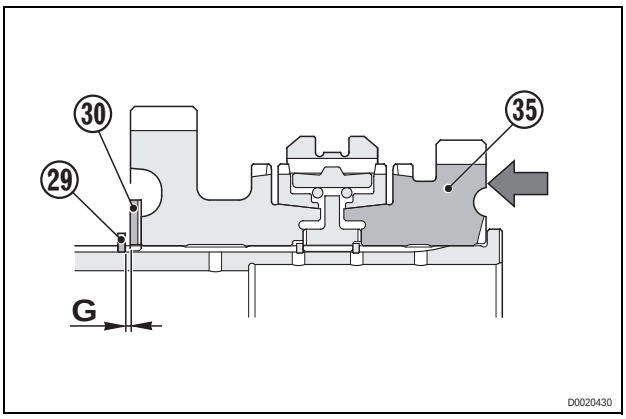
5 - Install the 4th speed driven gear (31) and the spacer (30).
★ Note which way the spacer (30) is installed.



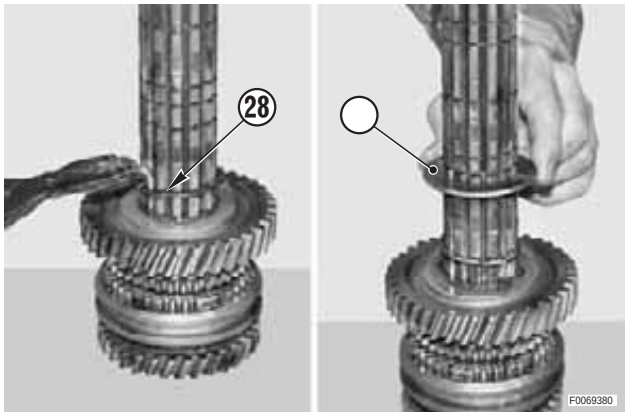
6 - Fit the circlip (29).

7 - Force the 5th speed driven gear (35) towards the spacer (30) and check that the residual clearance "*G*" between the circlip (29) and the spacer (30) is within the specified limits.
★ Normal clearance: 0.15 to 0.30 mm

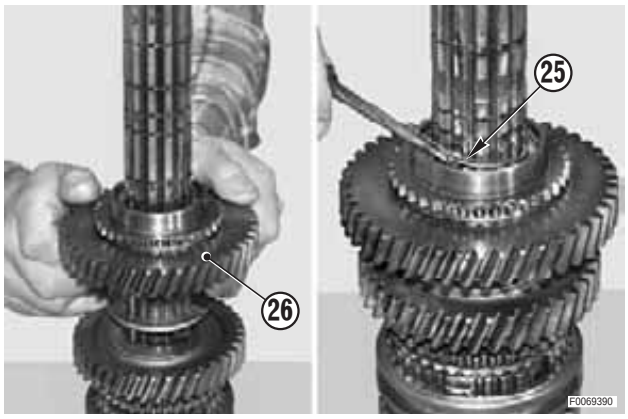
8 - If the clearance is not within the specified limits, replace the spacer (30) selecting one of suitable thickness from those available.



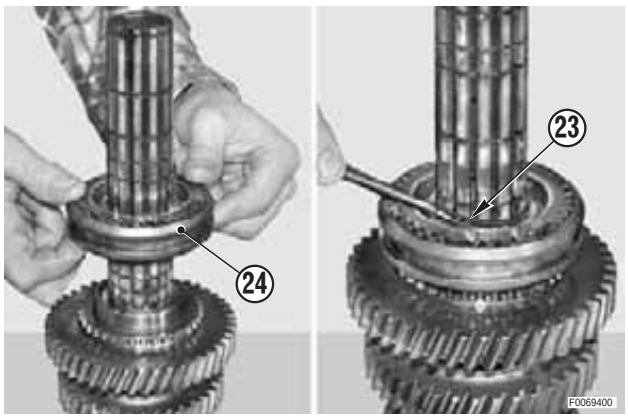
9 - Fit the circlip (28) and the spacer (27).
★ Note which way the spacer (27) is installed .



10 - Install the 3rd speed driven gear (26) and secure it in position with the circlip (25).
★ Renew the circlip (25) on reassembly.

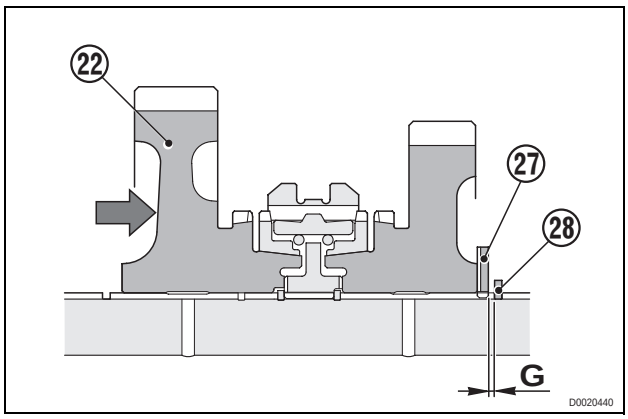


11 - Install the 2nd/3rd speed synchronizer (24) and secure it in position with the circlip (23).
★ Renew the circlip (23) on reassembly.

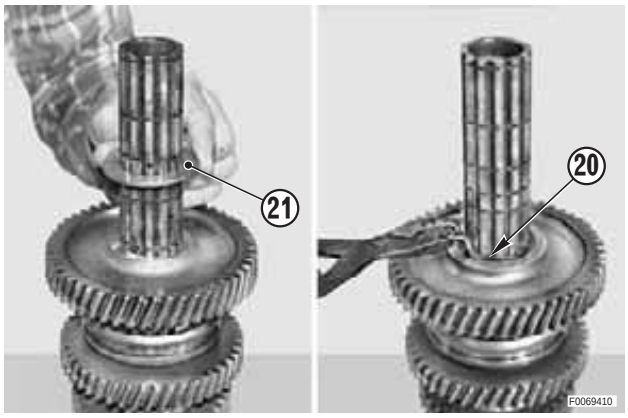


12 - Temporarily install the 2nd speed driven gear (22) and force it towards the spacer (27); check that the residual clearance "*G*" between the circlip (28) and the spacer (27) is within the specified limits.
★ Normal clearance: 0.15 to 0.30 mm

13 - If the clearance is not within the specified limits, replace the spacer (27) selecting one of suitable thickness from those available.

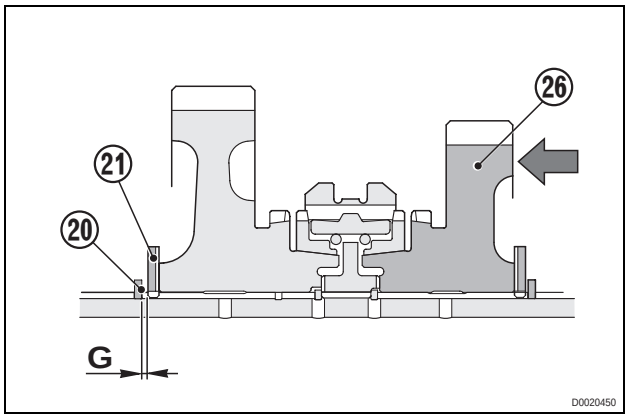


14 - Fit the spacer (21) and secure it in position with the circlip (20).
★ Note which way the spacer (21) is installed .

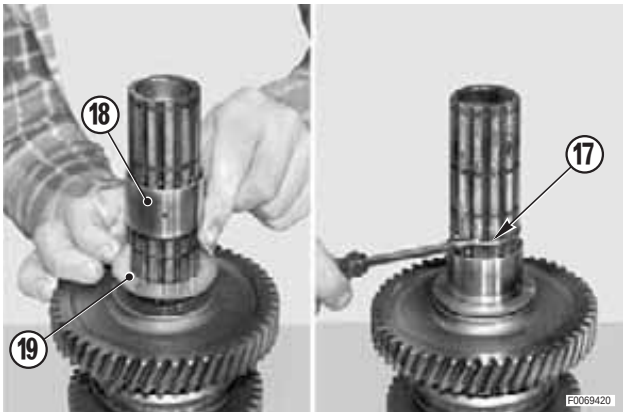


15 - Force the 3rd speed driven gear (26) towards the spacer (21) and simultaneously check that the residual clearance "*G*" between the circlip (20) and the spacer (21) is within the specified limits.
★ Normal clearance: 0.15÷0.30 mm

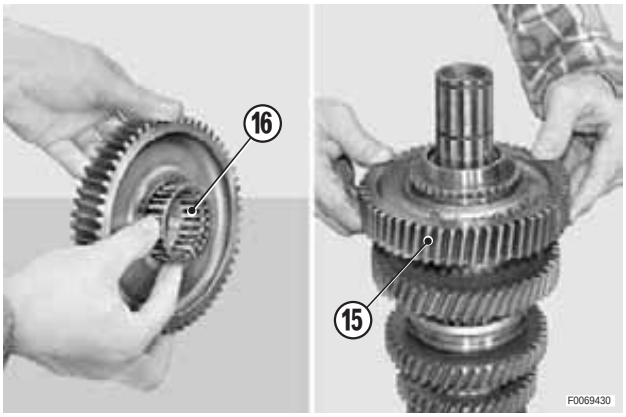
16 - If the clearance is not within the specified limits, replace the spacer (21), selecting one of suitable thickness from those available.



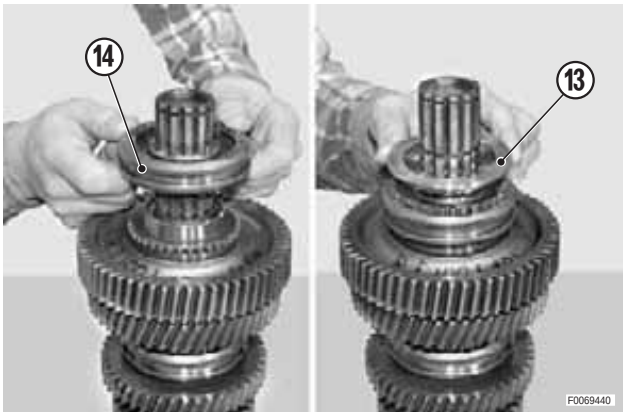
17 - Fit the spacer (19) and the race (18) and secure them with the circlip (17).
★ Note which way the spacer (19) is installed .
★ Renew the circlip on reassembly.



18 - Install the 1st speed driven gear (15) complete with the roller cage (16).
Roller cage: oil

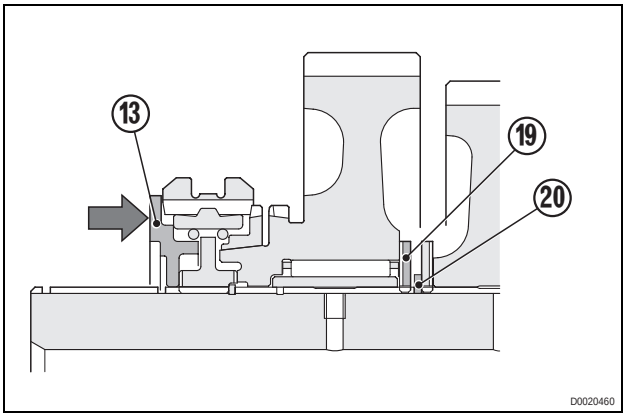


19 - Install the 1st speed synchronizer (14) and the thrust plate (13).

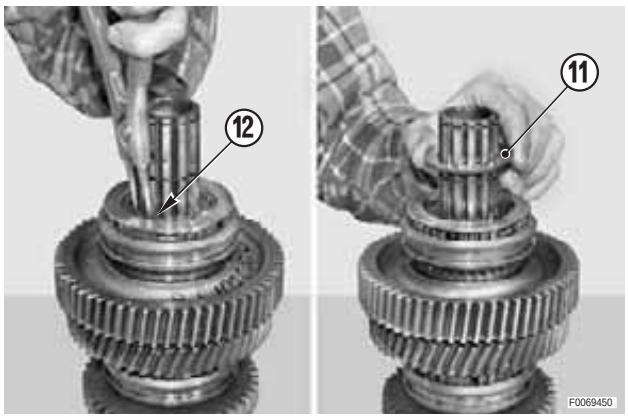


20 - Force the thrust plate (13) towards the spacer (19) and simultaneously check that the residual clearance "*G*" between the circlip (20) and the spacer (19) is within the specified limits.
★ Normal clearance: 0.15÷0.30 mm

21 - If the clearance is not within the specified limits, replace the spacer (19), selecting one of suitable thickness from those available.



22 - Fit the circlip (12) and the spacer (11).



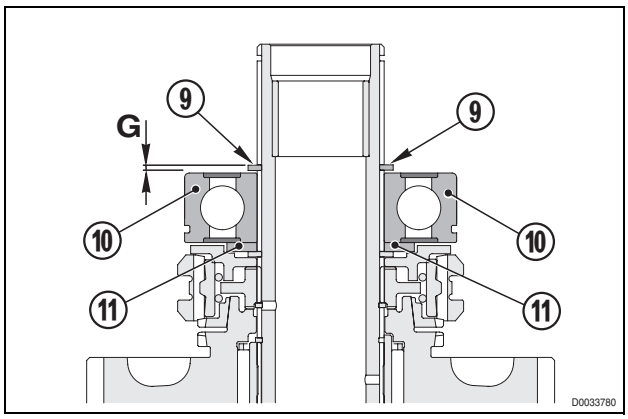
23 - Fit the bearing (10) and secure it in position with the circlip (9).

★ Take care to install the bearing (10) the right way round.

24 - Check that the residual clearance "*G*" of bearing (10) is within the specified limits.

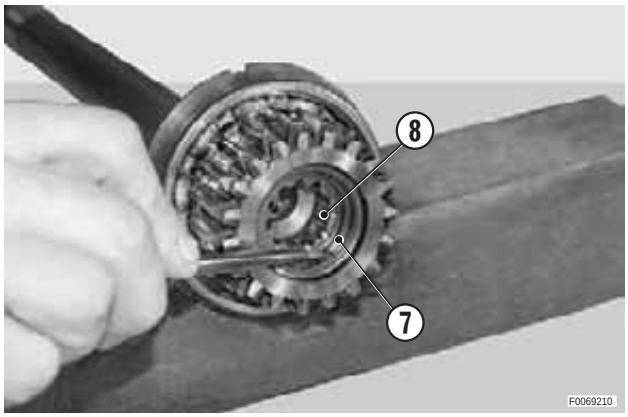
★ Normal clearance: 0÷0.09 mm

25 - If the clearance is not within the specified limits, replace the spacer (11), selecting one of suitable thickness from those available.



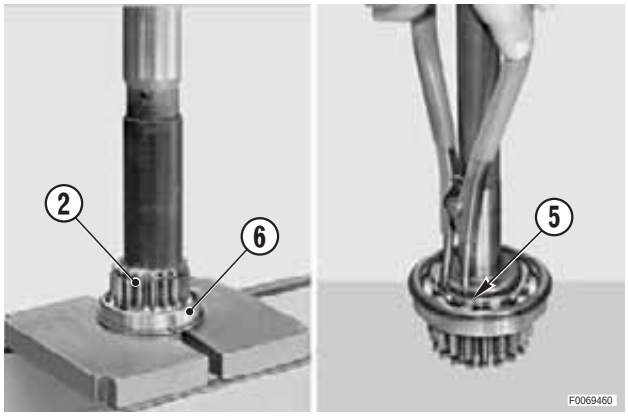
26 - Fit the roller cage (8) and secure in position with the circlip (7).

Roller cage: oil



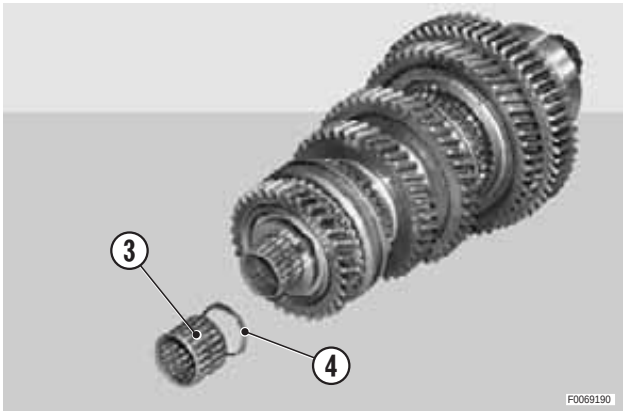
27 - Using a press and suitable tool, install the bearing (6) on the output shaft (2) and secure it in position with the circlip (5).

★ Take care to install the bearing the right way round.

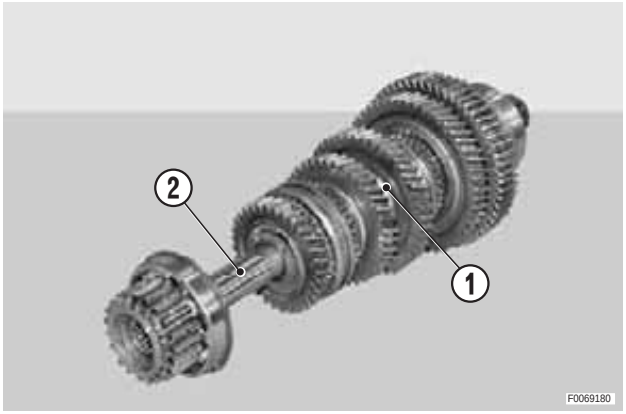


28 - Install the roller cages (3) and the spacer (4) in the HML unit.

Roller cage: oil

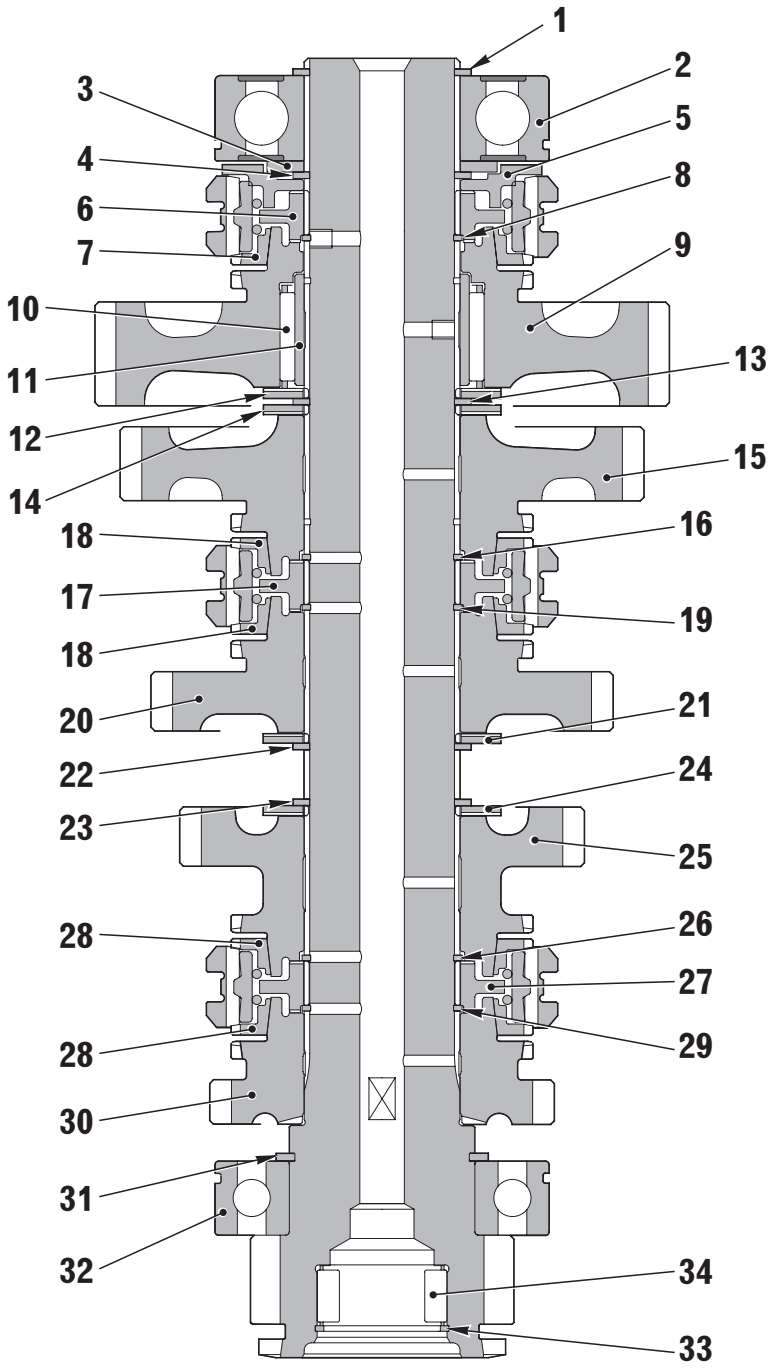


29 - Insert the output shaft (2) in the secondary shaft (1).

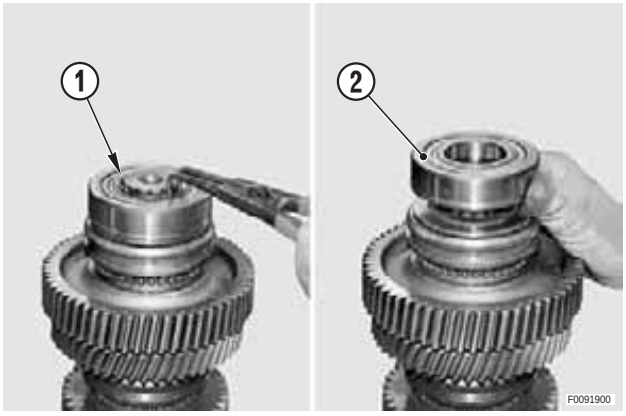


SECONDARY SHAFT (Version without HML)

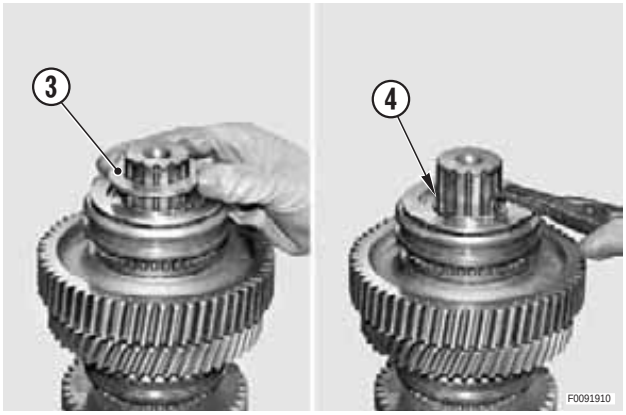
Smontaggio



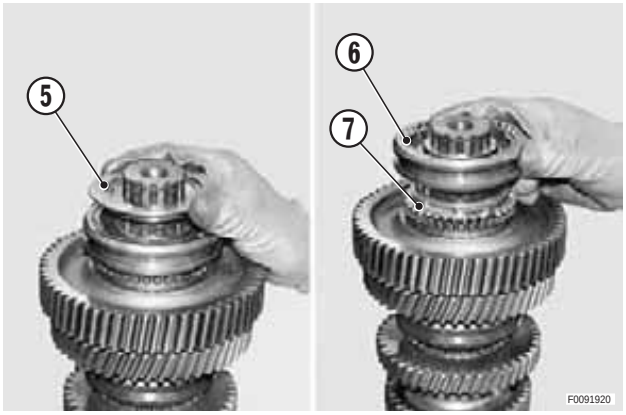
1 - Remove the circlip (1) and remove the bearing (2).



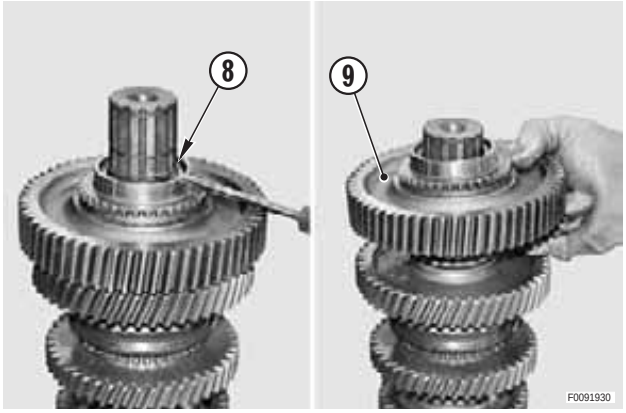
2 - Remove the spacer (3) and remove the circlip (4).



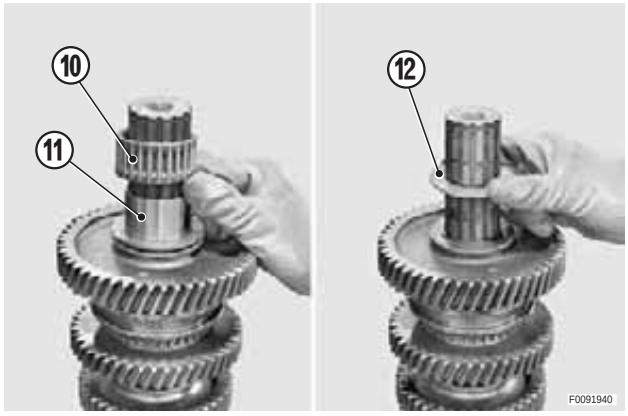
3 - Remove thrust plate (5) and 1st gear synchroniser (6) complete with driver ring (7).



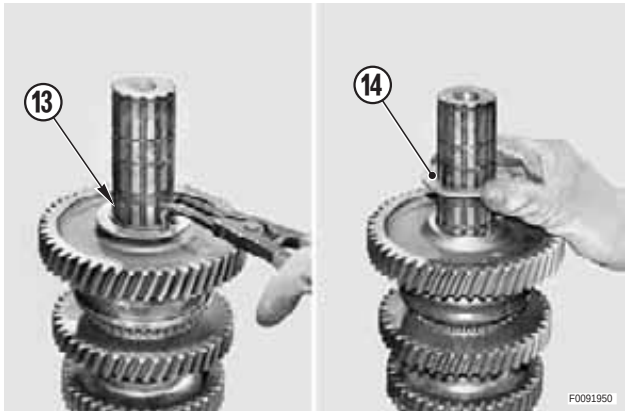
4 - Remove the circlip (8) and remove the 1st speed driven gear (9).
★ Renew the circlip on reassembly.



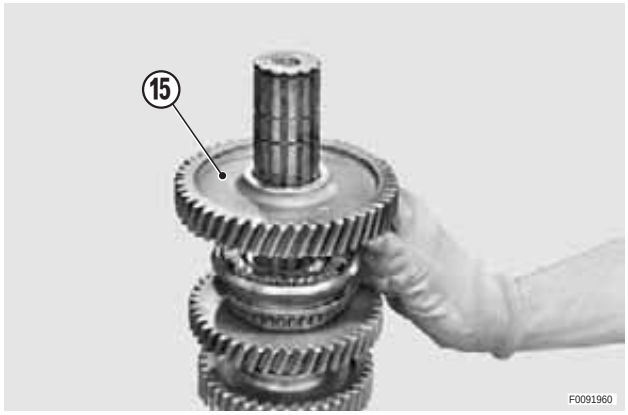
5 - Remove the roller cage (10), the race (11) and spacer (12).



6 - Remove the circlip (13) and spacer (14).

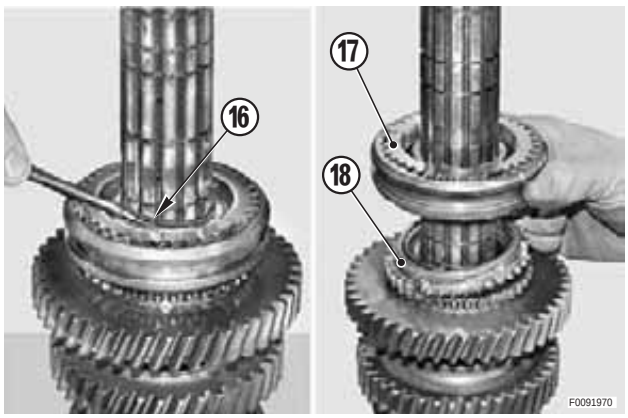


7 - Remove the 2nd speed driven gear (15).



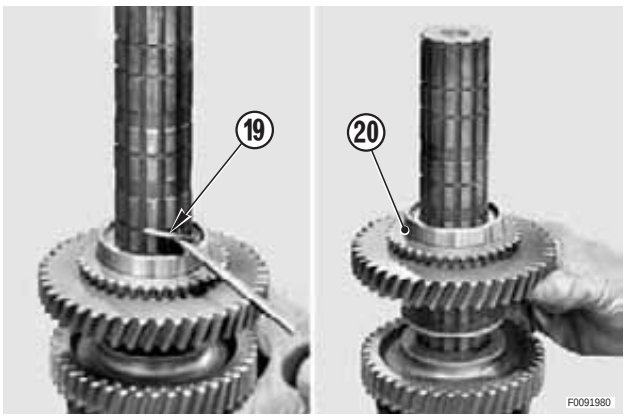
8 - Remove the circlip (16) and remove the 2nd and 3rd speed synchroniser (17) complete with driver rings (18).

★ Renew the circlip (16) on reassembly.

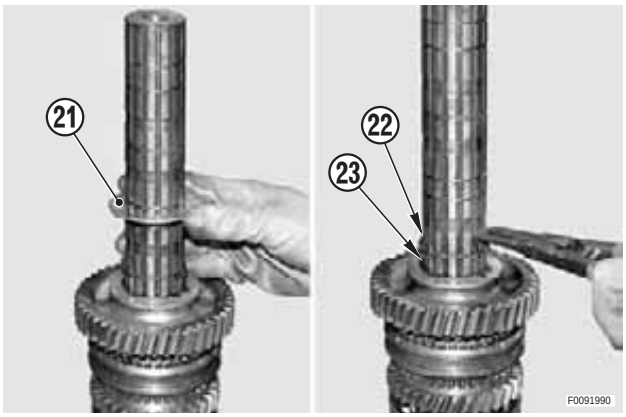


9 - -Remove the circlip (19) and remove 3rd speed driven gear (20).

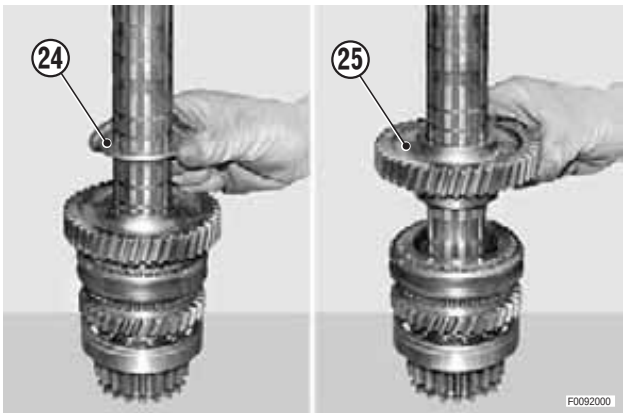
★ Renew the circlip (19) on reassembly.



10 - Remove the spacer (21) and remove the circlips (22) and (23).

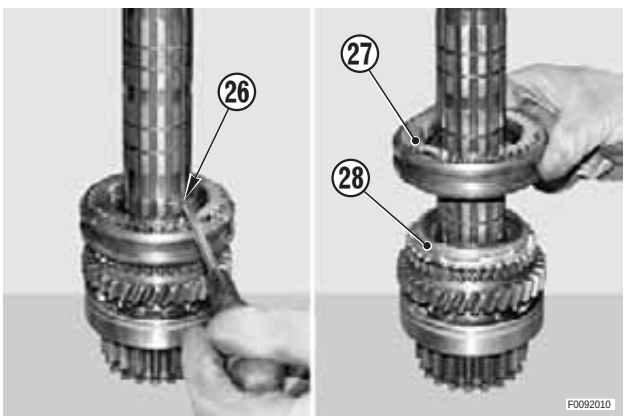


11 - Remove the spacer (24) and remove the 4th speed driven gear (25).

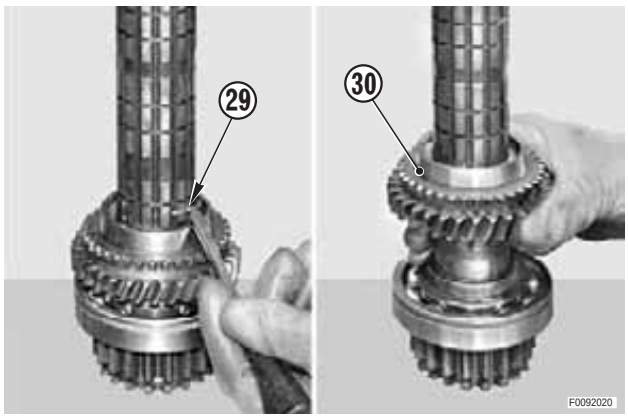


12 - Remove the circlip (26) and remove the 4th and 5th speed synchroniser (27) complete with driver rings (28).

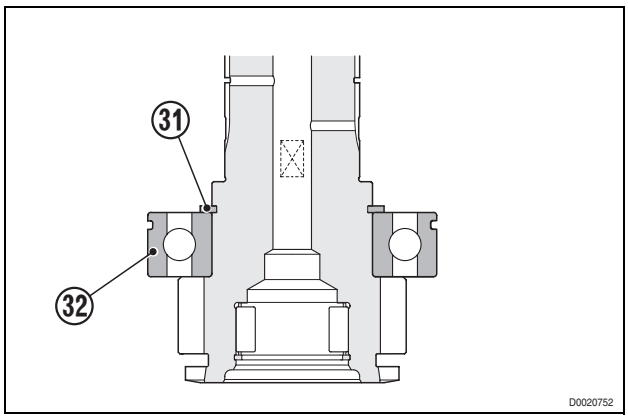
★ Renew the circlip (26) on reassembly.



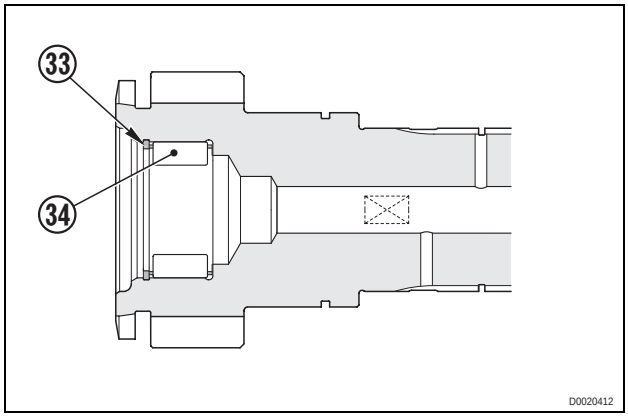
13 - Remove the circlip (29) and remove the 5th speed-driven gear (30).
★ Renew the circlip (29) on reassembly.



14 - Remove the circlip (31) and, using a press, remove the bearing (32).



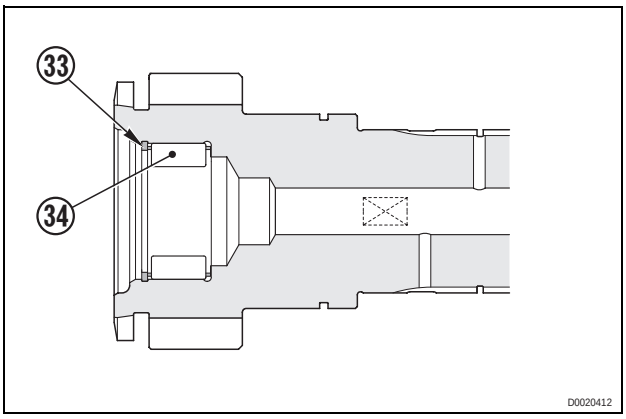
15 - Remove the circlip (33) and remove the roller cage (34).



Assembly

1 - Fit the roller cage (34) and secure in position with the circlip (33).

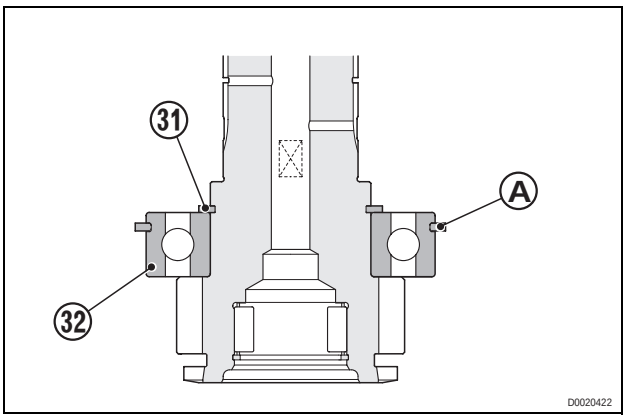
Roller cage: oil



2 - Using a press, install the bearing (32) and secure it in position with the circlip (31).

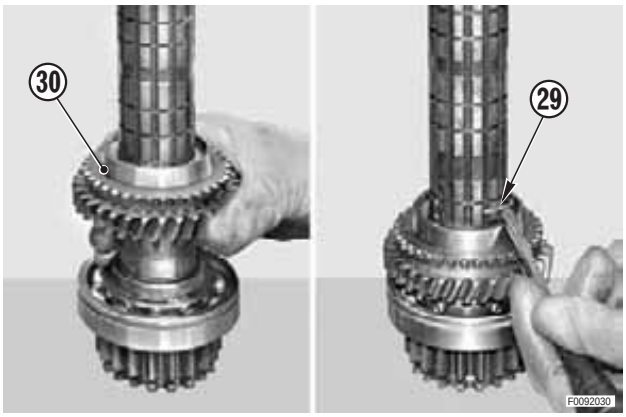
★ Take care to install the bearing (32) the right way round.

★ If a new bearing is installed, remove the old thrust washer "*A*" as the new bearing will come equipped its own thrust washer.



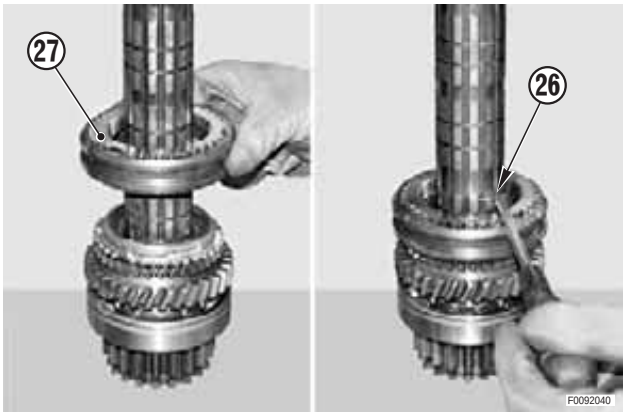
3 - Install the 5th speed driven gear (30) and secure it in position with the circlip (29).

★ Renew the circlip (29) on reassembly.

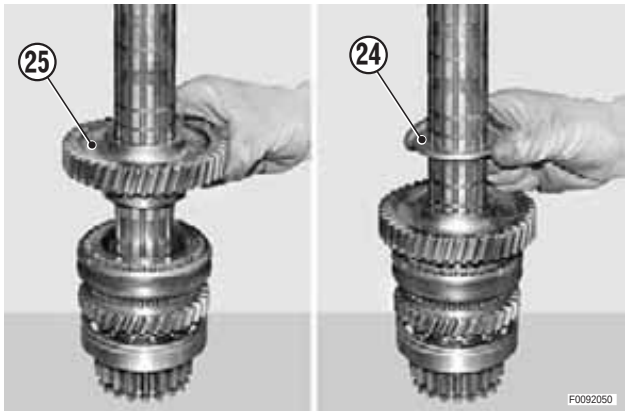


4 - Install the 4th and 5th speed synchroniser (27) and secure it with circlip (26).

★ Renew the circlip (26) on reassembly.



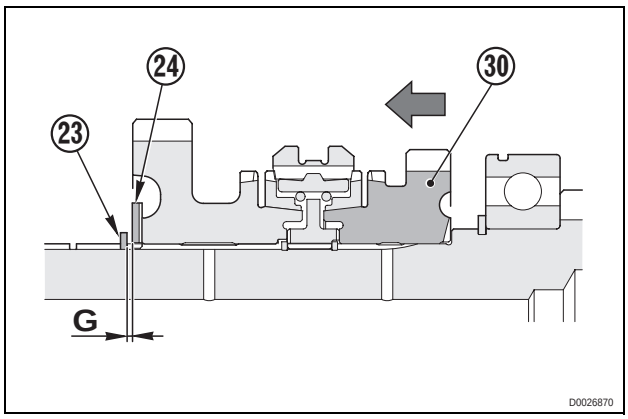
5 - Install the 4th speed driven gear (25) and spacer (24).
★ Note which way the spacer (24) is installed .



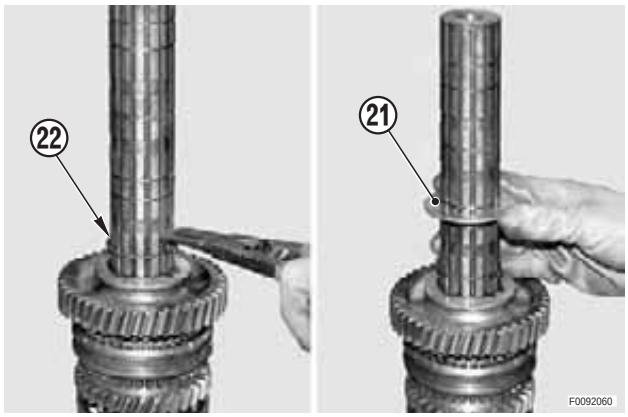
6 - Fit the circlip (23).

7 - Force the 5th speed driven gear (30) towards the spacer (24) and check that the residual clearance“*G*” between the circlip (23) and the spacer (24) is within the specified limits.
★ Normal clearance: 0.15 to 0.30 mm

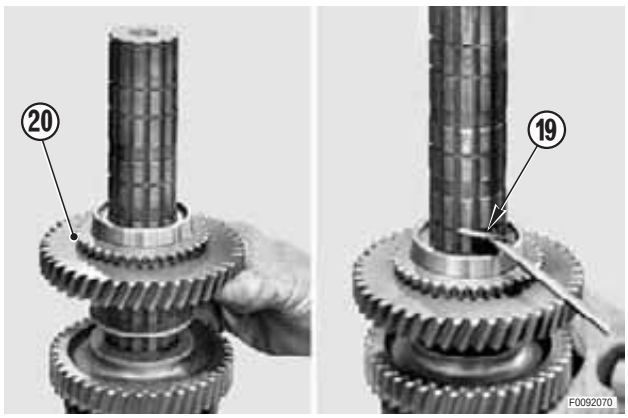
8 - If the clearance is not within the specified limits, replace the spacer (24) selecting one of suitable thickness from those available.



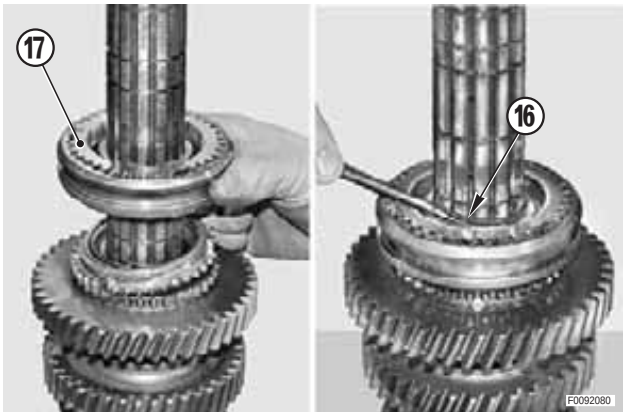
9 - Fit the circlip (22) and the spacer (21).
★ Note which way the spacer (21) is installed.



10 - Install the 3rd speed driven gear (20) and secure it in position with the circlip (19).
★ Renew the circlip (19) on reassembly.

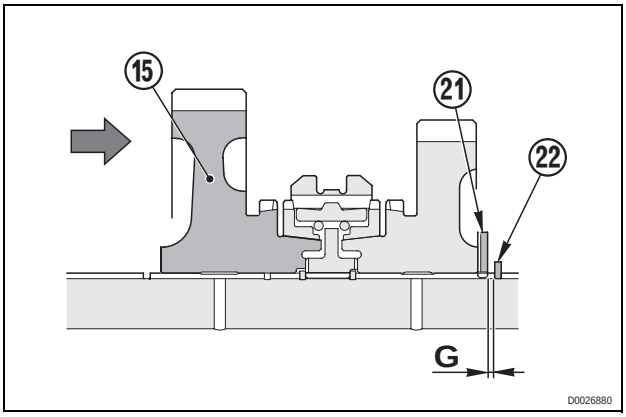


11 - Install the 2nd and 3rd speed synchroniser (17) and secure it with circlip (16).
★ Renew the circlip (16) on reassembly.

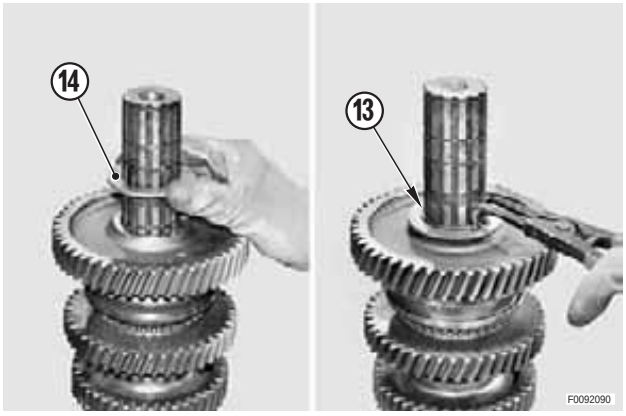


12 - Temporarily install the 2nd speed driven gear (15) and force it towards the spacer (21); check that the residual clearance "*G*" between the circlip (22) and the spacer (21) is within the specified limits.
★ Normal clearance: 0.15÷0.30 mm

13 - If the clearance is not within the specified limits, replace the spacer (21), selecting one of suitable thickness from those available.

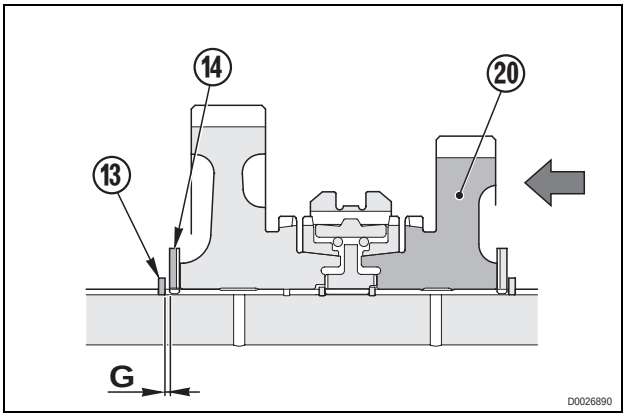


14 - Fit the spacer (14) and secure it in position with the circlip (13).
★ Note which way the spacer (14) is installed.

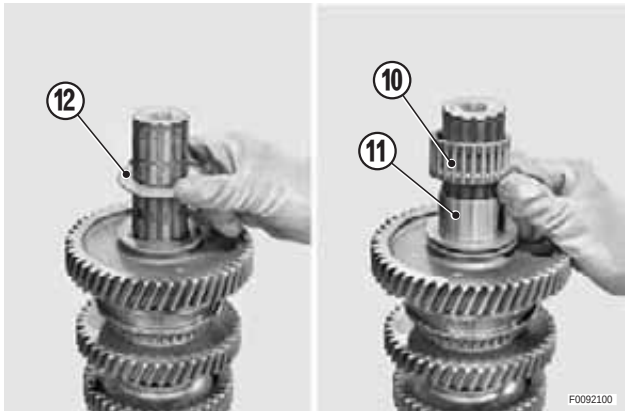


15 - Force the 3rd speed driven gear (20) towards spacer (14) and simultaneously check that residual clearance "*G*" between circlip (13) and spacer (14) is within the specified limits.
★ Normal clearance: 0.15÷0.30 mm

16 - If the clearance is not within the specified limits, replace the spacer (14), selecting one of suitable thickness from those available.

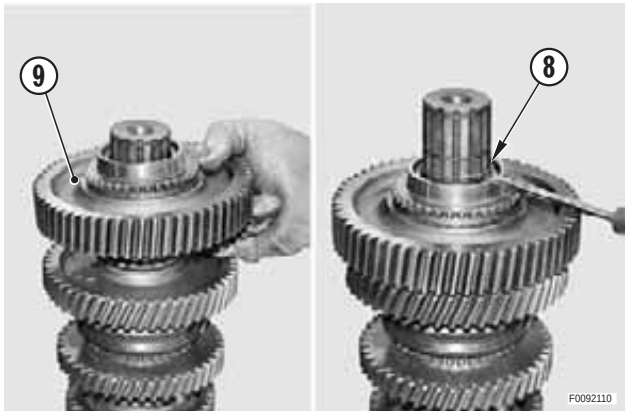


17 - Fit the spacer (12), race (11) and the roller cage (10).
★ Note which way the spacer (12) is installed.

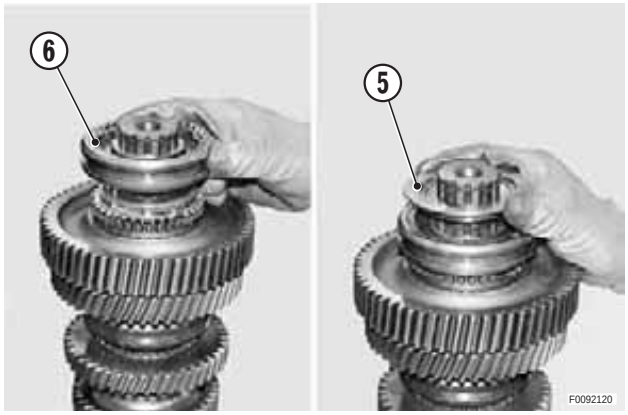


18 - Fit driven gear (9) and circlip (8).

Roller cage: oil

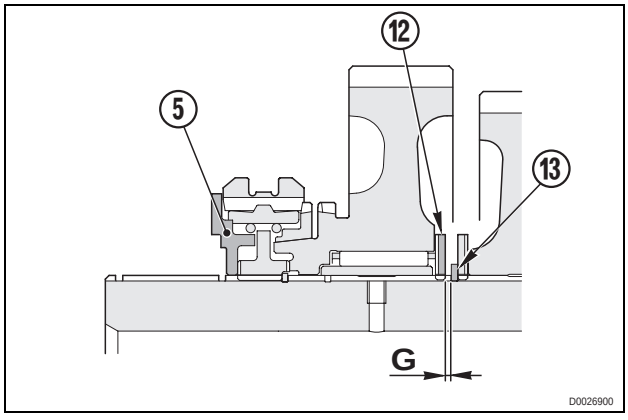


19 - Install the 1st speed synchroniser (6) and the thrust plate (5).

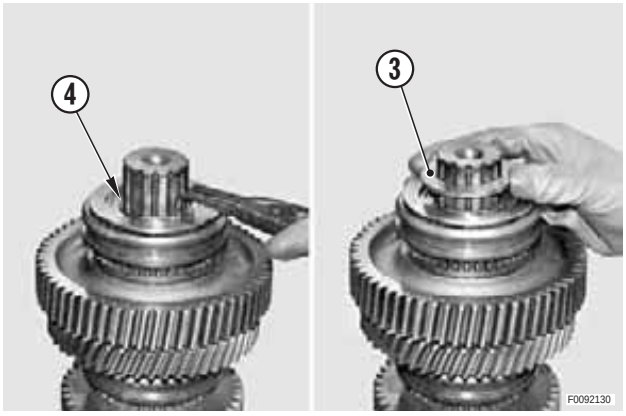


20 - Force the thrust plate (5) towards the spacer (12) and simultaneously check that the residual clearance "*G*" between the circlip (13) and the spacer (12) is within the specified limits.
★ Normal clearance: 0.15 to 0.30 mm

21 - If the clearance is not within the specified limits, replace the spacer (12), selecting one of suitable thickness from those available.



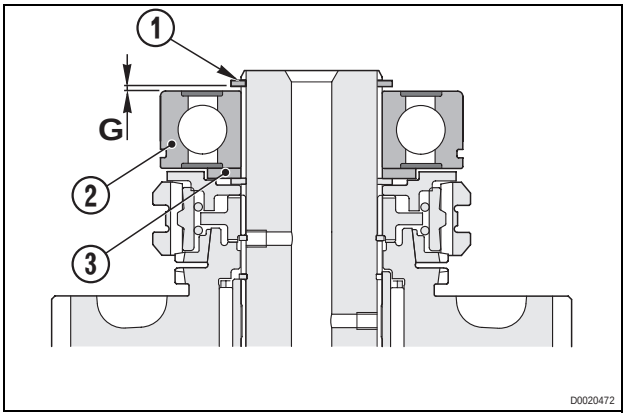
22 - Fit the circlip (4) and the spacer (3).



23 - Fit the bearing (2) and secure it in position with the circlip (1).
★ Take care to install the bearing (2) the right way round.

24 - Check that the residual clearance "*G*" of bearing (2) is within the specified limits.
★ Normal clearance: 0÷0.09 mm

25 - If the clearance is not within the specified limits, replace the spacer (3), selecting one of suitable thickness from those available.

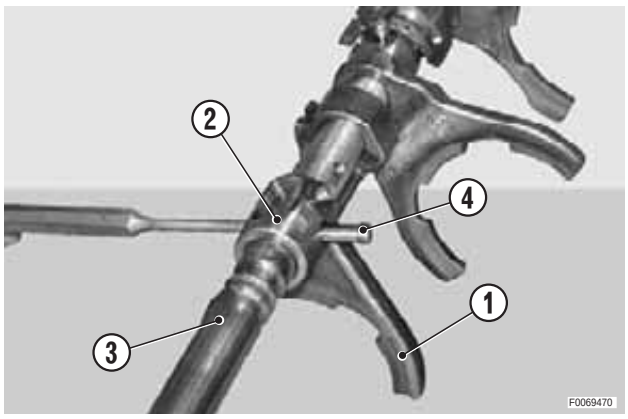


GEAR SELECTOR ROD

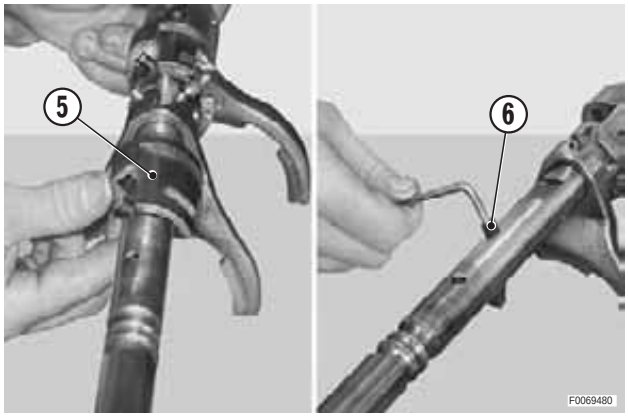
Disassembly

1 - Disengage the 1st speed selector fork (1) from the sleeve (2)then rotate the rod (3)so as to be able to withdraw the pin (4).

2 - Remove the pin (4) and withdraw the selector fork (1).



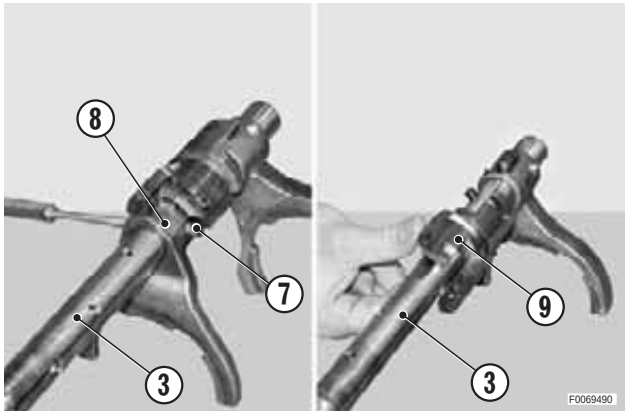
3 - Remove the sleeve (5) and remove the screw (6).



4 -- Rotate the rod (3) so as to be to remove the pin (7).

5 - Remove the pin (7) and withdraw the selector fork (8).

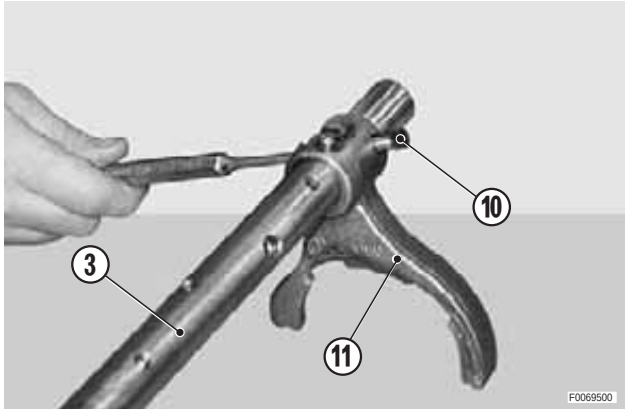
6 - Remove the sleeve (9).



7 - Rotate the rod (3) so as to be able to remove the pin (10) and remove the selector fork (11).

Assembly

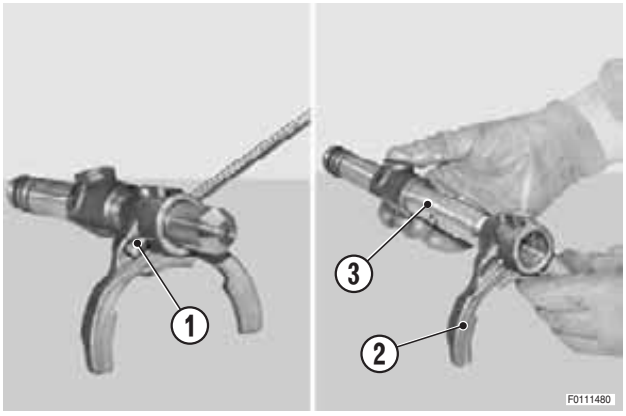
- To assemble, follow the disassembly steps in reverse order.



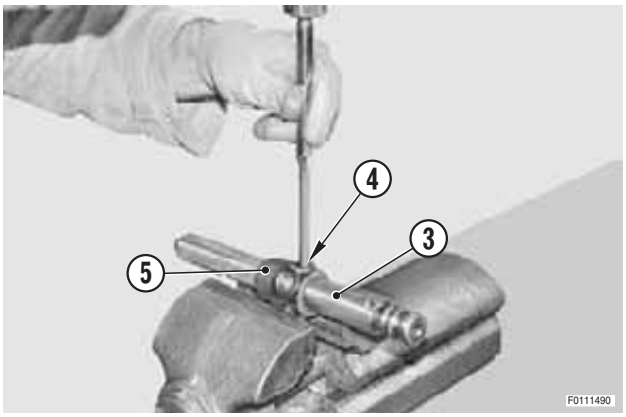
MINI REDUCTION GEAR CONTROL ROD

Disassembly

1 - Drive out the pin (1) and slide the selector fork (2) off the rod (3).



2 - Drive out the spring pin (4) and withdraw the rod (3) from the sleeve (5). ⁘ 1

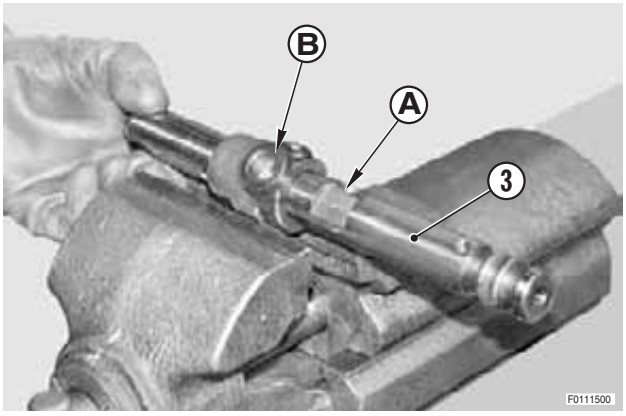


Assembly

- To assemble, follow the disassembly steps in reverse order.

⁘ 1

★ Position the rod (3) with the groove "*A*" facing hole "*B*" in the sleeve (5).

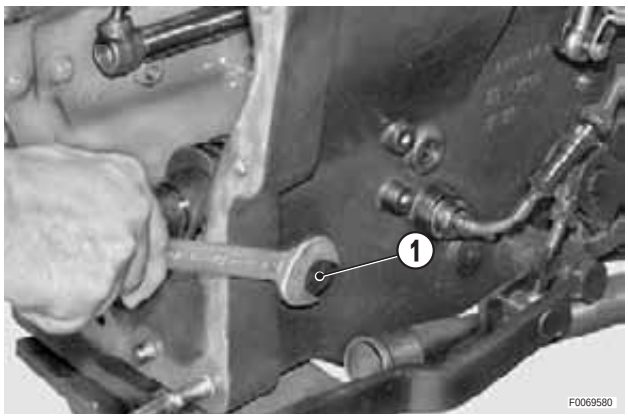


FOUR-WHEEL DRIVE ENGAGEMENT CONTROL

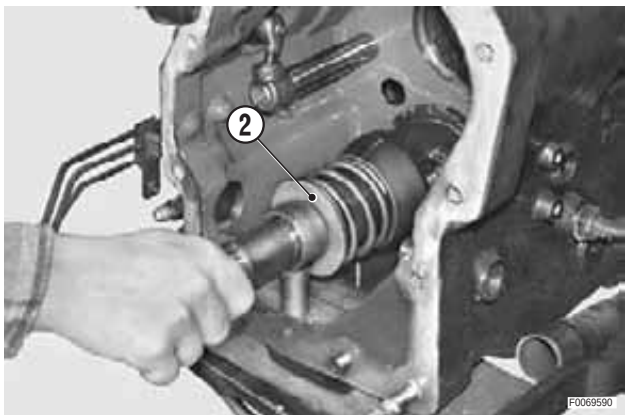
Removal

1 - Separate the gearbox from the transmission. (For details, see "GEARBOX ASSEMBLY").

2 - Remove the union (1). ※1
★ Renew the copper washers on reassembly.



3 - Remove the complete 4WD engagement control assembly (2).

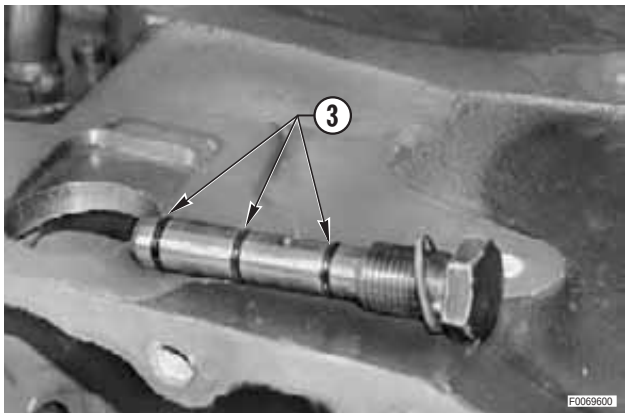


Refitting

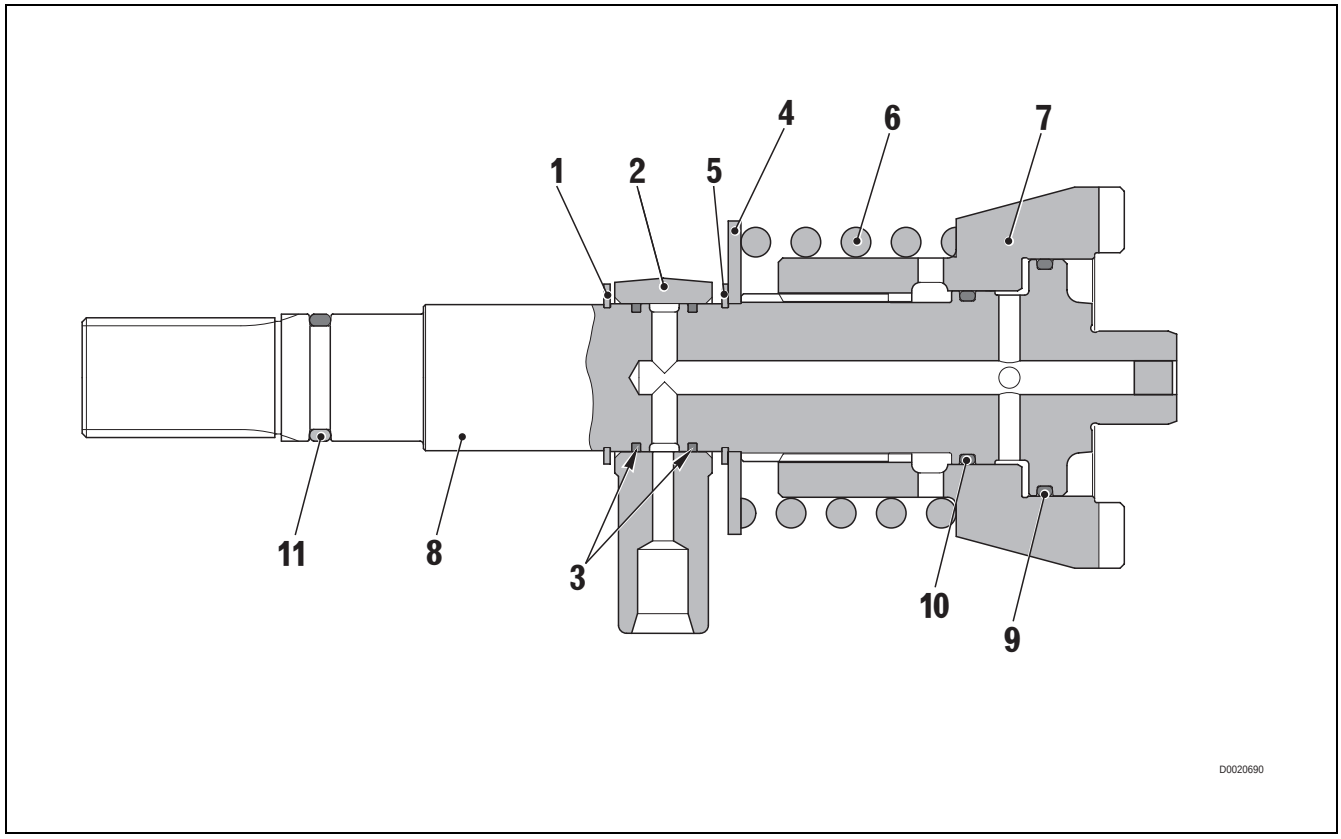
• Refitting is the reverse of removal.

※1

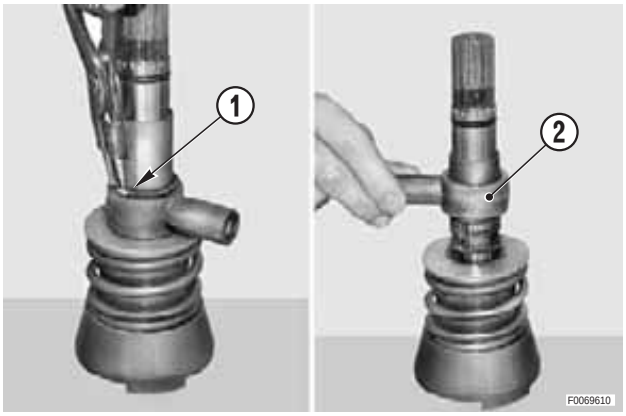
★ Check the condition of the O-rings (3) and renew them if necessary.



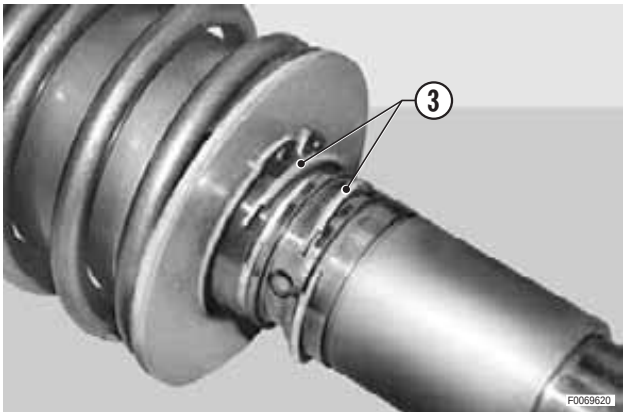
Disassembly



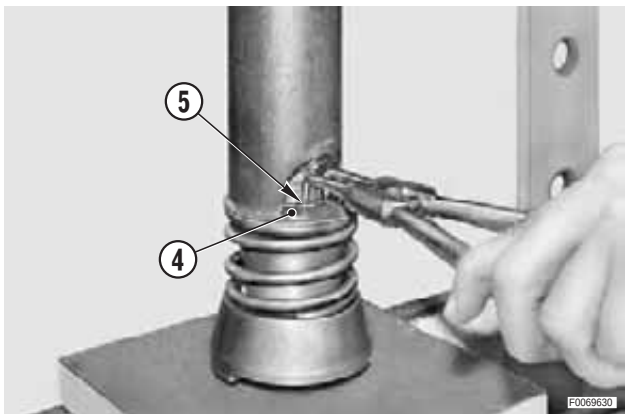
1 - Remove the circlip (1) and remove manifold (2).



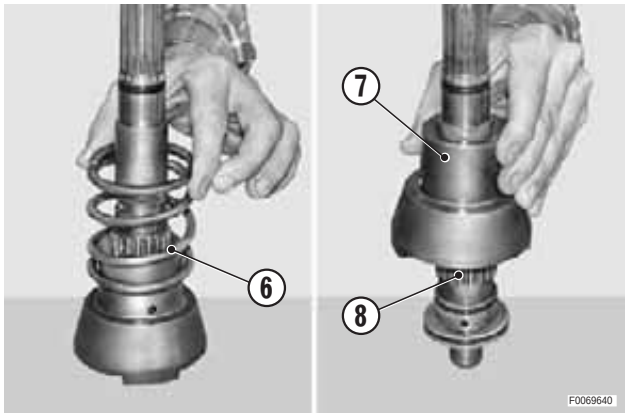
2 - Remove the oil seals (3). ※1



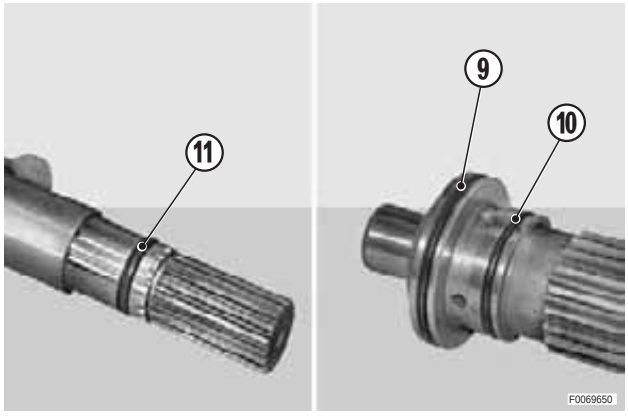
3 - Using a suitable tool and a press, press lightly on the disc (4) and remove the circlip (5) and the disc (4).
★ Take care not to apply to much pressure to the disc (4) to avoid bending it.



4 - Remove the spring (6) and separate the sleeve (7) from the shaft (8).



5 - Remove O-rings (9), (10) and (11). ※ 2



Assembly

- To assemble, follow the disassembly steps in reverse order.

※ 1

Oil seals: Grease

※ 2

O-rings (9) and (10): Grease

HYDRAULIC PUMPS
STEERING PUMP AND SOLENOID VALVES

Removal

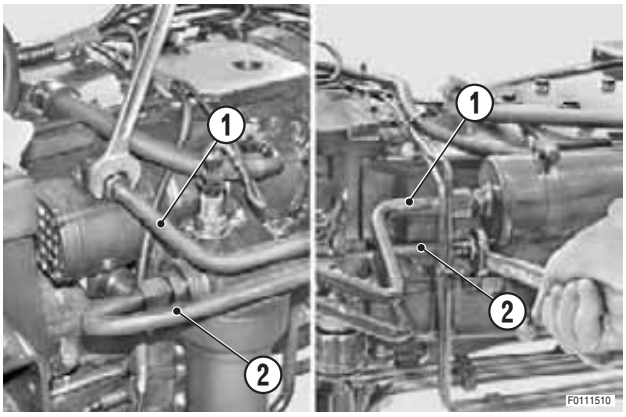
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil contained in the transmission.

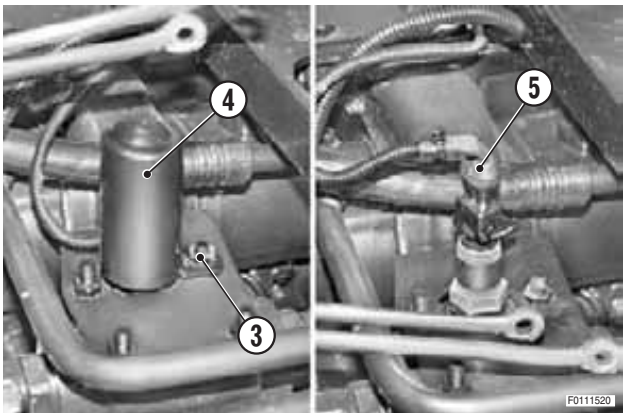
⁘ 1

Transmission oil: approx. 45 l (12 US.gall.)

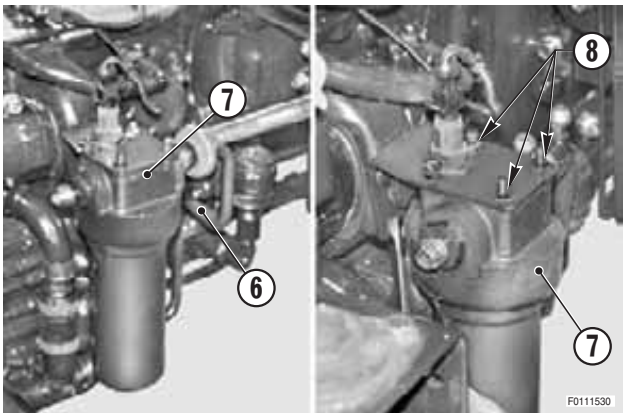
2 - Loosen the fittings and remove the pipes (1) and (2).



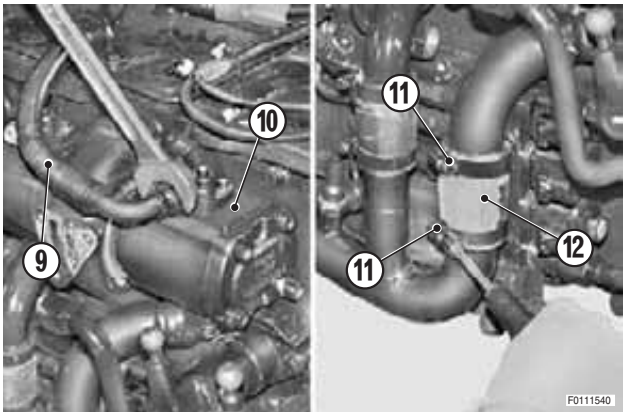
3 - Remove the nut (3), remove the cover (4) and disconnect the wiring connector (5).



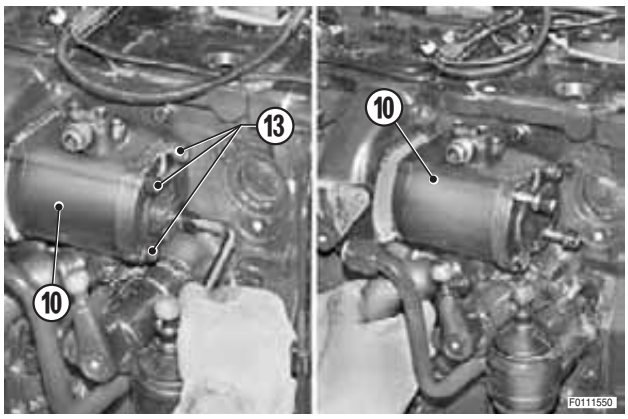
4 - Disconnect the pipe (6) from the filter (7), remove the nuts (8) and remove the filter (7).



5 - Disconnect the pipe (9) from the pump (10), loosen the hose clamps (11) and move the sleeve (12) downwards.



6 - Remove the screws (13) and remove the pump assembly (10).. ※ 2



Refitting

- Refitting is the reverse of removal.

※ 1

★ Fill the transmission with the required quantity of oil.

Oil: approx. 45 l (12 US gall.)

※ 2

Mating face: Silastic 738

PUMP FOR HYDRAULIC LIFT AND AUXILIARY SERVICES CONTROL VALVE

Removal

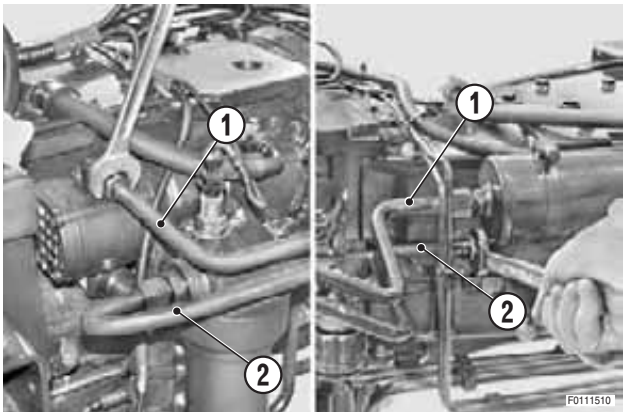
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil contained in the transmission.

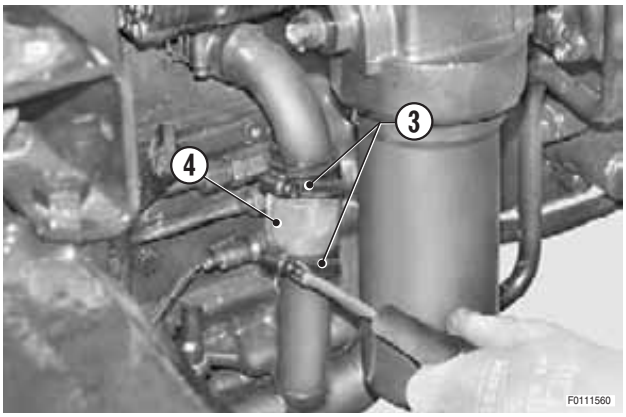
[1]

Transmission oil: max. 45 l (12 US.gall.)

2 - Loosen the fittings (4) and remove the pipes (1) and (2).

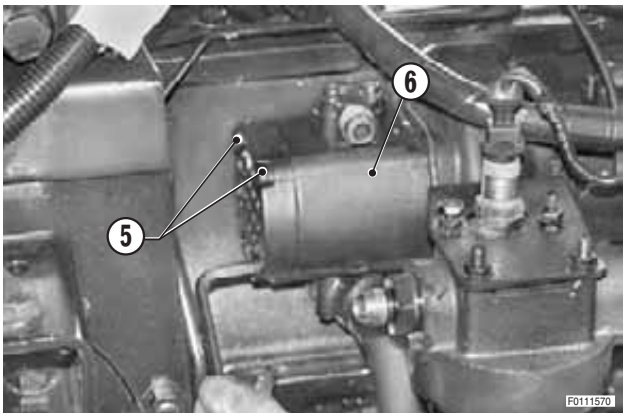


3 - Loosen the clips (3) and move the hose (4) towards the rear.



4 - Remove the screws (5) and remove the pump (6).

[2]



Refitting

- Refitting is the reverse of removal.

[1]

★ Fill the transmission with the required quantity of oil.

Approx. 45 l (12 US. gall.)

[2]

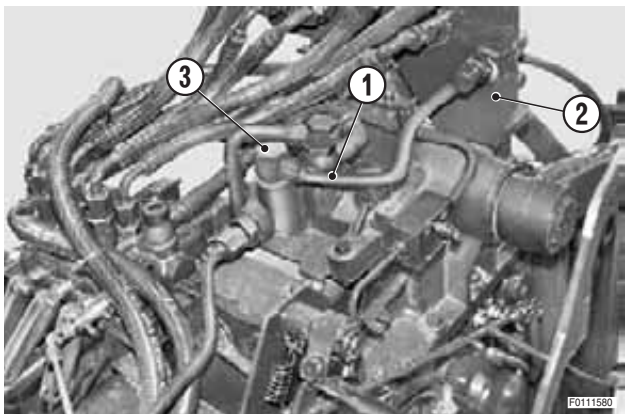
Mating face: Silastic 738

TRAILER BRAKING VALVE

Removal

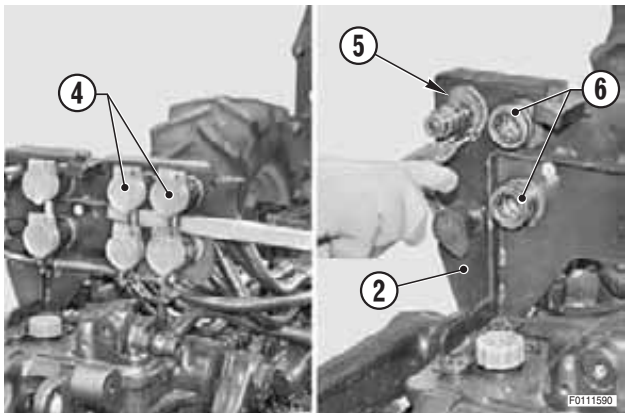
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Disconnect the trailer braking pipe(1) from the support (2), remove the union (3) and remove the pipe (1).

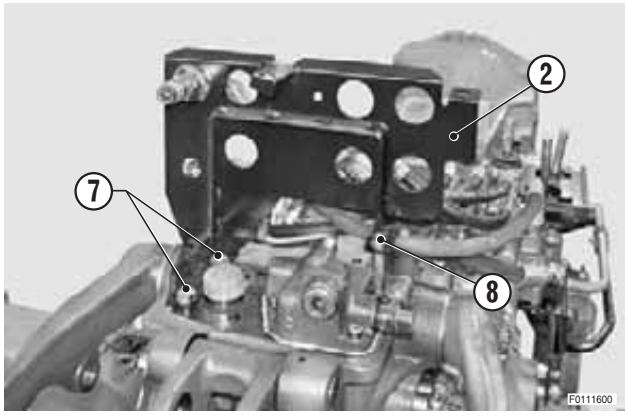


2 - Remove the covers (4), remove the circlips (5) and disconnect the pipes (6) from the support (2).

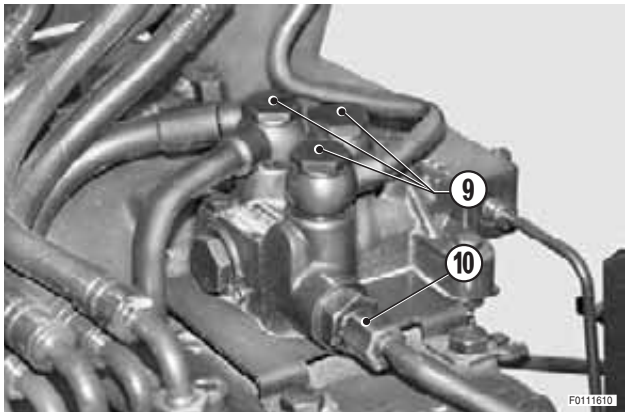
★ Mark the pipes (6) and the support (2) to prevent confusion on reassembly.



3 - Remove the two bolts (7) and the nut (8) and remove the quick-coupler support (2).



4 - Remove the unions (9) and disconnect the pipe (10).

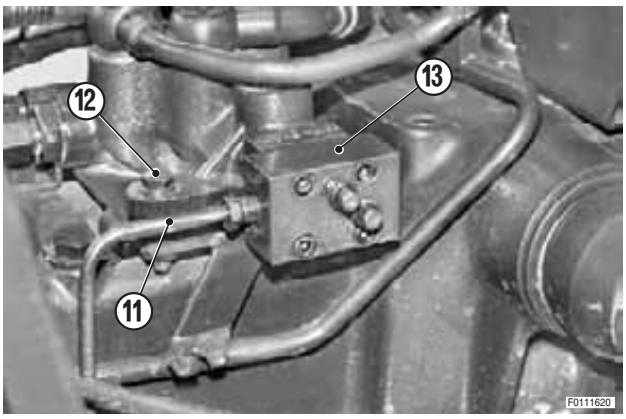


5 - Disconnect the brake pipe (11).

※ 1

★ Plug the pipe and port to prevent impurities getting in.

6 - Remove the screws (12) and remove the valve (13).



Refitting

• Refitting is the reverse of removal.

※ 1

★ Bleed the braking system.
(For details, see "BRAKES").

LIFT
(VERSION WITH MECHANICAL GOVERNOR)

COMPLETE ASSEMBLY

Removal

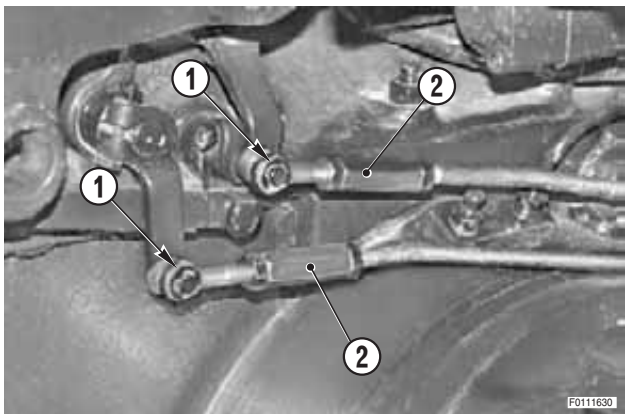
1 - Remove the auxiliary services control valve.
(For details, see "AUXILIARY SERVICES CONTROL VALVE").

• *For versions with hydraulic trailer braking*

2 - Remove the trailer braking valve.
(For details, see "TRAILER BRAKING VALVE").

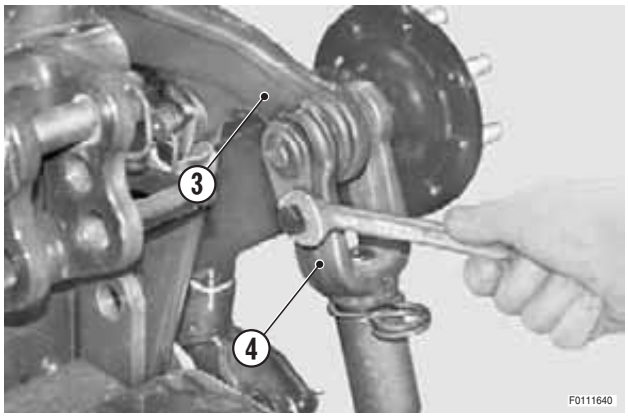
• *For all versions*

3 - Remove circlips (1) and remove lift control linkages (2).

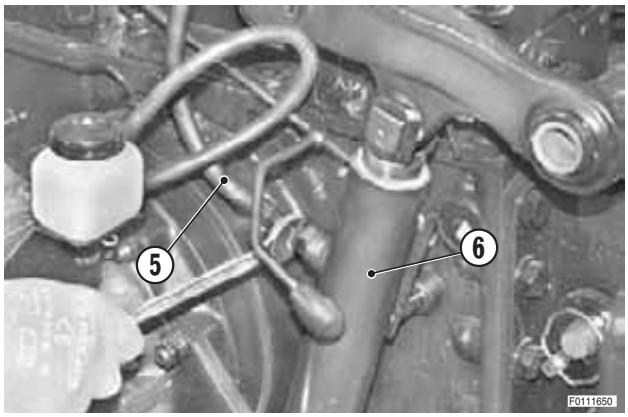


4 - Disconnect the lift rods (3) from the lift arms (4).

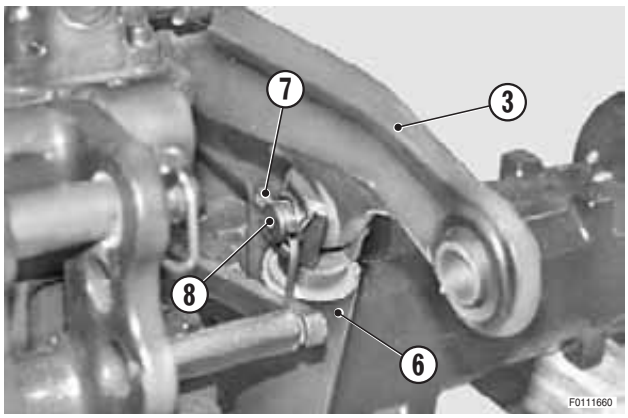
5 - Remove the lift rods (4).



6 - Disconnect the pipes (5) from the cylinder (6).



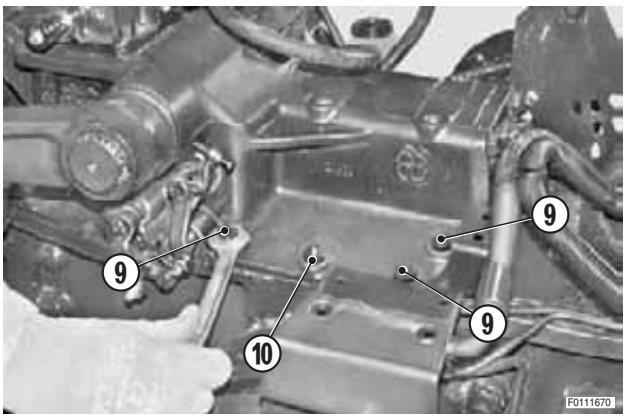
7 - Remove the split pins (7) and remove the pivot pins (8) anddisconnect the cylinders (6) from the lift arms (3).



• *For all versions*

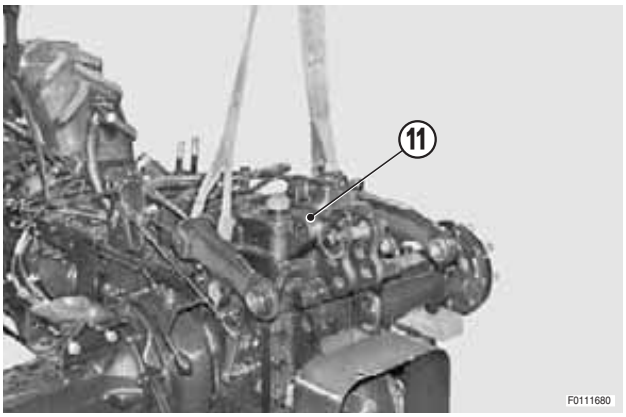
8 - Remove all the bolts (9) and the nuts (10).

※ 1



9 - Attach the lift assembly (11) to a hoist and lift it clear of the tractor.

※ 2



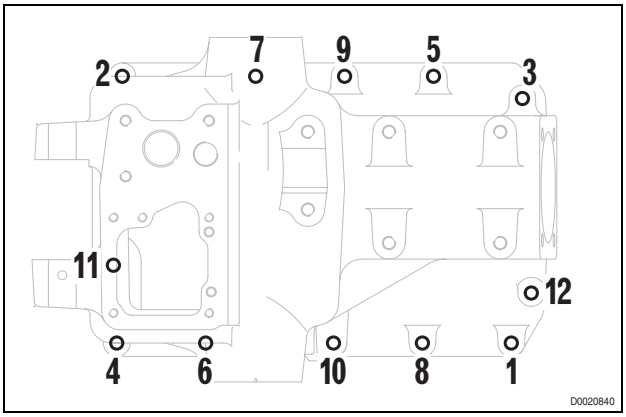
Refitting

• Refitting is the reverse of removal.

※ 1

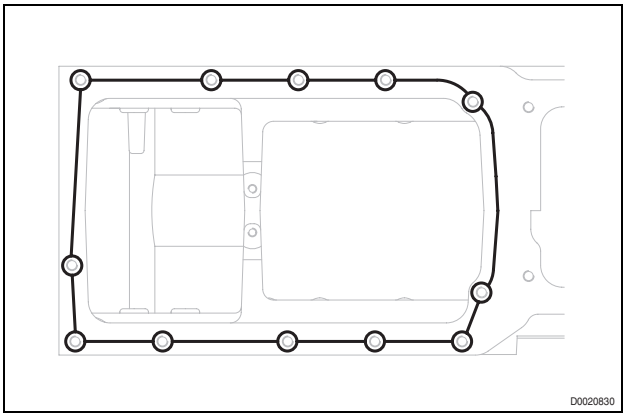
★ Tightening the bolts and nuts in the order indicated.

Nm Nuts and bolts: 45÷50 Nm (33.2-36.8 lb.ft.)



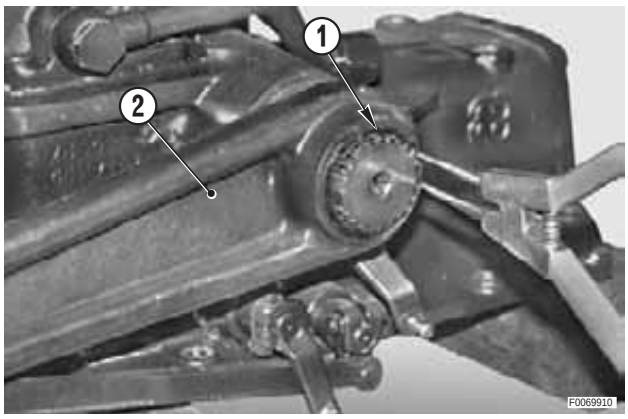
※ 2

Mating face: Loctite 518

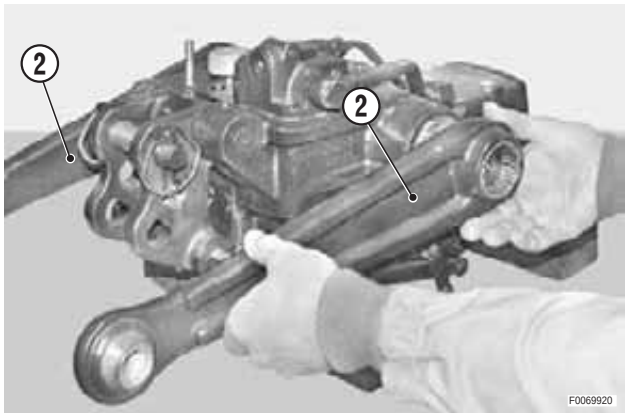


Disassembly

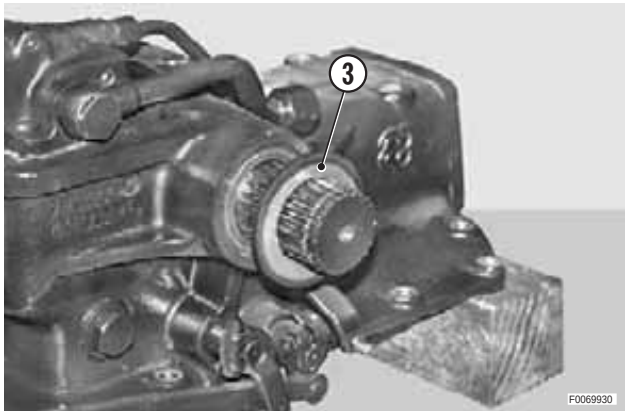
1 - Remove the circlips (1) securing the lift arms (2).



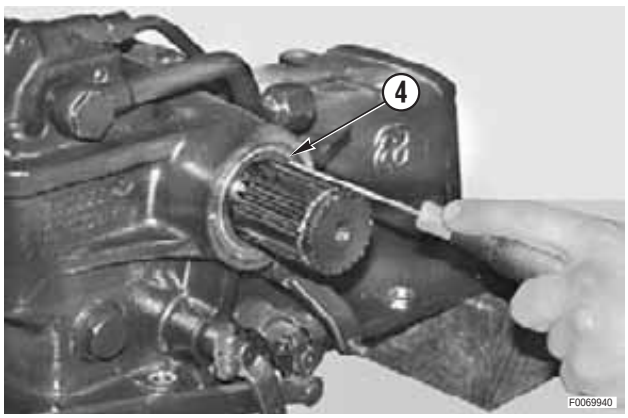
2 - Remove the lift arms (2).



3 - Remove the spacers (3).

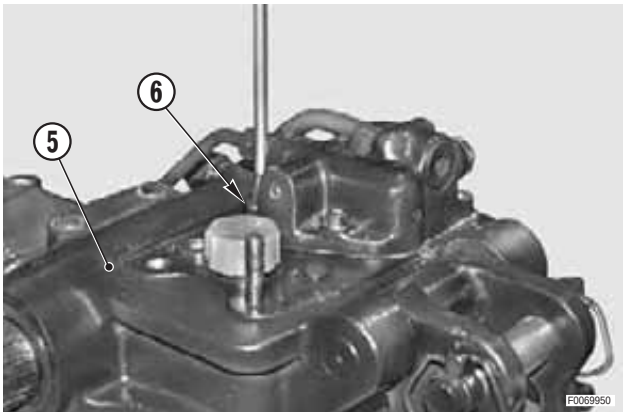


4 - Remove the oil seals (4) on both sides.
★ Note the direction in which the seal is fitted.

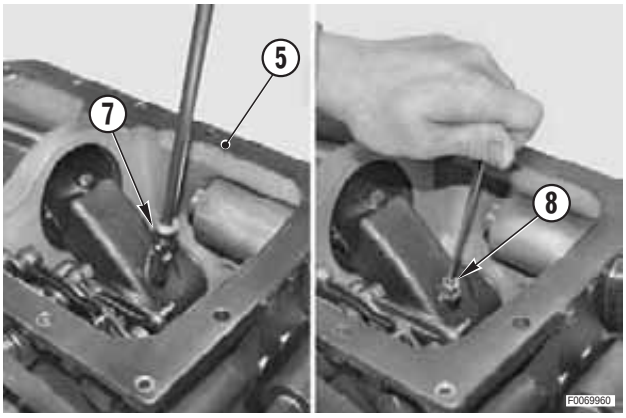


5 - Remove the lift control valve (5). (For details, see "LIFT CONTROL VALVE").

6 - Remove the oil filler plug (6).

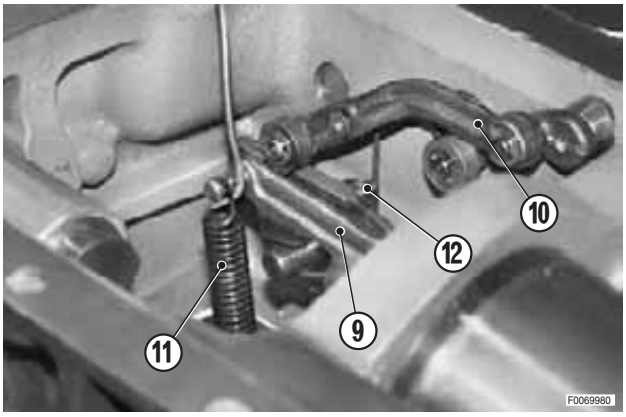


7 - Turn over the lift cover (5), loosen the nut (7) and remove the grub screw (8). ※ 1

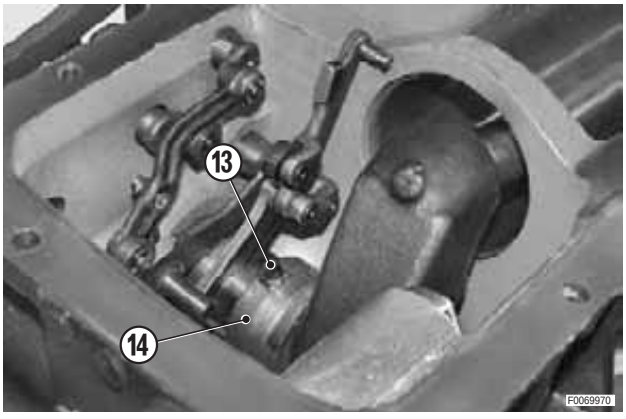


8 - Disconnect the springs (11) and (12) from the levers (9) and (10) and remove them.

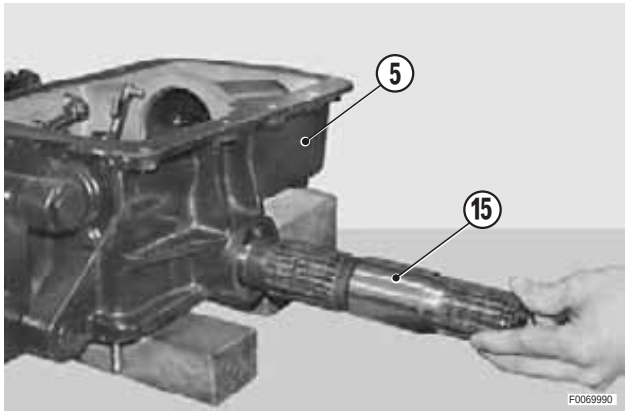
★ Note the position of the springs (11) and (12).



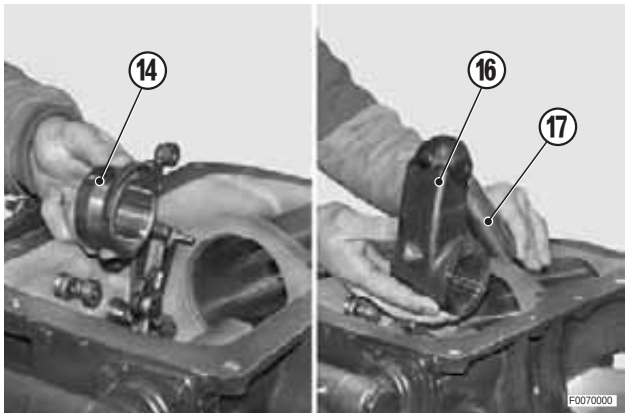
9 - Remove the pin (13) securing the cam (14). ※ 2



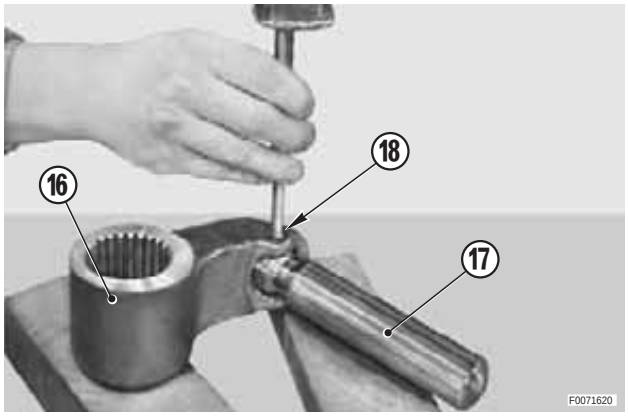
10 - Withdraw the shaft (15) from the lift cover (5).
※ 3



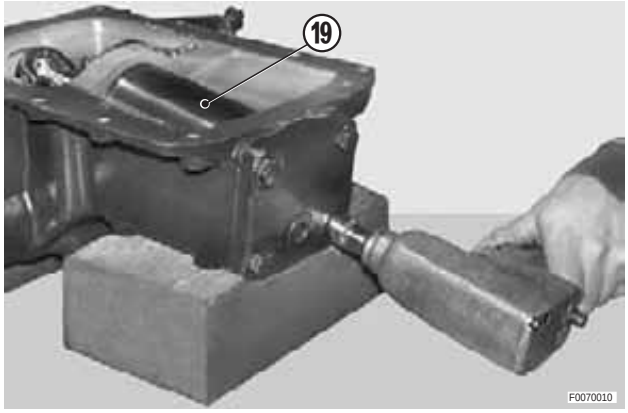
11 - Remove the cam (14) and the lever (16) complete with the connecting rod (17).
★ Note the position of the cam (14).



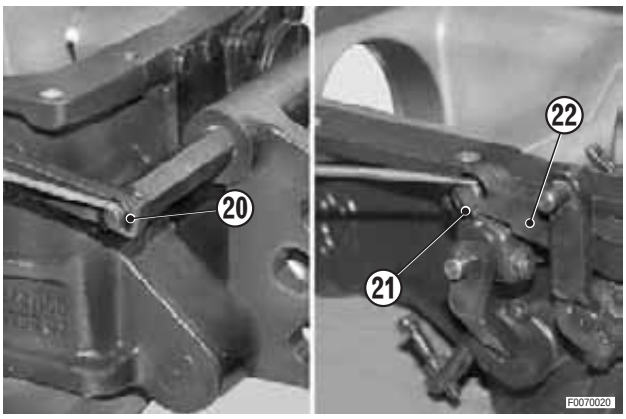
12 - Drive out the pin (18) and separate the connecting rod (17) from the lever (16).
※ 4



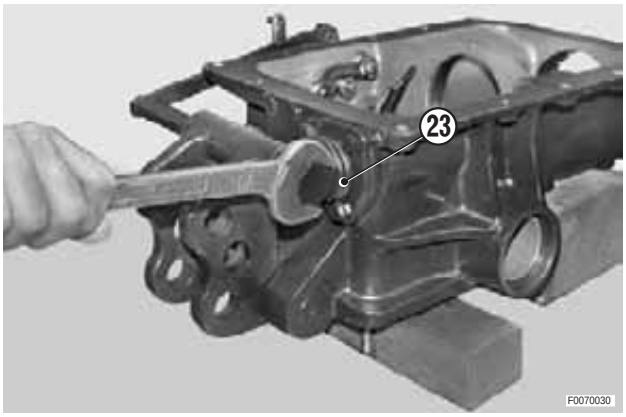
13 - Remove the complete cylinder assembly (19). (For details, see "LIFT CYLINDER").



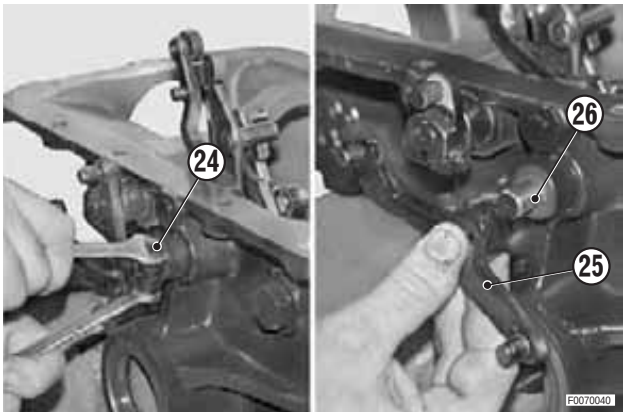
14 - Remove the circlips (20) and (21) and remove the rod (22).



15 - Remove the draft sensor (23). (For details, see "MECHANICAL DRAFT SENSOR").



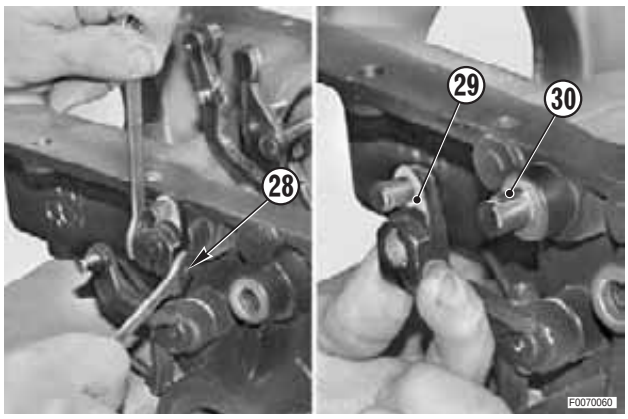
16 - Remove the screw (24) and remove the lever (25) and the key (26).



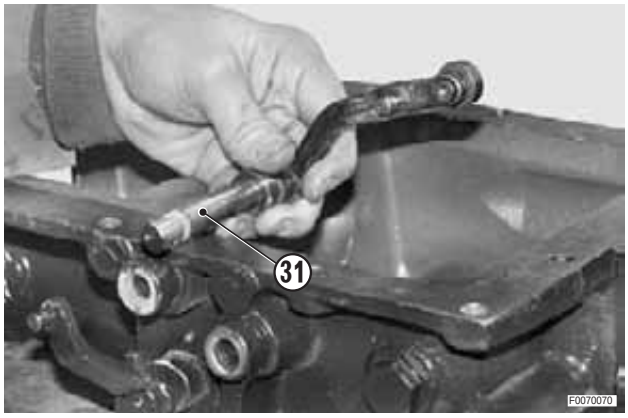
17- Remove the shaft (27). ※ 5



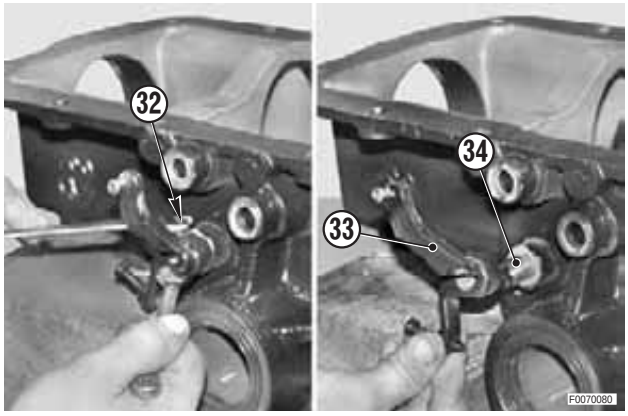
18 - Remove the screw (28) and remove the lever (29) and the key (30).



19 - Remove the shaft (31). ※5



20 - Remove the screw (32) and remove the lever (33) and the key (34).

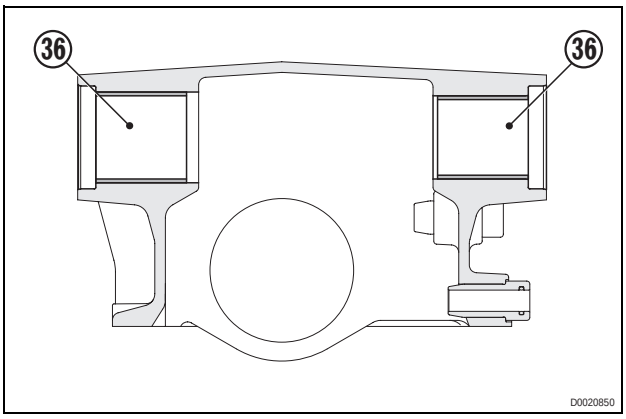


21 -Remove the complete shaft (35). ※5

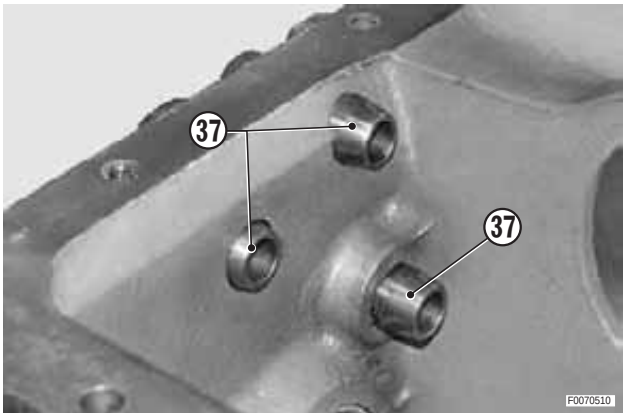


• *Only if necessary*

22 - Renew the bushes (36).
(For details, see "BUSHES"). ⁘ 3



23 - If the old bushes are removed (37), new bushes must be installed on reassembly.



Assembly

- Assembly is the reverse of disassembly.

★ Check that all components are installed the right way round.

※ 1

Grub screw: Loctite 242

★ Screw fully into the hole on the shaft and then unscrew it by half a turn.
While holding the screw in position, tighten the lock nut.

※ 2

Pin: Loctite 242

※ 3

★ Grease the bushes (36) and the shaft (16).

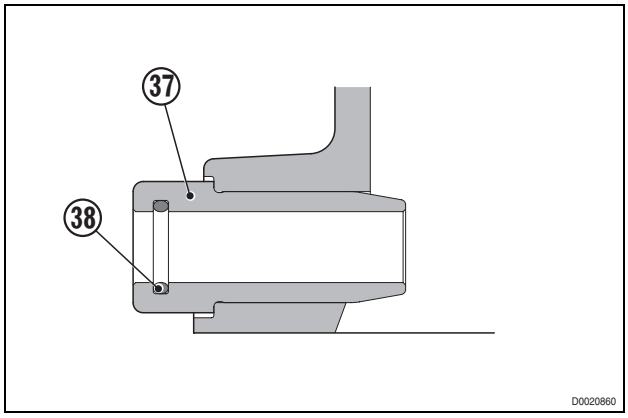
※ 4

★ Grease the seating of the connecting rod ball joint.

※ 5

★ Check the condition of the O-ring (38) installed in the bush (37) and renew it if necessary.

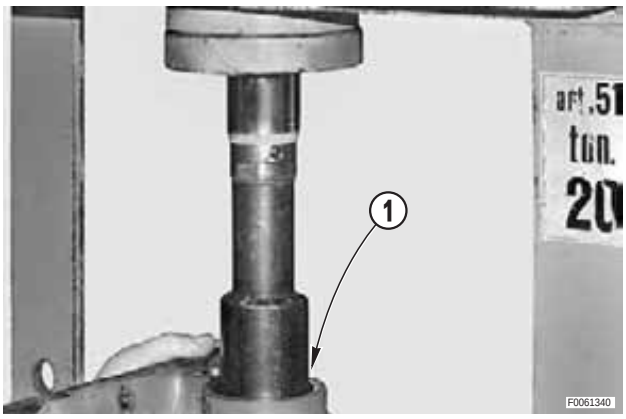
★ Grease the shaft and the bush.



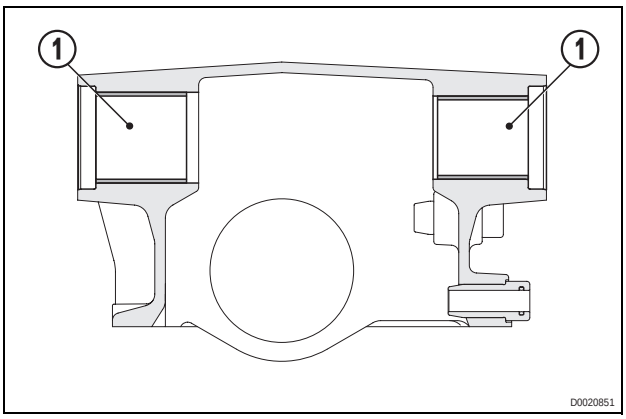
BUSHES

Renewal

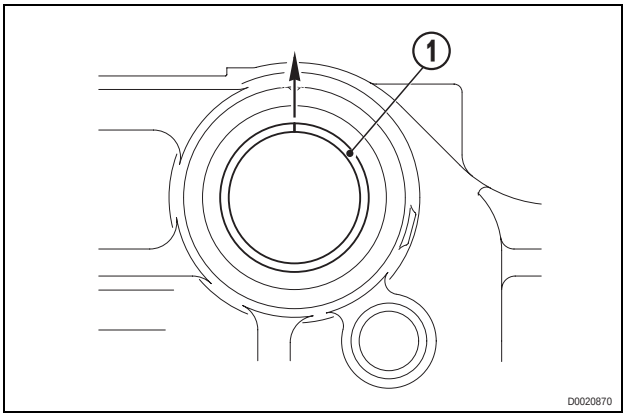
1 - Position the lift cover under a press and, using a suitable tool, remove the bushes (1).



2 - Install the new bushes (1) making sure that they are inserted flush with the bores in the lift cover.



★ Install the bushes (1) with the split oriented towards the top of the lift cover.

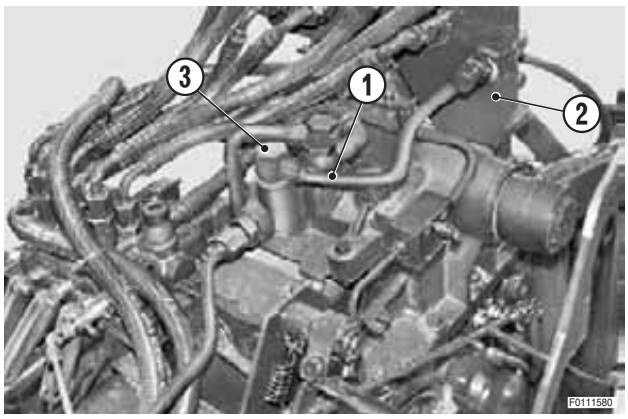


LIFT CONTROL VALVE

Removal

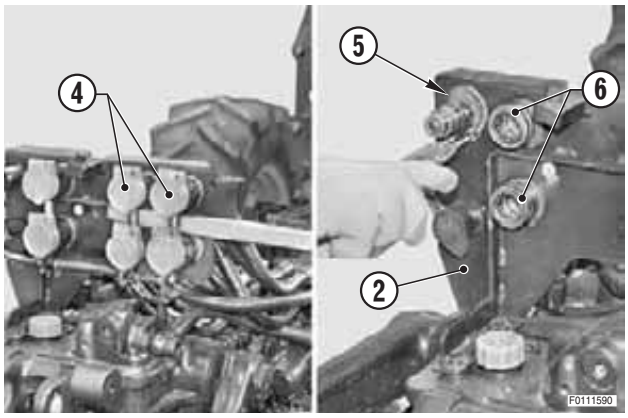
• *For versions with hydraulic trailer braking only*

1 - Disconnect the trailer braking pipe (1) from the support (2), remove the fitting (3) and remove the pipe (1).
★ Renew the copper washers on reassembly.

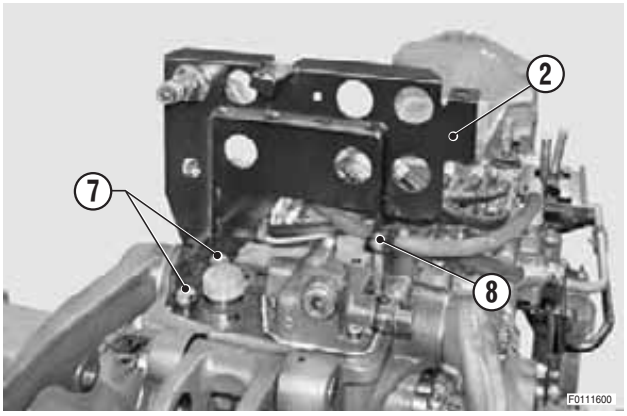


• *For all versions*

2 - Remove the covers (4), remove the circlips (5) and disconnect the pipes (6) from the support (2).
★ Label the pipes (6) and support (2) to avoid confusion on reassembly..

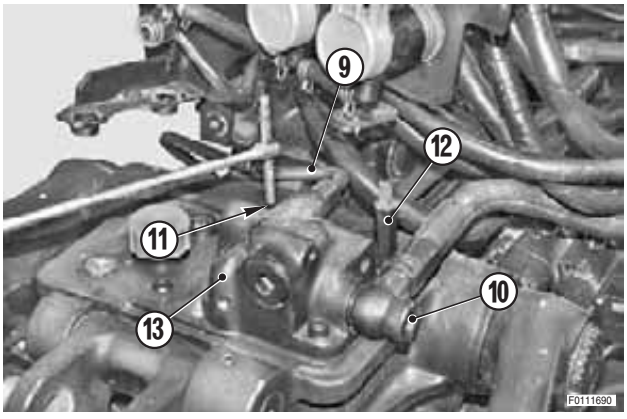


3 - Remove the two bolts (7) and the nut (8) and remove the quick couplers support (6).



4 - Disconnect the pipe (9) and remove union (10).
★ Renew the copper washers on reassembly.

5 - Remove the two screws (11) and the stud (12) and remove the lift control valve (13). ※ 1



Refitting

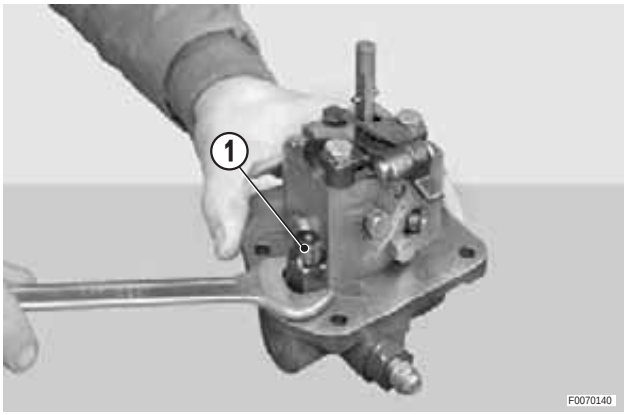
- Refitting is the reverse of removal.

※1

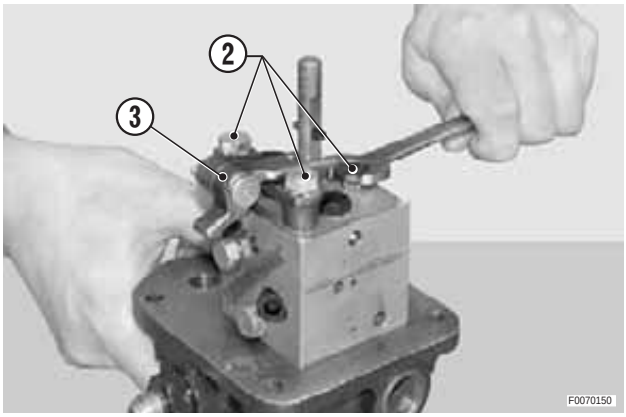
Mating face: Silastic 738

Disassembly

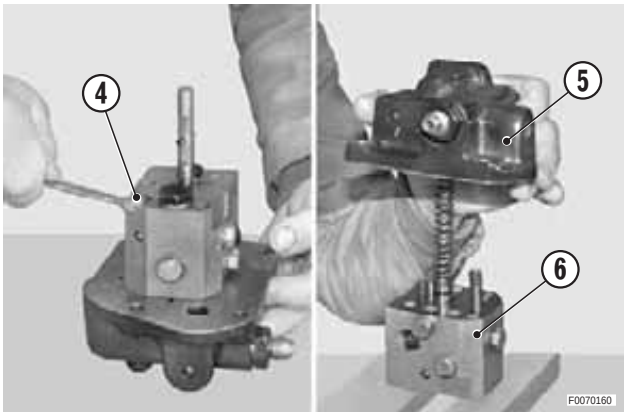
1 - Remove the safety valve (1).
★ Renew the copper washers on reassembly.



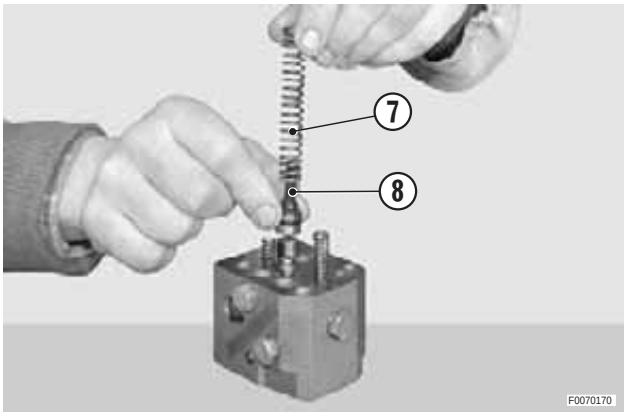
2 - Remove the three screws (2) and remove the complete bracket (3).



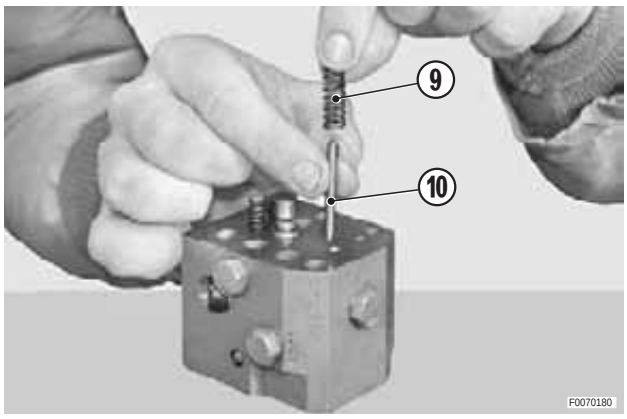
3 - Remove the screw (4) and separate the control valve bodies (5) and (6).



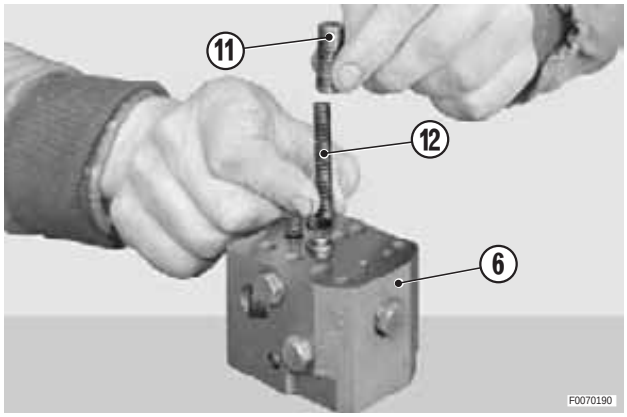
4 - Remove the spring (7) and the piston (8).



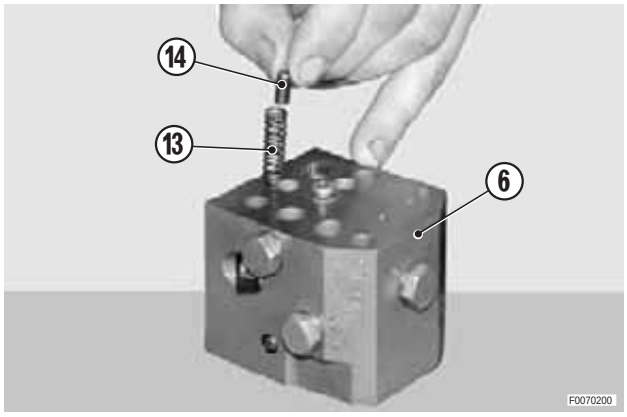
5 - Remove the spring (9) and the rod (10). ⁘ 1



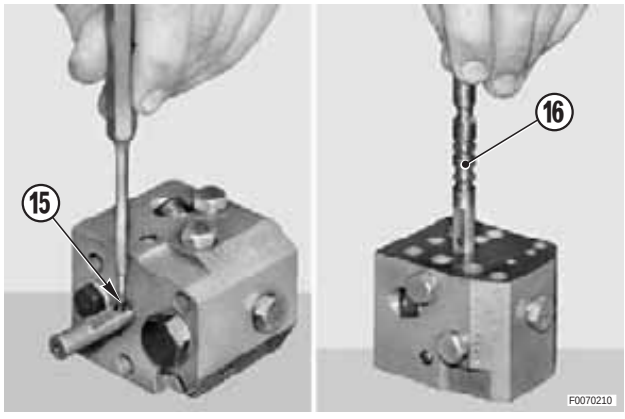
6 - Remove the piston (11) and the spring (12) from the control valve body (6). ⁘ 2



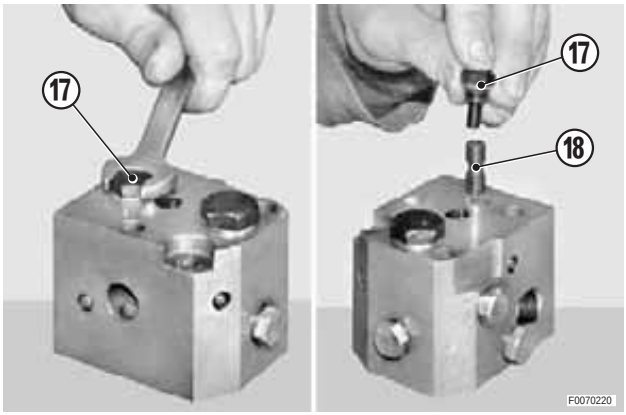
7 - Remove the spring (13) and the spacer (14) from the control valve body (6).



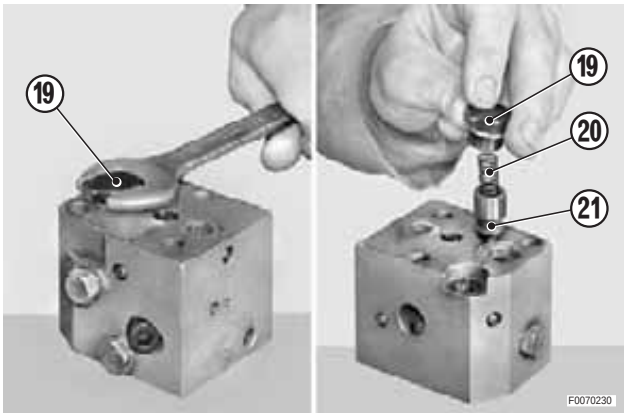
8 - Drive out the spring pin (15) and withdraw the spool (16). ⁘ 3



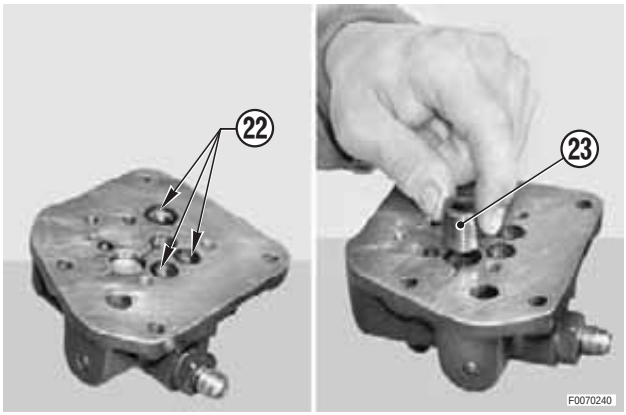
9 - Remove the plug (17) and remove the valve (18).
※ 4
★ Renew the copper washers on reassembly.



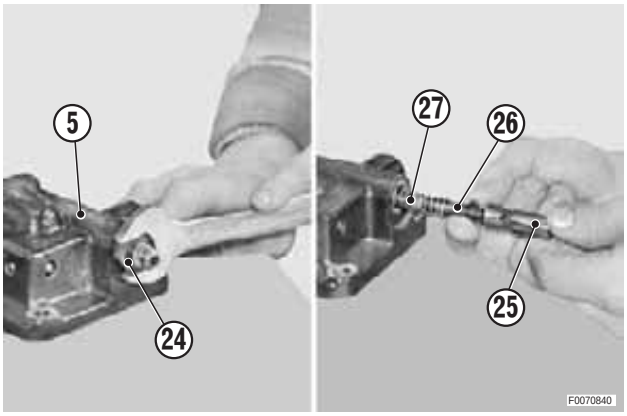
10 - Remove the plug (19) and withdraw the spring (20) and the valve (21).
※ 5
★ Renew the copper washers on reassembly.



11 - Remove the O-rings (22) and withdraw the piston (23).
※ 6



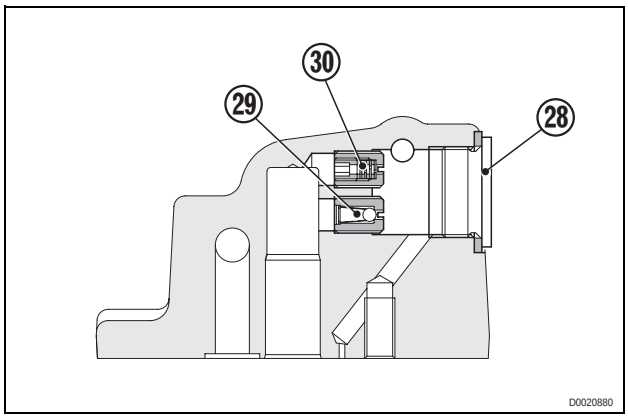
12 - Remove the union (24) and remove the valve (25), the pin (26) and the spring (27) from the valve body (5).
※ 7
★ Renew the copper washers on reassembly.



• *Only if necessary*

13 - Remove the plug (28) and remove the check valve (29) and the choke (30). ※ 8

★ Renew the copper washers on reassembly.

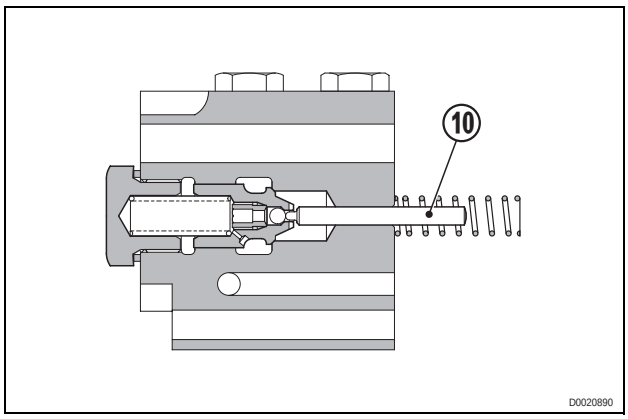


Assembly

- To assemble, follow the disassembly steps in reverse order.

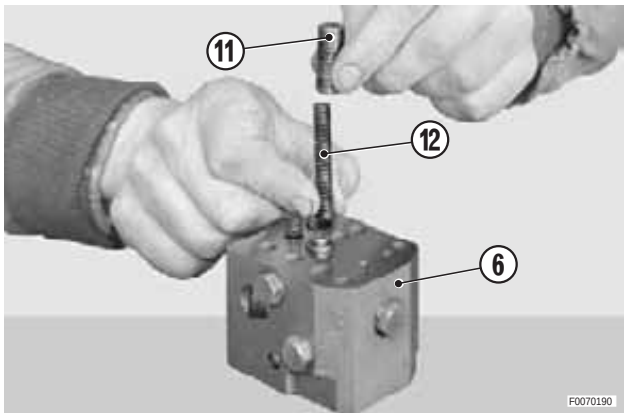
※ 1

★ Check that the rod (10) is installed the right way round.



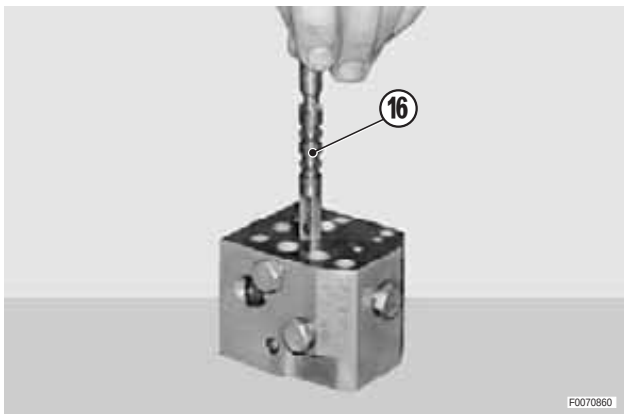
※ 2

★ Check that the piston (11) slides freely.



※ 3

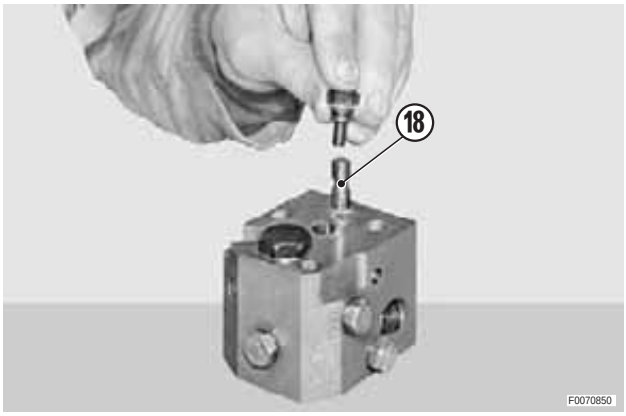
★ Check that the spool (16) slides freely.



※ 4

★ Check that the valve (18) slides freely.

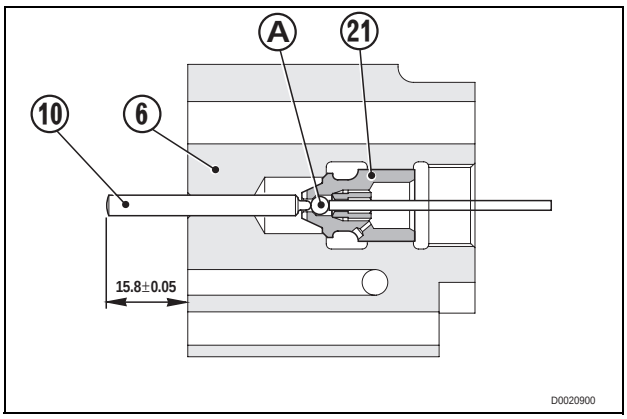
Plug: Loctite 542



※ 5

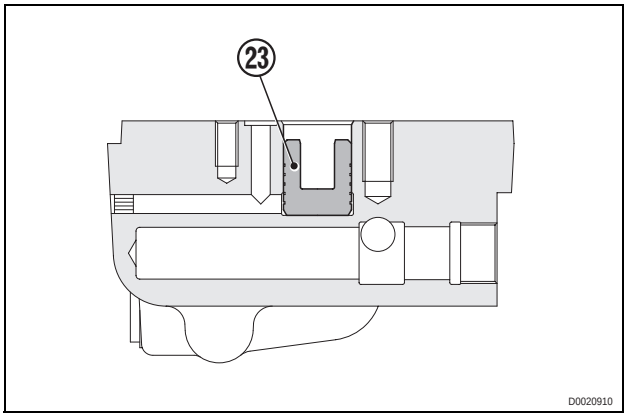
★ Hold the ball "*A*" contained in the valve (21) tight against the rod (10), and check that the rod (10) stan-dout relative to the face of the valve body (6) is within the specified limits (15.8±0.05 mm).

Plug: Loctite 542



※ 6

★ Check that the piston is installed the right way round (23).



※ 7

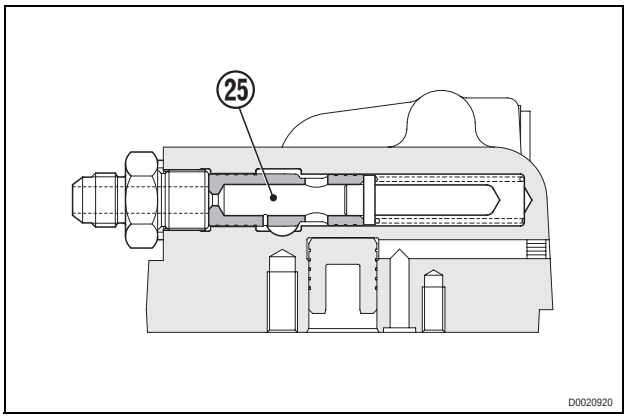
★ Check that the valve (25) is installed the right way round.

★ Check that the valve (25) slides freely in its housing.

Pipe union: Loctite 542

※ 8

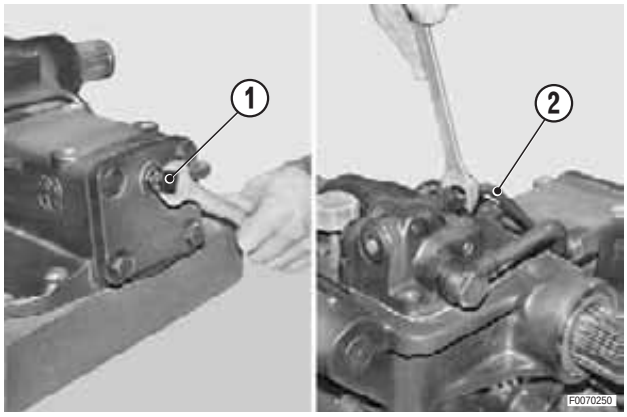
Plug: Loctite 542



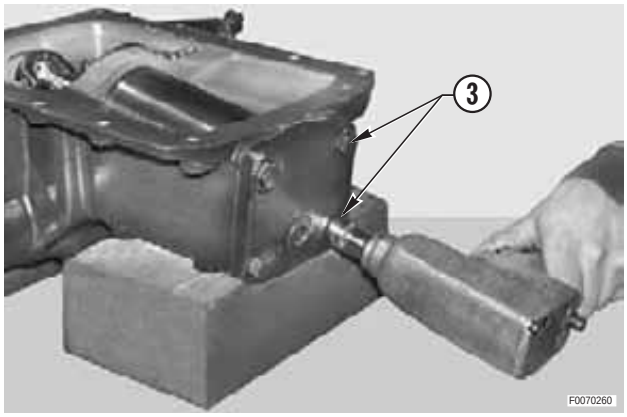
LIFT CYLINDER

Disassembly

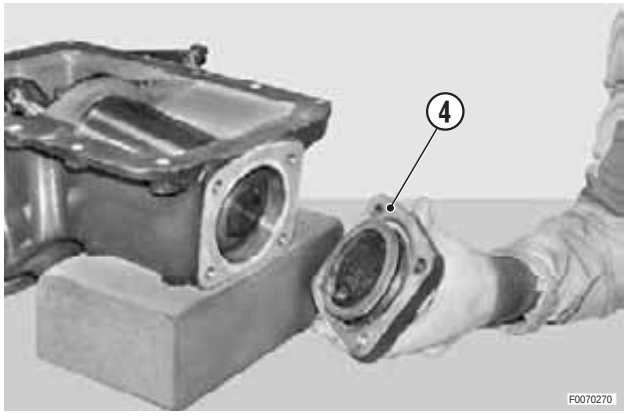
1 - Loosen the union (1) and disconnect the pipe (2).
★ Renew the copper washers on reassembly.



2 - Remove the screws (3). ⁘ 1

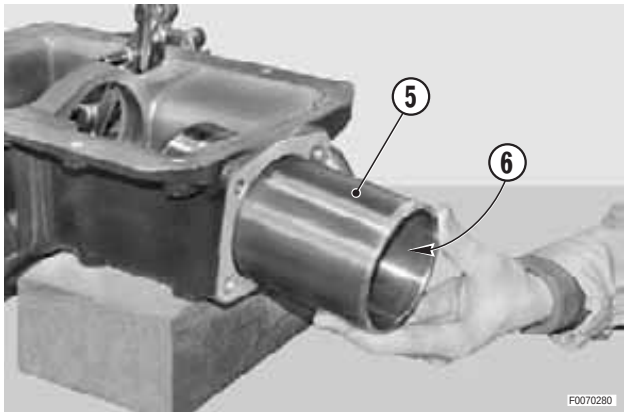


3 - Remove the cylinder flange (4).



4 - Remove the cylinder (5) complete with piston (6). ⁘ 2

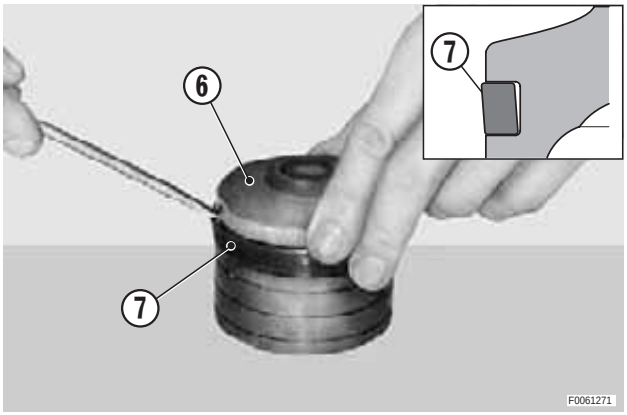
5 - Withdraw the piston (6) from the cylinder (5).



5 - Remove the seal (6) from the piston (7).

※ 3

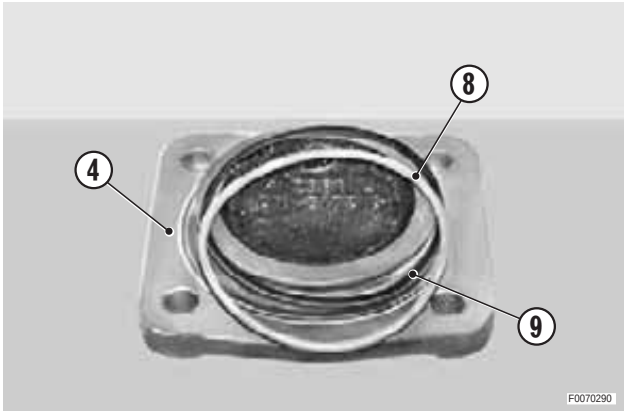
★ Note which way round the seal (7) is installed.



6 - Remove the O-ring (8) and the backup ring (9) from the flange (4).

※ 4

★ Note which way round the backup ring (9) is installed.



Assembly

- To assemble, follow the disassembly steps in reverse order.

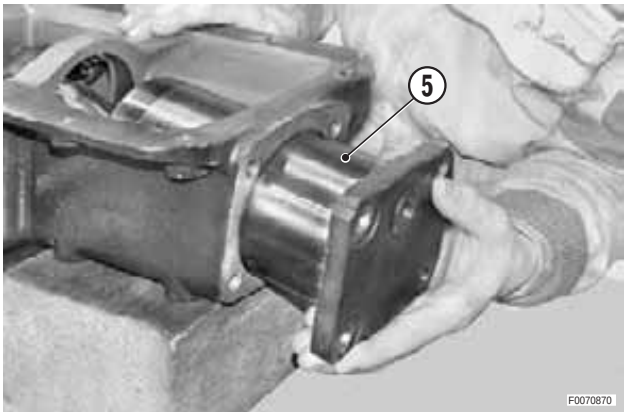
※ 1

1 - Install the complete cylinder assembly (5) in the lift cover.

Mating face: Silastic 738

2 - Tighten the screws (3) in a crosswise sequence.

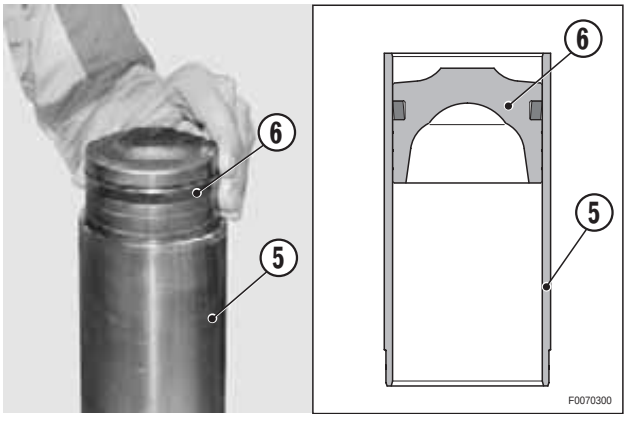
Nm Screws: 78±4 Nm (57.5±5.9 lb.ft.)



※ 2

1 - Insert the complete piston (6) in the cylinder (5).

★ Take care to install the piston (6) the right way round relative to the cylinder (5).



2 - Fit the complete flange (4) in the cylinder (5).

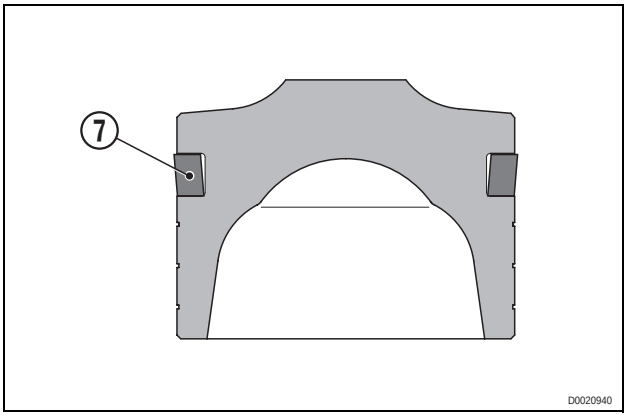


※ 3

★ Check that the seal (7) is the right way round.

★ Lubricate the seal (7) and the cylinder.

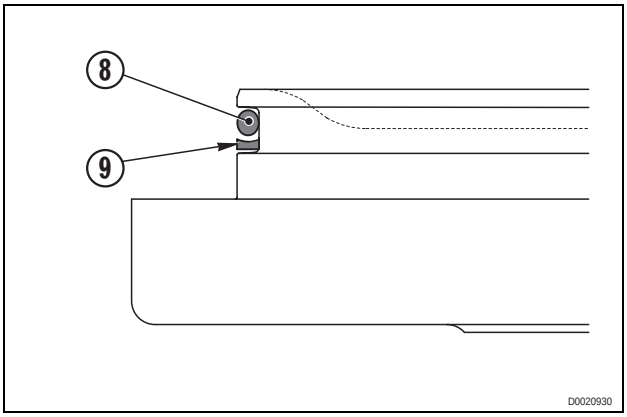
Seal and cylinder: oil



※ 4

★ Check that the backup ring (9) is installed the right way round and that it is positioned correctly relative to the O-ring (8).

O-ring: oil

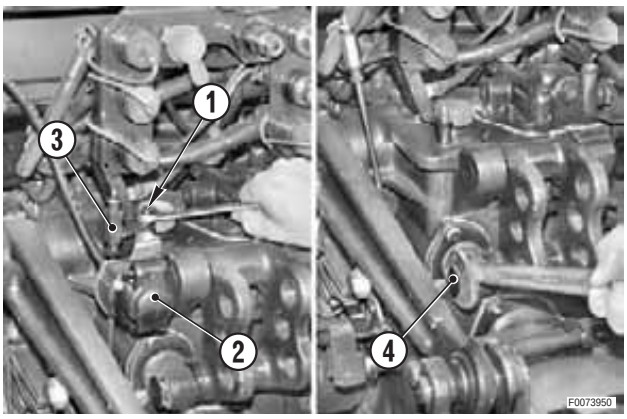


MECHANICAL DRAFT SENSOR

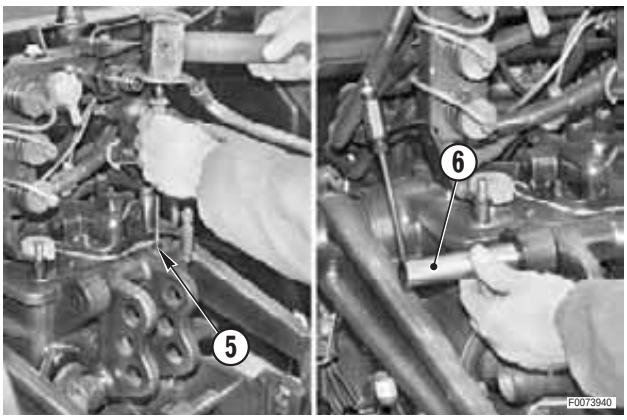
Removal

1 - Remove the nut (1) and move the trailer socket (2) and the brake bleed union (3) to one side.

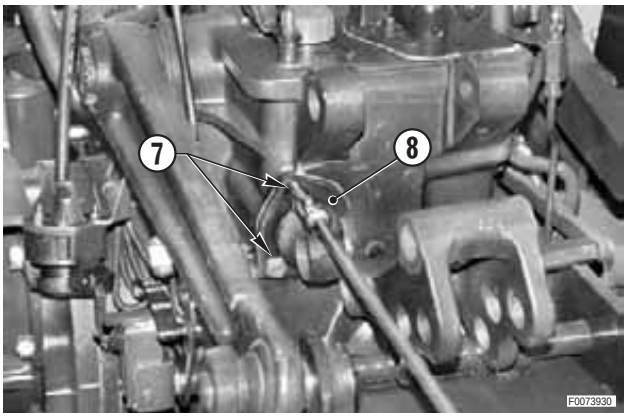
2 - Remove the pin (4).



3 - Drive out the pin (5) and remove the pivot pin (6).



4 - Remove the screws (7) and remove the draft sensor (8). ※ 1

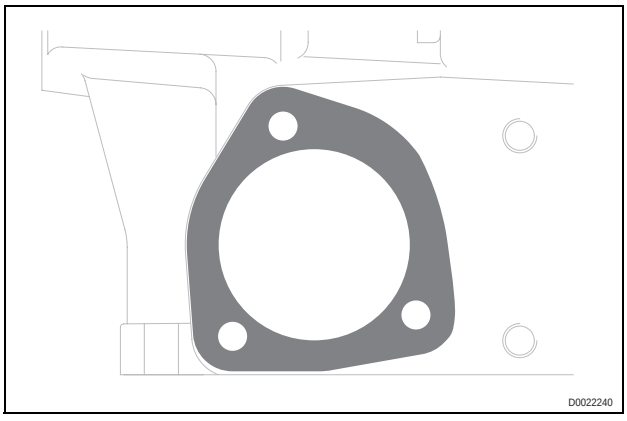


Refitting

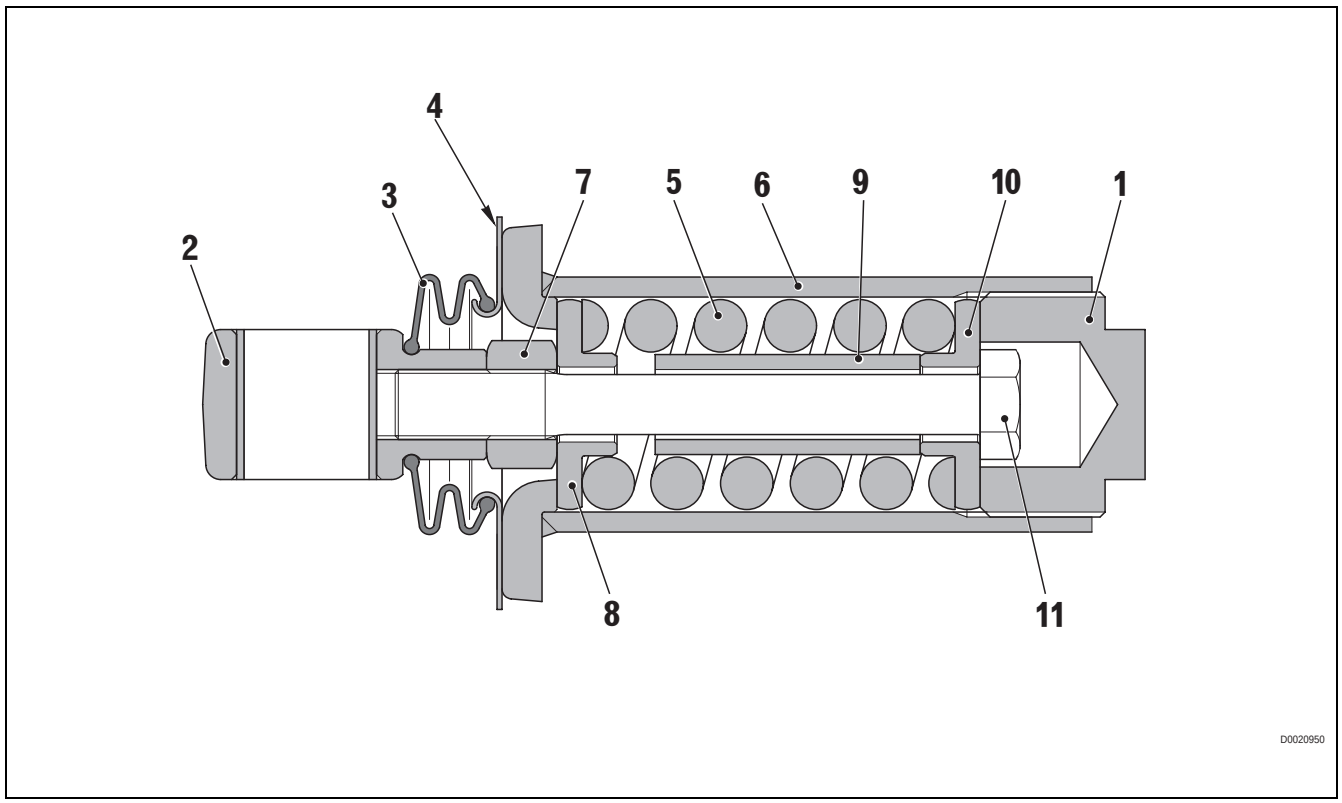
- Refitting is the reverse of removal.

※ 1

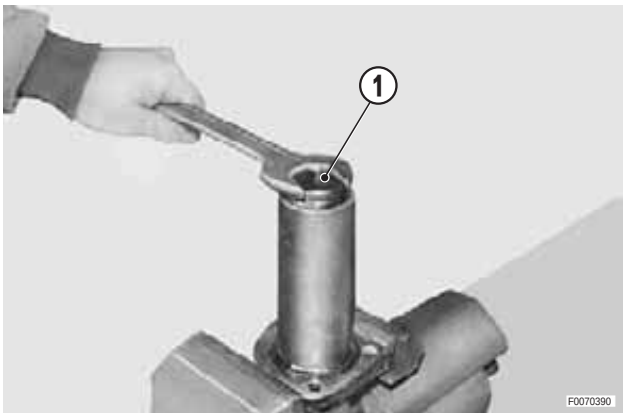
Mating face: Silastic 738



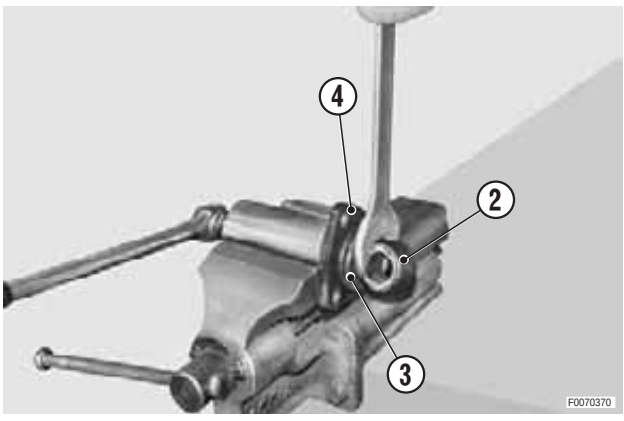
Disassembly



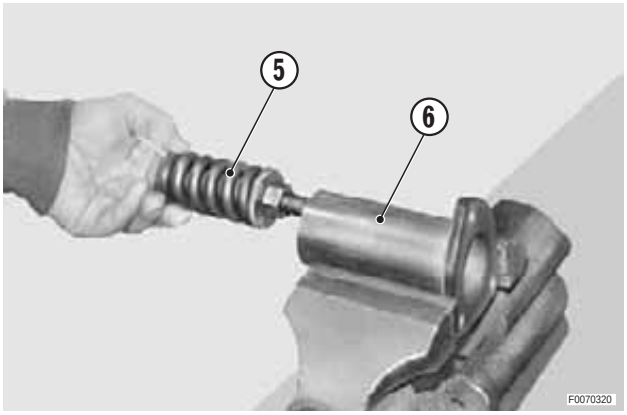
1 - Remove the plug (1).



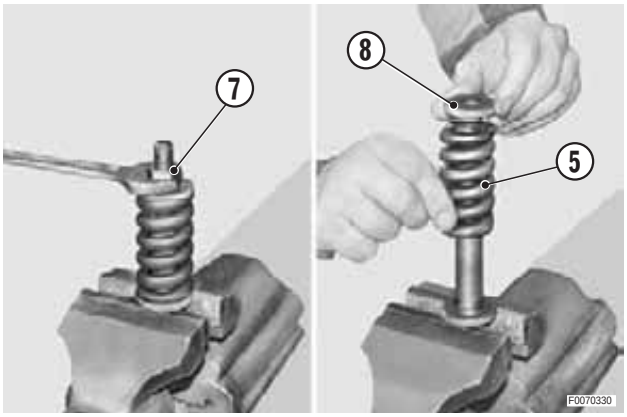
2 - Remove the mounting (2) complete with the gaiter (3) and plate (4).



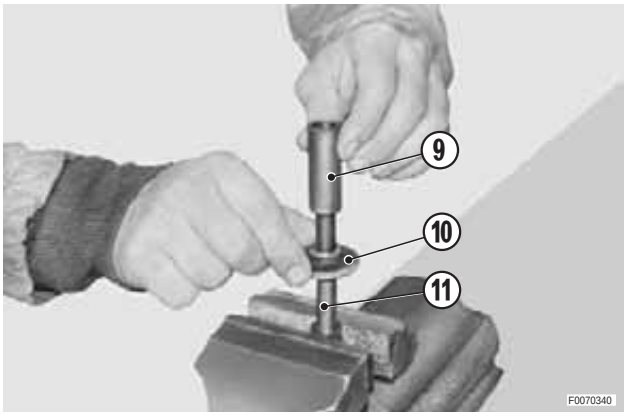
3 - Remove the spring assembly (5) from the sensor body (6).



4 - Remove the nut (7) and remove the disc (8) and spring (5).

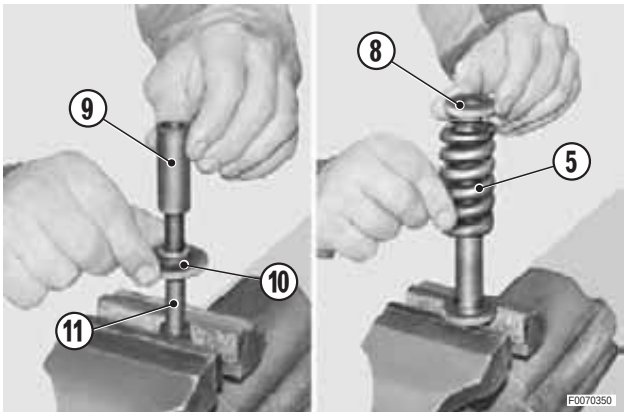


5 - Remove the spacer (9) and the disc (10) from the bolt (11).



Assembly

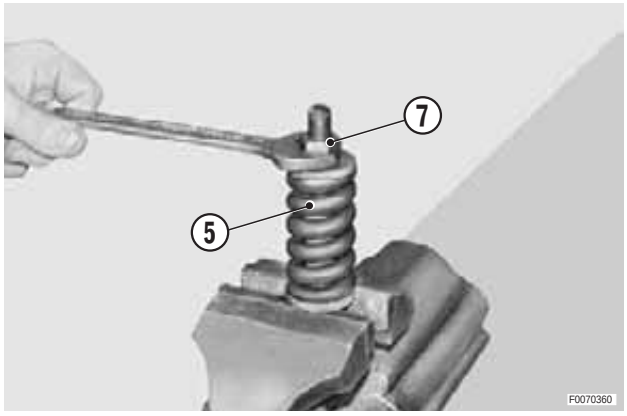
1 - Fit the disc (10), the spacer (9), the spring (5) and disc (8) on the bolt (11).



2 - Screw in the nut (7) sufficiently to eliminate all free play in the spring (5), then tighten the nut (7) by a further 1/4 turn.

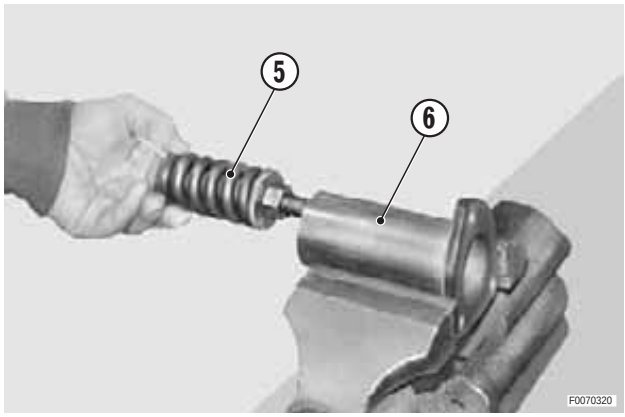
Nut: Loctite 242

★ Wait about two hours to allow the threadlocking compound to cure before proceeding.



3 - Grease the spring (5) and insert the assembly on the sensor body (6).

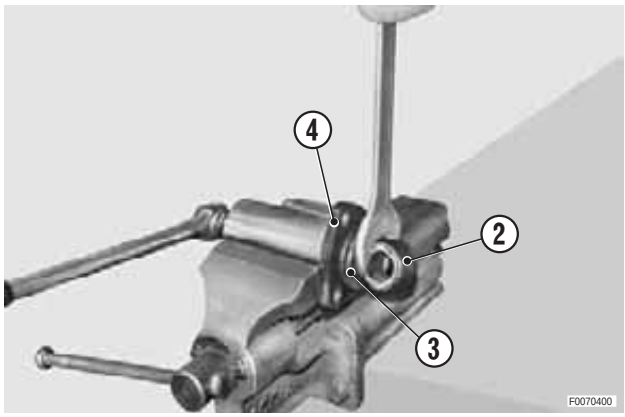
Spring: Grease



4 - Fit the mounting (2) complete with gaiter (3) and plate (4) and tighten it.

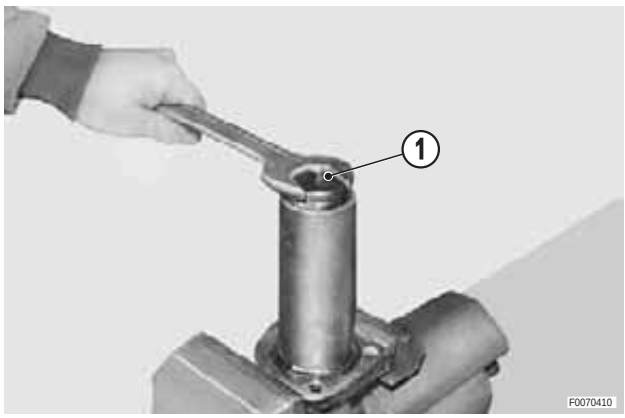
Nm Mounting: 100÷105 Nm (73.7–77.4 lb.ft.)

Mounting: Loctite 242



5 - Screw in the plug (1) to eliminate all axial play of the spring assembly.

Plug (1): Loctite 242



LIFT CONTROL LEVERS

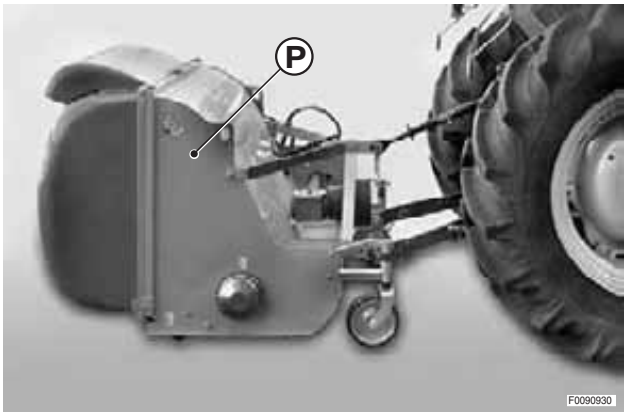
Adjustments

1 - All adjustment operations must be carried out with the lift installed.

2 - Before making the adjustment, connect an implement or a weight *"P"* of approximately 200 -250 kg (441 – 551lb) to the 3-point linkage.

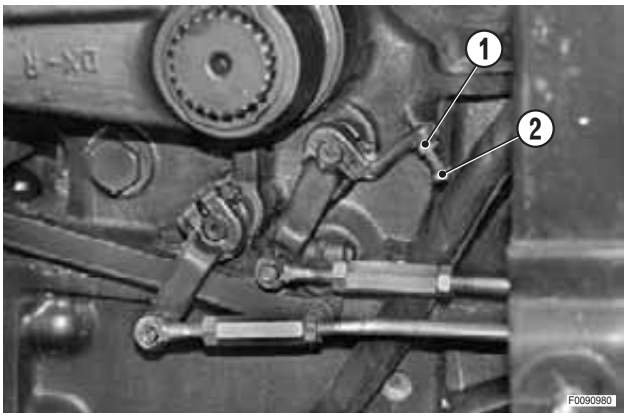
3 - Adjust the lift unit tie rod yokes and operating modes so that the control and selection levers travel through the full stroke.

4 - The numerical indications on the green lever are referred to the mid point of the lever.

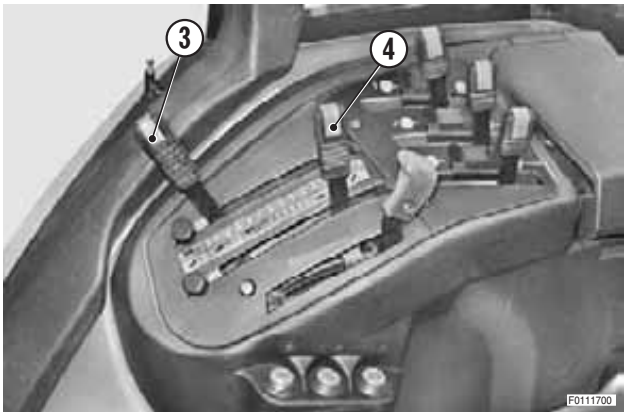


1. Adjusting lift travel (yellow lever)

1 - With the engine switched off, loosen nut (1) and screw (2).

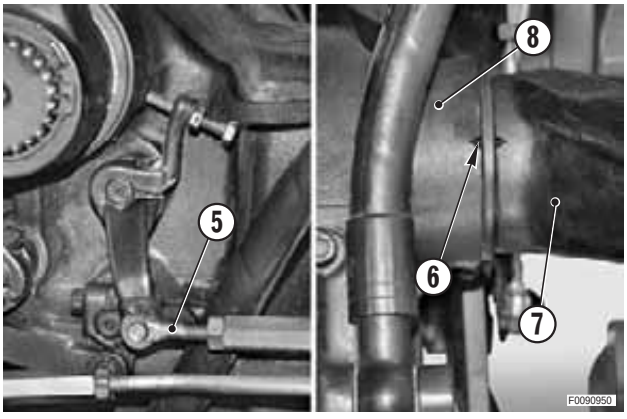


2 - Start the engine, move the green lever (3) to position *"12"* of its sector and the yellow lever (4) to the maximum lift position.

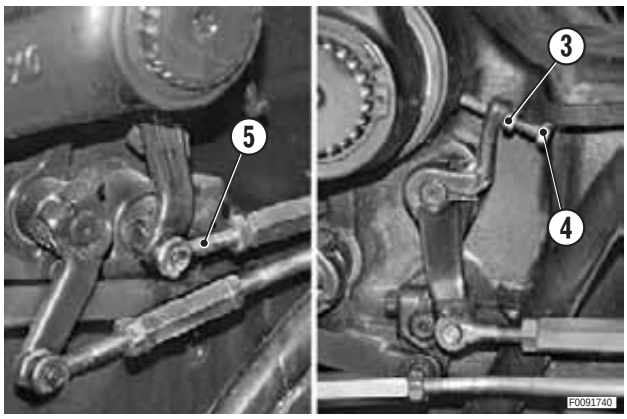


3 - Lengthen or shorten the tie rod (5) to bring the reference notches (6) on the right hand lift arm (7) and lift cover (8) into alignment.

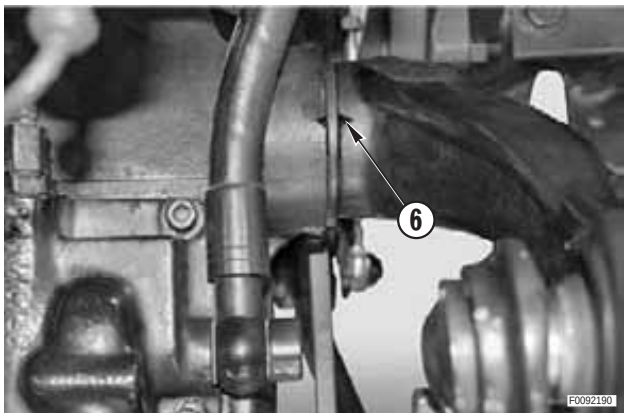
★ Take care not to move the yellow lever.



4 - Fix the tie rod (5) at the correct length and screw in the screw (4) until it seats against the lift cover, then secure it in position with the nut (3).

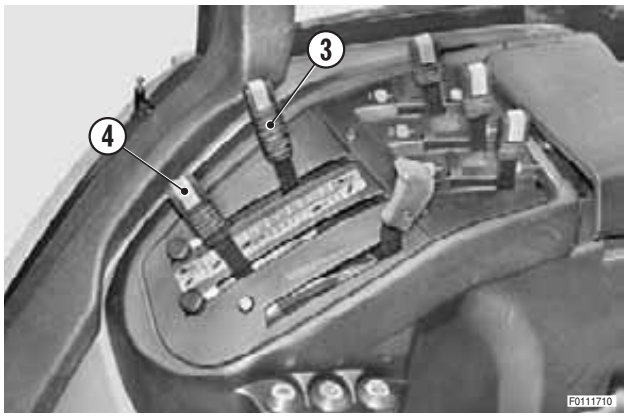


5 - Check the alignment of the reference notches (6) shifting the yellow lever towards the float position and then returning the lever to the maximum lift position.
If the adjustment was performed correctly, the notches (6) should still be aligned.

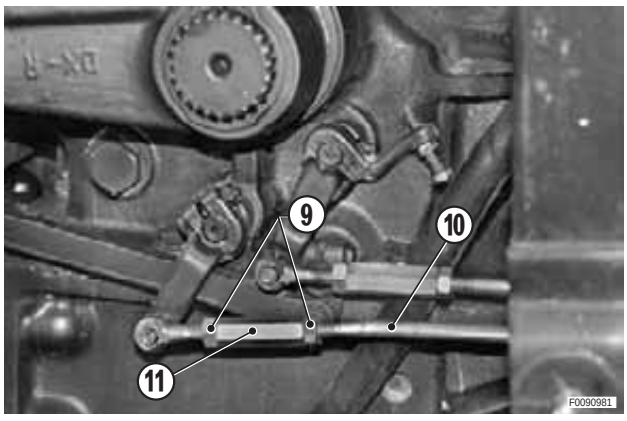


2. Adjustment of the control lever (Green)

1 - Move the yellow lever (4) to the position marked "*CONTR*"; check that on moving the green lever (3) from position "*12*" towards position "*Ø*", the arms begin to rise when the lever is in correspondence with position "*4*".

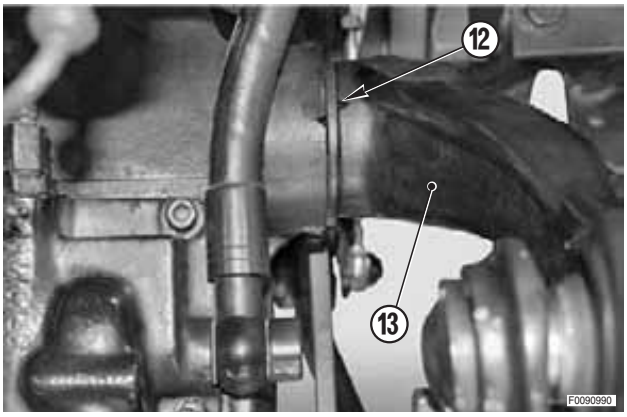


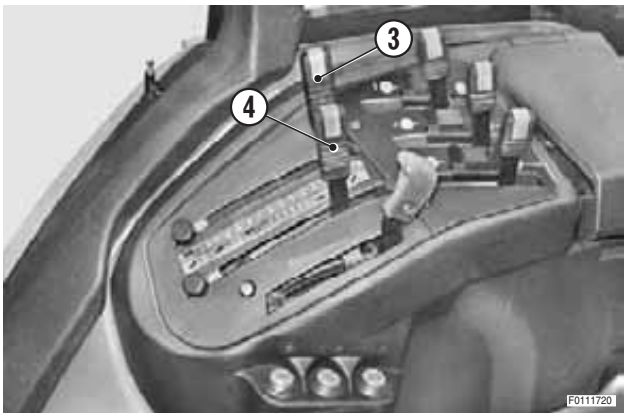
2 - If this is not the case, loosen the nuts (9) and adjust the length of tie rod (10) with tensioner (11).
After making the adjustment, lock in position by tightening the nuts (9).



3. Checking operation of the safety stop

1 - With the yellow lever (4) in the maximum lift position, move the green lever (3) to position "Ø" and check that the lift arms stopwhen the notch (12) on the arm (13) passes the position found in paragraph 1 by approximately 6 mm (4°).





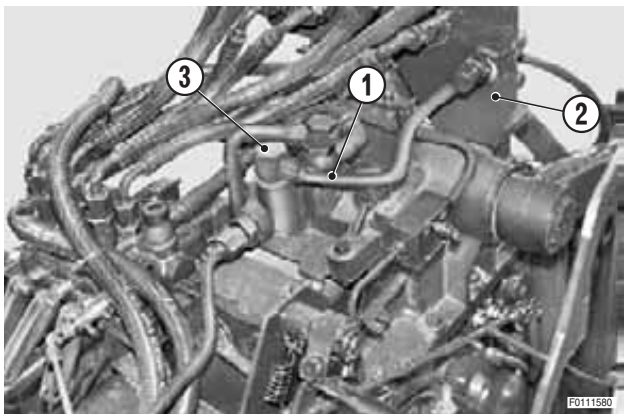
AUXILIARY SERVICES CONTROL VALVE
COMPLETE ASSEMBLY

Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

• *For versions with hydraulic trailer braking*

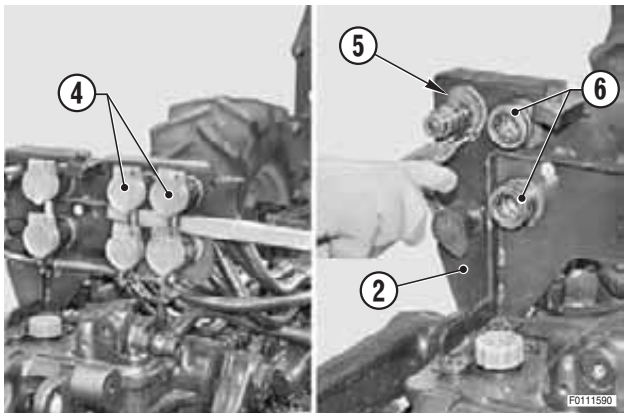
1 - Disconnect the trailer braking pipe (1) from the support (2), remove the fitting (3) and remove the pipe (1).



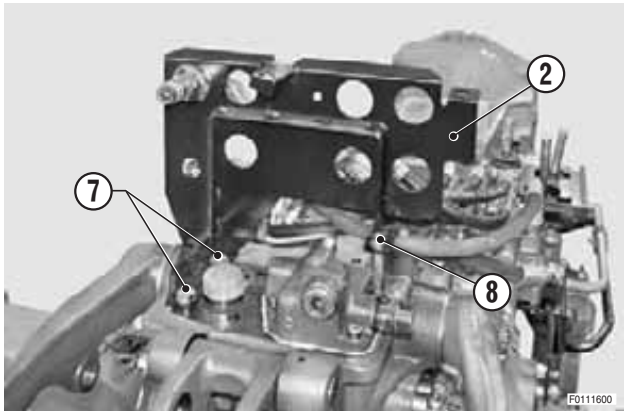
• *For all versions*

2 - Remove the covers (4), remove the circlips (5) and disconnect the pipes (6) from the support (2).

★ Label the pipes (6) and the support (2) to avoid confusion on reconnection.

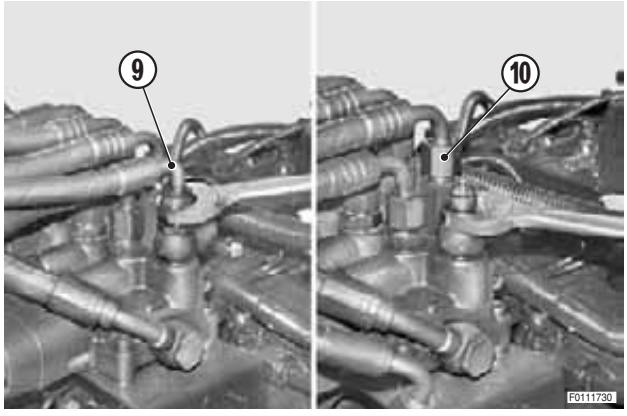


3 - Remove the two bolts (7) and the nut (8) and remove the quick couplers support (2).



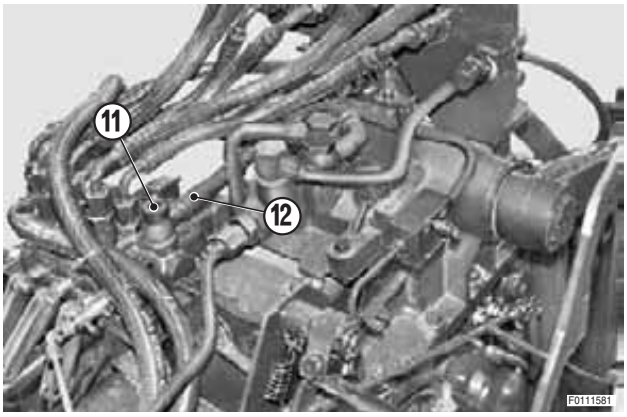
4 - Remove the pipe (9) and remove the union (10).

★ Renew the copper washers on reassembly.



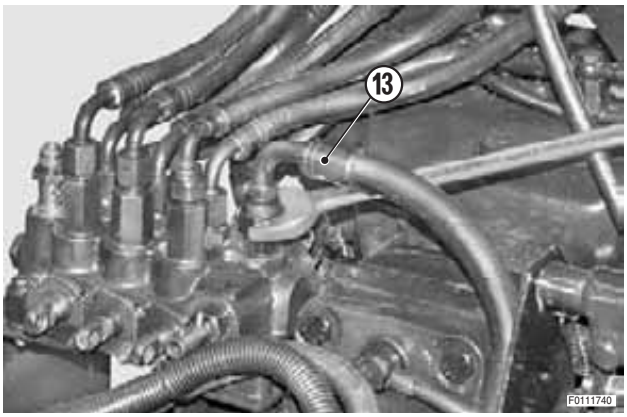
• *For versions with hydraulic trailer braking*

5 - -Remove the union (11) and disconnect the pipe (12).
★ Renew the copper washers on reassembly.



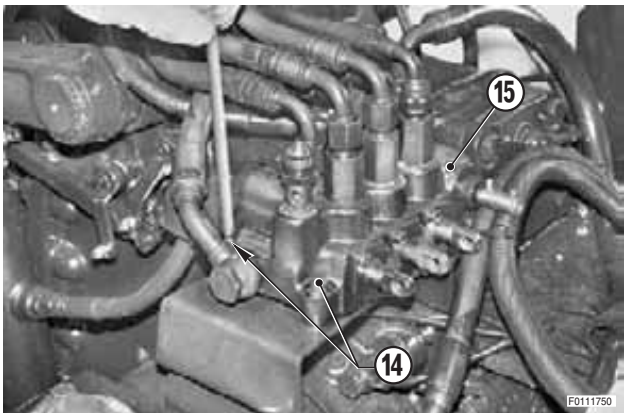
• *For versions without trailer braking*

6 - Disconnect the pipe (13).



• *For all versions*

7 - Remove the three screws (14) and remove the control valve assembly (15).



Refitting

• Refitting is the reverse of removal.

REAR AXLE
COMPLETE ASSEMBLY

Preparation for removal of the right axle

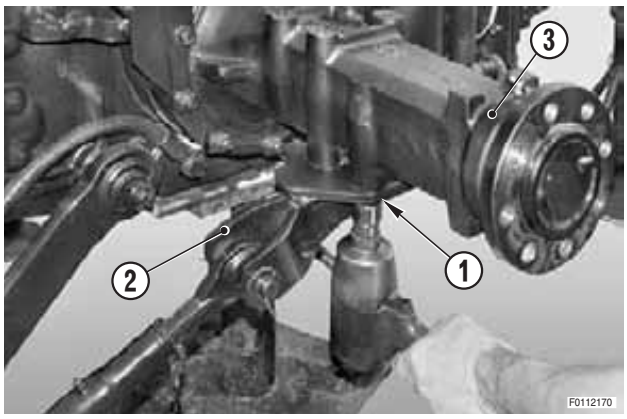
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil in the transmission. ⁂ 1

Transmission oil: approx. 45 l (12 US gall.)

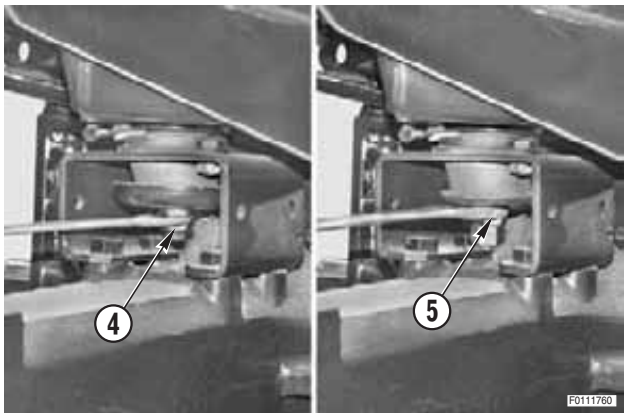
2 - Remove the right rear wheel.
(For details, see "WHEELS").

3 - Remove the screws (1) and disconnect the bracket (2) from the axle (3).

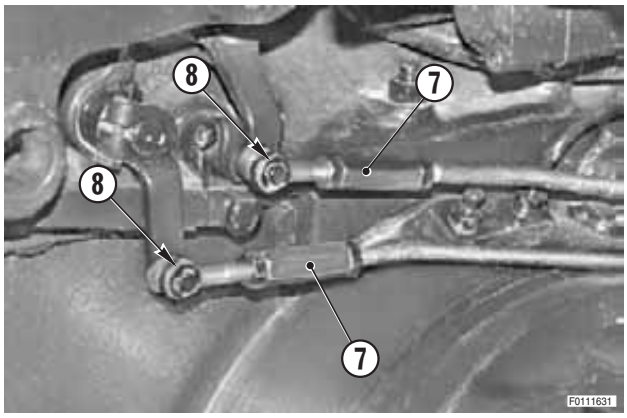


4 - Remove the cab fixing nut (4) on the right-hand side and loosen the front right nuts and left rear nuts.

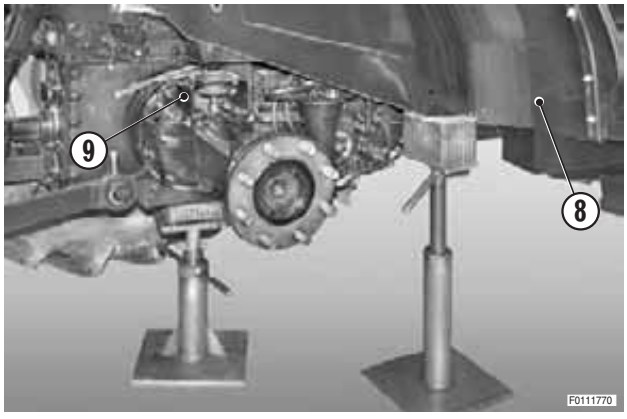
5 - Using the nut and lock nut method, remove the stud (5).



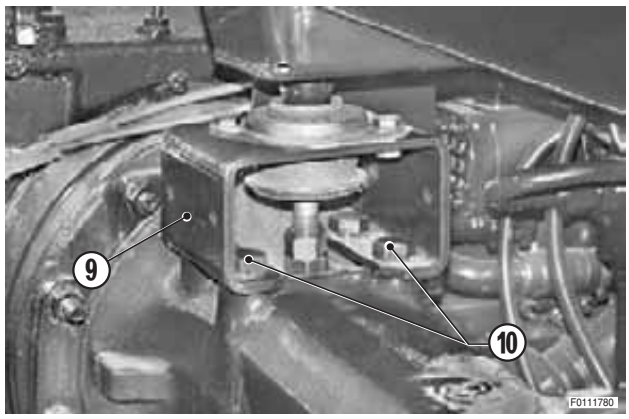
6 - Remove the circlips (6) and disconnect the lift control tie-rods (7).



7 - Position a suitable jack under the cab (8) and raise the cab sufficiently to free the support.

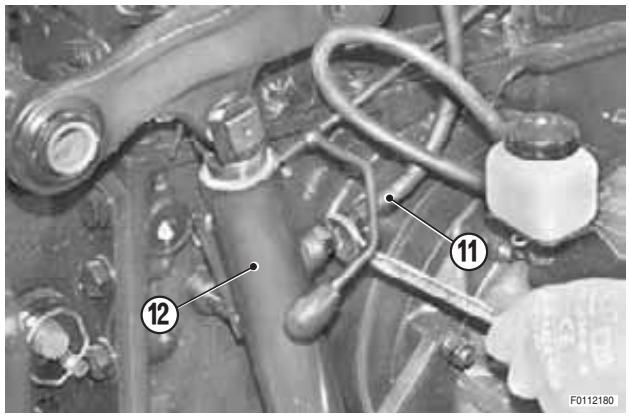


8 - Remove the four bolts (10) and remove the support (9).

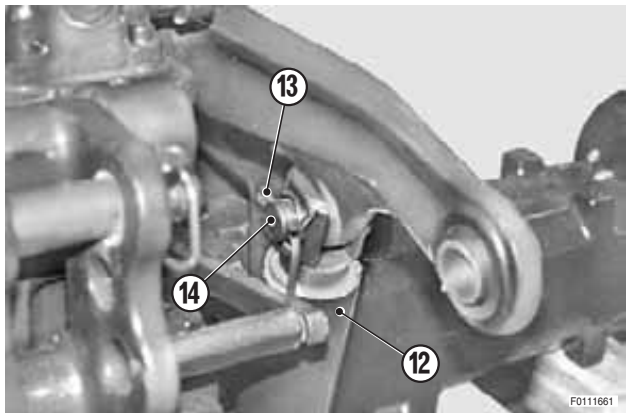


• *For versions with auxiliary lifting cylinders*

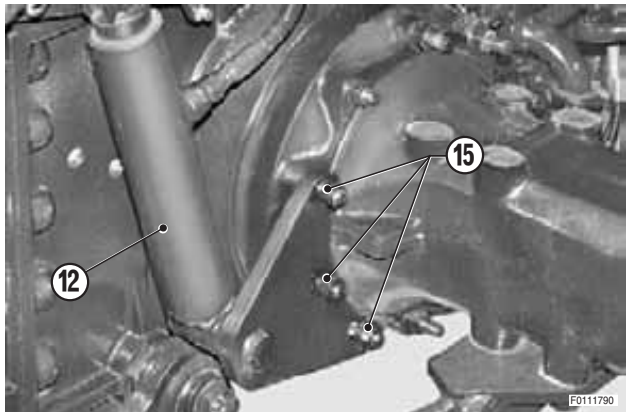
9 - Disconnect the pipe (11) from the cylinder (12).



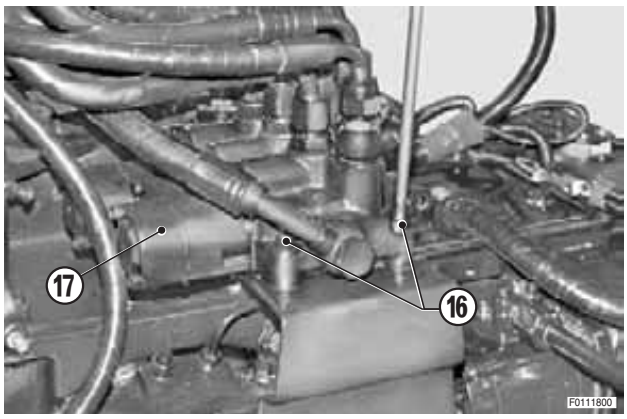
10 - Remove the pin (13), remove the pivot pin (14) and disconnect the cylinder (12) from the lift arm.



11 - Remove the nuts (15) and remove the cylinder (12).
⁘ 2



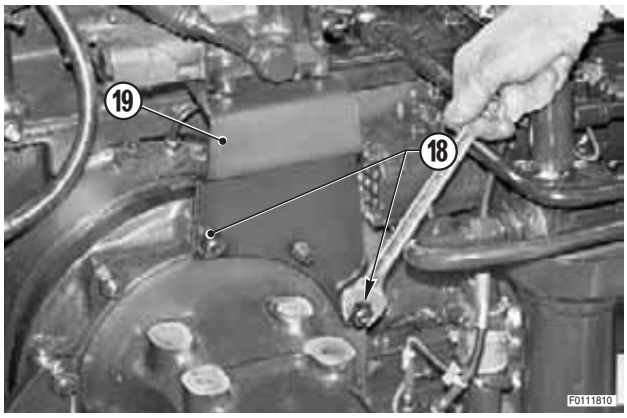
12 - Remove the two bolts (16) securing the control valve (17).



• *For all versions*

13 - Remove the nuts (18) and remove the support (19).

2



Preparation for removal of the left axle

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

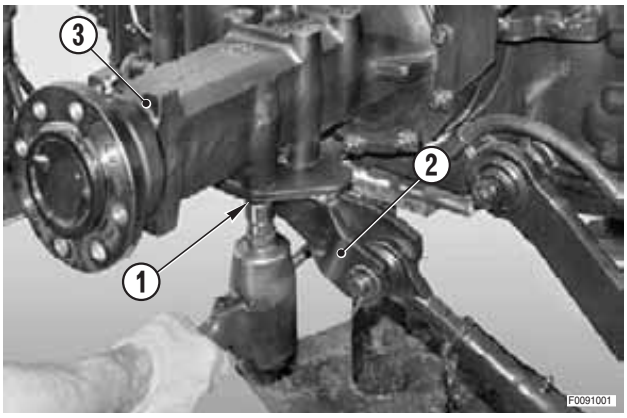
1 - Drain off all the oil in the transmission [1]

Transmission oil: approx. 45 l (12 US.gall.)

2 - Remove the left rear wheel.
(For details, see "WHEELS")

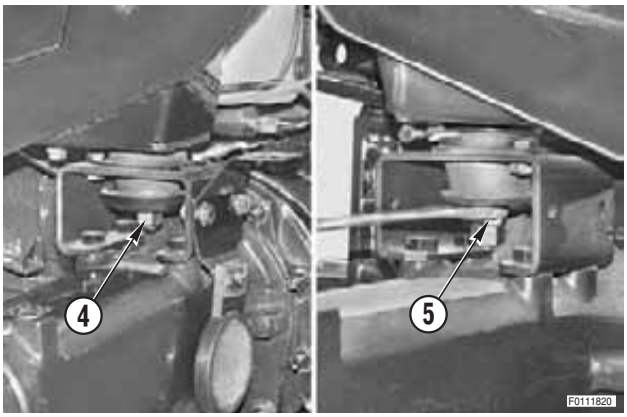
3 - Remove the fuel tank.
(For details see "FUEL TANK")

4 - Remove the bolts (1) and disconnect the bracket (2) from the axle (3).

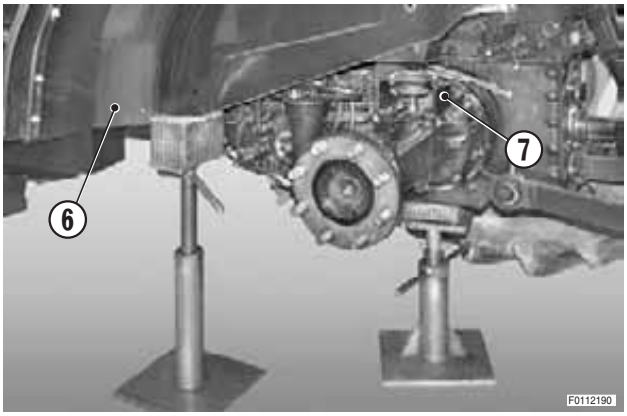


5 - Remove the left cab fixing nut (4) and loosen the front left nut and rear right nut.

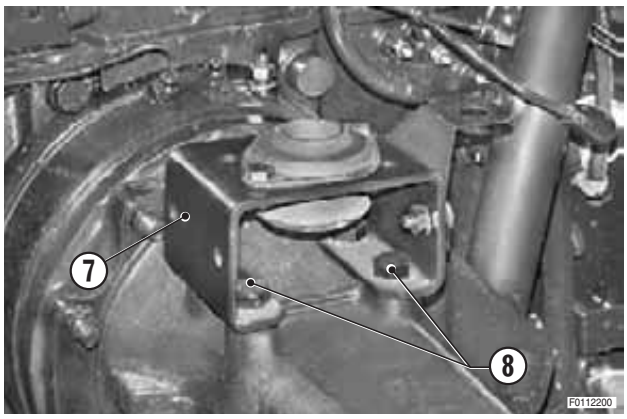
6 - Using the nut and lock nut method, remove the stud (5).



7 - Position a suitable jack (6) under the cab and raise the cab sufficiently to free the support (7).

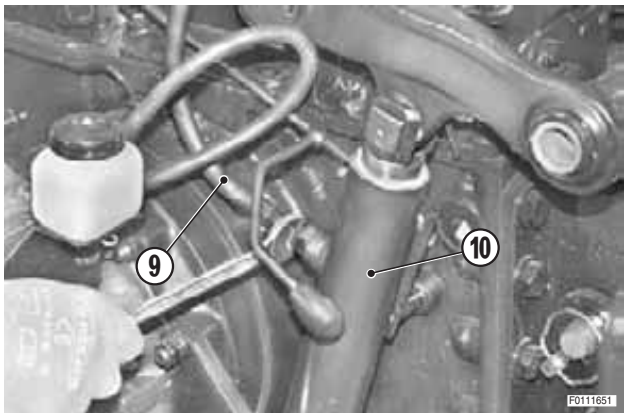


8 - Remove the four bolts (8) and remove the support (7).

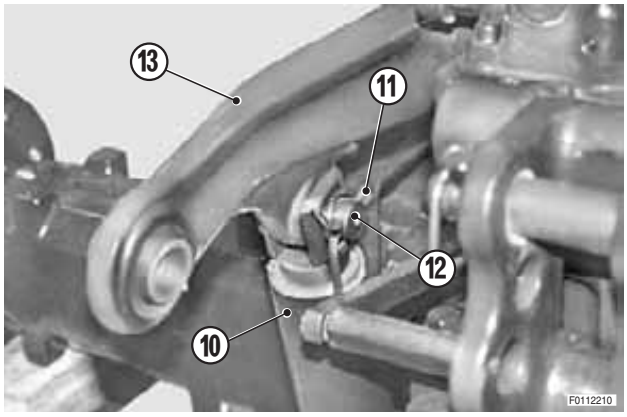


• *For versions with auxiliary lifting cylinders*

9 - Disconnect the pipes (9) from the cylinders (10).

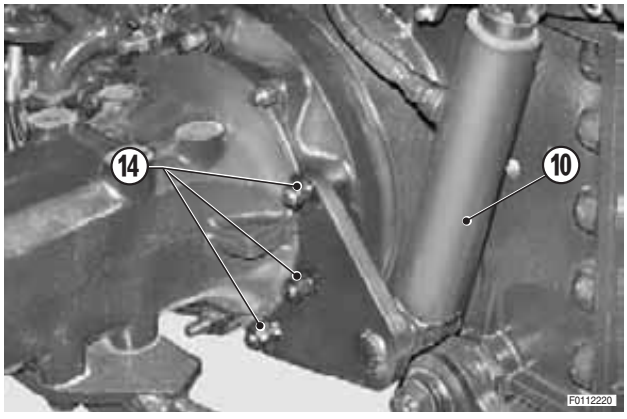


10 - Remove the pin (11), remove the pivot pin (12) and disconnect the cylinder (10) from the lift arm (13).



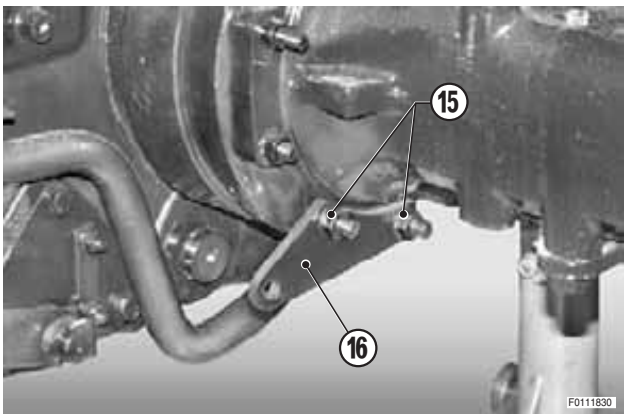
11 - Remove the nuts (14) and remove the cylinder (10).

2



• *For all versions*

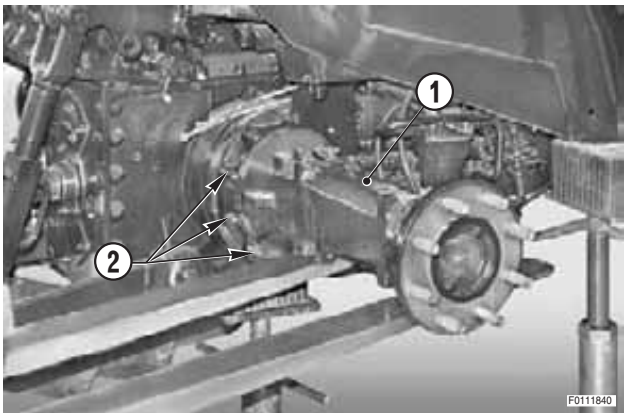
12 - Remove the nuts (15) and remove the fuel tank support (16).



Removal of the complete rear axle

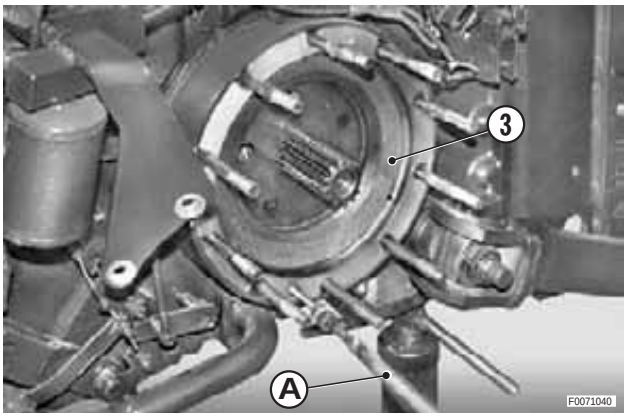
1 - Position a suitable jack under the axle (1).

2 - Remove the remaining nuts (2) and remove the rear axle (1). ⁘ 2

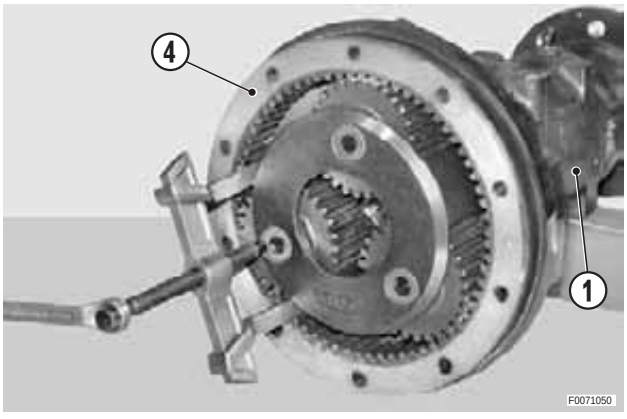


3 - If the brake flange (3) remains in its seating in the transmission casing, remove it using a slide hammer puller "*A*".

⁘ 3



4 - Using a puller, remove the ring gear (4) from the axle (1).



Refitting

- Refitting is the reverse of removal.

※ 1

★ Fill the transmission with the required quantity of oil.

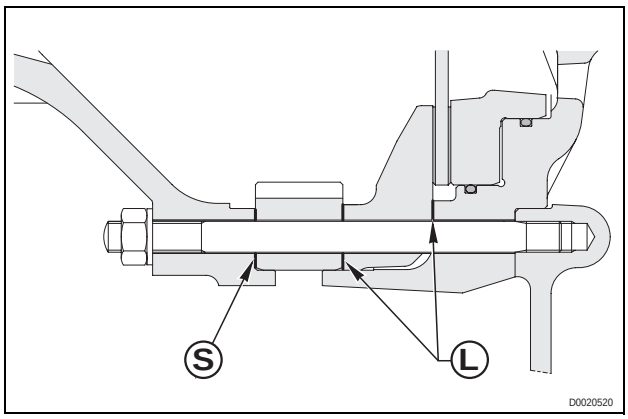
Transmission oil: approx. 45 l (12 US.gall.)

※ 2

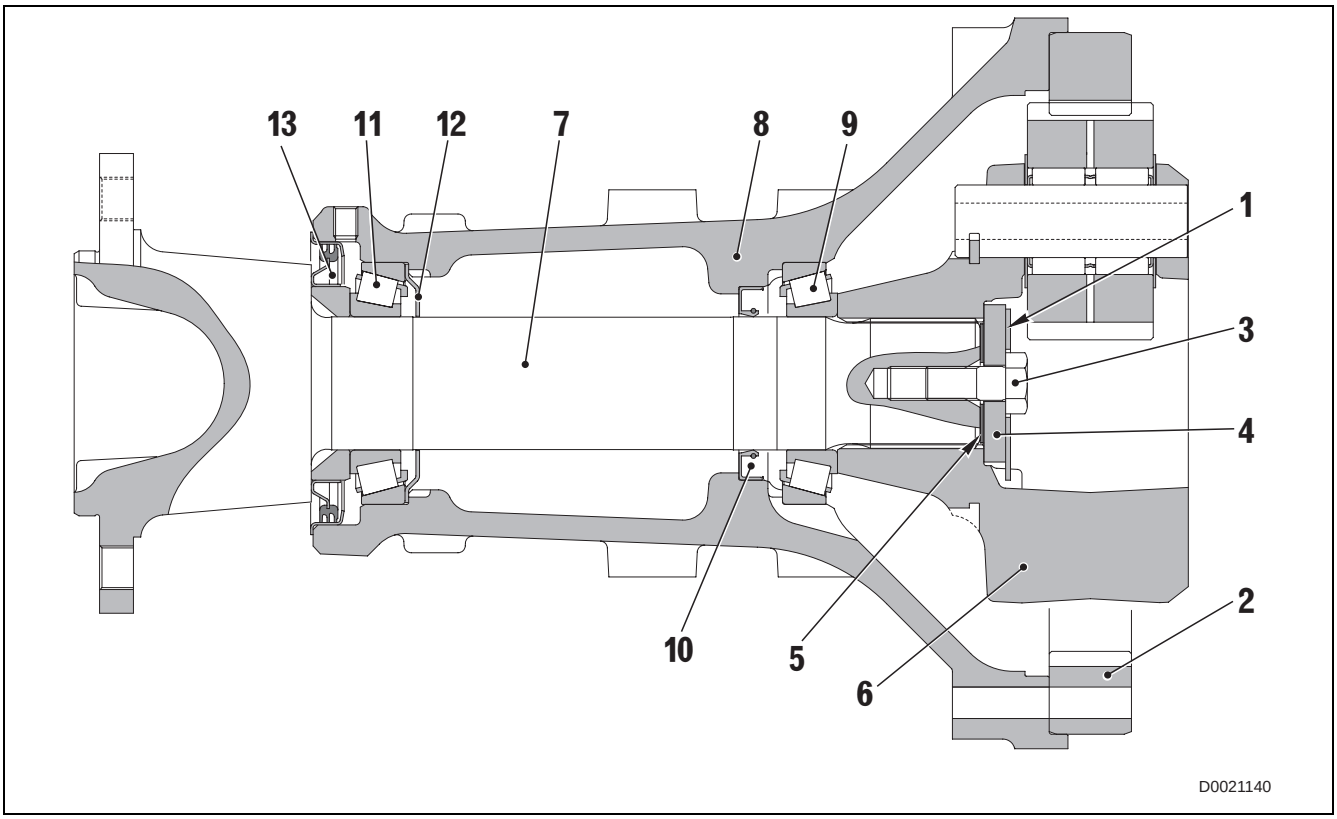
Nuts: 78±4 Nm (57.5±3.0 lb.ft.)

※ 3

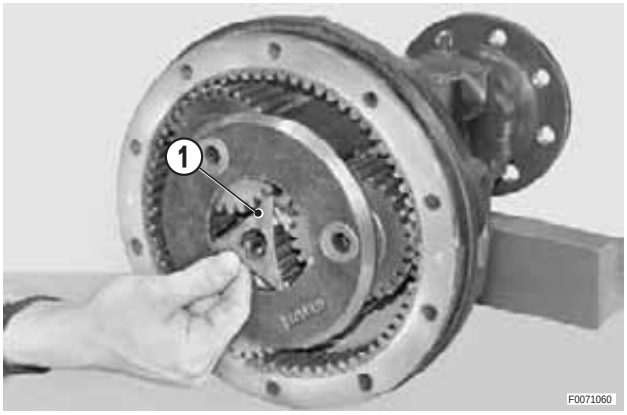
★ Apply a film of Loctite 510 between the mating faces indicated with the letter "*L*" and a film of Silastic 738 lon the mating faces indicated with the letter "*S*".



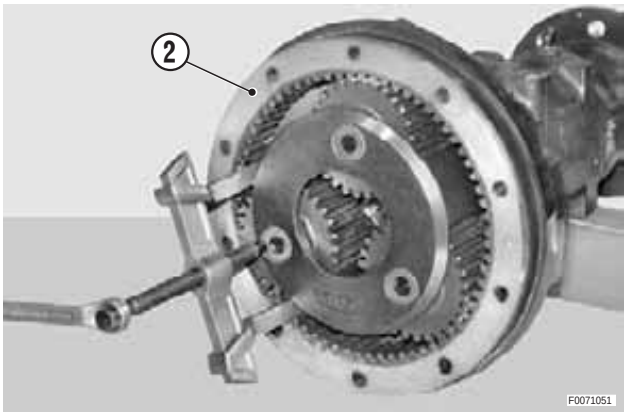
Disassembly



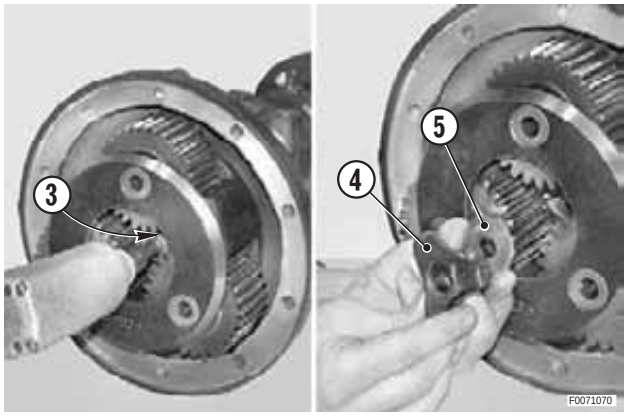
1 - Remove the antirotation plate (1) from the axle.



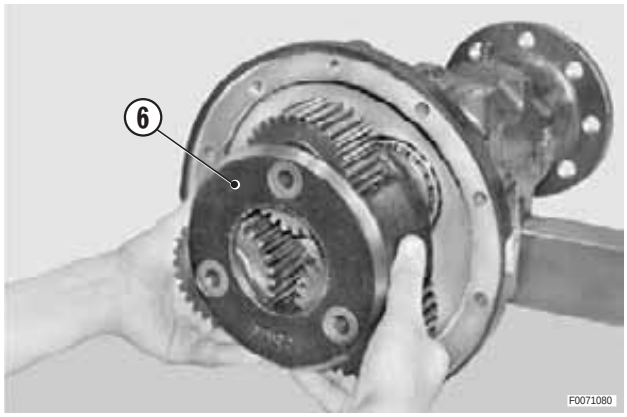
2 - Using a puller, remove the ring gear (2). ※1



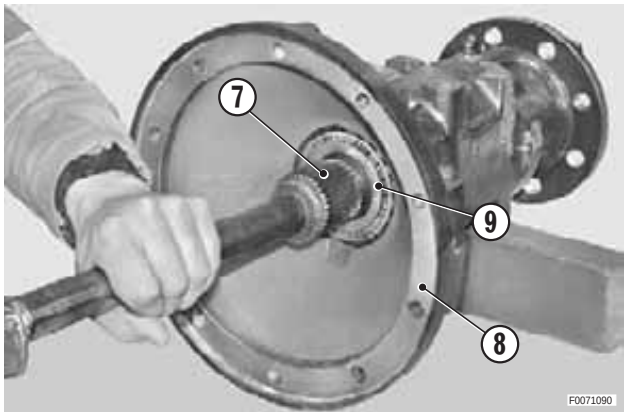
3 - Remove the screw (3) and remove the spacer (4) and shims (5). ⁘ 2



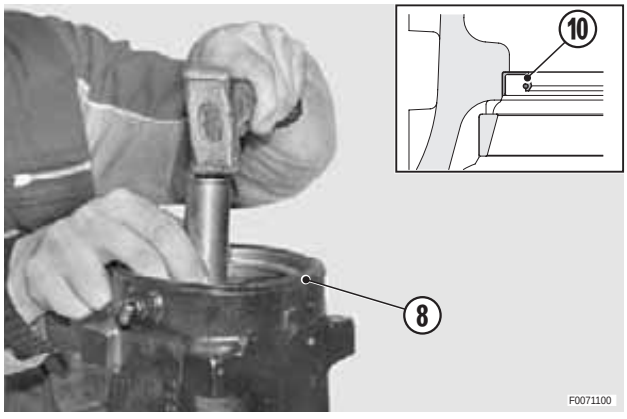
4 - Remove the complete planet carrier assembly (6).



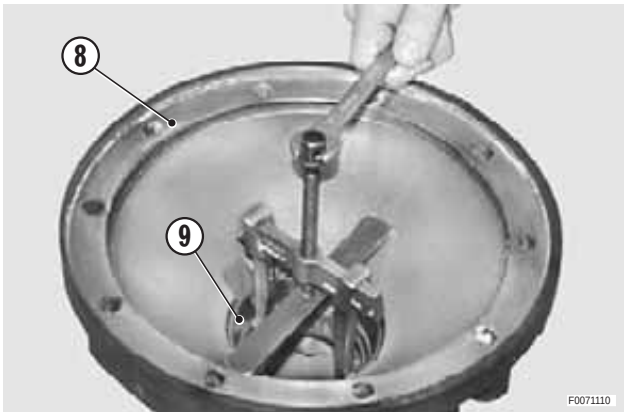
5 - Using a copper punch and a mallet, drive the halfshaft (7) out of the axle housing (8) and remove the inner ring of the bearing (9). ⁘ 3



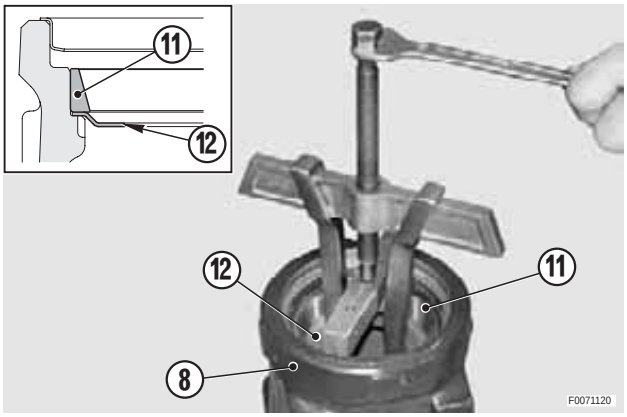
6 - Withdraw the oil seal (10) from the axle housing (8).
★ Note which way round the oil seal is installed (10).
⁘ 4



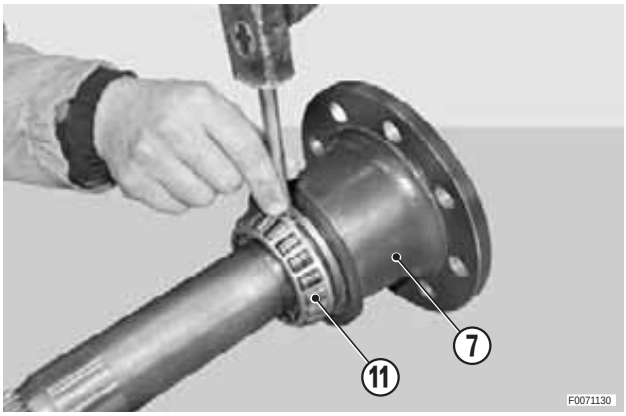
7 - Withdraw the outer ring of the bearing (9) from the axle housing (8).



8 - Withdraw the outer ring of the bearing (11) and the disc (12) from the axle housing (8).



9 - Remove the inner ring of bearing (11) from the half-shaft (7). ※ 5



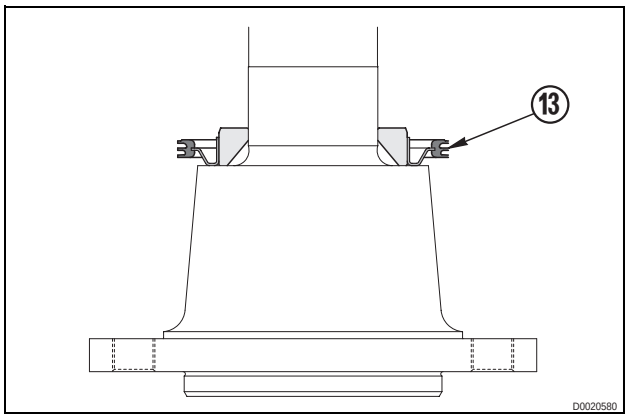
• *Only if necessary*

10 - Remove the slide ring of the oil seal (13).

★ Renew the oil seal on reassembly.



11 - Remove dust seal from the halfshaft (13).
★ Renew the oil seal on reassembly.
★ Note which way round the oil seal (13) is installed.



Assembly

- To assemble, follow the disassembly steps in reverse order.

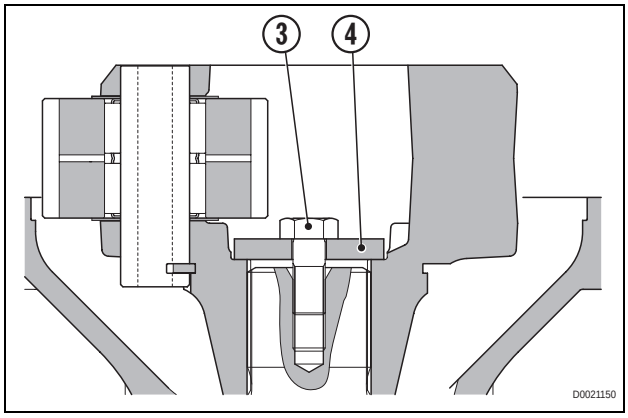
※ 1

★ Do not fit the ring gear at this stage.

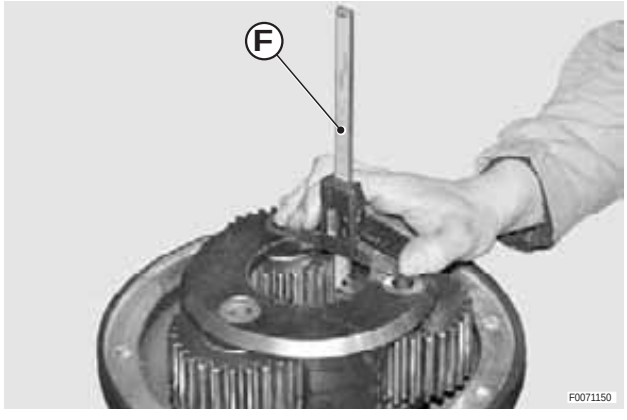
※ 2

1 - Position the axle housing (8) vertically.

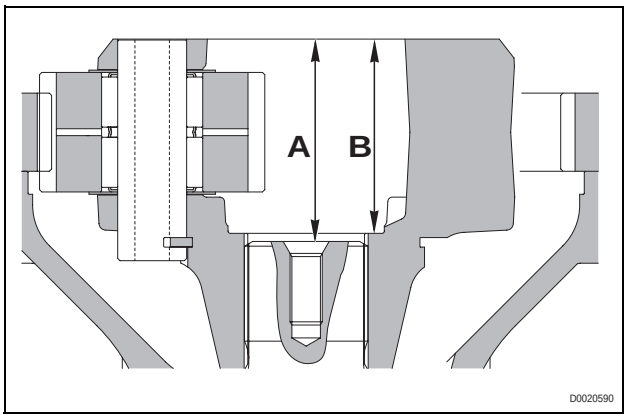
2 - Temporarily install the spacer (4) and the screw (3) and tighten gradually to slightly preload the bearings (9) and (11).
★ While tightening the nut, rotate the axle housing while holding the halfshaft firm to as to help seat the bearings.



3 - Remove the bolt (3) and the spacer (4) and, using a depth gauge "*F*" measure "*A*" and "*B*".



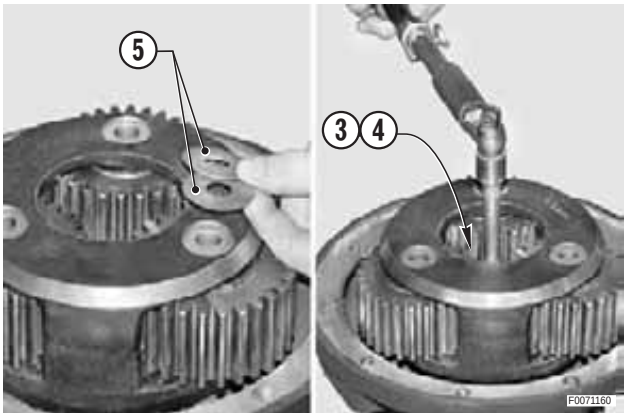
4 - Calculate the thickness "*S*" of the shim pack (5) to be installed under the spacer (4) with the formula:
S = *A* – *B*
(round down the value obtained)
- Example calculation:
dimension "A": 86.10 mm
dimension "*B*": 84.47 mm
S = 86.10 – 84.47 = 1.63 mm
then the final thickness "*S*" of shim pack (5) will be 1.60 mm.



5 - Fit the shim pack (5), the spacer (4) and secure in positionby tightening the screw (3).

Nm Screw: 177±9 Nm (130.5±6.6 lb.ft.)

Screw: Loctite 270

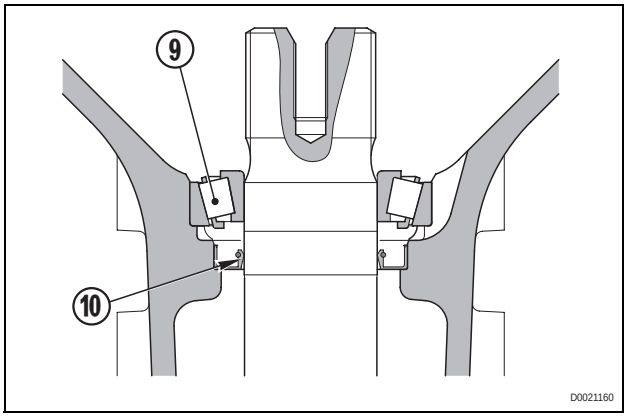


3

★ Lubricate the bearing (9) and the lips of the oil seal (10).

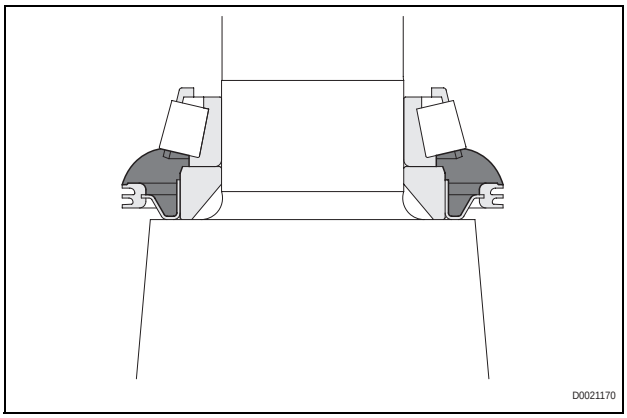
4

★ Take care to install the oil seal (10) the right way round.



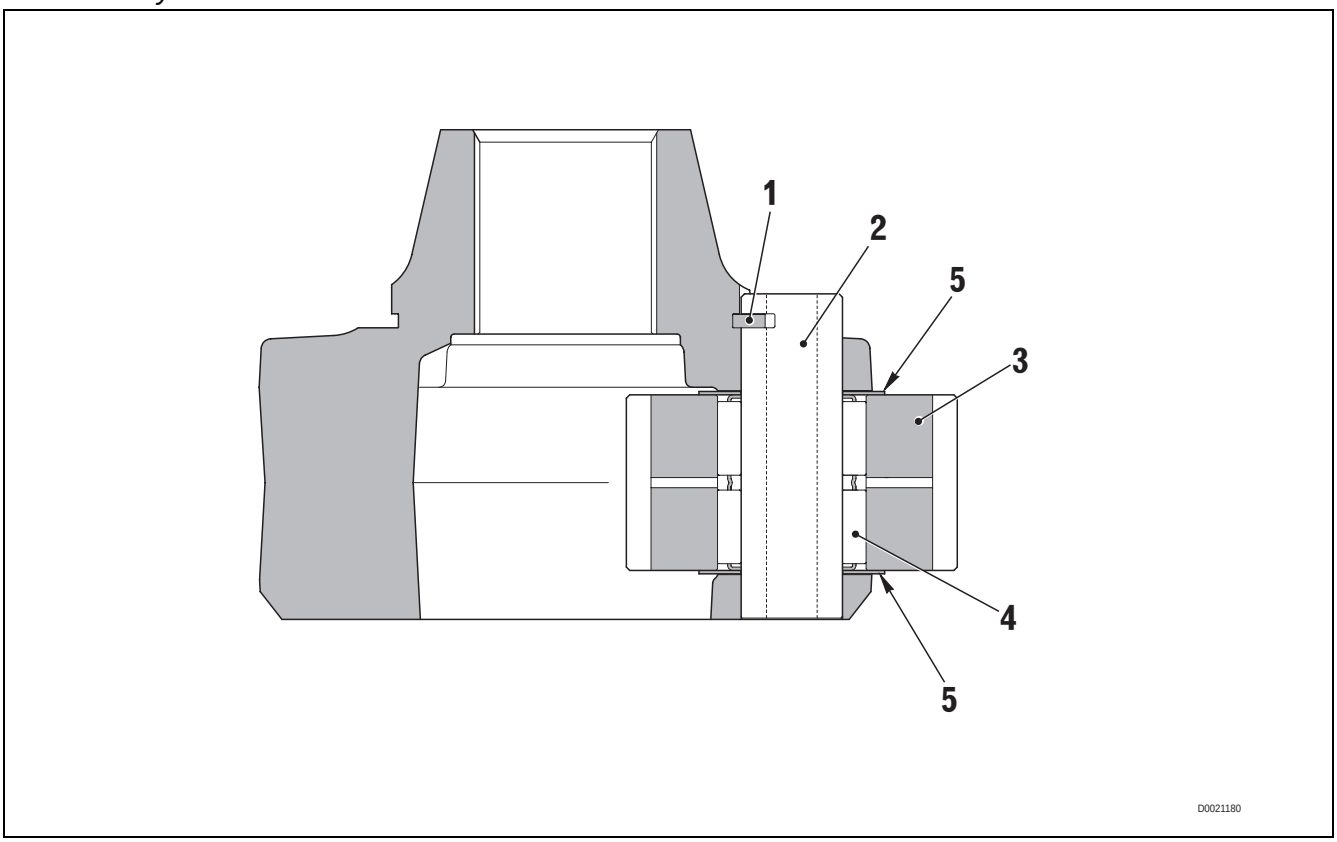
5

★ Fill the area indicated in the figure with grease.

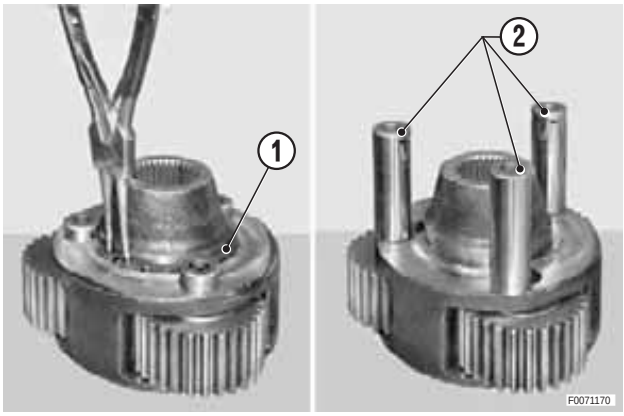


PLANET CARRIER ASSEMBLY

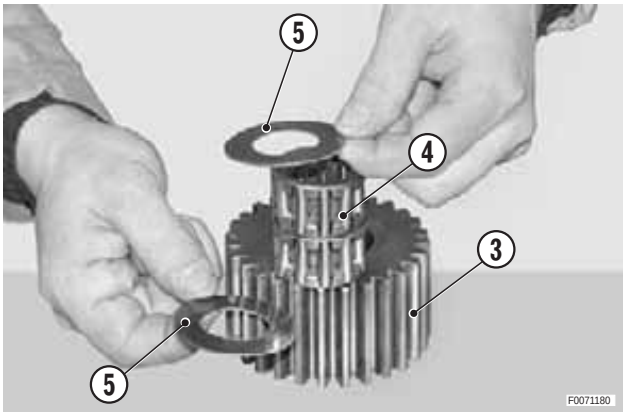
Disassembly



1 - Remove the circlip (1) and, at the time, withdraw the pins (2).



2 - Remove the planet gears (3) and remove the roller cage (4) and shims (5). ※1



Assembly

- To assemble, follow the disassembly steps in reverse order.

※1

★ Lubricate the roller cages (4).

Roller cages: oil

BRAKES

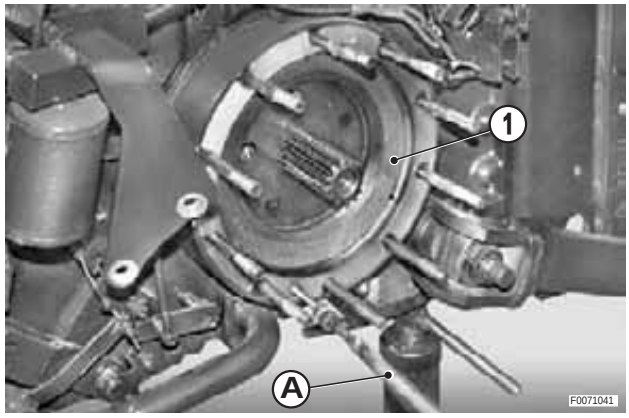
REAR AXLE BRAKES

Renewal of brake discs

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the left rear axle.
(For details, see "REAR AXLE").

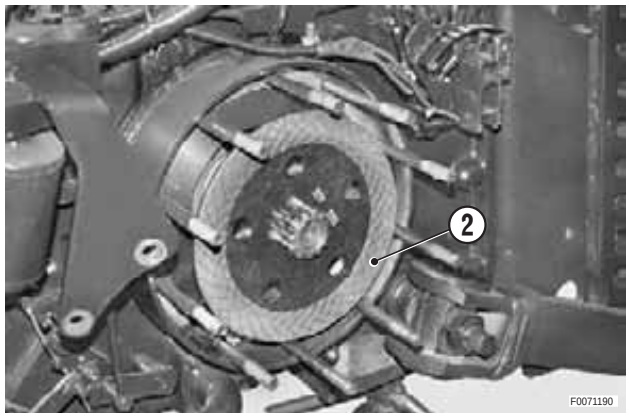
2 - If the brake flange (1) remains in its seating, remove it using a slidehammer puller “*A*”.



3 - Remove the old brake disc (2) and fit a new one.

4 - Refit the previously removed axle. (For details, see "REAR AXLE").

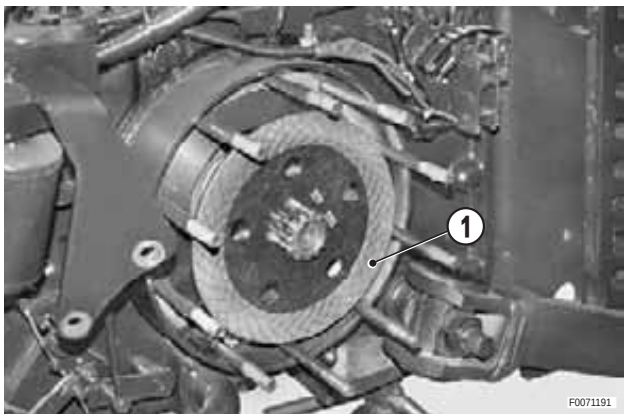
5 - Repeat the procedure for the brake disc on the opposite side.



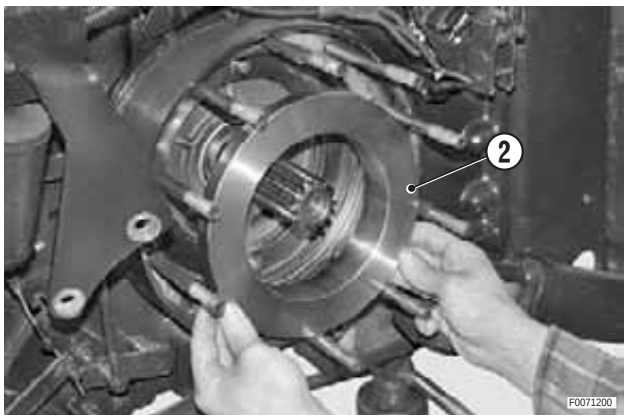
BRAKING PISTON

Disassembly

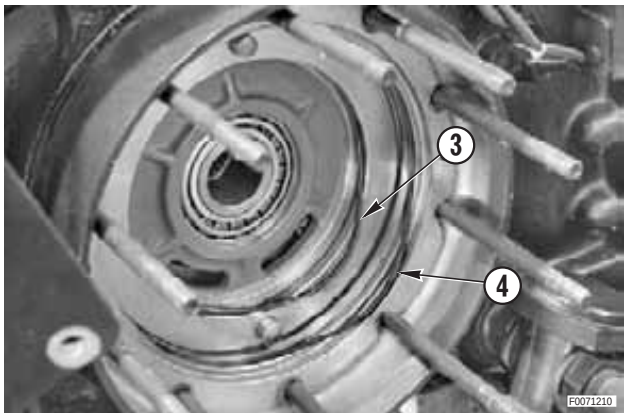
1 - Remove the axle and the brake disc (1) on the side to be overhauled.
(For details, see "REAR AXLE").



2 - Blow compressed air at low pressure into the brake control pipe of to expel the piston (2).



3 - Remove O-rings (3) and (4). ⁘ 2



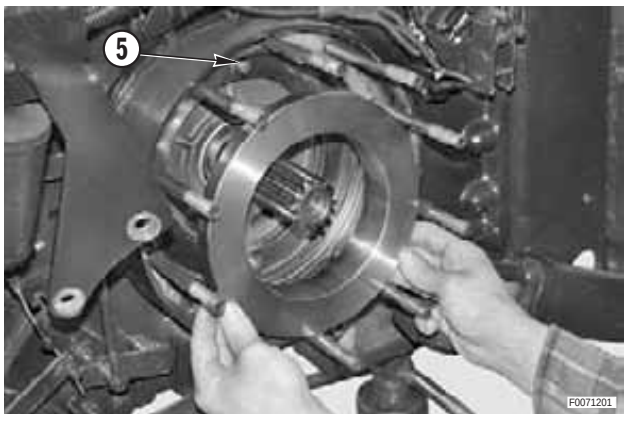
Assembly

- To assemble, follow the disassembly steps in reverse order.

⁘ 1

★ Fit the piston, taking care to centre the antirotation pins (5).

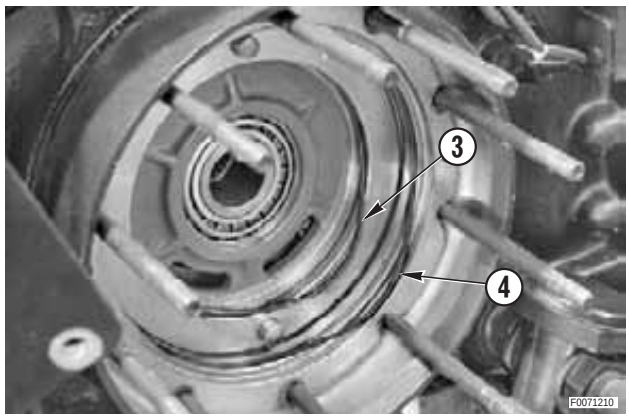
Piston: brake fluid



※ 2

★ To facilitate installation of the O-rings (3) and (4), stretch them slightly various points all around the circumference so that they are held in place in their seating.

Seals: brake fluid



FRONT AXLE BRAKES

Removal of the brake discs

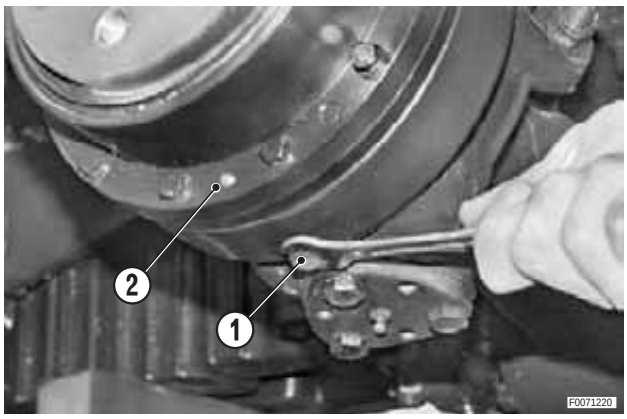
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the wheel on the side on which the brake discs are to be renewed.
(For details, see "WHEELS"). ※ 1

2 - Remove the plug (1) and drain off all the oil from the final drive reduction gear (2). ※ 2

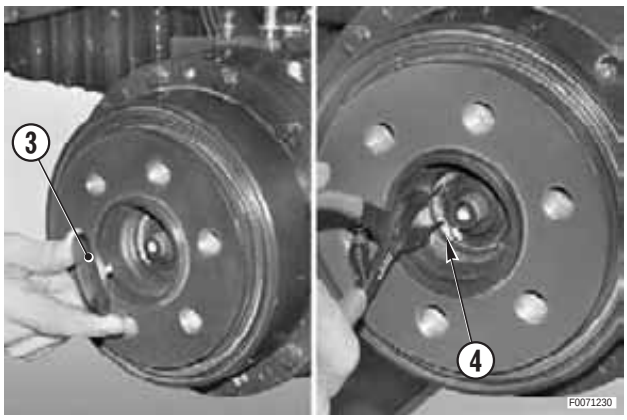
★ Renew the copper washers on reassembly.

Final drive oil: approx. 1.5 l (0.4 US.gall.)



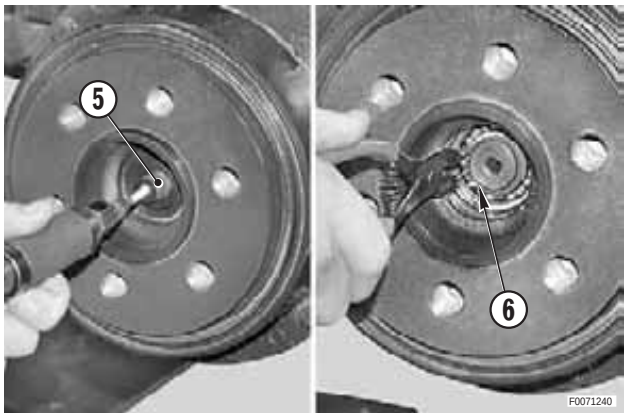
3 - Unscrew and remove the cover (3).

4 - Remove the circlip (4).

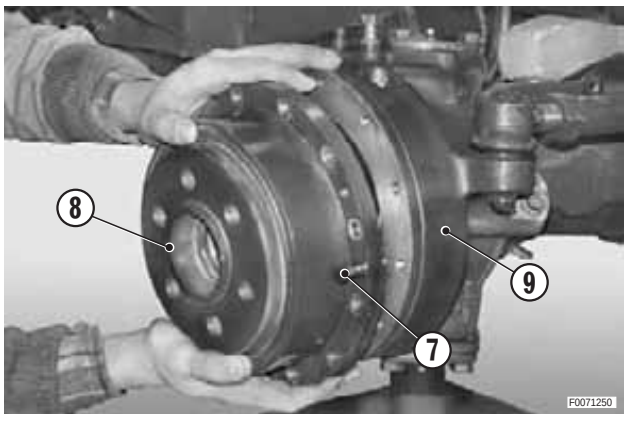


5 - Using a slide hammer puller, remove the cover (5).

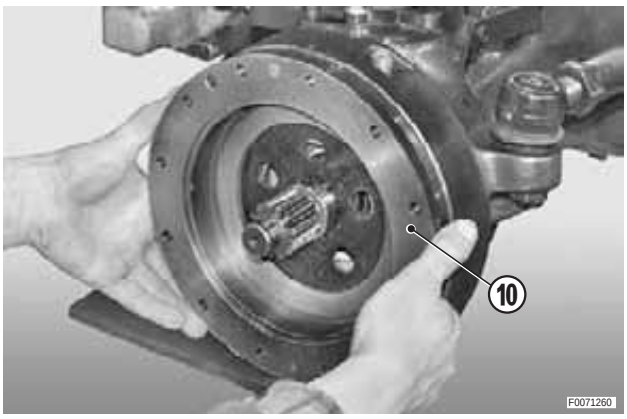
6 - Remove the circlip (6).



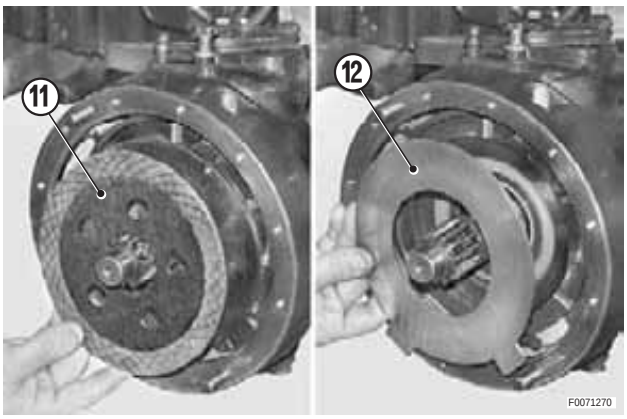
7 -Remove all the screws (7) and, using two screws (7) as pullers, separate the final drive epicyclic gear unit (8) from the steering knuckle housing (9). ※ 3



8 - Remove the brake flange (10). ※ 4



9 - Remove the friction disc (11) and the steel disc (12). ※ 5



Refitting the brake discs

- Refitting is the reverse of removal.

※ 1

★ Bleed the braking system.

※ 2

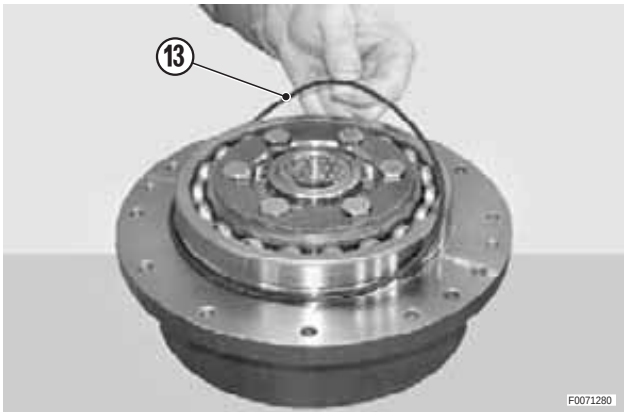
★ Fill the steering knuckle housing with oil.

Steering knuckle housing: max. 1.5 l (0.4 US.gall.)

※ 3

★ Check the condition of the O-ring (13) and renew it if necessary.

O-ring: Grease



※ 4

★ Check the condition of the O-ring (14) and renew it if necessary.

O-ring: Grease



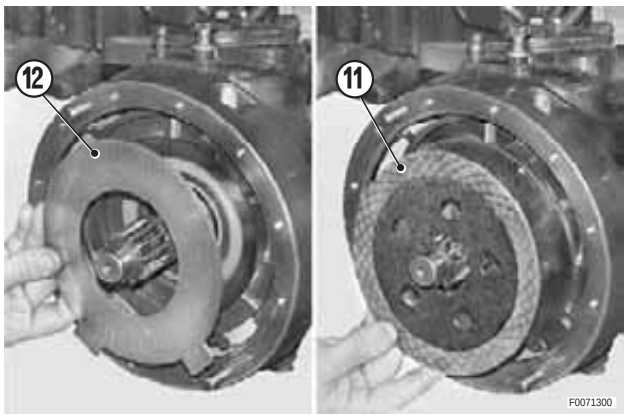
※ 5

1 - Loosen the bleed screw and, using a suitable tool, push the brake control piston home.

2 - Install the steel disc (12) and the friction disc (11).

Friction disc: oil

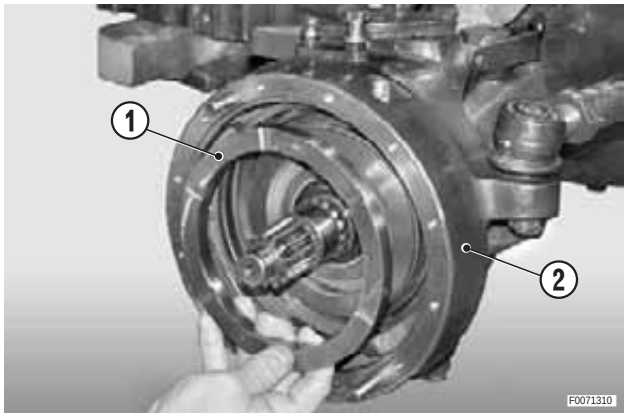
★ Take care to install the steel disc the right way round.



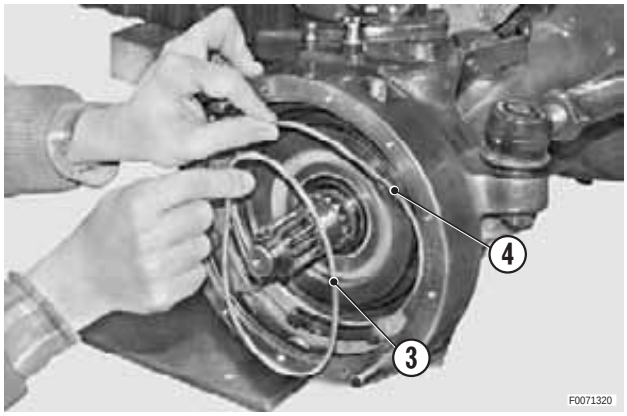
Piston disassembly

1 - Using a slide hammer puller, remove the piston (1) from the steering knuckle housing (2). ※ 1

★ To facilitate removal of the piston, loosen the bleed screw by a few turns.



2 - Remove O-rings (3) and (4).



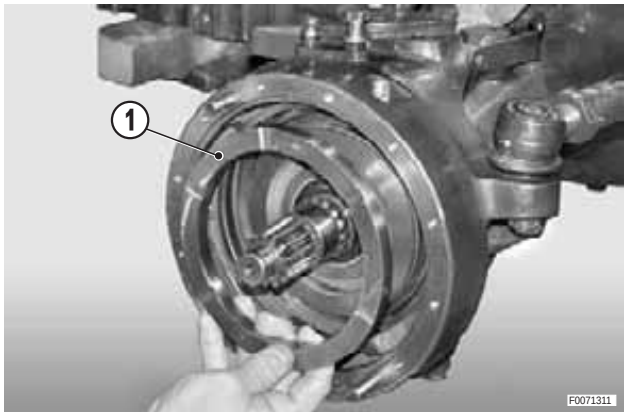
Piston assembly

- Refitting is the reverse of removal.

※ 1

★ Install the piston (1), making sure that splined side it is oriented outwards.

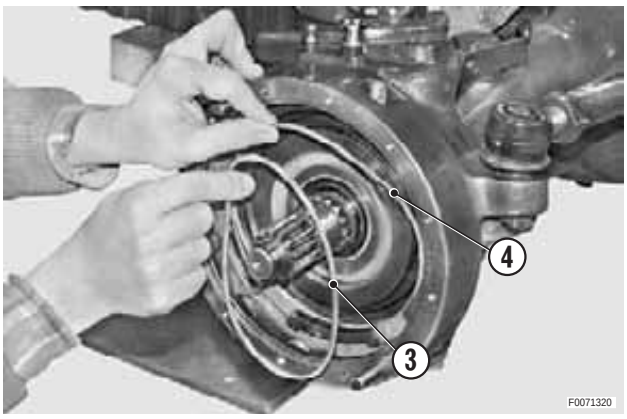
Piston: brake fluid



⁘ 2

★ To facilitate installation of the larger O-rings (4), stretch it slightly various points all around the circumference so that it is held in place in its seating.

O-rings: brake fluid



PARKING BRAKE

Removal of the friction shoes

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Drain off all the oil in the transmission. ※ 1

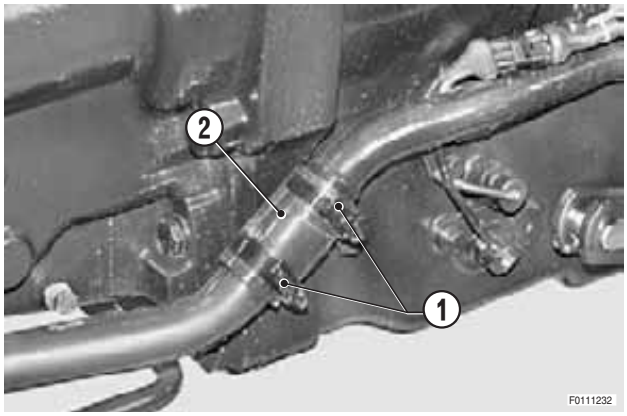
Transmission oil: approx. 45 l (12 US.gall.)

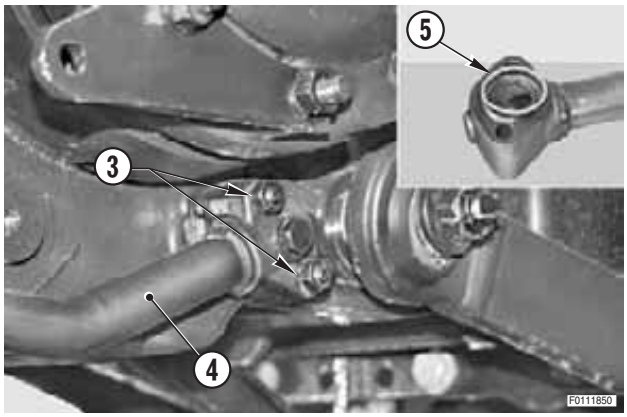
2 - Remove the left rear wheel.
(For details, see "WHEELS").

3 - Remove the fuel tan..
(For details, see "FUEL TANK").

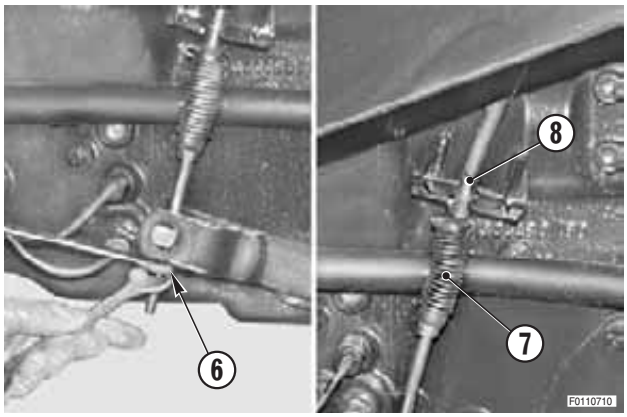
4 - Loosen the clips (1) and move the hose (2) towards the rear.

5 - Remove the nuts (3) and remove the transfer pipe (4).
★ Recover the O-ring (5).

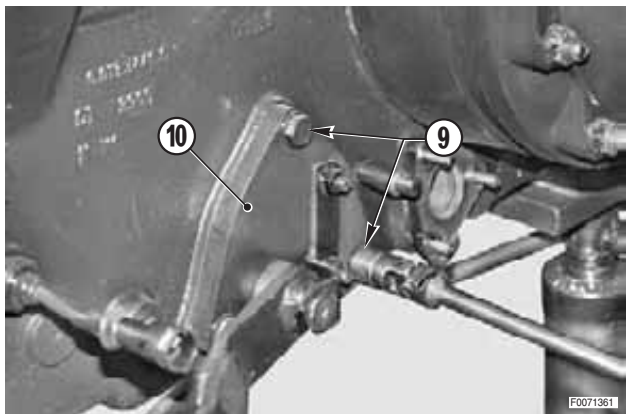




6 - Remove the nuts (6), peel back the gaiter (7) and disconnect the parking brake cable (8) . ※ 2

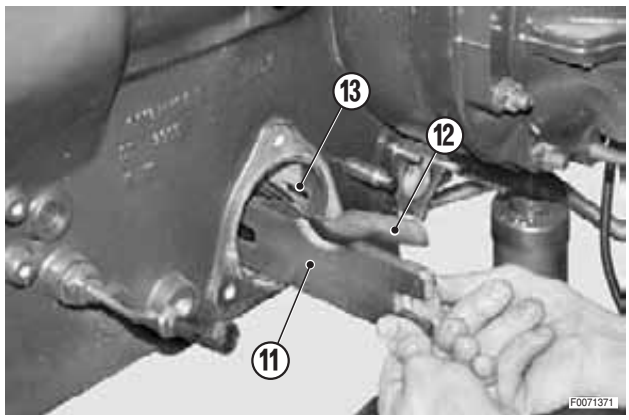


7 - Remove the screws (9) and remove the cover (10) .
[※ 3] [※ 4]



8 - Withdraw the spacer (11) and the first friction shoe (12) from the transmission.
★ In some cases there may be be an additional spacer installed between spacer (11) and friction shoe (12).

9 - Remove the three remaining friction shoes (13).



Refitting the friction shoes

• Refitting is the reverse of removal.

[※ 1]

★ Fill the transmission with the required quantity of oil.
Transmission oil: approx. 45 , (12 US.gall.)

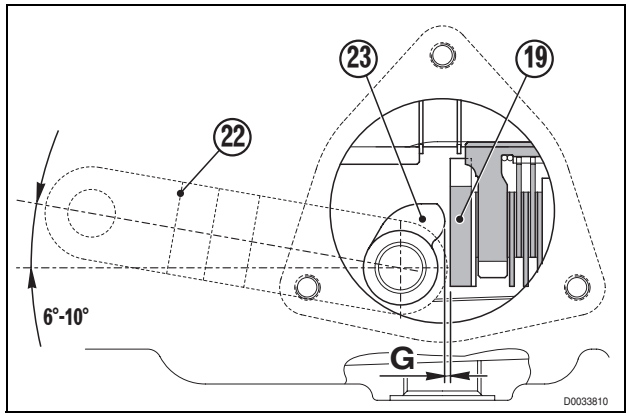
[※ 2]

★ Adjust the parking brake.

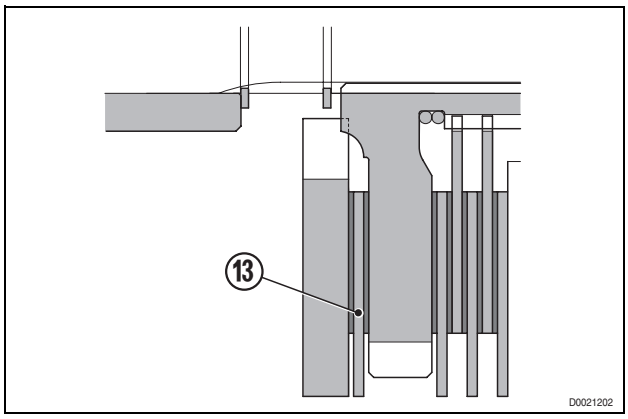
[※ 3]

• *Only if lever (14) and/or cam (15) are to be renewed.*

1 - With the lever positioned at between 6° and 10° from the horizontal, the clearance "*G*" between the cam (15) and the spacer (11) should be 10÷20 mm.

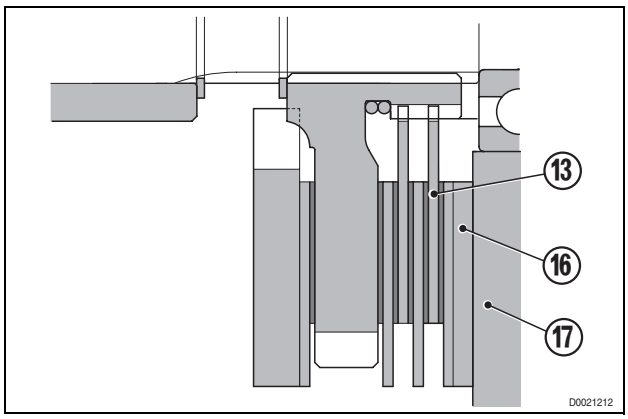


2 - If the play to be eliminated is about 1mm, replace the friction shoe (12) (with friction material on just one side) with an intermediate shoe (13) (with friction material on both sides).



3 - If the play to be eliminated is about 2mm, insert a spacer (16) between the transmission casing (17) and the last friction shoe (13).

★ For the part number of the spacer, refer to the parts catalogue.

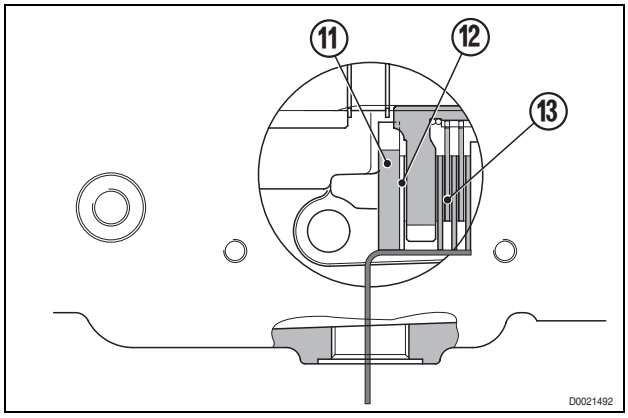


※ 4

★ To facilitate assembly of the cover (10), use a suitable tool to support the friction shoes (12) and (13) and spacer (11).

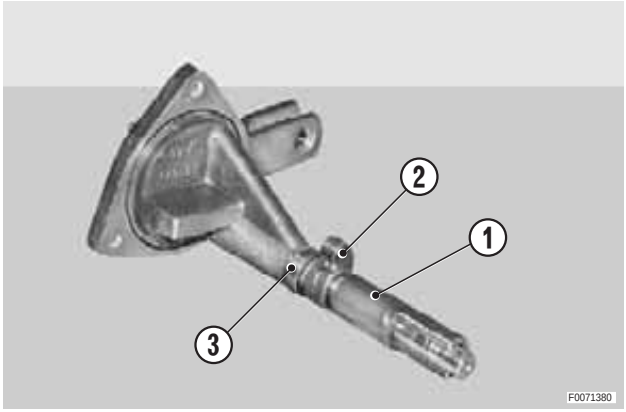
Mating face: Loctite 510

Nuts: 57±5 Nm (42±3.7 lb.ft.)

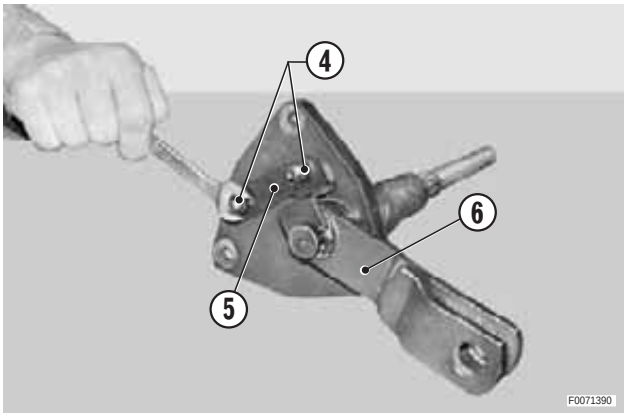


Disassembly

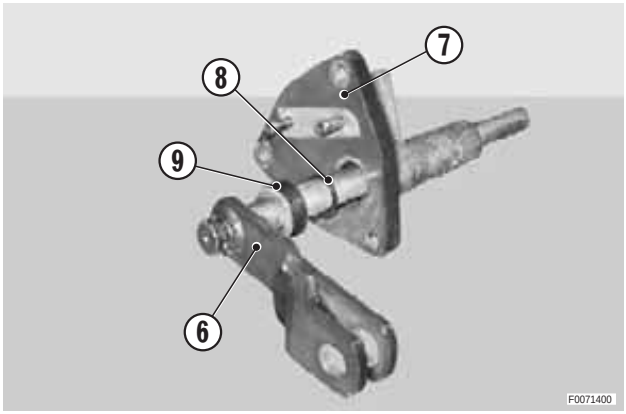
1 - Remove the spacer (1), cam (2) and spacer (3).
※ 1



2 - Remove the nuts (4) and remove the bracket (5) securing the lever (6).



3 - Withdraw the lever (6), the O-ring (8) and the spacer (9) from the cover (7).
※ 2



Assembly

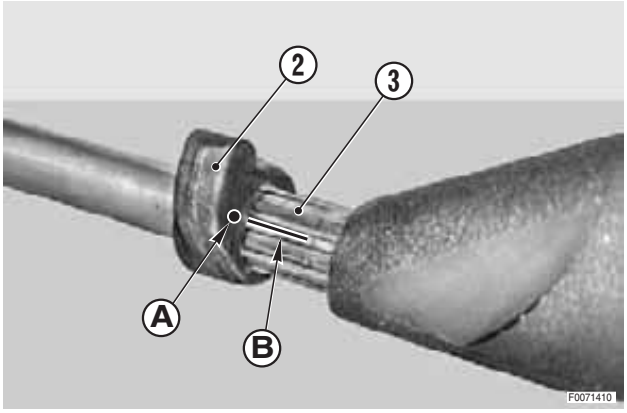
- To assemble, follow the disassembly steps in reverse order.

※ 1

★ Install cam (2) taking care to align marks "*A*" and "*B*" on the cam (2) and the lever (3).

※ 2

O-ring: Transmission oil



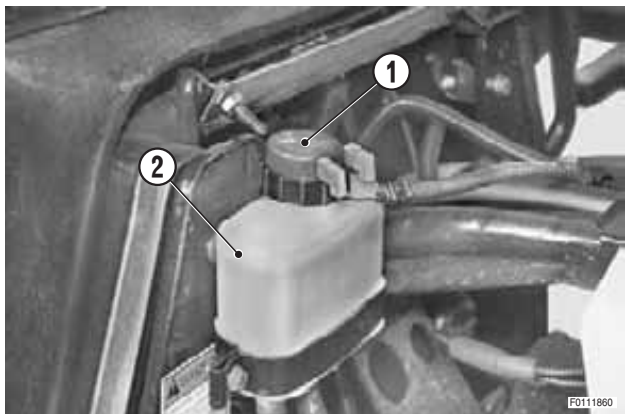
BRAKE MASTER CYLINDERS

Removal

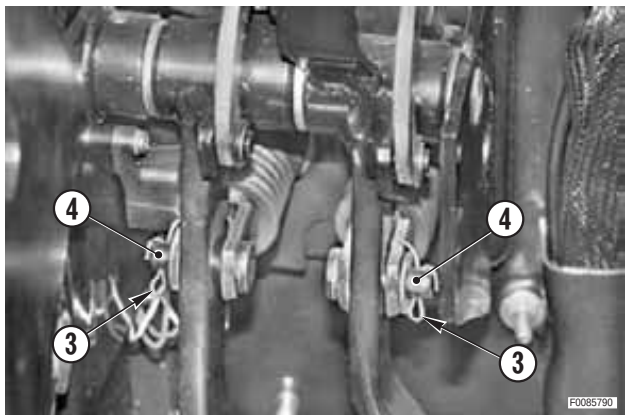
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the instrument panel.
(For details, see "FRONT INSTRUMENT PANEL").

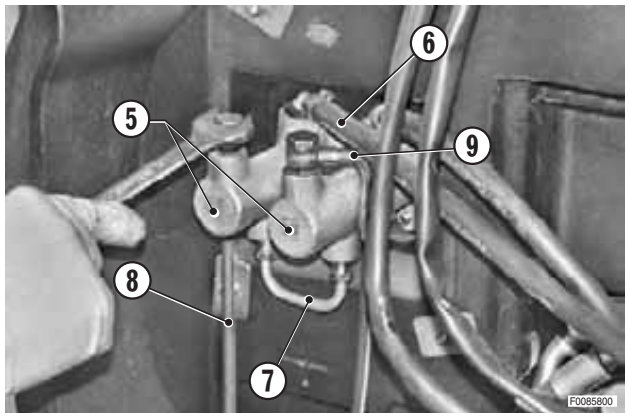
2 - Remove the cap (1) and draw off the fluid contained in the brake fluid reservoir (2).



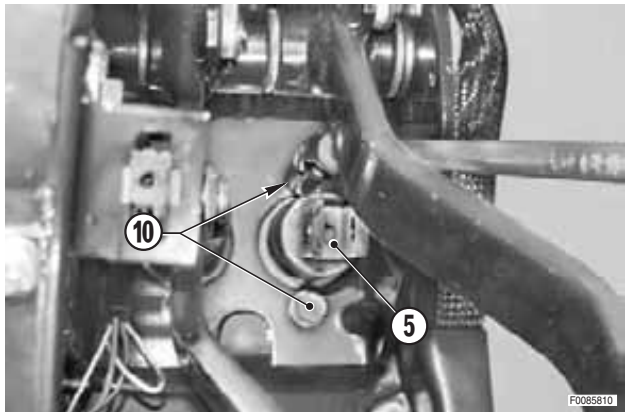
3 - Remove the split pins (3) and remove the pivot pins (4).



4 - Disconnect the inlet pipes (6), the balance pipe (7) and the brake pipes (8) and (9) from the brake master cylinders (5).
★ Label the pipes (8) and (9) to avoid confusion on reconnection.
★ Renew the copper washers on reassembly.



5 - Remove the screws (10) (two per cylinder) and remove the brake master cylinders.



Refitting

- Refitting is the reverse of removal.

1 - Fill the brake fluid reservoir to the maximum level.

2 - Bleed the braking system.
(For details, see "BRAKING CIRCUIT").

3 - Check the position and alignment of the brake pedals.

BRAKING CIRCUIT

Brake bleeding procedure

⚠ During brake bleeding operations, ensure that the fluid in the brake fluid reservoir is always above the minimum level.

★ Remove the dust cap and attach a length of transparent tubing "*A*" to the bleed valve; attach the other end of the tubing to a container to recover the fluid.

1 - Fully depress the brake pedal corresponding to the brake to be bled until you feel significant resistance and hold the brake pedal pressed.

2 - Slowly open the bleed valve and allow the fluid and air to flow throughout the entire pedal travel.

3 - While holding the pedal fully depressed, tighten the bleed valve; release the pedal.

4 - Repeat the previous operations until the fluid flowing from the bleed valve is entirely free of air bubbles.

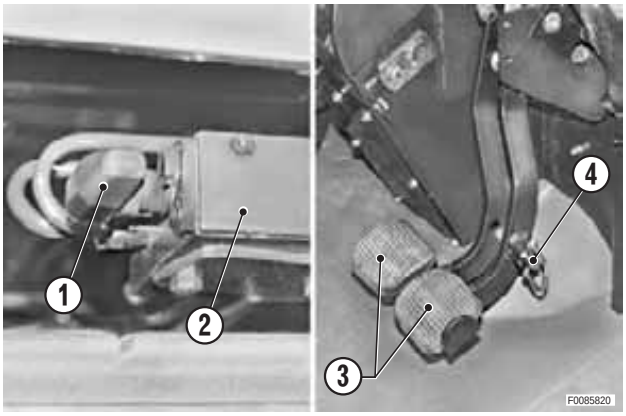
5 - Bleed all the brakes.

★ After bleeding, fit the dust caps to the bleed screws.

Bleeding the rear brakes circuit

1 - Turn the knob (1) of the "SEPARATE BRAKES" valve (2) to the ON position (horizontal) to enable braking on the rear brakes only.

2 - Disconnect the brake pedals (3) by removing the latch (4).



3 - Bleed the left rear brake.
(For details, see "Brake bleeding procedure").

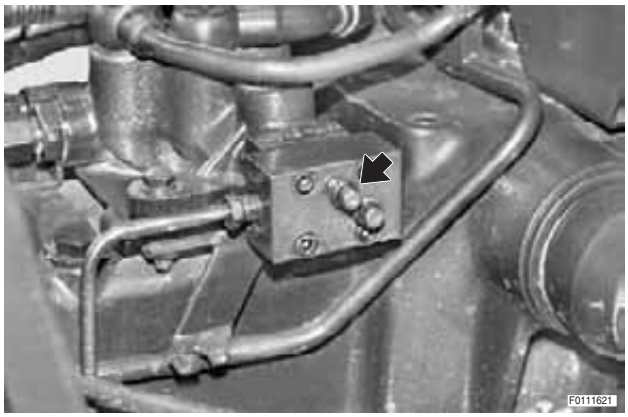


4 - Bleed the right rear brake
(For details, see "Brake bleeding procedure").



• *Versions with hydraulic trailer braking*

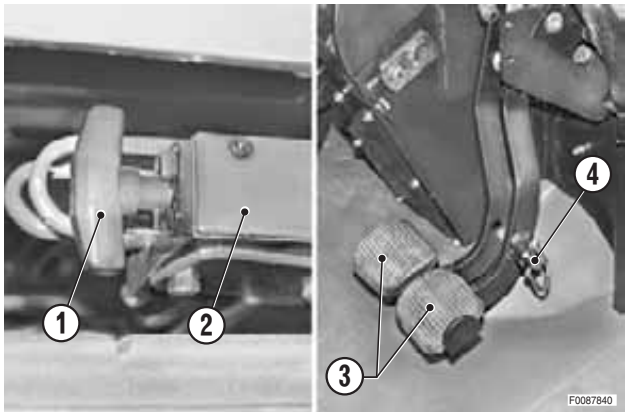
5 - Bleed the pilot circuit of the trailer braking valve.



Bleeding the front brakes circuit

1 - Turn the knob (1) of the “SEPARATE BRAKES” valve (2) to the OFF position (horizontal) to enable braking on all brakes.

2 - Disconnect the brake pedals (3) by removing the latch (4).



3 - Bleed the front brakes.
(For details, see "Brake bleeding procedure").



SERVICE VALVES ASSEMBLY

Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

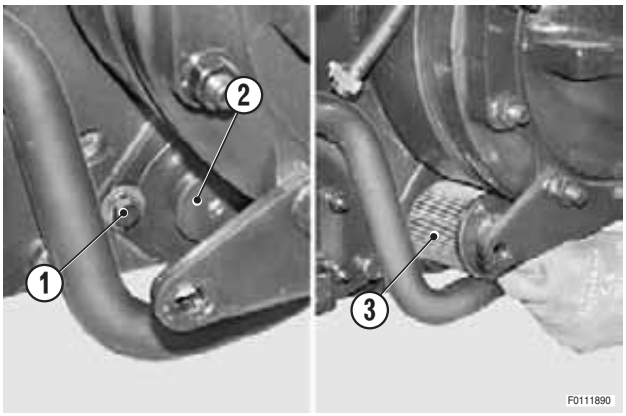
1 - Remove both hydraulic pumps (For details, see "HYDRAULIC PUMPS").

2 - Drain off all the oil from the transmission. ⁘ 1

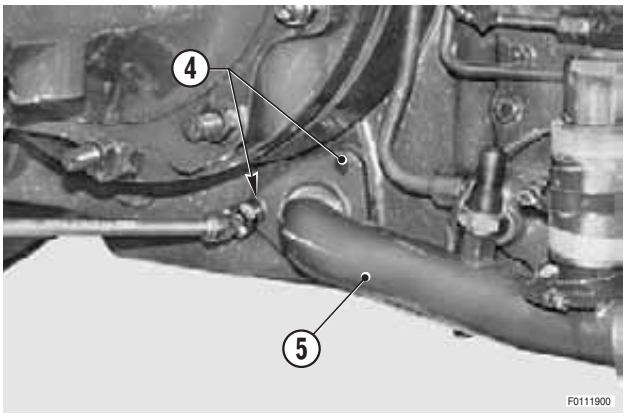
Transmission oil: approx. 45 l (12 US gall.)

3 - Remove the screw (1) and remove the cover (2).

4 - Remove the mesh filter (3) on the left-hand side of the tractor.

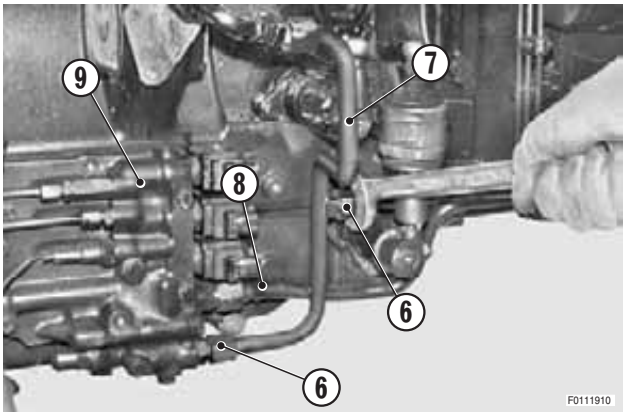


5 - Remove the screws (4) and remove the suction pipe (5) on the right-hand side of the tractor.

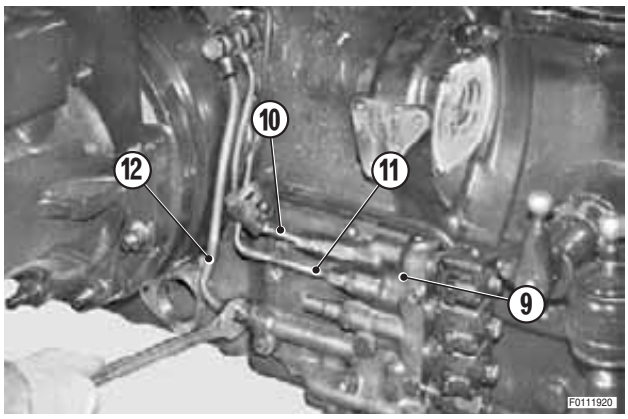


6 - Loosen the unions (6) and remove the pipe (7).

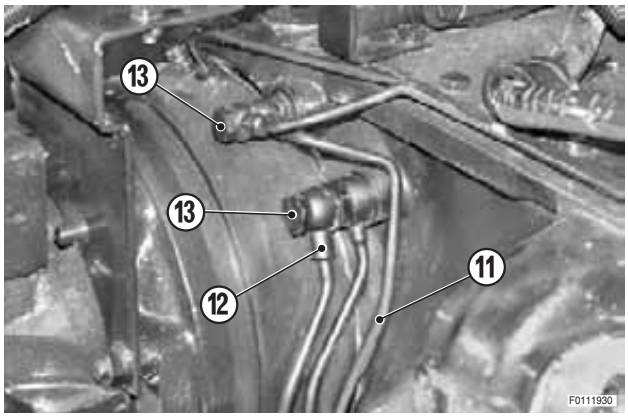
7 - Disconnect the pipe (8) from the valve assembly (9).



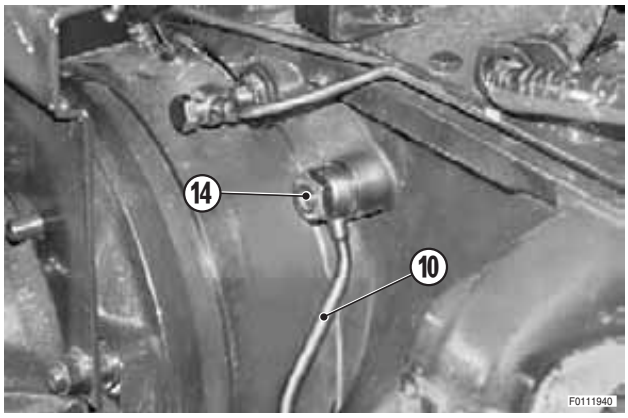
8 - Disconnect the pipes (10), (11) and (12) from the valve assembly (9).



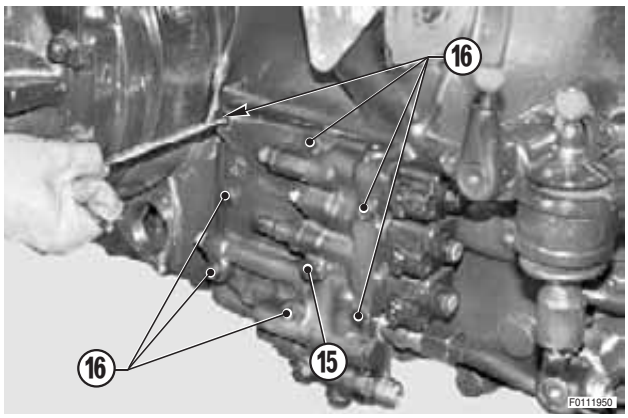
9 - Remove the unions (13) and remove pipes (11) and (12).
★ Renew the copper washers on reassembly.
※ 2



10 - Remove the union (14) and remove the pipe (10).
※ 2

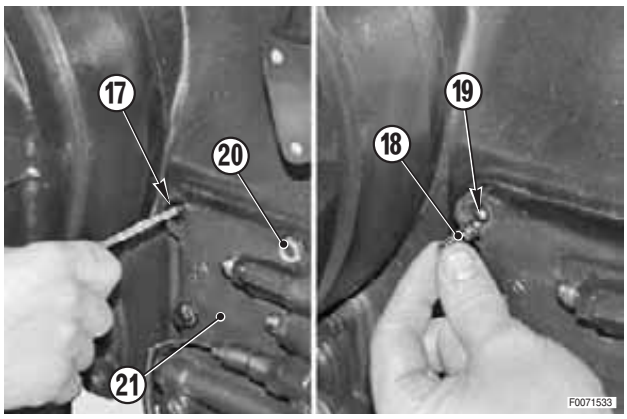


11 - Remove the plug (15) then remove the screws (16).
※ 3
★ Renew the copper washers on reassembly.



12 - Remove the plug (17) and recover the spring (18) and the ball (19).

13 - Remove the screw (20) and remove the complete valve assembly (21). ※ 4



Refitting

- Refitting is the reverse of removal.

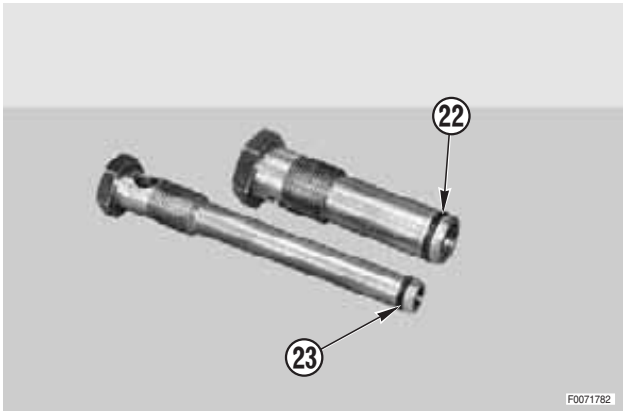
※ 1

★ Fill the transmission with the required quantity of oil.

Transmission oil: approx. 45 l (12 US.gall.)

※ 2

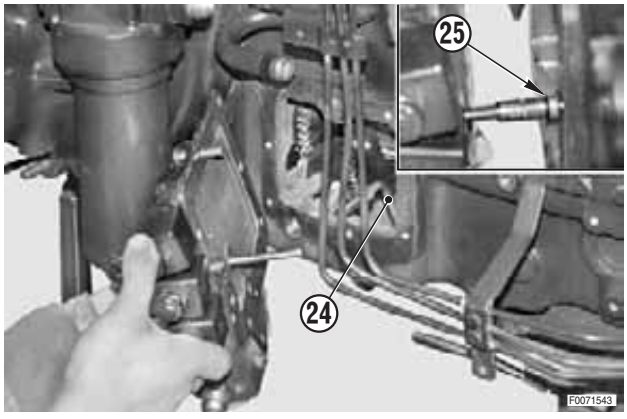
★ Check the condition of the O-rings (22) and (23) and renew them if necessary.



※ 3

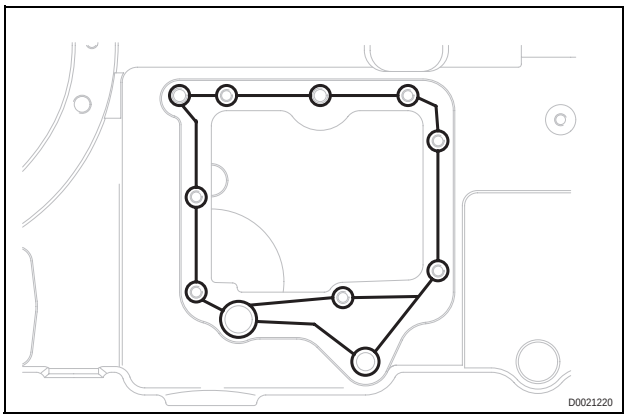
★ Use a long screw to guide the 4WD engagement control pipe (24).

★ Examine the O-ring (25) and renew it if necessary.



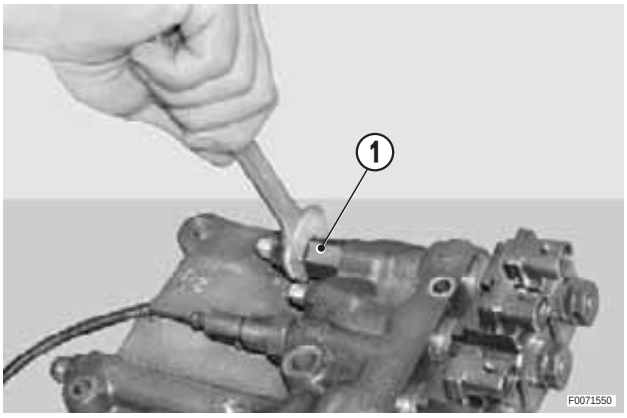
※ 4

Mating face: Loctite 510

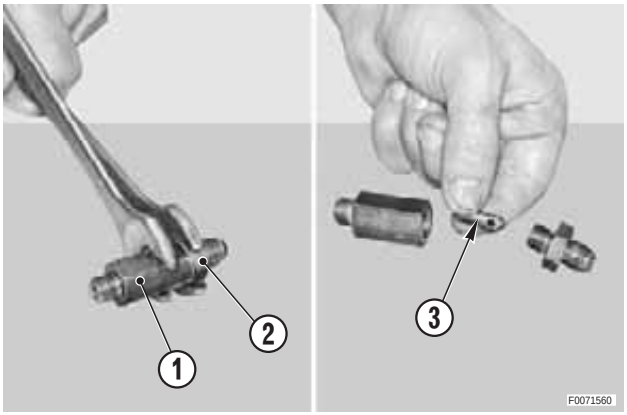


Disassembly

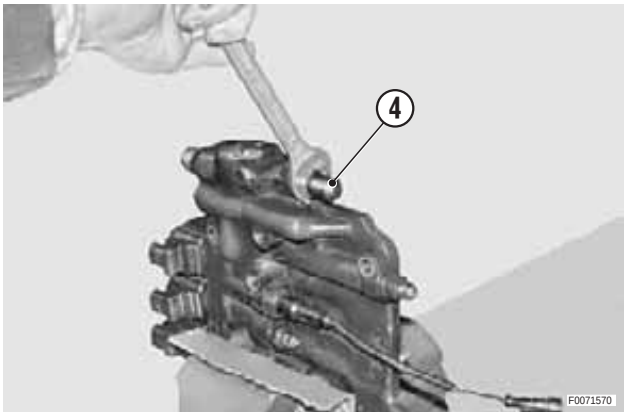
1 - Remove the complete valve assembly (1).
★ Renew the copper washers on reassembly.
※ 1



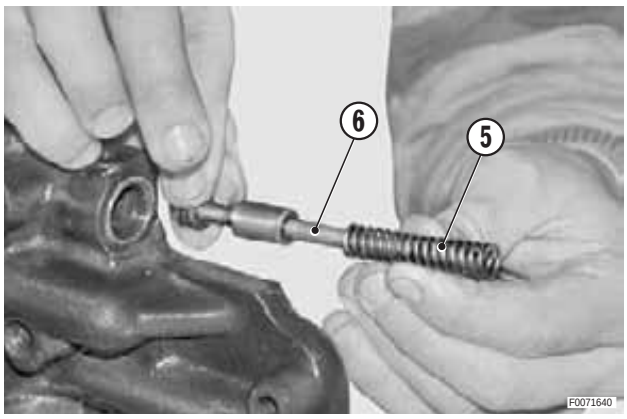
2 Remove the union (2) and withdraw the choke (3) from the valve (1).
※ 1
★ Renew the copper washers on reassembly.
★ Note which way round the choke is installed.



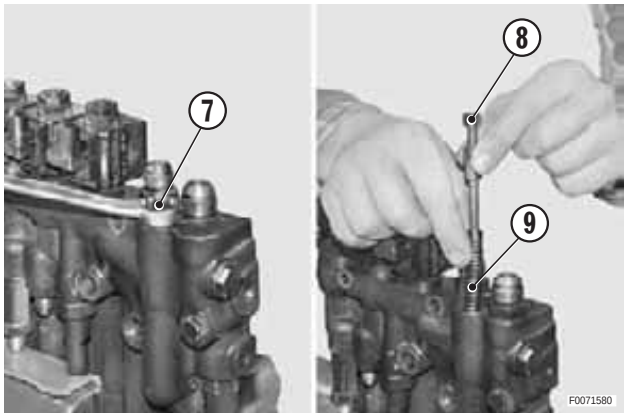
3 - Remove the plug (4).
★ Renew the copper washers on reassembly.



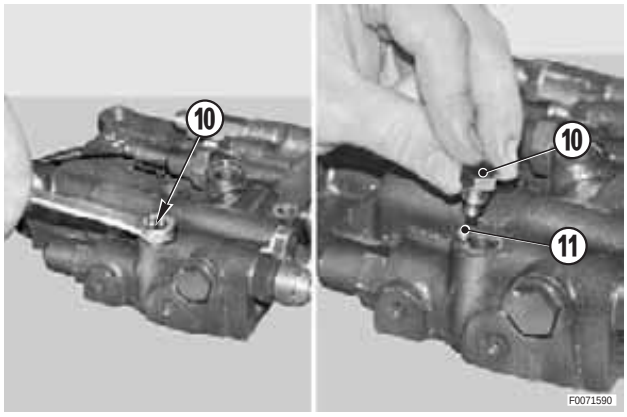
4 - Remove the spring (5) and the spool (6).



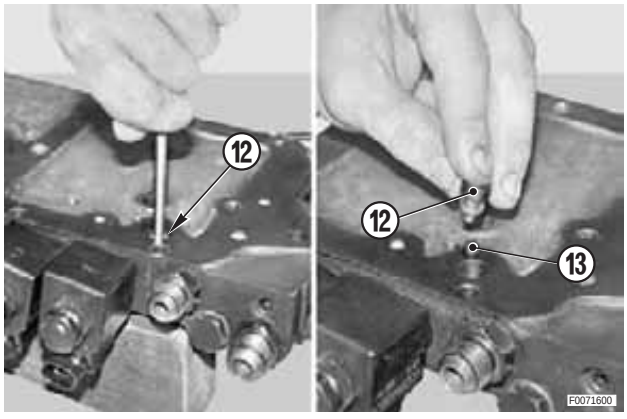
5 - Remove the plug (7) and withdraw the spool (8) and the spring (9).
★ Renew the copper washers on reassembly.



6 - Remove the plug (10) and withdraw the sphere (11).
★ Renew the copper washers on reassembly.

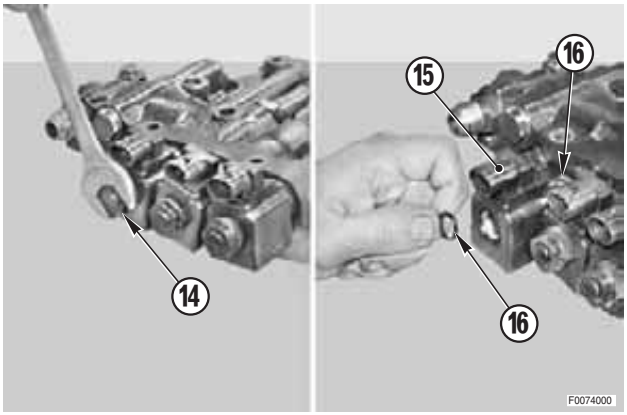


7 - Remove the plug (12) and extract the ball (13).
⁘ 1

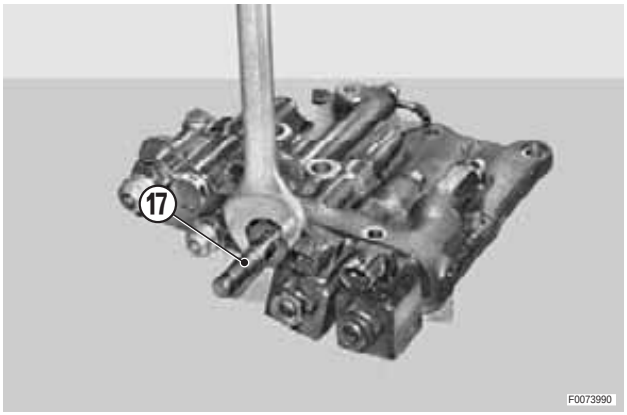


• *Only if necessary*

8 - Remove the nut (14) and remove the coil (15).
★ Recover the O-ring (16).



9 Remove the spindle (17). ※ 2
★ Renew the O-rings on reassembly.



Assembly

• Assembly is the reverse of disassembly.

※ 1

Valve and plugs: Loctite 542

※ 2

Nm Nut: 5÷8 Nm (3.7–5.9 lb.ft.)

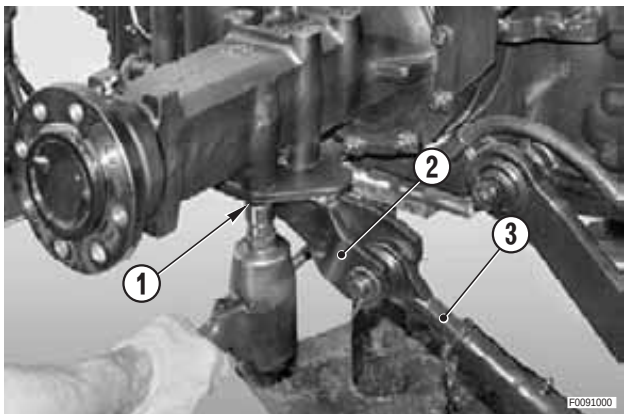
Nm Valve stem: 15÷20 Nm (11–14.7 lb.ft.)

3-POINT LINKAGE

Removal

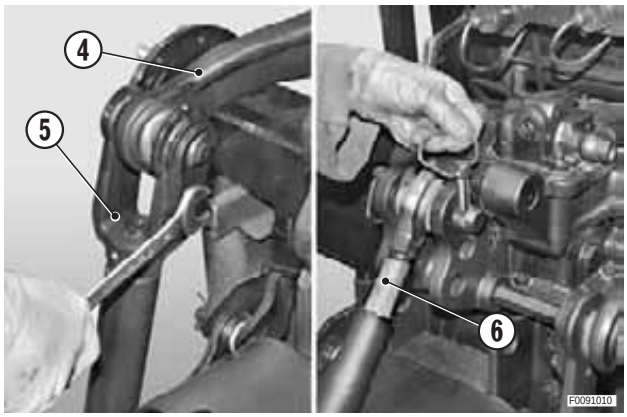
1 - Remove the rear wheels.
(For details, see "WHEELS").

2 - Remove the screws (1) and remove the bracket (2) complete with rod (3).



3 - Disconnect the lift rods (5) from the lift arms (4).

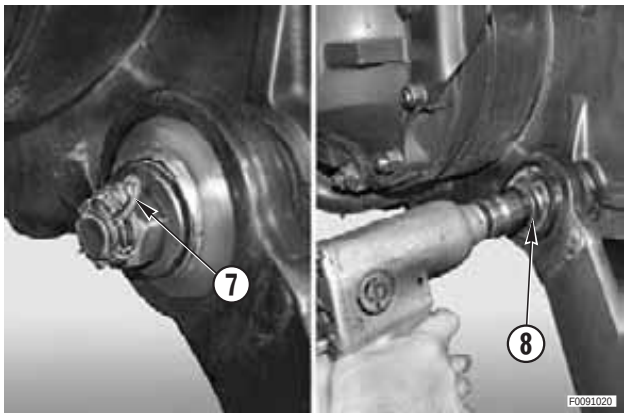
4 - Remove the rod (6).



5 - Remove the cotter pin (7) and remove the nut (8).

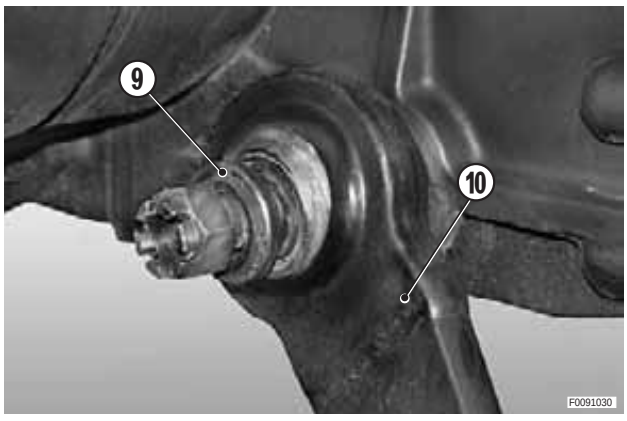
⁘ 1

★ Always renew the cotter pin on reassembly.



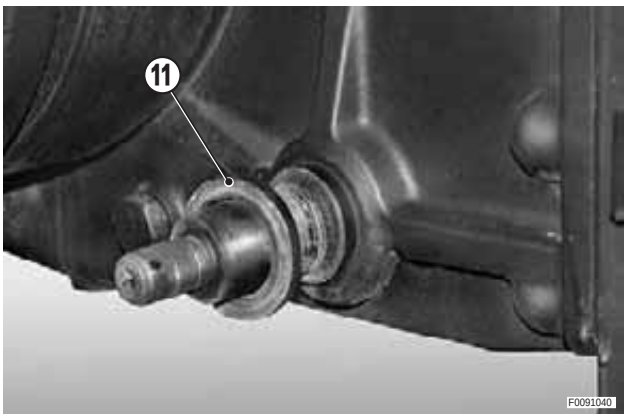
6 - Remove the washer (9) and the lever (10).

⁘ 2



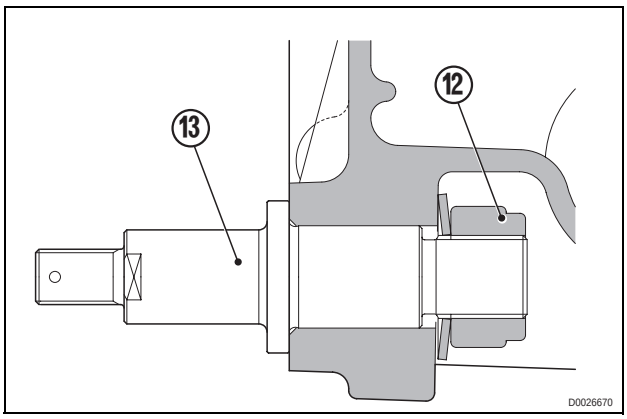
7 - Remove the washer (11). ※ 2

8 - Repeat the procedure on the opposite side.



• *Only if necessary*

9 - Loosen the nut (12) and remove the pin (13). ※ 3



Refitting

• Refitting is the reverse of removal.

※ 1

Nm Nut: 200÷250 Nm (147.4–184.3 lb.ft.)

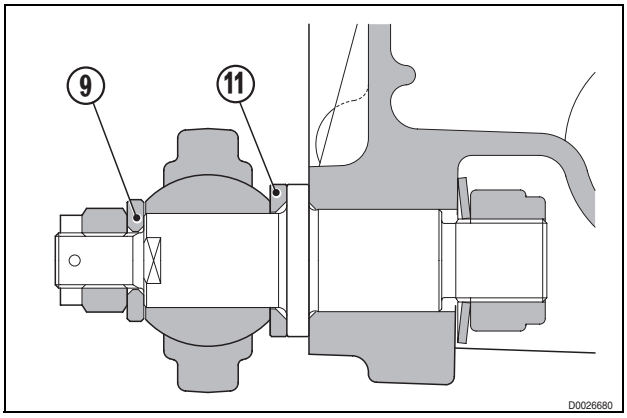
Nut: Loctite 242

※ 2

★ Check that the washers (11) and (13) are installed the right way round.

※ 3

Nm Nut: 350÷430 Nm (258–317 lb.ft.)

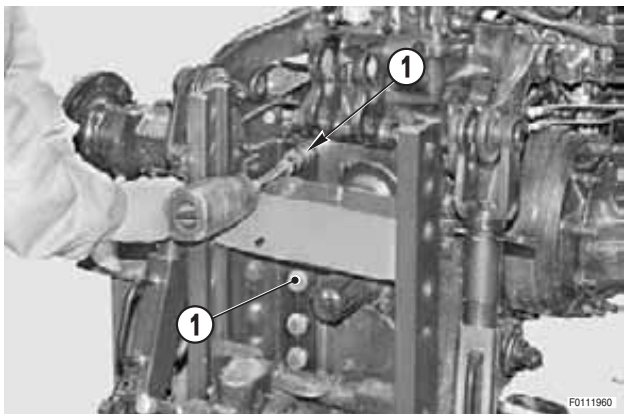


TOWING HITCH

Removal

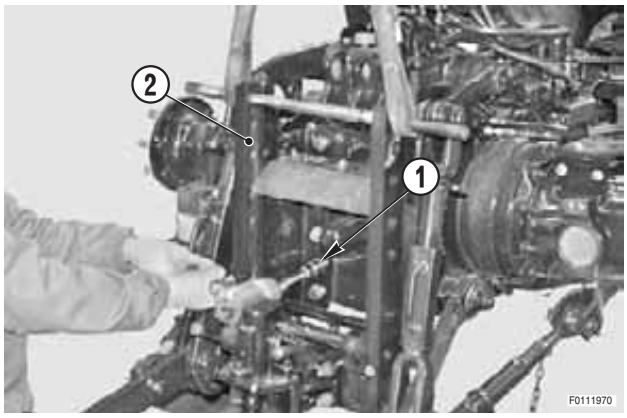
1 - Unscrew all the bolts (1), but leave two in position.

※ 1



2 - Sling the towing hitch (2) to hoist and take up the slack in lifting ropes.

3 - Remove the last two bolts (1) and remove the complete towing hitch.



Refitting

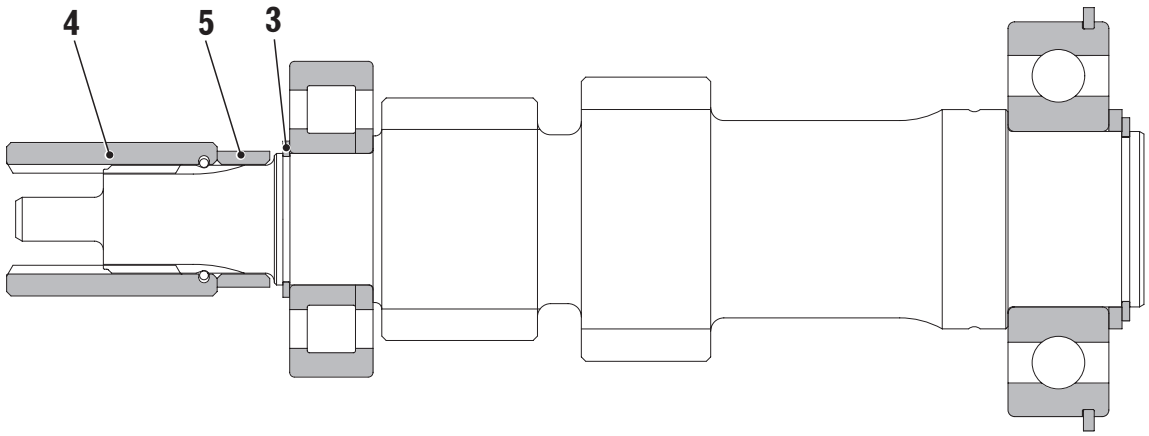
- Refitting is the reverse of removal.

※ 1

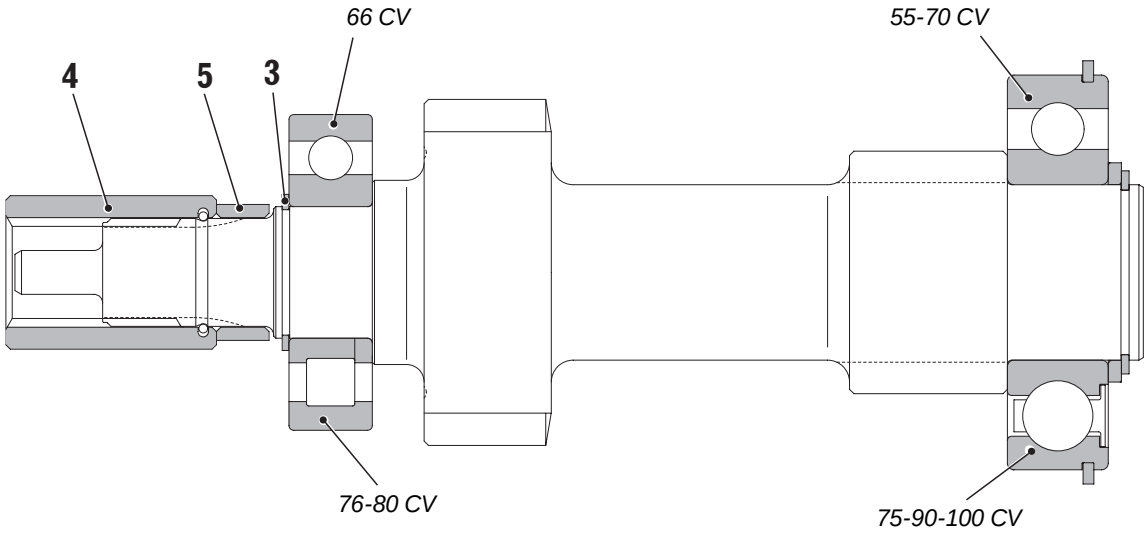
Nm Bolts: 173±8 Nm (127.5±5.9 lb.ft.)

REAR PTO
PTO INPUT SHAFT

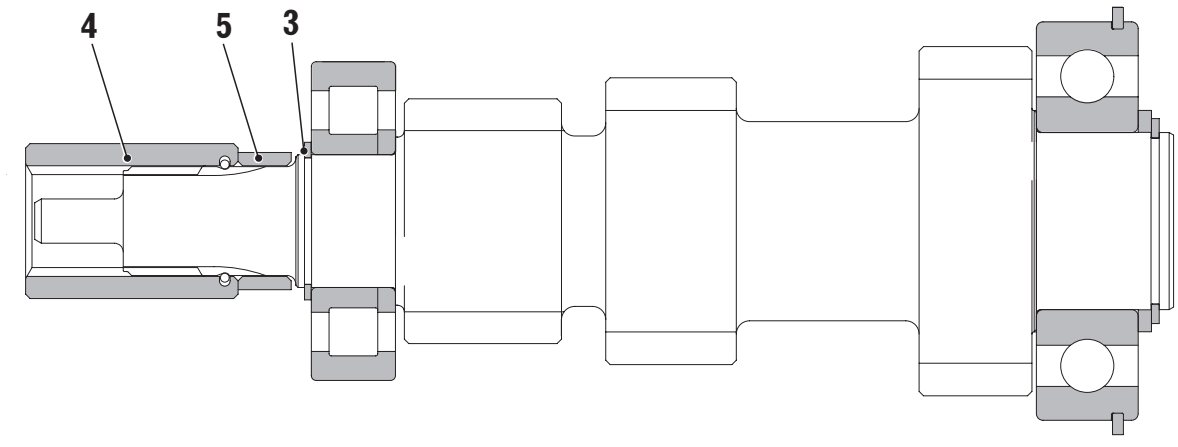
2-SPEED + GROUNDSPEED VERSION



2-SPEED VERSION



3-SPEED VERSION



Removal

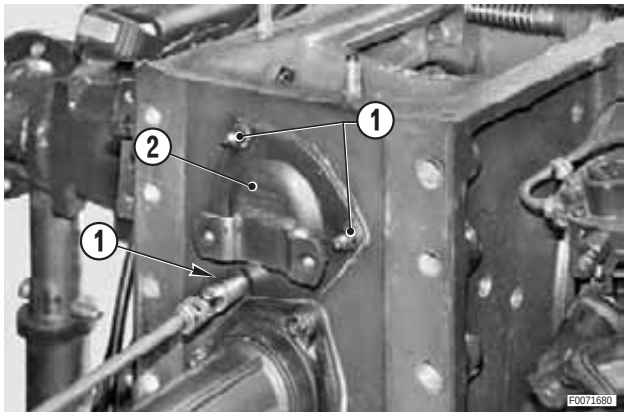
1 - Remove the platform. (For details, see “CAB”).

2 - Remove the towing hitch. (For details, see "TOWING HITCH").

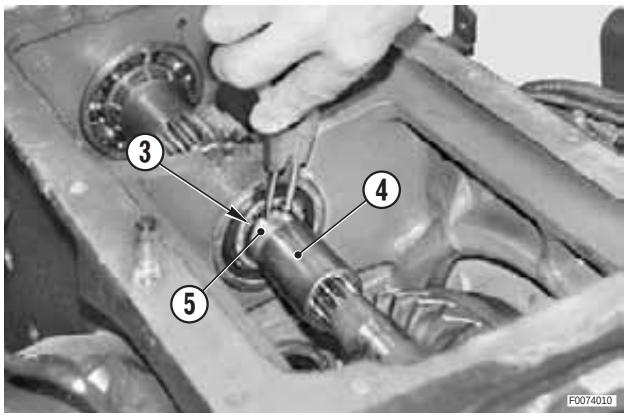
3 - Remove the complete lift assembly. (For details,see "LIFT (VERSION WITH MECHANICAL GOVERNOR)").

4 - Remove the nuts (1) and remove the cover (2).

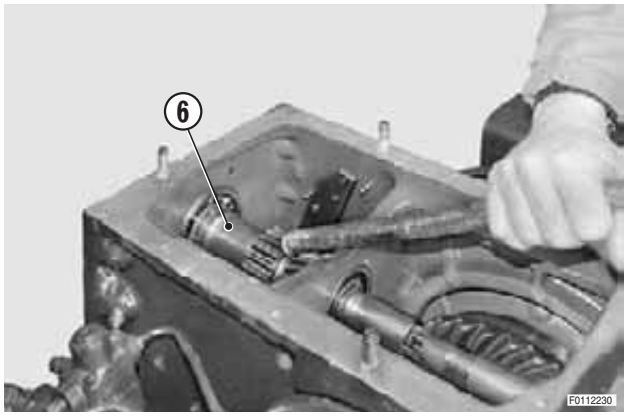
※ 1



5 - Move the circlip (3), the sleeve (4) and the spacer (5) towards the front of the transmission.



6 - Using a soft metal punch and mallet, drive out the PTO input shaft (6).

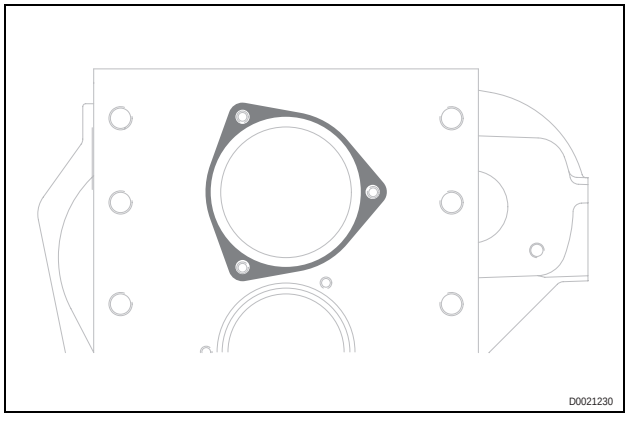


Refitting

- Refitting is the reverse of removal.

※ 1

Mating face: Silastic 738



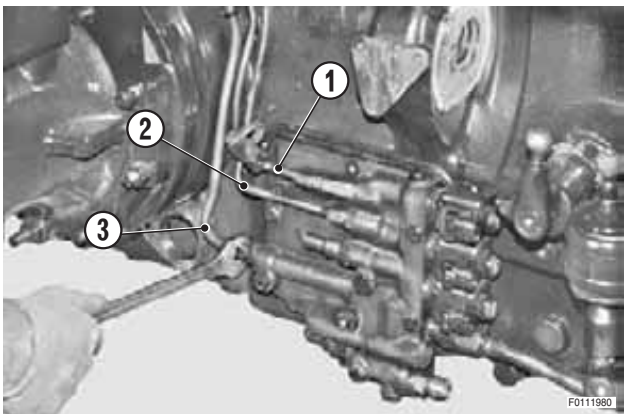
PTO CLUTCH

Removal

1 - Remove the PTO input shaft. (For details, see "PTO INPUT SHAFT" in this chapter).

2 - Disconnect the pipes (2) and (3) from the service valve assembly (1).

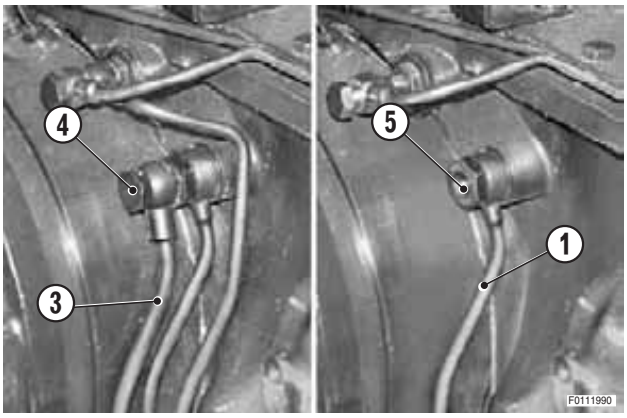
★ Plug the holes to prevent the entry of impurities.



3 - Remove the unions (4) and (5) and remove the pipes (1) and (3).

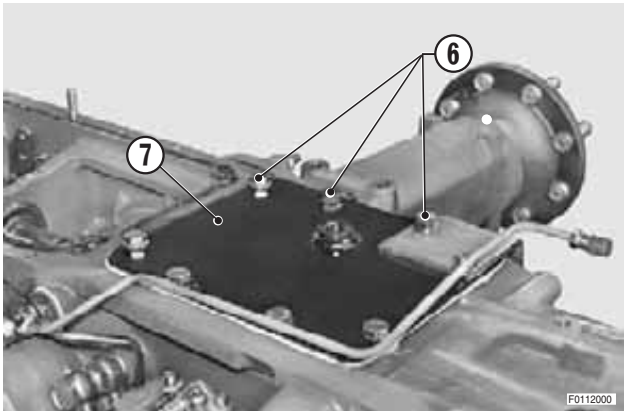
※ 1

★ Renew the copper washers on reassembly.



4 - Remove the screws (6) and remove the cover (7).

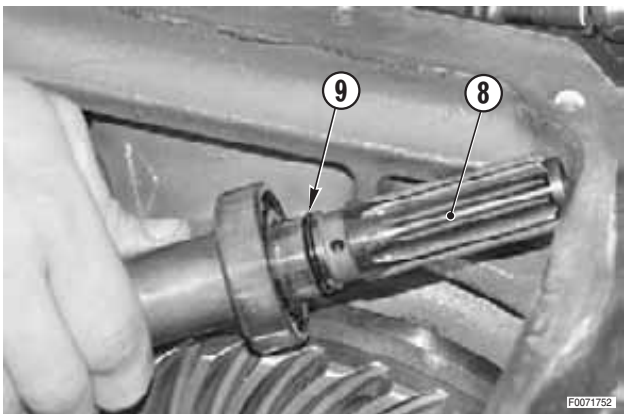
※ 2



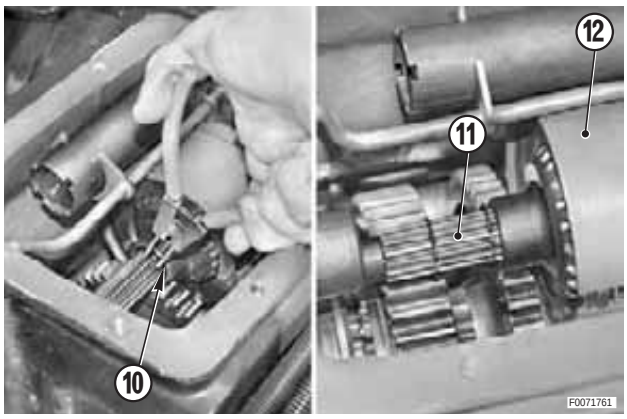
5 - Remove PTO drive shaft (8).

★ Check the condition of the O-ring (9).

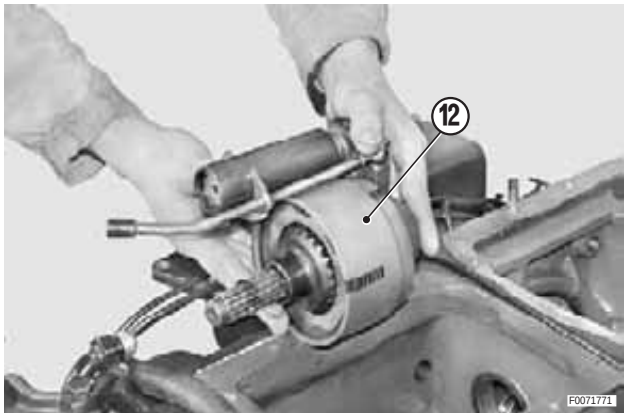
※ 3



6 - Move the circlip (10) towards the front of the tractor and insert the shaft (11) in the clutch assembly (12).



7 - Remove the complete clutch assembly (12).

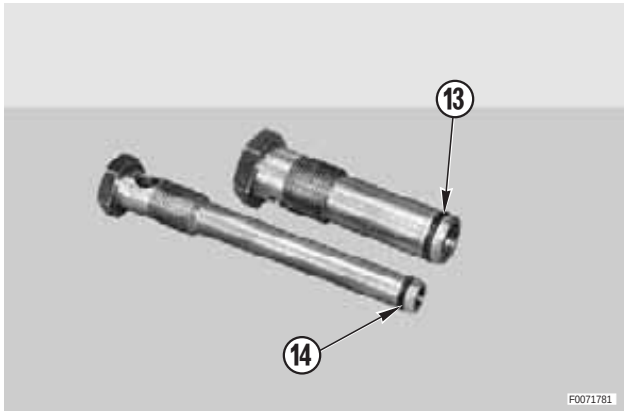


Refitting

- Refitting is the reverse of removal.

※ 1

★ Check the condition of the O-rings (13) and (14) and renew them if necessary.

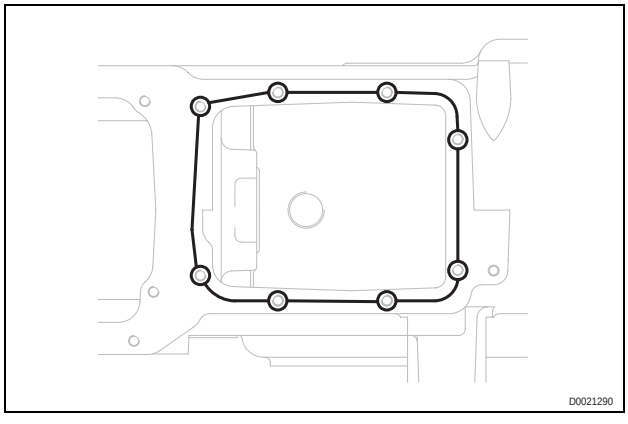


※ 2

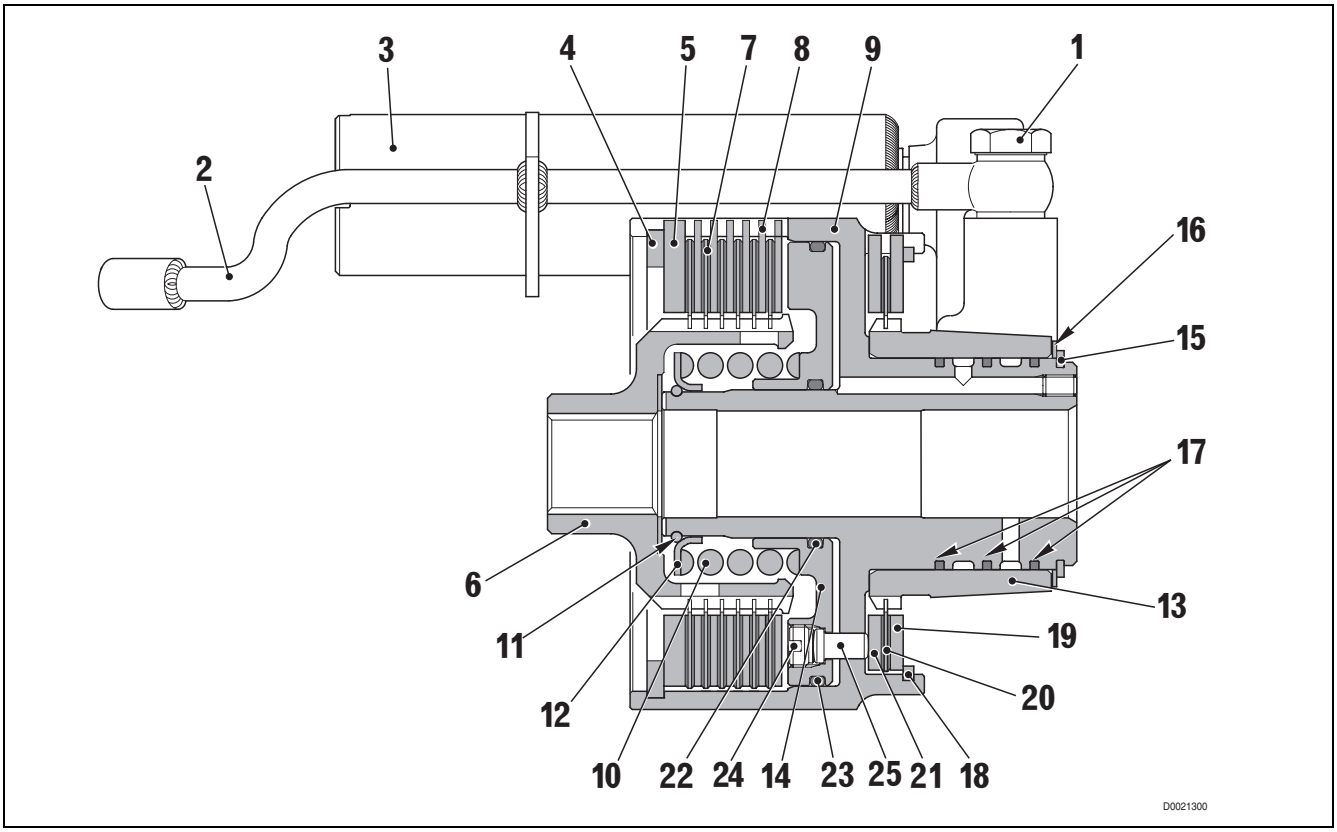
Surfaces: Silastic 738

※ 3

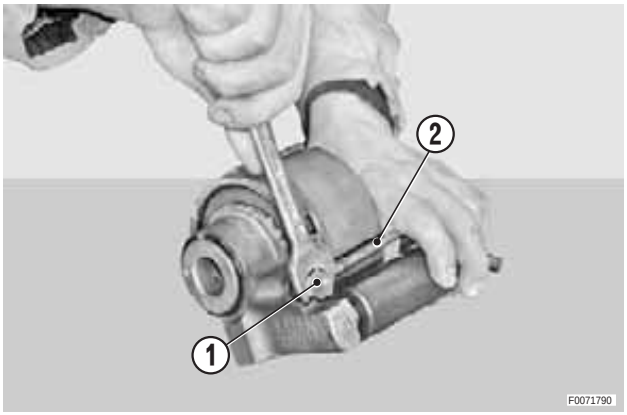
O-ring: oil



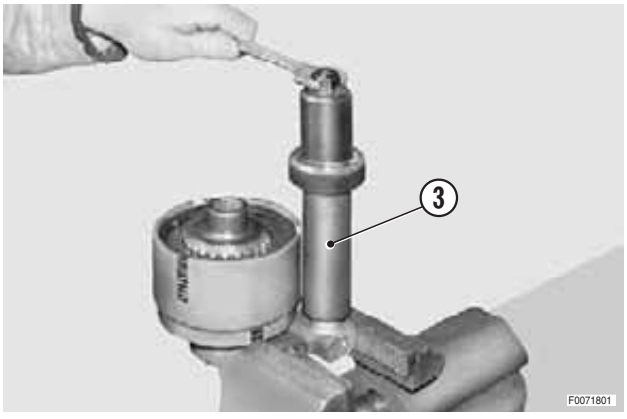
Disassembly



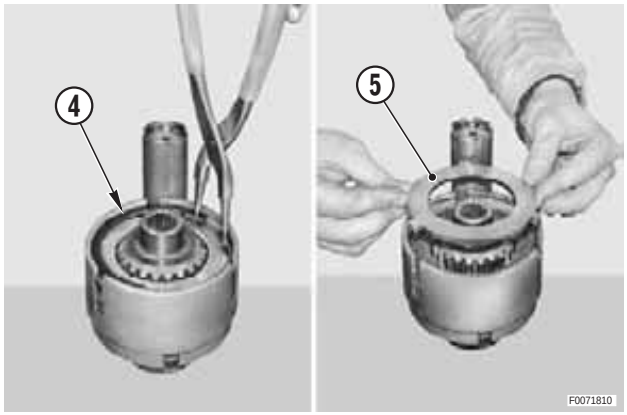
1 - Remove the union (1) and remove the pipe (2).
★ Renew the copper washers on reassembly.



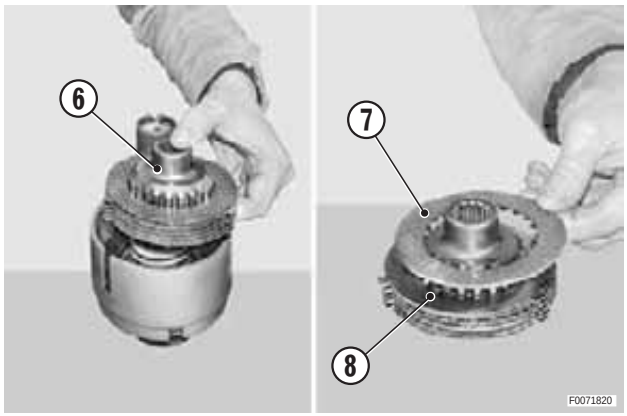
2 - Using a suitable wrench, remove the accumulator (3).
★ Renew the copper washers on reassembly.



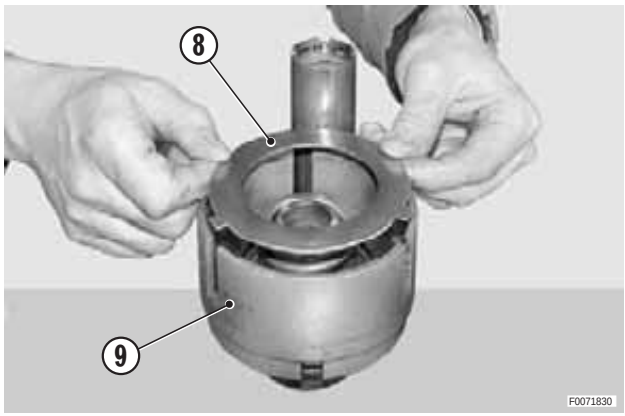
3 - Remove the circlip (4) and remove the steel plate (5).



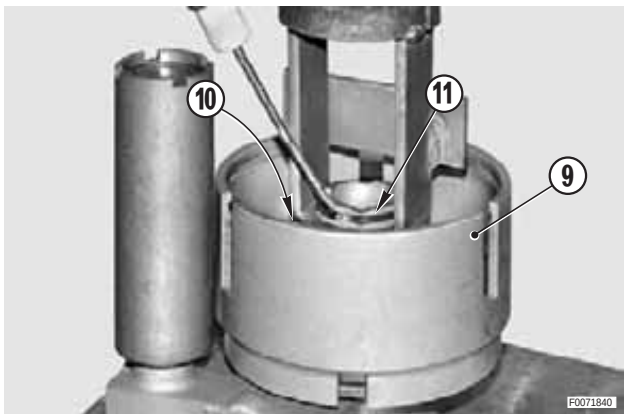
4 - Remove the complete sleeve assembly (6).
5 - Remove the friction plates (7) and steel plates (8) from the sleeve (6). ⁘ 1



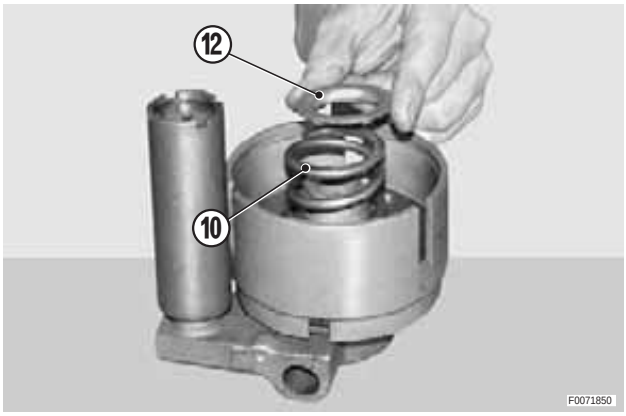
6 - Remove the last steel plate (8) from the clutch housing (9).



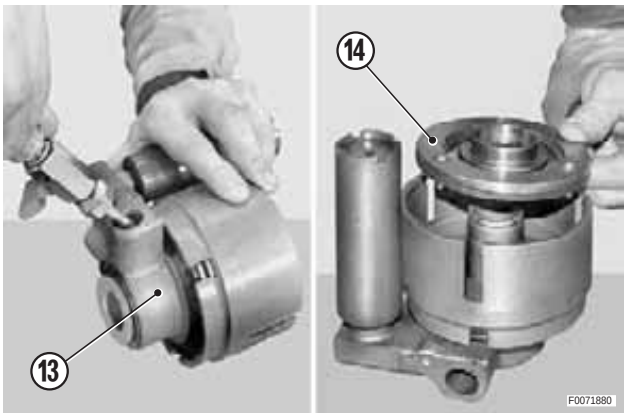
7 - Position the clutch housing under a press (9) and, using a suitable tool, slightly compress the spring (10) and remove the retaining ring (11).



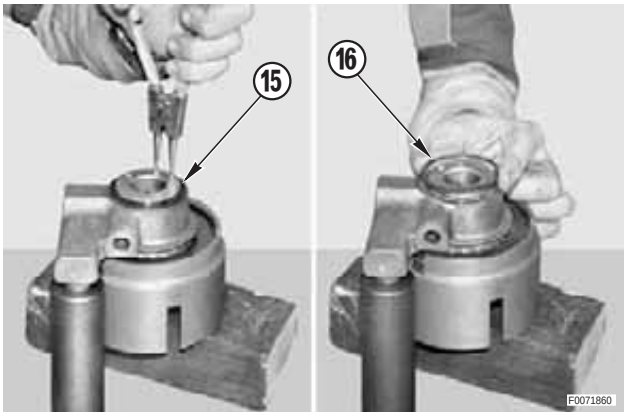
8 - Remove the disc (12) and the spring (10).



9 - Blow compressed air at low pressure through the hole in the side of the clutch housing (13) to expel the piston (14).



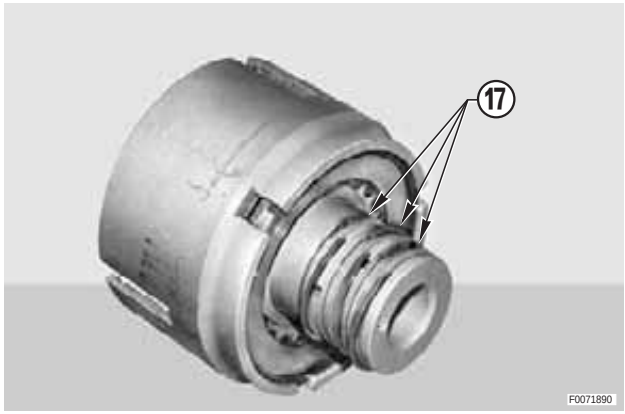
10 - Remove the circlip (15) and remove theshim (16).



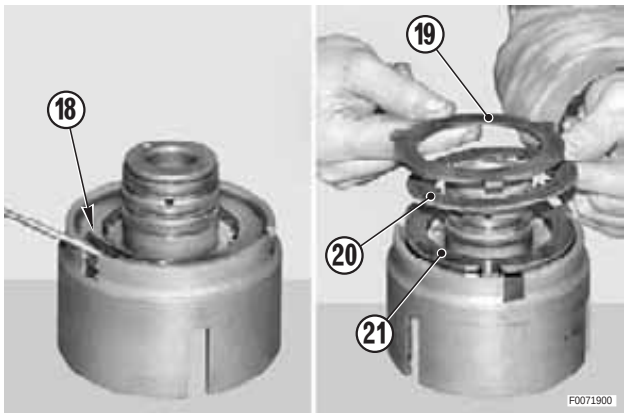
11 - Remove the clutch assembly (13) from the clutch housing (9).



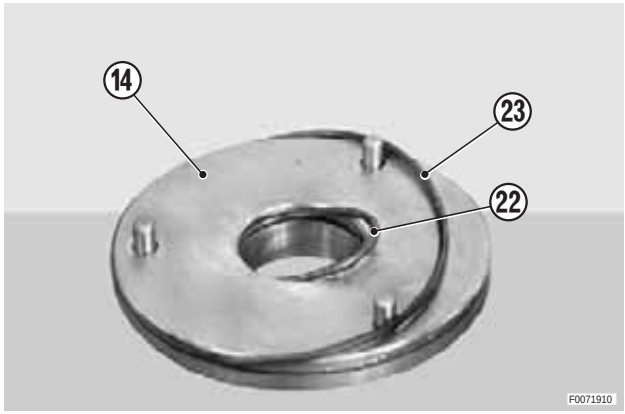
12 - Remove the oil seals (17). ⁘ 2



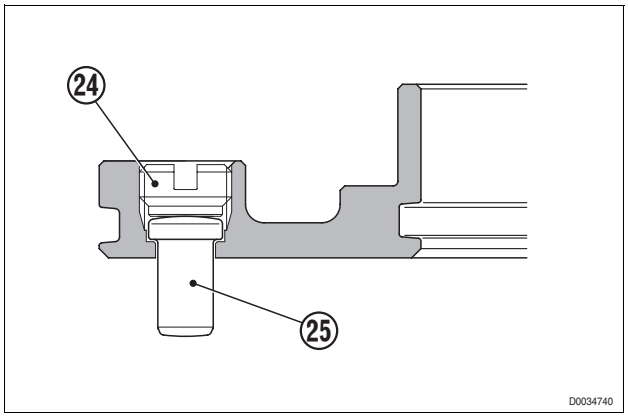
13 - Remove the circlip (18) and remove the steel plate (19), friction plate (20) and steel plate (21). ⁘ 3



14 - Remove the O-rings (22) and (23) from the piston (14). ⁘ 4



15 - Remove the grub screws (24) and remove the pins (25).



Assembly

- To assemble, follow the disassembly steps in reverse order.

※ 1

Friction plates: oil

※ 2

Oil seals: oil

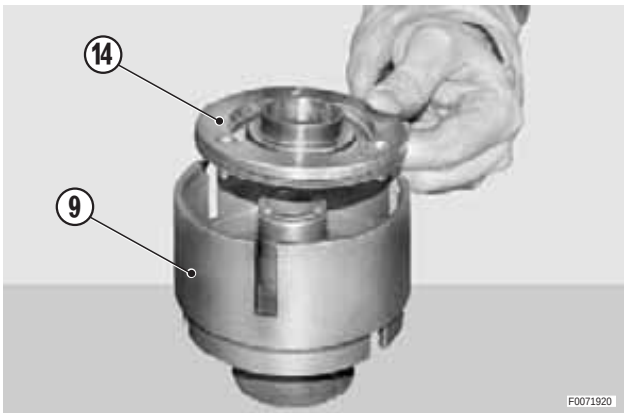
※ 3

Friction disc: oil

※ 4

★ At this point, install the piston (14) in the clutch housing (9).

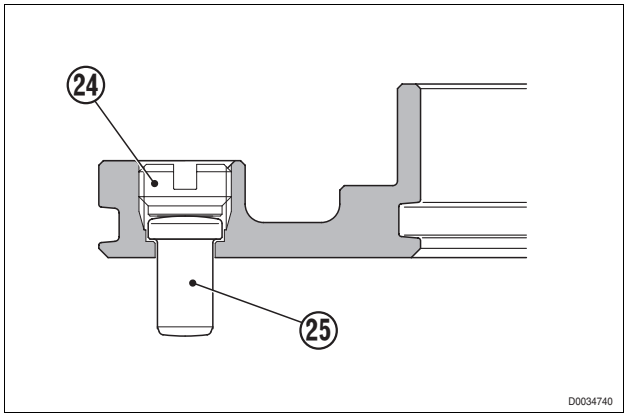
O-ring: oil



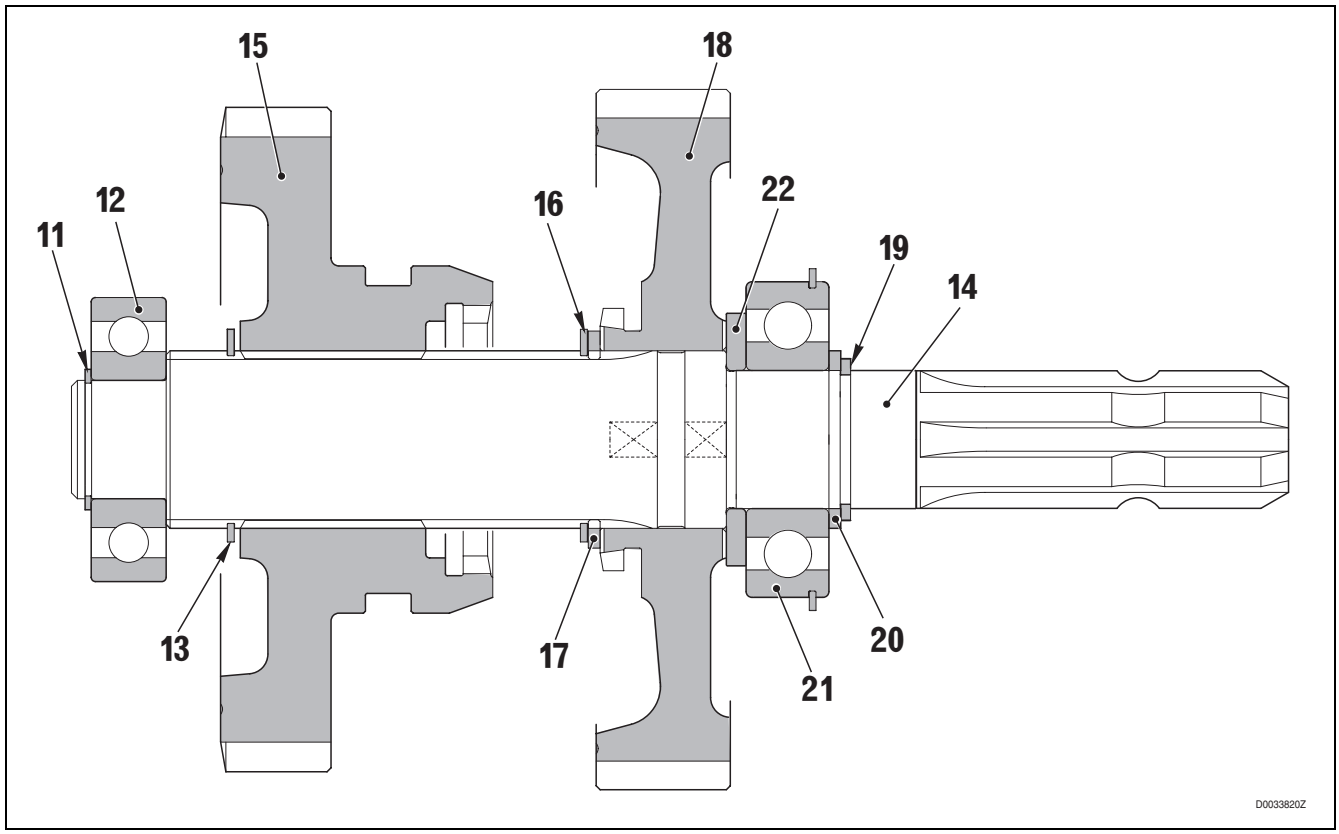
※ 5

★ Fit the pins (25) and tighten the screws (24), then back off the screws (24) a 1/4 turn (90°) to obtain play of 0.25 mm.

Locating dowels: Loctite 542



PTO OUTPUT SHAFT
(2-SPEED VERSION)

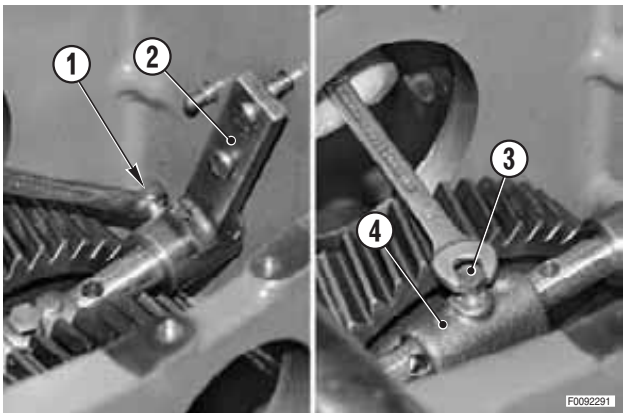


Removal

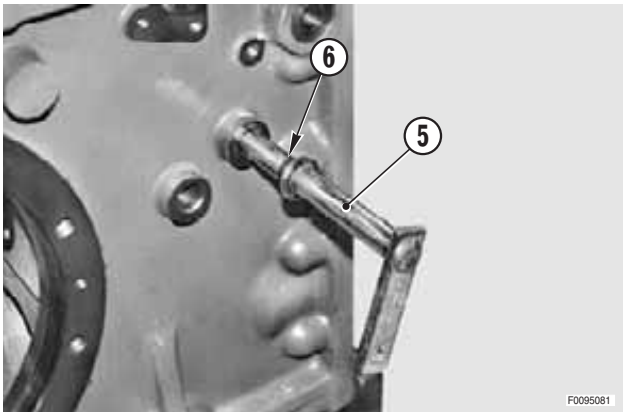
1 - Remove the PTO input shaft.
(For details, see "PTO INPUT SHAFT")

2 - Unscrew and remove the screw (1) from the lever (2).
※ 1

3 - Unscrew and remove the retaining screw (3) of the fork (4).
※ 1



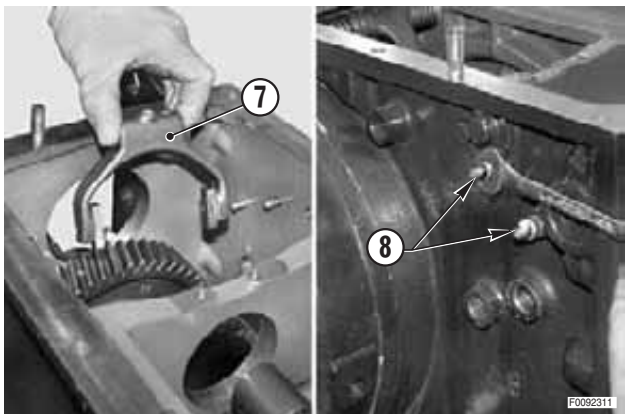
4 - Withdraw the shaft (5).
★ Renew the O-ring (6) on reassembly.



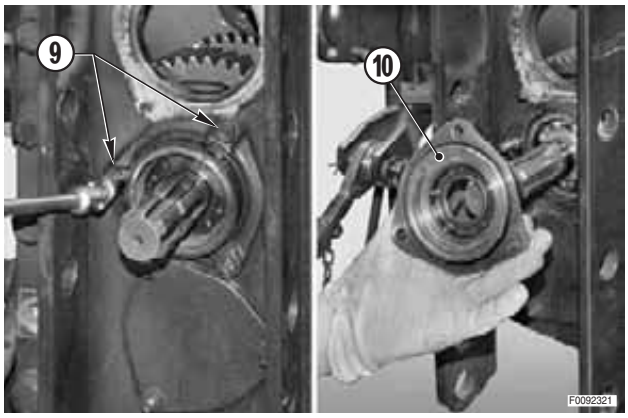
5 - Remove the fork (7) and microswitches (8).

※ 2

★ Renew the microswitch seals on reassembly.



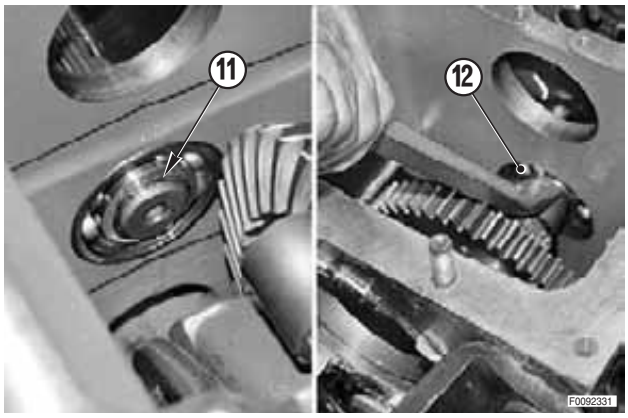
6 - Unscrew and remove the nuts (9) and remove the flange (10).



7 - Remove the circlip (11).

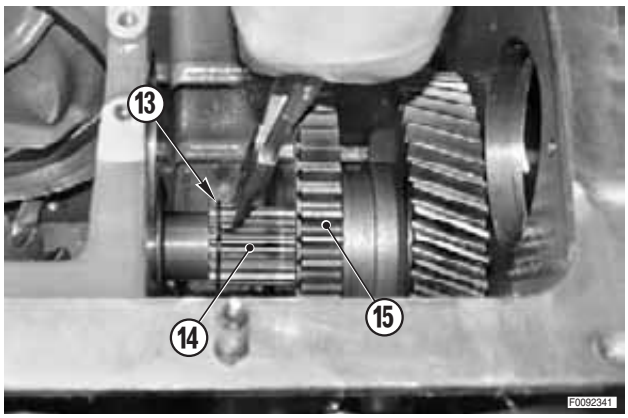
8 - Using a shaped drift, drive out the bearing (12).

★ Strike the inner race of the bearing.

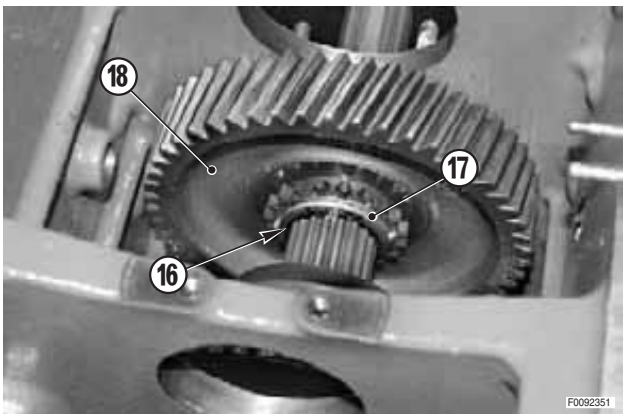


9 - Remove the circlip (13) and move it towards the end of the shaft (14).

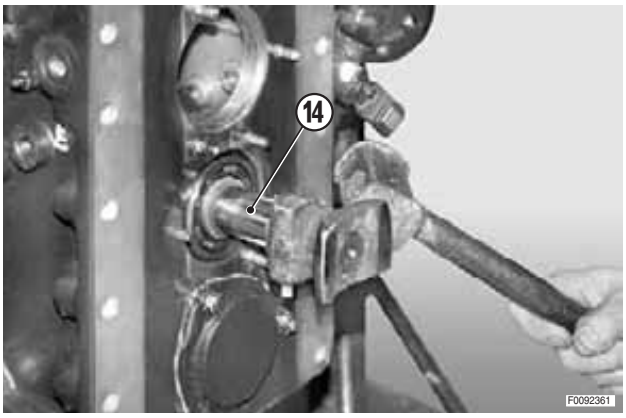
10 - Slide the gear (15) towards the front.



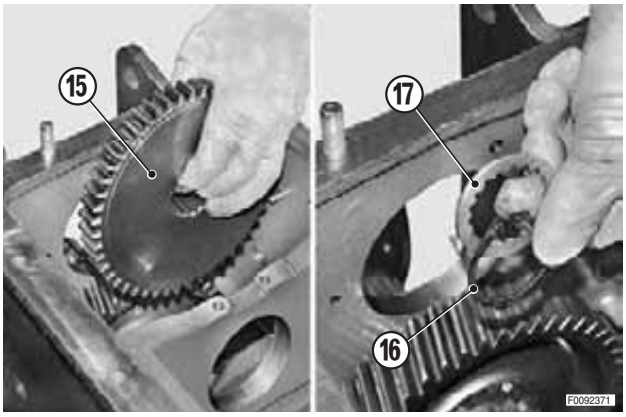
11 - Remove the circlip (16) and the spacer (17), moving it as far away as possible from the gear (18).



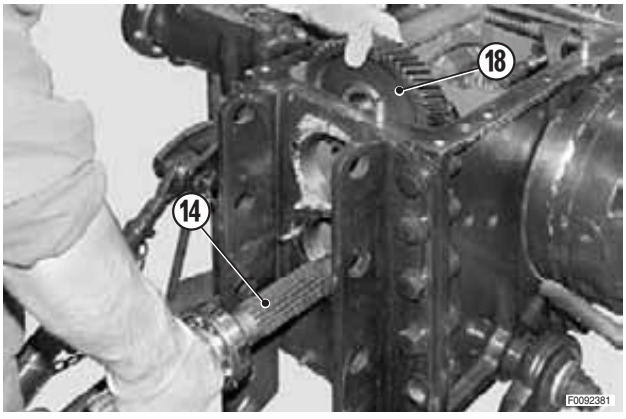
12 - Using a suitable tool, partially withdraw PTO output shaft (14).



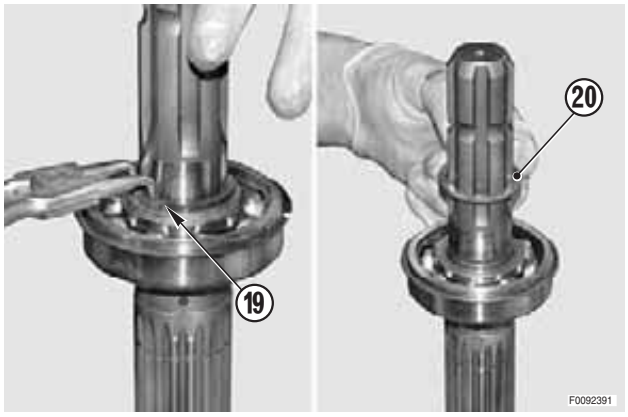
13 - Remove the gear (15), circlip (16) and the spacer (17).



14 - Remove the complete shaft (14) and the gear (18).

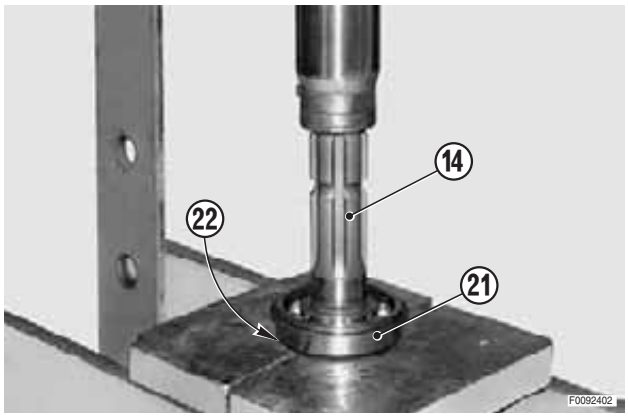


15 - Remove the circlip (19) and the spacer (20).



16 - Position the shaft (14) under a press and remove the bearing (21) and recover the spacer (22).

※ 3

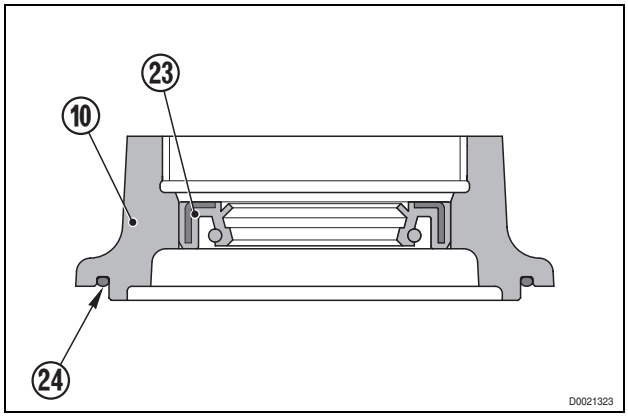


17 - Remove oil seal (10) from flange (23).

★ Note which way round the seal is fitted.

※ 4

18 - Carefully inspect the O-ring (24); renew it if it shows any signs of distortion.



Refitting

- Refitting is the reverse of removal.

※ 1

Bolt: Loctite 270

Nm Bolt: 25 Nm (18.4 lb.ft.)

※ 2

Nm Microswitches: 10 Nm (7.4 lb.ft.)

※ 3

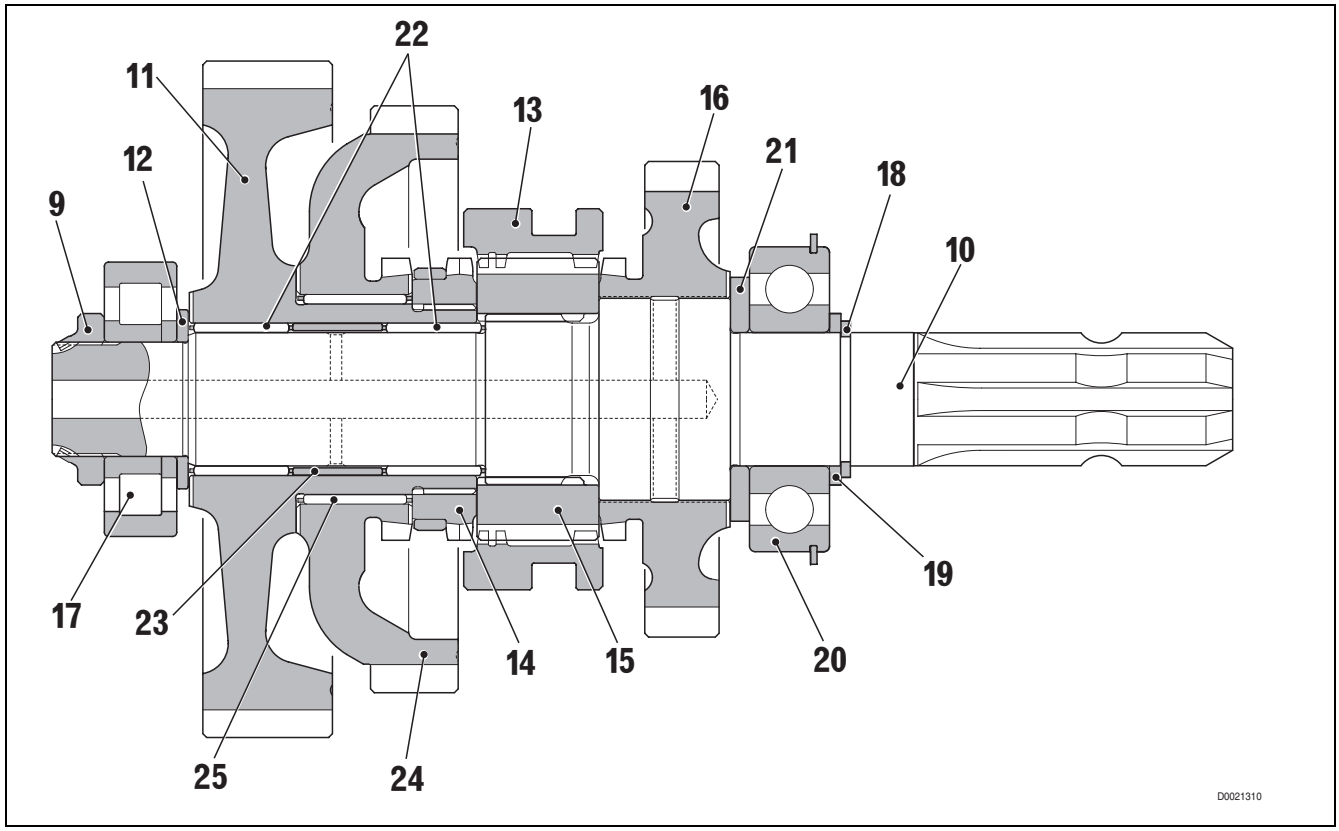
★ Bearing installation: heated (90÷100 °C)

※ 4

Outer ring and lips of seal: Grease NLGI 2

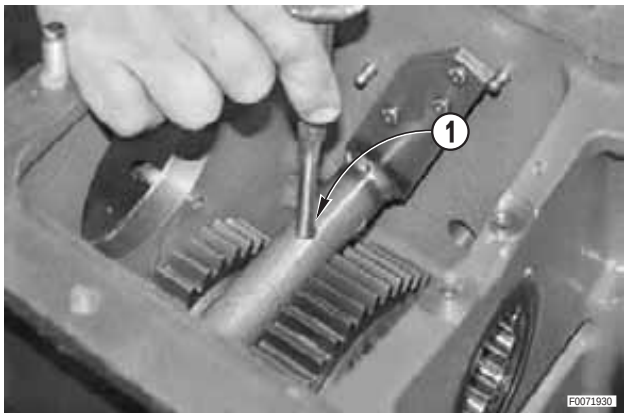
PTO OUTPUT SHAFT (2-SPEED + GROUNDSPEED VERSION AND 3-SPEED VERSION)

Disassembly

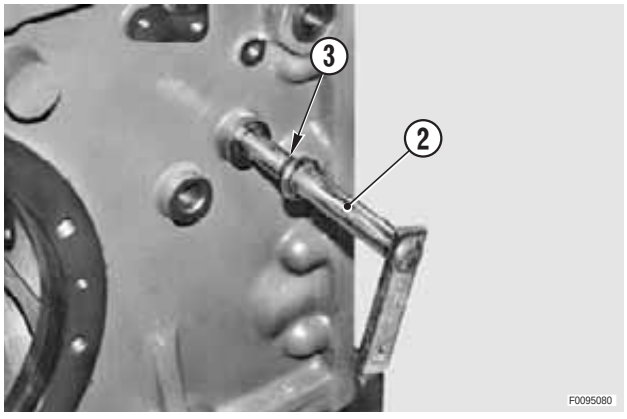


1 - Remove the PTO input shaft. (For details, see "PTO INPUT SHAFT" in this chapter).

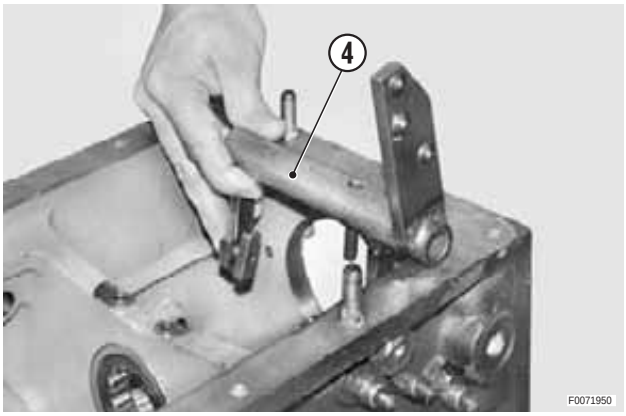
2 - Drive out the spring pin (1).



3 - Withdraw the shaft (2).
★ Renew the O-ring (3) on reassembly.

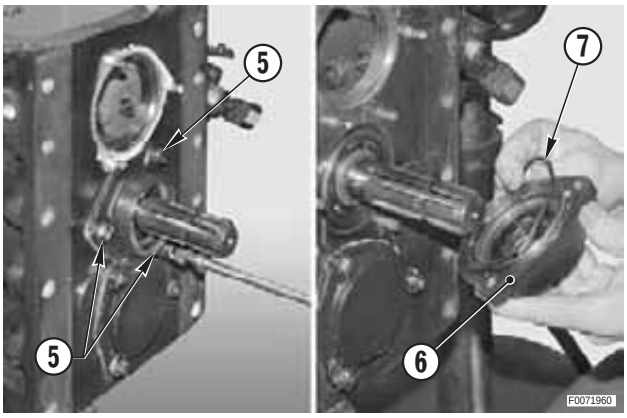


4 - Remove the PTO speed selector fork (4).



5 - Remove the nuts (5) and remove the cover (6).

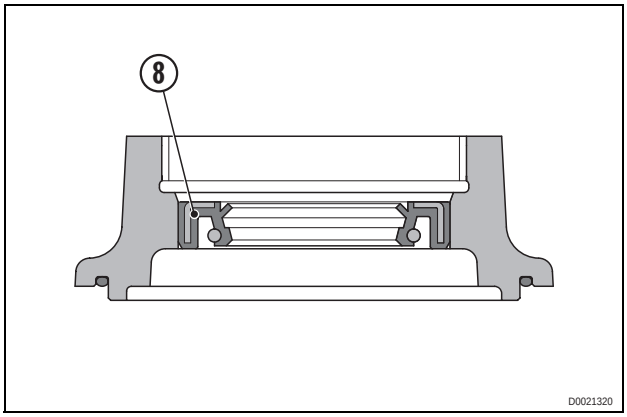
★ Recover the O-ring (7).



• *Only if necessary*

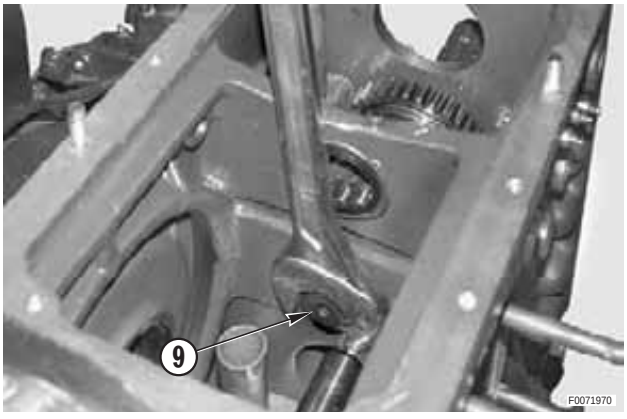
6 - Remove the oil seal (8).

★ Note which way round the oil seal is installed.

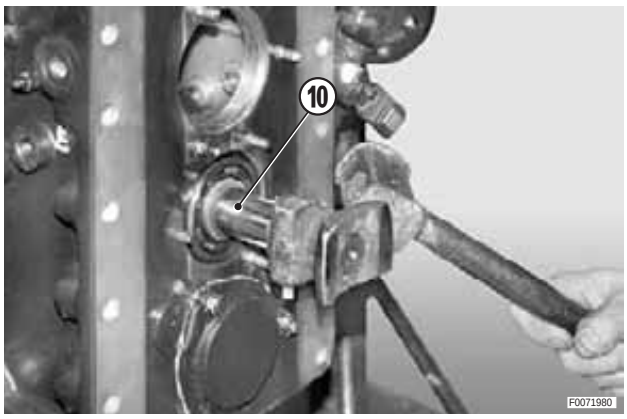


7 - Using a bar made of soft material to hold the shaft against rotation, remove the nut (9). ⁘ 1

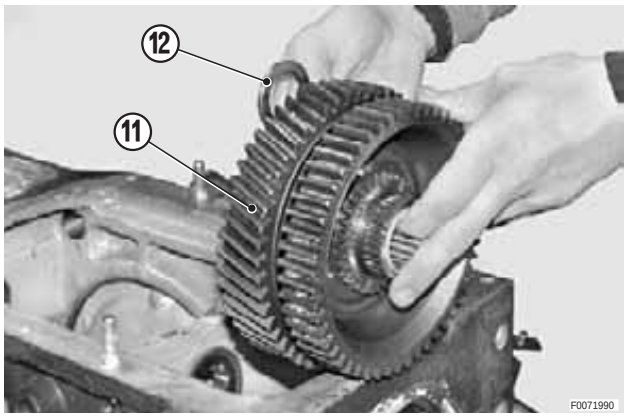
★ Fit a new nut on reassembly.



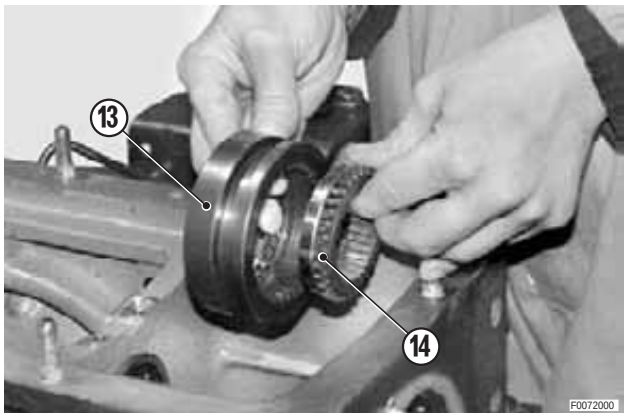
8 - Using suitable tool, partially withdraw the PTO output shaft (10).



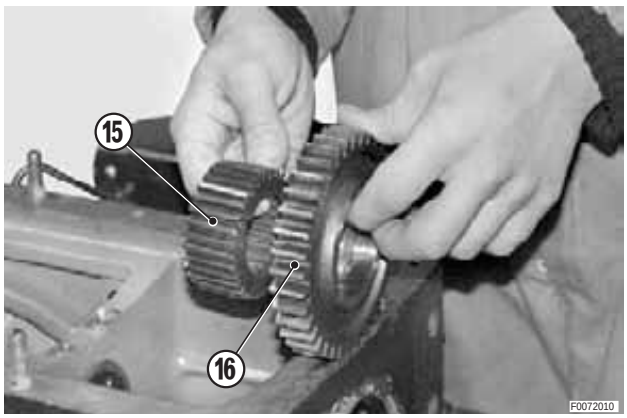
9 - Remove the gear cluster (11) and the spacer (12).



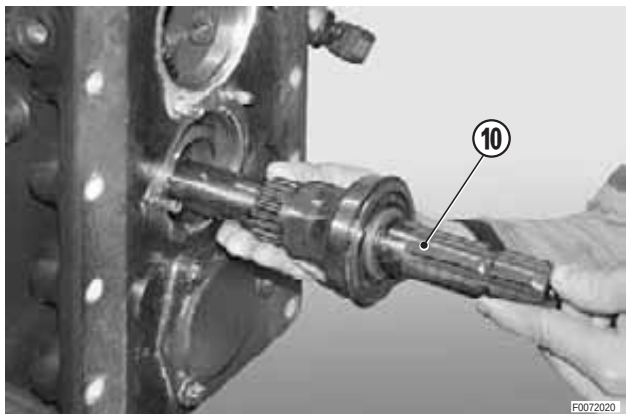
10 - Remove the selector sleeve (13) and the coupler (14).



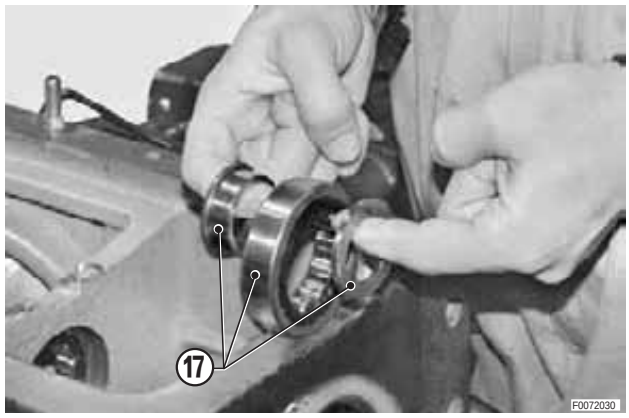
11 - Remove the sliding coupler (15) and the driven gear (16) of the Groundspeed PTO.



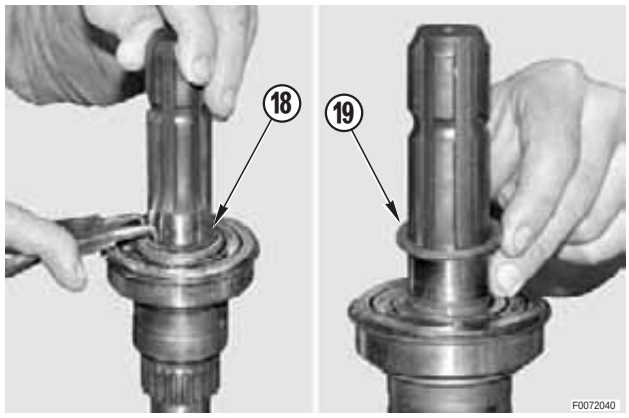
12 - Remove PTO output shaft (10).



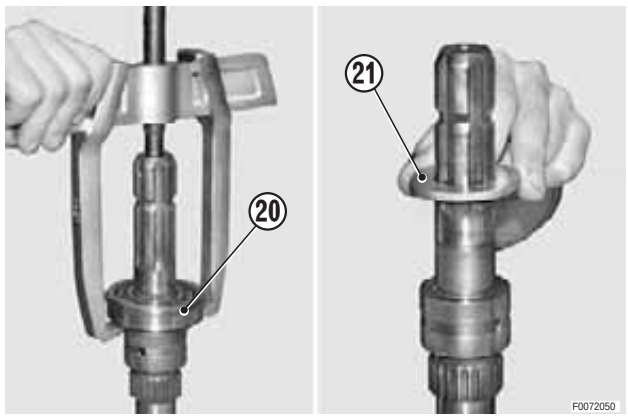
13 - Remove the complete bearing assembly (17) from the transmission.
★ Note which way round the inner ring of the bearing and the thrust plate are installed.



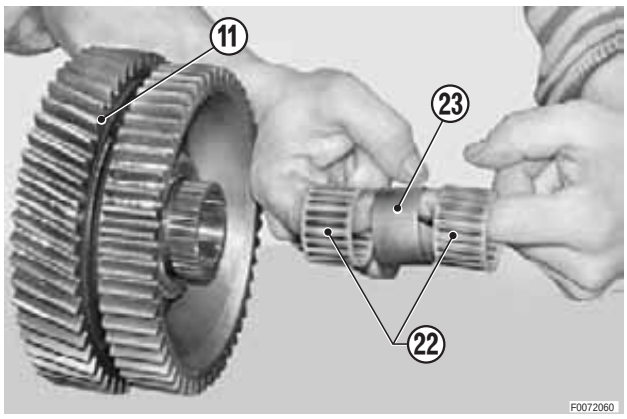
14 - Remove the circlip (18) and remove the spacer (19).



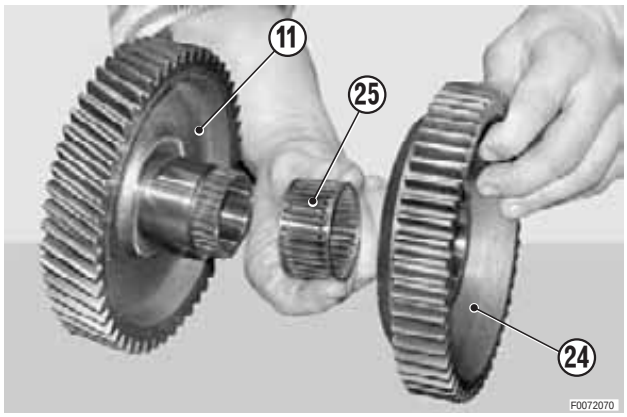
15 - Using a puller, remove the bearing (20) and remove the spacer (21).
★ Note the position of the thrust plate of the bearing.



16 - Withdraw the roller cages (22) and the spacer (23) from the gear cluster (11). ⁘ 2



17 - Separate the gear (24) from the gear cluster (11) and remove the roller cage (25). ⁘ 2



Assembly

- Refitting is the reverse of removal.

⁘ 1

Nm Nut: 78÷88 Nm (57.5–65 lb.ft.)

★ Stake the nut

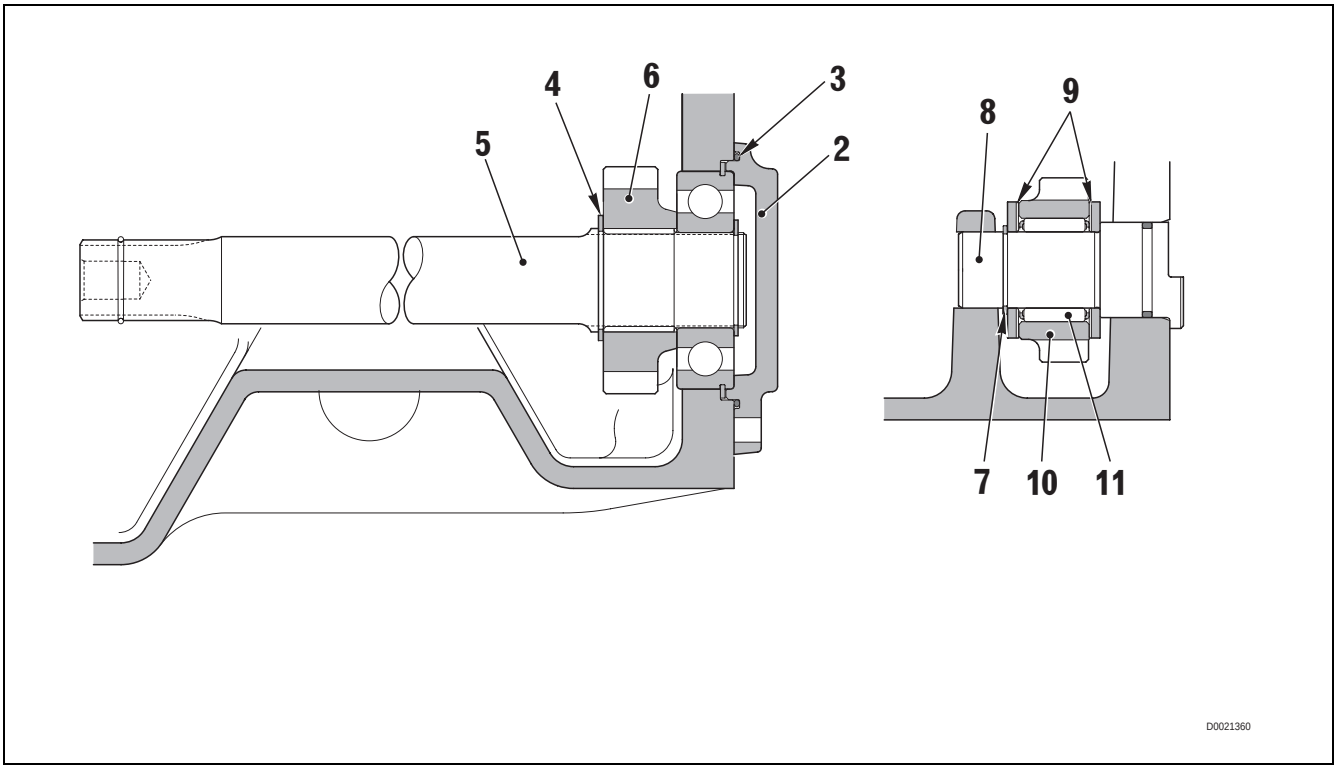
⁘ 2

Roller cage: oil



GROUND SPEED PTO DRIVE SHAFT

Disassembly

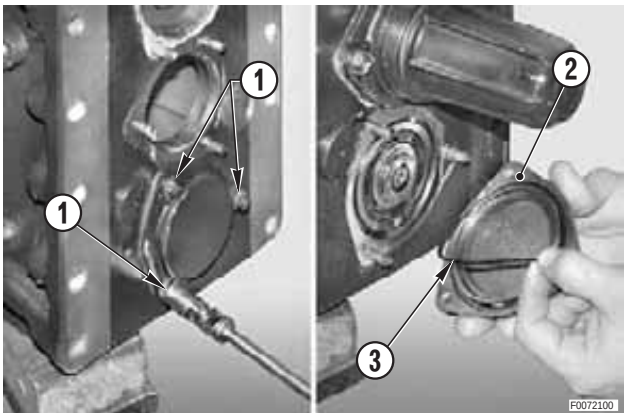


1 - Remove the PTO output shaft.
(For details, see “PTO OUTPUT SHAFT (2-SPEED + GROUND SPEED VERSION AND 3-SPEED VERSION”)

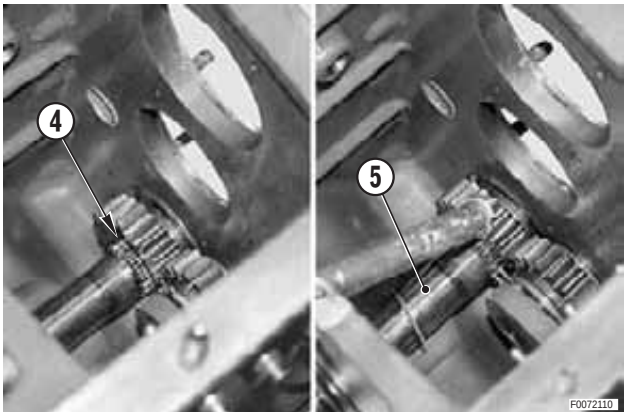
1 - Remove the nuts (2) and remove the cover (2).

※ 1

★ Recover the O-ring (3).

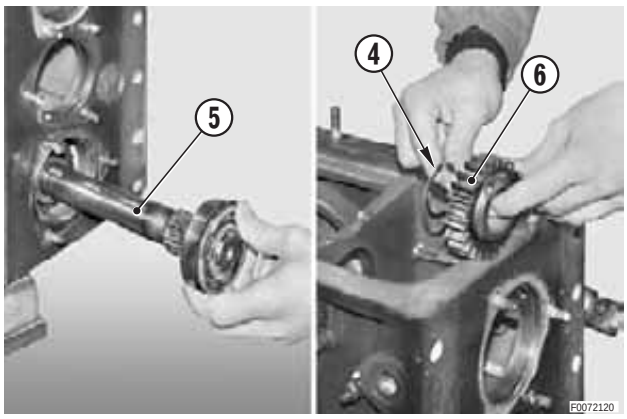


3 - Move the circlip (4) towards the front and, using a soft metal punch, drive out the shaft (5).

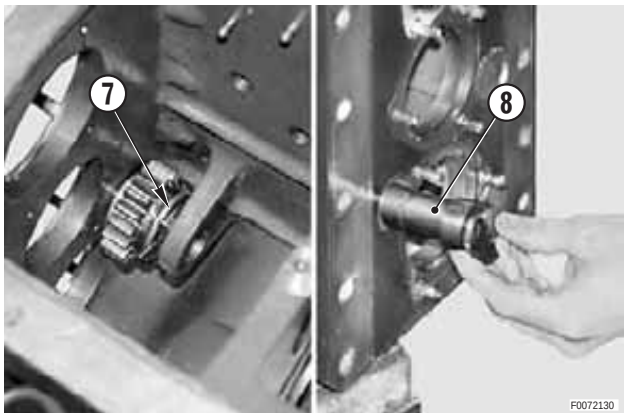


4 - Remove the complete shaft (5) and remove the gear (4) and the circlip (6).

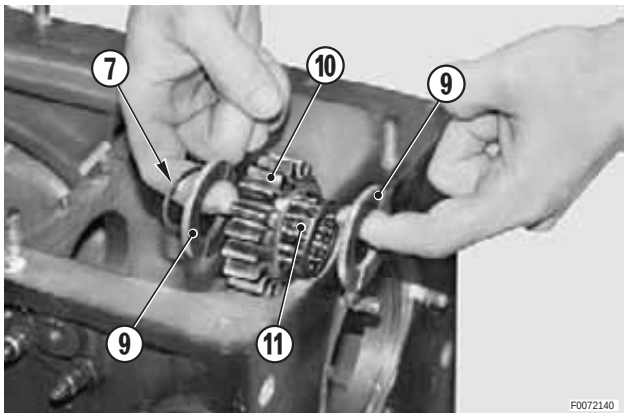
★ Make sure that the sleeve coupling the 4WD output shaft and shaft (5) remains in place.



5 - Open the circlip (7) and withdraw the shaft (8).



6 - Remove the spacers (9), gear (10), roller cage (11) and circlip (7) from the transmission casing.



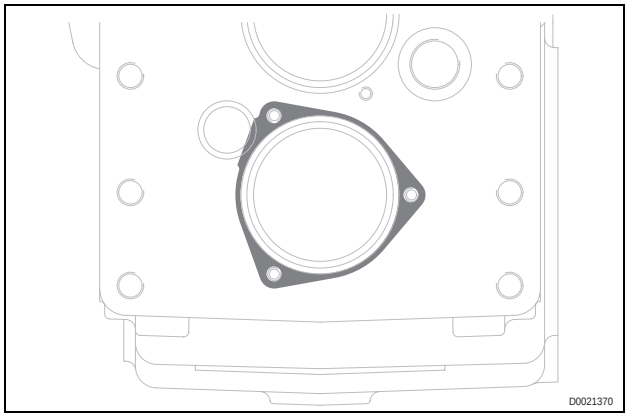
Assembly

- Assembly is the reverse of disassembly.

1

★ Take care to install the cover the right way round.

Mating face: Silastic 738



RANGE GEARBOX AND REAR DIFFERNTIAL ASSEMBLY

COMPLETE ASSEMBLY

Disassembly

1 - Remove the cab. (For details, see “CAB”).

2 - Separate the gearbox and shuttle assembly from the transmission. (For details, see "GEARBOX ASSEMBLY").

3 - Remove the complete lift assembly. (For details, see "LIFT (VERSION WITH MECHANICAL GOVERNOR)").

4- Remove the rear PTO clutch. (For details, see "REAR PTO").

5 - Only if the power take-off for the hydraulic pumps is to be overhauled, remove the hydraulic pumps. (For details, see "HYDRAULIC PUMPS").

6 - Remove the left rear axle. (For details, see "REAR AXLE").

7 - Remove the services valve assembly. (For details, see "SERVICE VALVES ASSEMBLY").

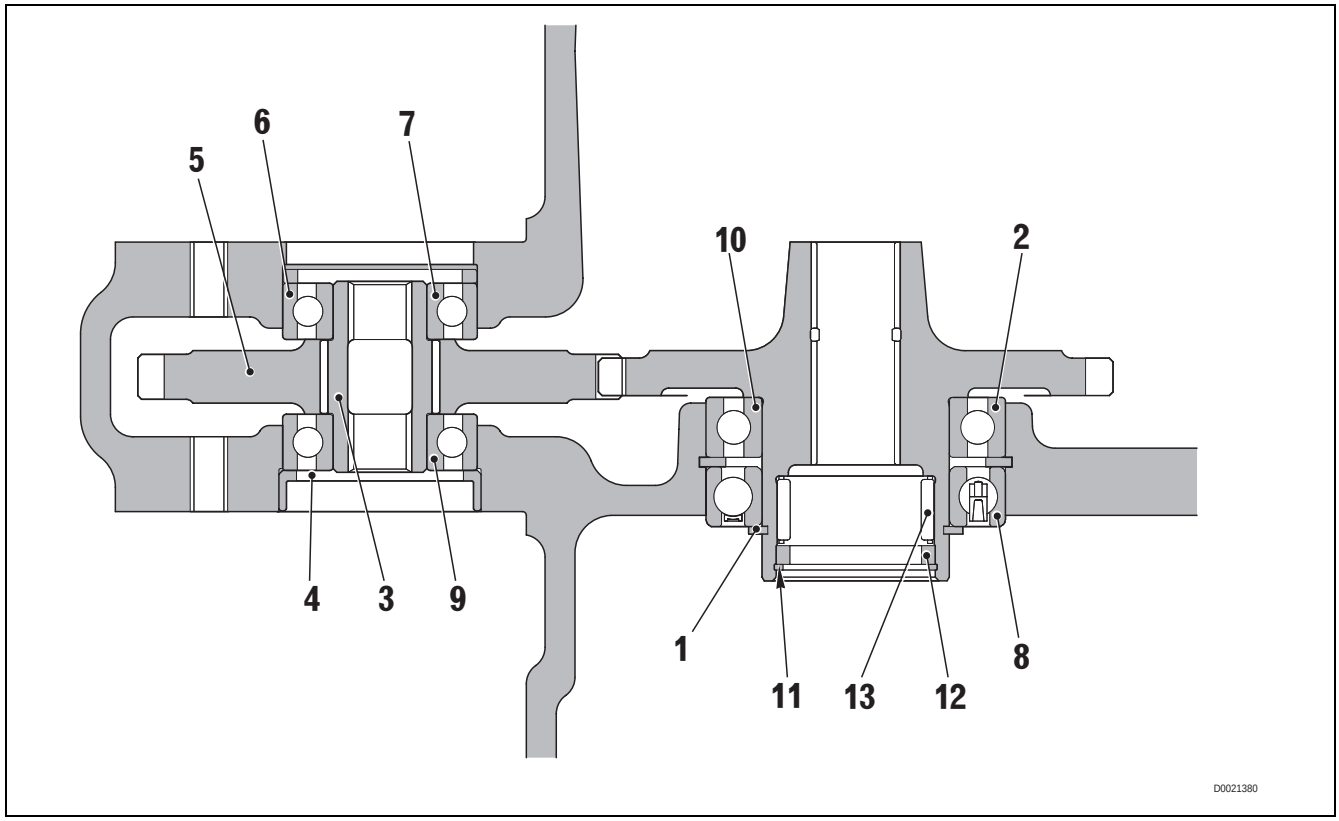
8 - Only if the 4WD shaft and groundspeed PTO are to be overhauled, remove the groundspeed PTO drive shaft. (For details, see "REAR PTO") and the four-wheel drive engagement device (for details, see "FOUR-WHEEL DRIVE ENGAGEMENT CONTROL").

Assembly

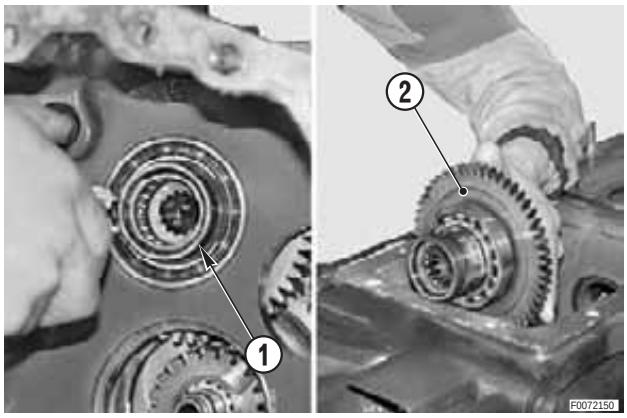
- Assembly is the reverse of disassembly.

PUMP DRIVE PTO

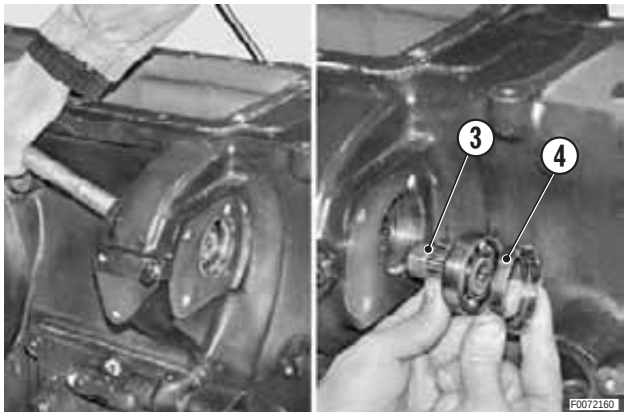
Disassembly



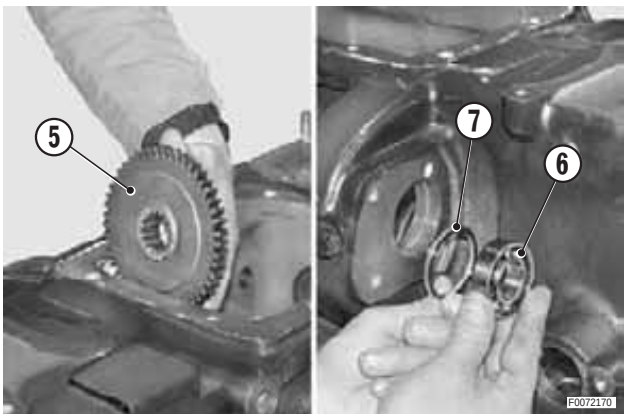
1 - Remove the circlip (1) and remove the drive gear (2).



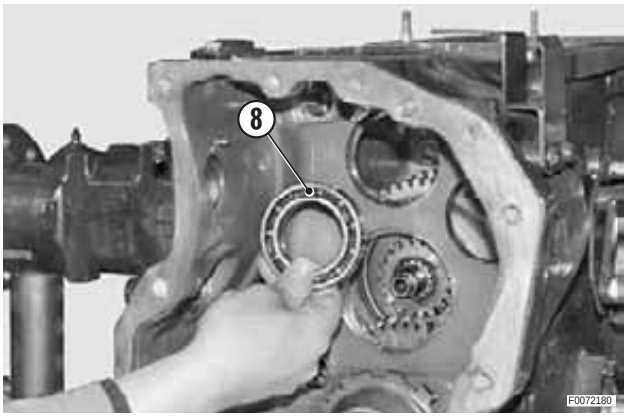
2 - Using a soft metal punch, drive out the sleeve (3) and the spacer (4).



3 - Remove the driven gear (5) and remove the bearing (6) and spacer (7).



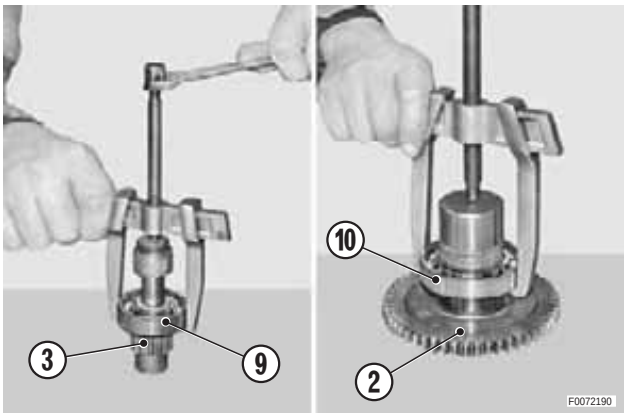
4 - Remove the bearing (8). ⁘ 1



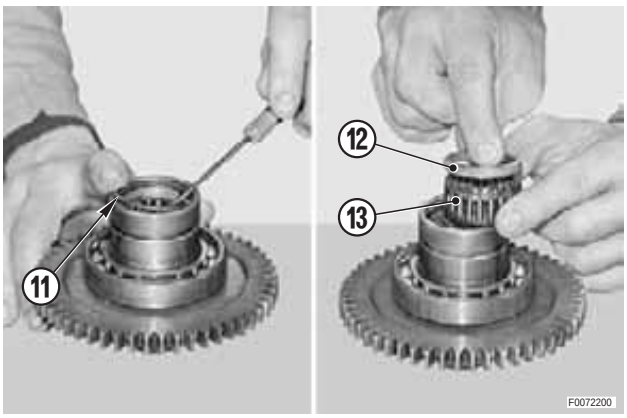
5 - Remove the bearing (9) from the sleeve (3).

6 - Remove the bearing (10) from the gear (2).

★ Note that the bearing (10) does not have shields.



7 - Remove the circlip (11) and remove the spacer (12) and roller cage (13).

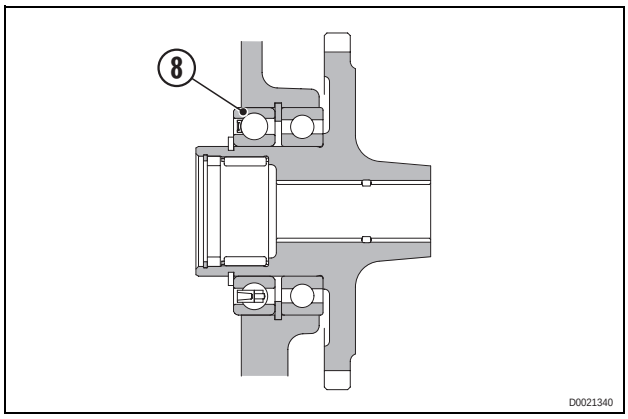


Assembly

- To assemble, follow the disassembly steps in reverse order.

※ 1

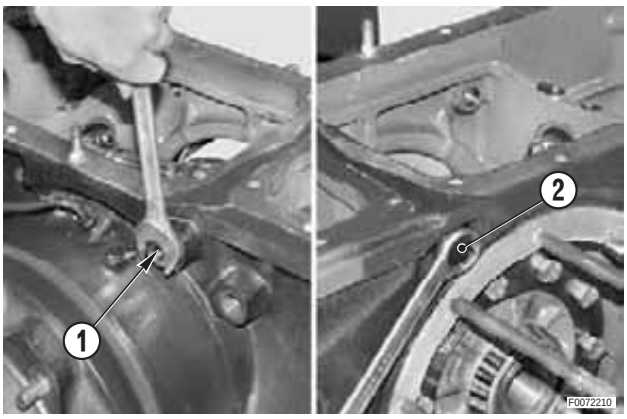
★ Check that the bearing (8) is installed the right way round.



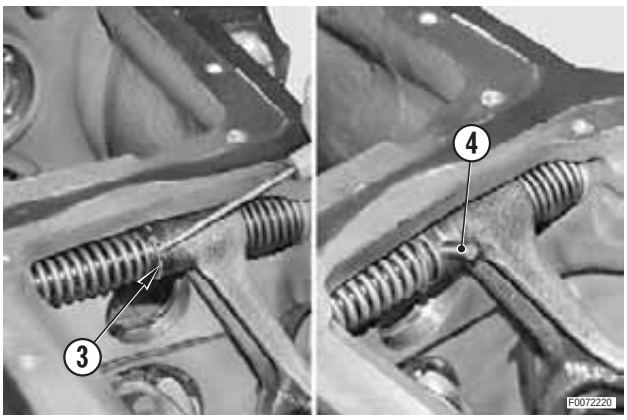
DIFFERENTIAL UNIT

Removal

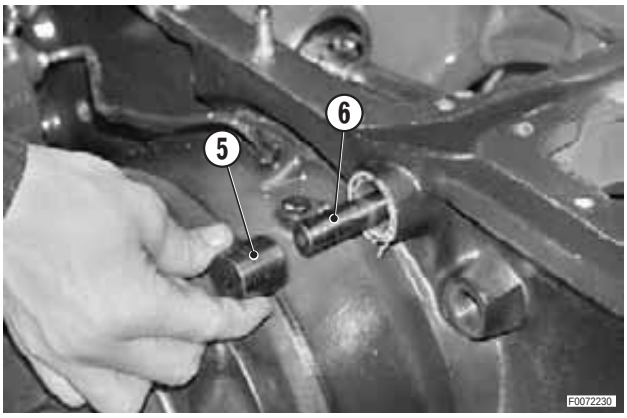
1 - Remove the union (1) and the plug (2).
★ Renew the copper washers on reassembly.



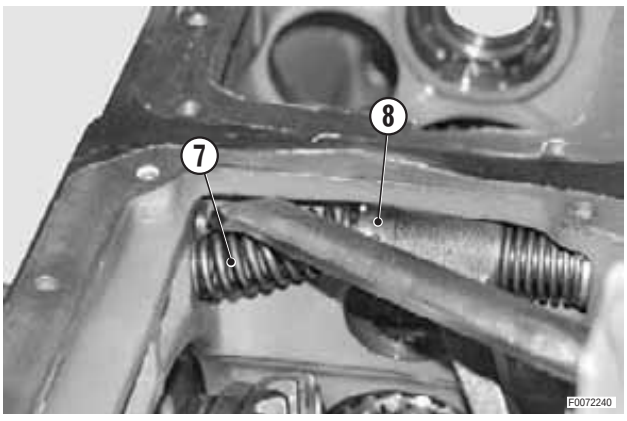
2 - Move the circlip (3) in its seating and remove the spring pin (4).



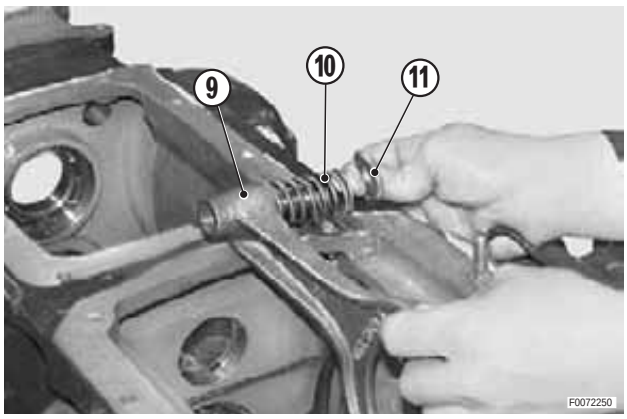
3 - Withdraw the piston (5) from the transmission casing and partially withdraw the rod (6).



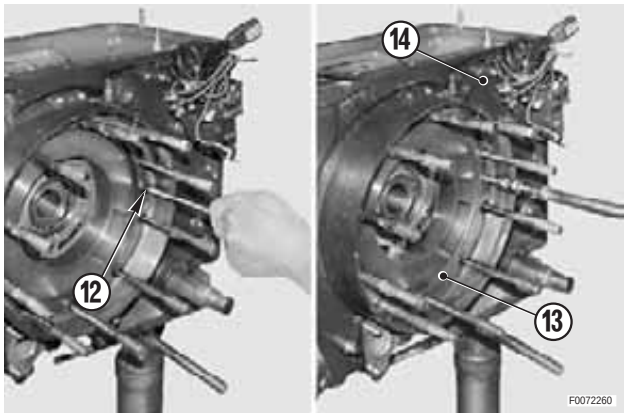
4 - Remove the spring (7) and remove the spacer (8).



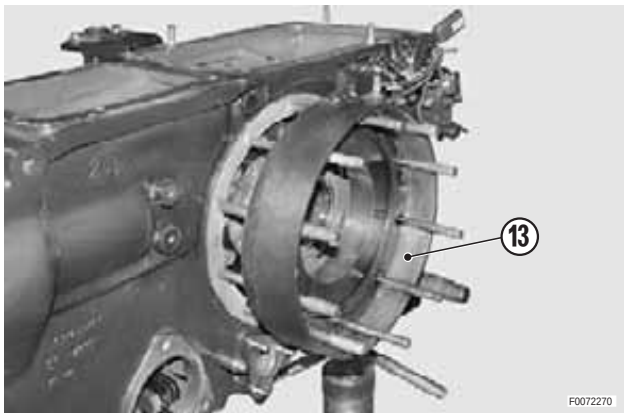
5 - Finally remove the rod (6) and remove the selector fork (9), the spring (10) and the spacer (11).



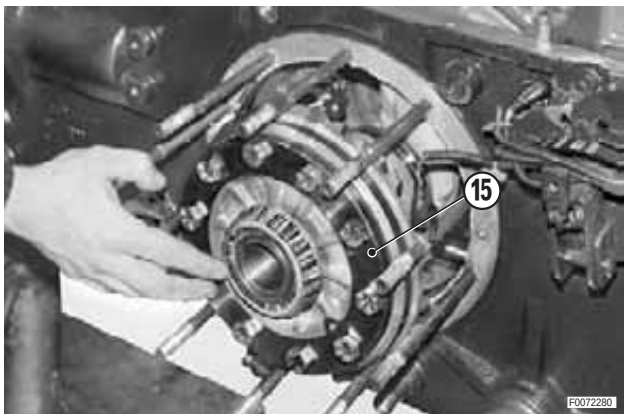
6 - Remove the two bolts (12) and using a slide hammer puller screwed into the holes previously occupied by the bolts (12), disconnect the differential carrier (13) from the transmission casing (14). ⁘ 1



7 - Remove the left differential carrier assembly (13).



8 - Withdraw the differential (15).



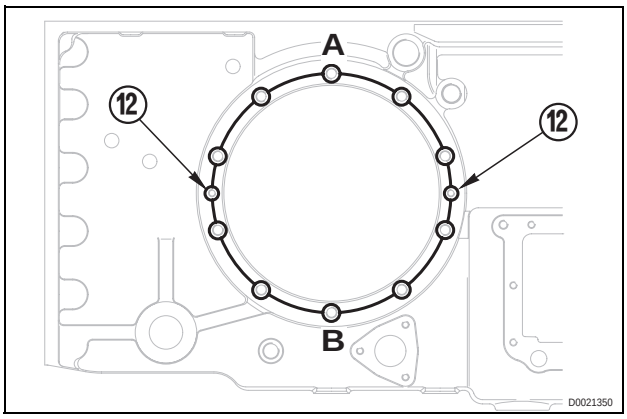
Refitting

- Refitting is the reverse of removal.

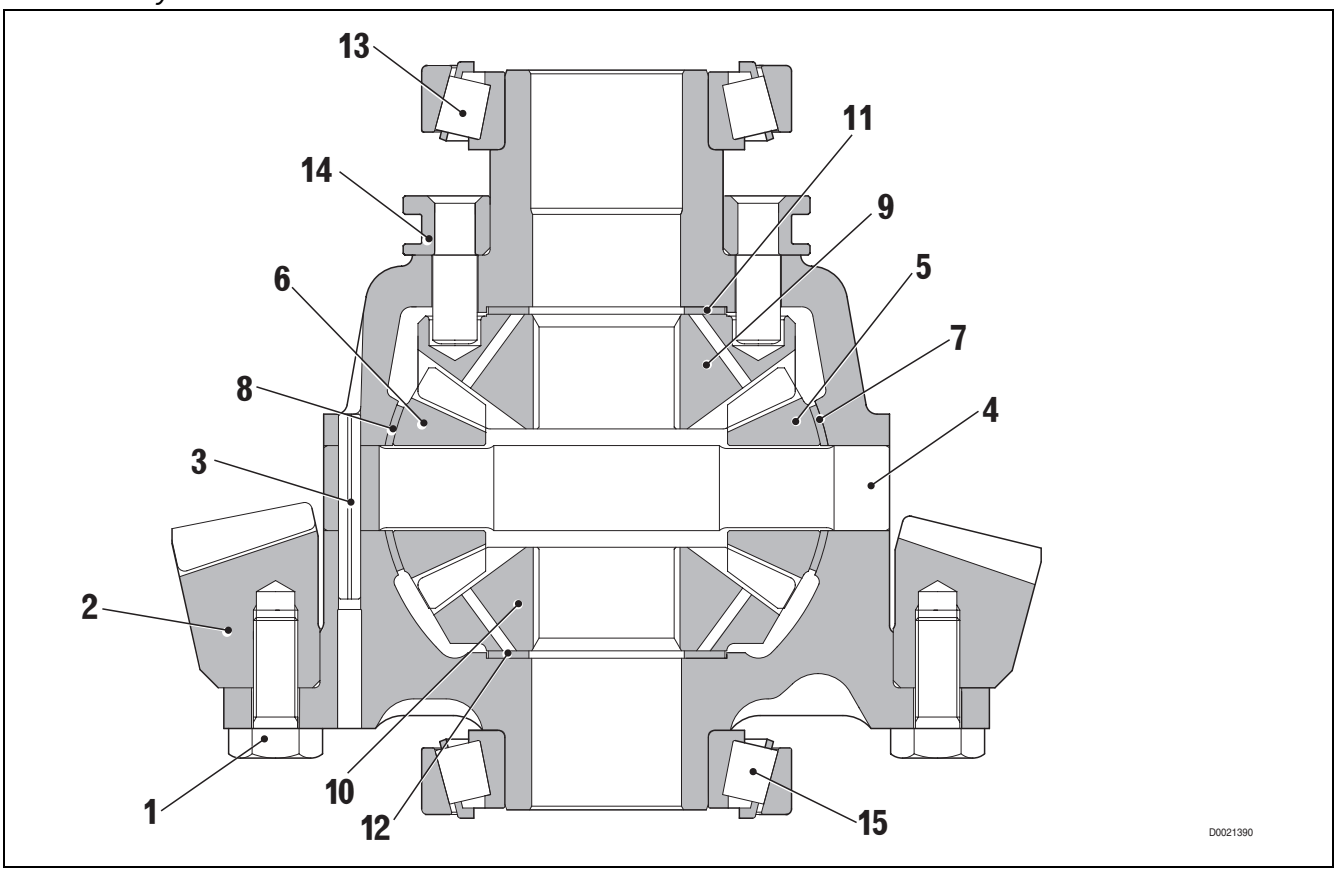
※ 1

Mating face: Loctite 510

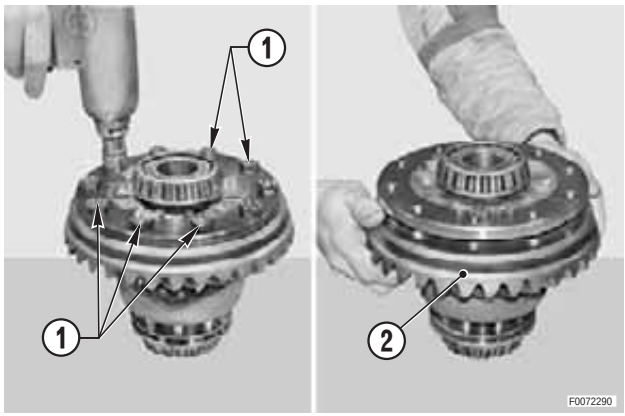
★ If you are not going to proceed with the assembly of the axle, secure the differential carrier (13) with the bolts (12) and with two spacers mounted on the studs "*A*" and "*B*".



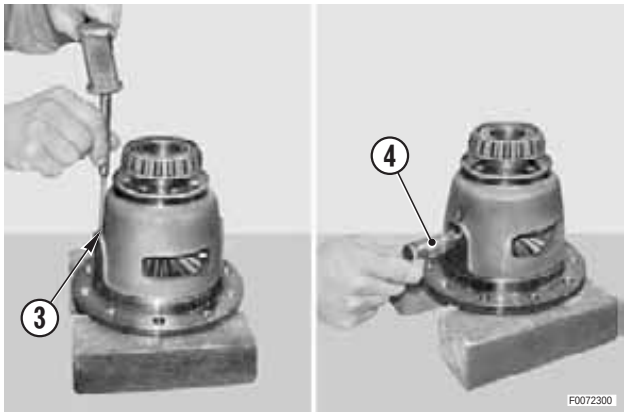
Disassembly



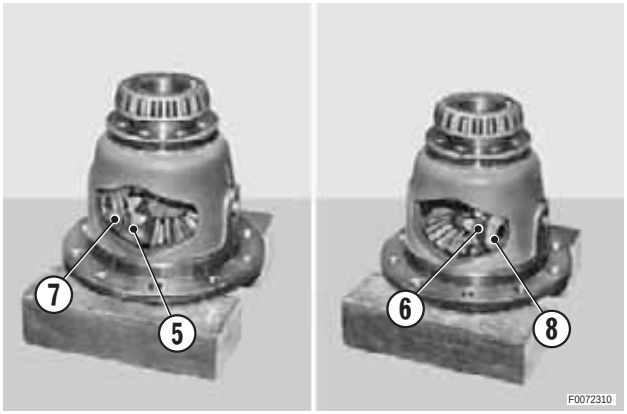
1 - Remove the bolts (1) and remove the crown wheel (2).
⁘ 1



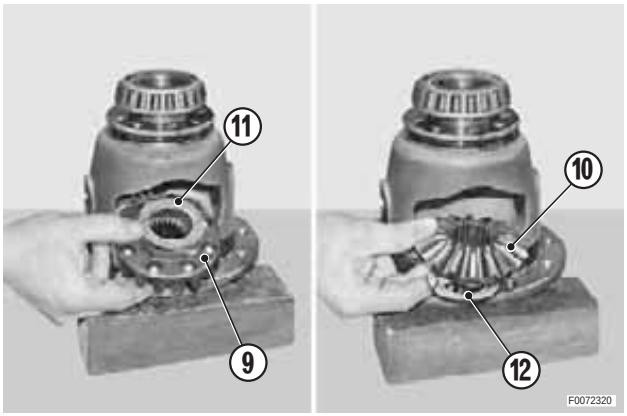
2 - Drive out the spring pin (3) and withdraw pin (4).



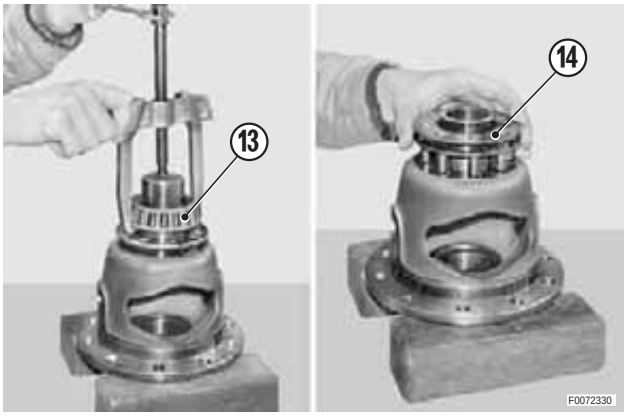
3 - Remove the planet pinions (5) and (6) and the thrust washers (7) and (8). ※ 2



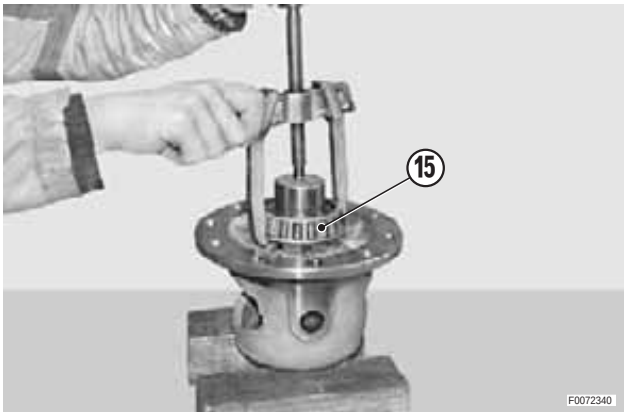
4 - Remove planet pinions (9) and (10) with the thrust washers (11) and (12). ※ 2



5 - Using a puller, remove the inner ring of the bearing (13) and remove the differential lock flange (14).



6 - Using a puller, remove the inner ring of the bearing (15).



Assembly

- To assemble, follow the disassembly steps in reverse order.

1

Nm Bolts: 117÷130 Nm (86.2–96 lb.ft.)

Bolts: Engine oil

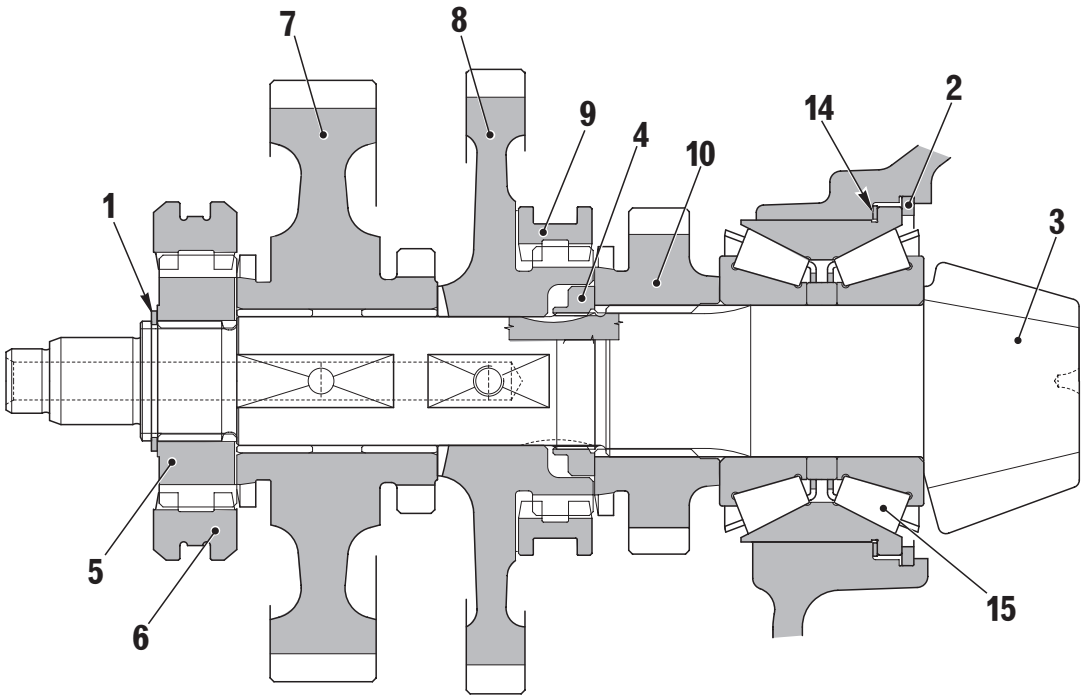
2

Thrust washers: transmission oil

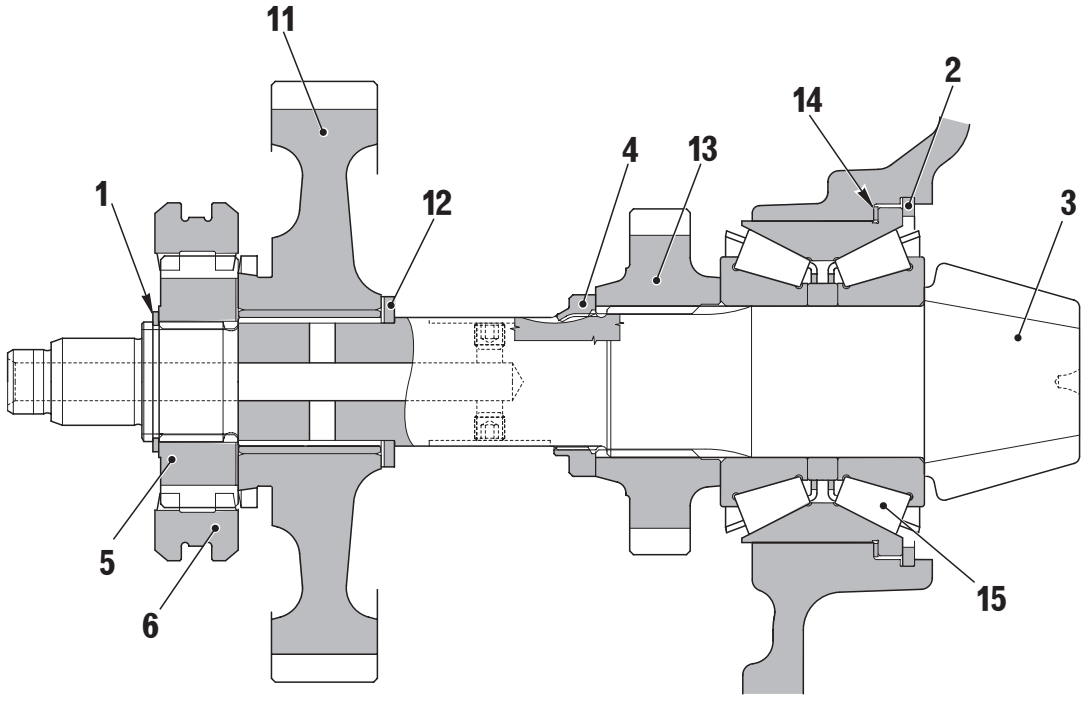
PINION

Disassembly

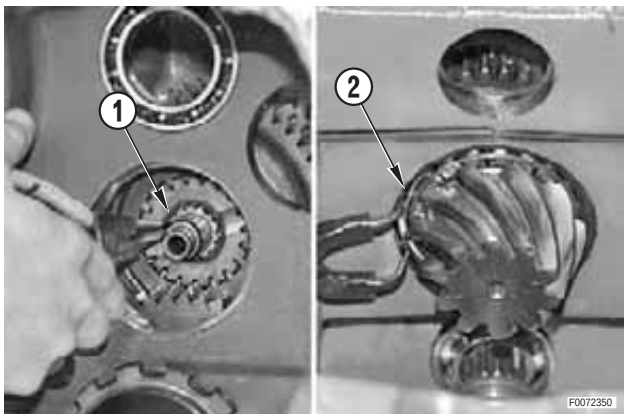
3-RANGE VERSION



2-RANGE VERSION

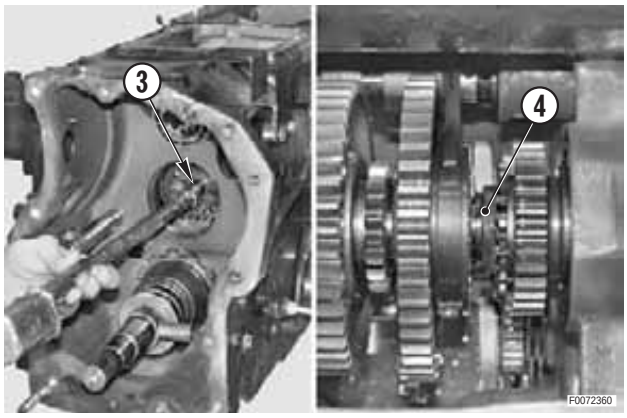


1 - Remove the circlips (1) and (2).



• *For versions with 3 ranges only*

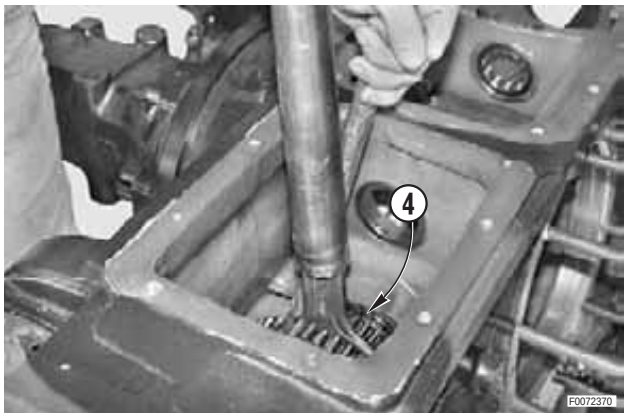
2 - Using a copper punch and a mallet, drive out the pinion shaft (3) far enough to access the ringnut (4).



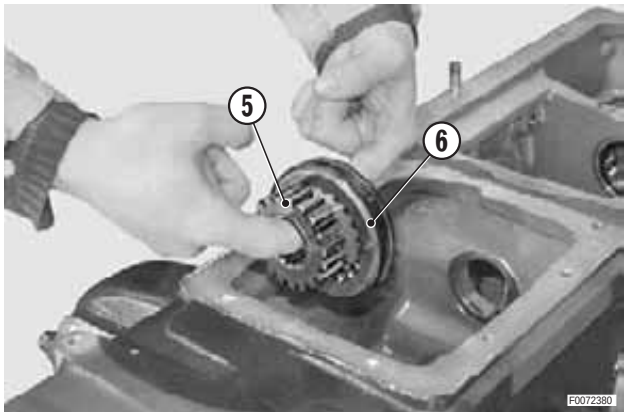
• *For all versions*

3 - Using a bar made of soft material to hold the shaft against rotation, unscrew the ringnut (4) until it comes off the thread. ⁘ 1

★ Renew the ringnut (4) on reassembly.



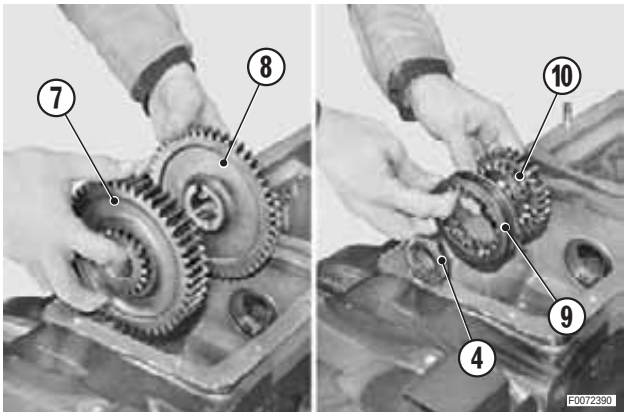
4 - Proceed with withdrawal of the pinion shaft (3) and removethe sleeve (5) and the selector (6).



• *For versions with 3 ranges only*

5 - Remove gear (7) and gear (8).

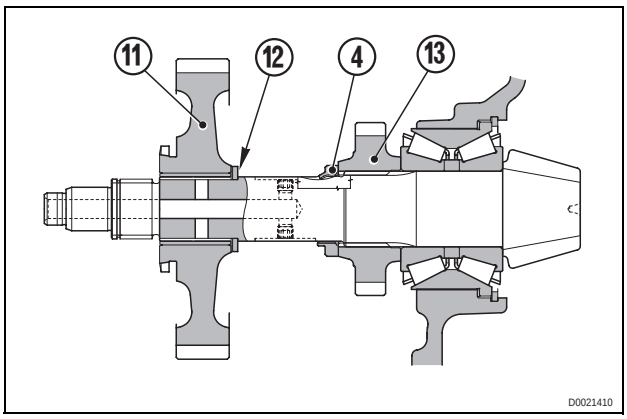
6 - Remove the ringnut (4), the selector (9) and the gear (10).



• *For versions with 2 ranges only*

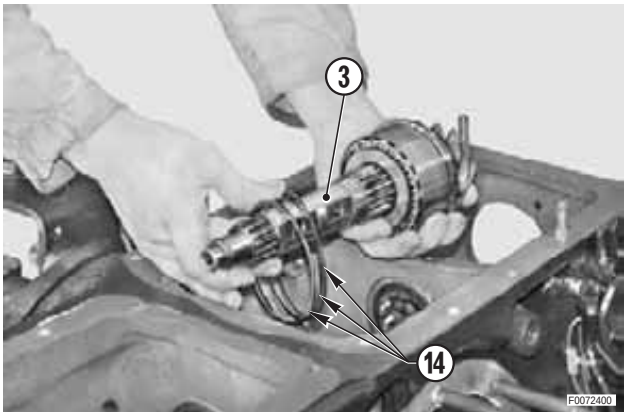
7 - Remove the gear (11), the spacer (12), the ringnut (4) and the gear (13).

★ Note which way the spacer (12) is installed .



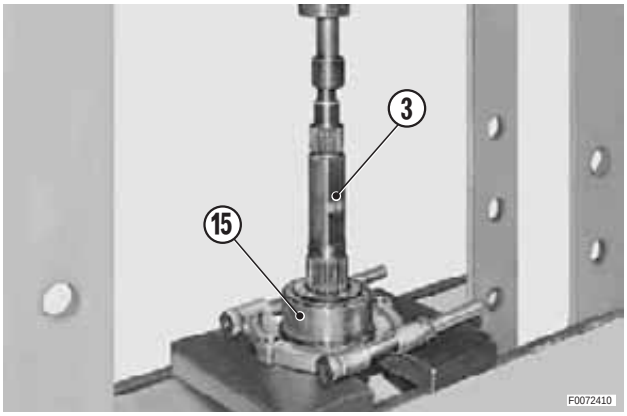
• *For all versions*

8 - Remove the pinion shaft (3) and the shims (14).



• *Only if necessary*

9 - Using a press and a suitable puller, remove the bearing (15) from the pinion (3). ⁘ 2



Assembly

- To assemble, follow the disassembly steps in reverse order.

⁘ 1

Nm Ringnut: 274÷294 Nm (202–217.7 lb.ft.)

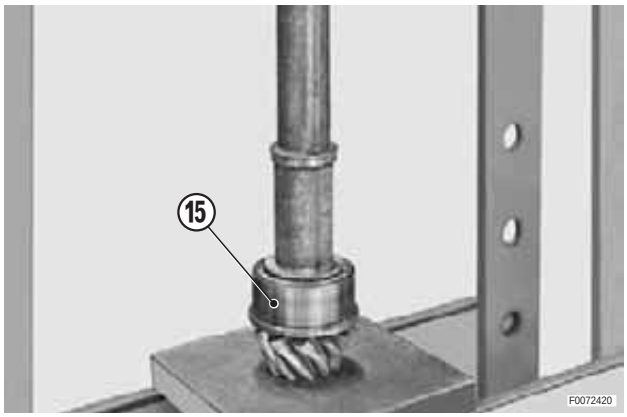
Ringnut: Loctite 270

⁘ 2

★ Before installing the bearing on the pinion shaft, lubricate the inner rings of the bearing.

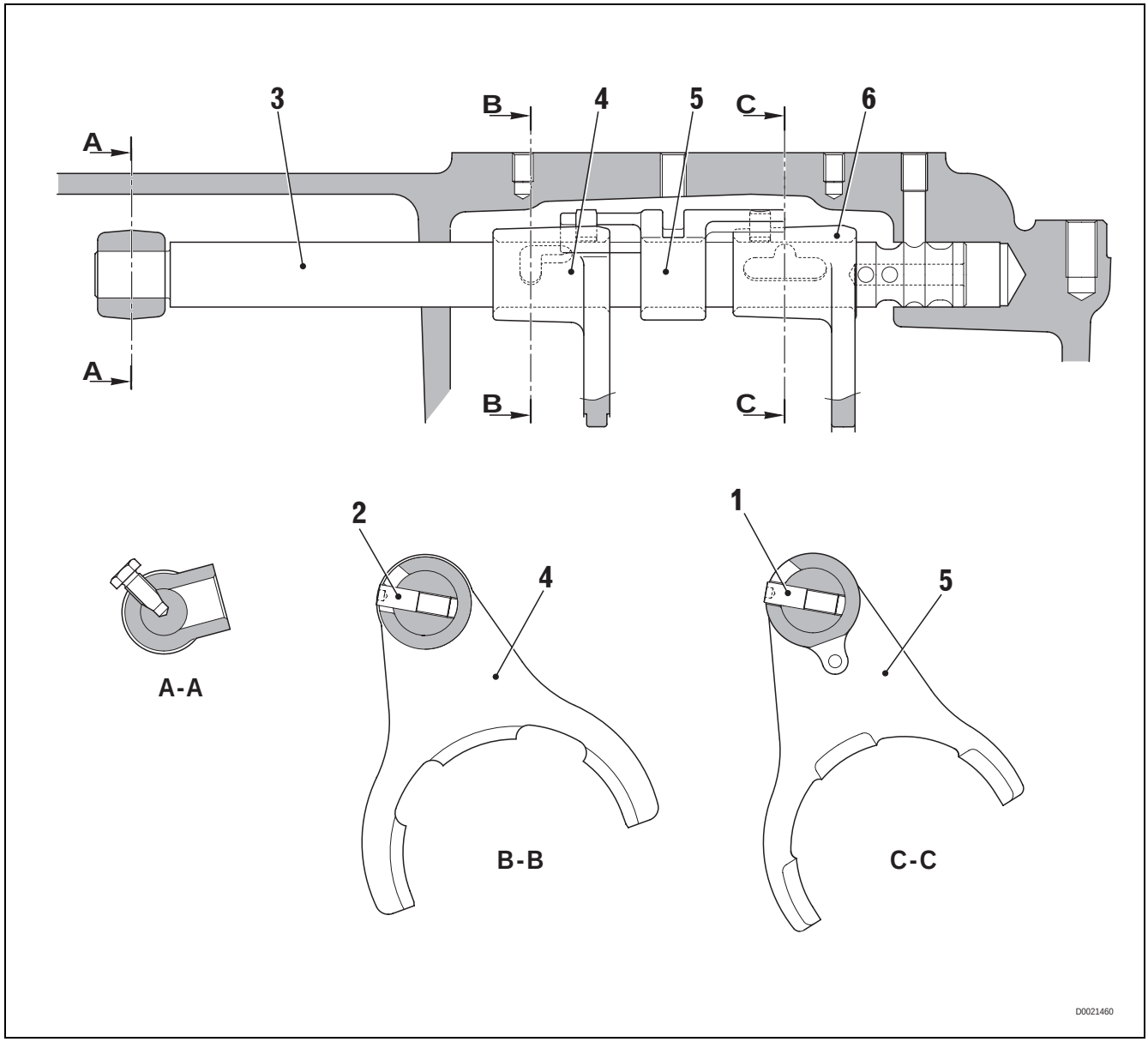
Bearing: transmission oil

★ During assembly of the bearing (15), rotate the outer ring to bed in the rollers and ensure smooth rotation.

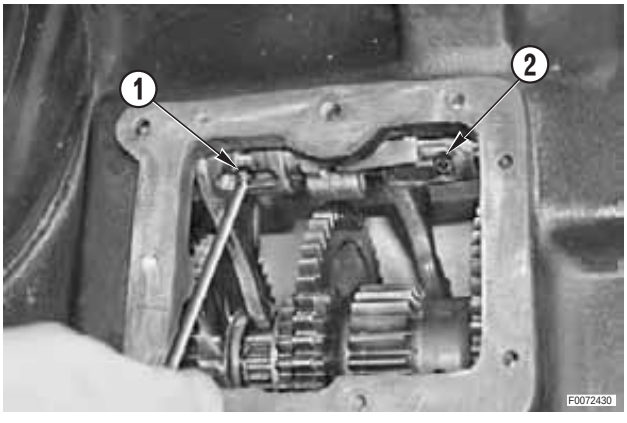


RANGE SELECTOR ROD

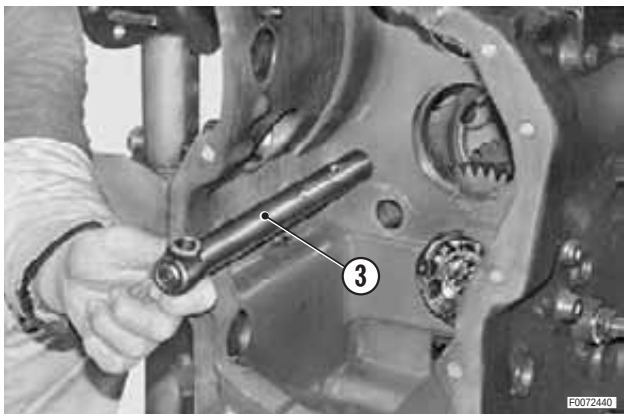
Disassembly



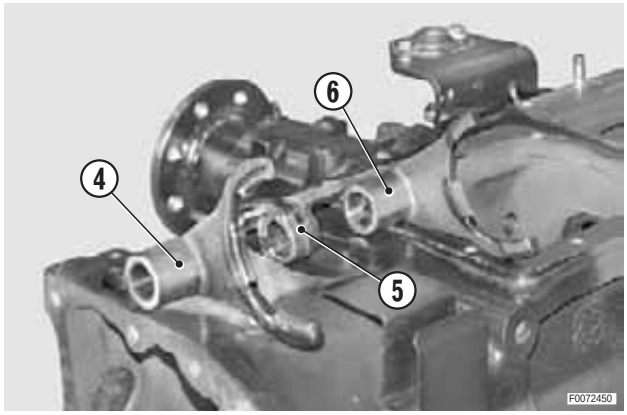
1 - Remove the pins (1) and (2).
★ Do not use an automatic screwdriver as this could damage the hex heads of the pins.



2 - Withdraw the range selector rod (3).



3 - Remove "*H*" and "*L*" range selector fork (4), the lock sleeve (5) and the "*SR*" range selector fork (6).



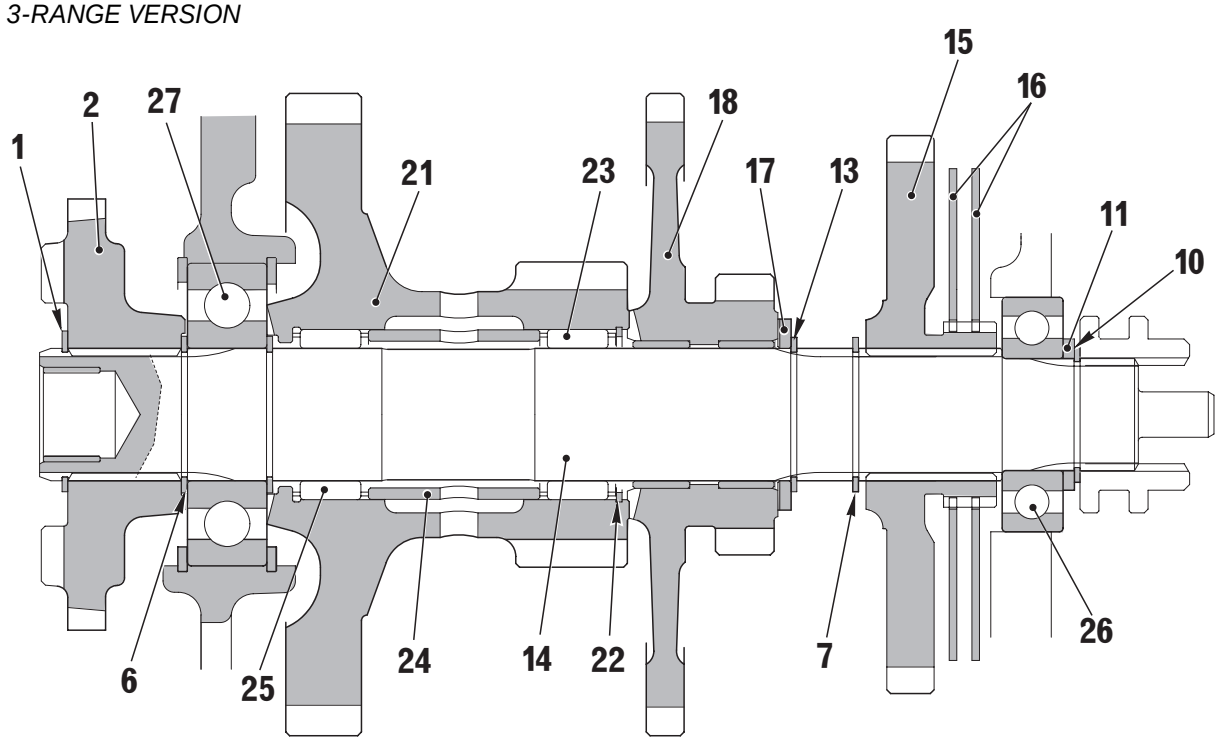
Assembly

- To assemble, follow the disassembly steps in reverse order.

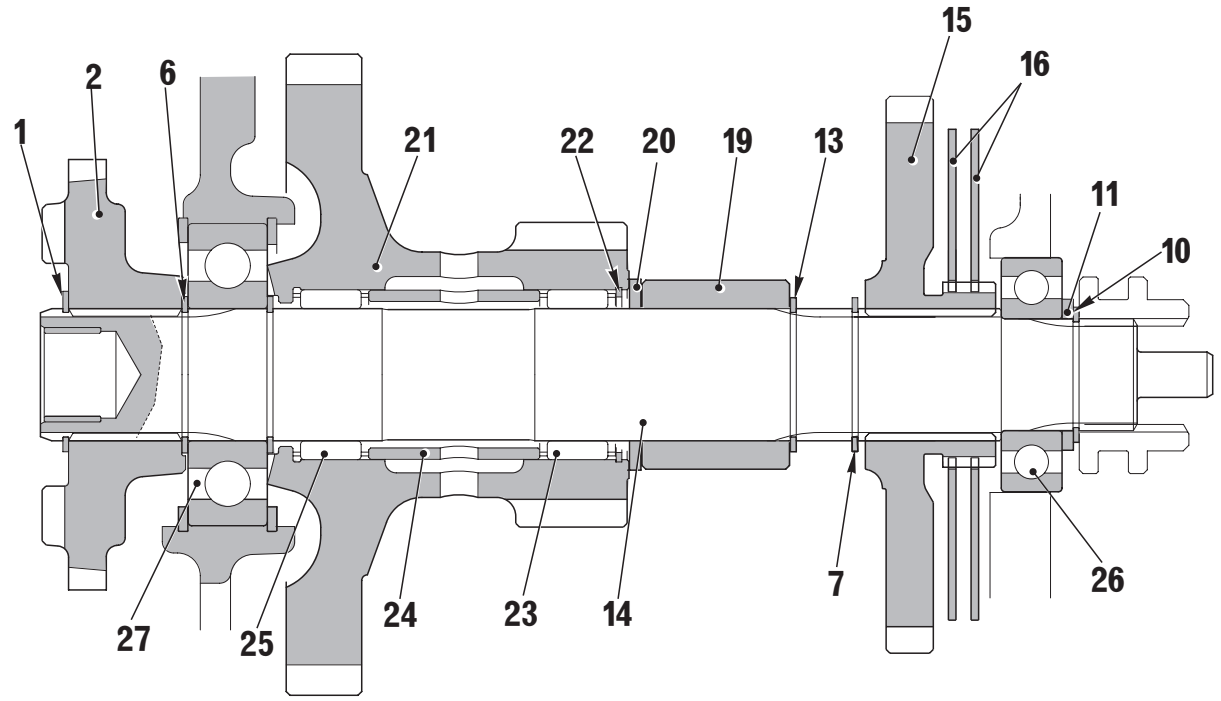
4WD AND GROUNDSPEED PTO OUTPUT SHAFT

Disassembly

3-RANGE VERSION

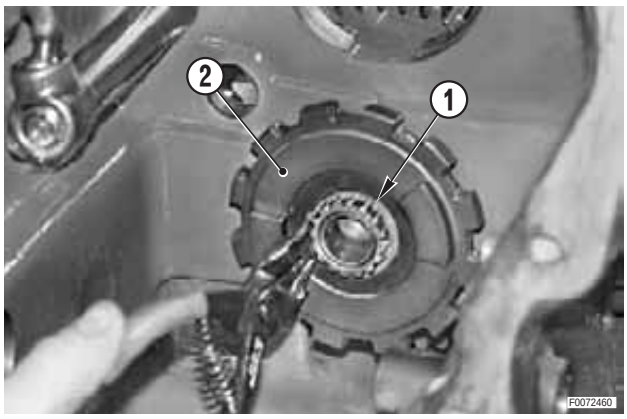


2-RANGE VERSION



D0021450

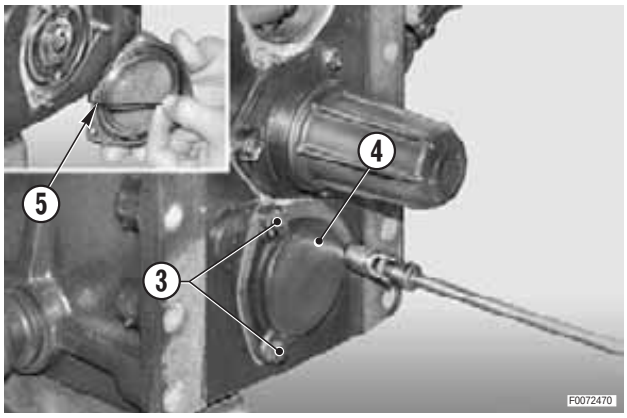
1 - Remove the circlip (1) and remove the pulse wheel (2).



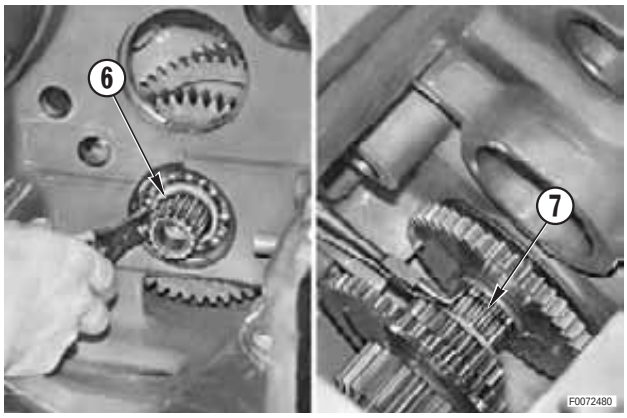
• *Only for versions with groundspeed PTO*

2 - Remove the nuts (3) and remove the cover (4). ⁘ 1

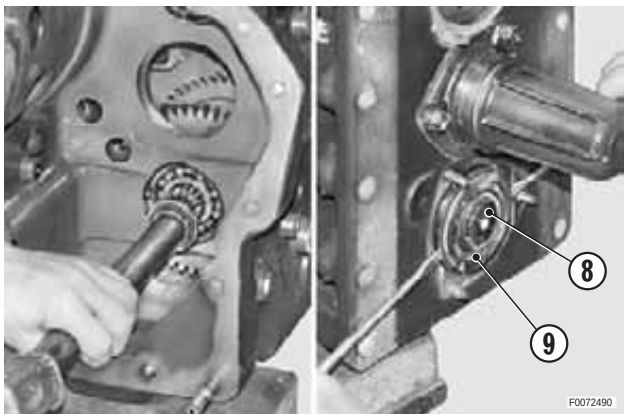
★ Recover the O-ring (5).



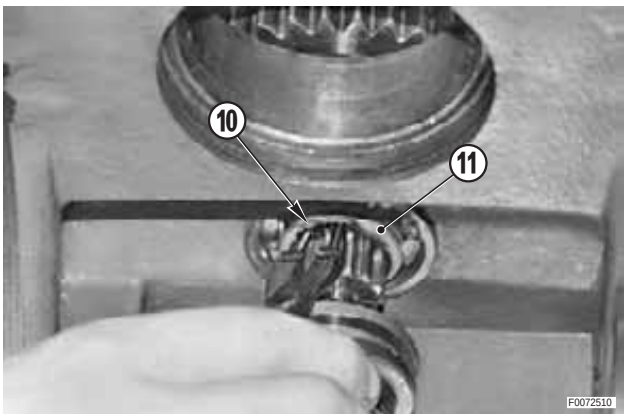
3 - Remove the circlip (6) and move the circlip (7) towards the front of the tractor.



4 - Using a soft metal punch, partially drive out the shaft (8) and then apply leverage the bearing ring (9) to withdraw the shaft as far as possible.

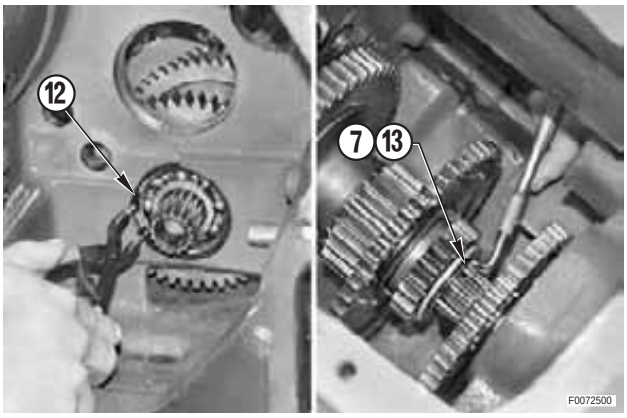


5 - Remove the circlip (10) and the spacer (11).



• *For all versions*

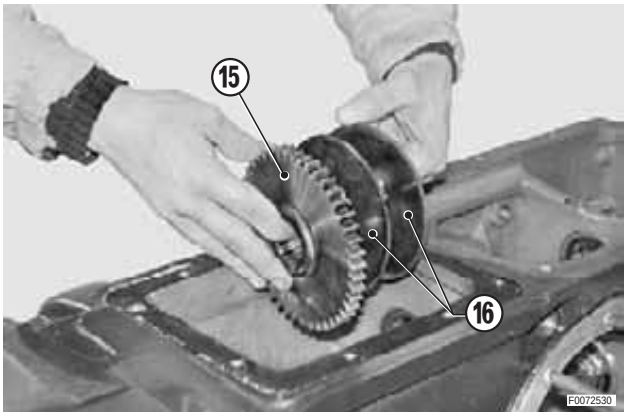
6 - Remove the circlip (12) and move both circlips (7) and (13) towards the rear of the tractor.



7 - Using a soft metal punch, drive out the shaft (14).

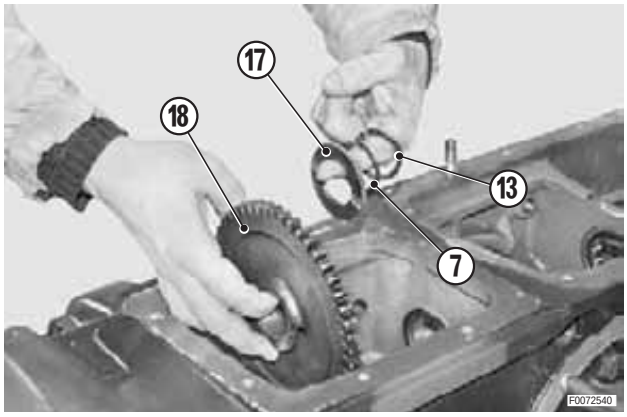


8 - Remove the 4WD driven gear (15) and the steel plates (16).



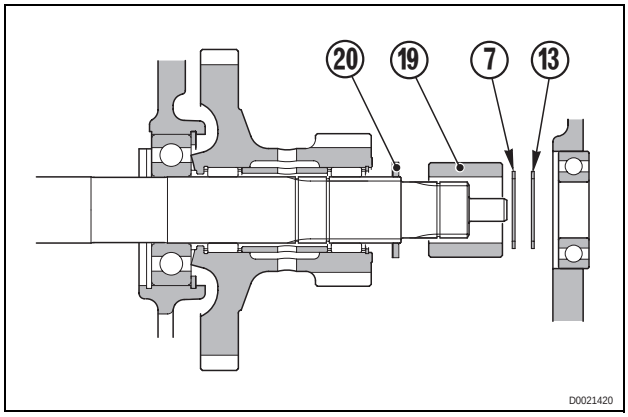
• *For versions with 3 ranges only*

9 - Remove the circlips (7) and (13), the shim (17) and the gear (18).
★ Note which way the round the shim is installed.
★ Renew the circlips on reassembly.



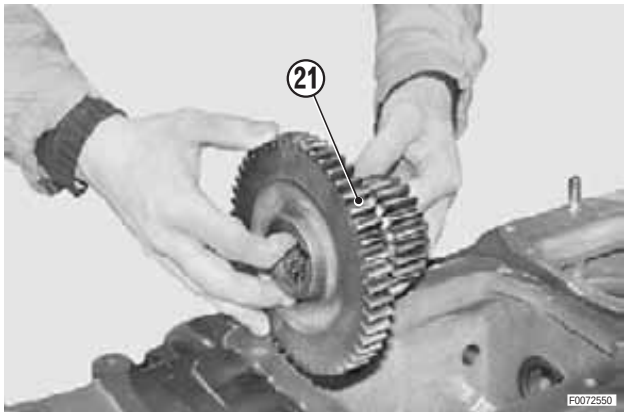
• *For versions with 2 ranges only*

10 - Remove the circlips (7) and (13), the spacer (19) and the shim (20).
★ Note which way the round the shim is installed.
★ Renew the circlips on reassembly.



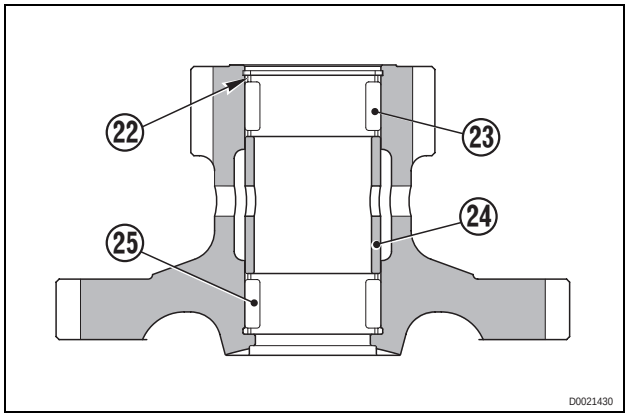
• *For all versions*

11 - Remove the gear assembly (21).

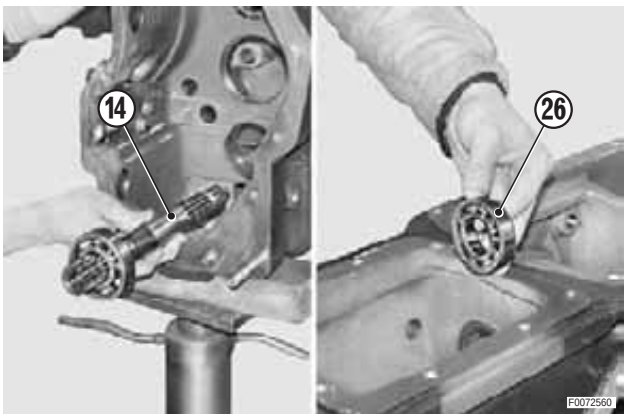


12 - Remove the circlip (22) and remove the roller cage (23), spacer (24) and roller cage (25).

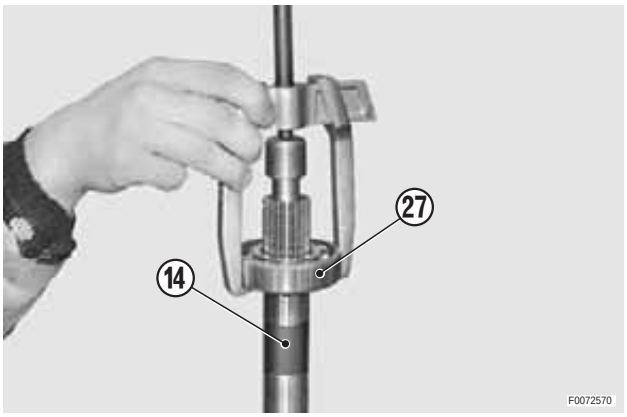
2



13 - Finally the remove the shaft (14) and remove the bearing (26) from the transmission casing.



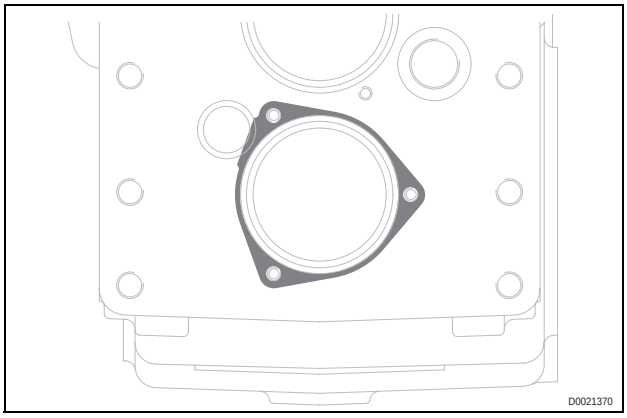
14 - Remove the bearing (27) from the shaft (14).



Assembly

- To assemble, follow the disassembly steps in reverse order.

※ 1

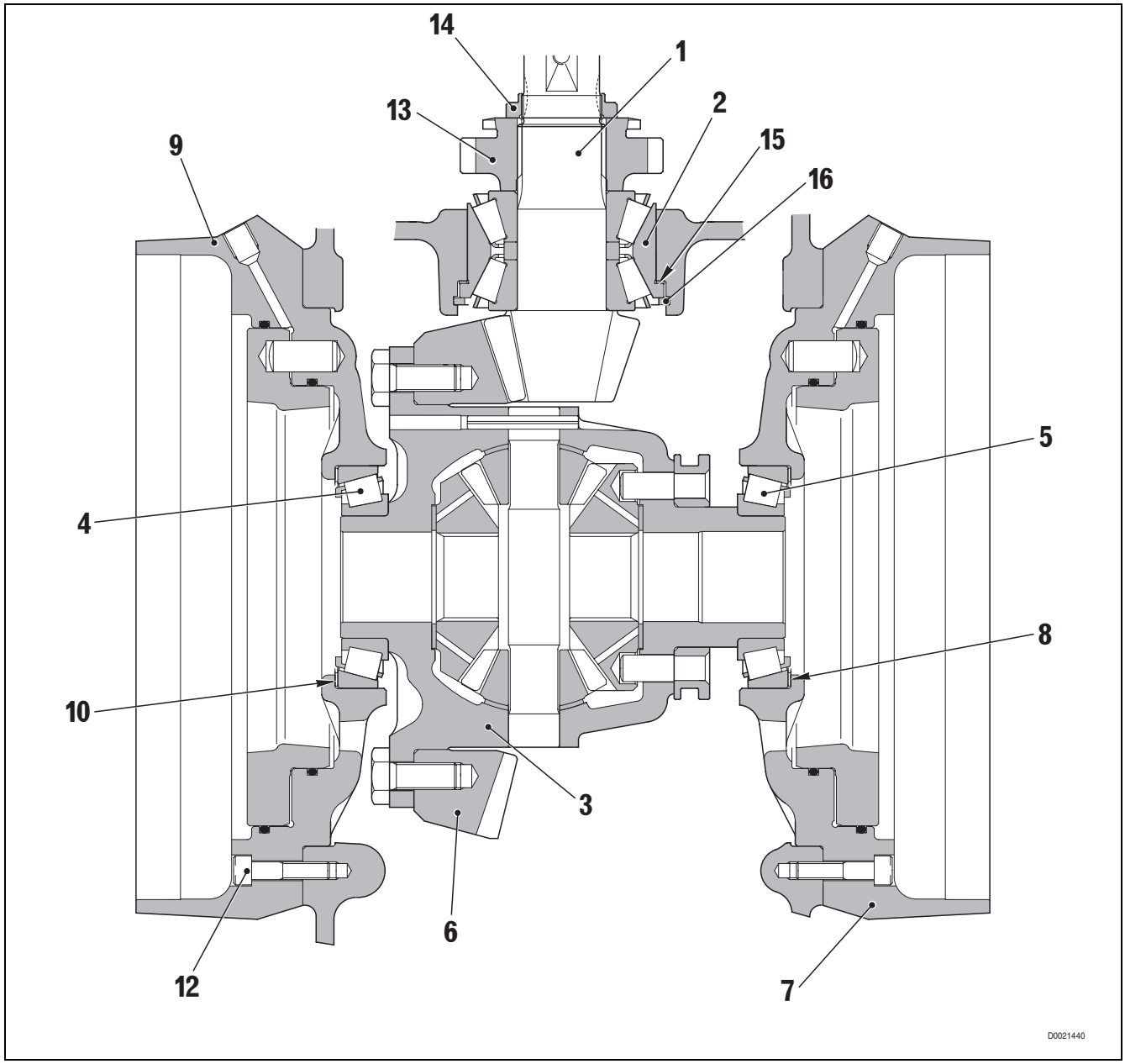


※ 2

Roller cages: transmission oil

BEVEL GEAR PAIR

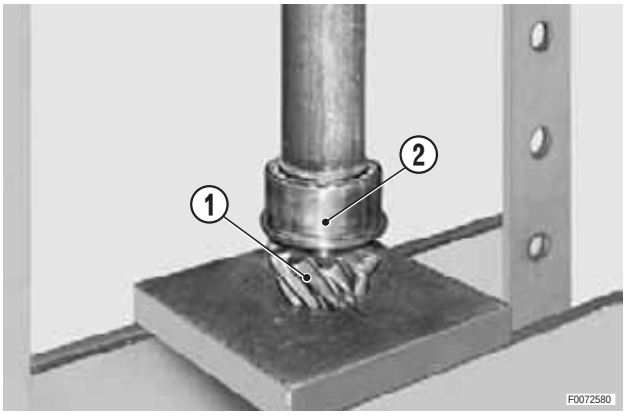
Preparation for adjustments



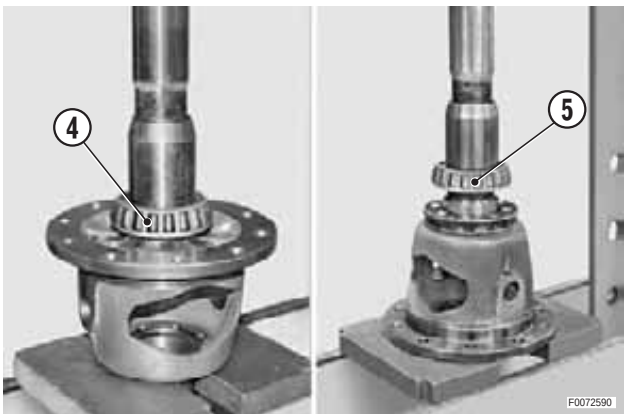
1 - Install the bearing (2) on the pinion shaft (1).
★ Lubricate the bearing.

Bearing: transmission oil

★ During assembly of the bearing (2), rotate the outer ring to bed in the rollers and ensure smooth rotation.



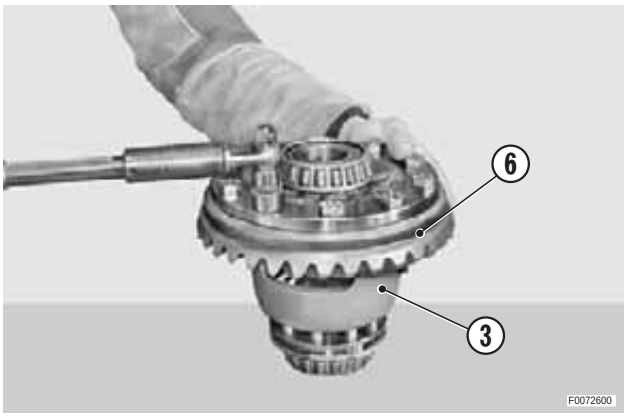
2 - Install the inner rings of bearings (4) and (5) in the transmission casing (3).



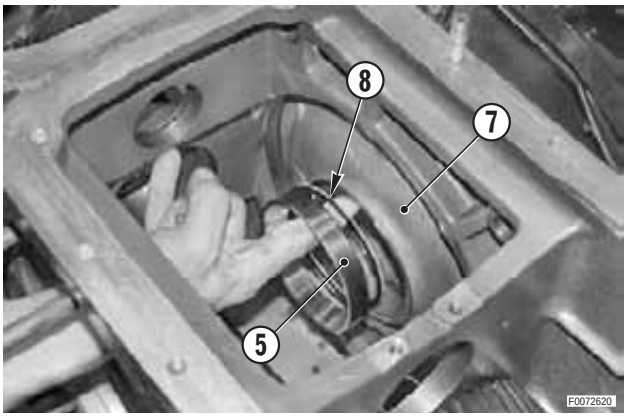
3 - Install the crown wheel (6) on the differential (3).

Nm Bolts: 117÷130 Nm (86–96 lb.ft.)

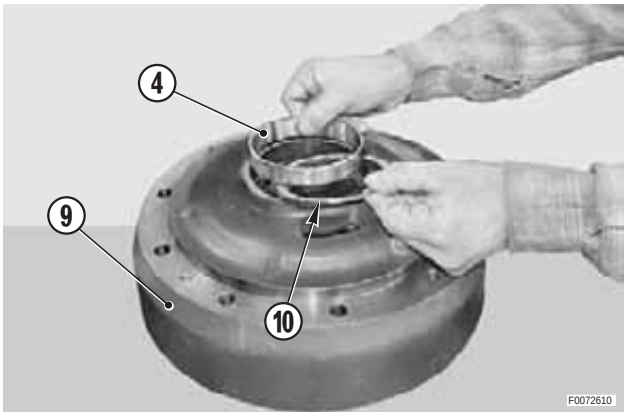
Bolts: Engine oil



4 - Remove the outer ring of the bearing (5) with the shims (8) from the side of the differential carrier (7) opposite to the crown wheel.

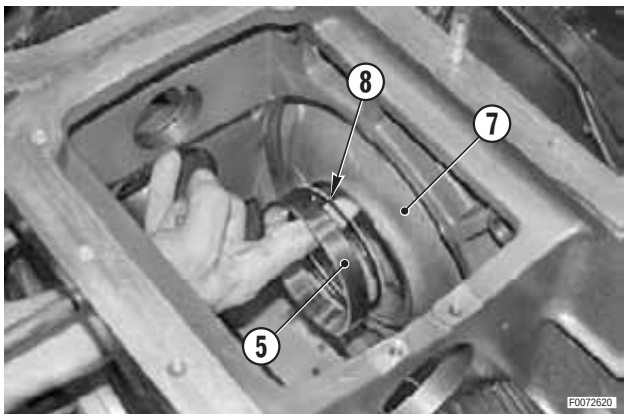


5 - Remove the outer ring of the bearing (4) with the shims (10) from the crown wheel side of the differential carrier (9).

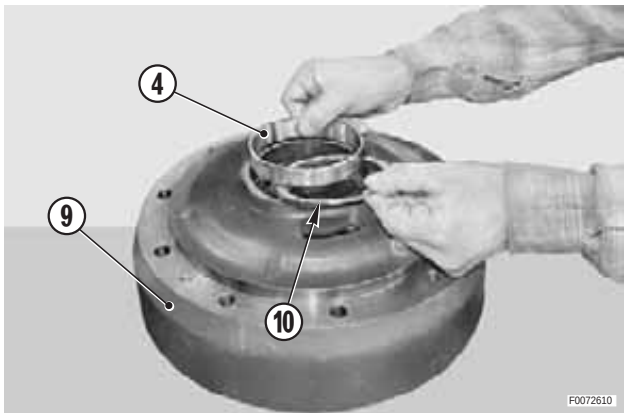


Adjustment of the differential bearings preload

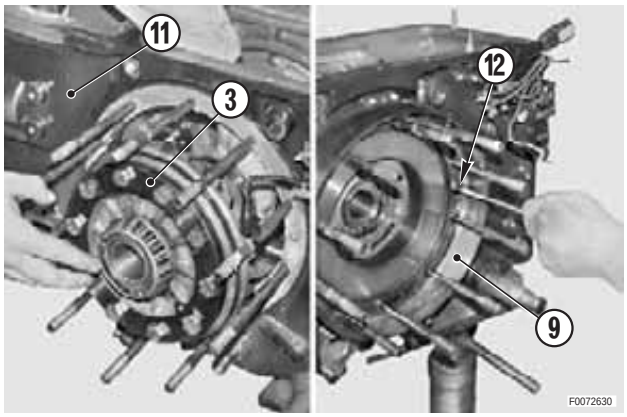
1 - On the side of the differential carrier (7) opposite to the crown wheel, install a 1.5 mm shim pack (8) and the outer ring of the bearing (5).



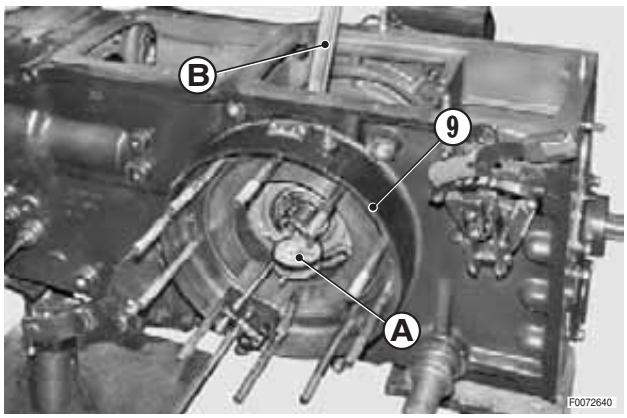
2 - On the crown wheel side of the differential carrier (9), install a 0.8 mm shim pack (10) and the outer ring of the bearing (4).



3 - Install the differential assembly (3) in the transmission casing (11) and secure it in position with the differential carrier (9) by tightening bolts (12).



4 - Position a dial gauge with magnetic stand "*A*" on the differential carrier (9) and set to zero on the end face of the differential while simultaneously forcing it with a lever "*B*" towards the opposite side.

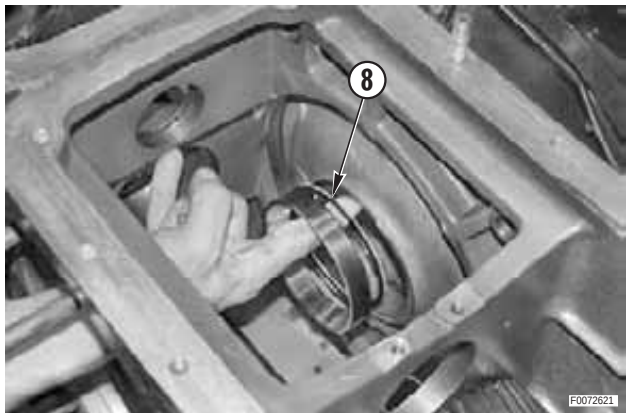


5 - Force the differential towards the crown wheel side and measure the end float.

6 - Add 0.1 mm to the measured end float and round the value obtained up to the nearest 0.05 mm to determine the thickness of the shims to be installed under the outer ring of the bearing (5) on the opposite side to the crown wheel.
Example:
Value measured: 0.18 mm
Nominal value: 0.18+0.10=0.28
Actual shim thickness: 0.30 mm



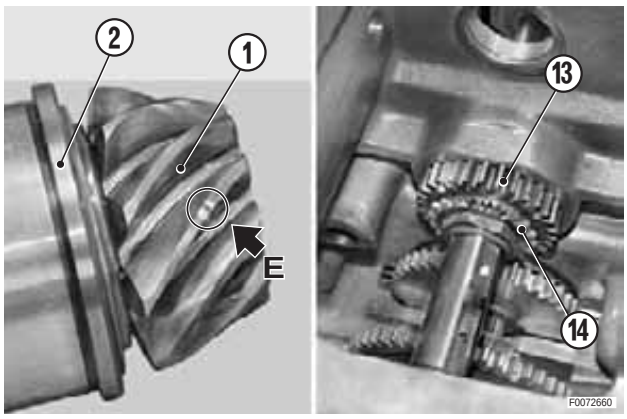
7 - Remove the crown wheel side different carrier (9) and the differential (3) and increase the thickness of the shim pack (8) by the value calculated in the previous step.



Adjustment of the pinion position

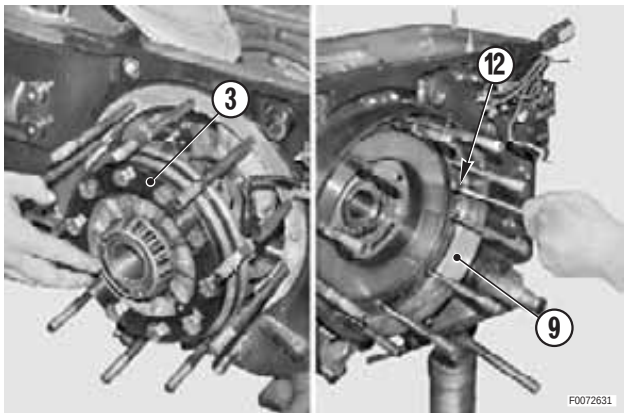
1 - Install the pinion (1) complete with the bearing (2) in the transmission casing and drive it fully home.
   ★ Make a note of the value "*E*" stamped on a tooth of the pinion (1) (in this example + 0.3 mm).

2 - Temporarily fit the 4WD gear (13) and the ringnut (14).
   ★ Tighten the ringnut to eliminate the bearing play.



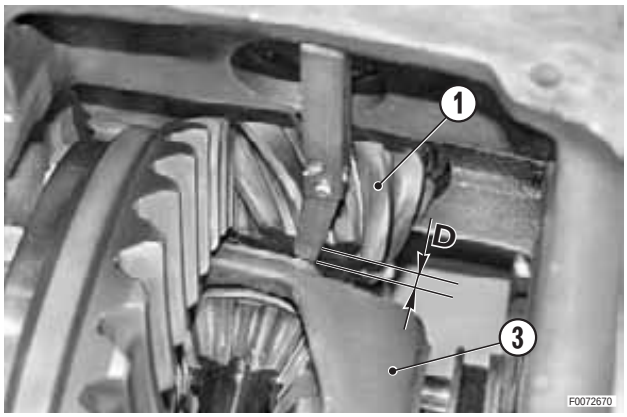
3 - Install the complete differential assembly (3) and the carrier (9).

4 - Fix the carrier (9).
   ★ While tightening the bolts (12), check that there is clearance between the differential and the pinion (1).
   If the differential is seated against the pinion, adjust the shim packs installed under the outer races of the bearings so as to reduce the thickness of the pack on the crown wheel side and increase the thickness of the pack on the opposite side by the same amount.



5 - Use a feeler gauge to measure the clearance "*D*" between the end face of the pinion (1) and the 153 mm Ø section of the differential (3) (in this example 4.25).

6 - Calculate the value "*R*" by adding the value "*E*" stamped on the tooth of the pinion (1) to the theoretical value of 2.50 mm.
   ★ If "*E*" is positive, as in the case reported in the figures, it should be added to the theoretical value of 2.50 mm.
   R = 2.50 + *E* i.e.:
   R = 2.50 + 0.30 = *2.80*
   ★ If "*E*" is negative, subtract it from the theoretical value of 2.50 mm.
   R = 2.50 – *E* i.e.:
   R = 2.50 – 0.30 = *2.20*



7 - If the measured value "*D*" differs from the calculated value "*R*", determine the difference between values "*D*" and "*R*".
   The resulting value "*S*" is the thickness of the shim pack to be installed under the bearing (2) of the pinion (1).
   ★ Formula:

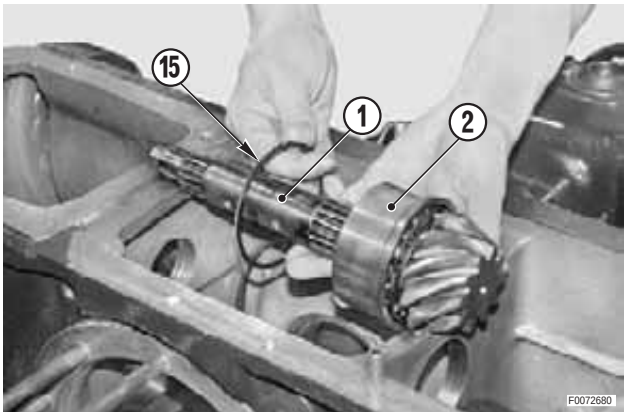
$$S = D - R$$

   which in our example gives:

$$S = 4.25 - 2.80 = 1.45 \text{ mm}$$

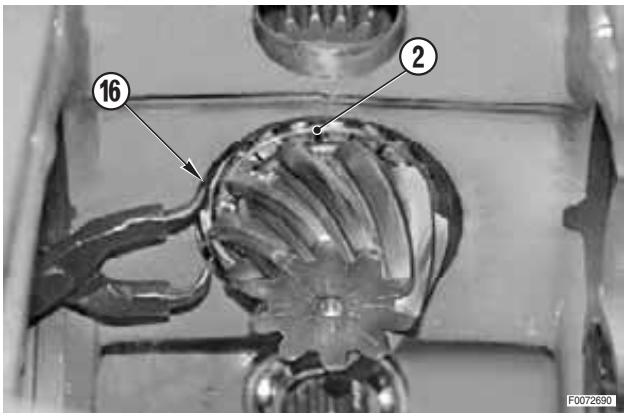
8 - Remove the differential (3) and the pinion (1) complete with bearing (2).

9 - Fit the shim pack (15) of the calculated thickness on the bearing (2) and install it in the transmission casing.



10 - Secure the bearing (2) in position with a suitable circlip (16) selected from those available.

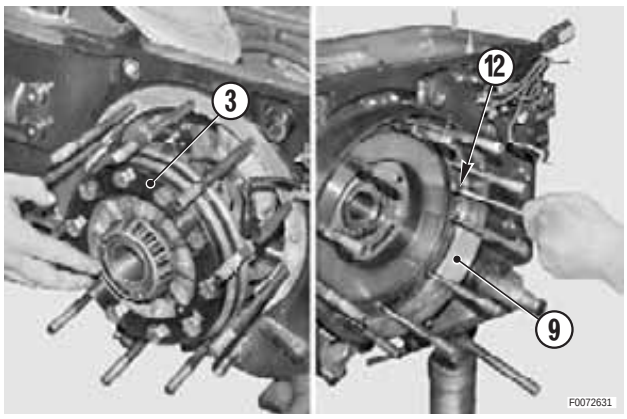
★ Select the circlip by applying the following formula:
Circlip thickness = "*A*":
Fixed dimension = "*K*" = 4.30
Shim thickness = "*S*"
A = *K* – *S*
which in our example gives:
A = 4.30 – 1.45 = 2.85 mm
The 2.80 mm thick circlip should therefore be installed.



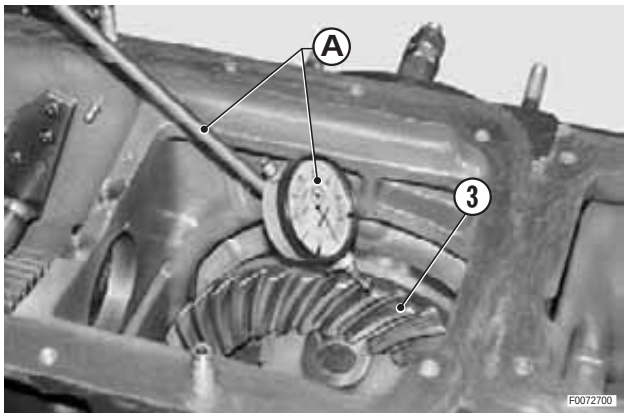
Adjustment of the pinion and crown wheel backlash

1 - Install the complete differential assembly (3) and the carrier (9).

2 - Fix the carrier (9) by tightening the bolts (12).
★ While tightening the bolts, rotate the pinion in both directions and lightly tap the differential housing to help seat the bearings.



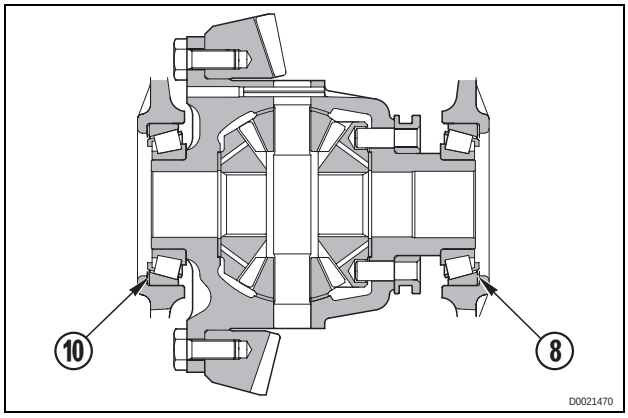
3 - Position a dial gauge on a magnetic stand "*A*" so that the contact point is perpendicular to the side of a tooth on the crown wheel, on the external diameter.
Preload the gauge by about 3 mm and check the backlash "*Z*" between the pinion and crown wheel while moving the crown wheel (3) in both directions.
★ Normal backlash: 0.18÷0.24 mm
★ Take four measurements 90° apart and calculate the average.



4 - If backlash "*Z*" is less than 0.10 mm, remove thickness from the shim pack (10) (crown wheel side) and add the same thicknessto shim pack (8) (opposite side to crown wheel).
If backlash "*Z*" is greater than 0.15 mm, add thickness to the pack (10) (crown wheel side) and removethe same thickness from the pack (8) (opposite side to the crown wheel).
★ The sum total thickness of the shim packs (10) and (8) should not vary from the value calculated during the differential rolling resistance torque test.

5 - Check again the backlash "*Z*" and move the shims to obtain the correct backlash.

6 - Remove the differential and the pinion and proceed with assembly following the procedures described in this chapter.

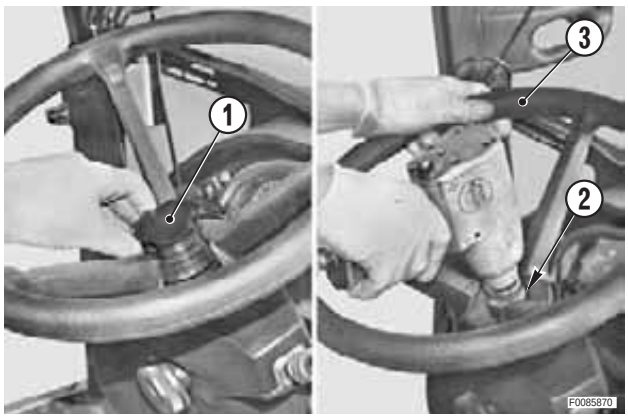


FRONT INSTRUMENT PANEL

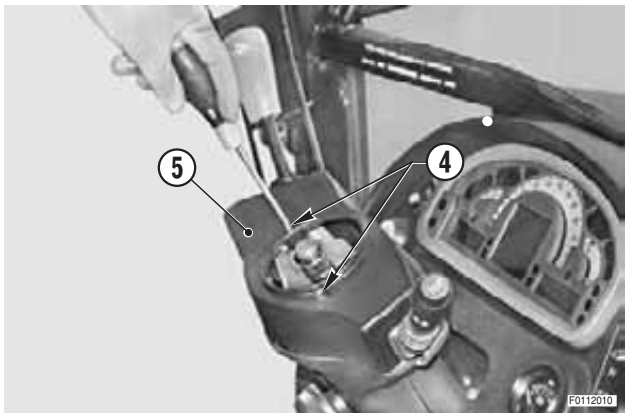
Removal

Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the cover (1), remove the nut (2) andremove the steering wheel (3). ⁂ 1



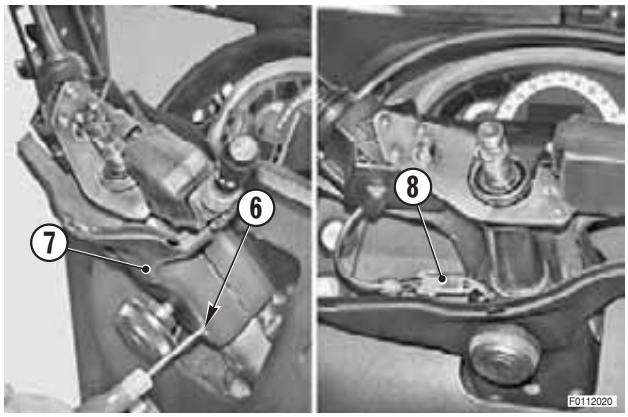
2 - Remove the two screws (4) and remove the upper shroud (5).



3 - Remove the two screws (6) and detach the rear shroud (7) from the steering column.

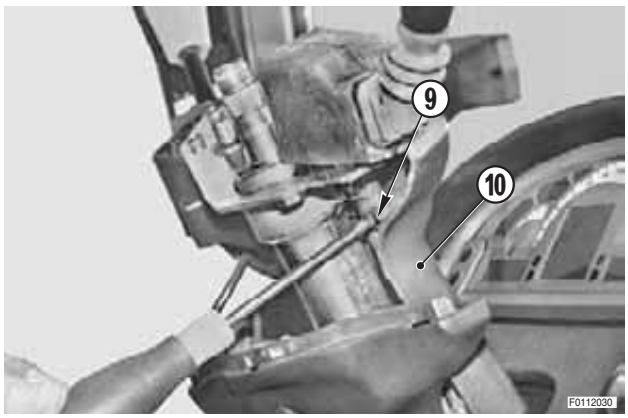
• *Versions with hydraulic shuttle*

4 - Disconnect the wiring connector (8) of the shuttle lever.

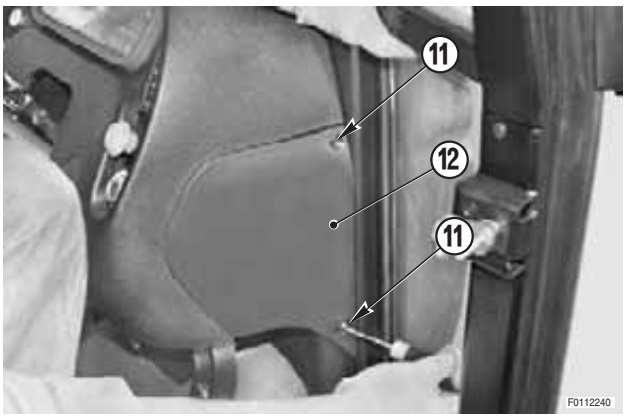


• *For all versions*

5 - Remove the two screws (9) and remove the front shroud (10).

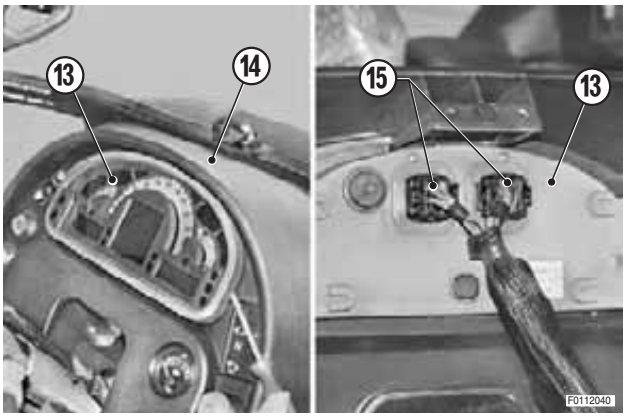


6 - Remove the screws (11) and remove left and right panels (12).

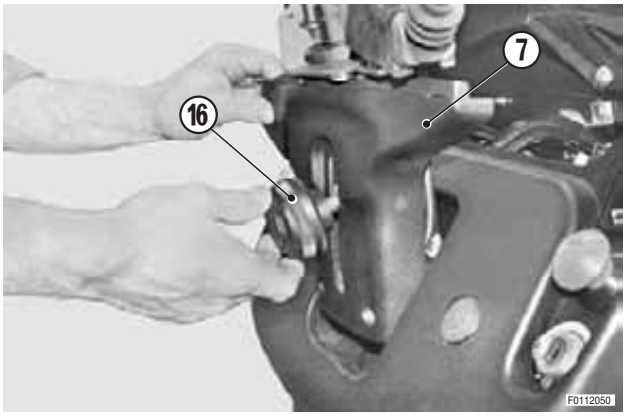


7 - Insert a screwdriver between the instrument (13) and the panel (14) and prise out the instrument (13).

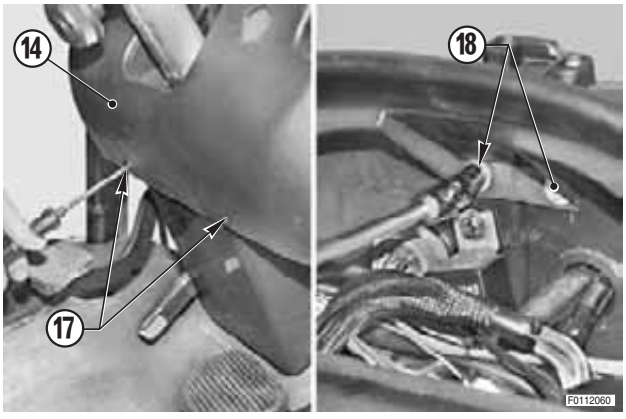
8 - Disconnect the wiring connector (15) from the instrument (13).



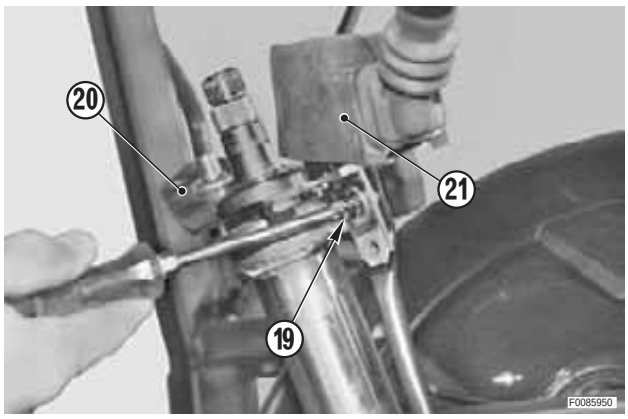
9 - Remove the knob (16) and remove the rear shroud (7).



10 - Remove the screws (17) and (18) and detach the instrument panel (14) from the cab.

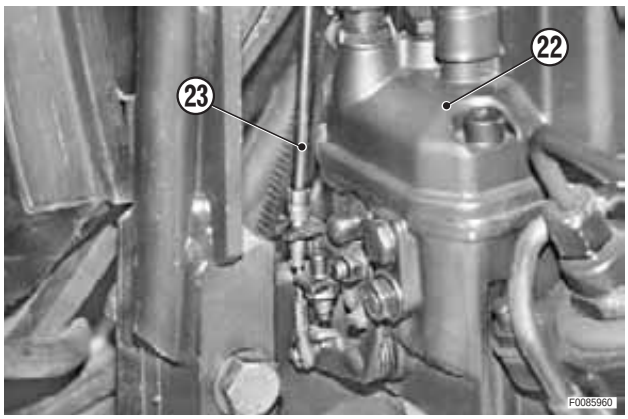


11 - Remove the two screws (19)and remove the support(20) complete with steering column switch unit (21) and, where present, the shuttle control lever.



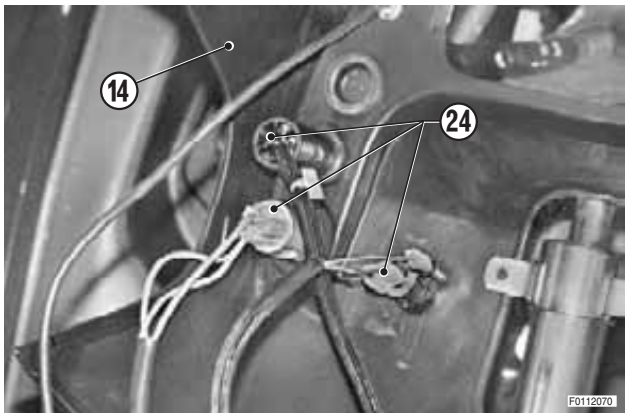
• *Versions with mechanical governor*

12 - Disconnect the engine stop cable (23) from the governor (22).



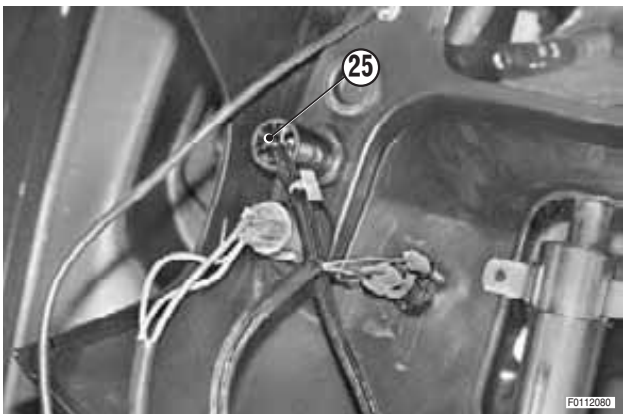
13 - Move the instrument panel (14) away slightly and disconnect the wiring connectors (24).

★ Label the connectors to avoid confusion on refitting.



• *For all versions*

14 - Disconnect the wiring connector (25) and remove the instrument panel (14).



Refitting

• Refitting is the reverse of removal.

1

Nut: Loctite 242

Nm Nut: 115 Nm (84.8 lb.ft.)

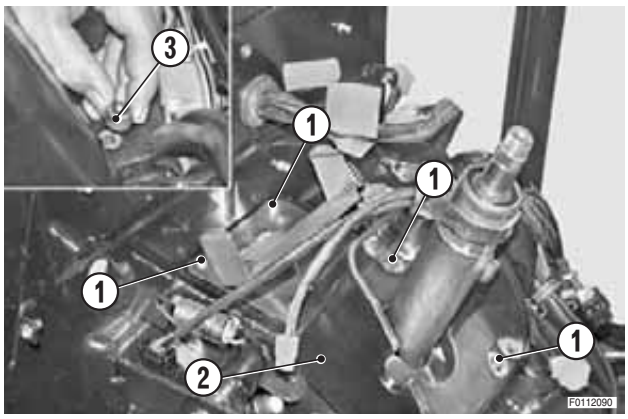
HYDROSTATIC STEERING VALVE

Removal

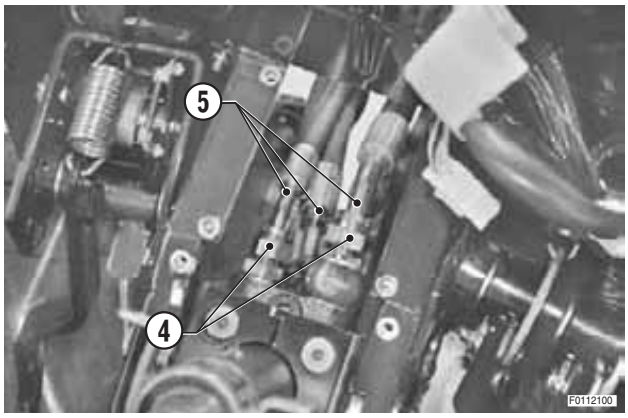
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Remove the front instrument panel.
(For details, see "FRONT INSTRUMENT PANEL").

2- Remove the eight screws (1) and remove the cover (2).
★ Recover the spacers (3).

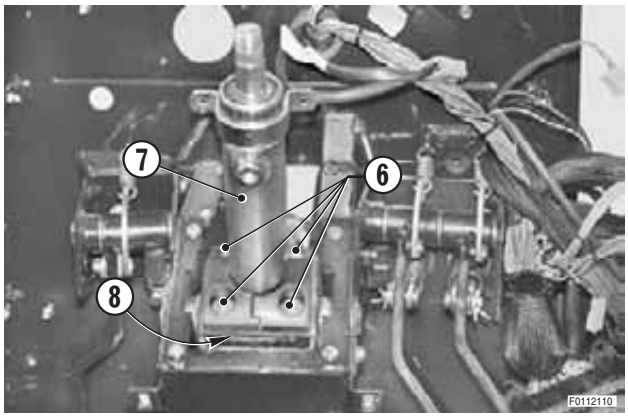


3 - Loosen the fittings (4) and disconnect the pipes (5) from the steering valve.
★ Label the pipes to avoid confusion on reconnection.
★ Renew the copper washers on reassembly.



4 - Remove the screws (6), remove the steering column (7) and the steering valve (8).

※ 1



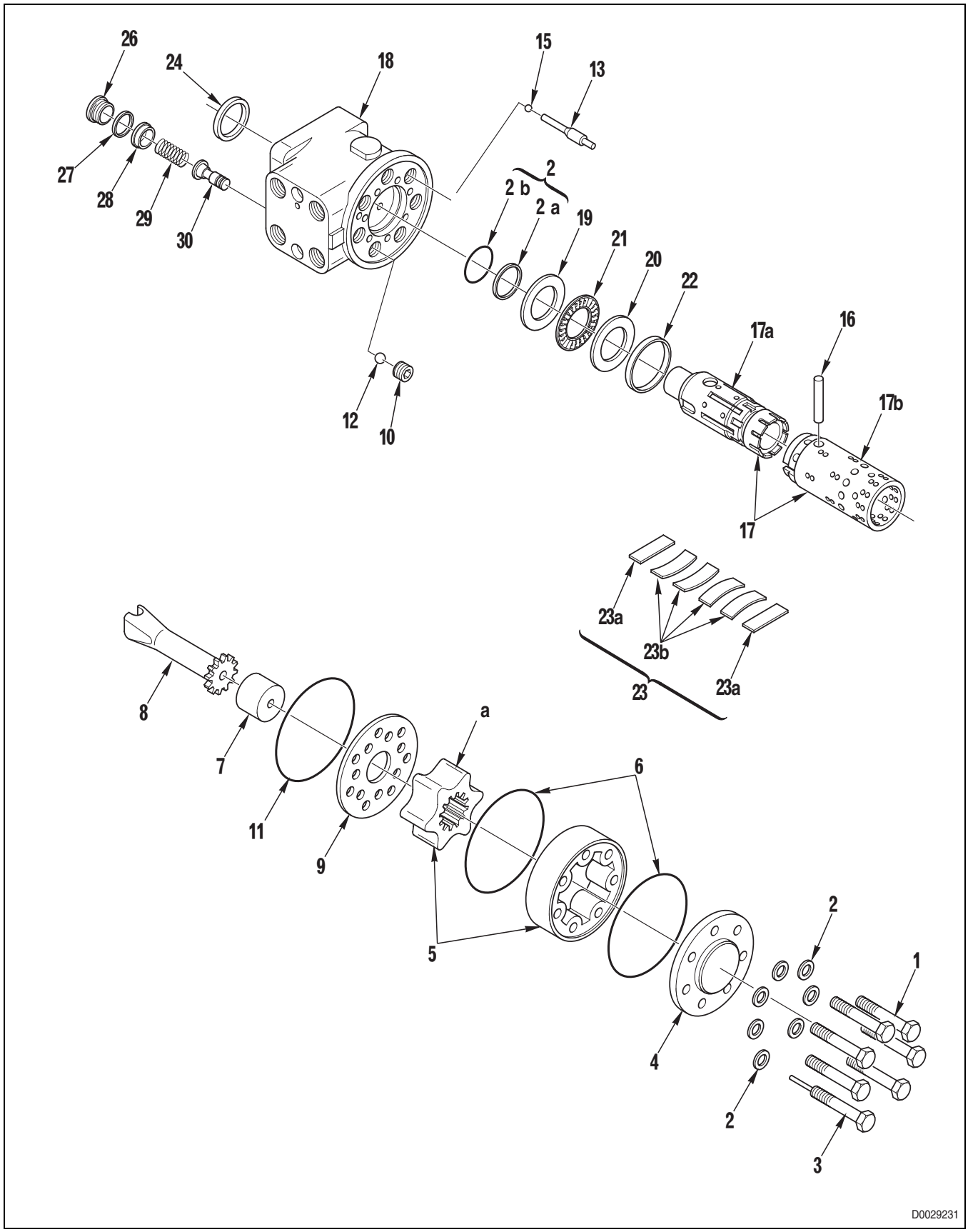
Refitting

- Refitting is the reverse of removal.

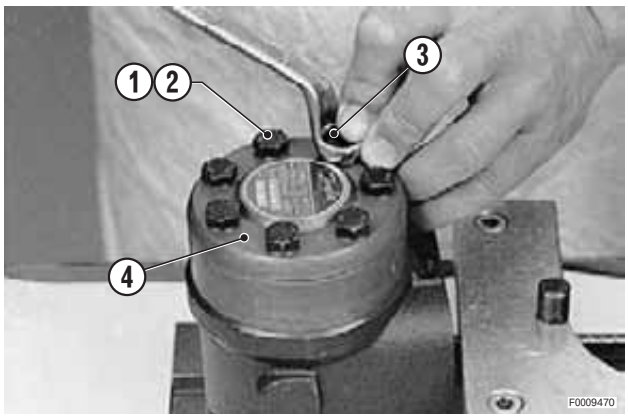
※ 1

Hydrostatic steering valve: Grease

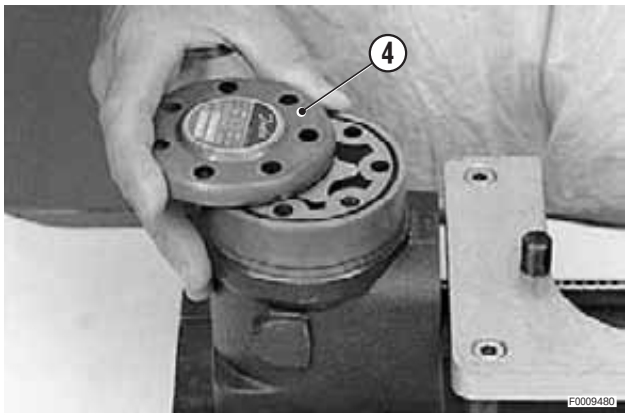
Disassembly



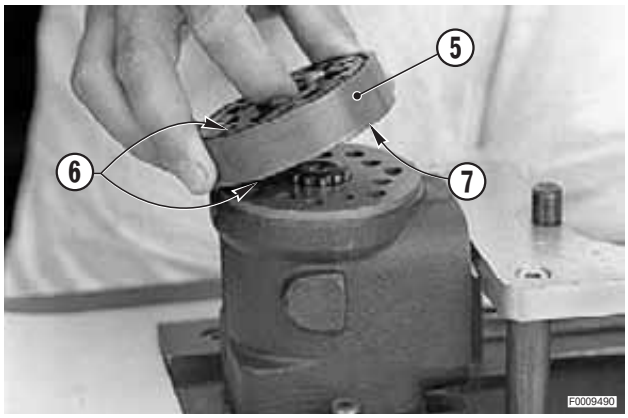
1 - Unscrew and remove the screws (1) and (3) washers (2) securing the cover (4) (six screws plus one special screw).



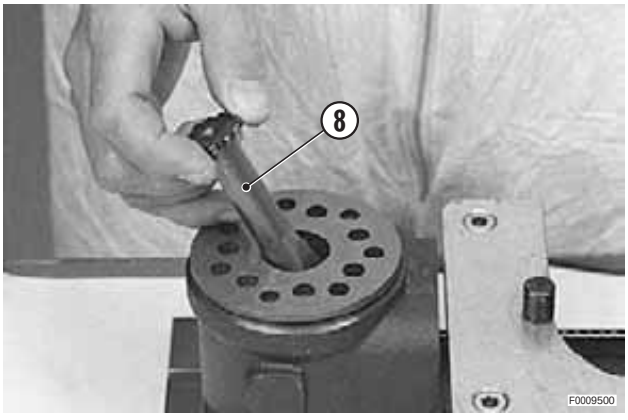
2 - Remove the cover (4) by sliding it off sideways.



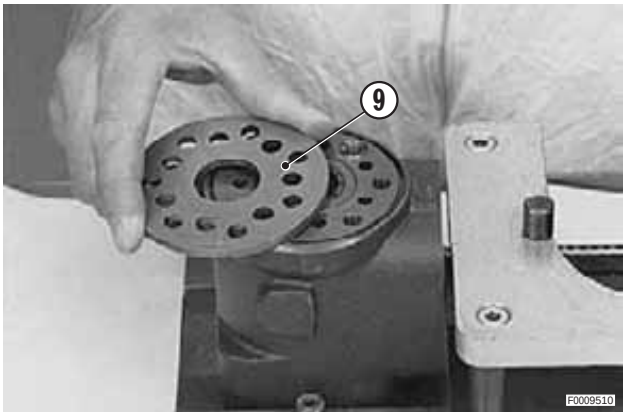
3 - Lift the rotary control valve (5) complete with the O-rings (6) and the spacer (7).



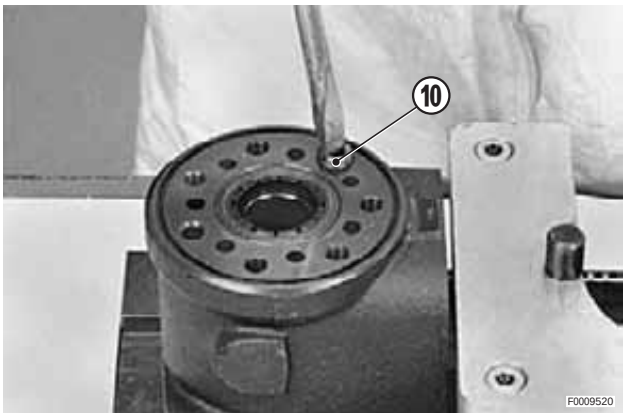
4 - Remove the drive shaft (8).



5 - Remove the distributor plate (9).



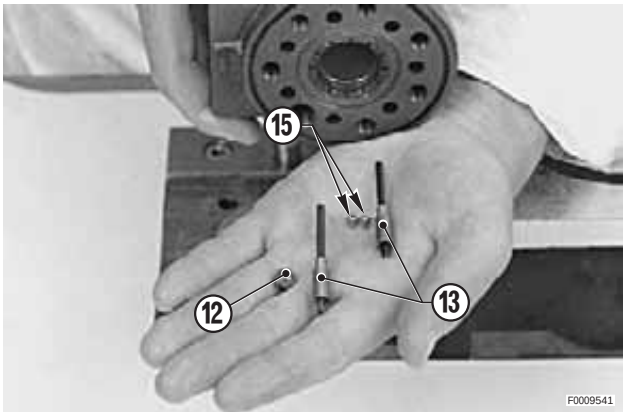
6 - Remove the safety valve bush (10).



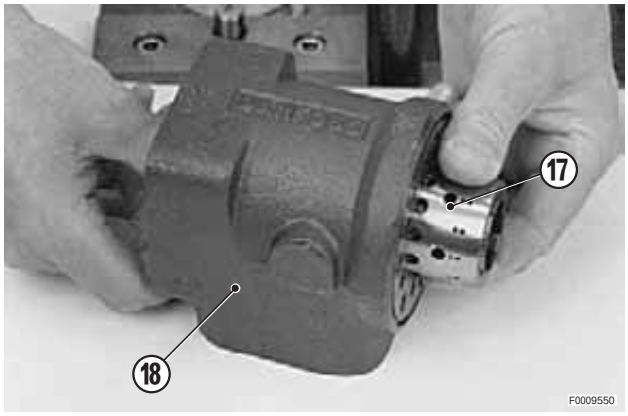
7 - Remove the O-ring (11).



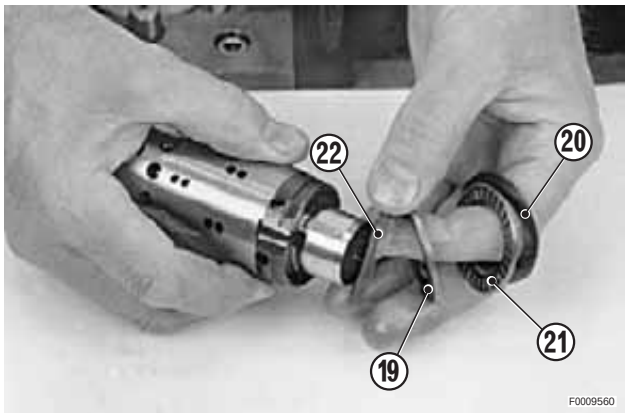
8 - Remove the ball (12) of the check valve and the pins (13) and balls (15) of the suction valves.



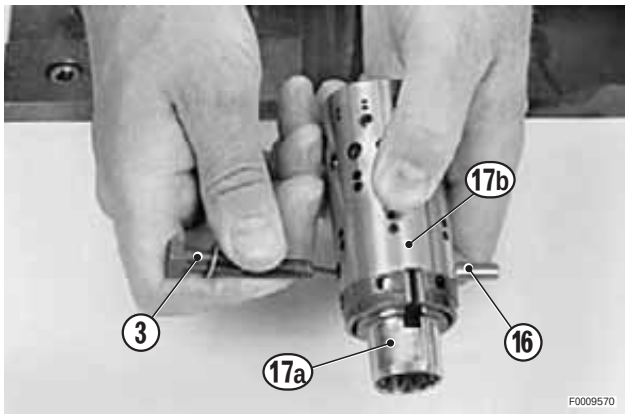
9 - Checking through the central hole of the rotary valve, position the cross pin (16) horizontally.
Push the rotary valve assembly (17) and the bearing assembly out of the steering valve housing (18).



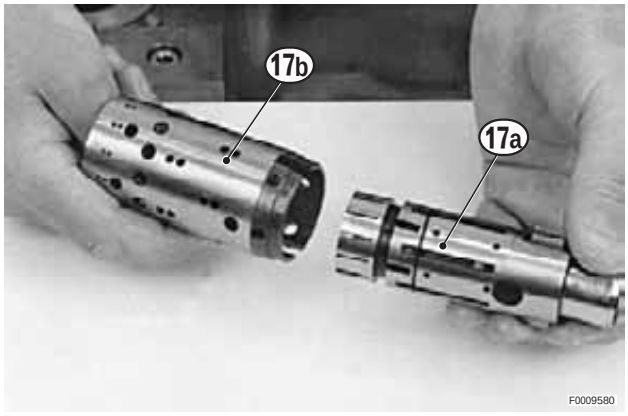
10 - Remove the outer race (19), the inner race (20) and the roller bearing (21) from the spool; remove alsothe ring (22).
★ The inner race (20) (thin) can sometimes remain in the steering valve housing; ensure that it is fact removed.



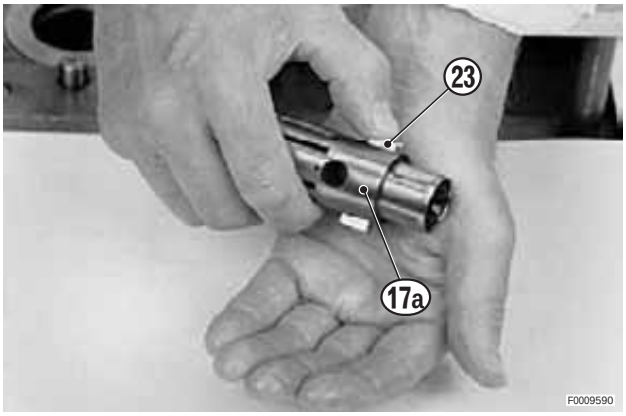
11 - Remove the cross pin (16), the valve sleeve (17b) and the valve spool (17a).
★ Use the special cover screw (3).



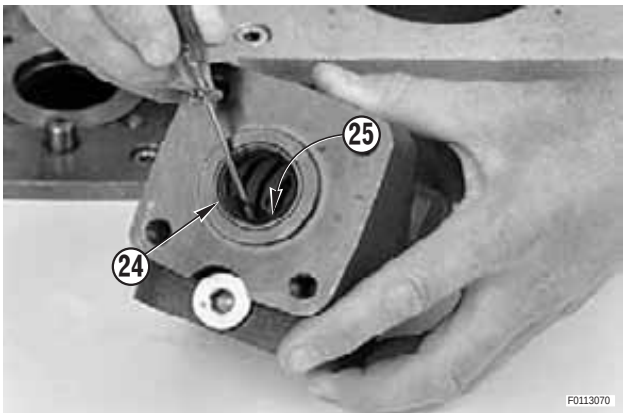
12 - Slowly withdraw the spool (17a) from the sleeve (17b).



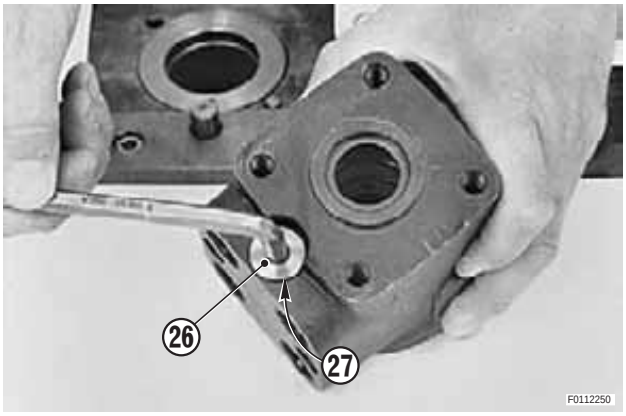
13 - Press the neutral position springs (23) and remove them from the spool (17a).



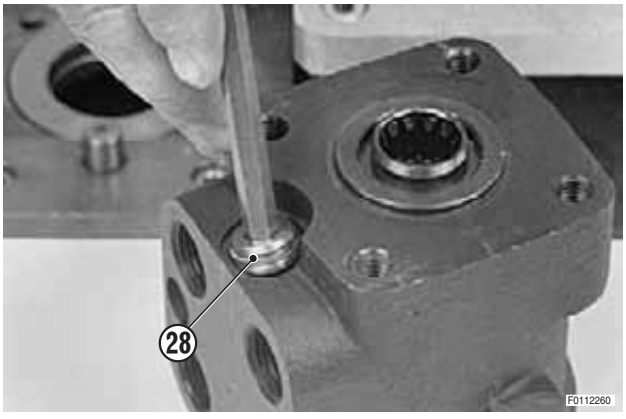
14 - Remove the dust seal (24) and the composite seal (25) (O-ring + seal).



15 - Remove the plug (26) and its gasket (27).

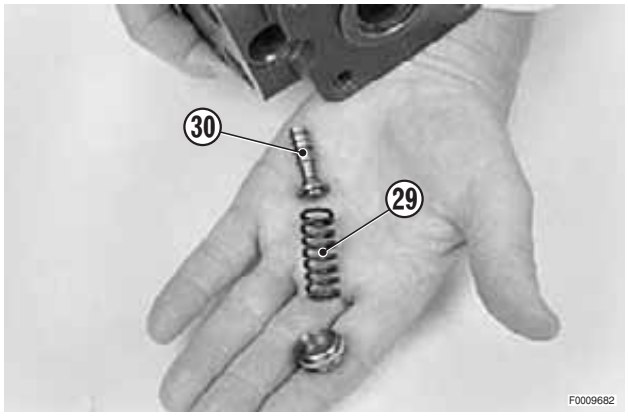


16 - Remove the pressure relief adjuster screw (28).



17 - Turn over the steering valve housing and remove the spring (29) and the relief valve (30).

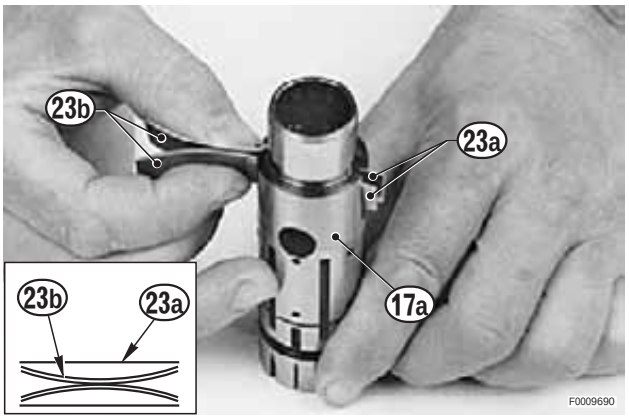
★ The seat of the relief valve is a force fit in the housing and cannot be removed.



Assembly

★ Prior to reassembly, lubricate all components with gearbox oil.

1 - Insert the two flat washers (23a) in the seat and centre them relative to the diameter of the spool (17a). Insert the four curved washers (23b) in pairs between the two flat washers (23a) and push them fully home.

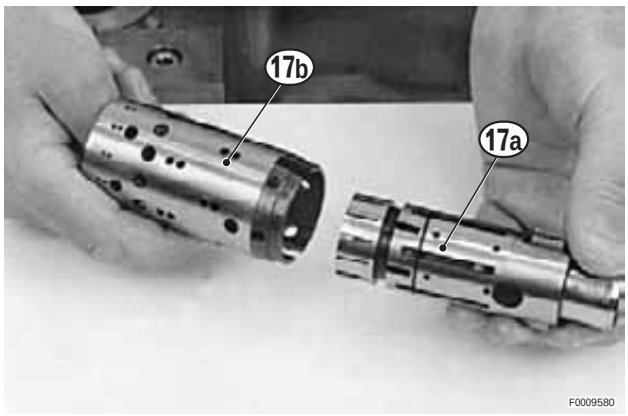


2 - Align the spring assembly (23).



3 - Insert the rotary valve spool (17a) in the sleeve (17b).

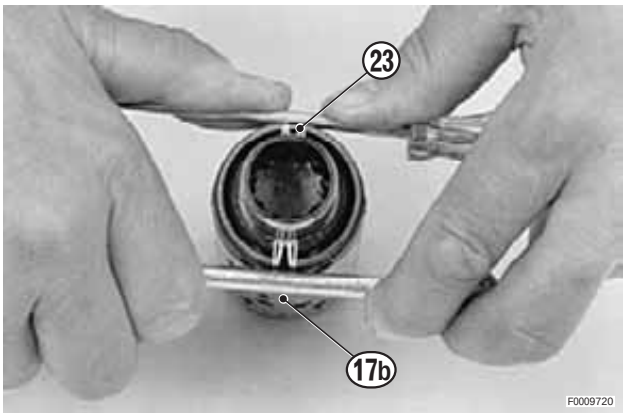
★ Check that the position between the sleeve and the spool is as described in stage 1.



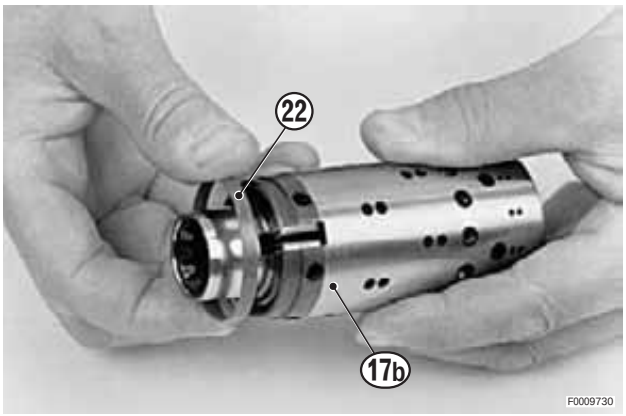
4 - Simultaneously push the springs (23) and the spool (17a) until the springs are seated in the slots in the sleeve (17b).



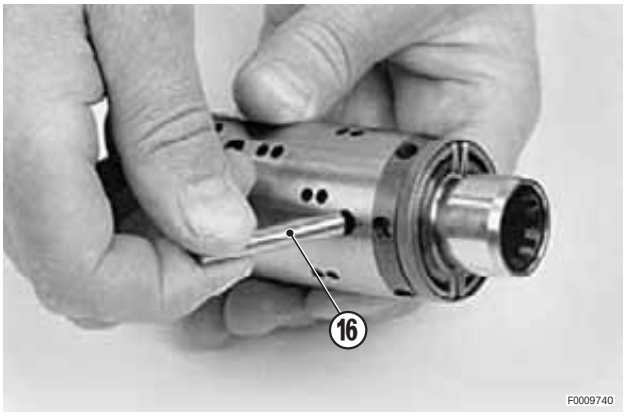
5 - Align the springs (23) and make sure they are positioned centrally in relation to the diameter of the sleeve (17b).



6 - Install the ring (22) on its seat on the sleeve (17b).
★ The ring (22) must be free to rotate without interfering with the springs (23).



7 - Insert the cross pin (16).

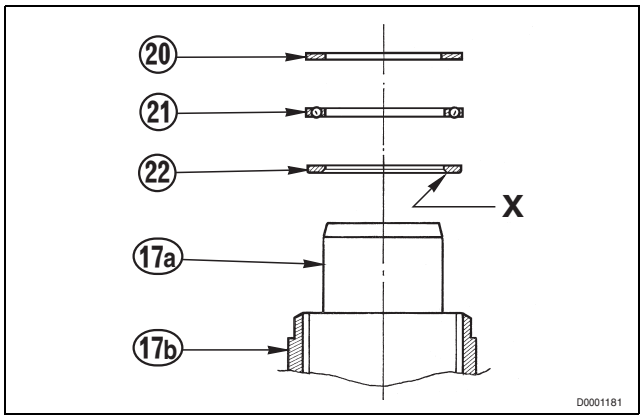


8 - Install the thrust bearing components in the order indicated in point 9.

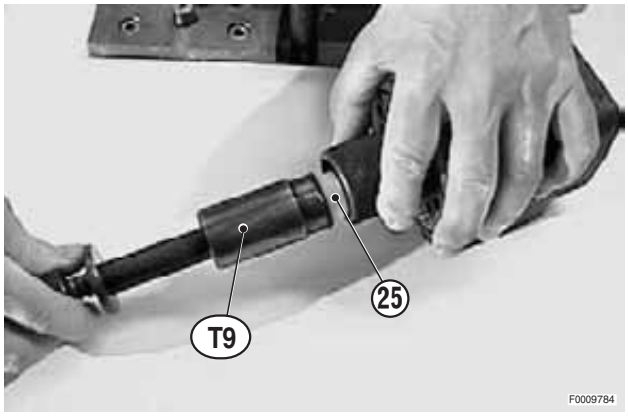


9 - Thrust bearing assembly.
17a -Spool
17b -Sleeve
21- Needle roller bearing
20 -Inner ring
22 -Outer ring

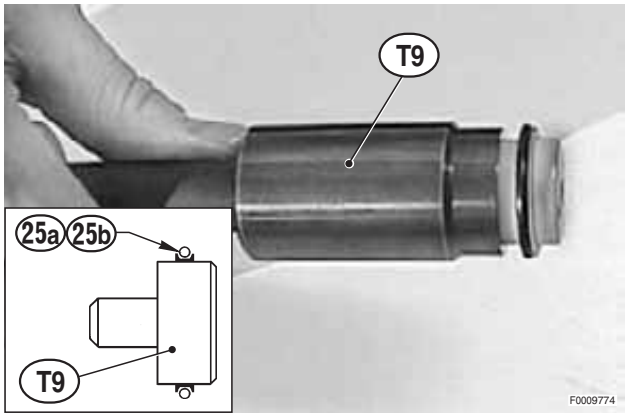
⚠ The outer ring must be installed with the chamfer "**X**" facing the shoulder of the valve spool.



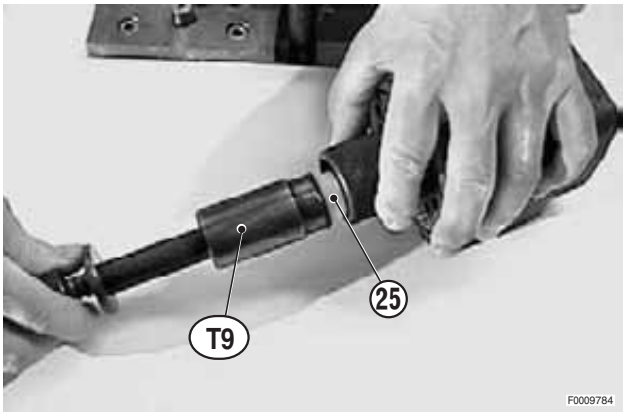
10 - Position the steering valve housing (18) so the hole is horizontal.
Insert the guide of special tool *T9* (P/N 5.9030.480.0) in the valve spool assembly.



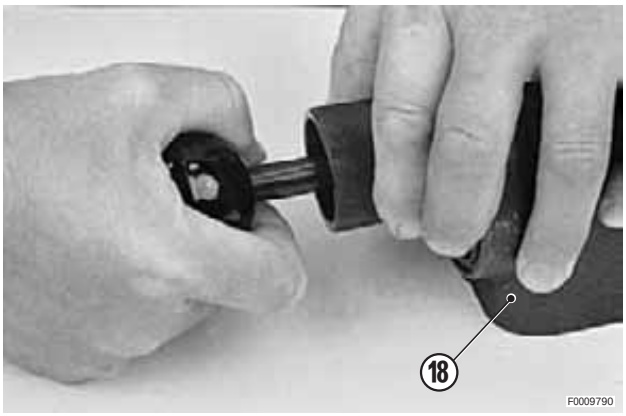
11 - Lubricate the oil seal (25a) and the O-ring (25b) and fit them on the plunger of tool *T9* (P/N 5.9030.480.0).



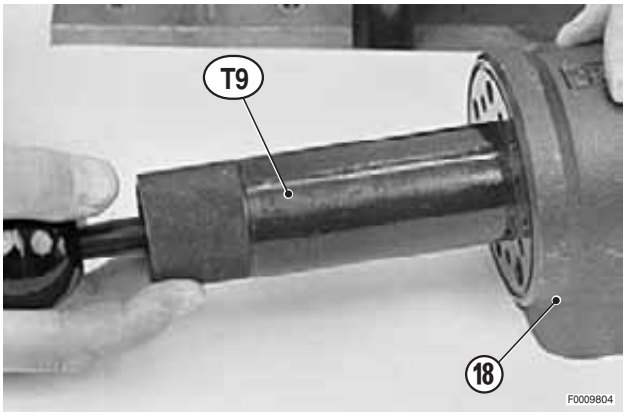
12 - Fit the tool *T9* (P/N 5.9030.480.0) and insert it in the guide previously inserted in the steering valve bore.



13 - Push the seal (25) into its seat in the steering valve housing (18) while rotating it to ease it into position.

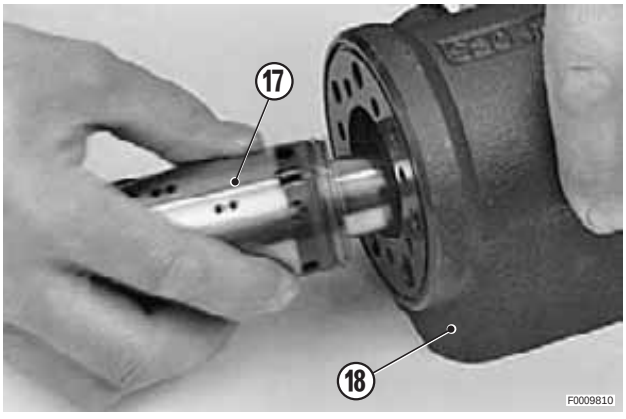


14 - Withdraw from the steering valve housing (18) the tool *T9* (P/N 5.9030.480.0) and the guide, leaving in position the tool plunger.

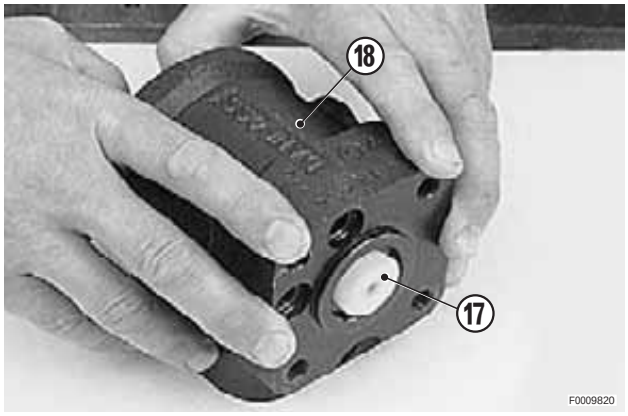


15 - Insert the rotary valve assembly (17) in the hole of the steering valve (18).
Rotate the valve slightly while inserting it to ease it into position.

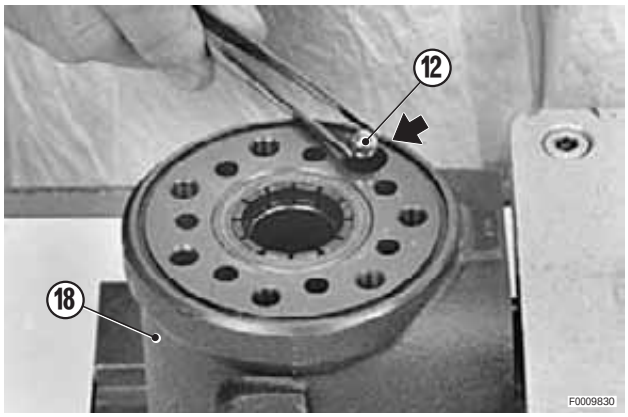
★ Keep the cross pin horizontal while inserting the rotary valve assembly.



16 - Push in the assembly (17) until fully seated so that it forces out the tool plunger left in the housing in step 14.

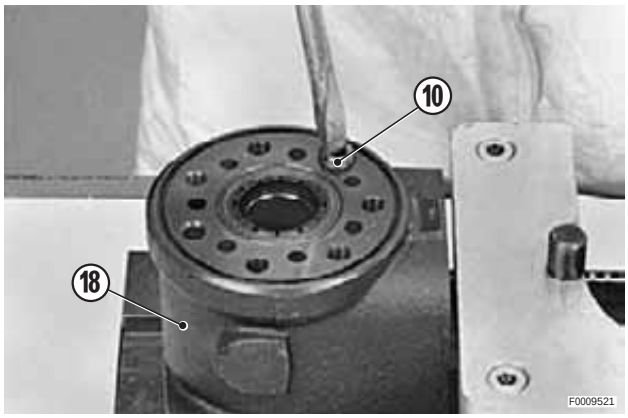


17 - Rotate the steering valve housing (18) until the centre hole is vertical.
Insert the ball (12) of the safety valve in the hole indicated by the arrow.

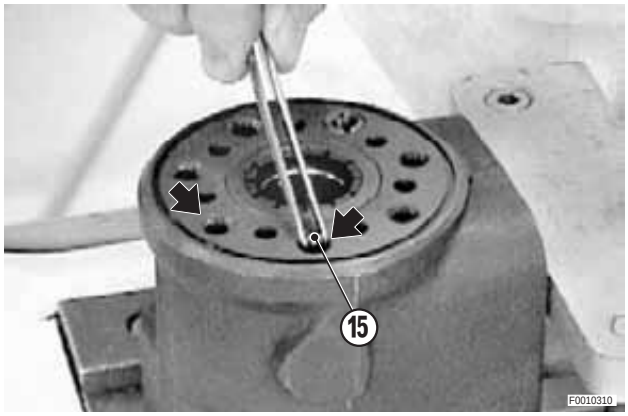


18 - Screw the retaining bush (10) into the hole of the safety valve.

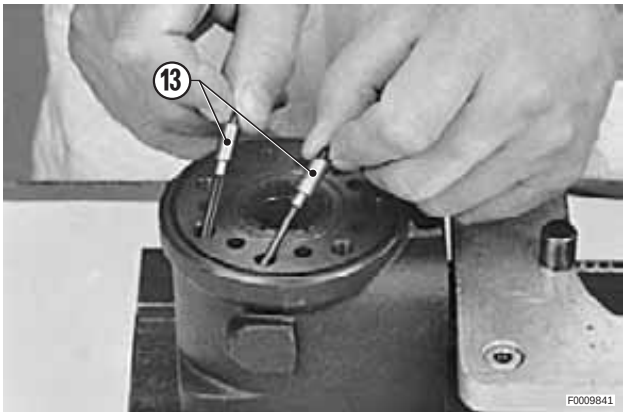
★ The top of the retaining bush should be set below the face of steering valve housing (18).



19 - Insert the two balls (15) in the holes indicated by the arrows.

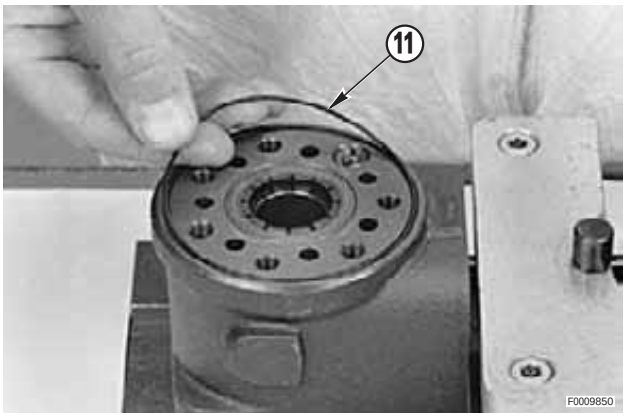


20 - Insert the pins (13) in the same holes.

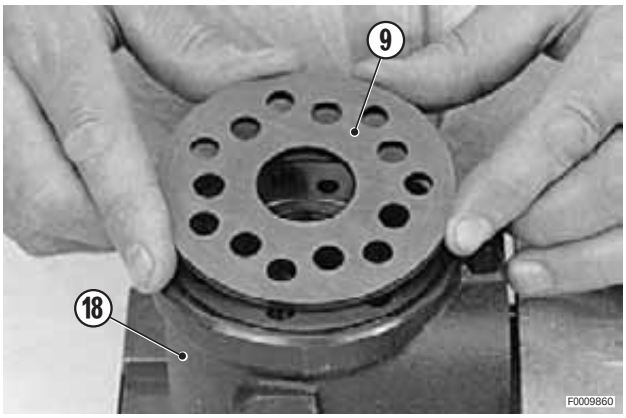


21 - Lubricate the O-ring (11) and fit it in its seat.

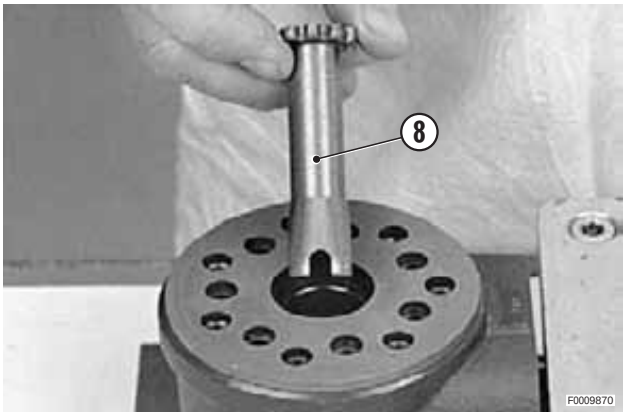
O-ring: Gearbox oil



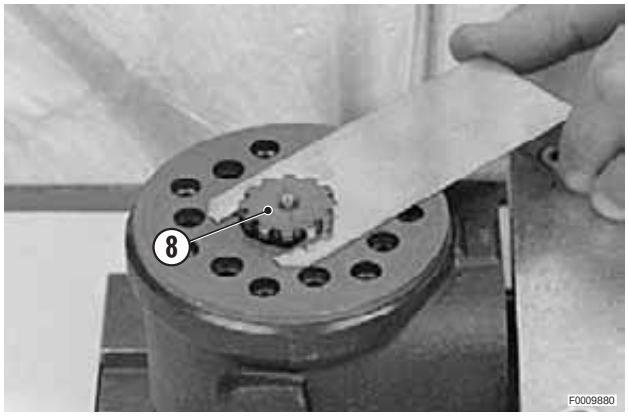
22 - Locate the distributor plate (9) so that its holes are aligned with the holes in the steering valve housing (18).



23 - Insert the drive shaft (8) in the hole so that it engages the cross pin; check that the engagement with the cross pin is parallel to the steering column mounting face.

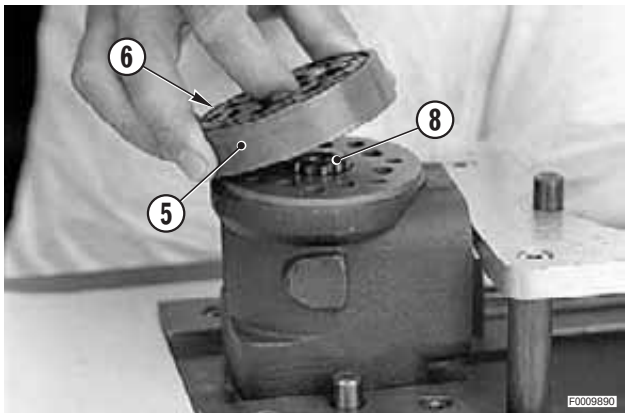


24 - Position the drive shaft so that it is vertical and hold it in this position using a suitable tool.

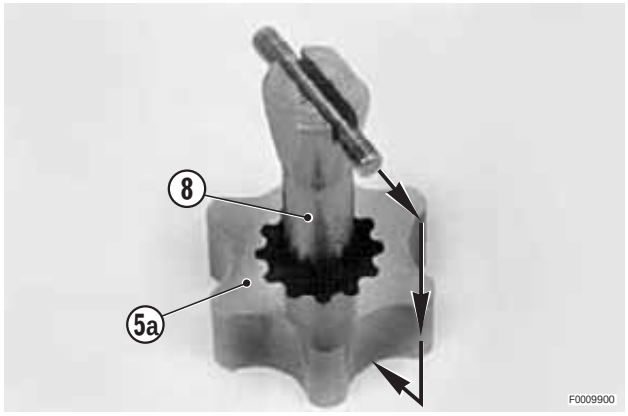


25 - Lubricate the two O-rings (6) and fit them in the two grooves in the rotary valve assembly (5).
Fit the rotary valve assembly (5) assembly to the drive shaft (8).

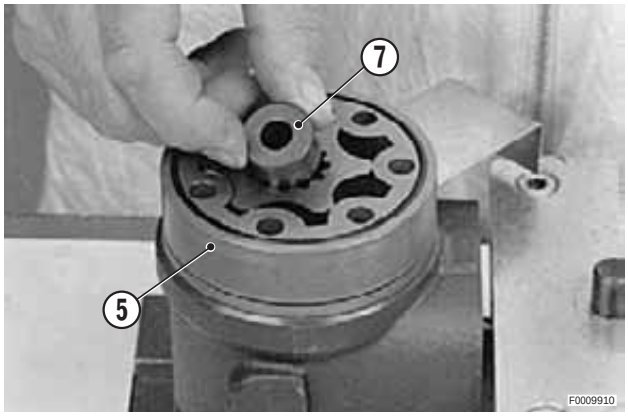
O-rings: Gearbox oil



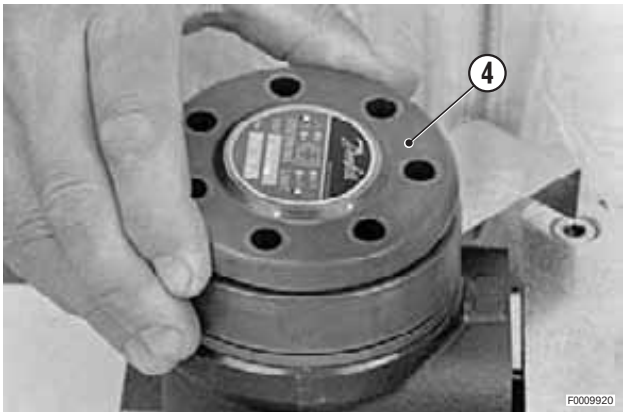
Install the rotor (5a) on the drive shaft (8) so that the valley between two lobes is aligned with the groove in the end of the drive shaft. Then turn the outer ring (5b) to align the fixing holes.



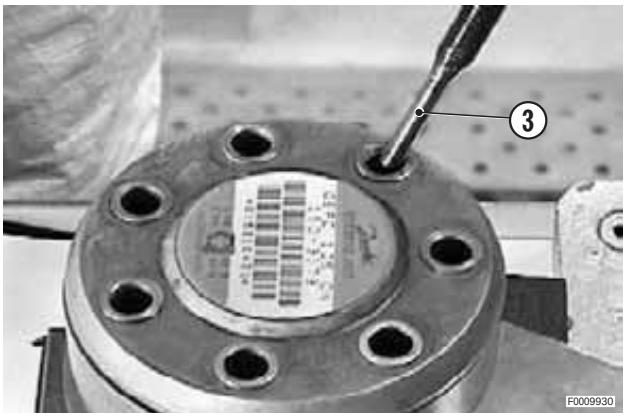
26 - Install the spacer (7).



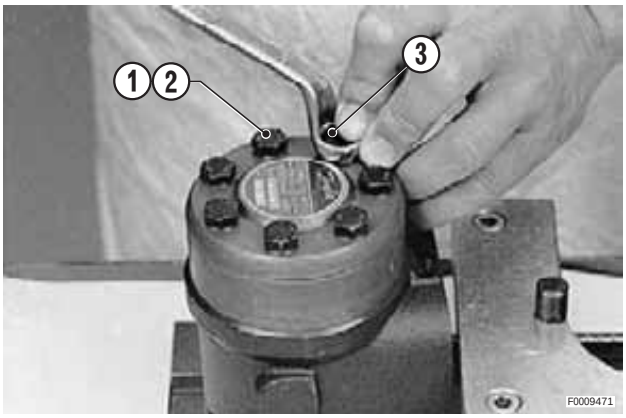
27 - Fit the cover (4).



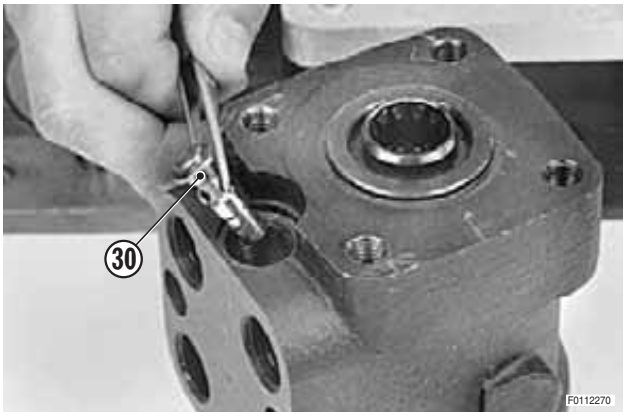
28 - Insert the special screw (3) complete with the washer (2) in the hole indicated in the photo.



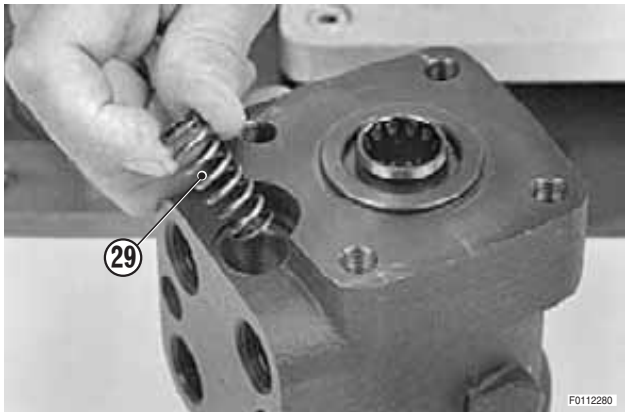
29 - Insert the six screws (1) complete with washers (2). Tighten the screws (1) and (3) in a crosswise sequence to a torque of 30±6 Nm (22.1±4.4 lb.ft.).



30 - Fit the relief valve (30).

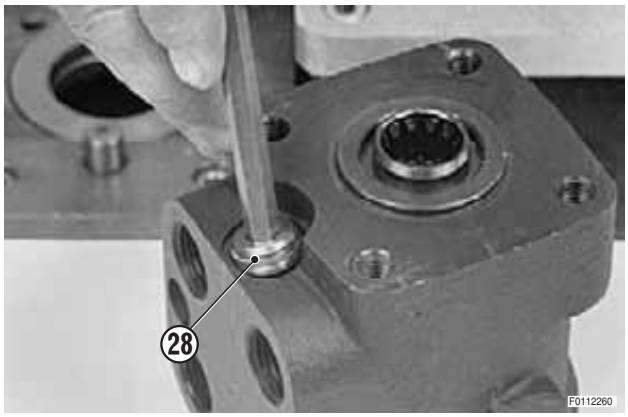


31` - Fit the spring (29).



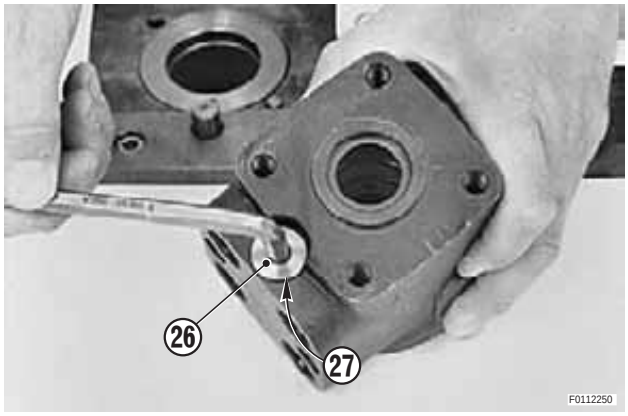
32- Fit the pressure adjustment screw (28).

★ Calibrate the maximum working pressure on a test bench
(For details, see "RELIEF VALVE" in this chapter).

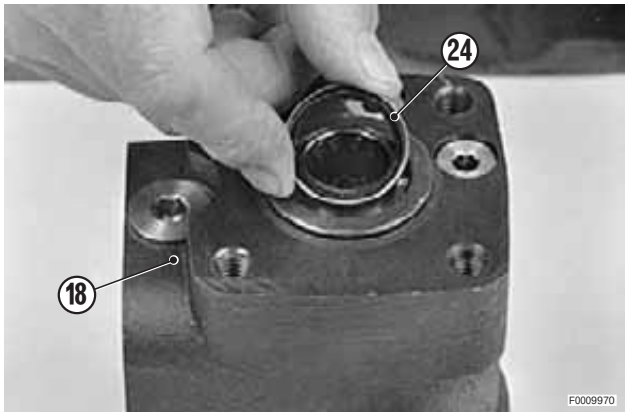


33 - Fit the plug (26) complete with seal (27).

Nm Plug: 50±10 Nm (36.8±7.4 lb.ft.)



34 - Locate the dust seal (24) in the steering valve housing (18).



35 - Install the dust seal (24) in the steering valve housing using a suitable drift and a soft faced mallet.



• *For all versions*

36 - Close off the oil ports with plastic plugs to prevent impurities getting in.

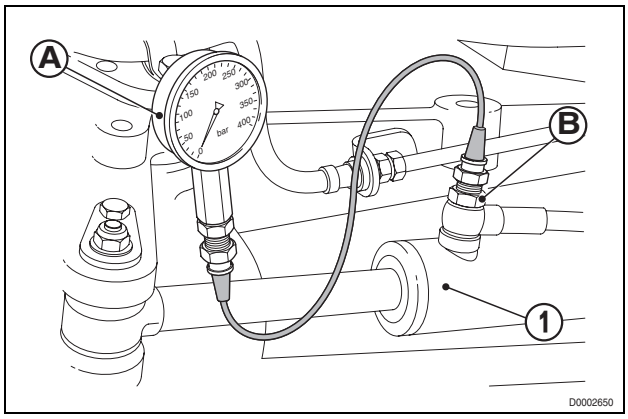
★ Fit the plugs by hand pressure alone; do not use a hammer.



37 - On completion of the assembly operation, test the operating pressure of the relief valve and calibrate as necessary.
(For details, see "Checking maximum operating pressure" in this chapter).

RELIEF VALVE

Checking maximum operating pressure



1 - Disconnect the rod side pressure connection from a steering cylinder (1) and fit in its place fitting "*B*" connected to a 400 bar pressure gauge *"A*".

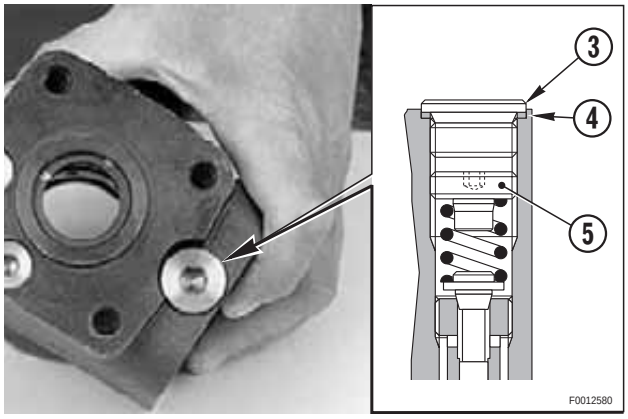
2 - Start the engine and turn the wheel back and forth between the full lock positions to eliminate all air from the system.

3 - With the engine running at 1000 rpm, force the steering wheel to full lock on the side to which the pressure gauge is connected and hold it in this position; read off the maximum continuous pressure on the pressure gauge "*A*".

★ Maximum permissible pressure:
2WD 100 $^{+5}_{0}$ bar - 4WD 150 $^{+5}_{0}$ bar

4 - If the pressure reading differs from the specified value, adjust the steering valve pressure relief valve).

Relief valve setting



1 - Remove the hydrostatic steering valve (2).
(For details, see "REMOVAL" in this chapter).

2 - Remove the plug (3) and the relative seal (4).

3 - Using a hex key, proceed to adjust the relief pressure by turning setscrew (5).

- To INCREASE the pressure, turn the screw CLOCKWISE
- To REDUCE the pressure, turn the screw COUNTER-CLOCKWISE.

4 - Refit the plug (3), checking that the seal (4) is correctly seated.

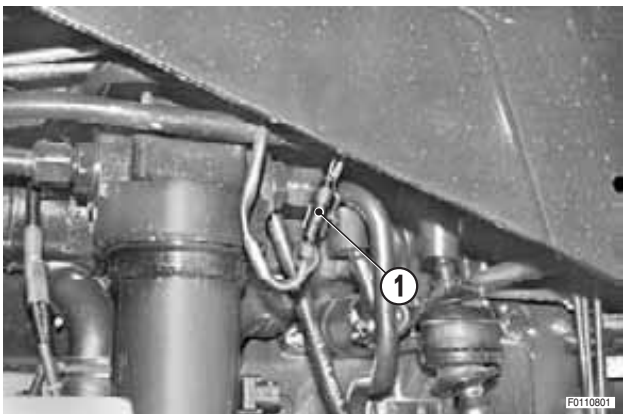
Nm Plug: 50÷60 Nm (36.9–44.2 lb.ft.)

SIDE CONSOLE

Removal

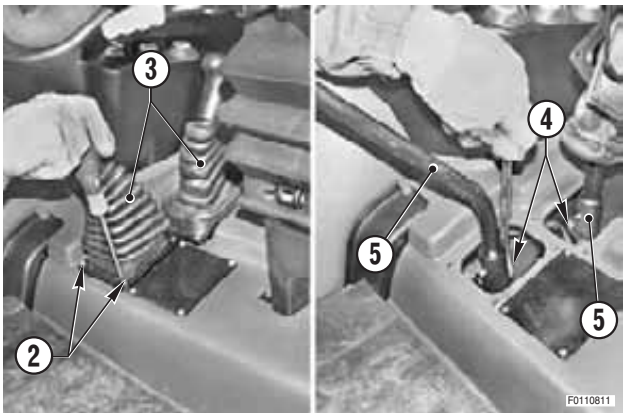
Disconnect the lead from the battery negative terminal (–) and apply the parking brake.

1 - Disconnect the wiring connector (1) of the gear lever.

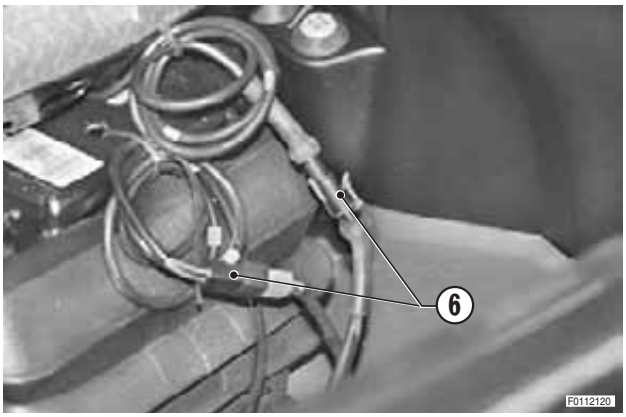


2 - Remove the screws (2) and lift the gaiters (3).

3 - Remove the screws (4) and disconnect the levers (5).



4 - Disconnect the wiring connectors (6) of the power feed to seat and the operator presence sensor.

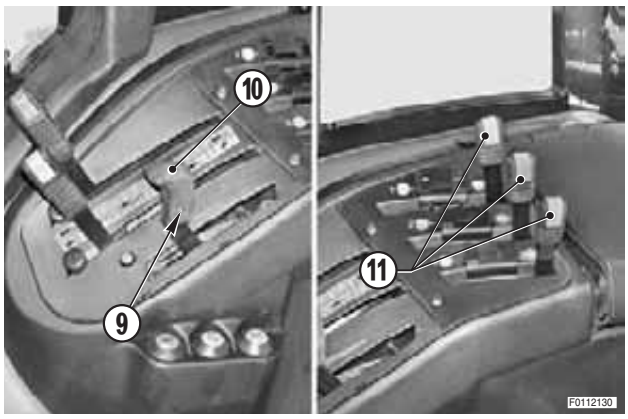


5 - Remove the screws (8) and remove the seat (7).

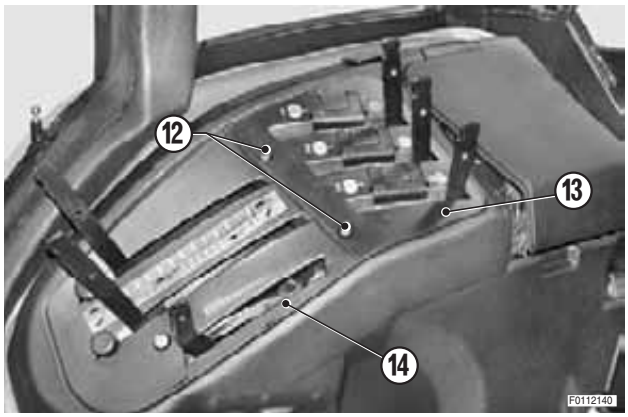


6 - Remove the screw (9) and remove the knob (10).

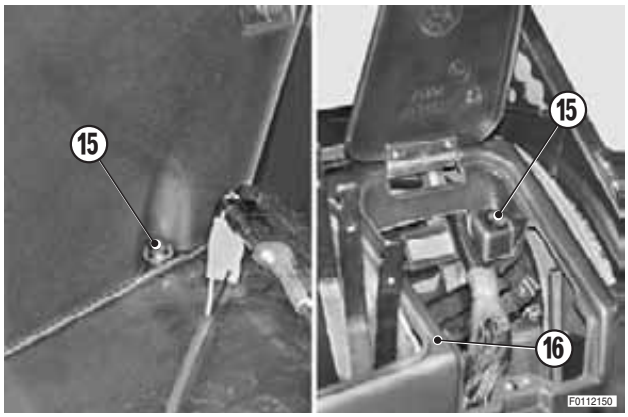
7 - Remove the knobs (11).



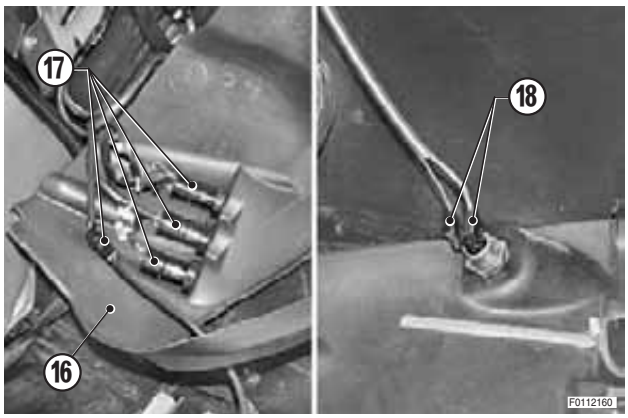
8 - Remove the screws (12) and remove the panels(13) and (14).



9 - Remove the three screws (15) and move the panels (16).



10 - Disconnect the wiring connectors (17) and (18) and remove the panels (16).



Refitting

- Refitting is the reverse of removal.

SECTION 40

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THE STRUCTURE OF THE UNIT

For easier consultation, this unit has been divided into the following chapters:

1. INTRODUCTION

Contains a brief description of the terminology used, the procedures to follow for troubleshooting and repairs, and the instruments required for troubleshooting.

2. INDICES

Contains the indices arranged by connector name, by component code and by component description.

3. COMPONENTS

Contains the layouts of the connectors used in the electrical system, descriptions of the components installed on the tractor,the technical data necessary for functional testing and the pinouts of the electronic control units.

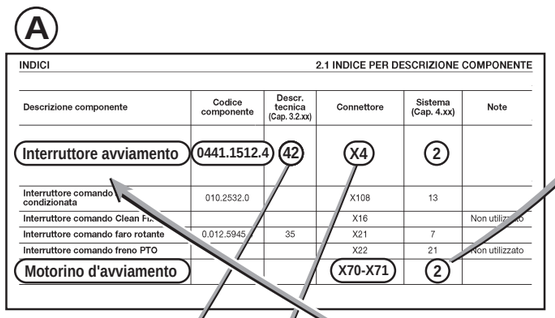
4. SYSTEMS

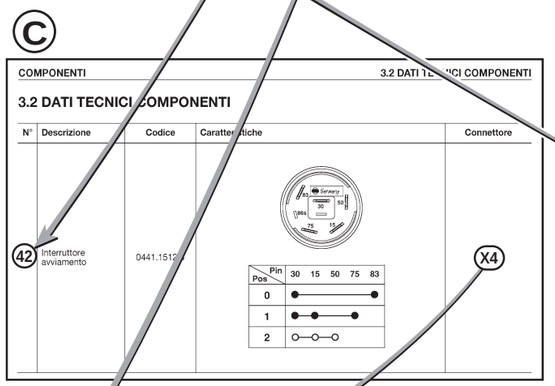
Contains the electrical diagrams of the tractor's systems.

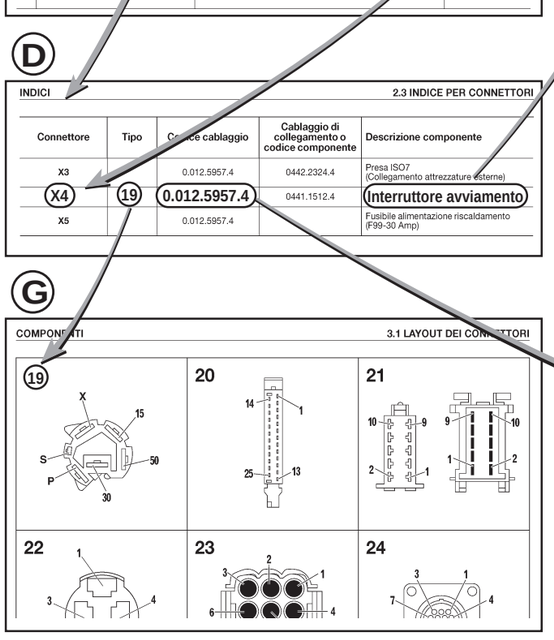
5. WIRING LOOMS

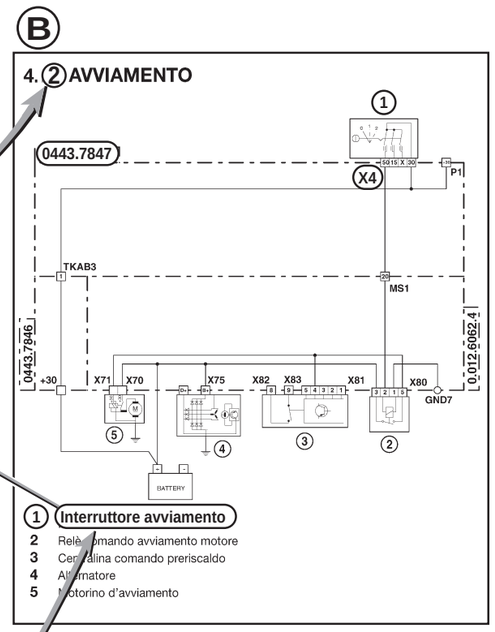
Contains the layouts, the wiring diagrams and the positioning of connectors on the tractor.

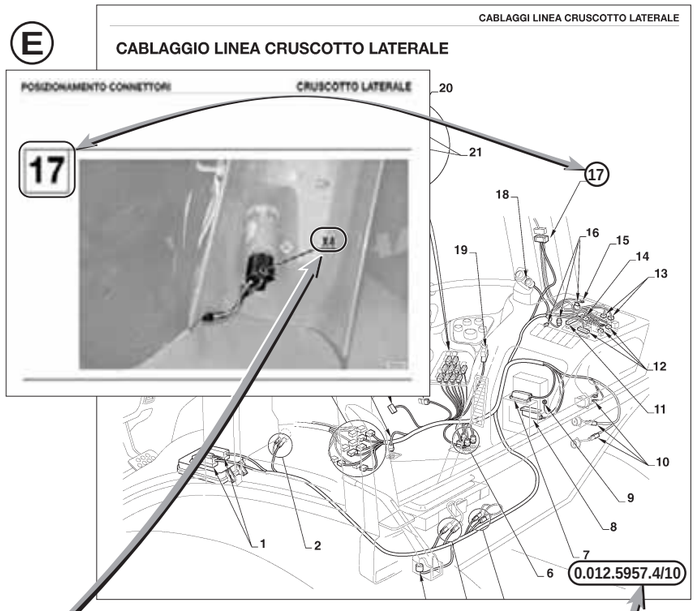
HOW TO CONSULT THE UNIT

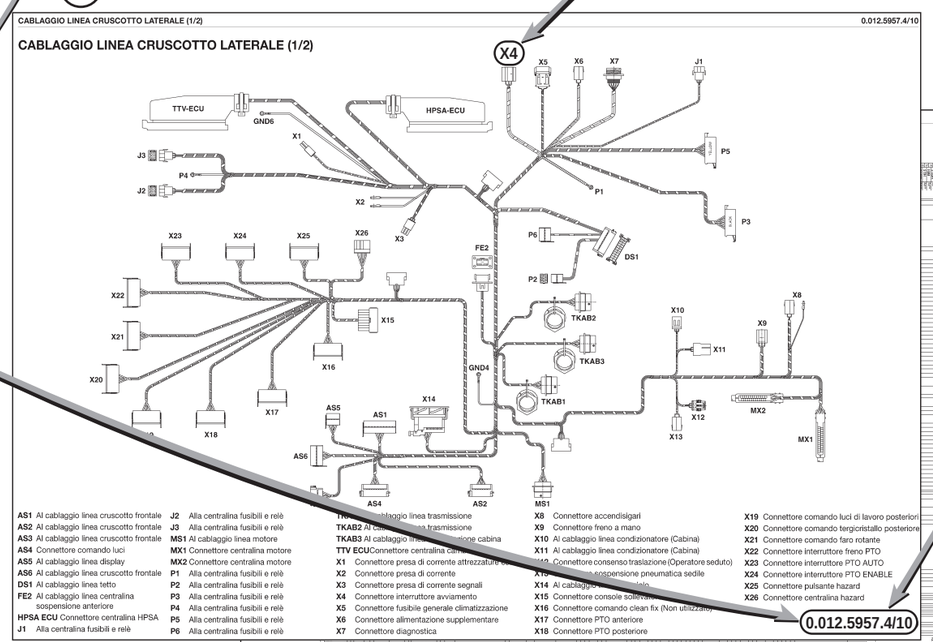












How to consult the table

The quickest way to determine the cause of a malfunction of a component is to check all the components in the system in which the component is incorporated.
In the example given on this page, the fault simulated is a malfunctioning starter motor that fails to start the engine.

1 - Look in paragraph «*2.1. Component description index*» for the starter motor and determine the system in which it is incorporated.
The system is indicated in the column «*System (para. 4.xx)*» and in this case is "*2*" (figure A).

2 - Consult paragraph «*4.2 Starting*» (figure B) where all system components are shown in the electrical diagram; these components are accompanied by numbers that correspond to the key on the same page.

3 - Check all the components in the system, starting, for example, with the switch "*1*".

4 - Look in paragraph «*2.1. Component description index*» (figure A) for "*Starter switch*" and check in the column «*Technical. Descr'n (par 3.2.xx)*» whether there is technical description (in this case it is reported at n° 42 in the paragraph «*3.2 component technical data*») (figure C).
Take note also of the name of the connector to which the component is connected (in this case "*X4*").

Only if the position of the component is not known

5 - Look in paragraph «*2.3 Connector index*» (figure D) for the name of the connector to which the component is connected (in this case "*X4*") and note down the wiring harness in which it is incorporated (in this case "*0.012.5957.4*") and the type of connector (in this case "*19*").

6 - Look for the wiring harness in chapter «*5. Layouts, electrical wiring diagrams, connector positions*» using the index at the beginning of the chapter.

7 - Look for the name of the connector in the photos attached to the electrical diagrams and determine its position on the tractor from the drawing (figure E)
NOTE.
The wiring diagrams (figure F) contain the names and descriptions of the connectors that are used in all the tables of chapter 2.

8 - Using the data contained in the paragraph «*3.2 Component technical data*» (figure C) in position n° *42*, check the operation of the switch.

⚠ If the pinout of the connector is not known, look in paragraph «*3.1 Connector layouts*» (figure G) for the number found in the column "*Type*" of paragraph «*2.3 Connector index*».

1. INTRODUCTION

This section of the workshop manual is intended as a practical guide to troubleshooting the tractor's electrical and electronic systems.

The following pages provide the technician with all the necessary information regarding the tractor's systems and components.

Due to the possible time difference between the introduction of technical modifications (in line with our policy of continuous product improvement) and the corresponding amendment of our printed documentation, we are obliged to state that the data contained in this document are subject to modification and as such are not binding.

1.1 LIST OF WIRING HARNESSES

DESCRIPTION	CODE	PAGE
Cab power supply wiring (standard cab)	0.013.9034.4	40-162
Cab power supply wiring (high-visibility cab)	0.013.9035.4	40-161
Power wiring (3-cylinder version)	0.013.9036.4/20	40-129
Power wiring (4-cylinder version)	0.013.9038.4/20	40-129
Loudspeaker wiring (Standard cab)	0.011.0729.4/10	40-239
Loudspeaker, radio, rear wiper, flashing light and clock wiring (High-visibility cab)	0.011.3596.3/40	40-231
Front wiring (4-cylinder version)	0.013.9030.4/10	40-127
Front wiring (3-cylinder version)	0.013.9031.4/10	40-127
Battery wiring (3-cylinder version)	0.013.9040.4	40-130
Battery wiring (4-cylinder version)	0.013.9041.4	40-130
Central wiring (electronic governor)	0.014.0880.4/50	40-93
Central wiring (mechanical governor)	0.014.0881.4/40	40-105
Air conditioning wiring (standard cab)	0.010.2153.2	40-197
Air conditioning wiring (high-visibility cab)	0.010.2560.0	40-201
Front lights wiring (horizontal exhaust silencer)	0.010.5582.3	40-221
Front lights wiring (vertical exhaust silencer)	0.011.0924.3	40-222
Wiring for lower front lights on cab (vertical exhaust silencer)	0441.1923.4	40-223
Worklights wiring (standard cab)	0.009.7851.4/50	40-211
Worklights wiring (high-visibility cab)	0.011.3595.3/10	40-217
Filter wiring	0.011.7711.3	40-118
Hydraulic braking wiring - ITALY	0.012.2103.3	40-125
Shuttle wiring	0.014.0878.4/30	40-143
Rotating beacon wiring	0.012.9909.4	40-232
Shuttle lever wiring	0.013.0675.4	40-145
Roof line wiring (standard cab)	0.009.7850.4/50	40-169

DESCRIPTION	CODE	PAGE
Roof line wiring (high-visibility cab)	0.011.3606.4/50	40-177
Alternator earth wiring	0.014.1056.4	40-131
Cab earth wiring	0.011.7074.3	40-163
Screenwash pumps wiring	0.011.3743.3	40-237
Rear wiring	0.014.0879.4/50	40-115
Heater wiring (standard cab)	0.010.2147.2	40-183
Heater wiring (high-visibility cab)	0.010.2554.2	40-187
RPM wiring	0.014.0884.4	40-117
Seat wiring	0.014.0883.4/10	40-147
Pneumatic seat wiring	0.010.6468.3	40-146
Electronic power lift wiring	0.011.6943.4/10	40-155
Windscreen wiper wiring (standard cab)	0.010.4516.3	40-238
Windscreen wiper wiring (high-visibility cab)	0.011.3597.3	40-227
Air conditioning fan wiring (standard cab)	0.009.7853.3/20	40-193
Air conditioning fan wiring (high-visibility cab)	0.011.3610.3/20	40-207

1.2 DEFINITION OF COMPONENTS AND SYMBOLS

To ensure comprehension of the information given in the following chapters it is important to establish the meaning of the following terms.

TERM	DESCRIPTION
Connector	Element used to connect two components (e.g. wiring-switch. wiring-wiring)
Temperature sensor	Electrical component that converts the temperature of a medium (air, water, oil, etc.) into a voltage or resistance
Pressure sensor	Electrical component that converts the pressure of a medium (air, water, etc.) into a voltage or resistance
Position sensor	Electrical component that converts the angular or linear position of an object into a voltage
Pressure switch	Switch that changes state (opens or closes a contact) according to the operating pressure in the circuit in which it is installed
Thermostat	Switch that changes state (opens or closes a contact) according to the temperature of the medium in which it is immersed.
Switch	Mechanical component that opens or closes one or more electrical contacts.
Solenoid valve	Valve operated by applying electrical current to a coil (or solenoid)

Chapter “3.2 Description of components” shows the wiring diagrams for certain switches and buttons. The following symbols are used for ease of identification:

SYMBOL	DESCRIPTION
	Contact between pins CLOSED (stable switch position)
	Contact between pins CLOSED (unstable switch position)
	Indicator LED
	Indicator light
	Diode

1.3 GENERAL RULES

The inspection, maintenance, troubleshooting and repair operations are essential to ensure that the tractor continues to operate correctly over time and to prevent malfunctions and breakdowns.

The scope of this paragraph is to describe repair procedures and to help improve the quality of repairs.

1.3.1 MODIFICATION OF THE TRACTOR'S ELECTRICAL/ELECTRONIC CIRCUITS

The manufacturer prohibits any modification or alteration of the electrical wiring for the connection of any non-approved electrical appliances or components.

For this reason it is good practice to dry the connectors with a low pressure jet of compressed air after washing the tractor.

1.3.2 MAIN WIRING FAULTS

a. Poor contact between connectors

The main causes of poor contact between connectors are incorrect insertion of the male into the female connector, deformation of one or both connectors, and corrosion or oxidisation of the pin contact surfaces.

b. Defective pin soldering or crimping

The pins of the male and female connectors make good contact in the crimped or soldered area, but the wires are subjected to excessive tension, leading to breakage of the insulation or the wire itself and a poor connection.

c. Disconnecting wiring

If components are disconnected by pulling on the wires, or if components are removed with the wires still connected, or if the wiring is subject to a heavy impact this could damage the connections at the pins, breaking strands of wire.

d. Penetration of water in connectors

The connectors are designed to prevent penetration of liquids (water, oil etc.); however, it is possible that when the tractor is cleaned using high-pressure water or steam, water could penetrate or condense in the connectors.

As the connectors are designed to prevent liquid penetration, any water that does get in will not be able to drain out, and thus may cause shortcircuits across the pins.

For this reason it is good practice to dry the connectors with a low pressure jet of compressed air after washing the tractor.

e. Oil or dirt on connectors

Oil or grease on the connectors or the pins may prevent current flow (oil and grease are electrical insulators) creating a poor contact.
In this case, carefully clean the connectors with a dry cloth or used compressed air at low pressure and use specific products for electrical contacts (deoxidising sprays, etc.) to degrease the contacts.

★ Take care not to bend the pins when cleaning them.

★ Use dehydrated not lubricated compressed air.

1.3.3 REMOVAL, REFITTING AND DRYING OF CONNECTORS AND WIRING

a. Disconnection of connectors

When disconnecting wiring, pull on the connectors rather than on the wires themselves. For connectors that are held in position with screws or levers, fully loosen the screws, then pull on the connector. For connectors that are clipped together, fully depress the clip then pull the connector apart. After disconnecting connectors, cover them in a water-proof material to prevent dirt or moisture getting into the contacts.

b. Connecting the connectors

Check the condition of the connectors:

- Make sure the pin contact surfaces are free of water, dirt or oil.
- Check that the connectors are not deformed and that the pins are not corroded or oxidised.
- Check that the connector casings are not damaged or split.

★ If a connector is contaminated with oil or grease, or if moisture has penetrated the casing, clean it as described in paragraph 1.3.2.

★ If a connector is damaged, deformed or broken, replace it with a new one.

When connecting connectors, make sure they are properly aligned before applying any force.
For connectors with clips, insert the two halves until they clip together.

c. Cleaning and drying wiring

When wiring is dirty or contaminated with oil or grease, clean it with a dry cloth, or, if necessary, with water or steam.
If the wiring has to be cleaned with water, avoid directing the water or steam jet on the connectors; if water penetrates the connector, proceed as indicatedin paragraph 1.3.2.

★ Check that the connector is not short circuited by water by testing the continuity across the pins.

★ After checking the connector is good condition, degrease the contacts using a de-oxidising product.

d. Renewal of damaged electrical components.

- When replacing electrical components (fuses, relays, etc.), use only original parts supplied by the manufacturer.
- When replacing fuses, check that the new fuse conforms to DIN 72581 or ISO 8820 standards and in particular:

  - fuse F1 (100A) DIN 72581/2
  - bayonet fuse (F2, F3, etc.) DIN 72581/3C
  - fuse F51 (100A) and F52 (200A) ISO 8820

  The fitting of replacement fuses that do not comply with these standards will invalidate the warranty with immediate effect and release the manufacturer from any liability.

- When replacing relays, make sure that the new relay conforms to the standards marked on the original relay.

1.4 DIAGNOSTIC INSTRUMENTS

For the correct diagnosis of any faults in the tractor's electrical system, the following instruments are required:

1 - *Digital multimeter* with the following minimum characteristics:
AC VOLT 0-600
DC VOLT 0-600
OHM..... 0-32M
AC AMP..... 0-10
DC AMP 0-10

2 - *All Round Tester* or *computer "PCTESTER"* software installed

1.5 WIRE COLOUR CODES

COLOUR CODES	
A	Light blue
B	White
C	Orange
G	Yellow
H	Grey
L	Blue

COLOUR CODES	
M	Brown
N	Black
R	Red
S	Pink
V	Green
Z	Purple

2. INDICES

2.1 INDEX BY PART DESCRIPTION

Component description	Component code	Technical descr'n (Chap. 3.2.xx)	Connector	System (Chap. 4.xx)	Notes
Cigar lighter	2.7099.770.0		X1	7-8-9-10	
Alternator, 65A	2.9439.420.0/10		B- B+ D+ W	2-3	
Alternator, 85A	2.9439.460.0/10		B- B+ D+ W	2-3	
Right loudspeaker	0.011.5631.3		X84-X92	7-8-9-10	
Left loudspeaker	0.011.5631.3		X86-X91	7-8-9-10	
Actuator	0.007.0992.4/60	20	X30	4	
Radio			X72-X87-X88-X90	7-8-9-10	
Horn	2.8419.007.0		X43	5-6	
Battery			+30 +30A +30B GND1		
Shuttle speed signal conversion control unit	2.8519.036.0		X58	31-32	
Hazard lights control unit	2.8639.007.0/10		X12	5-6	
Shuttle control unit	2.8519.030.0/30		REVERSE ECU	4-7-8-9-10-31-32-37-38	
Engine control unit	2.8519.054.0/50		ENGINE ECU	2-4-7-8-29-31-33-35-37	
Electronic lift control unit	0.011.2992.4/30		LIFT ECU	7-8-9-10-33-34-35	
Fan speed selector switch	0.010.2528.1		X95	22-24-26-28	High-visi-bility roof
	0.009.4743.1		X102	21-23-25-27	Standard cab
Air conditioning compressor	0.009.7660.4		X40	25-26-27-28	
Pneumatic seat air compressor	0.014.3061.4/10		X62	7-8-9-10	
Instrument panel	2.8339.248.0		X2-X3	2-3-4-5-6-7-8-9-10-11-12-29-30-31-32-35-36-37-38	
Lights selector switch	0.011.0918.4		AS4	5-6-7-8-9-10	
Preheating glowplug	0.013.3450.4/10		X46	2-3	
Differential lock control solenoid valve	2.3729.697.0	18	X24	31-32	
4WD control solenoid valve	2.3729.697.0	17	X23	31-32	
H gear control solenoid valve	2.3729.697.0	5	H	31-32	
L gear control solenoid valve	2.3729.697.0	6	L	31-32	
Front PTO control solenoid valve	2.3729.400.0	26	X44	35-36	
Electronic lift Down solenoid valve	2.3729.460.0		DW SV	33-34	
Electronic lift Up solenoid valve	2.3729.460.0		UP SV	33-34	

Component description	Component code	Technical descr'n (Chap. 3.2.xx)	Connector	System (Chap. 4.xx)	Notes
Electric fan	0.010.2121.1		X100	21-23-25-27	Standard cab
Right electric fan	0.011.2047.4		X99	22-24-26-28	High-visibility roof
Left electric fan	0.011.2047.4		X98	22-24-26-28	High-visibility roof
Right headlight	2.8029.760.0/30		X41	5-6	
Right headlight (GB)	2.8029.770.0/30				
Left headlight	2.8029.760.0/30		X45	5-6	
Left headlight (GB)	2.8029.770.0/30				
Front right worklight	2.8029.730.0		X76	13-14-15-16	
Front left worklight	2.8029.730.0		X77	13-14-15-16	
Rear right worklight	2.8029.730.0		X79	13-14-15-16	
Rear left worklight	2.8029.730.0		X78	13-14-15-16	
Number plate light	2.8029.240.0/10		X34	5-6	
Front right sidelight and direction indicator	2.8019.200.0		X74	5-6	Horizontal exhaust silencer
	0441.1921.4				Vertical exhaust silencer
Front left sidelight and direction indicator	2.8019.200.0		X75	5-6	Horizontal exhaust silencer
	0441.1920.4				Vertical exhaust silencer
Right tail light	2.8019.190.0		X21	5-6-29-30	
Left tail light	2.8019.180.0		X26	5-6-29-30	
Starter switch	0441.1512.4	9	X6		
Rotating beacon on/off switch	2.7659.126.0	37	X67	7-9	Standard cab
	2.7659.159.0	38		8-10	High-visibility roof
Front worklights switch	2.7659.078.0	41	X71	13-15	Standard cab
	2.7659.154.0	42		14-16	High-visibility roof
Rear worklights switch	2.7659.079.0	31	X64	13-15	Standard cab
	2.7659.155.0	32		14-16	High-visibility roof

Component description	Component code	Technical descr'n (Chap. 3.2.xx)	Connector	System (Chap. 4.xx)	Notes
Windscreen washer pump switch	2.7659.091.0	35	X66	17-19	Standard cab
	2.7659.223.0	36		18-20	High-visi-bility roof
Windscreen wiper switch	2.7659.092.0	39	X70	17-19	Standard cab
	2.7659.224.0	40		18-20	High-visi-bility roof
Rear window wiper switch	2.7659.146.0	33	X65	17-19	Standard cab
	2.7659.192.0	34		18-20	High-visi-bility roof
Parking brake switch	2.7659.129.0	43	X28	29-30	Electronic governor
A/C switch	0.900.0058.9		X94	26-28	High-visi-bility roof
Brake pedal switch	2.7659.097.0	8	X4	29-30	
Clutch pedal switch	2.7659.097.0	10	X7	2-3-31-32-35-36	
Rotating beacon	2.6039.017.0		X80	7-8-9-10	
Gear lever	0.010.9612.4/20		X56	31-32	Shuttle and HML
	0.010.9611.4/20				Shuttle
Shuttle Lever	0.013.4592.4/10		X60	31-32	
Windscreen wiper motor	0441.3192		X81	17-18-19-20	
Rear window wiper motor	2.9019.180.0		X85	18-20	High-visi-bility roof
	2.9019.100.0/20		X108	17-19	Standard cab
Starter motor	2.9619.390.0		+30C +50	2-3	4 cylinders
	2.9619.400.0				3 cylinders
Clock			X69	7-9-10	
Interior roof light	2.8339.032.0		X63	7-8-9-10	
Windscreen washer pump	0.9241.566.1		X82	17-18-19-20	
Rear screen washer pump	0.9241.566.1		X83	17-18-19-20	
Electronic lift max. lift height potentiometer	0.011.2990.0		H1	33-34	
Electronic lift position potentiometer	0.011.2990.0		P1	33-34	
Draft/wheelslip control potentiometer	0.011.2990.0		M	33-34	
Electronic lift rate of drop potentiometer	0.011.2990.0		V1	33-34	
Supplementary CANBUS socket			X57	37-38	
Outlet socket	0.008.1550.0		X59	7-8-9-10	
Diagnostic socket			X8	7-8-9-10	

Component description	Component code	Technical descr'n (Chap. 3.2.xx)	Connector	System (Chap. 4.xx)	Notes
Trailer socket			X32	5-6-29-30	
Services circuit alarm pressure switch	2.7099.750.0/10	30	X53	11-12	
Air conditioning pressure switch	0.010.2262.0		X104	26-28	High-visibility roof
	0.010.2140.0		X104-X107	25-27	Standard cab
Pressure switch - trailer braking low pressure	2.7099.960.0	21	X31	29-30	
Pressure switch - oil filter clogging sensor	2.7099.660.0/10	29	X51	31-32	
Shuttle oil pressure switch	2.7099.690.0/10	4	F	31-32	
Engine oil pressure switch	2.7099.940.0	24	X38	11-12	
Differential lock pushbutton	0.008.1335.0/10	51	X16	31-32	
Electronic rear lift Down pushbutton	2.7659.182.0	3	DW	33-34	
4WD control pushbutton	0.007.5945.0/20	14	X15	31-32	
Front PTO pushbutton	2.7659.108.0/10	11	X9	2-3-35-36	
AUTO PTO pushbutton	2.7659.108.0/10	53	X11	35	
Rear PTO pushbutton	2.7659.142.0	15	X17	35	Electronic governor
	2.7659.108.0/10	54		36	Mechanical governor
Electronic rear lift 'Up' pushbutton	2.7659.182.0	3	UP	33-34	
Electronic lift control pushbutton	0.011.7720.0/20	2	C - I	7-8-9-10-33-34	
Hazard warning lights pushbutton	2.7659.110.0	12	X10	5-6	
Memory pushbutton	2.7659.203.0/10	46	X18	4	
Preheating pushbutton	2.7659.203.0/10	47	X13	2-3	
Stop-Go pushbutton	2.7659.264.0	52	X5	31-32	
Resistor	0.010.2122.0		X101	21-23-25-27	
RH resistor	0.010.2555.0		X96	22-24-26-28	High-visibility roof
LH resistor	0.010.2555.0		X93	22-24-26-28	High-visibility roof
Air cleaner clogged sensor	2.7099.320.0/10	25	X42	11-12	
PALL filter clogging sensor	2.7099.700.0	27	X48	31-32	
Fuel level sensor	2.7059.998.0/10		X27	11-12	
Brake fluid level sensor	0.257.6654.3/10		X39	29-30	
Hand throttle position sensor	2.7099.740.0/10	13	X14	4	Electronic governor
Accelerator pedal position sensor	0.008.8199.3	16	X19	4	Electronic governor

Component description	Component code	Technical descr'n (Chap. 3.2.xx)	Connector	System (Chap. 4.xx)	Notes
Clutch pedal position sensor	2.7099.740.0/10	45	X55	31-32	
Electronic lift position sensor	0.009.2194.4	7	P2	33-34-35	
Right brake pressure sensor	0.012.1507.4	28	X50	31-32	
Left brake pressure sensor	0.012.1507.4	28	X49	31-32	
Electronic lift draft sensor	2.7099.983.0	56	S1	33-34	
Engine temperature sensor (for preheating)	2.7099.800.0	22	X36	2-3	
Engine temperature sensor (for instrument)	2.7099.640.0/10	23	X37	11-12	
Oil temperature sensor	2.7099.800.0	22	X52	31-32	
Engine speed sensor	2.7099.790.0	19	X29	4	Electronic governor
Engine speed sensor (for shuttle)	2.7099.996.0	44	X54	31-32	
Wheel speed sensor 1	0.010.5612.0/10		V	4-31-32	
Wheel speed sensor 2	0.010.5612.0/10		ECO	4-31-32	
1000 rpm PTO engagement sensor	2.7659.131.0	1	1	35-36	Electronic governor
540 rpm PTO engagement sensor	2.7659.131.0	1	5	35-36	Electronic governor
ECO PTO engagement sensor	2.7659.131.0	1	E	35-36	Electronic governor
Groundspeed PTO engagement sensor	2.7659.131.0	1	S	35-36	Electronic governor
Shuttle sensor	2.7099.999.0		X47	31-32	
Minireduction gear sensor	2.7659.258.0	50	MR	31-32	
Operator present sensor	0.010.3473.2	55	X61	31-32	
Rear PTO solenoid	0.010.2831.1	49	X25	35-36	
Proportional solenoid valve coil	0.010.2831.1	48	P	31-32	
Forward drive selection solenoid	0.900.0026.1		FWD	31-32	
Reverse drive selection solenoid	0.900.0026.1		REV	31-32	
Intermittent windscreen wiper timer	2.8639.008.0		X68	17-18-19-20	
Air conditioning temperature thermostat control	0.009.4744.1		X97-X103	25-26-27-28	
Air conditioning fan	0.010.2545.2		X105	26-28	High-visi-bility roof
Air conditioning fan	0.010.0618.4		X105	25-27	Standard cab
Supplementary air conditioning fan	0.010.2545.2		X106	26-28	High-visi-bility roof

2.2 INDEX BY PART CODE

Code	Description	Technical descr'n (Chap. 3.2.xx)	Connector	System (para. 4.xx)	Notes
0.007.0992.4/60	Actuator	20	X30	4	
0.007.5945.0/20	4WD control pushbutton	14	X15	31-32	
0.008.1335.0/10	Differential lock pushbutton	51	X16	31-32	
0.008.1550.0	Outlet socket		X59	7-8-9-10	
0.008.8199.3	Accelerator pedal position sensor	16	X19	4	Electronic governor
0.009.2194.4	Electronic lift position sensor	7	P2	33-34-35	
0.009.4743.1	Fan speed selector switch		X102	21-23-25-27	Standard cab
0.009.4744.1	Air conditioning temperature thermostat control		X97-X103	25-26-27-28	
0.009.7660.4	Air conditioning compressor		X40	25-26-27-28	
0.010.0618.4	Air conditioning fan		X105	25-27	Standard cab
0.010.2121.1	Electric fan		X100	21-23-25-27	Standard cab
0.010.2122.0	Resistor		X101	21-23-25-27	
0.010.2140.0	Air conditioning pressure switch		X104-X107	25-27	Standard cab
0.010.2262.0	Air conditioning pressure switch		X104	26-28	High-visi-bility roof
0.010.2528.1	Fan speed selector switch		X95	22-24-26-28	High-visi-bility roof
0.010.2545.2	Air conditioning fan		X105	26-28	High-visi-bility roof
0.010.2545.2	Supplementary air conditioning fan		X106	26-28	High-visi-bility roof
0.010.2555.0	RH resistor		X96	22-24-26-28	High-visi-bility roof
0.010.2555.0	LH resistor		X93	22-24-26-28	High-visi-bility roof
0.010.2831.1	Rear PTO solenoid	49	X25	35-36	
0.010.2831.1	Proportional solenoid valve coil	48	P	31-32	
0.010.3473.2	Operator present sensor	55	X61	31-32	
0.010.5612.0/10	Wheel speed sensor 1		V	4-31-32	
0.010.5612.0/10	Wheel speed sensor 2		ECO	4-31-32	
0.010.9611.4/20	Gear lever		X56	31-32	Shuttle
0.010.9612.4/20	Gear lever		X56	31-32	Shuttle and HML

Code	Description	Technical descr'n (Chap. 3.2.xx)	Connector	System (para. 4.xx)	Notes
0.011.0918.4	Lights selector switch		AS4	5-6-7-8-9-10	
0.011.2047.4	Right electric fan		X99	22-24-26-28	High-visibility roof
0.011.2047.4	Left electric fan		X98	22-24-26-28	High-visibility roof
0.011.2990.0	Electronic lift max. lift height potentiometer		H1	33-34	
0.011.2990.0	Electronic lift position potentiometer		P1	33-34	
0.011.2990.0	Draft/wheelslip control potentiometer		M	33-34	
0.011.2990.0	Electronic lift rate of drop potentiometer		V1	33-34	
0.011.2992.4/30	Electronic lift control unit		LIFT ECU	7-8-9-10-33-34-35	
0.011.5631.3	Right loudspeaker		X84-X92	7-8-9-10	
0.011.5631.3	Left loudspeaker		X86-X91	7-8-9-10	
0.011.7720.0/20	Electronic lift control pushbutton	2	C - I	7-8-9-10-33-34	
0.012.1507.4	Right brake pressure sensor	28	X50	31-32	
0.012.1507.4	Left brake pressure sensor	28	X49	31-32	
0.013.3450.4/10	Preheating glowplug		X46	2-3	
0.013.4592.4/10	Shuttle Lever		X60	31-32	
0.014.3061.4/10	Pneumatic seat air compressor		X62	7-8-9-10	
0.257.6654.3/10	Brake fluid level sensor		X39	29-30	
0441.3192	Windscreen wiper motor		X81	17-18-19-20	
0441.1512.4	Starter switch	9	X6		
0441.1920.4	Front left sidelight and direction indicator		X75	5-6	Vertical exhaust silencer
0441.1921.4	Front right sidelight and direction indicator		X74	5-6	Vertical exhaust silencer
0.900.0026.1	Forward drive selection solenoid		FWD	31-32	
0.900.0026.1	Reverse drive selection solenoid		REV	31-32	
0.900.0058.9	A/C switch		X94	26-28	High-visibility roof
0.9241.566.1	Windscreen washer pump		X82	17-18-19-20	
0.9241.566.1	Rear screen washer pump		X83	17-18-19-20	
2.3729.400.0	Front PTO control solenoid valve	26	X44	35-36	
2.3729.460.0	Electronic lift Down solenoid valve		DW SV	33-34	

Code	Description	Technical descr'n (Chap. 3.2.xx)	Connector	System (para. 4.xx)	Notes
2.3729.460.0	Electronic lift Up solenoid valve		UP SV	33-34	
2.3729.697.0	Differential lock control solenoid valve	18	X24	31-32	
2.3729.697.0	4WD control solenoid valve	17	X23	31-32	
2.3729.697.0	H gear control solenoid valve	5	H	31-32	
2.3729.697.0	L gear control solenoid valve	6	L	31-32	
2.6039.017.0	Rotating beacon		X80	7-8-9-10	Standard cab/high-visibility cab
2.7059.998.0/10	Fuel level sensor		X27	11-12	
2.7099.320.0/10	Air cleaner clogged sensor	25	X42	11-12	
2.7099.640.0/10	Engine temperature sensor (for instrument)	23	X37	11-12	
2.7099.660.0/10	Pressure switch - oil filter clogging sensor	29	X51	31-32	
2.7099.690.0/10	Shuttle oil pressure switch	4	F	31-32	
2.7099.700.0	PALL filter clogging sensor	27	X48	31-32	
2.7099.740.0/10	Hand throttle position sensor	13	X14	4	Electronic governor
2.7099.740.0/10	Clutch pedal position sensor	45	X55	31-32	
2.7099.750.0/10	Services circuit alarm pressure switch	30	X53	11-12	
2.7099.770.0	Cigar lighter		X1	7-8-9-10	
2.7099.790.0	Engine speed sensor	19	X29	4	Electronic governor
2.7099.800.0	Engine temperature sensor (for preheating)	22	X36	2-3	
2.7099.800.0	Oil temperature sensor	22	X52	31-32	
2.7099.940.0	Engine oil pressure switch	24	X38	11-12	
2.7099.960.0	Pressure switch - trailer braking low pressure	21	X31	29-30	
2.7099.983.0	Electronic lift draft sensor	56	S1	33-34	
2.7099.996.0	Engine speed sensor (for shuttle)	44	X54	31-32	
2.7099.999.0	Shuttle sensor		X47	31-32	
2.7659.078.0	Front worklights switch	41	X71	13-15	Standard cab
2.7659.079.0	Rear worklights switch	31	X64	13-15	Standard cab
2.7659.091.0	Windscreen washer pump switch	35	X66	17-19	Standard cab
2.7659.092.0	Windscreen wiper switch	39	X70	17-19	Standard cab

Code	*Description*	*Technical descr'n (Chap. 3.2.xx)*	*Connector*	*System (para. 4.xx)*	*Notes*
2.7659.097.0	Brake pedal switch	8	X4	29-30	
2.7659.097.0	Clutch pedal switch	10	X7	2-3-31-32-35-36	
2.7659.108.0/10	Front PTO pushbutton	11	X9	2-3-35-36	
2.7659.108.0/10	AUTO PTO pushbutton	53	X11	35	
2.7659.108.0/10	Rear PTO pushbutton	54	X17	36	Mechanical governor
2.7659.110.0	Hazard warning lights pushbutton	12	X10	5-6	
2.7659.126.0	Rotating beacon on/off switch	37	X67	7-9	Standard cab
2.7659.129.0	Parking brake switch	43	X28	29-30	Electronic governor
2.7659.131.0	1000 rpm PTO engagement sensor	1	1	35-36	Electronic governor
2.7659.131.0	540 rpm PTO engagement sensor	1	5	35-36	Electronic governor
2.7659.131.0	ECO PTO engagement sensor	1	E	35-36	Electronic governor
2.7659.131.0	Groundspeed PTO engagement sensor	1	S	35-36	Electronic governor
2.7659.142.0	Rear PTO pushbutton	15	X17	35	Electronic governor
2.7659.146.0	Rear window wiper switch	33	X65	17-19	Standard cab
2.7659.154.0	Front worklights switch	42	X71	14-16	High-visibility roof
2.7659.155.0	Rear worklights switch	32	X64	14-16	High-visibility roof
2.7659.159.0	Rotating beacon on/off switch	38	X67	8-10	High-visibility roof
2.7659.182.0	Electronic rear lift Down pushbutton	3	DW	33-34	
2.7659.182.0	Electronic rear lift 'Up' pushbutton	3	UP	33-34	
2.7659.192.0	Rear window wiper switch	34	X65	18-20	High-visibility roof
2.7659.203.0/10	Memory pushbutton	46	X18	4	
2.7659.203.0/10	Preheating pushbutton	47	X13	2-3	
2.7659.223.0	Windscreen washer pump switch	36	X66	18-20	High-visibility roof
2.7659.224.0	Windscreen wiper switch	40	X70	18-20	High-visibility roof
2.7659.258.0	Minireduction gear sensor	50	MR	31-32	

Code	Description	Technical descr'n (Chap. 3.2.xx)	Connector	System (para. 4.xx)	Notes
2.7659.264.0	Stop-Go pushbutton	52	X5	31-32	
2.8019.180.0	Left tail light		X26	5-6-29-30	
2.8019.190.0	Right tail light		X21	5-6-29-30	
2.8019.200.0	Front right sidelight and direction indicator		X74	5-6	Horizontal exhaust silencer
2.8019.200.0	Front left sidelight and direction indicator		X75	5-6	Horizontal exhaust silencer
2.8029.240.0/10	Number plate light		X34	5-6	
2.8029.730.0	Front right worklight		X76	13-14-15-16	
2.8029.730.0	Front left worklight		X77	13-14-15-16	
2.8029.730.0	Rear right worklight		X79	13-14-15-16	
2.8029.730.0	Rear left worklight		X78	13-14-15-16	
2.8029.760.0/30	Right headlight		X41	5-6	
2.8029.760.0/30	Left headlight		X45	5-6	
2.8029.770.0/30	Right headlight (GB)		X41	5-6	
2.8029.770.0/30	Left headlight (GB)		X45	5-6	
2.8339.032.0	Interior roof light		X63	7-8-9-10	
2.8339.248.0	Instrument panel		X2-X3	2-3-4-5-6-7-8-9-10-11-12-29-30-31-32-35-36-37-38	
2.8419.007.0	Horn		X43	5-6	
2.8519.030.0/30	Shuttle control unit		REVERSE ECU	4-7-8-9-10-31-32-37-38	
2.8519.036.0	Shuttle speed signal conversion control unit		X58	31-32	
2.8519.054.0/50	Engine control unit		ENGINE ECU	2-4-7-8-29-31-33-35-37	
2.8639.007.0/10	Hazard lights control unit		X12	5-6	
2.8639.008.0	Intermittent windscreen wiper timer		X68	17-18-19-20	
2.9019.100.0/20	Rear window wiper motor		X108	17-19	Standard cab
2.9019.180.0	Rear window wiper motor		X85	18-20	High-visibility roof
2.9439.420.0/10	Alternator, 65A		B- B+ D+ W	2-3	
2.9439.460.0/10	Alternator, 85A		B- B+ D+ W	2-3	
2.9619.390.0	Starter motor		+30C +50	2-3	4 cylinders
2.9619.400.0	Starter motor		+30C +50	2-3	3 cylinders

2.3 INDEX BY CONNECTOR

Connector	Wiring code	Connection wiring or component code	Component description	Notes
1	0.014.0880.4/50	2.7659.131.0	1000 rpm PTO engagement sensor	Electronic governor
	0.014.0881.4/40			Mechanical governor
5	0.014.0880.4/50	2.7659.131.0	540 rpm PTO engagement sensor	Electronic governor
	0.014.0881.4/40			Mechanical governor
+30	0.013.9040.4		Battery	3 cylinders
	0.013.9041.4			4 cylinders
+30A	0.013.9036.4/20		Battery	3 cylinders
	0.013.9038.4/20			4 cylinders
+30B	0.013.9036.4/20		Battery	3 cylinders
	0.013.9038.4/20			4 cylinders
+30C	0.013.9040.4	2.9619.400.0	Starter motor	3 cylinders
	0.013.9041.4	2.9619.390.0		4 cylinders
+50	0.013.9030.4/10	2.9619.390.0	Starter motor	4 cylinders
	0.013.9031.4/10	2.9619.400.0		3 cylinders
AS4	0.014.0880.4/50	0.011.0918.4	Lights selector switch	Electronic governor
	0.014.0881.4/40			Mechanical governor
FWD	0.014.0879.4/50	0.900.0026.1	Forward drive selection solenoid	
B-	0.014.1056.4	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
B+	0.013.9036.4/20	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
	0.013.9038.4/20	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
C	0.011.6943.4/10	0.011.7720.0/20	Electronic lift control pushbutton	
D+	0.013.9030.4/10	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
	0.013.9031.4/10	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
DW	0.011.6943.4/10	2.7659.182.0	Electronic rear lift Down pushbutton	

Connector	Wiring code	Connection wiring or component code	Component description	Notes
E	0.014.0880.4/50	2.7659.131.0	ECO PTO engagement sensor	Electronic governor
	0.014.0881.4/40			Mechanical governor
ECO	0.014.0879.4/50	0.010.5612.0/10	Wheel speed sensor 2	
ENGINE ECU	0.014.0880.4/50	2.8519.054.0/50	Engine control unit	Electronic governor
DW SV	0.011.6943.4/10	2.3729.460.0	Electronic lift Down solenoid valve	
UP SV	0.011.6943.4/10	2.3729.460.0	Electronic lift Up solenoid valve	
F100	0.014.0881.4/40		Fuse (40A)	Mechanical governor
F101	0.013.9036.4/20		100A fuse (alternator)	3 cylinders
	0.013.9038.4/20			4 cylinders
F102	0.013.9036.4/20		50A fuse (instrument panel)	3 cylinders
	0.013.9038.4/20		50A fuse (instrument panel)	4 cylinders
F103	0.013.9036.4/20		50A fuse (cab)	3 cylinders
	0.013.9038.4/20		50A fuse (cab)	4 cylinders
F104	0.013.9036.4/20		125A fuse (heater)	3 cylinders
	0.013.9038.4/20		125A fuse (heater)	4 cylinders
F130	0.011.3606.4/50		Roof line power fuse	High-visibility roof
F	0.014.0879.4/50	2.7099.690.0/10	Shuttle oil pressure switch	
G1	0.014.0880.4/50	0.013.9030.4/10		4 cylinders
		0.013.9031.4/10		3 cylinders
	0.014.0881.4/40	0.013.9030.4/10		Electronic governor
		0.013.9031.4/10		Mechanical governor
G2	0.014.0880.4/50	0.014.0878.4/30		Electronic governor
	0.014.0881.4/40			Mechanical governor
G3	0.014.0880.4/50	0.011.6943.4/10		Electronic governor
	0.014.0881.4/40			Mechanical governor

Connector	Wiring code	Connection wiring or component code	Component description	Notes
G4	0.014.0880.4/50	0.010.5582.3		Electronic governor
		0.011.0924.3		
	0.014.0881.4/40	0.010.5582.3		
		0.011.0924.3		Mechanical governor
G5	0.014.0880.4/50	0.013.9036.4/20		3 cylinders
		0.013.9038.4/20		4 cylinders
	0.014.0881.4/40	0.013.9036.4/20		Electronic governor
		0.013.9038.4/20		Mechanical governor
G6	0.014.0880.4/50	0.013.9034.4		Standard cab
		0.013.9035.4		High-visibility roof
	0.014.0881.4/40	0.013.9034.4		Electronic governor
		0.013.9035.4		Mechanical governor
G7	0.014.0880.4/50		Not utilised	
	0.014.0881.4/40			
G8	0.013.9030.4/10	0.013.9036.4/20		4 cylinders
		0.013.9038.4/20		3 cylinders
	0.013.9031.4/10	0.013.9036.4/20		3 cylinders
		0.013.9038.4/20		4 cylinders
G9	0.013.9034.4	0.013.9036.4/20		Standard cab
		0.013.9038.4/20		High-visibility roof
	0.013.9035.4	0.013.9036.4/20		3 cylinders
		0.013.9038.4/20		4 cylinders
G10	0.014.0878.4/30	0.014.0879.4/50		
G11	0.014.0879.4/50	0.011.7711.3		
G12	0.014.0879.4/50	0.014.0884.4		
G13	0.014.0878.4/30	0.013.0675.4		
G14	0.014.0878.4/30	0.014.0883.4/10		
G15	0.014.0878.4/30	0.010.6468.3		

Connector	Wiring code	Connection wiring or component code	Component description	Notes
G16	0.013.9034.4	0.009.7850.4/50		Standard cab
		0.011.3606.4/50		High-visi-bility roof
	0.013.9035.4	0.009.7850.4/50		Standard cab
		0.011.3606.4/50		High-visi-bility roof
G17	0.009.7850.4/50	0.011.3743.3		Standard cab
	0.011.3606.4/50			High-visi-bility roof
G18	0.009.7850.4/50	0.009.7853.3/20		Standard cab
G19	0.009.7850.4/50	0.009.7851.4/50		Standard cab
		0.011.3595.3/10		Standard cab
	0.011.3606.4/50	0.009.7851.4/50		High-visi-bility roof
		0.011.3595.3/10		High-visi-bility roof
G20	0.010.4516.3	0.009.7850.4/50		Standard cab
		0.011.3606.4/50		Standard cab
	0.011.3597.3	0.009.7850.4/50		High-visi-bility roof
		0.011.3606.4/50		High-visi-bility roof
G21	0.009.7850.4/50	0.010.2147.2		Standard cab
		0.010.2153.2		Standard cab
		0.010.2560.0		Standard cab
	0.011.3606.4/50	0.010.2147.2		High-visi-bility roof
		0.010.2153.2		
		0.010.2560.0		High-visi-bility roof
G22	0.009.7850.4/50	0.010.2153.2		Standard cab
G23	0.011.3606.4/50	0.011.3596.3/40		High-visi-bility roof

Connector	Wiring code	Connection wiring or component code	Component description	Notes
G24	0.011.3606.4/50	0.011.3610.3/20		High-visibility roof
G25	0.011.3606.4/50	0.010.2554.2		High-visibility roof
		0.010.2560.0		High-visibility roof
G26	0.009.7851.4/50	0.012.9909.4		Standard cab
	0.011.3596.3/40			High-visibility roof
G27	0.014.0880.4/50	0.012.2103.3		Electronic governor
	0.014.0881.4/40			Mechanical governor
G28	0.011.0924.3	0441.1923.4		Vertical exhaust silencer
G29	0.011.0924.3	0441.1923.4		Vertical exhaust silencer
G30	0.011.0924.3	0441.1923.4		Vertical exhaust silencer
G31	0.011.0924.3	0441.1923.4		Vertical exhaust silencer
G32	0441.1923.4		Not utilised	Vertical exhaust silencer
G33	0441.1923.4		Not utilised	Vertical exhaust silencer
G34	0.010.2554.2	0.010.2560.0	Wiring connector	High-visibility roof
G35	0.010.2554.2	0.010.2560.0	Wiring connector	High-visibility roof
GND1	0.013.9040.4		Battery	3 cylinders
	0.013.9041.4		Battery	4 cylinders
GND2	0.013.9040.4		Earthing point 2	3 cylinders
	0.013.9041.4			4 cylinders
GND3	0.014.0880.4/50		Earthing point 3	Electronic governor
	0.014.0881.4/40			Mechanical governor

Connector	Wiring code	Connection wiring or component code	Component description	Notes
GND4	0.014.0878.4/30		Earthing point 4	
	0.014.0880.4/50			Electronic governor
	0.014.0881.4/40			Mechanical governor
GND5	0.013.9030.4/10		Earthing point 5	4 cylinders
	0.013.9031.4/10			3 cylinders
GND6	0.014.1056.4		Earthing point 6	
GND7	0.011.3595.3/10		Earthing point 7	High-visibility roof
	0.011.3596.3/40			High-visibility roof
	0.011.3606.4/50			High-visibility roof
GND8	0.011.7074.3		Earthing point 8	
GND9	0.011.7074.3		Earthing point 9	
GND10	0.009.7850.4/50		Earthing point 10	Standard cab
H1	0.011.6943.4/10	0.011.2990.0	Electronic lift max. lift height potentiometer	
H	0.014.0879.4/50	2.3729.697.0	H gear control solenoid valve	
HML	0.014.0879.4/50		Not utilised	
I	0.011.6943.4/10	0.011.7720.0/20	Electronic lift control pushbutton	
L	0.014.0879.4/50	2.3729.697.0	L gear control solenoid valve	
LIFT ECU	0.011.6943.4/10	0.011.2992.4/30	Electronic lift control unit	
M	0.011.6943.4/10	0.011.2990.0	Draft/wheelslip control potentiometer	
MR	0.014.0879.4/50	2.7659.258.0	Minireduction gear sensor	
P1	0.011.6943.4/10	0.011.2990.0	Electronic lift max. lift height potentiometer	
P2	0.011.6943.4/10	0.009.2194.4	Electronic lift position sensor	
P	0.014.0879.4/50	0.010.2831.1	Proportional solenoid valve coil	
REVERSE ECU	0.014.0878.4/30	2.8519.030.0/30	Shuttle control unit	
RL1	0.014.0880.4/50		Preheating relay	Electronic governor
RL2	0.014.0880.4/50		Engine starter relay	Electronic governor
	0.014.0881.4/40			Mechanical governor
RL3	0.014.0880.4/50		Key positive supply relay	Electronic governor

Connector	Wiring code	Connection wiring or component code	Component description	Notes
RL5	0.014.0880.4/50		Brake control relay	Electronic governor
	0.014.0881.4/40			Mechanical governor
RL6	0.014.0880.4/50		Lights switch relay	Electronic governor
	0.014.0881.4/40			Mechanical governor
RL30	0.009.7850.4/50		Roof line power relay	Standard cab
	0.011.3606.4/50			High-visibility roof
	0.013.9034.4			Standard cab
	0.013.9035.4			High-visibility roof
RL42	0.013.9030.4/10		Preheating relay	4 cylinders
	0.013.9031.4/10			3 cylinders
RL42A	0.013.9036.4/20		Preheating relay	3 cylinders
	0.013.9038.4/20			4 cylinders
RL42B	0.013.9036.4/20		Preheating relay	3 cylinders
	0.013.9038.4/20			4 cylinders
RL50	0.010.2554.2		3rd blower speed relay	High-visibility roof
	0.010.2560.0			High-visibility roof
RL51	0.010.2554.2		Max. blower speed relay	High-visibility roof
	0.010.2560.0			High-visibility roof
RL52	0.010.2560.0		Compressor and starting in 1st blower speed in A/C relay	High-visibility roof
RL53	0.010.2153.2		Compressor relay	Standard cab
RL54	0.011.3610.3/20		Control relay for supplementary air conditioning fan	High-visibility roof
RL55	0.009.7853.3/20		Control relay for air conditioning fan	Standard cab
	0.011.3610.3/20			High-visibility roof
REV	0.014.0879.4/50	0.900.0026.1	Reverse drive selection solenoid	
S1	0.011.6943.4/10	2.7099.983.0	Electronic lift draft sensor	

Connector	Wiring code	Connection wiring or component code	Component description	Notes
S	0.014.0880.4/50	2.7659.131.0	Groundspeed PTO engagement sensor	Electronic governor
	0.014.0881.4/40			Mechanical governor
UP	0.011.6943.4/10	2.7659.182.0	Electronic rear lift 'Up' pushbutton	
V1	0.011.6943.4/10	0.011.2990.0	Electronic lift rate of drop potentiometer	
V	0.014.0879.4/50	0.010.5612.0/10	Wheel speed sensor 1	
W	0.013.9030.4/10	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
	0.013.9031.4/10	2.9439.420.0/10	Alternator, 65A	
		2.9439.460.0/10	Alternator, 85A	
X1	0.014.0880.4/50	2.7099.770.0	Cigar lighter	Electronic governor
	0.014.0881.4/40			Mechanical governor
X2	0.014.0880.4/50	2.8339.248.0	Instrument panel	Electronic governor
	0.014.0881.4/40			Mechanical governor
X3	0.014.0880.4/50	2.8339.248.0	Instrument panel	Electronic governor
	0.014.0881.4/40			Mechanical governor
X4	0.014.0880.4/50	2.7659.097.0	Brake pedal switch	Electronic governor
	0.014.0881.4/40			Mechanical governor
X5	0.014.0880.4/50	2.7659.264.0	Stop-Go pushbutton	Electronic governor
	0.014.0881.4/40			Mechanical governor
X6	0.014.0880.4/50	0441.1512.4	Starter switch	Electronic governor
	0.014.0881.4/40			Mechanical governor
X7	0.014.0880.4/50	2.7659.097.0	Clutch pedal switch	Electronic governor
	0.014.0881.4/40			Mechanical governor

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X8	0.014.0880.4/50		Diagnostic socket	Electronic governor
	0.014.0881.4/40			Mechanical governor
X9	0.014.0880.4/50	2.7659.108.0/10	Front PTO pushbutton	Electronic governor
	0.014.0881.4/40			Mechanical governor
X10	0.014.0880.4/50	2.7659.110.0	Hazard warning lights pushbutton	Electronic governor
	0.014.0881.4/40			Mechanical governor
X11	0.014.0880.4/50	2.7659.108.0/10	AUTO PTO pushbutton	Electronic governor
X12	0.014.0880.4/50	2.8639.007.0/10	Hazard lights control unit	Electronic governor
	0.014.0881.4/40			Mechanical governor
X13	0.014.0880.4/50	2.7659.203.0/10	Preheating pushbutton	Electronic governor
	0.014.0881.4/40			Mechanical governor
X14	0.014.0880.4/50	2.7099.740.0/10	Hand throttle position sensor	Electronic governor
X15	0.014.0880.4/50	0.007.5945.0/20	4WD control pushbutton	Electronic governor
	0.014.0881.4/40			Mechanical governor
X16	0.014.0880.4/50	0.008.1335.0/10	Differential lock pushbutton	Electronic governor
	0.014.0881.4/40			Mechanical governor
X17	0.014.0880.4/50	2.7659.142.0	Rear PTO pushbutton	Electronic governor
	0.014.0881.4/40	2.7659.108.0/10	Rear PTO pushbutton	Mechanical governor
X18	0.014.0880.4/50	2.7659.203.0/10	Memory pushbutton	Electronic governor
X19	0.014.0880.4/50	0.008.8199.3	Accelerator pedal position sensor	Electronic governor

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X20	0.014.0880.4/50		Not utilised	
	0.014.0881.4/40			
X21	0.014.0880.4/50	2.8019.190.0	Right tail light	Electronic governor
	0.014.0881.4/40			Mechanical governor
X22	0.014.0880.4/50		Not utilised	
X23	0.014.0880.4/50	2.3729.697.0	4WD control solenoid valve	Electronic governor
	0.014.0881.4/40			Mechanical governor
X24	0.014.0880.4/50	2.3729.697.0	Differential lock control solenoid valve	Electronic governor
	0.014.0881.4/40			Mechanical governor
X25	0.014.0880.4/50	0.010.2831.1	Rear PTO solenoid	Electronic governor
	0.014.0881.4/40			Mechanical governor
X26	0.014.0880.4/50	2.8019.180.0	Left tail light	Electronic governor
	0.014.0881.4/40			Mechanical governor
X27	0.014.0880.4/50	2.7059.998.0/10	Fuel level sensor	Electronic governor
	0.014.0881.4/40			Mechanical governor
X28	0.014.0880.4/50	2.7659.129.0	Parking brake switch	Electronic governor
	0.014.0881.4/40			Mechanical governor
X29	0.014.0880.4/50	2.7099.790.0	Engine speed sensor	Electronic governor
X30	0.014.0880.4/50	0.007.0992.4/60	Actuator	Electronic governor
X31	0.012.2103.3	2.7099.960.0	Pressure switch - trailer braking low pressure	
X32	0.014.0880.4/50		Trailer socket	Electronic governor
	0.014.0881.4/40			Mechanical governor

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X33	0.014.0880.4/50		Not utilised	
	0.014.0881.4/40			
X34	0.014.0880.4/50	2.8029.240.0/10	Number plate light	Electronic governor
	0.014.0881.4/40			Mechanical governor
X35	0.014.0881.4/40		Not utilised	
X36	0.013.9030.4/10	2.7099.800.0	Engine temperature sensor (for preheating)	4 cylinders
	0.013.9031.4/10			3 cylinders
X37	0.013.9030.4/10	2.7099.640.0/10	Engine temperature sensor (for instrument)	4 cylinders
	0.013.9031.4/10			3 cylinders
X38	0.013.9030.4/10	2.7099.940.0	Engine oil pressure switch	4 cylinders
	0.013.9031.4/10			3 cylinders
X39	0.013.9030.4/10	0.257.6654.3/10	Brake fluid level sensor	4 cylinders
	0.013.9031.4/10			3 cylinders
X40	0.013.9030.4/10	009.7660.4	Air conditioning compressor	4 cylinders
	0.013.9031.4/10			3 cylinders
X41	0.013.9030.4/10	2.8029.760.0/30	Right headlight	4 cylinders
		2.8029.770.0/30	Right headlight (GB)	4 cylinders
	0.013.9031.4/10	2.8029.760.0/30	Right headlight	3 cylinders
		2.8029.770.0/30	Right headlight (GB)	3 cylinders
X42	0.013.9030.4/10	2.7099.320.0/10	Air cleaner clogged sensor	4 cylinders
	0.013.9031.4/10			3 cylinders
X43	0.013.9030.4/10	2.8419.007.0	Horn	4 cylinders
	0.013.9031.4/10	2.8419.007.0	Horn	3 cylinders
X44	0.013.9030.4/10	2.3729.400.0	Front PTO control solenoid valve	4 cylinders
	0.013.9031.4/10			3 cylinders
X45	0.013.9030.4/10	2.8029.760.0/30	Left headlight	4 cylinders
	0.013.9030.4/10	2.8029.770.0/30	Left headlight (GB)	4 cylinders
	0.013.9031.4/10	2.8029.760.0/30	Left headlight	3 cylinders
	0.013.9031.4/10	2.8029.770.0/30	Left headlight (GB)	3 cylinders
X46	0.013.9036.4/20	0.013.3450.4/10	Preheating glowplug	3 cylinders
	0.013.9038.4/20			4 cylinders
X47	0.014.0879.4/50	2.7099.999.0	Shuttle sensor	
X48	0.014.0879.4/50	2.7099.700.0	PALL filter clogging sensor	

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X49	0.014.0879.4/50	0.012.1507.4	Left brake pressure sensor	
X50	0.014.0879.4/50	0.012.1507.4	Right brake pressure sensor	
X51	0.014.0879.4/50	2.7099.660.0/10	Pressure switch - oil filter clogging sensor	
X52	0.014.0879.4/50	2.7099.800.0	Oil temperature sensor	
X53	0.011.7711.3	2.7099.750.0/10	Services circuit alarm pressure switch	
X54	0.014.0884.4	2.7099.996.0	Engine speed sensor (for shuttle)	
X55	0.014.0878.4/30	2.7099.740.0/10	Clutch pedal position sensor	
X56	0.014.0878.4/30	0.010.9612.4/20	Gear lever	HML
		0.010.9611.4/20	Gear lever	
X57	0.014.0878.4/30		Supplementary CANBUS socket	
X58	0.014.0878.4/30	2.8519.036.0	Shuttle speed signal conversion control unit	
X59	0.014.0878.4/30	0.008.1550.0	Outlet socket	
X60	0.013.0675.4	0.013.4592.4/10	Shuttle Lever	
X61	0.014.0883.4/10	0.010.3473.2	Operator present sensor	
X62	0.010.6468.3	0.014.3061.4/10	Pneumatic seat air compressor	
X63	0.009.7850.4/50	2.8339.032.0	Interior roof light	Standard cab
	0.011.3606.4/50			High-visi-bility roof
X64	0.009.7850.4/50	2.7659.079.0	Rear worklights switch	Standard cab
	0.011.3606.4/50	2.7659.155.0	Rear worklights switch	High-visi-bility roof
X65	0.009.7850.4/50	2.7659.146.0	Rear window wiper switch	Standard cab
	0.011.3606.4/50	2.7659.192.0	Rear window wiper switch	High-visi-bility roof
X66	0.009.7850.4/50	2.7659.091.0	Windscreen washer pump switch	Standard cab
	0.011.3606.4/50	2.7659.223.0	Windscreen washer pump switch	High-visi-bility roof
X67	0.009.7850.4/50	2.7659.126.0	Rotating beacon on/off switch	Standard cab
	0.011.3606.4/50	2.7659.159.0	Rotating beacon on/off switch	High-visi-bility roof
X68	0.009.7850.4/50	2.8639.008.0	Intermittent windscreen wiper timer	Standard cab
	0.011.3606.4/50		Intermittent windscreen wiper timer	High-visi-bility roof
X69	0.009.7850.4/50		Clock	Standard cab

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X70	0.009.7850.4/50	2.7659.092.0	Windscreen wiper switch	Standard cab
	0.011.3606.4/50	2.7659.224.0	Windscreen wiper switch	High-visibility roof
X71	0.009.7850.4/50	2.7659.078.0	Front worklights switch	Standard cab
	0.011.3606.4/50	2.7659.154.0	Front worklights switch	High-visibility roof
X72	0.009.7850.4/50		Radio	Standard cab
X74	0.010.5582.3	2.8019.200.0	Front right sidelight and direction indicator	
	0441.1923.4	0441.1921.4	Front right sidelight and direction indicator	Vertical exhaust silencer
X75	0.010.5582.3	2.8019.200.0	Front left sidelight and direction indicator	
	0441.1923.4	0441.1920.4	Front left sidelight and direction indicator	Vertical exhaust silencer
X76	0.009.7851.4/50	2.8029.730.0	Front right worklight	Standard cab
	0.011.3595.3/10			High-visibility roof
X77	0.009.7851.4/50	2.8029.730.0	Front left worklight	Standard cab
	0.011.3595.3/10			High-visibility roof
X78	0.009.7851.4/50	2.8029.730.0	Rear left worklight	Standard cab
	0.011.3595.3/10			High-visibility roof
X79	0.009.7851.4/50	2.8029.730.0	Rear right worklight	Standard cab
	0.011.3595.3/10			High-visibility roof
X80	0.012.9909.4	2.6039.017.0	Rotating beacon	
X81	0.010.4516.3	0441.3192	Windscreen wiper motor	Standard cab
	0.011.3597.3			High-visibility roof
X82	0.011.3743.3	0.9241.566.1	Windscreen washer pump	
X83	0.011.3743.3	0.9241.566.1	Rear screen washer pump	
X84	0.011.3596.3/40	0.011.5631.3	Right loudspeaker	High-visibility roof
X85	0.011.3596.3/40	2.9019.180.0	Rear window wiper motor	High-visibility roof

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X86	0.011.3596.3/40	0.011.5631.3	LH loudspeaker	High-visibility roof
X87	0.011.3596.3/40		Radio	High-visibility roof
X88	0.011.3596.3/40		Radio	High-visibility roof
X89	0.011.3596.3/40		Clock	High-visibility roof
X90	0.011.0729.4/10		Radio	Standard cab
X91	0.011.0729.4/10	0.011.5631.3	Left loudspeaker	Standard cab
X92	0.011.0729.4/10	0.011.5631.3	Right loudspeaker	Standard cab
X93	0.010.2554.2	0.010.2555.0	Left resistor	High-visibility roof
	0.010.2560.0			High-visibility roof
X94	0.010.2560.0	0.900.0058.9	A/C switch	High-visibility roof
X95	0.010.2554.2	0.010.2528.1	Fan speed selector switch	High-visibility roof
	0.010.2560.0			High-visibility roof
X96	0.010.2554.2	0.010.2555.0	Right resistor	High-visibility roof
	0.010.2560.0			High-visibility roof
X97	0.010.2560.0	0.009.4744.1	Air conditioning temperature thermostat control	High-visibility roof
X98	0.010.2554.2	0.011.2047.4	Left electric fan	High-visibility roof
	0.010.2560.0			High-visibility roof
X99	0.010.2554.2	0.011.2047.4	Right electric fan	High-visibility roof
	0.010.2560.0			High-visibility roof
X100	0.010.2147.2	0.010.2121.1	Electric fan	Standard cab
	0.010.2153.2			Standard cab
X101	0.010.2147.2	0.010.2122.0	Resistor	Standard cab
	0.010.2153.2			Standard cab

Connector	Wiring code	Connection wiring or component code	Component description	Notes
X102	0.010.2147.2	0.009.4743.1	Fan speed selector switch	Standard cab
	0.010.2153.2			Standard cab
X103	0.010.2153.2	0.009.4744.1	Air conditioning temperature thermostat control	Standard cab
X104	0.009.7853.3/20	0.010.2140.0	Air conditioning pressure switch	Standard cab
	0.011.3610.3/20	0.010.2262.0	Air conditioning pressure switch	High-visi-bility roof
X105	0.009.7853.3/20	0.010.0618.4	Air conditioning fan	Standard cab
	0.011.3610.3/20	0.010.2545.2	Air conditioning fan	High-visi-bility roof
X106	0.011.3610.3/20	0.010.2545.2	Supplementary air conditioning fan	High-visi-bility roof
X107	0.009.7853.3/20	0.010.2140.0	Air conditioning pressure switch	Standard cab
X108	0.009.7851.4/50	2.9019.100.0/20	Rear window wiper motor	Standard cab
X109	0.014.0880.4/50		Not utilised	

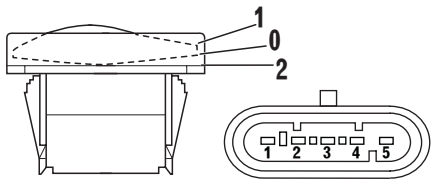
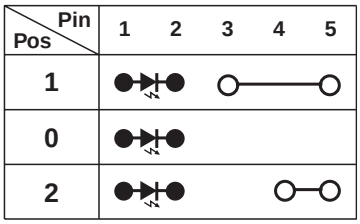
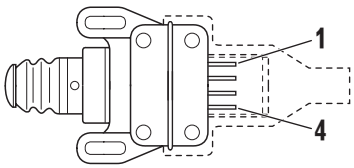
3. COMPONENTS

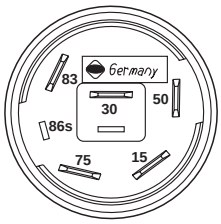
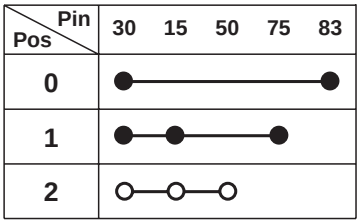
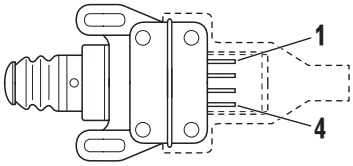
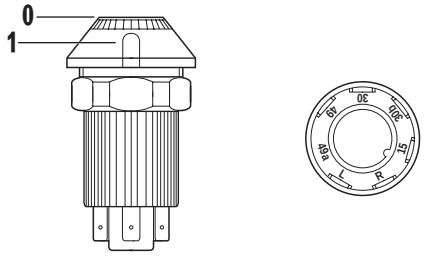
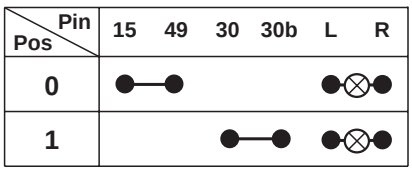
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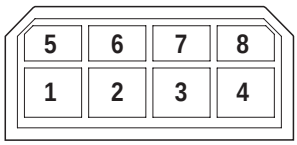
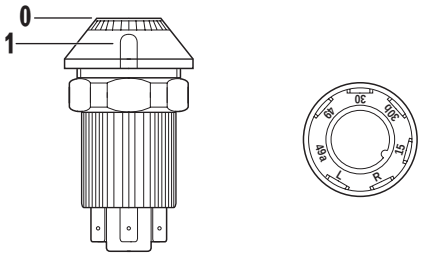
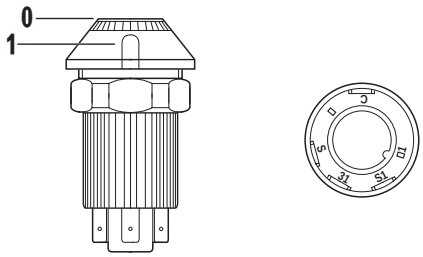
1 - Components table: technical and functional description of the components

2 - Pinouts of the electronic control units

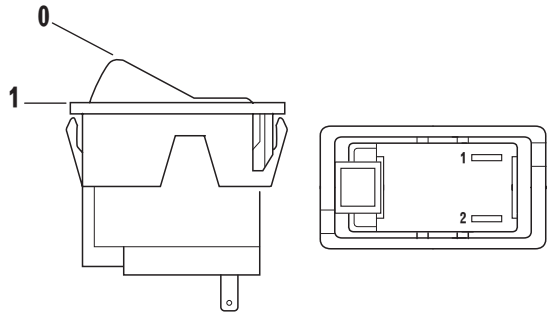
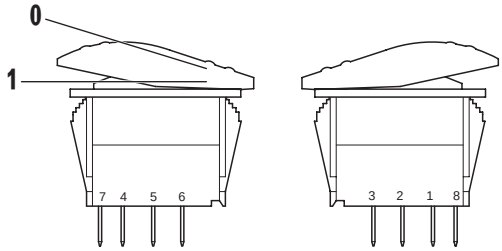
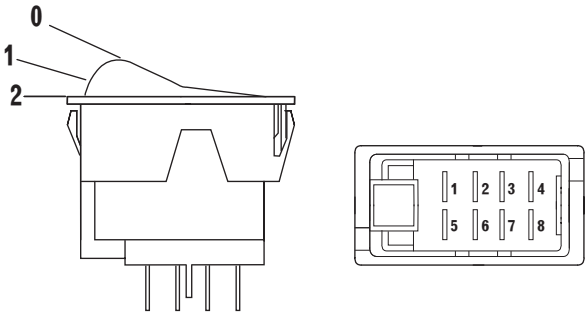
3.1 COMPONENT TECHNICAL DATA

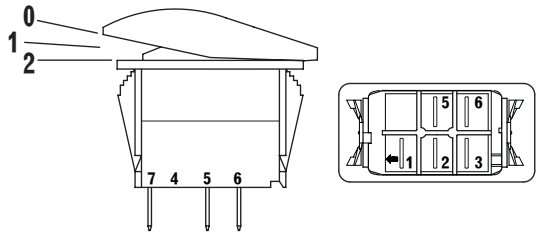
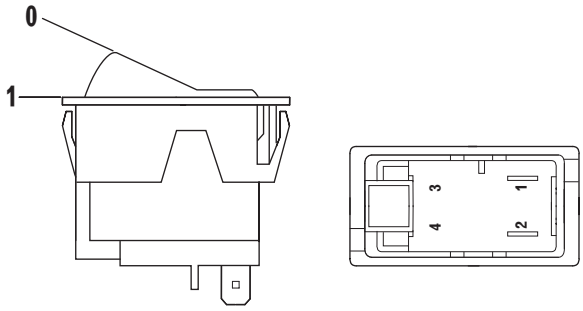
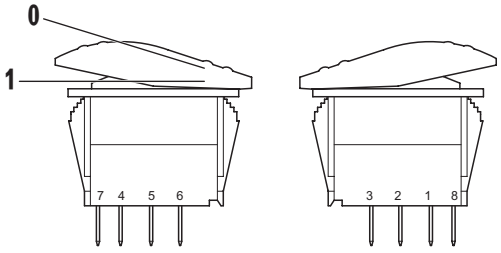
No	Description	Code	Characteristics	Connector
1	PTO engagement sensor	2.7659.131.0	Normally open contact (NO)	1-5-E-S
2	Lift Up/Down switch	0.011.7720.0/20	 	C-I
3	Lift up/downpush-button	2.7659.182.0	Normally open contact (NO)	DW-UP
4	Pressure switch	2.7099.690.0/10	Normally closed contact (NC) Switching pressure: 4 bars	F
5	H gear control sole-noid valve	2.3729.697.0	See solenoid 0.010.2831.1	H
6	L gear control sole-noid valve	2.3729.697.0	See solenoid 0.010.2831.1	L
7	Rear lift position sensor	0.009.2194.4	Pin1 = earth Pin2 = Output signal Pin3 = 10Vdc power Output 0.2Vdc (sensor released) Output 8.3Vdc (sensor fully pressed) Check the supply voltage	P2
8	Brake pedal switch	2.7659.097.0	 Across pin 1 and pin 2: normally closed (NC) switch Across pin 3 and pin 4: normally open (NO) switch	X4

No	Description	Code	Characteristics	Connector
9	Starter switch	0441.1512.4	 	X6
10	Clutch enable switch	2.7659.097.0	 Across pin 1 and pin 2: normally closed (NC) switch Across pin 3 and pin 4: normally open (NO) switch	X7
11	Front PTO pushbutton	2.7659.108.0/10	 	X9

No	Description	Code	Characteristics	Connector
12	Hazard warning lights switch	2.7659.110.0	 Pin / Pos: 1 2 3 4 5 6 7 8 FR SX: ● ● (6–8) FR DX: ● ● (6–7) CLAX: ○ ○ (1–5) LAMP: ○ ○ (1–4) POS: ● ● (1–2) ANA: ● ● ● (1–3) ABB: ● ● ● (1–4)	X10
13	Hand throttle position sensor	2.7099.740.0/10	Pin1 = power (Nominal 5.0V) Pin2 = earth Pin4 = analog signal	X14
14	4WD switch	0.007.5945.0/20	 Pin / Pos: 15 30b 30 49 L R 0: ● ● (15–49) 1: ● ● ⊗ ● (15–30–L–R)	X15
15	Rear PTO engagement pushbutton	2.7659.142.0	 Pin / Pos: S1 S 31 C 0: ⊗ ● (31–C) 1: ● ⊗ ● (S–31–C)	X17

No	Description	Code	Characteristics	Connector
16	Position sensor	0.008.8199.3	Resistance between pin A and pin E: ~ 1800 Ohm Resistance between pin A and pin S: 5 to 1800 Ohm	X19
17	4WD control solenoid valve	2.3729.697.0	See solenoid 0.010.2831.1	X23
18	Differential lock control solenoid valve	2.3729.697.0	See solenoid 0.010.2831.1	X24
19	Engine speed sensor (pick-up)	2.7099.790.0	Resistance between pin1 and pin 2: ~900 Ohm	X29
20	Actuator	0.007.0992.4/60	Resistance between pin1 and pin 2: 2.3±0.5 Ohm	X30
21	Pressure switch	2.7099.960.0	Normally closed contact (NC) Switching pressure: 11 bar	X31
22	Temperature sensor	2.7099.800.0	Resistance between pins 1 and 2 at 0±1 °C: 7351 Ohm at 20±1 °C: 2812 Ohm at 40±1 °C: 1199 Ohm at 60±1 °C: 560.2 Ohm at 80±1 °C: 283.2 Ohm	X36-X52
23	Engine temperature sensor	2.7099.640.0/10	Resistance between the pin and the sensor body: at 20°C ~2000 Ohm at 60°C 470 to 499Ohm ± 3% at 80°C 238 to 247Ohm ± 2% at 100°C 129 to 131Ohm ± 1%	X37
24	Engine oil pressure switch	2.7099.940.0	Normally closed contact Switching pressure: 0.4 to 0.7 bar	X38
25	Air cleaner clogging sensor	2.7099.320.0/10	Normally open contact Switching pressure: 0.93 to 0.94 bar absolute pressure	X42
26	Front PTO control solenoid valve	2.3729.400.0	See solenoid 0.010.3140.0	X44
27	Clogged filter sensor	2.7099.700.0	Normally open contact (NO) Pressure differential for commutation: 2.4 bar Reset pressure: 1.8 bar	X48
28	Brake pressure sensor	0.012.1507.4	Pin1 = 5.0Vdc power Pin2 = earth Pin3 = analog signal 0.5V DC output (0 bar) 4.5V DC output (40 bar)	X49-X50
29	Pressure switch - oil filter clogging sensor	2.7099.660.0/10	Normally open contact Calibration pressure: 0.4 to 0.5 bar absolute pressure	X51
30	Services circuit alarm pressure switch	2.7099.750.0/10	Normally closed contact (NC) Switching pressure: 11 bar ± 1	X53

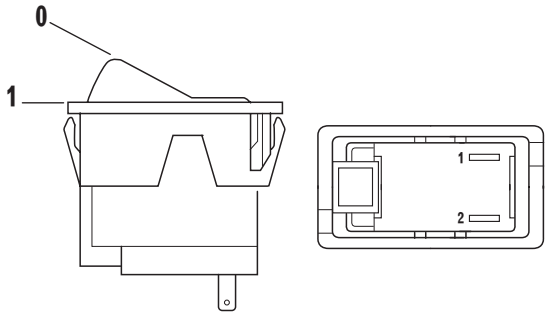
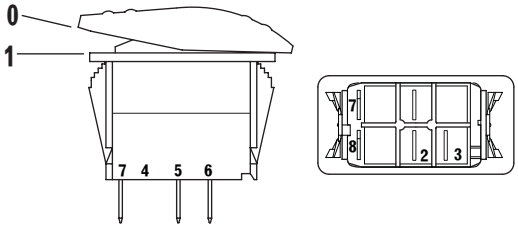
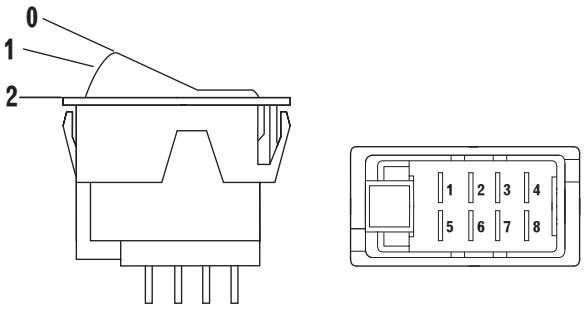
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31	Rear worklights switch	2.7659.079.0	 Pos \ Pin: 1 2 0: 1: ●—●	X64
32	Rear worklights switch	2.7659.155.0	 Pos \ Pin: 1 2 3 4 5 6 7 8 0: ●—● ●—▷● 1: ●—● ●—▷●	X64
33	Rear window wiper switch	2.7659.146.0	 Pos \ Pin: 1 2 3 4 5 6 0: 1: ○—○—○—○ 2: ○—○—○—○	X65

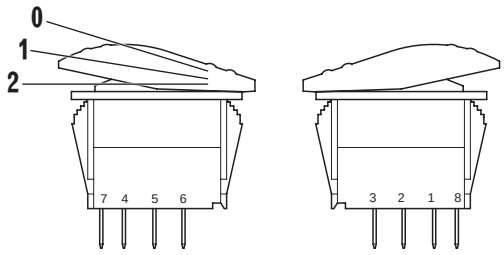
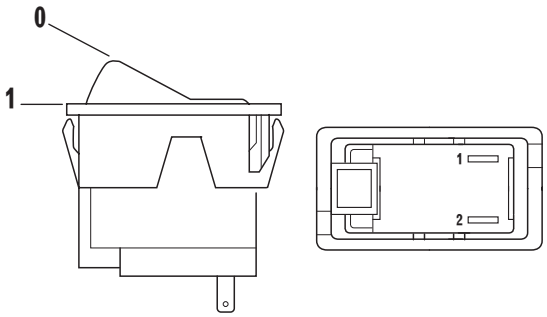
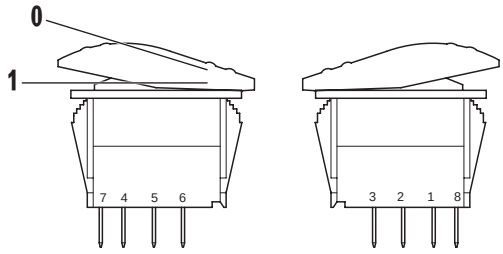
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34	Rear window wiper switch	2.7659.192.0		X65
35	Windscreen washer pump switch	2.7659.091.0		X66
36	Windscreen washer pump switch	2.7659.223.0		X66

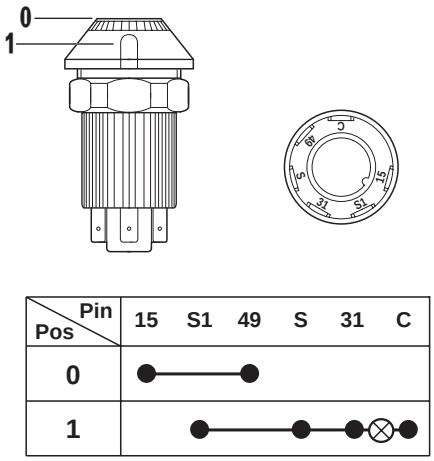
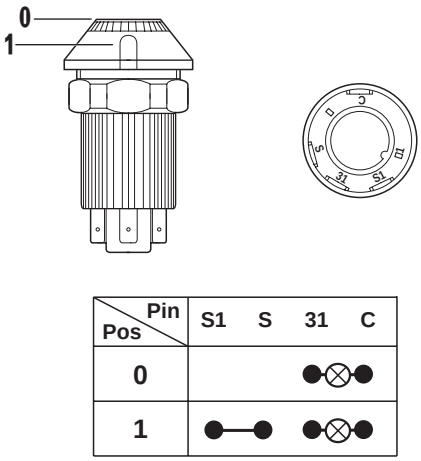
Pos \ Pin	1	2	3	4	5	6	7	8
0	●	●						
1	○	○						
2	○	○			○	○		

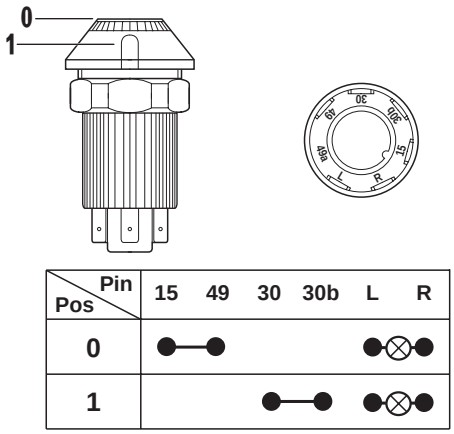
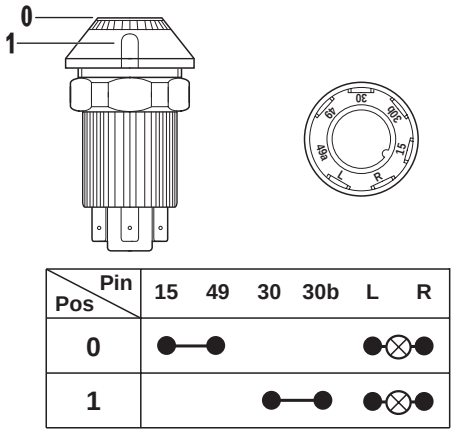
Pos \ Pin	1	2
0		
1	○	○

Pos \ Pin	1	2	3	4	5	6	7	8
0								
1		○	○					

No	Description	Code	Characteristics	Connector
37	Rotating beacon switch	2.7659.126.0	 Pos \ Pin: 1 2 0 1 ● — ●	X67
38	Rotating beacon on/ off switch	2.7659.159.0	 Pos \ Pin: 1 2 3 4 5 6 7 8 0 ● ● (LED) 1 ● — ● ● (LED)	X67
39	Windscreen wiper switch	2.7659.092.0	 Pos \ Pin: 1 2 3 4 5 6 7 8 0 ● — ● — ● — ● 1 ● — ● — ● — ● 2 ● — ● — ● — ●	X70

No	Description	Code	Characteristics	Connector
40	Windscreen wiper switch	2.7659.224.0	 Pos \ Pin: 1 2 3 5 6 0: ●—● 1: ●—● ●—● 2: ●—● ●—●	X70
41	Upper front work-lights switch	2.7659.078.0	 Pos \ Pin: 1 2 0: 1: ●—●	X71
42	Front worklights switch	2.7659.154.0	 Pos \ Pin: 1 2 3 4 5 6 7 8 0: ●—● ●—● 1: ●—● ●—●	X71
43	Parking brake switch	2.7659.129.0	Normally closed contact (NC) (parking brake on)	X28
44	Engine speed sen-sor	2.7099.996.0	This cannnot be checked using a simple Tester; use the ART.	X54

No	Description	Code	Characteristics	Connector
45	Clutch pedal position sensor	2.7099.740.0/10	Pin1 = power (Nominal 5.0V) Pin2 = earth Pin4 = analog signal	X55
46	Memory pushbutton	2.7659.203.0/10	Normally open contact (NO)	X18
47	Preheating pushbutton	2.7659.203.0/10	Normally open contact (NO)	X13
48	Solenoid	0.010.2831.1	Pin 1 = earth Pin 2 = power Resistance between pins 1 and 2: ~ 8 Ohm (at 20 °C)	P
49	Rear PTO solenoid	0.010.2831.1	Pin 1 = earth Pin 2 = power Resistance between pins 1 and 2: ~ 8 Ohm (at 20 °C)	X25
50	Minireduction gear sensor	2.7659.258.0	Normally open contact (NO)	MR
51	Differential lock pushbutton	0.008.1335.0/10		X16
52	Stop-Go pushbutton	2.7659.264.0		X5

No	Description	Code	Characteristics	Connector
53	AUTO PTO pushbutton	2.7659.108.0/10	 Pin / Pos: 15 49 30 30b L R 0: ● — ● ⊗ ● ● 1: ● — ● ⊗ ● ●	X11
54	Rear PTO pushbutton	2.7659.108.0/10	 Pin / Pos: 15 49 30 30b L R 0: ● — ● ⊗ ● ● 1: ● — ● ⊗ ● ●	X17
55	Operator present sensor	0.010.3473.2	Pin / Pos: 1 2 3 0: 1K Ohm; 2K Ohm; 3K Ohm 1: 1K Ohm; 500 Ohm; 1.5K Ohm	X61
56	Electronic lift draft sensor	2.7099.983.0	Pin 1: Earth Pin 2: analogue signal Pin 3: 10V power Signal with sensor disconnected from tractor between pin1 and pin 2: ~ 5V	S1

3.2 PINOUTS AND DESCRIPTIONS OF ELECTRONIC CONTROL UNITS

3.2.1 ENGINE CONTROL UNIT (P/N 2.8519.054.0/50)

ENGINE ECU CONNECTOR			
Pin	*Volts*	*Abbrevia-tion*	*Description*
1			Battery negative
2			Power (-), engine temperature sensor
3			Input, engine temperature signal
4			Not utilised
5			Input, accelerator pedal sensor signal
6			Input, hand throttle sensor signal
7			Not utilised
8			Not utilised
9			Not utilised
10			Input, engine speed pickup
11			Input, wheel rotation sensor 1 signal
12			Input, wheel rotation sensor 2 signal
13			Not utilised
14			Not utilised
15			Not utilised
16			Not utilised
17			Not utilised
18			Not utilised
19			Not utilised
20			Not utilised
21			Not utilised
22			Digital output, engine speed
23	+ 12V		Battery positive
24			Not utilised
25	0V		Battery negative
26			Not utilised
27		TxD	ISO 9141 serial interface (Diagnostics connector)
28	+5V		+5V reference voltage for signal on pins 5 and 6
29		RxD	ISO 9141 serial interface (Diagnostics connector)
30			Not utilised
31			Not utilised
32			Not utilised
33	0V		Power (–), sensors
34			Not utilised
35			Not utilised
36			Not utilised
37			Not utilised
38			Not utilised
39			Not utilised

40			Not utilised
41			Not utilised
42			Not utilised
43			Not utilised
44			Not utilised
45	+12V		Battery positive
46			Power (+), actuator
47			Power (–), actuator
48			Not utilised
49			Input, preheating device on check signal
50			Not utilised
51			Input, engine start signal
52	+12V		Power (+) common, "H" &"L" solenoids
53			Power (–), "H" speed solenoid valve
54			Power (–), "L" speed solenoid valve
55			Not utilised
56			Power (–), preheating relay
57			Power (–), preheating indicator light
58			Not utilised
59			Not utilised
60			Power (–), "M" speed warning light
61			Power (–), "HOLD" warning light
62			Range upshift pushbutton signal
63			Range downshift pushbutton signal
64			Not utilised
65			Input, preheating signal
66			Not utilised
67			"HOLD" pushbutton signal
68			Not utilised

3.2.2 ELECTRONIC LIFT CONTROL UNIT (P/N 0.011.2992.4/30)

LIFT ECU CONNECTOR			
Pin	*Volts*	*Abbrevia-tion*	*Description*
1	+12V		Battery positive
2			Power for "UP" solenoid
3			Power for "DOWN" solenoid
4	0V		Battery negative
5	+10V		Power (+) common, solenoids and sensors
6			Analog input, lift position sensor
7			Analog input, lift draft sensor
8			Analog input, lift lowering rate trimmer
9			Analog input, maximum lift height trimmer
10			Analog input, lift draft-wheelslip control trimmer
11			Analog input, maximum lift position trimmer
12			ISO 9141 serial interface (Diagnostics connector)

3.2.3SHUTTLE CONTROL UNIT (P/N 2.8519.030.0/30)

SHUTTLE ECU CONNECTOR			
Pin	*Volts*	*Abbrevia-tion*	*Description*
1	0V		Battery negative
2	0V		Sensor power negative
3			Input, right brake pressure sensor signal
4			Input, forward drive signal
5			Input, reverse drive signal
6			Not utilised
7			Not utilised
8			Power (+), buzzer
9			Not utilised
10			Not utilised
11			Not utilised
12			Input, Comfort Clutch button signal
13			Not utilised
14			Not utilised
15			Input, shuttle speed sensor
16			Input, minireduction engaged signal
17			Not utilised
18			Input, clutch pedal pressed switch
19			Not utilised
20			Not utilised
21			Not utilised
22			Power (+), forward drive solenoid valve
23	+12V	+15	Battery positive
24	0V		Battery negative
25	+12V	+30	Battery positive
26			Not utilised
27	+8V		Power (+), operator present sensor
28	+5V		+5V reference voltage for signal on pins 3, 46 and 48
29			ISO 9141 interface serial (half duplex)
30		CANH	CAN H
31		CANL	CAN L
32		CANRES	CAN RES
33	0V		+0V reference voltage for signal on pins 3, 46, 48 and 51
34			Not utilised
35			Not utilised
36			Not utilised
37			Not utilised
38			Display control output signal
39			Display control clock output
40			Not utilised

41			Not utilised
42			Not utilised
43			Power (+), shuttle proportional solenoid valve
44	+12V	+15	Battery positive
45	+12V	+15	Battery positive
46			Input, accelerator pedal position sensor signal
47			Input, transmission oil temperature sensor signal
48			Input, left brake pressure sensor signal
49			Input, neutral signal
50			Not utilised
51			Input, operator presence sensor signal
52			Not utilised
53			Not utilised
54			Not utilised
55			Input, "Stop & Go" switch signal
56			Input, filter clogging sensor signal
57			Input, HML + signal
58			Input, HML -signal
59			Input, engine speed sensor signal
60			Input, wheel speed sensor signal
61			Not utilised
62			Input, proportional solenoid valve pressure sensor signal
63			Power (+), "Stop & Go" switch light
64			Power (+), H speed solenoid valve
65			Power (+), L speed solenoid valve
66			Power (), reverse drive solenoid valve
67			Power (-), shuttle proportional solenoid valve
68			Not utilised

3.2.4INSTRUMENT PANEL (P/N. 2.8339.248.0)

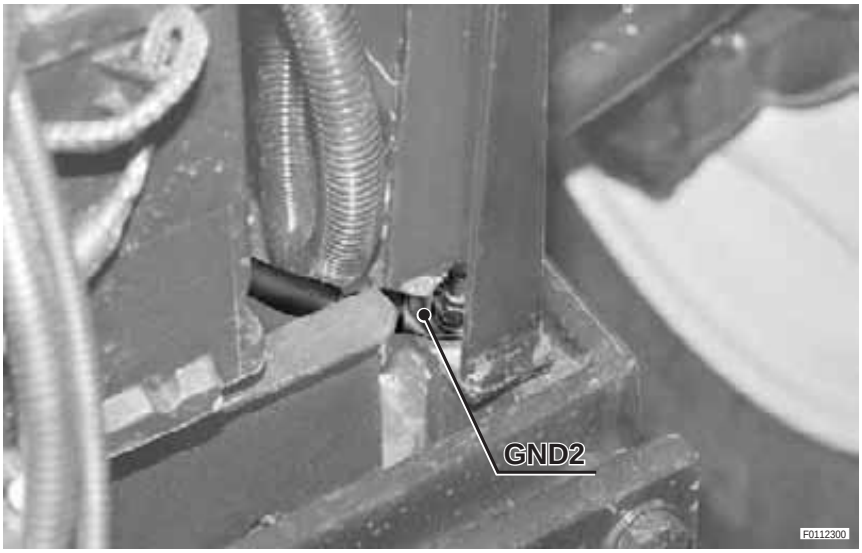
CONNECTOR X3 (3K)			
Pin	*Volts*	*Abbrevia-tion*	*Description*
1			Not utilised
2			Not utilised
3			Not utilised
4			Input, fuel reserve signal
5			Input, air cleaner clogged signal
6			Input signal, engine oil pressure
7			Input, brake fluid level signal
8			Not utilised
9			Input, ECO PTO engaged signal
10			Input, 1000 PTO engaged signal
11			Input, 540 PTO engaged signal
12			Input, trailer brake
13			Input, rear PTO engaged signal
14	+12V	+15	Battery positive
15	+12V	+30	Battery positive
16			Input, diff lock engaged signal
17			Input, 4WD activated signal
18			Input, transmission oil filter clogged signal
19			Input, transmission oil pressure signal
20			Input, battery charging signal
21	+12V	+30	Battery positive
22			Input, parking brake
23			Not utilised
24			Input, groundspeed PTO engaged signal
25			Input, preheating control pushbutton (with mechanical governor)
			Not utilised (with electronic governor)
26			Not utilised
CONNECTOR X2 (5K)			
Pin	*Volts*	*Abbrevia-tion*	*Description*
1			ISO 9141 serial interface
2		CANH	CAN H
3		CANL	CAN L
4		CANRES	CAN RES
5			Input, display control
6			Input, clock display control
7		+50	Input, engine start signal (with mechanical governor)
			Not utilised (with electronic governor)
8			Input, low beam headlights signal
9			Input, high beam headlights signal
10			Input, direction indicators
11			Input, 1st trailer direction indicators

12			Input, 2nd trailer direction indicators
13	0V		Battery negative
14			Buzzer
15			Input, preheating on signal (with mechanical governor)
			Input, preheating warning light on (with electronic governor)
16			Input, front PTO engaged signal
17			Not utilised (with mechanical governor)
			Input, MEM light signal (with electronic governor)
18			Not utilised
19			Power (+), preheating relay (with mechanical governor)
			Not utilised
20			Input, coolant temperature sensor signal
21			Input, fuel level signal
22			Not utilised
23			Input, wheel speed signal
24			Engine speed signal input
25			Not utilised
26			Not utilised

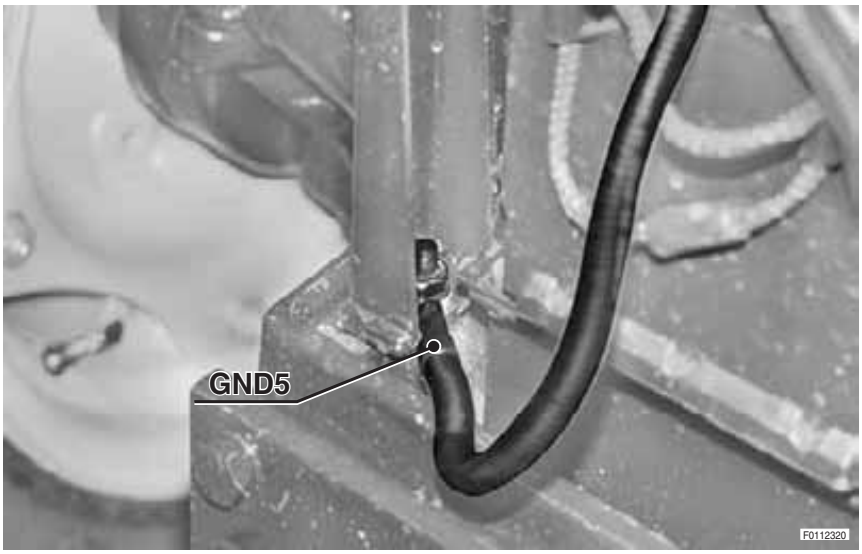
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4. SYSTEMS
4.1 EARTHING POINTS

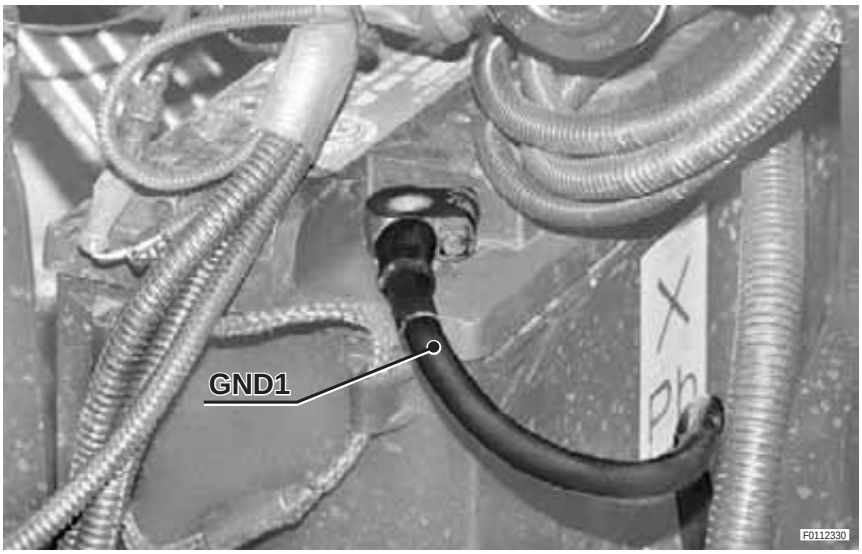
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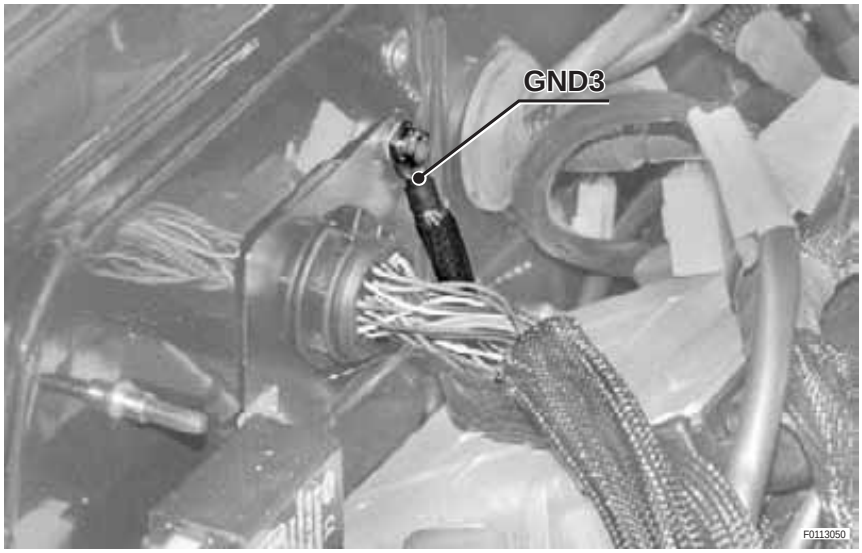
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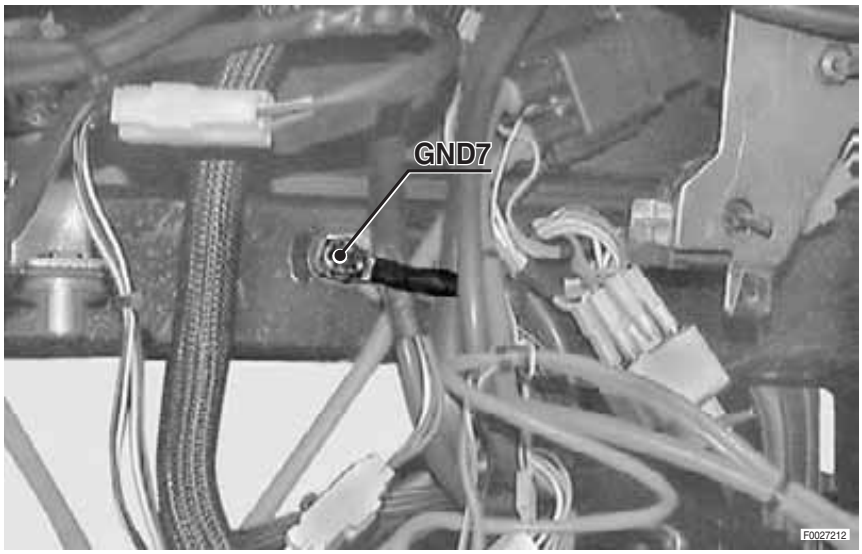
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4

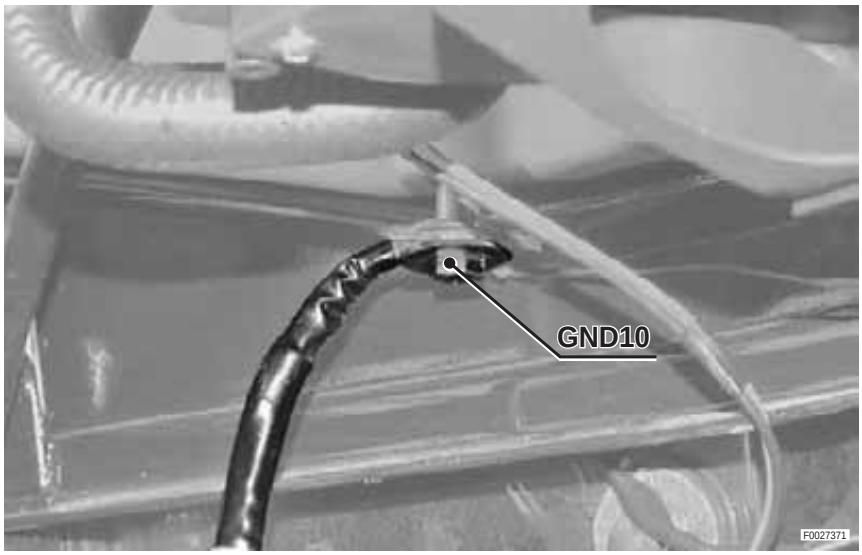


5



HIGH-VISIBILITY CAB

6

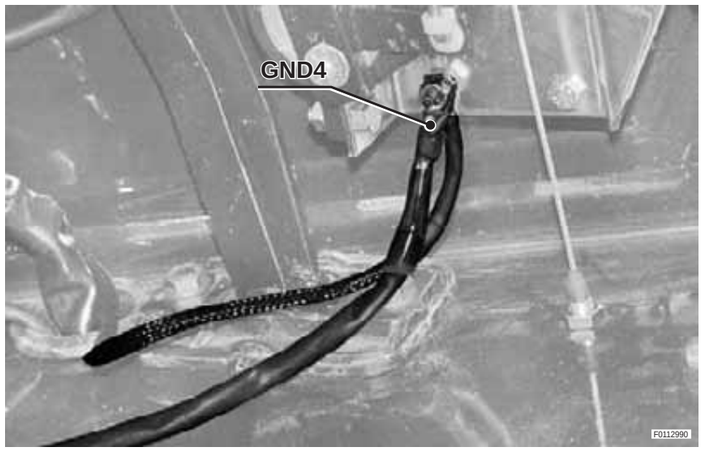


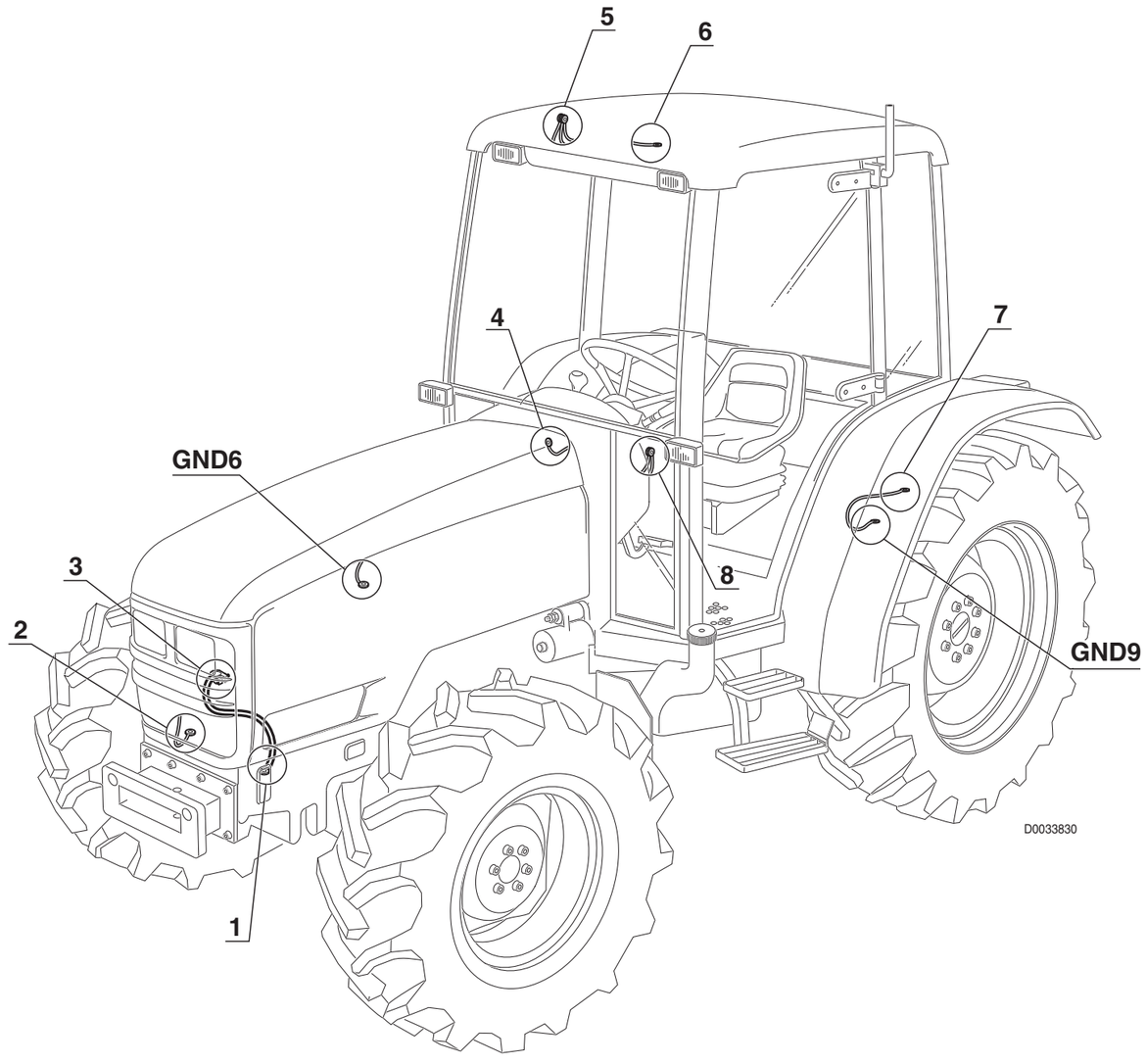
STANDARD CAB

7



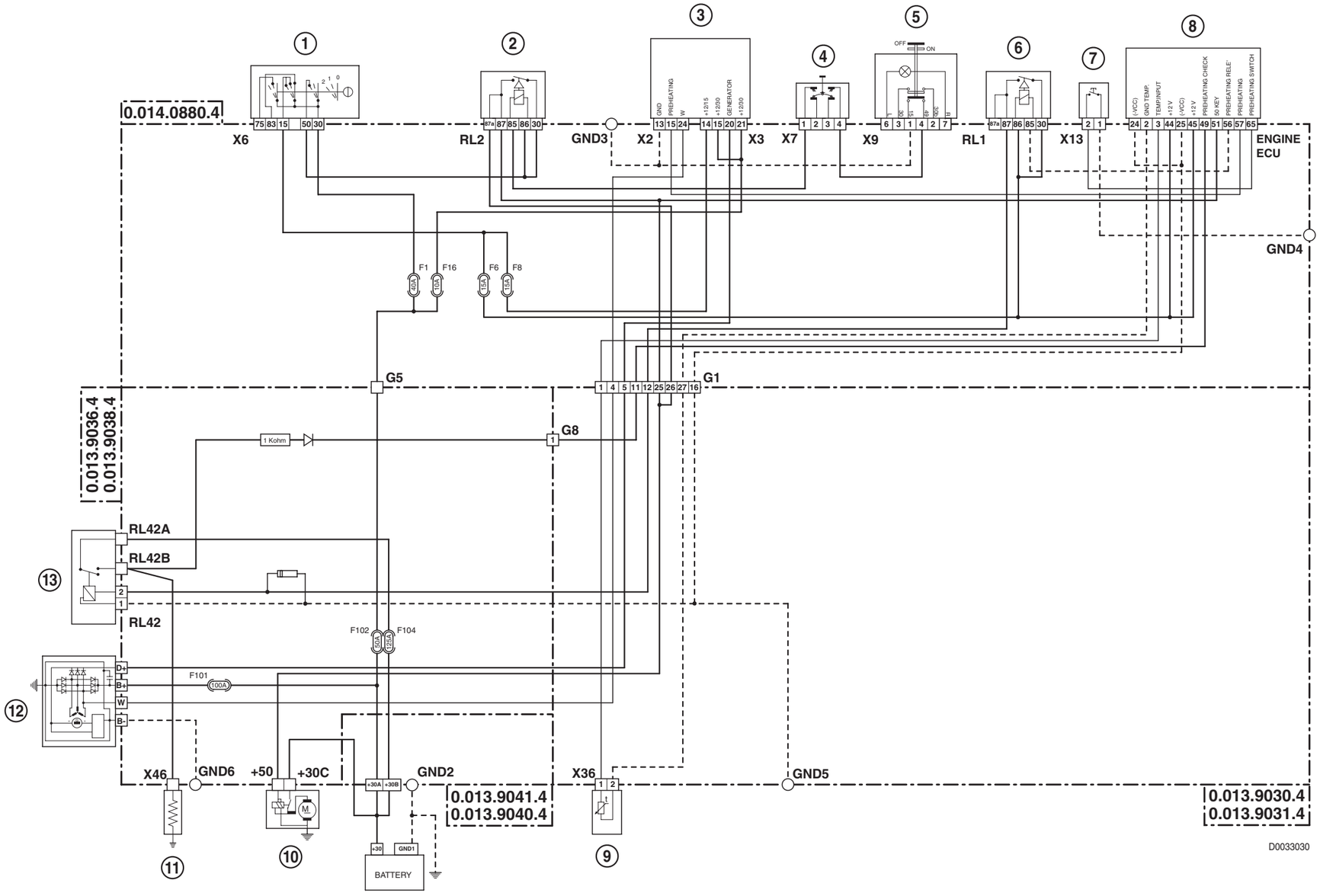
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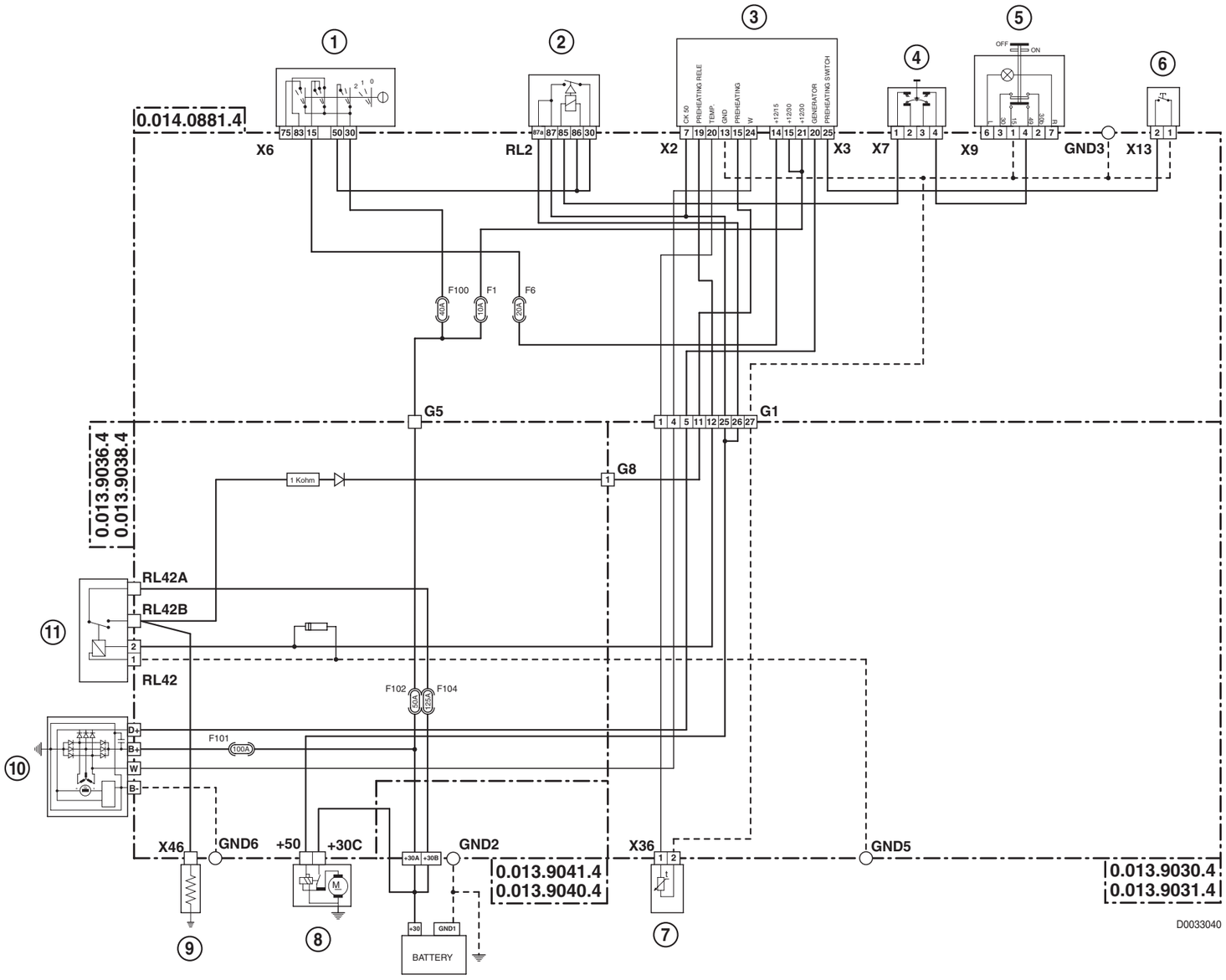
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4.2 STARTING AND PREHEATING (ELECTRONIC GOVERNOR VERSION)



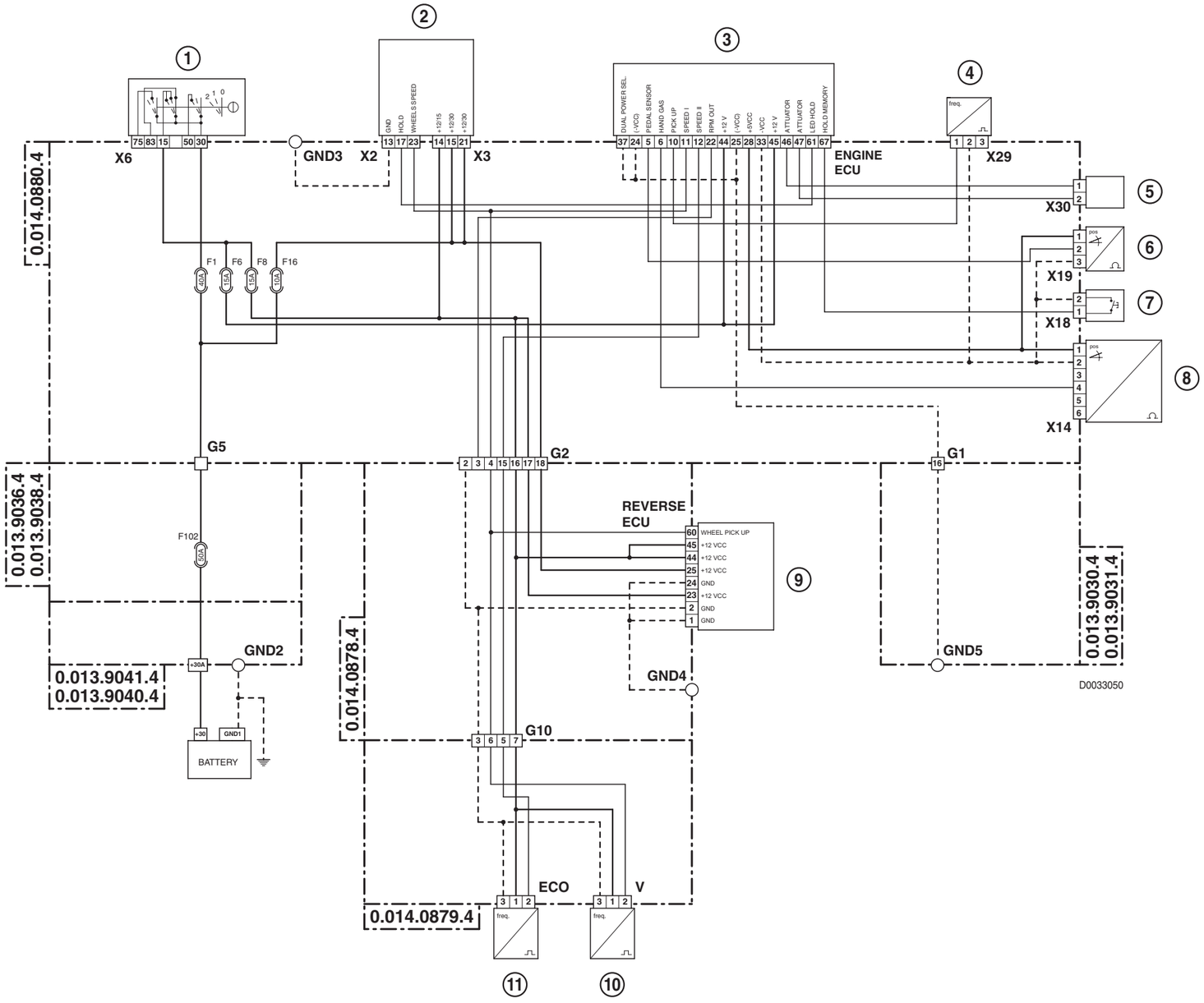
1 Starter switch
2 Engine starter relay
3 Instrument panel
4 Clutch pedal switch
5 - Front PTO pushbutton
6 - Preheating relay
7 Preheating pushbutton
8 Engine control unit
9 Engine temperature sensor (for preheating)
10 Starter motor
11 Preheating device
12 Alternator
13 Preheating relay

4.3 STARTING AND PREHEATING (MECHANICAL GOVERNOR VERSION)



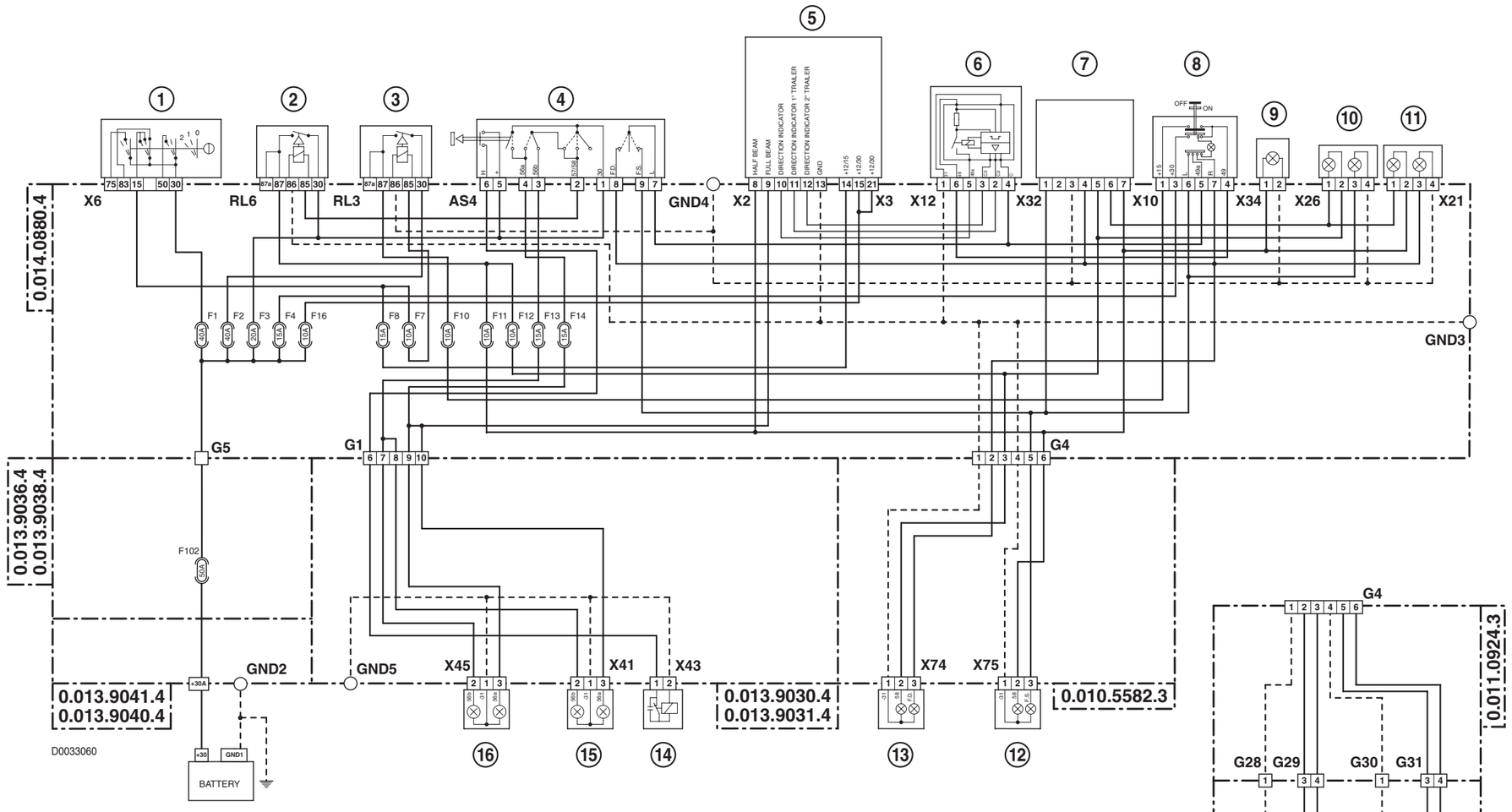
1 Starter switch
2 Engine starter relay
3 Instrument panel
4 Clutch pedal switch
5 Front PTO pushbutton
6 Preheating pushbutton
7 Engine temperature sensor (for preheating)
8 Starter motor
9 Preheating device
10 Alternator
11 Preheating relay

4.4 ELECTRONIC ENGINE CONTROL



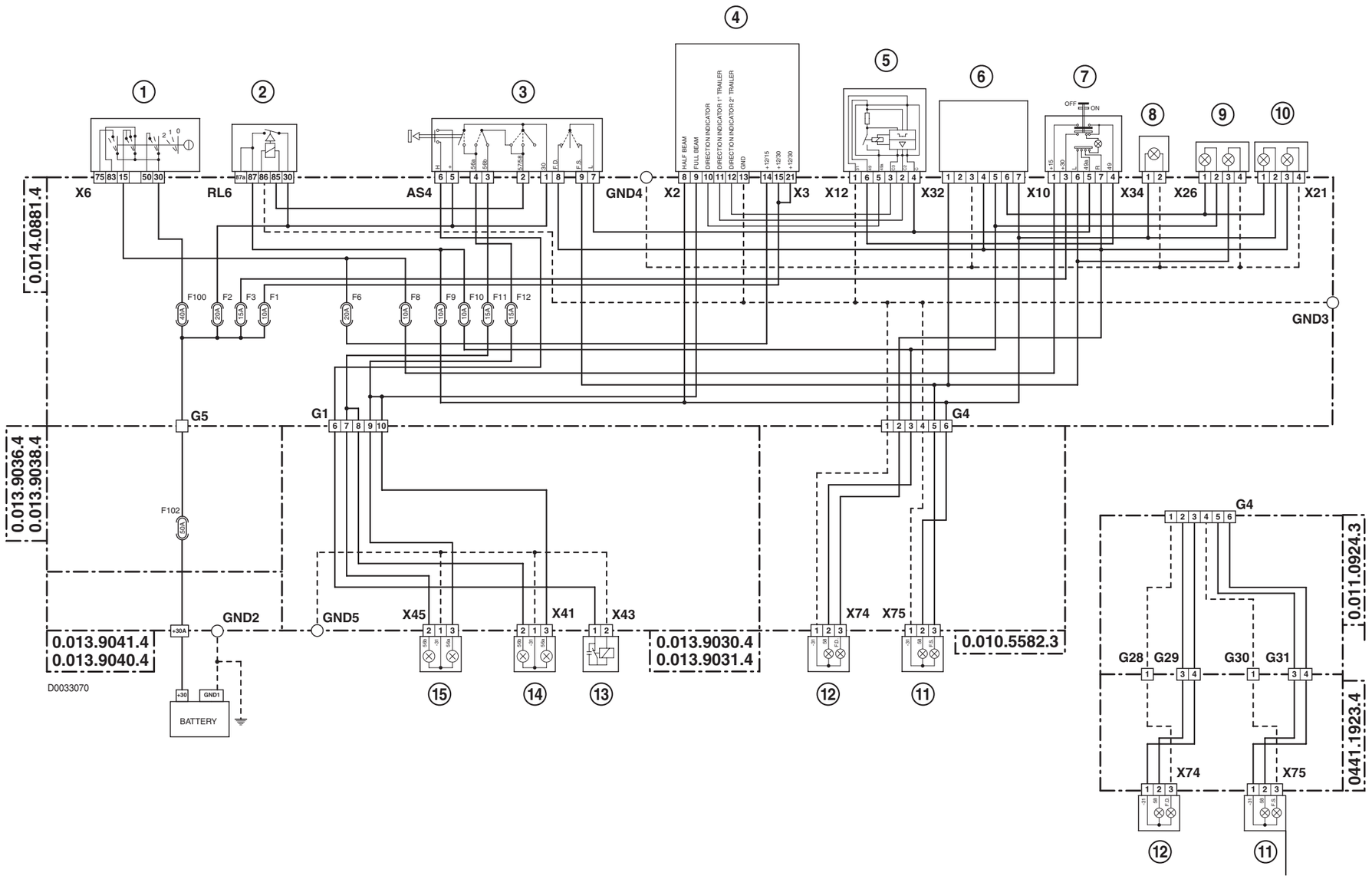
1 Starter switch
2 Instrument panel
3 Engine control unit
4 Engine speed sensor
5 Actuator
6 Accelerator pedal position sensor
7 Memory pushbutton
8 Hand throttle position sensor
9 Shuttle control unit
10 Wheel speed sensor 1
11 Wheel speed sensor 2

4.5 STEERING COLUMN LIGHT SWITCH (VERSION WITH ELECTRONIC GOVERNOR AND VERTICAL EXHAUST SILENCER)



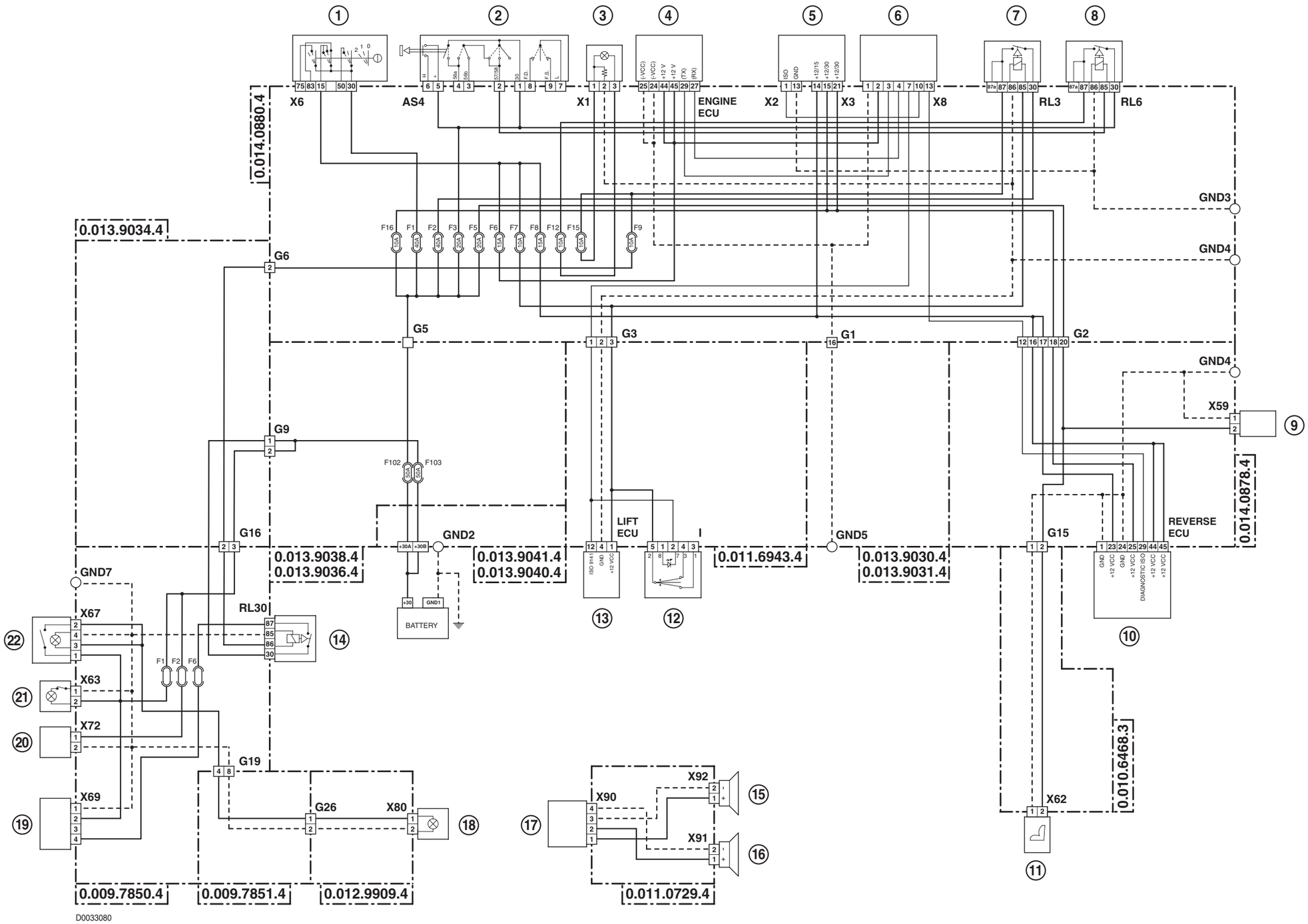
1 Starter switch
2 Lights switch relay
3 Key positive power relay
4 Steering column lights switch
5 Instrument panel
6 Hazard lights control unit
7 Trailer socket
8 Hazard warning lights pushbutton
9 Number plate light
10 Left tail light
11 Right tail light
12 Front left sidelight and direction indicator
13 Front right sidelight and direction indicator
14 Horn
15 Right headlight
16 Left headlight

4.6 STEERING COLUMN LIGHT SWITCH (VERSION WITH MECHANICAL GOVERNOR AND VERTICAL EXHAUST SILENCER)



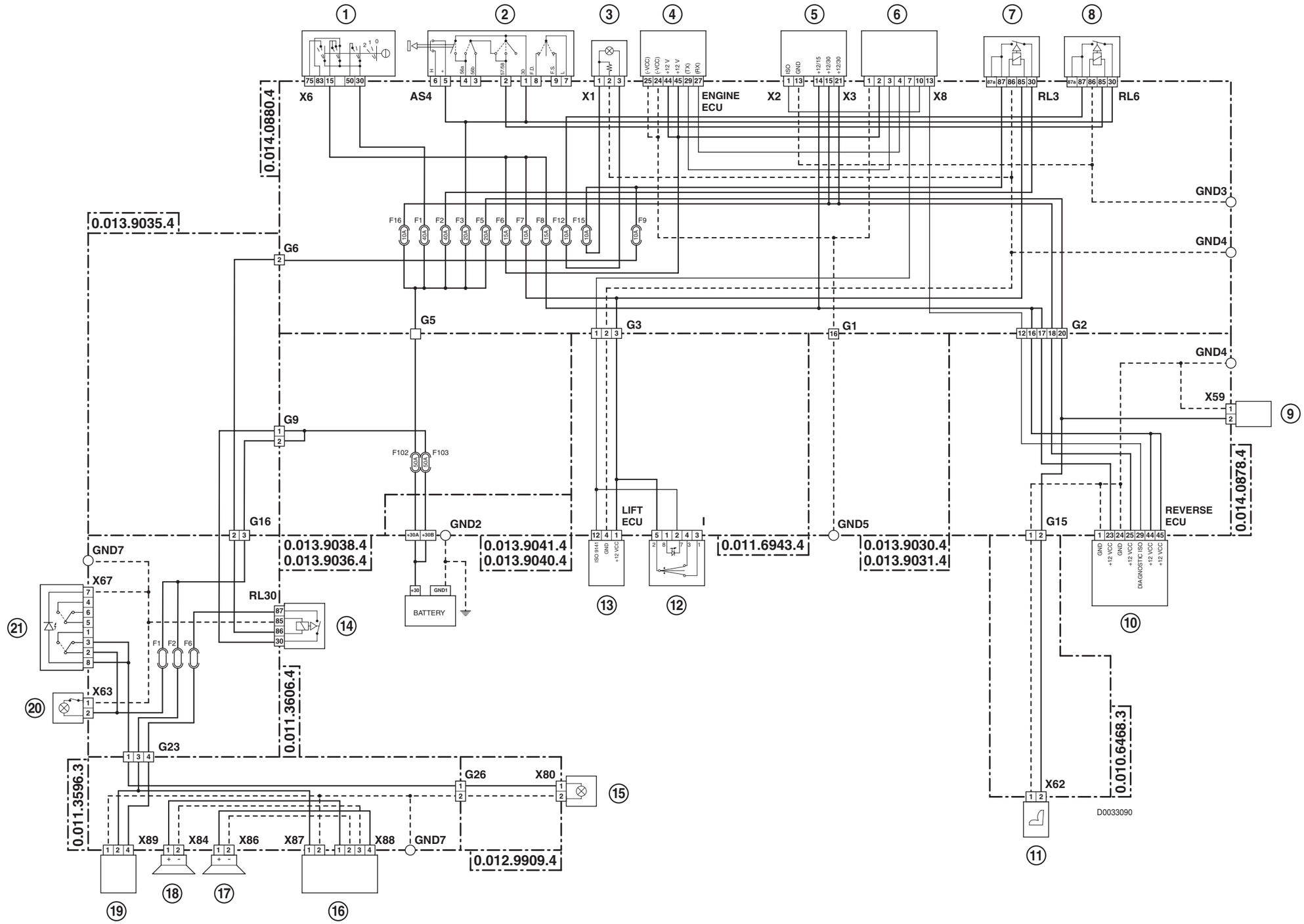
1 Starter switch
2 Lights switch relay
3 Steering column lights switch
4 Instrument panel
5 Hazard lights control unit
6 Trailer socket
7 Hazard warning lights pushbutton
8 Number plate light
9 Left tail light
10 Right tail light
11 Front left sidelight and direction indicator
12 Front right sidelight and direction indicator
13 Horn
14 Right headlight
15 Left headlight

4.7 DIAGNOSTIC ACCESSORIES (VERSION WITH ELECTRONIC GOVERNOR AND STANDARD CAB)



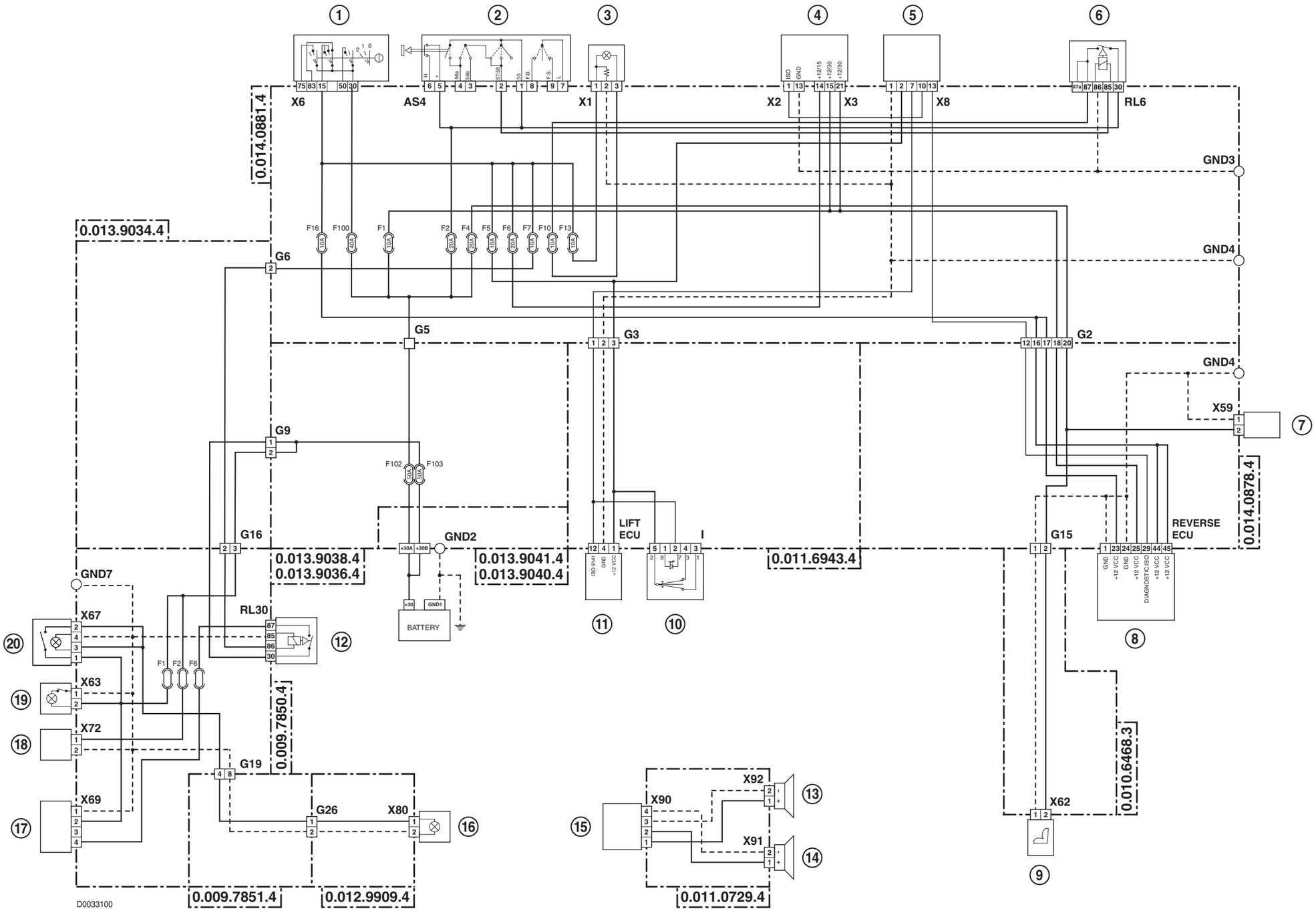
1 Starter switch
2 Steering column lights switch
3 Cigar lighter
4 Engine control unit
5 Instrument panel
6 Diagnostic socket
7 Key positive power relay
8 Lights switch relay
9 Outlet socket
10 Shuttle control unit
11 Seat air compressor
12 Electronic lift control pushbutton
13 Electronic lift control unit
14 Roof line power relay
15 Right loudspeaker
16 Left loudspeaker
17 Radio
18 Rotating beacon
19 Clock
20 Radio
21 Interior roof light
22 Rotating beacon on/off switch

4.8 DIAGNOSTIC ACCESSORIES (VERSION WITH ELECTRONIC GOVERNOR AND HIGH-VISIBILITY CAB)



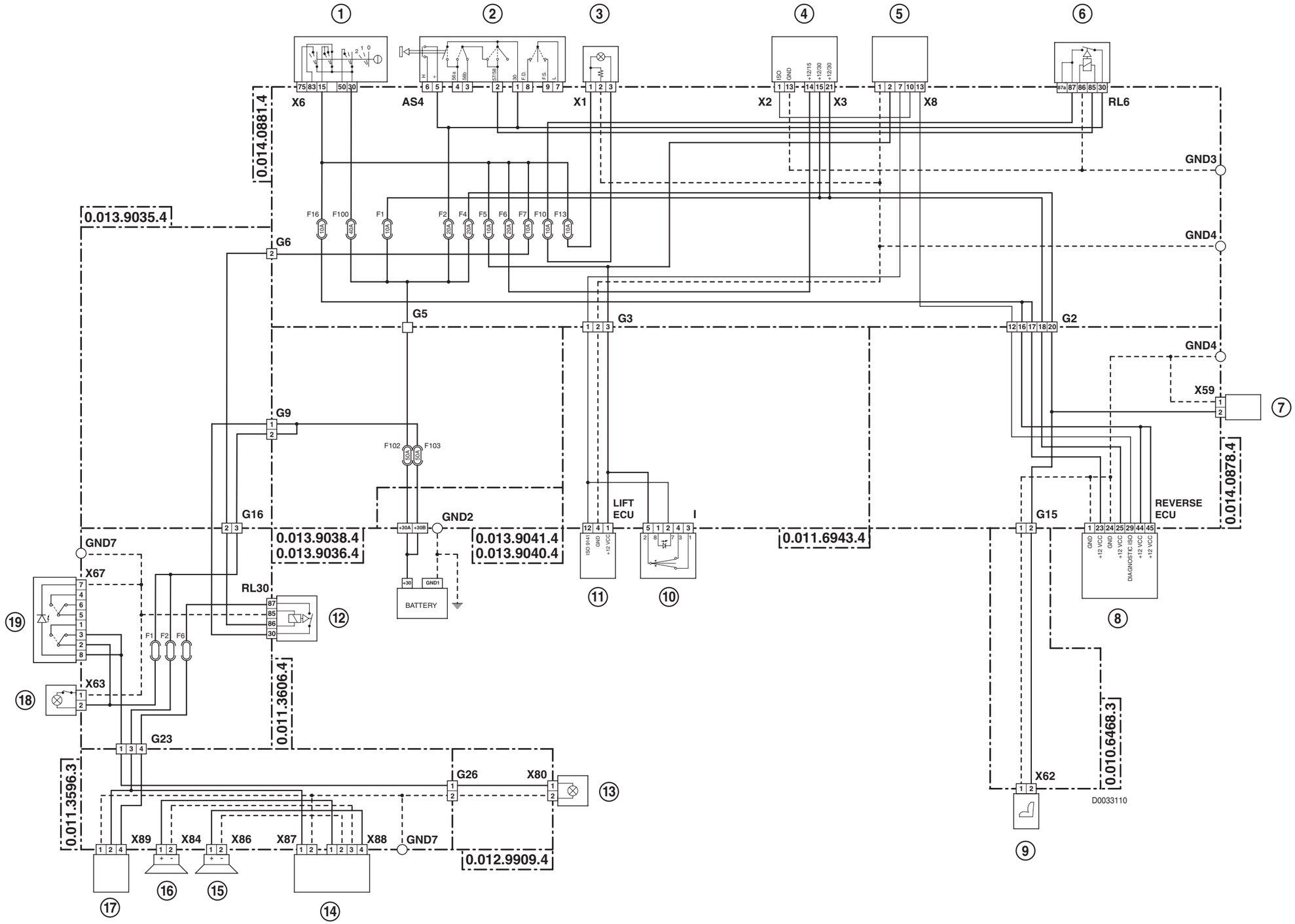
1 Starter switch
2 Steering column lights switch
3 Cigar lighter
4 Engine control unit
5 Instrument panel
6 Diagnostic socket
7 Key positive power relay
8 Lights switch relay
9 Outlet socket
10 Shuttle control unit
11 Seat air compressor
12 Electronic lift control pushbutton
13 Electronic lift control unit
14 Roof line power relay
15 Rotating beacon
16 Radio
17 Right loudspeaker
18 Left loudspeaker
19 Clock
20 Interior roof light
21 Rotating beacon on/off switch
1 Starter switch

4.9 DIAGNOSTIC ACCESSORIES (VERSION WITH MECHANICAL GOVERNOR AND STANDARD CAB)



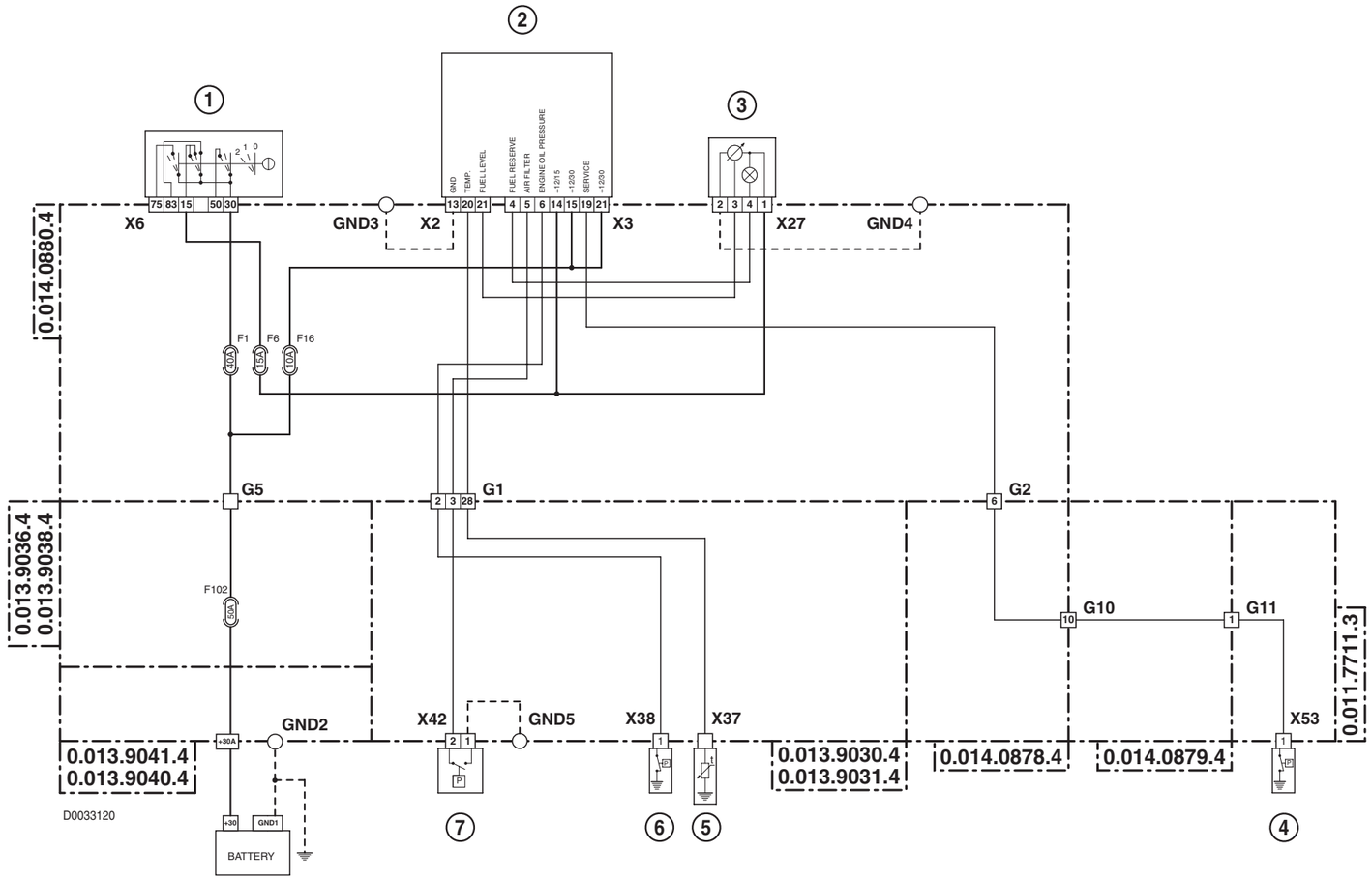
2 Steering column lights switch
3 Cigar lighter
4 Instrument panel
5 Diagnostic socket
6 Lights switch relay
7 Outlet socket
8 Shuttle control unit
9 Seat air compressor
10 Electronic lift control pushbutton
11 Electronic lift control unit
12 Roof line supply relay
13 Right loudspeaker
14 Left loudspeaker
15 Radio
16 Rotating beacon
17 Clock
18 Radio
19 Interior roof light
20 Rotating beacon on/off switch

4.10 DIAGNOSTIC ACCESSORIES (VERSION WITH MECHANICAL GOVERNOR AND HIGH-VISIBILITY CAB)



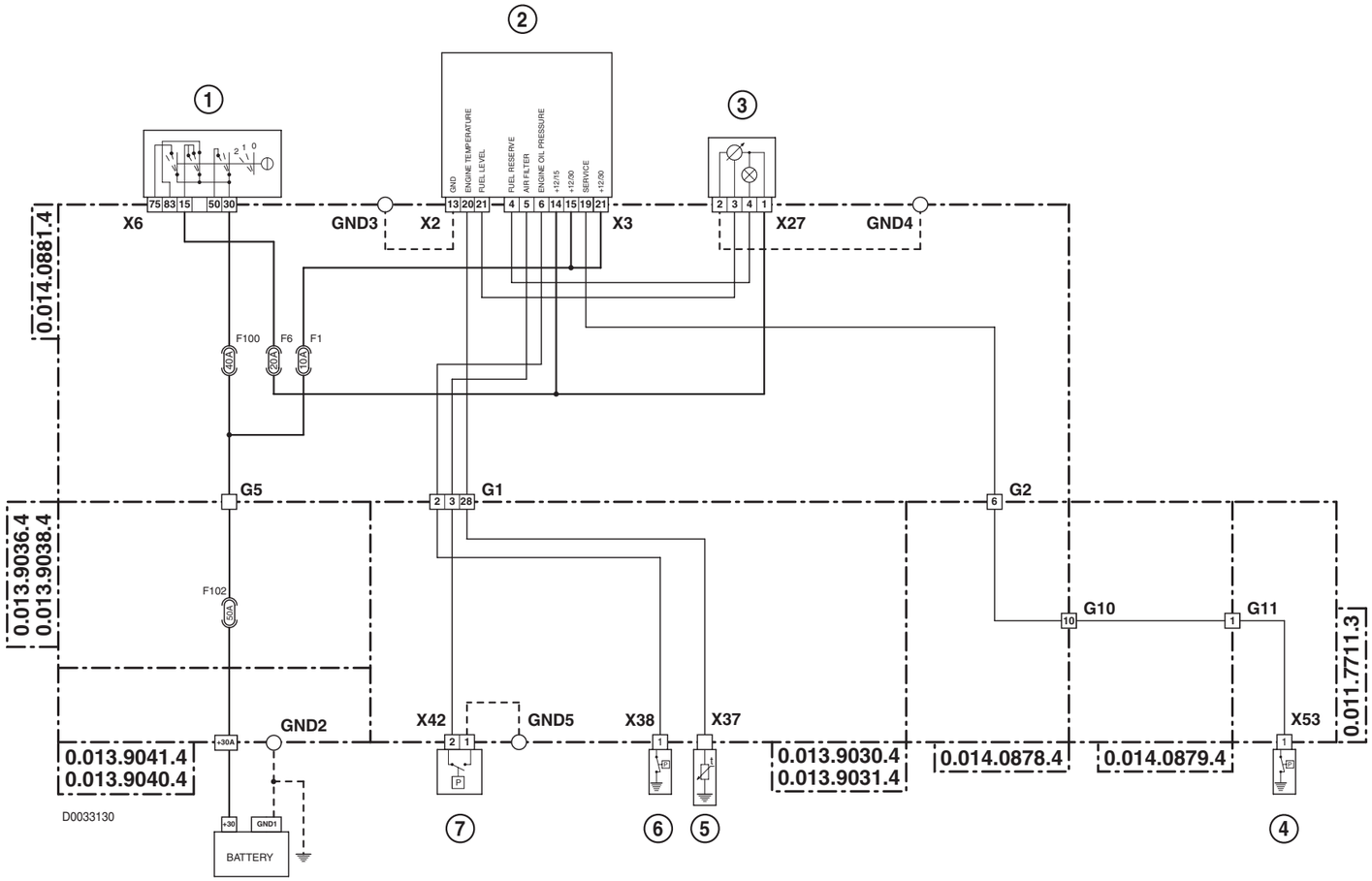
1 Starter switch
2 Steering column lights switch
3 Cigar lighter
4 Instrument panel
5 Diagnostic socket
6 Lights switch relay
7 Outlet socket
8 Shuttle control unit
9 Seat air compressor
10 Electronic lift control pushbutton
11 Electronic lift control unit
12 Roof line supply relay
13 Rotating beacon
14 Radio
15 Left loudspeaker
16 Right loudspeaker
17 Clock
18 Interior roof light
19 Rotating beacon on/off switch

4.11 INSTRUMENT PANEL (VERSION WITH ELECTRONIC GOVERNOR)



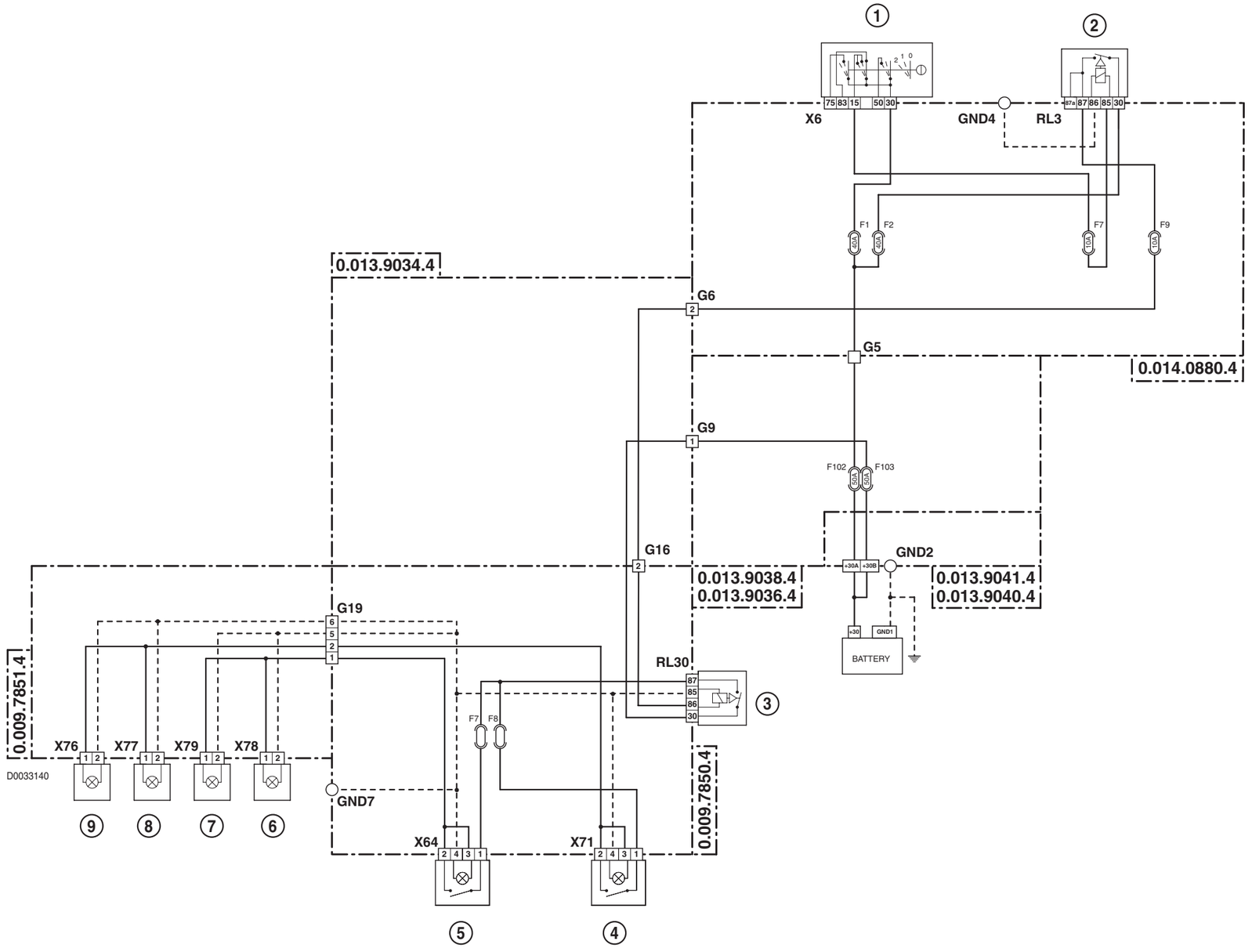
1 Starter switch
2 Instrument panel
3 Fuel level sensor
4 Services circuit alarm pressure switch
5 Engine temperature sensor (for instrument)
6 Engine oil pressure switch
7 Air cleaner clogging sensor

4.12 INSTRUMENT PANEL (VERSION WITH MECHANICAL GOVERNOR)



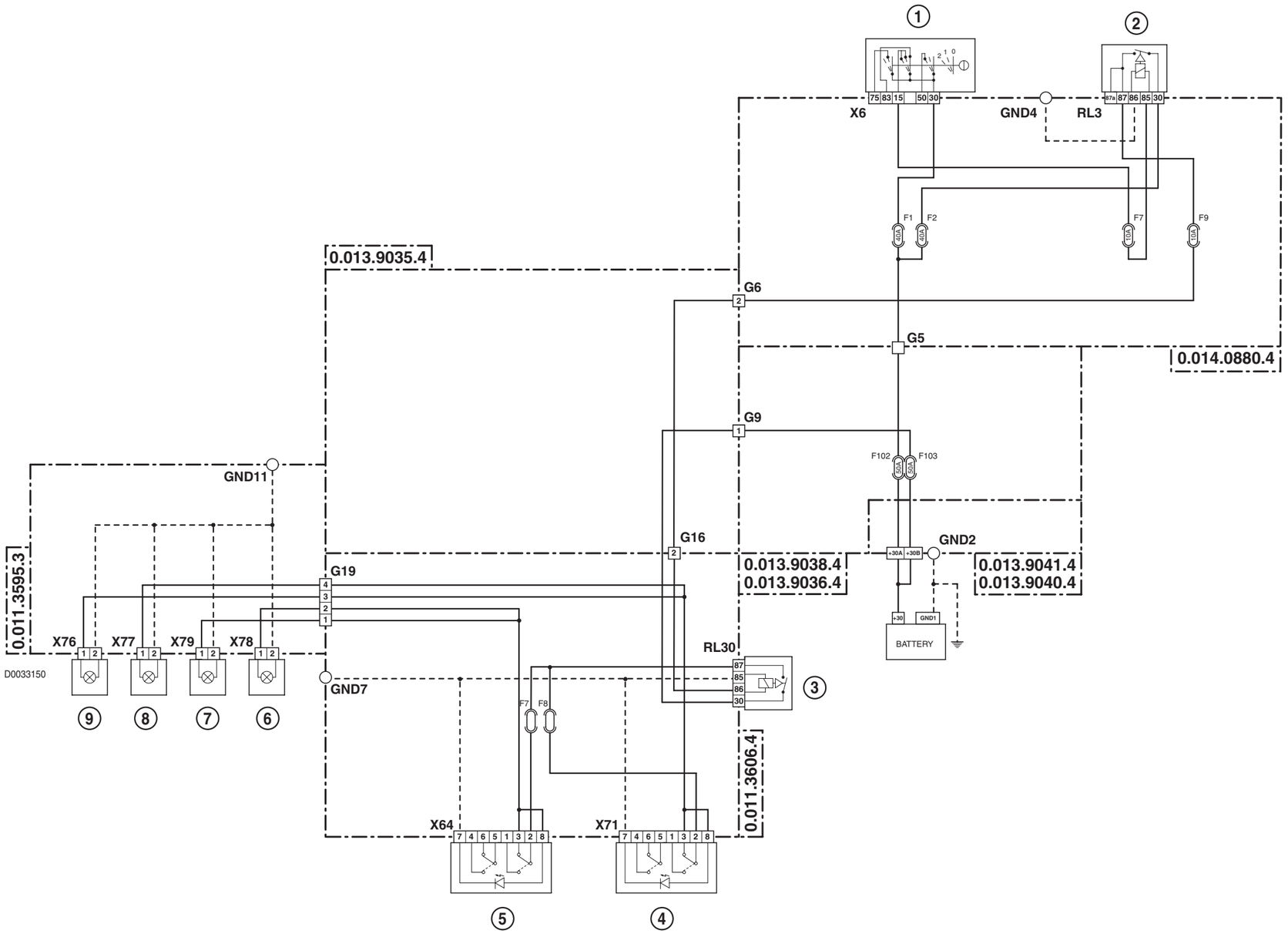
1 Starter switch
2 Instrument panel
3 Fuel level sensor
4 Services circuit alarm pressure switch
5 Engine temperature sensor (for instrument)
6 Engine oil pressure switch
7 Air cleaner clogging sensor

4.13 WORKLIGHTS (VERSION WITH ELECTRONIC GOVERNOR AND STANDARD CAB)



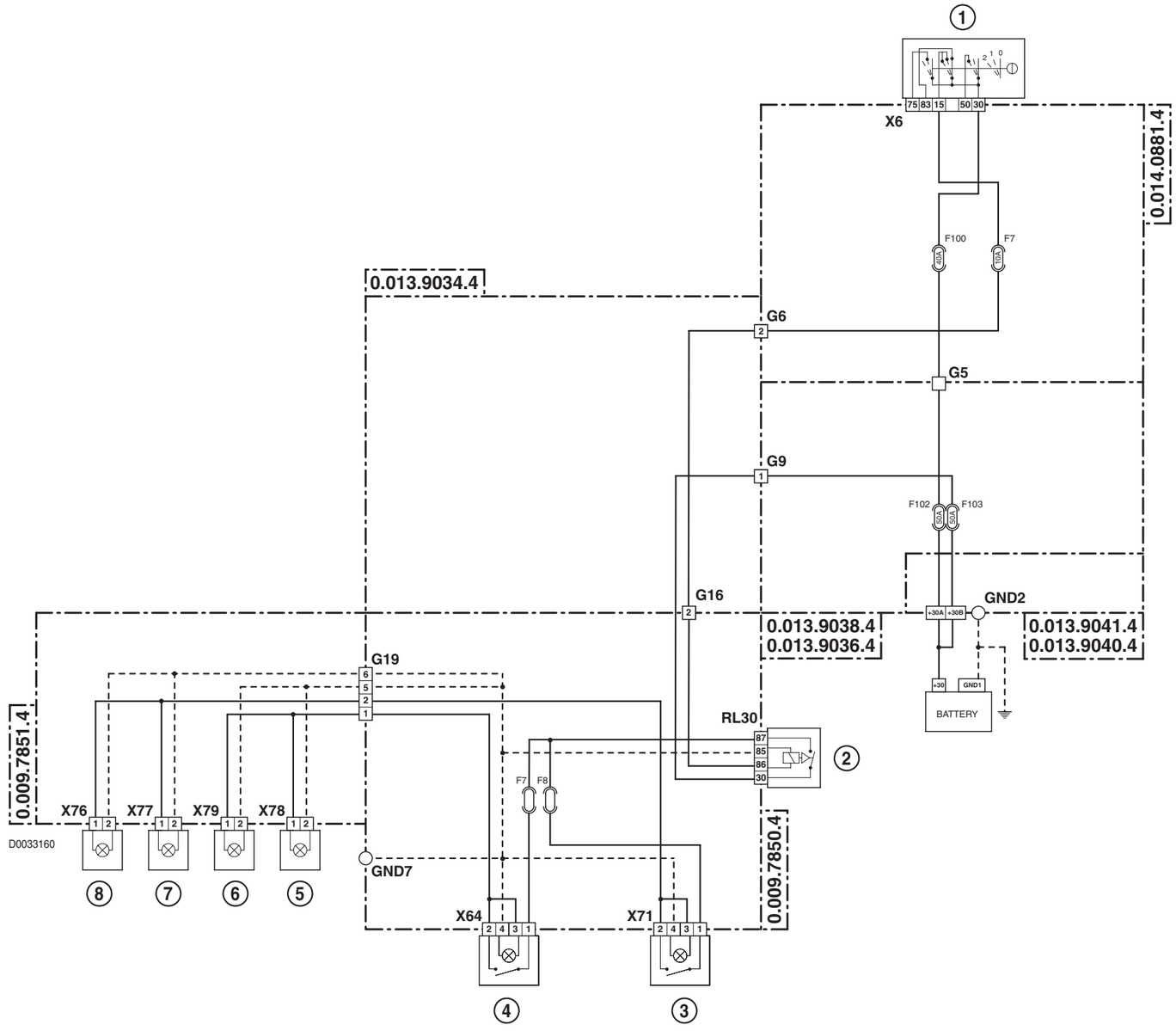
1 Starter switch
2 Key positive power relay
3 Roof line power relay
4 Front worklights switch
5 Rear worklights switch
6 Left rear worklight
7 Right rear worklight
8 Left front worklight
9 Right front worklight

4.14 WORKLIGHTS (VERSION WITH ELECTRONIC GOVERNOR AND HIGH-VISBILITY CAB)



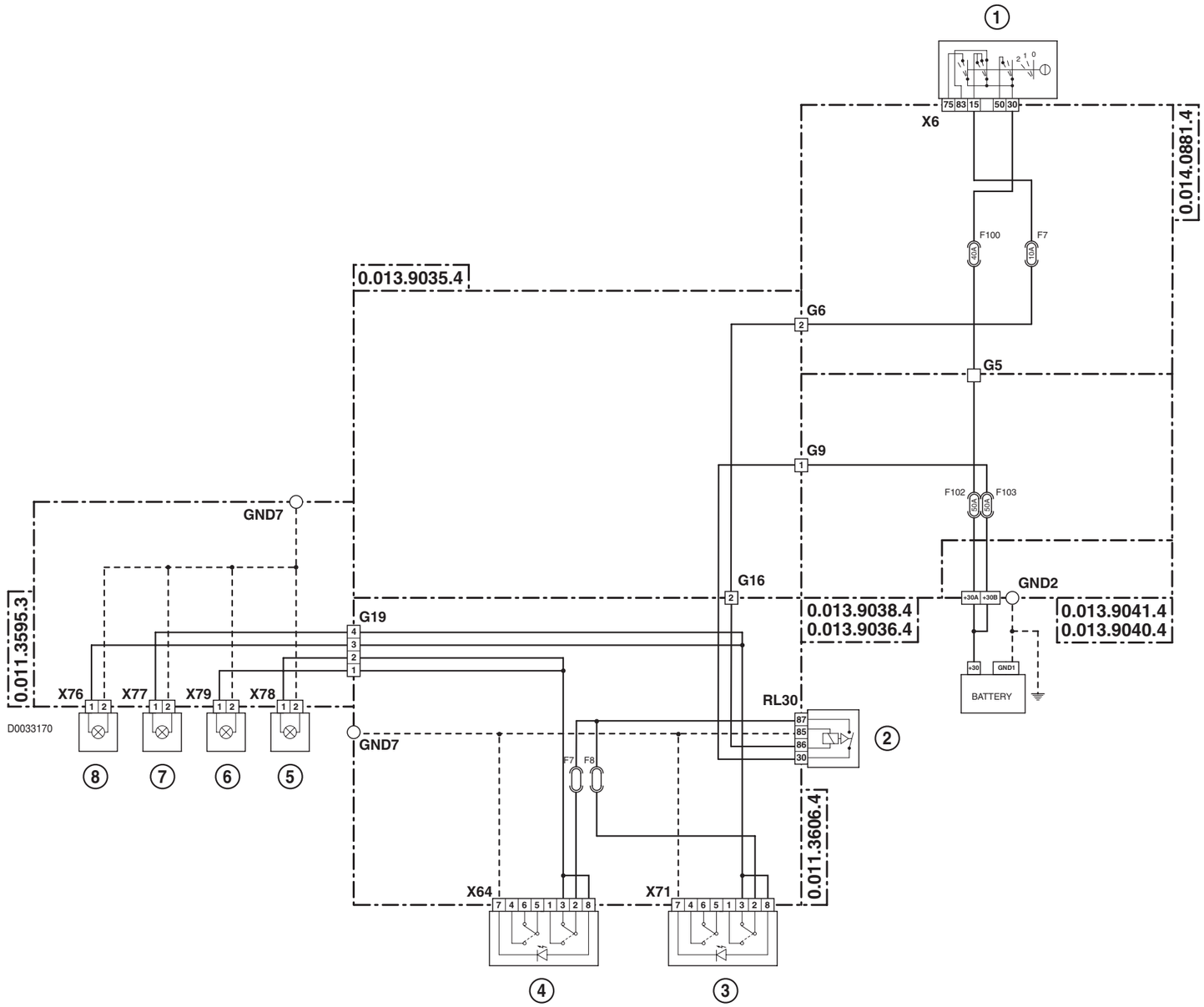
1 Starter switch
2 Key positive supply relay
3 Roof line supply relay
4 Front worklights switch
5 Rear worklights switch
6 Left rear worklight
7 Right rear worklight
8 Left front worklight
9 Right front worklight

4.15 WORKLIGHTS (VERSION WITH MECHANICAL GOVERNOR AND STANDARD CAB)



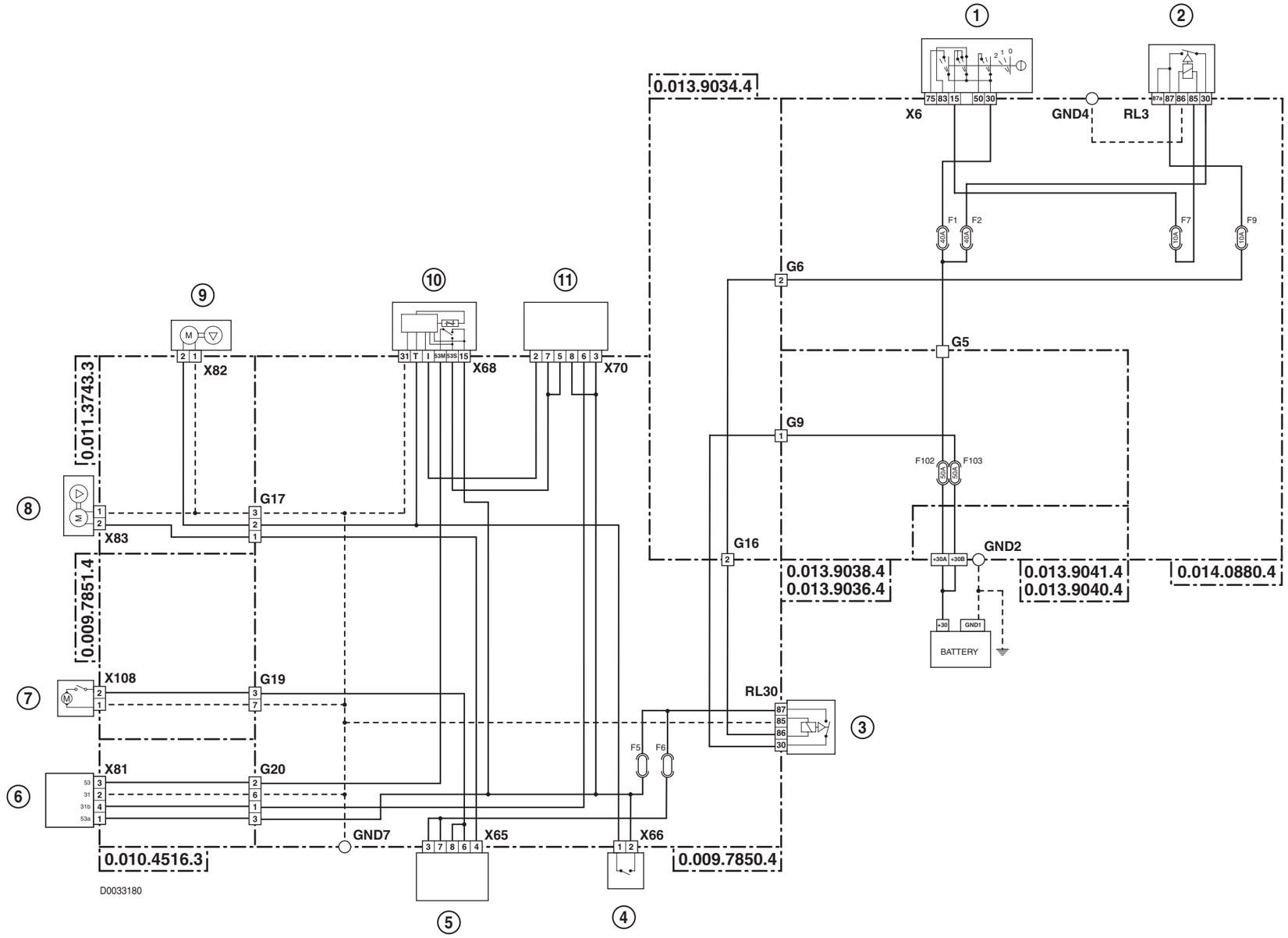
1 Starter switch
2 Roof line power relay
3 Front worklights switch
4 Rear worklights switch
5 Left rear worklight
6 Right rear worklight
7 Left front worklight
8 Right front worklight

4.16 WORKLIGHTS (VERSION WITH MECHANICAL GOVERNOR AND HIGH-VISIBILITY CAB)



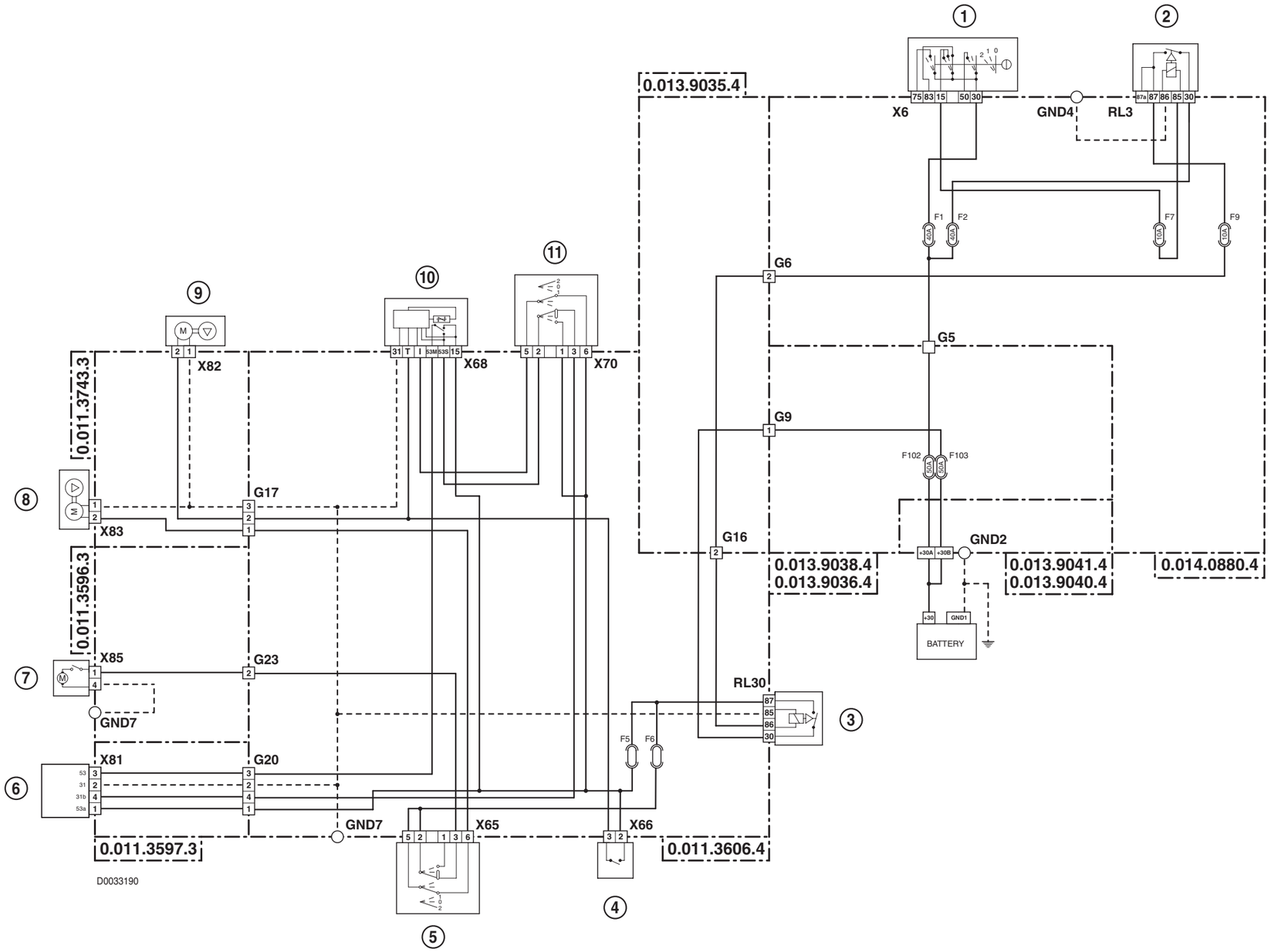
1 Starter switch
2 Roof line power relay
3 Front worklights switch
4 Rear worklights switch
5 Left rear worklight
6 Right rear worklight
7 Left front worklight
8 Right front worklight

4.17 WINDSCREEN WIPERS (VERSION WITH ELECTRONIC GOVERNOR AND STANDARD CAB)



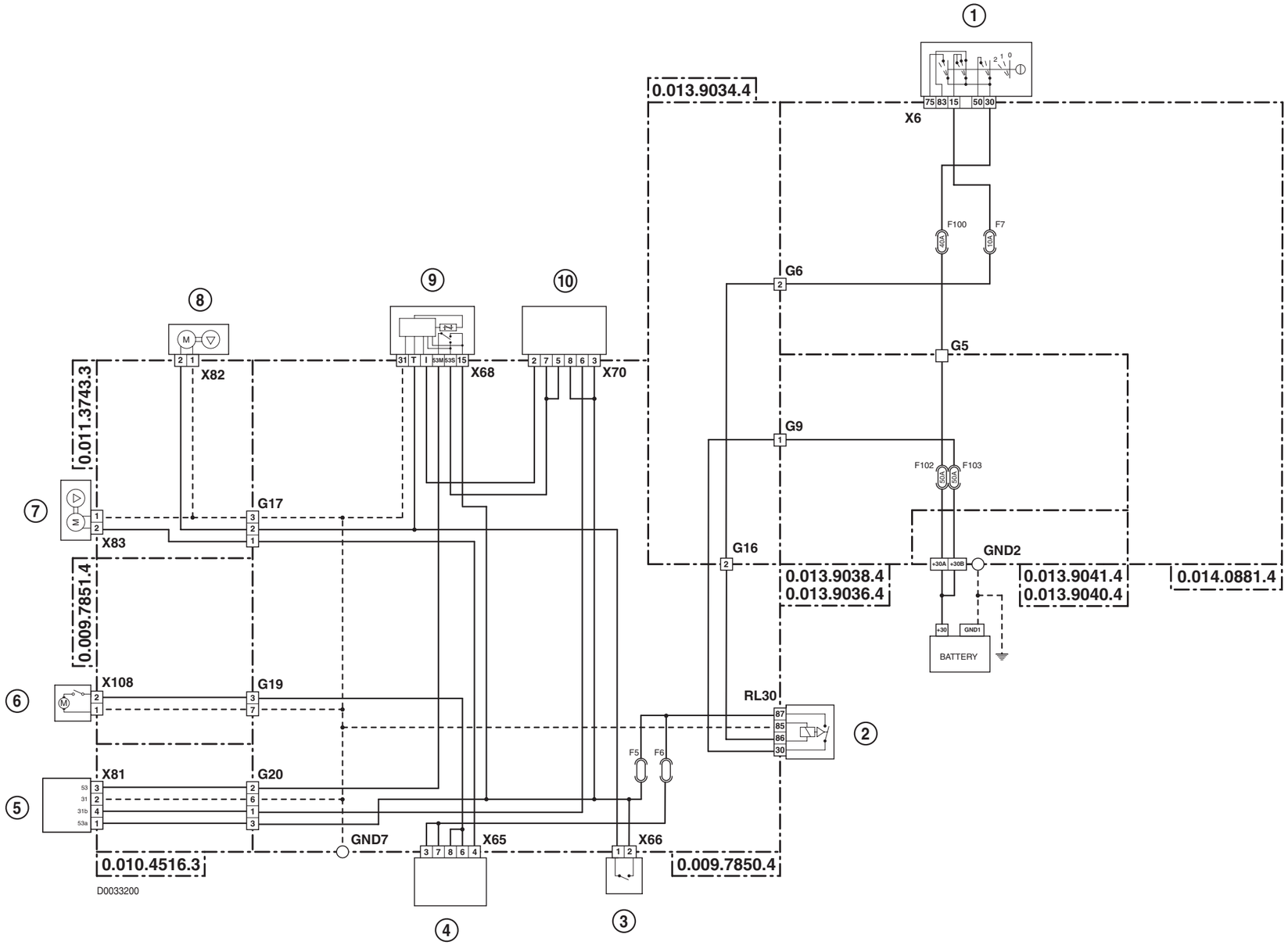
1 Starter switch
2 Key positive power relay
3 Roof line power relay
4 Windscreen washer pump switch
5 Rear window wiper switch
6 Windscreen wiper motor
7 Rear window wiper motor
8 Rear window washer pump
9 Windscreen washer pump
10 Intermittent windscreen wiper timer
11 Windscreen wiper switch

4.18 WINDSCREEN WIPERS (VERSION WITH ELECTRONIC GOVERNOR AND HIGH-VISIBILITY CAB)



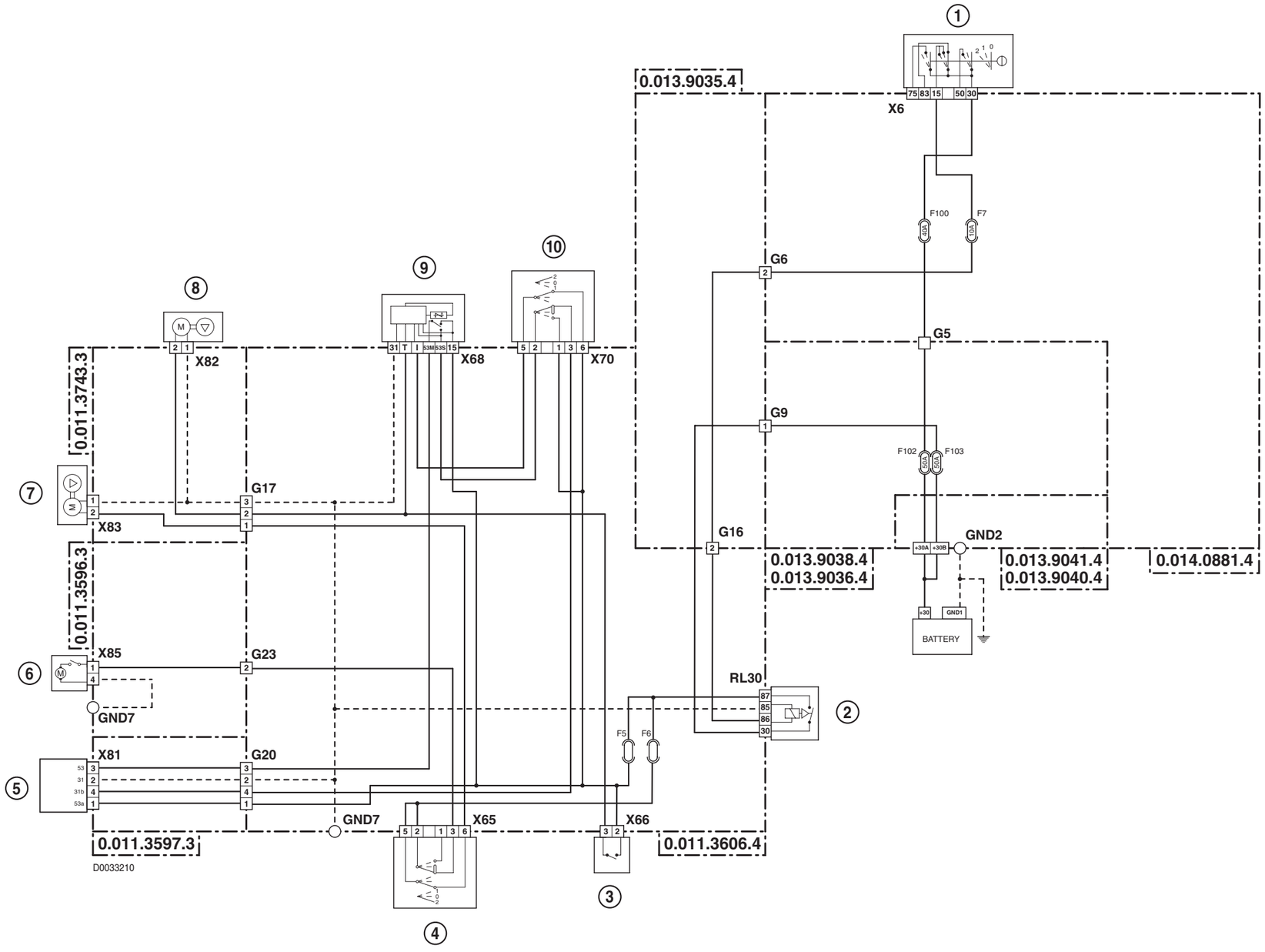
1 Starter switch
2 Key positive power relay
3 Roof line power relay
4 Windscreen washer pump switch
5 Rear window wiper switch
6 Windscreen wiper motor
7 Rear window wiper motor
8 Rear window washer pump
9 Windscreen washer pump
10 Intermittent windscreen wiper timer
11 Windscreen wiper switch

4.19 WINDSCREEN WIPERS (VERSION WITH MECHANICAL GOVERNOR AND STANDARD CAB)



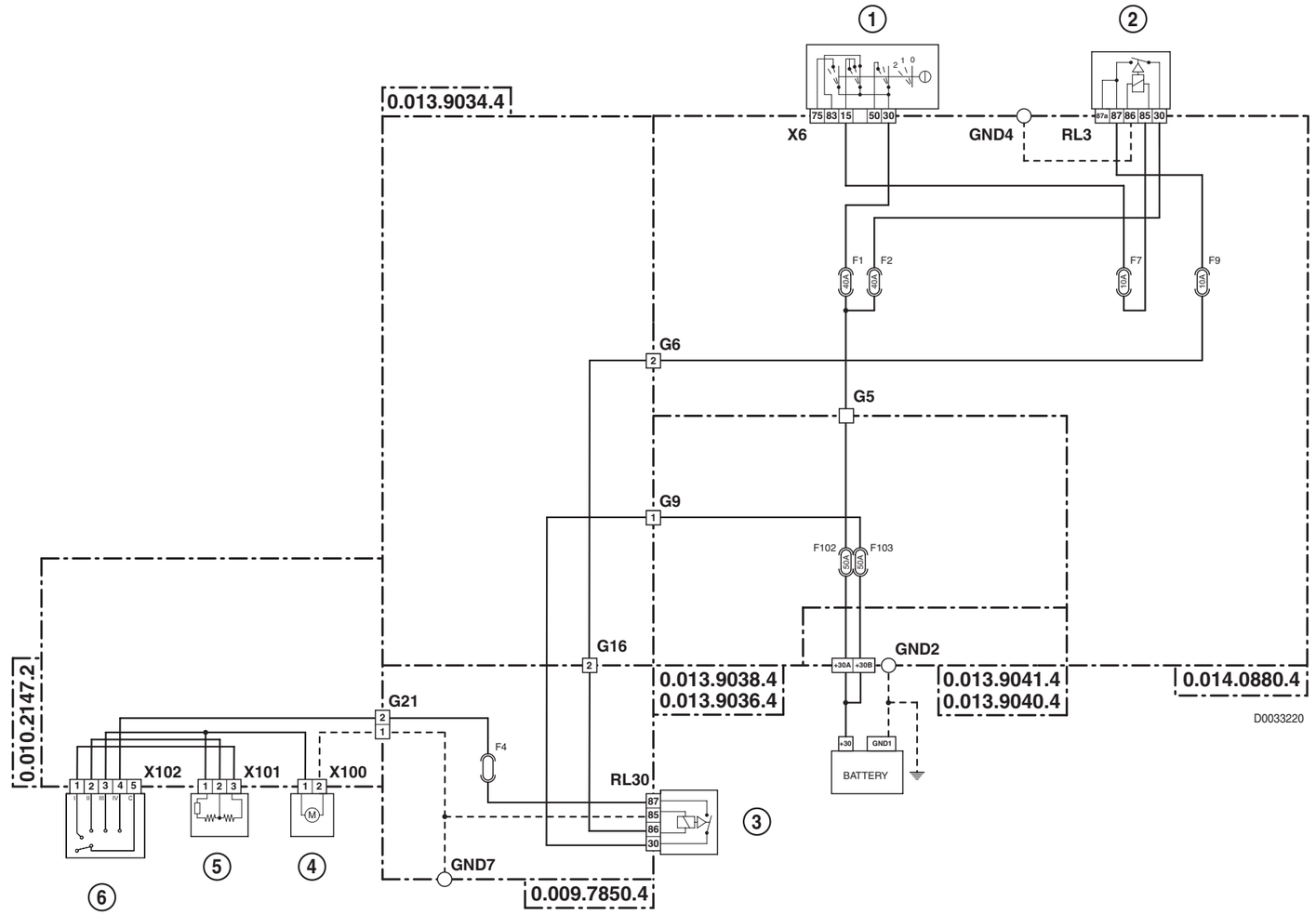
1 Starter switch
2 Roof line power relay
3 Windscreen washer pump switch
4 Rear window wiper switch
5 Windscreen wiper motor
6 Rear window wiper motor
7 Rear window washer pump
8 Windscreen washer pump
9 Intermittent windscreen wiper timer
10 Windscreen wiper switch

4.20 WINDSCREEN WIPERS (VERSION WITH MECHANICAL GOVERNOR AND HIGH-VISIBILITY CAB)



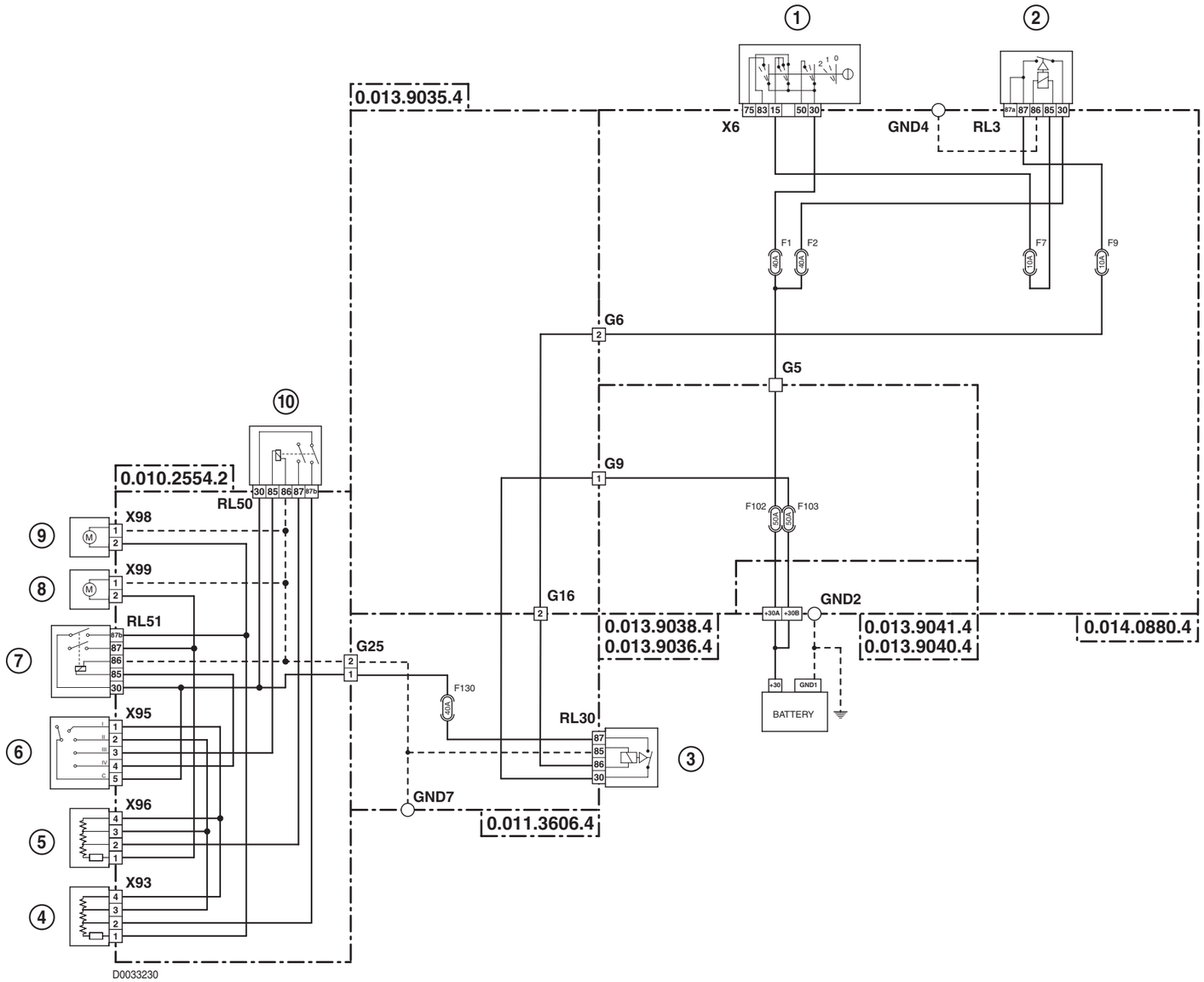
1 Starter switch
2 Roof line power relay
3 Windscreen washer pump switch
4 Rear window wiper switch
5 Windscreen wiper motor
6 Rear window wiper motor
7 Rear window washer pump
8 Windscreen washer pump
9 Intermittent windscreen wiper timer
10 Windscreen wiper switch

4.21 HEATING (VERSION WITH ELECTRONIC GOVERNOR AND STANDARD CAB)



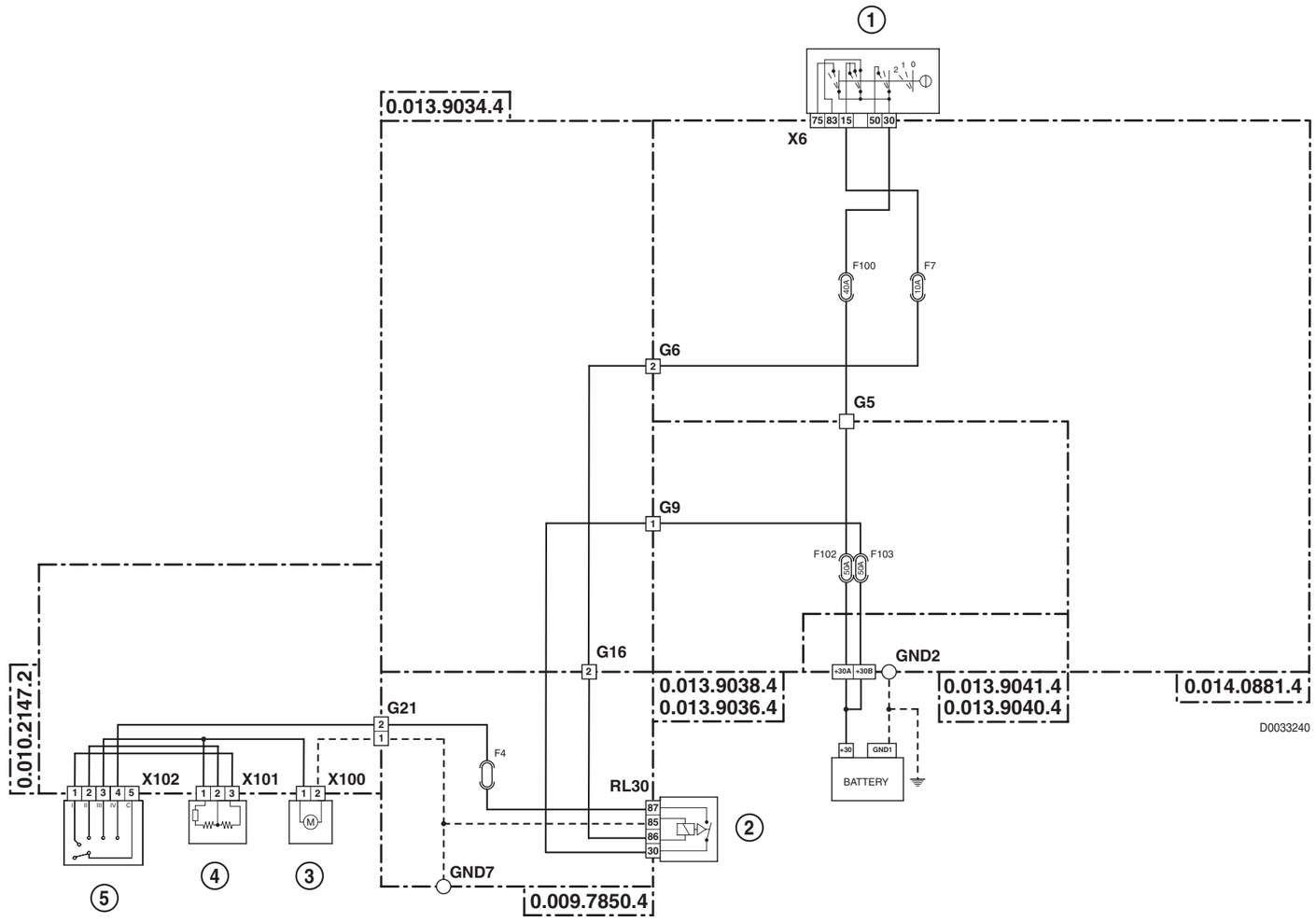
1 Starter switch
2 Key positive power relay
3 Roof line power relay
4 Electric fan
5 Resistor
6 Fan speed selector switch

4.22 HEATING (VERSION WITH ELECTRONIC GOVERNOR AND HIGH-VISIBILITY CAB)



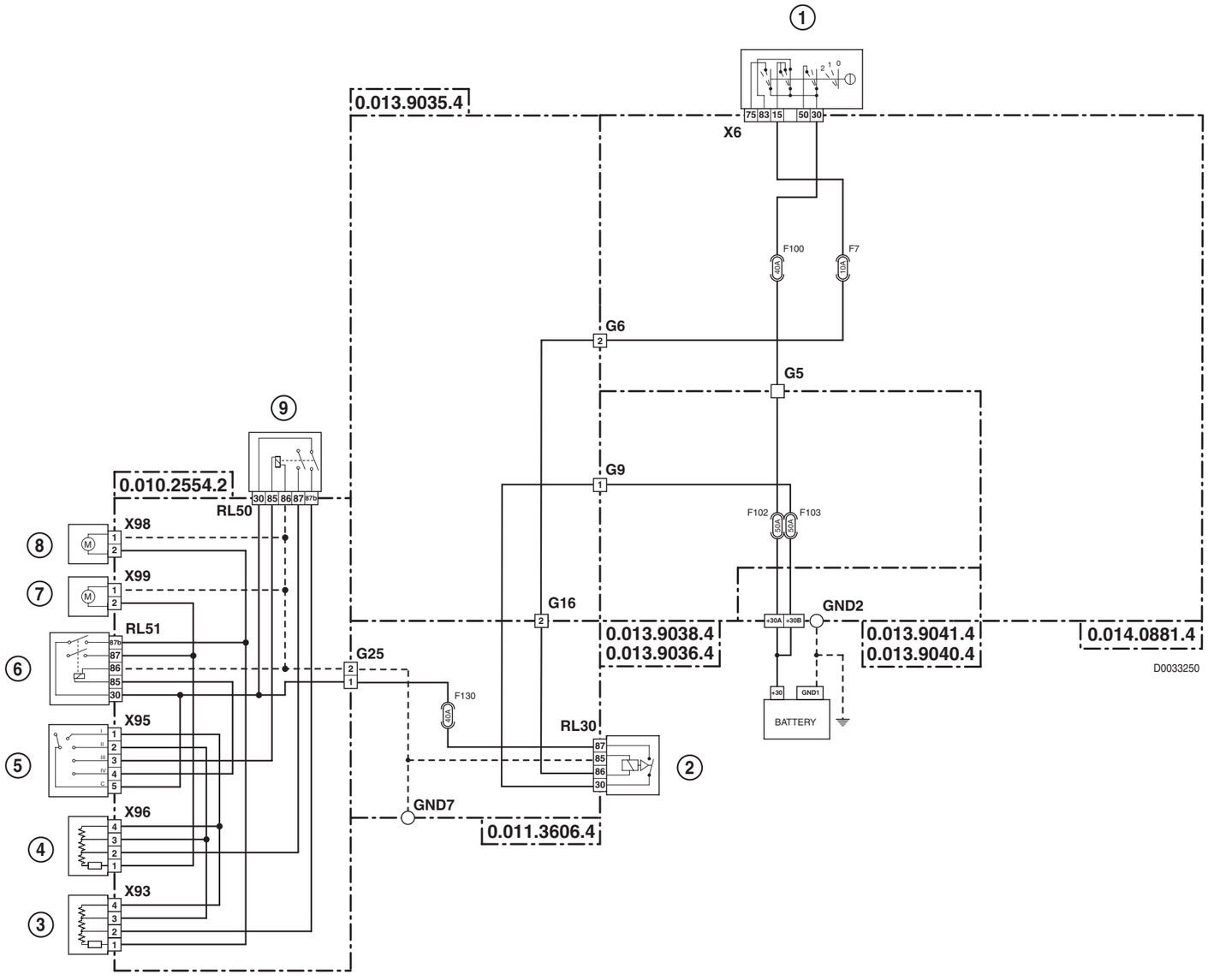
1 Starter switch
2 Key positive power relay
3 Roof line power relay
4 Left resistor
5 Right resistor
6 Fan speed selector switch
7 Max. blower speed relay
8 Right fan
9 Left fan
10 3rd blower speed relay

4.23 HEATING (VERSION WITH MECHANICAL GOVERNOR AND STANDARD CAB)



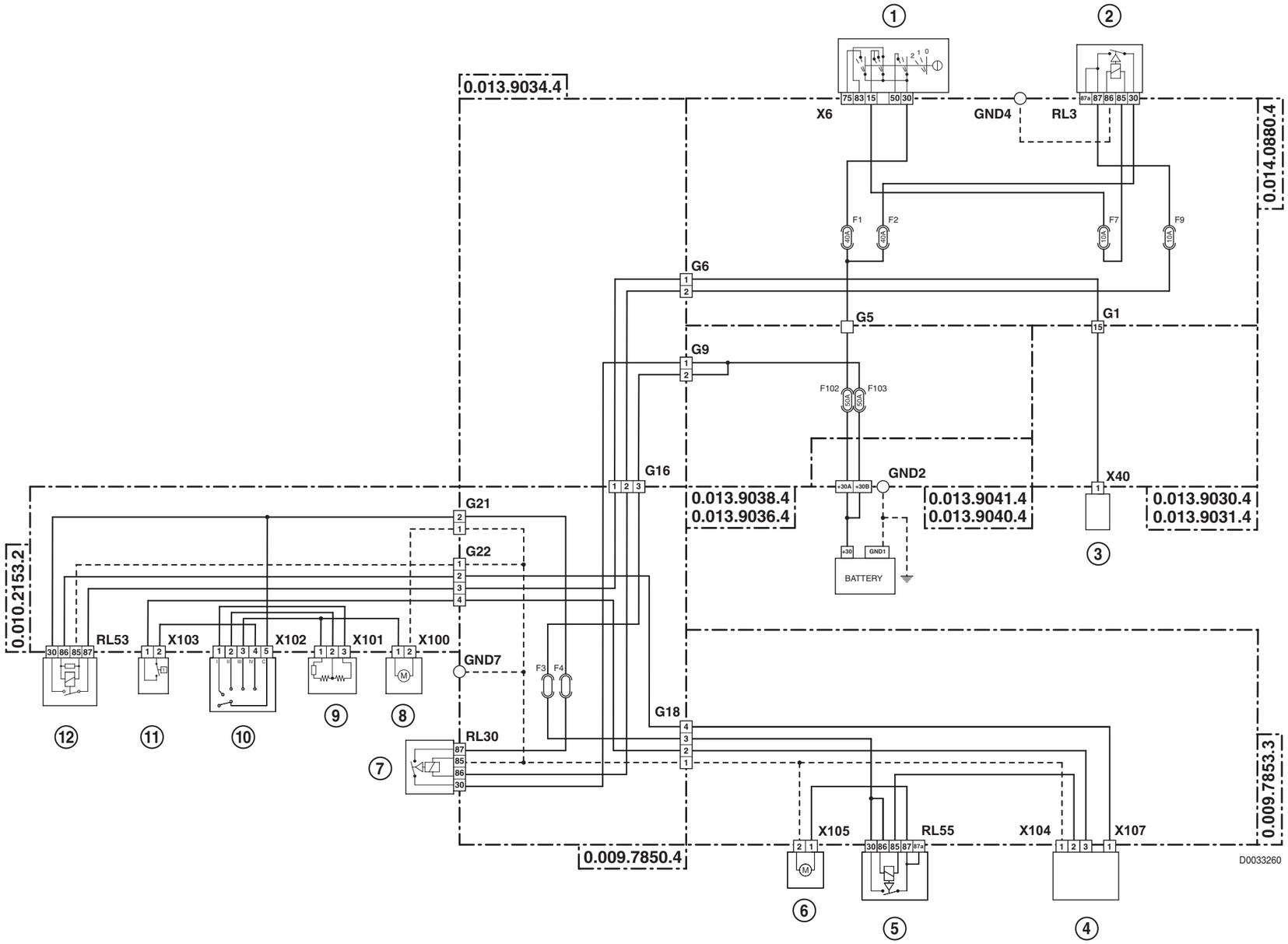
1 Starter switch
2 Roof line power relay
3 Electric fan
4 Resistor
5 Fan speed selector switch

4.24 HEATING (VERSION WITH MECHANICAL GOVERNOR AND HIGH-VISIBILITY CAB)



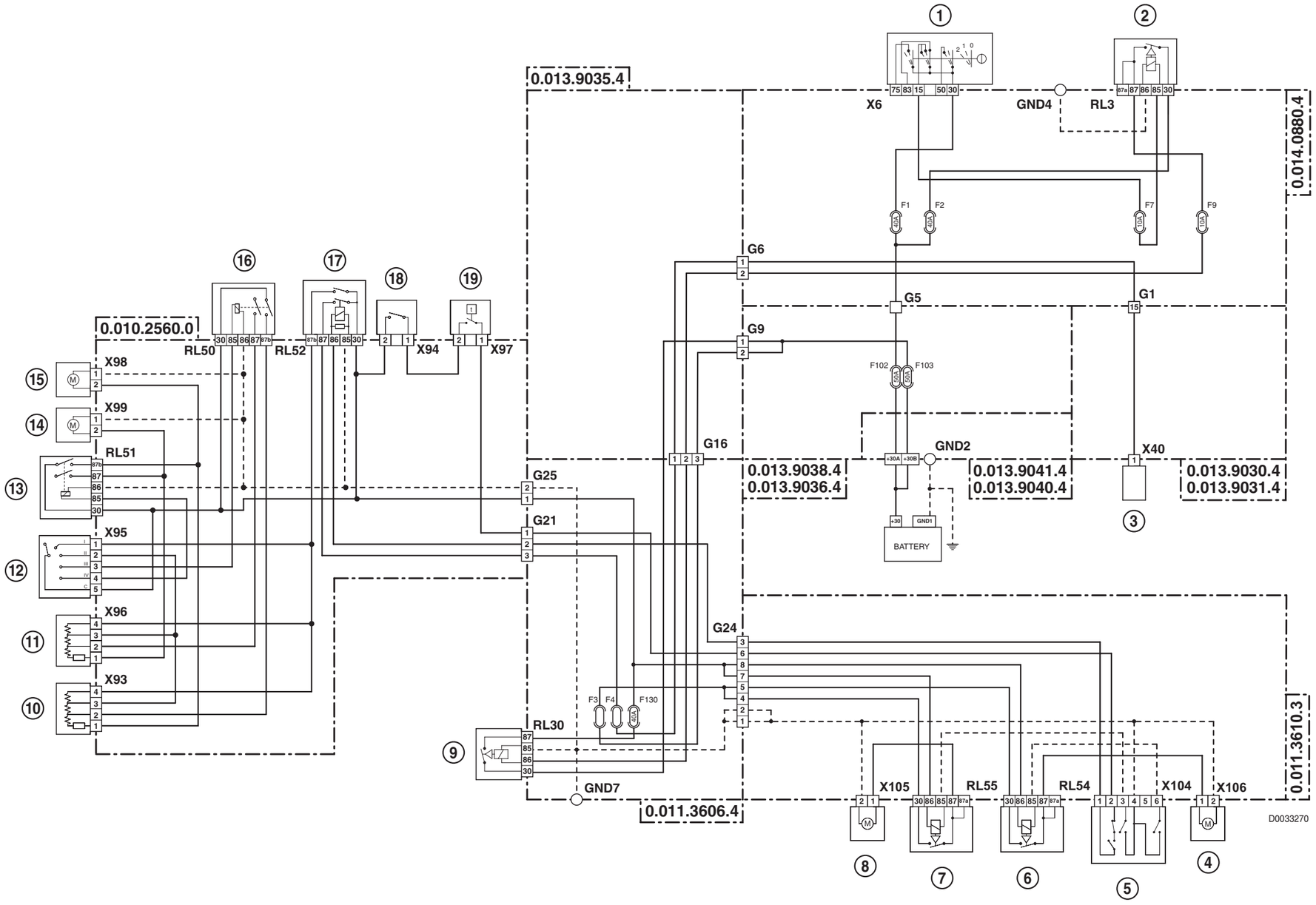
1 Starter switch
2 Roof line power relay
3 Left resistor
4 Right resistor
5 Fan speed selector switch
6 Max. blower speed relay
7 Right fan
8 Left fan

4.25 AIR CONDITIONING (VERSION WITH ELECTRONIC GOVERNOR AND STANDARD CAB)



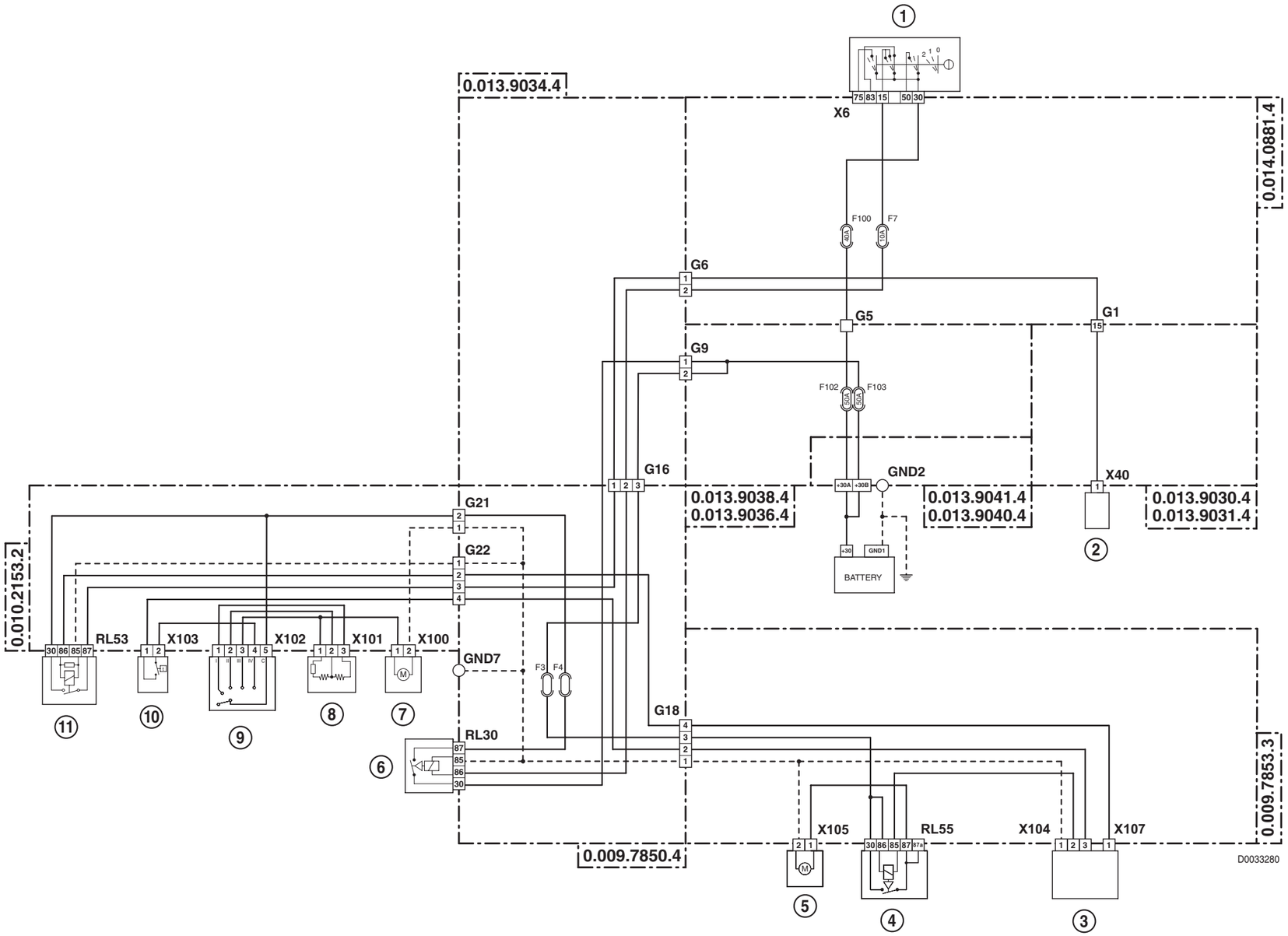
1 Starter switch
2 Key positive power relay
3 Air conditioning compressor
4 Air conditioning pressure switch
5 Control relay for air conditioning fan
6 Air conditioning fan
7 Roof line power relay
8 Electric fan
9 Resistor
10 Fan speed selector switch
11 Air conditioning temperature control thermostat
12 Compressor relay

4.26 AIR CONDITIONING (VERSION WITH ELECTRONIC GOVERNOR AND HIGH-VISIBILITY CAB)



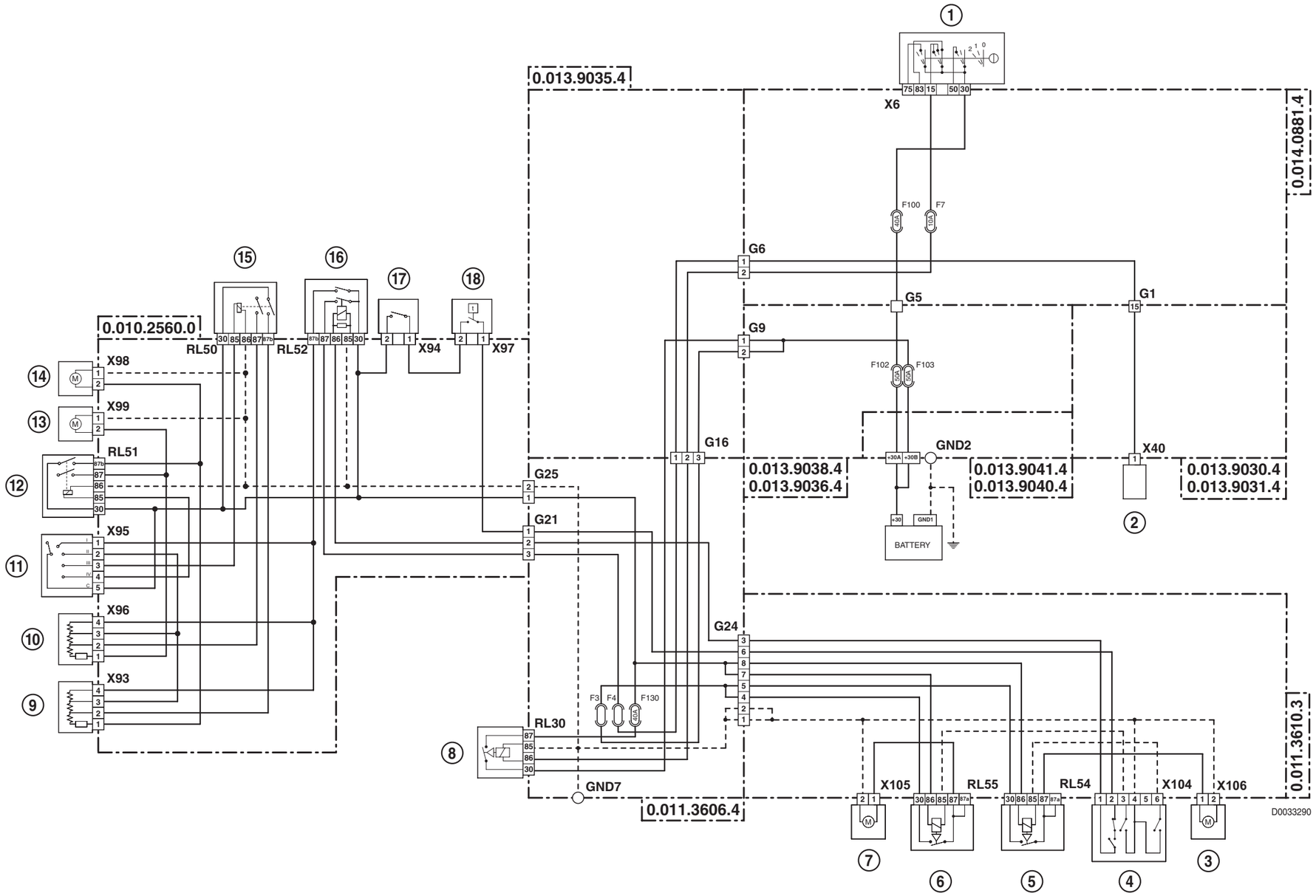
1 Starter switch
2 Key positive power relay
3 Air conditioning compressor
4 Supplementary air conditioning fan
5 Air conditioning pressure switch
6 Control relay for supplementary air conditioning fan
7 Control relay for air conditioning fan
8 Air conditioning fan
9 Roof line power relay
10 Left resistor
11 Right resistor
12 Fan speed selector switch
13 Max. blower speed relay
14 Right fan
15 Left fan
16 3rd blower speed relay
17 Max. blower speed relay
18 A/C switch
19 Air conditioning temperature control thermostat

4.27 AIR CONDITIONING (VERSION WITH MECHANICAL GOVERNOR AND STANDARD CAB)



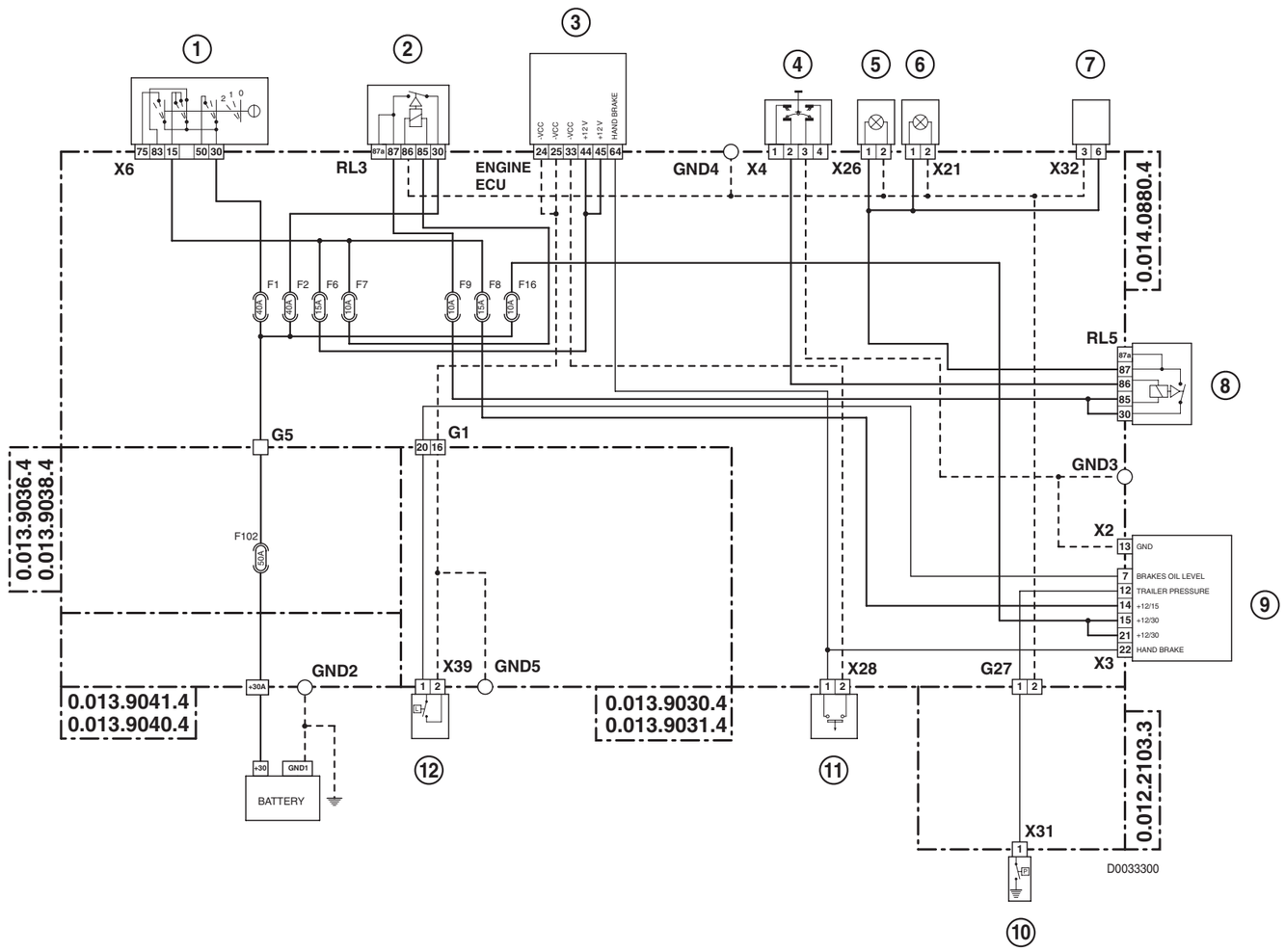
1 Starter switch
2 Air conditioning compressor
3 Air conditioning pressure switch
4 Control relay for air conditioning fan
5 Air conditioning fan
6 Roof line power relay
7 Electric fan
8 Resistor
9 Fan speed selector switch
10 Air conditioning temperature control thermostat
11 Compressor relay

4.28 AIR CONDITIONING (VERSION WITH MECHANICAL GOVERNOR AND HIGH-VISIBILITY CAB)



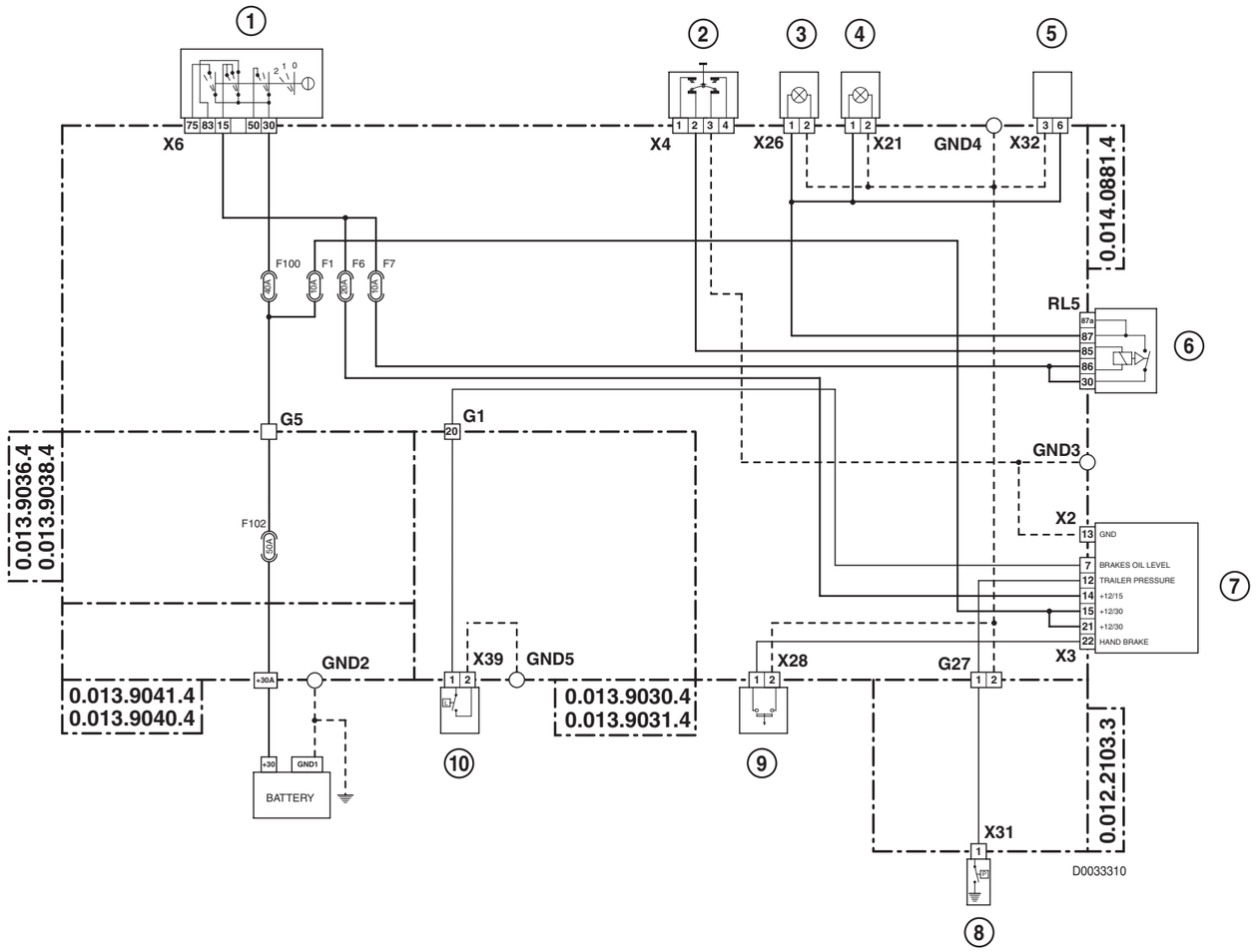
1 Starter switch
2 Air conditioning compressor
3 Supplementary air conditioning fan
4 Air conditioning pressure switch
5 Control relay for supplementary air conditioning fan
6 Control relay for air conditioning fan
7 Air conditioning fan
8 Roof line power relay
9 Left resistor
10 Right resistor
11 Fan speed selector switch
12 Max. blower speed relay
13 Right fan
14 Left fan
15 3rd blower speed relay
16 Max. blower speed relay
17 A/C switch
18 Air conditioning temperature control thermostat

4.29 BRAKES (VERSION WITH ELECTRONIC GOVERNOR AND HIGH-VISIBILITY AND STANDARD CABS)



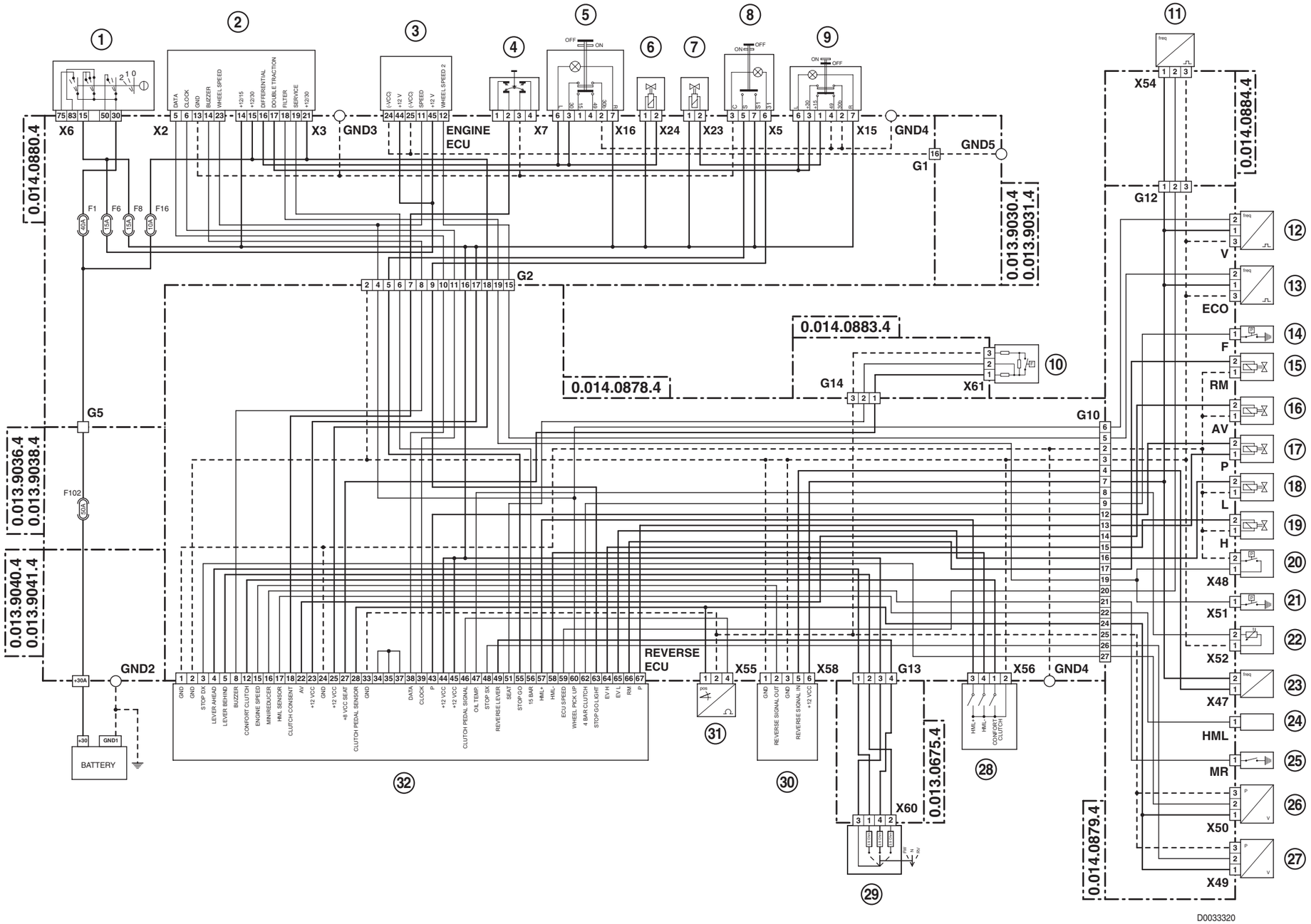
1 Starter switch
2 Key positive power relay
3 Engine control unit
4 Brake pedal switch
5 Left tail light
6 Right tail light
7 Trailer socket
8 Brake control relay
9 Instrument panel
10 Trailer braking low pressure switch
11 Handbrake switch
12 Brake fluid level sensor

4.30 BRAKES (VERSION WITH MECHANICAL GOVERNOR)



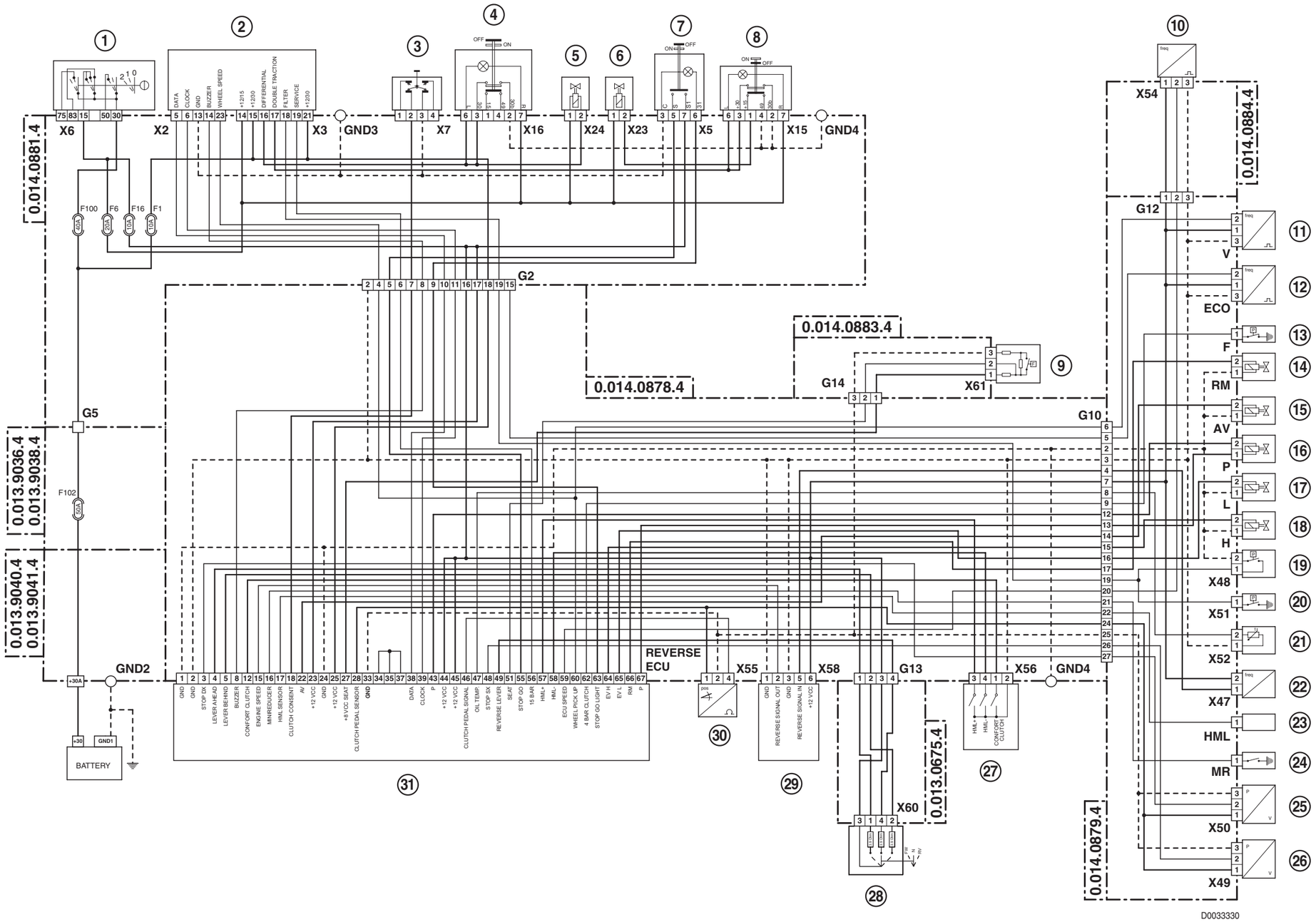
1 Starter switch
2 Brake pedal switch
3 Left tail light
4 Right tail light
5 Trailer socket
6 Brake control relay
7 Instrument panel
8 Trailer braking low pressure switch
9 Handbrake switch
10 Brake fluid level sensor

4.31 TRANSMISSION (VERSION WITH ELECTRONIC GOVERNOR)



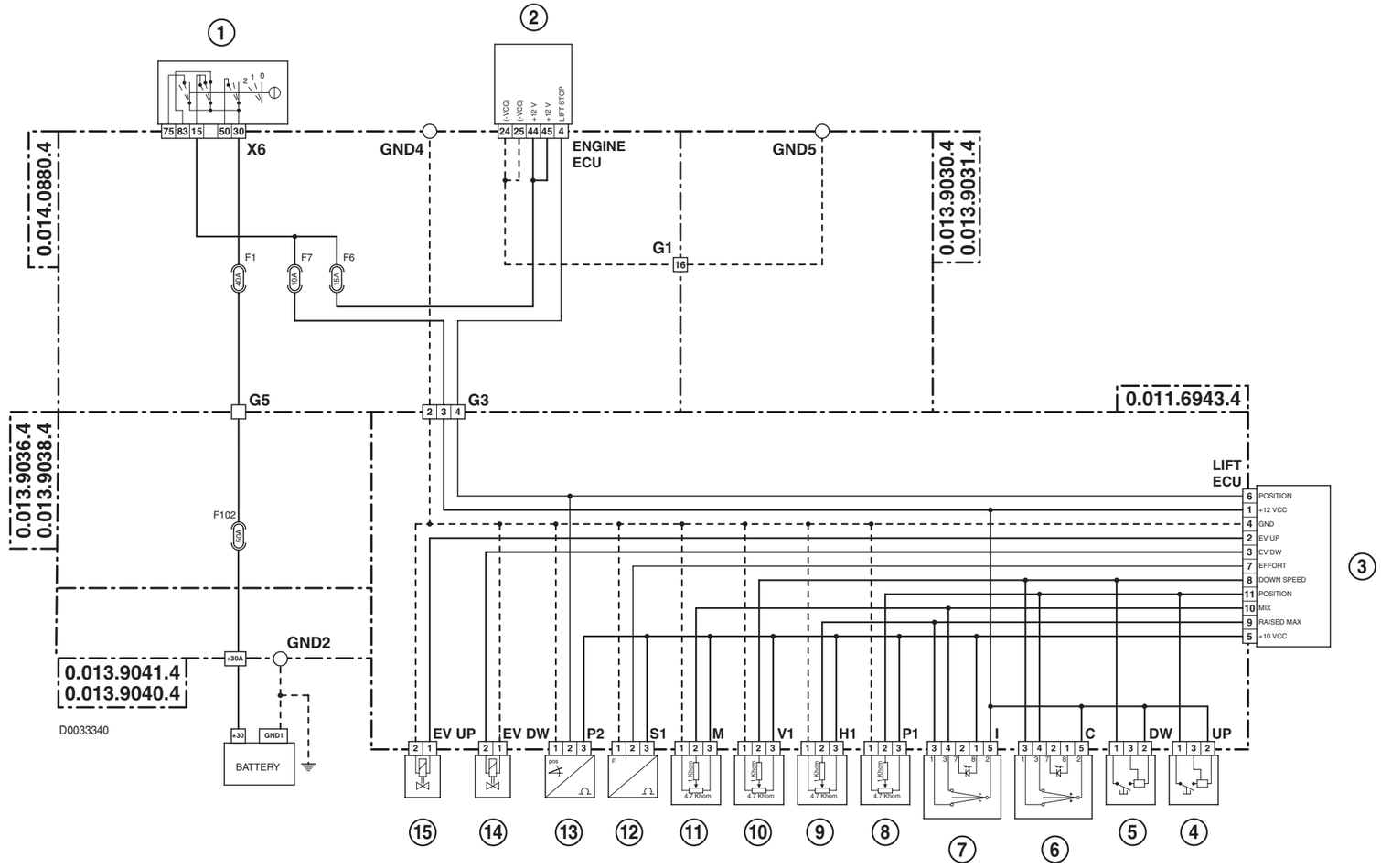
1 Starter switch
2 Instrument panel
3 Engine control unit
4 Clutch pedal switch
5 Differential lock pushbutton
6 Differential lock solenoid valve
7 4WD control solenoid valve
8 Stop-Go pushbutton
9 4WD control pushbutton
10 Operator present sensor
11 Engine speed sensor (for shuttle)
12 Wheel speed sensor 1
13 Wheel speed sensor 2
14 Shuttle oil prerssure switch
15 Reverse drive selection solenoid
16 Forward drive selection solenoid
17 Proportional solenoid valve
18 L speed control solenoid valve
19 H speed control solenoid valve
20 PALL filter clogging sensor
21 Pressure switch - oil filter clogging sensor
22 Oil temperature sensor
23 Shuttle sensor
24 Not utilised
25 Minireduction gear sensor
26 Right brake pressure sensor
27 Left brake presure sensor
28 Gear lever
29 Shuttle lever
30 Shuttle speed signal conversion control unit
31 Clutch pedal position sensor
32 Shuttle control unit

4.32 TRANSMISSION (VERSION WITH MECHANICAL GOVERNOR)



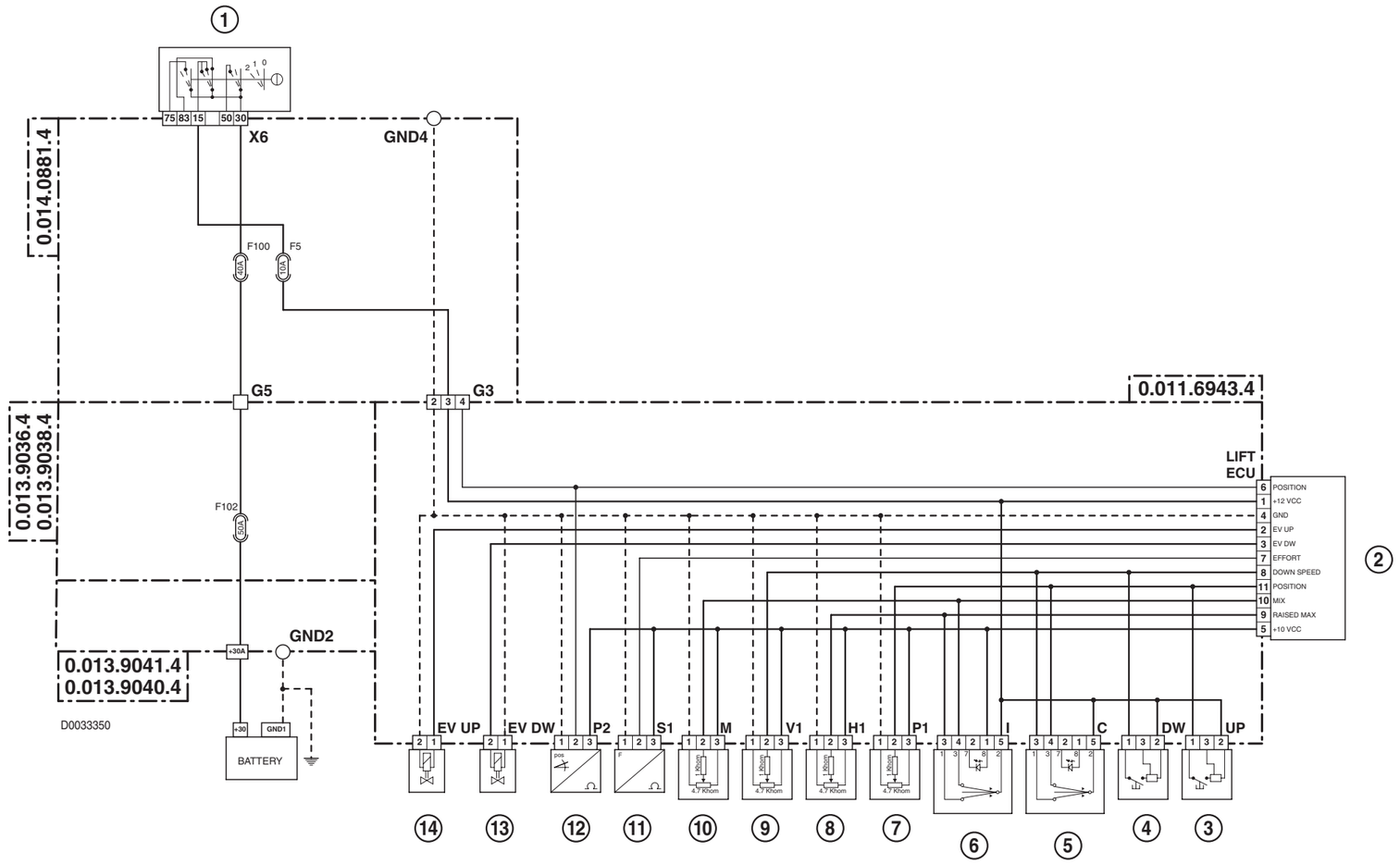
1 Starter switch
2 Instrument panel
3 Clutch pedal switch
4 Differential lock pushbutton
5 Differential lock solenoid valve
6 4WD control solenoid valve
7 Stop-Go pushbutton
8 4WD control pushbutton
9 Operator present sensor
10 Engine speed sensor (for shuttle)
11 Wheel speed sensor 1
12 Wheel speed sensor 2
13 Shuttlle oil pressure switch
14 Reverse drive selection solenoid
15 Forward drive selection solenoid
16 Proportional solenoid valve
17 L speed control solenoid valve
18 H speed control solenoid valve
19 PALL filter clogging sensor
20 Pressure switch - oil filter clogging sensor
21 Oil temperature sensor
22 Shuttle sensor
23 Not utilised
24 Minireduction gear sensor
25 Right brake presure sensor
26 Left brake pressure sensor
27 Gear lever
28 Shuttle lever
29 Shuttle speed signal conversion control unit
30 Clutch pedal position sensor
31 Shuttle control unit

4.33 ELECTRONIC LIFT CONTROL (VERSION WITH ELECTRONIC GOVERNOR)



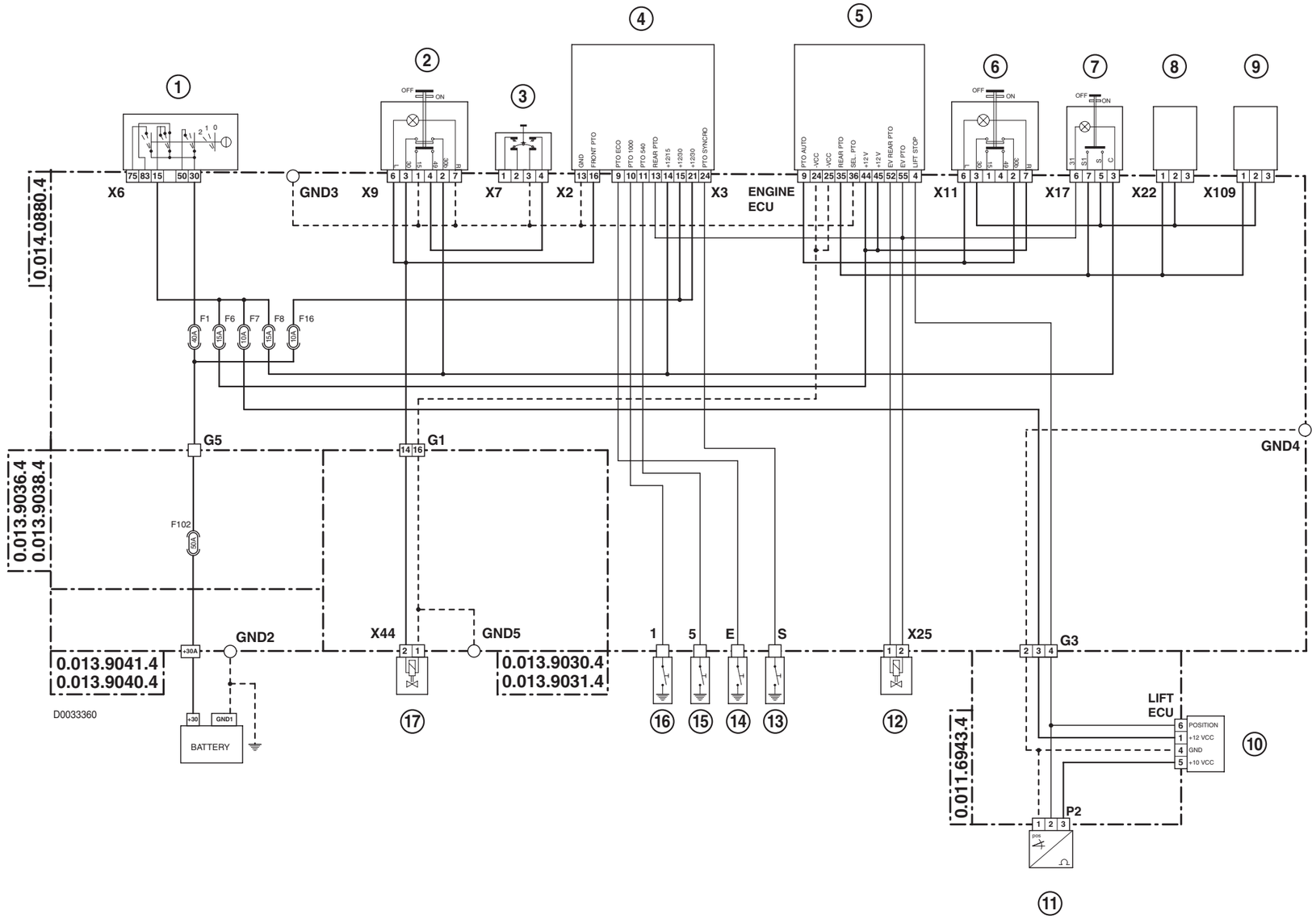
1 Starter switch
2 Engine control unit
3 Electronic lift control unit
4 Electronic lift 'Up' pushbutton
5 Electronic lift 'Down' pushbutton
6 Electronic lift control pushbutton
7 Electronic lift control pushbutton
8 Electronic lift position potentiometer
9 Electronic lift max. height potentiometer
10 Electronic lift rate of drop potentiometer
11 Draft/wheelslip control potentiometer
12 Electronic lift draft sensor
13 Electronic lift position sensor
14 Electronic lift 'Down' solenoid valve
15 Electronic lift 'Up' solenoid valve

4.34 ELECTRONIC LIFT CONTROL (VERSION WITH MECHANICAL GOVERNOR)



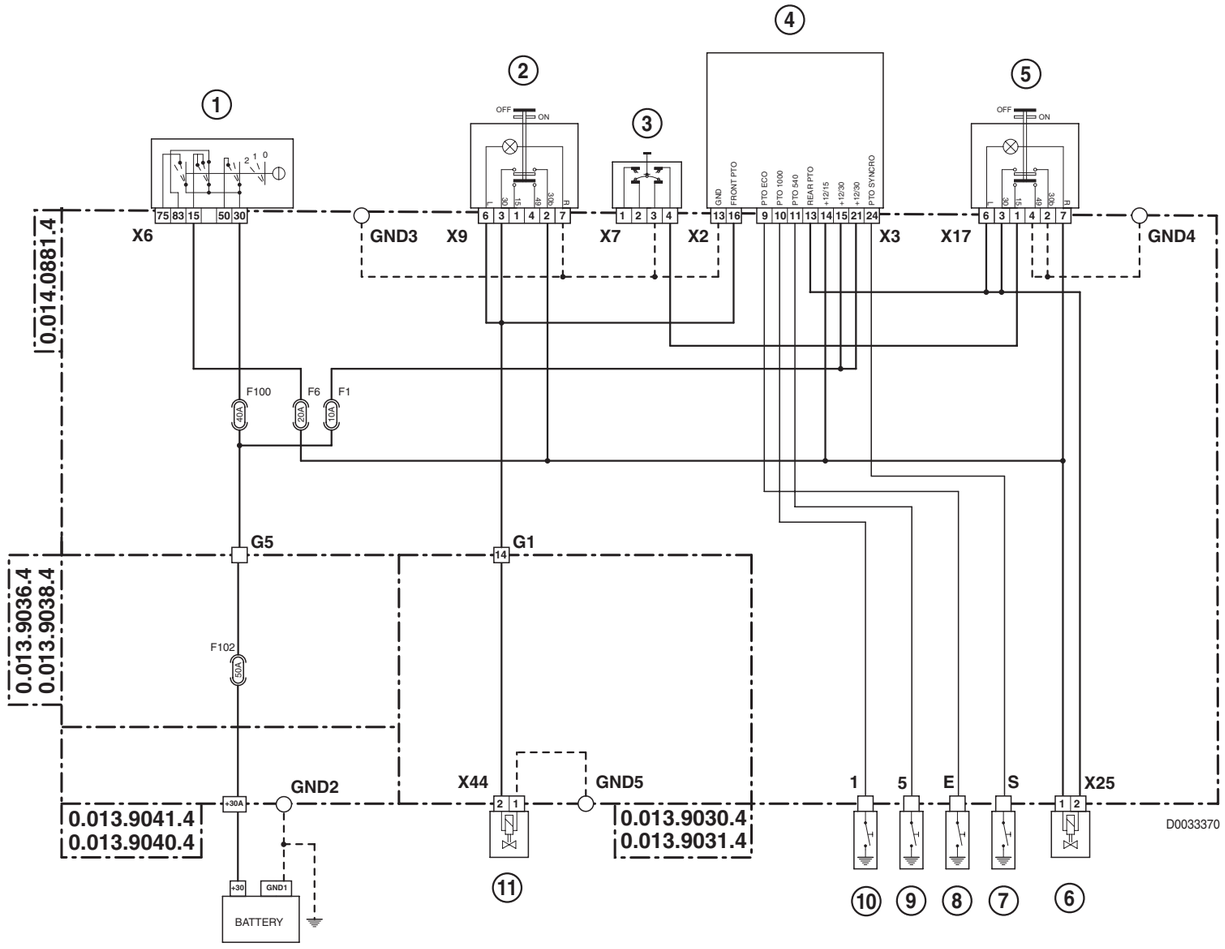
1 Starter switch
2 Electronic lift control unit
3 Electronic lift 'Up' pushbutton
4 Electronic lift 'Down' pushbutton
5 Electronic lift control pushbutton
6 Electronic lift control pushbutton
7 Electronic lift position potentiometer
8 Electronic lift max. height potentiometer
9 Electronic lift rate of drop potentiometer
10 Draft/wheelslip control potentiometer
11 Electronic lift draft sensor
12 Electronic lift position sensor
13 Electronic lift 'Down' solenoid valve
14 Electronic lift 'Up' solenoid valve

4.35 PTO (VERSION WITH ELECTRONIC GOVERNOR)



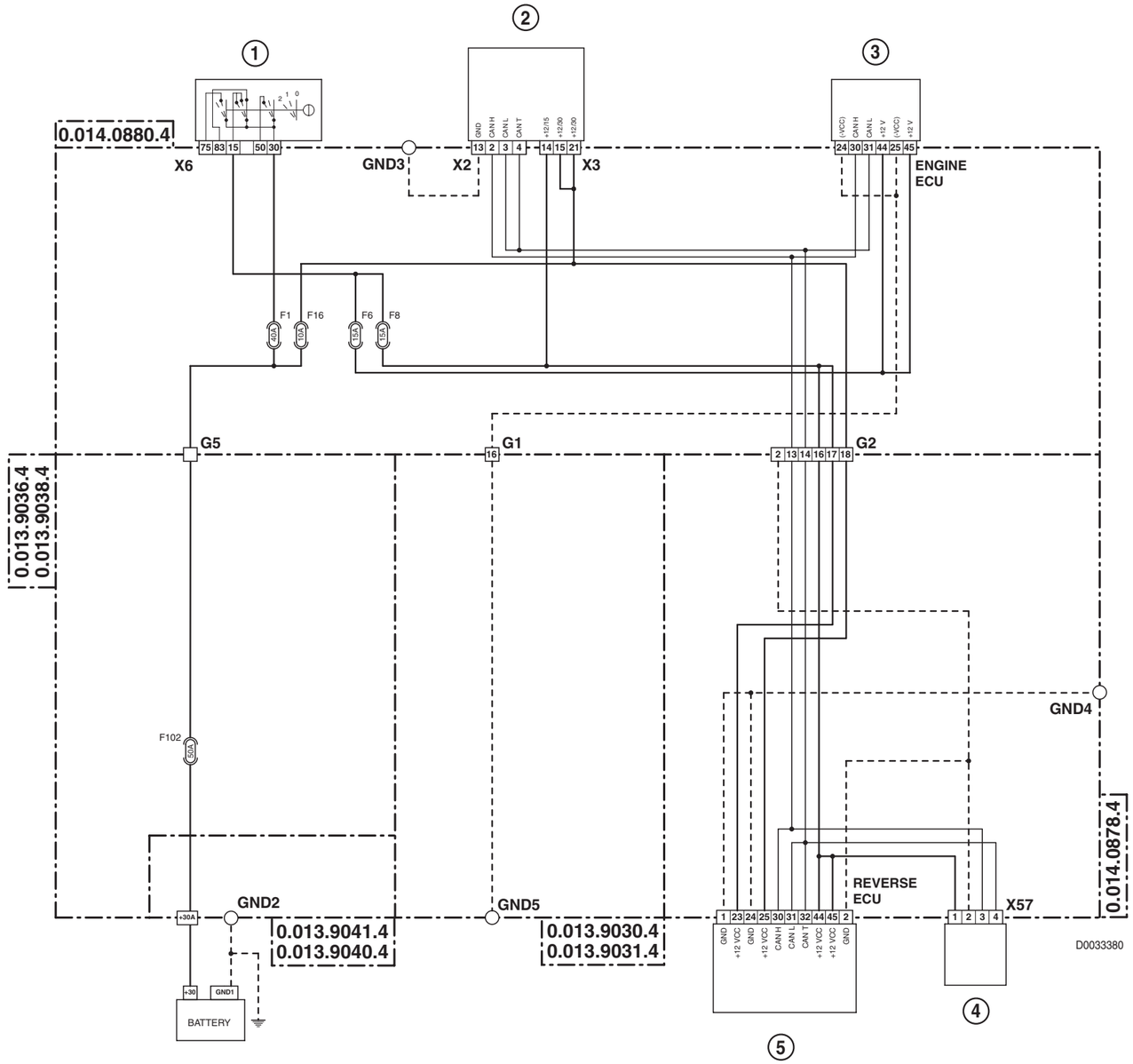
1 Starter switch
2 Front PTO pushbutton
3 Clutch pedal switch
4 Instrument panel
5 Engine control unit
6 AUTO PTO pushbutton
7 Rear PTO pushbutton
8 Not utilised
9 Not utilised
10
11 Electronic lift position sensor
12 Rear PTO solenoid
13 Groundspeed PTO engagement sensor
14 ECO PTO engagement sensor
15 540 rpm PTO engagement sensor
16 1000 rpm PTO engagement sensor
17 Front PTO control solenoid valve

4.36 PTO (VERSION WITH MECHANICAL GOVERNOR)



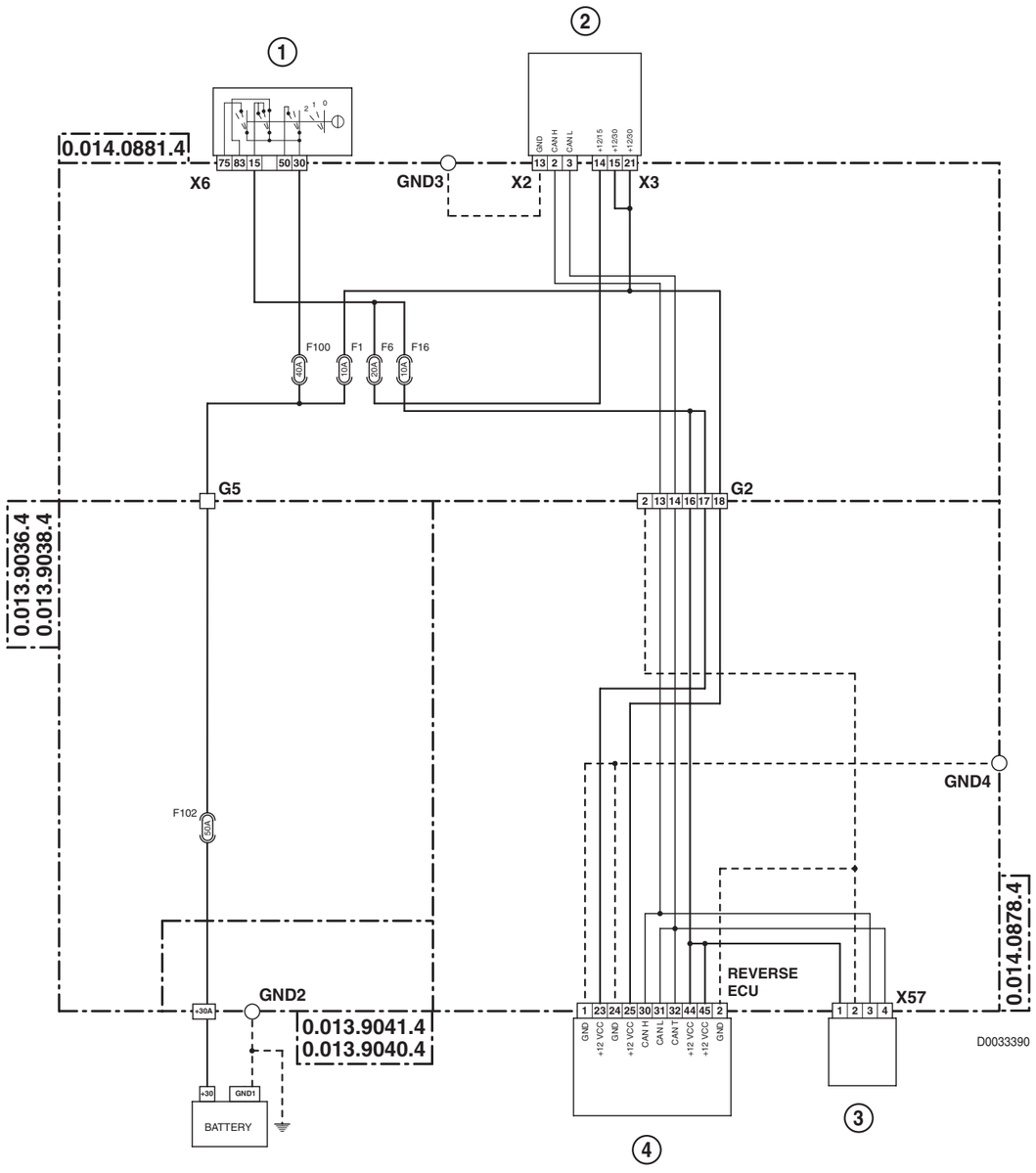
1 Starter switch
2 Clutch pedal switch
3 Front PTO pushbutton
4 Instrument panel
5 Rear PTO pushbutton
6 Rear PTO solenoid
7 Groundspeed PTO engagement sensor
8 ECO PTO engagement sensor
9 540 rpm PTO engagement sensor
10 1000 rpm PTO engagement sensor
11 Front PTO control solenoid valve

4.37 CAN BUS (VERSION WITH ELECTRONIC GOVERNOR)



1 Starter switch
2 Instrument panel
3 Engine control unit
4 Supplementary CANBUS socket
5 Shuttle control unit

4.38 CAN BUS (VERSIONE WITH MECHANICAL GOVERNOR)

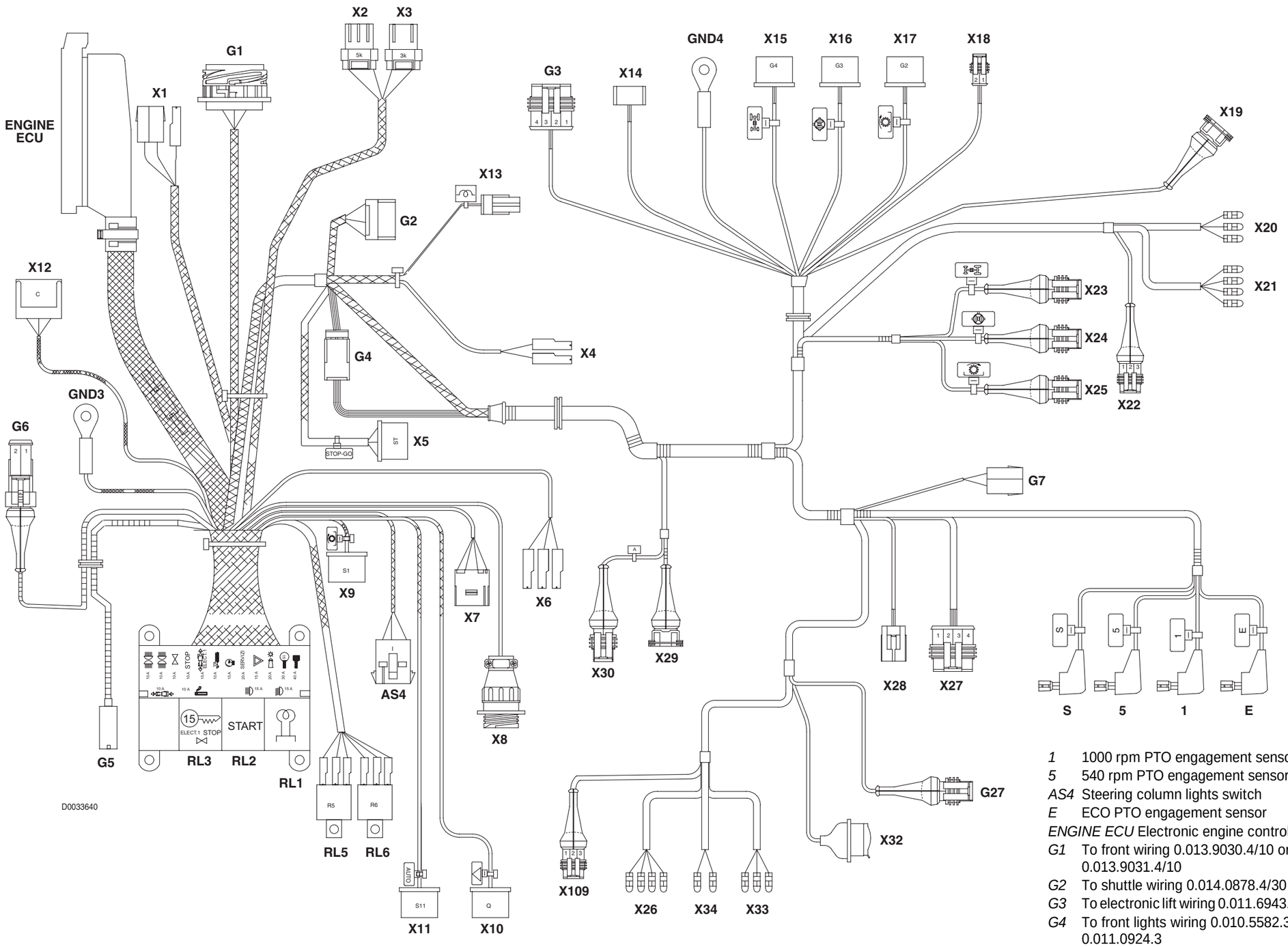


1 Starter switch
2 Instrument panel
3 Supplementary CANBUS socket
4 Shuttle control unit

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5. WIRING LOOMS

CENTRAL WIRING (ELECTRONIC GOVERNOR) (1/2)



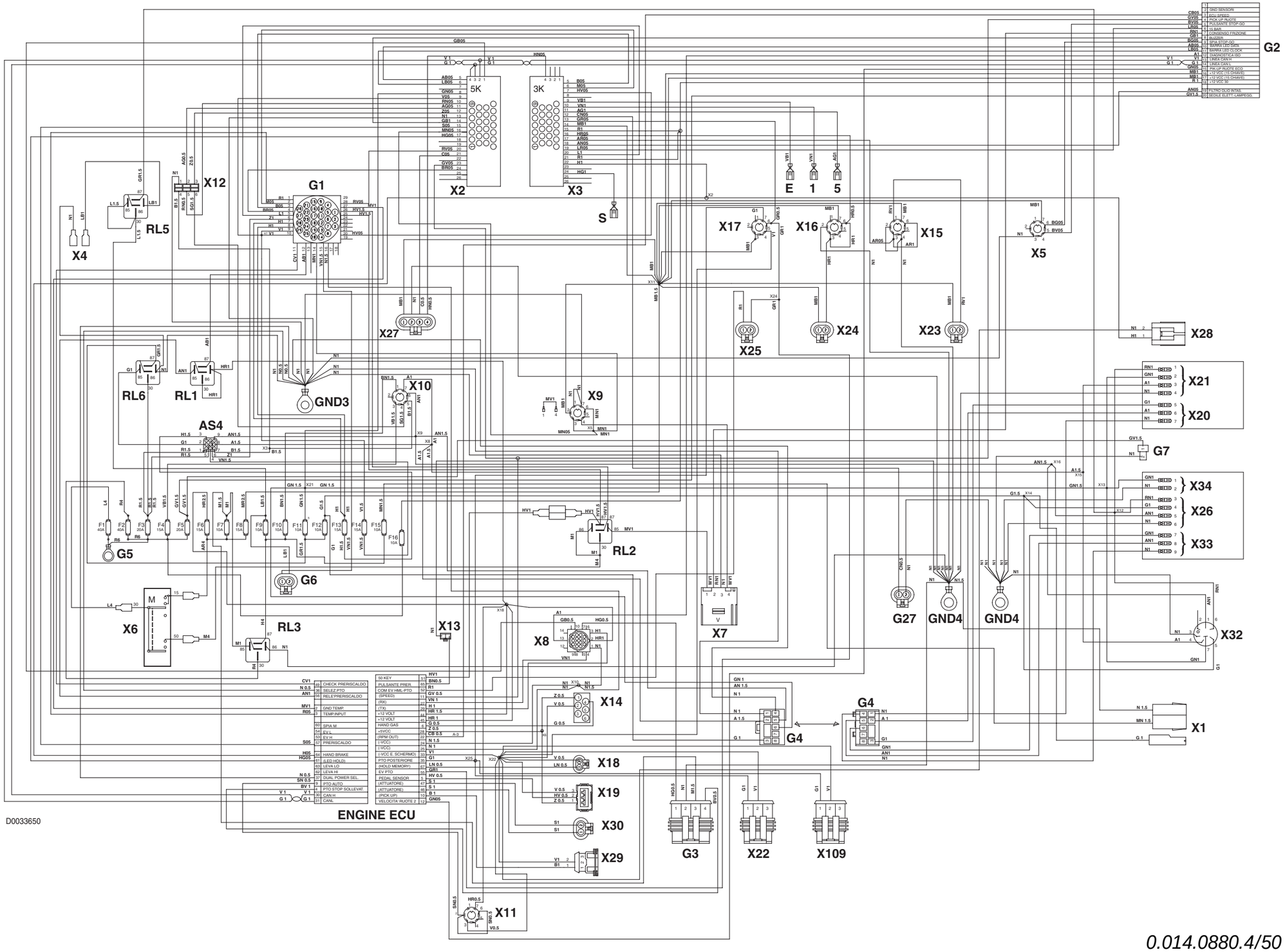
G5 To power supply wiring 0.013.9036.4/20 or 0.013.9038.4/20
G6 To cab power supply wiring 0.013.9034.4 or 0.013.9035.4
G7 Not utilised
G27 To hydraulic trailer braking wiring Italy 0.012.2103.3
GND3 Earthing point 3
GND4 Earthing point 4
RL1 Preheating control relay
RL2 Engine starting relay
RL3 Key positive power relay
RL5 Brake control relay
RL6 Lights control relay
S Groundspeed PTO (SYNCRO) engagement sensor
X1 Cigar lighter
X2 Instrument panel
X3 Instrument panel
X4 Brake pedal switch
X5 Stop-Go pushbutton
X6 Starter switch
X7 Brake pedal switch
X8 Diagnostic socket
X9 Front PTO control pushbutton
X10 Hazard pushbutton
X11 AUTO PTO pushbutton
X12 Hazard warning lights control unit
X13 Preheating pushbutton
X14 Hand throttle position sensor
X15 4WD pushbutton
X16 Diff lock pushbutton

X17 Rear PTO pushbutton
X18 Memory pushbutton
X19 Accelerator pedal position sensor
X20 Not utilised
X21 Right tail light
X22 Not utilised
X23 4WD control solenoid valve
X24 Differential lock control solenoid valve

X25 Rear PTO control solenoid
X26 Left tail light
X27 Fuel level sensor
X28 Handbrake switch
X29 Engine speed sensor
X30 Actuator
X32 Trailer socket
X33 Not utilised
X34 Number plate light

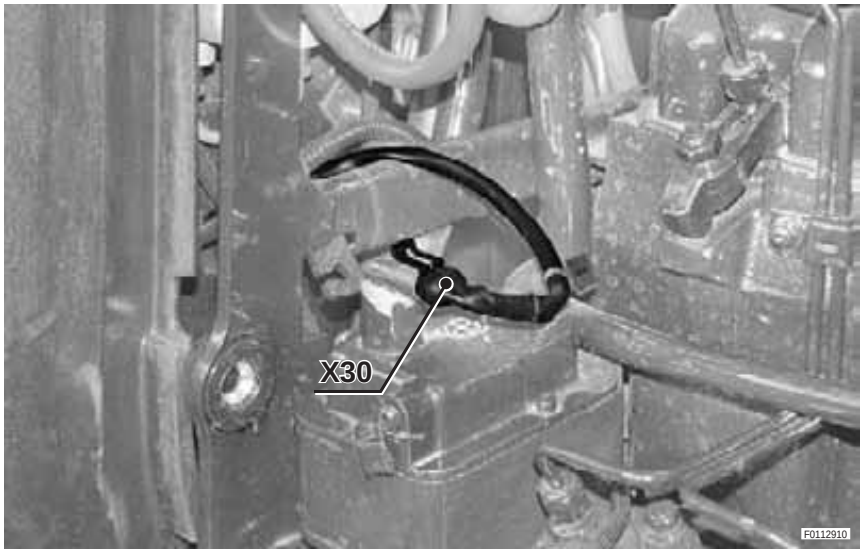
1 1000 rpm PTO engagement sensor
5 540 rpm PTO engagement sensor
AS4 Steering column lights switch
E ECO PTO engagement sensor
ENGINE ECU Electronic engine control unit
G1 To front wiring 0.013.9030.4/10 or 0.013.9031.4/10
G2 To shuttle wiring 0.014.0878.4/30
G3 To electronic lift wiring 0.011.6943.4/10
G4 To front lights wiring 0.010.5582.3 or 0.011.0924.3

CENTRAL WIRING (ELECTRONIC GOVERNOR) (2/2)

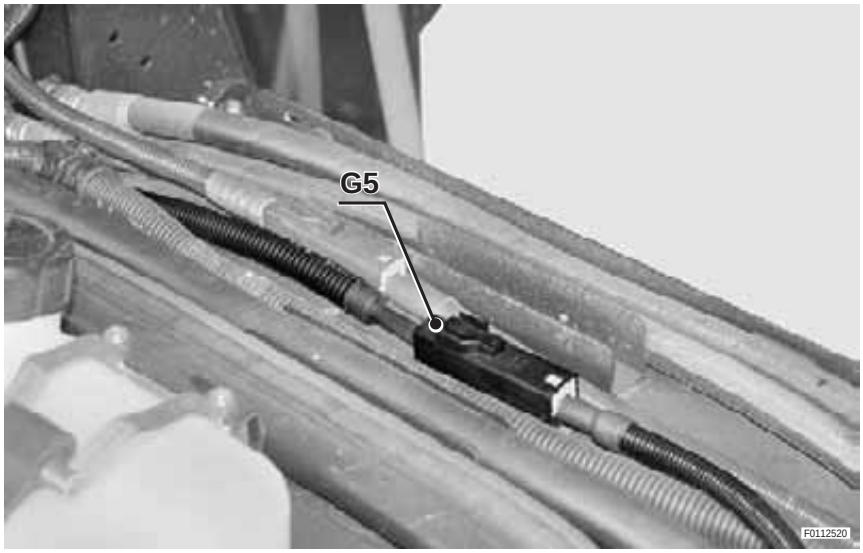


CONNECTOR POSITIONS

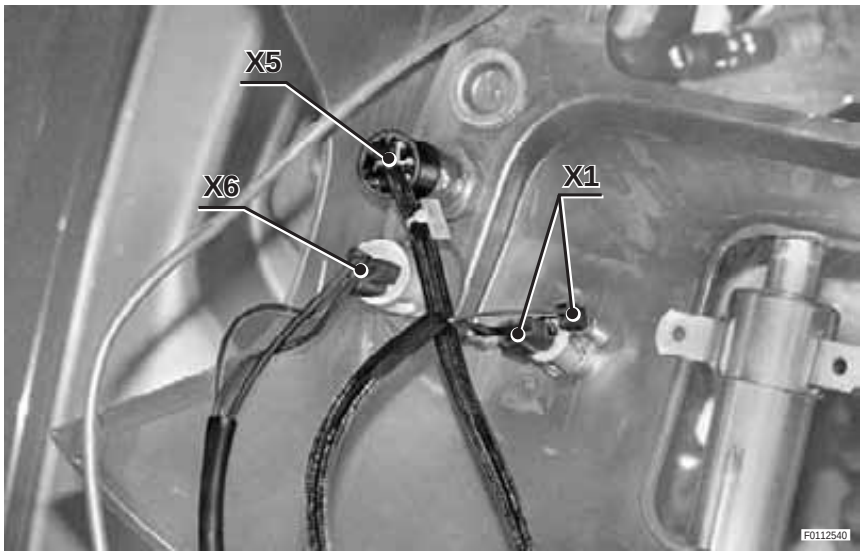
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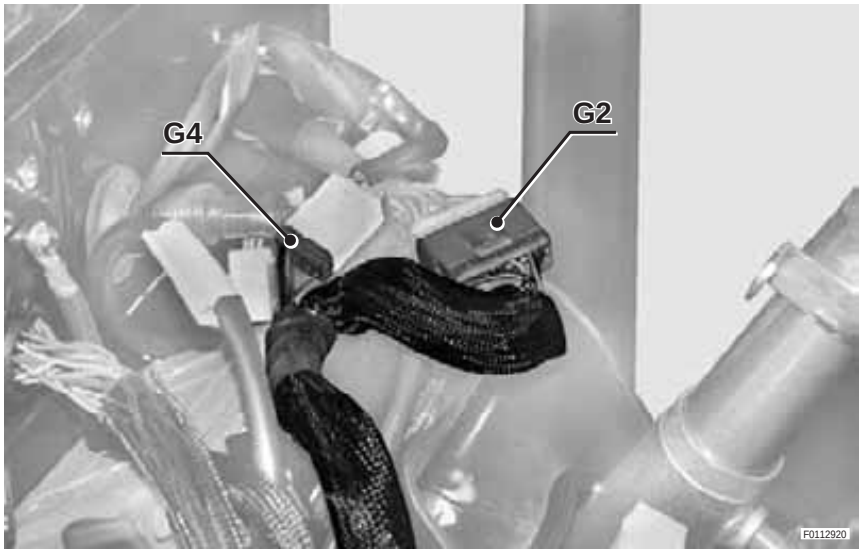
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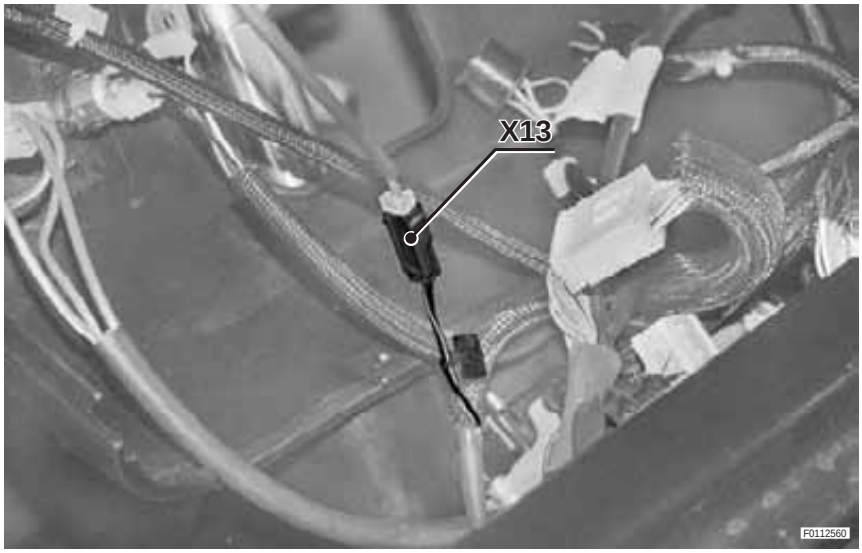
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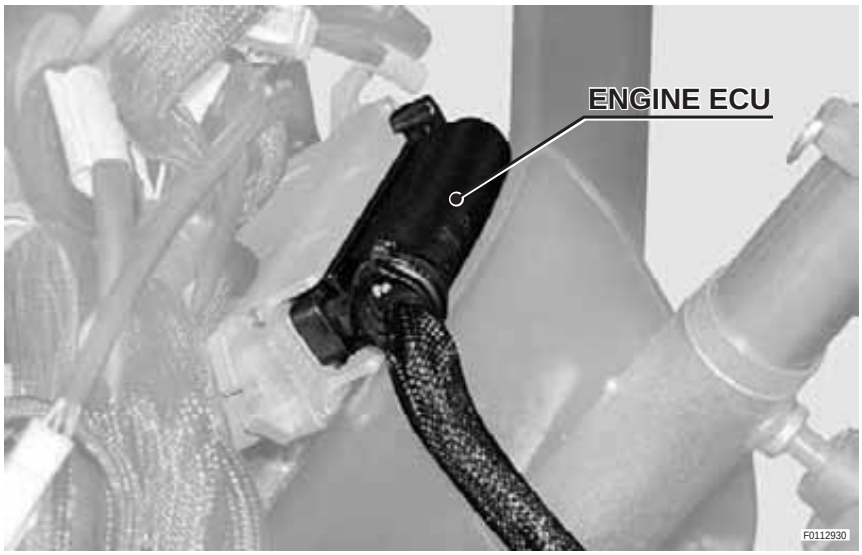
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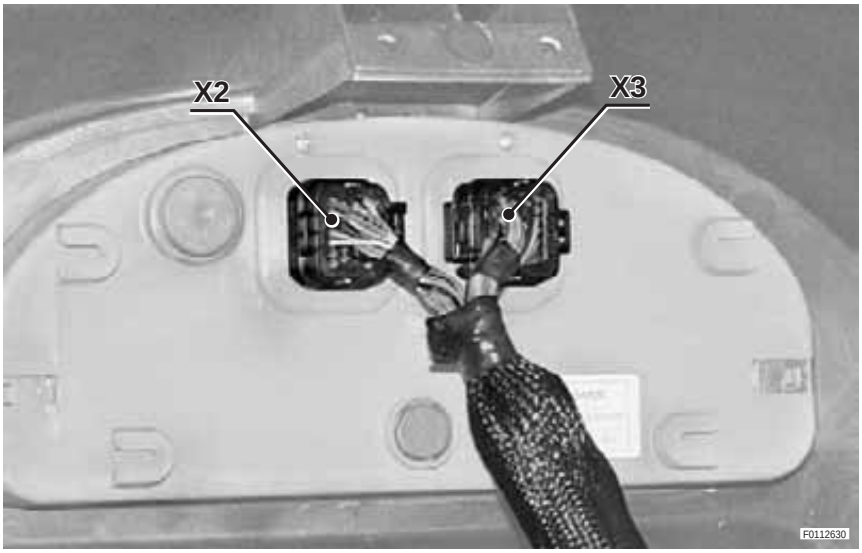
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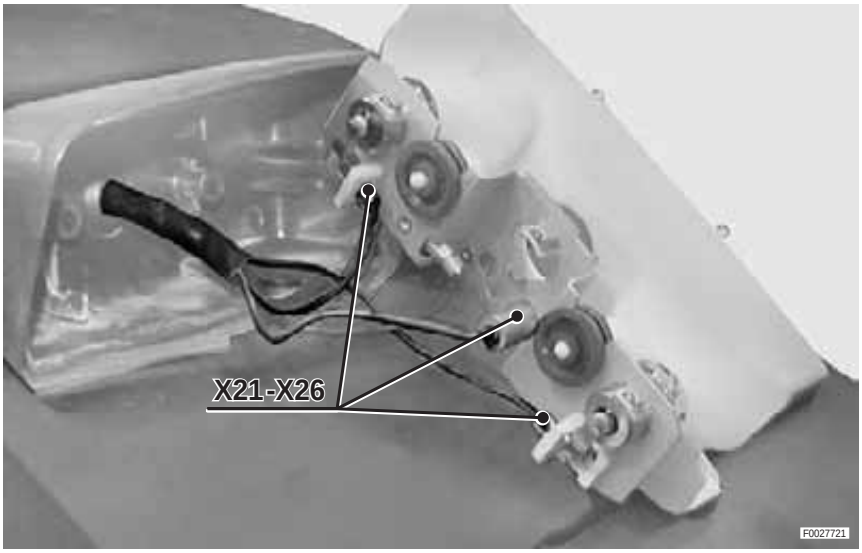
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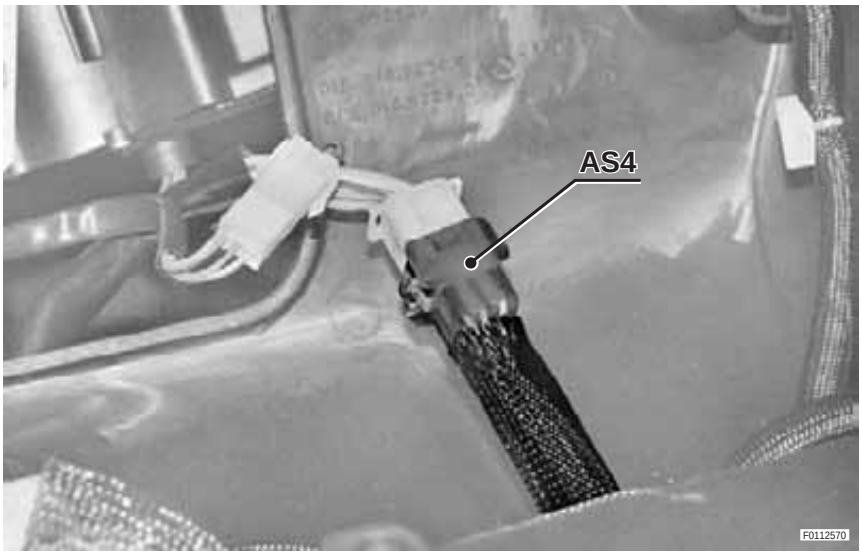
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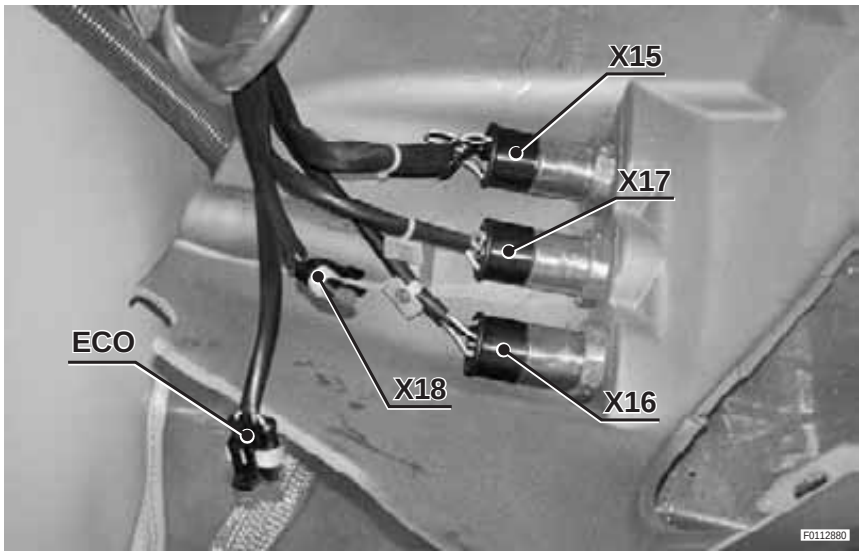
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9



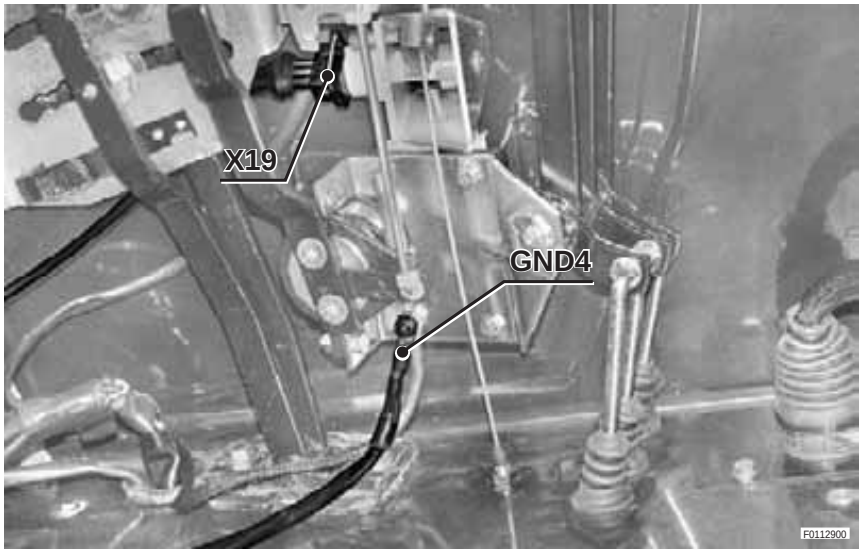
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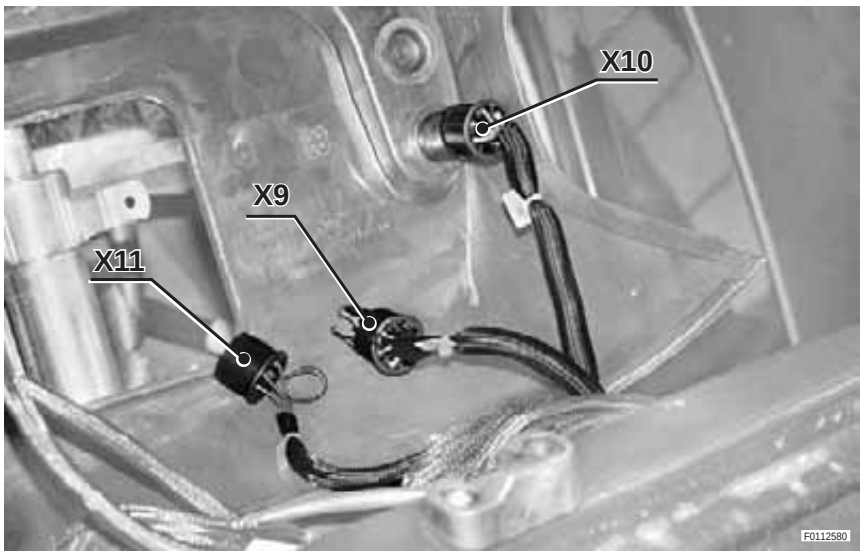
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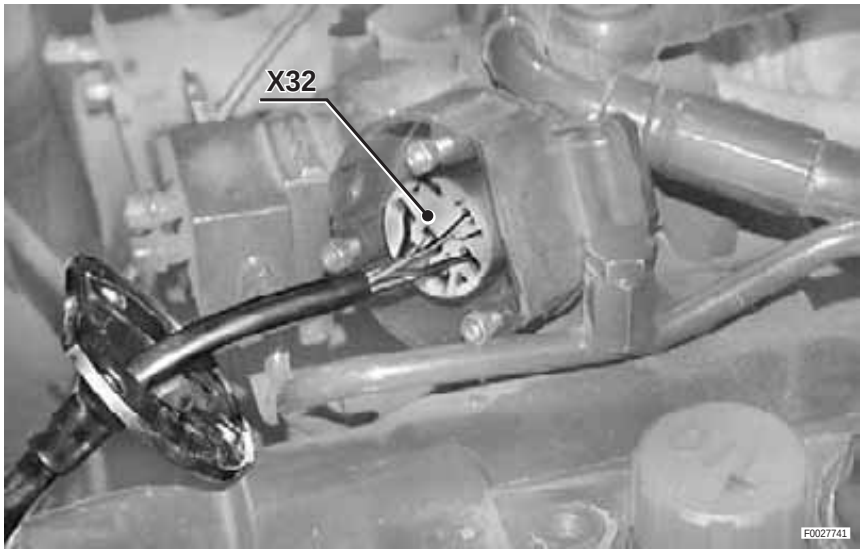
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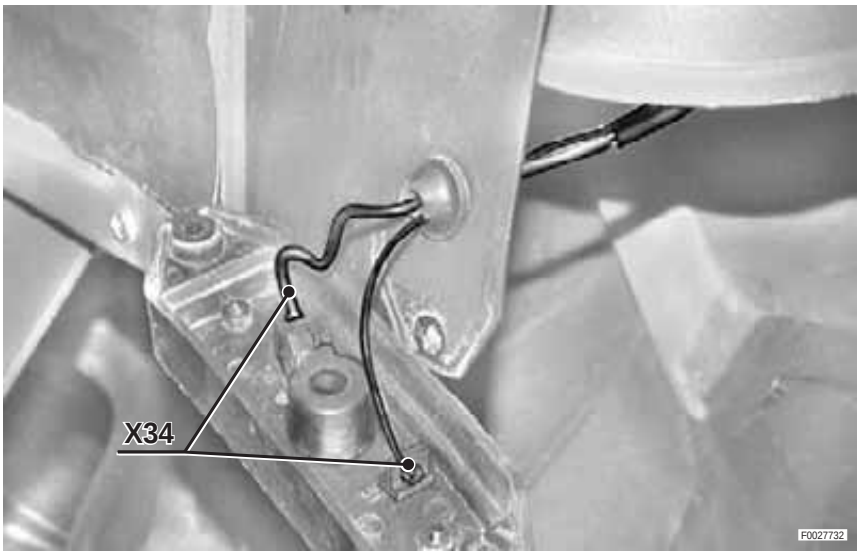
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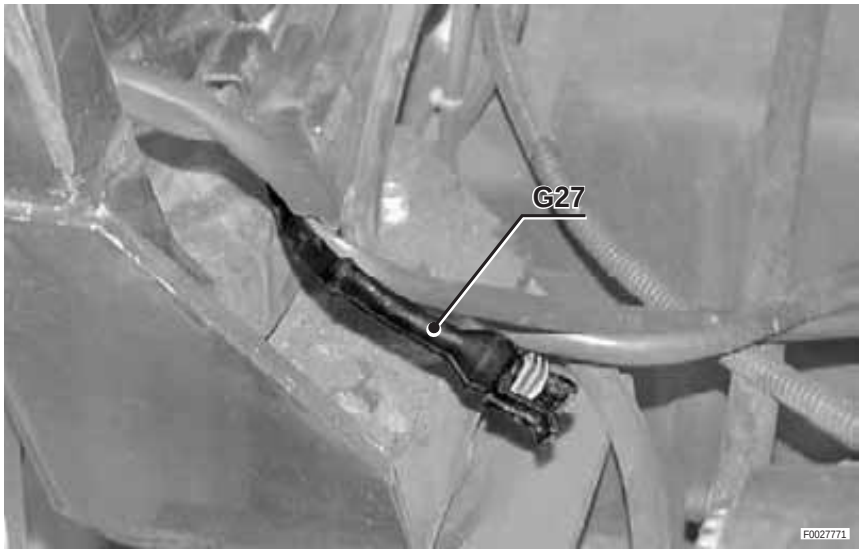
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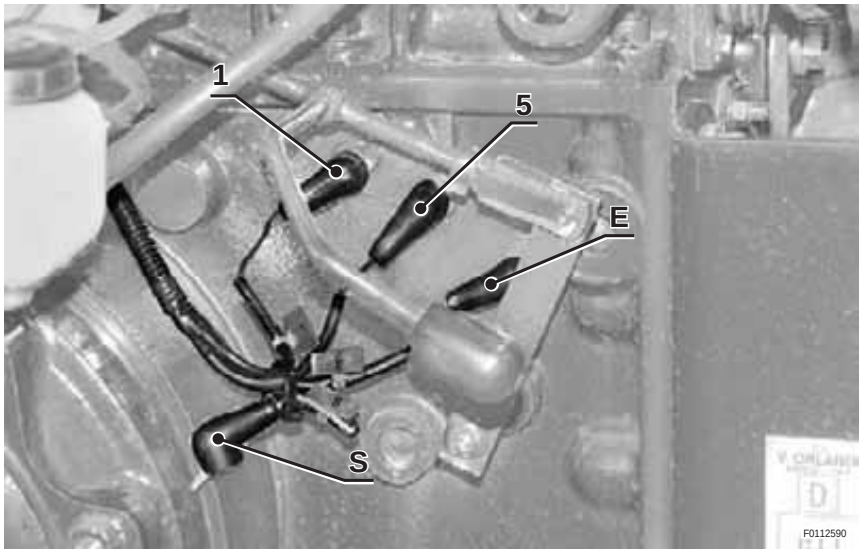
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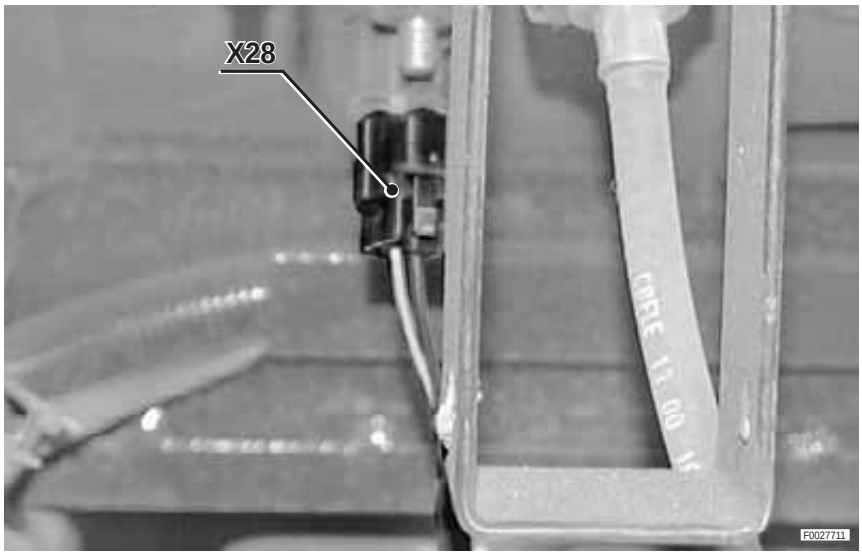
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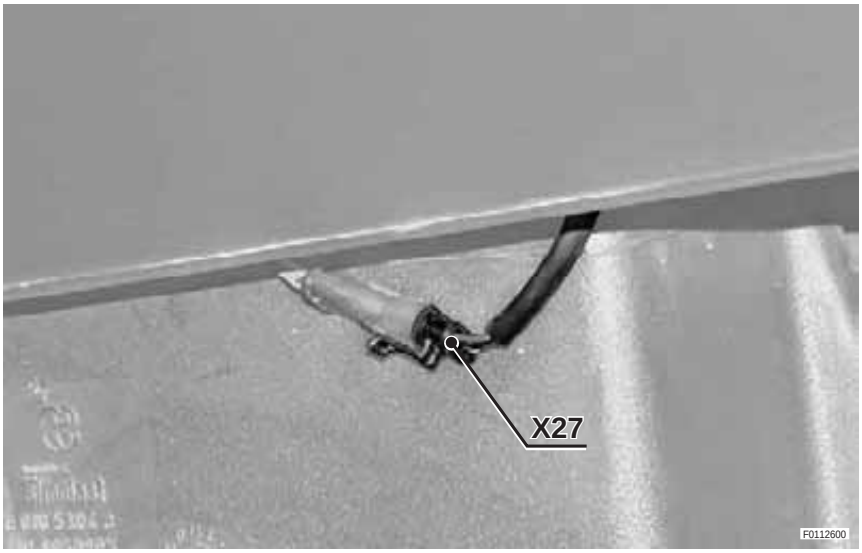
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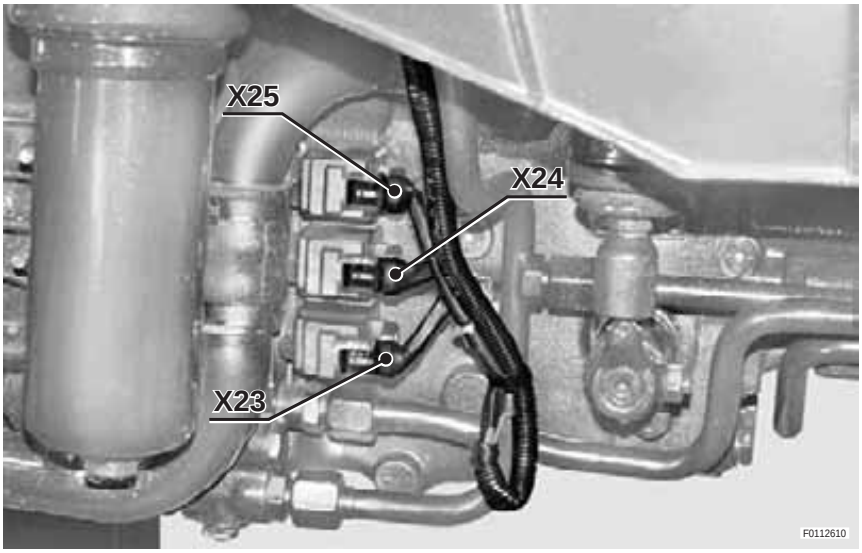
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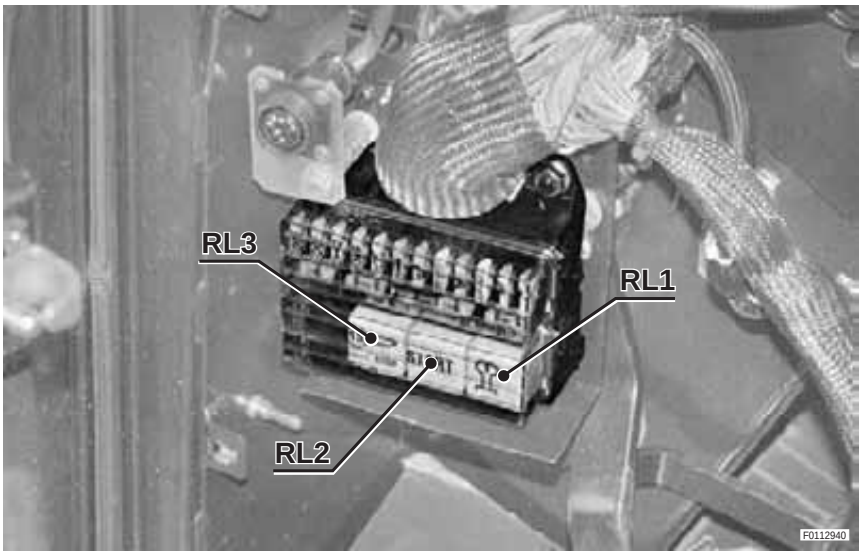
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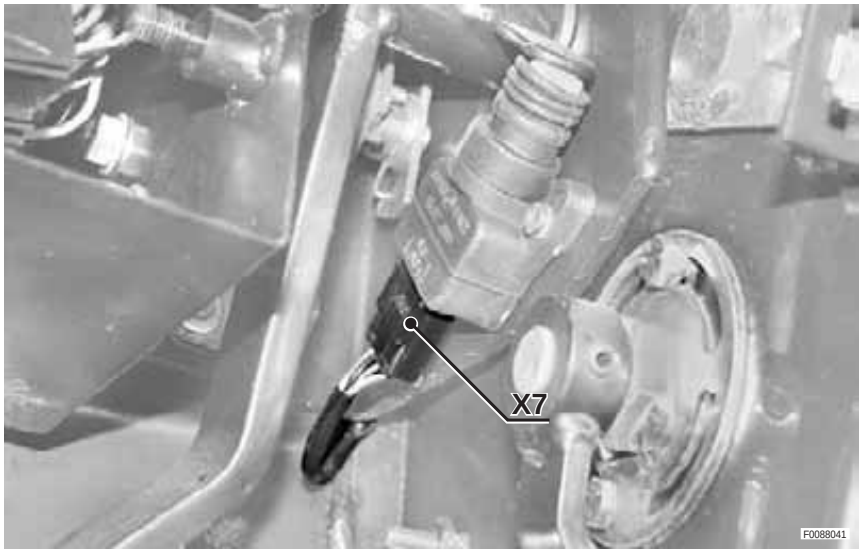
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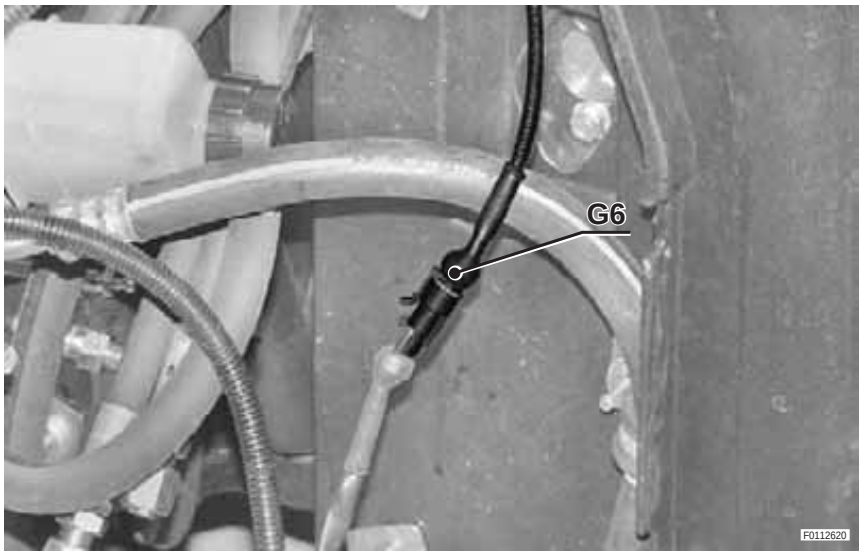
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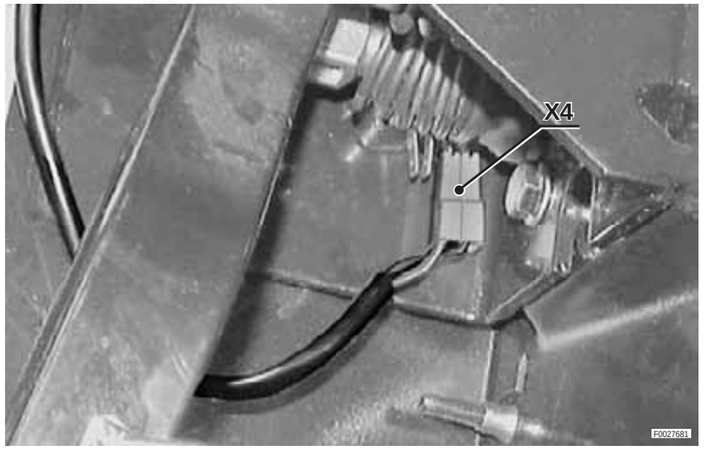


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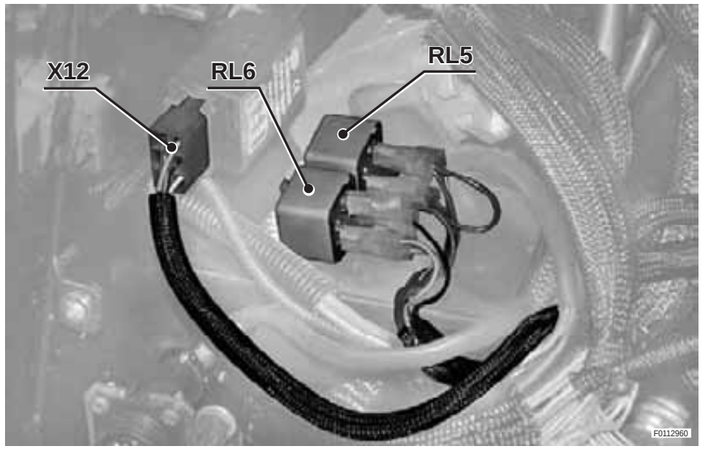


CENTRAL WIRING (ELECTRONIC GOVERNOR)

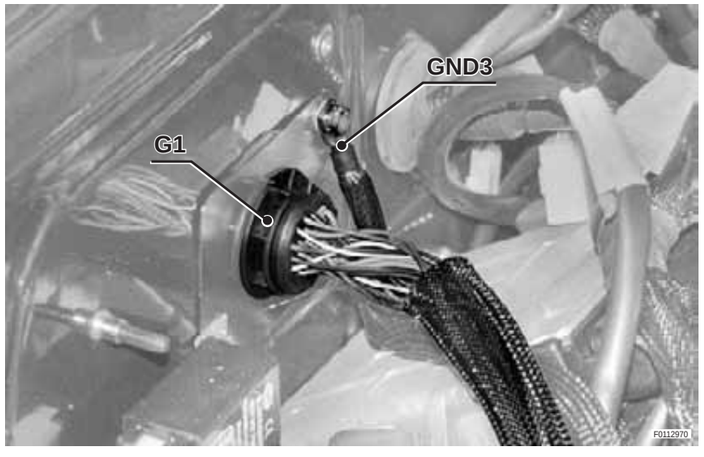
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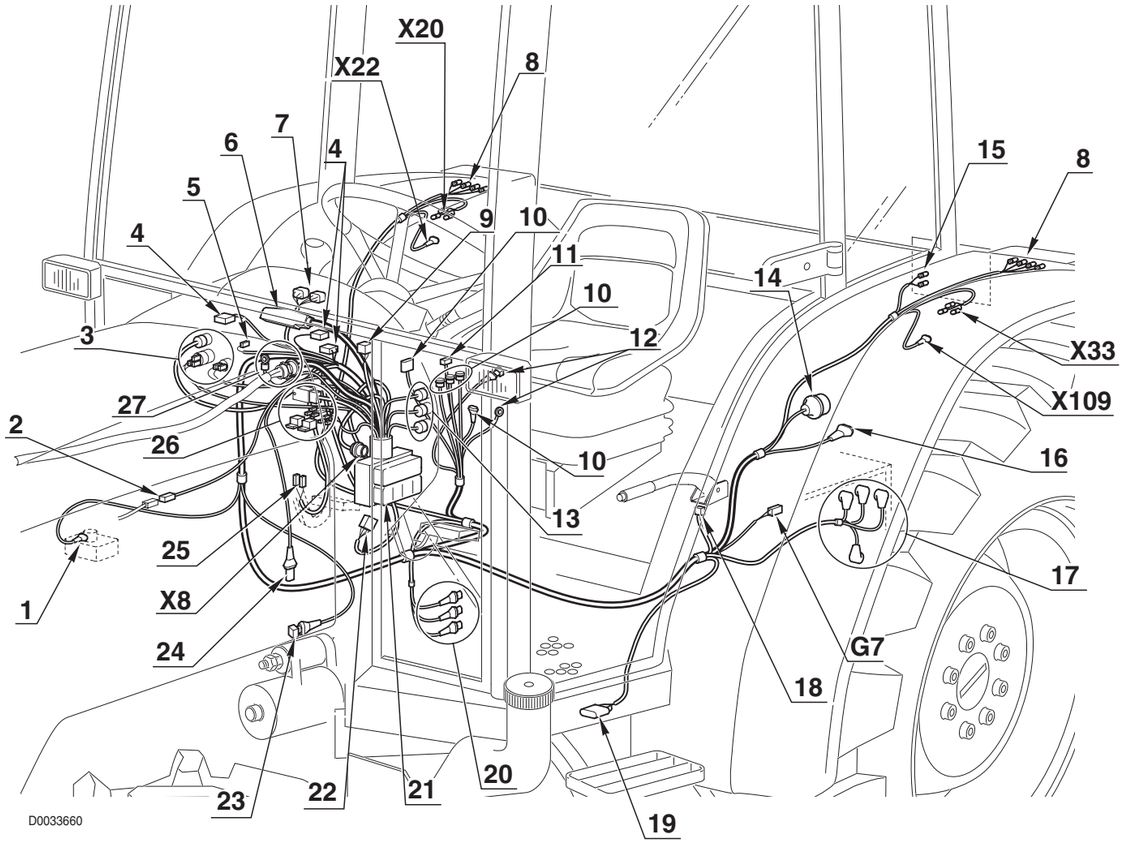


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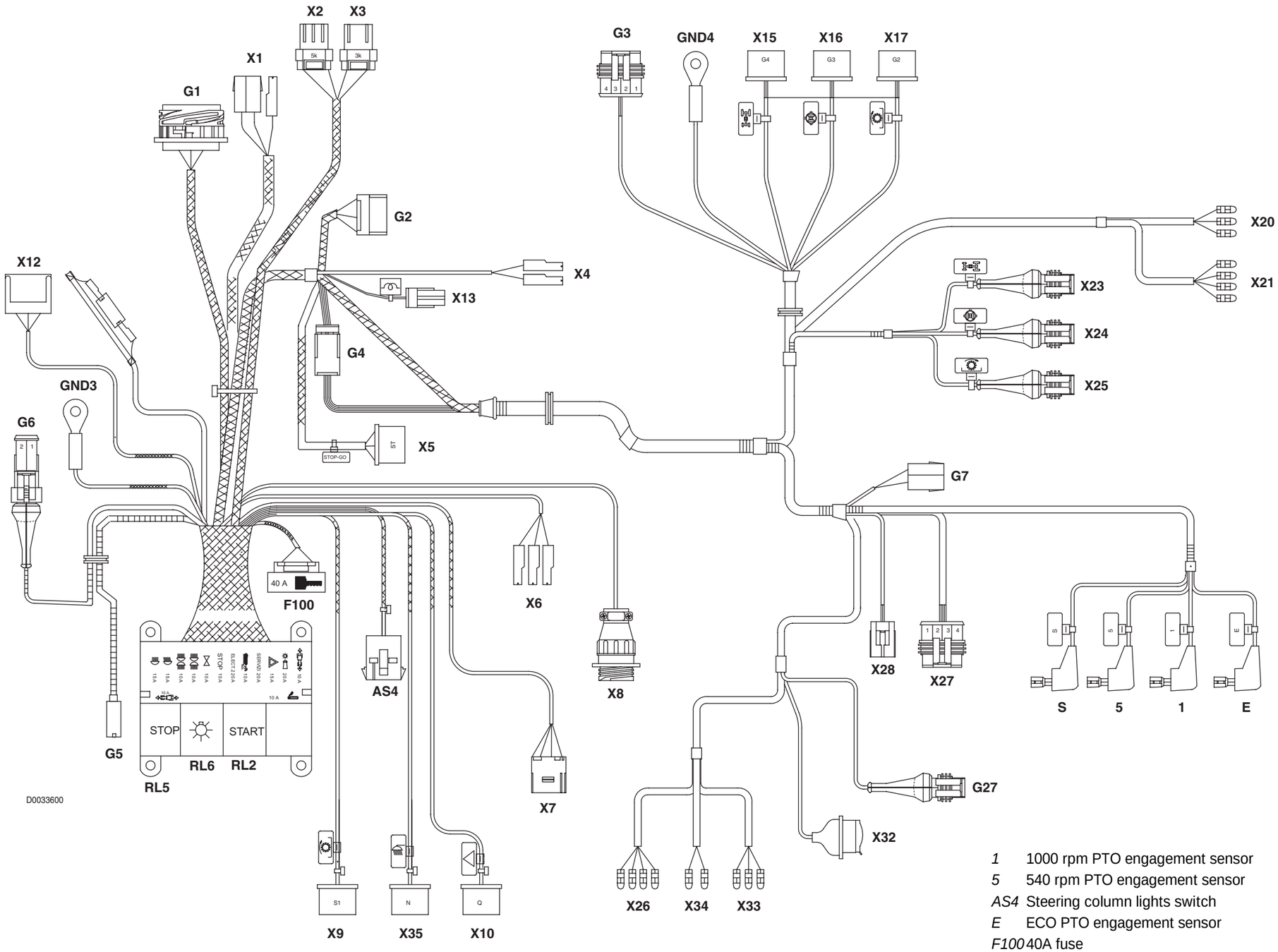
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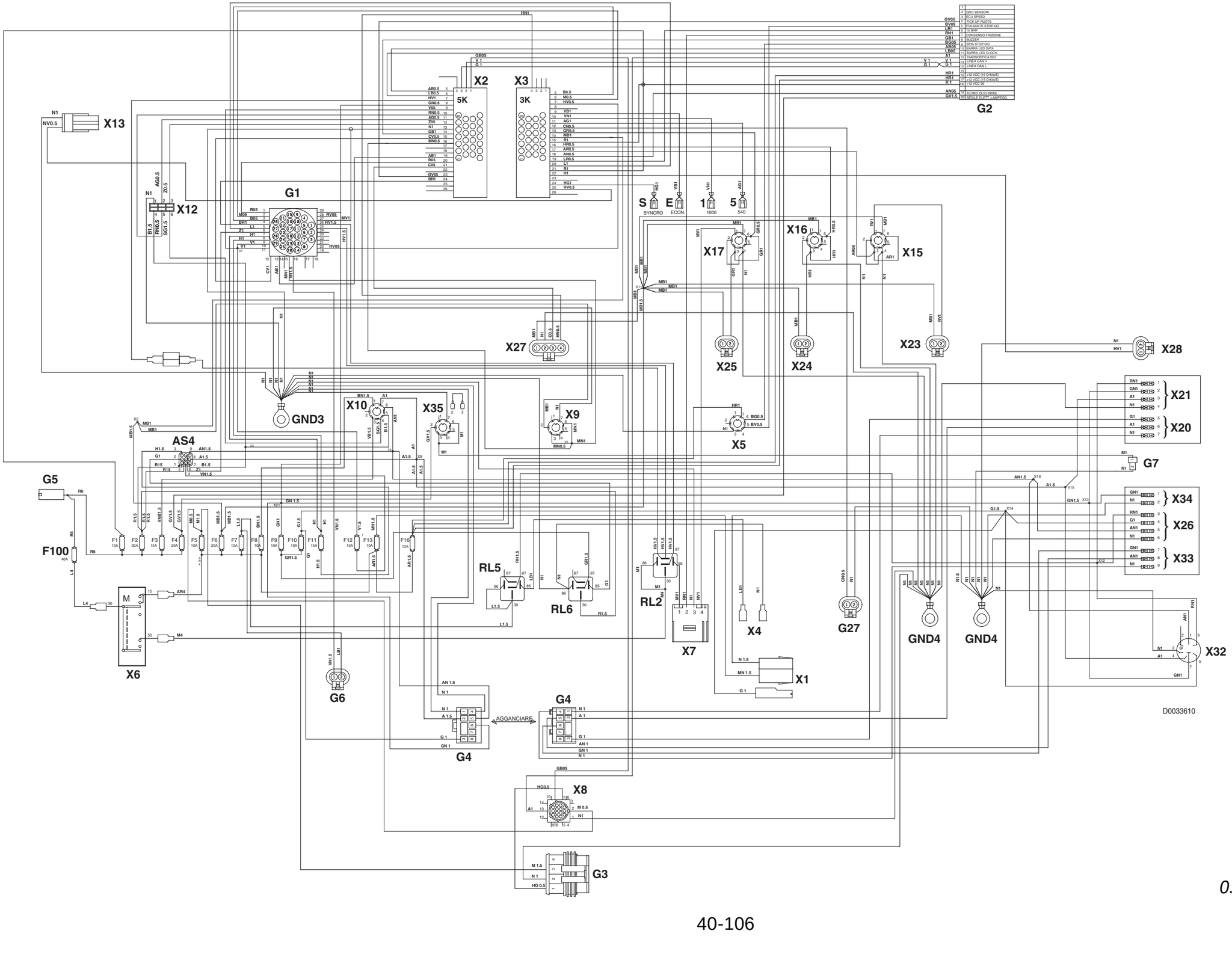
CENTRAL WIRING (MECHANICAL GOVERNOR) (1/2)



G2 To shuttle wiring 0.014.0878.4/30
G3 To electronic lift wiring 0.011.6943.4/10
G4 To front lights wiring 0.010.5582.3 or 0.011.0924.3
G5 To power supply wiring 0.013.9036.4/20 or 0.013.9038.4/20
G6 To cab power supply wiring 0.013.9034.4 or 0.013.9035.4
G7 Not utilised
G27 To hydraulic braking wiring (Italy) 0.012.2103.3
GND3 Earthing point 3
GND4 Earthing point 4
RL2 Engine starting relay
RL5 Brake control relay
RL6 Lights control relay
S Groundspeed PTO engagement sensor
X1 Cigar lighter
X2 Instrument panel
X3 Instrument panel
X4 Brake pedal switch
X5 Stop-Go pushbutton
X6 Starter switch
X7 Brake pedal switch
X8 Diagnostic socket
X9 Front PTO pushbutton
X10 Hazard warning lights pushbutton
X12 Hazard warning lights control unit
X13 Preheating pushbutton
X15 4WD pushbutton
X16 Differential lock pushbutton
X17 Rear PTO pushbutton
X20 Not utilised
X21 Right tail light
X23 4WD control solenoid valve
X24 Differential lock control solenoid valve
X25 Rear PTO control solenoid
X26 Left tail light
X27 Fuel level sensor
X28 Parking brake switch
X32 Trailer socket
X33 Not utilised
X34 Number plate light
X35 Not utilised

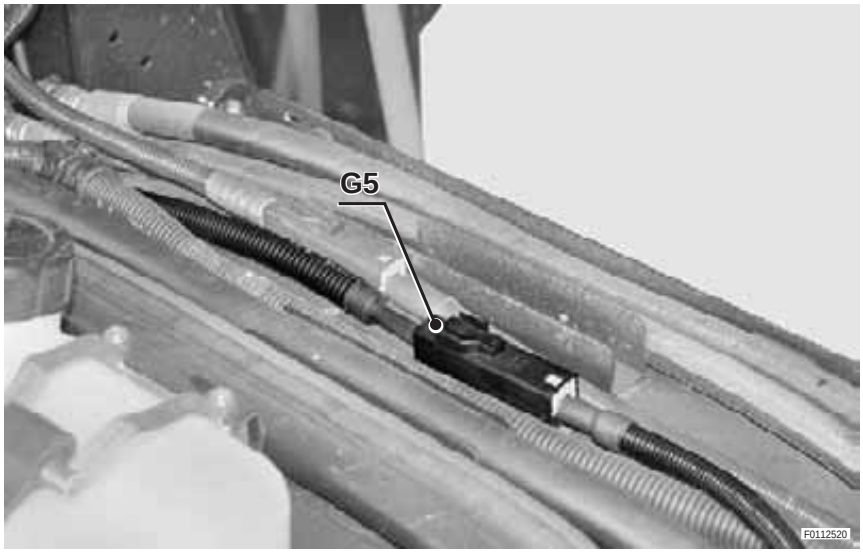
1 1000 rpm PTO engagement sensor
5 540 rpm PTO engagement sensor
AS4 Steering column lights switch
E ECO PTO engagement sensor
F100 40A fuse
G1 To front wiring 0.013.9030.4/10 or 0.013.9031.4/10

CENTRAL WIRING (MECHANICAL GOVERNOR) (2/2)

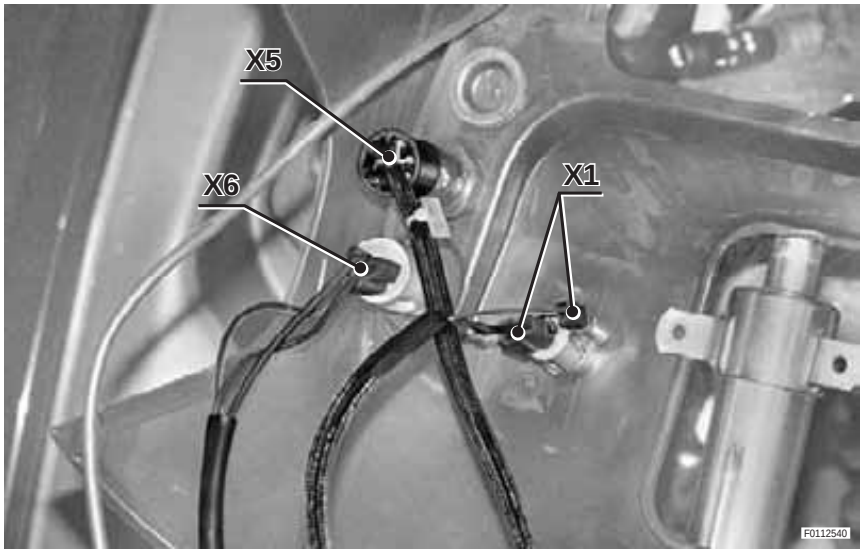


CONNECTOR POSITIONS

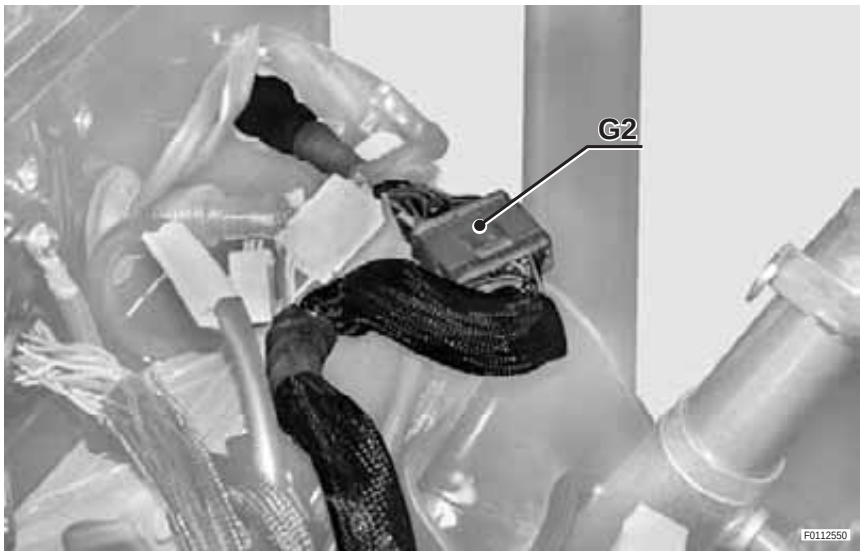
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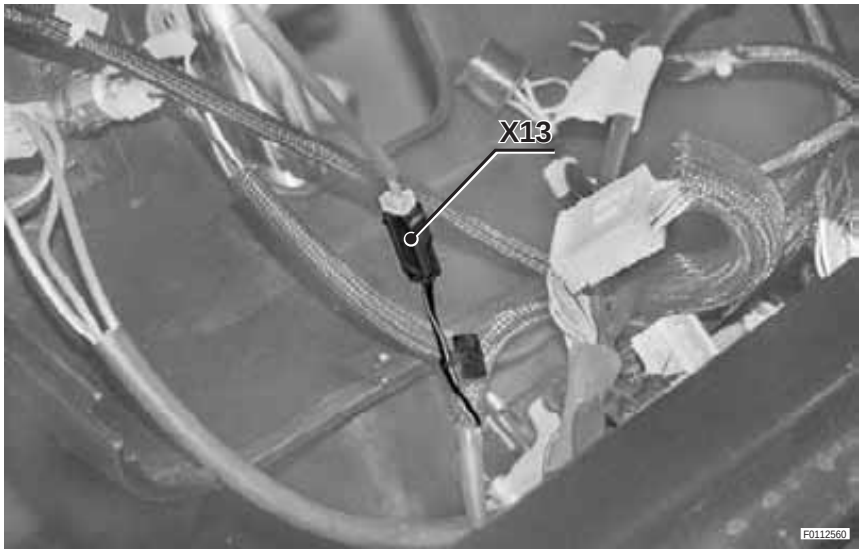
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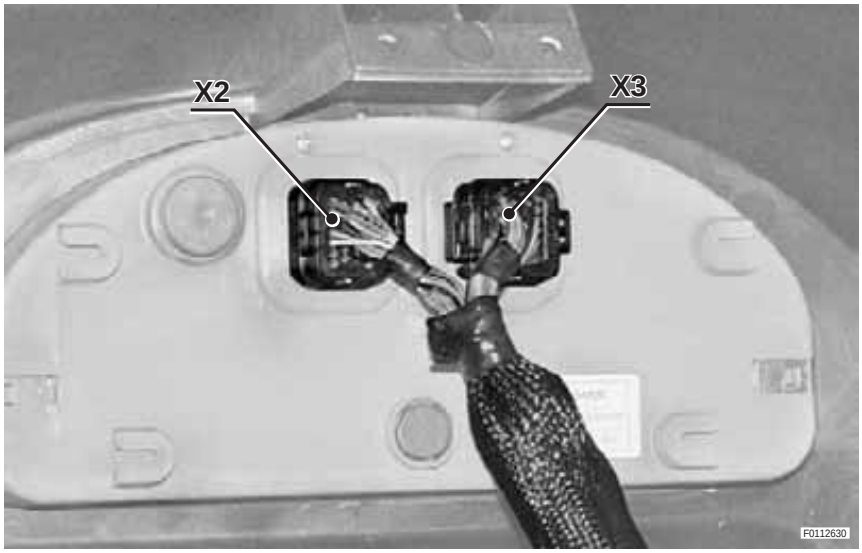
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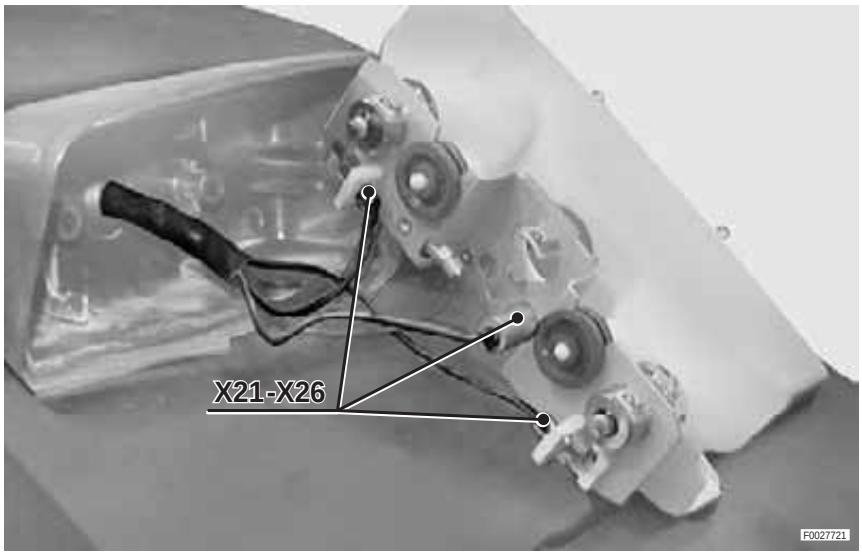
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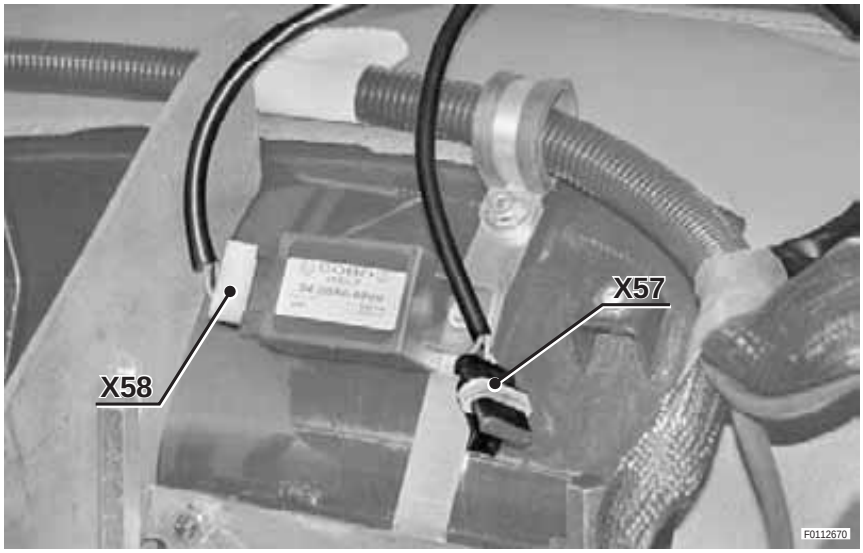
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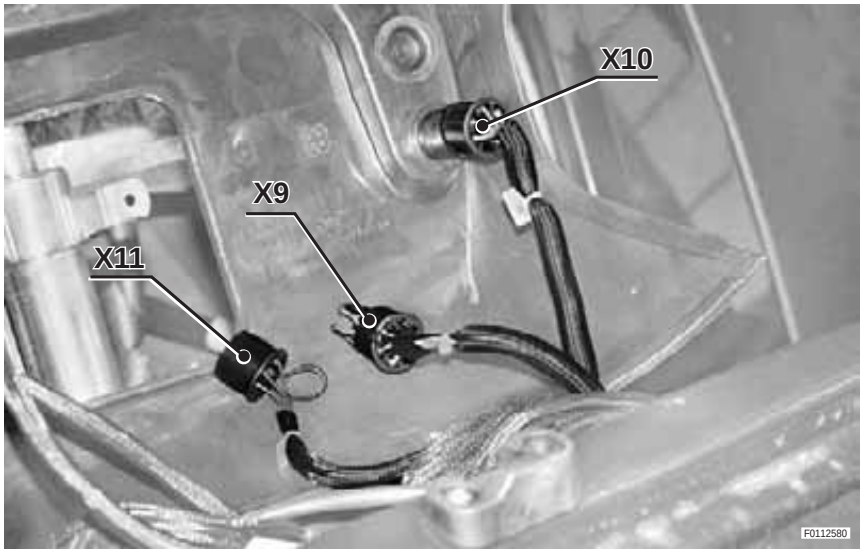
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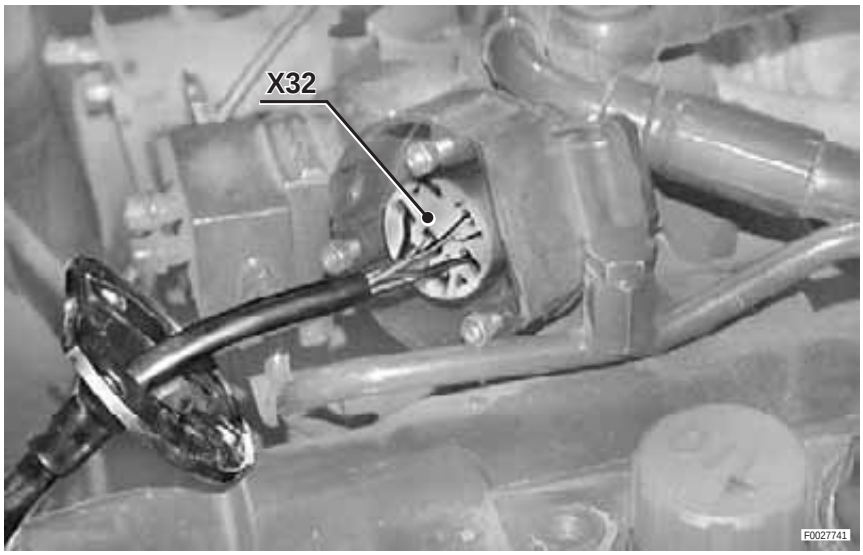
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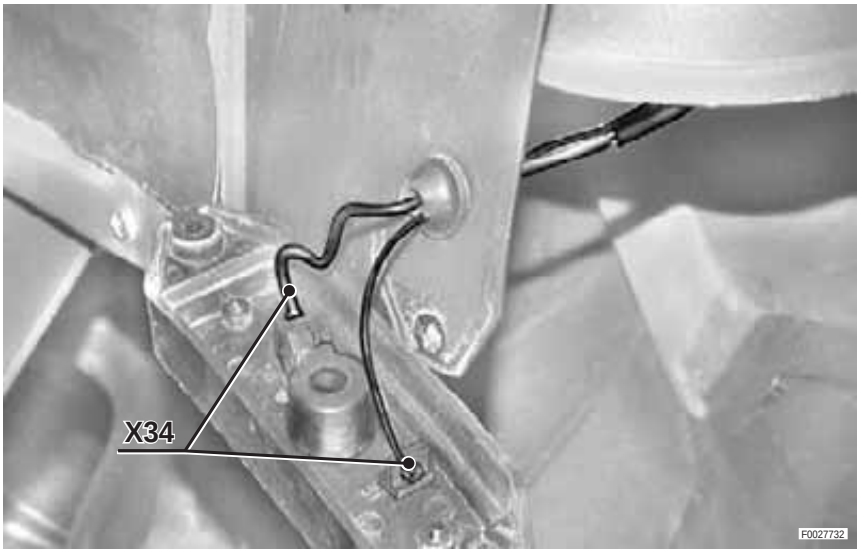
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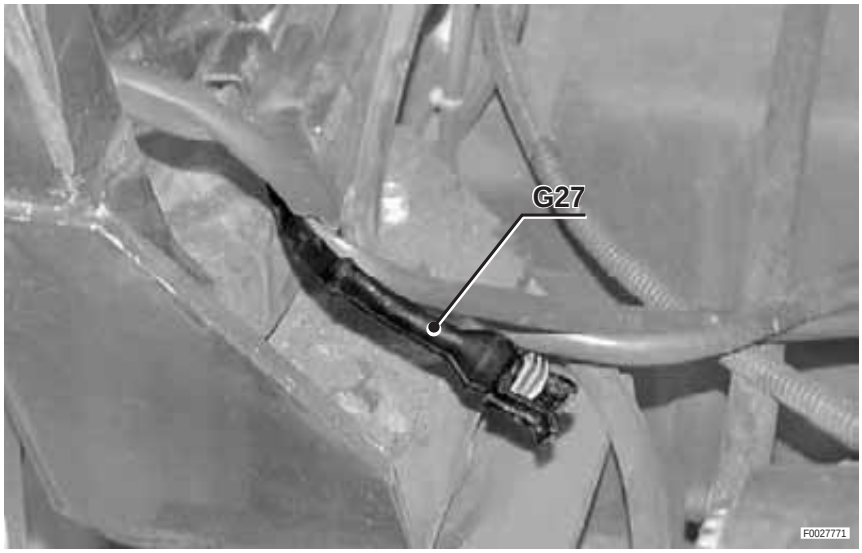
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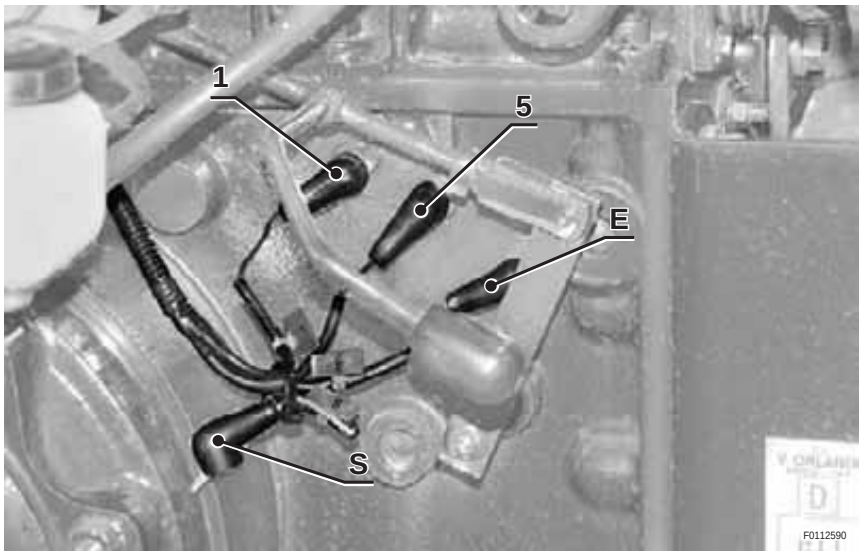
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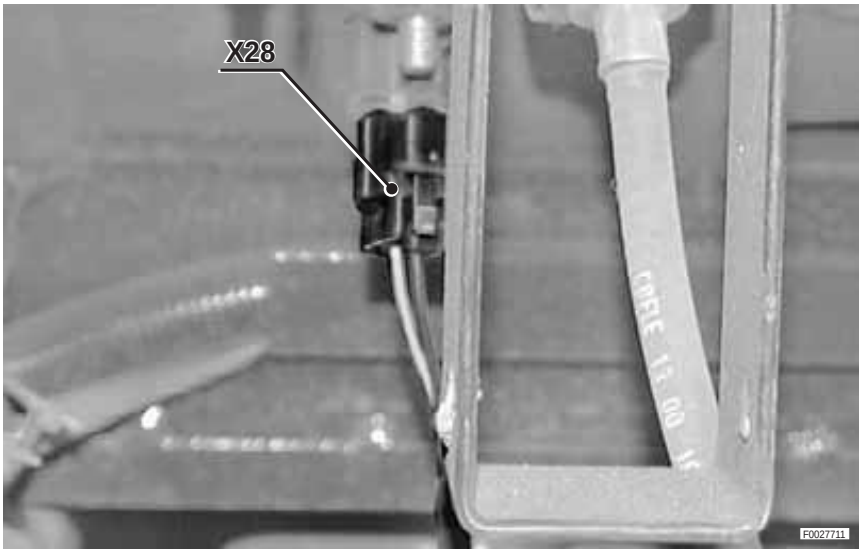
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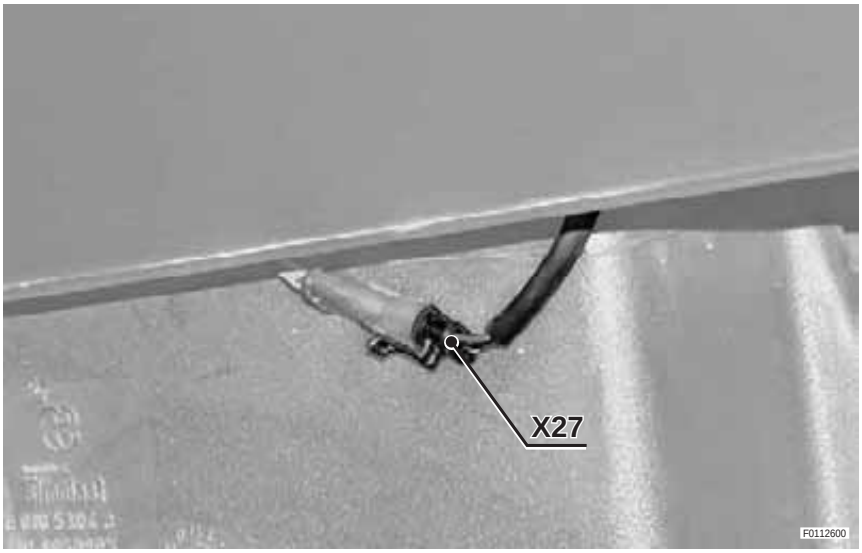
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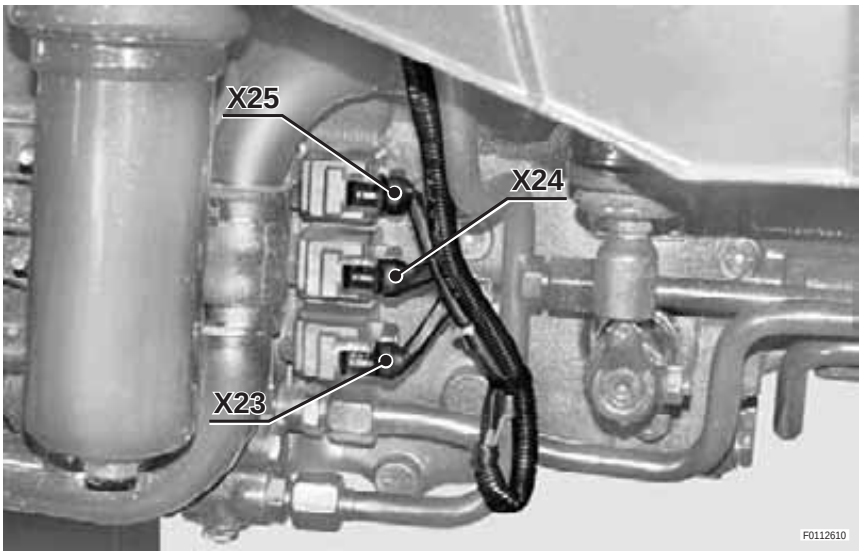
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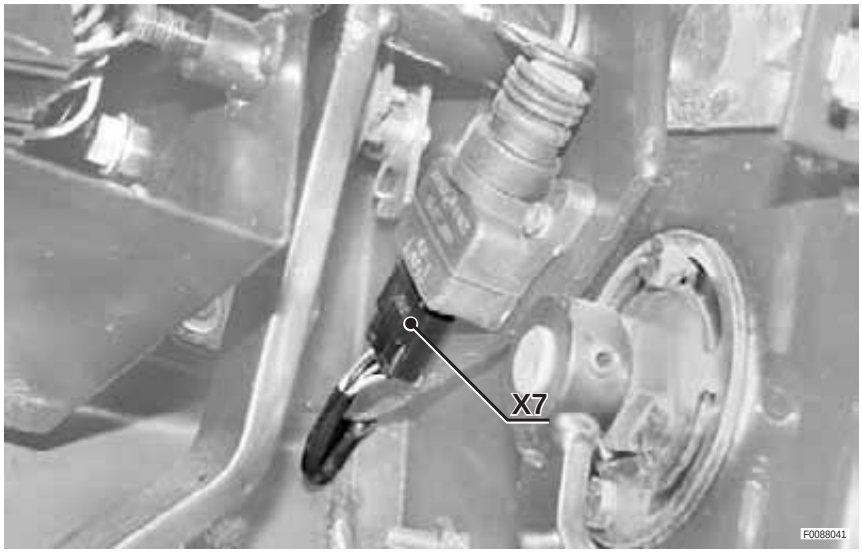
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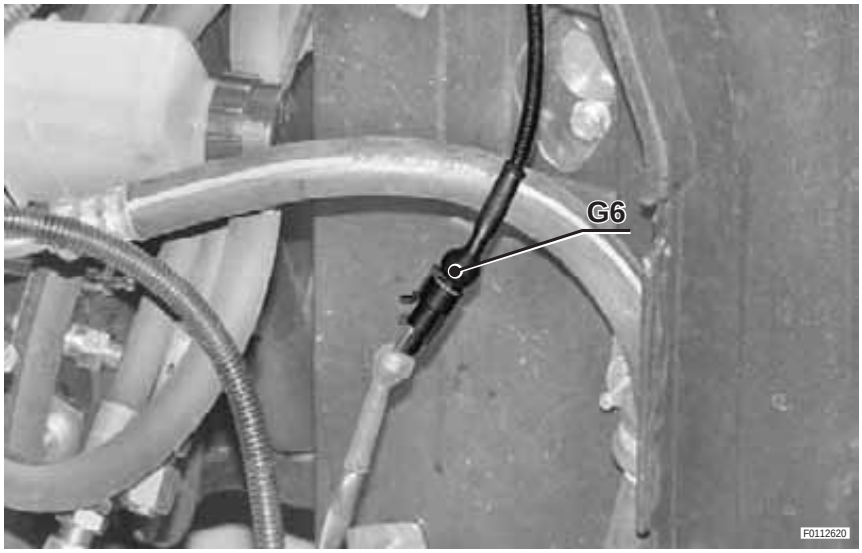
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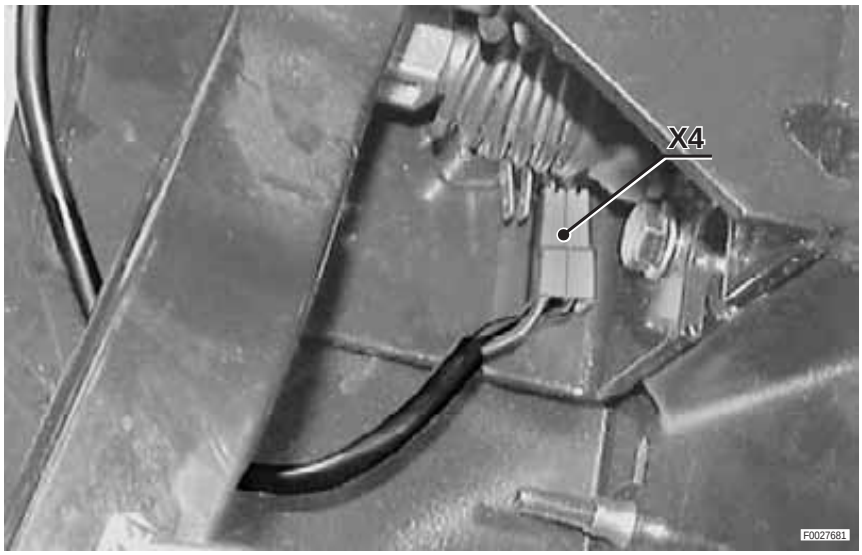
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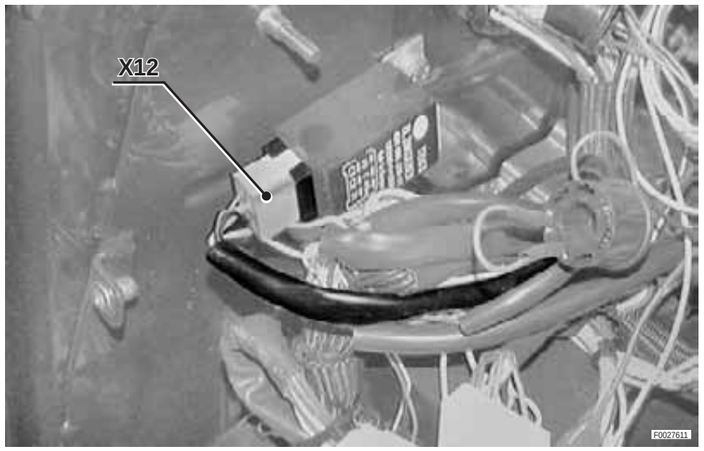


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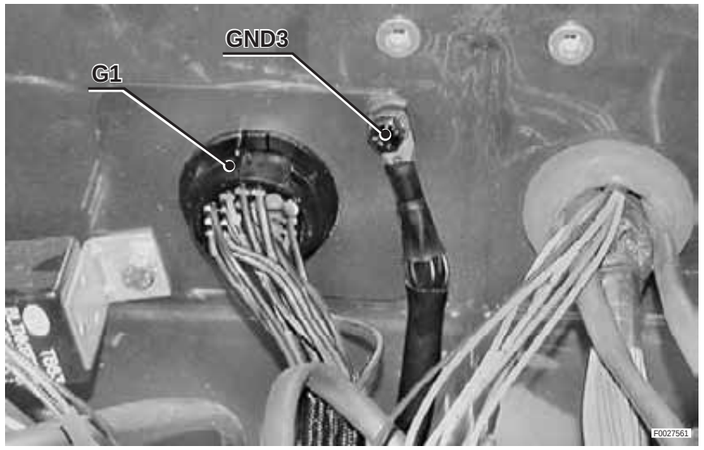


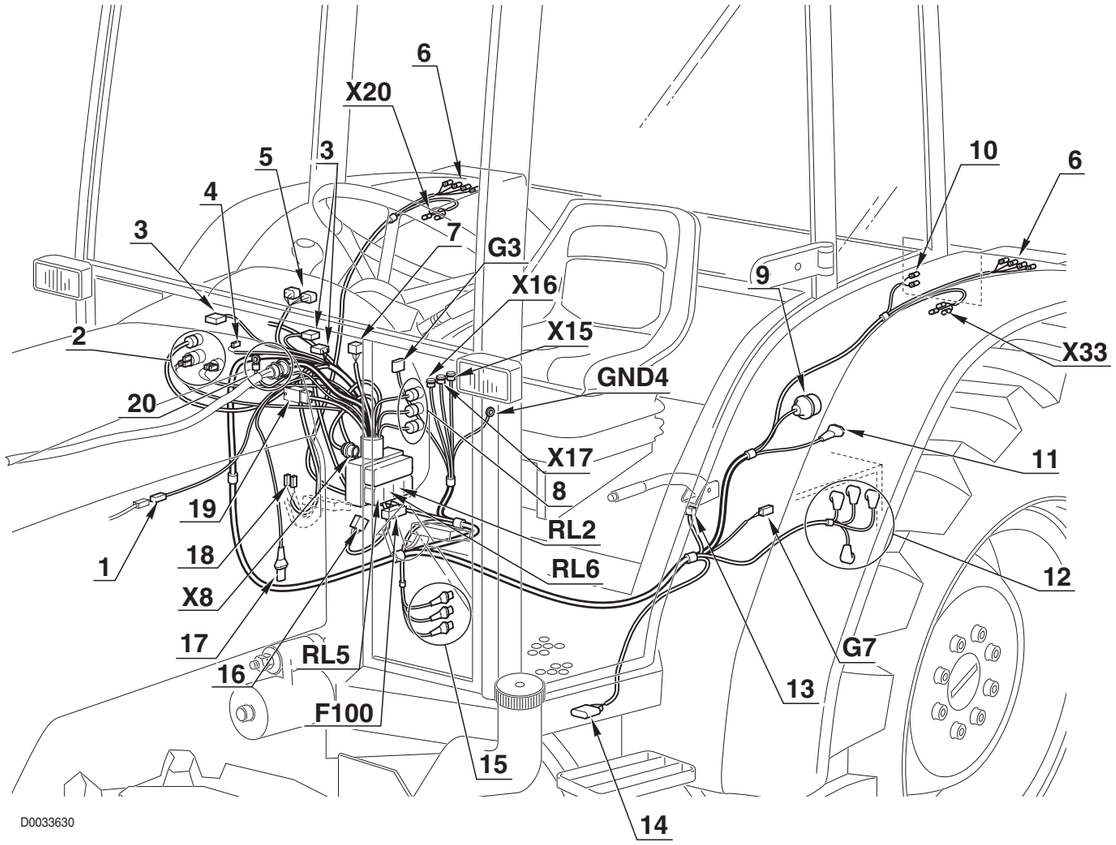
CENTRAL WIRING (MECHANICAL GOVERNOR)

19



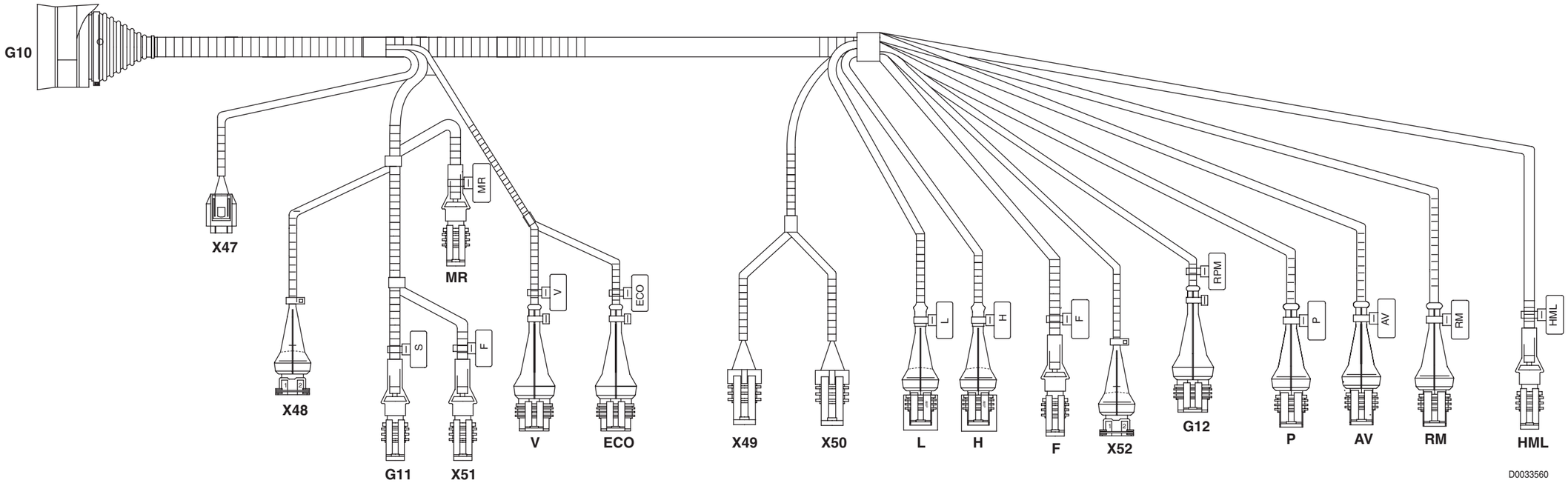
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REAR WIRING (1/2)



AV Forward drive selection solenoid
ECO Wheel speed sensor 2
F Shuttle oil pressure switch
G10 To shuttle wiring 0.014.0878.4/30
G11 To filter wiring 0.011.7711.3
G12 To RPM wiring 0.014.0884.4
H H speed control solenoid valve
HML Not utilised
L L speed control solenoid valve
MR Minireduction gear sensor
P Proportional solenoid valve
RM Reverse drive selection solenoid
V Wheel speed sensor 1
X47 Shuttle sensor
X48 PALL filter clogging sensor
X49 Left brake pressure sensor
X50 Right brake pressure sensor
X51 Oil filter clogging pressure switch
X52 Oil temperature sensor

REAR WIRING (2/2)

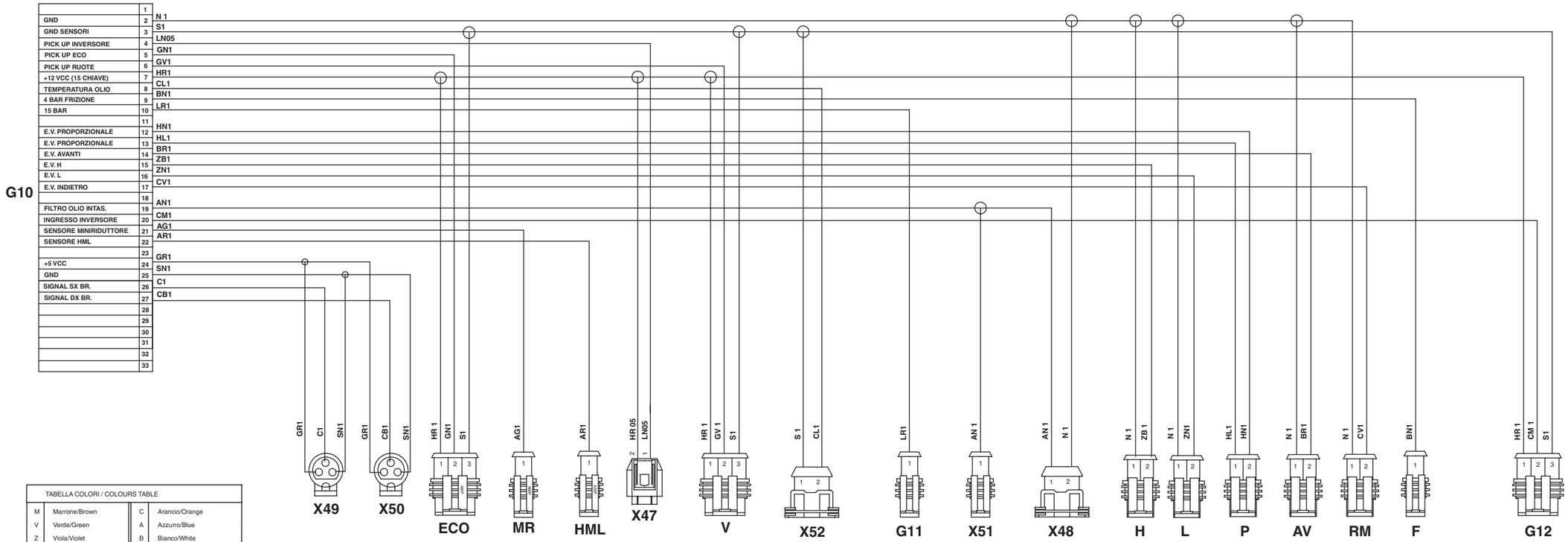
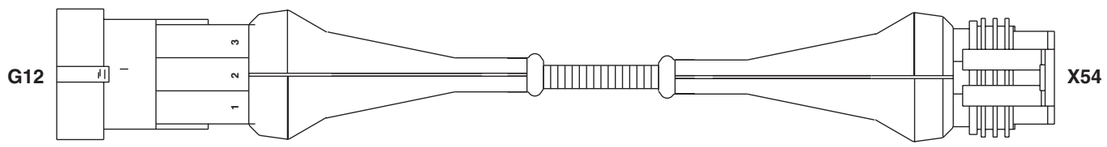


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033570

RPM WIRING



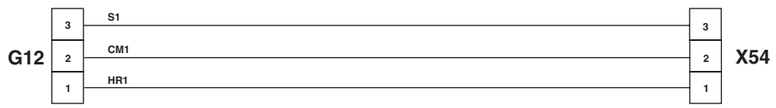


TABELLA COLORI / COLOURS TABLE			
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V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033580

X54 Engine speed sensor (for shuttle)
G12 To rear wiring 0.014.0879.4/50

FILTER WIRING

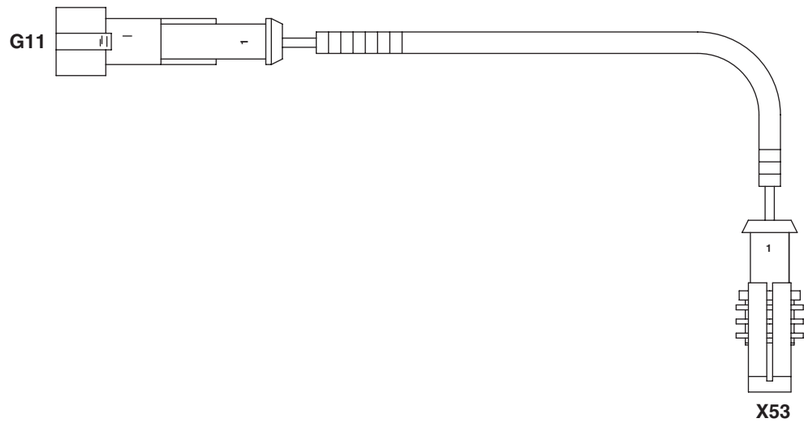


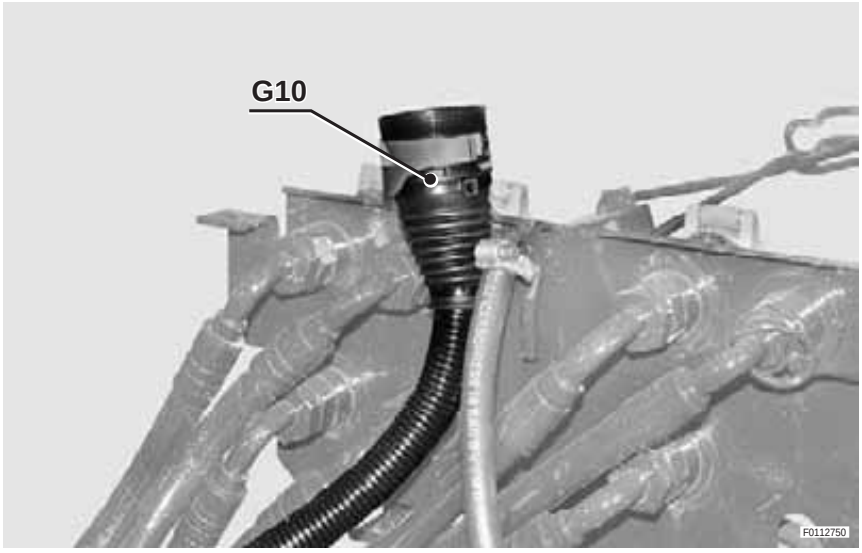
TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
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R	Rosso/Red	H	Grigio/Gray

D0033590

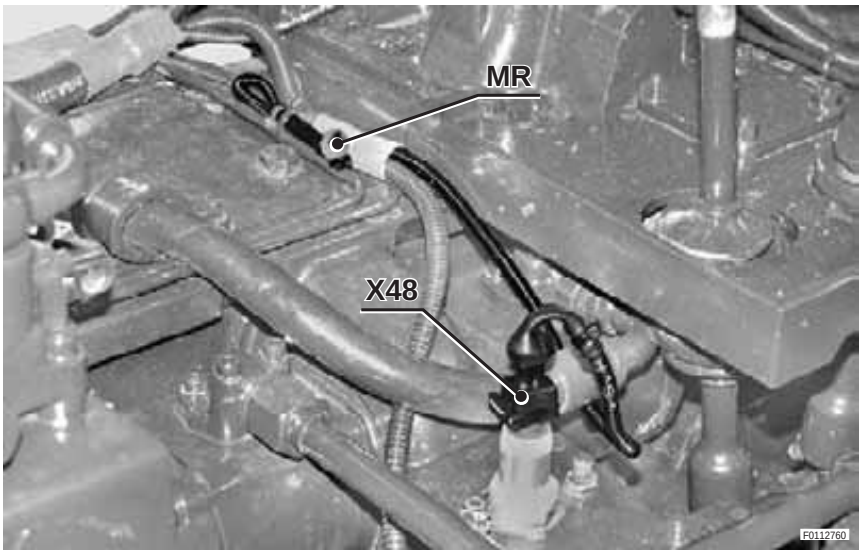
G11 To rear wiring 0.014.0879.4/50
X53 Services circuit alarm pressure switch

CONNECTOR POSITIONS

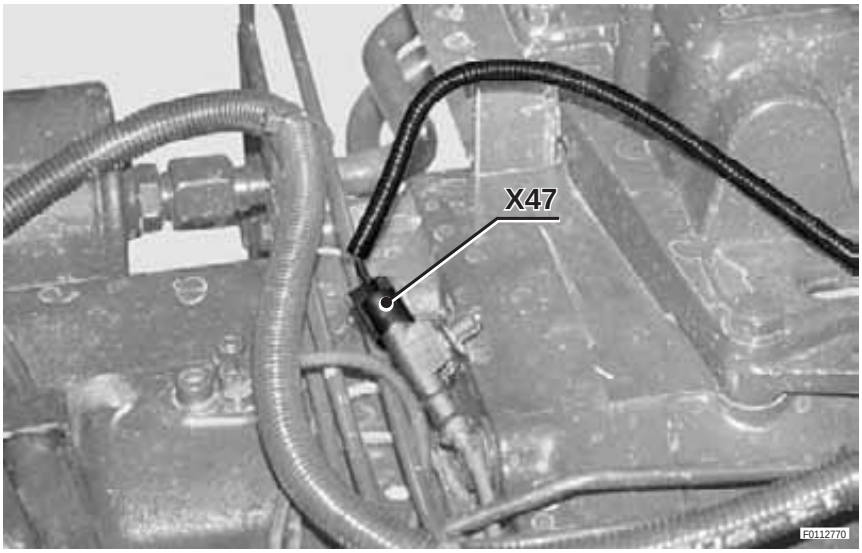
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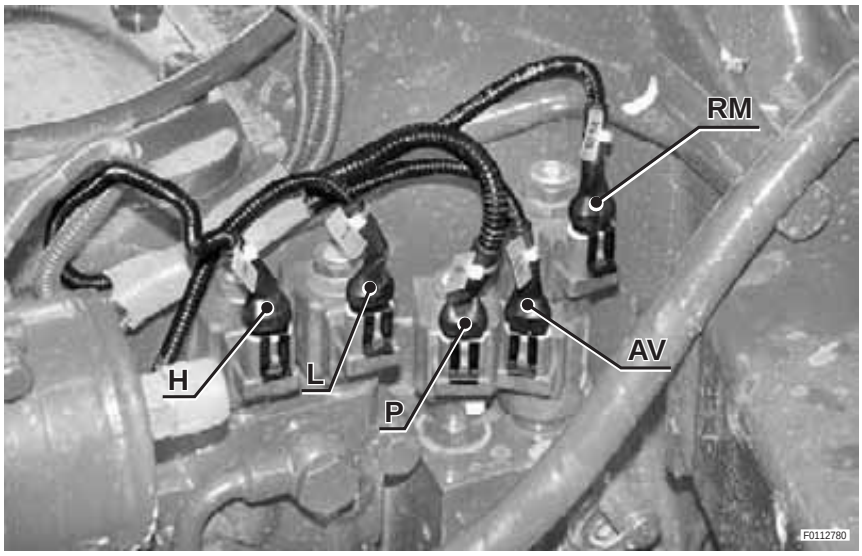
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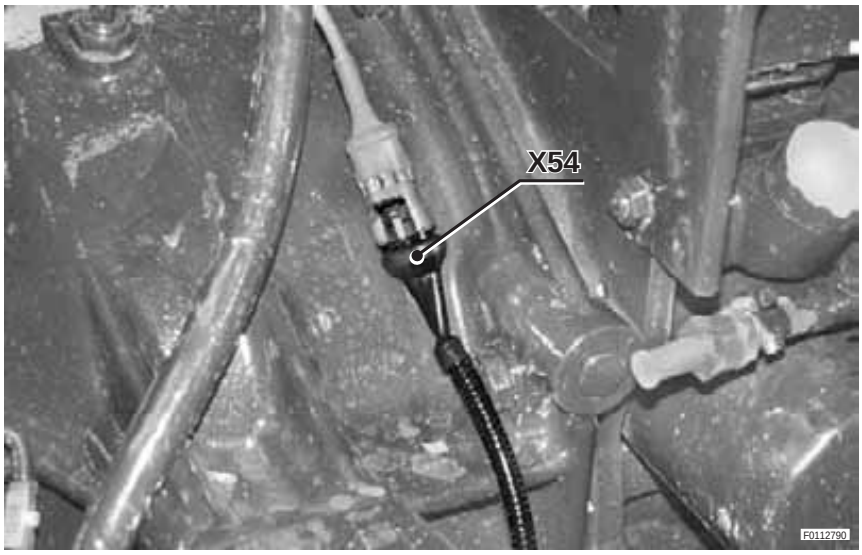
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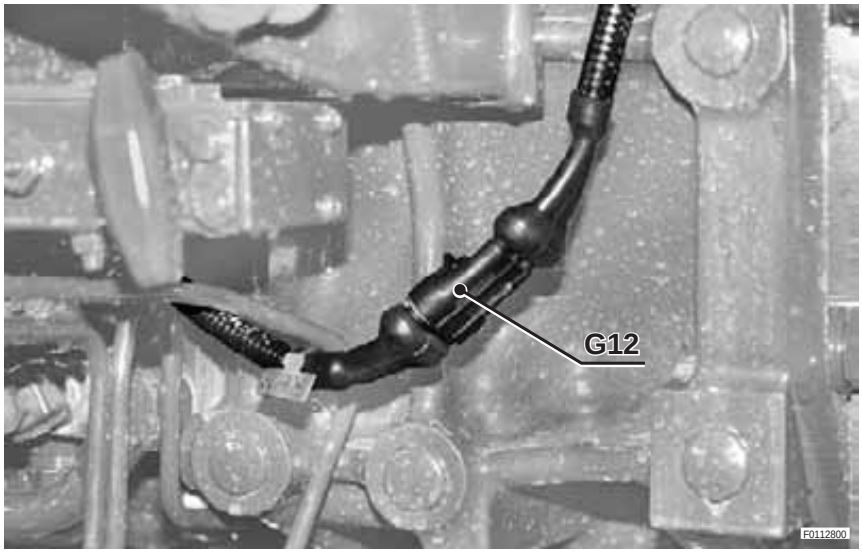
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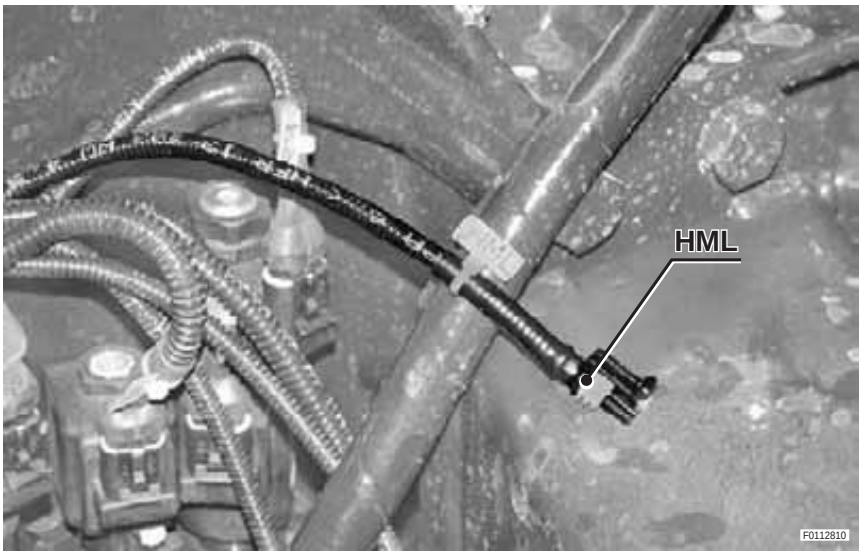
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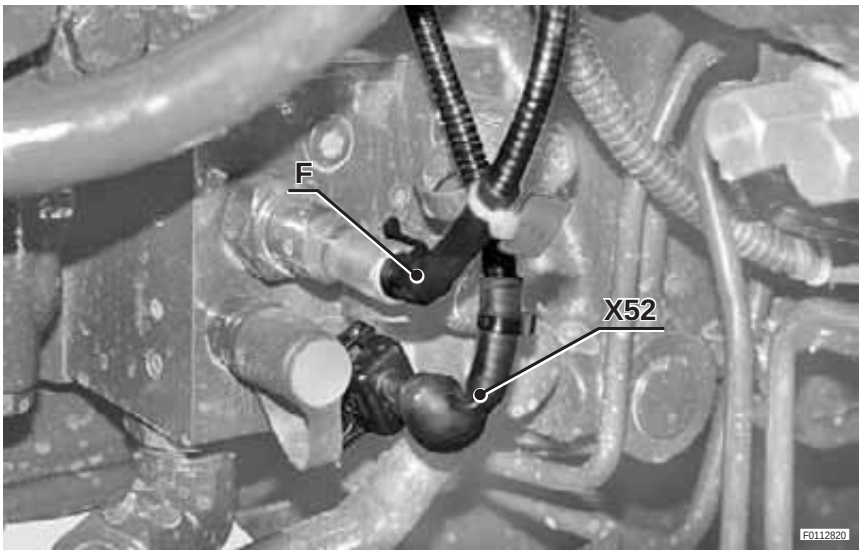
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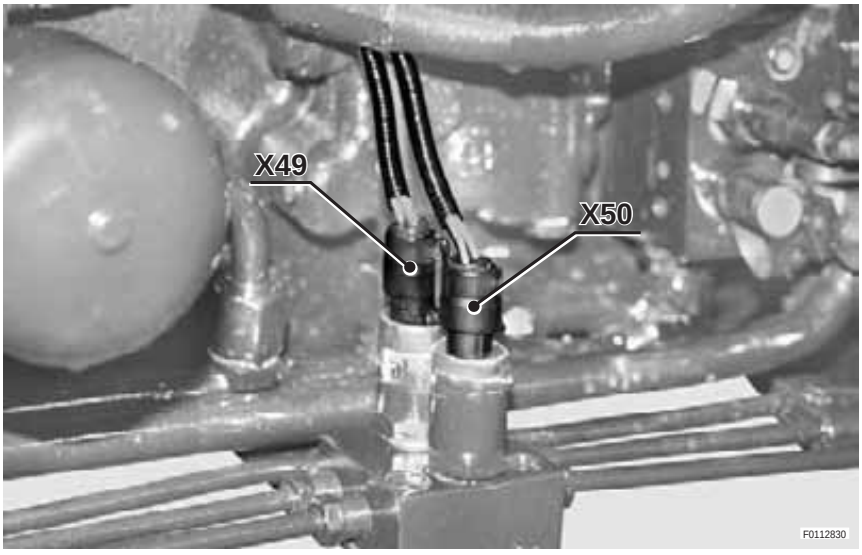
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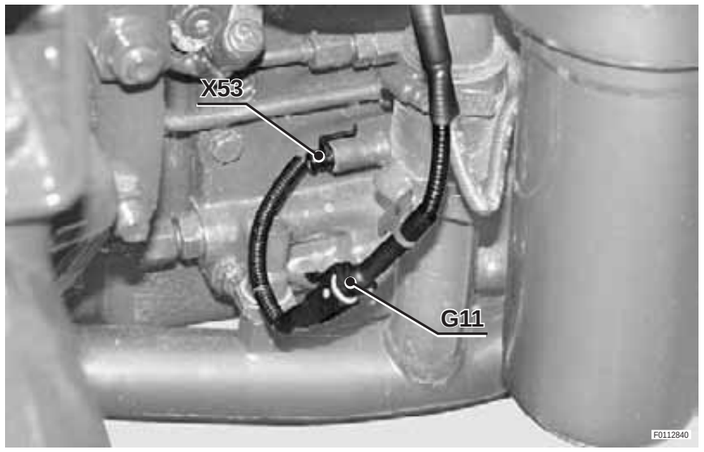
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REAR WIRING - RPM WIRING - FILTER WIRING

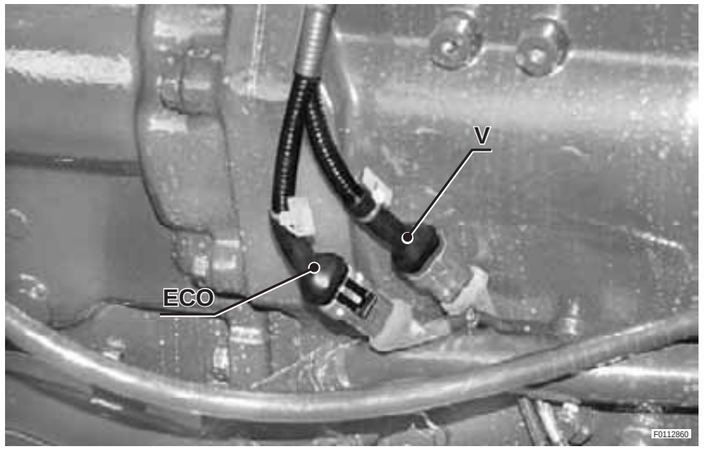
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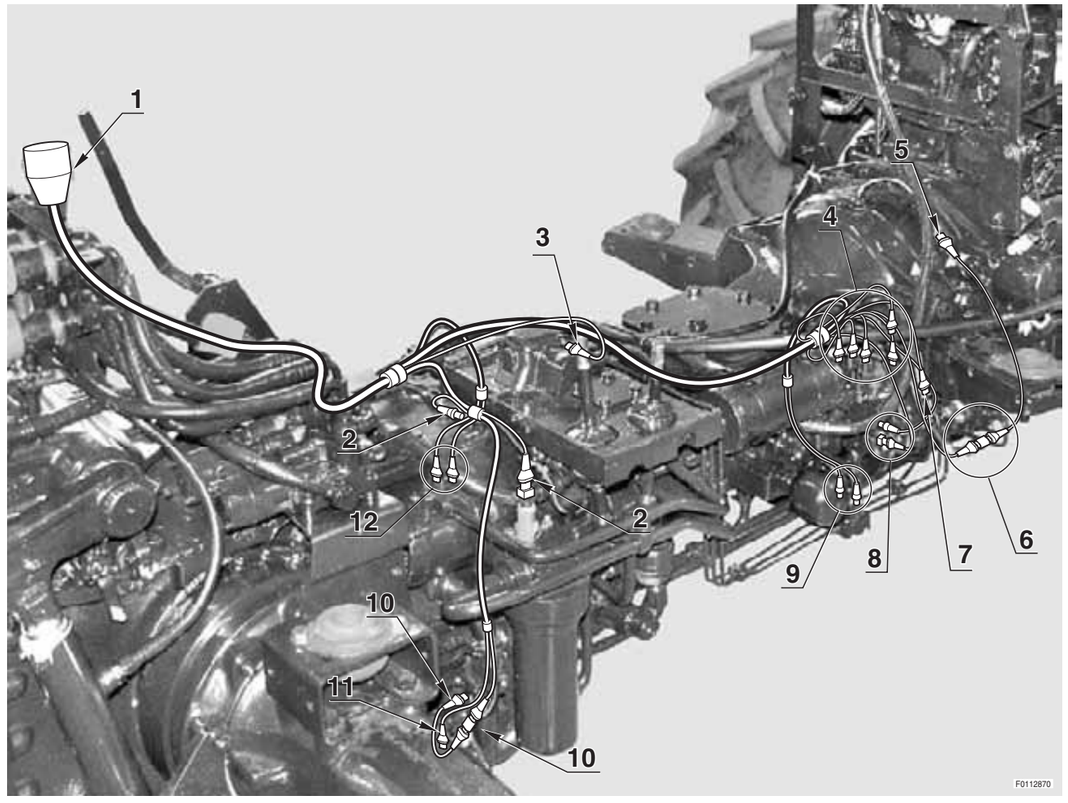


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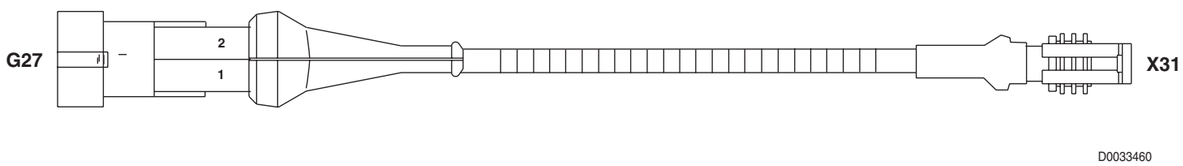
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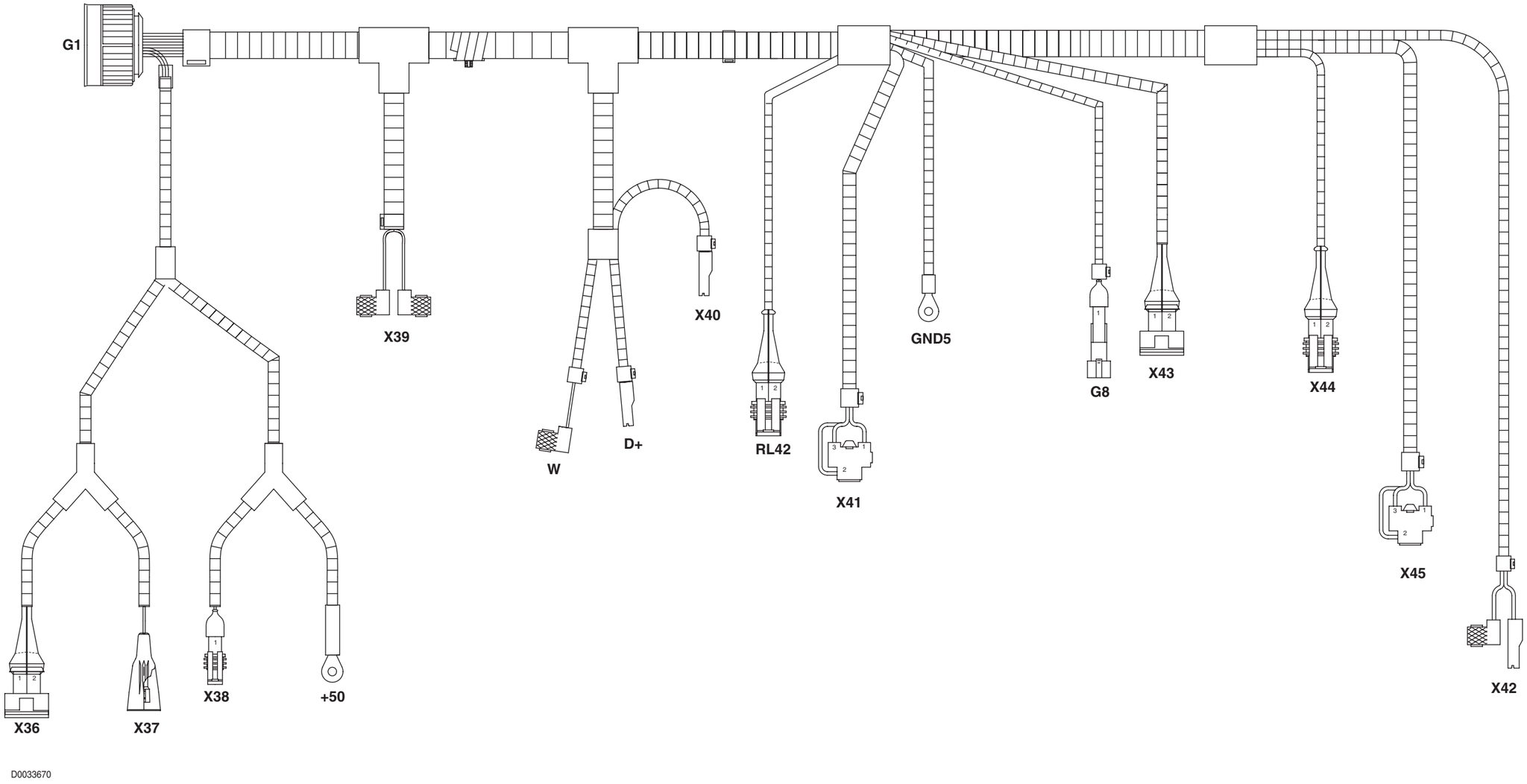
HYDRAULIC BRAKING WIRING (ITALY)



G27 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
X31 Trailer braking low pressure switch

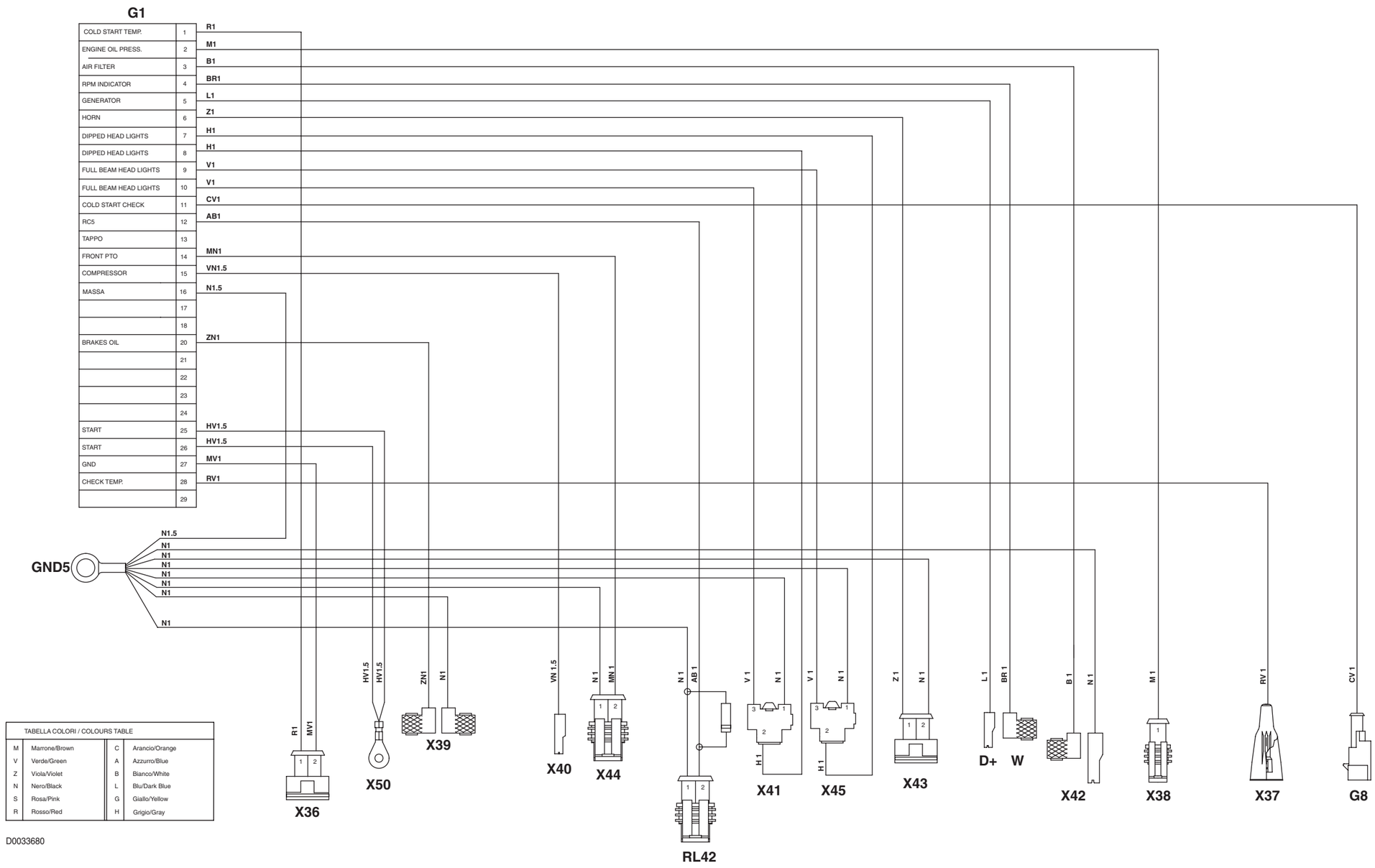
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FRONT WIRING (3-4 CYLINDERS) (1/2)

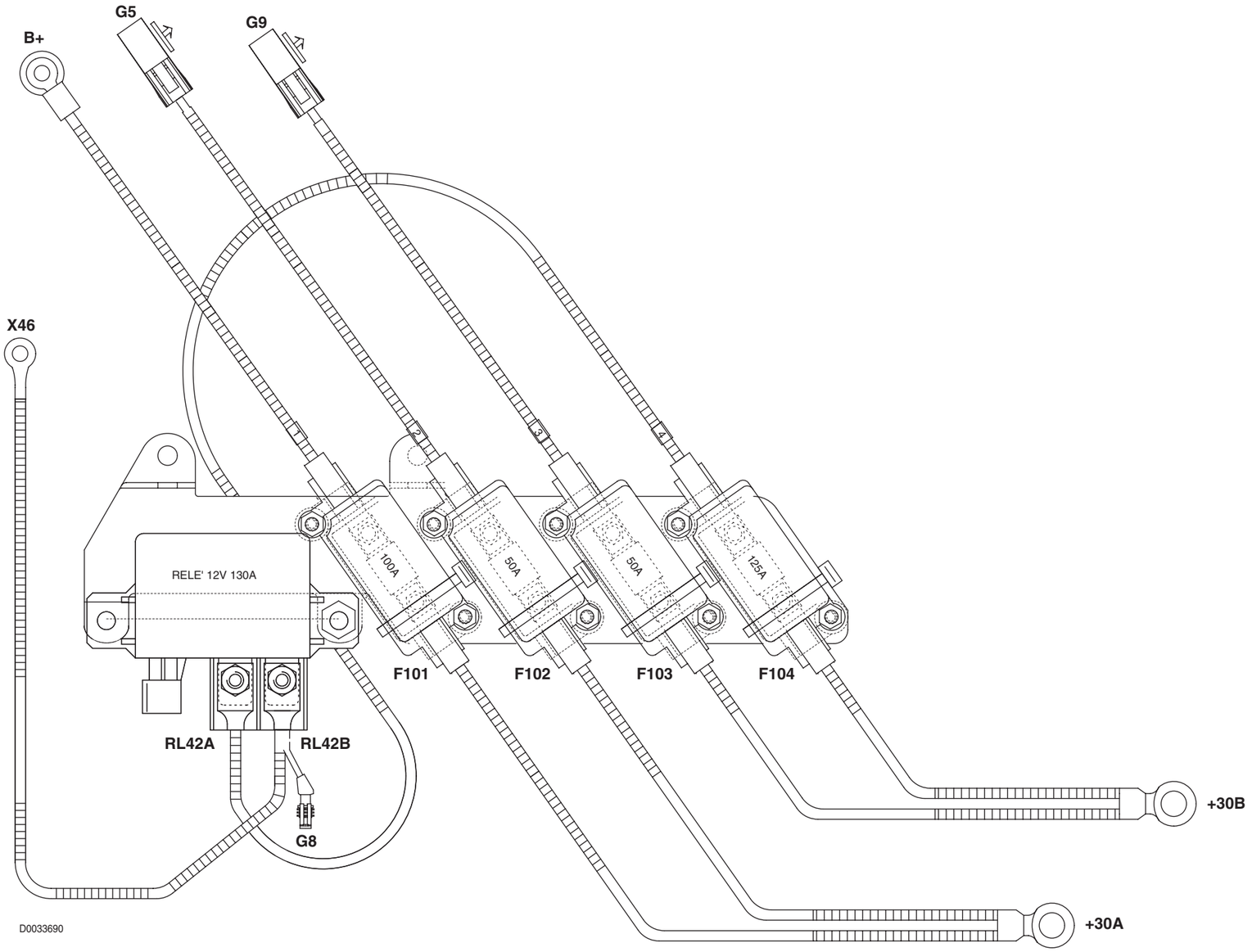


G1 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
+50 Starter motor
D+ Alternator
G8 To power supply wiring 0.013.9036.4/20 or 0.013.9038.4/20
GND5 Earthing point 5
RL42 Preheating relay
W Alternator
X36 Engine temperature sensor (for preheating)
X37 Engine temperature sensor (for instrument)
X38 Engine oil pressure switch
X39 Brake fluid level sensor
X40 Air conditioning system compressor
X41 Right headlight
X42 Air filter clogging sensor
X43 Horn
X44 Front PTO control solenoid valve
X45 Left headlight

FRONT WIRING (3-4 CYLINDERS) (2/2)

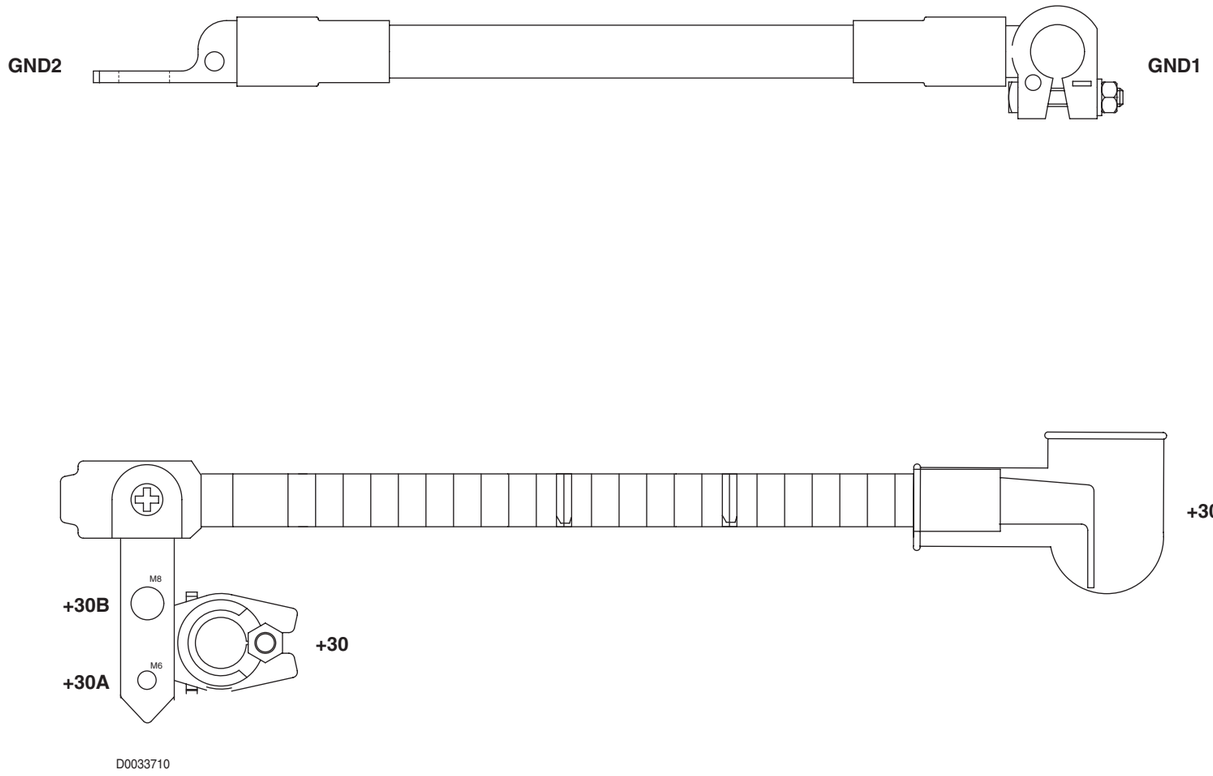


POWER SUPPLY WIRING (3-4 CYLINDERS)



G5 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
G8 To front wiring 0.013.9030.4/10 o 0.013.9031.4/10
G9 To cab power supply wiring 0.013.9034.4 or 0.013.9035.4
+30A Battery
+30B Battery
B+ Alternator
F101 100A fuse (alternator)
F102 50A fuse (instrument panel)
F103 50A fuse (cab)
F104 125A fuse (heater)
RL42A Preheating relay
RL42B Preheating relay
X46 Preheating device

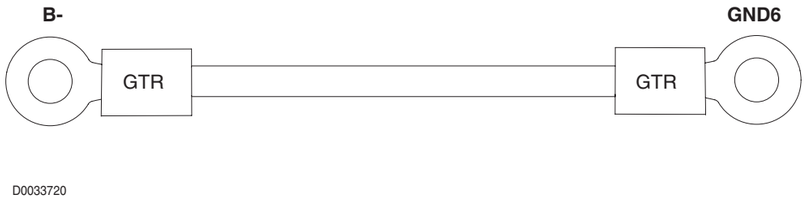
BATTERY WIRING (3-4 CYLINDERS)



+30 Battery
+30A Battery
+30B Battery
+30C Starter motor
GND1 Battery
GND2 Earthing point 2

0.013.9040.4
0.013.9041.4

ALTERNATOR EARTH WIRING



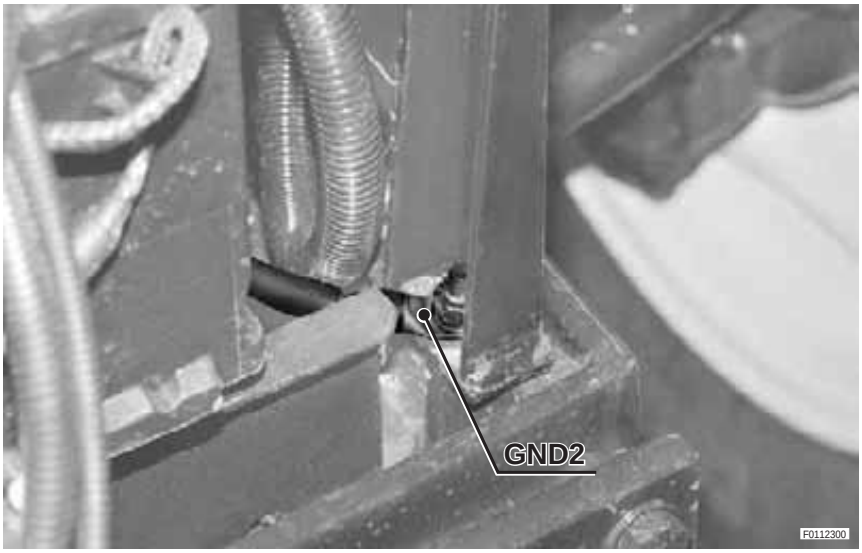
D0033720

B- Alternator
GND6 Earthing point 6

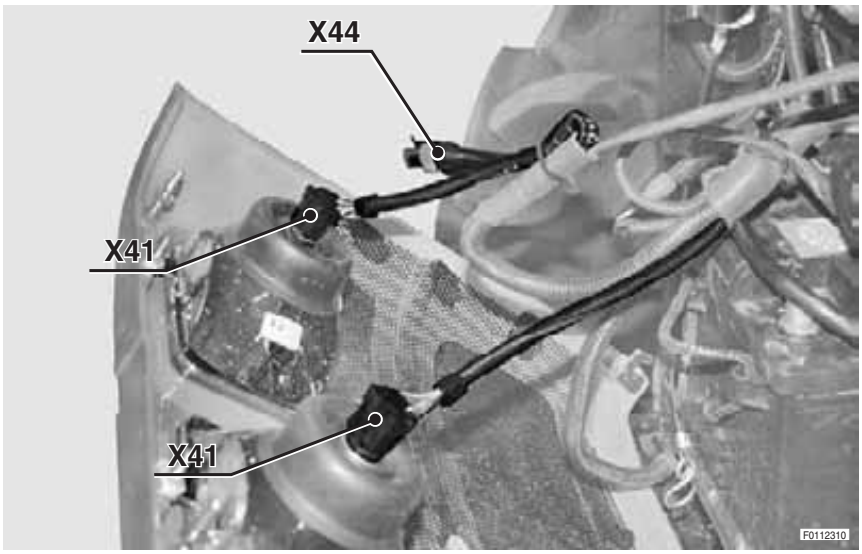
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CONNECTOR POSITIONS

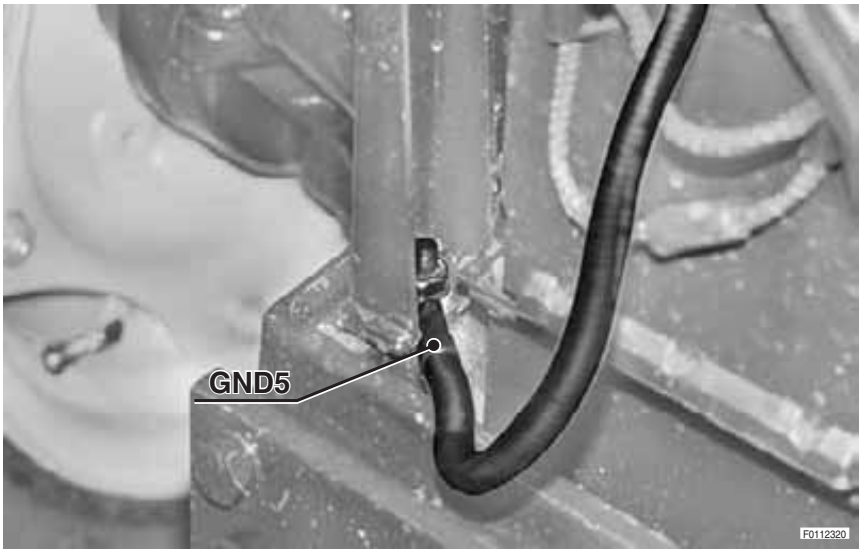
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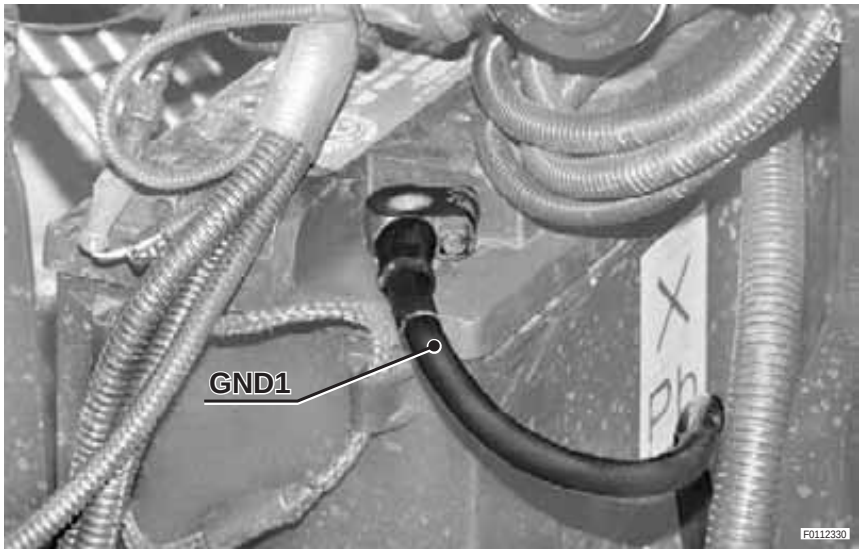
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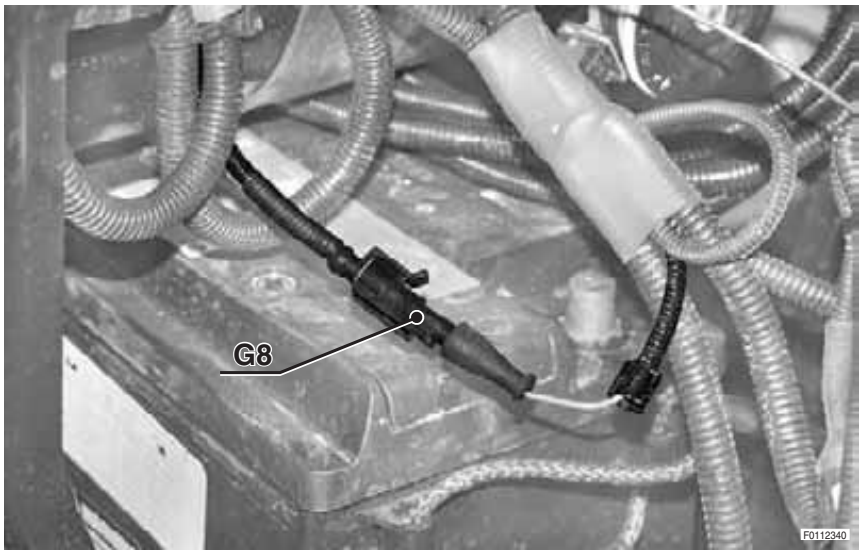
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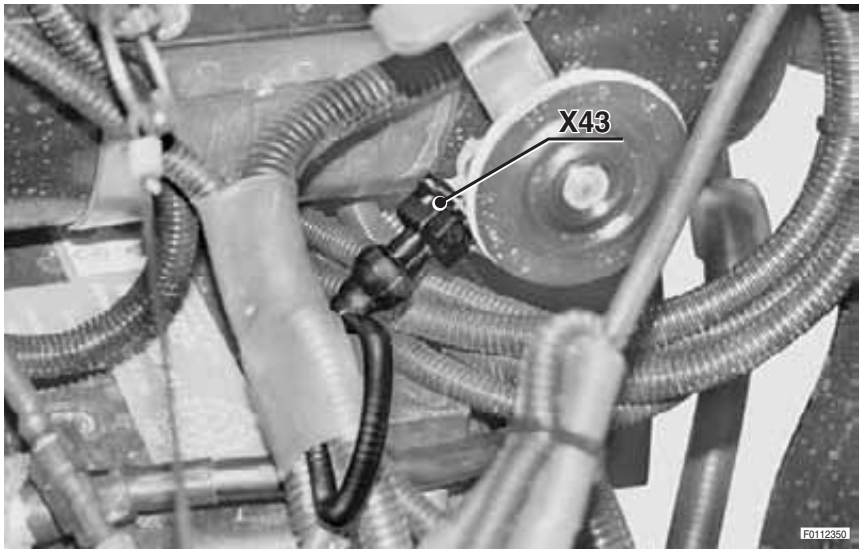
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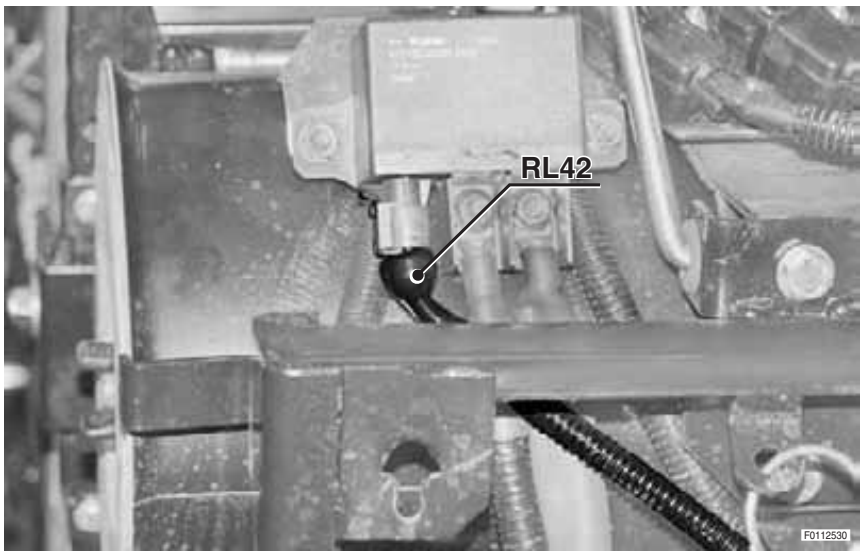
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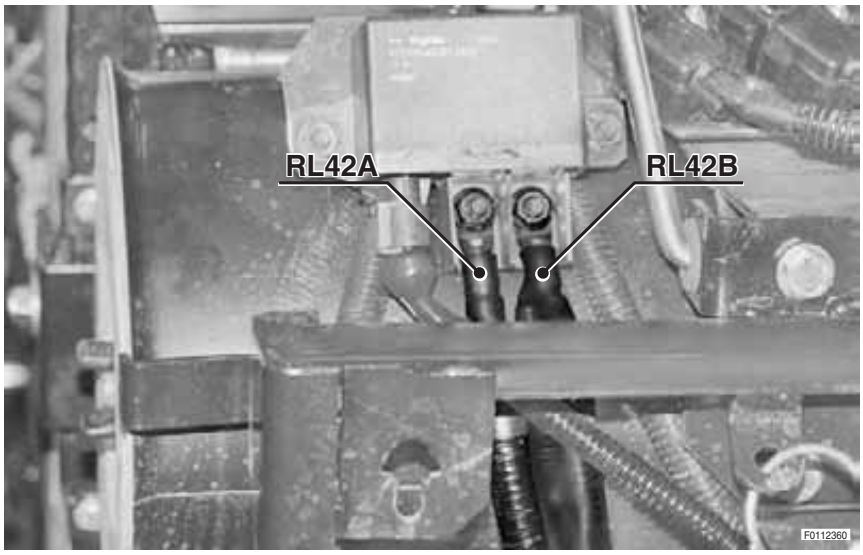
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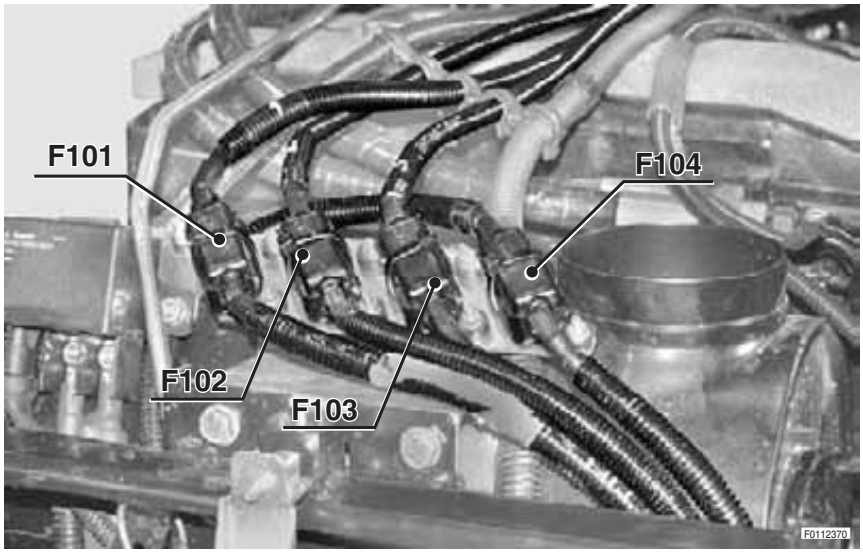
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RL42
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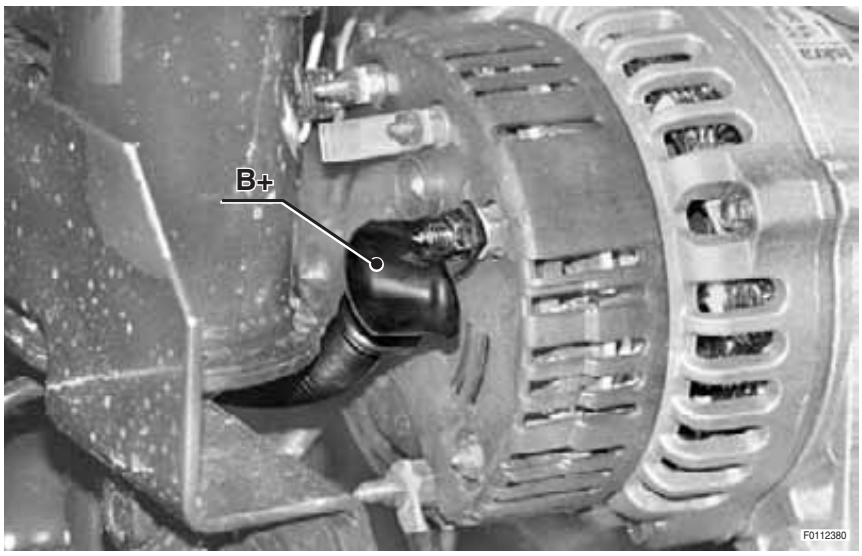
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RL42A
RL42B
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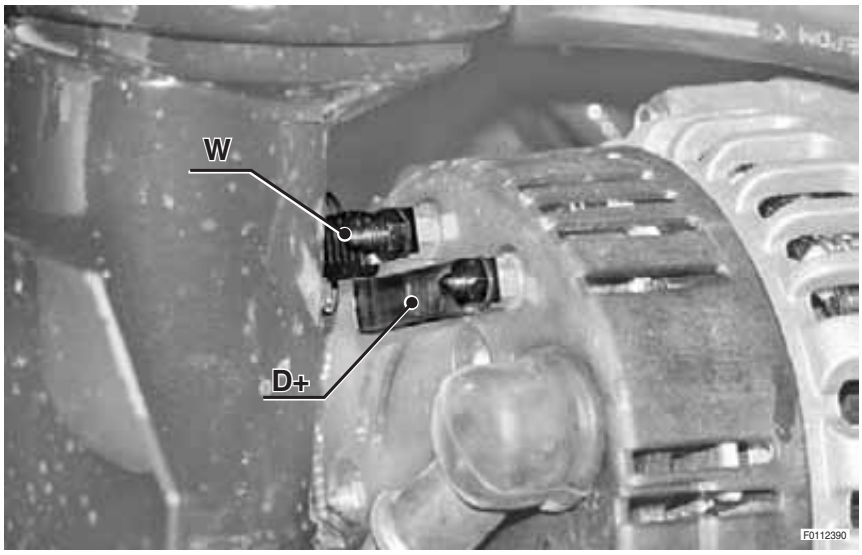
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F101
F104
F102
F103
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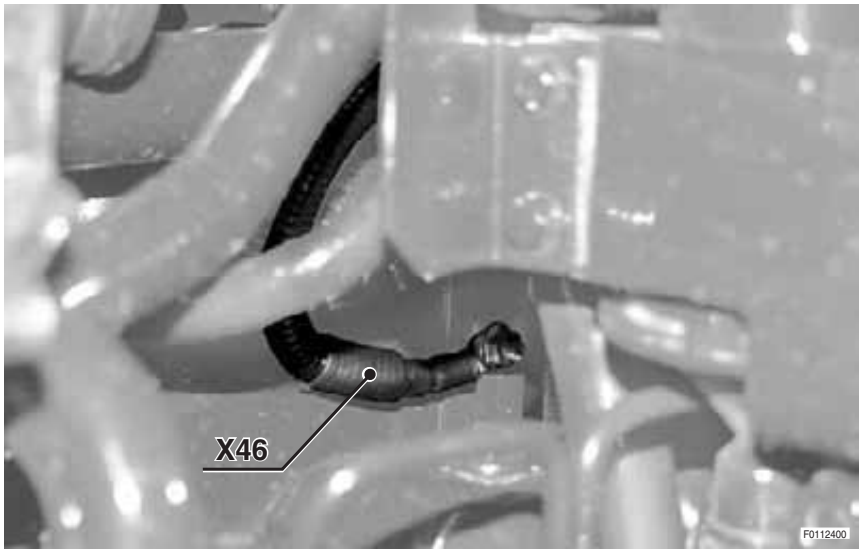
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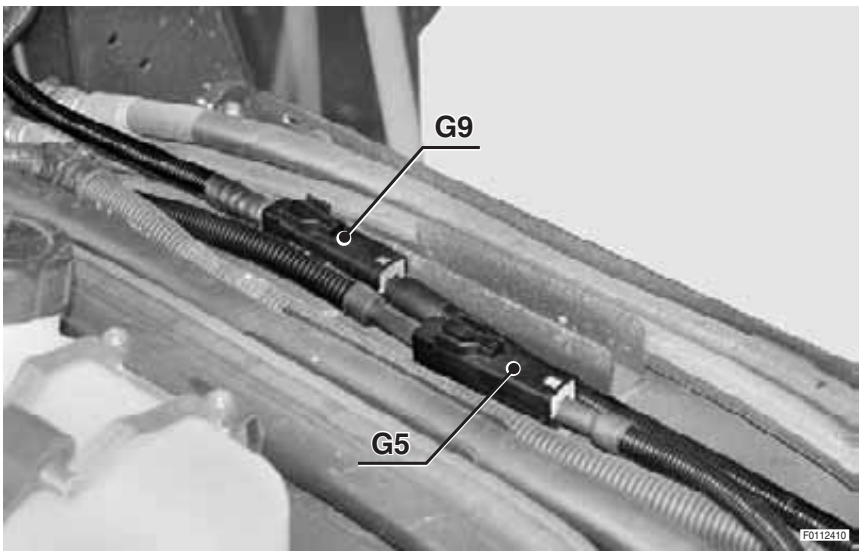
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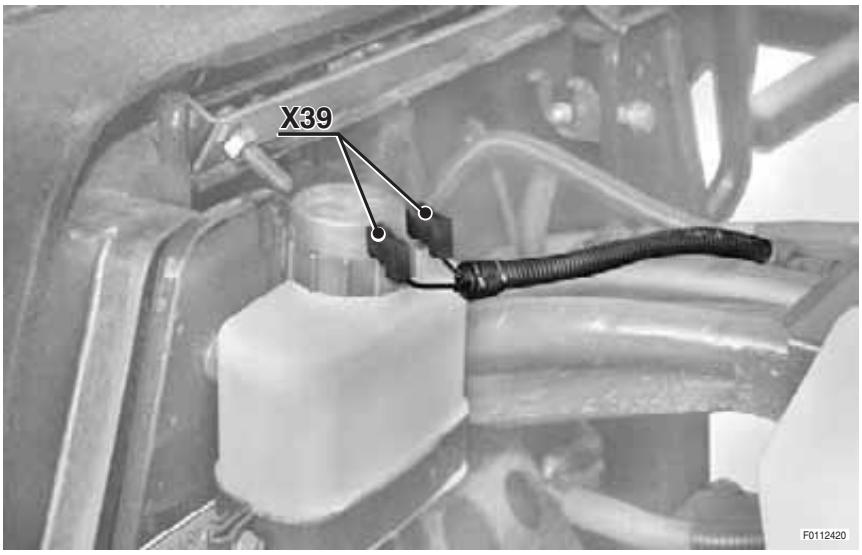
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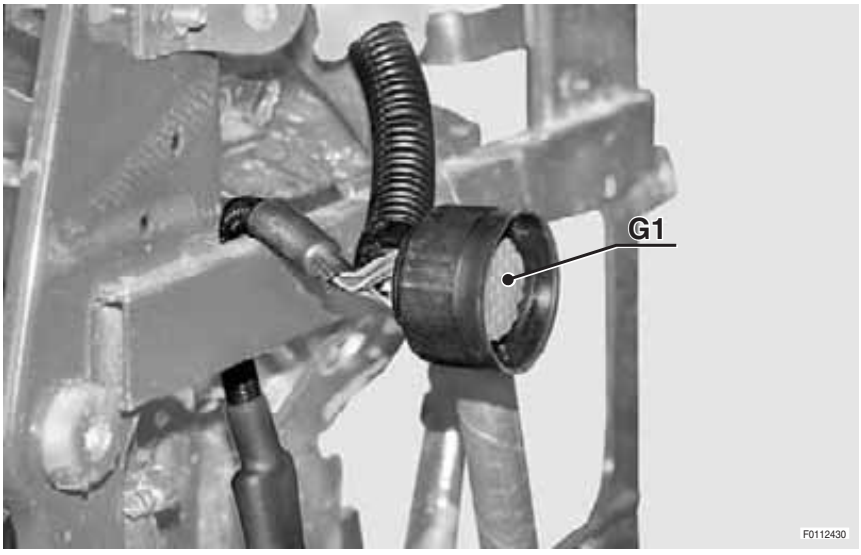
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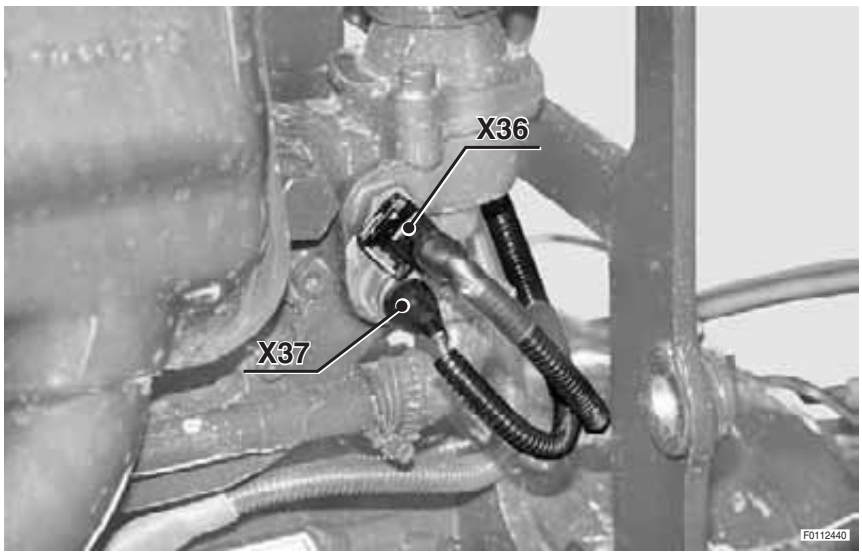
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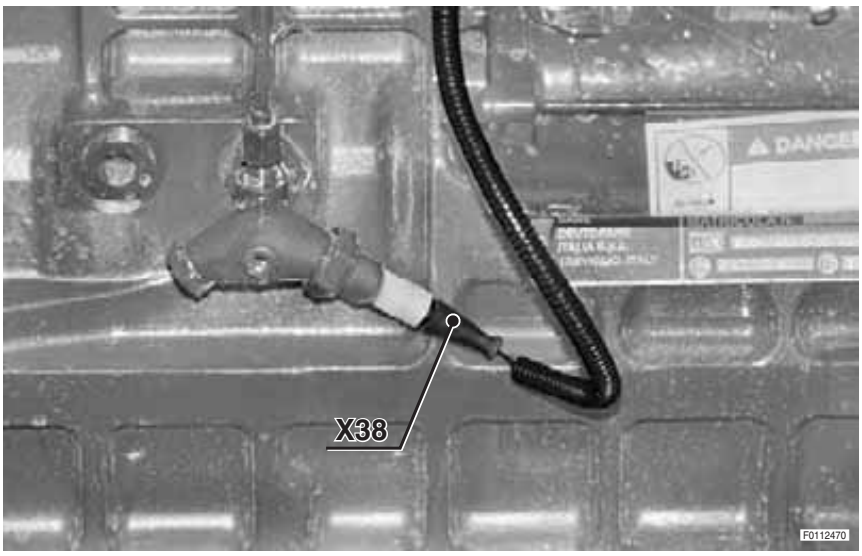
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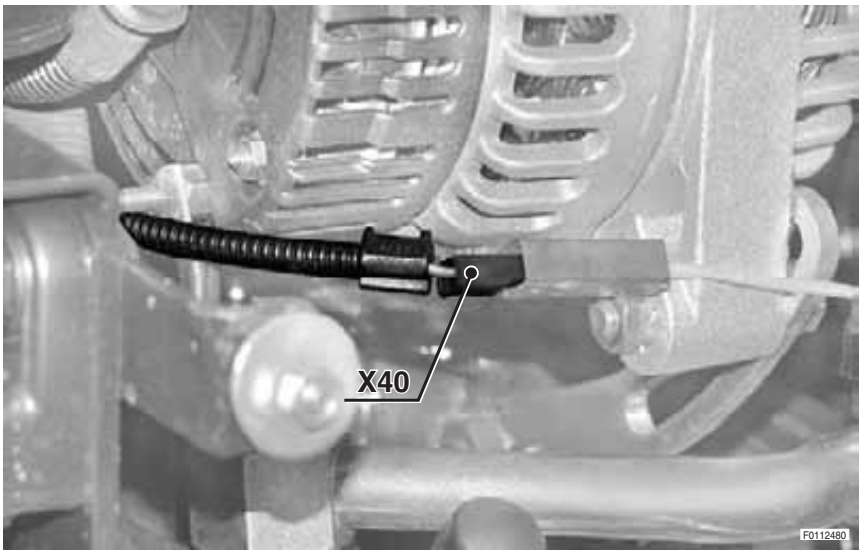
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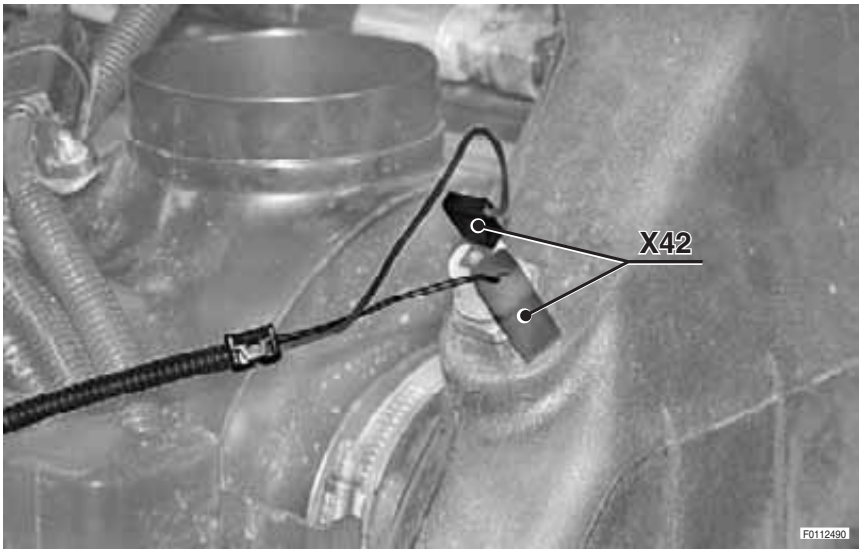
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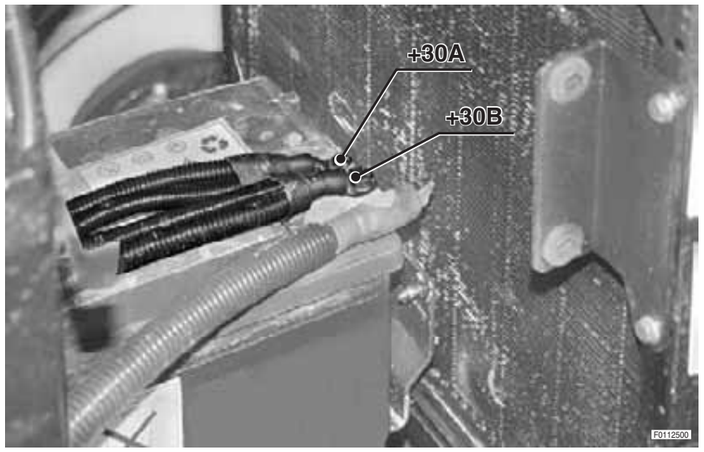


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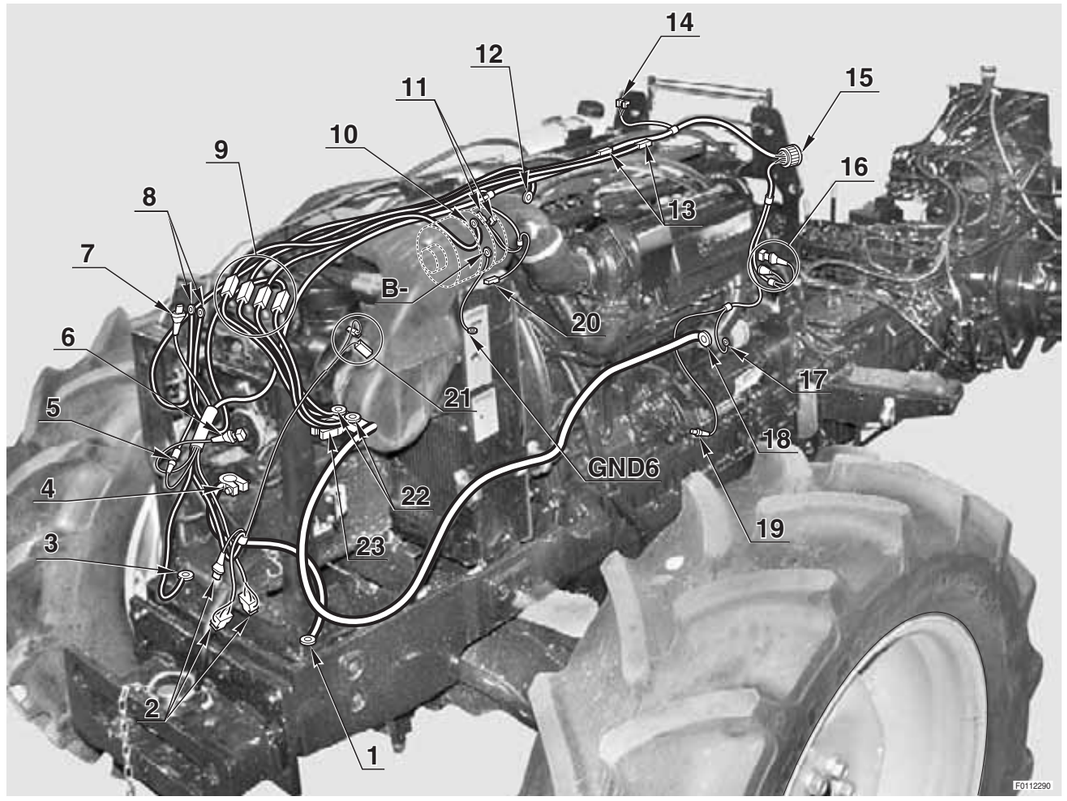
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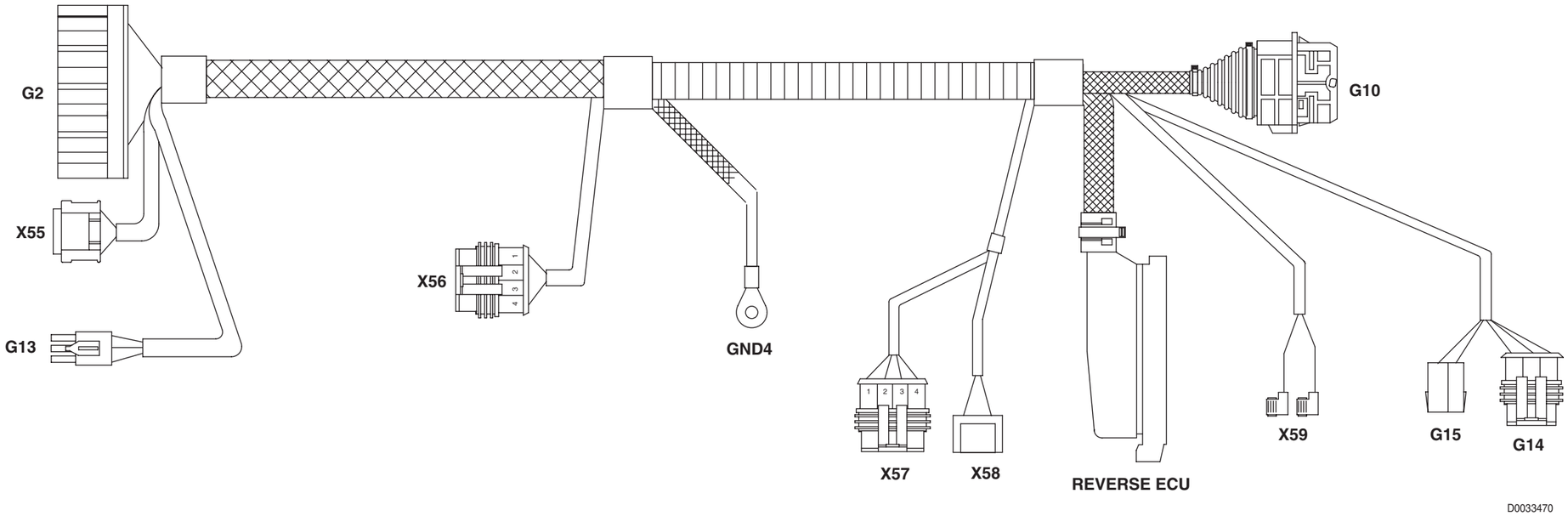


FRONT WIRING (3-4 CYLINDERS)
POWER SUPPLY WIRING (3-4 CYLINDERS)
POWER SUPPLY WIRING (3-4 CYLINDERS PLATFORM)
BATTERY WIRING (3-4 CYLINDERS) - ALTERNATOR EARTH WIRING



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SHUTTLE WIRING (1/2)



G2 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
G10 To rear wiring 0.014.0879.4/50
G13 To shuttle lever wiring] 0.013.675.4
G14 To seat wiring 0.014.0883.4/10
G15 To pneumatic seat wiring 0.010.6468.3
GND4 Earthing point 4
REVERSE ECU Shuttle control unit
X55 Clutch pedal position sensor
X56 Gear lever
X57 Supplementary CANBUS socket
X58 Shuttle speed signal conversion control unit
X59 Power socket

SHUTTLE WIRING (2/2)

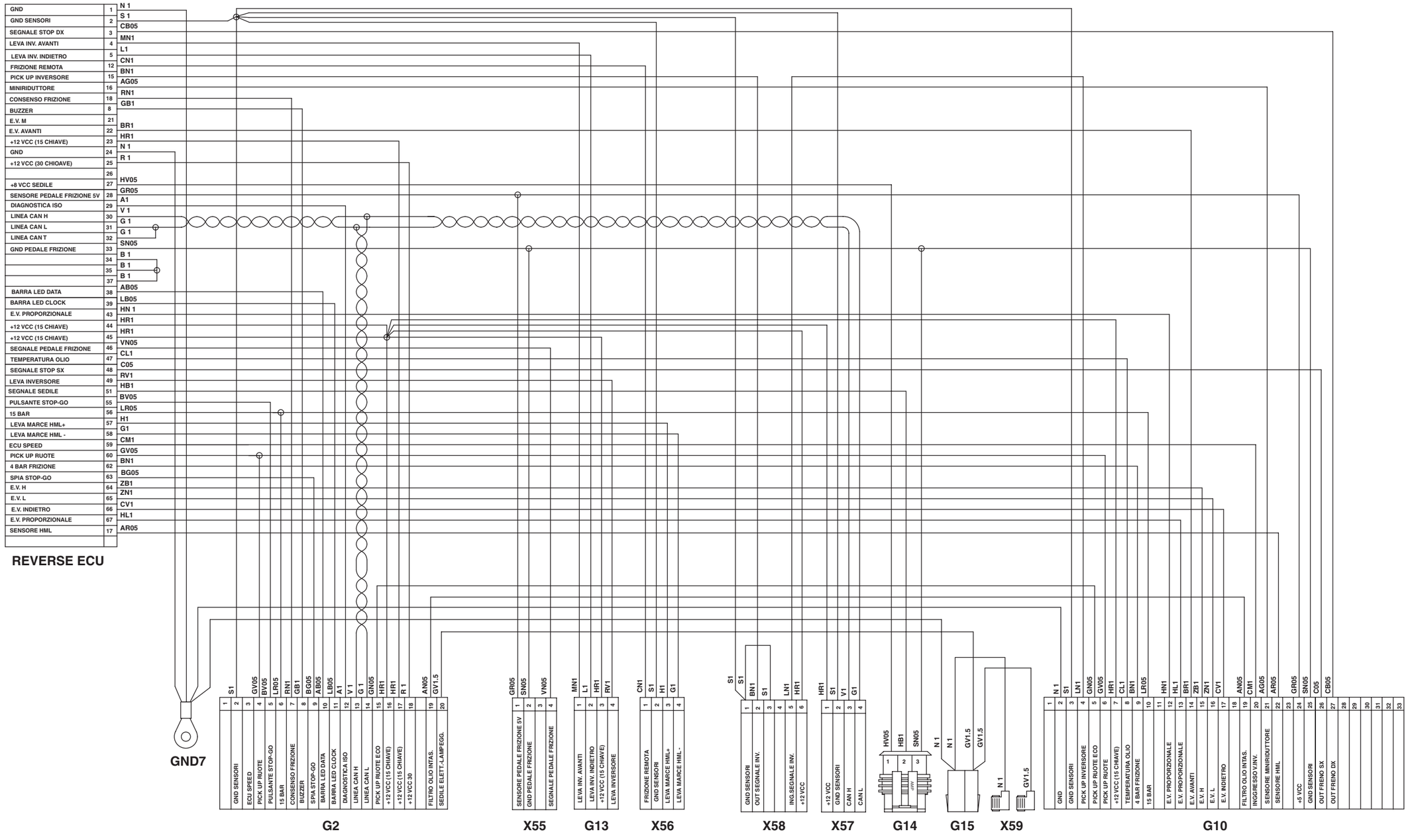


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033480

SHUTTLE LEVER WIRING



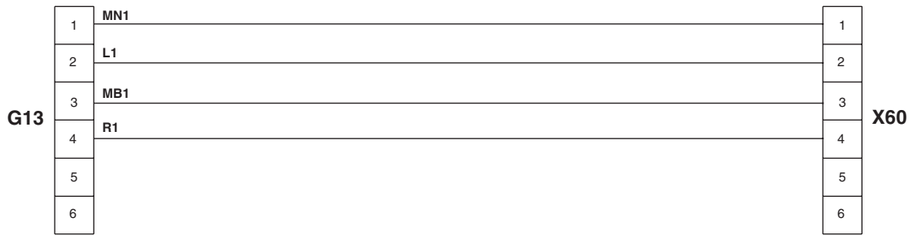


TABELLA COLORI / COLOURS TABLE			
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N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033530

G13 To shuttle wiring 0.014.0878.4/30
X60 Shuttle lever

PNEUMATIC SEAT WIRING

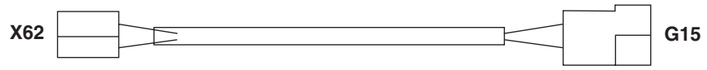


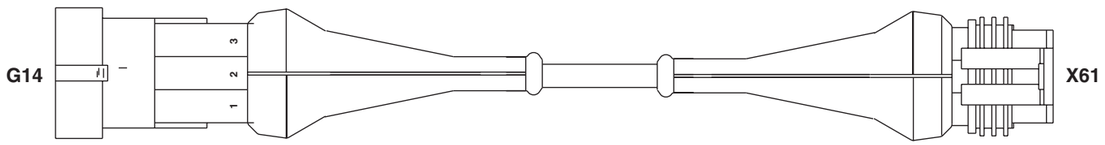


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V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033540

G15 To shuttle wiring 0.014.0878.4/30
X62 Seat air compressor

SEAT WIRING



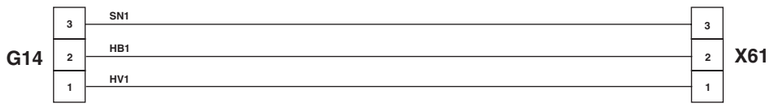


TABELLA COLORI / COLOURS TABLE			
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V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
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S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

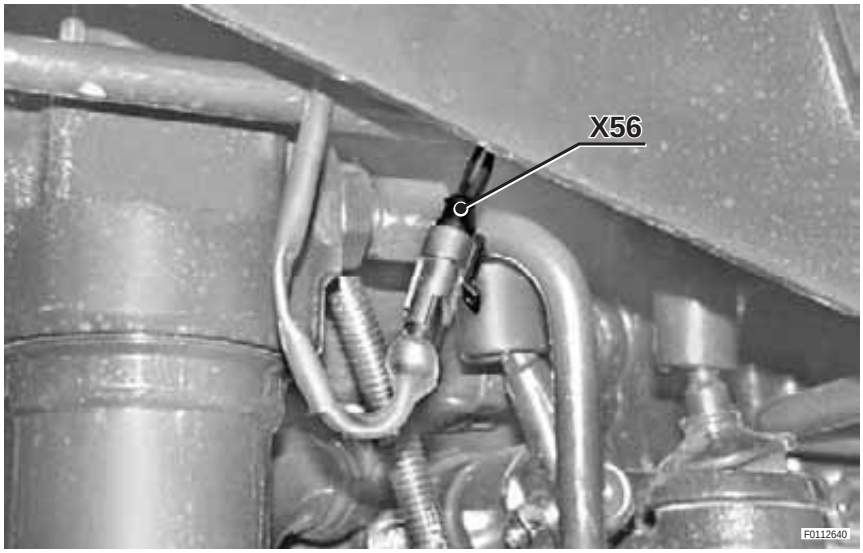
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G14 To shuttle wiring 0.014.0878.4/30
X61 Operator present sensor

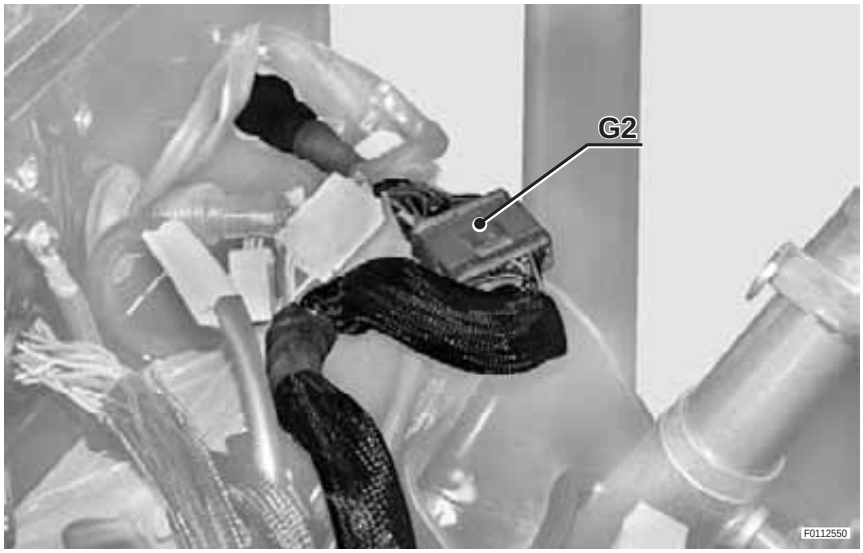
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CONNECTOR POSITIONSI

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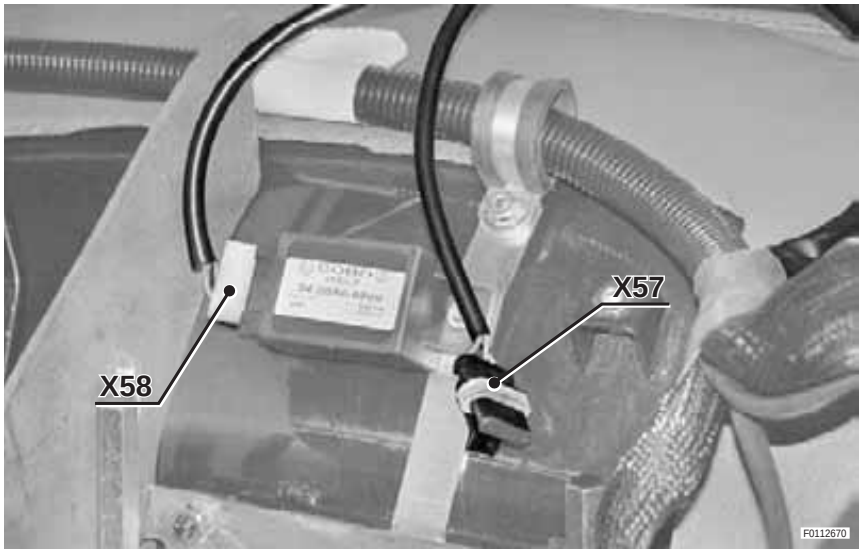
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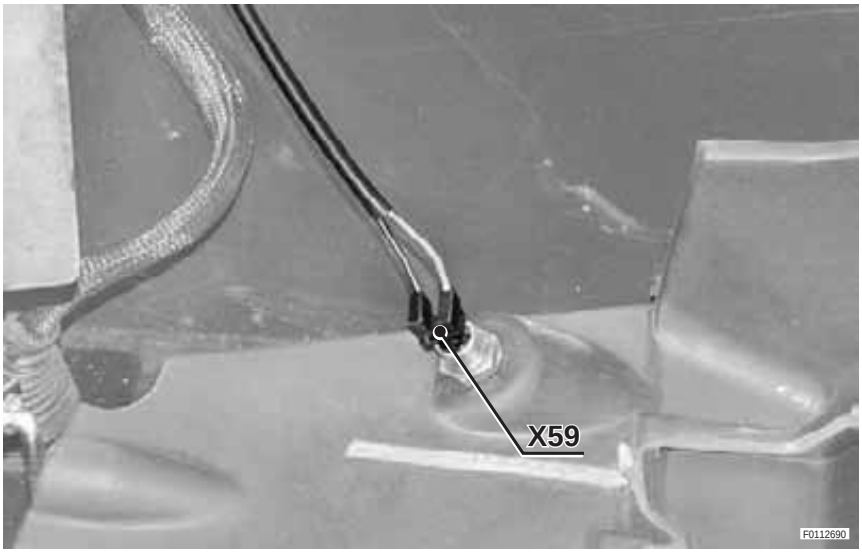
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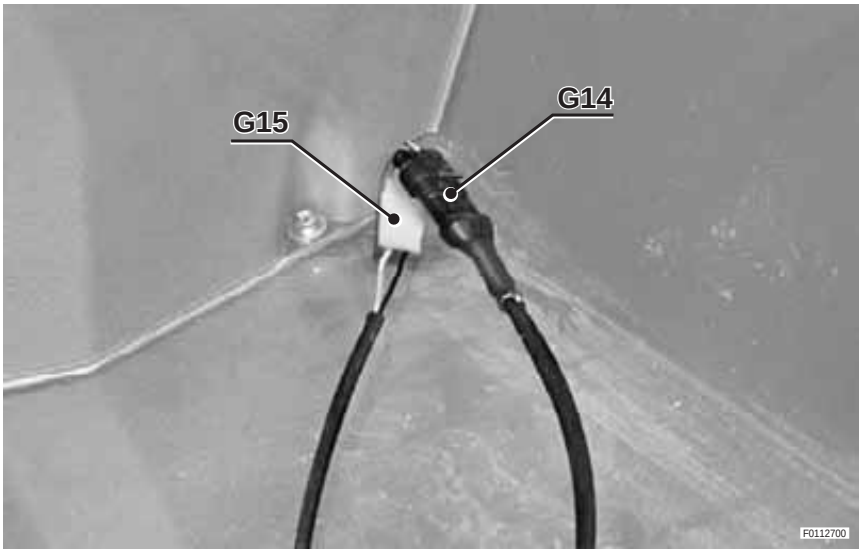
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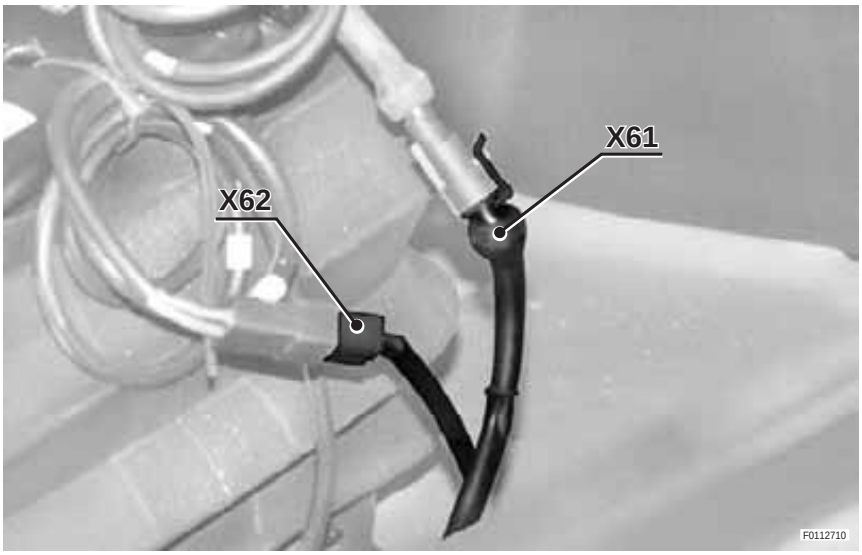
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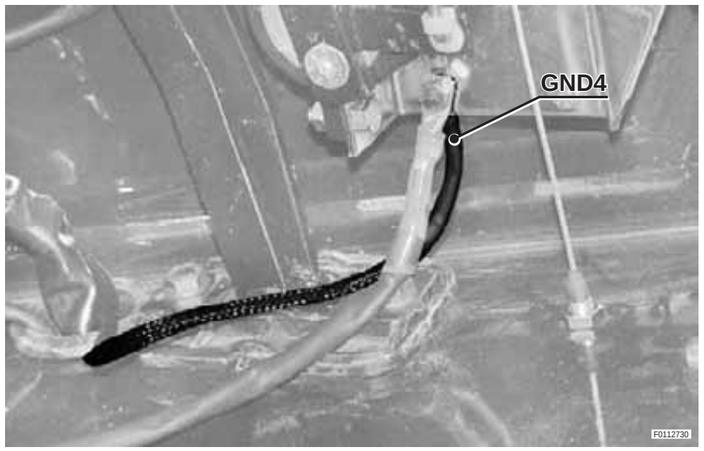


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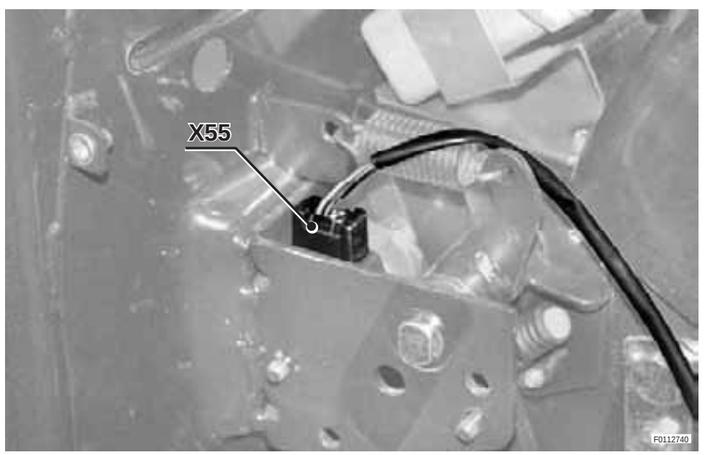
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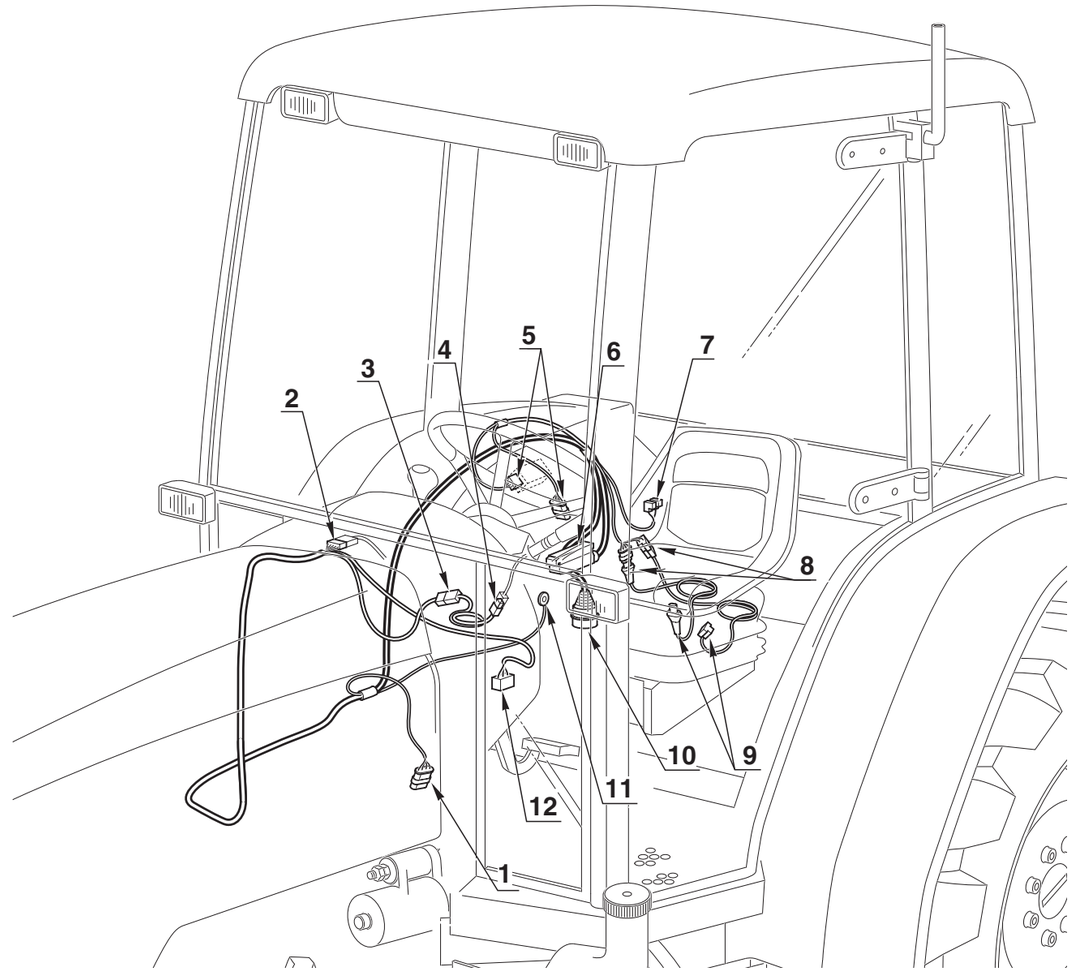
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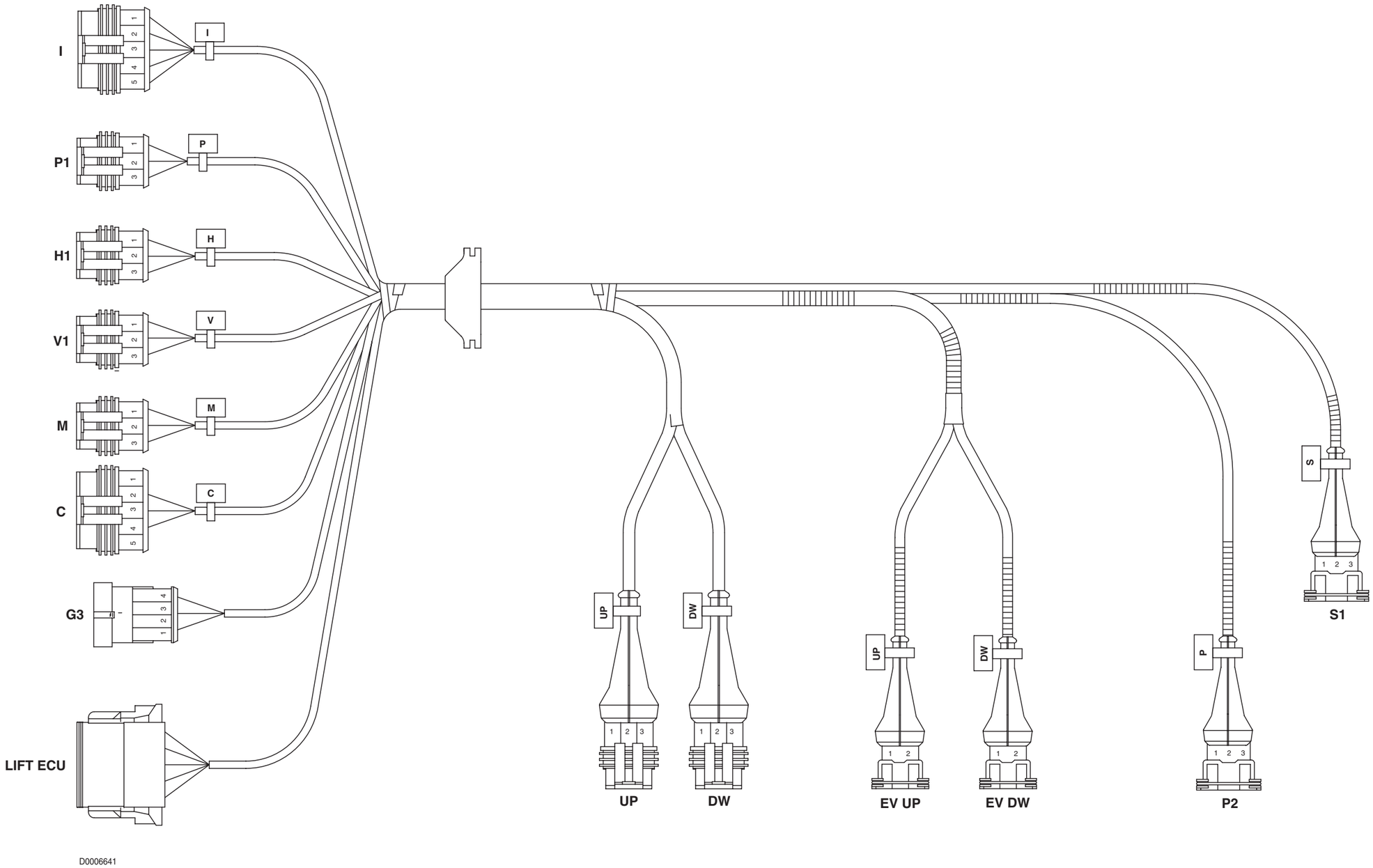
SHUTTLE WIRING - SHUTTLE LEVER WIRING - PNEUMATIC SEAT WIRING - SEAT WIRING



0.014.0878.4/30
0.013.0675.4
0.010.6468.3
0.014.0883.4/10

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ELECTRONIC LIFT WIRING (1/2)



G3 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40

C Electronic lift control pushbutton

DW Electronic rear lift 'Down' pushbutton

EV DW Electronic rear lift 'Down' solenoid valve

EV UP Electronic rear lift 'Up' solenoid valve

H1 Electronic lift max. height potentiometer

I Electronic lift control pushbutton

LIFT ECU Electronic lift control unit

M Draft/wheelslip control potentiometer

P1 Electronic lift position adjustment potentiometer

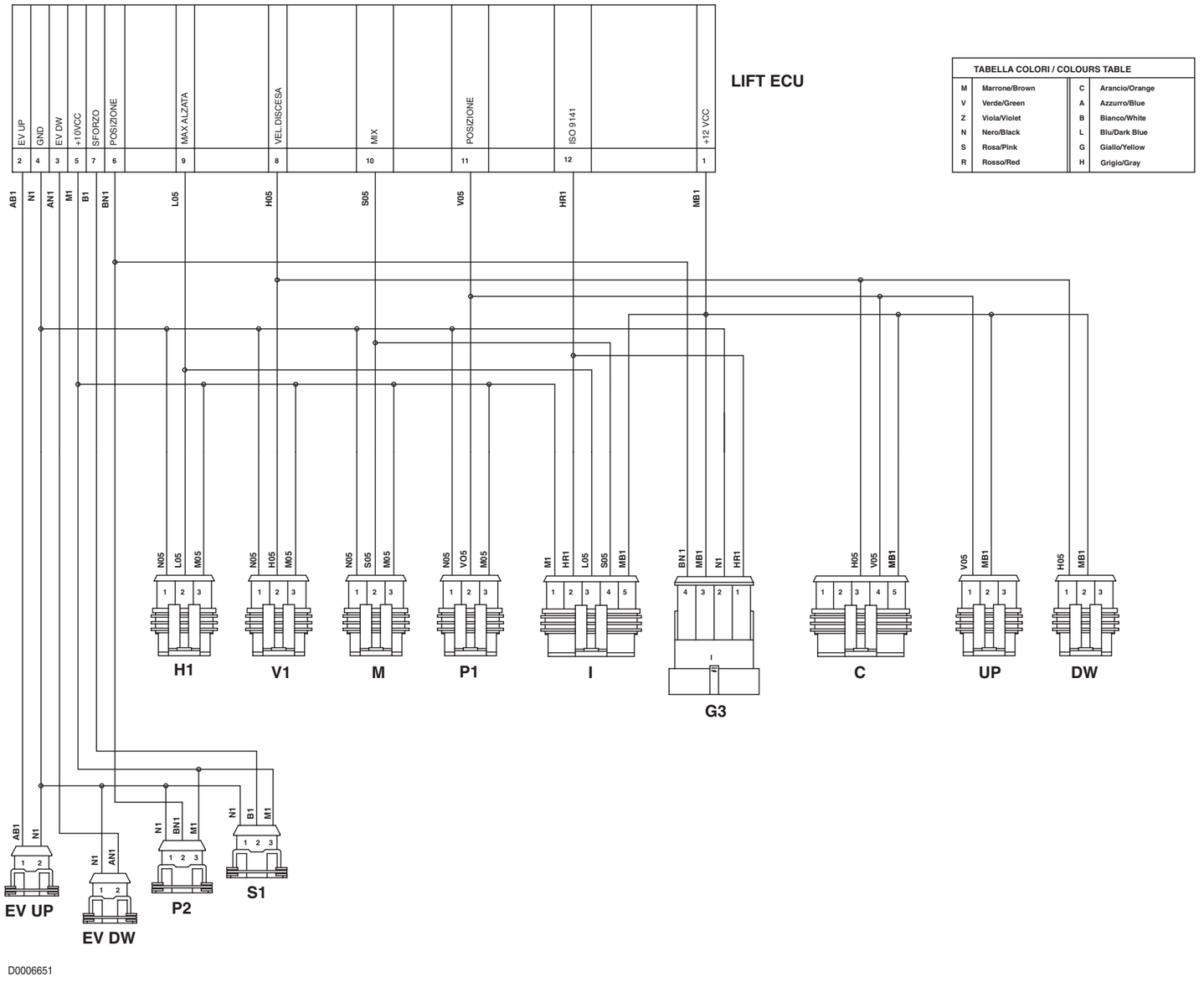
P2 Electronic lift position sensor

S1 Electronic liftdraft sensor

UP Electronic lift 'Up' pushbutton

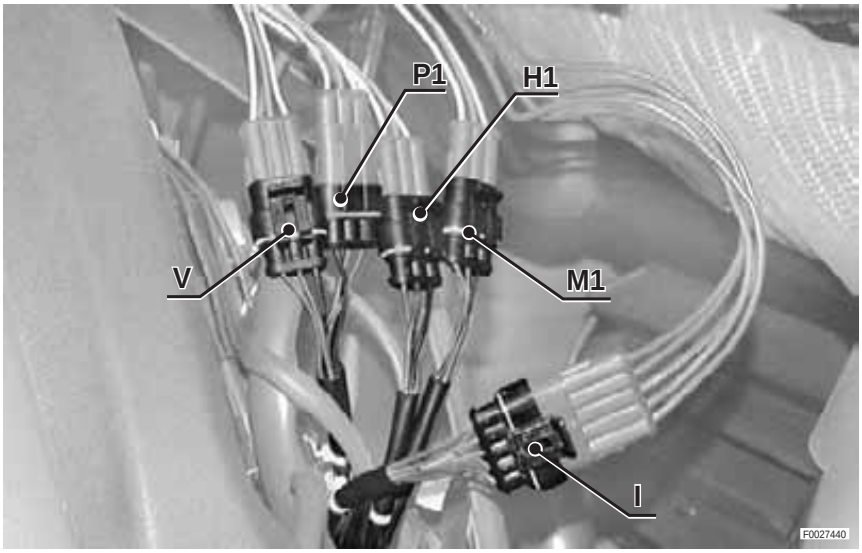
V1 Electronic lift rate of drop potentiometer

ELECTRONIC LIFT WIRING (1/2)

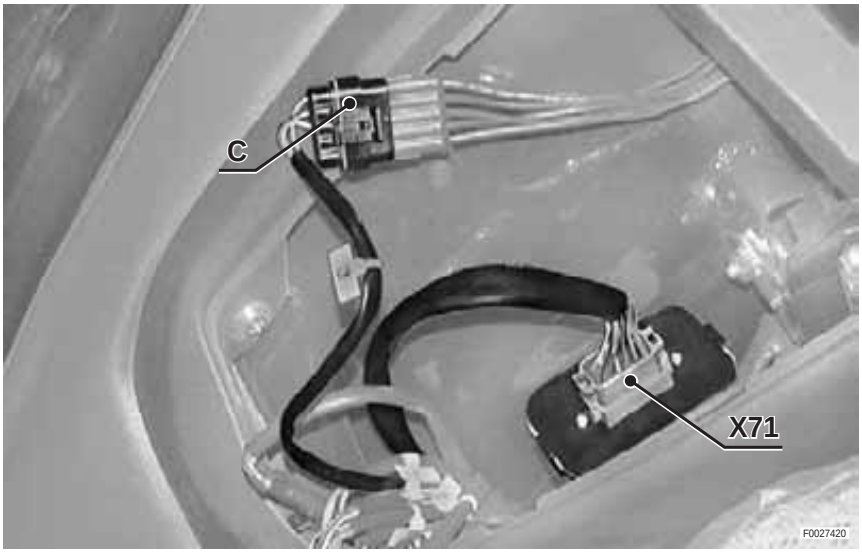


CONNECTOR POSITIONS

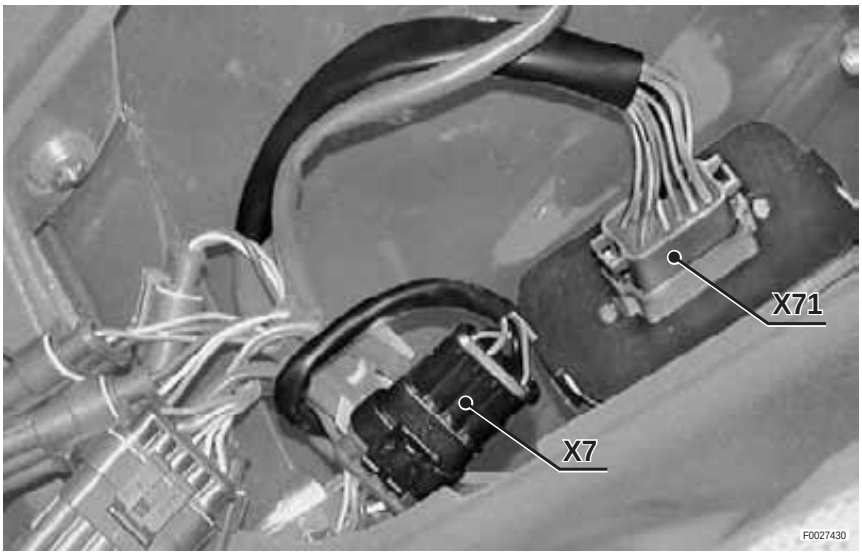
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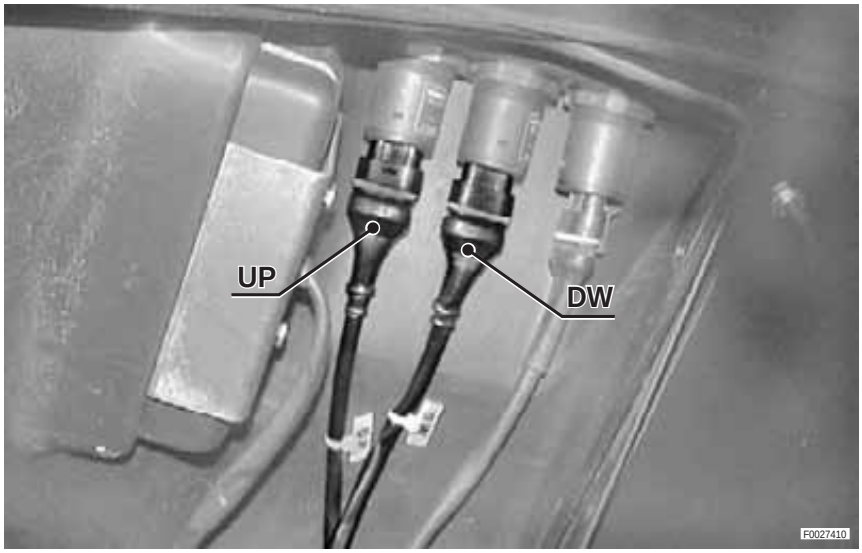
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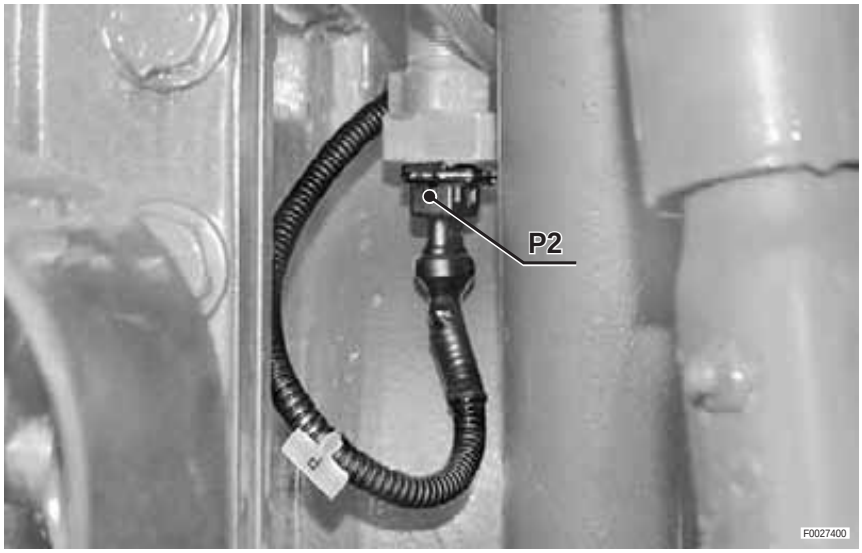
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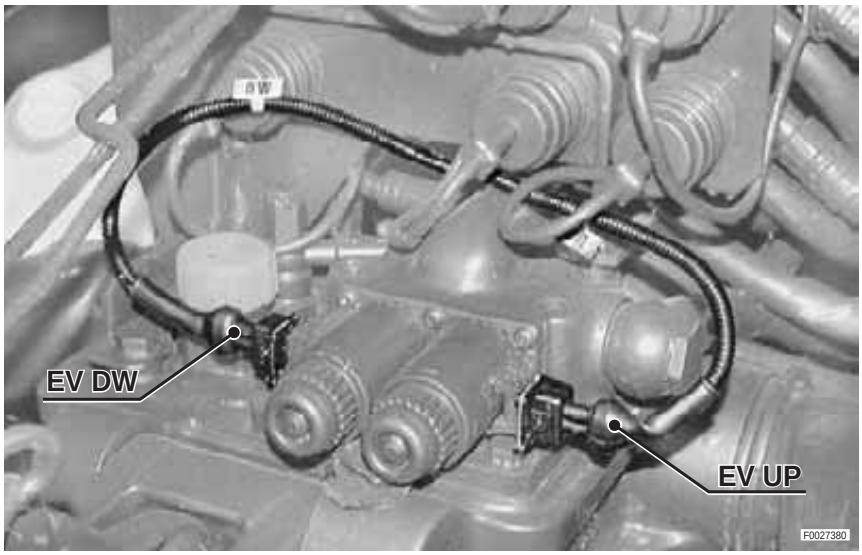
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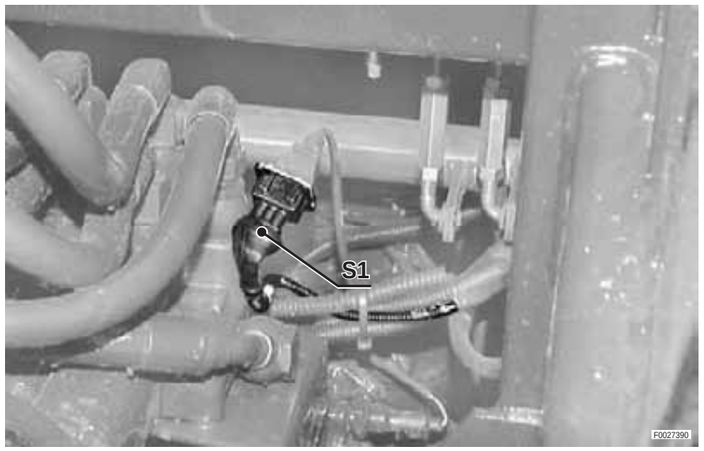
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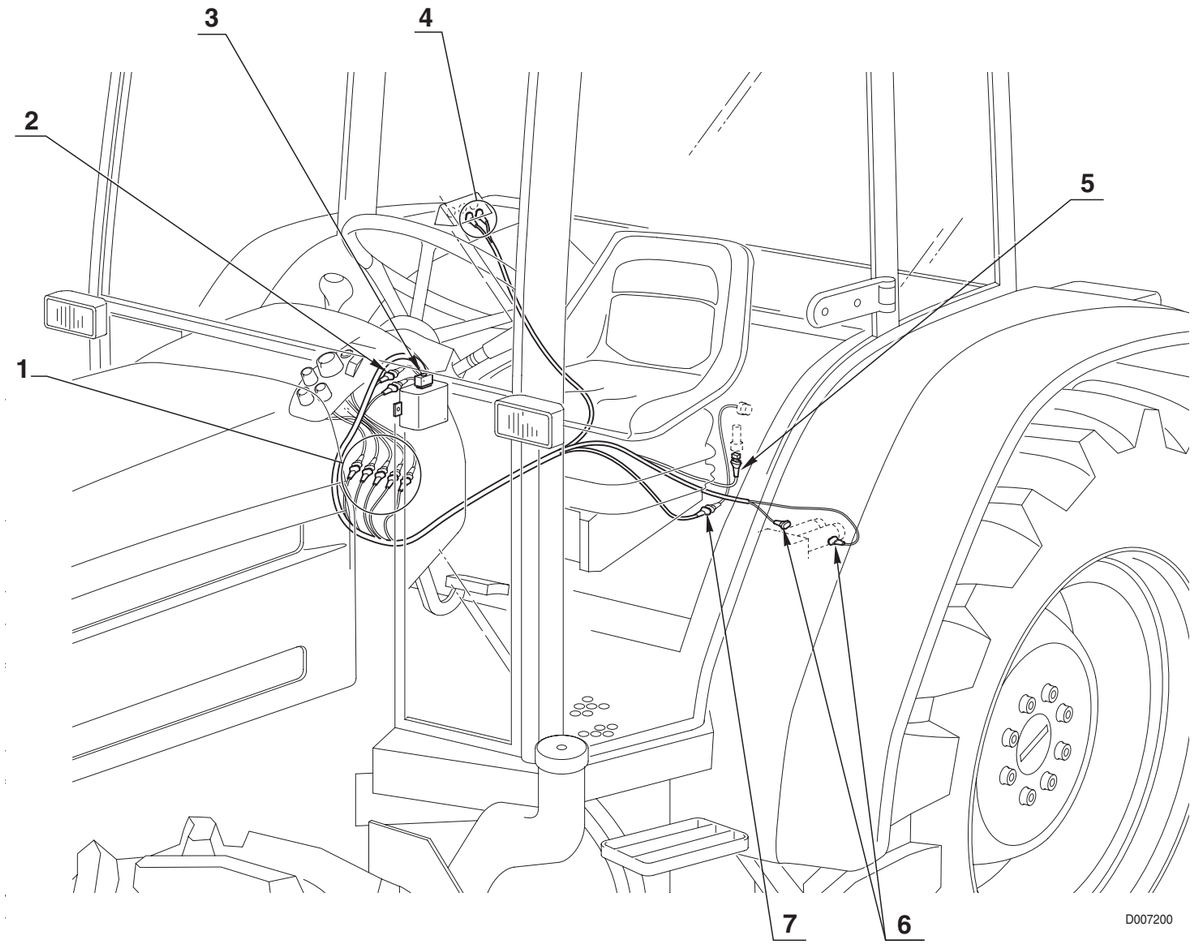
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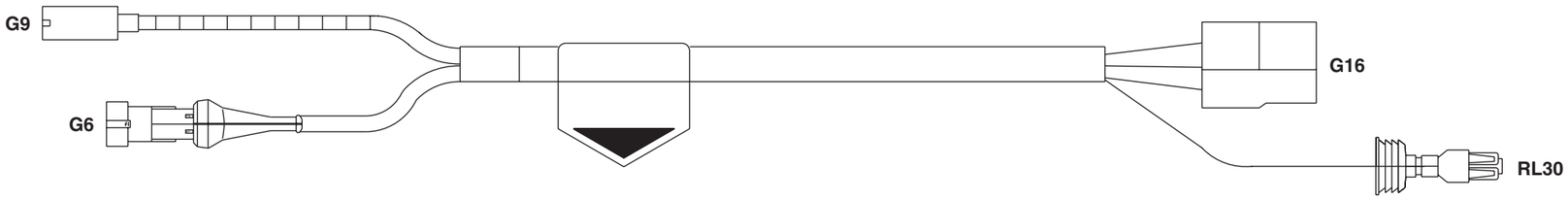


ELECTRONIC LIFT WIRING



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CAB POWER SUPPLY WIRING (HV)



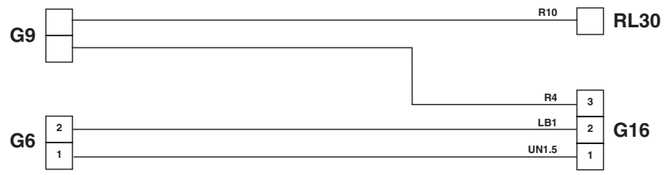
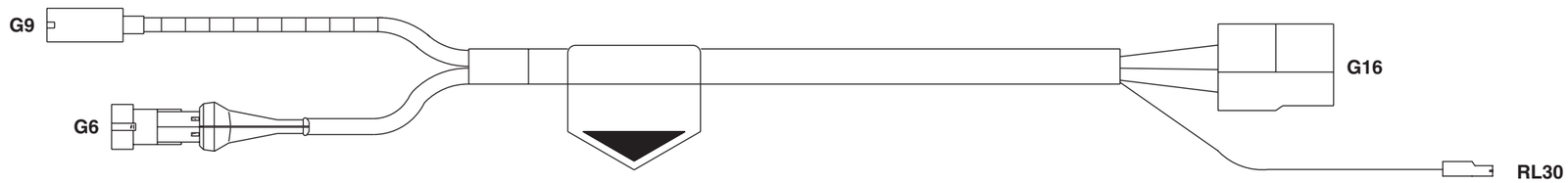


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033840

G6 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
G16 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
G9 To power supply wiring 0.013.9036.4/20 or 0.013.9038.4/20
RL30 Roof line supply relay

CAB POWER SUPPLY WIRING (STANDARD)



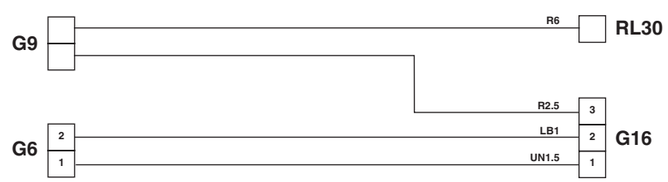


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033500

G6 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
G16 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
G9 To power supply wiring 0.013.9036.4/20 or 0.013.9038.4/20
RL30 Roof line supply relay

CAB EARTH WIRING

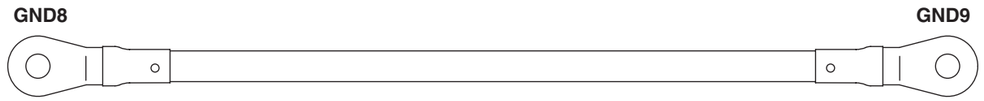




TABELLA COLORI / COLOURS TABLE			
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V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
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S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0033510

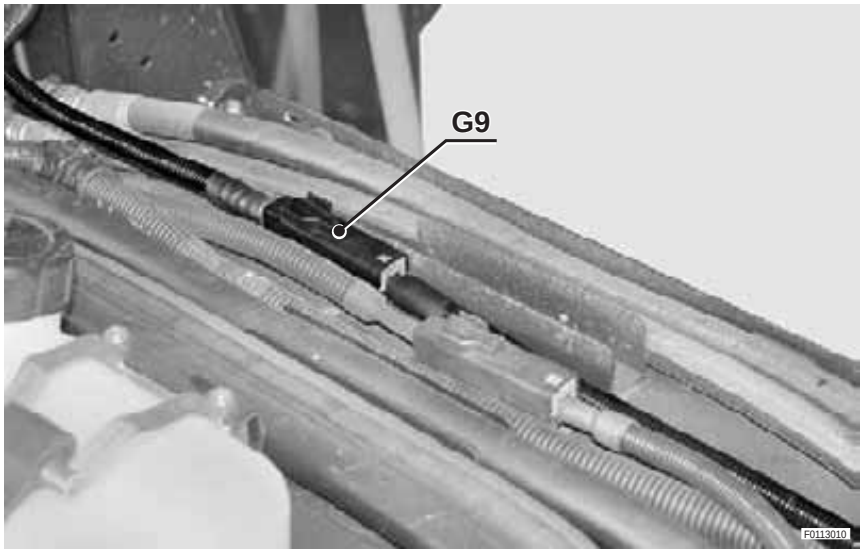
GND8 Earthing point 8

GND9 Earthing point 9

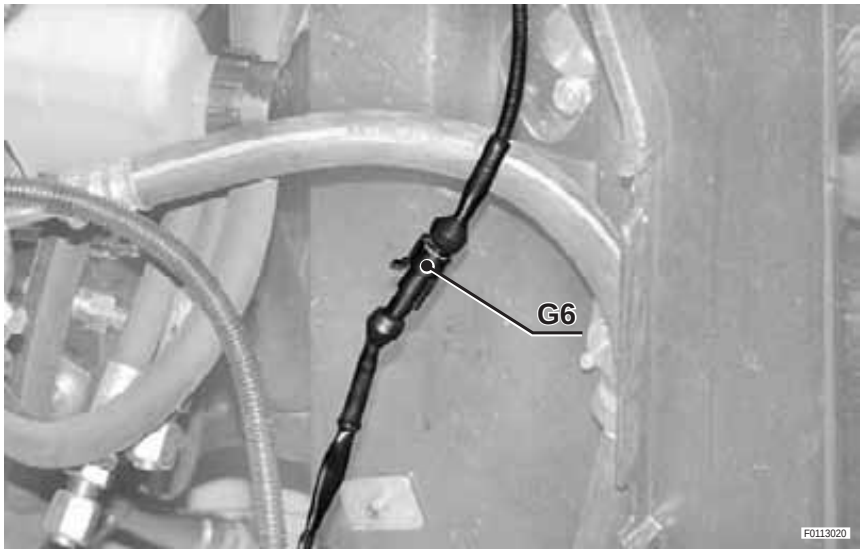
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CONNECTOR POSITIONS

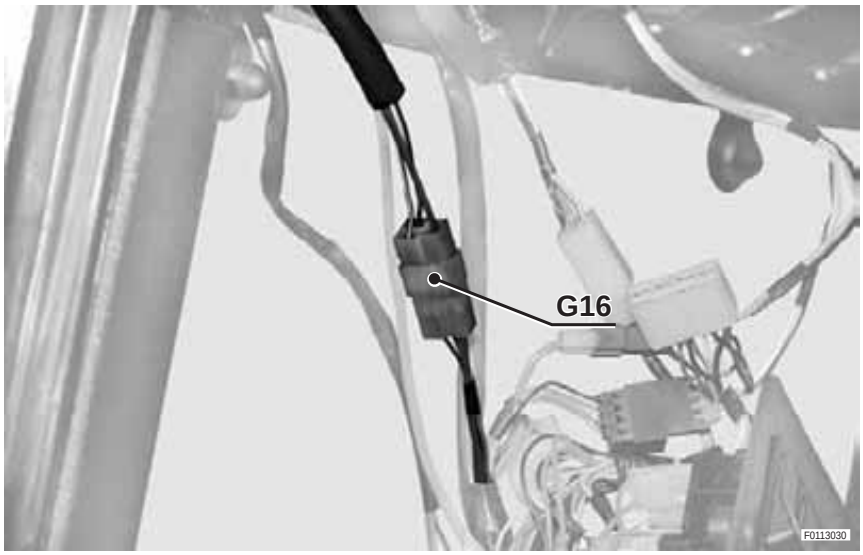
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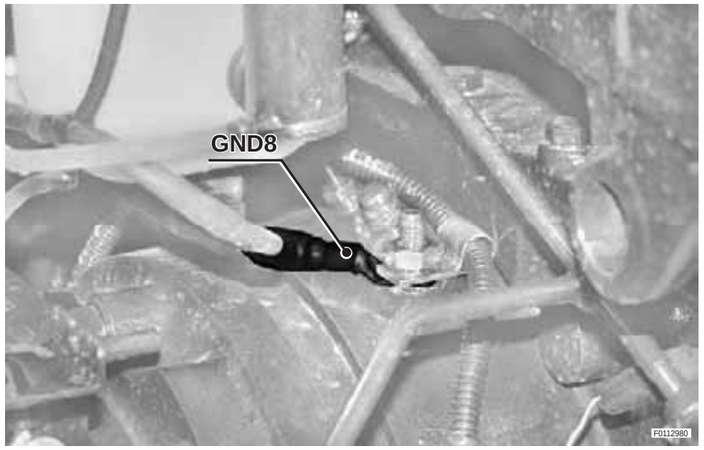


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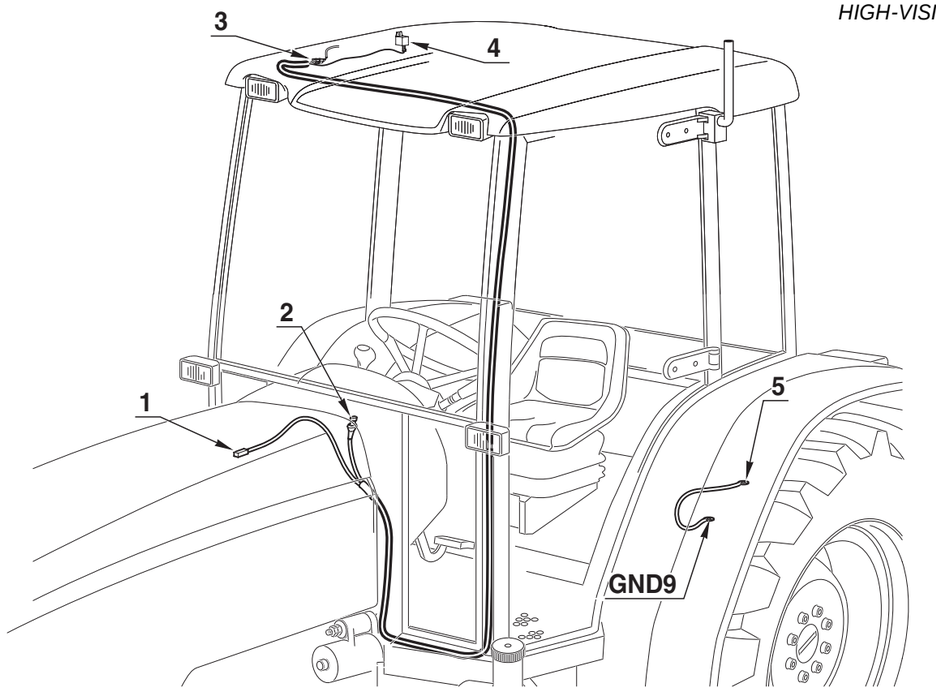


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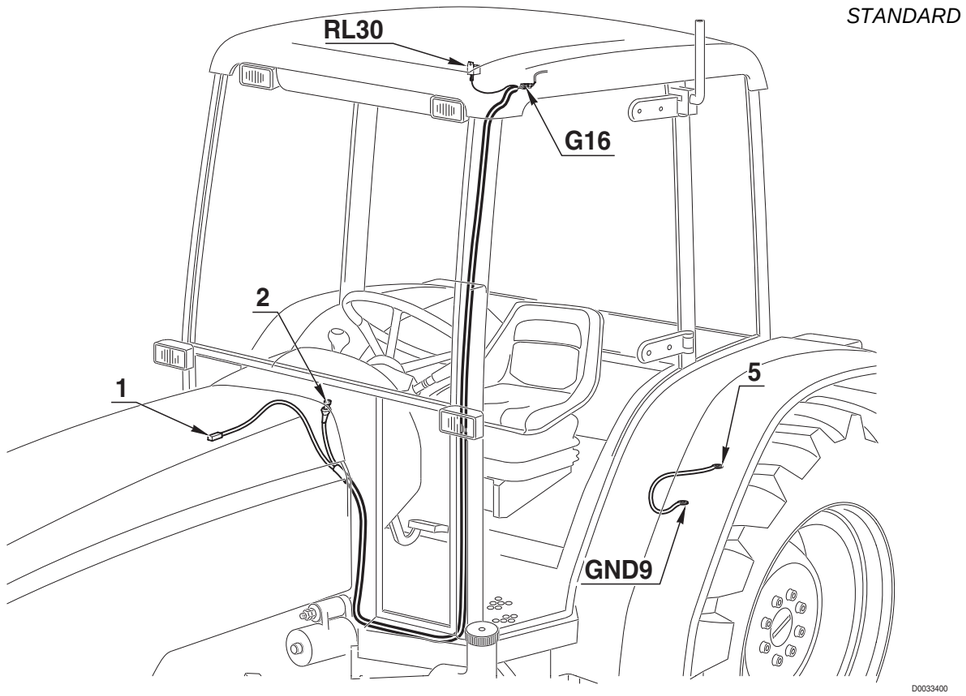


CAB POWER SUPPLY WIRING (STANDARD) - CAB POWER SUPPLY WIRING (HV) - CAB EARTH WIRING (STANDARD)

HIGH-VISIBILITY VERSION (HV)



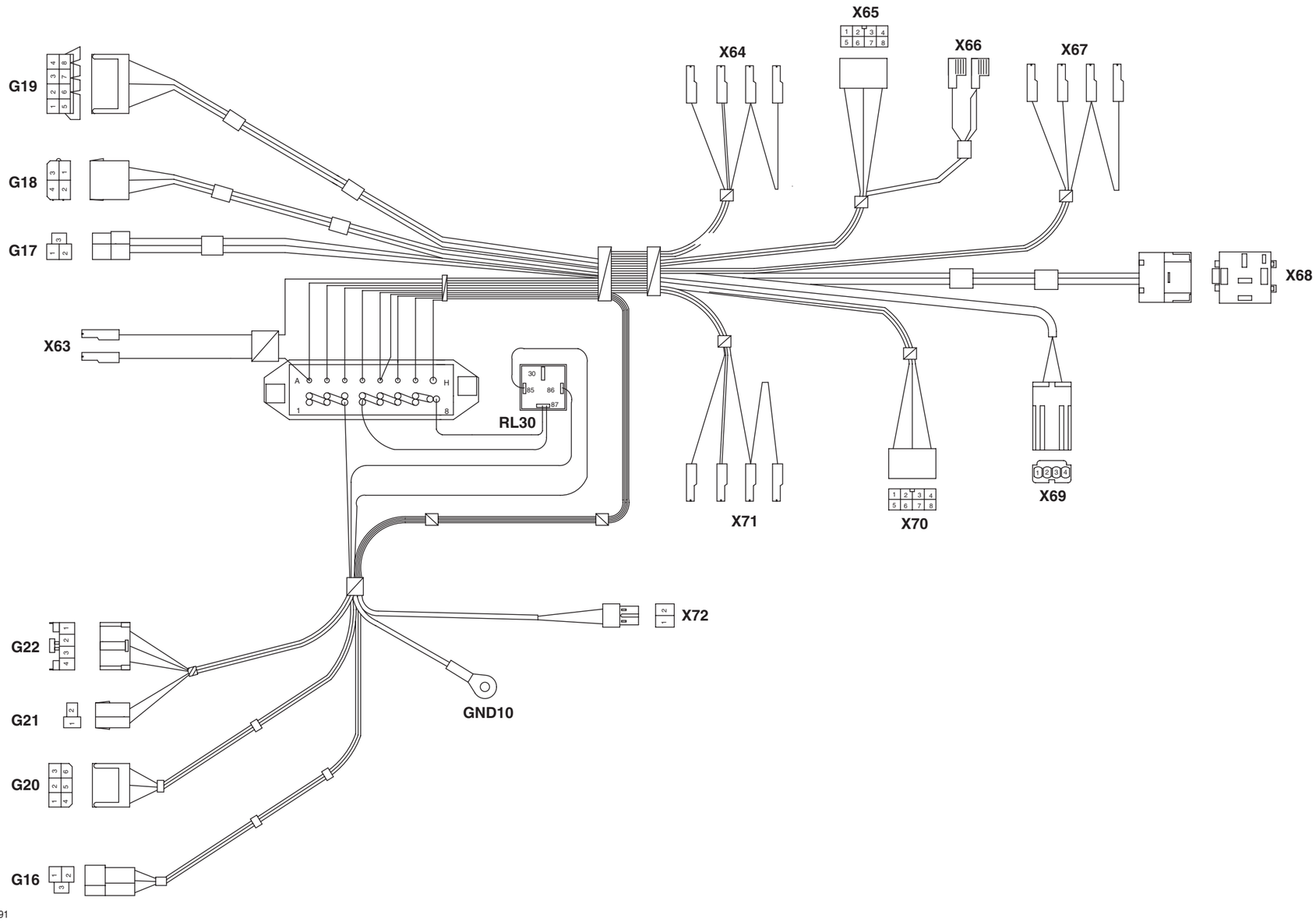
STANDARD VERSION



0.013.9035.4
0.013.9034.4
0.011.7074.3

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ROOF LINE WIRING (STANDARD) (1/2)



G16 To cab power supply wiring 0.013.9034.4 or 0.013.9035.4
G17 To screenwash pump wiring 0.011.3743.3
G18 To air conditioning fan wiring 0.009.7853.3/20
G19 To worklights wiring 0.009.7851.4/50 or 0.011.3595.3/10
G20 To windscreen wiper wiring 0.010.4516.3 or 0.011.3597.3
G21 To heating wiring 0.010.2147.2 or air conditiong wiring 0.010.2153.2 or 0.010.2560.0
G22 To air conditioning wiring 0.010.2153.2
*GND10*Earthing point 10
*RL30*Roof line power supply relay
X63 Cab courtesy light
X64 Rear worklights switch
X65 Rear window wiper switch
X66 Windscreen washer pump switch
X67 Rotating beacon on/off switch
X68 Intermittent windscreen wiper timer
X69 Clock
X70 Windscreen wiper switch
X71 Front worklights switch
X72 Radio

ROOF LINE WIRING (STANDARD) (2/2)

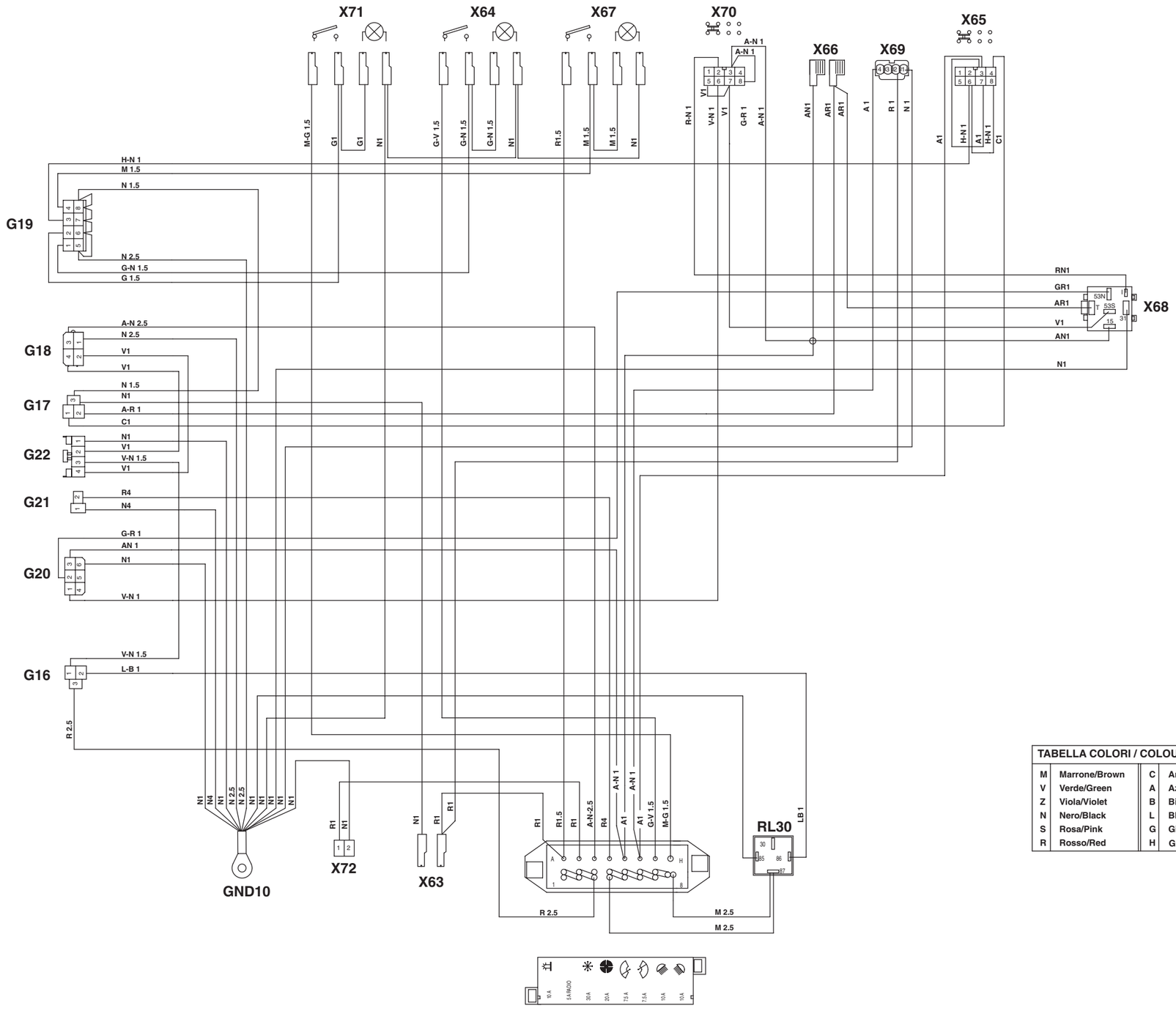
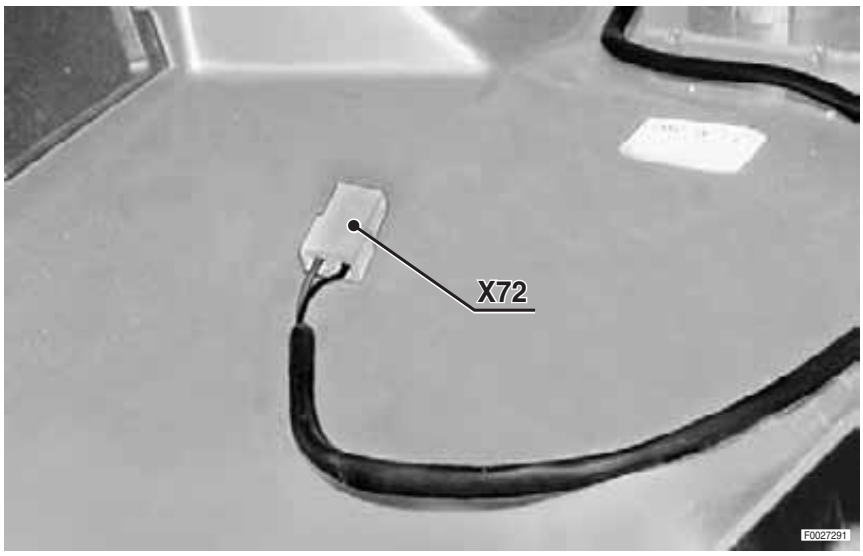


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S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

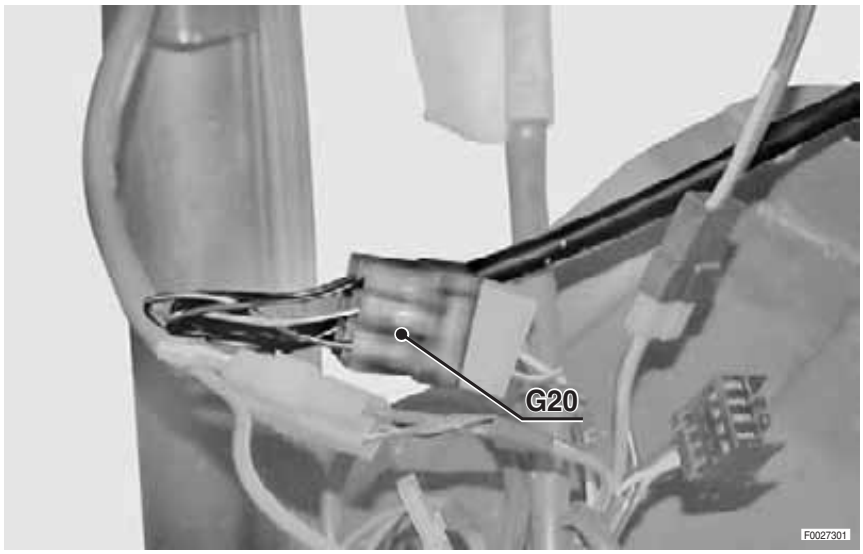
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CONNECTOR POSITIONS

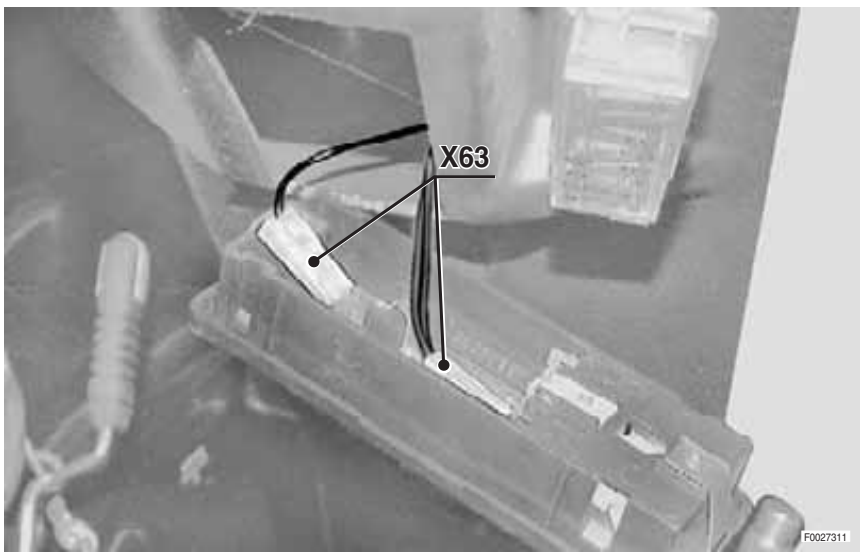
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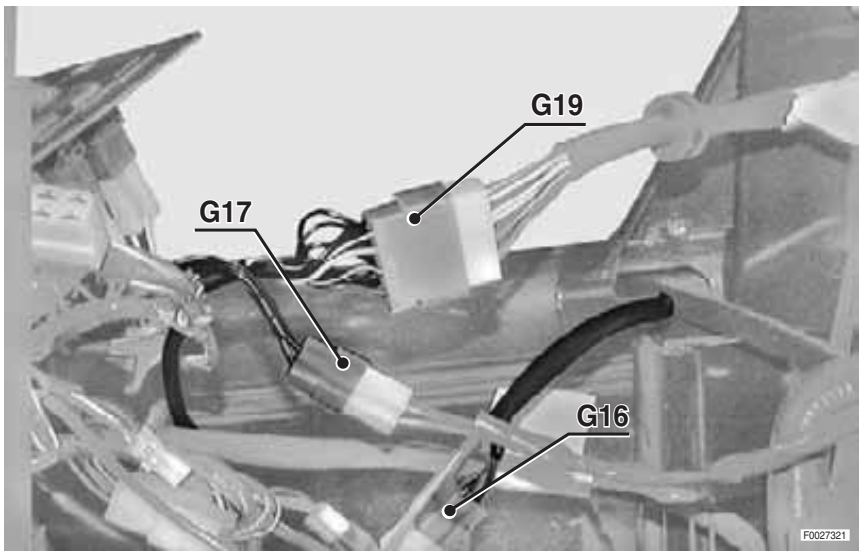
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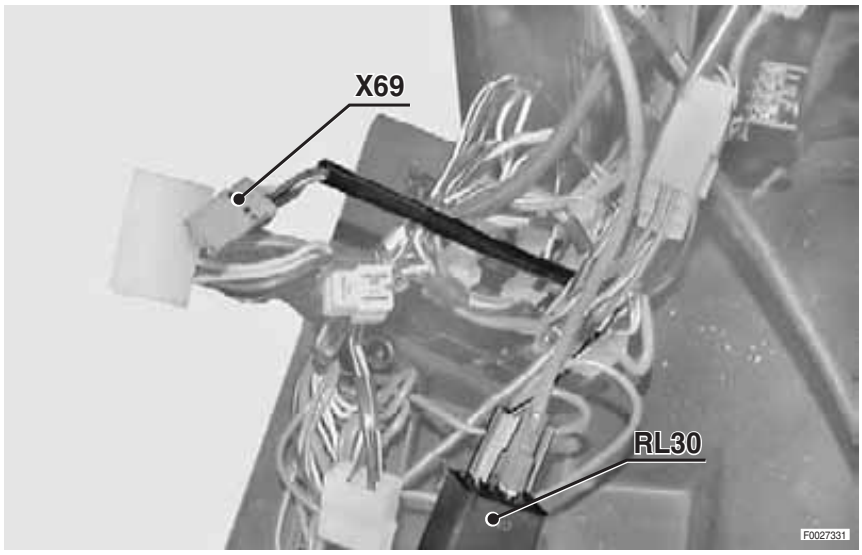
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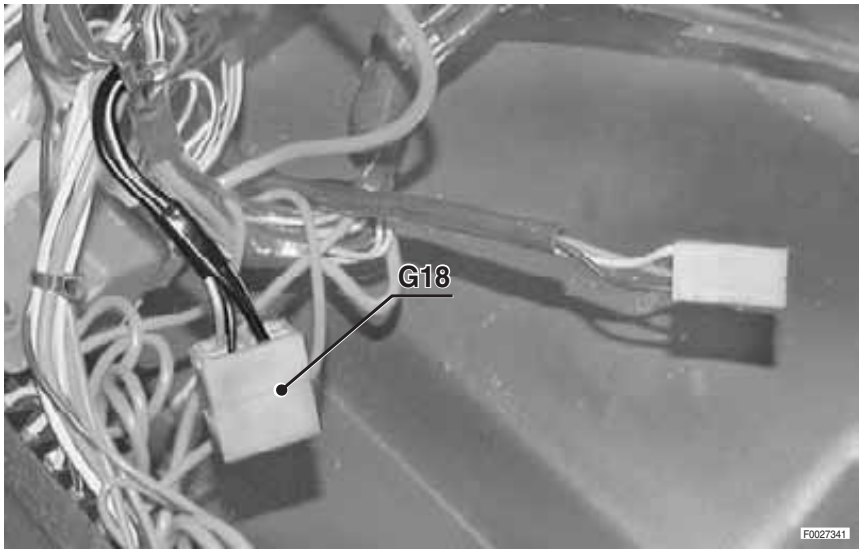
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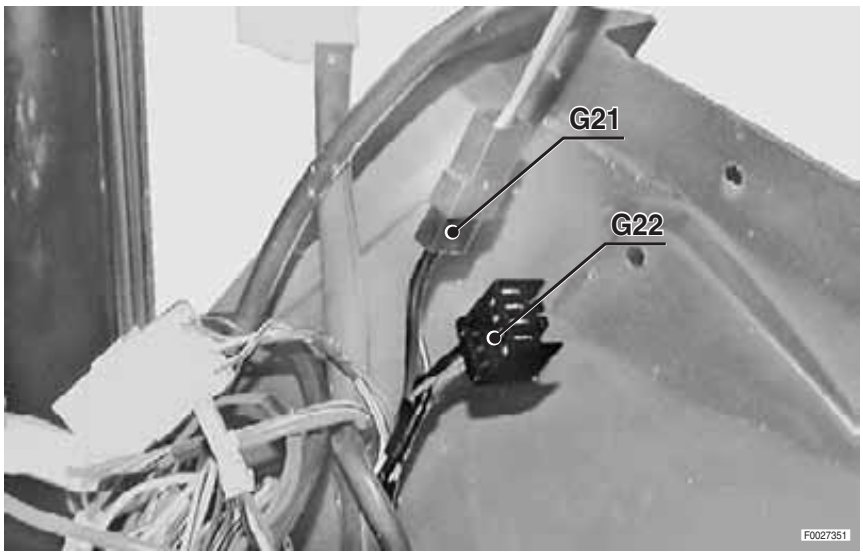
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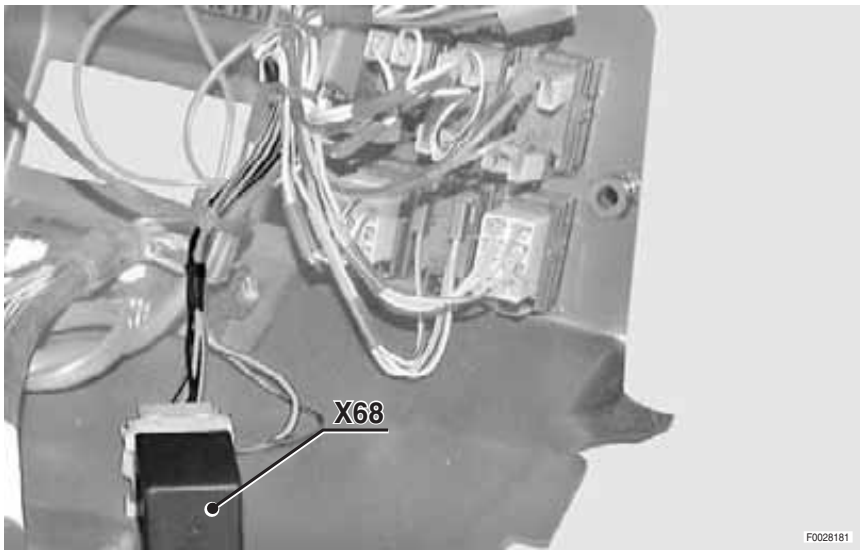
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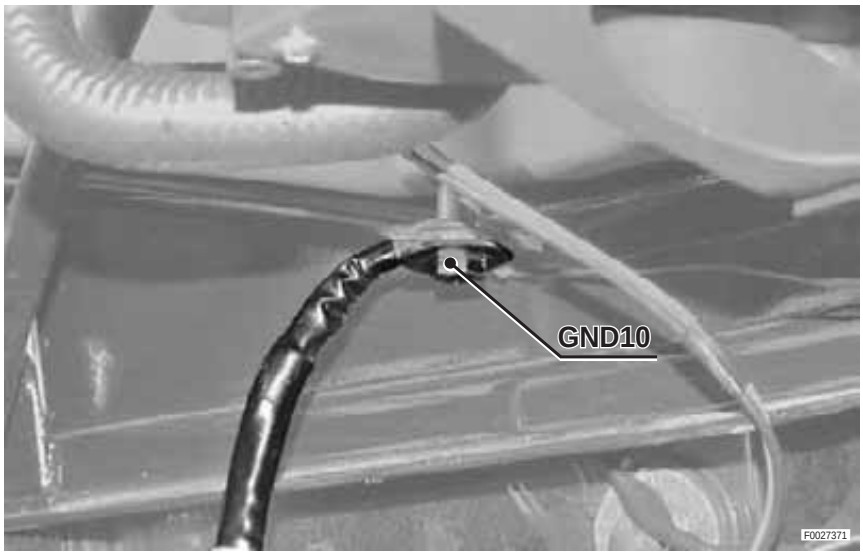
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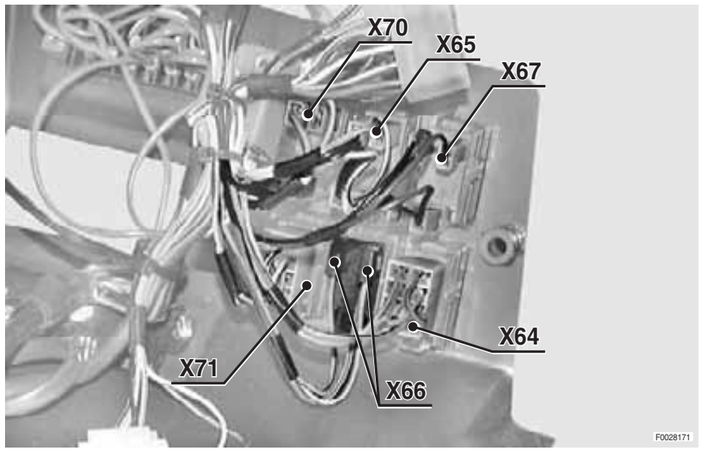


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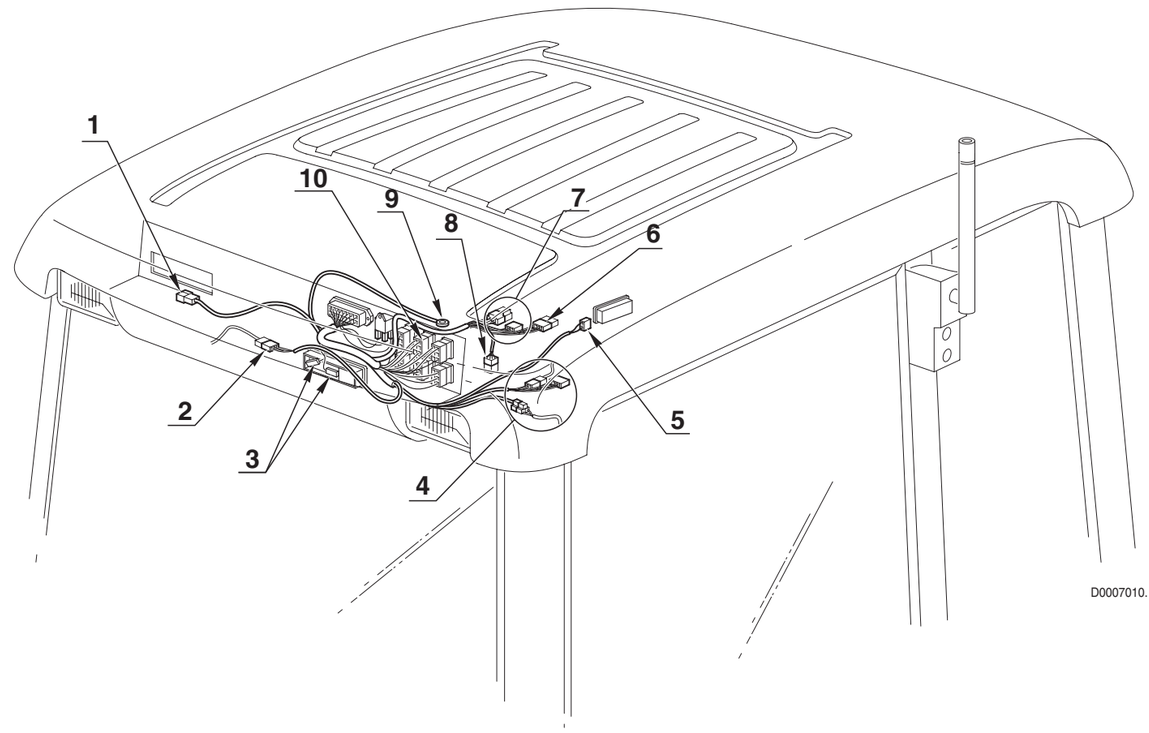


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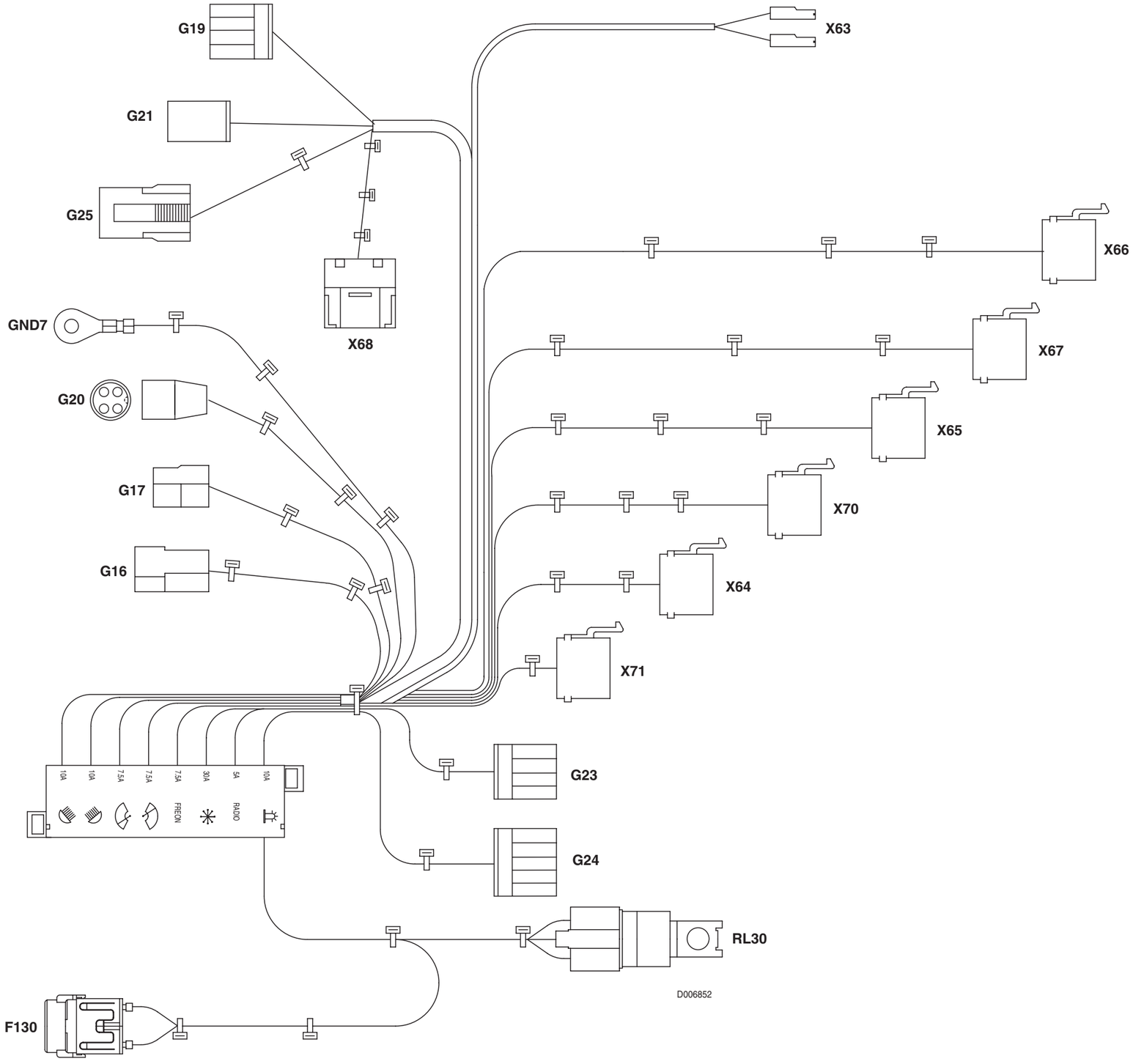


ROOF LINE WIRING (STANDARD)



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ROOF LINE WIRING (HIGH-VISIBILITY) (1/2)



F130 Roof line power fuse
G16 To cab power suppl;y wiring 0.013.9034.4 or 0.013.9035.4
G17 To screenwash pump wiring 0.011.3743.3
G19 To worklights wiring 0.009.7851.4/50 or 0.011.3595.3/10
G20 To windscreen wiper wiring 0.010.4516.3 or 0.011.3597.3
G21 To heater wiring 0.010.2147.2 or to air conditioning wiring 0.010.2153.2 or 0.010.2560.0
G23 To loudspeaker, radio, rear window, rotating beacon and clock wiring 0.011.3596.3/40
G24 To air conditioning fan wiring 0.011.3610.3/20
G25 To heater 0.010.2554.2 or air conditioning wiring 0.010.2560.0
GND7 Earthing point 7
RL30 Roof line power relay
X63 Cab courtesy light
X64 Rear worklights switch
X65 Rear wiper switch
X66 Windscreen washer pump switch
X67 Rotating beacon on/off switch
X68 Intermittent windscreen wiper timer
X70 Windscreen wiper switch
X71 Front worklights switch

ROOF LINE WIRING (HIGH-VISIBILITY) (2/2)

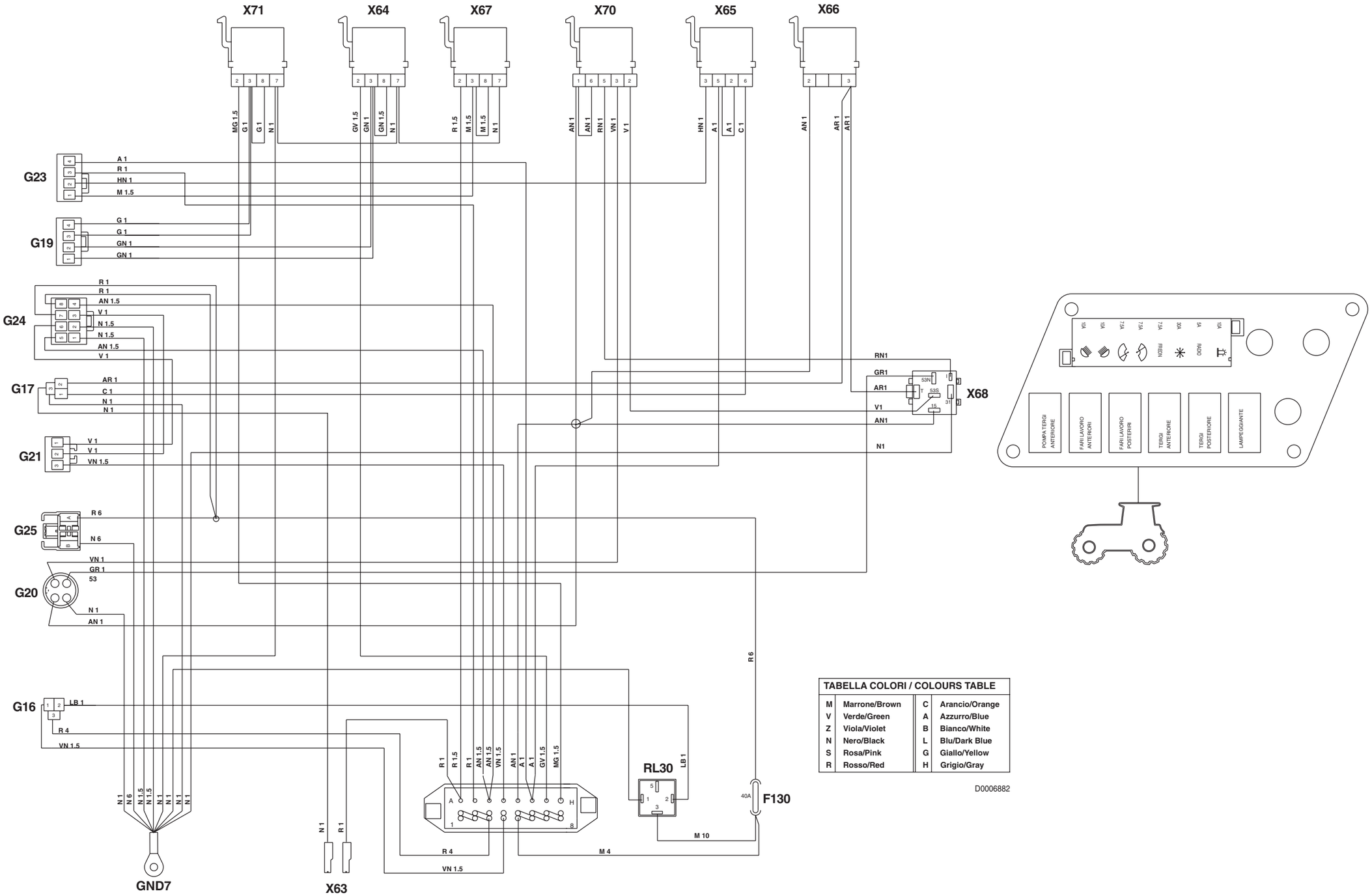
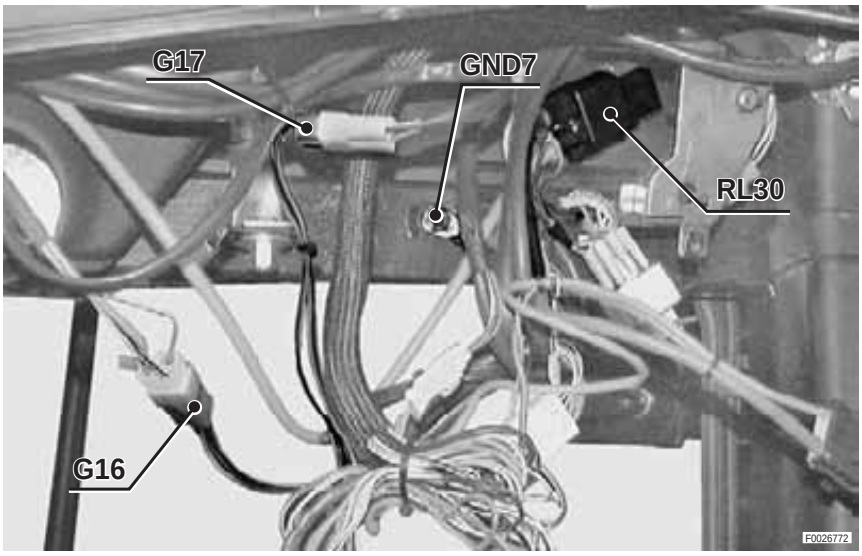


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

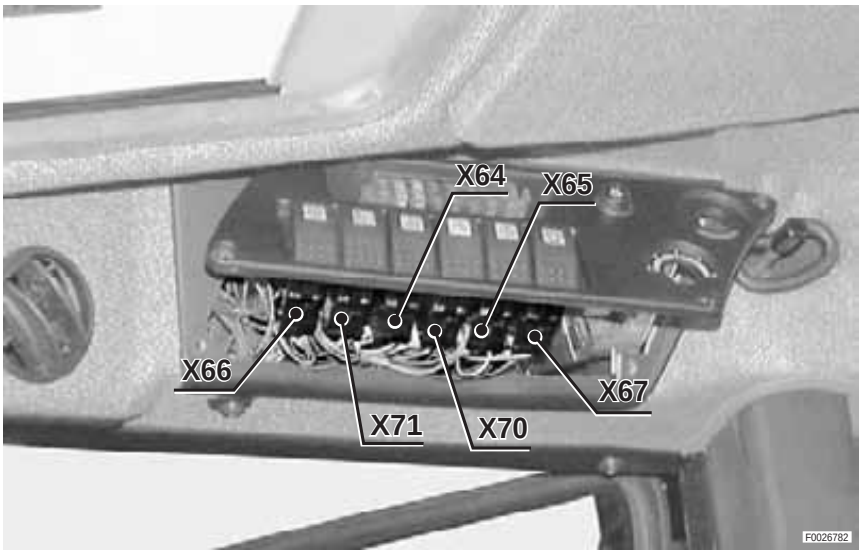
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CONNECTOR POSITIONS

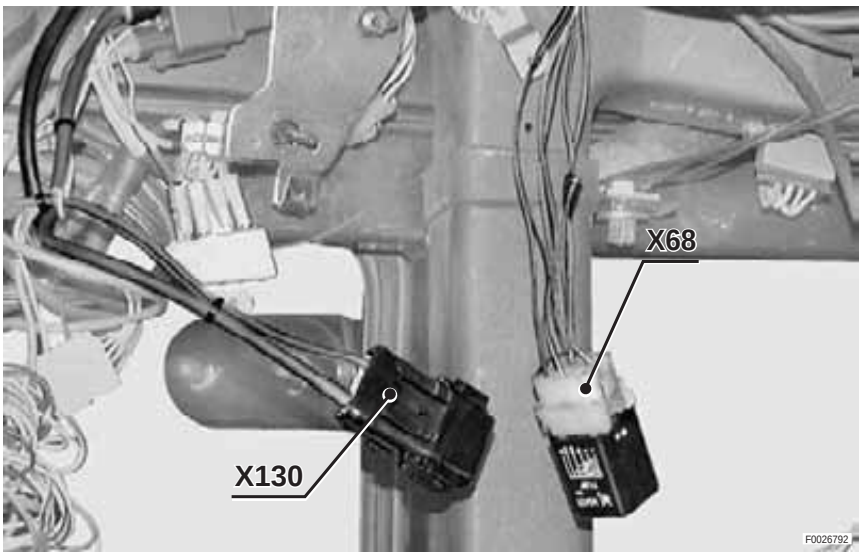
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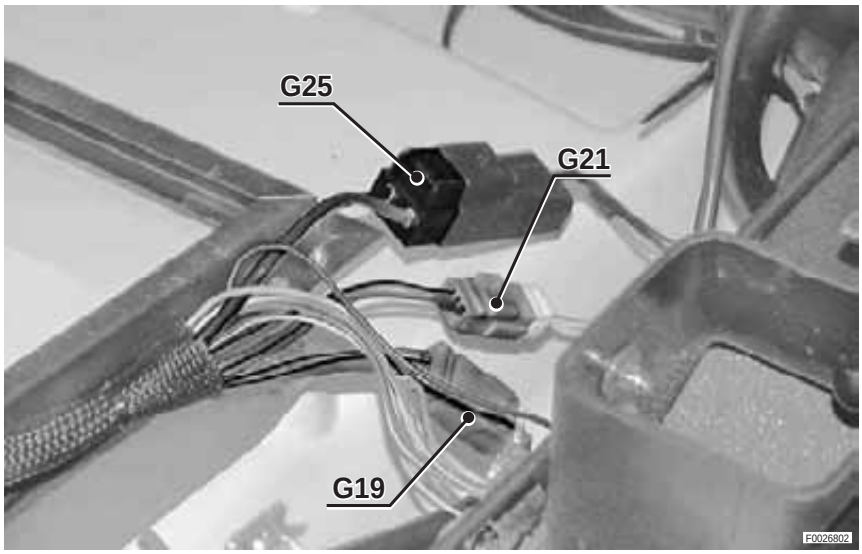
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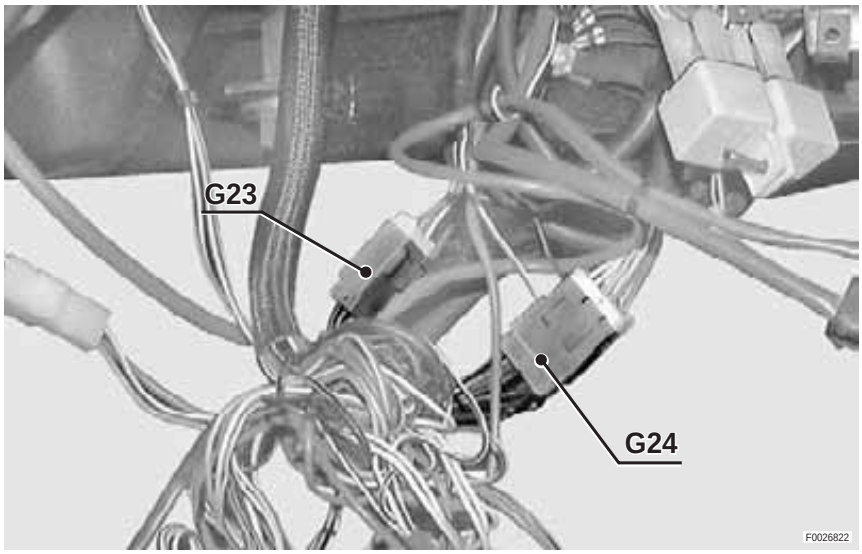
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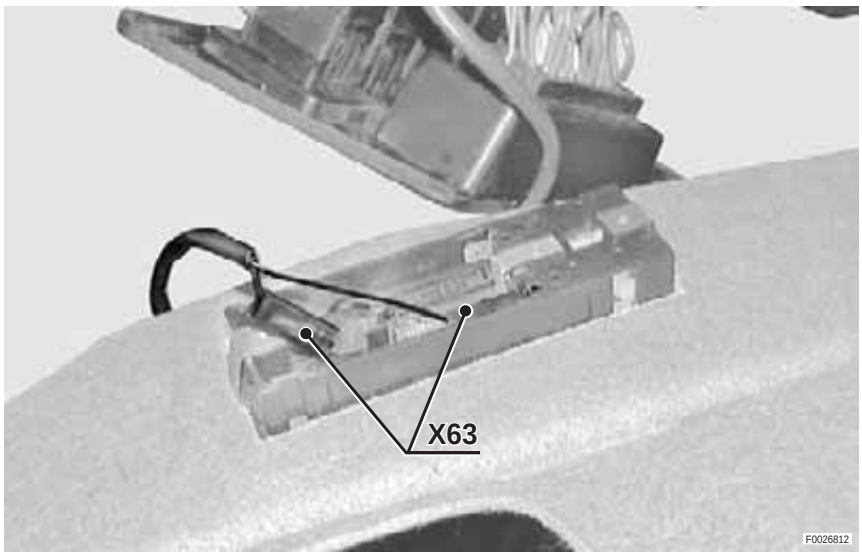
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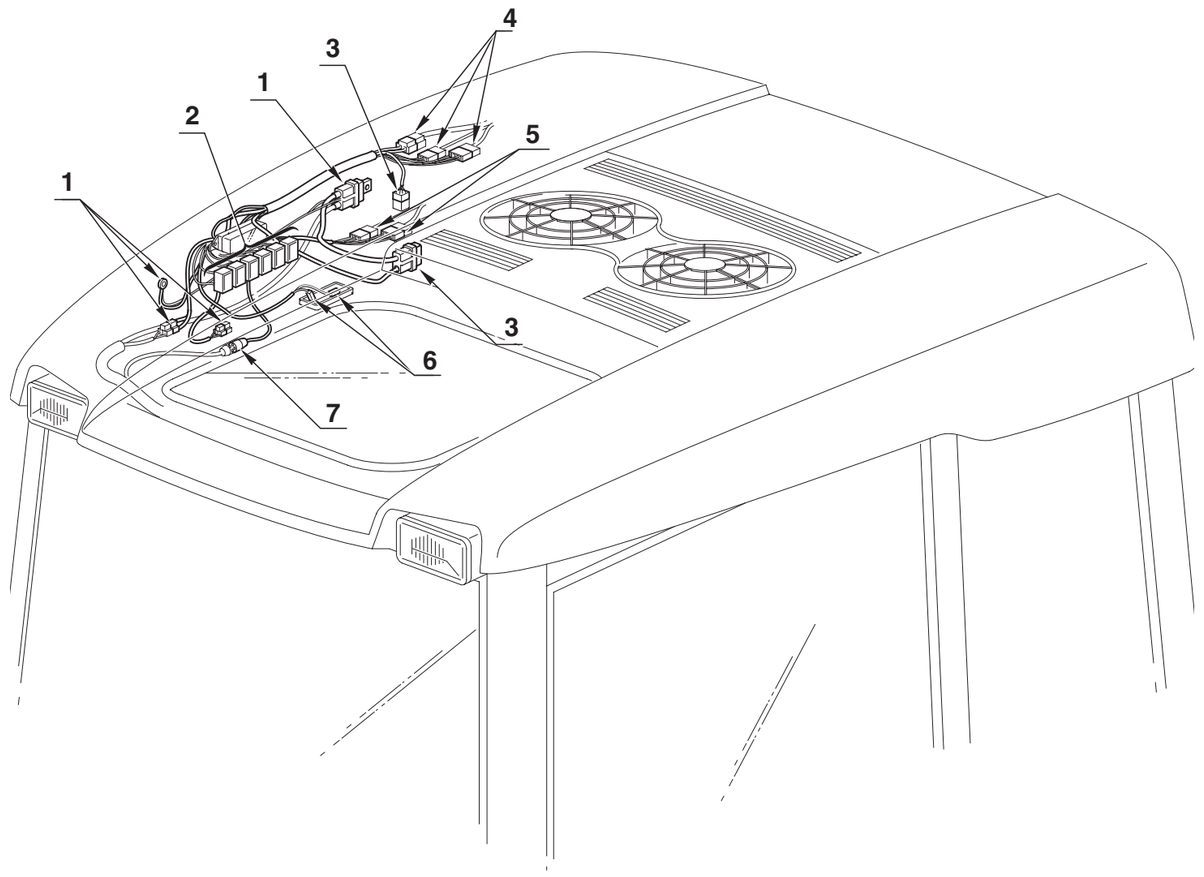
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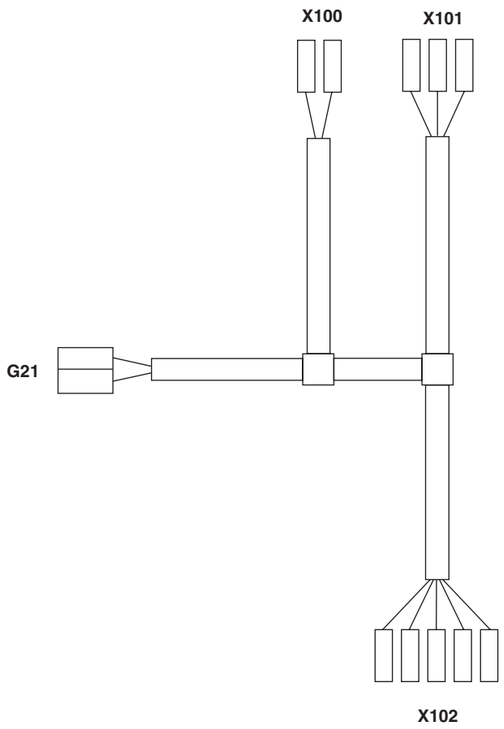


ROOF LINE WIRING (HIGH-VISIBILITY)



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HEATER WIRIND (STANDARD CAB)



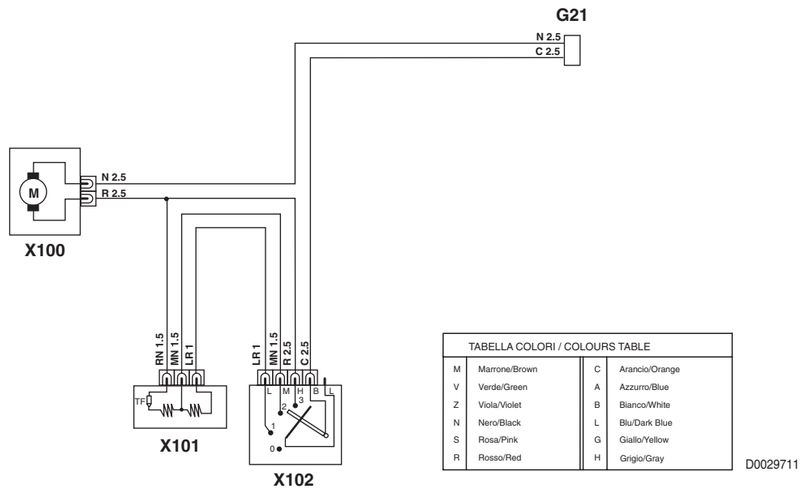


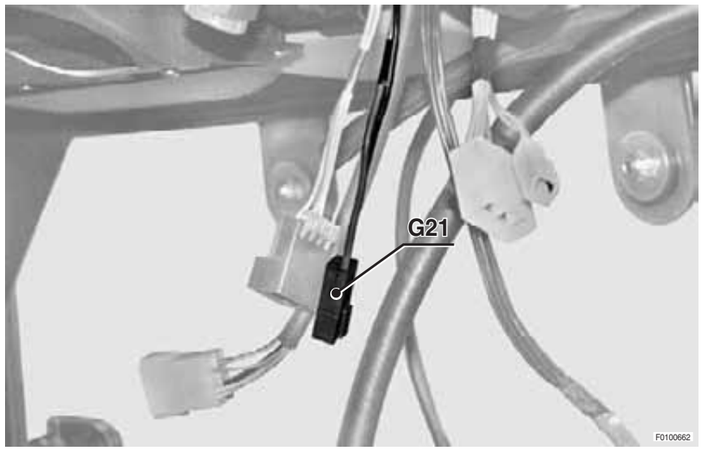
TABELLA COLORI / COLOURS TABLE			
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N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0029711

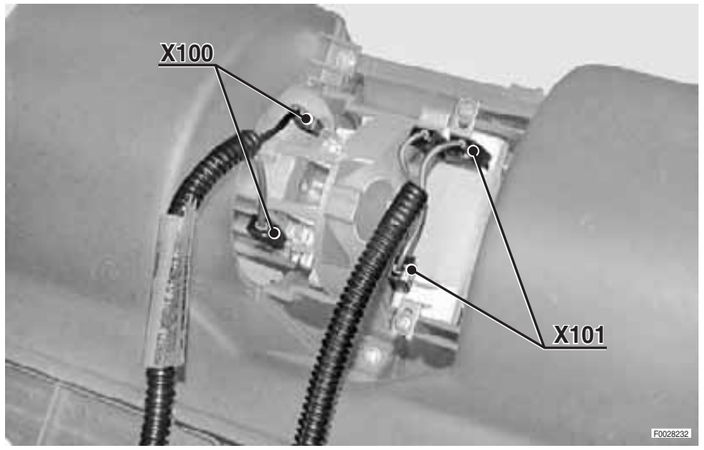
G21 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
X100 Electric fan
X101 Resistor
X102 Fan speed selector switch

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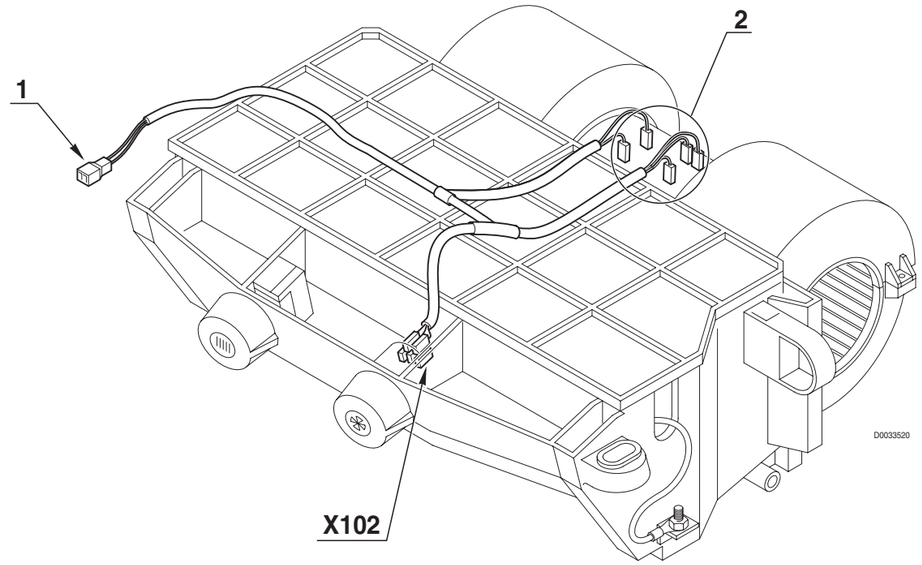
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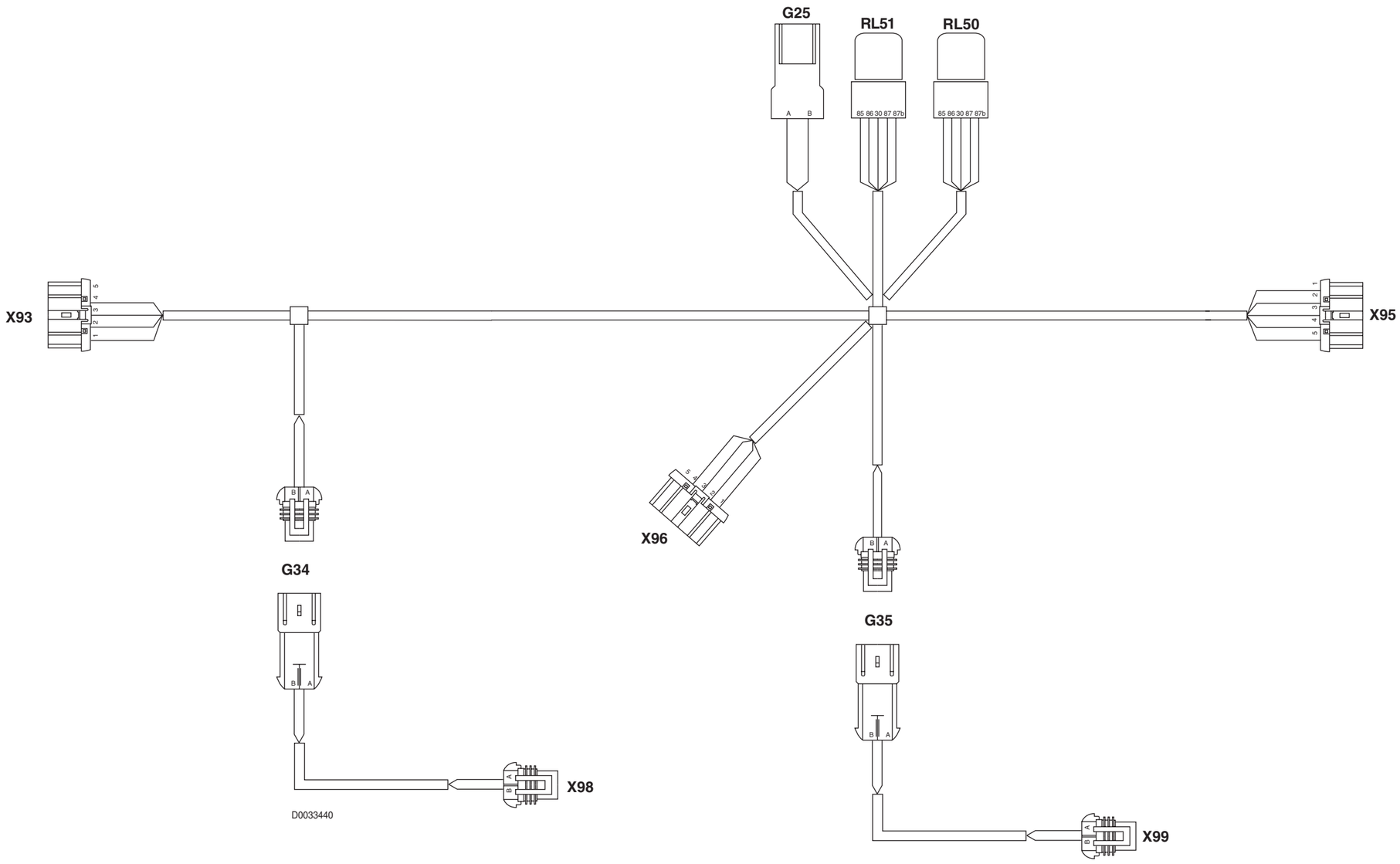


HEATER WIRING (STANDARD CAB)



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HEATER WIRING (HIGH-VISBILITY CAB) (1/2)



G25 To roof line wiring 0.011.3606.4/50
G34 Wiring connector
G35 Wiring connector
RL50 3rd blower speed relay
RL51 Max blower speed relay

X93 LH resistor
X95 Fan speed selector switch
X96 RH resistor
X98 LH fan
X99 RH fan

HEATER WIRING (HIGH-VISBILITY CAB) (2/2)

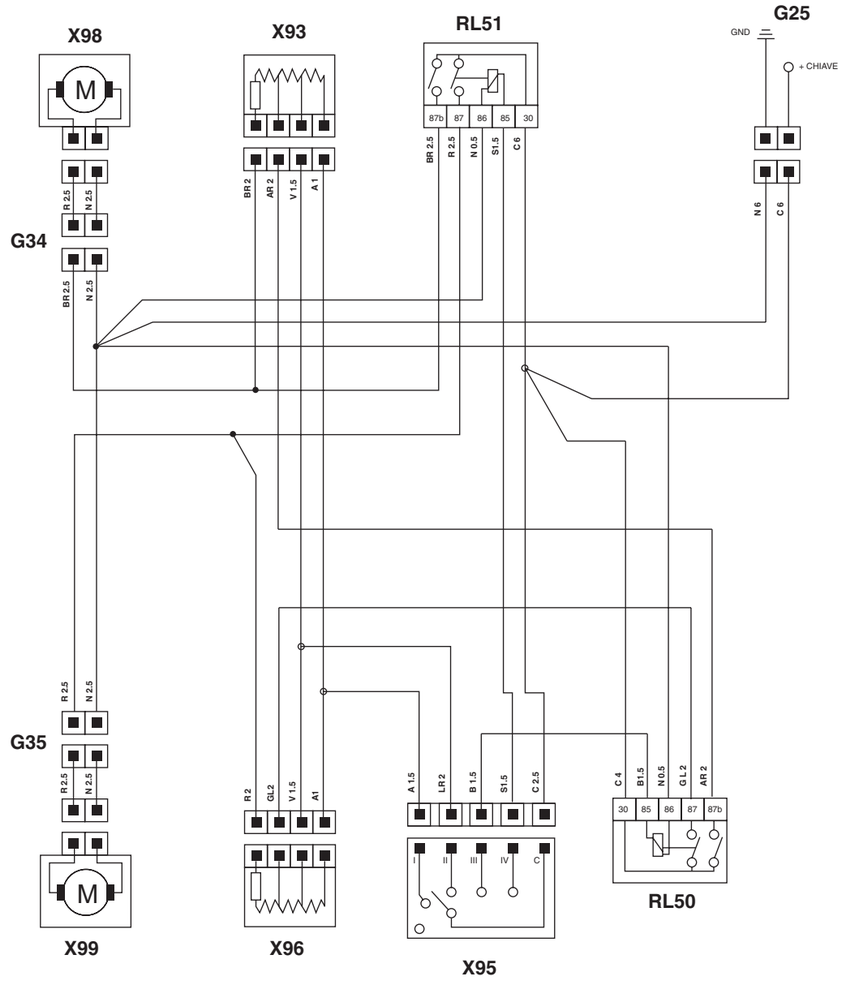


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S	Rosa/Pink	G	Giallo/Yellow
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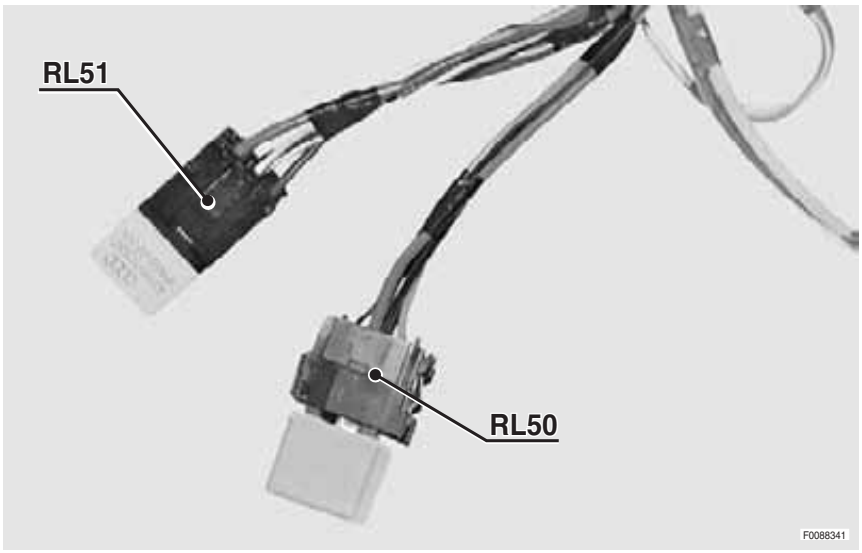
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CONNECTOR POSITIONS

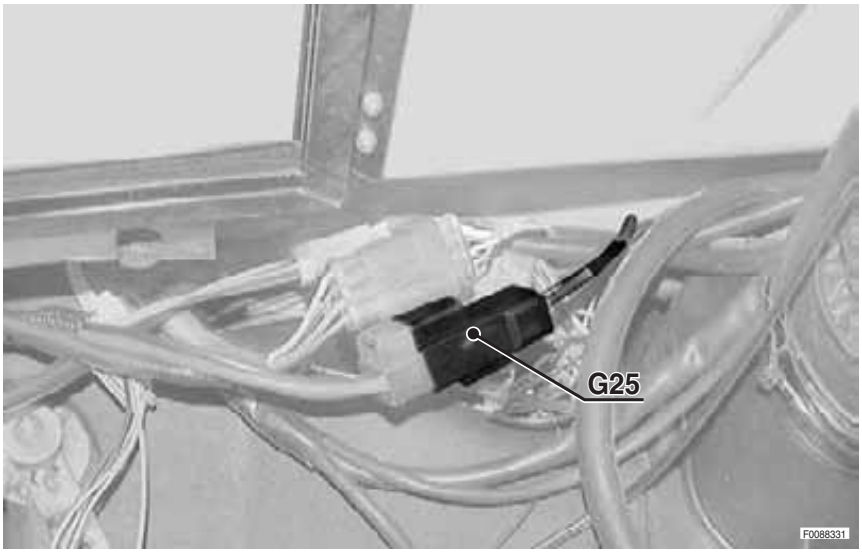
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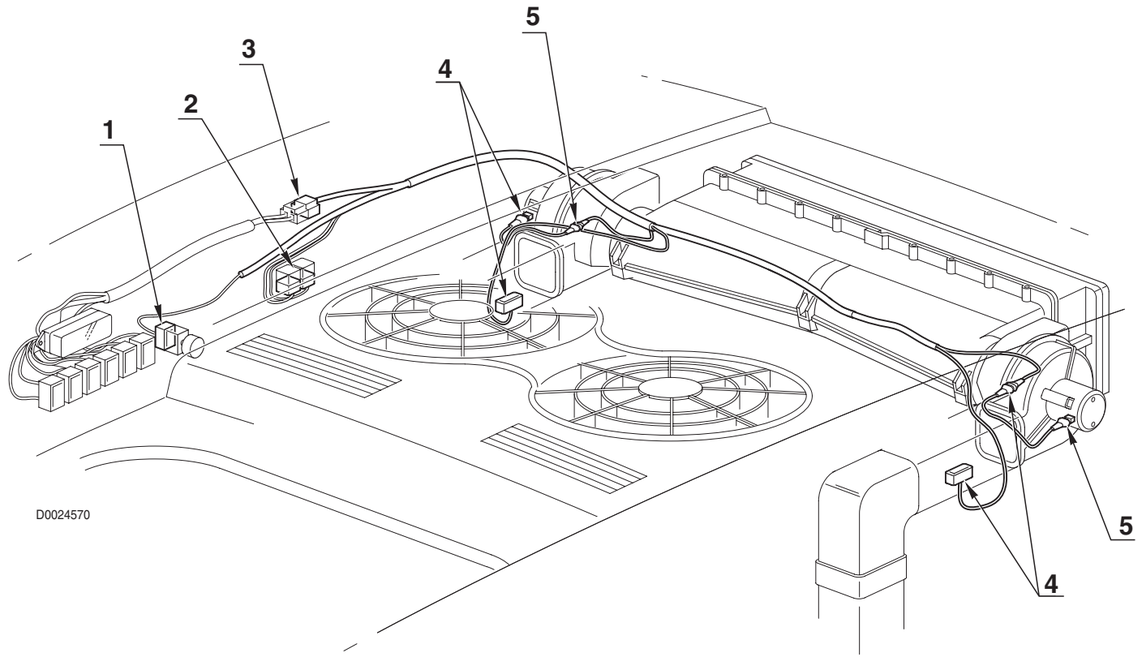


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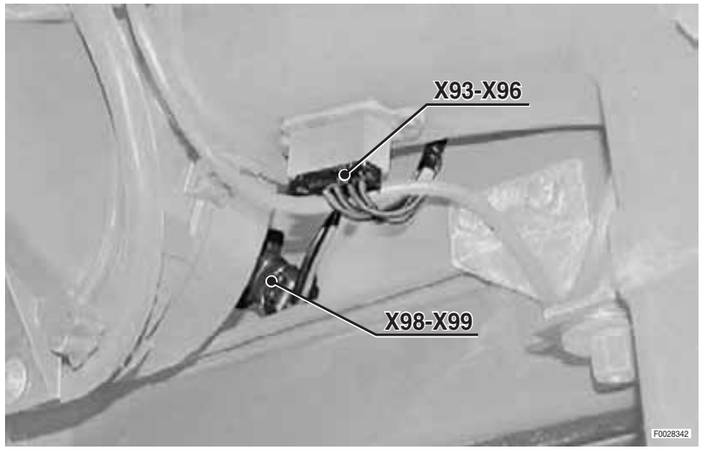


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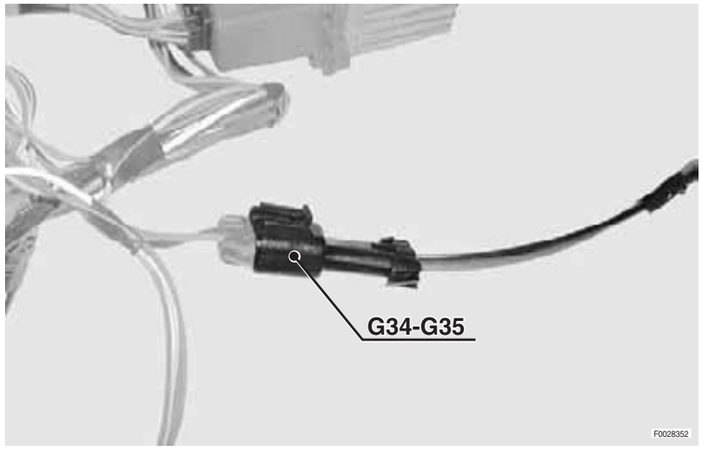
HEATER WIRING (HIGH.VISIBILITY CAB)



4

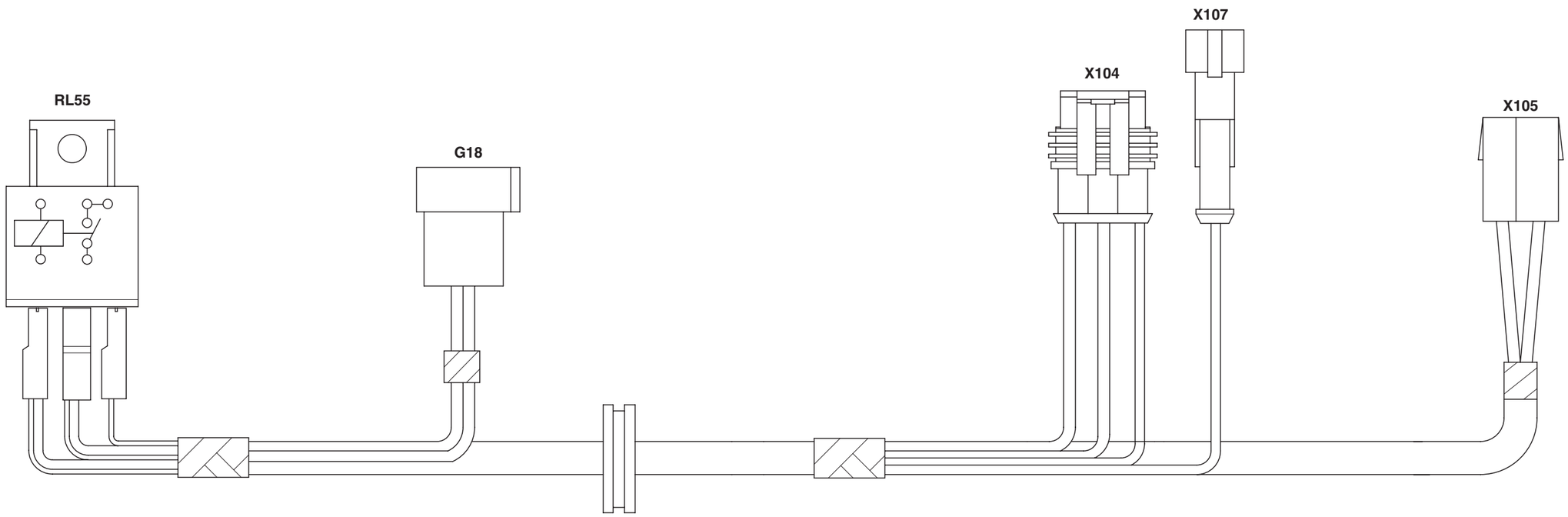


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AIR CONDITIONING FAN WIRING (STANDARD) (1/2)

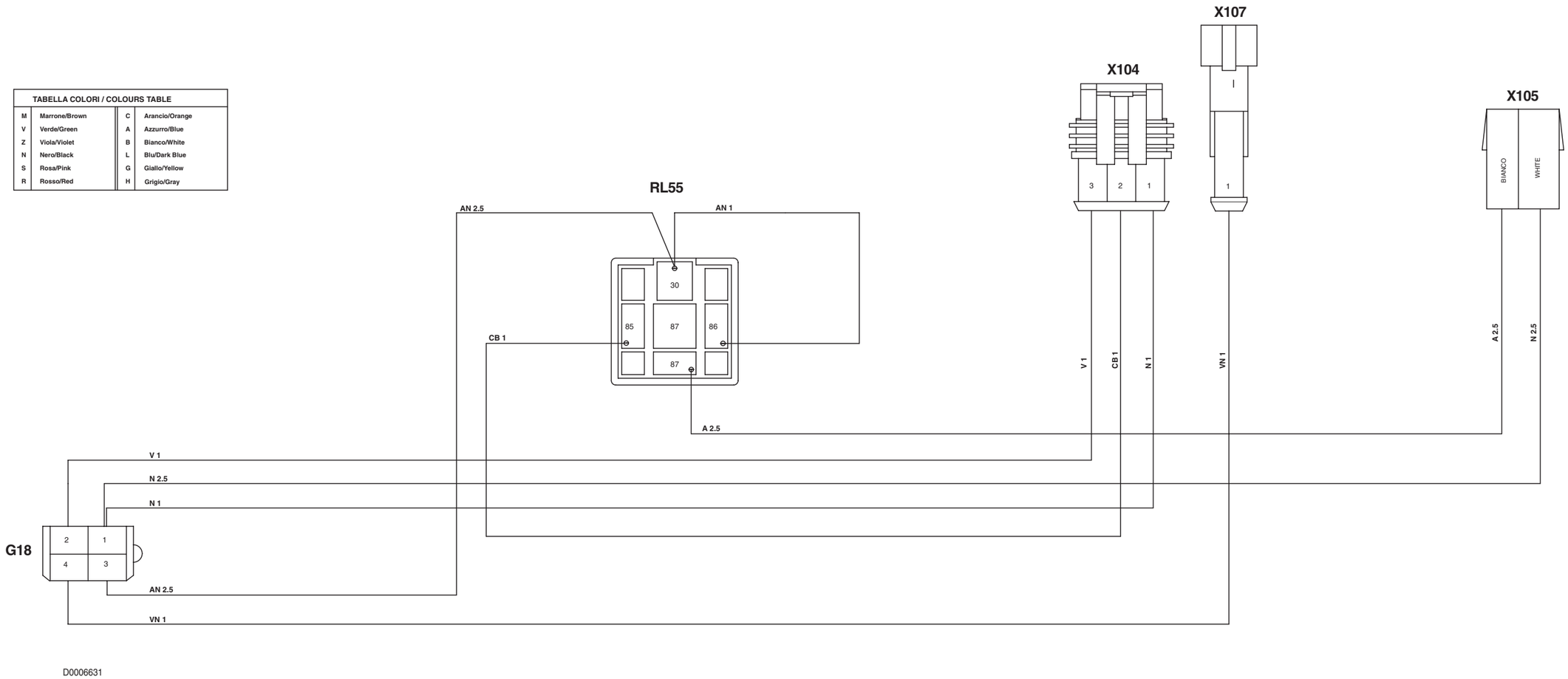


D0006621

G18 To roof line wiring 0.009.7850.4/50
RL55 Control relay for air conditioning fan
X104 Air conditioning pressure switch
X105 Air conditioning fan
X107 Air conditioning pressure switch

AIR CONDITIONING FAN WIRING (STANDARD) (2/2)

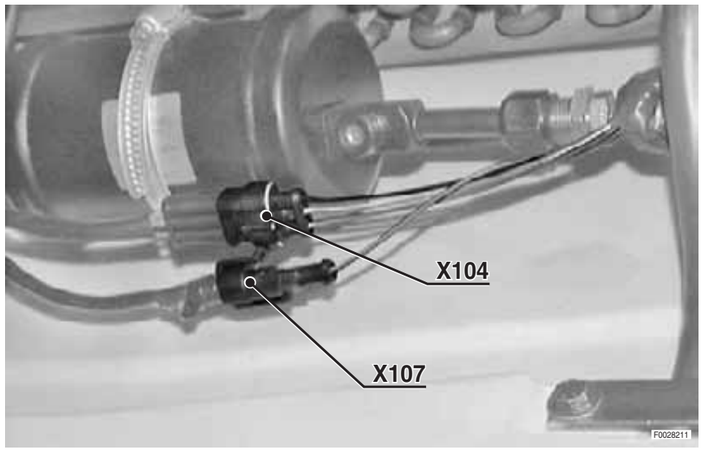
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M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray



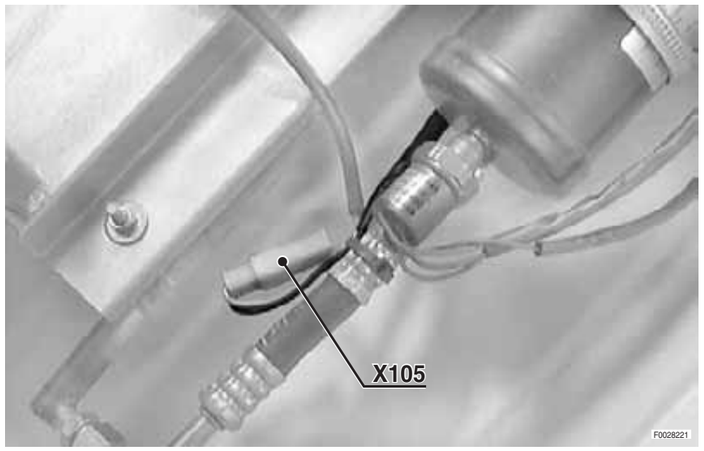
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AIR CONDITIONING FAN WIRING (STANDARD)

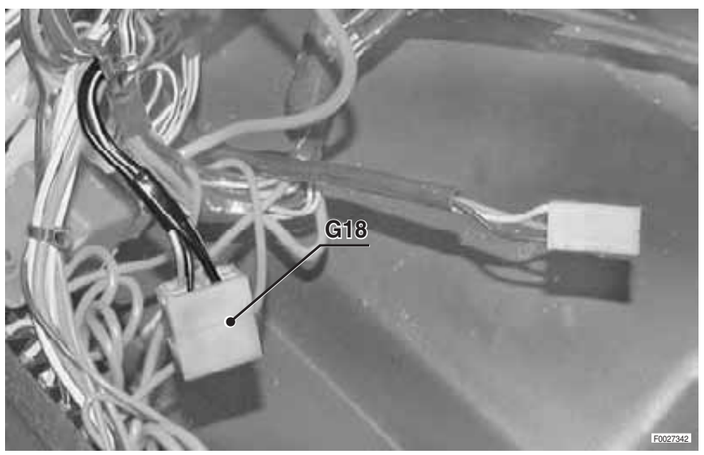
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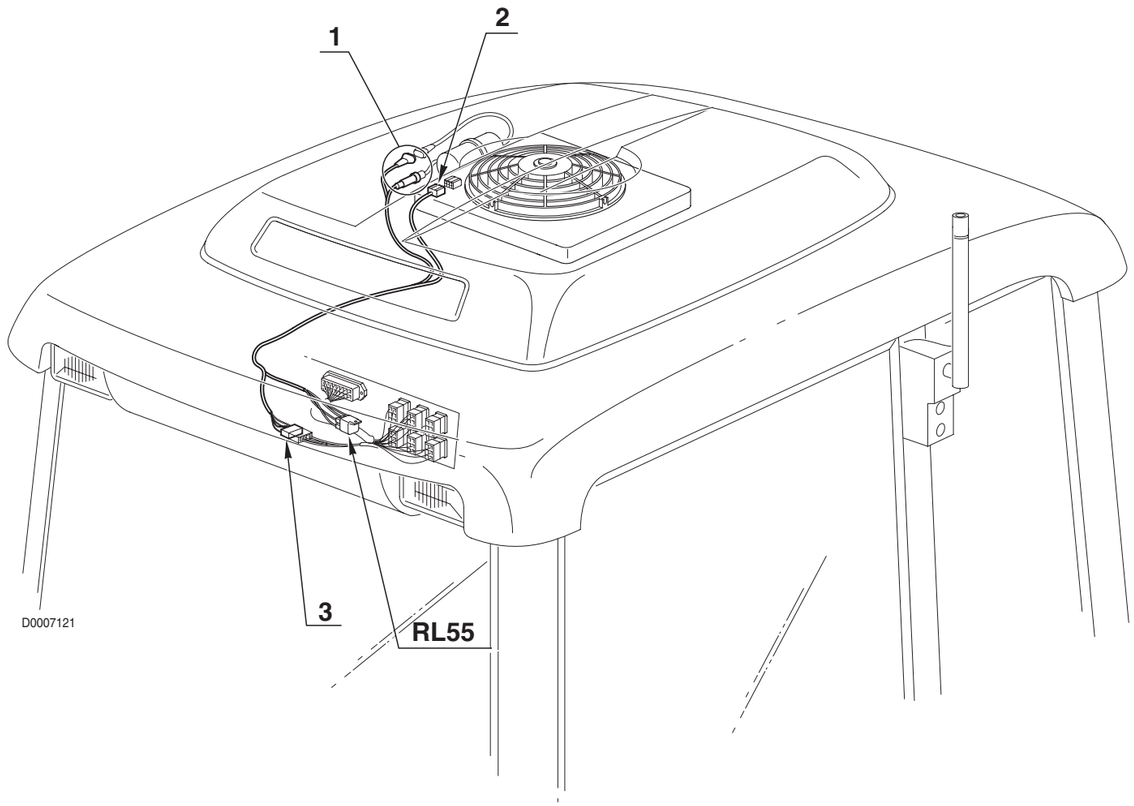


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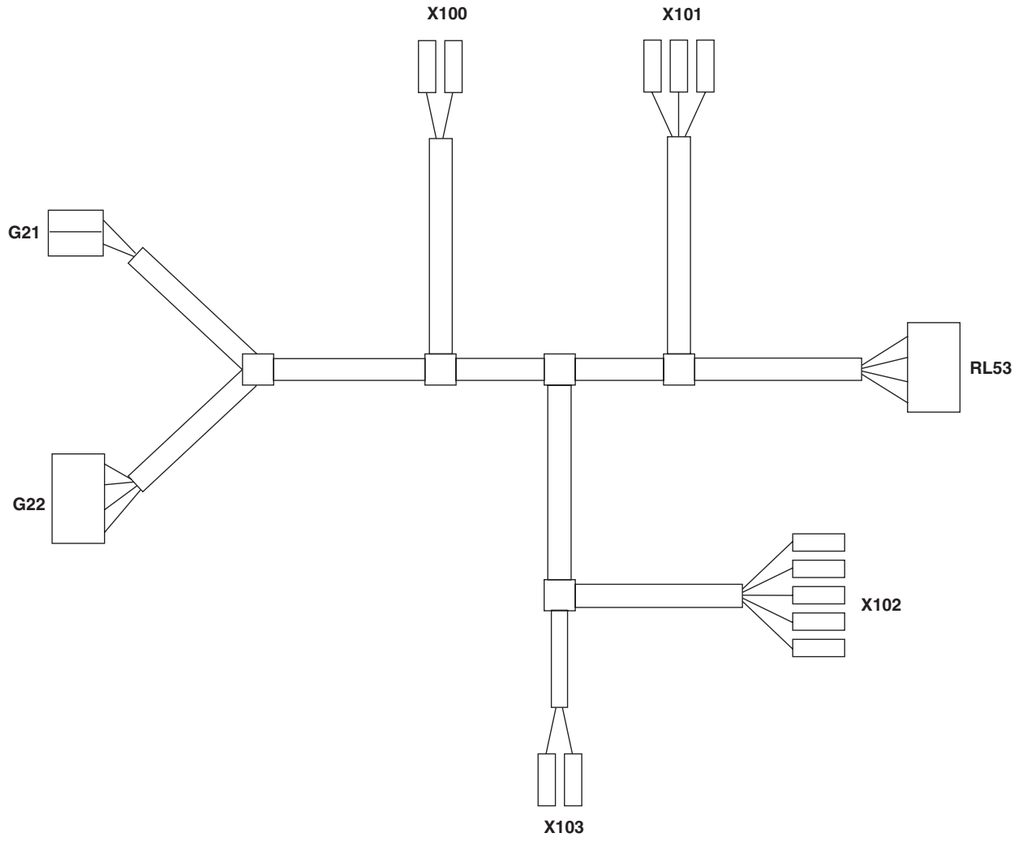
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AIR CONDITIONING WIRING (STANDARD CAB)



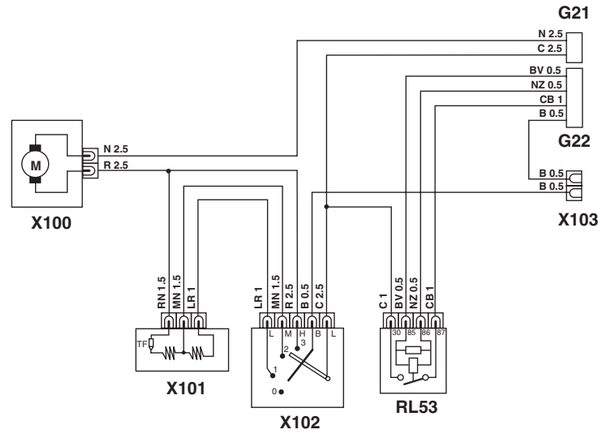


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

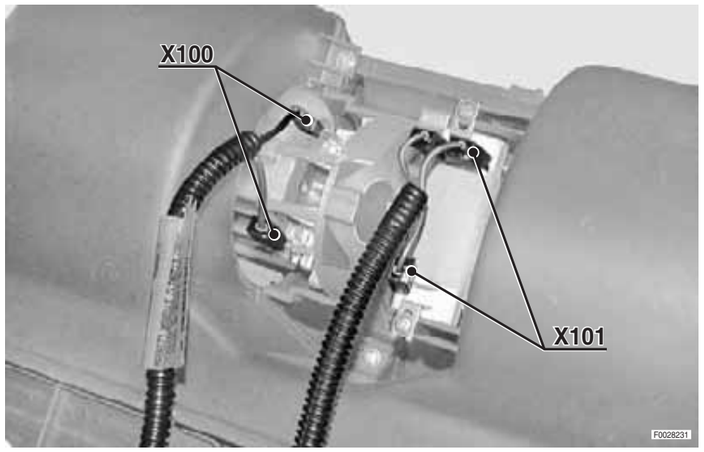
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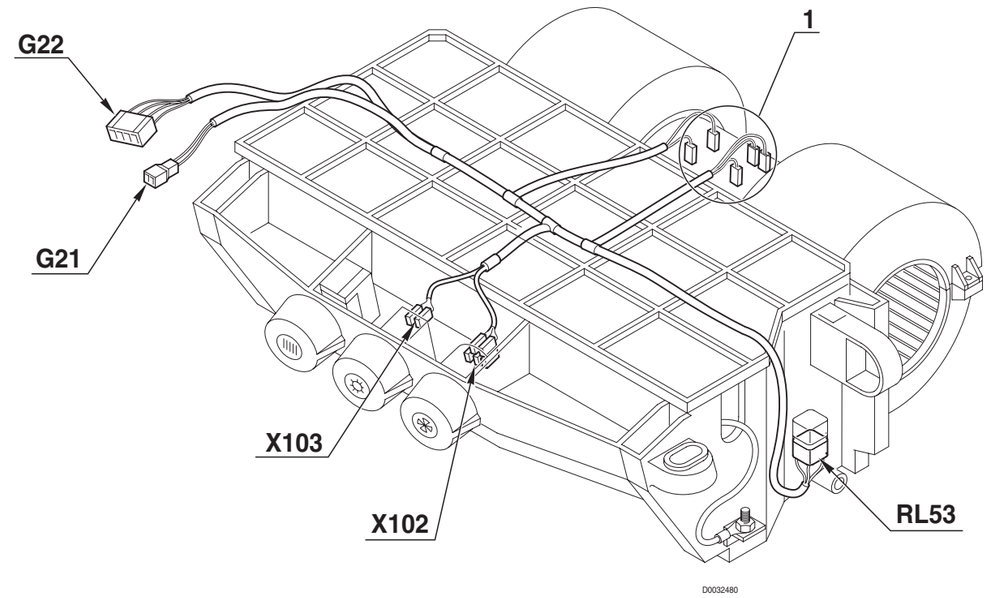
G21 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
G22 To roof line wiring 0.009.7850.4/50
RL53 Compressor relay
X100 Electric fan
X101 Resistor
*X102*Fan speed selector switch
X103 Air conditioning temperature control thermostat

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AIR CONDITIONING WIRING (STANDARD CAB)

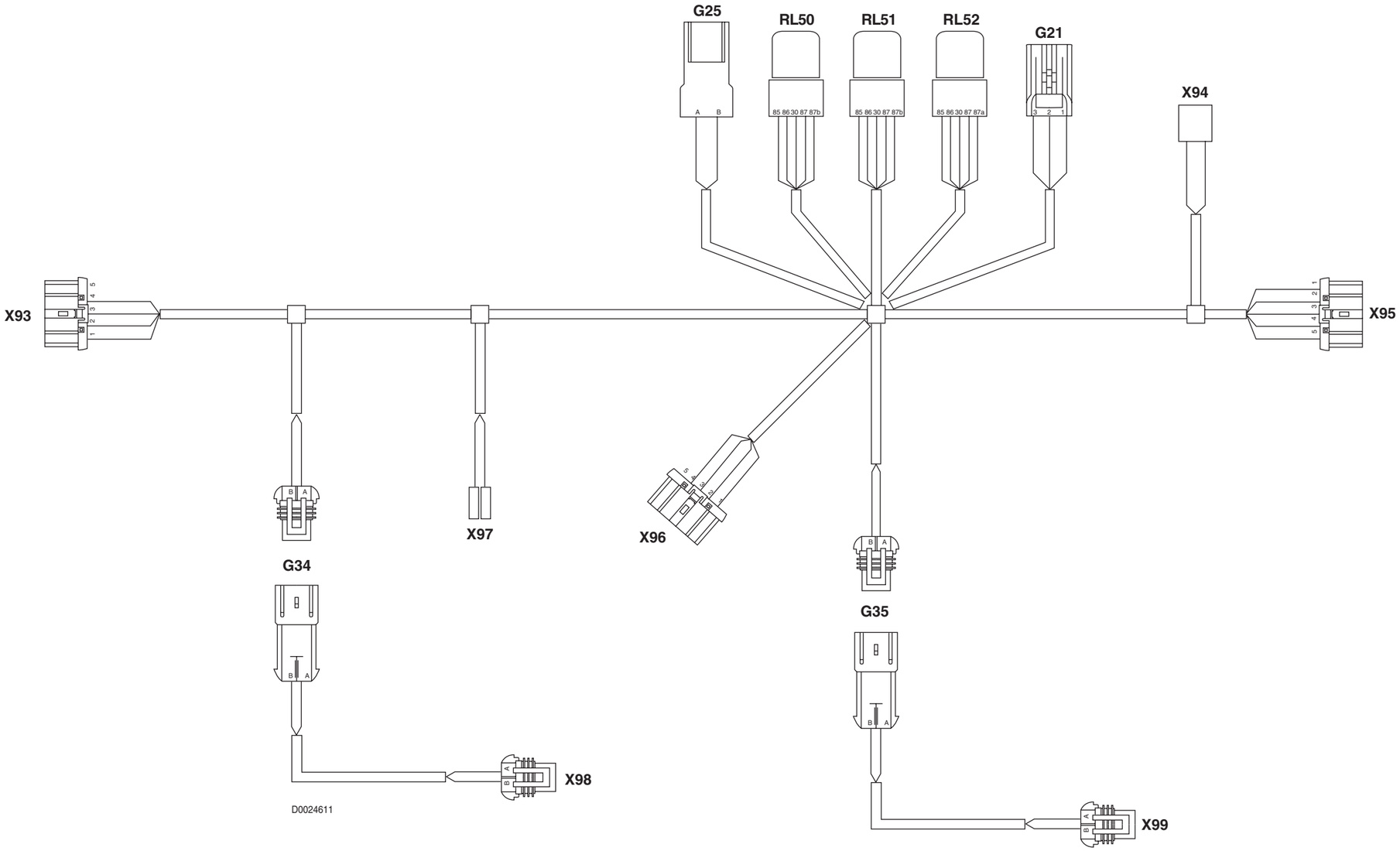
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AIR CONDITIONING WIRING (HIGH-VISIBILITY) (1/2)



G21 To roof line wiring 0.011.3606.4/50
G25 To roof line wiring 0.011.3606.4/50
G34 Wiring connector
G35 Wiring connector
*RL50*3rd blower speed relay
*RL51*Max. blower speed relay
*RL52*Relay and 1st speed starting in A/C relay

X93 Left resistor
X94 A/C switch
X95 CFan speed selector switch
X96 Right resistor
X97 Air conditioning temperature control thermostat
X98 Left fan
X99 Right fan

AIR CONDITIONING WIRING (HIGH-VISIBILITY) (2/2)

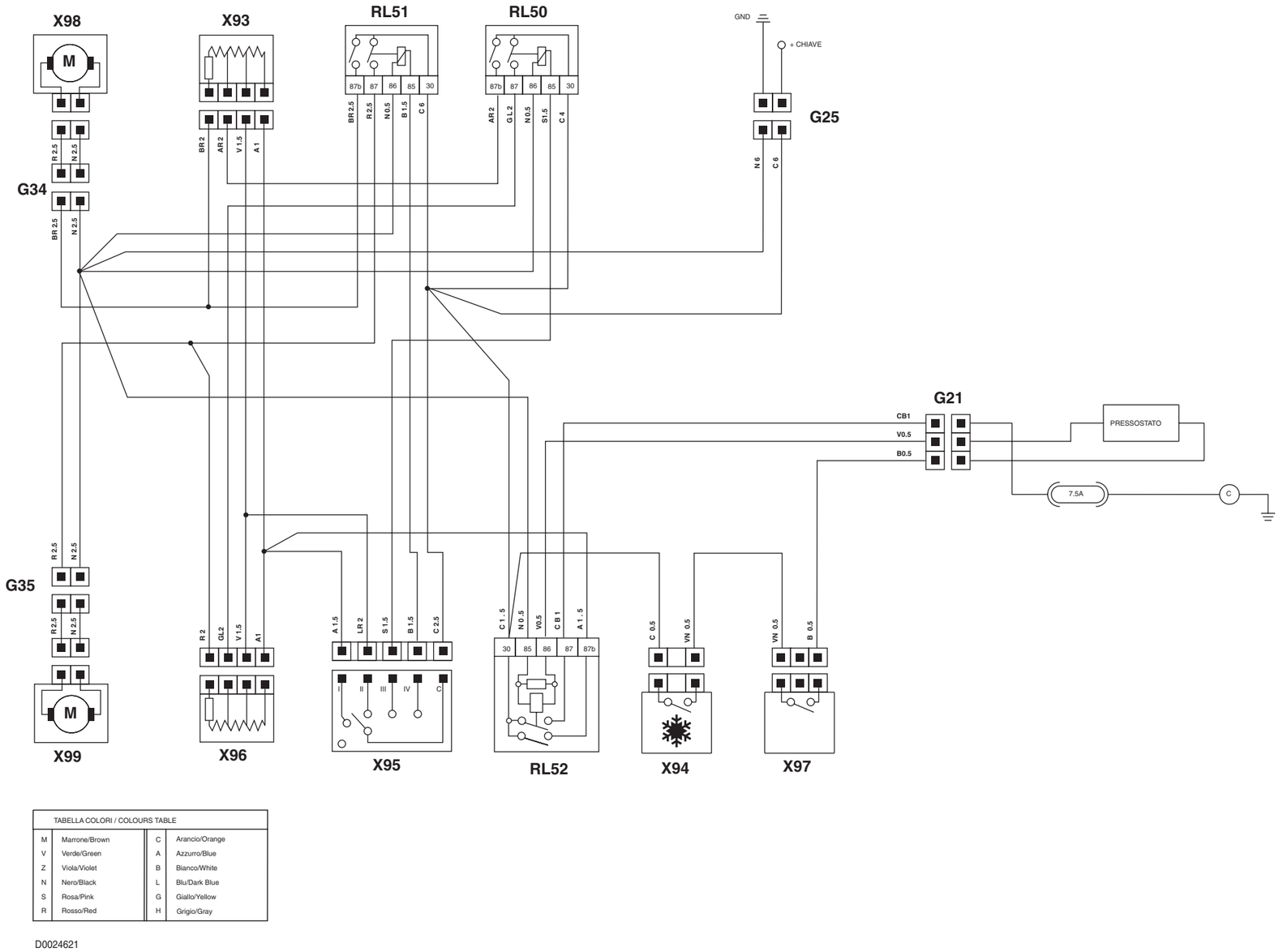
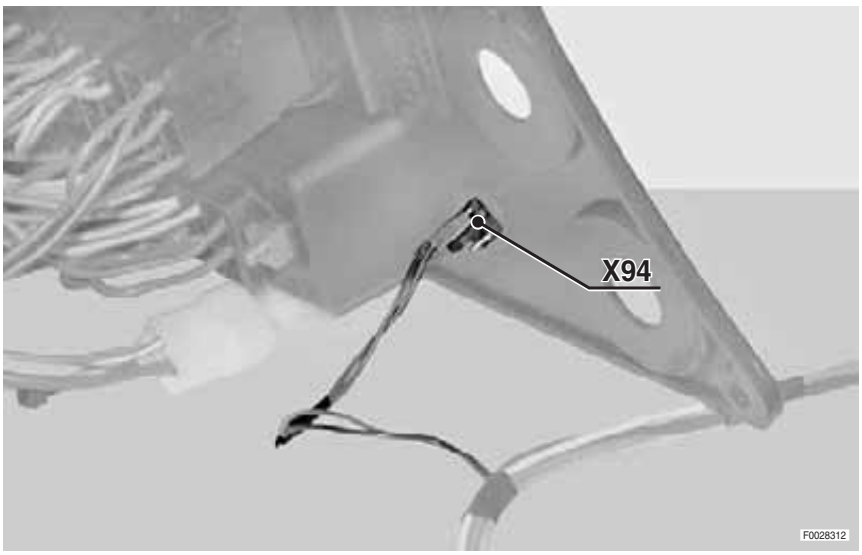


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0024621

CONNECTOR POSITIONS

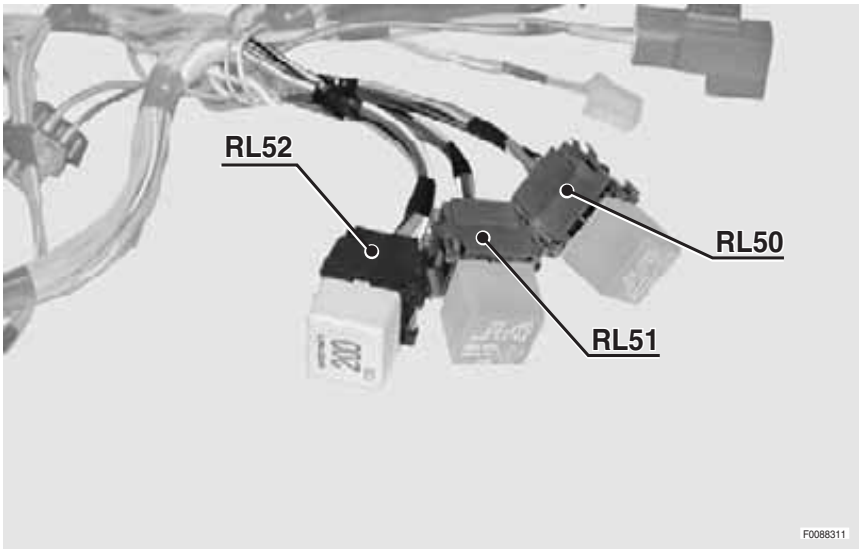
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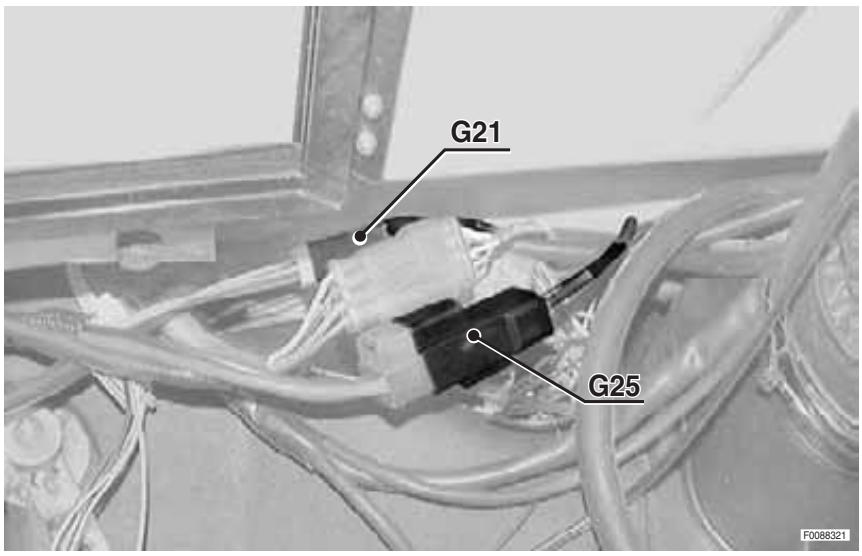
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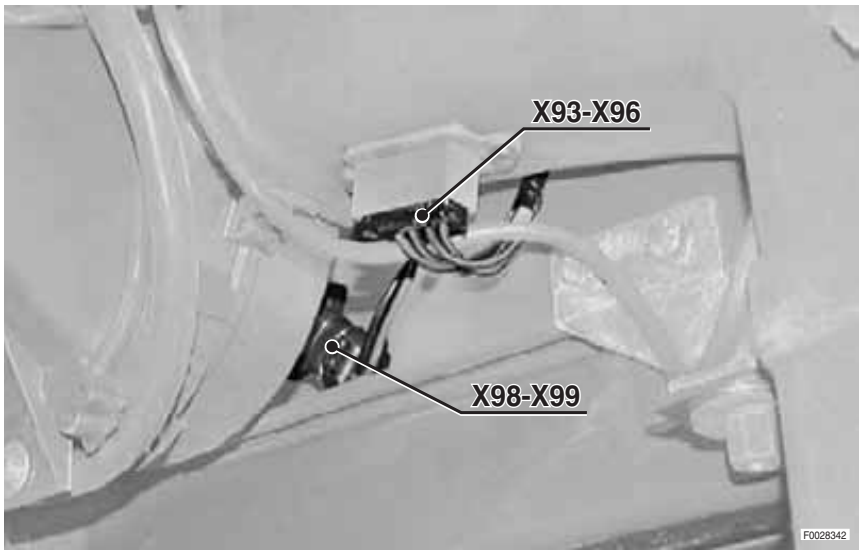
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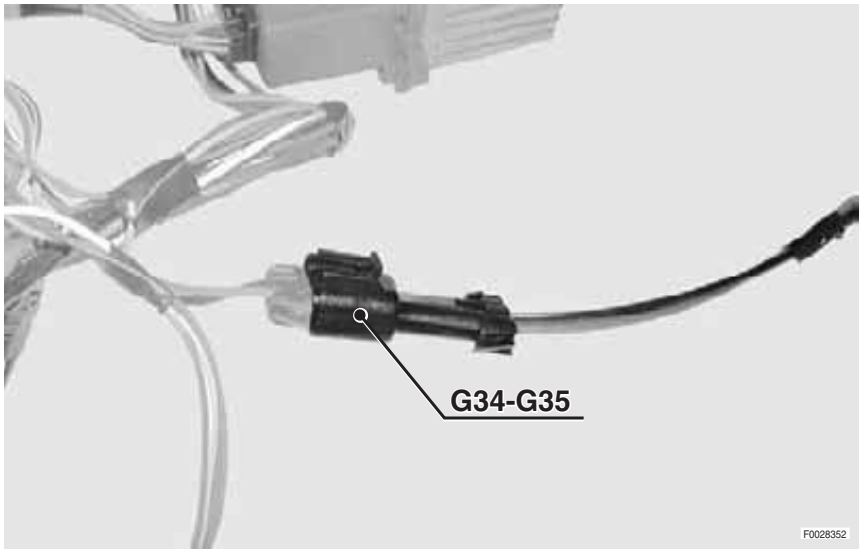
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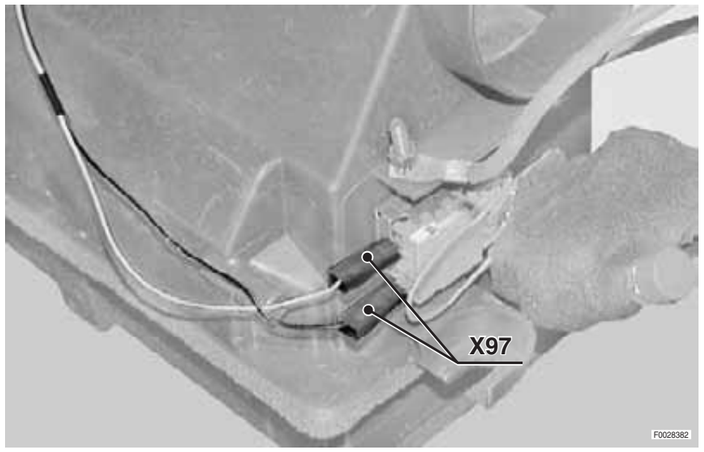
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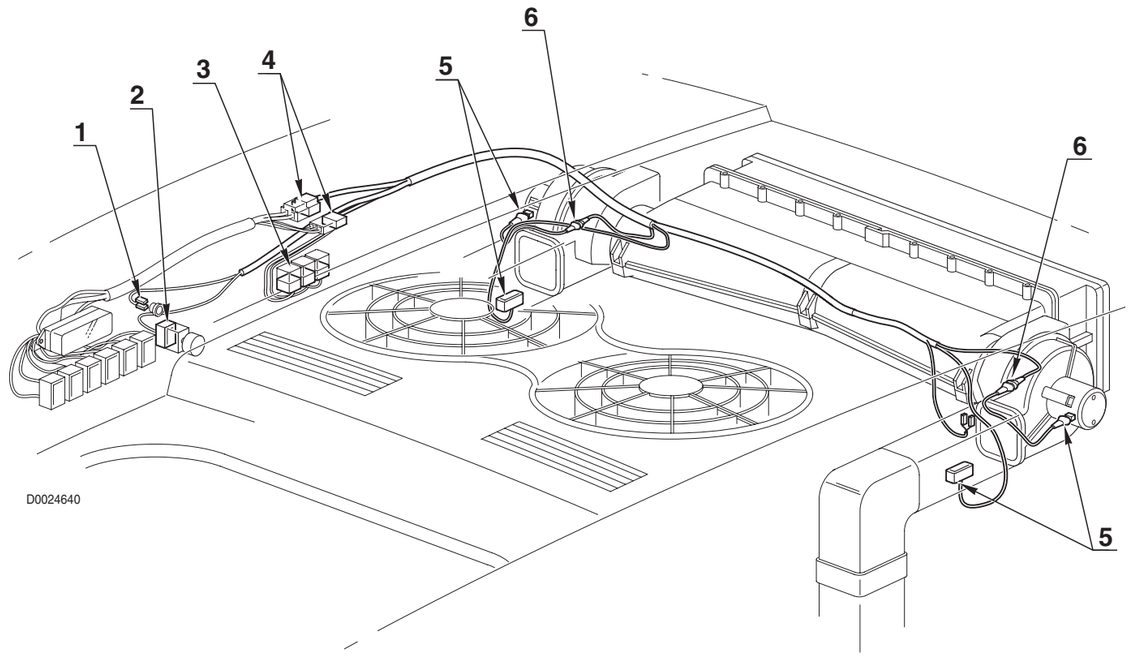
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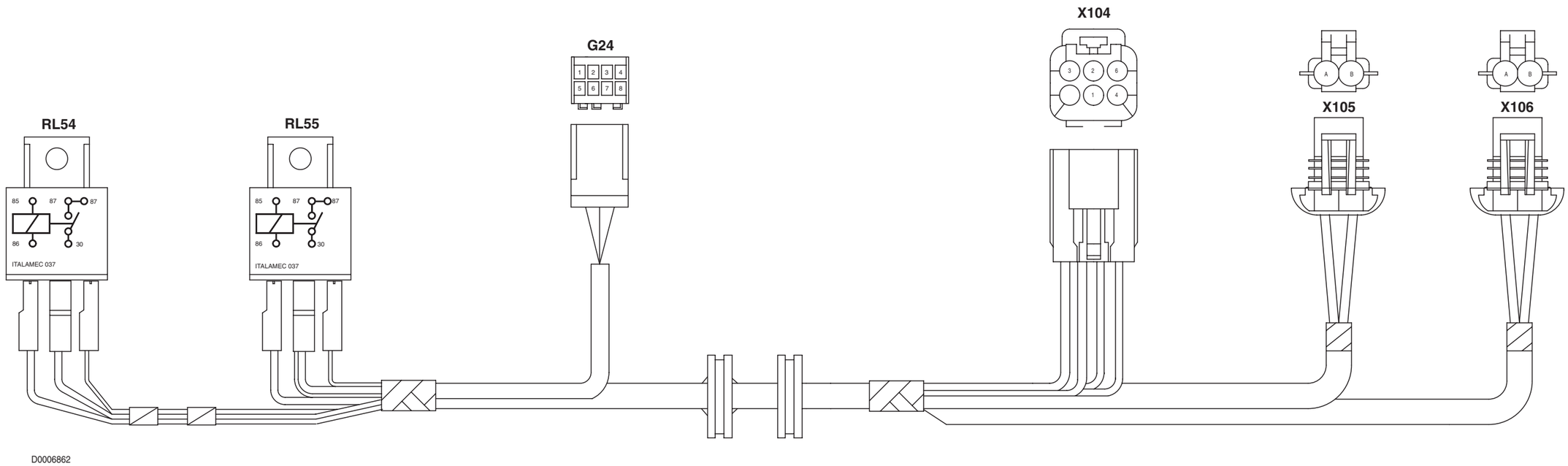


AIR CONDITIONING WIRING (HIGH-VISIBILITY)



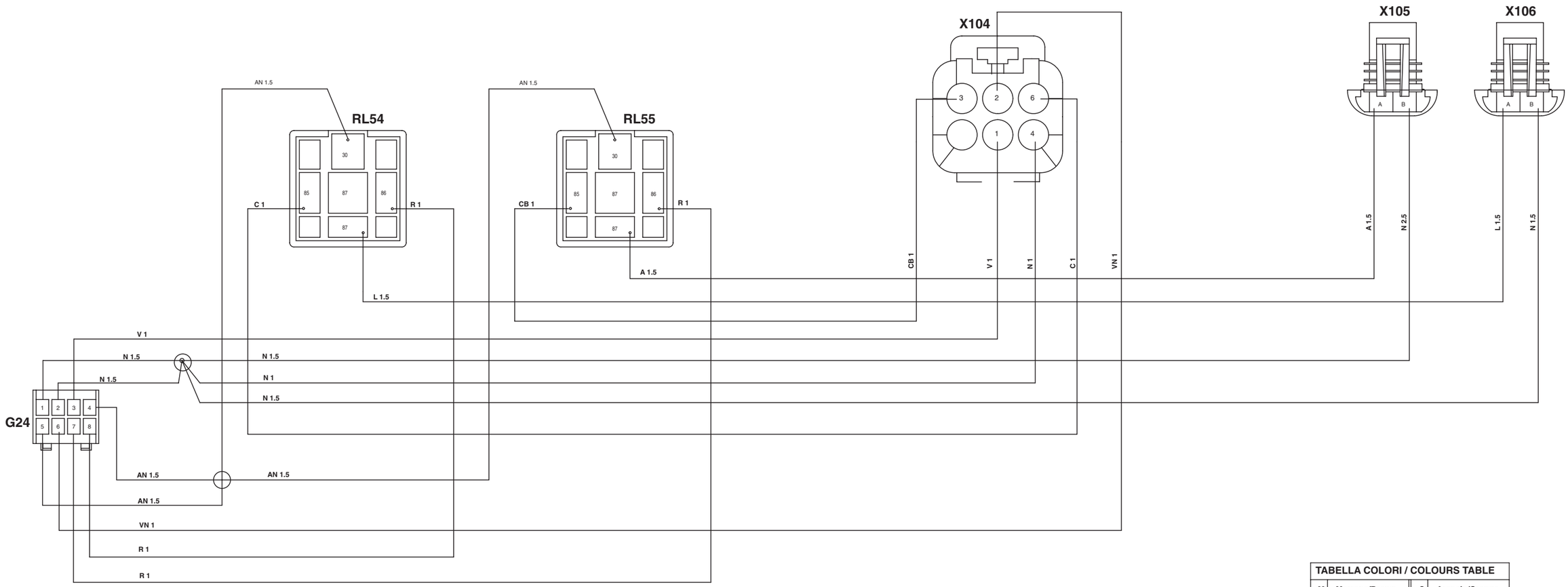
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AIR CONDITIONING FAN WIRING (HIGH-VISIBILITY) (1/2)



G24 To roof line wiring 0.011.3606.4/50
RL54 Control relay for supplementary air conditioning fan
RL55 Control relay for air conditioning fan
X104 Air conditioning pressure switch
X105 Air conditioning pressure switch
X106 Supplementary air conditioning fan

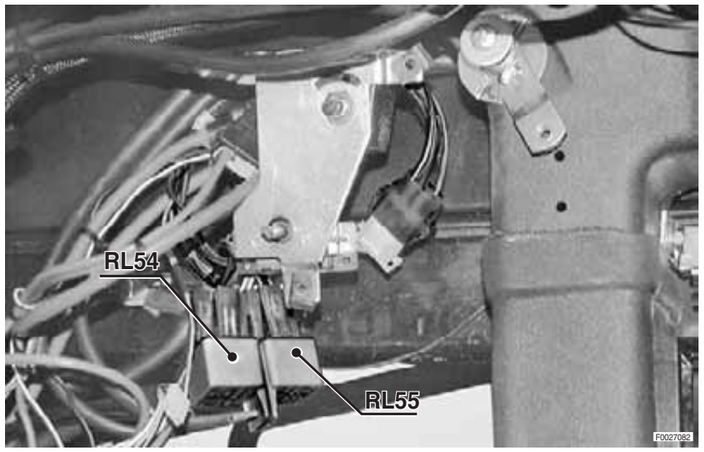
AIR CONDITIONING FAN WIRING (HIGH-VISIBILITY) (2/2)



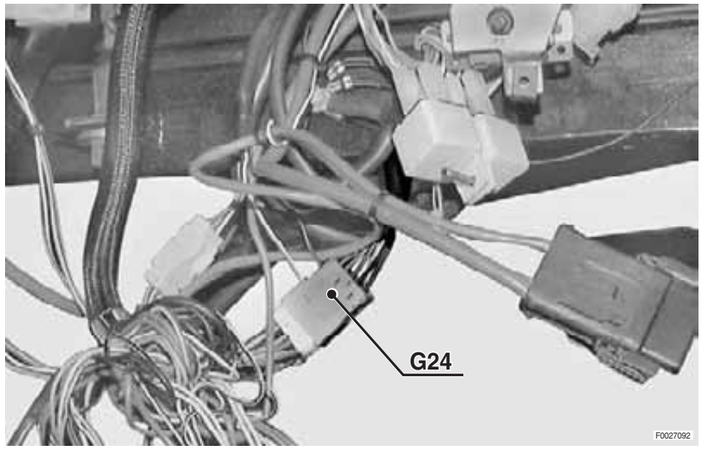
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TABELLA COLORI / COLOURS TABLE			
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V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

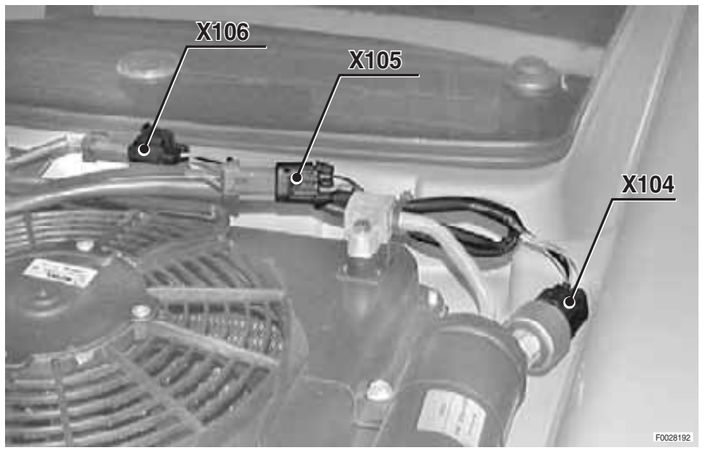
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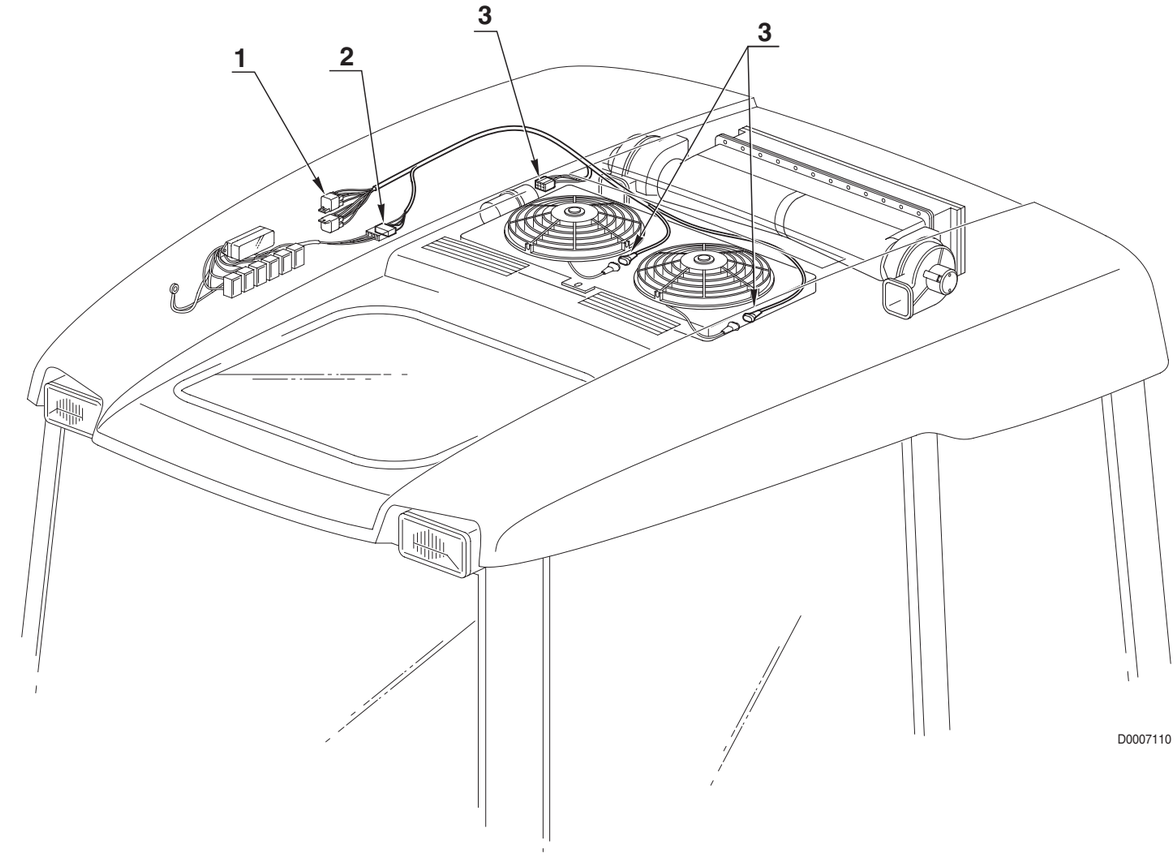
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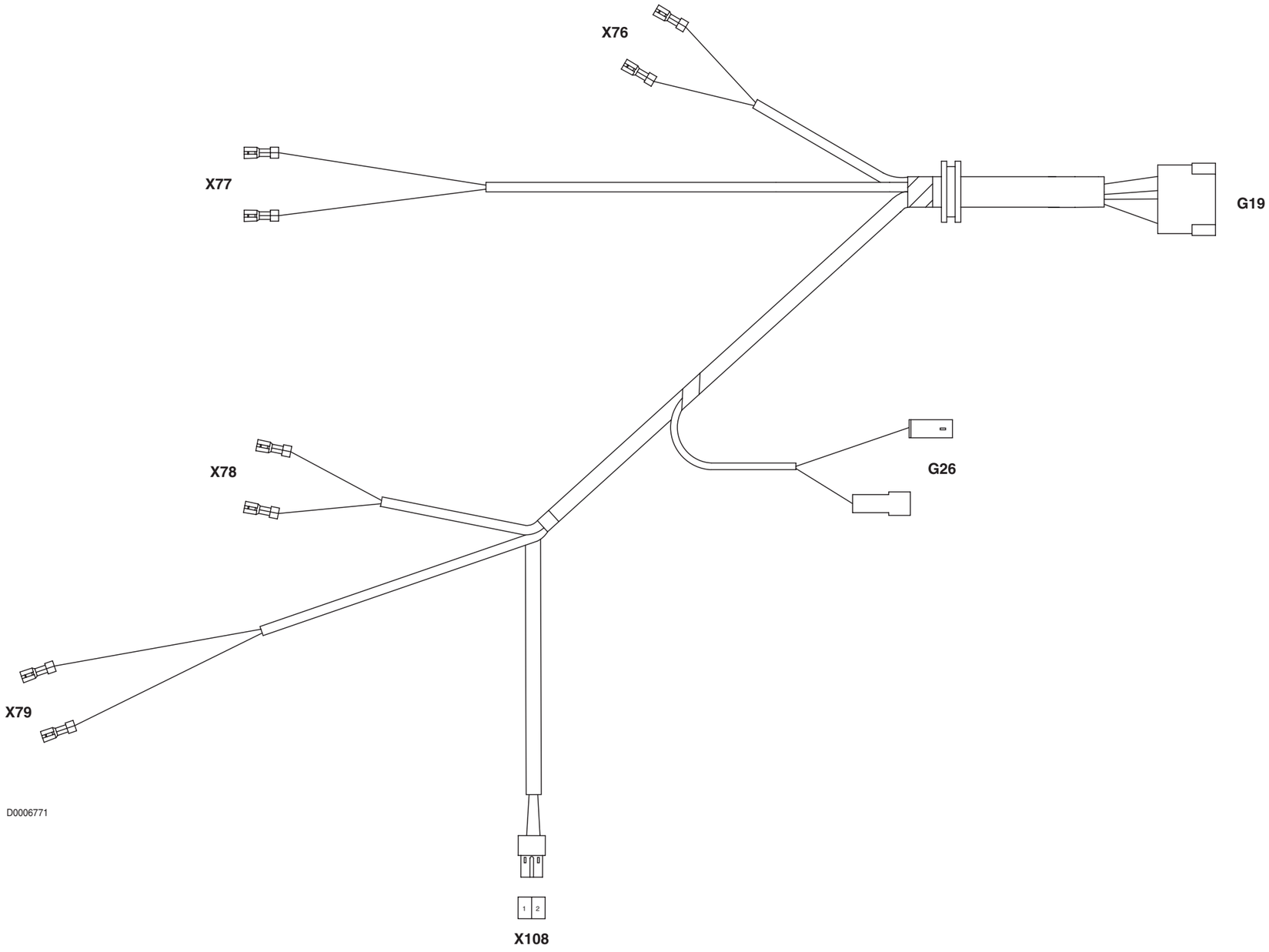


AIR CONDITIONING FAN WIRING (HIGH-VISIBILITY)



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WORKLIGHTS WIRING (STANDARD CAB) (1/2)



G19 To roof line wiring 0.009.7850.4/50
or 0.011.3606.4/50
G26 To rotating beacon wiring 0.012.9909.4
X108 Rear window wiper motor
X76 Right front worklight
X77 Left front worklight
X78 Left rear worklight
X79 Right rear worklight

WORKLIGHTS WIRING (STANDARD CAB) (2/2)

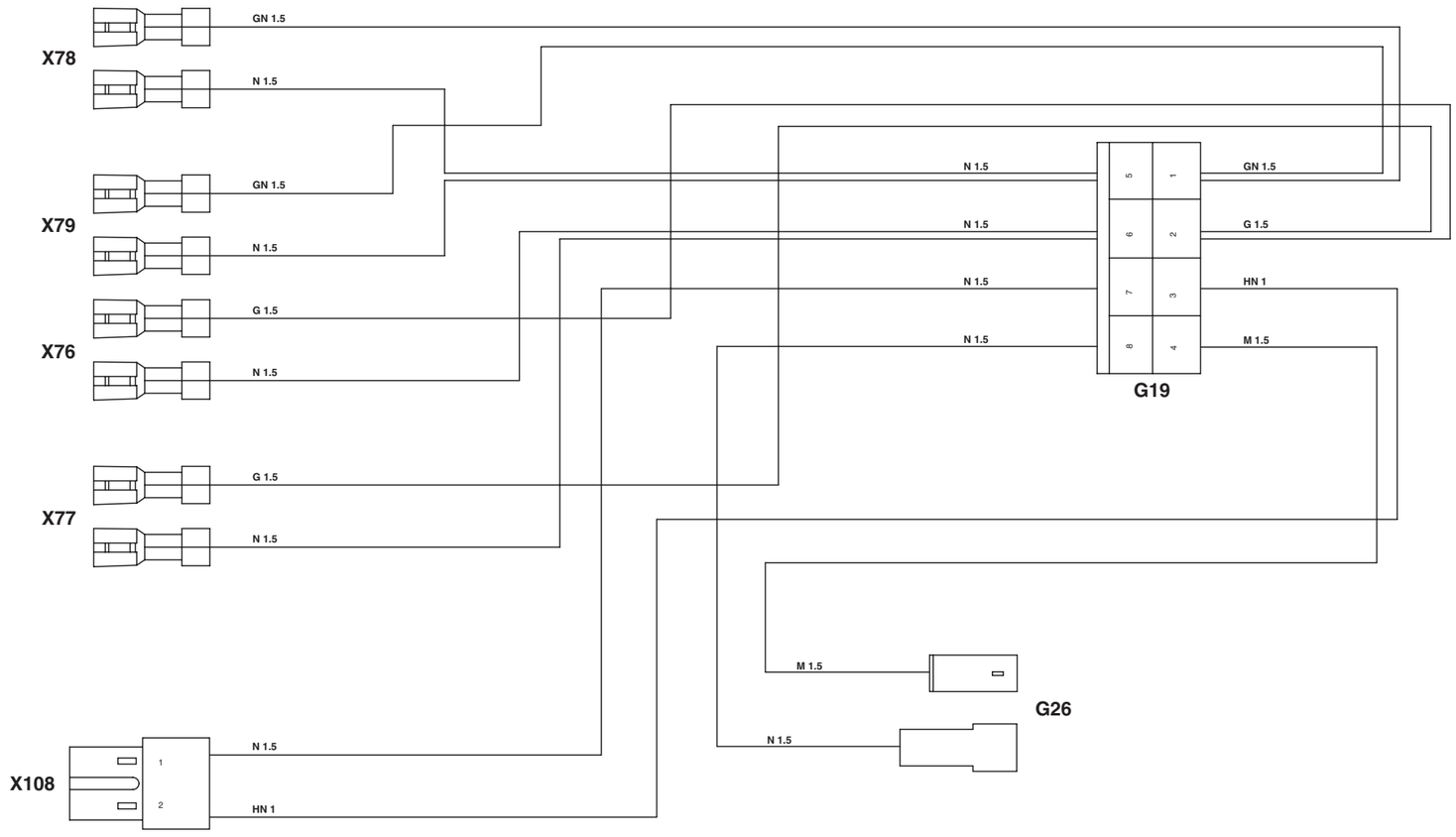
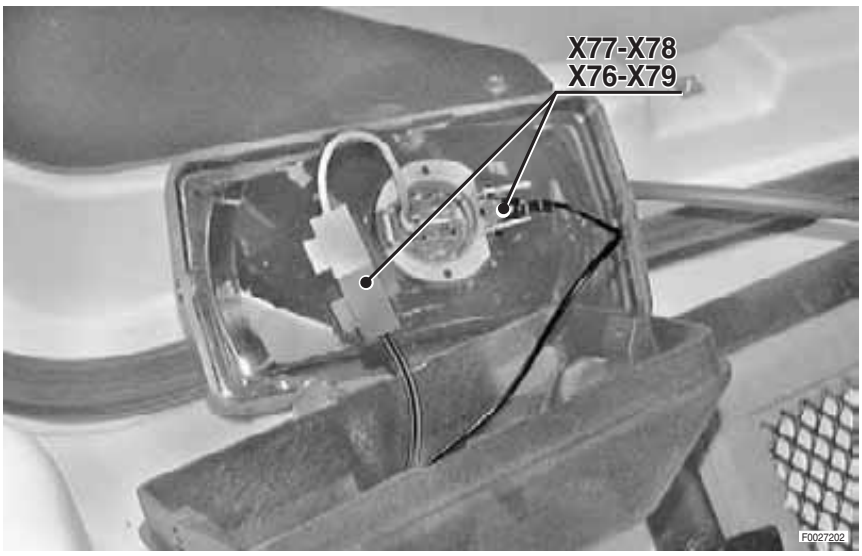


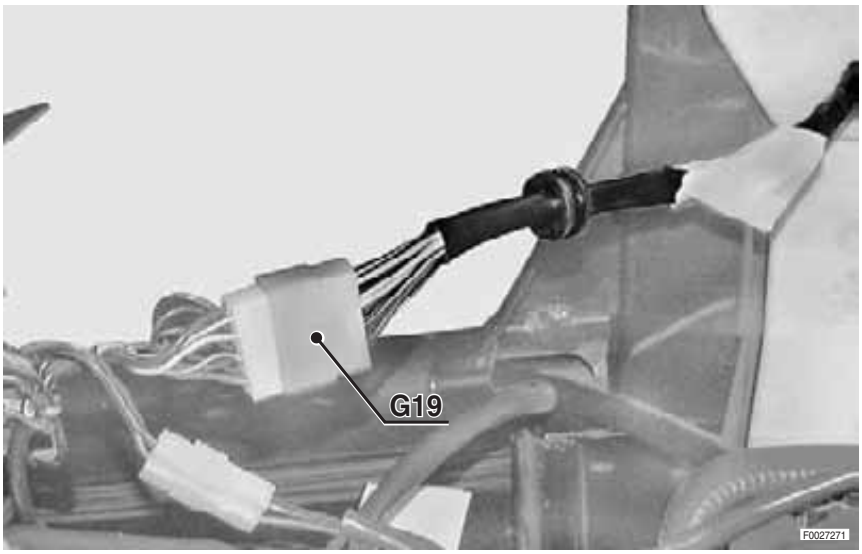
TABELLA COLORI / COLOURS TABLE			
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N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

CONNECTOR POSITIONS

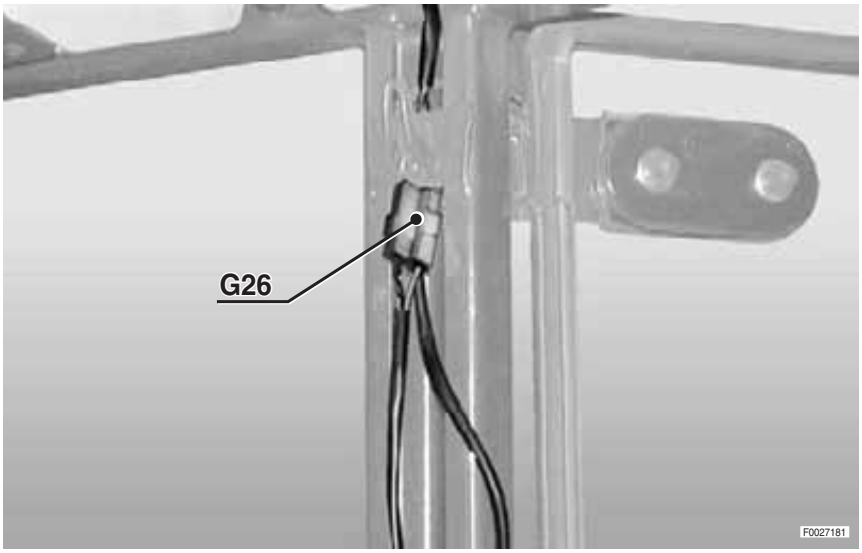
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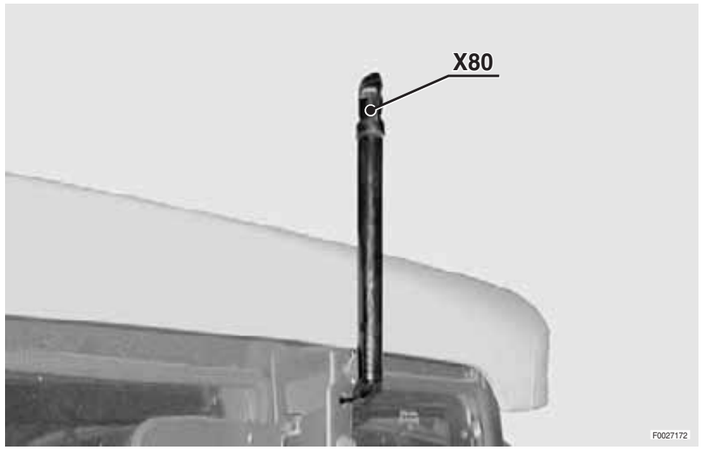
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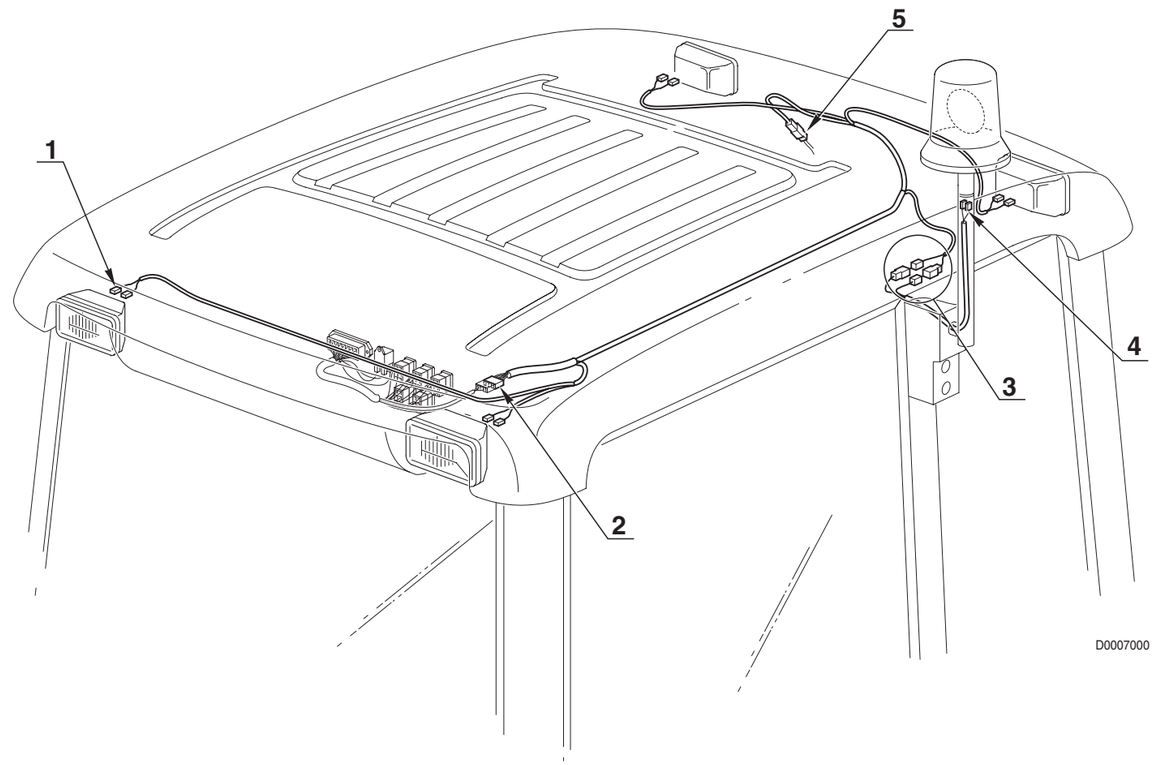
WORKLIGHTS WIRING (STANDARD CAB)

4



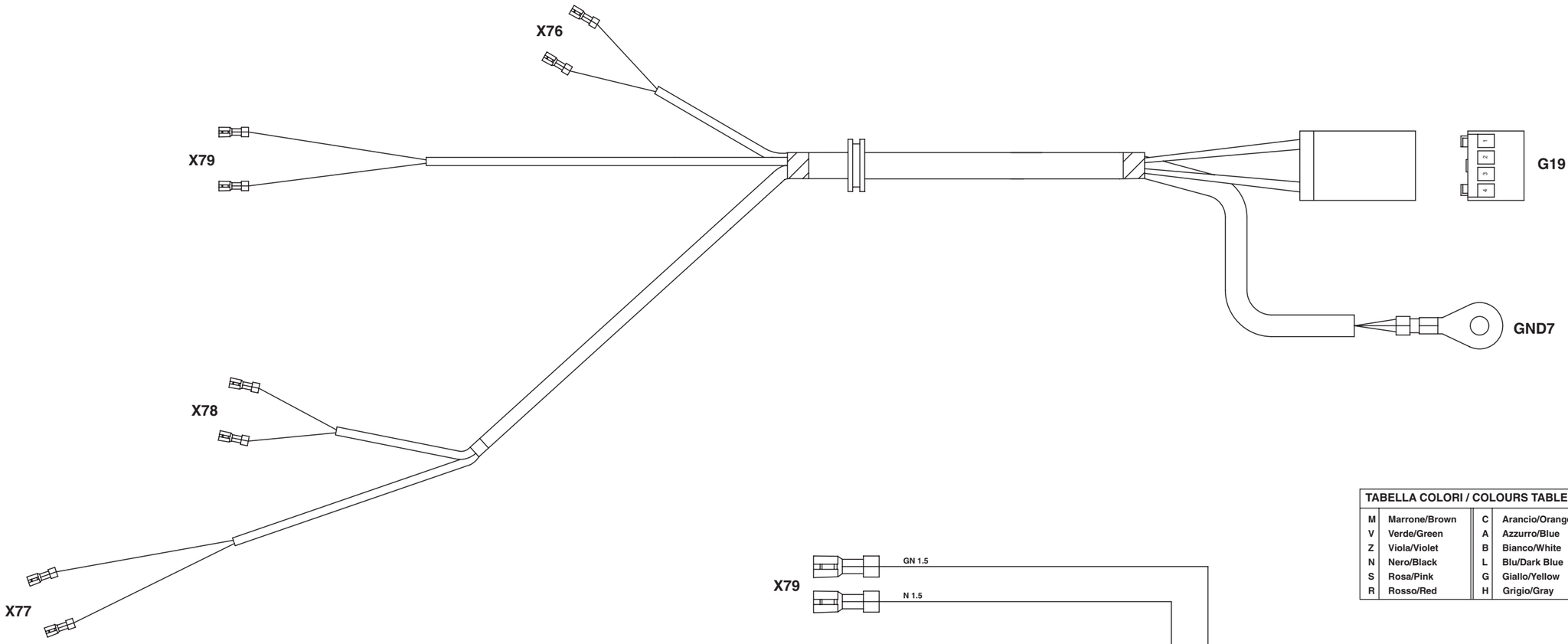
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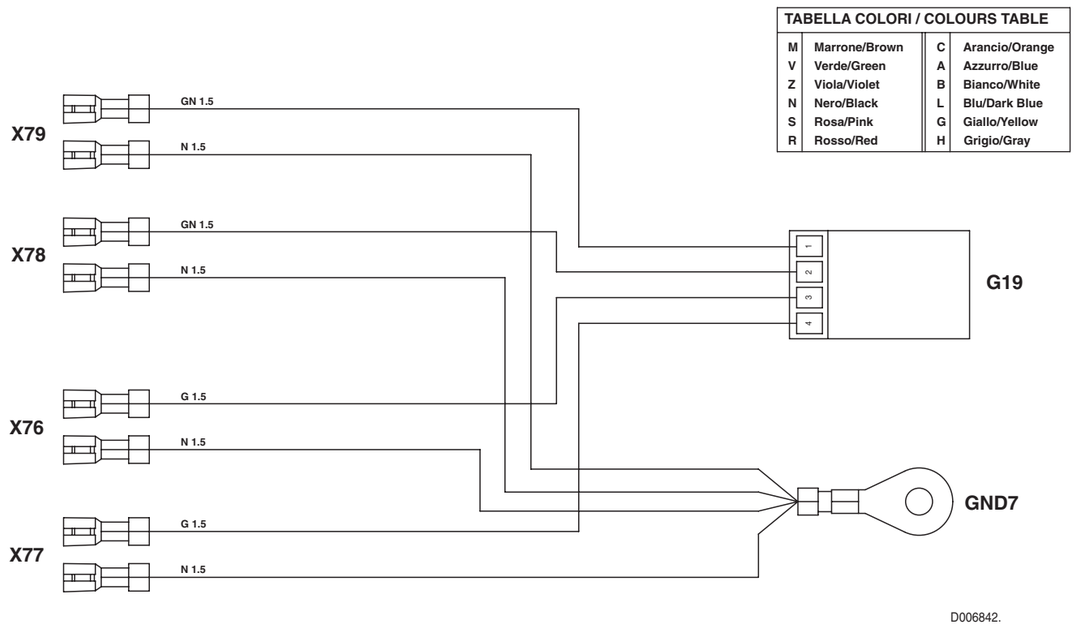




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WIRING FOR WORKLIGHTS (HIGH-VISIBILITY)

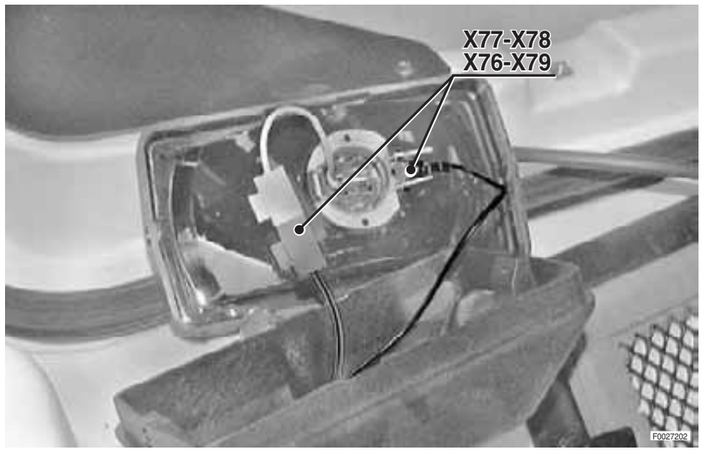




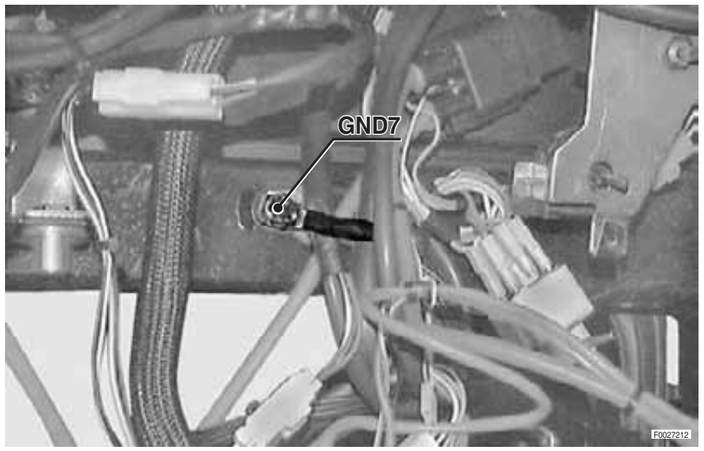
G19 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
GND7 Earthing point 7
X76 Right front worklight
X77 Left front worklight
X78 Left rear worklight
X79 Right rear worklight

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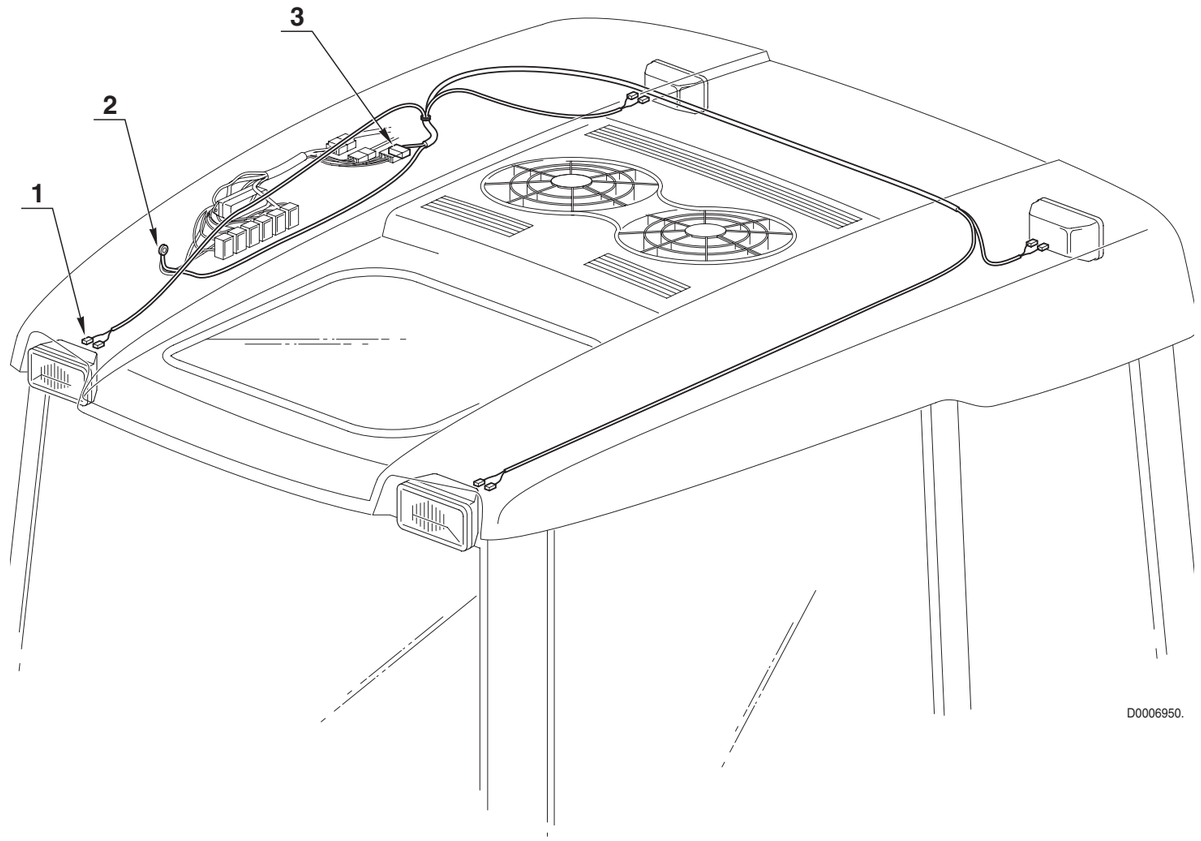
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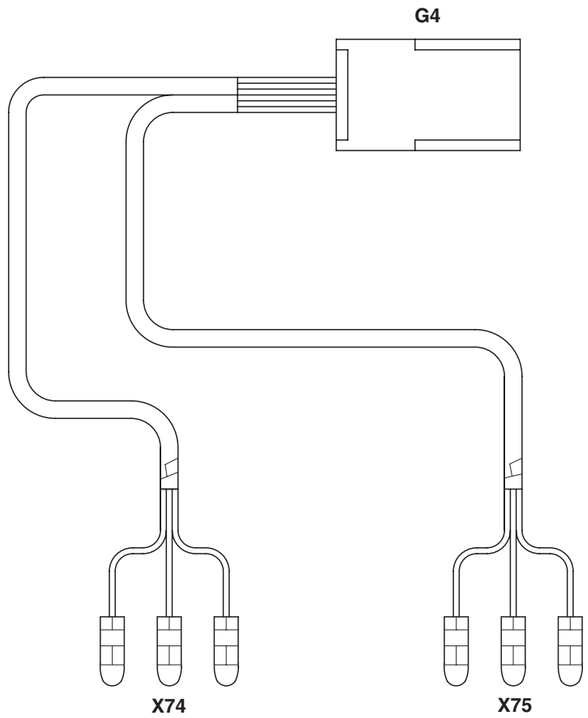


WIRING FOR WORKLIGHTS (HIGH-VISIBILITY)



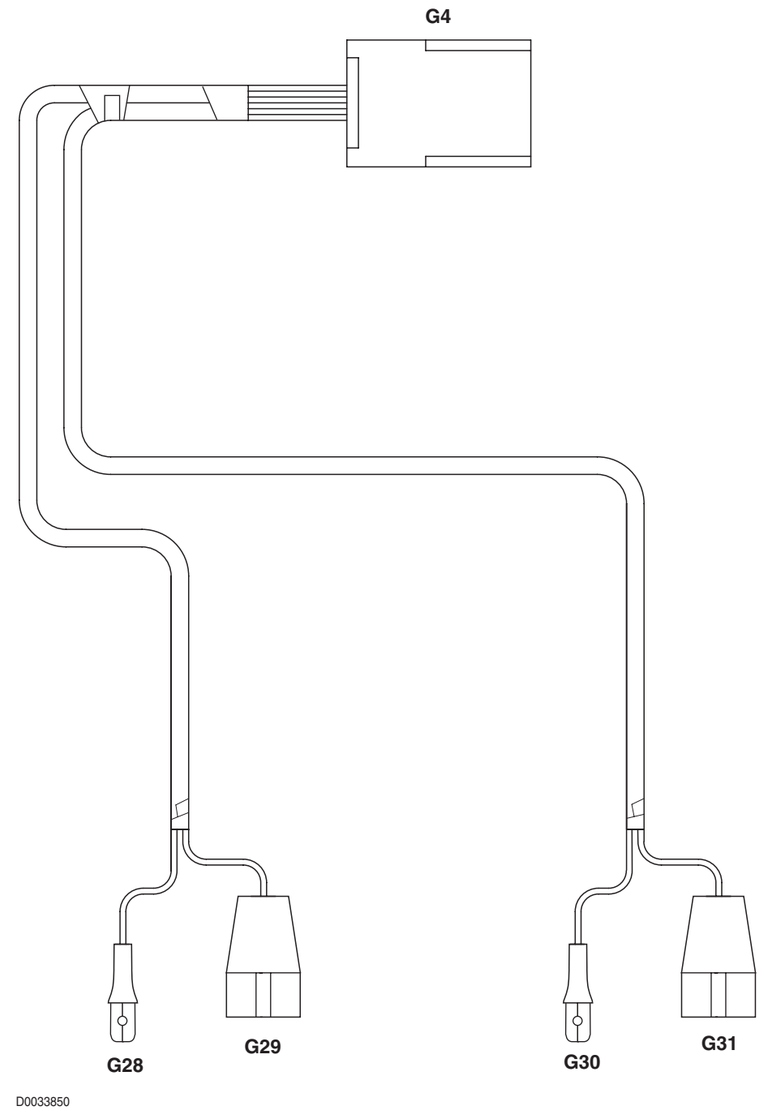
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FRONT LIGHTS WIRING (VERSION WITH CAB)



G4 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
X74 Front right sidelight and direction indicator
X75 Front left sidelight and direction indicator

FRONT LIGHTS WIRING (VERTICAL EXHAUST SILENCER)



G4 To central wiring 0.014.0880.4/50 or 0.014.0881.4/40
G28 To wiring for lower front lights on cab 0441.1923.4
G29 To wiring for lower front lights on cab 0441.1923.4
G30 To wiring for lower front lights on cab 0441.1923.4
G31 To wiring for lower front lights on cab 0441.1923.4

WIRING FOR LOWER FRONT LIGHTS ON CAB (VERTICAL EXHAUST SILENCER)



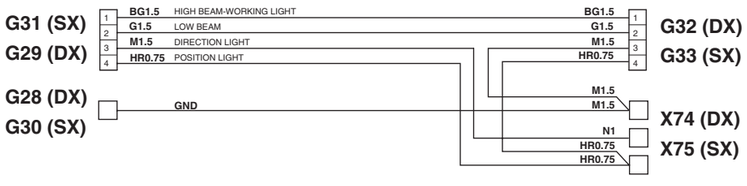


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

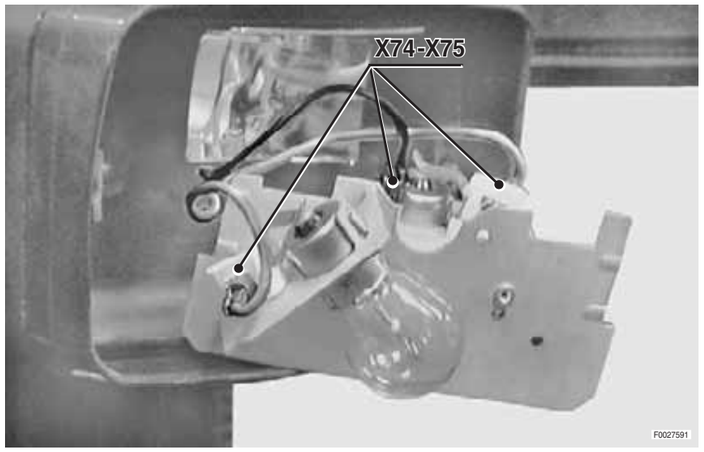
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G28 To front lights wiring 0.011.0924.3
G29 To front lights wiring 0.011.0924.3
G30 To front lights wiring 0.011.0924.3
G31 To front lights wiring 0.011.0924.3
G32 Not utilised
G33 Not utilised
X74 Front right sidelight and direction indicator
X75 Front left sidelight and direction indicator

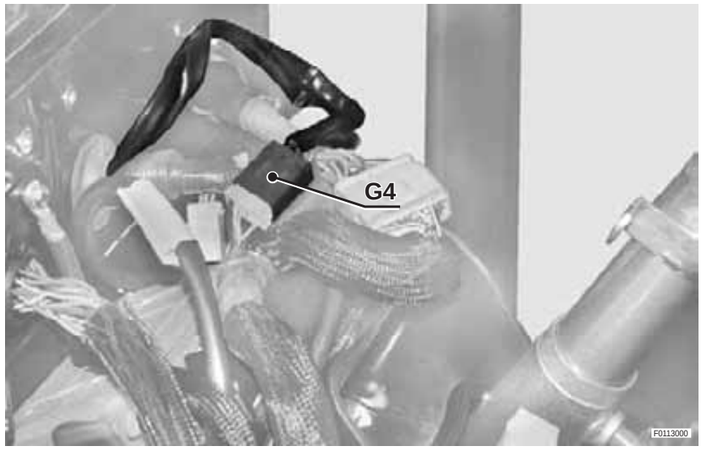
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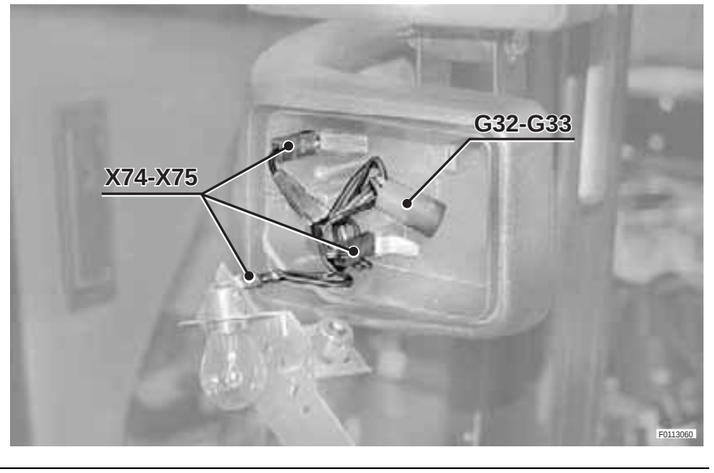
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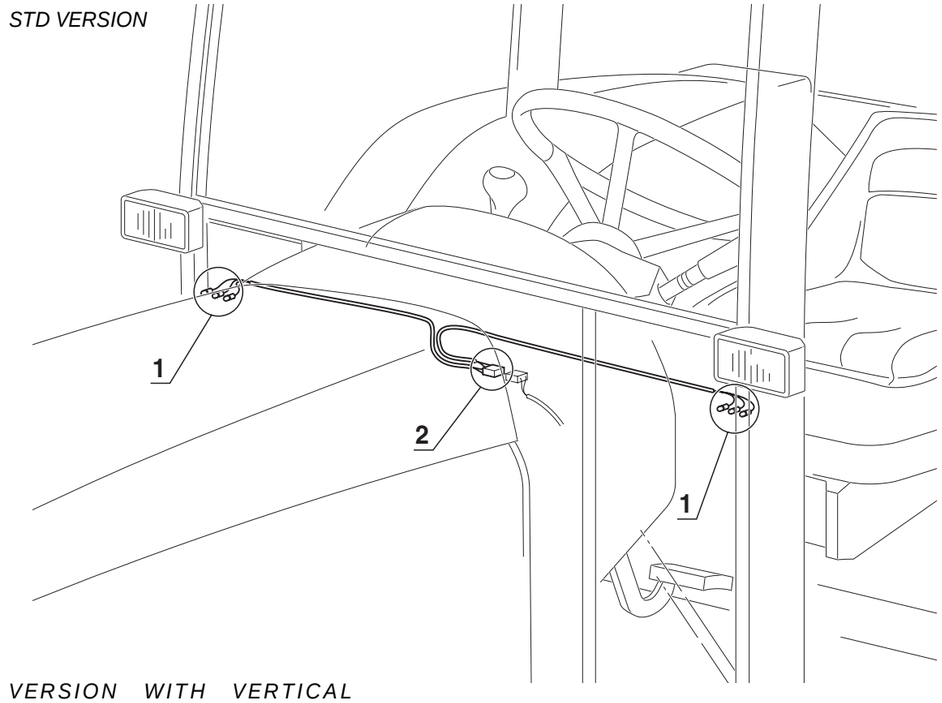


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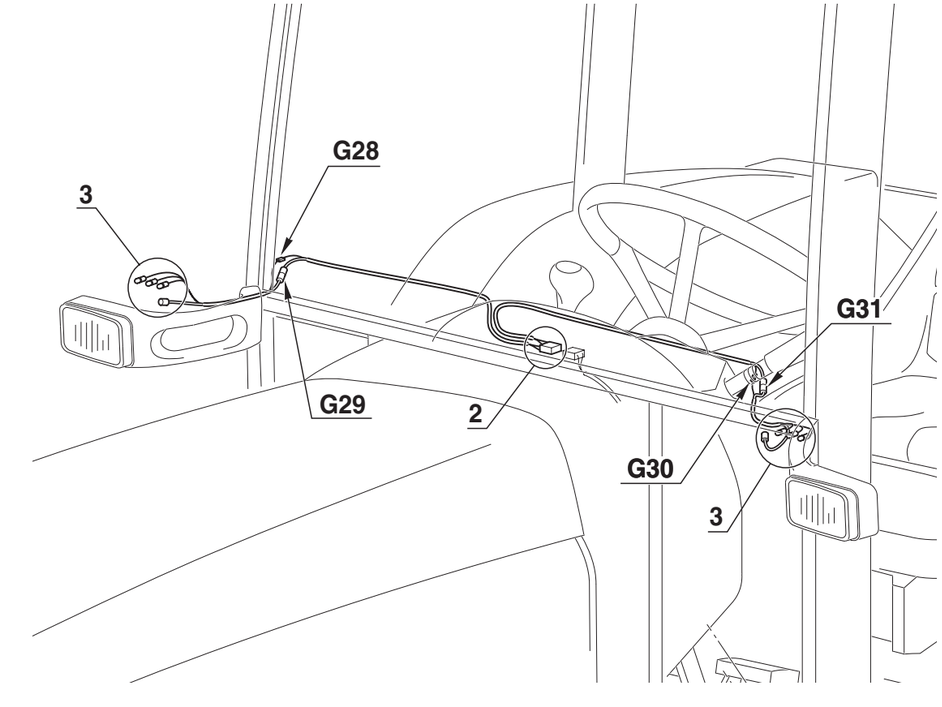


FRONT LIGHTS WIRING (CAB)
FRONT LIGHTS WIRING (VERTICAL EXHAUST SILENCER)
WIRING FOR LOWER FRONT LIGHTS ON CAB (VERTICAL EXHAUST SILENCER)

STD VERSION

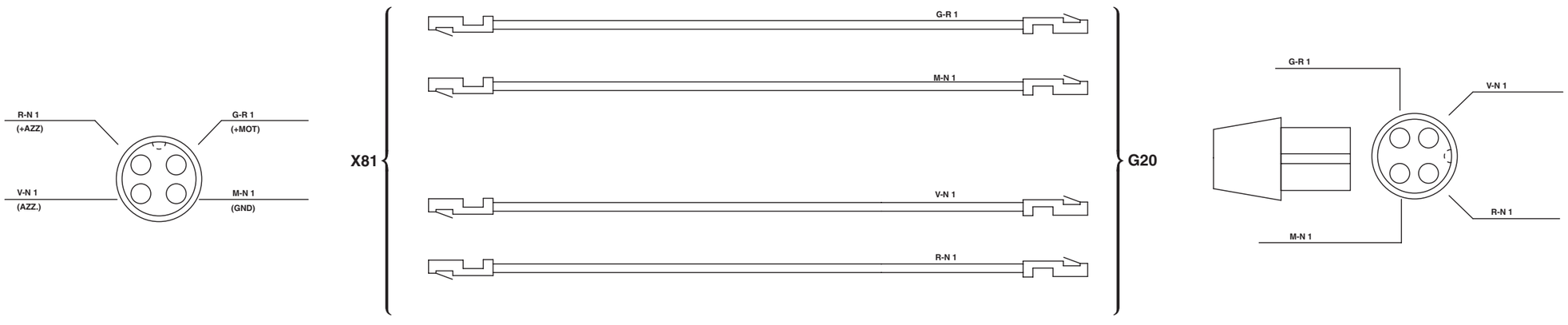


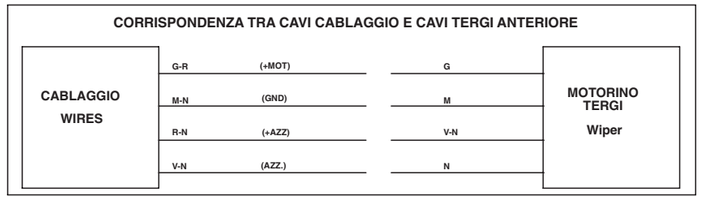
VERSION WITH VERTICAL EXHAUST SILENCER



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WINDSCREEN WIPER WIRING (HIGH-VISIBILITY)





D0006832

G20 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
X81 Windscreen wiper motor

SCREENWASHER PUMP WIRING

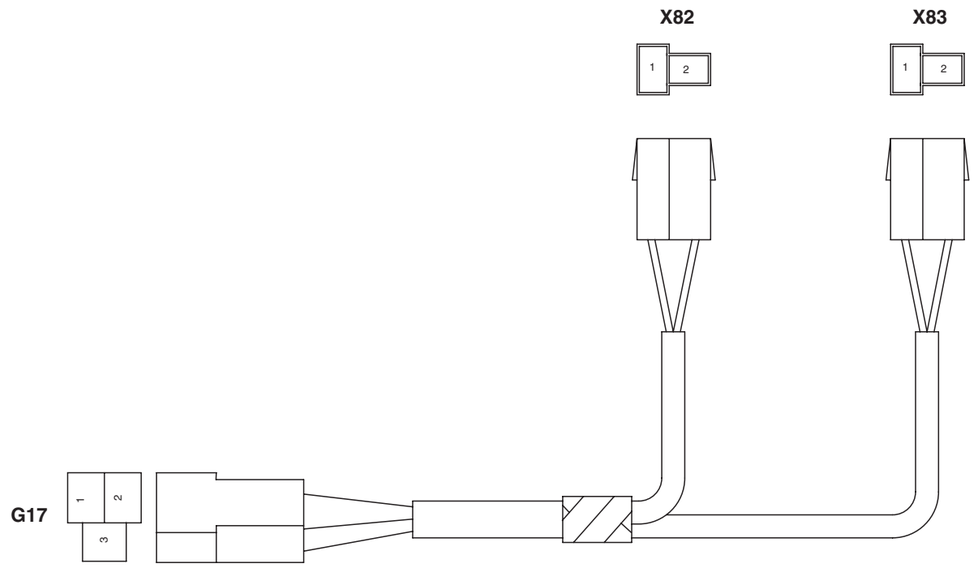
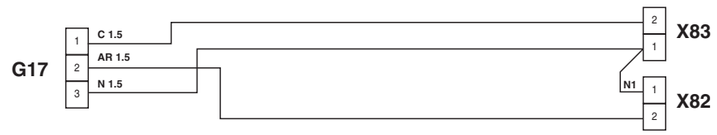


TABELLA COLORI / COLOURS TABLE			
M	Marrone/Brown	C	Arancio/Orange
V	Verde/Green	A	Azzurro/Blue
Z	Viola/Violet	B	Bianco/White
N	Nero/Black	L	Blu/Dark Blue
S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

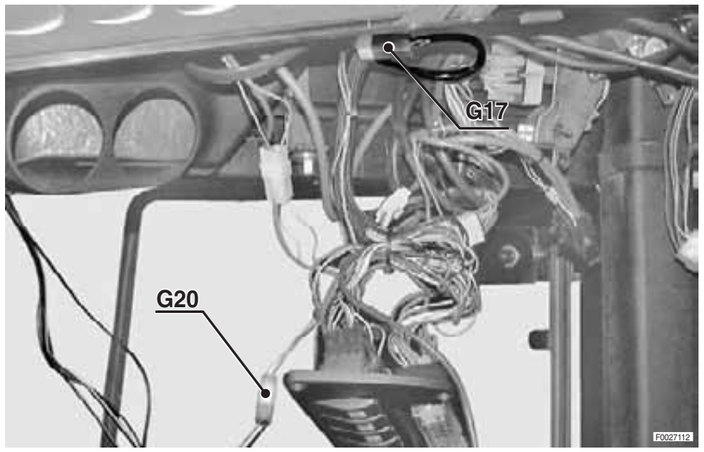


D0006821

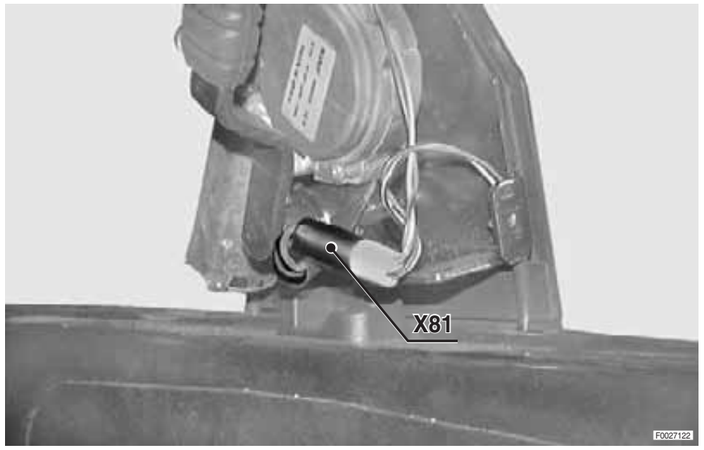
G17 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
X82 Windscreen washer pump
X83 Rear screenwasher pump

WINDSCREEN WIPER WIRING (HIGH-VISIBILITY) AND SCREENWASHER PUMPS

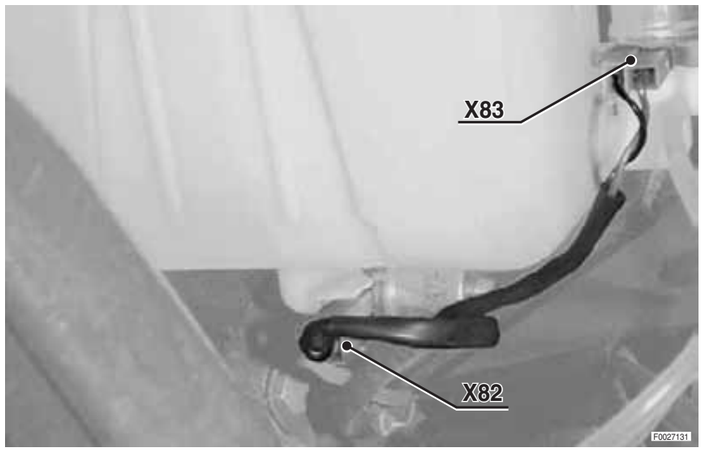
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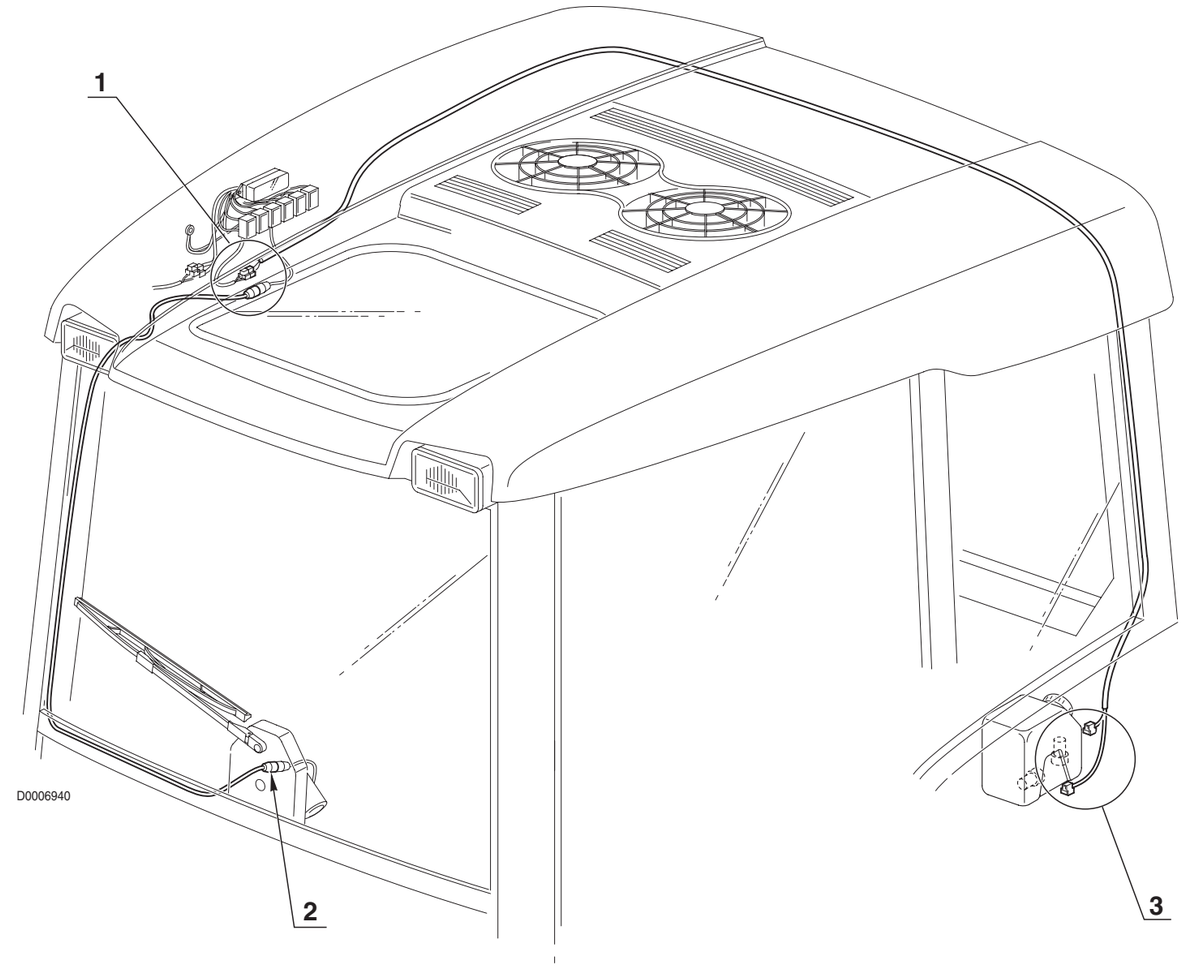


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3





0.011.3597.3
0.011.3743.3

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LOUDSPEAKER, RADIO, REAR WIPER, ROTATING BEACON AND CLOCK WIRING (HIGH VISIBILITY)

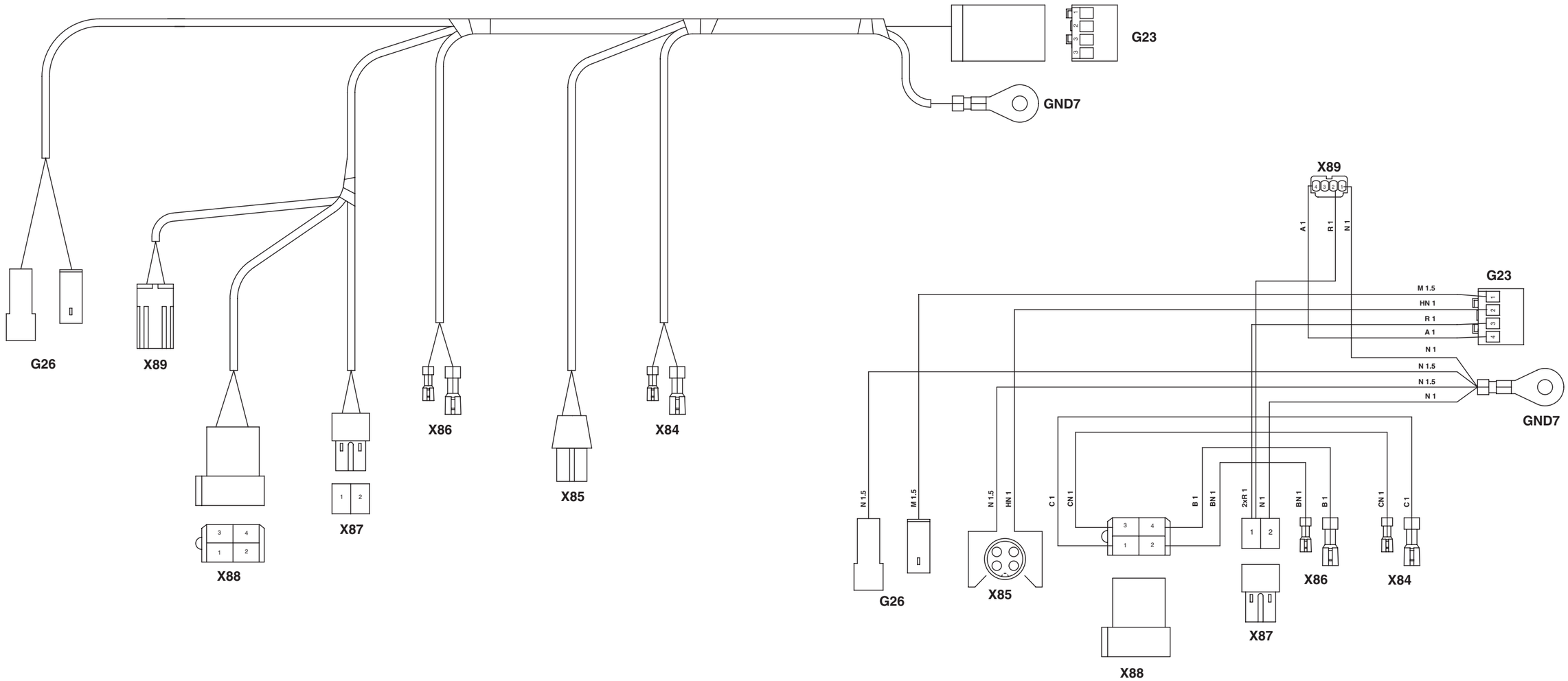
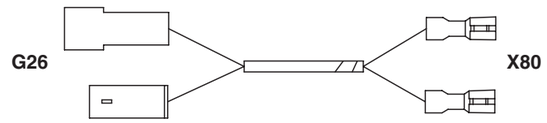


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S	Rosa/Pink	G	Giallo/Yellow
R	Rosso/Red	H	Grigio/Gray

D0006812

G26 To rotating beacon wiring 0.012.9909.4
G23 To roof line wiring 0.011.3606.4/50
GND7 Earthing point 7
X84 Right loudspeaker
X85 Rear window wiper motor
X86 Left loudspeaker
X87 Radio
X88 Radio
X89 Clock

ROTATING BEACON WIRING



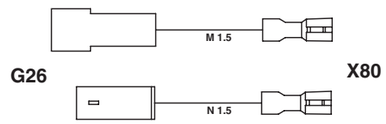


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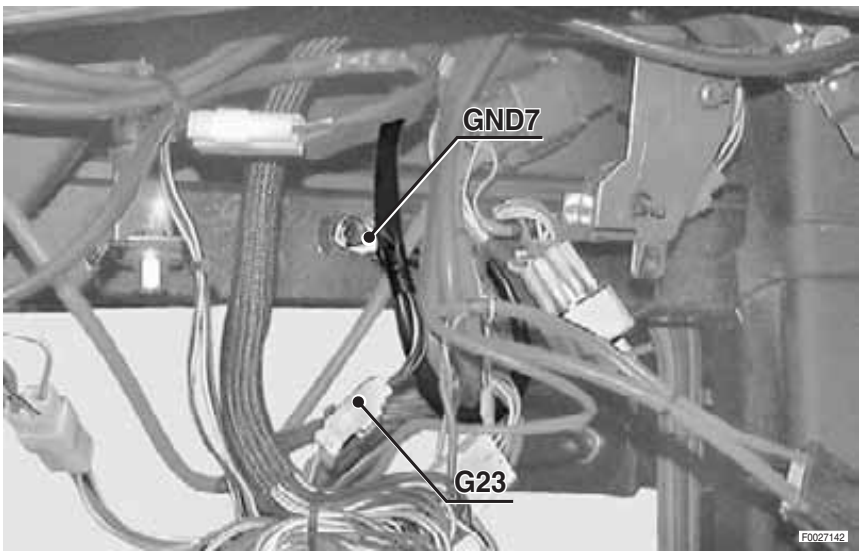
D0033420

G26 To worklights wiring 0.009.7851.4/50 or to loudspeaker, radio, rear wiper, rotating beacon and clock wiring 0.011.3596.3/40

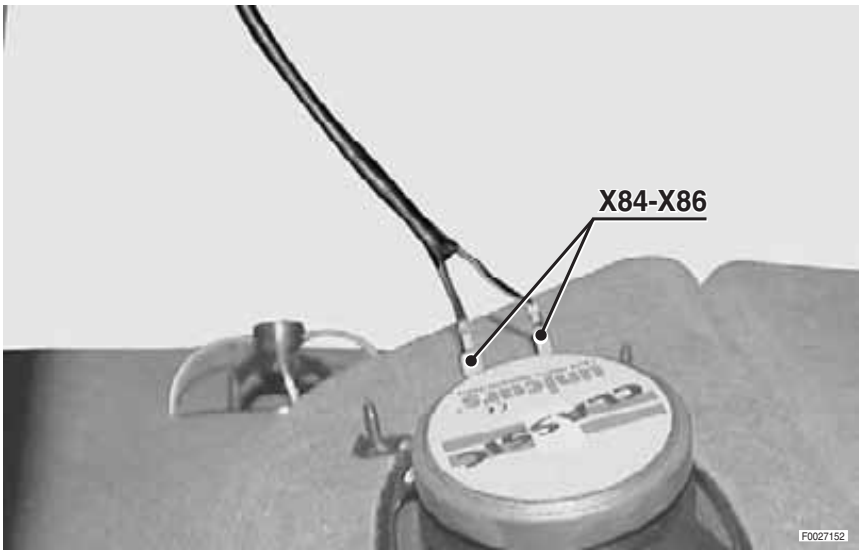
X80 Rotating beacon

CONNECTOR POSITIONS

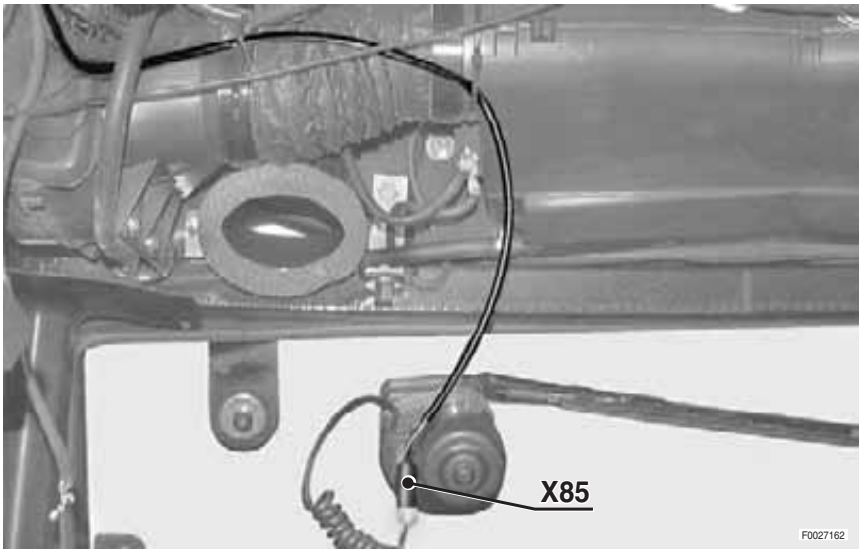
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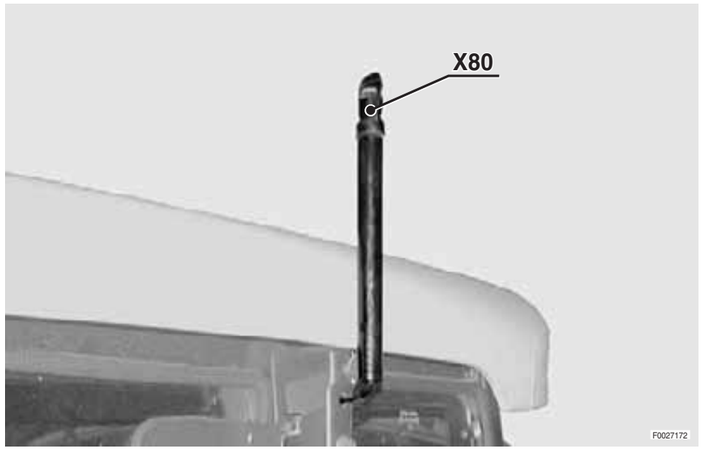


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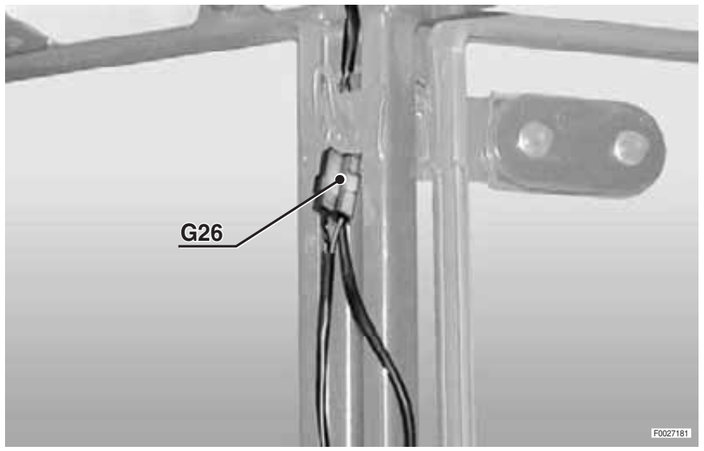


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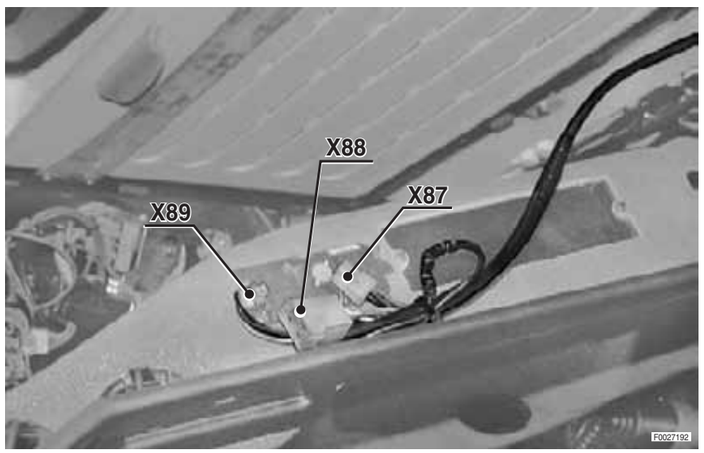
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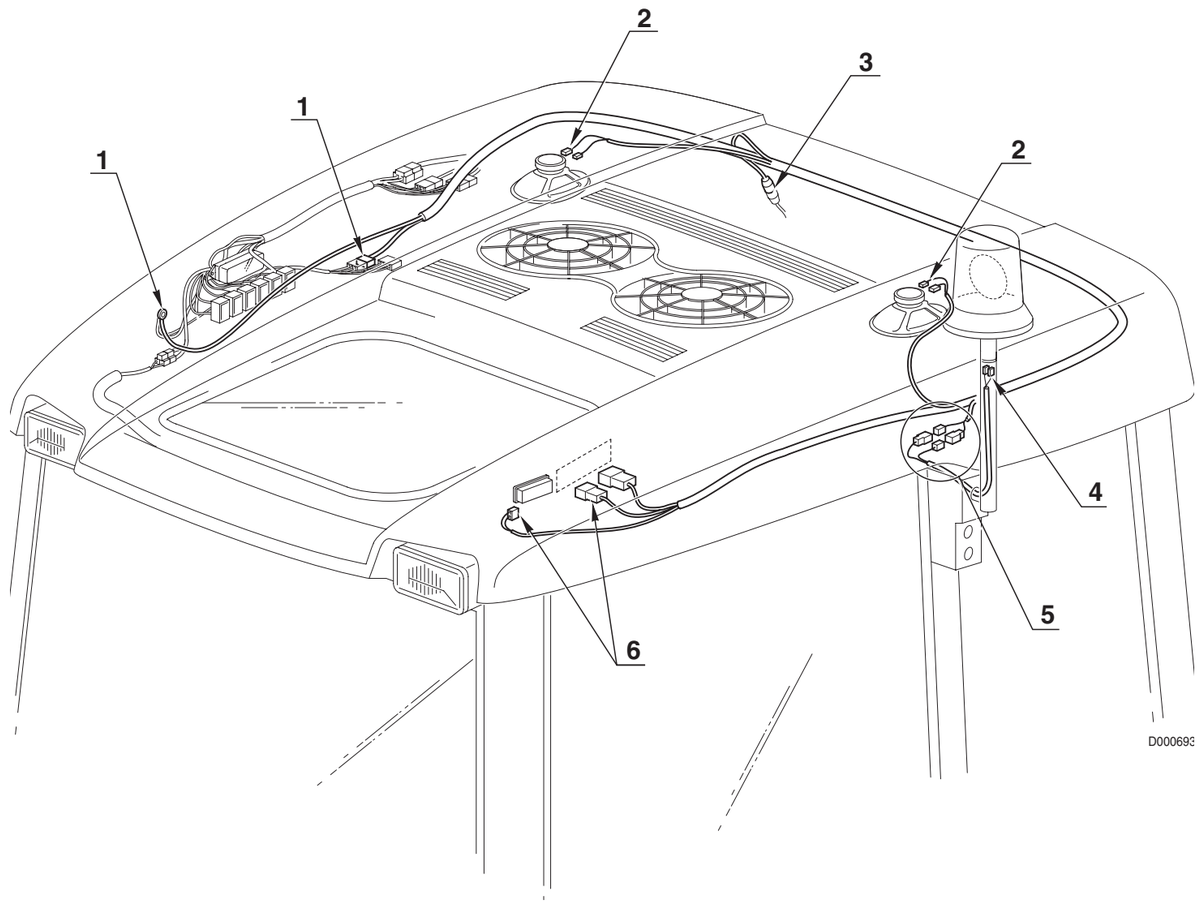
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LOUDSPEAKER, RADIO, REAR WIPER, ROTATING BEACON AND CLOCK WIRING (HIGH VISIBILITY)
ROTATING BEACON WIRING



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SCREENWASH PUMP WIRING

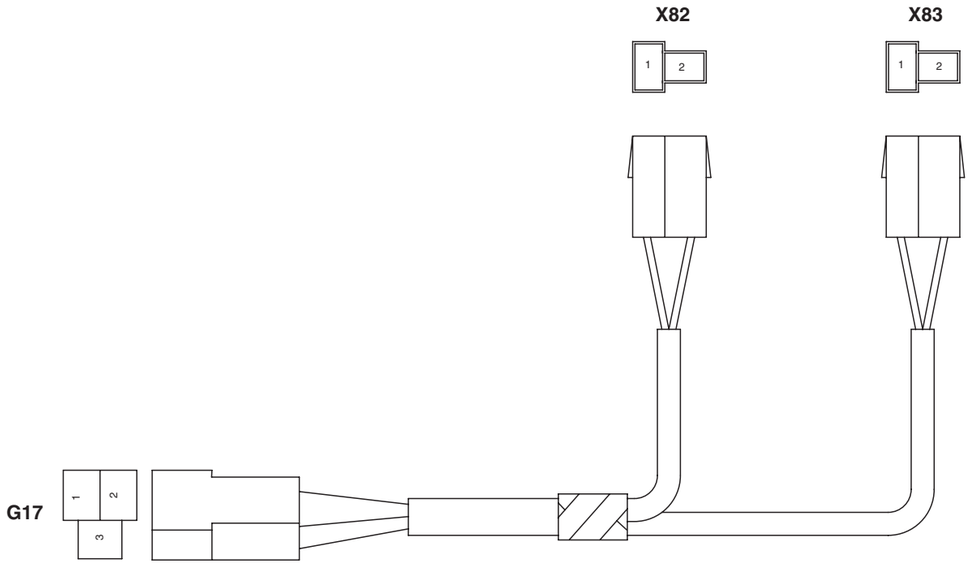
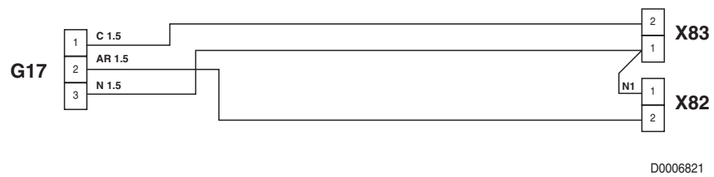


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G17 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
X82 Windscreen washer pump
X83 Rear window washer pump

WINDSCREEN WIPER WIRING (STANDARD)

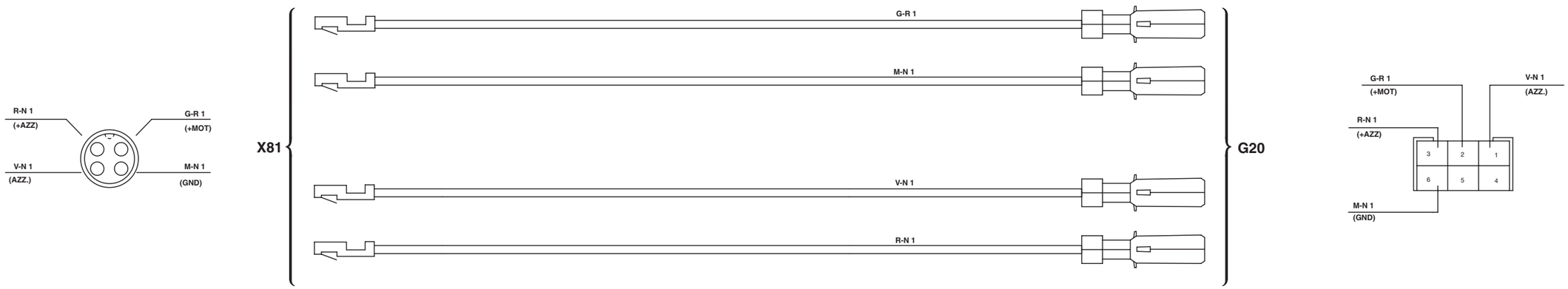
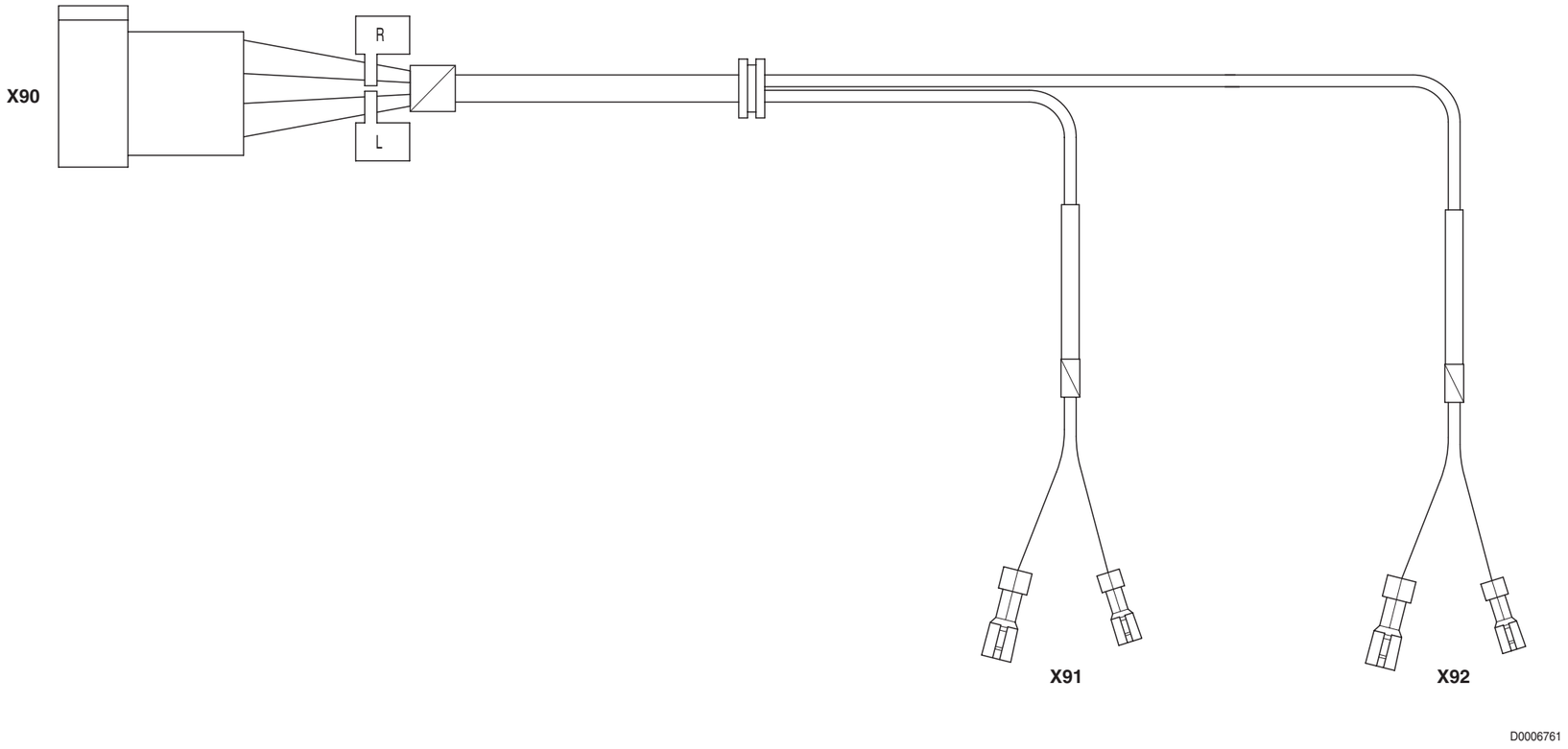


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R	Rosso/Red	H	Grigio/Gray

D0006741

G20 To roof line wiring 0.009.7850.4/50 or 0.011.3606.4/50
*X81*Windscreen wiper motor

LOUDSPEAKER WIRING (STANDARD)

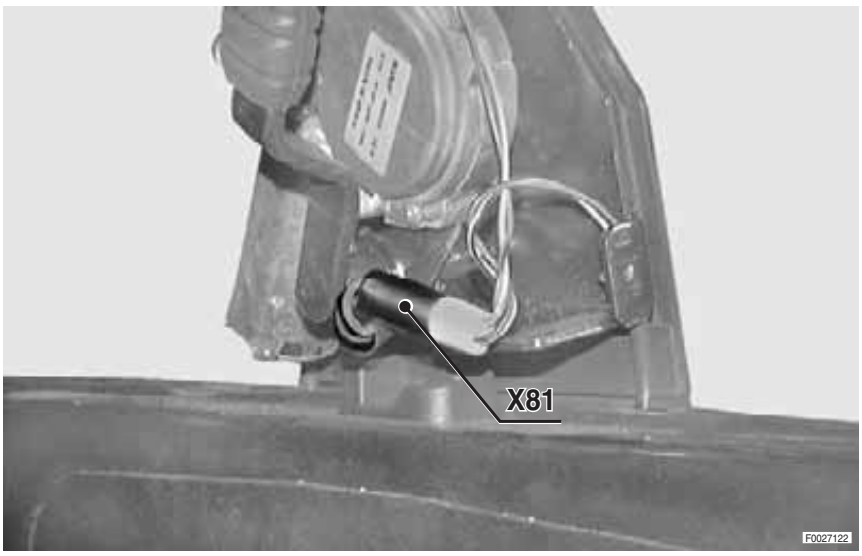


X90 Radio
X91 Left loudspeaker
X92 Right loudspeaker

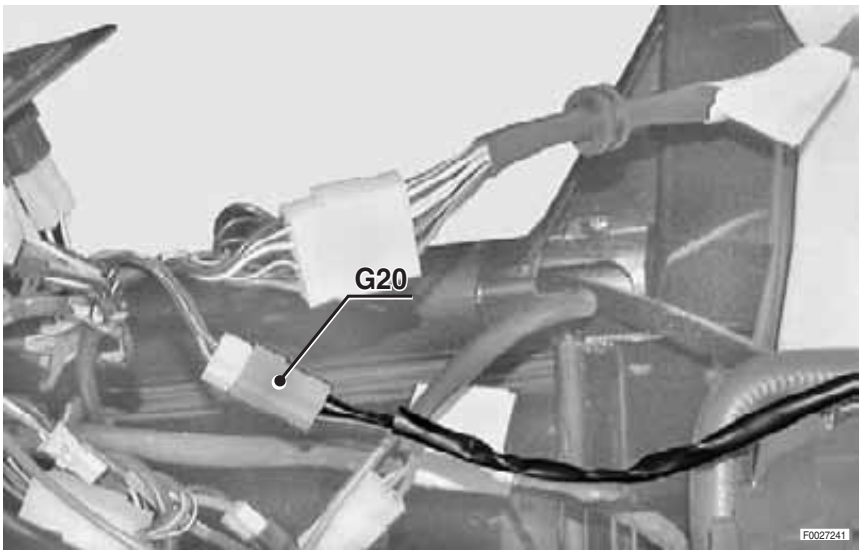
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CONNECTOR POSITIONS

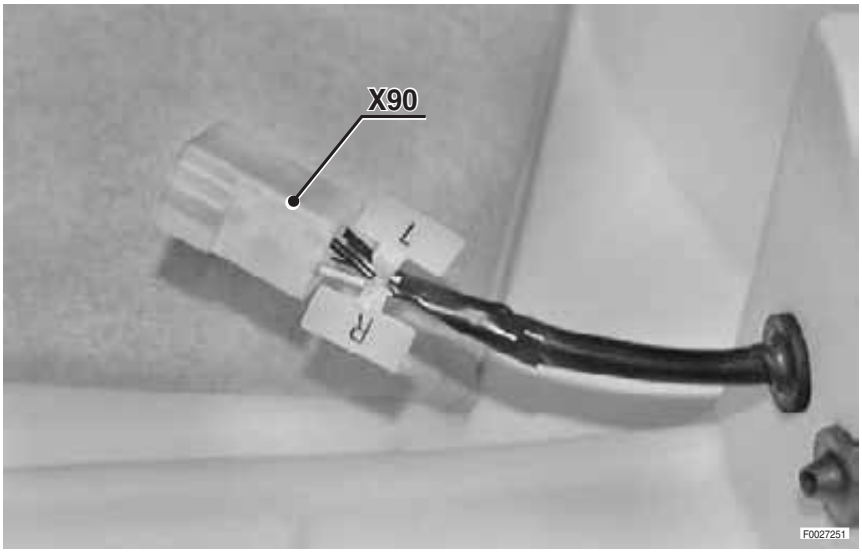
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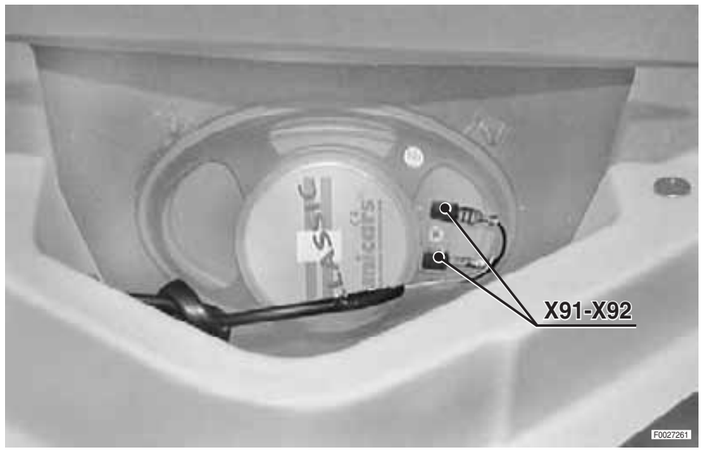


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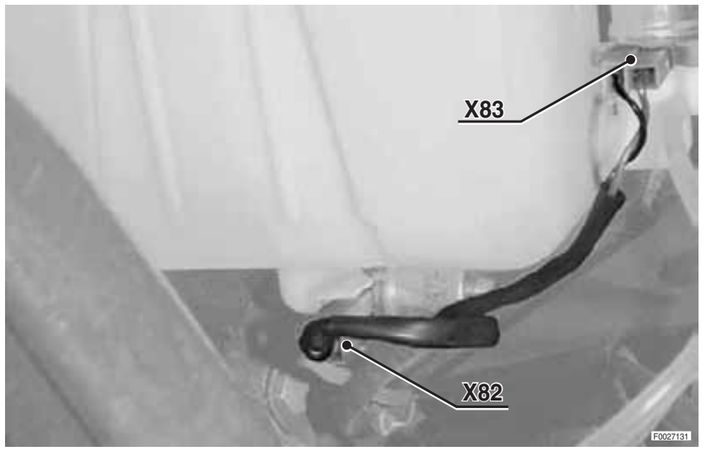


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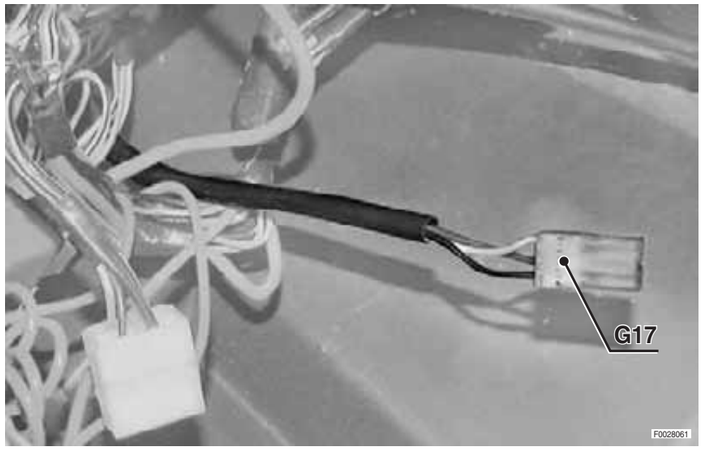
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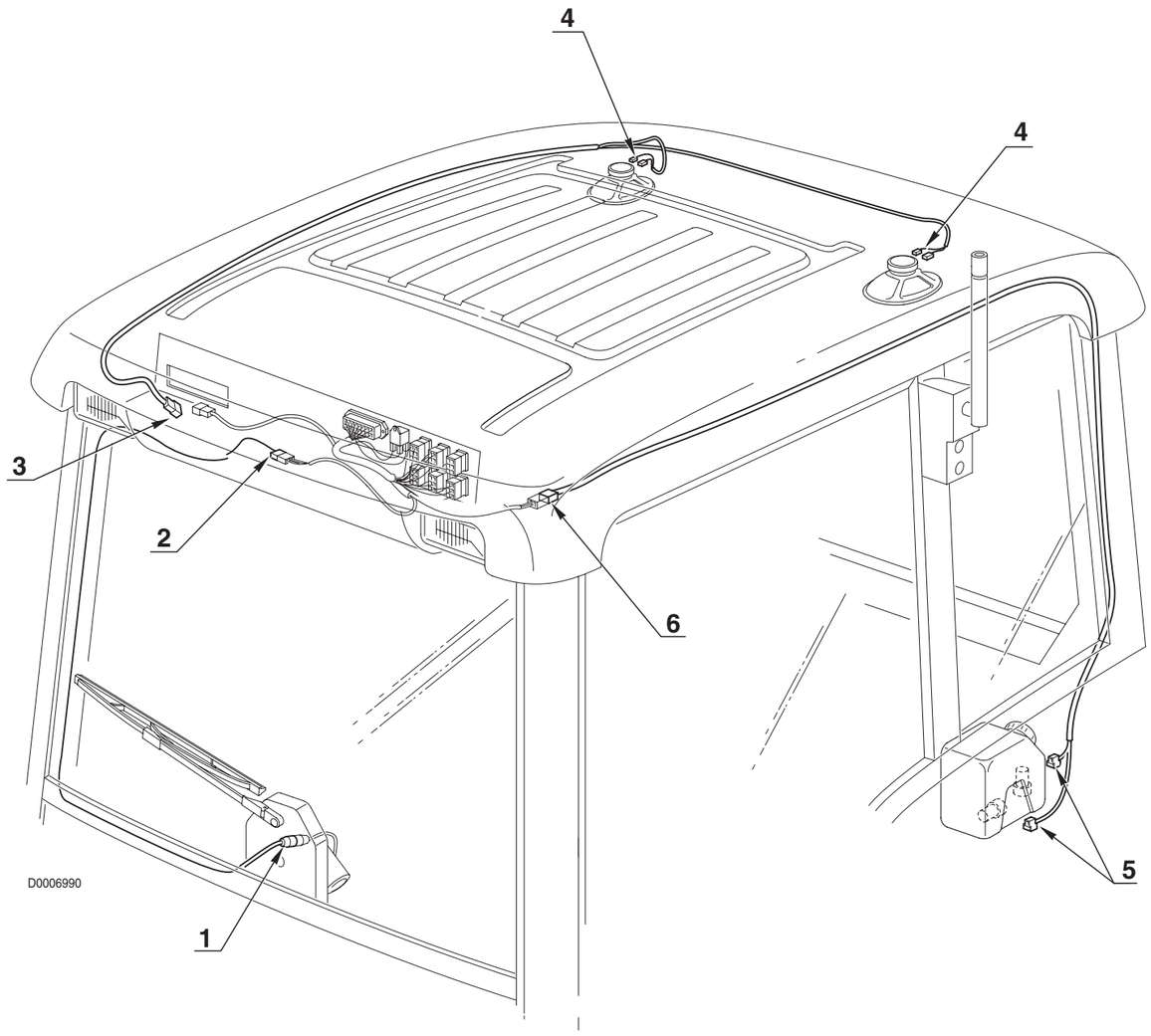
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6



SCREENWASH PUMP WIRING
WINDSCREEN WIPER WIRING (STANDARD)
LOUDSPEAKER WIRING (STANDARD)



0.011.3743.3
0.010.4516.3/1
0.011.0729.4/10

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