



**FABRYKA
SAMOCHODÓW
OSOBOWYCH**

REPAIR MANUAL

POLONEZ

1300

1500



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SAMOCHODÓW
OSOBYCH**

POLONEZ

**1300
1500**

**REPAIR
MANUAL**

75P
GENERAL DATA

TECHNICAL SERVICE

ENGINE

CLUTCH

GEARBOX

PROPELLER SHAFT

REAR AXLE

BRAKES

STEERING SYSTEM

SUSPENSION AND ROAD
WHEELS

ELECTRIC SYSTEM

BODY

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AGPOL ZW-10-7961/79

Zakłady Graficzne „Dom Słowa Polskiego”
7837/AO/79

NOTE

This manual gives a description of principal service and repair operations. It is divided into sections distinguished by two-digit numbers. Each section describes service and repair operations for various assemblies and sub-assemblies, the latter being designated by a number corresponding to that given in the spare parts catalogue. In this manner individual sheets of this manual are cross-referenced to an appropriate table in the parts catalogue.

HOW TO USE THE MANUAL

The code number to identify a given information is composed of five digits:

- a) the first two digits denote **the section**.
- b) the third digit denotes **the assembly** and is used jointly with the first two.
- c) the last two digits denote **the sub-assembly** which should be referred to in the spare parts catalogue.

To find the required information:

- 1) Look up the Index (title page of this manual) to find the section containing the required information.
- 2) Find out, from the appropriate section, under which assembly or sub-assembly the required information is given.
- 3) Locate the sub-assembly concerned by numbers printed in bold face in the top right-hand corner of each sheet.

UPDATING THIS WORKSHOP MANUAL

The updated sheets are delivered jointly with a reprinted Index. The updated sheets may be of two kinds:

- 1) **To replace a given sheet:** in this case the updated sheet will bear the number of the sheet it replaces; in the bottom right-hand corner a note will be printed: "Replace sheet No. dated."
- 2) **To complement instructions already given in this manual:** in this case the additional sheet will carry the same numbers as the sheet being complemented with a small letter added in alphabetical order.
Example: To complement information pertaining to the problem described on sheet No. 2, the first additional sheet will bear the number 2a.

an information is composed of five digits
no digits stand the section.
right denotes the assembly and is used jointly with the first two.
to right denotes the sub-assembly which should be referred to
their relation.

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00	—	—	3	VIII-1978	21	2	00	9	VIII-1978
00	—	—	4	VIII-1978	21	2	21	1	VIII-1978
00	—	—	5	VIII-1978	21	A	—	1	VIII-1978
00	—	—	6	VIII-1978	24	—	—	1	VIII-1978
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21	2	00	6	VIII-1978	44	3	00	8	VIII-1978

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44	3	06	1	VIII-1978
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Section	Assembly	Sub-assy	Sheet	Data
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70	1	37-38	1	VIII-1978
70	1	37-38	2	VIII-1978
70	1	50-51	1	VIII-1978
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70	1	55-56	2	VIII-1978
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70	3	02	1	VIII-1978
70	3	06-07	1	VIII-1978
70	6	23	1	VIII-1978
70	6	23/01	1	VIII-1978
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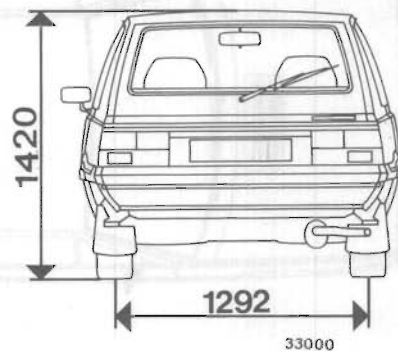
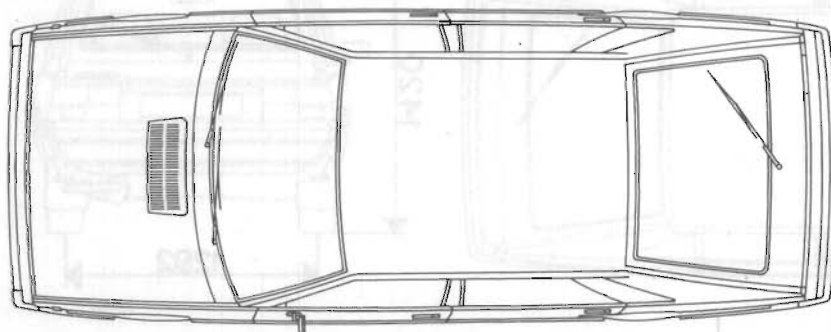
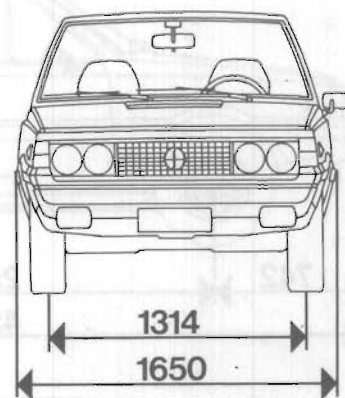
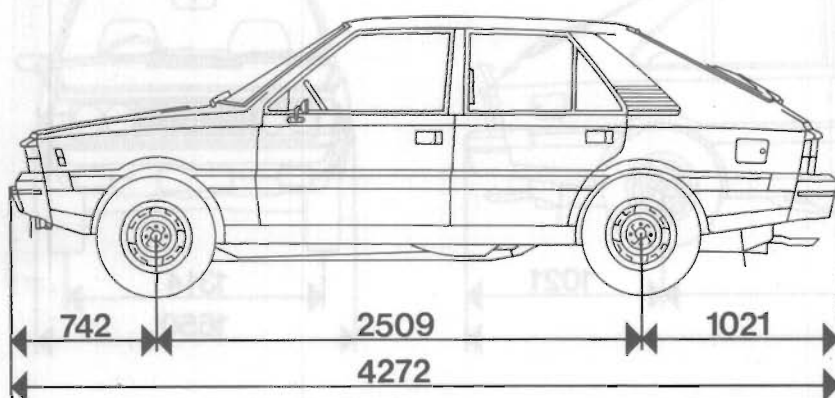
General data

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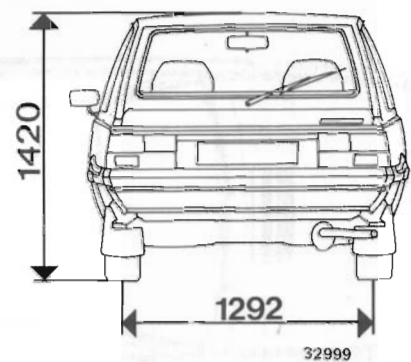
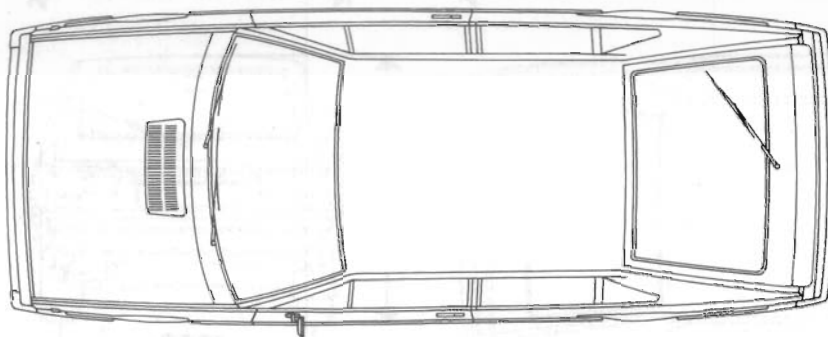
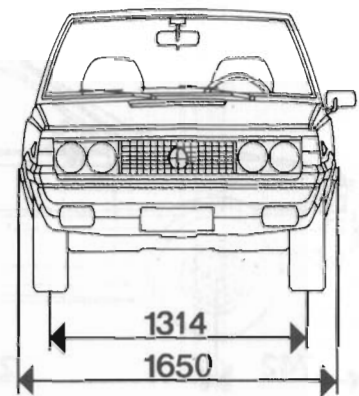
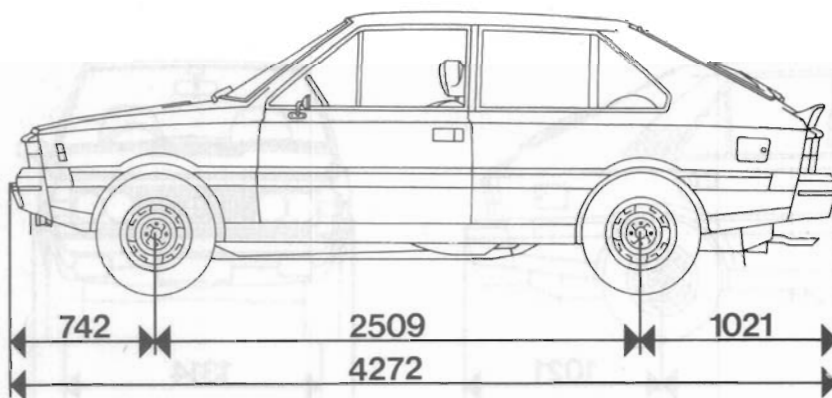
Sheet 1

DIMENSIONS

**POLONEZ – 5-door version**

Maximum height measured on unladen vehicle

Polonez Model 1300/1500

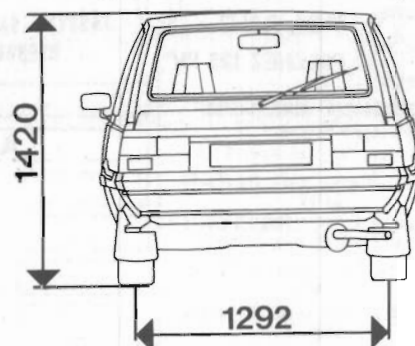
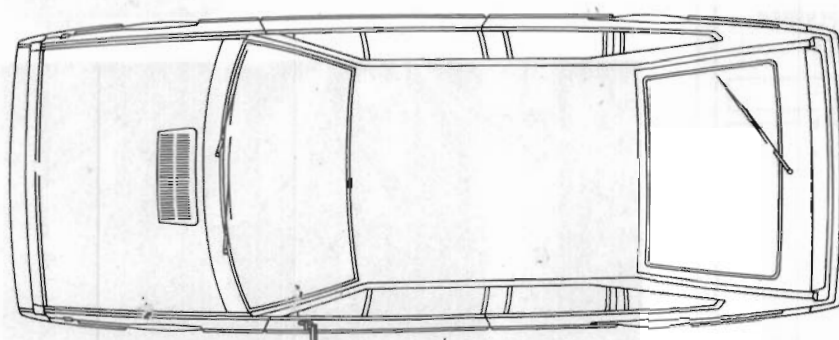
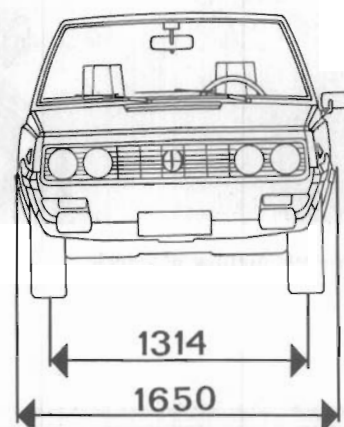
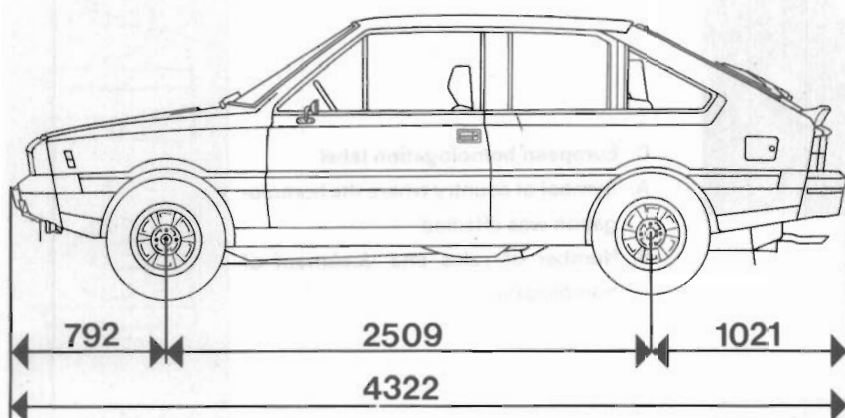


POLONEZ – 3-door version

Maximum height measured on unladen vehicle

General data

Połonez Model 1300/1500



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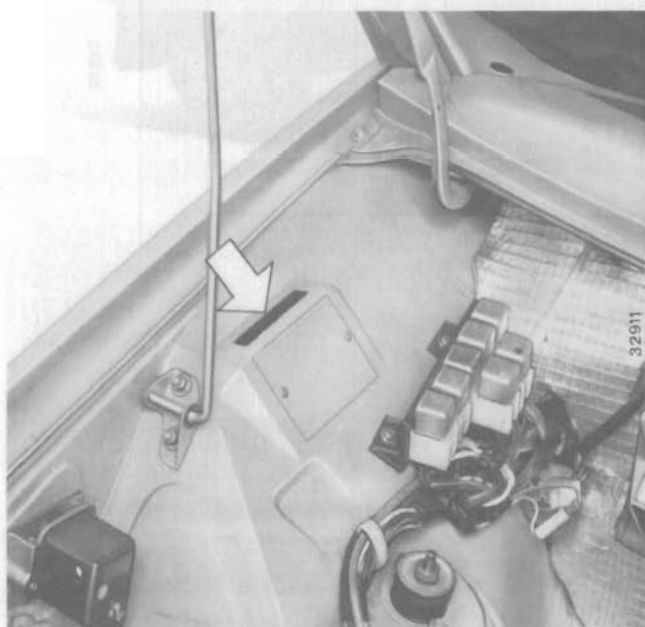
POLONEZ – Coupé version

Maximum height measured on unladen vehicle

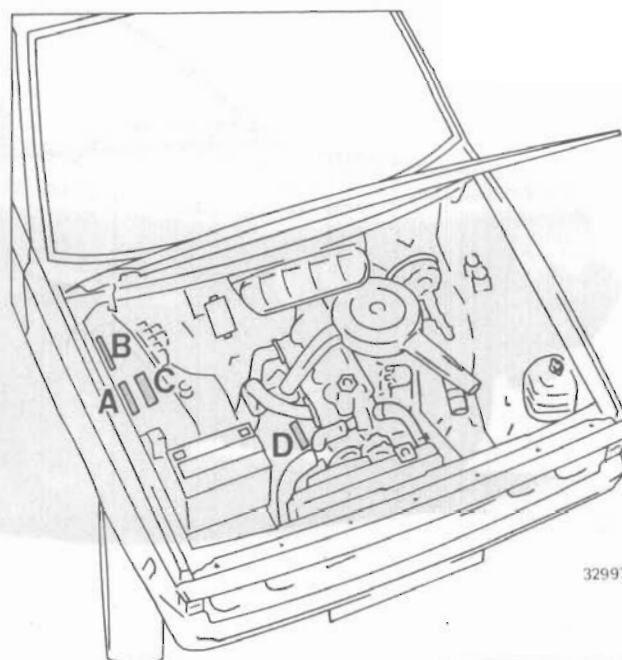
LOCATION OF IDENTIFICATION DATA ON THE VEHICLE

The vehicle bears the following markings:

- A. Type and number of vehicle
- B. Identification label
- C. European homologation labels
- D. Type and number of engine



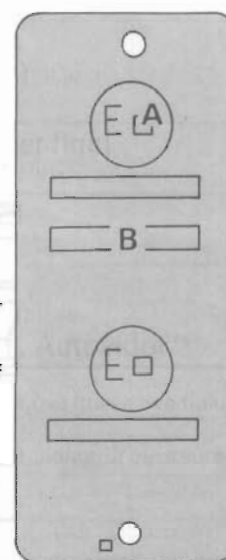
A. Type and number of vehicle



32997

C. European homologation label

- A. Symbol of country where the homologation was effected
- B. Number of rules and document of homologation



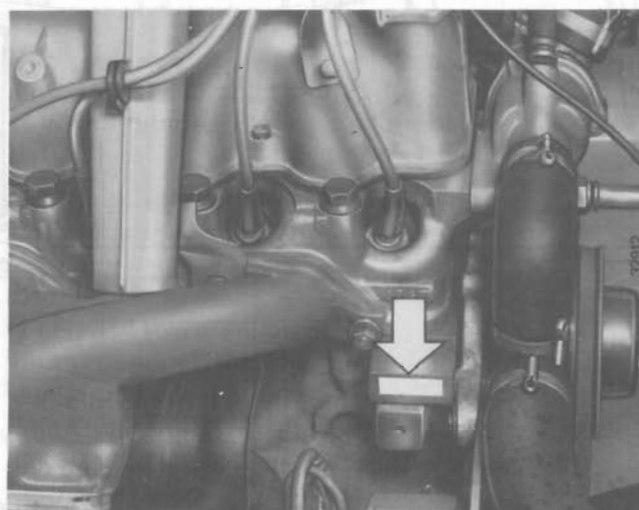
33049



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B. Identification label

- A. Type and number of vehicle
- B. Code number for spares
- C. Code number for paint



D. Type and number of engine stamped on cylinder block

General data

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Sheet 3

IDENTIFICATION DATA

Vehicle type		Engine type	Drive		Bodywork			Engine			Gearbox		Rear axle	
			LH	RH	3-door saloon	2-door saloon	Coupé	standard 65 or 75 HP	fuel oct. no. 78	boosted to 82 HP	4-speed	5-speed	ratio	
													10:41	10:43
POLONEZ	with 1500 ccm engine	B01AAA	AA	•	•			•			•		•	
		B01AAB	AA	•	•			•				•		•
		B51AAA	AA	•	•			•			•		•	
		B51AAB	AA	•	•			•				•		•
		B01ABA	AB	•	•					•	•		•	
		B01ABB	AB	•	•					•		•		•
		B01ACA	AC	•	•				•		•		•	
		B01ADA	AD	•	•				•		•		•	
		B02AAA	AA	•		•		•			•		•	
		B02AAB	AA	•		•		•				•		•
		B52AAA	AA	•		•		•			•		•	
		B52AAB	AA	•		•		•				•		•
		B02ACA	AC	•		•			•		•		•	
		B02ADA	AD	•		•			•		•		•	
		B03AAB	AA	•			•	•				•		•
		B53AAB	AA	•			•	•				•		•
		B03ABB	AB	•			•			•		•		•
	with 1300 ccm engine	B01BAD	BA	•	•			•			•		•	
		B01BBD	BB	•	•				•		•		•	
		B02BAD	BA	•		•		•			•		•	
		B02BBD	BB	•		•			•		•		•	

* for tropical climate

Vehicle type is denoted by type of bodywork (digit 1, 2, 3), type of engine (digit 4, 5), and type of chassis (digit 6).

Polonez Model 1300/1500

ENGINE

	1300 (standard)	1500 (standard)	1300 (for ON78)	1500 (for ON78)	1500 (boosted)
Type	BA	AA	BB	AC	AB
Working cycle	4-stroke, spark-ignited				
Number of cylinders	4 in row				
Cylinder bore	72 mm	77 mm	72 mm	77 mm	77 mm
Piston stroke	79.5 mm				
Total volume	1295 cm ³	1481 cm ³	1295 cm ³	1481 cm ³	1481 cm ³
Compression ratio	9	9.2	7.5	7.2	9.2
Maximum output (DIN)	47.8 kW (65 bhp)	55.2 kW (75 bhp)	44.2 kW (60 bhp)	51.5 kW (70 bhp)	60.4 kW (82 bhp)
Max. output rotational speed	5600 rpm	5200 rpm	5500 rpm	5200 rpm	5200 rpm
Maximum torque	93.2 Nm (9.5 kgm)	114.7 Nm (11.7 kgm)	95 Nm (9.7 kgm)	106 Nm (10.8 kgm)	113.8 Nm (11.6 kgm)
Max. torque rotational speed	3400 rpm	3200 rpm	3000 rpm	3400 rpm	3400 rpm
Timing gear	Overhead valves, camshaft in cylinder block driven by toothed belt				
Timing phases: — intake opening angle before TDC closing angle after BDC — exhaust opening angle before BDC closing angle after TDC	25° 51° 64° 12°				6° 44° 48° 2°
Valve clearances: — checking — working intake exhaust	0.45 mm 0.20 mm 0.25 mm				0.90 mm 0.20 mm 0.25 mm

General data

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Sheet 4

Fuel supply

The fuel is supplied by a mechanical pump; the supply pressure is 0.19 – 0.295 bar (0.2 – 0.3 kg/cm²). Carburettors are of the two throat type:

- Weber 34 DCMP 250 for the 1300 BA engine,
- Weber 34 DCMP 1/250 for the 1500 AA engine,
- Weber 34 DCMP 2/250 for the 1500 AB engine,
- Weber 34 DCMP 250 for the 1300 BB engine,
- Weber 34 DCMP 1/250 for the 1500 AC engine.

Manual starter

Suction device for combustion gases and oil fumes.

Tubing for feeding back excess fuel.

Mechanical actuation of the second throttle.

Hot water circulating in the intake manifold to heat up the mixture.

Air cleaner with paper cartridge, with seasonal adjustment.

Lubrication

By means of gear pump provided with pressure regulating valve.

Full-flow oil filter, with cartridge and cut-off valve.

Lubricating pressure at a temperature of 100°C:

- 3.43–4.9 bar
- 3.5–5 kg/sq.cm.

Cooling

By liquid, with the use of a centrifugal pump.

By-pass thermostat in the tubing between the engine and the radiator.

Electric fan controlled by a thermal switch located in the radiator:

- switch-on temperature of the liquid: $92 \pm 2^\circ\text{C}$
- switch-off temperature of the liquid: $87 \pm 2^\circ\text{C}$

Vertical-tube radiator.

Expansion reservoir plastic material.

CHASSIS

CLUTCH

Dry single-disc, with diaphragm spring and mechanical actuation.

Slack of clutch pedal: 24 mm.

GEARBOX

Mechanical, 4 or 5 speeds and reverse forward speeds synchronised.

Gearbox lever placed on the floor.

Ratios:

1st gear
2nd gear
3rd gear
4th gear
5th gear
Reverse

	4-speed version	5-speed version
1st gear	3.753	3.753
2nd gear	2.132	2.132
3rd gear	1.378	1.378
4th gear	1	1
5th gear	—	0.881
Reverse	3.867	3.867

PROPELLER SHAFT

Two-part shaft resilient support with ball bearing mounted in rubber, Cardan joints on the rear part, flexible joint and sliding sleeve on the gearbox side.

REAR AXLE

Hypoid gears with ratios.

- on vehicles with 1500 ccm engine and 4-speed gearbox: 10/41;

- on vehicles with 1500 ccm engine and 5-speed gearbox: 10/43;

- on vehicles with 1300 ccm engine and 4-speed gearbox: 10/43.

BRAKES

Disc brakes on 4 wheels, with independent circuits for front and rear wheels.

Floating yokes with single cylinder.

Vacuum-assisted operation on 4 wheels.

Braking corrector in the rear circuit, linked by a torsion rod with the rear axle.

Automatic adjustment of clearance between the friction pads and the disc.

Master cylinder dia. 19.05 mm (3/4")

Wheel cylinder dia.:

– front 48 mm (1 7/8")

– rear 38 mm (1 1/2")

Disc dia. 227 mm

Disc thickness 9.95–10.15 mm

Hand-operated parking brake acting on rear wheels; signal lamp indicates engagement.

Signal lamp for braking system breakdown.

Signal lamp indicating wear of friction pads (Coupé version only).

STEERING GEAR

Worm and roller.
Main shaft with three bearings.
Steering wheel shaft with two Cardan joints.
Steering gear ratio 1:16.4
Minimum turn dia. 10.80 m
Hydraulic shock-absorber mounted on the intermediate lever support.
Steering rods symmetrical, independent for each wheel, with intermediate rod in the middle.
Ball joints sealed for life.
Steering column vertically adjustable.

FRONT SUSPENSION

Independent, on wishbones. Helical springs and double-acting hydraulic telescoping shock-absorbers mounted on upper wishbones. Stabiliser bar and radius rods mounted on lower wishbone. Ball joints sealed for life. Kingpin inclination $6^\circ \pm 30'$.
Camber^(*) $0^\circ 30' \pm 30'$
Castor^(*) $4^\circ 30' \pm 30'$
Toe-in^(*) 2–4 mm
Axial play of wheelhub bearings 0.025–0.1 mm.

(*) Vehicle loaded with 4 persons and 50 kg luggage.

REAR SUSPENSION

Rigid rear axle with 3-leaf semi-elliptical springs. Two longitudinal radius rods.
Springs and radius rods resiliently mounted on the axle.
Double-acting hydraulic telescoping shock-absorbers.

ROAD WHEELS AND TYRES

Disc wheels with $5J \times 13''$ rim.
Radial tyres, type:
– Michelin 170 SR 13''
– Stomil Dębica D 124 175 SR 13''
Tyre pressure:

Front		Rear	
bar	kg/cm ²	bar	kg/cm ²
1.76	1.8	1.96	2
1.76	1.8	1.86	1.9

– Michelin
– Stomil Dębica

ELECTRIC SYSTEM

Voltage: 12 V
Battery capacity (discharge during 20 hours): 45 Ah
Alternator: ZEM, type A 124–14 V–60 A or A 124–14 V–44 A
Voltage regulator: ZEM, type RC 2/12 E or RC 2/12 D.
Starter motor: ZEM, type 100 N–1.5/12

Cylinder firing sequence: 1–3–4–2.
Ignition distributor: type ZEM.
Initial spark advance: 10° .
Automatic centrifugal advance: $24 \pm 2^\circ$.
Breaker contact gap: 0.4 ± 0.03 mm.

Spark plugs type	CHAMPION	MAGNETI MARELLI	BOSCH	ISKRA (KLG)	AC DELCO
Symbol	N 9 Y	CW 7 LP	W 175 T 30	FE 65 P	44 Lx
Spark plug seat thread	M 14×1.25				
Gap between electrodes	0.6÷0.7				

General data

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Sheet 5

WEIGHTS

	5-door saloon	3-door saloon	Coupé
Curb weight*	1140	1125	1135
Maximum load	400	400	400
Weight fully laden	1540	1525	1535
Max. admissible trailer weight	1000	1000	1000

(*) All systems filled, with spare wheel and equipment.

Vehicles with 5-speed gearbox weigh approximately 5 kg more.

PERFORMANCE

Maximum speeds(**)

— engine	1300 BA	1500 AA		1300 BB	1500 AC	1500 AB	
— rear axle	10/43	10/41	10/43	10/43	10/41	10/41	10/43
— gearbox (no. of speeds)	4	4	5	4	4	4	5
in 1st gear	40	41	40	40	40	41	40
in 2nd gear	73	73	70	73	73	73	70
in 3rd gear	110	115	105	105	110	115	110
in 4th gear	~ 140	~ 145	~ 140	~ 135	~ 143	~ 150	~ 140
in 5th gear	—	—	~ 155	—	—	—	~ 160
in reverse gear	39	40	39	39	39	40	39
Climbing ability**							
in 1st gear	29	36	36	29	26	36	36
in 2nd gear	16	20	21	16	18	20	20
in 3rd gear	9	11	12	9	10	11	11
in 4th gear	4	7	8	4	7	7	7
in 5th gear	—	—	6	—	—	—	6
in reverse gear	29	36	38	29	26	36	36

** Vehicle fully laden with run-in engine, on road in good repair.

FILLING-IN QUANTITIES

Filling-in point	Q-ty		Specification
	litres	kg	
Fuel tank	45	—	Fuel with Octane Number 64(RM) for AA, AB, BA engines
Including reserve of	4.5—7	—	Fuel with Octane Number 78 (RM) for AC and BB engines
Radiator, expansion reservoir, engine, heater	7.5	—	Cooling fluid ⁽¹⁾
Oil sump and filter: 1300 and 1500 ccm	4	3.6	Engine oil Selektol Special SD ⁽²⁾ ⁽³⁾
Gearbox: mechanical 4-speed mechanical 5-speed	1.55 1.55	1.40 1.40	Gear oil Hipol 15-F ⁽⁴⁾ (SAE 90 EP)
Rear axle	1.2	1.07	Gear oil Hipol 15-F ⁽⁴⁾ (SAE 60 EP)
Steering gear housing	0.160	0.150	Gear oil Hipol 15-F ⁽⁴⁾ (SAE 90 EP)
Front shock-absorbers (each) Rear shock-absorbers (each)	0.125 0.215	0.116 0.200	Shock absorber fluid
Hydraulic brakes: front rear	0.14 0.22	0.18 0.22	Brake fluid-R3 (SAE 70 R3) ⁽⁵⁾
Washer reservoir for: Windscreen Rear window	ab. 2 ab. 2	— —	Washing fluid „Lazuron” or „Autovidol”

¹ Or equivalents: FIAT antifreeze “Paraflu 11” with 50% addition of water, or Polish “Borygo” fluid, sold ready for use (these two fluids must not be mixed).

² Joint capacity of oil sump, filter and oil tubing is 4 kg. The quantity specified in the table is required for periodical change of oil in sump and filter.

³ See next table.

⁴ Hipol 15-F oil may be used to replenish systems containing FIAT – W 90 M (Spirax 90 EP) or Hipoidok 90 oil.

⁵ Or equivalent brake fluids: “Shell Donax B” (SAE 70 R3) or “Brake Fluid M 7669” made by Karbid Union.

All these brake fluids may be mixed with each other.

ENGINE OILS

AMBIENT TEMPERATURE		SEASONAL OIL	MULTIGRADE OIL
Below –15°C		—	Selektol Special SD SAE 10 W/30 Selektol Special SD SAE 20 W/40
Between –15°C and 0°C		Selektol Special SD SAE 20 W (winter)	
Above 0°C	up to 35°C over 35°C	Selektol Special SD SAE 30 (summer)	

Selektol Special oils of all grades may be mixed together.

LIST OF PERIODICAL SERVICE OPERATIONS

[illegible]

10	Basic Data
	– Bolts and nuts tightening torques
100.01	Engine suspension
101.01	Cylinder block and head
101.02	Cylinder block covers
101.03	Crankshaft with flywheel
101.05	Connecting rods and pistons
101.06	Timing gear drive
101.07	Timing gear
102.02	Fuel pump and tubing
102.04	Carburettor
103.01	Lubricating system
104.01	Radiator
104.02	Cooling fluid pump with tubing
10A	Special tools

Engine: basic data

Polonez Model 1300/1500

10

Sheet 1

CYLINDER BLOCK - CONNECTING RODS

DIMENSION	1300	1500
	mm	
Cylinder bore (graded in groups by every 0.01 mm)	72,000 ÷ 72,030	77,000 ÷ 77,030
Dia. of bore for cylinder liner	75,930 ÷ 75,950	80,930 ÷ 80,950
Cylinder liner outside dia.	76,000 ÷ 76,020	81,000 ÷ 81,020
Cylinder liner oversize	0,04	
Main crankshaft bearing seat dia.	66,675 ÷ 66,687	
Width of middle main bearing, between seats for thrust half-rings	30,140 ÷ 30,200	
Con. rod bearing seat dia.	56,718 ÷ 56,730	
Small-end bore dia.	23,939 ÷ 23,972	
Small-end bush outside dia. — catalogue No. — 4025617 — 4058779	23,979 ÷ 24,000 24,016 ÷ 24,041	
Small-end bush inside dia. — group 1 — group 2 (pressed-in and machined)	22,000 ÷ 22,003 22,003 ÷ 22,006	
Nominal thickness of con. rod bearing	1,838 ÷ 1,847	
Con. rod bearing undersizes	0,254 - 0,508 - 0,762 - 1,016	
Assembling interference: small-end bush — catalogue No. — 4025617 — 4058779	0,007 ÷ 0,061 0,044 ÷ 0,102	
Assembling clearance: gudgeon pin — small-end bush	0,006 ÷ 0,012	
Small-end bush undersizes	0,2 ÷ 0,5	
Assembling clearance: connecting-rod — crankshaft con. rod journal	0,011 ÷ 0,062	
Max. deviation from parallelism of connecting-rod bore centre lines (measured at 125 mm distance from centre line of connecting-rod stem)	± 0,05	

PISTONS – GUDGEON PINS – PISTON RINGS

DIMENSION		1300	1500
		mm	
Nominal piston dia.*	group A	71,920 ÷ 71,930	76,920 ÷ 76,930
	group B	71,930 ÷ 71,940	76,930 ÷ 76,940
	group C	71,940 ÷ 71,950	76,940 ÷ 76,950
Piston oversizes		0,2 - 0,4 - 0,6	
Gudgeon pin bore dia.	group 1	21,998 ÷ 22,001	
	group 2	22,001 ÷ 22,004	
Piston ring groove width :	1st groove	1,535 ÷ 1,555	
	2nd groove	2,030 ÷ 2,050	
	3rd groove	3,967 ÷ 3,987	
Nominal gudgeon pin dia.	group 1	21,991 ÷ 21,994	
	group 2	21,994 ÷ 21,997	
Gudgeon pin oversizes		0,2	
Piston ring thickness :	1st ring	1,478 ÷ 1,490	1,478 ÷ 1,490
	2nd ring	1,978 ÷ 1,990	1,978 ÷ 1,990
	3rd ring	3,925 ÷ 3,937	3,925 ÷ 3,937
Assembling clearance : piston — cylinder		0,070 ÷ 0,090	
Assembling clearance : gudgeon pin — piston boss		0,004 ÷ 0,010	
Assembling clearance : piston rings — grooves	1st ring	0,045 ÷ 0,077	0,045 ÷ 0,077
	2nd ring	0,040 ÷ 0,072	0,040 ÷ 0,072
	3rd ring	0,030 ÷ 0,062	0,030 ÷ 0,062
Distance between piston ring ends inserted in cylinder	1st ring	0,25 ÷ 0,45	0,30 ÷ 0,50
	2nd ring	0,25 ÷ 0,45	0,30 ÷ 0,50
	3rd ring	0,20 ÷ 0,45	0,25 ÷ 0,50
Piston ring oversizes		0,2 - 0,4 - 0,6	
Maximum difference between piston weights		± 5 G	

* Measured perpendicularly to gudgeon pin centre line at a distance of 51.4 mm from piston crown (see drg. in table 101.05, sheet 4).

Engine: basic data

Polonez Model 1300/1500

10

Sheet 2

CRANKSHAFT - BEARINGS

DIMENSION	1300	1500
	mm	
Main crankshaft journal nominal dia.	62,962 ÷ 62,982	
Main half-bearing nominal thickness	1,825 ÷ 1,834	
Main half-bearing undersizes	0,254 - 0,508 - 0,762 - 1,016	
Conrod journal nominal dia.	52,992 ÷ 53,013	
Assembling clearance: main journal - half-bearing	0,025 ÷ 0,075	
Middle main journal length between two locating half-rings	34,980 ÷ 35,020	
Locating half-ring nominal thickness	2,310 ÷ 2,360	
Oversize half-ring thickness	2,410 ÷ 2,460	
Crankshaft axial play	0,060 ÷ 0,260	
Max. permissible misalignment of crankshaft main journal centre lines	≤ 0,03	
Maximum permissible deviation of journal position in relation to crankshaft axis of symmetry *)	± 0,5	
Max ovality of main and con. rod journals after grinding	0,007	
Max taper of main and con. rod journals after grinding	0,007	
Max. deviation from square of flywheel flange face to crankshaft centre line **)	0,025	
Maximum deviation from parallelism of thrust and friction faces of flywheel	0,1	

*) Joint gauge reading.

**) Measured with gauge placed at one side, at a distance of approx. 38 mm from crankshaft axis of rotation.

Polonez Model 1300/1500

CYLINDER HEAD

DIMENSION	1300	1500
	mm	
Valve guide seat dia.	13,950 ÷ 13,977	
Valve guide nominal outside dia.	14,040 ÷ 14,058	
Valve guide oversize	0,2	
Assembling interference : valve guide — seat	0,063 ÷ 0,108	
Valve guide inside dia. after pressing-in and machining	8,029 ÷ 8,047	
Valve stem dia.	7,981 ÷ 7,999	
Assembling clearance : valve stem — valve guide	0,030 ÷ 0,066	
Valve seat contact surface inclination angle	45° ± 5'	
Valve mating surface inclination angle	45° 30' ± 5'	
Valve head dia.	intake exhaust	35 ± 0,15 31,5 ± 0,15
Valve seat contact surface width	intake exhaust	1,2 ÷ 1,4 0,9 ÷ 1,1
Valve seat inside dia.	intake exhaust	32,1 ÷ 32,3 28,6 ÷ 28,8
Valve seat dia. after pressing into cylinder head and milling	intake exhaust	32,1 ÷ 32,3 29,0 ÷ 29,2

VALVE SPRINGS

DIMENSION	Inner spring	Outer spring
Catalogue No.	4118614 4160871	4118615 4160872
Height of spring compressed under load of 136.3±8.8 N (13.9±0.9 kg)	29,7 mm	—
Height of spring compressed under load of 283.5±17.4 N (28.9±1.8 kg)	—	33,7 mm
Minimum admissible pressure at above specified heights of springs	107,5 N (11 kg)	225,5 N (23 kg)

Engine: basic data

Polonez Model 1300/1500

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Sheet 3

TIMING GEAR

DIMENSION		1300	1500
		mm	
Camshaft	Camshaft bearing seat in cylinder block dia. front bearing middle bearing rear bearing	52,502 ÷ 52,527 50,927 ÷ 50,952 49,340 ÷ 49,365	
	Bush outside dia. front bush middle bush rear bush	52,467 ÷ 52,482 51,028 ÷ 51,079 49,428 ÷ 49,479	
	Bush inside dia. (after pressing-in and machining) front bush middle bush rear bush	36,025 ÷ 36,045 47,720 ÷ 47,740 46,324 ÷ 46,344	
	Fit of bush into cylinder block seat: front bush (clearance) middle bush (interference) rear bush (interference)	0,020 ÷ 0,060 0,076 ÷ 0,152 0,063 ÷ 0,139	
	Camshaft journal dia. front journal middle journal rear journal	35,975 ÷ 36,000 47,664 ÷ 47,689 46,273 ÷ 46,298	
	Assembling clearance: bush — camshaft journal front bearing middle bearing rear bearing	0,025 ÷ 0,070 0,031 ÷ 0,076 0,026 ÷ 0,071	
	Cam lift	boosted 1500	
		6,650	5,900
	Timing phases:		
Push-rods	intake { open before TDC close after BDC	6° 44°	25° 51°
	exhaust { open before BDC close after TDC	48° 2°	64° 12°
	Valve clearances (on valve c/l) setting { intake exhaust	0,90 0,90	0,45 0,45
	working { intake exhaust	0,23 0,25	0,20 0,25
	Push-rod seat dia.		22,003 ÷ 22,021

Polonez Model 1300/1500

DIMENSION		boosted 1500	1300	1500
			mm	
Push-rods	Push-rod nominal outside dia.		21,978 ÷ 21,996	
	Push-rod oversizes		0,05 - 0,10	
	Assembling clearance: push-rod — seat		0,007 ÷ 0,043	
	Valve lift without valve clearance	9,975	8,850	
Valve rocker pivot	Valve rocker pivot bracket bore dia.		17,974 ÷ 18,034	
	Valve rocker pivot dia.		17,956 ÷ 17,974	
	Assembling clearance: pivot — bracket bore		0 ÷ 0,078	
	Valve rocker bore dia.		18,006 ÷ 18,024	
	Assembling clearance: pivot — rocker bore		0,032 ÷ 0,068	

Engine: basic data

Polonez Model 1300/1500

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Sheet 4

FUEL SUPPLY

CARBURETTOR TYPE	34 DCMP 250		34 DCMP 1/250		34 DCMP 2/250	
	mm		mm		mm	
	1st stage	2nd stage				
Throat dia.	21	21	24	24	24	24
Atomiser type	4,5	4,5	4,5	4,5	4,5	4,5
Main fuel jet bore	1,05	1,15	1,20	1,35	1,20	1,40
Main air jet bore	2,20	2,20	2,30	2,00	2,20	2,00
Emulsion tube type	F 26	F 26	F 30	F 30	F 30	F 30
Booster pump jet bore	0,50	—	0,50	—	0,50	—
Pump valve	closed	—	closed	—	closed	—
Pump stroke	10	—	10	—	10	—
Idling fuel jet bore	0,45	1,00	0,45	1,00	0,50	1,00
Idling air jet bore	1,10	0,80	1,40	0,80	1,20	0,80
1st transition orifice dia.	0,90	1,20	0,90	1,20	0,90	1,20
2nd transition orifice dia.	0,80	1,20	0,80	1,20	0,80	1,20
3rd transition orifice dia.	0,80	1,50	0,80	1,50	0,80	1,50
Idling mixture adjusting jet bore	1,00	—	1,20	—	1,00	—
Needle valve seat dia.	1,75		1,75		1,75	
Fuel level in float chamber (*)	7,5 ± 0,25		7,5 ± 0,25		7,5 ± 0,25	
Starter jet air orifice dia.	5,75		5,75		5,75	
Starter fuel jet bore	F 1/1,50		F 1/1,30		F 1/1,50	
Starter air jet bore	2,20		2,20		2,20	
Economiser 1st orifice dia.	2,50		2,50		2,50	
Economiser 2nd orifice dia.	2,30		2,30		2,30	

* Without gasket.

FUEL SUPPLY CONTD

Fuel pump capacity	≥ 75 l/h
Actuating lever travel	2.75—2.95 mm
Supply pressure at 4000 crankshaft rpm	0.19—0.29 bar (0.2—0.3 kg/cm ²)

LUBRICATION

Oil pump type	gear pump
Drive	from camshaft gear
Oil pressure regulating valve	in pump body
Clearance between top gear face and pump body face	0.031—0.116 mm
Clearance between tooth tips and pump body	0.110—0.180 mm
Clearance between drive shaft and bush in pump body	0.016—0.055 mm
Clearance between pin and driven gear	0.017—0.057 mm
Backlash (between drive and driven gears)	0.15 mm
Backlash (between pump drive gear and camshaft gear)	0.100 mm
Full-flow filter with cut-off valve	paper cartridge
Oil pressure sensor	electric
Lubricating pressure at 100°C	3.43—4.9 bar (3.5—5 kg/cm ²)

Engine: basic data

Polonez Model 1300/1500

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Sheet 5

OIL PRESSURE REGULATING VALVE SPRING

Catalogue number	4357458
Length of spring placed in the seat, under load of 51.94 ± 3.92 N (5.3 ± 0.4 kg)	42 mm
Minimum admissible load on spring placed in the seat	48 N (4.9 kg)

COOLING

Fluid cooling by means of pump	centrifugal with blade-type impeller
Pump drive	by V-belt
Fan drive thermal switch: — off at — on at	$92^{\circ} \pm 2^{\circ}\text{C}$ $87^{\circ} \pm 2^{\circ}\text{C}$
Engine cooling fluid thermostat: — top valve opening start — maximum opening — top valve stroke — bottom valve stroke	$82^{\circ} \pm 2^{\circ}\text{C}$ 96°C 8 mm 4.25 mm
Assembling clearance between impeller blades and pump body	0.5—1 mm
Radiator leakage test pressure	0.98 bar (1 kg/cm ²)
Radiator cap spring test pressure	0.78 bar (0.8 ± 0.1 kg/cm ²)



Engine: Bolts and nuts tightening torques

10

Polonez Model 1300/1500

Sheet 6

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
Bolt fastening main crankshaft bearing covers to cylinder block	4025557	M12×1.5	R100	103	10.5
Bolt fastening cylinder head to block	1/59748/30	M12×1.5	R100	98	10
Nut of stud fixing intake manifold to cylinder head	1/61008/11	M8	R50 Znt (stud R80 Znt)	25	2.5
Nut of stud fixing exhaust manifold to cylinder head	1/61008/11	M8	R50 Znt (stud R80 Znt)	25	2.5
Bolt fastening con. rod bearing cover	4119148	M11×1	R100	69	7
Self-locking bolt fastening flywheel to crankshaft	1/43486/70	M10×1.25	R120	83	8.5
Self-locking bolt fastening driven gear to camshaft	1/42337/30	M10×1.25	R100	78	8
Nut of stud holding valve rocker pivot bracket	1/61008/11	M8	R50 Znt (stud R80)	19	1.9
Link fastening oil tube to cylinder block	4357452	M20×1.5	R50	93	9.5
Bolt fastening thermostat housing to cylinder head	1/60447/21	M8	R80 Znt	20	2.2
Bolt fastening cooling fluid pump and alternator drive pulley to crankshaft	4376199	M20×1	R50 Znt (crankshaft C40 Bon)	137	14
Bolt fastening pulley to cooling fluid pump hub	1/60432/21	M8	R80 Znt	20	2

Polonez Model 1300/1500

BOLTS AND NUTS TIGHTENING TORQUES, contd

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
Bolt fastening starter motor to clutch housing	1/38268/21	M8	R80 Znt/EC	20	2
Nut of bolt for bottom fastening of alternator	4383647	M12×1.25	R50 Znt (bolt R80 Znt)	69	7
Bolts fastening oil filter and alternator bracket to cylinder block	1/60438/21 1/60448/21 1/60446/21	M8	R80 Znt	43	4.4
Nut of stud fastening alternator top bracket to cooling fluid pump cover	1/21647/11	M10×1.25	R50 Znt (stud R80 Znt)	49	5
Self-locking nut with plastic insert for alternator top fastening	1/25745/11	M10×1.25	R50 Znt (bolt R80 Znt)	49	5
Cooling fluid temperature sensor	4108672 013913	M16×1.5	brass	49	5
Oil pressure sensor 12 V	5305685 4151243 012579	M12×1.5	steel Cdt Brill or Znt Brill	22	2.2
Spark plugs	4092518 4079729 4238208 009394 012760	M14×1.25	—	37	3.8

Engine suspension

Polonez Model 1300/1500

100.01

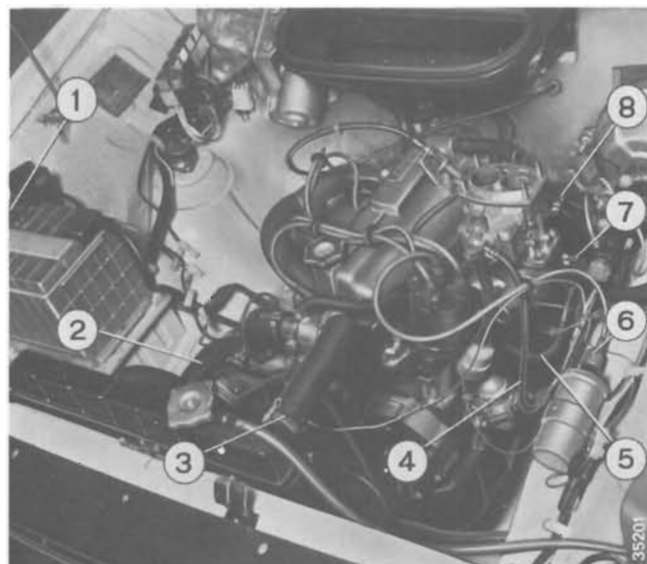
Sheet 1

ENGINE DISMOUNTING

In order to dismount the engine from the vehicle, the following operations should be carried out after first dismounting the gearbox as described in Section 21 (Gearbox).

Components to be disconnected when dismounting engine from the vehicle.

1. Negative battery terminal.
2. Radiator outlet connector.
3. Radiator inlet connector.
4. Pipe carrying excess fuel from carburettor back to fuel tank.
5. Pipe for supply of fuel from fuel tank to fuel pump.
6. HT and LT leads.
7. Vacuum pipe of brake assisting servo.
8. Flexible link of cold-start device.

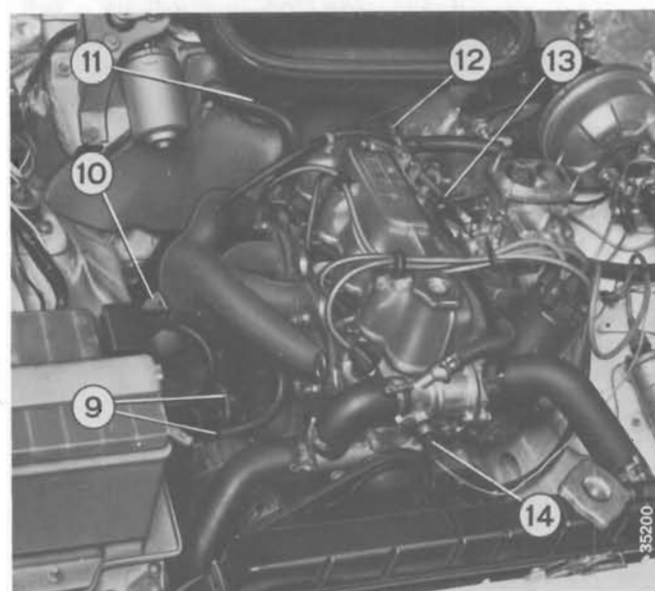


After disconnecting the negative battery terminal (to avoid a short-circuit) disconnect the following components located in the lower part of the vehicle:

- unscrew the nuts fastening engine mounts;
- disconnect the ground lead between engine and body.

Components to be disconnected when dismounting engine from the vehicle.

9. Alternator and starter leads.
10. Exhaust manifold.
11. Heater inlet connector.
12. Heater outlet connector.
13. Throttle control link.
14. Cooling fluid temperature sensor lead.

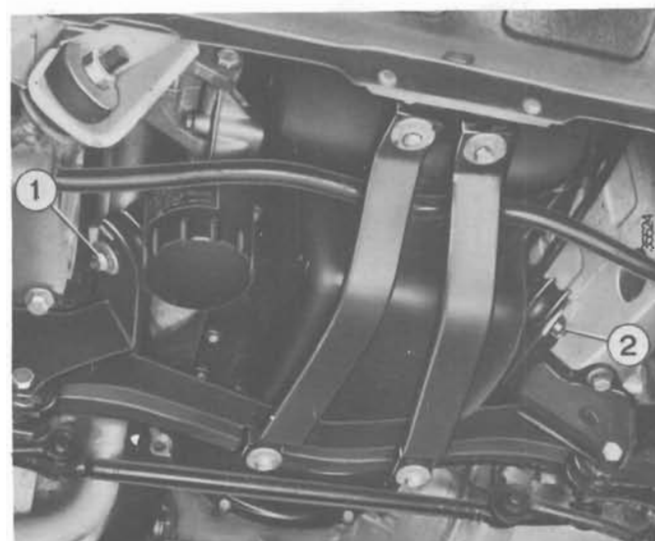


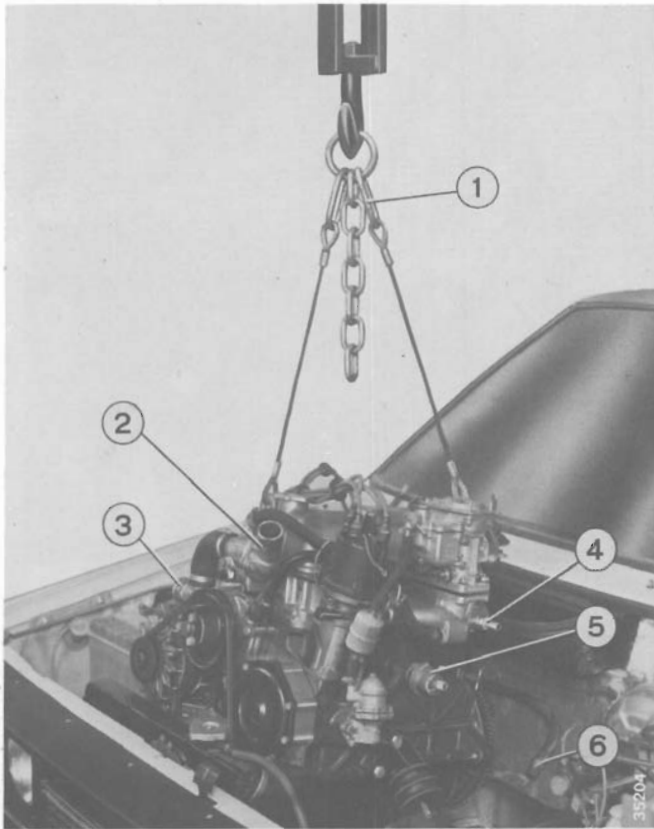
Operations to be carried out at engine compartment:

- remove engine cover;
- drain fluid from cooling system;
- remove cleaner with connections;
- remove heater connectors, radiator connectors and carburettor tubes.

Components to be disconnected when dismounting engine from the vehicle – view from the underside.

1. Nut fastening resilient engine mount – RH side.
2. Nut fastening resilient engine mount – LH side.





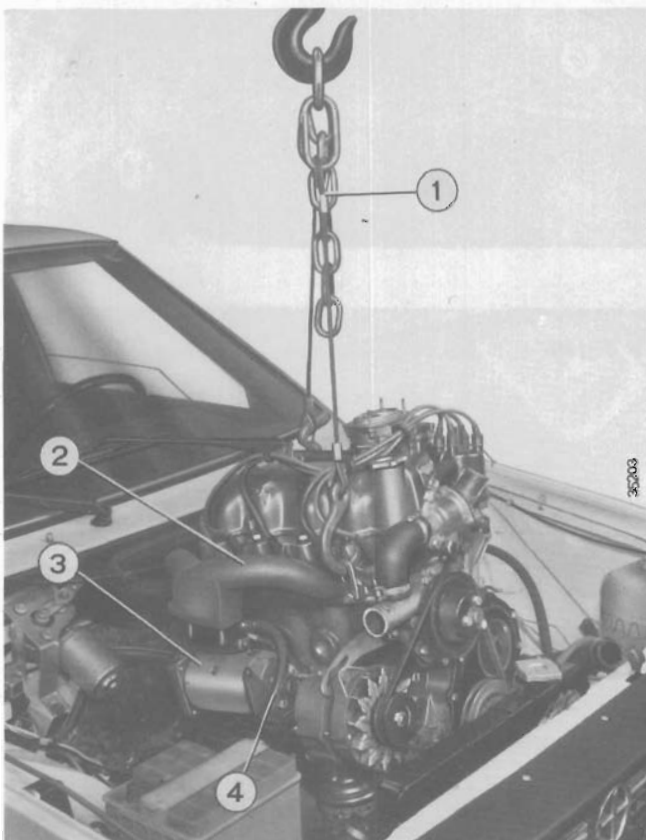
- disconnect links for accelerator and cold-start device from carburettor;
- disconnect brake servo vacuum pipe from intake manifold;
- disconnect electric leads from starter motor and alternator;
- disconnect exhaust pipes from exhaust manifold;
- disconnect electric fan from radiator;
- disconnect all electric leads from engine;
- remove engine with the use of hoist and A.60592 hanger as shown in the picture.

Use of A.60592 hanger when removing engine from engine compartment.

1. A. 60592 hanger.
2. Cooling fluid thermostat (needs not to be dismounted when removing the engine).
3. Thermostat inlet.
4. Coupling of vacuum servo pipe.
5. Electric oil-pressure sensor.
6. Rubber connector to heater.

REPLACING ENGINE IN TO VEHICLE

The operations required for replacing the engine in to the vehicle do not present any particular problem as they are the same as in the case of engine dismounting and have only to be carried out in a reversed sequence. After replacing the engine in to the vehicle, connections of all tubes must be checked for tightness.



View of engine in engine compartment.

1. A. 60592 hanger.
2. Exhaust manifold.
3. Starter motor.
4. Starter motor lead.

Engine suspension

Polonez Model 1300/1500

100.01

Sheet 2

ENGINE BRAKING TEST

The braking test should be carried out under conditions specified in the Table below:

Rotational speed rpm	Test time minutes	Brake load
800—1000	10'	without load
1500	10'	without load
2000	10'	without load

NOTE: During the braking test the engine must not be run at full speed; use speeds given in the Table above. The actual running-in to be done with engine mounted on the vehicle.

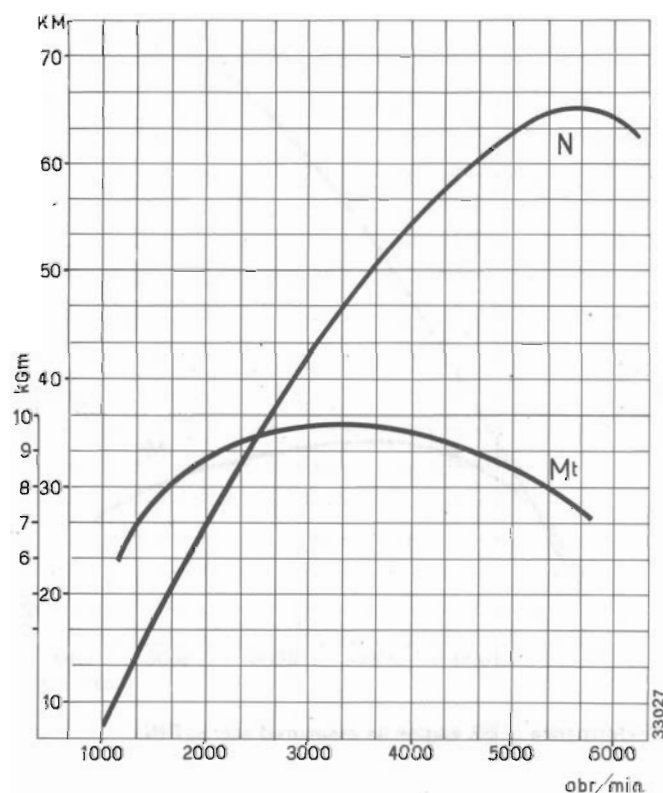
The performance curves shown in the diagrams are for engines repaired, run-in, fitted with fan, exhaust silencer and air cleaner, tested under conditions prescribed by DIN.

Mt — engine torque

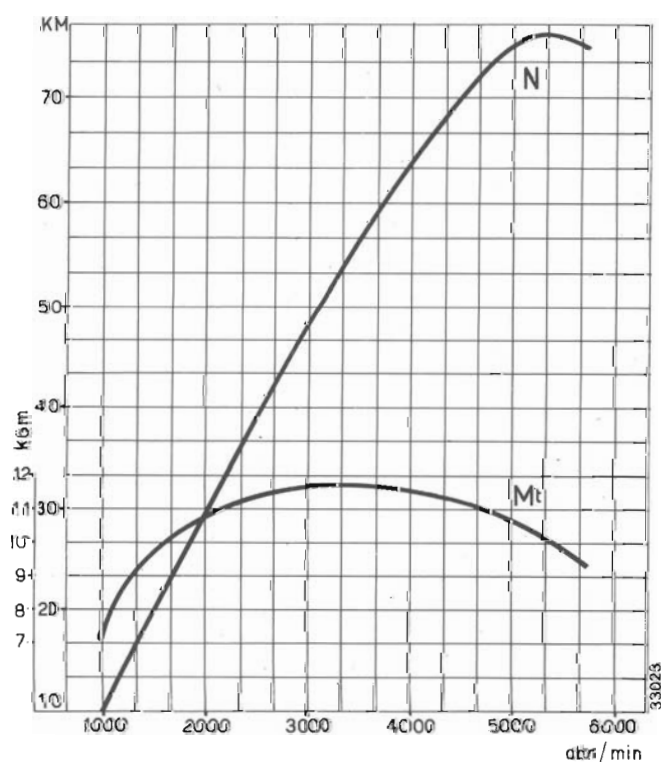
N — engine speed

KM = HP

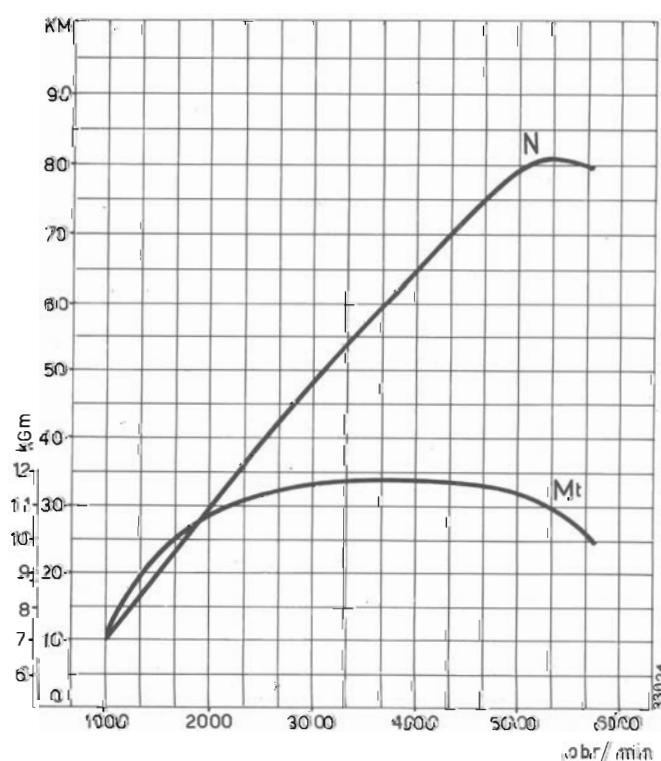
obr/min = rpm



Performance of BA engine as measured acc. to DIN.

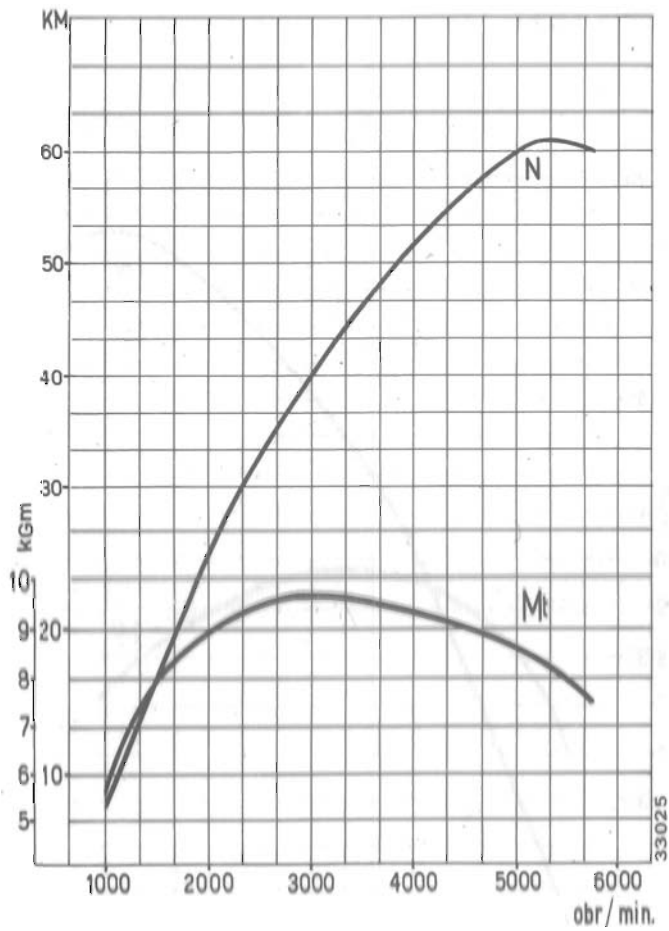


Performance of AA engine as measured acc. to DIN

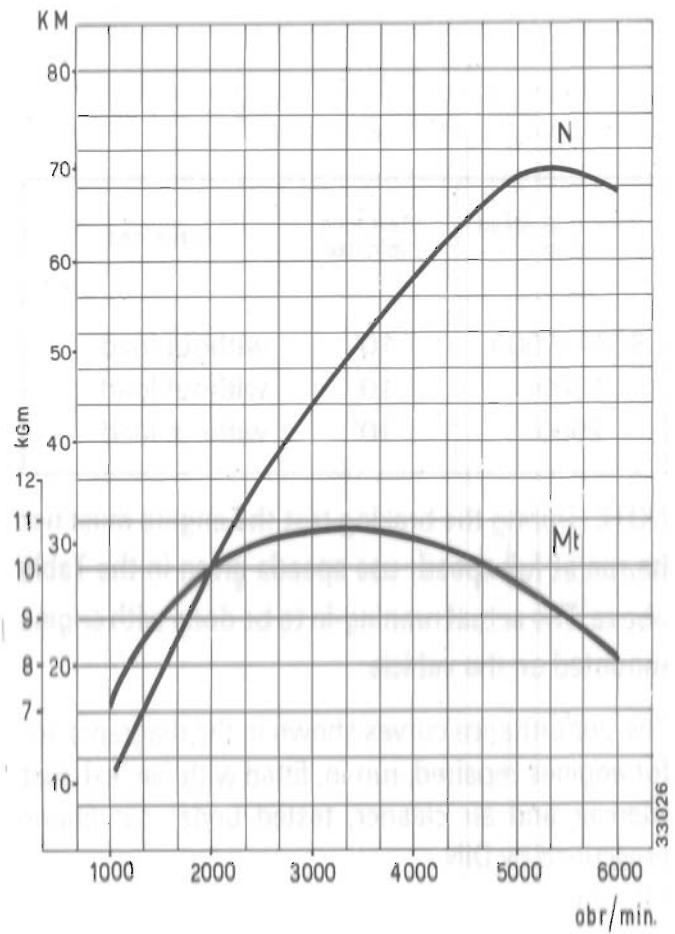


Performance of AB engine as measured acc. to DIN.

Polonez Model 1300/1500



Performance of BB engine as measured acc. to DIN.



Performance of AC engine as measured acc. to DIN.

Cylinder block and head

Polonez Model 1300/1500

101.01

Sheet 1

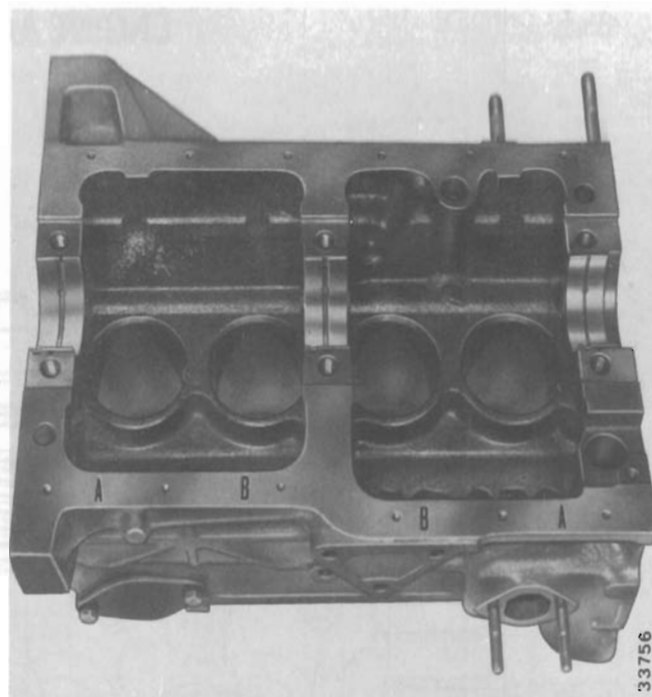
CYLINDER BLOCK

Checking and repair

On the bottom face of cylinder block, opposite each cylinder bore, letters denoting size groups are stamped. The cylinder bores are graded in size by every 0.01 mm according to bore diameter.

The flatness of the surface mating with the cylinder head may be checked by means of a layout plate covered with coal black or a straight edge and appropriate feeler gauge (the permissible total out-of-flatness is 0.1 mm, and local out-of-flatness – 0.05 mm/100 mm).

Letters denoting size groups of cylinder bores.



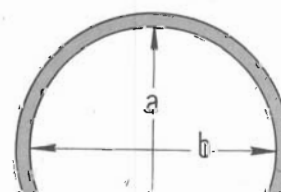
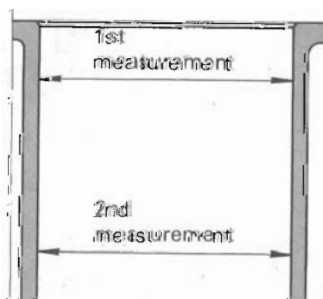
When correcting flatness of the surface mating with the cylinder head, grind-off the smallest possible amount of material.

NOTE: When checking flatness of the surface mating with the cylinder head, apply the straight edge diagonally and along the cylinder block longitudinal axis.

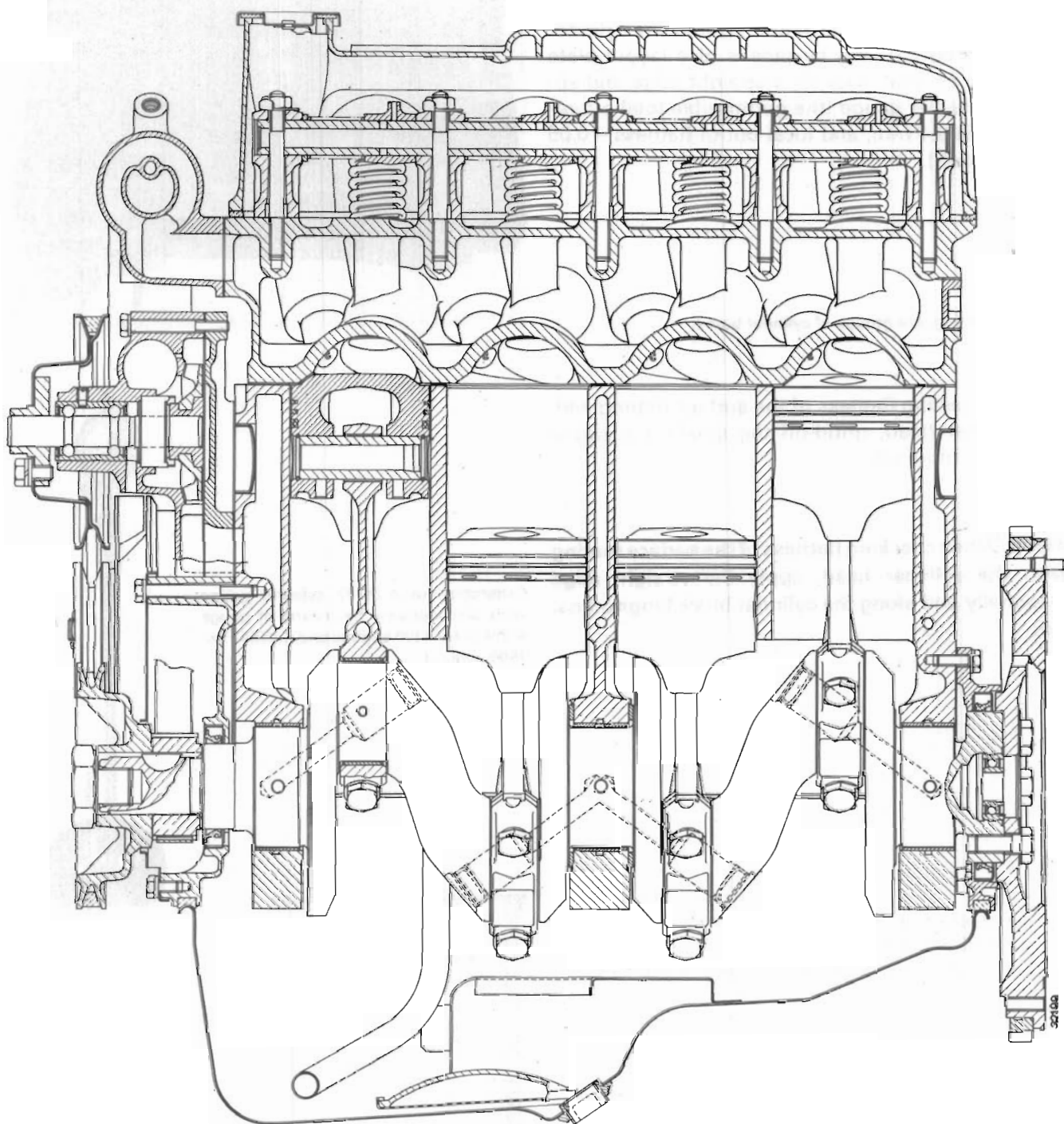
Calibration of A.95787 cylinder gauge with dial indicator by means of gauge A.95671 for 1300 engine) and A.95641 (for 1500 engine).



In case of leakage caused by cracks in cylinder block, the latter should be replaced; if leakage is caused by ill-fitting plugs, the offending plugs should be replaced.



ENGINE AA (1500 ccm)



Longitudinal section of AA (1500 ccm) engine through cylinders, crankshaft, bearings, cylinder head, valve rockers centre line and cooling liquid pump

Cylinder block and head

Polonez Model 1300/1500

101.01

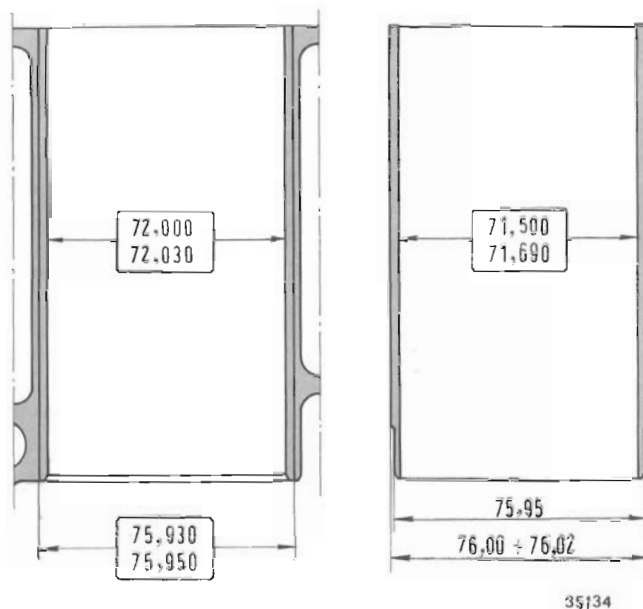
Sheet 2

Repair of cylinder bores

The maximum limit for boring cylinders above the nominal diameter is 0.6 mm irrespective of piston oversizes.

If the pistons must be replaced and cylinders re-bored, with the bores already widened by 0.6 mm, then cylinder liners must be used (they may be supplied as spares).

Inside and outside diameters of cylinder liner and bore diameter before and after pressing-in the liner into cylinder block – engine 1300.



The supplied liners have an outside diameter of 76.00–76.02 for the 1300 engine, and 81.00–81.02 for the 1500 engine. Therefore, before they can be pressed into the cylinder block, the cylinders must be re-bored, and, after pressing-in, the liners must be re-bored and honed in order that the dimensions given in the respective drawing opposite can be obtained.

The fining of cylinder bores is carried out as follows:

– re-bore the cylinders to obtain the following bore diameters:

- 75.88 mm for the 1300 engine;
- 80.88 mm for the 1500 engine;

– hone and lap the bores until the following diameters are obtained:

- 75.93–75.95 mm for the 1300 engine;
- 80.93–80.95 mm for the 1500 engine;

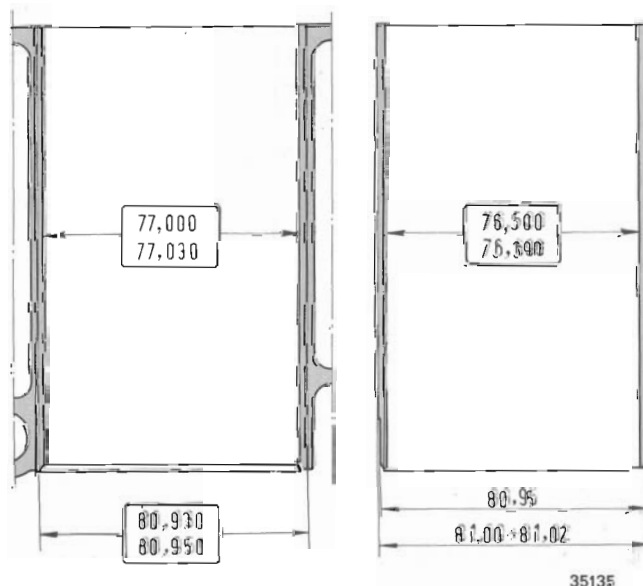
– use hydraulic press and special plate to press liners into cylinder block. This operation is to be carried out at room temperature, with cylinder bore and external liner walls previously covered with grease.

Assembling interference between cylinder and liner: 0.05 – 0.09 mm.

– bore and hone the inserted liners until inside diameter of 72.000–72.030 mm for the 1300 engine, and 77.000–77.030 mm for the 1500 engine, is obtained,

– grade the cylinders into three size groups and stamp the identifying letter on the bottom edge of cylinder block.

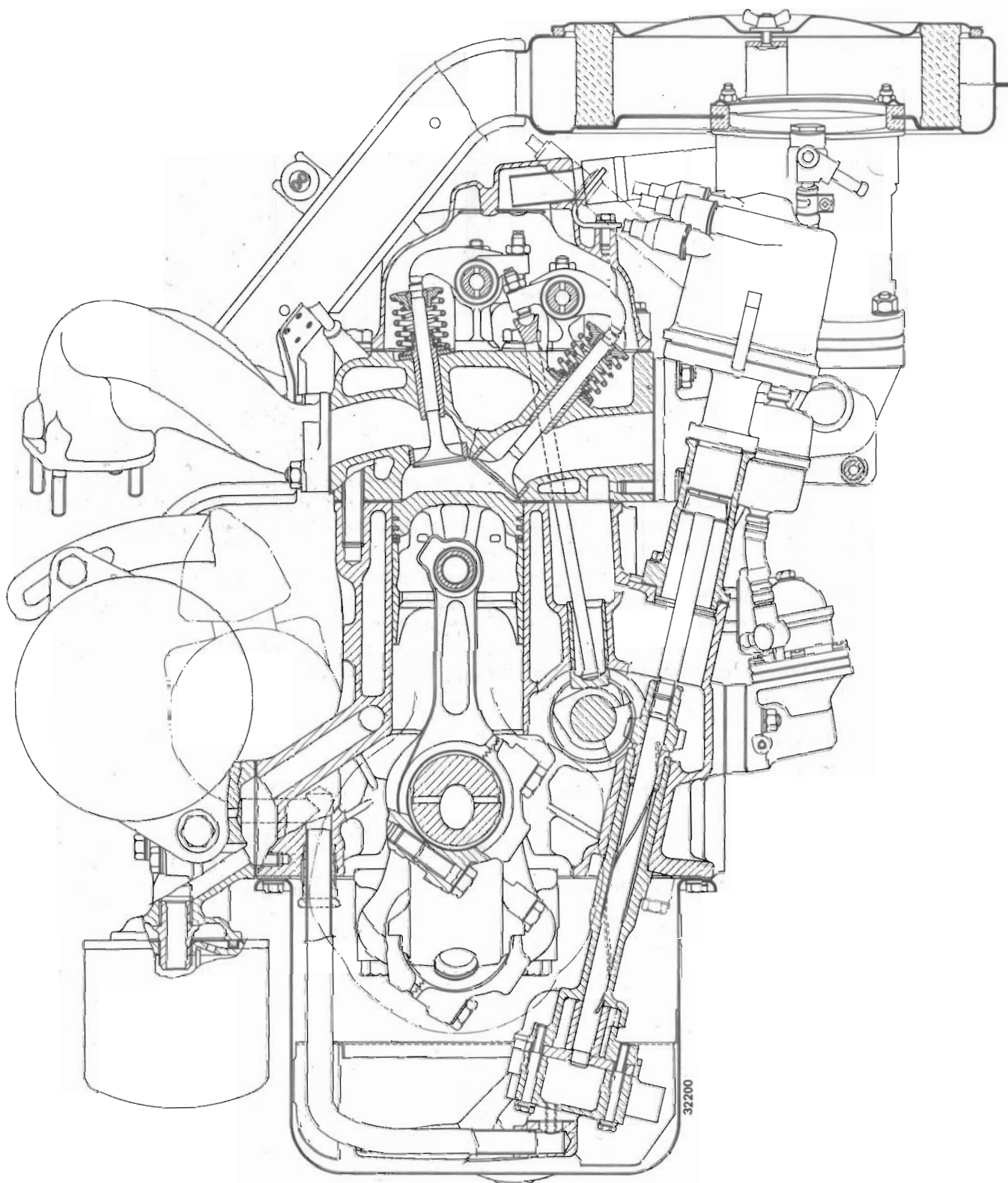
After pressing-in the cylinder liners the top face of the cylinder block must be re-ground.



Inside and outside diameters of cylinder liner and bore diameter before and after pressing-in the liner into cylinder block – 1500 engine

35135

ENGINE AA (1500 ccm)



Cross-section of AA (1500 ccm) engine through the cylinder, valves, oil gear pump, oil pump drive, ignition distributor, full-flow oil filter connection and air cleaner

Cylinder block and head

Polonez Model 1300/1500

101.01

Sheet 3

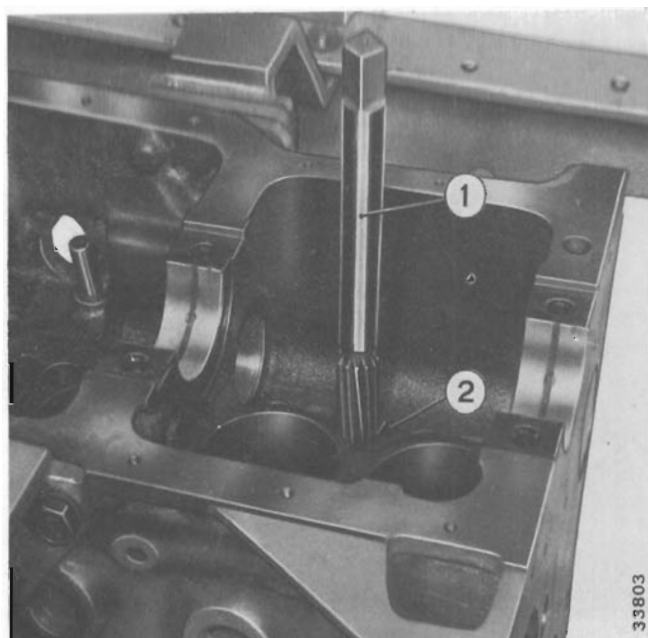
Reaming the push-rod bores in cylinder block

If it proves necessary to ream the push-rod bores in cylinder block, this operation is carried out as follows:

- measure the bore diameter and, after the amount of wear has been determined, select the required reaming size, bearing in mind that spare push-rods are also supplied in oversizes 0.05 and 0.10 mm apart from nominal sizes;

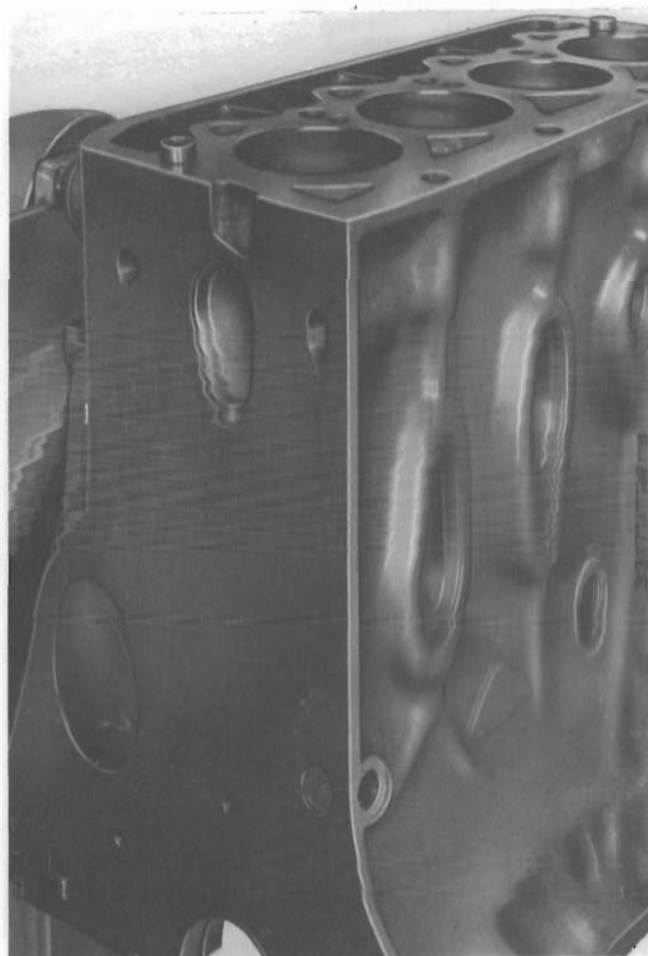
Reaming the push-rod bores in cylinder block by means of A.90338/1/2 reamer.

1. A.90338/1 reamer
2. Push-rod bore in cylinder block.



- ream the push-rod bore using first the **A.90338/1** reamer, then finish with the **A.90338/2** reamer;
- bring the clearance between the push-rod and the push-rod bore to the nominal size of 0.007–0.043 mm.

On completion of the reaming operation scavenge thoroughly the cylinder block in order to remove any metal chips which might cause damage to engine components; use a stream of compressed air for this purpose.

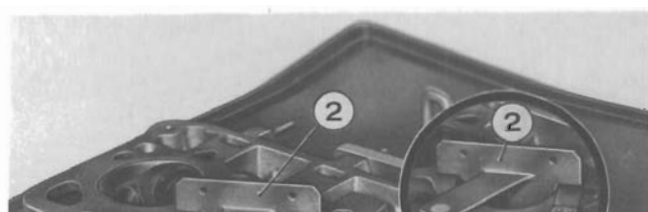


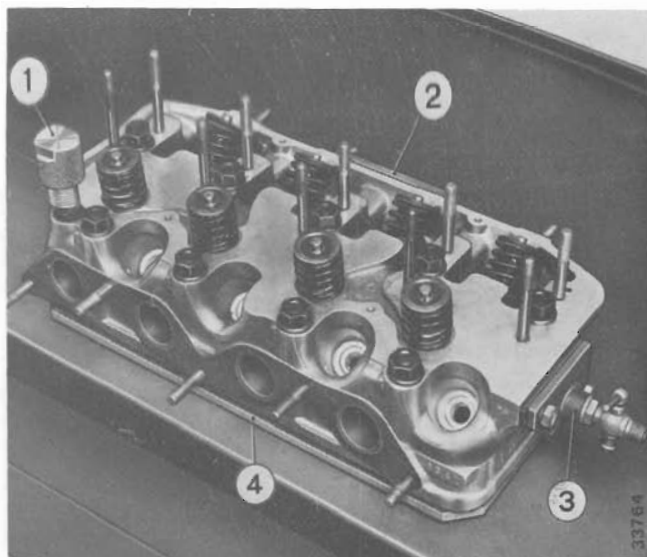
Location of some plugs in cylinder block.

CYLINDER HEAD

Checking the depth of combustion chambers

If necessary, machine smooth the cylinder head face





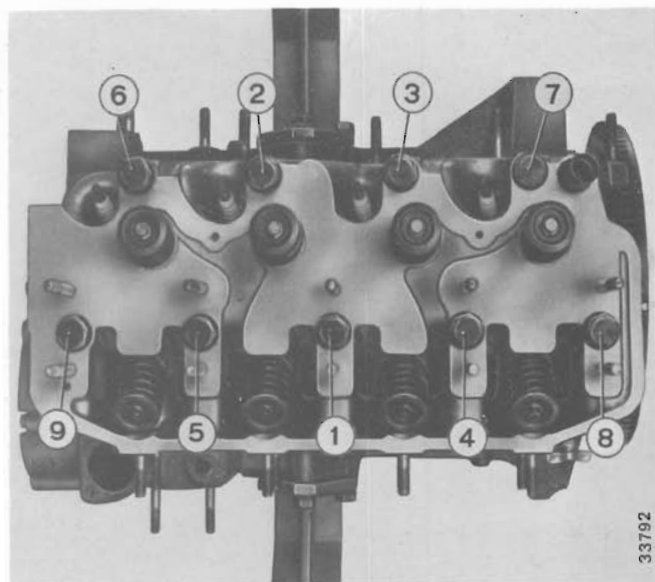
Cylinder head tightness test

Place the cylinder head on the **A.60609** plate and perform the following operations:

- connect the **A.5048** pump to cock;
- heat up water in pump tank to a temperature of 85–90°C;
- pump water into cylinder head until pressure of 1.96–2.94 bar (2–3 kg/sq.cm) is obtained; at this pressure there must be no leakage from the cylinder head.

Cylinder head tightness test.

1. Plug of heater inlet connector.
2. Plate closing the duct feeding water to inlet manifold.
3. Plate closing the cock seat.
4. **A.60609** plate.



Bolts tightening sequence

The bolts fastening the cylinder head should be tightened according to the sequence shown in the picture, in two stages. The torque spanner should be set to a torque of 98 Nm (10 kgm).

Cylinder head to cylinder block fastening bolts tightening sequence.

Cylinder block covers

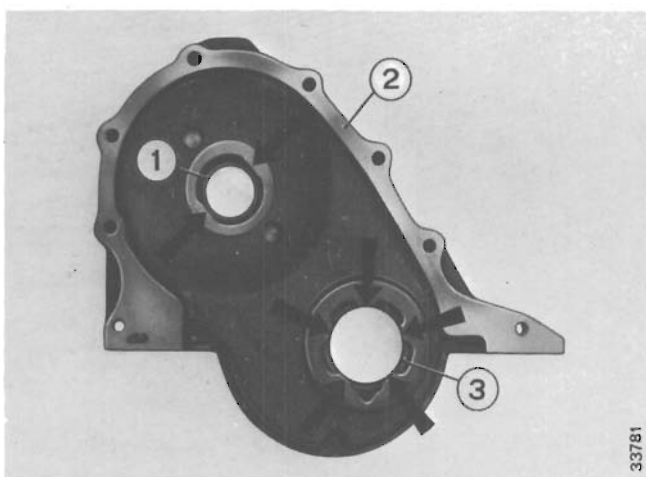
Polonez Model 1300/1500

101.02

Sheet 1

LIP SEAL REPLACEMENT

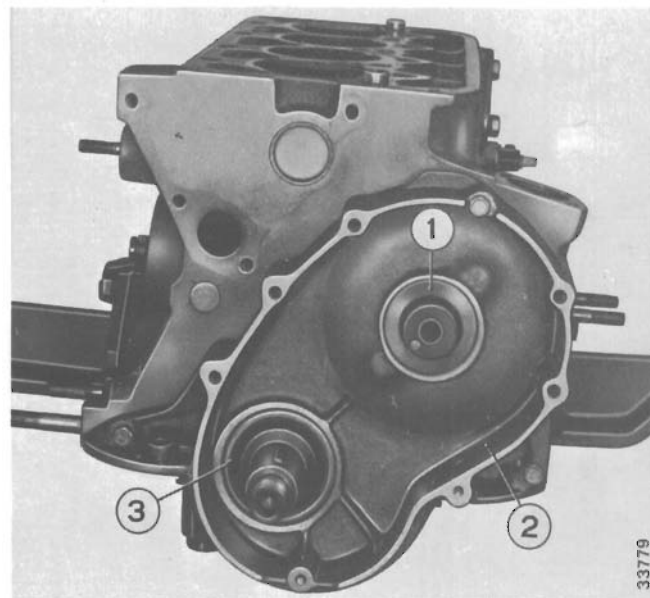
During engine repair it is recommended to replace lip seals of crankshaft and camshaft end journals.



Inside view of cover with crankshaft and camshaft lip seals (camshaft drive end).

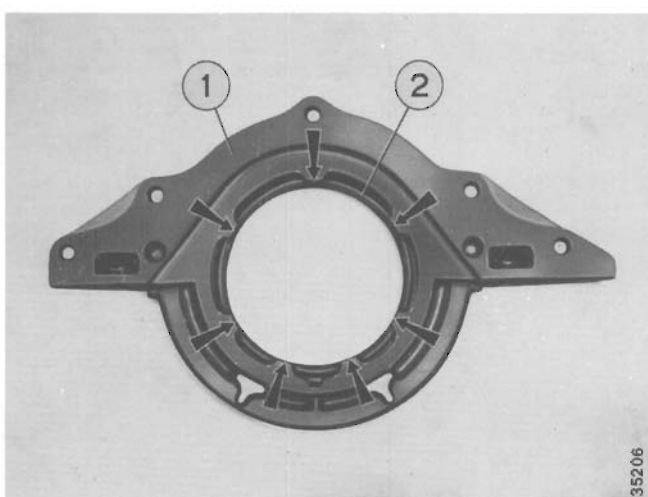
1. Camshaft lip seal mounted in front cover.
2. Front cover.
3. Crankshaft lip seal mounted in front cover.

Arrows indicate the reference surfaces for proper positioning of cover in relation to shafts.



View of front cover mounted on cylinder block.

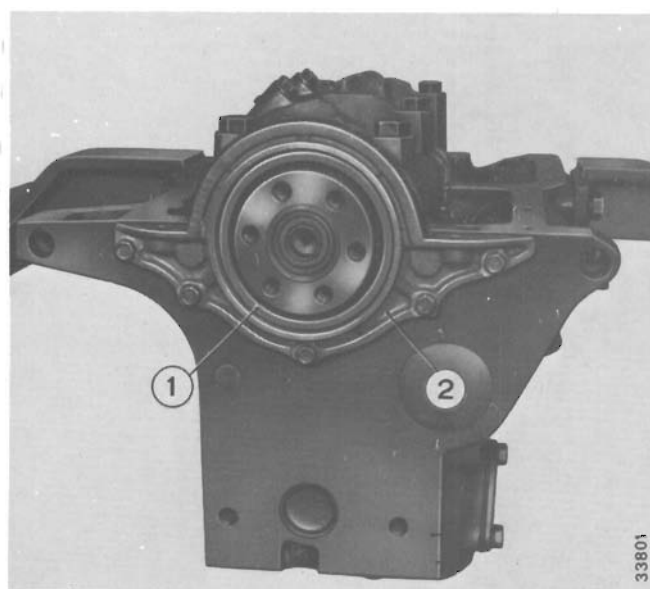
1. Camshaft lip seal mounted in front cover.
2. Front cover.
3. Crankshaft lip seal mounted in front cover.



Inside view of cover with lip seal of crankshaft (flywheel end).

1. Rear cover.
2. Crankshaft lip seal mounted in rear cover.

Arrows indicate the reference surfaces for proper positioning of cover in relation to crankshaft flange.



View of rear cover mounted on cylinder block.

1. Crankshaft lip seal mounted in rear cover.
2. Rear cover.

Crankshaft with flywheel

Polonez Model 1300/1500

101.03

Sheet 1

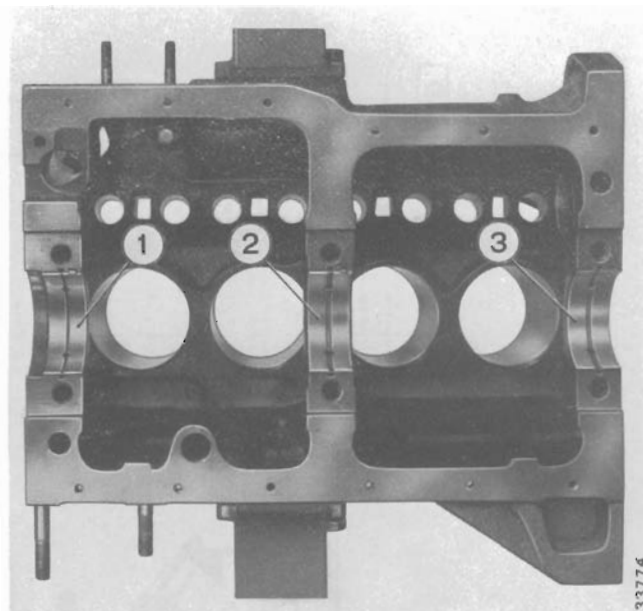
CRANKSHAFT

Checking main journals and crankpins

The crankshaft must be free from cracks on its main journals and crankpins or on the cranks, otherwise it must be replaced so as to avoid serious damage during engine operation.

Main crankshaft journal half-bearing in cylinder block.

1. Front half bearing.
- 2-3. identical middle and rear half-bearings.

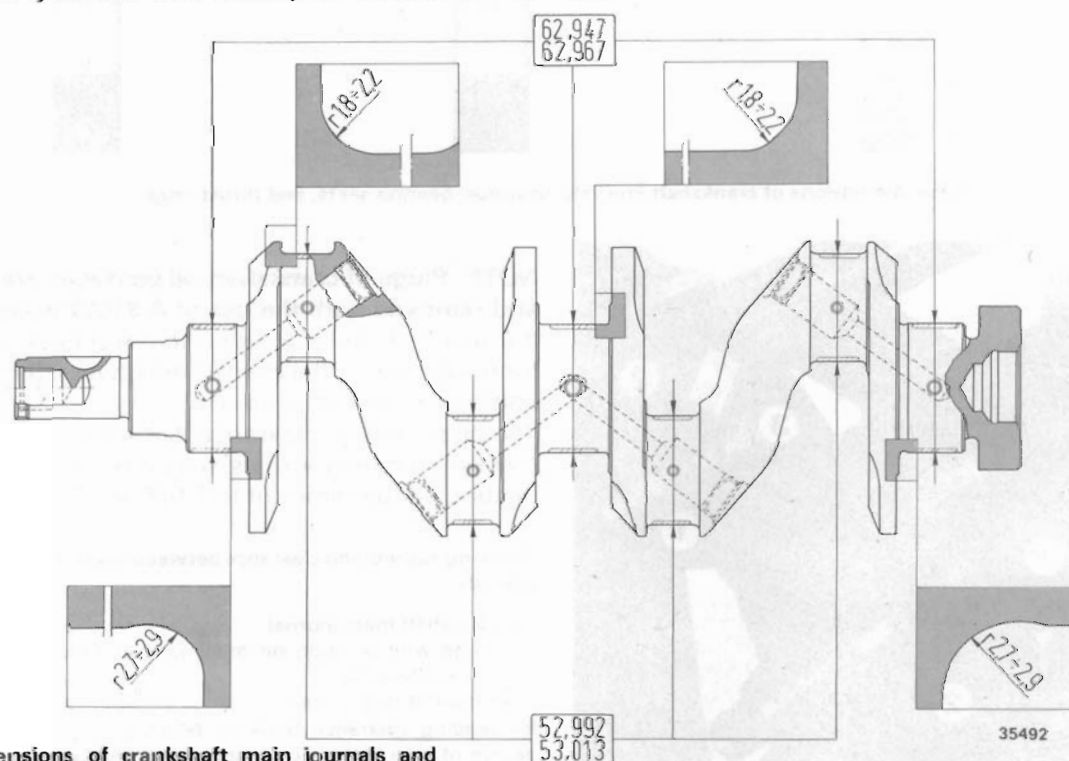


Traces of seizure, detected on the journals or crankpins, may be removed with fine abrasive of the "carborundum" type. If scratches on journal surfaces are deep and the journals measured with a micrometer show ovality in excess of **0.007 mm** they should be re-ground. When performing this operation bear in mind assembling clearances and oversizes of the bearings supplied as spares (see Table 10, Sheet 2). The main journals and crankpins should be re-

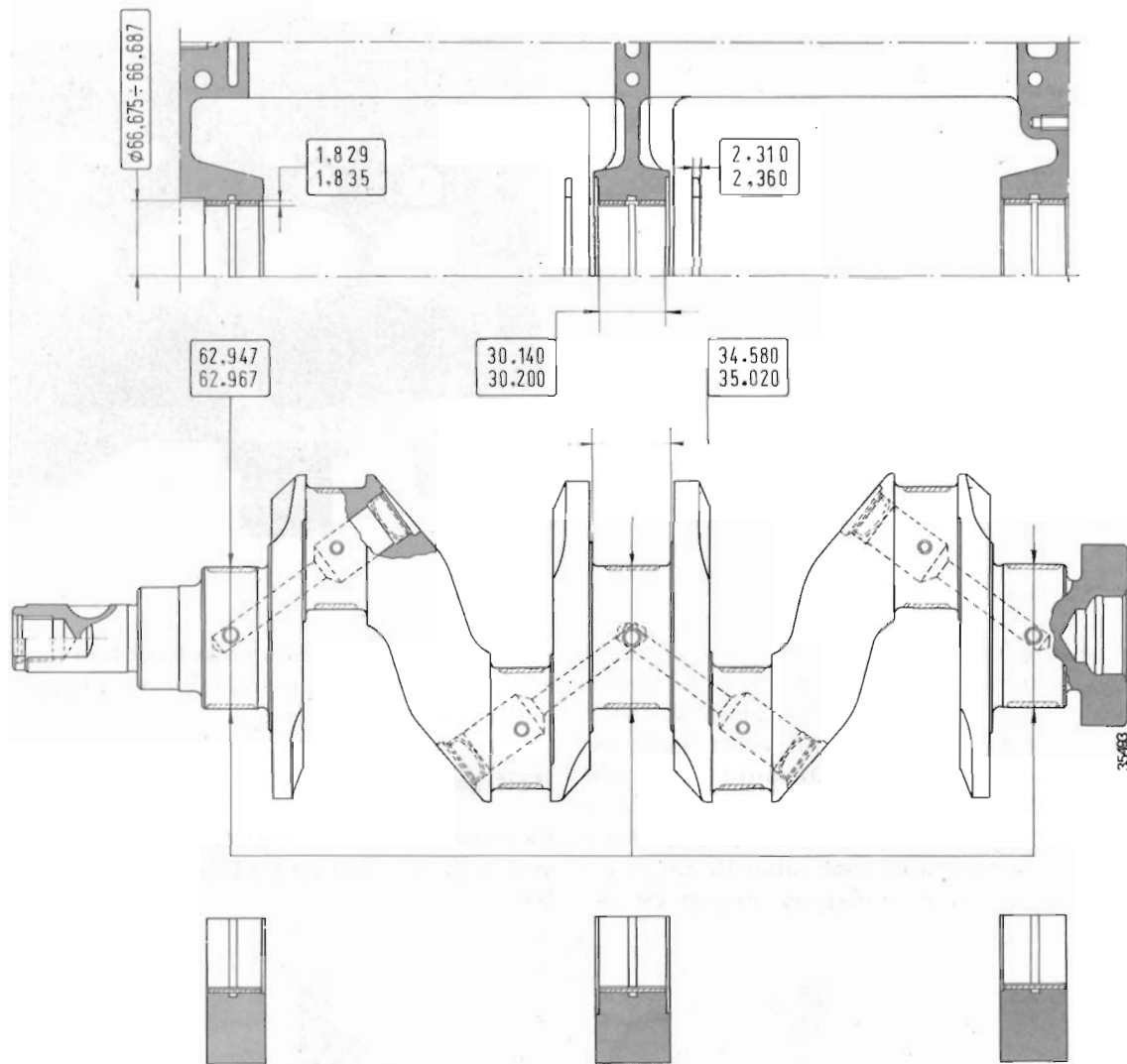
ground in such a manner as to obtain the requisite assembling clearance and journal radii as indicated in the picture.

Half-bearings

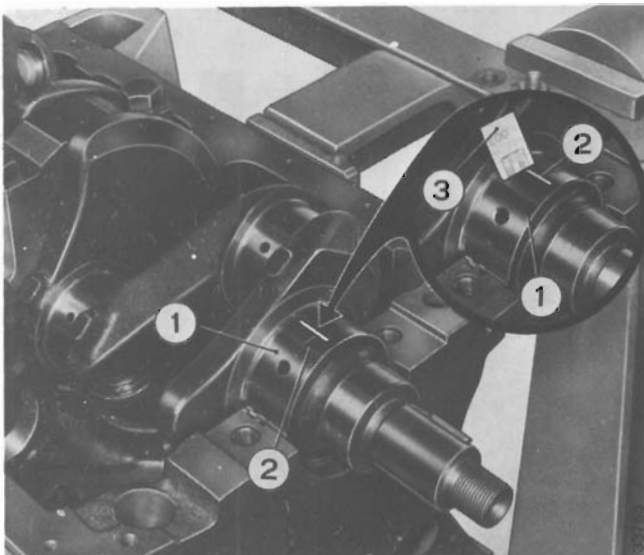
Half-bearings with scratches, traces of seizure or visible wear must be replaced. Repair is inadmissible.



Basic dimensions of crankshaft main journals and crankpins, and radii of journal necks.



Basic dimensions of crankshaft journals, bearings, bearing seats, and thrust rings.



NOTE: Plugs of crankshaft oil passages are inserted and removed with the use of A.86022 mandrel.

If it results from inspection that the bearings are fit for re-use, check the clearance between the bearings and the crankshaft journals.

The assembling clearance between bearings and crankshaft main journals, measured as shown in the picture, should amount to 0.025–0.075 mm.

Checking assembling clearance between crankshaft bearings and journals.

1. Crankshaft main journal.
2. Gauge wire position on main journal when checking fit of journal and bearing.
3. Portion of bag containing gauge wire with comparison scale for reading clearance between bearing and journal from the degree of wire flattening on tightening, with appropriate torque, the bearing cover to cylinder block.

Crankshaft with flywheel

Polonez Model 1300/1500

101.03

Sheet 2

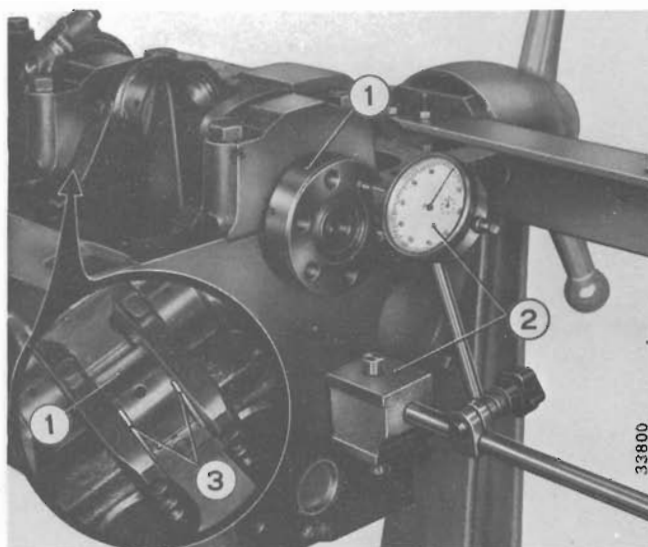
Axial play between the middle bearing fitted with thrust half-rings and the crankshaft should amount to 0.60–0.260 mm. This play is checked with the use of **A.95684** dial indicator with magnetic base.

When inserting the thrust half-rings bear in mind that the notches at one side of the half-ring must be oriented toward the thrust flange of crankshaft.

Spare thrust half-rings are also supplied in oversize of **0.1 mm** (2.410–2.460 mm).

Assembling the crankshaft thrust half-rings and checking the play.

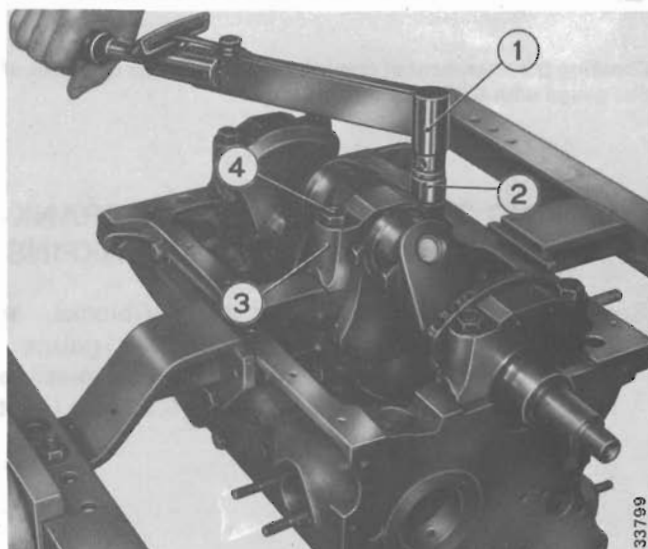
1. Crankshaft.
2. **A.95684** dial indicator with magnetic base for checking axial play of crankshaft.
3. Thrust half-rings.



After checking of play and replacement of components, fit the crankshaft bearing covers and then tighten the cover fastening bolts with the use of a torque spanner set to 103 Nm (10.5 kgm) torques.

Tightening the crankshaft bearing cover fastening bolts.

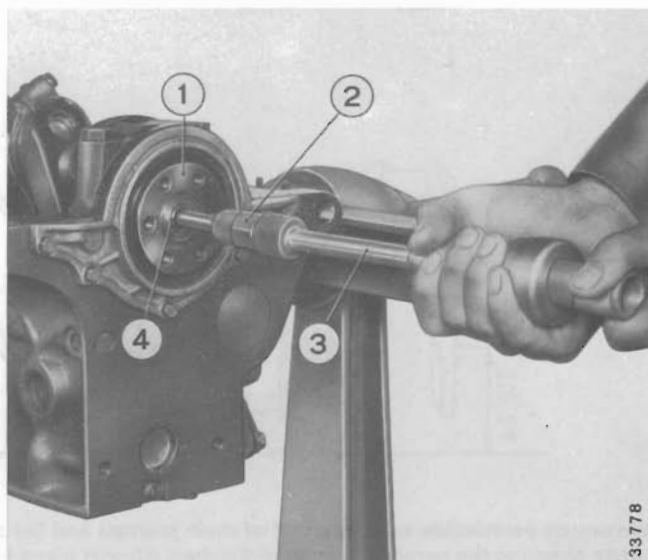
1. Torque spanner.
2. Sleeve.
3. Bearing cover.
4. Bolt fastening the crankshaft bearing cover to cylinder block.

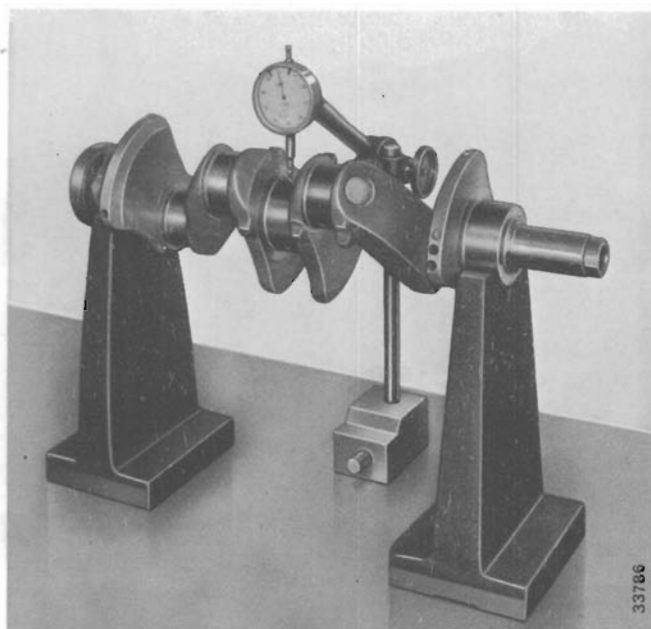


If it should become necessary to replace the ball bearing of gearbox drive shaft support the bearing it should be extraced from the crankshaft by means of **A.40206/801** puller with **A.40207/813** device.

Extracting gearbox drive shaft support ball bearing from crankshaft.

1. Crankshaft.
2. **A.40208/813** device for ball bearing extraction.
3. **A.40206/813** puller.
4. Ball bearing.





Checking the alignment of crankshaft main journals by means of dial gauge with A.95684 magnetic stand.

CHECKING THE ALIGNMENT OF CRANK-SHAFT MAIN JOURNALS AND CRANKPINS

Support crankshaft ends on two V-blocks, or between two centres, and check with a dial gauge:

- main journal alignment; maximum permissible misalignment should be less than 0.03 mm (joint reading from the gauge);

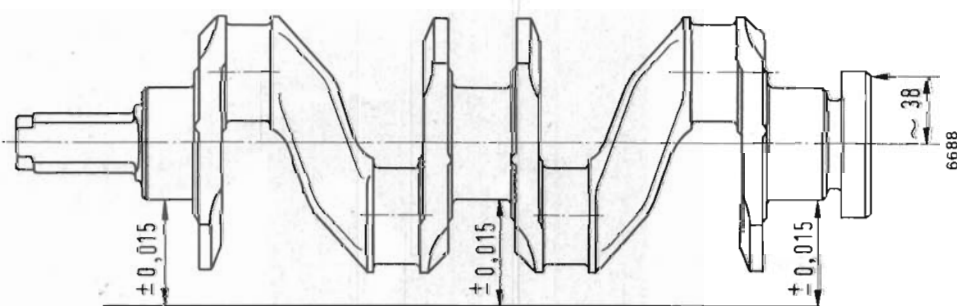
- crankpin alignment in relation to main journals; the centre line of each pair of crankpins and the main journal centre line must be in the same plane; the maximum permissible deviation is 0.5 mm;
- circular shape (check for ovality) of main and connecting-rod journals; the maximum permissible ovality is 0.007 mm;
- cylindrical shape (check for taper) of main journals and crankpins; the maximum permissible taper is 0.007 mm;
- run-out of flywheel flange; the maximum permissible run-out measured by means of a gauge applied to the face of flywheel at a distance of 38 mm from the axis of rotation with the crankshaft rotating should not exceed 0.025 mm;
- deviation of flange centre line and flywheel centering face from the main journal centre line; the maximum permissible deviation is 0.03 mm.

Flywheel ring gear replacement

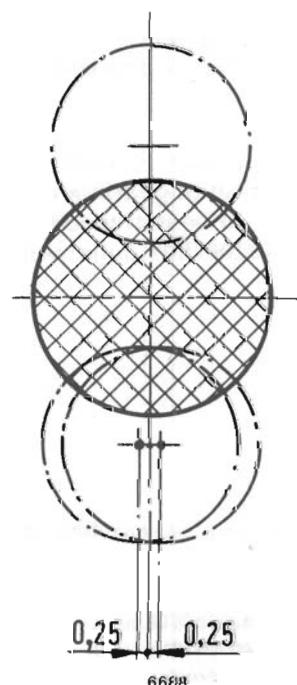
It is necessary to replace the flywheel ring gear when considerable wear of its teeth is detected.

Flywheel ring gear is mounted and dismantled with the use of a hydraulic press; the ring gear should be previously heated up to a temperature of 80°C. Care should be taken that the above mentioned temperature is not exceeded considerably, since this could cause changes in gear tooth metal structure produced by heat treatment after machining.

The flywheel should be bolted to crankshaft by means of a torque spanner, using a torque of 83 Nm (8.5 kgm).



Maximum permissible misalignment of main journals and the place of dial gauge application when checking the perpendicularity of flywheel support plane to crankshaft centre line.



Connecting-rods and pistons

Polonez Model 1300/1500

101.05

Sheet 1

CONNECTING-RODS – PISTONS

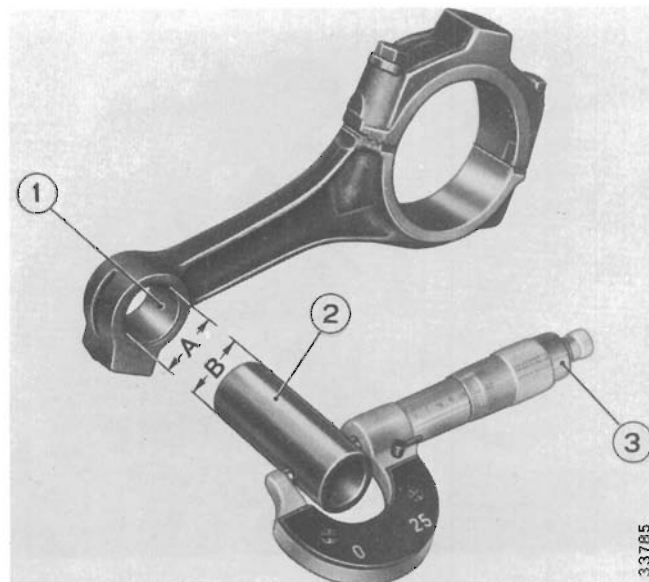
Checking the connecting-rod small-end bushing

The connecting-rod small-end bushing is pressed-in with 0.007–0.061 mm interference; make sure that it adheres firmly to the bore.

Checking the clearance between gudgeon pin and connecting-rod small-end bushing.

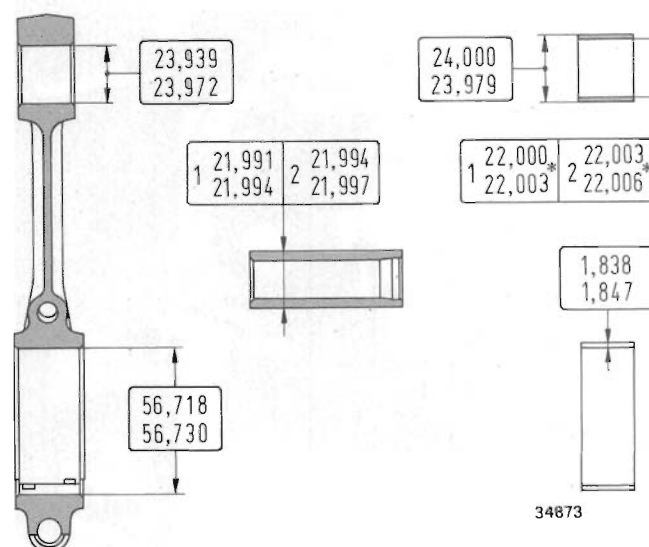
1. Connecting-rod small-end bushing.
2. Gudgeon pin.
3. Micrometer gauge.

The clearance is defined by the difference between A and B.



33785

Check the bushing inner surface; if ovality or minor defect is detected, the bushing must be reamed and an oversize gudgeon pin installed as described below.



34873

Basic dimensions of connecting-rod, small-end bushing, gudgeon pin and bearing.

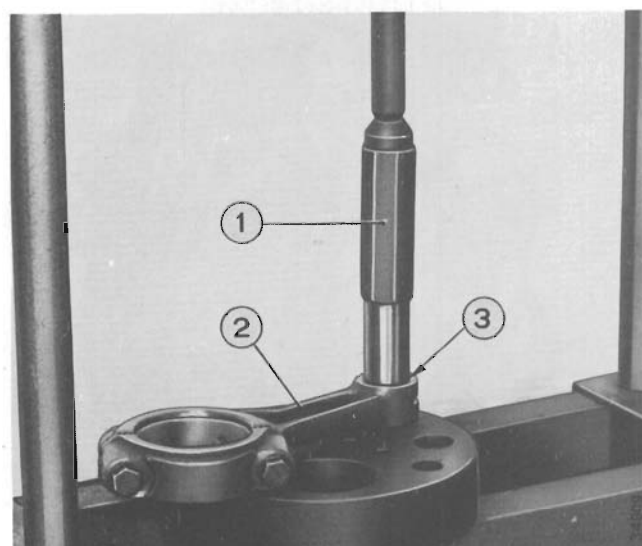
* Dimensions after pressing-in small-end bushing into connecting-rod.

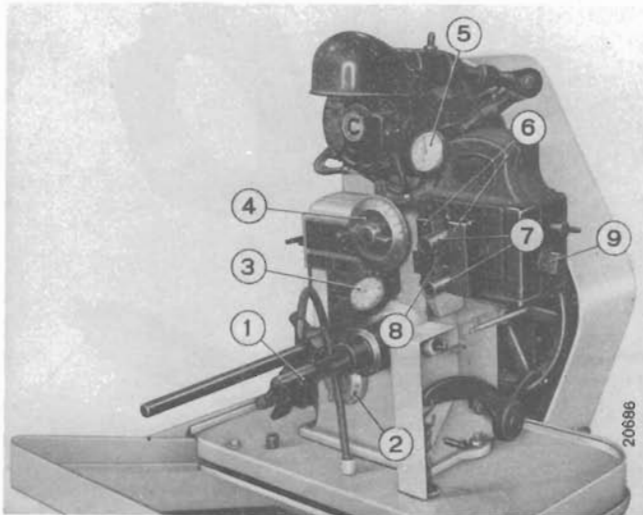
Replacement and grinding of connecting-rod small-end bushing

After the bushing had been forced into the connecting-rod small-end bore by means of **A.60054** punch, it must be machined with the use of **M1044** grinder so that the bore shows the desired tolerance ensuring proper clearance between bushing and gudgeon pin.

Inserting bushing into connecting-rod small-end bore by means of a press.

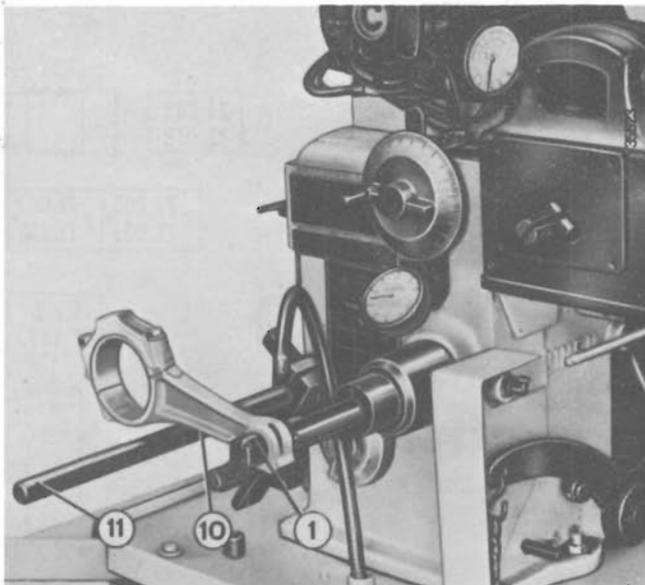
1. **A.60054** punch for inserting bushing into connecting-rod small-end bore.
2. Connecting-rod.
3. Connecting-rod small-end bushing.





Setting-up M.1044 grinder for work.

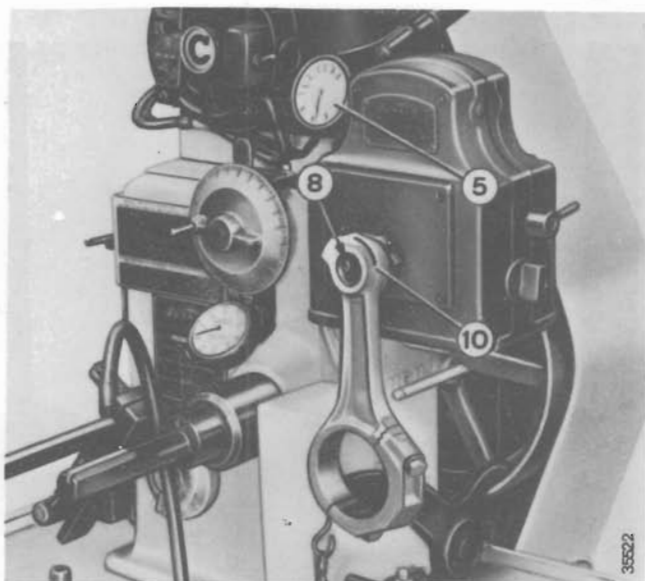
1. Grinder spindle.
2. Grinding wheel pressure regulator.
3. Grinding wheel dimension indicator.
4. Automatic grinding wheel feed selector.
5. Gauge sensor.
6. Parallel plates for fastening gudgeon pins in the machine.
7. Gudgeon pins.
8. Gauge elements.
9. Thumb screw for fine adjustment of gauge.



Grinding may also be applied to used bushings to eliminate ovality or traces of wear.

Grinding a bushing inserted into connecting-rod small-end.

1. Spindle with grinding wheel.
10. Connecting-rod.
11. Connecting-rod support during grinding operation.



On completion of grinding measure the small-end bushing bore and check that the clearance between the bushing and a nominal or oversize gudgeon pin conforms to specification.

Measuring the connecting-rod small-end bushing bore.

5. Dial gauge.
8. Gauge.
10. Connecting-rod small-end with bushing.

Connecting-rods and pistons

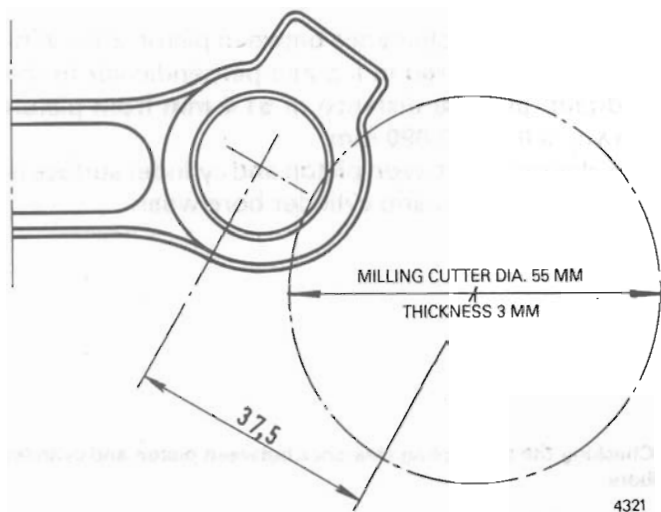
Polonez Model 1300/1500

101.05

Sheet 2

After pressing in, mill in the bushing a slot corresponding with the groove on the top part of connecting-rod small-end (to ensure satisfactory lubrication of bushing and gudgeon pin), using a milling cutter 55 mm in dia. and 3 mm thick; while machining, cutter centre line should be at a distance of 37.5 mm from the centre line of connecting-rod bore.

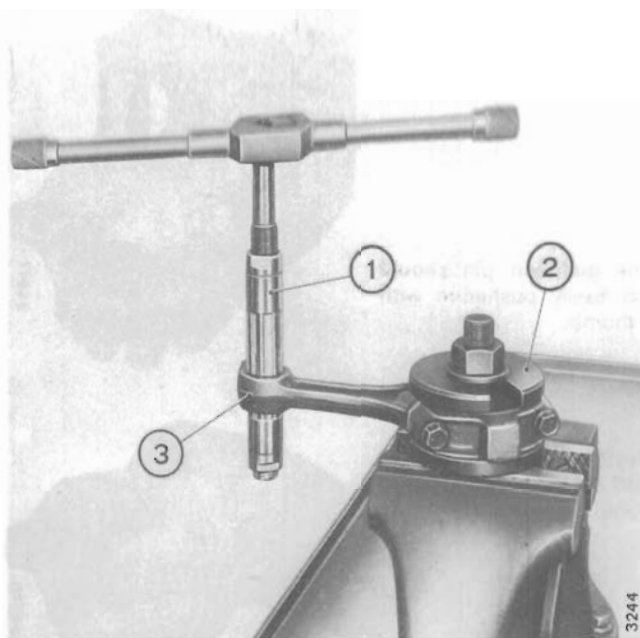
If, upon checking, it should prove necessary to ream the bushing, use **A.90308** reamer for this purpose. After reaming, oversize gudgeon pins with outside diameter increased by 0.2 mm should be used; the bore of the reamed bushing must conform to dimensions indicated in the picture. Particular care should be exercised



Schematic diagram showing the milling of slot in a new bushing installed in connecting-rod small-end.

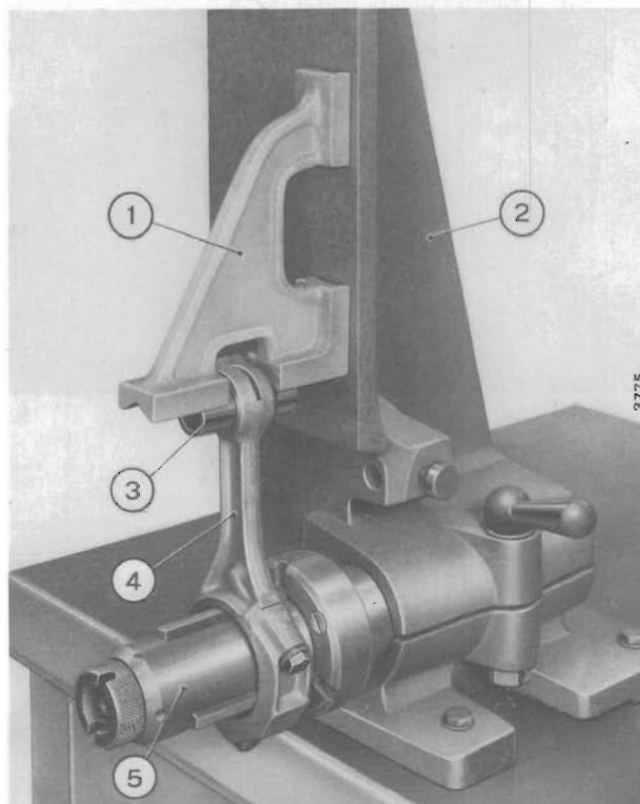
in selecting suitable bushing and gudgeon pin size groups, so that the assembling clearance between these components is 0.006 – 0.12 mm.

Error in parallelism of connecting-rod bores centre lines may be checked on a suitable fixture, by measuring the gap between the square and the vertical plane of the fixture. The maximum permissible deviation, when measured at a distance of 125 mm from connecting-rod stem, is ± 0.05 mm. If the deviation is larger than that, the connecting-rod must be straightened.



Reaming the connecting-rod small-end bushing.

1. **A.90308** adjustable reamer.
2. Connecting-rod test fixture.
3. Connecting-rod small-end.



Checking parallelism of connecting-rod bores centre lines.

1. Test square.
2. **Ap. 5051** fixture.
3. Gudgeon pin.
4. Connecting-rod.
5. Expanding mandrel.

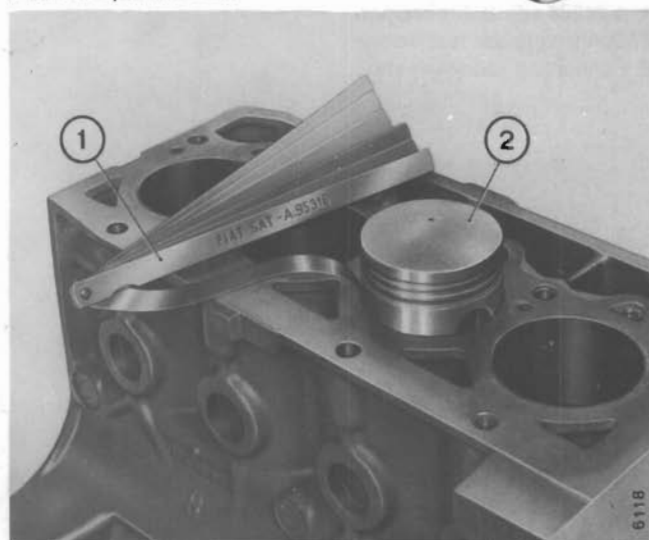
The gudgeon pin should get easily pushed-in with a thumb.



Appropriate gudgeon pin and piston mating conditions.



The gudgeon pin must not show a tendency to slide out of the piston boss.



The mating of gudgeon pin to piston is checked by introducing a selected gudgeon pin, covered with engine oil, into the piston boss.

With appropriate clearance, the gudgeon pin should be easily pushed-in with a thumb, and when placed in vertical position, it must not tend to slide out of the boss. Spare pistons are supplied in nominal size and in the **0.2 – 0.4 – 0.6 mm oversizes; oversize pistons have no size groups for gudgeon pin bore.**

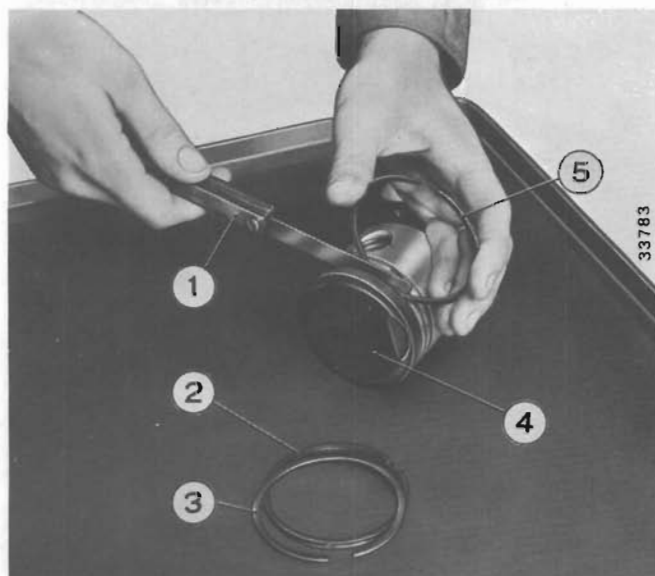
Spare gudgeon pins are also supplied in **0.2 mm oversize without a size group calibration.**

The assembling clearance between piston and cylinder bore, measured in a plane perpendicular to the gudgeon pin at a distance of **51.4 mm** from piston crown, is **0.070–0.090 mm.**

The clearance between piston and cylinder surface is the sum of piston and cylinder bore wear.

Checking the assembling clearance between piston and cylinder bore.

1. A.95316 feeler gauge.
2. Piston.



Check (vertically) the clearance between piston rings and their grooves; assembling clearances are given in Table 10, Sheet 1.

Spare piston rings are also supplied in **0.2 – 0.4 – 0.6 mm oversizes.** Too tight mounting of rings in grooves causes loss in compression, excessive oil consumption and premature wear of rings and cylinder surface.

Checking assembling clearance between piston rings and their grooves.

1. A.95113 feeler gauge.
2. Scraper ring with orifices and inner spring.
3. Scraper ring.
4. Piston.
5. Compression ring.

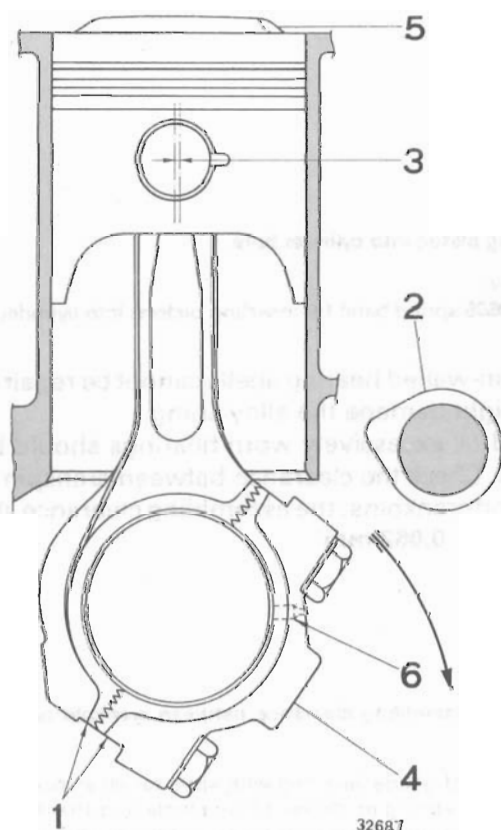
Connecting-rods and pistons

Polonez Model 1300/1500

101.05

Sheet 4

The centre line of gudgeon pin seat in the piston is displaced by 1 mm in relation to connecting-rod centre line. The piston should be mounted on the connecting-rod in such a manner that the piston recess (5) is located opposite to the cylinder number (1) to which the piston - connecting-rod assembly belongs.



32687

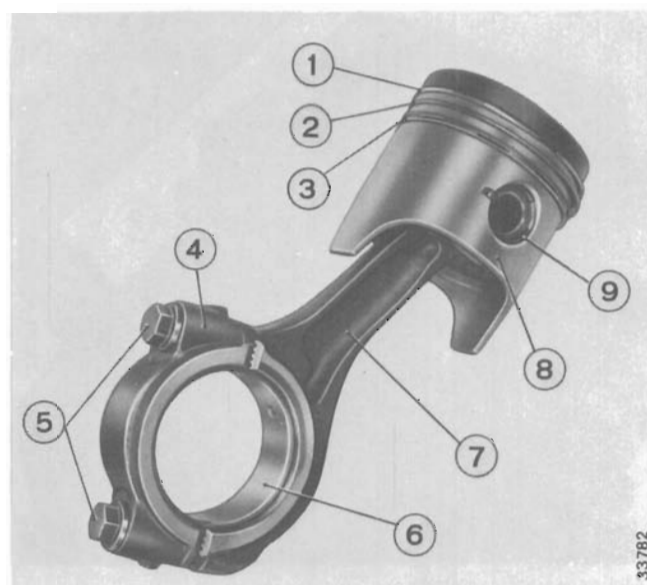
Schematic diagram for setting the piston - connecting-rod assembly in cylinder.

1. Place for stamping the number of cylinder to which the piston - connecting-rod assembly belongs.
2. Camshaft.
3. Offset between gudgeon pin and piston centre lines.
4. Place for stamping connecting-rod small-end bore size-group.
5. Recess in piston head.
6. Calibrated oil jet to camshaft.

Arrow indicates engine rotating direction when viewed from timing gear side.

When inserting the connecting rod - piston assembly into cylinder bore, care should be taken that the numbers stamped on the connecting-rod are opposite to camshaft.

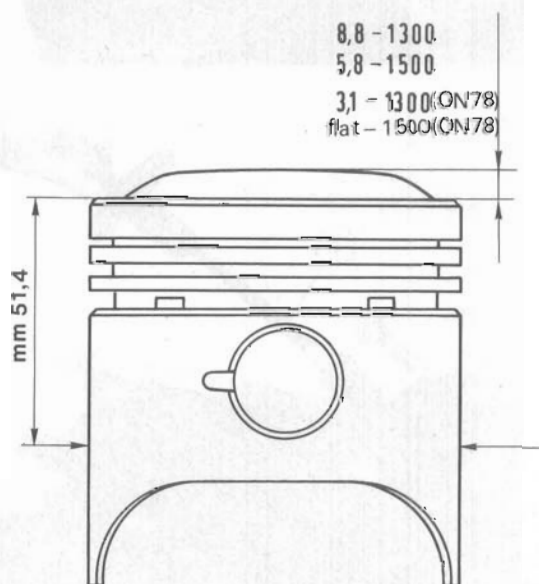
Prior to inserting the connecting rod - piston assembly, cylinder walls should be lubricated with engine oil.



33782

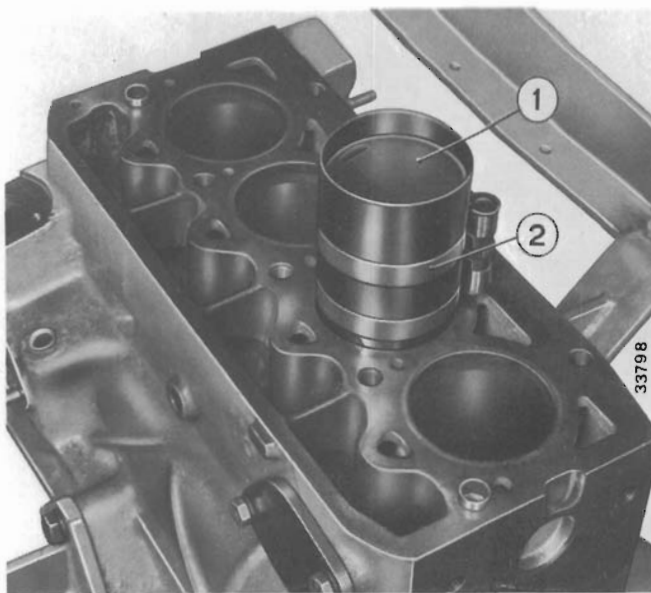
Connecting-rod - piston assembly with bearing, gudgeon pin and piston rings.

1. Compression ring.
2. Oil ring.
3. Scraper ring with slits and inner spring.
4. Connecting-rod bearing cover.
5. Connecting-rod bearing cover fastening bolts.
6. Bearing.
7. Connecting-rod.
8. Piston.
9. Gudgeon pin retaining circlip.



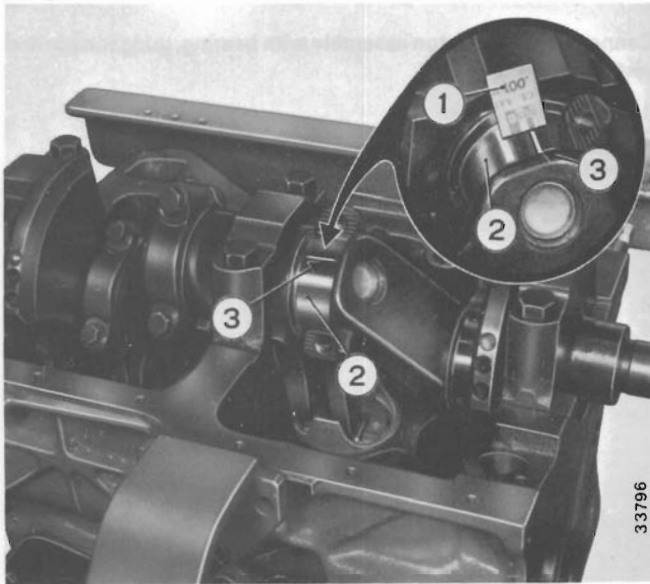
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Schematic diagram for checking piston size group when mating piston to cylinder.



Inserting piston into cylinder bore.

1. Piston.
2. **A.60605** spring band for inserting pistons into cylinder bores.

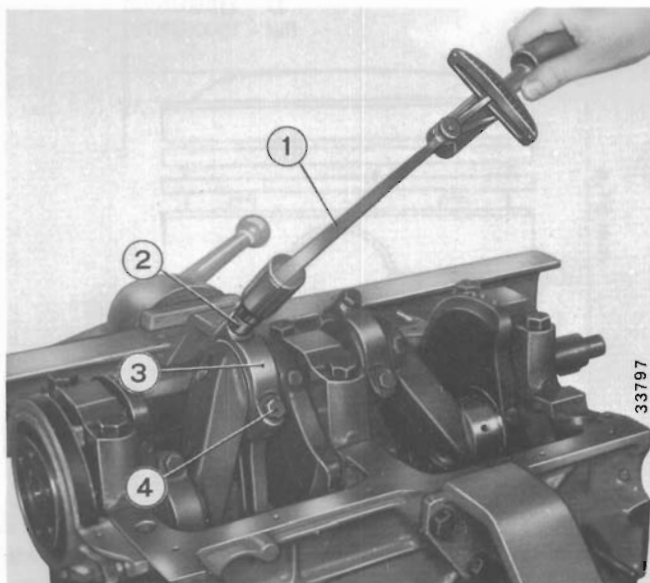


The thin-walled bearing shells cannot be repaired, as this might damage the alloy lining. Scored or excessively worn bearings should be replaced. Check the clearance between crankpin bearings and crankpins; the assembling clearance should be **0.011 – 0.062 mm**.

Scored or excessively worn bearings should be replaced. Check the clearance between crankpin bearings and crankpins; the assembling clearance should be **0.011 – 0.062 mm**.

Checking assembling clearance between crankpin bearing and crankpin.

1. Section of gauge wire bag with scale for clearance measurement depending on degree of wire flattening after the connecting-rod bearing cover fastening nuts have been tightened with the appropriate torque.
2. Crankpin.
3. Position of gauge wire on crankpin when checking the assembling clearance between crankpin and its bearing.



If the measured clearance differs from the prescribed values, undersize bearings should be installed and the crankpins re-ground. After re-grinding, the crankpin should have a diameter ensuring proper assembling clearance with the undersize bearing (as far as possible, maintain an intermediate value).

Tightening connecting-rod bearing cover fastening bolts with a torque spanner set to a torque of 69 N.m (7 kgm).

1. Torque spanner.
2. Bush.
3. Connecting-rod bearing cover.
4. Connecting-rod bearing cover fastening bolt.

Timing gear drive

Polonez Model 1300/1500

101.06

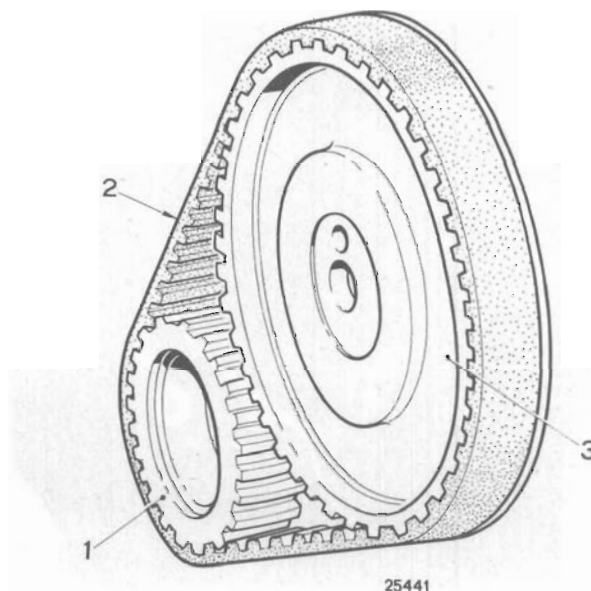
Sheet 1

TIMING GEAR DRIVE

The timing gear is driven by toothed pulleys connected by a toothed belt.

Timing gear drive components.

1. Driving toothed pulley mounted on crankshaft.
2. Toothed belt.
3. Driven toothed pulley mounted on camshaft.

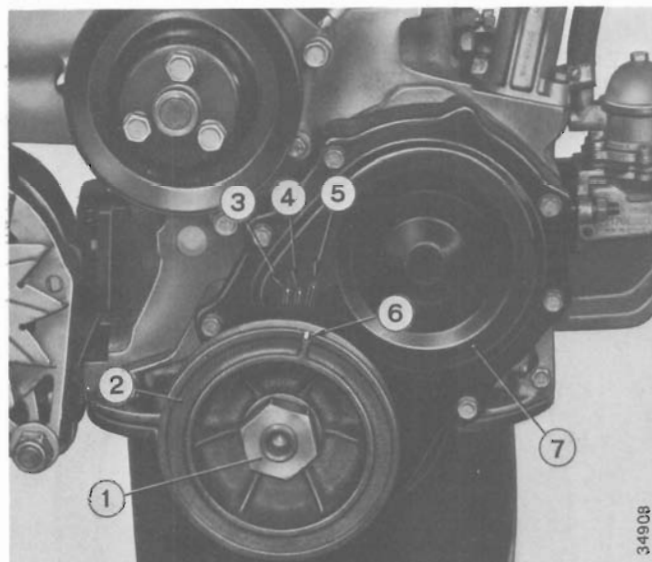


Replacement of timing gear drive toothed belt

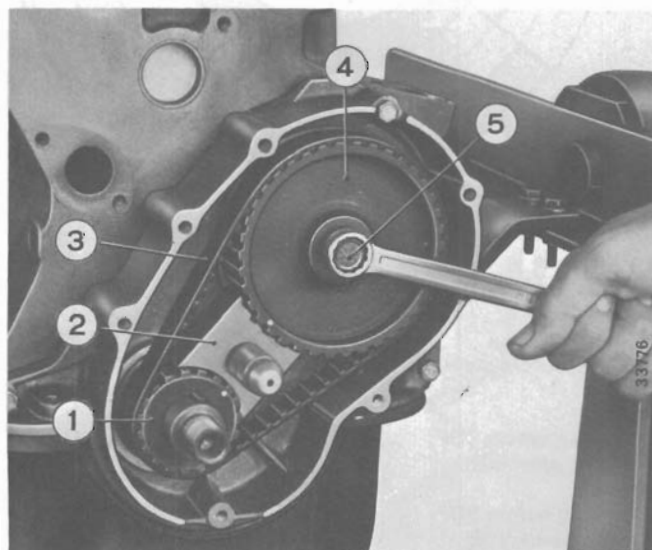
To replace the toothed belt, remove pulley (2) driving the cooling fluid pump and alternator by unscrewing its fastening nut (1), remove toothed belt guard (7) and take off the toothed belt (3) from toothed pulleys.

Components dismantled when replacing the timing gear drive toothed belt.

1. Bolt fastening pulley (2) to crankshaft.
2. Cooling fluid pump and alternator drive pulley.
3. Mark denoting 10° spark advance.
4. Mark denoting 5° spark advance.
5. Mark denoting 0° spark advance.
6. Mark on pulley for ignition setting.
7. Timing gear drive toothed belt guard.

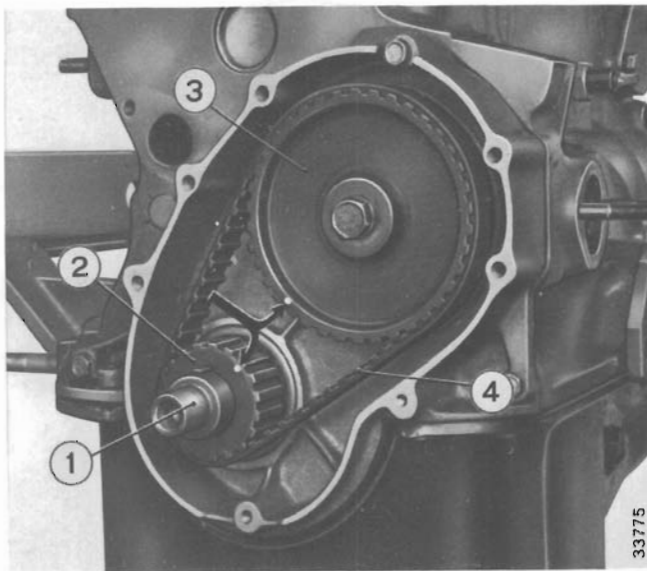


If it becomes necessary to replace camshaft pulley, or to remove it in order to gain access to some other component requiring repair, **A.60500** lock plate should be used to prevent the pulley from turning.



Dismounting the camshaft drive toothed pulley.

1. Camshaft drive toothed pulley.
2. **A.60500** lock plate.
3. Toothed belt.
4. Driven toothed pulley on camshaft.



TIMING ADJUSTMENT

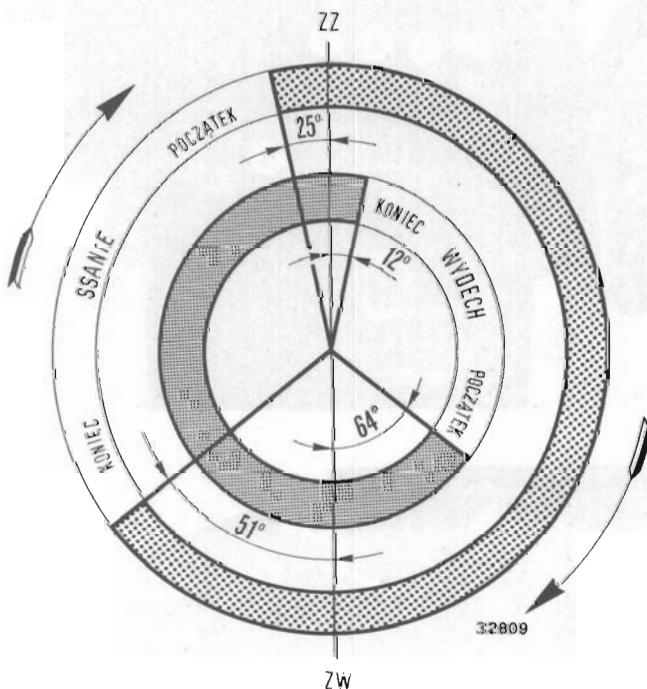
Timing is adjusted by positioning the setting marks (1-2) on both toothed pulleys opposite each other. Then fit the toothed belt onto pulleys and carry out in reversed sequence the operations described under instructions for toothed belt replacement, bearing in mind that the driven pulley fastening bolt and drive pulley fastening nut must be tightened using the required torques.

Timing

1. Crankshaft.
2. Toothed drive pulley.
3. Toothed driven pulley.
4. Toothed belt.

Arrow shows setting marks on toothed pulleys.

KONIEC – End
POCZĄTEK – Start
SSANIE – Intake
WYDECH – Exhaust



Timing phases for all 1300 and 1500 engines.

Valve clearance:
for timing checks
working (in cold state)

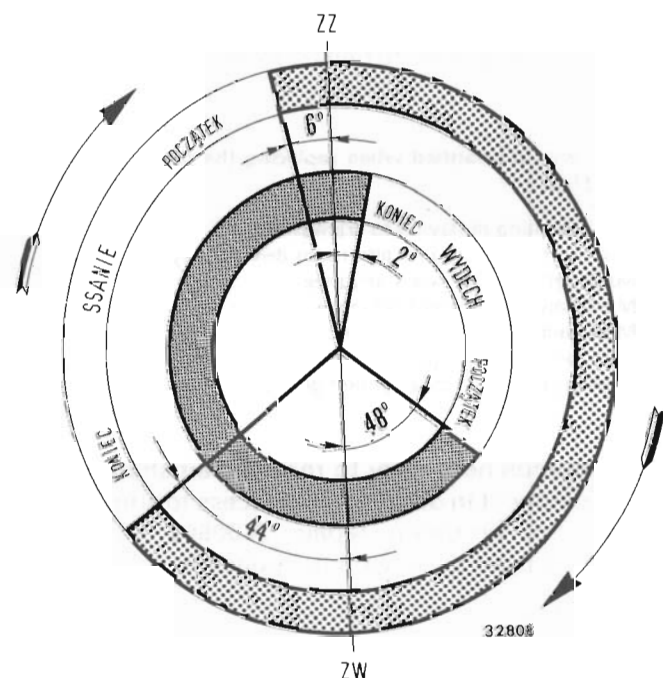
0.45 mm
intake 0.20 mm
exhaust 0.25 mm

Intake:

- opening before TDP 25°
- closing after BDP 51°

Exhaust:

- opening before BDP 64°
- closing after TDP 12°



Timing phases for boosted 1500 engine only.

Valve clearance:
for timing checks
working (in cold state)

0.90 mm
intake 0.20 mm
exhaust 0.25 mm

Intake:

- opening before TDP 6°
- closing after BDP 44°

Exhaust:

- opening before BDP 48°
- closing after TDP 2°

Timing gear

Polonez Model 1300/1500

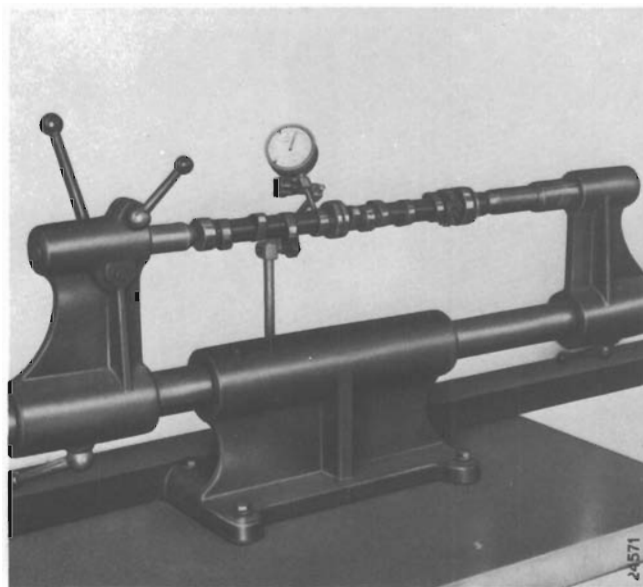
101.07

Sheet 1

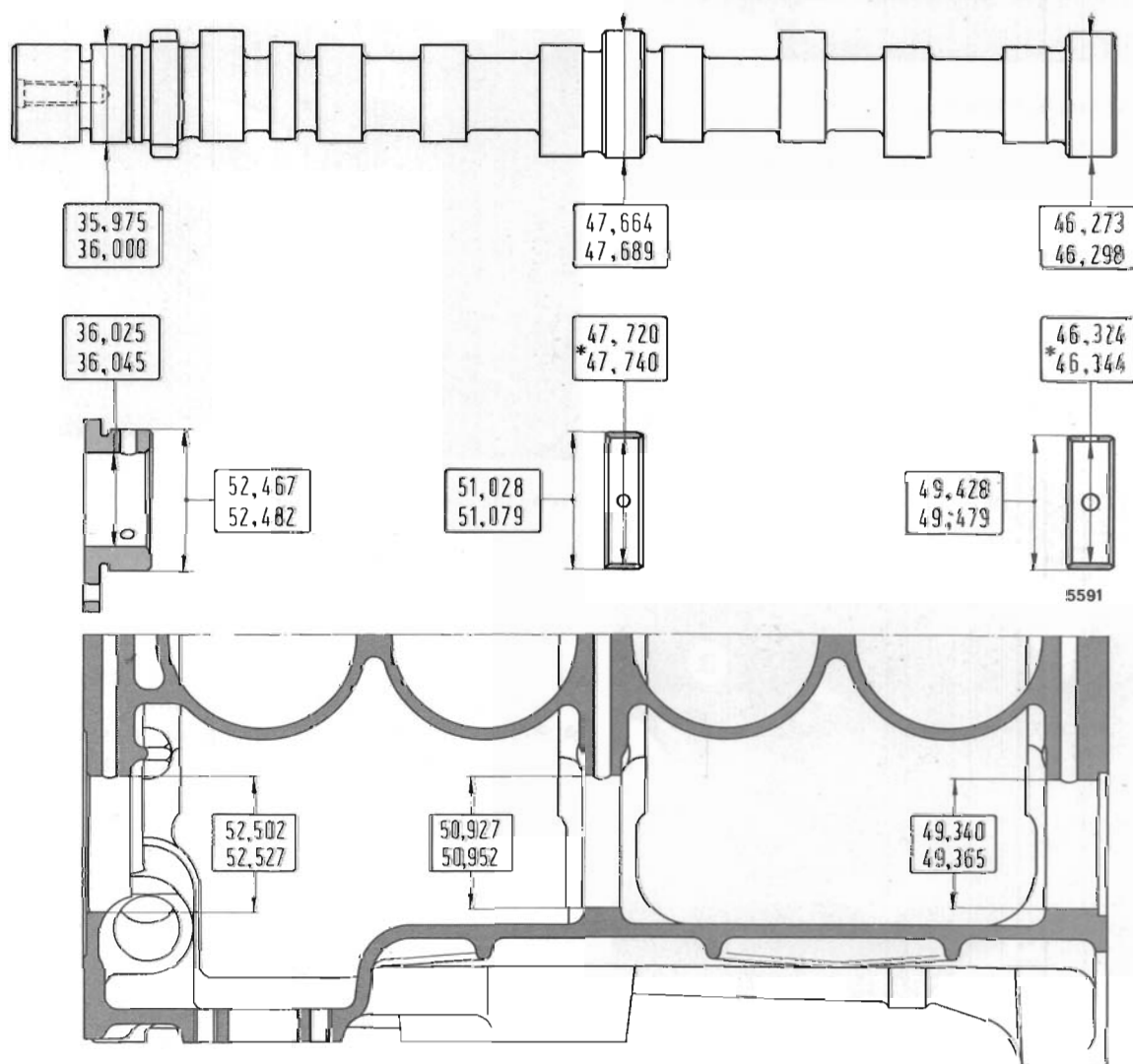
CAMSHAFT

Checking

Mount the camshaft between centres and use **A.95684** dial gauge to measure inlet and exhaust valve cam lift which should be **5.900 mm**.

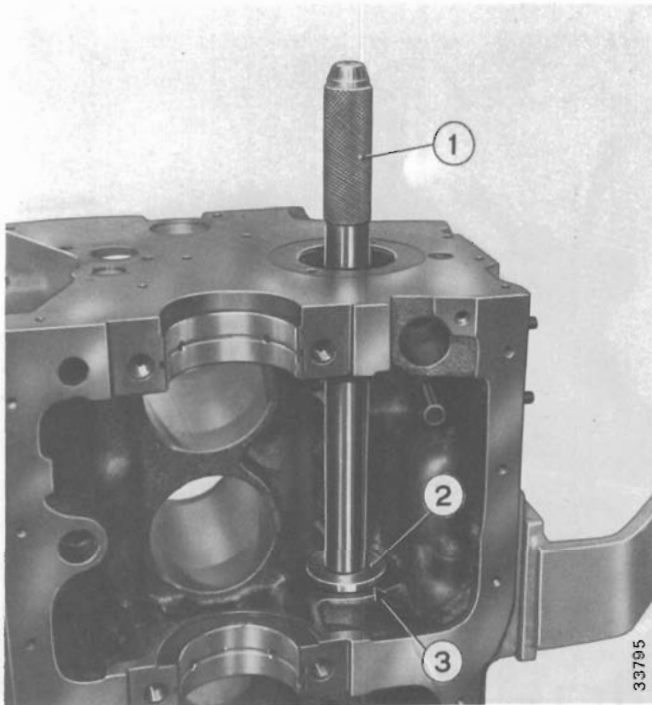


Checking cam lift on the camshaft by means of a dial gauge with magnetic stand.



Basic dimensions of camshaft, bearings and bearing bores in cylinder block.

(x) Dimensions are valid for bearings pressed into the cylinder block and machined; the given bearing outside diameter corresponds to gauge ring diameter (bearing pressed-in by hand).

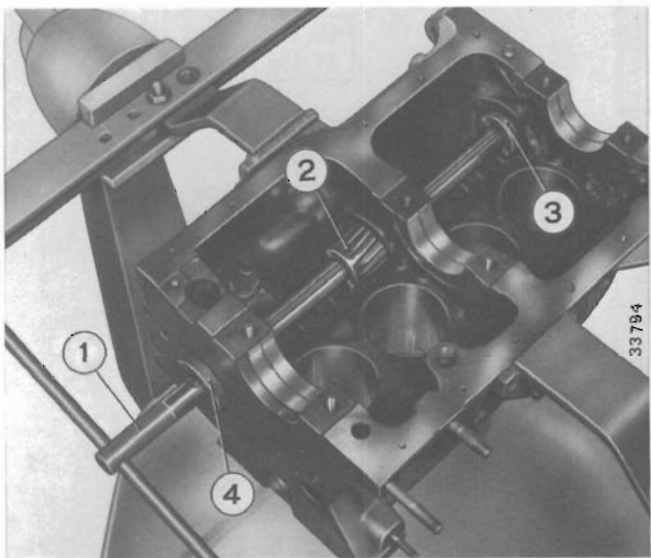


Extracting the camshaft bearings.

1. A.74365 shank.
2. A.60598 device for extraction and insertion of bearings.
3. Camshaft middle bearing.

Checking and reaming the camshaft bearings

Check bearings for ovality or slack fitting in the bores, and for proper coincidence of oil passages in bearings with suitable passages in cylinder block.



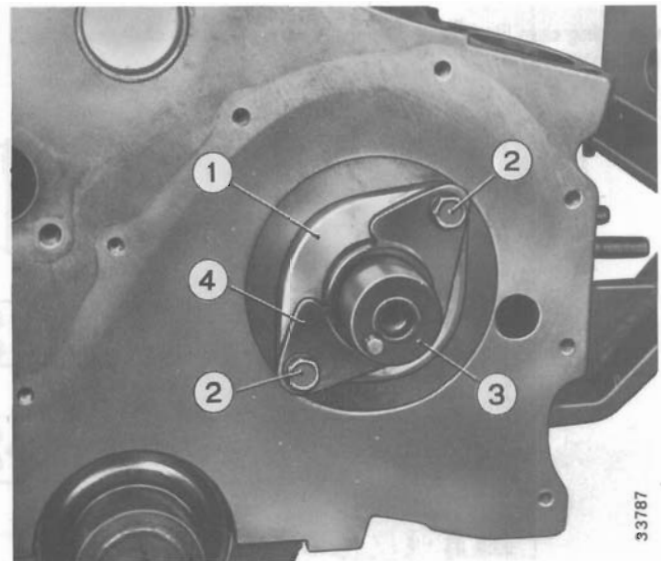
Reaming the camshaft bearings.

1. A.90394 mandrel.
2. Milling cutter for middle bearing.
3. Rear bearing centering taper.
4. Front bearing centering taper.

Bearing must have their internal surfaces smooth and free from scoring, otherwise they must be replaced.

If replacement is necessary, the bearings should be extracted from cylinder block seats by means of A.60598 puller for the middle bearing, and A.60599 puller for the rear bearing. The same tools are used both for installation of bearings and for their extraction.

New bearings should be installed in such a manner that oil passage in the bearing coincides with suitable passage in cylinder block.



Fixing the camshaft in cylinder block.

1. Front bearing.
2. Camshaft fastening bolts.
3. Camshaft.
4. Camshaft retaining plate.

The bearings must then be reamed by means of A.90394 mandrel; this operation ensures precise alignment of bores and perpendicularity to camshaft bearing seat centre lines.

Push-rods

The outer surface of push-rods and their guides in cylinder block must not be excessively worn, oval or scored. The push-rod face riding on cams must be ideally smooth and flat; small irregularities may be removed with an abrasive stick.

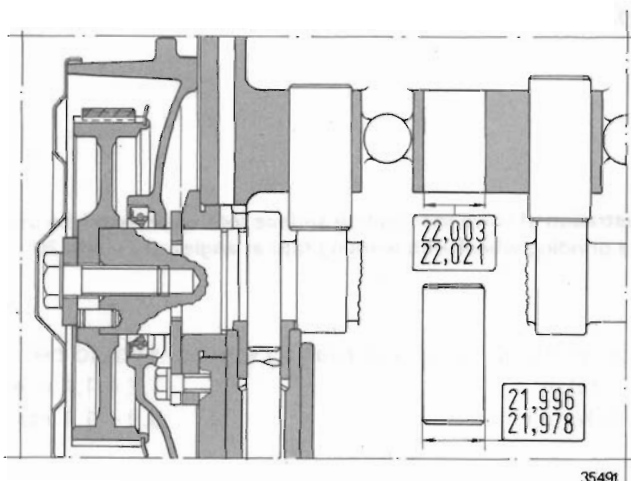
Timing gear

Polonez Model 1300/1500

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Sheet 2

Next, check the clearance between push-rod and its guide; it should not exceed **0.043 mm**; if this value is exceeded, guide must be reamed with the use of **A.90338/1** reamer for **the first** oversize (**0.05 mm**) and **A.90338/2** reamer for **the second** oversize (**0.10 mm**), and then new push-rods of suitable oversize have to be installed. **Spare push-rods have their outside diameters increased by 0.5 and 0.10 mm.**



Clearance between push-rods and guides.

VALVES AND VALVE SEATS

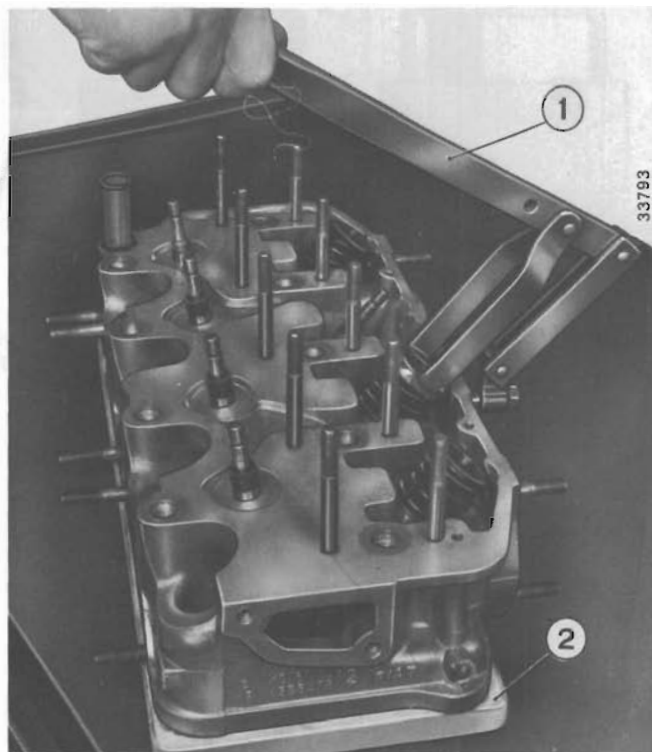
Dismounting and mounting of valves

Place cylinder head on **A.60612** stand. Set up **A.60611** device in a manner shown in the picture, and compress the spring so as to free valve retaining half-cones. Remove the spring, spring cup and oil thrower ring from valve stem. Unscrew spark plugs, turn over the cylinder head, and extract valves from valve guides.

To replace valves in position, perform the above described dismounting operations in reversed sequence.

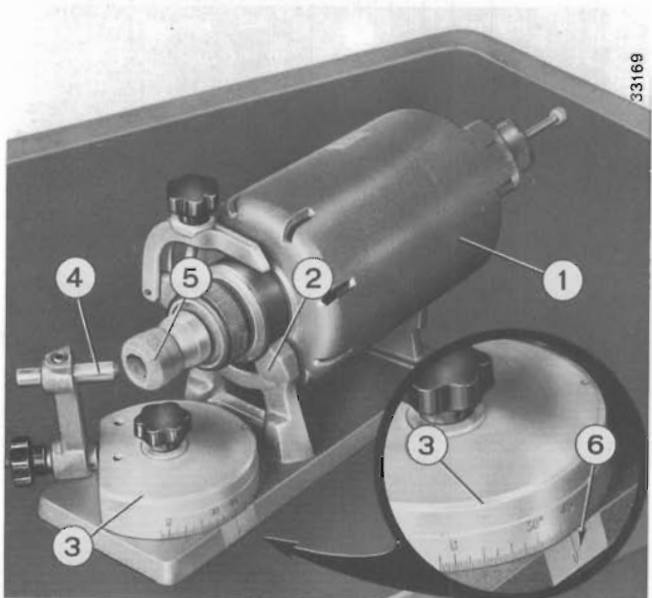
Grinding valve seats in cylinder head

Valve seats in cylinder head must not show any pitting on the valve mating surface; if so, they must be re-ground. For grinding valve seats use should be made of **Ap.5133** grinder.



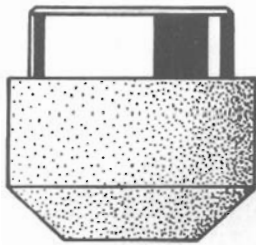
Dismounting and mounting of valves in cylinder head with the use **A.60611** device.

1. **A.60611** device.
2. **A.60612** stand for support of cylinder head while dismounting and mounting valves.



Dressing the grinding wheel with the use of **Ap.5133** grinder.

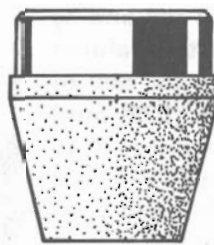
1. **Ap.5133** grinder.
2. Grinder support.
3. Angle setting attachment.
4. Diamond stylus.
5. Grinding wheel (silicon carbide).
6. Reference mark.



Grinding wheel with working face at 45° angle.



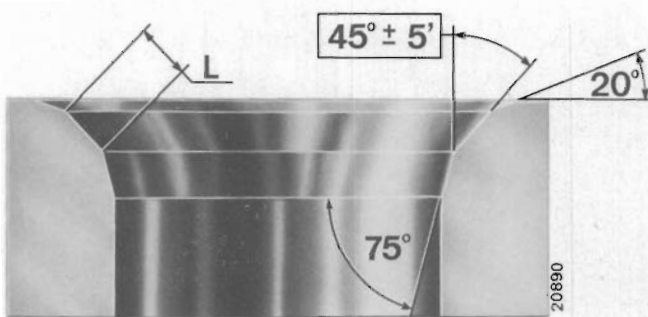
Grinding wheel with working face at 20° angle.



Grinding wheel with working face at 75° angle.

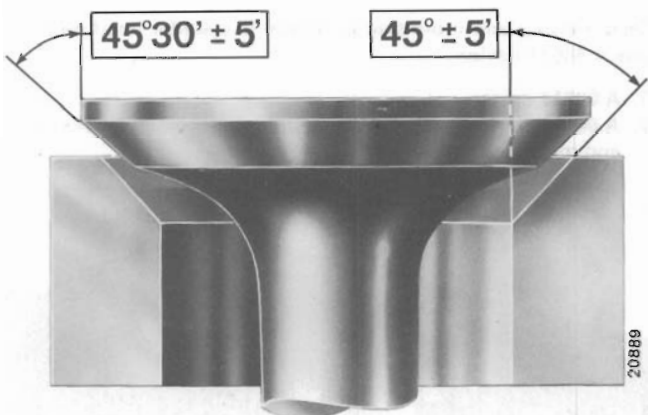
24693

NOTE: If it becomes necessary to dress the grinding wheel to an angle of 45°, set the angle setting attachment scale to 44°30' so that in grinding valve seat an angle of 45° can be obtained.



This is necessary in view of the design features of Ap.5133 grinder.

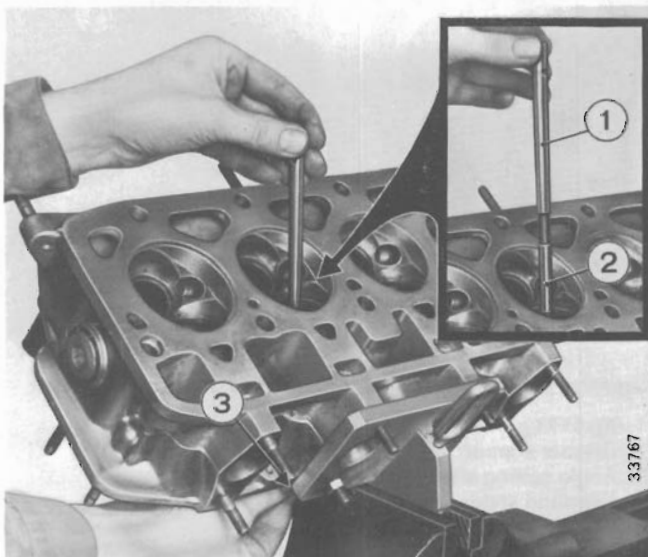
Illustration of valve seat mating surface reduced in width by use of a grinding wheel with working face at angles of 75° and 20°.



The width of valve seat mating surface should be:

- intake 1.2 – 1.4 mm
- exhaust 0.9 – 1.1 mm

Angles of valve seat and valve head mating surfaces.



NOTE: Before starting the valve seat grinding operation, check that valve guides are thoroughly cleaned. To prevent bending of the Ap.5133 grinder centering rod, support the cylinder head in such a way that the centering rod is in vertical position.

Inserting and fixing centering rod in valve guide.

1. Centering rod.
2. Centering-rod setscrew.
3. Spanner.

Timing gear

Polonez Model 1300/1500

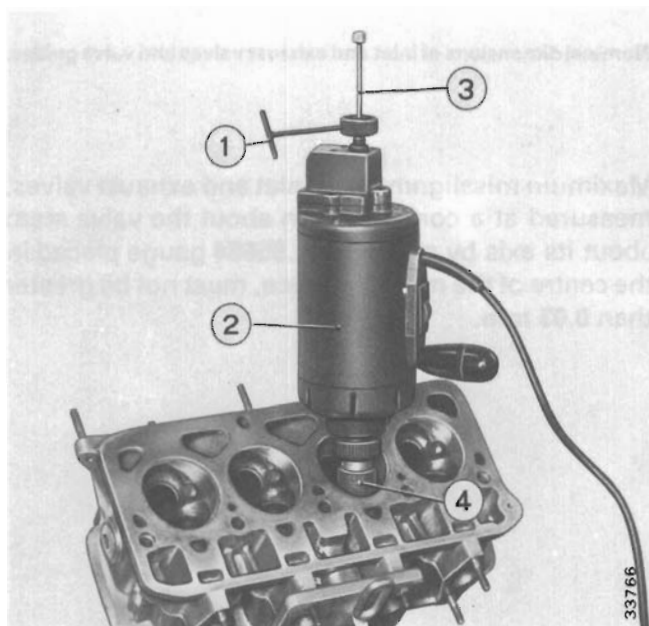
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Sheet 3

Place the grinder upon the centering rod so that the grinding wheel comes into contact with the valve seat surface; the grinding wheel should be clean and the centering rod setscrew released.

Without knocking or bending the centering rod, tighten the setscrew and adjust the setting with the handwheel so that the grinding wheel rotates freely in the seat.

Start the grinder and select suitable machining depth with the handwheel (1).



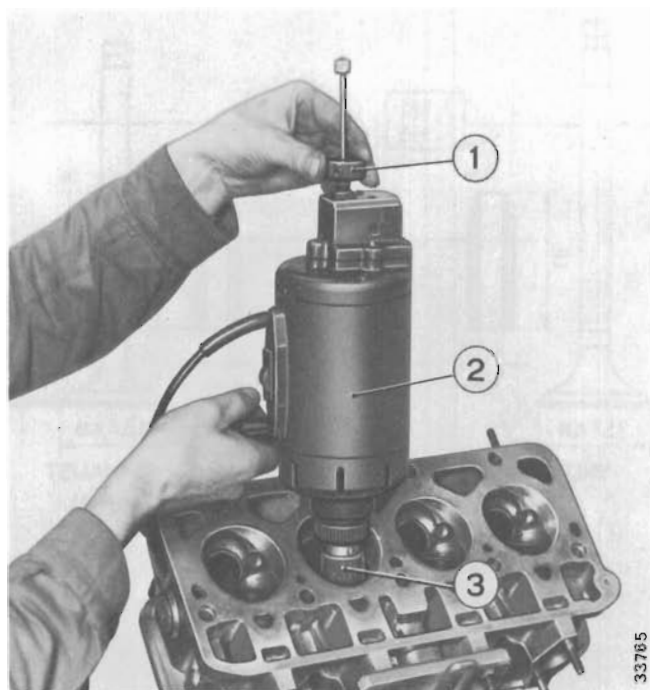
Setting up Ap.5133 grinder in working position.

1. Hexagonal spanner for the centering rod setscrew.
2. Ap. 5133 grinder.
3. Rod for adjusting the grinding depth.
4. Grinding wheel.

Turning the handwheel (1) by 8 notches corresponds to a depth change of **0.1 mm**.

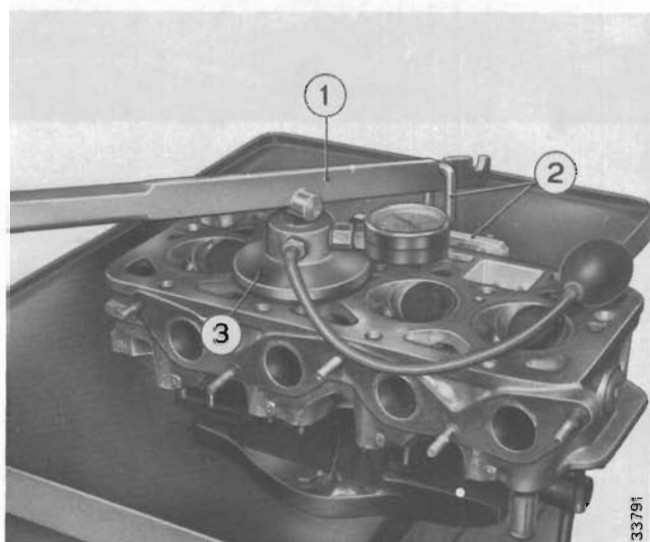
Before stopping the grinder motor, turn the depth adjusting handwheel so as to withdraw the grinding wheel out of contact with the valve seat.

If the valve head does not adhere closely to the valve seat, air will escape outside during the tightness test, which is indicated by the pressure gauge the pointer of which moves abruptly towards zero. If such is the case, the valve seat grinding must be repeated.



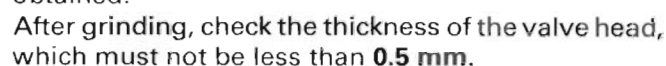
Grinding the valve seats in cylinder head by means of a grinding wheel with working surface at 45° angle.

1. Grinding depth adjusting handwheel.
2. Ap. 5133 grinder.
3. Grinding wheel with working surface at 45° angle.



Valve tightness test.

1. A.60041/2 device for fixing valve tightness testing device.
2. A.60393 fixture for mounting and setting up the cylinder head during valve seat grinding.
3. A.95868 valve tightness testing device.



Replacement of valve guides

The valve guides are fitted into the cylinder head bores with **0.063–0.108 mm** interference; check that there is no play.

Spare valve guides are supplied with nominal outside diameter of **14.040 – 14.058 mm** and with outside diameter increased by **0.2 mm**, i.e. measuring **14.240, 14.258 mm**.

Fitting the valve guides into cylinder head bores.

Timing gear

Polonez Model 1300/1500

101.07

Sheet 4

The replacement of valve guides becomes necessary if valve replacement has failed to eliminate the excessive clearance between valve stem and guide, or if the valve guide is loose in its seat.

Forcing out valve guides with the use of A.60613 punch.

Heat up the cylinder head evenly to a temperature of 80–100°C, then set up and press in the valve guide with the use of **A.60614** punch in the way shown in the picture.

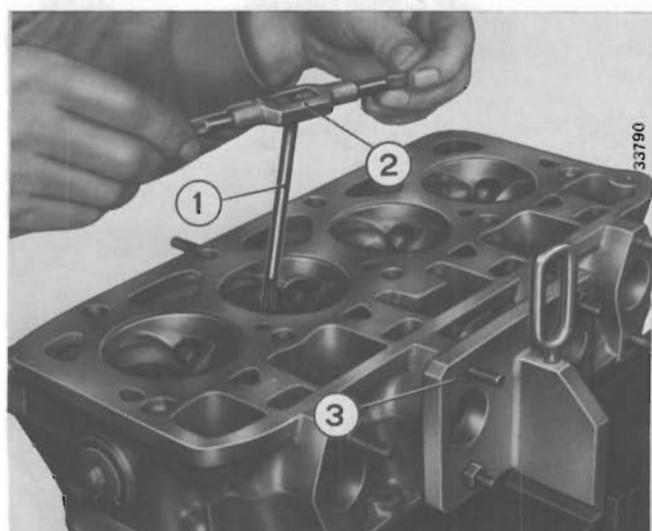
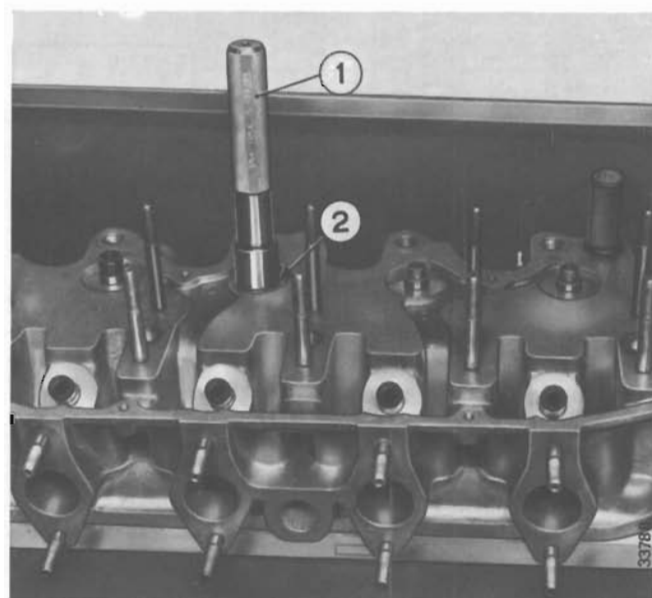
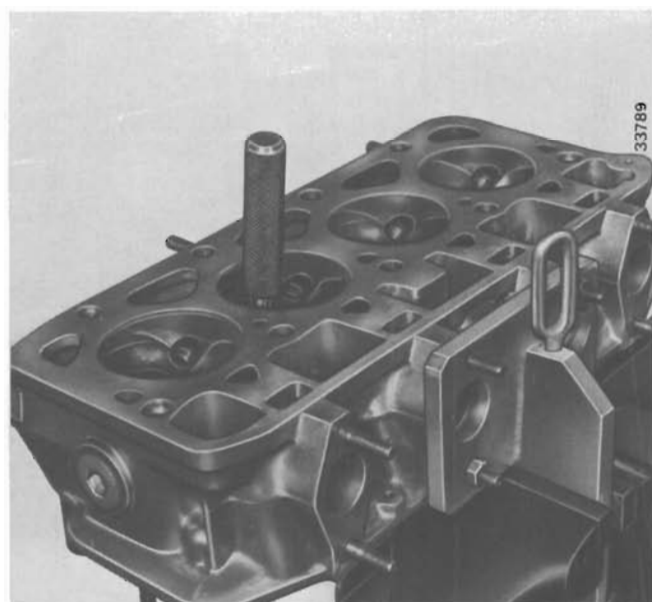
Setting up and pressing in valve guides with the use of **A.60614** punch.

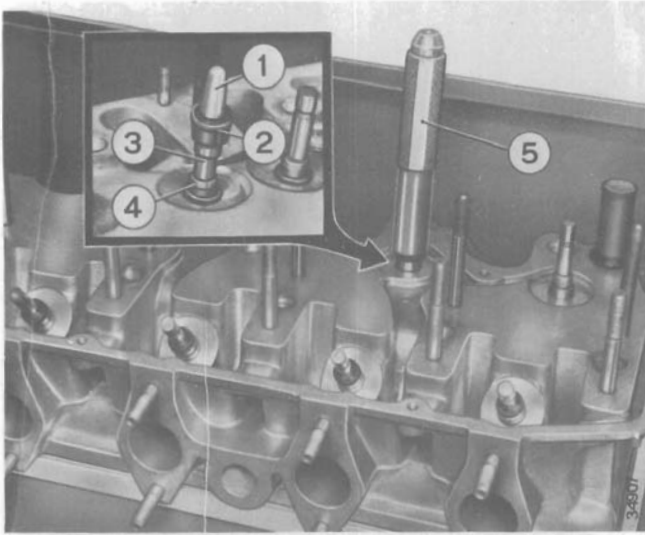
1. **A.60614** punch.
2. Valve guide.

Spare valve guides are supplied with their bores finished. Should it prove necessary, however, to ream the bore in view of any slight deformation caused by pressing into the cylinder head bore, use should be made of **A.90310** reamer, as shown in the picture.

Reaming valve guide with the use of **A.90310** reamer.

1. **A.90310** reamer.
2. Reamer handle.
3. **A.60393** fixture for mounting and setting up the cylinder head for valve seat grinding.



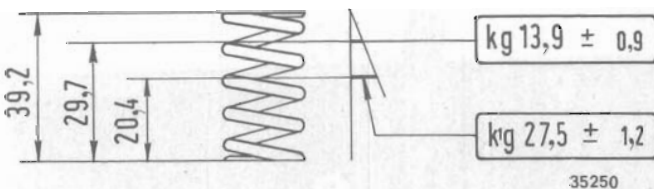


The installation of sealing rings on valve guides, both for inlet and exhaust valves, is performed in two stages:

- place **A.60313** device (1) on the valve stem (3) and then place the sealing ring on the device shank;
- use **A.60313/2** punch (5) to place the sealing ring (2) in the recess on the top part of valve guide.

Installation of sealing rings on inlet and exhaust valve guides.

1. **A.60313** device for installation of sealing rings.
2. Sealing ring.
3. Valve stem.
4. Valve guide.
5. **A.60313/2** punch for installation of sealing rings.

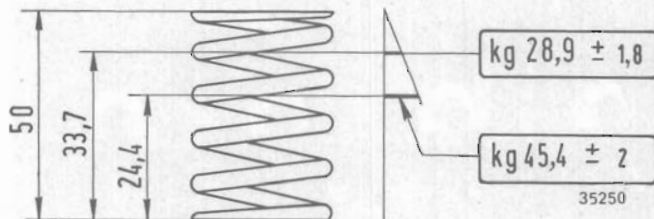


Checking the valve springs

Check the valve springs for cracks and loss of elasticity.

Basic data for checking the valve inner spring.

Check the force of spring by means of **Ap.5049** tester. Compare the established force and spring deformation with the data given in the drawing opposite and in Table 10, Sheet 2.



Basic data for checking the valve outer spring.

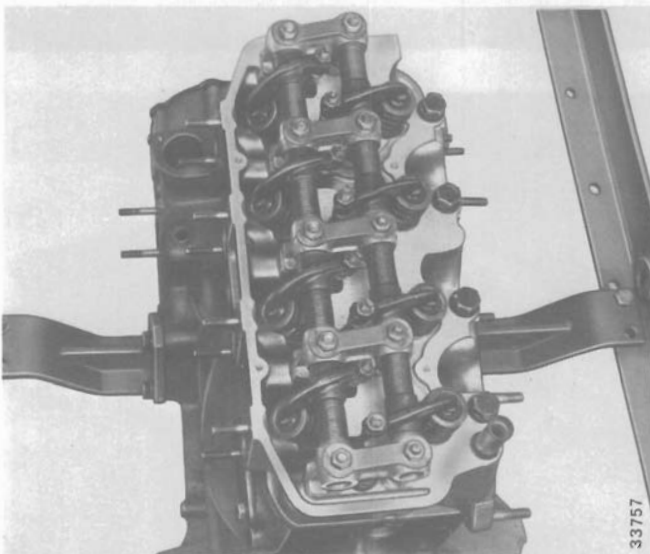
ROCKER BRACKETS – PIVOTS – ROCKERS

Checking

Check the working surface of valve rockers, their pivots and brackets for scratches and scoring. If necessary, the damaged parts should be replaced. Check the contact surfaces of valve and rocker, and also of adjusting screw and push-rod; these must be ideally smooth (mirror-like).

Check the valve rocker springs for cracks and loss of elasticity; this check can be performed with the use of **Ap.5049** tester; under a load of **2.8 kg** the height of the spring should be **21.5 mm**.

The assembling clearance between rocker pivot shaft and rocker bore should be **0.032 – 0.068 mm**, and between rocker shaft and rocker bracket – **0.000 – 0.078 mm**.

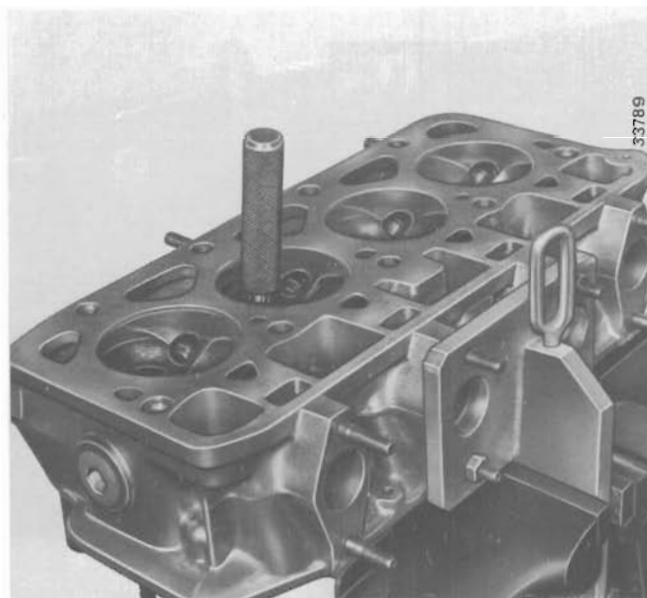


View of rocker pivot shaft rockers installed in cylinder head.

Timing gear

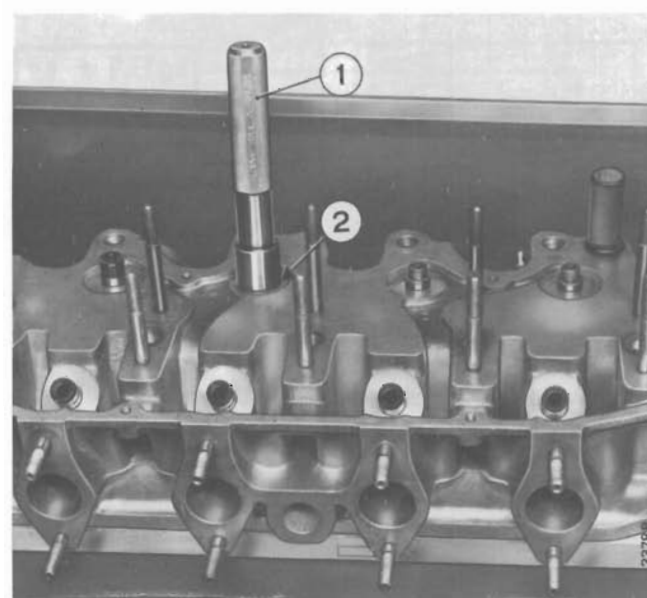
Polonez Model 1300/1500

The replacement of valve guides becomes necessary if valve replacement has failed to eliminate the excessive clearance between valve stem and guide, or if the valve guide is loose in its seat.



Forcing out valve guides with the use of A.60613 punch.

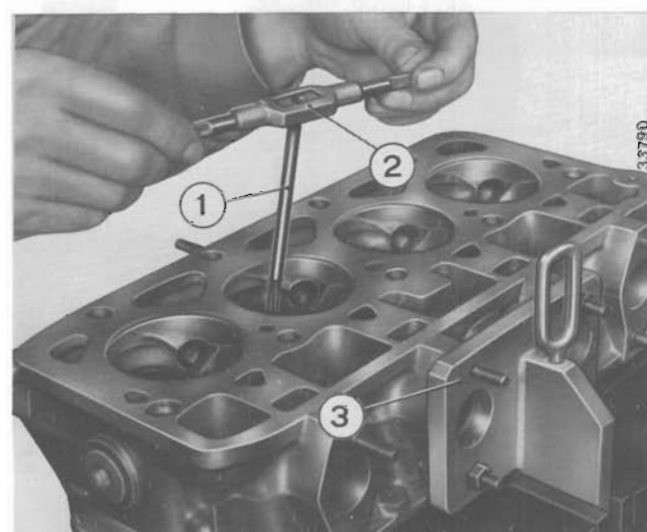
Heat up the cylinder head evenly to a temperature of 80–100°C, then set up and press in the valve guide with the use of A.60614 punch in the way shown in the picture.



Setting up and pressing in valve guides with the use of A.60614 punch.

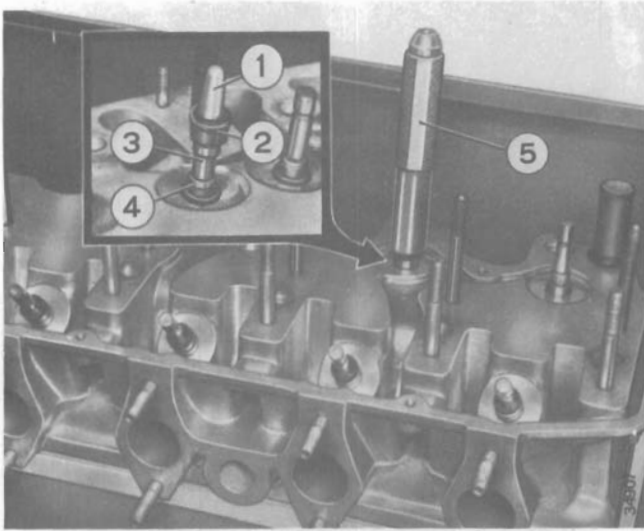
1. A.60614 punch.
2. Valve guide.

Spare valve guides are supplied with their bores finished. Should it prove necessary, however, to ream the bore in view of any slight deformation caused by pressing into the cylinder head bore, use should be made of A.90310 reamer, as shown in the picture.



Reaming valve guide with the use of A.90310 reamer.

1. A.90310 reamer.
2. Reamer handle.
3. A.60393 fixture for mounting and setting up the cylinder head for valve seat grinding.



The installation of sealing rings on valve guides, both for inlet and exhaust valves, is performed in two stages:

- place **A.60313** device (1) on the valve stem (3) and then place the sealing ring on the device shank;
- use **A.60313/2** punch (5) to place the sealing ring (2) in the recess on the top part of valve guide.

Installation of sealing rings on inlet and exhaust valve guides.

1. **A.60313** device for installation of sealing rings.
2. Sealing ring.
3. Valve stem.
4. Valve guide.
5. **A.60313/2** punch for installation of sealing rings.

Checking the valve springs

Check the valve springs for cracks and loss of elasticity.

Basic data for checking the valve inner spring.

Check the force of spring by means of **Ap.5049** tester. Compare the established force and spring deformation with the data given in the drawing opposite and in Table 10, Sheet 2.

Basic data for checking the valve outer spring.

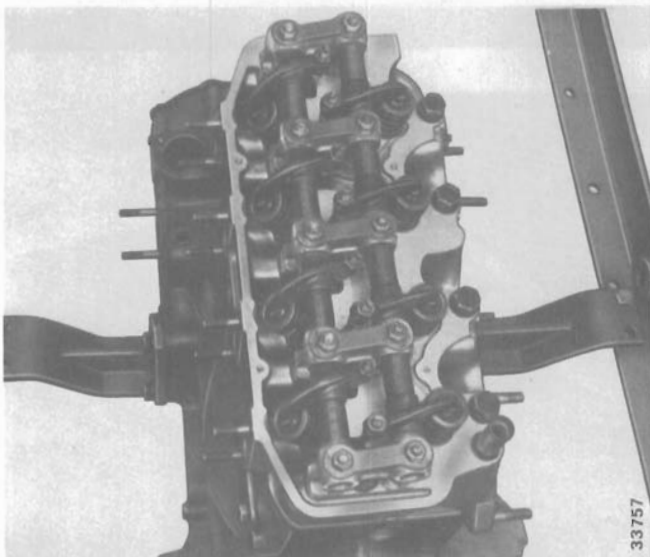
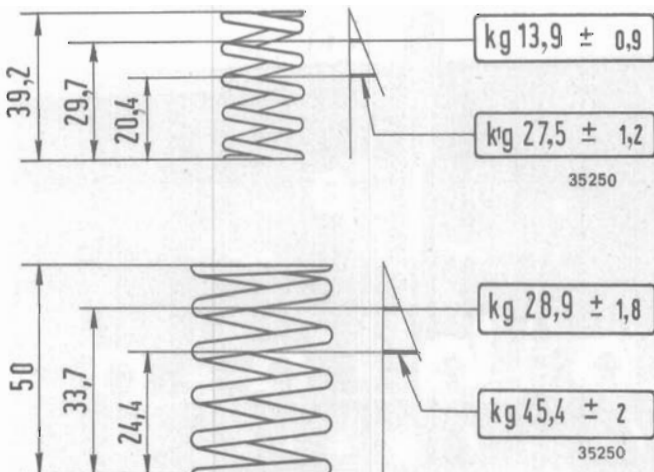
ROCKER BRACKETS – PIVOTS – ROCKERS

Checking

Check the working surface of valve rockers, their pivots and brackets for scratches and scoring. If necessary, the damaged parts should be replaced. Check the contact surfaces of valve and rocker, and also of adjusting screw and push-rod; these must be ideally smooth (mirror-like).

Check the valve rocker springs for cracks and loss of elasticity; this check can be performed with the use of **Ap.5049** tester; under a load of **2.8 kg** the height of the spring should be **21.5 mm**.

The assembling clearance between rocker pivot shaft and rocker bore should be **0.032 – 0.068 mm**, and between rocker shaft and rocker bracket – **0.000 – 0.078 mm**.



View of rocker pivot shaft rockers installed in cylinder head.

Timing gear

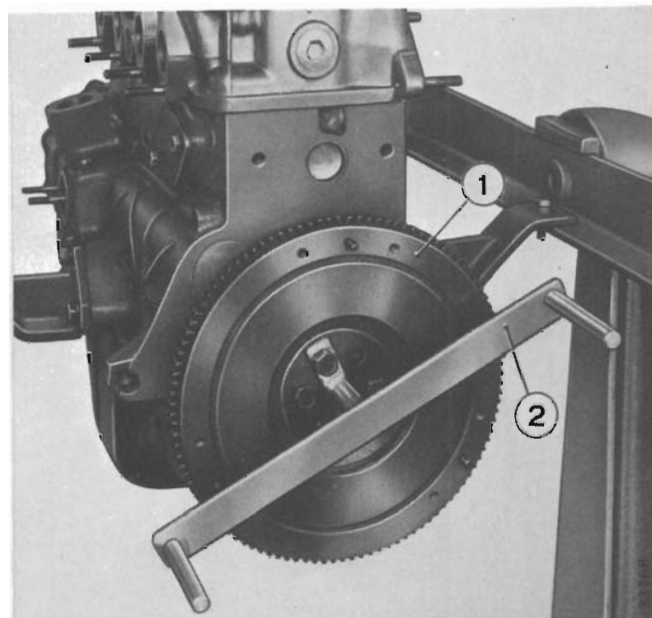
Polonez Model 1300/1500

101.07

Sheet 5

VALVE CLEARANCE ADJUSTMENT

Fasten **A.60459** handle to flywheel by means of two flywheel bolts; this handle facilitates turning the crankshaft at timing adjustment and valve clearance adjustment operations.



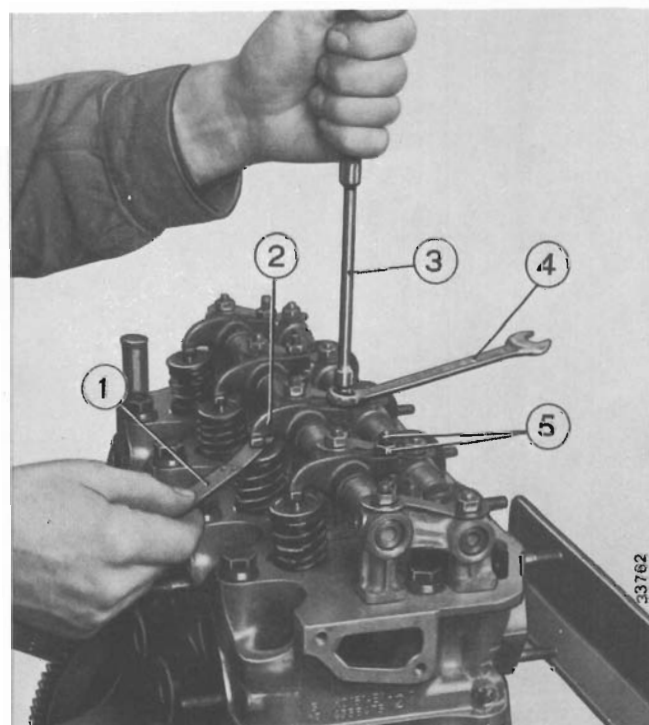
Fastening **A.60459** crankshaft turning handle.

1. Flywheel.
2. **A.60459** handle.

The clearance between valves and valve rockers must be adjusted very carefully; the required clearance with cold engine is **0.20 mm** for inlet valves, and **0.25 mm** for exhaust valves.

If valve clearances differ from the above values, timing phases are affected, which might result in damage to the engine.

Inlet valve clearance should be checked with **A.9510** feeler gauge, and exhaust valve clearance – with **A.95111** feeler gauge.



Adjustment of clearance between valves and valve rockers.

1. Feeler gauge.
2. Valve rocker.
3. **A.50006** spanner for adjusting screw.
4. Hexagon spanner.
5. Clearance adjusting screw with locknut.



Fuel pump and tubing

Polonez Model 1300/1500

102.02

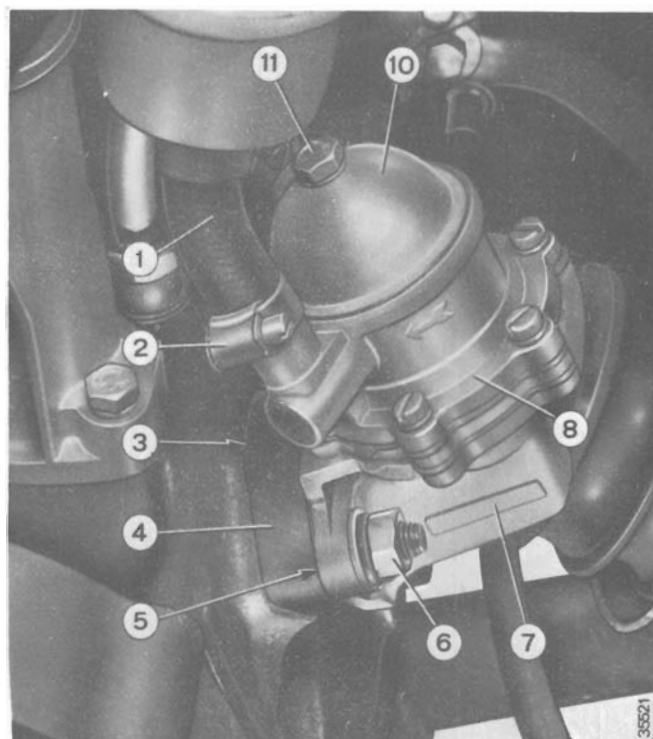
Sheet 1

FUEL PUMP

Fuel pump installation and adjustment on cylinder block

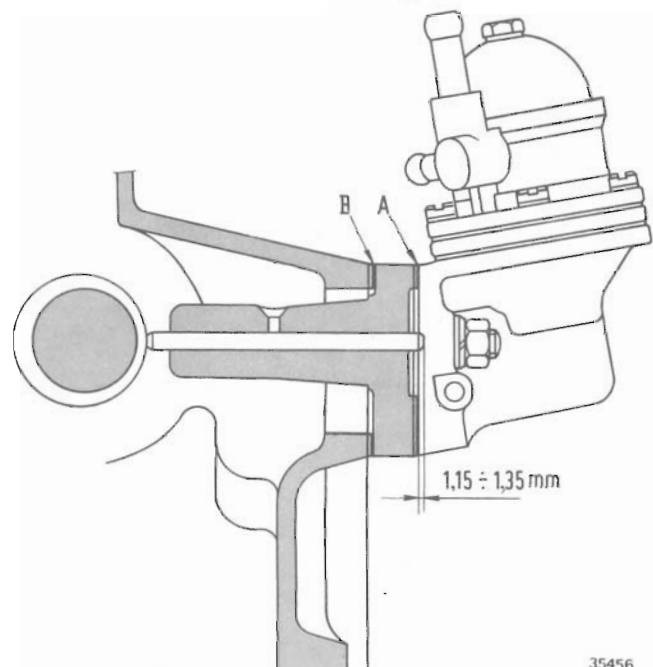
To ensure correct operation of fuel pump, the push-rod protrusion must be adjusted before mounting on the cylinder block. This is done in the following manner:

- place fuel pump push-rod housing together with 1.2 – 1.3 mm thick gasket in the opening in cylinder block;
- place 0.7 – 0.8 mm thick gasket on fuel pump fastening studs;
- insert the push-rod into housing bore and turn the crankshaft until the push-rod actuating eccentric reaches the position shown in the picture below;
- use a gauge to check the distance between push-rod end and the plane of gasket A; it should be 1 – 1.5 mm;
- if this distance is less than 1 mm, replace gasket B with gasket A (both gaskets will then be of the A type, 0.7 – 0.8 mm thick); if the distance is more than 1 mm, replace gasket A with gasket B (both gaskets will then be of the B type, 1.2 – 1.3 mm thick).



Fuel pump installation in cylinder block.

1. Tubing feeding fuel from pump to carburettor.
2. Clamp.
3. Gasket.
4. Actuating push-rod housing.
5. Gasket.
6. Nut with spring washer for fastening fuel pump to cylinder block.
7. Fuel pump base.
8. Fuel pump head.
9. Nipple for inlet of fuel from fuel tank.
10. Pump cover.
11. Pump cover to pump head fastening bolt.



Adjusting the position of fuel pump actuating push-rod in cylinder block.

A = gasket 0.7 – 0.8 mm thick.

B = gasket 1.2 – 1.3 mm thick.

The dimension indicated is the amount of fuel pump actuating rod protrusion.

Carburettor

Polonez Model 1300/1500

102.04

Sheet 1

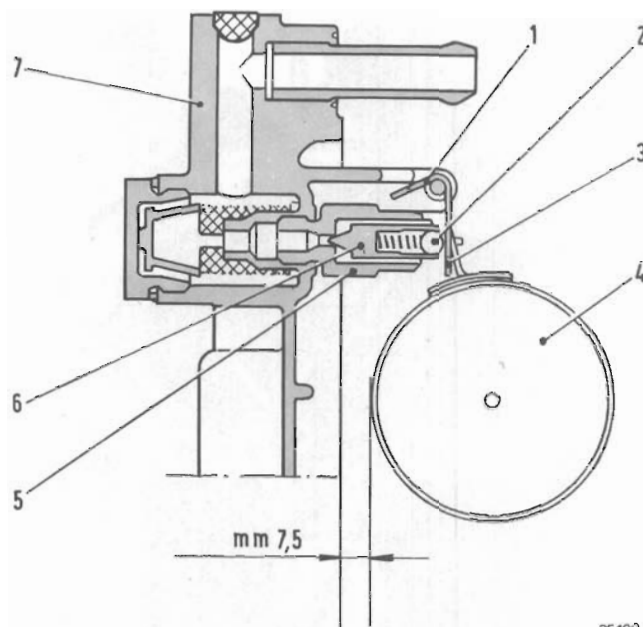
FUEL LEVEL ADJUSTMENT

To adjust fuel level in the carburettor, perform the following operations:

- check float for possible perforation and dents, and for free rotation on its pin;

Checking and adjustment of fuel level in carburettor.

1. Float deflection limiter.
 2. Damper ball at needle end.
 3. Fuel level adjusting tang.
 4. Float (18 ± 0.5 g).
 5. Needle valve seat.
 6. Needle.
 7. Carburettor cover.
- 7.5 ± 0.25 mm = distance between float and cover plane, without gasket, in vertical position.



35490

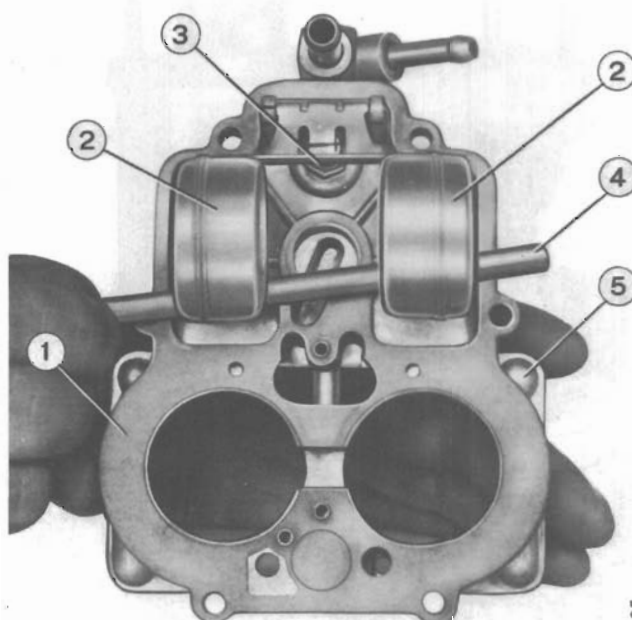
- check that the needle valve seat is screwed tightly into its mounting, and that the damper ball at needle end moves freely;
- set the carburettor cover in vertical position, as shown in the picture, so that the float does not depress the needle damper ball with its weight;
- check the distance between float and carburettor cover, without gasket, with the tang on float hinge touching lightly the needle damper ball, and with the carburettor cover in vertical position; this distance should be 7.5 ± 0.25 mm;
- after adjustment, check float travel (it should be 6.5 mm) and adjust the travel, if necessary, by bending off the hinge protruding member; check that the ball moves freely in its seat under action of springs;
- if the float is still in the wrong position, adjust the float control tang so as to obtain the required distance; the tang should be at right angles to the needle centre line and its contact surface must be free from pitting which might obstruct free movement of the needle.

- replace the carburettor cover and check whether the float can move freely without rubbing against the float chamber walls.

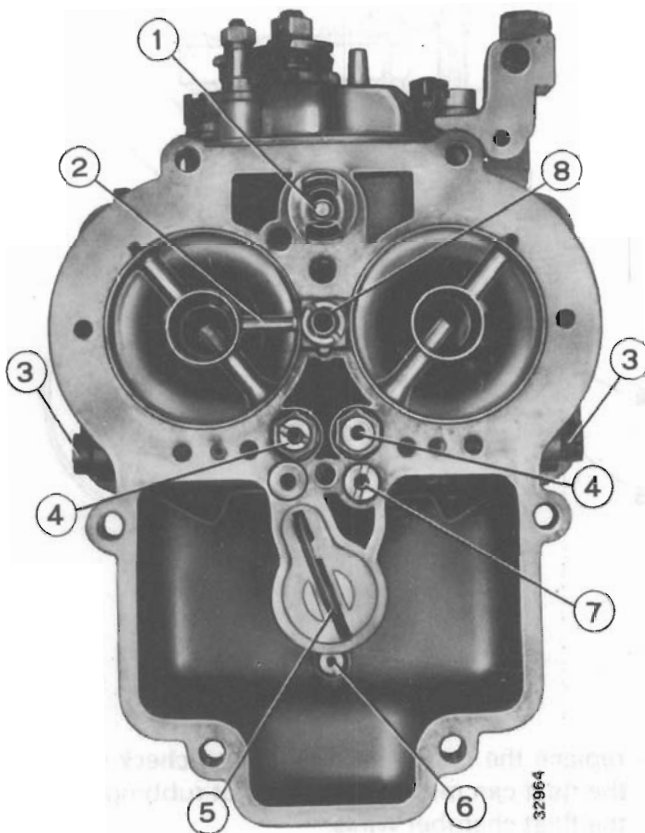
NOTE: The float setting must be checked each time the float or needle valve is replaced; when replacing the needle valve, the valve seat gasket must also be replaced.

Checking and adjustment of fuel level in carburettor with the use of A.95129 gauge.

1. Paper gasket.
2. Float.
3. Needle valve.
4. Gauge for checking distance between float and cover plane.
5. Carburettor cover.



32965



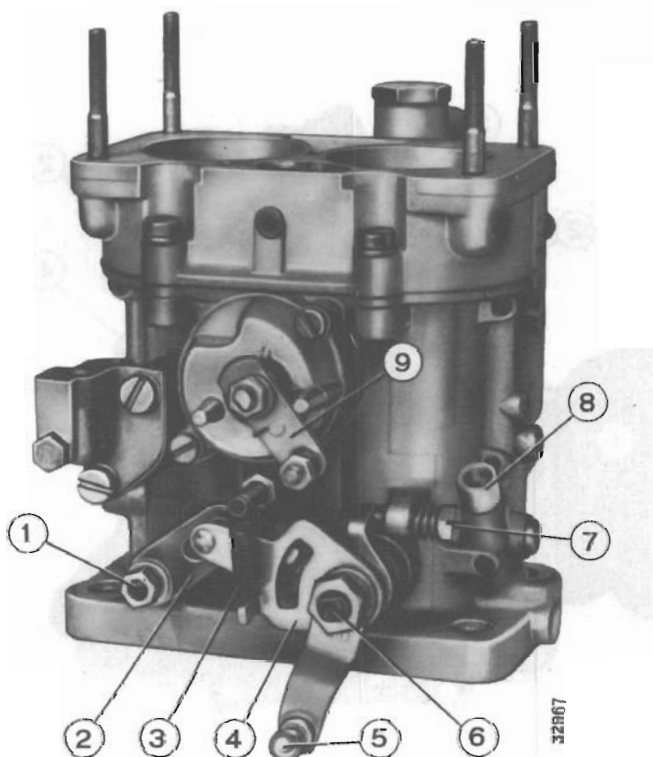
View of carburettor inner components with cover removed.

1. Starter device.
2. Acceleration pump nozzle.
3. idling fuel jet.
4. Emulsion tubes.
5. Acceleration pump actuating link.
6. Acceleration pump inlet valve.
7. Starter air jet.
8. Acceleration pump ball valve.



View of carburettor from the side of acceleration pump and excess fuel recycling connection.

1. Fuel filter plug.
2. Fuel inlet nipple.
3. Excess fuel nipple for connection to fuel tank.
4. I-throat throttle pivot pin.
5. Acceleration pump actuating lever.



View of carburettor from the side of starter device and throttle position setting screw.

1. I-throat throttle pivot pin.
2. I-throat throttle actuating lever.
3. Lever return spring.
4. Releasing lever.
5. I-throat throttle lever.
6. I-throat throttle pivot pin.
7. Throttle position setting screw.
8. Seat for idling-speed adjusting screw.
9. Starter actuating lever.

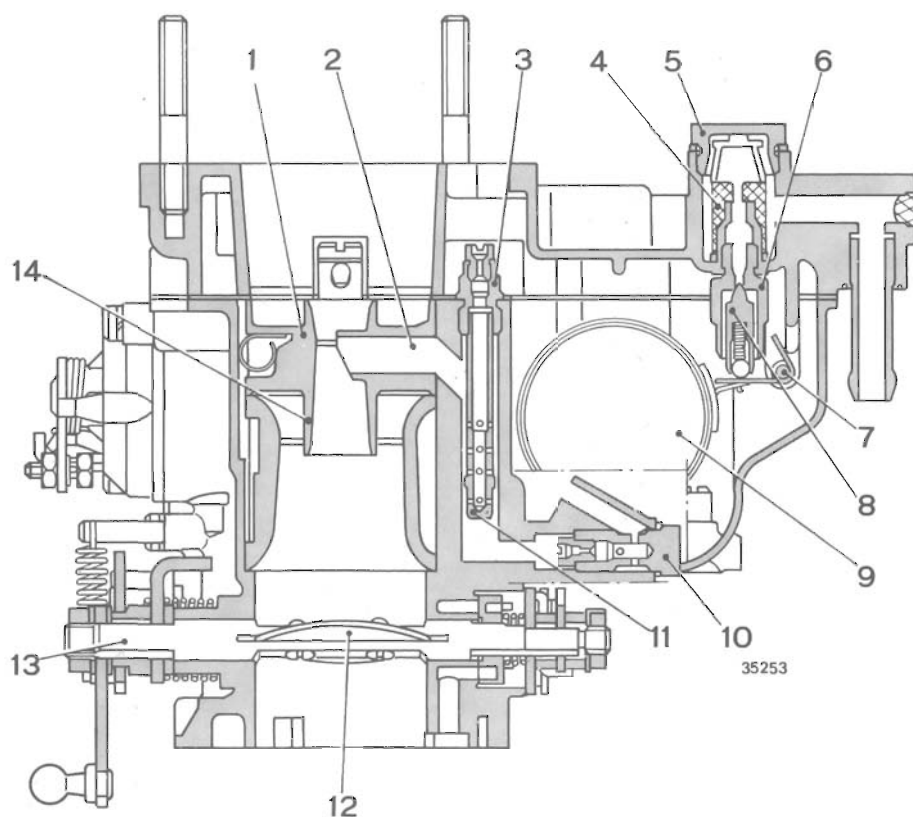
Carburettor

Polonez Model 1300/1500

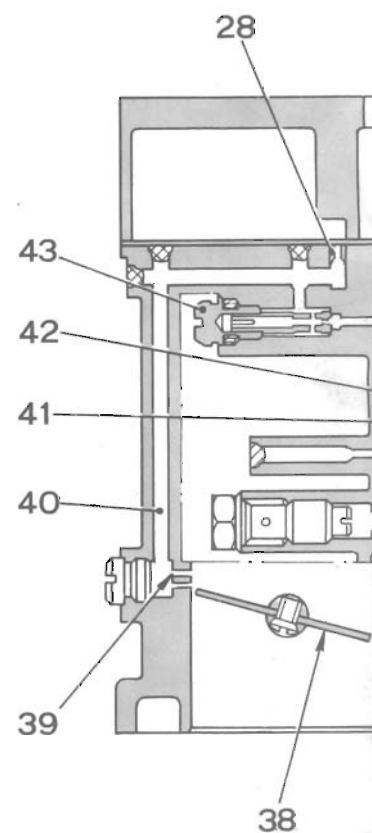
102.04

Sheet 2

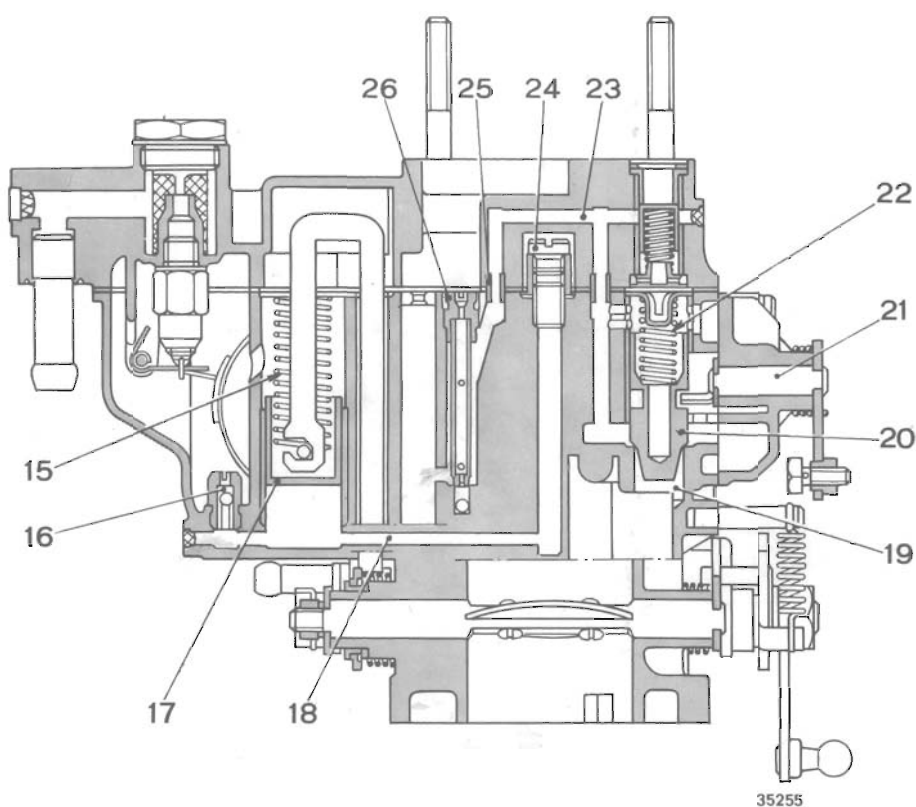
ENGINE NORMAL SPEED



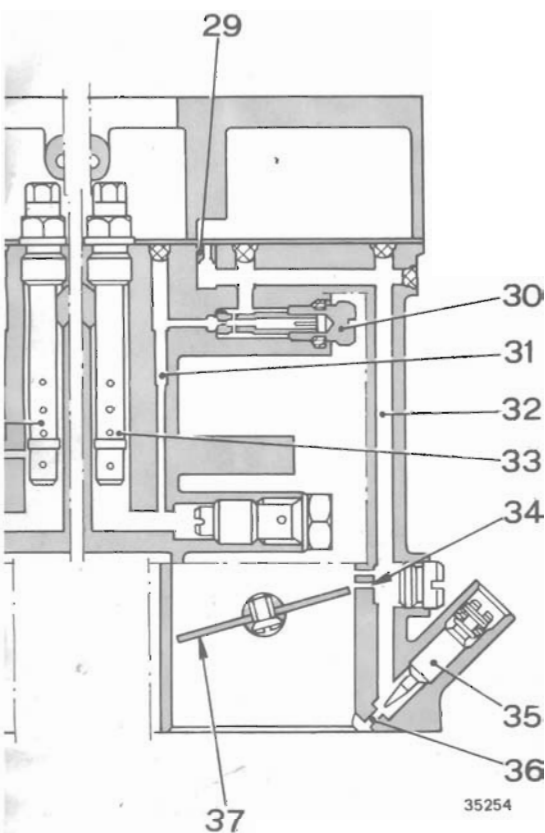
ENGINE IDLING



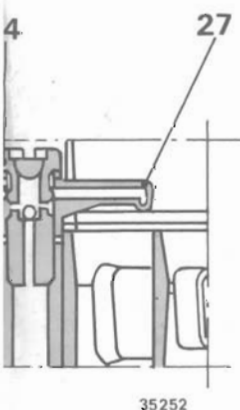
ENGINE ACC



3 AND ELEVATED SPEEDS



ACCELERATION AND STARTING



WEBER CARBURETTOR

1. Main throat.
2. Atomiser.
3. Main air jet.
4. Mesh filter.
5. Plug.
6. Needle valve seat.
7. Float pivot pin.
8. Needle.
9. Float.
10. Main fuel jet.
11. Emulsion tube.
12. I-throat throttle.
13. I-throat throttle pivot pin.
14. Throat.
15. Spring.
16. Acceleration pump jet.
17. Acceleration pump plunger.
18. Fuel passage.
19. Starter device fuel well.
20. Starter device plunger.
21. Plunger lever shaft.
22. Plunger spring.
23. Starter device mixture passage.
24. Acceleration pump valve.
25. Starter device calibrated bush.
26. Main air jet.
27. Acceleration pump atomiser.
28. Calibrated bush.
29. Idling air calibrated bush.
30. I-throat idling fuel jet.
31. Idling and transition feed fuel passage.
32. Idling and transition feed mixture passage for I throat.
33. Emulsion tube.
34. I-throat transition orifices.
35. Idling mixture adjusting screw.
36. Idling mixture orifice.
37. I-throat throttle.
38. II-throat throttle.
39. II-throat transition orifices.
40. II-throat transition orifices mixture passage.
41. Emulsion tube.
42. II-throat transition orifices fuel passage.
43. II-throat idling jet.

Carburettor

Polonez Model 1300/1500

102.04

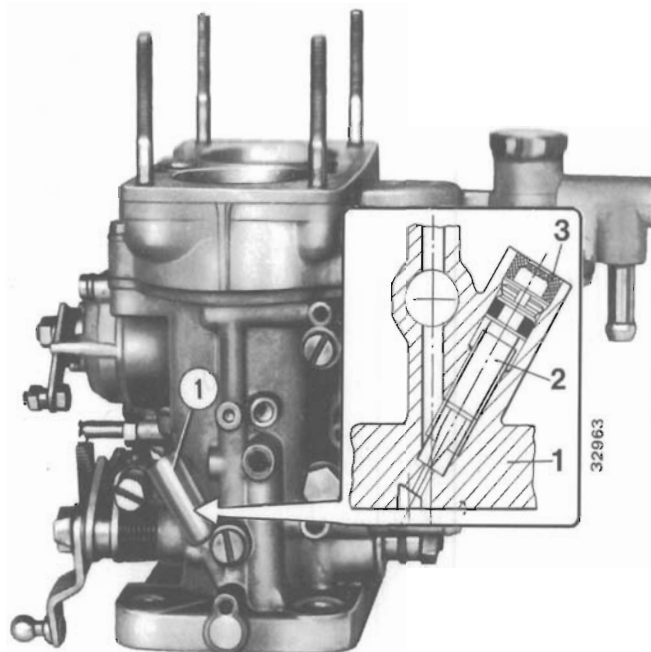
Sheet 3

IDLING SPEED ADJUSTMENT

Idling speed adjustment is made for the I-throat only, using for this purpose the adjustment screw (1) and the idling mixture adjusting screw (2). Screw (1) permits the I-throat throttle to be opened gradually; screw (2), having a tapered end, is designed for adjusting the quantity of feed from idling-speed mixture passage, the mixture being diluted with air aspired by the engine, which makes it possible to obtain a mixture of optimum composition for proper operation of the engine.

View of carburettor: from the side of the idling-speed adjusting screw.

1. Carburettor body and idling-speed adjusting screw seat.
2. Minimum mixture adjusting screw.
3. Plastic plug for adjusting screw seat.

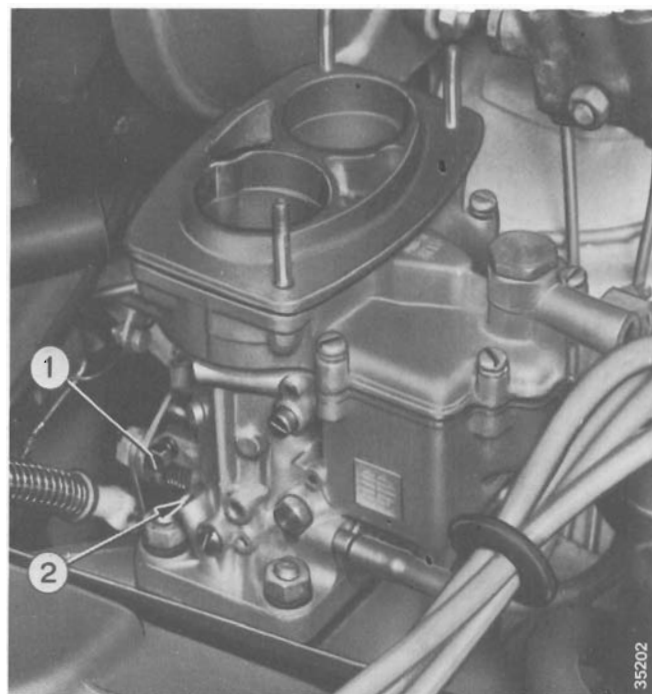


The idling-speed adjustment should be carried out on a hot and working engine by adjusting first, with screw (1), the first throttle minimum opening so that the engine runs smoothly without stalling.

Next, use screw (2) to select such a mixture composition which would ensure the maximum constant speed for the given throttle opening; then decrease further the minimum throttle opening until the most convenient idling-speed is obtained. On completion of the idling-speed adjustment remember to replace the plastic closing plug into the seat of the mixture adjusting screw.

Carburettor adjustment for idling-speed.

1. Throttle opening and idling-speed adjusting screw.
2. Idling mixture adjusting screw.



Lubrication system

Polonez Model 1300/1500

103.01

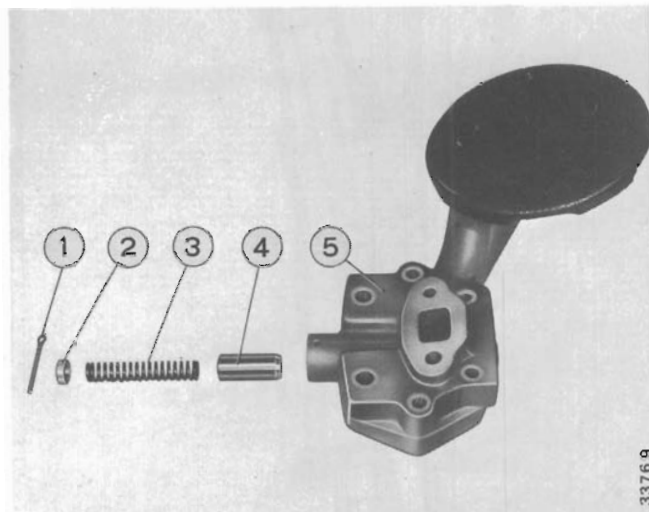
Sheet 1

OIL PUMP

Oil pressure in the engine lubrication system at a temperature of **100°C** should be **3.43 – 4.90 bar (3.5 – 5 kg/sq.cm)** the oil pressure can be checked with the use of **A.60162** pressure gauge.

Components of oil pressure regulating valve.

1. Split pin.
2. Spring seat.
3. Spring.
4. Valve.
5. Pump cover with suction strainer.

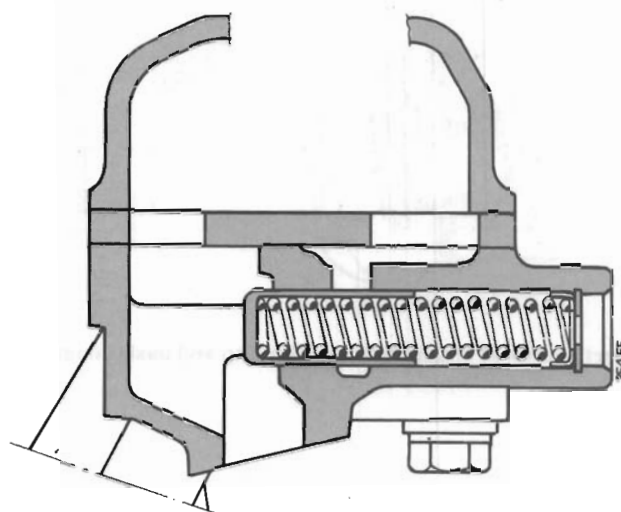


33769

Check the oil pressure regulating spring for cracks and loss of elasticity. The load capacity of the spring can be checked with the use of **Ap. 5049** tester, comparing the readings obtained with the data for the spring shown in the picture opposite.

The minimum permissible load for a **42 mm** long spring should be **51.94 ± 3.92 N (5.3 ± 0.4 kg)**.

NOTE: Particular attention should be paid to cleanliness of the pressure regulating valve and its seat in the pump body; contamination might result in valve seizure.

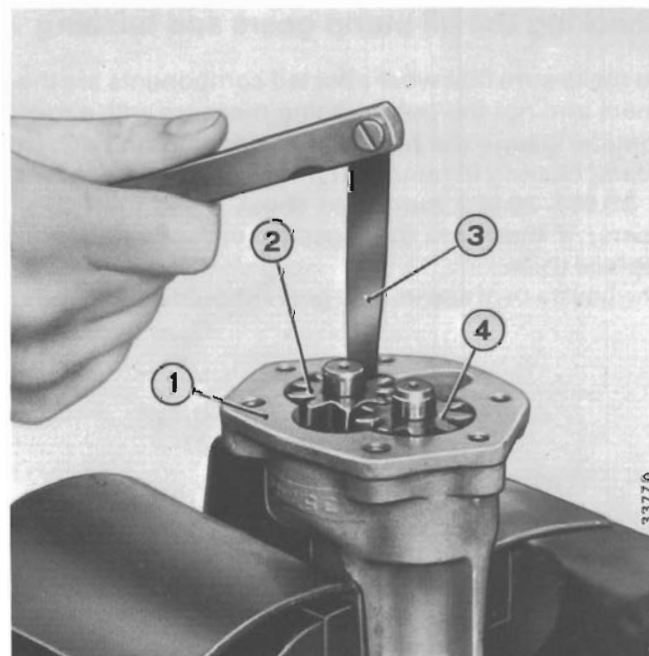


Setting of oil pressure adjusting valve spring in pump housing.

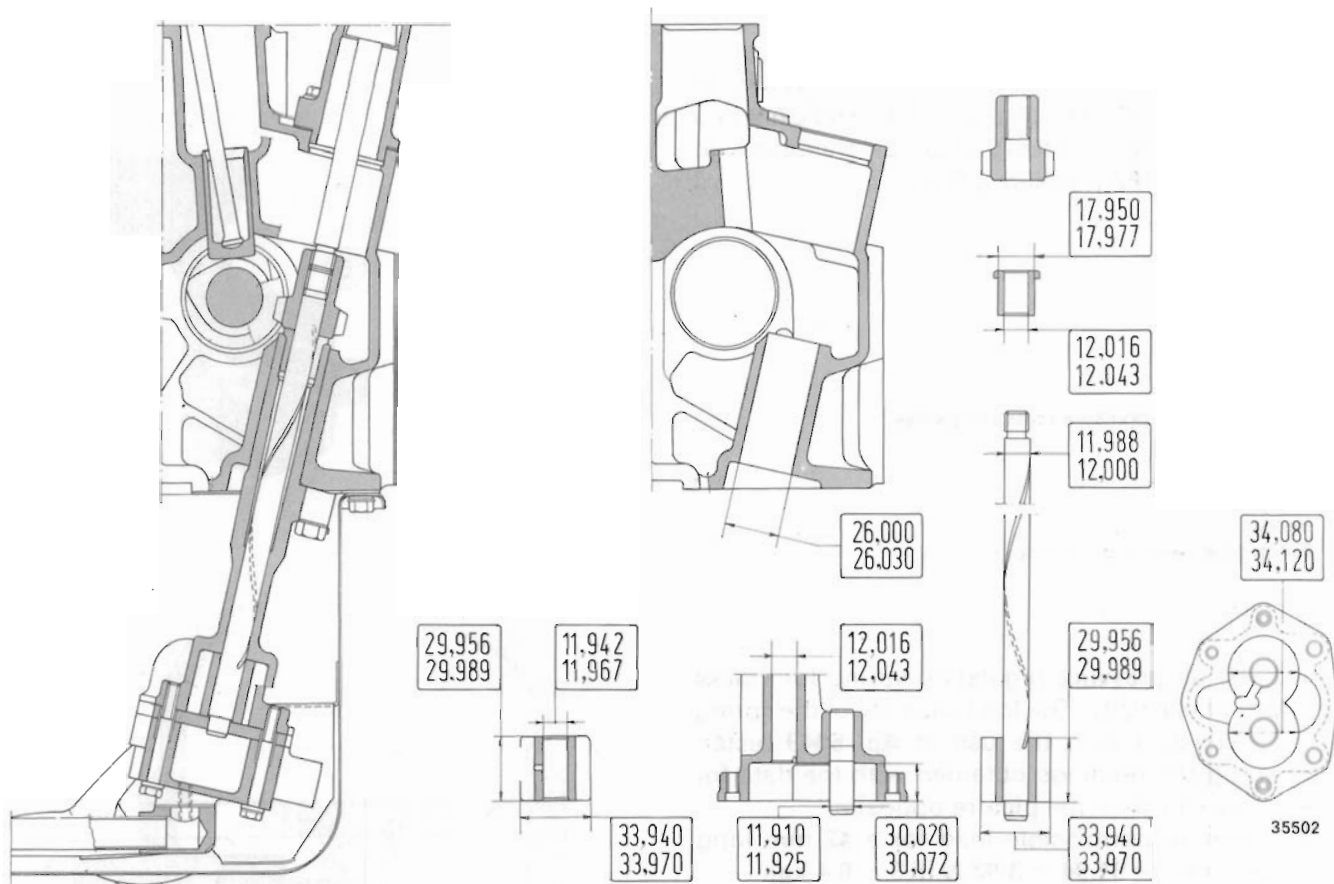
Clearance between the gear tooth tips and the wall of pump housing, measured as shown in the picture, should be **0.110 – 0.180 mm**. If the value of clearance is outside the above range, the pump gears must be replaced and, if necessary, the pump housing as well.

Checking the clearance between gear tooth tips and wall of pump housing.

1. Oil pump housing.
2. Driven gear.
3. **A.95113** feeler gauge.
4. Driving gear.



33770



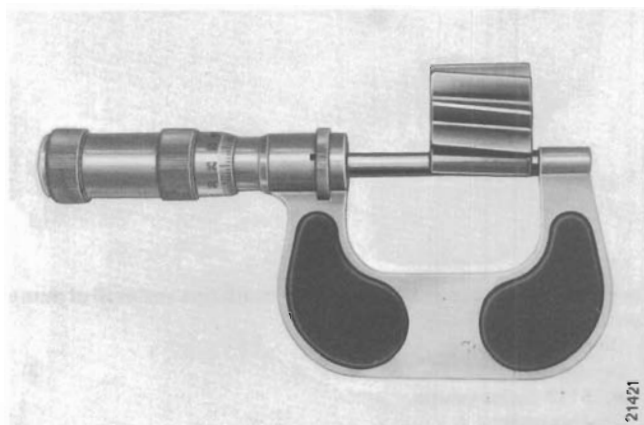
Part section of engine through oil pump and basic dimensions for checking the clearances of oil pump components and gearing.

Checking the oil pump gears and bushing

To make sure that wear affected components are the gears and not the pump casing measure with a micrometer gauge the height of the driving and driven gears, bearing in mind that this height for new gears is **39.956–39.989 mm**. Also check the condition of gears; if these are damaged or excessively worn, replace them.

The backlash of assembled gears should be **0.15 mm**.

After reassembly of oil pump, turn the drive shaft by hand to check that the gears rotate without undue resistance or jamming (maximum torque 0.01 kgm).



Measuring the height of oil pump driven gear.

Lubrication system

Polonez Model 1300/1500

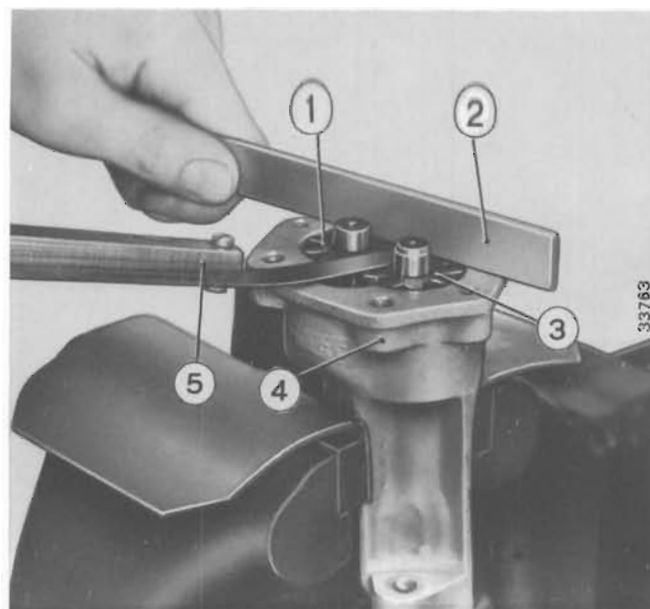
103.01

Sheet 2

Clearance between the face of gears and the pump casing face should be **0.031–0.116 mm**. If the clearance is found to be different, replace the gears of the pump casing.

Checking the clearance between face of gears and oil pump casing face.

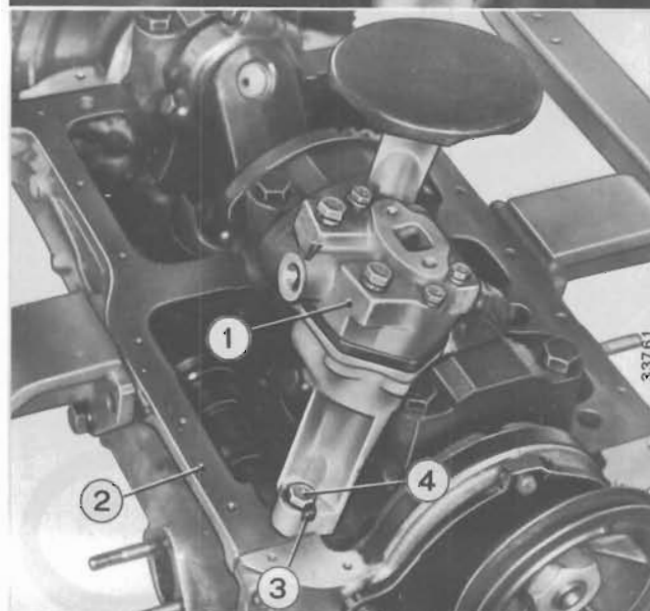
1. Driven gear.
2. Straight edge.
3. Driving gear.
4. Oil pump casing.
5. A.95113 feeler gauge.



33763

Oil pump installation

Mount the pump, along with its suction strainer and tube feeding oil to the engine, onto the cylinder block and fasten it to the block using a bolt with a tab washer.

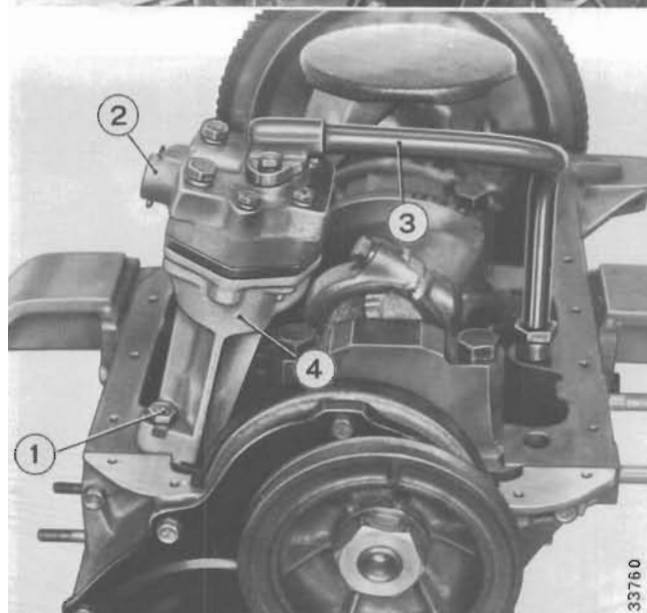


33761

Oil pump installation on cylinder block.

1. Oil pump.
2. Cylinder block.
3. Tab washer for oil pump to cylinder block clamping bolt.
4. Oil pump to cylinder block clamping bolt.

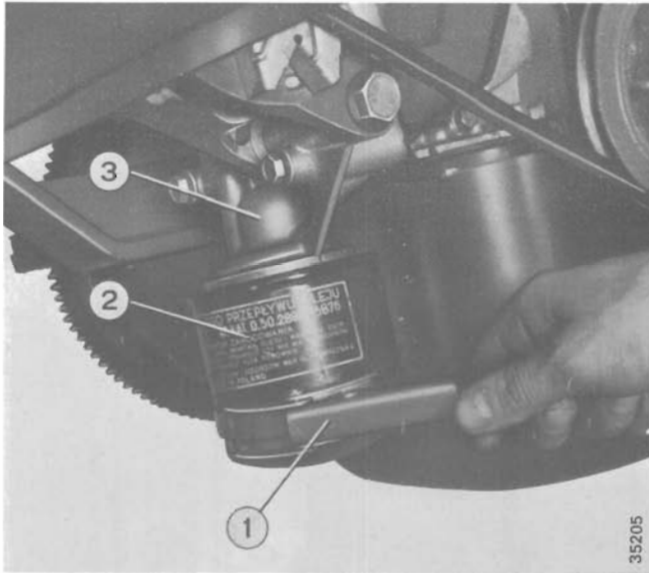
Connect the oil supply tube to cylinder block using a special coupling of the tube.



33760

Pump assembly mounted on cylinder block.

1. Oil pump to cylinder block clamping bolt.
2. Oil pressure regulating valve.
3. Oil supply tube from pump to oil filter.
4. Oil pump.



OIL FILTER

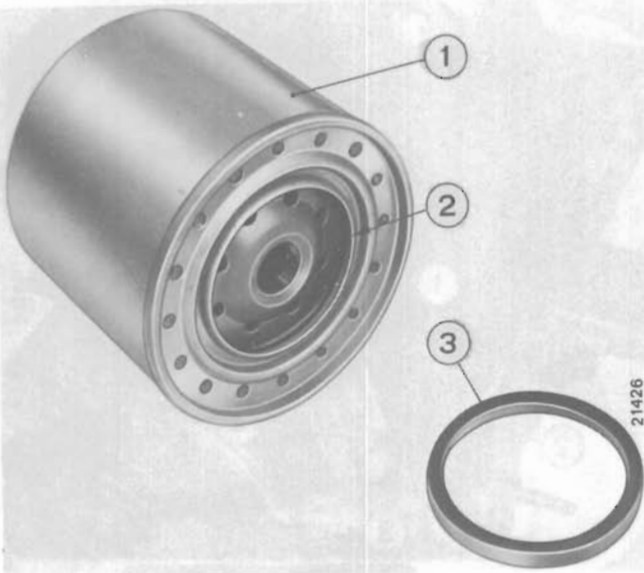
Oil filter replacement

Particular attention should be paid to efficient operation of the oil filter in view of the importance of appropriate and rational lubrication of the engine and due to the in-line arrangement of the filter within the lubrication system.

For filter dismounting use **A.60300** handle.

Oil filter dismounting.

1. **A.60300** handle.
2. Oil filter.
3. Alternator and filter bracket.



Prior to installing a new filter, the gasket should be covered with oil and the filter **screwed by hand** onto a corresponding bracket nipple. After the gasket comes into contact with the bracket, the filter should be screwed home by a further **3/4 of a turn** to secure it properly in position and thus to prevent oil leaks.

NOTE: The oil filter must be replaced at every oil change. If the vehicle is operated under rugged conditions, in very dusty areas or predominantly in city traffic, the filter must be replaced every 5,000 km.

Full-flow oil filter with gasket.

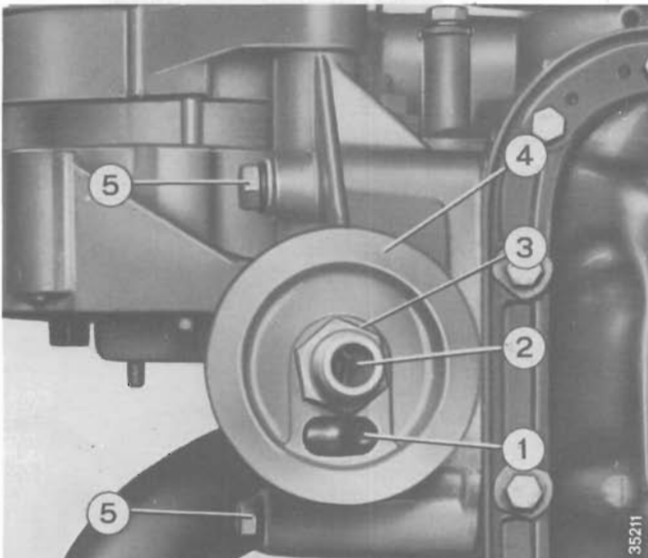
1. Oil filter.
2. Gasket seat.
3. Gasket.

Inside the filter there is a valve for by-passing the filter cartridge in case of its clogging.

NOTE: Every 10 000 km the oil in the sump must be changed with the engine hot.

Oil filter bracket.

1. Oil feed passage from oil pump.
2. Oil feed passage from filter to individual engine components.
3. Filter coupling.
4. Alternator and filter bracket.
5. Bracket to cylinder block clamping bolts.



Radiator

Polonez Model 1300/1500

104.01

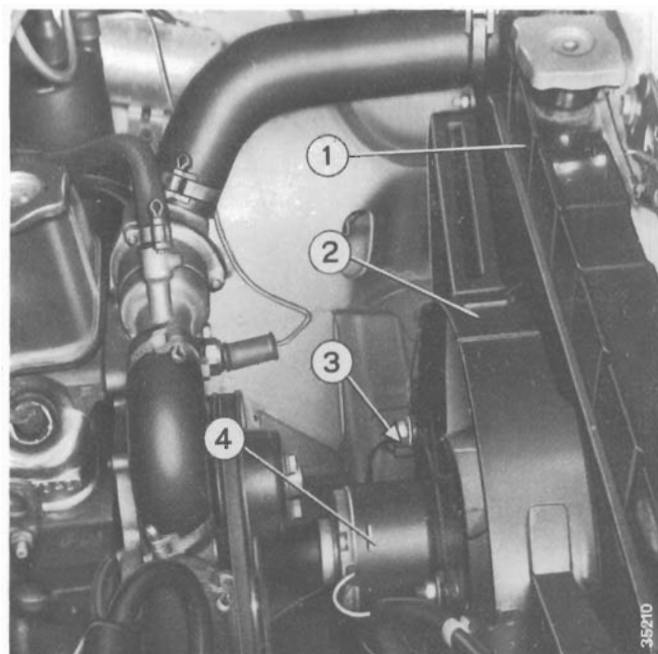
Sheet 1

RADIATOR

The radiator-mounted switch for cutting in and out the fan motor starts to operate when the cooling fluid temperature rises to 90°–94°C, and opens when this temperature drops to 85–89°C.

Location of radiator and fan in the vehicle.

1. Radiator.
2. Cooling air intake.
3. Thermal switch.
4. Radiator fan electric motor.

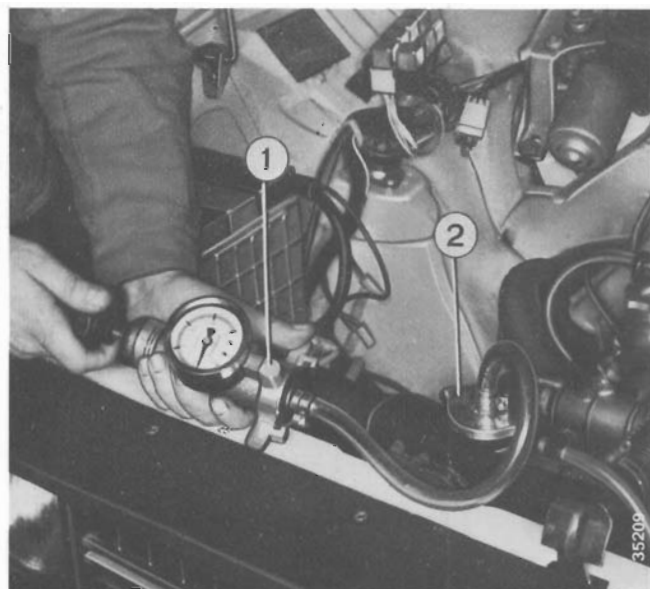


Checking the tightness of radiator and radiator cap drain valve

Fill the cooling system with water, mount the **A.95362** tester in position and open the supply of compressed air until the pressure rises to 0.98 bar (1 kg/sq.cm); check that there is no leakage from radiator and its connectors; in case of leaks the radiator should be dismantled and the leaky places made tight or the defective connectors replaced.

Cooling system pressure test with the use of A.95362 tester.

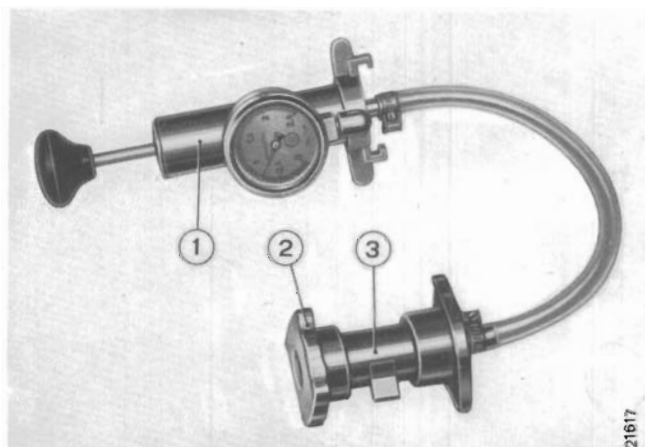
1. **A.95362** tester.
2. Radiator inlet.



To check the setting of the radiator cap drain valve spring, place the cap (2) in coupling (3) and connect the latter to **A.95362** tester. Apply pressure by means of pump and check that this pressure amounts to **0.784 bar (0.8 ± 0.1 kg/sq.cm)**. If pressure reading differs from the above value, replace the complete cap.

Checking the setting of radiator cap drain valve spring.

1. **A.95362** tester.
2. Radiator cap.
3. **A.95362** tester coupling.





Cooling fluid pump with tubing

Polonez Model 1300/1500

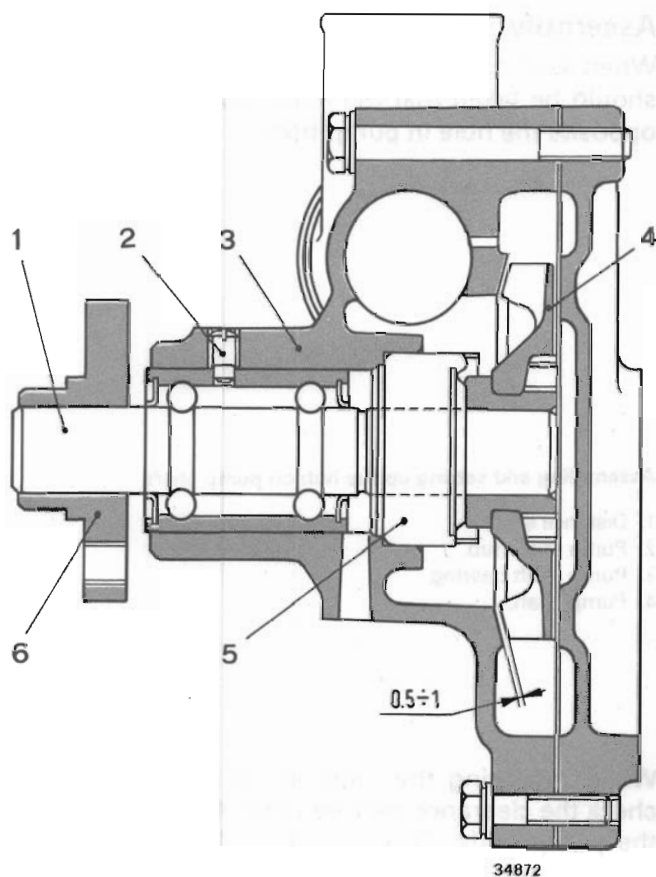
104.02

Sheet 1

COOLING FLUID PUMP DISMOUNTING AND CHECKING THE PUMP

The engine cooling system includes a centrifugal pump with a vane-type impeller. The pump bearing is integral with the impeller shaft and shielded at the ends.

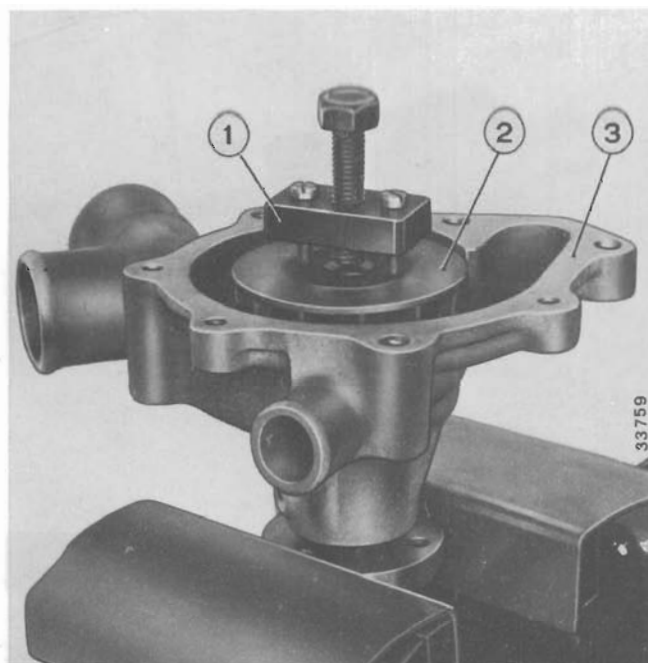
The impeller is extracted with the use of **A.40055** puller. Screw the two bolts of the puller into threaded holes in the pump impeller, and then turn the screw until the impeller is extracted from the pump.



Longitudinal section of cooling fluid pump.

1. Pump impeller shaft with bearing.
 2. Bearing to pump body fixing screw.
 3. Pump body.
 4. Pump impeller.
 5. Lip seal.
 6. Pump impeller shaft hub.
- 0.5–1 mm** = assembling clearance between impeller and pump body.

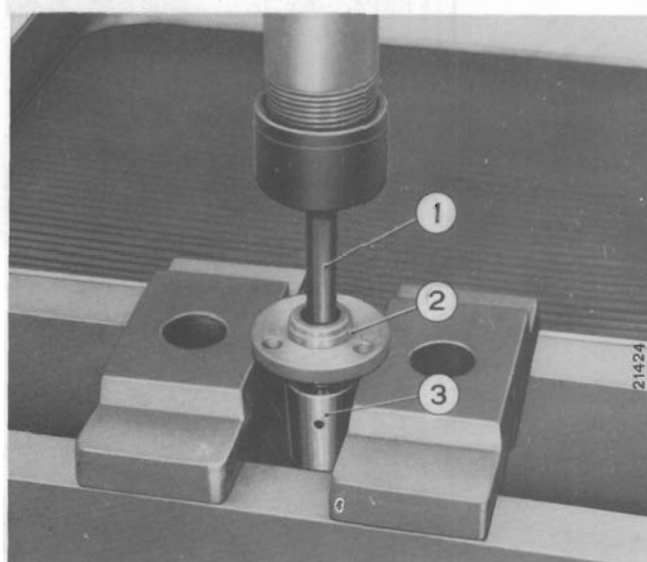
Prior to extracting the impeller shaft with its bearing from the pump body, unscrew the bearing fixing screw. The pump bearing is sealed for life and does not require lubrication during operation.



Extraction of cooling fluid pump impeller.

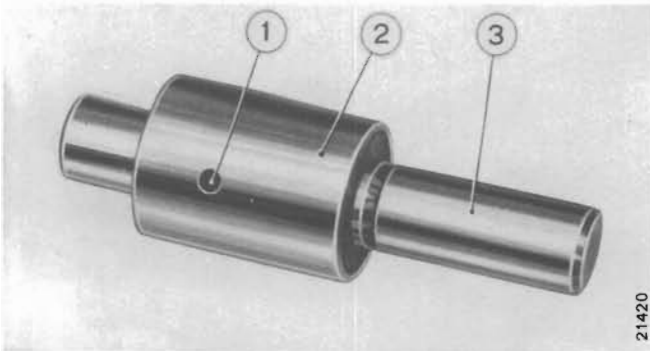
1. **A.40055** puller.
2. Pump impeller.
3. Pump body.

Check the impeller shaft bearing for excessive play, particularly if the pump operates with too much noise: in such a case the complete shaft and bearing assembly must be replaced.



Extracting the impeller shaft from hub.

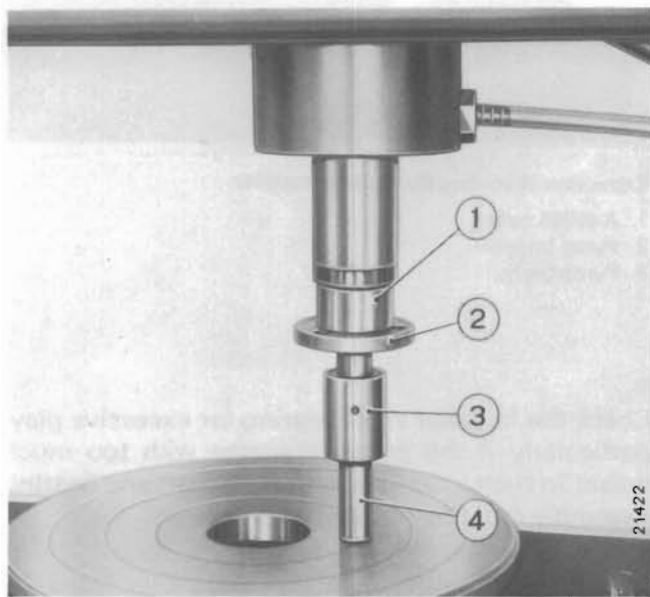
1. Mandrel of hydraulic press.
2. Pump impeller shaft hub.
3. Pump impeller shaft bearing.



NOTE: The seal in pump body must be replaced by a new one every time the shaft is removed.

Pump shaft complete with bearing.

1. Seat for bearing to pump body fixing.
2. Bearing.
3. Pump shaft.

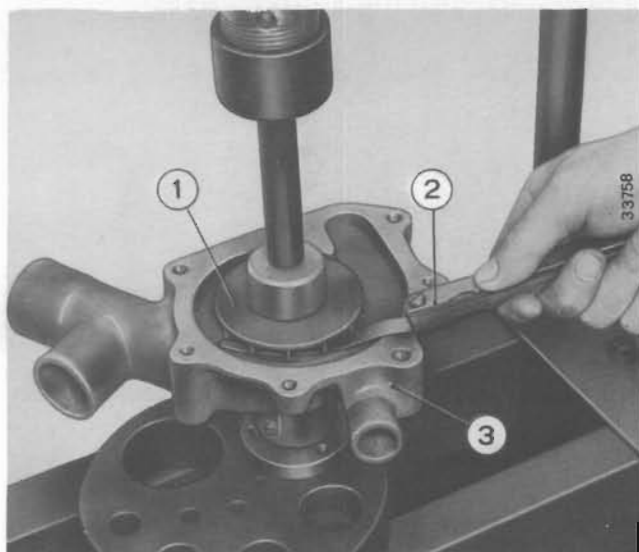


Assembly

When assembling the pump shaft with bearing, care should be taken that the fixing bolt seat is located opposite the hole in pump body.

Assembling and setting up the hub on pump shaft.

1. Distance sleeve.
2. Pump shaft hub.
3. Pump shaft bearing.
4. Pump shaft.



While mounting the impeller on the pump shaft, check the clearance between the impeller vanes and the pump body. This is done with use of **A.95113** feeler gauge as shown in the picture opposite. This clearance should be **1 mm**.

Mounting the impeller on pump shaft and checking the clearance between impeller vanes and pump body.

1. Pump impeller
2. **A.95113** feeler gauge.
3. Pump body.

Cooling fluid pump with tubing

Polonez Model 1300/1500

104.02

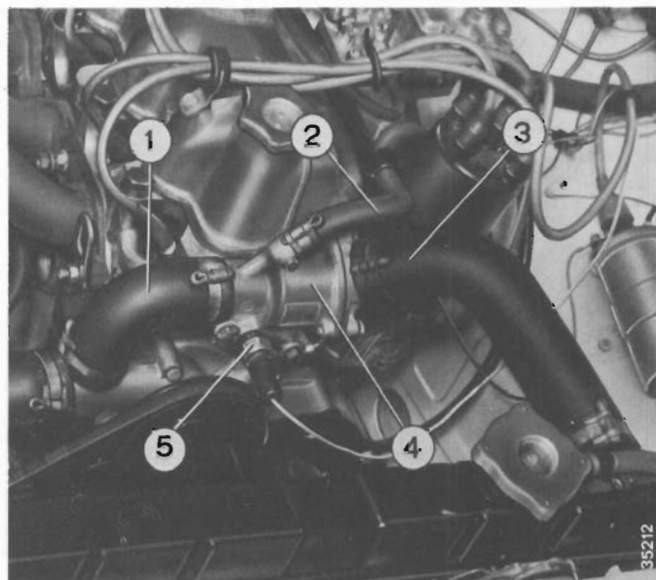
Sheet 2

COOLING FLUID THERMOSTAT

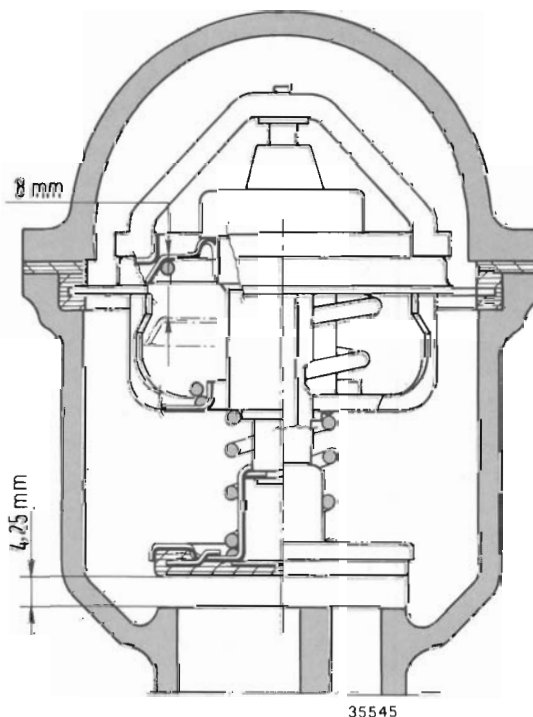
To ensure correct operation of the engine, the thermostat must switch on at the required temperature. However, if its valve opens at a temperature lower than the prescribed one the engine cannot reach its appropriate working temperature; if the valve opens at a temperature higher than the prescribed one, the

Thermostat location in the engine.

1. Tube feeding cooling fluid from thermostat to pump.
2. Tube for fluid return from heater.
3. Tube feeding cooling fluid to radiator.
4. Thermostat housing.
5. Fluid temperature sensor.



engine cooling will be inefficient, which may cause dangerous overheating of its components. The thermostat starts to open at a temperature of $82^{\circ} \pm 2^{\circ}\text{C}$. Full opening is reached at a temperature of 96°C .



Schematic drawing of cooling fluid thermostat.

8 mm = top valve stroke.

4.25 mm = bottom valve stroke.

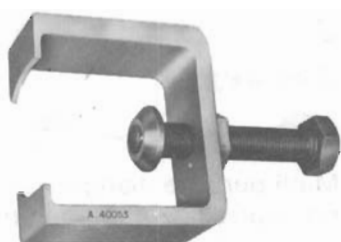


Special tools

Polonez Model 1300/1500

10A

Sheet 1



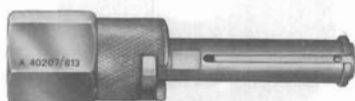
A.40053 Puller for stripping the timing gear drive pulley from crankshaft.



A.40055 Puller for removal of cooling fluid pump impeller.



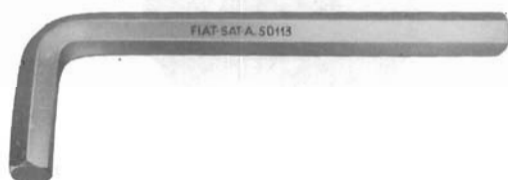
A.40206/801 Inertia puller - to be used with A.40207/813.



A.40207/813 Device for stripping the clutch shaft support bearing.



A.50006 Socket spanner for valve clearance adjusting screws.



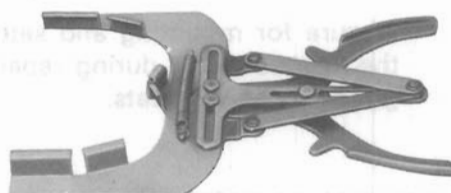
A.50113 Hexagon spanner for engine oil drain plug.



A.50121 Box spanner for pulley to crankshaft clamping nut.



A.60054 Mandrel for insertion and extraction of connecting-rod small-end bushing.



A.60182 Pliers for fitting and removal of piston rings



A.60251 Mandrel for fitting and removal of gudgeon pins.



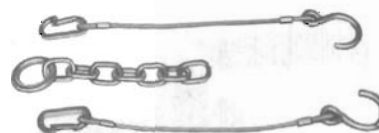
A.60300 Handle for installation and removal of oil filter.



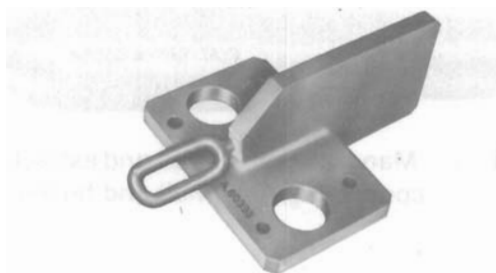
A.60303 Device for inserting gudgeon pin retaining clips.



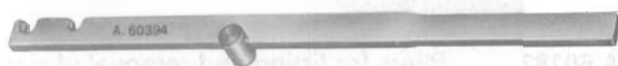
A.60313 Device for fitting valve guide seals.



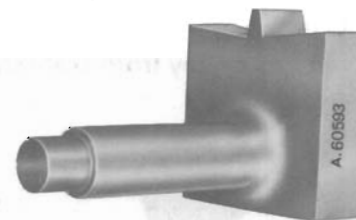
A.60592 Multi-purpose hanger for dismantling, replacing, lifting and transporting the engine.



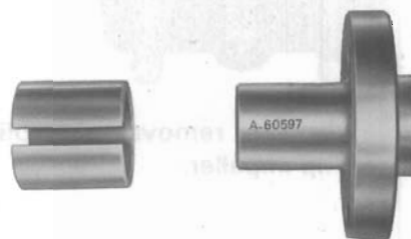
A.60393 Fixture for mounting and setting up the cylinder head during repairs and grinding of valve seats.



A.60394 Fixture for mounting the **A.95868** tester at valve tightness checks (to be used with **A.60393**).



A.60593 Block for immobilizing the flywheel while mounting it on the crankshaft.



A.60597 Flange and bush for mounting the crankshaft in the grinding machine.



A.60459 Fixture for checking the timing set-up.



A.60598 Ring for fitting and removal of camshaft bearings (to be used with **A.74365**)



A.60500 Block for immobilizing the camshaft pulley while unscrewing the clamping screw.



A.60599 Ring for fitting and removal of rear camshaft bearing (to be used with **A.74365**).

Special tools

Polonez Model 1300/1500

10 A

Sheet 2



A.60600 Flange for mounting the lip seal in crankshaft rear cover (to be used with **A.70007**).



A.60610 Bushing for setting-up the hub of cooling fluid pump drive pulley.



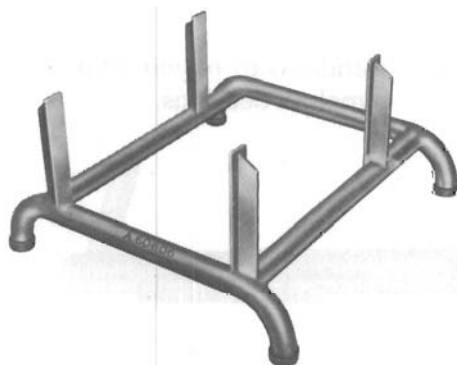
A.60605 Spring band for inserting nominal size and oversize pistons in cylinder bores.



A.60611 Handle for installation and removal of valves.



A.60612 Cylinder head support stand for valve installation and removal.



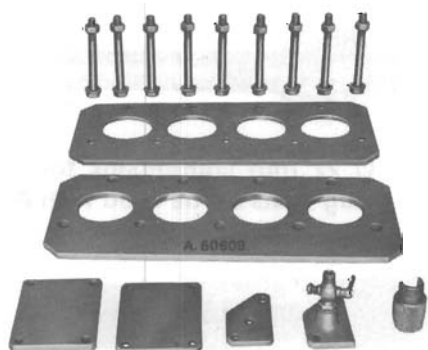
A.60606 Support stand for dismantled engine.



A.60613 Mandrel for extraction of valve guides.



A.60614 Mandrel for installation of valve guides.



A.60609 Fittings for cylinder head tightness test (to be used with **Ap.5048**).



A.61001/21 Lugs for mounting the engine on rotary stand.



A.70007 Handle for endpieces of assembly devices.



A.74365 Handle for endpieces of assembly devices.



A.76036 Cable with terminals for starter motor connection during valve adjustment.



A.86012 Ø 12 mm mandrel for inserting plugs in valve rocker pivot shafts.



A.86022 Ø 22 mm mandrel for inserting crankshaft plugs.



A.86032 Ø 32 mm mandrel for inserting cylinder block plugs.



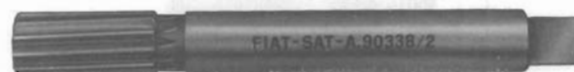
A.86036 Ø 36 mm mandrel for inserting cylinder block plugs.



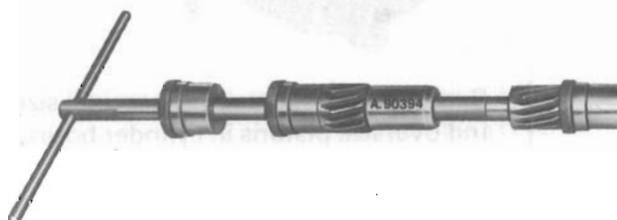
A.90308 Expanding reamer (Ø 22 mm) for connecting-rod small-end bush.



A.90310 Ø 8 mm reamer for valve guide bores.



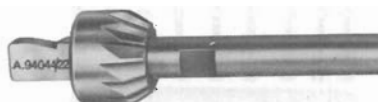
A.90338/1/2 Ø 14 mm reamers for valve guide over-size bores.



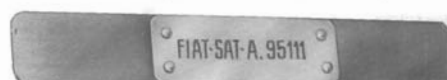
A.90394 Handle with reamers for reaming the camshaft bearings.



A.94016 Handle for plug seat countersink.



A.94044/22 Ø 22 mm countersink for crankshaft plug seats (to be used with A. 94016).



A.95111 0.15 – 0.25 mm feeler gauge for checking valve clearances.

Special tools

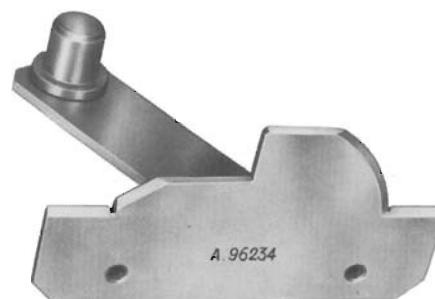
Polonez Model 1300/1500

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Sheet 3



A.95641 Ø 77 mm ring gauge for calibration of **A.95687** cylinder gauge to check cylinder bores of 1500 engine.



A.96234 Gauge for checking the combustion chamber depth after cylinder head planing.



A.95671 Ø 72 mm ring gauge for calibration of **A.95687** cylinder gauge to check cylinder bores of 1300 engine.



A.65501 Tray and graduated cylinder for checking the output of carburettor acceleration pump.



A.95868 Valve tightness tester.



Polonez 1300/1500

CATALOGUE
TABLE

CLUTCH – 18

18	Characteristics and technical data – Bolts and nuts tightening torques
181.01	Clutch controls
181.09	Clutch
18A	Special tools

Clutch

Polonez Model 1300/1500

18

Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Type : dry, single-plate, with diaphragm spring, mechanical actuation	
Friction lining outer dia.	200
Friction lining inner dia.	130
Clutch plate lining faces deviation from parallelism	0.2
Clutch pedal slack*	24 approx.
Diaphragm spring disengaging stroke **	8.5

* Corresponding to 2 mm distance between diaphragm spring and thrust bearing.

** Corresponding to minimum disengagement of pressure ring of 1.7 mm.

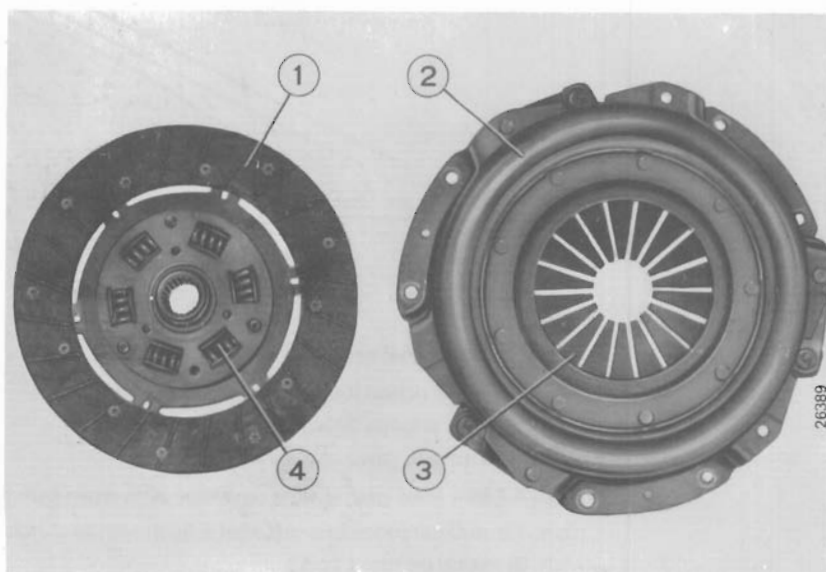
BOLTS AND NUTS TIGHTENING TORQUES

Component to be tightened	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
CLUTCH					
Clutch to flywheel fastening bolts	1/38258/21	M8	R80 Cdt	29	3
Nut of link between clutch pedal and clutch	1/61036/11	M12×1.25	R50 Znt (bolt R80 Znt)	29	2.5

Clutch complete with housing and clutch plate with friction linings.

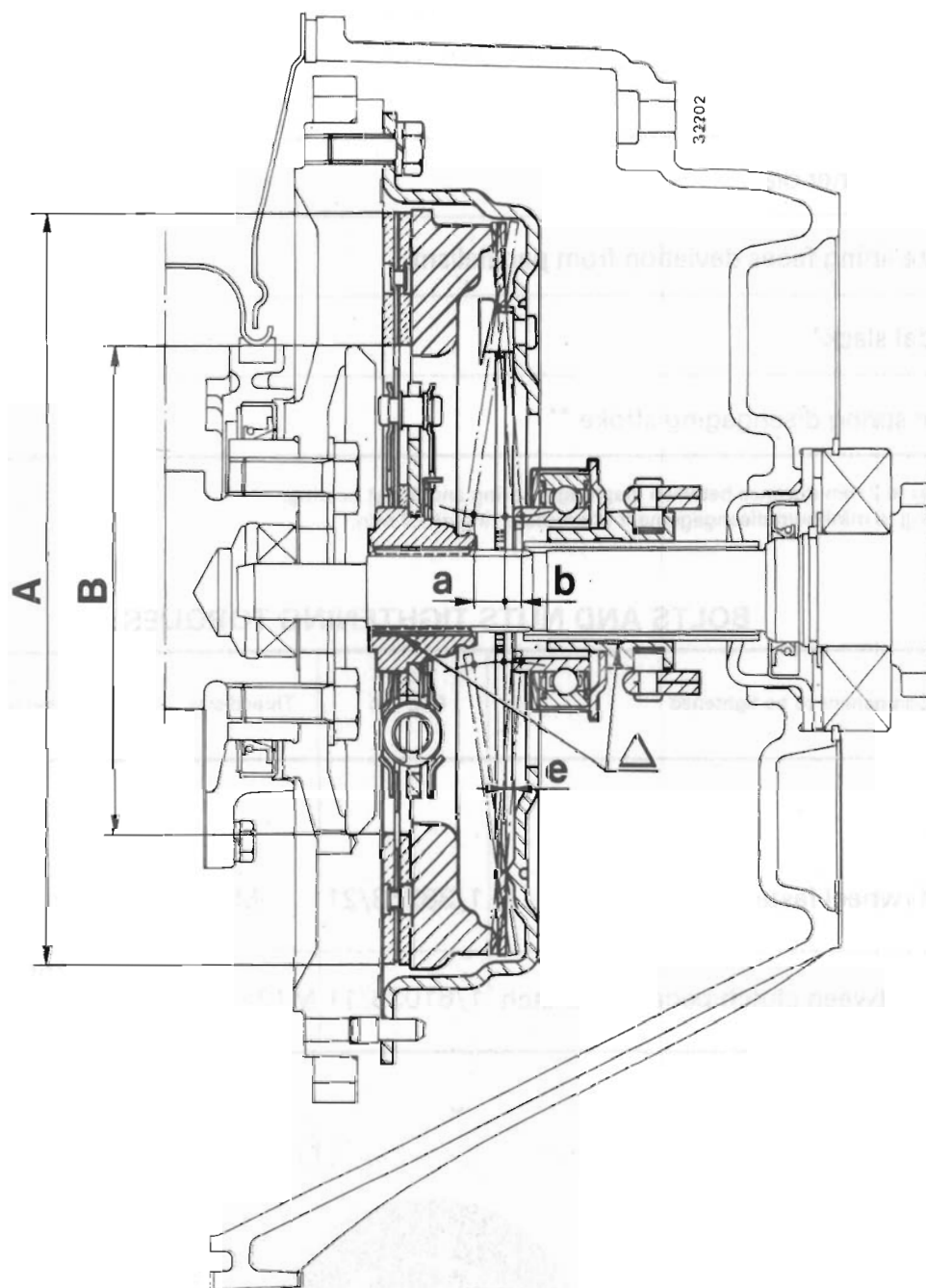
1. Clutch plate friction linings.
2. Clutch housing.
3. Diaphragm spring.
4. Torsion damper springs.

NOTE: The clutch plate should be installed so that the more protruding part of the hub is located on the side of the throw-out bearing.



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CLUTCH ASSEMBLY



Clutch longitudinal section.

A = 200 mm Friction lining outer dia.

B = 130 mm Friction lining inner dia.

a = 8.5 – 10 mm Disengaging stroke.

b = 4.7 mm Max. permissible deviation with worn clutch plate friction linings.

e = 2 mm Clearance obtained after adjustment of clutch pedal link.

△ = Greasing points: LT4-S3.

Clutch controls

Polonez Model 1300/1500

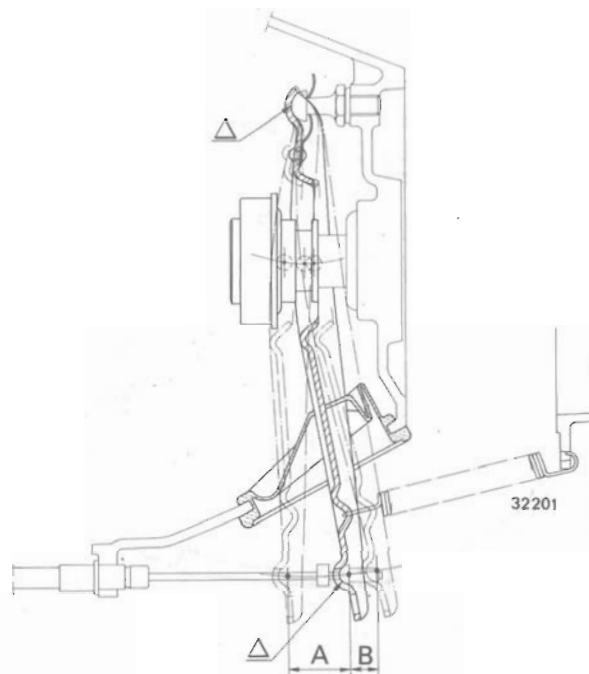
181.01

Sheet 1

Clutch pedal slack adjustment

Prior to adjusting clutch pedal slack, check that the pedal moves smoothly over its entire travel. The test is carried out with pedal return spring removed, since its action might hinder the checking. If the pedal feels hard, or if other irregularities are observed, dismount the pedals and check them as described in **Section 33**.

Check whether the clutch control cable moves freely in its sheath, if not – find the reason or replace the cable. The clutch pedal slack should be **24 mm** approximately. Otherwise unscrew locknut (2) using **A.56109** spanner and turn the adjusting nipple until appropriate slack is obtained.

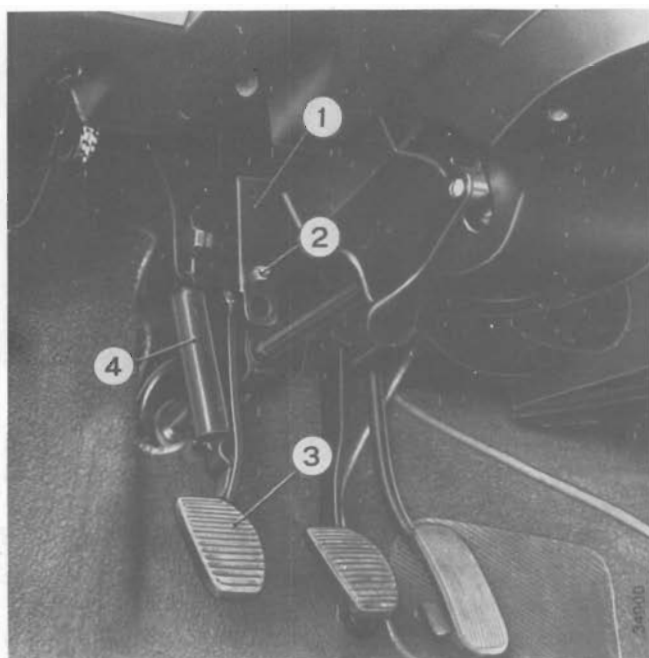


Longitudinal section of clutch control mechanism, through throw-out lever and bearing.

A = 32 mm Disengaging stroke corresponding to minimum withdrawal (1.7 mm) of clutch pressure ring.

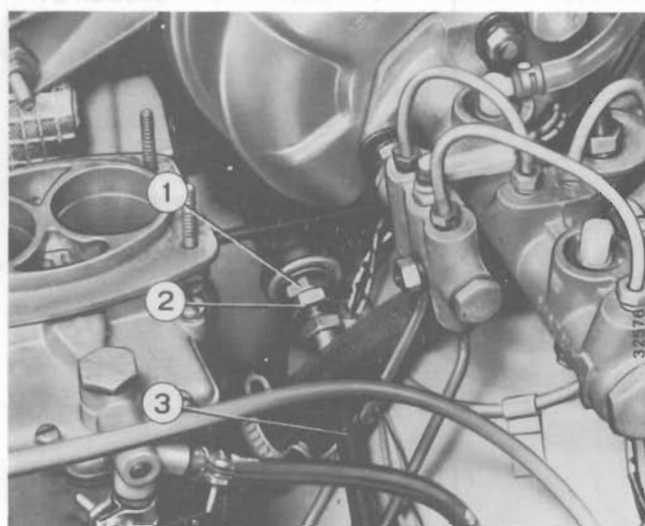
B = 14 mm Throw-out lever stroke corresponding to wear of friction linings.

Δ = Greasing points: LT4-S3.



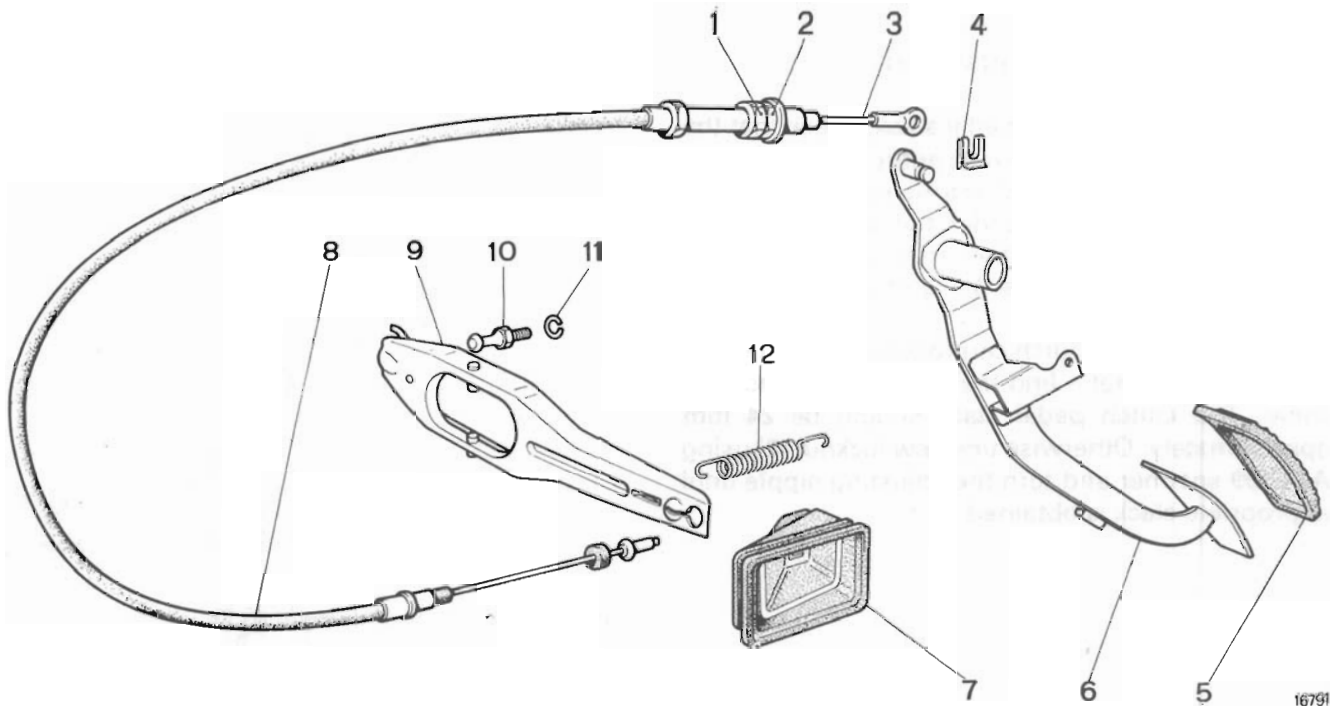
Clutch controls.

1. Pedal bracket.
2. Locknut of clutch pedal slack adjusting screw.
3. Clutch pedal.
4. Clutch pedal return spring.



Adjustment of clutch disengagement and pedal slack.

1. Cable adjusting nipple.
2. Adjusting nipple locknut.
3. Clutch control cable sheath.



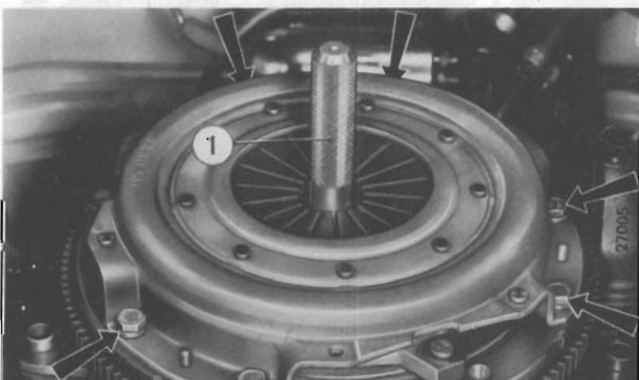
Components of clutch control mechanism.

- | | |
|---|---|
| 1. Locknut of clutch control cable sheath nipple. | 7. Dust shield. |
| 2. Clutch control cable adjusting nipple. | 8. Clutch control cable sheath. |
| 3. Clutch control cable. | 9. Clutch throw-out lever. |
| 4. Clutch control cable catch clip. | 10. Spherical support pin. |
| 5. Pedal rubber pad. | 11. Spring washer for pin (10). |
| 6. Clutch pedal. | 12. Clutch throw-out lever return spring. |

DISMOUNTING AND REASSEMBLY

Place the vehicle on a hoist and lift.

Dismount the gearbox as described in **Section 21**. Mark position of clutch housing in relation to flywheel (if it does not need replacement) to make possible its reassembly in identical position. Mount **A.60593** locking device to immobilize the flywheel.



Clutch plate alignment.

1. **A.70081** guide pin for clutch plate alignment. Arrows indicate clutch housing fastening bolts.

Unscrew clutch housing fastening bolts, loosening the opposite bolts by 1–2 turns until the diaphragm spring is released; this prevents spring deformation. For clutch reassembly, reverse the above described sequence of operations, taking care to:

- check the condition of clutch shaft bearing fitted into crankshaft. If noisy or difficult to rotate, it must be replaced (**see Section 10**);
- place the clutch plate in such a way that the more protruding part of the hub faces the gearbox;
- ensure proper alignment of the clutch plate (with the use of **A.70081** guide pin) in relation to flywheel prior to tightening clutch housing fastening bolts.

Tighten clutch housing to flywheel fastening bolts with the prescribed torque, in the sequence described for dismantling. If the clutch throw-out bearing is noisy, it must be replaced. This bearing requires no maintenance and must not be washed with petrol or other washing agent. If necessary, it may be wiped with a clean cloth.

Clutch

Polonez Model 1300/1500

181.09

Sheet 1

Check-up and adjustment data

After mounting the clutch housing on a base, used instead of the flywheel, with an 8.2 mm thick gasket, disengage the clutch four times applying a load C amounting to 1300 N (133 kg) to the diaphragm spring, in the direction shown by arrow F. Then check, whether – at a stroke D (8.5 – 10 mm) – the pressure ring moves through a distance of 1.7 mm and the dimension X is 33.2 – 35.1 mm.

Check diagram for clutch housing assembly.

1. Pressure ring.

2. Clutch housing.

3. Clutch diaphragm spring.

S = 8.2 mm Thickness of clutch assembly checking ring.

F = Direction of load C applying.

C = 1300 N (133 kg) – Load applied to thrust bush spring to check whether the disengaging stroke

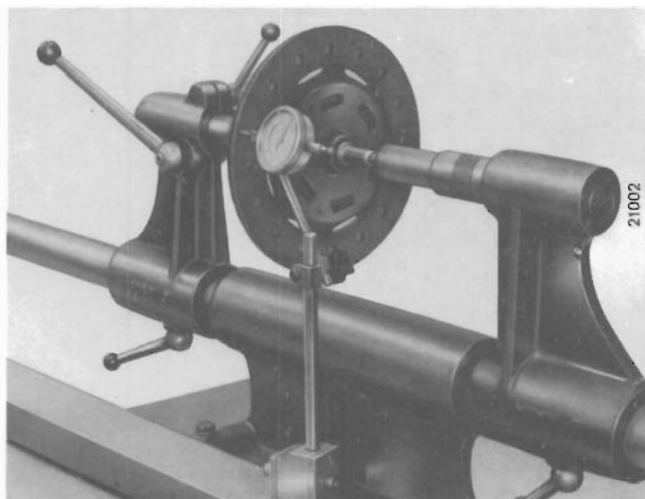
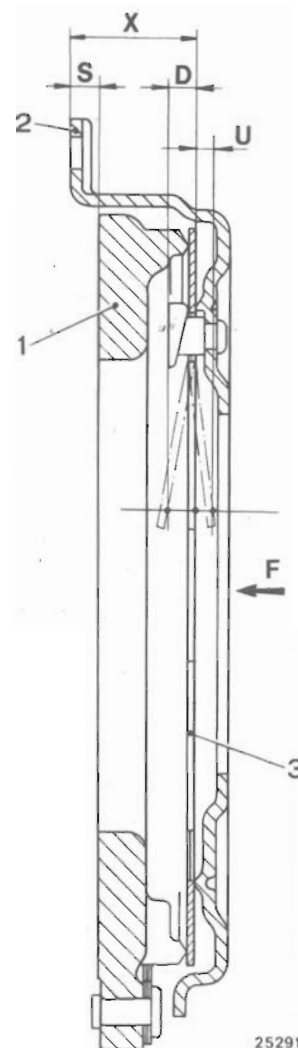
D produces the minimum withdrawal of pressure ring.

D = 8.5 – 10 mm Disengaging stroke.

X = 33.2 – 35.1 mm Dimension obtained during check-up on disengaging bush thrust diameter.

U = 4.7 mm Maximum permissible displacement due to wear of clutch plate friction linings.

NOTE: If the established dimensions are other than indicated, the complete clutch housing assembly must be replaced.



Checking run-out of clutch plate mounted in A.95361 fixture, with the use of A.95684 dial gauge on magnetic stand.

Check the axial run-out (0.20 mm) of the clutch plate by inserting a special shaft in its hub clamping the shaft and plate set between the centres of A.95684 fixture. Rotate slowly the clutch plate and check the run-out with the use of A.95684 dial gauge on magnetic stand.

18A

Special tools



A.56109 19 mm spanner for adjusting the clutch pedal slack.



A.70081 Guide pin for dismantling the clutch plate and its re-installation on the flywheel.



21	Characteristics and technical data –
	Bolts and nuts tightening torques
212.00	Gearbox
212.21	External gear change mechanism
21A	Special tools

Gearbox

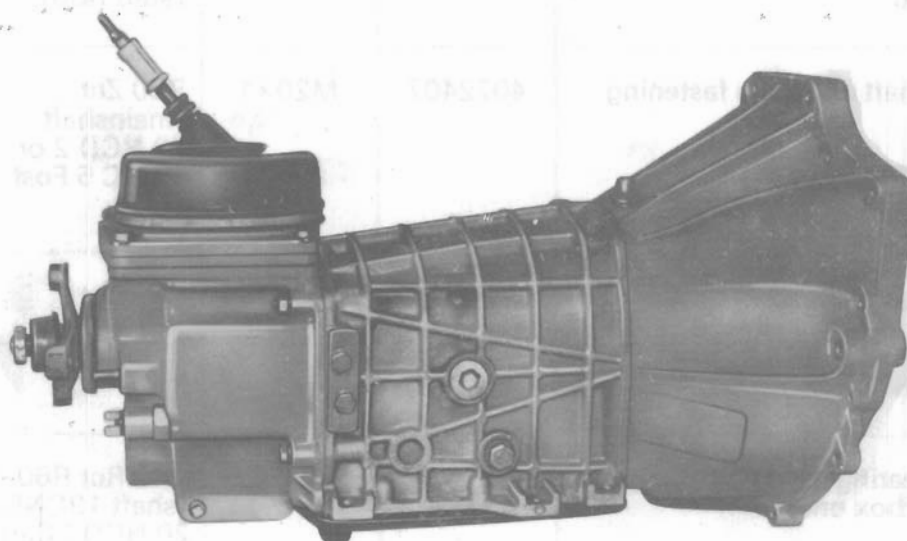
Polonez Model 1300/1500

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Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Gearbox type:	4-speed	5-speed
	4 forward speeds + reverse	5 forward speeds + reverse
Synchronisers type: lock ring with outer cone	1-2-3-4 speeds	1-2-3-4-5 speeds
Ratios: 1st gear 2nd gear 3rd gear 4th gear 5th gear reverse gear	 3.753 2.132 1.378 1 — 3.867	 3.753 2.132 1.378 1 0.881 3.867
Assembling clearance for gears	0.10 mm	
Permissible shaft misalignment	0.05 mm	
Clearance between reverse gear shaft and bushing	0.05—0.09 mm	



32577

Mechanical 5-speed gearbox

BOLTS AND NUTS TIGHTENING TORQUES

Component to be tightened	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
Reversing light switch (4-speed gearbox)	4132067 4356374 4365313	M14×1.5	Steel Cdt or Znt	43	4.4
Reversing light switch (5-speed gearbox)	4132067 4356374	M14×1.5	Steel Cdt or Znt	43	4.4
Lock cover bolt	4212140	M8	R80 Znt	20	2
Gearbox housing front cover to cylinder block fastening bolt	1/13077/21 1/14053/21	M12×1.25	R80 Znt	83	8.5
Nut for rear cover to gearbox housing fastening stud	1/61008/11	M8	R50 Znt (stud R80 Znt)	25	2.5
Rear cover to gearbox housing fastening bolt	1/38268/21	M8	8.8 Znt/EC* R80 Cdt	25 20	2.5 2
Front cover to gearbox housing fastening bolt	4332304	M10×1.25	R80 Znt	49	5
Nut for front cover to gearbox housing fastening stud	1/61008/11	M8	R50 Znt (stud R80)	25	2.5
Gearbox mainshaft endpiece fastening nut	4022407	M20×1	R50 Znt (mainshaft 20 NCD 2 or 19 NC 5 Fosf Lub)	78	8
Front shaft bearing fastening bolt	1/55404/21	M12×1.25	R80 Znt	93	9.5
Gear change fork fastening bolt	813149	M6	R100	18	1.8
Lyashaft rear bearing fastening nut (for 5-speed gearbox only)	4171631	M18×1.5	C40 Rct R60-70 (shaft 19CN5 or 20 NCD2 Carbn 5 Fosf Lub)	118	12

* Material marked in olive-green colour.

Gearbox

Polonez Model 1300/1500

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Sheet 1



View of engine compartment showing components to be dismantled.

1. Starter motor thermal shield.
2. Exhaust manifold.

3. Negative ground lead.
4. Air cleaner.

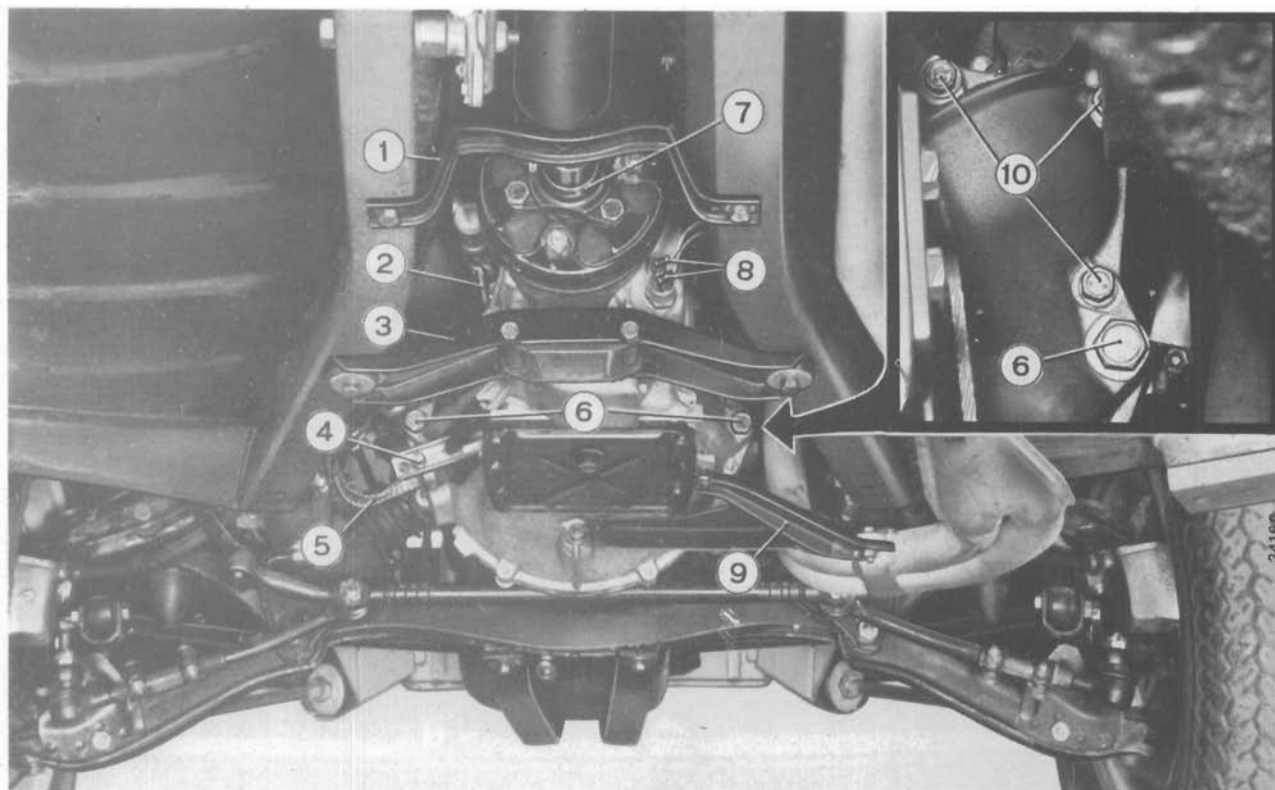
Gearbox dismantling

Place the vehicle on a lift, or – if no lift is available – on **Ar.22906** props, using the **Ap.6051** hydraulic jack. Disconnect the negative ground lead to avoid short circuits. Remove air cleaner from the carburettor. Disconnect front part of exhaust manifold. Remove starter motor thermal shield.

Inside the vehicle, remove the gear change lever boot and disconnect the gear change link from the lever: push the lever downwards and use a screwdriver to extract the circlip from its seat on the link.



Removing the gear change lever boot

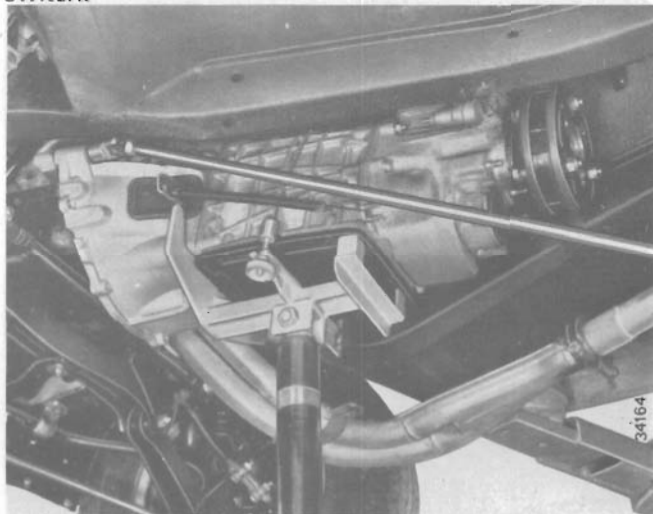


View of vehicle underside with components to be dismantled.

1. Propeller shaft securing bracket.
2. Distance recorder drive cable.
3. Gearbox supporting bracket.
4. Clutch control cable.
5. Ground lead.

6. Gearbox to cylinder block fastening bolts.
7. Propeller shaft sliding sleeve.
8. Reversing light cables.
9. Exhaust pipe supporting bracket.
10. Starter motor to clutch housing fastening bolts.

Disconnect clutch control cable from its fork. Remove flywheel housing from gearbox front cover and disconnect the ground lead. Disconnect speedometer drive cable from its bracket on the gearbox by unscrewing the knurled nut. Disconnect electric cables from reversing light switch.



Unscrewing front gearbox cover to cylinder block fastening bolts with the use of A.55035 spanner.

Disconnect front propeller shaft bearing from flexible joint after removal of the securing bracket.

Mount **A.70573** bracket on the gearbox and introduce **Ap.6053** hydraulic jack, securing the gearbox by cable with a suitable nut.

Disconnect from the chassis gearbox suspension crosspiece with rubber mount.

Dismount the starter motor.

Unscrew gearbox suspension crosspiece.

Disconnect the gearbox from cylinder block by unscrewing the fastening bolts with the use of **A.55035** spanner, and shift it towards vehicle rear so as to withdraw the clutch shaft from clutch assembly; lower the hydraulic jack and remove the gearbox.

NOTE: While disconnecting the gearbox from the engine, the clutch shaft must not bear against the plates of the clutch diaphragm spring to avoid damage to the plates.

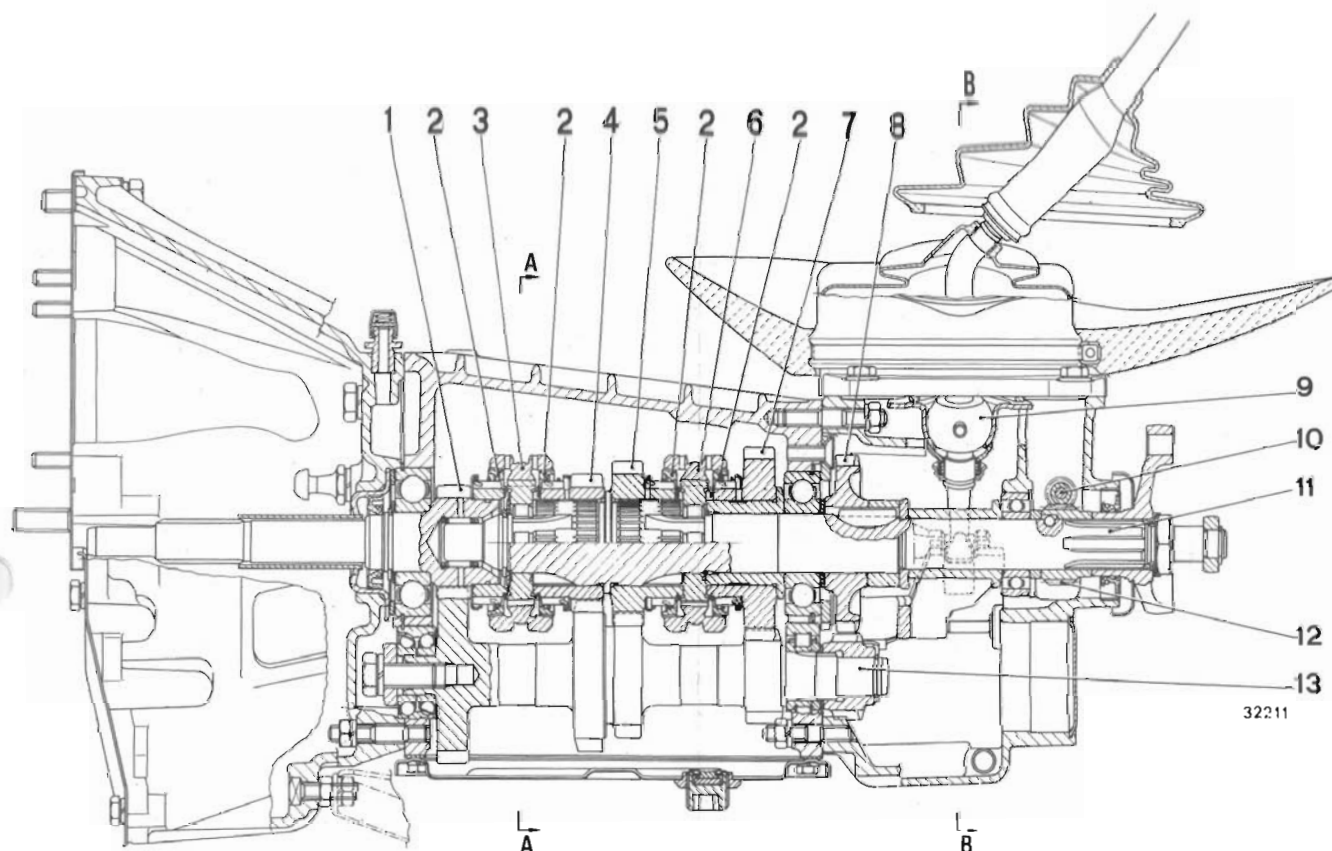
For reassembly of the gearbox perform the above described operations in reversed sequence.

Gerbox

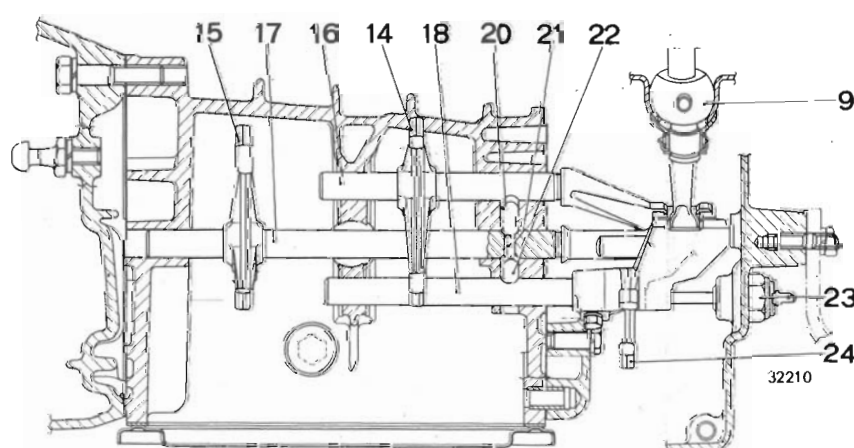
Polonez Model 1300/1500

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Sheet 2



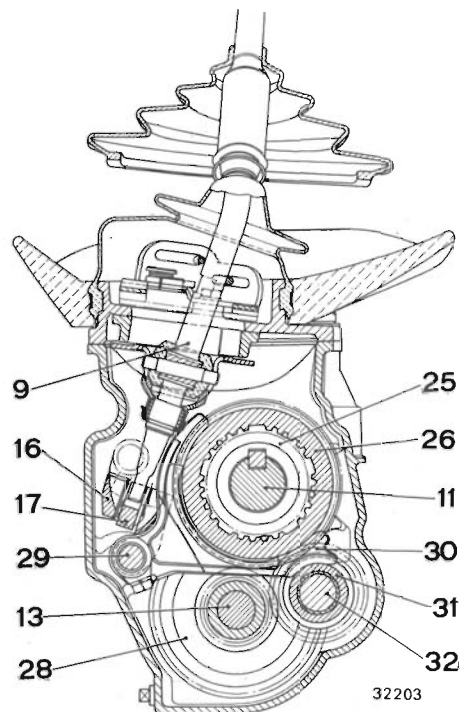
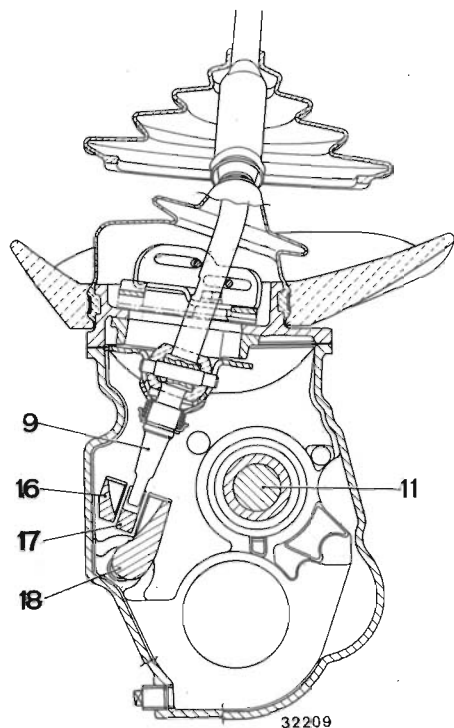
Longitudinal section of 4-speed gearbox.



Longitudinal section through gear change fork shafts and lock pins of 4-speed gearbox.

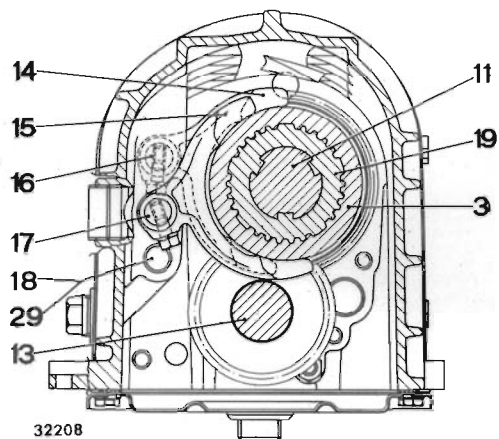
1. Clutch shaft.
2. Synchronising ring.
3. 3rd and 4th speed engaging sleeve
4. 3rd speed gear.
5. 2nd speed gear.
6. 1st and 2nd speed engaging sleeve.
7. 1st speed gear.
8. Reverse gear.
9. Gear change inner lever.
10. Speedometer drive shaft.
11. Mainshaft.

12. Drive shaft for gear 10.
13. Layshaft.
14. 1st and 2nd speed gear change fork.
15. 3rd and 4th speed gear change fork.
16. 1st and 2nd speed gear change fork shaft.
17. 3rd and 4th speed gear change fork shaft.
18. Reverse gear change fork shaft.
19. Hub of engaging sleeve 3.
20. 1st and 2nd speed lock pin.
21. 3rd and 4th speed lock pin.
22. Reverse lock pin.

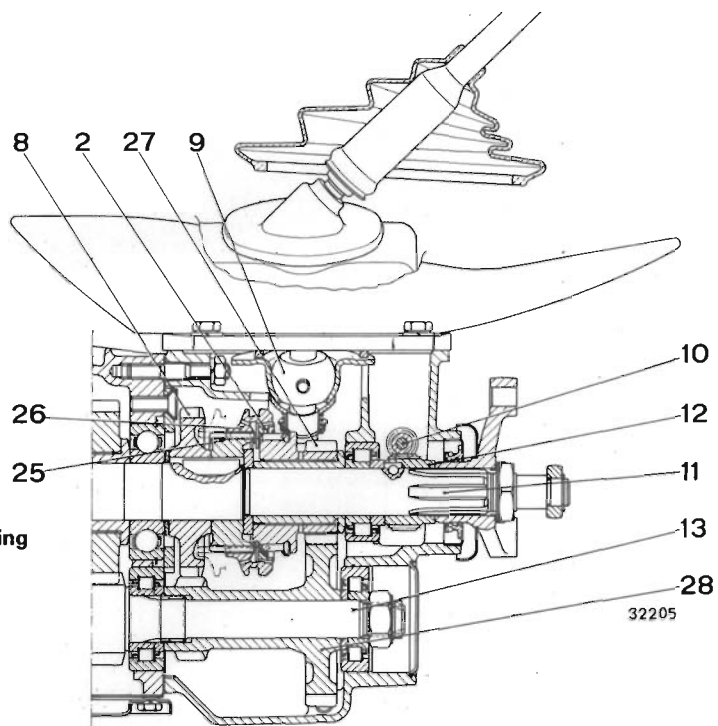


Section B-B. Cross-section through gear change lever of 4-speed gearbox.

Cross-section through gear change lever of 5-speed gearbox.



Section A-A. Cross-section through 3rd and 4th speed engaging sleeve in 4-speed and 5-speed gearboxes.



Longitudinal section through 5th speed gear components (5-speed gearbox).

- 23. Reversing light switch.
- 24. Reverse gear change fork.
- 25. Hub of engaging sleeve
- 26. 5th speed engaging sleeve.
- 27. 5th speed gear.
- 28. Reverse and 5th speed gear cluster.
- 29. Reverse and 5th speed gear change fork shaft.
- 30. Reverse and 5th speed gear change fork.
- 31. Reverse engaging sliding gear.
- 32. Shaft of gear 31.

Gearbox

Polonez Model 1300/1500

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Sheet 3

REPAIRS

The operations described below and shown in the pictures pertain to 5-speed gearbox, but they are applicable as well to 4-speed gearbox in view of its similar design.

Dismantling

Bolt **A.71001/19** gearbox maintenance bracket to the arm of **Ar.22201** rotary stand.

Mount and secure the gearbox on **A.71001/19** bracket, with bottom cover oriented upwards.

Drain oil by unscrewing the sealing and filling plugs with **A.50113** spanner, and the plug in the rear cover with **A.57051** spanner.

Dismantle the gearbox performing the operations described and illustrated below.

Dismount the declutching lever from clutch housing and remove the sleeve with throw-out bearing from gearbox front cover. Dismantle the clutch housing with gasket.

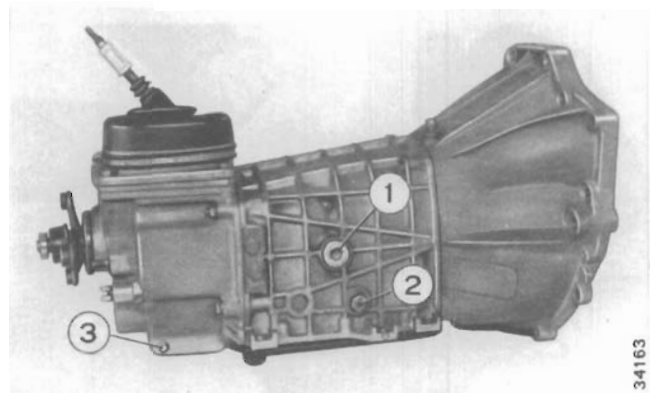
Gearbox mounted on rotary stand by means of **A.71001/19** bracket.

Unscrew the 3rd and 4th speed gear change fork fastening screw.

NOTE: After unscrewing the 3rd and 4th speed gear change fork fastening screw, the fork is free to move along its shaft, which makes it possible for two speed to be engaged simultaneously and the shafts locked, this being required for further dismantling procedure.

Unscrewing the 3rd and 4th speed gear change fork fastening screw.

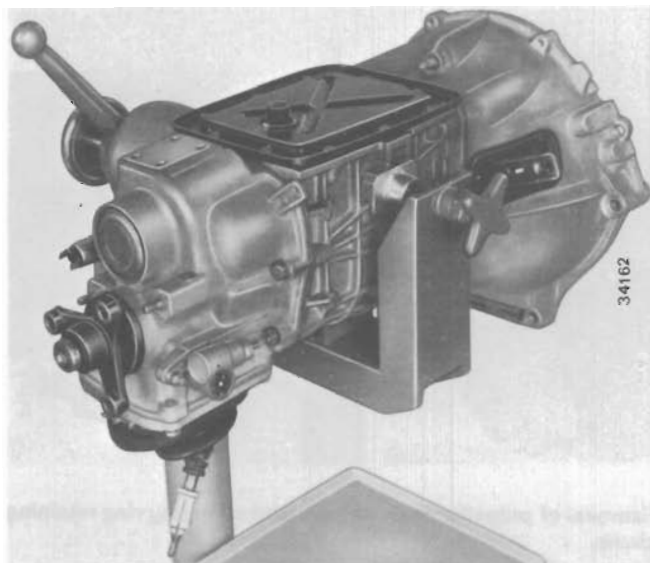
1. 3rd and 4th speed gear change fastening screw.
2. 3rd and 4th speed gear change fork.
3. 3rd and 4th speed gear change fork shaft.



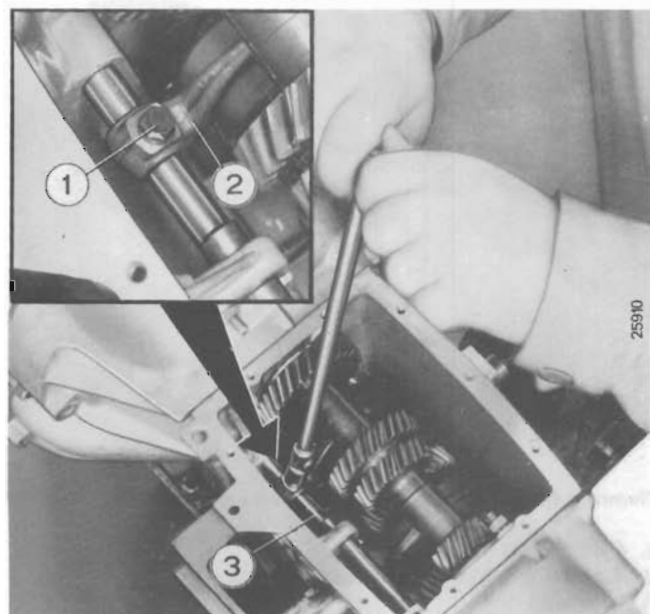
34163

Complete gearbox.

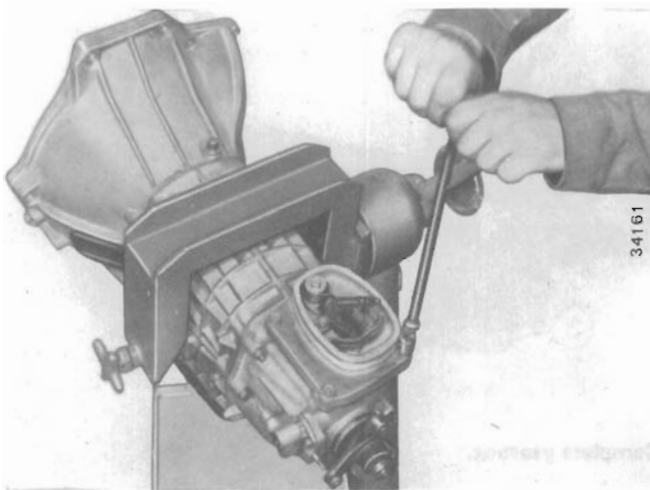
1. Sealing plug.
2. Filling and level checking plug
3. Drain plug in rear cover.



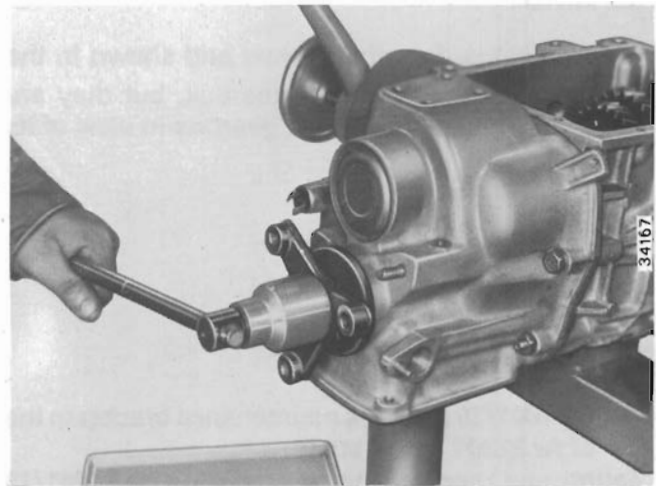
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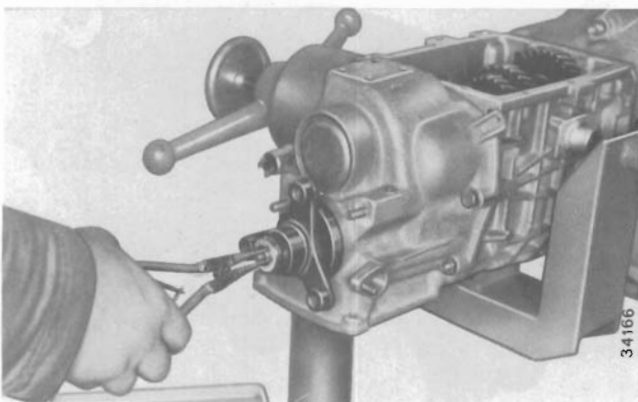
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Dismounting gear change lever bracket from gearbox rear cover.

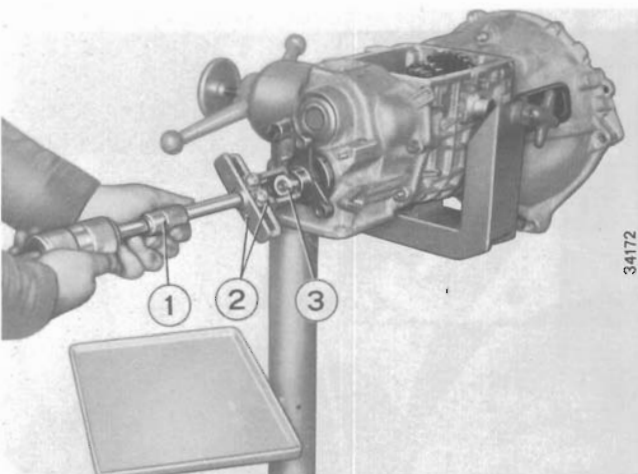


Unscrewing propeller shaft flexible joint end to mainshaft fastening nut with the use of A.55050 socket.



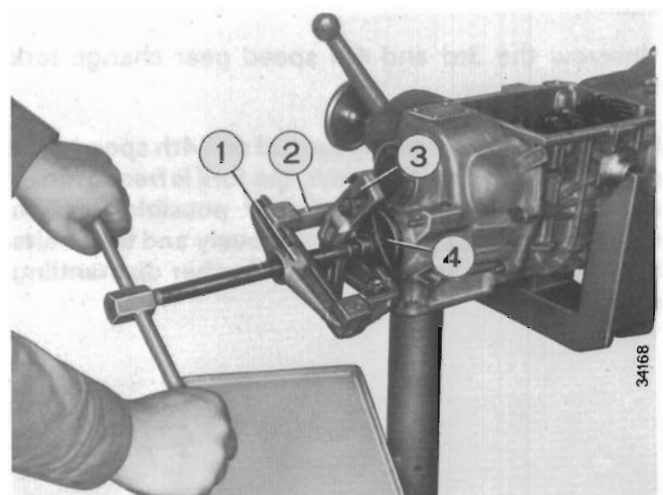
Removal of propeller shaft flexible joint centering ring retaining circlip.

Remove the gear change lever bracket. Use A.81101 pincers to remove propeller shaft flexible joint centering ring retaining circlip. by means of A.40206/801 inertia puller with A.40005/109/134 crosspiece and arms, remove propeller shaft flexible joint centering ring from gearbox mainshaft. Then unscrew the nut fastening propeller shaft flexible joint end to gearbox mainshaft by using A.55050 handle and socket spanner set. Use the general purpose A.40005/002 puller with A.40005/309/310 arms and grip to strip the flexible joint end from gearbox mainshaft.



Removal of propeller shaft flexible joint centering ring.

1. A.40206/801 inertia puller.
2. A.40005/109/136 puller crosspiece with arms.
3. Centering ring.



Stripping the flexible joint endpiece from gearbox mainshaft.

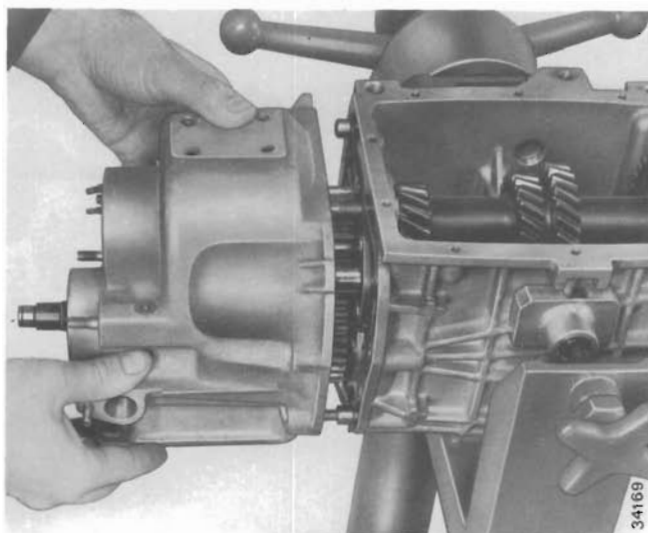
1. A.40005/002 puller crosspiece.
2. A.40005/309 puller arms.
3. A.40005/310 grip.
4. Flexible joint endpiece.

Gearbox

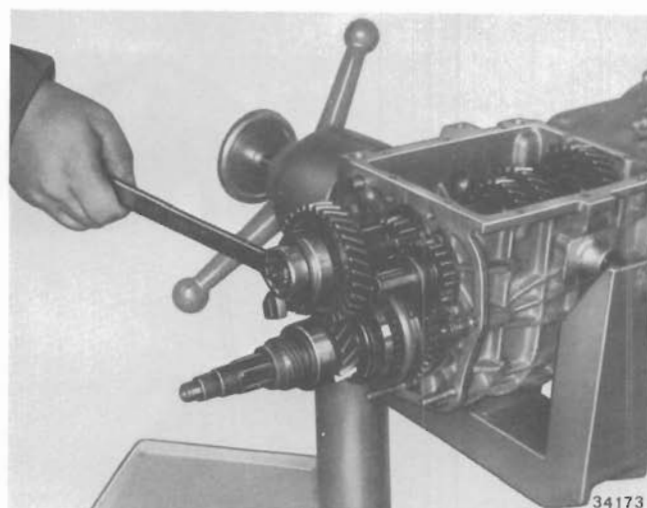
Polonez Model 1300/1500

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Sheet 4

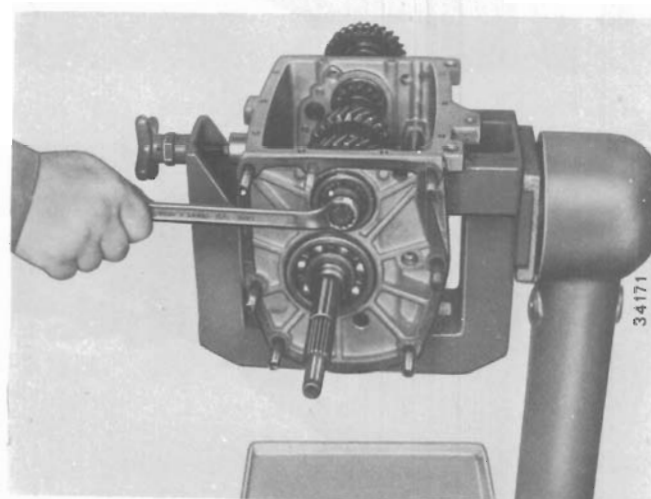


Dismounting the rear cover from gearbox housing.

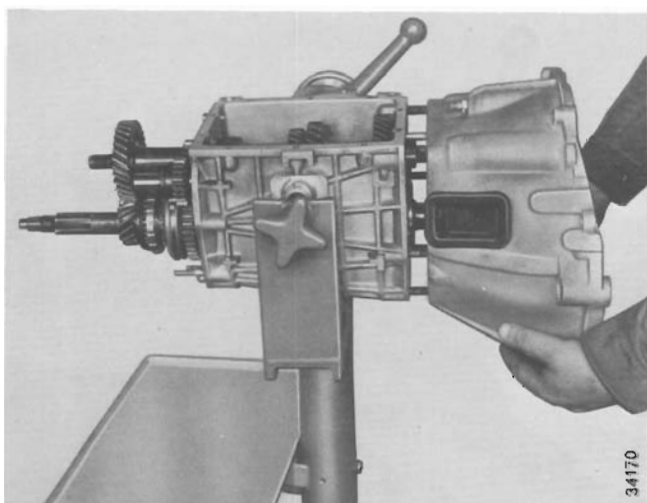


Unscrewing rear ball bearing and 5th and reverse gear cluster to layshaft fastening nut.

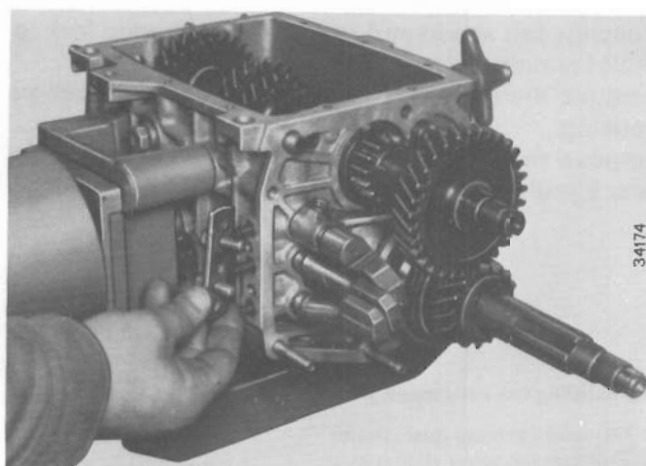
Remove speedometer drive gear from rear cover.
Remove clutch housing and rear cover.
Lock the shafts by engaging two speeds simultaneously.
Unscrew the ball bearing, 5th speed gear and reverse gear cluster to layshaft fastening nut.
Remove rear ball bearing from layshaft.
Remove speedometer drive gear and rear ball bearing from mainshaft.
Remove the cover of gear change fork shaft lock springs.



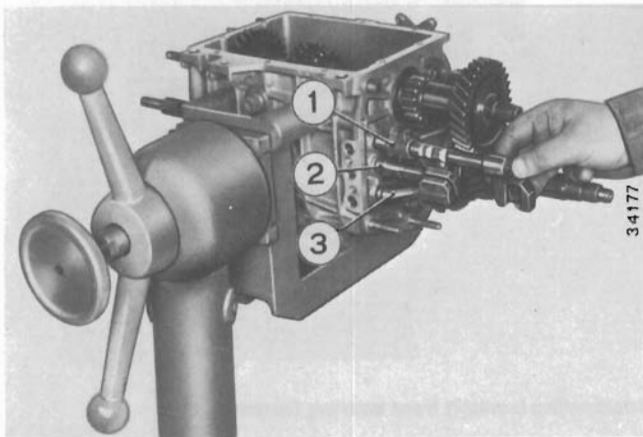
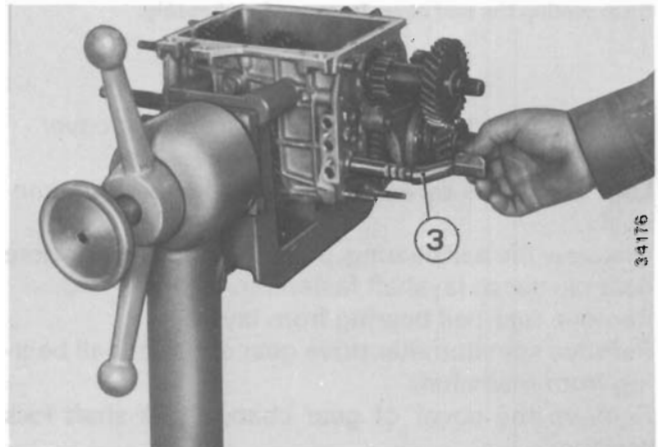
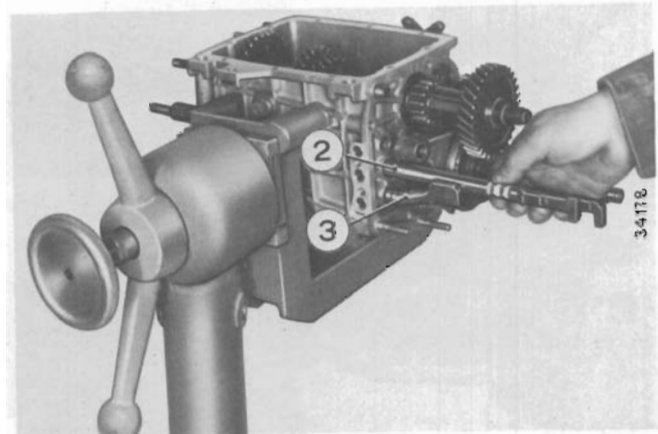
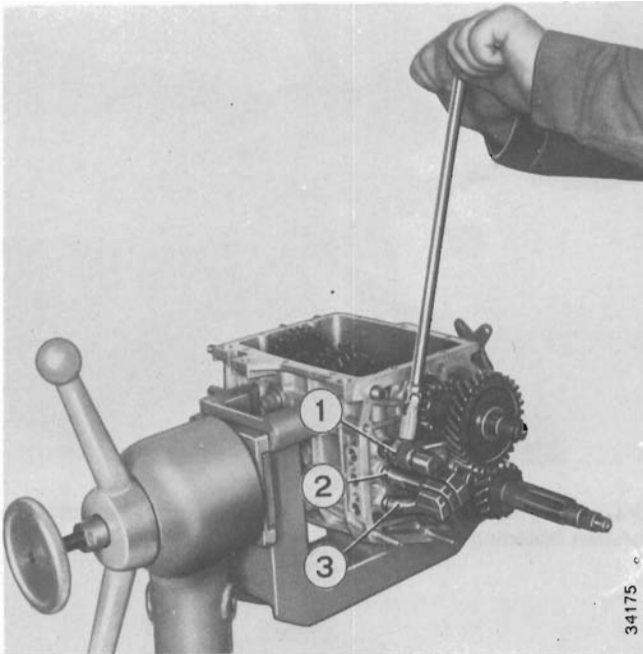
Unscrewing layshaft front bearing fastening bolt.



Dismounting the clutch housing.



Dismounting the gear change fork shaft lock spring retaining cover.



Sequence of dismantling gear change fork shafts from the gearbox housing.

1. 5th speed and reverse gear change fork shaft.
2. 3rd and 4th speed gear change fork shaft.
3. 1st and 2nd speed gear change fork shaft.

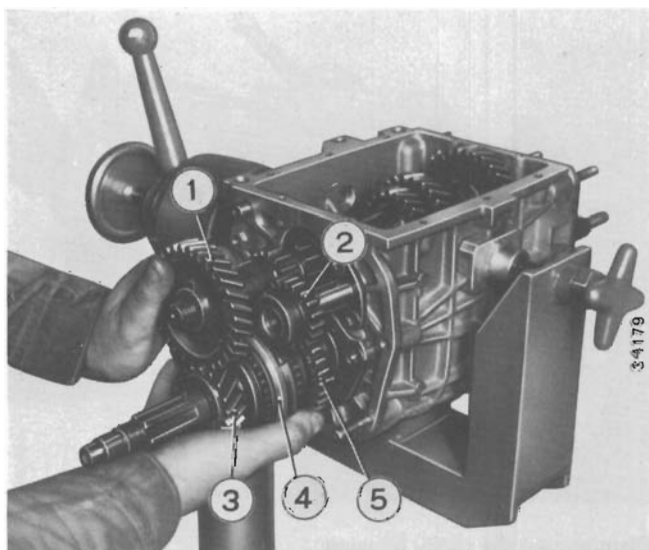
Unscrew 5th speed and reverse gear change fork to shaft fastening screw.

Remove the gear change fork shafts from gearbox housing.

Remove the components of 5th speed and reverse gear simultaneously from mainshaft and layshaft.

Dismantling the components of 5th speed and reverse gear.

1. 5th speed driving gear cluster.
2. Reverse engaging sliding gear.
3. 5th speed driven gear.
4. 5th speed engaging sleeve.
5. Reverse driven gear.

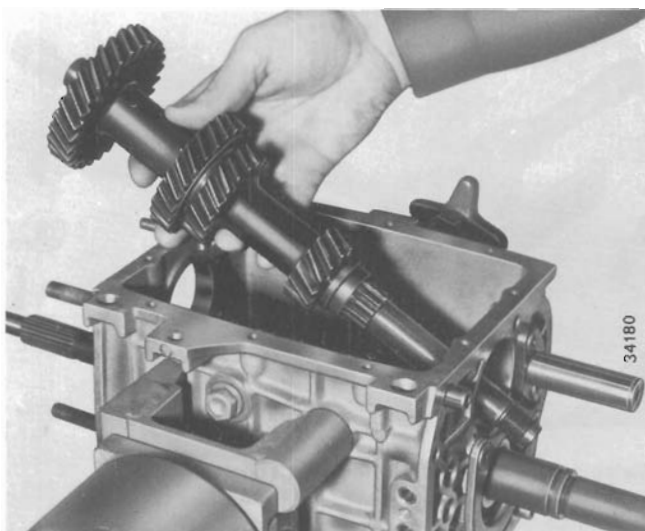


Gearbox

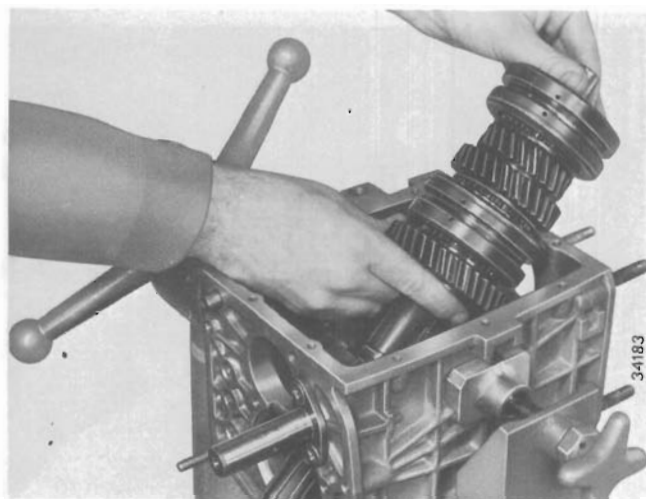
Polonez Model 1300/1500

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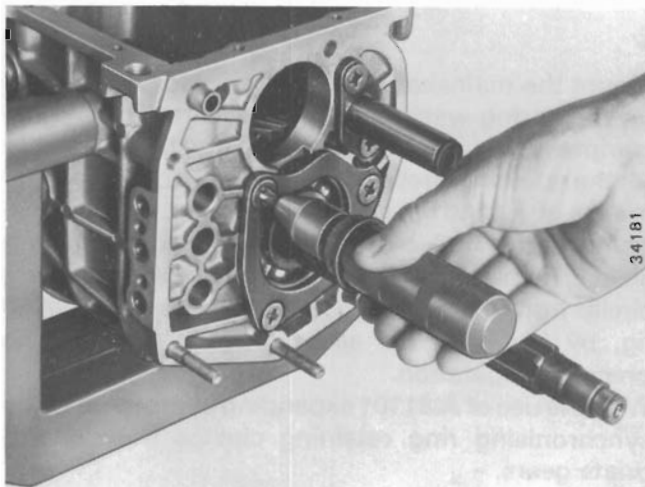
Sheet 5



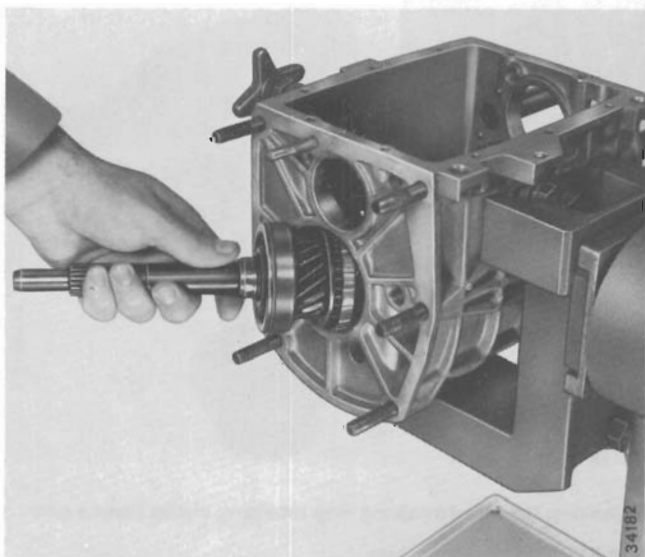
Removing the layshaft from gearbox housing.



Removing the mainshaft assembly from gearbox housing.

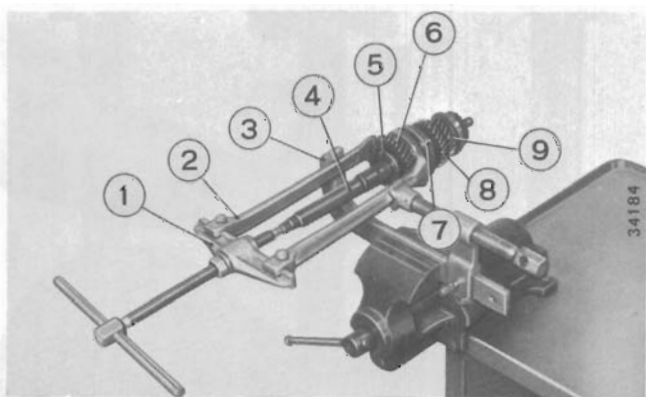


Unscrewing mainshaft middle ball bearing retaining plate by means of A.81011 inertia screwdriver.



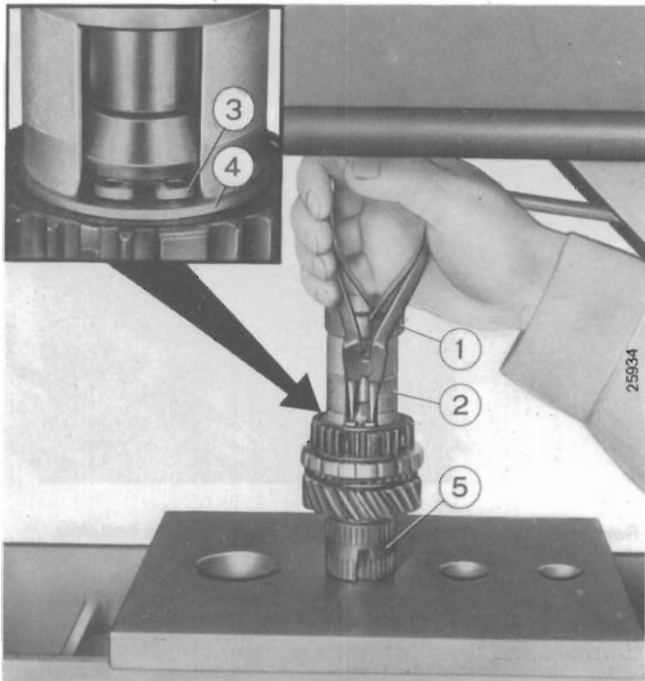
Removing the clutch shaft with bearing from gearbox housing.

Remove layshaft front and rear bearings.
Remove the layshaft from gearbox housing.
Remove gear change forks.
Unscrew mainshaft middle bearing retaining plate by means of **A.81011** inertia screwdriver.
Remove the clutch shaft.
On the working stand, dismantle the mainshaft assembly by stripping 1st speed gear with sleeve, the hub with 1st and 2nd speed engaging sleeve, and finally the 2nd speed gear.



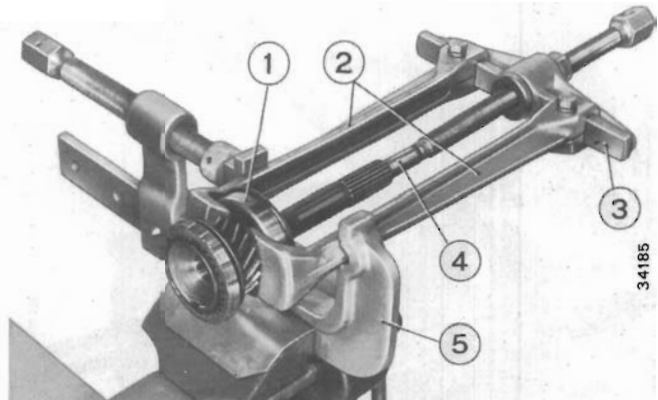
Stripping 1st speed gear sleeve from mainshaft.

1. **A.40005/002** puller crosspiece.
2. **A.40005/306** puller arms.
3. **A.40005/400** clamp.
4. Mainshaft.
5. Sleeve of 1st speed gear (6).
6. 1st speed gear.
7. 1st and 2nd speed engaging sleeve.
8. 2nd speed gear.
9. 3rd speed gear.



Removing 3rd and 4th speed engaging sleeve spring washer retaining circlip from the mainshaft by means of A.81101 expanding pliers.

1. Ap.5086 press.
2. A.70159 jig.
3. Retaining circlip.
4. Spring washer.
5. Mainshaft.



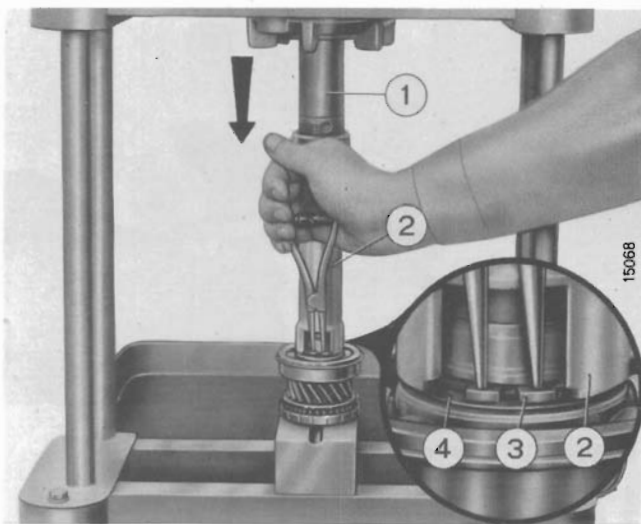
Stripping ball bearing from the clutch shaft.

1. Clutch shaft bearing.
2. A.40005/306 puller arms.
3. A.40005/002 puller crosspiece.
4. Clutch shaft.
5. A.40005/400 clamp.

Mount the mainshaft in the press, place **A.70159** jig on the spring washer; apply pressure to the jig to compress the spring washer thus making it possible for the retaining circlip to be removed from its seat by means of **A.81101** expanding pliers.

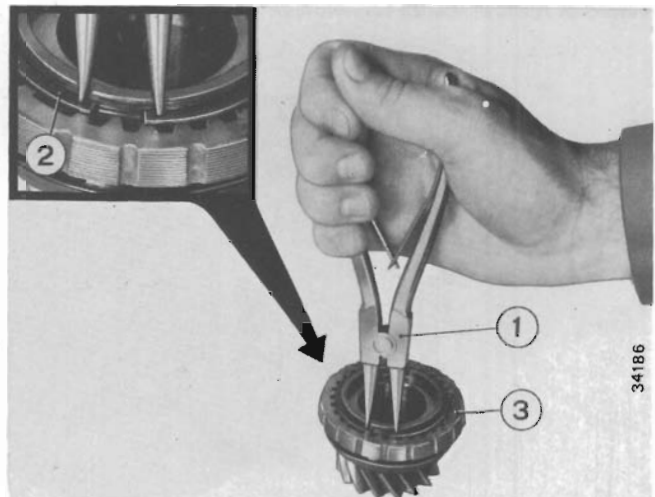
Remove the hub of 3rd and 4th speed engaging sleeve. Remove ball bearing spring washer retaining circlip from the clutch shaft with the use of **A.70350** jig, by following the same procedure as for the preceding operation.

With the use of **A.81101** expanding pliers remove the synchronising ring retaining circlips from appropriate gears.



Removing ball bearing spring washer retaining circlip from the clutch shaft by means of A.81101 expanding pliers.

1. Ap.5086 press.
2. A.70350 jig.
3. Retaining circlip.
4. Spring washer.



Removing the synchronising ring retaining circlip from a gear.

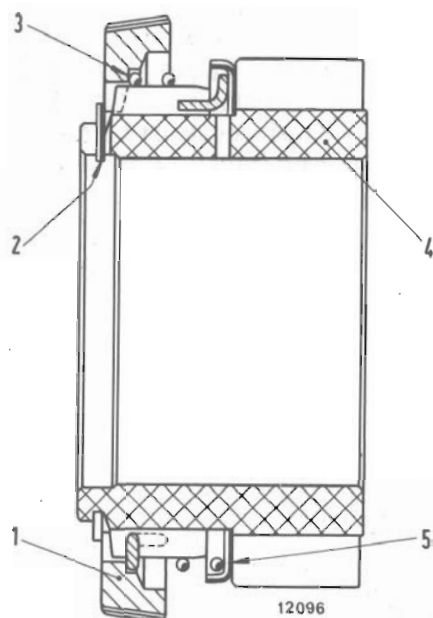
1. A.81101 expanding pliers.
2. Retaining circlip.
3. Synchronising ring.

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Section through 3rd speed externally coned synchronising ring.

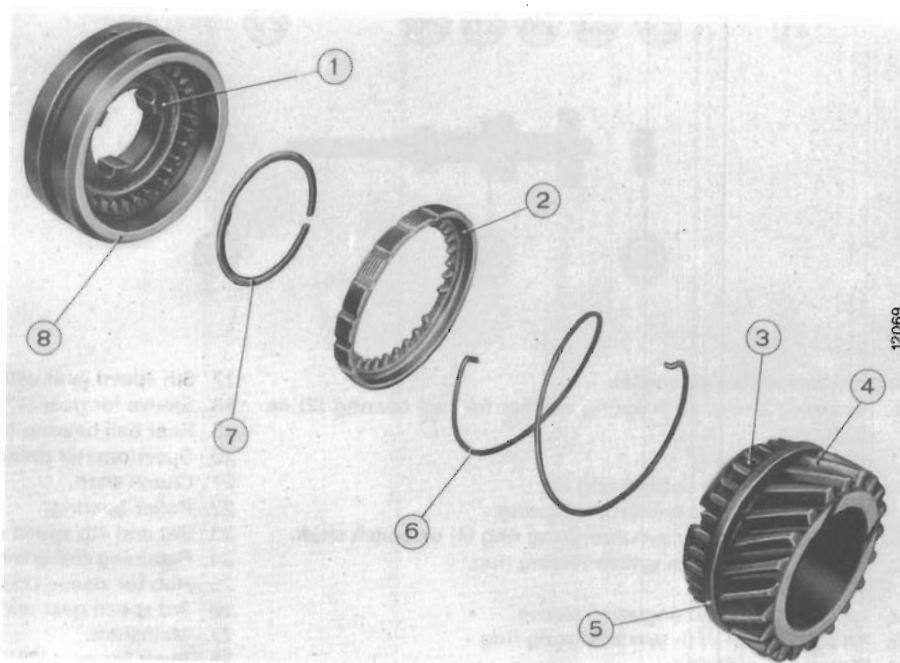
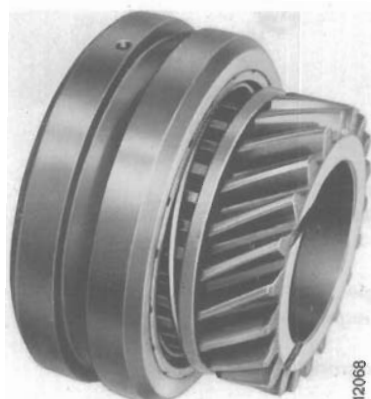
1. Synchronising ring.
2. Retaining circlip.
3. Spring.
4. 3rd speed gear.
5. Seat.

Checking

EXTERNALLY CONED SYNCHRONISING RING

The 1st, 2nd, 3rd, 4th and 5th speed synchronising rings must not show excessive wear on their external surfaces or on the teeth mating with the engaging teeth of the gears; components worn beyond the permissible limit must be replaced.

NOTE REGARDING ASSEMBLY – when installing the synchronising rings, prior to pressing the retaining circlip into its seat, check that the bent spring ends are engaged in appropriate recesses of the gear, and that the spring is not deformed.



Externally coned synchronising ring: assembly and exploded view.

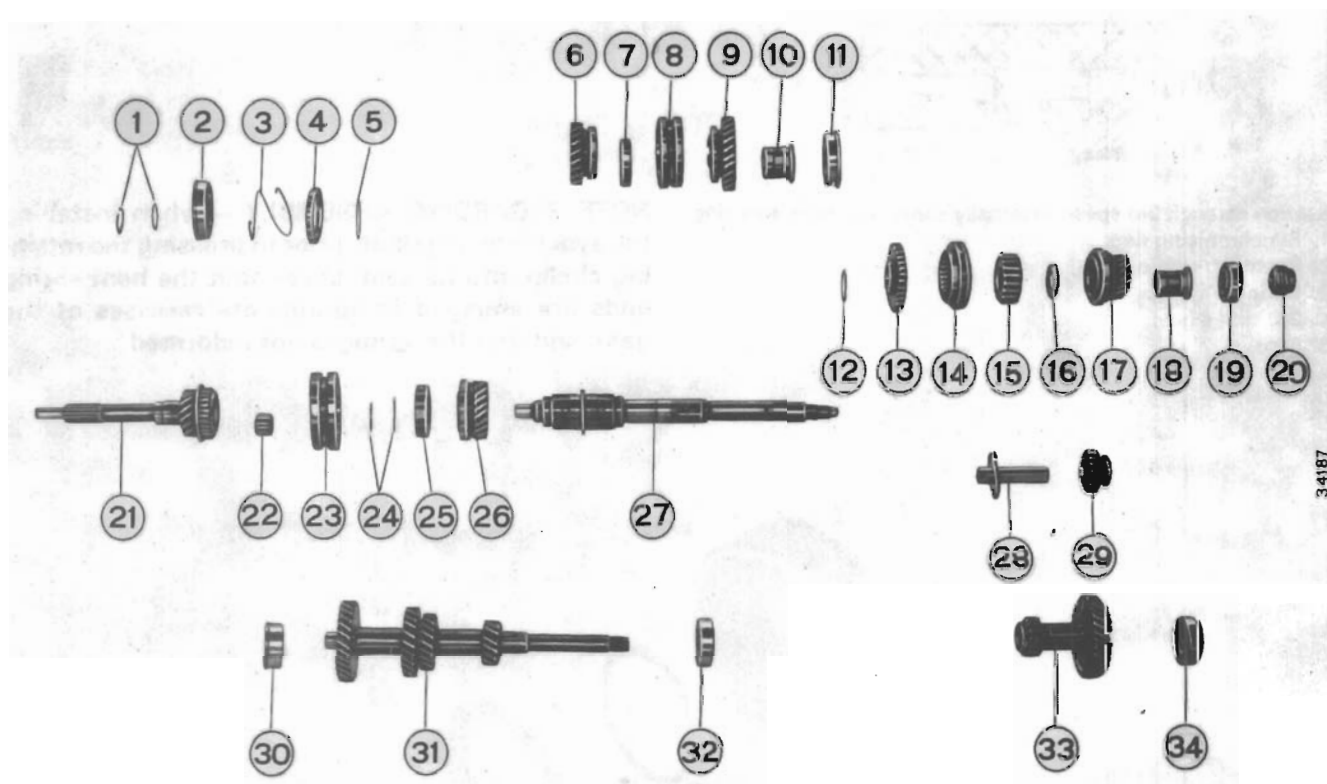
1. Hub
2. Synchronising ring.
3. Engaging teeth.
4. 3rd speed gear.

5. Seat.
6. Spring.
7. Retaining circlip.
8. Sliding sleeve.

GEARBOX HOUSING AND COVERS

Check the gearbox condition and make sure that the clutch shaft when mounted in the housing rotates freely. If incorrect alignment of the shaft in the housing is detected, check both components and replace the faulty one, if necessary. The housing must not be cracked, and the bearing holes must not be worn or damaged in a way allowing the rotation of outer bearing races.

The clutch cover and front and rear cover surfaces mating with those of the gearbox housing must not be damaged; this could cause mismatching of the components after installation, and leakages. Damaged and uneven surfaces must be filed smooth. If the damage is considerable, or the wear excessive, the faulty component must be replaced. Check that the gearbox vent located in clutch housing is not blocked.



Gearbox internal components.

1. Retaining circlip with spring washer for ball bearing (2) on shaft (21).
2. Front ball bearing.
3. Spring for synchronising ring (4).
4. 4th and 5th speed synchronising ring.
5. Retaining circlip for synchronising ring (4) on clutch shaft.
6. 2nd speed gear with synchronising ring.
7. Hub for sleeve (8).
8. 1st and 2nd speed engaging sleeve.
9. 1st speed gear with synchronising ring.
10. Sleeve for gear (9).
11. Middle ball bearing for shaft (27).
12. Spring washer for gear (13).
13. Reverse driven gear.
14. 5th speed engaging sleeve.
15. Hub for sleeve (14).
16. Spacer.
17. 5th speed gear with synchronising ring.
18. Sleeve for gear (17).
19. Rear ball bearing for shaft (21).
20. Speedometer driving gear.
21. Clutch shaft.
22. Roller bearing.
23. 3rd and 4th speed engaging sleeve.
24. Retaining circlip with spring washer for hub (25) on shaft (27).
25. Hub for sleeve (23).
26. 3rd speed gear with synchronising ring.
27. Mainshaft.
28. Shaft for gear (29).
29. Reverse engaging sliding gear.
30. Front ball bearing for shaft (31).
31. Layshaft.
32. Rear roller bearing for shaft (31).
33. 5th speed and reverse driving gear cluster.
34. Rear ball bearing for shaft (27).

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GASKETS

Check the condition of gaskets and make sure that they are undamaged; exercise particular care when checking rubber lip seals; their working surfaces must be completely free from nicks and tears. If even the slightest damage is found, the lip seal must be replaced.

SHAFTS

Check the run-out of mainshaft and layshaft. For this purpose, mount the shaft between centers and rotate by hand. The maximum permissible run-out measured with a dial gauge must not exceed **0.05 mm**.

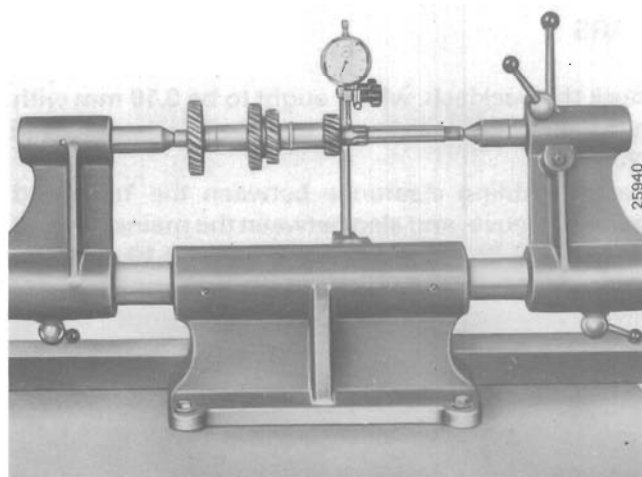
In the same way check the run-out of clutch shaft; check that the seat for mainshaft bearing rollers is in good repair. Next, check the layshaft, making sure, in particular, that the gears have no broken or excessively worn teeth.

The surface of the reverse gear shaft must be smooth and undamaged.

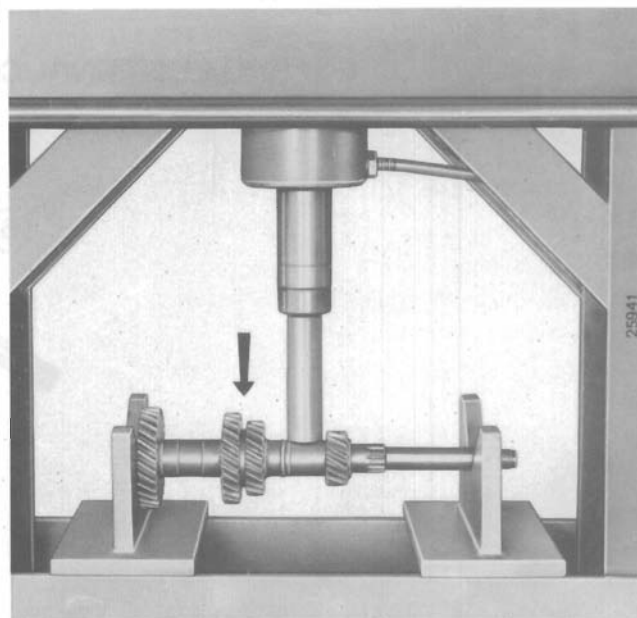
The assembling clearance between the reverse gear shaft and gear sleeve is **0.05 – 0.09 mm**; the maximum permissible clearance between these two components is **0.15 mm**.

Surface faults, if not excessive, may be rectified with very fine abrasive cloth.

Slightly deformed shafts may be straightened on a press, but care should be taken not to damage their surface; considerably deformed shafts must be replaced.



Checking the layshaft run-out on A.95644 fixture, with the use of A.95684 dial gauge mounted on magnetic stand.



Straightening the layshaft on Ap.5086 hydraulic press.

HUBS AND SLEEVES

Check that the hubs of gear engaging sleeves are not pitted, particularly on their sliding surfaces; also check that the backlash between the hub clutch splines is not excessive.

Spline damage, if any, hindering the free motion of components, may be removed with a very fine file or whetstone, as the case may be.

Worn or damaged components must be replaced.

BEARINGS

Ball or roller bearings must be in ideal condition, free from excessive play, axial (maximum permissible **0.50 mm**) or radial (maximum permissible **0.05 mm**). A bearing held by hand and rotated in both directions must not offer the slightest resistance to rotation.

Check carefully that the balls or rollers in bearings are not damaged.

Bearings in a condition other than ideal must be replaced.

GEARS

Check the backlash, which ought to be **0.10 mm** with new gears; the maximum permissible backlash is **0.20 mm**.

The assembling clearance between the 1st speed gear and sleeve, and also between the mainshaft and the 2nd and 3rd speed gears is **0.05 – 0.10 mm**; the maximum permissible clearance is **0.15 mm**.

Excessively worn or damaged gears must be replaced.

GEAR CHANGE FORKS AND THEIR SHAFTS

The gear change forks must show no deformation.

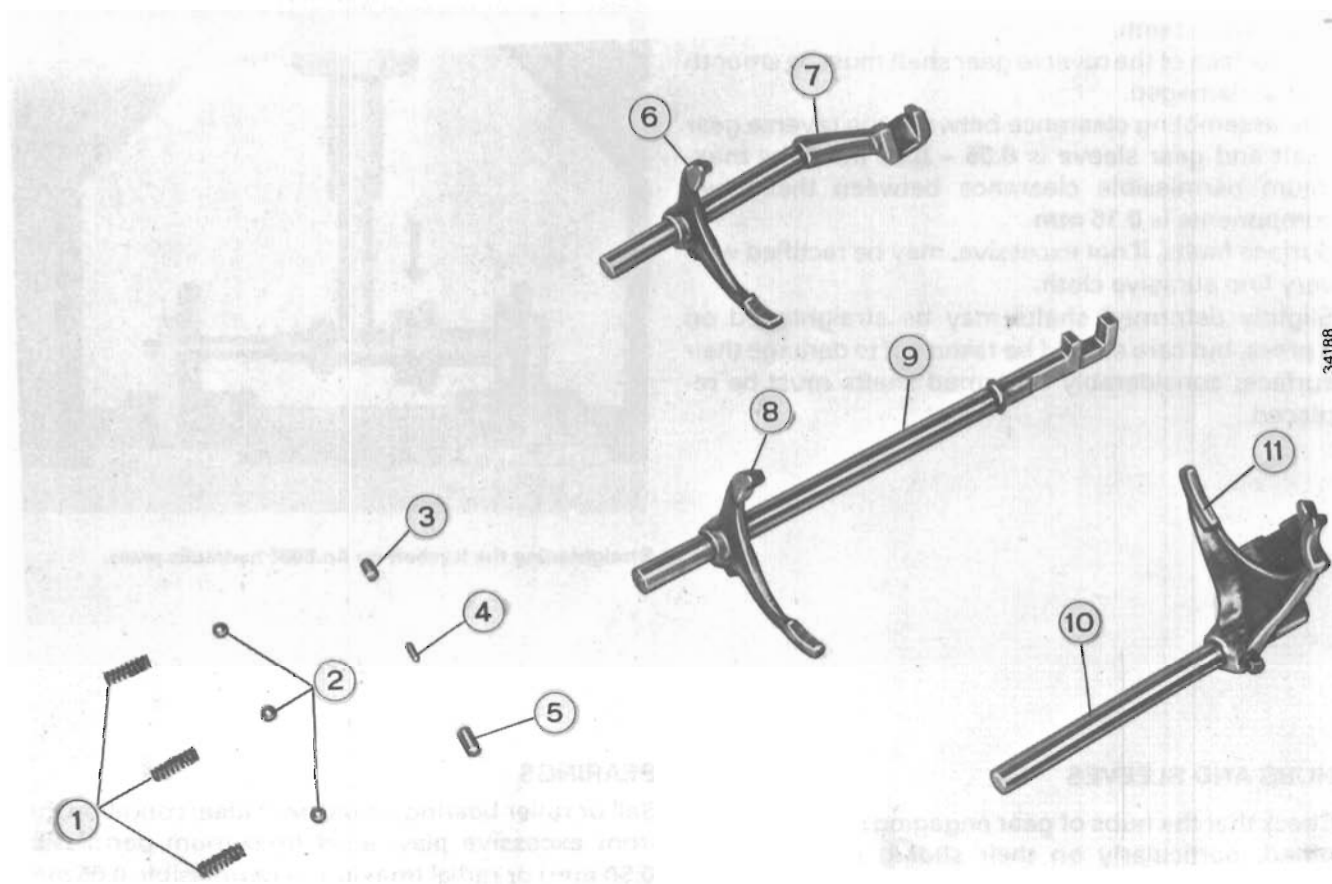
The fork shafts must move in their seats in the gearbox housing without appreciable play.

Check the condition of lock pins, springs and balls.

Should any of these components be scored, or the springs weakened, they must be replaced.

Weakened springs cannot be reused.

GEARBOX INTERNAL CONTROL COMPONENTS



Gearbox internal control components

- | | |
|--|---|
| 1. Spring for ball (2). | 7. Shaft of fork (6). |
| 2. Lock ball. | 8. 3rd and 4th speed gear change fork. |
| 3. 1st and 2nd speed lock pin. | 9. Shaft of fork (8). |
| 4. 3rd and 4th speed lock pin. | 10. Shaft of fork (11). |
| 5. 5th speed and reverse lock pin. | 11. 5th speed and reverse gear change fork. |
| 6. 1st and 2nd speed gear change fork. | |

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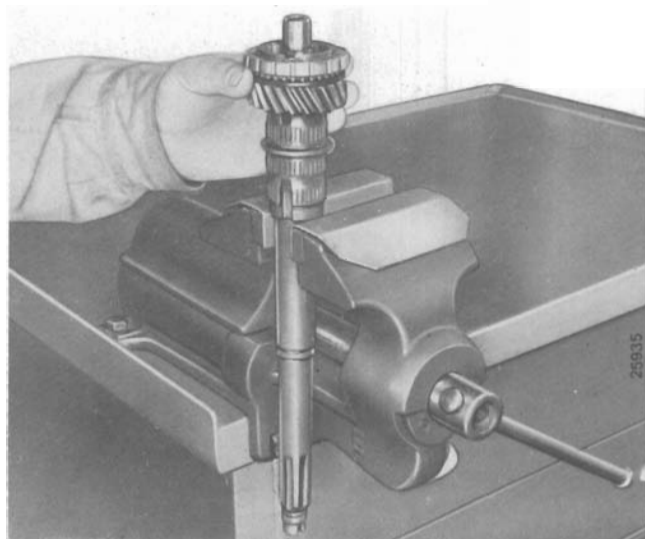
Sheet 8

REASSEMBLY

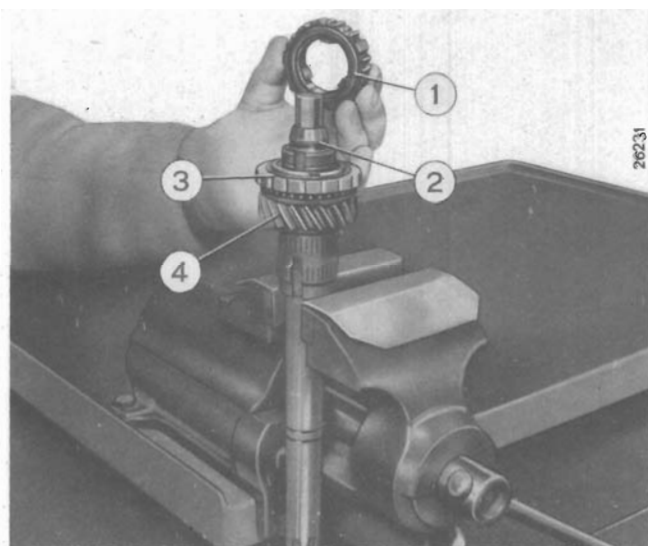
After washing and thorough checking of gearbox components, and replacement of worn or damaged parts, if any, proceed to reassembly of the gearbox by performing successively the operations described and illustrated below.

Assemble the mainshaft: mount the hub of 3rd speed gear together with synchronising ring, and the hub of 3rd and 4th speed engaging sleeve;

Mounting 3rd speed gear with synchronising ring on the mainshaft.



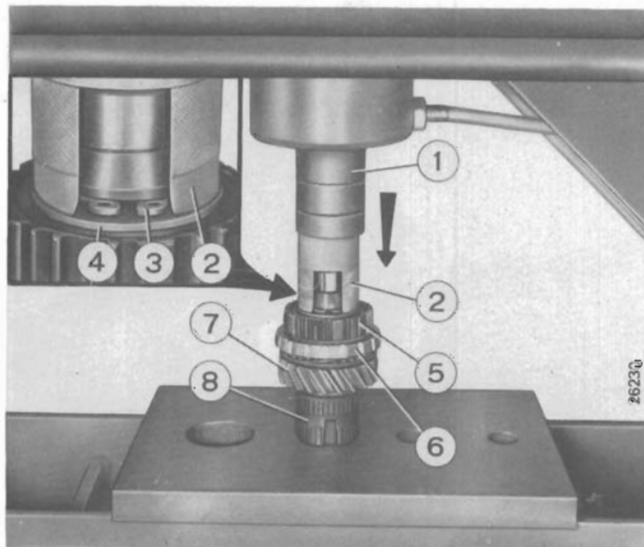
NOTE: When mounting 3rd and 4th speed engaging sleeve hub, take care that the splines meshing with the mainshaft are oriented towards 3rd speed gear as shown in the picture. The same applies to mounting 1st and 2nd speed engaging sleeve hub, with 2nd speed gear mounted first.



Mounting 3rd and 4th speed engaging sleeve hub on the mainshaft.

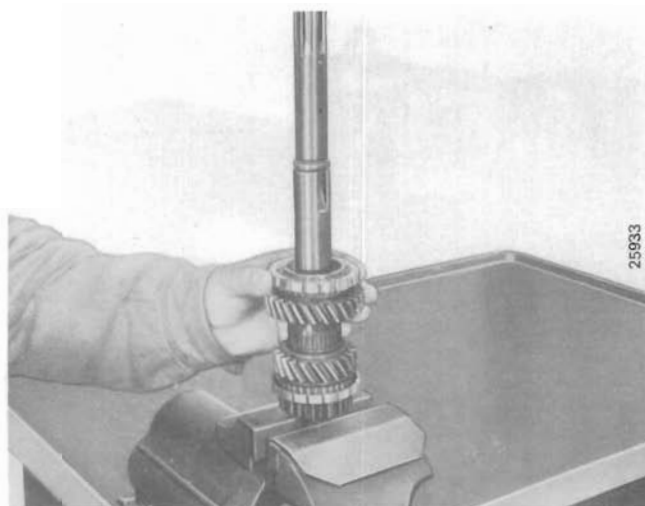
1. 3rd and 4th speed engaging sleeve hub.
2. Mainshaft.
3. 3rd speed synchronising ring.
4. 3rd speed gear.

place the mainshaft in a press and mount spring washer and suitable retaining ring with the use of **A.70159** jig;

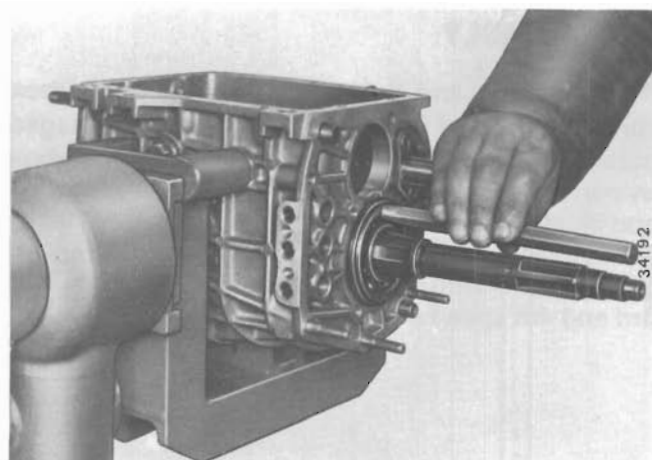


Installing retaining ring for mainshaft components.

1. **Ap5086** press.
2. **A.70159** jig.
3. Retaining ring.
4. Spring washer.
5. 3rd and 4th speed engaging sleeve hub.
6. 3rd speed synchronising ring.
7. 3rd speed gear.
8. Mainshaft.



Mounting 2nd speed gear and synchronising ring on the mainshaft.



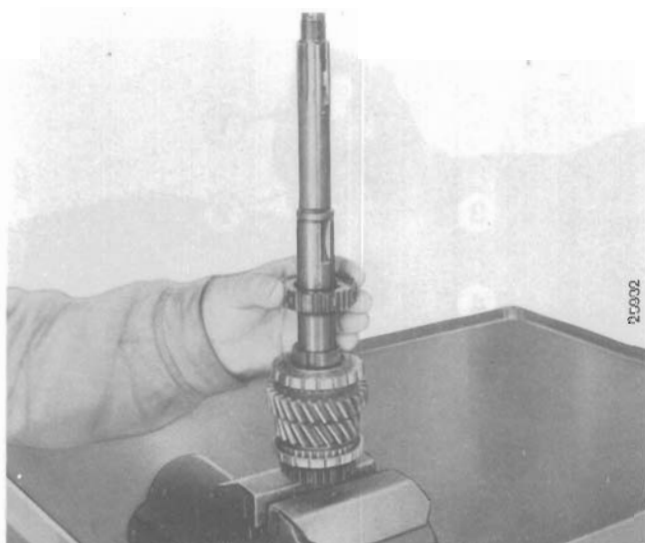
Mounting middle ball bearing on the mainshaft and in its gearbox housing seat.

Mount 2nd speed gear together with synchronising ring, 1st and 2nd speed engaging sleeve hub and sleeve, and 1st speed gear with synchronising ring and sleeve. Place the mainshaft assembly together with its middle bearing in gearbox housing.

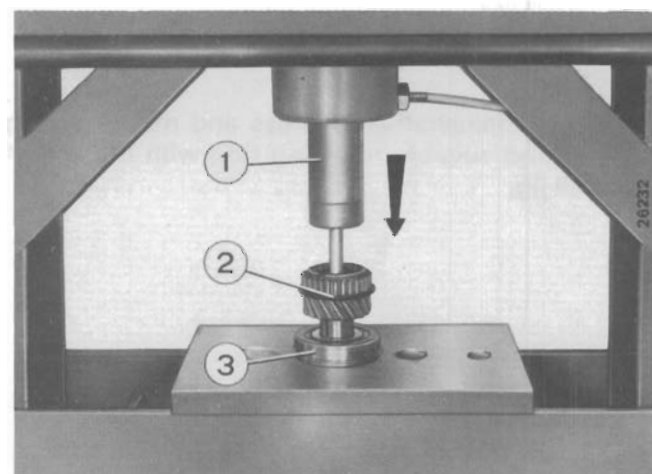
NOTE: Ball or roller bearings are installed in their seats with a punch applied evenly to the entire surface of inner and outer races so as to avoid incorrect installation with damage to bearing and its seat.

Mount ball bearing, spring washer and retaining ring on clutch shaft, and insert a complete needle bearing into clutch shaft inner race.

Mount the clutch shaft in gearbox housing.

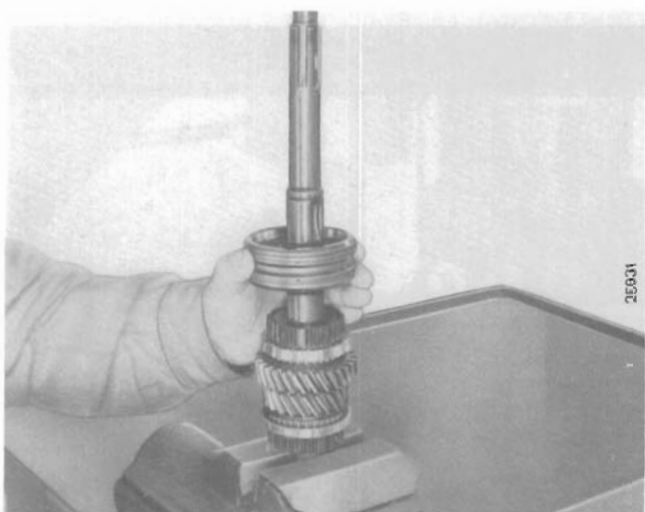


Mounting 1st and 2nd speed engaging sleeve hub on the mainshaft.



Mounting ball bearing on clutch shaft on AP.5086 press.

1. Ap.5086 press.
2. Clutch shaft.
3. Ball bearing.



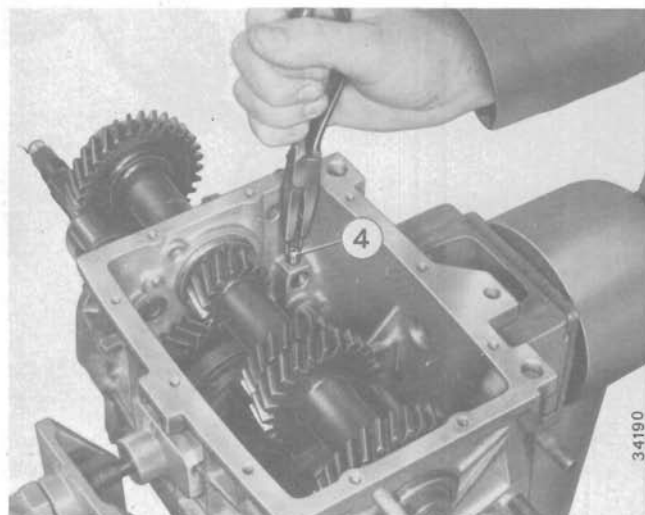
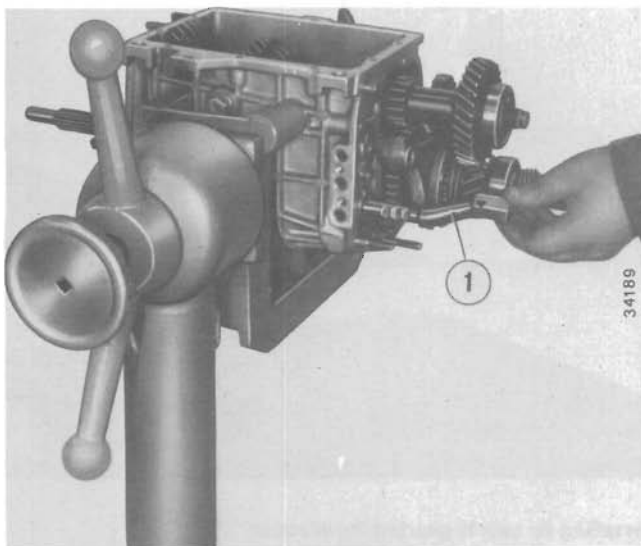
Mounting 1st and 2nd speed engaging sleeve on the mainshaft.

Gearbox

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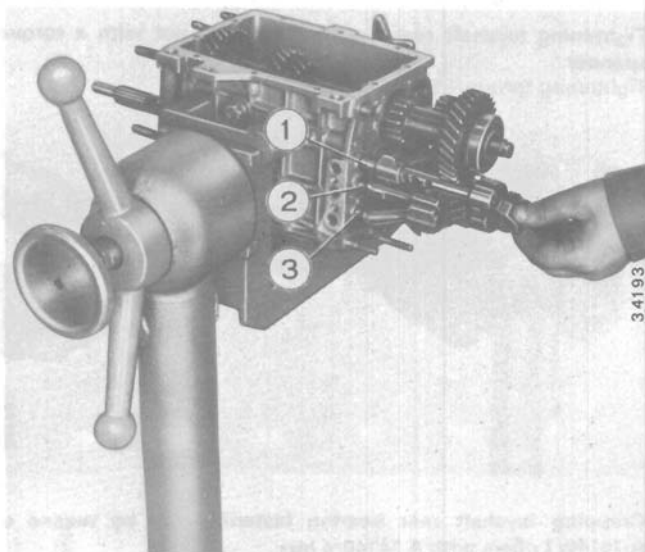
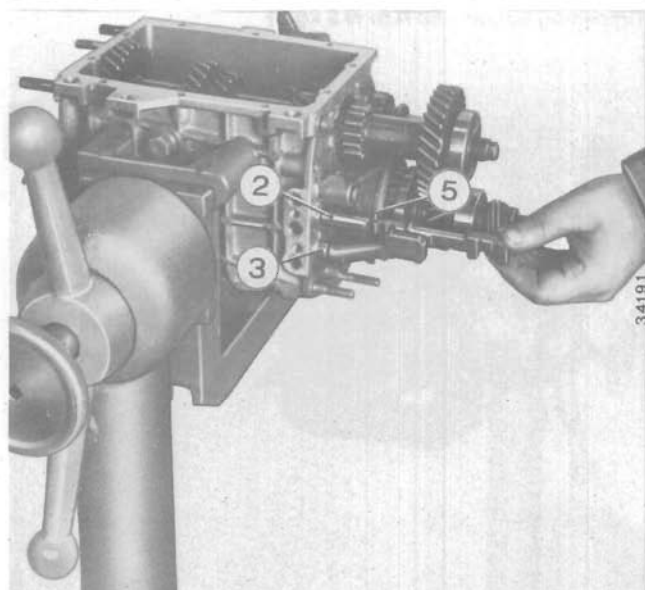
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Mount mainshaft middle bearing retaining plate on gearbox housing. Mount gear change forks on appropriate sleeves.

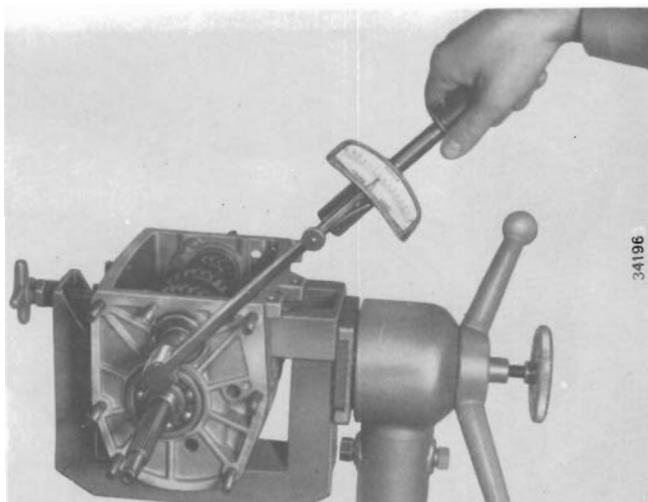
Mount the layshaft with its front and middle bearings. Lock simultaneously 5th speed and reverse gear change components on their shafts.

Mount gear change fork shafts with their locking pins in gearbox housing and in their corresponding forks, in the sequence shown in the pictures, bearing in mind that the longest locking pin must be inserted after installation of 1st and 2nd speed gear change fork shaft.

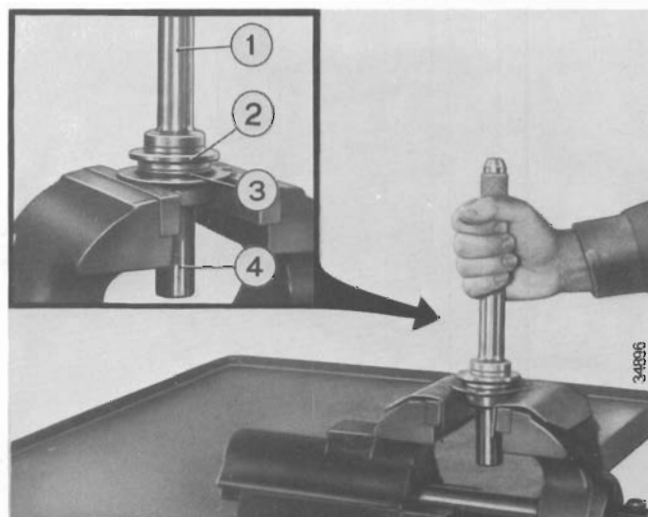


Sequence of assembling gear change fork shafts in gearbox housing.

1. 1st and 2nd speed gear change fork shaft.
2. 3rd and 4th speed gear change fork shaft.
3. 5th speed and reverse gear change fork shaft.
4. 5th speed and reverse locking pin.
5. 3rd and 4th speed locking pin.

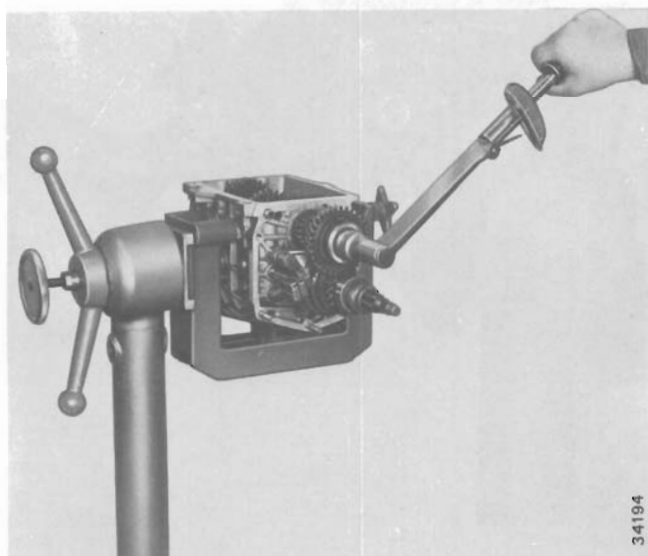


Tightening layshaft front bearing fastening screw with a torque spanner.
Tightening torque – 93 N.m (9.5 kgm)



Installing lip seal in gearbox front cover.

1. **A.70007** shank.
2. **A.70332** bush.
3. Lip seal.
4. Gearbox front cover.

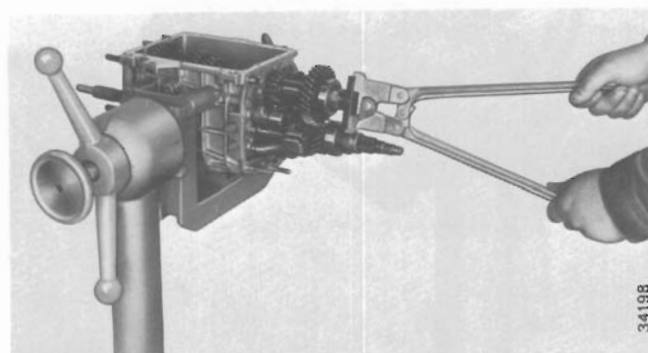


Tightening layshaft rear bearing fastening nut with a torque spanner.
Tightening torque – 118 N.m (12 kgm)

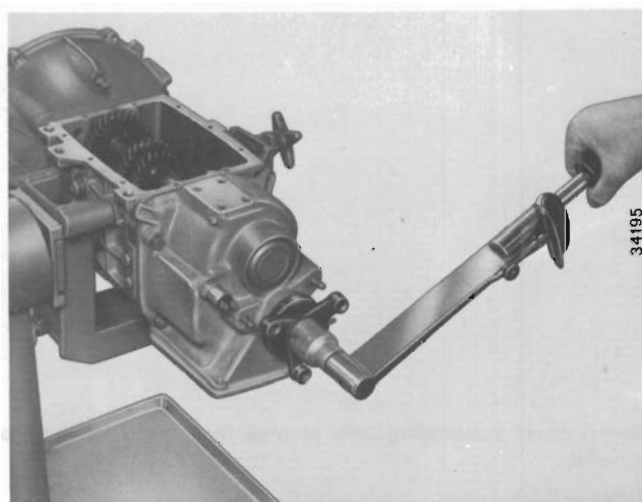
Immobilise the shafts by engaging two speeds simultaneously.

With a torque spanner and the prescribed torque, tighten front bearing fastening screw and rear bearing fastening nut on the layshaft; crimp the fastening nut by means of **A.74140/1** pliers with **A.74140** bits. Install clutch shaft lip seal with the use of **A.70007** shank and **A.70332** bush.

Mount propeller shaft flexible joint endpiece on the mainshaft, and tighten the fastening nut with the prescribed torque.



Crimping layshaft rear bearing fastening nut by means of **A.74140/1 pliers with **A.74140/4** bits.**



Tightening the flexible joint endpiece to mainshaft fastening nut with a torque spanner.
Tightening torque – 78 Nm (8 kgm).

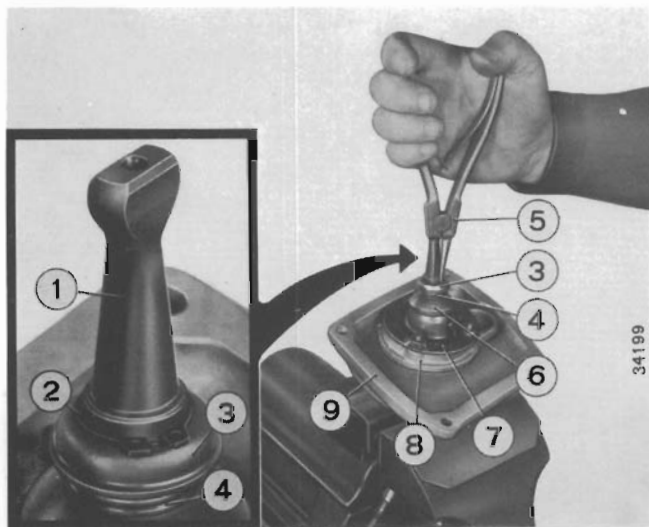
External gear change mechanism

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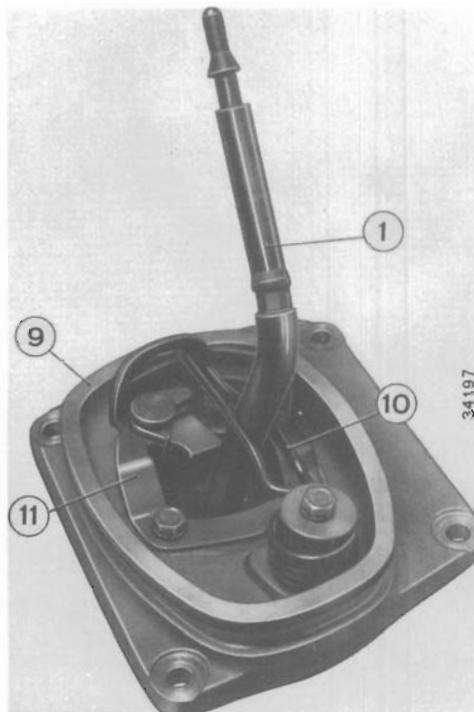
212.21

Sheet 1



Dismounting the gear change lever from external gear change mechanism bracket.

1. Gear change lever.
2. Retaining circlip.
3. Spring cup.
4. Spring.
5. A.81101 expanding pliers.
6. Spherical washer.
7. Supporting seat for lever (1).



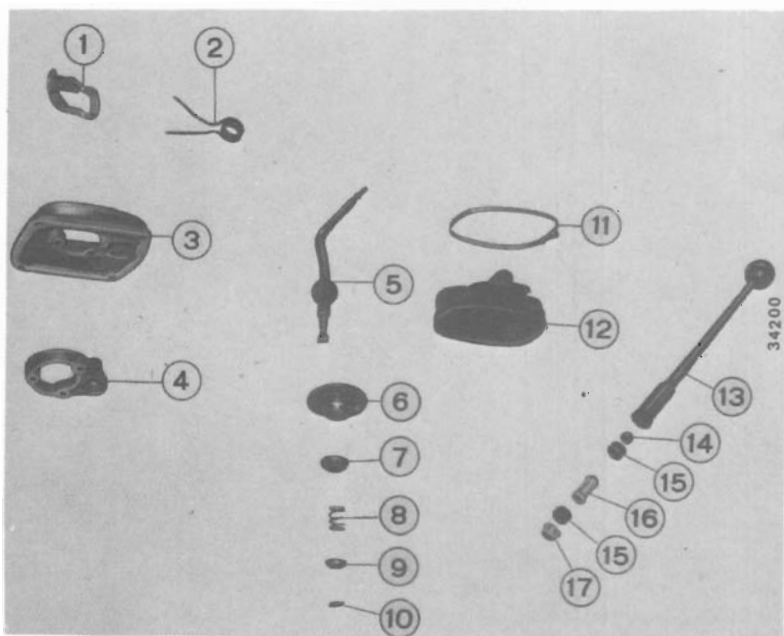
8. Spacing washer.
9. External gear change mechanism supporting bracket.
10. Gear selecting spring.
11. Plate for spring (10).

Use the **A.81101** expanding pliers to remove the retaining circlip, which holds the various gear change mechanism components in position, from the base of the gear change lever. Remove the spring from the gear change lever. Remove the spring plate

to release the lever supporting seat and spacer. During reassembly, the operations described for dismantling are to be carried out in reversed sequence.

Components of the gear change lever bracket assembly.

1. Plate of spring (2).
2. Gear selecting spring.
3. External gear change mechanism supporting bracket.
4. Spacer.
5. Gear change lever.
6. Supporting seat for lever (5).
7. Spherical washer.
8. Spring.
9. Spring cup.
10. Lock ring.
11. Clamp.
12. Boot.
13. Gear change lever stick.
14. Taper bush.
15. Flexible ring.
16. Spacer bushing.
17. Resilient ring.





Special tools

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Sheet 1

GEARBOX

A.55035 Spanner used for dismounting the gearbox without removing the engine from the vehicle.



A.55050 Socket (30 mm) used with a torque spanner for tightening flexible joint endpiece to gearbox mainshaft fastening nut.



A.55087 Spanner for 4-speed and 5-speed gearbox oil level checking plug, and for 5-speed gearbox oil drain plug.



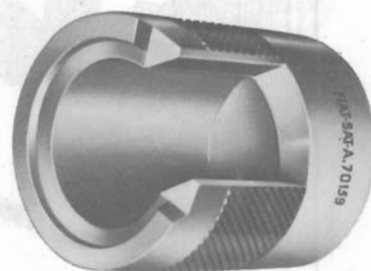
A.57051 Spanner for oil drain plug in gearbox rear cover.



A.70007 Shank for various assembling devices.



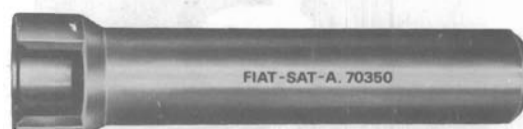
A.70159 Jig for installation and dismounting „Belleville” spring washers of synchronising rings on gearbox mainshaft.

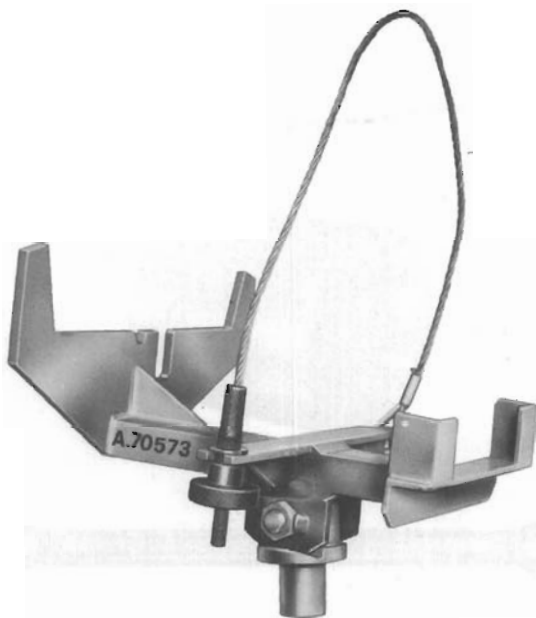


A.70332 Bushing for installing lip seal in front gearbox cover, to be used with **A.70007** shank.

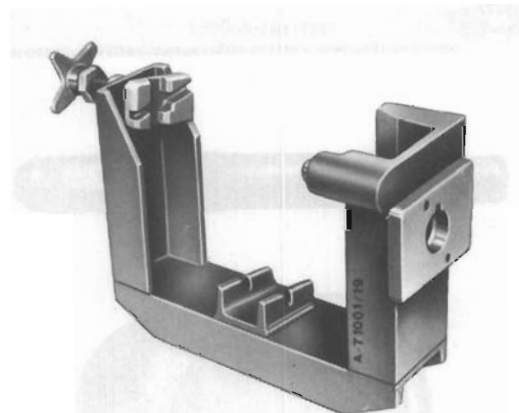


A.70350 Mandrel for installation and dismounting of retaining rings and „Belleville” spring washers on gearbox shafts.

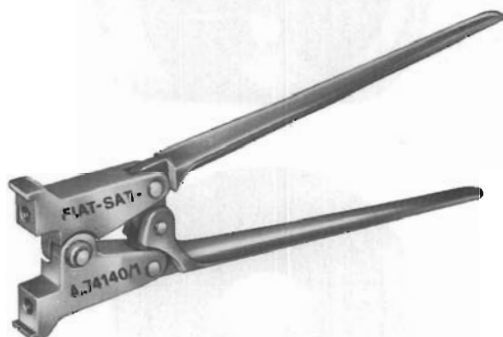




A.70573 Gearbox supporting bracket for dismantling the gearbox from the vehicle, used in conjunction with a hydraulic jack.



A.71001/19 Gearbox supporting bracket for maintenance work.



A.74140/1 Nut crimping pliers – to be used in conjunction with **A.74140/4**.



A.74140/4 Pair of bits for nut crimping – to be used in conjunction with **A.74140/1**.

24	Characteristics and technical data –
	Nuts and bolts tightening torques
243.01	Propeller shaft

Propeller shaft

Polonez Model 1300/1500

24

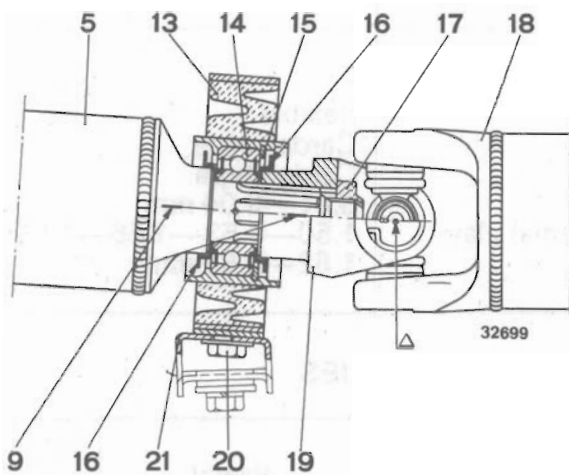
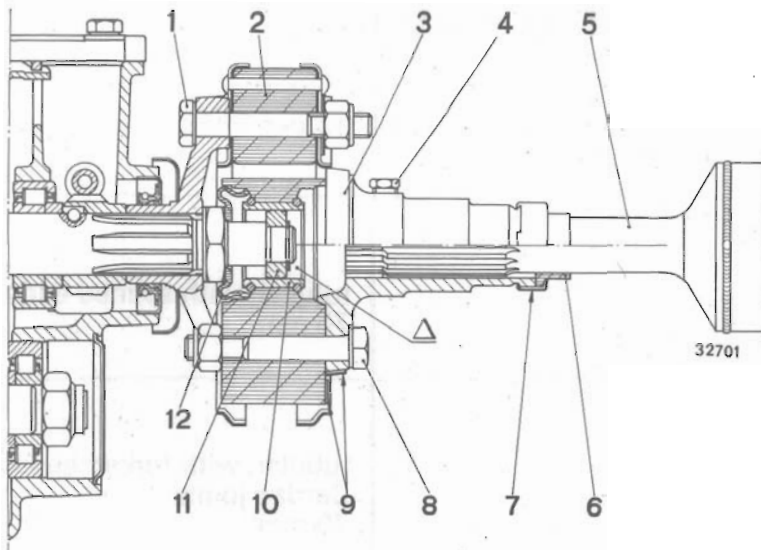
Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Two-part propeller shaft, middle support with rubber-mounted ball bearing, rear part with Cardan joints, front part with flexible joint on gearbox side.	
Front propeller shaft: — type — diameter	tubular, with splined ends 70 mm
Rear propeller shaft: — type — diameter	tubular, with forked ends for Cardan joints 70 mm
Propeller shaft support	resilient, with ball bearing sealed for life
Joints: — front — middle — rear Spider radial play Thickness of flexible shims for adjustment of spider radial play, supplied as spares	flexible Cardan type Cardan type 0.01—0.04 mm 1.50—1.53—1.56—1.59— 1.62—1.65 mm

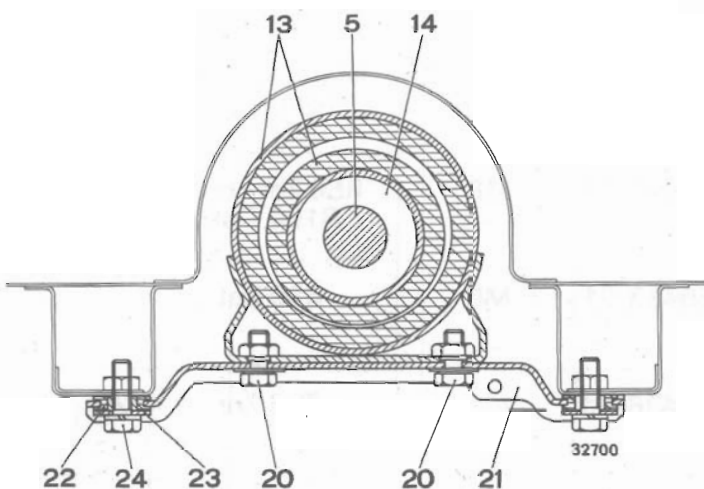
BOLTS AND NUTS TIGHTENING TORQUES

Component to be tightened	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
Front propeller shaft with forked end fastening nut	4593215	M16×1.5	R80 Fosf Lub (shaft NC D4 Bon Fosf Lub)	29	3
Self-locking nut for flexible joint to propeller shaft fastening bolt	1/25745/11	M10×1.25	R50 Znt (bolt R80 Znt)	49	5
Self-locking nut for propeller shaft to differential fastening bolt	1/61041/11	M8	R50 Znt (bolt R100 Cdt)	32	3.3
Resilient propeller shaft support fastening bolt	1/60433/21	M8	R80 Znt	25	2.5
Supporting bracket to body longitudinal beam fastening bolt	1/60436/21	M8	R80 Znt	25	2.5



Longitudinal section of propeller shaft through flexible joint and resilient support, and cross-section of resilient support.

1. Flexible joint to gearbox fastening bolt.
2. Flexible joint.
3. Sliding sleeve.
4. Bolt.
5. Front propeller shaft.
6. Seal.
7. Seal retaining nut.
8. Bolt and nut for fastening flexible joint to front propeller shaft sliding sleeve.
9. Mark defining propeller shaft position during assembly.
10. Centering sleeve.
11. Centering ring.
12. Dust boot.
13. Resilient support.
14. Ball bearing.
15. Ball bearing retaining circlip.
16. Bearing housing.
17. Joint sleeve fastening nut.
18. Rear propeller shaft.
19. Cardan joint forked end.
20. Support to bracket fastening bolts.
21. Bracket.
22. Vibration absorbing washers.
23. Plain washers.
24. Bracket with resilient support to body fastening bolts.



Δ = Lubricating points – Albon 215.

Propeller shaft

Polonez Model 1300/1500

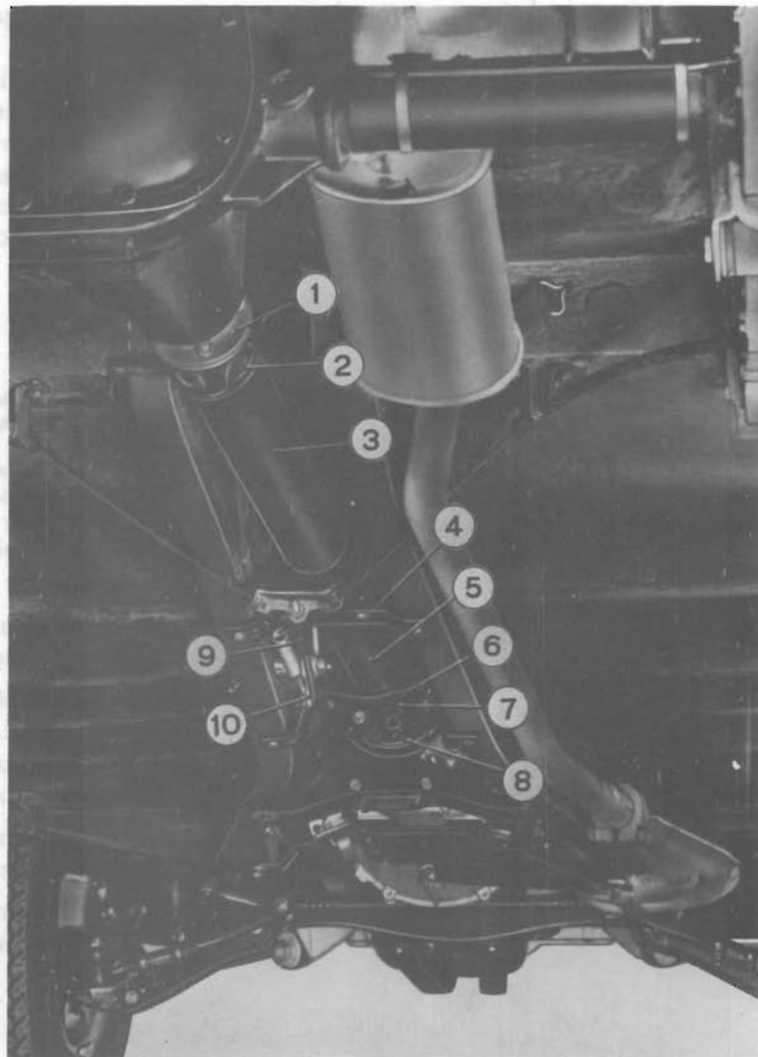
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DISMOUNTING AND REASSEMBLY

Place the vehicle on a hoist and lift.
 Disconnect front shaft sliding sleeve from the flexible joint.
 Disconnect handbrake pull rod by removing the cotter pin. Unscrew shaft resilient support bracket and guard from the chassis.
 Disconnect the propeller shaft by unscrewing rear shaft Cardan joint yoke fastening bolts from differential pinion flanged end.
 In order to reassemble the propeller shaft, reverse the above described operations.

NOTE: The propeller shaft should be reassembled in such a manner that the marks stamped on flexible joint and sliding sleeve are aligned, which makes it possible for the previously performed balancing of the assembly to be re-established.

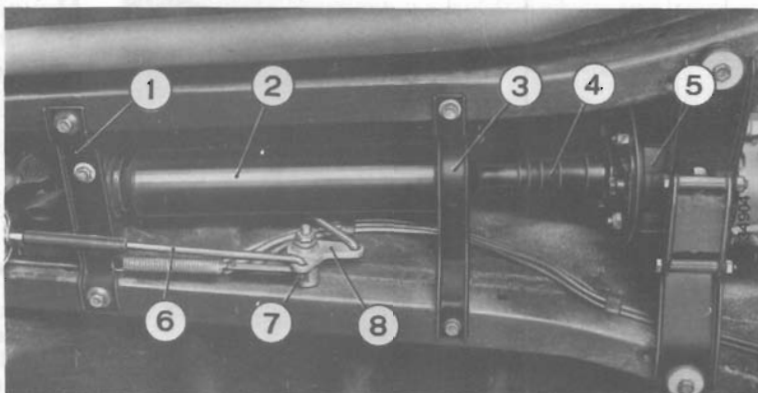


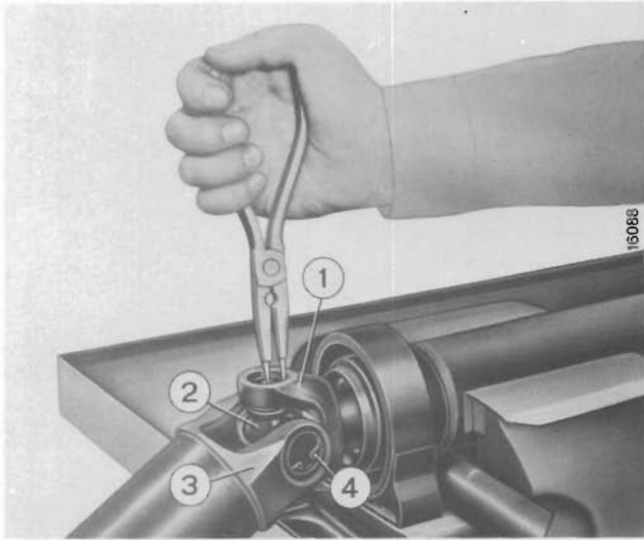
Propeller shaft mounted on the vehicle.

1. Differential pinion flanged end.
2. Forked end of joint.
3. Rear propeller shaft.
4. Middle support bracket.
5. Front propeller shaft.
6. Guard for shaft (5).
7. Sliding sleeve of propeller shaft (5).
8. Flexible joint.
9. Handbrake pull rod.
10. Handbrake intermediate lever.

Partial view of propeller shaft showing the components to be dismantled.

1. Bracket of middle resilient support.
2. Front propeller shaft.
3. Guard for shaft (2).
4. Propeller shaft sliding sleeve.
5. Flexible joint.
6. Handbrake pull rod.
7. Cotter pin.
8. Handbrake intermediate lever.





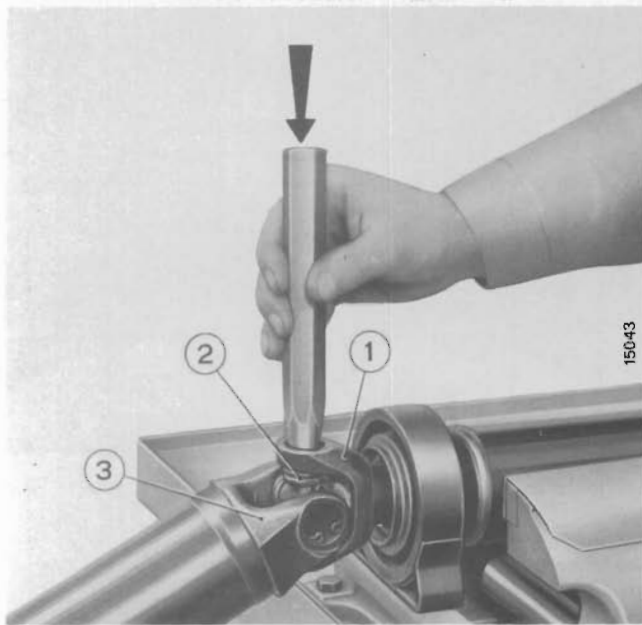
PROPELLER SHAFT CHEKING

The dismantled propeller shaft must be checked. Mount it in a vice and proceed as follows:

- mark individual Cardan joints so that they may be reassembled in identical position, should the replacement of the components prove unnecessary on checking;

Removing the retaining circlip from its seat in forked end with the use of A.81102 round-nosed pliers.

1. Forked end.
2. Spider.
3. Rear propeller shaft.
4. Retaining circlip.

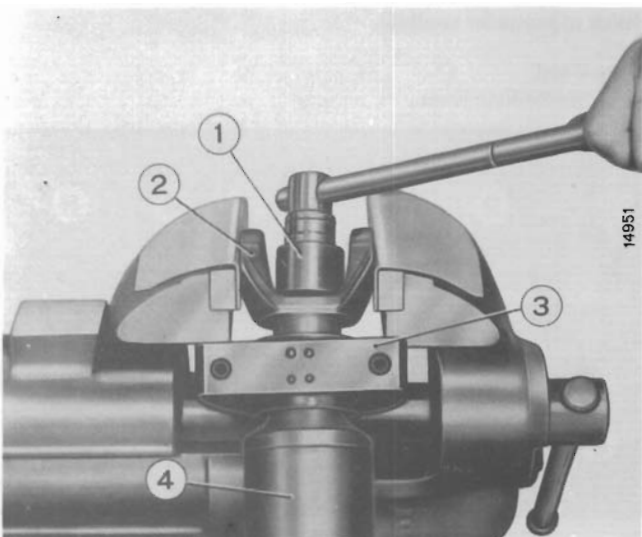


- remove the retaining circlips from spider needle bearing seats with the use of round-nosed pliers;
- apply punch to the face of needle bearing housing and cause it to slide out on the opposite side of the forked end; repeat this operation for the remaining bearings;
- turn the front propeller shaft so that it can be disconnected from the rear shaft.

Repeat the same operations for dismantling Cardan joint connecting the propeller shaft with the differential.

Dismantling Cardan joint spider with the use of a punch.

1. Forked end.
2. Spider.
3. Rear propeller shaft.



Dismantling propeller shaft resilient support

Mount the rear shaft in a vice as shown in the picture and unscrew forked end to front shaft splined end fastening nut.

Unscrewing forked end to front shaft splined end fastening nut.

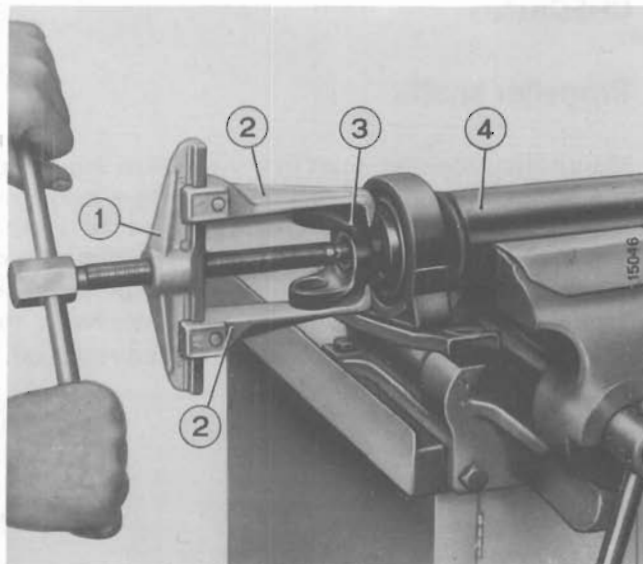
1. Socket spanner.
2. Forked end.
3. Resilient support.
4. Front propeller shaft.

Propeller shaft

Polonez Model 1300/1500

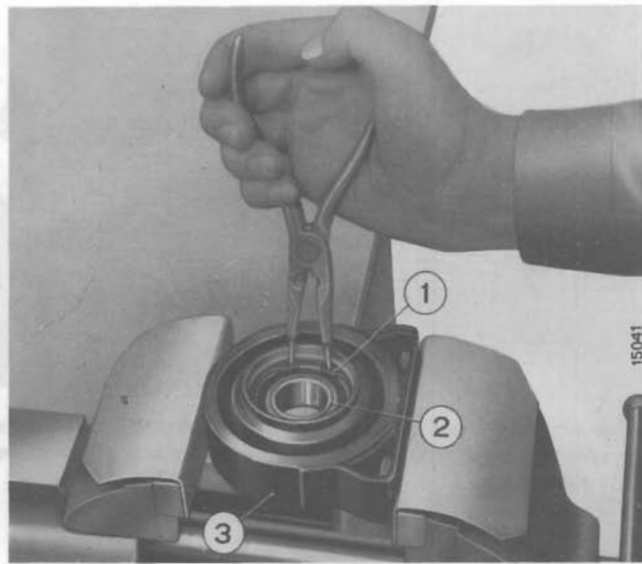
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Stripping the forked end from front propeller shaft splined end with the use of a general-purpose puller.

1. A.40005/001 puller.
2. A.40005/301 grips.
3. Forked end.
4. Front propeller shaft.

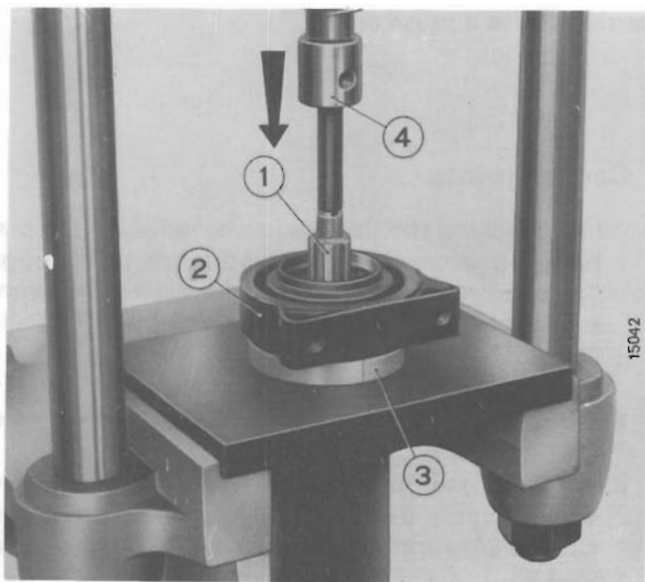


Removing bearing retaining circlip from the resilient support with the use of round-nosed pliers.

1. Retaining circlip.
2. Ball bearing.
3. Resilient support.

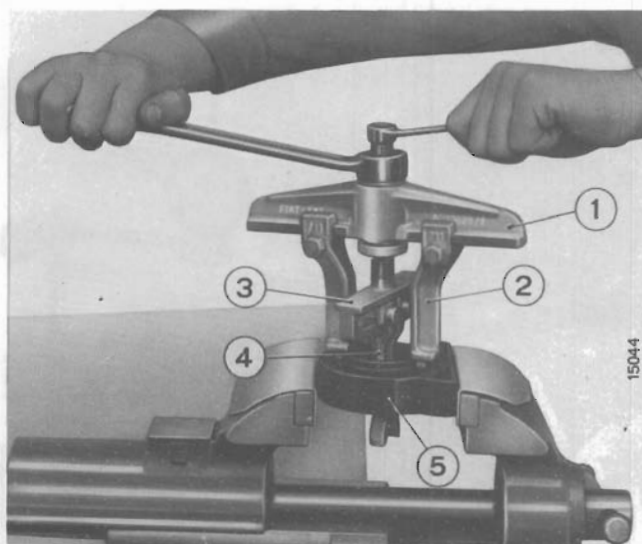
- use a general-purpose puller to strip the forked end from front propeller shaft splined end;
- mount the front shaft in a press as shown in the picture, and remove the resilient support from shaft splined end with the use of a special device;

- mount the resilient support in a vice;
- remove front propeller shaft support ball bearing retaining circlip with the use of round-nosed pliers;
- extract ball bearing from the resilient support with the use of a general-purpose puller.



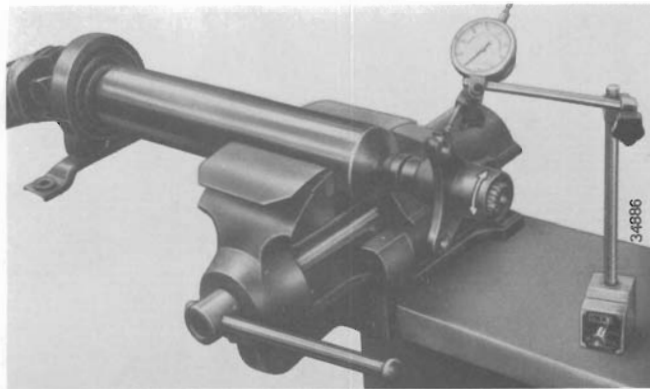
Stripping on a press the resilient support from front propeller shaft splined end.

1. Front propeller shaft splined end.
2. Resilient support.
3. A.45009 device with outer ring, used for stripping the support.
4. Hydraulic press.

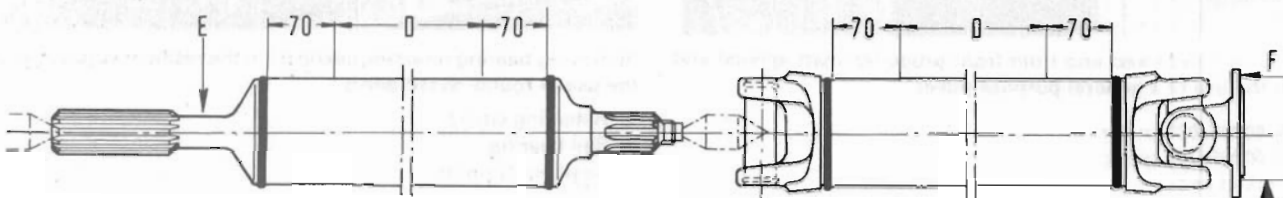


Extracting ball bearing from the resilient support with the use of a general-purpose puller.

1. A.40005/02 puller.
2. A.40005/312 thrust ends of puller.
3. and 4. A.40005/109 puller corsspiece with grips.
5. Resilient support.



Checking the play between sliding endpiece splines and the splined end of front propeller shaft with the use of a micrometer dial gauge.



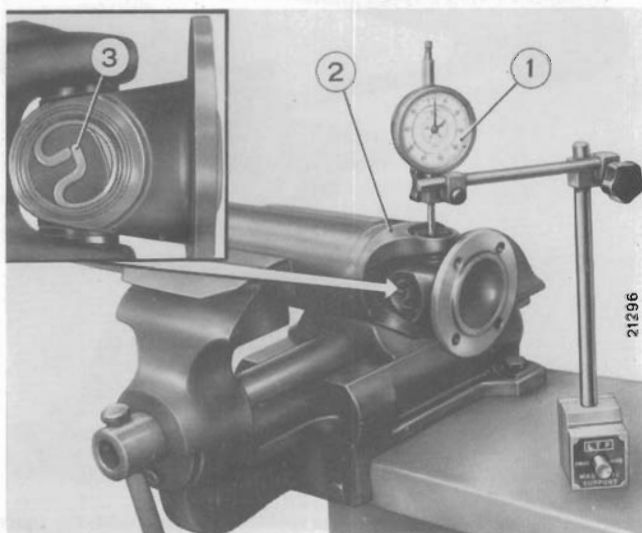
Front and rear propeller shafts.

24761

FRONT SHAFT. Mount the propeller shaft assembly between centres. Check that the difference in gauge readings obtained at the **D** length does not exceed **0.35 mm**, and at the **E** length – **0.15 mm**.

REAR SHAFT. Fit Cardan joint to the shaft and mount the assembly in the fixture. Check that the difference in gauge readings obtained at the **D** length does not exceed **0.35 mm**, and at the **F** length – **0.10 mm**.

NOTE: Straightening of shafts, if required, may be carried out in a press only.



Checking radial play of the spider.

1. **A.95684** dial gauge with magnetic stand.
2. Rear propeller shaft.
3. Retaining circlip.

CHECKING

Propeller shafts

Mount the propeller shaft in a vice. With the use of **A.95684** micrometer dial gauge with a magnetic stand, applied to the circumference of sliding endpiece arms, check the play in the splined joint between endpiece and front shaft splines. This play must not exceed **0.30 mm**, otherwise the excessively worn component must be replaced.

Cardan joints

While checking the Cardan joints, measure the play between spider journals and their needle bearings. To measure this play, mount the shaft in a vice and measure the play with the use of **A.95684** dial gauge.

The measured play should be within the limits of **0.01–0.04 mm**.

If a larger play is detected, replace the retaining circlip with another of suitable thickness. Spare circlips are supplied in the following thicknesses: **1.50–1.53–1.56–1.59–1.62–1.65 mm**.

Check the condition of spider and needle bearings. If needle slanting or excessive play is detected, the complete joint must be replaced.

NOTE: Spare Cardan joints are supplied complete with bearings.

Propeller shaft

Polonez Model 1300/1500

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Flexible joint

Check that the flexible joint is not damaged or deformed in any way. Also, check that the rubber component still has its original elasticity.

Reassembly

Reassembly of propeller shaft presents no special problems, since it is sufficient to reverse the operations already described for dismantling.

There are, however, certain recommendations regarding the proper assembly procedure.

For the installation of ball bearing in the resilient support, and for subsequent installation of the support on front propeller shaft, use should be made of suitable assembly aids. Care should be taken that the force applied by means of these aids is distributed uniformly over the entire face of bearing outer race during its installation in the support, and over the entire face of inner race being mounted on the propeller shaft. In this way any possible damage to the bearing is avoided.

Cover thoroughly needle bearings and splines with the recommended lubricant.

If no Cardan joint components had been replaced, take care to reassemble the joints in accordance with marks made during dismantling, so that their previous balancing is not disturbed.

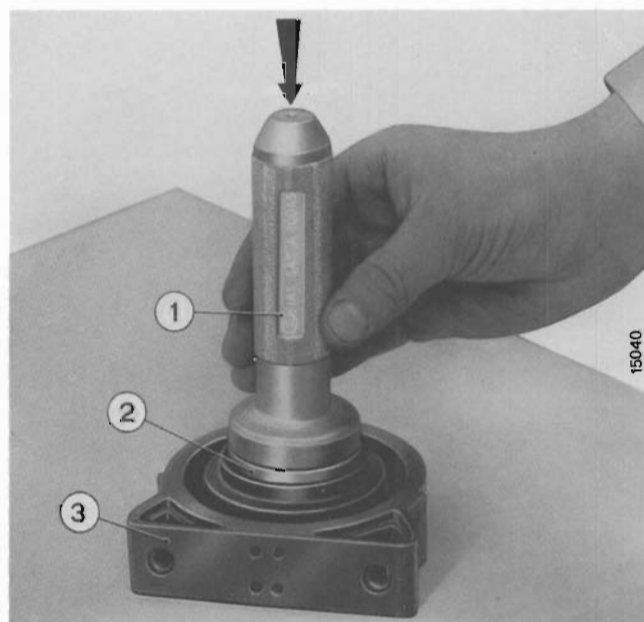
The forked end of joint must be mounted on the differential pinion in accordance with marks made during dismantling.

Resilient middle support

Check the ball bearing for excessive play.

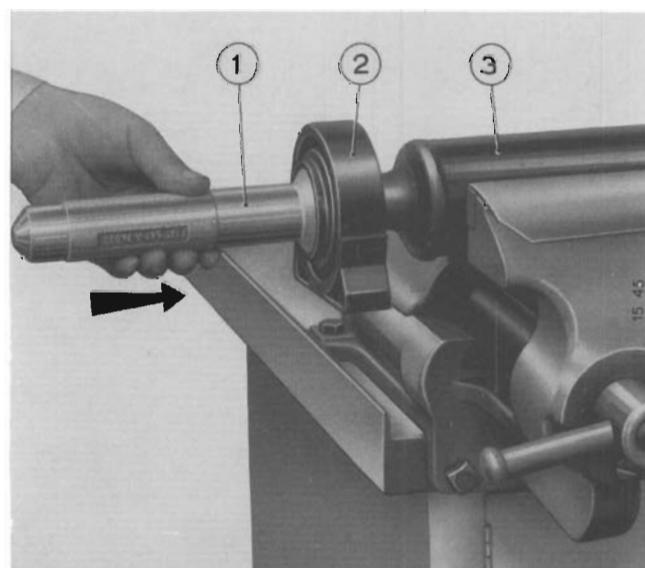
Check that the bearing rotates without appreciable resistance.

Check that the resilient support is not deformed, and that the rubber component still has its original elasticity.



Installation of ball bearing in resilient support with the use of a punch.

1. Punch.
2. Ball bearing.
3. Resilient support



Installation of resilient support on front propeller shaft with the use of a punch.

1. Punch.
2. Resilient support.
3. Front propeller shaft.



Polonez 1300/1500

CATALOGUE
TABLE

REAR AXLE – 27

27	Characteristics and technical data – Bolts and nuts tightening torques
274.01	Rear axle and drive shafts
274.05	Differential mechanism and final drive
27A	Special tools

Rear axle – differential mechanism

27

Polonez Model 1300/1500

Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Type: with load-bearing drive shafts, rear axle housing with tubular sheaths pressed-in from differential side and welded to sleeves from wheel side. Hypoid gear and pinion.	
Ratio: – version with 1300 engine and 4-speed gearbox – version with 1500 engine and 4-speed gearbox – version with 1500 engine and 5-speed gearbox	10/43 10/41 10/43
Thickness of shim for gear and pinion adjustment	2,40 - 2,45 - 2,50 - 2,55 - 2,60 2,65 - 2,70 - 2,75 - 2,80 - 2,85 2,90 - 2,95 - 3,00 - 3,05 - 3,10 3,15 - 3,20 - 3,25 - 3,30 - 3,35 3,40 - 3,45 mm
Gear and pinion bearing torque	1,37 ÷ 1,57 N · m (0,14 ÷ 0,16 kgm)
Thickness of shims for satellite adjustment	0,85 - 0,90 - 0,95 - 1,00 - 1,05 1,10 - 1,15 - 1,20 - 1,25 - 1,30 mm
Differential carrier bearings pre-loading adjustment	By means of fixed shims
Thickness of shims for adjustment of differential carrier bearings pre-loading	6,50 - 6,52 - 6,54 - 6,56 - 6,58 6,60 - 6,62 - 6,64 - 6,66 - 6,68 6,70 - 6,72 - 6,74 - 6,76 - 6,78 6,80 - 6,82 - 6,84 - 6,86 - 6,88 6,90 - 6,92 - 6,94 - 6,96 - 6,98 7,00 - 7,02 - 7,04 - 7,06 - 7,08 7,10 - 7,12 - 7,14 - 7,16 - 7,18 7,20 - 7,22 - 7,24 - 7,26 - 7,28 7,30 - 7,32 - 7,34 - 7,36 - 7,38 7,40 - 7,42 - 7,44 - 7,46 - 7,48 7,50 mm
Expansion of rear axle housing	0,04 ÷ 0,06 mm
Assembling clearance of gear and pinion	0,10 ÷ 0,15 mm

BOLTS AND NUTS TIGHTENING TORQUES

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
Rear wheel brake and bearing carrier plate fastening bolt	1/59709/21	M10×1.25	R80 Znt	49	5
Differential cover fastening bolt	1/13438/20	M10×1.25	R80	51	5.2
Rear axle cover fastening bolt	1/60432/21	M8	R80 Znt	25	2.5
Ring gear fastening bolt	4145197	M10×1.25	40 Ni Cr Mo 2 Bon R120—135	73	7.5
Pinion endpiece fastening nut with crimped flange	1/40442/71	M20×1.25	C40 Norm HB 164—215 Znt (pinion 19 CN 5 Fosf Lub)	176 — 275	18 — 28
Wheel bolt	4388376	M12×1.25	C35 R Bon Crt mat. or R80 Trf Crt mat.	86	8.8
Rear brake bleed screw	4230797	M8	R50 Ind Cdt bright	6.4	0.65
Rear brake yoke fastening bolt	4212564	M10×1.25	R80 Fost black	53	5.4
Coupling of rear brake circuit flexible tubing	4170331	M10×1.25	OOCR Cdt	18	1.8
Coupling of rear brake circuit rigid tubing	4108899	3/8—24 UNF 3A	OOCR Cdt	18	1.8

Rear axle and drive shaft

Polonez Model 1300/1500

274.01

Sheet 1

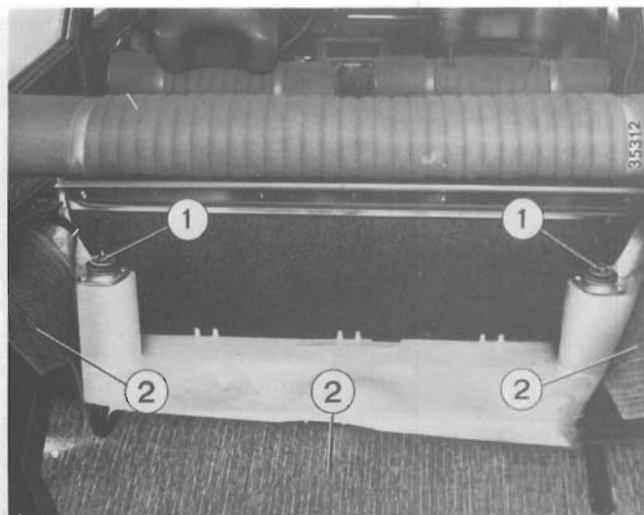
DISMOUNTING AND REASSEMBLY

To dismantle the rear axle assembly, place the vehicle on an asymmetric pillar hoist and carry out first the following two operations:

- open the tailgate and move aside the luggage compartment mat, then unscrew the two nuts securing top part of shock-absorber to the body;
- loosen the rear wheel bolts.

Part view of luggage compartment interior.

1. Shock-absorber to body fastening nuts.
2. Luggage compartment mat.

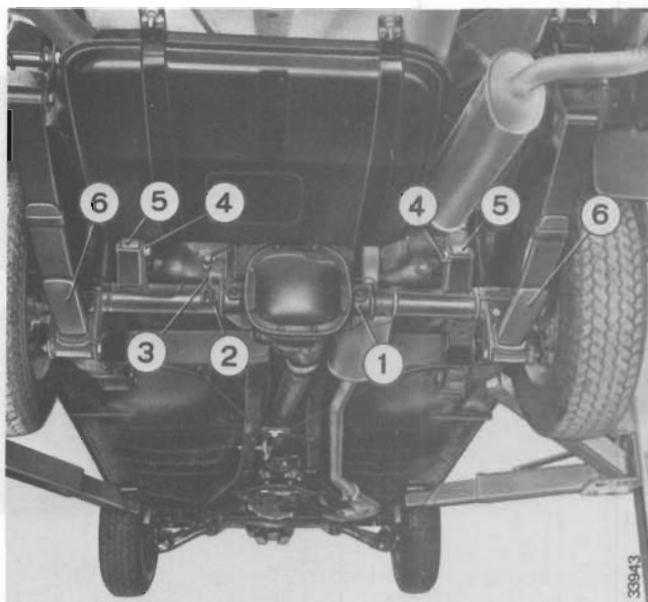


Lift the vehicle so as to obtain free access to chassis subassemblies.

Set up **A.70581** fixture, mounted on the pillar hoist, under differential housing and secure it with the provided clamps.

The remaining operations, required for rear axle dismantling, are as follows and may be carried out in any chosen sequence:

- take off the rear wheel;



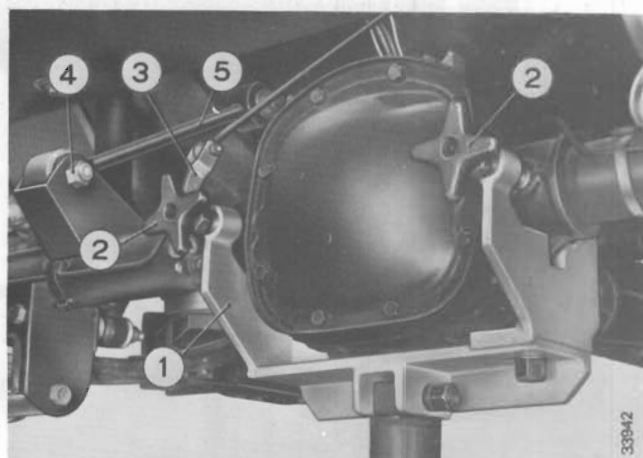
View of vehicle underside.

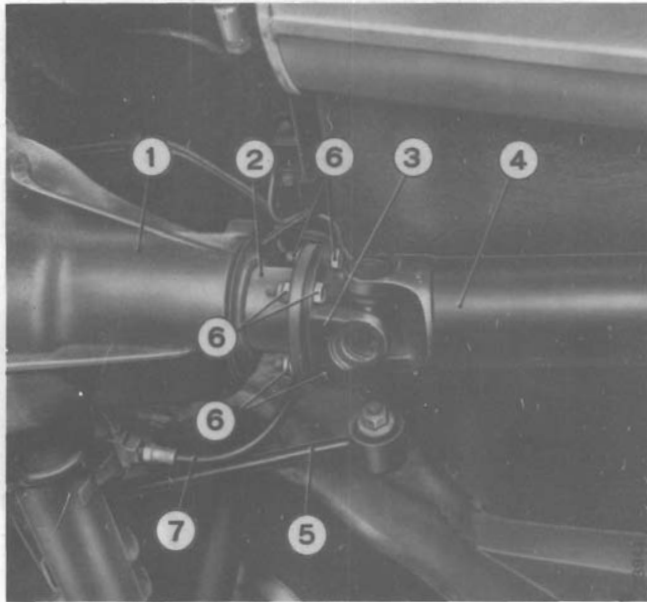
1. Rear axle
2. Link to braking corrector torsion bar fastening bolt.
3. Braking corrector link.
4. Radius rod to rear axle bracket fastening bolts.
5. Radius rods.
6. Leaf springs.

- disconnect rear brake circuit flexible tubing from the rigid tubing;
- remove handbrake cables from levers on yokes and leaf springs;

Dismounting the rear axle (part view)

1. **A.70581** fixture for rear axle support during dismantling and reassembly.
2. **A.70581** fixture clamps for attachment to rear axle.
3. Braking corrector link.
4. Radius rod to rear axle bracket fastening bolt.
5. Radius rod.

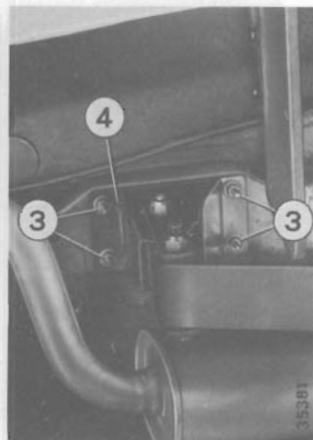
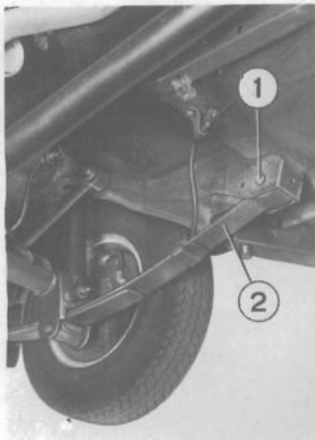




- unscrew the nuts and remove radius rod and braking corrector link to rear axle bracket fastening bolts.

Propeller shaft attachment to rear axle.

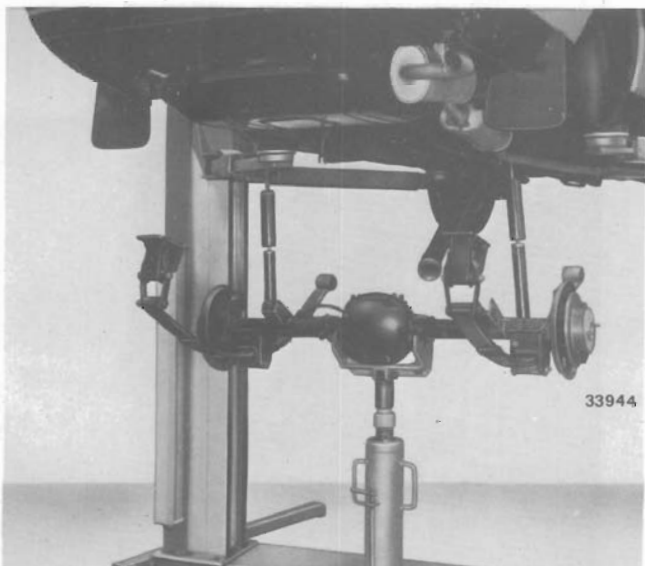
1. Rear axle housing.
2. Flanged end of differential pinion.
3. Propeller shaft forked end.
4. Propeller shaft.
5. Radius rod.
6. Flanged differential pinion end to propeller shaft Cardan joint fastening bolts and nuts;
7. Rear brake circuit flexible tubing.



- unscrew the nuts and remove propeller shaft to differential pinion flanged end fastening bolts;
- unscrew the nuts and remove leaf spring front end to body fastening bolts;
- unscrew the nuts of rear leaf spring brackets to body fastening studs;

Leaf spring front and rear end suspensions.

1. Leaf spring front end to body fastening bolt.
2. Leaf spring.
3. Leaf spring rear end bracket to body fastening nuts.
4. Leaf spring rear end bracket.



Lower slowly the jack with the rear axle resting on it. To reassemble the rear axle, reverse the above described operations.

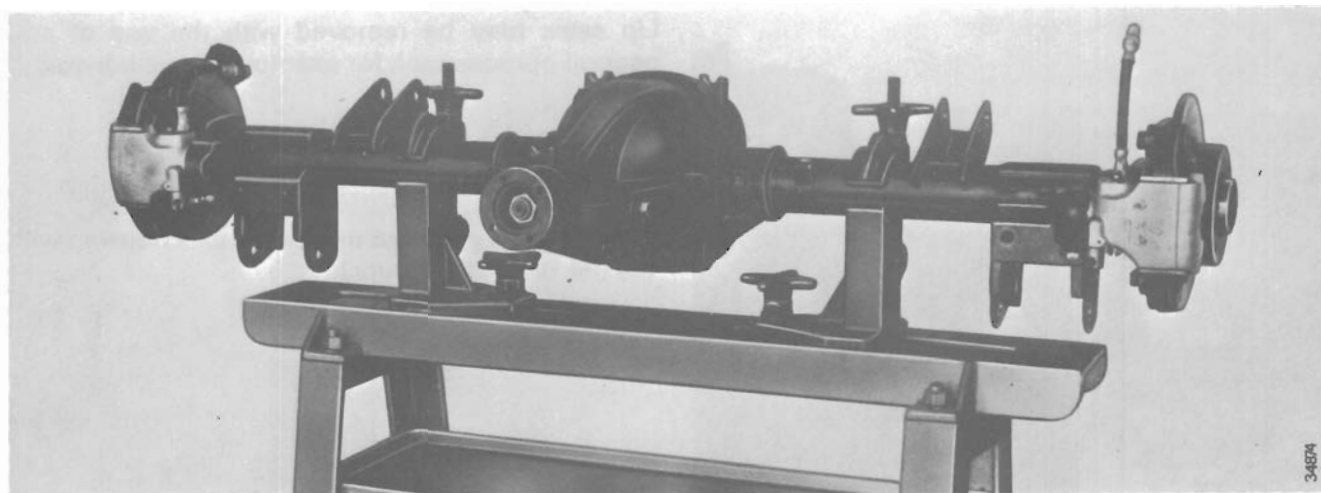
Removing the rear axle

Rear axle and drive shafts

Polonez Model 1300/1500

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Sheet 2



Rear axle mounted on Ar. 22210 stand.

DISMANTLING

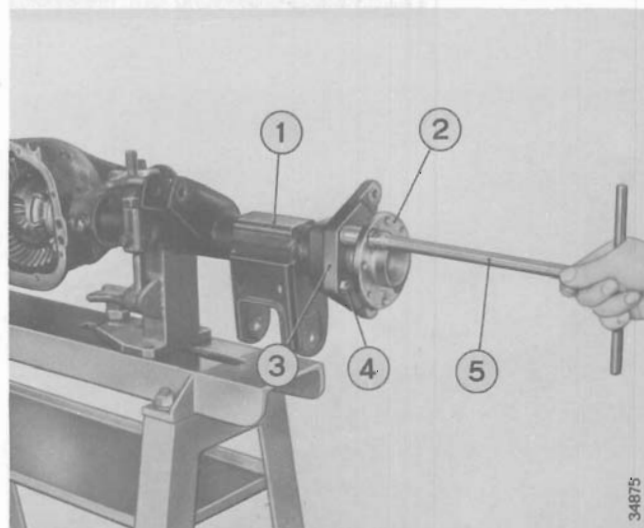
After dismantling the leaf springs, shock-absorbers, and rigid brake tubing together with three-way coupling, mount the rear axle on **Ar.22210** stand and secure with clamps.

Carry out the following operations:

- remove the plug and drain oil from rear axle housing;

Dismantling brake carrier plate.

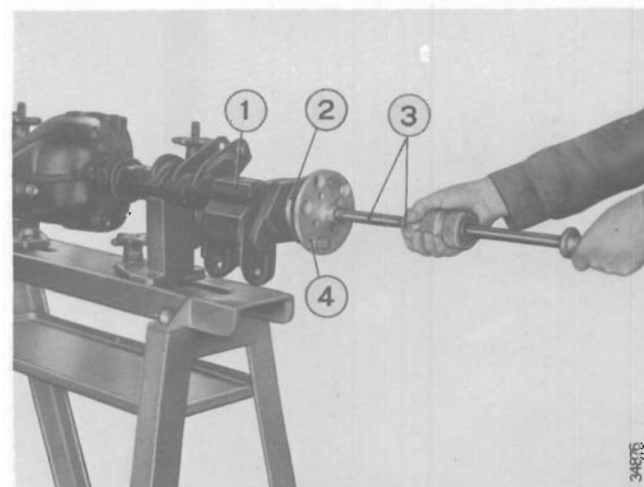
1. Rear axle housing.
2. Drive shaft.
3. Brake carrier plate.
4. Brake carrier plate to rear axle housing fastening bolts.
5. Articulated socket spanner.

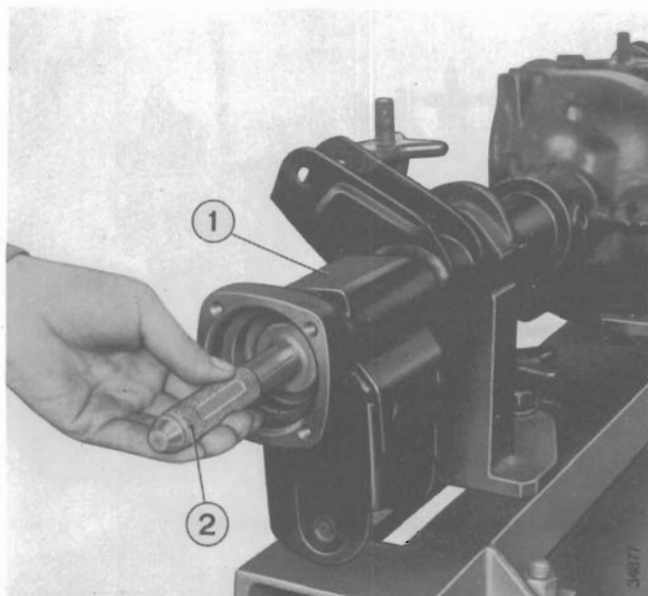


- dismount dust shields by unscrewing their fastening bolts;
- remove cotter pins and dismount brake yoke guides;
- remove brake yokes, friction pads and pressure springs;
- unscrew brake yoke to carrier plate fastening bolts to dismount yokes;
- dismount brake discs;
- unscrew brake carrier plate to rear axle housing fastening bolts.

Removing right-hand drive shaft with the use of A.47017/1 inertia puller.

1. Rear axle housing.
2. Drive shaft.
3. A.47017/1 inertia puller.
4. A.47017/5 flange.





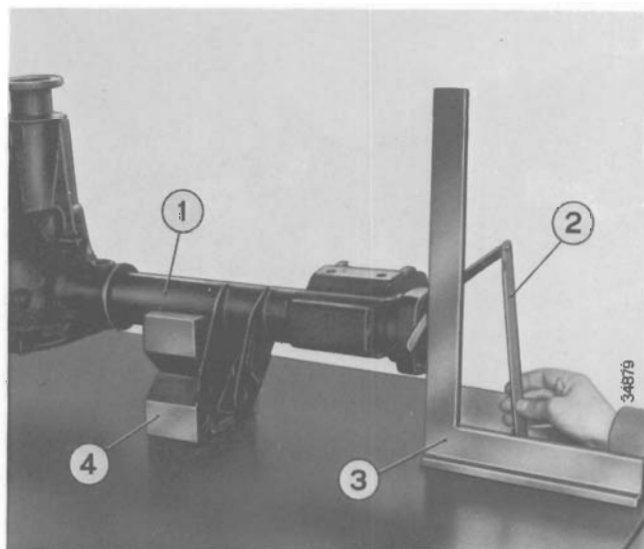
Lip seals may be removed with the use of any general-purpose tool, for example, a screwdriver.

REASSEMBLY

New lip seals are fitted in the rear axle housing with the use of **A. 70157** punch.

Fitting new drive shaft lip seals in rear axle housing.

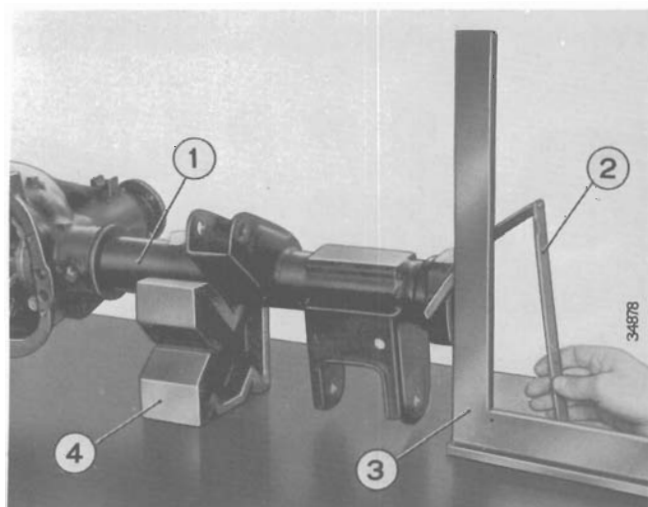
1. Rear axle housing.
2. **A. 70157** punch.



The remaining rear axle components are reassembled by suitably reversing the operations required for their dismantling.

Checking rear axle housing squareness in the vertical plane with the use of a feeler gauge.

1. Rear axle housing.
2. Feeler gauge.
3. Square.
4. **A. 95730** Vee-blocks.



In order to check the squareness of rear axle housing, mount it on **A. 95730** Vee-blocks and apply a square to the face of brake carrier plate attachment flange as shown in the picture. In this position, the square should adhere accurately to the flange. The permissible deviation, measured with a feeler gauge, is 0.20 mm.

Next, turn the rear axle housing through 90° and repeat the above described procedure to check rear axle housing squareness in the horizontal plane.

Checking rear axle housing squareness in the horizontal plane.

1. Rear axle housing.
2. Feeler gauge.
3. Square.
4. **A. 95730** Vee-blocks.

Rear axle and drive shafts

Polonez Model 1300/1500

274.01

Sheet 3

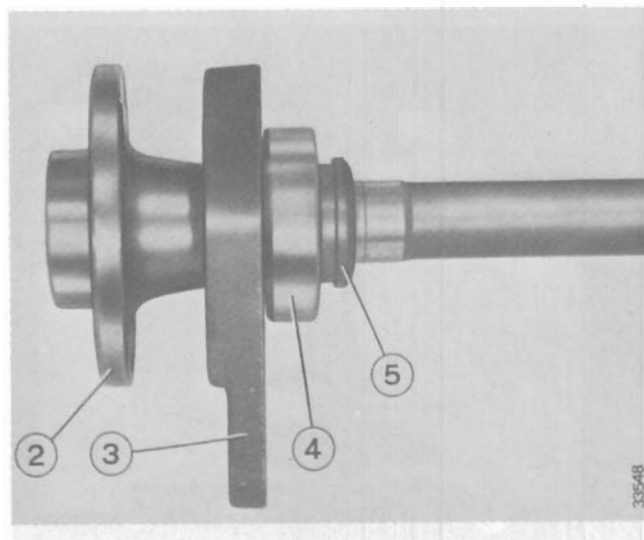
Checking the drive shafts

Check the condition of drive shaft assembly components and make sure that:

- the ball bearing is not worn or damaged;
- ball bearing locating ring and the ball bearing are not displaced from their correct position on the drive shaft.

Drive shaft assembly (part view).

2. Drive shaft.
3. Brake carrier plate.
4. Ball bearing.
5. Ball bearing locating ring.



- the ball bearing adheres to drive shaft locating shoulder and the locating ring adheres accurately to the bearing;
 - the drive shaft is not deformed and its surface and splines are not damaged.
- If such faults are detected, the defective components must be replaced.

Operate the press to force the ball bearing onto the drive shaft until it rests against the shoulder face. Place a new locating ring in the seat of **A.74107/4** fixture and heat in a furnace to about 300°C.

NOTE: Ball bearing locating rings must on no account be reused. If the ring was displaced on the drive shaft or removed, it must be replaced with a new one.

Dismantling the drive shaft

The locating ring and ball bearing are stripped from the drive shaft with the use of **A.74108/1** fixture equipped with **A.74108/10** half-rings. This operation is carried out in a press as shown in the picture.

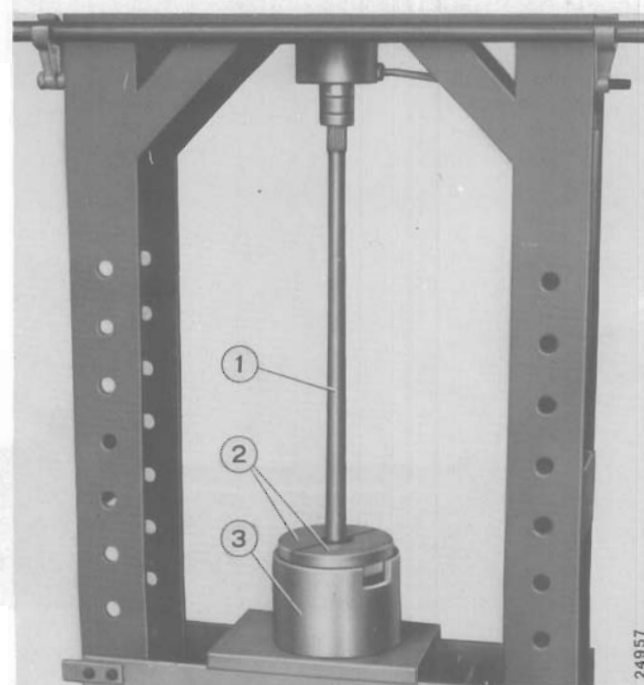
Check whether the ball bearing mounting place on the drive shaft is free from scratches and other damages. Otherwise, the complete drive shaft must be replaced.

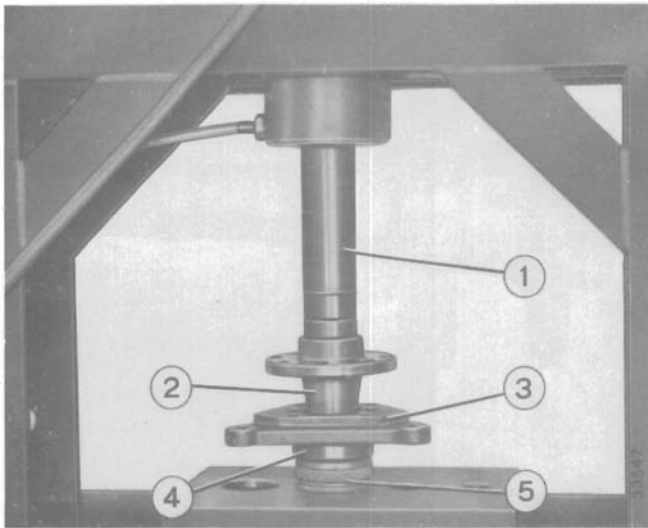
Drive shaft reassembly

Mount brake carrier plate and ball bearing on the drive shaft and place it in the fixture with the flange upper-most, near to the press ram. The ball bearing must rest with its both surfaces on the press platen.

Dismounting drive shaft ball bearing locating ring.

1. Drive shaft.
2. **A.74108/10** half-rings.
3. **A.74108/1** fixture.

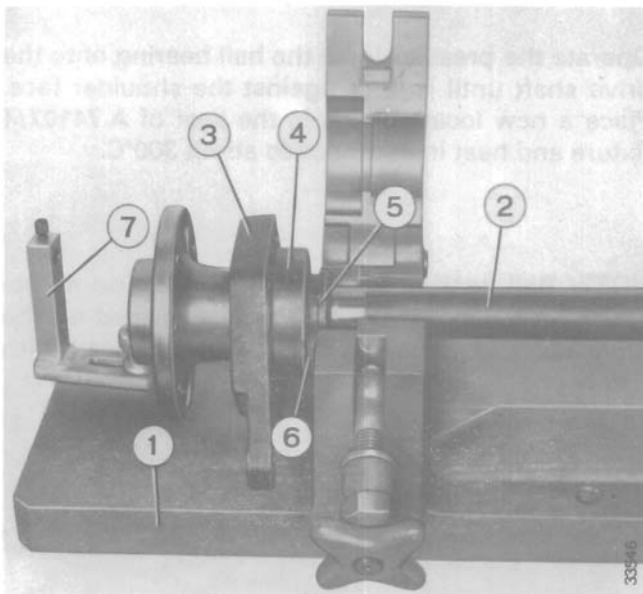




After establishing the proper height of press ram, move the jig with the drive shaft to one side of press platen. Remove the socket with ring from the furnace and place it on the platen with the ring oriented upwards.

Mounting bearing retaining ring on drive shaft.

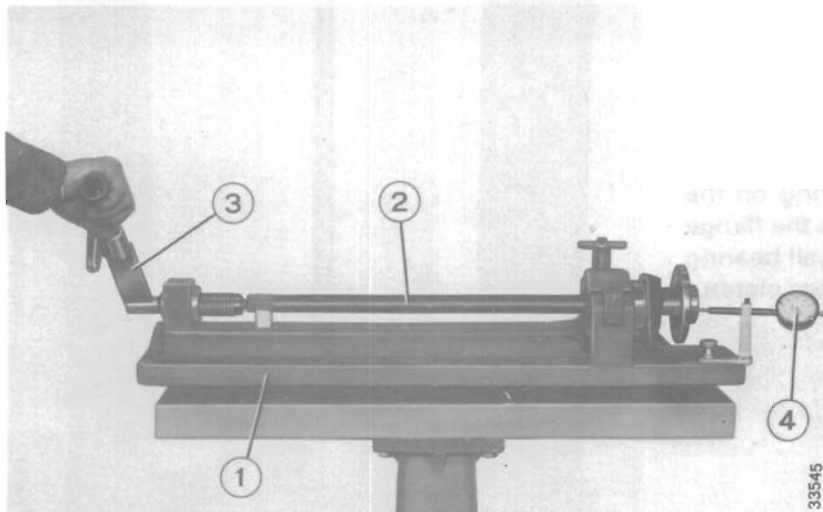
1. Press ram.
2. Drive shaft.
3. Brake carrier plate.
4. Ball bearing.
5. Socket of A. 47107/4 fixture.



Insert drive shaft into the ring without allowing it to cool down below 220–240°C, and set beneath press ram. Push the ring home using a force not exceeding 6,000 kg until bearing inner race is clamped between the retaining ring and drive shaft thrust flange. Prior to mounting the drive shaft in rear axle housing, check the axial thrust required to dislodge the retaining ring. Mount the drive shaft in A.95601 fixture equipped with A.95601/10 spacer and a dial gauge.

Drive shaft assembly mounted in A. 95601 fixture.

1. A.95601 fixture.
2. Drive shaft.
3. Brake carrier plate.
4. Bearing
5. Bearing retaining ring.
6. A. 95601/10 spacer.
7. Dial gauge holder.



Set the dial gauge to zero and then apply load to the drive shaft by turning the screw of the fixture with a torque spanner and a torque of 78.4–83.4 Nm (8–8.5 kgm). When the load is removed, dial gauge pointer should return to zero, which means that the retaining ring had withstood an axial thrust of 2,000 kg without moving on the drive shaft.

Checking the thrust required to move bearing retaining ring on the drive shaft.

1. A. 95601 fixture.
2. Drive shaft.
3. Torque spanner.
4. Dial gauge.

Differential mechanism and final drive

Polonez Model 1300/1500

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Sheet 1

Dismounting the differential mechanism

Place the rear axle on **Ar. 22210** stand. Drain oil and remove both drive shafts, then unscrew rear axle housing cover fastening bolts.

Final drive and differential mechanism.

1. Satellite.
2. Satellite pivot.
3. Drive shaft pinion.
4. Differential bearing cover fastening bolts.
5. Differential bearing covers.
6. Rear axle housing.
7. Final drive pinion.
8. Differential carrier.
9. Final drive gear.

Unscrew bolts (4) fastening differential bearing covers (5) to rear axle housing (6).

To remove the differential carrier from rear axle housing perform the following operations

- mount **A.95753** device on rear axle housing, placing its dowels in appropriate holes with the expander unfastened;
- secure the device to rear axle housing, using the cover fastening bolts;

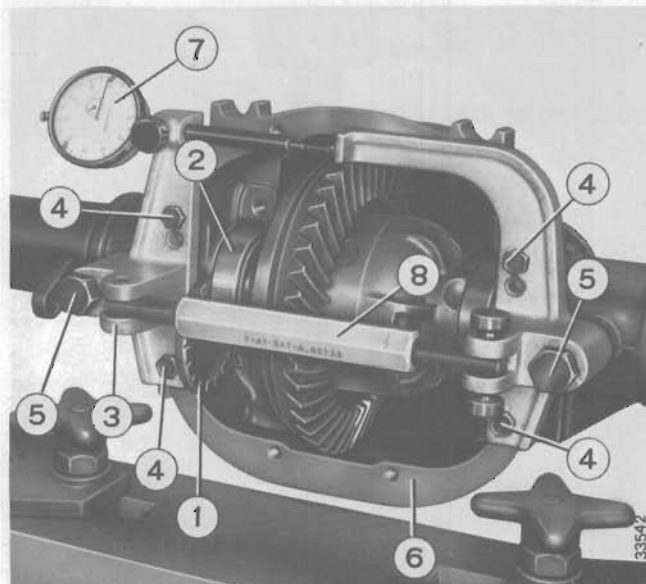
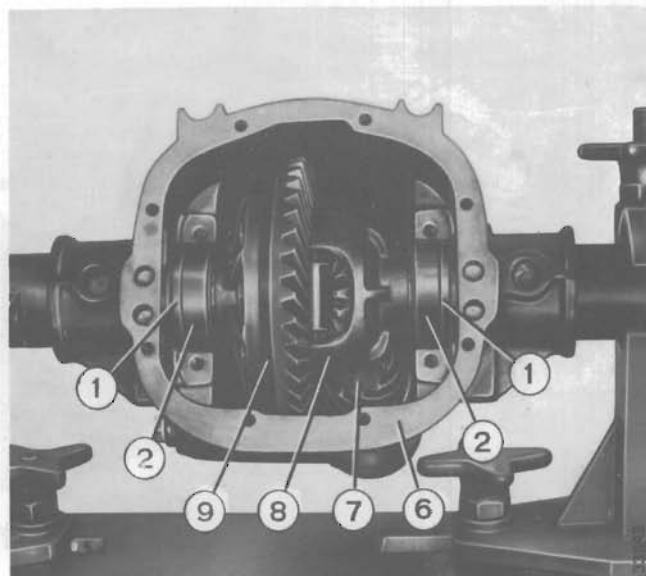
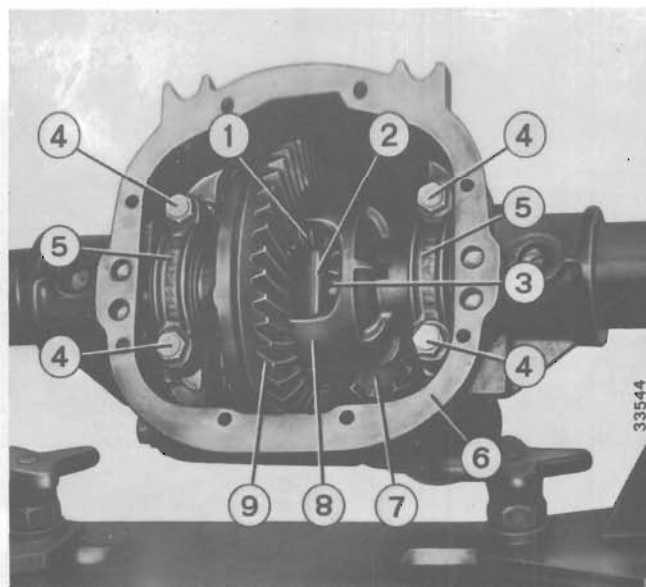
Final drive and differential mechanism.

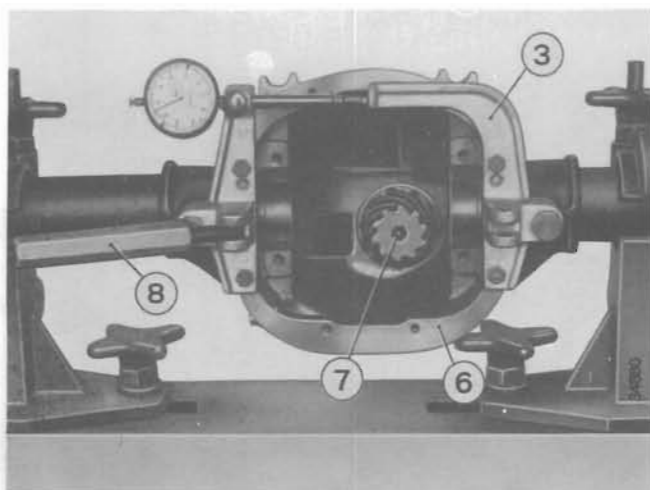
1. Differential carrier taper bearing pre-loading shims.
2. Differential carrier taper roller bearings.
6. Rear axle housing.
7. Final drive pinion.
8. Differential carrier.
9. Final drive gear.

- tighten side locking bolts using a torque not exceeding 9.81 Nm (1 kgm).
- insert the expander pin and tighten it with the knurled thumbscrew;
- set the dial gauge pointer to zero;
- expand the rear axle housing by 0.6–0.8 mm by turning the hexagonal expander with a spanner in the direction indicated by arrow;

Mounting **A.95753** device on rear axle housing.

1. Differential carrier taper roller bearing pre-loading shims.
2. Differential carrier taper roller bearing.
3. **A. 95753** device.
4. **A. 95753** device to rear axle housing fastening bolts.
5. Side bolts for locking the device.
6. Rear axle housing.
7. Dial gauge for measuring rear axle housing expansion.
8. Expander of **A. 95753** device.

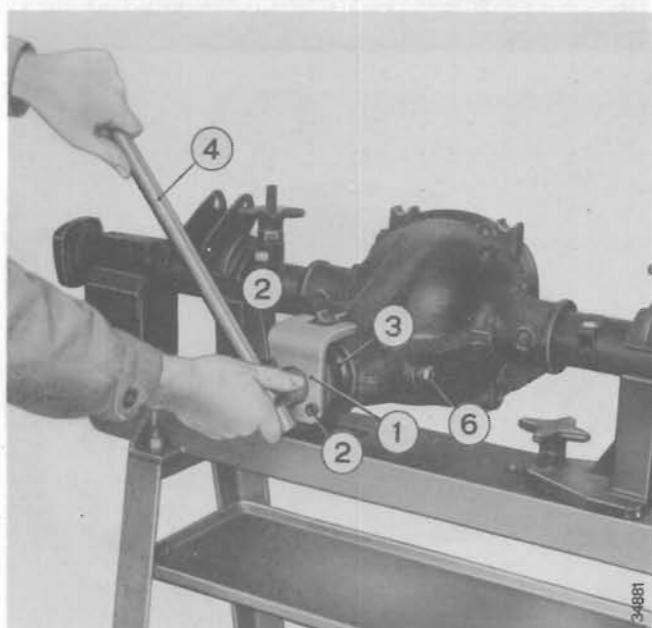




- remove differential carrier bearings pre-loading shims;
- release the housing by turning the expander in a direction opposite to the arrow, and swing the expander away to position indicated in the picture, after unscrewing the pin with knurled thumb-screw;
- remove the complete differential mechanism from rear axle housing.

Rear axle housing with differential mechanism removed.

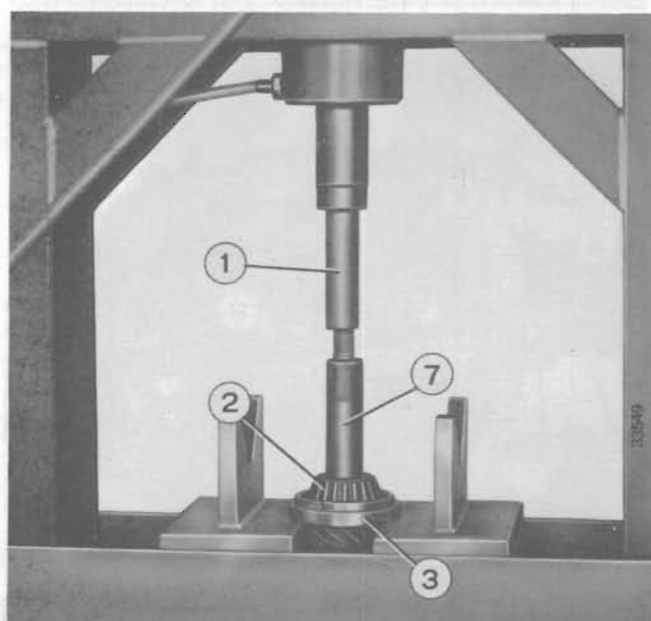
3. A. 95753 device.
6. Rear axle housing.
7. Final drive pinion.
8. Expander of A. 95753 device.



To dismount final drive pinion from rear axle housing, mount **A.70341** device on pinion flanged end and unscrew the fastening nut (see picture). Pinion taper bearing outer-races are removed from the housing with the use of a suitable brass punch.

Unscrewing flange to pinion fastening nut.

1. A. 70341 device for flange immobilising.
2. Bolts fastening A. 70341 device to pinion flange.
3. Pinion flange.
4. Spanner.
6. Rear axle housing.



The rear taper bearing inner race is stripped from the pinion on a hydraulic press with the use of **A. 45009** bushing.

Stripping taper bearing inner race from pinion.

1. Hydraulic press.
2. Pinion rear taper bearing inner race.
3. A. 45009 bushing.
7. Final drive pinion.

Differential mechanism and final drive

Polonez Model 1300/1500

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Sheet 2

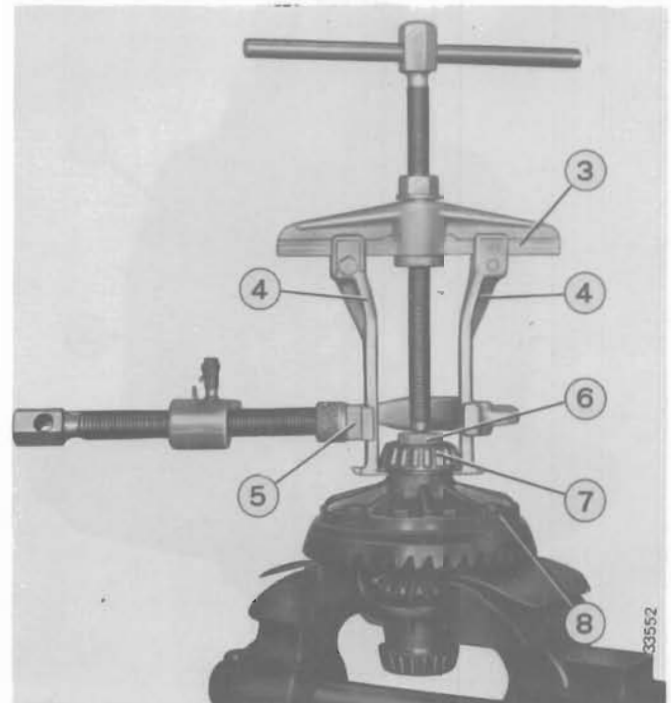
Inspection

Prior to inspection, all components should be thoroughly washed. Check the wear of all teeth and their correct meshing. If excessive wear is found, replace the components concerned. If the gears did not mesh correctly, find the reason.

If damage on teeth surface of drive shaft pinions or satellites is detected, the damaged gear must be replaced. Also, make sure that the mating gear is not damaged.

Stripping differential carrier inner bearing races.

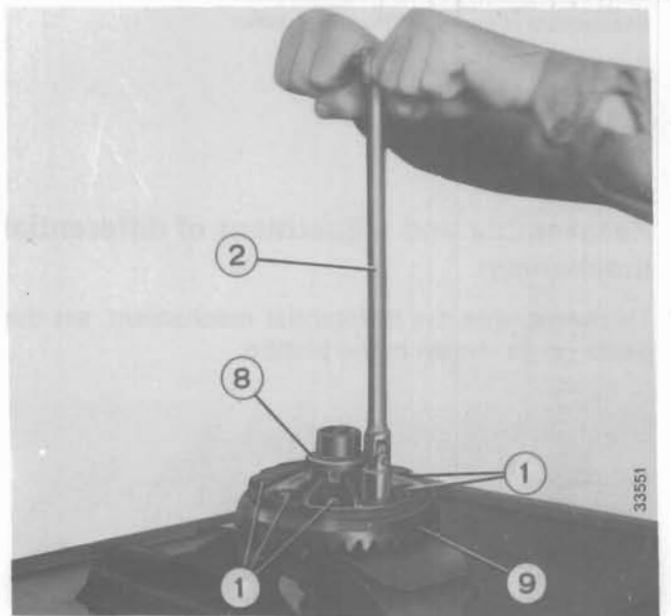
3. A. 450005/002 puller.
4. A. 450005/302 puller arms.
5. A. 45005/400 clamp.
6. A. 45027 bushing.
7. Differential carrier inner bearing race.
8. Differential carrier.



Check the pinion bearings. If there is the slightest doubt regarding their correct operation, the bearings must be replaced, otherwise excessive noise or teeth damage might result.

Check drive shaft pinion thrust faces, and replace the pinions, if necessary.

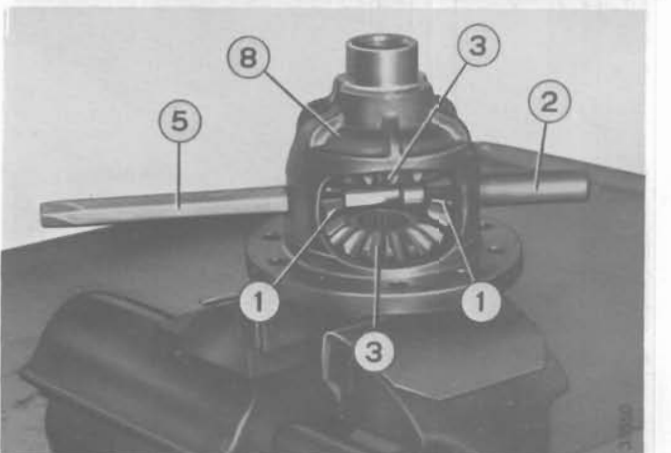
Spare drive shaft pinion shims are supplied with a thickness of 0.85–1.30 mm, graded every 0.05 mm.



Unscrewing ring gear to differential carrier fastening bolts.

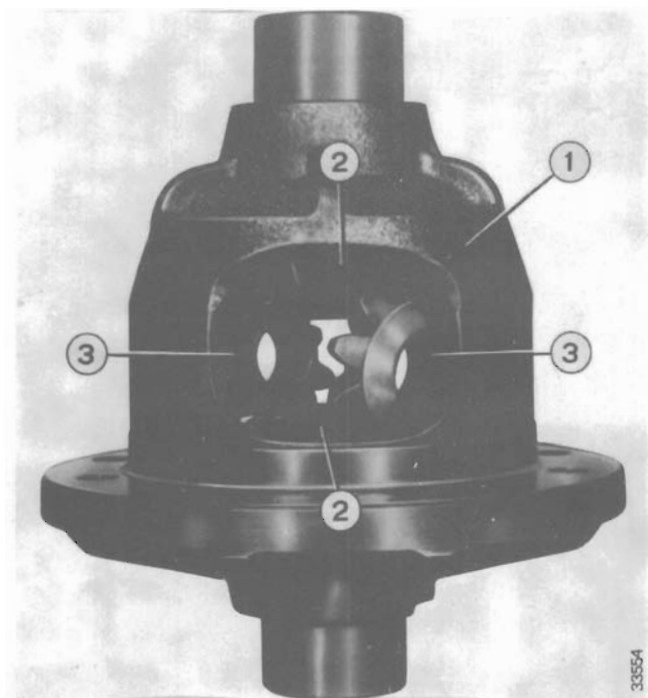
1. Ring gear fastening bolts.
2. Articulated socket spanner.
8. Differential carrier
9. Ring gear.

Check that rear axle housing and differential carrier are not deformed or cracked; if so, they must be replaced.



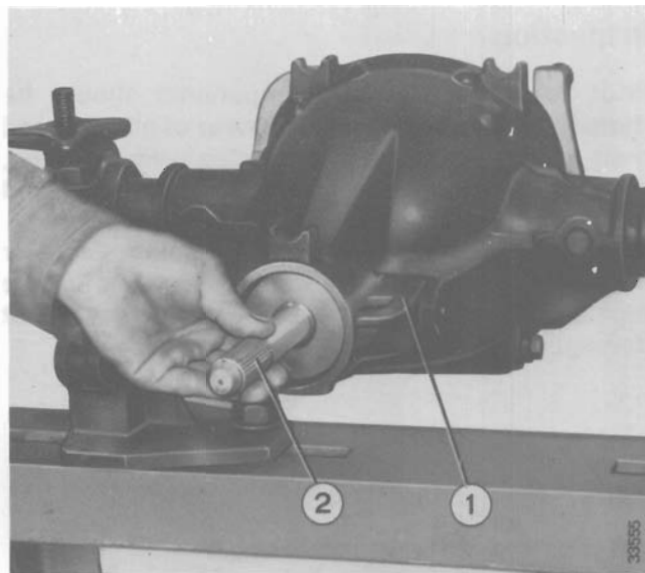
Punching out satellite pivot from differential carrier.

1. Satellites.
2. Satellite pivot.
3. Drive shaft pinion.
5. Punch.
8. Differential carrier.



Reassembly of gears in differential carrier

1. Differential carrier.
2. Drive shaft pinions.
3. Satellites.



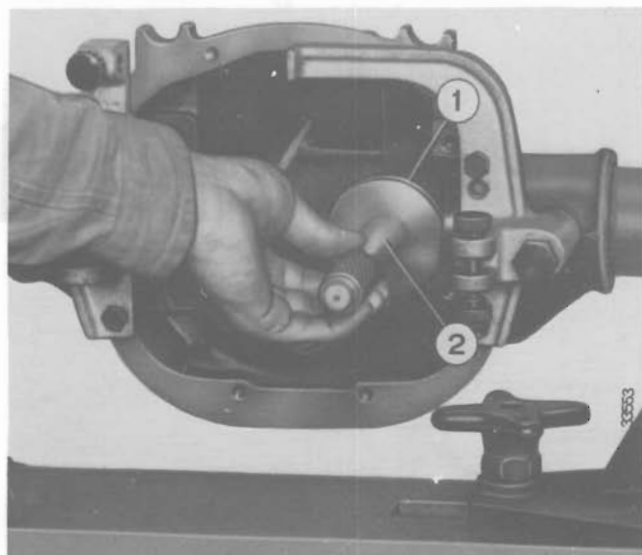
Mounting pinion front bearing outer race.

1. Rear axle housing.
2. A. 70173 punch.

Reassembly and adjustment of differential mechanism

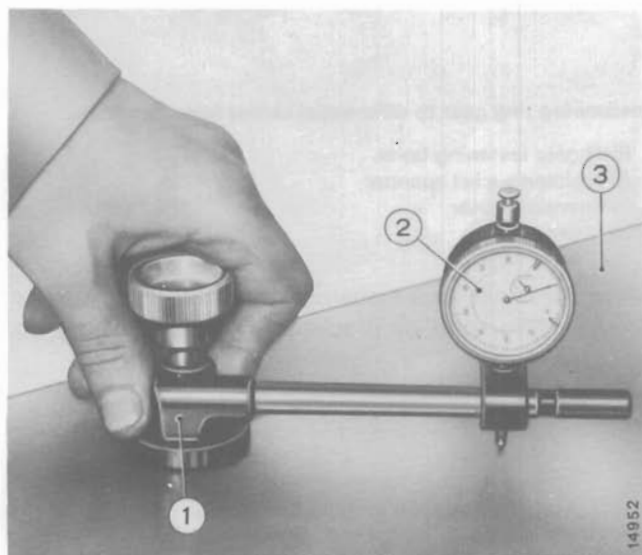
To reassemble the differential mechanism, set the gears up as shown in the picture.

Check with a dynamometer that the torque required for turning one drive shaft, with the other locked and the differential carrier rotating freely, is 2.94 – 4.90 mN.m (300–500 kgcm), otherwise replace drive shaft pinion shims as required.



Mounting pinion rear bearing outer race.

1. Pinion rear taper bearing outer race.
2. A. 70173 punch.



Zeroing A. 95690 dial gauge on a layout block.

1. Dial gauge base.
2. A.95690 dial gauge.
3. Layout block.

Differential mechanism and final drive

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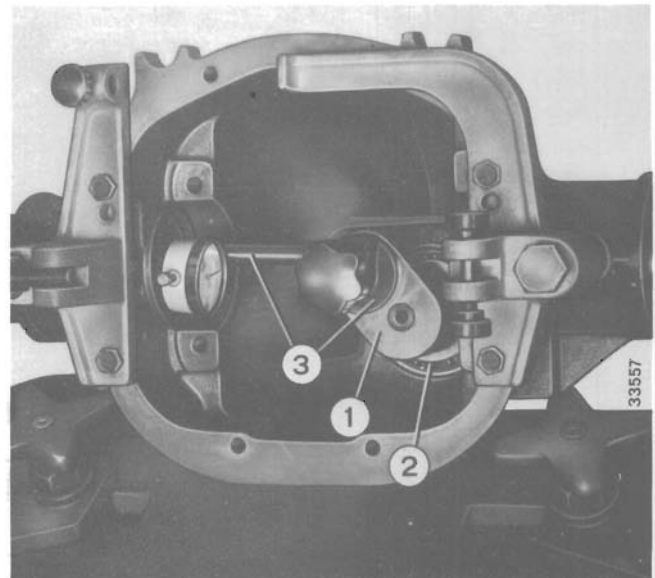
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Sheet 3

Prior to mounting the final drive pinion in rear axle housing, make the measurement required to define the thickness of pinion rear bearing shim. For this purpose use **A.70371** master pinion and mount it in the housing in the same way as the working pinion, omitting the expanding sleeve between bearings. Fasten the flange to master pinion with a flat washer and nut, and then turn the master pinion a few times to align the bearings, and tighten the nut.

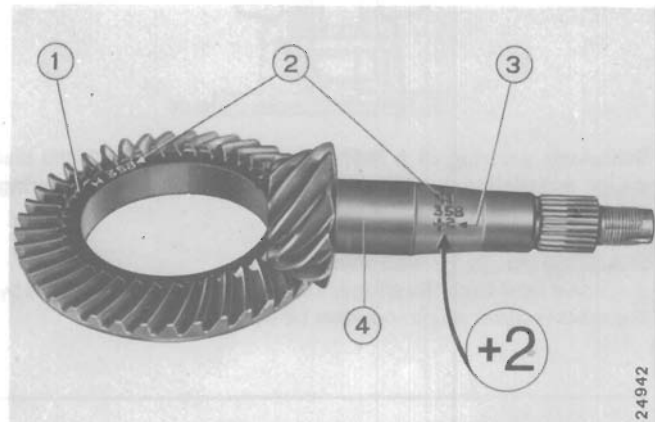
Measuring thickness of pinion rear bearing shim.

1. **A.70371** master pinion.
2. Pinion rear bearing.
3. Stand with **A.95690** dial gauge.



Final drive gear and pinion set.

1. Ring gear.
2. Production serial number and number of set.
3. Difference between assembly and real distance expressed in 0.01 mm.
4. Pinion.

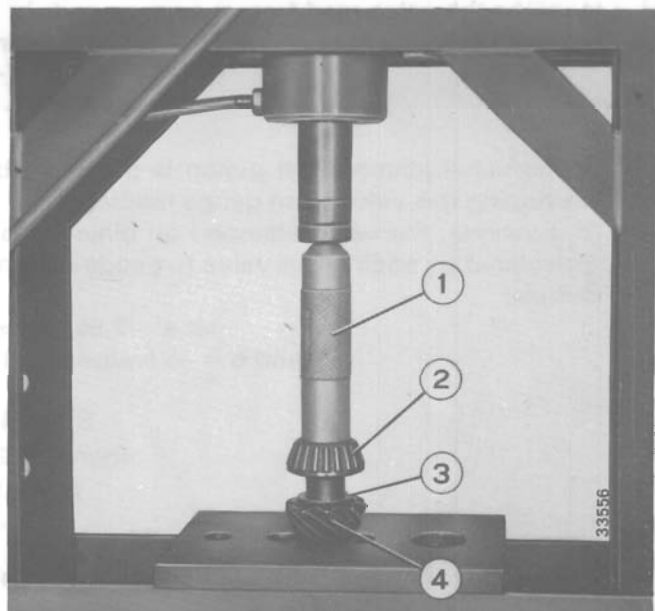


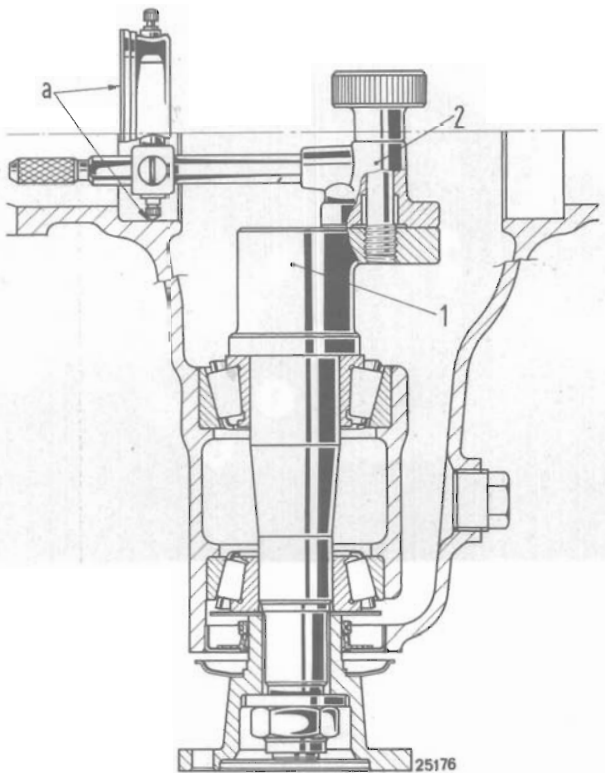
NOTE: Spare gears and pinions are supplied in matched sets. If one of them is damaged, the complete set must be replaced.

Mounting rear bearing inner race on pinion.

1. **A.70152** device.
2. Rear bearing inner race.
3. Thrust ring.
4. Pinion.

Pinion rear bearing shim spares are supplied with thicknesses from 2.40 to 3.45 mm, graded every 0.05 mm.



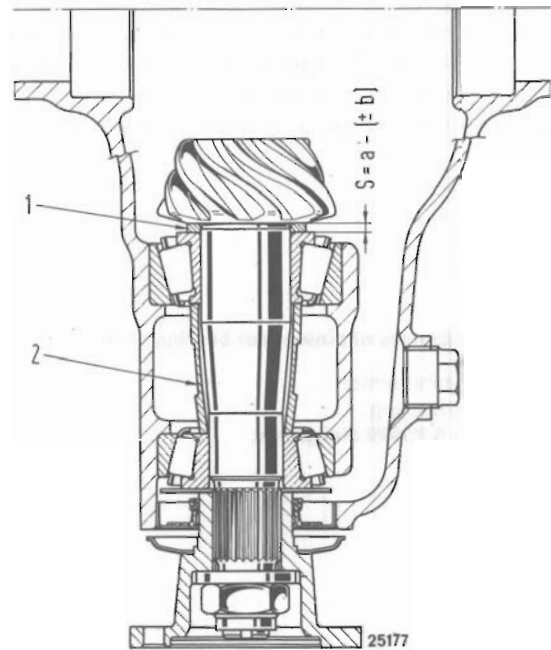


Schematic drawing of A.70371 master pinion and A.95690 dial gauge installation for defining thickness of pinion rear bearing shim.

1. A.70371 master pinion.

2. A.95690 dial gauge with stand.

a = value read from the gauge, from which the value stamped by the manufacturer on pinion must be deducted.



Schematic drawing of final drive pinion.

S = pinion rear bearing shim thickness.

a = value read from the gauge.

b = value stamped by the manufacturer on pinion.

1. Rear pinion bearing shim.

2. Resilient distance sleeve.

Example for defining thickness of pinion rear bearing shim.

Let „a” be the value read from the gauge and „b” – the value stamped by the manufacturer on pinion. The shim thickness is calculated from the following formula:

$$S = a - (+b) = a - b$$

$$\text{or } S = a - (-b) = a + b$$

Thus:

- if the value stamped on pinion is preceded by a plus (+) sign, shim thickness is calculated by deducting this value from gauge reading;
- if, however, the value stamped on pinion is preceded by a minus (–) sign, the shim thickness is calculated by adding this value to gauge reading.

Example:

let a = 2.90 (value read from gauge),
and b = –5 (value in 0.01 mm stamped on pinion).

$$\text{Since } S = a - (-b)$$

$$\text{then } S = 2.90 - (-0.05)$$

$$S = 2.90 + 0.05$$

$$S = 2.95$$

In this case a shim 2.95 mm thick should be installed.

Differential mechanism and final drive

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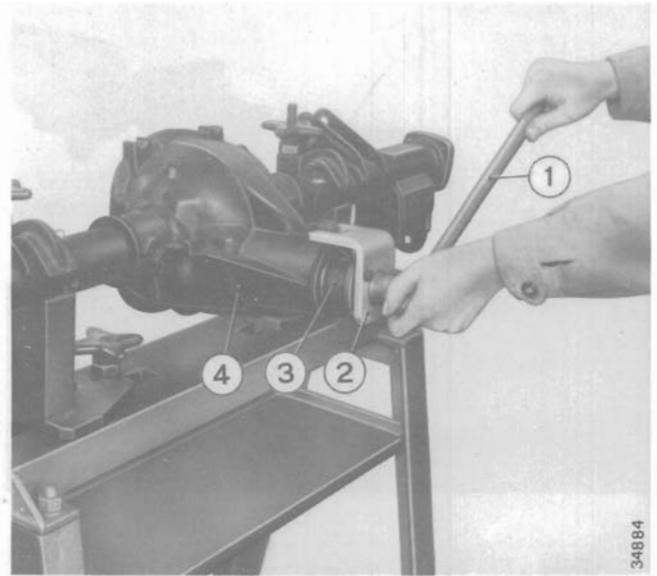
Sheet 4

Use a hydraulic press and **A.70152** punch to mount rear bearing inner race on pinion, after checking that a suitable shim has been mounted.

With the use of a punch, mount lip seal in rear axle housing. Place pinion in rear axle housing, mount the flange and immobilise it by means of **A.70341** device, then tighten the nut with a torque of 176–275 Nm (18–28 kgm).

Tightening flange to pinion fastening nut.

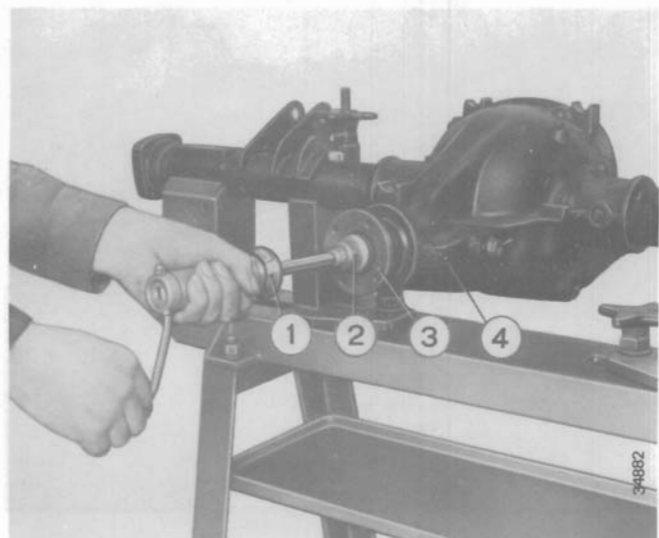
1. Spanner.
2. **A.70341** device for flange immobilising.
3. Pinion flange.
4. Rear axle housing.



Use **A.95697** dynamometer to check the torque required to turn the pinion. This torque must be within the limits of 1.37–1.57 N.m (0.14–0.16 kgm).

Checking the torque required for pinion turning (checking pre-loading of pinion bearings)

1. **A.95697** dynamometer.
2. Socket spanner.
3. Pinion flange.
4. Rear axle housing.



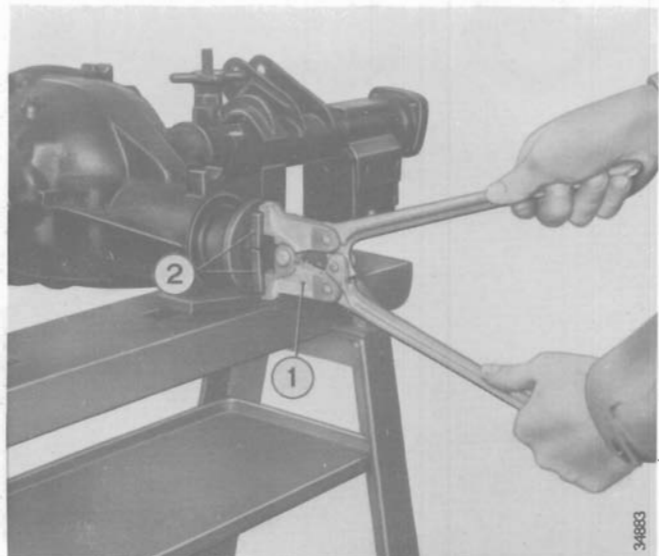
Bear in mind that, while assembling this type of rear axle equipped with an expanding sleeve, this nut must never be unscrewed.

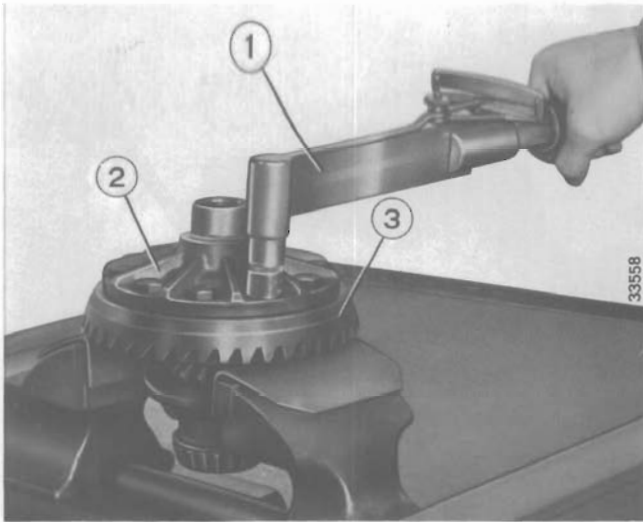
If the check reveals that the torque required for turning the pinion exceeds the permissible value for any reason whatsoever, the assembly operations must be repeated with the use of a new expanding sleeve, and the checking carried out again.

The nut securing the flange to pinion must be crimped in places where notches are milled in pinion end.

Crimping flange to pinion fastening nut.

1. **A.74140/1** crimping pliers.
2. **A.74140/9** bits.

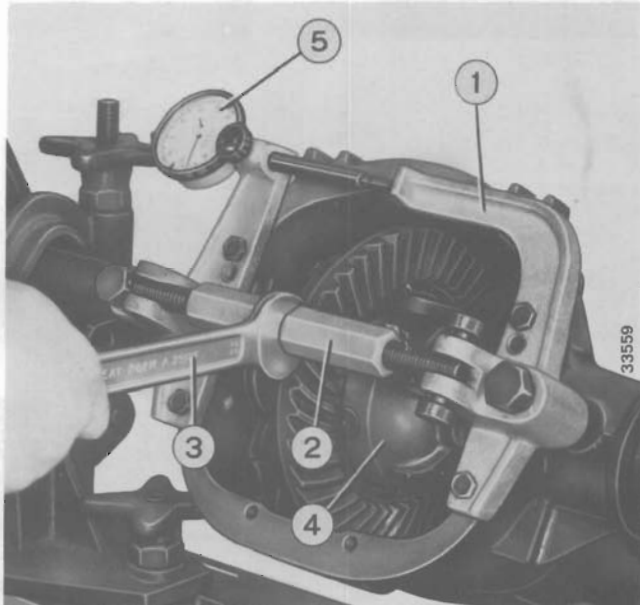




Place the ring gear upon differential carrier and fasten with bolts using a torque of 73.5 Nm (7.5 kgm). Using a brass punch, mount both bearing inner races on differential carrier.

Tightening ring gear to differential carrier fastening bolts.

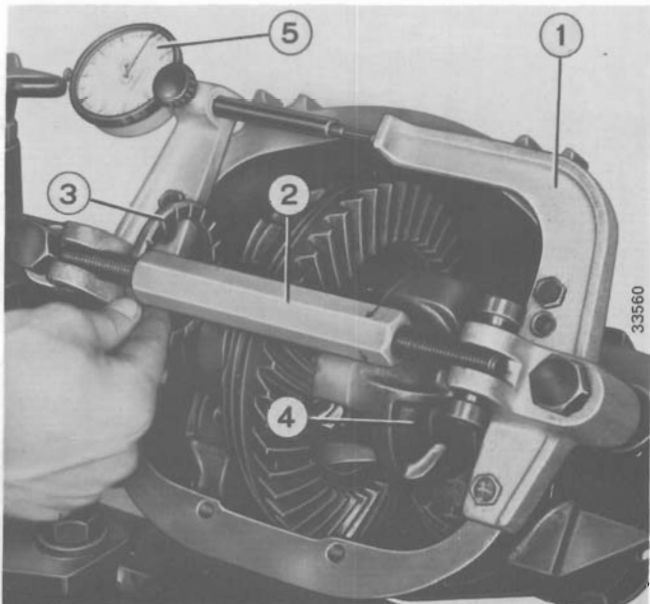
1. Torque spanner.
2. Differential carrier.
3. Ring gear.



Place the differential mechanism in rear axle housing. Mount **A.95753** fixture on rear axle housing. Set dial gauge to zero and expand the housing by 0.6–0.8 mm by turning the expander; mount pre-loading shims. The thickness of these shims should be such as to pre-load the bearings by 0.04–0.06 mm when the expander is released. This value may be read from dial gauge (5).

Expanding rear axle housing.

1. **A.95753** fixture.
2. Expander of **A.95753** fixture.
3. Spanner.
4. Rear axle housing.
5. Dial gauge for checking rear axle housing expansion.



Inserting bearing pre-loading shims.

1. **A.95753** fixture.
2. Expander of **A.95753** fixture.
3. Bearing pre-loading shim.
4. Rear axle housing.
5. Dial gauge for checking rear axle housing expansion.

Differential mechanism and final drive

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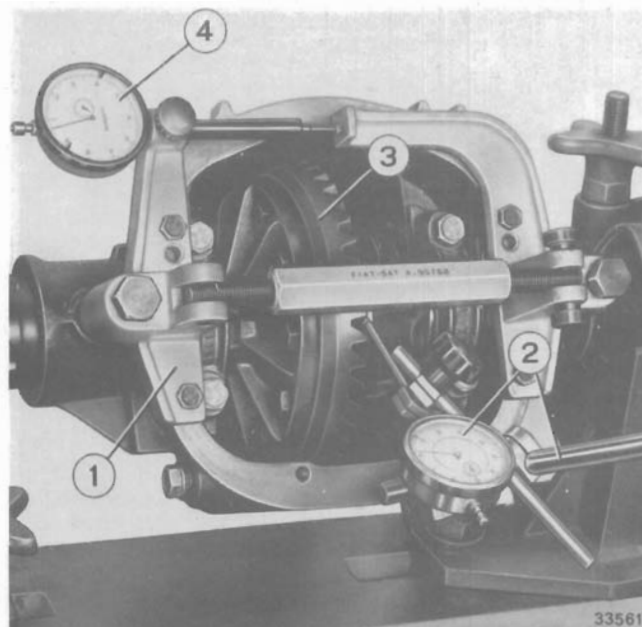
274.05

Sheet 5

Mount both differential bearing covers and secure them with bolts.

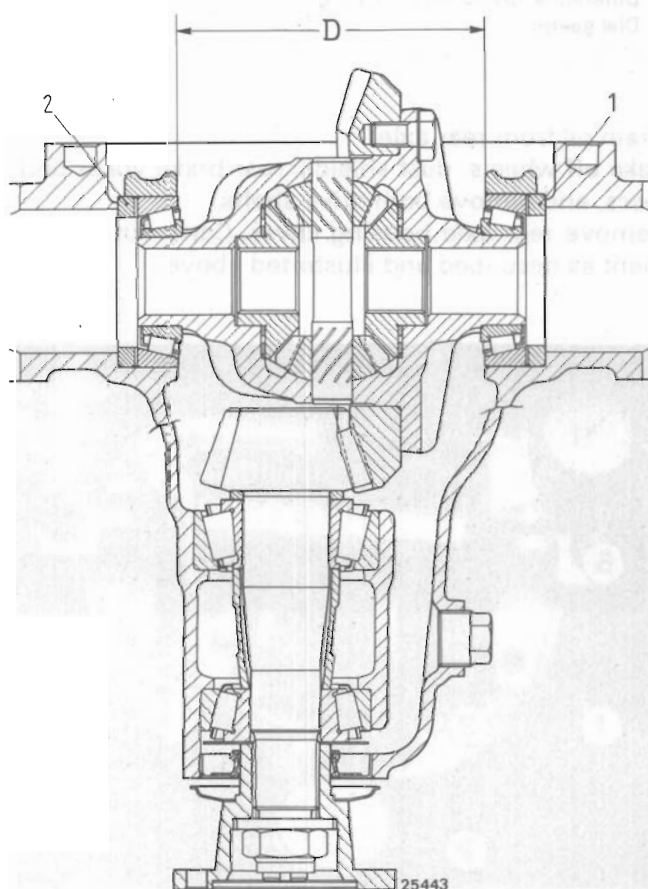
Use **A.95684** dial gauge with magnetic stand to measure final drive backlash. It should be 0.10–0.15 mm. This value may be obtained by suitably dividing for both sides the summary thickness of pre-loading shims, without changing bearing pre-loading.

The shims should be selected from spare shims supplied in various thicknesses. If a shim with the required thickness is unavailable, use the next thicker size. After mounting a shim of correct thickness, replace bearing covers and tighten the fastening bolts with a torque of 51 N.m (5.2 kgm).



Checking final drive backlash.

1. **A.95753** fixture.
2. Dial gauge with magnetic stand.
3. Ring gear.
4. Dial gauge for measuring rear axle housing expansion.

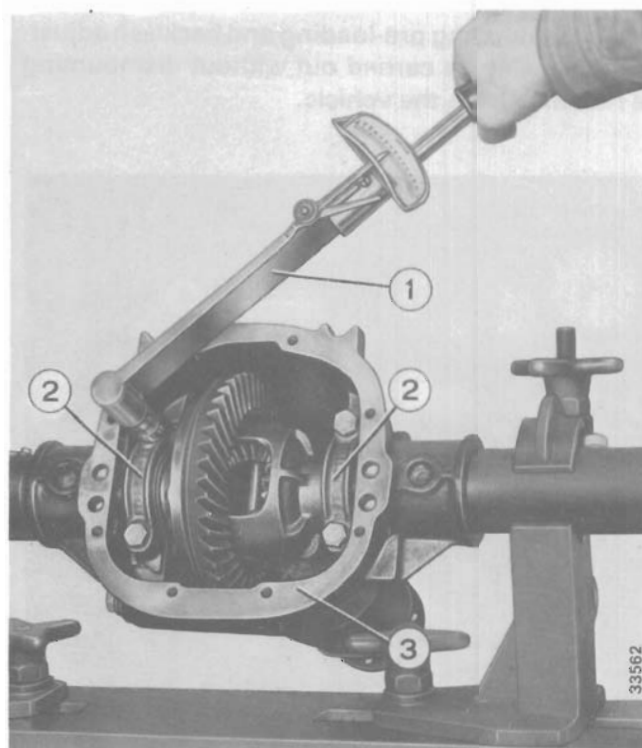


Schematic drawing for checking pre-loading of differential bearings.

D. Distance between differential bearing covers.

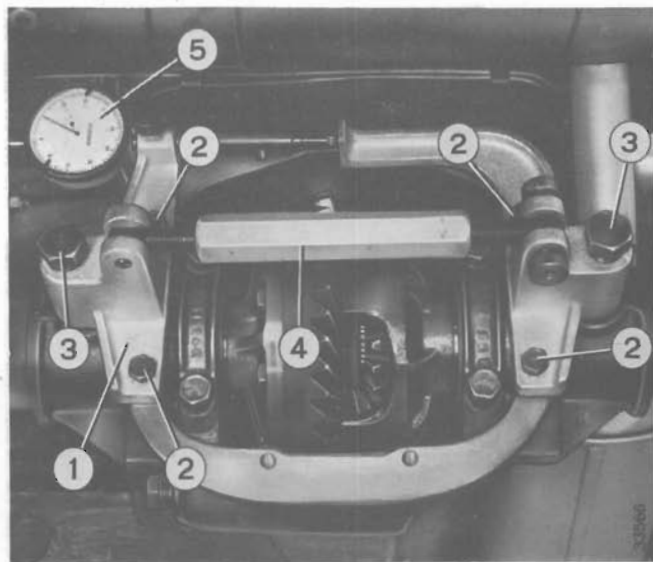
1 and 2. Pre-loading shims.

1 and 2 shims must be selected so that the **D** dimension is increased by 0.04–0.06 mm.



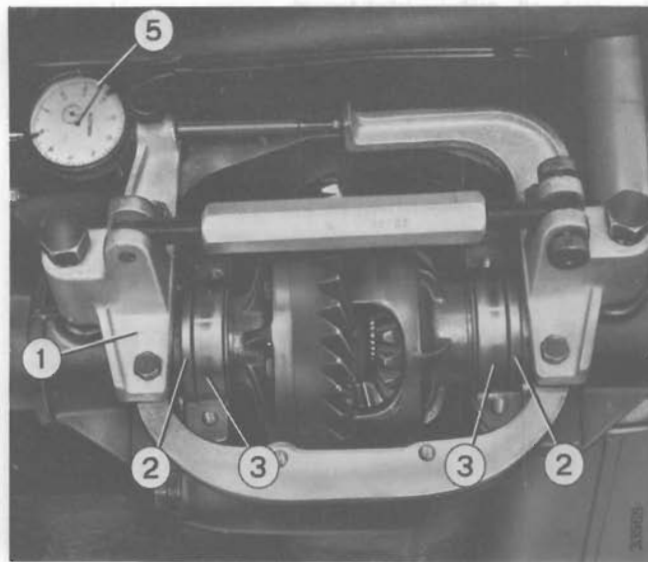
Tightening differential bearing cover to rear axle housing fastening bolts with a torque spanner.

1. Torque spanner.
2. Differential bearing covers.
3. Rear axle housing.



Mounting A.95753 fixture on rear axle housing.

1. A.95753 fixture.
2. A.95753 fixture to rear axle housing fastening bolts.
3. Side locking bolts.
4. Hexagonal expander.
5. Dial gauge.



Inserting differential bearing pre-loading shims.

1. A.95753 fixture.
2. Bearing pre-loading shim.
3. Differential carrier taper bearing.
5. Dial gauge.

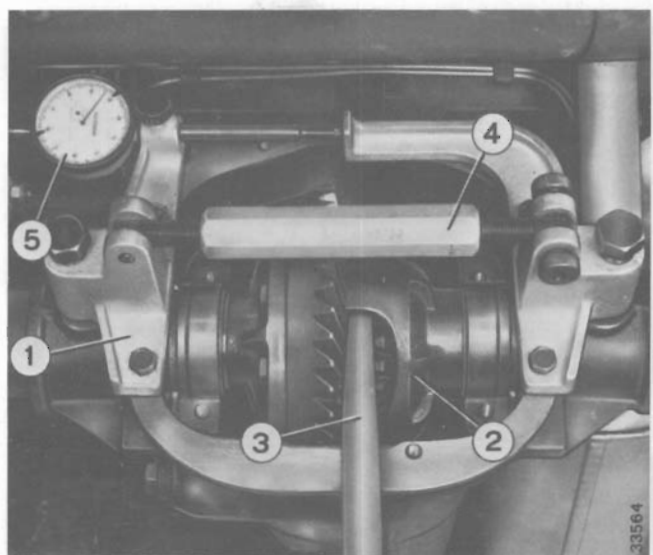
Adjusting backlash on the vehicle

Differential bearing pre-loading and backlash adjustment may also be carried out without dismantling the rear axle from the vehicle.

Drain oil from rear axle.

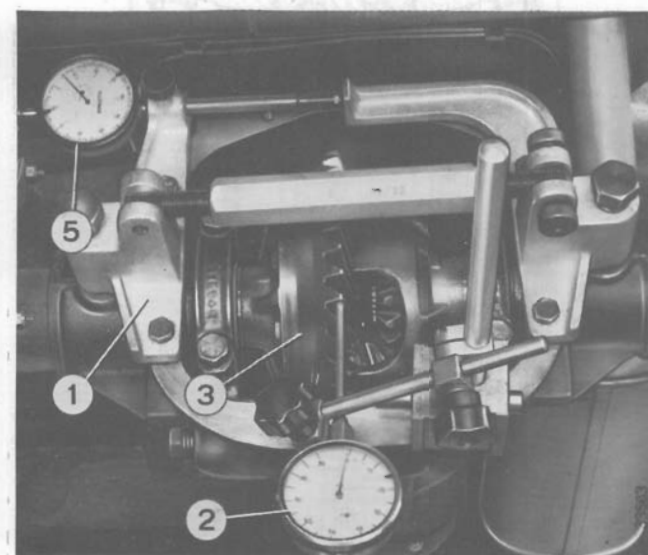
Take off wheels, dust shields, rear brake yokes and discs, and remove both drive shafts.

Remove rear axle housing cover. Carry out adjustment as described and illustrated above.



Removing differential mechanism.

1. A.95753 fixture.
2. Rear axle housing.
3. Lever for removal of differential mechanism.
4. Hexagonal expander.
5. Dial gauge.



Checking final drive backlash.

1. A.95753 fixture.
2. Dial gauge for backlash measurement.
3. Ring gear.
5. Dial gauge.

Special tools

Polonez Model 1300/1500

27 A

Sheet 1



A.45009 Bushing for stripping bearing inner race from final drive pinion (operation carried out on a press).



A.45027 Bushing for stripping bearing inner race from differential carrier (to be used together with A.40005/002/302/400).



A.47017/1/5 Inertia puller with flange for removing drive shafts.



A.70152 Mandrel for mounting rear bearing inner race on final drive pinion.



A.70157 Punch for mounting drive shaft lip seals.



A.70173 Punch for mounting pinion rear bearing outer race in rear axle housing.



A.70341 Lock for immobilising pinion flange while tightening the fastening nut.



A.70371 Master pinion for defining thickness of pinion bearing shims (to be used with A.95690 device).



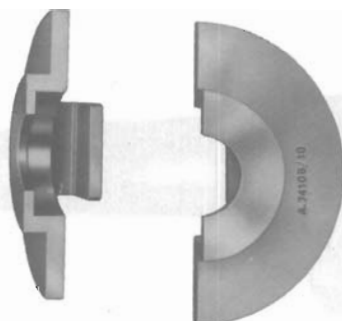
A.70581 Support for rear axle with springs dismounting and mounting operations (to be used with column-type hydraulic jack).



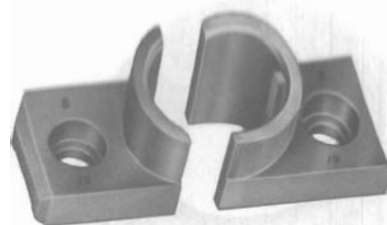
A.74107/4 Bushing for mounting, on a press, the bearing and locating ring on drive shaft.



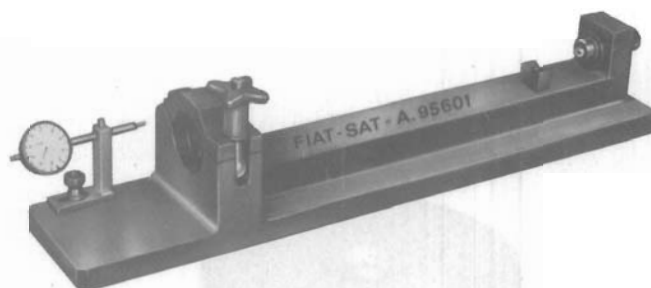
A.74108/1 Bushing for stripping, on a press, the bearing and locating ring from drive shaft (to be used with **A.74108** half-rings).



A.74108/10 Half-rings for stripping on a press the bearing and locating ring from drive shaft (to be used with **A.74108/1** bushing)



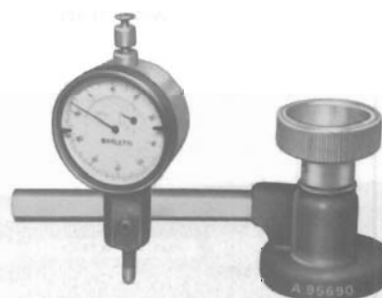
A.74104/9 Bits for crimping the pinion flange fastening nut (to be used with **A.74140/1** pliers).



A.95601/1/12 Fixture for checking the force required for displacing the bearing locating ring on drive shaft, with screw (12) -- (used together with **A.95601/10**).



A.95601/10 Split bushing for use with **A.95601** fixture.



A.95690 Dial gauge with support used in conjunction with **A.70371** master pinion to define thickness of pinion bearing shim.

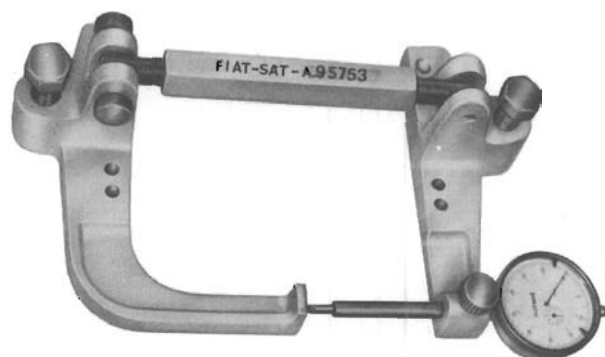
Special tools

Polonez Model 1300/1500

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Sheet 2

A.95753 Expanding fixture with dial gauge for checking the pre-loading of differential carrier bearings.



Model Polonez 1300/1500



33	Characteristics and technical data –
	Bolts and nuts tightening torques
331.01	Brake actuating assembly – pedals
331.02–06	Brake actuating hydraulic system
331.03	Brake actuating hydraulic system
331.04	Braking corrector
331.17–25	Front and rear wheel brakes
331.22–26	Brake yokes
331.35	Handbrake actuation
33A	Special tools

Brakes

33

Polonez Model 1300/1500

Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Type: disc brakes on 4 wheels, with independent front and rear circuits	
Disc diameter: — front — rear	227 mm 227 mm
Disc thickness: — front and rear — nominal — after turning — admissible minimum	9.95—10.15 mm 9.35 mm 9 mm
Maximum disc run-out (measured at a distance of 2 mm from outer edge)	0.15 mm
Minimum admissible thickness of friction pads	1.5 mm
Yoke bore: — front — rear	48 mm (1 7/8") 38 mm (1 1/2")
Master cylinder bore	19.05 mm (3/4")
Servo mechanism	vacuum, acting on 4 wheels
Distance between master cylinder push rod face and mounting surface	1.05—1.25 mm
Braking corrector	acting on rear wheel circuit
Braking corrector ratio	0.46
Parking brake	mechanical, acting on rear wheel yokes
Auxiliary brake	consisting in dual circuit brake system

BOLTS AND NUTS TIGHTENING TORQUES

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
PEDALS Brake and clutch pedals fastening nut	1/61036/11	M12×1.25	R50 Znt (bolt R80 Znt)	25	2.5
Nut of pedal bracket top part to dashboard fastening bolt	1/61008/11	M8	R50 Znt (bolt R50)	15	1.5
Nut of pedal bracket bottom part to dashboard fastening bolt	1/61008/11	M8	R50 Znt (bolt R50)	15	1.5
HYDRAULIC BRAKES Nut of brake master cylinder fastening bolt	1/61008/11	M8	R50 Znt (bolt R80 Znt)	25	2.5
Braking corrector to body fastening bolt	1/38258/21 1/38258/11	M8	8.8 Znt/EC(*) R80 Cdt	25 20	2.5 2
SERVO MECHANISM Nut of servo fastening bolt	1/61008/11	M8	R50 Znt (bolt R80 Znt)	25	2.5
Nut of servo bracket fastening bolt	1/61008/11	M8	R50 Znt (bolt R50)	15	1.5
Self-locking nut with plastic insert for servo lever pivot bolt	1/61041/11	M8	R50 Znt (bolt R50) Trf Cdt	15	1.5
MECHANICAL BRAKES Self-locking nut with plastic insert for handbrake intermediate lever	1/25745/11	M10×1.25	R50 Znt (pin R80 Trf)	32	3.3
Self-locking nut with plastic insert for handbrake intermediate lever pin	1/61050/11	M12×1.25	R50 Znt (pin R80 Trf)	55	5.6

Brake actuating assembly – pedals

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Sheet 1

PEDAL BRACKET

Dismantling and reassembly

Place the vehicle on a hoist; if unavailable – on **A.22209** props and lift with **Ap.6051** hydraulic jack. Disconnect battery negative ground lead to avoid short-circuits.

Remove oil cleaner from carburettor.

Remove throttle control cable from carburettor.

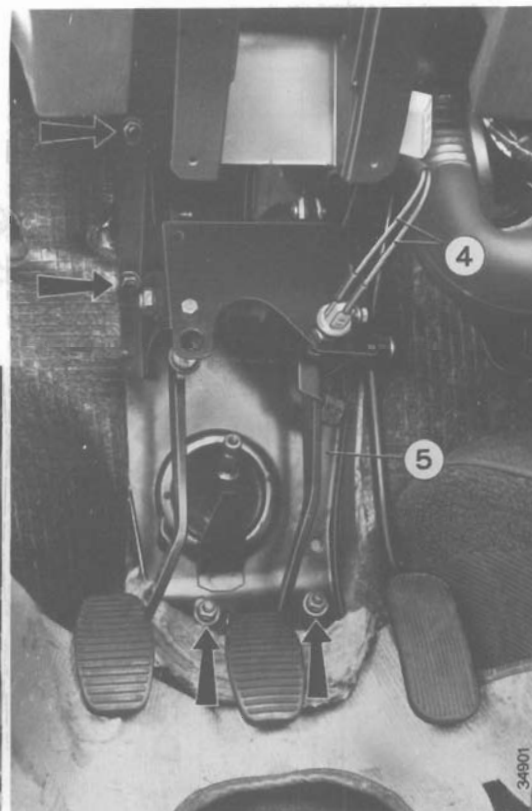
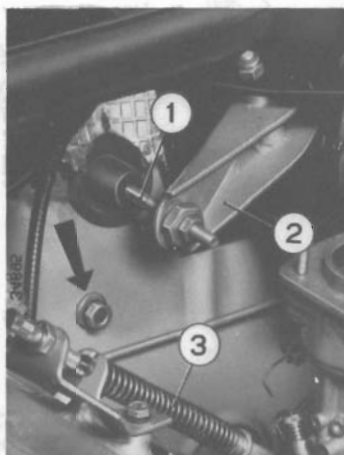
Lift sound-deadening lining on engine compartment side and unscrew pedal bracket to body fastening nut.

Unscrew nut from servo fastening stud on pedal bracket.

Disconnect servo actuating link from its lever.

On the underside of the vehicle, disconnect the clutch flexible cable from its lever.

From the inside of the vehicle, disconnect the steering linkage, as described in section 41.



Components to be removed or disconnected when dismantling pedal bracket.

1. Lever (2) actuating link.
2. Servo actuating lever.
3. Throttle control cable.
4. Electric cables for rear stop lights.
5. Pedal bracket.

Arrows indicate pedal bracket to body fastening nuts.

Lift floor mat and sound-deadening lining.

Disconnect blower tubing.

Disconnect electric cables of rear stop lights

Remove brake pedal return spring.

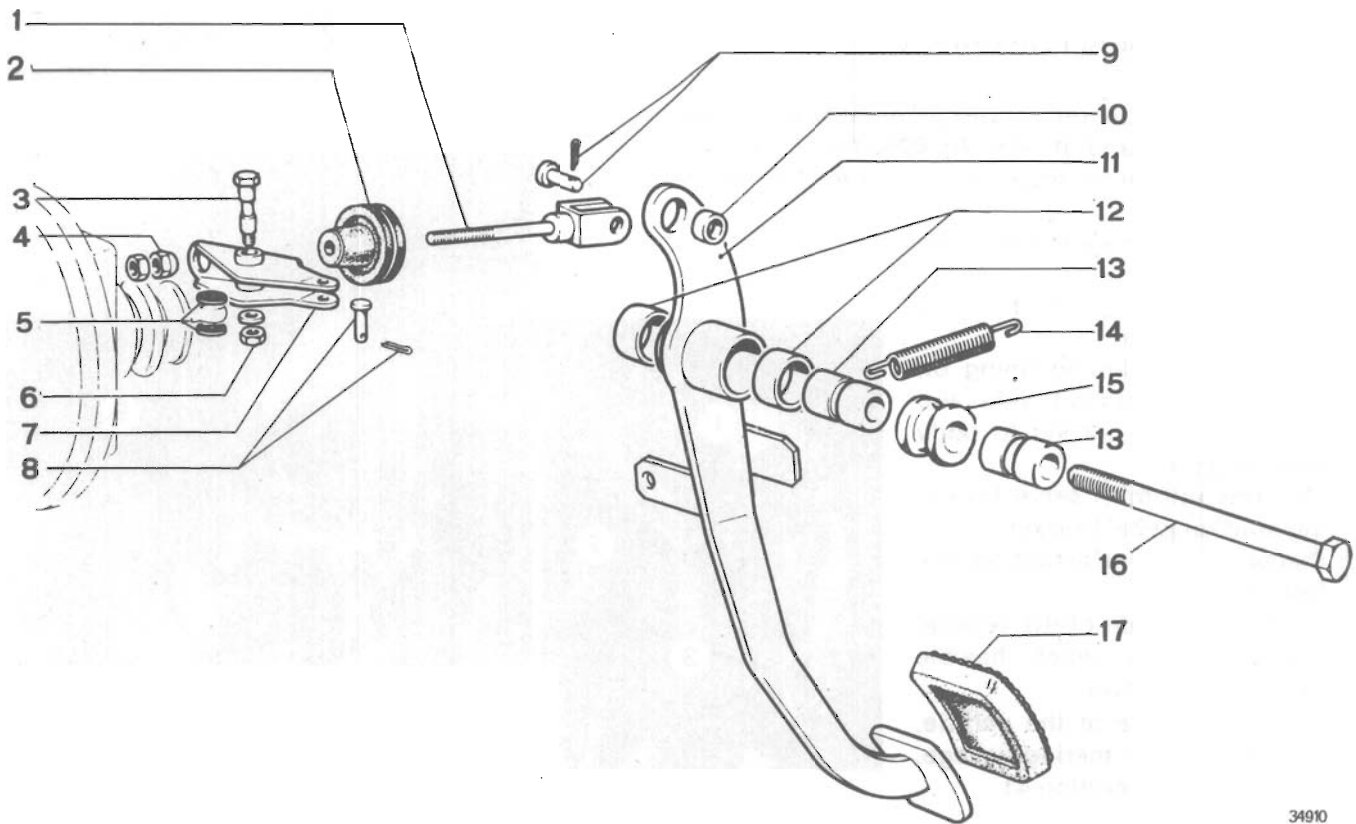
Disconnect throttle and clutch control cables from their respective pedals.

Unscrew pedal bracket to body fastening nuts and remove bracket.

To reassemble pedal bracket on the vehicle, perform the above described operations in reversed order.



View of pedal bracket assembly.



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Exploded view of brake pedal assembly.

- | | |
|--|--|
| 1. Brake servo link | 9. Pivot with split pin for connecting link (1) to pedal (11). |
| 2. Boot. | 10. Bushing of pedal (11). |
| 3. Pivot of lever (7). | 11. Brake pedal. |
| 4. Nut and locknut of link (1). | 12. Bushing. |
| 5. Spacer. | 13. Spacer for bushing (12). |
| 6. Nut and flat washer for bolt (3). | 14. Brake pedal return spring. |
| 7. Brake servo actuating lever. | 15. Spacer. |
| 8. Pivot with split pin for connecting lever (7) to brake servo. | 16. Brake and clutch pedals pivot pin. |
| | 17. Brake pedal pad. |

CHECKING AND REPAIR

Unscrew the nut of brake and clutch pedals pivot pin. Extract the pin to make it possible for the pedals with their bushings to be removed. Check that the play between pedal bushings, spacers and pivot pin is not excessive; otherwise, the excessively worn components must be replaced.

On detecting slight scratches or oxidation on the working surfaces of the above components, remove the defects with fine abrasive cloth. Check that the pedal return springs are not weakened or damaged. When reassembling the above described components on pedal bracket, cover the mating surfaces with grease.

Brake actuating hydraulic system

Polonez Model 1300/1500

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331.02-06

Sheet 1

BRAKE MASTER CYLINDER

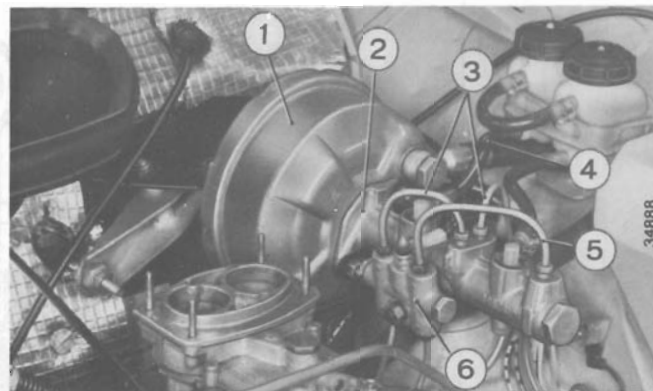
Dismantling and reassembly

Disconnect tubings supplying brake fluid from tanks to master cylinder, and drain brake fluid from the system to suitable container.

Disconnect from master cylinder the tubings supplying brake fluid to front and rear brake circuits.

Disconnect brake system breakdown signalling device from master cylinder.

Disconnect master cylinder from servo mechanism.



Components to be disconnected when dismantling brake master cylinder.

1. Servo mechanism.
2. Brake master cylinder.
3. Front brake circuit tubings.
4. Tubings feeding fluid from tanks.
5. Tubings feeding fluid to rear brake circuit.
6. Brake failure signalling device.

Checking and repair

Unscrew plug from cylinder front part and floating ring guide securing screws from cylinder bottom. This makes it possible for all master cylinder components to be removed and checked.

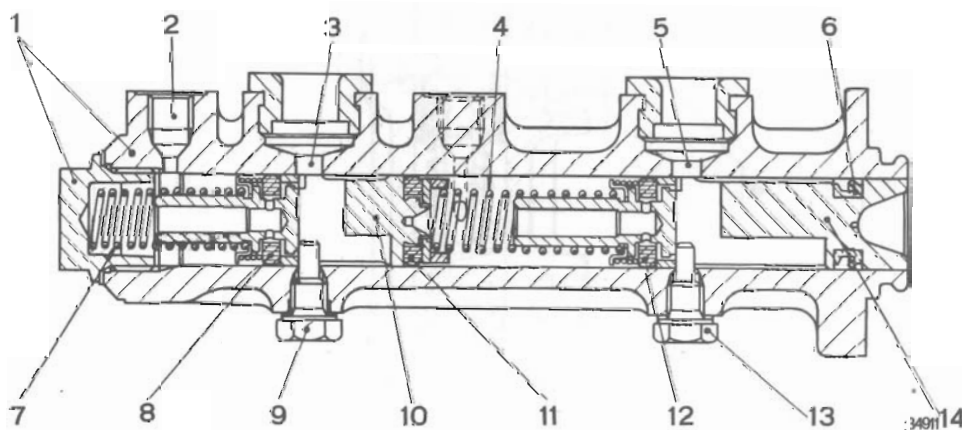
Make sure that the inner surface of cylinder bore and the outer surface of plunger show mirror-like smoothness, check them for rust or roughness and, also, for excessive play.

If any uneven spots are detected on cylinder bore, they should be removed in order to avoid fluid leakage or excessive wear of sealing rings and floating ring guides.

If the uneven spots cannot be rectified, the complete master cylinder should be replaced along with the floating ring guides since they are unavailable separately as spares. Also, check that the floating ring guide return springs are not weakened.

During repairs, it is also recommended to replace sealing rings, even if they appear to be in good repair.

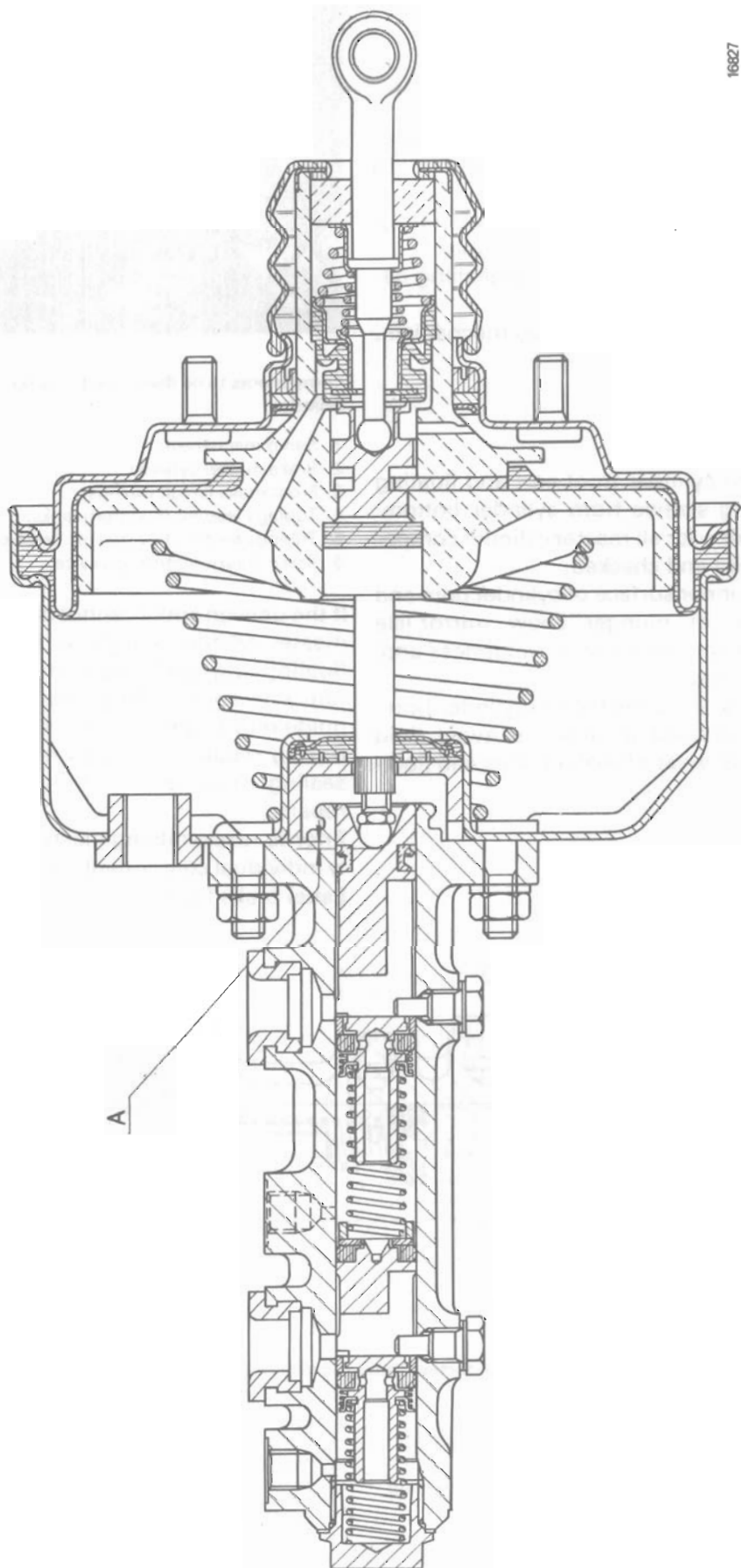
Prior to reassembling master cylinder, wash carefully individual components with **R3 or FIAT DOT 3 Blue Label** brake fluid.



Longitudinal section through brake master cylinder.

1. Master cylinder casing with plug.
2. Seat for rear brake circuit feeding tubing.
3. Seat for tubing supplying fluid from tank to rear brake circuit.
4. Spring.
5. Seat for tubing supplying fluid from tank to front brake circuit.
6. Sealing ring.
7. Spring.
8. Floating ring.
9. Screw with gasket for floating ring guide (10).
10. Front floating ring guide.
11. Floating ring.
12. Floating ring.
13. Screw with gasket for floating ring guide (14).
14. Rear floating ring guide.

BRAKE MASTER CYLINDER AND SERVO MECHANISM ASSEMBLY



16827

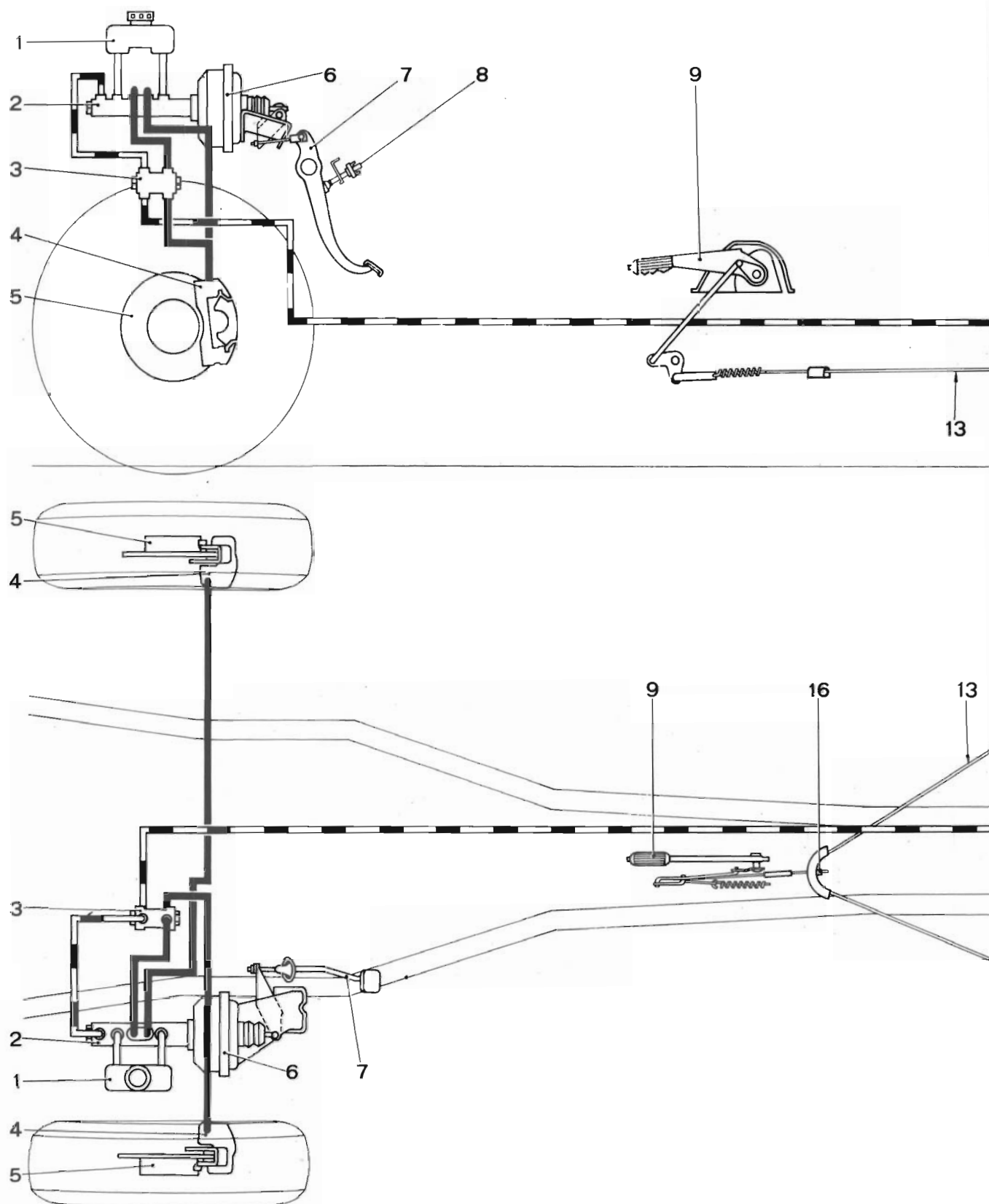
Longitudinal section through double-circuit brake system master cylinder and servo mechanism.
A = 1.05–1.25 mm. Distance between cylinder plunger push rod thrust face and cylinder mounting surface.

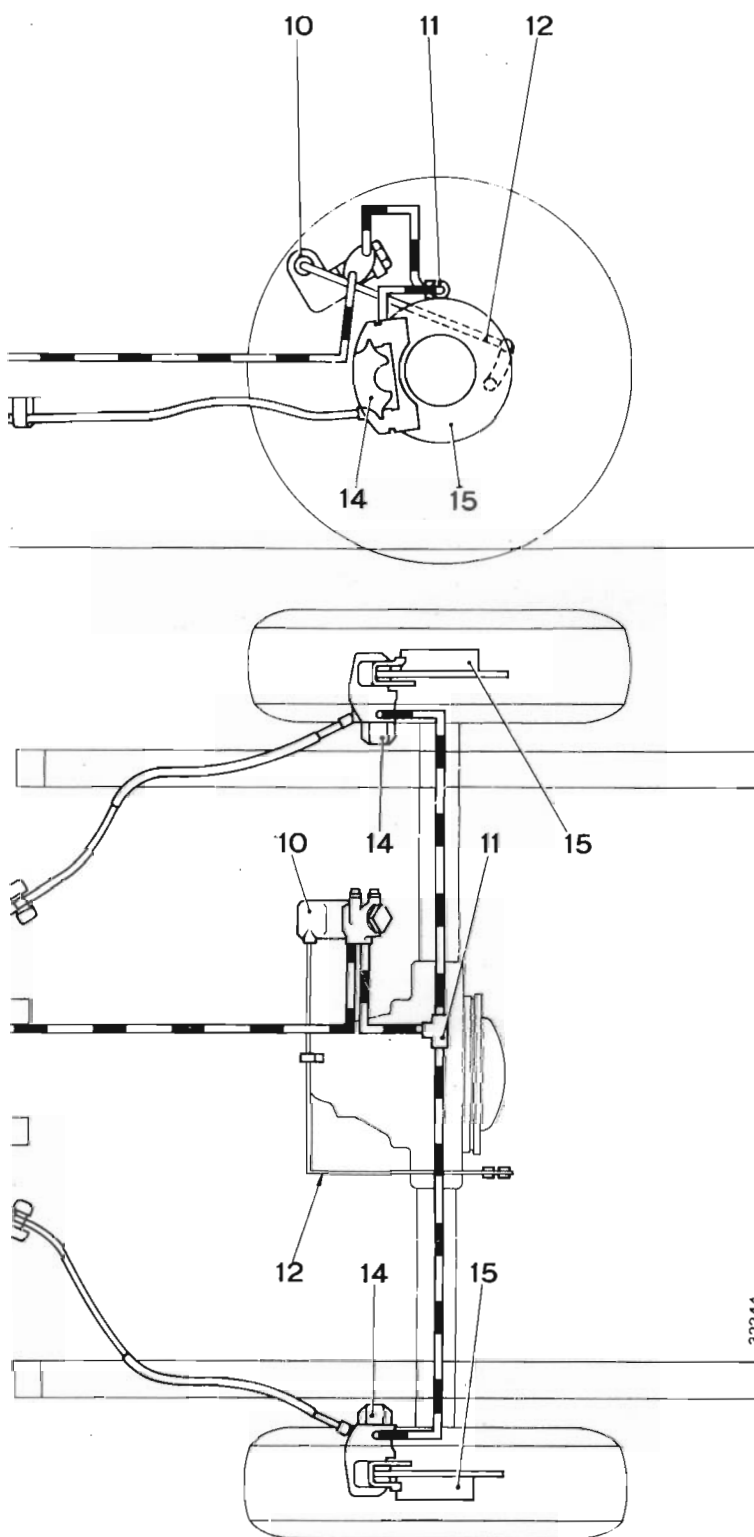
Brake actuating hydraulic system

Polonez Model 1300/1500

331.03

Sheet 1





Layout of brake system components.

1. Brake fluid tank.
2. Master brake cylinder for two independent circuits.
3. Brake failure signalling device.
4. Front wheel yoke.
5. Front wheel brake disc.
6. Power assisting mechanism (servo).
7. Brake pedal.
8. Stop light switch.
9. Handbrake lever.
10. Rear wheel braking corrector.
11. Three-way coupling of rear brake circuit.
12. Braking corrector torsion rod.
13. Handbrake cable.
14. Rear wheel yoke.
15. Rear wheel brake disc.
16. Nut with locknut for handbrake adjustment.

— Front wheel hydraulic brake circuit.
 -- Rear wheel hydraulic brake circuit.

Brake actuating hydraulic system

Polonez Model 1300/1500

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331.03

Sheet 2

BRAKE FAILURE SIGNALLING DEVICE

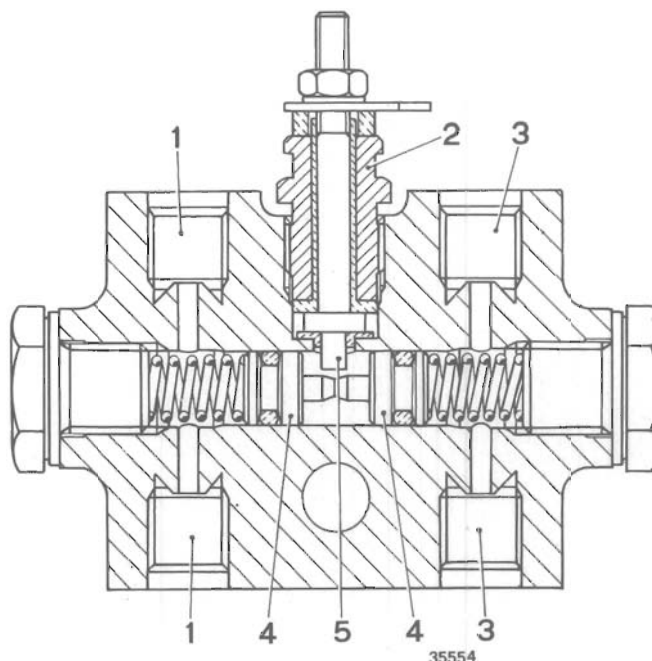
This device is designed for signalling the failure of brake system hydraulic circuits.

If the system operates correctly, then brake is depressed, uniform pressure is generated and acts on the plungers in opposite directions, keeping the plungers in rest position.

In case of failure (broken or eareated tubing) the pressure in damaged circuit drops, causing the plungers to move and close the contacts of electric sensor, which in turn lights a signal lamp on dash-board.

Longitudinal section through brake failure signalling device.

1. Front wheel brake circuit.
2. Electric switch.
3. Rear wheel brake circuit.
4. Plungers.
5. Fixed contact of switch (2).



BLEEDING THE HYDRAULIC BRAKE SYSTEM

Bleeding the hydraulic brake system is essential for its correct operation. During repairs it must be bled with strict adherence to the following principles:

- fill the brake fluid tanks and the entire brake system with R3 or FIAT DOT 3 Blue Label brake fluid;
- place rubber tubing **A.72206** on yoke bleeding nipple, and insert its other end into a suitable transparent vessel, filled in part with the same fluid which is contained in brake system;
- loosen the bleeding nipple by half a turn and depress brake pedal so that fluid starts to emerge from tubing immersed in vessel; this is signalled by visible air bubbles;
- stop depressing the pedal only when the fluid emerging from tubing is free of air bubbles;
- with pedal depressed, tighten the bleeding nipple and remove the tubing.

Wipe thoroughly fluid from bleeding nipple and protect it with dust cap.

When one brake circuit only is being repaired, front or rear, it is sufficient to bleed the circuit under repair only. On completion of bleeding operation, refill the tanks with brake fluid to the prescribed minimum level.

When air bubbles continue to appear even after prolonged bleeding, it means that air is penetrating into the system through leaky couplings or damaged tubing, master cylinder or wheel yoke cylinders.

If such is the case, check the couplings and tubing for leakage, and also the master cylinder and wheel yoke cylinder sealing rings.



Bleeding the left-hand front wheel brake.



Braking corrector

Polonez Model 1300/1500

331.04

Sheet 1

BRAKING CORRECTOR

Rear wheel braking corrector, attached to the body, adjusts the pressure in rear brake circuit in relation to front brake circuit depending on vehicle loading and deceleration.

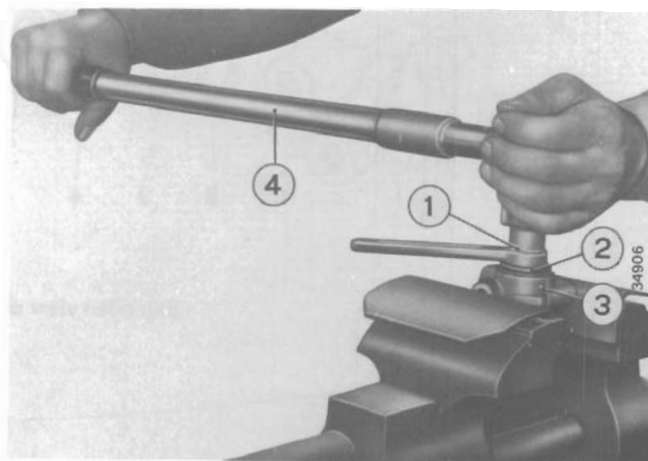
Dismantling and reassembly

Disconnect from corrector brake fluid intake and delivery tubings; drain fluid to a vessel made ready for this purpose.

Disconnect torsion bar from link which connects the bar to rear axle housing.

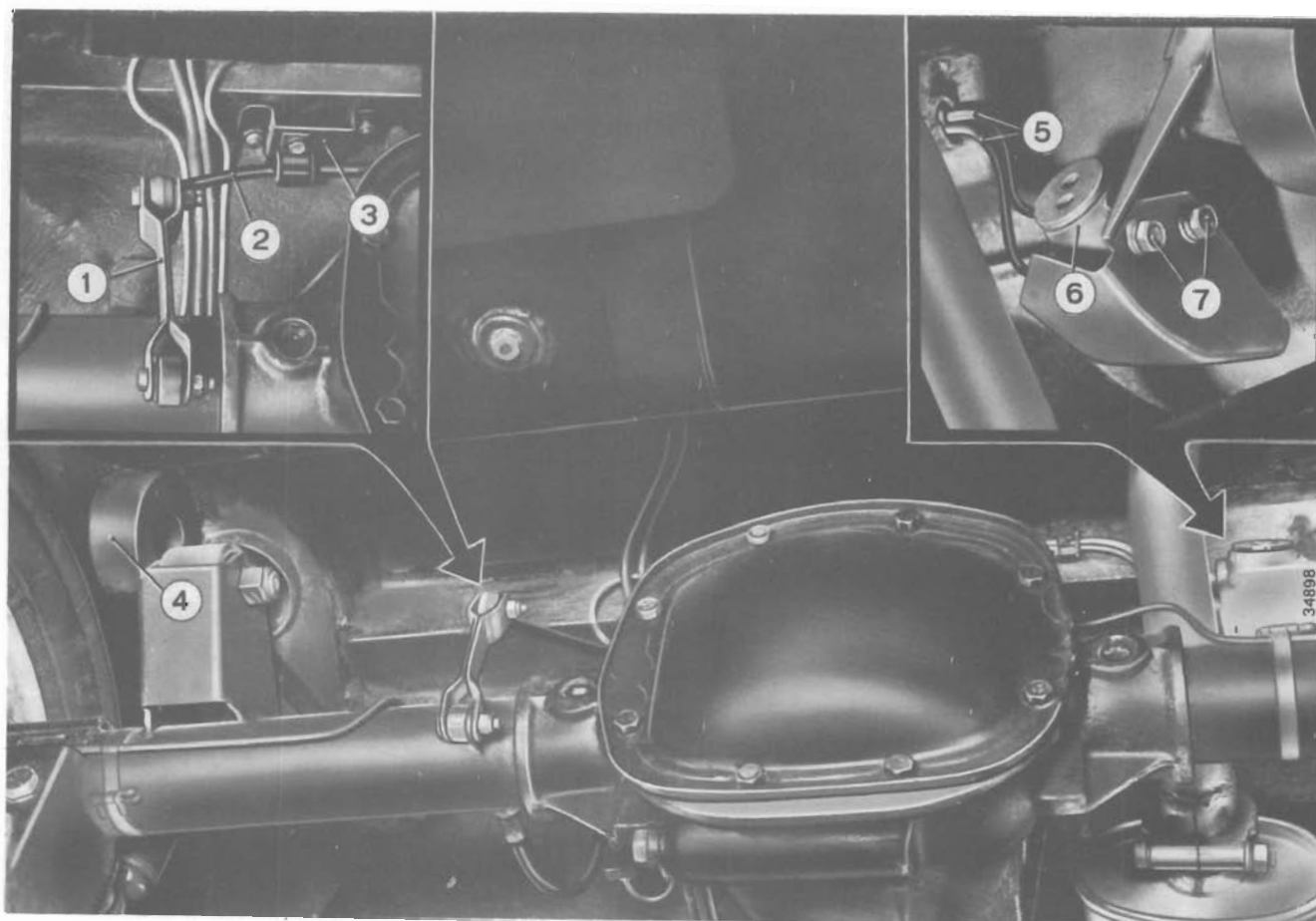
Disconnect from body the torsion rod bracket.

Dismount braking corrector by unscrewing bolts which fasten it to bracket.



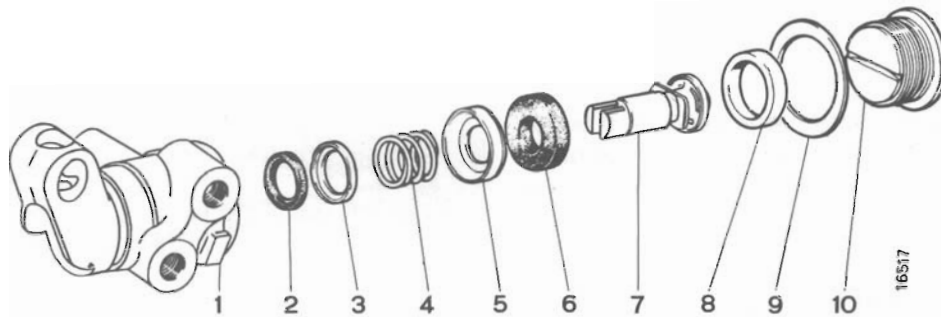
Dismantling the braking corrector.

1. A.56124 device for dismantling the braking corrector.
2. Braking corrector plug.
3. Braking corrector.
4. A.89815/821 ratchet spanner.



View of braking corrector mounted on the vehicle, with indication of components to be dismantled.

1. Link for torsion bar connection to rear axle housing.
2. Torsion bar.
3. Bracket fastening torsion bar (2) to body.
4. Bumper.
5. Brake circuit tubing.
6. Braking corrector.
7. Braking corrector to bracket (8) fastening bolts.
8. Braking corrector bracket.



Exploded view of braking corrector.

1. Corrector body.
2. Seal.
3. Thrust ring.
4. Spring.
5. Spring cup.

6. Sealing ring.
7. Plunger.
8. Bushing.
9. Sealing gasket.
10. Plug.

Checking and repair

To dismantle the body of braking corrector, use **A.56124** spanner, then check carefully that inner bore and plunger outer surface are mirror-smooth and free of rust spots or roughness, and that there is no excessive play between the mating components.

If even the slightest damage to surfaces is detected, it must be removed in a suitable manner or the complete braking corrector must be replaced, since the corrector body and plunger are unavailable separately as spares.



Checking the distance between friction bar eye and bumper mounting plane.

1. Bumper mounting plane.
2. **A.72269** device.
3. Torsion bar.

Reassembly and adjustment

Place braking corrector on bracket without tightening the fastening bolts.

Remove rubber bumper.

Apply **A.72269** device to torsion bar.

Sealing rings must be replaced even if they appear undamaged.

Check that plunger return spring is not deformed and did not lose its elasticity.

Check that corrector shield is not cracked or worn.

Check that the bushings are undamaged and did not lose their elasticity.

Check that the torsion bar and its link are not deformed.

If any component is found damaged, it must be replaced.

Braking corrector

Polonez Model 1300/1500

331.04

Sheet 2

Raise the torsion bar so that the end of **A. 72269** device touches the bumper mounting plane; if the **A. 72269** device is unavailable, set the torsion bar so that the distance between the eye centre and the bumper mounting plane is 155 ± 5 mm.

Then turn the corrector so that the piston touches slightly the torsion bar end.

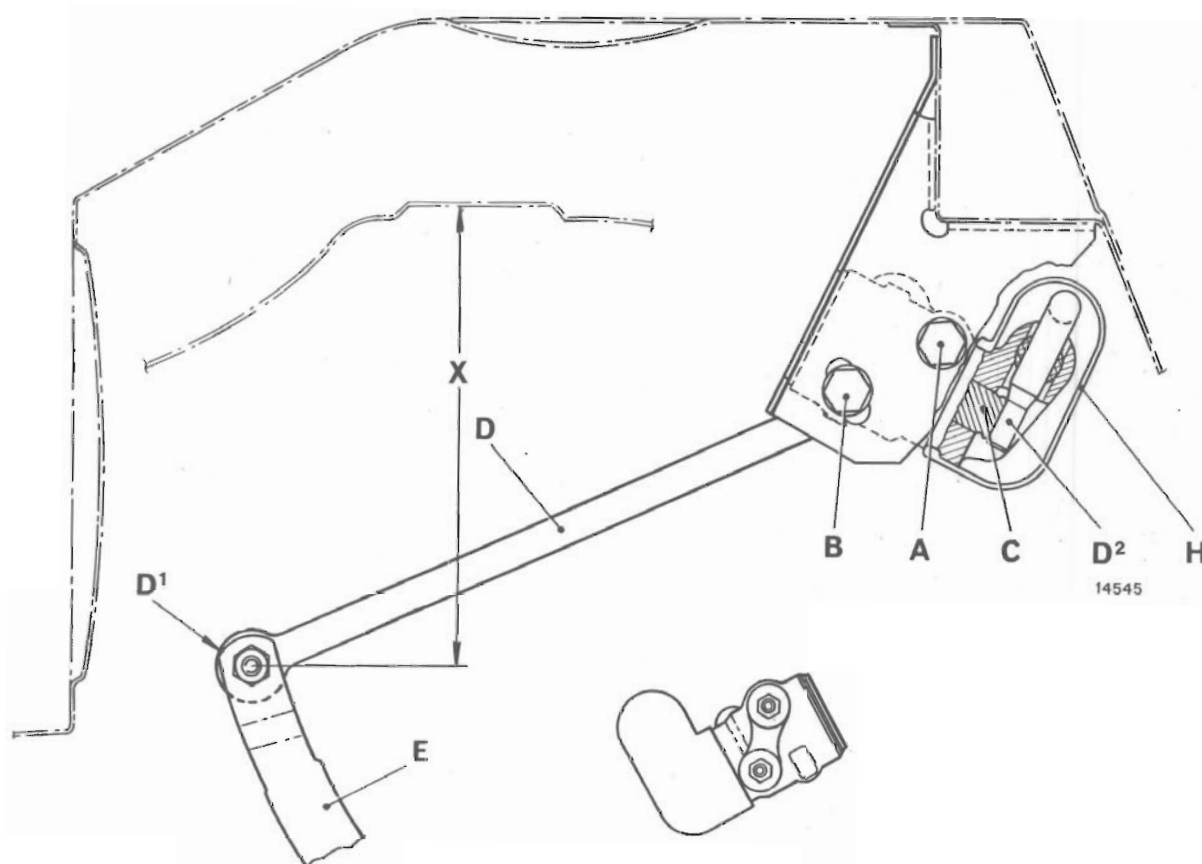
After establishing this position, tighten the fastening bolts with the prescribed torque.

Cover the contact surfaces of torsion bar end and corrector plunger with a thin coat of SP 349 grease and put on the boot.

Connect brake fluid tubings to corrector.

Attach the torsion bar by its link to rear axle housing. Bleed the brake circuit in the way described in the appropriate subsection.

Should the need arise to check the braking corrector without dismantling it from the vehicle, follow the recommendations given for adjustment, bearing in mind that the position of corrector is right when a resistance is felt after raising the torsion bar to the prescribed height, signifying the start of corrector operation. If there is no resistance, the position of corrector must be adjusted.



14545

Schematic drawing of braking corrector installation in the vehicle.

A. B. Corrector to bracket fastening bolts.

C. Corrector plunger.

D. Torsion bar.

D¹. Torsion bar eye.

D². Torsion bar end acting on corrector plunger C.

E. Link joining torsion bar D with rear axle housing.

H. Corrector boot.

X. 155 ± 5 mm. Distance between torsion bar eye centre D¹ and bumper mounting plane.

Polonez Model 1300/1500

Front and rear wheel brakes

Polonez Model 1300/1500

331.17-25

Sheet 1

REPLACEMENT OF FRICTION PADS

Friction pads in yokes of front and rear wheel brakes should be replaced when their thickness is decreased to 1.5 mm.

To replace the pads, the yoke is dismantled from its mounting in the following manner:

- disconnect electric cable of friction pad wear signalling device from front friction pad (for Coupé version only);
- remove cotter pins from yoke guides;
- dismount yoke guides;
- remove yoke from its mounting;
- mark friction pads and their seats, to avoid wrong reassembly if replacement proves unnecessary, and remove friction pads.

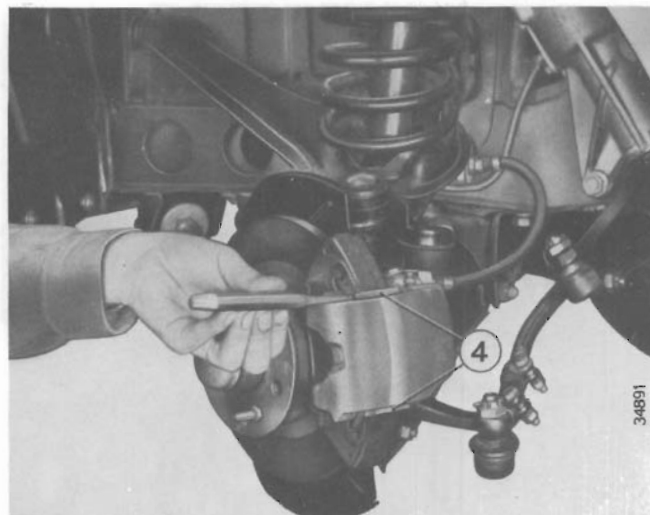
Prior to dismantling rear brake friction pads, in addition to the above described operations, dismount brake disc shield.

When reinstalling new friction pads, reverse the above described operations, bearing in mind that:

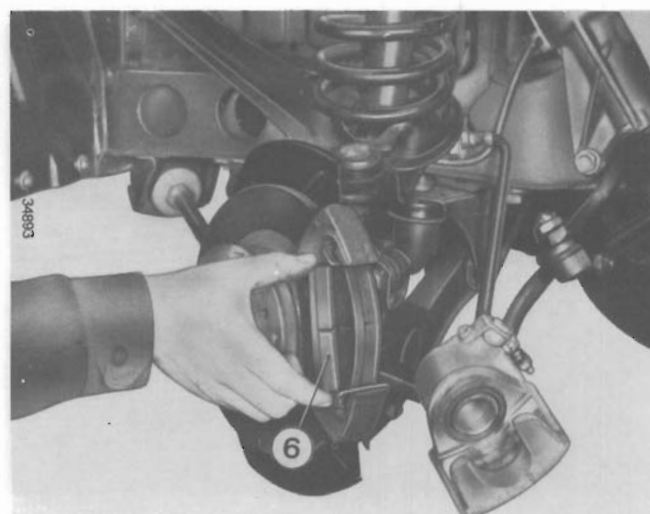
- on front brake yokes, push the piston inside the cylinder as far as it will go;
- on rear brake yokes, turn the piston to the right until it completely enters its seat.

Brake friction pads dismantling sequence

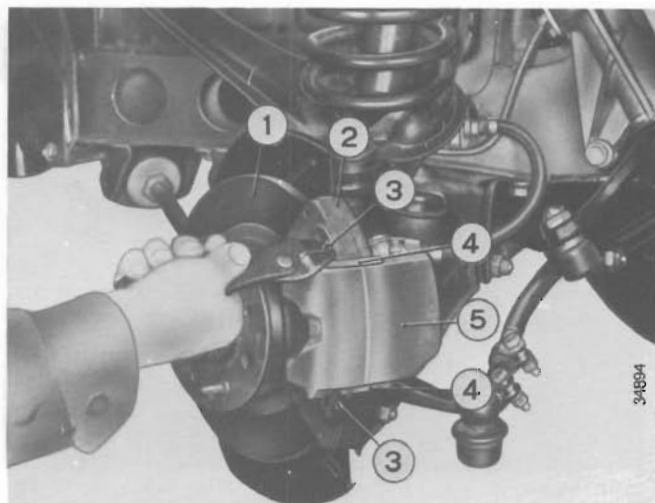
1. Brake disc.
2. Brake yoke mounting.
3. Cotter pin.
4. Yoke guide.
5. Yoke.
6. Friction pad.
7. Spring.



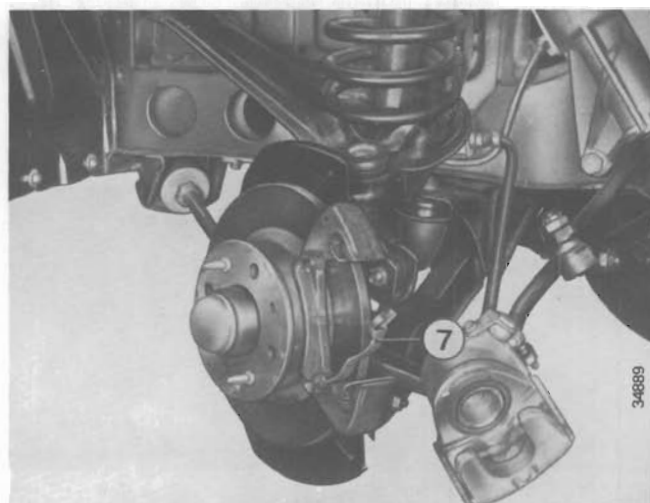
Dismounting guide retaining yoke in its mounting.



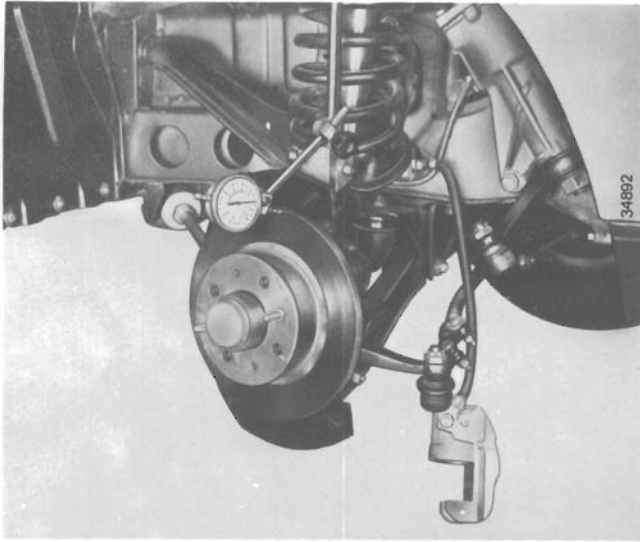
Dismounting brake friction pads.



Dismounting yoke guide cotter pin.



Dismounting friction pad spring.



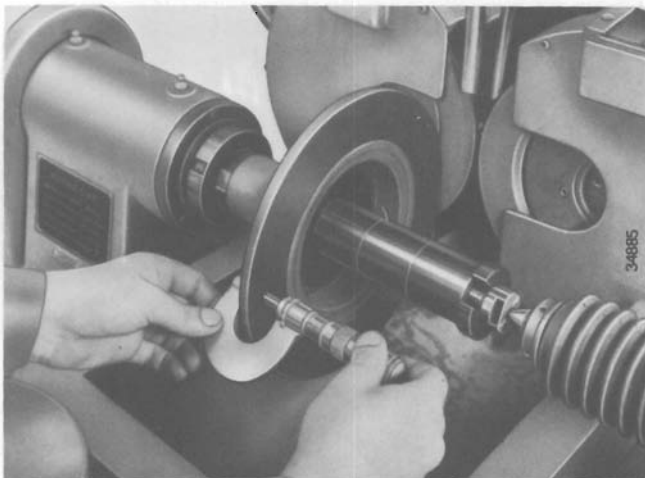
Checking squareness of brake disc with the use of dial gauge with magnetic stand.

CHECKING BRAKE DISC

Disc surface must be square to its axis of rotation:
– permissible deviation (total reading from gauge placed about 2 mm from disc outer edge) is **0.15 mm**. If the value read from the gauge exceeds the permissible tolerance, or if deep scratches are present, the disc must be re-ground.

The permissible minimum thickness of worn brake disc is **9 mm**; any thinner disc must be replaced.

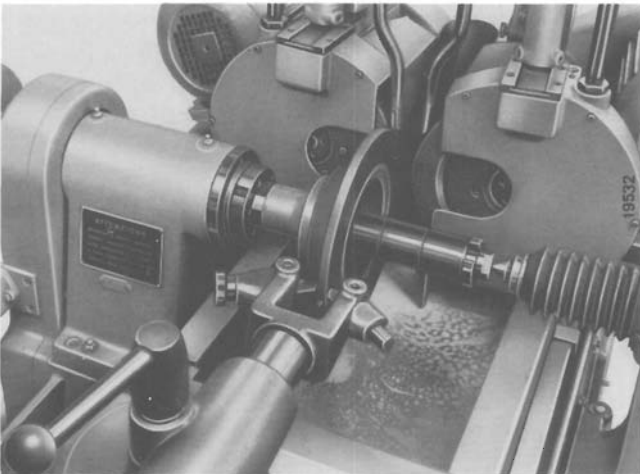
The brake disc is dismounted by unscrewing bolts fastening it to wheel hub by means of **A.47221/754** device with **A.40005/004** and **A.47210/371** pullers.



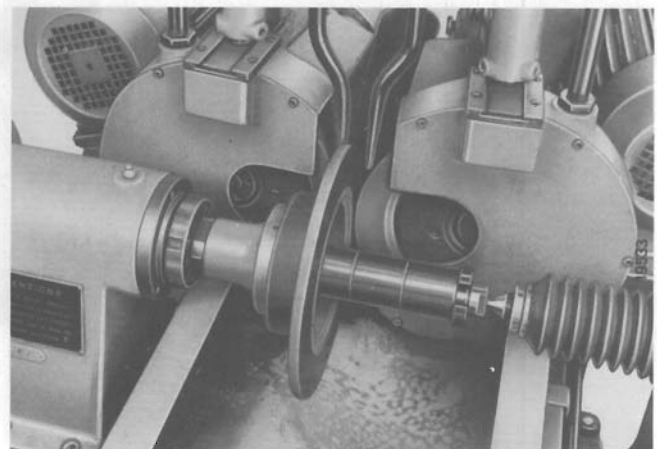
Checking brake disc while grinding.

DISC GRINDING

Deep scratches on disc surface must be removed by grinding. This operation is to be carried out only if it is certain that there after the disc thickness will be within permissible limits; if not, the disc must be replaced.



Grinding brake disc to remove scratches and damage to friction surfaces.



Finishing disc surface with grinding wheels.

Brake yokes

Polonez Model 1300/1500

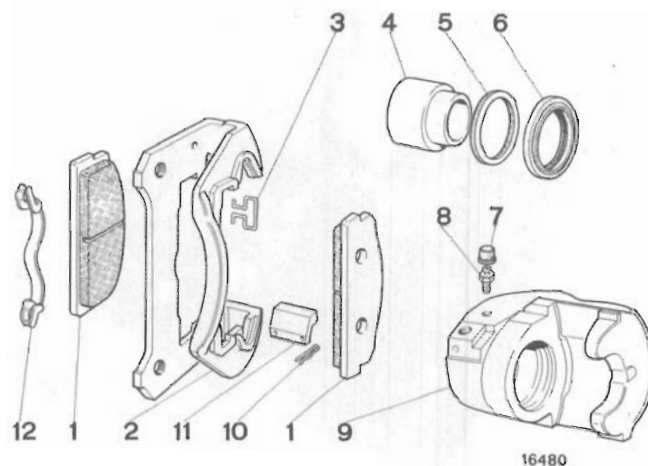
331.22-26

Sheet 1

FRONT WHEEL BRAKE YOKE

Components of front wheel brake mounting and yoke.

1. Friction pads.
2. Yoke mounting.
3. Spring.
4. Piston.
5. Sealing ring.
6. Piston shield.
7. Bleeding nipple cap.
8. Bleeding nipple.
9. Yoke.
10. Cotter pin.
11. Yoke guide.
12. Friction pad spring.



Repair

The only repair possible for brake yokes is the replacement of sealing ring and piston shield. The piston may be forced out of its cylinder by compressed air supplied to brake fluid inlet.

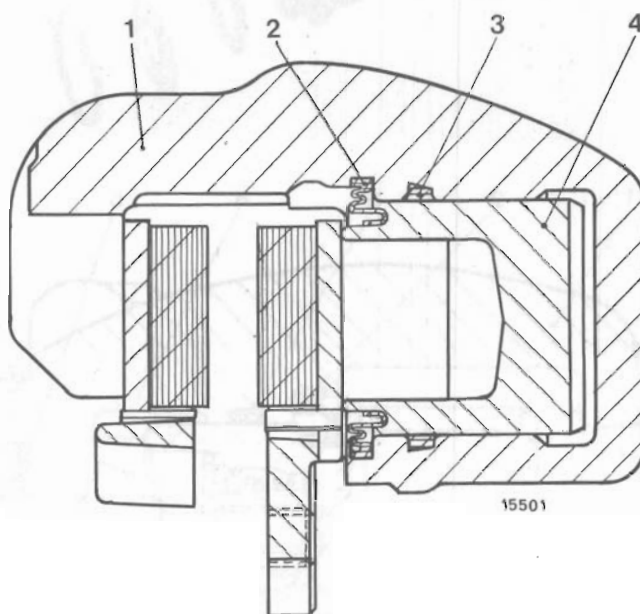
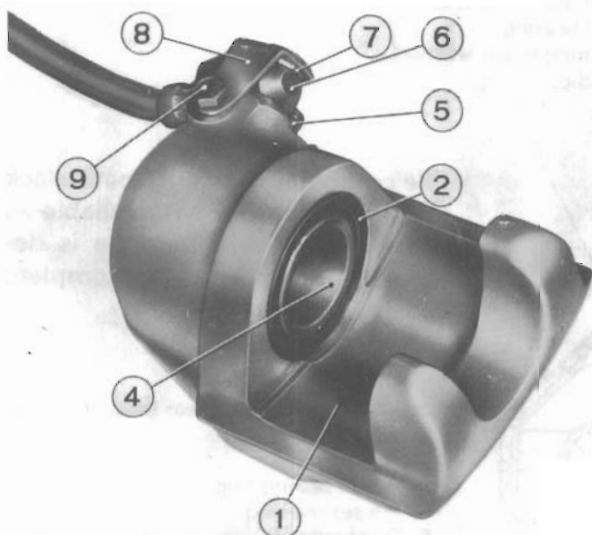
Both when removing and reinstalling sealing rings, care should be taken not to scratch piston surface and cylinder bore.

Check piston and cylinder for traces of wear or seizure. If such defects are present, the complete yoke with piston must be replaced.

When reinstalling piston in yoke cylinder, always replace the sealing ring and piston shield.

Prior to mounting the shield, cover piston face on the sealing ring side with **SP 349 grease**.

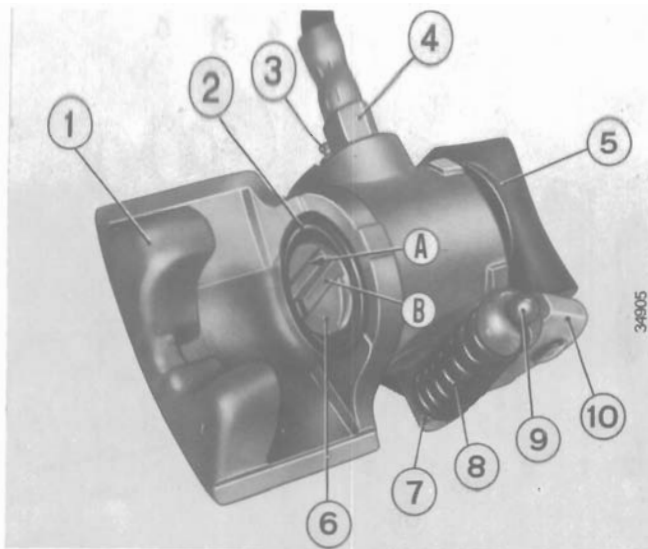
NOTE – Prior to inserting yoke in its mounting, push the piston into cylinder so that the distance between the inner faces of two friction pads is not less than 10.5 mm.



Front wheel brake yoke and its longitudinal section.

1. Yoke.
2. Piston shield.
3. Sealing ring.
4. Piston.
5. Bleeding nipple.

6. Brake fluid inlet coupling
7. Brake fluid inlet.
8. Shield.
9. Shield fastening screw.



REAR BRAKE YOKE

To remove piston from yoke, it is sufficient to screw it out with a screwdriver placed in slot (B).

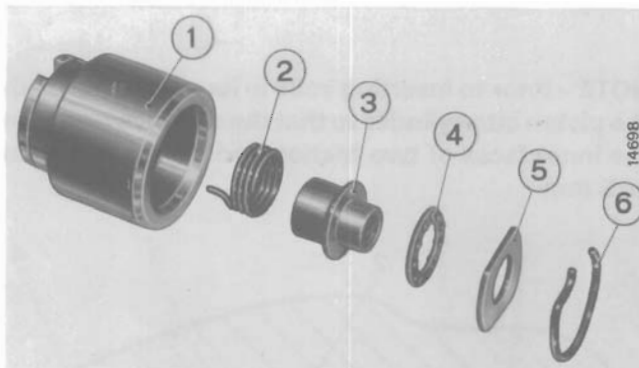
Rear brake yoke with brake fluid tubing and bracket for attachment of handbrake cable.

1. Yoke.
2. Piston shield.
3. Bleeding nipple.
4. Brake fluid inlet coupling.
5. Handbrake lever shield.
6. Piston.
7. Handbrake cable bracket.
8. Spring.
9. Handbrake cable pawl.
10. Handbrake lever.
- A. Groove indicating piston position.
- B. Slot for friction pad boss.

While reassembling, bear in mind that after screwing in the piston in yoke, the groove indicating its position should be directed toward the bleeding nipple.

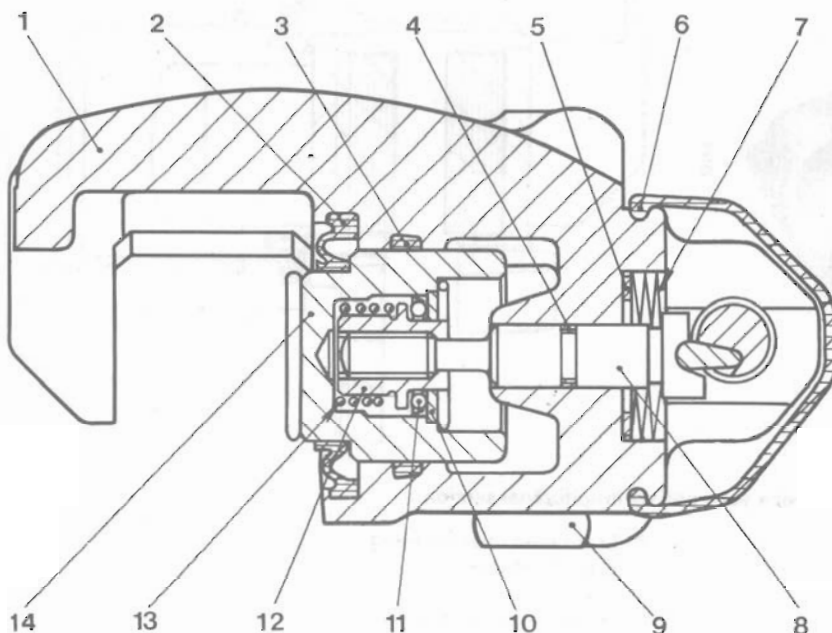
NOTE - After each dismounting of piston from yoke, replace piston shield and inner sealing ring.

Prior to mounting the shield, cover the piston face from the sealing ring side with **FIAT SP 349 grease**.



Components of device for automatic take-up of slack between friction pads and brake disc.

1. Piston.
2. Bush spring.
3. Self-adjusting bush.
4. Ball bearing.
5. Bearing thrust washer.
6. Circlip.



The components of automatic slack take-up device are not available as spares, so if their damage is detected during repair, the complete yoke must be replaced.

Longitudinal section of rear brake yoke.

1. Yoke.
2. Piston shield.
3. Piston sealing ring.
4. Pin sealing ring.
5. Diaphragm spring washer.
6. Handbrake lever shield.
7. Diaphragm springs.
8. Self-adjusting pin.
9. Handbrake lever.
10. Bearing thrust washer.
11. Ball bearing.
12. Self-adjusting bush.
13. Bush spring.
14. Piston.

Handbrake actuating mechanism

Polonez Model 1300/1500

VIII - 1978

331.35

Sheet 1

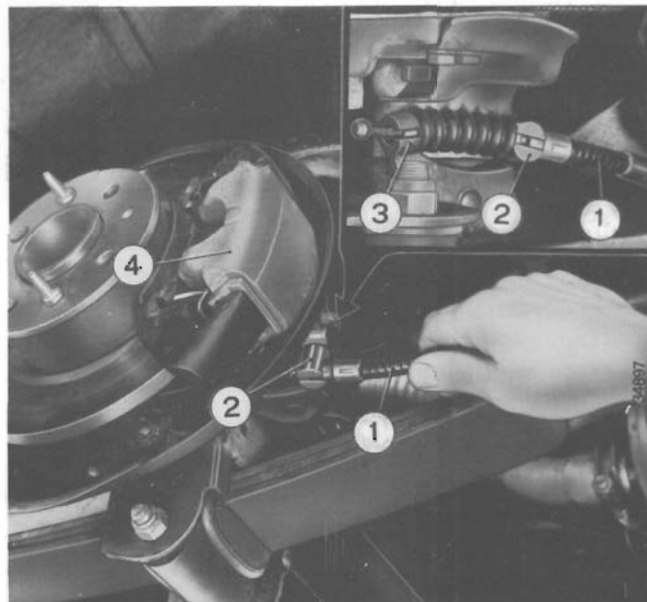
HANDBRAKE CABLE REPLACEMENT

Parking handbrake does not require any special maintenance

During repair, check the cable wear; if broken wires are detected, the cable must be replaced.

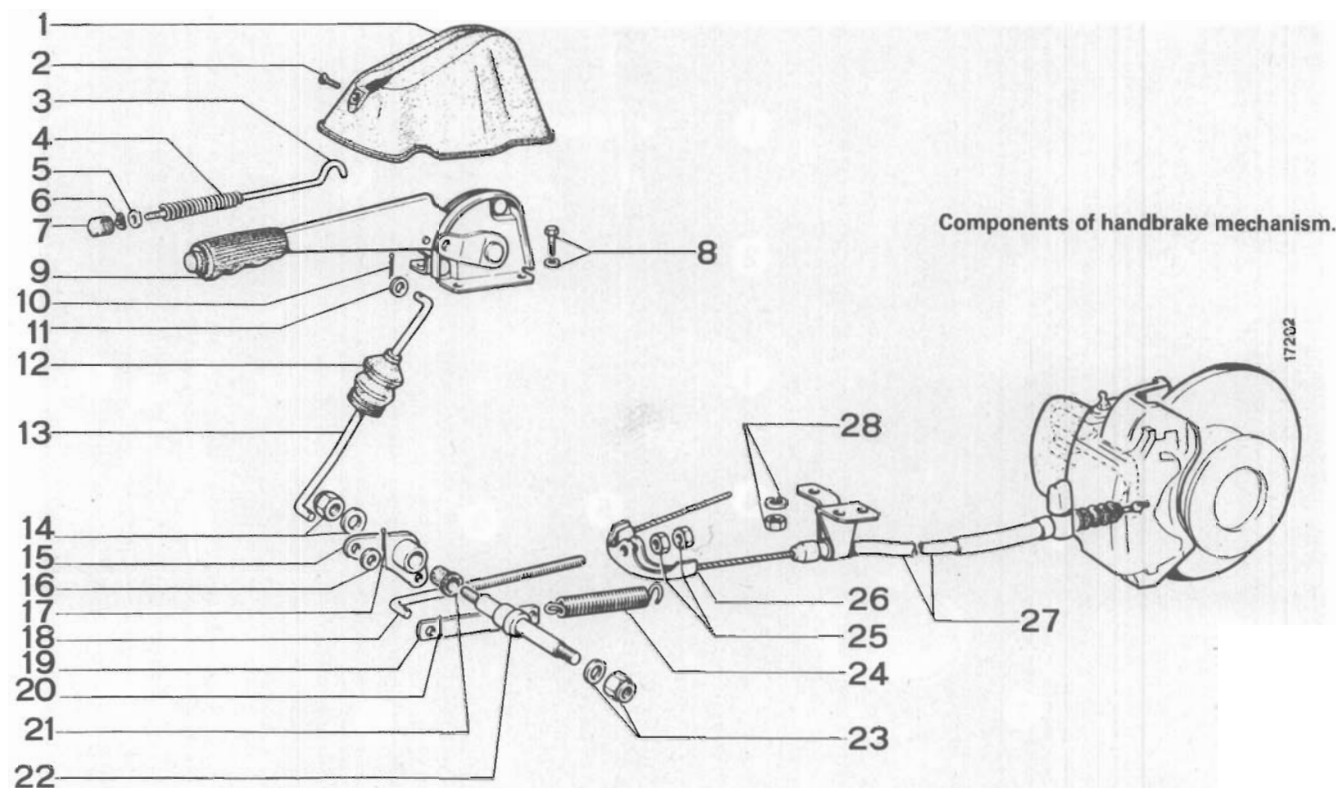
The cable is dismantled as follows:

- unscrew adjusting nut with locknut;
- remove cable brackets from vehicle underside;
- disconnect cable from handbrake levers on brake yokes.



Disconnecting handbrake cable from lever on rear brake yoke.

1. Handbrake steel cable.
2. Pin for fastening cable (1).
3. Handbrake lever.
4. Brake yoke.



1. Boot.
2. Screw.
3. Pawl.
4. Spring.
5. Flat washer.
6. Sealing washer.
7. Clamp.
8. Screw with lockwasher.
9. Handbrake lever.

10. Cotter pin.
11. Flat washer.
12. Boot.
13. Link.
14. Nut with flat washer.
15. Intermediate lever.
16. Flat washer.
17. Cotter pin.
18. Link.

19. Plate.
20. Cotter pin.
21. Spring bush.
22. Pivot.
23. Nut with flat washer.
24. Return spring.
25. Link nuts.
26. Cable catch.
27. Cable.
28. Nut with lockwasher.

HANDBRAKE ADJUSTMENT

If the handbrake lever travel is too long because of cable elongation only, the adjustment is made by means of suitable nut.

The assembly and adjustment should be done only after bleeding and adjustment of hydraulic brakes.

Briskly depress a few times the brake pedal so that the yoke pistons adjust to correct working position. Connect cable to rear brake yoke levers.

Starting from rest position, move the lever upwards by three teeth on the rack. Tighten the adjusting nut until the rear wheels are locked (turn wheel by hand), then tighten the locknut.

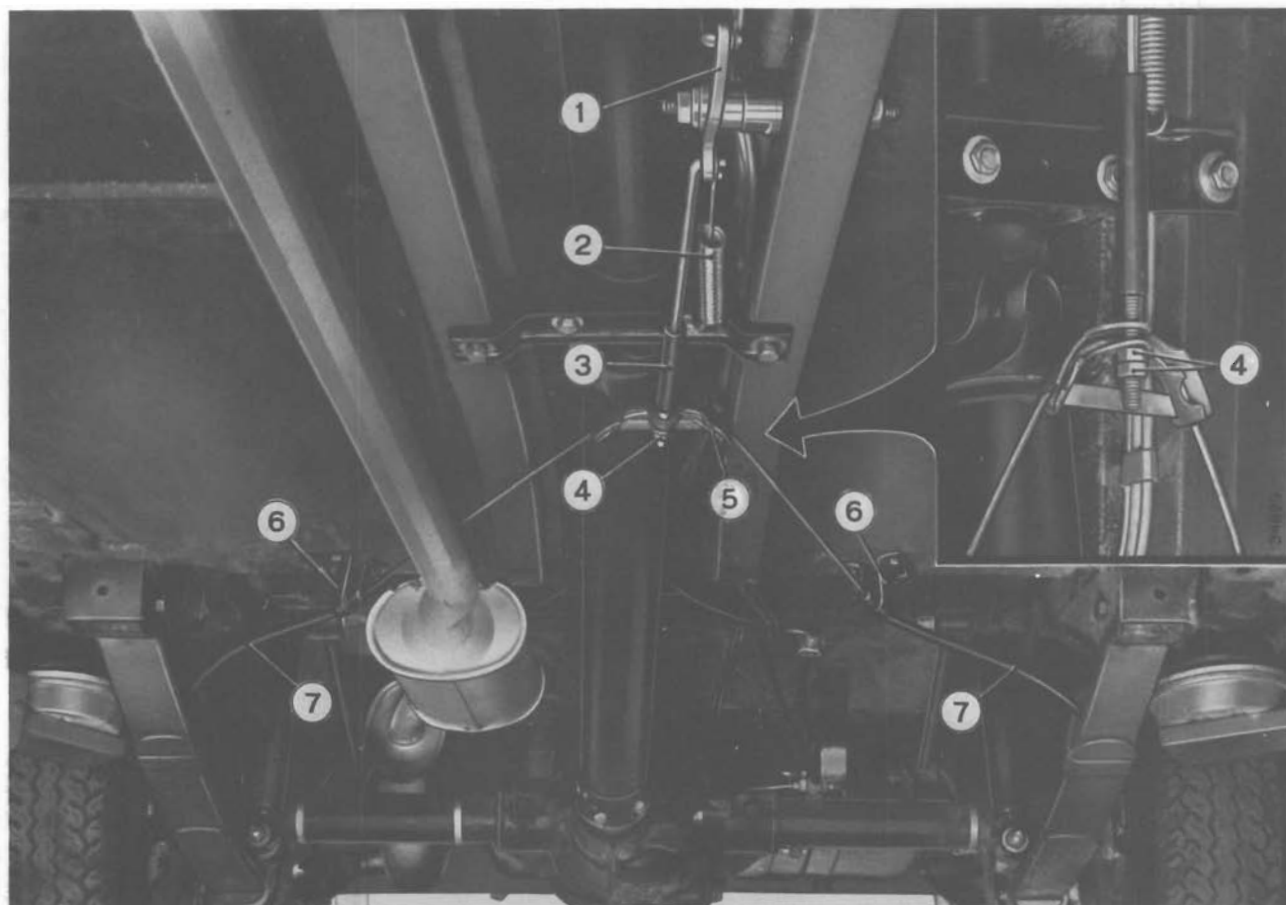
Then actuate the handbrake a few times and check that:

– the number of teeth on the rack remains unchanged;

– with handbrake lever in rest position, the wheels are released (check by turning the wheel by hand).

If the number of teeth covered by lever travel on the rack has increased, repeat the adjustment and check again.

When one or both wheels are locked, check individual components of handbrake mechanism, and particularly the movement of cable in its sheath. On completion of the above operations, repeat adjustment and checking of handbrake operation.



View of handbrake actuating mechanism mounted on the vehicle

1. Intermediate lever.
2. Lever return spring.
3. Handbrake adjusting link.
4. Nut and locknut of link (3).

5. Cable catch.
6. Cable brackets.
7. Cable.

Special tools

Polonez Model 1300/1500

33A

Sheet 1

A.47210/371 Pair of pullers (180 mm long) used with **A.47211** and **A.40005/004** devices for stripping brake disc.



A.47211/754 Set of half-rings for stripping brake disc, used with **A.40005/004** and **A.47210/371** devices.



A.56124 Spanner for dismounting braking corrector.



A.56126 Spanner for brake tubing couplings.



A.72269 Device for adjustment of braking corrector.





41	Characteristics and technical data – Bolts and nuts tightening torques
412.01	Steering system
412.02	Steering gear
412.10	Steering linkage
41A	Special tools

Steering system

Polonez Model 1300/1500

41

Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Steering gear type: worm and roller. Steering column inclination adjustable; steering column with two universal joints. Tierods symmetrical, independent for each wheel, with middle rod and intermediate lever. Middle steering rod with fixed ball joints. Wheel tierods with ball joints of adjustable length. Sealed-for-life ball joints. Intermediate lever bracket with vibration damper.	
Number of steering wheel turns	about 3
Steering gear ratio	1:16.4
Thickness of upper worm bearing adjusting shims	0.10—0.15 mm
Thickness of lower worm bearing adjusting shims	0.100—0.125— 0.190—0.250— 0.350 mm
Worm turning torque	0.20—0.65 Nm (0.020—0.065 kgm)
Adjustment of play between worm and roller	screw with washer acting on main shaft
Worm and main shaft turning torque: — steering wheel turning to right and left — up to 30° — over 30°	0.90—1.20 Nm (0.090—0.120 kgm) 0.70 Nm (0.070 kgm)
Minimum turning radius	about 5350 mm
Wheel turning angles: — inside wheel — offside wheel	34°30' ± 1°30' 26°30'
Toe-in — vehicle loaded(*)	2—4

(*) 4 persons + 50 kg baggage, tires inflated according to recommendations.

BOLTS AND NUTS TIGHTENING TORQUES

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
Steering wheel to column fastening nut	1/07914/11	M16×1.5	R50 Znt (column C30 Norm)	49	5
Self-locking nut with nylon insert for steering column joint spider fastening bolt	1/61044/21	M8	R80 Znt (bolt R100 Cdt)	26	2.7
Front part of steering column housing bracket to body fastening bolt	1/09022/23	M6	R80 Fosf	10	1
Nut for rear part of steering column housing to body fastening bolt	1/61008/11	M8	R50 Znt (bolt R50 Sd Stab)	15	1.5
Worm bearing cover fastening bolt	4212140	M8	R80 Znt	20	2
Steering gear housing cover fastening bolt	4165454	M8	R80 Znt	20	2
Self-locking nut with nylon insert for steering gear housing to body fastening bolt	1/25745/11	M10×1.25	R50 Znt (bolt R80 Znt)	49	5
Steering gear arm fastening nut	1/21643/21	M20×1.5	R80 Cdt shaft 38 CD 4 Bon)	235	24
Self-locking nut with nylon insert for vibration damper to body fastening bolt	1/25745/11	M10×1.25	R50 Znt (bolt R80 Znt)	49	5
Nut for outer tierod clamp fastening bolt	1/61008/11	M8	R50 Znt (bolt R80 Znt)	20	2
Nut with cotter pin fastening ball pivot to steering gear arm	1/07934/11	M14×1.5	R50 Znt (ball pivot 40 Ni Cr Mo 2 R Bon R90—105 or 40 Ni Cr Mo 4 R Bon R90—105)	53(*)	6(*)

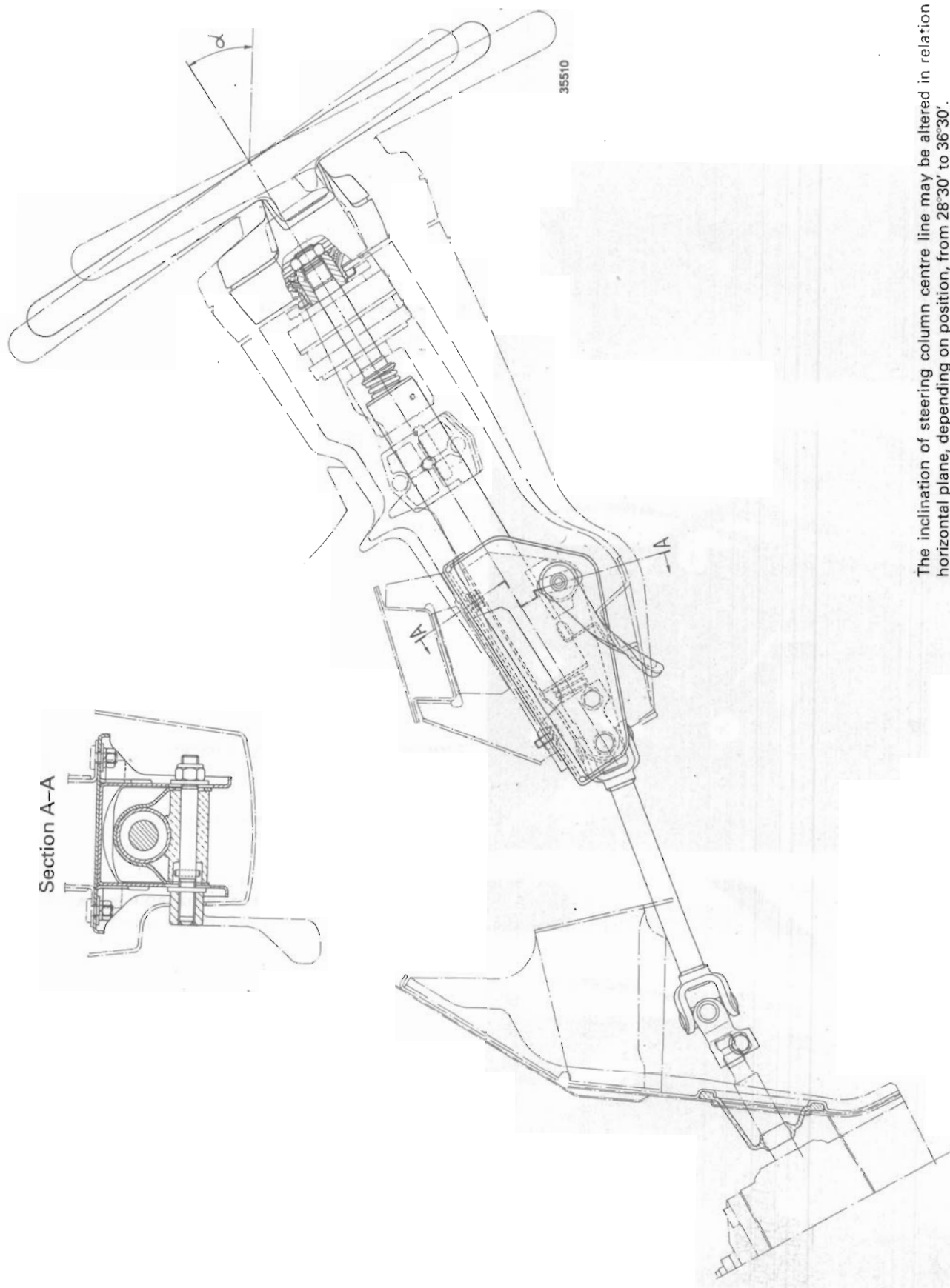
(*) If, after application of the prescribed torque, the notch in nut does not coincide with hole in pivot, the nut must be tightened further so as to allow insertion of cotter pin (minimum angle 60°).

Steering system

Polonez Model 1300/1500

412.01

Sheet 1

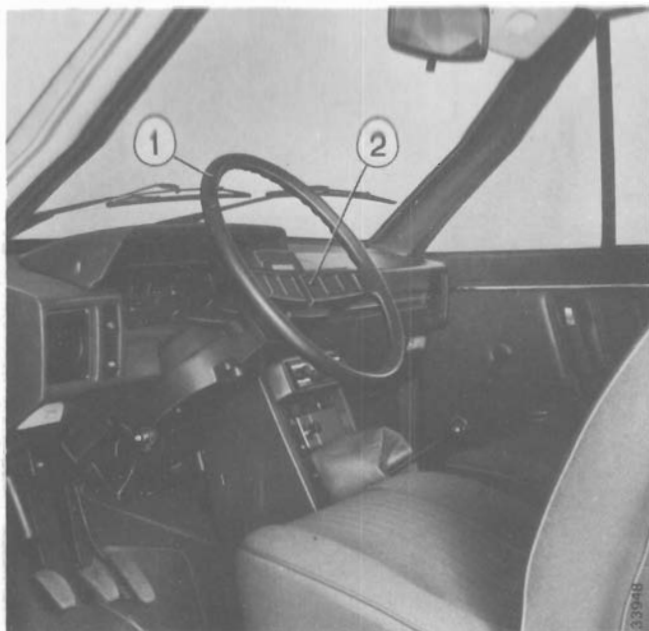


The inclination of steering column centre line may be altered in relation to the horizontal plane, depending on position, from $28^{\circ}30'$ to $36^{\circ}30'$. The angle α , corresponding to intermediate position, is $33^{\circ}50'$.

DISMANTLING AND REASSEMBLY

For dismantling steering column assembly, it is necessary to:

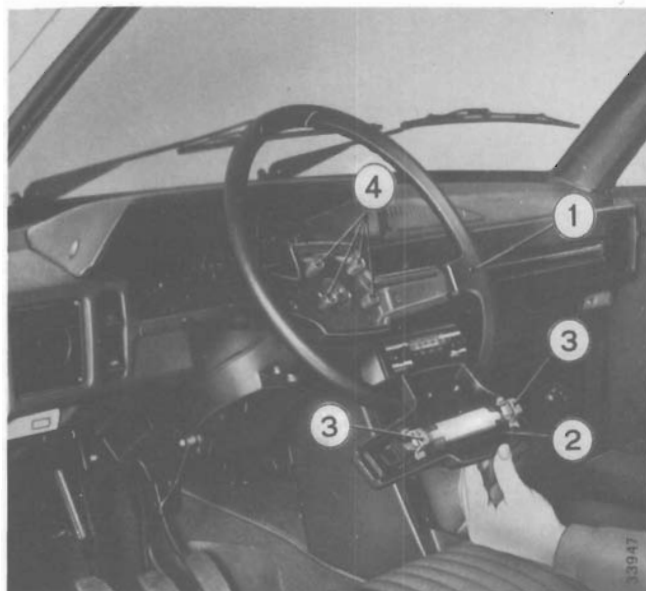
- unscrew the two screws at the underside of steering wheel spokes fastening the horn actuating pad;



Steering wheel assembly in the vehicle.

1. Steering wheel.
2. Horn actuating pad.

- remove the horn actuating pad and the springs underneath;



Steering wheel assembly in the vehicle.

1. Steering wheel.
2. Horn actuating pad.
3. Pad to steering wheel fastening points.
4. Pad springs.

- use **A.57005** spanner, or a suitable eye spanner, to unscrew steering wheel to column fastening nut;
- remove steering wheel from column pulling the steering wheel by its spokes;



Unscrewing steering wheel to steering column fastening nut.

1. Steering wheel.
2. Eye spanner.

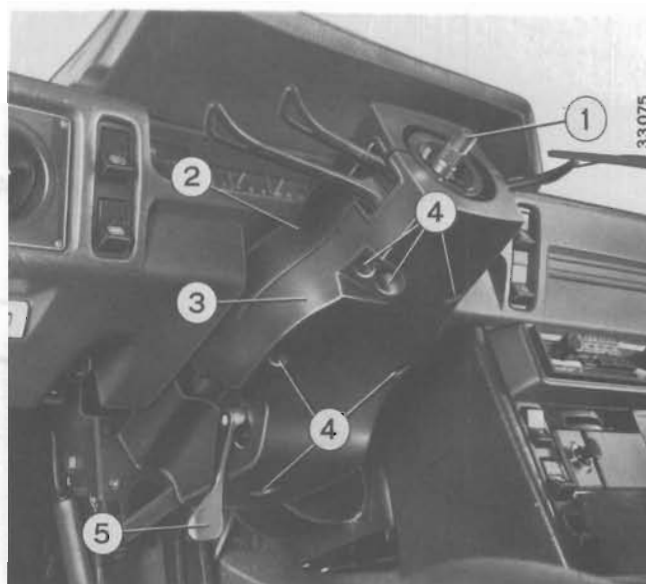
Steering system

Polonez Model 1300/1500

412.01

Sheet 2

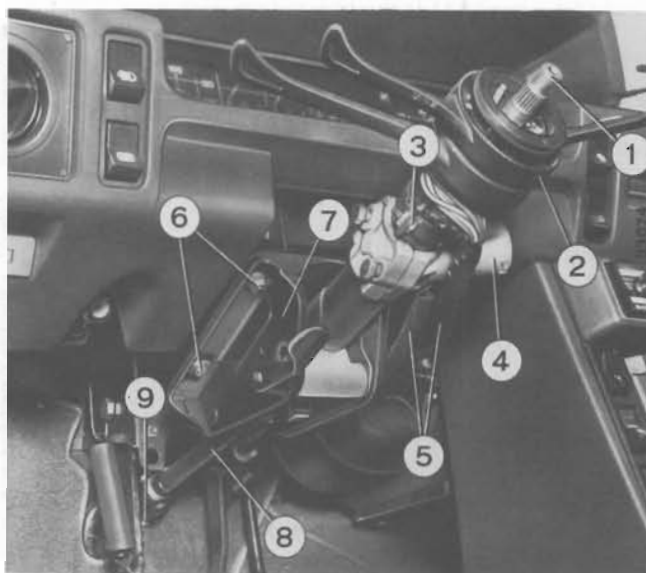
- unscrew column upper housing fastening bolts (2) and lower housing fastening bolts (3);
- remove housings;
- disconnect electric cables of direction indicator, windscreen wiper and ignition switches;
- unscrew bolt (3) fastening the ring of direction indicator switch;



Steering column assembly with steering wheel removed.

1. Steering column.
2. Steering column upper housing.
3. Steering column lower housing.
4. Location of housing fastening screws.
5. Lever for locking the steering column in chosen position.

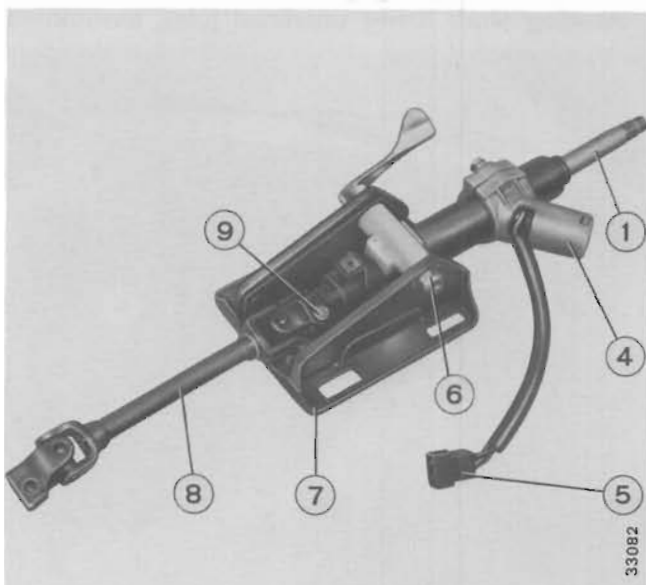
- remove direction indicator switch from steering column;
- unscrew the nut and remove steering shaft universal joint to steering column fastening bolt;



Dismantling steering column assembly.

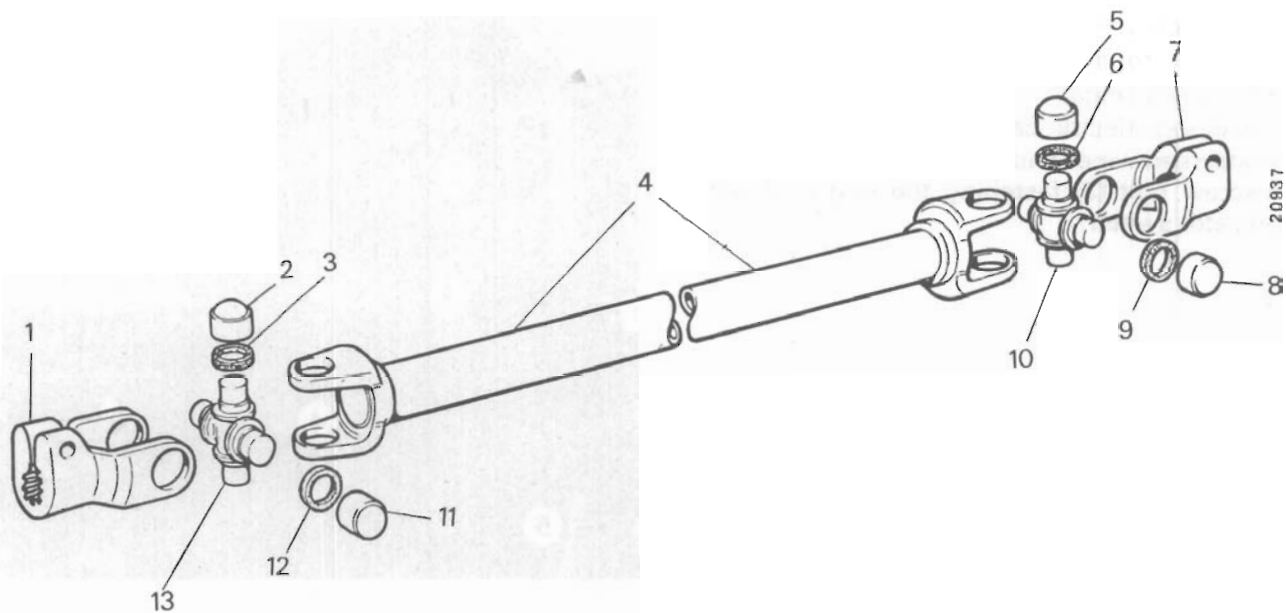
1. Steering column.
2. Direction indicator switch.
3. Direction indicator switch ring fastening screw.
4. Ignition switch with steering column lock.
5. Electric cables of direction indicator, windscreen wiper and ignition switches.
6. Nut and bolt for fastening steering column bracket to body.
7. Steering column bracket.
8. Steering shaft with universal joints.
9. Steering shaft universal joint to steering gear fastening bolt.

- unscrew bolts and nuts (6) fastening steering column bracket (7) to body;
- remove steering column assembly from the vehicle.



Steering column assembly dismantled from the vehicle.

1. Steering column.
2. Ignition switch with steering column lock.
3. Ignition switch electric cable terminal.
4. Nut adjusting steering wheel setting lever.
5. Steering column bracket.
6. Steering shaft with universal joints.
7. Steering shaft universal joint to steering column fastening bolt.



Exploded view of steering shaft.

1. Lower universal joint fork.
2. Spider bearing.
3. Sealing ring.
4. Steering shaft.
5. Spider bearing.
6. Sealing ring.
7. Upper universal joint fork.

8. Spider bearing.
9. Sealing ring.
10. Upper universal joint spider.
11. Spider bearing.
12. Sealing ring.
13. Lower universal joint spider.

– unscrew nut and remove steering shaft upper universal joint fork to steering column fastening bolt;

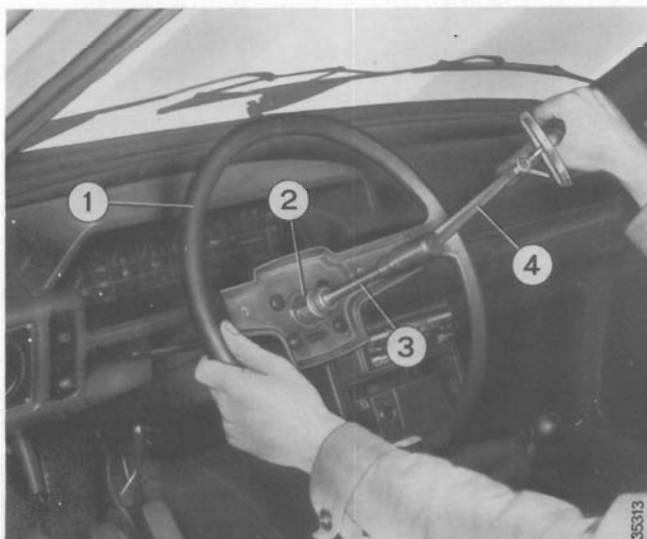
– remove steering column.

To reassemble the steering system, perform the following operations:

- fasten steering gear to body, by tightening nuts of fastening bolts with the requisite torque;
- set steering gear arm to middle position;
- connect to steering gear drive shaft the fork of steering shaft lower universal joint, assembled

with steering column and steering wheel, and check that steering wheel spokes are in horizontal position;

- tighten the universal joint fastening nut with a torque of 26 N.m (2.7 kgm);
- fasten to body the steering column bracket without tightening nuts and bolts;
- turn steering wheel to right and left to lock so that the bracket is set up properly;
- tighten bracket to body fastening nuts and bolts with the requisite torque.



Tightening steering wheel to steering column fastening nut with a torque spanner, using a torque of 49 Nm (5 kgm).

1. Steering wheel.
2. Socket.
3. Socket extension.
4. Torque spanner.

Steering gear

Polonez Model 1300/1500

412.02

Sheet 1

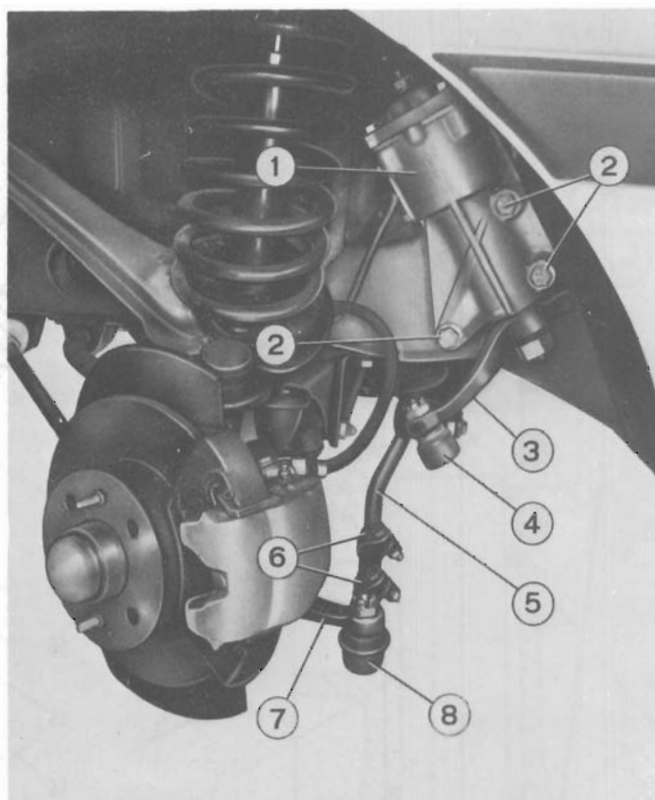
DISMOUNTING AND REASSEMBLY

To dismount the steering gear from the vehicle, perform the following operations:

- from the inside of the vehicle, unscrew the nut and remove steering shaft lower joint fork to steering gear shaft fastening bolt;

Steering gear assembly mounted in the vehicle.

1. Steering gear housing.
2. Steering gear housing to body fastening bolts.
3. Steering gear arm.
4. Middle tierod ball joint.
5. Left-hand side tierod.
6. Tierod adjusting sleeve clamps.
7. Left-hand steering knuckle lever.
8. Left-hand tierod ball joint.

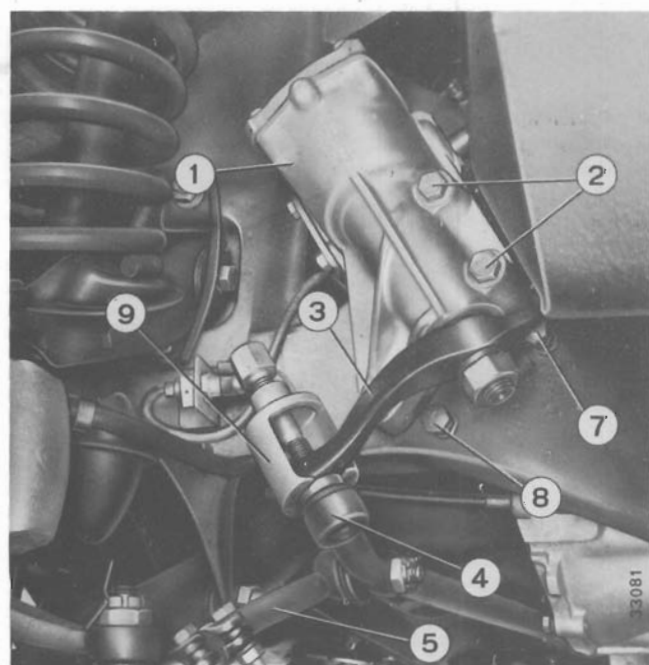


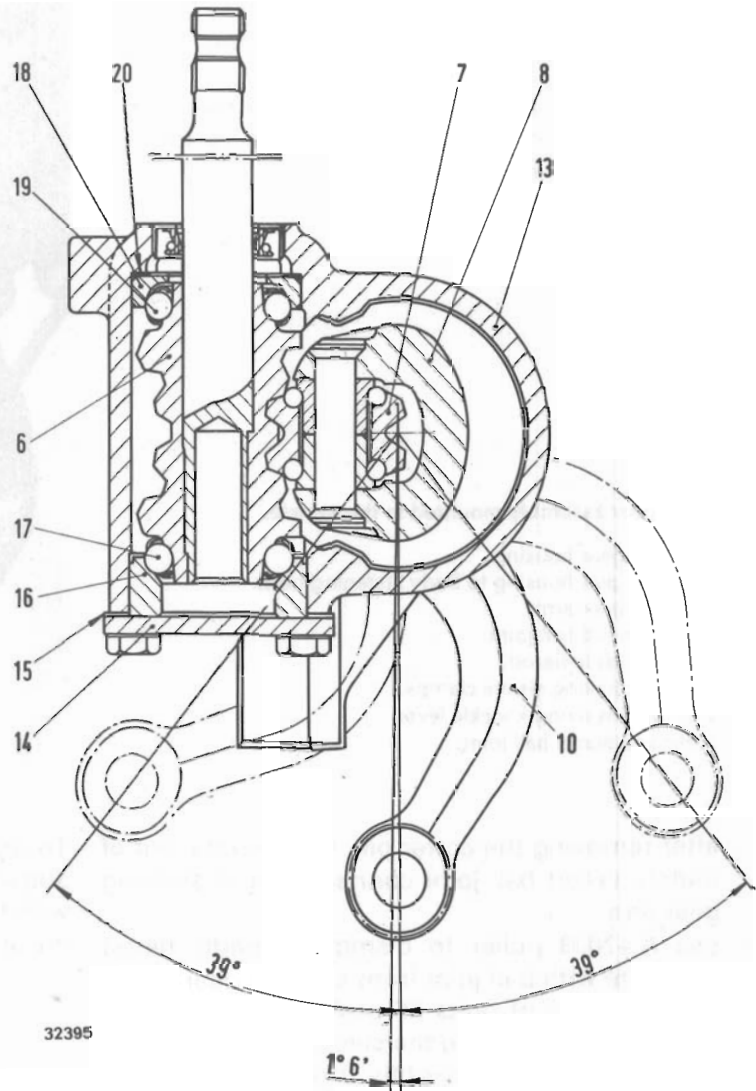
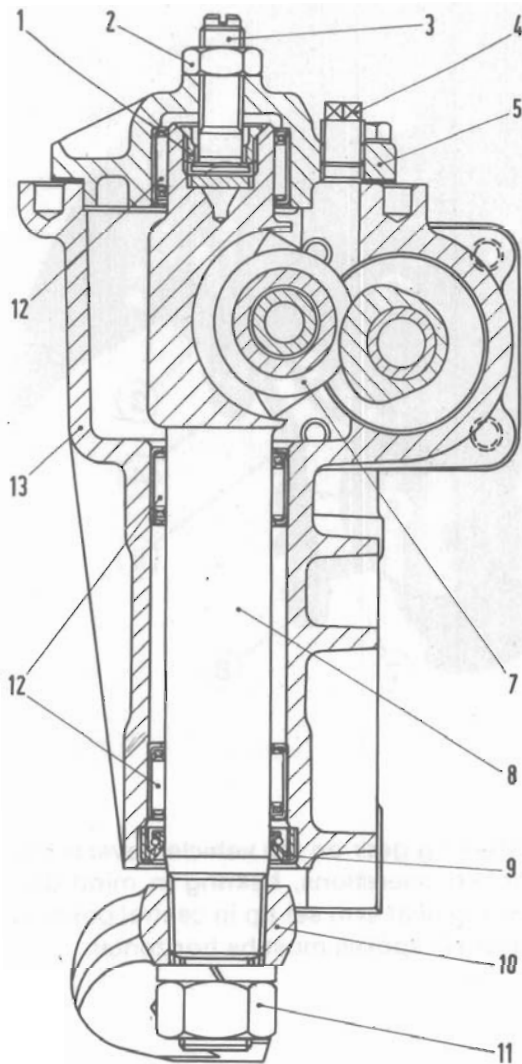
- after removing the cotter pin, unscrew the nut of middle tierod ball joint connecting it to steering gear arm;
- use **A.47033** puller to dismount middle tierod complete with ball joint from steering gear arm;
- unscrew nuts of bolts (2) passing through body element and fastening the steering gear to body;
- push steering gear slightly forwards so that its drive shaft emerges from its rubber boot;
- remove the complete steering gear.

To replace steering gear on the vehicle, reverse the above described operations, bearing in mind that with the steering gear arm set up in central position the steering wheel spokes must be horizontal.

Dismounting ball joint from steering gear arm.

1. Steering gear housing.
2. Steering gear to body fastening bolts.
3. Steering gear arm.
4. Middle tierod ball joint.
5. Left-hand side tierod.
7. Bolt with right-hand turn adjusting nut.
8. Bolt with left-hand turn adjusting nut.
9. **A.47033** puller.





Steering gear: section through main shaft and worm.

1. Adjusting screw sleeve.
2. Adjusting screw lock nut.
3. Main shaft adjusting screw.
4. Fill-in plug.
5. Steering gear housing top cover.
6. Worm.
7. Roller.
8. Main shaft.
9. Main shaft lip seal.
10. Steering gear arm.

11. Steering gear arm fastening nut.
12. Main shaft needle bearings.
13. Steering gear housing.
14. Worm bearing cover.
15. Front bearing adjusting shims.
16. Front bearing outer race.
17. Front bearing rollers with cage.
18. Rear bearing outer race.
19. Rear bearing rollers with cage.
20. Rear bearing adjusting shims.

Steering gear

Polonez Model 1300/1500

412.02

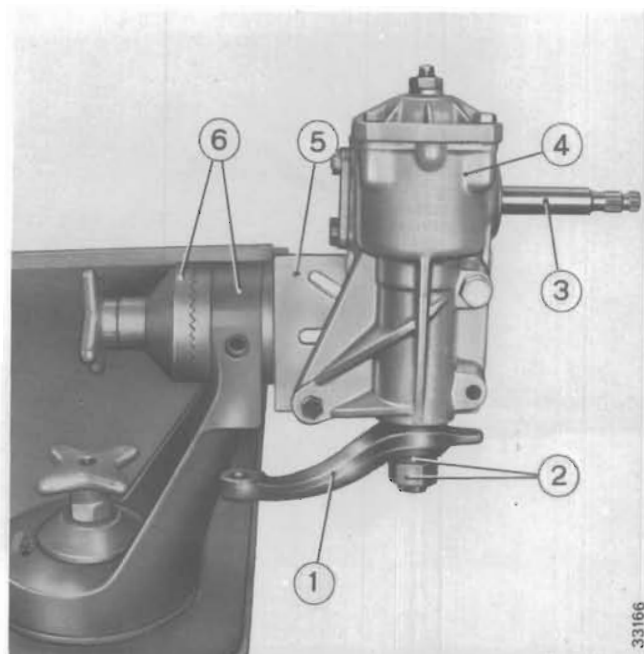
Sheet 2

DISMANTLING

Mount the steering gear on general-purpose holder **A.74076/1** equipped with **A.74076/12** plate.

Steering gear mounted on **A.74076/1** holder by means of **A.74076/12** plate.

1. Steering gear arm.
2. Nut with spring washer for fastening arm (2) to main shaft.
3. Steering gear drive shaft with worm.
4. Steering gear housing.
5. **A.74076/12** plate.
6. **A.74076/1** general-purpose holder.



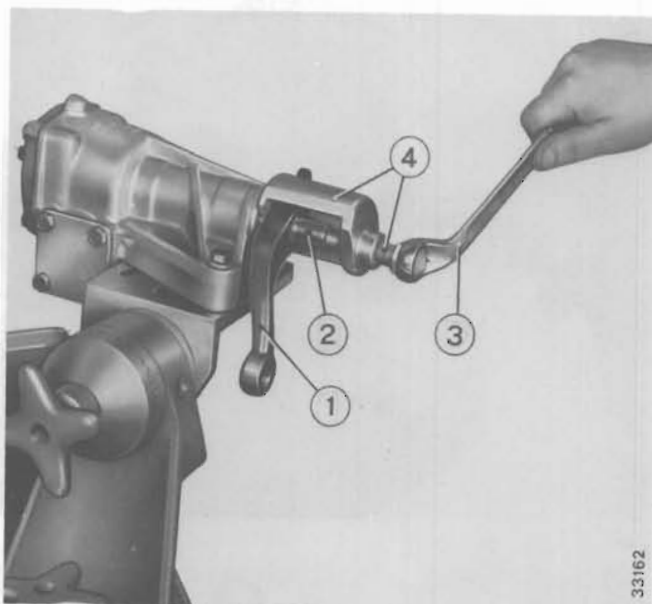
33166

Use **A.57133** spanner to unscrew oil filling plug placed on steering gear housing cover.

By suitably turning **A.74076/12** plate in relation to **A.74076/1** holder, set the steering gear so as to drain oil.

Unscrew the nut fastening steering arm to main shaft and remove spring washer.

Use **A.47043** puller to strip arm (1) from main shaft.



33162

Stripping steering arm from main shaft.

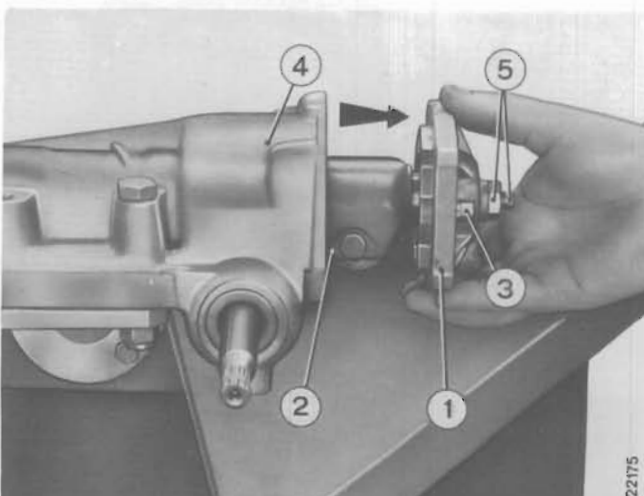
1. Steering arm.
2. Main shaft.
3. Eye spanner.
4. **A.47043** puller.

Unscrew top cover to steering gear housing fastening bolts and remove main shaft together with cover.

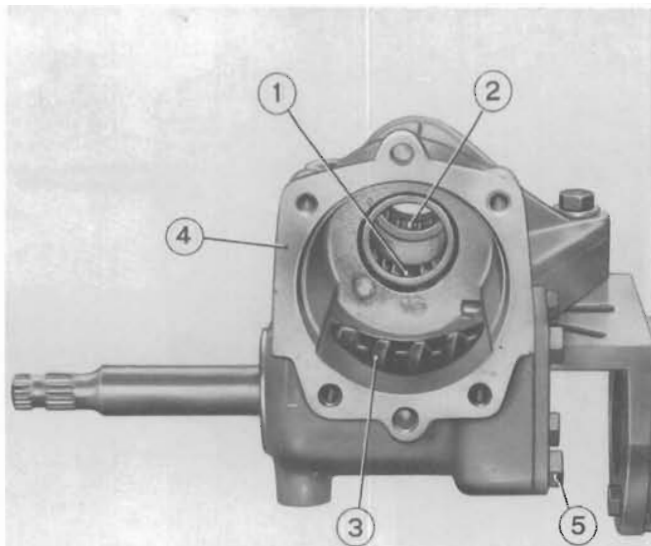
Removing main shaft with cover from steering gear housing.

1. Steering gear housing cover.
2. Main shaft.
3. Filling plug in cover (1).
4. Steering gear housing.
5. Main shaft adjusting screw with nut.

Arrow indicates direction in which to remove main shaft with cover from steering gear housing.



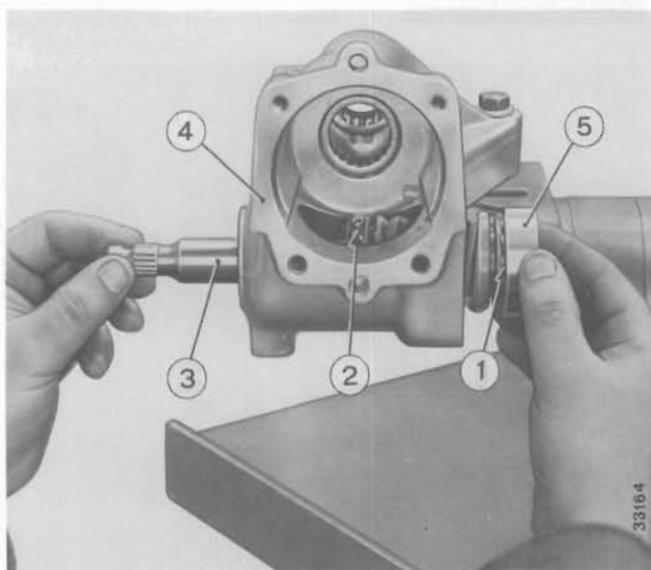
22175



Unscrew bolts (5) fastening drive shaft bearing cover to steering gear housing.

Steering gear partly dismantled.

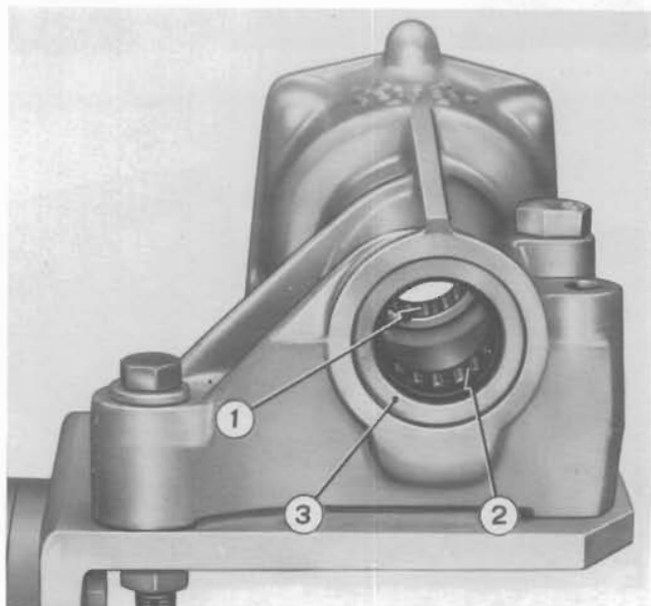
1. Main shaft rear roller bearing.
2. Main shaft front roller bearing.
3. Drive shaft worm.
4. Steering gear housing.
5. Drive shaft cover to steering gear housing fastening bolts.



As shown in the picture, remove drive shaft with worm from steering gear housing.

Removing drive shaft with worm from steering gear housing.

1. Drive shaft and worm front ball bearing.
2. Drive shaft and worm rear ball bearing.
3. Drive shaft and worm.
4. Steering gear housing.
5. Drive shaft and worm front ball bearing outer race.



Dismantling of steering gear is completed by removing drive shaft rear bearing outer race with its lip seal. At the end, remove main shaft lip seal (3). Check the play between roller bearings and main shaft; the maximum permissible play is 0.10 mm, if larger – replace the complete steering gear housing.

Steering gear partly dismantled.

1. Main shaft rear roller bearing.
2. Main shaft front roller bearing.
3. Lip seal.

Steering gear

Polonez Model 1300/1500

412.02

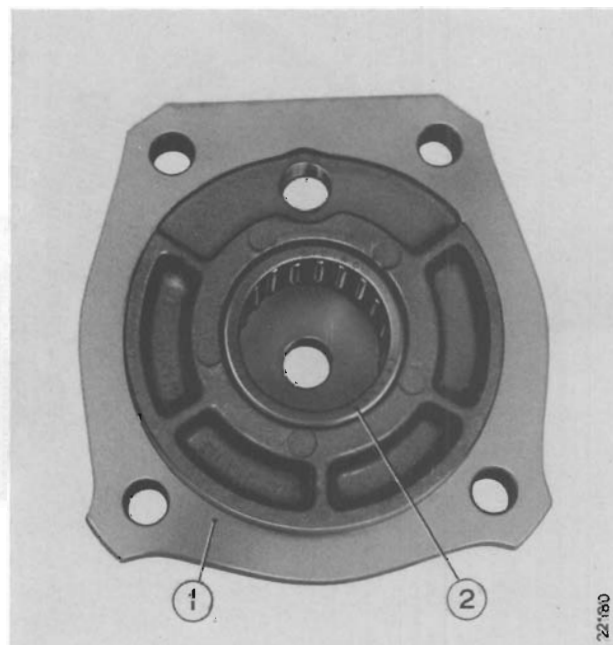
Sheet 3

NOTE – Spare roller bearings, both in steering gear housing and in cover, are not available; if worn, the complete steering gear housing and cover must be replaced.

Check carefully worm and roller mating surfaces for indentations and deep scratches; if these are found, both components must be replaced.

Steering gear housing cover with main shaft roller bearing.

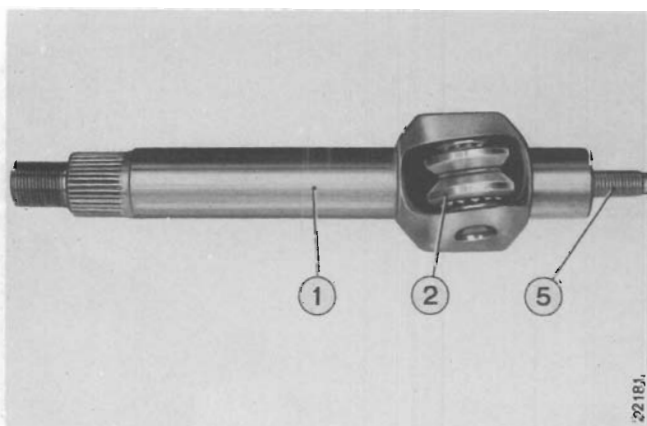
1. Steering gear housing cover.
2. Main shaft roller bearing.



Next, check that these surfaces contact each other exactly, in the centre to see which adjusting shims must be used during reassembly and adjustment.

Main shaft with roller and adjusting screw.

- 1 and 2. Main shaft and roller.
5. Main shaft adjusting screw.



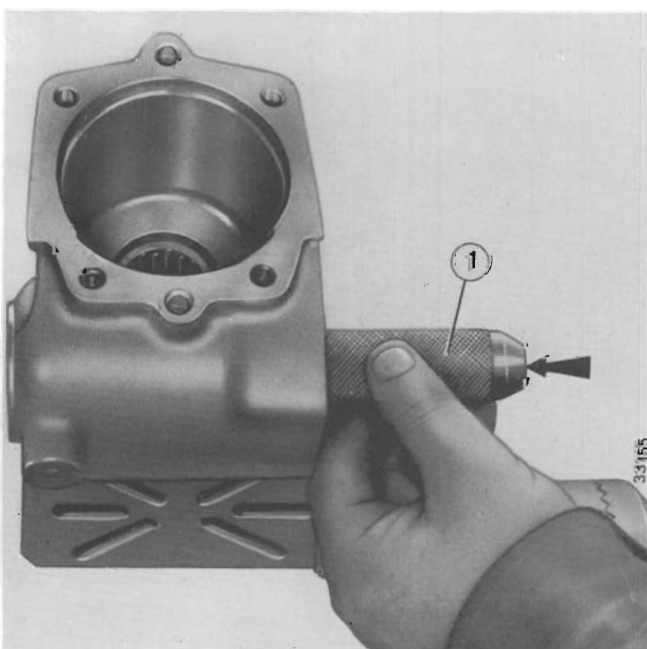
REASSEMBLY AND ADJUSTMENT

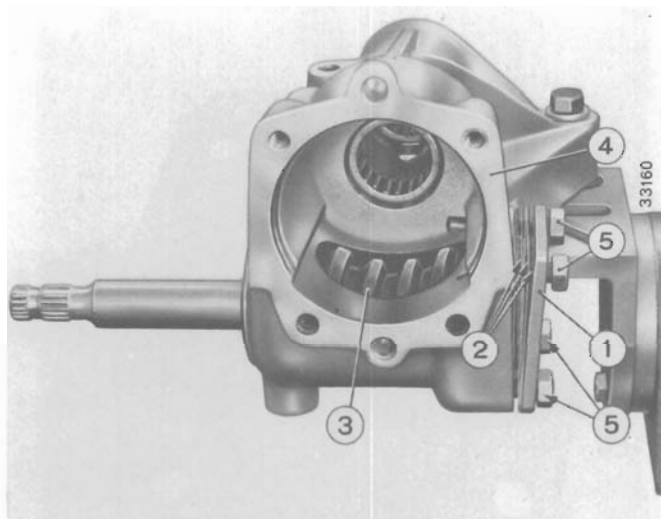
The roller bearings of main shaft with worm must rotate freely without play, otherwise they must be replaced. The main shaft and worm rear bearing outer race is installed in steering gear housing with the use of **A.74186** punch.

Place rear roller bearing on main shaft with worm, and then insert main shaft with worm in steering gear housing.

Mounting main shaft and worm rear bearing outer race in steering gear housing.

1. **A.74186** punch.



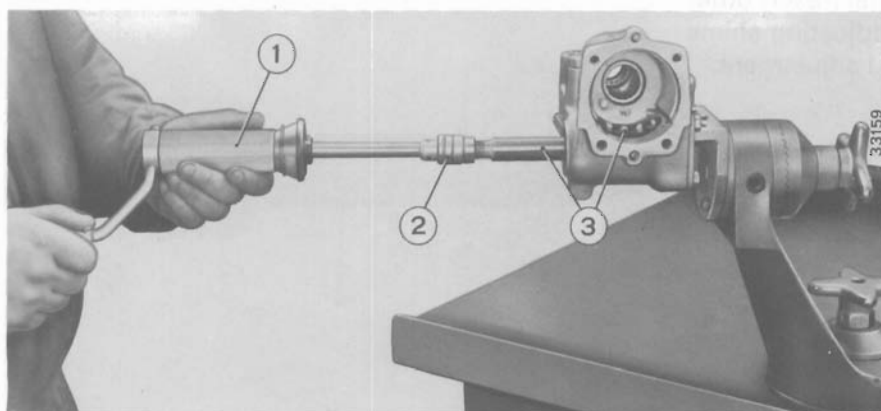


After mounting the main shaft, put in front ball bearing with its outer race and replace cover with suitable adjusting shims; then tighten cover fastening bolts with a torque spanner, using a torque of 20 Nm (2 kgm). Next, check the torque required to turn drive shaft with worm.

Mounting bearing cover with adjusting shims.

1. Bearing cover.
2. Adjusting shims.
3. Worm.
4. Steering gear housing.
5. Cover to housing fastening bolts.

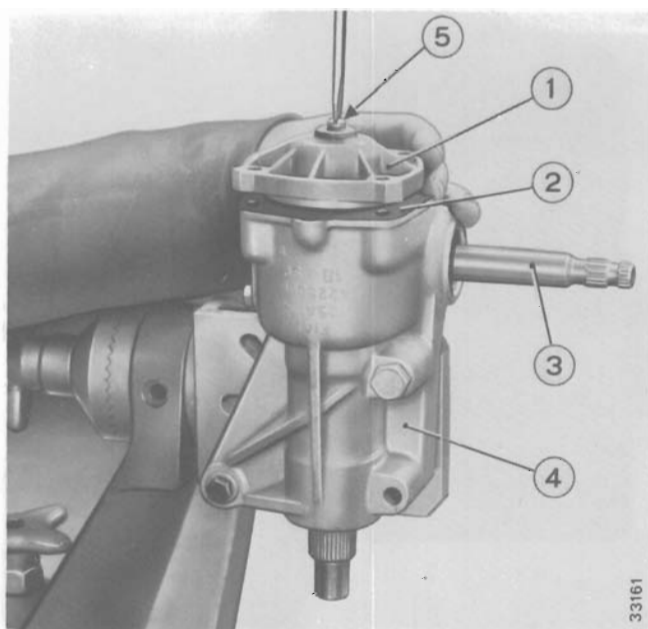
NOTE – The torque required for turning steering gear shaft with worm should be 0.50 Nm (0.050 kgm).



If the torque smaller, the adjusting shim thickness must be reduced, and if higher – increased.

Checking steering gear drive shaft with worm turning torque by means of A.95697 dynamometer.

1. A.95697 dynamometer.
2. A.95697/7 socket.
3. Steering gear drive shaft with worm.



Mount main shaft with roller in steering gear housing and put on cover (1) with sealing gasket (2). Then turn main shaft adjusting screw (5) so that the cover comes into contact with steering gear housing. Fasten the cover with its fastening bolts.

Starting with the centre position, move steering gear arm in both directions, checking that there is no play between roller and worm when the drive shaft and worm (and not the steering gear arm) is moved through an angle of at least 30° to the right and left; the play, if any, must be eliminated by turning in the main shaft adjusting screw and tightening its locknut.

Mounting steering gear housing cover.

1. Cover.
2. Sealing gasket.
3. Drive shaft with worm.
4. Steering gear housing.
5. Main shaft adjusting screw.

Steering gear

Polonez Model 1300/1500

412.02

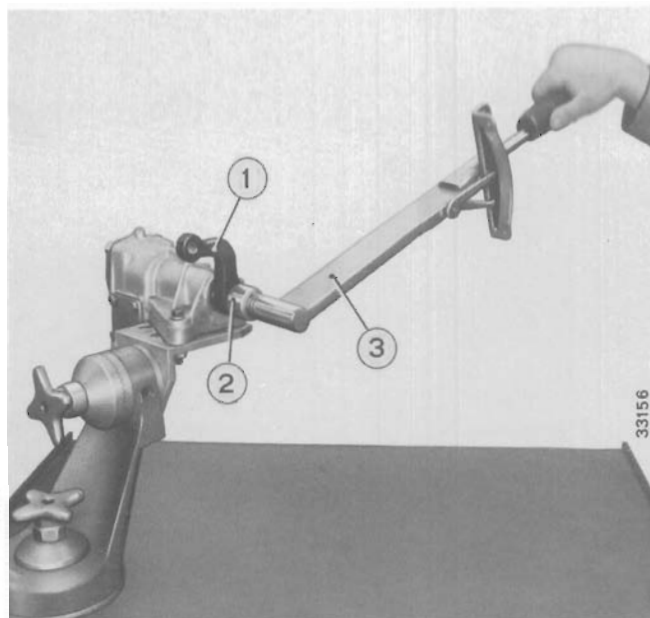
Sheet 4

If, when adjusting the play between worm and roller, it is found that these components do not mesh exactly in the centre, then the worm bearing races and adjusting shims must be selected so as to obtain exact central position.

If this irregularity is found, the adjustment of worm bearings and play between worm and roller must be repeated and then the torques required for turning checked in a way described on the preceding sheet and below.

Tightening with torque spanner steering gear arm to main shaft fastening nut.

1. Steering gear arm.
2. Socket.
3. Torque spanner.

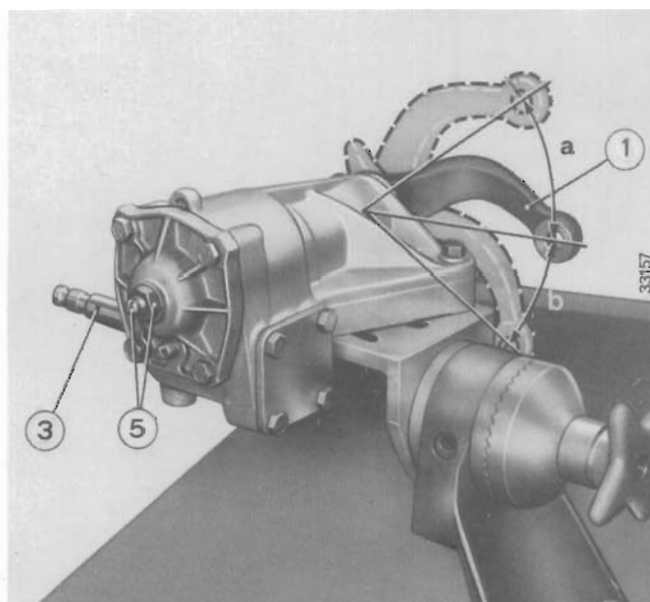


After adjusting the play between worm and roller, check with the use of **A.95697** dynamometer the torque required to turn the steering gear drive shaft (without oil) which should amount to:

- 9 – 12 kgcm – from steering gear arm central position turning the drive shaft by about 30° in both directions;
- less than 7 kgcm beyond 30° to both locks.

Steering gear arm in central position and its angular movement to both sides.

1. Steering gear arm.
 3. Steering gear drive shaft with worm.
 5. Main shaft adjusting screw and nut.
- a = b = 39° approximately.



NOTE – The play between drive shaft worm and roller should be adjusted with steering gear arm (1) in central position and front wheels pointing straight ahead. The central position is determined

from the number of revolutions of steering gear drive shaft (3) required for turning the gear arm from lock to lock.



Steering linkage

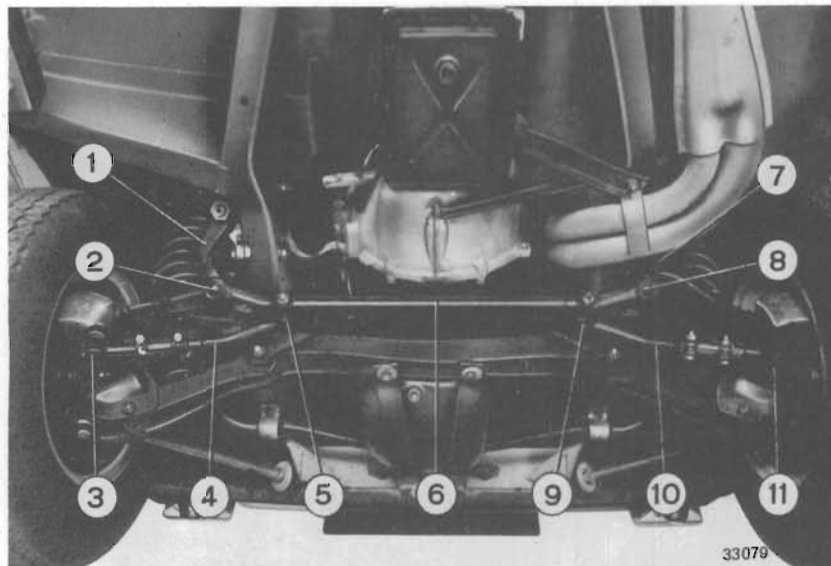
Poionez Model 1300/1500

412.10

Sheet 1

View of steering linkage mounted in the vehicle.

1. Steering gear arm.
2. Ball joint linking steering gear arm to middle rod.
3. Ball joint linking left-hand tierod to left-hand steering knuckle lever.
4. Left-hand tierod.
5. Ball joint linking left-hand tierod to middle rod.
6. Middle steering rod.
7. Intermediate lever.
8. Ball joint linking middle rod to intermediate lever.
9. Ball joint linking right-hand tierod to middle rod.
10. Right-hand tierod.
11. Ball joint linking right-hand tierod to right-hand steering knuckle lever.



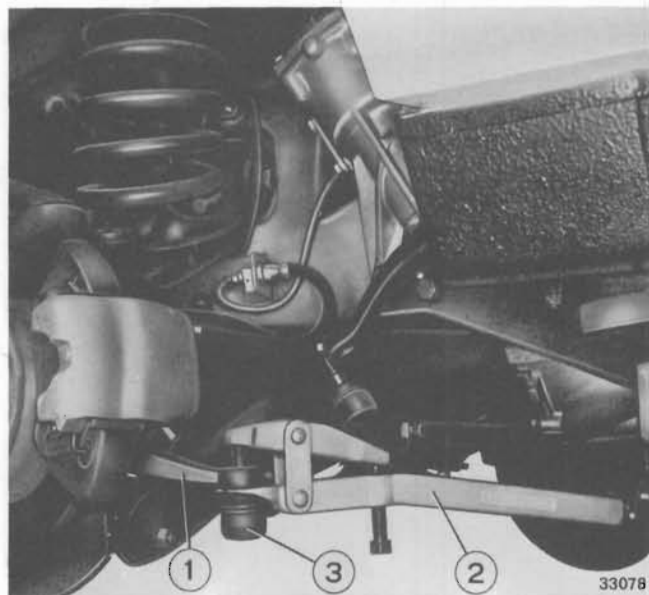
STEERING LINKAGE

To dismount the steering linkage from the vehicle perform the following operations:

- remove cotter pins and unscrew nuts fastening tierod ball joints to steering knuckles, and the middle rod to steering gear arm and intermediate levers;
- use **A.47035** puller to remove tierod ball joints from steering knuckle levers;

Dismounting ball joint of left-hand tierod from steering knuckle lever.

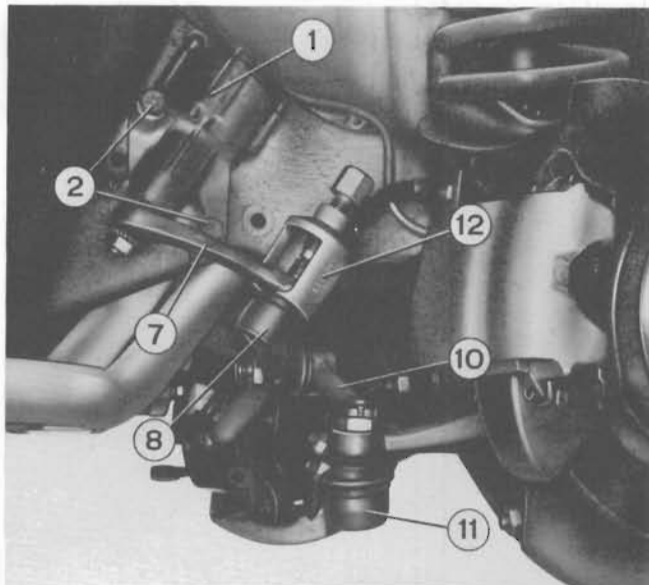
1. Steering knuckle lever.
2. **A.47035** puller.
3. Ball joint linking left-hand tierod to steering knuckle arm.



- use **A.47033** puller to remove middle rod ball joints from steering gear arm and intermediate lever;
- next, disconnect middle rod from side tierods with the use of **A.47035** puller.

Dismounting middle rod ball joint from intermediate lever.

1. Intermediate lever bracket.
2. Intermediate lever bracket to body fastening bolts.
7. Intermediate lever.
8. Ball joint linking middle steering rod to intermediate lever.
10. Right-hand tierod.
11. Ball joint linking right-hand tierod to steering knuckle lever.
12. **A.47033** puller.



steering linkage

Polonez Model 1300/1500



Steering linkage

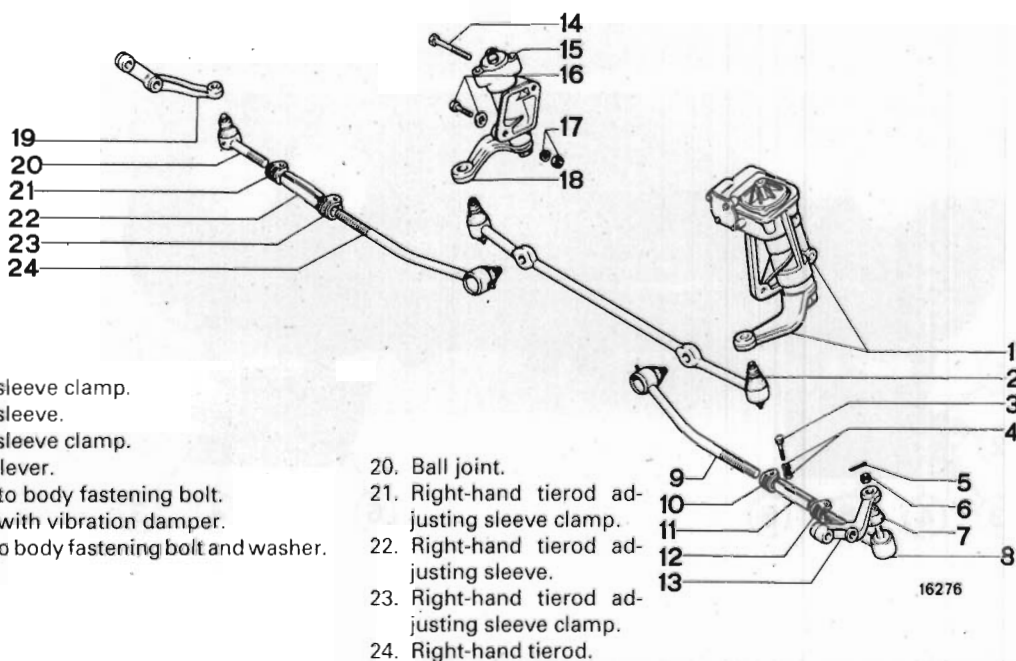
Polonez Model 1300/1500

412.10

Sheet 2

Steering linkage components.

1. Steering gear.
2. Middle steering rod.
3. Bolt.
4. Nut with lockwasher.
5. Cotter pin.
6. Nut for fastening ball joint at the end of left-hand tierod to left-hand steering knuckle lever.
7. Boot.
8. Ball joint.
9. Left-hand tierod.
10. Left-hand tierod adjusting sleeve clamp.
11. Left-hand tierod adjusting sleeve.
12. Left-hand tierod adjusting sleeve clamp.
13. Left-hand steering knuckle lever.
14. Intermediate lever bracket to body fastening bolt.
15. Intermediate lever bracket with vibration damper.
16. Intermediate lever bracket to body fastening bolt and washer.
17. Nut with flat washer.
18. Intermediate lever.
19. Right-hand steering knuckle lever.



Checking and repair

After dismantling, check that tierod ball joints have no excessive play on the ball pins, and that the pins and sealings are undamaged.

If any of these are damaged, replace:

- in case of middle steering rod – the complete component;
- in case of a tierod – the damaged adjustable end.

BALL JOINTS (SEALED-FOR-LIFE)

The ball joints are protected by rubber boots; if these are in good repair and ensure tightness of the joint, its life is practically unlimited.

In case the replacement of boot on ball pin or tierod becomes necessary, bear in mind that the recess under the boot must be filled to 50 – 70% of its capacity with "KB 521" grease.

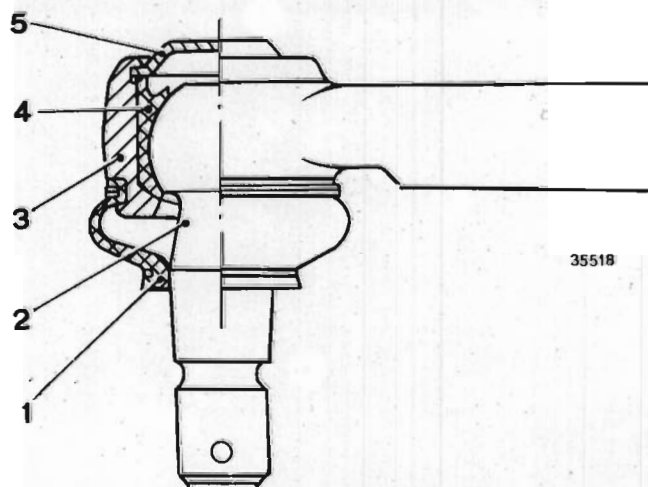
INTERMEDIATE LEVER BRACKET

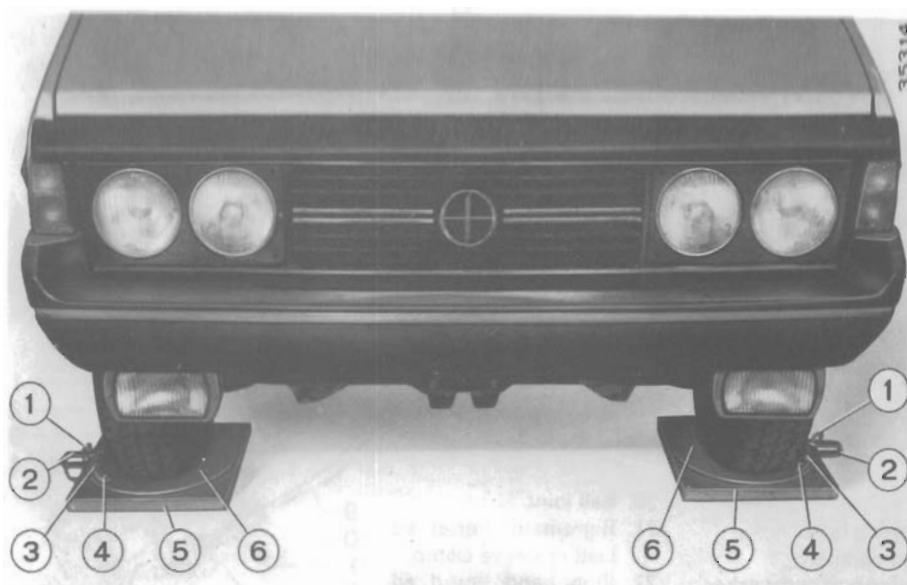
To dismantle the bracket, disconnect intermediate lever from middle steering rod with the use of **A.47033** puller, and unscrew bolts (2) (see picture at the bottom of preceding sheet) securing the bracket to body.

After repair of steering linkage, if excessive vibration of steering wheel is felt while driving the vehicle (not caused by incorrect wheel balance), or pulling to one side the complete bracket with hydraulic vibration damper must be replaced since they cannot be repaired.

Section of tierod ball joint.

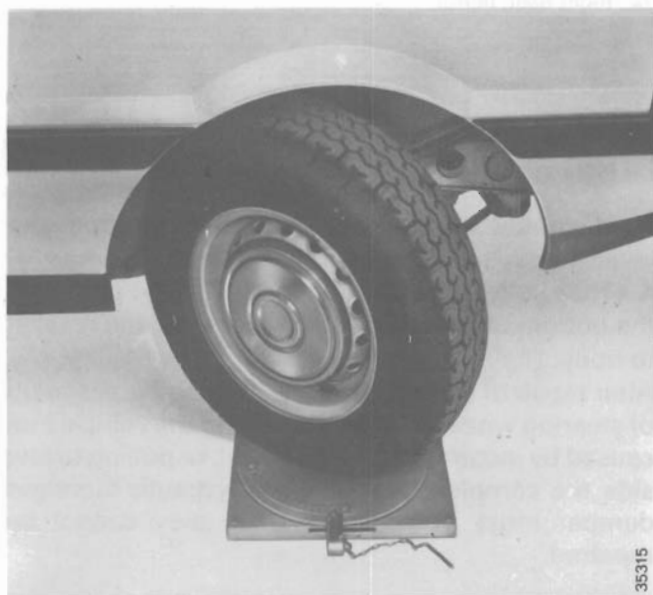
1. Rubber boot.
2. Ball pin.
3. Ball seat.
4. Ball pin half-bushing.
5. Cover.





Checking front wheel turning angle on a vehicle placed on turntables.

1. Turn-table to plate fastening pin.
2. Indicator.
3. Scale.
4. Scale fixing screw.
5. Plate.
6. Turn-table.



View of RH front wheel turned to the right.

CHECKING FRONT WHEEL TURNING ANGLE

To make this check, place the vehicle on a level surface provided with four plates: the front ones with turntables and the rear ones fixed. Prior to placing the vehicle on plates, the front-plate turntables must be secured with their pins to the plates.

NOTE – Tires should be inflated to correct pressure and placed in the centre of turntables.

Next, set to zero scales (3) by means of indicators (2) by unscrewing the screws (4).

Remove pins (1) securing the turn-tables to plates and turn the wheel to the right.

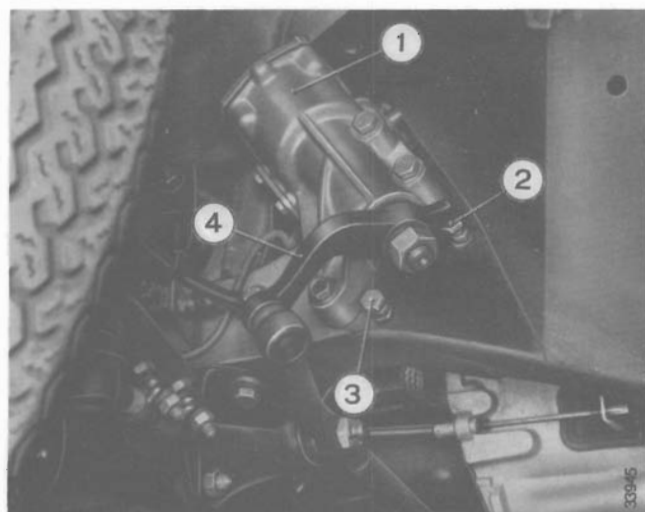
In order to obtain correct results, prior to turning the wheels to the left, set them straight ahead, replace the turn-table securing pins, and get the wheels settled properly by depressing and releasing a few times the front of the vehicle.

Then remove the pins again and turn the wheels to the left.

In case other values are found than those indicated in Table 41, Sheet 1, adjustment should be made by suitably turning the screws (2 and 3).

View of steering gear and wheel right and left turn adjusting screws.

1. Steering gear.
2. Screw and nut for adjusting right-hand turn.
3. Screw and nut for adjusting left-hand turn.
4. Steering gear arm.

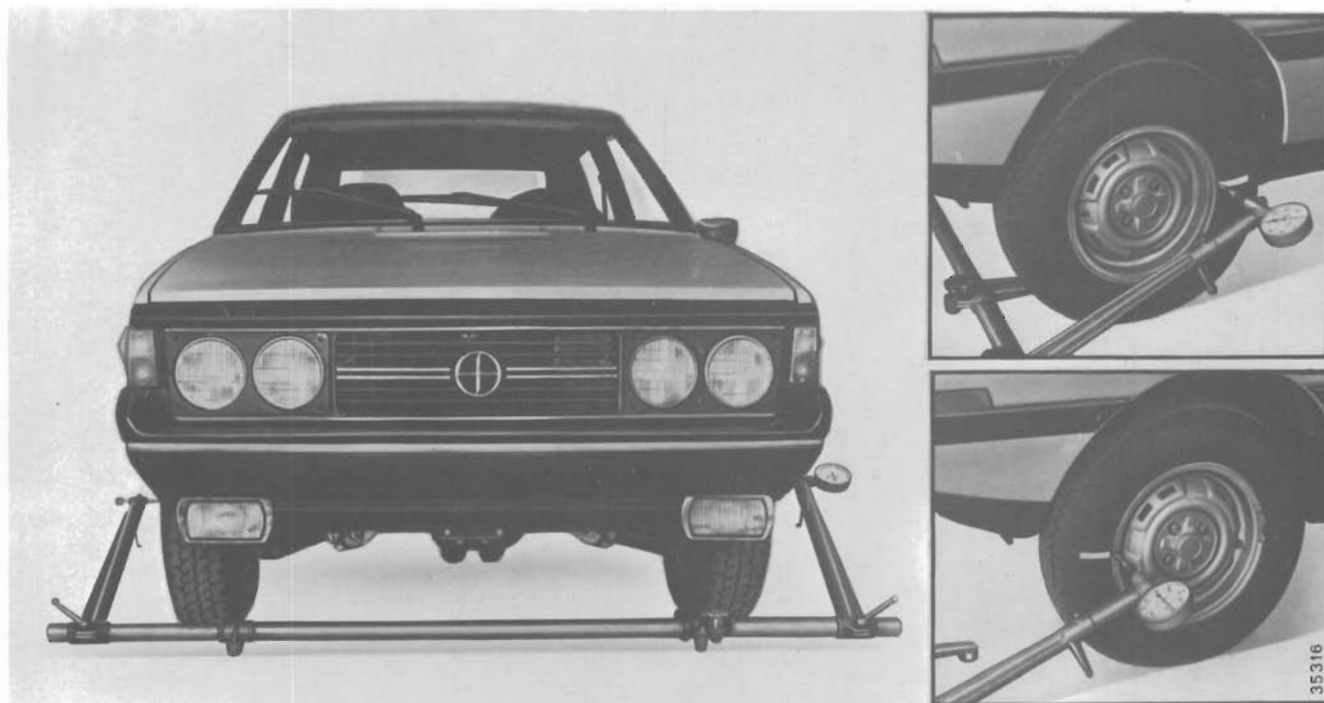


Steering linkage

Polonez Model 1300/1500

412.10

Sheet 3



Checking front wheel toe-in by means of Ap.5107 fixture.

CHECKING FRONT WHEEL TOE-IN

Prior to toe-in checking make sure that the wheels are set in straight ahead position, i.e. parallel to the longitudinal centre line of the vehicle, and that the tires are inflated to correct pressure.

Set the sliding levers of **Ap.5107** fixture so that they are located at the height of wheel centre.

Set the dial gauge contact points so that they touch the outside of front wheel rims at the rear, set the dial gauge mounted on one of the levers to zero, and mark the checked points as shown in the picture (top).

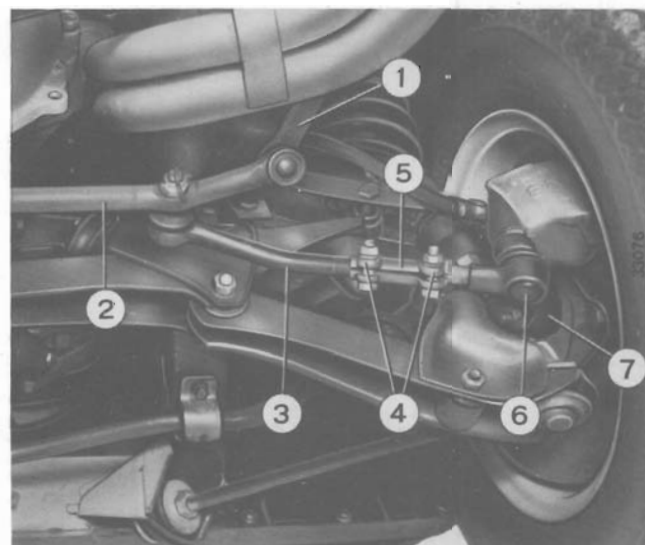
Move the vehicle so that the wheels are rotated through 180° and then set the gauge contact points again at the previous marks (bottom).

Read from the gauge the measured value, which should be contained within the limits given in Table 41, Sheet 1.

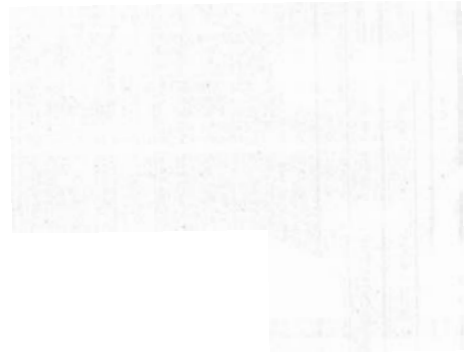
If a different reading is obtained, turn uniformly the adjusting sleeves (5), after first loosening their clamps.

View of right-hand tierod.

1. Intermediate lever.
2. Middle steering rod.
3. Right-hand tierod.
4. Clamps of right-hand tierod adjusting sleeve.
5. Right-hand tierod adjusting sleeve.
6. Right-hand tierod ball joint.
7. Right-hand steering knuckle lever.



Polonez Model 1300/1500

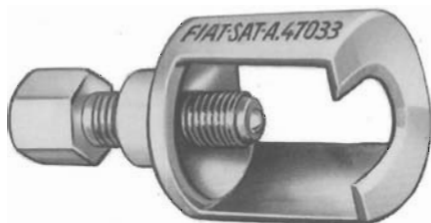


Special tools

Polonez Model 1300/1500

41 A

Sheet 1



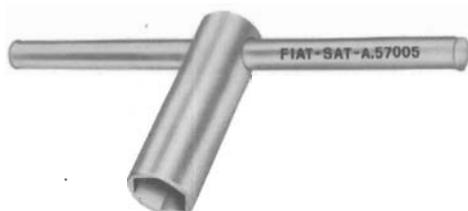
A.47033 Puller for intermediate steering lever.



A.47035 Puller for tierod ball joints.



A.47043 Puller for steering gear arm.



A.57005 Spanner for unscrewing steering wheel to steering column fastening nut.



A.57133 8 mm eye spanner for fill-in plug in steering gear cover.



A.74076/1 General-purpose holder for repairs of steering gear.



A.74076/12 Plate used in conjunction with A.74076/1 holder for repairs of steering gear.



A.74186 Punch for installation of worm bearing outer race.



A.95697/7 Socket used in conjunction with A.95697 dynamometer for checking the torque required for turning steering gear drive shaft with worm.



44	Characteristics and technical data – Bolts and nuts tightening torques
443.00	Wheel suspension
443.01	Front suspension
443.02	Shock-absorbers and front stabiliser bar
443.05	Rear suspension
443.06	Shock-absorbers and rear radius rods
443.14	Steering knuckle
443.16	Road wheels
44A	Special tools

Suspension and road wheels

44

Polonez Model 1300/1500

Sheet 1

CHARACTERISTICS AND TECHNICAL DATA

Front suspension , type: independent, with two transverse swing arms, helical springs and double-action hydraulic shock-absorbers.	
Steering knuckles: — caster — vehicle loaded(*) — camber	$4^{\circ}30' \pm 30'$ $6^{\circ} \pm 30'$
Road wheels: — vehicle loaded(*) — wheel camber — toe-in	$0^{\circ}30' \pm 30'$ 2—4 mm
Helical springs: — catalogue number — spring with yellow mark on middle coil, height under load(**) — spring with green mark on middle coil, height under load(**)	4167802 >231 mm 4310 N (440 kg) <231 mm 4310 N (440 kg)
Shock-absorbers: — type — catalogue number — total stroke — characteristics {bound force {rebound force	F.A. Krosno 016145 122.5 mm 216±49 N (22±5 kg) 637±73.6 N (65±7.5 kg)
Rear suspension , type: rigid axle with semi-elliptical leaf springs, radius rods and double-action hydraulic shock-absorbers.	
Semi-elliptical leaf spring Test load: — static load — start of elasticity test(***) — end of elasticity test(***) — sag — elastic deflexion from initial position(***) — elasticity	3 leaves 3140 N (320 kg) 2160 N (220 kg) 4120 N (420 kg) 32±3 mm 56±3 — 112±6 mm 56±4.5 mm (100 kg) 571±46 mm (100 N)
Shock-absorbers: — type — catalogue number — total stroke — characteristics {bound force {rebound force	F.A. Krosno 016146 206 mm 235±49 N (24±5 kg) 736±73.6 N (75±7.5 kg)

* Curb weight with 4 passengers and 49 daN (50 kg) baggage.

* When reassembling, use springs with marks of the same colour.

*** From rest position.

BOLTS AND NUTS TIGHTENING TORQUES

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
FRONT SUSPENSION Wheel bolt	4388376	M12×1.25	C35 Bon Crt R80 Trf	86	8.8
Upper swing arm fastening bolt	4060013	M12×1.25	R80 Znt	59	6
Radius rod fastening nut	1/21641/11	M16×1.5	R50 Znt (rod 30 CD 4 Bon)	98	10
Swing arm bracket fastening bolt	1/21647/11	M10×1.25	R50 Znt (bolt R80 Znt)	49	5
Lower swing arm to cross member fastening nut	1/61015/11	M12×1.25	R50 Znt (bolt R80 Znt)	83	8.5
Upper swing arm to bracket fastening nut	1/61015/11	M12×1.25	R50 Znt (bolt R80 Znt)	59	6
Radius rod to lower swing arm fastening nut	1/61015/11	M12×1.25	R50 Znt (bolt R100)	92	9.4
Front suspension cross member to body beam fastening bolt	1/61419/21	M12×2.25	R80 Znt	83	8.5
Steering knuckle fastening nut	1/25748/11	M14×1.5	R50 Znt	98	10
Stabiliser rod bracket fastening bolt	4045345	M10×1.25	R80 Cdt	39	4
Shock-absorber upper fastening nut	1/21647/21	M10×1.25	R80 Znt	39	4
Shock-absorber lower fastening nut	1/21647/21	M10×1.25	R80 Znt (bolt R100)	49	5
Shock-absorber upper bracket fastening nut	1/61008/11	M8×1.25	R50 Znt (bolt R50)	17	1.7
Nut of stabiliser rod link fastening bolt	1/21647/11	M10×1.25	R50 Znt (bolt R80 Znt)	39	4
Steering knuckle nut with crimped flange (left-hand and right-hand)	1/40441/71 1/40448/71	M18×1.5	C40 Rct Znt (steering knuckle 38 CD 4 Bon)	see Table 443. 14 Sheet 2	
Nut of brake carrier plates to steering knuckle fastening bolt	1/21647/21	M10×1.25	R80 Znt (bolt R80 Cdt)	49	5

Suspension and road wheels

Polonez Model 1300/1500

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Sheet 2

BOLTS AND NUTS TIGHTENING TORQUES, contd.

COMPONENT TO BE TIGHTENED	Cat. No.	Thread size	Material	Tightening torque	
				Nm	kgm
FRONT SUSPENSION, contd. Front wheel brake carrier plate fastening bolt	4146130	M10×1.25	R80 Fosf	47	4.8
Flexible tubing to front wheel brake fastening screw	4117215	3/8—24 UNF 2A	C4 Mf Trf Bon Cdt bright	27	2.8
REAR SUSPENSION Spring shackle to middle bracket fastening nut	4160673	M8×1.25	R80 Znt (shackle 38 CD 4 Bon Cdt R98—112)	27	2.8
Nut of spring to bracket fastening bolt	1/61050/11	M12×1.25	R50 Znt (bolt R80 Znt)	78	8
Nut of rear spring bracket fastening bolt	1/61008/11	M8×1.25	R50 Znt (bolt R50)	20	2
Upper shock-absorber fastening nut	1/71647/11	M10×1.25	R80 Znt	39	4
Nut of shock-absorber bottom to spring bracket fastening bolt	1/61050/11	M12×1.25	R50 Znt (bolt R80 Znt)	64	6.5
Rear shock-absorber upper bracket fastening bolt	1/60432/21	M8×1.25	R80 Znt	24	2.4
Radius rod front fastening nut	1/25748/11	M14×1.5	R50 Znt (pin 12 NC 3)	88	9
Radius rod rear fastening nut	1/25748/11	M14×1.5	R50 Znt (bolt R80 Znt)	88	9



Wheel suspension

Polonez Model 1300/1500

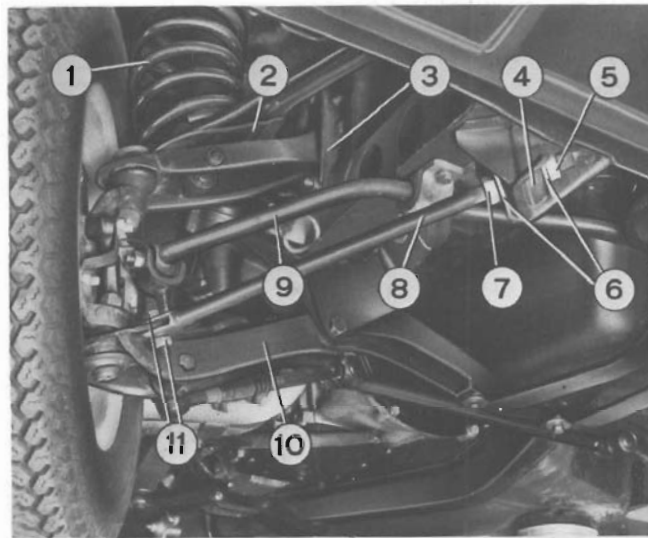
443.00

Sheet 1

FRONT SUSPENSION

Front right-hand wheel suspension.

1. Helical spring.
2. Upper swing arm.
3. Upper swing arm bracket.
4. Rubber pad.
5. Front nut for radius rod adjustment.
6. Flat thrust washers.
7. Rear nut for radius rod adjustment.
8. Radius rod.
9. Stabiliser bar.
10. Lower swing arm.
11. Radius rod to lower swing arm fastening bolt and nut.

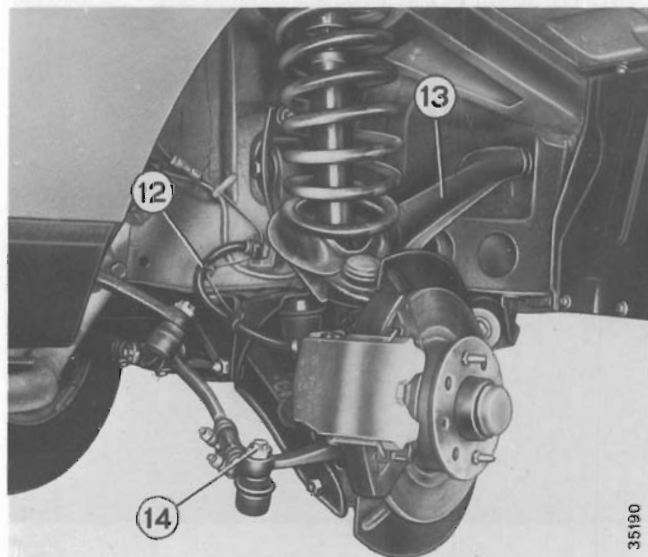


Dismantling and reassembly

In order to dismantle front suspension, the front of the vehicle is raised with **Ap.6051** hydraulic trolley jack and set on **Ar.22908** props, and front wheels removed with the use of **A.86511** spanner. During major overhaul, or when checking of brake yoke is necessary, the yoke need not be dismantled from the brake

Front right-hand wheel suspension rear view.

12. Flexible brake tubing.
13. Upper swing arm strut.
14. Tierod to steering knuckle fastening nut.

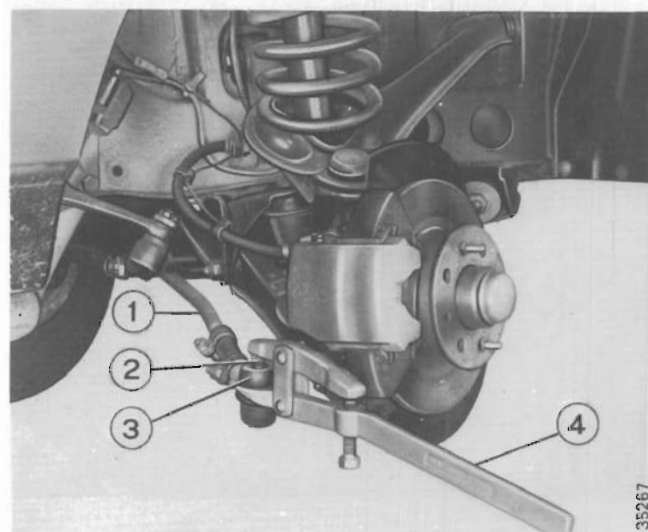


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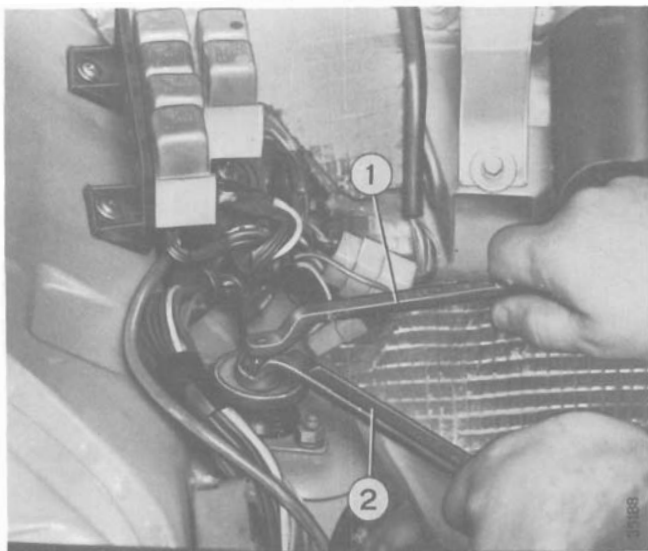
carrier plate. In such case, disconnect flexible brake tubing from its coupling to the rigid tubing, having previously stopped front circuit vent in brake fluid tank. To dismant the right-hand tierod, remove cotter pin, unscrew nut and remove ball joint with the use of **A.47035** puller.

Disconnecting right-hand tierod ball joint from steering knuckle lever.

1. Tierod.
2. Ball joint.
3. Right-hand steering knuckle lever.
4. **A.47035** puller.



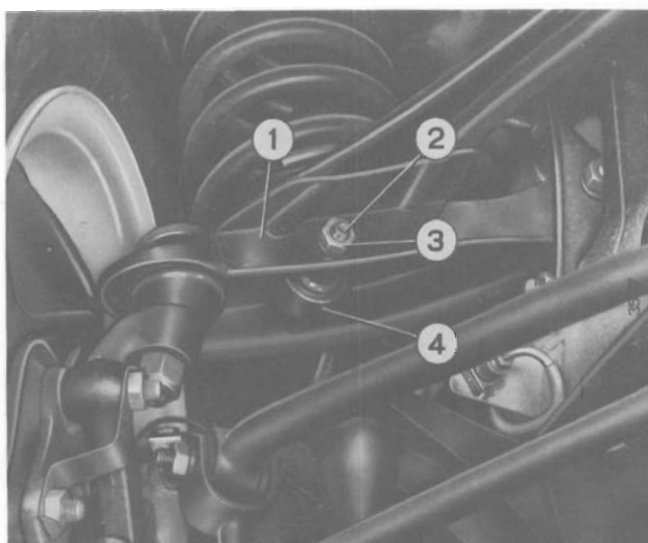
35267



While dismantling tierod ball joints, check ball joint rubber boots. These must be undamaged to protect the joint against penetration of water or foreign matter which could have a detrimental effect on joint operation.

Dismounting right-hand shock-absorber towards the inside of engine compartment.

1. **A.57152** spanner immobilising shock-absorber while unscrewing the fastening nut.
2. Spanner for unscrewing the fastening nut.



Dismount the shock-absorber, and remove it through the upper mounting hole towards engine compartment.

To make it possible for the left-hand shock-absorber to be dismantled, disconnect vacuum tubing from brake servo-mechanism in order to facilitate slipping out the shock-absorber through the hole.

Shock-absorber lower mounting.

1. Upper swing arm.
2. Shock-absorber bottom part to upper swing arm fastening bolt.
3. Nut.
4. Shock-absorber lower eye with metal-rubber bushes.



After dismantling the shock-absorbers, and prior to further dismantling operations, suspension springs must be compressed with use of **A.74112** fixture.

Front right-hand shock-absorber dismantling – view from engine compartment.

Wheel suspension

Polonez Model 1300/1500

443.00

Sheet 2

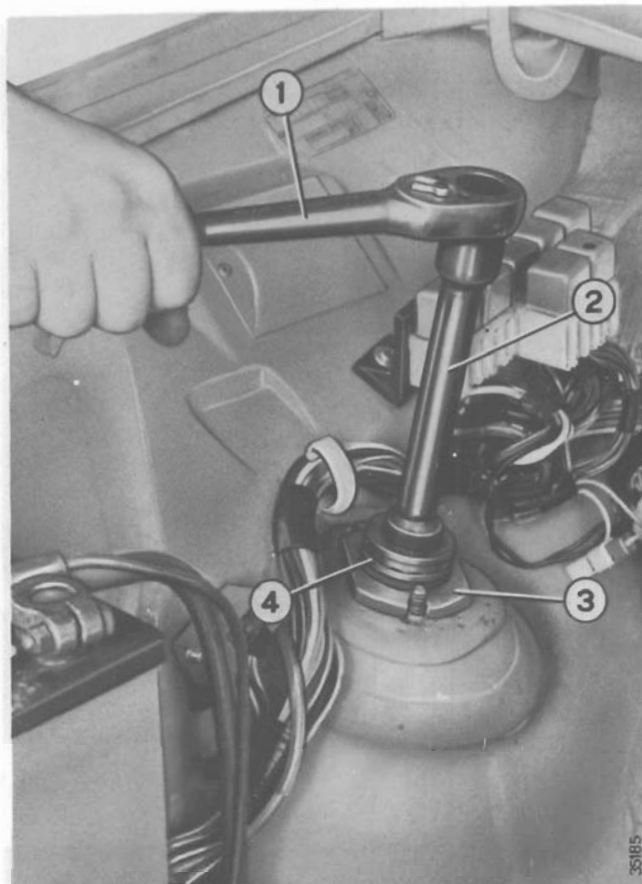
Introduce threaded pin of **A.74112** fixture through the hole of shock-absorber mounting seat in wheel arch, placing the upper flange slots over shock-absorber top fastening studs.

Fixture lower flange must rest against one of spring coils and be secured to with clamp provided for this purpose.

Turn the threaded pin with a ratchet spanner until the helical spring is entirely compressed. When the force exerted by spring is removed, proceed to dismantle the swing arms.

A.74112 spring compressing fixture – top view.

1. Ratchet spanner.
2. Threaded pin of **A.74112** fixture.
3. Upper flange of fixture set in shock-absorber mounting seat.
4. Bearing.



While dismantling the upper swing arm, note the number of shims between swing arm bracket and its mounting place on the body. These shims must be replaced in the same quantity in order to obtain the prescribed wheel camber. Disconnect radius rod from lower swing arm by unscrewing nut and removing bolt with washers.

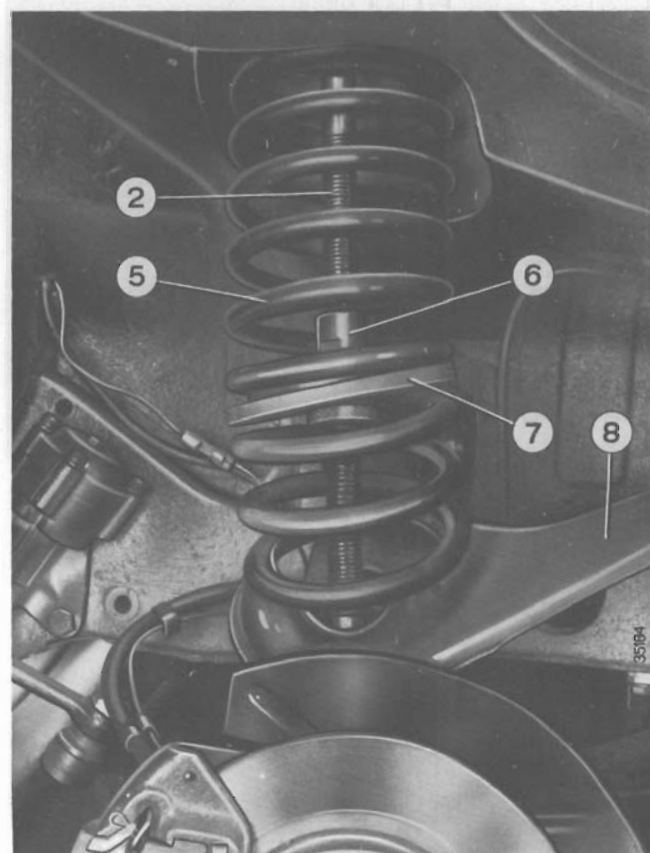
Raise swing arm assembly and remove the bolt fastening lower swing arm to suspension cross member.

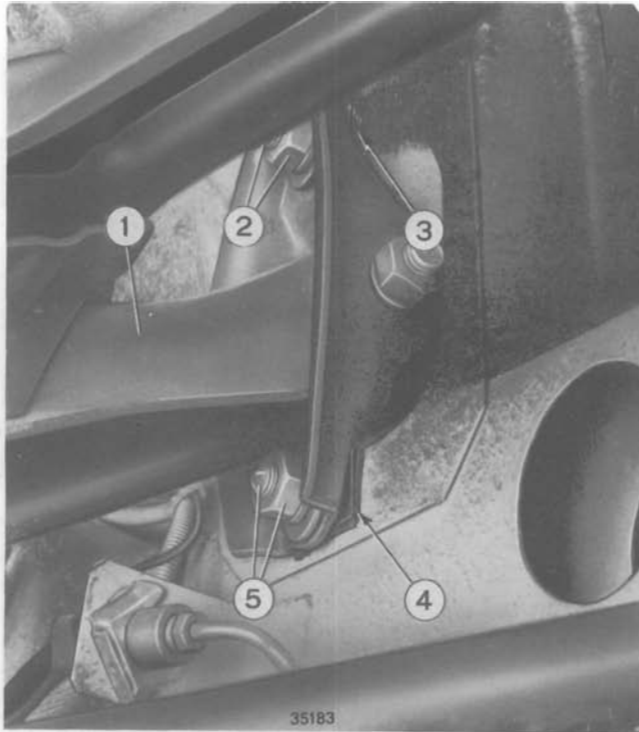
This makes it possible for the entire swing arm assembly, complete with steering knuckle, to be removed, after which further dismantling operations must be carried out at an assembly station.

Gradually release the helical spring compressed in **A.74112** fixture, and remove it together with fixture.

A.74112 fixture for compressing helical spring – bottom view.

2. Threaded pin of **A.74112** fixture.
5. Helical spring.
6. Lower sleeve of **A.74112** fixture.
7. Flange of **A.74112** fixture.
8. Upper swing arm.

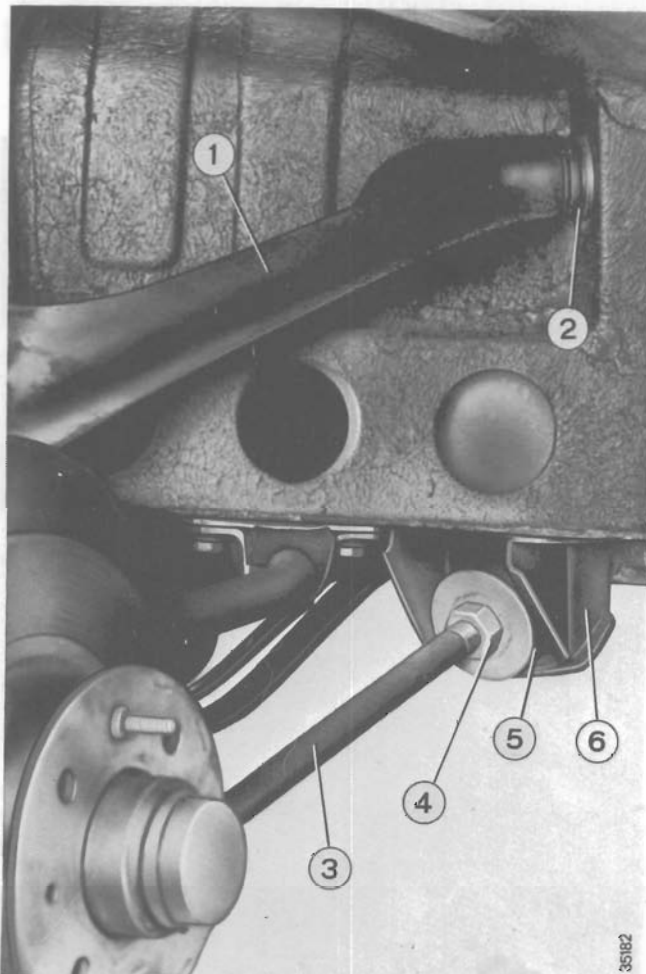




To reassemble the front wheel suspension, reverse the operations described for dismantling. While doing this, bear in mind that for tightening of fastening bolts and adjustment, if required, the vehicle must be loaded with a weight equivalent to four persons.

Fastening upper swing arm bracket to body.

- 1. Upper swing arm.
- 2 and 5. Upper swing arm bracket to body fastening bolts and nuts.
- 3 and 4. Shims for wheel camber adjustment.



NOTE – Bolt fastening upper swing arm strut (1) to body is dismantled with the use of a ratchet spanner with extension. The bolt is provided with a special securing washer fastened to body with bolt and nut.

Part view of upper swing arm and front radius rod mounted on the vehicle.

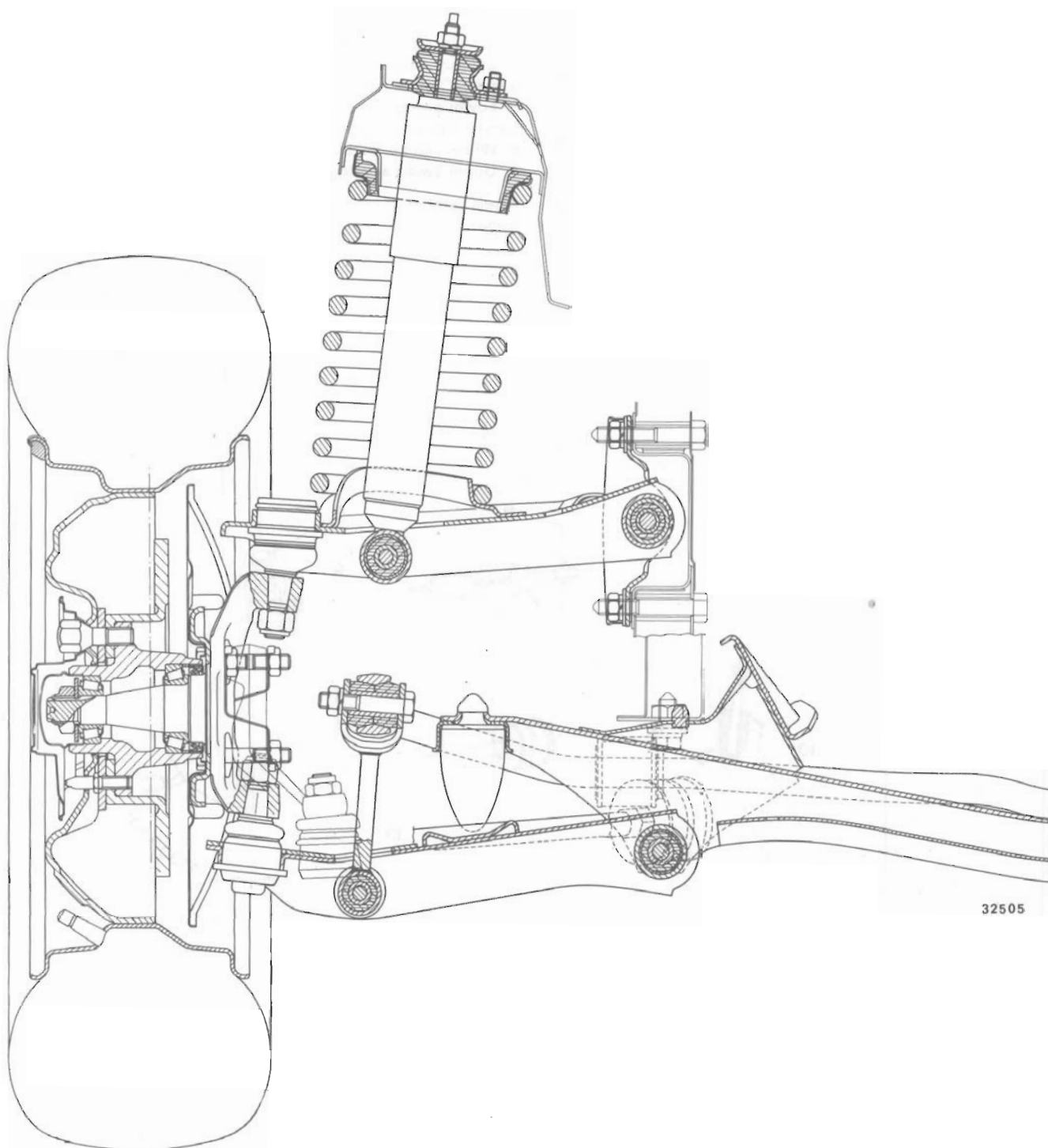
- 1. Front swing arm strut.
- 2. Shims for adjusting steering knuckle caster.
- 3. Radius rod.
- 4. Radius rod rear adjusting nut.
- 5. Radius rod rubber mount.
- 6. Radius rod mounting bracket.

Wheel suspension

Polonez Model 1300/1500

443.00

Sheet 3



32505

Front suspension assembly: cross-section through road wheel and left-hand swing arms.
NOTE: Arrows indicate location of wheel camber adjusting shims.

SCHEMATIC DRAWING OF FRONT SUSPENSION ASSEMBLY

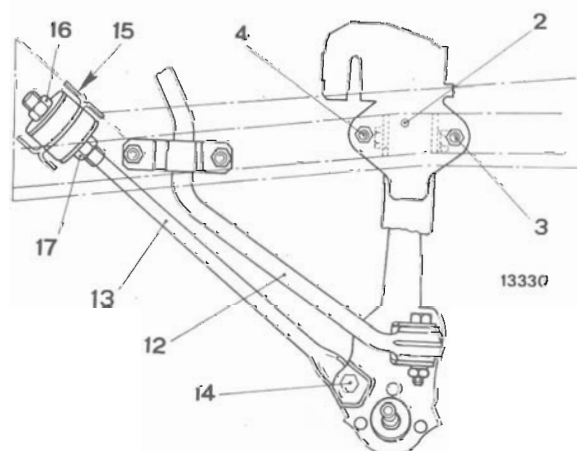
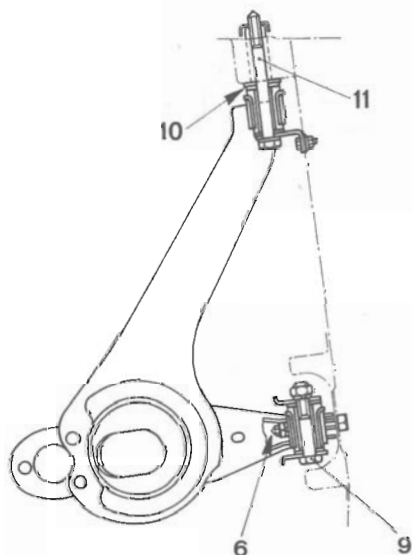
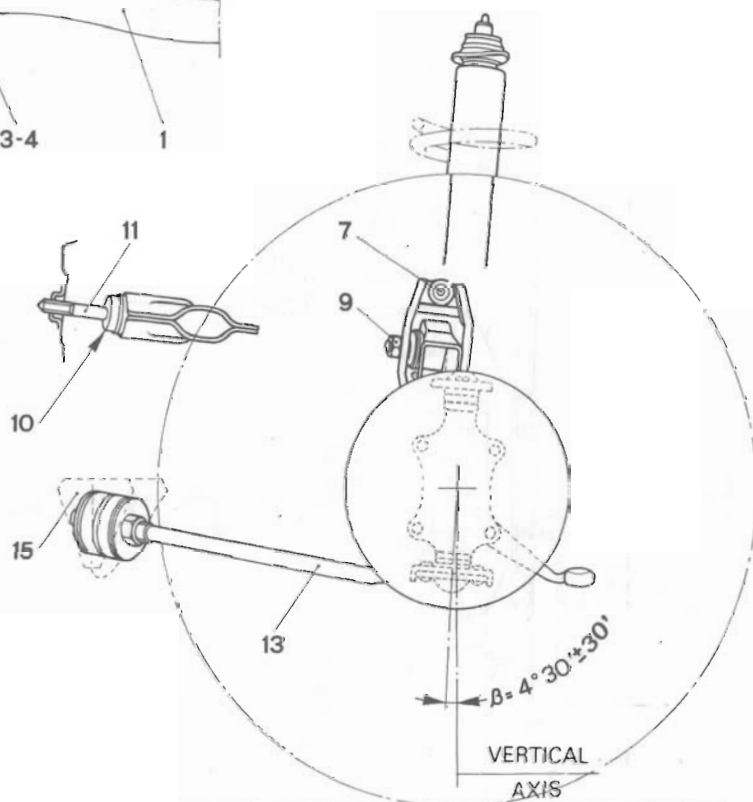
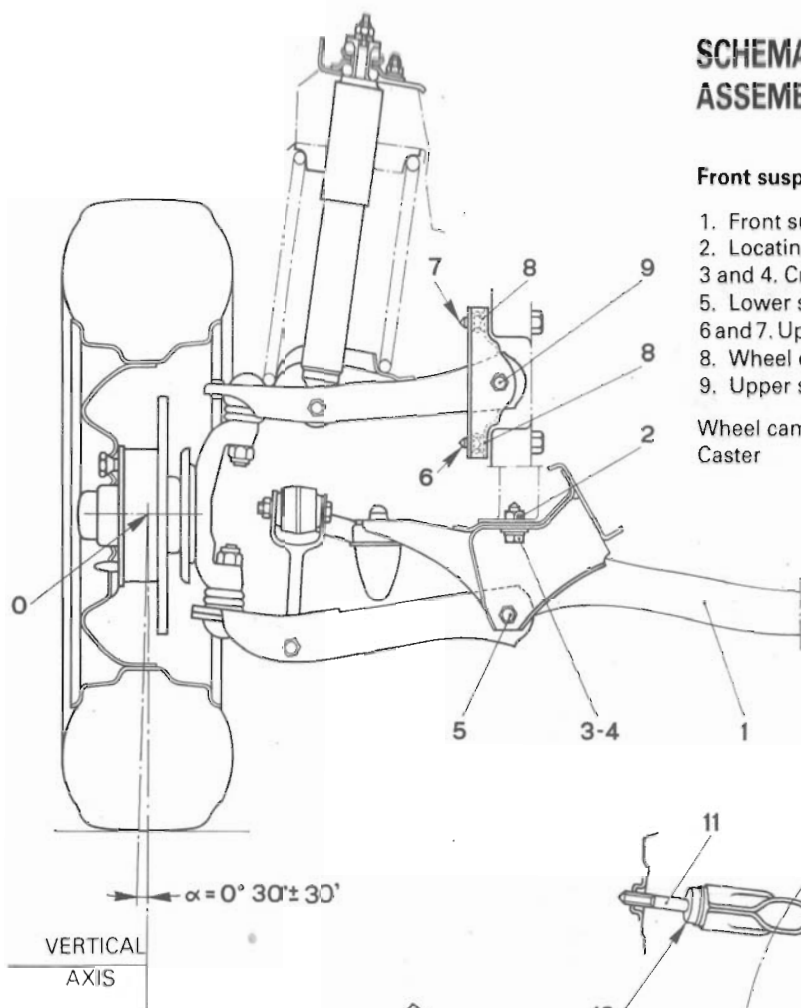
Front suspension assembly and adjustment diagrams.

1. Front suspension cross member.
2. Locating dowel.
- 3 and 4. Cross member to body fastening bolts.
5. Lower swing arm to cross member fastening bolt.
- 6 and 7. Upper swing arm bracket to body fastening bolts and nuts.
8. Wheel camber adjusting shims.
9. Upper swing arm to body bracket fastening bolt.

Wheel camber
Caster

$$\alpha = 0^{\circ}30' \pm 30'$$

$$\beta = 4^{\circ}30' \pm 30'$$



10. Caster adjusting shims.
11. Upper swing arm strut to body fastening bolt.
12. Stabiliser bar.
13. Radius rod.
14. Radius rod to lower swing arm fastening bolt and nut.
15. Radius rod to body fastening bracket.
- 16 and 17. Radius rod adjusting nuts.
0. Wheel centre.

Wheel geometry angles to be measured on a vehicle loaded with 4 persons + 49 daN (50 kg) baggage.

Wheel suspension

Polonez Model 1300/1500

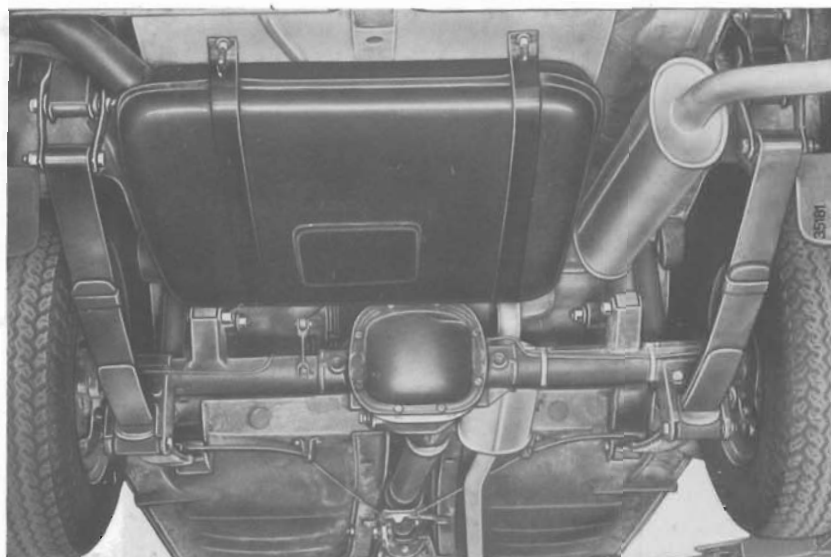
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Sheet 4

REAR SUSPENSION

Dismantling and reassembly

To dismantle the rear suspension, it is first necessary to remove rear axle from the vehicle, after which the remaining subsassemblies can be dismantled.

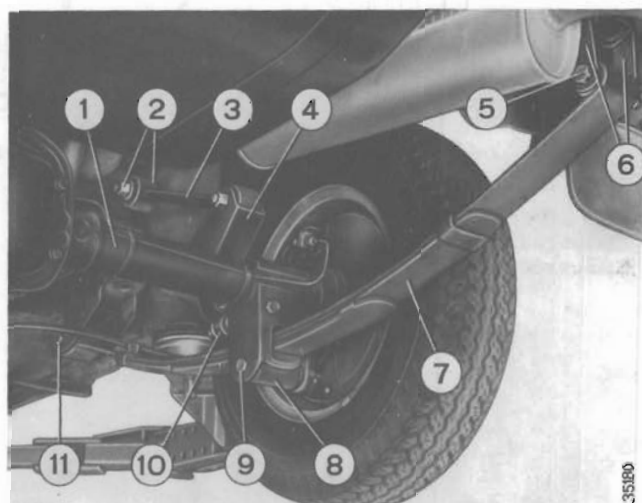


Rear suspension mounted on the vehicle.

The rear axle is dismantled as described in Table 274.01, Sheet 1. The suspension is then dismantled by performing the following operations:

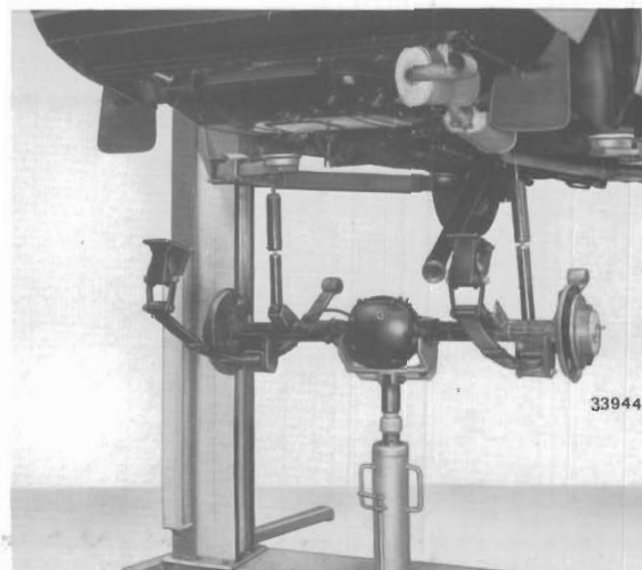
Rear suspension part view – right-hand side.

1. Rear axle housing tubular sheath.
2. Radius rod to body mounting bracket.
3. Radius rod.
4. Radius rod to rear axle mounting bracket.
5. Spring to shackle fastening bolt.
6. Spring shackles.
7. Leaf spring.
8. Bracket with metal-rubber bushing.
9. Spring bracket to rear axle tube fastening bolt and nut.
10. Shock-absorber to rear axle tube mounting bracket.
11. Spring front to body floor panel fastening bolt.



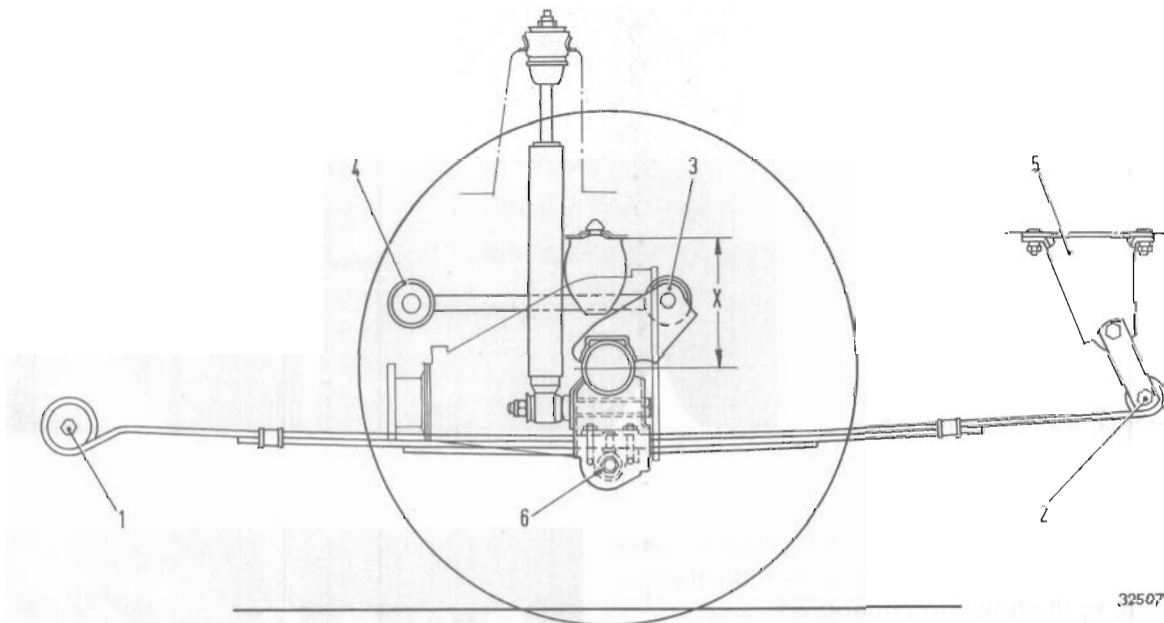
- disconnect shock-absorbers from brackets on rear axle tubes;
- dismount springs by disconnecting spring brackets with metal rubber bushings from rear axle brackets;
- disconnect radius rods from body.

NOTE – While carrying out dismantling operations, it is recommended to mark suspension components in a way making it possible for them to be correctly reassembled.



Dismounting rear axle with rear suspension from the vehicle.

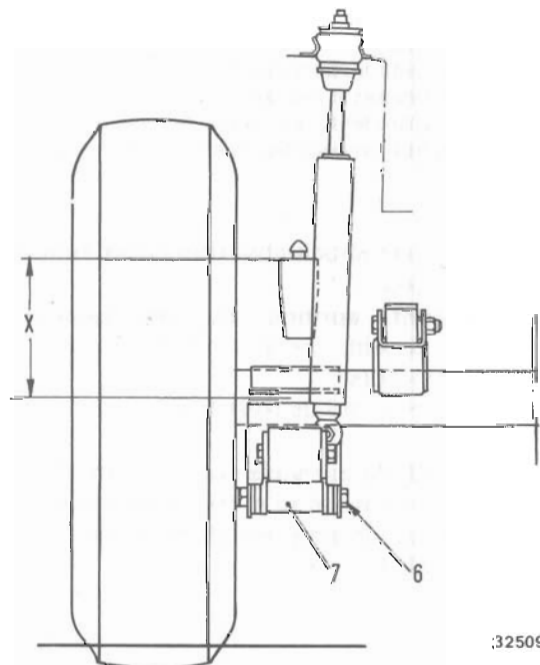
REAR SUSPENSION ASSEMBLY DIAGRAM



Schematic drawing for assembly and adjustment of rear suspension.

- | | |
|---|--|
| 1. Spring front to body floor panel fastening bolt. | 5. Spring to body floor panel mounting bracket. |
| 2. Spring to shackle fastening bolt. | 6. Spring bracket with metal-rubber bushing to rear axle bracket fastening bolt. |
| 3. Radius rod to rear axle fastening. | 7. Spring bracket with metal-rubber bushing. |
| 4. Radius rod to body fastening. | |

$X = 147 \text{ mm}$. This distance must be kept while tightening the metal-rubber bushings (under static load).



Rear axle is connected to the suspension by means of metal-rubber bushings; such design ensures suspension elasticity in relation to rear axle and thus helps to absorb vibrations generated while driving on uneven surface.

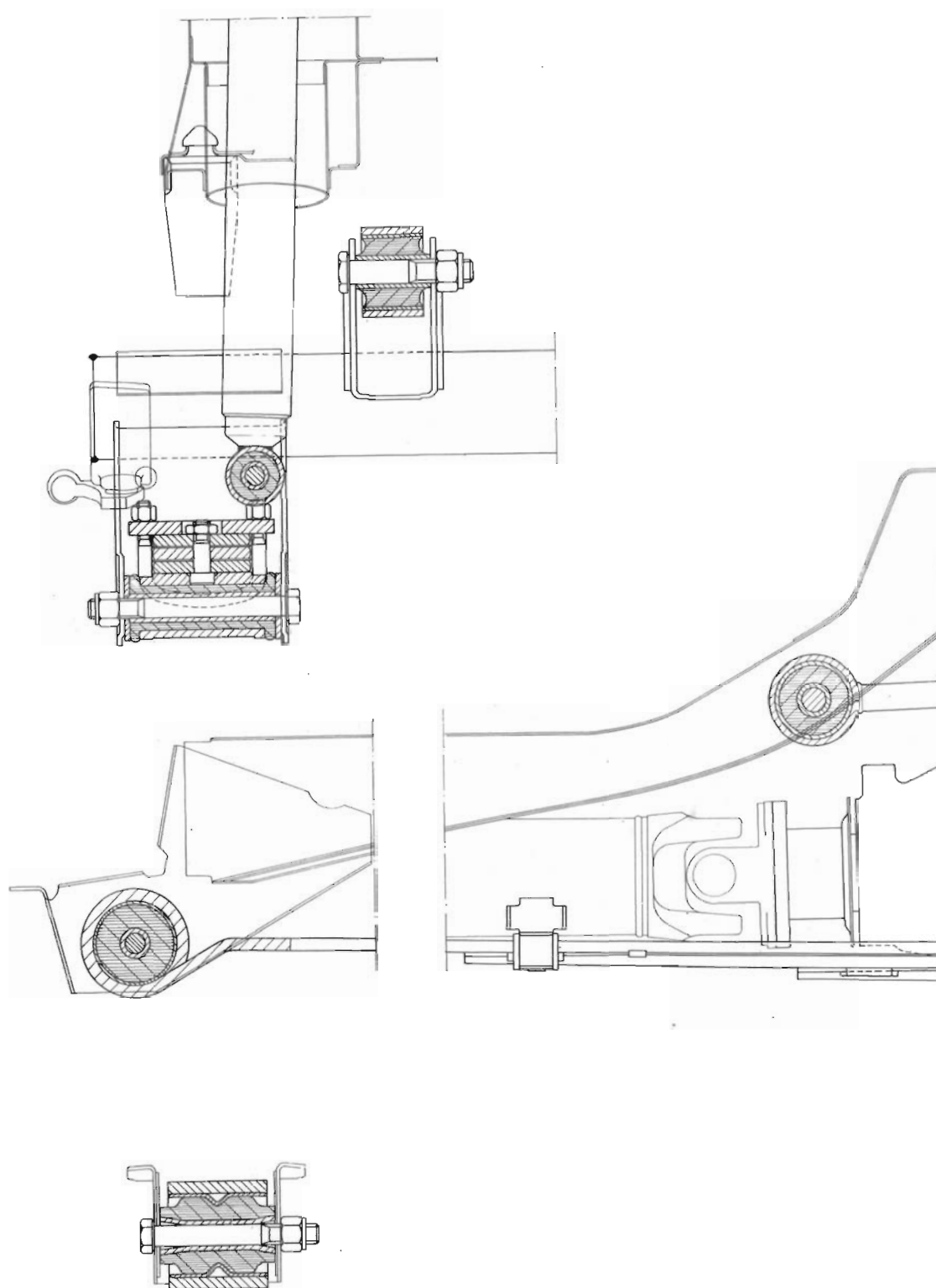
Wheel suspension

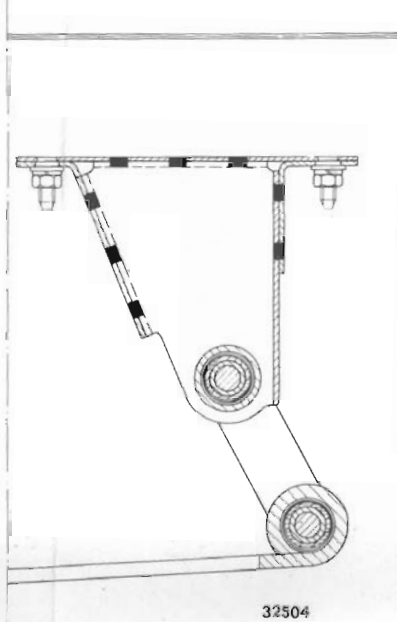
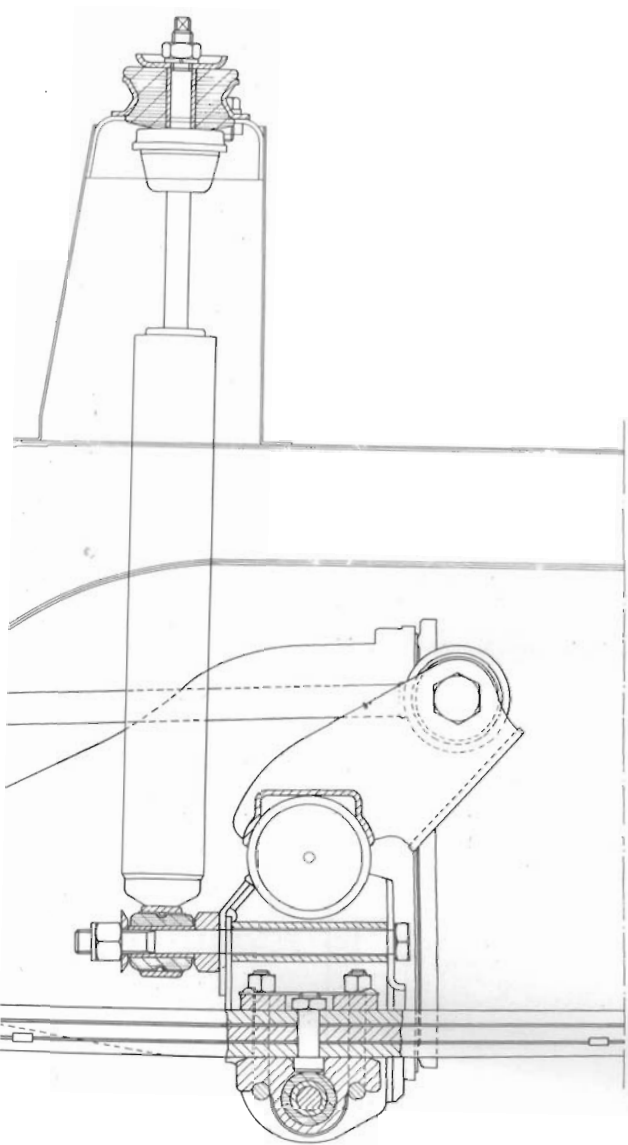
Polonez Model 1300/1500

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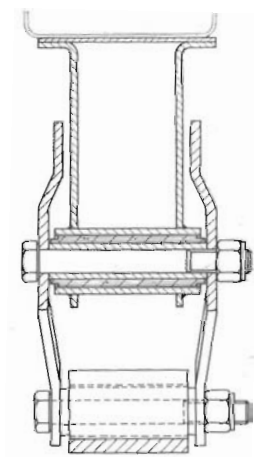
Sheet 5

REAR SUSPENSION





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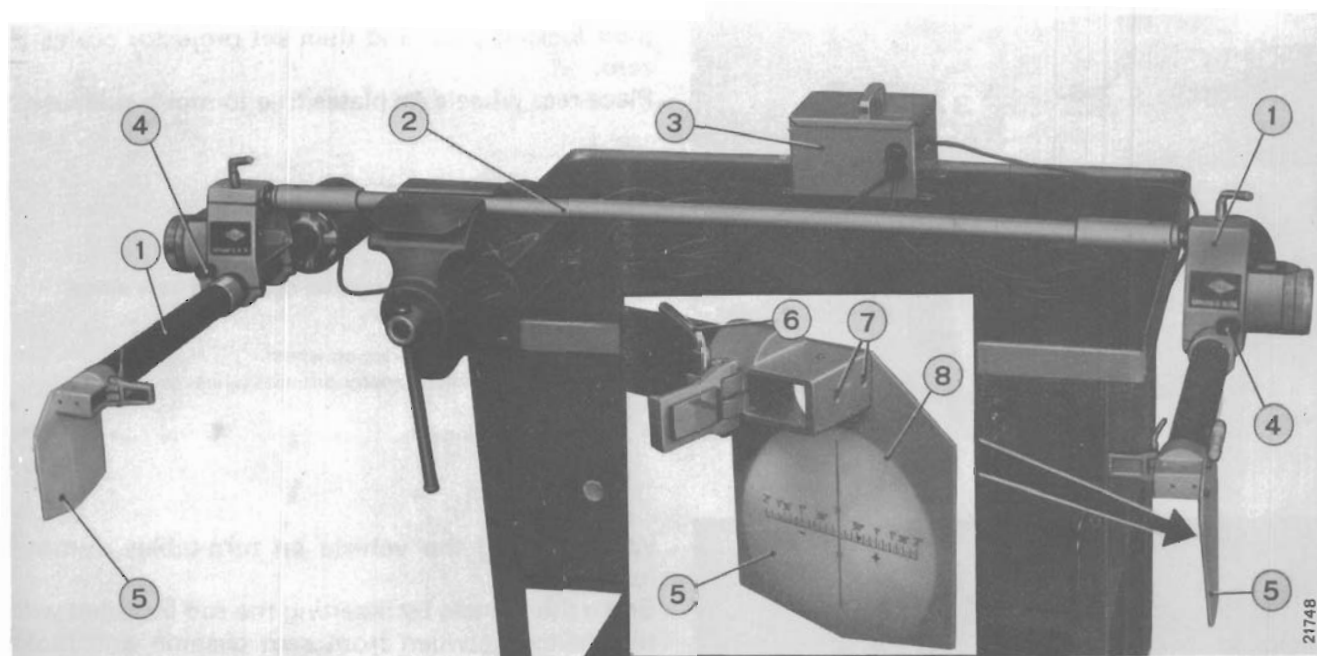
Wheel suspension

Polonez Model 1300/1500

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Sheet 6

SETTING UP THE FRONT WHEEL GEOMETRY



Setting to zero the scale of „Uniflex“ Ap.5106/1 device projectors.

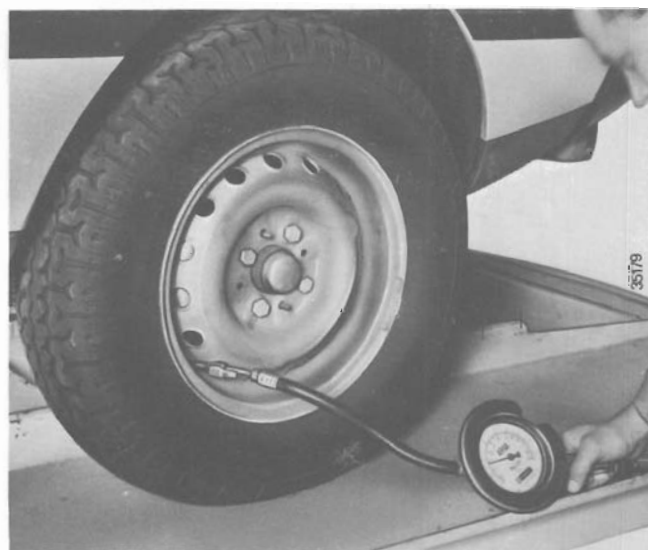
- | | |
|---|--------------------------------------|
| 1. Projector. | 5. Screen. |
| 2. Rod for setting the device to zero. | 6. Screen locking lever. |
| 3. Projector lamp supply transformer. | 7. Screws for setting scale to zero. |
| 4. Knob for image sharpness adjustment. | 8. Scale. |

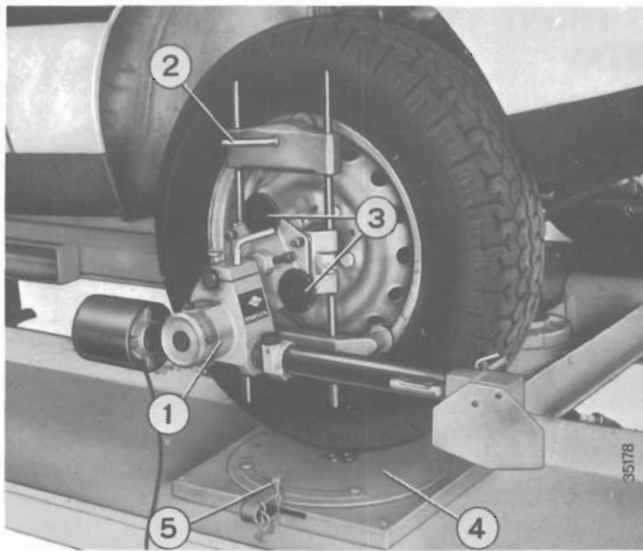
Prior to mounting the **Ap.5106/1** „Uniflex“ device on wheels, a few preliminary operations must be performed.

Use the rod included with the device to set to zero both projector scales with the adjusting screws. Inspect vehicle subassemblies which might influence the front wheel geometry, and check:

- tire pressure;
- tire mounting: deviation from concentricity and squareness cannot exceed 3 mm;
- bearing axial play (0.025 - 0.1 mm);
- play between steering knuckle and swing arm articulated joints;
- play in steering linkage ball joints.

Checking tire pressure





Install the device on wheels and proceed to eliminate any possible error in wheel squareness using a level. Set the front wheels in straight ahead position and place them on device turn-tables immobilised with their locking pins, and then set projector scales to zero.

Place rear wheels on plates free to move sideways.

Installation of Ap.5106/1 device on right-hand front wheel.

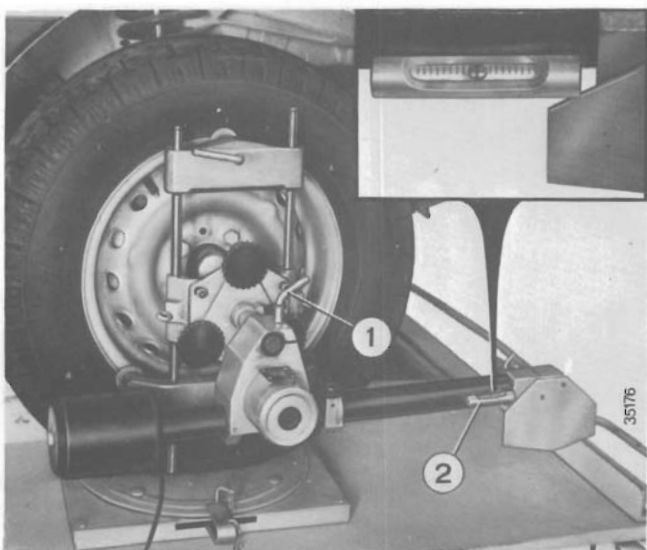
1. Projector.
2. Lever for fixing the device on wheel.
3. Knobs for aligning projector pin with wheel centre line.
4. Turn-table.
5. Turn-table locking pin.



While placing the vehicle on turn-tables, remove locking pins.

Brake the vehicle by inserting the rod included with the device between front seat cushion and brake pedal. This is necessary for measuring steering knuckle caster. Also, depress briskly a few times vehicle front and rear before measurement, in order to settle the suspension components in their respective positions in relation to each other.

Placing rod between brake pedal and front wheel cushion in order to brake the wheels.



To eliminate errors while measuring the toe-in, the projectors must be levelled with the use of level shown in the picture. After levelling, bolt the projectors on to wheels.

Front wheel toe-in should be contained within 2 to 4 mm.^(x) If the optical accessories of **Ap.5106/1** make it possible for the toe-in value to be read only in angles, the readings should be converted into millimetres with the aid of the table given on the next page.

(x) Measured with 4 persons load and tires inflated to prescribed pressure.

Levelling of projector.

1. Lever fastening projector to its pin.
2. Level.

Wheel suspension

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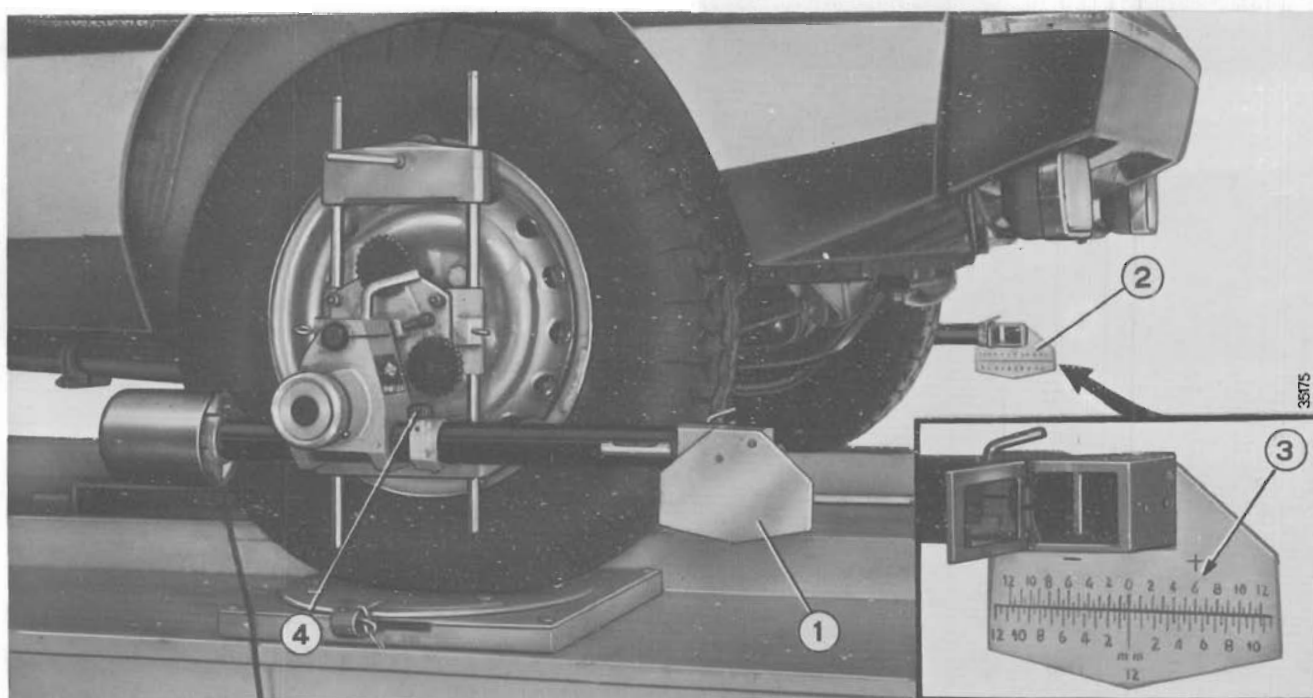
Sheet 7

millimetres	degrees
0,53	5'
1,06	10'
1,59	15'
2,12	20'
2,65	25'
3,19	30'
3,72	35'
4,25	40'
4,78	45'
5,31	50'
5,84	55'
6,37	1°
6,90	1° 5'
7,43	1° 10'
7,96	1° 15'
8,49	1° 20'
9,03	1° 25'
9,56	1° 30'
10,09	1° 35'
10,62	1° 40'
11,15	1° 45'
11,68	1° 50'
12,21	1° 55'
12,75	2°

Millimetres to degrees conversion table checking front wheel toe-in with the use of Ap.5106/1 device.

The millimetres to degrees conversion table, supplied with **Ap.5106/1** „Uniflex” device, gives values depending on wheel rim type. The values given opposite correspond to Polonez model with a 13” wheel rim.

NOTE – The toe-in value read from the screen of **Ap.5106/1** device is half of the total front wheel toe-in value. Thus, the reading taken for right-hand wheel must be added to the reading for left-hand wheel in order to obtain the total front wheel toe-in.

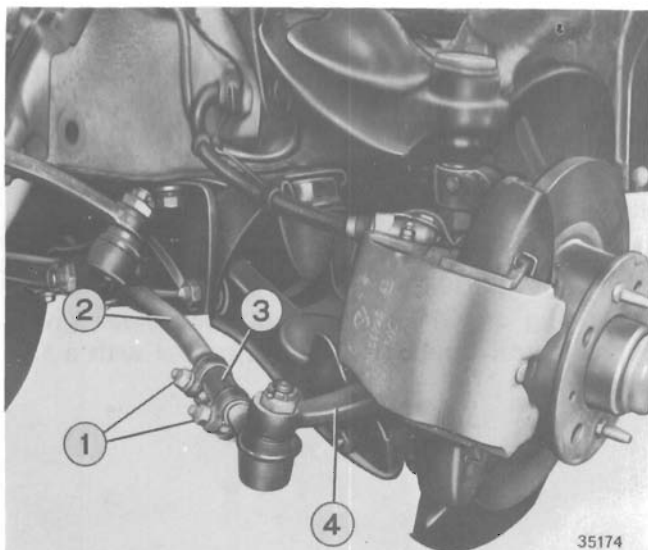


Checking front wheel toe-in.

1. Screen for reading right-hand wheel toe-in.
2. Screen for reading left-hand wheel toe-in.

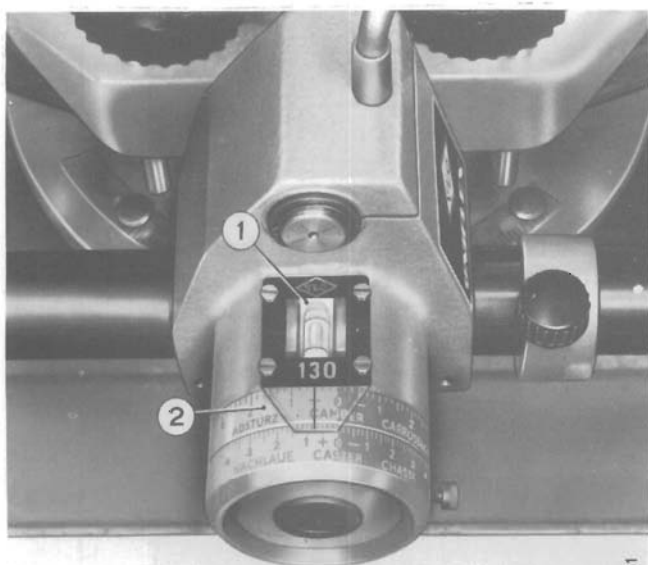
3. Scale.
4. Scale aligning knob.

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Adjustment of right-hand tierod in order to obtain requisite toe-in.

1. Adjusting sleeve bolts and nuts.
2. Tierod.
3. Adjusting sleeve.
4. Steering knuckle lever.

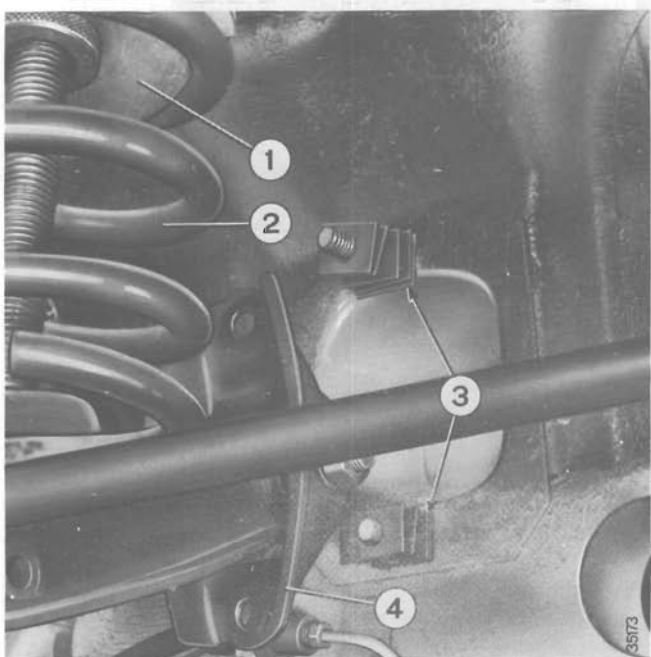


In order to measure wheel camber, place the level between two rest points and turn the scale to read the angle. This angle, with the vehicle loaded^(*), should be from 0° to 1°.

(*) Vehicle loaded with 4 persons, tires inflated to the prescribed pressure.

Checking wheel camber.

1. Level.
2. Scale for reading camber.



For camber adjustment, dismount the shock-absorber, compress the helical spring, disconnect upper swing arm to body mounting bracket, and change the number of adjusting shims.

To decrease camber, remove the same number of shims from both bolts, and to increase it – add the same number of shims on to both bolts.

Wheel camber adjustment.

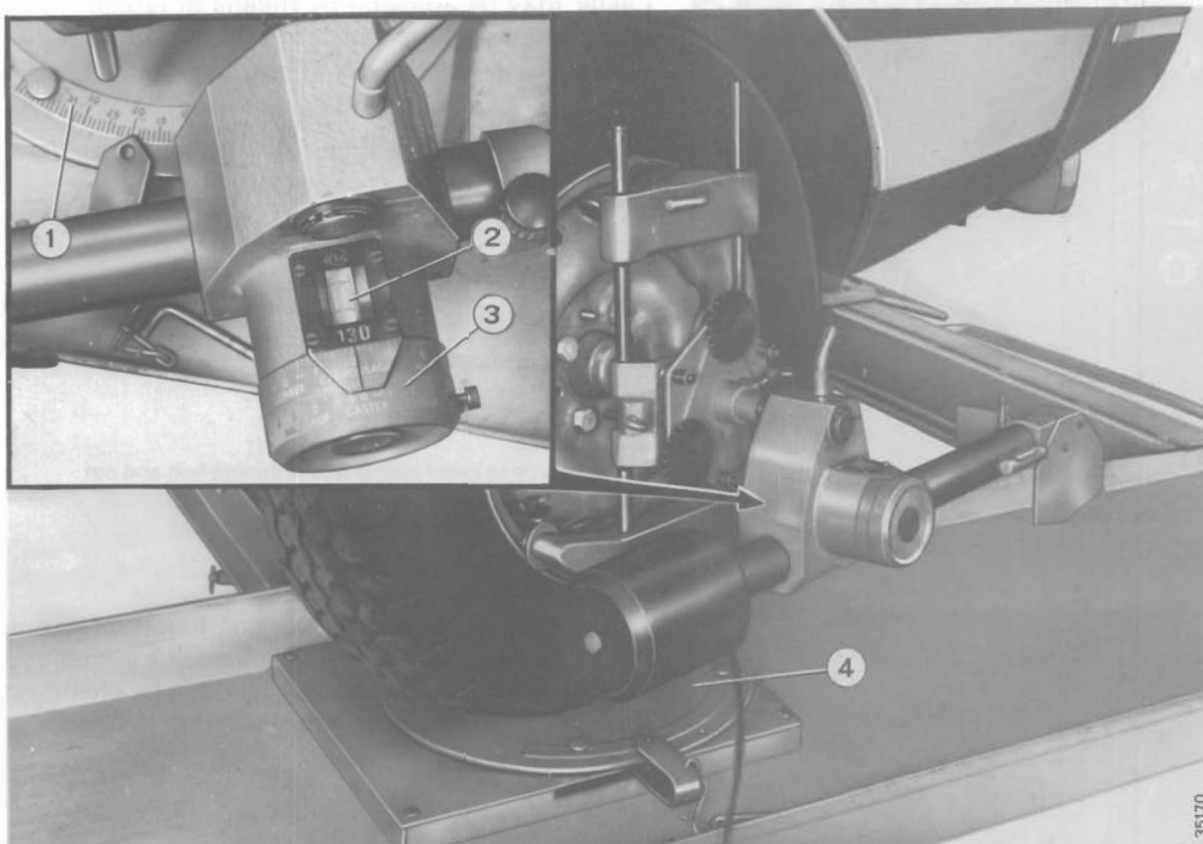
1. A.74112 device for compression of helical spring.
2. Helical spring.
3. Camber adjusting shims.
4. Upper swing arm to body mounting bracket.

Wheel suspension

Polonez Model 1300/1500

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Sheet 8

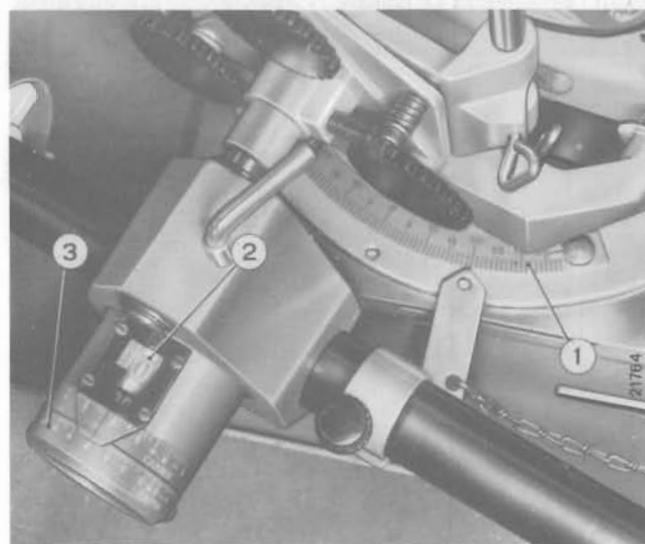


Setting to zero caster measuring scale.

1. Turn-table scale.
2. Level.

3. Caster measuring scale.
4. Turn-table.

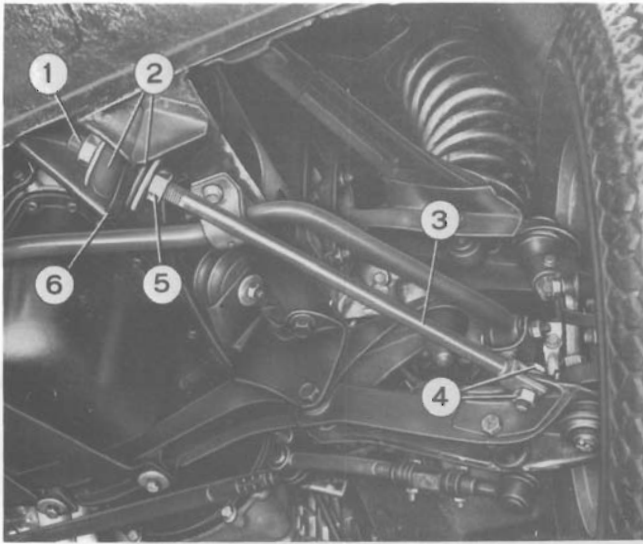
For caster measurement, turn the wheel inwards until 20° is read from turntable scale. Then place the level on measuring points and turn the scale knob until zero setting is reached, and lock the scale with screw provided for this purpose. Turn the wheel outwards through 40° (20° to the outside). Again adjust level position by turning scale knob, and then read caster angle from scale. Its value should be 4° to 5° with the vehicle loaded^(*).



Reading caster angle.

1. Turn-table scale.
2. Level.
3. Caster reading scale.

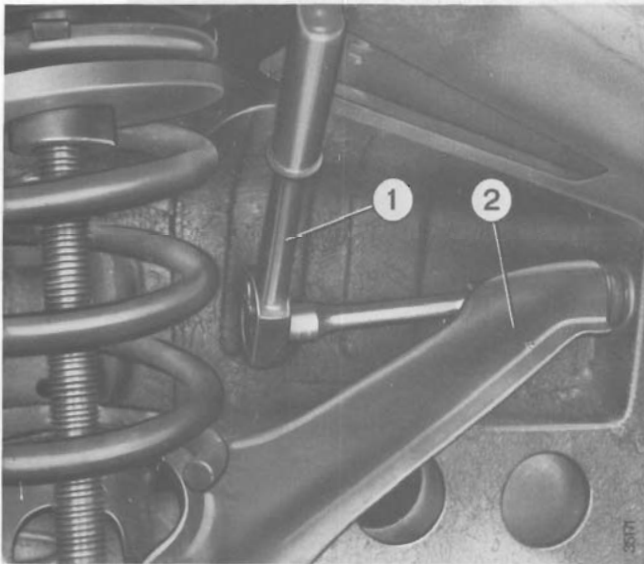
^(*) Vehicle loaded with 4 persons, tires inflated to recommended pressure.



Caster may be adjusted by means of radius rod to body fastening nuts which make it possible for the working length of the rod to be altered.

Radius rod mounted in the vehicle.

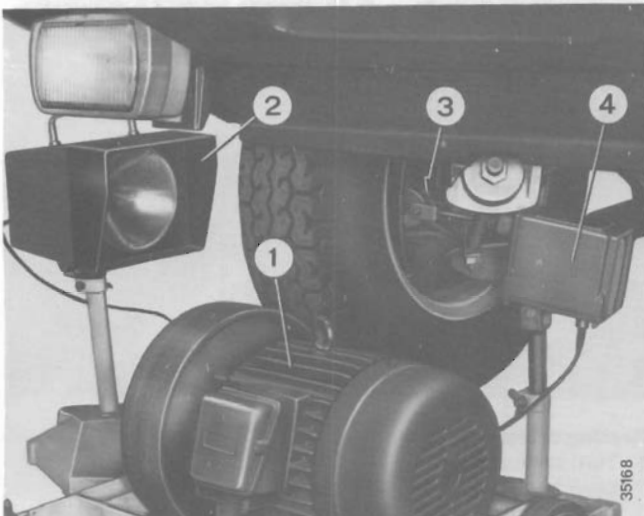
1. Front adjusting nut.
2. Rubber pads.
3. Radius rod.
4. Radius rod to lower swing arm fastening bolt and nut.
5. Rear adjusting nut.
6. Radius rod to body mounting bracket.



To increase to caster, the working length of radius rod must be reduced, and vice versa. If the adjustment required is small, it may be done by changing radius rod working length as described above.

Unscrewing upper swing arm strut to body fastening bolt.

1. Ratchet spanner with extension.
2. Upper swing arm.



For larger adjustment, the change of radius rod working length must be accompanied by change in the number of shims placed on upper swing arm strut fastening bolt to avoid excessive stressing of metal-rubber bushing. In this case, it is necessary to tighten bolt (2), on completion of adjustment, with the prescribed torque, the vehicle being loaded with four persons.

Placing caster adjusting shims under upper swing arm strut.

1. A.74112 device.
2. Upper arm strut to body fastening bolt.
3. Spring washer.
4. Lockwasher for bolt (2).
5. Caster adjusting shims.
6. Helical spring.
7. Upper swing arm.

Wheel suspension

Polonez Model 1300/1500

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Sheet 9

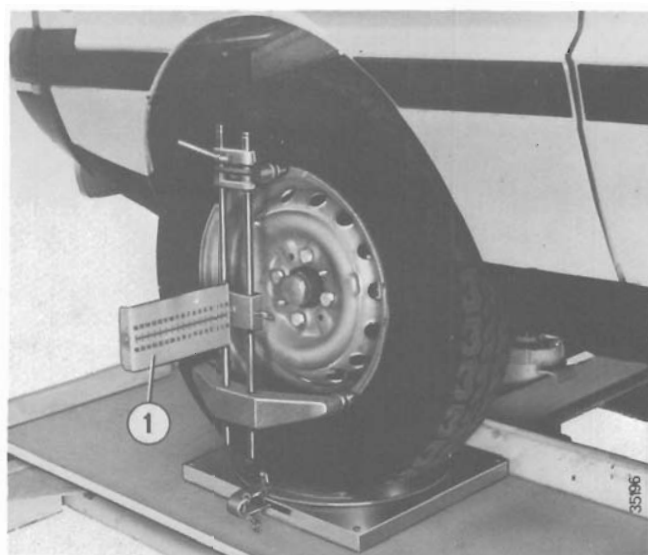
Front and rear wheel setting



Checking front and rear wheel setting.

Front wheel setting in relation to rear wheels must be checked to make sure that both pairs of wheels are set symmetrically to the symmetry plane of the vehicle. To make this check, remove projector screen brackets, after releasing their locking levers, and mount them on rear wheels.

The projectors are installed in a manner previously described for front wheels. Place the screens with scales on front wheels and check that light beams „0” projected on the screens indicate the same values for both wheels. If these values are different, the irregularity is caused by swing arms or body deformation, since the rear wheels are interconnected by a rigid axle.



Screen for checking front and rear wheel setting, installed on front wheels.

1. Screen with scale.



Front suspension

Polonez Model 1300/1500

443.01

Sheet 1

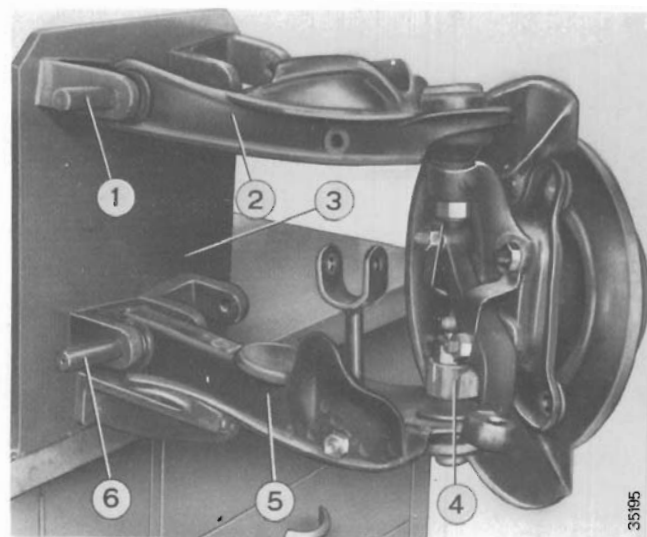
SWING ARMS

Dismantling and checking

The swing arm assembly is dismantled with the use of **A.74115** fixture.

Swing arm assembly prepared for dismantling.

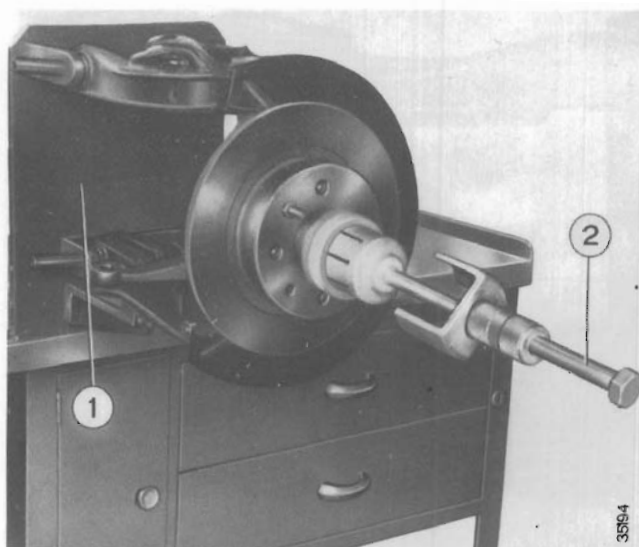
1. Upper swing arm to fixture fastening pin.
2. Upper swing arm.
3. **A.74115** fixture.
4. Steering knuckle lever.
5. Lower swing arm.
6. Lower swing arm to fixture fastening pin.



The fixture may be used both for the left-hand and right-hand swing arm assembly.

After mounting swing arm assembly in the fixture, carry out the following operations:

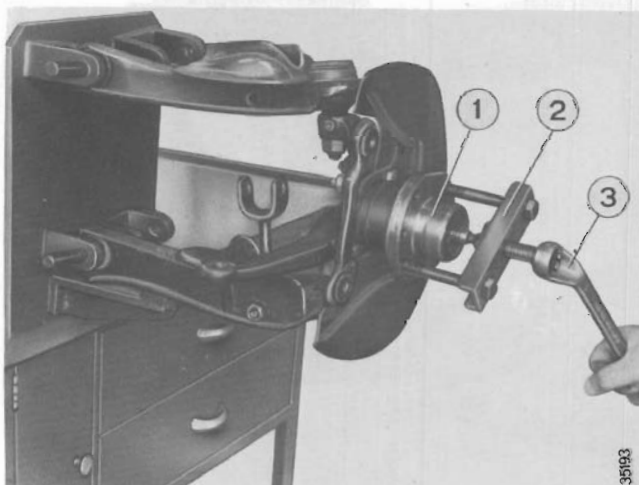
Remove wheel hub cover with the use of **A.47014** inertia puller as shown in the picture; the cover is replaced with the use of **A.74088** punch. Remove brake disc from wheel hub.



Removing wheel hub cover.

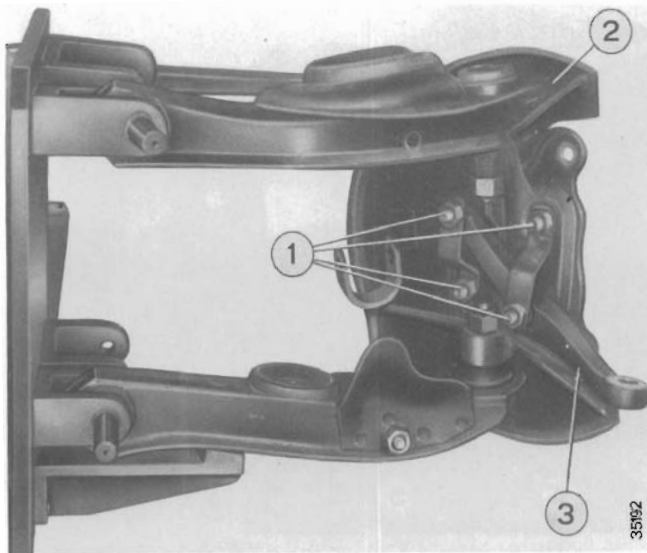
1. **A.74115** fixture.
2. **A.47014** inertia puller.

Unscrew hub to steering knuckle fastening nut, having first straightened the crimp in nut flange. Strip the wheel hub from steering knuckle with the use of **A.47015** puller as shown in the picture.



Dismantling front wheel hub.

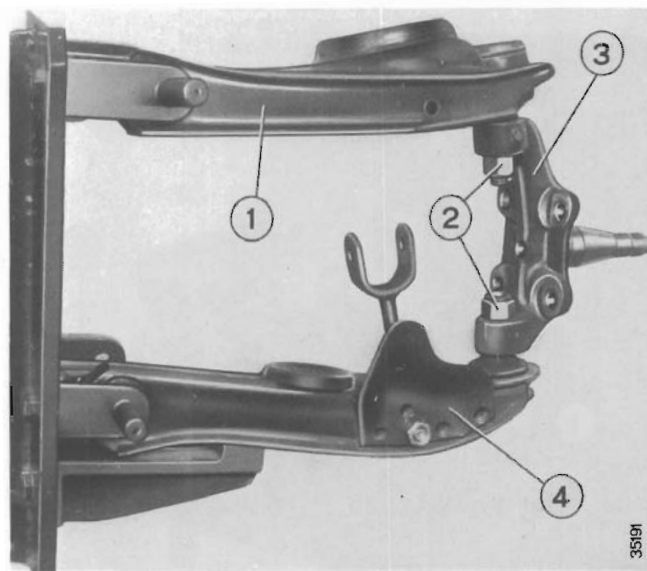
1. Front right-hand wheel hub.
2. **A.47085** puller.
3. Spanner.



Disconnect steering knuckle lever (3) from steering knuckle by unscrewing fastening nuts (1) with lock-washers. This will also disconnect the brake carrier plate and brake shield.

Right-hand swing arm assembly partly dismantled.

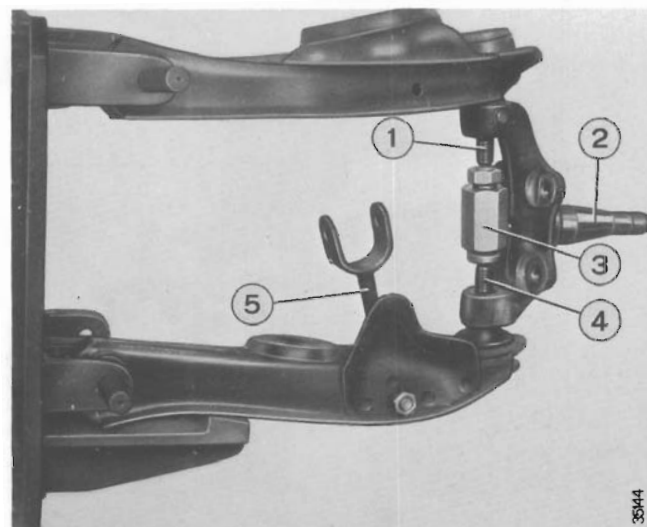
1. Steering knuckle lever and brake shield fastening nuts.
2. Brake shield.
3. Steering knuckle.



Proceed to dismantling steering knuckle (3) by unscrewing nuts (2) and mounting in place **A.47058** puller. With the use of the puller remove ball joints from steering knuckle arms.

Right-hand swing arm assembly partly dismantled.

1. Upper swing arm.
2. Ball joint fastening self-locking nuts.
3. Steering knuckle.
4. Lower swing arm.



Unscrew and remove stabiliser bar to lower swing arm fastening link.

On completion of the above described operations, remove pins of **A.74115** fixture and take off both swing arms.

Dismounting front suspension ball joints.

1. Upper ball joint pin.
2. Steering knuckle shaft.
3. **A.47058** puller.
4. Lower ball joint pin.
5. Stabiliser bar fastening link.

Front suspension

Polonez Model 1300/1500

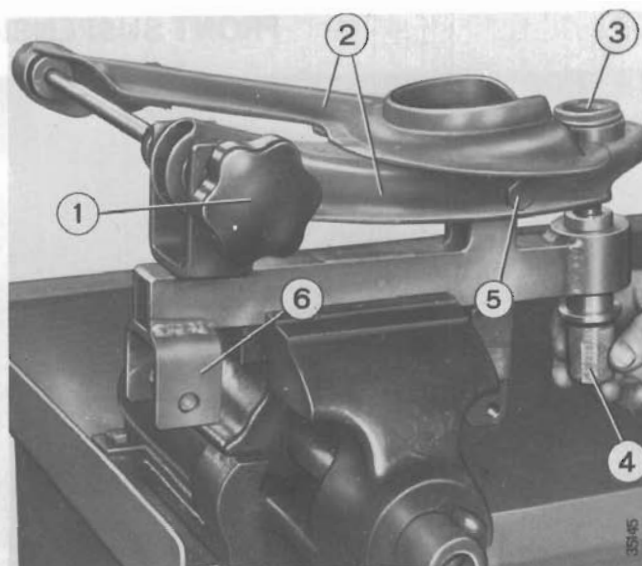
443.01

Sheet 2

Upper and lower swing arms may be checked for possible deformation with the use of **A.96758** fixture. The amount of deformity is defined by the resistance encountered while inserting the pin into holes of metal-rubber bushing, and also by incorrect seating of ball joint tapered shank.

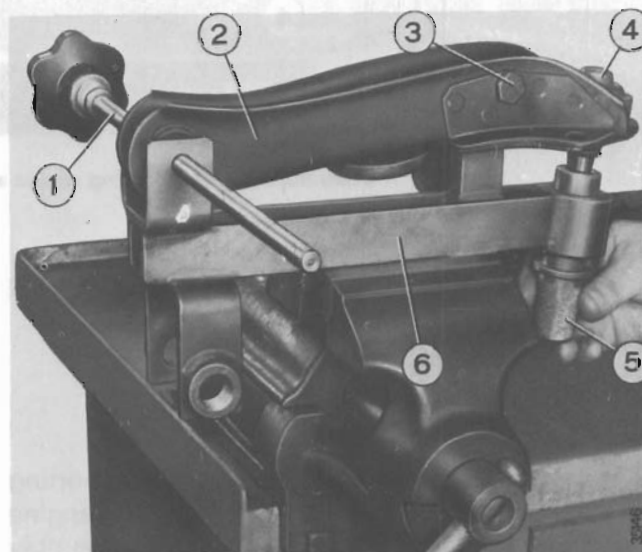
Checking right-hand upper swing arm on A.95758 fixture.

1. Metal-rubber bushing locating pin.
2. Right-hand upper swing arm.
3. Ball joint.
4. Ball joint locating pin.
5. Swing arm to **A.95758** fixture fastening bolt.
6. Swing arm checking fixture.



The remaining checking operations to be carried out, are:

- check ball joints for wear and free rotation;
- check ball joints for correct sealing in swing arm openings and for absence of play in taper seats;



Checking lower swing arm on A.96758 fixture.

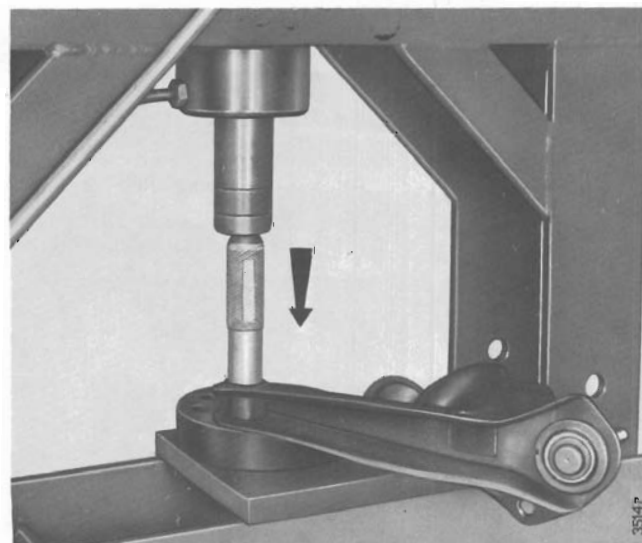
1. Metal-rubber bushing locating pin.
2. Right-hand lower swing arm.
3. Swing arm to **A.95758** fixture fastening bolt.
4. Ball joint.
5. Ball joint locating pin.
6. **A.95758** swing arm checking fixture.

- check the condition of metal-rubber bushings pressed into swing arms. Their bore must show no traces of seizure against the pin.

The rubber part of the bushing must not be worn and must keep its original elasticity.

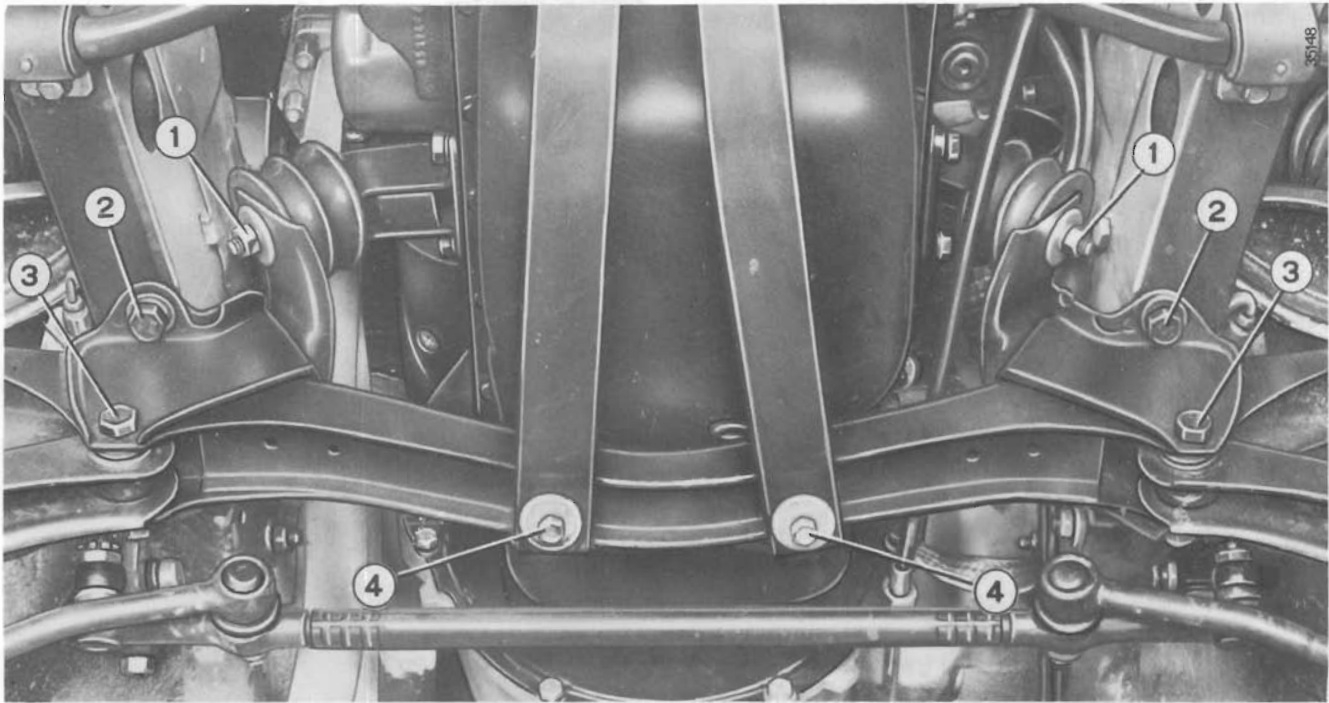
If the swing arms do not conform to these requirements, they must be replaced. This does not pertain to metal-rubber bushings which are replaceable.

Their removal and replacement is done with the use of **A.74053** mandrel.



Removal and installation of metal-rubber bushing on lower swing arm with the use of hydraulic press and **A.74053** mandrel.

FRONT SUSPENSION CROSS MEMBER



Cross member for mounting engine and swing arm assembly on the vehicle.

1. Engine resilient mounts fastening bolts.
2. Cross member to body fastening bolts.

3. Lower swing arm fastening bolts and nuts.
4. Engine oil sump to cross member fastening bolts.

Dismantling and reassembly

Mount on the vehicle **A.70526** hanger for supporting the engine, as shown in the picture. Dismount engine suspension cross member and swing arm assembly in the following manner:

- unscrew engine oil sump guards;
- unscrew lower swing arms from cross member;
- unscrew bolts and remove flat washers fastening the cross member to body;
- disconnect the cross member from resilient engine mounts;
- remove the complete cross member.

When reassembling the cross member, the above described operations should be reversed, and attention should be paid that the locating dowels are positioned in the centres of body holes.

Checking

The cross member must not be deformed, particularly in the proximity of engine mounts fixing points and lower swing arm fastening holes.

If deformations are found of such extent that they cannot be rectified, the complete cross member must be replaced.

Installation of **A.70526** hanger for engine support while dismantling and reassembling the cross member of engine and swing arm suspension.



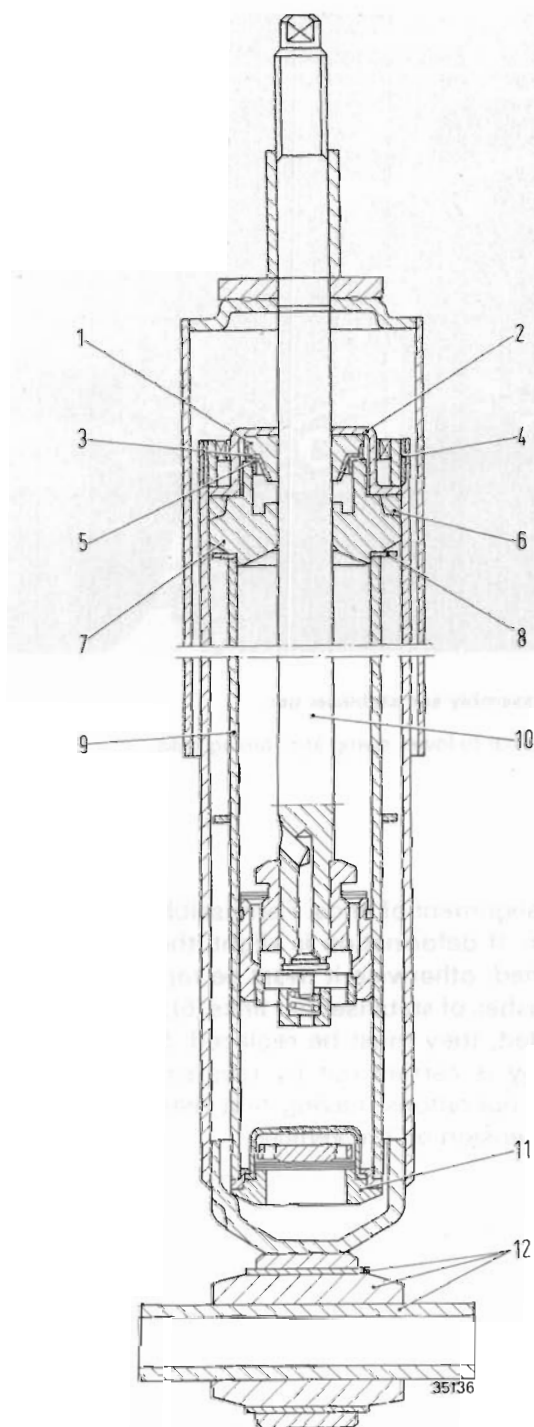
Front shock-absorbers and stabiliser bar

Polonez Model 1300/1500

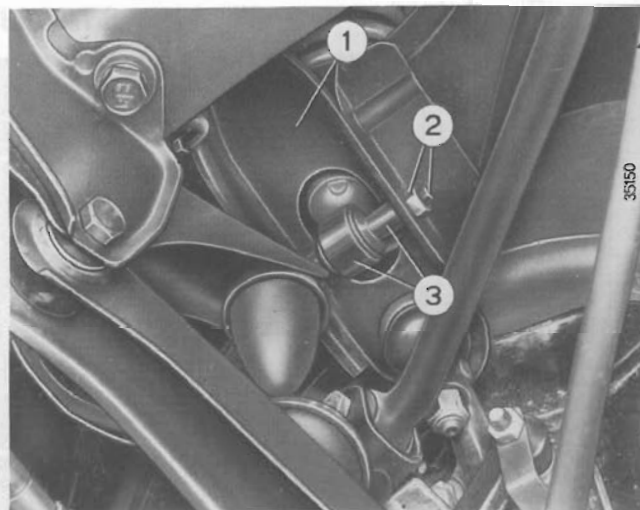
443.02

Sheet 1

FRONT SHOCK-ABSORBERS



1. Piston rod sealing sleeve
2. Piston rod sealing cup.
3. Spring washer.
4. Upper sealing ring.
5. Thrust cup.
6. Sealing ring.
7. Guide bush
8. Oil drain plate.
9. Cylinder with anti-emulsion ring.
10. Piston rod.
11. Bottom valve.
12. Metal-rubber bushing.



View of shock-absorber bottom mounting on upper swing arm.

1. Upper swing arm.
2. Shock-absorber to swing arm (1) fastening bolt and nut.
3. Shock-absorber bottom mounting bracket with metal-rubber bushing.

Dismounting and reassembly

Unfasten the shock-absorber top, securing it from turning with the use of **A.57152** spanner.

Dismount the shock-absorber bottom, and remove it through hole in wheel arch.

To remove the left-hand shock-absorber, it is first necessary to disconnect vacuum tubing of brake servo-mechanism from intake manifold.

Checking and inspection

Check shock-absorber characteristics and make sure that there is no jamming when the shock-absorber is compressed and extended.

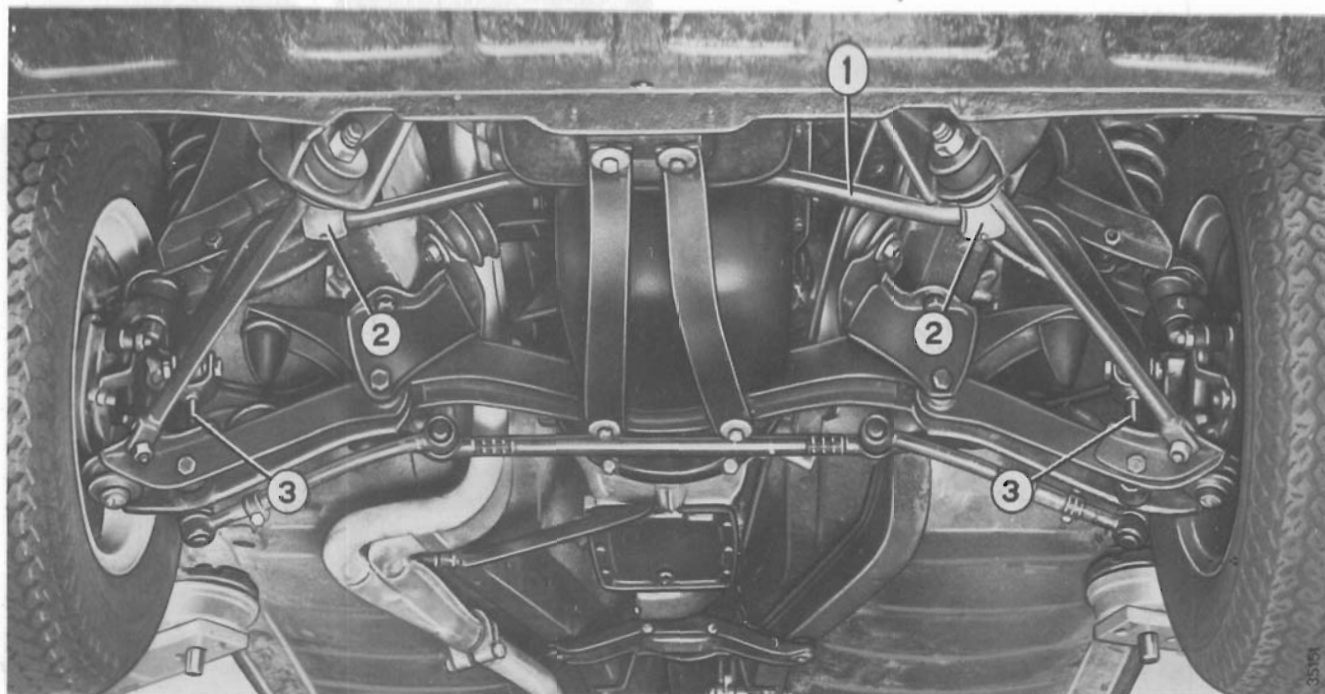
The characteristics include maximum bound and rebound when compressing and extending the shock-absorber. These values are:

- bound: 216 ± 49 N (22 ± 5 kg)
- rebound: 637 ± 73.6 N (67 ± 7.5 kg)

After checking the shock-absorber for correct operation, proceed to its dismantling, if necessary. The components must then be checked and replaced depending on the test results.

After overhauling, the test is repeated to make sure that the shock-absorber operates correctly. Compare the results with those obtained previously, and also with the recommended values.

STABILISER BAR



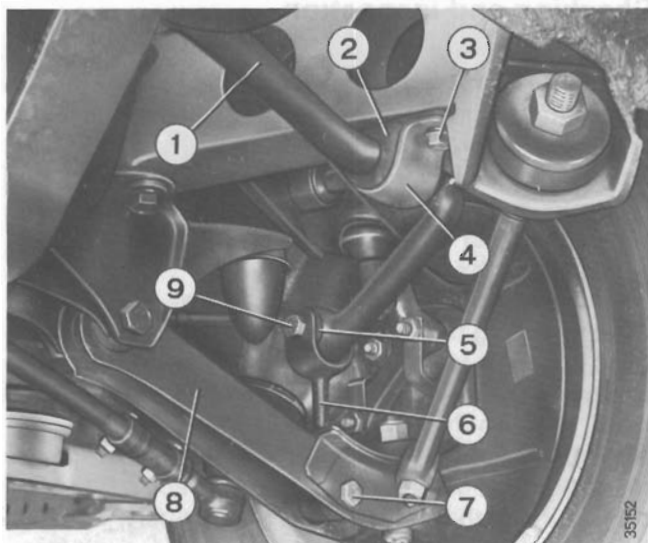
Cross member supporting the engine, swing arm assembly and stabiliser bar.

1. Front suspension stabiliser bar.
2. Stabiliser bar mounts.
3. Stabiliser bar to lower swing arm joining links.

Dismounting, checking and reassembly

Prior to dismounting the stabiliser bar with links joining it to swing arms, it is necessary to remove oil sump guards. To dimount the stabiliser bar with links, unscrew bolts (3) fastening its mounts to body and bolts (9) fastening the stabiliser bar to lower swing arm links. Check the stabiliser bar for deforma-

tion and alignment of ends. Permissible deviation is ± 1.5 mm. If deformation is slight, the bar may be straightened, otherwise it must be replaced. Check rubber bushes of stabiliser bar links (6); if bushes are deteriorated, they must be replaced. Stabiliser bar reassembly is carried out by reversing the above described operations, having first reassembled the front suspension on the vehicle.



Left-hand front suspension.

1. Stabiliser bar.
2. Stabiliser bar resilient mount.
3. Mount to body fastening bolt.
4. Stabiliser bar to body mounting bracket.
5. Metal-rubber bushing.
6. Forked link joining stabiliser bar to lower swing arm.
7. Link to lower swing arm fastening bolt.
8. Lower swing arm.
9. Stabiliser bar to link fastening bolt.

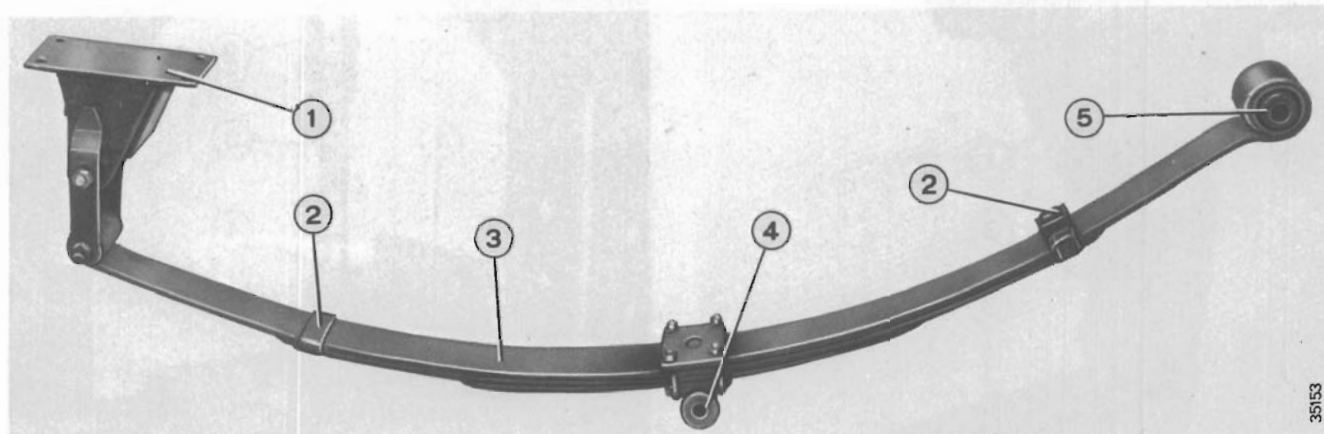
Rear suspension

Polonez Model 1300/1500

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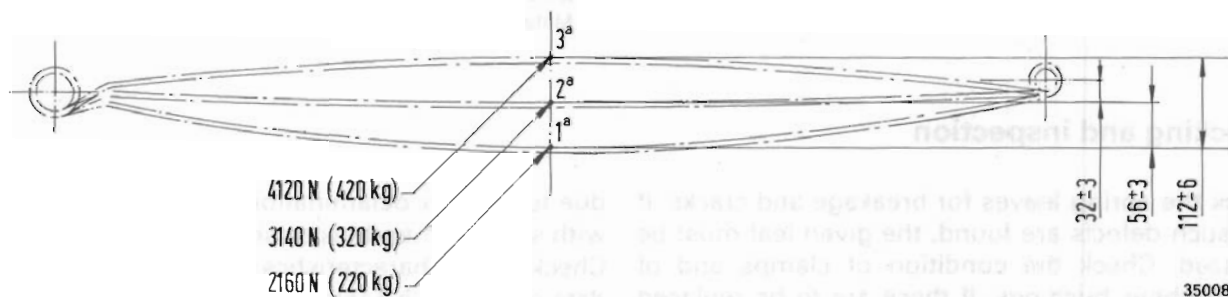
Sheet 1

LEAF SPRING



Rear suspension leaf spring complete with mounting bracket.

1. Leaf spring to body mounting bracket.
2. Spring leaf clamps.
3. Leaf spring.
4. Lug with metal-rubber bushing for mounting the spring on rear axle tube bracket.
5. Metal-rubber bushing in spring front eye.



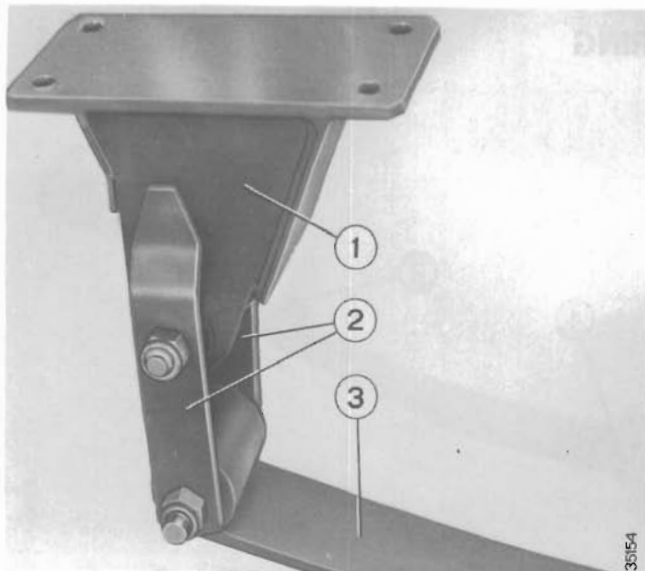
Main spring leaf deflection.

LEAF SPRING CHECKING DATA

Position	Force	Sag mm	Elastic de- flection from 1st position	Spring constant	
	N	kg		mm 100 N	mm 100 kg
1 Initial load for checking spring elasticity	2160	220	—	—	—
2 Static load	3140	320	32±3	56±46	571±46 56±4.5
3 Load at the end of spring elasticity test	4120	420	—	112±6	—
4 Settlement	5400	550	—	—	—

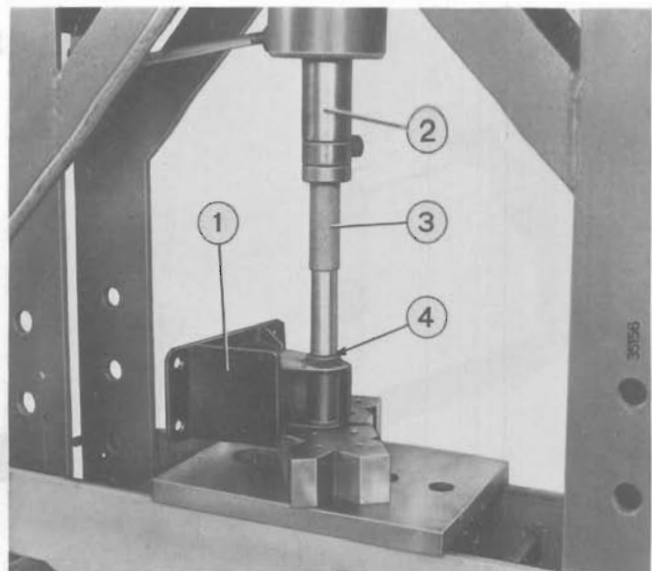
NOTE: The centre lines of main spring leaf eyes must be parallel to leaf plane and square to its longitudinal centre line. The sag is given for a pre-loaded spring.

Polonez Model 1300/1500



Leaf spring rear portion.

1. Rear leaf spring to body mounting bracket.
2. Spring shackle.
3. Leaf spring.



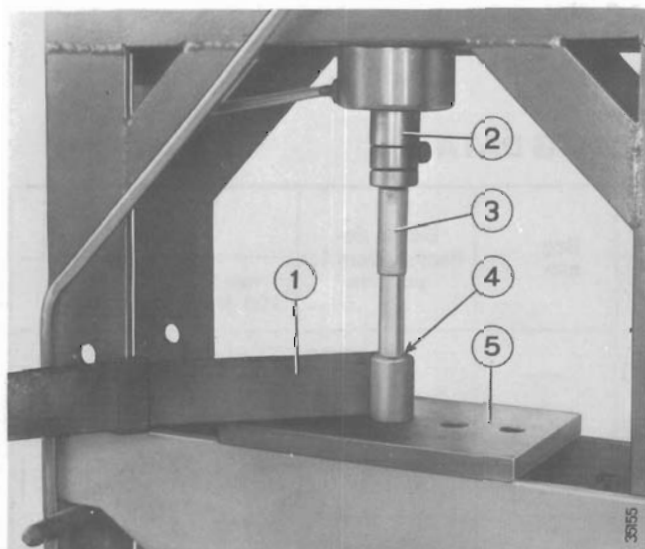
Stripping and installation of metal-rubber bushing in rear spring mounting bracket.

1. Rear spring mounting bracket.
2. Hydraulic press.
3. A.74120 mandrel.
4. Metal-rubber bushing.

Checking and inspection

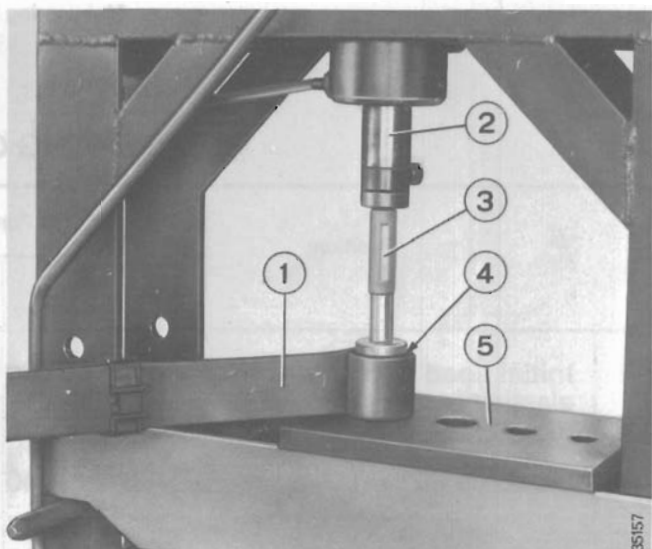
Check the spring leaves for breakage and cracks. If any such defects are found, the given leaf must be replaced. Check the condition of clamps and of metal-rubber bushings. If these are to be replaced

due to wear or delamination, use a hydraulic press with suitable mandrels as shown in the picture. Check spring characteristics by comparing them with data given in the Table on the preceding page.



Stripping and installation of metal-rubber bushing in rear spring eye.

1. Leaf spring.
2. Hydraulic press.
3. A.74120 mandrel.
4. Metal-rubber bushing.
5. Baseplate.



Stripping and installation of metal-rubber bushing in front spring eye.

1. Leaf spring.
2. Hydraulic press.
3. A.74209 mandrel.
4. Metal-rubber bushing.
5. Baseplate.

Rear shock-absorbers and radius rods

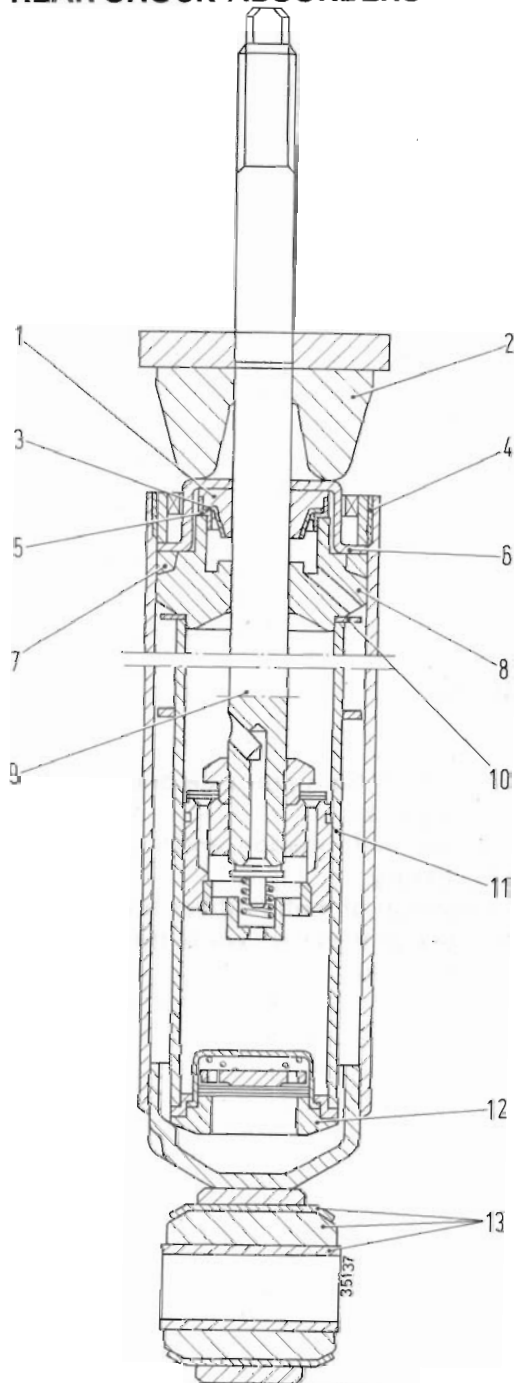
Polonez Model 1300/1500

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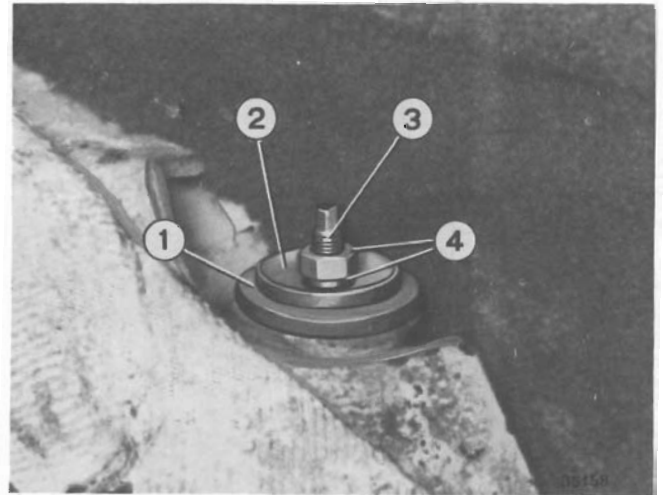
Sheet 1

REAR SHOCK-ABSORBERS



Rear shock-absorber longitudinal section.

1. Piston rod sealing sleeve.
2. Bumper.
3. Spring washer.
4. Top sealing ring.
5. Thrust cup.
6. Piston rod sealing cup.
7. Sealing ring.
8. Guide bush.
9. Piston rod.
10. Oil drain plate.
11. Cylinder with anti-emulsion ring.
12. Bottom valve.
13. Metal-rubber bushing.



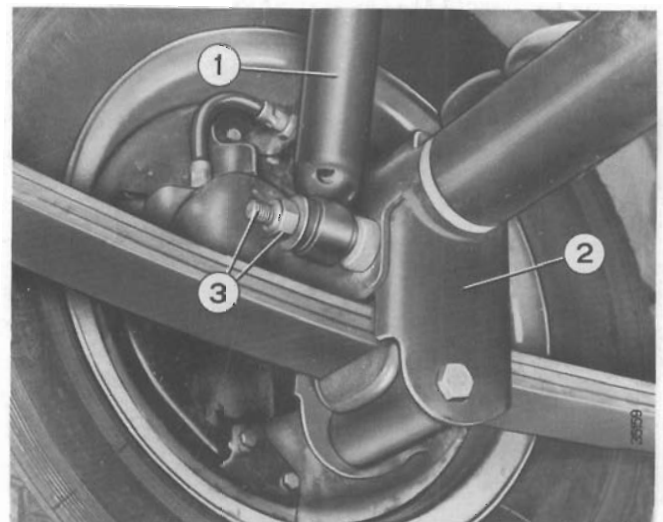
Rear shock-absorber top mounting.

1. Resilient insert of shock-absorber top mounting bracket.
2. Top cup.
3. Threaded piston rod end for shock-absorber fastening.
4. Nut and lockwasher.

Dismounting and reassembly

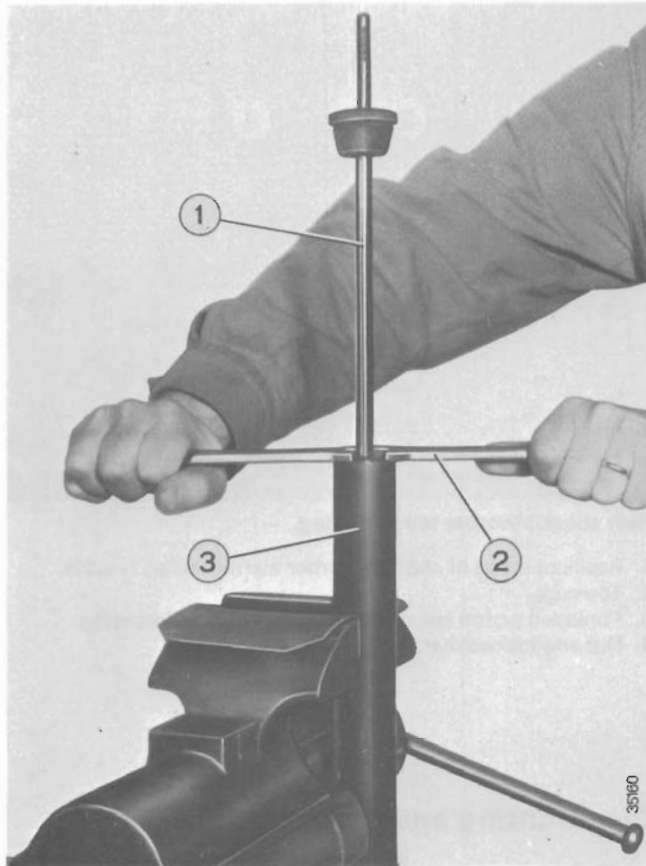
Unfasten the shock-absorber top part in the luggage compartment, using **A.57152** spanner to prevent the piston rod from turning. Raise the vehicle rear with a hydraulic jack and set it on props.

Dismount the shock-absorber bottom from its bracket on rear axle tube by unscrewing the nut and removing the bolt and spacers with metal-rubber bushings.



Shock-absorber bottom mounting on rear axle tube.

1. Hydraulic shock-absorber.
2. Bracket on rear axle tube.
3. Shock-absorber to rear axle bracket fastening bolt and nut.



Unscrewing and replacing top shock-absorber cylinder closing bushing.

1. Shock-absorber piston rod.
2. A 57034 spanner.
3. Shock-absorber outer cylinder.

Checking and inspection

Prior to dismounting hydraulic shock-absorbers, check their characteristics. Also, check that there is no jamming of piston rod on bound and rebound. Shock-absorber characteristics to be checked include the maximum values of bound and rebound force. These should be as follows:

- bound: $235 \pm 49 \text{ N}$ ($24 \pm 5 \text{ kg}$)
- rebound: $735 \pm 73.6 \text{ N}$ ($75 \pm 7.5 \text{ kg}$)

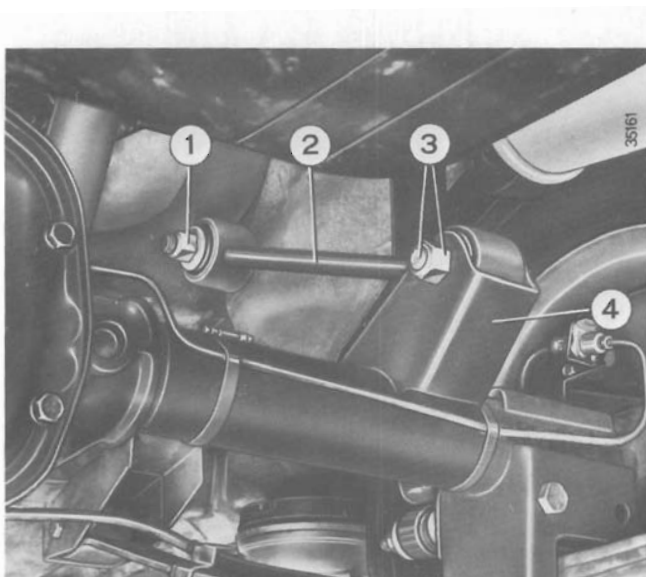
After checking shock-absorber operation, proceed to its dismantling and verifying or replacing components as indicated by test results.

After overhaul, repeat test to make sure that the unit operates correctly. Compare the results with those previously obtained and with the recommended values.

RADIUS RODS

On dismounting them from rear axle bracket, carry out the following checks:

- check the rods for deformation, and straighten on a press, if necessary;
- check the condition of metal-rubber bushings inserted in the eye; if these are worn, the complete rod must be replaced;
- check rear axle and body mounting brackets for deformation; rectify, if necessary.



Rear radius rod mounted in the vehicle.

1. Radius rod to body fastening bolt.
2. Radius rod.
3. Radius rod to bracket (4) fastening bolt.
4. Radius rod mounting bracket on rear axle tube.

Steering knuckle

Polonez Model 1300/1500

443.14

Sheet 1

STEERING KNUCKLE

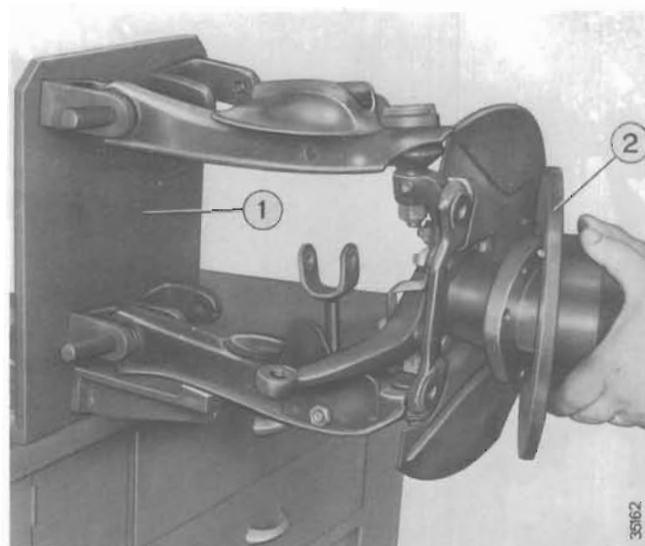
Dismantling

To dismantle wheel hub and steering knuckle, carry out the following operations:

- remove wheel hub cover with the use of **A. 47014** interia puller,
- unfasten and remove brake disc from wheel hub.

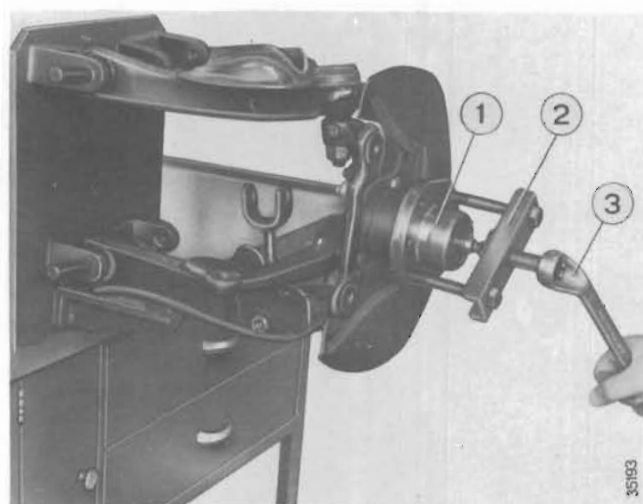
Swing arm assembly on A. 74115 fixture prepared for dismantling.

1. **A. 74115** fixture.
2. Brake disc.



Straighten the crimps in flange of wheel hub fastening nut and unscrew the nut. Strip wheel hub from steering knuckle shaft with the use of **A. 47085** puller as shown in the picture.

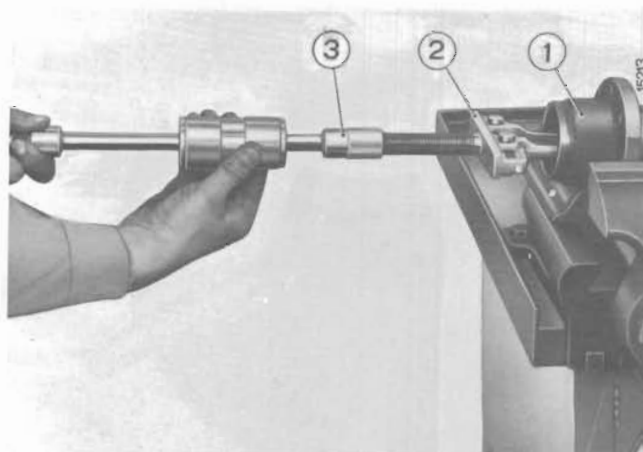
Unfasten steering knuckle arm, dismantling at the same time the brake carrier plate and brake shield.



Front wheel hub dismantling.

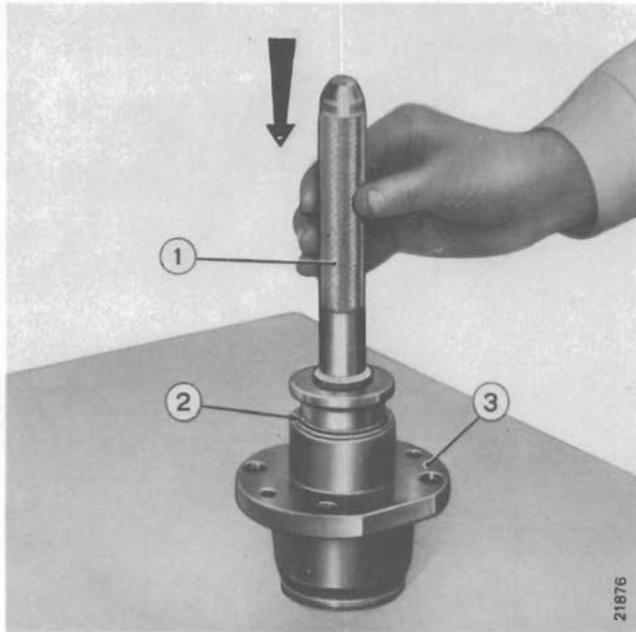
1. Front right-hand wheel hub.
2. **A. 47085** puller.
3. Spanner.

Dismantle the steering knuckle by unscrewing ball joint fastening nuts and then using **A. 47058** puller. On extracting wheel hub lip seals, remove outer bearing races as shown in the picture. Lip seals are not reusable and must be replaced.



Dismantling front wheel hub inside bearing outer race.

1. Wheel hub.
2. **A. 40005/009** puller crosspiece.
3. **A. 40206/801** interia puller.

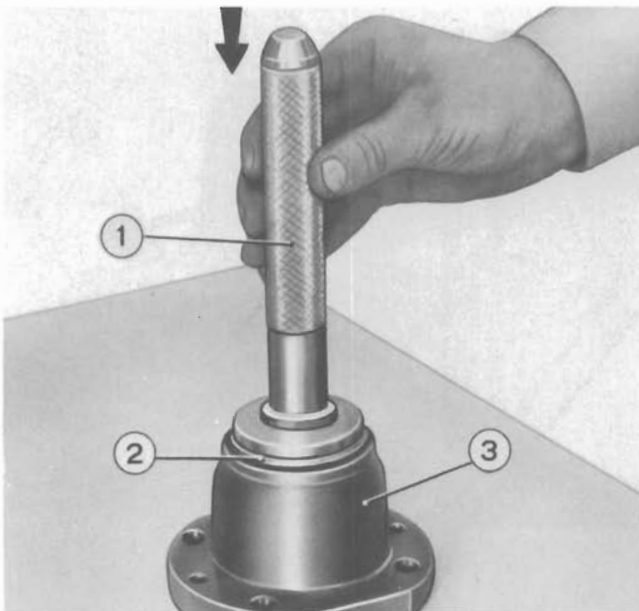


Checking and reassembly.

If the steering knuckle is found deformed in any way, it must be replaced. Check wheel hub bearing races for scratches or other damage, and replace the complete bearing, if necessary.

Installation of wheel hub outside bearing outer race with the use of A. 74257 punch with A. 70007 handle.

1. A. 74257 punch with A. 70007 handle for installation of front wheel hub bearing outer race.
2. Outside bearing outer race.
3. Front wheel hub.

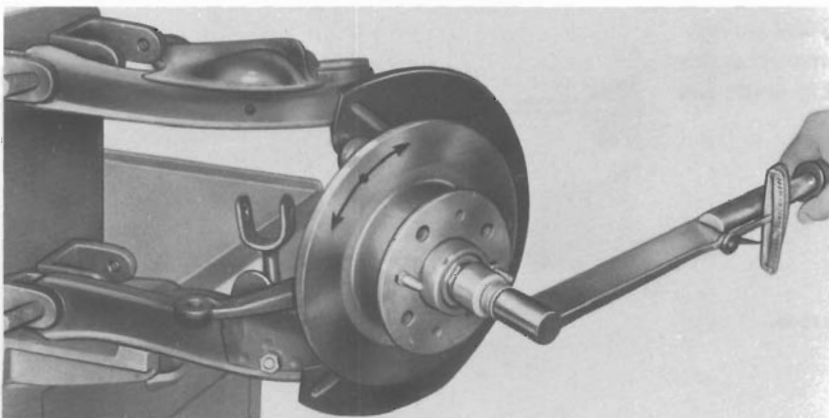


NOTE – Put the requisite amount (60 g) of Grassofiat MR 3 grease in the wheel hub recess between bearings.

The inner lip seal of wheel hub is installed with the use of A. 74257 punch with A. 70007 handle, the same as used for installation of wheel hub inside bearing outer race.

Installation of wheel hub inside bearing outer race with the use of A. 74257 punch with A. 70007 handle.

1. A. 74257 punch with A. 70007 handle for installation of front wheel hub outer bearing race.
2. Inside bearing outer race.
3. Front wheel hub.



Tighten wheel hub fastening nut with a torque of 19.6 N.m. (2 kgm), simultaneously turning the wheel hub in both directions, as shown in the picture, at least 4 to 5 times.

Pre-tightening wheel hub fastening nut with a torque spanner, using a torque of 19.6 N.m (2 kgm).

Steering knuckle

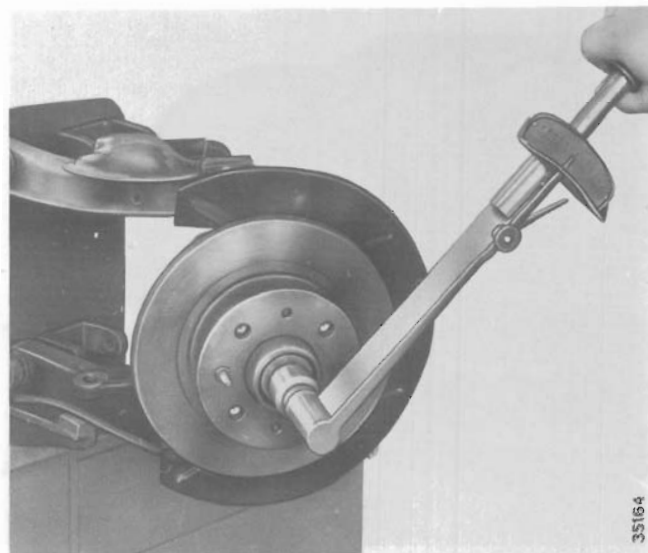
Polonez Model 1300/1500

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Sheet 2

Unscrew wheel hub fastening nut, tighten it with a torque of 6.86 N.m (0,7 kgm), unscrew it again through 30° and crimp its flange in this position. Wheel hub axial play should then be from 0.025 to 0.10 mm.

Wheel hub play is checked with the use of A. 74029 dial gauge mounted on a stand.



Tightening wheel hub nut with a torque of 6.86 N.m (0.7 kgm) and loosening it through 30°.

Wheel hub play must be adjusted when it exceeds 0.10 mm. Bear in mind that the wheel hub fastening nut must be replaced with a new one after each play adjustment.

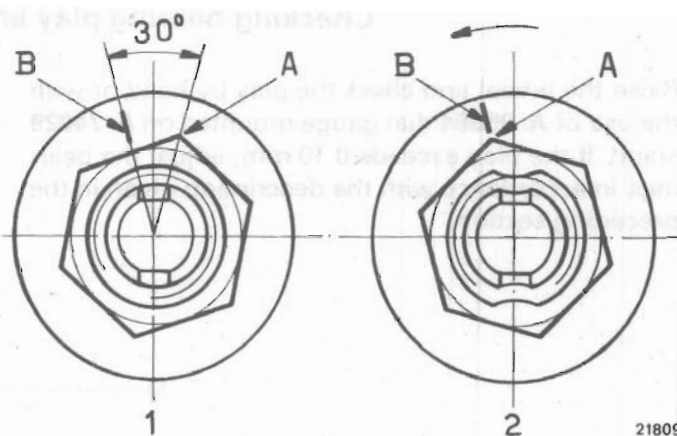
Schematic drawings for adjustment of front wheel hub roller bearing axial play.

A. Nut apex.

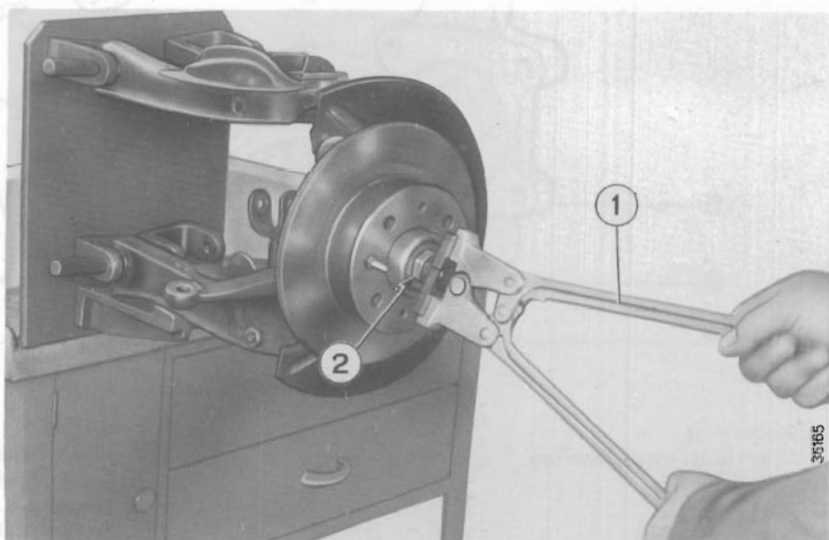
B. Notch in washer.

1. Nut to be tightened with a torque of 6.86 N.m (0.7 kgm).

2. Loosening the nut by turning it through 30°.



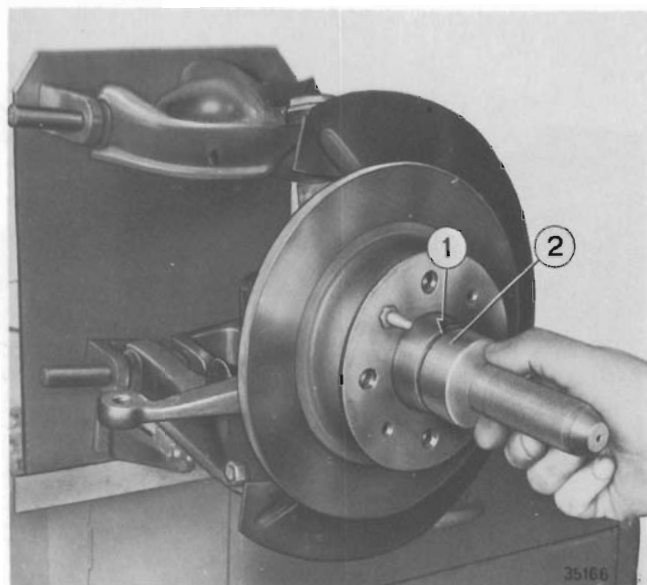
The wheel hub nut is crimped with the use of A. 74140/1 tongs with A. 74140/4 bits. The crimps should be made in places where grooves are milled in the steering knuckle shaft. After nut crimping, turn the wheel hub to make sure that the bearings are not too tight.



Crimping wheel hub nut flange with the use of A. 74140/1 tongs with A. 74140/4 bits.

1. A. 74140/1 tongs.

2. Front wheel hub fastening nut.



NOTE – Prior to replacing the wheel hub cover, put 25 g of LTS-S3 grease on its inside perimeter.

Mounting front wheel hub cover with the use of A. 74088 punch.

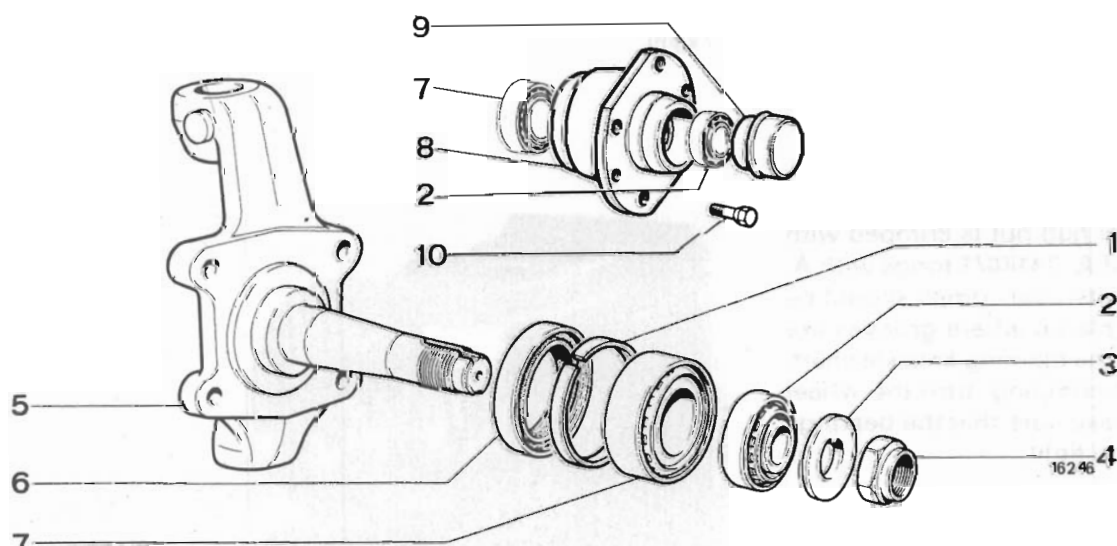
1. Front wheel hub cover.
2. A. 74088 punch.

Checking bearing play and noise on the vehicle

Raise the wheel and check the play by hand or with the use of A. 95684 dial gauge mounted on A. 74029 stand. If the play exceeds 0.10 mm, adjust the bearings in accordance with the description given in the preceding section.

Noise, if any, may be detected by raising the wheel and setting it in rotary motion.

Noisy bearings should be replaced in accordance with the instructions already given above.



Exploded view of front wheel hub.

- | | |
|-------------------------------|--|
| 1. Spacer ring. | 6. Lip seal. |
| 2. Wheel hub outside bearing. | 7. Wheel hub inside bearing. |
| 3. Flat washer. | 8. Front wheel hub. |
| 4. Nut. | 9. Wheel hub cover. |
| 5. Steering knuckle. | 10. Road wheel to wheel hub fastening bolts. |

Road wheels

Polonez Model 1300/1500

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Sheet 1

Balancing the wheels with the use of Ap. 5029 balancer (wheel mounted on the vehicle).

NOTE: The magnetic unbalance measuring pick-up contact point must be carefully cleaned to avoid erroneous indication

Front wheel balancing.

1. Electronic balancer.
2. Wheel angular position mark.
3. Electric motor.

When checking wheel **static balancing**, the magnetic pick-up arm must be in contact with the swing arm and at a point as near to the wheel as possible.

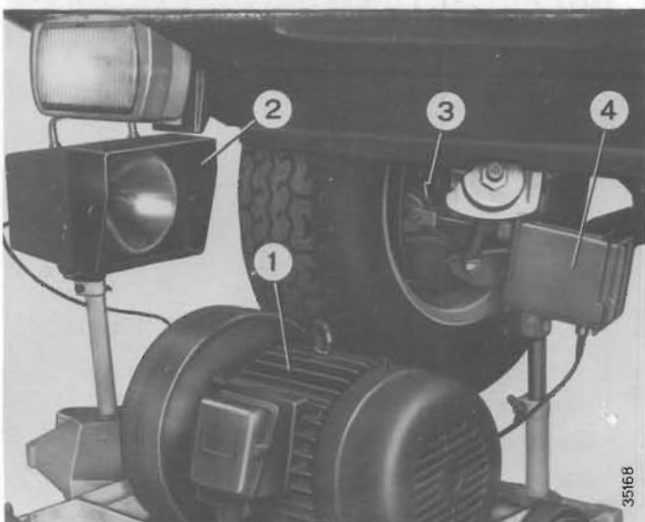
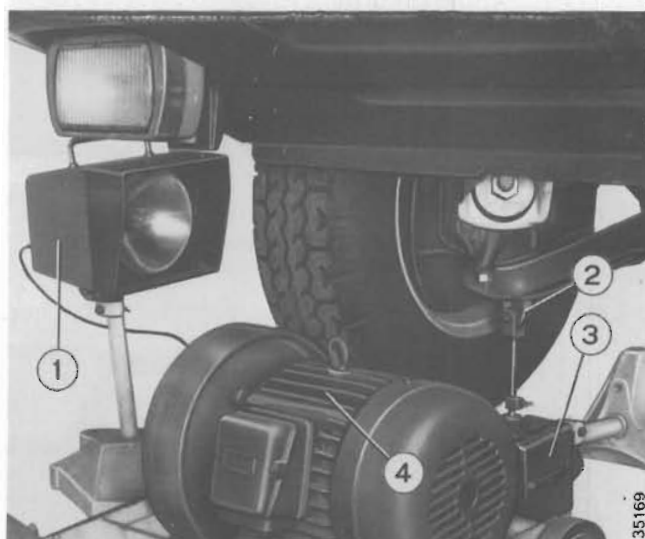
Ap. 5029 balancer prepared for front wheel static balancing.

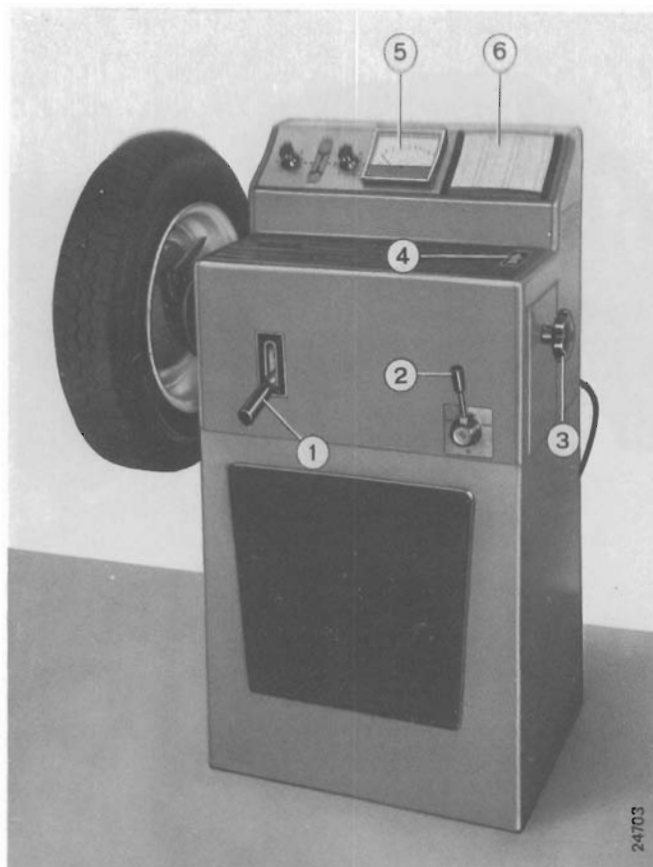
1. Electronic balancer.
2. Magnetic pick-up arm.
3. Pick-up.
4. Electric motor.

When checking wheel **dynamic balancing**, the magnetic pick-up arm must be in contact with the brake carrier plate on its external periphery.

Ap. 5029 balancer prepared for front wheel dynamic balancing.

1. Electric motor.
2. Electronic balancer.
3. Magnetic pick-up arm.
4. Pick-up.





Balancing the wheels on Ap. 5064 balancer (wheel dismounted from the vehicle)

Prior to wheel balancing, check visually the wheel rim for deformation, and use a scribe to make sure that the run-out on tire thread and side-wall does not exceed 1.5 mm. After mounting the chuck on the balancer, select a centering taper with dimensions suitable for the hole in wheel disc.

Ap. 5064 balancer with wheel mounted.

1. Selector lever for balancing wheel right-hand or left-hand side.
2. Balancer start lever.
3. Knob for finding the amount of unbalance.
4. Arrow indicating knob (3) turning direction.
5. Unbalance meter.
6. Table giving correction values for various wheels.



Mount the wheel in chuck, set it against chuck face, and insert the centering, tightening it with the hand-wheel. If the taper penetrates too deep into the wheel and cannot be tightened, then a spacer, forming part of balancer accessories, must be inserted between taper and handwheel.

Mounting the wheel in chuck of Ap. 5064 balancer.

1. Wheel tightening handwheel.
2. Wheel in chuck centering taper.

Road wheels

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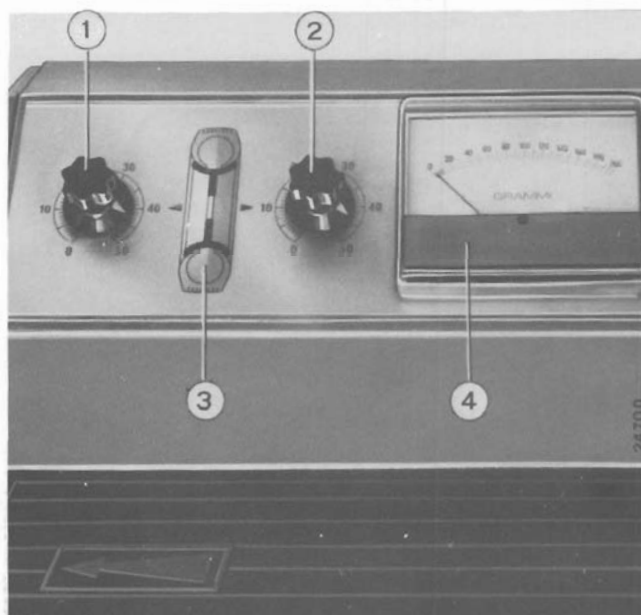
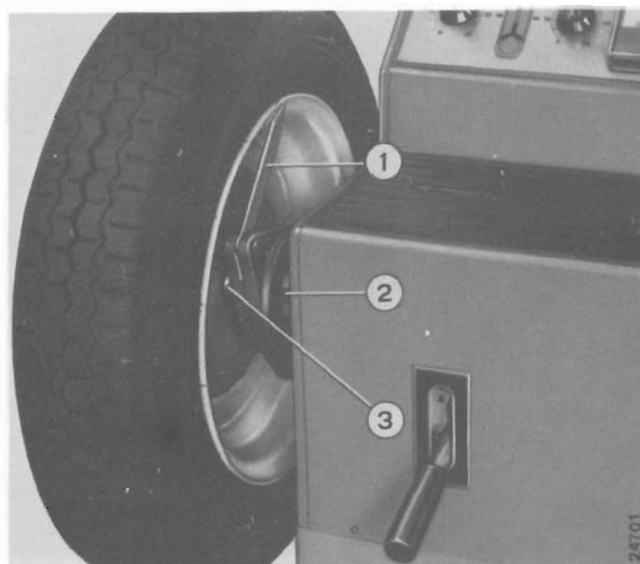
Sheet 2

When the wheel is mounted in position, move axially the balancer flange after unscrewing the knurled knob, where after the wheel inner rim surface should come into contact with the rod for wheel location.

Wheel mounted on balancer.

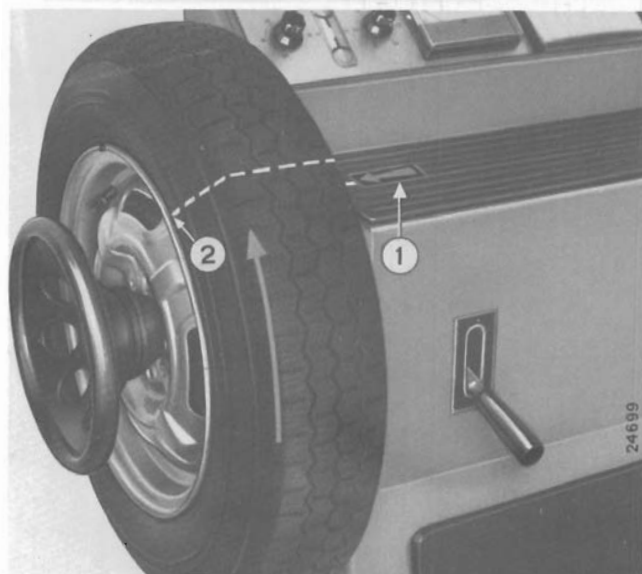
1. Articulated wheel locating rod.
2. Wheel chuck.
3. Wheel fastening shaft.

The locating rod is fitted on balancer spindle. When the wheel is set up, tighten the knurled knob. The balancer calibration to suit the type of wheel to be balanced is done with two knobs which must be set in accordance with data given in the table at right-hand end of balancer control panel.

**Detail of Ap. 5064 balancer control panel.**

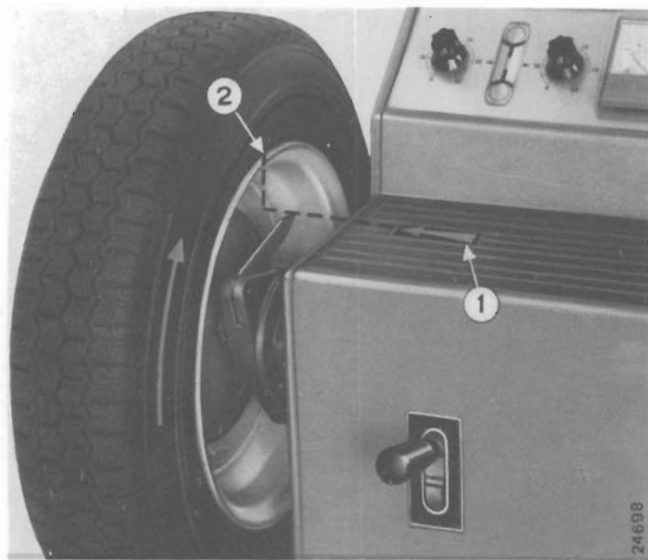
1. Calibrating knob for wheel outside balancing.
2. Calibrating knob for wheel inside balancing.
3. Light indicator of wheel side under balancing.
4. Unbalance meter.

Meter reading is in grammes and must be rounded up to 10 g, an unbalance below 10 g being negligible. Wheel balancing is to be performed first on the outside and then on the inside of wheel. The balancing weights should be fixed at the largest diameter of the rim. The weight fixing point is indicated by a red arrow lighting up.

**Installation of balancing weight on wheel outside.**

1. Red arrow indicating weight fixing point.
2. Balancing weight fixing point on wheel outside.

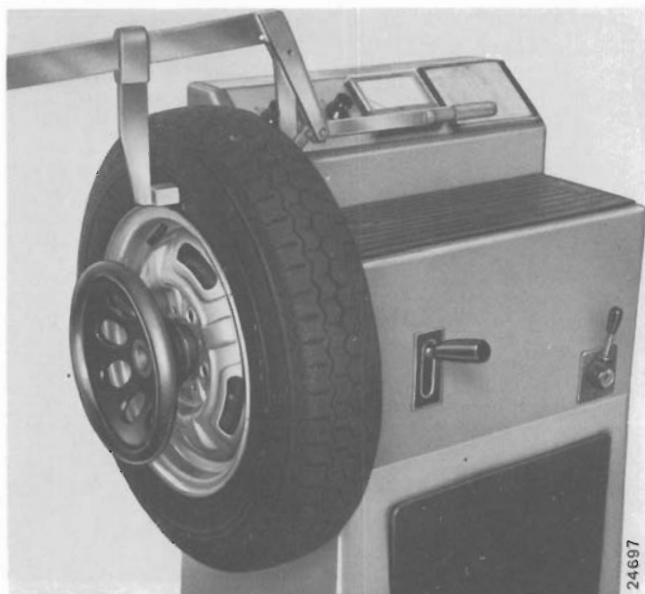
Polonez Model 1300/1500



If all balancer operating conditions were adhered to while balancing the wheel, the latter is balanced both statically and dynamically.

Installation of balancing weight on wheel inside.

1. Red arrow indicating weight fixing point.
2. Balancing weight fixing point on wheel inside.



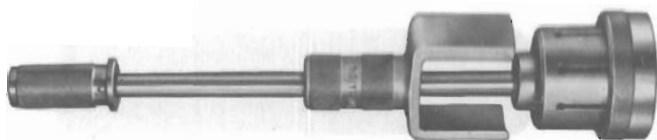
Use of A. 81117 fixture facilitating the fixing of balancing weights according to results obtained from wheel balancer Ap. 5064.

Special tools

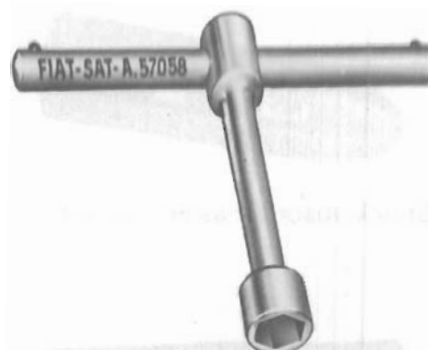
Polonez Model 1300/1500

44A

Sheet 1



A. 47014 Inertia puller for wheel hub cover.



A. 57058 16 mm socket spanner for shock-absorber piston rod fastening plug.



A. 47035 Puller for tierod ball joints.



A. 57152 Spanner for immobilising shock-absorber piston rod while tightening and unscrewing the piston rod nut.



A. 47058 Puller for front suspension ball joints.



A. 70007 Handle for use with various punches.



A. 47085 Puller for front wheel hub.



A. 70526/1 Hanger for supporting engine in the vehicle while dismounting and replacing suspensions cross member (to be used with A. 70526/8).



A. 57034 Spanner for nut of shock-absorber piston rod.



A. 70526/8 Hook for engine suspension (to be used together with A. 70526/1).

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A. 74019 Shock-absorber assembly aid.



A. 74053 Mandrel for installation of lower swing arm metal-rubber bushing.



A. 74088 Punch for installation of front wheel hub cover.



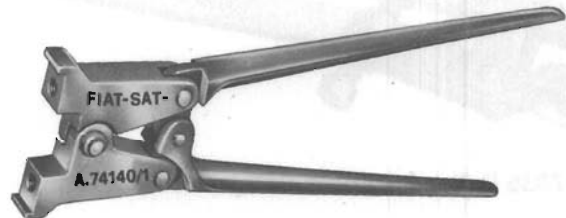
A. 74112 Fixture for front suspension helical spring compression.



A. 74115 Fixture for swing arm assembly dismantling and reassembly.



A. 74120 Mandrel for metal-rubber bushing installation in rear leaf spring eye and spring bracket.



A. 74140/1 Tongs for crimping front wheel hub fastening nut (to be used with **A. 74140/4** bits).



A. 74140/4 Bits for crimping front wheel hub fastening nut (to be used together with **A. 74140/1** tongs).



A. 74209 Mandrel for installation of metal-rubber bushings in rear leaf spring front eye.

Special tools

Polonez Model 1300/1500

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Sheet 2



A. 74257 Mandrel for mounting front wheel bearing outer race.



A. 86511 Spanner (17, 19, 22 mm) for wheel bolts.



A. 74281 Adapters for mounting „Hiperbloc“ bushings in shock-absorbers (to be done on a press).



A. 95758 Front suspension swing arm checking fixture.



55	Characteristics and technical data – Wiring diagram
551.01	Ignition circuit
552.01	Starting circuit
553.01	Battery charging circuit
554.01	External and internal lighting
555.01	Signalling devices
555.10	Instrument cluster
555.15	Miscellaneous equipment
55A	Special tools

Electric system: characteristics and technical data

55

Polonez Model 1300/1500

Sheet 1

IGNITION

Ignition sequence					1—3—4—2
Ignition distributor	Type				ZEM 4492
	Initial spark advance, on engine				10°
	Automatic centrifugal advance, on engine				24°±2°
	Breaker contact pressure				450±50 g
	Breaker contact gap				0.4±0.03 mm
	Capacitor rating (50—1000 c/s)				0.20—0.25 µF
	Cam opening angle				35°±3°
	Cam closing angle				55°±3°
Ignition coil	Typ				ZEM 12 V
	Primary winding ohmic resistance at 20°C				3.1—3.4 Ω
	Secondary winding ohmic resistance at 20°C				6750—8250 Ω
Spark plugs	Type	CHAMPION	MAGNETI MARELLI	BOSCH	ISKRA (KLG)
	Symbol	N 9 Y	CW 7 LP	W 175 T 30	FE 65 P
	Thread size	M14×1.25	M14×1.25	M14×1.25	M14×1.25
	Electrode gap	0.6—0.7	0.6—0.7	0.6—0.7	0.6—0.7

STARTER MOTOR

Type		ZEM 100 N—1.5/12
Voltage		12 V
Rating		1.5 kW
Direction of rotation from drive end		RH
Number poles		4
Excitation		compound
Clutch		roller-type
Engagement		electro-magnetic
Inside diameter between poles		67.66 mm
Rotor outside diameter		66.9—66.85
Mechanical data	Spring pressure on brush (unused)	1 ^{+0.2} _{-0.1} kg
	Rotor shaft axial play	0.1—0.7 mm
	Insulation level beneath commutator segments	1 mm
Data for use on test stand	Operating test(*) — current — rotational speed — voltage — torque	270 A 1260±100 rpm 9.6 V ≥8.33 Nm (0.85kgm)
	Full braking test(*) — current — max. voltage — torque	540±20 A 6.7 V ≥19.62 Nm (2.00kgm)
	Test without load(*) — current — (current without switch) — voltage — rotational speed	≤65 A (35±5 A) 12 V 5000—6000 rpm
Starter switch	Current input	≤33 A
	Winding resistance at 20°C	0.39±0.02
	Contact stroke	2.87—4.03 mm
	Armature stroke	13.88—16.09 mm
Lubri-cation	Self-lubricating bearings and shaft journals	engine oil VS 10 W or se-lektol 9
	Spline on starter shaft	ŁT 4 S 2 or MR 2

Electric system: characteristics and technical data

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Sheet 2

BATTERY CHARGING CIRCUIT

Alternator	Type	ZEM A 124—14 V—60 A
	Rated voltage (insulation)	12 V
	Maximum output	~1000 W
	Maximum current	~70 A
	Initial charging speed at 12 V(*)	1150±50 rpm
	Current fed to battery at 13.5 V and at 7000 rpm, continuous	≥57 A
	Winding resistance between two collector rings(*)	2.6±0.1 Ω
	Direction of rotation from drive end	RH
	Engine — alternator ratio	2
	Rectifier diode characteristics Continuous direct current — power diodes at 130°C — excitation diodes	25 A 3 A
	Reverse voltage	≥150 V
	Reverse current at 130°±5°C with 150 V applied for 5 seconds	1 mA
Voltage regulator	Type	ZEM RC 2/12 E
	Alternator speed for voltage regulation check	5000 rpm
	Thermal stabilisation current	7 A
	2nd stage control current	10—14 A
	2nd stage regulation voltage	14.2±0.3 V
	1st stage control current	40—45 A
	1st stage regulation voltage, higher than	0—0.5 V
	Resistance between terminal 15 and ground (at 25°±10°C)	27.2±2 Ω
	Resistance between terminals 15 and 67 with contacts open	3.7±0.2 Ω
	Gap between armature and core	1.5±0.05 mm
Storage battery	Gap between 2nd stage contacts	0.45±0.1 mm
	Rated voltage	12 V
Storage battery	Rated capacity (when discharging)	45 Ah

* Measurement data for room temperature of 20°C.

LIGHTING SYSTEM

Values in Watts – 12 V voltage

Headlights:(*)		
Dipped beam lamp		40
Driving beam lamp		45
Direction indicator lamp:	— front	21
	— side	4
	— rear	21
Parking light lamp:	— front	5
	— rear	5
Lamps for other lights:	— braking	21
	— reversing	21
	— rear fog	21
	— licence plate	5
Interior light lamps:	— dome	5
	— luggage compartment	5
	— glove compartment	4
	— lighter socket	4
	— instrument cluster	1.2
	— ideograms	1.2
Signal and pilot lamps:	— reserve fuel	1.2
	— oil pressure	
	— spare — unused	
	— parking lights ON	
	— headlights ON	
	— direction indicators ON	
	— brake failure, headbrake ON	
	— choke ON	
	— rear window heating ON	
	— rear fog lamp ON	
	— emergency lights ON	
	— faulty battery charging	

Electric system: fuses

55

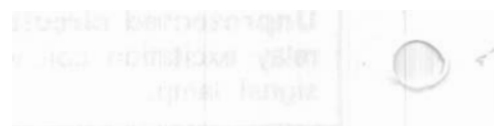
Polonez Model 1300/1500

Sheet 3

FUSES

Fuses	Protected circuits
A (25 A)	— Horns with relays — Radiator fan motor.
B (8 A)	— Blower motor — Rear window wiper — Rear window washer — Rear fog lamps (with front fog lamps on).
C (16 A)	— RH and LH headlights (outside) and pilot lamp
D (16 A)	— RH and LH head lights (inside).
E (16 A)	— LH dipped beam.
F (16 A)	— RH dipped beam — Rear fog lamps (with front fog lamps off).
G (8 A)	— Front LH parking lights — Rear RH parking light — Licence plate light (N.1) — Lighter socket light — Luggage compartment light.
H (8 A)	— Front RH parking light — Rear LH parking light — Licence plate light (N.1) — Parking lights indicating lamp — Instrument cluster light.
I (8 A)	— Direction indicators with signal lamp — Glove compartment light — Rear stop light — Excitation of rear window heating relay — Oil pressure gauge — Oil pressure signal light — Cooling fluid temperature indicator — Fuel level gauge with reserve signal light — Cold start signal lamp — Handbrake and brake failure signal lamp — Engine rev. meter — Heater light — Reversing light.
L (8 A)	— Windscreen wiper — Windscreen washer.
M (16 A)	— Lighter — Quartz clock — Portable lamp socket — Interior front and rear lights — Front fog lamps.
N (16 A)	— Rear window heating with signal lamp — Emergency lights with signal lamp.

Unprotected circuit: Battery charging circuit, ignition circuit, starting circuit, radiator fan relay excitation coil, voltage regulator, front fog lamp relay excitation coil, battery charging signal lamp.



Electric system: wiring diagram

Polonez Model 1300/1500

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Sheet 4

Electric wiring diagram.

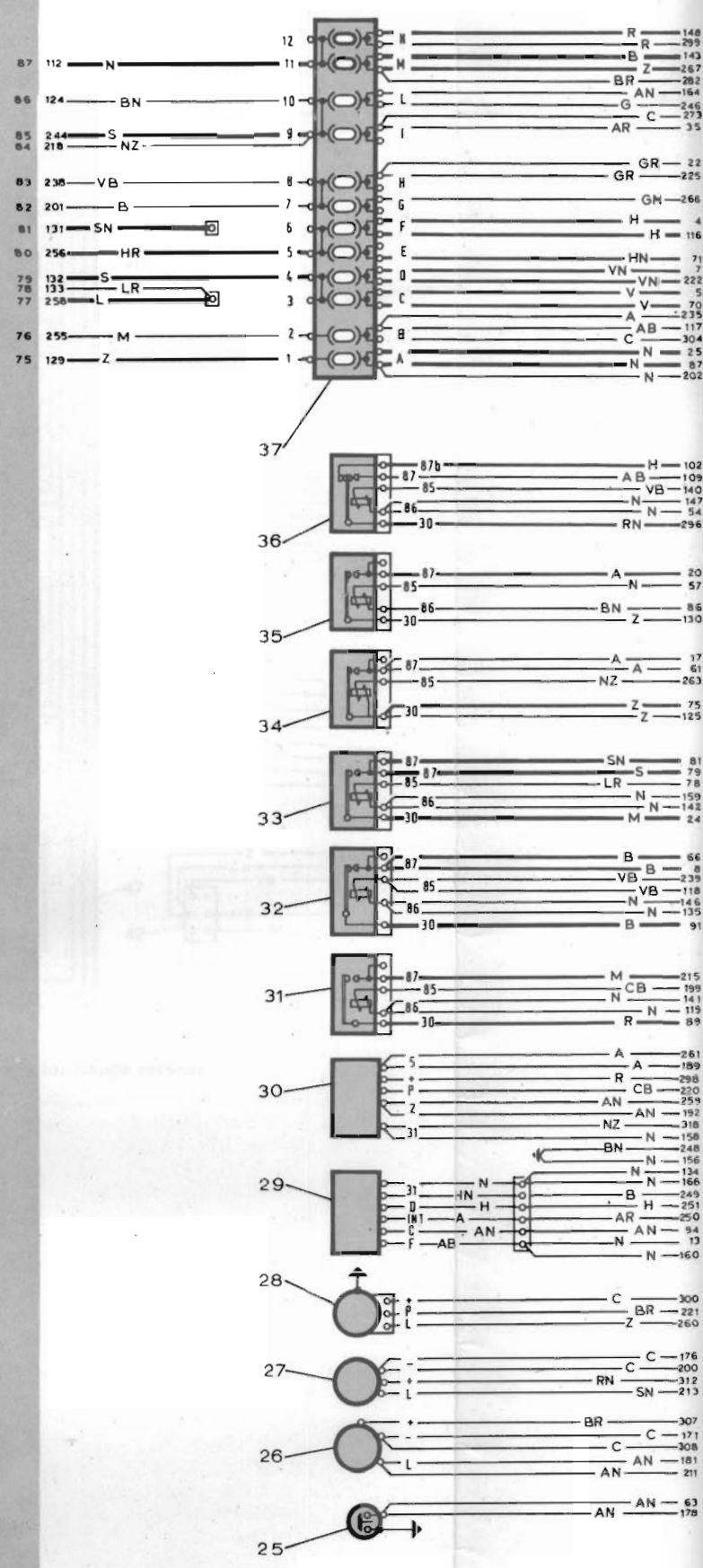
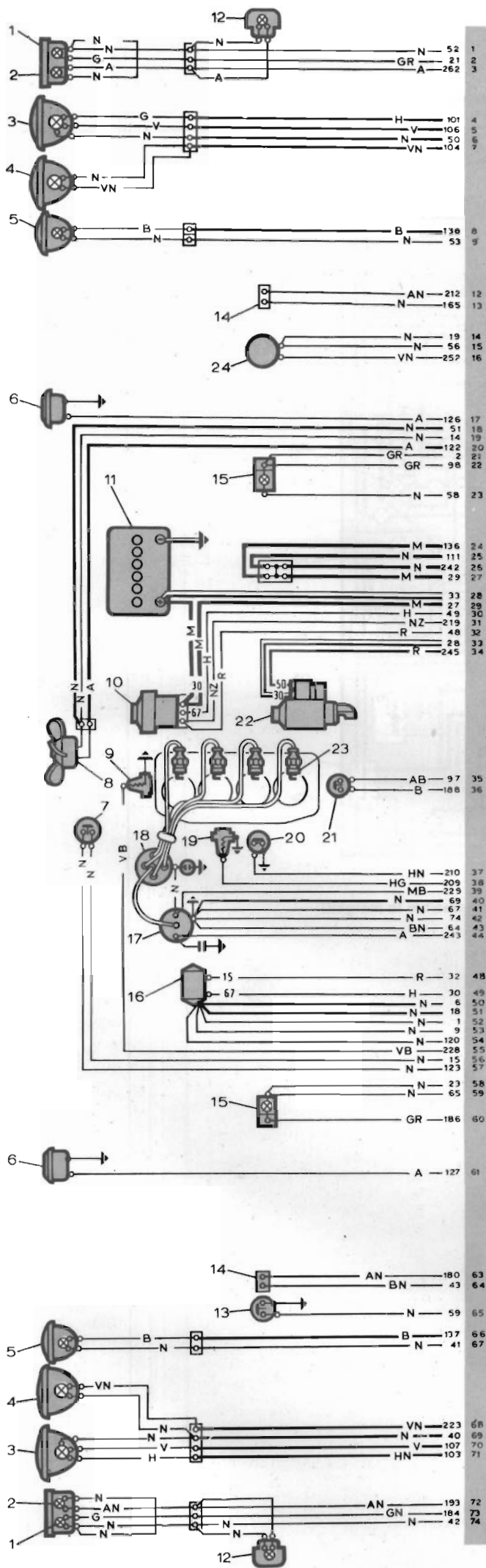
1. Front parking lights (spherical lamp 12 V, 5 W).
2. Front direction indicators (spherical lamp 12 V, 21 W).
3. Headlights with driving beam and dipped beam (spherical lamp 12 V, 45/40 W).
4. Headlights with driving beam (spherical lamp 12 V, 45/40 W).
5. Fog lamps (halogen lamp 12 V, 55 W, H3 type).
6. Horns.
7. Fan motor (8) thermal switch.
8. Radiator fan motor.
9. Sensor of cooling fluid temperature gauge (45).
10. Alternator.
11. Storage battery.
12. Side direction indicators (spherical lamp 12 V, 4 W).
14. Cable for eventual connection of brake pad wear signal lamp.
For Coupé version – brake pad wear signalling device.
16. Voltage regulator.
17. Ignition coil.
18. Ignition distributor.
19. Sensor of oil pressure gauge (44).
20. Sensor of oil pressure signal lamp (43).
21. Reversing light push-button switch.
22. Starter motor.
23. Spark plugs.
24. Windscreen washer pump.
25. Brake failure signalling device.
26. Handbrake signal light pulsating device.
27. Cold start signal light pulsating device.
28. Direction indicator pulsating device.
29. Windscreen wiper motor.
30. Emergency light pulsating device.
31. Rear window heating (71) relay.
32. Front fog lamp relay.
33. Headlight relay.
34. Horn relay.
35. Radiator fan motor (8) relay.
36. Rear fog lamp relay.
37. Fuses.
38. Cable for eventual connection of headlight washer.
39. 3-position switch for outside lights and instrument light.
40. Instrument lighting lamps (12 V, 1.2 W).
41. Fuel level gauge.
42. Electric cable connections to instrument cluster.
43. Oil pressure signal lamp.
44. Oil pressure gauge.
45. Cooling fluid temperature gauge.
46. Electronic clock.
47. Tachometer.
48. 3-position blower motor (80) switch.
49. Fog lamp switch.
50. Switch with rheostat for dimming instrument lights.
51. Parking light signal lamp.
52. Driving beam signal lamp.
53. Direction indicator signal lamp.
54. Emergency light signal lamp.
55. Battery charging signal lamp.
56. Rear window heating signal lamp.
57. Rear fog lamps signal lamp.
58. Cold start signal lamp.
59. Handbrake ON signal lamp.
60. Reserve fuel signal lamp.
61. Rear window heating (71) switch.
62. Ignition switch (with key).
63. Windscreen wiper and washer pump lever-operated switch.
64. Headlight dipping lever-operated switch.
65. Direction indicator switch.
66. Horn push-button.
67. Door-operated switches. For Coupé version – place for courtesy light switches.
68. Interior lights (tubular lamps 12 V, 5 W) with switch.
69. Portable lamp socket.
70. Switch for cold start signal lamp (58).
71. Rear window heating.
72. Stop light push-button switch.
73. Switch for handbrake ON signal light (59).
74. Rear fog lamp switch.
75. Emergency light switch.
76. Rear window wiper and washer switch.
77. Electric lighter with lamp (spherical lamp 12 V, 4 W) for socket lighting.
78. Glove compartment light (spherical lamp 12 V, 4 W) with switch.
79. Lamps (12 V, 1.2 W) for illumination of heater ideograms.
80. Two-speed blower for heater.
81. Cable for eventual radio aerial motor.
82. Rear direction indicators (spherical lamps 12 V, 21 W).
83. Stop lights (spherical lamps 12 V, 21 W).
84. Tail lights (spherical lamps 12 V, 5 W).
85. Rear fog lamps (spherical lamps 12 V, 21 W).
86. Reversing lights (spherical lamps 12 V, 21 W).
87. Sensor for fuel gauge and fuel reserve signal lamp.
88. Luggage compartment light (tubular lamp 12 V, 4 W).
89. Rear window wiper.
90. Licence plate light (spherical lamps 12 V, 5 W).
91. Rear window washer pump.
92. Voltmeter (for Coupé version).

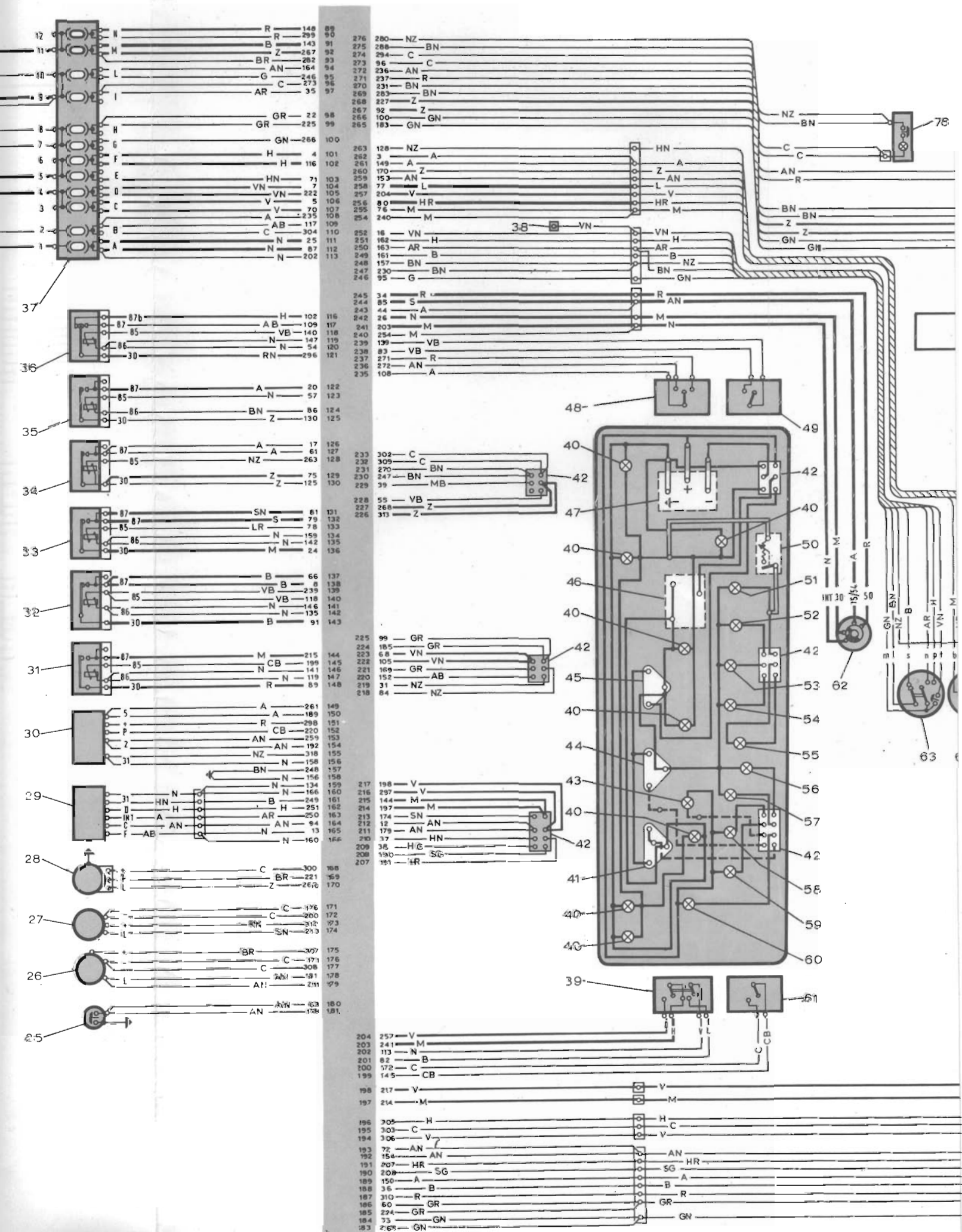
Note regarding the use of wiring diagram

Each coloured stripe bears several consecutive numbers. To trace cable continuity, find the proper number on the coloured stripe, corresponding to the number of cable terminal.

Colour designation:

C = orange
 B = white
 G = yellow
 Ml = brown
 S = pink
 V = green
 A = dark blue
 L = light blue
 H = grey
 Nl = black
 R = red
 Z = violet







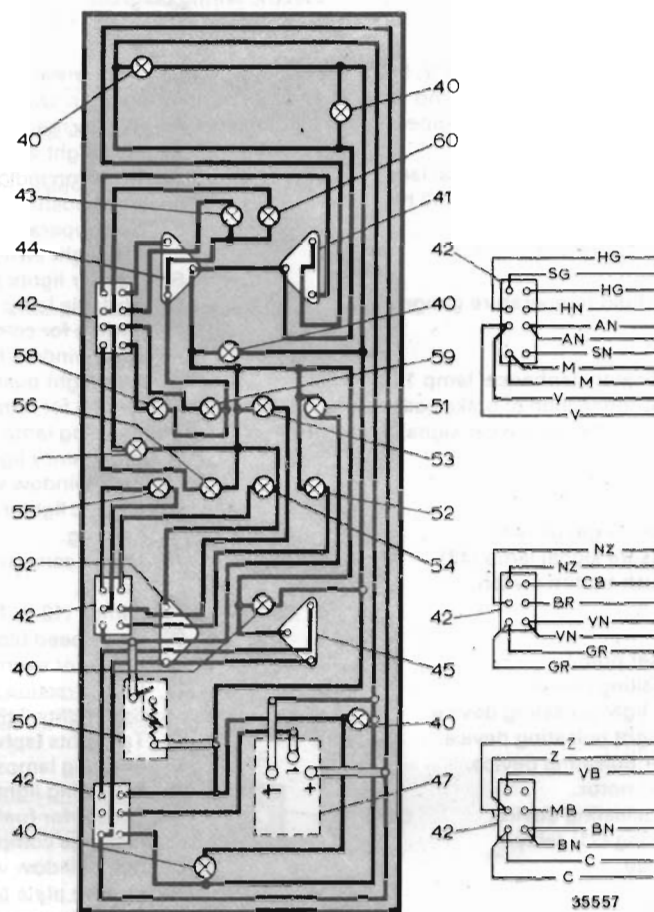
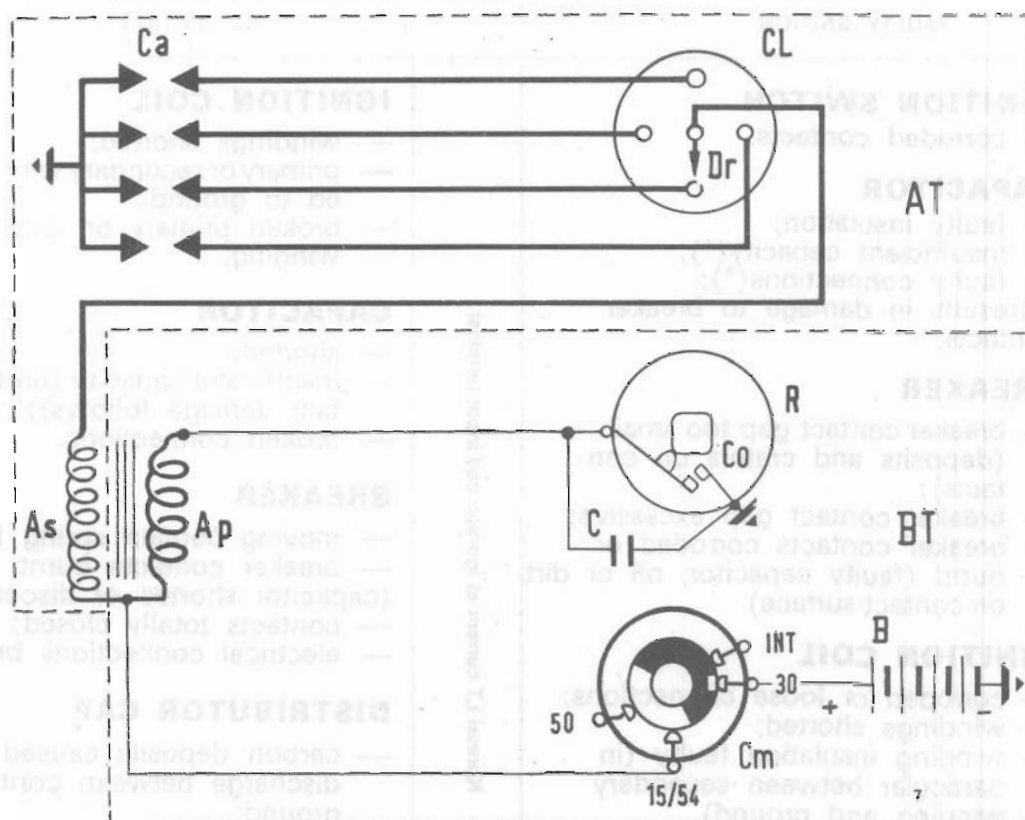


Diagram of indicator cluster for Coupé version

Ignition circuit

Polonez Model 1300/1500

SCHEMATIC DIAGRAM OF IGNITION CIRCUIT



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BT - Low tension.

B – 12 V storage battery.

Cm - Ignition switch.

Co — Breaker contacts.

R - Breaker.

C - Capacitor.

Ap - Ignition coil primary winding.

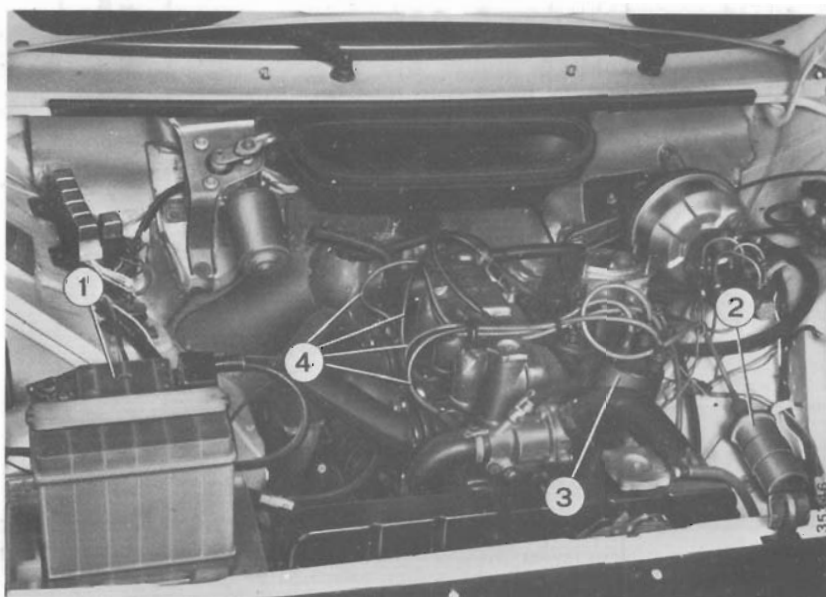
AT -- High tension.

As \rightarrow Ignition coil secondary winding.

Dr - Distributor finger.

CI = Distributor cap.

Ca - Spark plugs.



Ignition circuit components.

1. 12 V storage battery.
2. Ignition coil.
3. Ignition distributor.
4. Spark plug leads.

TYPICAL IGNITION TROUBLES AND THEIR CAUSES

FAULTY IGNITION		NO IGNITION	
WEAK HT CURRENT IN DISTRIBUTOR CAP MAIN LEAD	IGNITION SWITCH — corroded contacts. CAPACITOR — faulty insulation; — insufficient capacity(*); — faulty connections(*); (*)results in damage to breaker contacts. BREAKER — breaker contact gap too small (deposits and craters on contacts); — breaker contact gap excessive; — breaker contacts corroded or burnt (faulty capacitor, oil or dirt on contact surface). IGNITION COIL — corroded or loose connections; — windings shorted; — winding insulation faulty (in particular between secondary winding and ground).	Normal LT current at ignition coil input terminal	IGNITION COIL — windings shorted; — primary or secondary winding shorted to ground; — broken primary or secondary winding. CAPACITOR — shorted; — insufficient capacity (breaker contact damage follows); — broken connections. BREAKER — moving contact spring broken; — breaker contacts burnt or fused (capacitor shorted or disconnected); — contacts totally closed; — electrical connections broken. DISTRIBUTOR CAP — carbon deposits caused by HT discharge between contacts and ground; — brush broken or jammed in its seat. DISTRIBUTOR FINGER — carbon deposit between brush and ground.
	SPARK PLUGS — electrode gap excessive; — one or more spark plugs shorted; — spark plug thermal value unsuitable; — leakage between metal body and insulator; — contamination.		IGNITION SWITCH — inner contacts corroded or weakend.
NORMAL HT CURRENT IN DISTRIBUTOR CAP MAIN LEAD	DISTRIBUTOR CAP — moisture inside the cap; — deposit between central contact and spark plug contacts; — deposit between spark plug contacts, or contacts and ground; — brush broken or jammed in its seat. DISTRIBUTOR FINGER — deposit between central contact and ground.	No LT current at ignition coil input terminal	
	CENTRIFUGAL ADVANCE MECHANISM — springs broken or cracked.		

NOTE – These troubles may be detected by testing separate ignition circuit components on a stand for testing and insulation resistance

Ignition circuit

Polonez Model 1300/1500

551.01

Sheet 2

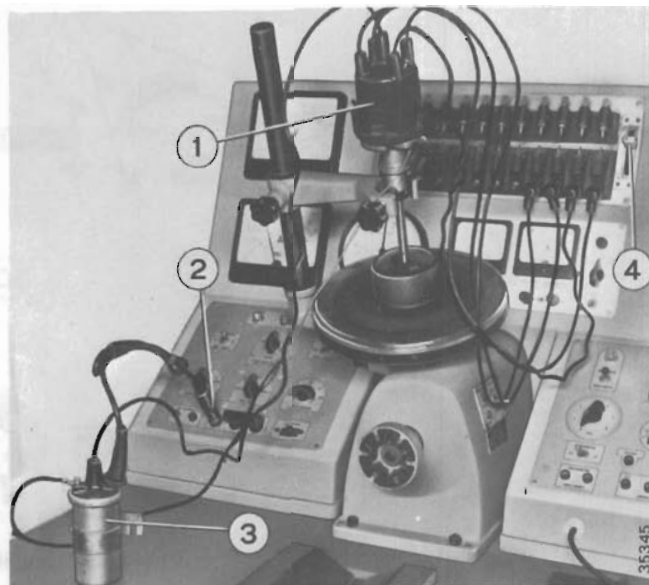
IGNITION DISTRIBUTOR

Test on a stand

Mount the ignition distributor on a test stand and connect electric cables as shown in the picture. Then, rotate the distributor shaft in the requisite direction for a few minutes at a speed of about 2000 r.p.m., the spark gaps being set to about 5 mm.

Next, widen the gap to about 10 mm and check the distributor for internal sparking.

This is manifested by noisy distributor operation, and also by reduction in intensity, and lack of one or more sparks on the spark gaps of the test stand.



Checking ignition distributor on a test stand.

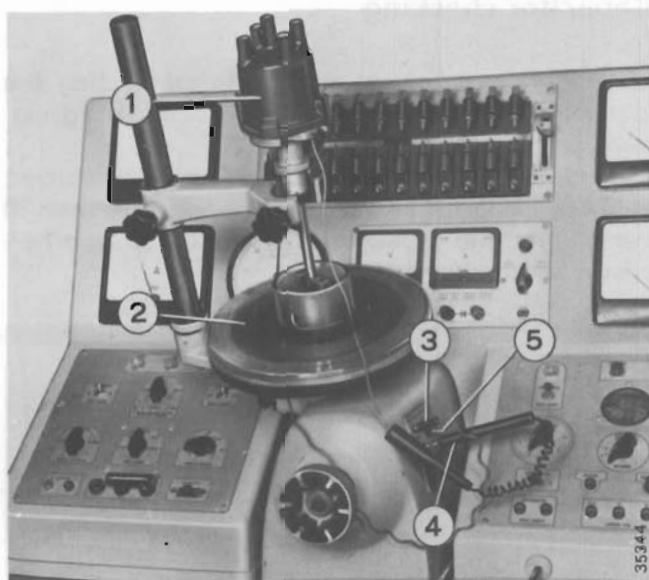
1. Ignition distributor.
2. Test stand socket.
3. Ignition coil.
4. Spark gap adjusting lever.

Checking centrifugal advance mechanism characteristics

For checking centrifugal advance mechanism characteristics, the distributor is mounted on a test stand as shown in the picture.

Rotate the distributor shaft at a speed of 300–400 r.p.m. and from the graduated scale read the angle at which discharge occurs (there is a spark in one of the four spark gaps). Increase the speed gradually and read successively the sparking angles; check the test results with the master diagram reproduced on this page.

Bear in mind that ignition distributor rotational speed is half the engine speed, so that in order to plot the automatic advance diagram for the engine for



Checking ignition distributor automatic advance on a test stand.

1. Ignition distributor.
2. Test stand graduated scale.
3. Socket for test stand disc supply cable.
4. Socket for ignition distributor supply cable.
5. Stroboscope lamp switch.

comparison with the master diagram – the values established by test (both rotational speed and spark advance angles) must be doubled.

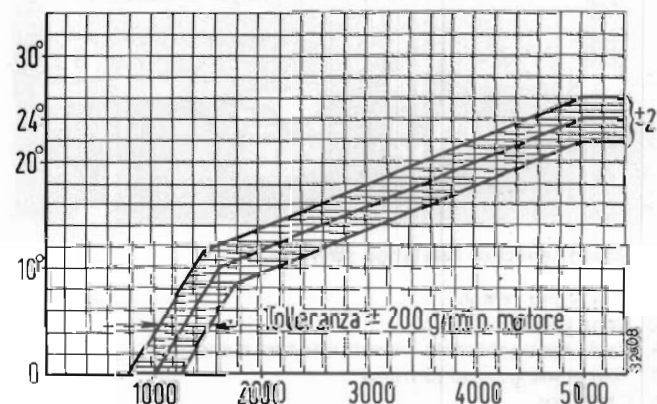
Next, check on the test stand breaker contact closing and opening angles:

- the opening angle should be $35 \pm 3^\circ$;
- the closing angle should be $55 \pm 3^\circ$;

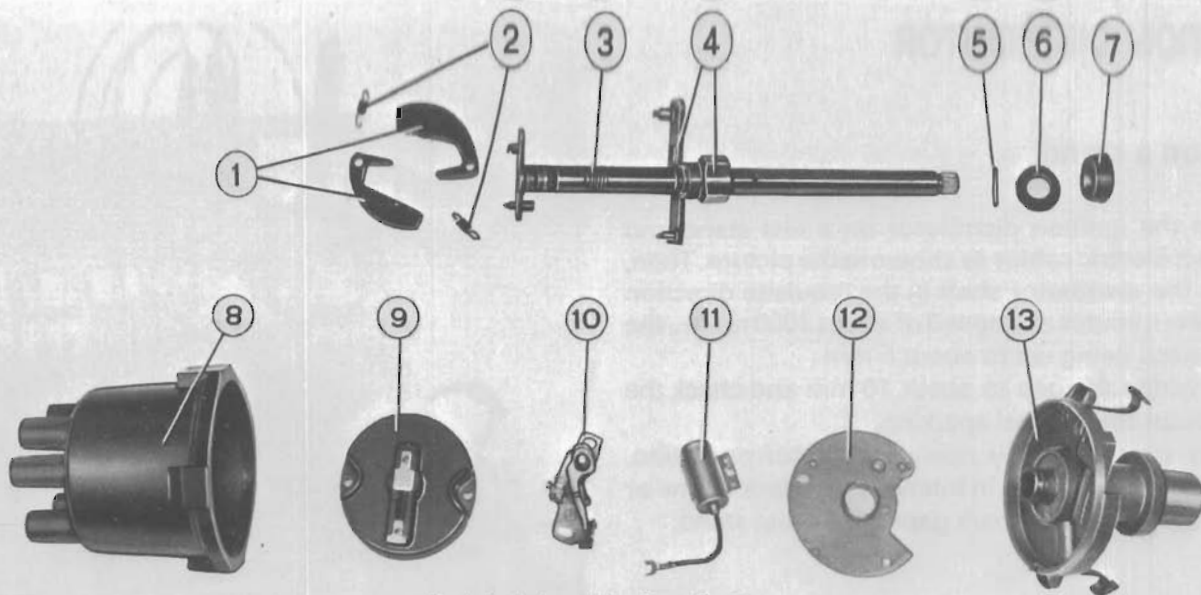
Master diagram – characteristics of centrifugal spark advance mechanism.

Spark advance angle.

Tolerance ± 200 r.p.m. of engine.



Polonez Model 1300/1500



Exploded view of ignition distributor.

1. Centrifugal weights.
2. Centrifugal weight springs.
3. Distributor shaft.
4. 4-apex cam.

5. Oil slinger ring fastening pin.
6. Flat washer.
7. Oil slinger ring.
8. Distributor cap.

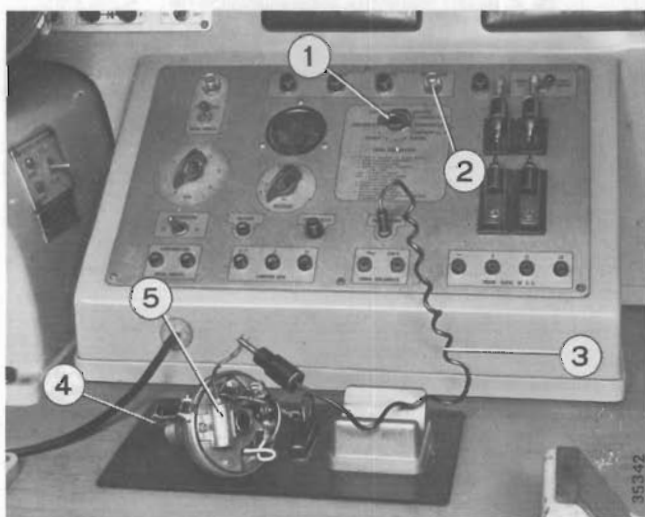
9. Distributor finger.
10. Breaker contacts.
11. Capacitor.
12. Breaker plate.
13. Breaker carrier.

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Capacitor checking

Checking insulation strength: on connecting the capacitor to the test stand, set the switch to „insulation” and watch the neon probe.

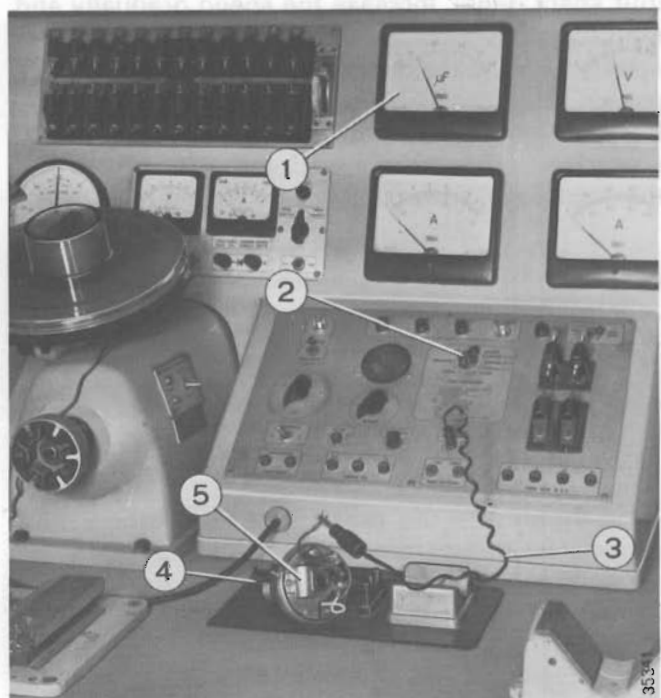
If there is one single flash, the capacitor is in order; with consecutive flashes at a frequency less than 30 per minute, the capacitor may still be used; otherwise it should be replaced.



Checking capacitor insulation strength.

1. Test stand switch.
2. Neon probe.
3. Cable for connecting capacitor to test stand.
4. Test stand ground terminal.
5. Capacitor.

Checking capacitor rating: set the test stand switch to „capacitance” and watch the meter. The capacitance measured at a frequency of 50–1000 Hz should be 0.20–0.25 μF .



Checking capacitor rating on a test stand.

1. Capacitance meter.
2. Test stand switch.
3. Capacitor connecting cable on test stand.
4. Test stand ground terminal.
5. Capacitor.

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Ignition circuit

Polonez Model 1300/1500

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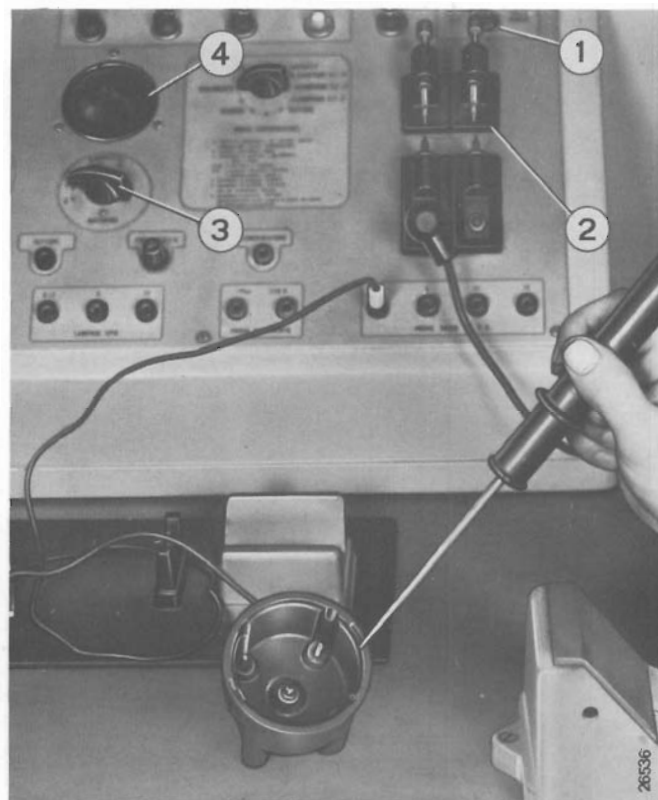
Sheet 3

Checking HT circuit

The HT circuit is checked in order to make sure that the distributor cap and finger are in order; otherwise these components must be replaced.

Checking distributor cap insulation strength

Connect the insulated needle to the spark gap; set the test stand switch to „High Tension Test”; turn the rheostat of test stand switch drive motor. Connect the cap to ground and move the needle over cap inner and outer surface; with the requisite insulation strength and the cap free of cracks, no spark should jump from the needle on to cap surface.



Checking distributor cap insulation strength.

1. HT test switch.
2. Spark gap.
3. Resistor.
4. Switch.

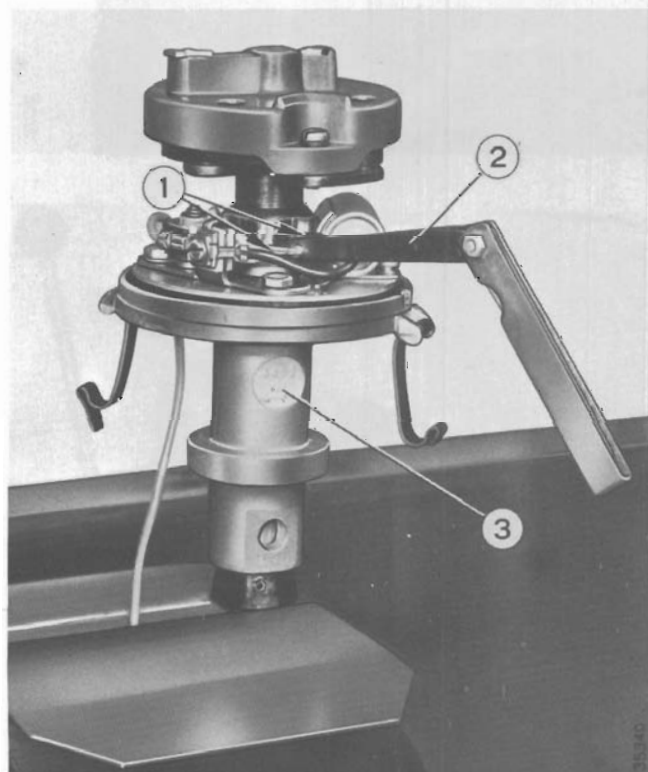
Checking distributor finger insulation strength

The procedure is the same as for the distributor cap.

Breaker contacts

Check the condition of breaker contacts, particularly check them for roughness, corrosion, burns, etc. If their replacement is not imperative, smooth out their surfaces with a suitable file, and clean carefully prior to reassembly.

After reassembly, adjust the gap between contacts in accordance with data given in Table 55, Sheet 1.



Breaker contact gap adjustment.

1. Breaker contacts.
2. Feeler gauge.
3. Ignition distributor base.



IGNITION COIL

Checking coil operation

Connect the coil to a standard spark gap with ionisation terminal for maximum spark length measurement.

With the coil warmed up after 2 hours of operation at 50 sparks per second, the spark length must not be less than 12 mm at 12 V.

Checking ignition coil on test stand.

1. Coil supply cable (leading from test stand switch).
2. Ignition coil.
3. Cable to coil positive (+) terminal.
4. HT lead (from coil to spark gap).



SPARK PLUGS

Checking plug tightness

The tightness test of spark plug body and insulator is performed in the following manner:

Screw the plug in a suitable seat on the test stand and then with a hand pump raise pressure to 1.96–2.45 N/mm² (20–25 kg/cm²).

Pour a few drops of oil or kerosene from an oil can to the plug; if untight, air bubbles shall appear between insulator and metal body.

Checking spark plug tightness.



Operational check

Connect the plug to the stand and then depress the spark and air pressure push-buttons.

Watch spark plug operation under pressure through the eyepiece.

Checking spark plug operation.

Ignition circuit

Polonez Model 1300/1500

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Sheet 4

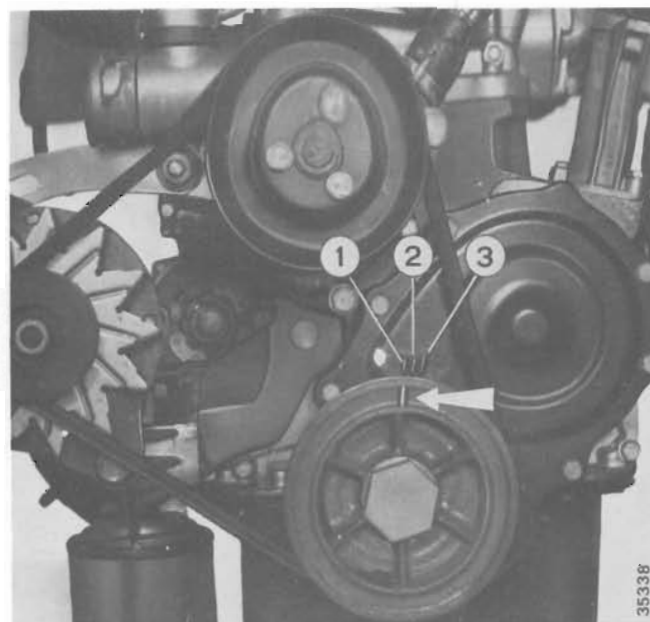
IGNITION TIMING

Engage the 3rd or 4th speed, turn the crankshaft so that the first cylinder is at compression stroke and the timing mark on alternator and cooling fluid pump drive pulley coincides with the mark on timing cover denoting a 10° spark advance.

Ignition timing marks.

1. Mark denoting 10° spark advance.
2. Mark denoting 5° spark advance.
3. Mark denoting 0° spark advance.

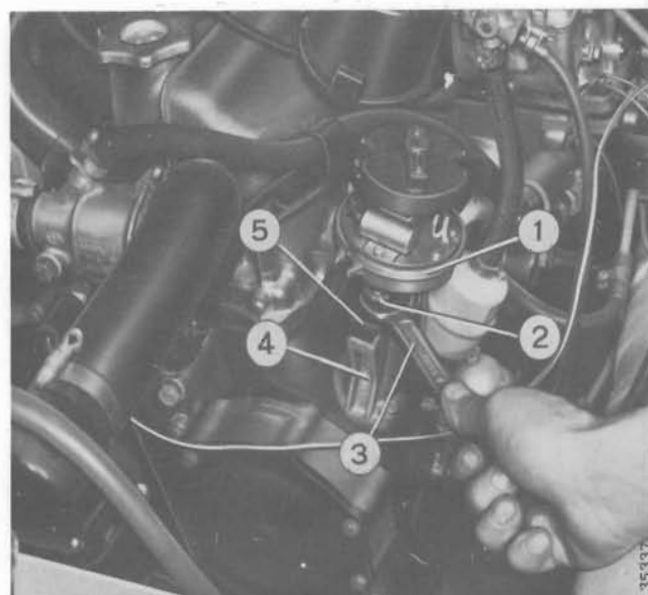
Arrow indicates timing mark on alternator and cooling fluid pump drive pulley to be set so as to coincide with mark 1 (10°) on timing gear drive cover.



Remove distributor cap and turn distributor shaft so that the distributor finger coincides with the first cylinder contact. In this position, breaker contacts start to open (check that breaker contact gap is within the required values of 0.37–0.43 mm).

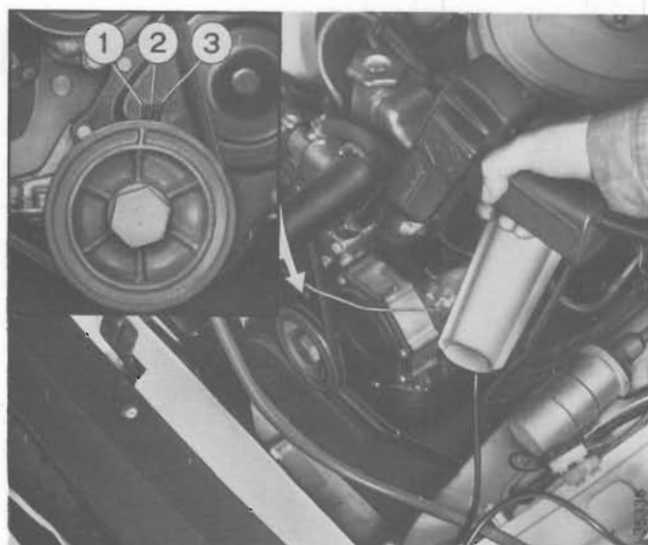
Ignition distributor mounted on engine.

1. Ignition distributor.
2. Bracket fastening nut.
3. Spanner.
4. Distributor to cylinder block mounting bracket.
5. Distributor bracket.



Without changing distributor shaft position, mount the distributor on a special bracket placing the shaft in the drive pulley; then secure the distributor to the engine bracket, replace distributor cap and make sure that HT leads are connected to appropriate spark plugs.

Ignition timing may be checked with the use of Ap. 5030 device as shown in the picture opposite.



Checking ignition timing with the use of Ap. 5030 device.

1. Mark denoting 10° spark advance.
2. Mark denoting 5° spark advance.
3. Mark denoting 0° spark advance.



PRINCIPAL TROUBLES OF ENGINE STARTING CIRCUIT

NO STARTING		STARTING FAULTY	
STARTER MOTOR INOPERATIVE	<p>STORAGE BATTERY</p> <ul style="list-style-type: none"> — starter motor supply cable terminals loose or corroded, particularly the terminal on battery; — battery fully discharged; — one battery cell damaged. <p>STARTER MOTOR</p> <ul style="list-style-type: none"> — worn or jammed brushes; — rotor or excitation winding damaged; — rotor or excitation winding shorted to ground; — starter motor jammed (rotor damaged by centrifugal force). <p>SOLENOID SWITCH</p> <ul style="list-style-type: none"> — shorted solenoid coil; — broken solenoid coil; — contacts excessively worn or corroded. <p>Starter motor operates properly.</p> <ul style="list-style-type: none"> — contacts corroded; — cables disconnected or loose. 	STARTER MOTOR OPERATES HALTINGLY	<p>STORAGE BATTERY</p> <ul style="list-style-type: none"> — starter motor feeding cable terminals corroded or loose; — battery partly discharged; — one battery cell damaged. <p>STARTER MOTOR</p> <ul style="list-style-type: none"> — faulty contact between brushes and commutator; — rotor or excitation winding shorted; — bearing bushes excessively worn (too small air gap, rotor rubs against pole shoe).
	<p>COUPLING MECHANISM</p> <ul style="list-style-type: none"> — free-wheel device faulty; — damaged forked lever. 		<p>COUPLING MECHANISM</p> <ul style="list-style-type: none"> — excessive play in free-wheeling mechanism; — corroded forked lever. Excessive rotor axial play. Worn bearing bushes.
STARTER MOTOR OPERATES PROPERLY		STARTER MOTOR OPERATION NOISY	

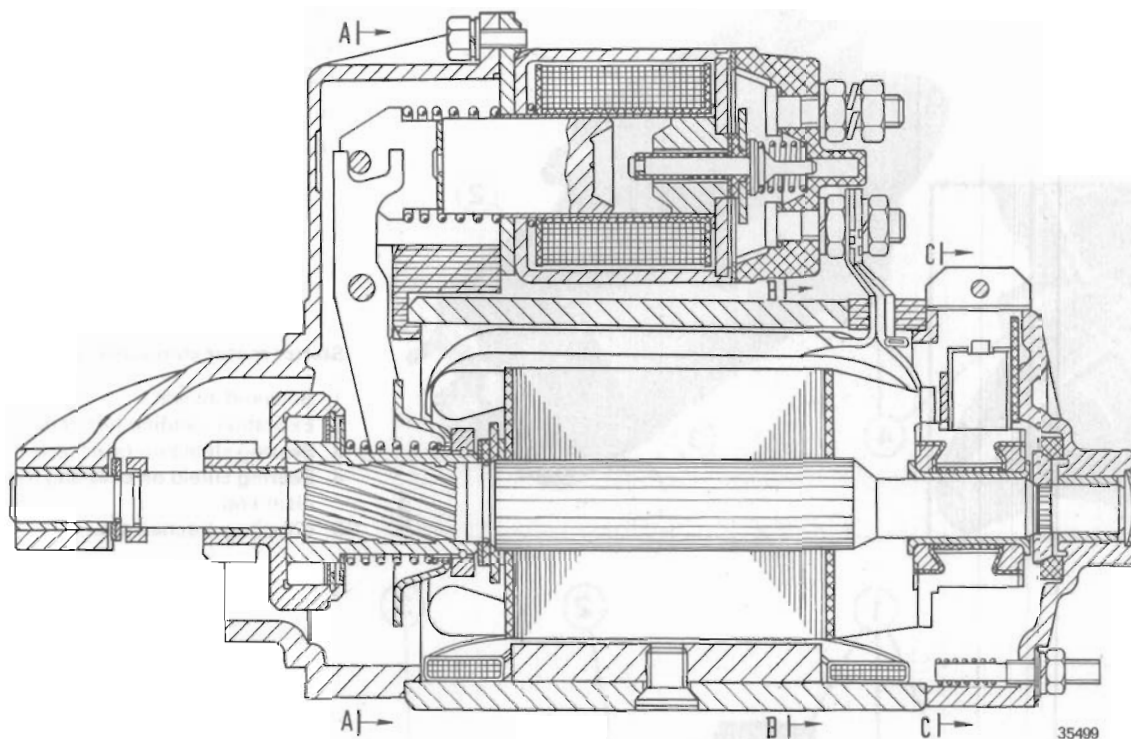
Starting circuit

Polonez Model 1300/1500

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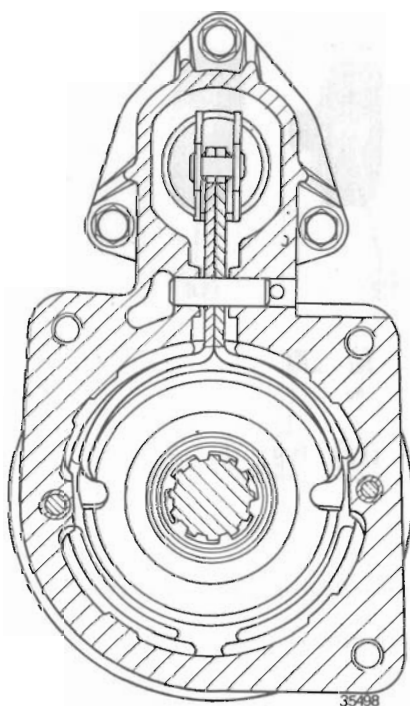
Sheet 2

ZEM 100 N - 1.5/12 STARTER MOTOR ASSEMBLY



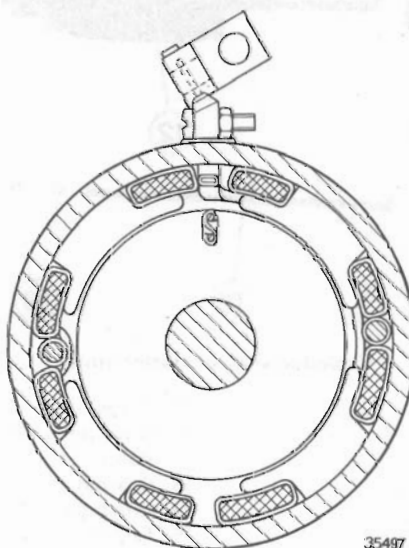
Longitudinal section through starter motor.

SECTION A-A



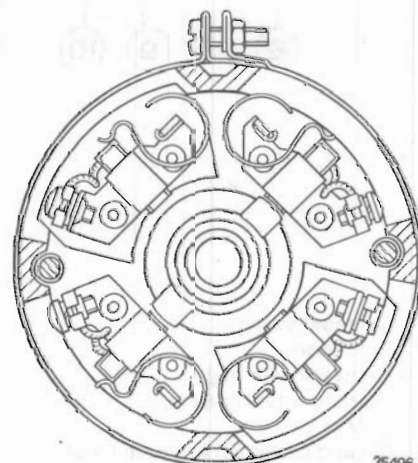
Cross section through coupling mechanism.

SECTION B-B



Cross section through pole shoes and excitation winding.

SECTION C-C



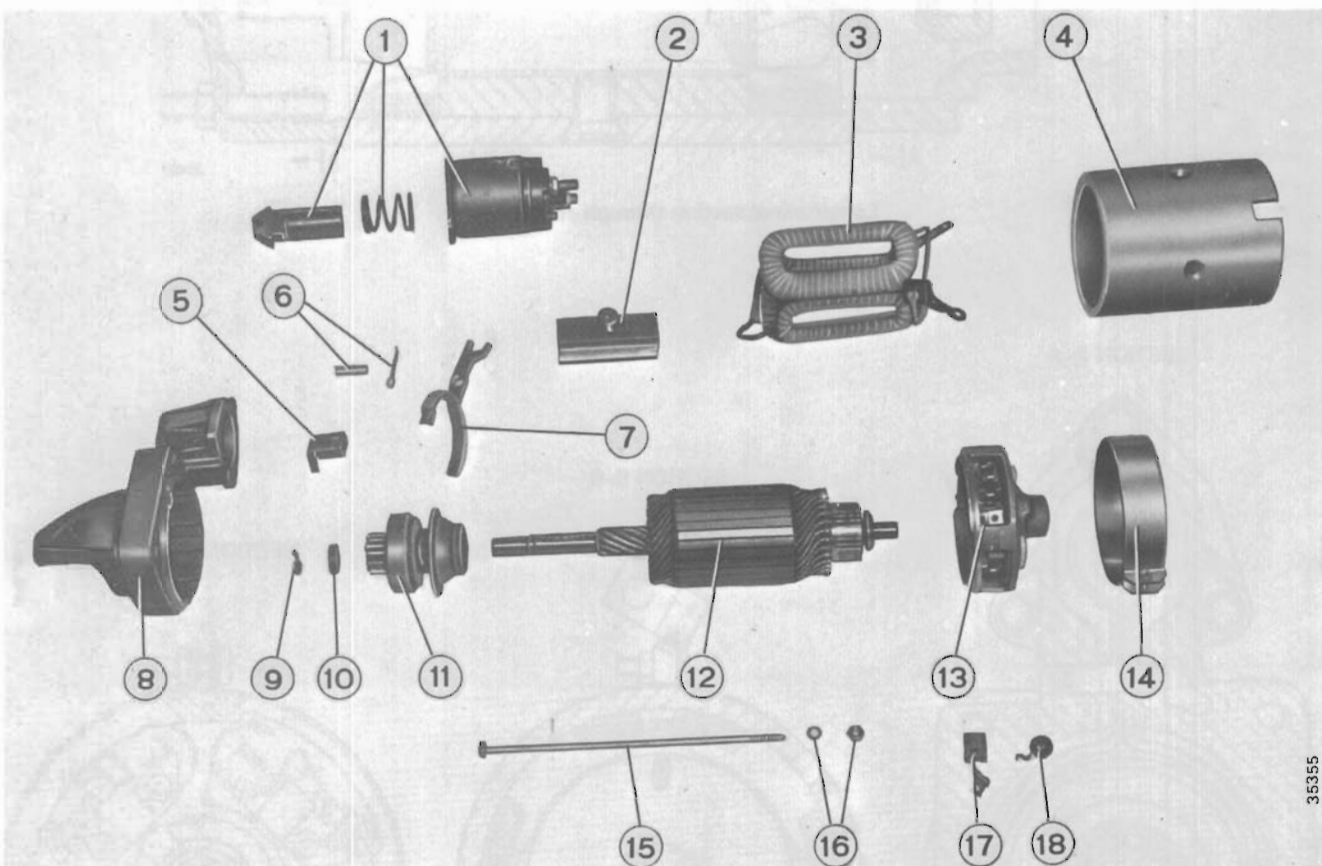
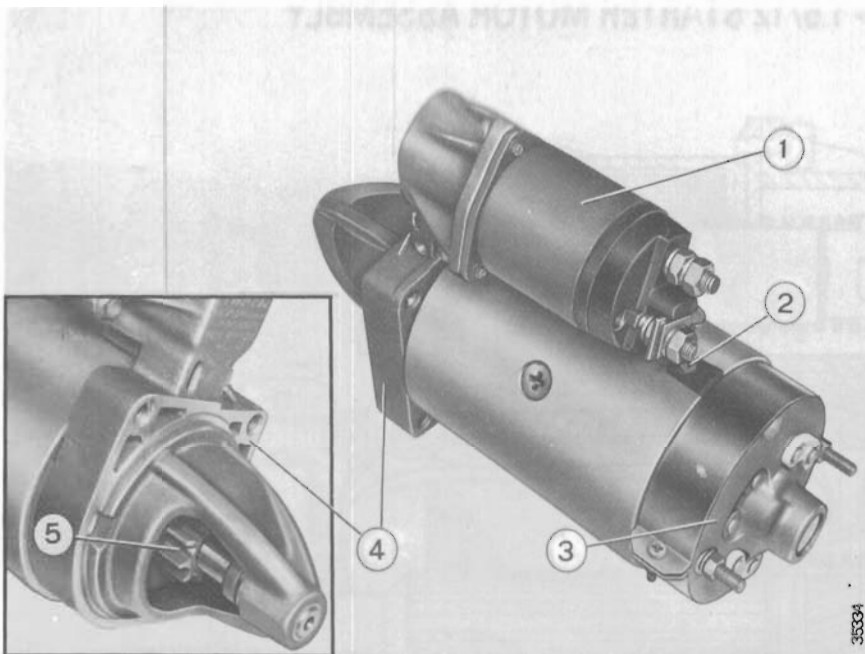
Cross-section showing bearing shield from commutator side and brushes.

STARTER MOTOR

Should the necessity arise to repair the starter motor, dismantle it in order to check the components, find the trouble and eliminate its source.

Starter motor components.

1. Solenoid switch.
2. Excitation winding terminal.
3. Bearing shield on brush end.
4. Bearing shield on coupling mechanism end.
5. Coupling mechanism.



Exploded view of starter motor.

1. Solenoid switch.
2. Pole shoe.
3. Excitation winding.
4. Starter motor housing.
5. Rubber pad.
6. Pin and cotter pin for forked lever (7).
7. Coupling mechanism forked lever.
8. Bearing shield on drive end.
9. Spring washer.
10. Thrust ring.
11. Drive pinion with free-wheeling mechanism and sleeve.
12. Rotor.
13. Bearing shield on commutator end.
14. Brush guard.
15. Fastening bolt.
16. Nut and washer for fastening bolt (15).
17. Brush.
18. Brush pressure spring.

Starting circuit

Polonez Model 1300/1500

Checking and repair

Prior to checking, wash thoroughly and blow with compressed air starter motor component parts to remove carbon dust deposited from brushes, which could impair the results.

Faults of individual starter motor components may be detected on a special test stand in the following manner:

— checking excitation winding insulation:

connect suitable cables to test stand sockets marked „Insulation test”, and touch cable ends: one to starter motor housing, and the other – to excitation winding terminal. If the insulation is sound, the signal lamp should remain extinguished, otherwise the winding must be dismantled, and replaced, if the insulation cannot be repaired.

— checking rotor winding insulation:

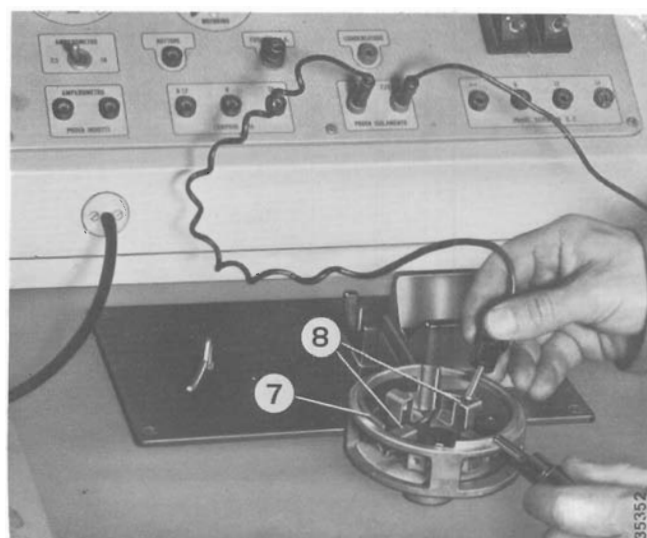
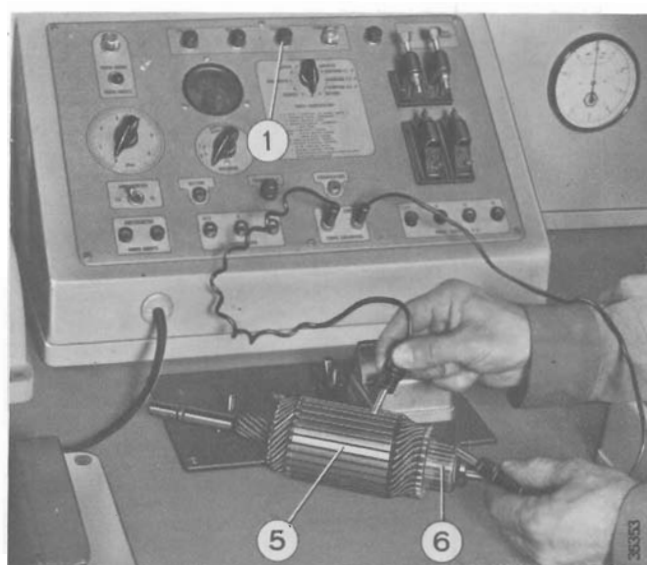
proceed as for checking the excitation winding insulation, touching one cable end to rotor laminations and the other – to commutator. In case of faulty insulation, the complete rotor must be replaced as it cannot be repaired.

— checking brush holder insulation:

touch one cable end to the metal shield, and the other – to insulated brush holder. In case of fault, replace the complete brush shield as the repair is impossible.

Checking the insulation on a test stand

1. Test stand signal lamp.
2. Test cables.
3. Housing.
4. Excitation winding terminals.
5. Rotor laminations.
6. Commutator.
7. Bearing shield on commutator end.
8. Brush holder.

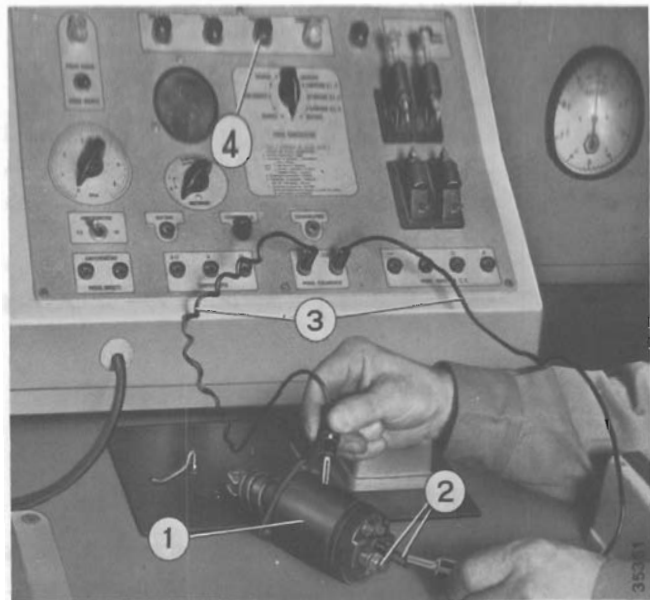


- checking solenoid switch fixed contact insulation:

touch one cable end to the metal part of switch, and the other consecutively to the solenoid switch fixed contacts. If insulation is faulty, it may be repaired after dismantling the switch.

Checking solenoid switch fixed contact insulation.

1. Solenoid switch.
2. Solenoid switch fixed contacts.
3. Test cables.
4. Test stand signal lamp.



- checking solenoid coil winding continuity:

touch test cable ends to coil terminals. The signal lamp should light up, otherwise the winding is broken and, if repair is impossible, it must be replaced. The metal band used to make this coil is of ample cross-section, so its continuity can only be broken at soldered connections.

- checking rotor winding continuity:

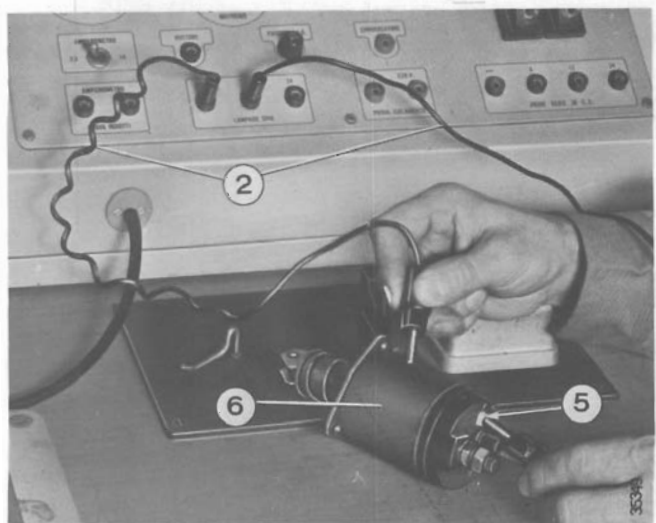
touch test cable ends to two adjacent commutator segments, and then move the cable ends over commutator periphery by one segment each time. The number of measurements must be equal to the number of segments, and the signal lamp must light up each time, otherwise the winding is broken and must be replaced.

- checking solenoid switch coil continuity:

touch end of one test cable to the metal part, and the other end to the terminal; the signal lamp should light up, otherwise the winding is broken. If the lamp does not light up although the connections are in order, the complete solenoid switch must be replaced.

Checking winding continuity on a test stand.

1. Test stand signal lamp.
2. Test cables.
3. Winding terminals.
4. Housing.
5. Solenoid terminals.
6. Solenoid switch.



Starting circuit

Polonez Model 1300/1500

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Sheet 4

Replacement of excitation winding

Dismount the excitation winding with the use of an inertia screwdriver or a press, unscrew pole shoe fastening screws and remove the winding. Clean thoroughly the housing, check the insulation, and replace if damaged.

Heat the new winding to a temperature of 50–60°C so that it may be fitted more easily, place it on pole shoes, and mount the assemble in the housing. Arrange the insulation, insert pole shoe fastening screws and tighten them gradually and alternately. To facilitate reassembly, it is recommended to place the pole shoes in their original positions.

Unscrewing pole shoe screws with an inertia screwdriver.

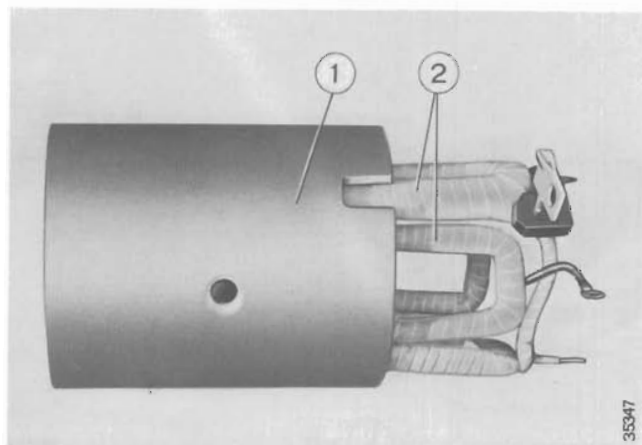


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For this purpose, mark the pole shoes and housing when dismantling. Pole shoe fastening screws should be tightened so that the original air gap is preserved. If, after reassembly, the air gap is other than required, in no case must the pole shoes be rectified by turning; the cause is faulty arrangement of the winding, so the entire replacement operation be repeated.

Replacement of excitation winding.

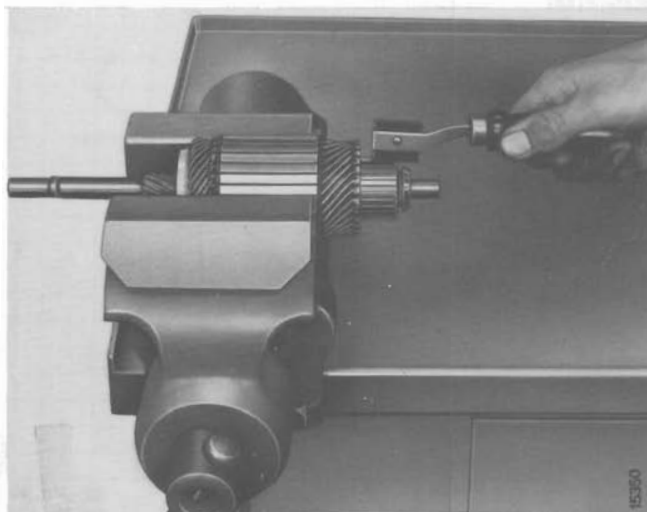
1. Housing.
2. Excitation winding.



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Commutator repair

If the commutator is found on inspection to be ovalised or excessively worn, it should be rectified by turning. After turning, the insulation between commutator segments must be pressed in deeper to obtain the requisite depth.



15350

Pressing in the insulation between commutator segments with the use of A.90747 device.

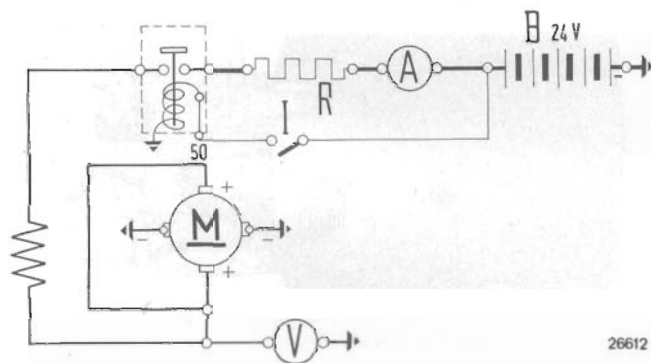


Checking operation

After reassembly of starter motor, check it for proper operation and electrical characteristics, which should conform to values given in the diagram. For checking, arrange the fixtures and apparatus required for the test and connect them in a manner shown in the picture. Perform ten working cycles (starts), each lasting four seconds, at thirty second intervals; brake the starter motor so as to obtain the following values:

Checking starter motor on a test stand.

1. Torque indicator.
2. Starter motor supply cable.
3. Solenoid switch supply cable.
4. Starter motor.
5. Starter motor switch.

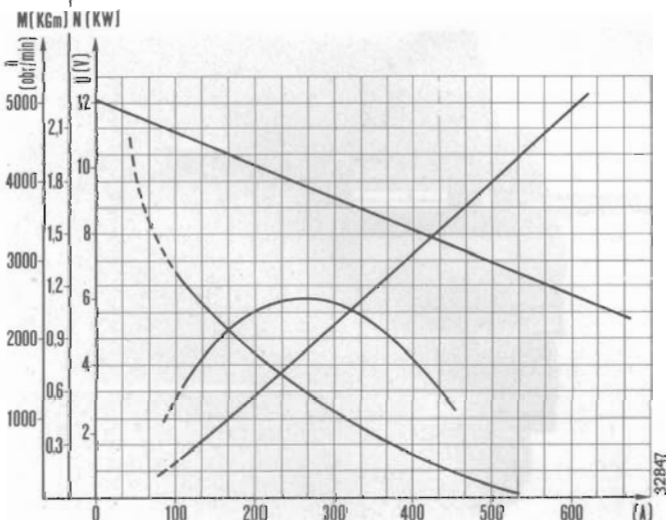


– Operating test

Current	270 A
Rotational speed	1260 ± 100 rpm
Voltage	9.6 V
Torque	≥ 8.33 N.m. (0.85 kgm)

Schematic diagram for starter motor connections on the test stand.

B – Storage battery.
A – Ammeter.
R – Rheostat.
I – Starter motor actuating switch.
V – Voltmeter.



– Test under load at total braking

Current	540 ± 20 A
Max voltage	6.7 V
Torque	≥ 19.62 N.m (2.00 kgm)

– Test without load

Current	≤ 65 A
(Current without switch)	(30 ± 5) A
Voltage	12 V
Rotational speed	5000–6000 rpm

NOTE – Tests to be carried out a temperature of 20°C.

Characteristics of E 100 N 1.5x12 starter motor.

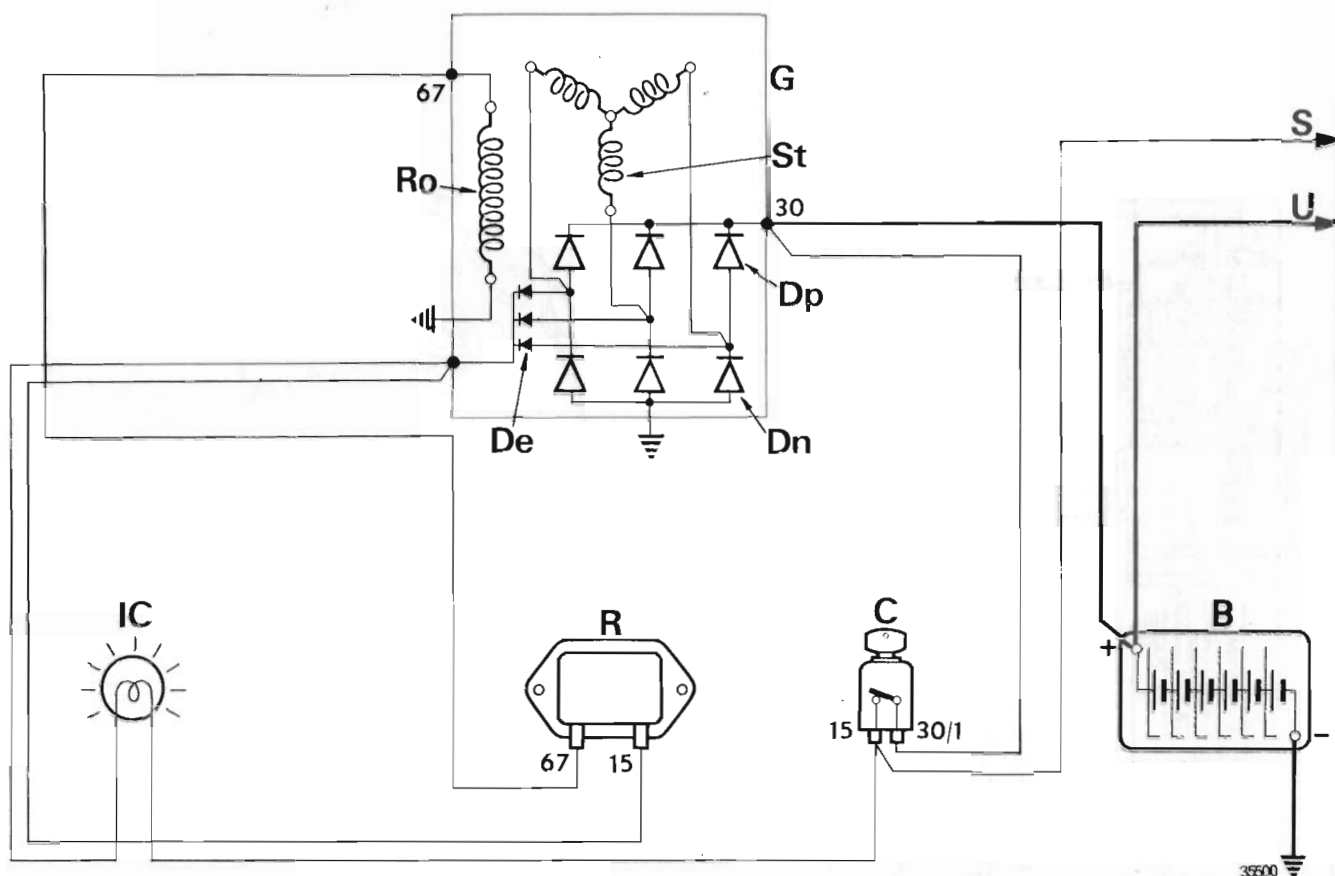
Battery charging circuit

Polonez Model 1300/1500

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Sheet 1

SCHEMATIC DIAGRAM OF BATTERY CHARGING CIRCUIT

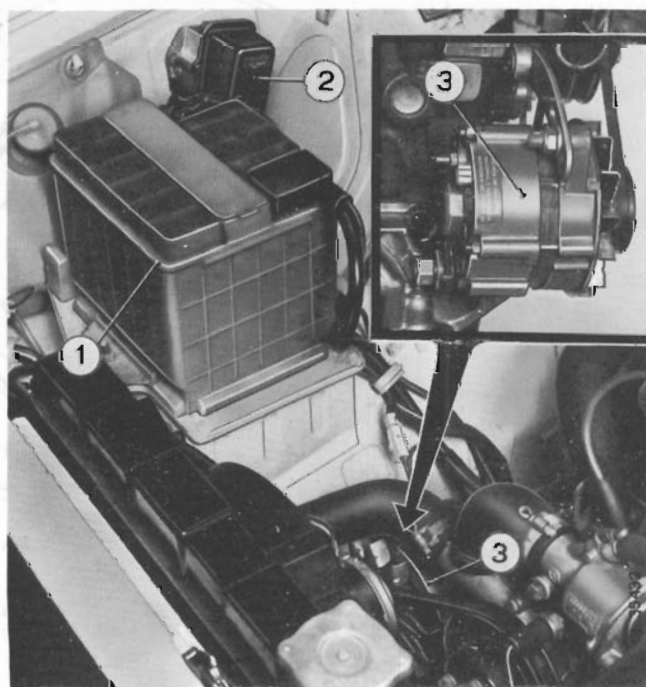


G Alternator
 St Stator
 Ro Rotor
 Dp Positive power diodes
 Dn Negative power diodes
 De Excitation diodes

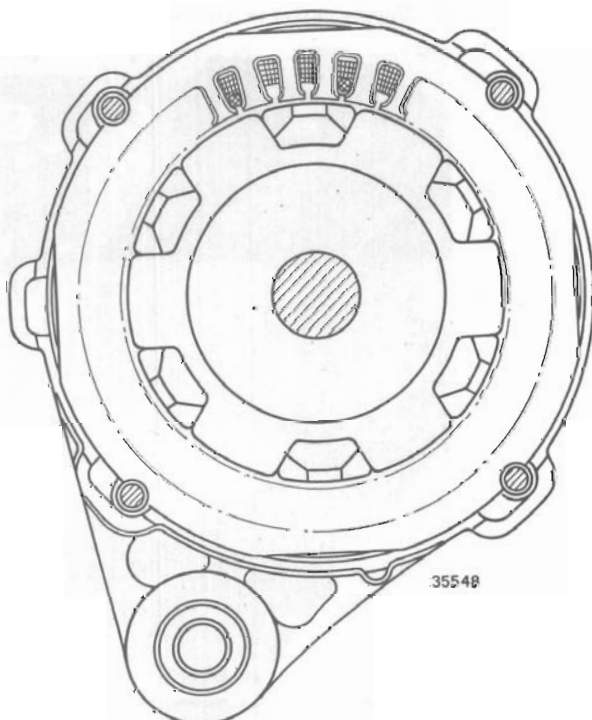
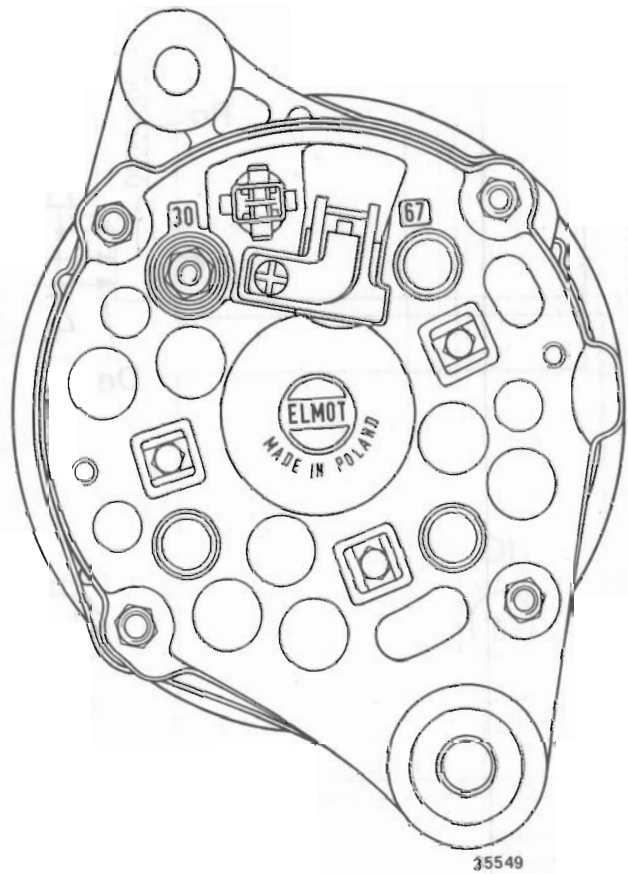
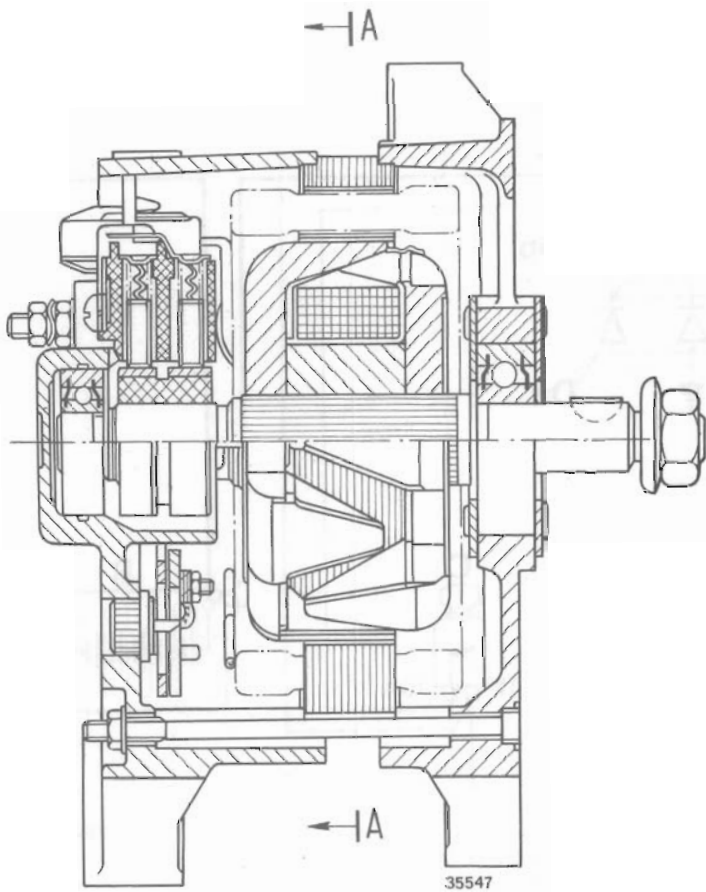
IC Charging signal lamp
 R Voltage regulator
 C Ignition switch
 B Storage battery (12 V)
 S Supply circuit of signalling devices
 U Supply circuit of receivers

Components of battery charging circuit.

1. 12 V storage battery.
2. Voltage regulator.
3. Alternator.



ZEM A 124 - 14 V - 60 A ALTERNATOR



Battery charging circuit

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Sheet 2

ALTERNATOR

Preliminary checking of battery charging circuit on the vehicle

Make sure that no receiver is switched on, then connect **A.95857** voltmeter to storage battery terminals; start the engine and run it up to 1500 – 3000 r.p.m.; in these circumstances the charging light should go off, and the voltage read from voltmeter should increase during 3 minutes to 14 V.

Electrical connections for checking battery charging circuit on the vehicle.

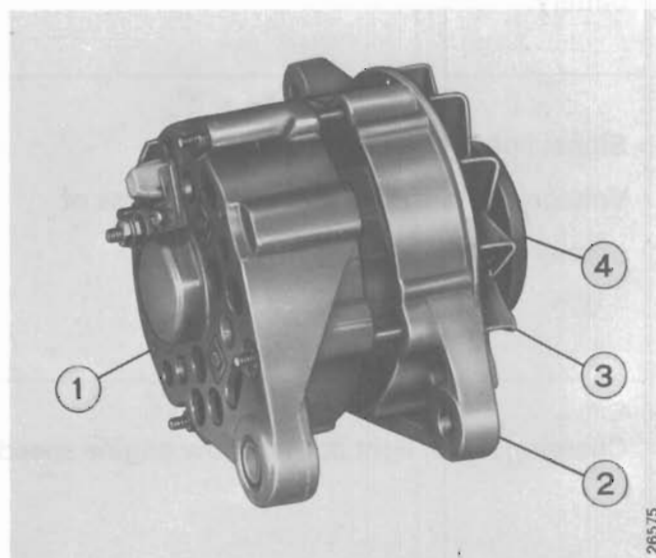
1. **A.95857** voltmeter.
2. Voltmeter negative terminal.
3. Voltmeter positive terminal.



If the signal lamp does not go off, and the voltage at the battery does not increase, or does increase excessively to as much as 16–17 V, the fault must be traced.

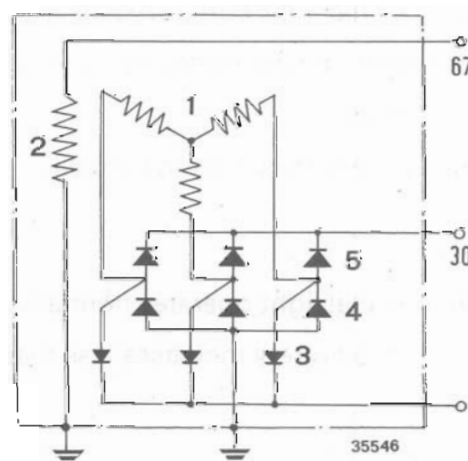
ZEM A 124 – 14 V – 60 A alternator.

1. Housing on diode end.
2. Housing on pulley end.
3. Cooling fan.
4. Alternator drive pulley.



Schematic diagram of ZEM A 124 – 14 V – 60 A alternator

1. Star-connected stator winding.
2. Rotor winding.
3. Excitation diodes.
4. Negative rectifier diodes.
5. Positive rectifier diodes.



MAIN BATTERY CHARGING CIRCUIT TROUBLES DETECTABLE DURING PRELIMINARY CHECKING ON THE VEHICLE AND THEIR RESULTS

FAULT DETECTED	TYPE OF TROUBLE AND RESULTS
Charging signal light burns with ignition switched. Voltage fails to increase to the required value.	One or more of positive diodes shorted. Charging current smaller than required. Battery discharges with vehicle inoperative.
Charging signal light does not go off after engine is started. No or very small increase in voltage at the battery.	One or more negative diodes and excitation diodes, shorted. No or very small charging current if only one negative diode is shorted.
Signal light operates normally. Voltage at the battery increase in excess of normal value.	Excitation diode circuit broken, voltage regulator coil broken, 2nd stage contacts do not close. Charging current in excess of normal. Gassing of electrolyte in battery.
Charging signal light burns at low engine speed	One stator phase faulty. No or less than normal charging current.
Charging signal light burns weakly with ignition switched on, and does not go off after engine is started. Voltage at the battery fails to increase.	Rotor winding broken, excitation circuit broken, jammed or worn brushes. No charging current.
Charging signal light operates normally. Voltage at the battery increases less than normally.	Voltage regulator out of adjustment (usually as a result of knocks). Less than normal charging current.

Battery charging circuit

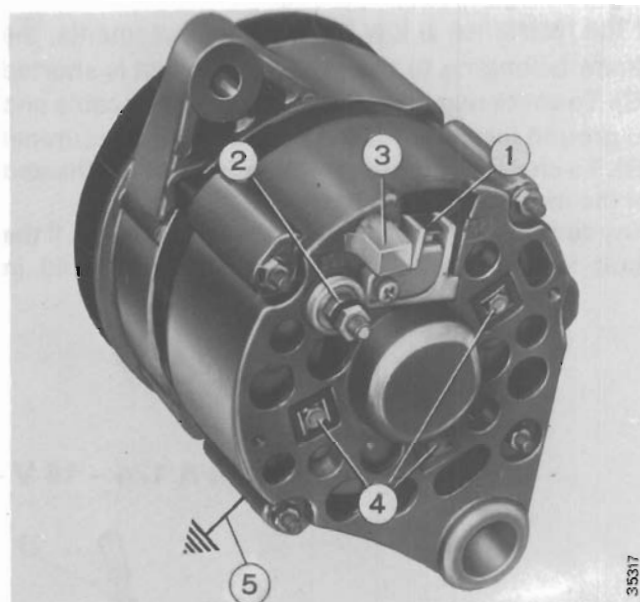
Polonez Model 1300/1500

Checking the alternator dismantled from the vehicle

The operations described below make it possible for such troubles as diode shortings and breaks in the rotor winding or in individual stator phase windings to be detected. The checking is done with test apparatus set to highest sensitivity ($\Omega \times 1$)

Alternator terminals.

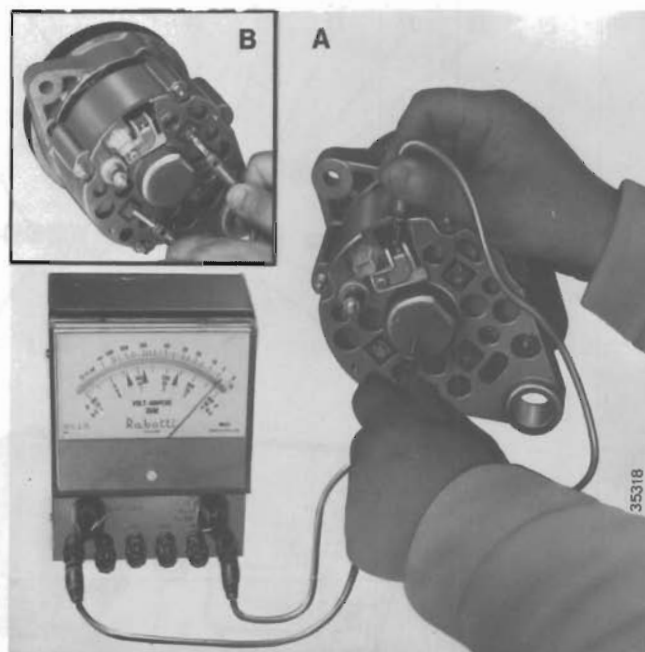
1. 67 terminal.
2. 30 terminal.
3. Excitation diode terminal.
4. Stator phase winding ends.
5. Ground.



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Checking rotor winding (A) and stator winding (B)

- A) On touching tester cable ends to terminal 67 and to ground, a small resistance value should be read on the meter, conforming to the table. If the resistance is high, it means broken rotor winding.
- B) Touch tester cable ends in turn to the three phase windings. In all cases the resistance reading should be low.
If a very high value is obtained in two measurements, it means that one phase winding is broken.



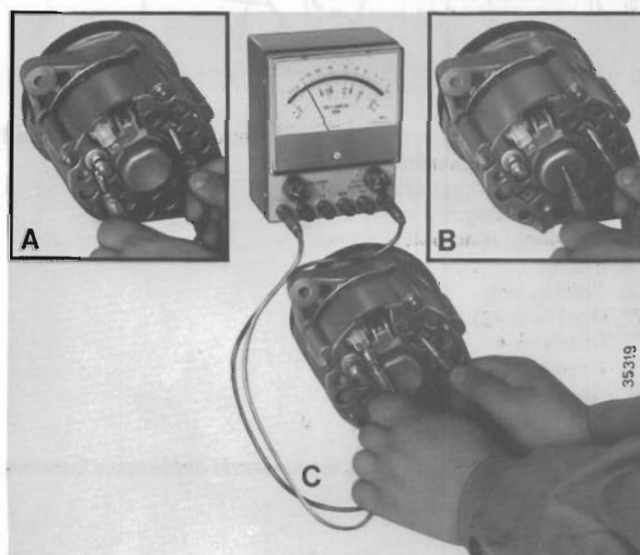
35318

Checking stator and rotor windings.

- A. Checking rotor winding.
- B. Checking stator winding.

Checking excitation diodes (C), negative diodes (B) and positive diodes (A)

Touch one tester cable end to excitation diode terminal and the other to one of the phase winding terminals, then change the tester polarity. The meter pointer should in one case stay unmoved (very high resistance), and in the other it should swing out substantially, indicating the actual resistance value (low resistance).



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Checking diode carrier plates.

- A. Checking positive diodes.
- B. Checking negative diodes.
- C. Checking excitation diodes.

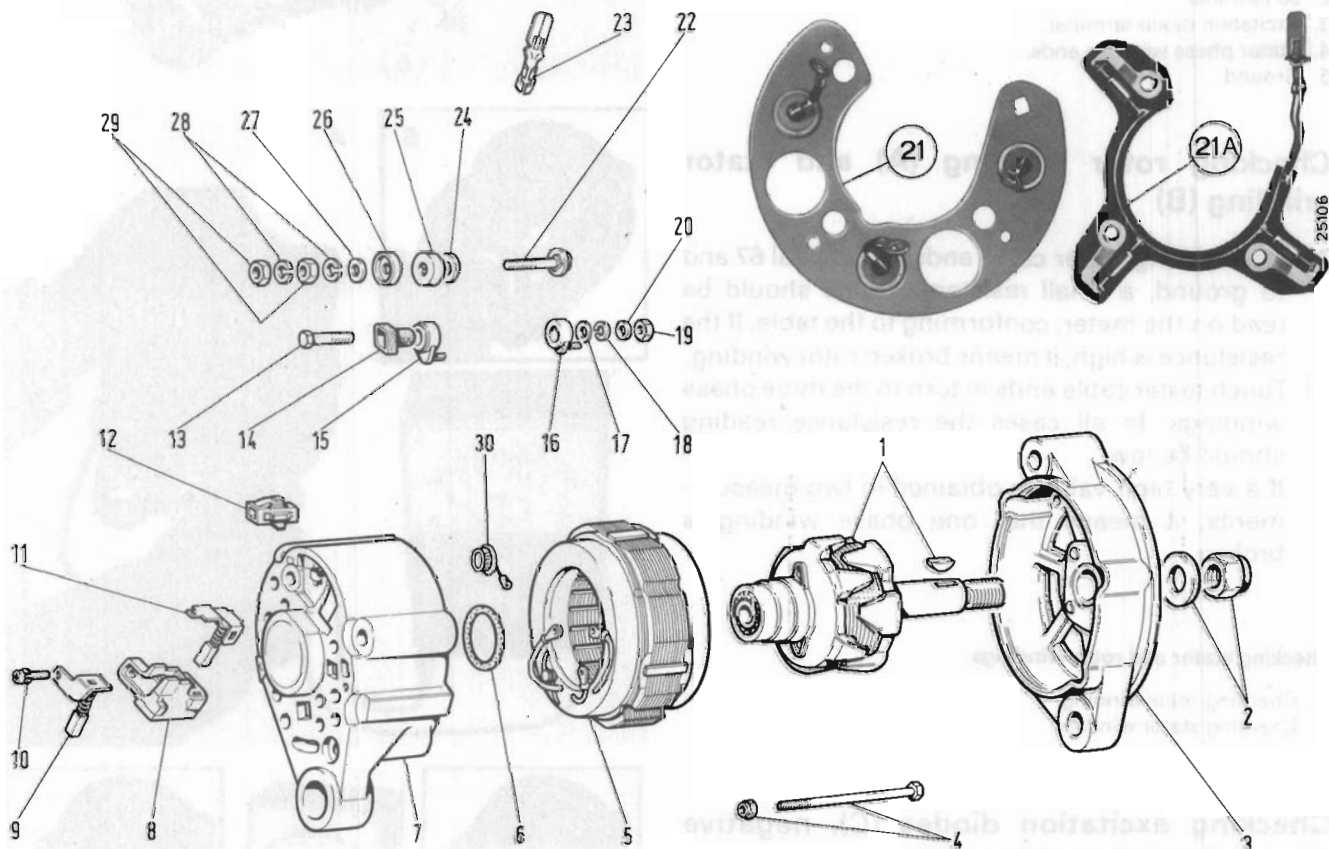
If the resistance is low for both measurements, the diode belonging to the phase under test is shorted (C). To check negative diodes, touch tester cable end to ground instead of to the excitation diode terminal (B). To check positive diodes use 30 terminal instead of the excitation diode terminal (A).

Any component found faulty must be replaced. If the fault is a shorted diode, it must be replaced in

accordance with the instructions included in section „Checking the components after dismantling – rectifier diode carrier plate”.

If the test of assembled alternator is not conclusive, check the initial charging speed and the current produced on a test stand. If these check give no conclusive result, check alternator individual components.

ZEM A 124 – 14 V – 60 A ALTERNATOR



Exploded view of zem a 124 – 14 V – 60 a alternator

- | | |
|--|--------------------------------------|
| 1. Rotor complete with key. | 16. Insulator. |
| 2. Pulley fastening nut and washer. | 17. Flat washer. |
| 3. Front housing. | 18. Lock-washer. |
| 4. Alternator fixing bolt and nut. | 19. Nut. |
| 5. Stator. | 20. Flat washer. |
| 6. Sealing ring. | 21. Positive diode carrier plate. |
| 7. Rear housing. | 21A. Excitation diode carrier plate. |
| 8. Brush holder. | 22. Screw of 30 terminal |
| 9. Negative pole brush. | 23. Excitation diode terminal. |
| 10. Brush holder fastening bolt. | 24. Flat washer. |
| 11. Positive pole brush. | 25. Insulator. |
| 12. Terminal insulator. | 26. Insulator. |
| 13. Diode carrier plate, phase terminal and diode cable fastening screw. | 27. Flat washer. |
| 14. Insulator. | 28. Lock-washer. |
| 15. Insulator. | 29. Nuts of 30 terminal screw. |
| | 30. Negative diode. |

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Battery charging circuit

Polonez Model 1300/1500

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Sheet 4

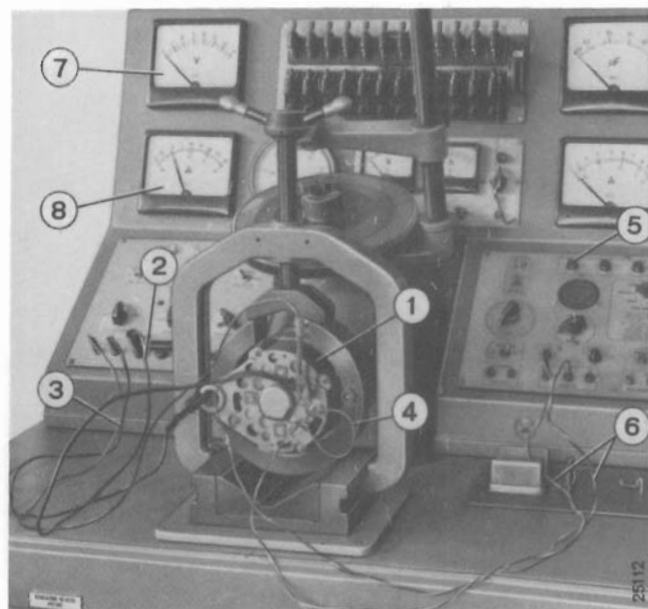
Checking initial charging speed and generated current on a test stand

(at ambient temperature of $25 \pm 5^\circ\text{C}$)

Mount the alternator on a test stand together with pulley and make connections in accordance with the schematic diagram given below.

Connecting alternator on a stand for testing the initial charging speed and generated current.

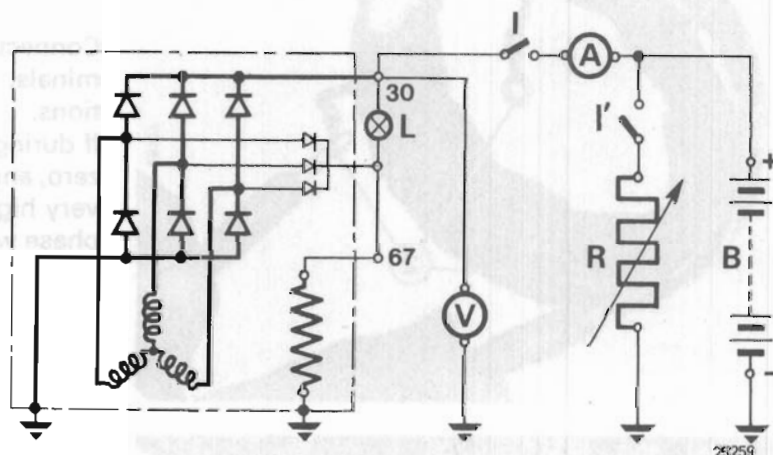
1. Alternator.
2. Cable connecting 30 terminal do stand.
3. Cable connecting alternator to voltmeter.
4. Cable connecting excitation diodes to 67 terminal.
5. Test stand signal lamp.
6. Cables connecting signal lamp to alternator.
7. Voltmeter.
8. Ammeter.



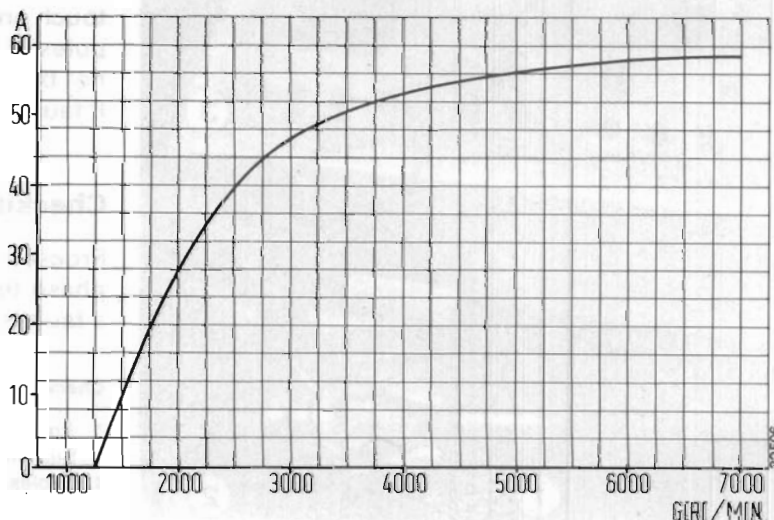
Start the unit and run the alternator rotor to such a speed as to obtain 1 – 3 A current with switch I' open. After a few minutes of operation at these parameters, open

Schematic diagram for alternator connection during measurement of initial charging speed and generated current.

- A. Ammeter.
- V. Voltmeter.
- R. Rheostat.
- B. Storage battery.
- I'. Switch
- I. Switch
- L. Signal lamp.



switch I and set the rotational speed so that the voltage is 14 V. This speed should correspond to the start of the output curve of the alternator. To check output current, run the alternator for about 15 minutes at a speed of 7000 r.p.m. After thermal stabilisation, check that the current generated at 14 V corresponds to the output curve of the alternator being checked. The measurement is to be carried out with switches I and I' closed and suitably selected resistance R.



Current intensity curve as a function of rotational speed for ZEM A 124 – 14 V – 60 A at stabilised temperature. GIR/MIN = r.p.m.



Checking the components after dismantling

Checking rotor winding continuity and resistance. Set the rotor on a test stand, connect the positive (+) cable of the stand to one rotor slip ring, and the negative (-) cable – to the second slip ring; check that the voltage applied corresponds to rated voltage of the alternator being tested. The ammeter should indicate current passage, otherwise the winding is faulty and the complete rotor must be replaced.

Using the rheostat, set the voltage to rated value and read current intensity.

Checking rotor winding continuity on a test stand.

Calculate rotor winding resistance ($R = \frac{V}{I}$) which at 20°C should amount to 2.6 ± 1 ohm.

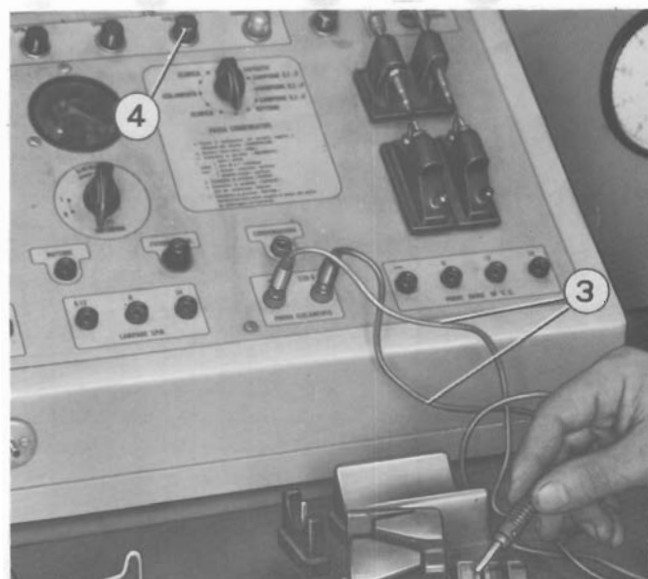
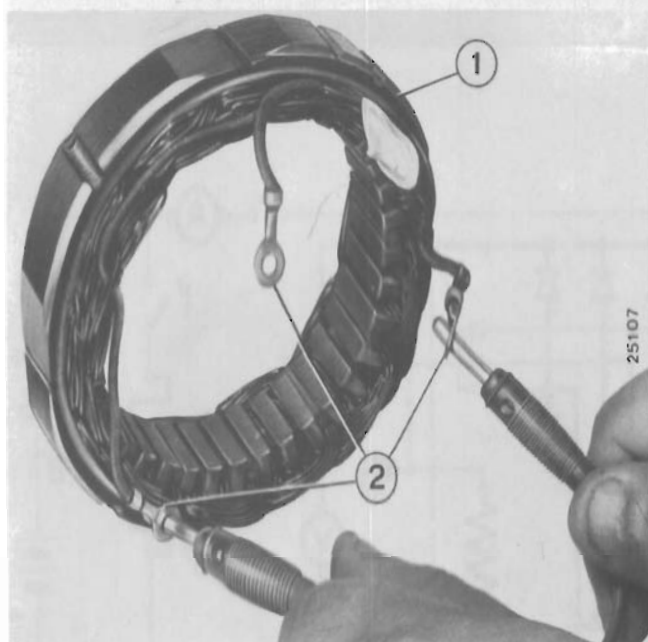
Checking stator phase winding continuity

Connect the ohmmeter to stator phase winding terminals, using three possible measuring combinations.

If during one measurement the resistance is almost zero, and during the remaining two measurements – very high, it means that the continuity of one stator phase winding is broken.

Checking stator phase winding.

1. Stator.
2. Phase terminals.



Checking rotor insulation

Insert cables in „Insulation test“ terminals, and then touch one of them to slip ring and the other – to rotor poles. If the insulation is sound, the signal lamp will not burn.

If faults are detected, the rotor must be replaced.

Checking stator insulation

Proceed as before, touching one cable end to the phase terminal and the other to the laminations. If a fault is detected, replace the stator.

Checking rotor insulation

Battery charging circuit

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Sheet 5

Checking the diodes

Subject the diodes mounted in rear alternator cover to the following checking operations, setting the instrument to maximum sensitivity ($\Omega \times 1$).

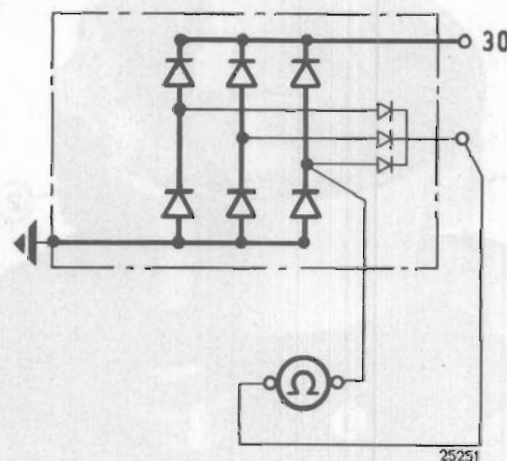
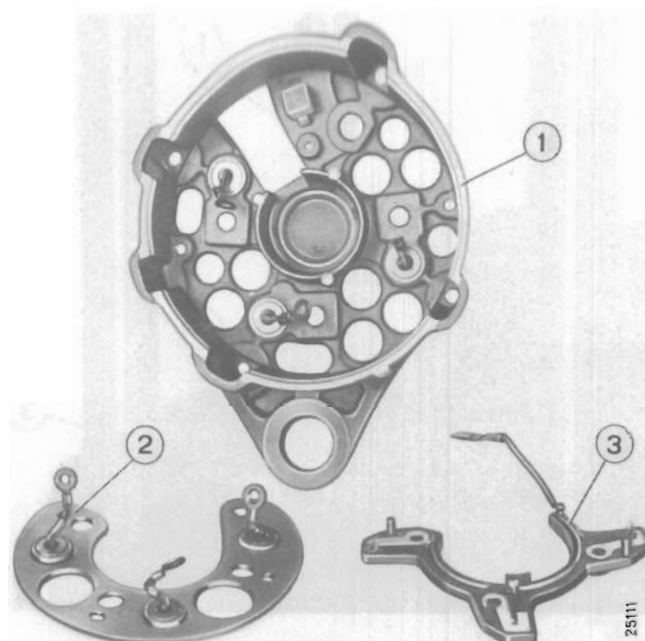
Excitation diodes: connect instrument cables to excitation diode terminals and to individual phase ends. Repeat the measurement while altering the terminals.

Diode assembly after dismantling.

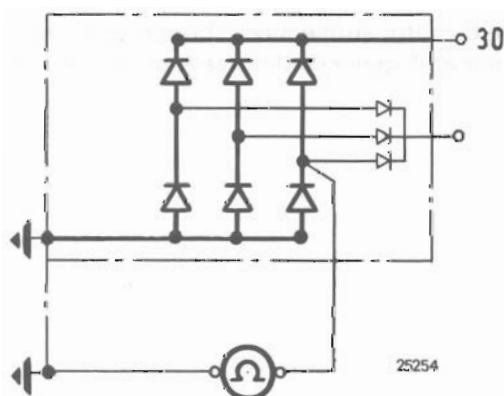
1. Rear alternator cover with negative diodes.
2. Positive diode carrier plate.
3. Excitation diode carrier plate.

Negative and positive diodes: repeat the above described operations, connecting one cable to ground for negative diodes, and to 30 terminal for positive diodes, instead of to the excitation terminal.

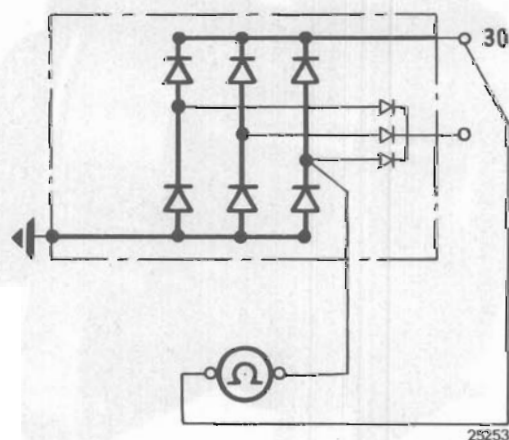
Analysis of results: during each measurement, the instrument pointer should be immobile (very high resistance), or should move considerably, indicating a certain (low) resistance. Should even one measurement indicate an incorrect value, the component is faulty and must be replaced. Bear in mind that even if only one excitation or positive diode is faulty, the entire assembly must be replaced. It is possible, however, to replace a single negative diode.



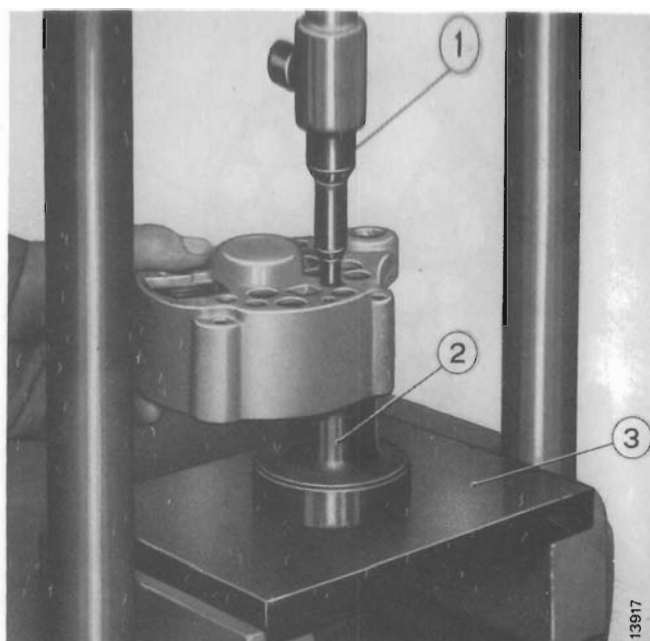
Connection diagram for checking excitation diodes.



Connection diagram for checking negative diodes.



Connection diagram for checking positive diodes.



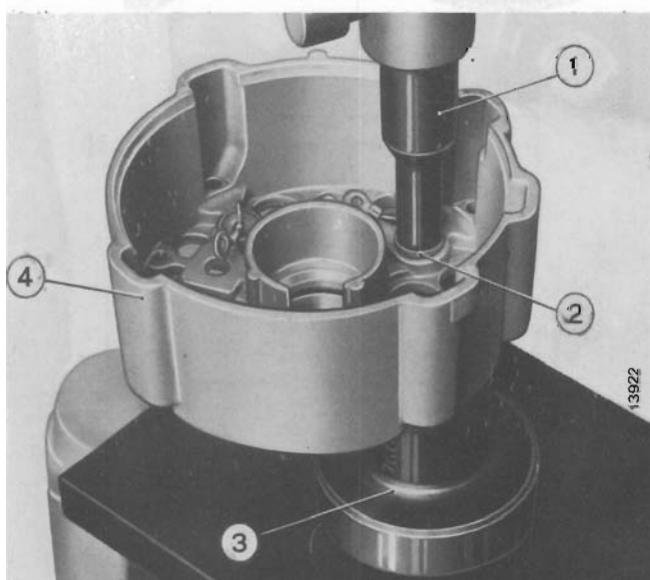
Replacement of rectifier diodes

The design makes it possible for single negative diodes to be replaced, on the following conditions:

- 1) The diode to be used must be of the type supplied as spares. These have the outside knurled diameter increased by 0.5 mm.

Dismantling negative diodes on Ap.5074 hand press.

1. A.76027 mandrel.
2. A.76029 stand.
3. A.76032 platen.



- 2) The housing bore, from which the damaged diode was removed, must be reamed with A.90340 reamer prior to new diode installation.

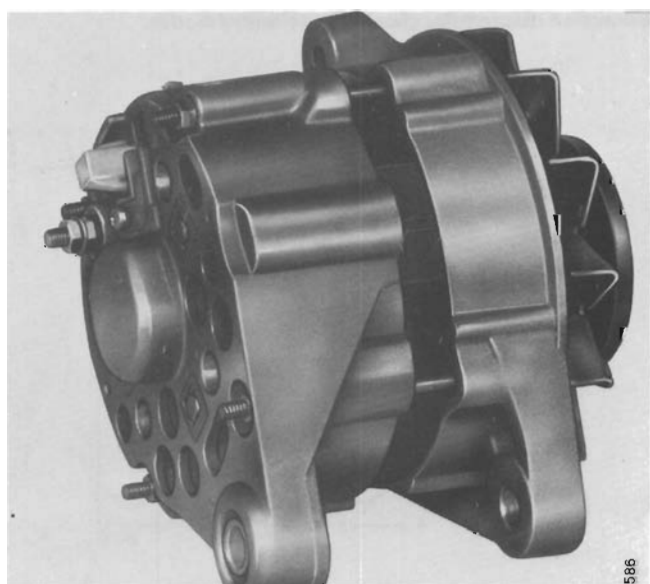
The pointers given above must be strictly followed to ensure correct operation of the new diode.

Pressing in a new diode on Ap.5074 hand press.

1. A.76028 mandrel.
2. Negative diode.
3. A.76031 stand.
4. Rear alternator housing.

Checking the operation

On completion of repairs and reassembly of the alternator, check its operation, by repeating the tests described in the subsection "Checking initial charging speed and generated current on a test stand".



Battery charging circuit

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Sheet 6

VOLTAGE REGULATOR

Checking operations for voltage regulator

Circuit continuity test. Set the instrument to maximum sensitivity (range $\Omega \times 1$), then test the connection between 15 and 67 terminals for possible faults of 1st stage contacts (corrosion, burn-out, etc.), and the connection between 15 terminal and ground for possible break in compensation resistor or induction coil circuits.

Checking voltage on a test stand. After mounting, on the test stand, and suitably connecting the voltage regulator (with cover) and the alternator, run the alternator for at least 10 minutes at a speed of 4000–5000 r.p.m. and ambient temperature of $25 \pm 5^\circ\text{C}$. with current output at 1/6 of the maximum. Perform the following checking operations:

a) 2nd stage regulation.

Stop the alternator and start it again, running it up to 4000–5000 r.p.m. Set the resistance so as to obtain a current of 10–14 A. In these conditions the regulated voltage should be within the limits of $14.2 \pm 0.3 \text{ V}$.

Connecting alternator and voltage regulator on the test stand.

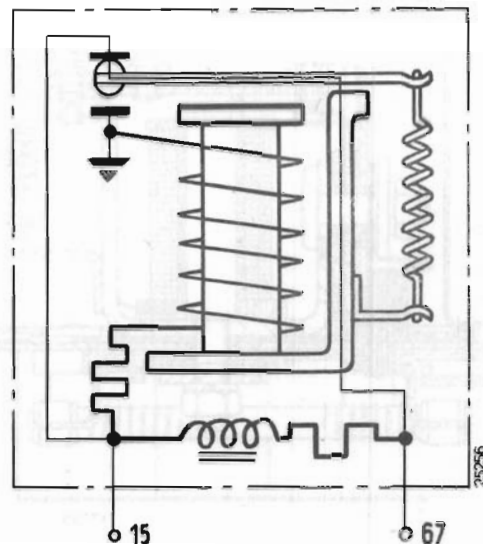
1. Alternator.
2. Voltage regulator.
3. Cable connecting alternator to storage battery and test stand resistance.
4. Voltmeter connecting cables.
5. Charging signal light connecting cables.
6. Charging signal light.
7. Voltmeter.
8. Ammeter.
9. Alternator to voltage regulator connecting cables.

b) 1st stage regulation.

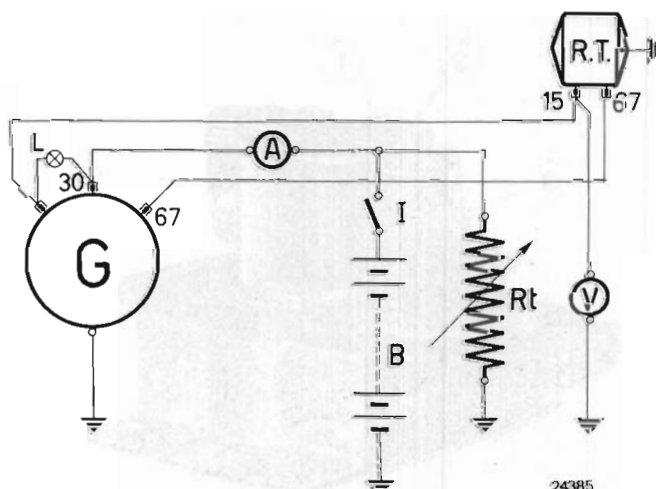
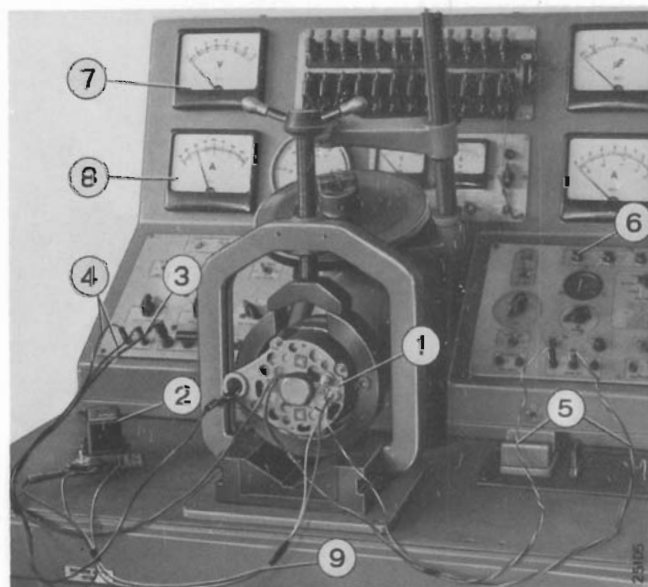
Directly after checking the 2nd stage regulation, set the resistance R so as to obtain 40–45 A current and check that the regulated voltage is lower by 0–0.5 V than that obtained during the preceding measurement.

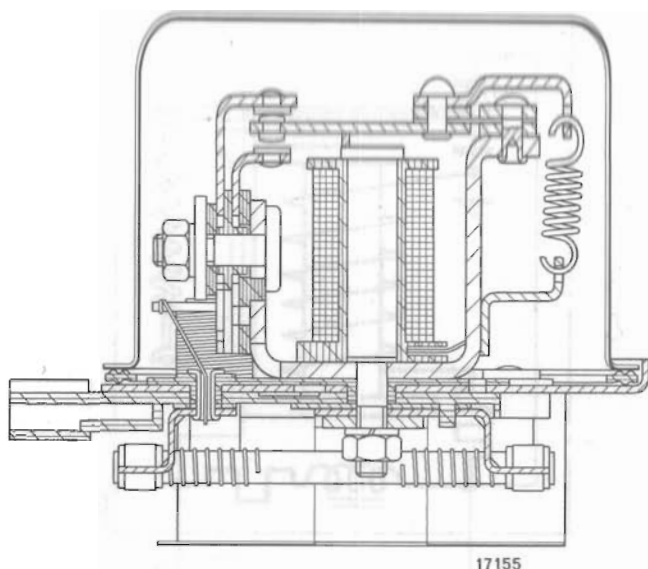
Schematic diagram for connecting alternator and voltage regulator on the test stand.

- L Charging signal light.
- A Ammeter.
- I Switch.
- B Storage battery.
- Rt Resistance.
- RT Voltage regulator.
- V Voltmeter.
- G Alternator.



Schematic diagram for voltage regulator.

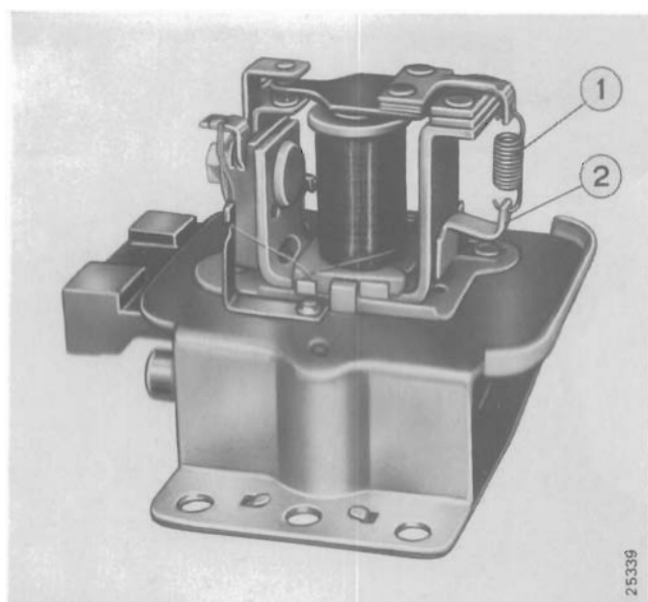




Regulator setting: if the readings obtained during the previously described tests do not conform to the recommended values, the regulator must be replaced or adjusted in accordance with the indications given below.

Adjustment of 2nd stage regulation: pay attention to voltage change which occurs when the cover is removed. After checking the voltage according to para. a) second-stage regulation and the difference from the rated value of 14.2 V, repeat the test with the cover off. The regulated voltage should change by the previously indicated amount. The adjustment is

Longitudinal section of voltage regulator.

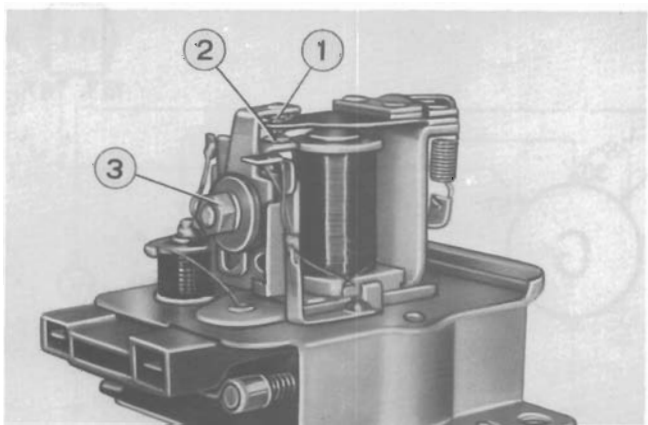


done by suitably bending the spring lower catch to increase or decrease the tension depending on the voltage being too low or too high.

Adjustment of 1st stage regulation: if the voltage difference between the 2nd and 1st stage regulation effected in accordance with para. b) exceeds 0.5 V or is negative, the air gap between armature and core should be suitably changed, by lowering or raising the 1st stage contact plate by 0.1–0.2 mm, taking care

Voltage regulator with cover off, viewed from adjusting spring side.

1. Spring.
2. Lower spring catch.



that the gap between the 2nd stage contact (0.45 ± 0.1 mm) is not disturbed. While performing these operations take care that the contacts are not contaminated. Should this happen, they may be cleaned with a fine file carefully washed with denatured spirit. After performing even one adjusting operation, repeat the regulated voltage check as described above.

Voltage regulator with cover off, viewed from 1st and 2nd stage contact side.

1. 1st stage contact plate.

Battery charging circuit

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Sheet 7

STORAGE BATTERY

Maintenance and checking operations

The battery must always be kept clean and dry on the outside. Corrosion, if any, of terminals and fastening cross member should be cleaned periodically to avoid premature destruction of metal parts.

Prior to storage battery checking or charging, verify the electrolyte level and replenish, if necessary.

Replenishing electrolyte in storage battery

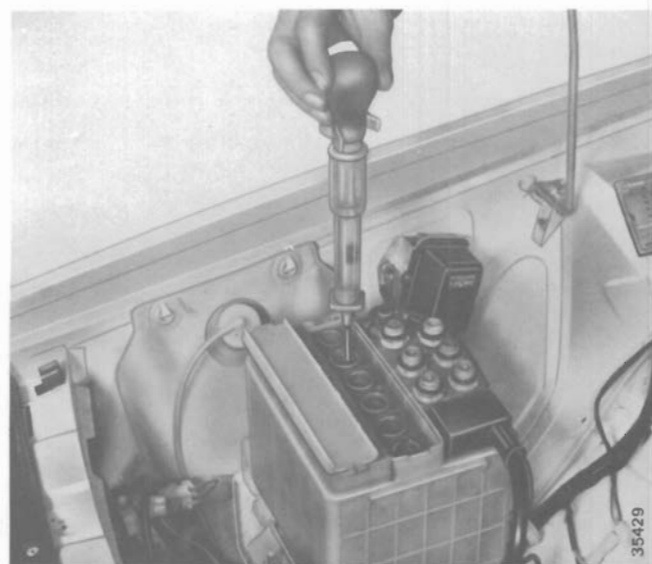
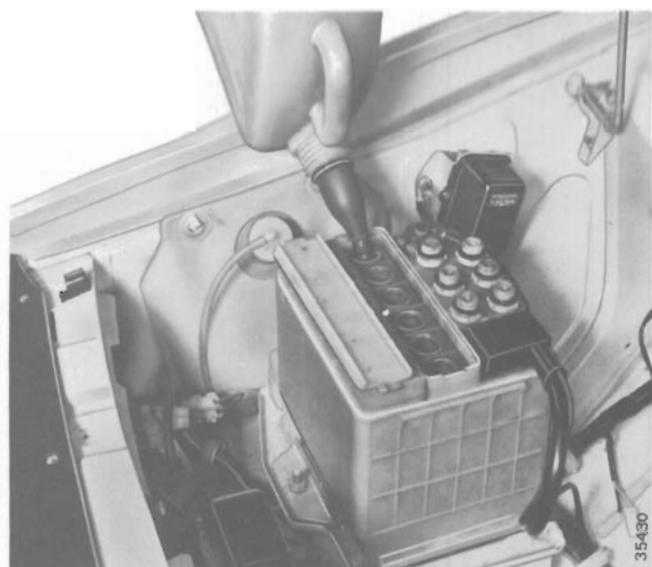
Checking electrolyte density

Electrolyte density depends on battery charge. It is checked with the use of **A.95584** acidimeter and battery charge is defined in per cent according to the table below:

Degrees Baumé	Electrolyte density	Battery charge in per cents
32	1.28	100%
29	1.25	75%
26	1.22	50%
23	1.19	25%
20	1.16	almost discharged
15	1.11	totally discharged

Measuring temperature 15°C.

Measuring electrolyte density with **A.95584** acidimeter to check the battery charge.



Battery charge may also be checked with the use of **Ap.5008** battery charger.

If the battery is being charged from an external source (rectifier, motor-generator set), necessitating its dismounting from the vehicle, be sure first to disconnect the negative battery terminal to avoid possible short-circuits.

Checking or charging a storage battery mounted in the vehicle with the use of **Ap.5008** charger. Picture shows cables connecting charger to battery.

While checking, it is necessary to remove the plugs from all battery cells, which makes it possible for gassing of damaged cells, if any, to be detected.



Polonez Model 1300/1500



Служба безопасности



External and internal lighting

Polonez Model 1300/1500

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Sheet 1

HEADLIGHTS

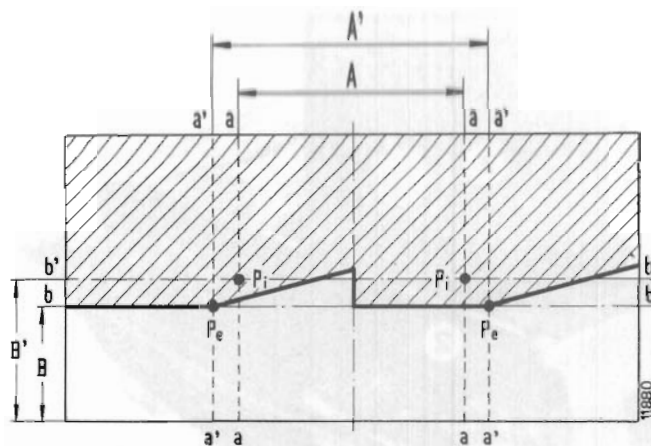
Headlight setting is checked with the vehicle unladen and tires inflated to the required pressure. The vehicle should be positioned at a distance of 5 m from the screen.

Schematic drawing for headlight setting.

A = Distance between inner headlights centre lines.

A' = Distance between outer headlights centre lines.

B, B' = Distance to be measured.



Headlight setting

In order to adjust headlight setting, switch on dipped beams (outer headlights) and adjust them by turning screw (1) for vertical adjustment, and screw (2) for horizontal adjustment. After adjustment, the border-line between light and shadow should coincide with $b - b'$ line, being inclined upwards at of 15° an angle starting from the intersection points P_e (or their proximity) of vertical $a' - a'$ lines and horizontal $b - b'$ lines.

For setting of inner headlights, switch on the driving beam and turn screw (3) for vertical adjustment, and screw (4) for horizontal adjustment. After adjustment, the light spots of highest intensity should coincide with intersection points P_i of $a - a$ vertical lines with $b' - b'$ horizontal lines.



Headlight adjusting screws.

1. Screw for dipped beam vertical adjustment.
2. Screw for dipped beam horizontal adjustment.
3. Screw for driving beam vertical adjustment.
4. Screw for driving beam horizontal adjustment.

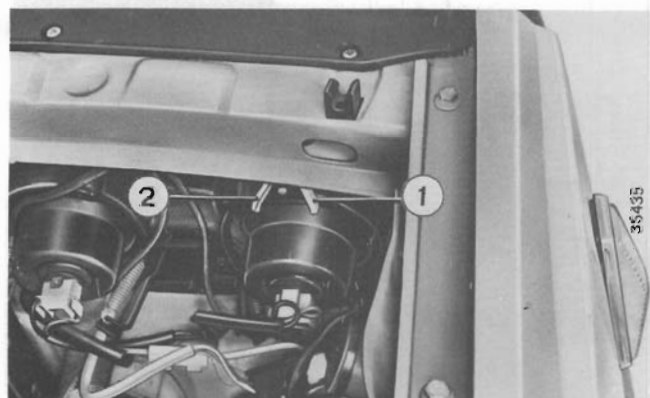
Vehicle	B(*)	B'
New	C-10 cm	C-5 cm
After suspension settlement	C- 8 cm	C-5 cm

C = Distance from headlight centre line to ground, measured during adjustment.

* Dipped beam setting corrector positioned for normal load running weight of vehicle.

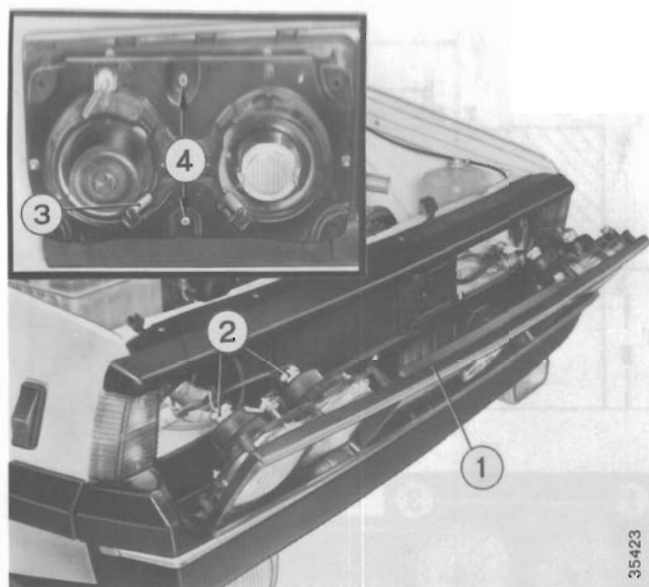
Dipped headlights are fitted with a setting corrector operated by hand, making it possible for the headlight to be set in two different positions depending on vehicle load. Normally the corrector is set to position 1. For a considerable load, the corrector should be set to position 2.

It is necessary for both headlight correctors to be in the same position while driving.



Dipped beam setting corrector.

1. Corrector in position for driving with normal load.
2. Corrector in position for driving with full load.

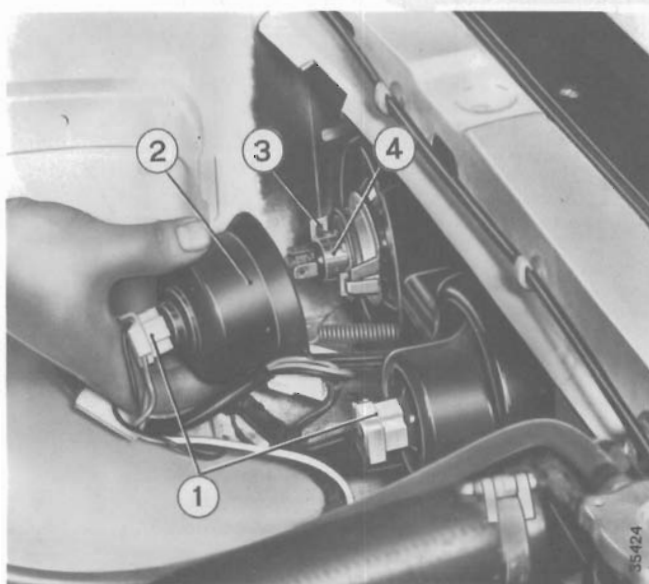


Replacement of headlights

To replace a headlight, or headlight assembly (left-hand or right-hand), first take off the air inlet grille and then disconnect from it the required assembly. This will make it possible to remove the headlight fastened to the housing by means of a spring and adjusting screws.

Headlight set dismounting and reassembly.

1. Air inlet grille.
2. Electrical connections.
3. Spring.
4. Headlight housing to grille fastening screws.

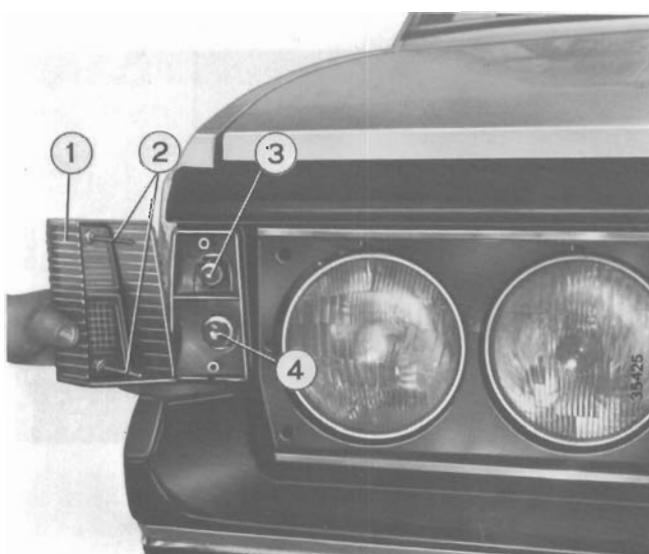


Lamp replacement

Headlight lamps are accessible from the inside of engine compartment. For their replacement, take off connector (1), rubber guard (2) and spring (3) from the reflector. Then remove lamp (4) and insert a new one, making sure that it is in correct position in relation to the reflector.

Headlight lamp replacement

1. Electrical connections.
2. Rubber guard.
3. Spring.
4. Lamp.



Lamps of parking lights and direction indicators have bayonet holders and are accessible by unscrewing the lens screws and removing the lenses.

Replacement of lamps in front parking lights and direction indicators.

1. Lens.
2. Lens to housing fastening screws.
3. 5 W lamp with bayonet holder for parking lights.
4. 21 W lamp with bayonet holder for direction indicators.

External and internal lighting

Polonez Model 1300/1500

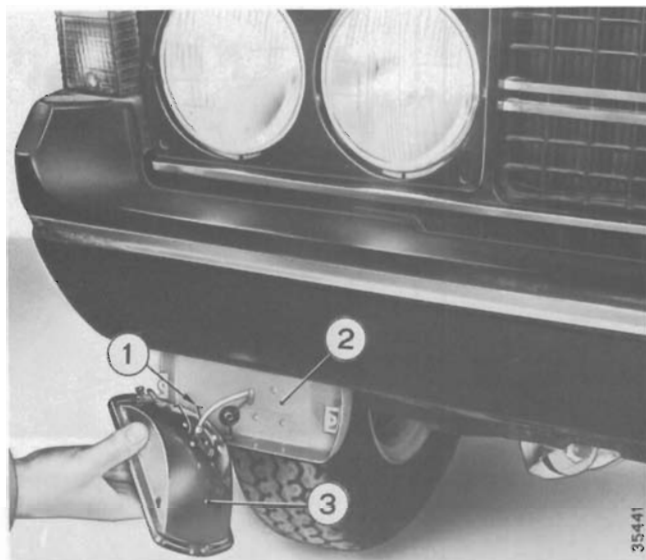
554.01

Sheet 2

To obtain access to fog light lamp, dismount the light (3) from bracket (2); remove the halogen lamp held by spring (1) in reflector opening.

Replacement of fog light lamp.

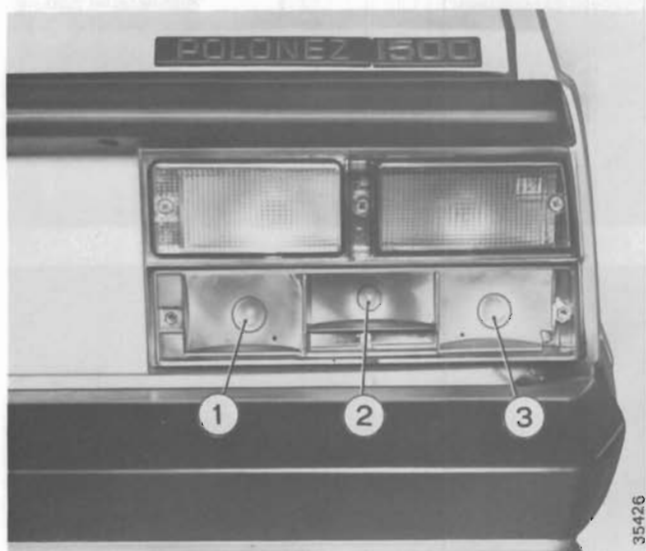
1. Lamp retaining spring.
2. Reflector housing.
3. Fog light.



Access to lamps of rear fog light, tail light and stop light is obtained by removing the integrated lower lens fastened to the housing by two screws with heads of transparent plastic. The lamps have bayonet holders.

Rear fog lights, tail and stop lights.

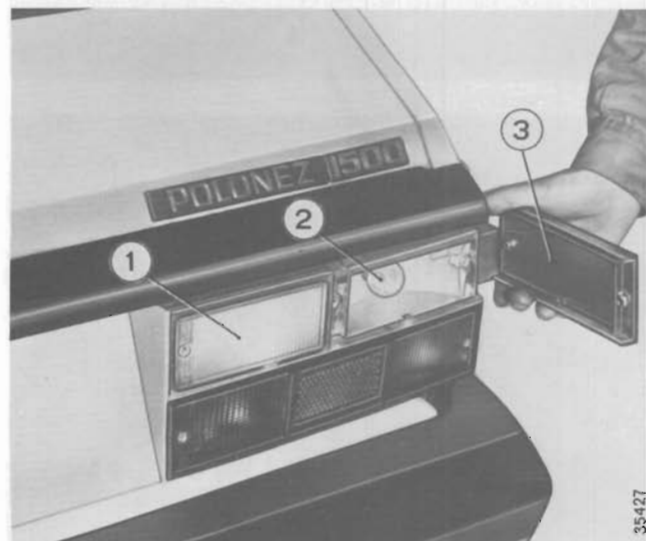
1. Fog light lamp.
2. Tail light lamp.
3. Stop light lamp.

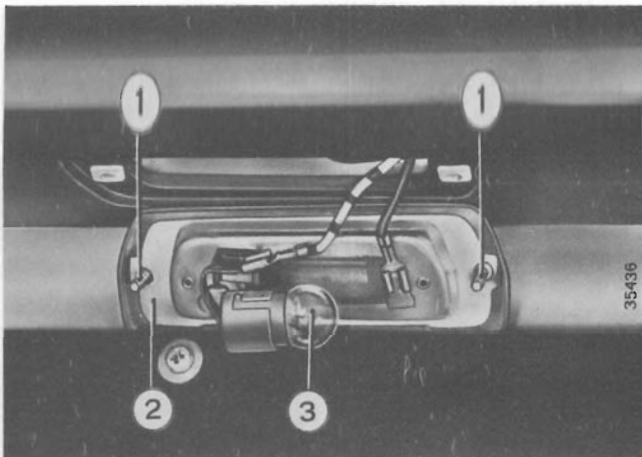


The rear light cluster also contains reversing lights and direction indicators. Their lamps have bayonet holders and are accessible on taking off individual lenses.

Reversing light and direction indicator.

1. Reversing light lens.
2. Direction indicator lamp.
3. Direction indicator lens.

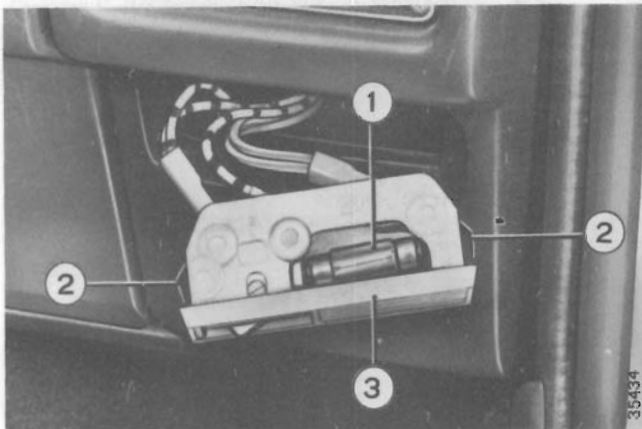




To obtain access to rear licence plate illuminating lamp, unscrew the fastening screws (1) and remove lamp housing (2). The lamp has a bayonet holders.

Rear licence plate light.

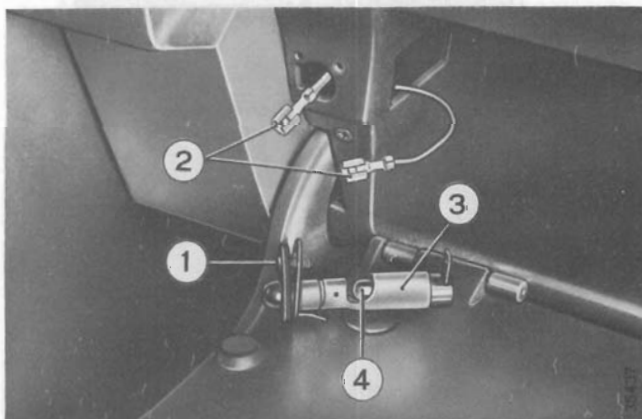
1. Lamp housing to body fastening screws.
2. Lamp housing.
3. Rear licence plate illuminating lamp.



Interior lighting lamps are pressed into their sockets. To replace a lamp, remove lens held by a spring in the housing.

RH interior light.

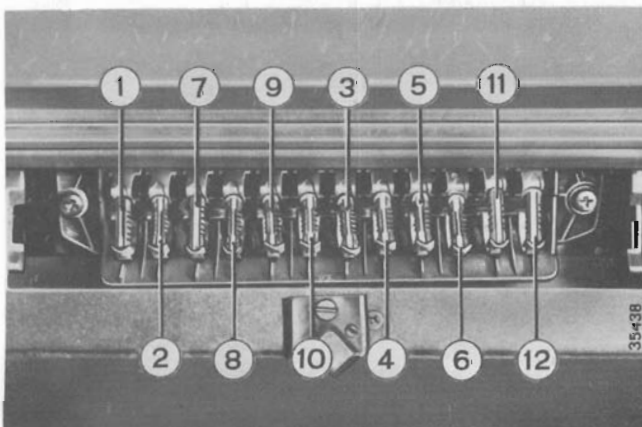
1. Interior lighting lamp.
2. Retaining spring.
3. Transparent lens.



To replace lamp of glove compartment lighting, remove the lamp with bayonet holder, from its socket.

Glove compartment lighting.

1. Lamp holder fastening screw.
2. Electrical connection.
3. Lamp holder.
4. Glove compartment lamp.



FUSES

Fuse box located under the dashboard within the glove compartment area. Prior to replacing a blown fuse, the offending fault must be located and eliminated.

Fuses protecting the electrical system of vehicle.

- 1-12 fuses.
 Fuse No. 1 is 25 A.
 Fuses Nos 2-6 are 8 A.
 Fuses Nos 7-12 are 16 A.

Signalling device

Polonez Model 1300/1500

555.01

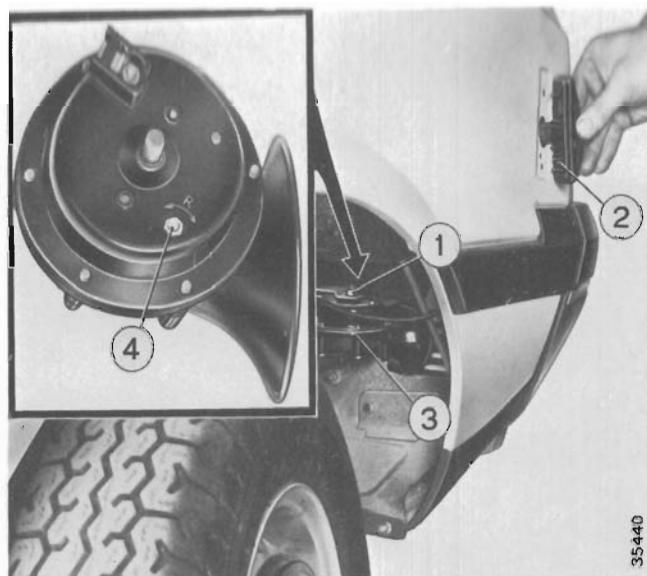
Sheet 1

HORN AND SIDE DIRECTION INDICATORS

Horns are located in front wheel arches. They may be dismantled after removal of wheel arch shield, by unscrewing nut (1) fastening them to body bracket.

Horn and side direction indicator.

1. Horn to body fastening nut.
2. RH side direction indicator.
3. RH horn.
4. Horn sound adjusting screw.



35440

Faulty operation of the horn may be corrected with the use of adjusting screw (4).

Side direction indicators are pressed into mudguards. To replace a lamp, the entire indicator must be removed. The lamp has a bayonet holder.

COMBINATION SWITCH BENEATH THE STEERING WHEEL

Dismounting switch housing.

Arrows show the location of housing fastening screws.



35443

Should it prove necessary to repair the combination switch for direction indicators, lights, windscreen wiper and horn, the switch must be dismantled in the following manner.:

- take off the steering wheel as described in the subsection "Steering wheel";
- remove the housing and loosen screw (1) holding the switch clamp;
- disconnect electric cables and remove the switch.



Dismounting combination switch beneath the steering wheel.

Polonez Model 1300/1500



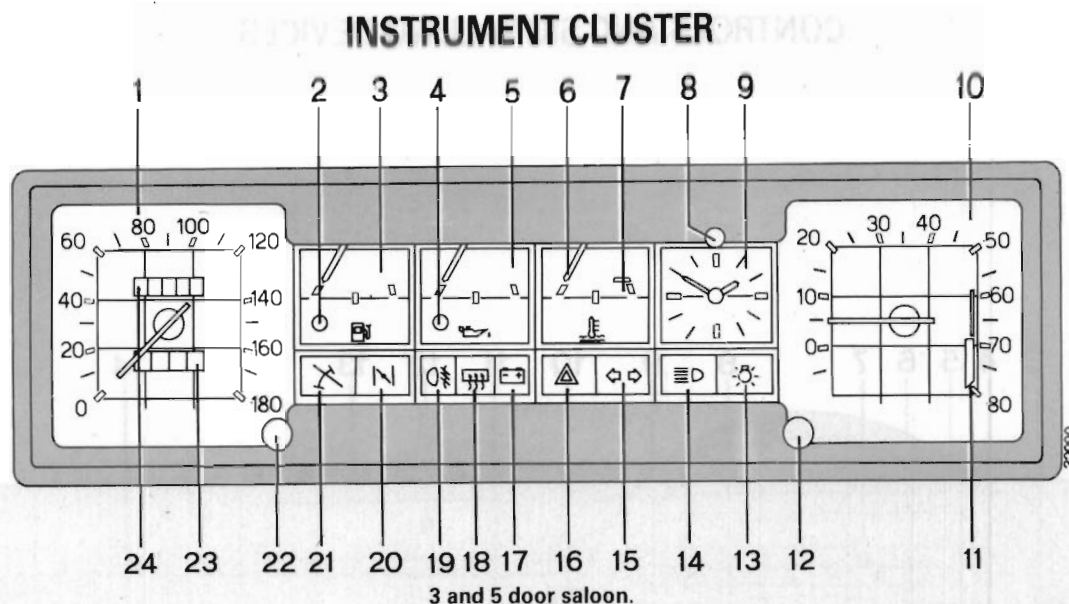
TCR BENEATH THE

Instrument cluster

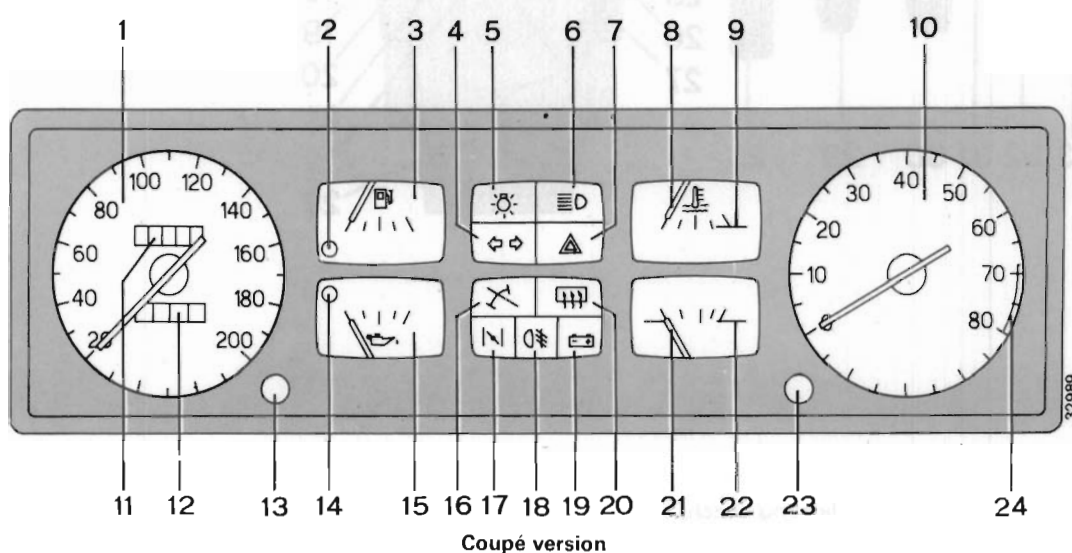
Polonez Model 1300/1500

555.10

Sheet 1

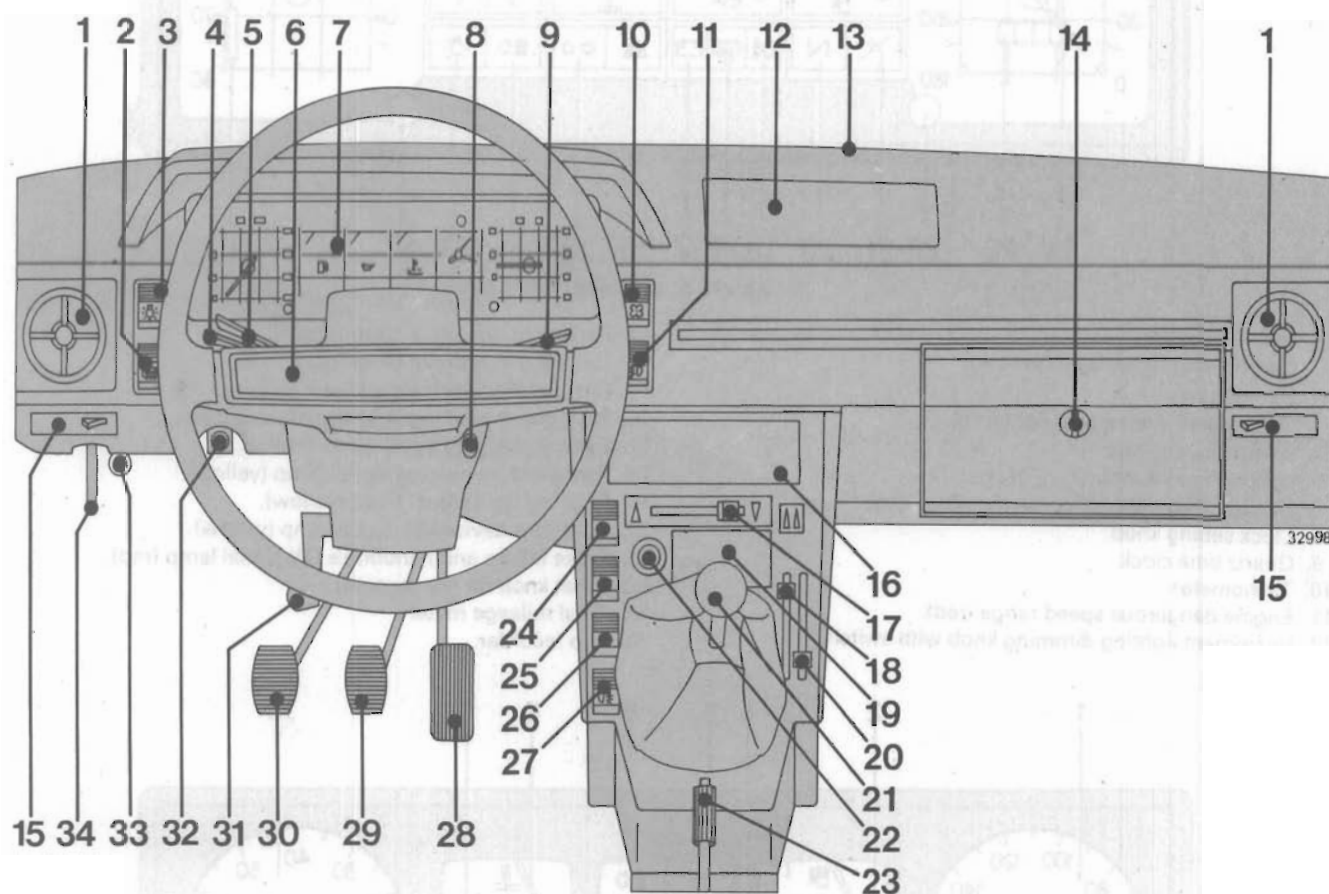


- | | |
|---|---|
| 1. Speed indicator. | 13. Parking lights signal lamp (green). |
| 2. Fuel reserve signal light (yellow). | 14. Driving beam signal lamp (blue). |
| 3. Fuel gauge. | 15. Direction indicator signal lamp (green). |
| 4. Oil pressure drop signal light (red). | 16. Emergency warning light signal lamp (red). |
| 5. Oil pressure gauge. | 17. Battery charging signal lamp (red). |
| 6. Cooling fluid temperature gauge. | 18. Rear window heating signal lamp (yellow). |
| 7. Cooling fluid dangerous overheating range. | 19. Rear fog light signal lamp (yellow). |
| 8. Clock setting knob. | 20. Cold start device ON signal lamp (yellow). |
| 9. Quartz time clock. | 21. Brake failure and handbrake ON signal lamp (red). |
| 10. Tachometer. | 22. Reset knob for trip recorder. |
| 11. Engine dangerous speed range (red). | 23. Total mileage meter. |
| 12. Instrument lighting dimming knob with switch. | 24. Trip recorder. |



- | | |
|---|--|
| 1. Speed indicator. | 13. Trip recorder reset knob. |
| 2. Fuel reserve signal lamp (yellow). | 14. Oil pressure drop signal light (red). |
| 3. Fuel gauge. | 15. Oil pressure gauge (red). |
| 4. Direction indicator signal light (green). | 16. Brake failure and handbrake ON signal light (red). |
| 5. Parking lights signal lamp (green). | 17. Cold start device ON signal light (yellow). |
| 6. Driving beam signal light (blue). | 18. Rear fog light signal lamp (yellow). |
| 7. Emergency warning light signal lamp (red). | 19. Battery charging signal lamp. |
| 8. Cooling fluid temperature gauge. | 20. Rear window heating signal lamp (yellow). |
| 9. Cooling fluid dangerous overheating range. | 21. Voltmeter. |
| 10. Tachometer. | 22. Voltmeter dangerous range (red). |
| 11. Trip recorder. | 23. Instrument lighting dimming knob with switch. |
| | 24. Dangerous engine speed range (red). |

CONTROLS AND SIGNALLING DEVICES



- | | |
|--|--|
| 1. Dashboard vents. | 18. Cold air control lever. |
| 2. Rear window heating switch. | 19. Ash tray. |
| 3. External lighting and instrument lighting switch. | 20. Warm air control lever. |
| 4. Lever of headlight and flasher switch. | 21. Gear change lever. |
| 5. Lever of direction indicator switch. | 22. Lighter with pilot lamp. |
| 6. Horn push-button. | 23. Handbrake lever. |
| 7. Instrument cluster. | 24. Plugged seat for additional switch. |
| 8. Ignition and starter switch with key and steering wheel lock. | 25. Rear window washer and wiper switch. |
| 9. Lever of windscreen washer and wiper switch. | 26. Emergency warning light switch. |
| 10. Heater blower switch. | 27. Rear fog light switch. |
| 11. Front fog light switch. | 28. Accelerator pedal. |
| 12. Loudspeaker cover. | 29. Brake pedal. |
| 13. Windscreen vents. | 30. Clutch pedal. |
| 14. Glove compartment. | 31. Steering column adjusting lever. |
| 15. Front interior lights with switches. | 32. Cold start knob. |

Miscellaneous equipment

555.15

Polonez Model 1300/1500

Sheet 1

REAR WINDOW HEATING

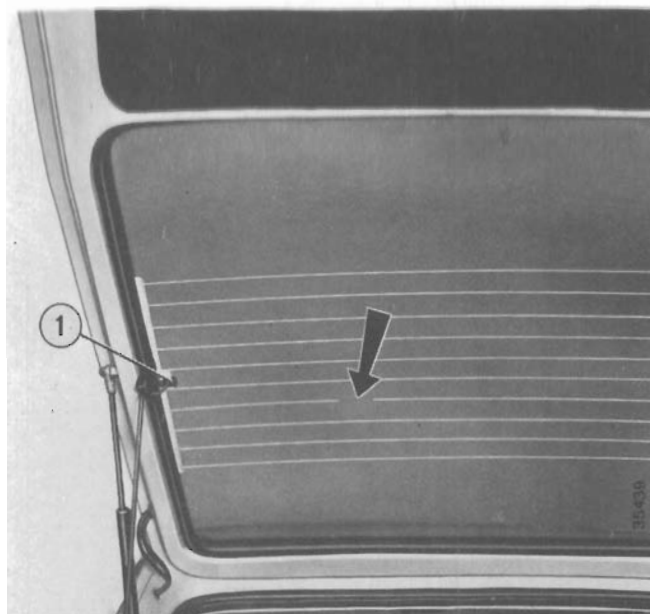
Should a break be detected in rear window heating threads, it is possible to effect a repair without having to replace the complete window (max. break 2 mm). For repair, a special conductive paint* is used, containing silver addition. It is applied in the following manner:

* for instance, Silver No 460 G.B.C.

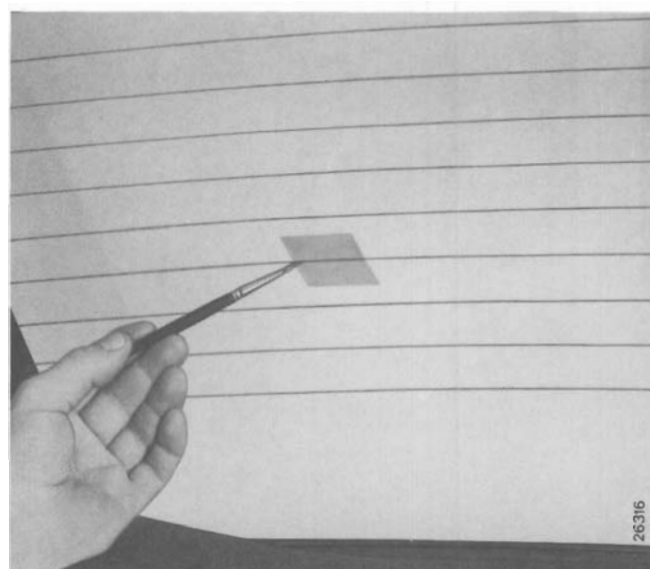
Heated rear window with a break in one heating thread.

1. Electrical connection.

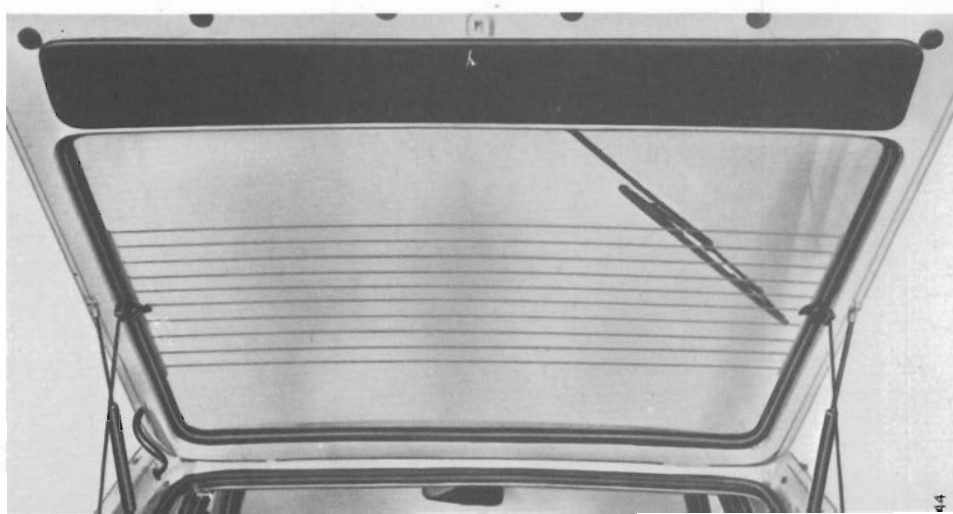
Arrow shows the place where the heating circuit is broken.



- a) clean and degrease the window pane near the damaged place,
- b) mix the paint by shaking the container,
- c) apply the silver paint with a fine brush, having previously masked the adjacent areas. Dry at ambient temperature for 4-5 hours; complete cure and electric conductivity is obtained after 24 hours.

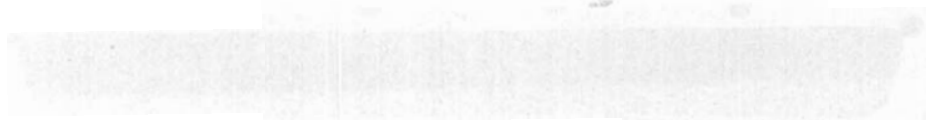


Applying conductive paint with suitable masking of adjacent areas.





Wykonaj kopię z tego dokumentu i przekaż ją osobie, która ma ją otrzymać.

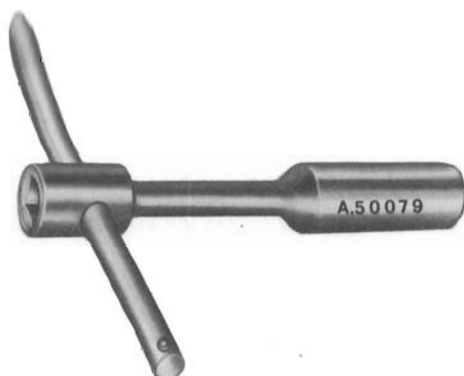


Special tools

Polonez Model 1300/1500

55 A

Sheet 1



A.50079 Spark plug spanner (with a 1/2" square shank) to be used on a work stand together with a torque spanner.



A.76029 Stand for extraction of alternator diodes (to be used with **Ap.5074** press).



A.50087 Spark plug spanner (to be used on the vehicle).



A.76031 Stand for installation of alternator diodes (to be used with **Ap.5074** press).



A.50095 Articulated spanner (13 mm) for starter motor dismounting and reassembly (on the vehicle).



A. 76032 Platen to be used on the press for diode removal and installation.



A.76027 Mandrel for removal of alternator diodes (to be used with **Ap.5074** press).



A.90340 Reamer for oversize diode seats (to be used with an electric drilling machine).



Fig. 1

Fig. 2



70	General Data
701.01	Bonnet
701.03–04	Dashboard
701.08–09	Floor – middle and rear parts
701.12–14	Body – front and rear part skeleton
701.14/01	Body – rear part skeleton (3-door and Coupé version)
701.18	Body – front outer panels
701.19–20	Body – middle and rear outer panels
701.20/01	Body – rear outer panels (3-door and Coupé version)
701.29–30	Front door – windows
701.30/01	Front door – windows (3-door and Coupé version)
701.31	Front door – locks
701.32–33	Front door – seals, trim and upholstery
701.37–38	Rear door – windows and locks
701.50–51	Tailgate – window and lock
701.55–56	Windscreen and rear side windows
701.62–64	External mouldings and trim
703.02	Air inlet grille
703.06–07	Front and rear bumpers
706.23	Upholstery
706.23/01	Upholstery (3-door and Coupé version)
70A	Special tools

Body

70

Polonez Model 1300/1500

Sheet 1

GENERAL DATA

5-door, 5-seat saloon.

Integral body of varying strength: rigid passenger cage energy-absorbing front and rear part skeleton.

The roof forms a rigid assembly together with sides, windscreen frame and rear part skeleton. Gutters covered with stainless-steel moulding.

Sides with bolted front mudguards; sills coated with black anticorrosive mastic. Rear window posts covered with mouldings of black plastic with metalised border. At the LH side, lockable fuel tank inlet. Side trim on the entire length made of black polyurethane foam. Diamond-shaped direction indicators on front mudguards.

Front design horizontal with four round headlights, fog lights, black intake grid with horizontal stainless steel mouldings. FSO badge in the middle. Bumper with a black bayflex pad and decorative mylar trim. Bumper pad has recesses for fog lamps and licence plate. Front valance coated with black anticorrosive mastic. *Upper pad of black foamed plastic.*

Vehicle tail: heated rear window with wiper, tail lights, direction indicators, stop lights, reversing lights and reflectors. Bumper with black bayflex pad and mylar decorative trim. Upper pad of black foamed plastic with licence plate light built in. Rear panel underside coated with anticorrosive black mastic. Mud flaps of black rubber.

Bonnet hinged at the rear and provided with a catch securing it from opening while driving. Bonnet lock releasing handle located under dashboard according to safety regulations.

Front side doors are hinged at the front. Safety glass pane is wound down by a crank; outer door handles are horizontal, flush-mounted, chrome-plated. Doors are secured from the inside; inner handles are located on door panels.

Rear side doors: hinged to middle door post. Two safety glass panes — front one wound down by a crank, rear one fixed. The stanchion between panes — black. Securing from the inside. Inner handles on door panels. Lock preventing inadvertent opening by children from inside is accessible with door open.

Safety windscreen with black rubber seal and decorative mylar trim.

Windscreen wipers with black arms and blades.

Separate front seats adjustable in guides, with adjustable backrest. Upholstery of fabric in the middle, with leatherette borders. Pocket at the rear of backrest. Inertia reel safety belts for passengers.

Front seat headrest with adjustable height are made of foam and upholstered to match the colour of seats.

Rear seat: upholstered with fabric, with decorative stitching in the middle part, trimmed with leatherette stripes.

Floor mat of the boucle type available in various colours; mat cover of plastic in the same colour.

Luggage compartment mat of the boucle type, moulded, of the same colour as floor mat. Spare wheel cover held by snap fasteners.

Rear shelf of black plastic, covered with boucle mat matching floor mat colour. The shelf opens partly with the tailgate; it may be completely removed and deposited at the rear of luggage compartment.

Dashboard is filled with polyurethane and covered with laminated plastic available in various colours. Front part is intended for instrument mounting. Glove compartment flap in the dashboard at the side opposite to steering wheel, space for loudspeaker — in the central part. Inner lights are mounted in the bottom. Longitudinal decorative trim is of stainless steel. Vents for windscreen and side windows are adjustable. Switch plate is made of black plastic material.

Heater housing front and bottom part is filled with polyurethane and faced with laminated plastic of the same colour as dashboard. Front cover of plastic with cut-outs for radio, switches, ash tray, lighter and air control lever.

Polonez Model 1300/1500

Roof lining is moulded of polystyrene foam and covered with beige fabric.

Sun visors upholstered in fabric of the same colour as roof lining, adjustable in two directions, with a document pocket.

Door panels covered with laminated plastic, with mylar trim and pockets, arm rests of polyurethane upholstered in door matching colour, ash trays in rear door panels, middle mouldings of plastic in the same colour as door panels.

Hand grips with hangers black, with pads masking the fastening screws.

Steering wheel of black plastic.

Wheel trim – dull chrome.

Gear change lever in heater housing, knob black, stick chrome-plated, leatherette boot of the same colour as dashboard.

Spare wheel has its own place in the luggage compartment.

Wheel arches behind the rear seat backrest, covered with boucle material of the same colour as floor mats, are adapted for loudspeaker mounting; luggage compartment light at the bottom.



Body

Polonez Model 1300/1500

70

Sheet 2

GENERAL DATA

Differences between 3-door, 5-seat saloon and 5-door saloon.

Sides: rear posts without decorative moulding.

Side doors: two safety glass panes, front one fixed and rear one wound down by a crank, dividing stanchion black.

Side windows: safety glass panes, front one fixed, rear one partly deflectable, dividing stanchion black.

Tailgate with spoiler located at the bottom.

Front seats: back rests inclinable forwards to obtain access to rear seats.

Dashboard: glove compartment flap covered with the same material as dashboard.

Door and rear side upholstering panels of plastic foil with mylar mouldings, ash trays in rear side panels.

Steering wheel of black plastic material in different shape.



Differences in the 3-door Coupé version as compared with the 5-door saloon.

Sides: Upper middle post covered with polished aluminium moulding; rear posts without outer mouldings.

Front: Radiator grille of black plastic with chromed trim, FSO badge in the upper middle part, bumpers without mouldings have recesses for licence plate, parking lights and fog lamps; no pad in the upper part.

Side doors: safety glass panels, front pane fixed, rear one wound down with a crank; dividing stanchion black.

Rear: two safety glass panes, front pane fixed, rear one partly deflectable; dividing stanchion black.

Tailgate with spoiler of black foam located at the bottom.

Front seats with backrests inclinable to give access to rear seats; leatherette upholstery in walnut colour at the sides and Scotch tartan pattern in the middle.

Front and rear seat foamed plastic headrests in walnut colour.

Rear seats upholstered with leatherette in walnut colour at the sides, and Scotch tartan pattern in the middle.

Floor mats preformed, in brown colour, at the front with cover of the same colour.

Luggage compartment mat preformed, in the same colour as floor mats.

Rear shelf of the same material and colour as mats.

Dashboard covered with laminated plastic of walnut colour, glove compartment flap the same as dashboard.

Roof lining of foamed polystyrene with cover of brown fabric and sun visor brackets in the front part.

Door and rear side upholstery of plastic foil in walnut cover at top and bottom, and Scotch tartan pattern with mylar trim in the middle, arm rests of walnut colour, ash trays in rear side panels, centre mouldings of plastic material in walnut colour.

Steering wheel of black plastic material, different shape.

Gear change lever with boot of leatherette in walnut colour.

Side pockets lined with material of the same colour as floor mats.



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701.55–56	Windscreen and rear side windows
701.62–64	External mouldings and trim
703.02	Air inlet grille
703.06–07	Front and rear bumpers
706.23	Upholstery
706.23/01	Upholstery (3-door and Coupé version)
70A	Special tools

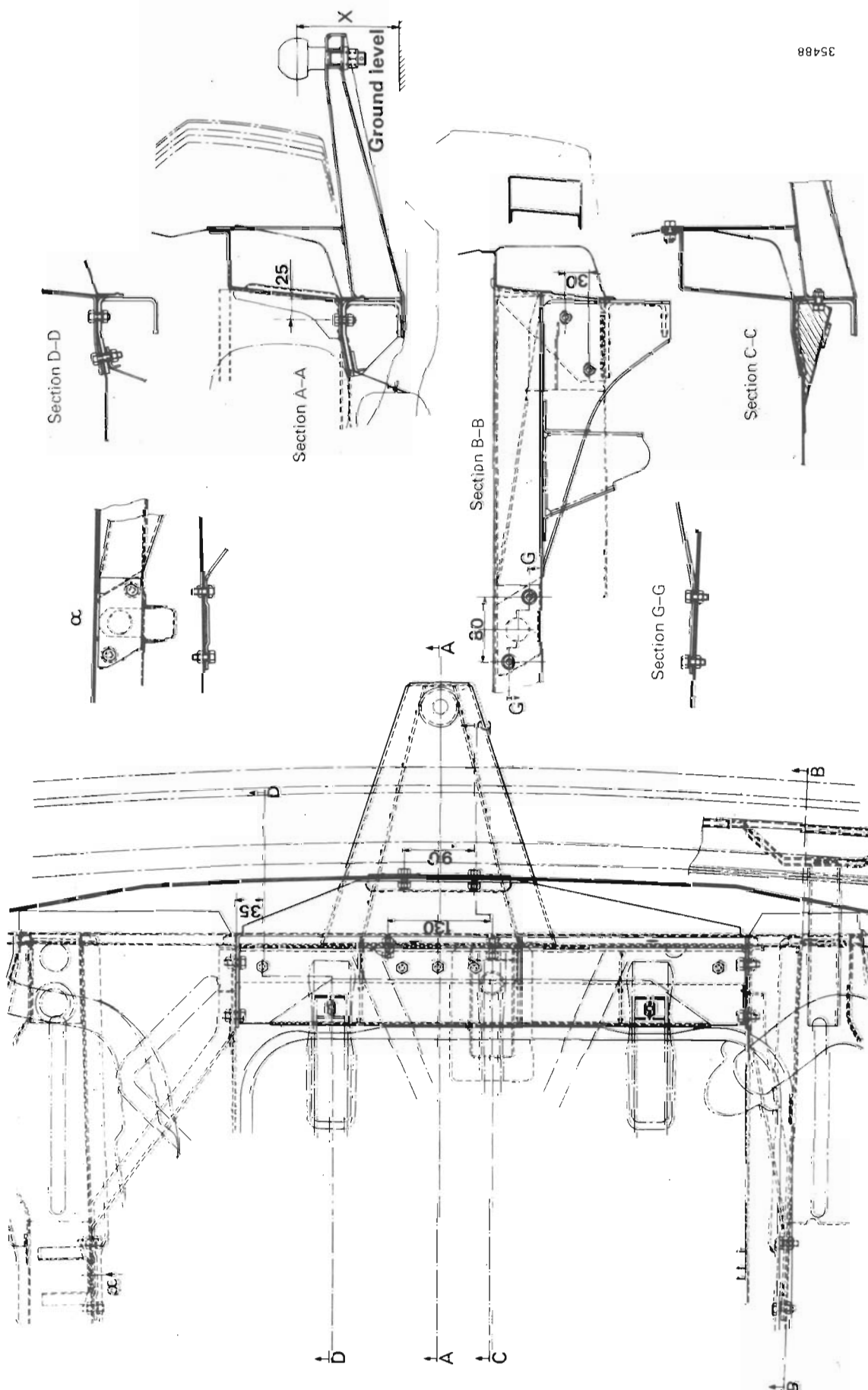
Body

Polonez Model 1300/1500

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Sheet 4

INSTALLATION OF TRAILER TOWING HOOK



Distance from ground level X:
 With unloaded vehicle must not exceed 520 mm.
 With fully loaded vehicle cannot be less than 350 mm.

Polonez Model 1300/1500

Bonnet

Polonez Model 1300/1500

BONNET

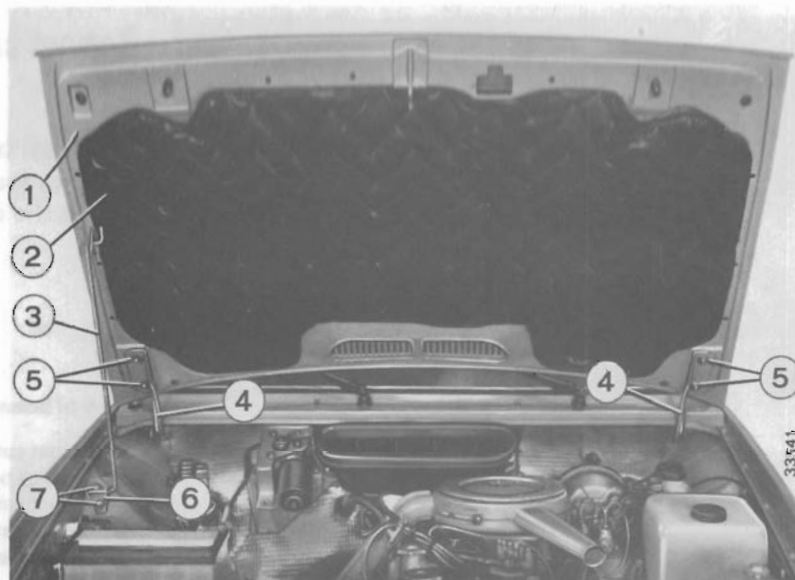
Dismounting and reassembly

To dismount the bonnet, perform the following operations:

- unscrew bonnet to hinges fastening screws;

View of bonnet.

1. Bonnet.
2. Bonnet inner lining.
3. Bonnet prop.
4. Bonnet hinges.
5. Bonnet to hinges fastening screws and washers.
6. Prop bracket.
7. Prop bracket to body fastening screws.

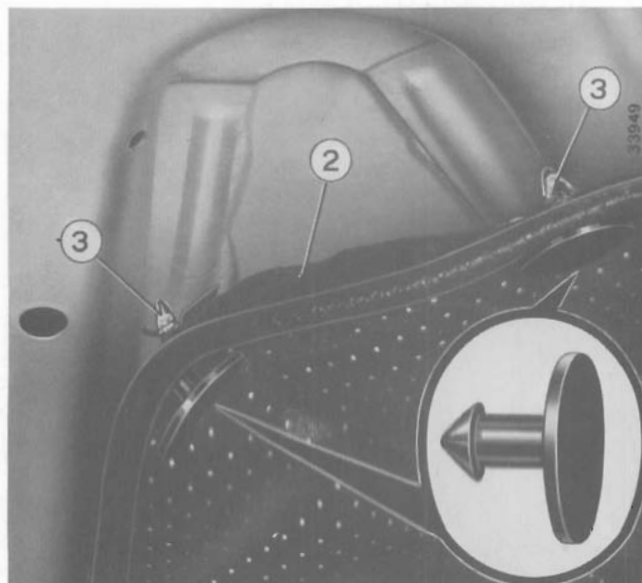


- dismount the bonnet;
- remove inner lining and two rubber pads and mount them on the new bonnet.

During reassembly, check, prior to tightening bonnet to hinges fastening screws, that the bonnet fits correctly into the opening. If necessary, adjust bonnet position in relation to hinges.

Fastening inner lining to the bonnet.

2. Bonnet inner lining.
3. Fasteners attaching lining to bonnet.



The fastener is shown in the right-hand bottom corner of the picture.

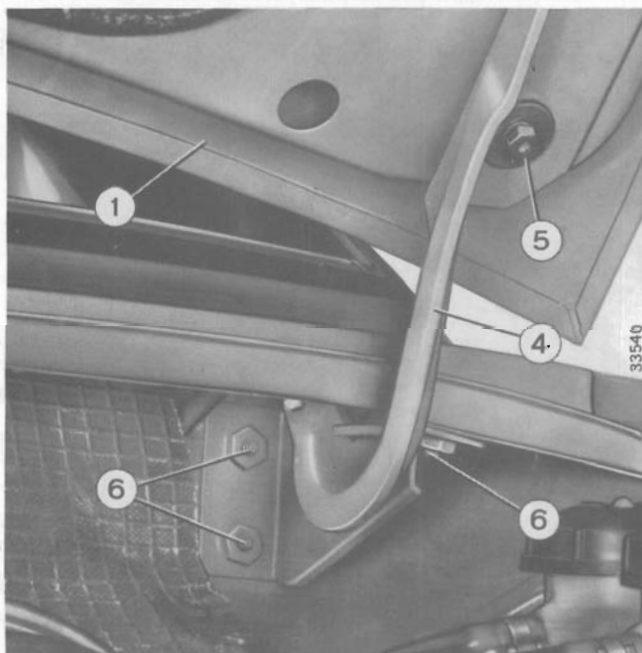
Replacement of bonnet hinges

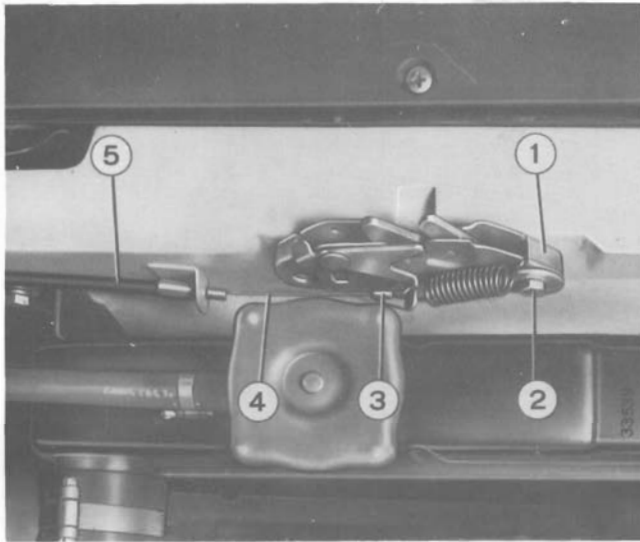
To replace bonnet hinge, perform the following operations:

- dismount the dashboard (Table 701.03–04, sheet 1 and successive sheets);
- unscrew inner and upper screws fastening bonnet hinge to body.

Bonnet hinge fastening.

1. Bonnet.
2. Bonnet hinge.
4. Bonnet to hinge fastening screws





Bonnet catch

To adjust bonnet catch so as to ensure proper bonnet closing, loosen catch to body fastening screws and adjust the catch as required.

View of bonnet catch.

1. Bonnet catch.
2. Catch to body fastening screw.
3. Bonnet catch release cable protecting sleeve.
4. Bonnet catch release cable.
5. Bonnet catch release cable sheath.



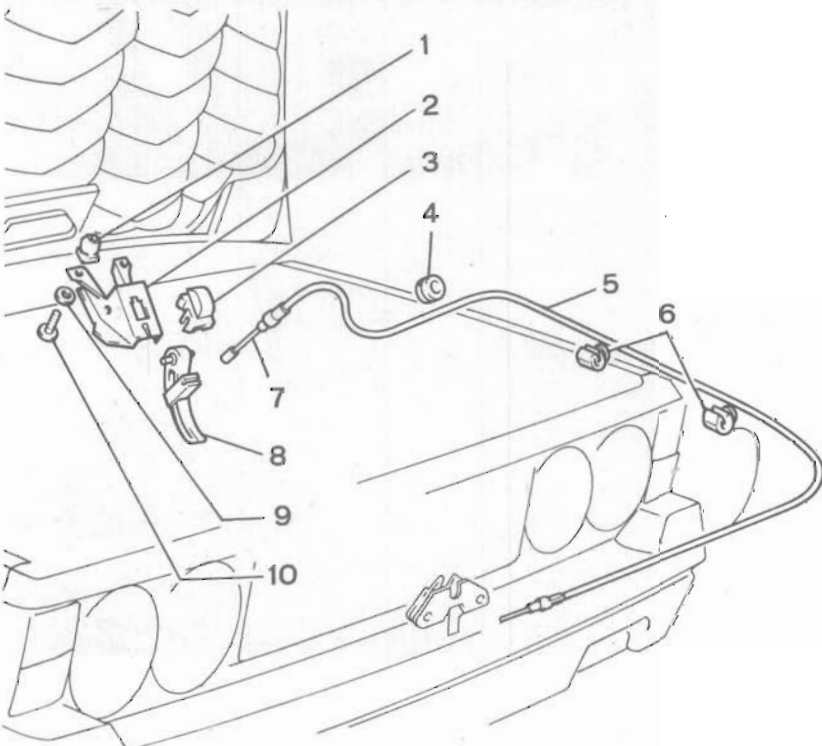
Replacement of bonnet catch release cable

After disconnecting release cable from the catch, push the release lever upwards and then towards the vehicle inside until the lever becomes detached from its seat, and then pull the cable out of its sheath. After inserting a new cable into lever opening and sheath, remove the left-hand adjustable vent from the dashboard to check whether the lever has properly entered its seat.

Bonnet release lever.

1. Dashboard.
2. Bonnet release lever.

To replace release lever seat, it is necessary to dismount the dashboard.



Bonnet release mechanism

1. Screw seat.
2. Bonnet release lever bracket.
3. Bonnet release lever holder.
4. Rubber grommet.
5. Bonnet catch release cable sheath.
6. Cable sheath brackets.
7. Bonnet release cable.
8. Bonnet release lever.
9. Washer.
10. Release lever bracket fastening screw.

Dashboard

Polonez Model 1300/1500

DASHBOARD

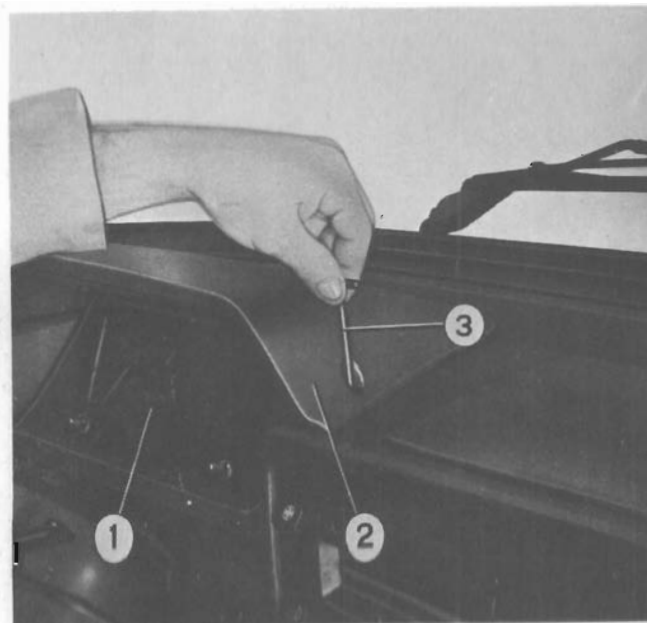
Dismantling

In order to dismantle the dashboard, perform the following operations:

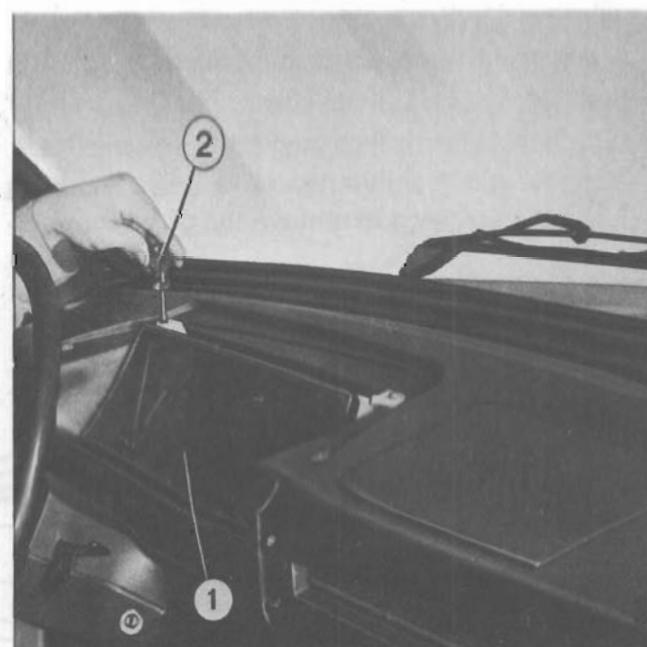
- disconnect the cable from storage battery negative terminal;
- unscrew dashboard outer panel to front posts fastening screws;

Dashboard.

1. Instrument cluster.
2. Instrument cluster housing.
3. Internal hexagonal spanner.



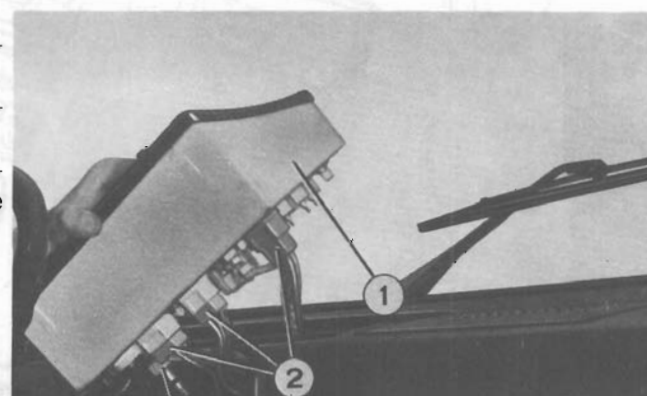
- with an internal hexagonal spanner, unscrew instrument cluster housing fastening screws;
- unscrew instrument cluster to dashboard fastening screws;

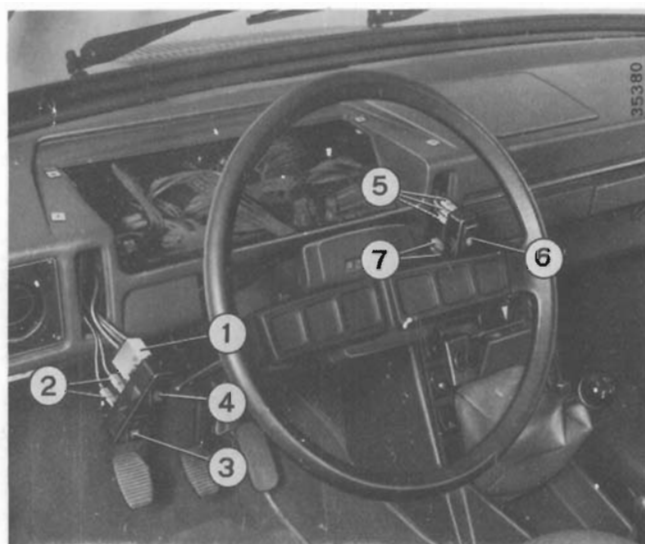


Dashboard with instrument cluster housing removed.

1. Instrument cluster.
2. Screwdriver.

- partly lift out the instrument cluster from dashboard;
- disconnect instrument cluster electrical connections;
- unscrew nut (3) and disconnect speedometer driving cable from instrument cluster, then remove the instrument cluster;



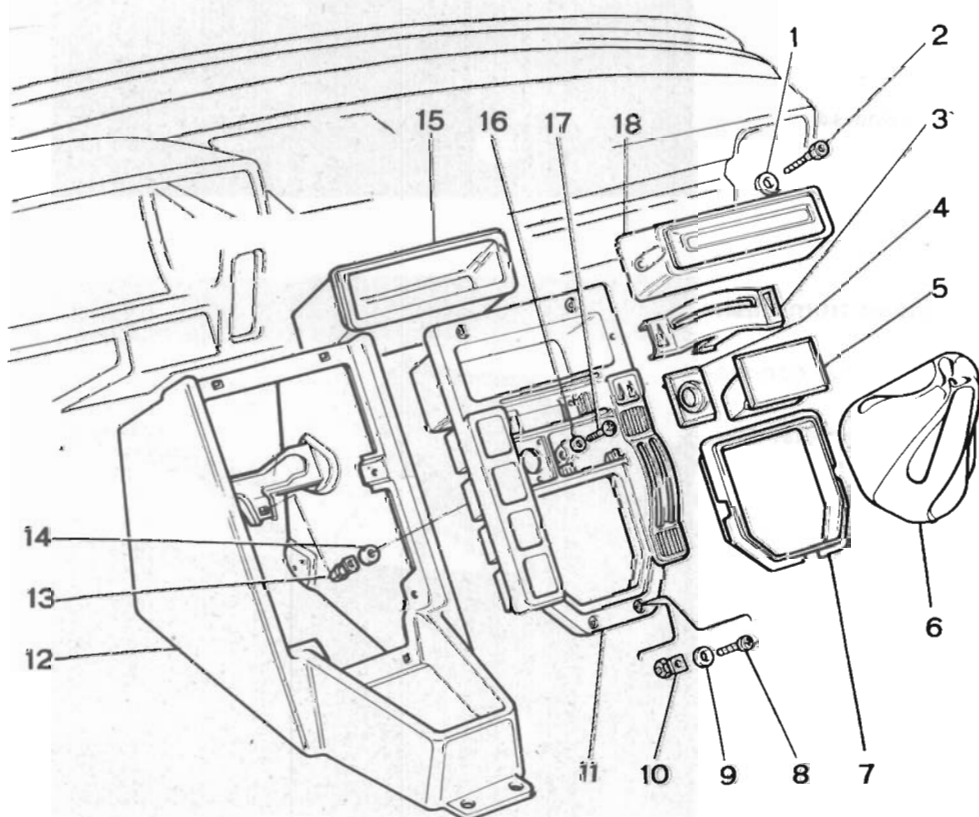


Dashboard with instrument cluster removed.

1. Electrical connector of switch (4).
2. Electrical connector of switch (3).
3. Rear window heating switch.
4. External lighting and instrument cluster lighting switch.
5. Electrical connector of blower switch.
6. Blower switch.
7. Electrical connector of fog light switch.

- remove two inserts with taster switches located on both sides of instrument cluster opening;
- disconnect electrical connectors from switches;
- unscrew glove compartment to heater housing fastening screws and remove the glove compartment;

- if the vehicle is equipped with radio, remove radio compartment cover and the radio together with its bracket after unscrewing the fastening screws and disconnecting the electric cables and the screened aerial cable;



Component parts of heater housing assembly.

1. Washer.
2. Radio compartment lid (18) or pocket (15) to outer cover (11) fastening screw.
3. Decorative trim of air flow control lever.
4. Lighter trim.
5. Ash tray.
6. Gear change lever boot.
7. Gear change lever boot retaining frame.
8. Outer cover to heater housing fastening screw.
9. Washer.
10. Socket for screw (8).
11. Outer cover.
12. Heater housing.
13. Socket for screw (17).
14. Spacer.
15. Pocket.
16. Washer.
17. Outer cover to heater housing fastening screw.
18. Radio compartment lid.

Dashboard

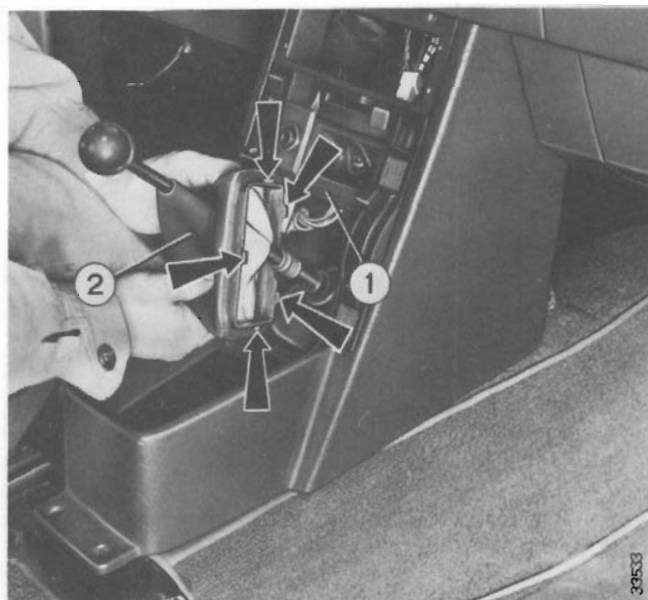
Polonez Model 1300/1500

- using a screwdriver, unfasten the catches holding the gear change lever boot frame;

Heater housing.

1. Heater housing cover.
2. Gear change lever boot.

Arrows indicate catches fastening gear change lever boot frame to heater housing.

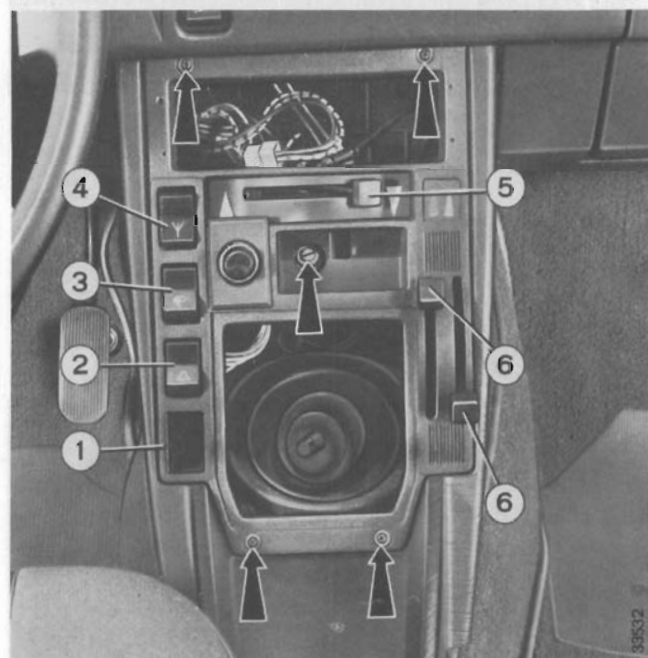


- unscrew gear change lever knob and slide off boot;
- release spring catch and remove ash tray;
- remove knobs of air flow control levers and heater control levers (5 and 6);
- unscrew heater cover to housing fastening screws (indicated by arrows);

Heater housing.

1. Heater housing cover.
2. Emergency warning light switch.
3. Rear window wiper switch.
4. Radio aerial switch.
5. Air flow control lever knob.
6. Heater control lever knobs.

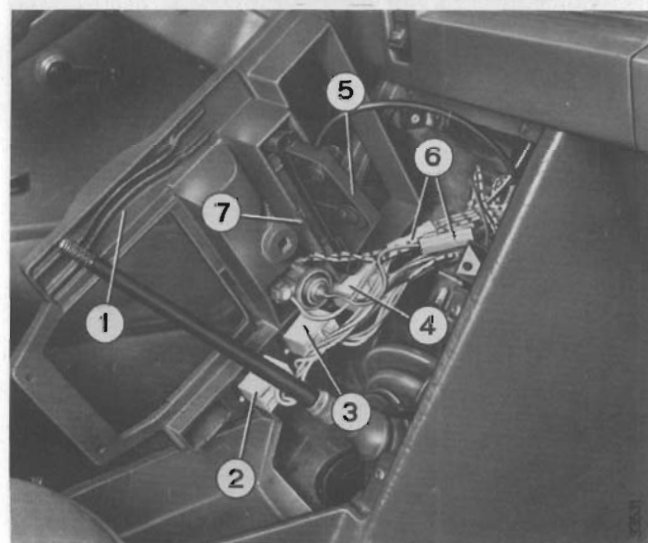
Arrows indicate cover to heater housing fastening screws.

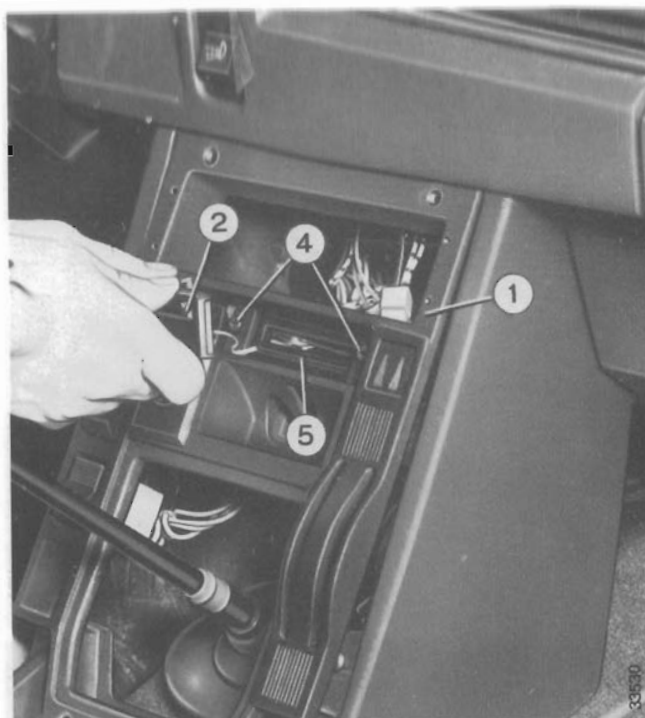


- after sliding off the cover, disconnect electric cables from various switches;
- disconnect, from cover (1), catch (7) for the plate of air flow control lever;

Removing heater housing cover.

1. Heater housing cover.
2. Electrical connector of emergency warning light switch.
3. Electrical connector of rear window wiper switch.
4. Electrical connector of radio aerial.
5. Bracket of air flow control lever.
6. Protective sleeve of electric lighter connector.
7. Catch for fastening the air flow control lever trim to heater housing cover.

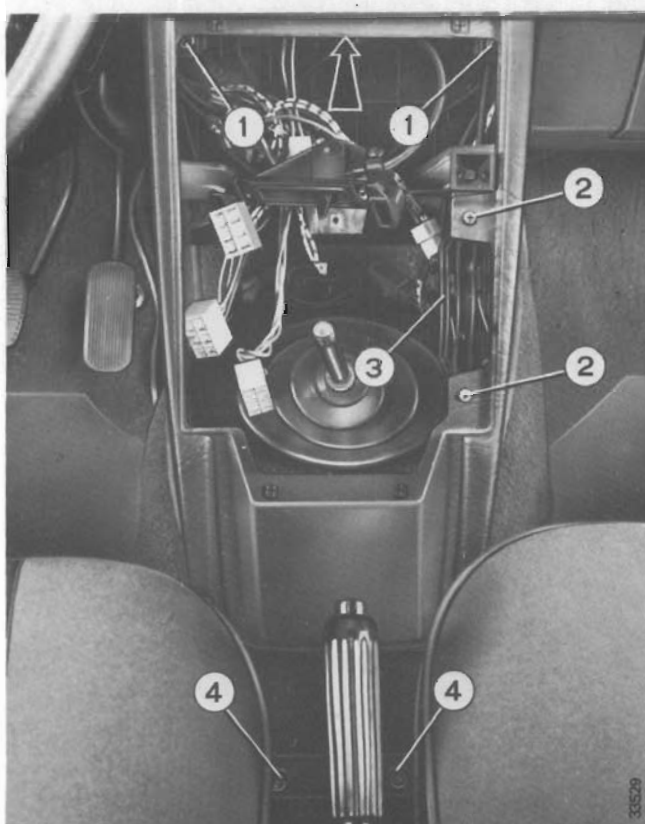




- place the cover closer to the housing and remove the trim of air flow control lever;
- unscrew air flow control lever to heater housing cover fastening screws (4);
- remove cover from heater housing;

Heater housing with cover.

1. Heater housing cover.
2. Decorative trim for air flow control lever.
4. Bracket (5) to housing cover fastening screws.
5. Bracket of air flow control lever.



- unscrew heater control lever bracket to housing fastening screws (2);
- unscrew outer dashboard panel to body fastening screw (indicated by arrow);
- unscrew heater housing to dashboard and tunnel fastening screws (1 and 4);
- remove heater housing;
- unscrew dashboard to body fastening screws located in the lower part of dashboard and on both sides of steering column housing;
- remove two inserts with switches and disconnect the appropriate electric cables;

Heater housing with cover removed.

1. Heater housing to dashboard fastening screws.
 2. Heater control lever bracket to heater housing fastening screws.
 3. Heater control lever bracket.
 4. Heater housing to tunnel fastening screws.
- Arrow indicates location of dashboard to body fastening screw.

Dashboard

Polonez Model 1300/1500

- unscrew dashboard to body fastening upper screws;
- partly lift out the dashboard;
- disconnect air ducts from dashboard vents;
- disconnect electric cables of glove compartment light;
- remove dashboard.

LH side of dashboard viewed from below.

1. Dashboard to body fastening screw.
2. Inner light with switch.

Arrow indicates location of dashboard to body fastening screw at the side of steering column.



Detail of dashboard upper fastening.

Arrows indicate location of dashboard to body upper fastening screws.

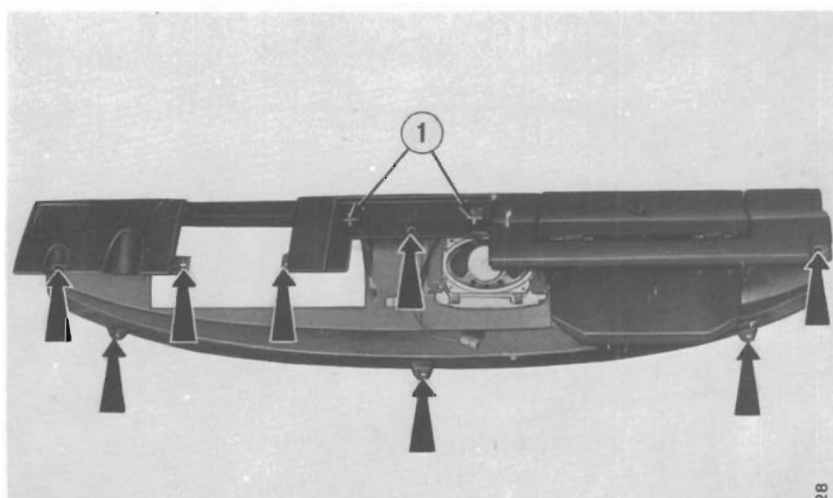


Reassembly

In order to reassemble the dashboard, reverse the above described operations.

Dashboard.

1. Dashboard to heater housing fastening points.



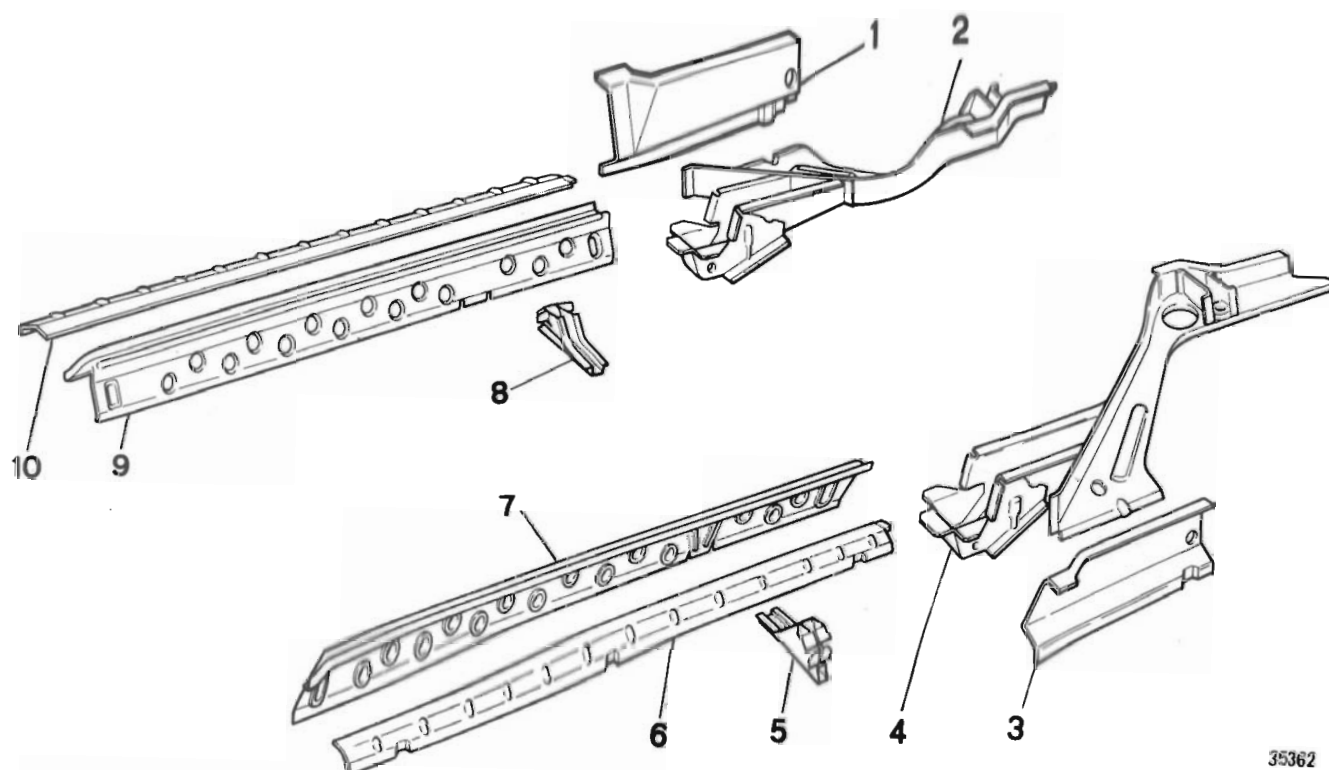
Polonez Model 1300/1500

Floor – middle and rear parts

Polonez Model 1300/1500

701.08-09

Sheet 1



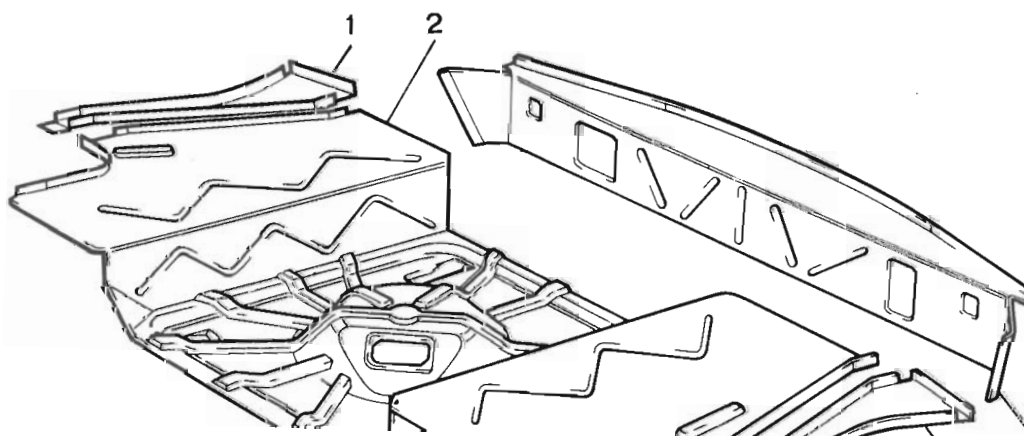
35362

Exploded view of floor middle part.

1. RH side floor reinforcement.
2. RH rear floor longeron.
3. LH side floor reinforcement.
4. LH rear floor longeron.
5. LH jack seat.
6. LH lower sill reinforcement.
7. LH sill.
8. RH jack seat.
9. RH sill.
10. RH lower sill reinforcement.

Exploded view of floor rear part.

1. LH rear floor to inner side connection.
2. Rear floor panel.
3. Rear floor back member.
4. RH rear floor to inner side connection.
5. LH rear floor longeron.



Polonez Model 1300/1500

Body – front and rear part skeleton

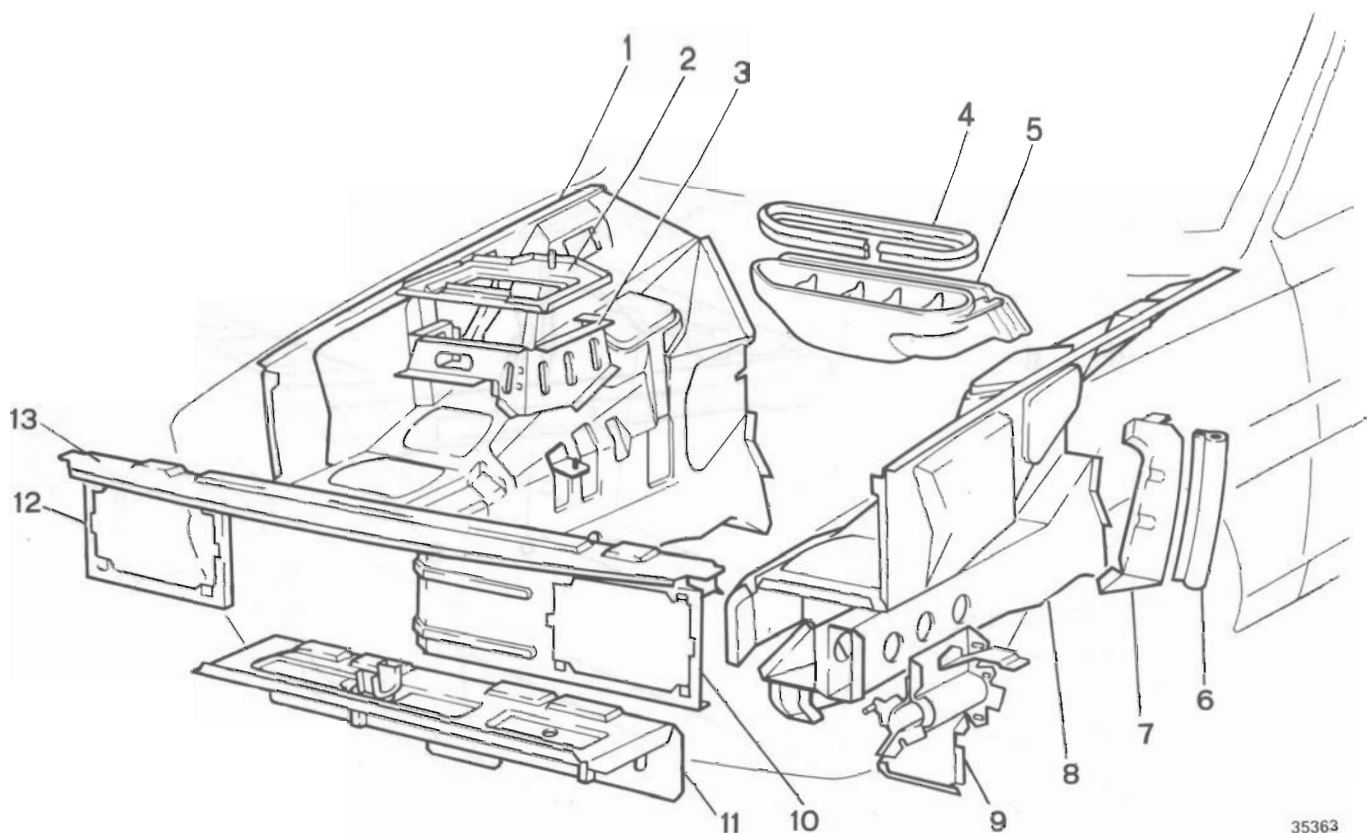
Polonez Model 1300/1500

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701.12-14

701.14/01

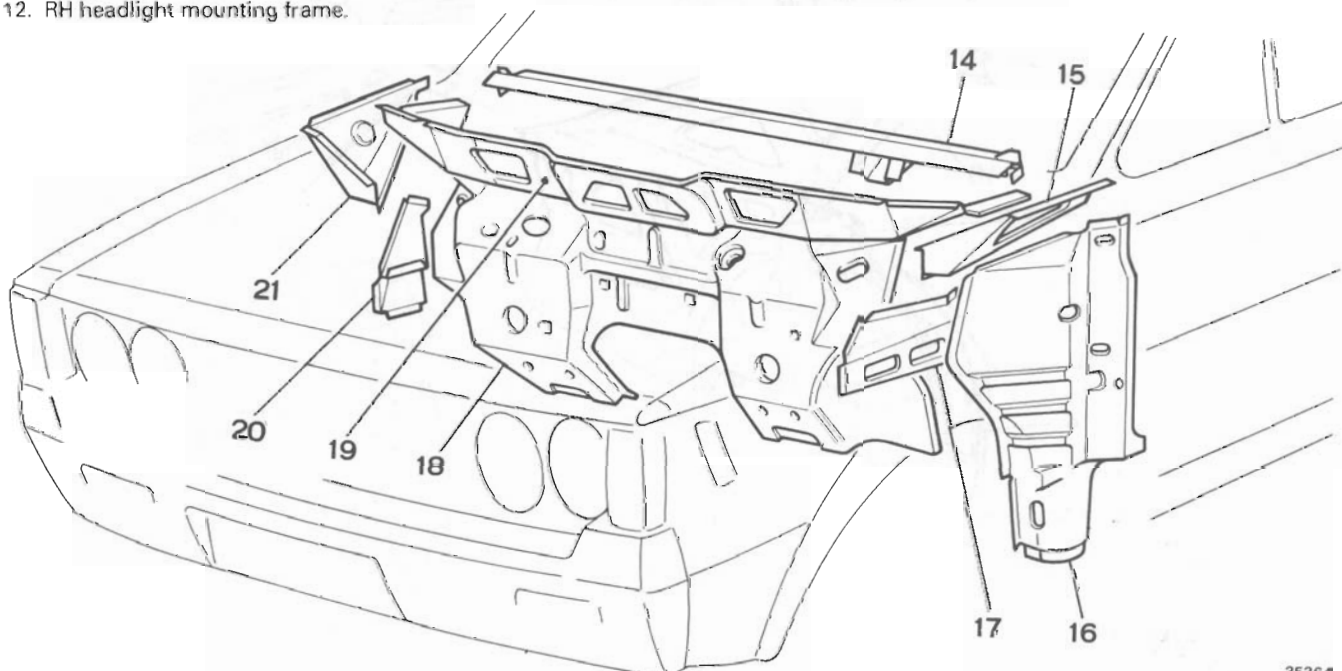
Sheet 1



35363

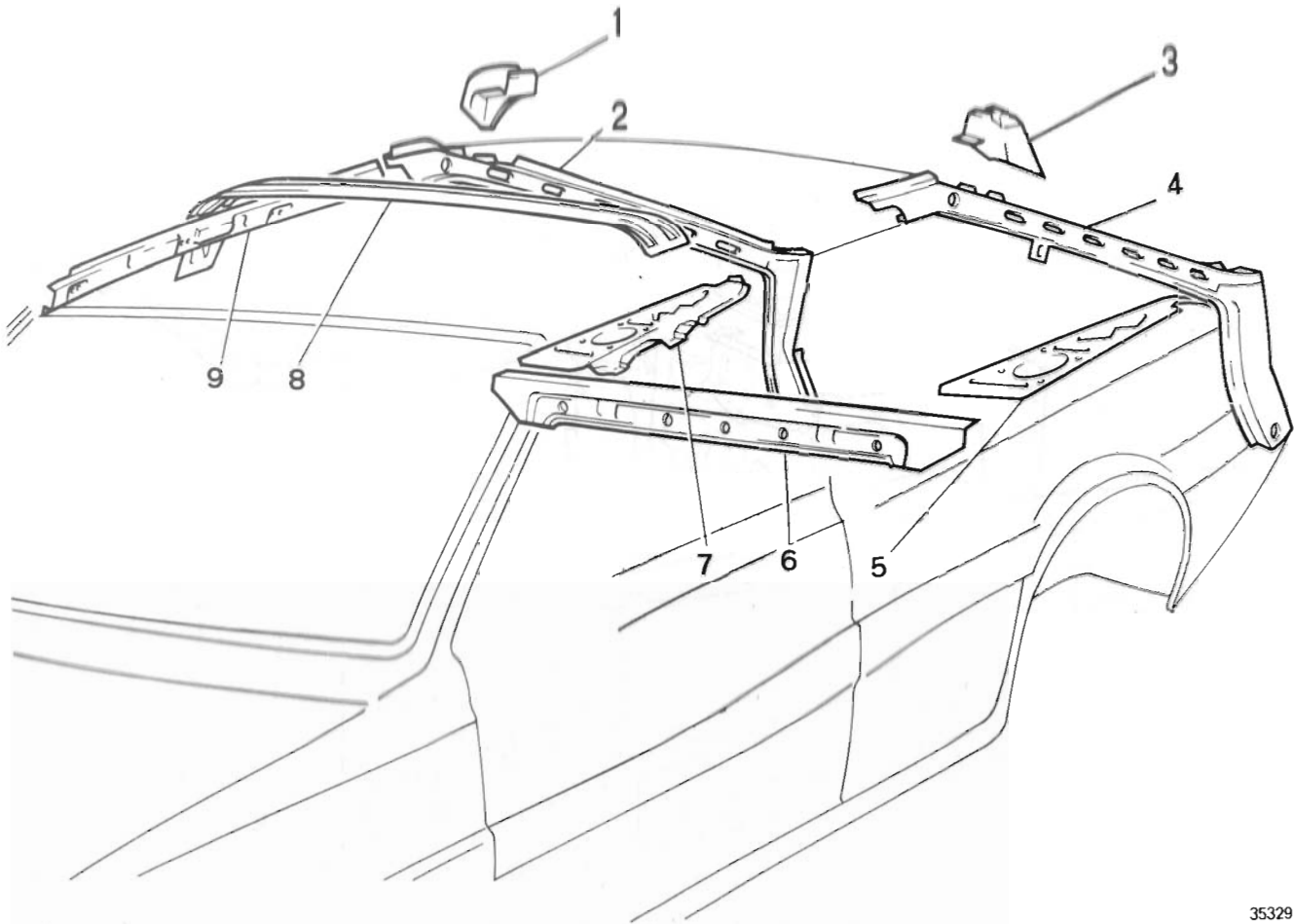
Exploded view of body front part skeleton.

- | | |
|---|--|
| 1. RH front side. | 13. Upper front cross-member shelf. |
| 2. Storage battery tray. | 14. Dashboard supporting cross-member. |
| 3. Storage battery tray bracket. | 15. LH bracket for joining front partition to front post upper part. |
| 4. Air intake seal. | 16. LH inner panel joining front partition to front post lower part. |
| 5. Front air intake. | 17. LH reinforcement joining wheel arch skeleton to side skeleton. |
| 6. Seal for LH front wheel arch upper part cover. | 18. Front partition. |
| 7. LH front wheel arch upper part cover. | 19. Cross-piece joining front partition to windscreen frame bottom part. |
| 8. LH front longeron. | 20. RH reinforcement joining wheel arch skeleton to side skeleton. |
| 9. Bumper mounting bracket. | 21. RH bracket joining front partition to front post upper part. |
| 10. LH headlight mounting frame. | |
| 11. Front longerons connecting cross-member. | |
| 12. RH headlight mounting frame. | |



35364

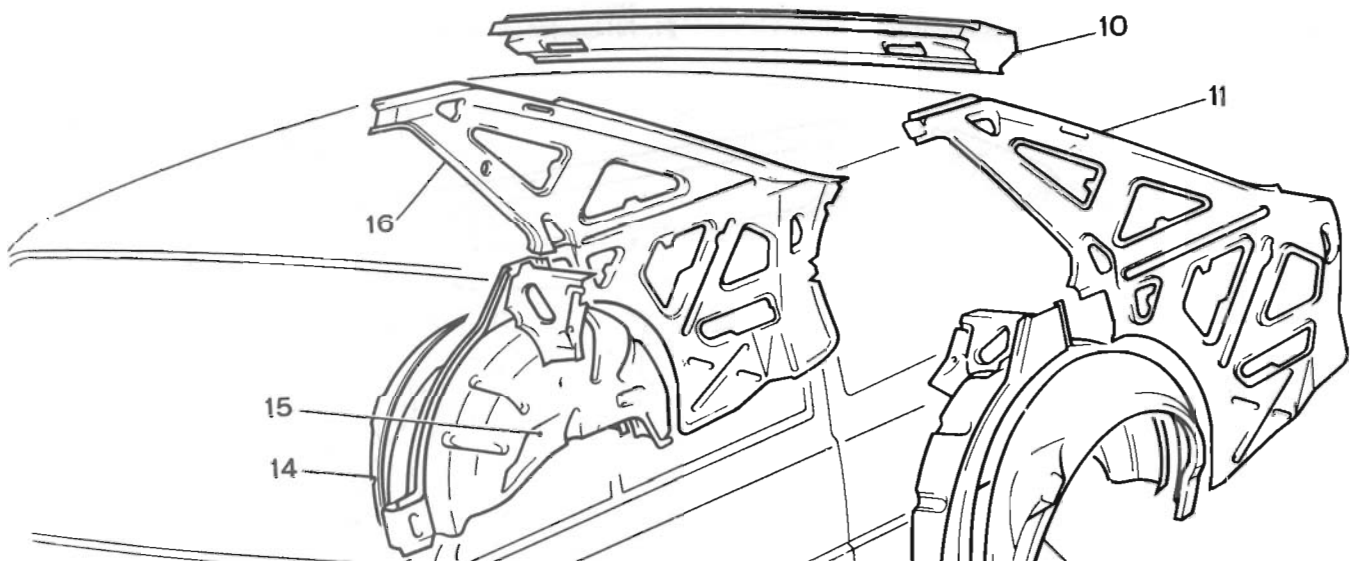
Polonez Model 1300/1500



35329

Exploded view of body rear part skeleton (5-door version).

- | | |
|--|-------------------------------|
| 1. Bracket joining tailgate opening lintel to rear inner side panel. | 9. RH roof longeron. |
| 2. RH tailgate opening side post. | 10. Tailgate opening lintel. |
| 3. Bracket joining tailgate opening lintel to rear inner side panel. | 11. LH rear inner side panel. |
| 4. LH tailgate opening side post. | 12. LH outer rear wheel arch. |
| 5. LH rear shelf supporting bracket. | 13. LH inner rear wheel arch. |
| 6. Rear seat backrest supporting cross-member. | 14. RH outer rear wheel arch. |
| 7. RH rear shelf supporting bracket. | 15. RH inner rear wheel arch. |
| 8. Roof hoop. | 16. RH rear inner side panel. |



Body – front and rear part skeleton

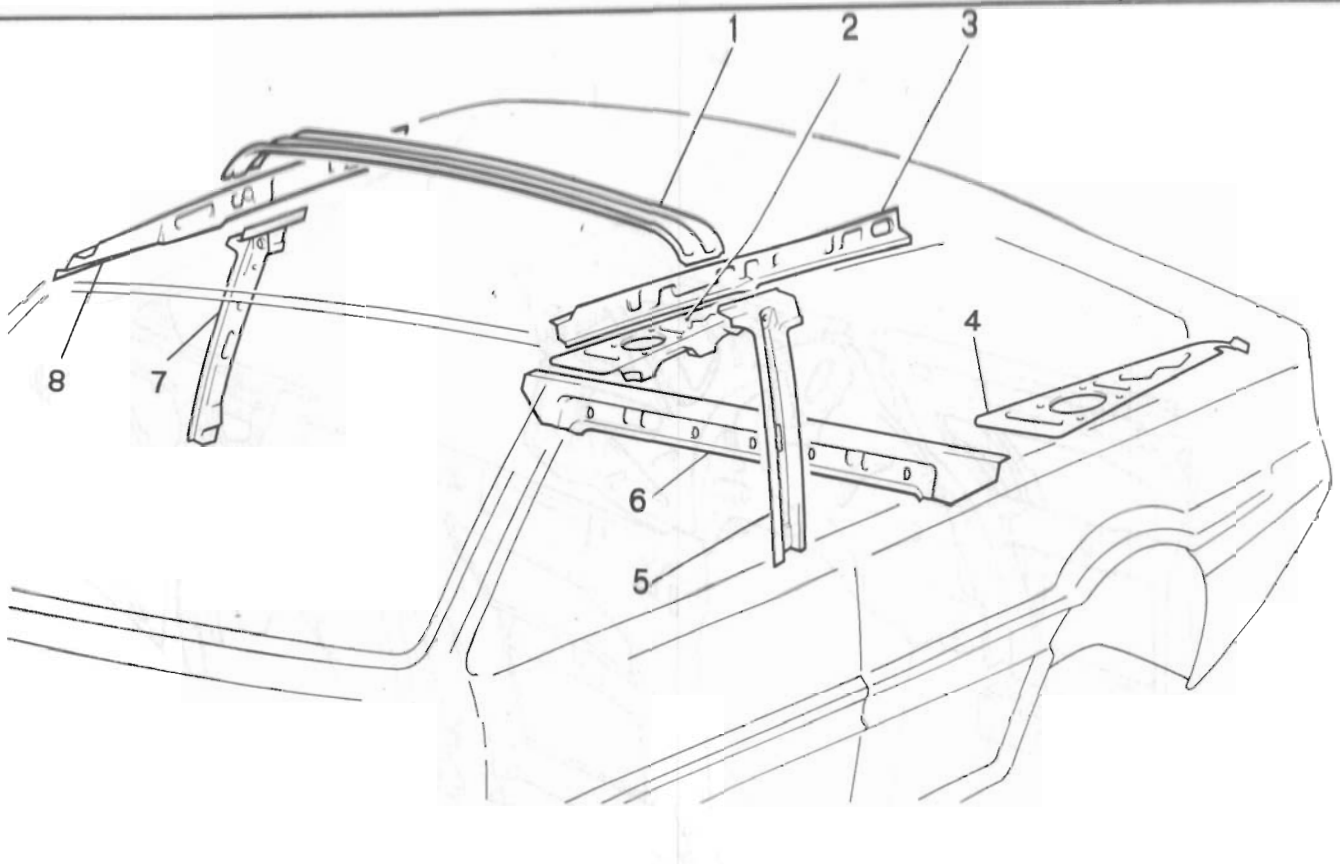
Polonez Model 1300/1500

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701.12-14

701.14/01

Sheet 2



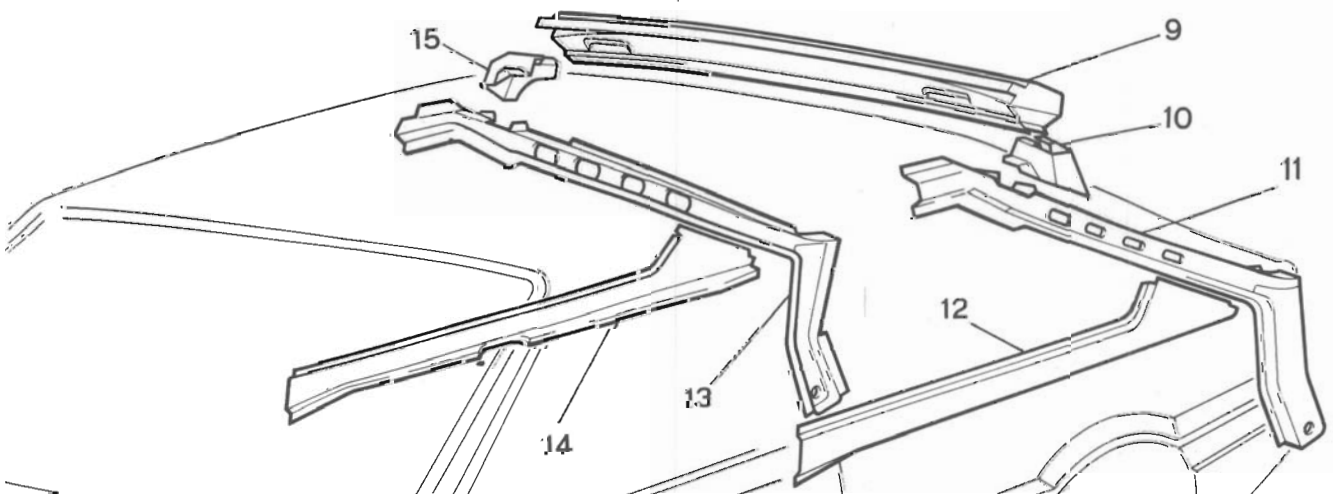
Exploded view of body rear part skeleton (3-door saloon and Coupé versions).

1. Roof hoop.
2. RH side rear shelf bracket.
3. LH roof longeron.
4. LH side rear shelf bracket.
5. LH middle post reinforcement.
6. Rear seat backrest supporting cross-member.
7. RH middle post reinforcement.
8. RH roof longeron.

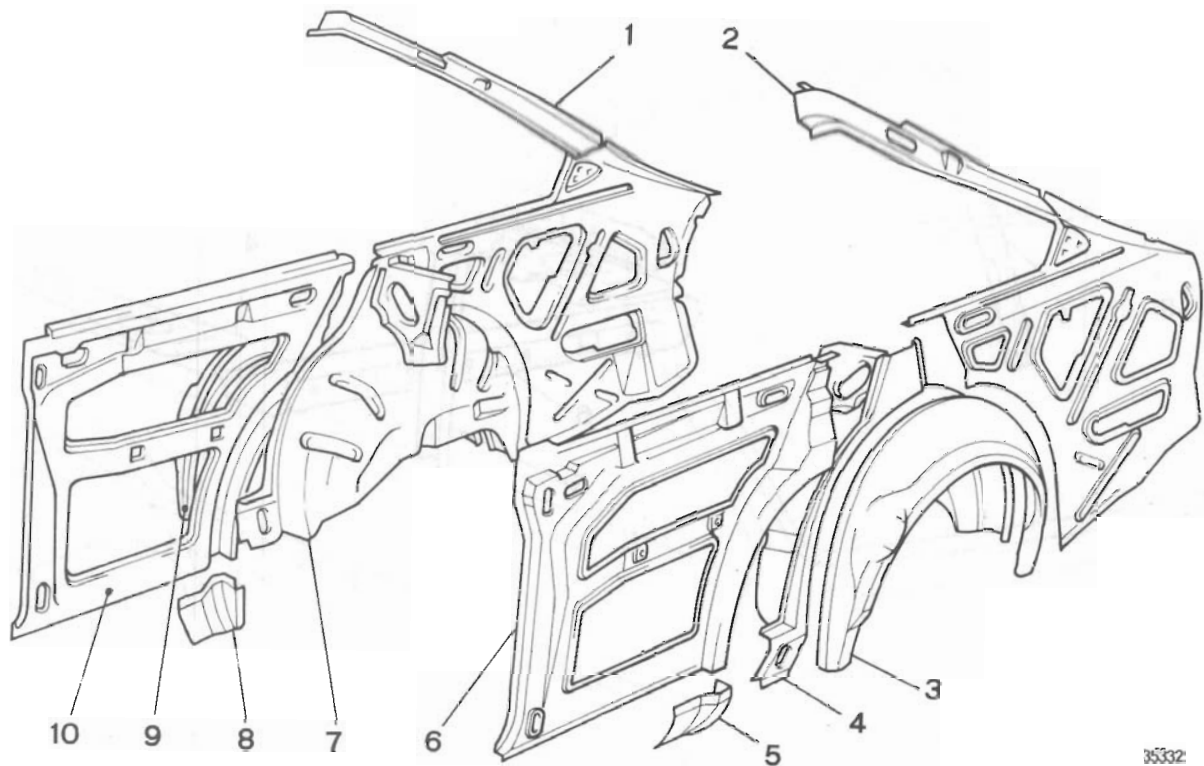
9. Tailgate opening lintel with reinforcement.
10. LH bracket joining tailgate opening lintel to rear body inner side panel.
11. LH tailgate opening side post.
12. LH rear window sill, inner.
13. RH tailgate opening side post.
14. RH rear window sill, inner.
15. RH bracket joining tailgate opening lintel to rear body inner side panel.

3-door saloon differs from the 5-door version by the following components: 3, 5, 7, 8, 11, 12, 13 and 14.

Coupé version differs from the 5-door saloon by the following components: 3, 5, 7, 8, 10, 11, 12, 13, 14, 15.



Polonez Model 1300/1500



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Exploded view of body rear part skeleton (3-door saloon and Coupé versions).

- | | |
|--|--|
| 1. RH inner side panel, rear. | 6. LH inner side panel, middle. |
| 2. LH inner side panel, rear. | 7. RH rear wheel inner arch. |
| 3. LH rear wheel outer arch. | 8. RH inner side panel bottom connector. |
| 4. LH rear wheel inner arch. | 9. RH rear wheel outer arch. |
| 5. LH inner side panel bottom connector. | 10. RH inner side panel, middle. |

Inner and outer wheel arches are identical with those of the 5-door saloon

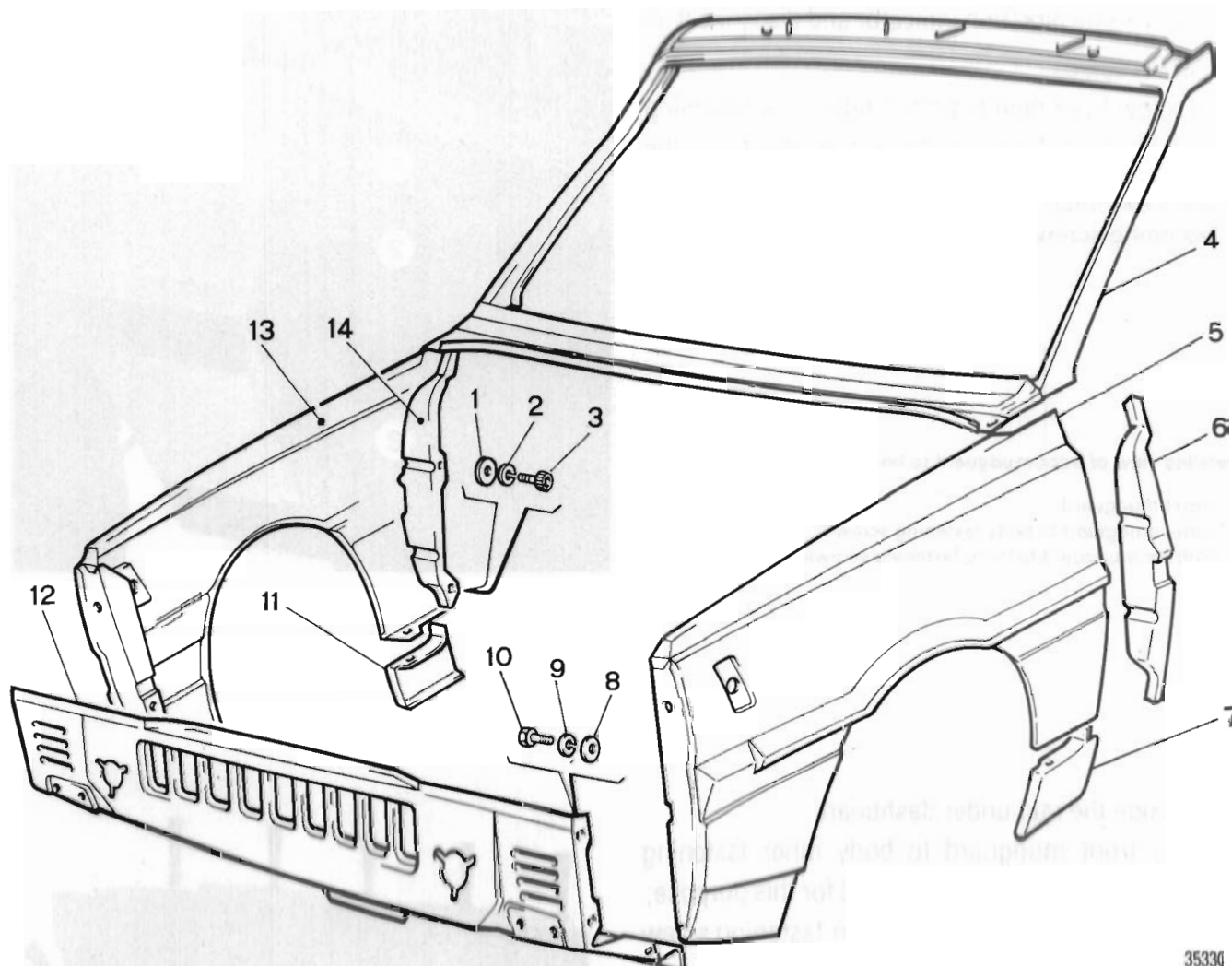
Rear (1 and 2) and middle (6 and 10) inner side panels of the Coupé version differ in design from those of the 3-door saloon.

Body – front outer panels

Polonez Model 1300/1500

701.18

Sheet 1



35330

Front outer panels.

1. Washer.
2. Lock washer.
3. RH front mudguard to body fastening bolt.
4. Windscreen frame.
5. LH front mudguard.
6. LH front mudguard to body joining bracket.
7. Front corner of LH side.

8. Washer.
9. Lock washer.
10. LH front mudguard to body fastening bolt.
11. Front corner of RH side.
12. Front valance.
13. RH front mudguard.
14. RH front mudguard to body joining bracket.

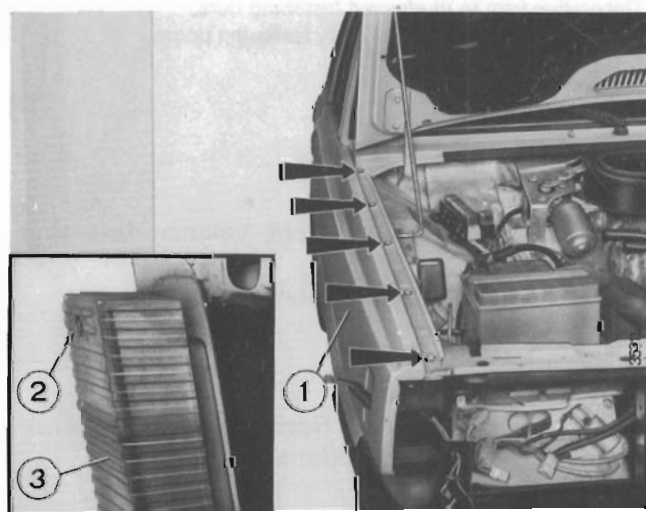
FRONT MUDGUARD

Dismounting

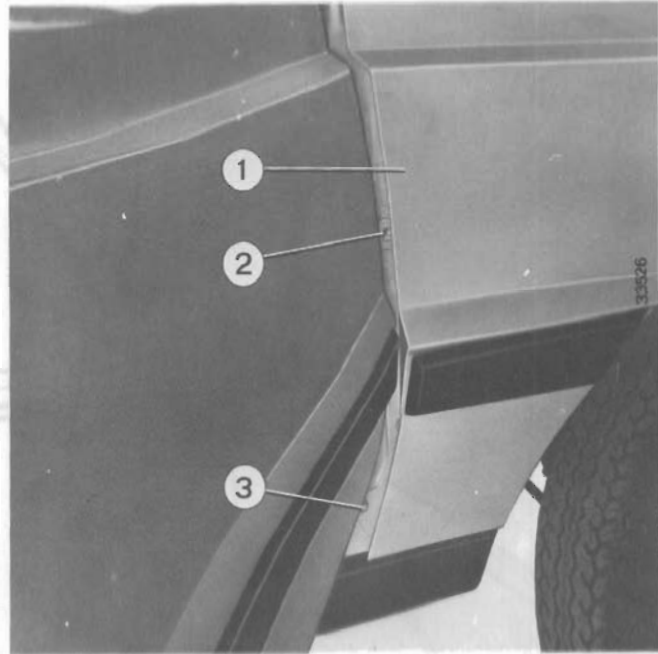
To dismount the RH front mudguard, perform the following operations:

- remove the air inlet grille (Table 703.02, Sheet 1);
- remove upper front decorative trim (Table 701.62-64, sheet 1);
- unscrew front light cluster housing and lens to body fastening screws;

Detailed view of RH front mudguard to body upper fastening.



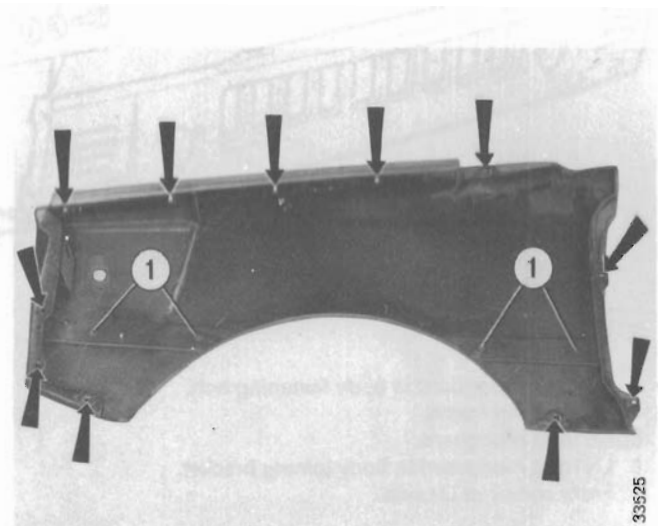
- remove side direction indicator and disconnect its electric cables;
- unscrew front mudguard to body upper fastening bolts indicated by arrows in the picture in the right-hand bottom corner of the preceding page;
- unscrew inner and bottom mudguard to body fastening screws;



Detailed view of front mudguard to body attachment.

1. Front mudguard.
2. Inner mudguard to body fastening screws.
3. Bottom mudguard to body fastening screws.

- lift aside the mat under dashboard;
- undo front mudguard to body inner fastening screw through the hole provided for this purpose;
- undo mudguard to body bottom fastening screw (item 3 in the picture above);
- unscrew wheel guard fastening nuts;



RH front mudguard after dismounting.

1. Decorative trim to mudguard fastening nuts;
- Arrows indicate mudguard to body fastening points.

- unscrew mudguard to front valance fastening bolts;
- remove mudguard in a suitable manner.



Reassembly

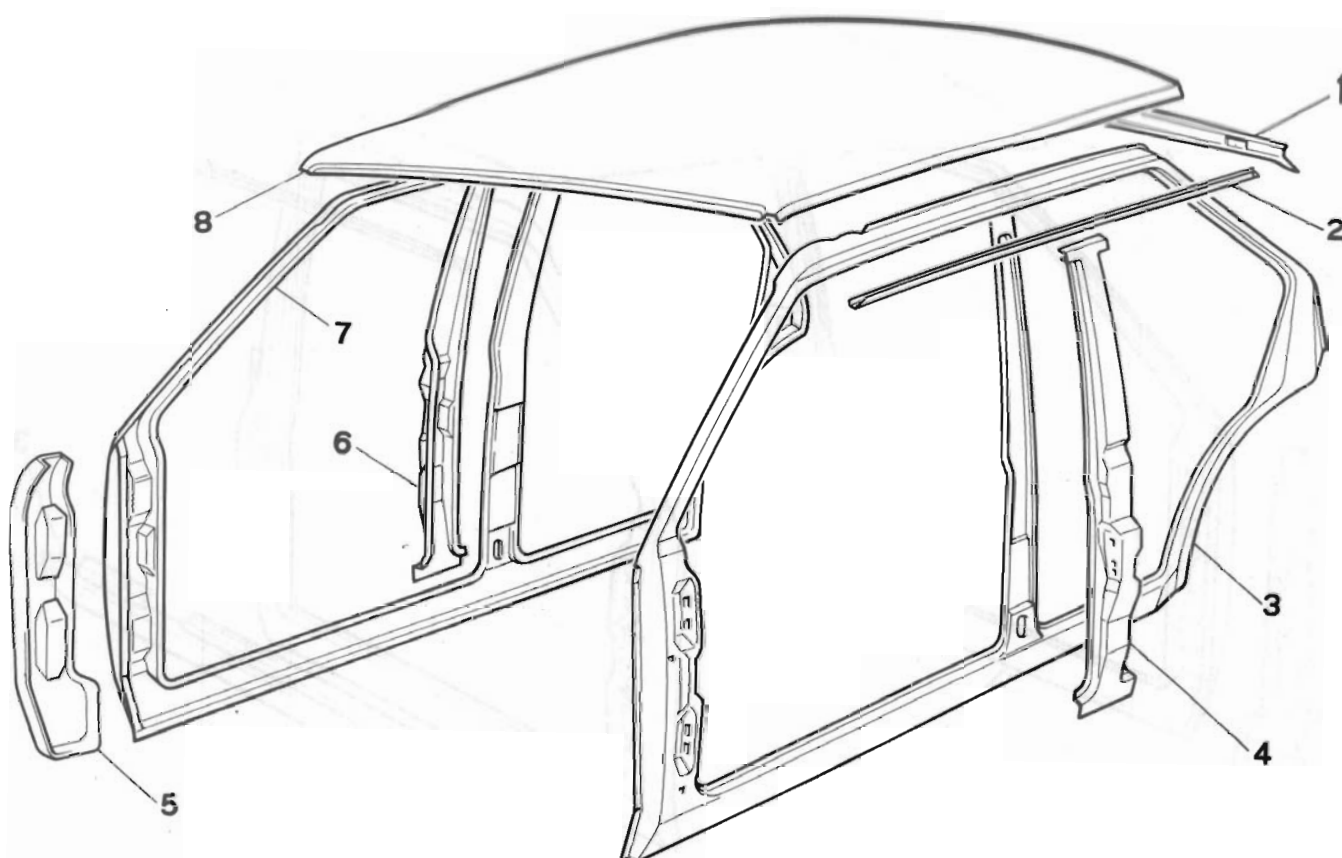
Body – middle and rear outer panels

Polonez Model 1300/1500

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701.19-20
701.20/01

Sheet 1

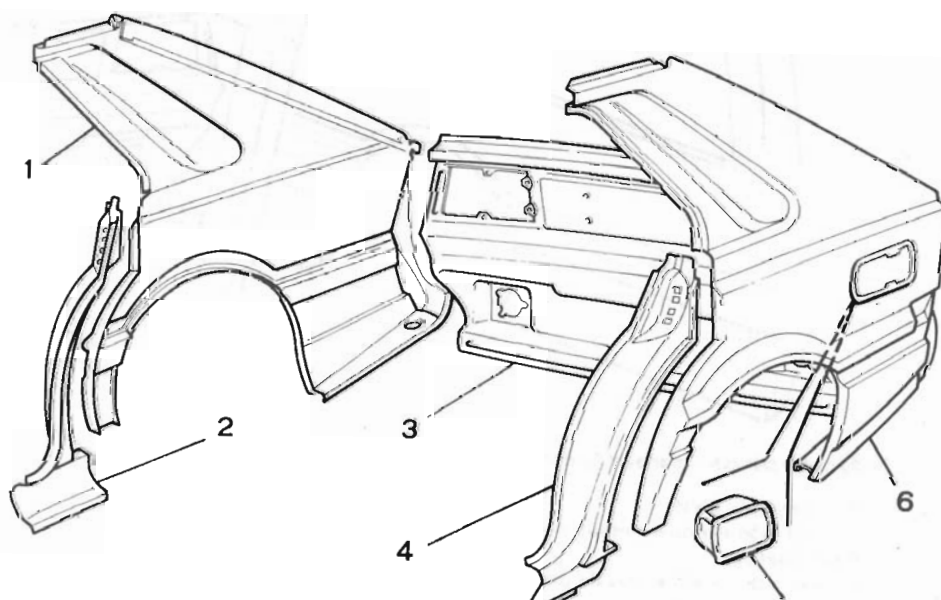


35331

Body outer panels – middle part (5-door saloon).

1. Gutter over tailgate opening.
2. LH roof gutter.
3. LH body side.
4. LH centre post.

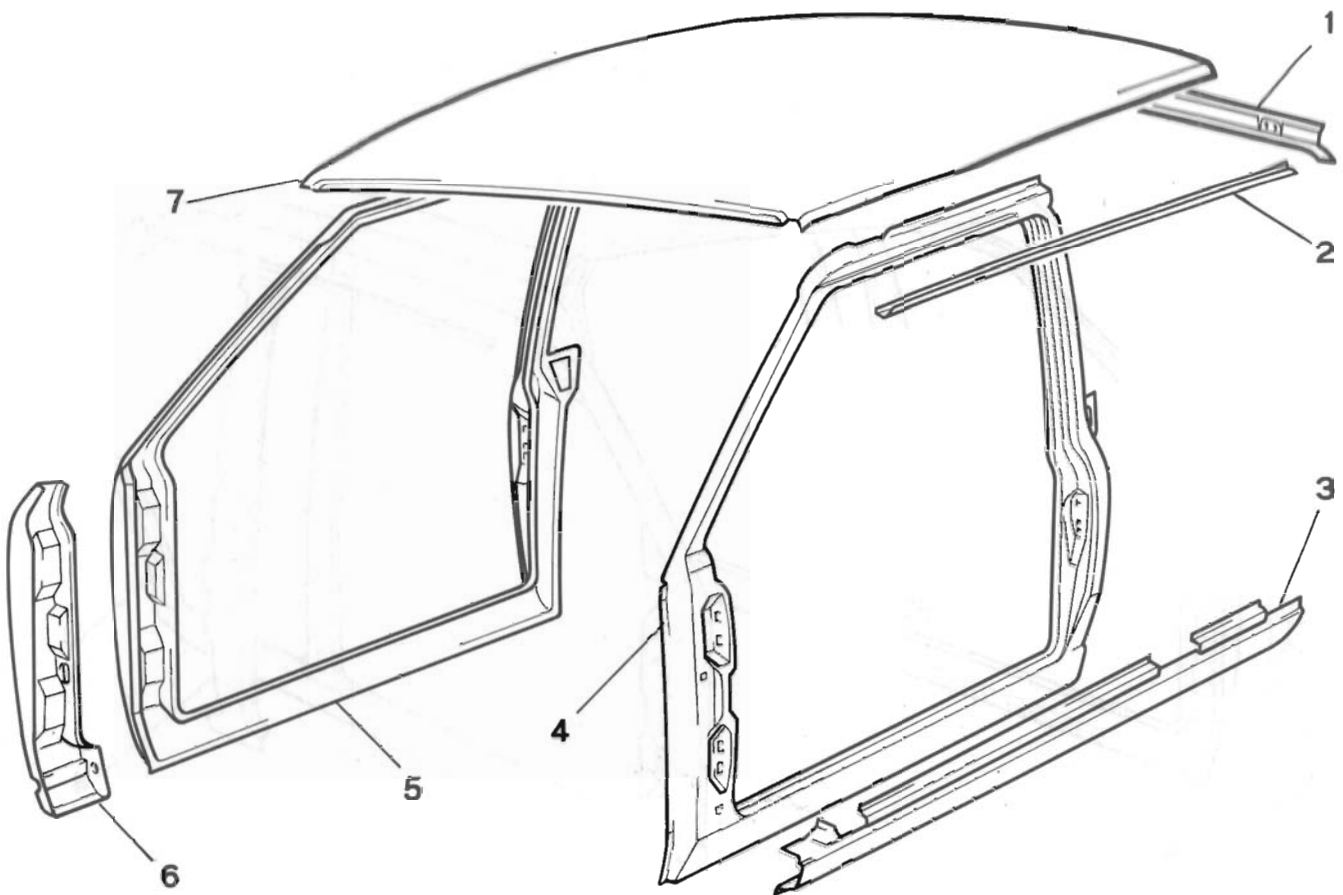
5. RH front post.
6. RH centre post.
7. RH body side.
8. Roof panel.



Body outer panels – rear part (5-door saloon).

1. RH rear mudguard.
2. RH rear mudguard to door frame linking bracket.
3. Rear valance.
4. LH rear mudguard to door frame linking bracket.
5. Fuel tank inlet pipe.

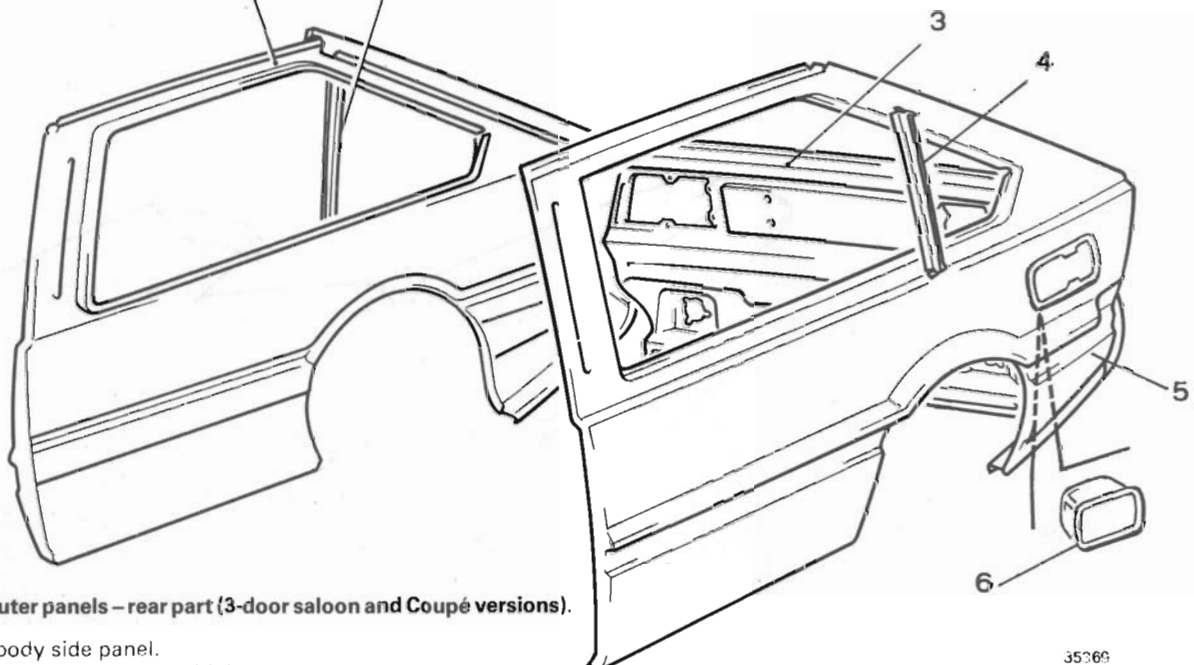
Polonez Model 1300/1500



35333

Body outer panels – middle part (3-door saloon and Coupé versions).

- | | |
|----------------------------------|-------------------------------|
| 1. Gutter over tailgate opening. | 5. RH body side – front part. |
| 2. LH roof gutter. | 6. Front post. |
| 3. Sill covering. | 7. Roof panel. |
| 4. LH body side – front part. | |



Body outer panels – rear part (3-door saloon and Coupé versions).

- | |
|-------------------------------------|
| 1. RH body side panel. |
| 2. RH rear side window middle post. |
| 3. Rear valance. |
| 4. LH rear side window middle post. |
| 5. LH body side panel. |
| 6. Fuel tank inlet recess. |

35369

NOTE – Rear valance (3) is the same as for 5-door saloon.

Front door – windows

Połonez Model 1300/1500

FRONT DOOR

Dismounting

To dismount the front door, perform the following operations:

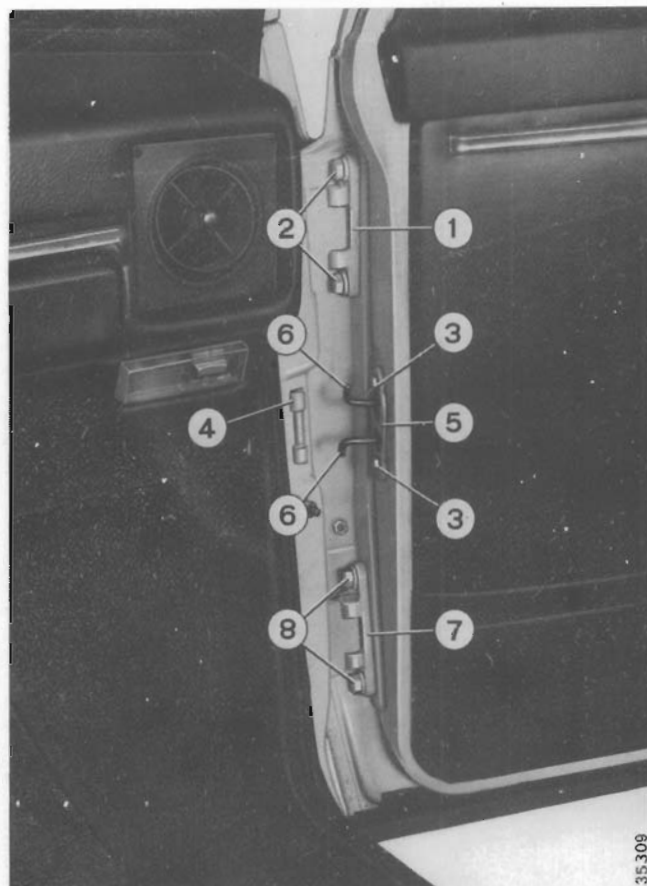
- disconnect door opening angle limiter (6) from its hinge (4);
- unscrew upper and lower hinge to door fastening bolts (2 and 8);

For door reassembling, the above described operations must be suitably reversed.

The door should fit snugly in the door opening. If required, door position may be corrected by performing the following operations:

RH front door hinges.

1. Upper door hinge.
2. Upper door hinge fastening bolts.
3. Door opening angle limiter plate fastening bolts.
4. Door opening angle limiter hinge.
5. Door opening angle limiter plate.
6. Door opening angle limiter.
7. Lower door hinge.
8. Lower door hinge fastening bolts.



NOTE – Prior to adjusting door position in both directions, mark the initial position so that the amount of change can be measured.

Front door longitudinal adjustment

- dismount the front mudguard (see Table 701.18, sheet 1);
- loosen upper and lower hinge to body fastening bolts;
- adjust door position as required and tighten the previously loosened bolts.

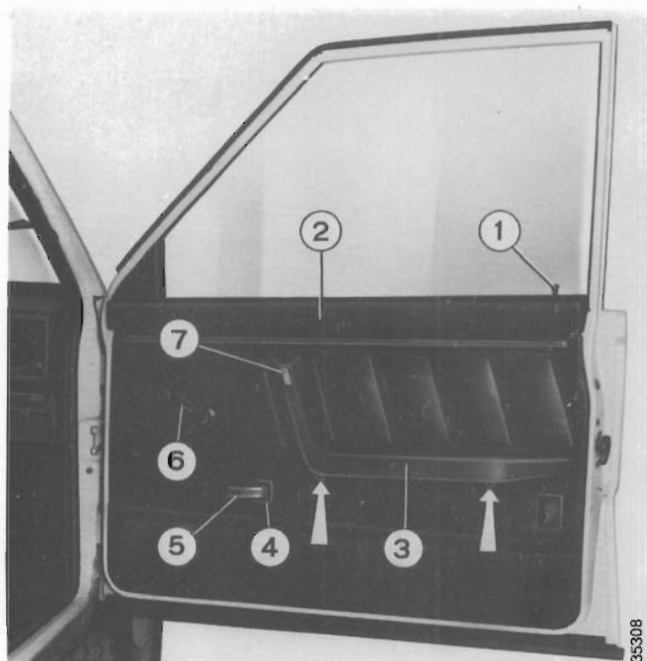
Front door lateral adjustment

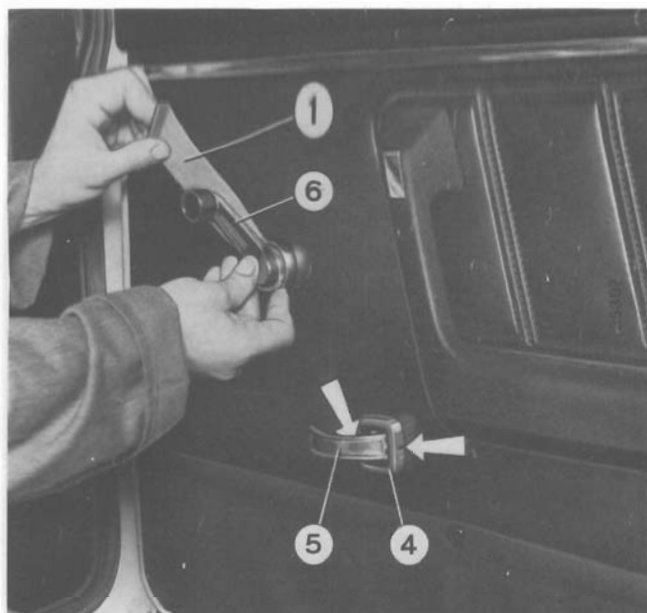
- loosen hinge to body fastening bolts;
- insert the requisite number of spacer shims between hinge and body and retighten the bolts.

RH front door assembly.

1. Push-button of door lock.
2. Inner window sill.
3. Arm rest.
4. Inner handle trim.
5. Inner handle.
6. Window operating crank.
7. Arm rest fastening screw trim.

Arrows indicate location of arm rest fastening screws.





Dismounting window operating crank.

1. A.78034 device.
4. Inner handle decorative trim.
5. Inner handle.
6. Window operating crank.

Arrows indicate two slots to receive screwdriver flat end for dismounting inner handle decorative trim.

Front door wind-down window

Dismounting

To dismount the front door wind-down window, perform the following operations:

- dismount window winding crank with the use of A.78034 device;
- remove inner handle decorative trim;
- remove arm rest;
- remove door upholstery panel held by snap fasteners on the periphery;
- unscrew window bottom trough to winding gear fastening bolts (3);
- unscrew two screws (item 5 in the picture below) fastening window rear guide to door;
- remove the window pane together with bottom trough via upper door opening.

Reassembly

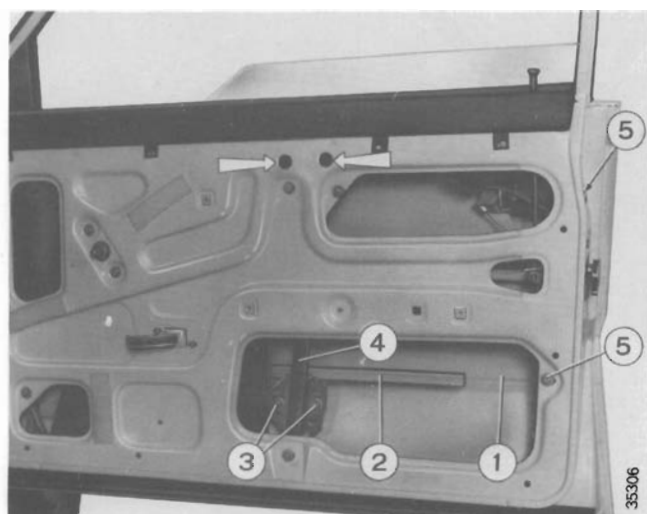
To reassemble front door wind-down window, reverse suitably the operations described above.

Window winding gear

Dismounting

To dismount window winding gear, perform the following operations:

- remove door upholstery;
- unscrew window bottom trough to winding gear fastening screws (3);
- raise the window completely;
- undo screws (5);
- remove window winding gear via lower door opening.



RH front door with upholstery removed.

1. Wind-down window pane.
2. Wind-down window bottom trough.
3. Window bottom trough to winding gear fastening screws.
4. Window winding gear.
5. Window rear guide to door fastening screws.

Arrows indicate opening giving access to screws (5) fastening window bottom trough to winding gear.

Front door – windows

Polonez Model 1300/1500

701.29-30

701.30/01

Sheet 2

Reassembly

To reassemble the window winding gear, reverse suitably the above described operations.

FRONT AND REAR GUIDES

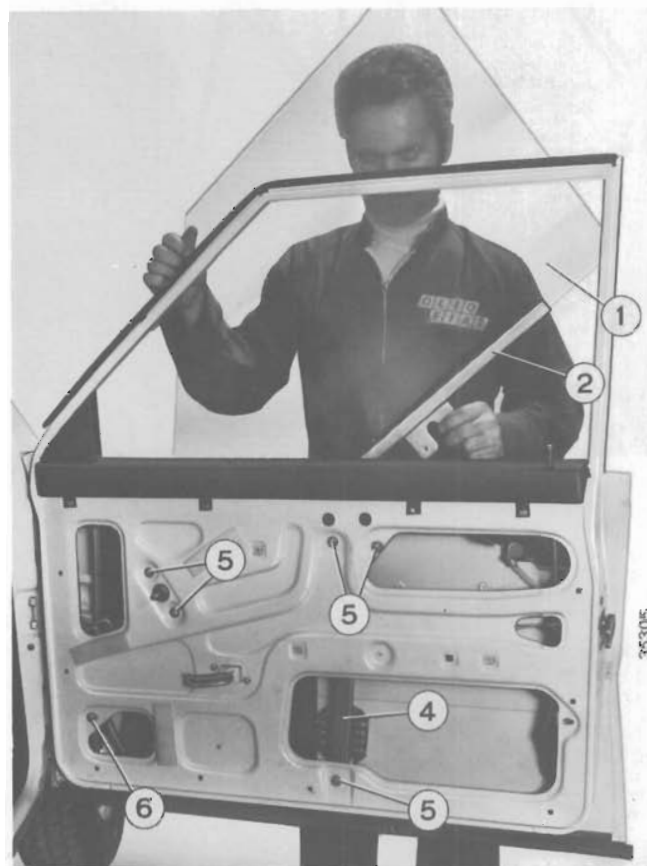
Dismounting

To dismount front and rear guides of the wind-down window, perform the following operations:

- remove the pane;
- dismount inner window sill (see table 701.32–33, sheet 1);
- unscrew guide fastening screws (marked with number 6 and indicated by arrows);
- remove both guides with their seals.

Dismounting the wind-down window pane:

1. Wind-down window pane.
2. Wind-down window pane bottom trough.
4. Window winding gear.
5. Window winding gear to door fastening screws.
6. Front guide to door fastening screw.

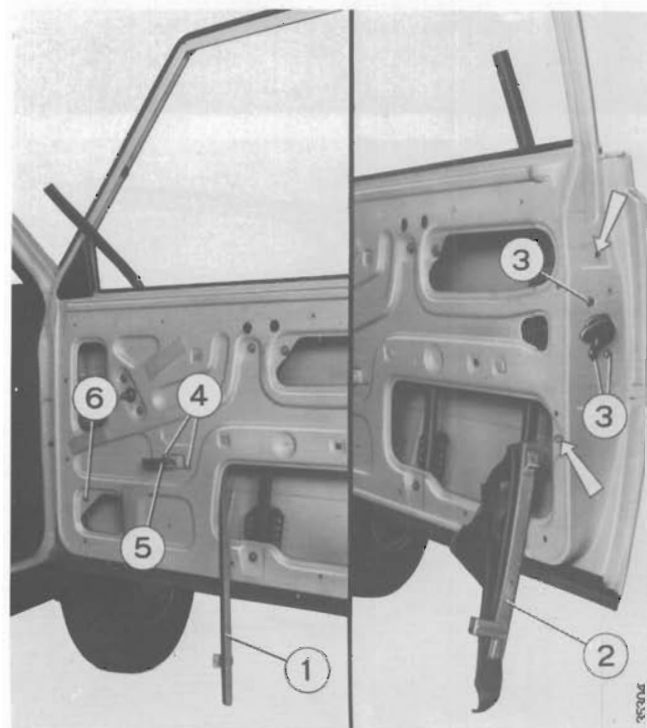


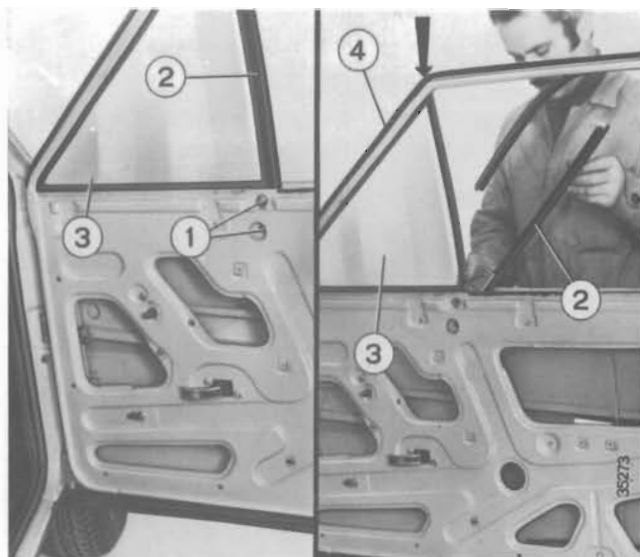
Reassembly

To reassemble the wind-down window guides, reverse suitably the above described operations.

Dismounting wind-down window guides.

1. Front guide with seal.
 2. Rear guide with seal.
 3. Lock to door fastening screws.
 4. Inner handle to door fastening screws.
 5. Inner door handle.
 6. Holes for front guide to door fastening screws.
- Arrows indicate holes for rear guide (2) to door fastening screws.





SIDE DOOR WIND-DOWN WINDOW

Dismounting

To dismount side door wind-down window, perform the following operations:

- remove door upholstering panel,
- remove inner window sill;
- unscrew window operating cable plate to window bottom trough fastening screws;

Dismounting window dividing stanchion.

1. Window dividing stanchion to door fastening screws.
2. Window dividing stanchion.
3. Fixed window.
4. Door frame upper seal.

Arrow indicates stanchion to window frame upper fastening screw.



- dismount front and rear window guides;
- unscrew dividing stanchion to door frame fastening screw;
- remove window seals;
- unscrew dividing stanchion to door fastening screws (item 1 in the upper picture);
- remove the stanchion;
- remove the window via door top part.

Dismounting the wind-down window pane.

2. Wind-down window pane.
3. Fixed window pane.



Reassembly

To reassemble the front door wind-down window, reverse suitably the above described operations.

FIXED WINDOW PANE

To dismount the fixed window pane, perform the operations described above, save for removing the wind-down window rear guide and pane which should be wound down instead.

Dismounting the fixed window pane.

2. Wind-down window pane.
3. Fixed window pane.

Front door – windows

Polonez Model 1300/1500

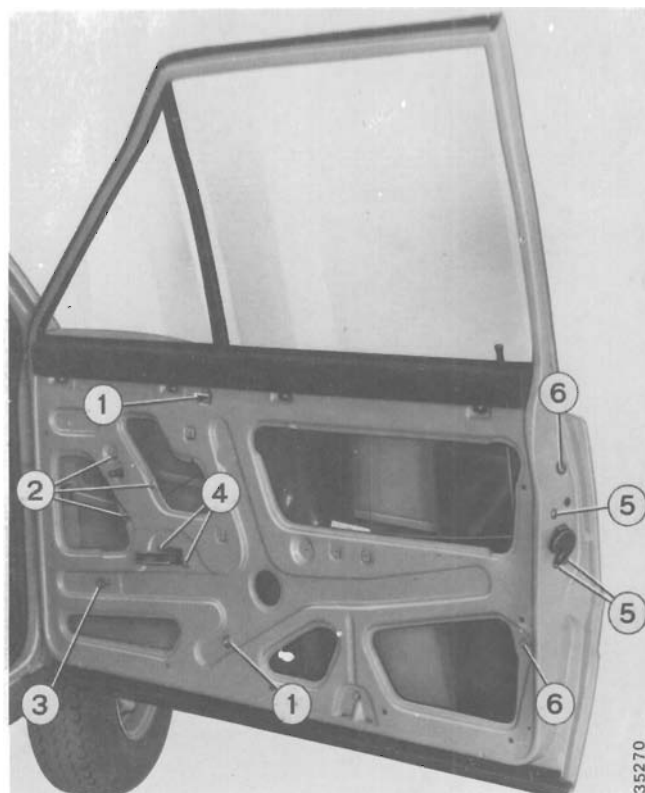
WIND-DOWN WINDOW GUIDES

To dismount wind-down window rear and front guides, perform the following operations:

- remove door upholstery panel;
- unscrew front and rear guide to door fastening screws (1 and 6);
- remove both window guides from the door.

RH front door with upholstering panel removed.

1. Front guide to door fastening screws.
2. Window winding gear to door fastening screws.
3. Cable guide sheave to door fastening screw.
4. Inner handle to door fastening screws.
5. Lock to door fastening screws.
6. Rear guide to door fastening screws.



Window winding gear

To dismount the winding gear, first remove door upholstery and disconnect the operating cable from the window, and then perform the following operations:

- loosen cable tensioning sheave to door fastening screw (3);

- unscrew window winding gear to door fastening nuts (2);
 - dismount operating cable from guide sheaves and remove window winding gear from the door.
- Prior to reassembling the winding gear in the door, wind the operating cable on its drum and immobilise it with wooden blocks.



Front door – locks

Polonez Model 1300/1500

701.31

Sheet 1

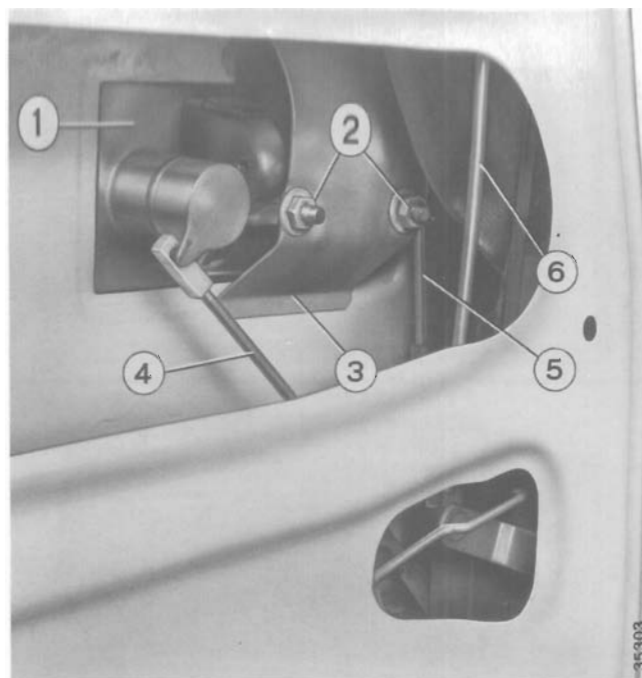
Outer and inner door handles

To dismount outer and inner door handles, perform the following operations:

- wind up the window;
- remove door upholstering panel;

Outer handles to door fastening.

1. Outer handle.
2. Outer handle to door fastening screws.
3. Bracket.
4. Link for door locking with key.
5. Link for door opening with handle.
6. Link for door locking from inside.



35303

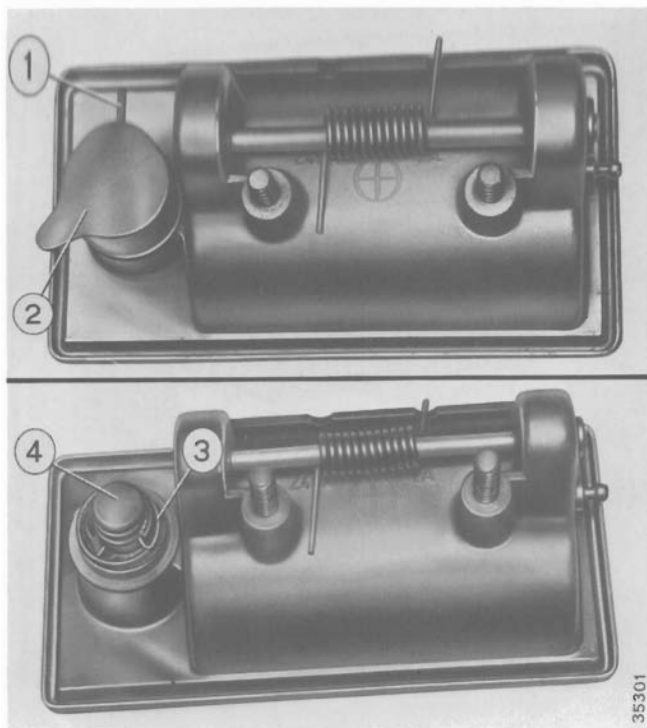
- disconnect from lock opening link (5) and internal locking link (6);
- disconnect link (4) for locking with key from outer handle lever;
- unscrew outer handle to door fastening nuts (2) via bracket (3) which should be removed;
- dismount outer handle;
- unscrew rear window guide to door fastening screws;
- push off rear window guide from the lock;
- unscrew inner handle and lock to door fastening screws;
- remove lock with inner handle and handle link via the opening in door bottom part.

Dismounting inner handle, lock and link.

1. Inner handle.
2. Handle to door connecting link.
3. Lock.



35302



Replacement of lock barrel

After dismantling the outer handle, use a suitable punch to remove dowel (1) securing lever (2), then remove lock barrel spring (3) with appropriate pliers. Take out the barrel from outside.

If the door does not open and close properly, adjust the position of door catch, by unscrewing the fastening screws (1 and 3) and arranging the catch as required.

Dismounting lock barrel from door outer handle.

1. Dowel securing the lever for locking the door with a key.
2. Lever for locking the door with a key.
3. Barrel spring.
4. Lock barrel.



It is recommended to mark the original position of catch to make it possible for the amount of shift to be estimated.

Front door catch.

1. Front door catch fastening screws.
2. Door catch.
3. Catch inner plate to body fastening screw.

Front door – seals, trim, upholstery

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701.32-33

Sheet 1

Chromium-plated decorative trim

Remove, with the use of a screwdriver, the triangular plate then detach the moulding and slide it out.

Seals

To dismount seals, remove internal window sill and chromium-plated decorative moulding, then remove seals.

Dismounting lower chromium-plated decorative moulding.

1. Chromium-plated decorative moulding.
2. Outer window seal.



Window frame decorative trims

These are dismounted with the use of **A.78018** device as shown in the picture opposite.



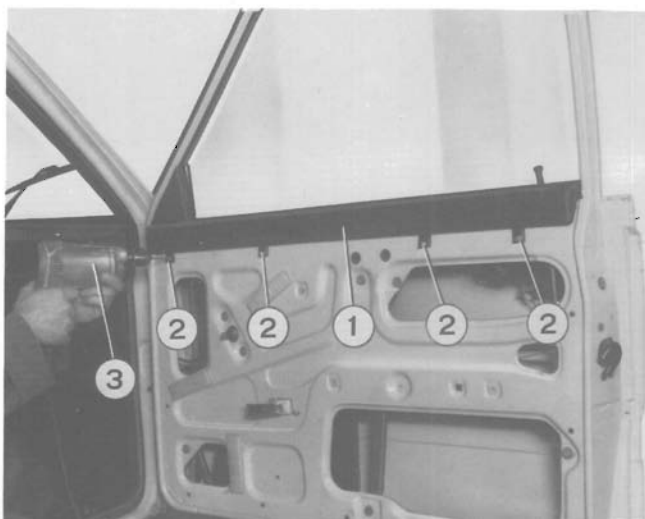
Dismounting window frame decorative trim.

1. **A.78018** device.
2. Window frame outer decorative trims.

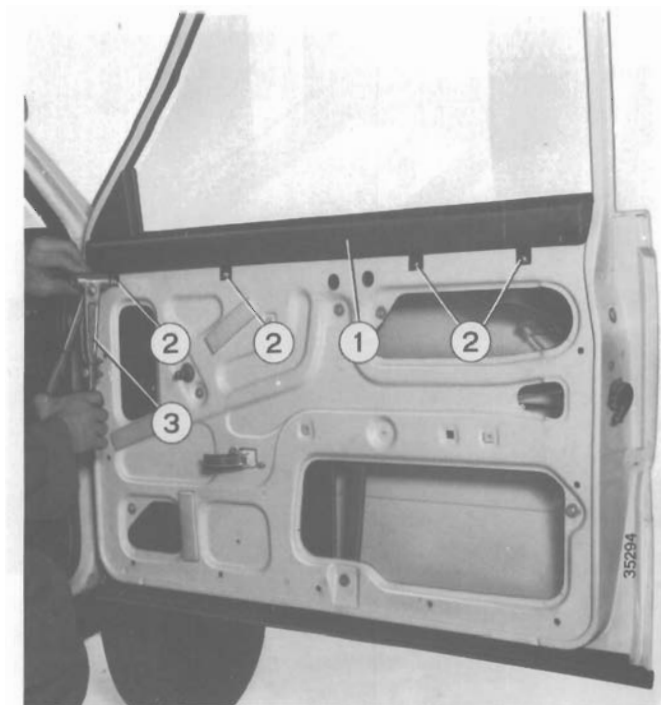
WINDOW SILL

Dismounting

To dismount window sill, use an electric drill to drill holes in the centre of sill catches to door inner panel fastening rivets, and remove the knob for locking the door from inside with its link.



Removing rivets fastening window sill catches to door inner panel



Reassembly

Use **A.78023** tongs to set new window sill to door inner panel fastening rivets.

Setting window sill to door inner panel fastening rivets.

1. Inner window sill.
2. Sill to door inner panel fastening rivets.
3. **A.78023** tongs.

Rear door – windows and locks

701.37.38

Polonez Model 1300/1500

Sheet 1

REAR DOOR

Dismounting

To dismount rear door, perform the following operations:

- remove door opening angle limiter from its hinge;
- unscrew upper and lower hinge to door post fastening screws (2 and 6).

Reassembly

To reassemble rear side door, reverse suitably the above described operations.

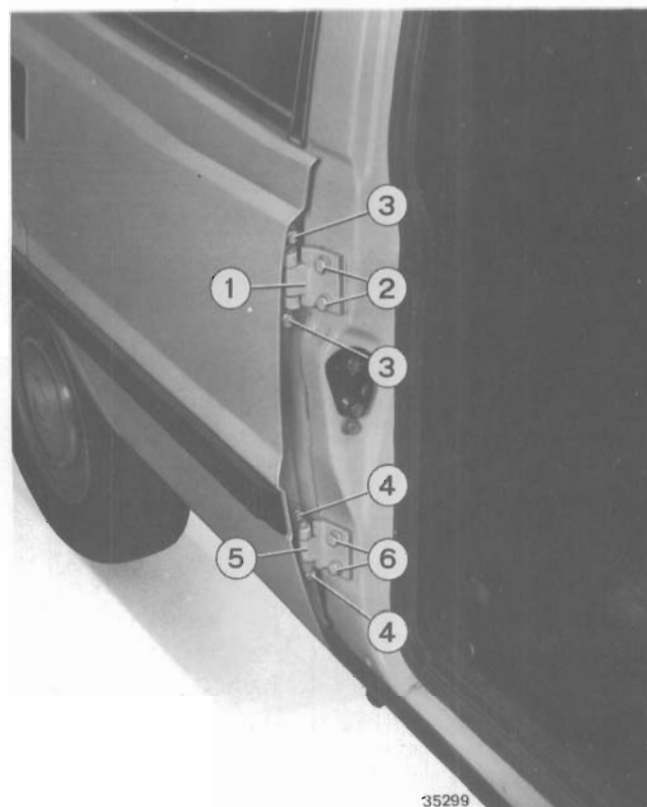
The door should fit snugly in the opening. If need be, its position may be adjusted as follows:

Door position adjustment in longitudinal direction

- Loosen upper and lower hinges to middle post fastening screws (2 and 6) and adjust door position as required.

Door position adjustment in lateral direction

- Loosen hinges to post fastening screws (2 and 6);
- adjust door position by inserting spacer shims between post and hinges, and retighten the screws.



35299

Rear door hinges.

1. Upper rear door hinge.
2. Upper rear door hinge to middle post fastening screws.
3. Upper hinge to door fastening screws.
4. Lower hinge to door fastening screws.
5. Lower rear door hinge.
6. Lower hinge to middle post fastening screws.

WIND-DOWN WINDOW PANE

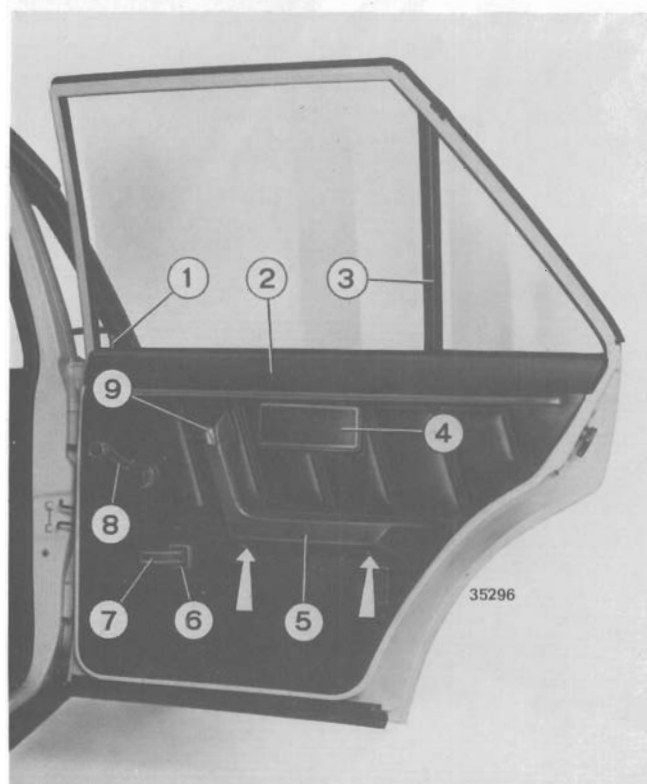
Dismounting

To dismount rear door wind-down window pane, perform the following operations:

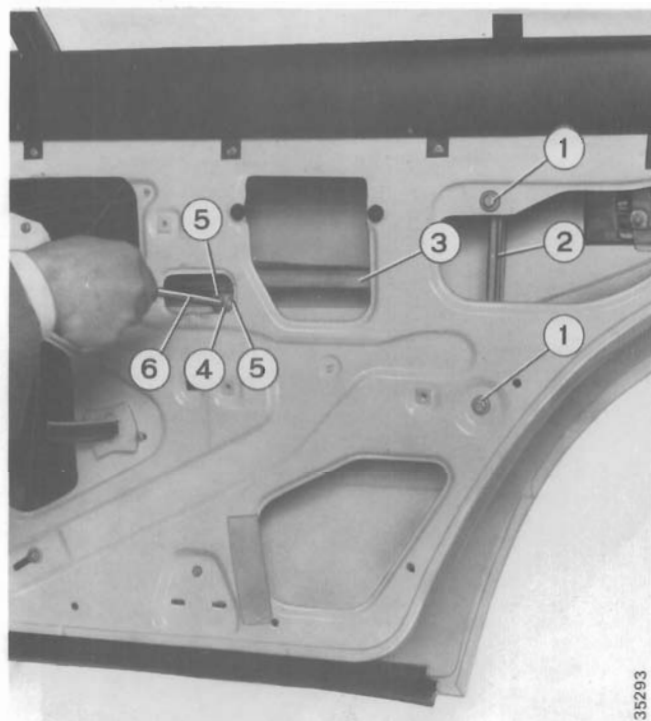
- dismount window actuating crank with the use of A.78034 device;

RH rear door.

1. Inner door locking knob.
 2. Inner window sill.
 3. Pane dividing stanchion.
 4. Ash tray.
 5. Arm rest.
 6. Inner handle decorative trim.
 7. Inner handle.
 8. Window operating crank.
 9. Arm rest to door fastening screw decorative trim.
- Arrows indicate the location of arm rest to door fastening screws.



35296



- remove inner handle decorative trim;
- remove arm rest;
- extract ash tray and undo two screws fastening its housing to the door;
- remove door upholstery panel;
- undo screws (5) fastening window operating cable to window lower trough fixing plate;
- remove window sill;
- undo screws (item 1 in the picture) fastening the window rear guide;
- partly remove outer seal from the door frame;

Dismantling window operating cable to window lower trough fixing plate.

1. Window rear guide to door fastening screw.
2. Window rear guide.
3. Lower trough of window pane.
4. Operating cable to lower trough fixing plate.
5. Fixing plate (4) to lower trough fastening screws.
6. Philips screwdriver.

- unscrew window dividing stanchion to window frame fastening screw;
- remove the fixed window pane;
- remove the wind-down window pane.

Reassembly

To reassemble the wind-down window pane, reverse suitably the above described operations.

FIXED WINDOW PANE

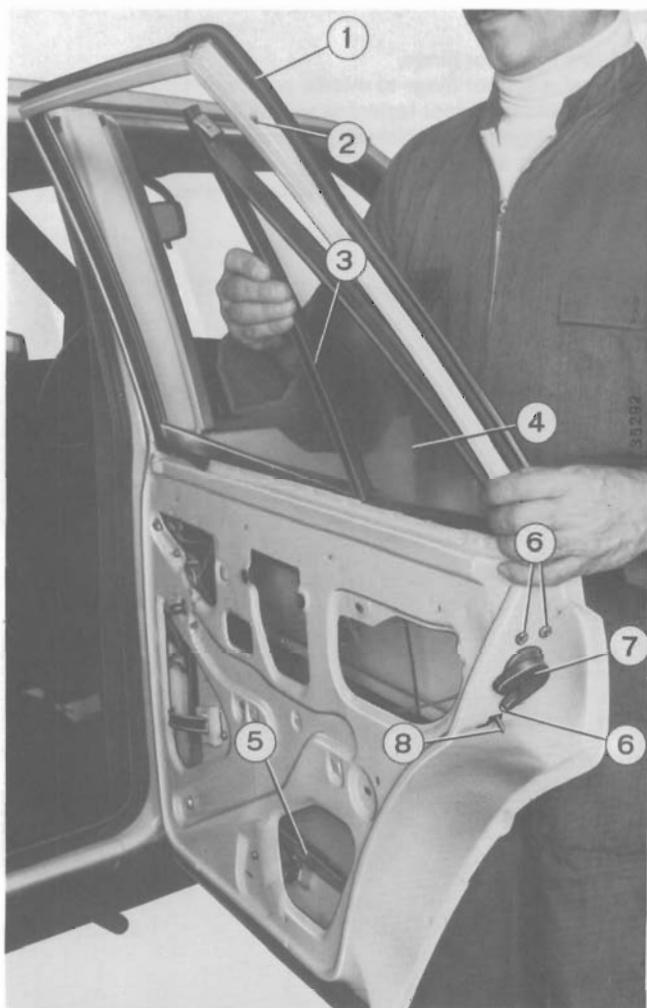
To dismantle the fixed window pane, perform the same operations as for dismantling the wind-down window.

WIND-DOWN WINDOW REAR GUIDE

To dismantle the wind-down window rear guide, remove door upholstery and wind the window completely down, then undo screws (1) fastening the guide (2) to door.

Dismounting rear window fixed pane.

1. Door outer sealing strip.
2. Hole for window dividing stanchion fastening screw.
3. Window dividing stanchion.
4. Fixed window pane.
5. Wind-down window pane.
6. Lock fastening screws.
7. Door lock.
8. Lever locking the door against inadvertent opening from the inside by children.



Rear door – windows and locks

Polonez Model 1300/1500

701.37.38

Sheet 2

Window winding gear

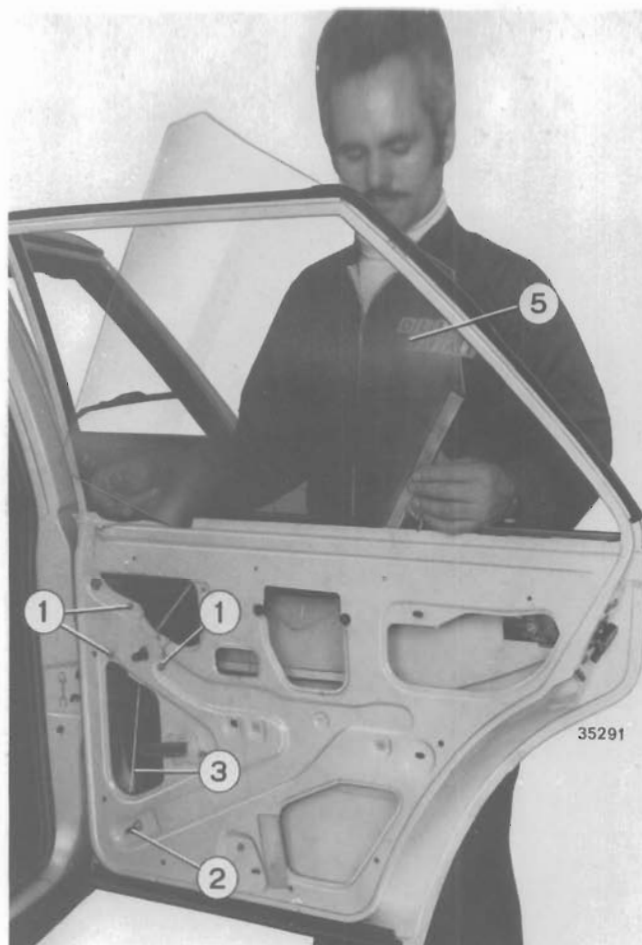
To dismount window winding gear from the door, perform the following operations:

- remove door upholstery panel;
- unscrew window winding gear cable plate to window lower trough fastening screws;
- loosen lower cable tensioning sheave to door fastening nut (2);
- unscrew window winding gear to door fastening nuts (1);
- take off the cable from upper and lower guide sheaves and remove the window winding gear.

Prior to reassembling the window winding gear, wind the operating cable on its drum and immobilise it with wooden blocks. After reassembly, tension the cable by suitably positioning the lower sheave and fixing it by tightening nut (2).

Dismounting wind-down window pane.

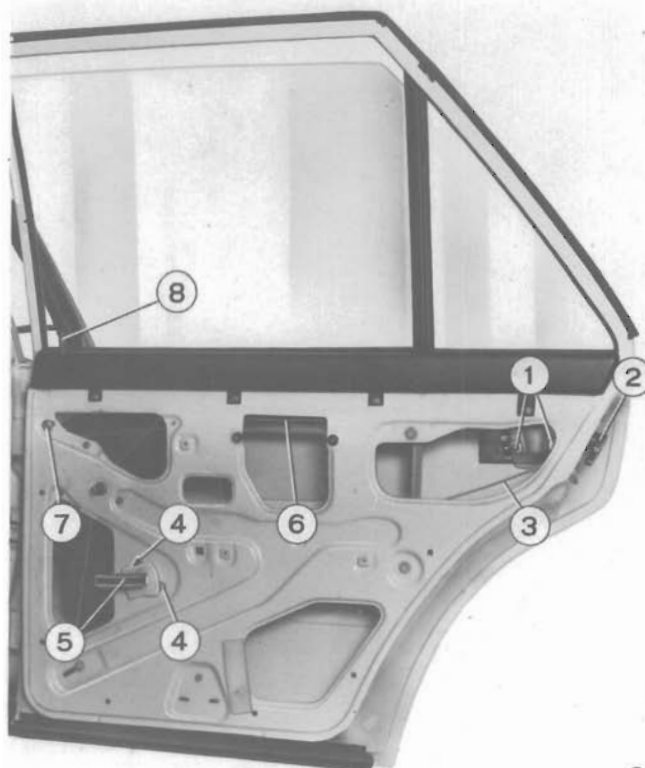
1. Window winding gear to door fastening nuts.
2. Winding gear cable tensioning sheave fastening nut.
3. Winding gear cable.
5. Wind-down window pane.



Inner handle

In order to dismount the inner handle and handle to inner locking lever connecting link, perform the following operations:

- remove door upholstering panel;
- unscrew door locking link fastening nut (7);
- remove outer handle;
- unscrew inner handle and lock to door fastening screws;
- take out of the door inner handle, link (3) and lock.



RH rear door with upholstering panel removed.

1. Outer handle to door fastening nuts.
2. Door lock.
3. Inner handle to lock connecting link.
4. Inner handle to door fastening screws.
5. Inner handle.
6. Inner door locking lever to lock connecting link.
7. Inner locking mechanism to door fastening nut.
8. Inner locking knob.



Tailgate – window and lock

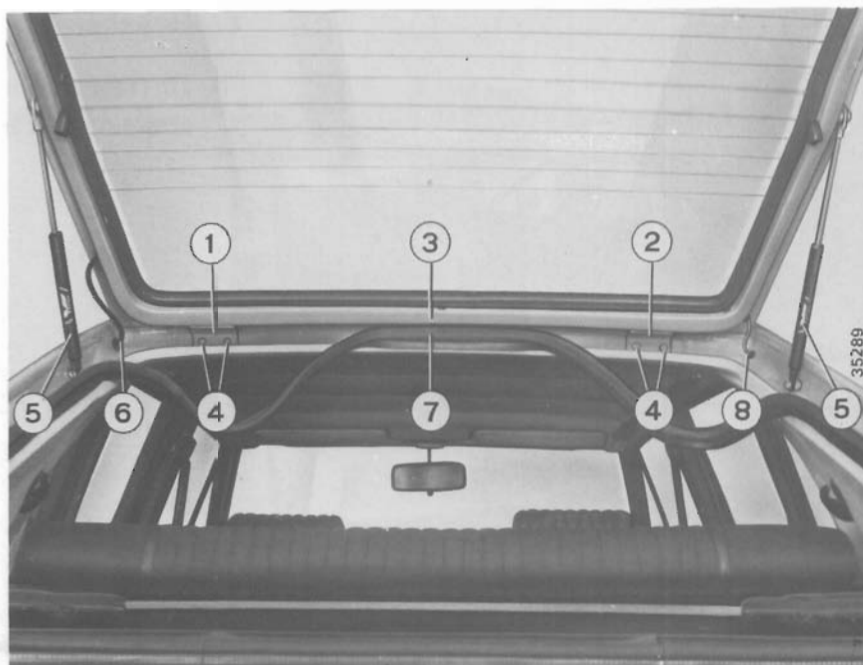
Polonez Model 1300/1500

701.50-51

Sheet 1

Tailgate.

1. LH tailgate hinge.
2. RH tailgate hinge.
3. Tailgate.
4. Hinge to body fastening bolts.
5. Gas-filled springs.
6. Tailgate wiper and heating electric cables.
7. Tailgate opening rubber seal.
8. Tailgate washer tube.



TAILGATE

Dismounting

In order to dismount tailgate from the vehicle, perform the following operations:

- remove inner upholstery panel held in place with snap fasteners;
- remove connector guards and disconnect electric cables of tailgate wiper and heating;
- remove wiper and heating electric cables (6) from tailgate frame;
- disconnect fluid supplying tube from washer nozzle, detach it from seal and remove from tailgate;
- dismount gas-filled spring (5);
- partly dismount tailgate opening seal in its upper part;
- unscrew tailgate hinges to door fastening bolts;

Reassembly

In order to reassemble the tailgate, reverse suitably the above described operations.

Tailgate window pane

Dismounting

In order to dismount tailgate window pane, perform the following operations:

- remove the wiper arm;
- disconnect window heating electric cables and remove them from under the window seal;
- remove washer tube from under the window seal;
- extract mylar expanding insert from the window seal;
- remove the window by pressing it out from the inside of the vehicle.



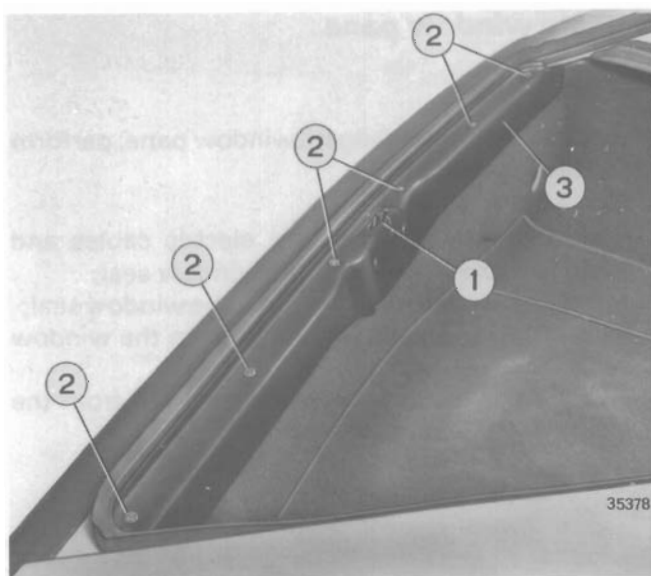
Extracting mylar expanding insert.



Reassembly

To reassemble the tailgate window, follow the instructions given for windscreen installation.

Installation of tailgate window.



Tailgate lock

In order to adjust the tailgate lock so that it should close properly, undo lock fastening screws and arrange the lock as required. To obtain access to lock fastening screws, remove rear tailgate upholstery.

Tailgate lock.

1. Tailgate lock.
2. Tailgate rear upholstery fastening screws.
3. Tailgate rear upholstery.

Windscreen and rear side windows

Polonez Model 1300/1500

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701.55-56

Sheet 1

WINDSCREEN

Dismounting

In order to dismount windscreen, first remove wiper arms and expanding mylar insert, then exert pressure from inside of the vehicle on the windscreen to push it out together with rubber seal.

Installation of windscreen.

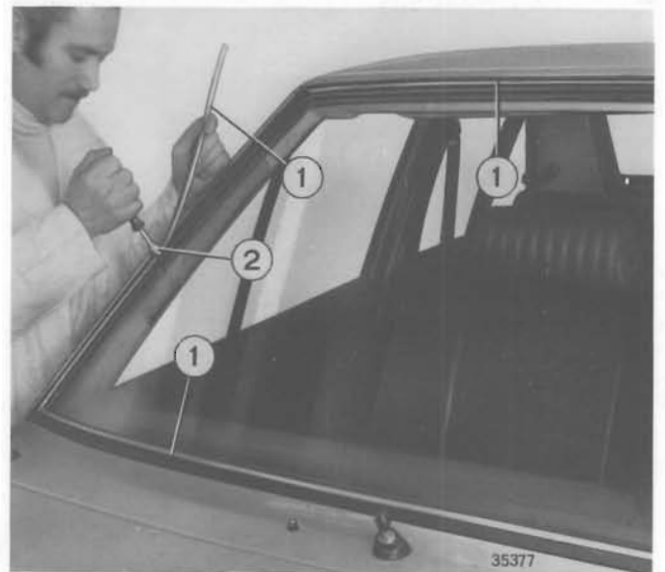
1. The cord serves for proper installation of rubber seal in windscreen frame.

Installation

For windscreen installation perform the following operations:

- mount rubber seal on windscreen periphery;
- cover the cord with vaseline and insert it in the groove under the inner lip of the seal on its entire periphery;
- clean windscreen frame edges with petrol;
- place the windscreen over frame and pull cord ends exerting pressure on the windscreen from outside in places where the cord emerges.

NOTE – When installing the windscreen no sealing compounds must be used, save for cases of water leaks.



Installation of mylar expanding insert in windscreen seal.

1. Mylar expanding insert.
2. A.78024 device.

FIXED REAR SIDE WINDOWS

Dismounting

To dismount fixed rear side window, perform the following operations,

- remove inside rear upholstering panel;
- remove rear window sill;
- remove the middle stanchion inner trim;
- remove the window dividing stanchion inner trim;

Rear side window.

1. Fixed window pane.
2. Fixed window pane seal.
3. Chromium-plated outer trim of fixed window seal.





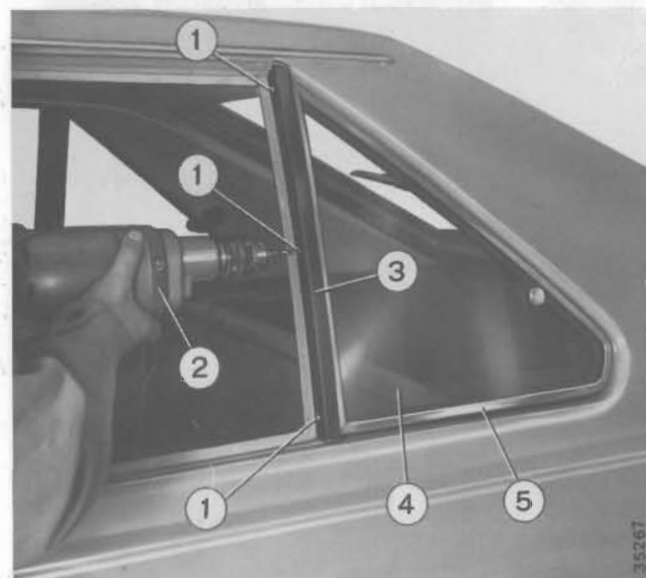
- apply pressure from the inside to the window pane so as to push it out of the opening.

Reassembly

While replacing rear side window pane, follow the instructions pertaining to windscreen installation, having first mounted outer decorative trim.

Installation of rear side window.

1. Ends of cord used for forcing window seal over the window frame edges.



Dismounting window dividing stanchion decorative trim.

1. Dividing stanchion trim fastening rivets.
2. Electric drill.
3. Window dividing stanchion decorative trim.
4. Hinged rear side window.
5. Hinged rear side window metal frame.

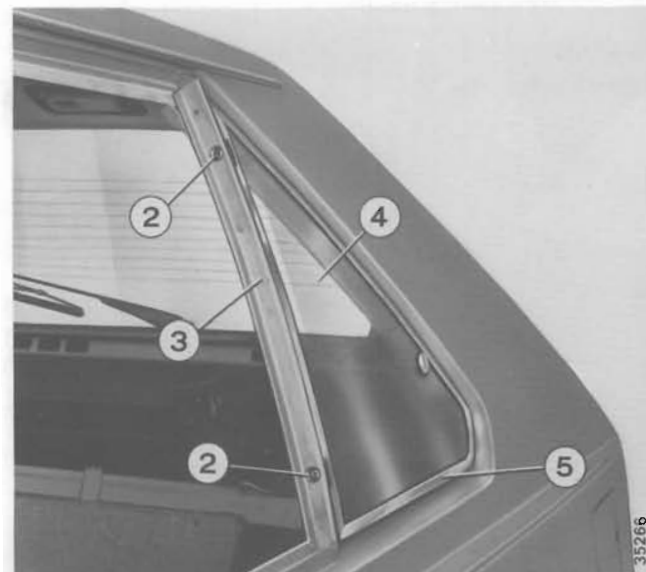
HINGED REAR SIDE WINDOW

In order to dismount hinged rear side window pane, after having first removed the fixed pane, perform the following operations:

- unscrew window catch plate to rear stanchion fastening screws;
- use an electric drill to remove window dividing stanchion decorative trim fastening rivets;

Fastening the hinged rear side window to window dividing stanchion.

2. Hinged rear window frame to window dividing stanchion fastening screws.
3. Window dividing stanchion.
4. Hinged rear side window.
5. Hinged rear side window metal frame.



Windscreen and rear side windows

Polonez Model 1300/1500

701.55-56

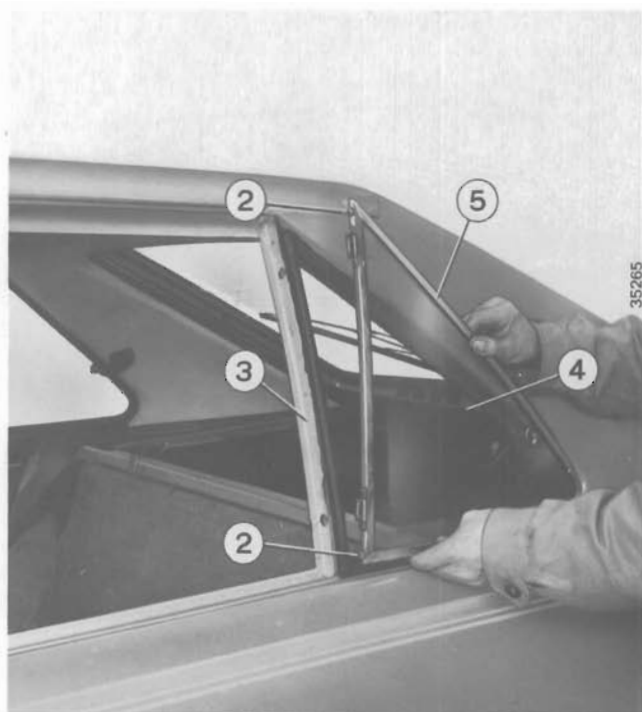
Sheet 2

- undo screws (2);
- remove hinged rear window pane together with its frame.

The frame is dismantled by undoing the screws (2) joining both parts of the frame.

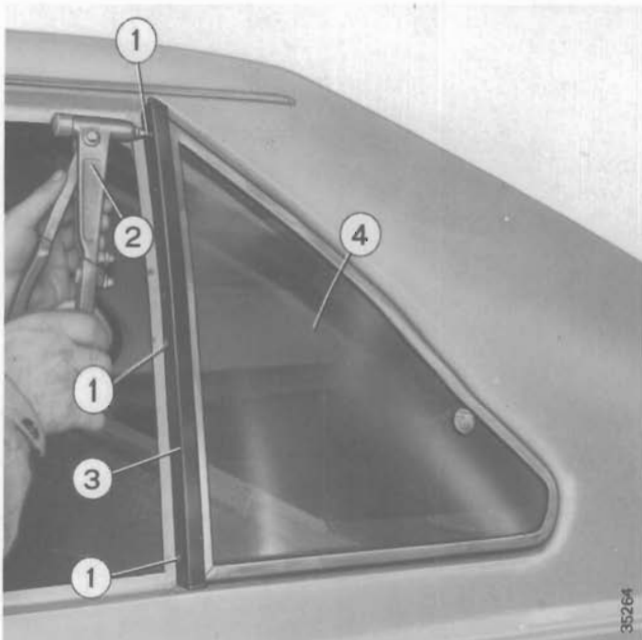
Dismounting hinged rear side window.

2. Hinged rear window metal frame to window dividing stanchion fastening screws.
3. Window dividing stanchion.
4. Hinged rear side window.
5. Hinged rear side window metal frame.



To replace the hinged rear side window, reverse suitably the above described operations.

Dividing stanchion decorative trim is fastened with the use of **A. 78023** rivet tongs and new rivets.



Replacing window dividing stanchion decorative trim.

1. Decorative trim fastening rivets.
2. **A.78023** riveting tongs.
3. Window dividing stanchion decorative trim.
4. Hinged rear side window.

Polonez Model 1300/1500



External mouldings and trim

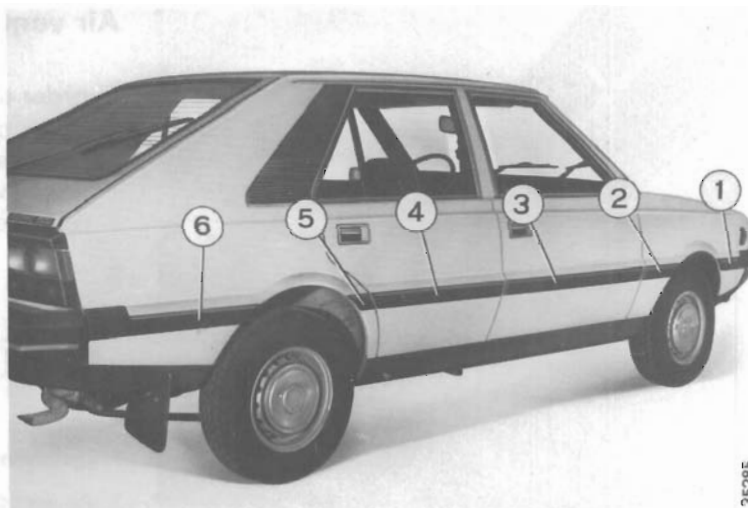
Polonez Model 1300/1500

UPPER FRONT MOULDING

To dismount upper front moulding, first dismount the air inlet grille and then unscrew upper and lower moulding to body fastening screws (see picture in section 703.02, sheet 1).

RH side view of the vehicle.

1. Front side moulding.
2. Front side moulding – rear part.
3. Front door moulding.
4. Rear door moulding.
5. Rear side moulding – front part.
6. Rear side moulding.



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SIDE MOULDINGS ON MUDGUARDS AND DOORS

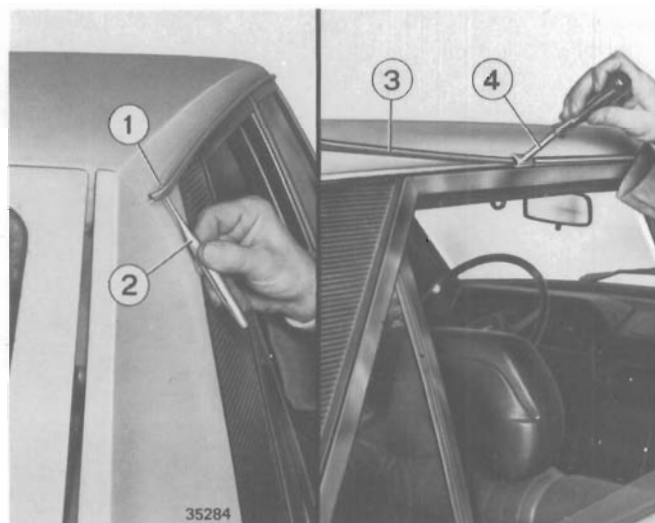
To dismount side mouldings, unscrew the nuts fastening them to doors and mudguards. To obtain access to these nuts, remove front wheel guards, door upholstering panels and luggage compartment floor mat.

DECORATIVE MOULDING ON ROOF GUTTER.

To remove decorative moulding from roof gutter, use a punch to drive out the moulding to gutter fastening rivets (1) and dismount the moulding with the use of A.78010 device.

Dismounting decorative moulding from roof gutter.

1. Rivet.
2. Punch.
3. Decorative moulding.
4. A.78010 device.



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REAR UPPER MOULDING

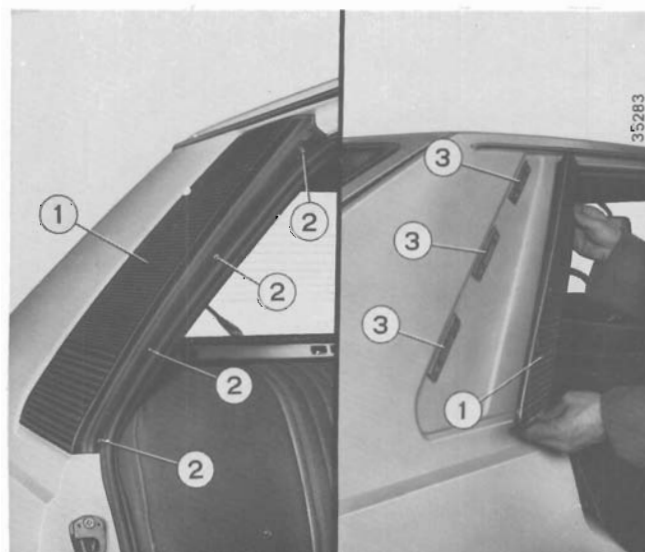
In order to remove rear upper moulding, first dismount the lenses of rear lamp clusters, and then unscrew upper and lower moulding to body fastening screws.

REAR PILLAR DECORATIVE TRIM

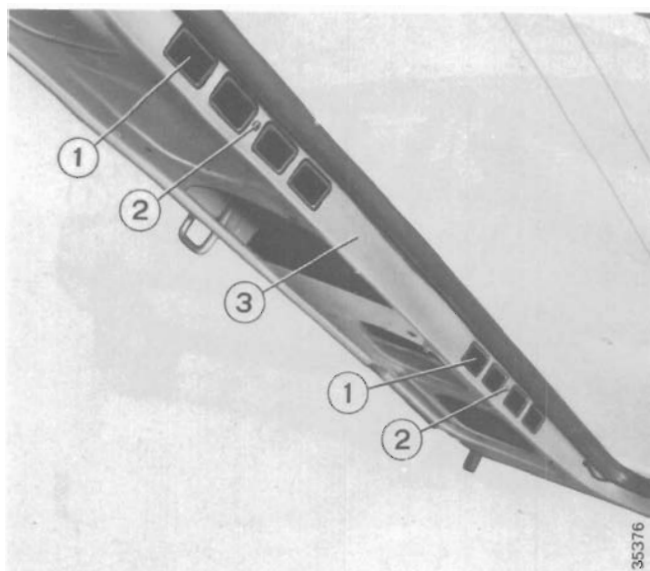
In order to dismount rear pillar decorative trim, unscrew trim to rear pillar fastening screws (2) and slide it off the fasteners located on pillar inner surface.

Fastening of rear pillar decorative trim

1. Rear pillar decorative trim.
2. Trim to rear pillar fastening screw.
3. Fasteners holding trim (1) to rear pillar.



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Air vent decorative trim

In order to remove air vent decorative trim from the tailgate, perform the following operations:

- remove tailgate upholstering panel,
- unscrew air vent trim to tailgate fastening screws,
- remove the trim from the inside of tailgate.

Tailgate vents.

1. Air vent decorative trim.
2. Trim to tailgate fastening screws.
3. Tailgate.

Air inlet grille

Polonez Model 1300/1500

AIR INLET GRILLE

In order to dismount air inlet grille, perform the following operations:

- disconnect headlight electrical connectors;
- unscrew inlet grille to body fastening screws.

Front view of the vehicle.

Arrows indicate location of air inlet grille to body fastening screws.



35282

Front view of the vehicle with inlet grille removed.

1. Upper front decorative moulding.
 2. Upper front decorative moulding to body fastening screws.
- Arrows indicate air inlet grille fastening points.



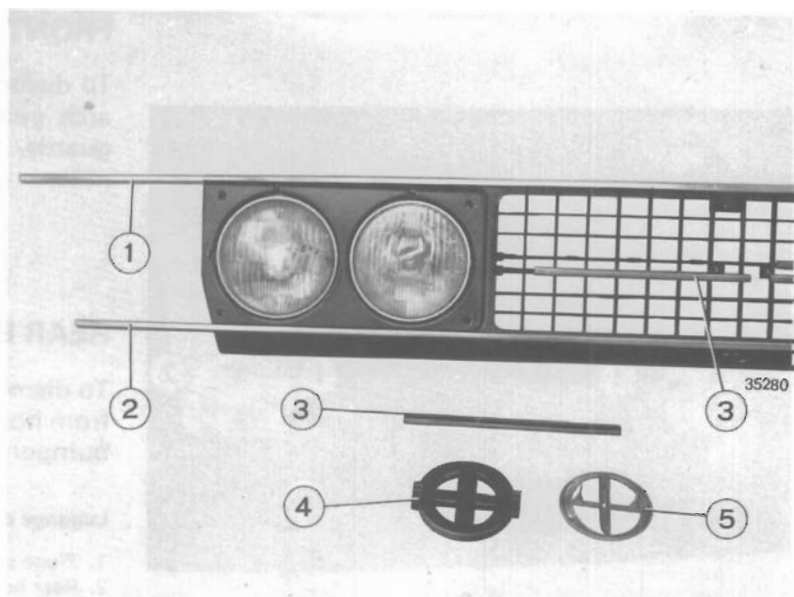
35281

AIR INLET GRILLE DECORATIVE MOULDINGS

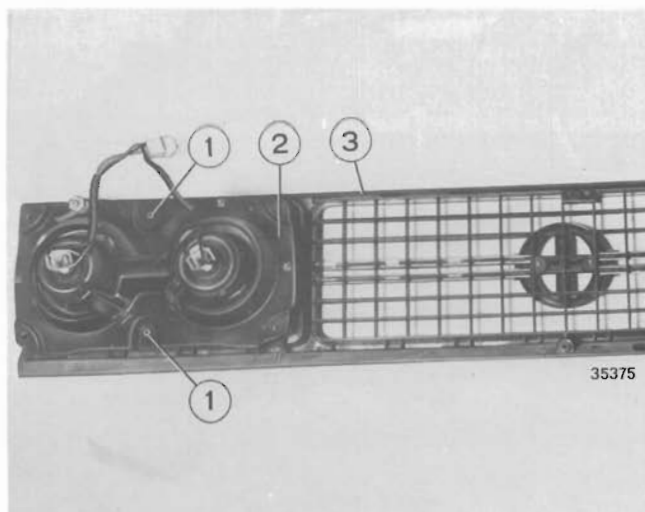
The upper (1) and lower (2) decorative mouldings are removed by sliding them off of the grille.

Air inlet grille.

1. Upper decorative moulding.
2. Lower decorative moulding.
3. Middle decorative mouldings.
4. Trim for factory badge.
5. Factory badge.



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The middle mouldings are removed with the use of a screwdriver, having first extracted the factory badge (5) from its spring clips.

To dismount the headlights, it is sufficient to unscrew their fastening screws (1) which hold the twin headlights to the grille.

Inlet grille details.

1. Headlight carrier to inlet grille fastening screws.
2. Headlight carrier.
3. Air inlet grille.

Front and rear bumpers

703.06/07

FRONT BUMPER

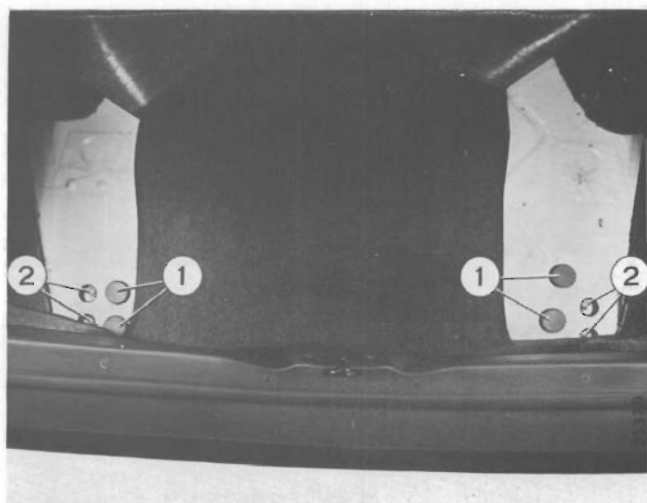
To dismount the front bumper, first unscrew wheel arch guard fastening nuts and remove wheel arch guards, then unscrew bumper to body fastening nuts.

REAR BUMPER

To dismount the rear bumper, first remove plugs (1) from holes giving access to bolts, and then unscrew bumper to body fastening bolts (2).

Luggage compartment.

1. Plugs in holes giving access to bolts (2).
2. Rear bumper to body fastening bolts.



Upholstery

Polonez Model 1300/1500

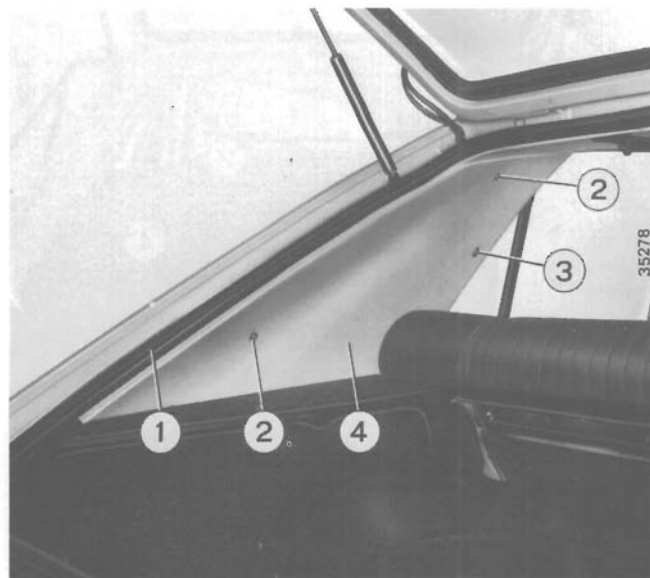
REAR PILLAR UPHOLSTERING PANEL (5-door version)

In order to remove rear pillar upholstering panel, perform the following operations:

- partly remove seals from rear door and tailgate openings;

Rear pillar upholstering panel.

1. Tailgate opening seal.
2. Rear pillar upholstery to inner panel fastening screws.
3. Snap fastener holding upholstery to rear pillar.
4. Rear pillar upholstering panel.



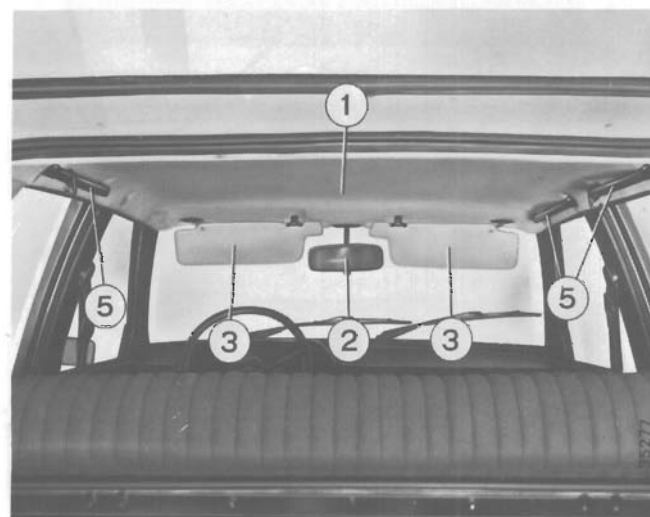
- remove the adhesive tape attaching the edges of rear pillar upholstery to rear door and tailgate opening edges;
- remove plug (3) and unscrew rear pillar upholstery to pillar inner skeleton fastening screws (2).

Headlining (5-door version)

To dismount the headlining it is necessary to:

Vehicle interior with headlining.

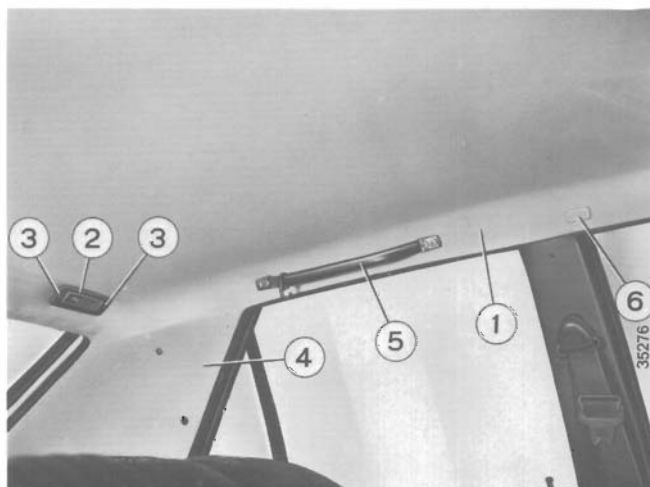
1. Headlining.
2. Inner rear view mirror.
3. Sun visors.
5. Passenger handgrips.

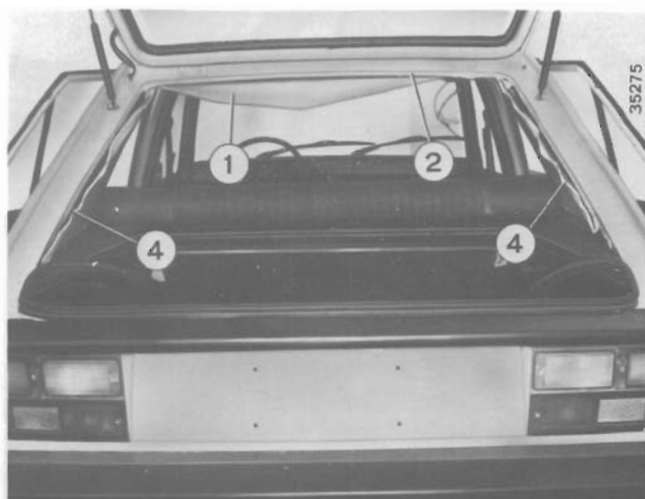


- unscrew sun visor arms and sockets to roof fastening screws;
- unscrew rear view mirror fastening screws;
- remove passenger grip trims and unscrew grip fastening screws;
- unscrew dome light (2) fastening screws (3);

Vehicle interior with headlining – rear view.

1. Headlining.
2. Dome light.
3. Dome light to roof fastening screws.
4. Rear pillar upholstery.
5. LH rear passenger grip.
6. Decorative plug.

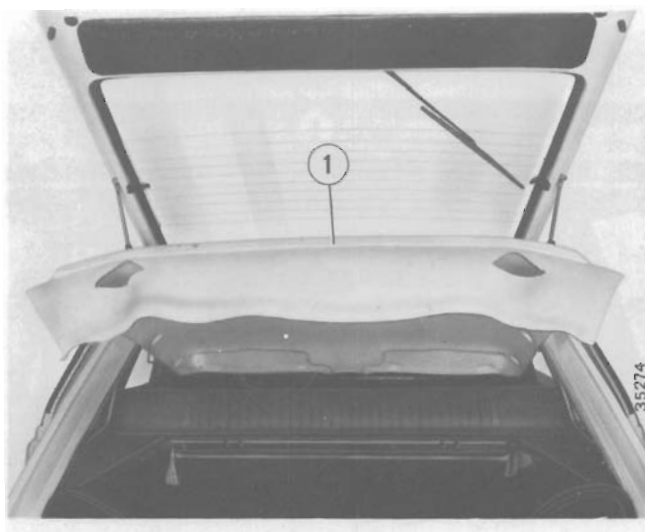




- disconnect dome light electric cables;
- remove two decorative plugs from holes provided for fastening passenger grip at the driver's side;
- remove tailgate seal in its upper and side parts;

Tailgate opening.

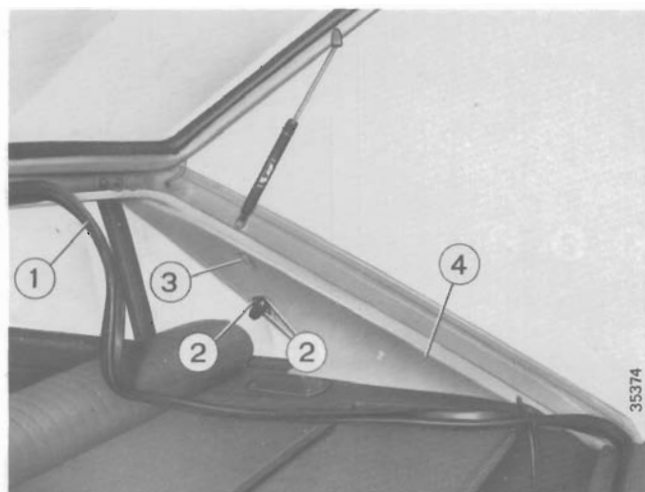
1. Headlining.
2. Tailgate opening edge.
4. Rear pillar upholstering panels.



- detach edges of headlining and both rear pillar upholstering panels;
- remove both rear pillar upholstering panels;
- detach headlining edges from the inside near the rear pillars;
- remove headlining through tailgate opening.

Removing headlining from the vehicle.

1. Headlining.



REAR PILLAR UPHOLSTERING PANEL (3-door and Coupé versions)

In order to remove rear pillar upholstering panel, perform the following operations:

- lift out partly tailgate opening seal (1), and rear side hinged window seal;
- unscrew rear side hinged window catch fastening screw (2);

Rear pillar upholstering panel.

1. Tailgate seal.
2. Rear side hinged window catch to rear pillar fastening screws.
3. Snap fastener holding rear pillar upholstering panel to rear pillar.
4. Rear pillar upholstering panel.

Upholstery

Polonez Model 1300/1500

- undo the snap fastener (3) holding the upholstery to rear pillar;
- detach the pillar upholstery edges from the tail-gate and rear side window opening edges.

HEADLINING (3-door and Coupé versions)

In order to remove the headlining, first take off the rear pillar upholstery, dismount the windscreen, centre pillar inner trims and window dividing stanchion trims, and then perform the following operations:

Removal of headlining.

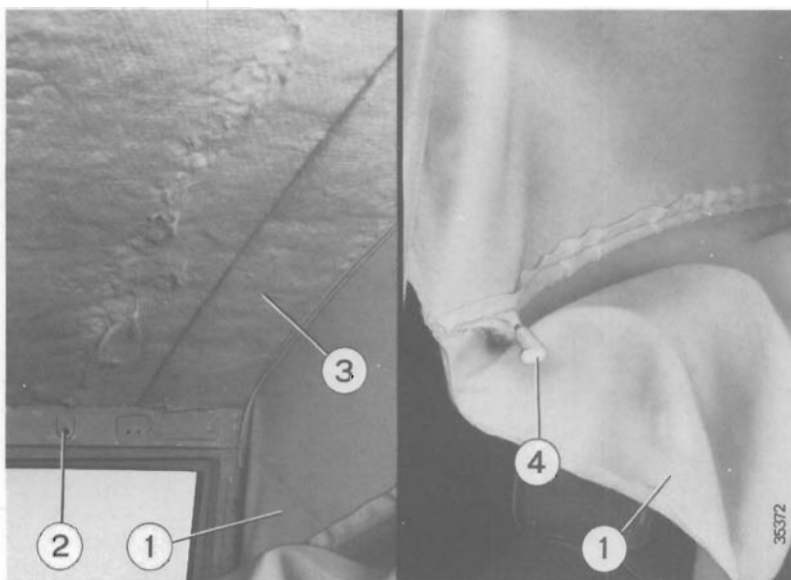
1. Headlining.



- dismount the sun visors, rear view mirror and passenger grips;
- lift out partly the door seals (upper parts only);
- remove the dome lights and detach the headlining edges.

Removal of headlining.

1. Headlining.
2. Hole for mounting the headlining hoop.
3. Sound deadening material.
4. Catch for headlining rail.





Special tools

Polonez Model 1300/1500

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Sheet 1

A.78010 Device for dismounting roof gutter strip.



A.78018 Device for dismounting door frame external trim.



A.78023 Tongs for sill riveting.



A.78024 Device for inserting expander strip into windscreen and tailgate window rubber seals



A.78031 Set of four suction cups for handling windscreen and tailgate window pane.



A.78034 Device for dismounting window operating crank.



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