

Workshop Manual

Turbo Carrera

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STUTT GART-ZUFFENHAUSEN**

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This repair manual describes all of the important operations for which special instructions are required to assure proper completions. This manual is essential for the shop foremen and mechanics, who need this information to keep the vehicles in a safe operating condition. The basic safety rules, of course, also apply to repairs on vehicles without exception.

The Turbo Carrera Repair Manual only describes repair operations which differ from those for 911 models. Refer to the 911 Repair Manual for all other information.

The information is grouped according to repair numbers, which are identical to the first two digits of the repair time and warranty code.

The repair group index and register table are quick guides to find information in the manual.

Descriptions of design and function can be found in service training course reference material.

This repair manual will be kept up to date with workshop bulletins; the information in these bulletins will be made part of the manual from time to time. We recommend that the Workshop Bulletins be filed in the special folder provided for this purpose.







REGISTRATION OF SUPPLEMENTS FILED FOR REPAIR MANUAL

Turbo Carrera

Please file the supplements according to repair groups and make appropriate entries in the table below.

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IV	—	—
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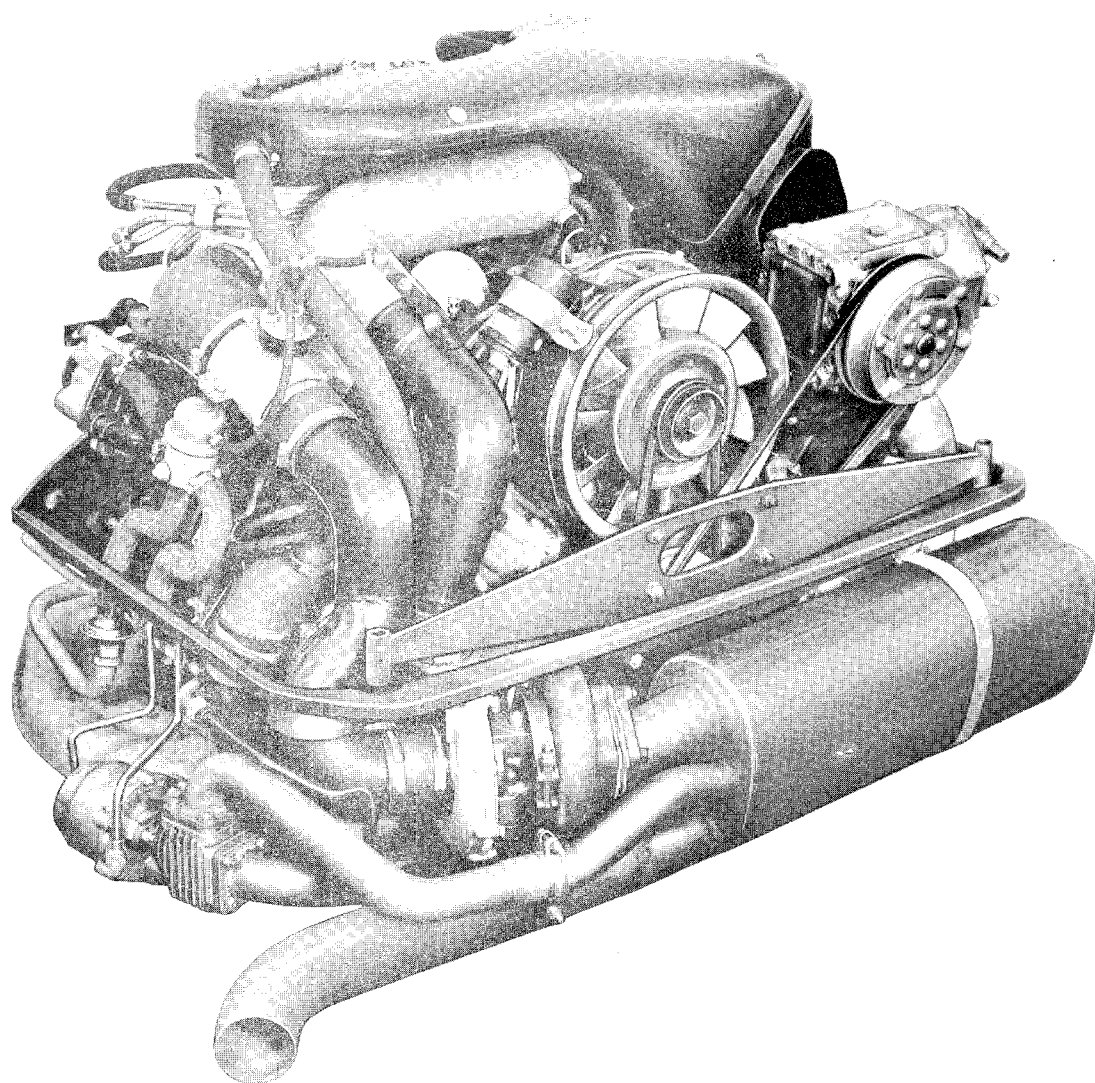
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TECHNICAL DATA

(Refer to appropriate repair group for adjusting and wear limit data.)

Engine

Internal engine code		930/51 from Aug. 1976 930/53
Bore	mm/inch	95/3.74
Stroke	mm/inch	70.4/2.77
Displacement	cm ³ /in. ³	2993/182.64
Compression ratio		6.5 : 1
Horsepower SAE Net	HP	234 at engine speed of 5500 rpm

Torque SAE Net	Nm/ft. lbs	382/245	at engine speed of 4000 rpm
Output per liter	KW/HP	58 / 82	
Max. engine speed	rpm	6700	
Max. engine cruising speed	rpm	6000	
Cutoff speed of speed limiter in distributor	rpm	7000 \pm 200	
Weight of engine with air cleaner (dry)	kg/lb	217/478	

Engine Design

Crankcase	Diecast, light alloy, two-piece
Crankshaft	Forged, journals surface-hardened
Crankshaft bearings	Eight, plain
Connecting rods	Forged steel
Connecting rod bearings	3 layer, split inserts
Piston pin bushings	Press-fit bronze
Intermediate shaft bearings	2, plain
Pistons	Forged light alloy, slipper skirt
Piston pins	Floating, secured by circlips
Piston rings	2 compression rings, 1 oil scraper ring
Cylinders	Light alloy, Nikasil coated
Cylinder head	Light alloy
Valve seat inserts	Shrunk-in, annealed sintered steel
Valve guides	Press fit, special bronze
Location of valves per cylinder	1 intake and 1 exhaust valve overhead in V
Exhaust valve	Sodium -filled, reinforced seat
Valve springs	2 coil springs per valve
Valve drive	One each overhead camshaft, left and right
Camshaft	Cast, 4 bearings, runs directly on camshaft housing metal
Camshaft drive	Chain
Engine cooling	Air cooled by axial fan on alternator shaft

Cooling fan drive		V-Belt from crankshaft
Crankshaft/blower ratio		approx. 1 : 1.67
Air flow rate		1560 ltr/sec at 6000 crankshaft rpm
Engine Lubrication		
Oil cooling		Thermostatic control, oil cooler on crankcase in fan air stream, cooling coils in front right wheel-housing
Oil filter		Full flow
Oil pressure at 5500 rpm	bar/psi	approx. 4.0/60 at 80°C (176°F)
Oil pressure gauge		Electric
Max. oil temperature		approx. 150°C/300°F
Oil consumption	qt./600 mi.	approx. 1.0 to 2.0
Exhaust System		
	930/51	double pipe system with turbocharger, waste gate, 2 reactors, muffler, air pump
	(930/53	same as 930/51, but with EGR)
Heating		
		Hot air heater with automatic temperature control.
Fuel System		
Fuel supply		2 electric roller-type pumps connected in series
Fuel octane	RON	91 - 96 (premium grade)
Electrics		
Battery voltage	V	12
Battery capacity	Ah	66
Alternator/output	W	980
Ignition		CDI (breakerless)
Transformer		Bosch
Firing order		1 - 6 - 2 - 4 - 3 - 5
Brakes		
Foot brakes		hydraulic, dual-circuit disc brakes with power booster
Front brake disc diameter	mm	282.5 vented

Rear brake disc diameter	mm	290 vented
Effective front brake disc dia.	mm	228
Effective rear brake disc dia.	mm	244
Front brake disc thickness	mm	20, 5
Rear brake disc thickness	mm	20
Total effective braking surface	cm ²	257
Pad surface per front wheel	cm ²	76
Pad surface per rear wheel	cm ²	52, 5
Front caliper piston dia.	mm	48
Rear caliper piston dia.	mm	38
Parking brakes		Mechanical, on rear wheels
Parking brake drum diameter	mm	180
Brake shoe width	mm	25
Effective braking surface per wheel	cm ²	85
Power brake booster		Teves, Type T 52 / 7 "
Pressure ratio		1.8
Pedal ratio (mechanical)		5.2

Dimensions

(DIN-Curb Weight)

Length	mm/inch	4291/168.94
Width	mm/inch	1775/69.88
Height	mm/inch	1340/52.76
Wheelbase	mm/inch	2272/89.45
Front track	mm/inch	1431/56.34
Rear track	mm/inch	1501/59.09
Ground clearance (full load)	mm/inch	155/6.10
Curved ground clearance	mm/inch	100/3.94
Front approach angle (limited by spoiler)		16°
Rear departure angle (limited by apron)		18°

Weights

(DIN 70020)

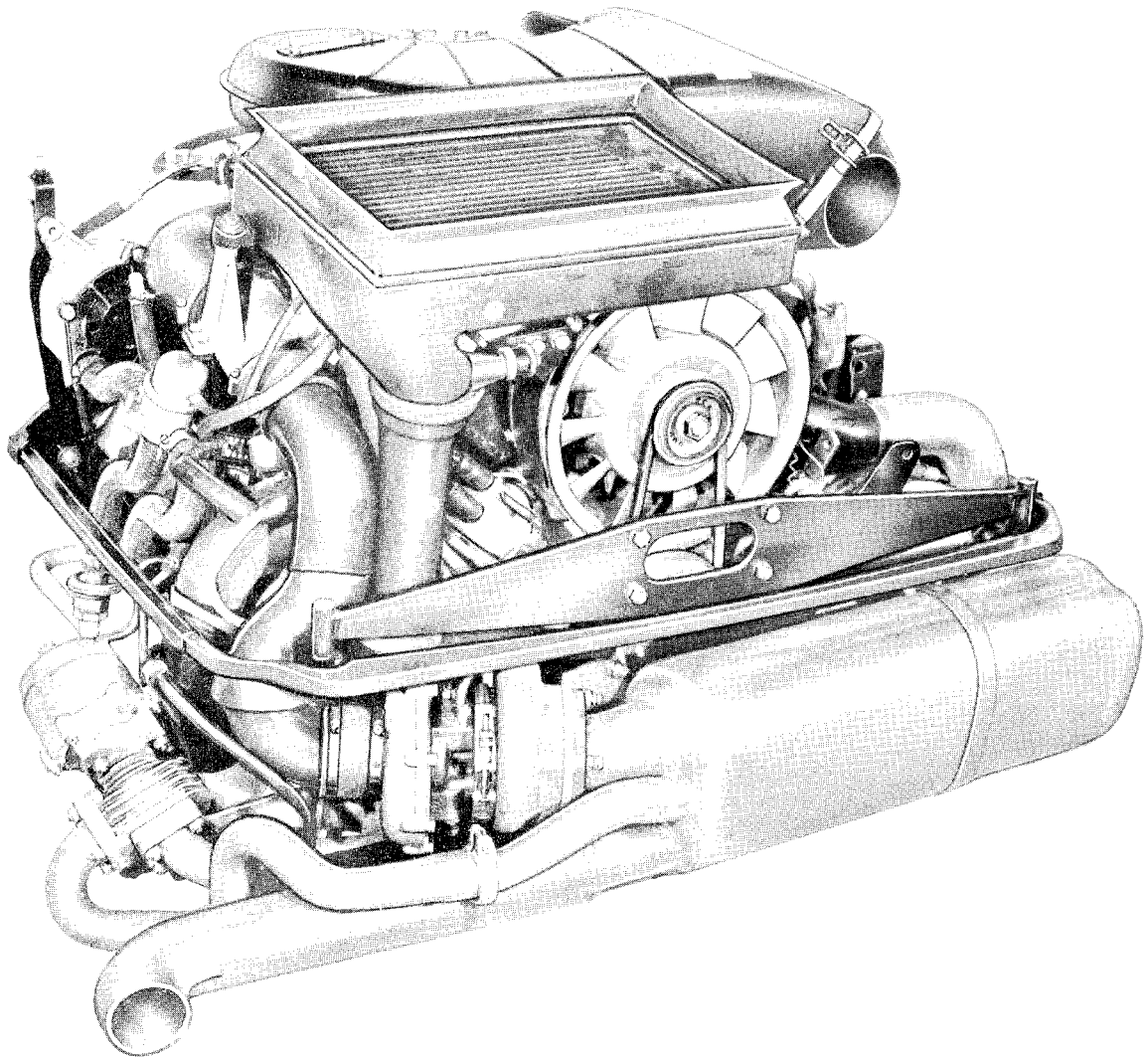
Curb weight	kg/lbs	1140/2514
Max. total weight	kg/lbs	1400/3087
Max. front axle load	kg/lbs	600/1323
Max. rear axle load	kg/lbs	840/1852
Payload	kg/lbs	205/452
Max. roof load including roof luggage carrier	kg/lbs	35/77 without exceeding max. total weight

 Capacities

Engine (as measured with oil dipstick according to Owner's Manual)	Brand name heavy duty oils meeting API Classification SD or SE with a viscosity of: SAE 30 for summer, SAE 20 for winter, SAE 20 W 20 for permanent temperatures betw. -15°C ($+5^{\circ}\text{F}$) and 0°C ($+32^{\circ}\text{F}$) or SAE 10 W for permanent temperatures below -15°C ($+5^{\circ}\text{F}$)	
Total oil capacity of system with cooling coils	ltr/qt	approx. 13/13.8
Oil change capacity	ltr/qt	approx. 10/10.6
Transmission and differential	Refer to page 30 - 05	
Fuel tank	ltr/gal.	80/21.1, 8 liters/2.1 gal. in reserve
Brake fluid	ltr/pt	approx. 0.2/0.42
Windshield washer	ltr/gal.	approx. 8.5/2.2

Performance

Top speed	mph	Above 152
Acceleration from 0 - 100 kph/62 mph	sec	5,7 DIN curb weight +
Km from standing start	sec.	25,0 1/2 payload
Weight per horsepower	lb./HP	9.7
Hill climbing ability in % 4-speed transmission		1st gear over 100 2nd gear 47 3rd gear 28 4th gear 16,5



TECHNICAL DATA - 1978 MODEL

(Refer to appropriate repair group for adjusting and wear limit data)

Engine

Internal engine code	930/61, Cal. 930/63, from 1979 models 930/64
Bore	mm/inch 97/3.82
Stroke	mm/inch 74.4/2.93
Total displacement	cm ³ /inch ³ 3299/201.3
Compression ratio	7.0 : 1

Torque SAE net	Nm/ft lbs	395/291 at engine speed of 4000 rpm
Output per liter	kW/HP	67/91
Max. engine speed	rpm	6700
Max. engine cruising speed	rpm	6000
Governor cut-off speed (in distributor)	rpm	7000 [±] 200
Engine weight (dry) with muffler	kg/lbs	240/529

Engine Design

Type	4 stroke internal combustion
Cooling System	Air
Crankcase	Light alloy
Crankshaft	Forged
Crankshaft bearings	8 plain main bearings
Connecting rod bearings	Plain bearings
Cylinders, individual	Light alloy
Arrangement of valves per cylinder	1 intake valve 1 exhaust valve Vee configuration, overhead
Valve actuation	One each overhead camshaft OHC, left and right
Camshaft drive	Chain
Camshaft bearings	Plain, directly on camshaft housing
Cooling fan drive	V-belt from crankshaft
Crankshaft/blower ratio	Approx 1 : 1.67
Lubrication	Dry sump with separate oil tank thermostat controlled oil cooling and full flow oil filter, cooling coils in front right wheel house
Fuel supply	electric pumps in series connected
Mixture	Continous injection system (CIS)
Induction system	KKK exhaust turbocharger

Electric System

Battery voltage	V	12
Battery capacity	Ah	66
Alternator output	W	980
Ignition system		CDI (breakerless)
Firing order		1 - 6 - 2 - 4 - 3 - 5

Exhaust System

Single pipe system with turbocharger, waste gate, muffler, air pump and 2 reactors

Heating Automatic temperature control for heater

Dimensions

(at DIN curb weight)

Wheel base	mm/inch	2272 / 89.45
Front track width	mm/inch	1432 / 56.38
Rear track width	mm/inch	1501 / 59.09
Length	mm/inch	4291 / 168.94
Width	mm/inch	1775 / 69.88
Height	mm/inch	1328 / 52.28
Turning circle dia.	m/ft	10.7 / 35.10
Ground clearance, full load	mm/inch	120 / 4.72

Weights

(DIN 70020)

Curb weight	kg/lbs	1295 / 2855
Max. total weight	kg/lbs	1500 / 3307
Max. front axle load	kg/lbs	625 / 1378
Max. rear axle load	kg/lbs	900 / 1984

Capacities

Total amount of oil for system with cooling coils	ltr/qt	Approx. 13/14, exact amount determined by reading on oil dipstick, measured with engine running at idle speed and operating temperature
Amount for oil change	ltr/qt	Approx. 10/11
Amount of oil between min. and max. marks on dipstick	ltr/qt	Approx. 2/2

Brand name heavy duty oils for internal combustion engines acc. to API Classification SE. Use following viscosity multi-grade oils for year round operations (oil change every 15,000 mi./24,000 km): SAE 10 W/50, 15 W/50 or 20 W/50. Do not use latter oil for constant temperatures below - 15° C/+ 5° F. Brand name single grade oils of API Classification SE should only be used when multi-grade oils are not available and normal operating conditions prevail. The use of such oils will require observance of additional change intervals according to season of year to prevent any damage. Use SAE 30 oil for summer and SAE 20 W for winter (only at constant temperatures below + 5° C/+ 41° F).

Transmission + differential	See page 30 - 05
Fuel tank	ltr/qt 30/21, of which 8 ltr/2 US gal. in reserve
Brake fluid tank	ltr/pt Approx. 0.2/0.4
Windshield washer	ltr/gal. Approx. 8.5/2.2

Performance

Top speed	km/h / mph	250 / 155
Acceleration 0 - 100 km/h (0 - 62 mph)	s	5.6 DIN curb weight + 1/2 payload
Km from standing start	s	24.0

ENGINE-ASSEMBLY

TECHNICAL DATA - ADJUSTING AND WEAR LIMIT DATA

ENGINE

VALVE DRIVE

Tappet clearance (cold engine)

Intake	0.10 mm	(measured betw valve and rocker arm)
Exhaust	0.10 mm	

Timing at 1 mm tappet clearance

Intake opens	3° ATDC
Intake closes	37° ABDC
Exhaust opens	27° BBDC
Exhaust closes	5° BTDC

Intake valve stroke in TDC overlap at 0.1 mm tappet clearance 0.65 - 0.80 mm

Valve spring installation lengths

Intake valve springs	33.5 ± 0.3 mm
Exhaust valve springs	

Ignition

Ignition Timing Adjustment
(engine oil temperature at least 80° C)

Engine Type 930/50, 930/52	$29 \pm 2^{\circ}$ BTDC on crankshaft at 4000 rpm (vacuum hose disconnected)
Engine Type 930/51 (USA)	$5 \pm 3^{\circ}$ ATDC on crankshaft at 950 ± 50 rpm (vacuum hose connected)
Engine Type 930/53 (USA)	$7 \pm 2^{\circ}$ ATDC on crankshaft at 1000 ± 50 rpm (vacuum hose connected)
Engine Type 930/54 (Japan)	$15 \pm 2^{\circ}$ ATDC on crankshaft at 1000 ± 50 rpm (vacuum hose connected)

Check ignition timing advance
(ignition timing must be adjust first)

Engine Type 930/50, 930/52	$0 \pm 4^{\circ}$ on crankshaft at 900 ± 50 rpm (vacuum hose connected)
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Engine Type 930/51 (USA)	$26 \pm 3^{\circ}$ on crankshaft before TDC at 4000 rpm (vacuum hose disconnected)
Engine Type 930/53 (USA)	$29 \pm 3^{\circ}$ on crankshaft before TDC at 4000 rpm (vacuum hose disconnected)
Engine Type 930/54 (Japan)	$30 \pm 3^{\circ}$ on crankshaft before TDC at 4000 rpm (vacuum hose disconnected)
Spark plugs (electrode gap in mm)	Bosch W 280 P 21 (0.6)

SINCE 1978 MODEL, TURBO 3.3

IGNITION

Ignition Timing Adjustment
(Engine Oil Temp. at Least 80°C)

Engine Type 930/60	29° before TDC at 4000 rpm (vacuum hose disconnected)
Engine Type 930/61 (USA), 930/64 (USA)	$10 \pm 2^{\circ}$ after TDC at 1000 ± 50 rpm (vacuum hose connected)
Engine Type 930/63 (California), 930/62 (Japan) 930/65 (Japan)	$5 \pm 1^{\circ}$ after TDC at 1000 ± 50 rpm (vacuum hose connected)
Engine Type 930/66	$29 \pm 1^{\circ}$ before TDC at 4000 rpm (vacuum hose disconnected)
Engine Type 930/68 (USA)	$26 \pm 1^{\circ}$ before TDC at 4000 rpm (vacuum hose - red - disconnected)

Checking Ignition Timing
(Ignition Timing Adjusted First)

Engine Type 930/60	$0 \pm 2^{\circ}$ at 1000 ± 50 rpm (vacuum hose connected)
Engine Type 930/61 (USA) 930/64 (USA)	$26 \pm 4^{\circ}$ before TDC at 4000 rpm (vacuum hose disconnected)
Engine Type 930/63 (California) 930/62 (Japan) 930/65 (Japan)	$31 \pm 4^{\circ}$ before TDC at 4000 rpm (vacuum hose disconnected)
Engine Type 930/66	$2 \pm 2^{\circ}$ before TDC at 900 ± 50 rpm (vacuum hoses connected)
Engine Type 930/68 (USA)	$1 \pm 2^{\circ}$ after TDC at 900 ± 50 rpm (vacuum hoses connected)

TORQUE SPECIFICATIONS FOR ENGINE

Location	Threads	Torque	
		Nm	ft lb
Conrod nuts*	M 10 x 1.25	50 - 55	36 - 40
Crankcase	M 10	35	25
All bolts on crankcase and camshaft housing	M 8	25	18
Oil filter screen cover nuts	M 6	10	7
Flywheel	M 12 x 1.5	150	108
from 1978 models	M 10 x 1.25	90	65
Bush and needle bearing to crankshaft	M 6	10	7
Pulley to crankshaft (without air conditioner)	M 12 x 1.5	80	58
Double-belt pulley to crankshaft (with air conditioner)	M 12 x 1.5	170	123
Safety valve plug to crankcase	M 18 x 1.5	60	43
Pressure relief valve plug to crankcase	M 18 x 1.5	60	43
Adapter (on neck for oil pressure transmitter) to crankcase	M 12 x 1	35	25
Adapter in crankcase (oil return line)	M 12 x 1	120	87
Cylinder head nuts**	M 10 socket	33	24
Rocker arm shafts	M 6 socket	18	13
Nut on camshaft	M 27 x 2	150	108
Bolt on camshaft	M 12 x 1.5	120	87
Cover to camshaft housing	M 8	8	6
Adapter on cylinder head (air injection)	M 10 x 1	15	11
Air line coupling on adapter	14 x 1.5	22	16
Reactor to cylinder head	M 8	20 - 23	14 - 17
Spark plug	M 14 x 1.25	25 - 30	18 - 22
Intake manifold	M 8	25	18

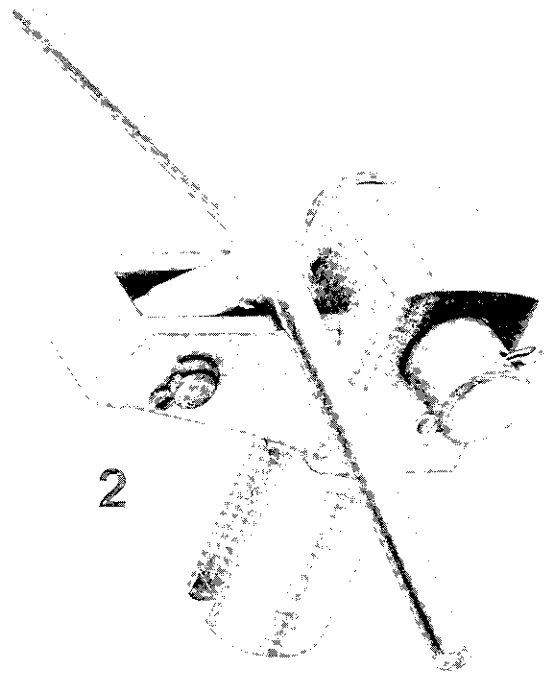
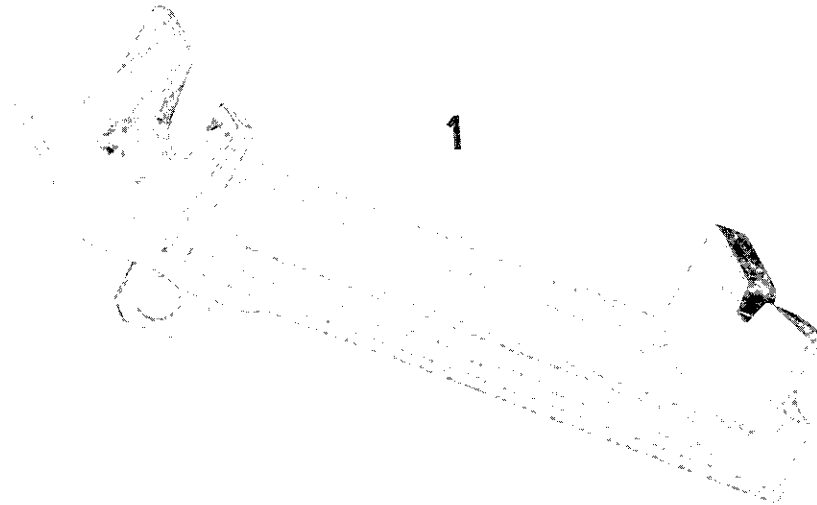
* Threads and bearing surfaces lubricated with oil.

** Threads of cylinder head nuts coated with Optimoly HT.

Location	Threads	Torque	
		Nm	ft lb
Console for engine carrier	M 10	40	29
Wide clamping strap on blower housing	M 6	6.5	5
	M 8	12	9
Pulley to alternator	M 16 x 1	40 S.E.V. Alterna- teurs (Motorola)	29
	M 14 x 1.5	40 Bosch	29
Oil pressure control switch to crankcase	M 10 x 1	max. 20	max. 14
Temperature transmitter to crankcase	M 14 x 1.5	max. 25	max. 18
Oil pressure transmitter to adapter	M 18 x 1.5	Max. 35	max. 25
Volume transmitter (for oil level indicator) to oil tank	M 5	2.4	1.7
Oil drain plug (to cover for oil filter screen)	M 22 x 1.5	42	30
Oil drain plug (oil tank)	M 22 x 1.5	42	30
Oil lines to engine, oil tank, governor housing, coil cooler or pipe oil cooler	M 30 x 1.5	80 - 100	58 - 72

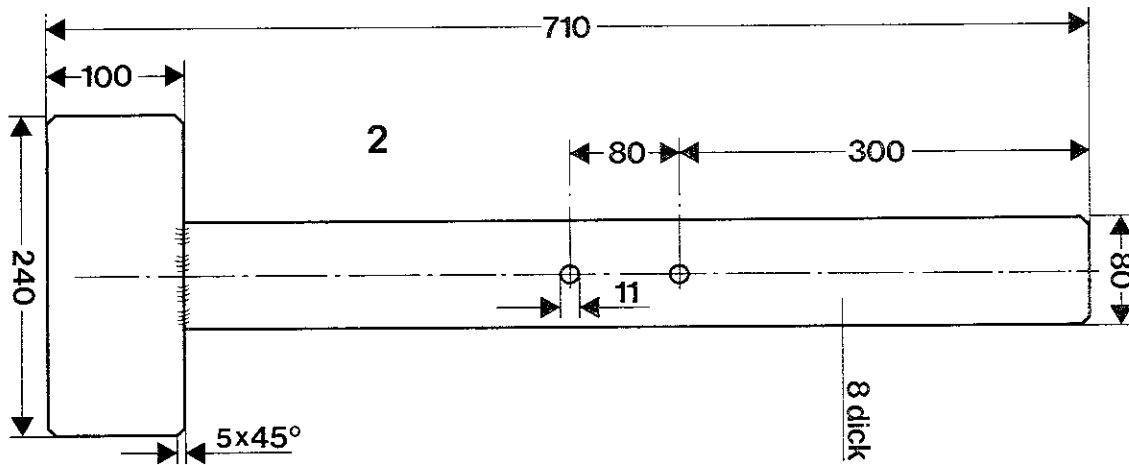
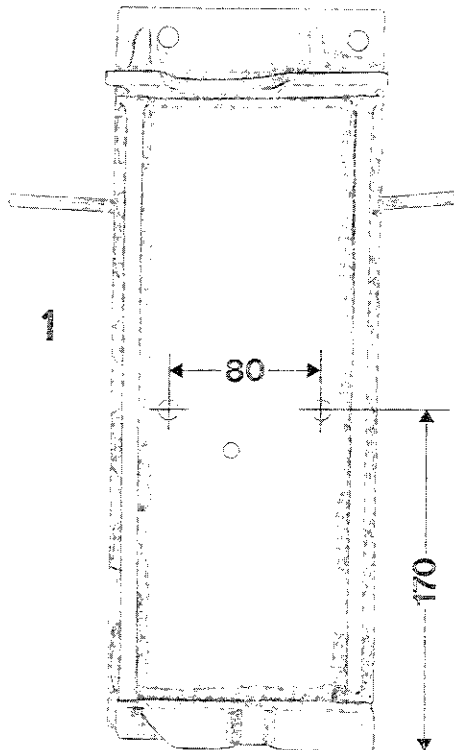
All bolts for exhaust system coated with Optimoly HT.

TOOLS



No.	Description	Special Tool	Remarks
1	Engine holder	9111	Use with support plate - see next page
2	Adapter for engine holder	US 8007/1	

TOOLS



No.	Description	Special Tool	Remarks
1	Engine holder	9111	modified
2	Support plate	9111/1	

REMOVING AND INSTALLING ENGINE

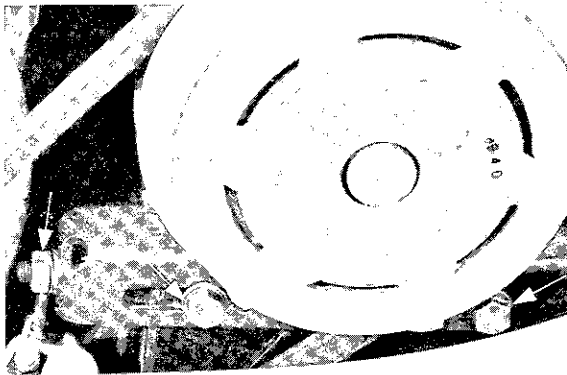
The engine and transmission assembly is lowered to remove.

Removing

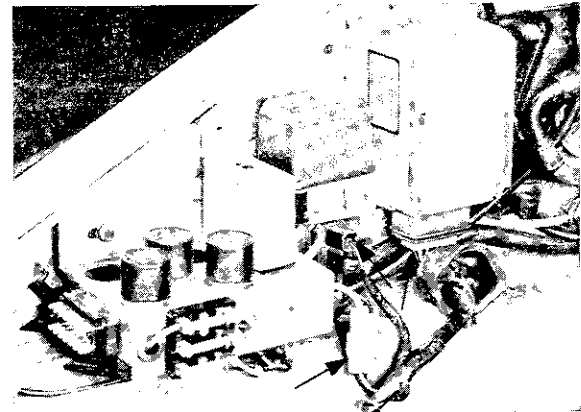
1. Jack up car.
2. Disconnect ground cable at battery.
3. Remove air cleaner.
4. Loosen engine block vent hose at engine, pull off and plug opening at vent cover.
5. - Cars with air conditioning only -
Detach compressor at console and leave it connected to the hoses in the car.

Caution

The air conditioner system must be discharged if the compressor hoses are disconnected.



6. Remove relay plate cover and disconnect engine wires at relay plate, at adapter plug, relay plate socket and ignition control unit.



7. Unscrew fuel hoses at filter and return line.

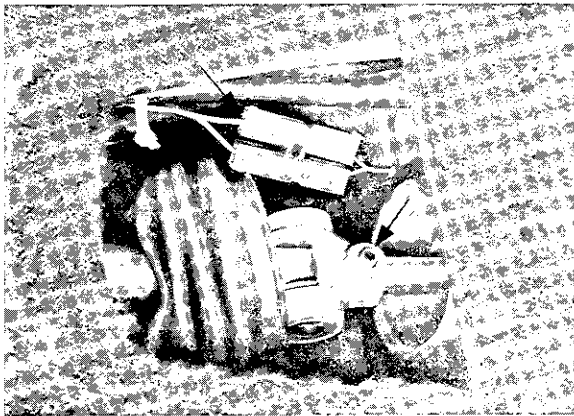


8. Disconnect accelerator linkage.

9. Loosen rear tunnel cover screws and remove cover.

10. Pull boot off of body and slide it forward over the selector rod.

11. Loosen socket head at screw of shift rod coupling and pull coupling off of the transmission inner shift rod.



12. Pull off wires of electronic speedometer sensor in tunnel and remove rubber plug with wire plug.

13. Drain engine oil and plug oil hoses on engine and oil tank.



14. Loosen heater hoses at heat exchangers, and pull off.

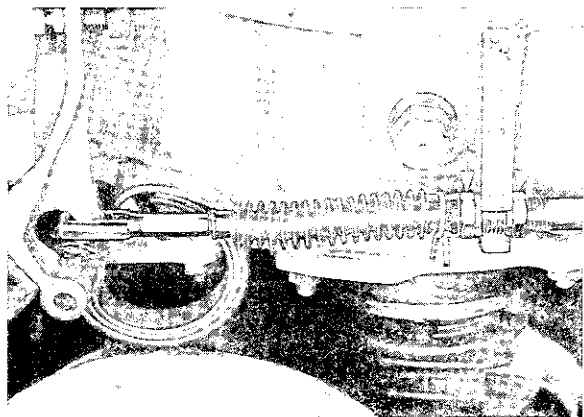
15. Remove rear stabilizer.

16. Loosen ground strap at body.

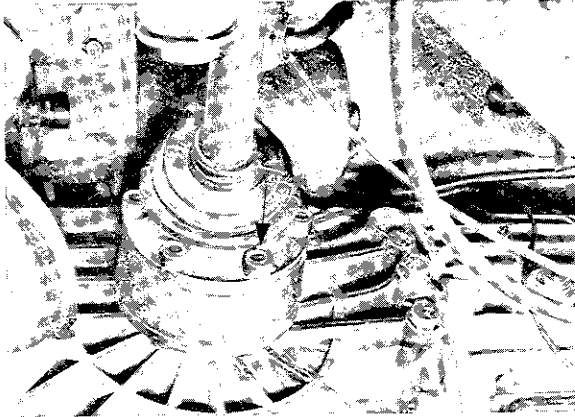
17. Disconnect battery wires at starter.

18. Disconnect accelerator linkage at operating lever.

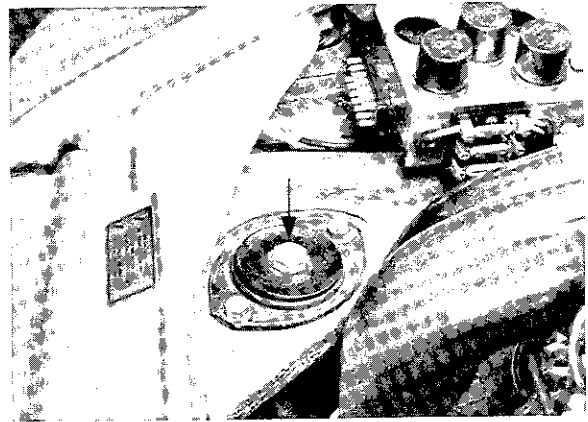
19. Disconnect clutch cable at transmission.
From 1977 Models - see figure.



20. Loosen drive shaft flange socket head screws at transmission.



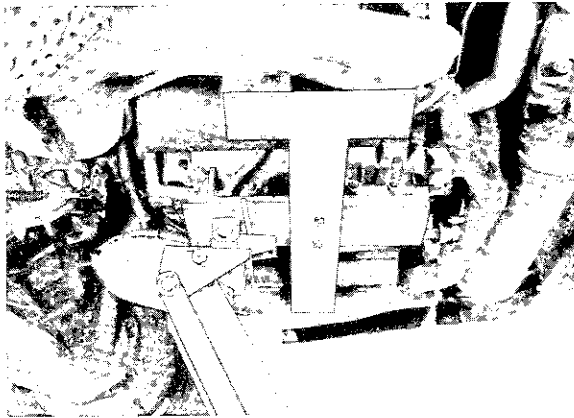
23. Loosen engine carrier bolts.



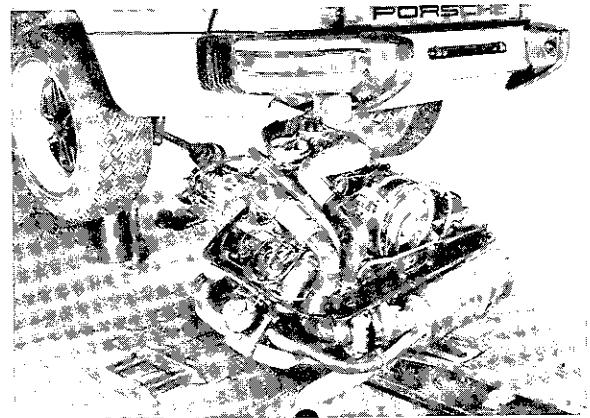
21. Place car jack with appropriate attachment underneath engine/transmission assembly at center point of gravity and apply a little pressure.

Caution

Be careful not to damage secondary air injection pipes.

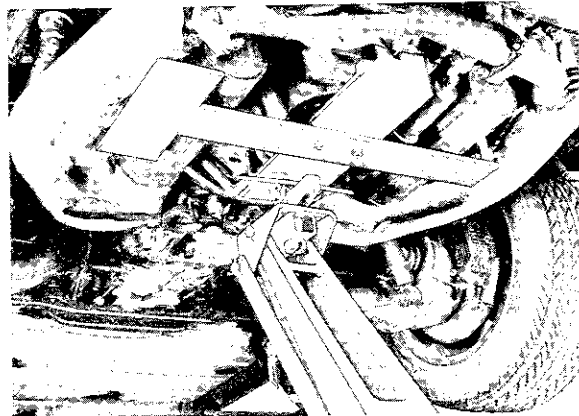


24. Lower car jack with engine/transmission assembly carefully and back it out.



Caution

If the car is moved with the engine/transmission unit removed, the drive shafts must be suspended horizontally to prevent damage to dust covers.



22. Loosen transmission carrier bolts.

Installing

Observe the following instructions when installing.

1. Caution! Don't clamp the heater hoses.
If necessary, slide them on the heat exchangers just before the engine/transmission assembly is in its final position.

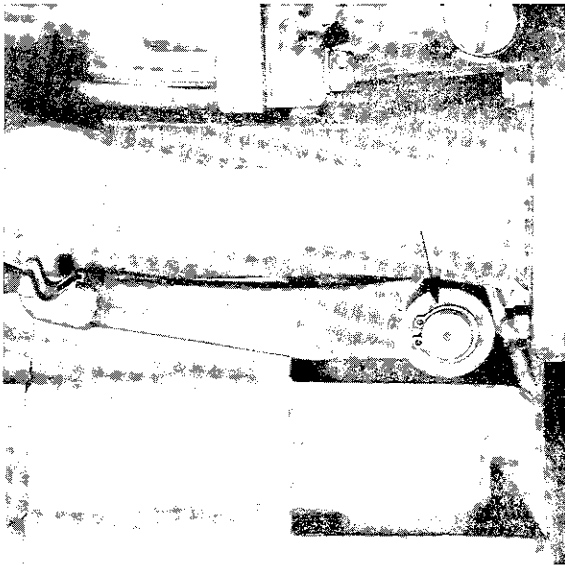
 2. Torque specifications: Engine and transmission carrier hex head screws:
9.0 mkg (65 ftlb)
Drive shaft/flange flister head capscrews:
8.3 mkg (60 ftlb)

 3. Adjust clutch - see Repair Manual 911, Group 7, Page 2.1 - 2/3.
-

DETACHING AND ATTACHING ENGINE AND TRANSMISSION

Detaching

1. Remove wires at starter and backup light switch.
2. Remove clutch release lever circlip and take off lever and rubber ring. Clutch release lever does not have to be removed from 1977 Models.



3. Loosen engine mounting bolts and nuts.

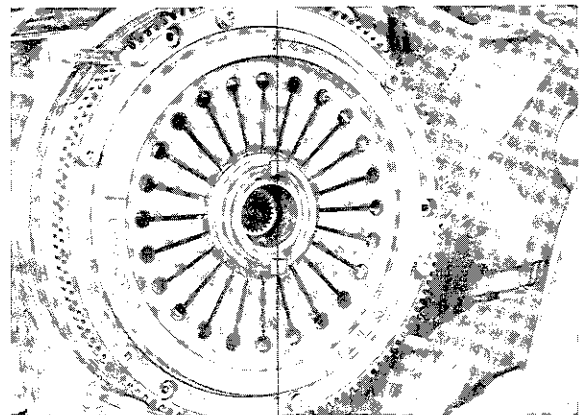


4. Pull transmission off of engine.

Attaching

Observe the following points.

1. Coat all bearing surfaces of clutch release and drive shaft splines with a multi-purpose lubricant containing MOS_2 .
2. Place hub part of release bearing vertical and engage release fork when attaching to hub section. Check if in correct position through opening in transmission case.



Note

Tension release lever to keep bearing in place.

3. After attaching the engine and transmission, slide on release lever parallel to holder of clutch cable sleeve.
4. Torque engine mounting bolts and nuts to 4.5 mkg (33 ftlb).

DETACHING AND ATTACHING ENGINE/TRANSMISSION UNIT
(1978 MODEL)

Detaching

1. Disconnect wires from starter and backup light switch.
2. Remove clutch release spring, see page 30 - 11.
3. Unscrew engine mounting bolt and nuts.

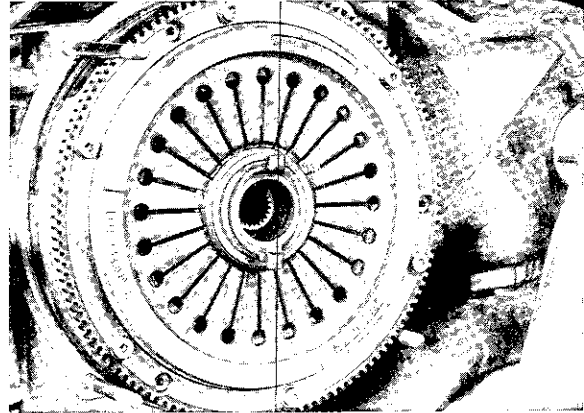


Attaching

Note the following points.

1. Coat all sliding surfaces of clutch release as well as splines of drive shaft with MoS_2 multi-purpose grease.

2. Place hub of release bearing upright and engage release fork on hub when attaching. Check proper position through opening in transmission case.

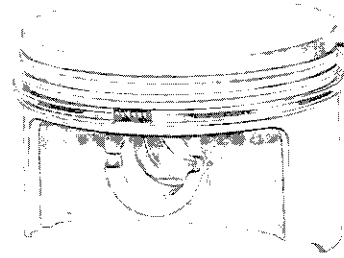


3. Install clutch release spring, see page 30 - 11.
4. Tighten engine mounting bolt and nuts to 4,5 mkg (33 ft lb).

ENGINE-CRANKSHAFT
ASSEMBLY

PISTON AND CYLINDER SIZES - 930 TURBO

Cylinder Code	Cylinder Dia. in mm	Piston Dia. D in mm
<u>Standard Size</u>		
Stamped		
0	95.000-95.010	94.933-94.947
1	95.010-95.020	94.943-94.957
2	95.020-95.030	94.953-94.967



Clearance between cylinder and piston: 0.053-0.077 mm

PISTON INSTALLATION NOTES

Because the piston pin bore is offset, the piston must be installed correctly. The installation mark faces the clutch - see figure.



CHECKING PISTONS AND CYLINDERS

Cylinders

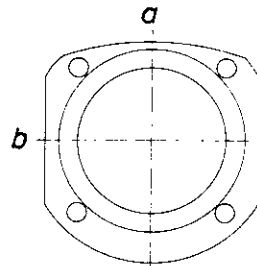
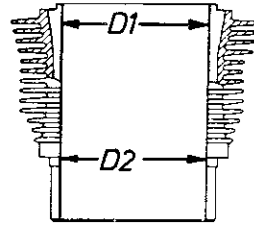
D1 = Measuring point for wear and ovality

30 mm below upper edge of cylinder

The cylinder is worn if the measurement is 0.08 mm more than the size at installation. Measurements are made in directions a and b to check ovality. The amount of deviation between a and b should not exceed 0.04 mm.

D2 = Measuring point for piston ring end gap

Rings slid in at height of cylinder base gasket.



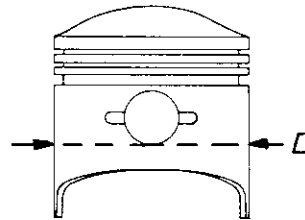
Pistons

D = Measuring point for wear

At lower edge of piston pin bore.

Caution!

Replace piston and cylinder if clearance exceeds 0.15 mm.



PISTON RING END GAP

Piston Ring	End Gap in mm (new)	End Gap in mm (wear limit)
Compression ring, I and II	0.15 - 0.3	0.8
Oil scraper ring, III (see measuring point "D2")	0.15 - 0.3	1.0

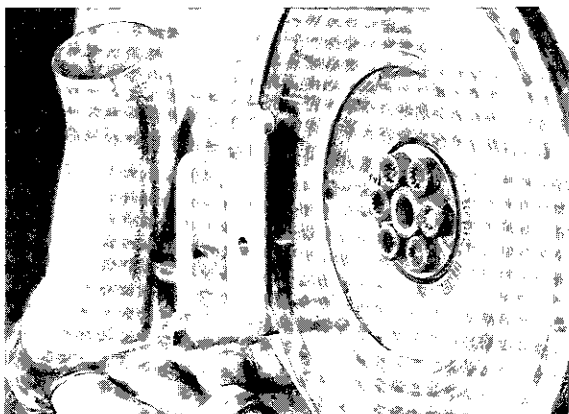
PISTON RING SIDE CLEARANCE

Piston Ring	Side Clearance in mm (new)	Side Clearance in mm (wear limit)
Compression ring, I	0.070 - 0.102	0.2
Compression ring, II	0.040 - 0.072	0.2
Oil scraper ring, III	0.020 - 0.052	0.1

REMOVING AND INSTALLING FLYWHEEL

Removing

1. Loosen flywheel mounting bolts (using special tool P 238) and remove flywheel (take off inner stop pin of P 238).



Installing

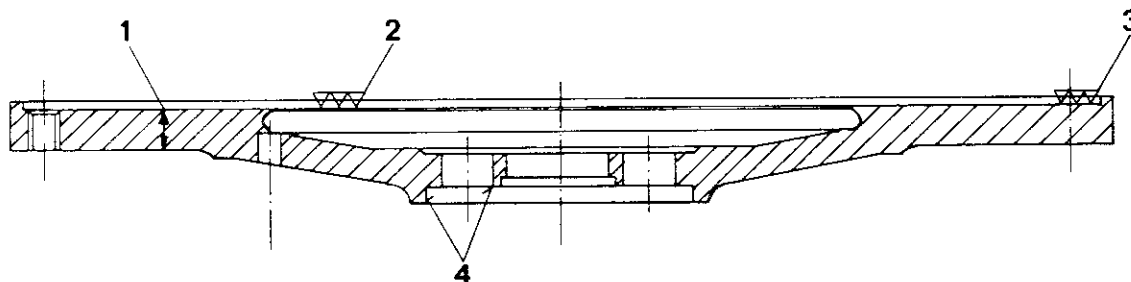
1. The contact surfaces of crankshaft, flywheel and washer must be free of grease.
2. Torque mounting bolts to specifications.

MACHINING FLYWHEEL

If severely scored or burnt, the flywheel can be machined on a lathe.

The chip size should be kept as small as possible.

Flywheel thickness wear limit is 9.9 mm.



1 Wear limit 9.9 mm

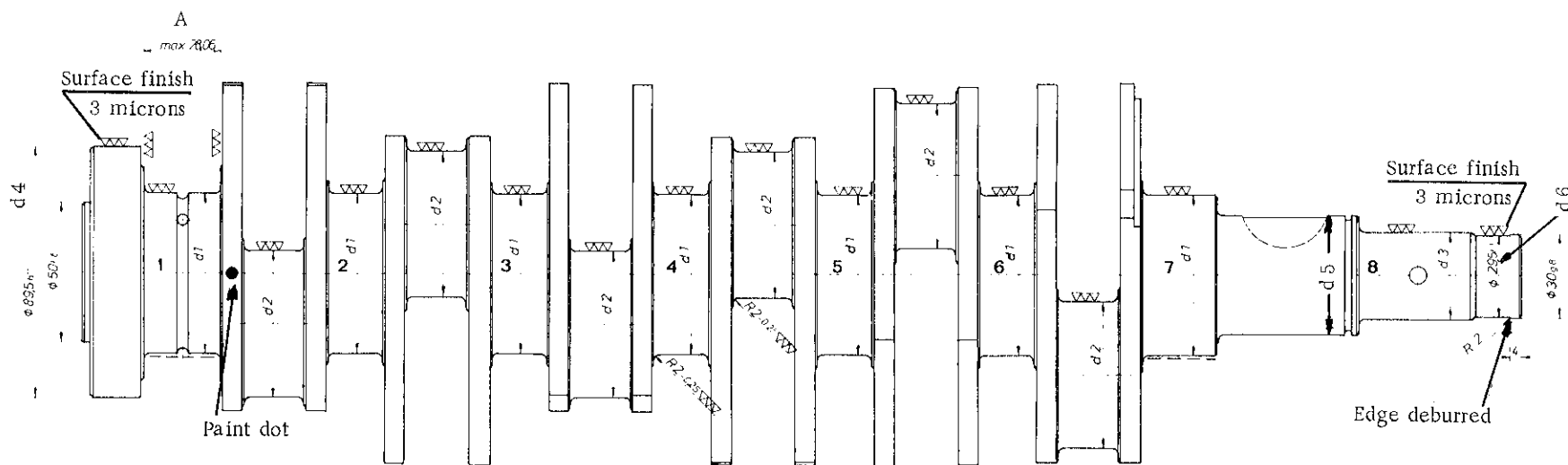
2 Smallest chip size

3 Max. runout 0.1 mm

4 Lathe mounting points

CRANKSHAFT - STANDARD AND UNDERSIZES
(1978 Model)

Size mm	Crankcase bore Bearings 1 ... 8	All Main Bearing journals d 1	Connecting Rod Bearing journals d 2	Main Bearing journal d 3 of Crankshaft Bearing 8	Oil Seal journal d 4	Seat for Timing Gear Dia. d 5	Crankshaft Pulley Seat Diameter d 6	Thrust Bearing Width A
Standard		59.971...59.990	54.971...54.990	30.980...30.993	89.780...90.000	42.002...42.013	29.960...29.993	28.000...28.060
- 0.25	65.019 Oversize	59.721...59.740	54.721...54.740	30.730...30.743				
- 0.50		59.471...59.490	54.471...54.490	30.480...30.493	89.280...89.500		29.370...29.500	
- 0.75	65.000... Standard	59.221...59.240	54.221...54.240	30.230...30.243				
- 1.00		58.971...58.990	53.971...53.990	29.980...29.993				



Grind crankshaft oil seal surfaces only when deeply scored.
Grind to dimensions of 29,5 mm and 89,5 mm respectively.
Otherwise polish out to 3 microns.

After grinding, chamfer oil holes to 0,5 mm radius. Break all sharp edges to 0,2 - 0,5 mm radius. Maximum radial runout measured at bearings 1 and 7 is 0,04 mm.

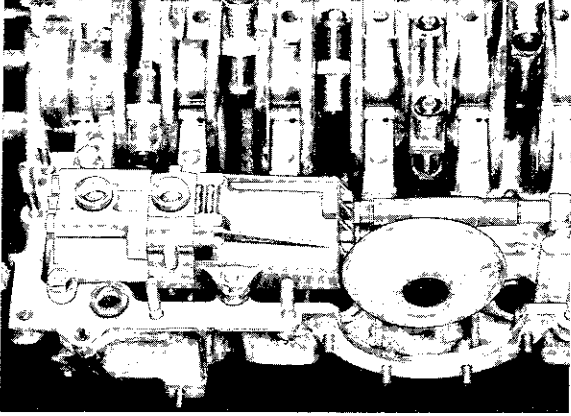
Tenifer treat crankshaft after grinding.
Magnaflux to check for cracks.

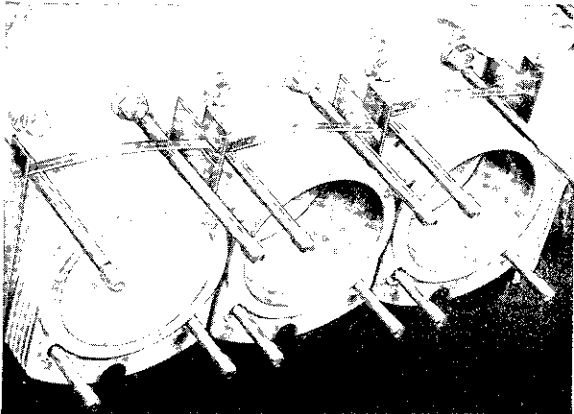
Do not straighten bearing journals 3 and 5 after Tenifer treatment.
All other main bearing journals can be straightened by applying pressure to the bearing journal webs.

Undersize color codes

1st undersize	blue paint dot
2nd undersize	green paint dot
3rd undersize	yellow paint dot
4th undersize	white paint dot

Layout of Oil Pump - 1978 Model



Installation of Cylinders and Air Guide
Plates 1978 Model

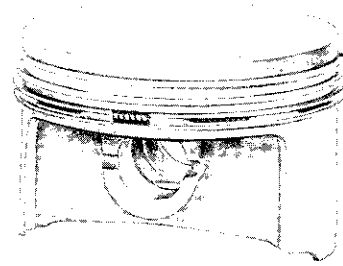
PISTON AND CYLINDER SIZES - 1978 MODEL

Cylinder Code	Cylinder Dia. in mm	Piston Dia. D in mm
---------------	---------------------	---------------------

Standard Size

Stamped

0	97.000 - 97.007	96.850 96.860
1	97.007 - 97.014	96.857 96.867
2	97.014 - 97.021	96.864 96.874
3	97.021 - 97.028	96.871 96.881



Cylinder/piston clearance: 0.025 - 0.052 mm

ENGINE-CYLINDER HEAD
AND VALVE DRIVE

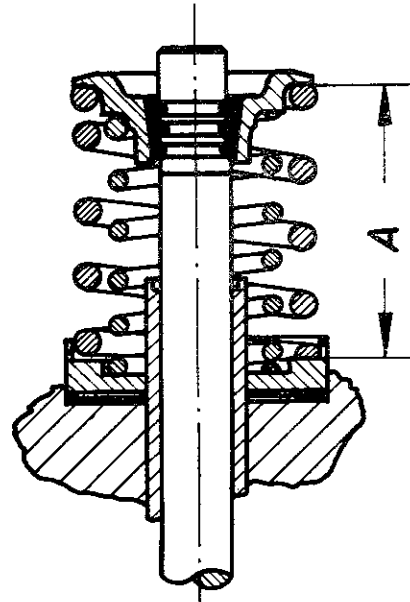
CHECKING INSTALLED LENGTH OF VALVE SPRINGS

Checking

Note

Set tool P 10 c to "33.5".

1. Install special tool P 10 c with shim corresponding to valve, spring support washer, spring retainer and both valve keepers.
2. Read distance "A" on special tool P 10 c and, if necessary, correct by removing or installing shims.



Installation Sizes

Install length of intake valve springs

A $33.5^{+0.3}$ mm

Install length of exhaust valve springs

ADJUSTING TIMING

Intake valve lift at TDC overlap with 0.1 mm valve clearance is 0.65 to 0.80 mm.

ADJUSTING VALVES

Valves are adjusted with engine installed in car. Only following parts are removed: air cleaner, relay plate cover, diverter valve and air pump.

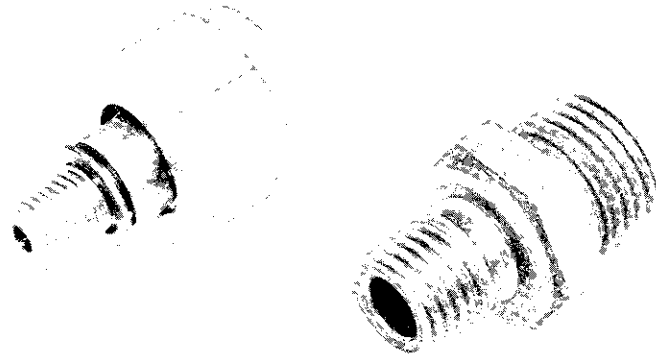
From 1978 Model, intake air intercooler also has to be removed.

REMOVING AND INSTALLING CHAIN TENSIONER

Chain tensioners can only be replaced after removal of engine.

FUEL SUPPLY

TOOLS



No.	Description	Special Tool	Remarks
	Connecting adapter	9114	For testing both fuel pumps in conjunction with P 378

CHECKING FUEL PUMP DELIVERY

Note

Before checking fuel pump, check for:

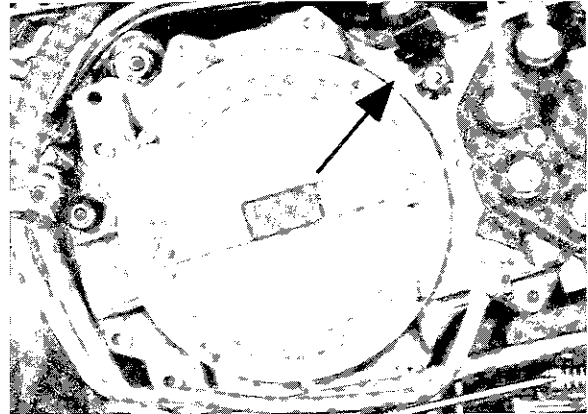
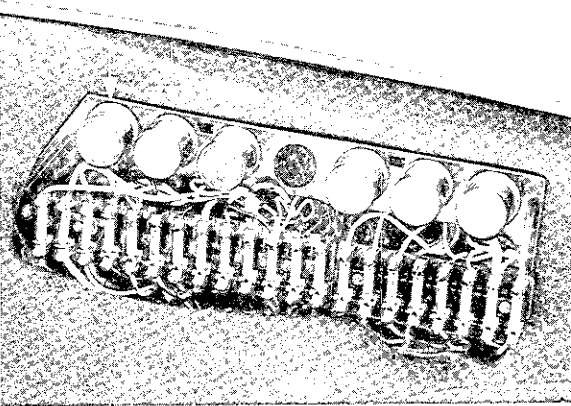
- clean fuel filter
- electrical connections OK
- at least 11.5 volts at both fuel pumps

1. Detach fuel return line (left side of engine compartment).



2. Extend fuel return line with a section of fuel hose and place end in a measuring glass (contents about 1500 cc).

3. Bridge both fuel pump relays (30 and 87) or pull out plug on air sensor contact.



4. Switch on ignition for 30 seconds. Both pumps must deliver 140 liter/hour or 1170 cc in 30 seconds.

Note

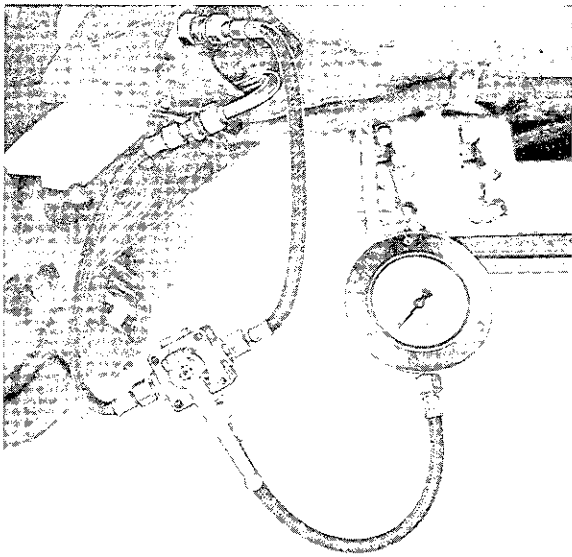
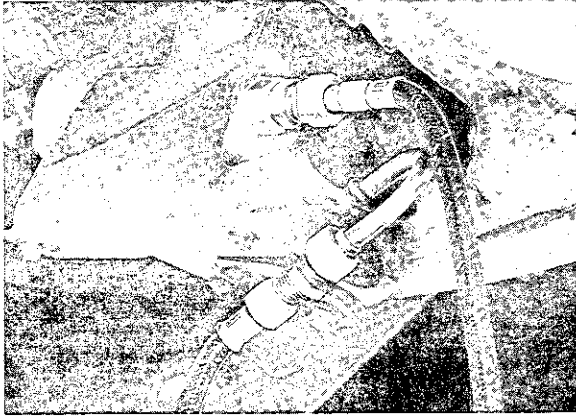
If delivery rate is less than this specification, check pressure of fuel pumps to determine which pump is defective.

CHECKING PUMP PRESSURE

1. Loosen intake fuel line.



2. Connect pressure gauge of P 378 between intake line and rear fuel pump in conjunction with Special Tool P 9114.



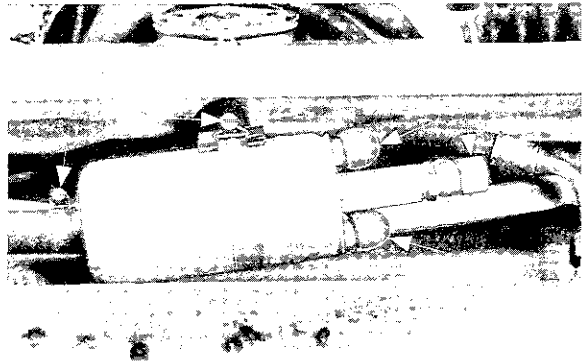
3. Turn ignition on (after first bridging relays or pulling off plug at air sensor contact).
4. Read pressure gauge. Pressure must be between 2 and 4 bar. If less than 2 bar, the first pump (front) is defective. If more than 4 bar, the second pump (rear) is defective. Replace defective pumps and recheck pressure.

Check connections for leaks after completing pressure test.

REMOVING AND INSTALLING FRONT FUEL PUMP

Removing

1. Disconnect ground cable at battery.
2. Remove bottom protection plate.
3. Clamp intake fuel hose shut. Loosen hose clamp and pull off intake fuel hose.
4. Pull off rubber caps and remove nuts attaching wires.
5. Remove hollow bolt for pressure fuel line.
6. Loosen pump clamp and remove fuel pump.



Installing

1. Always use new seals.
2. Install fuel pump so there is clearance all around it.

REMOVING AND INSTALLING REAR FUEL PUMP

Removing

1. Disconnect ground cable at battery.
2. Remove hollow bolt for pressure fuel line.
3. Pull off rubber caps and remove nuts attaching wires.
4. Loosen intake fuel line and catch escaping fuel.
5. Remove nuts and take fuel pump off bracket.
6. Loosen fuel pump clamp and take fuel pump off holder.



Installing

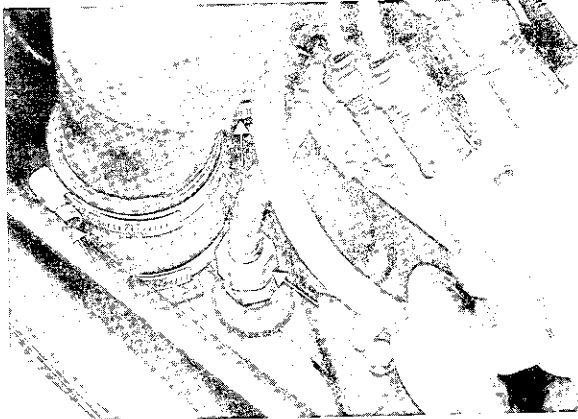
Always use new seals.

TURBOCHARGER

REMOVING AND INSTALLING EXHAUST GAS TURBOCHARGER

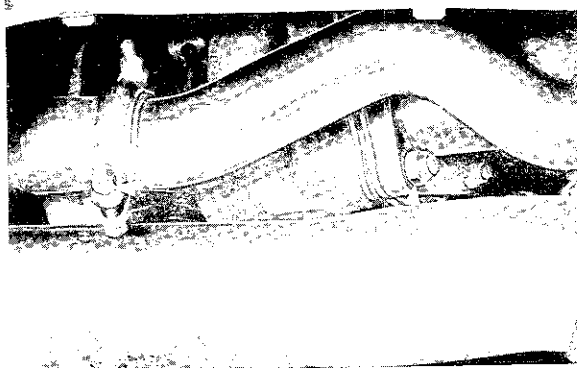
Removing

1. Disconnect hose (arrow) between turbo outlet and turbo outlet duct. Disconnect oil pressure line (arrow) from engine.



2. Loosen rear apron socket head screws and remove apron with seal.

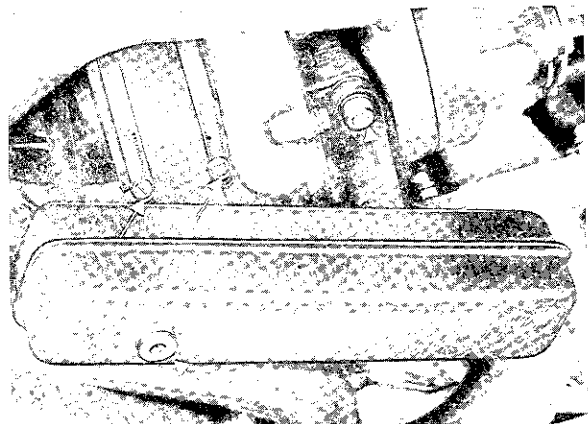
3. Loosen clamp (arrow) between bypass line and muffler. Loosen mounting nuts (arrow) between turbo and muffler.

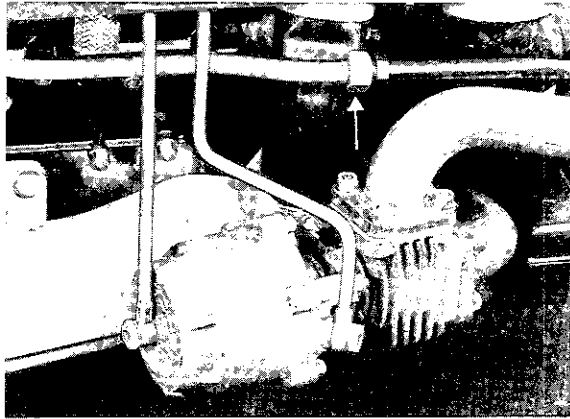


4. Loosen muffler clamp and remove muffler.

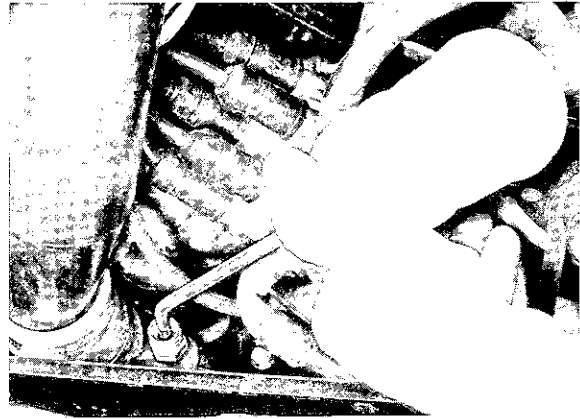
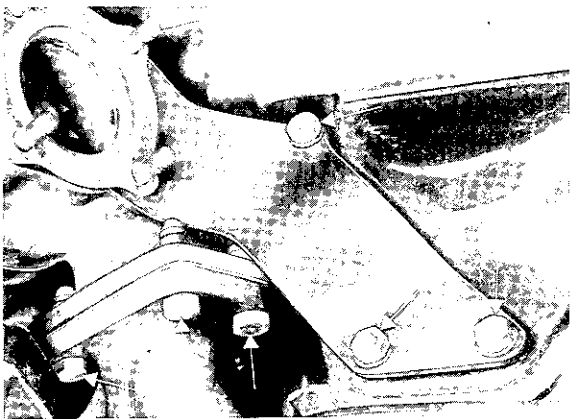
5. Loosen hose between turbocharger inlet line and turbocharger. Slide hose to left. Drain oil in oil trap.

Disconnect oil return line at oil trap, loosen oil drain tube of oil trap on bottom of turbocharger and remove trap.





6. Loosen turbocharger to exhaust pipe mounting bolts as well as mounting nuts on turbocharger holder. Remove turbocharger.



Note

When installing a new turbocharger, the connections are located by turning the turbocharger compressor side to align it with the turbine side.

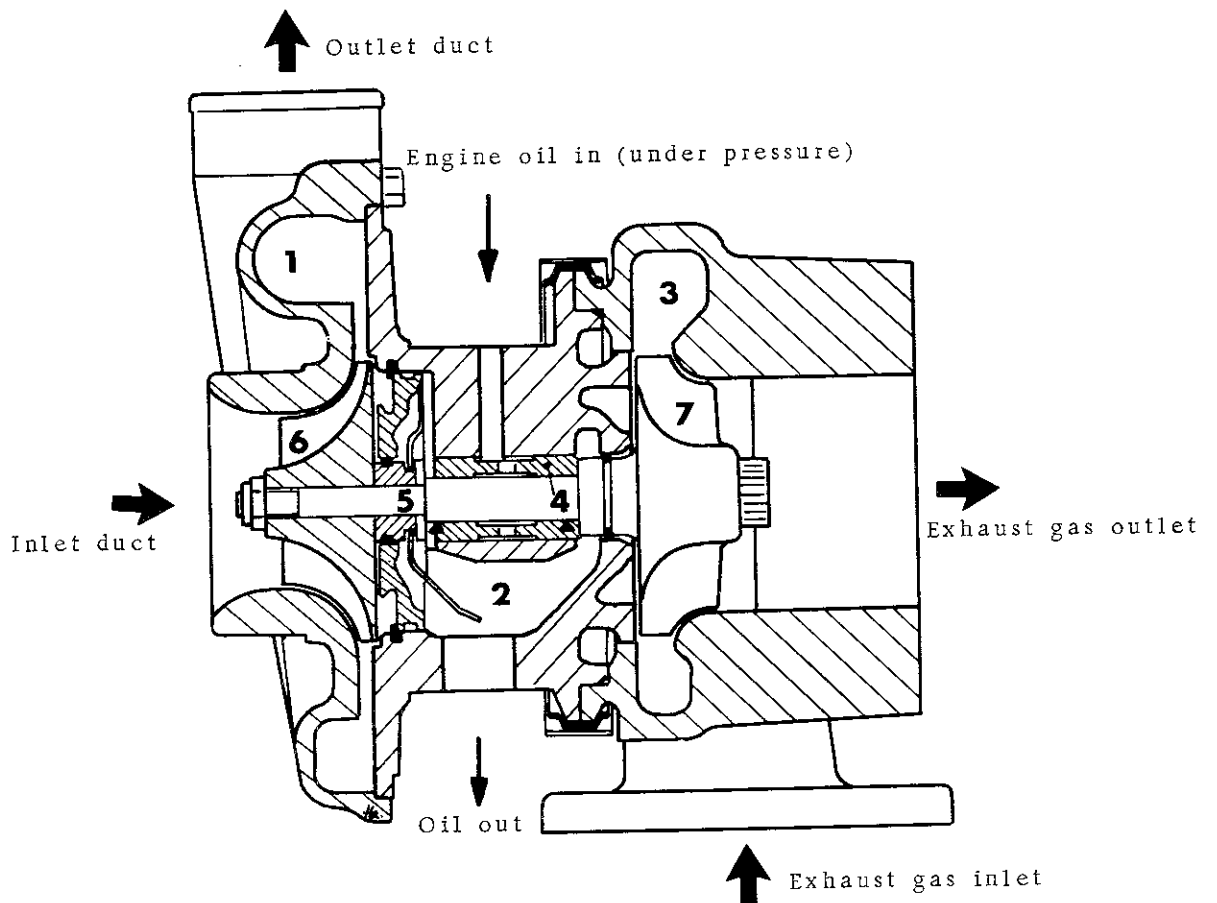
- a) Loosen strap on turbocharger a little.
- b) Install turbocharger on engine and align location of connections.
- c) Secure rubber hoses and exhaust pipe and then tighten strap screws to specified torque (refer to page 21 - 5).
- d) Always install new oil drain plug seals, self-locking nuts and gaskets
- e) Before starting the engine for first time, the turbocharger lubrication oil must be pumped for 30 seconds - which requires disconnecting wires at manifold pressure limiting switch and operating starter motor.

Installing

1. Be sure that hose connections are properly made between turbocharger outlet duct and turbocharger outlet.
2. After installation, lubricate turbocharger with 2 to 4cm³ of engine oil.



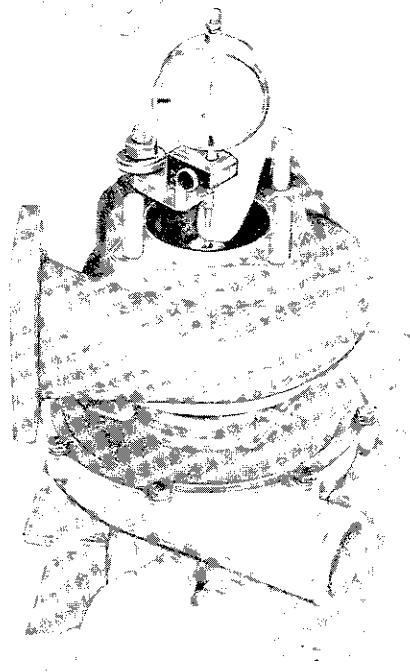
TURBOCHARGER



- 1 Compressor housing
- 2 Bearing housing
- 3 Turbine housing
- 4 Shaft bearing
- 5 Shaft
- 6 Compressor wheel
- 7 Turbine wheel

CHECKING TURBOCHARGER SHAFT END PLAY

1. Place dial gauge in holder. Special tool P 207 can be used as a holder.
2. Set dial gauge on end of turbine wheel shaft. Press rotor shaft against dial gauge, read and note play. Press rotor shaft in opposite direction, read and note play. Difference of both readings is the end play.
Max. play: 0,35 mm



CHECKING TURBOCHARGER TURBINE RADIAL PLAY

Radial play is checked on the turbine end only.

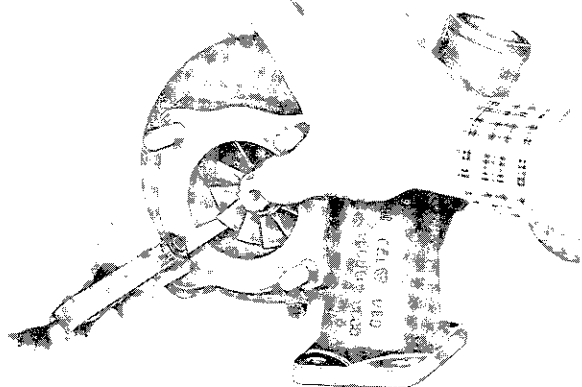
Note

Be sure not to rotate the turbine wheel at all during these measurements.

1. Press turbine wheel toward side of housing, check gap with a feeler gauge and note.
2. Press turbine wheel toward opposite side of housing, check gap and note.

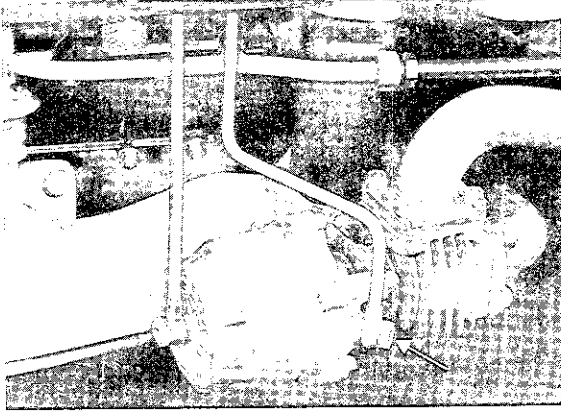
Difference of both measurements is the radial play. Measure play at least at two different locations.

Max. play: 0,65 mm



CHECKING WASTE GATE OPERATION

1. Loosen and remove control line to waste gate.



2. Run engine at idle speed. There must be noticeable vacuum in control line. With increasing engine speed, vacuum changes to pressure (charging pressure).
3. Insert a plug in disconnected control line, so that engine will not stall while checking waste gate operation.
4. Carefully blow compressed air in control line opening of waste gate. Listen for sound of waste gate opening.

C a u t i o n

Do not use more than 1,5 bar (21 psi) air pressure.

In addition to sound of valve opening, check that bypass line warms up (cold engine).

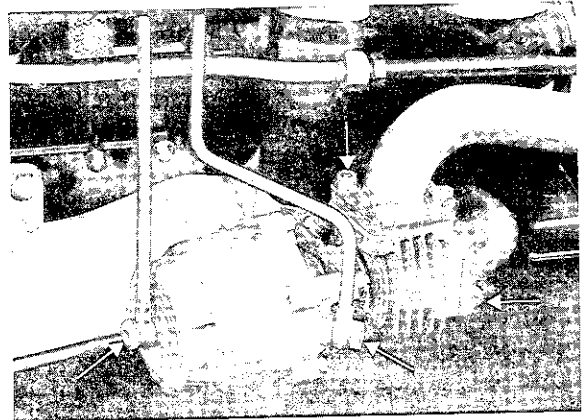
If necessary, replace waste gate.

REMOVING AND INSTALLING WASTE GATE (CHARGE PRESSURE CONTROL VALVE)

Removing

Engine Type 930/51

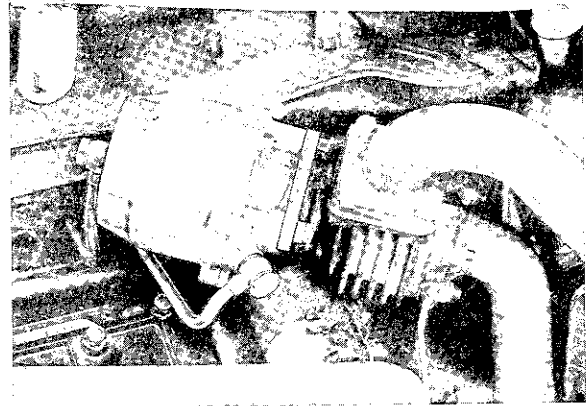
1. Detach vent line and control line.
2. Unlock and remove thermag nuts.
3. Remove waste gate, upper gasket, heat guard and lower gasket.

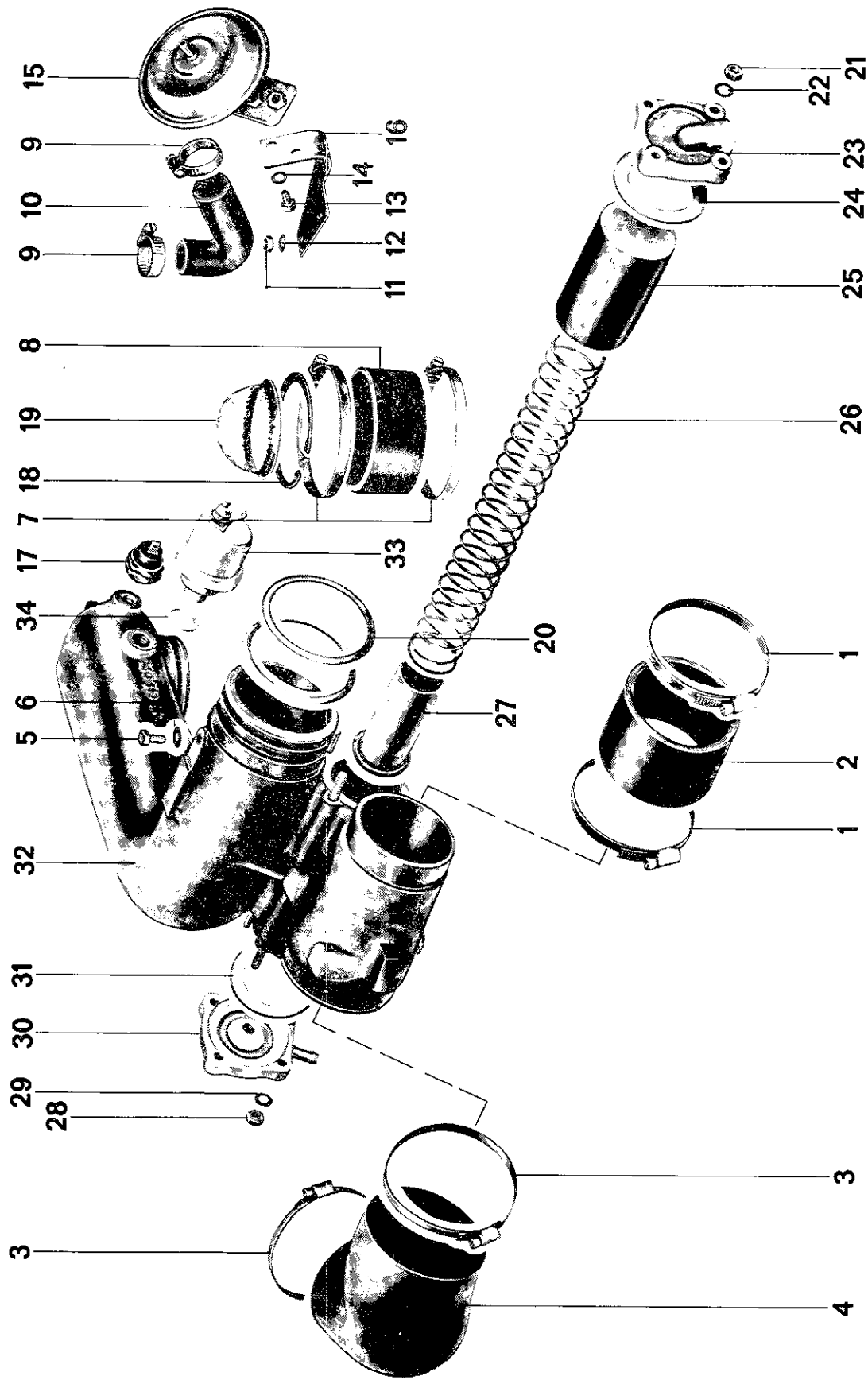


Engine Type 930/53

Installing

Use new gaskets, seals, thermag nuts and lockplates.

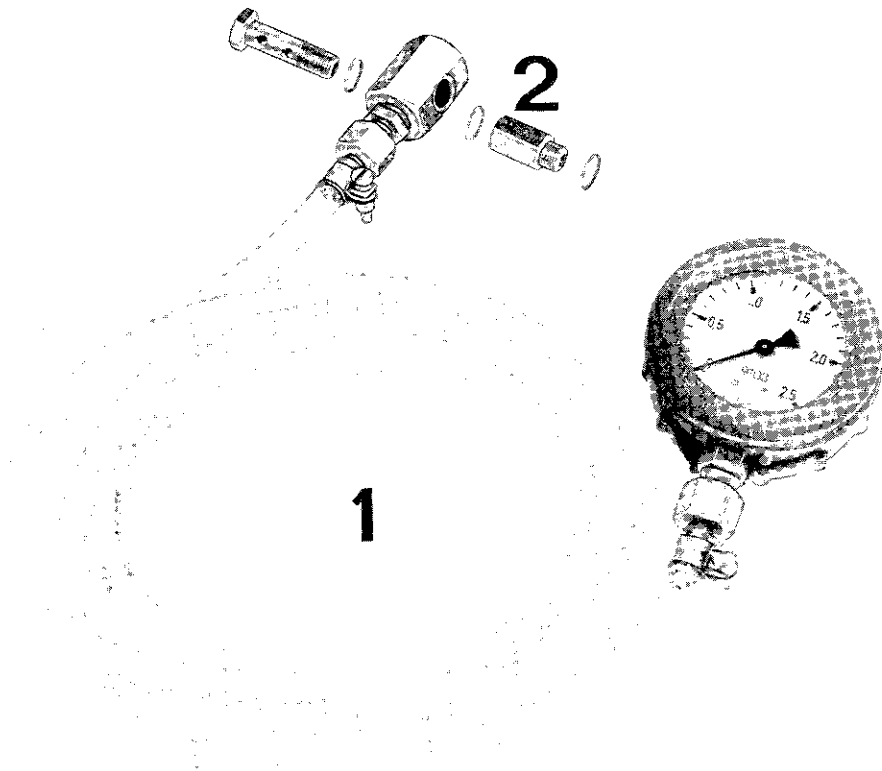




No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
1	Hose clamp	2			
2	Rubber sleeve	1		Install correctly	
3	Hose clamp	2			
4	Hose	1		Install correctly	
5	Bolt	1			
6	Washer	1			
7	Hose clamp	2			
8	Rubber sleeve	1		Install correctly	
9	Hose clamp	2			
10	Hose	1			
11	Nut	2			
12	Washer	2			
13	Bolt	2			
14	Washer	2			
15	Anti-backfire valve	1			
16	Holder	1			
17	Manifold pressure limiting switch	1		Check	See page 21-11
18	Snap ring	1			
19	Filter screen	1			
20	Seal	2		Replace	
21	Nut	4			
22	Washer	4			
23	Cover	1			

No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
24	Gasket	1		If necessary replace	
25	Control piston	1	Caution - under spring pressure	Lubricate slightly, check movement in valve housing	
26	Spring	1			
27	Guide	1			
28	Nut	4			
29	Washer	4			
30	Cover with control line connection	1			
31	Gasket	1		Replace, if necessary	
32	Pop-off valve housing	1			
33	Turbo boost pressure sender	1		Check	
34	Seal	1		Replace	

TOOLS



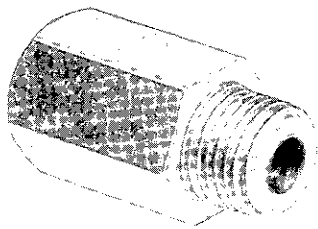
No.	Description	Special Tool	Remarks
1	Manifold pressure tester	9103	
2	Threaded adapter	9103/1	for 1978 model

CHECKING MANIFOLD PRESSURE

1. Disconnect and remove electric plug and manifold pressure limiting switch. From 1978 Model, switch is located behind pop-off valve housing as seen looking forward.

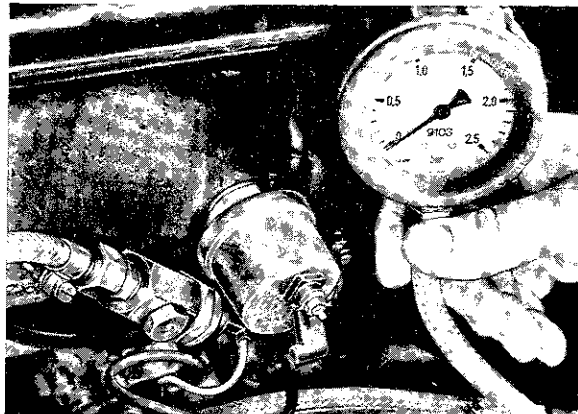


2. Screw adapter (with seal) of special tool in valve housing and tighten slightly. From 1978 Model, first install threaded adapter, Special Tool 9103/1.

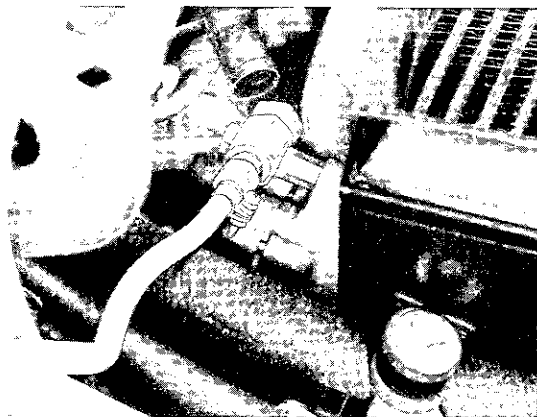


3. Screw manifold pressure limiting switch in adapter and tighten only finger tight, counter-holding adapter.
4. Route gauge hose with pressure gauge from passenger compartment to engine compartment.

5. Connect gauge hose to adapter, counterholding the adapter.



Turbo 3.0



Turbo 3.3

6. Check manifold pressure in a road test or on a dynamometer. Manifold pressure: 0.70 - 0.85 bar (0.7 - 0.85 atm).

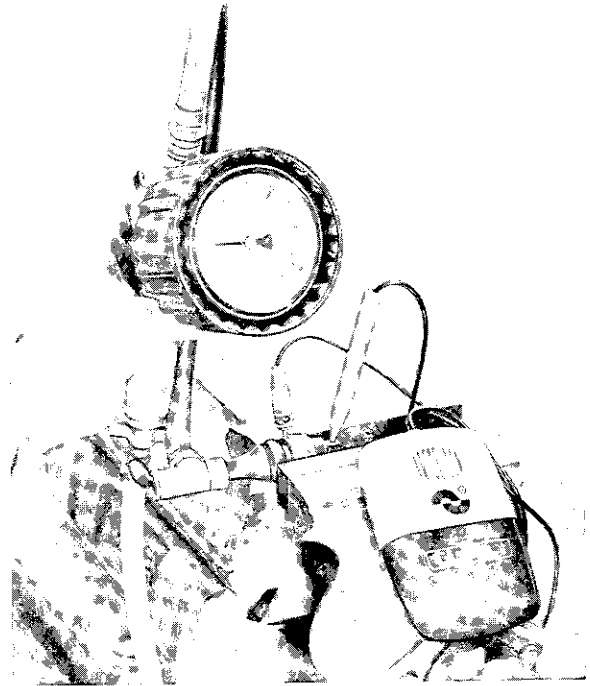
Fully accelerate car in 1st or 2nd gear and read charge pressure between 4500 and 5500 rpm (2nd person). Manifold pressure can only be checked in the acceleration phase.

If necessary, replace waste gate.

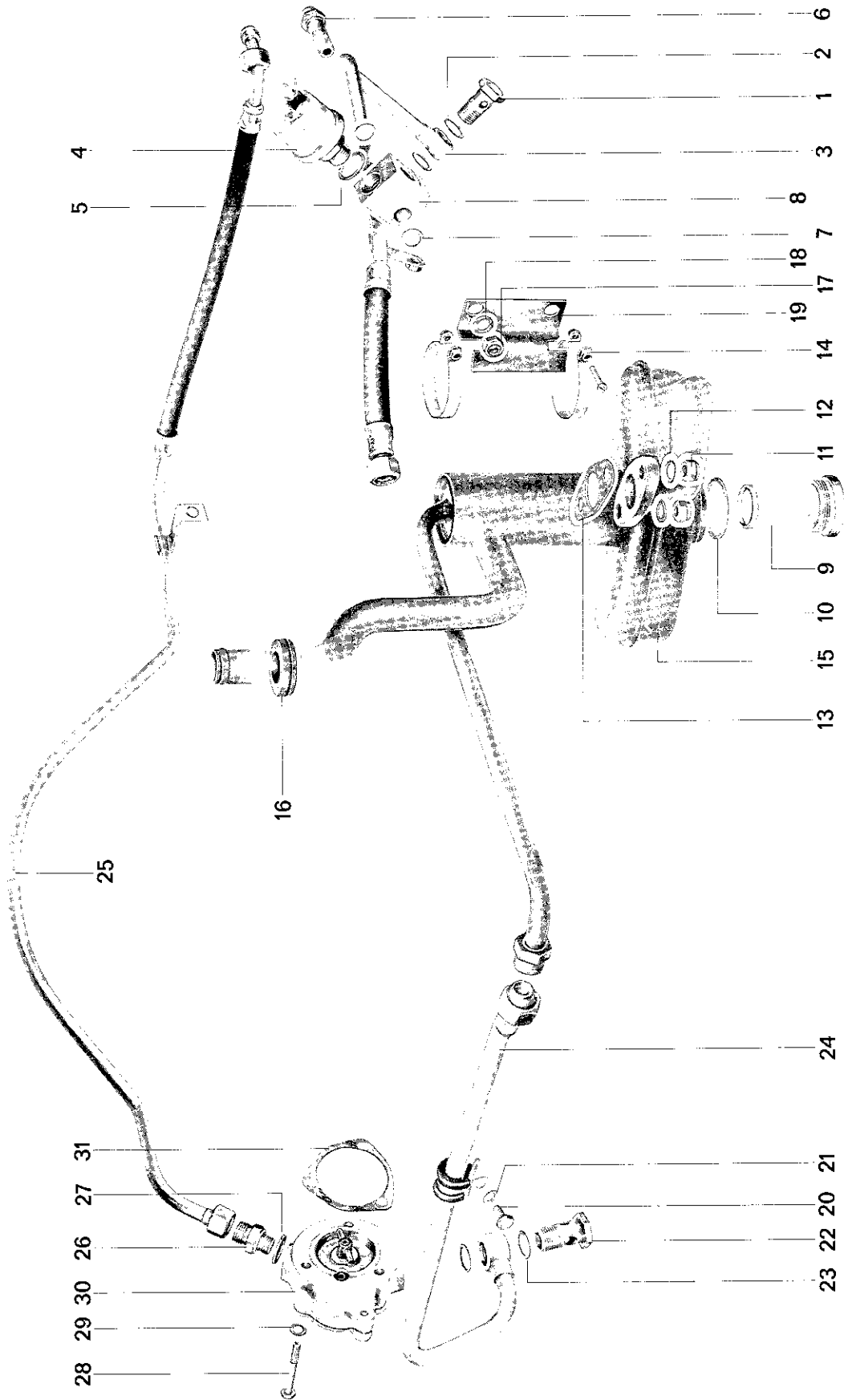
CHECKING FUNCTION OF MANIFOLD PRESSURE LIMITING SWITCH

Checking

1. Remove manifold pressure limiting switch.
2. Clamp manifold pressure limiting switch carefully.
3. Connect ohmmeter between switch housing and connecting terminal. Check that ohmmeter reads 0 ohms.
4. Install tubeless tire valve (without valve insert) on threads of switch.
5. Connect air pressure hose to pressure gauge (at valve).
6. Increase pressure carefully. Check that ohmmeter goes to ∞ at about 1,5 bar.
7. Drop pressure slowly until ohmmeter again goes to 0. Now read pressure which should be between 1.1 and 1.4 bar. If necessary replace manifold pressure limiting switch.

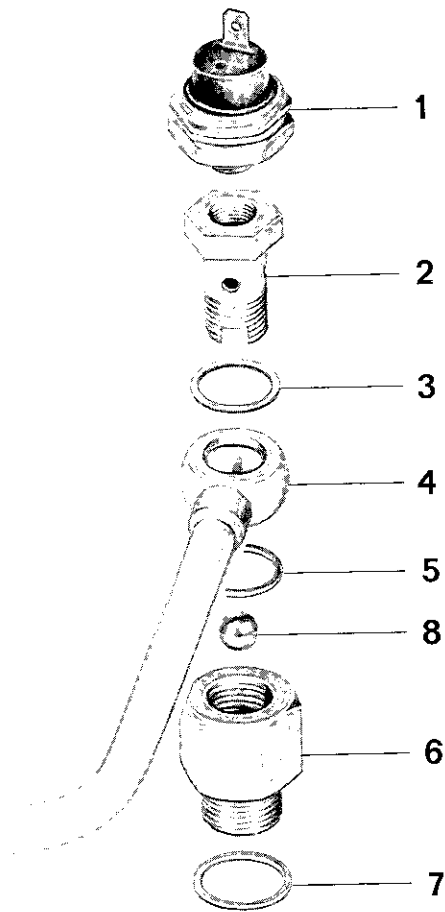


No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
1	Hollow bolt	1			
2	Seal	2		Replace	
3	Oil pressure line to turbocharger (hollow bolt)	1			
4	Pressure sensor	1			
5	Seal	1		Replace	
6	Adaptor	1			
7	Seal	2		Replace	
8	Adaptor	1			
9	Filter screen	1		Clean	
10	Seal	1		Replace	
11	Thermag nut	2		Replace	
12	Washer	2			
13	Gasket	1		Replace	
14	Clamp	2			
15	Turbocharger Oil tank	1			
16	Rubber grommet	1			
17	Nut	2		Replace	
18	Washer	2			
19	Bracket	1			
20	Bolt	1			
21	Washer	1			
22	Hollow bolt	1			
23	Seal	2		Replace	
24	Oil line	1			

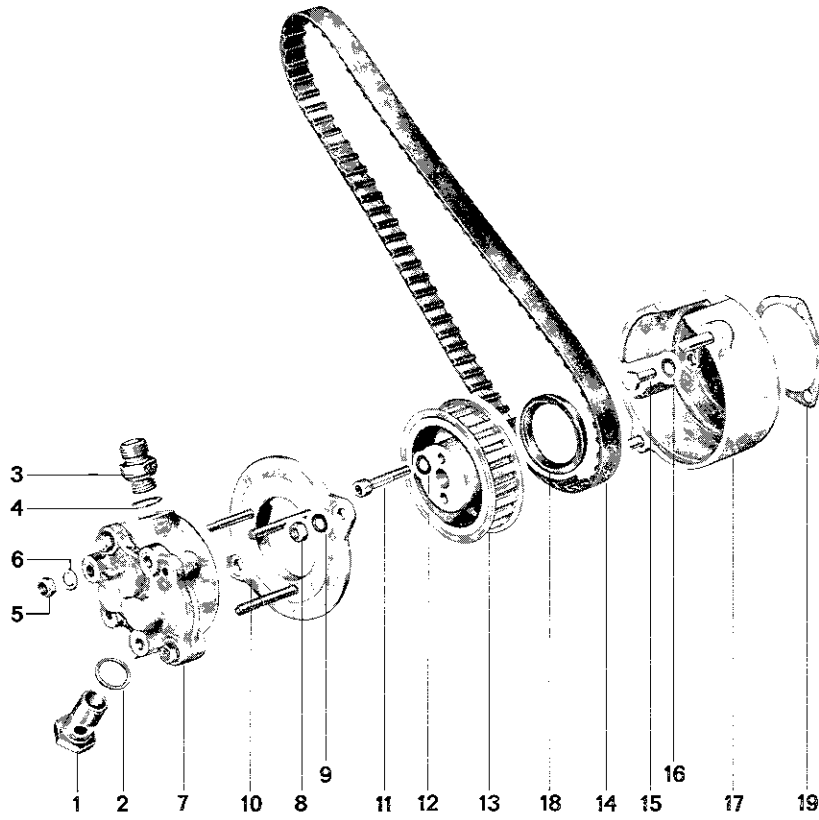


No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
25	Oil line from pump to tank	1			
26	Adaptor	1			
27	Seal	1		Replace	
28	Bolt	3			
29	Washer	3			
30	Oil pump	1			See page 21-15
31	Gasket	1		Replace	

PRESSURE OIL LINE CONNECTION FOR TURBOCHARGER WITH OIL PRESSURE SWITCH (ACCESSORY)



No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
1	Oil pressure switch	1			
2	Adapter	1			
3	Seal	1		Replace	
4	Oil line	1			
5	Seal	1		Replace	
6	Adapter	1			
7	Seal	1		Replace	
8	Ball	1			



No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
1	Hollow bolt	1			
2	Seal	2		Replace	
3	Adapter	1			
4	Seal	1		Replace	
5	Nut	3			
6	Washer	3			
7	Oil pump	1		Install dowel pin of oil pump shaft between socket head screws of pulley (13)	
8	Nut	2			
9	Washer	2			
10	Cover, flange	1			

No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
11	Socket head screw	2			
12	Washer	2			
13	Pulley	1			
14	Drive belt, 80 teeth	1		Tighten, must deflect by 6 to 8 mm at center under thump pressure	
15	Bolt	3			
16	Washer	3			
17	Flange	1			
18	Oil seal	1		Replace, install properly with VW 433	
19	Gasket	1		Replace, coat both sides with sealing compound	

REMOVING AND INSTALLING TURBOCHARGER OIL PUMP

Removing

1. Detach guard at exhaust pipe.
2. Detach pressure and inlet lines at oil pump.
3. Loosen bolts and remove oil pump with gasket.



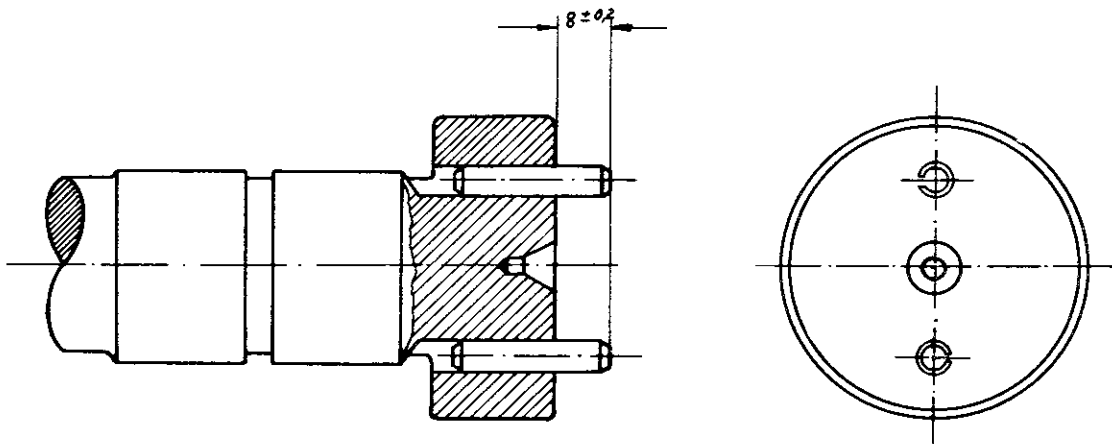
Installing

Observe the following when installing:

1. Use new paper gasket.
2. Install cylindrical pin of oil pump shaft between keys of camshaft.

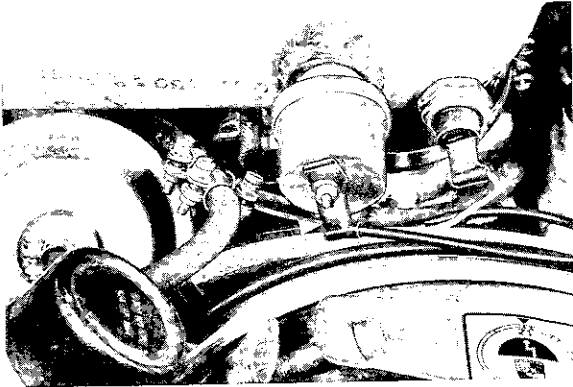
Note

Keys of left camshaft must be installed to protrude beyond face of camshaft by 8 mm. Key slots also have to be positioned properly so that oil pump cylindrical pin does not rest in a slot.



CHECKING BOOST PRESSURE GAUGE

If boost pressure gauge in tachometer fails, check all wire connections on tachometer or boost pressure sender against wiring diagram. Pull off wire on boost pressure sender.



Turn on ignition. Boost pressure gauge needle must deflect fully. Hold disconnected wire against ground. Needle must return to zero.

If gauge is OK, trouble is in pressure sender. If gauge is defective, tachometer will have to be replaced.

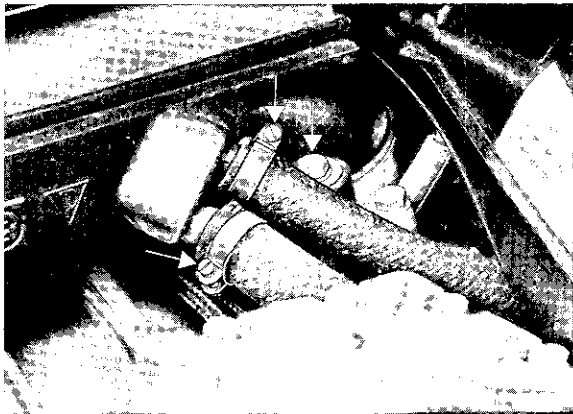
Note

Resistance of boost pressure sender (measured between connecting lug and housing) must be between 5 and 13 ohms at 20° C (68° F) and atmospheric pressure.

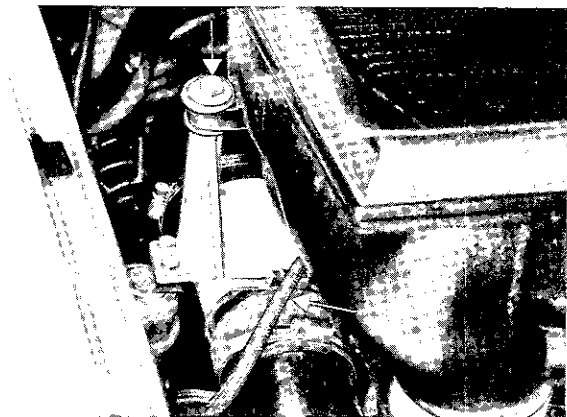
REMOVING AND INSTALLING INTAKE AIR INTERCOOLER (1978 MODEL)

Removing

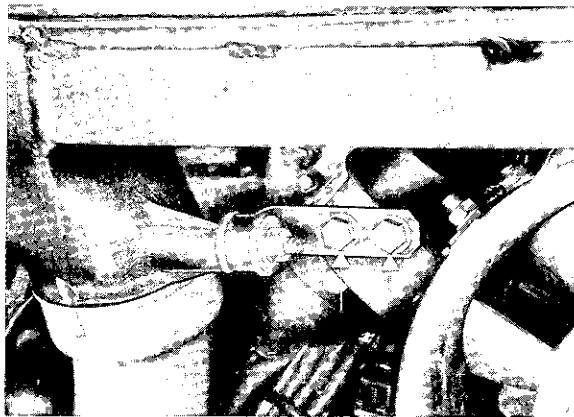
1. Loosen hose clamps on right side of intake air intercooler and pull off hoses. Loosen and remove bolt.



2. Detach hose between waste gate and intake air intercooler at intake air intercooler. Loosen and remove bolt.



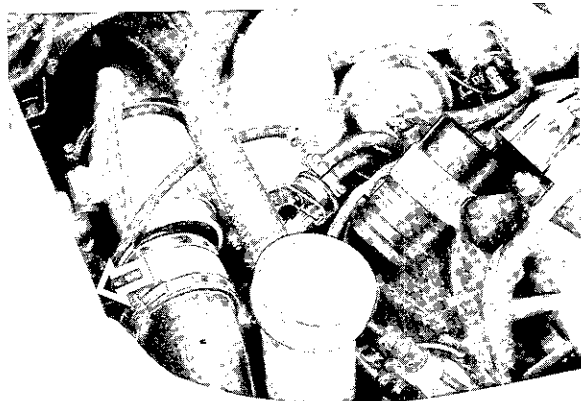
3. Unscrew bolts and remove intake air intercooler.



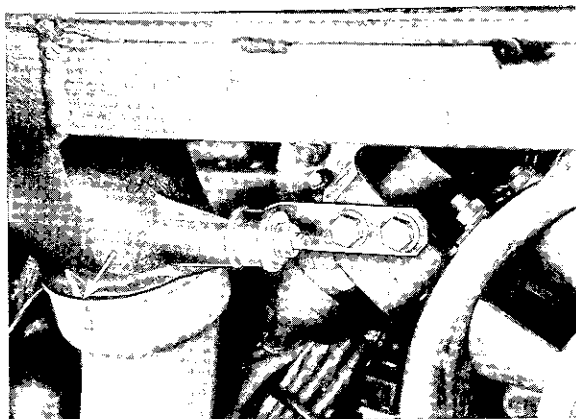
4. Remove turbo outlet duct to intake air intercooler.

Installing

1. Check all O-rings, replacing if necessary.
2. Lubricate O-rings with lubricant before installation.
3. To facilitate installation of turbo outlet duct, loosen hose clamps of rubber sleeve on turbo intake duct and push back sleeve. Also press intake duct to the left a little.



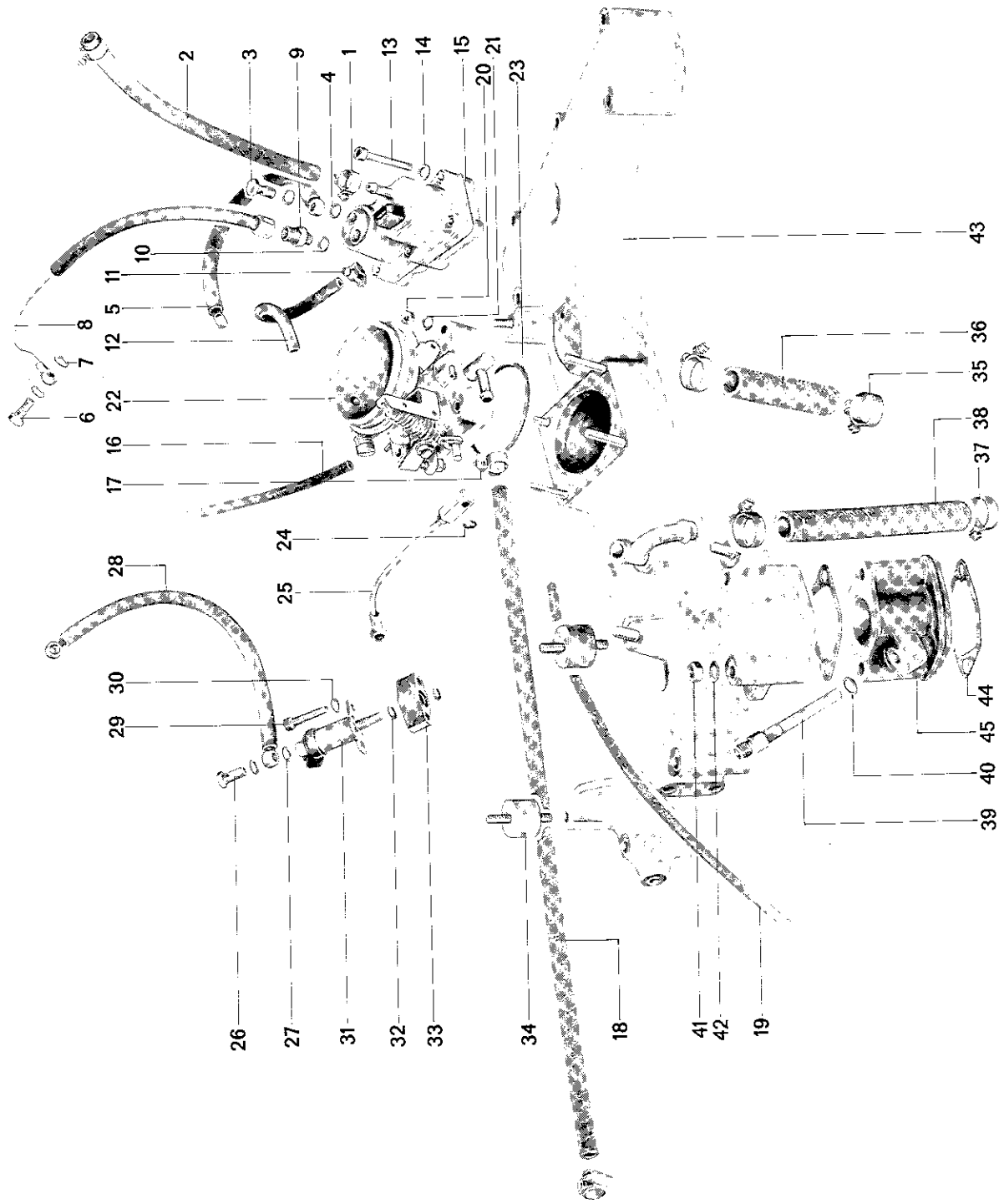
4. Turn turbo outlet duct to one side, so that marks on intercooler and turbo outlet duct align or turbo outlet duct is installed without stress.



Note

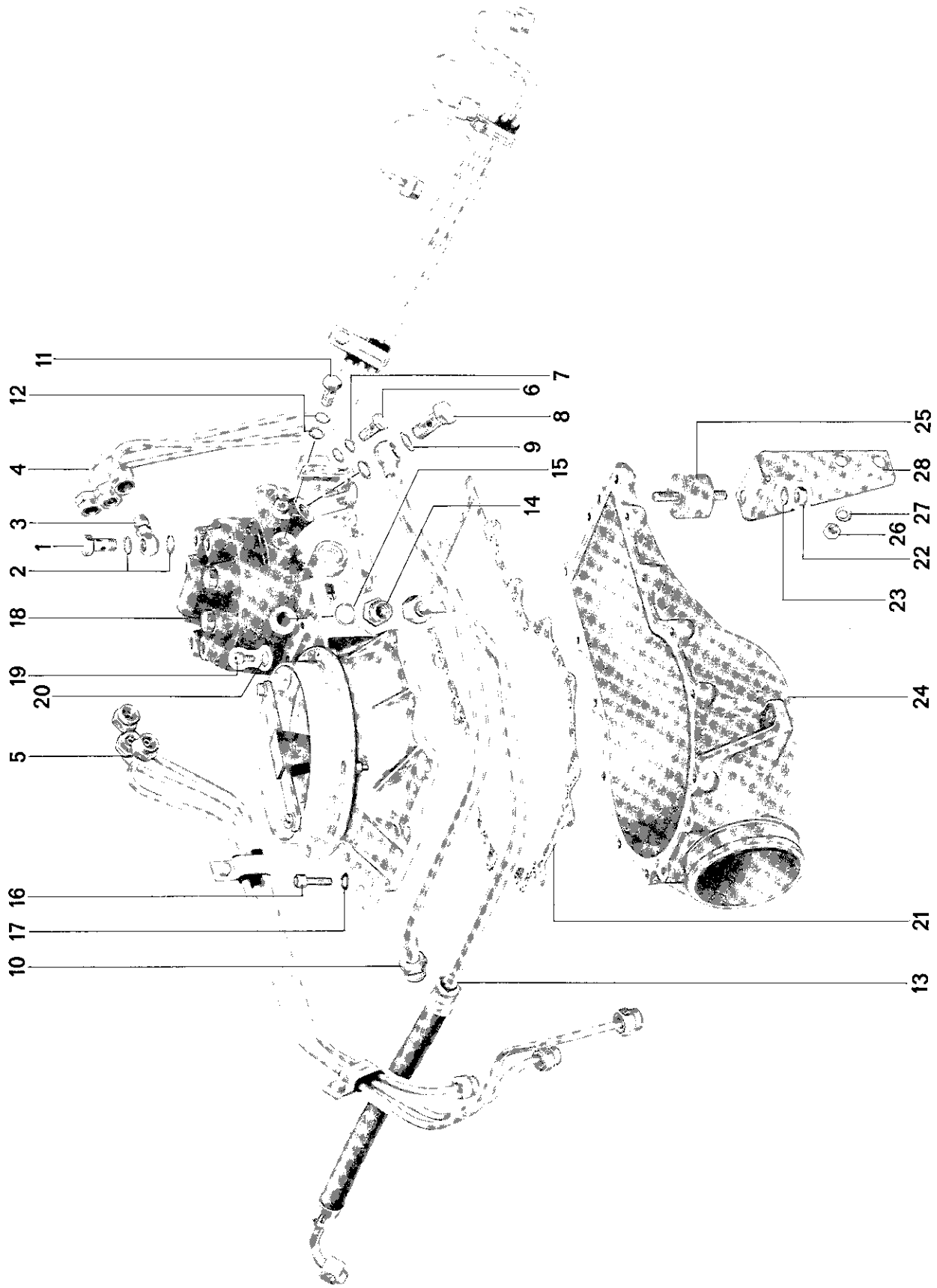
When replacing rubber seal on intake air intercooler, make sure that it is positioned correctly (arrows face in forward direction).

FUEL SYSTEM (CIS)



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Clamp	2			
2	Vacuum hose	1			
3	Hollow bolt	1			
4	Seal	2		Replace	
5	Fuel return line	1			
6	Hollow bolt	1			
7	Seal	2		Replace	
8	Fuel feed line	1			
9	Adaptor	1			
10	Seal	1		Replace	
11	Clamp	2			
12	Vacuum line	1			
13	Allen bolt	2			
14	Washer	2			
15	Warm-up governor	1			
16	Vacuum hose	1			
17	Clamp	2			
18	Control line, (to waste gate)	1			
19	Vacuum hose, distributor	1			
20	Nut	4			
21	Washer	4			
22	Connector	1			
23	Seal	1		Replace	
24	Lock clip	1			

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
25	Linkage	1			
26	Hollow bolt	1			
27	Seal	2		Replace	
28	Fuel line	1			
29	Allen bolt	2			
30	Washer	2			
31	Cold start valve	1			
32	Seal	2		Replace	
33	Flange	1			
34	Rubber/metal pad	2			
35	Clamp	2			
36	Hose	1			
37	Clamp	2			
38	Hose	1			
39	Injection valve	6			
40	Seal	6		Replace	
41	Nut	12			
42	Washer	12			
43	Throttle valve housing	1			
44	Gasket	12		Replace, install correctly	
45	Flange	6			



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Hollow bolt	6			
2	Seal	12		Replace	
3	Banjo Fitting	6			
4	Injection lines Cylinders 4 - 6	1			
5	Injection lines Cylinders 1 - 3	1			
6	Hollow bolt	1			
7	Seal	2		Replace	
8	Hollow bolt	1			
9	Seal	2		Replace	
10	Fuel return line	1			
11	Plug	1			
12	Seal	2		Replace	
13	Fuel feed line	1			
14	Adaptor	1			
15	Seal	1		Replace	
16	Fillister head screw	15		Observe installation notes	Page 25 - 6
17	Washer	15			
18	Mixture control unit	1			
19	Plug (Allen bolt)	1			
20	Seal	1		Replace	
21	Gasket	1		Replace	
22	Nut	1			
23	Washer	1			

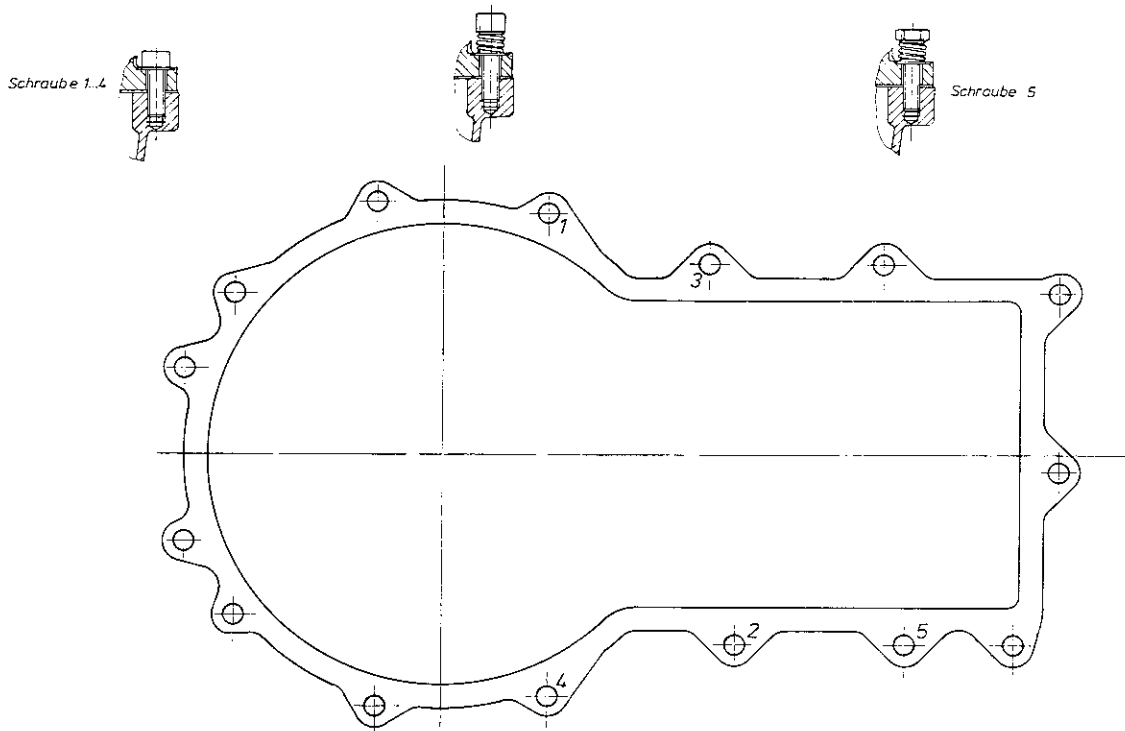
No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
24	Mixture control unit lower	1			
25	Rubber/metal pad	1			
26	Nut	1			
27	Washer	1			
28	Bracket	1			

INSTALLATION NOTES - REMOVING AND INSTALLING MIXTURE CONTROL

1. Torque fillister head screws 1 through 4 cross-wise to 10 Nm (1.0 kpm).

2. Tighten other fillister head screws and hex head screws (5 mm longer) with spring and plain washers to block and loosen again 1 turn each.

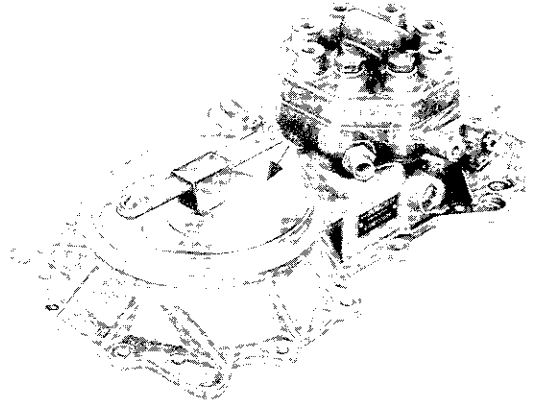
The 5th screw is a hex head screw due to the lack of adequate space.



CHECKING AND ADJUSTING AIR FLOW SENSOR PLATE AT REST POSITION

Checking

1. Pull off plug for safety switch on mixture control unit.
Turn ignition on and off again after approx. 10 seconds.
Upper edge of air flow sensor plate must be flush with beginning of cone or max. 0.5 mm higher (try for lower position).
2. Air flow sensor plate must be level and centered in the venturi cone. The edges of the plate must not touch the sides of the cone and restrict the free movement of the plate and lever.

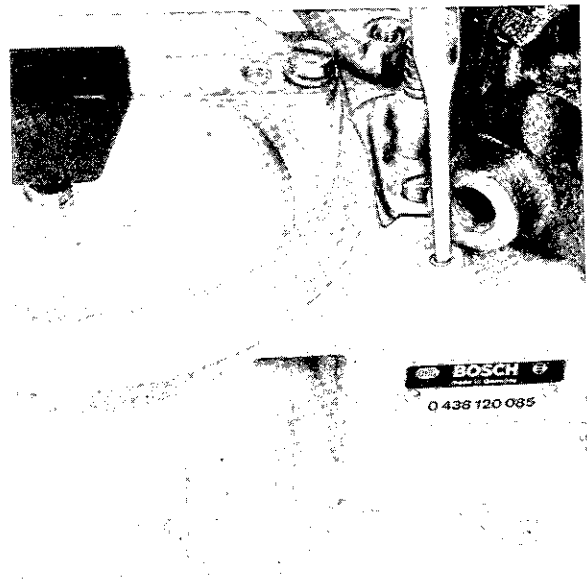


Adjusting

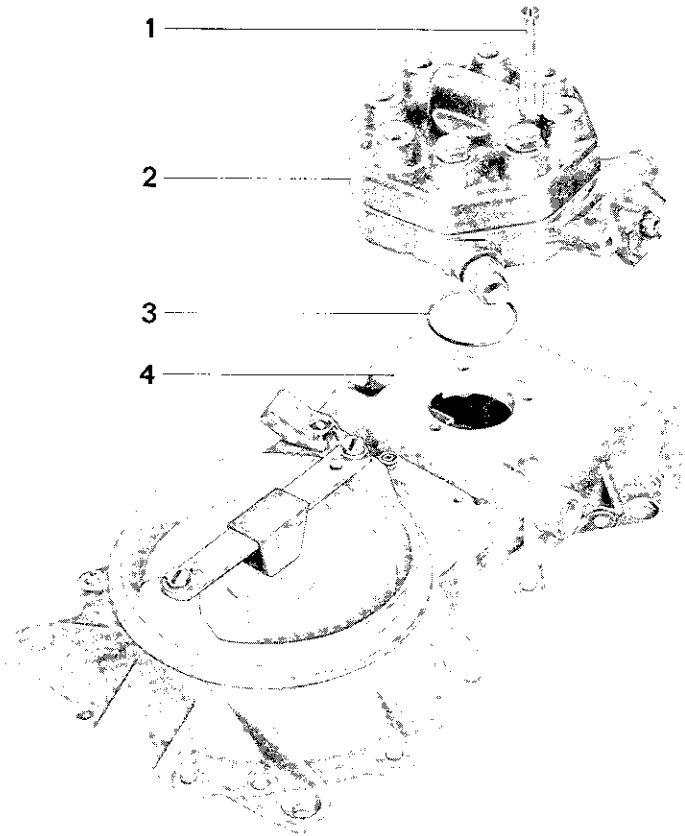
An excessively high air flow sensor plate setting can be corrected by driving down the stop spring guide pin accordingly, using a drift and a light hammer.

Note

Adjust very carefully, so that guide pin is not driven too deep. Avoid frequent adjustments in both directions, since press fit of pin will not hold.

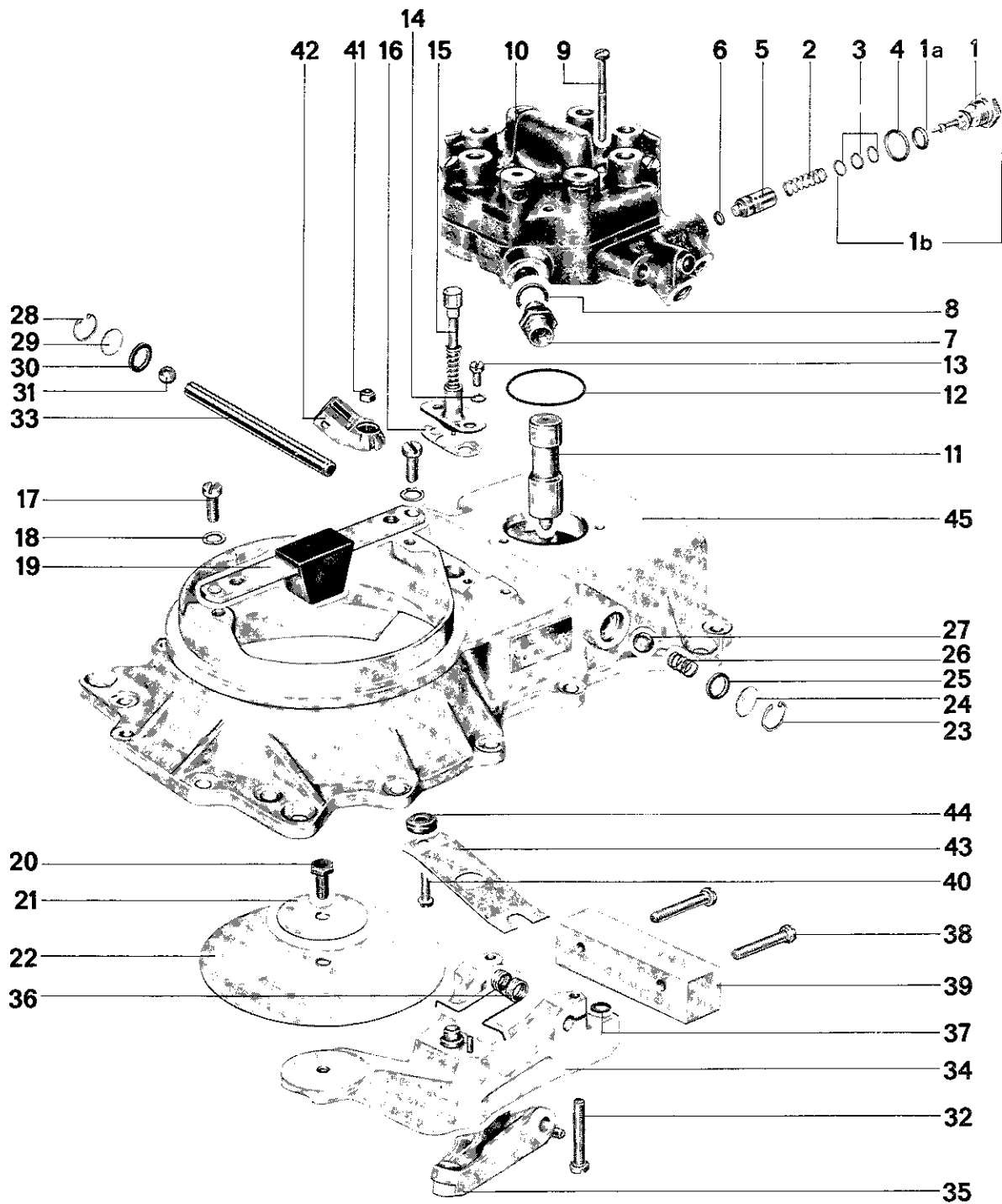


REMOVING AND INSTALLING FUEL DISTRIBUTOR OF MIXTURE CONTROL UNIT

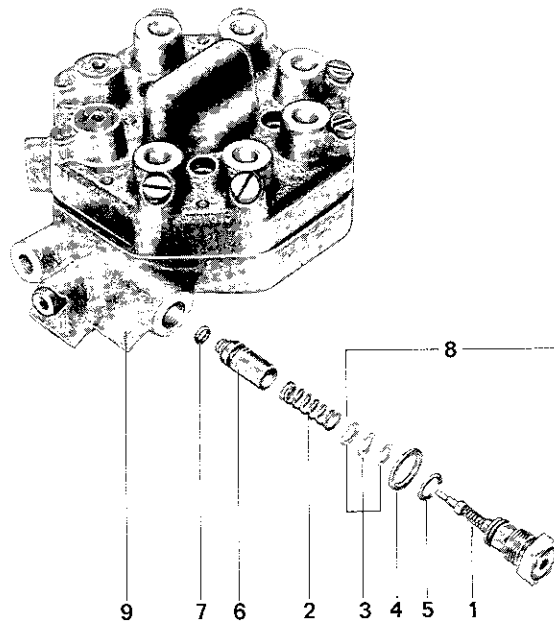


No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
1	Fillister head screw	3		Torque to 0,35 mkg (2,5 ft lb)	
2	Fuel distributor	1	Caution! Do not let control piston fall out	If control piston has been removed, clean thoroughly with unused gasoline before installing	Don't disassemble
3	O-ring	1		Replace, lubricate and install new O-ring in groove of fuel distributor	
4	Air flow sensor	1			

DISASSEMBLING AND ASSEMBLING MIXTURE CONTROL UNIT

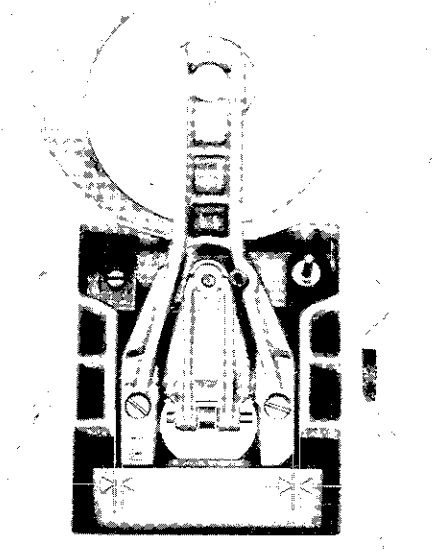


REPLACING PRESSURE RELIEF AND RESIDUAL PRESSURE VALVES

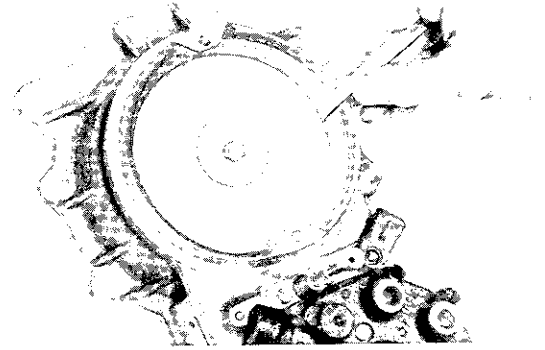


No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
1	Adapter with residual pressure valve (assembled unit)	1		Torque 1.3 - 1.5 mkg (9.4 - 10.8 ft lb)	
2	Spring	1			
3	Shim (0.1, 0.15, 0.3, 0.4, 0.5 mm thick as req.)	3		Install same shims removed (always 3)	Check system pressure
4	Flat seal	1		Replace	
5	O-ring	1		Replace	
6	Piston	1	Use tapered wood peg if necessary	Check, if damaged replace fuel distributor (close tolerance part)	
7	O-ring	1		Check, replace if necessary	
8	Set of parts	1			
9	Fuel distributor	1			Do not disassemble

5. Center adjusting lever in air flow sensor housing and tighten mounting screws.

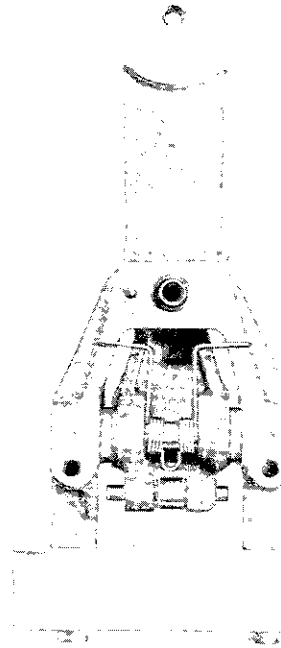
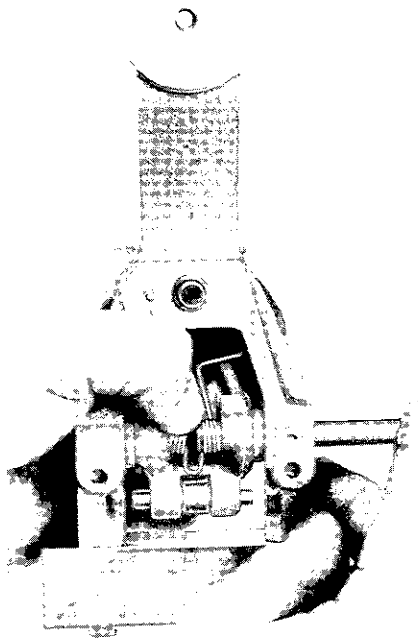


6. Align angular clearance between air flow sensor plate and venturi. The angular clearance must be uniform. It can be checked with a 0.10 mm feeler gauge. This requires that height adjustment (rest position) of air flow sensor plate be correct.



DISASSEMBLING AND ASSEMBLING MIXTURE CONTROL UNIT

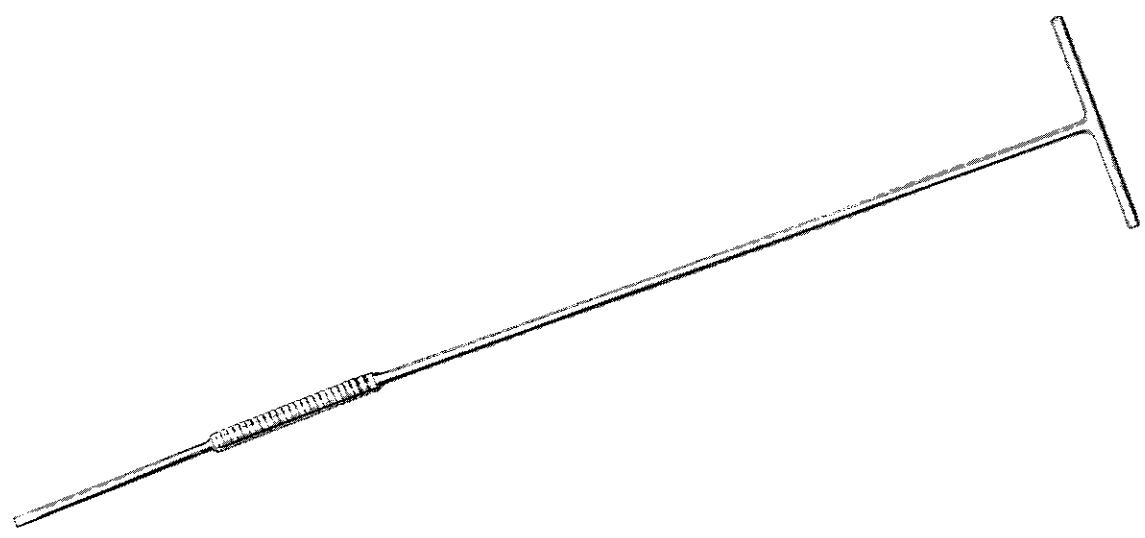
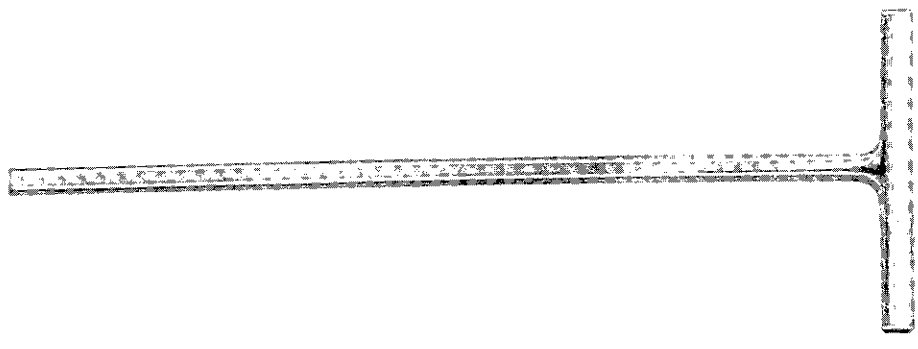
1. Preassemble adjusting lever, spring and pivot fork lever prior to installation in air flow sensor housing.
2. Use an appropriate cylindrical pin for this purpose, e.g. one from adjusting lever of 911 mixture control unit or a standard 8 h 8 x 60 DIN 7 cylindrical pin. Both ends of pin must be chamfered.
3. Make sure that spring fits properly.



4. Guide assembled parts into air flow sensor housing and push out cylindrical pin used for assembly carefully with the original cylindrical pin.

No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
33	Cylindrical pin	1			
34	Adjusting lever	1		Check	
35	Pivot fork lever	1			
36	Spring	1			
37	Spacer	2			
38	Fillister head screw	2		Torque 0.47 - 0.53 mkg (3.4 - 3.8 ft lb)	
39	Counterweight	1		Position correctly	
40	Fillister head screw	1			
41	Locknut	1			
42	Plug, safety switch	1		Turned approx. 15° toward venturi	
43	Stop spring	1		Position correctly	
44	Insulator	1			
45	Air flow sensor housing	1		Lubricate bearing bores with silicone grease	

TOOLS



No.	Description	Special Tool	Remarks
1	Adjusting wrench	P 377	
2	Special screwdriver	P 229 c	

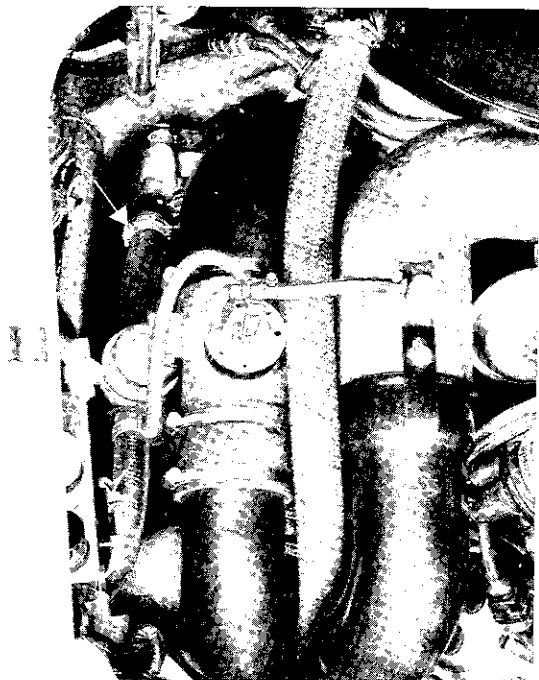
ADJUSTING IDLE

Note

Test requirements:

Engine must be in perfect mechanical condition and ignition timing set correctly.

1. Run engine to operating temperature (about 80° C/176° F).
2. Remove air cleaner.
3. Detach air hose at air pump and plug open end of hose.

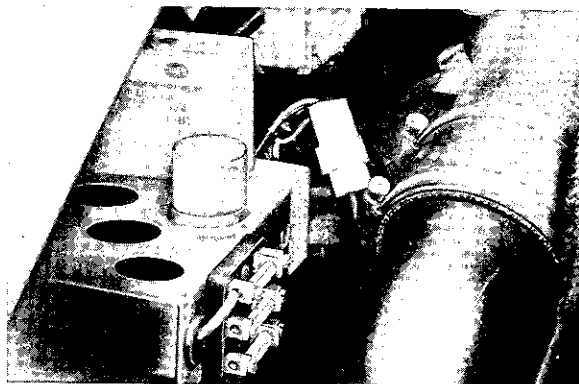


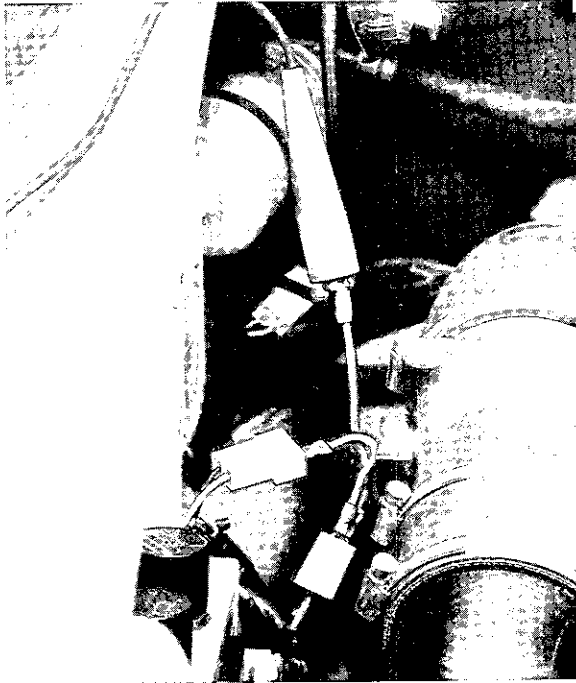
4. Check if manual accelerator lever is at bottom stop.

5. Connect CO tester and separate tachometer according to manufacturer's instructions. Separate 2-pole plug connector when connecting tachometer. Use jumper wires to bridge connectors and provide terminal for connecting black/violet wire to tachometer or engine tester. Black/violet wire normally goes to terminal 1 of the distributor. The tachometer or engine tester is connected to this wire, which normally goes to terminal 1 of the distributor.

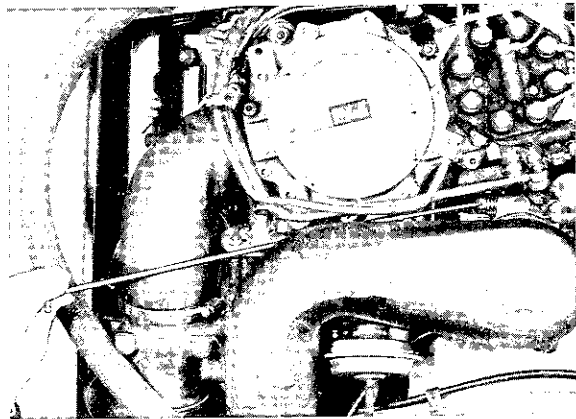
Warning

Never hold black/violet wire against any ground while engine is running.

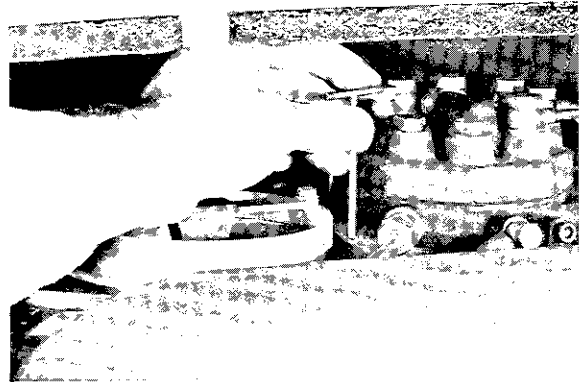




6. Turn air correction screw on throttle valve housing until specified speed is reached. Use special tool P 229 c.



7. Adjust CO.
Remove plug with seal in top of mixture control unit.
8. Guide adjusting wrench P 377 in.
Turning clockwise richens mixture; counter-clockwise leans mixture.



Caution

- a) Always adjust CO from lean to rich.
Example: if idle screw setting is too rich, first turn counterclockwise further than necessary and then clockwise to nominal setting.
- b) Never apply pressure to adjusting wrench while adjusting (engine stops).
- c) Turn control screw very slightly as very small turns alter amount of CO in exhaust gases considerably. Maximum adjustment on mixture control screw is 1/2 turn.
- d) When checking (or adjusting) CO, plug adjusting hole before taking CO reading. If hole is not plugged, extra air will be pulled into control unit giving wrong reading.

9. Remove wrench.

Caution

Never leave wrench in adjusting hole when accelerating engine as this could severely damage mixture control unit.

10. Accelerate engine briefly.

11. Wait until CO tester shows a concentration of exhaust gas at idle speed.
See Page 25 - 15 for adjusting data.
If necessary repeat procedure.

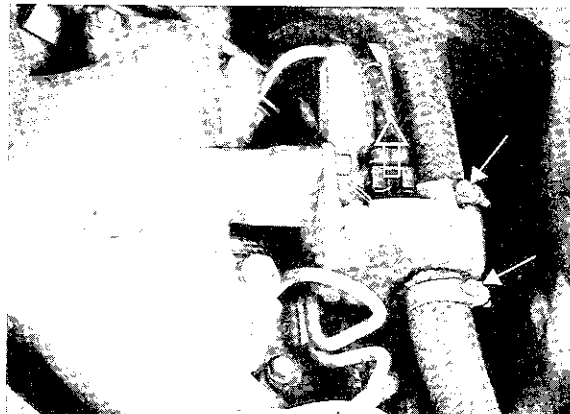
12. Install air cleaner again and recheck idle speed and CO content.

Caution

Complete adjustments as quickly as possible to prevent overheating intake ports.

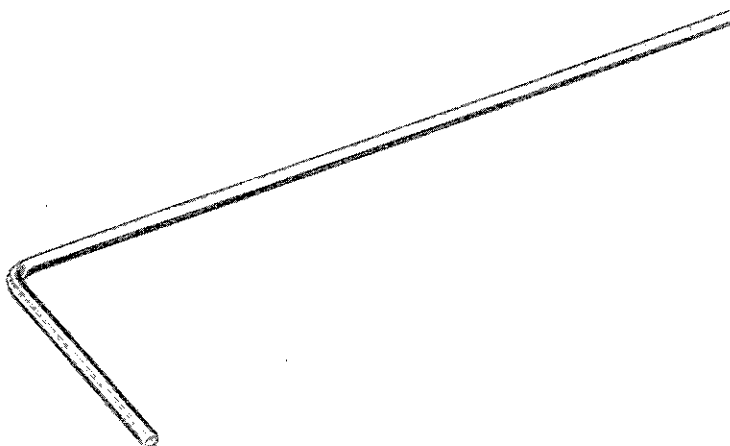
REMOVING AND INSTALLING AUXILIARY AIR VALVE

1. Remove air cleaner.
2. Loosen clamps and disconnect hoses.
3. Pull off electric plug connectors.
4. Loosen socket head screws and remove auxiliary air valve.



ADJUSTING IDLE (1978 MODEL)

TOOLS



No.	Description	Special Tool	Remarks
1	Allen key	9156	

ADJUSTING IDLE 1978 MODEL

Note

Air cleaner must be installed for all adjustments.

1. Detach air hose from air pump and install a suitable plug in open end of hose.
2. Turn control screw on throttle housing until specified speed is reached.
3. Adjust mixture. Insert special tool 9156 into spring-loaded Allen key in mixture control unit. Press down special tool approx. 18 mm to engage spring-loaded Allen key in mixture control screw.

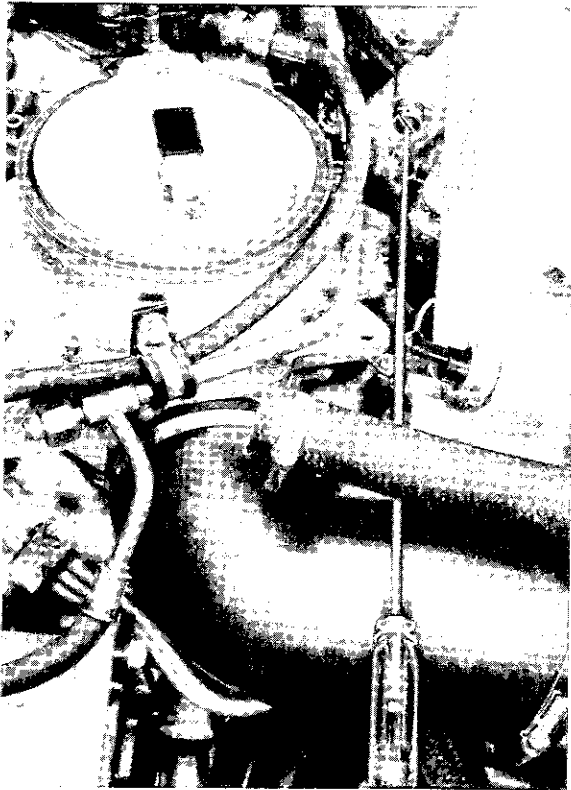
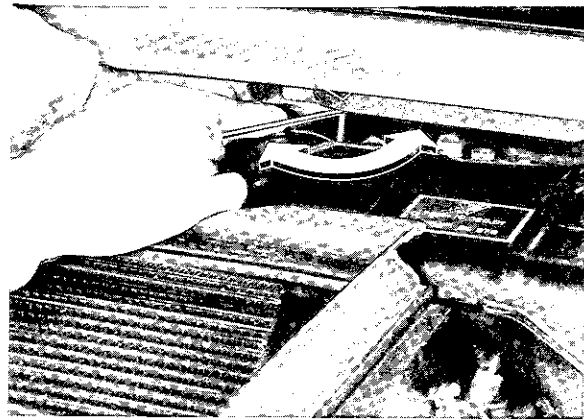


Figure shows control screw without air cleaner

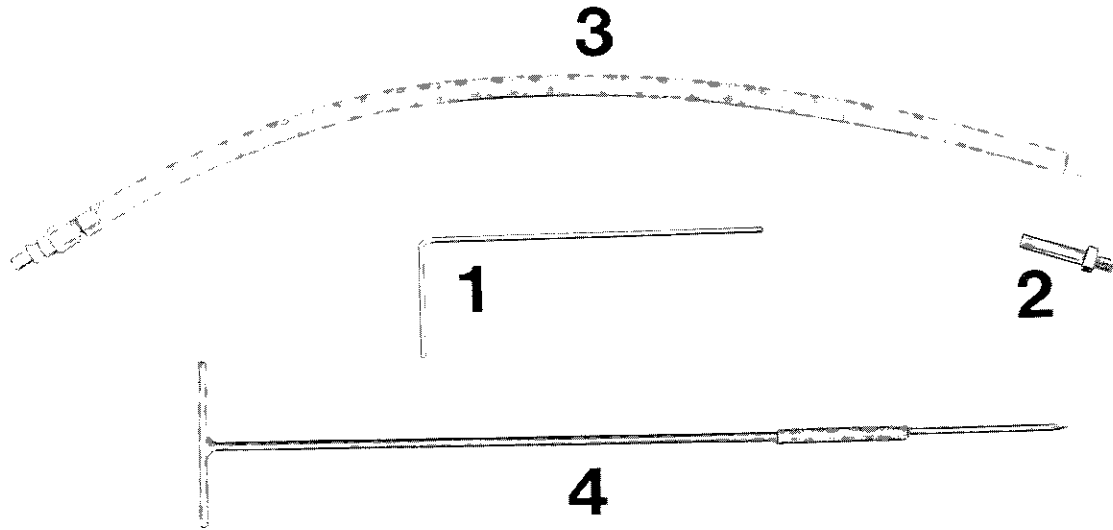


4. See notes on page 25 - 9 and adjusting values on page 25 - 16.

ADJUSTING IDLE – US CARS SINCE 1986 MODEL

Engine Type 930/68

TOOLS



No.	Description	Special Tool	Remarks
1	Adjusting wrench	9156	
2	Adapter	US 8040	
3	CO tester	US 4492	
4	Special screwdriver	P 229 b or P 229 c	

ADJUSTING IDLE

Note

Adjusting Requirements:

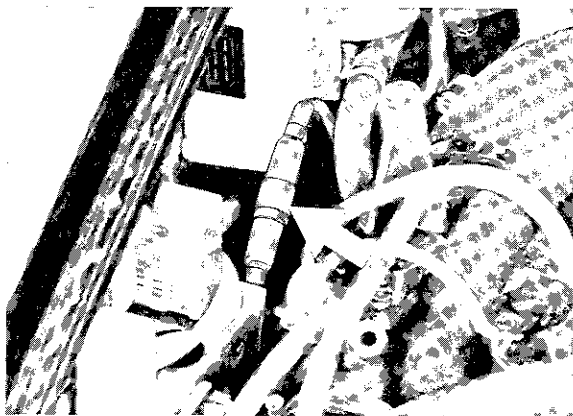
Engine must be in perfect mechanical condition. Electric equipment must be switched off during adjustments. Adjustments must be completed as quickly as possible, to avoid excessive heat in the intake ports and consequently wrong CO values.

Adjustments must be performed with the air cleaner mounted.

1. Install adapter US 8040 and CO tester US 4492 on the test connection.



2. Disconnect plug for oxygen sensor and connect CO tester to instructions supplied with equipment.

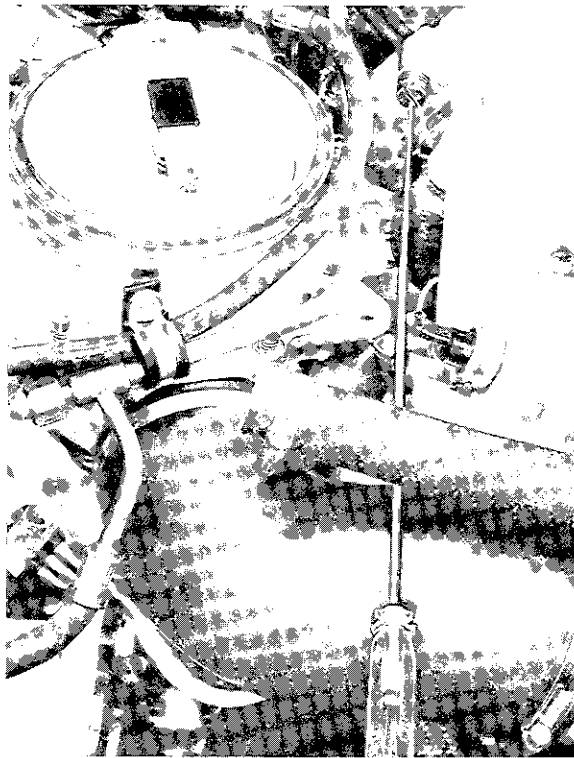


3. Insert a suitable plug in the air hose between the air pump and blowoff switching valve.



4. Run engine to operating temperature (80 to 90° C oil temperature).

5. Turn control screw on the throttle housing until specified engine speed of 900 ± 50 rpm is reached.

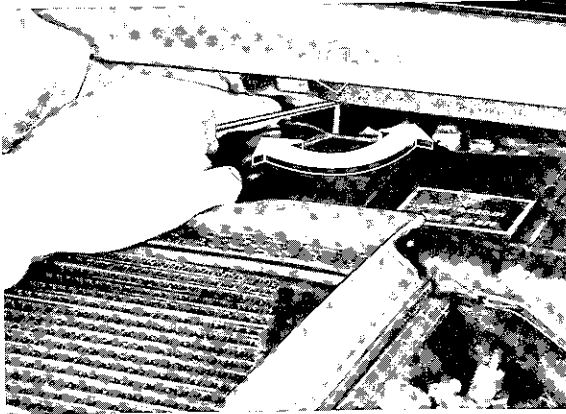


Picture shows the control screw without the charging air cooler and air cleaner.

6. Check CO level. If the CO level is not within specifications, correct the adjustment on the mixture control unit. Insert Special Tool 9156 in the spring loaded wrench in the mixture control unit. Press special tool down about 18 mm to have the spring loaded wrench engage in the mixture control screw.

Turned clockwise = richer mixture.
Turned anticlockwise = leaner mixture.

CO level: 0.6 ± 0.2 % by volume.



Note

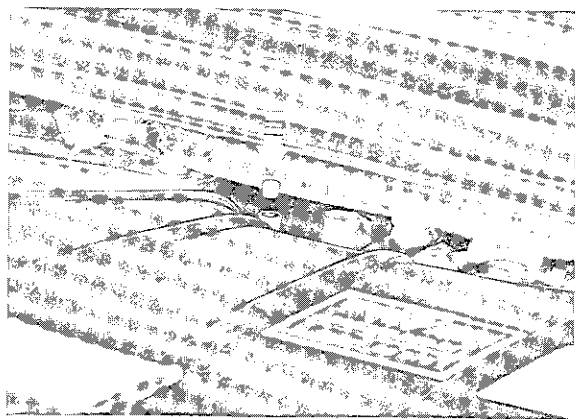
The charging air cooler, complete air cleaner and lead-sealed wrench will have to be removed (see page 25 - 10 f), if the CO level has to be corrected on the mixture control unit.

7. After finishing adjustments, connect the oxygen sensor plug, install the air hose and screw the plug in the test connection.

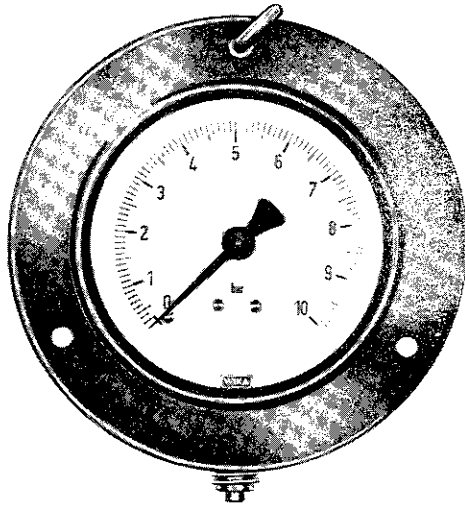
Give threads of plug a thin coat of Bosch VS 140 16 Ft or Optimoly Ht.
Torque: 15 Nm (11 ft. lbs.).

CORRECTING CO ADJUSTMENT ON MIXTURE CONTROL UNIT – US CARS

1. Remove the lead-sealed wrench and replace it with a new wrench, Part No. 930 110 910 01, if the CO level is not within specifications.
2. Adjust CO and engine idle speed.
3. Apply one drop of Loctite No. 270 in the bore of the adjusting wrench and close the bore with a plug, Part No. 930 110 921 00, after finishing adjustments.



TOOLS

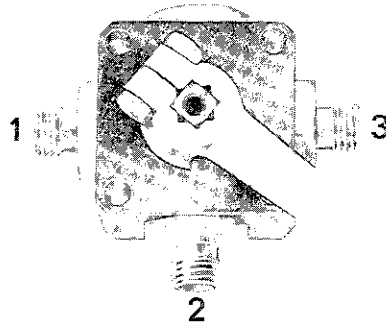


No.	Description	Special Tool	Remarks
1	Pressure gauge	P 378 a	

CHECKING PRESSURE

Note

For better understanding we have numbered connections and lever positions of change-over valve in the following text.

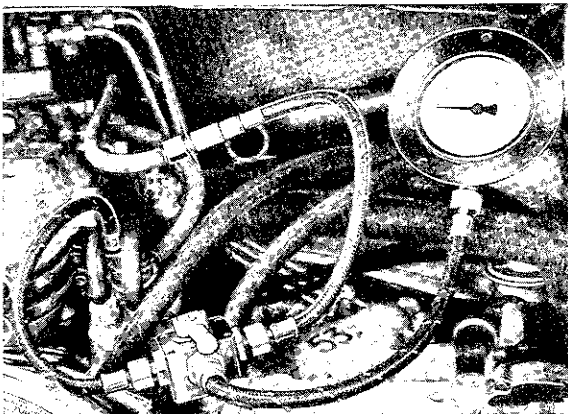


Connecting and Bleeding Pressure Gauge

1. Remove air cleaner.

2. Remove line from mixture control unit to control pressure regulator at control pressure regulator. Connect selector valve into line as shown (connection 1 to control pressure regulator. Connection 3 to regulator feed line).

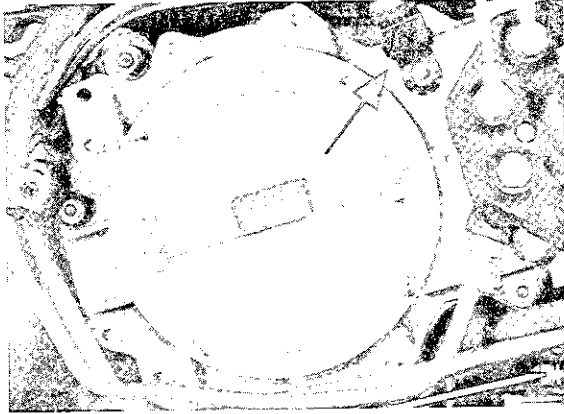
3. Switch selector valve to position 2. Let pressure gauge hang down (by its hose), disconnect 2-pole plug at mixture control unit (arrow) and turn on ignition (fuel pump runs). Move change-over valve lever to position 3 about 5 times at intervals of 10 seconds.



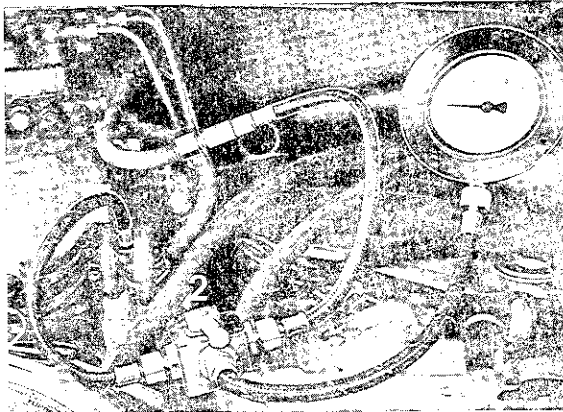
CHECKING "COLD" CONTROL PRESSURE

This test can only be made on a cold engine. This test is absolutely essential for starting or warm-up problems.

1. Connect and bleed pressure gauge.
2. Disconnect 2-pole plugs at mixture control unit and control pressure regulator, and turn on ignition (fuel pumps run).



3. Move selector valve to position 2.



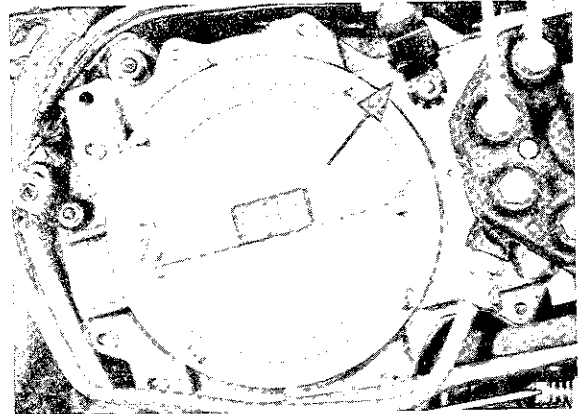
4. Refer to Testing and Adjusting Data on Page 25 - 15 and 25 - 16 for nominal pressure corresponding with outside temperature at moment of testing.
5. Any variations mean control pressure regulator must be replaced.

CHECKING "WARM" CONTROL PRESSURE
(cold or warm engine)

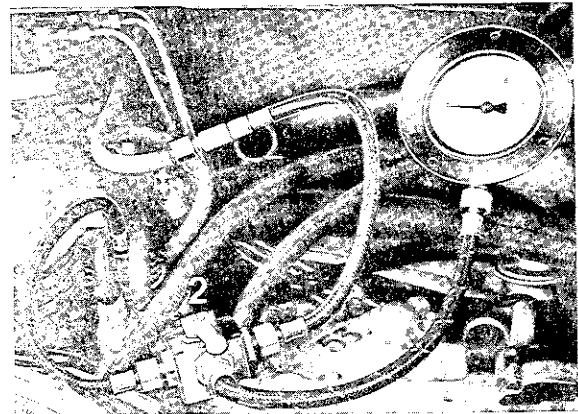
This test is carried out on a cold or warm engine.

Connect and bleed pressure gauge.

1. Disconnect 2-pole plug (arrow) at mixture control unit and turn on ignition (fuel pumps run)



2. Move selector valve to position 2.
Control pressure will now rise slowly and must reach specified value when control pressure regulator has been controlled. Off time varies according to ambient temperature. If necessary, replace control pressure regulator.

**C a u t i o n**

Be sure to connect 2-pole plug to mixture control unit.

FROM 1978 MODELS, TURBO 3.3
ALSO MEASURING CONTROL PRESSURE
"WARM WITH FULL THROTTLE ENRICHMENT"

CHECKING CONTROL PRESSURE "WARM -
FULL THROTTLE ENRICHMENT"

1. Check control pressure "warm" (fuel pumps must be running).
2. Disconnect pressure hose for warm-up regulator at throttle housing.
4. Pump warm-up regulator to approx. 0.5 bar (7 psi) pressure.

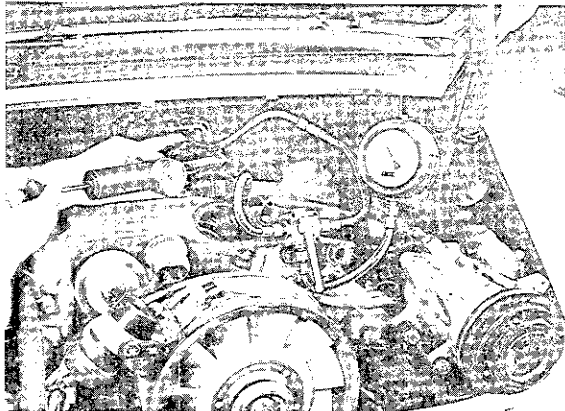


Note

A pressure above 0.8 bar (11 psi) could damage the diaphragm in the warm-up regulator.

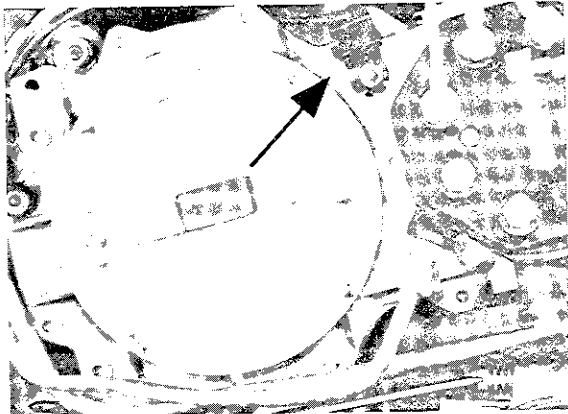
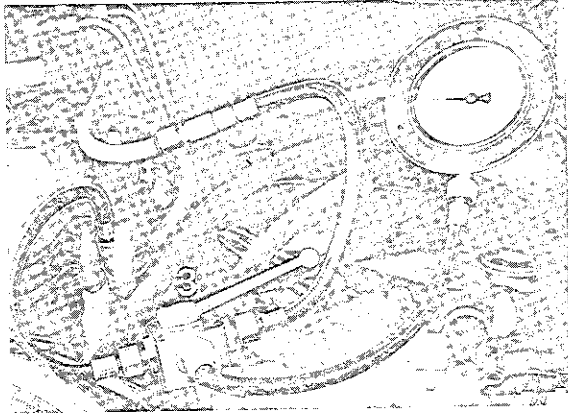
Control pressure will now drop and must reach the specified value with warm-up regulator out of action (see page 25 - 16). If necessary, replace regulator.

3. Connect tester VW 1274 with (locally made) adapter on disconnected hose (to warm-up regulator).



CHECKING SYSTEM PRESSURE

1. Connect and bleed pressure gauge.
2. Move selector valve to position 3.
Disconnect 2-pole plug at mixture control unit and turn on ignition.



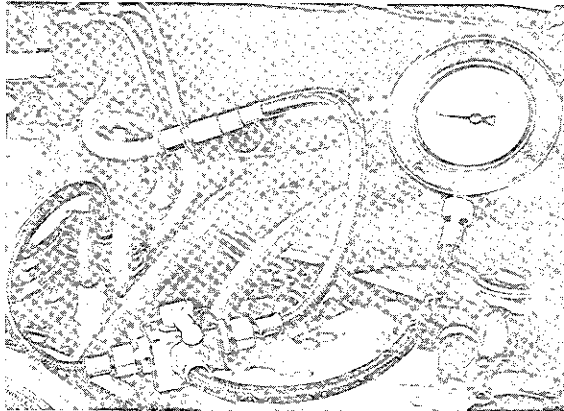
3. System pressure must have now reached specified value.

CHECKING FUEL DELIVERY RATE FOR CONTROL PRESSURE CIRCUIT

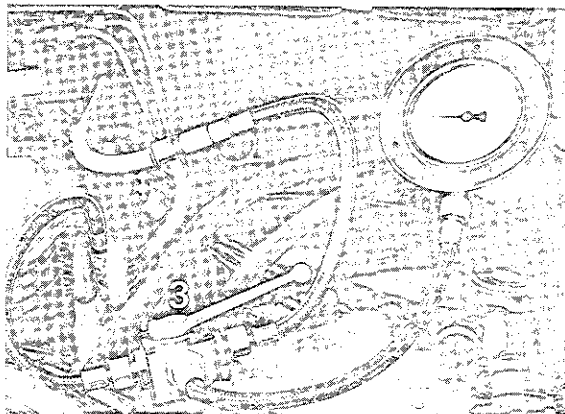
Requirements: Fuel pumps in correct operational condition.

Checking

1. Connect and bleed pressure gauge.



2. Set switching valve to position 3.

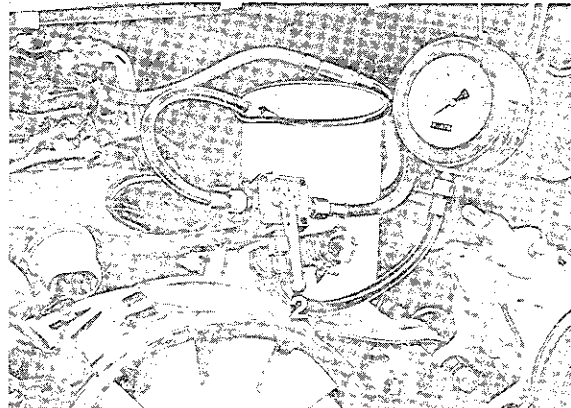


3. Unscrew hose from Special Tool P 378 on warm-up regulator and hold end in a measuring glass with volume of at least 500 cc.



4. Turn on ignition.

5. Move switching valve to position 2 and let electric fuel pumps run exactly 1 minute by pulling off two-pin plug on mixture control unit. Stop by switching valve to position 3 and measure delivery rate.
Test value: 160 to 240 cc/minute.

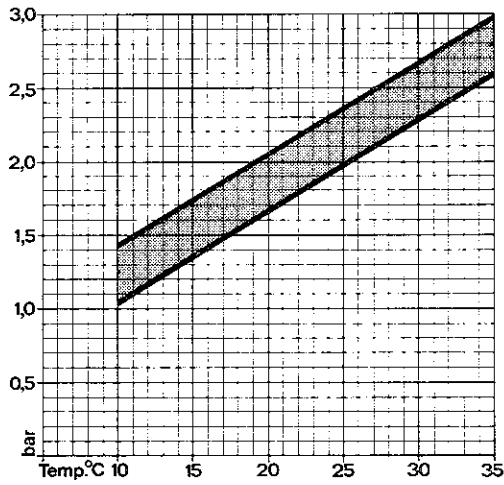


If measured value is outside of tolerances, the cause will be in the fuel distributor. Replace fuel distributor.

TESTING AND ADJUSTING DATA FOR CIS FUEL INJECTION

Test	Testing and Adjusting Data	Special Notes
Electric fuel pump delivery rate	min. 1170 cm ³ /30s (valid for both pumps together)	Page 20 - 3
Control pressure "cold" (acc. to outside temp.)	Diagram for warm-up control Part No. 911.606.105.02 and 930.606.105.00 Bosch No. 0 438 140 016 and 0 438 140 022	Page 25 - 13
Control pressure "warm" Engine Type 930/51, 930/53	2.6 - 3.0 bar (atm)	Page 25 - 13
System pressure	6.0 - 6.7 bar (atm)	Page 25 - 14 a
Leak test min. pressure after 10 minutes: 20 minutes:	1.7 bar (1.8 atm) 1.5 bar (1.6 atm)	
Injectors opening pressure	2.1 - 3.2 bar (atm)	
Idle adjustments Idle speed	900 - 950 rpm 950 - 1050 rpm (1977 Model)	
CO level	Engine Type 930/51 1 to 3 % * 930/53 2 to 4 % *	* air pump dis- connected

TESTING AND ADJUSTING DATA FOR CIS FUEL INJECTION (1978 MODEL)

Test	Testing/Adjusting Data	Special Notes
Electric fuel pump Delivery rate	at least 1170/cm ³ /30 sec. (for both pumps together)	Page 20 - 3
Control pressure "cold" (according to outside temp.)	Diagram for control pressure regulator Part No. 930.606.105.03 Bosch No. 0 438 140 054 	Page 25 - 13
Control pressure "warm"	3.65 [±] 0.20 bar	Page 25 - 13
"Full throttle enrichment"	2.9 [±] 0.20 bar	
System pressure Testing value Adjusting value Leak Test	6.0 to 6.7 bar 6.2 to 6.5 bar	Page 25 - 14 a
Min. press. after 10 min. after 20 min.	1.6 bar 1.4 bar	
Fuel Injectors Opening pressure	2.1 + 1.1 bar	
Delivery rate - Control pressure circuit	160 to 240 cm ³ /min	Page 25 - 14 b

Test	Testing/Adjusting Data		
	Engine Type	USA	California
Idle adjustment (oil temp. approx. 90° C/ 195° F)			
Idle speed rpm	930 all	1000 ± 50	1000 ± 50
CO level in %	930/61 930/63/64	2 to 3*	2 to 3*

* Air pump disconnected.

TESTING AND ADJUSTING VALUES FOR K-JETRONIC SINCE 1986 MODEL

Engine Type 930/68

Test Step	Specifications	Remarks
Electric fuel pump Delivery rate	at least 1500 cc / 30 sec. (valid for both pumps together)	Page 20 - 3
Control pressure "cold" (equal to outside temperature)	Diagram for warm-up regulator Part No. 930.606.105.06 Bosch No. 0 438 140 153	Page 25 - 13
1 - without charging pressure 2 - with charging pressure		
Control pressure "warm" "full throttle enrichment"	3.75 ± 0.20 bar (kp/cm ²) 2.90 ± 0.20 bar (kp/cm ²)	Page 25 - 13
System pressure Test value Adjusting value	6.7 to 7.4 bar (kp/cm ²) 6.9 to 7.1 bar (kp/cm ²)	Page 25 - 14 a
Leak test Minimum pressure after 10 minutes after 20 minutes	1.6 bar (kp/cm ²) 1.4 bar (kp/cm ²)	
Fuel injectors Opening pressure	2.7 + 1.1 bar (kp/cm ²)	
Control pressure circuit Delivery rate	160 to 240 cc / min.	Page 25 - 14 b

Test Step	Eng. Type	Specifications					
		Europe	USA	California	Japan	Sweden	Canada
Idle speed (approx. 90° C oil temperature)							
rpm	930 all 930/68	950±50	1000±50 900±50	1000±50	1000 ±50	1000 ±50	950±50
CO level in % by volume	930/60	2 to 4*	—	—	—	1.5 to 2.5*	—
	930/61 930/63 930/64	—	2 to 3*	2 to 3*	—	—	—
	930/62 930/65	—	—	—	1.5 to 2*	—	—
	930/60 models 81/82	1.5 to 2.5*	—	—	—	—	1.5 to 2.5*
	930/66 models 83/84	1.5 to 2.5*	—	—	—	—	1.5 to 2.5*
	930/68 1986 model	—		*/** 0.6±0.2			

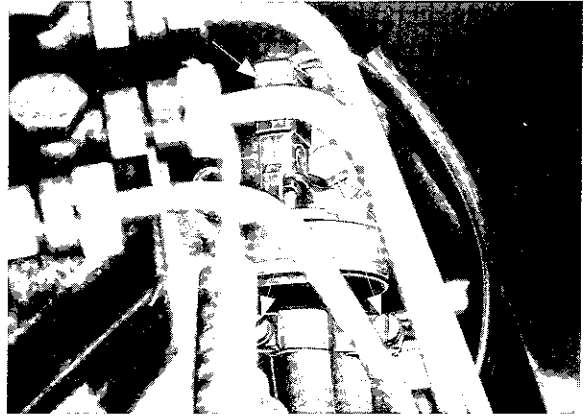
* Air pump disconnected.

** Measured in front of catalytic converter
and oxygen sensor plug disconnected.

REMOVING AND INSTALLING THERMO-VALVE

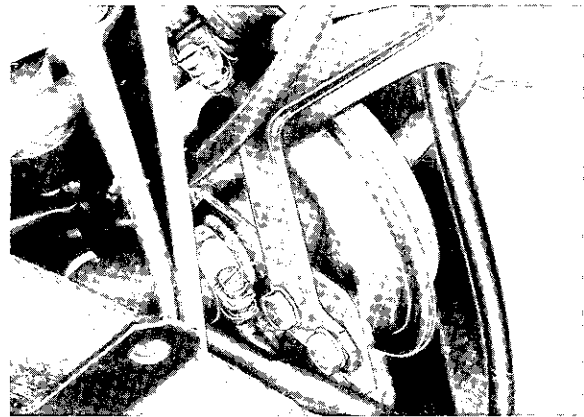
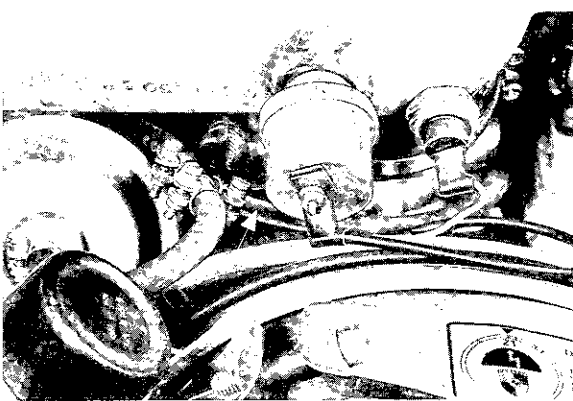
Removing

Disconnect plug, loosen hose clamps and remove mounting bolt.



CHECKING THERMO-VALVE

1. Detach vacuum hoses.



2. Blow air (by mouth) into vacuum hose taken off T-adaptor.

3. Thermo-valve must not be open when engine is warm.

Thermo-valve must be open at an ambient temperature of less than 20°C (68°F).

Note

A 0,5 mm long piece of resistance wire (3 ohms) is installed in lead running to thermo-valve.

A 3 ohm resistor (about 10 watts) must always be used when checking thermo-valve, e.g. to check while installed in car.

REMOVING AND INSTALLING AUXILIARY AIR VALVE

Removing

Detach vacuum hose, remove bolts, loosen hose clamp and remove auxiliary air valve.

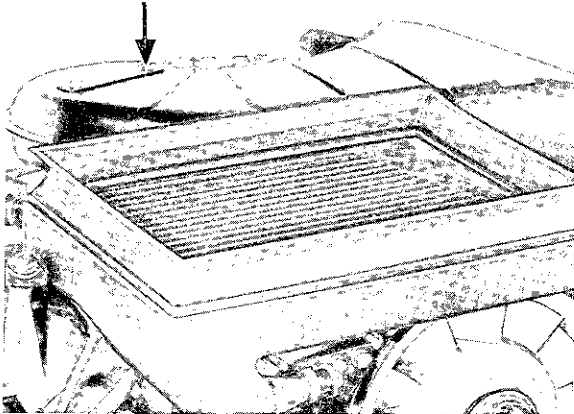


REMOVING AND INSTALLING AIR CLEANER (1978 TURBO 3.3)

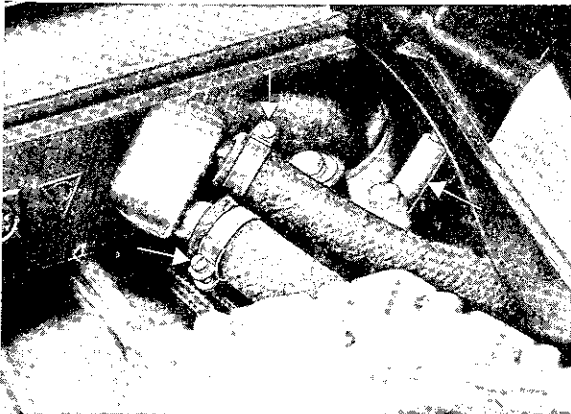
Note

When installing, be careful that spring-loaded Allen key for idle adjustment on mixture control unit is not damaged.

1. Unscrew bolts and detach vent hose of air cleaner.



2. Loosen hose clamps and pull off hoses.



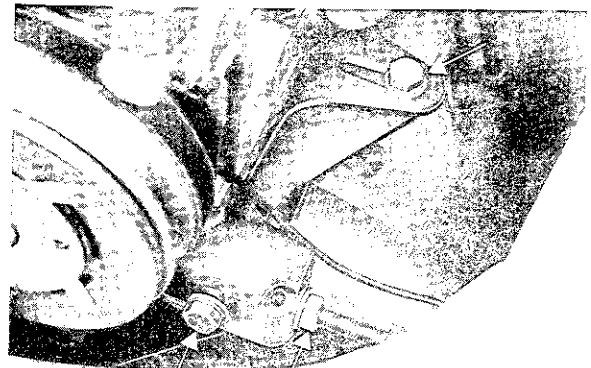
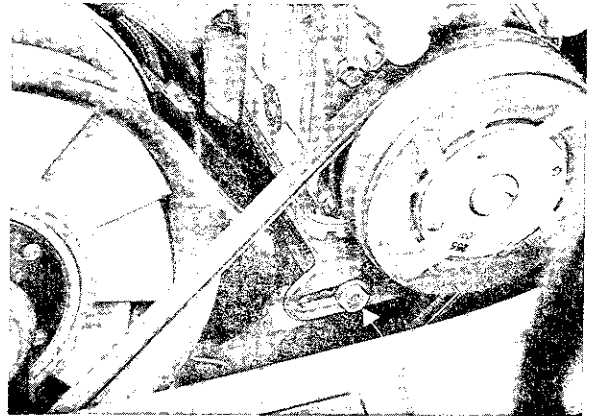
3. Loosen vent hose clamp on oil filler neck and pull off hose.



4. Unscrew nut slightly and remove air cleaner.



5. On cars with air conditioning, loosen compressor and place to one side.

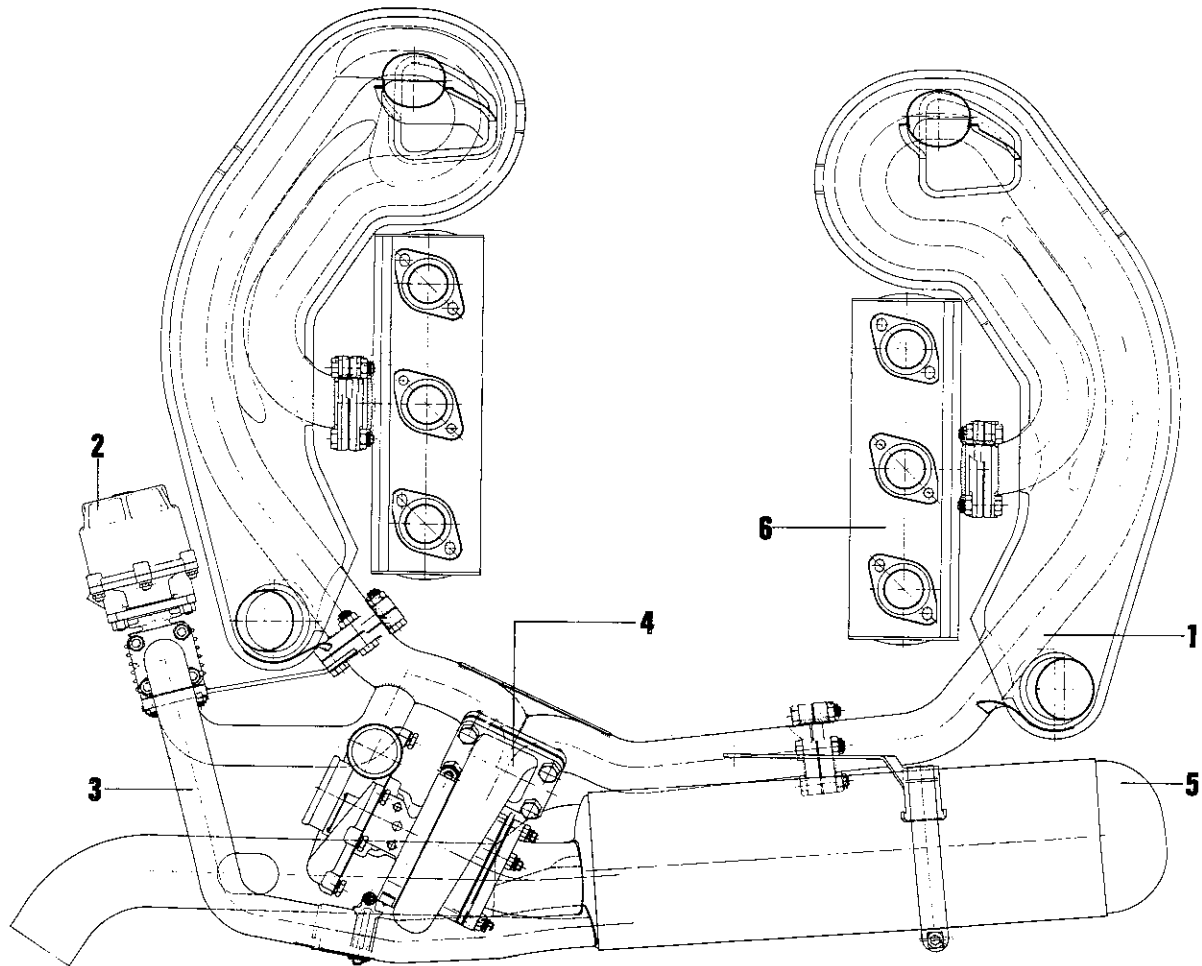


Note

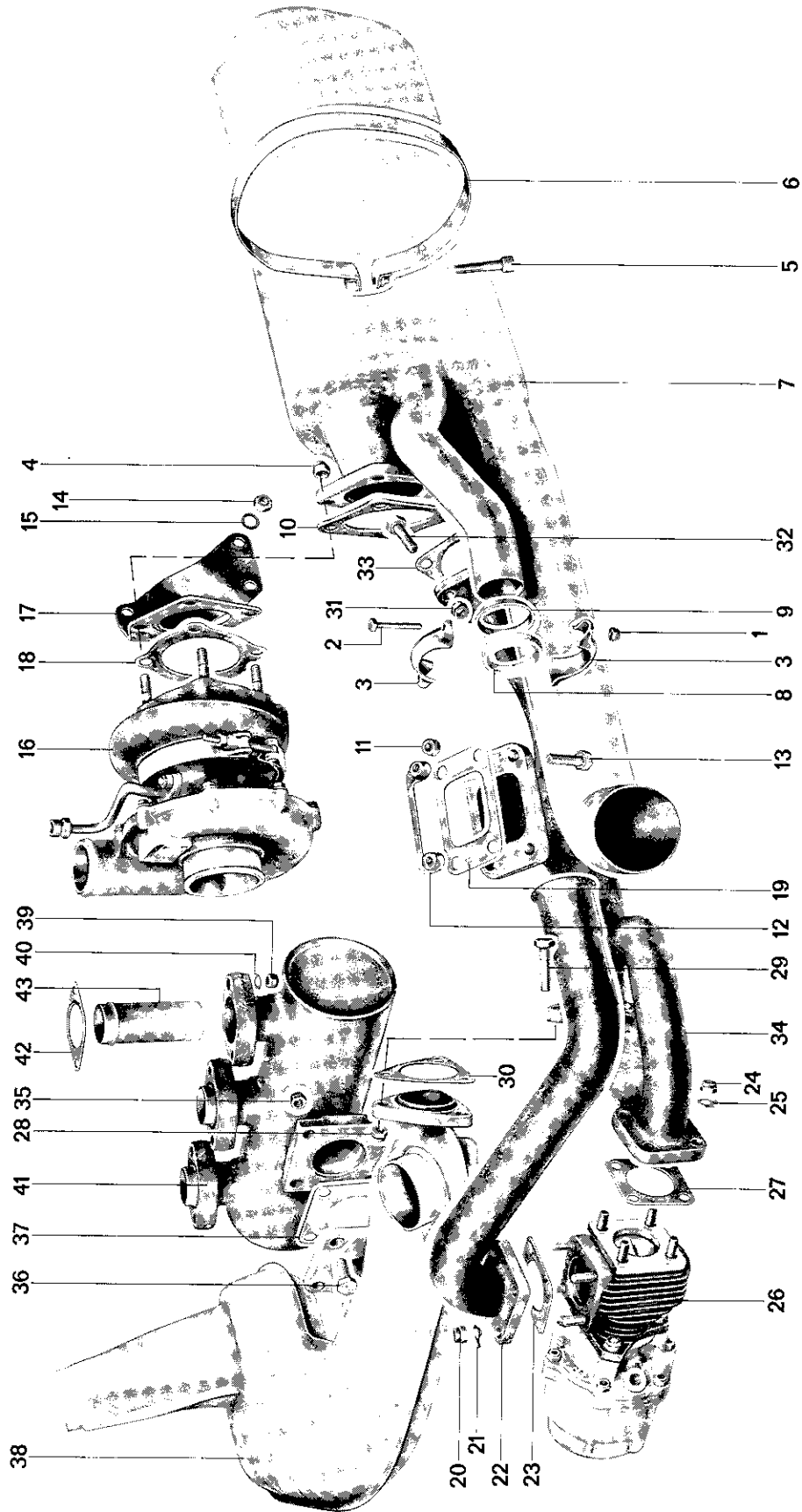
Be careful not to damage rubber seal on induction system air cooler while removing and installing air cleaner.

EXHAUST SYSTEM

EXHAUST SYSTEM LAYOUT



- 1 Heat exchanger
- 2 Waste gate
- 3 Bypass line
- 4 Turbocharger
- 5 Muffler
- 6 Reactor

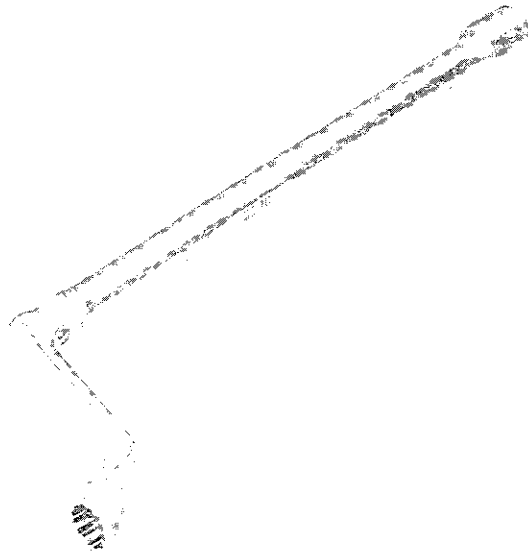


No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
1	Thermag nut	2		Replace	
2	Bolt	2			
3	Clamp	2			
4	Thermag nut	4		Replace	
5	Socket head screw	1			
6	Clamp	1			
7	Muffler	1			
8	Seal	1		Replace	
9	Support ring	1			
10	Gasket	1		Replace	
11	Thermag nut	2		Replace	
12	Holder, thermag nut	1		Replace	
13	Bolt	4			
14	Nut	3			
15	Washer	3			
16	Turbocharger	1			Installation notes on Page 21 - 1
17	Carrier, turbocharger	1			
18	Gasket	1		Replace	
19	Gasket	1		Replace	
20	Thermag nut	4		Replace	
21	Lockplate	4		Replace	
22	Bypass line	1			
23	Gasket	1		Replace	

No.	Descriptions	Qty.	Note when		Remarks	
			Removing	Installing		
24	Thermag nut	4		Replace	Installation notes on Page 26 - 7	
25	Lockplate	4		Replace		
26	Waste gate	1				
27	Gasket	1		Replace		
28	Thermag nut	3		Replace		
29	Bolt	3				
30	Gasket	1		Replace		
31	Thermag nut	3		Replace		
32	Bolt	3				
33	Gasket	1		Replace		
34	Exhaust line	1				
35	Thermag nut	4		Replace		
36	Bolt	4				
37	Gasket	2		Replace		
38	Heat exchanger	2				
39	Thermag nut	12		Replace		
40	Washer	12				
41	Reactor	2		Torque 2.5 mkg (18 ft lb)		Installation notes on Page 26 - 5
42	Gasket	6		Replace		
43	Pipe	6				

REMOVING AND INSTALLING REACTOR

TOOLS



No.	Description	Special Tool	Remarks
1	Socket wrench	P 9110	

INSTALLATION NOTES

Tighten nuts evenly to 2.0 - 2.3 mkg (15 - 17 ft lb).



No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
1	Valve flange	1			
2	Hollow bolt	1			
3	Seal	2		Replace	
4	Control line	1			
5	Rubber grommet	1			
6	Hollow bolt	1			
7	Seal	2		Replace	
8	Vent line	1			
9	Rubber grommet	1			
10	Locknut	6		Replace	
11	Washer	6			
12	Waste gate cover	1	Caution! Cover under spring tension.		Installation notes on Pages 26 - 9
13	Shim	2			
14	Spring	1			
15	Nut, self-locking	1		Replace	
16	Washer	1			
17	Piston	1			
18	Diaphragm	1		Replace. Mount textile side (printed) facing piston.	Installation notes on Pages 26 - 9
19	Diaphragm plate	1			
20	Valve	1		Check, replace if necessary.	
21	Thermag nut	3		Replace	
22	Waste gate base	1		Mount correctly with respect to waste gate valve	Installation notes on Pages 26 - 9

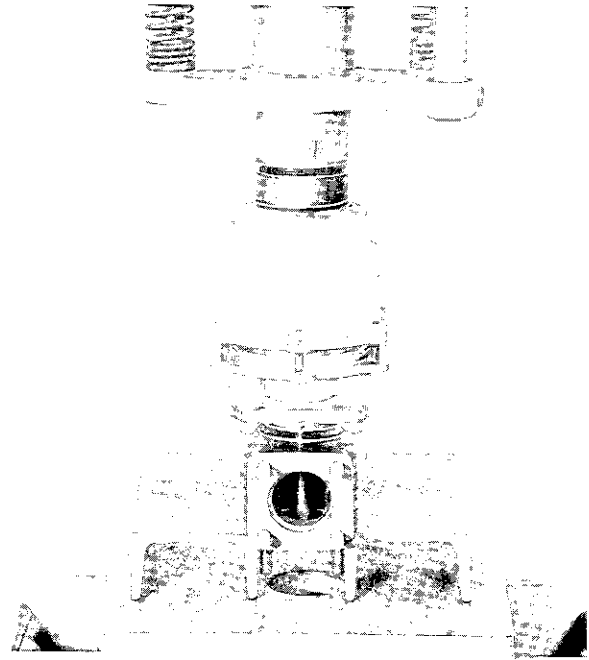
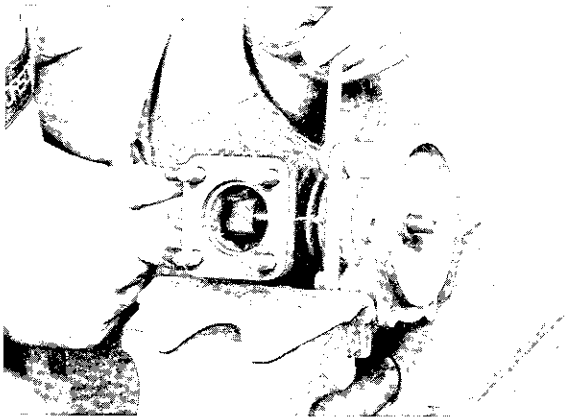
No.	Description	Qty.	Note when Removing Installing	Remarks
23	Valve gasket	1	Replace	
24	Waste gate valve housing	1		See Page 26 - 9

DISASSEMBLING AND ASSEMBLING WASTE GATE

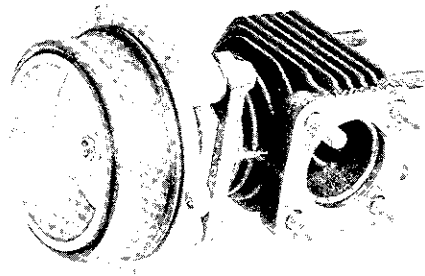
1. Join waste gate base to valve housing and tighten mounting nuts slightly.

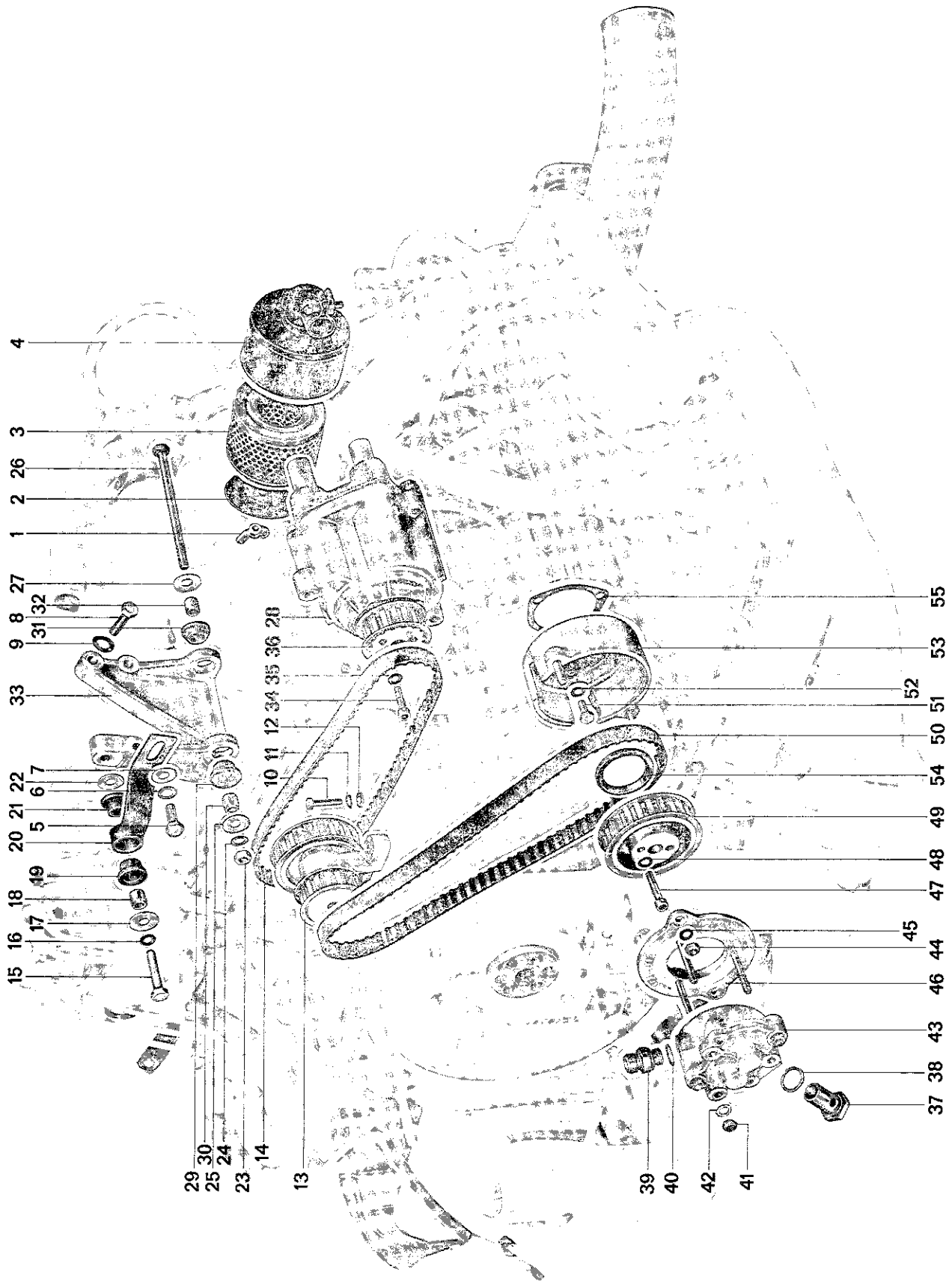
2. Align base and valve housing with a mandrel or long shaft drill of 10 mm (5/16 in.) diameter. Tighten mounting nuts evenly.

Mount waste gate cover in press when assembling.



Diaphragm installed correctly.





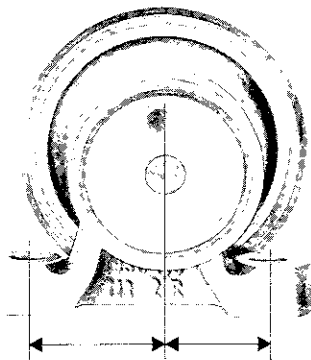
No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
1	Wing nut	1			
2	Cover	1			
3	Filter element	1		Check, replace if necessary	
4	Filter housing	1			
5	Bolt	1			
6	Washer	1			
7	Washer	1			
8	Bolt	3			
9	Washer	3			
10	Bolt	2			
11	Washer	2			
12	Washer	2			
13	Idler assembly (pulleys 2 + 3)	1			see Page 26 - 15
14	Drive belt, 72 teeth (Engine Type 930/53 73 teeth)	1		Tighten, it must deflect by 6 to 8 mm (1/4 to 5/16 in) at center under thumb pressure	
15	Bolt	1			
16	Washer	1			
17	Washer	1			
18	Spacer	1			
19	Rubber bearing	1		Check, replace if necessary	
20	Bracket	1			
21	Rubber bearing	1		Check, replace if necessary	
22	Washer	1			
23	Nut	1			

No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
24	Washer	1			
25	Washer	1			
26	Bolt	1			
27	Washer	1			
28	Air pump	1			
29	Rubber bearing	1		Check, replace if necessary	
30	Spacer	1			
31	Rubber bearing	1		Check, replace if necessary	
32	Spacer	1			
33	Air pump mount	1			
34	Socket head screw	3			
35	Washer	3			
36	Pulley 4	1			
37	Hollow bolt	1			
38	Seal	2		Replace	
39	Adapter	1			
40	Seal	1		Replace	
41	Nut	3			
42	Washer	3			
43	Oil pump	1		Mount oil pump shaft dowel pin between socket head screws of pulley 1.	
44	Nut	2			
45	Washer	2			
46	Cover, flange	1			

No.	Description	Qty.	Note when		Remarks
			Removing	Installing	
47	Socket head screw	2			
48	Washer	2			
49	Pulley 1	1			
50	Drive belt, 80 teeth	1		Tighten, it must deflect by 6 to 8 mm (1/4 to 5/16 in.) at center under thumb pressure	
51	Boit	3			
52	Washer	3			
53	Flange	1			
54	Seal	1		Replace, install correctly with VW 433	
55	Gasket	1		Replace, coat both sides with sealing compound	

REMOVING AND INSTALLING 2/3 IDLER SPROCKET ASSEMBLY

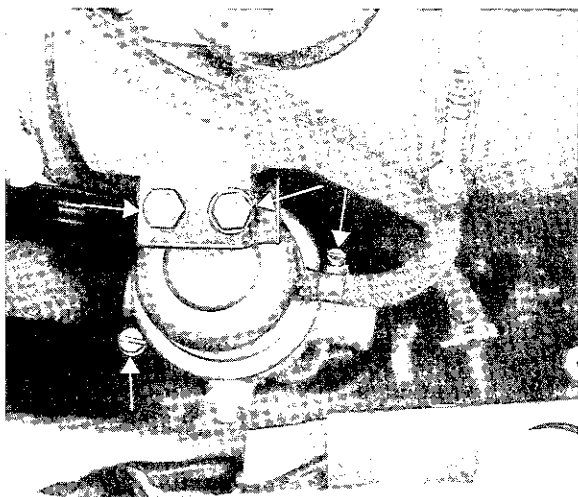
When removing or installing 2/3 idler sprocket (pulley) assembly on Engine Type 930/53, note that mounting bosses are offset to one side.



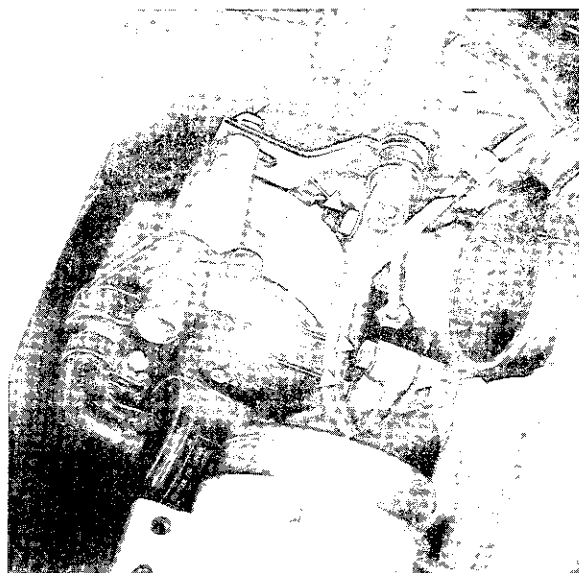
REMOVING AND INSTALLING AIR PUMP

Removing

1. Loosen bolts and hoses on diverter valve and remove valve.



3. Loosen nut on bracket and bolts on air pump mount.



2. Loosen clamps and remove hose between mixture control unit and valve housing.



4. Peel off toothed belt and remove air pump with mount.

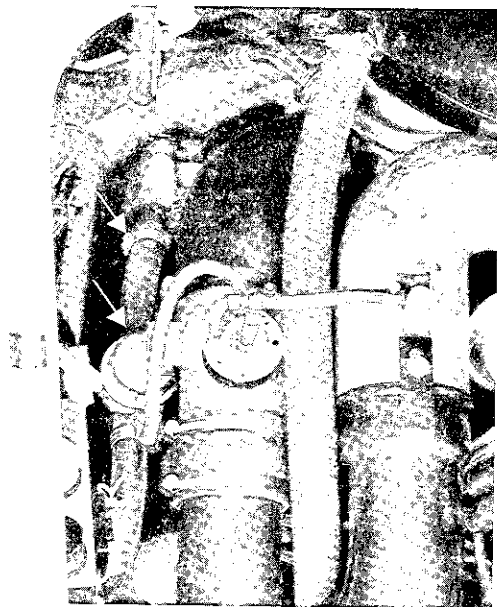
Installing

1. Install air pump with air pump mount and install toothed belt.
2. Press air pump to the left slightly and tighten the bolt on air pump bracket. Under thumb pressure, the toothed belt should deflect (at midpoint) by 6 - 8 mm (1/4 to 5/16 in.).

REMOVING AND INSTALLING AIR FILTER OF AIR PUMP

Removing

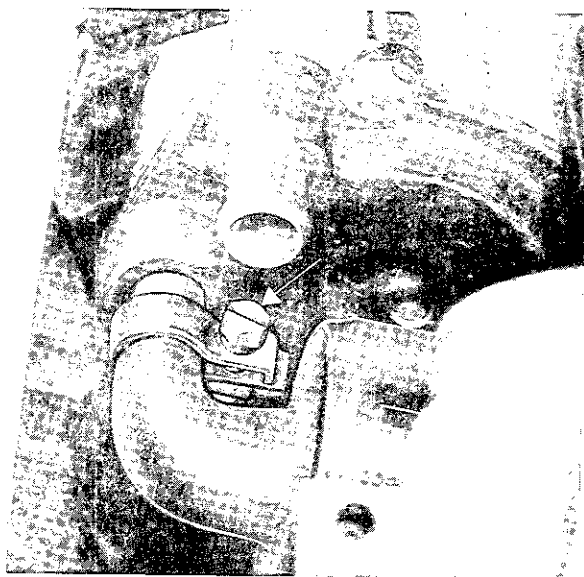
1. Loosen and remove air hose between air pump and diverter valve.



Note

When installing make sure that the air filter does not touch other parts.

2. Loosen clamp and remove air filter.

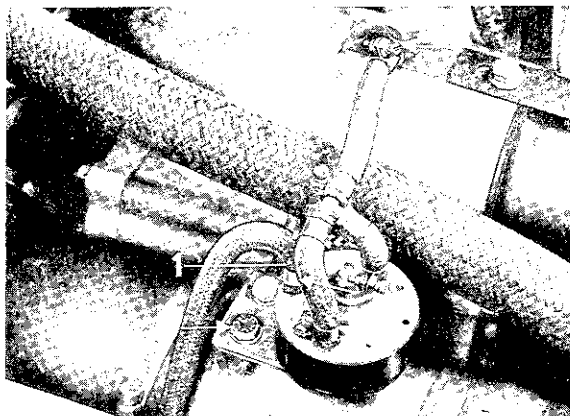


REMOVING AND INSTALLING CONTROL VALVE

Removing

1. Loosen clamps and pull control line off.

2. Loosen bolts and remove control valve.



Installing

Connect control line hoses properly.
Connect hose from diverter valve to control valve
at connection 1 (green ring).

REMOVING AND INSTALLING DIVERTER VALVE

1. Loosen and remove air hoses and control line.

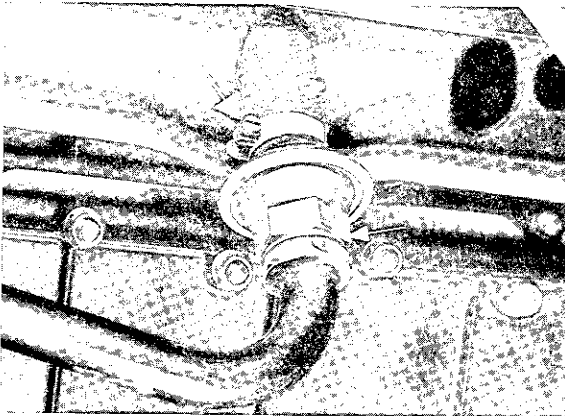
2. Loosen bolts and remove valve.



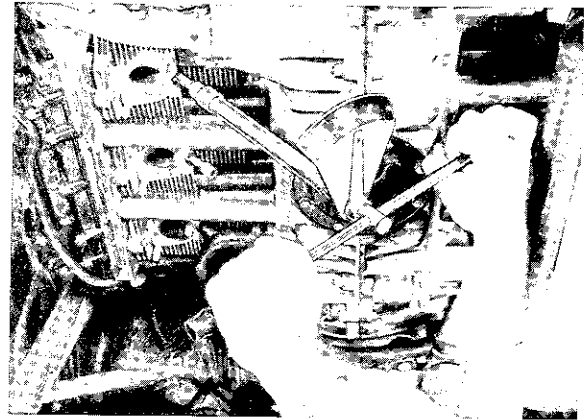
REMOVING AND INSTALLING AIR INJECTION LINE AND ADAPTER

1. Remove heat exchanger and reactors.

2. Loosen and remove check valve.



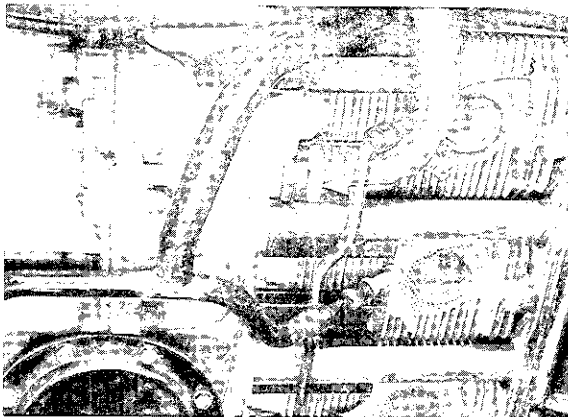
4. Tighten adapters to 1.0 - 1.2 mkg
(7 - 9 ft lb).



3. Loosen air injection line and connections
at adapters.

Note

Loosen the oil line slightly at the front left
adapter and move aside for clearance.



CHECKING CONTROL VALVE, DIVERTER VALVE AND CHECK VALVE

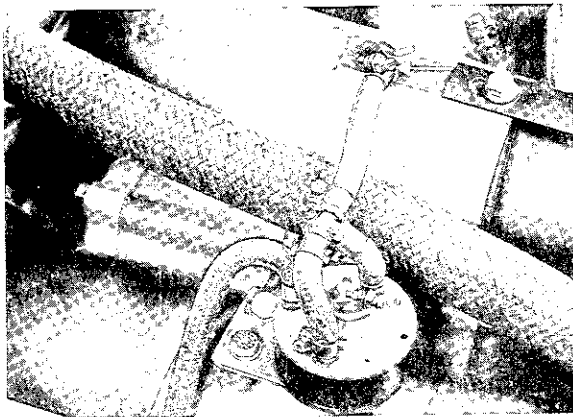
Note

In operation control valve, diverter valve and check valve are connected with each other. A defective control valve could also destroy diverter valve as well as check valve.

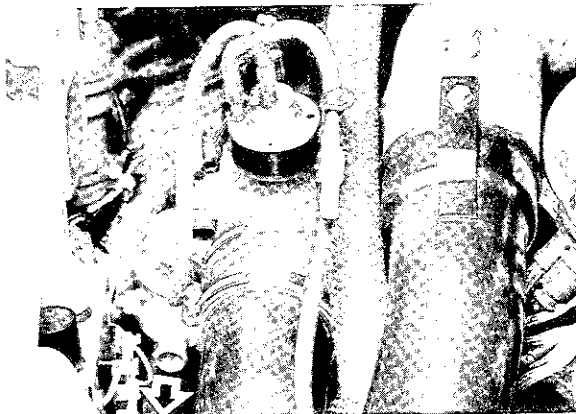
Always check all three parts, if one of them fails.

Checking Control Valve and Diverter Valve

1. Disconnect control hose line at pressure line.



2. Inject compressed air having a max. pressure of 1.0 bar (1.0 atm) into disconnected control line. Check if diverter valve blows off in open air.



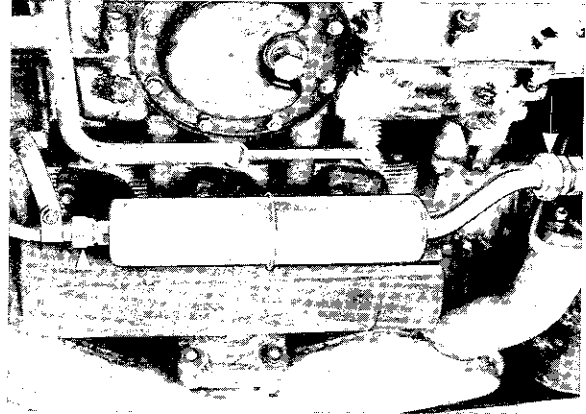
Checking Check Valve

Check valve should only open in direction of air injection. It must be closed in opposite direction.

REMOVING AND INSTALLING EGR FILTER

Removing

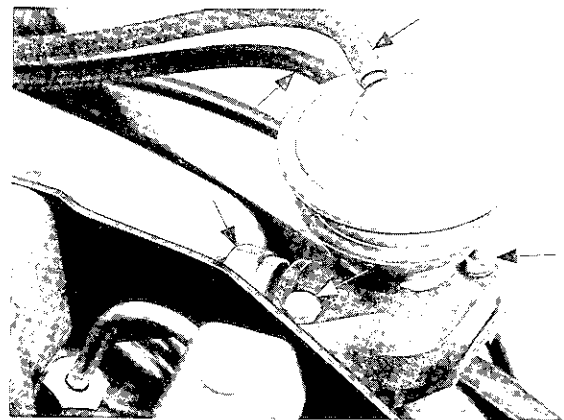
Unscrew coupling nuts.



REMOVING AND INSTALLING EGR VALVE

Removing

1. Detach vacuum hoses.
2. Disconnect pipe at valve.
3. Unscrew mounting bolts.



Installing

1. Use new gasket.

2. Connect vacuum hoses as follows:

1st stage - from upper vacuum unit to left throttle housing connection (in driving direction). Connections are marked with red rings.

2nd stage - from lower vacuum unit to right throttle housing connection (in driving direction).

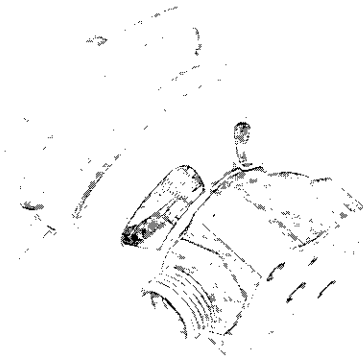


CHECKING EGR VALVE

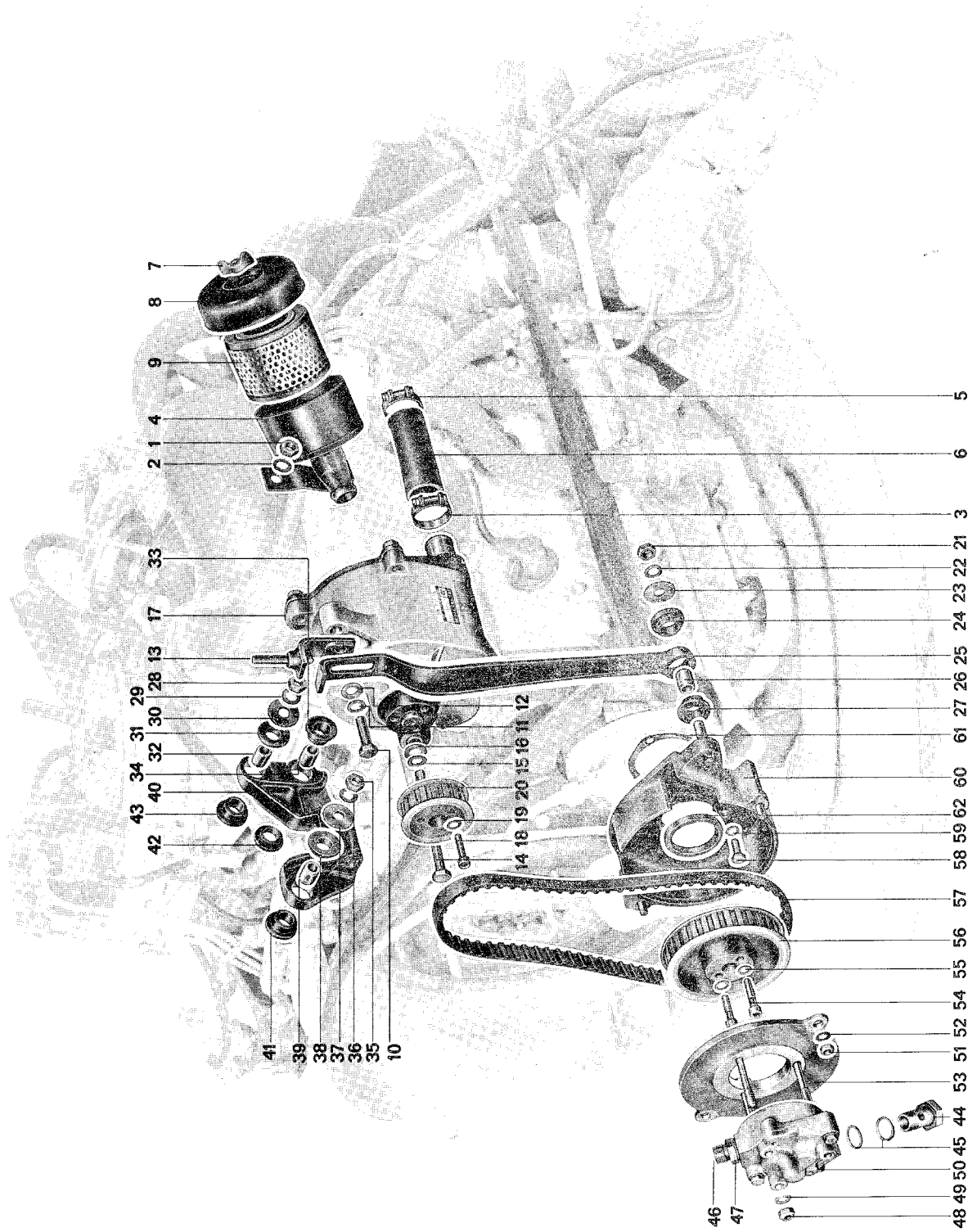
1. Remove air cleaner.
2. Detach upper vacuum hose at EGR valve.
3. Connect upper vacuum hose of 1st stage with an approx. 1 meter (3 feet) long hose.
4. Start engine and let it run at idle speed.
5. Detach vacuum hose at distributor and connect it to hose using an appropriate piece of tubing. Also check whether valve stem can be moved up.

Repeat this check several times by detaching and attaching hose.

A mirror must be used to see valve stem's movement.



DISASSEMBLING AND ASSEMBLING AIR INJECTION



No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
1	Nut	1			
2	Spring washer	1			
3	Hose clamp	1			
4	Air cleaner housing lower section	1			
5	Hose clamp	1			
6	Hose	1			
7	Wing nut	1			
8	Cover	1			
9	Filter cartridge	1		Check, replace if necessary	
10	Bolt	1			
11	Spring washer	1			
12	Washer	1			
13	Bracket	1			
14	Bolt	1			
15	Spring washer	1			
16	Washer	1			
17	Air pump	1			
18	Socket hd. screw	3			
19	Spring washer	3			
20	Sprocket	1			
21	Nut	1			
22	Spring washer	1			
23	Washer	1			

26 Exhaust System

No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
24	Rubber mount	1		Check, replace if necessary	
25	Air pump holder	1			
26	Spacer	1			
27	Rubber mount	1		Check, replace if necessary	
28	Nut	1			
29	Spring washer	1			
30	Washer	1			
31	Rubber mount	1		Check, replace if necessary	
32	Spacer	1			
33	Rubber mount	1		Check, replace if necessary	
34	Spacer	1			
35	Bolt	1			
36	Spring washer	1			
37	Washer	1			
38	Rubber mount	1		Check, replace if necessary	
39	Spacer	1			
40	Mount	1			
41	Rubber mount	1		Check, replace if necessary	
42	Rubber mount	1		Check, replace if necessary	
43	Rubber mount	1		Check, replace if necessary	
44	Hollow bolt	1			

No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
45	Seal	2		Replace	
46	Adapter	1			
47	Seal	1		Replace	
48	Nut	3			
49	Spring washer	3			
50	Oil pump	1		Install cyl. pin of oil pump shaft between capscrews of air pump drive gear	
51	Nut	2			
52	Spring washer	2			
53	Intermediate flange cover	1			
54	Socket hd, capscrew	2			
55	Spring washer	2			
56	Sprocket	1			
57	Drive belt	1		Check, replace if necessary, tighten	
58	Bolt	3			
59	Spring washer	3			
60	Intermediate flange	1			
61	Gasket	1		Replace	
62	Oil seal	1		Replace, position correctly, use proper tool, e.g. VW 433	

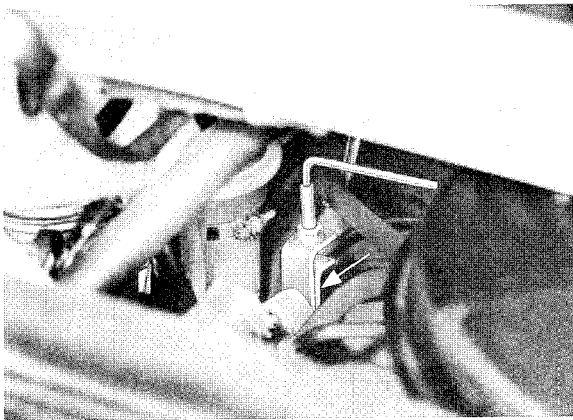
CHECKING AND ADJUSTING DRIVE BELT OF AIR PUMP

Checking

Drive belt tightness is correct if belt gives under thumb pressure applied at point midway between sprockets by 6 to 8 mm.

Adjusting

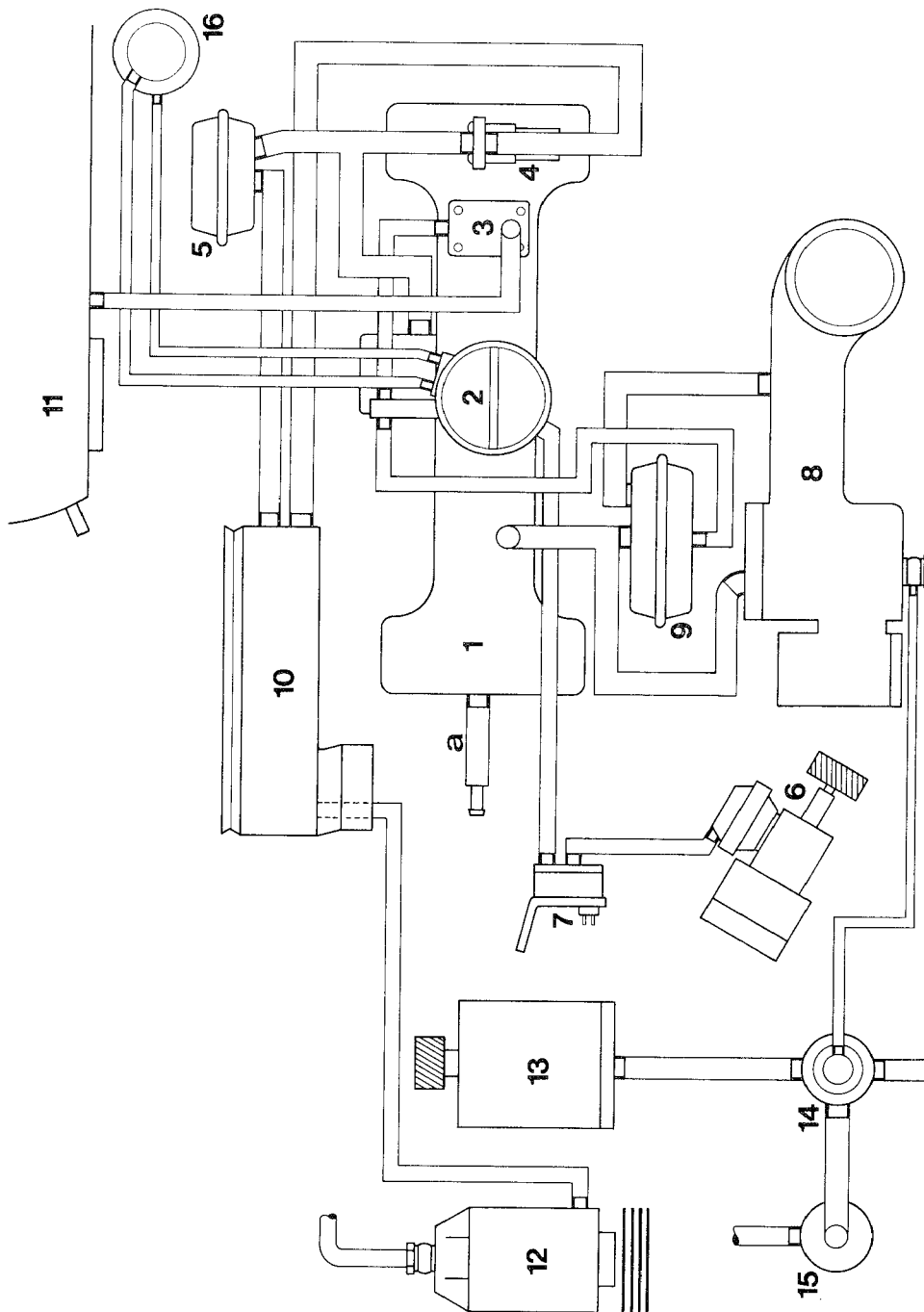
1. Loosen bolt slightly (arrow).



2. Turn self-locking adjusting bolt until belt tightness is correct. Tighten bolt.
-

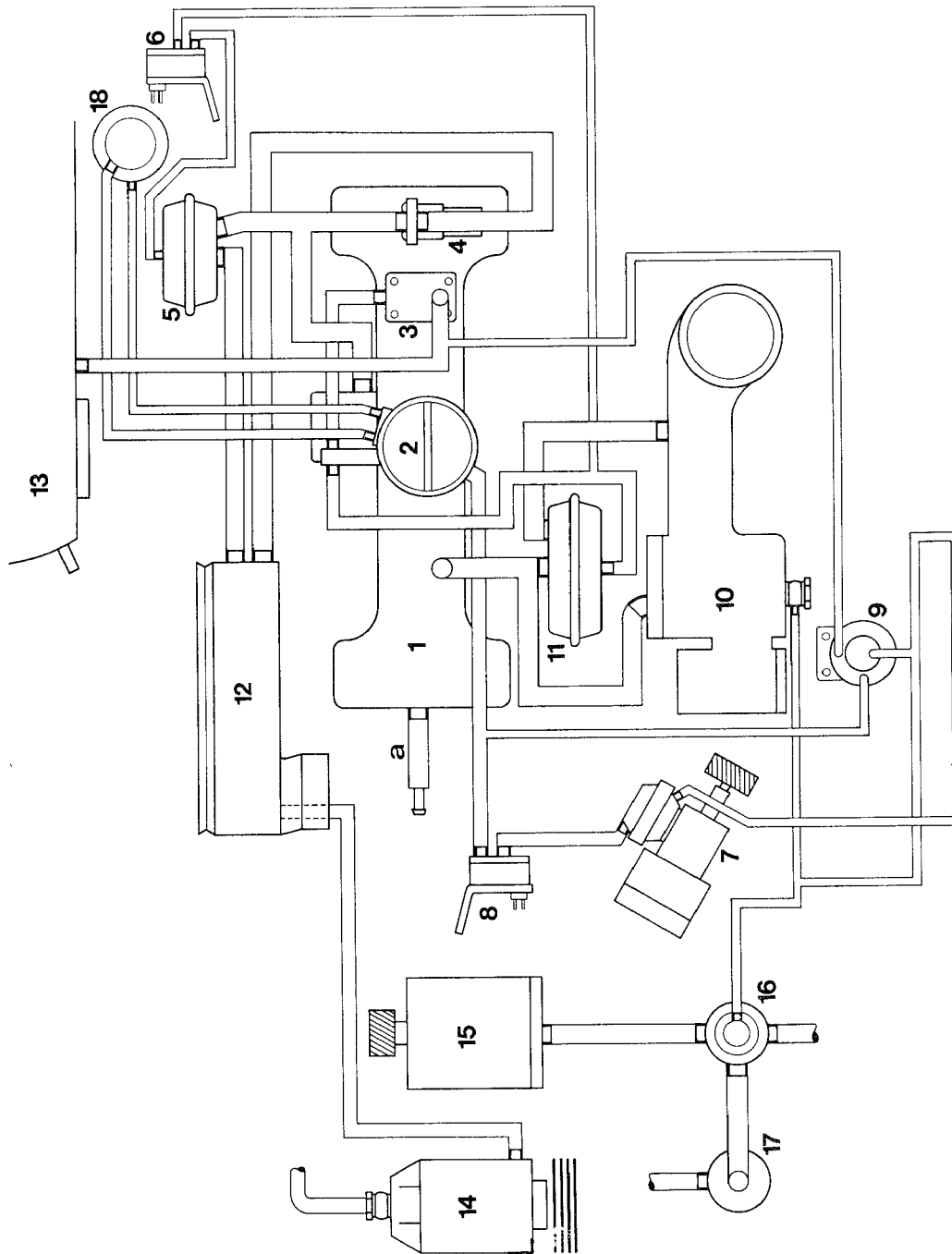
HOSE LAYOUT - USA

- 1 - Air distributor
- a - Connection for brake booster
- 2 - Throttle housing
- 3 - Control pressure regulator
- 4 - Auxiliary air regulator
- 5 - Auxiliary air valve
- 6 - Ignition distributor
- 7 - Thermo time valve
- 8 - Pop-off valve
- 9 - Deceleration valve
- 10 - Intake air intercooler
- 11 - Air cleaner
- 12 - Waste gate
- 13 - Air pump
- 14 - Diverter valve
- 15 - Check valve
- 16 - EGR valve



HOSE LAYOUT - CALIFORNIA

- 1 - Intake air distributor
- a - Connection for brake booster
- 2 - Throttle housing
- 3 - Control pressure regulator
- 4 - Auxiliary air regulator
- 5 - Auxiliary air valve
- 6 - Thermo time switch
- 7 - Ignition distributor
- 8 - Thermo time valve
- 9 - Control valve
- 10 - Pop-off valve
- 11 - Deceleration valve
- 12 - Intake air intercooler
- 13 - Air cleaner
- 14 - Waste gate
- 15 - Air pump
- 16 - Diverter valve
- 17 - Check valve
- 18 - EGR valve



**OPERATING AND TESTING THERMO TIME VALVE OF ENGINE TYPES 930/61
AND 930/63**

Thermo time valve in vacuum line between distributor and throttle housing is closed on a cold engine.

This eliminates vacuum retard control and the ignition timing moves toward advance by approx. 15° , which provides a fast idle speed after a cold start.

After about 15 to 20 seconds the thermo time valve will open and let the vacuum take effect, which pulls back ignition timing toward retard to the specified value.

The thermo time valve has to be replaced, if there is no movement toward advance and the related fast idle speed after a cold start.

The thermo time valve operation can only be tested on a completely cold engine.

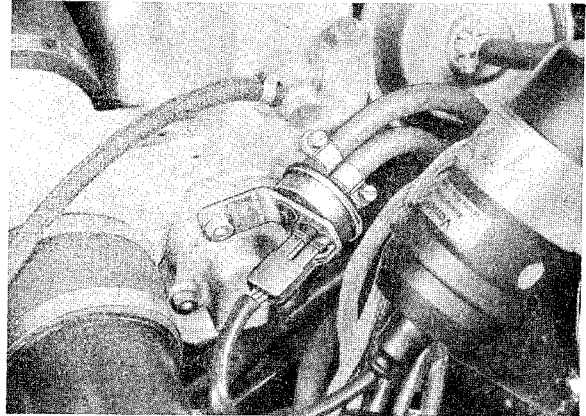


Figure shows thermo time valve with intake air intercooler removed.

Thermo time valve can be replaced without removing intake intercooler.

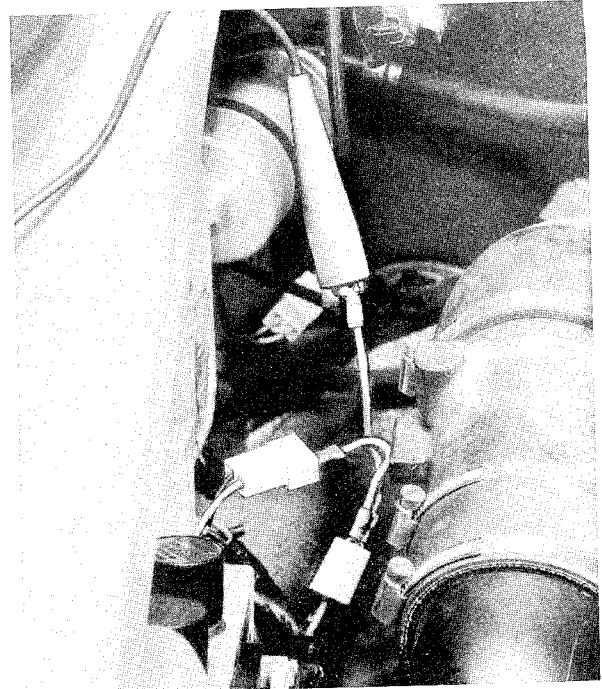
IGNITION SYSTEM

ADJUSTING IGNITION TIMING

Specifications:

$$5^{\circ} \pm 3^{\circ} \text{ ATDC at } 950 \pm 50 \text{ rpm}$$

1. Connect engine tester or tachometer. This requires separating a 2-pole plug connector near CDI control unit.



The connection can be made again with jumper wires, with a connection to black/violet wires. Tachometer or engine tester is connected to this wire, which in turn usually goes to terminal 1 of the distributor. Standard tachometers/engine testers normally connected to standard coil-type ignition, can also be connected here.

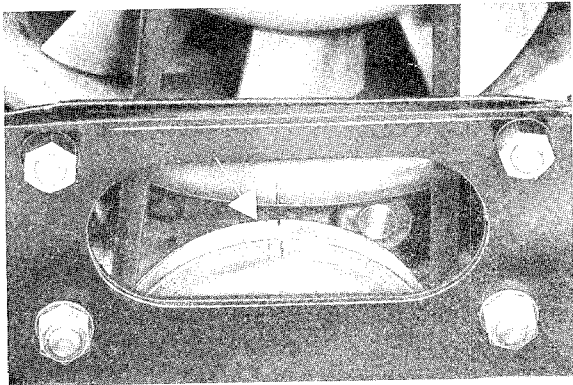
Note

Depending on type of tester used, tachometer installed in car could return to off during test. This is not important to test.

Warning

With the engine running the black/violet wire is charged with about 450 V. When connecting test equipment be careful that the connecting terminal does not touch car's ground. A short circuit of this type could damage ignition control unit.

2. Do not disconnect vacuum hose at distributor.
3. Make adjustments with the oil temperature at about $80^{\circ}\text{C}/176^{\circ}\text{F}$. The notch on the pulley to the left of the Z1 mark (5°ATDC on crankshaft) must be opposite the mark on the fan housing at an engine speed of 950 ± 50 rpm



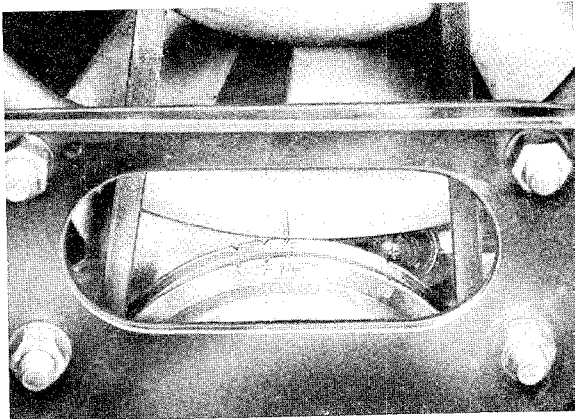
Note

Since the turbo engine uses breakerless ignition, there is no dwell angle adjustment.

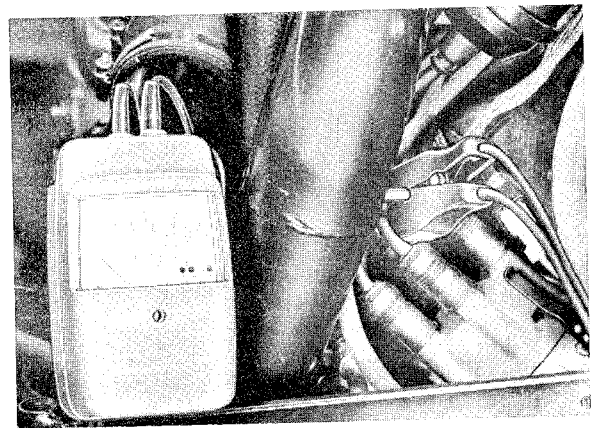
ADJUSTING IGNITION TIMING - 1977 MODELS

Timing data: $7 \pm 2^{\circ}$ ATDC at 1000 ± 50 rpm
(vacuum hose on)

Adjustments are made with an engine oil temperature of about 80° C (176° F). Pertinent mark on pulley must be opposite notch on blower housing at specified engine speed.



2-pole plug connector near CDI control unit (see Page 28 - 1) has been deleted from 1977 Models. Wires now routed over 14-pole plug on relay plate.



For this reason a tachometer can no longer be connected as described on Page 28 - 1. Instead a tester must be used, which records engine speed by an inductive pickup placed around an ignition cable.

After adjustment of ignition timing a check of ignition timing advance control must be made (see Page 28 - 3).

Note

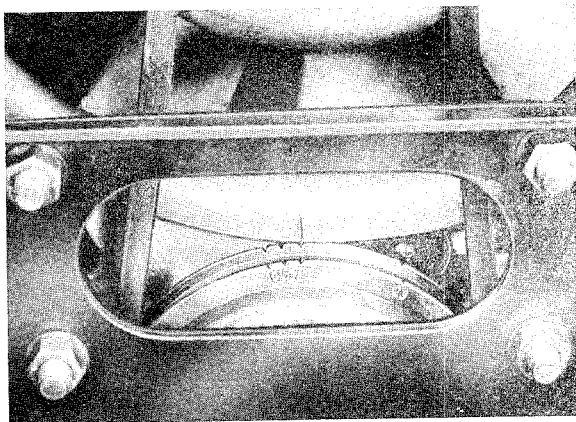
1° on crankshaft corresponds to 1 mm on pulley circumference.

ADJUSTING IGNITION TIMING - 1978 MODEL

Timing Data:

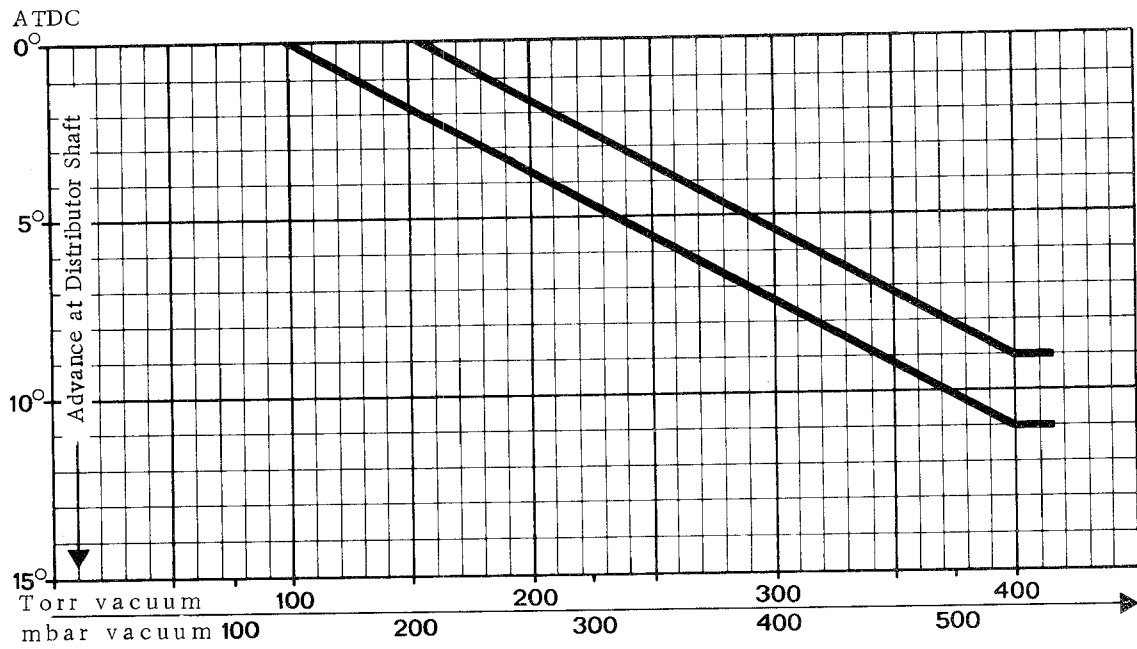
USA: $10 \pm 2^{\circ}$ ATDC at 950 - 1050 rpm
Vacuum hoses ON
California: $5 \pm 1^{\circ}$ ATDC at 950 - 1050 rpm
Vacuum hoses ON

Adjustments are made when engine oil is at a temperature of approx. 80° C (176° F). Pertinent mark on pulley must align with notch in blower housing at specified engine speed.



After adjustment of the ignition timing, check ignition timing advance (see page 28 - 4 c).

VACUUM RETARD CURVE TURBO ENGINE



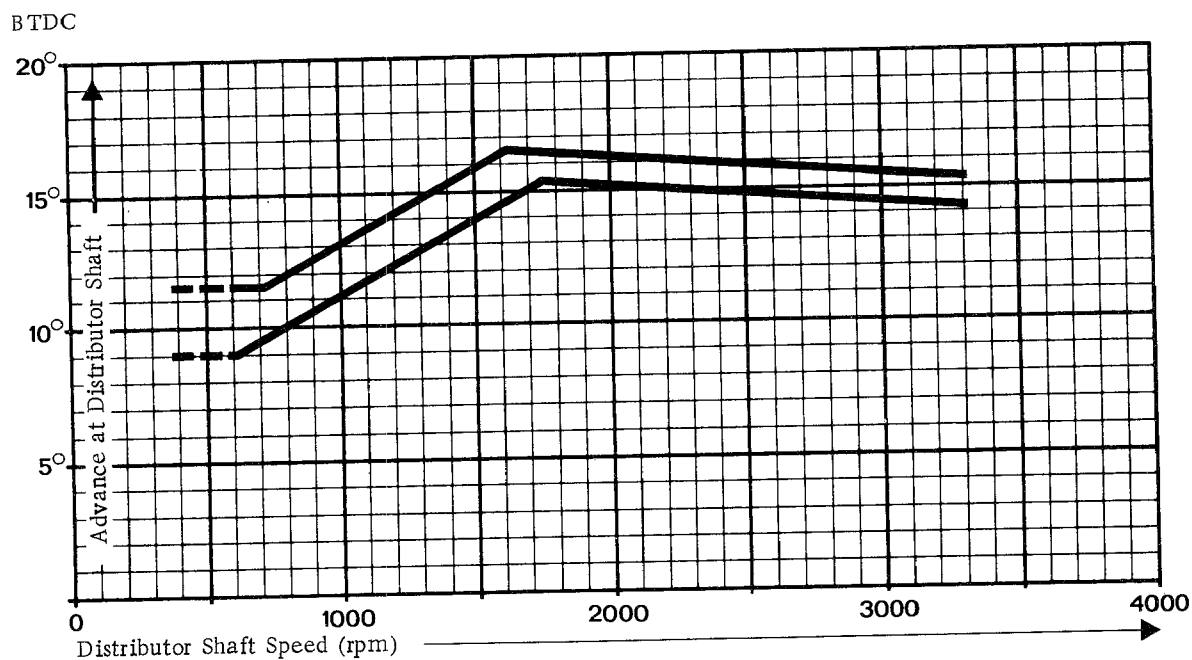
CHECKING IGNITION TIMING CONTROL

Requirements: Ignition timing is set correctly. Check timing angle as follows:

Ignition angle must be $26^{\circ} \pm 3^{\circ}$ BTDC at engine speed of 4000 rpm (vacuum hose disconnected).

If specifications are not met, remove distributor and check on test bench.

CENTRIFUGAL ADVANCE CURVE TURBO ENGINE



CHECKING IGNITION TIMING - 1977 MODELS

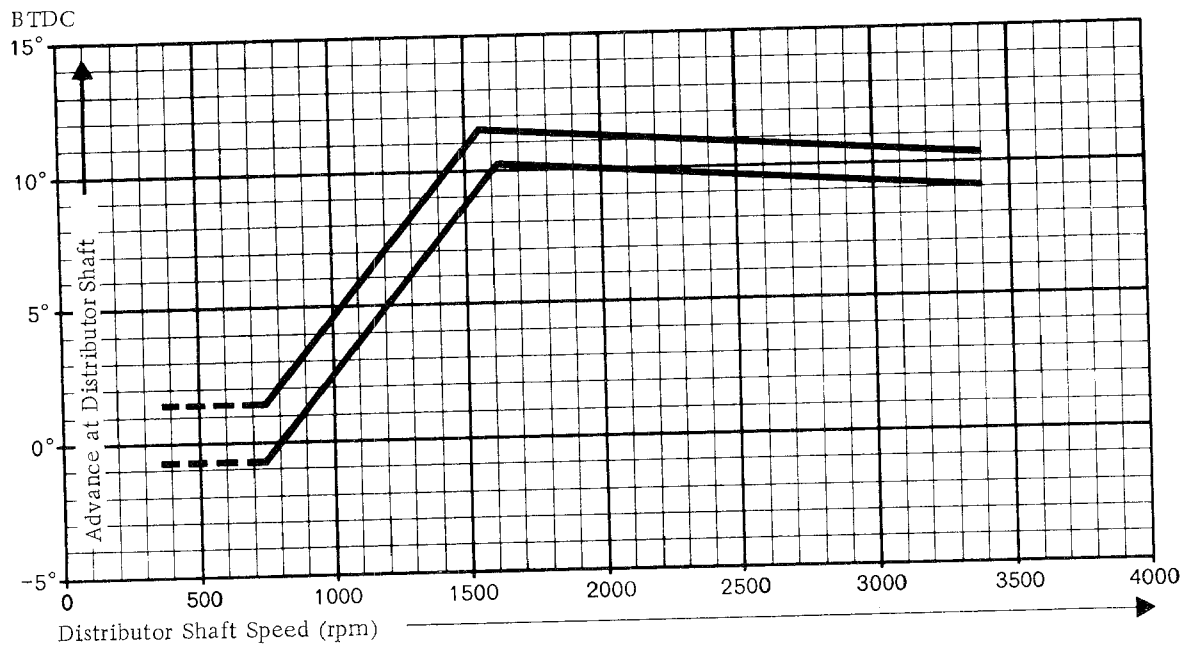
Prerequisite: Ignition timing adjusted correctly.

Checking Ignition Advance:

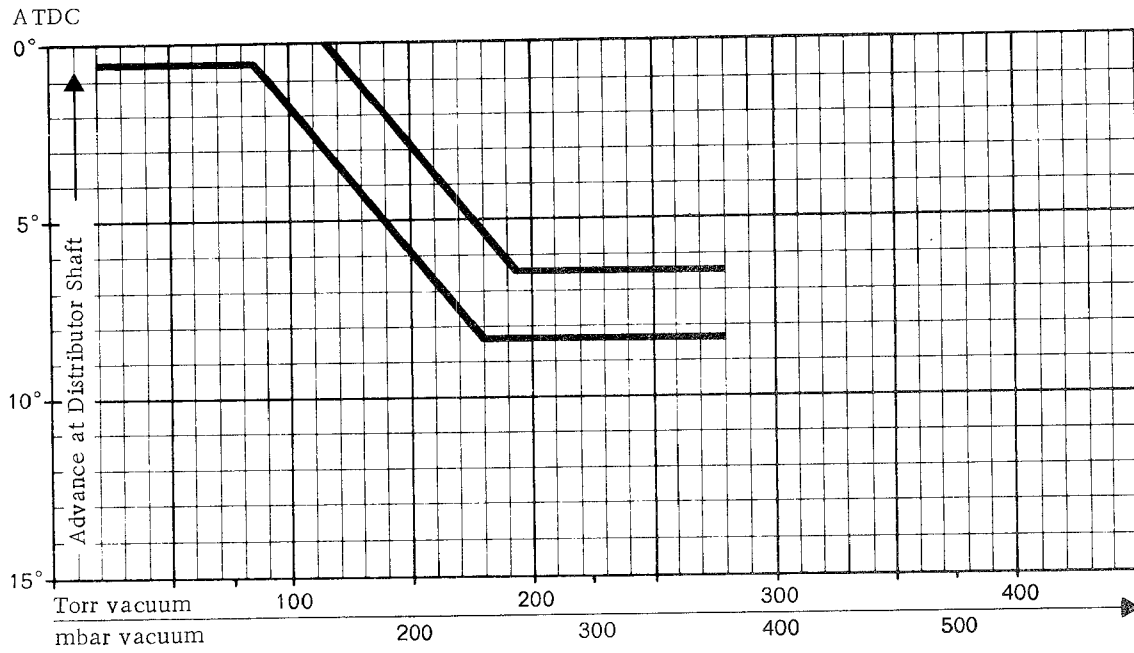
Ignition advance must be $29 \pm 3^\circ$ BTDC at an engine speed of 4000 rpm (vacuum hose disconnected).

If specification is not reached, remove distributor and check on test bench.

CENTRIFUGAL ADVANCE CURVE TURBO ENGINE FROM MODEL 77



VACUUM RETARD CURVE TURBO ENGINE FROM MODEL 77



CHECKING IGNITION TIMING 1978 MODELS

Requirement: ignition timing correct.

Checking Ignition Advance

USA

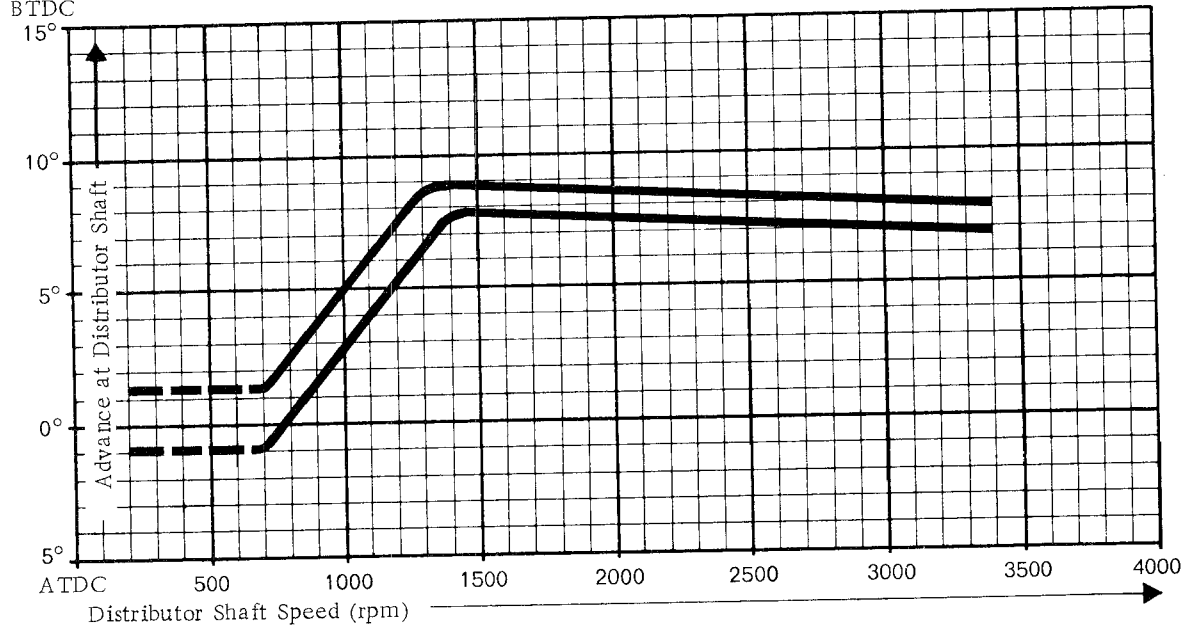
At engine speed of 4000 rpm ignition advance must be $26^{\circ} \pm 4^{\circ}$ before TDC.
(Vacuum advance hose disconnected)

California

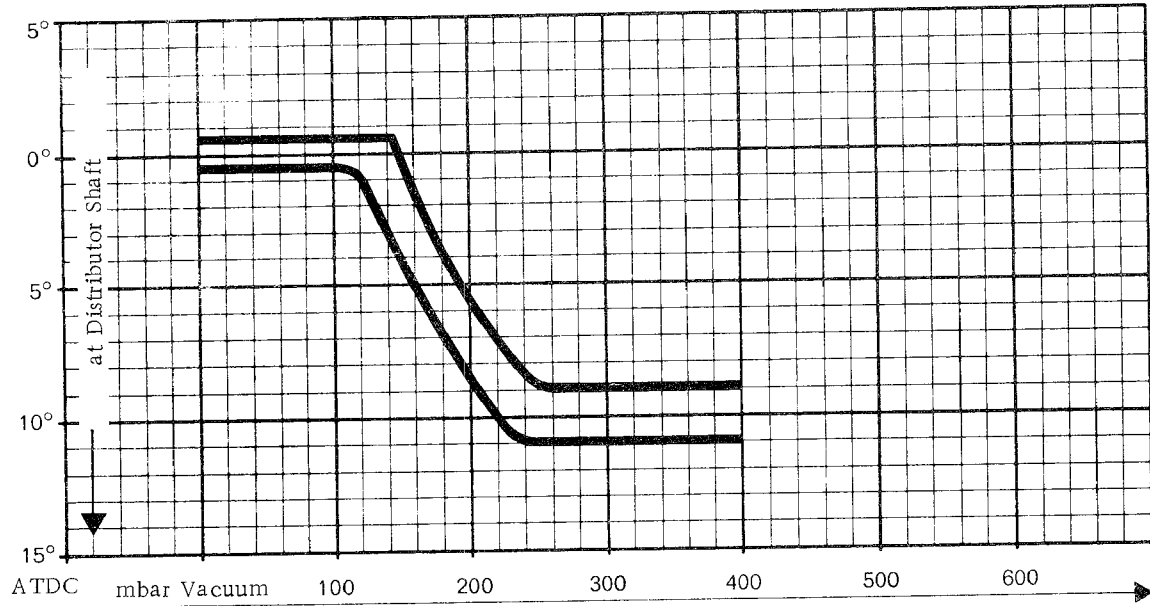
At engine speed of 4000 rpm ignition advance must be $31^{\circ} \pm 4^{\circ}$ before TDC.
(Vacuum advance hose disconnected, but retard hose can remain connected as long as the test is made without engine load.)

If specified values are not reached, remove distributor and check in a test bench.

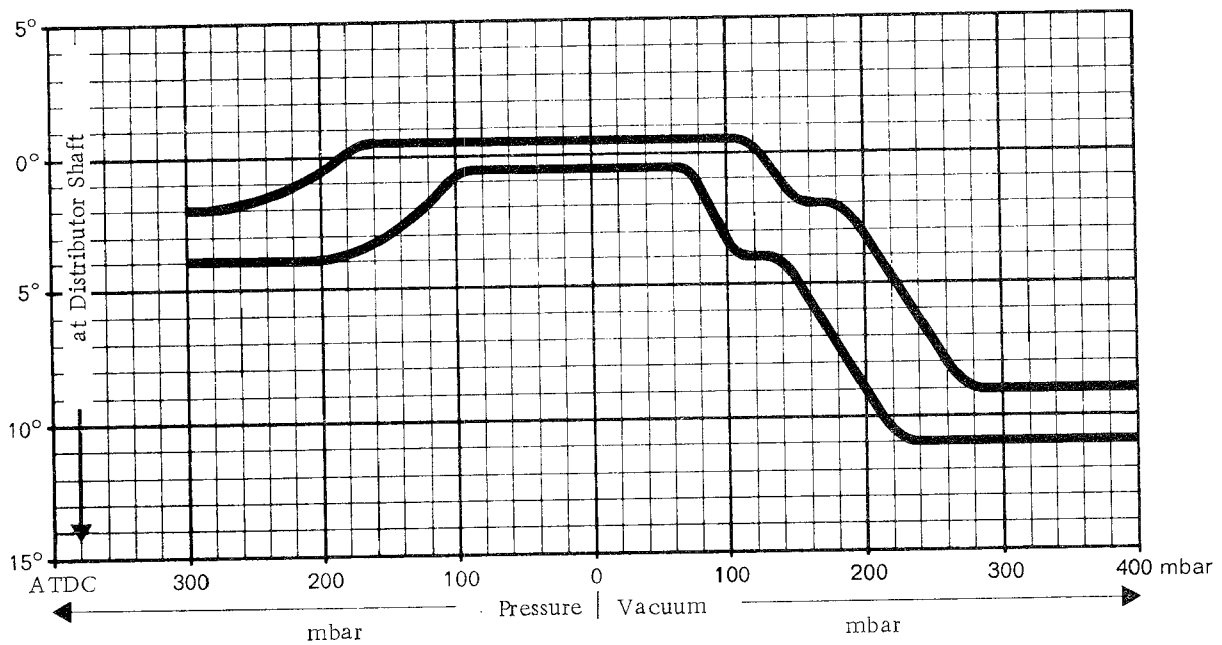
CENTRIFUGAL ADVANCE CURVE - TURBO ENGINE 1978 - USA/CALIFORNIA
BTDC



VACUUM RETARD CURVE - TURBO ENGINE 1978 - USA
BTDC



VACUUM RETARD/ADVANCE CURVE - TURBO ENGINE 1978 - CALIFORNIA
BTDC

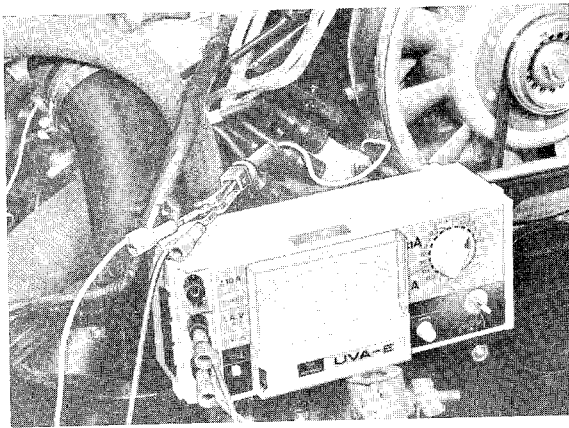


CHECKING DISTRIBUTOR IN CAR

Turning distributor shaft sends an alternating current signal to the CDI control unit. This alternating current signal which increases with engine speed, triggers the control unit to release ignition spark.

Distributor operation can be checked by measuring alternating current.

1. Disconnect 2-pole plug connector at wire from distributor to engine harness.
2. Connect a multipurpose tester to the plug and adjust it to measure AC voltage.



Note

This distributor test requires a voltmeter which measures very small AC voltage readings.

3. Operate starter and read voltage. The proper voltage is usually about 0.1 V. An exact reading cannot be made, because voltage depends on starting speed and type of measuring equipment. Distributor is bad and needs to be replaced if there is no voltage or much less than 0.1 V.

Note

Never make changes on soft iron teeth of rotor or stator.

If starter is operated with distributor cap taken off, be careful that cap holding springs do not fall into distributor.

TROUBLESHOOTING ELECTRONIC IGNITION SYSTEM (BOSCH CDI)

Testing Prerequisites

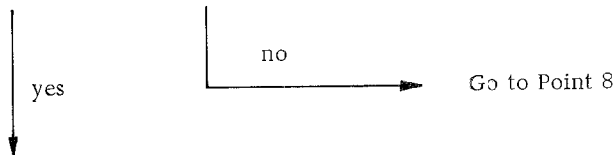
Battery fully charged, fuel in tank, engine or ambient temperature between 0 and + 40 °C/32 and 104 °F.
(Temperature has a direct influence on measured values).

Note especially information on possible dangers when doing any type of work on CDI system (see Workshop Manual 911, Vol. II, Pages SL 23 and 24).

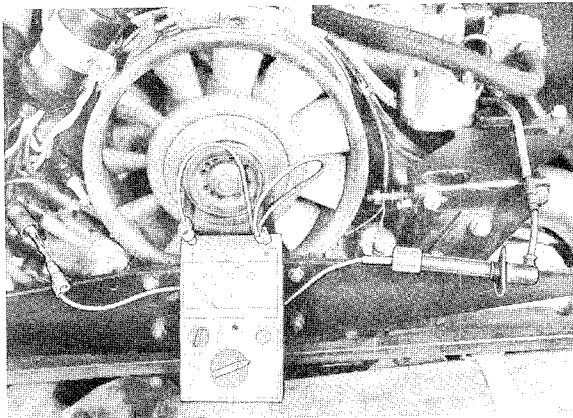
Starter turns, engine does not start or develops insufficient power

1. Connect spark gap tester to ignition transformer terminal 4 and set it for 12 mm.
Start engine.

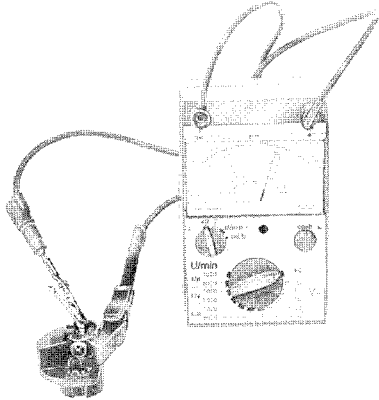
12 mm spark present?



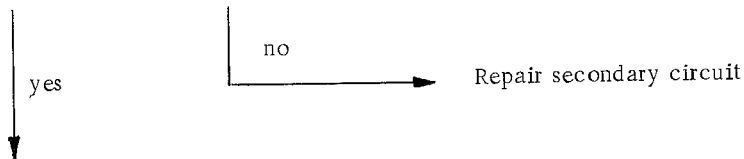
2. Check distributor cap, distributor rotor, ignition cables and spark plugs.
Resistance of ignition cable including plug: 4k ohms.



Resistance of distributor rotor: 5k ohms

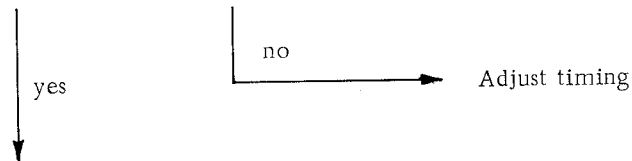


Spark from spark plug?



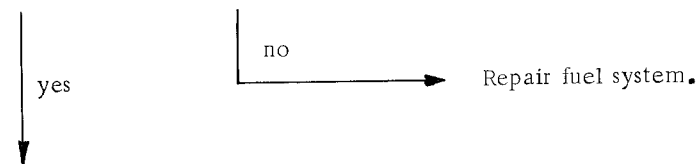
3. Check ignition timing.

Timing correct?



4. Check fuel system.

Engine receiving sufficient fuel?



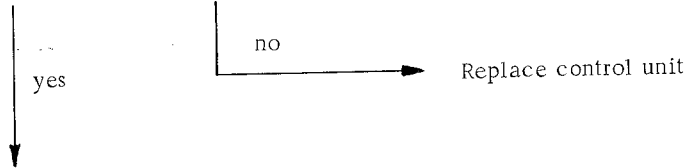
5. Check ignition transformer.

Disconnect plug and high voltage wire at ignition transformer.



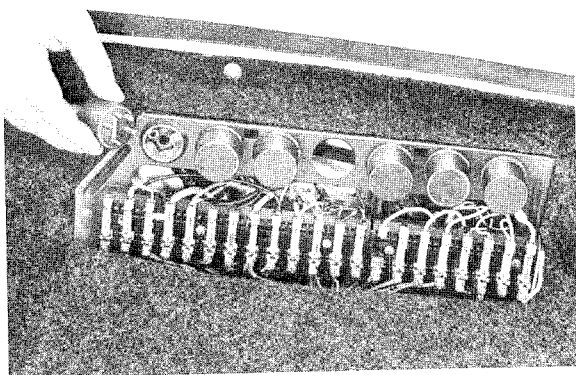
- 7. For ignition failure:
Disconnect tachometer.
If ignition failure is gone, tachometer is defective.
If not, tachometer is good.

Ignition failure eliminated?

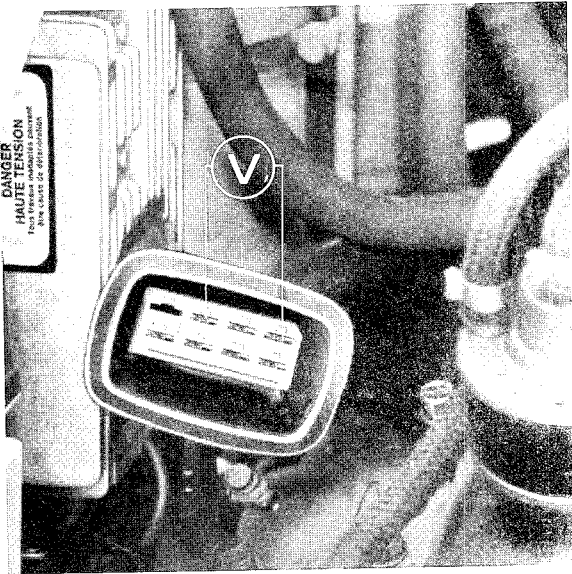


Engine must start or there must be adequate ignition voltage to engine. If not, there is a mechanical defect.

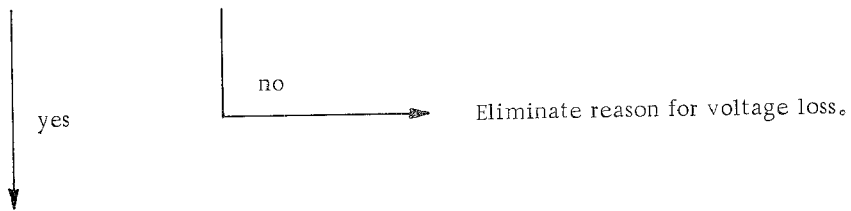
- 8. Disconnect plug at air flow sensor contact or bridge terminals 30 and 87 on base of relay for fuel pump II.



Check voltage at disconnected control unit plug between terminals 6 and 8 with ignition on. Voltage must equal battery voltage.



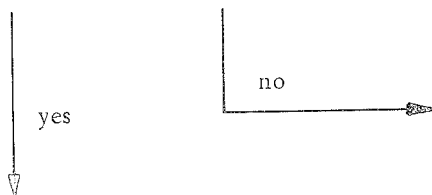
Voltage correct?



9. Check sensor resistance including sensor line at disconnected control unit plug between terminals 3 and 7.
Resistance: 490 to 700 ohms.

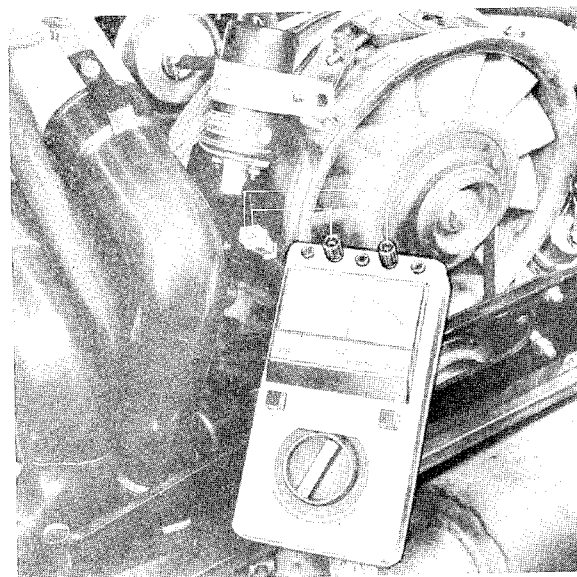


Resistance correct?



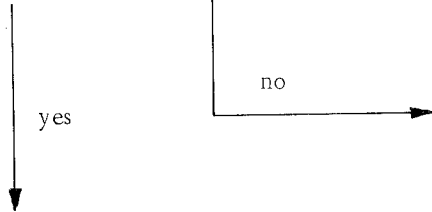
Repeat test at two-pole plug in sensor line.

- 10. Check ground of sensor coil including sensor line at disconnected control unit plug between terminal 3 and car's ground and terminal 7 and car's ground



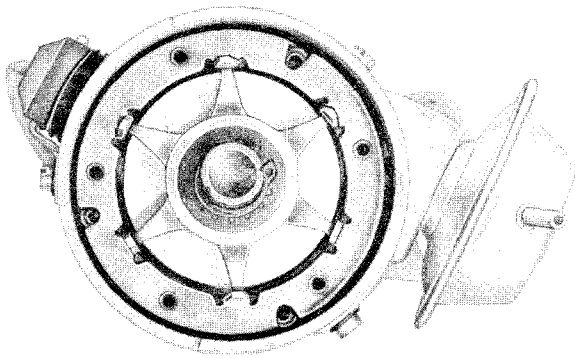
Test values correct: Repair or replace wires between plug and CDI control unit.
 Test values incorrect: Replace distributor.

Resistance infinite?

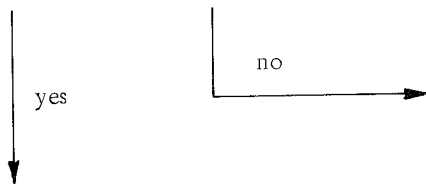


Repeat test at 2-pole plug in sensor line (see page 28 - 11).

11. Check sensor system for mechanical damage.
Visual inspection: Is there clearance between the rotor and stator?



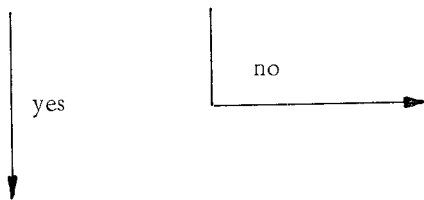
Sensor system good?



Replace distributor

12. Disconnect tachometer.
If there is an ignition spark now, tachometer is defective.

Tachometer good?

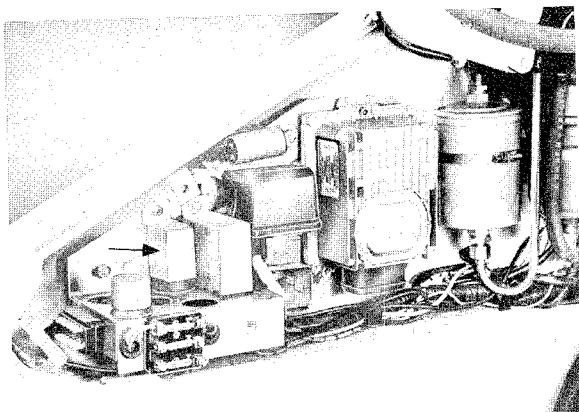


Replace tachometer

Go to Point 5.

DELAYED IGNITION CUTOFF

A time delay relay for ignition cutoff will be installed in 1977 Turbo Carrera Model.



An open circuit in diode could prevent energizing of alternator (charge indicator light does not come on while turning on ignition).

A break in diode in blocking direction will be noticed by extended engine run-on after turning it off.

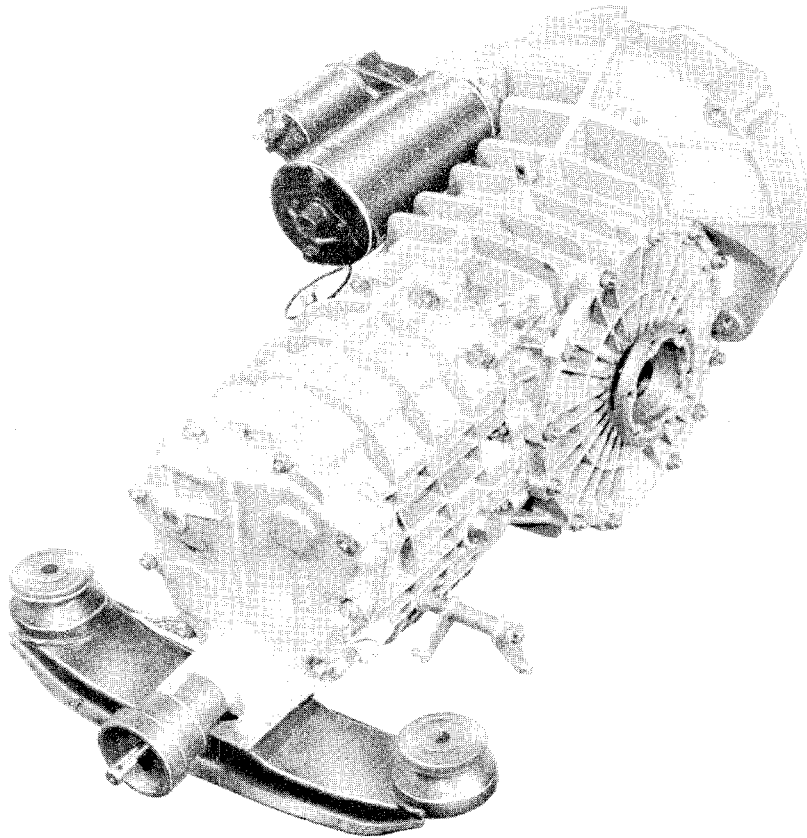
When stopping engine, only fuel pumps are turned off at first. After a time delay of 3 to 5 seconds power supply for CDI control unit is broken automatically. This delay allows any residual fuel to be completely burned before engine stops.

A diode is connected to battery charge indicator light.

It prevents voltage feedback into car's electrical system from terminal D + of alternator via charge indicator light while engine is stopping.

TRANSMISSION GENERAL
CLUTCH
CLUTCH CONTROLS

TRANSMISSION TYPE 930



The Turbo Carrera transmission is designated 930/30
4 speed transmission final drive ratio 9/38

For 1977 model, following transmission is installed:

930/33 4 speed with final drive ratio of 9/38

For 1978 model, following transmission is installed:

930/34 - 4 speed with final drive ratio of 9/38

MANUAL TRANSMISSION TIGHTENING TORQUES

Location	Description	Thread	Grade	Torque	
				Nm	ft lbs
Drive shaft	Nut	M 30 x 1.5	8.8	210	152
Drive shaft	Nut	M 20 x 1.5	C 35 V	160 - 180	116-130
Driven shaft	Nut	M 24 x 1.5	8	190 - 200	137-145
Stub axle	Stretch bolt	M 10 x 1.5	8.8	26 - 30	19-22
Stub axle	Bolt	M 10 x 1.5	8.8	39 - 46	28-33
Transm. case	Vent	M 14 x 1.5	9 S 20 K	20 - 30	14-22
Gearshift rod	Conical scr.	M 8 x 1.25	8.8	23 - 26	17-19
Shift cover	Self-locking nut	M 8 x 1.25	X 12 Cr No 18.8	22 - 25	16-18.5
Gear housing	Backup light switch	M 18 x 1.5	M S	25 - 35	18.5-25
Gearshift forks	Nut	M 6 x 1.0	8.8	9 - 11	6.5-8
Clamp, gears, transm. case, front and side covers	Nut	M 8 x 1.25	8	22 - 25	16-18.5
Shift lock, transm. case	Bolt	M 10 x 1.5	8.8	15 - 18	11-13
Selector forks	Bolt	M 8 x 1.25	8.8	24 - 26	17-19
Differential (ring gear attachment)	Bolt	M 12 x 1.25	11.9	135 - 140	98-101
	Bolt	M 12 x 1.25	12.9	150 - 160	108-116
Transm. housing (oil drain plug)	Plug with magnet	M 24 x 1.5 Con. 1:16	St 37-5,8	20 - 25	14-18,5
Transm. housing (oil filler plug)	Plug	M 30 x 1.5 Con. 1 : 16	5.8	20 - 25	14-18.5
Reverse gear Lock	Plug	M 16 x 1.5	5.8	20 - 25	14-18.5

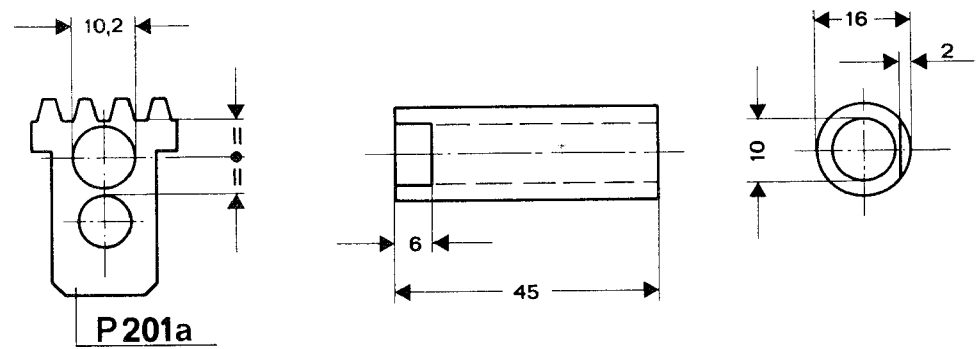
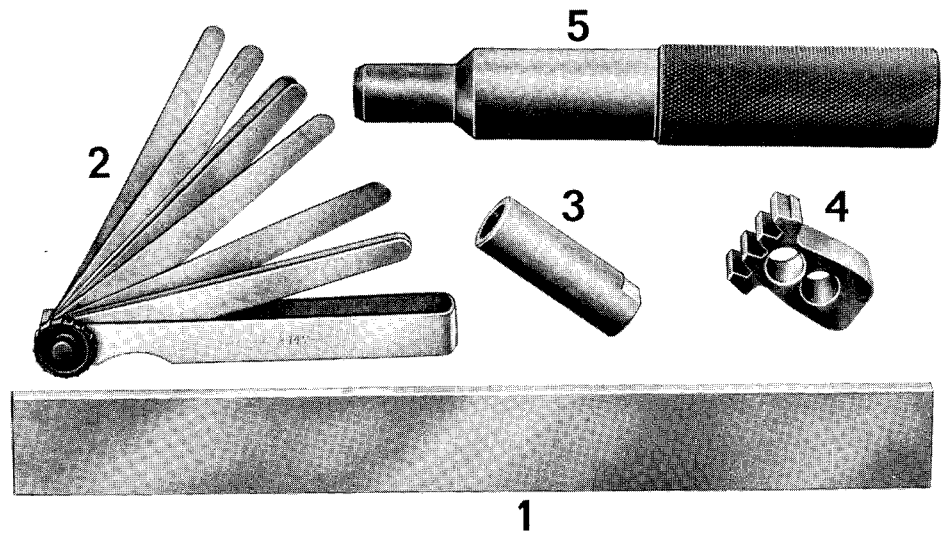
Location	Description	Thread	Grade	Torque	
				Nm	ft lbs
Guide tube	Bolt	M 6 x 1.0	8.8	8 - 10	6 - 7
Clutch and starter gear	Bolt	M 8 x 1.0	8.8	20 - 25	14 - 18,5
Starter	Nut	M 10 x 1.5	8	46 - 50	33 -36
Holder to base	Nut	M 6	8.8	6	4
Base to tunnel	Allen bolt	M 8	8.8	21	15
Shift rod end	Connecting screw	M 8	8.8	15	11
Coupling	Connecting screw	M 8	8.8	15	11
Clamp	Bolt	M 8	8.8	25	18.5

General Data	Manual Transm. 930/30, 930/33 and 930/34
Ratio	
1st gear	16/36 = 2.55
2nd gear	23/30 = 1.3043
3rd gear	28/25 = 0.8929
4th gear	32/21 = 0.6563 (32/20 = 0.625)
Reverse	16/39 = 2.4375
Climbing ability in %	
1st gear	above 100
2nd gear	47
3rd gear	27
4th gear	16
Final drive	Spiral cut bevel gears
Final drive ratio	
1976 models	9/38 = 4.222
1977 models	9/38 = 4.222
1978 models	9/38 = 4.222
Power transmission	Double constant velocity joint shafts to rear wheels
Transmission weight (dry) w/o starter	53 kg/117 lb
Filling capacity	Approx. 3.7 liters SAE 90 oil of API Classification GL 5 (or Mil-L 2105 B)

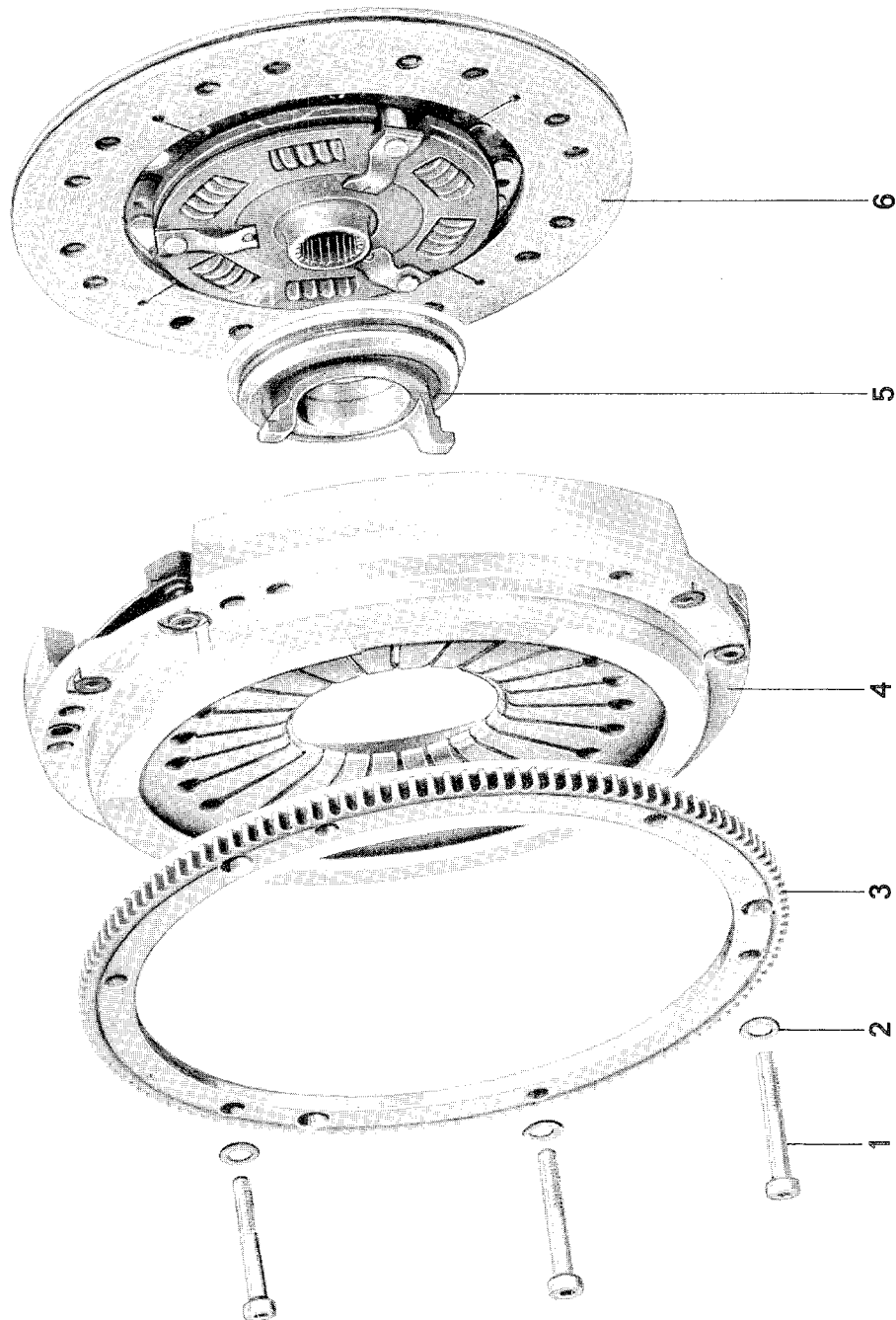
Note: Data for transmission type 930/34 are in parentheses.

General Data	Clutch
<u>Design</u>	Single disc, dry, pull-type
<u>Pressure plate</u>	MFZ 240 Fichtel + Sachs
Pressure	887 - 979 kg (1955 - 2158 lb)
Spring No.	3027 076 000
<u>Clutch disc</u>	240 SD, spring torsion damper
Spring No.	30 - S 10961
Spline profile	SAE 24/48 22 teeth

General Data	Clutch (1978 Model)
<u>Design</u>	Single disc, dry, pull-type
<u>Pressure plate</u>	MFZ 240 Fichtel + Sachs
Contact pressure	1142 - 1233 kg (2518 - 2476 lb)
Spring No.	3027 076 202
<u>Clutch disc</u>	240 GUD, rubber torsion spring
Spline profile	SAE 24/48 22 teeth



No.	Description	Special Tool	Remarks
1	Ruler		Min. length 250 mm
2	Feeler gauge		Commercial item
3	Spacer sleeve		Local manufacture (68 mm long from 1978 model)
4	Toothed segment	P 201 a	Reworked
5	Guide mandrel	9102	

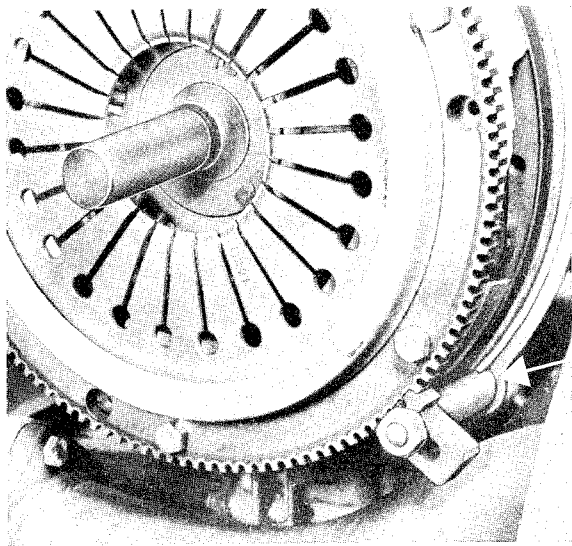


No.	Description	Qty.	Notes when		Remarks
			Removing	Installing	
1	Clutch bolts	6	Unscrew evenly	Tighten evenly and diagonally	torque: 2.0-2.5 mkg (14 - 18.5 ft lbs)
1a	Clutch bolts DIN 931 from Trans. No. 776 0013 or 776 1011	9	Unscrew evenly	Tighten evenly and diagonally.	torque: 2.0-2.5 mkg (14 - 18.5 ft lbs)
2	Washer	6		Replace, if needed	
3	Ring gear	1			
4	Pressure plate	1		Check for wear	
5	Throwout bearing	1		Don't wash. Wipe with dry rag. Coat guide tube contact surface with MoS ₂ lubricant.	Don't apply pressure - danger of damage!
6	Clutch disc	1		Check for wear. Center with clutch centering tool 9102	

REMOVING AND INSTALLING

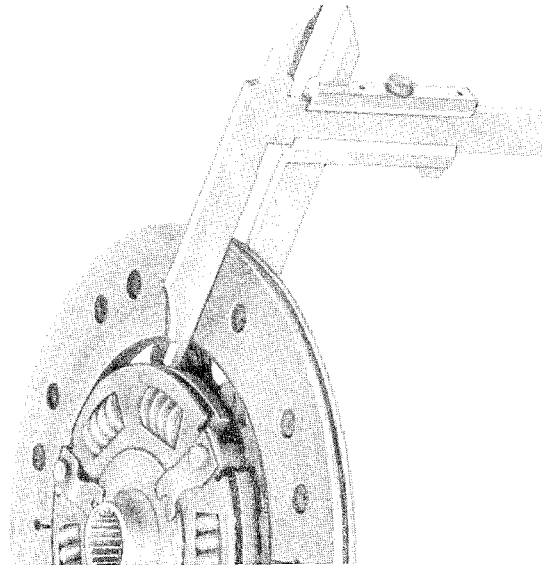
Removing

1. Hold flywheel with toothed segment P 201 a and spacer sleeve. Make sure that spacer sleeve fits engine with adequate clearance.



Note

Clutch linings cannot be replaced.
If applicable, the entire disc is to be replaced.

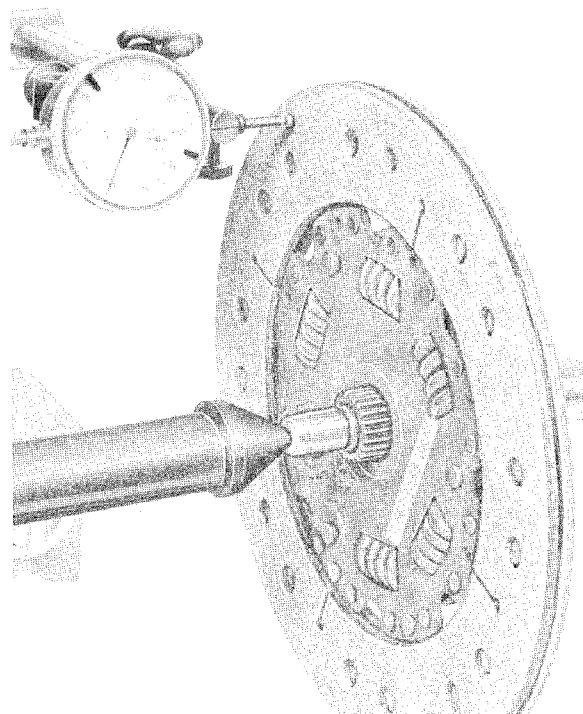


2. Loosen bolts holding clutch pressure plate to flywheel evenly and diagonally one or two threads, until the spring pressure stops (prevents distortion on clutch pressure plate).

5. Check disc with lining for lateral runout. Permissible lateral runout on 225 mm diameter is max. 0.6 mm.

CHECKING CLUTCH DISC

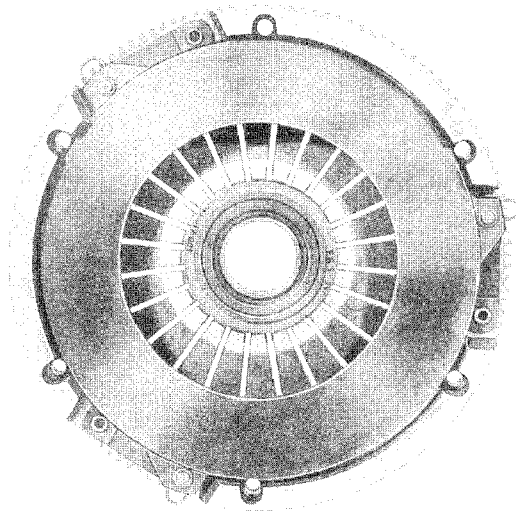
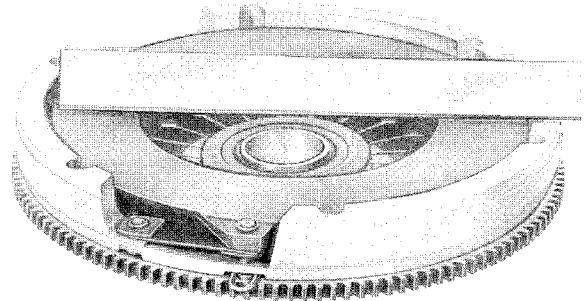
1. Check teeth. The clutch disc must move easily in axial direction on drive shaft without radial play.
2. Check rivets. Replace clutch disc if in doubt.
3. Check clutch lining. If clutch lining has oil spots, is burnt, torn or worn at spots, install a new disc.
4. Check lining thickness. Thickness of disc with riveted lining (no tension) is $10.1^{+0.3}$ mm. Wear limit (no tension) is 8.5 mm for symmetrical wear.



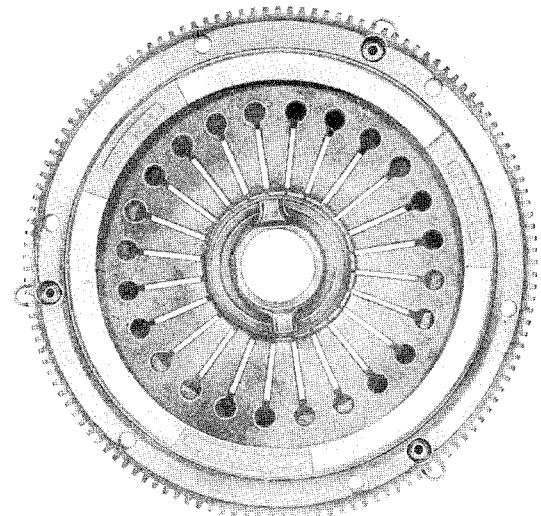
CHECKING CLUTCH PRESSURE PLATE/DISC

The MFZ clutch pressure plate from Fichtel and Sachs is not designed for reconditioning or repairing. The inspection is limited to dry cleaning and removing dust with compressed air and emery cloth, and a thorough visual examination.

1. Clean clutch. If necessary, clean bearing surface of pressure plate with emery cloth. Remove burnt spots by polishing. Clean entire assembly thoroughly with compressed air.
2. Check ends of diaphragm springs for traces of wear from clutch release bearing. Wear up to a depth of 0,3 mm is not serious.



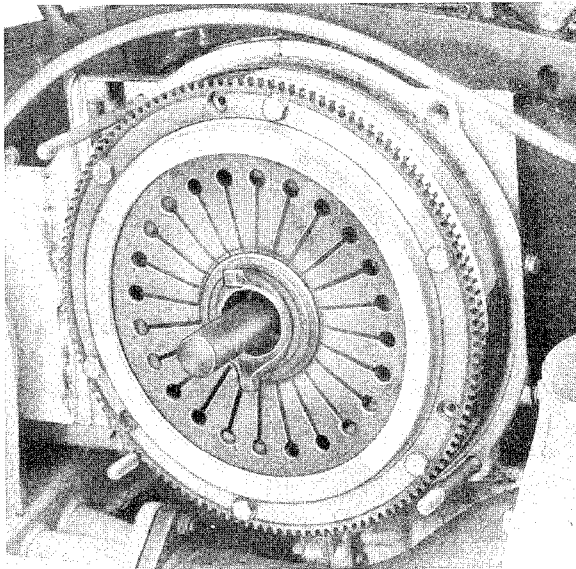
4. Check spring connections between pressure plate and cover for cracks. Check tightness of rivet connections. Replace pressure plates with damaged or loose rivets.



3. Check friction surface of pressure plate for cracks, burnt spots and wear. Check with steel ruler. Pressure plates which are tapered up to 0,3 mm toward inside, can still be used (check with feeler gauge blade).

Installing

1. After cleaning, check clutch contact surface of flywheel for wear. If necessary, machine surface and smooth with emery cloth. Replace the flywheel, if necessary.
2. Lubricate needle bearing in flywheel with about 1 cm³ (1,5 grams) of MoS₂ grease.
3. Install clutch with special tool 9102 to center in flywheel.



4. Center clutch pressure plate on flywheel.
5. Tighten bolts evenly and diagonally to prevent distortion on cover. Tighten bolts to specified torque. Use Special Tool P 201 a and a spacing sleeve to hold the flywheel.

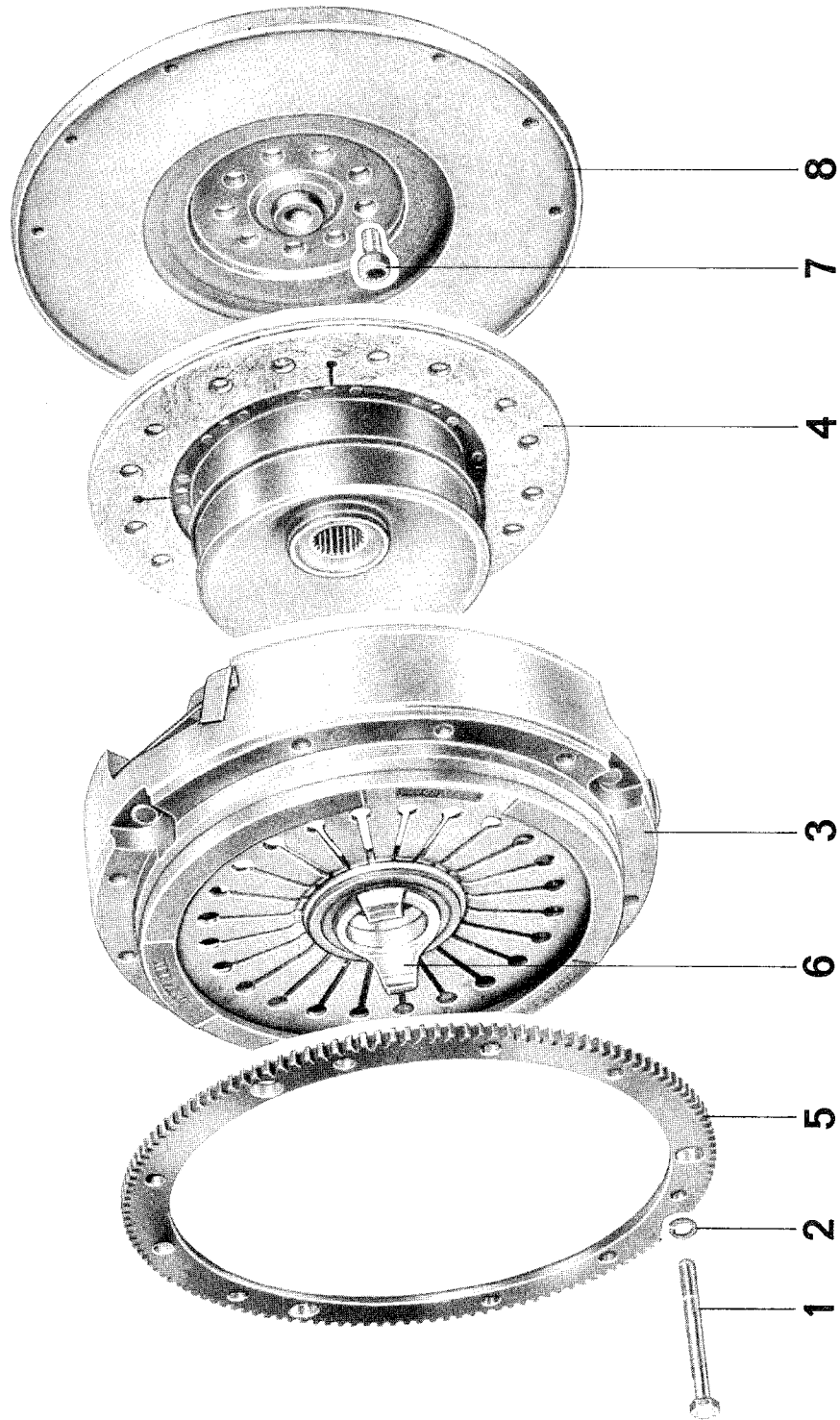
ADJUSTING CLUTCH - 1977 MODEL (with auxiliary clutch spring on transmission)

Note

With auxiliary clutch spring it is no longer possible to accurately check clutch free play at clutch pedal. Consequently clutch free play has to be checked at transmission adjusting lever.

Check and adjust clutch, see Workshop Manual 911, Main Group 7 - Page 2.1 - 2/3.

DISASSEMBLING AND ASSEMBLING CLUTCH



No.	Description	Qty.	Note When		Special Instructions
			Removing	Installing	
1	Bolt	9			
2	Washer	9		If necessary, replace	
3	Pressure plate	1			
4	Drive plate	1		Check for wear, center with a mandrel	
5	Starter gear ring	1			
6	Release bearing	1	Only possible, when pressure plate not loaded (without 3 brackets)	Check, replace if necessary. Do not wash, only wipe off dry. Coat sliding surfaces for guide tube with MoS ₂ multi-purpose grease	Don't apply pressure - danger of damage!
7	Capscrew	9			
8	Flywheel	1			

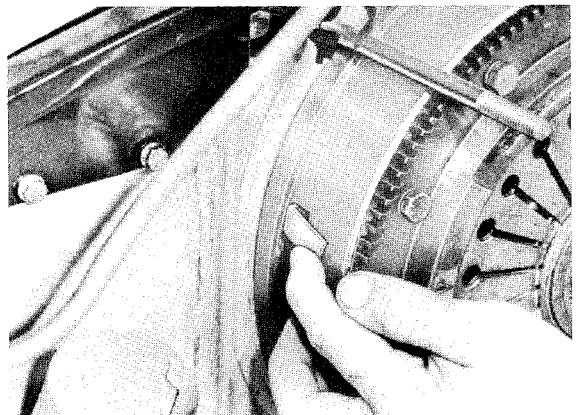
DISASSEMBLING AND ASSEMBLING CLUTCH

1. Three brackets be used to facilitate installation of clutch pressure plate.

These clips are mounted on all spare part clutch pressure plates and must be removed after installation. It is recommended to keep these clips on hand for later repair jobs.

2. Since the clutch concerned is pulled and the release bearing is designed accordingly, the release bearing must never be subjected to pressure in direction of drive plate.

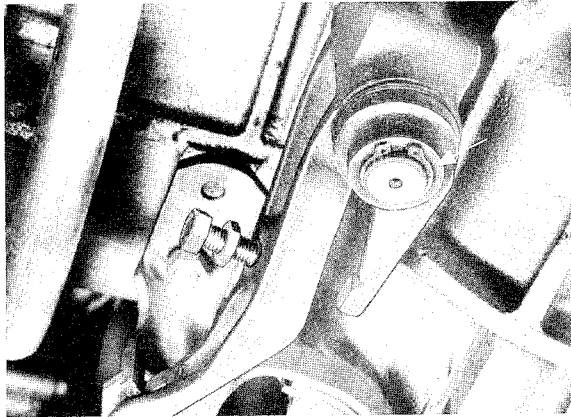
Consequently never place removed pressure plate on release bearing.
When installing or assembling engine and transmission also make sure that release lever is not exerting force on bearing.



REMOVING AND INSTALLING CLUTCH RELEASE SPRING (FROM 1978 MODELS)

Removing

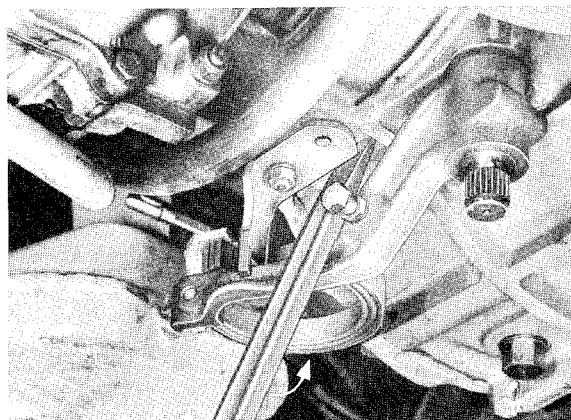
1. Loosen clutch cable at holder and detach at release lever.
2. Remove adjusting lever, by taking off the circlip and, if applicable, disconnecting spring for adjusting lever (since October, 1978).



3. Press release lever forward with a suitable tool (to disengage).

Note:

Spring stretches when passing "top dead center" and the release lever will snap forward.

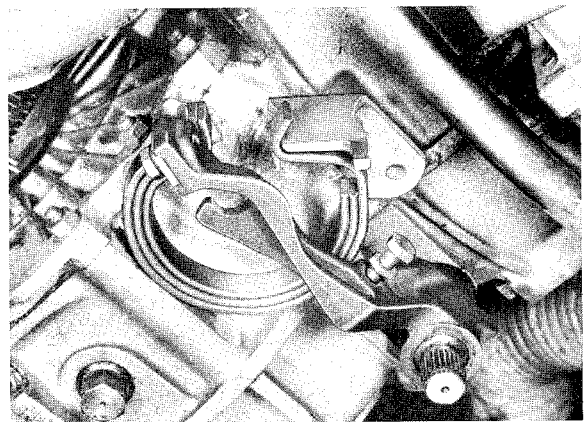


Checking and Lubricating

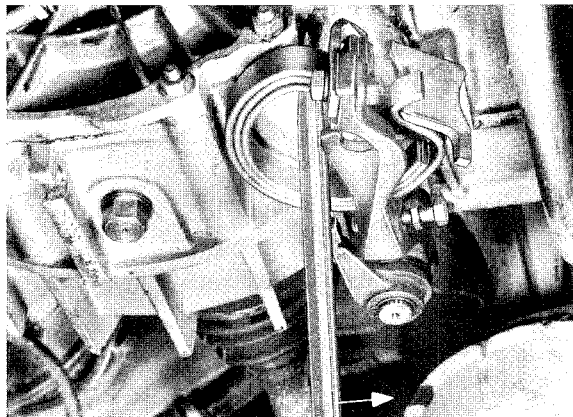
1. Check movement of release lever on release lever shaft, correcting if not easy enough.
2. Coat following sliding and bearing surfaces with a waterproof lubricant, for example: Staburags NBU 12/300 KB from Klüber or a multi-purpose grease.
 - Release lever bore.
 - Release lever shaft (also splines for adjusting lever).
 - Release spring bearing surface on console.
 - Clutch cable mounting point on release lever.

Installing

1. Slide release lever with spring on to lever shaft and mount adjusting lever.



2. Press back release lever with a suitable tool until release spring passes the top dead center point (lever snaps against stop on console).



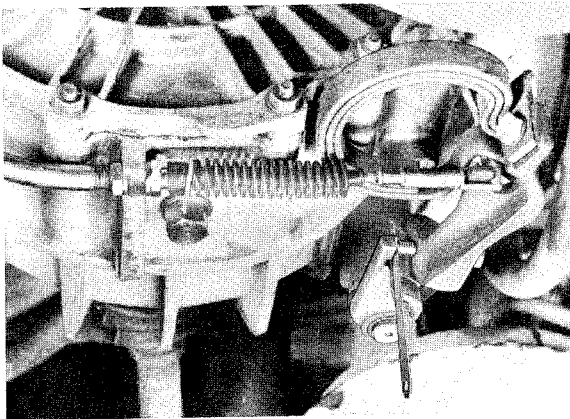
3. Remove adjusting lever again and mount as close as possible to release lever.
4. Make basic clutch adjustment.

ADJUSTING CLUTCH - 1978 MODEL (with auxiliary clutch spring on transmission)

Checking Clutch Play

Because of the auxiliary clutch spring it is no longer possible to exactly determine clutch play by checking at clutch pedal. Consequently the clutch play of cars with auxiliary clutch spring will have to be checked at transmission adjusting lever.

1. Check whether clutch cable is tight.
2. If cable is tight enough, check clutch play with a feeler gauge, if necessary readjusting to $1.0 + 0.1$ mm with adjusting bolt.

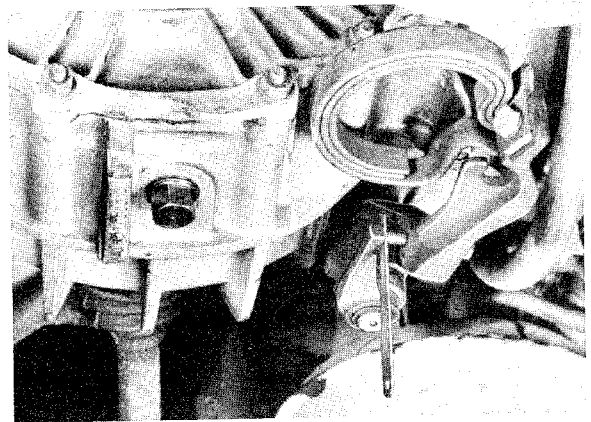


Note

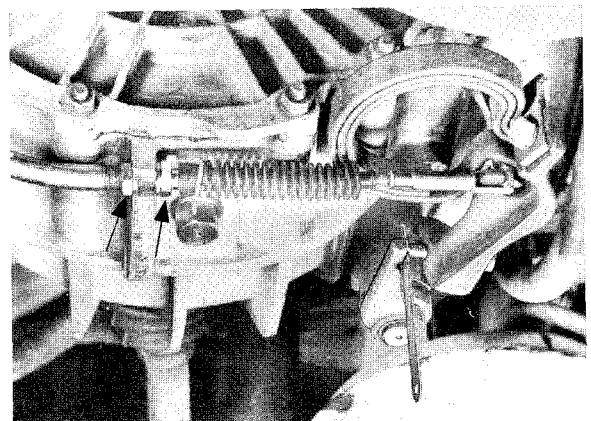
Make basic adjustment, if cable is loose (hanging).

Basic Adjustment

1. Detach clutch cable or loosen completely at holder.
2. Adjust clutch play to $1.2 + 0.1$ mm with a feeler gauge and counterlock adjusting bolt.

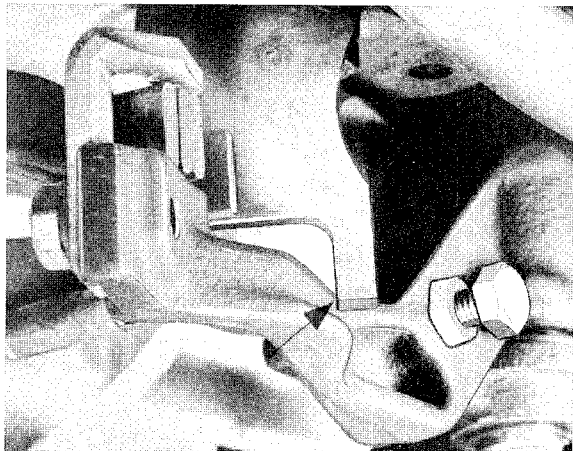


3. Attach clutch cable.
4. Tighten clutch cable at holder until clutch play is 1.0 mm.



Note

Clutch cable tightness is correct if, when engaged, the release lever just lifts off of stop.

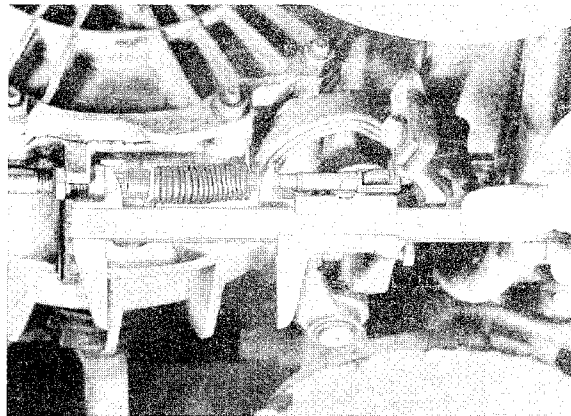


Note

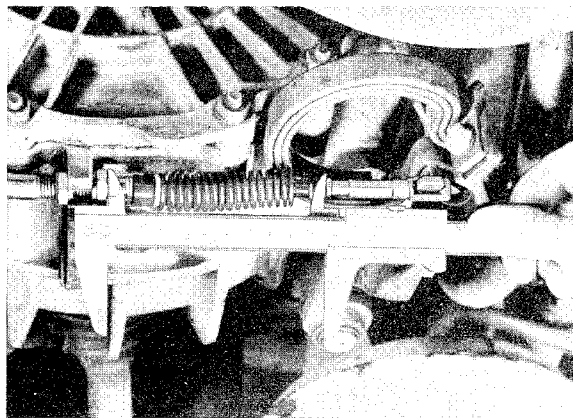
If adjusting room on clutch cable holder is not sufficient, also adjust front end at pedals. For this purpose, adjust stop on floor plate so that release travel on release lever is $27 \pm 0,5$ mm.

5. Measure release travel.

a) Apply calipers with clutch engaged (see figure) and read distance I (e.g. 101.9 mm).

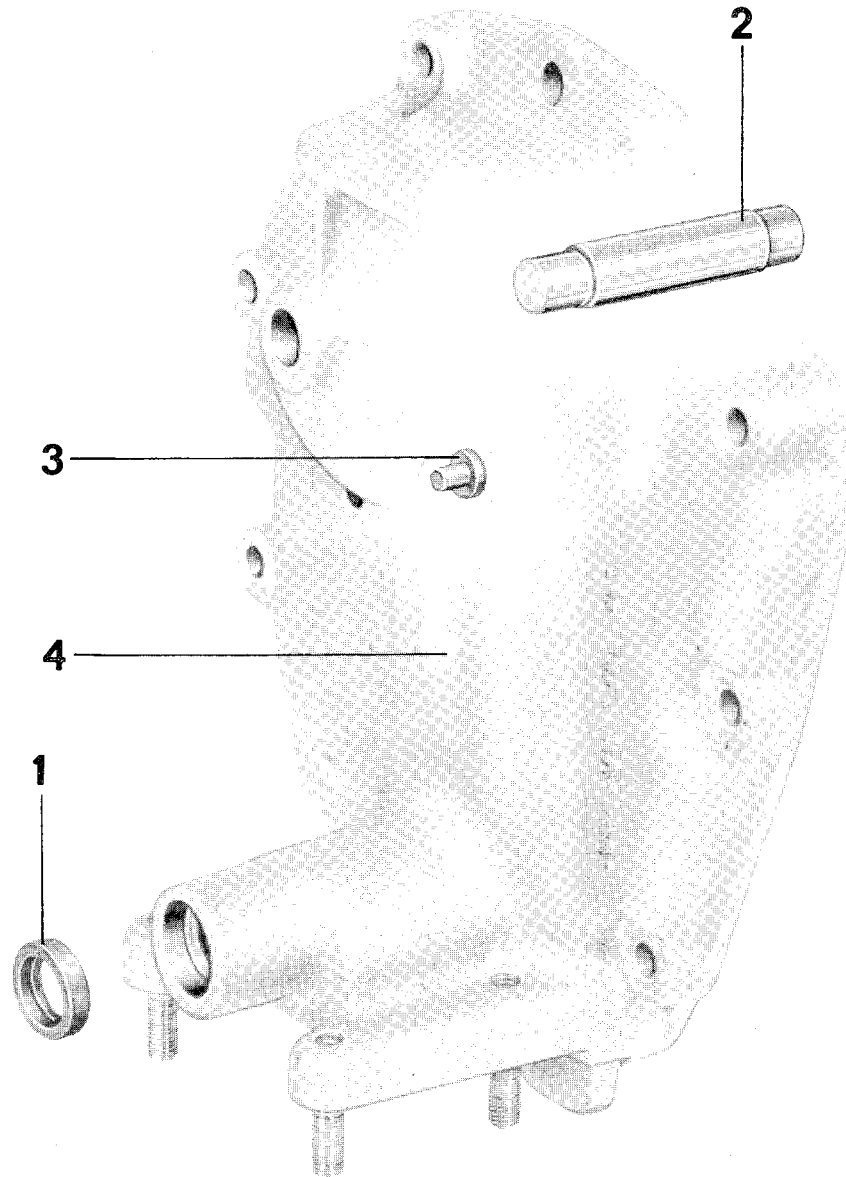


b) Disengage clutch and measure distance II as shown in figure (e.g. 74.7 mm).



c) Dimension I less dimension II (in example, 101.9 mm minus 74.7 mm = 27.2 mm) gives the release travel.

MANUAL TRANSMISSION
CONTROLS
CASE

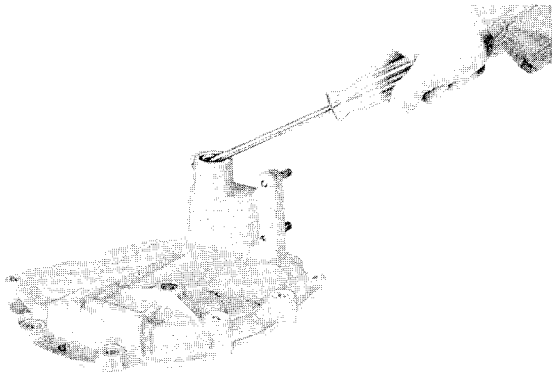


No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Selector rod seal	1	Pry out with screwdriver.	Use proper sized drift. Drive in to stop.	
2	Reverse gear shaft	1	Drive out.	Heat cover to about 120° C (250°F) Drive in.	
3	Operating lever spacer	1	Drive out	Heat cover to about 120°C (250°F) Drive in.	
4	Transmission front cover	1			

DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

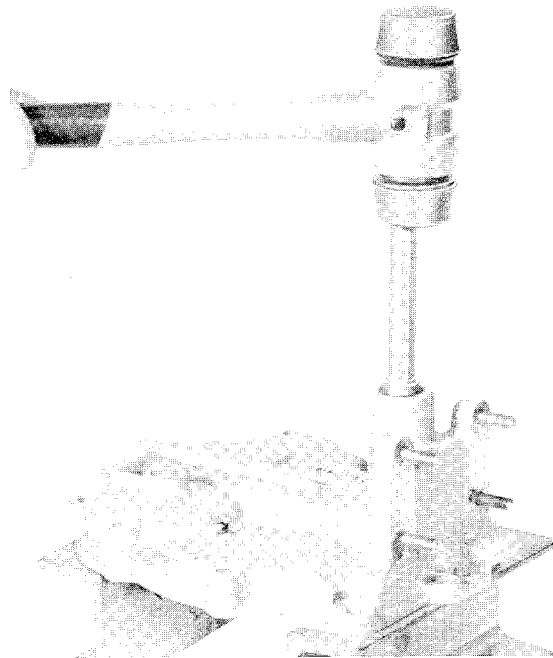
Disassembling

- Using screwdriver, pry out seal for main selector rod.



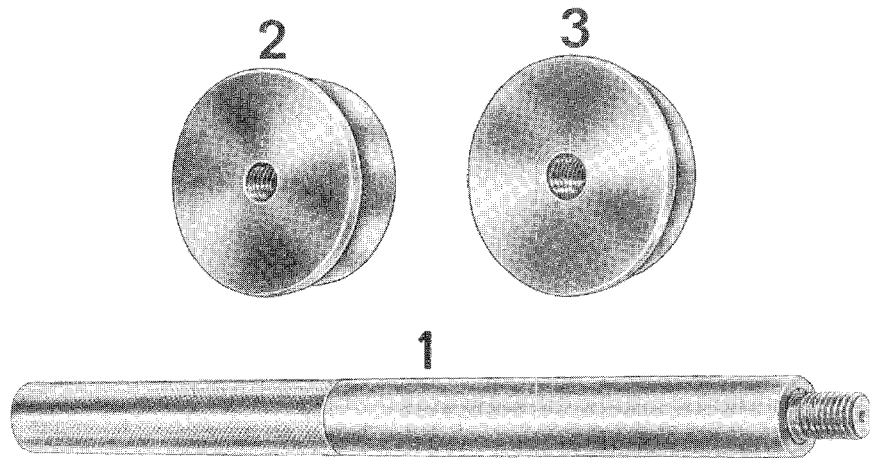
Assembling

- Using a proper sized drift, drive selector shaft seal in to stop.

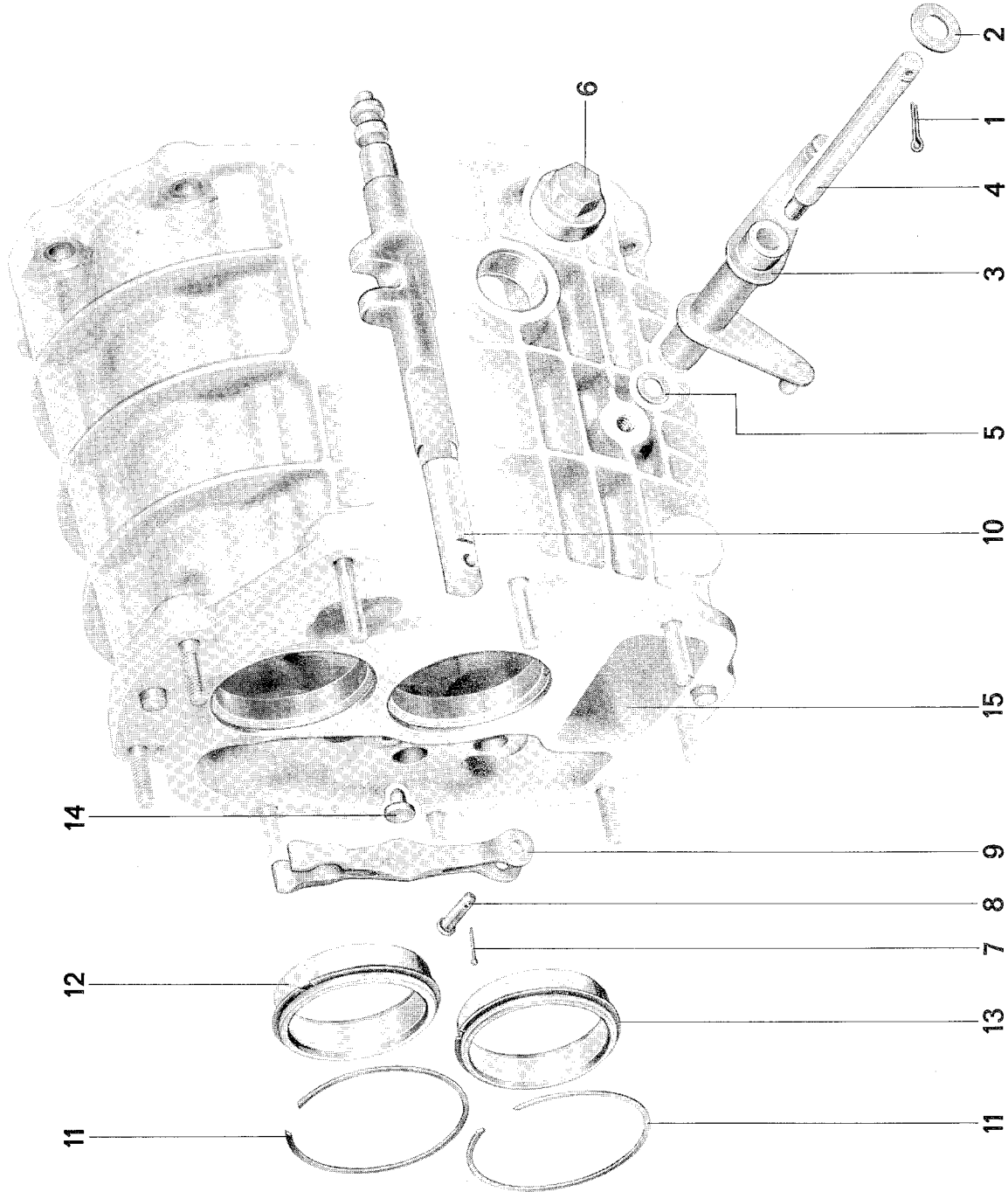


- Drive out reverse gear shaft and operating lever spacer.

TOOLS



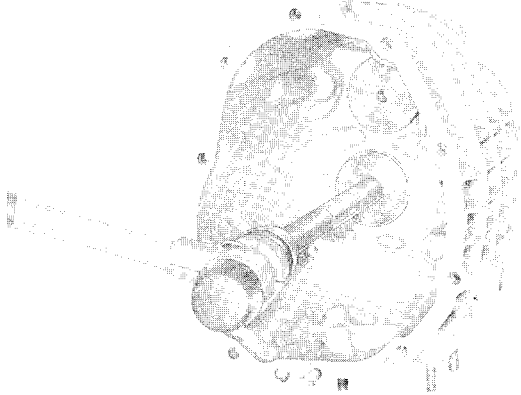
No.	Description	Special Tool	Remarks
1	Drift	Part of P 254	
2	Driver	P 254 b	
3	Driver	P 254 c	



DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

1. Remove snap rings for bearing outer races with P 254 b or 254 c.

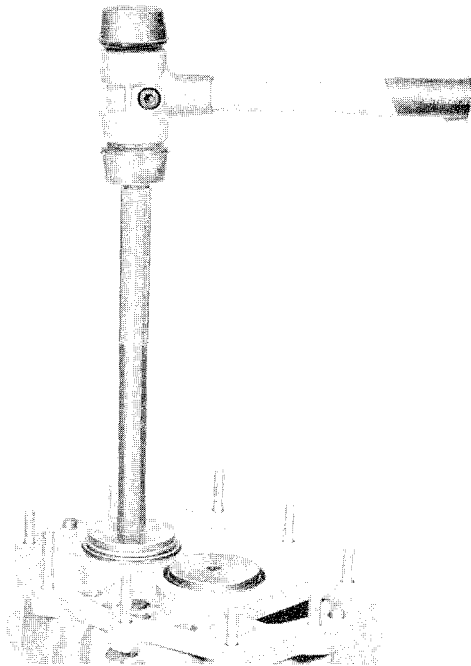


Note

The bearing outer races have different inside diameters. The bearing outer race with the largest inside diameter belongs to the driven shaft cylindrical roller bearing.

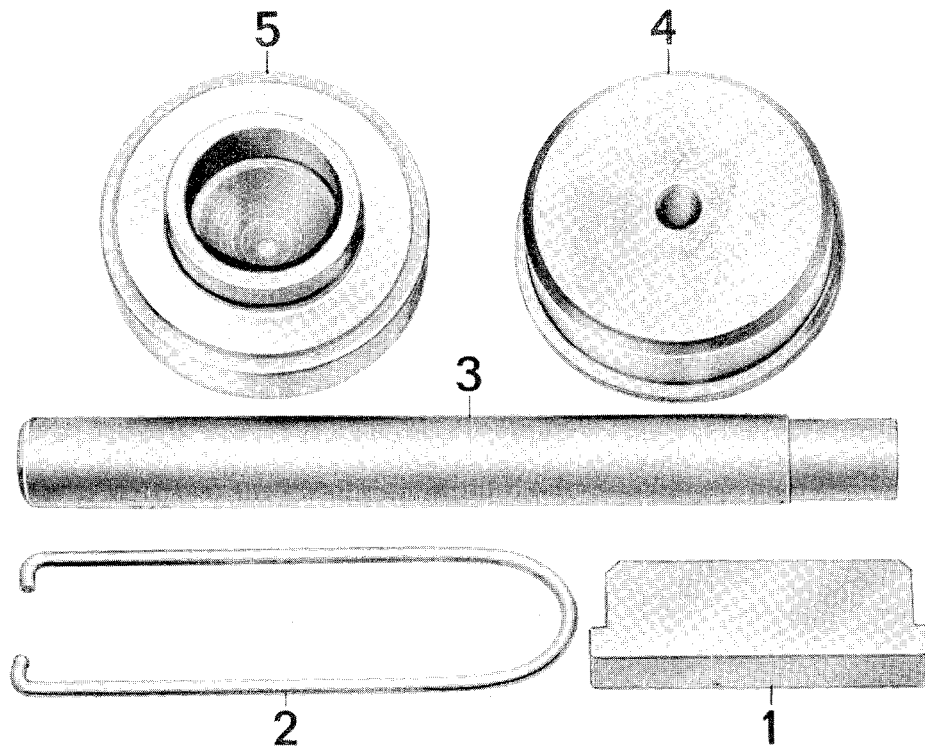
Assembling

1. Heat gear housing to about 120°C and drive in outer races with P 254 b or P 254 c.



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Cotter pin	1		Replace	
2	Washer	1			
3	Operating lever	1			
4	Operating lever shaft	1		Coat with universal lubricant	
5	Washer	1			
6	Plug	1		Torque to specifications	
7	Cotter pin	1		Replace	
8	Pin	1			
9	Reverse operating lever	1			
10	Reverse rod	1			
11	Snap ring	2	Remove with small screw-driver.	Install correctly.	
12	Outer race with snap ring	1	Drive out with P 254 b.	Heat gear hsg. to about 120°C (250°F) and drive in with P 254 b.	
13	Outer race with snap ring	1	Drive out with P 254 c.	Heat gear hsg. to about 120°C (250°F) and drive in with P 254 c.	
14	Operating lever spacer	1	Drive out from inside		
15	Gear housing	1			

TOOLS



No.	Description	Special Tool	Remarks
1	Driver	P 254 d	
2	Hook		Local Manufac.
3	Mandrel	P 375	
4	Driver	P 254 a	
5	Driver	P 265 c	

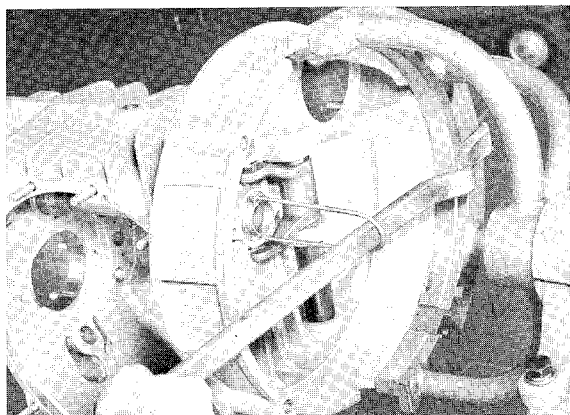
No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Capscrew	2		Torque to specifications	
2	Lockwasher	2		Replace, if necessary	
3	Guide tube	1		Lubricate with MoS ₂ paste	
4	Tube, drive shaft seal	1	Pull out with hook	Light coat of oil for seal and lip	
5	Circlip	1			
6	Release lever	1		Adjust	
7	Seal	1			
8	Key	1			
9	Lever shaft	1		Coat with a MoS ₂ lubricant	
10	Release fork	1		Adjust	
11	Guard	1			
12	Bushing (long)	1	Drive out with P 375.	Drive in with P 375 correctly.	
13	Bushing	1	Drive out with P 375.	Drive in with P 375 correctly.	
14	Bearing sleeve (Delrin)	1	Pull out angled screw-driver		
15	Vent	1		Install correctly and torque to specifications	
16	Hex hd screw	1		Torque to specifications	
17	Washer	1			
18	Holder	1			

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
19	Electronic speedometer sensor	1			
20	Spiral pin	3			
21	Hex hd screw	3		Torque to specifications	
22	Spring	3			
23	Lock	3			
24	Plug	1	Drill out		
25	Spiral pin	2			
26	Lock	2			
27	Plug with magnet	1		Torque to specifications	
28	Shaft seal	1		Drive in with P 265 c	
29	Outer race	1		Heat transm. case to about 120°C and drive in.	
30	Outer race	1	Drive out with P 254d.	Heat case to about 120°C and drive in with P 254 a.	
31	Outer race	1	Drive out with appropriate pressure pad.	Heat case to about 120°C and drive in.	
32	Guide ring	1	Drive out with appropriate pressure pad.	Heat case to about 120°C and drive in.	
33	Transmission case	1			

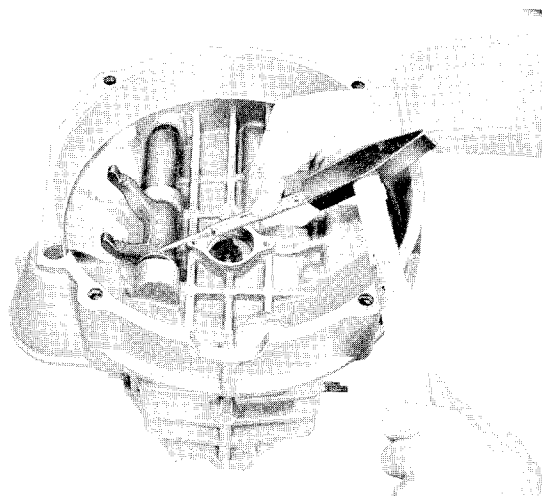
DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

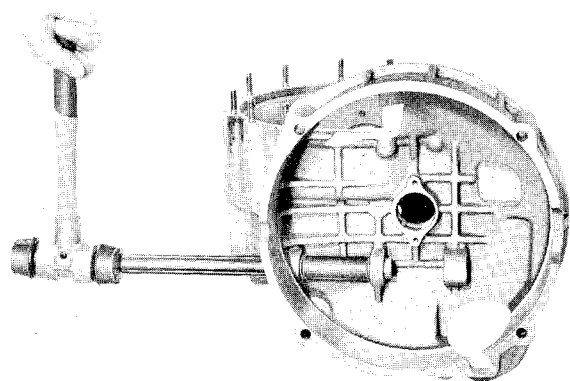
1. Pull out guide tube for drive shaft seal with local manufactured hook.



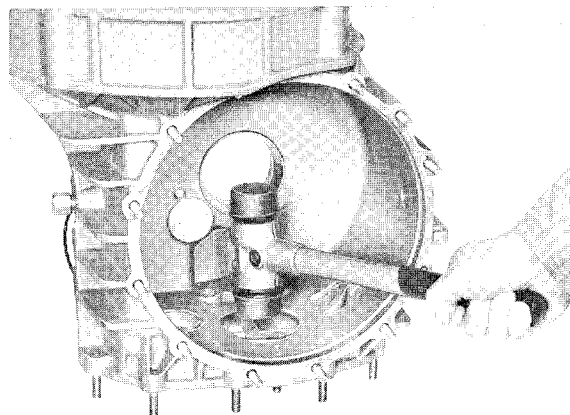
2. Drive out spiral pin for release fork.



3. Drive out lever shaft bushings with P 375.



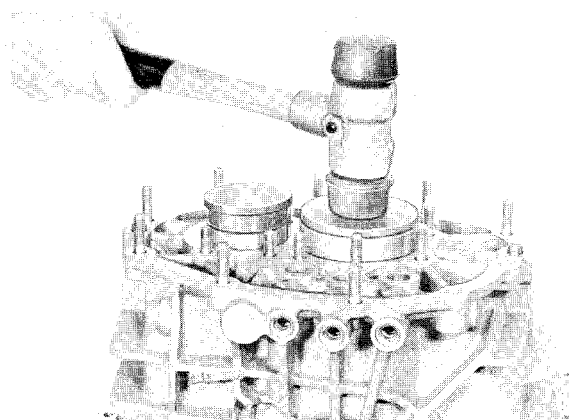
4. Drive out bearing race of drive pinion bearing with P 254 d.



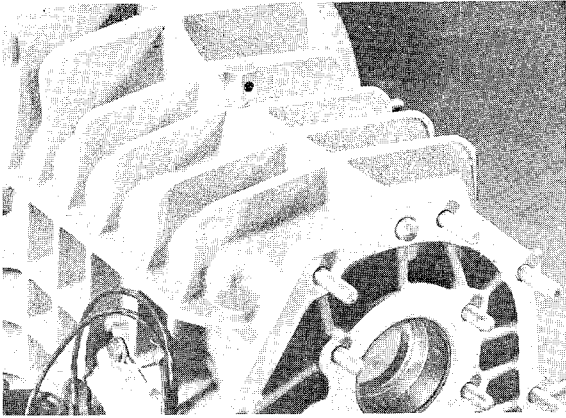
Assembling

1. Clean transmission case and check for wear, exterior damage and cracks. If drive pinions or ring gears are damaged (e.g. broken), check if the bearing bores in the center housing web have been damaged (replace case if necessary).

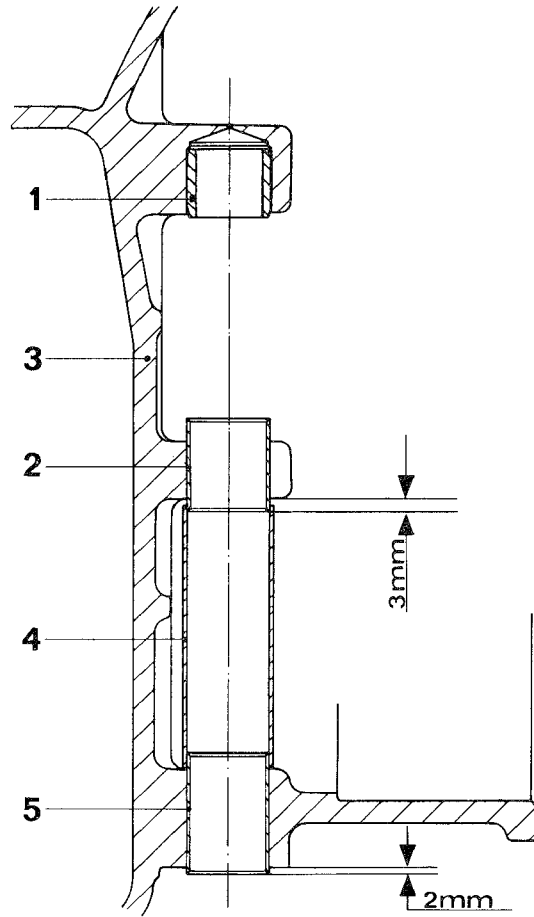
2. Heat transmission case to about 120°C and drive in drive pinion bearing outer race with P 254 a.



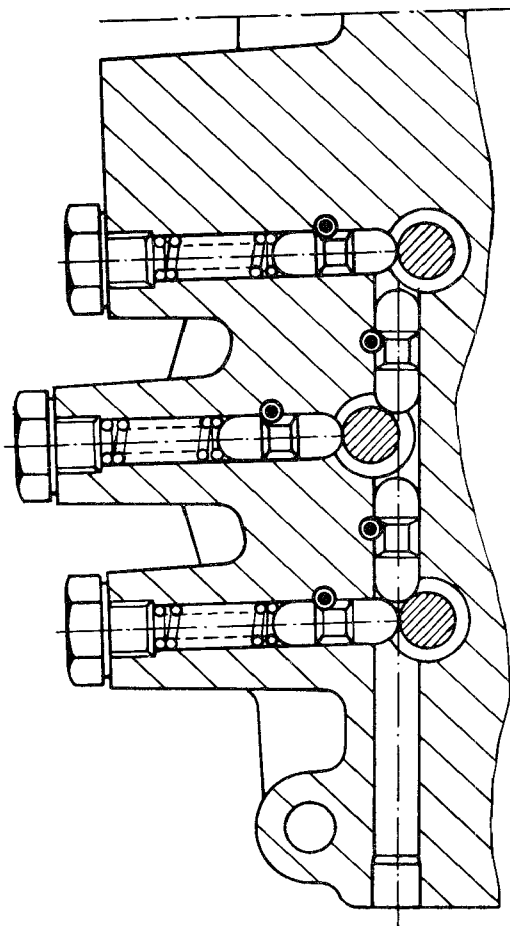
3. Screw in vent correctly (bore in hexagon must face forward toward transmission cover).



5. Drive in lever shaft bushings with P 375.

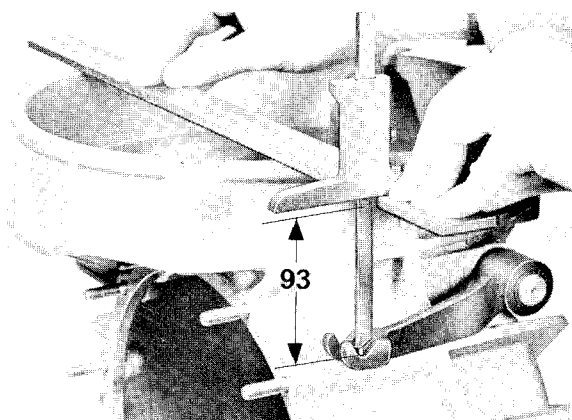
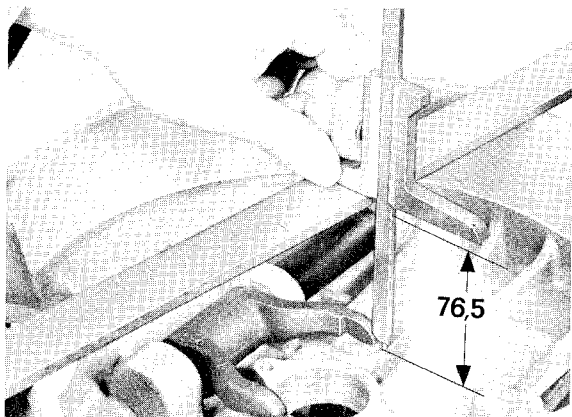


4. Install selector rod locks.

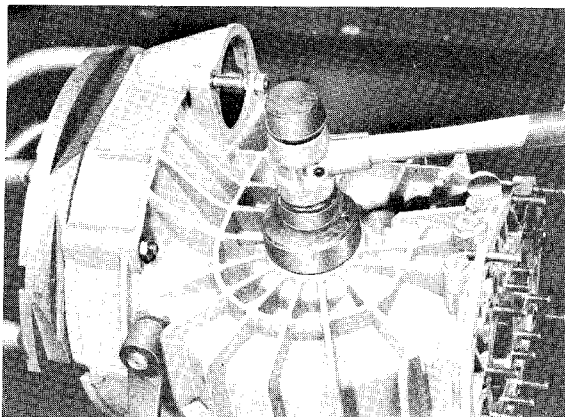


- 1 - Bearing sleeve (Delrin)
- 2 - Lever shaft bushing (short)
- 3 - Transmission Case
- 4 - Guard
- 5 - Lever shaft bushing (long)

6. Adjust release forks and release levers. The distances are 76.5 mm and 93 mm.



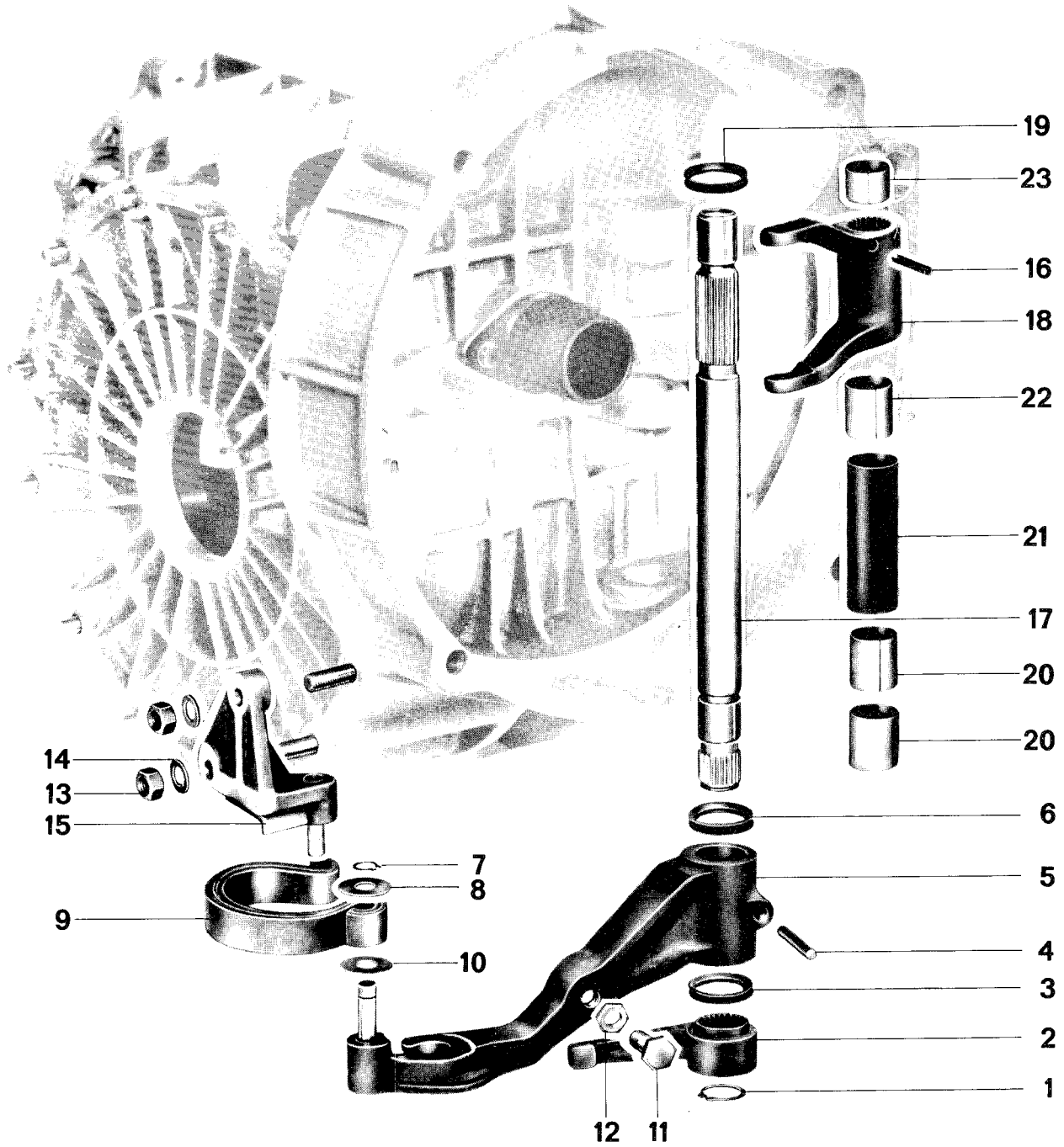
7. Drive in stub axle seal with P 265 c.



Note

Insert the drive shaft seal guide tube after installation of the drive shaft.

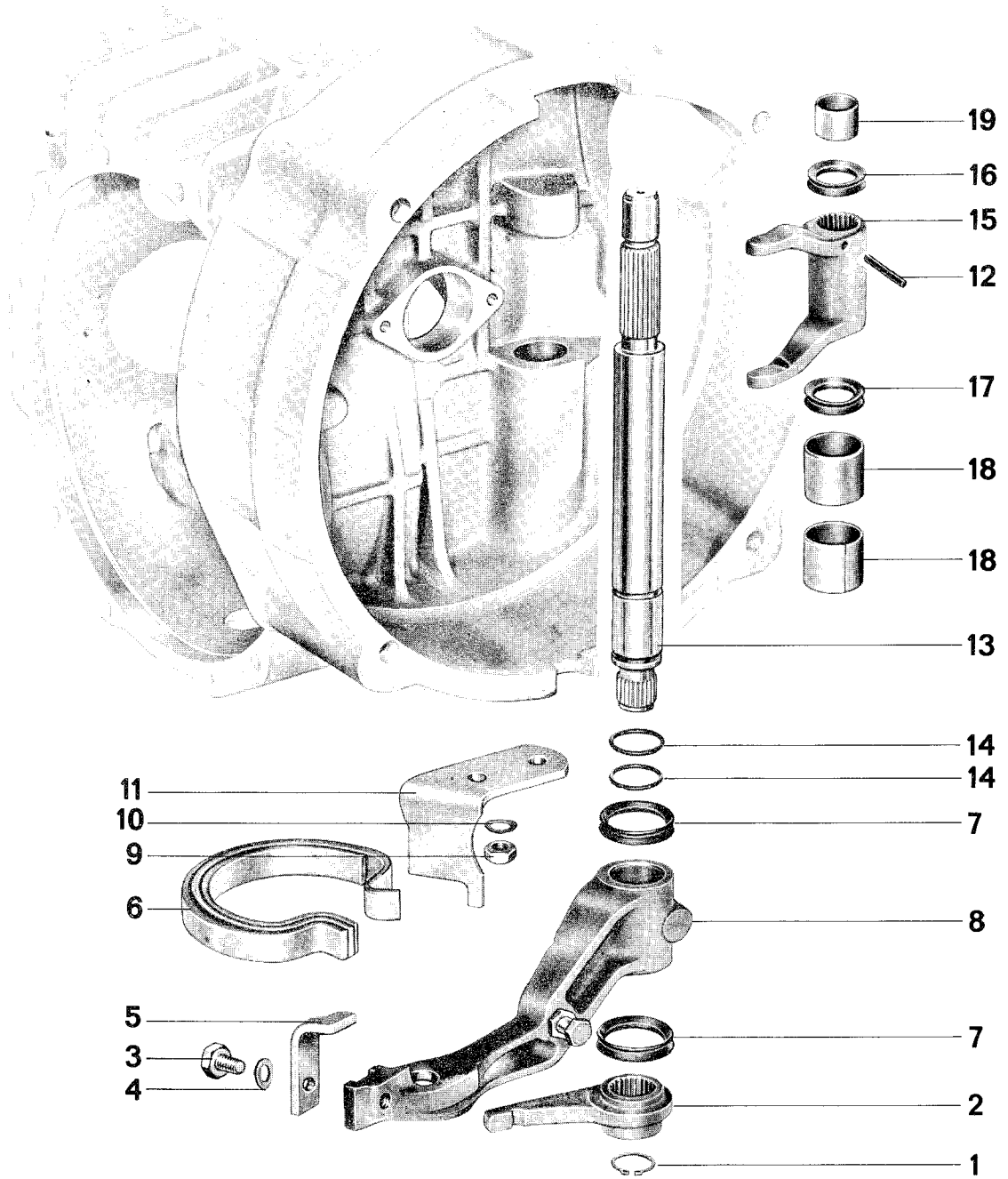
TRANSMISSION CASE WITH AUXILIARY CLUTCH SPRING



No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
1	Circlip	1		Replace, if necessary	
2	Adjusting lever	1		Adjust	
3	Seal	1		Replace, if necessary	
4	Dowel pin	1			
5	Clutch release lever	1		Coat pin with a multi-purpose grease containing MoS ₂	
6	Seal	1		Replace, if necessary	
7	Circlip	1		Replace, if necessary	
8	Washer	1			
9	Auxiliary spring	1			
10	Washer	1			
11	Adjusting bolt	1			
12	Nut	1		Tighten to specified torque	
13	Nut	4		Tighten to specified torque	
14	Washer	4		Replace, if necessary	
15	Base	1		Coat pin with a multi-purpose grease containing MoS ₂	
16	Spring pin	1		Replace, if necessary	
17	Lever shaft	1		Coat bearing surfaces and splines with multi-purpose grease containing MoS ₂	
18	Release fork	1			
19	Seal	1		Replace, if necessary	

No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
20	Bushing	2	Drive out with P 375	Drive in with P 375 until positioned correctly	
21	Cover tube	1			
22	Bushing	1	Drive out with P 375	Drive in with P 375 until positioned correctly	
23	Bushing	1		Replace, drive in with mandrel	

TRANSMISSION CASE WITH AUXILIARY CLUTCH SPRING 1978 MODELS



DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

Take tension off spring to remove release lever. This is done by pressing clutch release lever toward front transmission cover with an appropriate tool.

Note

Spring will snap back on its own when reaching "dead point".

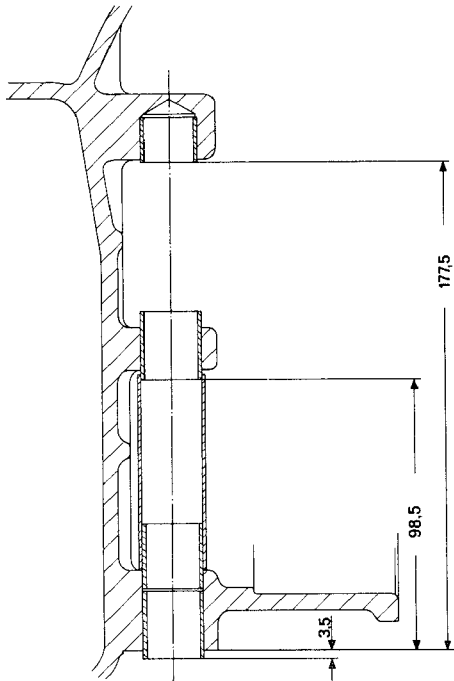
Assembling

Drive in lever shaft bushings with Special Tool P 375 until they are positioned correctly (see drawing).

Note

Only install adjusting lever after engine/transmission assembly has been installed in car.

Adjust clutch, see Workshop Manual 911, Main Group 7, Page 2.1 - 2/3.



No.	Description	Qty.	Notes		Remarks
			Removing	Installing	
1	Circlip	1			
2	Adjusting lever	1			
3	Bolt	1			
4	Spring washer	1			
5	Spring mount	1			
6	Auxiliary spring	1			
7	Seal	2		Replace	
8	Release lever	1			
9	Nut	1			
10	Spring washer	1			
11	Base	1			
12	Spring pin	1			
13	Lever shaft	1			
14	O-ring	2		Replace	
15	Release fork	1			
16	Seal	1		Replace	
17	Seal	1		Replace	
18	Bushing	2	Drive out with Special Tool 9167	Drive in to proper position with 9167	
19	Bushing	1		Drive in with suitable mandrel	

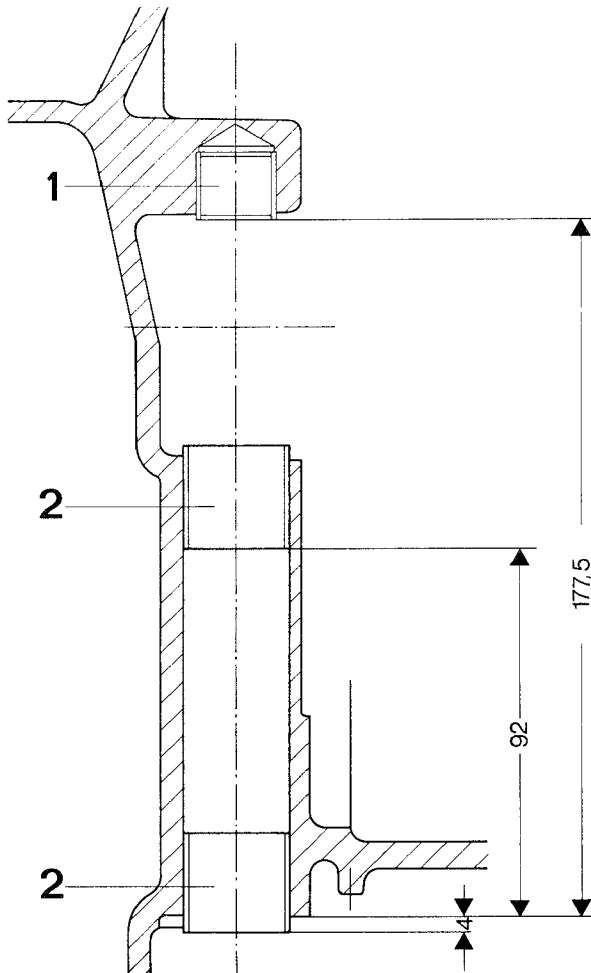
DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

1. Remove release lever with spring (see page 30 - 11).
2. Drive out bushings with US 8050/12 and US 8050/1.

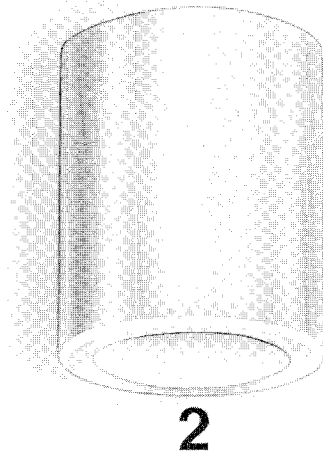
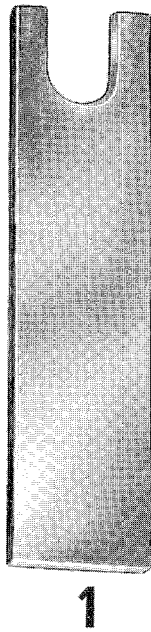
Assembling

1. Drive in bushings for lever shaft with US 8050/12 and US 8050/1 (see drawing) and coat with a grease having a lithium or silicone basis (e.g. Shell Retinax).

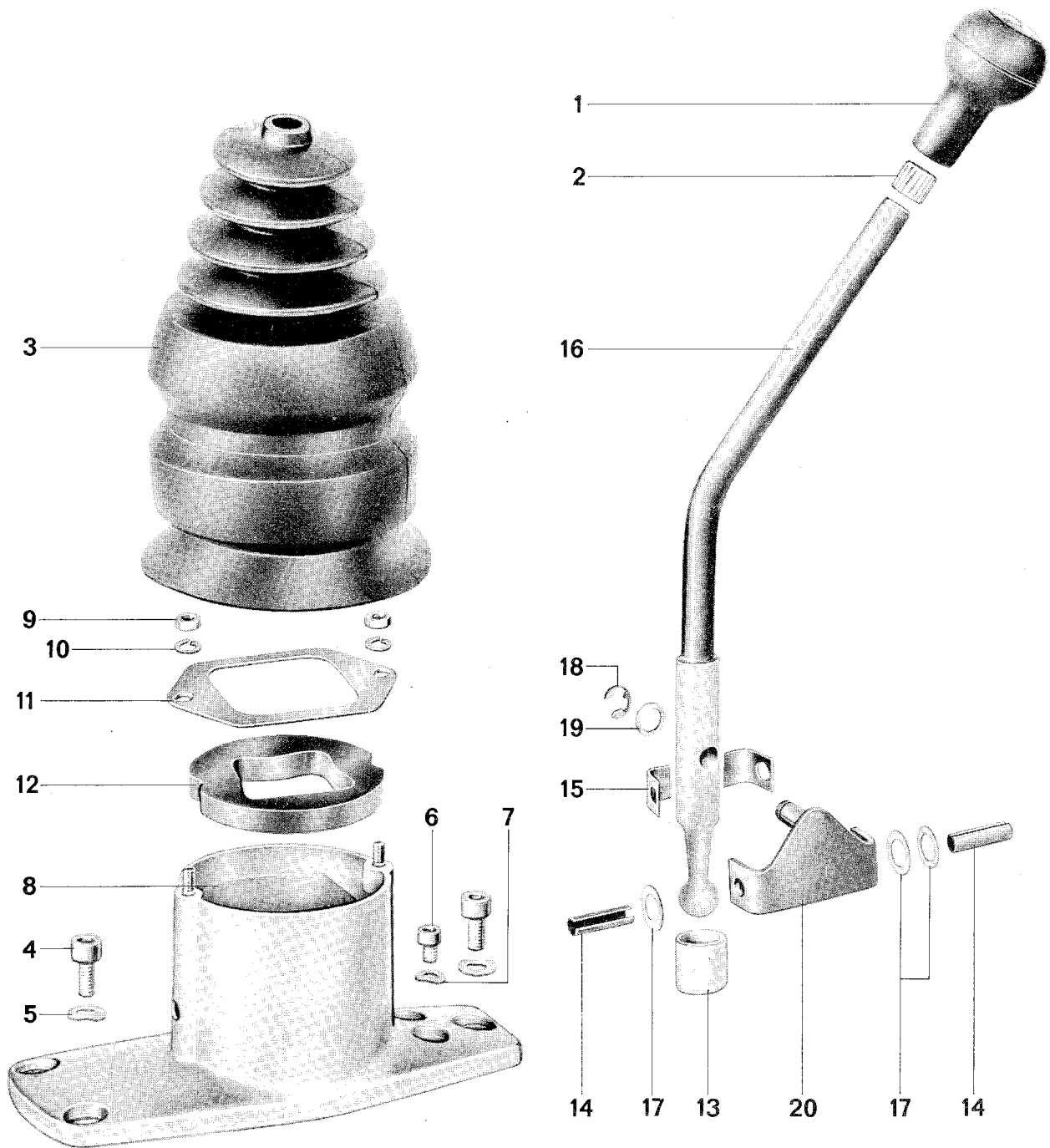


- 1 - Bushing for lever shaft
2 - Bushing for lever shaft

TOOLS



No.	Description	Special Tool	Remarks
1	Installing lever		Local manufacture
2	Driver	P 299	



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Gearshift knob	1		Check for damage and tightness	
2	Tolerance ring	1		Replace	
3	Seal	1			
4	Capscrew M 8 x 20 (socket hd)	3		Torque to specifications	
5	Washer	3		Replace, if necessary	
6	Capscrew M 6 x 20 (socket hd)	2		Torque to specifications	
7	Washer	2		Replace, if necessary	
8	Gearshift base	1			
9	Hex nut M 6	2			
10	Lockwasher	2		Replace, if necessary	
11	Holder	1			
12	Pad plate	1		3rd and 4th gear opening faces right in driving direction. Coat inside with MoS ₂ lubricant.	
13	Ball socket	1		Apply MoS ₂ lubricant	
14	Key	2	Drive out with appropriate punch	Replace, if necessary. Drive in key until flush on base	
15	Spring	1		Bend, if necessary. Adjust frictional torque	
16	Selector lever	1		Coat bearing surfaces with MoS ₂ lubricant	
17	Shim	X	Note number and thickness	Redetermine if necessary. Max. play 0.1 mm.	

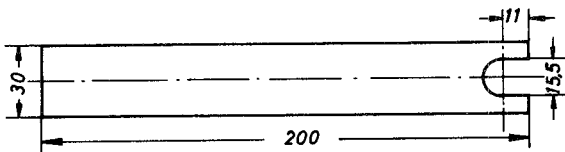
No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
18	Lock	1		Replace, if necessary	
19	Washer	1			
20	Fork	1		Coat bearing surfaces with MoS ₂ lubricant	

DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

1. Drive out gearshift knob with dismantling lever (see local manufacture sketch).

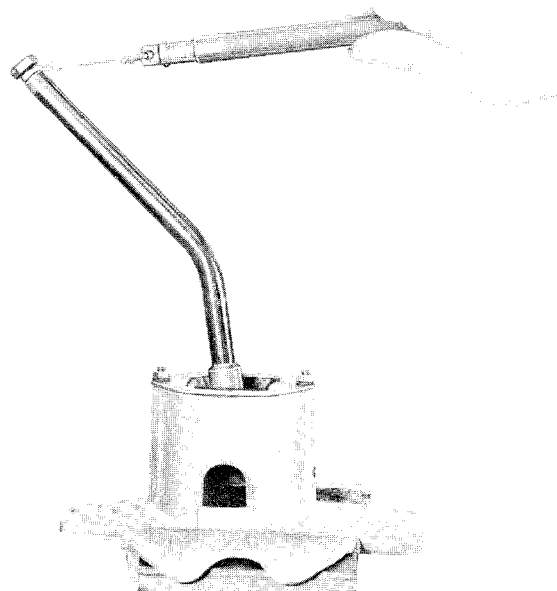
Local Manufacture Sketch



Break all edges
6 mm thick flat steel

Assembling

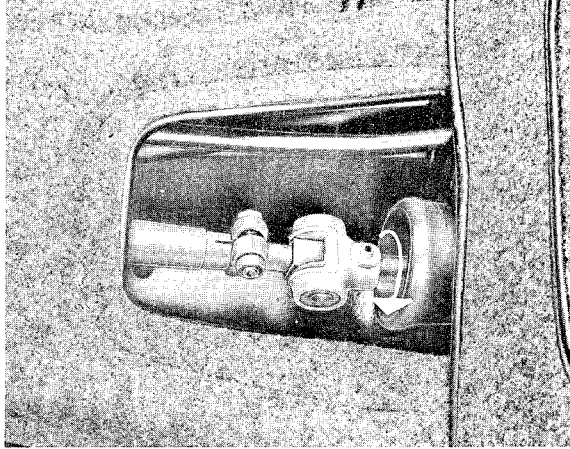
1. Clamp gearshift base in a vise. Move selector lever in shifting direction. Pressure must build up from min. 250 g to max. 600 g. Bend spring in gearshift base if necessary.



2. Max. pressure transverse to shifting direction is 60 g.

ADJUSTING GEARSHIFT MECHANISM

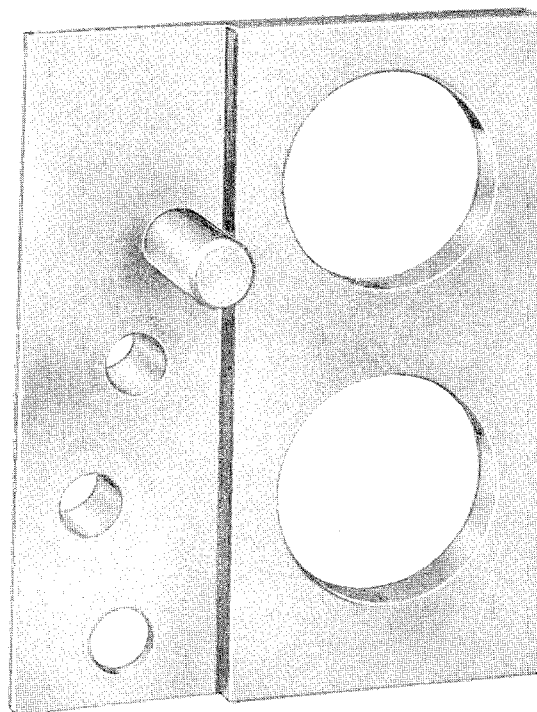
1. Loosen selector rod clamp. Turn selector rod for transmission's inner selector lever left in neutral to stop (as seen in driving direction).



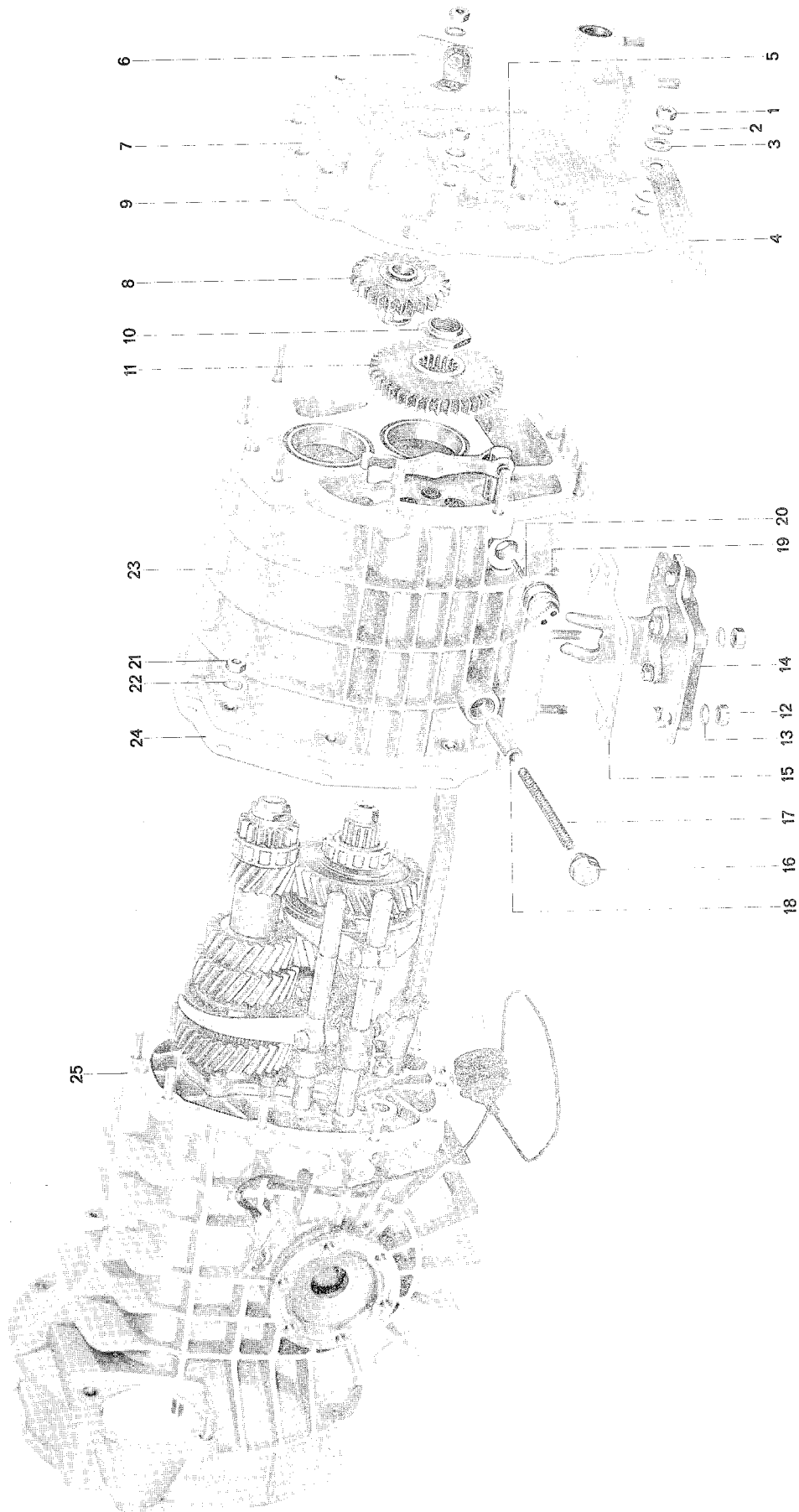
2. Move selector lever in neutral position so that the lower part of the selector lever is vertical and on right stop (3rd and 4th gear).
3. Tighten selector rod clamp slightly.
4. Check if shift travel is just as large in 1st through 4th gears and if reverse is easy to engage. Correct adjustments if necessary.
5. Tighten hex nut on clamp to specifications.

MANUAL TRANSMISSION
GEARS
SHAFTS

TOOLS



No.	Description	Special Tool	Remarks
1	Holder	No. 9106	



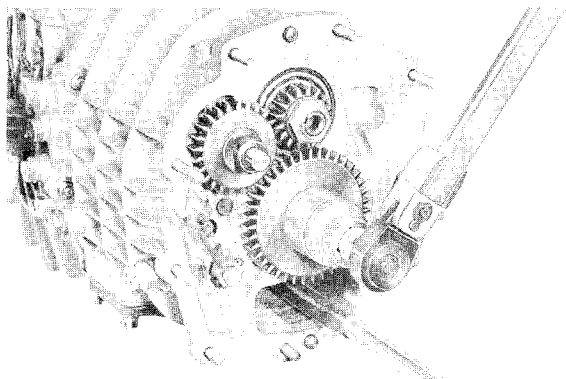
No.	Description	Amt	Notes		Remarks
			Removing	Installing	
1	Hex nut	9		Torque to specifications	
2	Washer	9			
3	Washer	2		One in front and one behind ground strap	
4	Ground strap	1			
5	Holder	1			
6	Holder	1			
7	Front transm. cover	1			
8	Reverse gear II	1			
9	Gasket	1		Replace	
10	Nut	1	Block transmission with 2 gears and loosen	Replace. Torque to specifications	
11	Rev. gear III	1	Pry off with 2 screwdrivers		
12	Self-locking hex nut	4		Replace, if necessary. Torque to specifications	
13	Washer	4			
14	Selector cover with fork	1			
15	Gasket	1		Replace	
16	Plug	1	Caution! Under spring tension.	Torque to specifications.	
17	Spring	1			
18	Lock	1		Move reverse selector rod to off position and insert	

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
19	Backup light switch	1		Torque to specifications	
20	Pin	1		Install correctly. Long end faces in	
21	Hex nut	10		Torque to specifications	
22	Washer	10			
23	Gear housing	1	Move selector rods to off position and remove		
24	Gasket	1		Replace	
25	Transmission case with change gear	1			

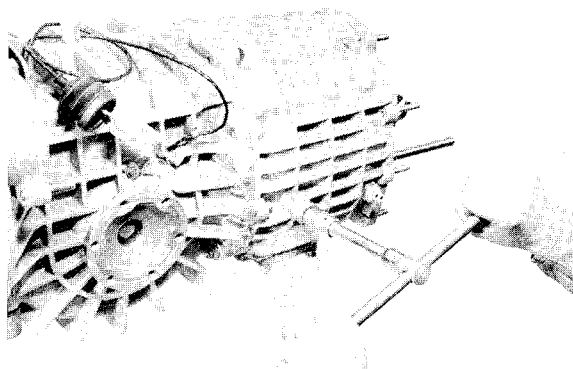
REMOVING AND INSTALLING INSTRUCTIONS

Removing

1. Loosen nuts for drive pinion and drive shaft.
Place reverse gear shaft or other corresponding shaft in bore of gear housing. Slide on reverse gear II as illustrated and place in 4th.



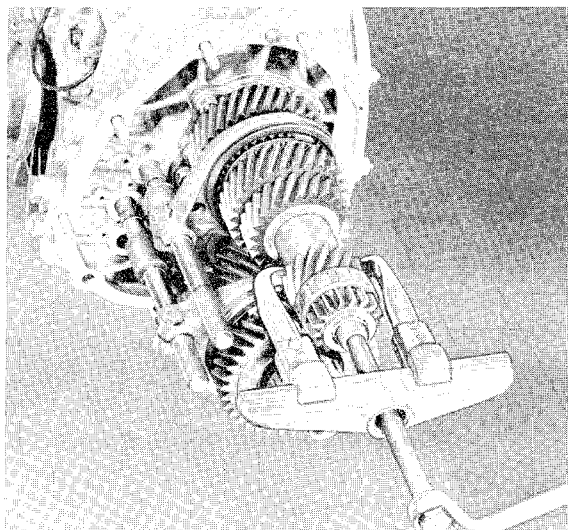
2. Unscrew reverse gear lock plug.



Note

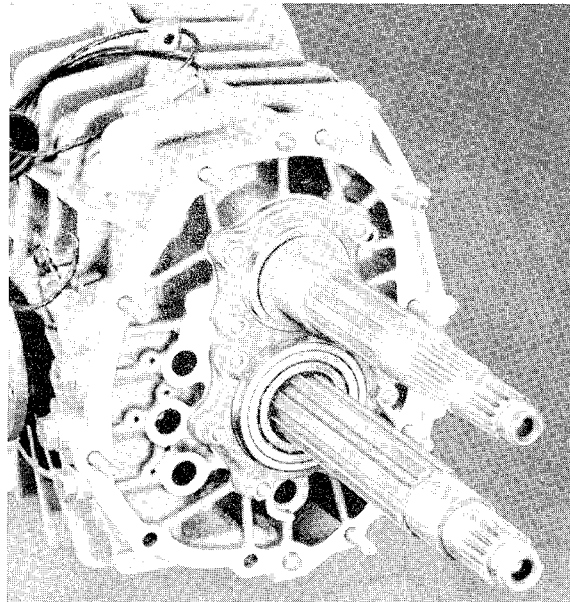
Plug is under heavy spring tension. Prevent spring and plug from jumping away when unscrewing (danger of injuries).

3. Pull off cylindrical roller bearing toward front.



4. Remove all parts from drive pinion and drive shaft, and mark needle bearings for installation (also refer to "Dismantling and Assembling Drive Pinion and Drive Shaft").

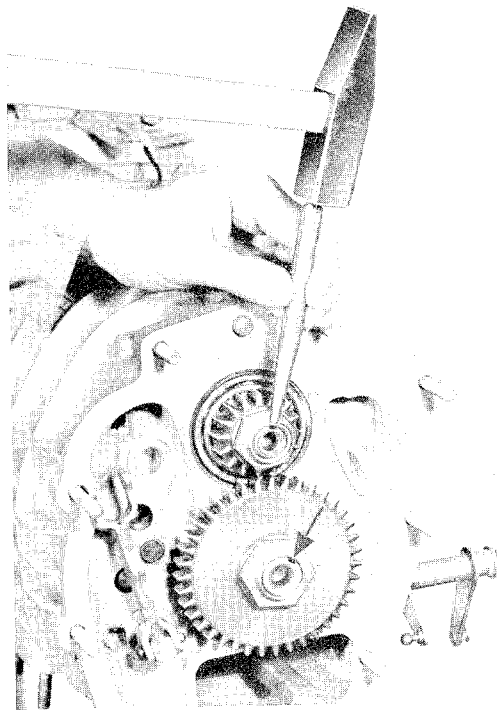
5. Loosen clamp nuts and remove drive pinion and drive shaft.



6. Remove shims. Note number and thickness for installation.

Installing

1. Install shims in number and thickness as noted or as determined while adjusting the pinion.
2. Install preassembled drive pinion and drive shaft, and torque clamp nuts to specifications.
3. Install drive pinion and drive shaft as follows.
 - a. 4th speed gear II
 - b. Needle cage, spacer, 4th speed gear I
 - c. Operating sleeve for 3rd and 4th speed
 - d. Gearshift sleeve, selector fork and selector rod for 3rd and 4th speed
 - e. Bushing, spacer, needle cage, 3rd speed gear I
 - f. Spacer, 3rd speed gear II
 - g. Thrust washer, 2nd speed gear I
 - h. Bushing, needle cage, 2nd speed gear II
 - i. Operating sleeve for 1st and 2nd speed
 - j. Gearshift sleeve, selector fork and selector rod for 1st and 2nd speed
 - k. Bushing, spacer, needle cage, 1st speed gear II
 - l. Thrust washer
 - m. Spacer, 1st speed gear I
 - n. Cylindrical roller bearing
4. Adjust selector forks (see page 35-7).
5. Install nut for drive pinion with a fluid adhesive (Loctite No. 73 or similar) and torque to specifications. Clean threads with Locquic Primer (or similar) to assure perfect lock.
6. Torque drive shaft nut to specified data.
7. Lock nuts.



Note

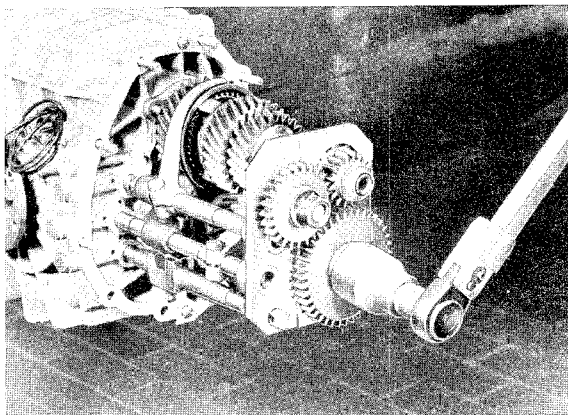
Heat all press fit parts to about 120°C.

ADJUSTING INSTRUCTIONS

Note

Torque drive pinion and drive shaft nuts to specifications to adjust selector forks.

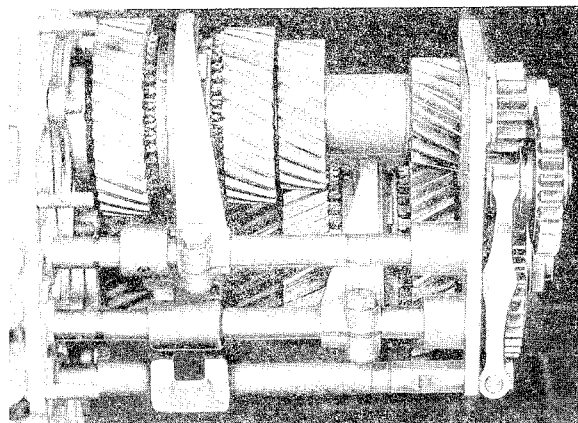
1. Install reverse gear selector rod.
2. Install Special Tool 9106 and assemble reverse gears I and III.
3. Install reverse gear II as shown in illustration.



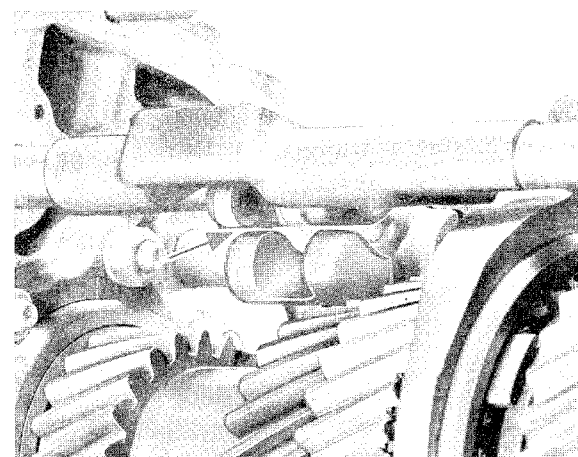
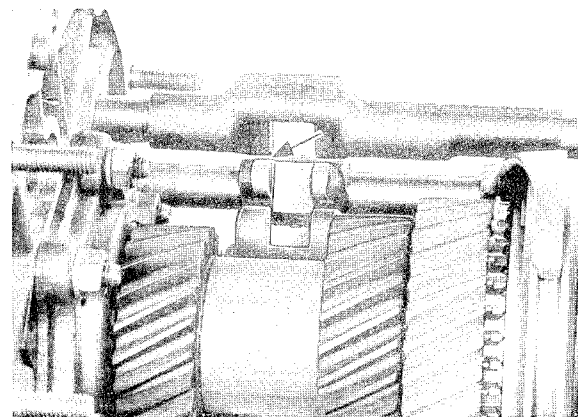
4. Place in 4th gear and torque nuts to specifications.

5. Remove reverse gear II again.

6. Install operating lever for reverse gear.
Reinstall reverse gear II.



7. Adjust reverse gear selector rod.
8. Adjust selector rods, so that there is play of 0,5 mm at tightest position between selector rod forks.



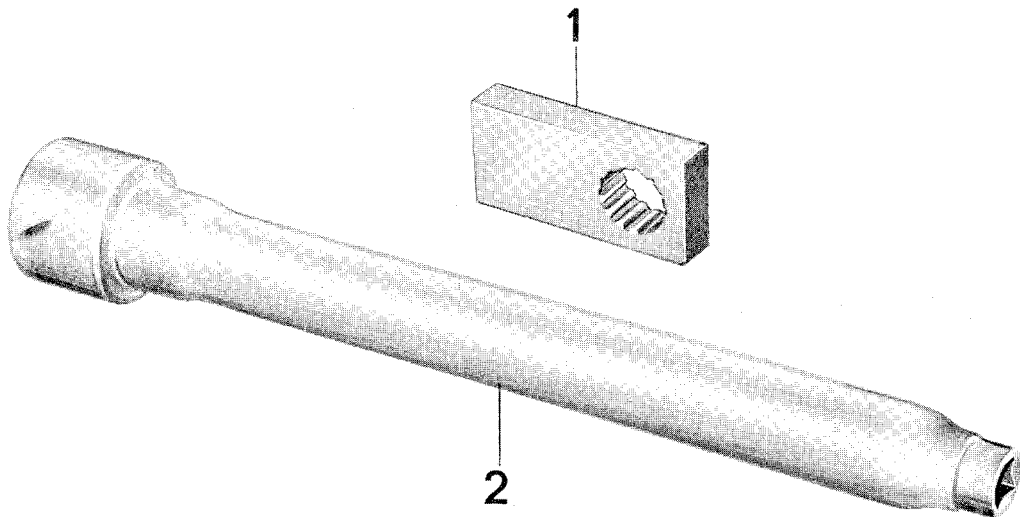
9. Adjust gearshift sleeves so that they are at dead center between the synchronizing rings in idle position.

10. Torque hex head screws of selector forks to specifications.

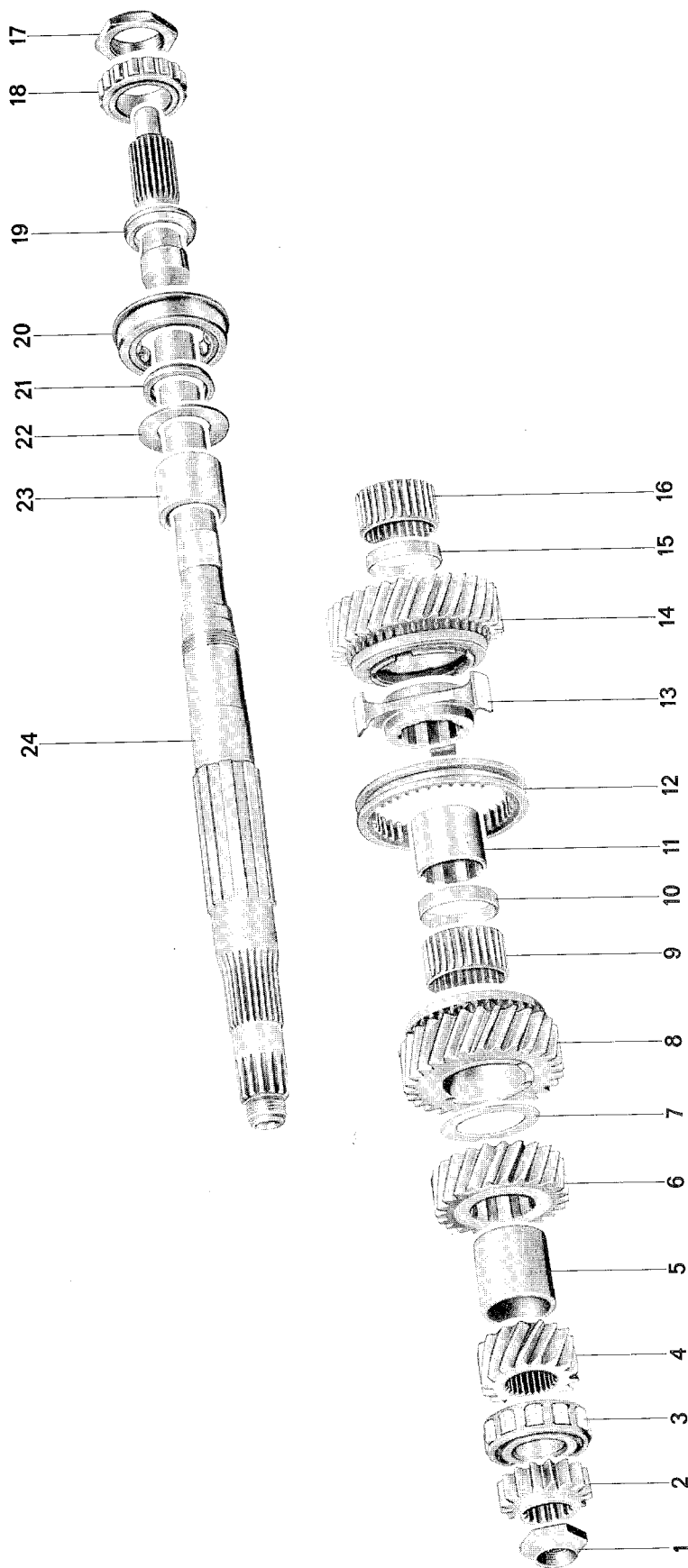
Note

Correct deviations in adjustments after completion of shifting controls, because they are essential for proper functioning of the synchronization.

TOOLS



Nr.	Description	Special Tool	Remarks
1	Holder	No. 9104	
2	Socket wrench	No. 9105	



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Nut	1		Torque to specifications and lock.	
2	Rev. gear I	1	Pry off with 2 screwdrivers.	Collar faces out.	
3	Cyl. roller bearing	1	Remove with extractor	Heat about 120°C and drive on.	
4	1st gear I	1	Remove with extractor	Replace in pairs only. Collar faces in.	
5	Spacer	1			
6	2nd gear I	1		Replace in pairs only. Faces same direction as countergear.	
7	Thrust washer	1			
8	3rd gear I	1		Check synchro. Replace in pairs only.	
9	Needle cage	1	Mark to install correctly	Assemble with same gear.	
10	Spacer	1			
11	3rd gear bush	1			
12	Gearshift sleeve	1			
13	Operating sleeve	1			
14	4th gear I	1		Check synchro. Replace in pairs only.	
15	Spacer	1			
16	Needle cage	1	Mark to install correctly.	Assemble with same gear.	
17	Nut	1	Loosen with 9104 + 9105	Torque to specifications and lock.	

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
18	Cylindrical roller bearing	1	Remove with spare sleeve	Heat to about 120 ^o C and drive on.	
19	Inner race	1	Remove with spare sleeve	Heat to about 120 ^o C and drive on.	
20	4-point bearing	1			
21	Inner race	1	Remove with spare sleeve	Heat to about 120 ^o C and drive on.	
22	Thrust washer	1	Remove with spare sleeve	Ground side faces needle bearing	
23	4th gear bush	1	Remove with spare sleeve	Heat to about 120 ^o C and drive on	
24	Drive shaft	1		Check runout	

DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

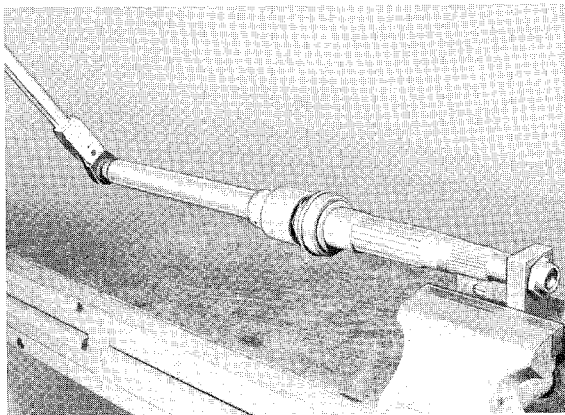
Disassembling

Note

For better understanding the blow-up drawing shows the entire drive shaft without a clamping plate.

The parts up to and including number 16 are dismantled and assembled without removing the drive shaft (refer to "Removing and Installing Change Gear").

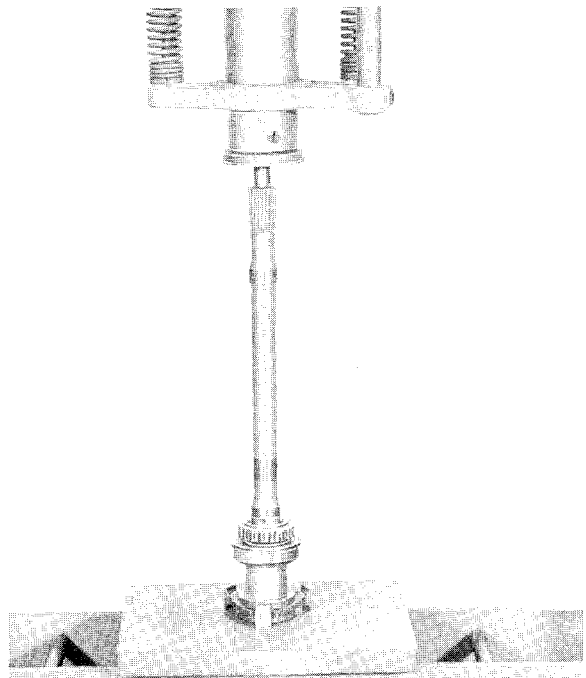
1. Clamp special tool no. 9104 in a vise, insert drive shaft and loosen nut with special tool no. 9105.



Note

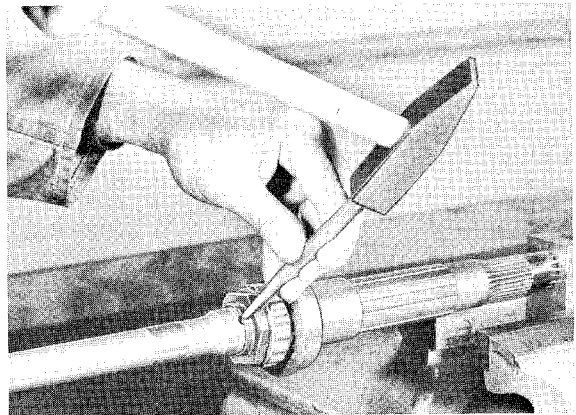
Special Tool 9105 cannot be used to unscrew and tighten the collar nut due to the longer drive shaft in transmission type 930/34 for Turbo 3.3 ltr.. For this purpose cut through the socket wrench at approximately center and weld in a suitable piece of pipe (36 mm dia. x 4 mm x 25 mm long). A torque wrench and an open-jawed or ring wrench could also be used instead of the special tool.

2. Press off 4th speed bushing, 4-point bearing and cylindrical roller bearing with a spare operating sleeve.

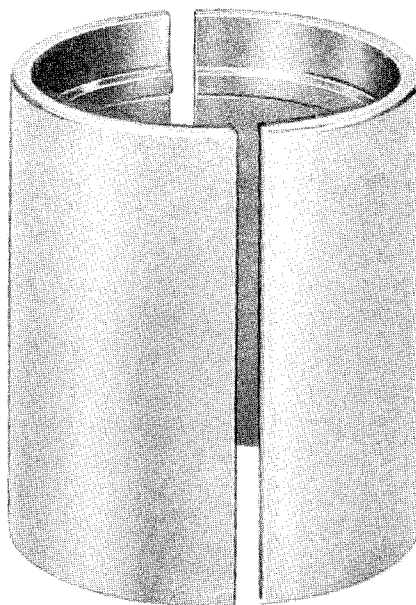


Assembling

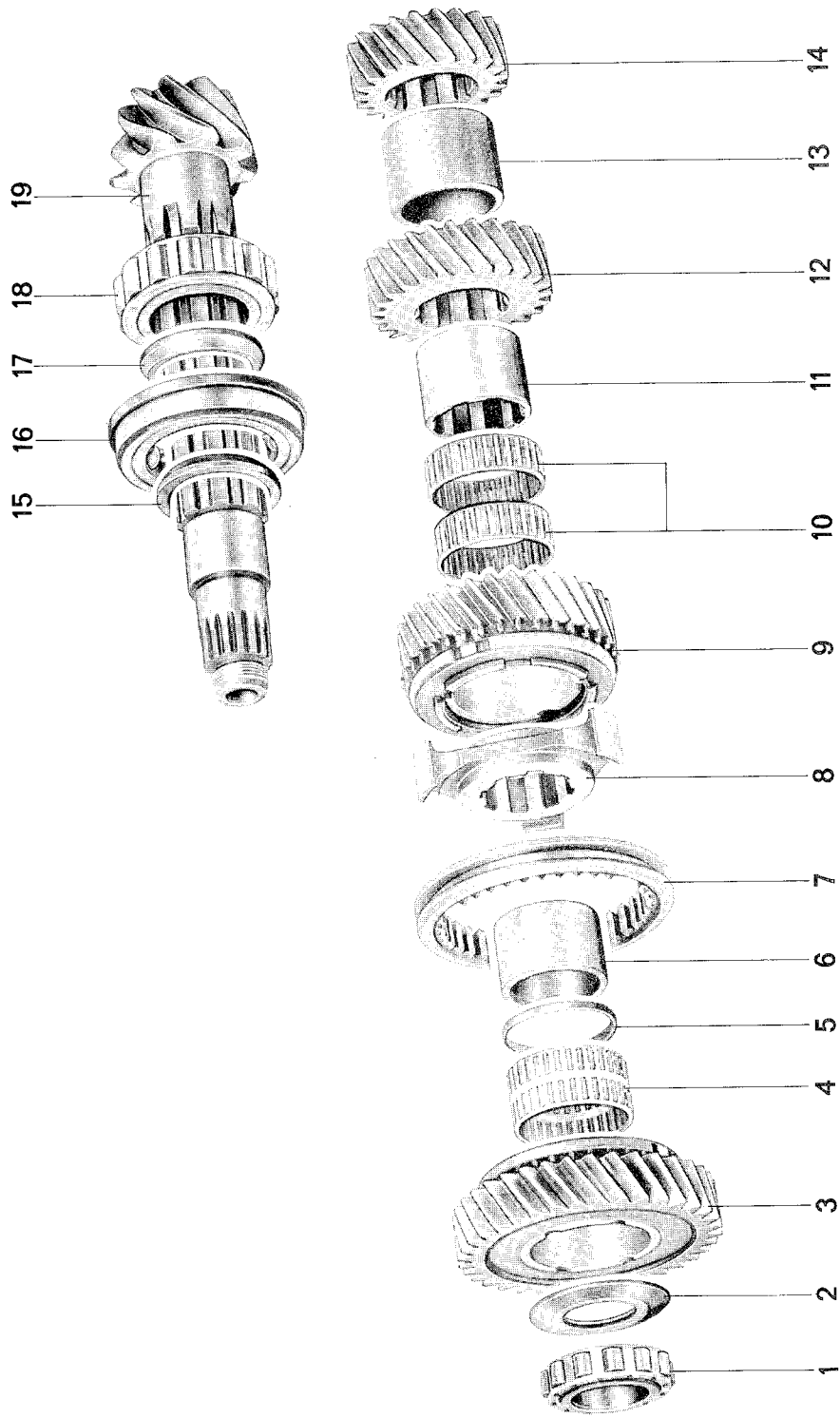
1. Torque nut to specifications and lock.



TOOLS



No.	Description	Special Tool	Remarks
1	Guide sleeve	No. 9108	



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Cyl. roller bearing	1	Remove with extractor	Heat to about 120° C and drive on	
2	Thrust washer	1		Plane ground side faces needle bearing	
3	1st speed gear II	1		Check synchro, replace in pairs only	1977 Models - with asymmetrically profiled teeth on clutch body
4	Needle cage	1			
5	Spacer	1			
6	Sleeve, 1st speed	1		Heat about 120° C and drive on	
7	Operating sleeve	1			1977 Models-with asymmetrically profiled teeth on 1st gear. Note installed direction (page 35-18)
8	Guide sleeve	1			
9	2nd speed gear II	1		Check synchro, replace in pairs only	
10	Needle cage	2			
11	Sleeve, 2nd speed	1			
12	3rd speed gear II	1		Replace in pairs only. Lettered side faces in same direction as countergear	
13	Spacer	1			
14	4th speed gear II	1		Replace in pairs only. Lettered side faces in same direction as countergear	
15	Bearing inner race	1	Remove with 9108	Heat about 120° C and drive on	
16	4-point bearing	1	Remove with 9108		
17	Bearing inner race	1	Remove with 9108	Heat about 120° C and drive on	

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
18	Cy. roller bearing	1	Remove with 9108	Heat about 120°C and drive on. Installed race faces gear set.	
19	Drive pinion	1		Adjust if necessary. Note pair codes.	

DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

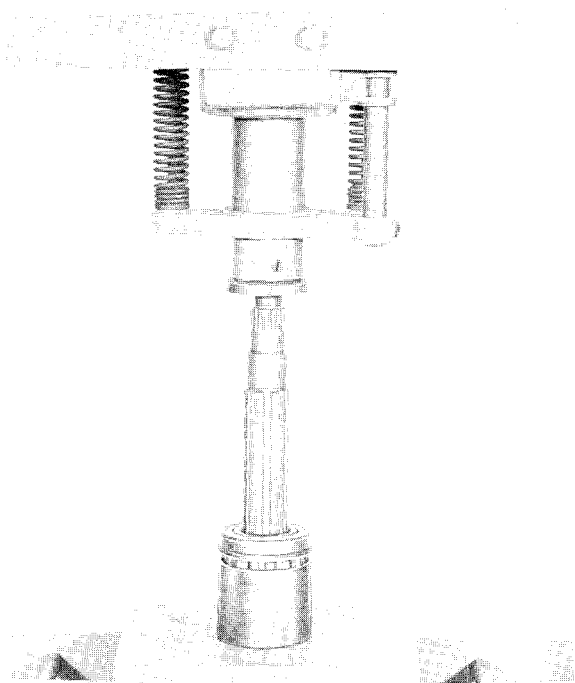
Disassembling

Note

The blow-up drawing shows the entire drive pinion without clamping plate for better understanding.

The parts up to and including number 14 are taken off and installed on an installed drive pinion (refer to "Removing and Installing Change Gear").

1. Remove cylindrical roller bearing and four point bearing with special tool number 9108.



Assembling

1. Heat cylindrical roller bearing to about 120°C and drive on.

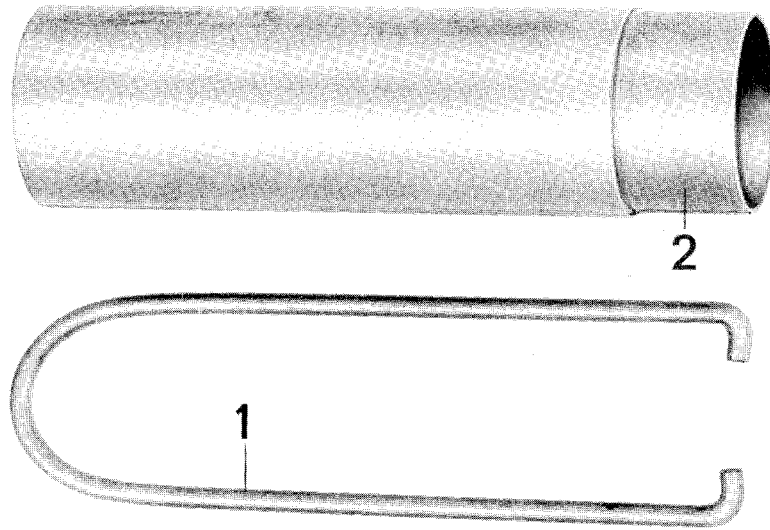
Note

Install bearing so that the two-part roller cage with installed race faces gear set.

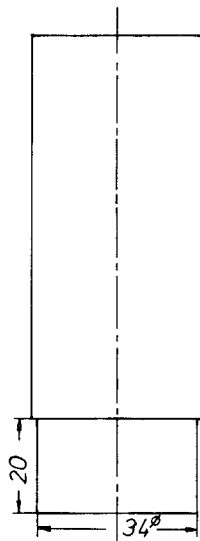
Modification - 1977 Model

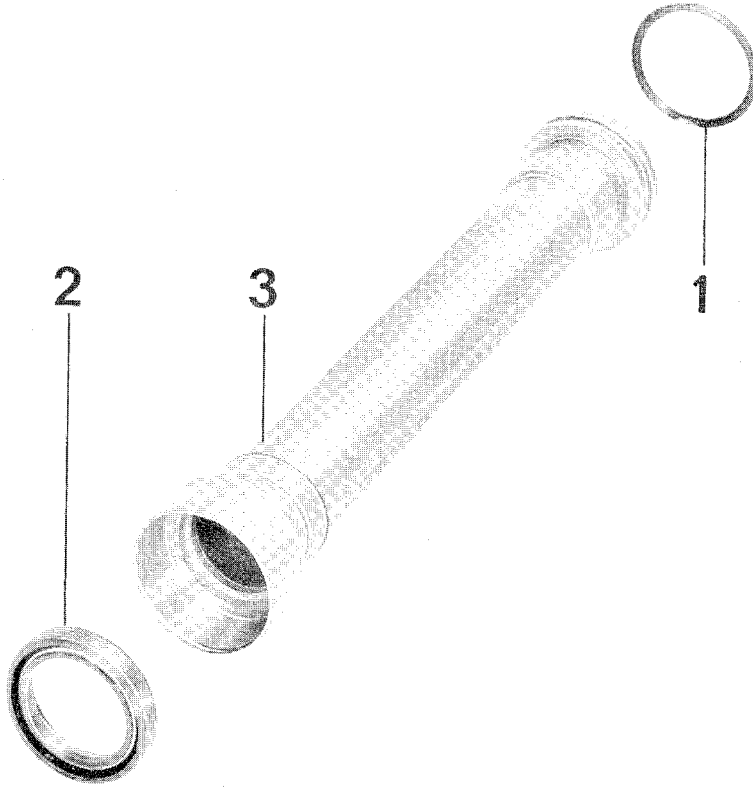
Asymmetrically profiled teeth of 1st/2nd gear - operating sleeve must face toward 1st gear.

TOOLS



No.	Description	Special Tool	Remarks
1	Extraction hook	-	Manufactured locally from 4 mm dia. welding wire
2	Pressure sleeve	30 - 11	or manufactured locally from 35 x 1.5 x 100 mm pipe



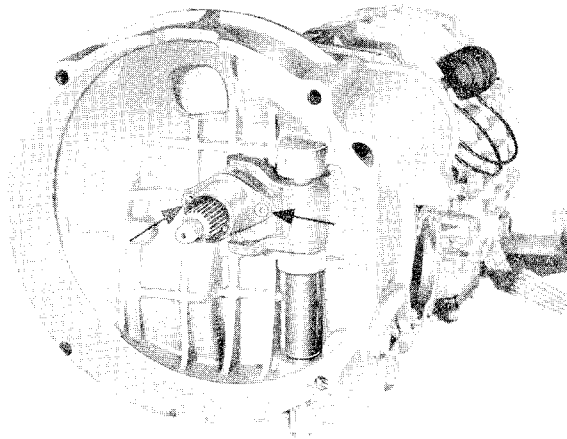


No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Seal	1		Lubricate slightly.	
2	Seal	1	Remove with screwdriver	Drive in to stop with pressure sleeve.	
3	Pipe	1			

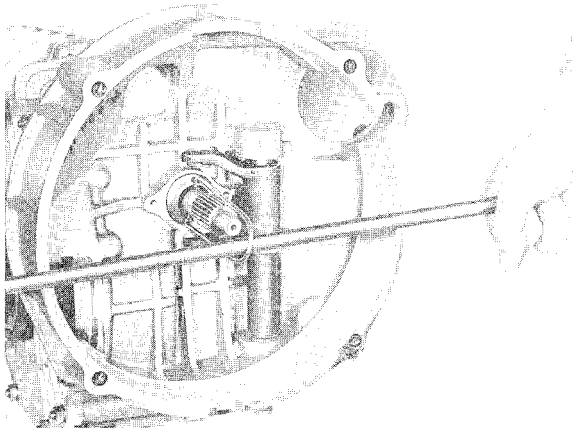
REMOVING AND INSTALLING INSTRUCTIONS

Removing

1. Remove engine/transmission assembly and unbolt transmission.
2. Unscrew guide sleeve capscrews and remove guide sleeve.

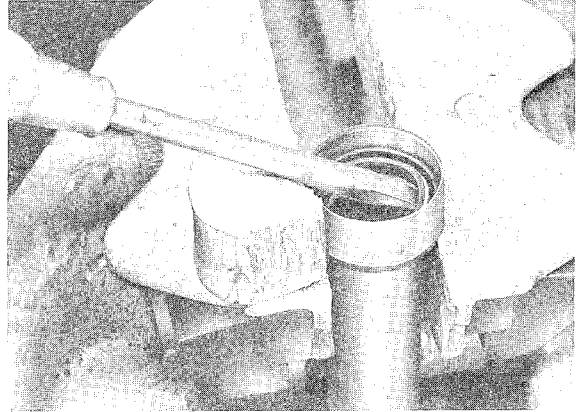


3. Pull out drive shaft seal tube with local manufactured hook.



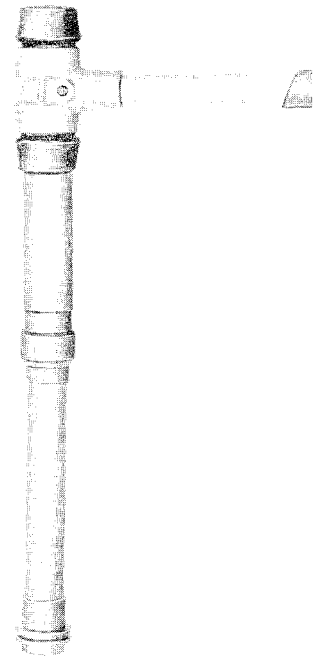
4. Remove seal.

5. Pry off seal with screwdriver. Do not use tube as leverage. Use a piece of wood for this purpose.

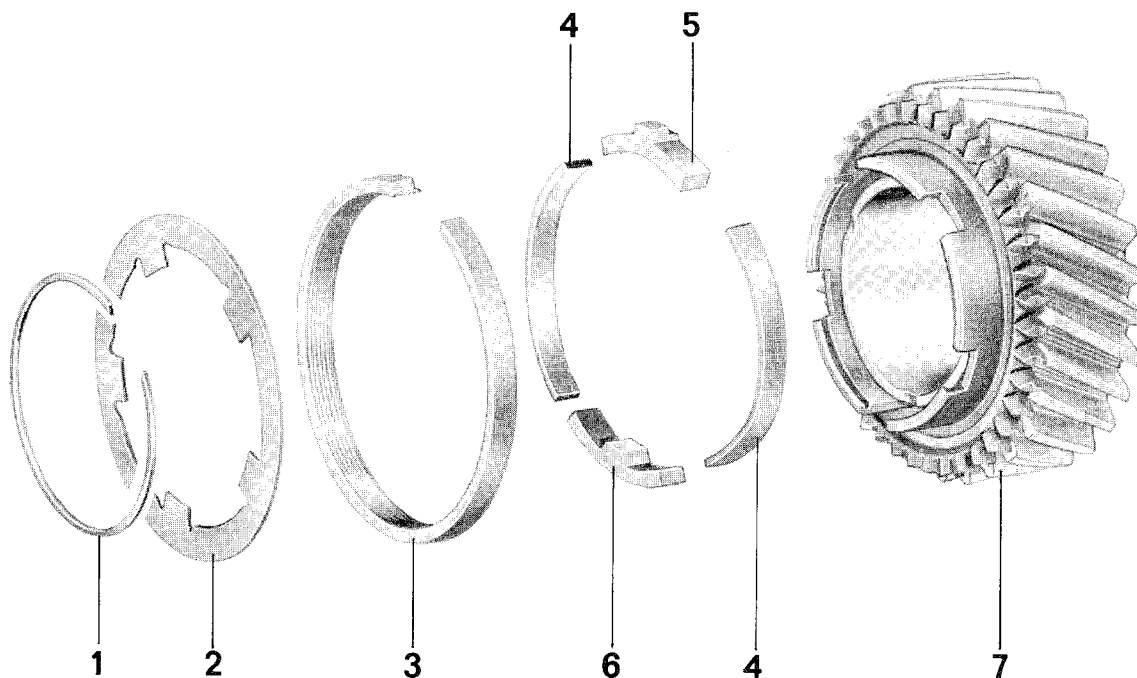


Installing

1. Drive in seal to stop with piece of pipe.



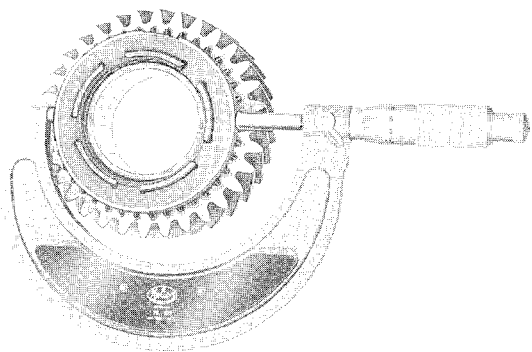
2. Install rubber seal.
 3. Lubricate rubber seal and sealing lip.
 4. Insert tube with rubber seal and seal.
 5. Install guide sleeve for release bearing and coat with MoS₂ paste.
 6. Bolt transmission to engine and install this assembly.
-



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Snap ring	1	Remove with small screwdriver	Install correctly, must fit properly.	
2	Lockwasher	1			
3	Synchronizer ring	1		Check for wear, install correctly.	
4	Stop	2			
5	Lock	1		Install correctly	
6	Stop	1		Install correctly	
7	Gear	1			

Check the following points to assure perfect synchronization.

1. Check diameter of installed synchronizing ring with a micrometer. Apply the micrometer at the highest position of the synchronizing ring.



Diameter:

1st and 2nd gear = $86.4 \begin{smallmatrix} + \\ - \end{smallmatrix} 0.25$ mm

3rd and 4th gear = $76.3 \begin{smallmatrix} + \\ - \end{smallmatrix} 0.17$ mm

2. Max. play between selector fork and operating sleeve of 1st through 4th gears is 0.5 mm.
-

DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

1. Lift out snap ring with a small screwdriver and remove lockwasher.

2. Insert lockwasher and install snap ring so that the opening is well located in the area of the guide groove.

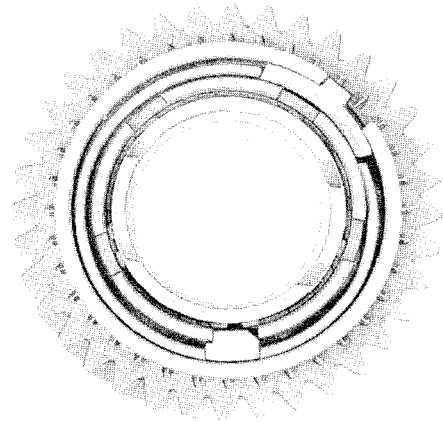
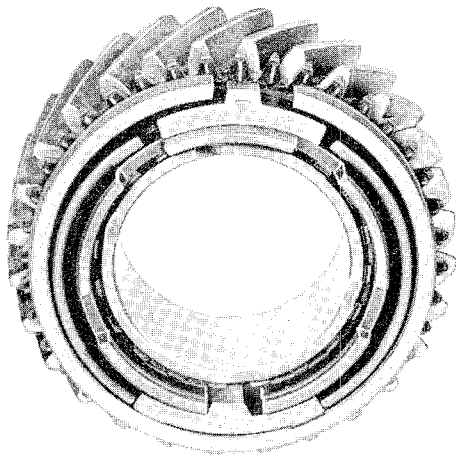
Assembling

1. Insert synchronizing ring on clutch body in correct position, and install lock, stop and lock straps (or just one lock strap for 1st gear).

MODIFICATIONS - 1977 MODELS

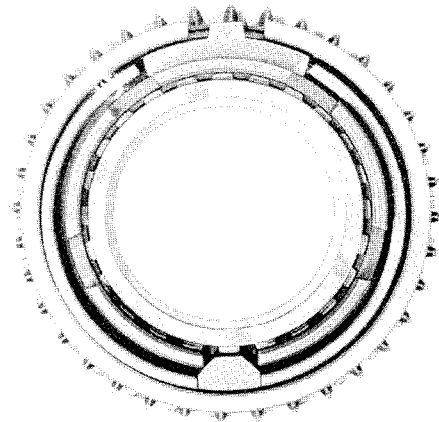
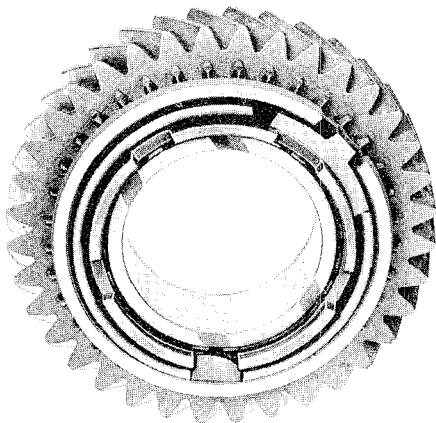
Synchronization for 1st and 2nd gears has been changed.

1. Synchronizer parts for 1st gear.



2. Synchronizer parts for 2nd gear.

Synchronization parts for 2nd, 3rd and 4th gear



3. Installed diameter of synchronizing rings has not been changed (see Page 35 - 26).

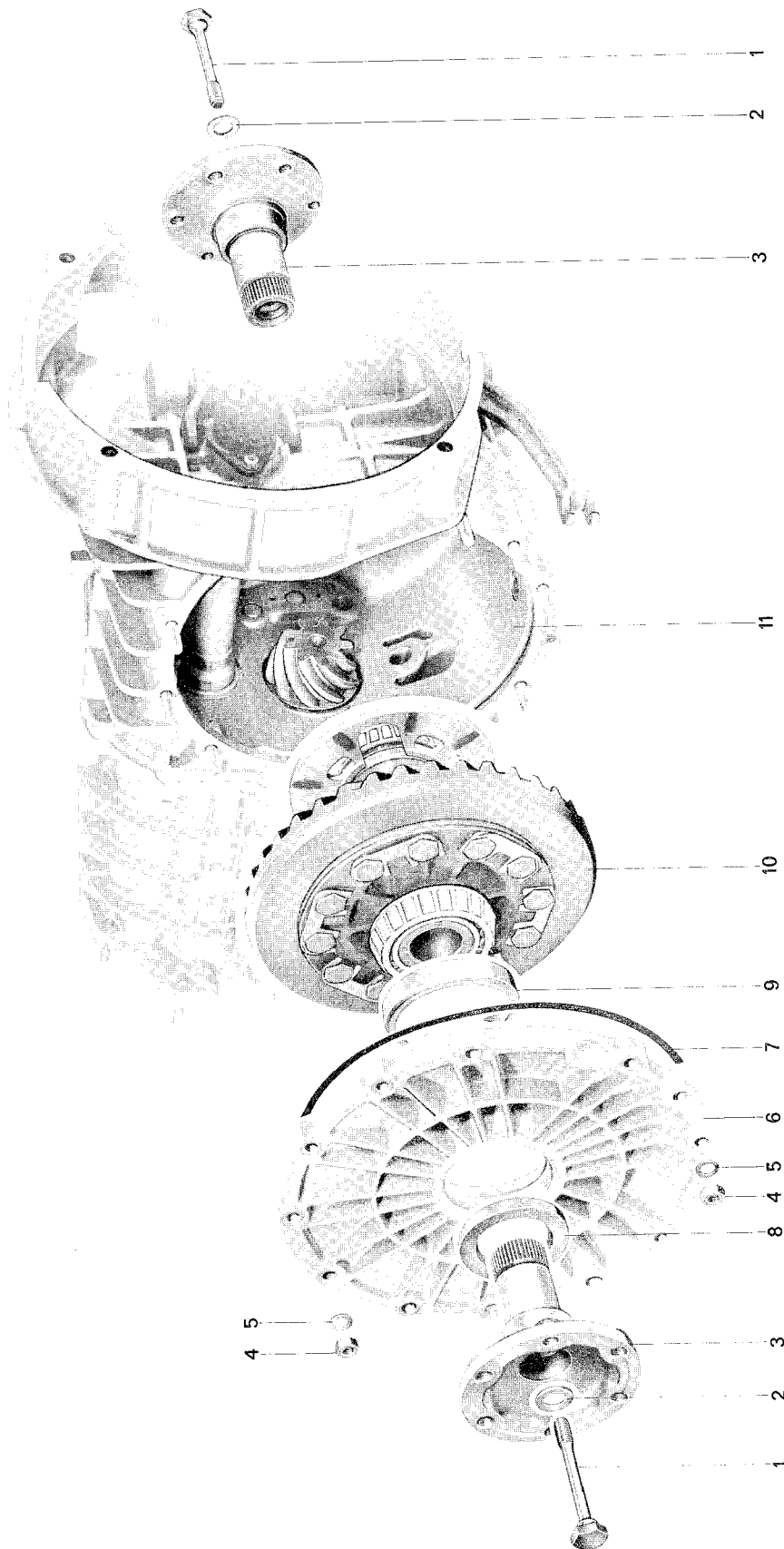
Synchronization parts for 1st gear

DIFFERENTIAL FINAL DRIVE

TOOL



No.	Description	Special Tool	Remarks
1	Driver	P 265 c	

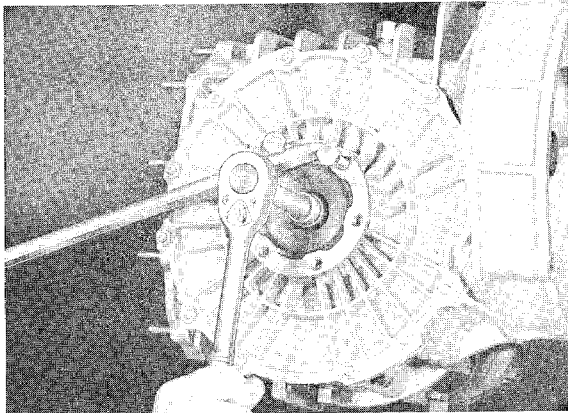


No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Stretch bolt	2		Torque to specifications	
2	Washer	2			
3	Flange	2			
4	Hex nut	12		Torque to specifications	
5	Washer	12		Replace if necessary	
6	Side cover	1	Drive off with plastic hammer		
7	Seal	1		Replace, lubricate slightly	
8	Shaft seal	1	Drive out punch	Drive in with P 265 c	
9	Outer race	1		Heat cover about 120 ^o C and drive in with corresponding pressure pad	
10	Differential	1			
11	Transm. case	1			

REMOVING AND INSTALLING INSTRUCTIONS

Removing

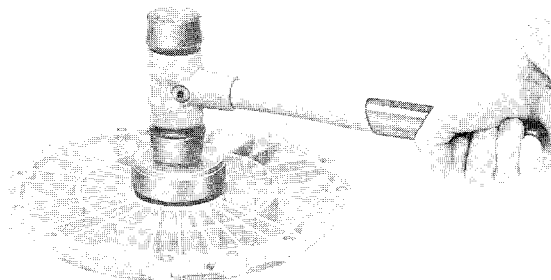
1. Loosen flange stretch bolt and remove flange.



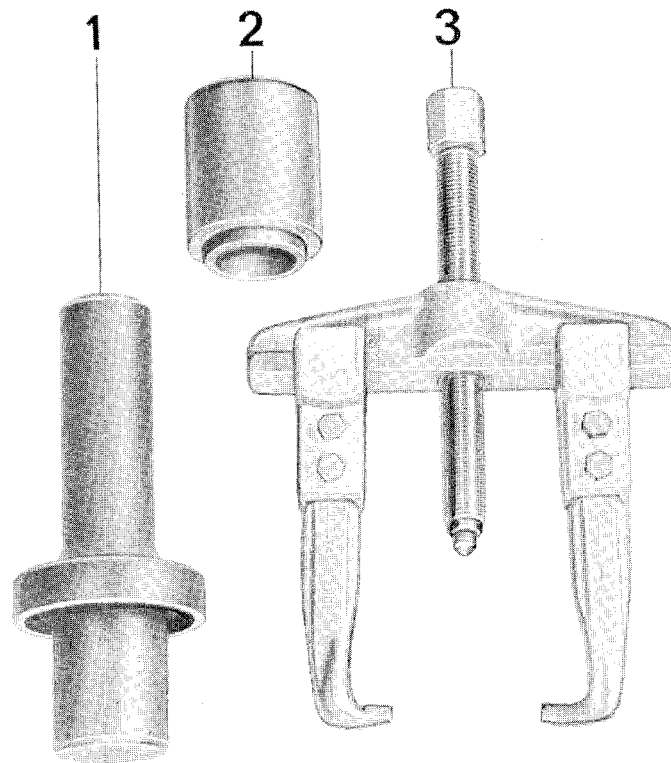
Installing

1. Heat transmission cover to about 120 °C and drive in bearing outer race.

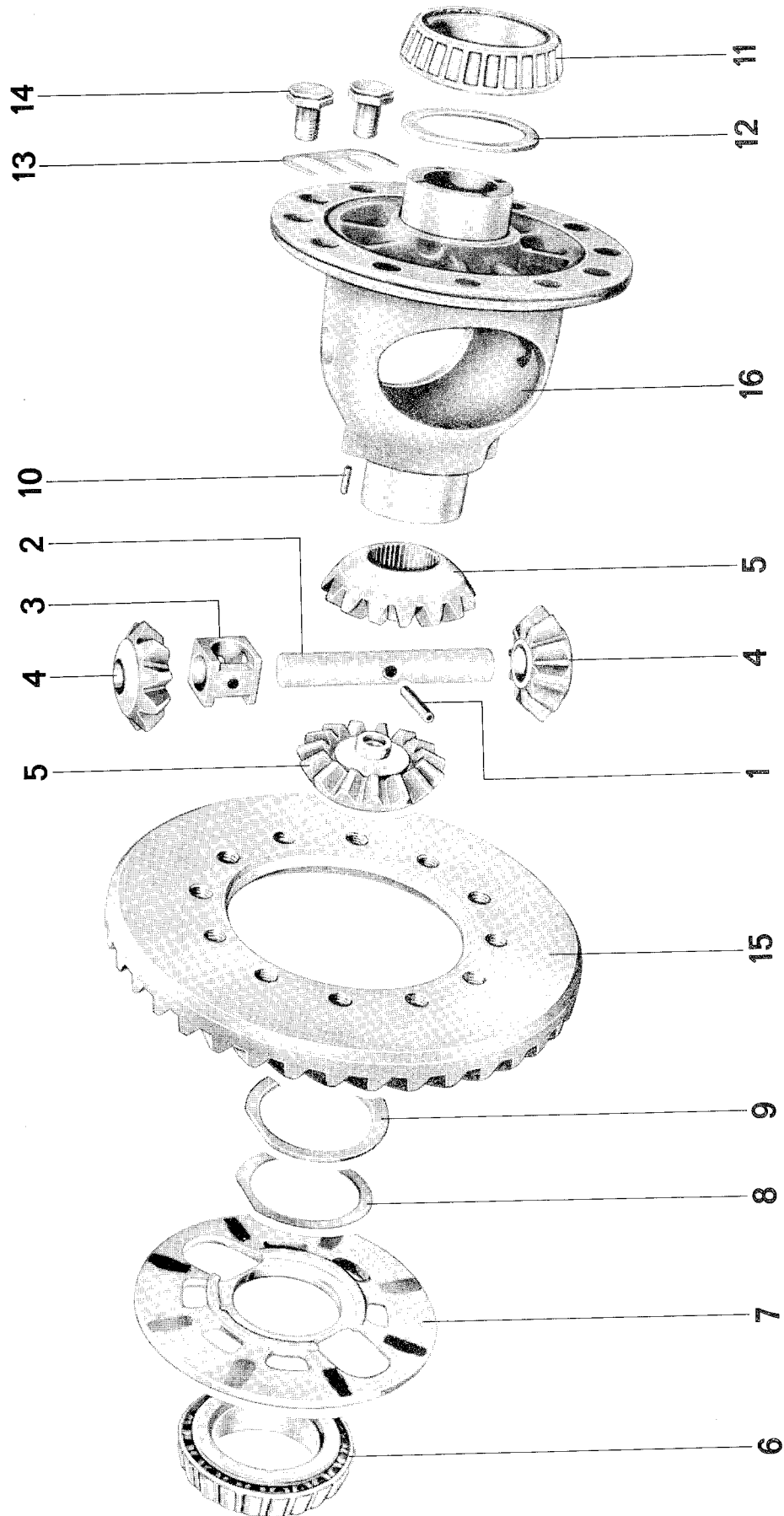
2. Drive in flange seal with P 265 c.



TOOLS



No.	Description	Special Tool	Remarks
1	Driver	P 264 b	
2	Driver	P 263	
3	Extractor		Kukko No. 20/1

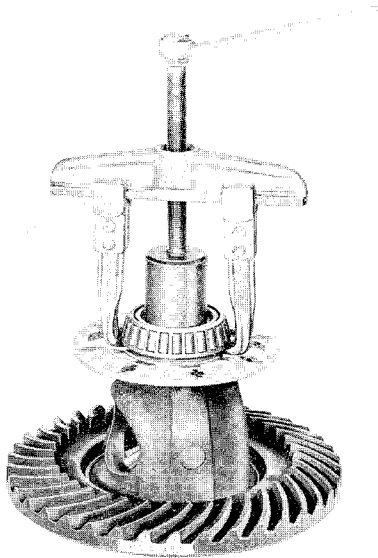


No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Spiral pin	1		Replace, if necessary	
2	Differential pin	1		Spiral pin bore aligns with bore in anchor	
3	Anchor	1			
4	Differential gear, small	2	Turn and remove	Coat semiround surface with MoS ₂ paste	
5	Large differential gear with threaded disc	2		Coat semiround surface with MoS ₂ paste	
6	Small taper roller bearing	1	Remove with 20/1 and P 263	Install with P 264 b	
7	Magnetic support disc	1		Watch magnetized parts	
8	Shim	X	Mark for reuse.	Determine thickness again if necessary	
9	Spacer	1	Mark for reuse.	Determine thickness again if necessary	
10	Key	1		Replace, if necessary	
11	Large taper roller bearing	1	Remove with 20/1 + P 263	Install with P 264 b	
12	Spacer	1	Mark for reuse	Determine thickness again if necessary	
13	Lockplate	6		Replace	
14	Hex head screw	12		Threads dry and free of grease. Torque to specifications	
15	Ring gear	1		Threaded bores for ring gear bolts dry and free of grease. Note pair codes.	
16	Differential housing	1			

DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

Disassembling

1. Remove taper roller bearing with an extractor and P 263.



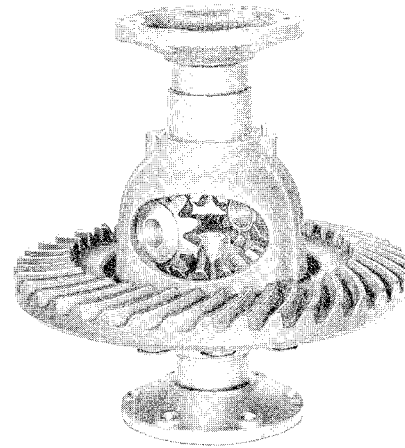
Note

The claws of both arms must be machined.

Assembling

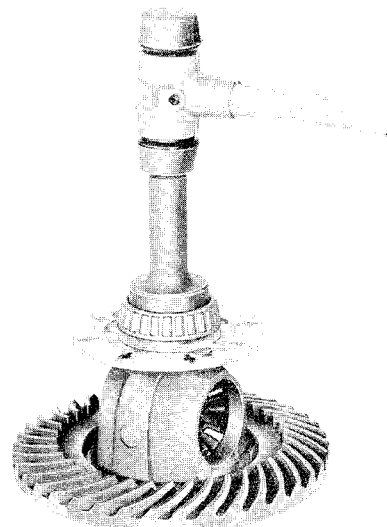
1. Slide lockplate into groove of hex head screws, pinch front part together with a pliers to secure lockplate to hex head screw and lock by pulling down over a hexagon surface.
2. Coat semi-circular surfaces of differential gears with MoS_2 paste.

3. Insert large differential gears with press fit threaded discs through oval opening in differential housing and align with flanges.

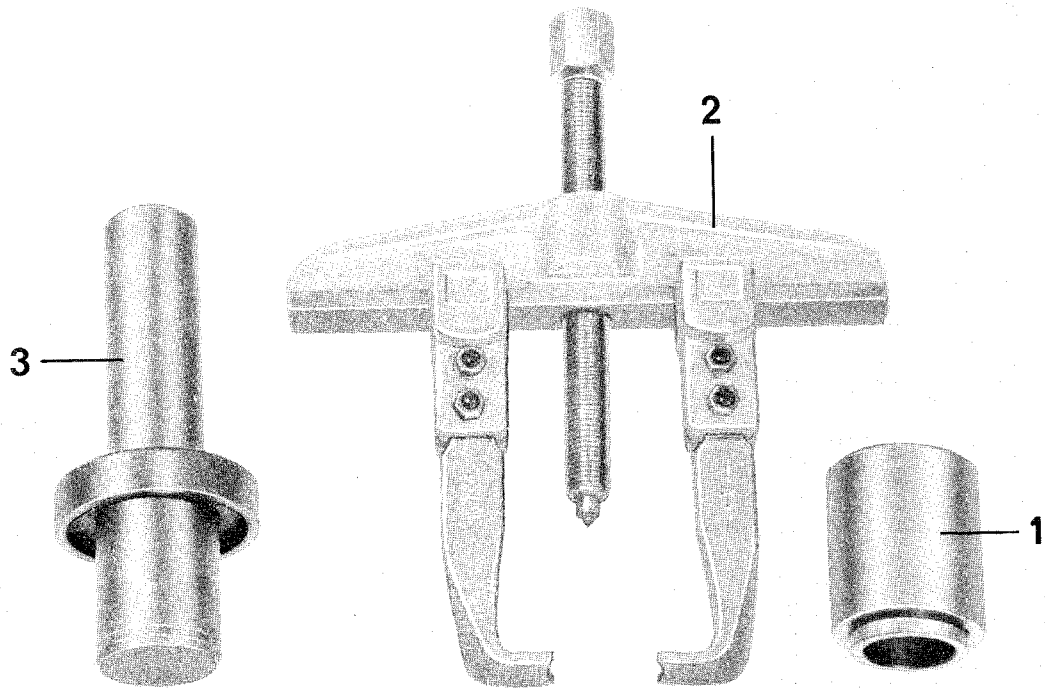


4. Place small differential gears between the large differential gears and turn until the gear bores align with the bores in the housing.

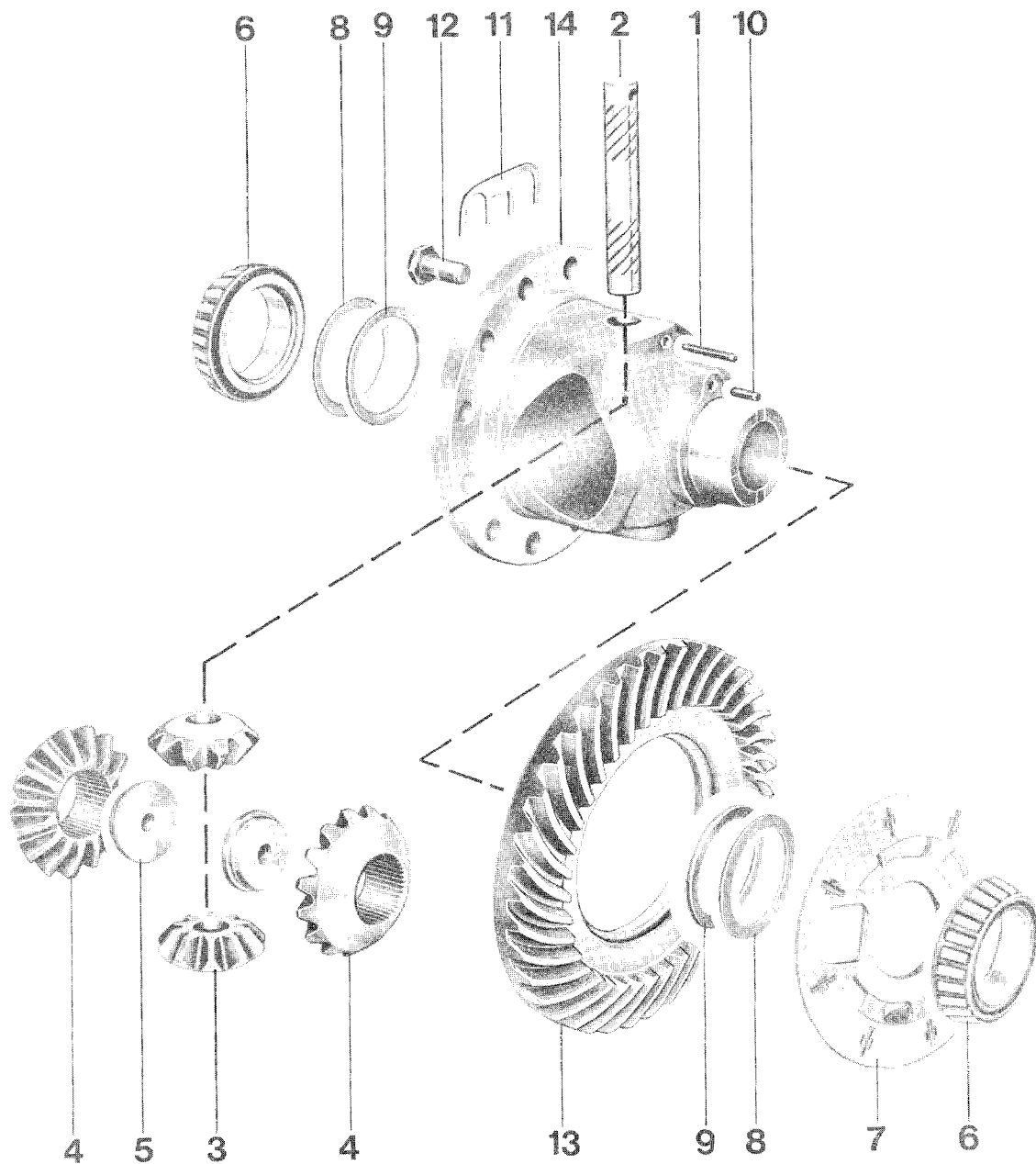
5. Install taper roller bearing with P 264 b.



TOOLS



No.	Description	Special Tool	Remarks
1	Mandrel	P 263	
2	Puller	US 1078	
3	Drift	P 264 b	

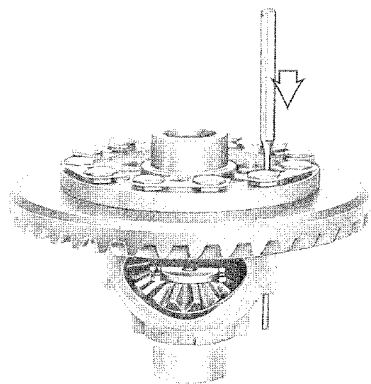


No.	Description	Qty.			Special Instructions
			Removing	Installing	
1	Spiral pin	1			
2	Pin	1			
3	Small differential pinion	2		Coat with MoS ₂ paste. Only replace in sets (with large differential pinions)	
4	Large differential pinion	2		Coat with MoS ₂ paste. Only replace in sets (with small differential pinions)	
5	Threaded piece	2			
6	Taper roller bearing inner race	2	Pull off with Kukko 20/1 and P 263	Knock on with P 264	
7	Magnetic carrier plate	1		Position correctly	
8	Washer	X	Mark to install later	If necessary, determine thickness	
9	Spacer	X	Mark to install later	If necessary, determine thickness	
10	Key	1			
11	Lockplate	6		Replace	
12	Bolt	12		Threads dry and free of grease. Tighten to 13.5 - 14 mkp (98 - 101 ft.lbs.).	
13	Ring gear	1		Tapped holes for ring gear bolts dry and free of grease Watch pairing codes. Read-just if necessary.	
14	Differential housing	1			

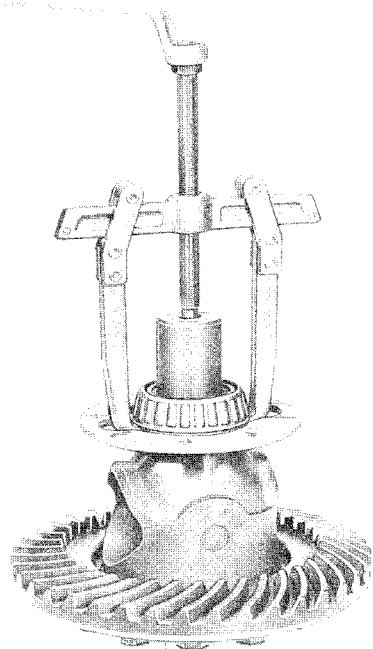
DISASSEMBLING AND ASSEMBLING DIFFERENTIAL

Disassembling

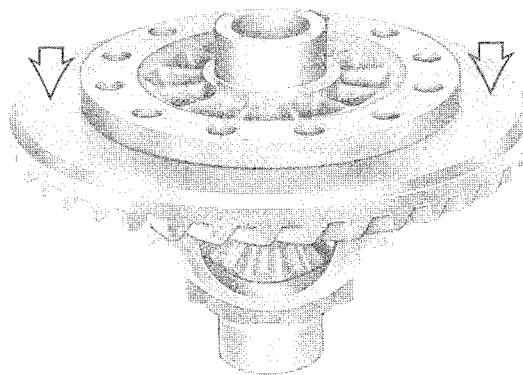
1. Knock out spiral pin for differential pins.



2. Pull off tapered roller bearing inner races with a puller (e.g. Kukko No. 20/1) and special tool P 263.

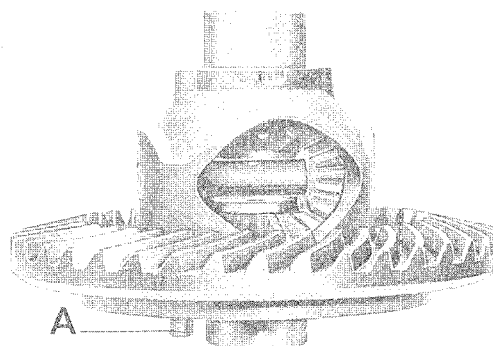


3. Knock ring gear off of housing.



Assembling

1. Mount ring gear, using locally manufactured centering pins as guides.



A - Centering pins (made locally)

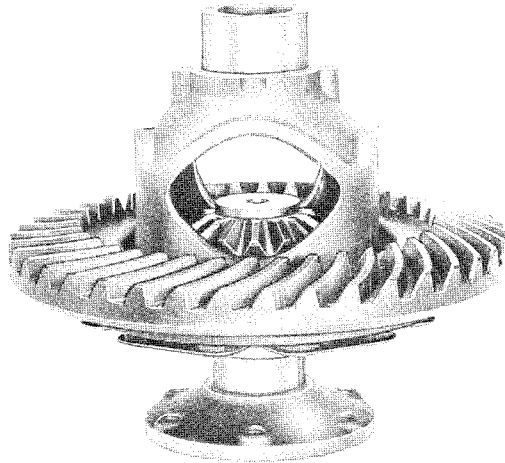
Note

Claws of both arms might have to be machined.

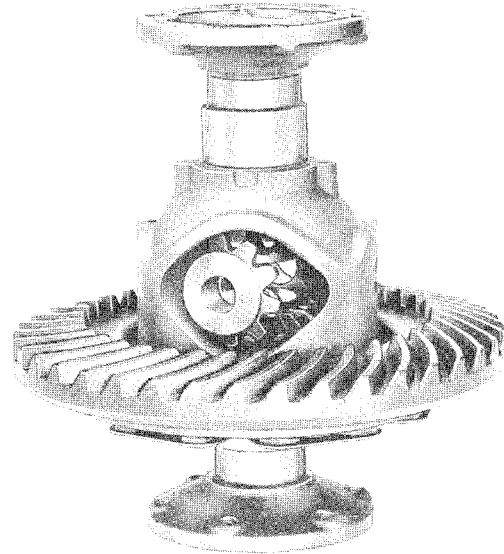
2. Tighten ring gear bolts to specified torque. Slide lockplate into groove of bolts, squeeze front end with a pliers (to firmly unite lockplate with bolts) and lock by bending lockplate down over side of bolt head.

3. Coat differential pinions with MoS₂ paste.

4. Install large differential pinions with press-fit threaded plates through large opening in differential housing and locate with joint flanges.

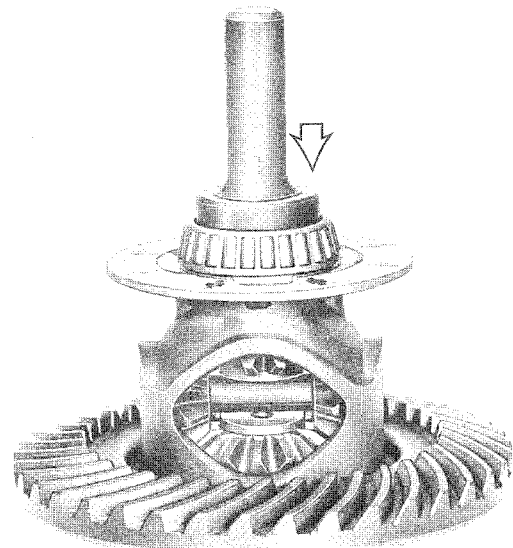


5. Install small differential pinions between large differential pinions and turn, until bores of pinions align with bores in housing.



6. Knock in differential pins in correct position and lock with spiral pin.

7. Knock on tapered roller bearing inner races with P 264.



Recommended Order for Readjustment of Pinion/Ring Gear

If it is necessary to adjust the drive pinion and ring gear, the following procedures are recommended for efficiency.

1. Determine total shim thickness " S_{tot} " (S_1 plus S_2) for specified pre-load of tapered roller bearings/differential.
2. Determine shim thickness " S_3 ".
3. Split total shim thickness " S_{tot} " into S_1 and S_2 that the specified backlash is provided between ring gear and drive pinion.

Objective of adjustments must be to reach the position of quietest running, as had been determined on special testing machines during production.

Absolute cleanliness is required during all assembly and testing procedures to attain good results.

Repairs on the final drive will only require readjustment of drive pinion and ring gear, when parts have been replaced which directly influence the adjustment. Refer to the following table to avoid unnecessary adjustments!

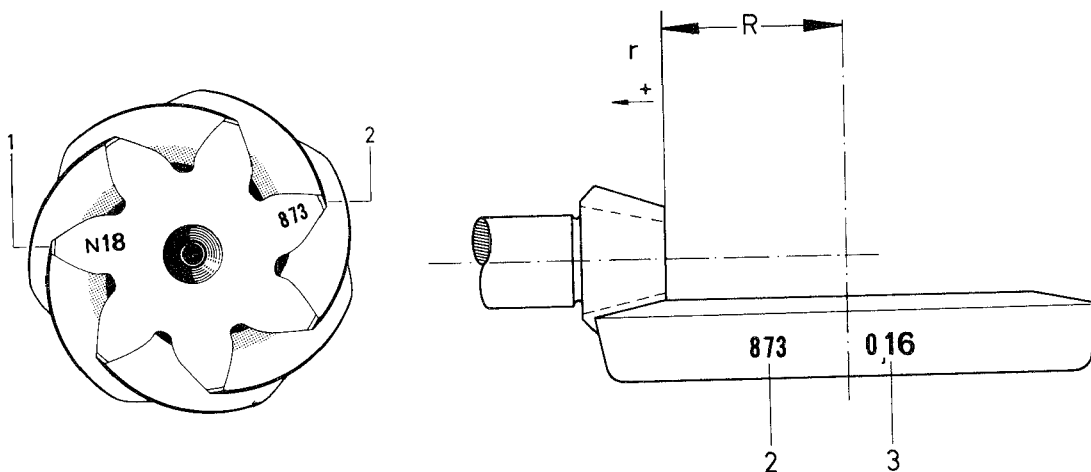
Adjust: Replaced Part:	Ring Gear ($S_1 + S_2$)	Drive Pinion dev. "r" (S_3)
Transmission case	X	X
Side case cover	X	X
Large cyl. roller bearing and four-point bearing for drive pinion	X	X
Drive pinion/ring gear	X	X
Differential housing	X	
Tapered roller bearing for differential	X	

ADJUSTING DRIVE PINION AND RING GEAR

General Notes

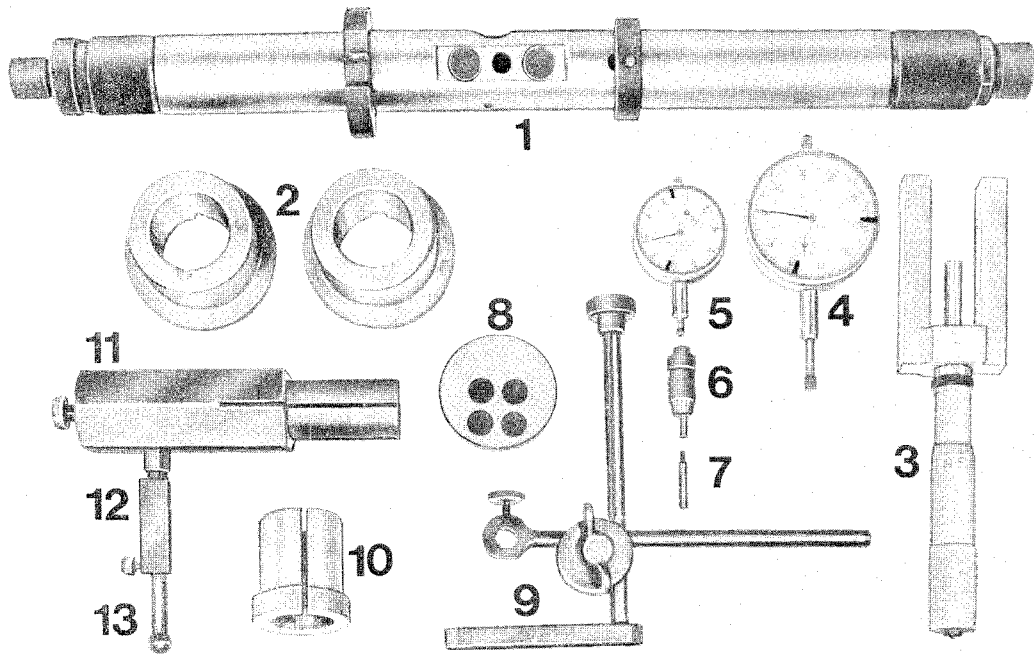
Drive pinion and ring gear settings are important for a long service life and quiet running of the final drive. This is why drive pinions and ring gears are matched during production and checked on special testing machines for the most favorable surface appearance and low noise levels in both directions of rotation. The position of quietest running is determined by moving the drive pinion in an axial direction, keeping the ring gear within specified backlash tolerances. The deviation "r" from the design distance "R" is measured and written on the face side of the drive pinion. Ring gears and drive pinions are designed so that deviation "r" is always added to design distance "R", i.e. is always considered plus.

To distinguish this pinion from former pinions, of which deviation "r" was either plus or minus, "r" on the head of the pinion is preceded by a capital "N". Each pair of drive pinions and ring gears receives a pair code and may only be replaced together.



- R = Design distance (81.69 or 82.29 mm)
- r = Deviation from R - quoted in 1/100 mm
- 1 = Deviation r
- 2 = Pair code
- 3 = Backlash

TOOLS

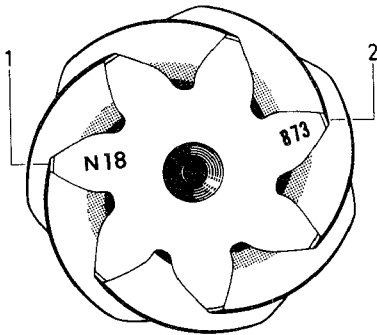


No.	Description	Special Tool	Remarks
1	Gauge	VW 385/1	
2	Centering disc	9109	
3	Master gauge	VW 385/54	R - 81.69
4	Dial gauge	-	Commercial item
5	Dial gauge	-	Commercial item 3 mm range
6	Gauge plunger	VW 385/14	
7	Dial gauge extention	VW 385/56	30 mm long
8	Gauge plate	VW 385/17	
9	Clock gauge holder	VW 387	
10	Sleeve	9145	
11	Adjusting device	VW 521/4	
12	Measuring lever	VW 388	
13	Gauge plunger	9196	

ADJUSTING DRIVE PINION

Distance "E" is calculated by adding together design distance "R" and deviation "r" as indicated on face of drive pinion.

R = 81.69 mm for transmission type 930/32
 R = 82.29 mm for transmission type 930/30/33/34



1 = Deviation "r" in 1/100 mm
 2 = Pair code

Examples:

N 18 is the deviation "r" on face of drive pinion.

R = Design distance	81.69 mm
(transm. type 930/32)	
r = Deviation	+ 0.18 mm
E = Pinion setting	81.87 mm

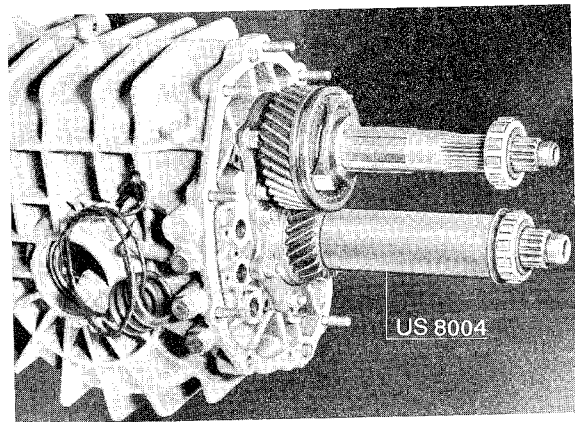
N 12 is the deviation "r" on face of drive pinion.

R = Design distance	82.29 mm
(transm. type 930/30/33/34)	
r = Deviation	+ 0.12 mm
E = Pinion setting	82.41 mm

1. Install preassembled drive pinion and drive shaft without shims and torque clamping plate nuts to specifications.

2. Install 4 th gear with operating and guide sleeves, and place in 4 th.

3. Slide 48 x 4 x 148 mm piece of pipe onto drive pinion.



4. Install thrust washer and cylindrical roller bearing.

5. Mount gear housing and secure with two nuts.

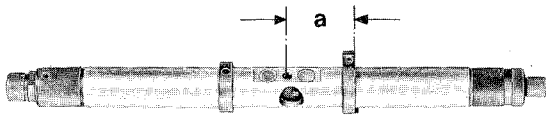
6. Install reverse gears I and III.

7. Place appropriate pin or reverse gear shaft in bore of transmission case and slide in reverse gear II.

8. Torque drive pinion nut to specifications.

9. Make sure that the taper roller bearing outer races fit tight in transmission case and side cover.

10. Set adjusting ring of universal gauge VW 385/1 to distance "a".

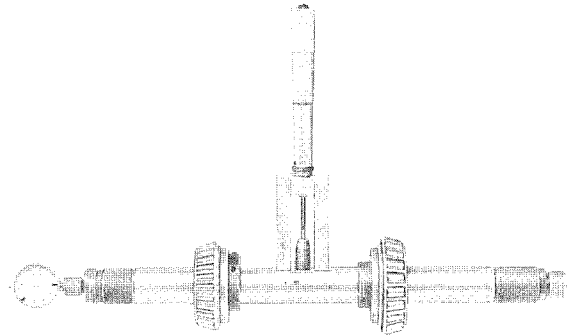


a = about 58 mm

11. Slide centering discs 9109 on gauge. Screw in gauge plunger VW 385/14 with 30 mm dial gauge extension VW 385/56.

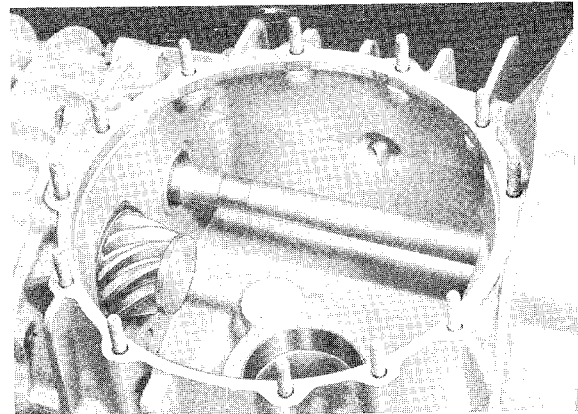
12. Install taper roller bearing from differential, or spare taper roller bearing, on centering discs.

13. Set master gauge VW 385/30 to pinion setting (82.41 mm in example) and place on master mandrel. Set dial gauge (3 mm range) at zero with 1 mm preload.

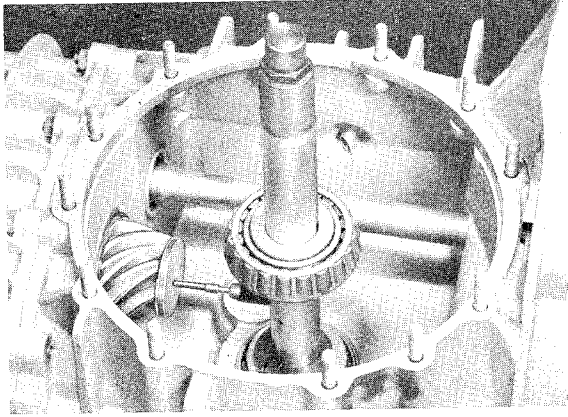


14. Remove master gauge after setting dial gauge.

15. Place gauge plate VW 385/17 on head of drive pinion.



16. Place gauge mandrel in transmission case.
The dial gauge extension is near the gauge plate.

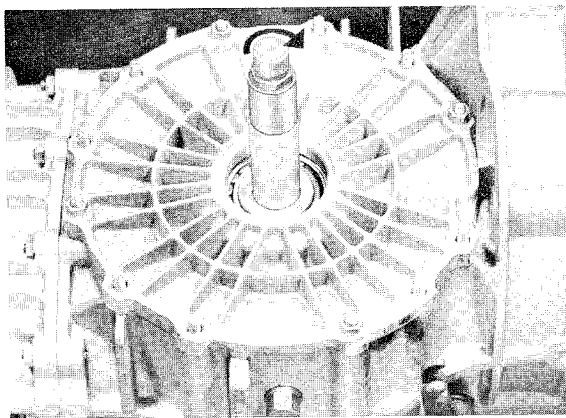


17. Install side transmission cover without seal and tighten the 4 nuts crosswise.

Note

Do not use a hammer to set up the side transmission cover (this could cause the gauge plate, held by a magnet, to fall down).
Position the cover by tightening the nuts evenly.

18. Pull second centering disc so far out with the spindle that the gauge mandrel can just barely be turned by hand.



19. Turn master mandrel carefully until dial gauge extension is vertical to face of drive pinion head.
At this moment the dial gauge needle will reach its maximum point of deflection (inflection), so that it can be read.

Note

Measured value always deviates from set value in clockwise direction (small dial gauge needle between 1 and 2), i.e. in setting the dial gauge with 1 mm preload the value deviating from 1 must be added to shim thickness S_3 .

Example:

If small dial gauge needle is between 1 and 2 and large needle points to 0.37 mm, with 1 mm dial gauge preload the shim thickness is 0.37 mm, whereby the thickness is always rounded off to the nearest 0.05 mm (e.g. 0.37 mm to 0.35 mm).

20. Recheck distance "E" after installing shims.
A deviation of ± 0.03 mm is permissible.

ADJUSTING RING GEAR

Determining total shim thickness " S_{tot} " ($S_1 + S_2$).

Ring gear must be readjusted after replacement of transmission case, side transmission cover, tapered roller bearing for differential, differential housing or pinion / ring gear set

N o t e

Drive pinion must be removed to determine preload of tapered roller bearing for differential.

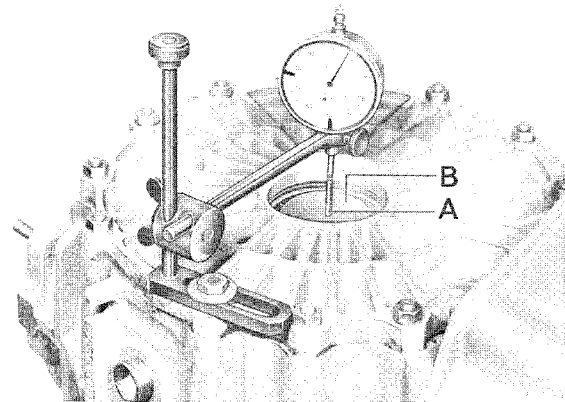
1. Make sure tapered roller bearing outer races fit tight in transmission case or side transmission cover.
2. Install pertinent differential with one each 2.5 mm thick spacer on the ring gear end and opposite end.
3. Insert differential in transmission case and turn several times.
4. Install side transmission cover and tighten all nuts to specified torque.

N o t e

Unscrew one stud to mount dial gauge holder.

5. Place gauge VW 385/17 on collar of differential.

6. Mount dial gauge holder VW 387 with dial gauge and extension on case and set dial gauge at zero with 2 mm preload.



A = Dial gauge extension 30 mm long

B = Gauge plate VW 385/17

7. Move differential up and down. Read and note play on dial gauge.

N o t e

Do not turn differential while measuring play, since this would cause wrong readings.

8. Calculate "S_{tot}".

$$\begin{aligned} \text{"S}_{\text{tot}} \text{"} &= \text{shim thickness} \\ &+ \text{measured value} \\ &+ \text{tapered roller bearing preload} \end{aligned}$$

Example:

Shim thickness	5.00 mm
Measured value	0.82 mm
Preload (constant value)	<u>0.33 mm</u>
"S _{tot} "	6.15 mm

9. Remove differential, pull off both tapered roller bearings and split up total shim thickness "S_{tot}" as follows.
Because of backlash adjustment later spacer S₁ is selected 0.20 mm thinner than spacer S₂.

Example:

Total thickness of spacers S₁ + S₂ = 6.15 mm.
Thickness of spacer S₁ :

6.15 mm

$$\begin{aligned} 2 &= 3.075 \text{ mm} \\ &- \underline{0.20 \text{ mm}} \\ &2.875 \text{ mm} \end{aligned}$$

Thickness of spacer S₂ :

6.15 mm

$$\begin{aligned} 2 &= 3.075 \text{ mm} \\ &+ \underline{0.20 \text{ mm}} \\ &3.275 \text{ mm} \end{aligned}$$

Note

Spacers are available in thicknesses of 2.4 to 3.7 mm, in steps of 0.10 mm.
A 0.25 mm thick shim permits spacing with 0.05 mm.

Round off the spacer thicknesses to the available distance that the total shim thickness S₁ and S₂ is not changed.

Example:

Calculated spacer thicknesses

$$S_1 + S_2 = 2.875 + 3.275 = 6.15 \text{ mm}$$

Rounded off spacer thicknesses

$$S_1 + S_2 = 2.85 + 3.30 = 6.15 \text{ mm}$$

Measure thickness of shims at several points with a micrometer. Max. permissible deviation 0.02 mm.
Check shims for burrs and damage.

ADJUSTING BACKLASH

Backlash should be 0.14 to 0.20 mm

1. Install pinion/ring gear set with shims "S₃" used for pinion setting.

N o t e

Collar nut of drive pinion must be tightened to specified torque prior to measuring backlash.

2. Install differential with tapered roller bearings and spacers (S₁ + S₂) in case.
3. Mount side transmission cover and tighten all nuts to specified torque.

N o t e

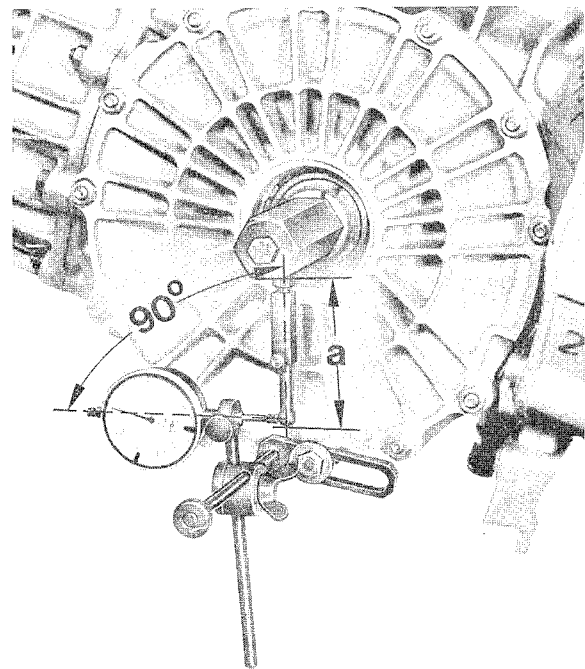
When tightening nuts check frequently that there is still a certain amount of backlash. Never let the drive pinion start to clamp.

4. Screw gauge lever VW 388 and adjuster VW 521/4 together and adjust lever length to 101 mm (measured from large hexagon surface to upper edge of ball) with gauge plunger 9196.

5. Insert adjuster with clamping bush (special tool 9145) in differential and clamp tight.

6. Turn differential in both directions several times to settle the tapered roller bearings.

7. Mount dial gauge holder VW 387 with dial gauge and plain extension that dial gauge axis and lever are at right angles.



Distance "a" = 101 mm

8. Turn ring gear carefully against stop and set dial gauge to zero. Turn back ring gear and read backlash. Note value.

N o t e

Hold drive pinion tight while measuring. This is done by clamping a suitable screwdriver between transmission case and reverse gear III.

9. Repeat measurement three times, turning ring gear 90° each time. Measures values must not deviate among each other by more than 0.05 mm.

Note

Backlash required is inscribed in ring gear.

10. If specified backlash is not reached, change spacers (S_1 and S_2) again. However, do not change total shim thickness (S_{tot}).
-

ADJUSTING RING GEAR BACKLASH

1. Assemble change gear with those shims determined for the drive pinion setting.

Note

Make sure that the drive pinion nut is torqued to specifications before adjusting the backlash.

2. Install differential with taper roller bearings and calculated spacers (S 1 and S 2) and position side transmission cover.

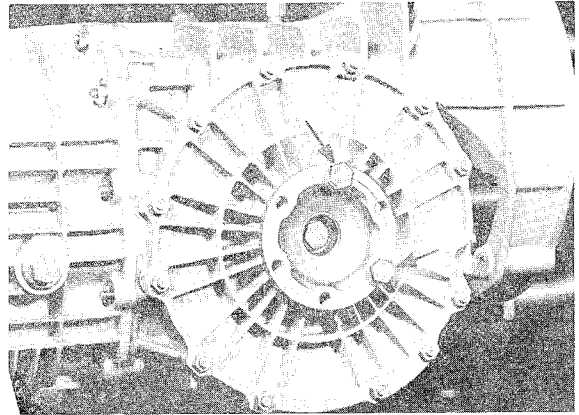
3. Torque side transmission cover hex nuts to specifications.

Note

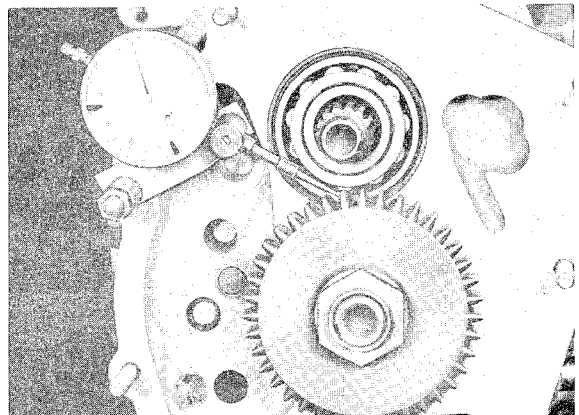
When tightening the nuts keep checking if there is still a certain amount of backlash. Never allow the drive pinion to jam.

4. Slide disc from special tool P 357 onto a stub axle and secure flange on ring gear end.

5. Block differential with two screws which are screwed in through the flange. Only tighten screws slightly against side transmission cover.



6. Install local manufactured dial gauge holder, as illustrated in figure, and check backlash.



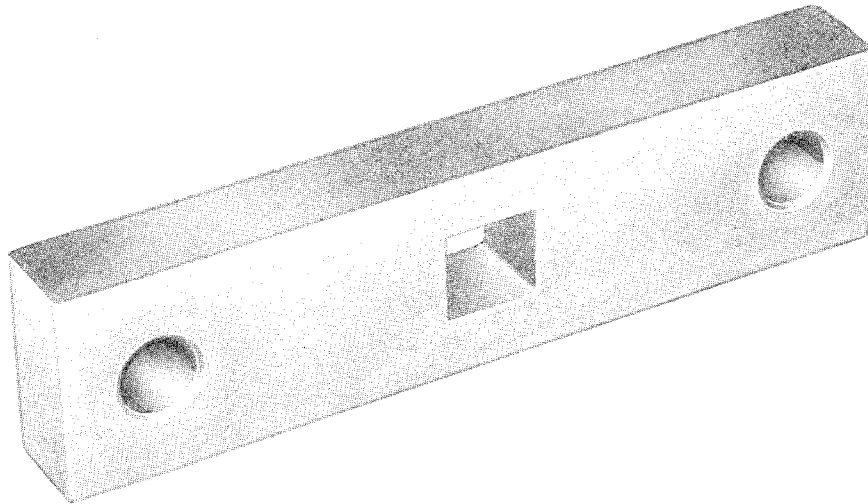
The check at the reverse gear III must show the following backlash:

0.33 \pm 0.1 mm Transmission type 930/30

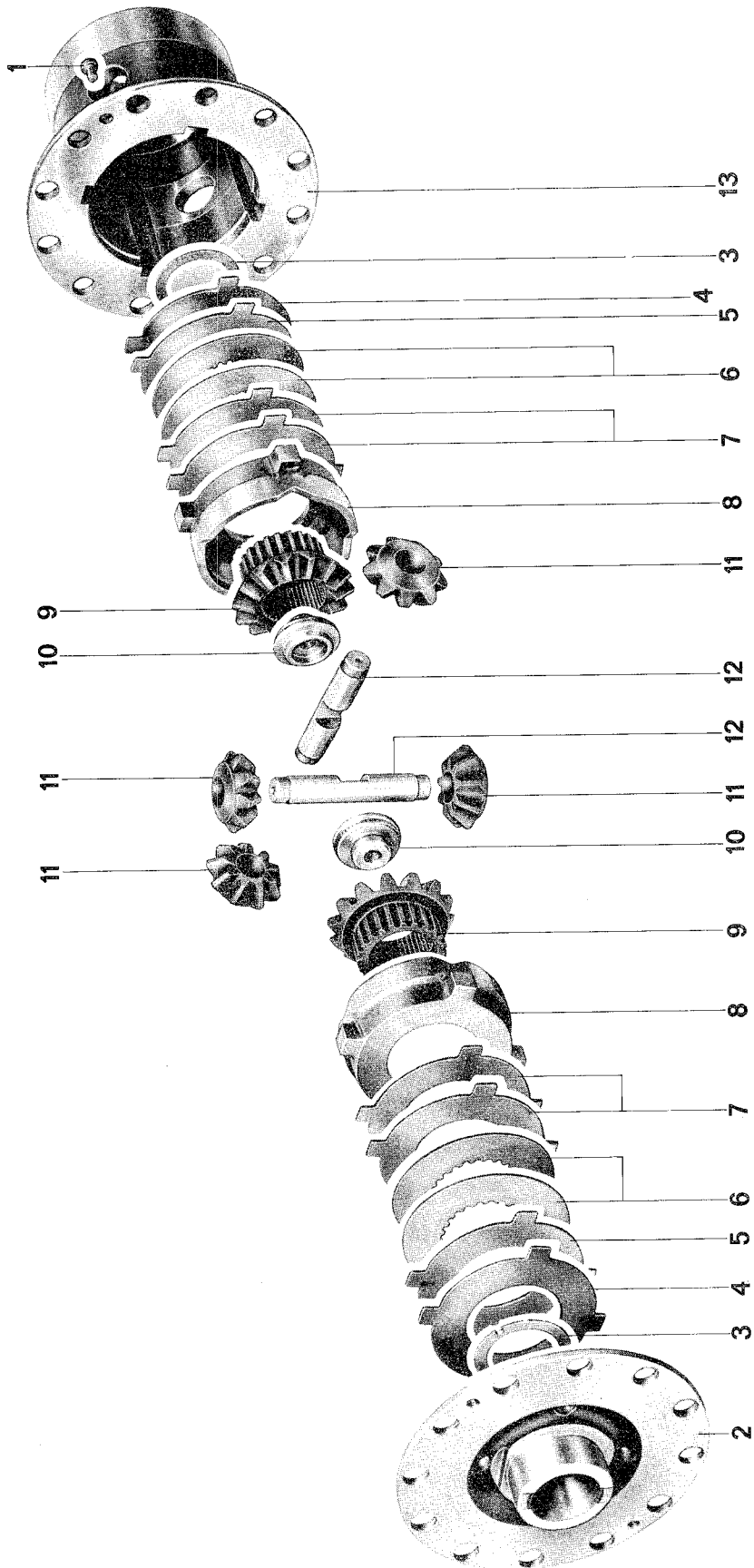
0.38 \pm 0.1 mm Transmission type 930/32

This backlash is equivalent to 0.16 or 0.20 mm on the ring gear.

TOOLS



No.	Description	Special Tool	Remarks
1	Adaptor	-	Local manufacture. The adaptor can be made of flat iron 30 x 15 x 120 mm. It must have a 1/2 in. square opening in the middle.

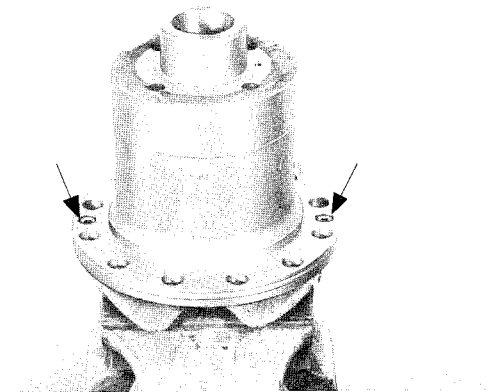


No.	Description	Qty.	Note When		Remarks
			Removing	Installing	
1	Socket head screw	2		Torque to 1, 4 mkg (10 ft lb)	
2	Housing cover	1			
3	Thrust washer	2		Insert properly	
4	Outer splined disc (wavy)	2			
5	Outer splined disc	2			
6	Inner splined disc (molybdenum surface)	4			
7	Outer splined disc	4			
8	Pressure ring	2			
9	Gear	2			
10	Threaded disc	2	Press on gear	Install properly	
11	Pinion	4			
12	Differential shaft	2			
13	Differential housing	1			

DISASSEMBLING AND ASSEMBLING LIMITED SLIP DIFFERENTIAL (40% Locking Effect)

Disassembling

1. Remove ring gear.
2. Loosen socket head bolts on housing flange and remove cover.



3. Remove all inside parts.

Caution

Note sequence of disc installation, so that differential maintains proper locking effect.

Assembling

1. Check all parts for wear or damage, and replace if necessary.

a. Differential Housing

Check guide grooves for outer splined discs and pressure rings for wear.

b. Pressure Rings

The guide tabs and bearing surfaces must not show excessive wear or scoring. They must also move easily in differential housing.

c. Differential Gears

The bearing surfaces for the thrust washers must not be worn and the inner splined discs must move easily on the serration of the differential gears.

d. Discs

Check inner and outer splined discs for wear. The guide tabs of the outer splined tabs of the outer splined discs and the inner splined disc serration should not be worn.

2. Before installation, lubricate all sliding surfaces of the discs, the pressure rings and the differential shafts with hypoid gear lube SAE 90.

3. Insert thrust washers, so that the retaining tabs engage in the bore of the housing or housing cover. It is recommended to coat the washers with a little grease to provide a better hold.

4. Install other parts as illustrated in the exploded view.

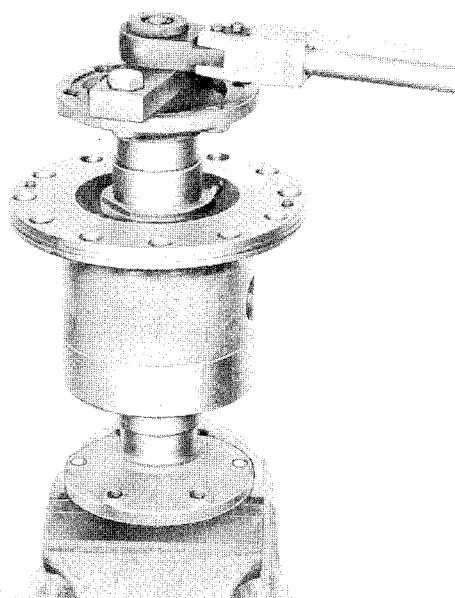
Caution

To prevent changing the locking effect, it is essential that the discs be reinstalled in their proper positions.

Note

Wavy outer splined discs must face housing or housing cover.

5. To measure locking effect of limited slip differential, install two drive flanges and clamp one (with two bolts inserted) in a vise. Install locally manufactured adaptor and turn differential with torque wrench. Check that torque is 4 - 8 mkg (29 - 58 ft lb).

**Note**

During the model year 1976, inner splined discs and outer splined discs will be modified. The present inner splined molybdenum coated discs of different thicknesses will be replaced by a single molybdenum coated disc. See chart:

Present Parts

901.332.551.21 (2.0 mm thick)
 901.332.551.22 (1.9 mm thick)
 901.332.551.23 (2.1 mm thick)

Replacement Part

917.332.551.10 (2.0 mm thick)

To meet or change the torque requirements of the limited slip differential, the following outer splined discs are available:

917.332.552.10 (1.9 mm thick)
 917.332.552.11 (2.0 mm thick)
 917.332.552.12 (2.1 mm thick)

The wavy outer splined discs - 901.332.552.12 (2.0 mm thick) - remain in use.

The torque can be changed by installing the old inner splined discs of different thicknesses with the new outer splined discs.

Notes

If torque does not meet specifications, change it by installing appropriate inner discs. Inner discs with thickness 1.9 mm, 2.0 mm and 2.1 mm (0.075, 0.079 and 0.083 in.) are available.

If the thickest discs are installed and the torque is still not correct, all discs are worn and must be replaced.

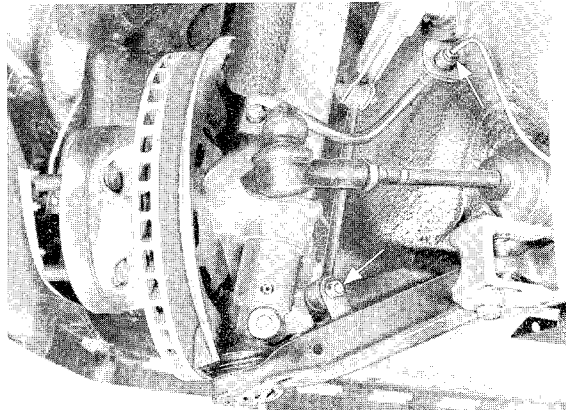
FRONT WHEEL SUSPENSION

REMOVING AND INSTALLING FRONT AXLE

Removing

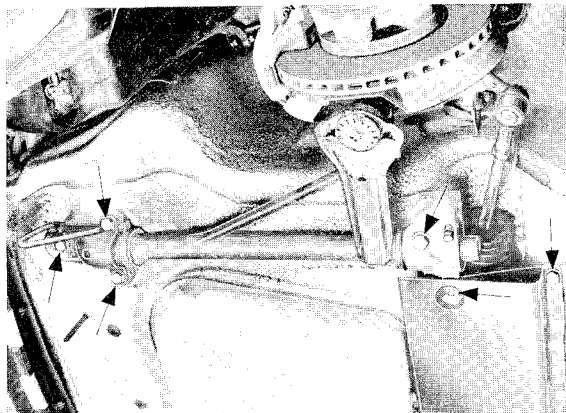
1. Disconnect brake hose at brake line after first depressing brake pedal somewhat with pedal strut to prevent brake fluid from escaping.

2. Unscrew stabilizer at suspension.



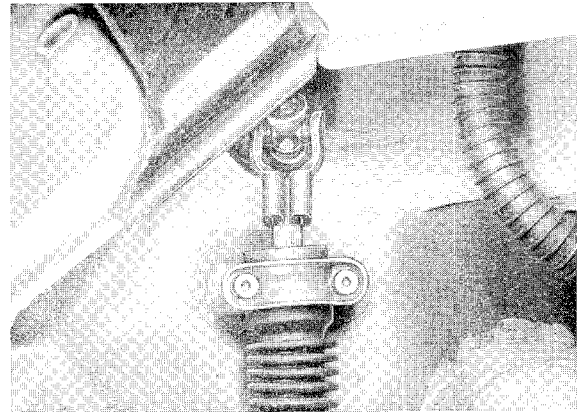
3. Remove guard.

4. Unscrew mounting screws at carrier and control arms.

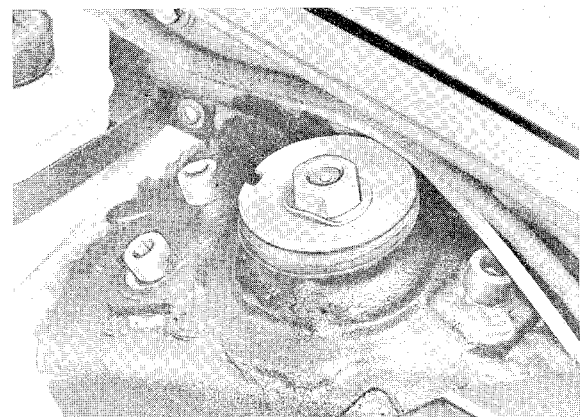


5. Place jack underneath carrier.

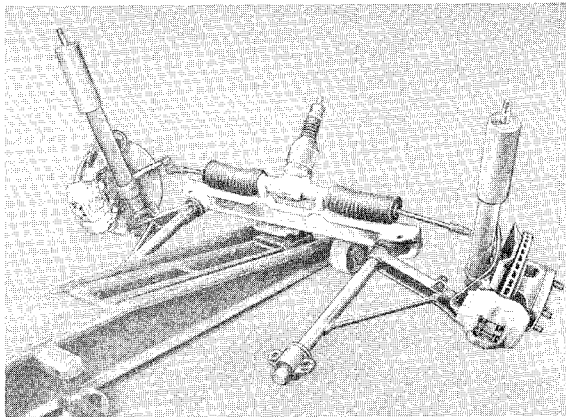
6. Detach steering shaft at steering shaft holder and lift joint off of steering shaft. Dismantle steering shaft holders.



7. Unscrew shock absorber hex nuts.



8. Lower complete front axle assembly.



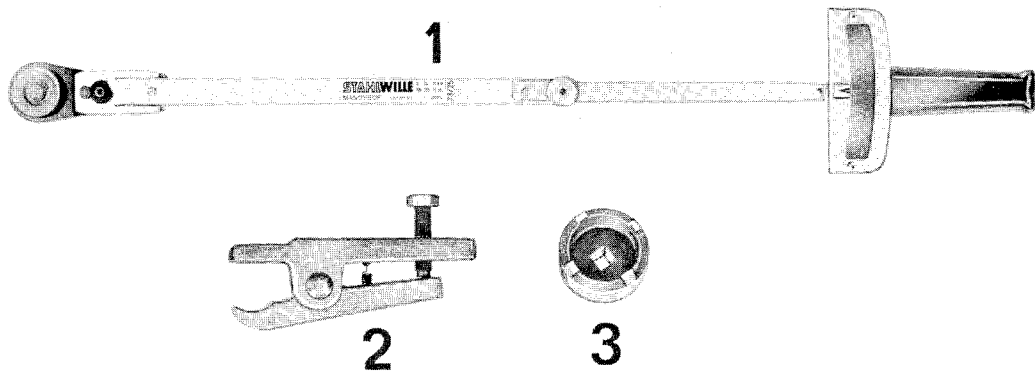
Note

Do not turn the steering wheel quickly from lock to lock when the car is raised, to prevent the cup from popping off at the steering gear or tie rod (air compensation).

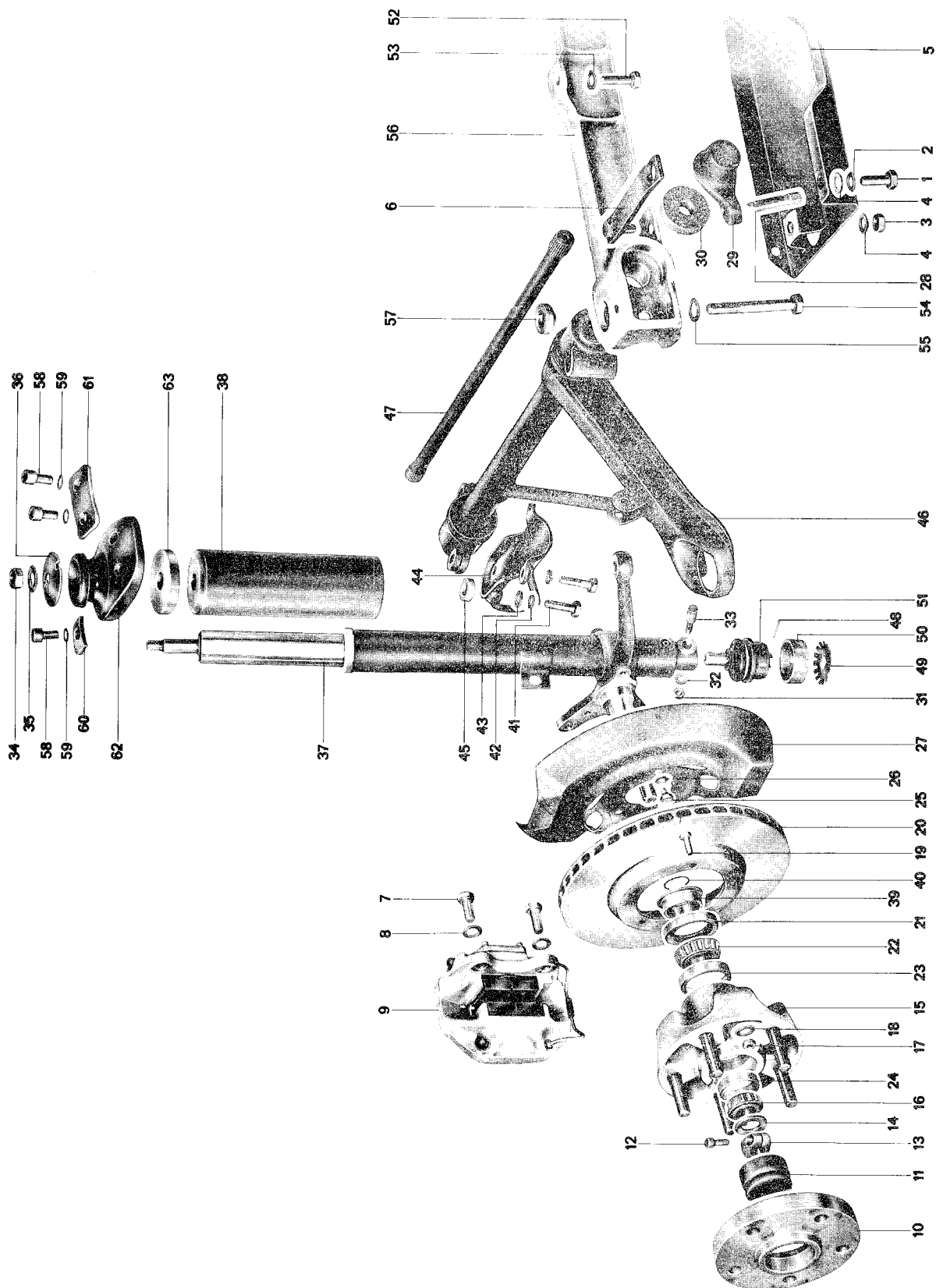
Installing

1. Raise complete front axle assembly.
2. Secure top of shock absorbers to body.
3. Secure bottom of front axle to body (carrier and control arms).
4. Connect brake hoses.
5. Bleed brakes.
6. Torque all mounting screws to specifications.

TOOLS



No.	Description	Special Tool	Remarks
1	Torque wrench		Commercial item, up to 36 mkg (261 ftlbs)
2	Tie rod remover		Commercial item
3	Wrench	P 280 b	



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Capscrew M 10	2		Torque to specifications	
2	Washer	2		Replace, if necessary	
3	Hex nut, self-locking	2		Torque to specifications	
4	Washer	4			
5	Guard	1			
6	Strut	2			
7	Hex hd screw	2		Torque to specifications	
8	Washer	2		Replace, if necessary	
9	Caliper	1			
10	Spacer	1			
11	Cap	1			
12	Capscrew	1		Torque to specifications	
13	Clamping nut	1			
14	Tab disc	1		Must just barely turn with screwdriver	
15	Wheel hub	1		Clean, check for wear, fill hub with about 60g multi-purpose lubricant	
16	Taper roller bearing	1		Clean, check and lubricate. If necessary, replace.	
17	Hex nut M 8	5		Torque to specifications.	

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
18	Washer	5		Replace, if necessary	
19	Hex head screw	5			
20	Brake disc	1		Check for wear and damage	
21	Radial seal	1		Replace, if necessary. Press in until seal is flush with hub.	
22	Taper roller bearing	1		Clean, check for wear and lubricate. Replace, if necessary.	
23	Outer race	1	Heat hub and press off race	Heat hub and install race	
24	Outer race	1	Heat hub and press off race	Heat hub and install race	
25	Hex hd screw	3		Torque to specifications	
26	Lockwasher	3		Replace, if necessary	
27	Guard	1			
28	Control screw	2		Lubricate with MoS ₂ . Readjust height	
29	Adjusting lever	2			
30	OWA gasket	2		Replace, if necessary	
31	Uni stop nut MS	1		Torque to specifications. Replace, if necessary	
32	Washer	1			

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
33	Threaded pin	1	Drive out	Install with lubricant. Position it correctly. Replace!	
34	Hex nut	1		Torque to specifications	
35	Lockplate	1		Replace, tab faces up.	
36	Support disc	1			
37	Strut	1		Check, replace if necessary	
38	Guard	1			
39	Spacer	1		Heat and install to stop	
40	Seal	1			
41	Hex hd screw M 10	3		Torque to specifications	
42	Lockwasher	2		Replace if necessary	
43	Washer	1			
44	Guard	1			
45	Spacer	1			
46	Control arm	1		Check	
47	Torsion bar	1		Check for damage, replacing if necessary. Note mark for installation. Lubricate	
48	Cotter pin	1		Replace	
49	Lockplate	1		Replace, if necessary	

No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
50	Nut	1	Loosen with P 280 b	Torque to specifications. Lubricate threads	
51	Ball joint	1		Check, replacing if necessary	
52	Hex hd screw M 10	2		Torque to specifications	
53	Washer	2		Replace, if necessary	
54	Hex hd screw M 10	2		Torque to specifications	
55	Washer	2		Replace, if necessary	
56	Carrier	1		Check for damage	
57	Adaptor	2			
58	Capscrew	3		Torque to specifications	
59	Lockwasher	3		Replace, if necessary	
60	Single-hole pressure plate	1	Mark for reuse		
61	Double-hole pressure plate	1	Mark for reuse		
62	Support with rubber bearing	1		Check, replacing if necessary	
63	Spacer	1			

TECHNICAL DATA

(In brackets: Turbo Carrera USA, Turbo Canada, Japan until end of 1982 only.
 Since 1983 models values are same as for R. o. W. cars.)

Wheel suspension	Wheels suspended independently on light alloy trailing arms.
Springs	One round torsion bar per wheel, transverse.
Torsion bar dia.	26 mm
Height adjustment (at DIN curbweight)	Cross tube center to wheel center 12 ± 5 mm (37 ± 5 mm)
Height difference left/right	max. 8 mm
Strut angle since 1978 models, Turbo 3.3 Ltr.	31° (34 °) 33° (37°)
Shock absorbers	Double action, hydraulic
Make	Bilstein
Stabilizer dia. since 1985 models	18 mm 20 mm

TECHNICAL DATA

(In brackets: Turbo Carrera USA, Turbo Canada, Japan until end of 1982 only.
Since 1983 models values are same as for R. o. W. cars.)

Wheel suspension	Wheels suspended independently on control arms and shock absorber struts.
Springs	One round torsion bar in driving direction for each wheel.
Torsion bar dia.	18.8 mm
Height adjustment (at DIN curbweight)	Wheel center to torsion bar center 94 ± 5 mm (85 ± 5 mm)
Height difference left/right	5 mm
Shock absorbers	Double action, hydraulic
Make	Bilstein
Stabilizer dia. since 1977 models since 1985 models	18 mm 20 mm 22 mm

TORQUE SPECIFICATIONS FOR FRONT AXLE

Location	Designation	Threads	Class	Torque	
				Nm	ft lb
Support bearing to strut	Nut	M 14 x 1.5	8	80	58
Support bearing to body	Capscrew	M 10	8.8	47	34
Carrier to body	Bolt	M 12 x 1.5	8.8	90	65
Carrier strut guard to body	Bolt	M 10	8.8	47	34
Stabilizer and suspension	Bolt	M 8	8.8	25	18
Guard	Bolt	M 8	8.8	25	18
Stabilizer to carrier strut	Bolt	M 8	8.8	25	18
Carrier strut, guard and stabilizer to body	Capscrew	M 10	8.8	47	34
Carrier strut and guard to carrier	Nut	M 10	8	28	20
Control arm to body	Bolt	M 10	8.8	47	34
Ball joint to control arm	Slotted nut	M 45 x 1.5	8.8	250	181
Nut on stub axle	Capscrew	M 7	10.9	15	11
Ball joint to strut	Uni stop nut	M 8	8	22	16
Brake disc to wheel hub	Nut	M 8	8.8	23	17
Cover for brake disc	Bolt	M 8	8.8	10	7
Caliper to stub axle	Bolt Capscrew	M 12 x 1.5	8.8	70	51
Brake line	Coupling	M 10 x 1		12	9
Wheel to wheel hub	Nut	M 14 x 1.5		130	94

FRONT AXLE AND STEERING TORQUE SPECIFICATIONS

Location	Description	Threads	Class	Torque	
				mkg	ft lbs
Support bearing to strut	Hex nut	M 14 x 1,5	8	8.0	58
Support bearing to body	Capscrew (socket)	M 10	8.8	4.7	34
Carrier to body	Hex hd screw	M 12 x 1,5	8.8	9.0	65
Carrier strut guard to body	Hex hd screw	M 10	8.8	4.7	34
Stabilizer and suspension	Hex hd screw	M 8	8.8	2.5	18
Guard	Hex hd screw	M 8	8.8	2.5	18
Control arm to body	Hex hd screw	M 10	8.8	4.7	34
Steering gear	Hex hd screw	M 10	8.8	4.7	34
Tie rod to gear	Hex nut	M 16 x 1.5	C 35 K	7.0	51
Clamp nut to stub axle	Capscrew (socket)	M 7	10.9	1.5	11
Ball joint to strut	Uni stop nut	M 8	8	2.2	16
Ball joint to steering lever	Castle nut	M 10 x 1	8	4.5	33
Ball joint to tie rod	Hex nut	M 14 x 1.5	04	4.5	33
Ball joint to control arm	Nut	M 45 x 1.5	8.8	25	181
Plug, strut	Plug			12	87
Wheel to hub	Nut	M 14 x 1.5	10.9	13	94
Brake disc to hub	Hex nut	M 8	8.8	2.3	17
Brake disc guard	Hex hd screw	M 8	8.8	1.0	7
Caliper to stub axle	Hex hd screw	M 12 x 1.5	8.8	7.0	51
Brake line	Coupling	M 10 x 1		1.4	10
Steering coupling to steering shaft	Hex hd screw	M 8	8.8	2.5	18

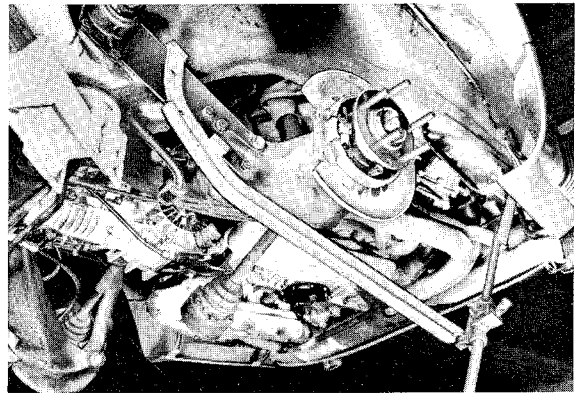
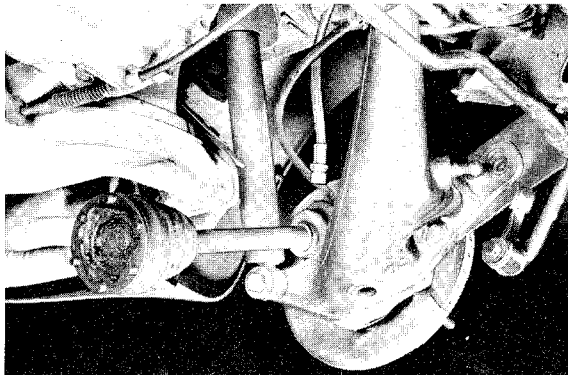
Location	Description	Threads	Class	Torque	
				mkg	ft lbs
Steering shaft to steering gear	Hex hd screw	M 8	8.8	2.5	18
Steering shaft holder	Capscrew	M 8	8.8	2.5	18
Universal joint to steering shaft	Hex hd screw	M 8	8.8	2.5	18
Coupling flange to drive pinion	Hex nut (self-locking)	M 10	8	4.0	29
Cover to steering gear	Hex hd screw	M 8	8.8	1.5	11
Steering wheel	Hex nut	M 18 x 1.5	8	7.5	54
Center screw to steering lock	Stud	M 8	10.9	2-3	1-2
Counternut, center screw	Hex nut	M 8	8	1.8	13
Tie rod to rack	Ball joint	M 16x1,5	8.8	15	108

REAR WHEEL SUSPENSION

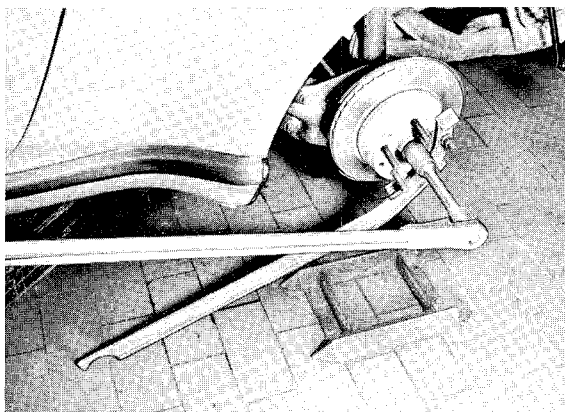
REMOVING AND INSTALLING REAR AXLE

Removing

1. Lift car.
2. Detach brake line at caliper and rear axle trailing arm. First depress brake pedal somewhat with pedal strut to prevent the brake fluid from escaping out of the reservoir.
3. Disconnect stabilizer at rear axle trailing arm.
4. Detach drive shaft at transmission flange.
5. Remove drive shaft castle nut cotter pin and unscrew nut.
6. Remove brake disc.
7. Lift rear axle strut with special tool P 289. Detach shock absorber at rear axle trailing arm.

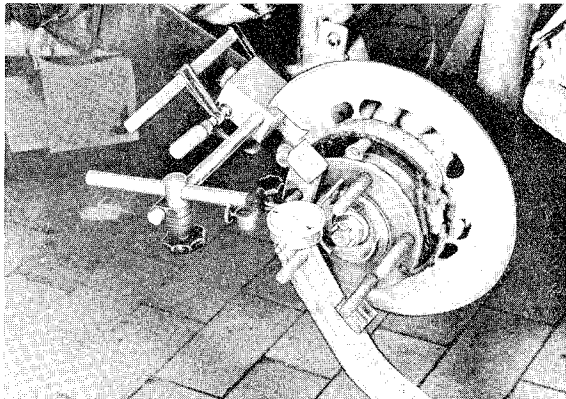


8. Remove special tool P 289. Pull out drive shaft with joint toward inside of car.
9. Remove cotter pin and castle nut at parking brake cable. Pull out parking brake cable on inside of car.
10. Detach rear axle trailing arm at cross tube and strut. Remove rear axle trailing arm.



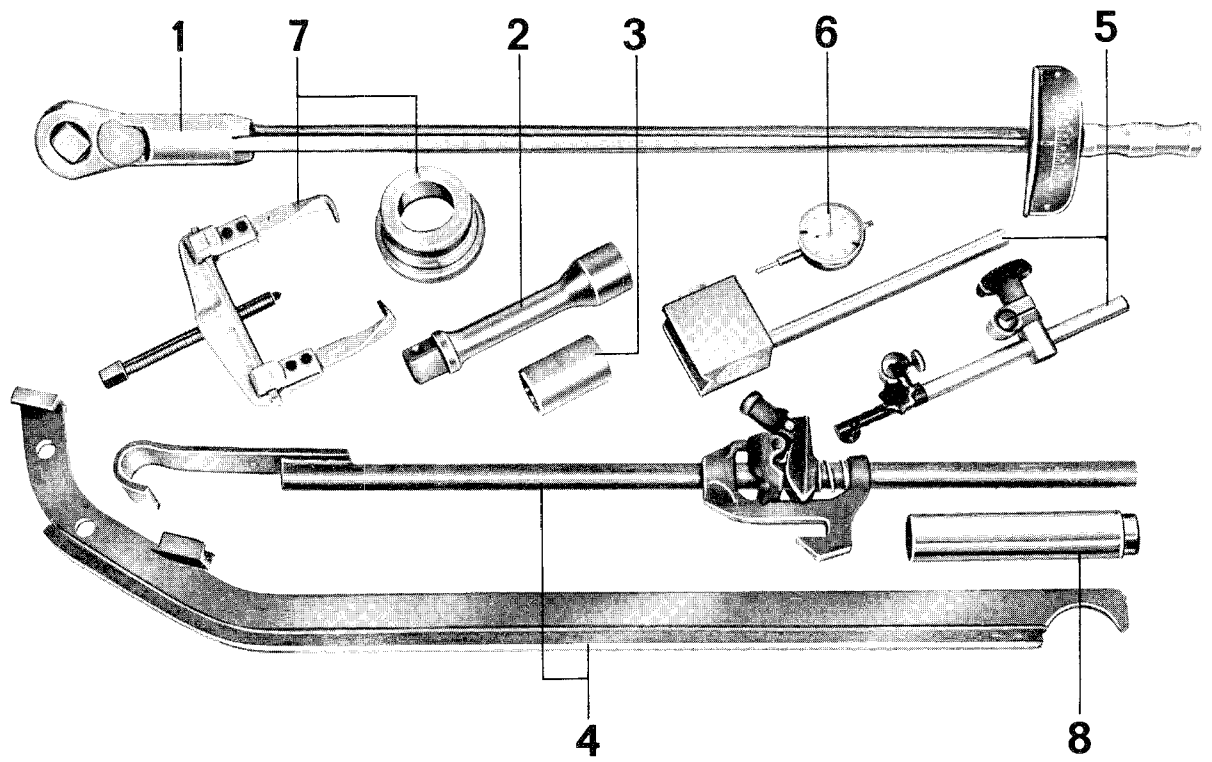
Installing

1. Slide in drive shaft through rear wheel hub before securing the shock absorber.
2. Install spacer and parking brake cable.
3. Torque axle nuts to specifications.
4. Check axial play of wheel bearings.
Max. wheel bearing play is 5/100 mm.
Adjust play if necessary.

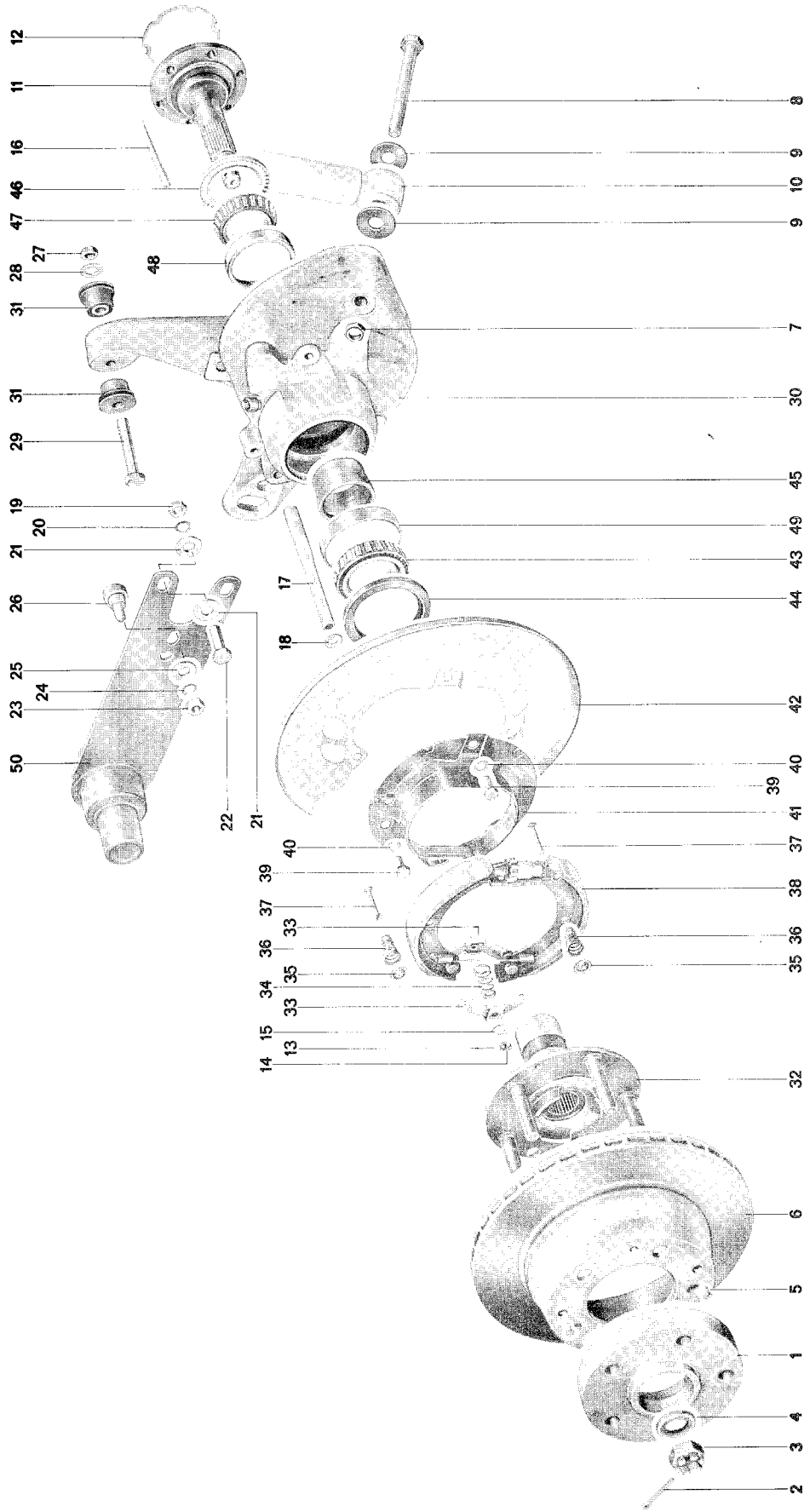


5. Lock castle nut.
6. Install brake disc, adjust parking brakes and bleed brakes.
7. Torque all screws and bolts to specifications.

TOOLS



No.	Description	Special Tool	Remarks
1	Torque wrench		Commercial item, up to 750 Nm (75 kpm)
2	Extention		Commercial item
3	Hexagon socket SW 30		Commercial item
4	Strut retractor	P 289	Check tool, see page 42 - 8
5	Dial gauge holder with magnetic column		Commercial item
6	Dial gauge		Commercial item
7	Extractor with grip ring		Commercial item
8	Removal mandrel	P 297 a	



No.	Description	Amt.	Notes		Remarks
			Removing	Installing	
1	Spacer	1			
2	Cotter pin	1		Replace, if necessary	
3	Castle nut	1		Torque to specifications	
4	Washer	1			
5	Screw M 6	2		Torque to specifications	
6	Brake disc	1		Check for wear	
7	Hex nut M 14 x 1.5 self-locking	1		Torque to specifications	
8	Hex hd screw	1			
9	Washer	2			
10	Vibration damp.	1			
11	Drive shaft	1	Pull out on inside of car		
12	Gasket	1		Paste to drive shaft	
13	Cotter pin	1		Replace	
14	Castle nut M 6	1		Screw on parking brake cable until cotter pin hole aligns	
15	Washer	1			
16	Parking brake cable	1		Pull out on inside of car	
17	Spacer	1		Install correctly, large pipe dia. faces in.	
18	Washer	1			

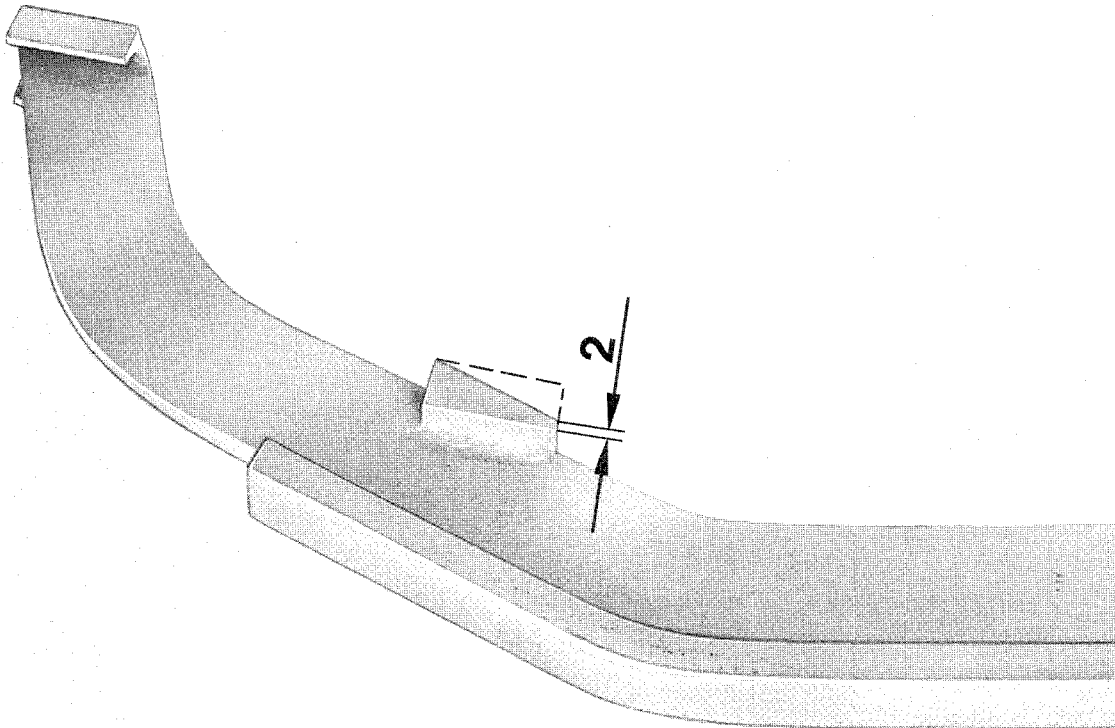
No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
19	Nut M 12 x 1.5	2		Torque: 120 Nm	page 42 - 11
20	Lockwasher	2			page 42 - 11
21	Washer	4			
22	Bolt	2			page 42 - 11
23	Nut M 12 x 1.5	2		Torque: 85 Nm	page 42 - 11/12
24	Lockwasher	2			page 42 - 11/12
25	Washer	1		only with camber excenter	
26	Camber excenter	1	Mark position for reinstallation		page 42 - 11/12
—	Toe excenter	1			
27	Self-locking nut M 14 x 1.5	1			page 42 - 10
28	Washer	1			
29	Bolt	1			page 42 - 10
30	Trailing arm	1			page 42 - 10/12
31	Flange block	2		Press in to stop	
32	Wheel hub	1	Drive out with P 297 a	Press into outer wheel bearing	
33	Spreader	2		Install correctly	
34	Spring	1			
35	Spring retainer	2		Install correctly	
36	Spring	2			
37	Pin	2		Check for correct fit in spring retainer	
38	Brake shoes with adjuster	1			

No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
39	Bolt	3		Torque: 25 Nm	
40	Lockwasher	3		Replace if necessary	
41	Brake backplate	1			
42	Guard	1			
43	Taper roller bearing, outer	1		Check, lubricate taper rollers with multiple purpose grease	
44	Shaft seal	1		Press in to stop	
45	Spacer	1		Install in correct position	
46	Shaft seal	1		Press in to stop	
47	Taper roller bearing, inner	1		Check, lubricate taper rollers. Drive on hub until bearing rests on spacer.	
48	Outer bearing race	1	Heat arm and drive out	Heat arm and drive in with suitable mandrel	
49	Outer bearing race	1	Heat arm and drive out	Heat arm and drive in with suitable mandrel	
50	Strut	1		Strut angle specified on page 42 - 01 and 44 - 1	Two-piece rear axle strut since 1977 models for correction of car height and wheel load difference with an excenter bolt. Struts adjusted in plant that entire range for higher adjusting is available.

MACHINING STRUT RETRACTOR P 289

Various modifications have been made on the rear axle of 911/911 Turbo cars since the beginning of production.

Consequently the holder on P 289 must be adapted to the present state. If tool is not changed, the light alloy rear axle trailing arms could be damaged when clamping the tool between spring strut and trailing arm to tighten the mounting bolts.



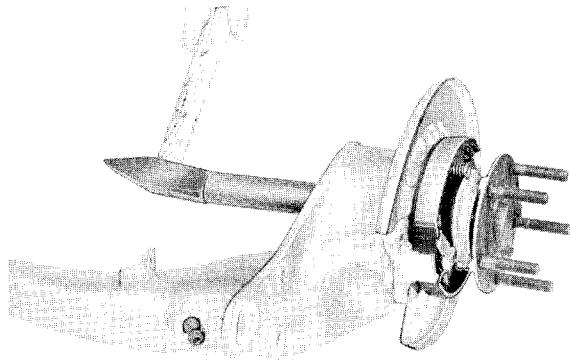
----- Holder shape before machining

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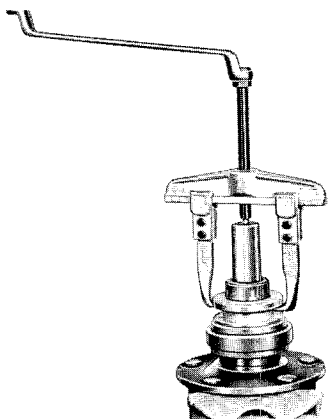
DISMANTLING AND ASSEMBLING INSTRUCTIONS

Disassembling

1. Drive out rear wheel hub with special tool P 297 a.



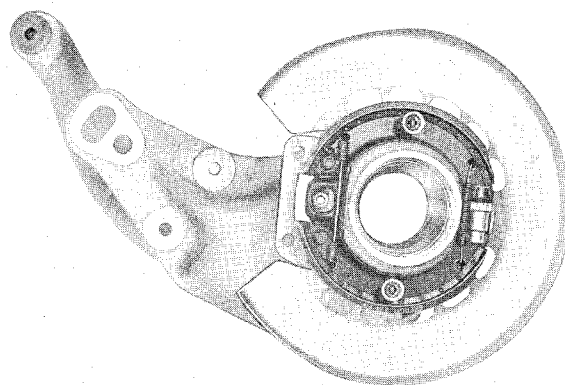
2. Pull wheel bearings off of rear wheel hub. Use extractor with grip ring. Only grab hold of bearing at rollers.



3. Heat trailing arm (heating plate, oven). Drive outer bearing races out of trailing arm.

Assembling

1. Heat trailing arm. Insert outer bearing races and drive in with an appropriate mandrel.
2. Install parking brake with anchor and guard on trailing arm. Install inner cross spring.

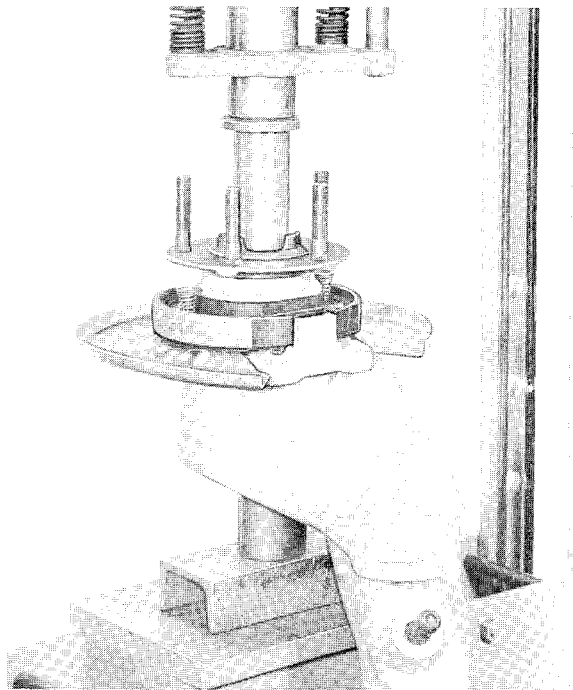


3. Lubricate bearing surfaces of trailing arm with a multi-purpose lubricant (fill space between both bearing surfaces in arm).

4. Place outer bearing in arm. Lubricate taper rollers.

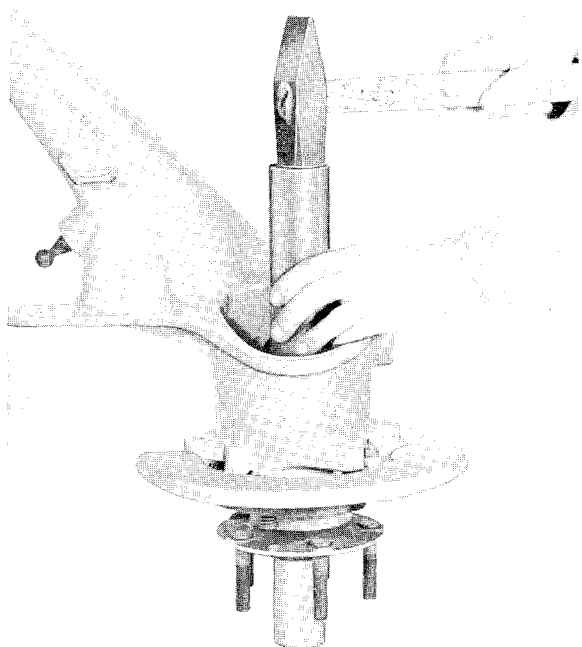
5. Press in outer shaft seal to correct position.

6. Press wheel hub into outer wheel bearing.



7. Install spacer.

8. Lubricate inner taper roller bearing and drive it onto the wheel hub until bearing rests on spacer.



9. Bolt rear axle trailing arm on body (refer to information note for point 11). Slide in propeller shaft with drive shaft.

10. Adjust rear wheel bearings.

11. Adjust parking brake. Bleed brakes. Torque all screws and bolts to specifications.

Note :

The bolting and tightening torques for rear axle trailing arms to rear axle cross tube and rear axle trailing arms to spring struts have been changed.

Rear Axle Trailing Arm to Rear Axle Cross Tube

Tightening torque increased from 60 to 100 Nm. This requires the use of a higher self-locking nut (12 mm instead of 9 mm, length of threads now 80 mm instead of 75 mm).

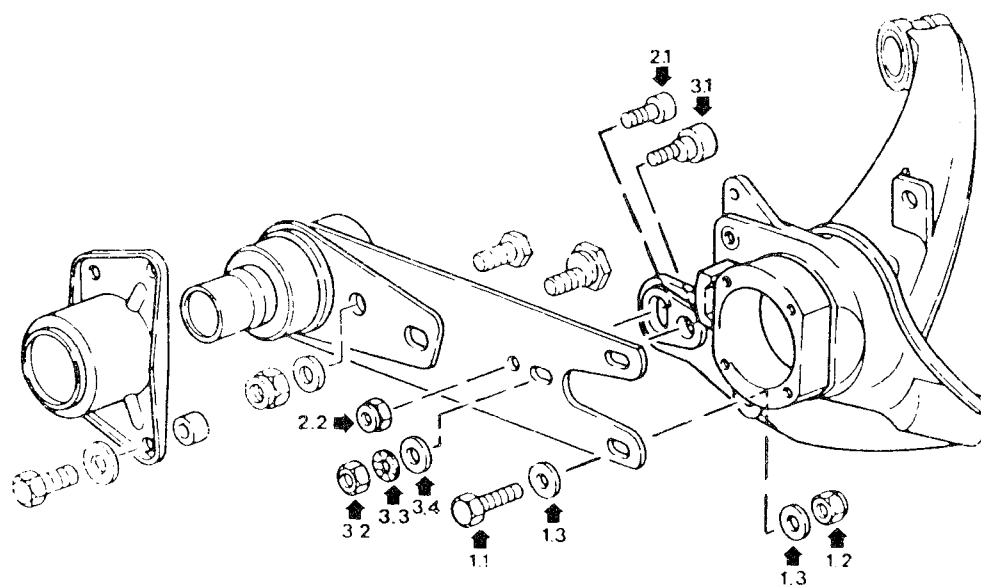
Mount parts with the 12 mm high nut and 80 mm long bolt.

There is not sufficient space for this in 911 Sportomatic models. In this case the increased tightening torque may also be applied on the 9 mm high nuts. However, tightening the 9 mm high nut with a torque of 100 Nm (10.0 kpm) is only permissible once, so that these nuts must always be replaced after loosening or removing.

Rear Axle Trailing Arm to Spring Strut

Self-locking nuts are used instead of hexagon nuts with lockwashers (Schnorr) on rear axle trailing arm/spring strut connections and toe excenters beginning with December of 1983. The tightening torque value was also increased. The new bolts and self-locking nuts can be installed retroactively. The higher torque value is applicable to old and new version bolting. It is recommended to replace removed self-locking nuts.

Survey of Changes



1. Rear Axle Trailing Arm – Spring Strut

	Old	New
1.1 Bolt	900.083.019.08 (M 12 x 1.5 x 35)	900.083.025.08 (M 12 x 1.5 x 40)
1.2 Nut M 12 x 1.5	900.076.035.02 (hex. nut)	900.910.085.02 (self-locking nut)
Lockwasher	999.523.109.02	none
1.3 Washer (bolt head and nut ends)	901.333.143.01	same
Tightening torque	90 Nm	120 Nm

2. Toe Excenter	Old	New
2.1 Excenter	901.333.133.05	same
2.2 Nut M 12 x 1.5	900.076.035.02 (hexagon nut)	900.910.085.02 (self-locking nut)
Lockwasher	999.523.109.02	none
Tightening torque	60 Nm	85 Nm

3. Camber Excenter	Old	New
3.1 Excenter	901.333.133.04	same
3.2 Nut M 12 x 1.5	900.078.017.02	same
3.3 Lockwasher	999.523.109.02	same
3.4 Washer	901.333.143.01	same
Tightening torque	60 Nm	85 Nm

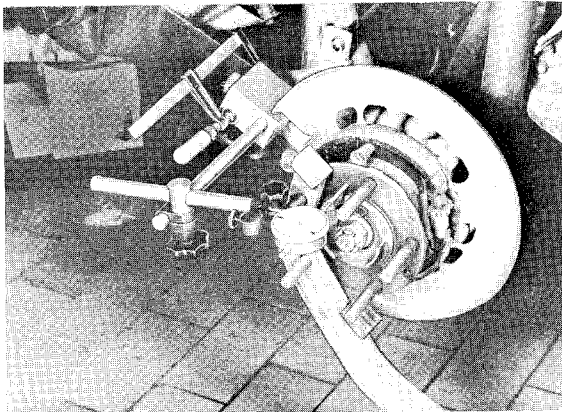
ADJUSTING REAR WHEEL BEARINGS

The spacer between both rear wheel bearings is designed to be shortened in length permanently when tightening the castle nut more than a certain torque (normally more than 300 Nm / 217 ft.lbs.)

1. Tighten castle nut to 20 kpm (145 ft. lbs.). Check axial play (specification: more than 5/100 mm). Replace spacer, if length had already been shortened (axial play less than 5/100 mm).

Note

Dial gauge holder must be mounted on trailing arm or spring strut.



2. Tighten castle nut to 30 kpm (217 ft. lbs.). Re-check axial play.

3. Continue turning nuts until an axial play of 4/100 to 1/100 mm is reached (while turning the torque could rise up to 45 kpm/325 ft. lbs.).

Note

Check play several times while tightening and also observe the cotter pin hole.

4. Insert cotter pin. Loosen nut when nut is offset to cotter pin hole. Tighten nut to specified torque (30 to 32 kpm/217 to 231 ft. lbs.) and then tighten further until nut can be locked.

5. Check axial play. Play must not exceed 5/100 mm. Repeat adjusting procedures from point 3, if play is greater.

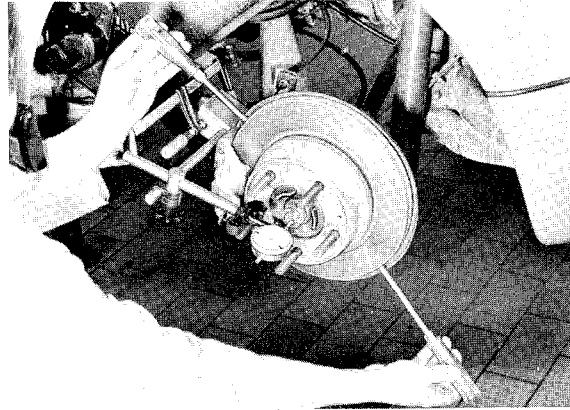
Note

No axial play can be accepted, if a wheel bearing friction force of max. 1.5 kp (3.2 lbs.) is not exceeded with cotter pin inserted and tightening torque of at least 32 kpm (231 ft. lbs.) (adjustment of axial play and possibly further tightening to next cotter pin hole).

CHECKING WHEEL BEARING PLAY

1. Remove wheel and take off brake liners.
2. Secure dial gauge holder with dial gauge to rear axle trailing arm or strut.
3. Check axial play.

Adjust play if it is more than 0.05 mm
(see page 42 - 13).



REAR AXLE TORQUE SPECIFICATIONS

Location	Description	Threads	Class	Torque	
				Nm	ft lbs
Cover to body	Hex hd screw	M 10	8.8	47	34
Trailing arm to cross tube	Self-locking nut	M 14 x 1.5	10	100*	72 *
Strut to trailing arm	Excenter	M 12 x 1.5	8.8/10.9	85	61
Strut to trailing arm	Hex hd screw	M 12 x 1.5	10.9	120	87
Caliper to trailing arm	Hex hd screw	M 12 x 1.5	8.8	60	43
Shock absorber to trailing arm	Hex hd screw	M 14 x 1.5	8.8/10.9	125	90
Shock absorber to body	Hex nut	M 10 x 1	8	25	18
Brake line	Coupling	M 10 x 1		12	9
Stabilizer to body	Hex hd screw	M 8	8.8	25	18
Drive shaft flange	Capscrew	M 10	12.9	83	60
Guard and brake backplate to trailing arm	Bolt	M 8	8.8	25	18
Wheel to hub	Nut	M 14 x 1.5		130	94
Hub to drive shaft	Castle nut	M 20 x 1.5	10.9	300 - 320	217 - 231
Brake disc to hub	Ctsk screw	M 6	8.8	5	4
Stabilizer to link	Nut	M 12 x 1.5	8/8.8	85	61
Stabilizer link to rear axle control arm	Bolt	M 12 x 1.5	8.8	85	61
Adjusting lever to strut	Bolt	M 16 x 1.5	10.9	245	177
Adjusting lever to strut	Eccentric Bolt	M 16 x 1.5	10.9	245	177

* Refer to information on page 42 - 10.

WHEELS, TIRES
WHEEL ALIGNMENT

AXLE ALIGNMENT SPECIFICATIONS

The following specifications apply to a car at curb weight according to DIN 70020 (car with full fuel tank, spare wheel and tools).

(In brackets: Turbo Carrera USA, Turbo Canada, Japan until end of 1982 models only.
Beginning with 1983 models same values as for R. o. W. models.)

	Specification and tolerance	Max. difference betw. left/right
Front axle		
Height adjustment:		
Wheel center to torsion bar center	94 mm \pm 5 mm (85 mm \pm 5 mm)	5 mm
Toe — not pressed	+ 15' \pm 5'	
Difference angle at 20° lock (toward toe)	0° to + 30'	Can only be adjusted by replacing steering levers
Camber, front wheel (pointing straight ahead)	0° \pm 10' (+ 30' \pm 10')	10'
Castor	6° 5' \pm 15'	30'
Rear Axle		
Height adjustment:		
Cross tube center to rear wheel cen.	12 mm \pm 5 mm (37 mm \pm 5 mm)	8 mm
Strut angle from 1978 models, turbo 3.3	31° (34°) 33° (37°)	0.5°
Each degree of change in strut angle will alter car height by ca. 7 to 9 mm		
Toe per wheel	+ 10' \pm 10'	20'
Camber	- 50' \pm 10' (0° \pm 10')	20'
from 1978 models, turbo 3.3	- 30' \pm 10' (0° \pm 10')	

TECHNICAL DATA

Rims and Tires

Rims	Forged aluminum
Standard tires — front wheels rear wheels	185/70 VR 15 on 7" aluminum rim 215/60 VR 15 on 8" aluminum rim
Cold tire inflation — front rear	2.0 bar 2.5 bar
Special tires — front wheels rear wheels	205/50 VR 15 on 7" aluminum rim 225/50 VR 15 on 8" aluminum rim
Cold tire inflation — front rear	2.0 bar 2.5 bar
Winter tires — front and rear	See page 44 - 05 (for special tires as 1976 models, see page 44 - 02)
Cold tire inflation	Same as standard tires
Spare wheel *	Collapsible tire on 5 1/2 J 15 steel rim, compressor supplied

* When using special tires together with a limited slip differential, the collapsible tire (spare wheel) can only be used on front axle wheels.

TECHNICAL DATA (since 1976 models)

Rims and Tires	Turbo	Turbo Carrera (USA)
Rims	Forged aluminum	Forged aluminum
Standard tires Front wheels Rear wheels	205/50 VR 15 on 7" rims 225/50 VR 15 on 8" rims	185/70 VR 15 on 7" rims 215/60 VR 15 on 8" rims
Special tires Front wheels Rear wheels	185/70 VR 15 on 7" rims 215/60 VR 15 on 8" rims	— —
Tire inflation pressure (cold) Front wheels Rear wheels	2.0 bar 2.5 bar	2.0 bar 2.5 bar
Winter tires (front + rear)	** 185/70 SR 14 M + S or 185/70 HR 14 on 5 1/2 J x 14 forged rims	
Tire inflation pressure (cold)	Same as for standard tires	
Spare wheel *	Collapsible tire on 5 1/2 J x 15 steel rim, incl. compressor	
* When using standard tires 50 % in conjunction with a limited slip differential, the collapsible tire wheel can only be used on the front axle wheels.		Not applicable in the USA.

** Only valid for cars equipped with standard 50 summer tires in 15" version.
See page 44 - 05 for cars with other summer tire sizes.

TECHNICAL DATA (since 1977 models)

Rims and Tires	Turbo and Turbo Carrera (USA)
Rims	Forged aluminum
Standard tires	
Front wheels	205/55 VR 16 on 7" rims
Rear wheels	225/50 VR 16 on 8" rims
Special tires	
Front wheels	185/70 VR 15 on 7" rims
Rear wheels	215/60 VR 15 on 8" rims
Cold tire inflation pressure	
Front wheels	2.0 bar
Rear wheels	2.5 bar
Winter tires	
Front) See page 44 - 05
Rear	
Front and rear	
Cold tire inflation pressure	Same as for standard tires
Spare wheel	Collapsible tire on 5 1/2 J x 15 steel rim Compressor supplied 2.2 bar inflation pressure

TECHNICAL DATA (since 1978 models)

Rims and Tires

Rims	Forged aluminum	
Tires		
Front wheels	205/55 VR 16 on 7 J x 16 rims	
Rear wheels	225/50 VR 16 on 8 J x 16 rims since 1986 models: 245/45 VR 16 on 9 J x 16 rims	
Spare wheel	Collapsible 165/15 tire on 5 1/2 J x 15 rim including compressor	
Cold tire inflation pressure	Turbo	Turbo - USA, Japan, Canada
Front wheels	2.0 bar	2.0 bar
Rear wheels	3.0 bar	2.5 bar or 3.0 bar*
Spare collapsible tire wheel	2.5 bar or 2.2 bar**	2.5 bar or 2.2 bar**
Winter tires	See page 44 - 05	

* The max. permissible inflation pressure specified on the tire is applicable.

“max. press 36 psi” = 2.5 bar pressure

“max. press 44 psi” = 3.0 bar pressure

From 1986 models on only tires with “max. press 44 psi” = 3.0 bar pressure are supplied.

** 2.2 bar pressure for 165 - 15 4 PR 83 P tires.

2.5 bar pressure for 165 - 15 8 PR 89 P tires.

TECHNICAL DATA

Winter Tires*

This table is not valid for 911 Turbo cars standard with 50 summer tires in 15" version (1976 model and optional extra equipment for 1975 model).

Tire Size**	Possible and Recommended Rim Sizes (Recommended Sizes are Underlined)	
185/70 R 15 M + S 88 T	6 J x 15 H2 front and 7 J x 15 H2 rear 6 J x 15 H2 front and rear 7 J x 15 H2 front and rear	
195/65 R 15 M + S 91 T	Same rim sizes as for 185/70 R 15 tires (see above)	
185/70 R 15 M + S 88 T 215/60 R 15 M + S 90 T (rear)	6 J x 15 H2 front 7 J x 15 H2 rear	or 7 J x 15 H2 front 8 J x 15 H2 rear
195/65 R 15 M + S 91 T 215/60 R 15 M + S 90 T	6 J x 15 H2 front 7 J x 15 H2 rear	or 7 J x 15 H2 front 8 J x 15 H2 rear
205/55 R 16 M + S 88 T	6 J x 16 H2 front and <u>7 J x 16 H2 rear</u> 6 J x 16 H2 front and rear 7 J x 16 H2 front and rear	
205/55 R 16 M + S 88 T 225/50 R 16 M + S 92 T (rear)	6 J x 16 H2 front 7 J x 16 H2 rear	or <u>7 J x 16 H2 front</u> <u>8 J x 16 H2 rear</u>

Cold tire inflation pressure: same as summer tires.

* Refer to Technical Information of Group 4 for information and recommendations concerning winter tires and tire chains. Only use forged aluminum wheel rims.

** M + S tires in version Q (SR) may also be used. Tires with higher load capacities, of course, may also be used.

Tire Codes:

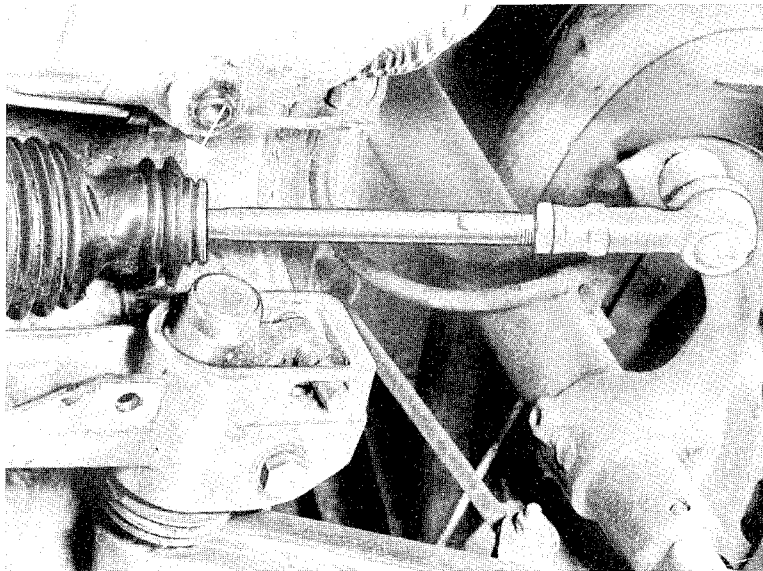
- Q (SR) = Version for top speed of 160 km/h
 T (HR) = Version for top speed of 190 km/h
 88 = Max. load capacity 560 kg
 89 = Max. load capacity 580 kg
 90 = Max. load capacity 600 kg
 91 = Max. load capacity 615 kg
 92 = Max. load capacity 630 kg

AXLE ALIGNMENT INSTRUCTIONS

Due to the steering box seal of the tie rods, when adjusting toe the dust cover is turned and could be damaged.

To avoid this, the dust cover must be pulled off the tie rod seat.

Return the dust cover after completing adjustments.



CHECKING THICKNESS OF BRAKE PADS

Cars without Brake Pad Wear Indicator

Brake pads must be replaced when thickness of 2 mm is reached.

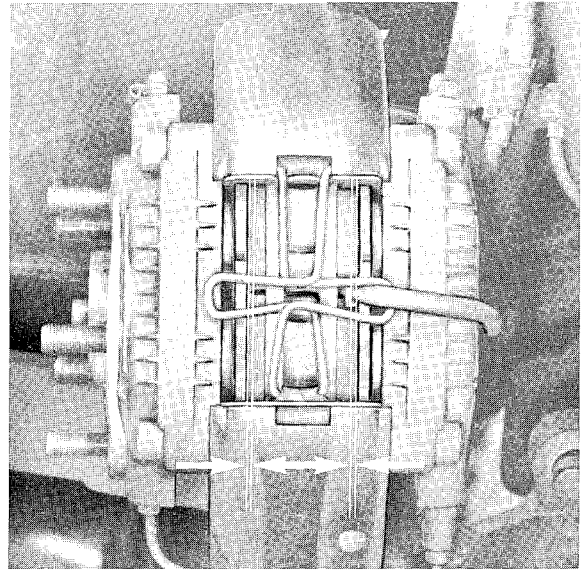
Cars with Brake Pad Wear Indicator (since 1984 Models)

All brake pads of one axle must be replaced when the brake pad wear indicator lamp comes on and, however, not later than after reaching a thickness of 2 mm. If brake pad wear is indicated by the lamp, the warning contact (sensor with lead and plug) must also be replaced. The warning contact need not be replaced, if brake pads are replaced at latest when reaching a thickness of 2.5 mm.

Warning contacts with ground cores of leads must be replaced. Replacements, however, are not necessary when only the plastic part of the warning contact is ground.

1. Remove wheels to check brake pad thickness.

2. Visually inspect brake pads for wear.



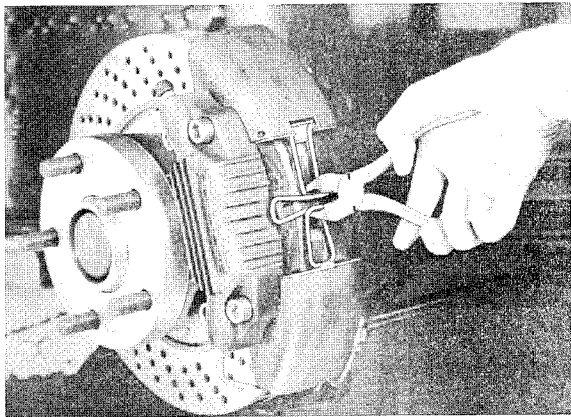
The wear limit is reached when the pads have a remaining thickness of 2 mm.

REMOVING AND INSTALLING BRAKE PADS – TURBO 3.3, BEGINNING WITH 1978 MODELS

Removing

If brake pads are supposed to be reused, mark them when removing. It is not permissible to shift pads from outside to inside or vice versa and from right to left wheel or vice versa, because this could cause uneven braking effect.

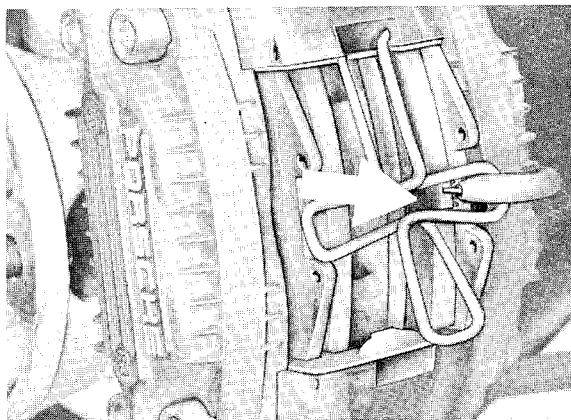
1. Compress spreader spring at center and remove from holding tab.



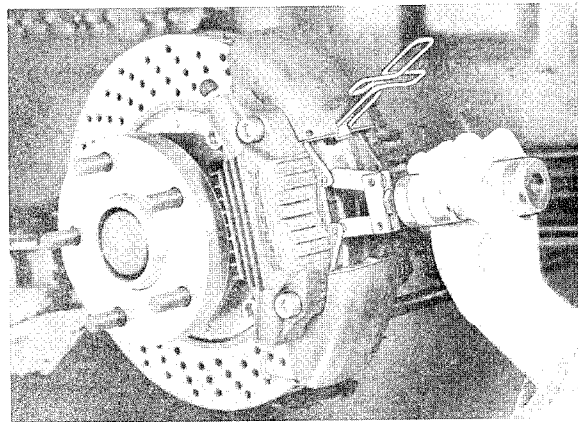
2. Pull warning contact out of pad plate in cars with a brake pad wear indicator. This is done by pulling brake pad out of brake pad recess slightly or disengaging lead in clip on brake line.

Note :

Replace warning contacts, if the lead's core is ground through or ground. The warning contact is still usable, if only the plastic part of the warning contact has signs of grinding.



3. Pull out brake pads with a suitable tool, e. g. Hazet 1966 - 2 impact puller with 4 mm pin diameter.

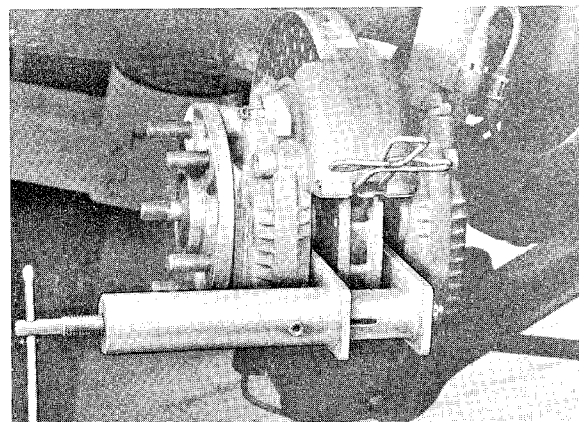


Installing

Note :

Replace brake pads, which show deep cracks, are loose on the brake pad plates or are splattered with oil. In this case, too, it is necessary to replace all four pads of one axle.

1. Push back piston to initial position with piston setback tool.



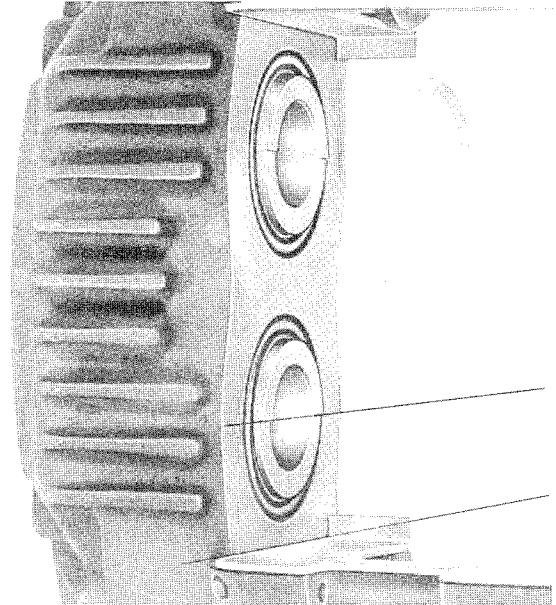
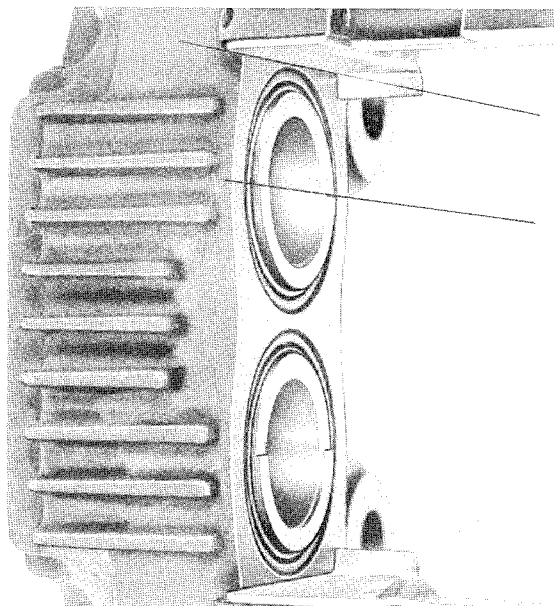
Note :

To prevent brake fluid from spilling, draw off some of brake fluid from tank before pushing back piston. This requires a syringe used exclusively with brake fluids. Brake fluid is poisonous and therefore must not be drawn out through a hose by mouth.

2. Clean seat and guide surface of brake pads in caliper with gasoline or a cylindrical brush. Never use solutions containing mineral oils or sharp edged metal tools.

Brake pad recess play: 0.4 to 0.6 mm.

3. Check position of piston. Edges of shoulder on piston must be parallel to guide surface of brake pad. The shoulder (setback surface) must face down on rear axle and up on front axle (toward brake disc inlet).

Rear Axle**Front Axle**

4. Install brake pads. Guarantee a play of 0.4 to 0.6 mm for brake pads in recess by pertinent steps, if necessary (replacement of spring plates *, cleaning guide surfaces on brake pads, replacement of brake pads).

Note :

Apply a light coat of grease on seats and guide surfaces to prevent seizure of brake pads in brake calipers due to corrosion. Use Optimoly HT (Cu Paste) or Plastilube (Schillings, Postfach 1703, 7080 Aalen).

5. Press warning contact into inner pad plate of cars with a brake pad wear indicator.

* Also refer to Group 47.

TECHNICAL DATA FOR TURBO 3.3 – SINCE 1978 MODELS

Description	Remarks Specifications	Wear Limit
Service brake (foot-operated)	Hydraulic dual circuit brakes with front/rear wheel brake circuit division (black/white), brake booster, inboard vented and perforated brake discs with calipers on all four wheels. Each brake caliper is fitted with four pistons. Push rod brake circuit belongs to rear wheels.	
Tandem brake master cylinder Bore dia. Stroke	23.81 mm 18/14 mm	
Brake pedal to brake booster ratio	5.14	
Brake booster diameter	8 inches *	
Boosting factor Since 1985 models	2.25 3.0	
Play at brake pedal with bled brakes and stopped engine	at least 10 mm	
Piston dia. in caliper	front 38 mm rear 30 mm	
Brake disc dia.	front 304 mm rear 309 mm	
Effective brake disc dia.	front 247 mm rear 251 mm	
Pad area of each front wheel	94 cm ²	
Pad area of each rear wheel	94 cm ²	
Total pad area	376 cm ²	
Pad thickness	front 13 mm rear 13 mm	2 mm 2 mm
New brake disc thickness	front 32 mm rear 28 mm	

* The internal ratio (boosting factor) in the brake booster has been changed: formerly 2.25, since 1985 models 3.0. Code since 1985 models: label showing 3.0 ratio. It is possible to install the modified brake booster in older models (beginning with 1978).

Description	Remarks Specifications	Wear Limit
Min. brake disc thickness after machining *	front 30.6 mm rear 26.6 mm	30 mm 26 mm
Thickness tolerance	max. 0.02 mm	
Brake disc lateral runout	max. 0.05 mm	
Installed brake disc lateral runout	max. 0.1 mm	
Peak-to-valley surface finish of brake discs after machining	max. 0.006 mm	
Parking brake (hand-operated)	Drum brakes with mechanical action on both rear wheels	
Brake drum dia.	180 mm	181 mm
Brake shoe width	25 mm	
Liner area per wheel	85 cm ²	
Liner thickness	4.5 mm	2 mm

* Brake disc must only be machined symmetrically, i. e. uniformly on both sides. Deburr vent holes after machining.

TORQUE SPECIFICATIONS FOR MECHANICAL BRAKE PARTS

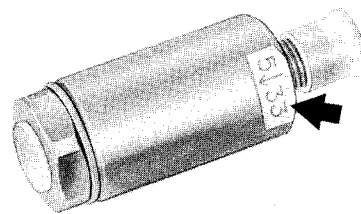
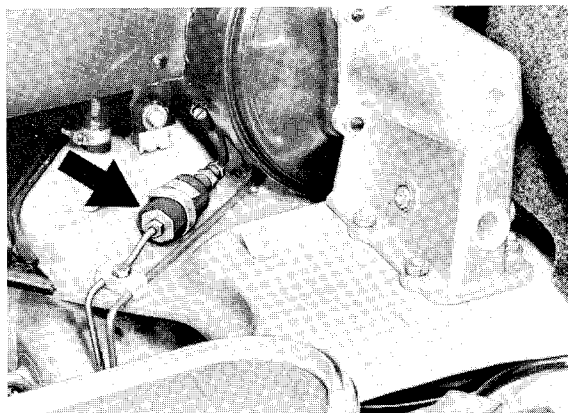
Location	Description	Threads	Class	Torque Nm (ft lb)
Nut on steering knuckle	Socket hd. screw	M 7	10.9	15 (11)
Brake caliper to steering knuckle	Bolt	M 12x1.5	8.8	70 (51)
Brake flange/brake disc to hub	Bolt	M 8	8.8	23 (17)
Brake disc to brake flange	Bolt	M 6	8.8	10 (7)
Splash shield to steering knuckle	Bolt	M 8	8.8	10 (7)
Splash shield and brake backing plate to control arm	Bolt	M 8	8.8	25 (18)
Brake disc to wheel hub	Flat hd. screw	M 6	8.8	5 (3.6)
Brake caliper to control arm	Bolt	M 12x1.5	8.8	60 (43)
Wheel to wheel hub	Wheel nut	M 14x1.5	F 53/10 K	130 (94)

INFORMATION ON BRAKES OF 911 CARRERA TURBO-LOOK

The 911 Carrera in Turbo-Look has the brake system of the Turbo 3.3.

However, the rear wheel brake circuit has a brake force regulator as in the 911 Carrera. The brake force regulator is located on the luggage compartment floor immediately behind the brake master cylinder.

It is bolted on the brake master cylinder of RHD cars.



The second number next to the switching pressure (separated by an arrow showing the direction of flow) indicates the reducing factor.

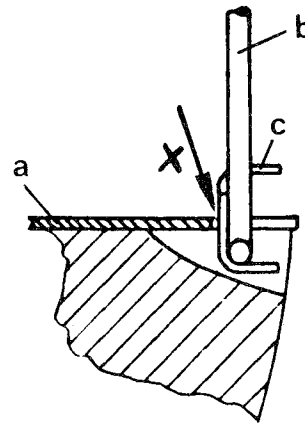
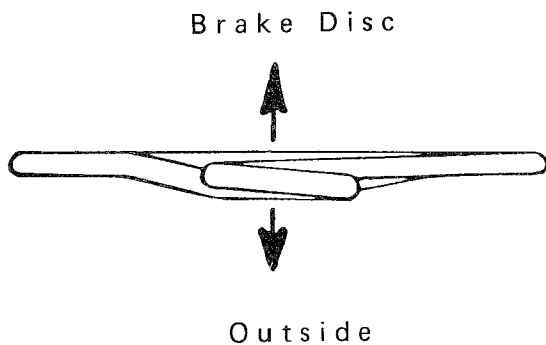
5 means a reducing factor of 0.46.

Brake force regulators with the code "3" (reducing factor = 0.3) must never be used.

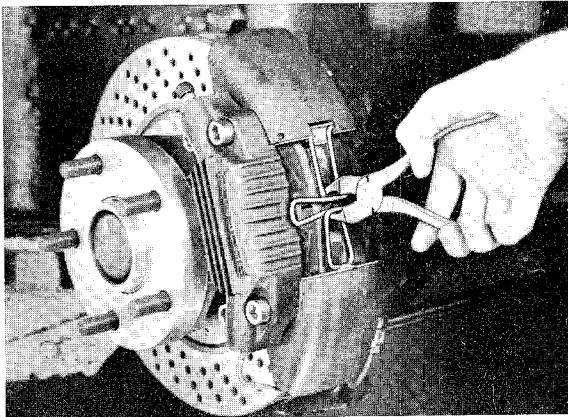
Brake force regulator switching pressure = 33 bar. The switching pressure was changed to 55 bar with the 1985 models. The brake force regulator with a 55 bar switching pressure can also be installed in Turbo-Look cars before 1985 models. The switching pressure is stamped on the brake force regulator.

6. Lubricate engaging eyes of spreader spring in bridge with Optimoly HT or Plastilube.

Install new spreader spring that its flat side faces brake disc. If installed incorrectly, proper fit of brake pads cannot be guaranteed. In addition, high spot at center of cross would scrape on brake disc.



a = Spring plate
b = Spreader spring
c = Lockplate



8. Depress brake pedal of stopped car firmly several times, to move brake pads into their normal operating position. Then check brake fluid level in tank, adding brake fluid if necessary.

7. In 1978 models, which are equipped with initial version spring plates *, the lockplate must still move in the recess after engagement of the spreader spring. This guarantees gap X between the lockplate and spring plate and deformation of the spreader spring is not possible.

Breaking in Brake Pads

Factory new brake pads will require about 200 km of operation before reaching their most favorable friction and wear values. Only then will the pads have adapted themselves to the brake discs and the squeaking noise will now disappear. Try to avoid full stop emergency braking during the breaking in period.

* Also refer to Group 47.

MODIFIED FRONT WHEEL BRAKES FOR 3.3 LITER TURBO

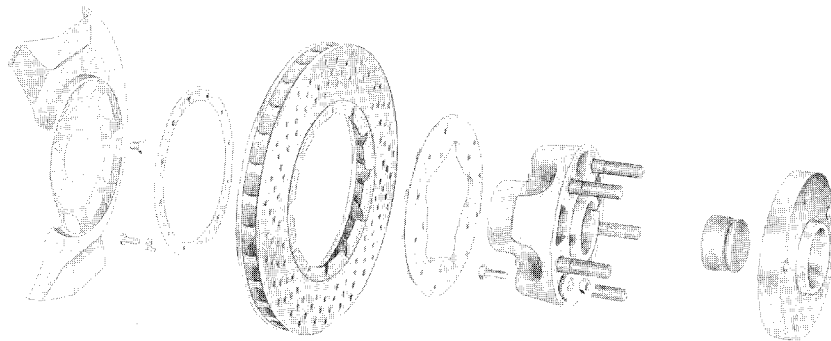
The front wheel brake disc/hub connection is changed since the production of 1981 models. The flange and ring connection has been changed to a brake disc shell connection as on the 911/3.0 ltr. Turbo.

By designing the new brake discs with a shell the total distance (brake disc - hub) is 21 mm longer. Consequently the installation of 21 mm spacers is omitted. It is not permitted to additionally install spacers with the wheel hub.

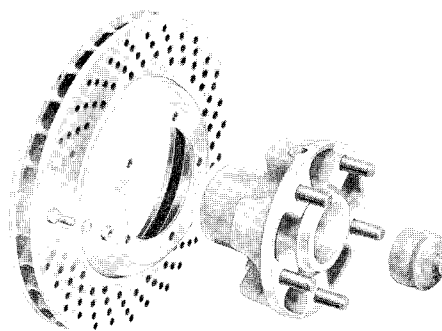
Conversion to new brake discs/wheel hubs is only permitted on both sides simultaneously for 3.3 liters cars before 1981 models.

Removing grease caps is different due to the modified hubs.

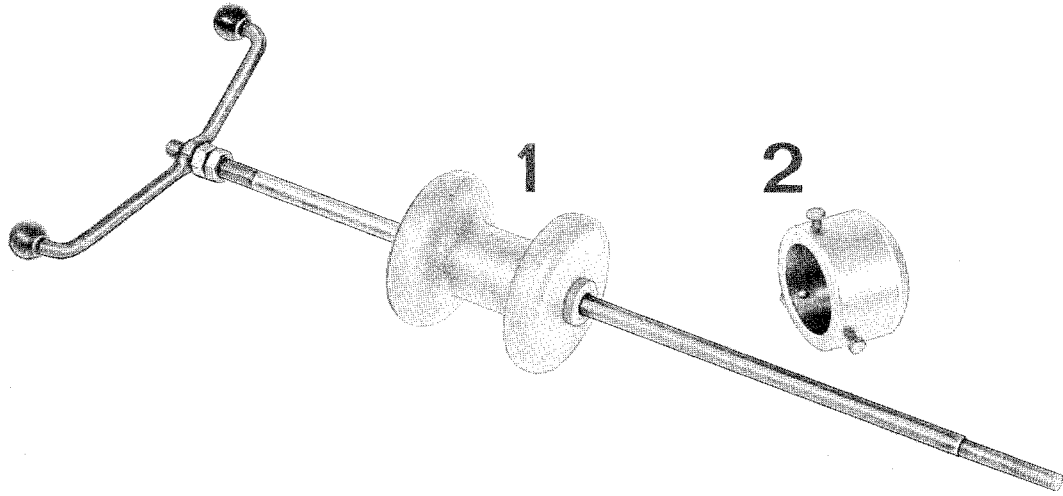
Old Version



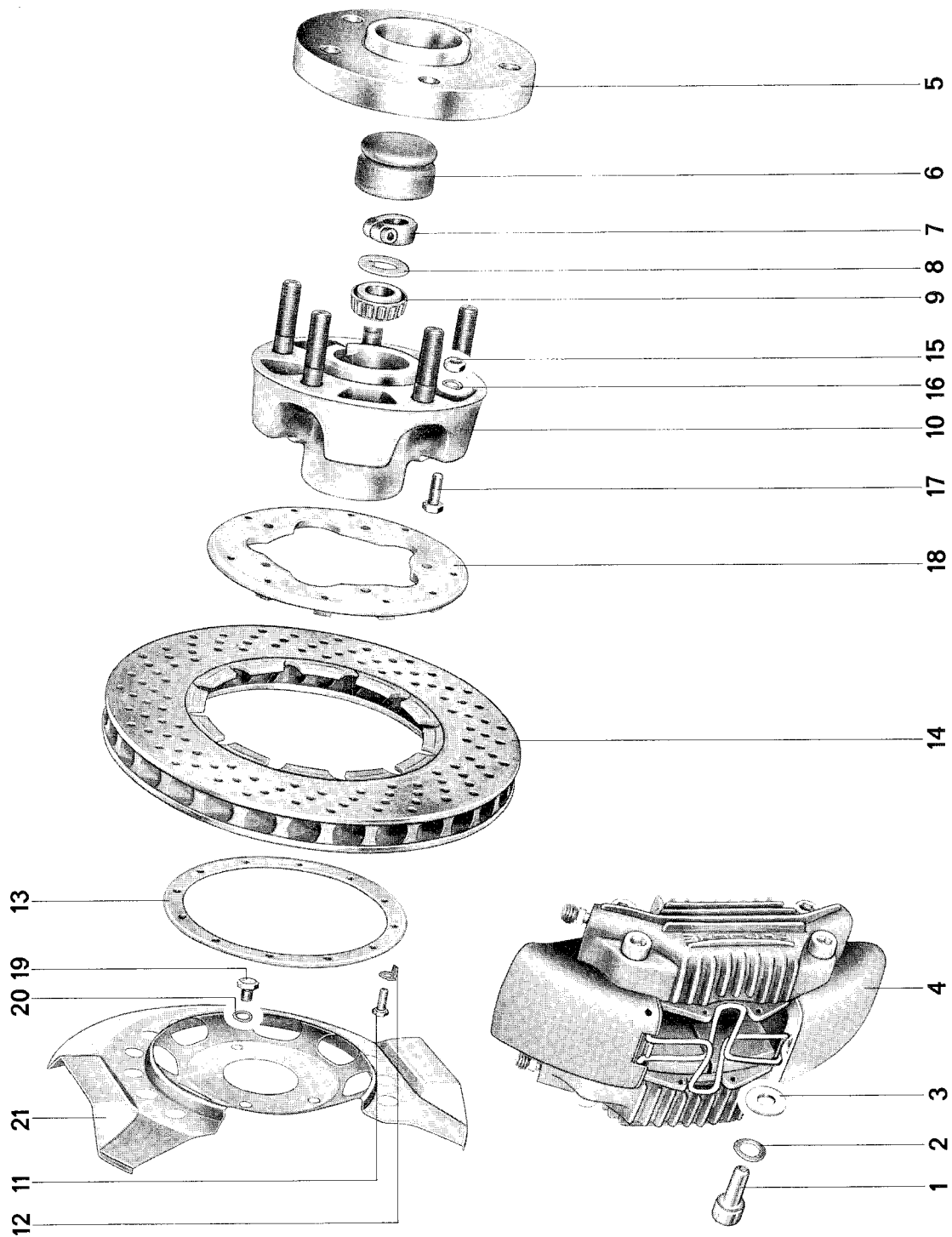
New Version



TOOLS



No.	Description	Special Tool	Remarks
1	Slide hammer	VW 771	
2	Puller	9165	Only required up to end of 1980 models



Note

The front wheel brake applicable up to end of 1980 models is shown. From 1981 models the brake disc/wheel hub connection is changed (see page 46 - 4).

No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
1	Bolt	2		Torque: 70 Nm	
2	Washer	2		Replace, if necessary	
3	Spacer	2		Between caliper and steering knuckle	
4	Brake caliper	1			
5	Spacer	1		Less width than on rear axle (21 mm)	Only version up to end of 1980 models
6	Hub cap	1	See text		Different versions
7	Nut with socket screw	1		Adjust wheel bearing play. Torque socket screw to 15 Nm	
8	Pressure disc	1			
9	Wheel bearing, outer	1		Check, replacing if necessary	
10	Wheel hub	1			2 versions
11	Screw	12		Install screws and tighten uniformly. Torque: 10 Nm	Only version up to end of 1980 models
12	Lockplate	12		Replace	
13	Ring	1			
14	Brake disc	1		Check for wear and damage. If applicable, mark for reinstallation	2 versions

No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
15	Nut	5		Torque: 23 Nm	
16	Washer	5		Replace, if necessary	
17	Bolt	5			
18	Brake flange	1			Only version up to end of 1980 models
19	Screw	3		Torque: 10 Nm	
20	Washer	3		Replace, if necessary	
21	Guard	1		Machine or replace, if necessary	Page 46 - 10 Point 1

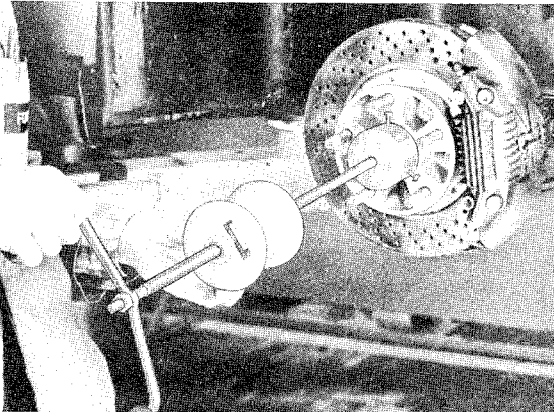
DISASSEMBLING AND ASSEMBLING FRONT WHEEL BRAKES

Disassembling

1. Unscrew and plug brake line to prevent brake fluid from flowing out of reservoir. Unscrew brake caliper.
2. Remove spacer (cars up to end of 1980 model year), but do not use sharp edged tools. Burrs could cause wheels to have lateral runout.
3. Remove grease cap according to version.

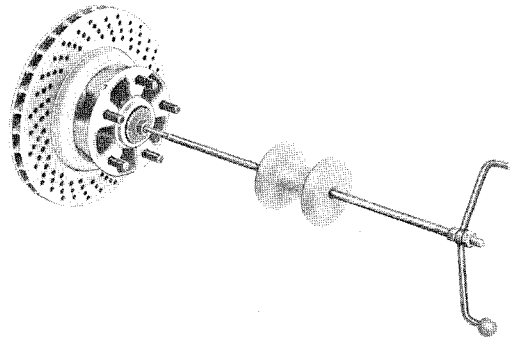
Version A

Up to end of 1980 model year. Knock out grease cap with special Tool VW 771 used in conjunction with 9165.



Version B

Grease caps with welded tapped adapters are installed since Chassis No. 93 Z BS 000094 (October, 1980). These caps can be knocked out with special tool VW 771, without puller 9165.



Version C

The first 1981 model cars (up to above mentioned chassis number) still had grease caps without the tapped adapter. These caps have been ground to the smallest possible diameter at the pressing-in point to reduce the pressing force.

They can be removed with a screwdriver.

4. Unscrew adjusting nut for wheel bearings.
Remove wheel hub with brake disc.
5. Separate brake disc and wheel hub.

DISASSEMBLING AND ASSEMBLING FRONT WHEEL BRAKES

Disassembling

1. Check condition of all parts and replace, if necessary.

Note:

Bridges of brake calipers have cast bosses since 1984 models and this has changed the brake guards.

Only brake calipers or caliper bridges with cast bosses are available for replacements after depletion of stocks in older models. In this case the new brake guard must also be installed or the old guard changed accordingly (cut off).

2. Clean centering surface for brake disc on wheel hub and apply a very thin coat of Optimoly TA.
3. Conversion to new brake discs/wheel hubs on 3.3 liter cars before 1981 model is only permitted simultaneously on both sides.
4. Brake discs must not be mounted on the wrong side, since inboard vent bores arranged evolvently.
Identification: evolvent shape and part number.

Part number is located on the brake disc.

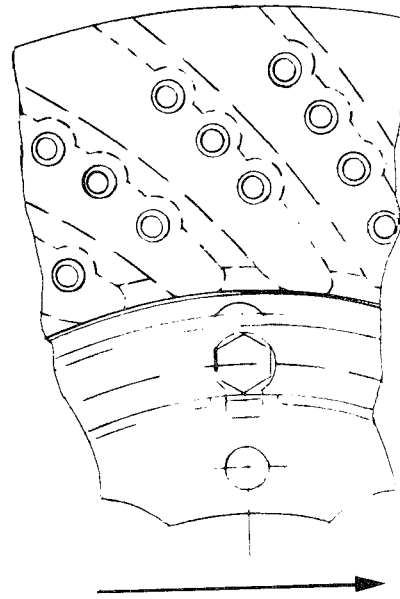
Spare part for left side
– 3rd group number uneven

Spare part for right side
– 3rd group number even

Examples:

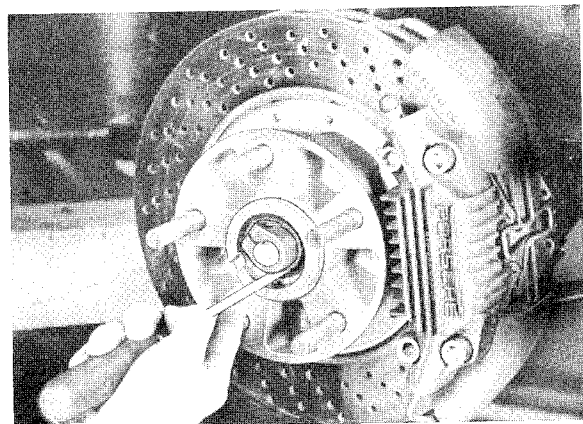
Left brake disc part no.: 930 351 047 00
or 930 351 047 01

Right brake disc
part no.: 930 351 048 00
or: 930 351 048 01

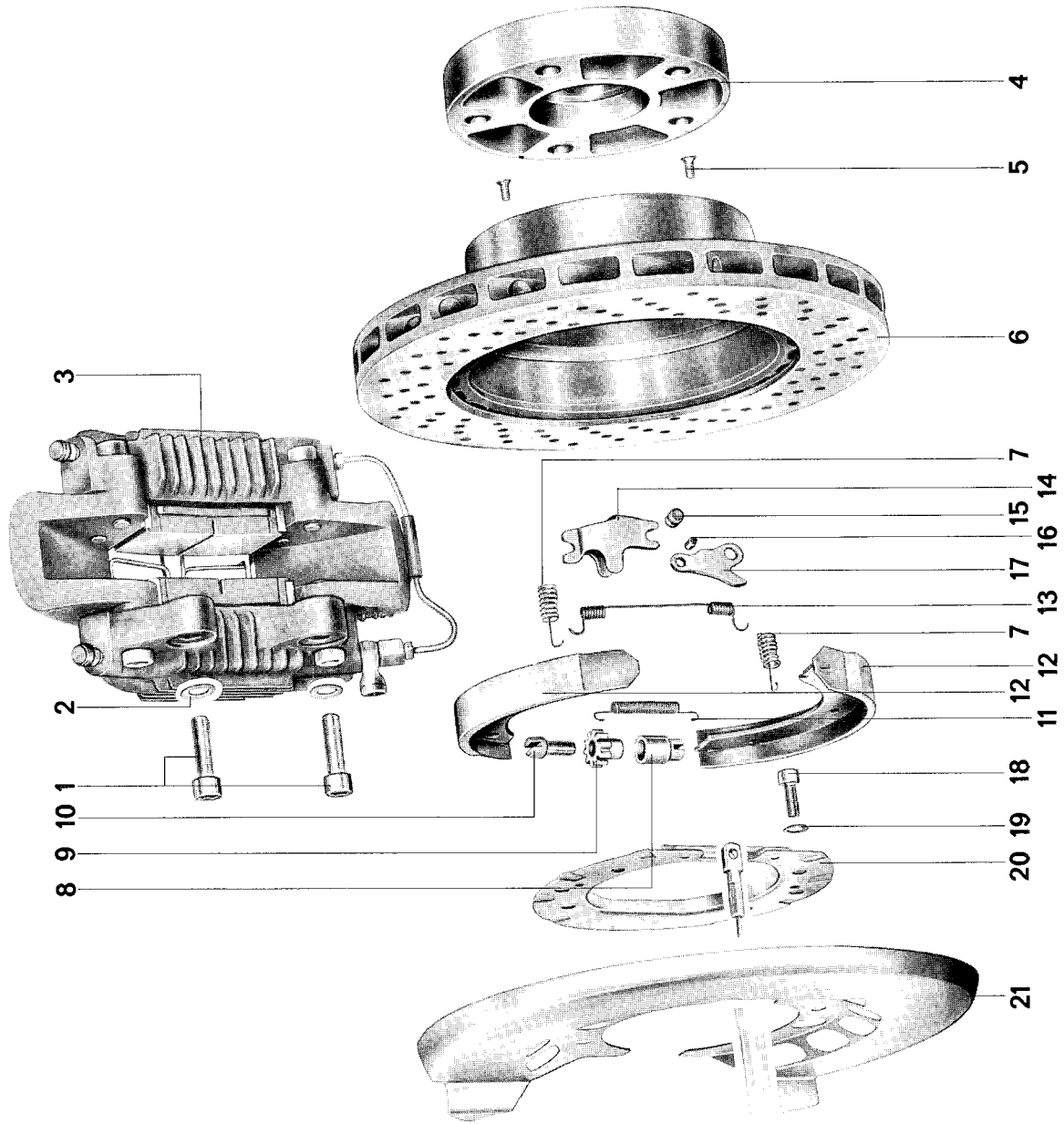


Forward Direction

5. Note torque specifications. Install taper roller bearings with a multi-purpose grease.
6. Adjust wheel bearing play that finger pressure applied to a screwdriver is just adequate to move pressure disc. Do not support screwdriver on hub. To adjust, first tighten nut slightly to keep bearings from seizing.
Drive in hub cap of version C with a piece of pipe to avoid damaging the threads.



7. Make sure brake hose is positioned correctly, when screwing on brake line. Bleed brakes.

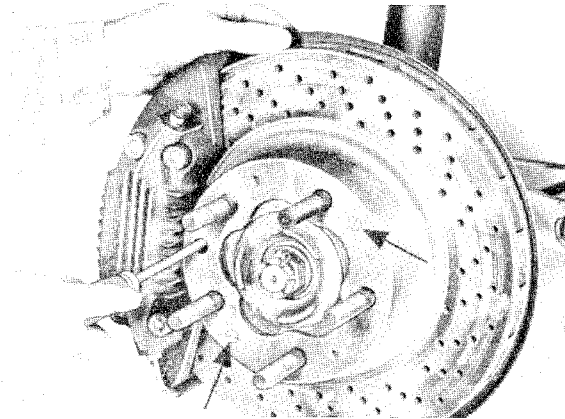


No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
1	Screw	2		Torque: 60 Nm	
2	Washer	2		Replace, if necessary	
3	Brake caliper	1			
4	Spacer	1		Wider than on front axle (28 mm)	
5	Screw	2			
6	Brake disc	1	Set back brake	Check for wear and damage	
7	Spring	2		Hooks must be in holes provided in brake backplate	
8	Support sleeve	1			
9	Adjusting nut	1			
10	Adjusting screw	1			
11	Return spring	1			
12	Brake shoe	2		Replace, if necessary. Wear limit: 2 mm	
13	Return spring	1			
14	Pressure bar	1			
15	Pivot pin	1		Lubricate lightly	
16	Pin	1		Lubricate lightly	
17	Operating lever	1			
18	Screw	4		Torque: 25 Nm	
19	Washer	4			
20	Brake backplate	1			
21	Guard	1		Machine or replace, if necessary	Page 46 - 13 (assembling)

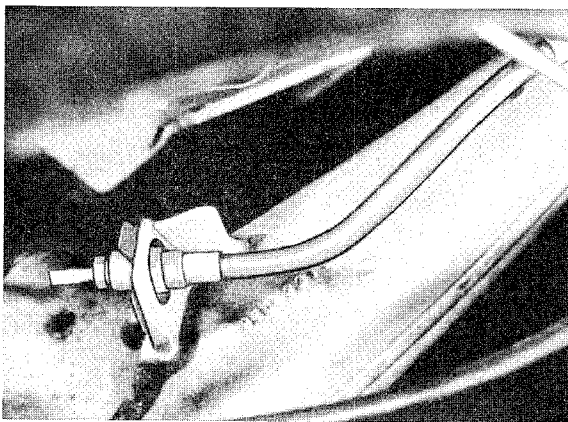
DISASSEMBLING AND ASSEMBLING REAR WHEEL BRAKES

Disassembling

1. Remove spacer. Do not use sharp edged tools. Burrs could cause wheel to have lateral runout.
2. Turn parking brake adjuster in loosening direction. Unscrew two countersunk screws.

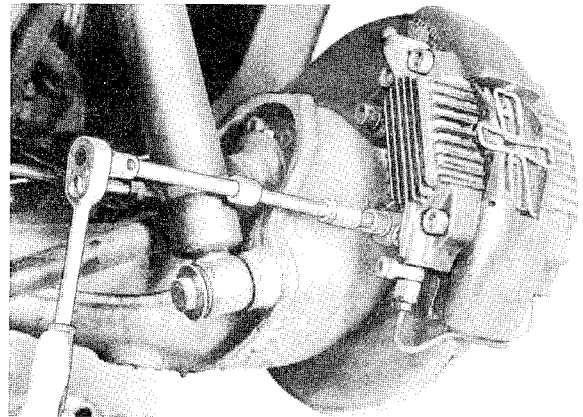


3. Unscrew brake line from brake hose. To prevent brake fluid tank from draining, screw a shortened, plugged piece of brake line in brake hose.



4. Press out brake line holding clip from rear control arm.

5. Unscrew brake caliper and remove brake disc. If a tight fitting brake disc cannot be removed even after applying light knocks with a plastic hammer, screw hexagon head bolts in two 8 mm diameter threads of brake disc uniformly to press off the disc.



Assembling

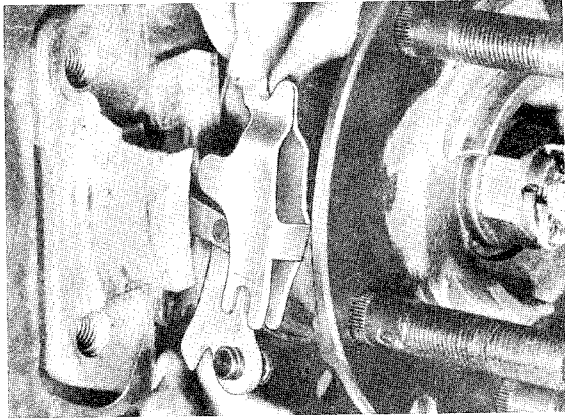
Note :

Bridges of brake calipers have cast bosses since 1984 models and therefore the guards have also been changed.

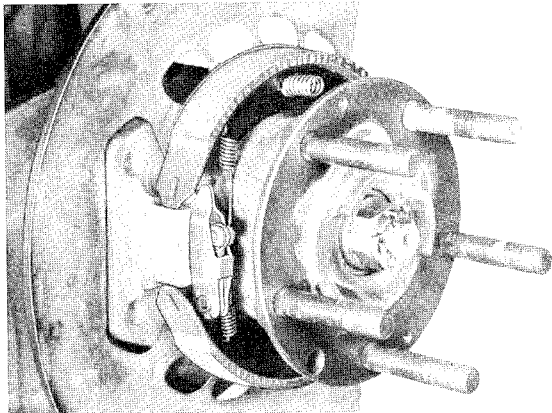
Only brake calipers or caliper bridges with cast bosses will be available for replacements after depletion of stocks in older models. In this case the new brake guard must also be used or the old guard changed accordingly (cut off).

1. Lubricate adjuster, pin of expander lever and sliding surfaces of parking brake shoes slightly.

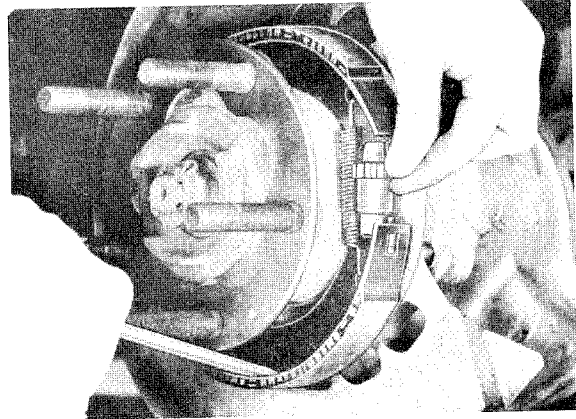
2. Assemble spreader lever.



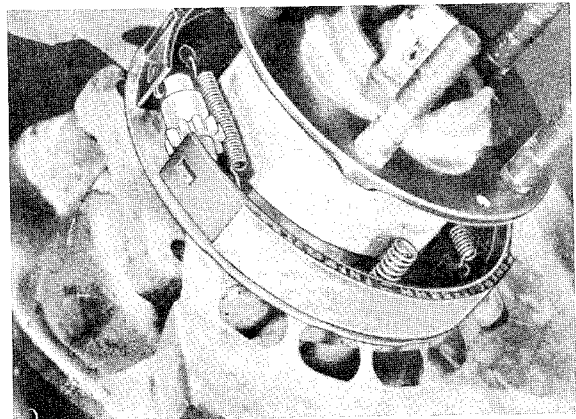
3. Install front (long) return spring with parking brake shoes on brake backing plate. Install rear return spring and upper spring.



4. Press down lower parking brake shoes with a screwdriver. Install assembled adjuster. Mount lower spring.



5. Check parking brake shoes, adjuster, return springs and springs for proper position, correcting if necessary.



Note

Make sure that hooks of springs are positioned in holes provided in brake backing plate.

6. Clean brake disc centering surface on wheel hub and apply a very thin coat of Optimoly HT.
7. Assemble brake disc and brake caliper. Tighten bolts to specified torque. Do not mix up left and right side discs, since inboard vent passages have an involute shape.
Identification: involute shape and part number.
8. Adjust parking brake. Bleed service brakes.

Part number is located on brake disc.

Spare part for left side

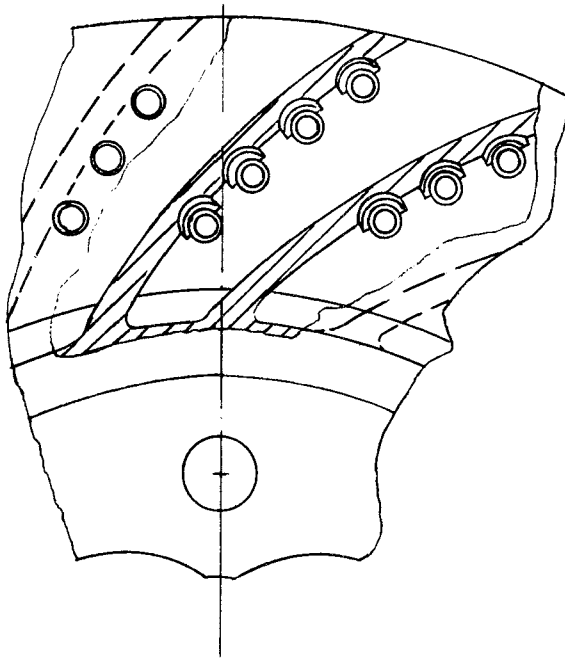
- 3rd group number uneven

Spare part right side

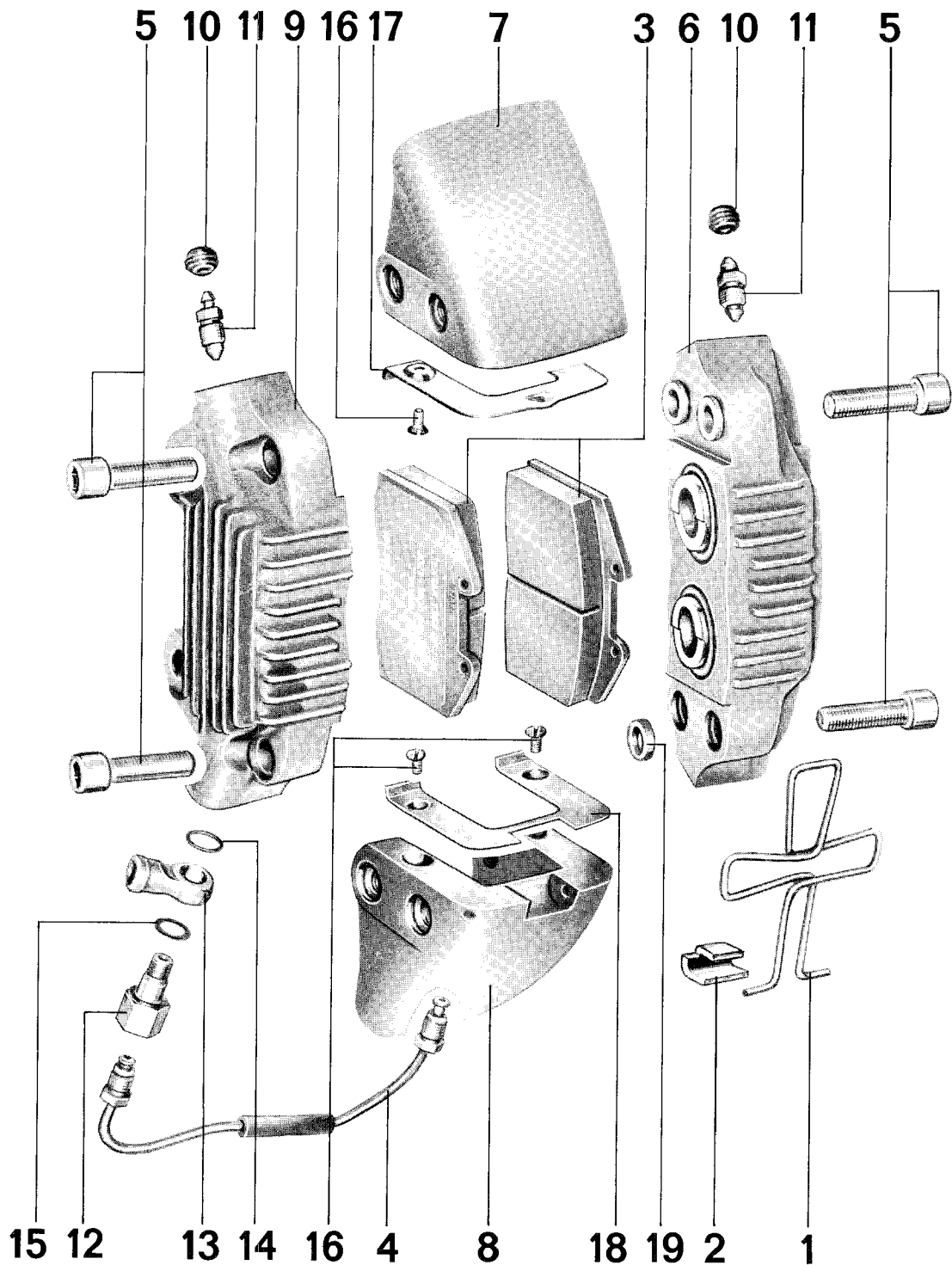
- 3rd group number even

Example:

Brake disc, left	Part No. 930 352 045 00
Brake disc, right	Part No. 930 352 046 00



Forward Direction



Note:

Blow-up view shows brake caliper of rear axle with 30 mm diameter piston (front axle piston diameter: 38 mm) and retaining tab of cross spring facing up. On brake caliper of front axle retaining tab is down, i. e. front bridges with spring plates are reversed.
 Disassembling and Assembling Brake Caliper Sections — page 47 - 7.

TORQUE SPECIFICATIONS FOR HYDRAULIC BRAKE PARTS

Location	Description	Threads	Class	Torque mkg (ft lb)
Master cylinder to vacuum booster	Nut	M 8	8	2.5 (18)
Stop light switch to master cylinder	Stop light switch	M 10x1		1.5 + 0.4 (11 + 2.9)
Brake booster unit to base	Nut	M 8	8	2.5 (18)
Brake fluid reservoir	Bolt	M 6	8.8	0.2 (1.5)
Fork and pivot to operating rod	Nut	M 10	8	3.5 (25)
Brake booster to luggage compartment floor plate	Nut	M 8	8	2.5 (18)
Brace to base	Bolt	M 10	8.8	4.6 (33)
Brake lines to master cylinder, hoses and calipers	Coupling	M 10x1		1.2 (9)
Distributor to rear axle cross tube	Bolt	M 6	8.8	0.6 (4)
Bleeder screws on brake calipers	Bleeder screw	M 10x1		0.8 - 1.1 (5.8 - 8)
Brake caliper half to bridge	Socket head bolt	M 12x1.5	8.8	6.0 (43)
Spring plate to bridge	Flat head screw	M 5		0.4 (2.9)
Adapter to brake caliper	Hollow bolt	M 10x1		1.6 (12)

No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
1	Cross spring	1		Replace if necessary. Position correctly (flat side faces brake disc).	
2	Lockplate	1		Lockplate must still move after cross spring has engaged, to exclude deformation of the cross spring.	Not applicable if openings of spring plate (no. 18) take over cross spring funct.
3	Brake pad	2	Mark for reinstallation later if applicable.	Check, replacing if necessary. Wear limit 2 mm.	
4	Connecting line	1		Down	
5	Screw	8		Torque: 60 Nm (43 ft. lbs.)	
6	Brake caliper half, outer (marked with Porsche)	1			
7	Bridge without opening			Bottom on front axle, top on rear axle	Page 47 - 5
8	Bridge with opening	1			Page 47 - 5
9	Brake caliper half, inner (with mounting eyes)	1		New version (without no. 12 - 15), can be installed retroactively.	
10	Dust cap	2			
11	Bleeder screw	2		Up	
12	Hollow union bolt	1		Torque: 16 Nm (12 ft. lbs.)))
13	Ring connector	1) omitted) since Dec.) 1984
14	Seal	1		Replace)

47 General Notes

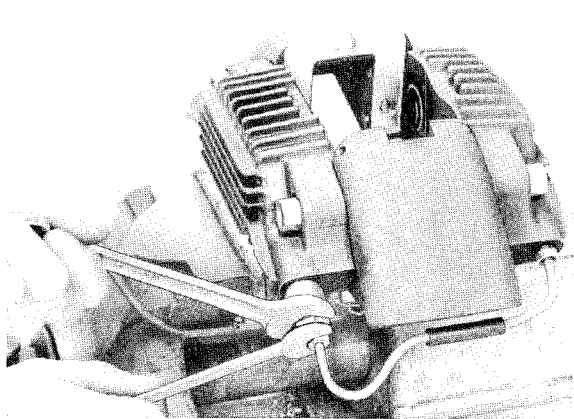
Location	Description	Threads	Material	Tightening Torque Nm (ftlb)	
Brake force regulator to connector or ring adapter		M 10 x 1		14	(10)
Ring adapter to brake master cylinder	Hollow union bolt	M 10 x 1	5.6	16	(12)

No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
15	Seal	1		Replace	Omitted since Dec. 1984
16	Screw	4	Heat to approx. 150° C	Install with Loctite No. 270.	
17	Spring plate with retainer	1	Heat screws to approx. 150°C.	Assemble with correct bridge. Lock screws with Loctite No. 270.	Page 47 - 5
18	Spring plate with openings	1	Heat screws to approx. 150°C.	Assemble with correct bridge (openings for cross spring). Lock screws with Loctite No. 270.	Use lockplate (no. 2), if there are no openings to service as a cross spring lock, see page 47 - 5.
19	Spacer (dowel sleeve)	8		Do not drive into brake caliper sections against stop. About one half each should be in the brake caliper section and bridge.	

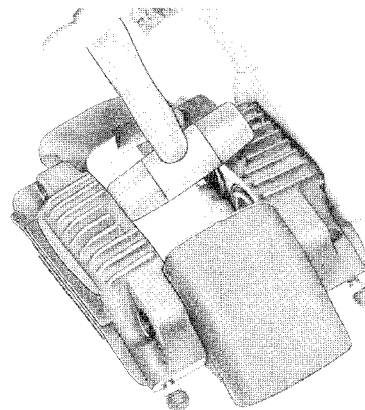
DISASSEMBLING AND ASSEMBLING BRAKE CALIPERS

Disassembling

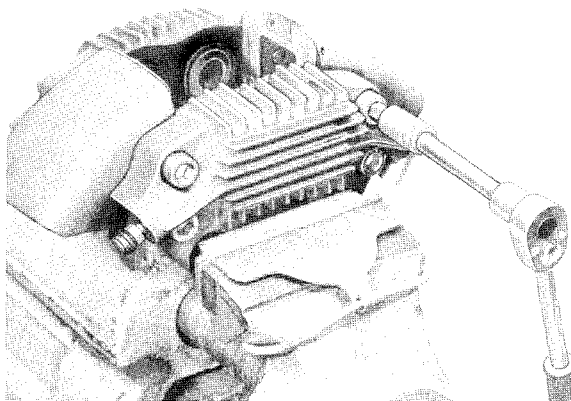
1. Clamp caliper in a vise with soft jaws and detach connecting line.



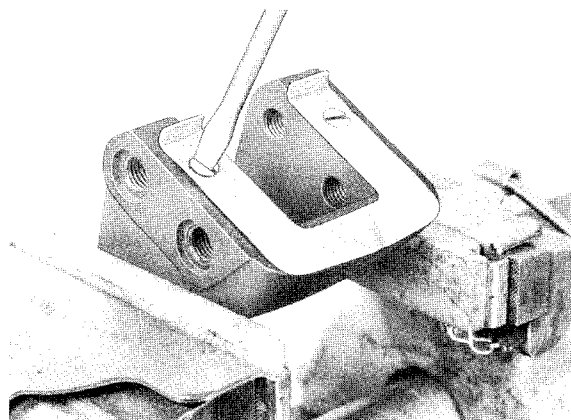
3. Drive off brake caliper halves from bridge by applying knocks from a plastic hammer alternately.



2. Unscrew bolts holding halves of brake caliper.



4. Countersunk screws of spring plate are locked in bridge with Loctite 270. To unscrew, heat screws to approx. 150 °C. This is necessary to prevent stripping threads in bridge.



Assembling

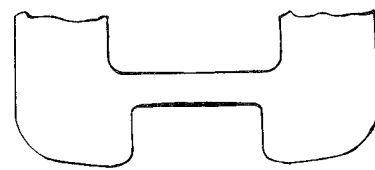
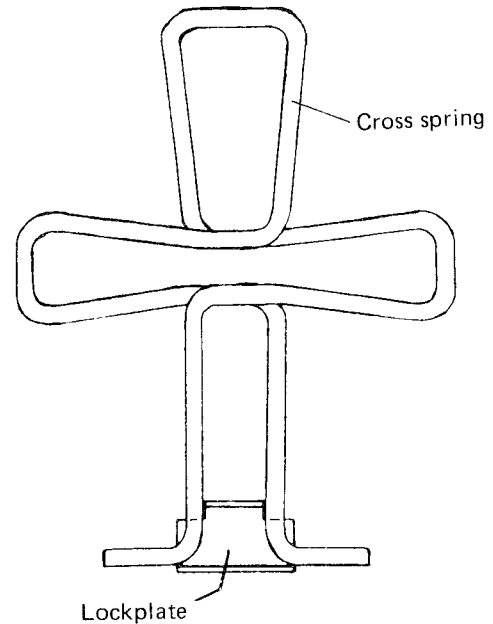
1. After replacing or loosening, lock counter-sunk screws for spring plate with Loctite 270.
Install spring plate with retaining tab on bridge without opening.

Note :

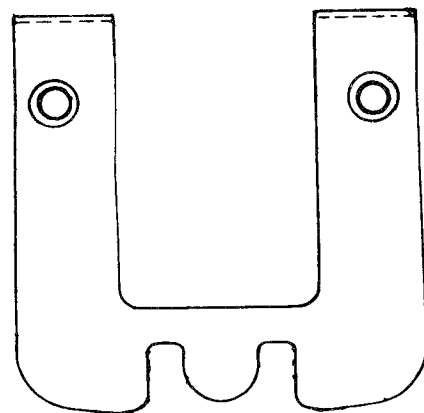
Following changes have been made on spring plates since the beginning of standard production.

- A lockplate for protection of the cross spring is required on spring plates with opening in initial version.
In the modified version a spring plate with pertinent openings protects the cross spring.
A conversion is only possible with conformance with point 4 on page 47 - 4 and use of correct spring plate (see note below).
- The countersink to take the mounting screws is larger for all spring plates since 1984 models and therefore the bridges had to be changed, too.
Spring plates with larger countersinks (present version 12.8 – 0.2 mm diameter; was 11.5 + 0.5 mm) cannot be used on old bridges.

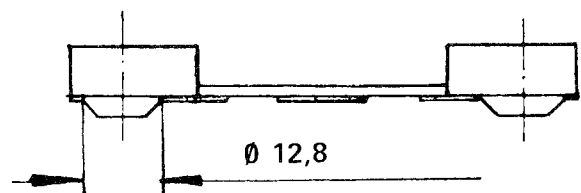
Initial Version



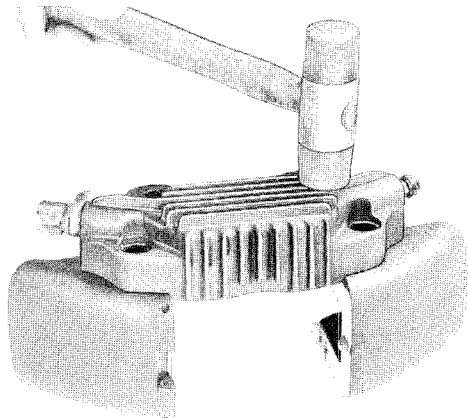
Modified Version



Spring Plates with Larger Countersink



2. Assemble brake caliper.

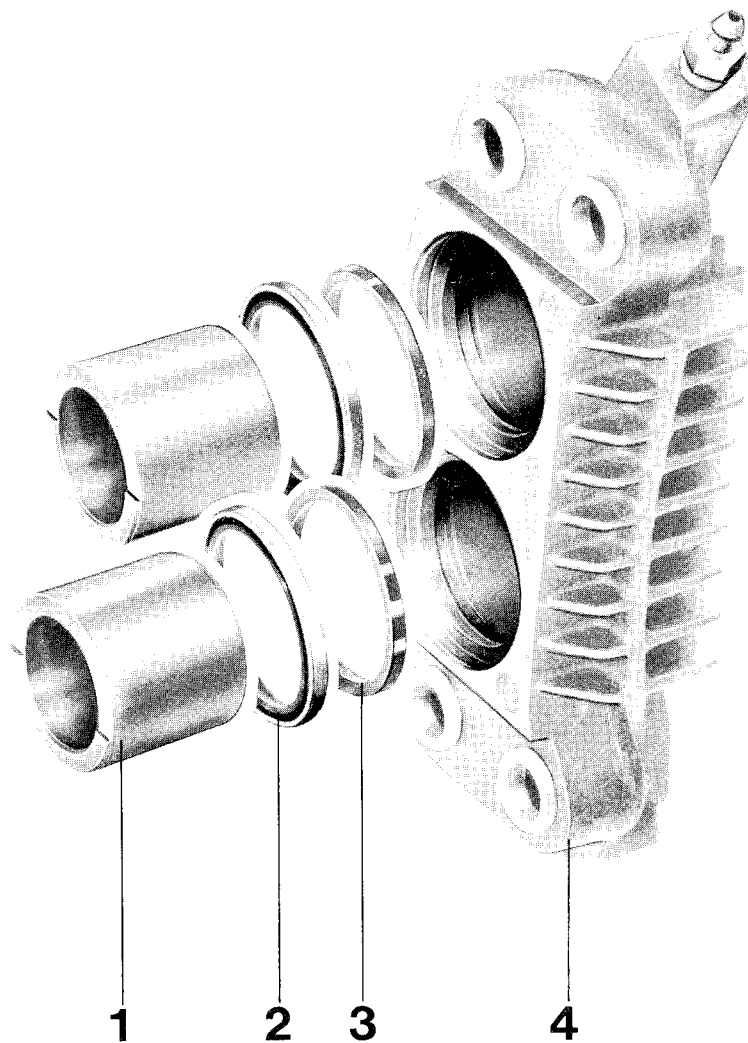


3. Replace seals on hollow bolt and adapter.

4. Check piston position — see page 46 - 3.

5. When installing brake pads, check for correct play between pad and recess, correct position of cross spring and clearance of lockplate in case of initial version spring plates (see pages 46 - 2 to 46 - 4).

6. Bleed brakes.



Note :

The blow-up view shows the outer front axle brake caliper half.

Piston diameter on front axle = 38 mm.

Piston diameter on rear axle = 30 mm.

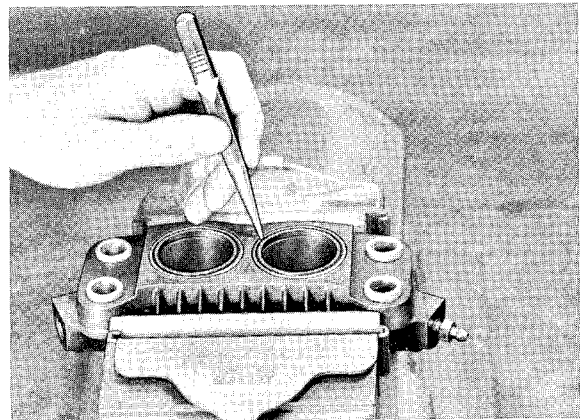
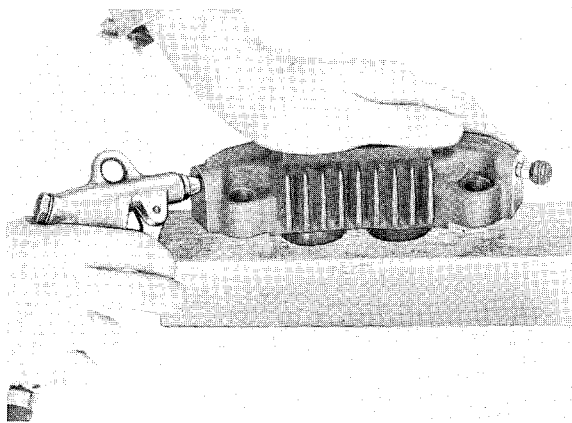
Mount piston and bleeder valve in correct position, depending on installation of brake caliper half on right or left side (setback surface on face of piston faces brake disc inlet/bleeder valve faces up).

No.	Description	Qty.	Note When:		Special Instructions
			Removing	Installing	
1	Piston	2	Press out of brake caliper half with compressed air. Use wood base — danger of injury!	Use brake cylinder paste. Check piston position (position of machined piston face) already while pressing in — page 46 - 3	
2	Dirt scraping ring	2	See page 47 - 9	Replace. Position correctly — see page 47 - 10	
3	Seal	2	Lift out with a plastic rod	Replace. Coat with brake cylinder paste.	
4	Brake caliper half	1			See pages 47 - 9 and 47 - 10 under "cleaning and inspecting"

DISASSEMBLING AND ASSEMBLING BRAKE CALIPERS

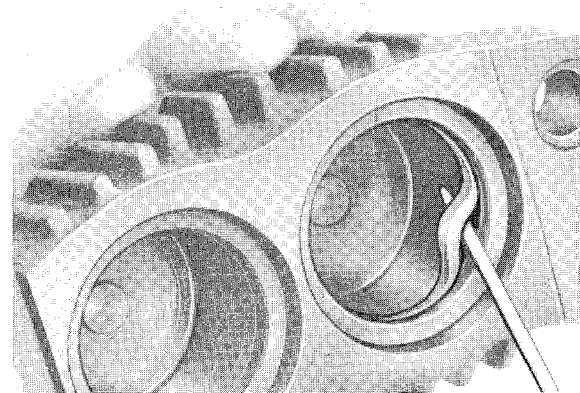
Disassembling

1. Place brake caliper section on a wooden board with the piston facing down and press out piston with compressed air.



4. Lift out seals with a plastic rod.

2. Clamp brake caliper section in a vise with the cylinder bores facing up. Use a vise with soft jaws.



Note :

Make sure surface of brake caliper section is not damaged and consequently the corrosion inhibiting coat is not injured.

3. Remove dirt scraping ring by deforming the support ring of the dirt scraping ring all around with a suitable tool (e. g. thin punch) to such an extent, that the scraping ring can be removed. Be careful not to damage seat surfaces.

Cleaning and Inspecting

1. Clean all parts with alcohol and dry with compressed air. Never use rags, since even minute particles of lint would lead to leakage.
2. Inspect connection threads and spacer sleeves (dowel sleeves) for damage as well as cylinder bores and pistons for scoring and corrosion.

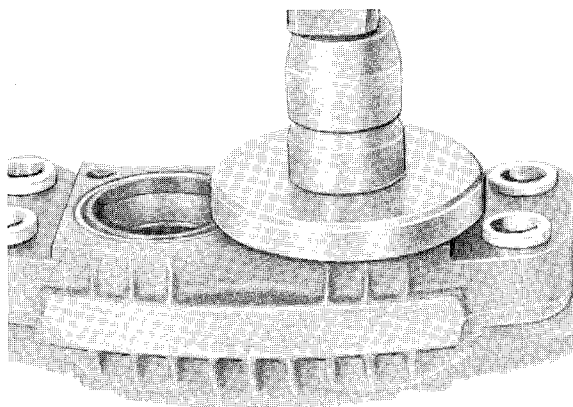
Note:

Machining cylinder bores and pistons is not approved. Replace pistons or complete brake caliper section, as applicable.

3. If the brake caliper section is in good condition, check whether connecting bore between the cylinder bores is plugged. Clean bores with compressed air.
4. Clean new seals and scraping rings with alcohol and dry with compressed air.

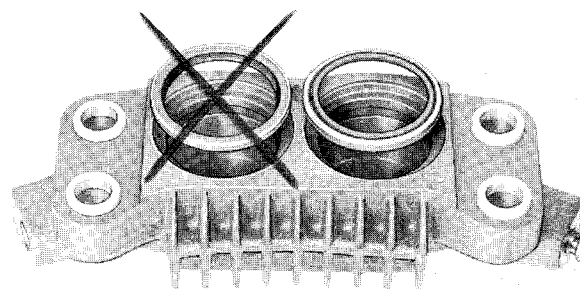
Assembling

1. Give cylinder bores, pistons and seals a thin coat of brake cylinder paste.
2. Place seals in grooves of cylinder bores.
3. Mount dirt scraping rings in correct position with a suitable pressure pad. Drive in dirt scraping rings at least so far, that they do not protrude beyond the machined surface of the brake caliper section.

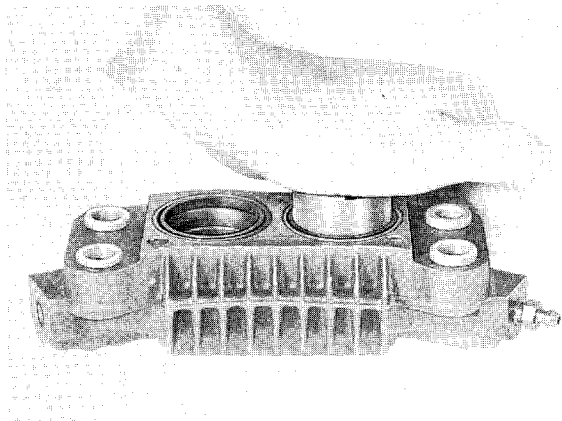


Note:

Mount dirt scraping ring in brake caliper section that the ring's printed part number faces in. The sealing lip then faces out (in contradiction to the normal position of a radial shaft seal) and prevents the entry of dirt and water.



4. Press in piston by hand slowly. Check position of the milled surface on the piston's face during this step (see page 46 - 3). If it is necessary to turn the piston after installation in the brake caliper section, a suitable tool (e. g. ATE piston turning pliers) must be used.



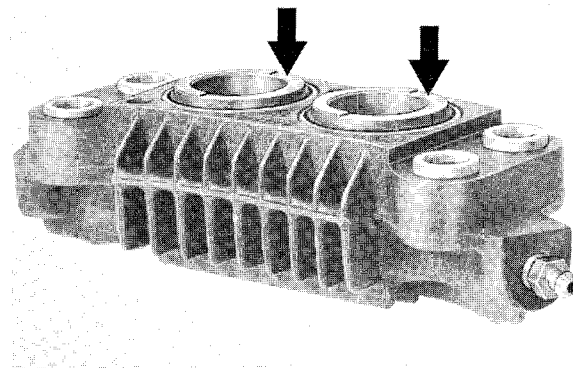
7. Check for leaks (high pressure test) with a pressure tester.

High Pressure Test

Produce a pressure of 50 to 100 bar in the braking system with a pedal prop. The produced pressure must not drop by more than 10 % during the testing time of 10 minutes with a constantly applied pedal force.

Note :

A brake force regulator is integrated in the rear axle brake circuit of cars with Turbo Look. When connecting a pressure tester on the rear axle brake circuit of these cars, the produced pressure must not exceed 70 bar.

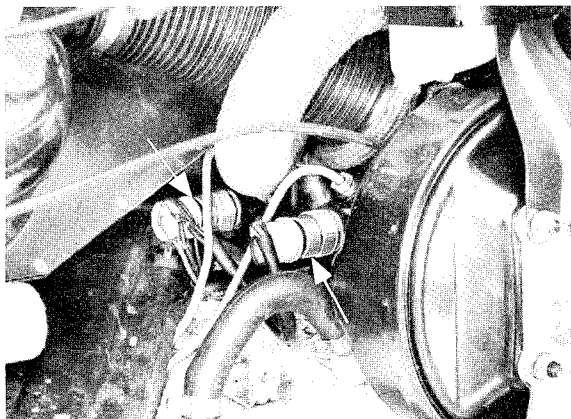


5. Assemble brake caliper (see page 47 - 1).

6. Recheck piston position in car after installation of the brake caliper.
Install brake pads.
Bleed brakes.

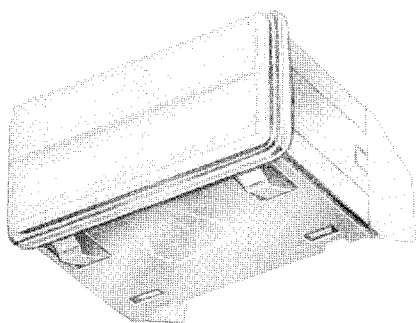
BRAKE CIRCUIT FAILURE INDICATOR (UNTIL END OF 1983 MODELS)

Each of both brake circuits has a brake light switch on the brake master cylinder, which also functions as a brake warning switch in cars up to the end of 1983 models.



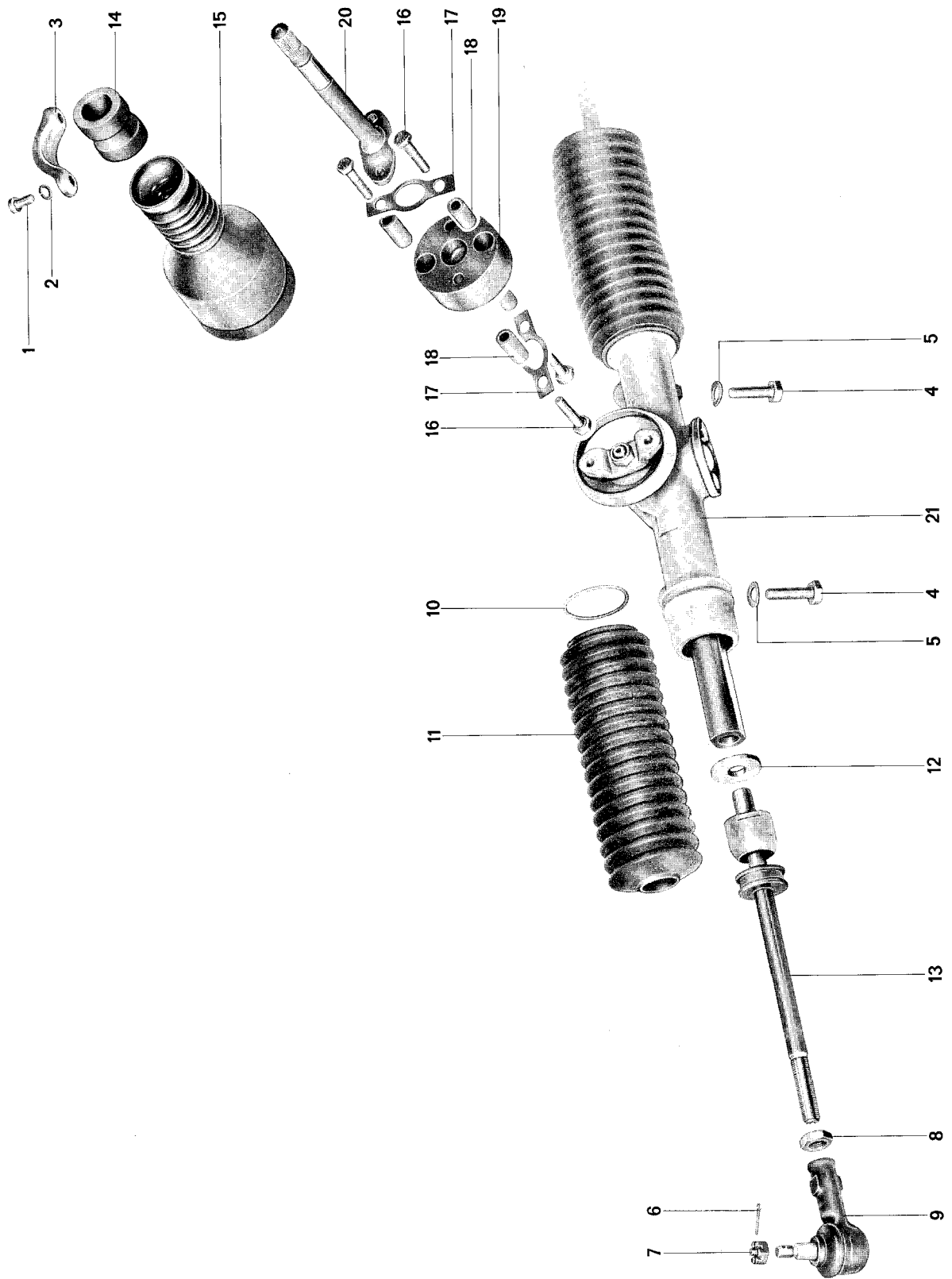
The brake circuit failure indicator has to be cancelled by disconnecting the battery after repairing the brake system. Beginning with 1984 models it is no longer necessary to disconnect the battery, since the brake indicator lamp (triple chamber light) goes out as soon as the brake fluid level in the tank has reached the minimum level.

An indicator lamp (bottom part of a double chamber light) installed in the instrument panel comes on when a brake circuit fails.



STEERING





SPECIFICATIONS

Steering

Steering wheel

Steering ratio in center
steering wheel angle to
wheel angle

Turning circle dia.

Track circle dia.

Non of steering wheel turns
from lock to lockFriction torque of steering
- measured on flange of
steering gear without
connected tie rods

Rack-and-pinion

380 mm (14.961") dia.,
lattice steering wheel
with impact pad

17.78 : 1

10.8 m (35.4 feet)

10.35 m (33.9 feet)

approx. 3.0

0.8 to 1.4 Nm/8 to 14 kpcm/
7 to 12 in. lbs.

No.	Designation	Amt.	Notes		Remarks
			Removing	Installing	
1	Capscrew	2		Torque to specifications	
2	Lockwasher	2		Replace, if necessary	
3	Cover	1		Must fit on steering shaft bearings correctly	
4	Hex hd screw M 10 x 35	2		Torque to specifications	
5	Washer	2		Replace, if necessary	
6	Cotter pin 2 x 25	2		Replace	
7	Castle nut M 10 x 1	2		Torque to specifications	
8	Hex nut M 14 x 1.5	2		Torque to specifications	
9	Ball joint	2		Check, replacing if necessary. Check seal for tight fit and damage.	Ball joint must show frictional torque when moving. Replace if it has axial play or no frictional torque.
10	Holder	2		Replace, if necessary	
11	Seal	2		Check for damage, replacing if necessary	
12	Spacer	2			
13	Tie rod	2		Torque to specifications	
14	Steering shaft holder with rubber bearing	1		Check, replacing if necessary	
15	Seal	1		Install correctly	

TORQUE SPECIFICATIONS FOR STEERING

Location	Designation	Threads	Material	Torque	
				Nm	ft lbs
Steering gear	Bolt	M 10	8.8	47	34
Tie rod to rack	Ball socket	M 16 x 1.5	C35K	150	108
Ball socket to steering arm	Castle nut	M 10 x 1	8	45	33
Ball socket to tie rod (lock nut)	Nut	M 14 x 1.5	04	45	33
Steering coupling to steering shaft	Bolt	M 8	8.8	25	18
Steering shaft to steering gear	Bolt	M 8	8.8	25	18
Steering shaft mount	Screw	M 8	8.8	25	18
Universal joint to steering shaft (lubricated with Optimoly HT)	Bolt	M 8	8.8	20	14
Coupling flange to drive pinion (self-locking)	Nut	M 10	8	45	33
Case cover to steering gear	Bolt	M 8	8.8	15	11
Steering wheel	Nut	M 18 x 1.5	8	50	36
Centering screw to steering lock	Stud	M 8	10.9	2 - 3	1.4 - 2.2
Lock nut on centering screw	Nut	M 8	8	18	13

No.	Designation	Amt.	Notes		Remarks
			Removing	Installing	
16	Hex hd screw M 8 x 42	4		Torque to specifications	
17	Lockplate	2		Replace	
18	Stop	4			
19	Steering coupling	1		Visual inspection, replacing if necessary	
20	Steering shaft	1			
21	Steering gear	1		Check frictional torque, replacing or repairing if necessary	

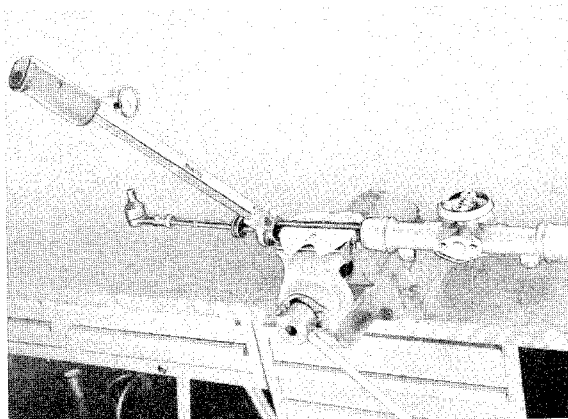
DISASSEMBLING AND ASSEMBLING INSTRUCTIONS

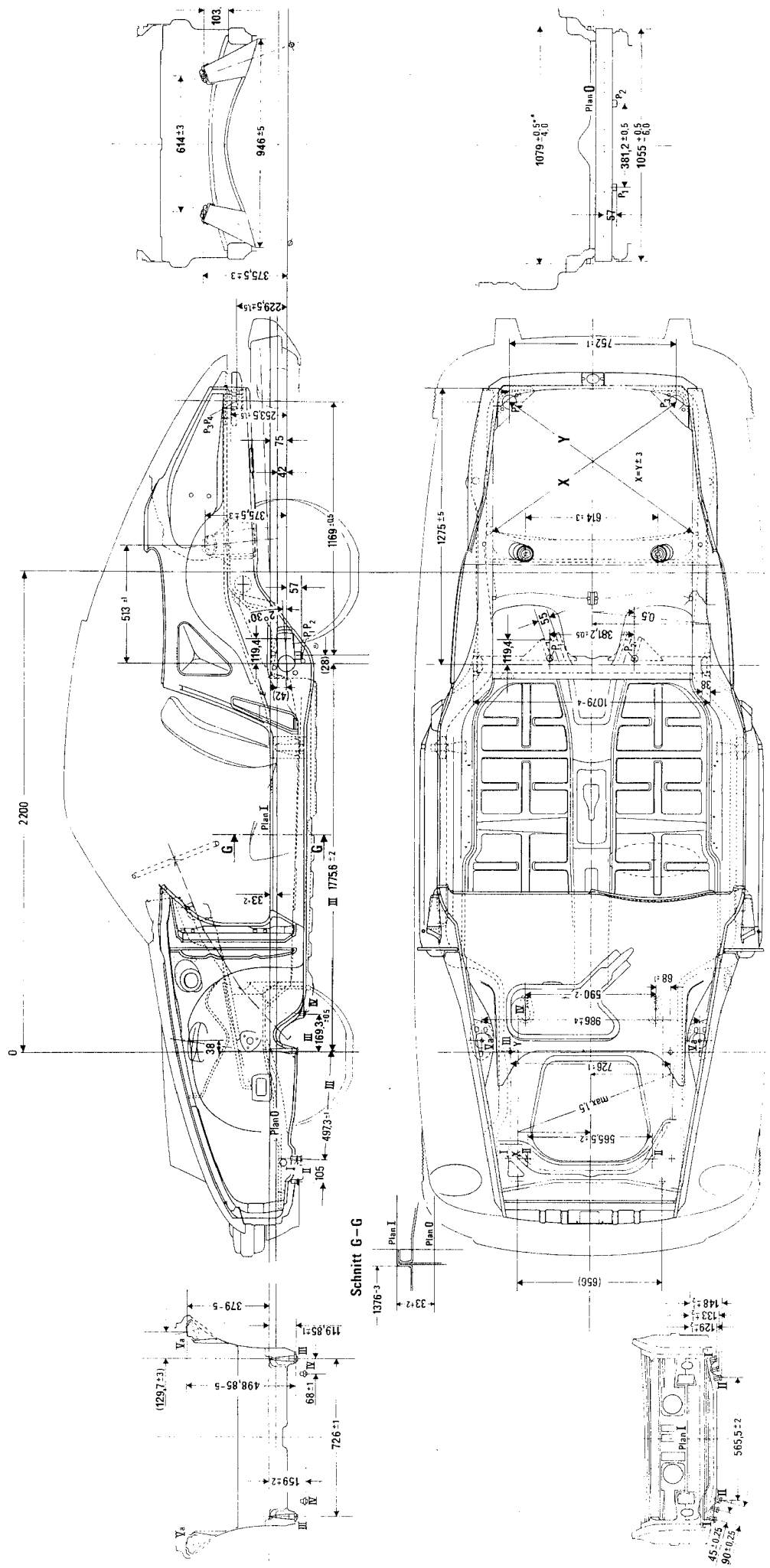
Assembling

1. Clamp steering box in a vise with protective jaws for the rack.
2. Screw tie rod with spacer in rack and tighten to specified torque.
Machine open end socket for torque wrench for this purpose.

Note

Omitting hex nut has made the former instructions for tie rod ball joint adjustments invalid. Only the spacer is available for replacements.



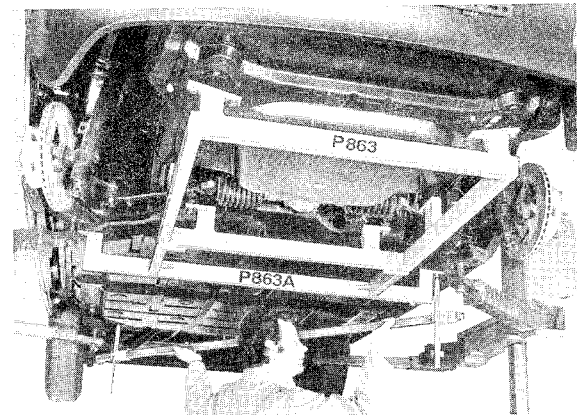
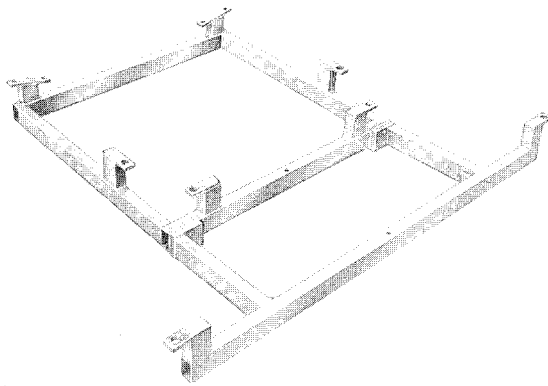


BODY, FRONT SECTION

FLOOR/FRAME CHECKPOINTS AND FRONT BODY SECTION GAUGES P 863 AND 863a

As already announced in the 1975 model information, checkpoints are welded to the floor/frame assembly from 1975 models. The extent of damage is quickly diagnosed with the help of these checkpoints and front body section gauge P 863 a (consisting of former gauge P 863 + additional adaptor).

The carrier pin of Type 930 Turbo is 21 mm higher. When measuring with front body section gauge P 863, the distance between the upper edge of the gauge and the collar on the carrier pin is 21 mm or, with the adaptor installed on the carrier pin, 13 mm.



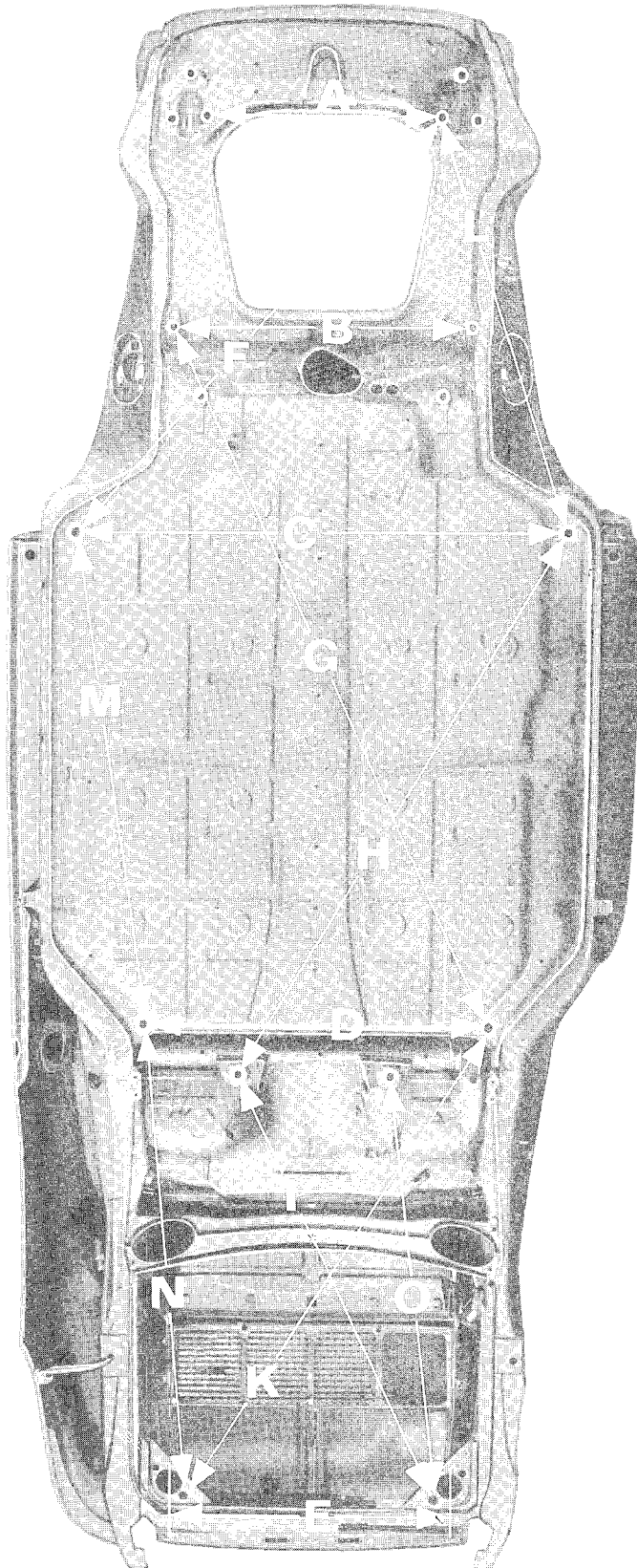
The gauge can also be used to repair light front section damage (upsets up to 10 mm). Cars with damage of this type no longer need to be installed on a straightening bench.

Installation of the gauge requires that the wheels, the guard, the carrier and the control arms be removed. The gauge is then bolted to the front axle take-up points and front floor/frame checkpoints, as illustrated above.

The distance from the rear floor/frame checkpoints and rear axle take-up points for the transmission to the engine suspension is checked with a measuring staff.

Note: This gauge is for checking only. It must be removed for straightening and welding operations to prevent it from becoming bent through body distortions.

FLOOR/FRAME ASSEMBLY DRAWING



Dim.	Designation	mm
A	Control arm take-up, front, inner	565.5 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 2
B	Carrier take-up	726 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 1
C	Front floor plate checkpoints	1200 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 2
D	Rear floor plate checkpoints	850 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 2
E	Engine suspension	752 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3
F	Front floor/inner control arm checkpoint	1327 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3
G	Rear floor/carrier checkpoint	1868 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3
H	Axle tube transmission/front floor checkpoint	1528.5 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3
I	Axle tube transmission/inner engine suspension 1978 models	1346 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3 1374
K	Rear floor/inner engine suspension checkpoint 1978 models	1557 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3 1582
L	Front floor/inner control arm checkpoint	1041 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3
M	Front floor/rear floor checkpoints	1215 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 2
N	Rear floor/inner engine suspension checkpoints 1978 models	1355 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3 1384
O	Axle tube transmission/inner engine suspension 1978 models	1245 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ 3 1273

All distances are measured from center of hole and horizontal.

Note

Distances to engine suspension bolts are measured direct (at an angle).

Note

Lengths measured on the left and right may not exceed the specified tolerances in difference to each other.

FLOOR/FRAME ASSEMBLY TURBO CARRERA

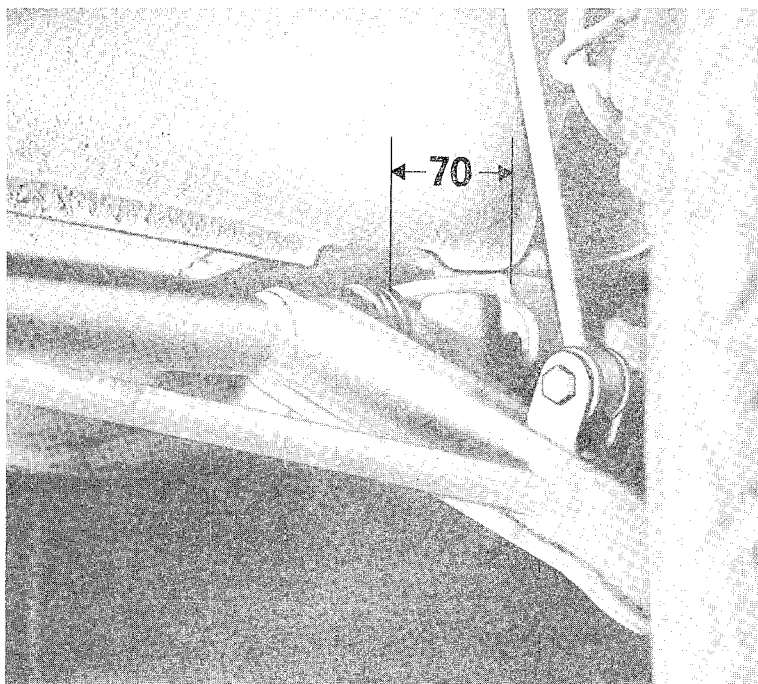
In comparison to the Type 911, the carrier pin of the turbo Carrera is 21 mm higher. This has caused changes to the floor/frame assembly in the area marked in white.

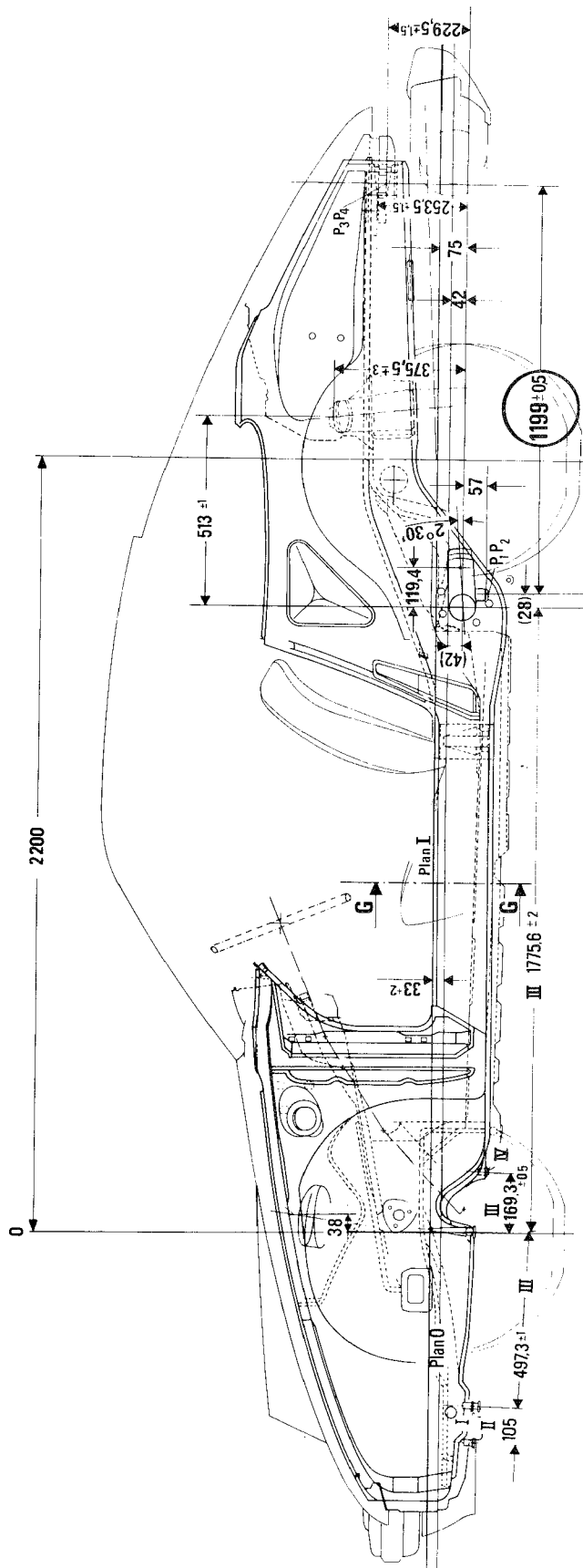


The border on the wheelhouse and floor plate is cut out about 70 mm higher than the control arm to allow accessibility.

Note

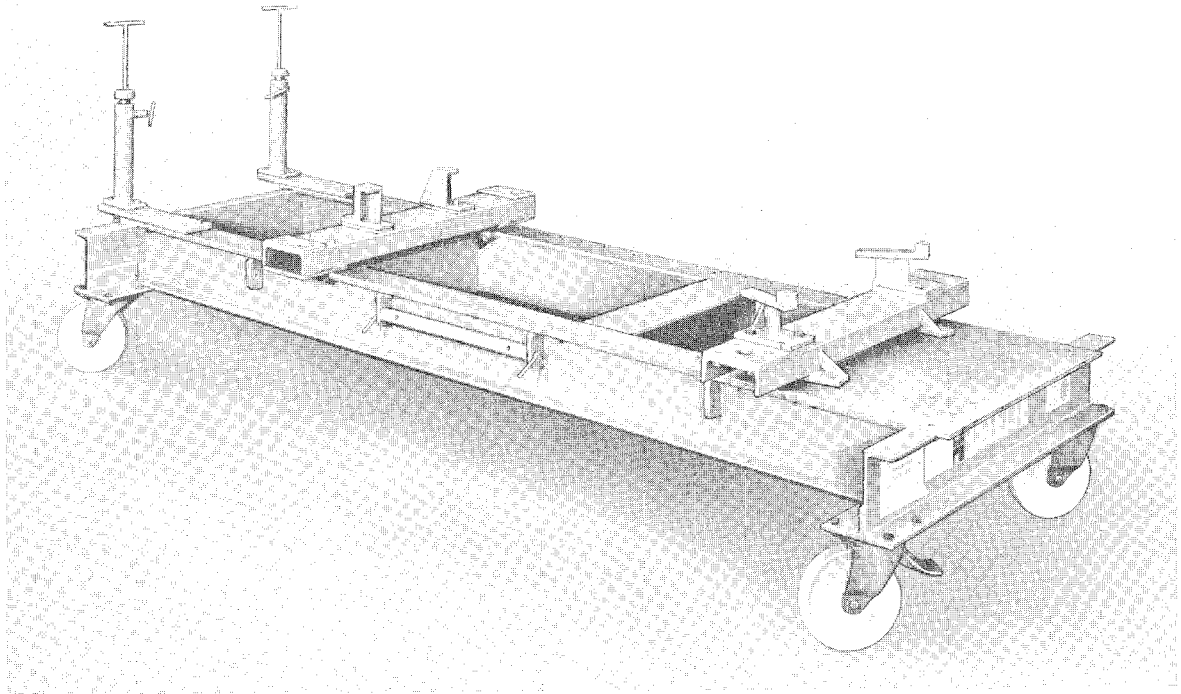
If new wheelhousings are required for repairs, make these openings in the borders on both sides and weld the seams to the floor plate.





REPAIR REFERENCE DIMENSIONS - 1978 MODEL

STRAIGHTENING BENCH ATTACHMENT SET ENS 77.303 FOR TYPE 930 TURBO



The illustrated take-up points differ from the attachment set for Type 911 and are applicable to Turbo cars.

The auxiliary carrier pin is installed 21 mm (0.827") higher.

The brackets on the rear axle cross tube are inclined upwards.

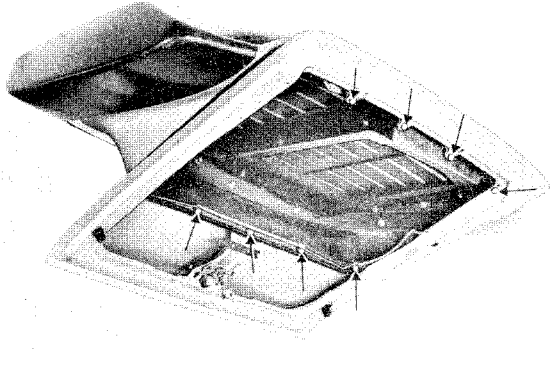
The take-up pin for the transmission suspension is located 25 mm (0.984") further forward.

The engine mount for Type 3.0 Turbo up to 1977 model conforms with Type 911.

The engine mount for Type 3.3 Turbo from 1978 model is moved further back by 30 mm (1.181").

Disassembling

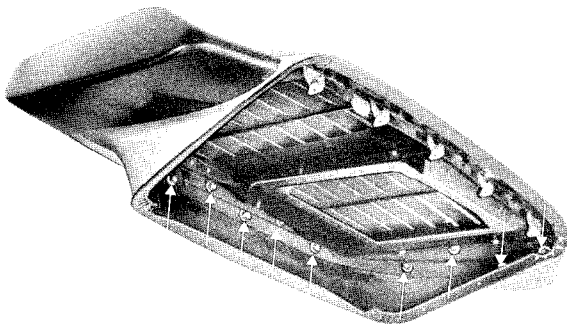
1. Unscrew rear spoiler carrier from hood and remove with reinforcement, see arrows.



Note

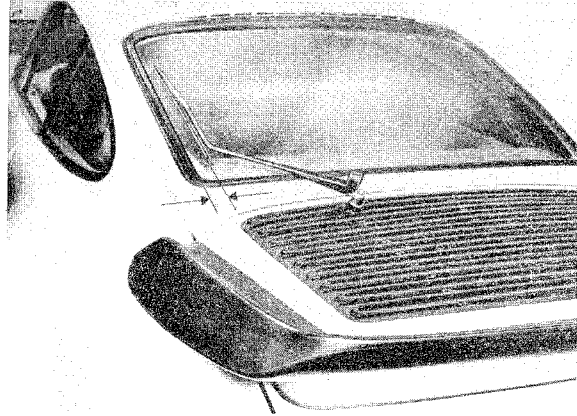
When painting car, cover riveted weatherstrip with tape.

2. Detach spoiler (polyurethane section) from carrier, see arrows.



Notes on Installing

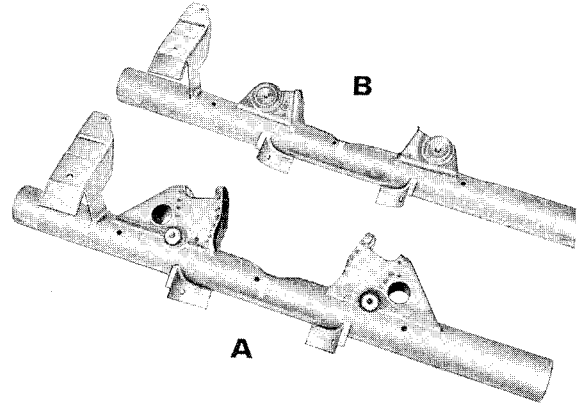
When installing the rear window wiper shaft, it is essential to insert spacer in hood. Wiper arm should be installed so that, when switched off, wiper blade will be parallel to side weatherstrip (distance approx. 40 mm/1 9/16 in.).



BODY, REAR SECTION

REAR AXLE CROSS TUBE OF TURBO CARRERA

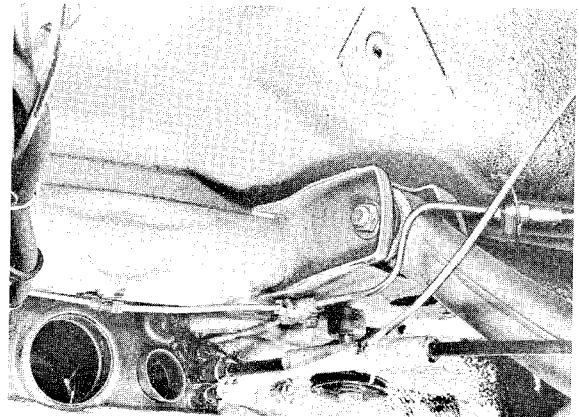
A new rear axle cross tube, Part No. 930 331 010 00,
- Fig. A - is installed in the Type turbo Carrera
This cross tube differs from the version for the
Type 911 - Fig. B - as follows.



1. New, larger holders for rear axle trailing arms at an angle of $2^{\circ} 30'$ upwards.
Reference point: 6 mm above the horizontal as measured at the rear inner support plate of the holder's lower edge.
2. New transmission suspension take-up pin (offset 25 mm toward front).

Notes

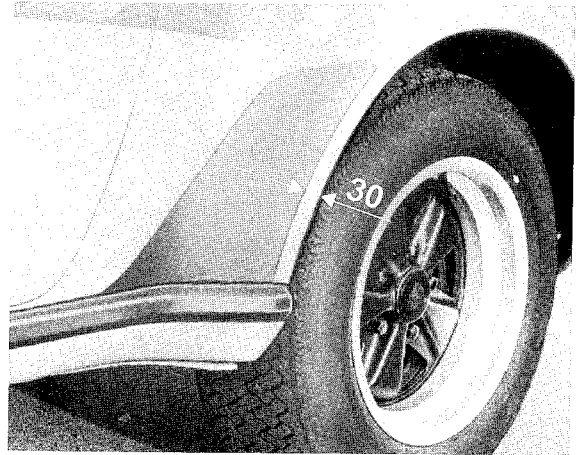
1. The seat wells have dents on both sides of the center tunnel above the holders for the Type turbo Carrera (see figure).
2. Large seat belt reinforcement plates are installed in all cars for Australia and France, and in fact on the transmission tunnel. These reinforcements are welded to the holders at the rear axle cross tube to increase the strength.



EXTERIOR FITTINGS

INSTALLING TURBO DECALS ON REAR FENDERS

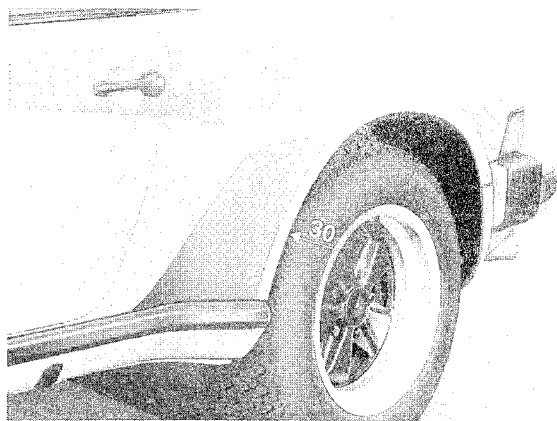
1. Using squeegee pull upper lip of rubber guard away from connector plate as far as necessary.
2. Clean and dry surfaces for decals.
3. Draw a pencil line 30 mm (1 1/8 in.) parallel to wheel opening.
4. Peel protective paper off decal and place decal on surface so that it matches the drawn line and its bottom is covered about 3 mm (1/8 in.) by the rubber guard strip.
5. Smooth decal toward outside and rub out bubbles with a squeegee. If necessary puncture bubbles with a pin and press smooth.



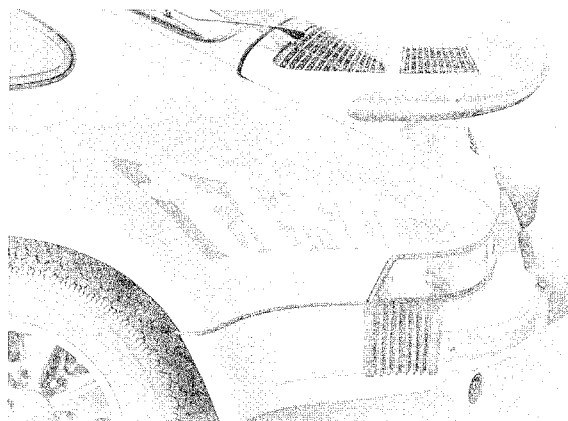
2. Install front fender decal - Part no. 930.559.301/302 00/01 - after the door decal has been installed. Start at the door edge. Make sure the point begins on the fender (not the headlight rim). Align the top paper edge of the front decal with the center of the headlight.

Press over fuel tank cover and after the protective paper has been pulled off, cut through decal which overlaps fuel flap cover.

3. Install rear fender decal - Part no. 930.559.305/306 00/01 - aligning it with the door decal. To facilitate alignment of the front fender with rear turbo decal, masking tape can be used.



4. Install turbo sign decal - Part no. 930.559.307/308 00/01 - below masking tape border parallel to tail lights. Make sure that the edges of the front and rear decals are parallel. Fold ends of decal at water drain molding.



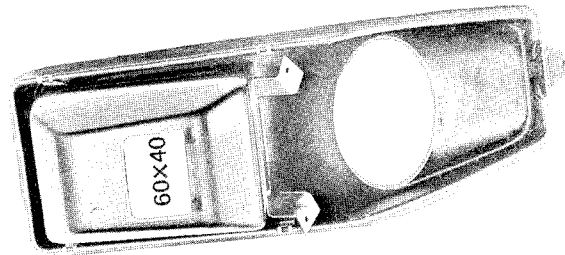
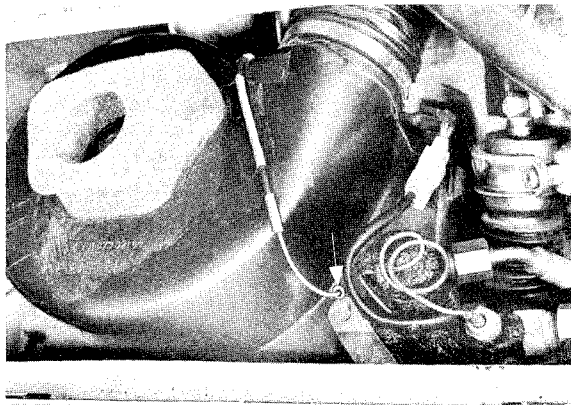
Note

When applying the turbo sign decal make sure that the shaded areas are pressed on without folds; folds between shaded areas cannot be avoided completely.

7. Enlarge opening for harness to about 40 x 60 mm, so that temperature switch can be removed. This means first cutting to proper depth with a saw and then cutting out metal with shears. Remove center console.

Note

If only temperature switch has to be replaced, capillary tube bulb must be pulled out of evaporator housing. Capillary tube is fastened to harness at several points with insulation tape. Cut through insulation tape and then slide on a matching sleeve to cover entire length. Pull out temperature switch and slide in new capillary tube through sleeve.



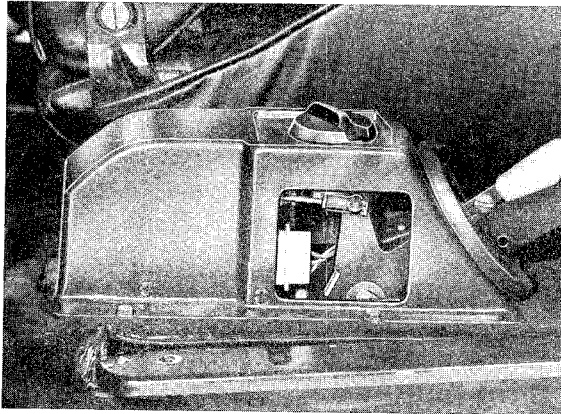
Open up harness opening of new center console to specified size.

AUTOMATIC HEATER

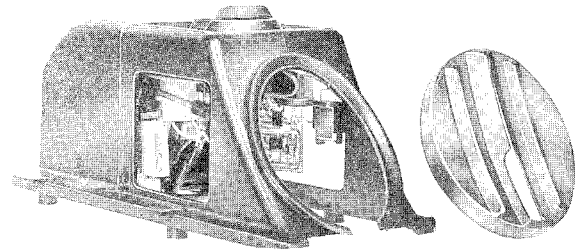
AUTOMATIC HEATER CONTROLS

Removing and Installing Control Unit

- 1 - Pry both side covers off of control unit.
- 2 - Detach connecting rod between motor and heater lever.

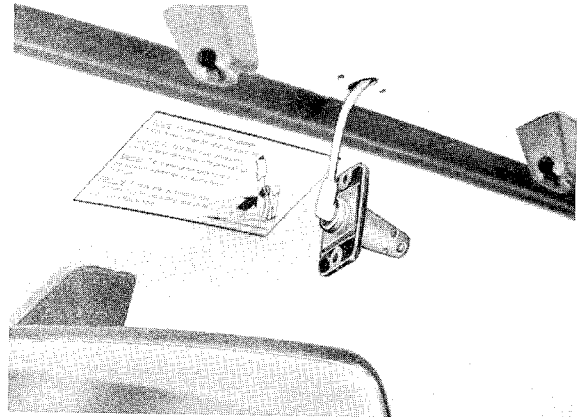


- 3 - Remove the four hex head screws, lift control unit carefully and disconnect the three plugs at the control unit.
- 4 - Remove rubber seal and slide control unit forward past heater and parking brake levers to remove.



Removing and Installing Interior Sensor

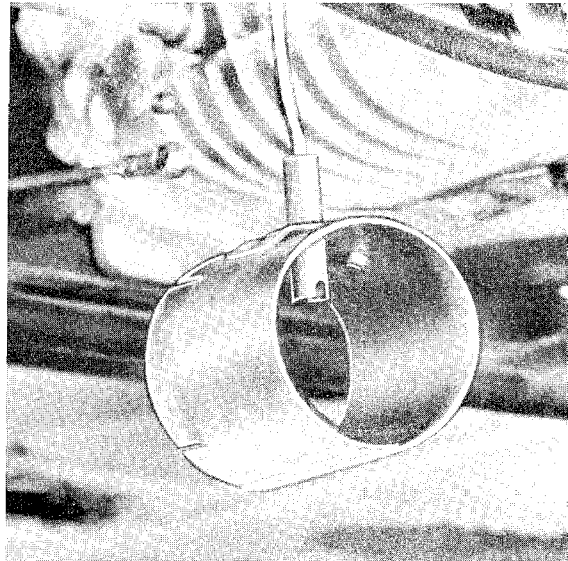
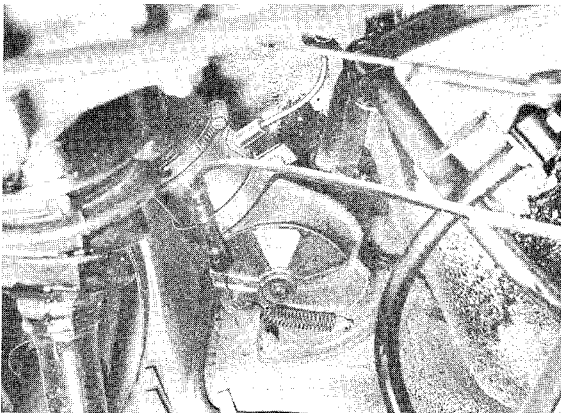
- 1 - Remove both Phillips screws and pull down sensor carefully.



- 2 - Pull angled plug off of sensor.

Removing and Installing Heat Sensor in Heater Flap Housing

1. Loosen control unit and pull off the front 2-pole male plug.
2. Loosen carpet along center tunnel and clear cable up to grommet in heel plate.
3. Pull both wires out of male plug housing (be carefull that they don't grab hold) and press out the grommet.
4. Remove adaptor on left heater flap housing.



5. Pull out cable and remove rivets on the adaptor.

6. Rivet new heat sensor, slide in cable and press in grommet.



7. Install adaptor. Make sure that the heater flaps are adjusted evenly on both sides.

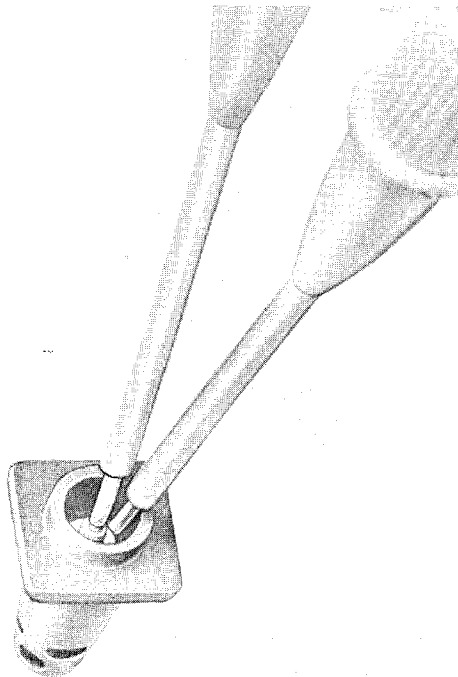
 8. Secure plug housing to cable. The black wire must be located on the side of the housing with a tab.

 9. Place cable inside of car, paste carpets, connect plug to control unit and secure control unit again.
-

TROUBLESHOOTING AUTOMATIC HEATER CONTROLS

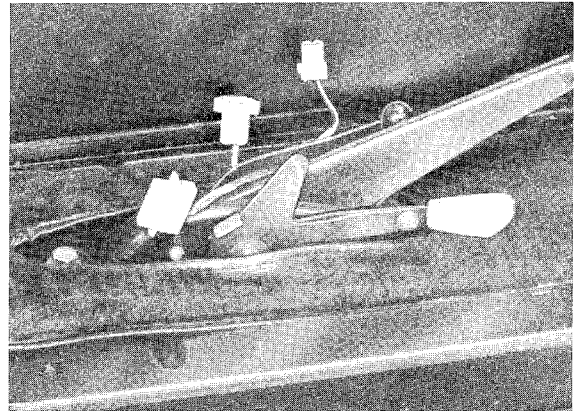
Checking Interior Sensor

- 1 - Remove interior sensor.
- 2 - Using an ohmmeter with an appropriate testing range, check the resistance between both coaxial connections on the sensor (use test points). The resistance is very dependent on the temperature and should be about 1.5 kOhm at room temperature. Replace the temperature sensor if the resistance is about ∞ ohm (interruption in sensor) or about 0 ohm (short circuit in sensor).



Checking Heat Sensor in Heater Flap Housing

- 1 - Remove control unit.
- 2 - Connect ohmmeter to 2-pole plug of heat sensor. The resistance must be 135 ohm with warm engine at 100°C. Replace heat sensor if resistance is way off (see "Checking Interior Sensor").

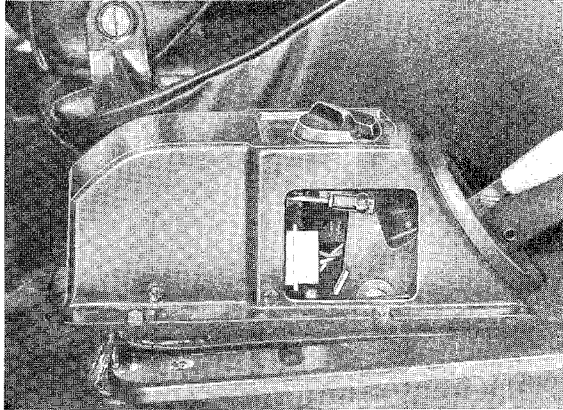


Note

An interruption in one of the sensors or in the wires to the control unit will fake a too low or, a short circuit, a too high inside temperature. This will result in an improper movement of the heater lever up or down.

Checking Power Supply to Control Unit

- 1 - Remove right side cover of control unit.



- 2 - Disconnect 3-pole plug.
- 3 - Turn on ignition and parking lights.
- 4 - Connect test lamp between brown and red/white as well as brown and gray/blue cables. Test lamp must come on in both cases.

If both temperature sensors and the power supply function correctly, but the heater controls do not function properly, replace the complete control unit.

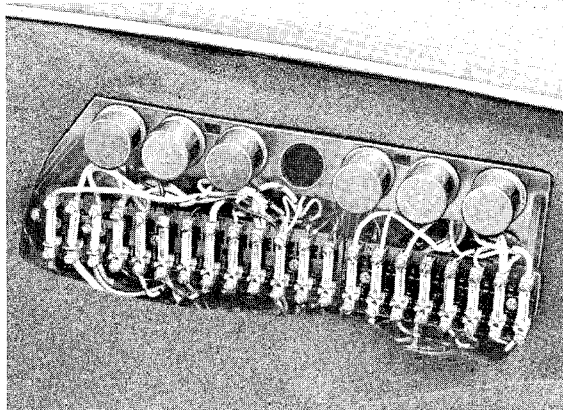
INSTRUMENTS, RADIO



LOCATION OF RELAYS IN CAR

Six standard relays are located in the fuse box in the luggage compartment.

- 1 - Air conditioner relay (front in driving direction) optional extra equipment
- 2 - Foglight relay
- 3 - Horn relay
- 4 - Not occupied
- 5 - Electric window winder relay
- 6 - Fuel pump relay I (front)
- 7 - Fuel pump relay II (rear)



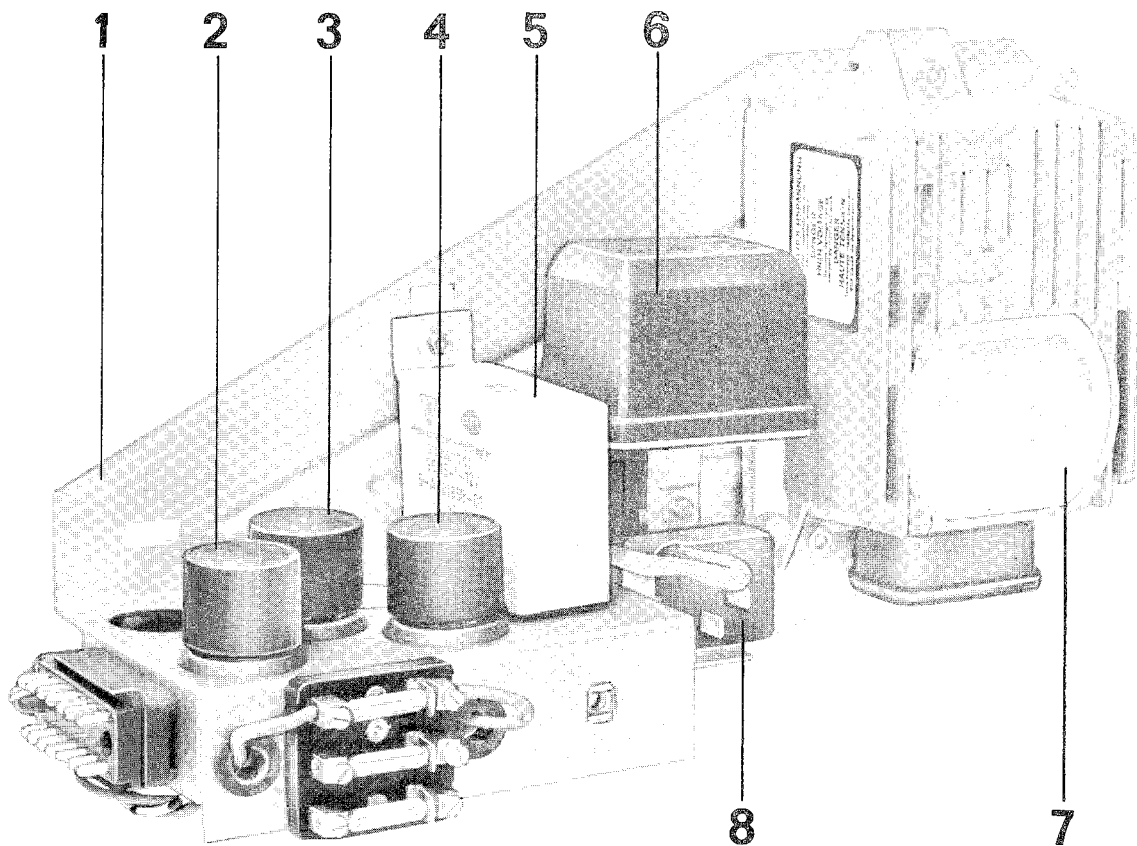
The standard relays for the rear window defogger, turn signal/emergency flasher lights and seat belt warning system are located on left side of luggage compartment floor as seen in driving direction - same as for the Type 911. The relays are accessible from the luggage compartment or after removal of small combination instrument.

On the 1977 Models the fuse sequence has changed as follows:

1. The fuses 16 and 21 (fuel pump and window controls) have been interchanged.
2. The fuses 12 and 14 (sliding roof and rear window wiper or fan and rear window defogger) have also been interchanged. This was necessary to prevent the engine from running for several seconds after the ignition was turned off with the heater fan turned on.

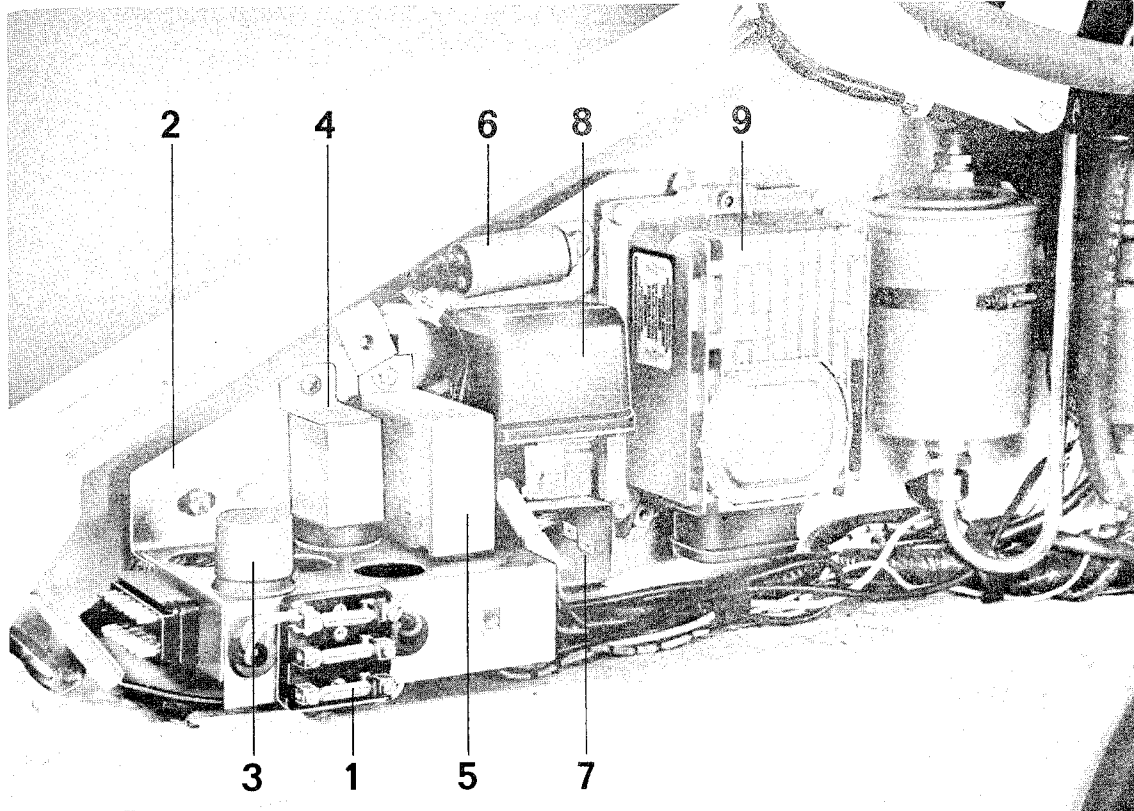
Fuse/Relay Plate from 1976 Models

- 1 - Rear fusebox (fuses S²² to S²⁴)
- 2 - Fuse/relay plate
- 3 - Relay, air control/charging pressure
- 4 - Relay, two stage rear window defogger
- 5 - Condenser, CDI control unit
- 6 - Radio suppressor
- 7 - Voltage stabilizer
- 8 - CDI control unit



Relay Plate - 1977 Models

- 1 - Rear fuse holder
- 2 - Relay plate
- 3 - Air flow sensor/turbo boost pressure relay
- 4 - Delayed ignition cut-off relay
- 5 - Two-stage rear window defogger relay
- 6 - CDI control unit capacitor (not applicable from 1978 model)
- 7 - Radio suppressor
- 8 - Voltage regulator
- 9 - CDI control unit



ELECTRONIC SPEEDOMETER

Checking Electronic Speedometer Sensor

Remove tunnel cover in front of emergency seats. Disconnect the flat male plugs at the connector in the tunnel and connect a test buzzer to the wires leading back. Lift car at rear axle and turn right rear wheel by hand. Lock left rear wheel. The buzzer must sound off 8 times for each two revolutions of the wheel. If not, replace the sensor.

The left rear wheel need not be locked, if a car is equipped with a limited slip differential. In this case the buzzer sounds off 8 times for each one revolution.

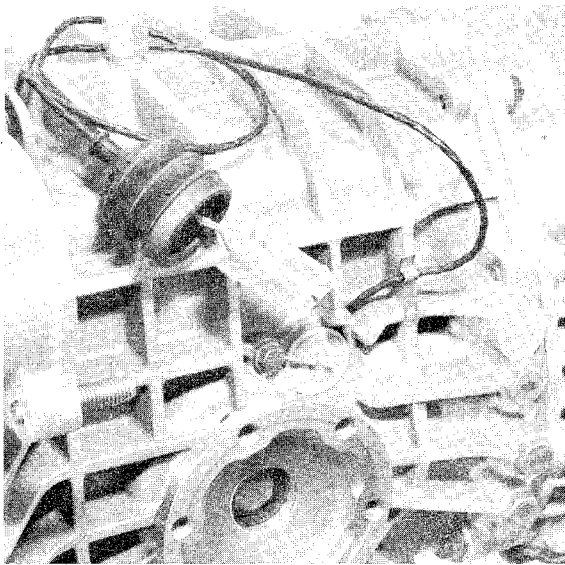
Checking Electronic Speedometer

Connect and disconnect very quickly the two wires in the tunnel that lead forward. A distributor can be applied to help, if both wires are connected to terminal 1 and the distributor housing, and the distributor shaft is turned by hand as quickly as possible. Remove the speedometer if there is no deflection of the needle. Check all wire connections to the speedometer and replace the speedometer if necessary.

Turn on the ignition for this test.

Removing and Installing Electronic Speedometer Sensor

- 1 - Remove right rear wheel.



- 2 - Remove hex head screw and take holder off of sensor.
- 3 - Take sensor wires out of holders and pull sensor out of transmission case.
- 4 - Separate connector in tunnel and pull out sensor wire toward rear.

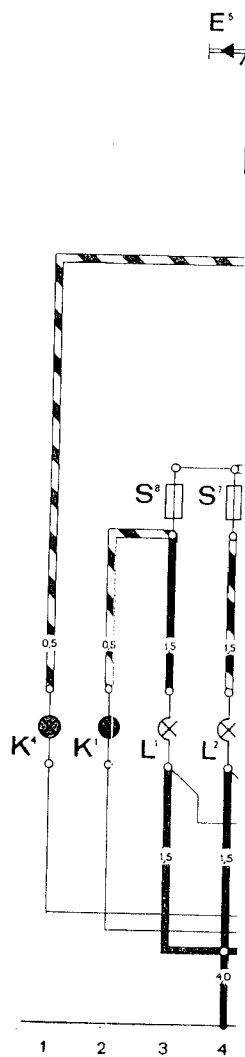
Note

The polarity need not be observed when connecting the sensor wire.

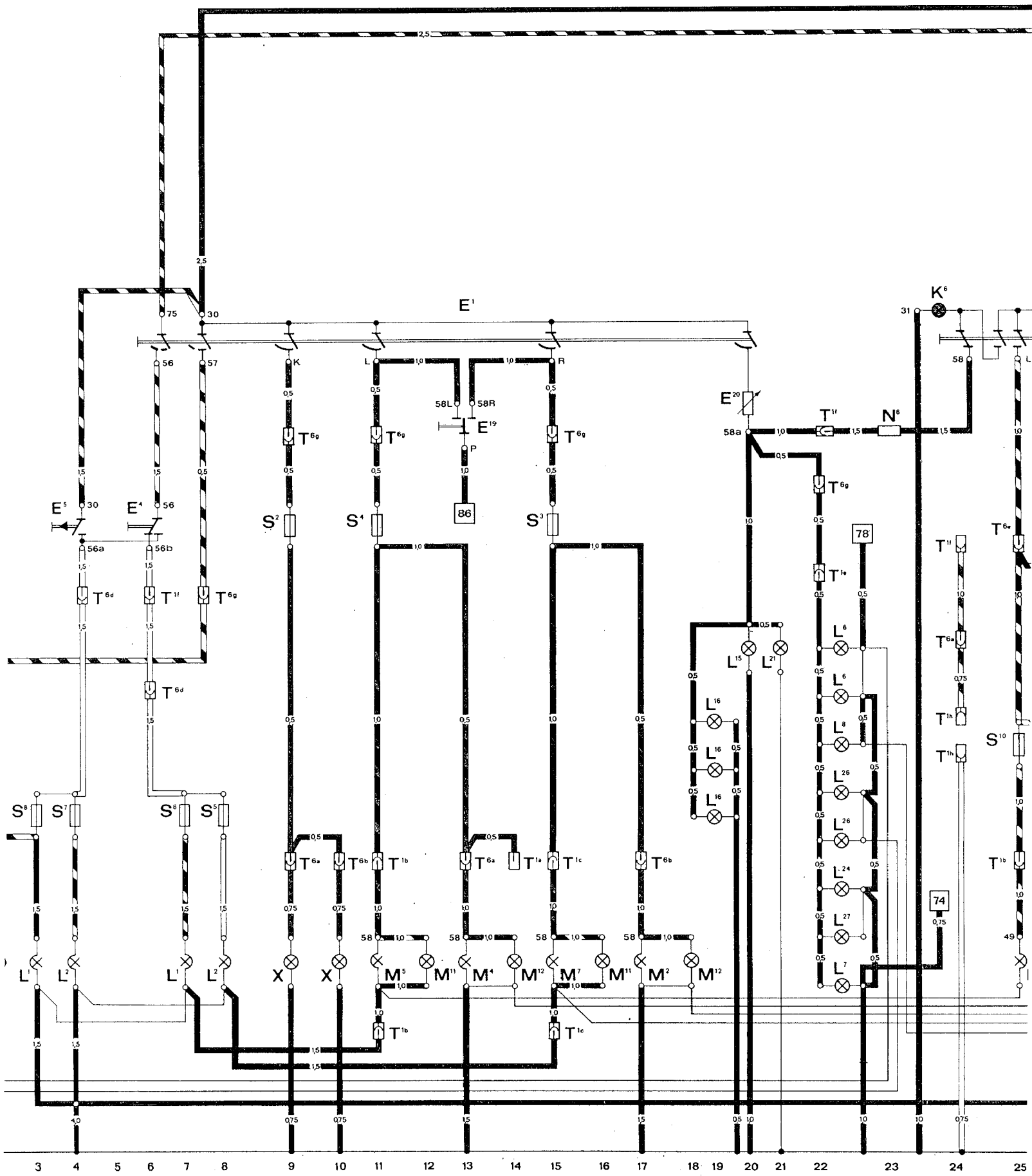
Current flow diagram 930 Turbo USA, Model 76

76-1

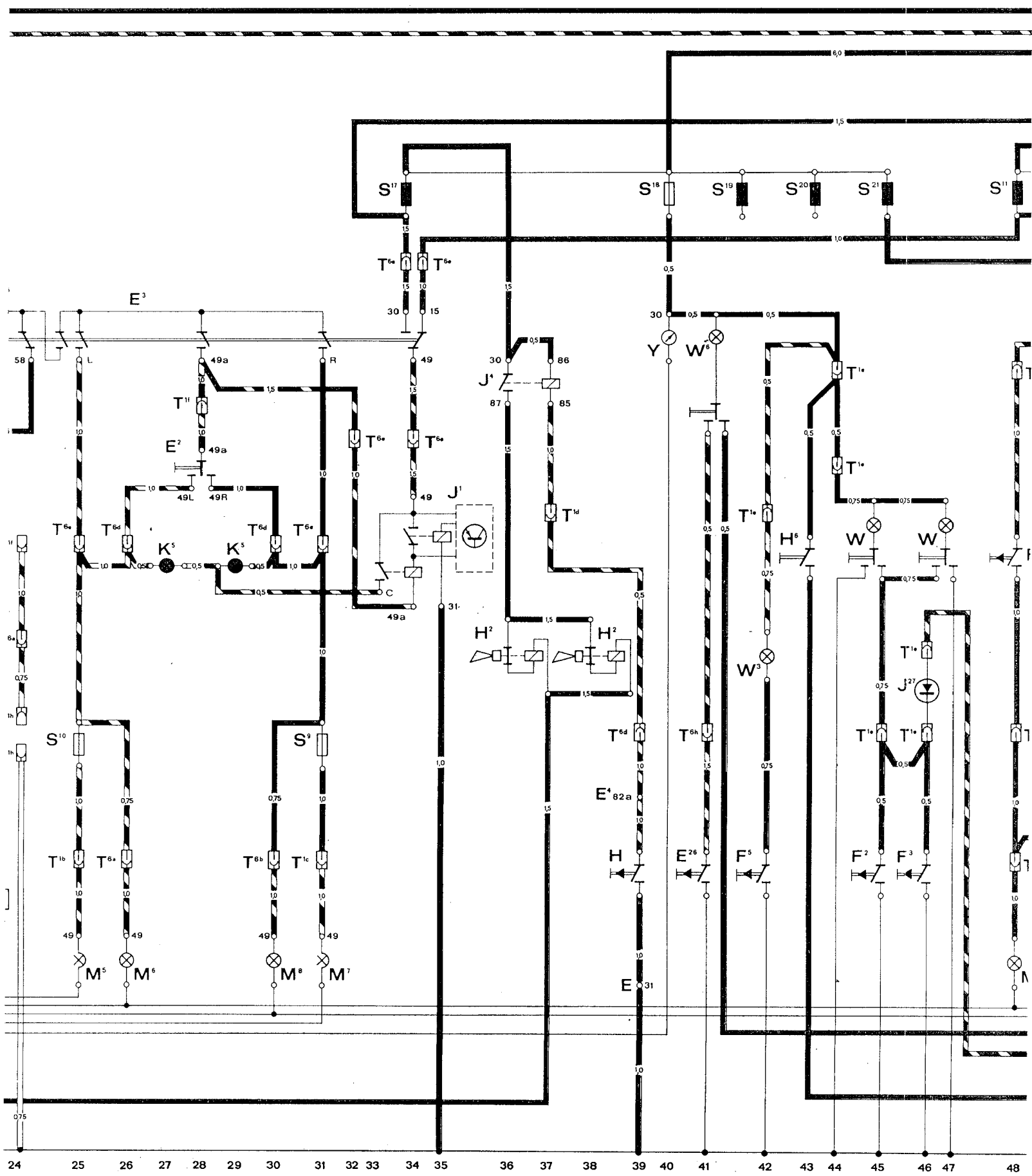
Description	Current track
E	39
E ¹	6, 8, 9, 11, 15, 20
E ²	28
E ³	24, 25, 28, 31, 34
E ⁴	6, 39
E ⁵	4
E ¹⁹	13
E ²⁰	20
E ²⁶	41
F	50
F ²	45
F ³	46
F ⁴	48
F ⁵	42
F ³²	57
G ⁶	53
G ¹⁹	58
G ²³	56
H	39
H ²	36, 37, 38
H ⁶	43
J ¹	33, 34, 35
J ⁴	36, 37
J ¹⁶	57, 58
J ¹⁷	52, 53
J ²⁷	46
J ⁴⁹	56, 58
K ¹	2
K ⁴	1
K ⁵	27, 29
K ⁶	24
L ¹	3, 7
L ²	4, 8
L ⁶	22
L ⁷	22
L ⁸	22
L ¹⁵	20
L ¹⁶	19
L ²¹	21
L ²⁴	22
L ²⁶	22
L ²⁷	22
M ²	17, 50
M ⁴	13, 51
M ⁵	11, 25
M ⁶	26
M ⁷	15, 31
M ⁸	30
M ¹¹	12, 16
M ¹²	14, 18
M ¹⁶	48
M ¹⁷	49
N ⁶	23
N ⁹	55
N ²¹	54
S ²	9, 15, 11
to	8, 7, 4
S ¹¹	3, 31, 25, 48
S ¹⁷	34, 40
to	42, 43
S ²¹	45
T ¹	14
a	11, 25
b	15, 31
c	37
d	22, 42, 44, 45, 46
e	6, 22, 24, 28
f	24
h	56
T ²	56, 57
b	9, 13, 24, 26, 48, 51
d	10, 17, 30, 49, 50
e	4, 6, 26, 30, 39
g	25, 31, 32, 34
h	8, 9, 11, 15, 22
T ¹⁴	41
W	48, 55, 57, 58
W ³	45, 46, 47
W ⁶	42
X	41
Y	9, 10
	40



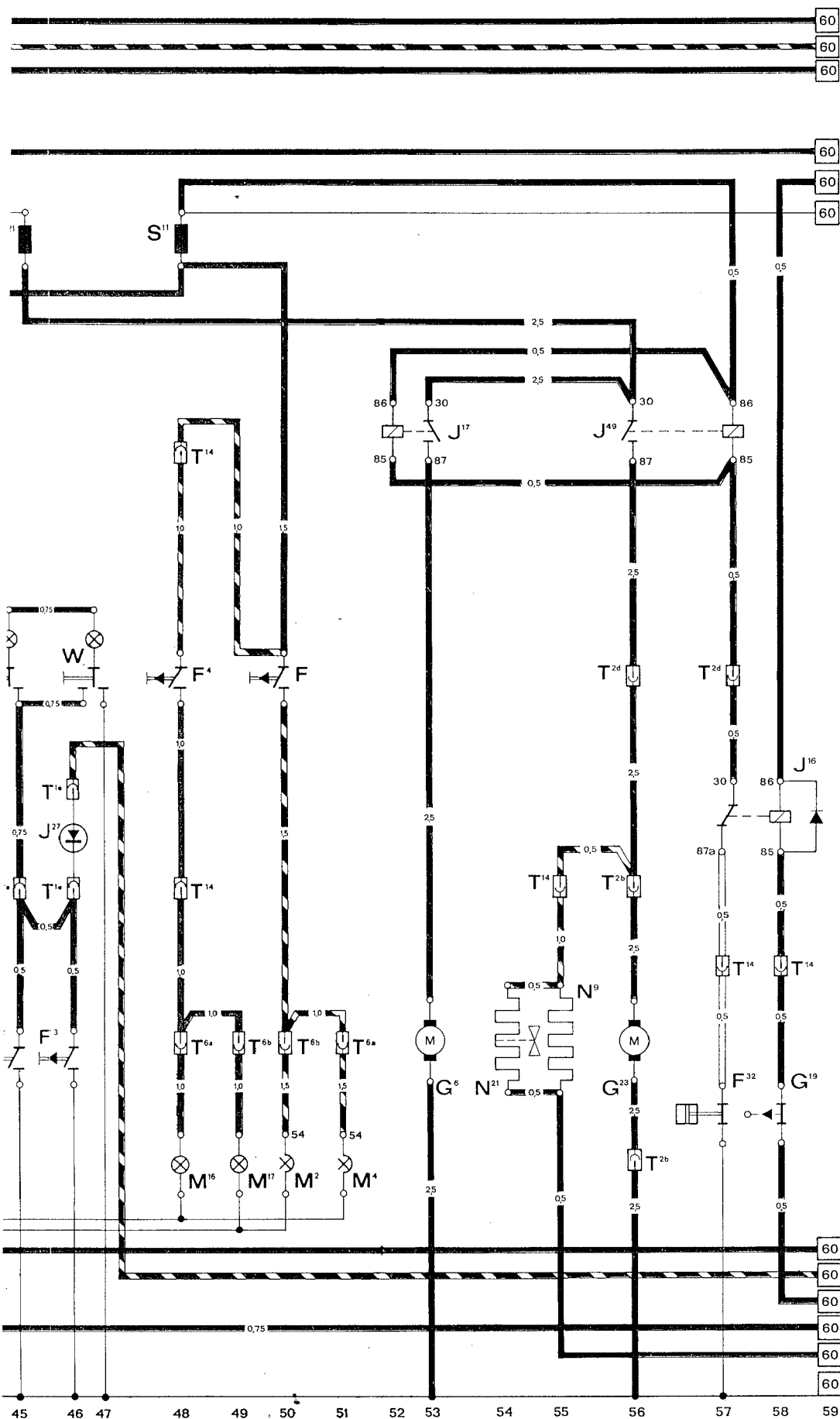
76-2



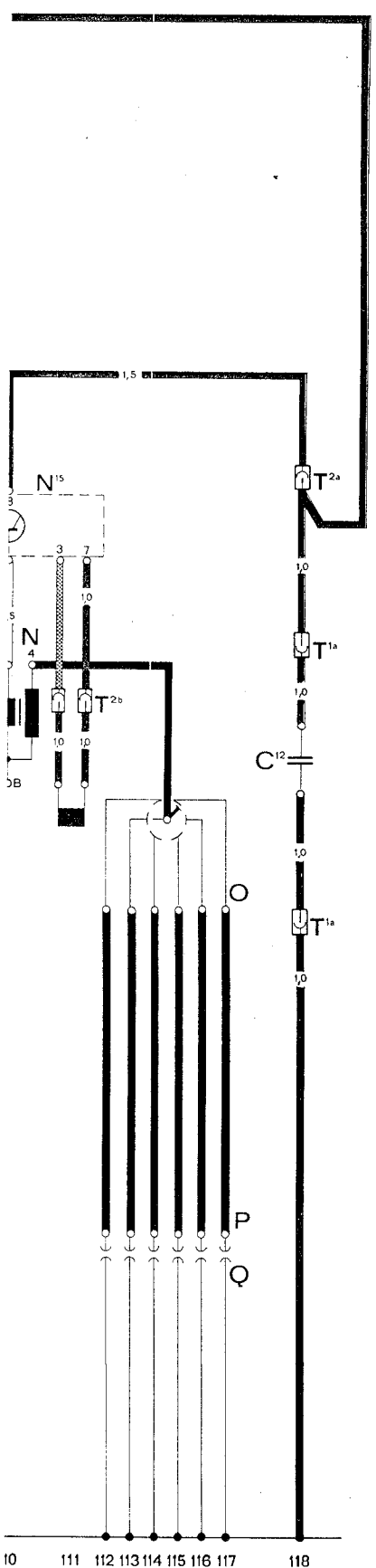
76-3



76-4



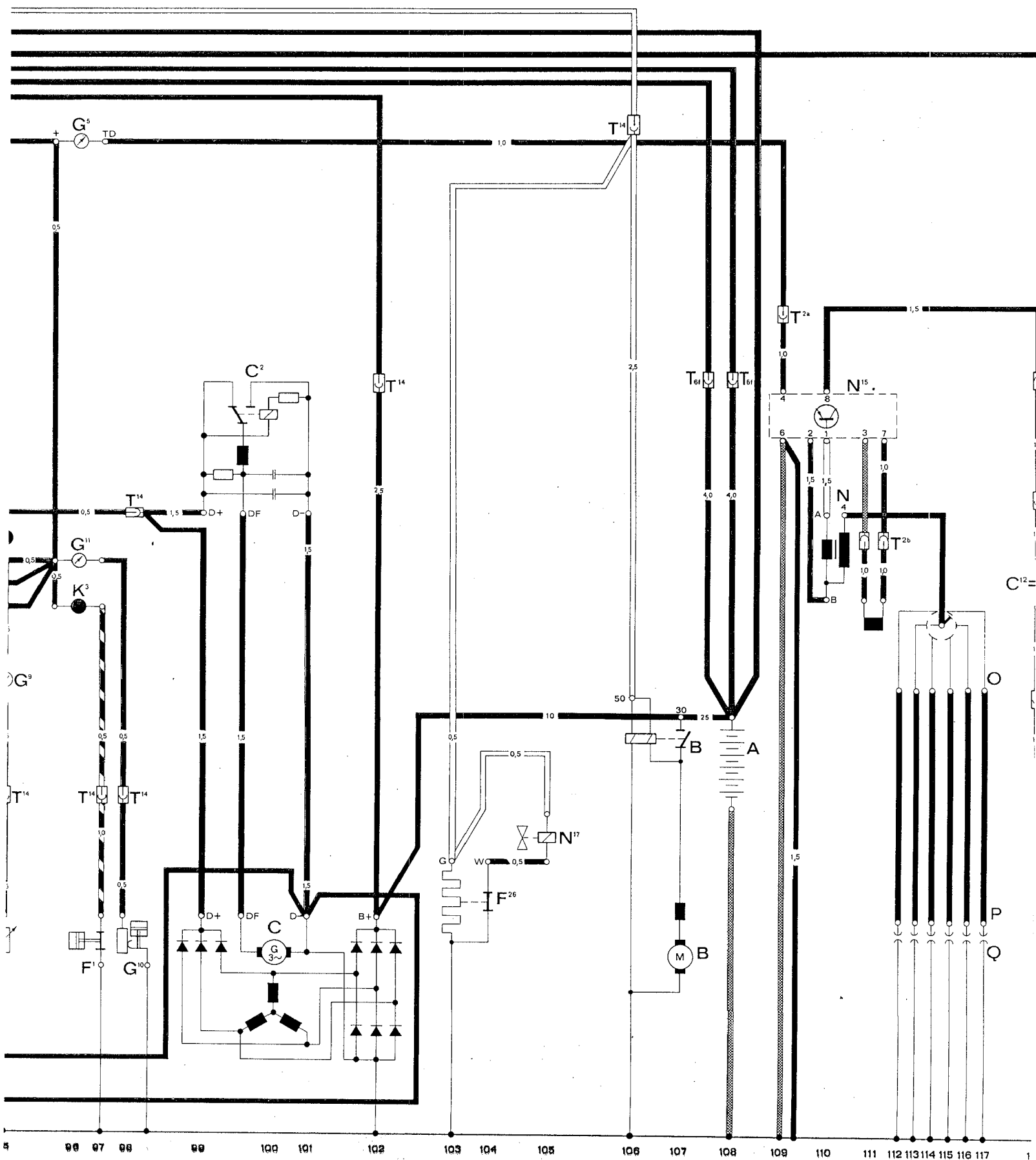
76-MS



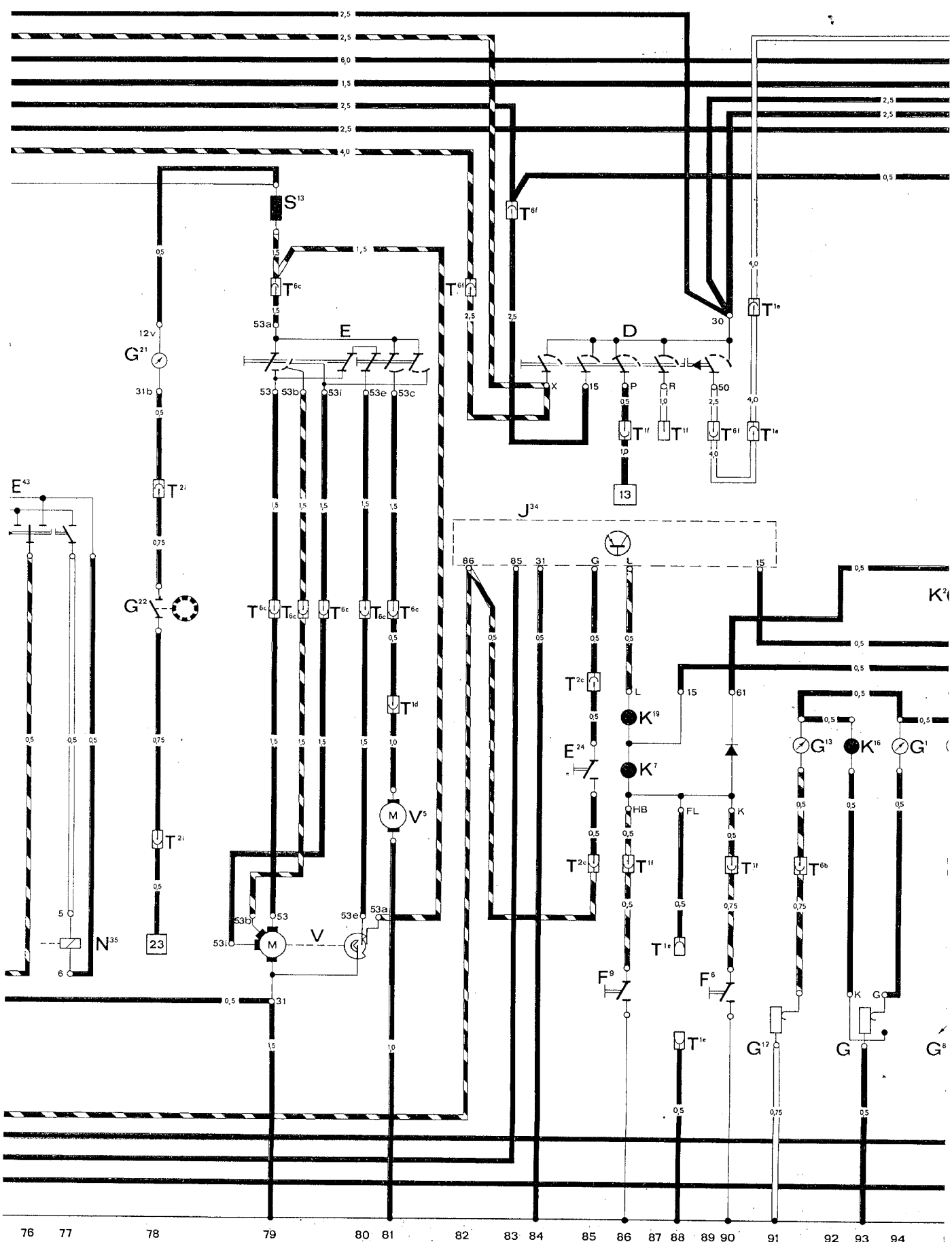
Description	Current track
A - Battery	108
B - Starter	106, 107
C - Generator	99, 100, 102
C ² - Voltage regulator	99, 100, 101
C ¹² - Capacitor for ignition unit	118
D - Ignition / starter switch	84 - 89
E - Windshield wiper switch	79, 80, 81
E ⁹ - Fresh air blower switch	70, 71
E ²⁴ - Left seat belt switch	85
E ³⁶ - Front and rear window defogger switch	64, 66, 68
E ⁴³ - Outside mirror control switch	75, 76, 77
F ¹ - Oil pressure switch	97
F ⁶ - Brake warning switch	90
F ⁹ - Parking brake switch	86
F ²⁶ - Thermo-switch for cold start valve	103, 104
G - Fuel sender unit	93
G ¹ - Fuel gauge	94
G ⁵ - Tachometer	96
G ⁸ - Oil temperature sender unit	95
G ⁹ - Oil temperature indicator	95
G ¹⁰ - Oil pressure sender unit	98
G ¹¹ - Oil pressure indicator	96
G ¹² - Oil level sender unit	91
G ¹³ - Oil level gauge	91
G ²¹ - Speedometer	78
G ²² - Speedometer sensor	78
J ³⁴ - Seat belt warning system relay with integrated buzzer	82 - 91
J ⁴⁵ - Diode for windshield defogger	65
J ⁴⁷ - Relay for windshield defogger	61, 62
J ⁴⁸ - Relay for two-stage rear window defogger	64, 66, 68, 69
K ² - Generator charge indicator light	95
K ³ - Oil pressure indicator light	96
K ⁷ - Parking brake / brake warning light	86
K ⁸ - Blower indicator light	72
K ¹⁶ - Low fuel warning light	93
K ¹⁹ - Seat belt warning light	86
K ²³ - Windshield and rear window defogger indicator light	63
N - Ignition transformer	110
N ¹⁵ - High tension ignition unit	109, 110, 111
N ¹⁷ - Cold start valve	105
N ³⁵ - Magnetic clutch for mirror control	77
O - Distributor	111 - 117
P - Spark plug connector	112 - 117
Q - Spark plug	112 - 117
S ¹² - Fuses	64
to - on the	79
S ¹⁵ - fuse box	73, 72
S ²² - Fuses	66
to - on the	68
S ²⁴ - rear fuse box	69
T ¹ - Cable connector, single	
a - near regulator panel	118
d - behind fuse box	61, 81
e - on luggage compartment floor	70, 88, 91
f - behind instrument panel	70, 71, 86, 87, 90
i - below regulator panel	64, 68
T ² - Cable connector, double	
a - below regulator panel	65, 66, 109, 118
b - near distributor	111
c - near left seat	85
i - in tunnel, rear	78
T ⁴ - Cable connector, fourfold, on luggage compartment floor	74, 75
T ⁶ - Cable connector, sixfold	
b - in engine compartment, right	91
c - below instrument panel	79, 80, 81
f - below instrument panel	82, 83, 89, 108
h - below instrument panel	70, 71, 72
T ¹⁴ - Cable connector, fourteenfold, on regulator panel	95, 97, 98, 102, 106
U ¹ - Cigar lighter	73
V - Windshield wiper motor	79, 80
V ² - Blower motor	70, 71
V ⁵ - Washer pump	81
V ¹⁷ - Outside mirror control motor	75
Z ¹ - Rear window defogger, stage 1	65
Z ² - Windshield defogger	61
Z ³ - Rear window defogger, stage 2	66, 67
Z ⁴ - Outside mirror defogger	74



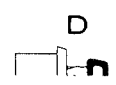
76.6



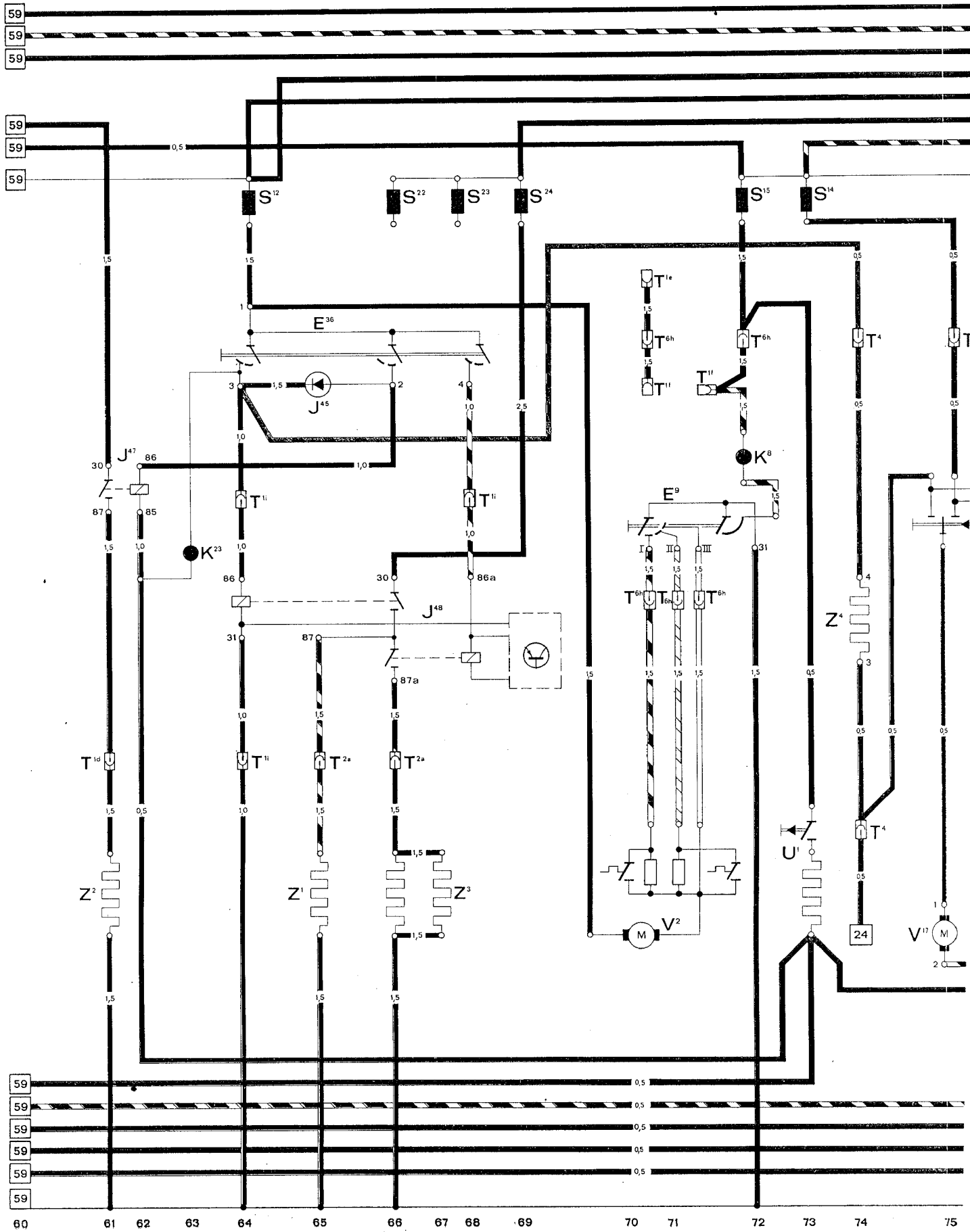
76-67



76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94



76-8

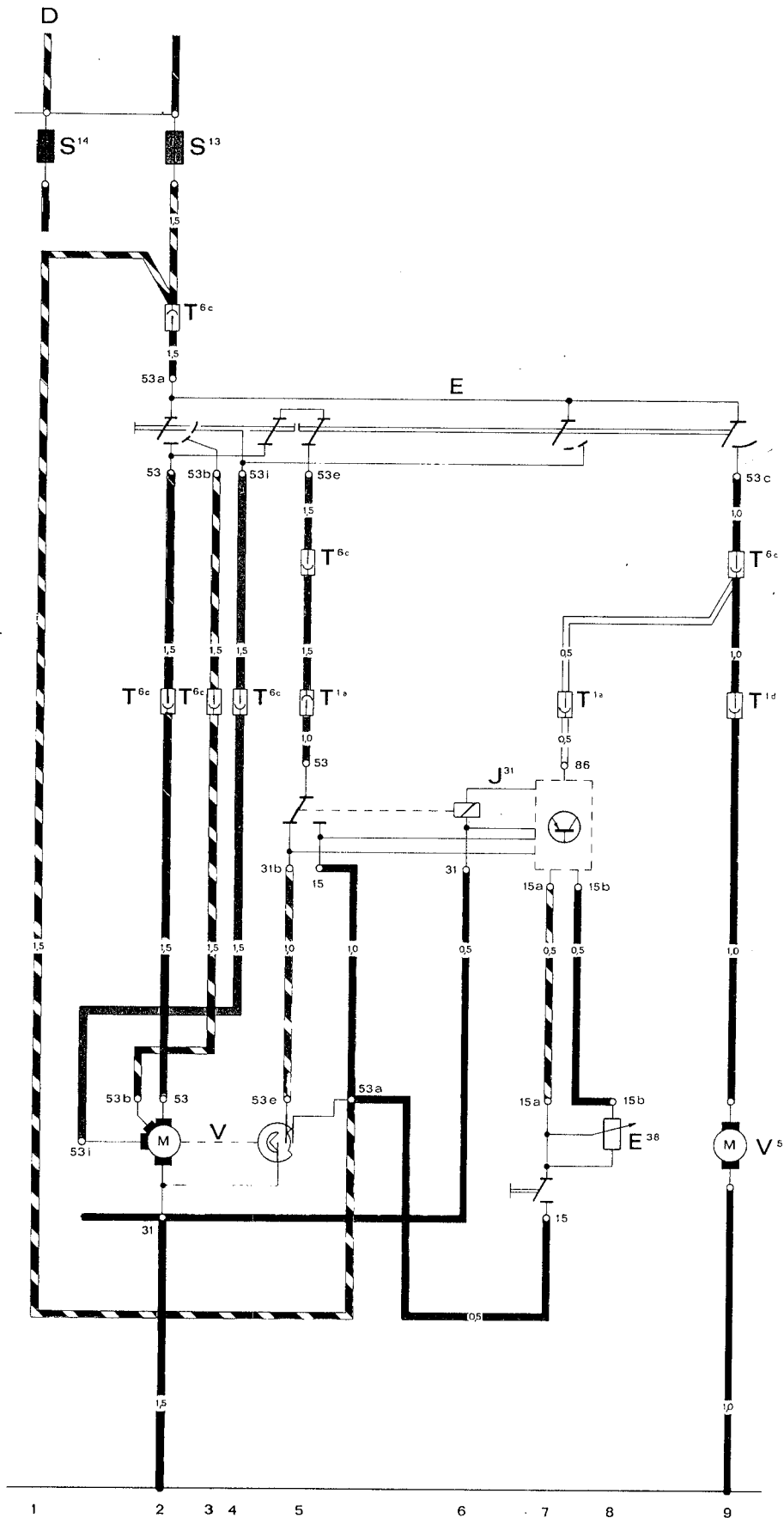


76
47-9

Additional current flow diagram intermittent wiper operation, Model 76

Description	Current track
D - to ignition/starter switch	1
E - Windshield wiper switch	2, 5, 7, 9
E ³⁸ - Potentiometer for intermittent wiper operation	7, 8
J ³¹ - Relay for intermittent wiper operation	5, 6, 7, 8
S ¹³ - Fuses in the	2
S ¹⁴ - fuse box	1
T ¹ - Cable connector, single	
a - on luggage compartment floor	5, 7
d - behind fuse box	9
T ^{6c} - Cable connector, sixfold, below instrument panel	2, 3, 4, 5, 9
V - Windshield wiper motor	2, 5
V ⁵ - Washer pump	9

76-27-10



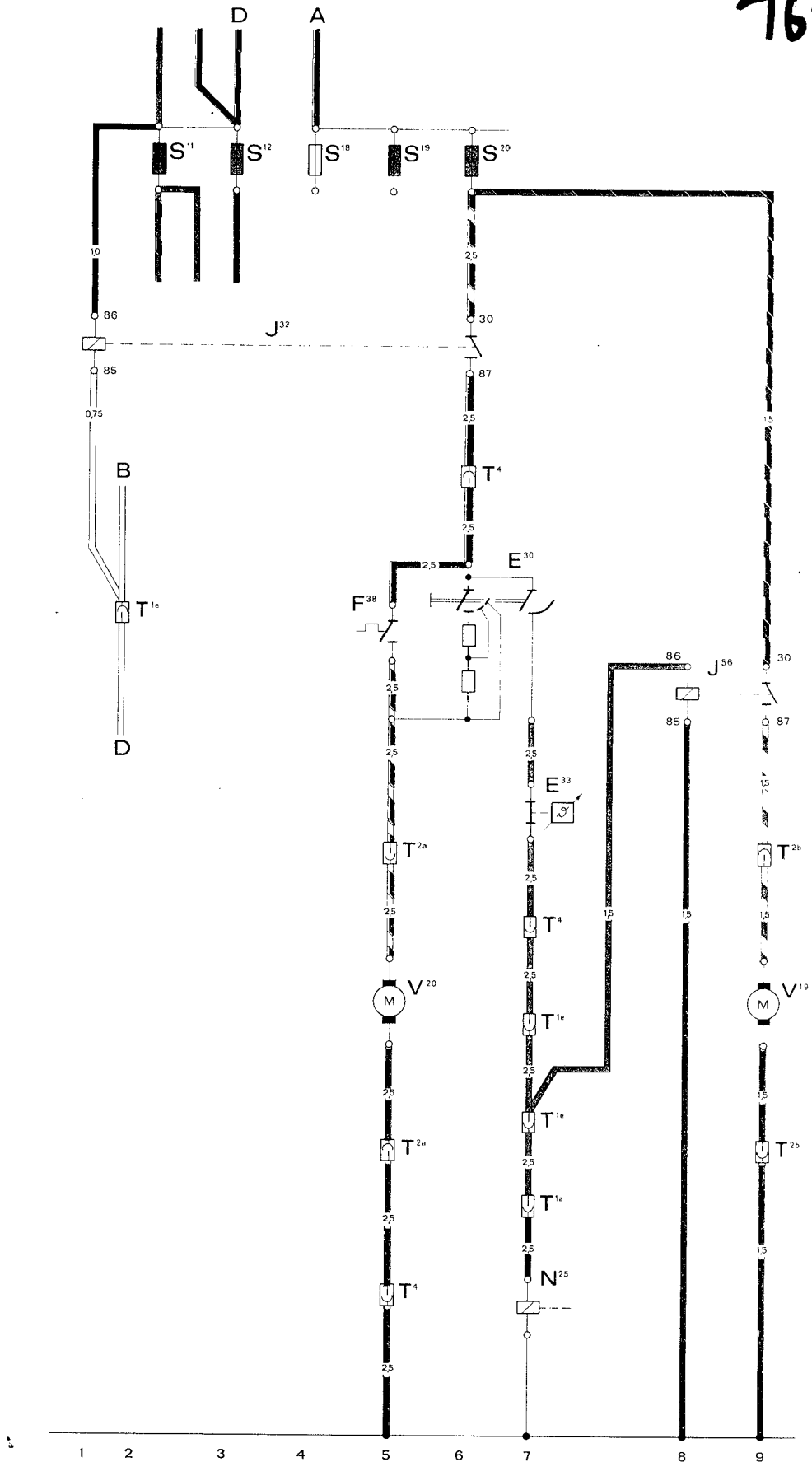
Additional current flow diagram intermittent wiper operation

Additional current flow diagram air conditioner with front condenser

76-11

Description	Current track
A - to battery	4
B - to starter	2
D - to ignition/starter switch, terminal 50	2
D - to ignition/starter switch, terminal 15	3
E ³⁰ - Blower switch	6, 7
E ³³ - Temperature switch	7
F ³⁸ - Thermostat	5
J ³² - Power supply relay	1, 6
J ⁵⁶ - Relay for condenser fan	8, 9
N ²⁵ - Electromagnetic clutch	7
S ¹¹ - Fuses	2
S ¹² - in	3
S ¹⁸ - the	4
S ¹⁹ - fuse	5
S ²⁰ - box	6
T ¹ - Cable connector, single	
a - near regulator panel	7
e - on luggage compartment floor	2, 7
T ² - Cable connector, double	
a - near evaporator blower	5
b - near battery	9
T ⁴ - Cable connector, fourfold, below instrument panel	5, 6, 7
V ¹⁹ - Condenser fan	9
V ²⁰ - Evaporator blower	5

76-12



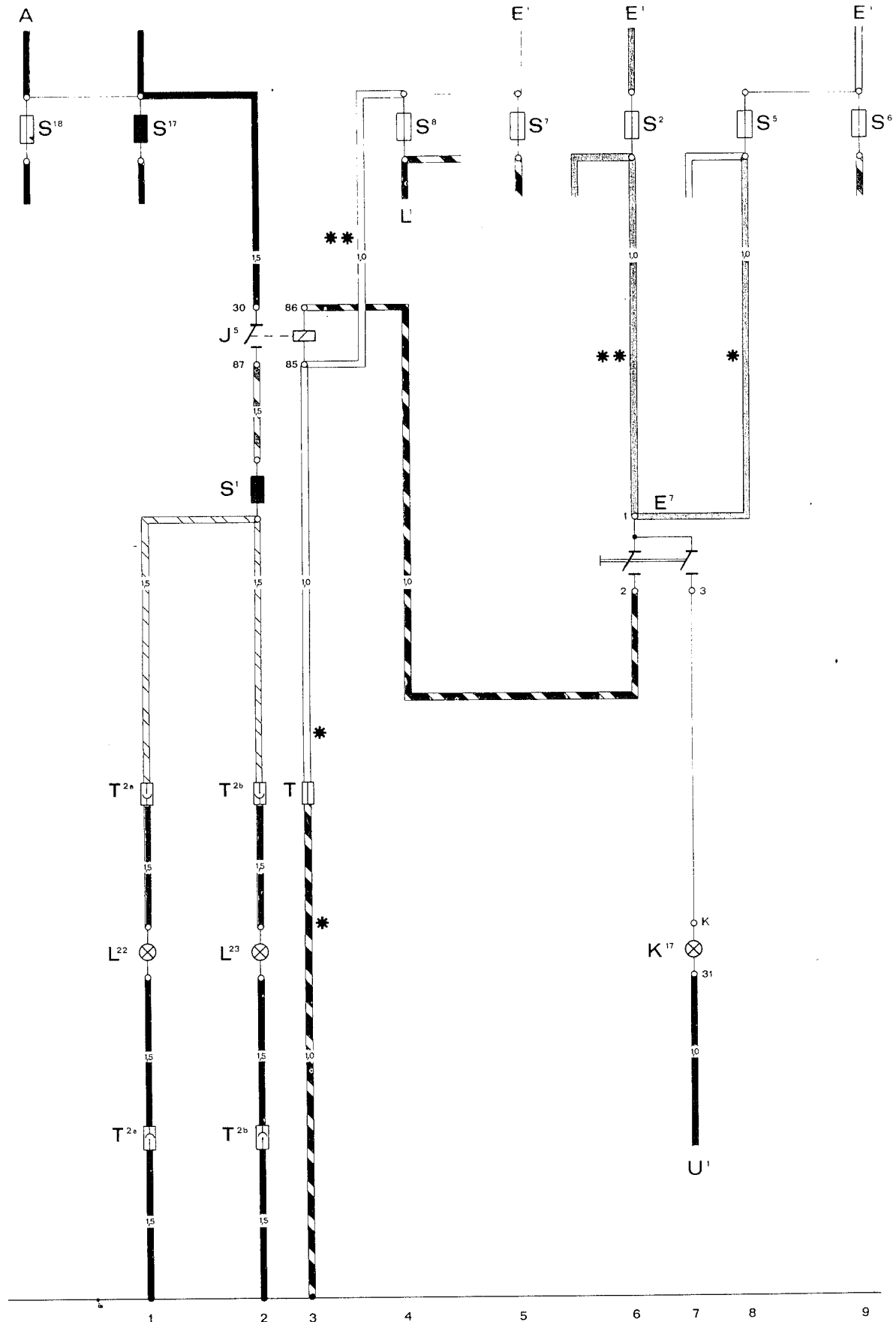
Additional current flow diagram air conditioner

76-13

Additional current flow diagram fog lights

Description	Current track
A - to battery	1
E ¹ - to headlight switch	5, 6, 9
E ⁷ - Fog light switch	6, 7
J ⁵ - Fog light relay	2, 3
K ¹⁷ - Fog light indicator light	7
L ¹ - to left headlight	4
L ²² - Left fog light	1
L ²³ - Right fog light	2
S ¹ -	2
S ² - Fuses	6
S ⁵ - in	8
a - the	9
S ⁸ - fuse	5, 4
S ¹⁷ - box	1
S ¹⁸ -	1
T - Cable connector	3
T ² - Cable connector, double	
a - in luggage compartment, left	1
b - in luggage compartment, right	2

76-14

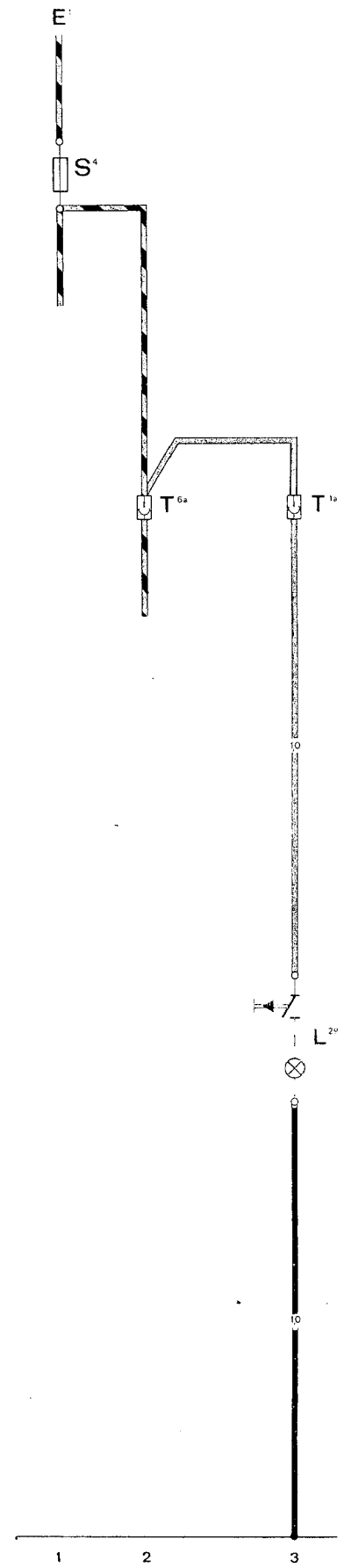


* USA
** Europa

76-15

Additional current flow diagram engine compartment light

Description	Current track
E ¹ - to headlight switch	1
L ²⁹ - Engine compartment light	3
S ⁴ - Fuse in fuse box	1
T ^{1a} - Cable connector, single, near regulator panel	3
T ^{6a} - Cable connector, sixfold, in engine compartment, rear left	2

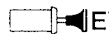
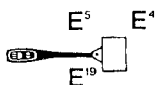
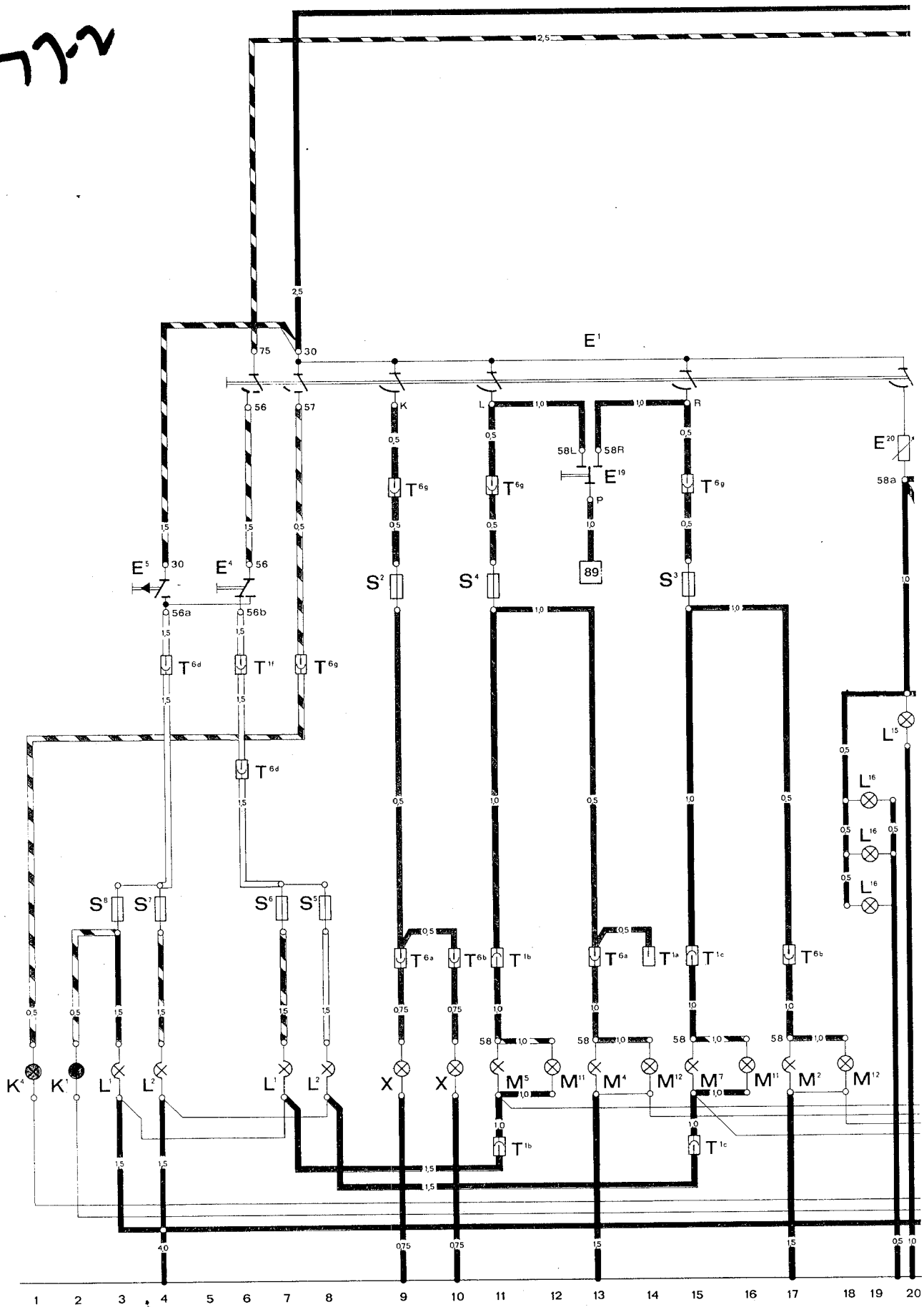


Current flow diagram 930 Turbo USA, Model 77

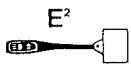
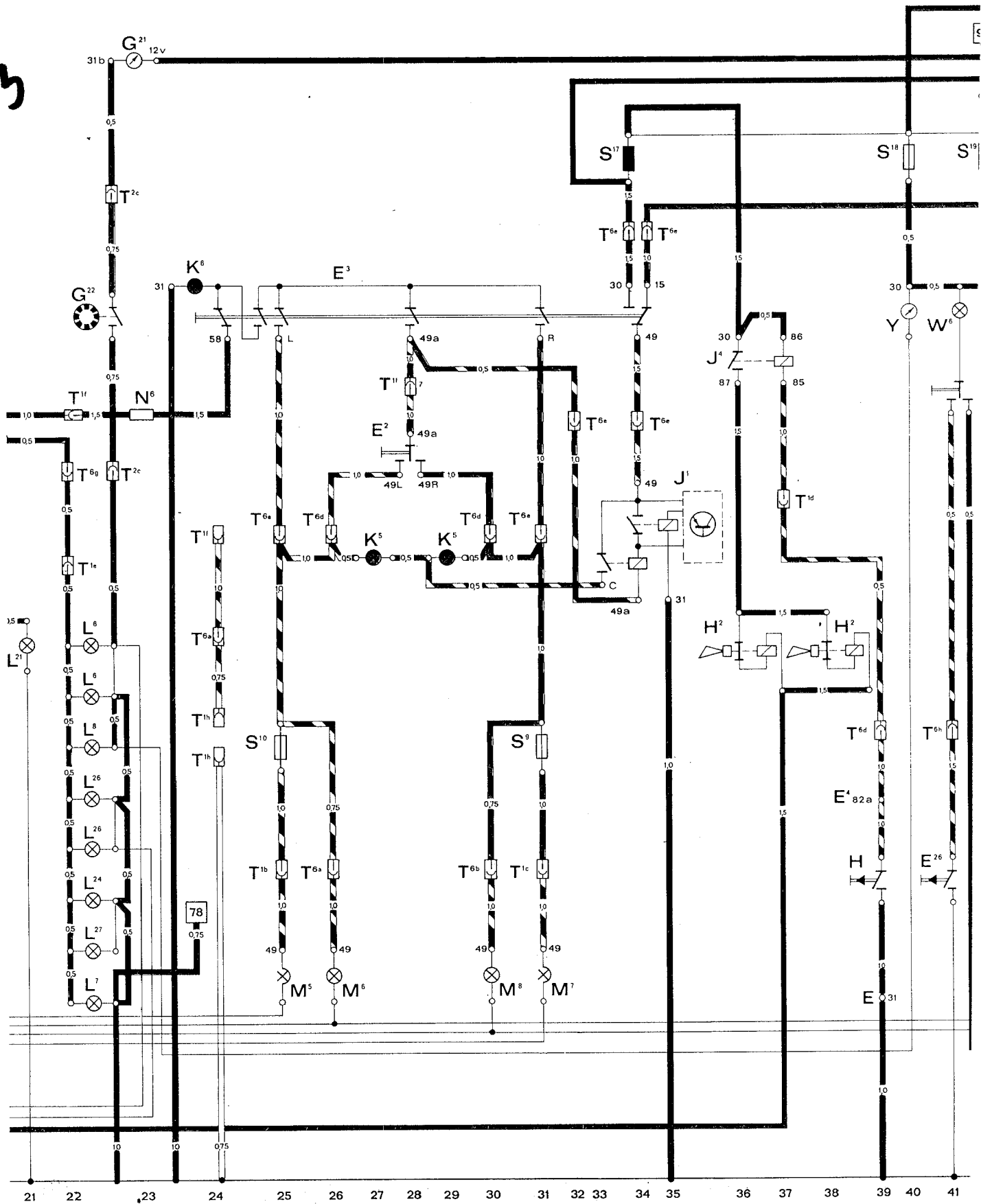
77-1

Description	Current track
E - Windshield wiper switch	39
E ¹ - Headlight switch	6, 8, 9, 11, 15, 20
E ² - Turn signal switch	28
E ³ - Emergency flasher switch	24, 25, 28, 31, 34
E ⁴ - Dimmer switch	6, 39
E ⁵ - Headlight flasher switch	4
E ¹⁹ - Parking light switch	13
E ²⁰ - Instrument panel illumination potentiometer	20
E ²⁶ - Switch for glove compartment light	41
F - Stop light switch	50, 52
F ² - Left door switch	45
F ³ - Right door switch	46
F ⁴ - Back-up light switch	48
F ⁵ - Switch for luggage compartment light	42
F ³² - Manifold pressure limiting switch	59
G ⁶ - Fuel pump I	55
G ¹⁹ - Air meter contact	60
G ²¹ - Speedometer	23
G ²² - Speedometer sensor	23
G ²³ - Fuel pump II	58
H - Horn switch	39
H ² - Horns	36, 37, 38
H ⁶ - Key warning buzzer contact	43
J ¹ - Hazard / turn signal flasher	33, 34, 35
J ⁴ - Horn relay	36, 37
J ¹⁶ - Relay boost switch / air meter contact	59, 60
J ¹⁷ - Relay for fuel pump I	54, 55
J ²⁷ - Diode for seat belt warning system	46
J ⁴⁹ - Relay for fuel pump II	58, 59
K ¹ - High beam indicator light	2
K ⁴ - Parking lights indicator light	1
K ⁵ - Turn signal indicator light	27, 29
K ⁶ - Hazard flasher indicator light	24
L ¹ - Sealed beam unit, left headlight	3, 7
L ² - Sealed beam unit, right headlight	4, 8
L ⁶ - Speedometer illumination light	22
L ⁷ - Fuel gauge illumination light	22
L ⁸ - Clock illumination light	22
L ¹⁵ - Ashtray illumination light	20
L ¹⁶ - Heater control assembly illumination light	19
L ²¹ - Temperature control lever illumination light	21
L ²⁴ - Oil temperature indicator illumination light	22
L ²⁶ - Tachometer illumination light	22
L ²⁷ - Oil pressure indicator illumination light	22
M ² - Right stop / rear light	17, 50
M ⁴ - Left stop / rear light	13, 51
M ⁵ - Left front turn signal / parking light	11, 25
M ⁶ - Left rear turn signal	26
M ⁷ - Right front turn signal / parking light	15, 31
M ⁸ - Right rear turn signal	30
M ¹¹ - Front side marker light	12, 16
M ¹² - Rear side marker light	14, 18
M ¹⁶ - Left back-up light	48
M ¹⁷ - Right back-up light	49
N ⁶ - Resistor	23
N ⁹ - Warm-up regulator	57
N ²¹ - Supplementary air valve	56
N ⁴³ - Thermovalve	56
S ² - Fuses	9, 15, 11
to -	8, 7, 4
S ¹¹ - on the	3, 31, 25, 48
S ¹⁶ - fuse	47, 34, 40
to -	42, 43
S ²¹ - box	45
T ¹ - Cable connector, single	
a - near regulator panel	14
b - behind sealed beam unit, left	11, 25
c - behind sealed beam unit, right	15, 31
d - behind fuse box	37
e - on luggage compartment floor	22, 42, 44, 45, 46
f - behind instrument panel	6, 22, 24, 28
h - near left rear lights	24
T ² - Cable connector, double	
b - in engine compartment	58
c - in tunnel, rear	23
d - behind fuse box	58, 59
T ⁶ - Cable connector, sixfold	
a - in engine compartment, rear left	9, 13, 24, 26, 48, 51
b - in engine compartment, rear right	10, 17, 30, 49, 50
d - below instrument panel	4, 6, 26, 30, 39
e - below instrument panel	25, 31, 32, 34
g - below instrument panel	8, 9, 11, 15, 22
h - below instrument panel	41
T ¹⁴ - Cable connector, fourteenfold	
on regulator panel	48, 57, 59, 60
W - Interior light	45, 46, 47
W ³ - Luggage compartment light	42
W ⁶ - Glove compartment light	41
W ¹¹ - Instrument panel light	41

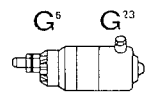
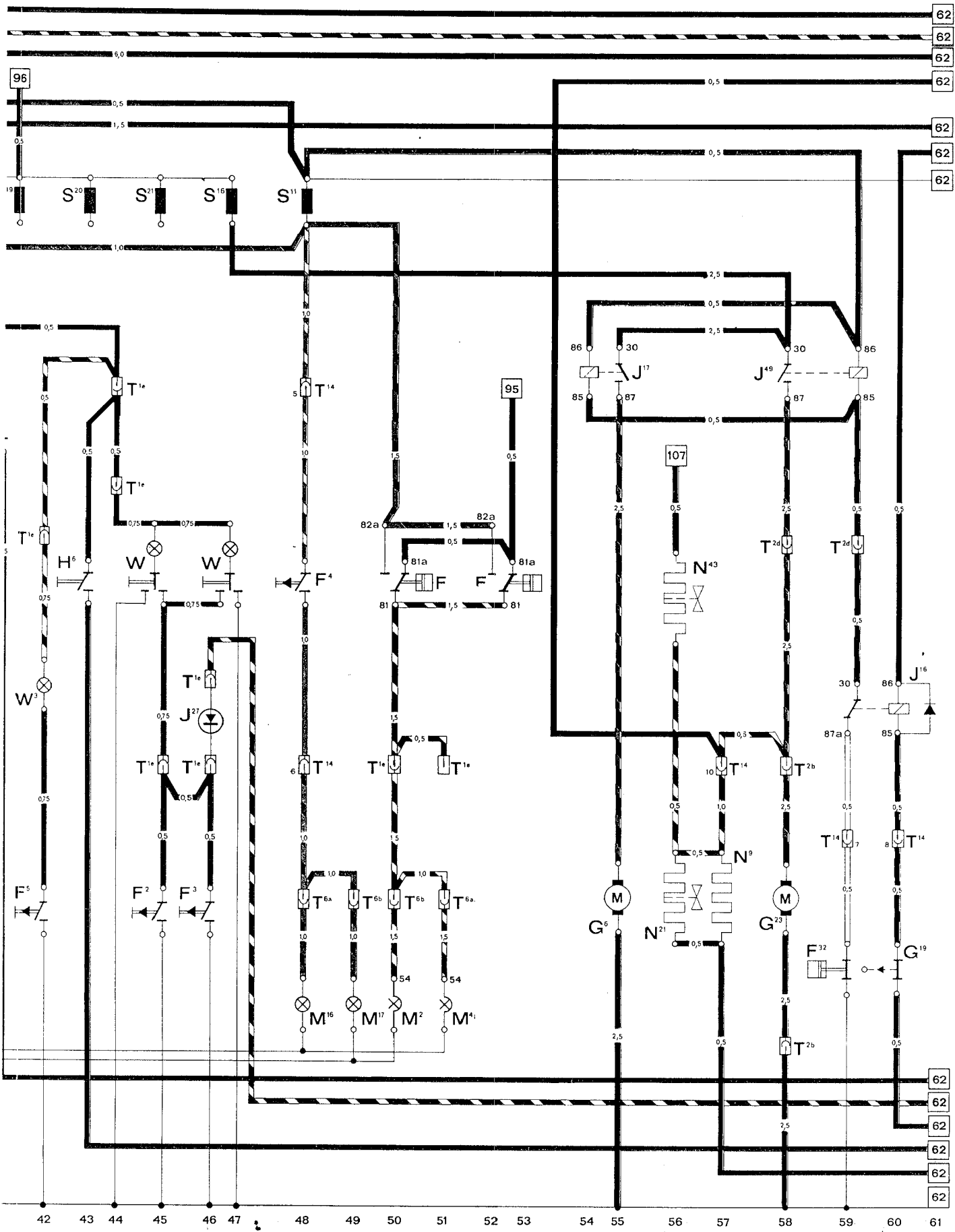
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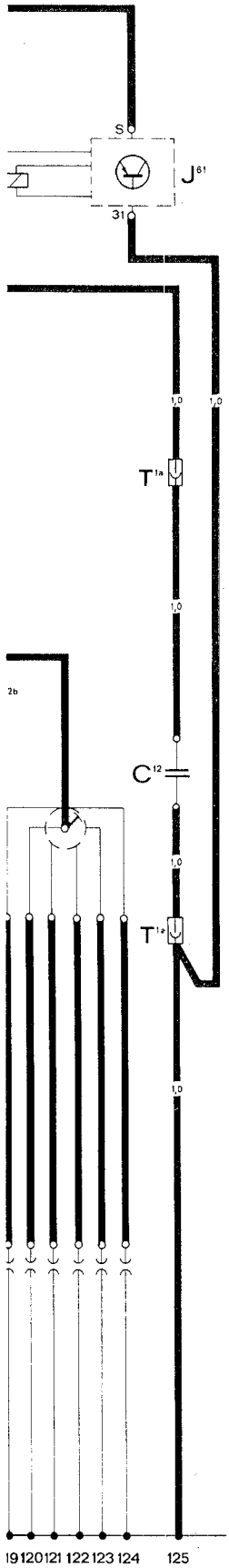
77-3



77.4

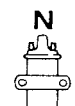
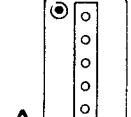
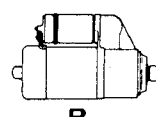
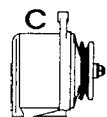
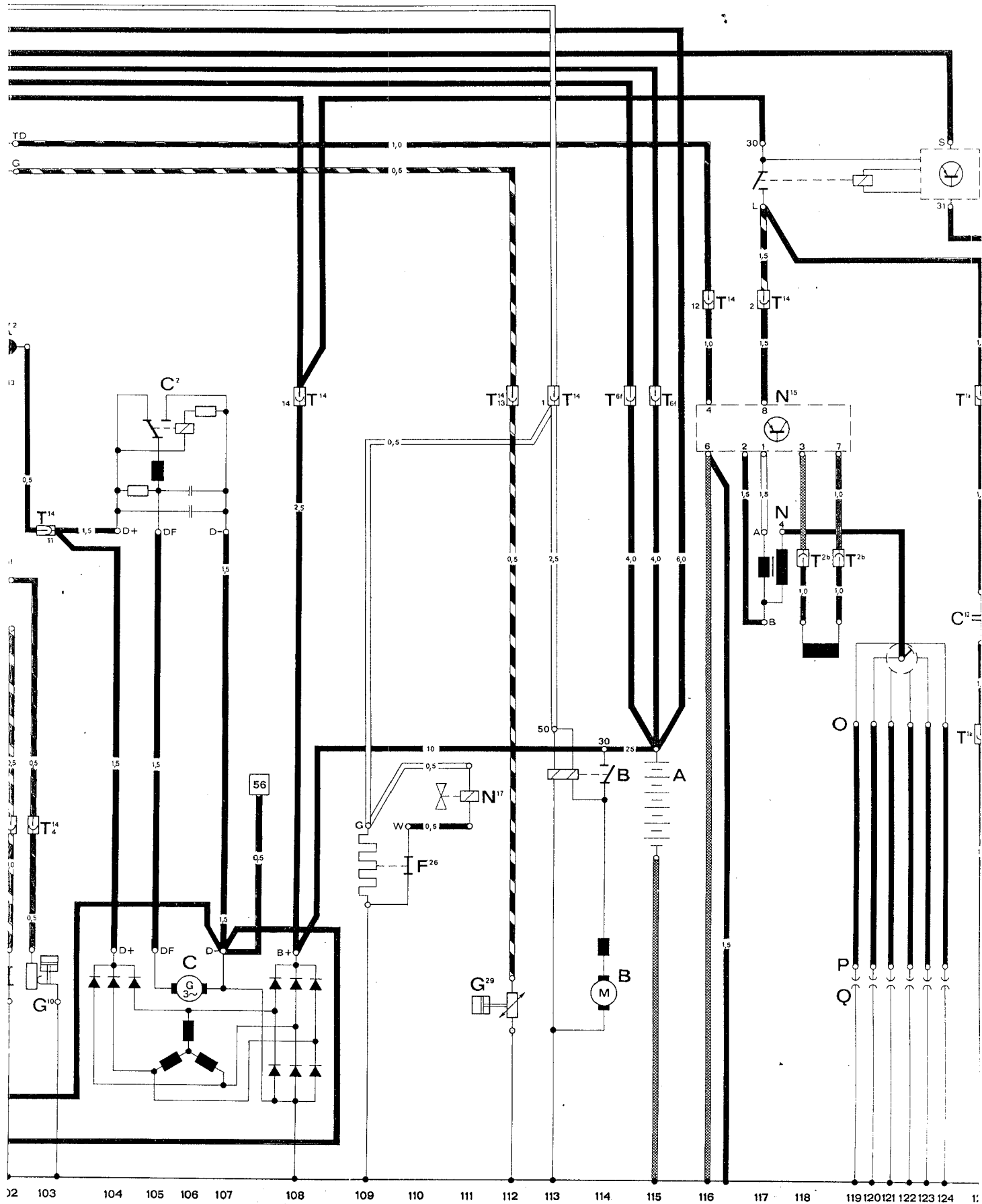


77.5

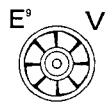
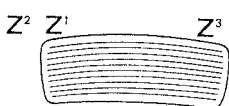
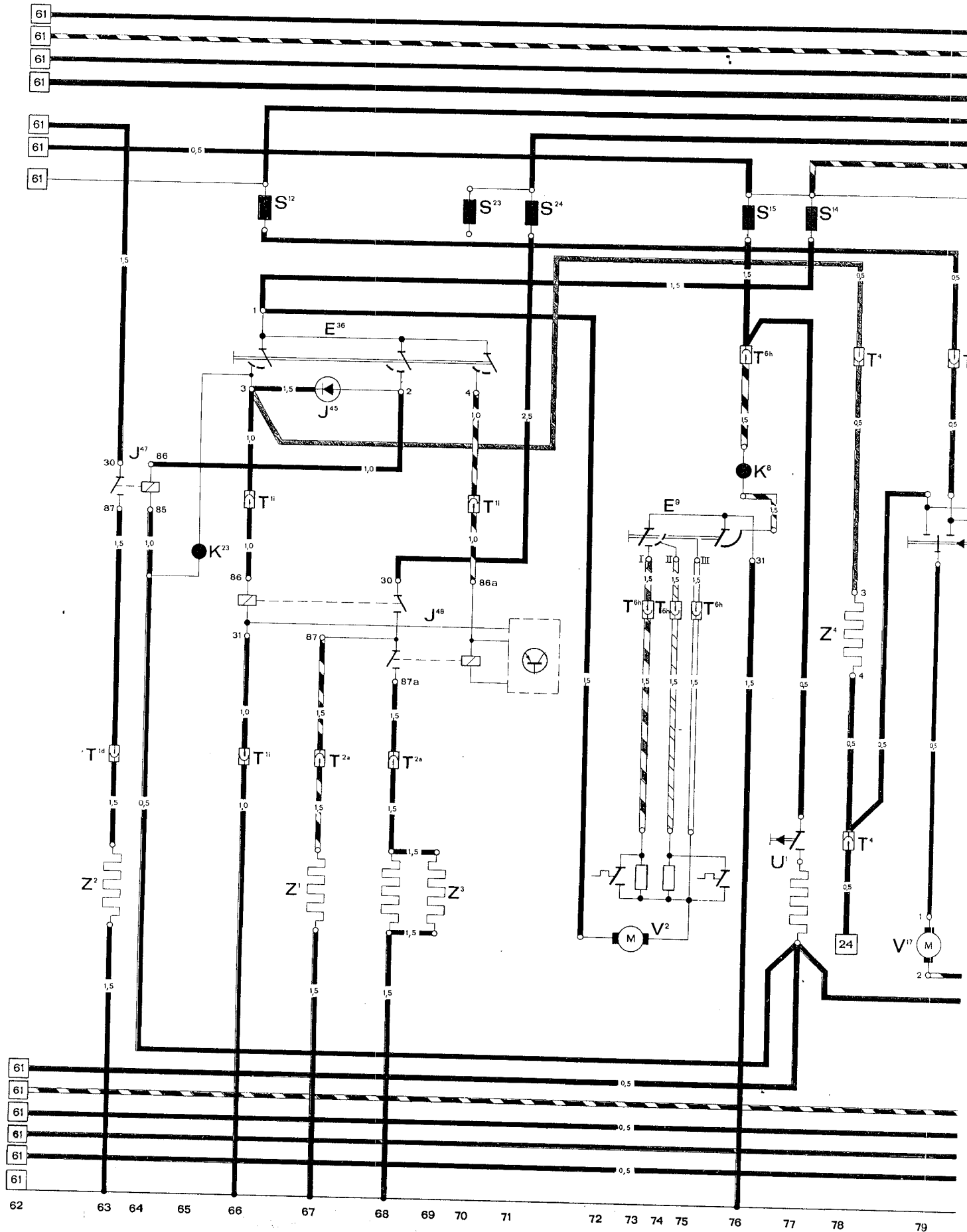


Description	Current track
A - Battery	115
B - Starter	113, 114
C - Generator	104-108
C ² - Voltage regulator	104, 105, 107
C ¹² - Capacitor for ignition unit	125
D - Ignition / starter switch	87-92
E - Windshield wiper switch	83, 84, 85, 87, 90, 92
E ⁹ - Fresh air blower switch	73-76
E ²⁴ - Seat belt switch	93
E ³⁶ - Front and rear window defogger switch	66, 68, 70
E ⁴³ - Outside mirror control switch	79, 80, 81
F ¹ - Oil pressure switch	102
F ⁹ - Parking brake switch	95
F ²⁶ - Thermo-switch for cold start valve	109, 110
G - Fuel sender unit	98, 99
G ¹ - Fuel gauge	99
G ⁵ - Tachometer	101
G ⁸ - Oil temperature sender unit	100
G ⁹ - Oil temperature indicator	100
G ¹⁰ - Oil pressure sender unit	103
G ¹¹ - Oil pressure indicator	101
G ¹² - Oil level sender unit	96
G ¹³ - Oil level gauge	97
G ²⁹ - Charging pressure sensor	112
G ³⁰ - Charging pressure indicator	101
J ³¹ - Relay for intermittent wiper operation	86, 87, 88, 90
J ³⁴ - Seat belt warning system relay	98, 99
J ⁴³ - Diode for delayed ignition cut-off	101
J ⁴⁶ - Diode for windshield defogger	67
J ⁴⁷ - Relay for windshield defogger	63, 64
J ⁴⁸ - Relay for two-stage rear window defogger	66, 67, 68, 70, 71
J ⁶¹ - Delayed-action relay for ignition cut-off	117, 119, 125
K ² - Generator charge indicator light	102
K ³ - Oil pressure indicator light	101
K ⁷ - Parking brake / brake warning light	98
K ⁸ - Blower indicator light	76
K ¹⁶ - Low fuel warning light	98
K ¹⁹ - Seat belt warning light	99
K ²³ - Windshield and rear window defogger indicator light	65
N - Ignition transformer	117
N ¹⁵ - High tension ignition unit	116-119
N ¹⁷ - Cold start valve	111
N ³⁵ - Magnetic clutch for mirror control	81
O - Distributor	118-124
P - Spark plug connector	119-124
Q - Spark plug	119-124
S ¹² - Fuses	66
to - on the	83
S ¹⁵ - fuse box	77, 76
S ²³ - Fuses on the	70
S ²⁴ - rear fuse box	71
T ¹ - Cable connector, single	
a - near regulator panel	125
d - behind fuse box	63, 92
e - on luggage compartment floor	86, 90, 92
f - behind instrument panel	89, 90, 95
i - below regulator panel	66, 70
T ² - Cable connector, double	
a - below regulator panel	67, 68
b - near distributor	118, 119
c - near left seat	93, 98
T ⁴ - Cable connector, fourfold, on luggage compartment floor	78, 79
T ⁶ - Cable connector, sixfold	
b - in engine compartment, right	97
c - below instrument panel	83, 84, 85, 86, 92
f - below instrument panel	84, 86, 91, 115
h - below instrument panel	73-76
T ¹⁴ - Cable connector, fourteenfold, on regulator panel	100, 102, 103, 108, 112, 113, 116, 117
U ¹ - Cigar lighter	77
V - Windshield wiper motor	82, 83, 86, 87
V ² - Blower motor	73, 74, 75
V ⁵ - Washer pump	92
V ¹⁷ - Outside mirror control motor	79
Z ¹ - Rear window defogger, stage 1	67
Z ² - Windshield defogger	63
Z ³ - Rear window defogger, stage 2	68, 69
Z ⁴ - Outside mirror defogger	78

77.6



77.4



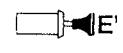
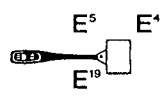
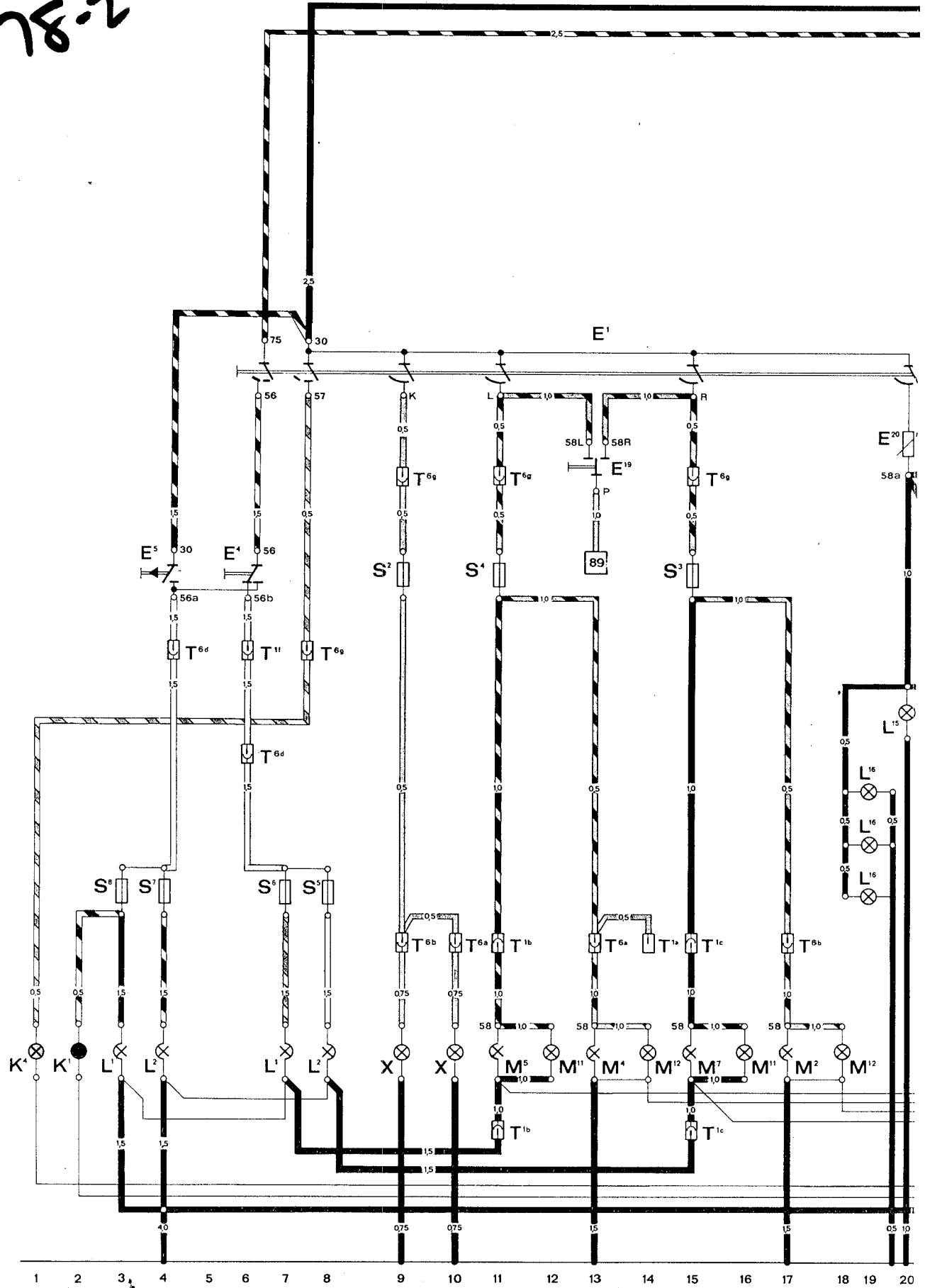
78-1

Current flow diagram 930 Turbo USA, Model 78

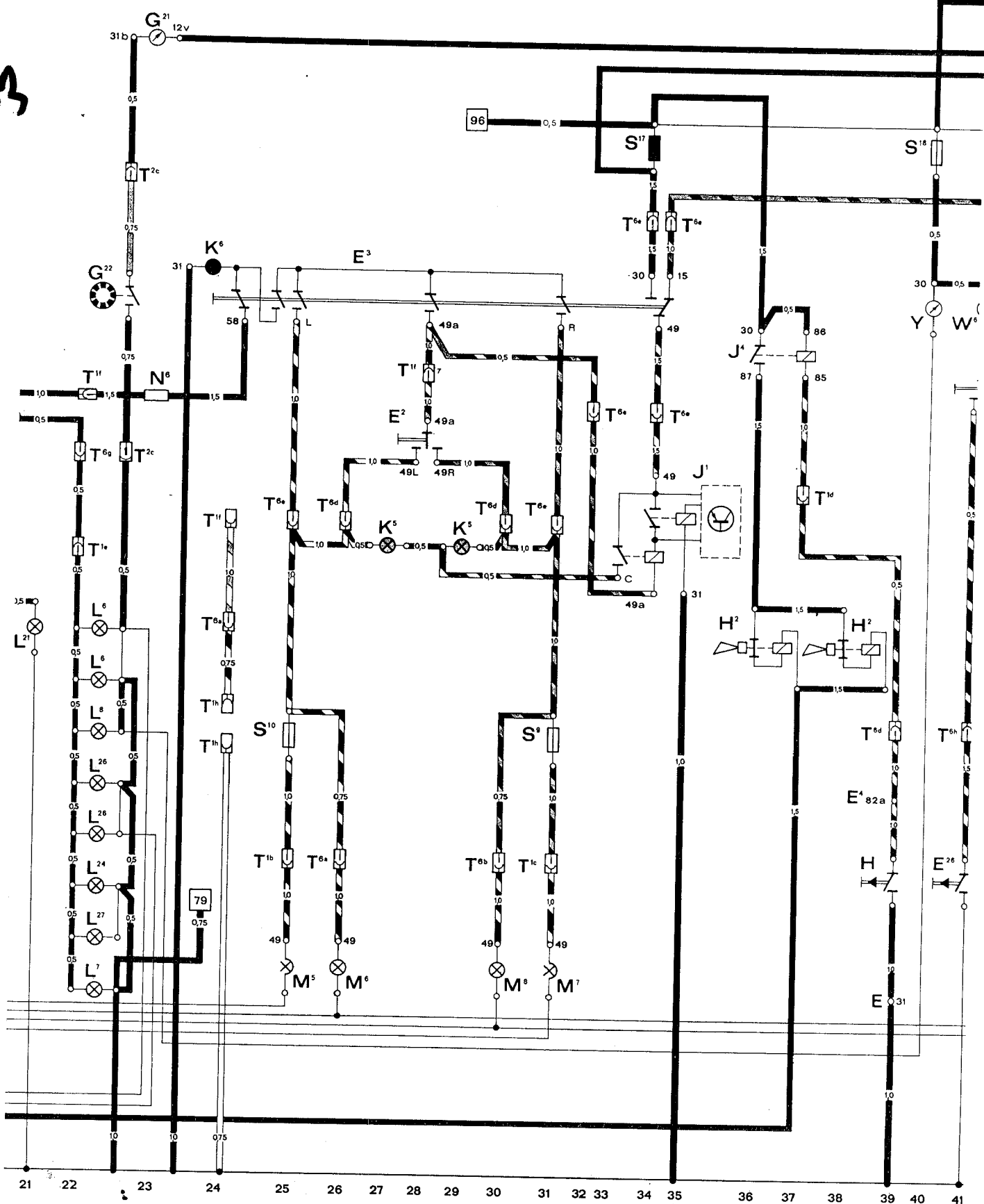
Description	Current track
E - Windshield wiper switch	39
E ¹ - Headlight switch	6, 8, 9, 11, 15, 20
E ² - Turn signal switch	28
E ³ - Emergency flasher switch	24, 25, 28, 31, 34
E ⁴ - Dimmer switch	6, 39
E ⁵ - Headlight flasher switch	4
E ¹⁹ - Parking light switch	13
E ²⁰ - Instrument panel illumination potentiometer	20
E ²⁶ - Switch for glove compartment light	41
F - Stop light switch	50, 52
F ² - Left door switch	45
F ³ - Right door switch	46
F ⁴ - Back-up light switch	48
F ⁵ - Switch for luggage compartment light	42
F ³² - Manifold pressure limiting switch	59
G ⁶ - Fuel pump I	52
G ¹⁹ - Air meter contact	60
G ²¹ - Speedometer	23
G ²² - Speedometer sensor	23
G ²³ - Fuel pump II	58
H - Horn switch	39
H ² - Horns	36, 37, 38
H ⁶ - Key warning buzzer contact	43
J ¹ - Hazard / turn signal flasher	33, 34, 35
J ⁴ - Horn relay	36, 37
J ¹⁶ - Relay boost switch / air meter contact	59, 60
J ¹⁷ - Relay for fuel pump I	54, 55
J ²⁷ - Diode for seat belt warning system	46
J ⁴⁹ - Relay for fuel pump II	58, 59
K ¹ - High beam indicator light	2
K ⁴ - Parking lights indicator light	1
K ⁵ - Turn signal indicator light	27, 29
K ⁶ - Hazard flasher indicator light	24
L ¹ - Sealed beam unit, left headlight	3, 7
L ² - Sealed beam unit, right headlight	4, 8
L ⁶ - Speedometer illumination light	22
L ⁷ - Fuel gauge illumination light	22
L ⁸ - Clock illumination light	22
L ¹⁵ - Ashtray illumination light	20
L ¹⁶ - Heater control assembly illumination light	19
L ²¹ - Temperature control lever illumination light	21
L ²⁴ - Oil temperature indicator illumination light	22
L ²⁶ - Tachometer illumination light	22
L ²⁷ - Oil pressure indicator illumination light	22
M ² - Right stop / rear light	17, 50
M ⁴ - Left stop / rear light	13, 51
M ⁵ - Left front turn signal / parking light	11, 25
M ⁶ - Left rear turn signal	26
M ⁷ - Right front turn signal / parking light	15, 31
M ⁹ - Right rear turn signal	30
M ¹¹ - Front side marker light	12, 16
M ¹² - Rear side marker light	14, 18
M ¹⁶ - Left back-up light	48
M ¹⁷ - Right back-up light	49
N ⁵ - Resistor	23
N ⁹ - Warm-up regulator	56
N ¹⁸ - EGR-valve	56
N ²¹ - Supplementary air valve	55
N ⁴⁸ - Thermostat	57
S ² - Fuses	9, 15, 11
to -	8, 7, 4
S ¹¹ - on the	3, 31, 25, 48
S ¹⁶ - fuse	47, 34, 40
to -	42, 43
S ²¹ - box	45
T ¹ - Cable connector, single	
a - near regulator panel	14
b - behind sealed beam unit, left	11, 25
c - behind sealed beam unit, right	15, 31
d - behind fuse box	37
e - on luggage compartment floor	22, 42, 44, 45, 46
f - behind instrument panel	6, 22, 24, 28
h - near left rear lights	24
T ² - Cable connector, double	
b - in engine compartment	58
c - in tunnel, rear	23
d - behind fuse box	58, 59
e - on luggage compartment floor	50
T ⁶ - Cable connector, sixfold	
a - in engine compartment, rear left	9, 13, 24, 26, 48, 51
b - in engine compartment, rear right	10, 17, 30, 49, 50
d - below instrument panel	4, 6, 26, 30, 39
e - below instrument panel	25, 31, 32, 34
g - below instrument panel	8, 9, 11, 15, 22
h - below instrument panel	41
T ¹⁴ - Cable connector, fourteenfold	
on regulator panel	48, 57, 59, 60
W - Interior light	45, 46, 47
W ³ - Luggage compartment light	42
W ⁶ - Glove compartment light	41

K

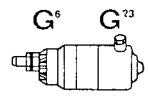
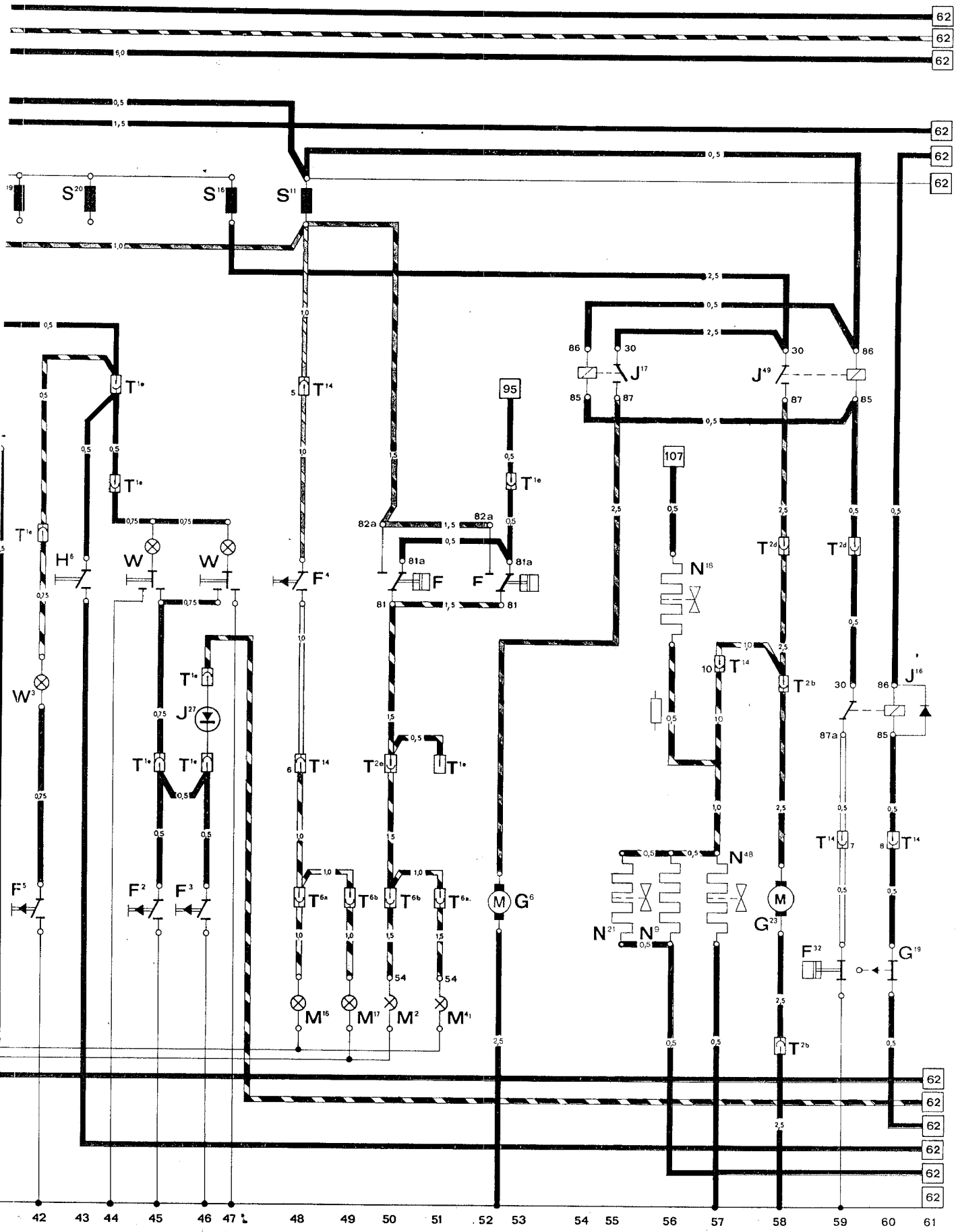
78-2



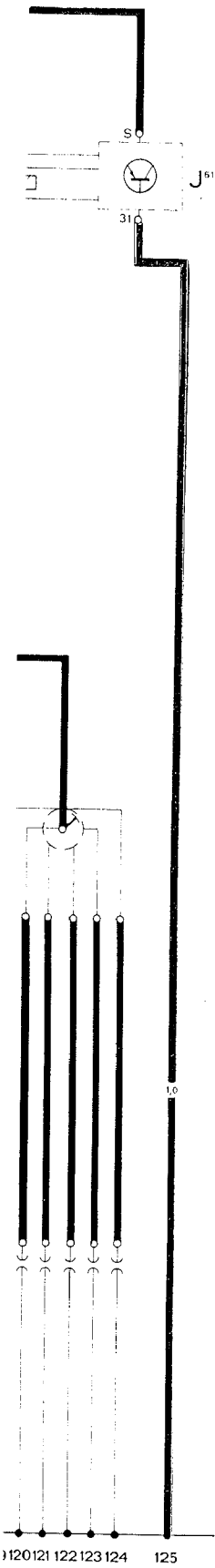
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78-4

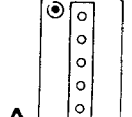
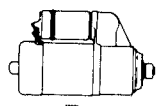
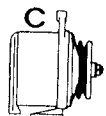
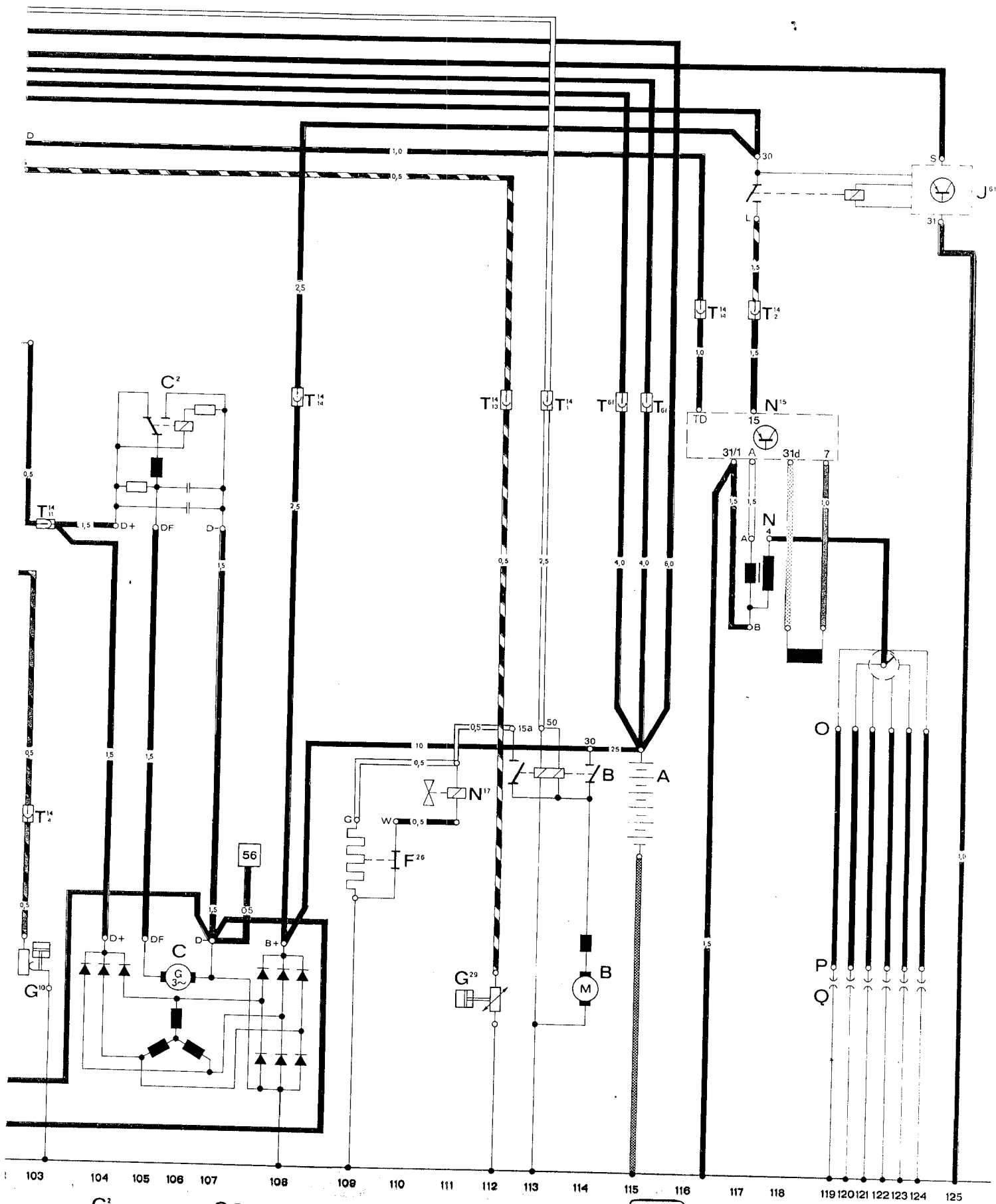


78.5



Description	Current track
A - Battery	115
B - Starter	113, 114
C - Generator	104-108
C ² - Voltage regulator	104, 105, 107
D - Ignition / starter switch	87-92
E - Windshield wiper switch	83, 84, 85, 87, 90, 92
E ⁹ - Fresh air blower switch	73-76
E ²⁴ - Seat belt switch	93
E ³⁶ - Front and rear window defogger switch	66, 68, 70
E ⁴³ - Outside mirror control switch	79, 80, 81
F ¹ - Oil pressure switch	102
F ⁹ - Parking brake switch	95
F ²⁶ - Thermo-switch for cold start valve	109, 110
G - Fuel sender unit	98, 99
G ¹ - Fuel gauge	99
G ⁵ - Tachometer	101
G ⁸ - Oil temperature sender unit	100
G ⁹ - Oil temperature indicator	100
G ¹⁰ - Oil pressure sender unit	103
G ¹¹ - Oil pressure indicator	101
G ¹² - Oil level sender unit	96
G ¹³ - Oil level gauge	97
G ²⁹ - Charging pressure sensor	112
G ³⁰ - Charging pressure indicator	101
J ³¹ - Relay for intermittent wiper operation	86, 87, 88, 90
J ³⁴ - Seat belt warning system relay	98, 99
J ⁴³ - Diode for delayed ignition cut-off	101
J ⁴⁵ - Diode for windshield defogger	67
J ⁴⁷ - Relay for windshield defogger	63, 64
J ⁴⁸ - Relay for two-stage rear window defogger	66, 67, 68, 70, 71
J ⁶¹ - Delayed-action relay for ignition cut-off	117, 119, 125
K ² - Generator charge indicator light	102
K ³ - Oil pressure indicator light	101
K ⁷ - Parking brake / brake warning light	98
K ⁸ - Blower indicator light	76
K ¹⁶ - Low fuel warning light	98
K ¹⁹ - Seat belt warning light	99
K ²³ - Windshield and rear window defogger indicator light	65
N - Ignition transformer	117
N ¹⁵ - High tension ignition unit	116-119
N ¹⁷ - Cold start valve	111
N ³⁵ - Magnetic clutch for mirror control	81
O - Distributor	118-124
P - Spark plug connector	119-124
Q - Spark plug	119-124
S ¹² - Fuses	66
to - on the	83
S ¹⁵ - fuse box	77, 76
S ²³ - Fuses on the	70
S ²⁴ - rear fuse box	71
T ¹ - Cable connector, single	
d - behind fuse box	63, 92
e - on luggage compartment floor	86, 90, 92
f - behind instrument panel	89, 90, 95
i - below regulator panel	66, 70
T ² - Cable connector, double	
a - below regulator panel	67, 68
c - near left seat	93, 97
e - on luggage compartment floor	95
T ⁴ - Cable connector, fourfold, on luggage compartment floor	78, 79
T ⁶ - Cable connector, sixfold	
b - in engine compartment, right	97
c - below instrument panel	83, 84, 85, 86, 92
f - below instrument panel	84, 86, 91, 115
h - below instrument panel	73-76
T ¹⁴ - Cable connector, fourteenfold, on regulator panel	100, 102, 103, 108, 112, 113, 116, 117
U ¹ - Cigar lighter	77
V - Windshield wiper motor	82, 83, 86, 87
V ² - Blower motor	73, 74, 75
V ⁵ - Washer pump	92
V ¹⁷ - Outside mirror control motor	79
Z ¹ - Rear window defogger, stage 1	67
Z ² - Windshield defogger	63
Z ³ - Rear window defogger, stage 2	68, 69
Z ⁴ - Outside mirror defogger	78

78-b



C²

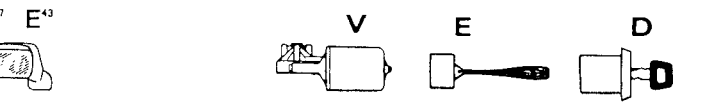
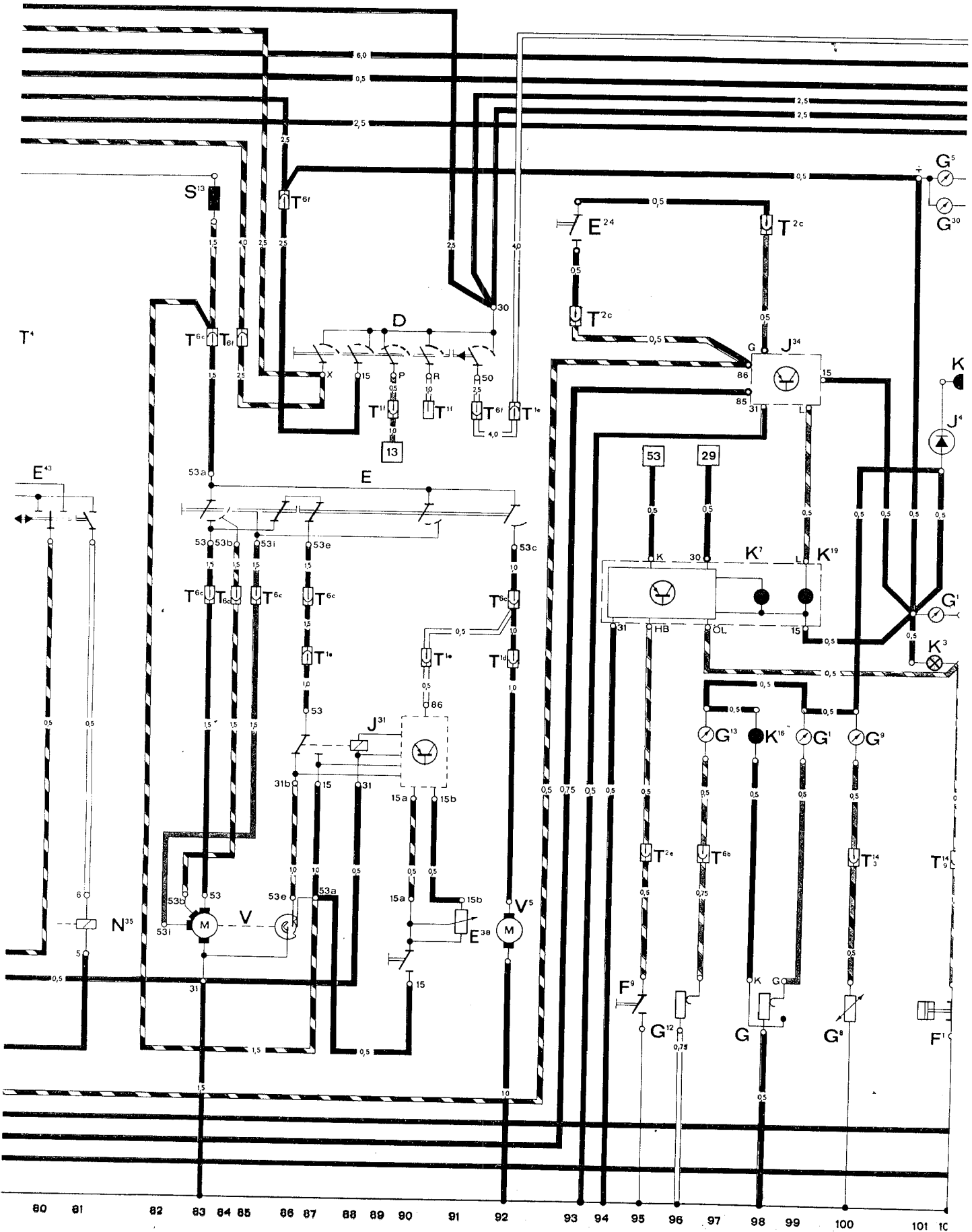
C

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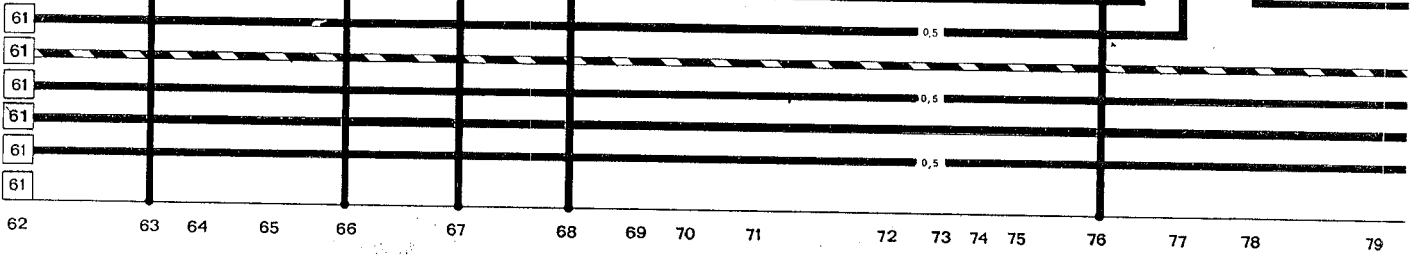
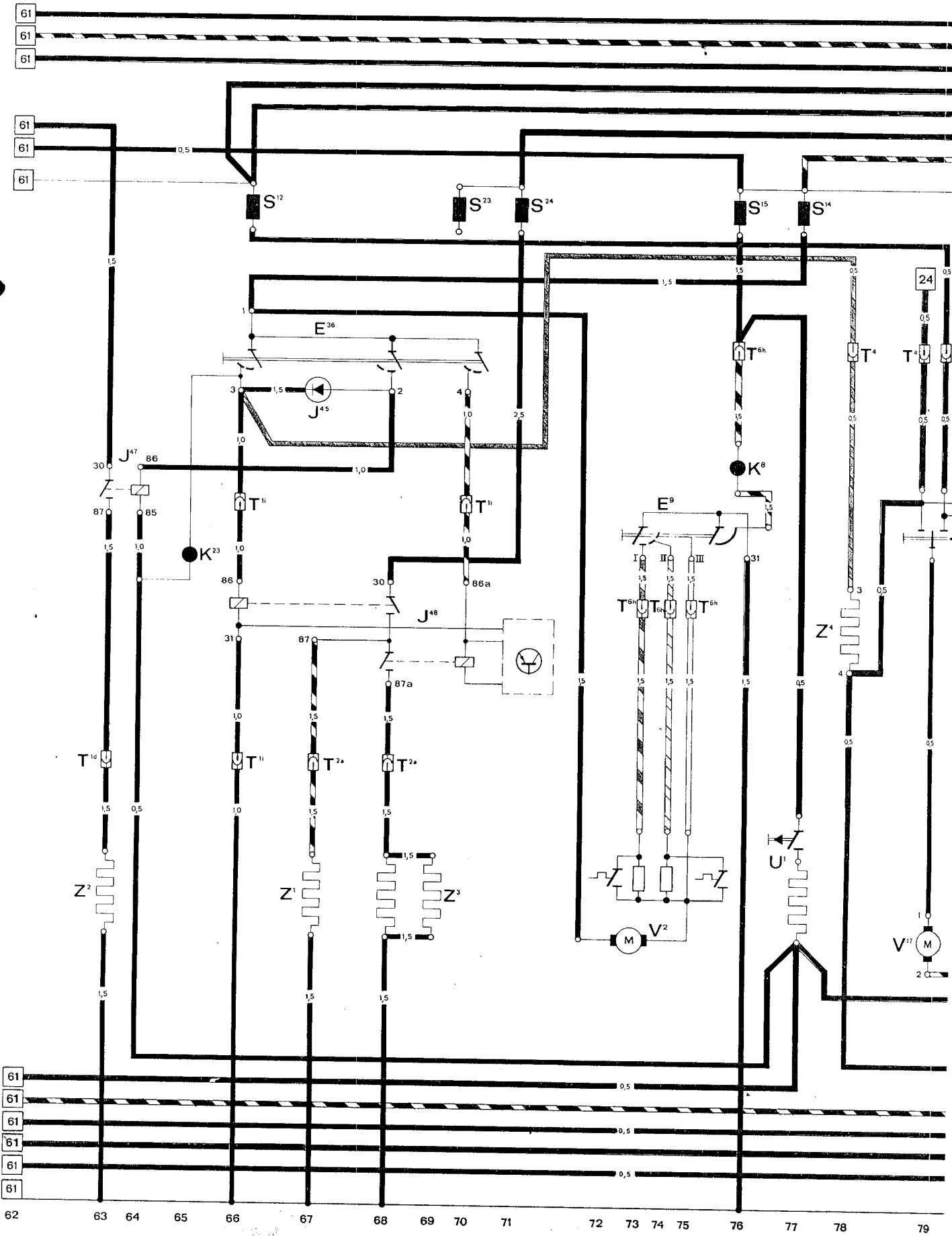
A

N

78.7



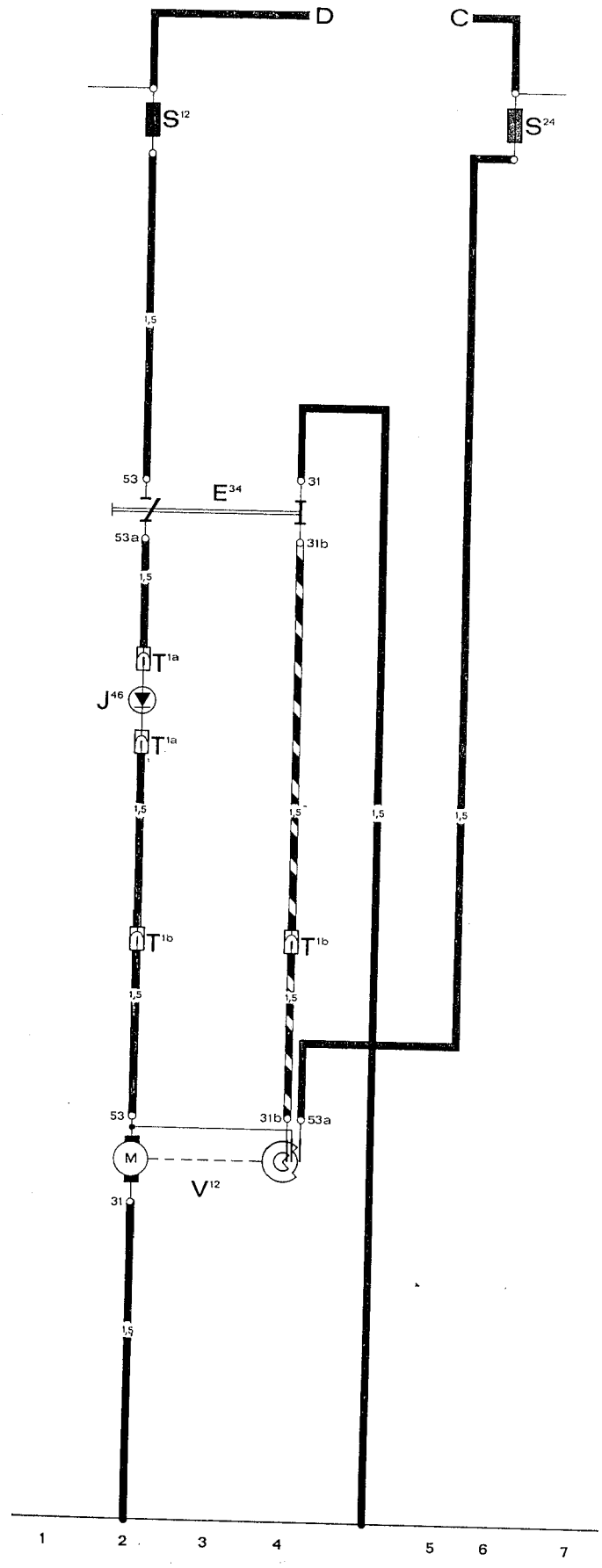
78-8



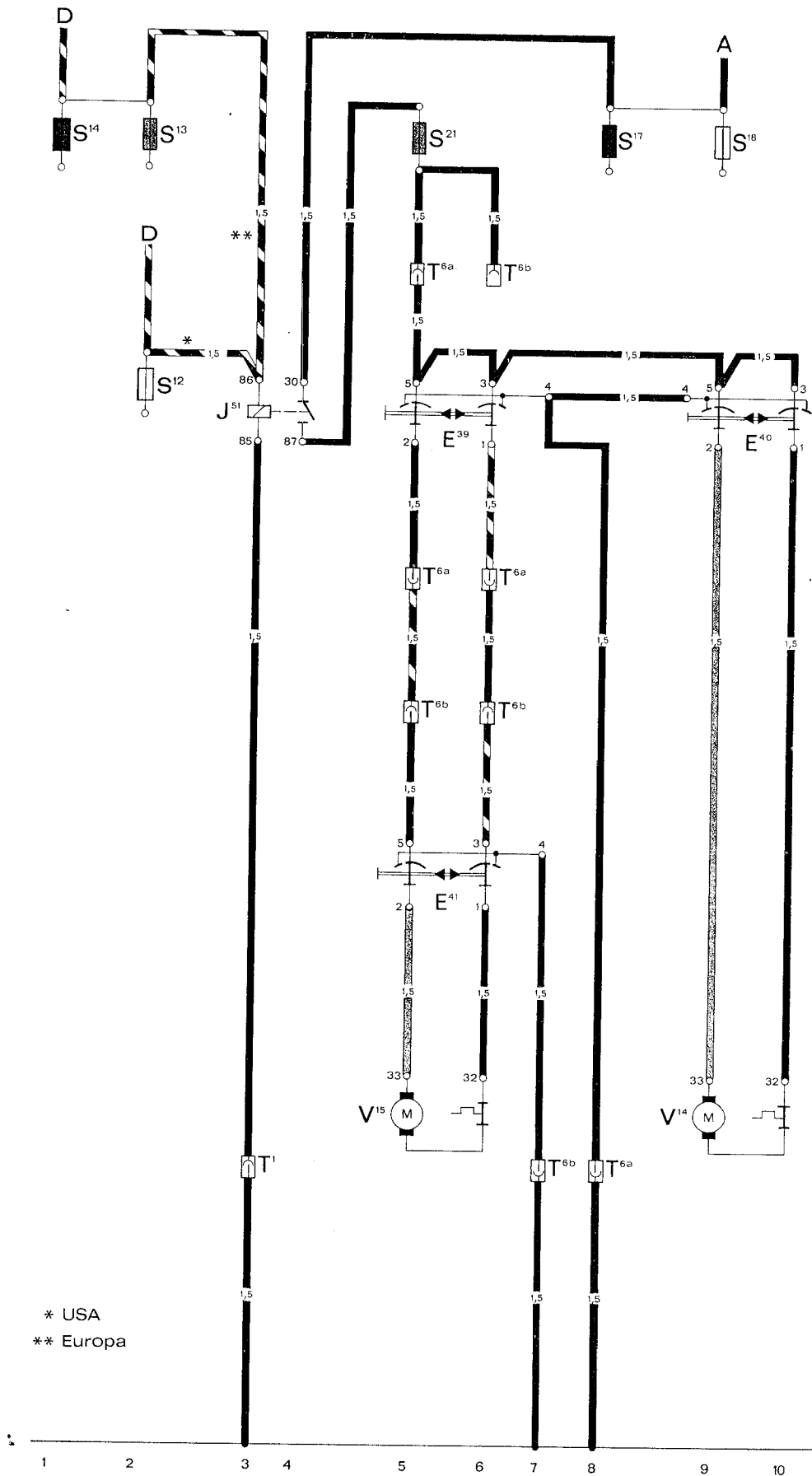
8-9

Additional current flow diagram, rear window wiper, Turbo from model 77

Description	Current track
C - to generator	5
D - to ignition/starter switch (terminal 15)	4
E ³⁴ - Rear wiper switch	2, 4
J ⁴⁶ - Diode for rear wiper	2
S ¹² - Fuse	2
S ²⁴ - Fuse	6
T ¹ - Cable connector, single	
a - behind instrument panel	2
b - in engine compartment, left	2, 4
V ¹² - Rear wiper motor	2, 4



78-10



* USA
** Europa

Additional current flow diagram, power windows, Turbo from model 77

78.11

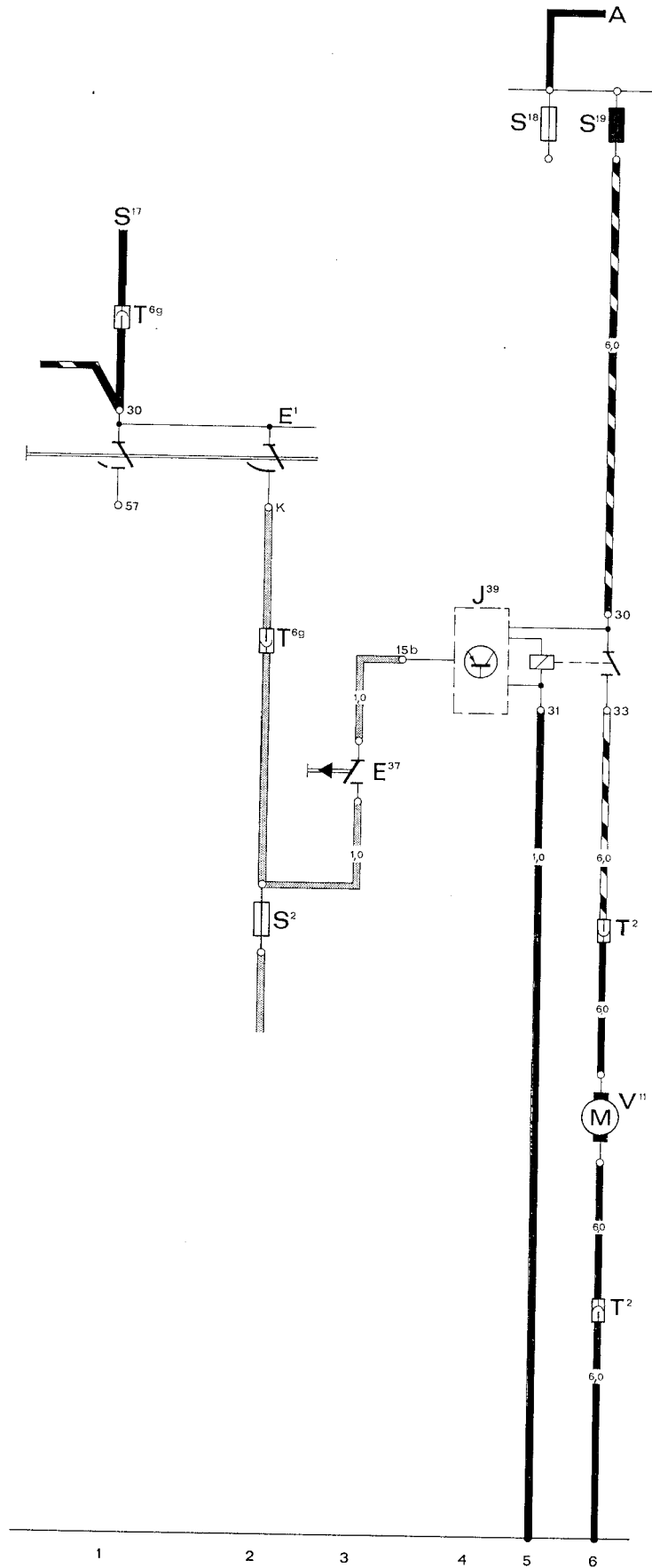
Description	Current track
A - to battery	9
D - to ignition/starter switch (terminal X)	1
D - to ignition/starter switch (terminal 15)	2
E ³⁹ - Power window switch, driver side, for passenger side	5, 6
E ⁴⁰ - Power window switch, driver side	9, 10
E ⁴¹ - Power window switch, passenger side	5, 6
J ⁵¹ - Power window relay	3, 4
S ¹² - Fuse	2
S ¹³ - Fuse	2
S ¹⁴ - Fuse	1
S ¹⁷ - Fuse	8
S ¹⁸ - Fuse	9
S ²¹ - Fuse	5
T ¹ - Cable connector, single, behind fuse box	3
T ⁶ - Cable connector, sixfold	
a - in door well, left	5, 6, 8
b - in door well, right	5, 6, 7
V ¹⁴ - Power window motor, left	9, 10
V ¹⁵ - Power window motor, right	5, 6

78-12

Additional current flow diagram, headlight washers, Turbo

Description	Current track
A - to battery	7
E ¹ - Headlight switch	1, 2
E ³⁷ - Headlight washer switch	3
J ³⁹ - Headlight washer relay	4
S ¹⁷ - to fuse S ¹⁷	1
S ² - Fuses	2
S ¹⁸ - in the	5
S ¹⁹ - fuse box	6
T ² - Cable connector, double, near battery	6
T ⁶ - Cable connector, sixfold g - below instrument panel	1, 2
V ¹¹ - Headlight washer pump	6

76-13

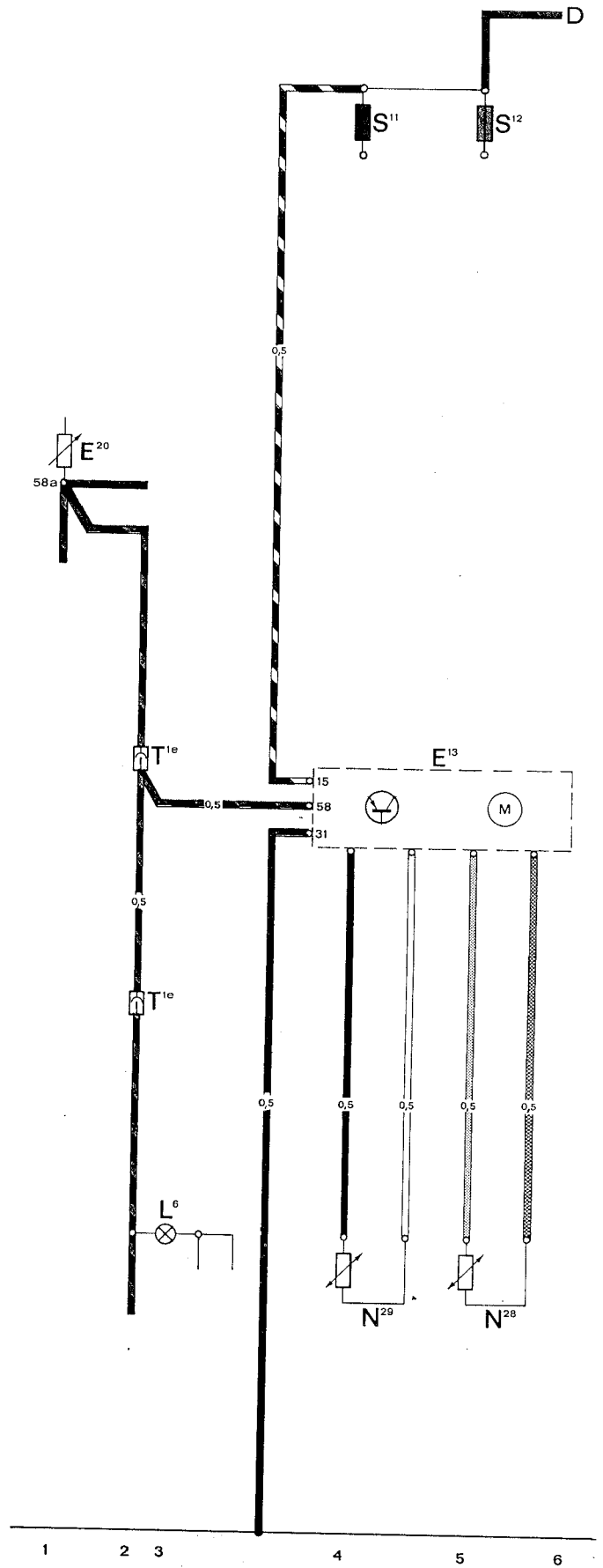


Additional current flow diagram, headlight washers 97-27

78.14

**Additional current flow diagram,
automatic heating system, Turbo**

Description	Current track
D - to ignition/starter switch (terminal 15)	6
E ¹³ - Control unit for automatic heating system	4, 5
E ²⁰ - Instrument panel illumination potentiometer	1
L ⁶ - Speedometer illumination light	3
N ²⁸ - Interior temperature sensor	5
N ²⁹ - Exterior temperature sensor	4
S ¹¹ - Fuses in the	4
S ¹² - fuse box	5
T ^{1e} - Cable connector, single, on luggage compartment floor	2

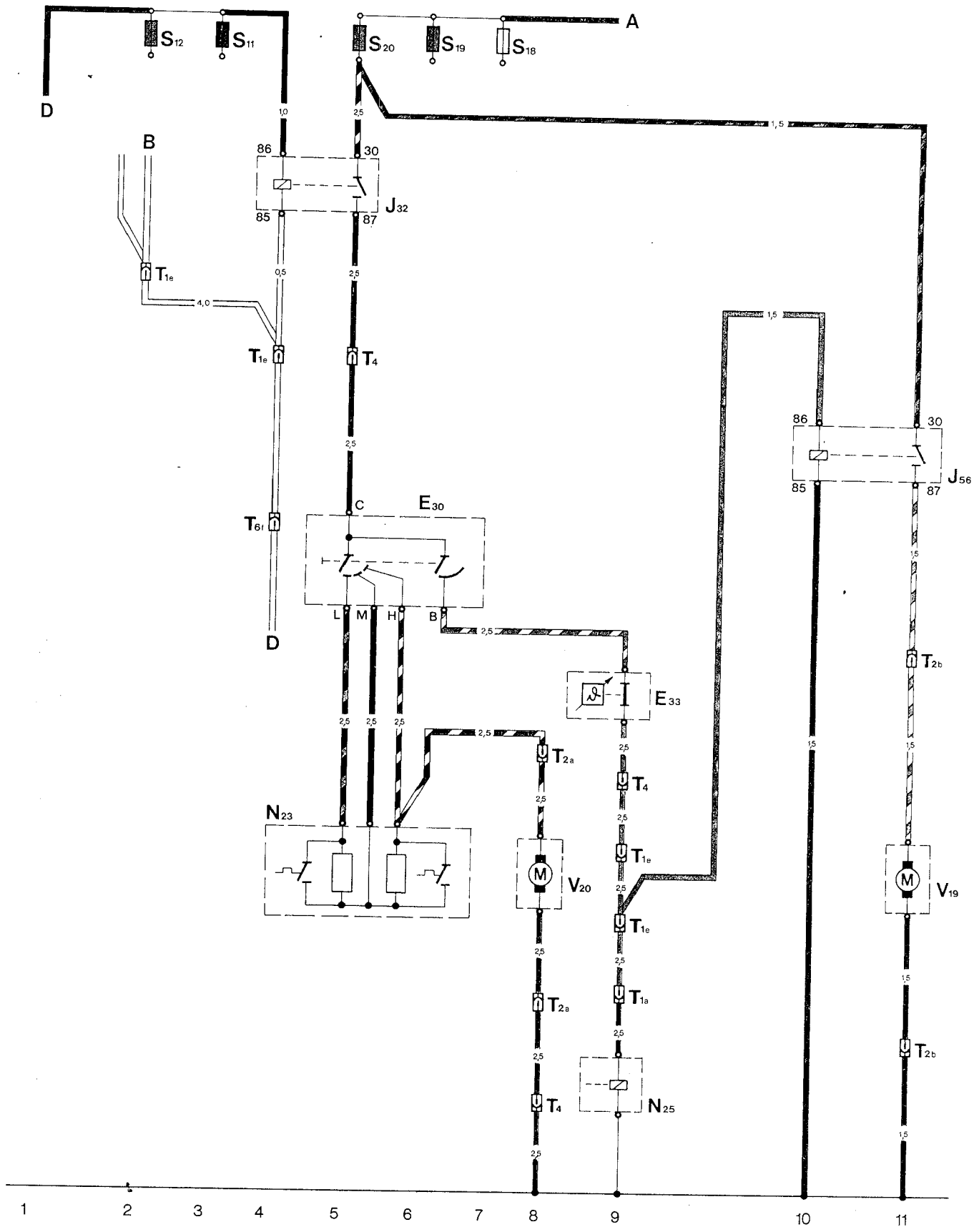


78-15

Additional Current Flow Diagram Air Conditioner (M 559), Turbo from model 77

Description	current track
A - to battery	9
B - to starter (terminal 50)	2
D - to ignition/starter switch (terminal 15)	1
D - to ignition/starter switch (terminal 50)	4
E ³⁰ - Switch for AC	5, 6
E ³³ - Temperature switch for AC	9
J ³² - Relay for AC	4, 5
J ⁵⁶ - Relay for condenser fan	10, 11
N ²³ - Resistor for evaporator blower	5, 6
N ²⁵ - Electromagnetic clutch	9
S ¹¹ - Fuse	3
S ¹² - Fuse	2
S ¹⁸ - Fuse	7
S ¹⁹ - Fuse	6
S ²⁰ - Fuse	5
T ¹ - Wire connector, single	
a - near compressor	9
e - on luggage compartment floor	2, 4, 9
T ² - Wire connector, two-pole	
a - near evaporator blower	8
b - near battery	11
T ⁴ - Wire connector, four-pole, below instrument panel	5, 8, 9
T ^{6f} - Wire connector, six-pole, below instrument panel	4
V ¹⁹ - Condenser fan	11
V ²⁰ - Evaporator blower	8

78-16



Additional Current Flow Diagram Air Conditioner