

PREFACE

Definitions adopted in the current Manual

The Company ASTRA VEICOLI INDUSTRIALI, Via Caorsana, 79 - 29100 PIACENZA (Italy) is hereinafter called *Manufacturer*.

The current WORKSHOP MANUAL is hereinafter called *Manual*.

The equipment dealt with in the current Manual is hereinafter called *vehicle*.

The operator directly or indirectly involved in vehicle repair is hereinafter called *operator*.

Introduction

The current Manual applies essentially to authorised workshop technical staff.

This Manual provides technical information but cannot replace a thorough professional experience.

This Manual contains all data and information required to perform correct checking and setting up operations as well as repair and overhaul operations.

Read this Manual right through before performing any operation on the vehicle.

Compliance with the provided information and the use of the recommended tools guarantee correct repair and avoid damages to operators.

You will frequently see that parts of the text are highlighted as shown below:



Failure to heed and/or correctly carry out procedures, technical information and precautions given may cause injury.



Failure to heed and/or correctly carry out procedures, technical information and precautions given may cause damage to the vehicle.



Procedures, technical information and precautions which must be highlighted.



Failure to heed and/or correctly carry out procedures, technical information and precautions given may cause environmental damages.

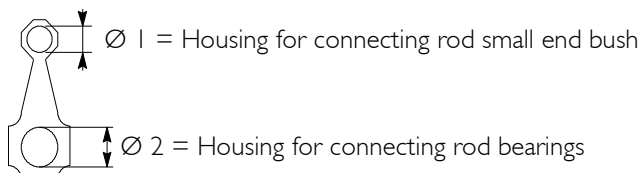
This Manual has been divided into Sections, each of which has a number and its relevant contents are indicated in the Index of Sections.

Each section features a main Unit (e.g.: engine, gears, etc.)

Where possible, the same sequence of procedures has been followed for easy reference.

Diagram and symbols have been widely used to give a clearer and more immediate illustration of the subject being dealt with (see next page) instead of giving descriptions of some operations or procedures.




Example:



Tighten to torque
Tighten to torque + angular value

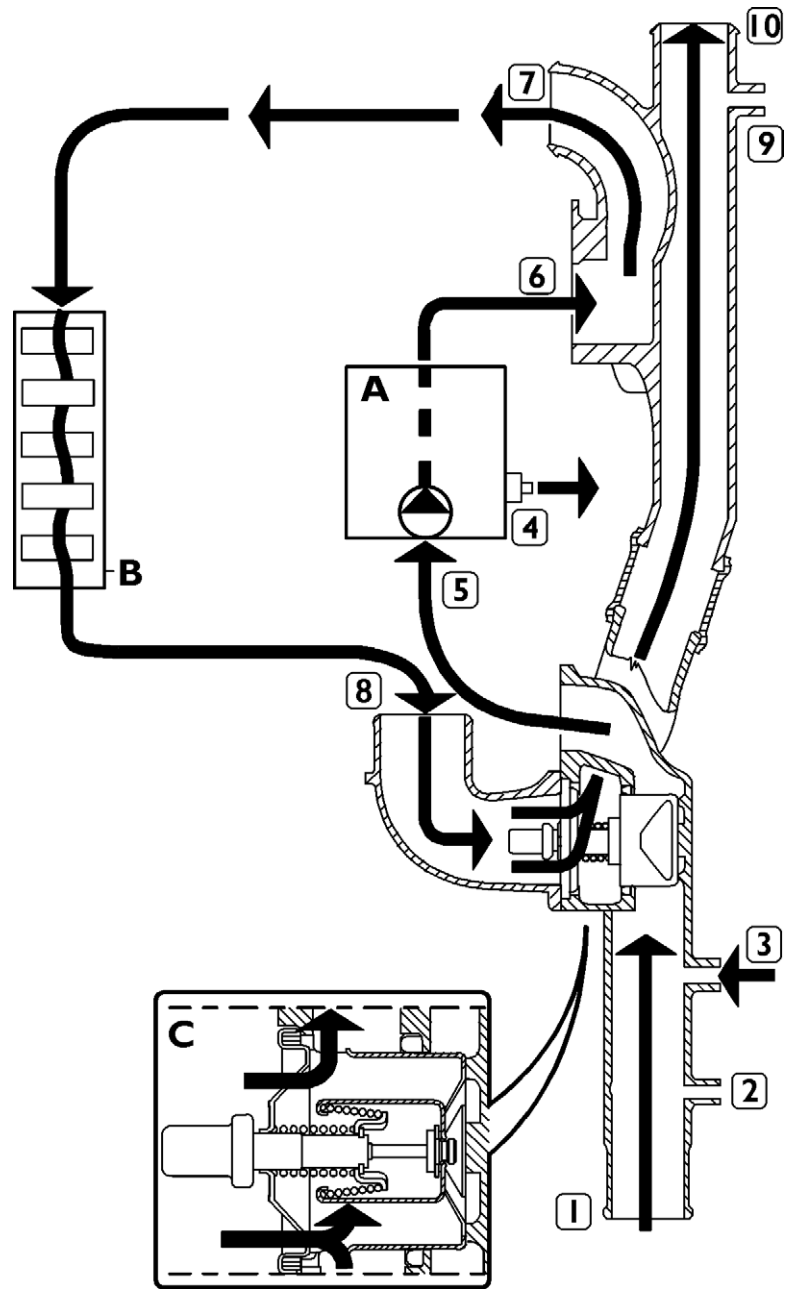
STANDARD TIGHTENING TORQUES

Screws and nuts with metric thread

Diameter x Pitch d x p (mm)	SCREW – CLASS 8.8 				SCREW – CLASS 10.9 				SCREW – CLASS 12.9 			
	UN- COATE D	DACRO- MET GAL- VANISED	CADMIUM PLATED	PHOSPHA- TE COA- TED	UN- COATE D	DACRO- MET GAL- VANISED	CADMIUM PLATED	PHOSPHA- TE COATED	UN- COATE D	DACRO GAL- VANISED	CADMIUM PLATED	PHOSPHA- TE COATED
3 x 0,5	0,12	0,12	0,11	0,09	0,17	0,16	0,15	0,13	0,21	0,19	0,18	0,15
4 x 0,7	0,28	0,26	0,24	0,20	0,39	0,37	0,34	0,29	0,47	0,44	0,41	0,35
5 x 0,8	0,56	0,52	0,48	0,40	0,79	0,74	0,67	0,57	0,94	0,88	0,80	0,68
6 x 1	1,0	0,9	0,8	0,7	1,3	1,3	1,2	1,0	1,6	1,5	1,4	1,2
8 x 1,25	2,3	2,2	2,0	1,7	3,3	3,1	2,8	2,3	3,9	3,7	3,3	2,8
8 x 1	2,5	2,4	2,1	1,8	3,5	3,3	3,0	2,5	4,3	4,0	3,6	3,0
10 x 1,5	4,7	4,4	4,0	3,3	6,5	6,1	5,6	4,7	7,9	7,4	6,7	5,6
10 x 1,25	5,0	4,7	4,2	3,5	7,0	6,5	5,9	4,9	8,4	7,9	7,1	5,9
12 x 1,75	8,0	7,5	6,8	5,7	11,3	10,6	9,6	8,0	13,6	12,7	11,5	9,6
12 x 1,25	9,0	8,4	7,5	6,2	12,6	11,8	10,6	8,7	15,1	14,1	12,7	10,4
14 x 2	12,8	12,0	10,9	9,1	18,0	16,9	15,3	12,8	21,6	20,2	18,4	15,3
14 x 1,5	14,1	13,1	11,9	9,7	19,8	18,5	16,7	13,6	23,8	22,2	20,0	16,4
16 x 2	19,8	18,5	16,8	13,9	27,9	26,1	23,6	19,5	33,5	31,3	28,3	23,4
16 x 1,5	21,5	20,0	18,0	14,6	30,2	28,2	25,3	20,6	36,3	33,8	30,4	24,7
18 x 2,5	27,2	25,4	23,1	19,2	38,2	35,8	32,4	27,0	45,8	42,9	38,9	32,4
18 x 1,5	31,4	29,2	26,2	21,1	44,1	41,1	36,8	29,7	53,0	49,3	44,2	35,7
20 x 2,5	38,4	36,1	32,7	27,0	54,3	50,8	46,0	38,0	65,2	61,0	55,2	45,6
20 x 1,5	43,9	40,9	36,5	29,4	61,7	57,5	51,4	41,3	74,1	68,9	61,6	49,5
22 x 2,5	53,9	49,0	44,6	36,2	75,9	68,8	62,8	51,0	91,0	82,6	75,3	61,1
22 x 1,5	59,0	54,8	48,9	39,1	82,9	77,1	68,8	55,0	99,5	92,5	82,6	66,1
24 x 3	66,7	62,4	56,4	46,6	93,8	87,7	79,3	65,5	112,5	105,2	95,2	78,6
24 x 2	74,2	69,1	61,9	50,0	104,4	97,2	87,1	70,3	125,3	116,7	104,5	84,4
27 x 3	98,7	92,2	83,1	68,2	138,8	129,6	116,9	95,9	166,5	155,5	140,2	115,0
27 x 2	108,4	100,8	90,1	72,4	152,4	141,8	126,7	101,8	182,9	170,2	152,1	122,2
30 x 3,5	133,7	124,9	112,7	92,8	188,0	175,6	158,5	130,5	225,6	210,7	190,2	156,5
30 x 2	151,6	141,0	125,8	100,6	213,2	198,2	176,9	141,5	255,9	237,9	212,2	169,8
Maximum tightening torques for metric threads in daNm												

Thermostat open

Figure 32



341B003002R

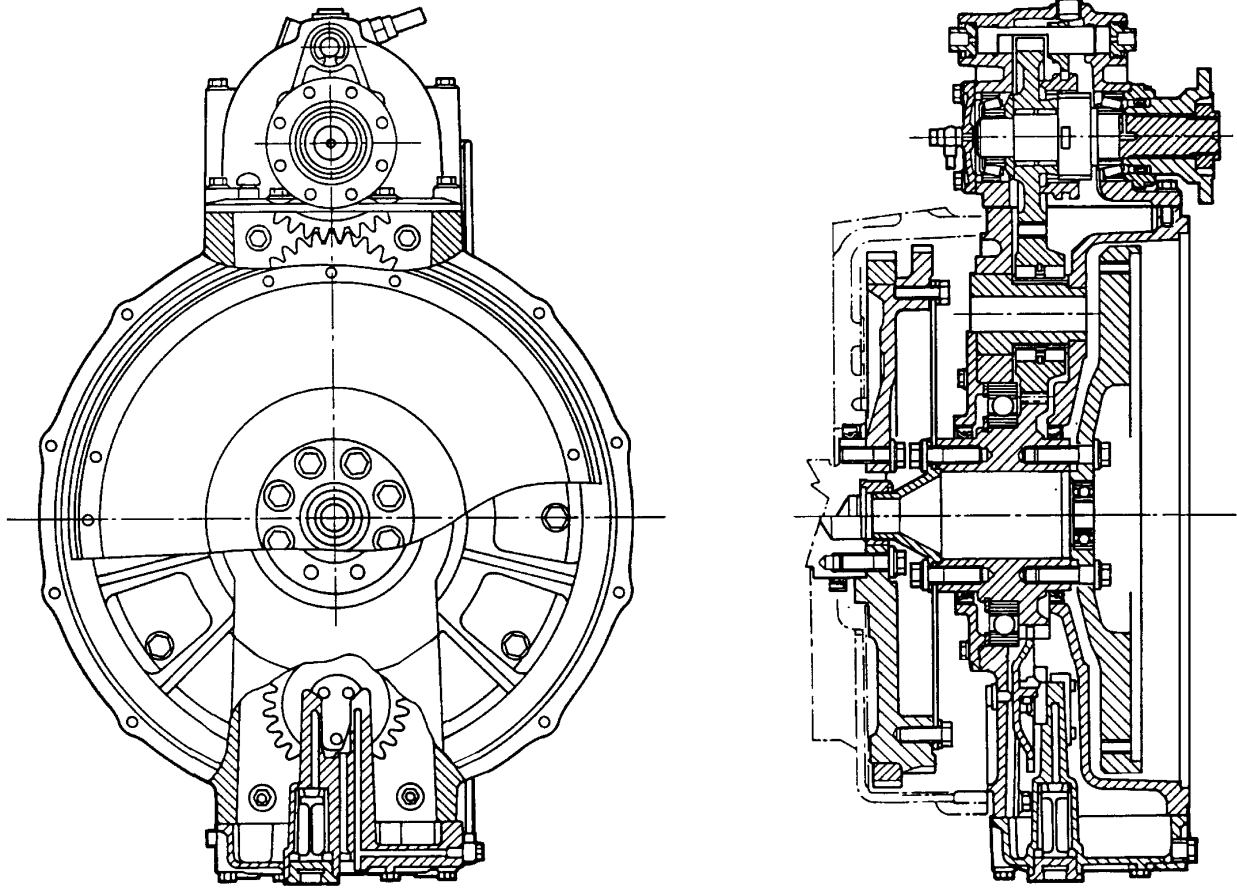
- 1. Pipe from radiator to engine (coolant fluid pump) - 2. Pipe from expansion chamber to engine (coolant fluid pump) - 3. Pipe from cab heater to engine - 4. Pipe from engine to cabin heater - 5. Engine intake - 6. Engine output - 7. Pipe from engine to exchanger (if present) - 8. Pipe from exchanger (if fitted) to thermostat - 9. Vent - 10. Pipe from thermostat to radiator

A. Engine - B. Exchanger (if fitted) - C. Thermostat

DESCRIPTION

The power take off is situated between the engine flywheel and the clutch assembly and is fitted with a non-synchronised pneumo--mechanical positive clutch to transfer the movement from the engine drive shaft to the pick up flange. Lubrication is ensured by an oil pump.

Figure 1

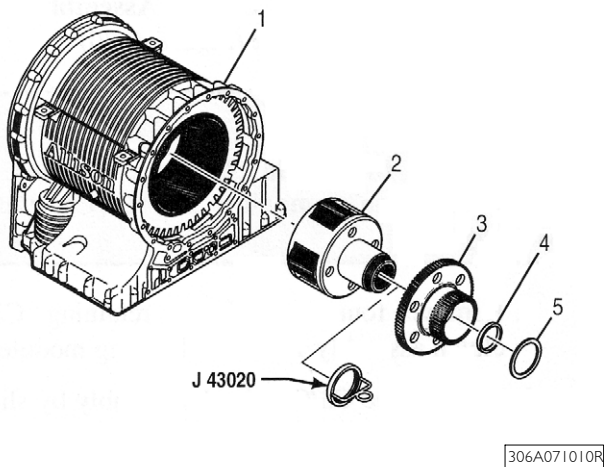


1780501

1780502

P3 planetary module assembly

Figure 82



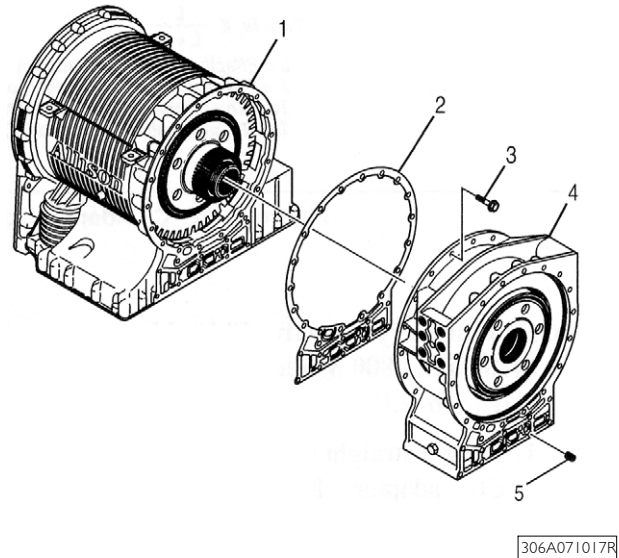
- Fit tool J 43020 on the P3 planetary module (2). Using a suitable lifting tool, fit the P3 planetary module on the automatic transmission assembly (1).
- Fit the P4 shaft flange (3).



Do not fit the adjustment shim. The measurements must be carried out at the end of re-assembly.

C6 clutch casing assembly

Figure 83



- Position a new seal (2) on the C6 clutch casing.



Caution: either two operators or suitable lifting means are needed considering the weight of the C6 clutch casing.

- Use appropriate lifting means to position the C6 clutch casing (4) on the automatic transmission.
- Fasten the fourteen bolts (3) which join the C6 clutch casing (4) to the automatic transmission assembly (1).

Tightening torque: 100-120 Nm (74-88 lb ft)

DESCRIPTION

The transfer group is located between the transmission and the front and tandem axles.

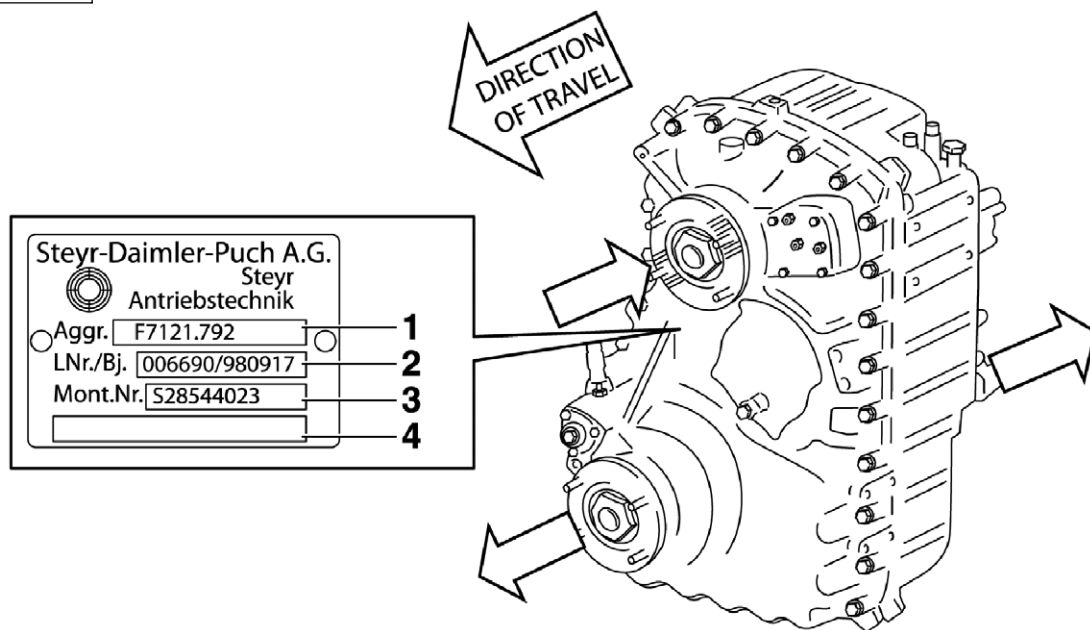
The two step-down ratios are obtained through two pairs of constant mesh gears mounted on the primary shaft and secondary shaft.

Shift between on ratio and the other is achieved by means of a grooved sliding coupling operated by a fork.

The transfer group is located on the output shaft and consists of a cylindrical wheel epicyclical differential.

The differential can be locked by means of a fork operated grooved coupling, to obtain fixed torque transfer.

Figure 1



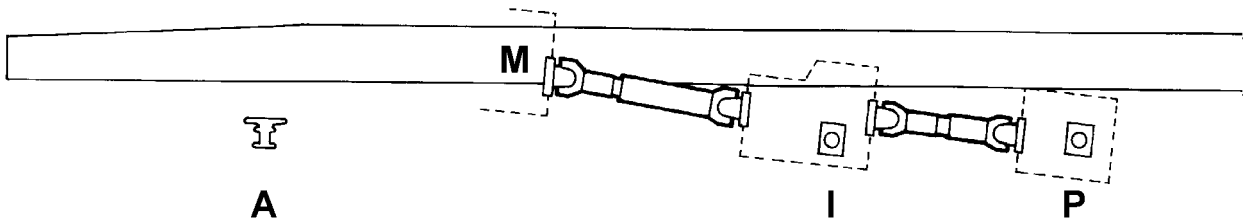
HD9ST0056MR

Plate:

1. Variation number
2. Serial number/Date of manufacture
3. Assembly number
4. Type/transmission ratios

6x4 vehicles

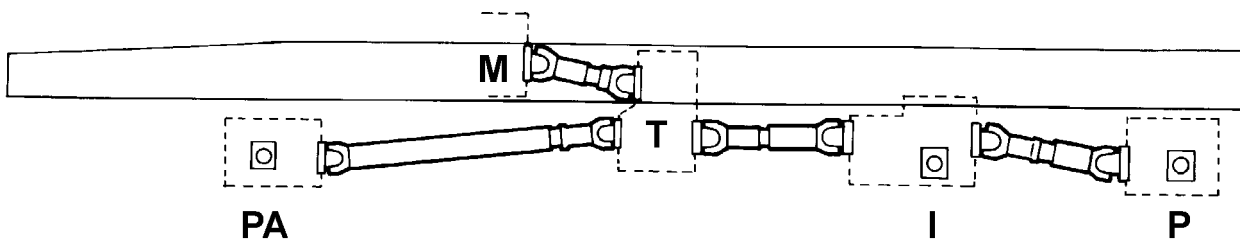
Figure 4



- M power unit
 A front axle
 I intermediate tandem axle
 P rear tandem axle

6x6 vehicles

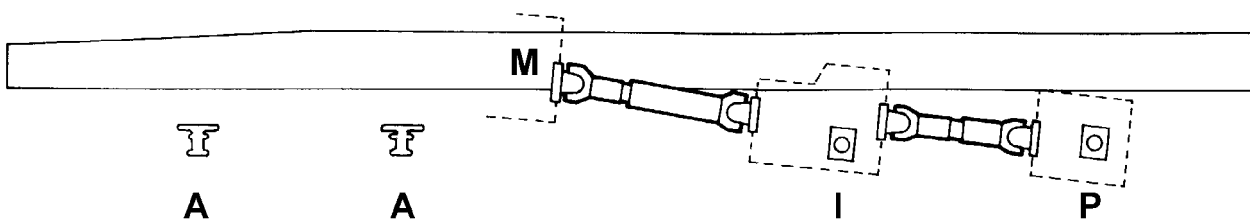
Figure 5



- M power unit
 T transfer unit
 PA front axle
 I intermediate tandem axle
 P rear tandem axle

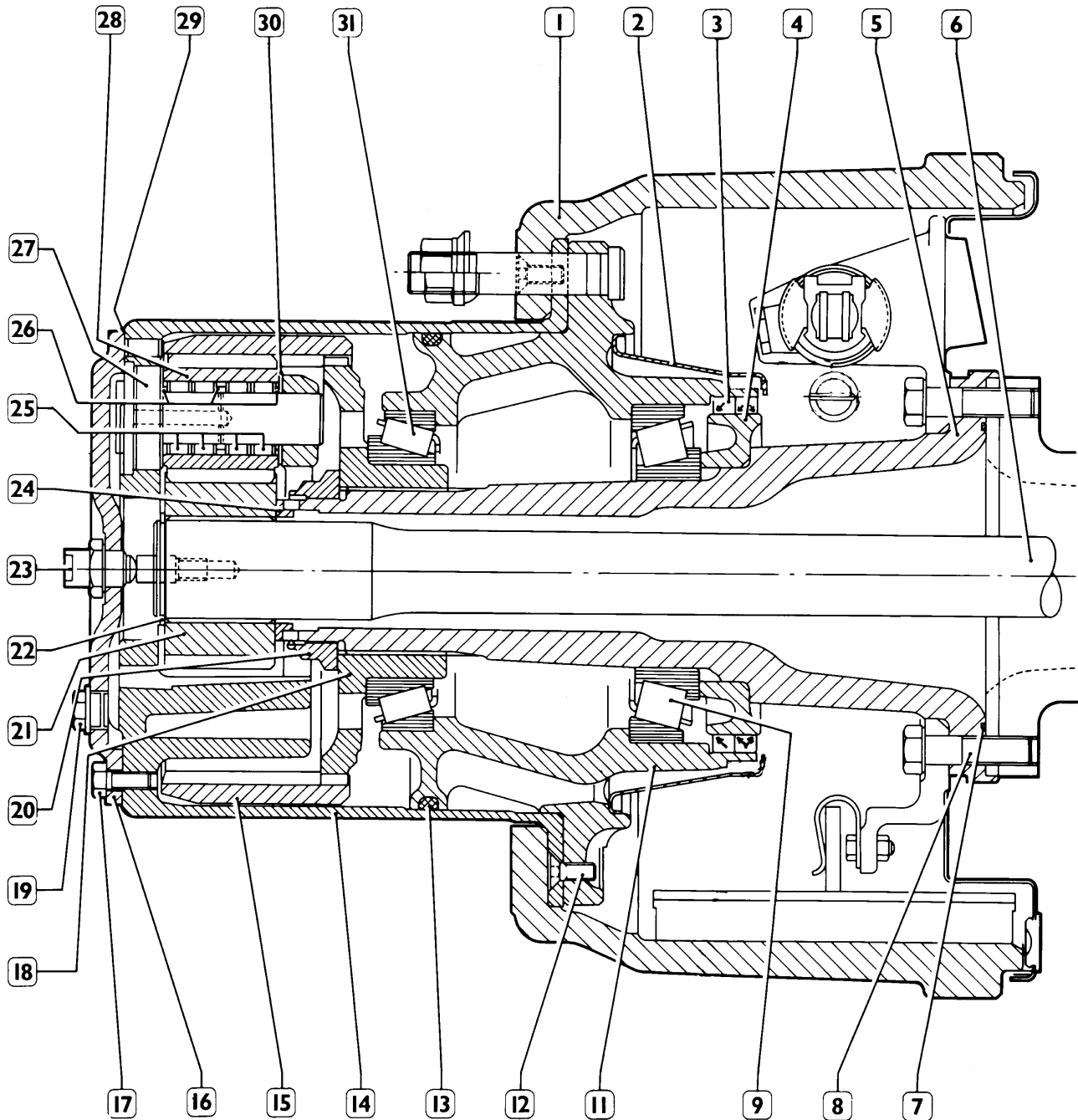
8x4 vehicles

Figure 6



- M power unit
 A front axle
 I intermediate tandem axle
 P rear tandem axle

Figure 2

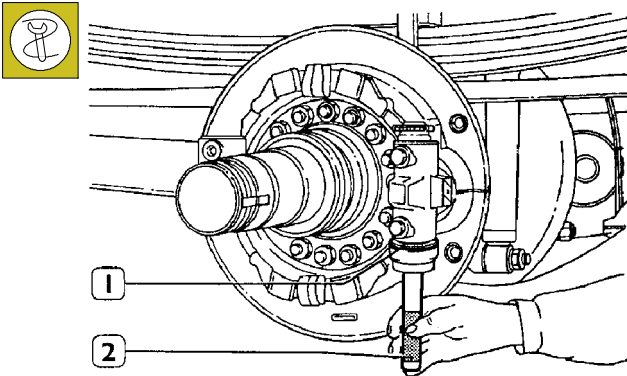


40379

CROSS SECTION OF EPICYCLIC REDUCTION GEAR AND WHEEL HUB (45139)

1. Brake drum - 2. Oil manifold - 3. Seal rings - 4. Intermediate ring for sealing gasket - 5. Bearing shaft - 6. Half-shaft - 7. Seal ring - 8. Screw - 9. Bearing - 11. Wheel hub - 12. Screw - 13. Seal ring - 14. Planetary gear carrier - 15. Crown wheel - 16. Cover - 17. Screw - 18. Crown wheel carrier - 19. Plug - 20. Collar nut - 21. Planetary gear - 22. Circlip - 23. Spacer screw - 24. Spacer ring - 25. Needles for planetary gear - 26. Spacer rings - 27. Support pin - 28. Planetary gear - 29. Gasket - 30. Spacer - 31. Bearing

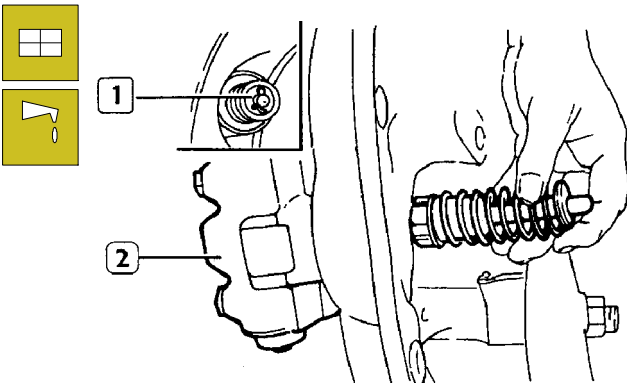
Figure 42



38370

- With tool 99373002 (2) press the seal metal ring (1) into the brake housing.
- Proceed to assemble the other brake shoe command units as instructed above.

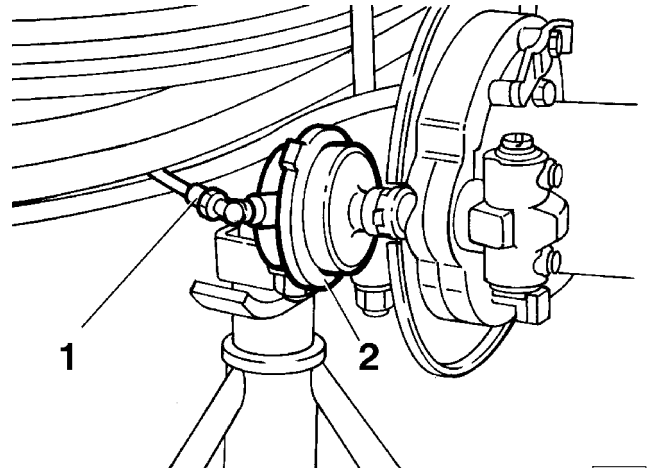
Figure 43



17268

- Thoroughly grease the wedge units (1) and insert them in the corresponding seats on the brake housing (2) such that the wedge unit roller rest on the corresponding races on the thrust pins.
- Hand tighten the ring nut on the rotochamber sleeve, to the end of its thread.
- Apply LOCTITE 573 sealing paste to the first few turns of the sleeve thread.

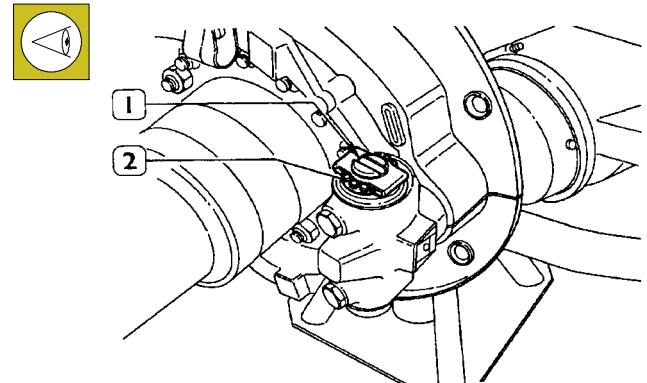
Figure 44



38500

- Fully tighten the brake cylinders (2) in the corresponding seats such that the air connectors are in their original position and the discharge hole is open and facing downwards.
- Connect the air lines (1) to the brake cylinders.

Figure 45



38373

- Fully tighten the adjuster units (2), then unscrew by one turn to give initial adjustment for automatic take-up; position them such that the slots (1) can engage with the shoes.

4 AXLE VEHICLES STEERING BOX REMOVAL-REFITTING

GENERAL

Safety instructions



Before starting any type of operation make sure all the necessary safety precautions have been taken and fully explained to those involved in the operations. If in doubt, consult a more experienced person. Read the instructions provided in the first part of this manual.

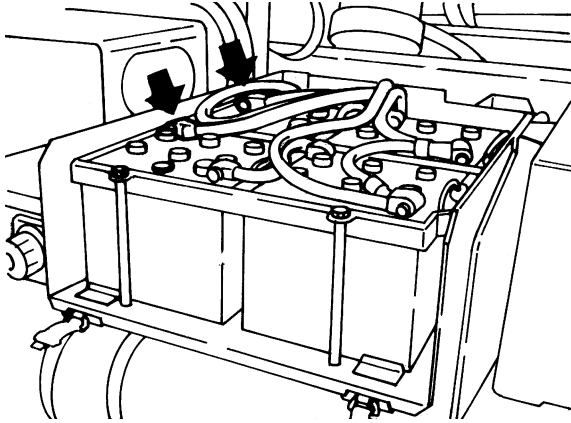
Observe all general recommendations for the correct execution of maintenance work.

Vehicle preparation



Take the vehicle onto a suitable flat, solid surface, switch off the engine, remove the ignition key, engage the parking brake and apply the warning signboards.

Figure 30



2371801

- cut off the battery master switch or disconnect the terminals from the battery (see arrow) to avoid the risk of short circuits;
- restore vehicle operation at the end of the operations.

Very heavy parts



The following operation requires handling of heavy parts. To lift and transport, use appropriate equipment and accessories.

Hazardous and/or polluting substances



The operation described requires handling of hazardous and/or polluting substances.

Do not touch with the hands.

Avoid contact with painted parts.

Collect and dispose of used lubricants and fluids, according to the local laws and regulations.

Specific safety instructions



Safety component.

Tighten the steering box fasteners to the specified torque.

Tighten the steering column flange fasteners to the specified torque.

DESCRIPTION OF OPERATION

Preliminary operations

Proceed as follows:

- drain off the fluid as described in the chapter HYDRAULIC FLUID REPLACEMENT in this Section.

Removal

Proceed as follows:

- disconnect the intake (1) and delivery pipes (2) from the pump;
- suitably support the pump, unscrew the fastening screws and remove the complete pump (3).



Fluid may be released from the pipes during these operations.

Refitting

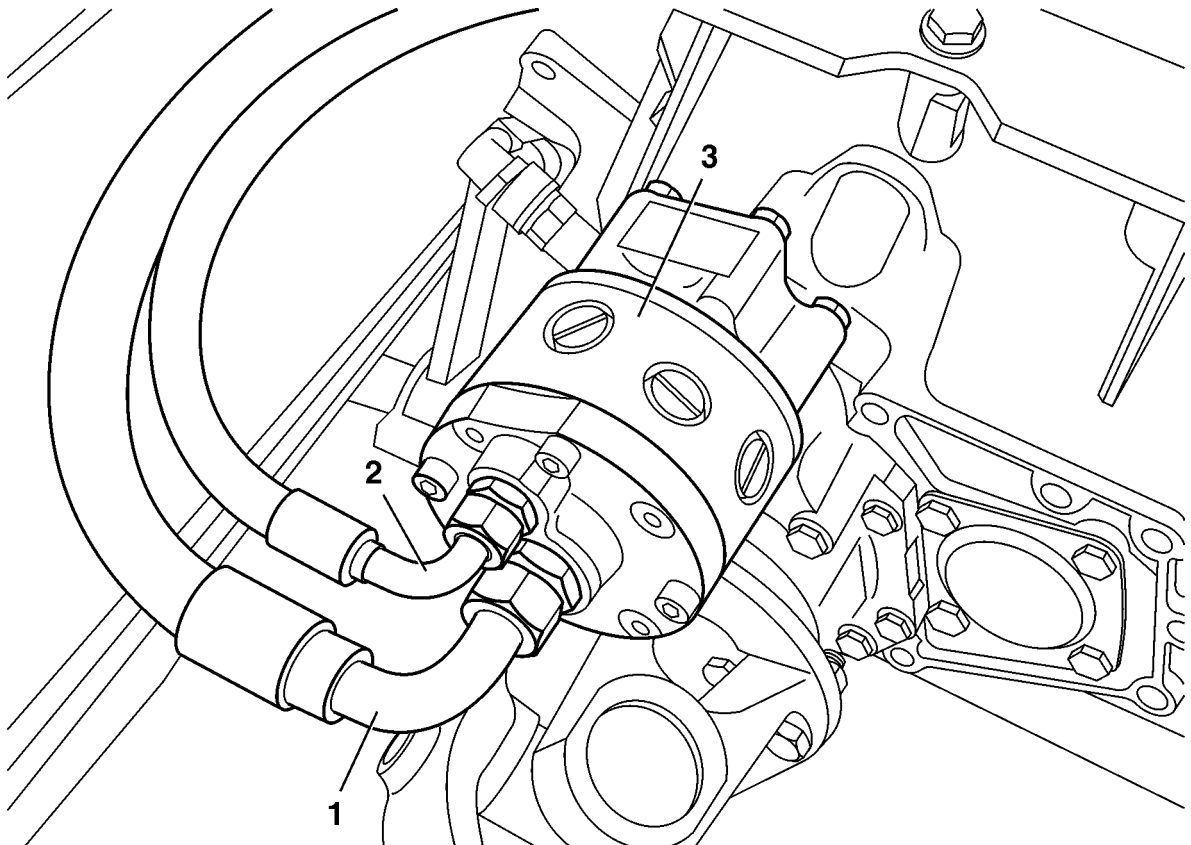
To refit, follow the removal operations in reverse.

Final operations

Proceed as follows:

- restore fluid as described in the chapter HYDRAULIC FLUID REPLACEMENT in this Section.

Figure 40



Vehicle braking system diagram 3 axles without ABS for towing

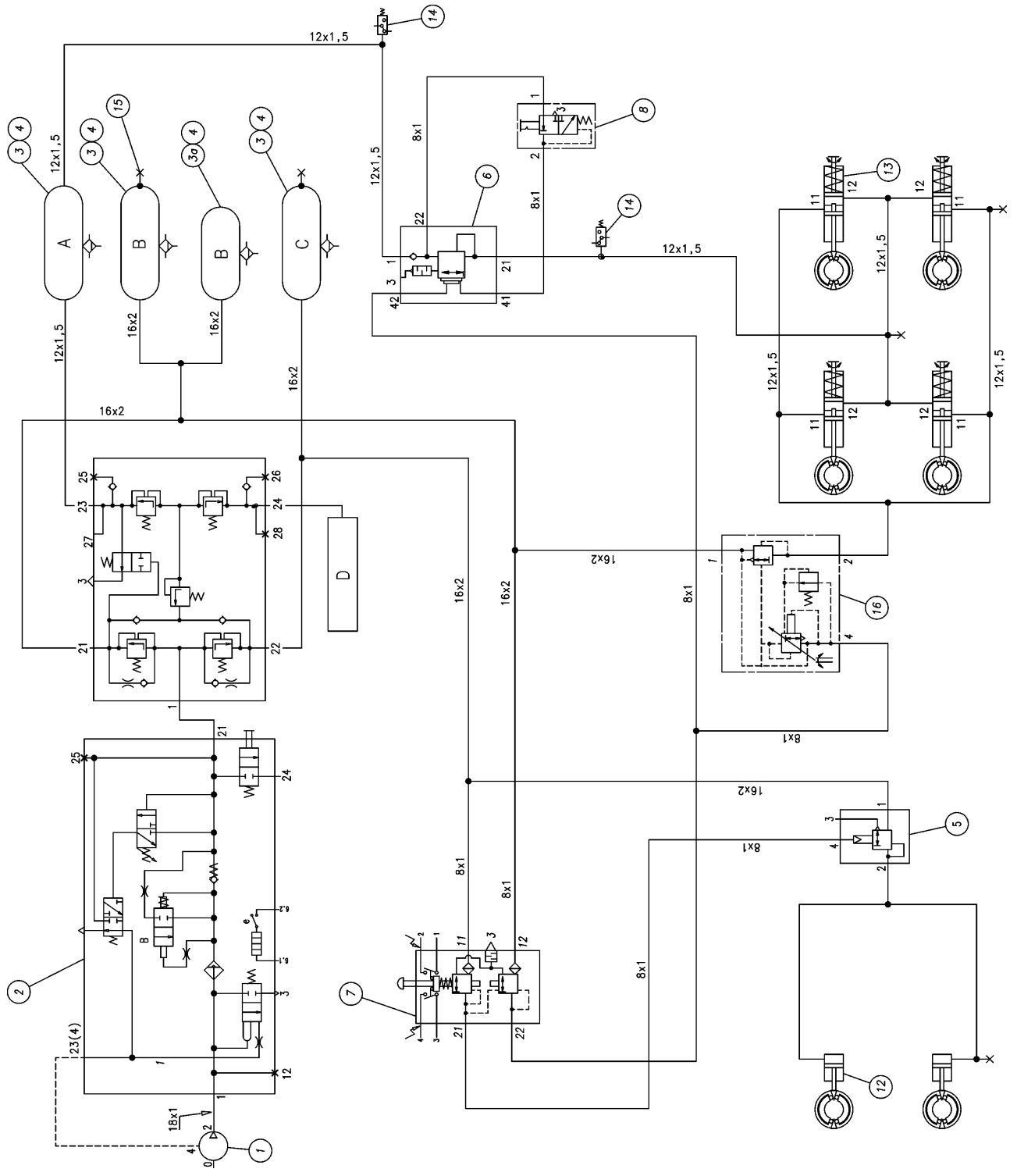
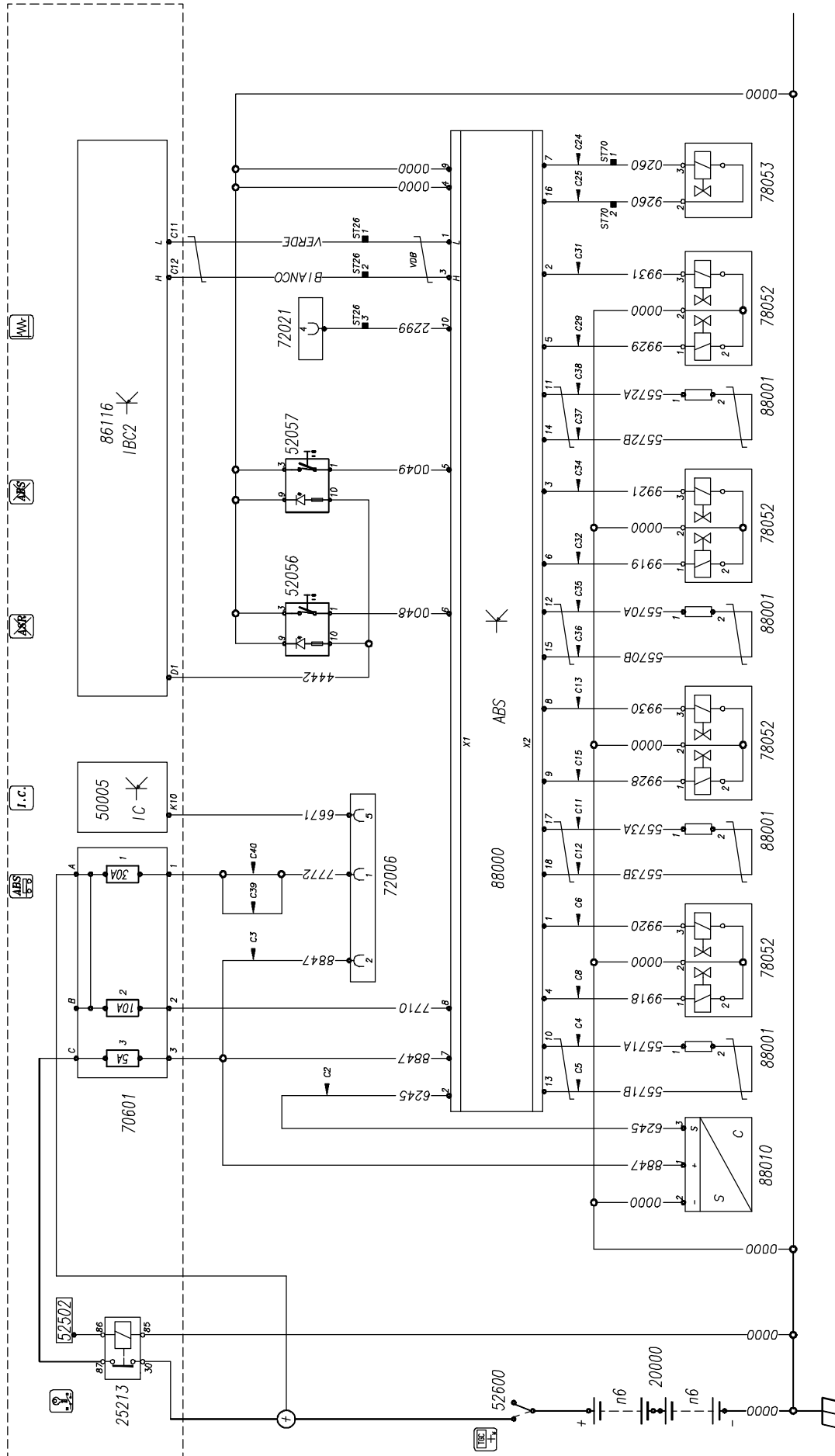


Diagram 20 - ABS



ECU type	First code	Second code	ECU pin	Signal type	Fault source	Notes / Operation type	Fault type	Colour
ECM	9A	02	–	–	PCR error	PCR error	Generic	Yellow
		03	–	–				
ECM	9B	03	–	–	VGT high speed and high pressure	Check VGT	Generic	Yellow
ECM	9D	03	–	–	Torque limiter	Check engine	Generic	Yellow
		04	–	–				
ECM	9E	03	–	–	Torque limiter	Check engine	Generic	Yellow
		04	–	–				
ECM	B1	03	–	–	CAN A, B, C lines	Check CAN A, B, C lines	Generic	Yellow
ECM	B5	02	–	–	VCM timeout	Check connection to centralina VCM	Generic	Yellow
ECM	B4	02	–	–	IBC timeout	Check connection to centralina IBC	Generic	Yellow
ECM	B9	03	–	–	MIL warning light	Check exhaust system	Generic	Yellow
ECM	IBC	02	–	–	MIL warning light	Check exhaust system	Generic	Yellow
ECM	BD	02	–	–	MIL warning light	Check exhaust system	Generic	Yellow
ECM	BF	02	–	–	MIL warning light	Check exhaust system	Generic	Yellow
ECM	C8	02	–	–	Torque limiter	Check engine	Generic	Yellow
		03	–	–				
ECM	C2	02	–	–	ETC timeout	Check connection to ETC control unit	Generic	Yellow
ECM	C6	02	–	–	Torque limiter	Check engine	Generic	Yellow
		03	–	–				
ECM	C3	02	–	–	DTCO timeout	Check connection to DTCO	Generic	Yellow
ECM	C9	02	–	–	TF timeout	Check connection to TF	Generic	Yellow
ECM	D1	03	–	–	Communication error	Check CAN line	Severe	Red
ECM	D3	0C	–	–	Communication error	Check CAN line	Severe	Red
ECM	D4	0C	–	–	Communication error	Check CAN line	Generic	Yellow
ECM	D5	02	–	–	Communication error	Check CAN line	Generic	Yellow
		04	–	–				
		0C	–	–				
ECM	D6	0C	–	–	Communication error	Check CAN line	Generic	Yellow
ECM	D7	02	–	–	Dataset ECM	Controllare dataset ECM	Severe	Red
		0C	–	–				
ECM	D8	0C	–	–	Communication error	Check CAN line	Generic	Yellow

When the cylinder contains the required quantity for charging, (the two pipes must already be connected to the sockets on the system, since the vacuum operation has already been performed), proceed as follows:

- Close the **LOW**, valve keeping the **HIGH** and **V1 - V2** valves open.
- Turn switch **B** (Refrigerant Process) to position 1, indicator **LB1** comes on.
- Turn switch **C** (Charge) to position 2, the corresponding indicator **LC2** will come on and refrigerant will flow from the station to the system.



If during charging the refrigerant level in the cylinder drops below the foreseen quantity, the system will stop and the minimum Level warning light will come on (L5).

- After charging 200 ÷ 500 g of refrigerant, according to system dimensions, stop charging by turning switch **C** (charge) to position 0.
- Using the electronic leak detector, search for any leaks in the system.
- Complete charging the system until the pre-calculated residual **weight in the cylinder has been reached**. (Residual weight = Total weight – system capacity weight).
- Complete the charge, turn switches **C - B** and **A** to position 0 (A having been turned to create vacuum). Re-check for any leaks.
- Close the **HIGH** valve.

Figure 156

