LIST OF ILLUSTRATIONS

FUEL SYSTEM

GENERAL

Fig. 1 Shows the layout of the fuel system, as fitted to the MF 50B Tractor Digger Loader.

The fuel tank, which is situated above the rocker cover, supplies fuel to the diaphragm type fuel lift pump. From here the fuel is passed, under light pressure, through the filters to the fuel injection pump.

The distributor type injector pump forces the fuel, under high pressure, to the injectors. Any fuel which is surplus to the requirements of the injectors is allowed to flow back, through a return pipe to the secondary fuel filter. A pipe from the filter to the tank provides a permanent 'bleed off' whilst the engine is running. In this way the fuel is kept in constant circulation, thus bleeding off any air which may be in the system.

When working on the fuel system, it is most important to maintain absolute cleanliness. Always blank off any open fuel connections. Always use lint free rags to wipe clean any equipment. DO NOT use cotton waste or fluffy rags.

AIR FILTER

General

The dry air filter body and enclosed elements are mounted under the engine bonnet in front of the radiator.

To gain access to the air filter, lift the hinged access panel in the left-hand side of the bonnet.

As the air is drawn in it swirls around the filter thus causing any dirt or abrasive particles to be flung out by centrifugal force. The dust then collects at the bottom of the air filter where it can be expelled by means of the unloader valve fitted to the bottom of the air filter.

Attention should also be paid to the hose and clips which connect the air cleaner outlet to the engine induction manifold, as a perished hose or loose clips will render the air cleaner inoperative.

AIR FILTER

Removal and Replacement (3B/1)

1. Remove the radiator grille.
2. Remove the hood.
3. Disconnect the air intake hose from the air filter to the air inlet manifold.
4. Disconnect the air cleaner obstruction indicator tube at the air cleaner.
5. Remove four screws and lock washers securing the air cleaner assembly to the air cleaner support bracket. Remove the air cleaner assembly.
6. Replacement is a reversal of the above procedure.

Disassembly, Cleaning and Reassembly (3B/2)

1. Remove the air filter as described in operation 3B/1
2. (Fig. 2) Unscrew the clamp bar (1) and remove the outer element (2).
3. Remove the washer and lock nut (3) and withdraw the inner element (4).
4. Clean the outer filter element using one of the following methods: –

   (a) Blow dry compressed air (pressure NOT to exceed 100 p.s.i. (7 Kg/cm^2) into the inside of the element. Blow the dust from the outside of the element, repeat the procedure until all the dust is removed.

   (b) If the element is contaminated with oil or soot, or if no compressed air is available, wash the element using water containing a non-suds detergent (temperature NOT to exceed 100°F (35°C). Flush out the

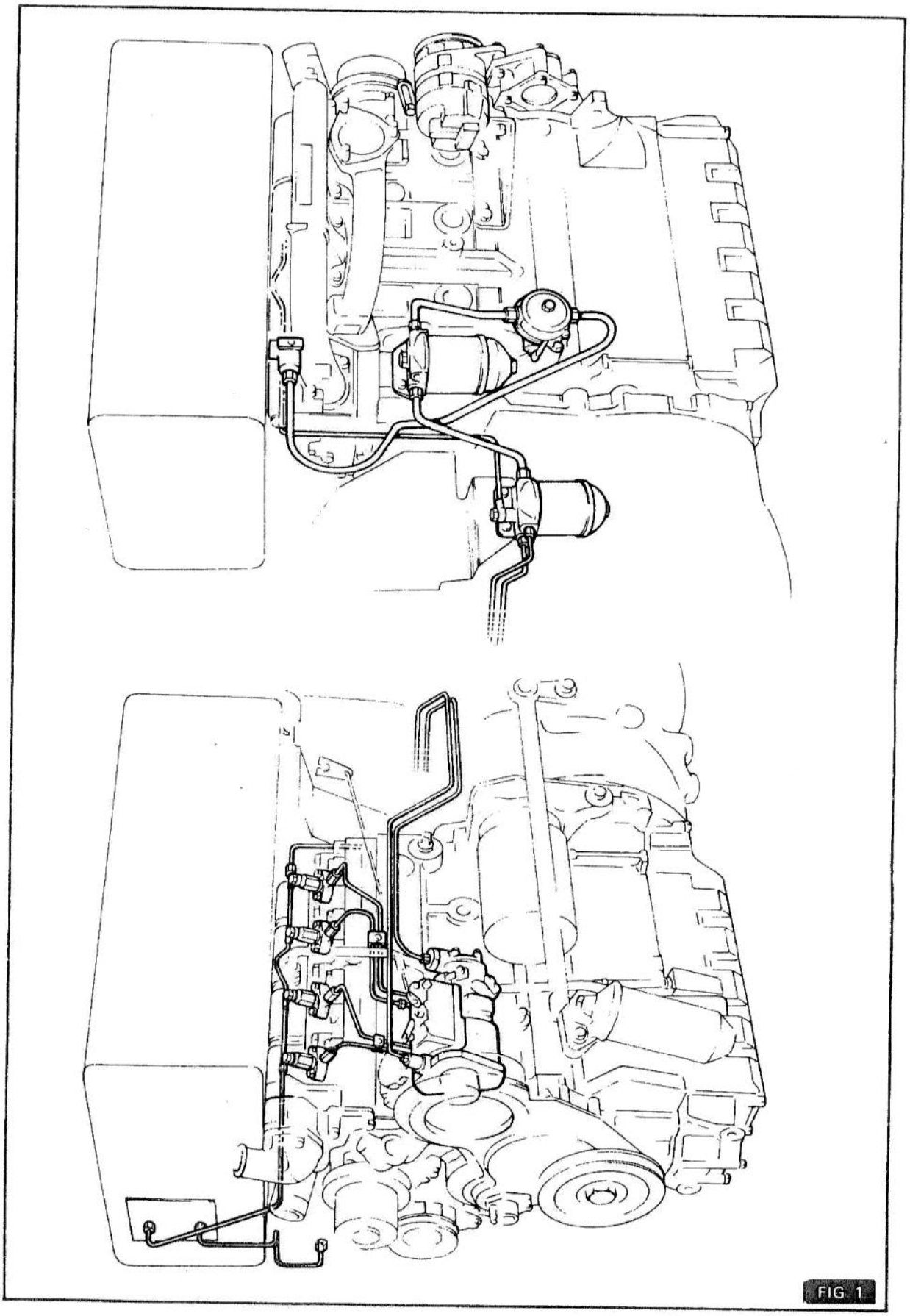


FIG. 1

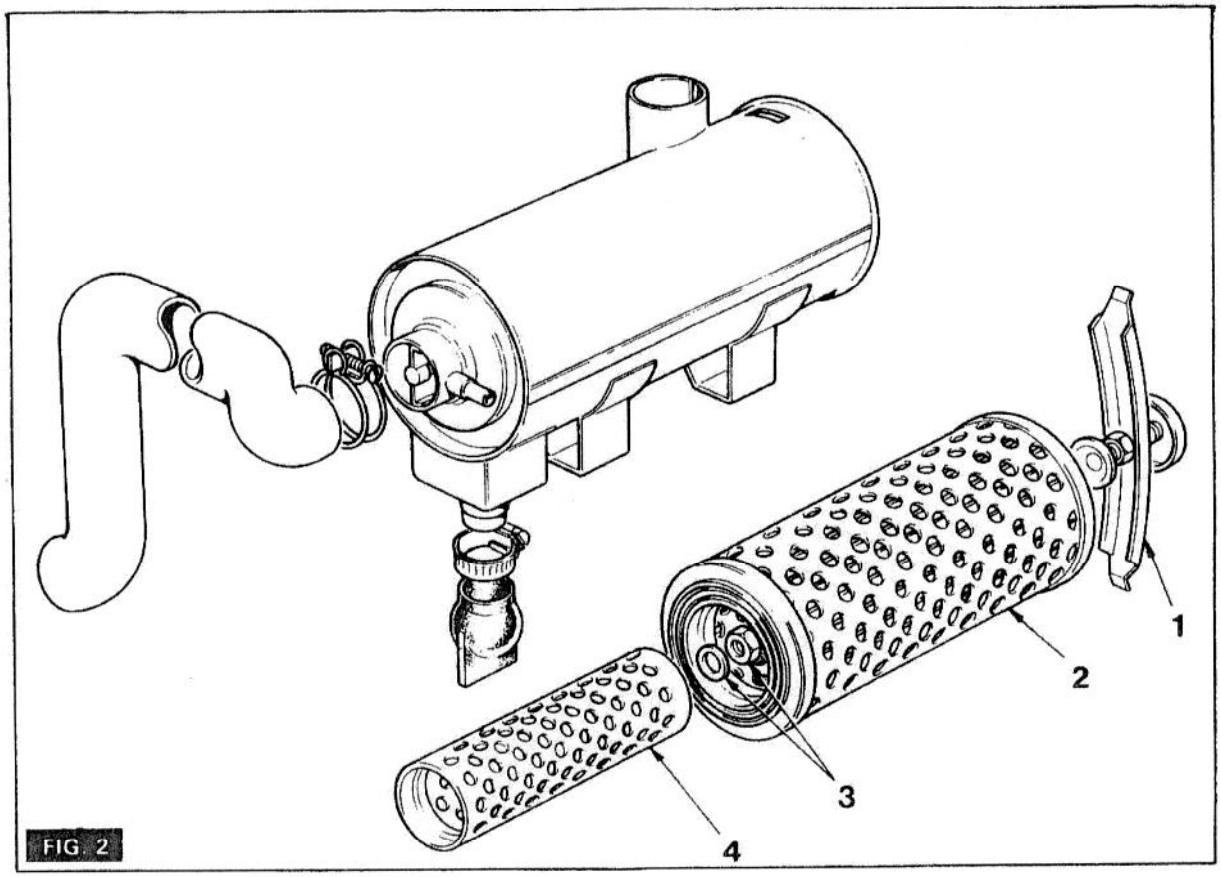


FIG 2

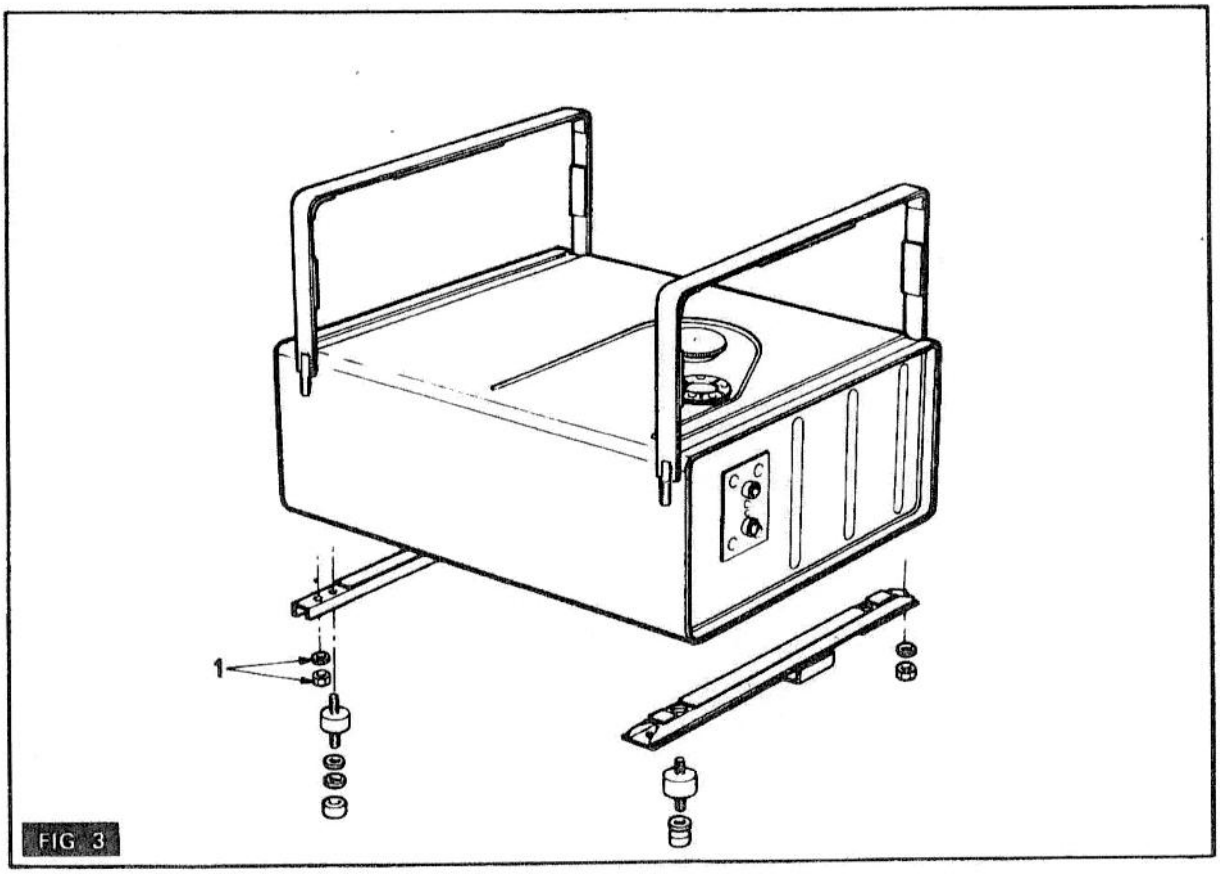


FIG 3

AIR FILTER

Disassembly, Cleaning and Reassembly . . . Con'd

element with clean water from a low pressure hose. Thoroughly shake out any excess water and allow element to dry naturally. Never fit a damp element.

5. To clean the inner filter element proceed as follows : –

   Rinse the element in kerosene or petrol. Shake out the excess kerosene or petrol and allow the element to dry naturally. Under no circumstances must a damp element be fitted.

6. After cleaning, inspect the outer element for damage by holding a light inside the element. Any large spots of light showing through the element indicate that it is unfit for further use.
7. Refit the filter as described in operation 3B/1

Note

The filter should be cleaned at intervals of approximately 150 hours. If the machine is working in dusty conditions the filter should be cleaned at more frequent intervals. At least once a year and in any case after ten cleanings the filter element should be renewed.

FUEL TANK

Removal and Replacement (3B/3)

1. Remove the hood.
2. Disconnect the leak-off pipe from the secondary fuel filter to the fuel tank at the fuel tank.
3. Disconnect the pipe from the fuel tank to the start aid at the fuel tank.
4. Close the shut-off cock on the tank and disconnect the pipe from the fuel tap to the fuel lift pump.
5. Disconnect the wire from the fuel gauge sender unit.
6. (Fig. 3) Remove the nuts (1) securing the strap assemblies to the fuel tank supports. Remove the strap assemblies.
7. Lift the fuel tank clear.
8. To replace the fuel tank, simply reverse the above procedure.
9. Bleed the fuel system as described in operation 3B/17.

FUEL GAUGE SENDER UNIT

Removal and Replacement (3B/4)

1. Remove the hood.
2. Disconnect the wiring from the sender unit.
3. (Fig. 4) Remove the 5 screws securing the sender unit to the tank.
4. Draw the sender unit out of the fuel tank and remove the gasket.
5. When refitting the sender unit, renew the gasket and reverse the above procedure.

FUEL LIFT PUMP

Removal and Replacement (3B/5)

1. Close the fuel tap at base of the fuel tank.
2. Disconnect the pipe from the fuel tank to the fuel lift pump at the fuel lift pump.
3. Disconnect the pipe from the fuel lift pump to the primary fuel filter.
4. Remove the two nuts and washers which secure the fuel lift pump to the engine block.
5. Withdraw the pump from the studs.

FUEL LIFT PUMP

Removal and Replacement . . . Cont'd

6. To replace the pump, reverse the above procedure. Ensure that a new gasket is fitted between the pump and engine block.

Disassembly (3B/6)

1. Remove the lift pump as described in operation 3B/5.
2. (Fig. 5) Scribe a line across the flanges of the cover (1) and pump body (2). This will ensure correct reassembly.
3. Remove the six screws and washers (3) and separate the cover from the pump body.
4. Remove the diaphragm (4) by unhooking it from the rocker arm link (5). The diaphragm spring may now be removed.
5. Drive out the rocker arm pivot pin (6) and remove the rocker arm (7), spring (8) and link (5).
6. Remove the priming lever pin (9) and withdraw the priming lever (10), seal (11) and spring (12).
7. Remove the valves (13) and valve gaskets (14) from the cover (1).
8. Remove the retaining bolt and washer (15) and lift off the pulsator cover (16) and pulsator (17).

FUEL LIFT PUMP

Reassembly (3B/7)

Before reassembling the pump, examine all the components for damage or wear. The main points to check are :–

(a) Diaphragm for cracking or hardening.
(b) Pull rod for excessive wear.
(c) Diaphragm spring for corrosion or distortion.
(d) Rocker arm, link, spring and pin.
(e) Pulsator diaphragm.

Note

The pump valves should be renewed whenever the pump is stripped down.

Having checked all the components, reassemble the pump as follows : –

1. Fit the new valves and valve gaskets into the pump cover. The inlet valve must be fitted so that it can open to admit fuel. Fit the outlet valve in the reverse position to the inlet valve. The valves should be staked in position using a suitable punch.
2. Fit the pulsator, diaphragm and pulsator cover to the pump cover. Secure them in place with the washer and bolt.
3. Fit the rocker arm pin through its hole in the pump body, at the same time engaging the link and the rocker arm. Tap the rocker arm pin until it is flush with the pump body. Stake the casting in three places at each side in order to retain the pin.
4. Place the diaphragm spring in position.
5. Fit the diaphragm assembly over the spring with the pull rod downwards. Ensure that the upper end of the spring is centred in the protector washer of the diaphragm.
6. Press the diaphragm down. Ensure that the downward tag on the lower diaphragm protector washer is on the priming lever side of the body. This tag is required to be in the hole of the body for fitment to the priming lever. Engage the diaphragm pull rod eye with link, at the same time lining up the holes in the diaphragm.
7. Push the rocker arm towards the pump to pull the diaphragm down to the pump body flange.
8. Fit the top cover to the pump body, making sure that the two parts are correctly aligned.
9. Fit the six screws and washers to hold the two halves of the pump together. DO NOT tighten the screws at this stage.

FUEL LIFT PUMP

Reassembly . . . Cont'd

10. Push the end of the pull rod to hold the diaphragm at the top of its stroke and tighten the screws diagonally.

Note

With the two halves of the pump bolted together, the diaphragm should be flush with the flanges all round. Any appreciable protrusion of the diaphragm indicates incorrect fitting.

11. Fit the priming lever to the side of the pump body and retain with the pin clip on the priming lever spring.

Testing (3B/8)

When a fuel lift pump fault is suspected mechanics are advised to test the pump, using the special equipment available, before refitting the pump to the engine.

Manual testing is not recommended for the following reason; movement of the pump rocker arm will produce a greater diaphragm movement than that produced by the engine camshaft when the pump is in situ. Furthermore, manual testing cannot reliably reproduce the conditions in which some faults occur unless the fault is severe.

PRIMARY FUEL FILTER ELEMENT

Renewal (3B/9)

1. Wipe clean the outside of the filter and surrounding area.
2. (Fig. 6) Slacken the bleed screw (1) and remove the drain cock (2) allowing the fuel to drain off.
3. Remove the centre bolt (3) from the filter head.
4. Remove the sediment bowl (4) complete with filter element (5). Discard the element.
5. Flush out the sediment bowl with clean diesel fuel or paraffin. Do not use rags.
6. Insert a new filter element, renew the sealing rings and fit the filter assembly into place against the filter head. Secure the whole assembly with the centre bolt.
7. Bleed the fuel system as described in operation 3B/17

PRIMARY FUEL FILTER ASSEMBLY

Removal and Refitting (3B/10)

1. Disconnect the pipes from the fuel lift pump to the primary filter and from the primary to the secondary filter. Blank off the open connections.
2. Remove the two securing bolts which hold the filter assembly to the engine.
3. To replace the filter assembly, reverse the above procedure and bleed the fuel system as described in operation 3B/17

SECONDARY FUEL FILTER ELEMENT

Renewal (3B/11)

1. Clean the outside of the filter assembly.
2. (Fig. 7) Remove the centre bolt (1) from the filter head.
3. Ease the base and sediment bowl (2) from the filter head.

SECONDARY FUEL FILTER ASSEMBLY

Renewal . . . Cont'd

4. Discard the filter element.
5. Fit a new filter element and sealing rings and reassemble the filter by reversing the above procedure. Bleed the fuel system as described in operation 3B/17.

Note

Never attempt to clean or reclaim a used filter element

SECONDARY FUEL FILTER ASSEMBLY

Removal and Refitting (3B/12)

1. Disconnect and blank off the following pipes at the secondary filter :—
   (a) Pipe from primary to secondary filter.
   (b) Pipes from secondary filter to fuel injection pump. (2 pipes).
   (c) Pipe from secondary filter to start aid tank.
2. Remove the two bolts which hold the filter to the engine.
3. To replace the filter assembly, reverse the above procedure and bleed the fuel system as described in operation 3B/17.

FUEL INJECTION PUMP

Removal and Refitting (3B/13)

1. Turn the engine to T.D.C. No. 1 cylinder on compression. In this position the T.D.C. mark on the flywheel should be in the mid position of the inspection port.
2. Remove the pipes from the injection pump to the injectors. Blank off the connections.
3. Remove all the fuel supply pipes and blank off the connections.
4. Disconnect the throttle and fuel cut-off control rods.
5. Remove the setscrews which hold the engine oil filler tube to the timing gear case. Lift the oil filler clear.
6. Remove the inspection cover from the timing gear casing in order to gain access to the injection pump gear.
7. Remove the three setscrews which hold the fuel pump gear to its hub. Take great care that these setscrews do not drop into the timing case.
8. Check that the scribed line on the rear of the timing case coincides with the scribed line on the fuel pump mounting flange.
9. Remove the three nuts and washers securing the injection pump to the timing case.
10. Withdraw the injection pump, leaving the pump driving gear in the timing case. Do not move the drive gear out of mesh with the idler gear or attempt to turn the engine until the injection pump has been replaced.
11. To refit the injection pump, reverse the above procedure. Ensure that the pump driving gear dowel is properly located and that the scribed marks on the engine timing case and fuel pump mounting flange are aligned (see Fig. 8). Renew the gaskets on the pump and timing case inspection cover.
12. Bleed the fuel system as described in operation 3B/17

FUEL INJECTION PUMP TIMING

Checking and Adjusting (3B/14)

The seal on the fuel injection pump must only be broken by an experienced and authorised person who must re-seal the cover with a suitable identification seal.

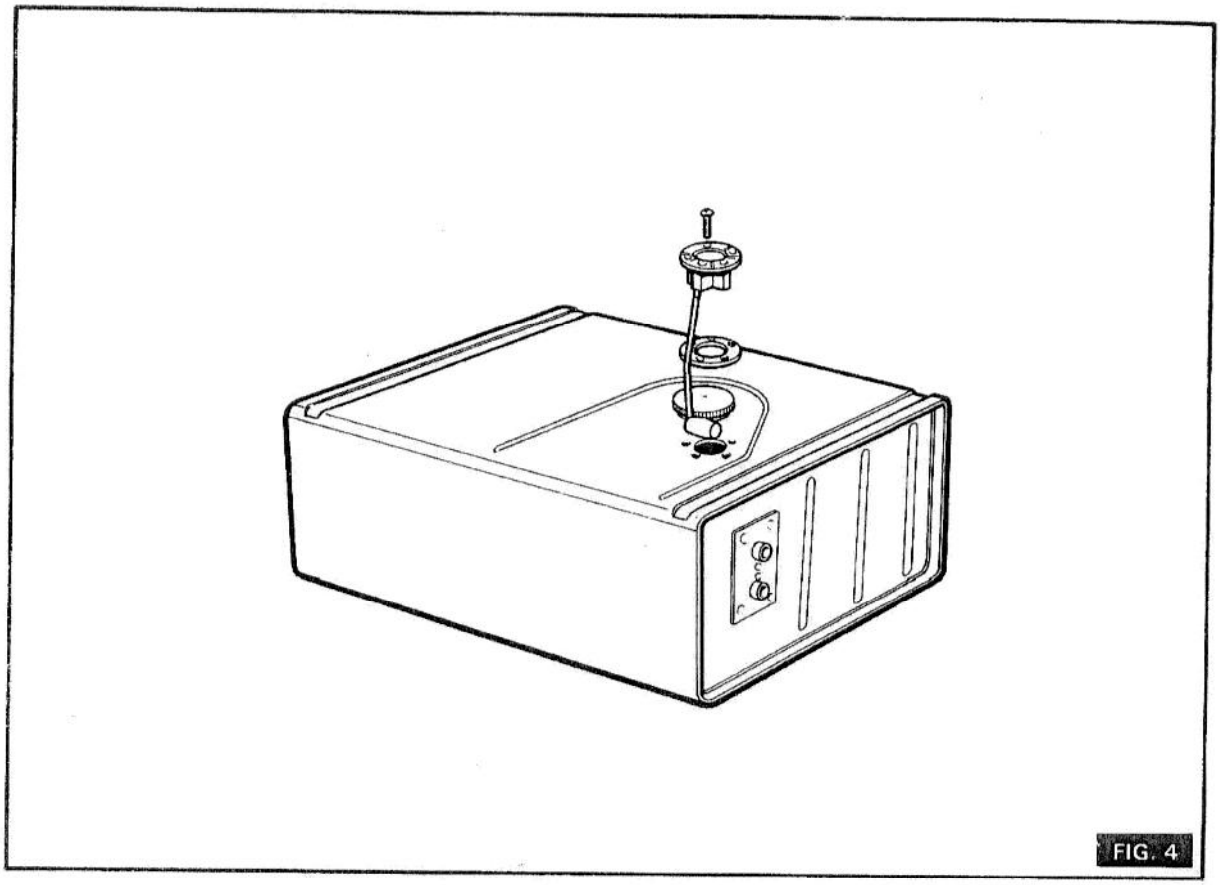
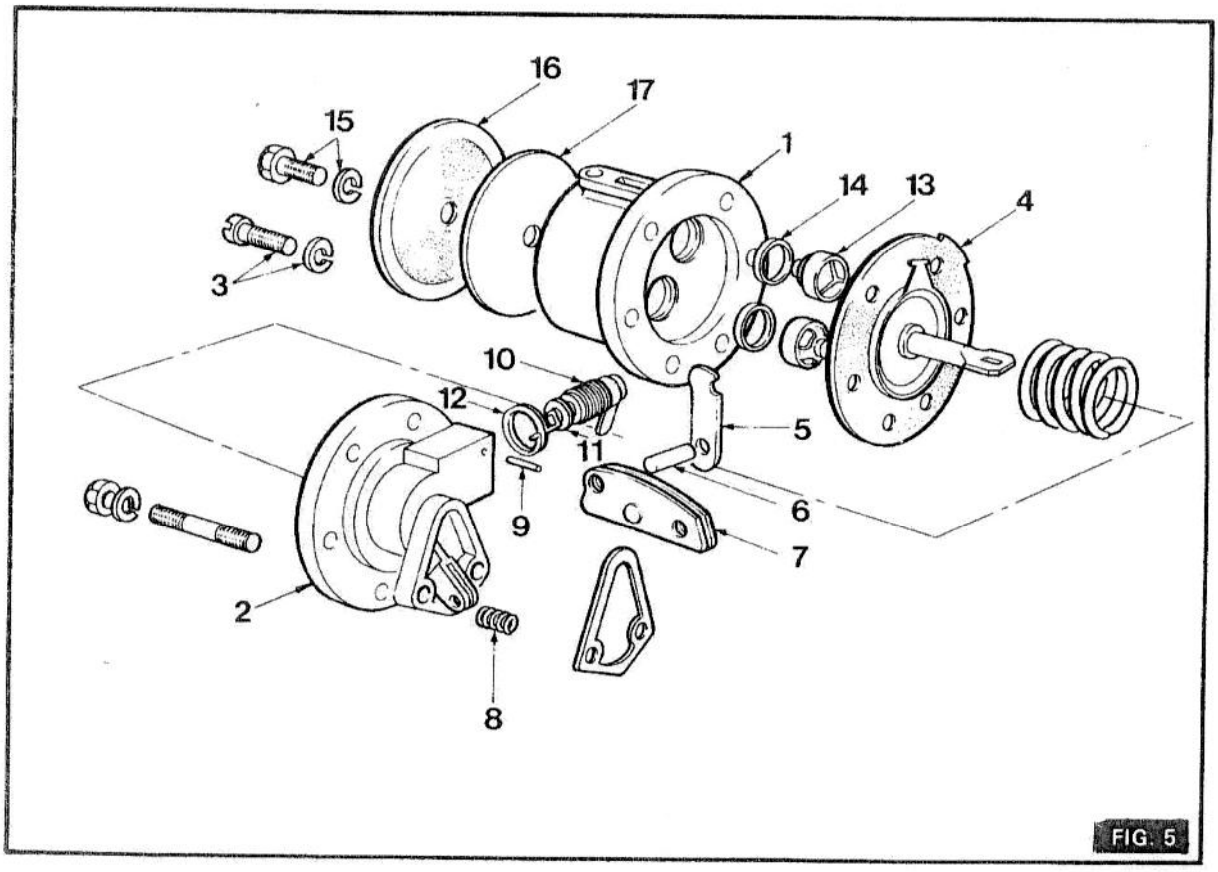


FIG. 4



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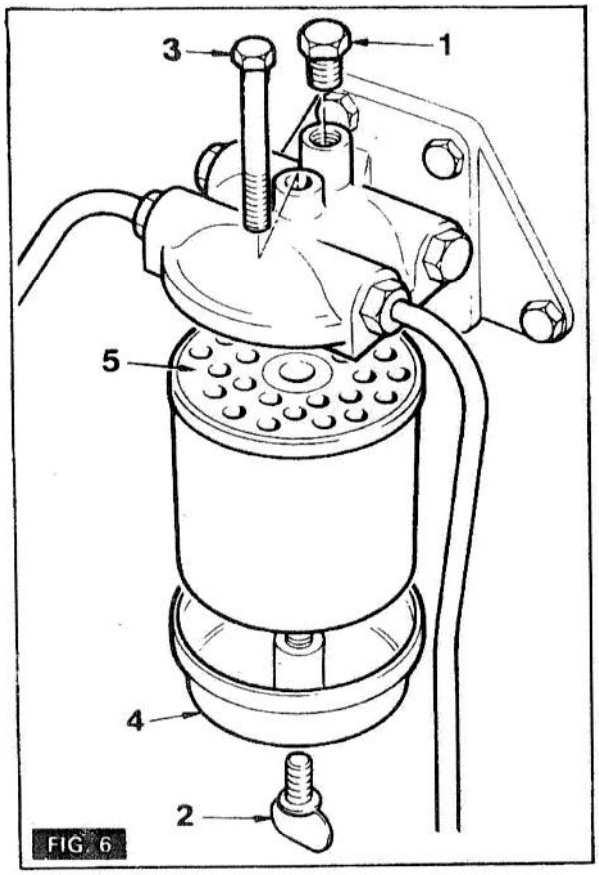

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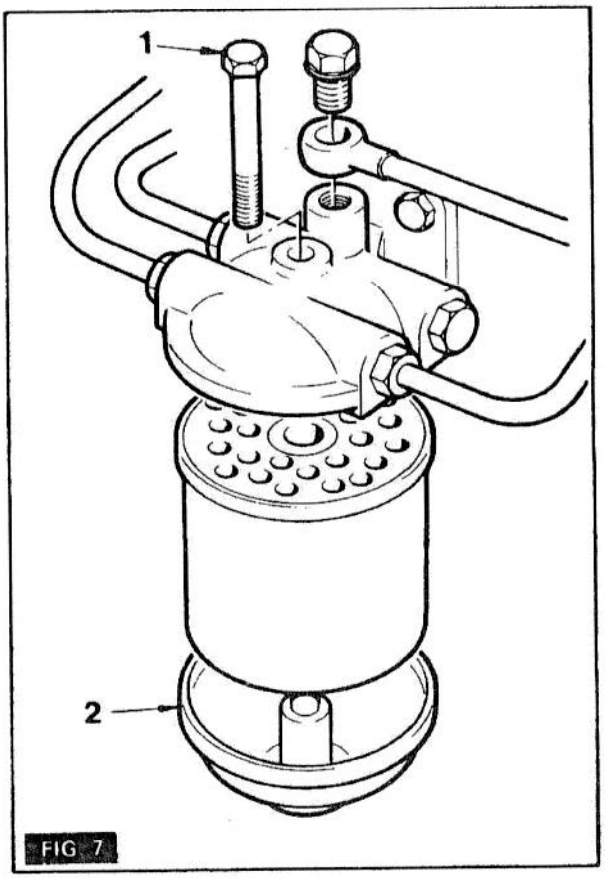

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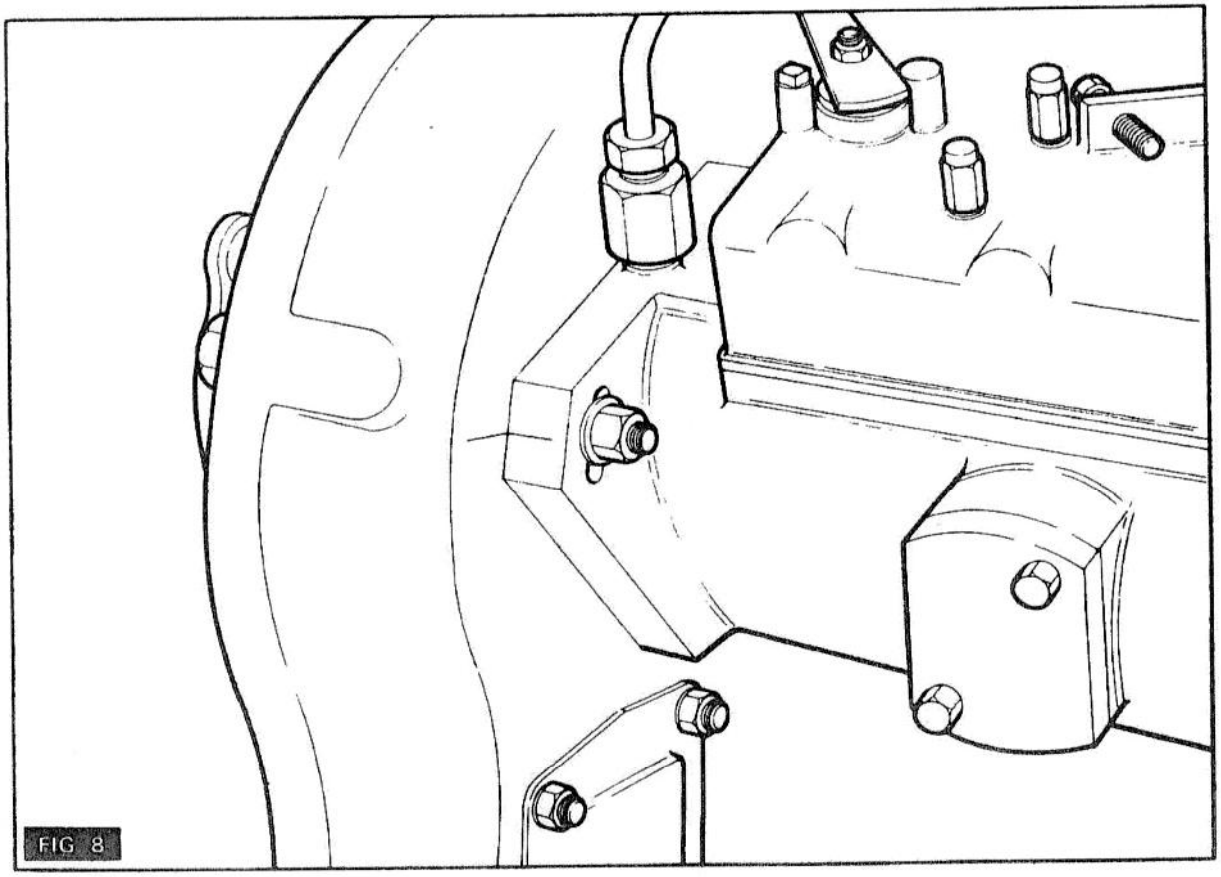
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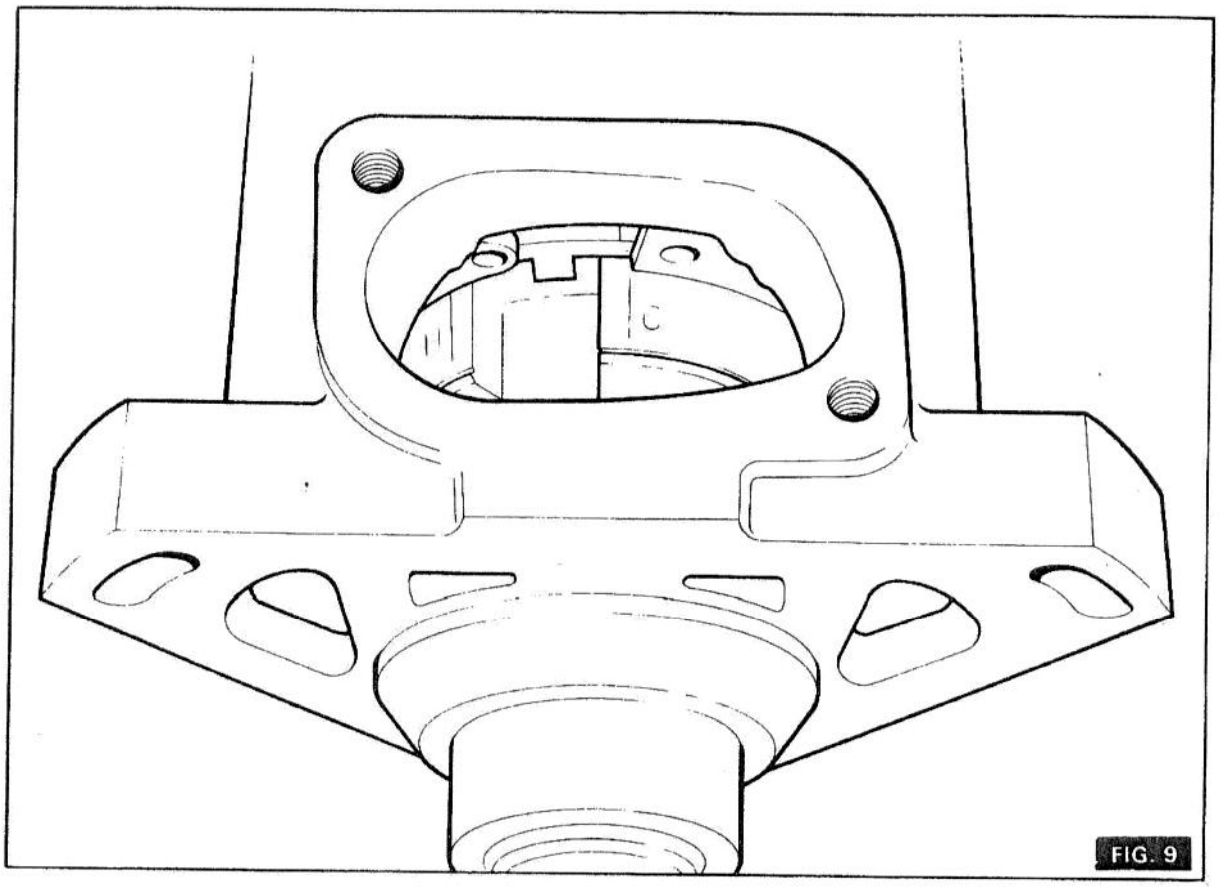


FIG. 9

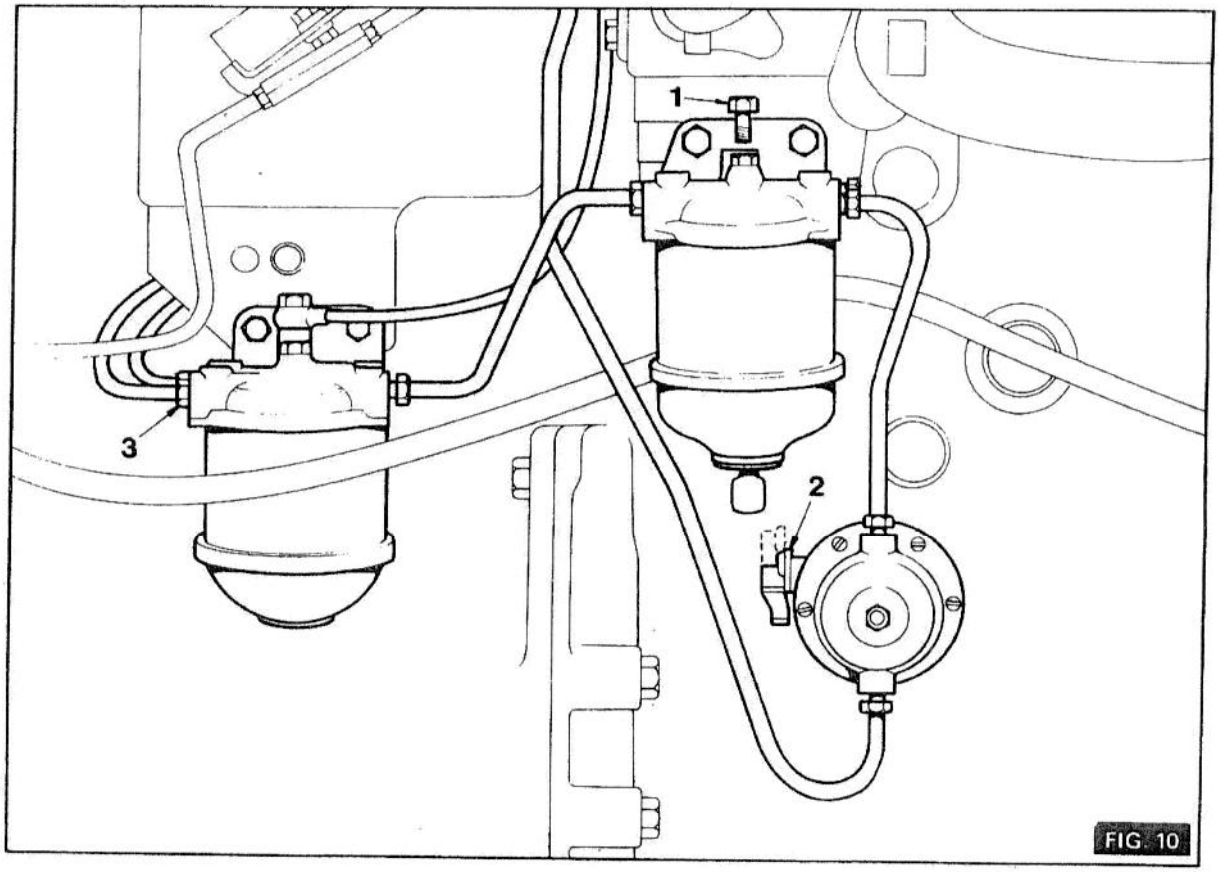


FIG. 10

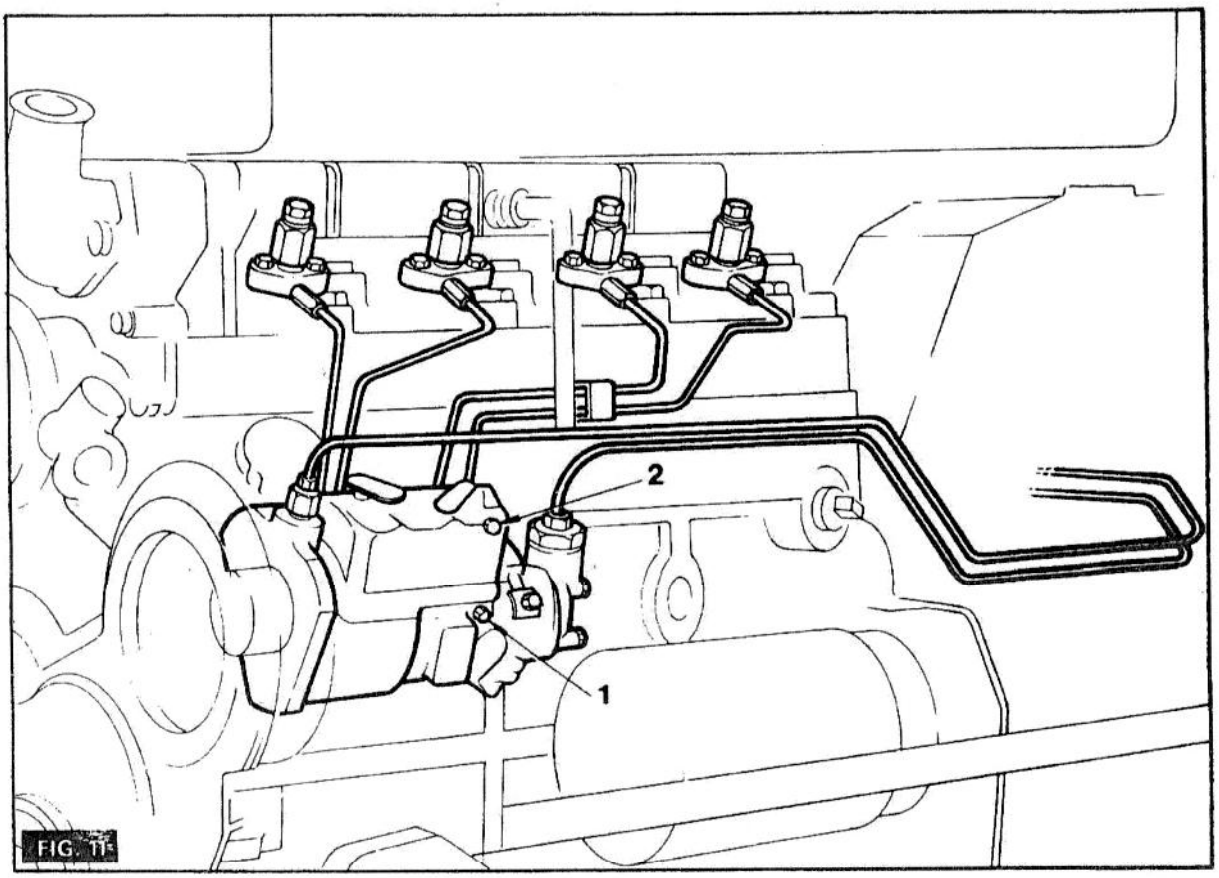


FIG. 11

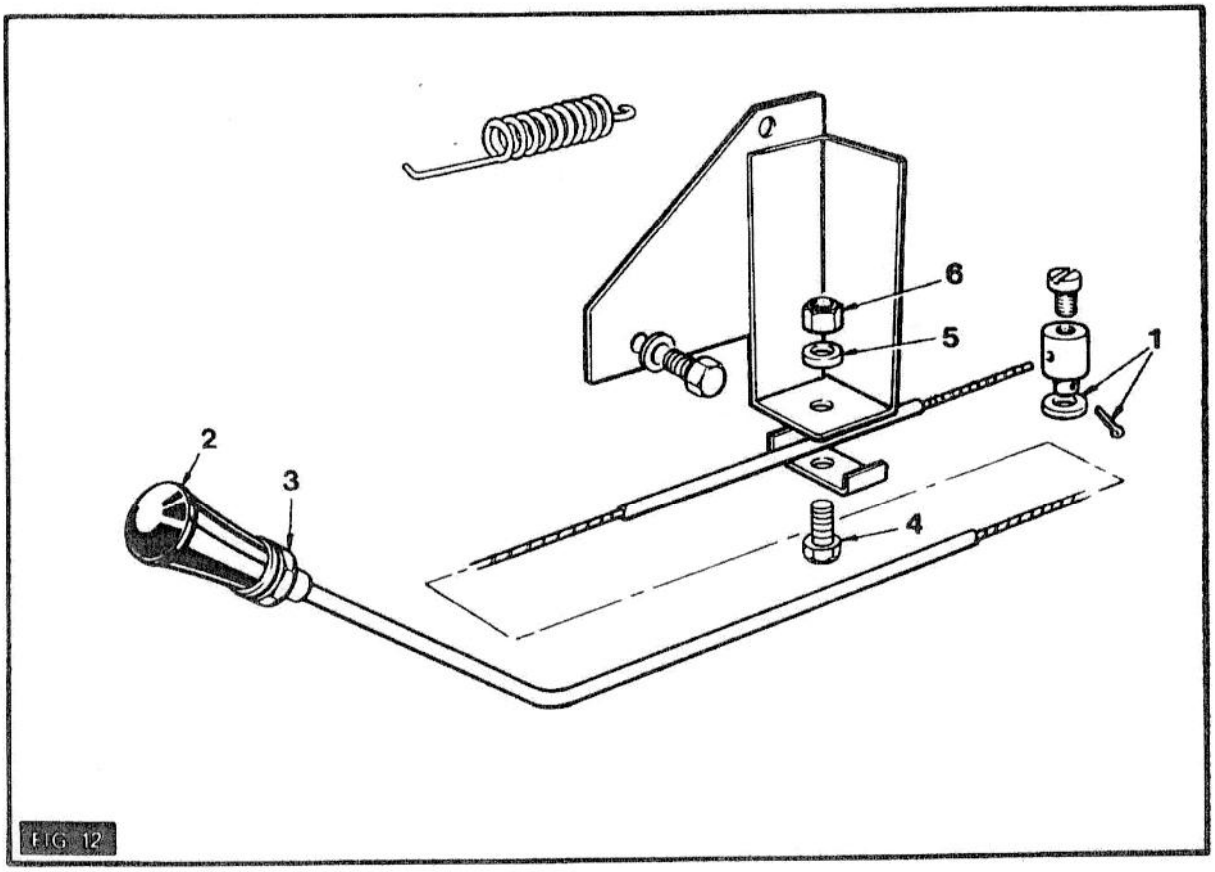


FIG. 12

FUEL INJECTION PUMP TIMING

Checking and Adjusting

1. Remove the plug from the flywheel housing inspection port.
2. Turn the crankshaft to position No. 1 and No. 4 piston on T.D.C. No. 1 cylinder on compression. In this position the T.D.C. mark on the flywheel should be in the mid position of the inspection port.
3. Rotate the crankshaft 90° in reverse direction to normal rotation.
4. Slowly turn the engine in the direction of normal rotation until the mark indicating 22° B.T.D.C. is at the centre of the inspection port.
5. Remove the inspection cover from the fuel injection pump.
6. (Fig. 9) If the timing gear has not been disturbed, a scribed line marked 'C' will be visible inside the fuel pump inspection hole. This scribed line should align with the squared end of the circlip when the crankshaft is 22° B.T.D.C. If the scribed line does not align with the squared end of the circlip, proceed as follows :—
7. Slacken the nuts securing the injection pump to the timing case. Twist the body of the pump in the required direction to enable the squared end of the circlip to line up with the mark 'C' on the rotor.
8. Tighten the nuts to hold the pump securely to the timing case.
9. Check again the timing mark 'C' with the circlip.
10. Replace the inspection cover on the pump and reseal.
11. Replace the plug in the flywheel housing inspection port.
12. Bleed the fuel system as described in operation 3B/17.

FUEL INJECTORS

Removal and Replacement

(3B/15)

1. Disconnect the fuel injection pipes and leak off pipe from the injectors.
2. Remove the two nuts which hold the injector to the cylinder head. Ensure that the nuts are slackened evenly.
3. Gently prise the injector out of position and lift clear.
4. To replace the injector, reverse the above procedure, ensuring that the copper sealing washer is renewed. Tighten the securing nuts evenly and progressively.

FUEL INJECTORS

Testing

(3B/16)

If no proper injector testing equipment is available, the following method of testing may be adopted.

1. Run the engine at a fast 'tick over' speed.
2. Slacken off the injector pipe union at each injector in turn.
3. If, after slackening an injector pipe union, the engine revolutions remain constant, this would indicate a faulty injector. On the other hand, a drop in engine speed indicates that the injector is working properly.
4. When one injector is found to be defective, it is advisable to remove all the injectors for reconditioning or replacement.

Note

Servicing the injectors requires special equipment and should not be attempted unless the equipment is available.

Bleeding the Fuel System (3B/17)

Air in the fuel system will result in poor engine performance and may even prevent the engine from starting. For this reason, whenever any part of the fuel system has been disconnected, disturbed or removed it will be necessary to bleed the fuel circuit in order to expel any air from the system before attempting to start the engine.

To bleed the system, proceed as follows :—

1. (Fig. 10) Open the vent plug (1) on primary filter and operate the hand priming lever (2) on the fuel lift pump
2. Continue to operate the hand priming lever until the fuel from the vent plug is free of air bubbles.
3. When the fuel is free of air bubbles, close the vent plug.
4. (Fig. 11) Slacken the outlet pipe (1) on the secondary fuel filter and once again operate the hand priming lever until fuel free of air bubbles issues from the union. Tighten the connection.
5. Open the lower vent plug (2) on the fuel injection pump and repeat the priming procedure to clear the air from the vent plug.
6. Close the lower vent plug and open the upper vent plug (3) in the fuel injection pump, repeat the priming procedure.
7. Close the upper vent plug.
8. Slacken off Nos. 1 and 4 OR 2 and 3 injection pipe unions. Operate the starter motor until fuel spurts from the slackened unions.
9. Tighten the union nuts and check through the system to make sure all connections are tight.

Note

The fuel stop control must be in the 'run' position when cranking the engine. Having carried out the above operations, the engine will then be ready for starting.

START AID TANK (3B/18)

The start aid tank is an integral part of the fuel tank and is a maintenance free item.

FUEL CUT-OFF CONTROL

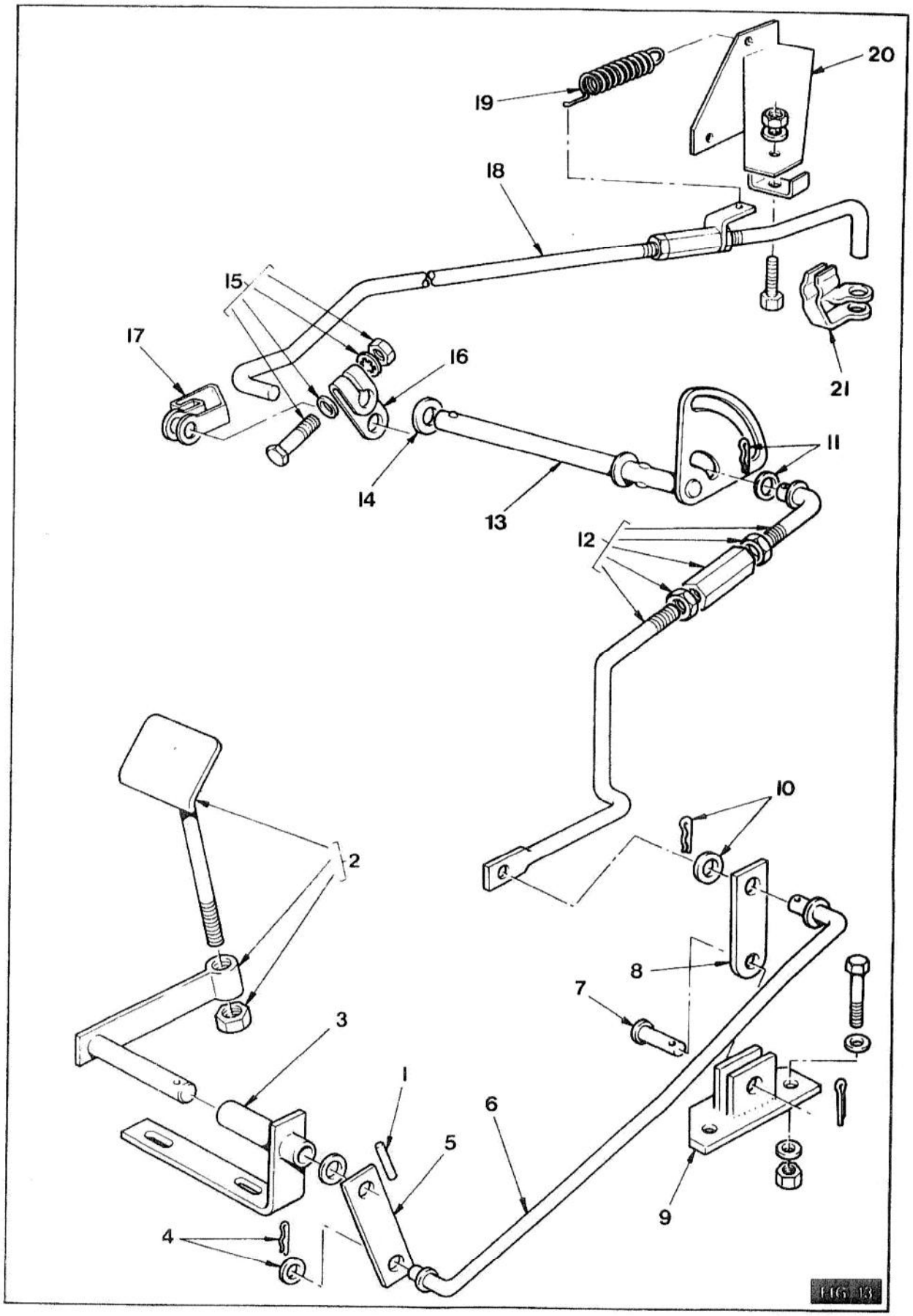
Removal and Refitting (3B/19)

1. (Fig. 12) Remove the cotter pin and washer (1) from the rod at the fuel injection pump.
2. Remove the screw (4) washer (5) and nut (6) securing the cable to the fuel injection pump bracket. Release the cable.
3. Remove the knob (2), nut (3). Pull the rod clear.
4. To replace the cut-off control, reverse the above procedure.

FOOT THROTTLE LINKAGE STANDARD TRANSMISSION

Removal and Replacement (3B/20)

1. Remove the right hand floor access panel
2. (Fig. 13) Remove the spirol pin (1) securing the throttle pedal assembly (2) to the pedal bracket (3). Remove the throttle pedal.
3. Withdraw the clip and flat washer (4) securing the throttle control rod (6) to the rod lever plate (5).
4. Remove the clevis pin (7) securing the throttle lever (8) to the pivot (9). Release the lever from the pivot and remove the clip and washer (10) securing the throttle control rod and withdraw the throttle rod and lever.
5. Remove the clip and flat washer (11) securing the throttle rod (12) to the throttle cross-shaft (13). Remove the throttle rod
6. Remove the throttle rod (18) from the clip (21) at the fuel injection pump. Disconnect the throttle rod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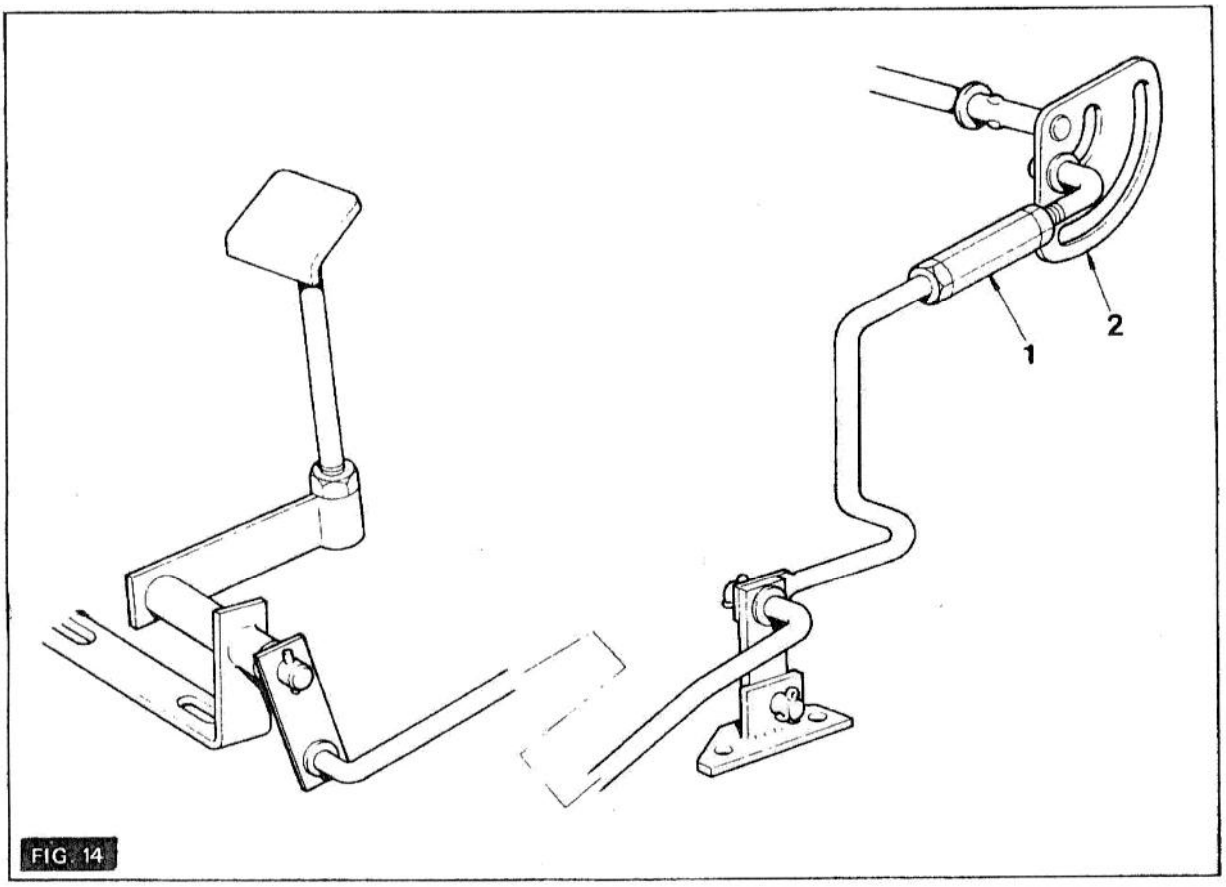

FIG. 14

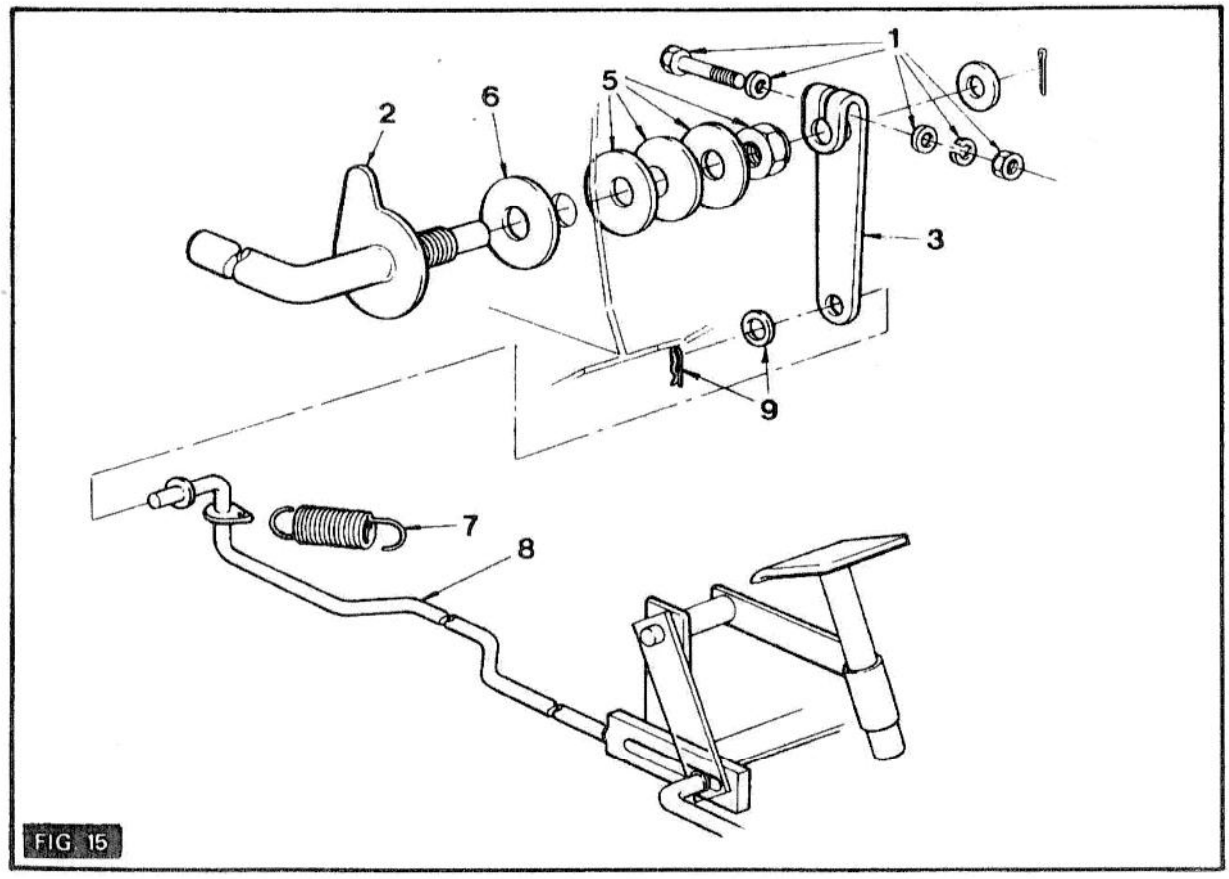

FIG. 15

FOOT THROTTLE LINKAGE STANDARD TRANSMISSION

Removal and Replacement . . . Cont'd

spring (19) at the fuel injection pump bracket (20).

7. Disconnect the throttle rod at the left hand side of the throttle cross-shaft by releasing clip (17).
8. Remove the bolt, washers and nut (15) and remove lever (16) from cross-shaft.
9. To remove the throttle cross-shaft remove washers (14) and withdraw cross-shaft.
10. To replace the throttle linkage, reverse the above procedure.

FOOT THROTTLE LINKAGE STANDARD TRANSMISSION

Adjustment

(3B/21)

1. (Fig. 14) Adjust the turnbuckle (1) such that maximum throttle opening is attained (2).
2. When fully depressed, the pedal lever end to contact the centre housing in order to avoid overloading the linkage.

FOOT THROTTLE LINKAGE STANDARD TRANSMISSION

Removal and Replacement

(3B/22)

1. Remove the four screws and washers securing the seat cowl to the floor. Remove cowl together with the seat
2. (Fig. 15) Remove the bolt washers and nut (1) securing the lever assembly (2) to the throttle control lever (3). Remove the split pin and flat washer (4) from the throttle lever assembly.
3. Withdraw the throttle control lever from the lever assembly, remove the nut and belleville washers (5) and remove the throttle control lever and friction disc. (6).
4. Remove the spring (7) securing the throttle rod (8) to the bracket on the underside of the floor.
5. Remove the clip and washer (9) securing the throttle rod to the throttle control lever. Remove the throttle control lever.
6. To dismantle the remainder of the hand throttle linkage proceed as in operation 3B/20.
7. Replacement is a reversal of the above procedure.

Note

When reassembling the throttle lever assembly it is important that the belleville washers are arranged exactly as shown in Fig. 16.

HAND THROTTLE LINKAGE STANDARD TRANSMISSION

Adjustment

(3B/23)

1. (Fig. 17) With the foot pedal in the off position set the angular position of the throttle control lever (1) so that the lever assembly is at the end of the slot on the throttle rod assembly. In this position adjust the throttle lever assembly to the horizontal.

FOOT THROTTLE LINKAGE REVERSOMATIC

Removal and Replacement

(3B/24)

1. Remove the throttle pedal and brake pedal gaiters.
2. Remove the front floor plate.
3. (Fig. 18) Remove the split pins and washers (1) which secure the selector rods (2) to the pedal assemblies (3).

FOOT THROTTLE LINKAGE REVERSOMATIC

Removal and Replacement . . . Con'd

4. Remove the spring pin (4) and withdraw the shaft, together with thrust washers (5) from the pedal assemblies (3). Remove the pedal assemblies.
5. Remove the nuts and lock washers (6) securing the lower end of the selector rods to the fork assembly (7). Remove the selector rods.
6. Remove the cotter pin, washer and clevis pin (8) securing the clevis spring assembly (9) to bracket assembly (10). Release the spring assembly at the throttle lever (11) and remove the spring assembly.
7. Remove the plain washers and retaining clips (13) securing the throttle rod (12) to the throttle quadrant (14) and throttle lever. Remove the rod.
8. Disconnect the gear selector lever by removing the pin and washer securing the shift selector assembly (15).
9. Withdraw the pin and washer which secures the shift selector assembly to the pivot shaft assembly (16), and remove the shift selector assembly.
10. Remove greaser (17) from the pivot shaft assembly.
11. Remove the lever and pivot shaft assembly from the front of the throttle lever assembly.
12. Remove the fork assembly from the rear of the throttle lever.
13. Remove the stub shaft (18) from the transmission control system carrier and remove the throttle lever assembly.
14. Remove three bolts, washers and nuts securing the transmission control carrier to the transmission case
15. Replacement is a reversal of the above procedure.

FOOT THROTTLE LINKAGE REVERSOMATIC

Adjustment (3B/25)

1. (Fig. 19) With the throttle rod assembly disconnected, position the cross-shaft quadrant in the idling position and set the hand throttle in the horizontal position.
2. With the hand throttle connected to the quadrant, set the hand throttle lever to the maximum speed position. With the throttle lever on the fuel injector pump set against the maximum speed stop, connect the throttle rod to suit.
3. Return the hand throttle to the idling position and fit the throttle return spring. With the linkage in the idling position, set the throttle pedal idle screw to suit and tighten the adjusting nut. Fit the throttle control spring with light tension.
4. Set the fuel cut off lever on the fuel injection pump in the "engine running" position, thread the core of the cable through the cable pivot until taut, then tighten the screw.
5. With both foot pedals level, adjust the nuts so that the direction engagement lever is in the neutral position. Tighten down the nuts onto the pivot shift selector.
6. Increase the tension in the spring assembly by screwing the locknut clockwise into the clevis. Spring tension to be such that, by application of the forward and reverse pedals, the transmission spool is fully selected in the appropriate direction via movement of the lever and pivot shaft assembly before movement of the throttle lever assembly occurs. Tighten the locknuts against the clevis.

HAND THROTTLE LINKAGE

Removal and Replacement (3B/26)

1. Remove the front floor plate.
2. Remove four screws and washers securing the seat cowl to the floor. Remove cowl together with the seat.
3. To remove the throttle rod from the throttle lever assembly, proceed as items 2–5 of operation 3B/22.
4. (Fig. 20) Remove washer and clip (1) securing the lower throttle rod to the lever (2). Remove the throttle rod.

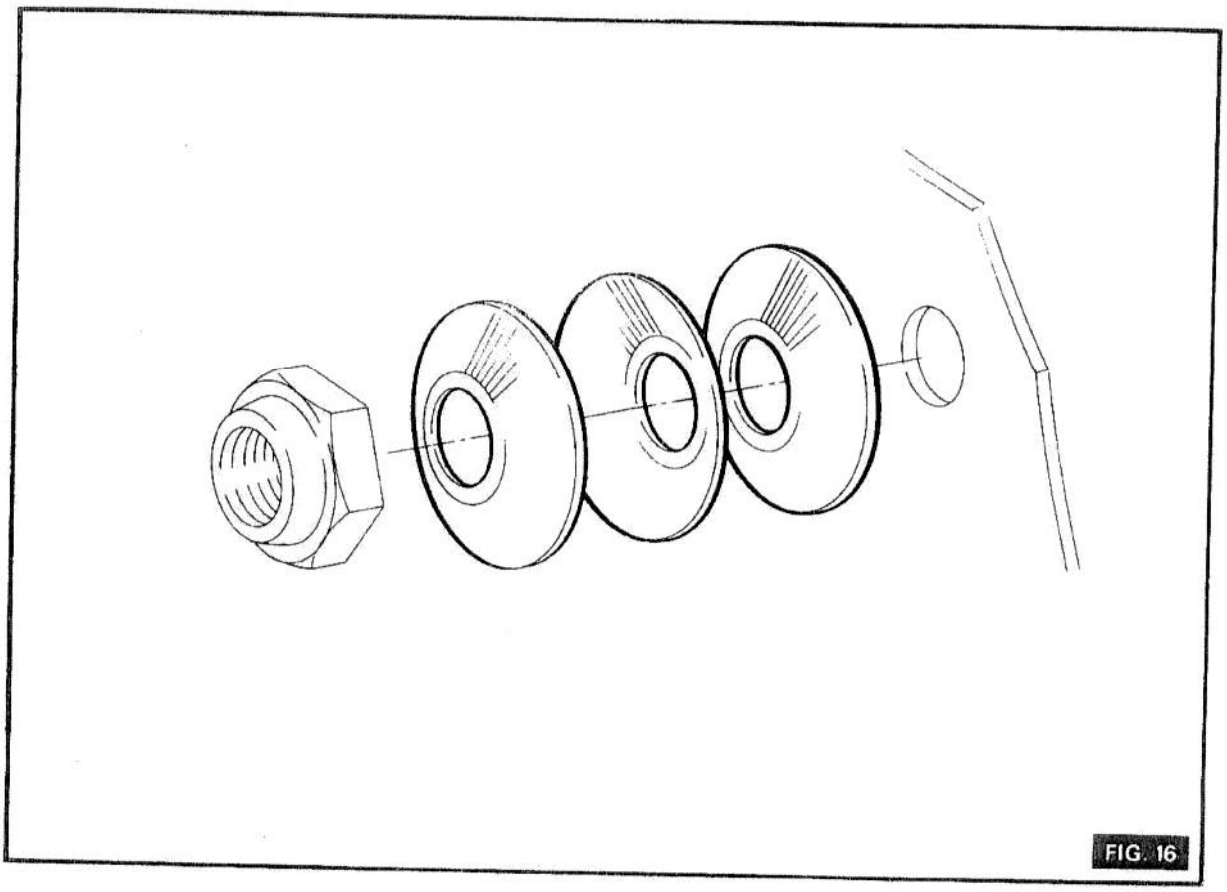

FIG. 16

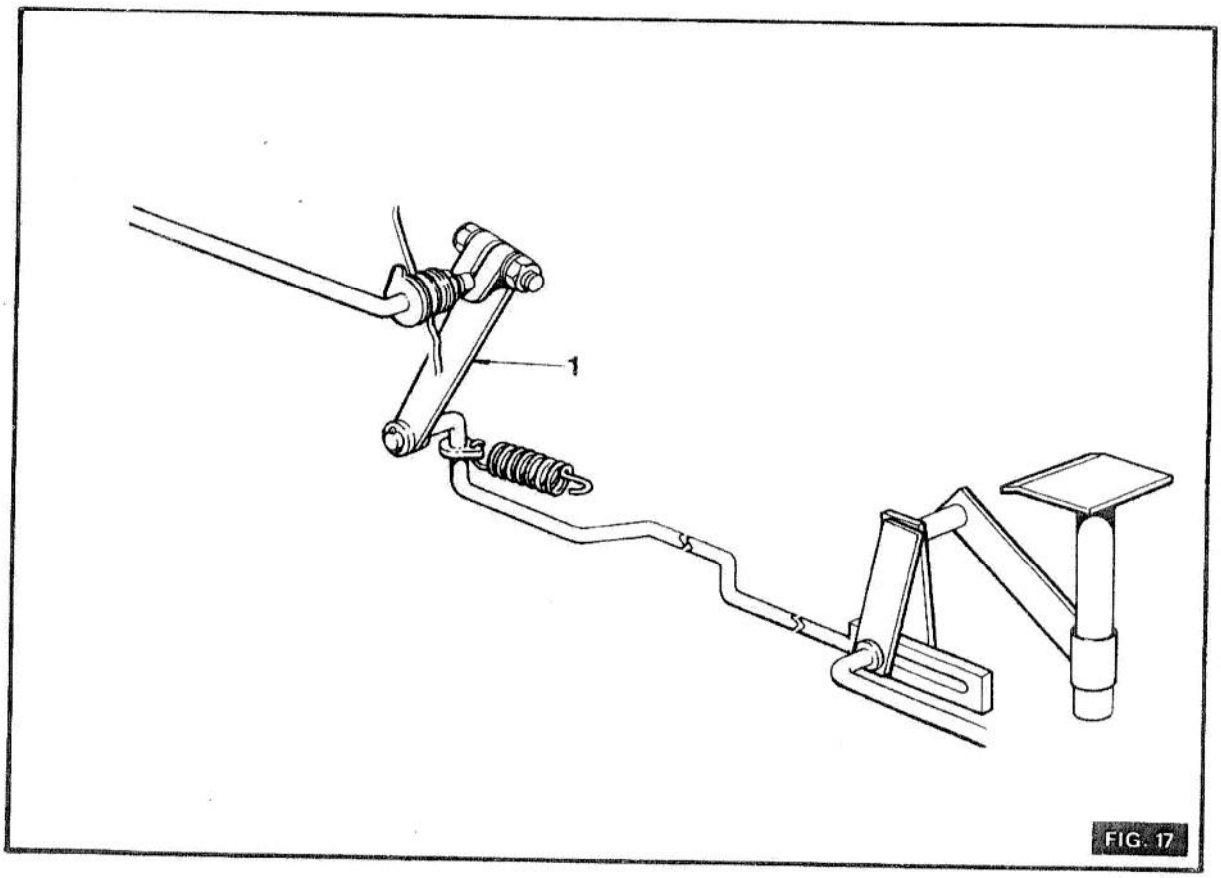

FIG. 17

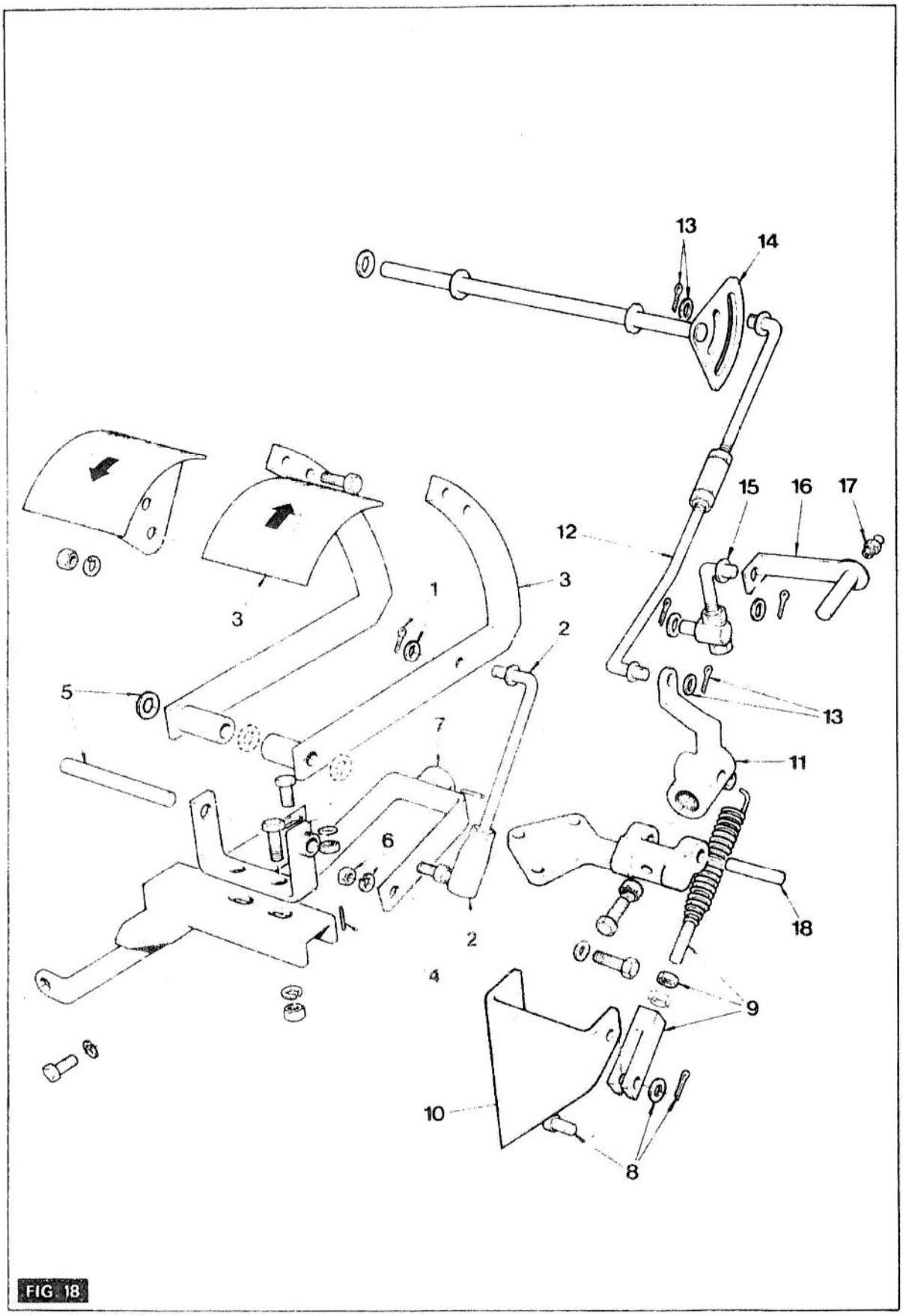

FIG. 18

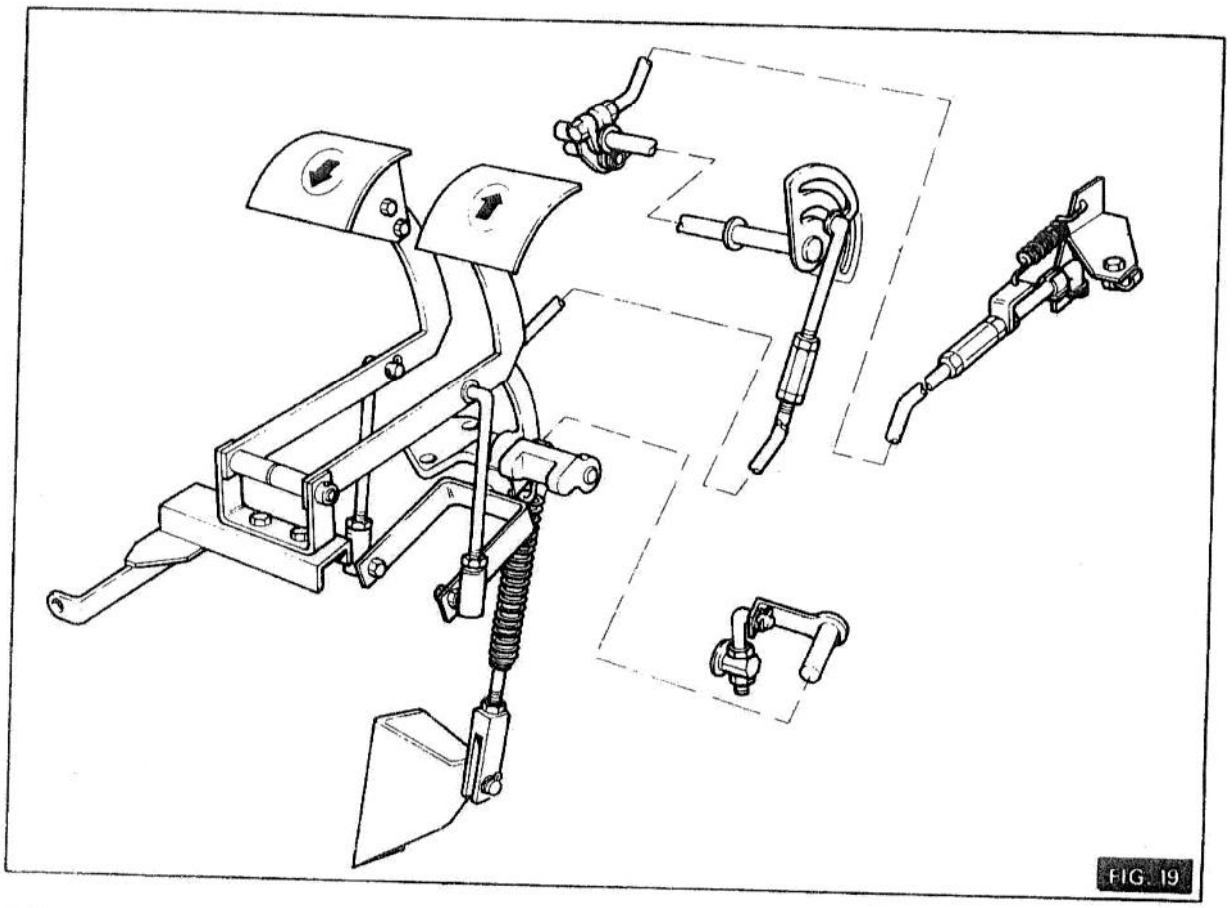

FIG. 19

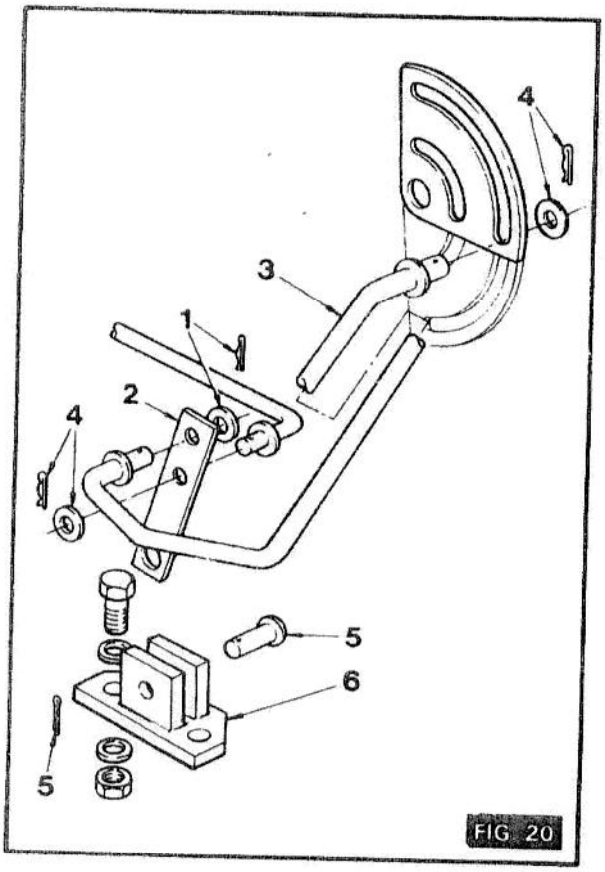

FIG. 20

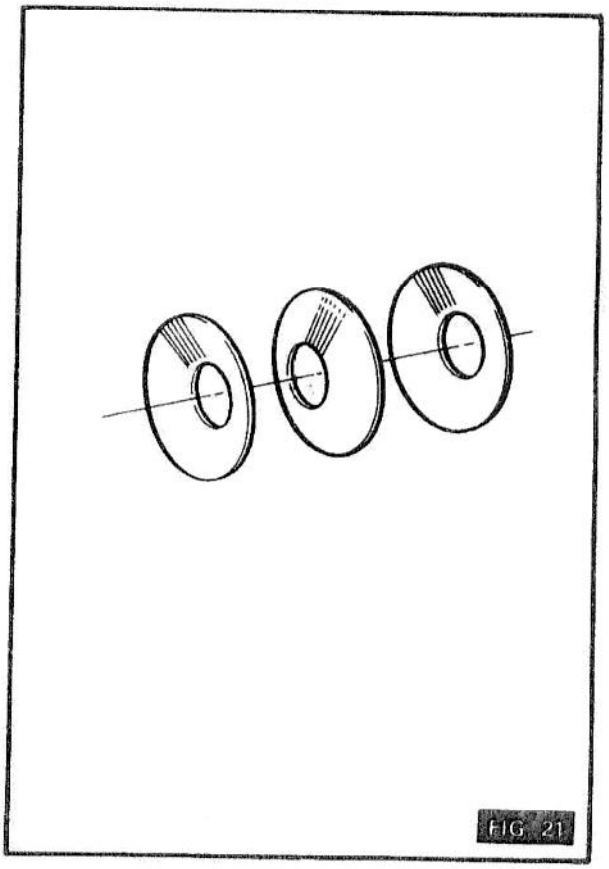

FIG. 21

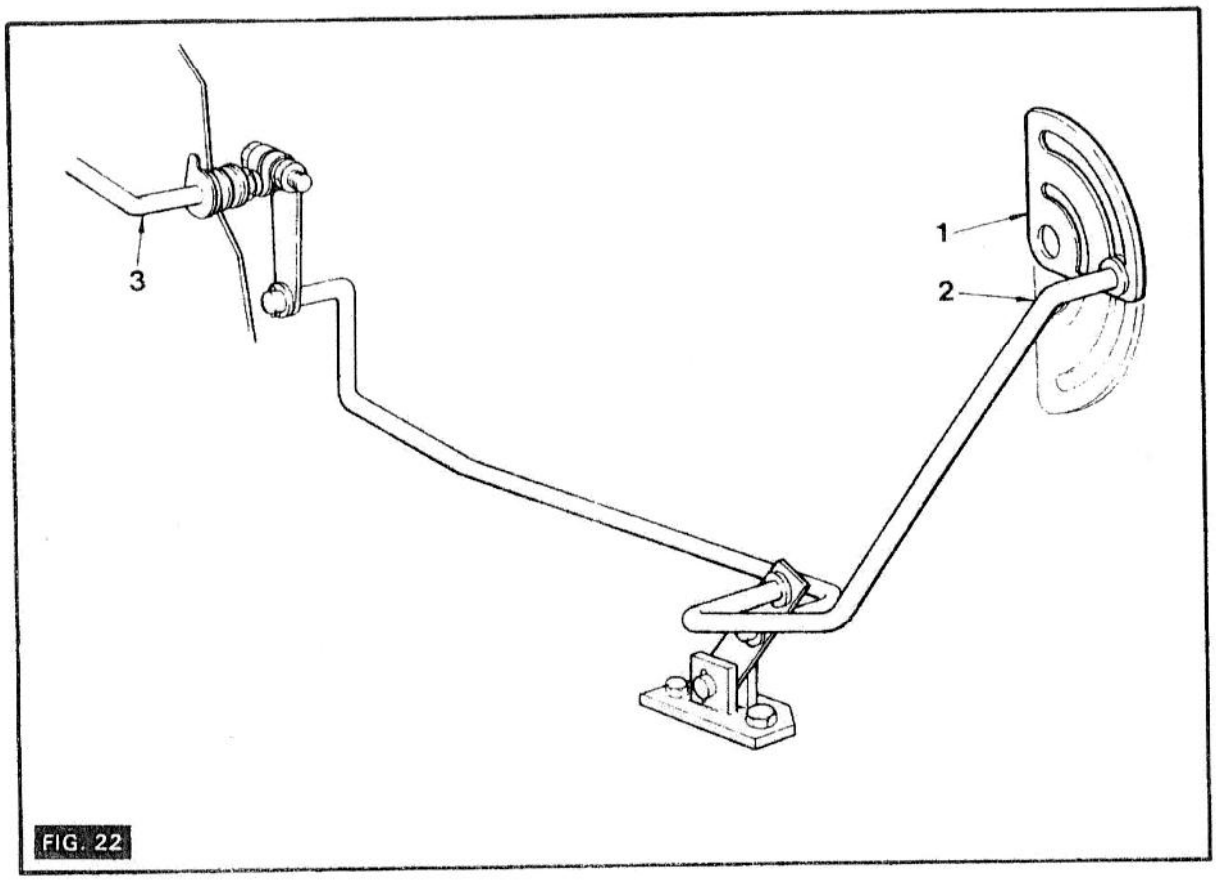

FIG. 22

HAND THROTTLE LINKAGE

Removal and Replacement . . . Cont'd

5. Disconnect the upper throttle rod (3) by removing clips and washers (4), securing the rod at the throttle lever and at the quadrant. Remove the throttle control rod.
6. Withdraw split pin and remove clevis pin (5) securing throttle rod lever to the pivot post (6). Remove the lever.
7. Replacement is a reversal of the above procedure.

Note

When reassembling the throttle lever assembly it is important that the belleville washers are arranged exactly as shown in Fig. 21.

HAND THROTTLE LINKAGE

Adjustment

(3B/27)

1. (Fig. 22) With the accelerator quadrant (1) set in the idling position connect the pull rod (2) to the quadrant. In this position adjust the assembly (3) to the horizontal.

ELECTRICAL SYSTEM

CONTENTS

LIST OF ILLUSTRATIONS

ELECTRICAL SYSTEM

GENERAL

This section covers the removal and replacement of all the electrical components (lights excepted).
The battery in this 12 volt negative earth system is situated under the floor plates and complete access is gained by lifting one section of the floorplates.
An alternator of the rotating field, ventilated design is fitted. It is fitted with sealed bearings and incorporates a voltage regulator on the slip ring end of the casting.
Fig. 1 shows the layout of all the electrical components and associated wiring.

Key to Fig 1

1 Battery
2 Horn
3 Alternator
4 Starter
5 Fusebox
6 Line Fuses
7 Trailer Socket

COMPONENT LOCATION AND DATA

CIRCUIT:	12 Volt Negative Earth
BATTERY:	12 volt, 17 plate, Exide, having a capacity of 128 a.h. in 20 hours. Situated under the platform to the right of the operator.
ALTERNATOR:	Lucas 18 ACR. Situated on the front off-side of the engine and belt driven from the crankshaft pulley. The alternator can be adjusted to give the correct tension on the fan belt.
STARTER MOTOR:	Lucas M50. Solenoid engaged pinion. Situated on the rear L.H. side of the engine.
CONTROL UNIT:	Incoporated in the alternator.
FUSE BOX:	The fuses in the fuse box are as follows:- two 5 amp, two 8 amp, one 15 amp and one 25 amp. The box is situated on the right hand side of the fairing under the instrument panel.
LINE FUSES:	Four line fuses are incorporated to protect the main beam system, lighter, starting aid and hazard warning lights. All four are situated at the rear of the instrument panel.
HEATER:	Smiths, 2-speed motor. Controls for the heater are fastened under the right hand side of the instrument panel and the Radiator/fan unit is positioned under the operator seat cowl.

Key to Fig 2

CAB WIRING

1 Multi Connector
2 Front Work Lights
3 Front Wiper
4 Interior Light
5 Rear Wiper
6 Rear Work Lights

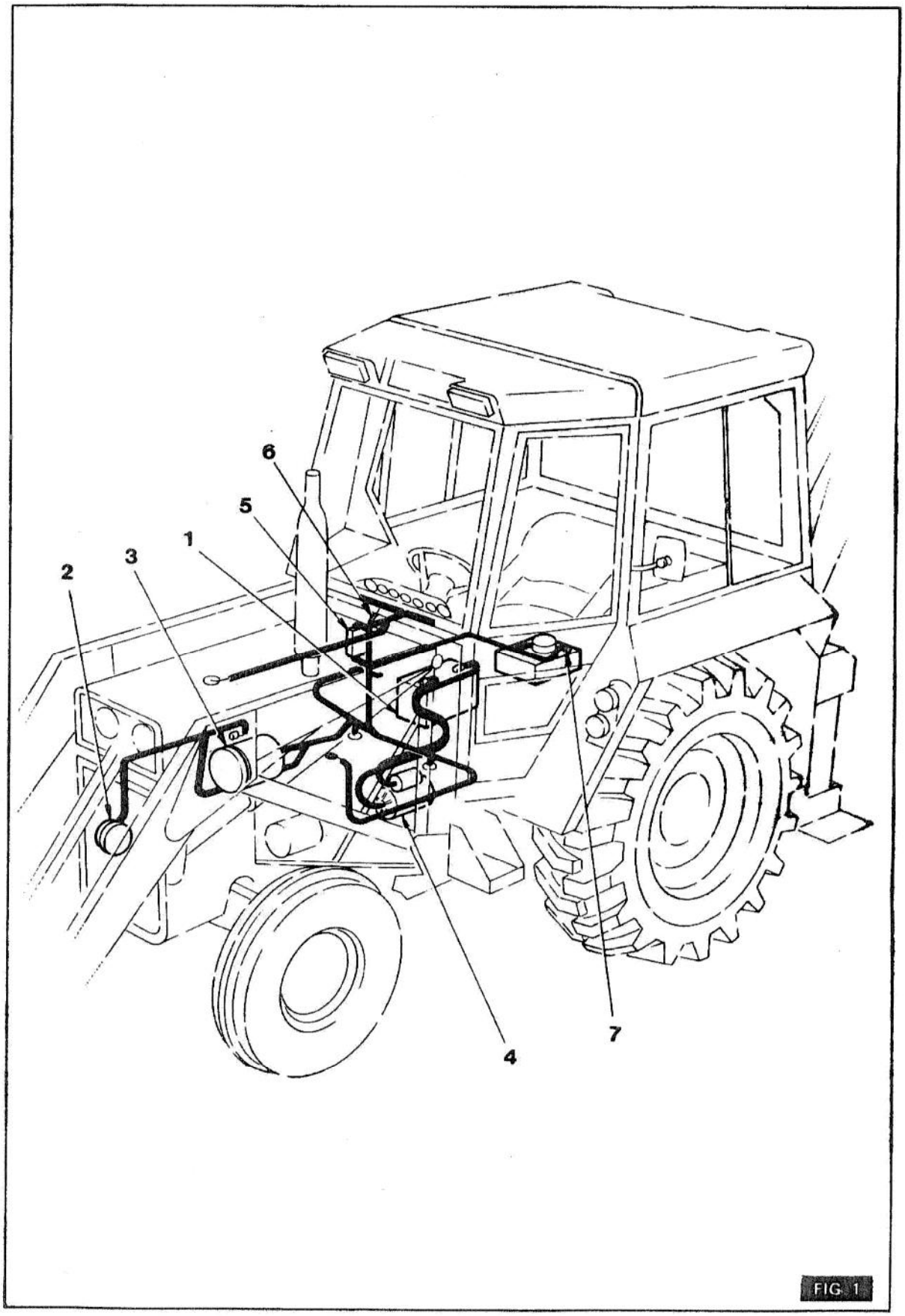

FIG. 1

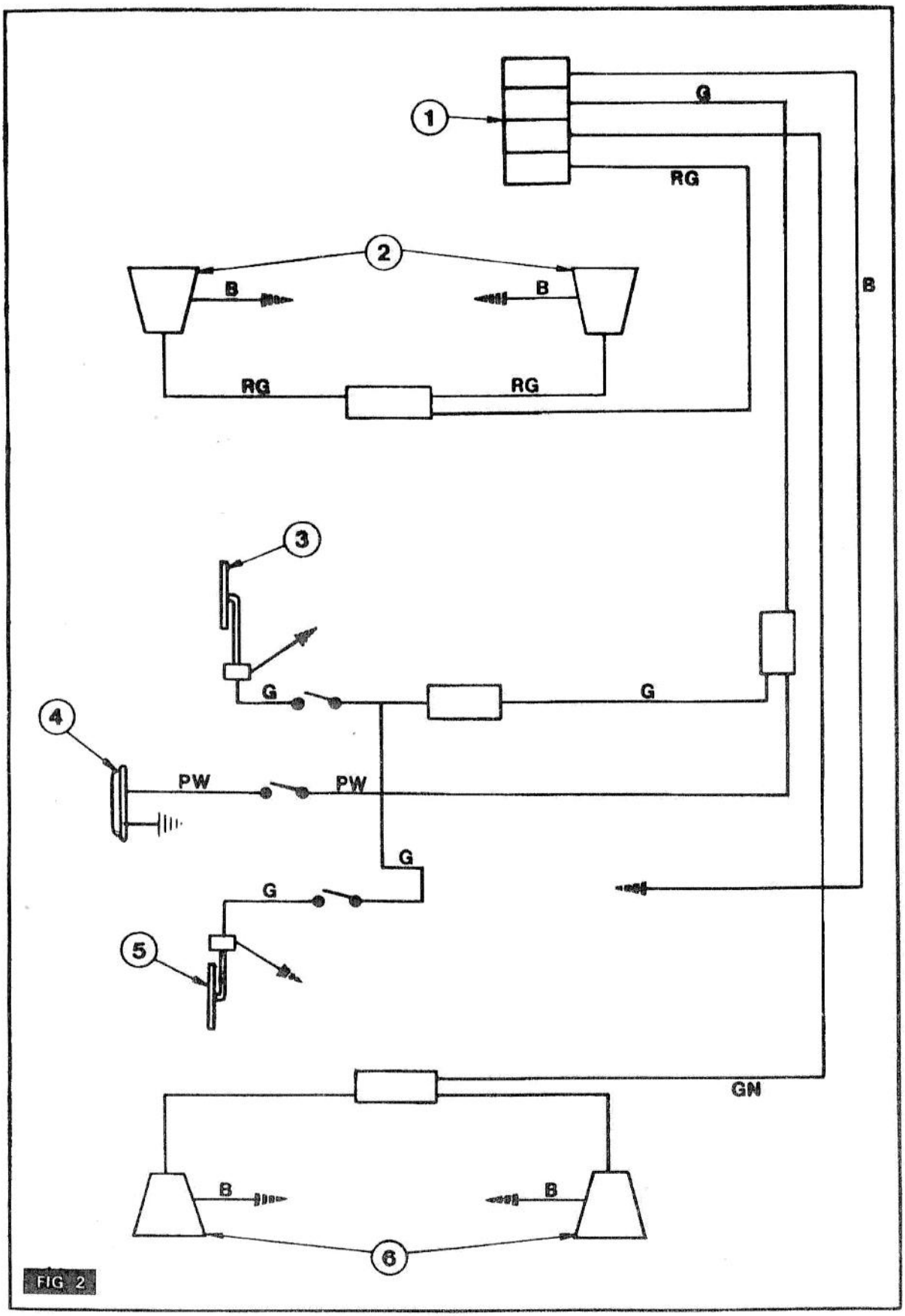

FIG 2

COMPONENT LOCATION AND DATA . . . Cont'd

Key to Fig 3

INSTRUMENTS

1	Neutral Safety Switch	12	Amp Meter
2	Starter	13	Fuel Gauge
3	Alternator	14	Oil Temperature Gauge
4	Starting Aid	15	Engine Thermo Unit
5	25 amp Fuse	16	Transmission Thermo Unit
6	5 amp Fuse	17	25 amp Fuse
7	25 amp Fuse	18	Heater Switch
8	Battery	19	Cigar Lighter
9.	Horn	20	Heat/Start Switch
10	Fuel Sender Unit	21	Horn Push
11	Water Temperature Gauge	22	Heater

COLOUR CODE:

R	Red	B	Black	N	Brown
W	White	Y	Yellow	P	Purple
G	Green	U	Blue	LG	Light Green

WIRING HARNESS

Removal and Replacement (4A/1)

1. Disconnect the battery.
2. Disconnect the following wires:
   - 10 at Fuse box
   - 2 at Neutral Safety Switch (Standard Transmission only)
   - 1 at Transmission Thermo Unit (Reversomatic Transmission only)
   - 1 at Engine Thermo Unit
   - 3 at Starter
   - 2 at Horn
   - 3 at O/S Headlights
   - 3 at N/S Headlights
   - 1 at Start Aid
   - 1 multi connector at Alternator
   - 2 at Stop Lamp Switch
   - 2 at Heater
   - 2 at Heater Resistor
   - 2 at Trailer Socket
   - 1 at Fuel Tank
   - 1 Multi Connector and Earth at L. H. Side Lights
   - 1 Multi Connector and Earth at R. H. Side Lights
3. Release harness from all clips and cleats.
4. Remove the four bolts which secure the instrument panel.
5. Lift the instrument panel from the cowl and remove all non electrical connections to the instrument panel. The panel can be lifted away gently pulling the wiring harness up the centre fairing.
6. If necessary the harness can be removed from the rear of the instrument panel by removing the following wires.
   - 2 at Horn Push
   - 3 at Transmission Temperature Gauge
   - 3 at Indicator Switch

WIRING HARNESS

Removal and Replacement . . . Cont'd

1 at Indicator Warning Light
3 at Fuel Gauge
2 at Ammeter
1 at Cigar Lighter
4 at Heat/Start Switch
6 at Hazard Switch
3 at Water Temperature Gauge
1 at Work Light Warning Lamp
1 at Main Beam Warning Lamp
2 at Main Beam Dip Witch
4 at Side/Headlight Switch
3 at Work Light Switch
3 at Heater Switch
4 at Flasher Units

7. Replacement is a reversal of the above procedure.

BATTERY

Removal and Replacement (4A/2)

1. Fig. 4 Remove the access panel.
2. Disconnect the battery leads from the terminals.
3. Unscrew the clamping bar and lift out the battery.
4. Replace the battery in a reverse order of the above procedure ensuring that the terminal posts are free from corrosion. If corrosion has occured, clean terminals and smear with petroleum jelly.

CAUTION

A. When refitting the battery, use the following procedure, as reversed battery connections will damage the alternator rectifier. First connect the earth strap to the negative terminal then the other lead to the positive terminal.
B. The battery must NEVER be disconnected while the engine is running or damage may occur to the regulator semiconductor devices.

ALTERNATOR

Removal and Replacement (4A/3)

1. (Fig. 5) Disconnect the Multi Connector (1) from the rear of the alternator.
2. Unscrew and remove the upper adjusting bolt (2) and the lower adjusting bolt (3). The guard (4) can now be removed.
3. Remove the remaining pivot bolt (5), slip the fan belt from round the pulley and remove the alternator.
4. Replace in a reverse order of the above procedure.

NOTE

The following precautions should always be taken to safeguard the alternator.

a) When fitting a replacement alternator, ensure it is of the same polarity as the original and that the connections are made correctly. The alternator polarity cannot be reversed by 'flashing' the field terminal as can a dynamo.
b) When refitting the batteries, use the following procedure as reversed battery connections will damage the alternator rectifiers. First connect the earth strap to the negative terminal on each battery, then connect the other lead to the positive terminals.

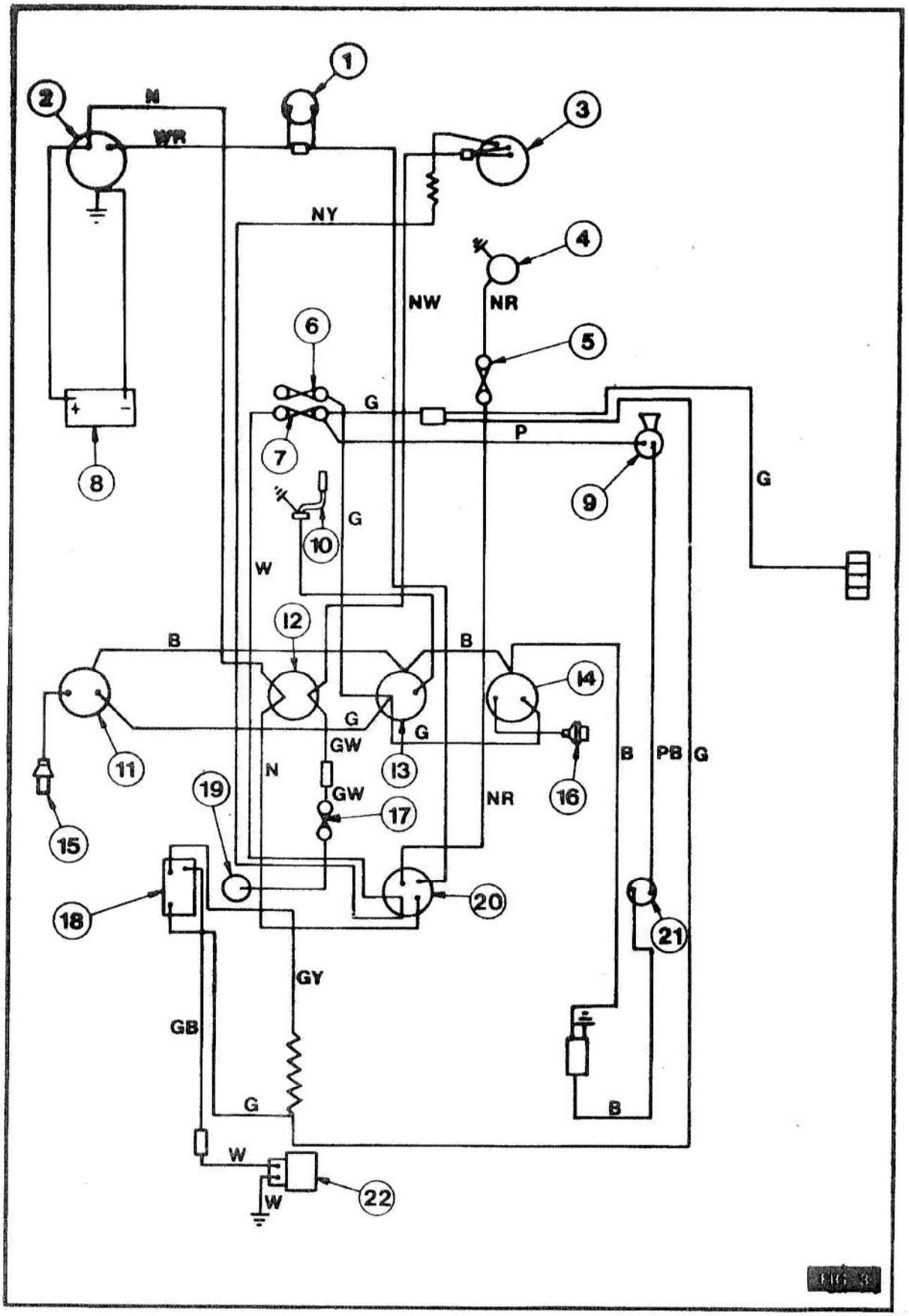
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FIG. 3

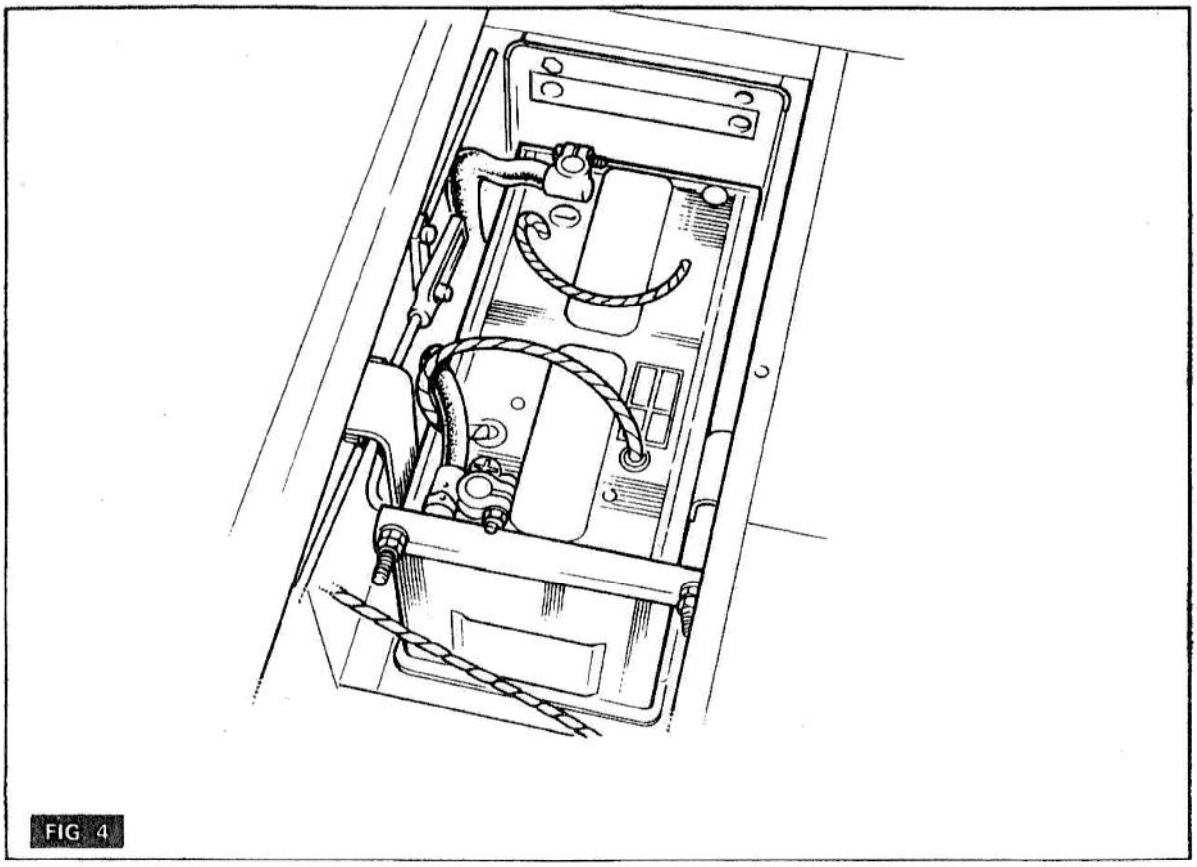

FIG 4

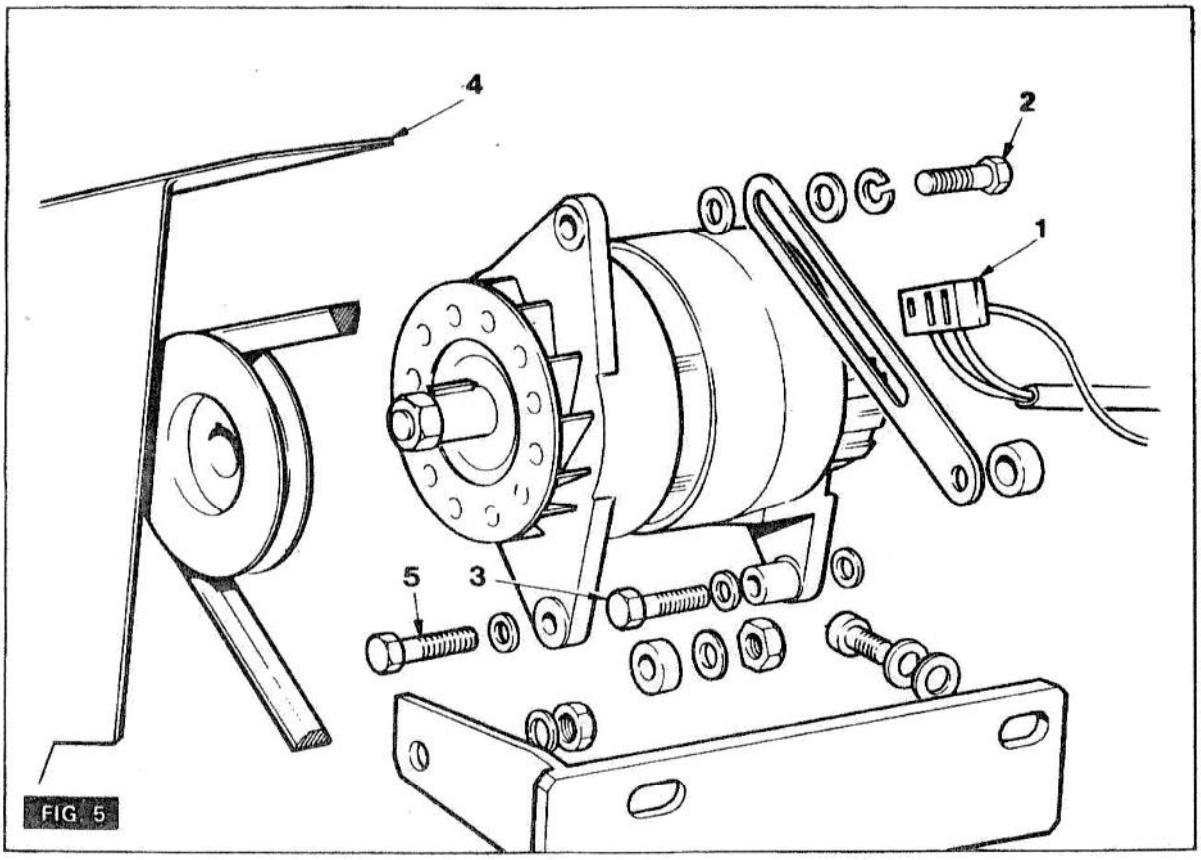

FIG 5

ALTERNATOR

Removal and Replacement . . . Cont'd

c) When using a high rate battery charger, take the connectors from the regulator before boost charging and reconnect when charging is completed.

d) When starting engine with the aid of a high rate charger, employ the following procedure:-
Before connecting the charger, remove the connectors from the regulator terminals. Start the engine. Do not reconnect the regulator until the charger has been disconnected and the engine speed reduced to idling.

e) The battery must NEVER be disconnected while the engine is running or damage may occur to the regulator semiconductor devices. For this reason the practice (often adopted with dynamos) of using a slave battery to start the engine and subsequently reconnecting the original batteries with the engine running must NOT be attempted.

f) The cable connecting alternator and batteries is 'live' even when the engine is not running. Care must be taken not to earth the alternator terminal or the cable end if removed from the terminal, or damage to the cable will occur.

g) The alternator must never be run with the main output cable disconnected either at the alternator or battery end while the field remains energised, or the rectifiers may be damaged.

h) Do not make or break any other connections in the alternator circuit while the engine is running.

j) If any arc welding is to be done on the machine, isolate the regulator and alternator by removing their connectors.

k) Never use an ohmmeter of the type incorporating a hand-driven generator for checking the rectifiers or transistors.

STARTER

Removal and Replacement (4A/4)

1. (Fig. 6) Disconnect the leads (1) at the three terminals on the starter unit.
2. Remove the three setscrews (2) which secure the starter to the engine.
3. Pull the starter clear of the engine.
4. Replace the starter in a reverse order of the above sequence.

HORN

Removal and Replacement (4A/5)

1. (Fig. 7) Remove the front grille (1).
2. Disconnect the two wires (2) at the horn.
3. Remove the two bolts (3) which secure the horn to the hard nose.
4. Remove the horn (4).
5. Replace in a reverse order of the above sequence.

HORN PUSH

Removal and Replacement (4A/6)

1. (Fig. 8) Remove the instrument panel to gain access to the rear of the horn push.
2. Disconnect the two wires (1) from the unit.
3. Remove the securing nut (2) and extract the unit through the front of the panel.
4. Replace in a reverse order of the above procedure.

STARTER SWITCH

Removal and Replacement (4A/7)

1. (Fig. 9) Lift the instrument panel from the cowl to gain access to the rear of the starter switch.
2. Disconnect the four wires ( ) from the switch.
3. Remove the securing nut ( ) from the front of the switch.
4. Extract the unit through the rear of the instrument panel.

FUSE BOX

Removal and Replacement (4A/8)

1. (Fig. 10) Remove the six bolts (1) which secure the fairing (2) to the fuel tank support, remove the fairing.
2. Remove the Fuse box cover (3).
3. Disconnect the ten wires (4) from the six fuses.
4. Unscrew the two nuts (5) and remove the bolts (6). The fuse box can then be removed from the bracket.
5. Replace the fuse box using a reversal of the above procedure.

NOTE

When refitting the wires to the fuse terminals ensure that they are correctly located.

LINE FUSES

Removal and Replacement (4A/9)

1. Lift off the instrument panel from the cowl. This gives access to the four line fuses which are incorporated in the electrical system.
2. Hold both ends of the fuse casing, push top of casing in and turn it in an anti-clockwise direction.
3. Separate the casing halves and tip out the fuse. Insert new fuse of equal amperage to the one that has been removed.
4. Reassemble the casing.

CIGAR LIGHTER

Removal and Replacement (4A/10)

1. (Fig. 12) Lift the instrument panel from the cowl to gain access to the rear of the cigar lighter.
2. Remove the lighter unit (1).
3. Disconnect the wire at the line fuse (2).
4. Unscrew the outer cover (3) and pull the heater unit (4) through the front of the panel.

TRAILER SOCKET

Removal and Replacement (4A/11)

1. (Fig. 13) Remove the four bolts (1) which secure the heater cowl (2) to the platform.
2. Tip the seat and cowl forward to expose the wiring connections.
3. Disconnect the earth lead (3) and positive lead (4) from the main wiring harness.
4. Lower the seat and cowl back on to the platform and extract the rubber socket( ) from the hole in the cowl.

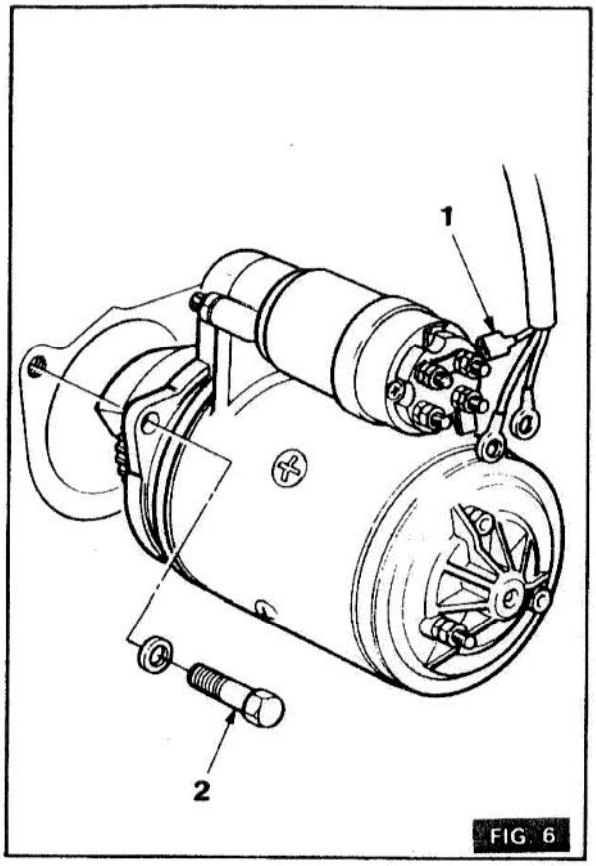

FIG. 6

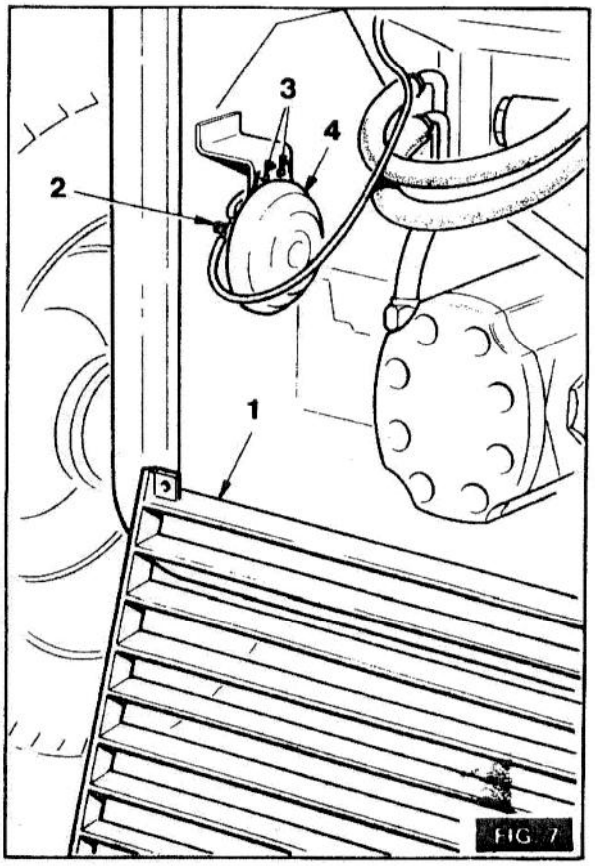

FIG. 7

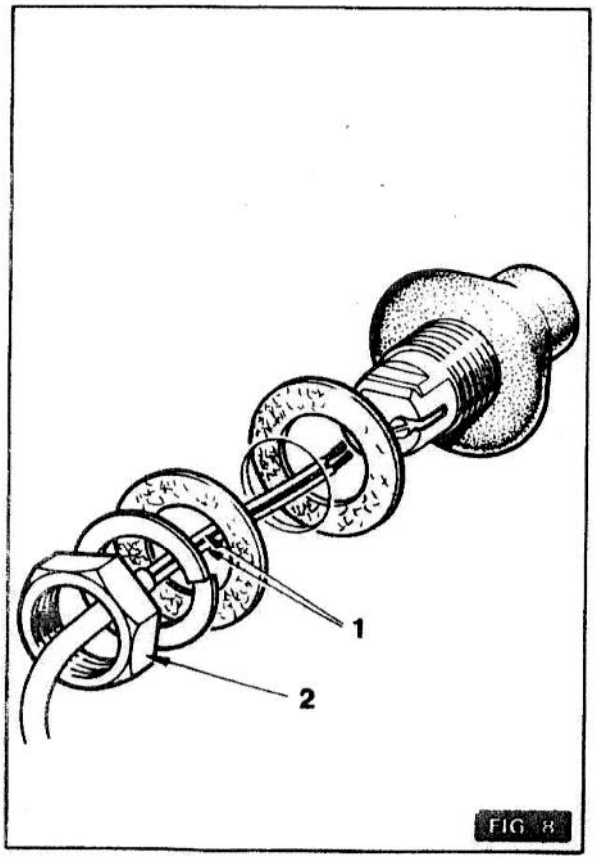

FIG. 8

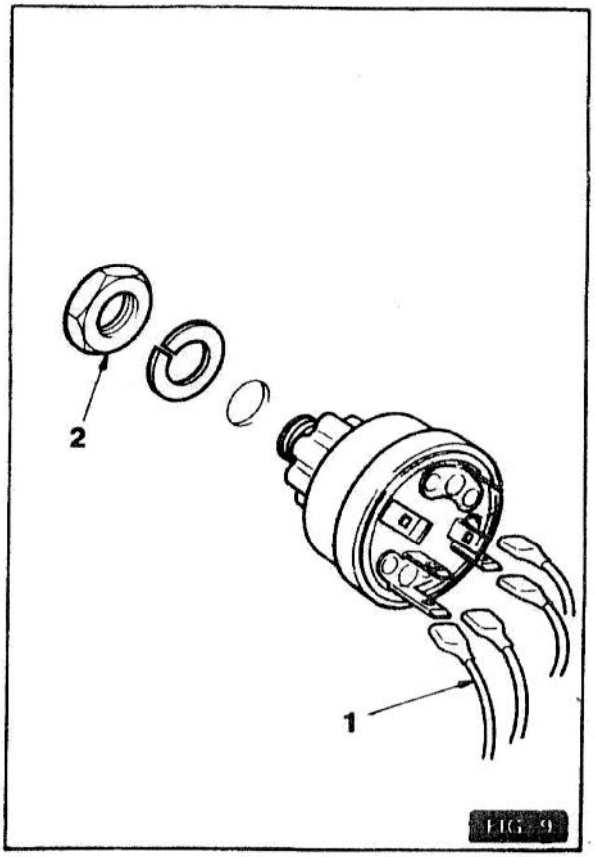

FIG. 9

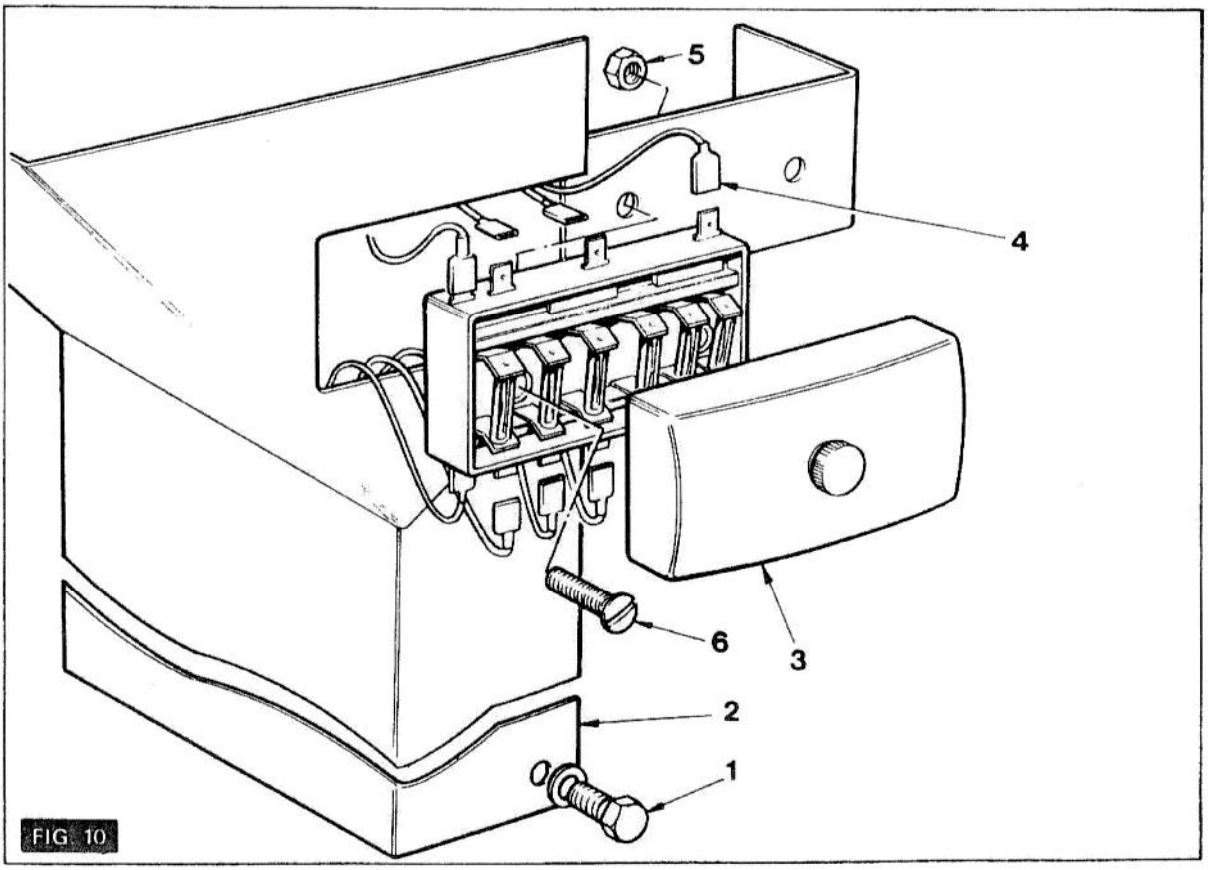

FIG 10

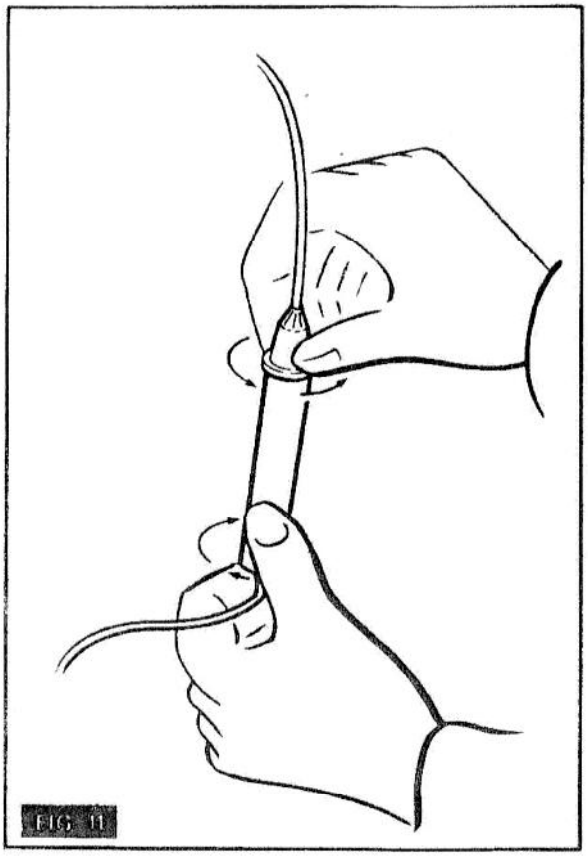
FIG 11

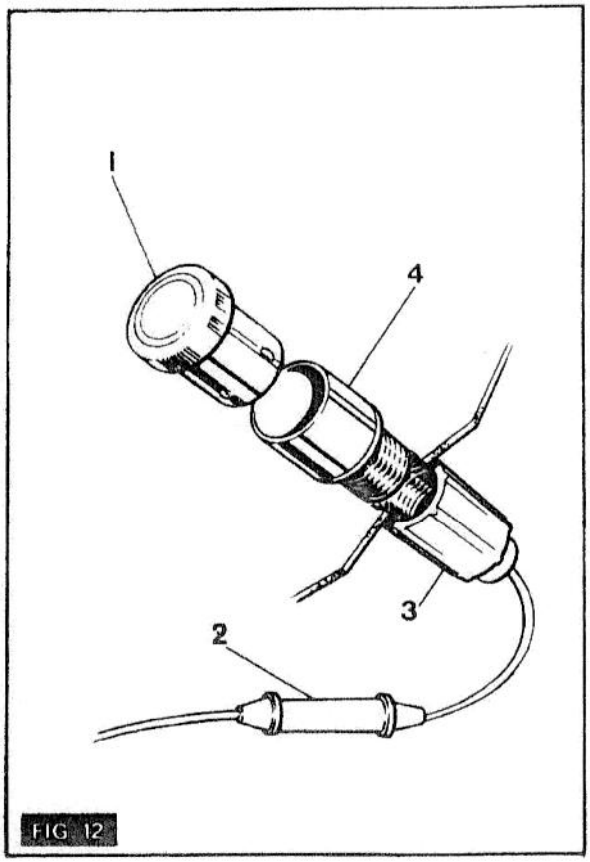

FIG 12

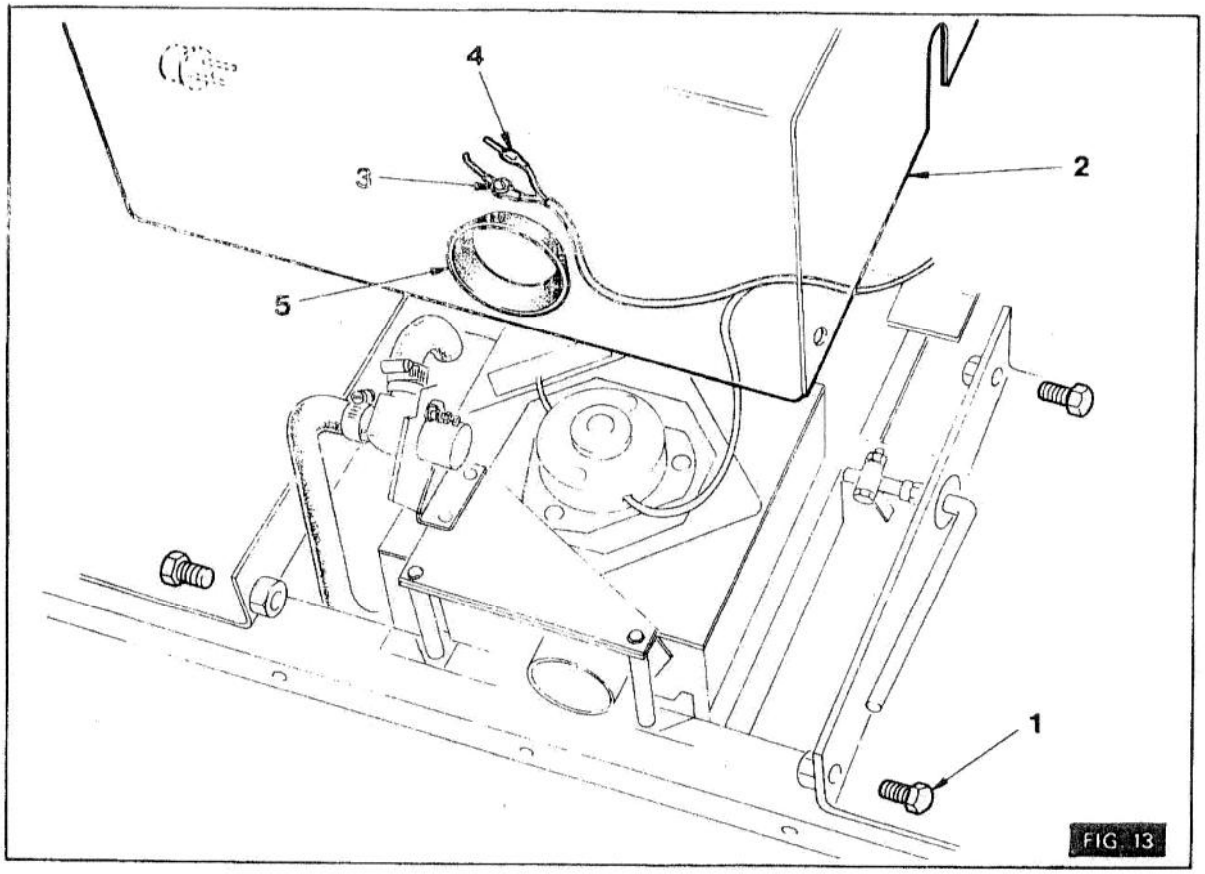

FIG. 13

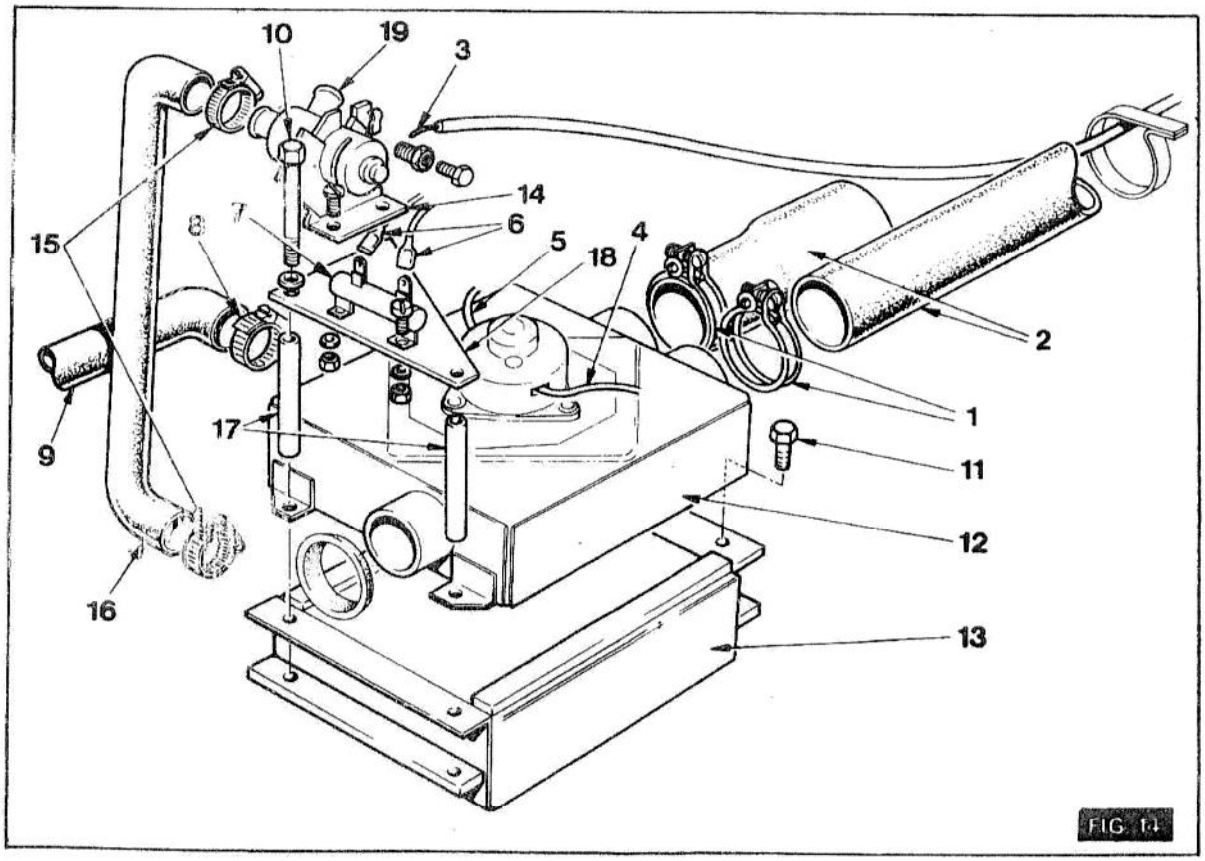

FIG. 14

HEATER

Removal and Replacement (4A/12)

1. Disconnect the trailer socket as described in parts 1 to 3 of operation 4A/11
2. Manoeuvre the seat and cowl assembly over the handbrake lever and remove from the machine.
3. (Fig. 14) Unfasten the clips (1) and remove the air outlet hoses (2) from the fan unit.
4. Disconnect the control cable (3) at the water valve.
5. Disconnect the earth lead (4) and positive lead (5) from the fan unit, then remove the two leads (6) from the resistor (7).
6. Unfasten the clip (8) and remove the outlet hose (9) from the radiator.
7. Unscrew the two long bolts (10) then the two short bolts (11) and lift the heater unit from the machine ensuring that the fan unit (12) radiator (13) and control valve mounting plate (14) are held together.

HEATER

Disassembly and Reassembly (4A/13)

1. Remove the heater as described in operation 4A/12.
2. (Fig. 14) Loosen the two clips (15) and remove the hose assembly (16) from the control valve and reservoir.
3. Remove the two bolts (10) and distance pieces (11) then take the support plate (18) complete with heater control (19) and resistor (7), away from the machine.
4. Remove the two bolts (11) and separate the fan unit (12) from the radiator (13).
5. If necessary the control unit and resistor can be removed from the support plate by removing the appropriate securing screws.
6. Reassembly is a reversal of the above procedure.

LIGHTING SYSTEM

CONTENTS

LIST OF ILLUSTRATIONS

LIGHTING SYSTEM

General

The lighting system consists of two front headlights, two front worklights, two front sidelights, two rear facing worklights, two rear lights, four indicators, one illuminated rear number plate, two panel lights, one interior light, all associated cables, harness and wires.

The cab is fitted with two front facing work lights, two rear facing worklights and an interior light.

All the lighting on the MF 50B Tractor Digger Loader complies with the road traffic regulations.

KEY TO FIG. 2 - LIGHTING

1. Left Hand Head Light.
2. Left Hand Side Light.
3. Left Hand Front Indicator Light.
4. Right Hand Head Light.
5. Right Front Indicator Light.
6. Right Hand Side Light.
7. Fuse Box
8. 8 Amp Fuse.
9. Stop Light Switch.
10. Flasher Unit.
11. Flasher Unit.
12. Panel Light.
13. Panel Light.
14. Amp Meter.
15. Warning Light, Main Beam / Dip Switch.
16. Warning Light, Work Light Switch.
17. Warning Light, Indicator Switch.
18. Main Beam / Dip Switch.
19. Side Light Switch.
20. Work Light Switch.
21. Heat / Start Switch.
22. Indicator Switch.
23. Hazard Warning Switch.
24. 10 Amp Fuse.
25. Left Hand Rear Indicator Light.
26. Left Hand Stop / Tail Light.
27. Trailer Socket.
28. Right Hand Stop / Tail Light.
29. Right Hand Rear Indicator Light.

KEY TO FIG. 3 - CAB WIRING

1. Multi Connector.
2. Front Work Lights.
3. Front Wiper.
4. Interior Light.
5. Rear Wiper.
6. Rear Work Lights.

COLOUR CODE

R	Red	B	Black	N	Brown
W	White	Y	Yellow	P	Purple
G	Green	U	Blue	LG	Light Green

WATTAGE OF BULBS

LIGHT	NO. OFF	WATTAGE
Head Light	2	36W/35W
Work Light	4	36W Single Contact
Panel Light	2	2 – 2 W
Interior Light	1	18W
Side Light	2	5W
Indicator Light	4	21W
Tail Light	2	5W
Number Plate Light	1	6W

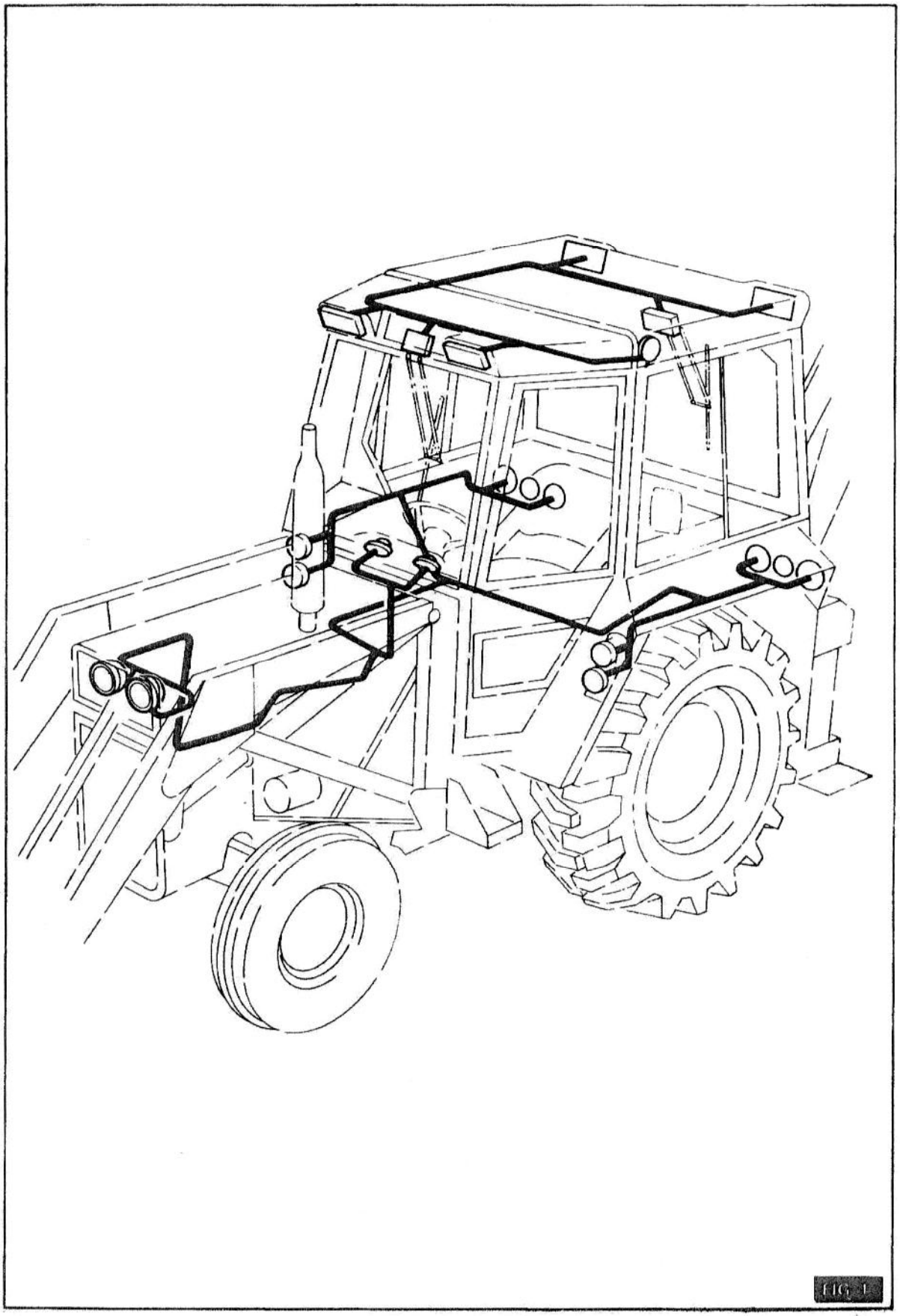

FIG. 1

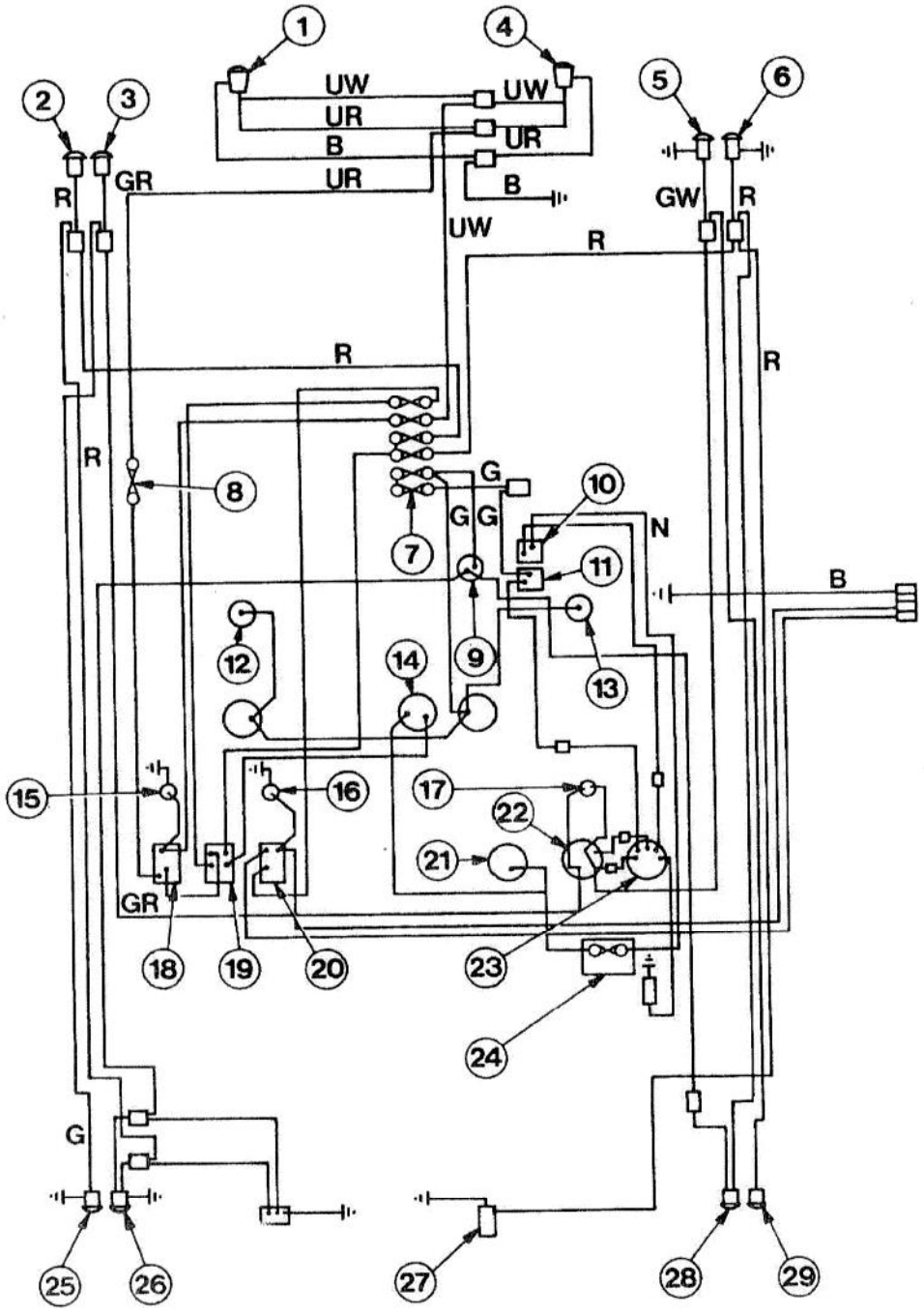
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FIG 2

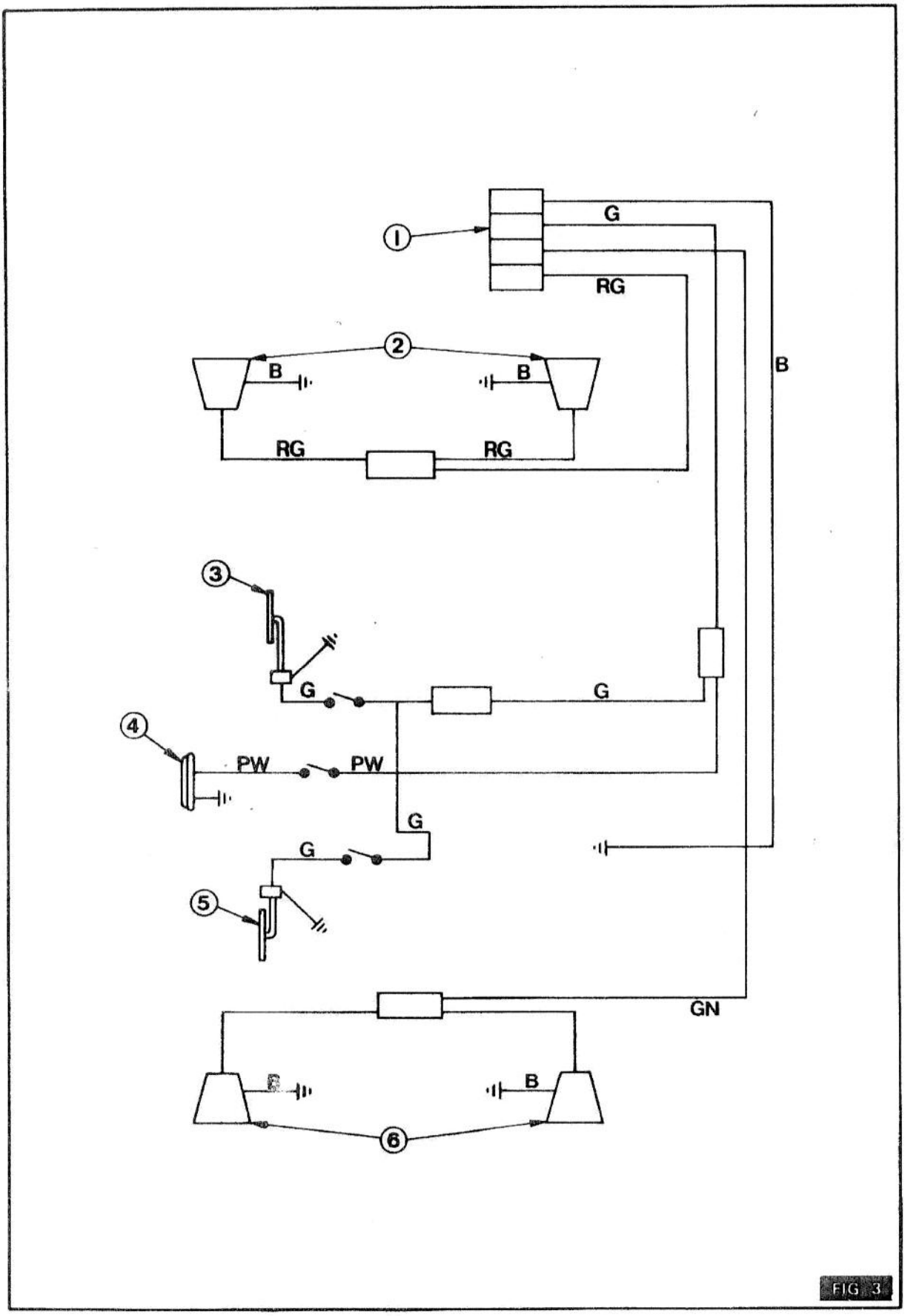


FIG. 3

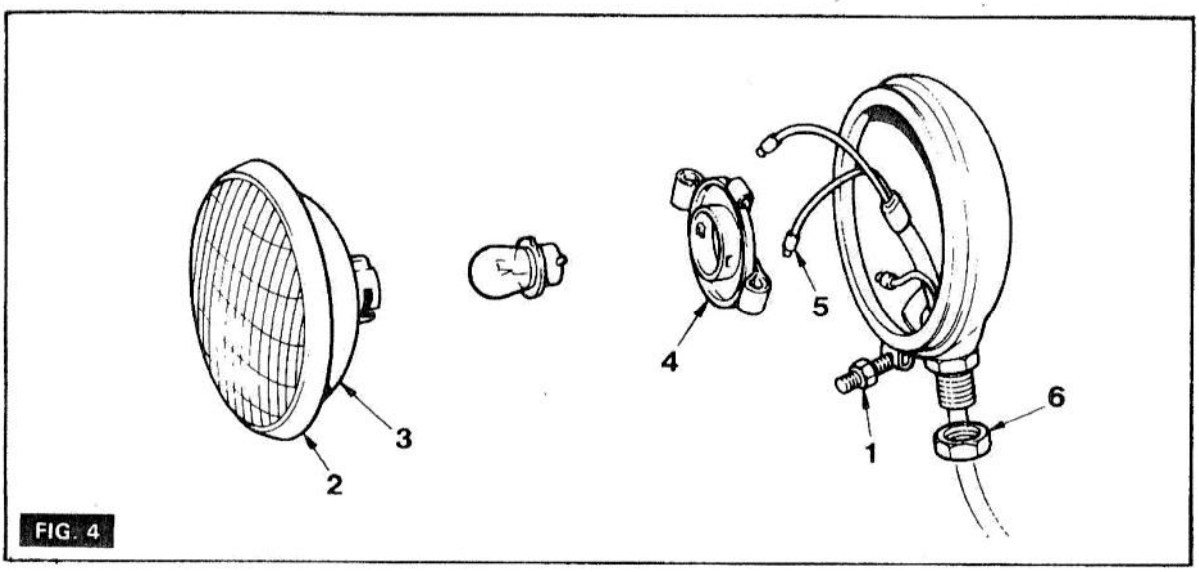


FIG. 4

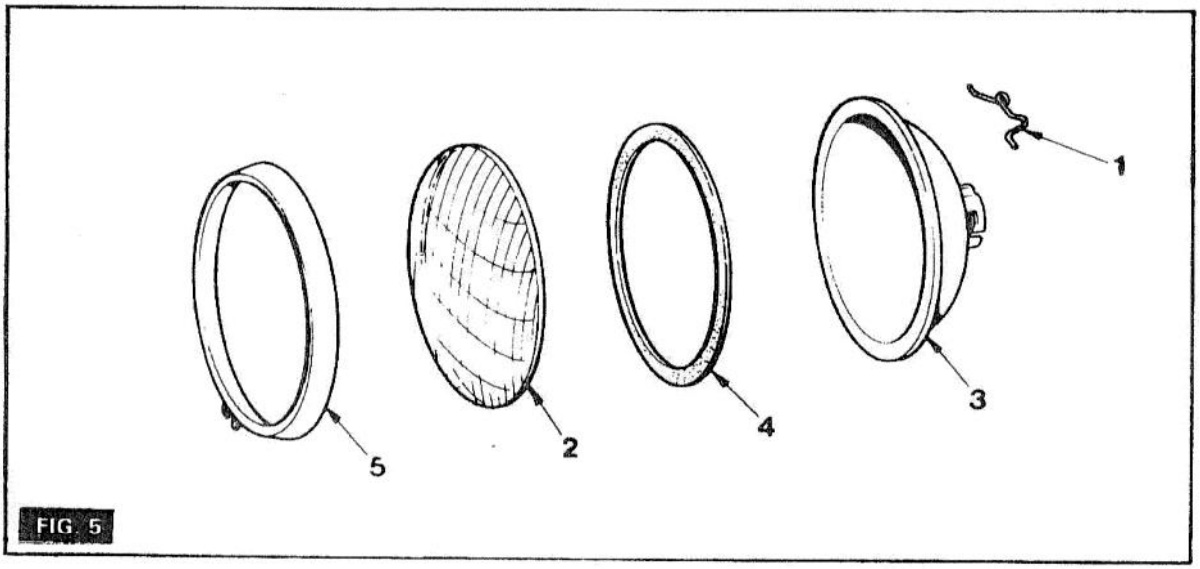


FIG. 5

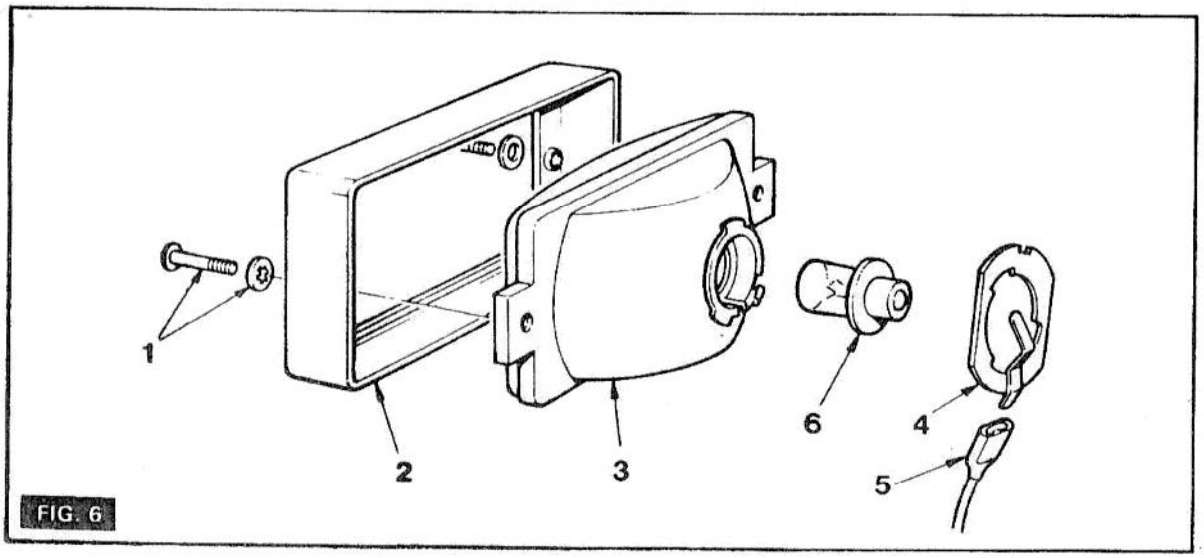


FIG. 6

LIGHTING SYSTEM

General . . . Cont'd

WARNING

BEFORE COMMENCING ANY WORK ON THE ELECTRICS ALWAYS DISCONNECT THE BATTERIES.

HEADLIGHT

Removal and Replacement (4B/1)

1. (Fig. 4) Slacken the hinged retaining screw (1) and swing the screw clear of the light.
2. Remove the rim (2) and reflector (3) assembly.
3. Press the cable holder (4) in, turn it in an anti-clockwise direction and lift out.
4. Remove the terminal posts (5) from the contact plate and pull the wires backwards through the mounting spigot.
5. Unscrew the securing nut (6) and remove the lamp.
6. (Fig. 5) Remove the bulb then extract the five clips (1) and remove the lens (2), reflector (3) and gaskets (4) from the rim (5).
7. Replace in a reverse order of the above procedure.

WORKLIGHT

Removal and Replacement (4B/2)

1. (Fig. 6) Remove the screws and lockwashers (1). Remove the lamp unit and separate the rim (2) and sponge lining from the lens unit (3).
2. Press the cable holder (4) in, turn it in an anti-clockwise direction and lift out.
3. Remove the terminal posts (5) from the contact plate and pull the wires clear.
4. Extract the bulb (6).
5. Replacement is a reversal of the above procedure.

INSTRUMENT PANEL ILLUMINATOR

Removal and Replacement (4B/3)

1. (Fig. 7) Remove the two screws (1) that secure the bulb cover (2) and glass (3) to the unit.
2. Extract the bulb and disconnect the cable at the back to back connector (4).
3. Unscrew the two securing nuts (5) and remove the lockwashers (6).
4. Withdraw the unit and cable from the instrument panel.
5. Refitting is a direct reversal of the above procedure.

FRONT SIDE LIGHT

Removal and Replacement (4B/4)

1. (Fig. 8) Remove the four bolts (1) Extract the plate and front lamp assembly.
2. Unfasten the two securing screws (2) and remove the lens (3).
3. Extract the bulb (4).
4. Unfasten the two nuts (5) and washers (6), remove the bulb holder and rubber sheath assembly.

FRONT SIDE LIGHT

Removal and Replacement . . . Cont'd

5. Separate the rubber sheath (7) from the bulb holder and draw it back along the wire to expose the end of the bulb holder(8).
6. Pull the two bullet connectors (9)) from their sockets.
7. Remove the bulb holder and rubber sheath.
8. Replacement is a reversal of the above procedure.

FRONT INDICATOR

Removal and Replacement (4B/5)

1. (Fig. 9) Remove the four bolts (1) and screws (2). Extract the plate and front lamp assembly.
2. Unfasten the two screws (3) on the front of the lens and remove the lens (4).
3. Extract the bulb (5).
4. Unfasten the two nuts (6) and washers (7). Remove the bulb holder and rubber sheath assembly.
5. Separate the rubber sheath (9) from the bulb holder and draw the sheath back along the wire to expose the end of the bulb holder (8).
6. Pull the two bullet connectors (10) from their sockets.
7. Remove the bulb holder and rubber sheath.
8. Replacement is a reversal of the above procedure.

REAR LIGHT

Removal and Replacement (4B/6)

1. (Fig. 10) Unfasten four screws (1) and nuts (2) and extract the plate complete with rear side light and indicator light (3).
2. (Fig. 11) Unfasten the two screws (1) on the front of the lens and remove the lens (2).
3. Remove the bulb (3).
4. Unfasten the two screws, lock washers and nuts (4), remove the bulb holder and rubber sheath assembly.
5. Separate the rubber sheath (6) from the bulb holder and draw the sheath back along the wire to expose the end of the bulb holder (5).
6. Pull the two bullet connectors (7) from their sockets.
7. Remove the bulb holder and rubber sheath.
8. Replacement is a reversal of the above procedure.

REAR INDICATOR

Removal and Replacement (4B/7)

1. (Fig. 10) Unfasten four screws (1) and nuts (2) and extract the plate, complete with rear side light and indicator light (3).
2. (Fig. 12) Unfasten two screws (1) on the front of the lens and remove the lens (2).
3. Remove the bulb (3).
4. Unfasten the two screws, lock washers and nuts (4), remove the bulb holder and rubber sheath assembly.
5. Separate the rubber sheath (6) from the bulb holder and draw the sheath back along the wire to expose the end of the bulb holder (5).
6. Pull the two bullet connectors (7) from their sockets.

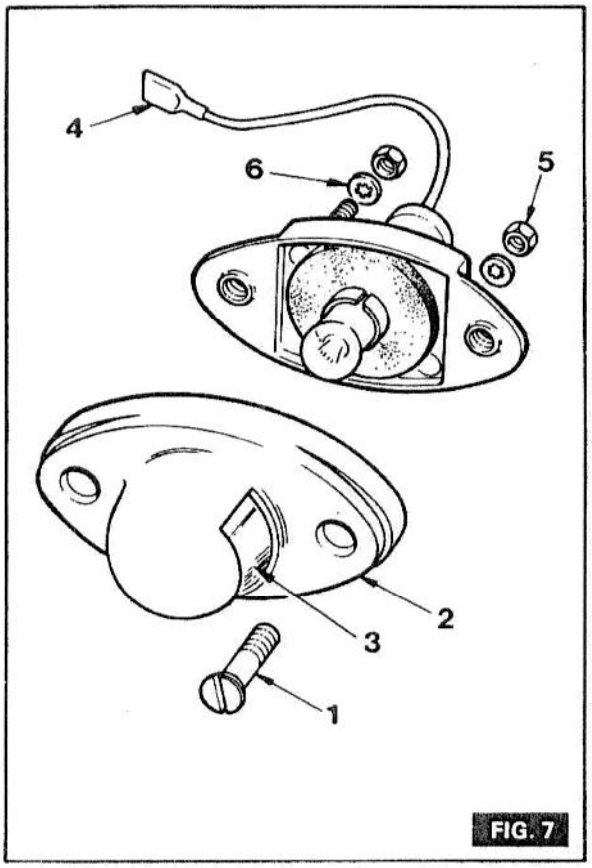


FIG. 7

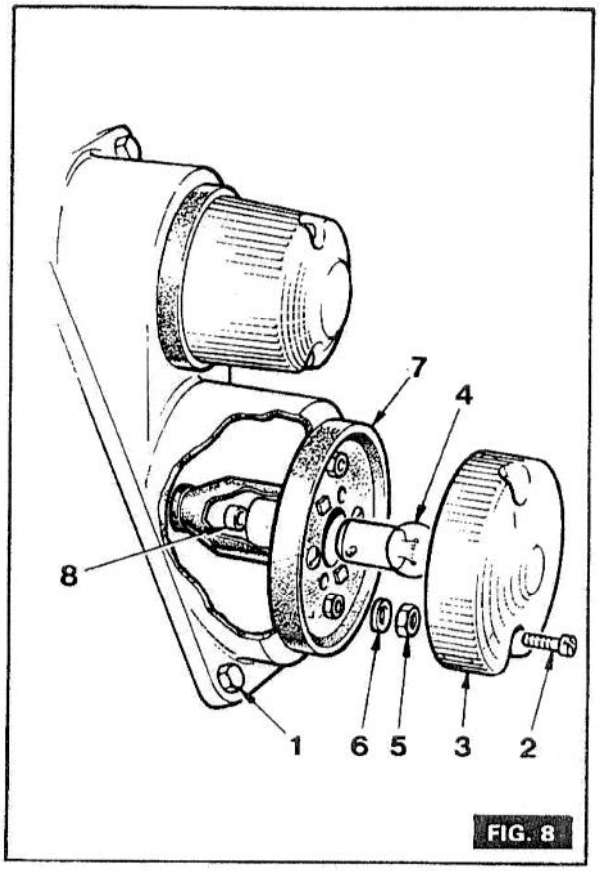


FIG. 8

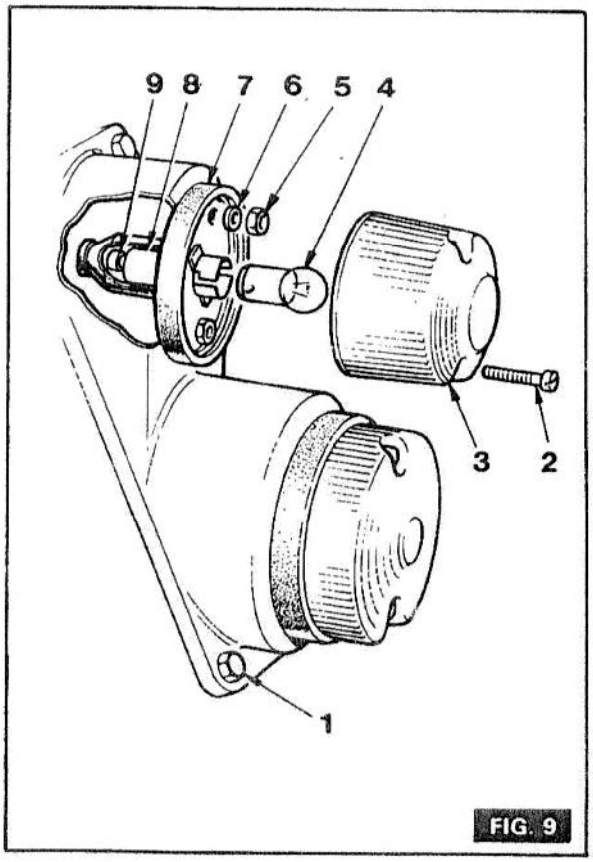


FIG. 9

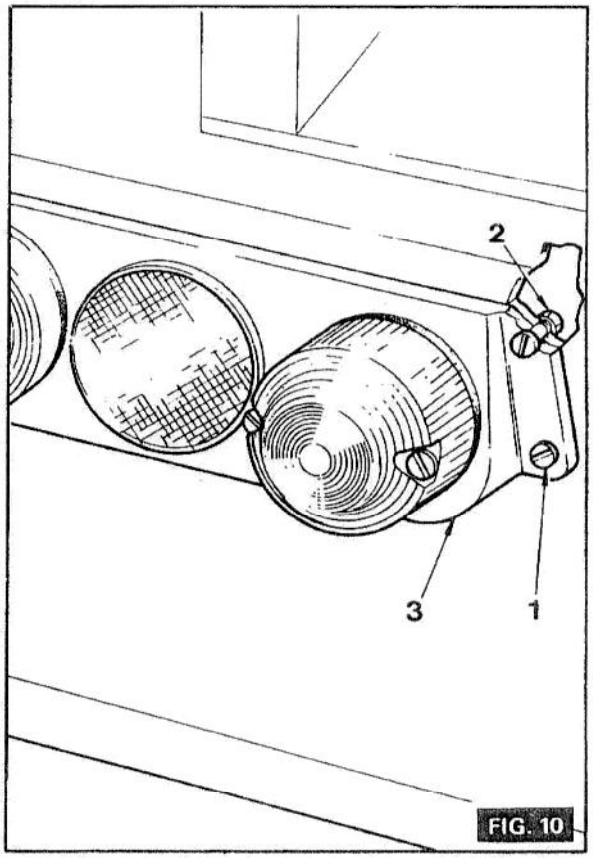


FIG. 10

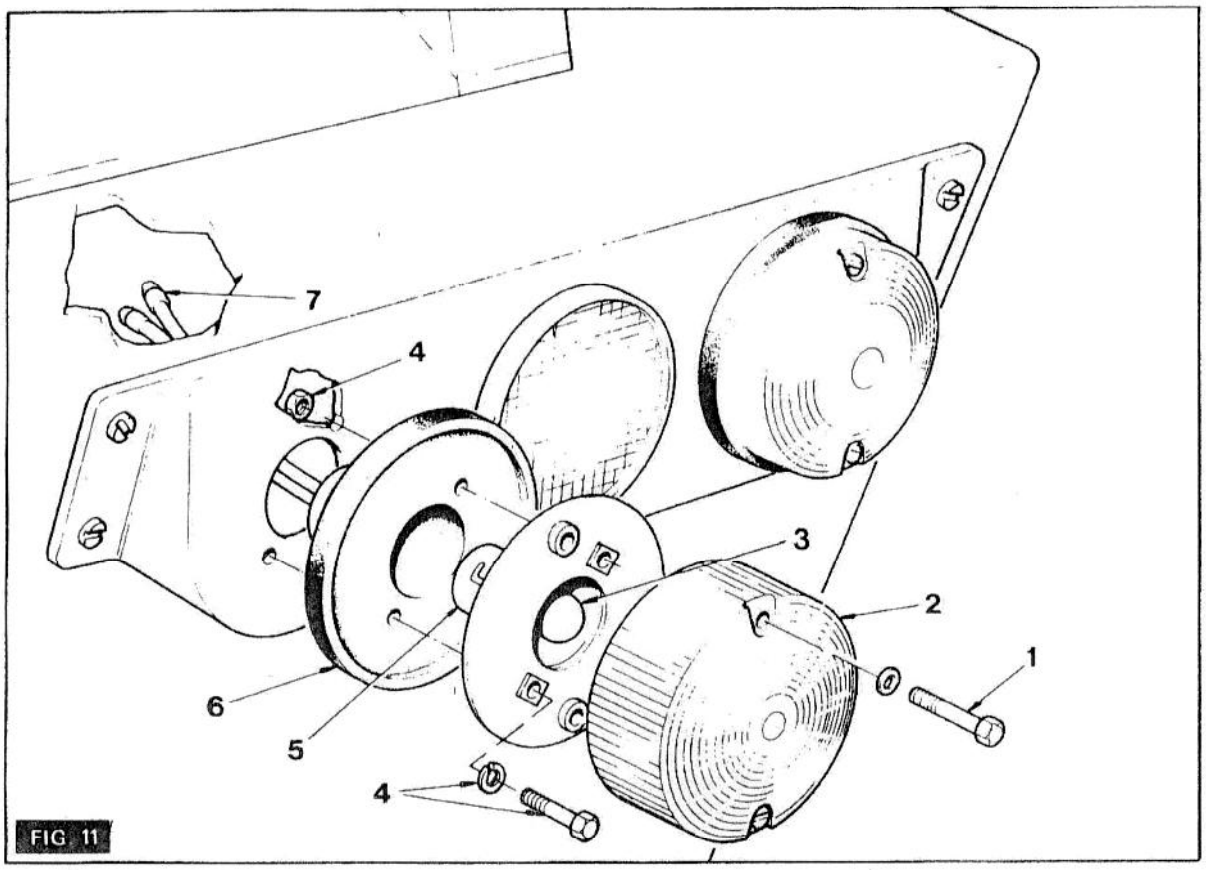


FIG 11

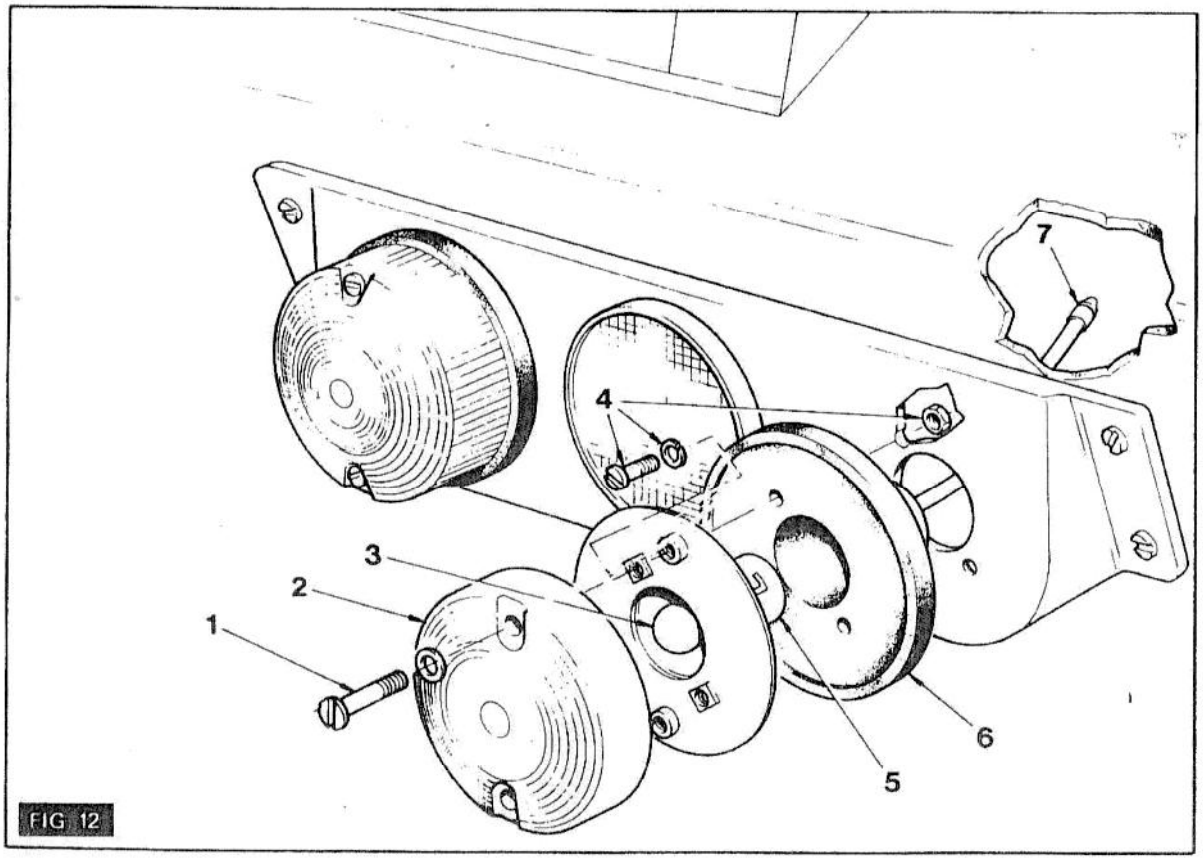


FIG 12

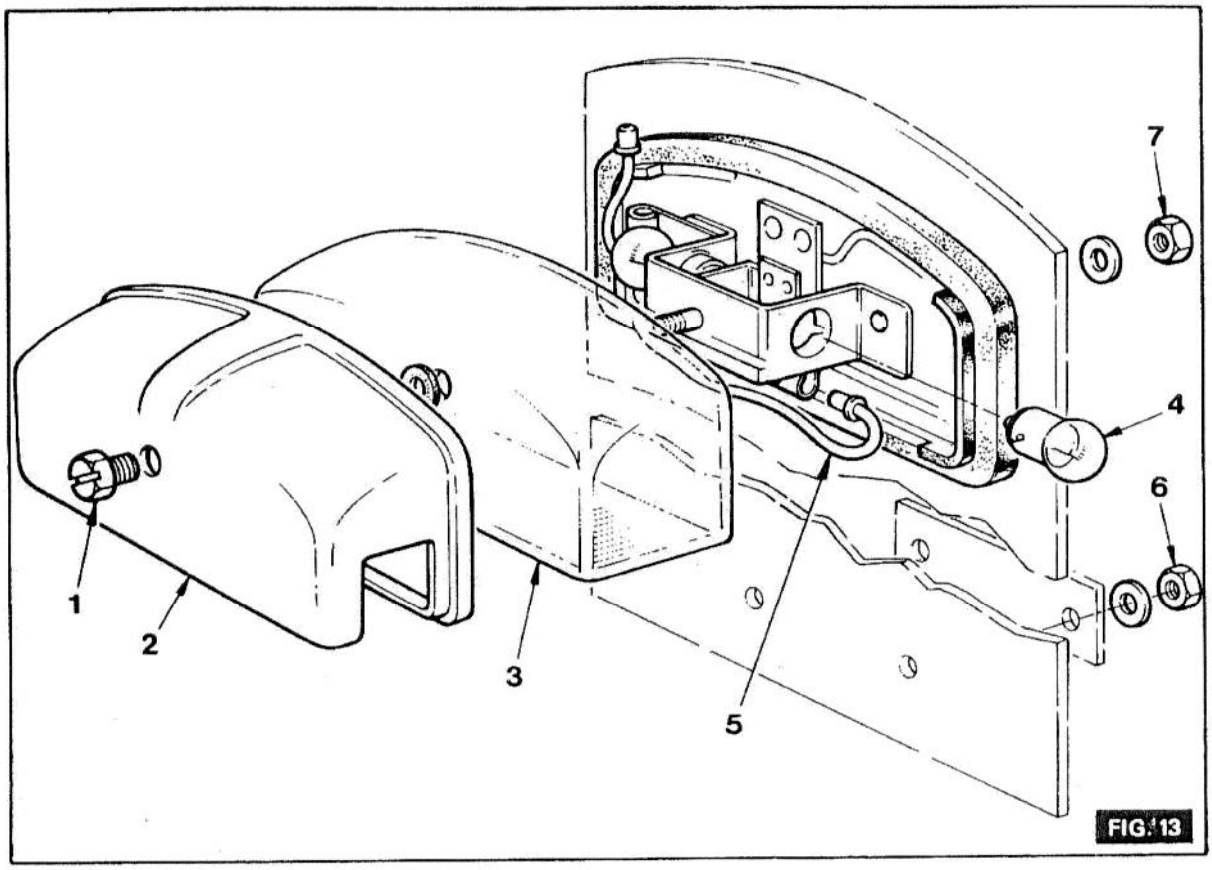


FIG. 13

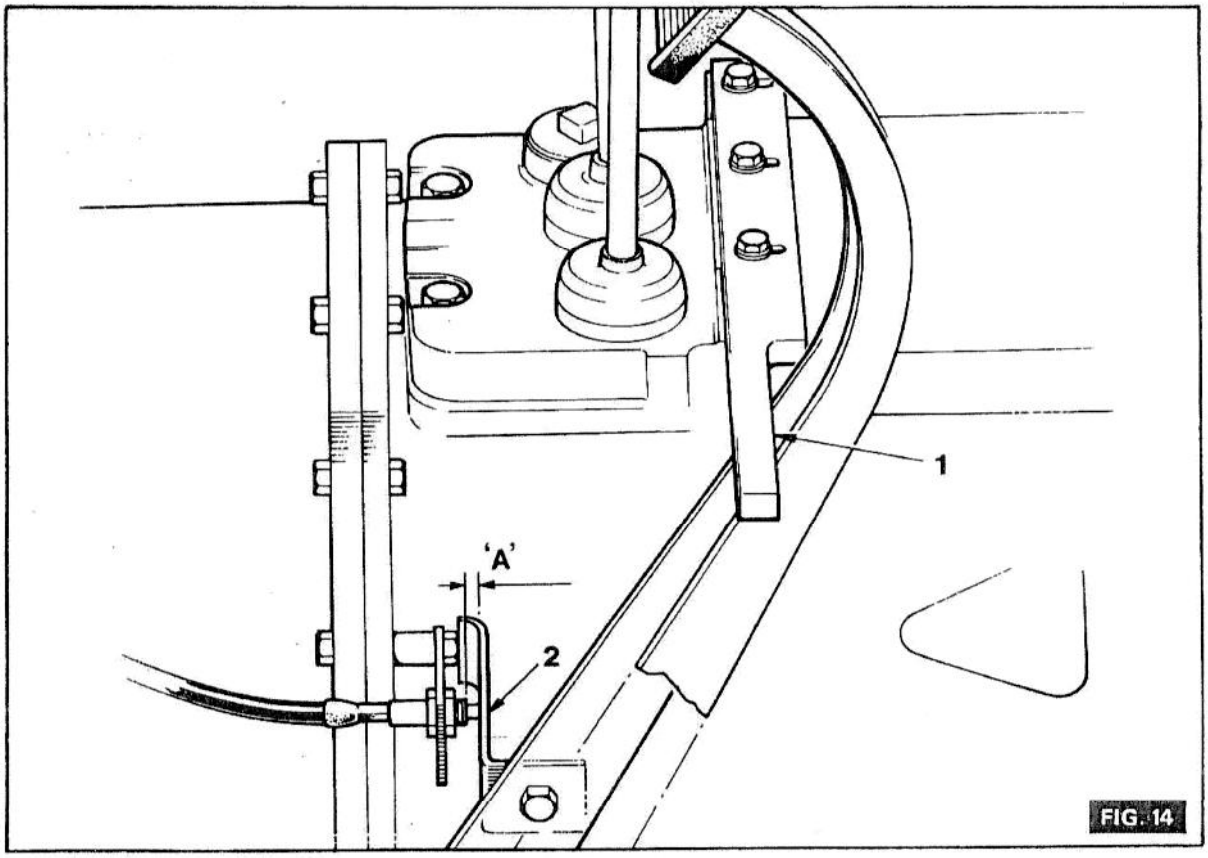


FIG. 14

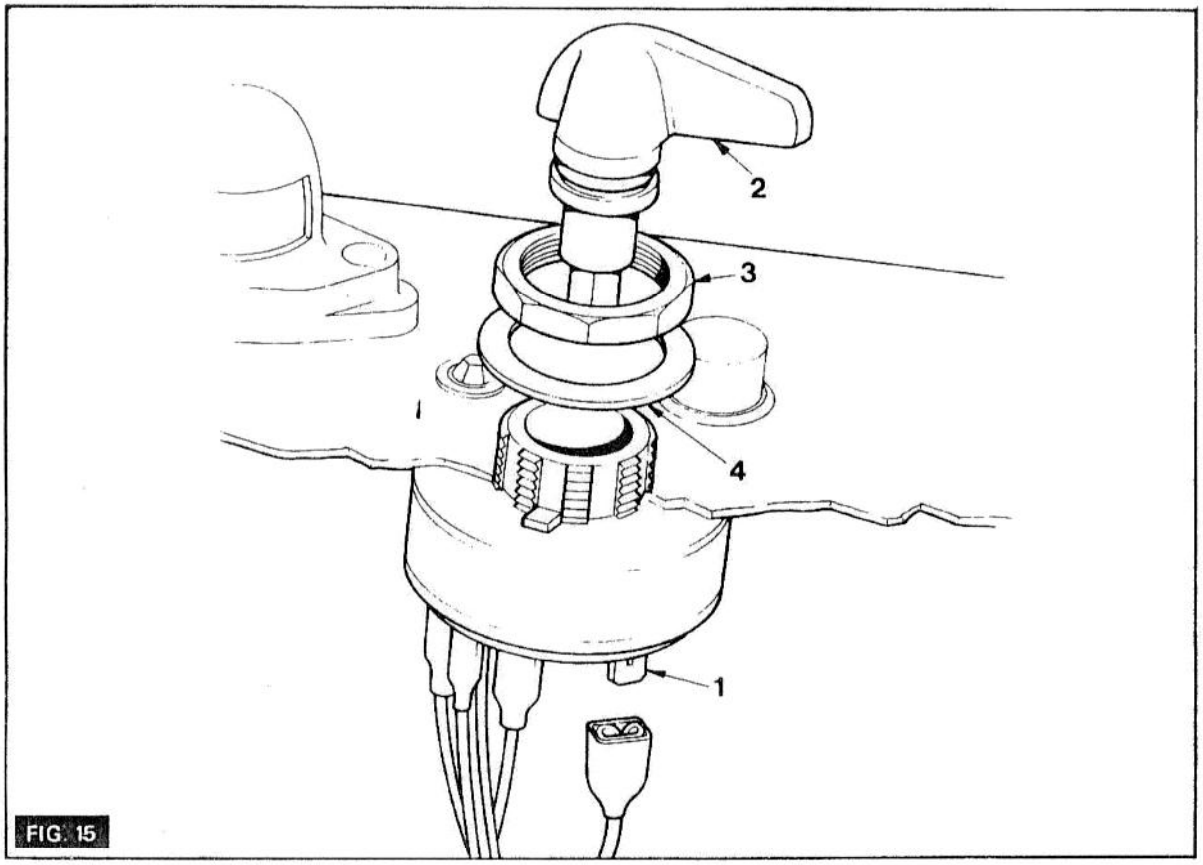


FIG. 15

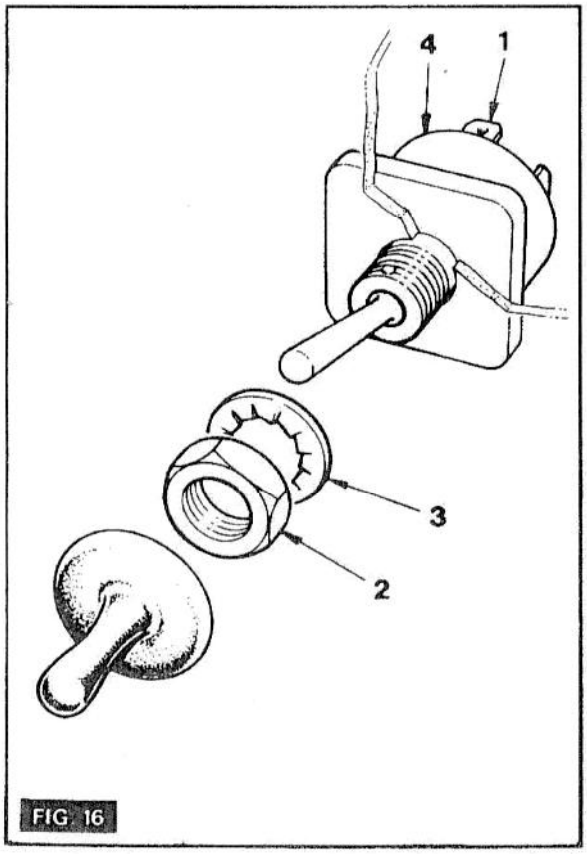


FIG. 16

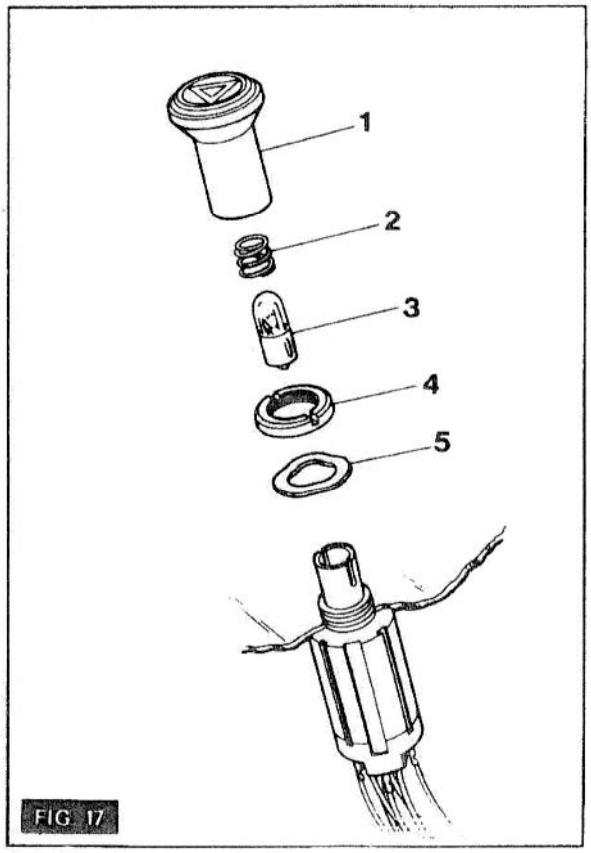


FIG. 17

REAR INDICATOR

Removal and Replacement . . . Cont'd

7. Remove the bulb holder and rubber sheath.
8. Replacement is a direct reversal of the above procedure.

REAR NUMBER PLATE ILLUMINATOR

Removal and Replacement (4B/8)

1. (Fig. 13) Unfasten the screw (1), remove the cover (2), rubber washer and lens (3).
2. Remove the bulbs (4) then disconnect the two bullet terminals (5).
3. Unscrew the two nuts (6) and remove the number plate complete with bulb holder.
4. To remove the bulb holder from the number plate, simply unscrew the two securing nuts (7).
5. To replace the unit, reverse the above procedure ensuring that the lens is located correctly on the rubber surround and that the rubber washer is located between the cover and the lens.

STOP LIGHT

Adjustment (4B/9)

(Fig. 14) With the brake pedals in contact with the brake pedal stop (1), adjust the stop light switch bracket(2) to give dimension A. — Dimension A is 0.1875 - 0.2185 in. (4.762 - 5.555 mm.).

Note

The brake pedal stop light switch is situated on the brake pedal bracket. On standard transmission tractors the switch is situated on the right hand side of the transmission case. On Instant Reverse machines the switch is situated on the left hand side of the transmission case.

DIRECTION INDICATOR SWITCH

Removal and Replacement (4B/10)

1. (Fig. 15) Disconnect the four connectors from the terminals (1).
2. Lift the lever (2) from the switch main shaft.
3. Unscrew the nut (3), remove the washer (4). The unit can then be extracted through the rear of the panel.
4. Replacement is a direct reversal of the above procedure.

LIGHT SWITCHES

Removal and Replacement (4B/11)

1. (Fig. 16) Disconnect all the connectors from the light switch terminals (1).
2. Remove the rubber protectors from the switch levers.
3. Unscrew the securing nut (2), remove the washer (3) and extract the switch (4) through the rear of the panel.
4. Replacement is a direct reversal of the above procedure.

HAZARD WARNING SWITCH

Removal and Replacement (4B/12)

1. (Fig. 17) Disconnect all the connectors from the warning switch terminals.
2. Lift the switch cover (1) from the mainshaft and remove the spring (2) from the cover.
3. Remove the bulb (3).
4. Unscrew the nut (4), remove the washer (5). The unit can then be extracted through the rear of the panel.
5. Replacement is a direct reversal of the above procedure.

FRONT AXLE

CONTENTS

LIST OF ILLUSTRATIONS

FRONT AXLE

GENERAL

The front axle is a one piece fabricated unit and comprises of an inverted channel section main beam, stiffened and closed by additional steel plates, heavy duty king pin housings welded to each end and a bushed horizontal tube through the axle centre to form a pivot.

The Pivot pin is housed at its front and rear in the axle support casting and is retained in position by a peg bolt and locknut and also by a special retaining bracket fitted to the front end of the shaft.

Front and rear float of the axle within the support casting is limited between .003" (.076 mm) and .010" (.254 mm) by shims and a thrust washer positioned between the pivot tube ends and the support casting.

The vertical king pin housings have bushes fitted at the upper and lower ends whilst a counter bore at the lower end of the housing accommodates a thrust race bearing. The counter bored portion of the housing is also stepped to provide steering lock stops.

A grease nipple is fitted in the centre pivot and one grease nipple fitted in each of the king pin housings to allow lubrication of the moving parts.

FRONT AXLE BEAM

Removal

1. If loader is fitted raise the loader arms and insert the ram stops.
2. Remove the front grille, the exhaust from the manifold, the hood and the side panels.
3. Disconnect the headlights and horn from the main wiring harness.
4. Drain the hydraulic oil into a suitable container.
5. Disconnect the suction and pressure pipes from the hydraulic pump and pull them outside the hard nose.
6. Remove the two bolts which secure the top assembly of the hard nose to the air cleaner support bracket.
7. (Fig. 2) Sling the complete hard nose assembly and take the weight on some suitable lifting gear, remove the two lower securing bolts and lift the hard nose away from the machine.
8. Remove the hydraulic pump and drive shaft as stated in operation 9C/1
9. Remove the drag link as stated in operation 5B/8.
10. Remove the power steering unit as described in operation 5B/9.
11. Jack up each side of the machine in turn and insert suitable stands. If the loader is fitted they can be positioned under the loader side frames. The stands should be of such a height that the front wheels are clear of the ground
12. Remove the two front wheels.
13. Place a trolley jack under the front axle at the centre point and take the weight of the axle.
14. Remove the pivot pin retaining bolt from the axle support casting and withdraw the pivot pin complete with retainer bracket.
15. (Fig. 3) Lower the axle beam until it is clear of the support bracket then carefully remove it from the machine.
16. Gather up the shims and thrust washer which are released from between the axle beam and the support bracket when the axle is lowered.

FRONT AXLE BEAM

Replacement

1. Raise the axle beam up to the support bracket.
2. Insert the pivot pin and retaining bracket through the support bracket and axle beam. Ensure that the thrust washer is fitted.
3. (Fig. 4) Check the clearance between the axle and support bracket at Point 'A'. This clearance should be 0.003–0.010 in. (0.076–0.254 mm). Adjust by means of shims.

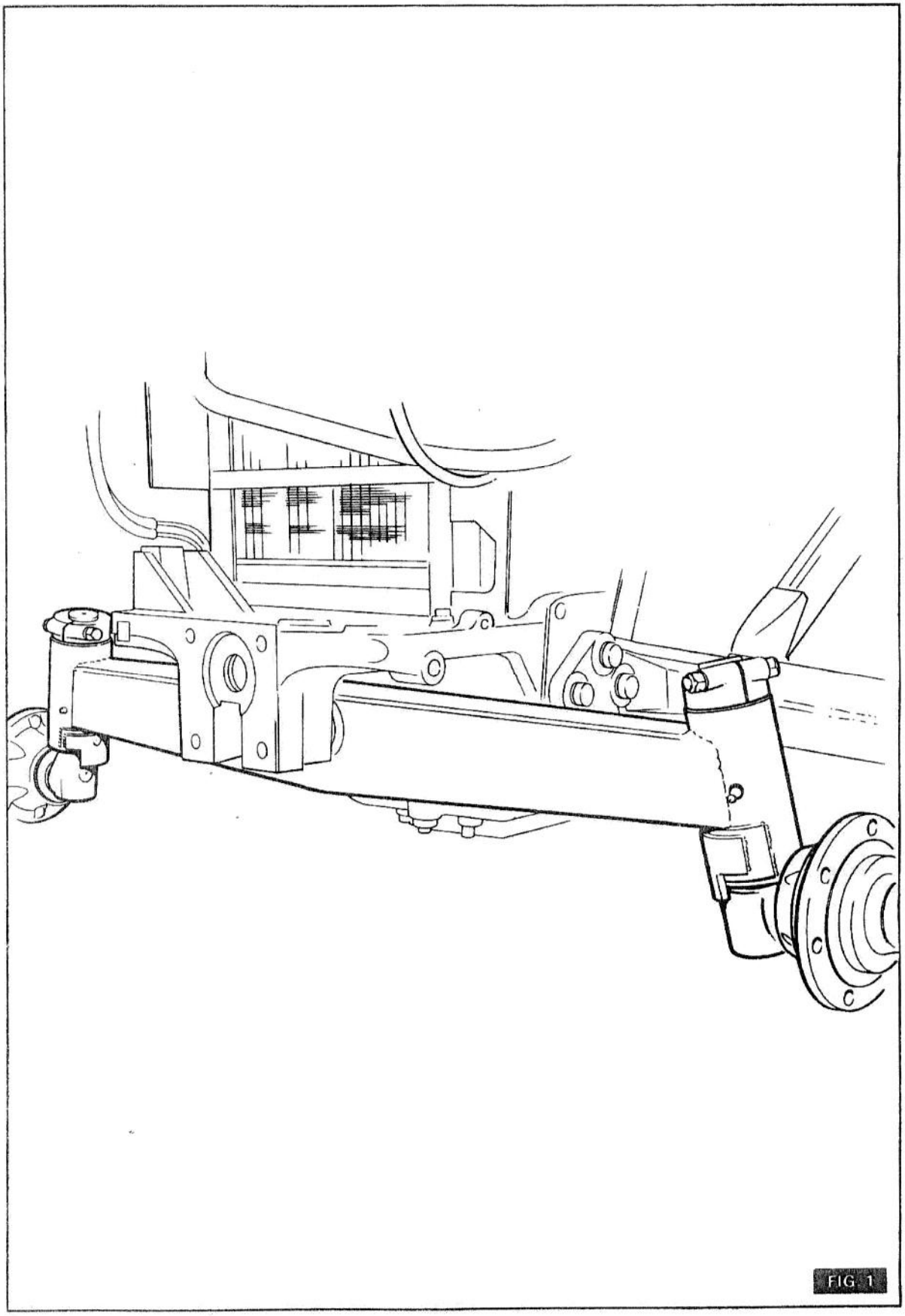


FIG. 1

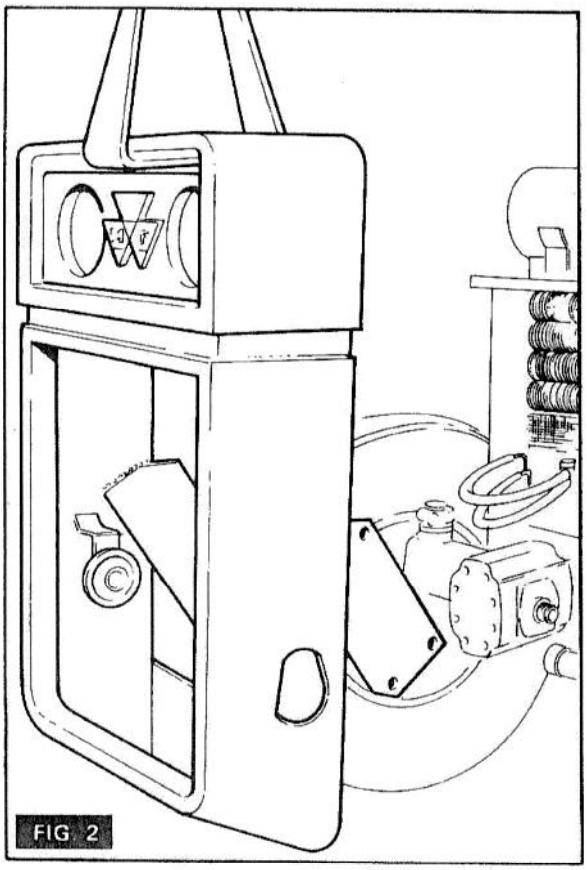


FIG 2

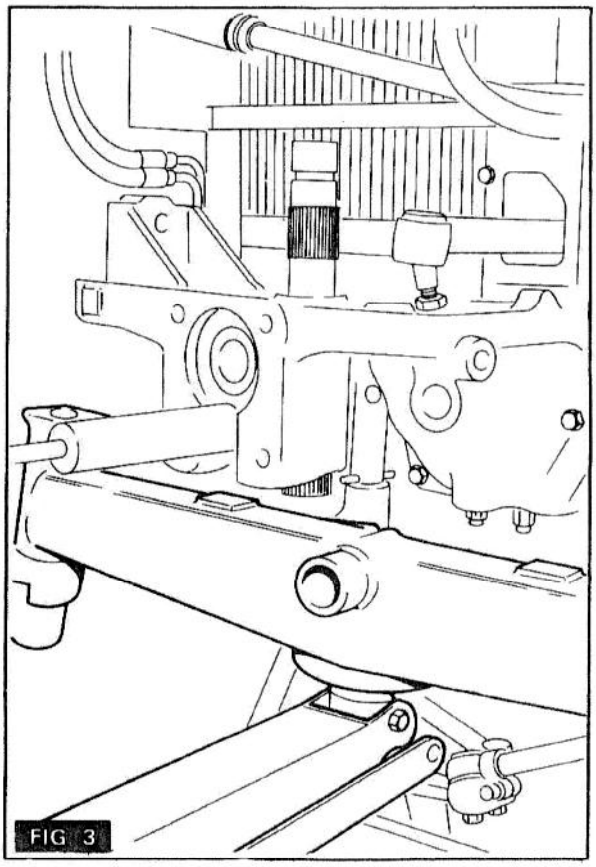


FIG 3

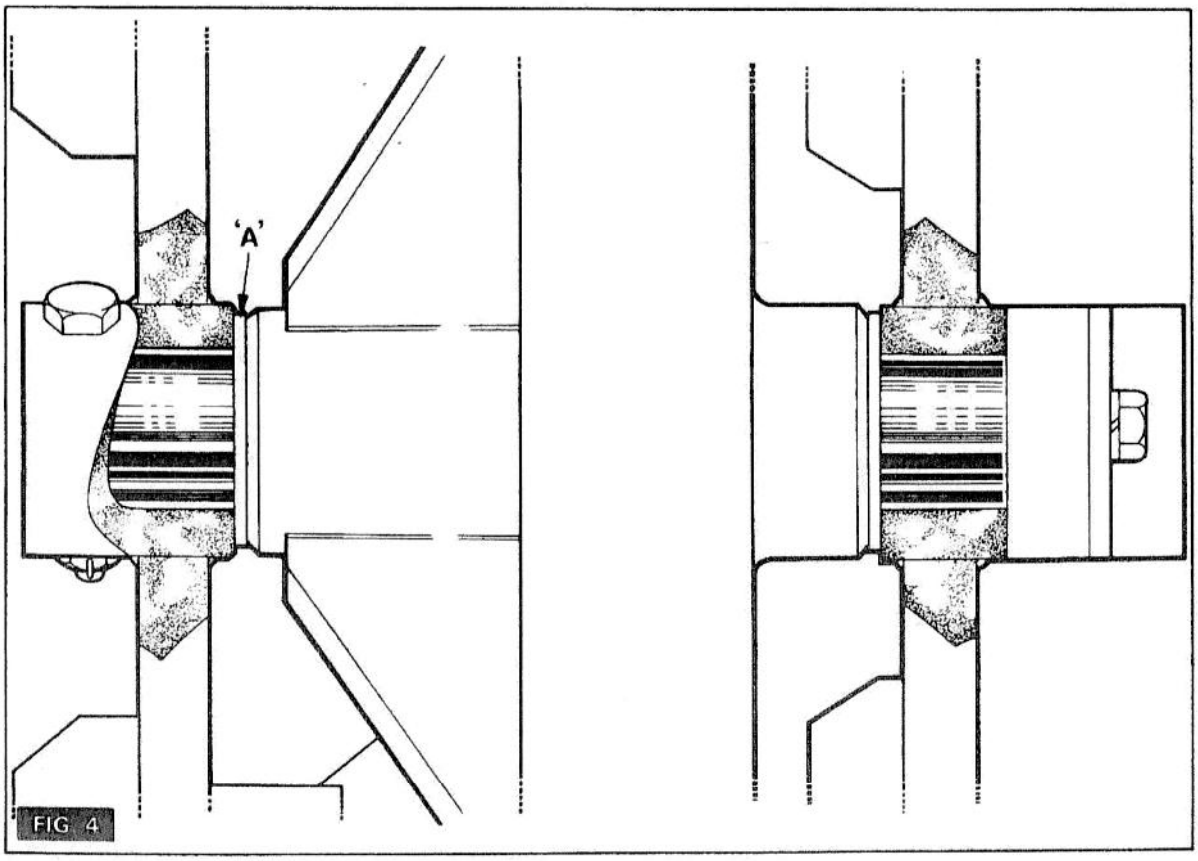


FIG 4

FRONT AXLE BEAM

Replacement . . . . Cont'd

4. Replace the wheels and remove the stands from under the machine.
5. Replace the power steering unit as described in operation 5B/9.
6. Refit the drag link as described in operation 5B/8.
7. Replace the hydraulic pump and drive shaft as described in operation 9C/1.
8. Replace the hard nose and secure it in position with the six bolts, remove the sling.
9. Reconnect the suction and pressure pipes to the pump.
10. Re-set the power steering mechanism as described in operation 5B/13.
11. Reconnect the horn and headlights to the main wiring harness.
12. Refit the side panels, hood, exhaust and front grille.
13. Refill the hydraulic reservoir.

FRONT AXLE BEAM

Disassembly

1. Remove the axle beam as stated in operation 5A/1
2. Remove the lleft and right hand king pins as stated in operation 5A/5.
3. Check the bushes in the king pin housing and pivot housing if scored, renew. Use tool MF 263/3 to remove the king pin bushes.

FRONT AXLE BEAM

Reassembly

1. If pivot housing bushes and king pin bushes are to be renewed, fit them into the housings with a suitable drift. Reamer the king pin bush with tool MF 264/7.
2. Refit the left hand and right hand spindle and hub assemblies as stated in operation 5A/5.
3. Replace the axle assembly as stated in operation 5A/2.

FRONT AXLE HUB AND KING PIN ASSEMBLY

Removal

1. Jack the front wheel clear of the ground.
2. Place an axle stand in position and remove the front wheel.
3. (Fig. 5) Remove the nut (1), washer (2) and bolt (3) from the steering arm (4).
4. Lightly tap the steering arm in an upward direction to release it from the king pin.
5. Support the weight of the king pin and hub, remove the Woodruff key (5) and slide the felt seal (6) off the pin.
6. Thoroughly clean the top of the king pin to remove any dirt, swarf or burrs. If the king pin is not cleaned before withdrawal the king pin housing bushes may be scored.
7. Lower the king pin and hub assembly out of the housing.
8. Remove the thrust bearing (7).
9. To ream the king pin bushes (8) use special tool MF 264/7.

FRONT AXLE HUB AND KING PIN ASSEMBLY

Replacement

1. (Fig. 5) Reverse the procedure in operation 5A/5 to refit the king pin and steering arm. Tighten the steering arm securing nut (1) to a torque of 90—100 lb. ft. (12.45—13.83 kgm). A clearance of .004 in. (.101 mm) maximum should exist between the lower face of the steering arm (4) and the top of the king pin housing (9) when the unit is fully assembled and resting on the ground.
   The bolt (3) should be replaced with the head nearest to the tyre.

FRONT HUB AND BEARING

Removal

1. Jack up the tractor, place axle stand under axle and remove the wheel.
2. (Fig. 6) Remove four bolts (1) detach hub cap (2) and sealing gasket (3).
3. Extract the cotter pin (4), unscrew retaining nut (5) and remove washer (6).
4. Slide the hub (7) off the stub axle (8) complete with bearings and seal.
5. Lift out taper roller bearing (9) from the bearing housing and drive out the bearing cup (10).
6. Remove the oil seal (11) from the bearing housing.
7. Remove the inner taper roller bearing (12) and drift out the inner bearing cup (13).

FRONT HUB AND BEARING

Replacement

1. Clean all bearing seats before starting reassembly.
2. Press inner bearing cup (13) into position.
3. Insert the taper roller bearing (12) into its cup, pack the bearing with appropriate grease.
4. Clean the seal seat and lightly tap the seal (11) into position with its flat face towards the king pin.
5. Pack the hub with grease and slide the hub into position on the stub axle.
6. Press the outer bearing cup (10) into position and replace the outer taper roller bearing (9), pressing it firmly home.
7. Replace the thrust washer (6) onto the stub axle and screw on the retaining nut (5). Tighten to a torque of 60 lbs. ft. (8.3 kgm). Back off to the nearest pin hole then further back off one complete flat to give .002 in.—.005 in. (0.05—0.13 mm) backlash. Insert and secure a new cotter pin (4).
8. Fill the hub cavity with grease. Fit a new gasket (3) to the hub and bolt the hub cap into positon.
9. Fill the hub with grease through the grease nipple in the hub cap, until grease exudes from the inboard seal. Wipe off any surplus grease.
10. Replace the wheel and tighten the wheel nuts to a torque of 170 lb. ft. (23.5 kgm).

AXLE SUPPORT BRACKET

Removal and Replacement

1. Remove the loader side frames.
2. Complete parts 2 to 9 of operation 5A/1
3. Drain water from the radiator and cylinder block.
4. Disconnect the upper and lower radiator hoses.
5. Disconnect the oil cooler supply and return pipes and move them to one side.
6. If machine has reversomatic transmission disconnect the torque converter oil cooler pipes.
7. Disconnect and remove the feed and return pipes from the power steering pump.
8. Disconnect and remove the air cleaner hose.
9. Insert wooden wedges between the upper side of the axle and the axle support bracket.
10. Adequately support the engine and rear part of the machine.
11. Remove the alternator pulley guard to gain access to the support bracket securing nuts.
12. (Fig. 7) Remove the nut (1) and washer (2) from the stud (3) on the L. H. side of the housing.
13. Remove bolt (4) then bolt (5).
14. Remove the nut (6) and washer (7) from the stud (8) on the R. H. side of the housing.
15. Remove bolt (9) then bolt (10).
16. Manoeuvre the front axle unit away from the engine. Gather up the shims (11).
17. Push the unit from the machine, chock the wheels to prevent rolling and support the axle housing on a stand.
18. Remove drag link as in operation 5B/8.
19. Remove the power steering unit as described in operation 5B/9.
20. Remove the four bolts which secure the radiator to the support casting, lift off the unit complete with air cleaner, oil cooler and torque converter oil cooler (if fitted).

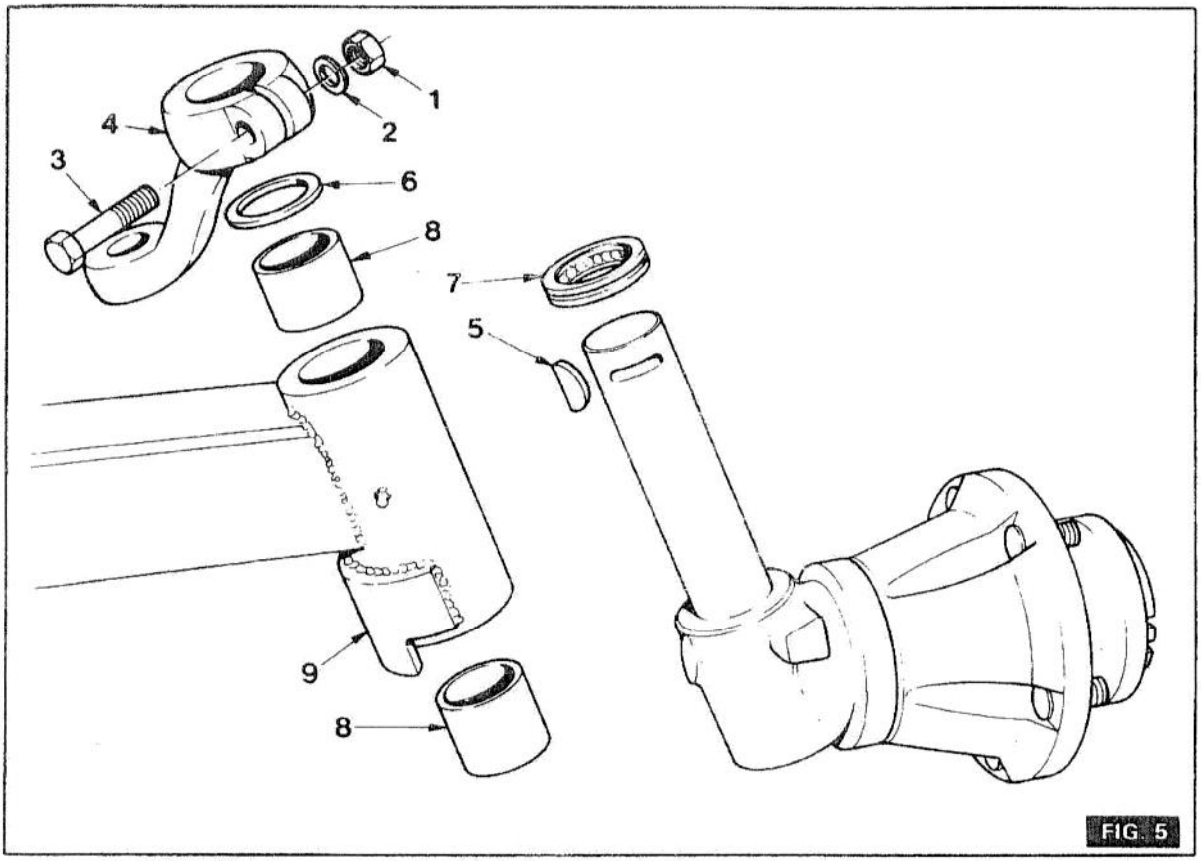


FIG. 5

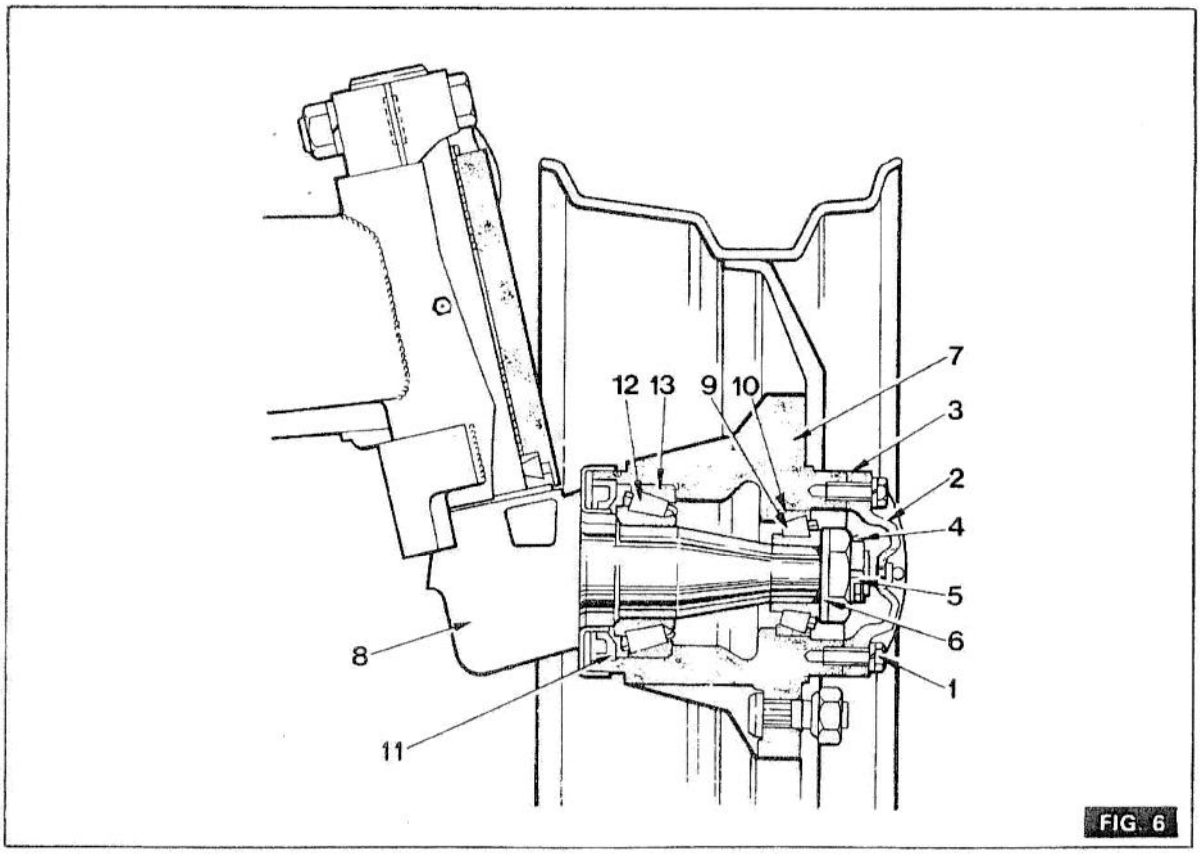


FIG. 6

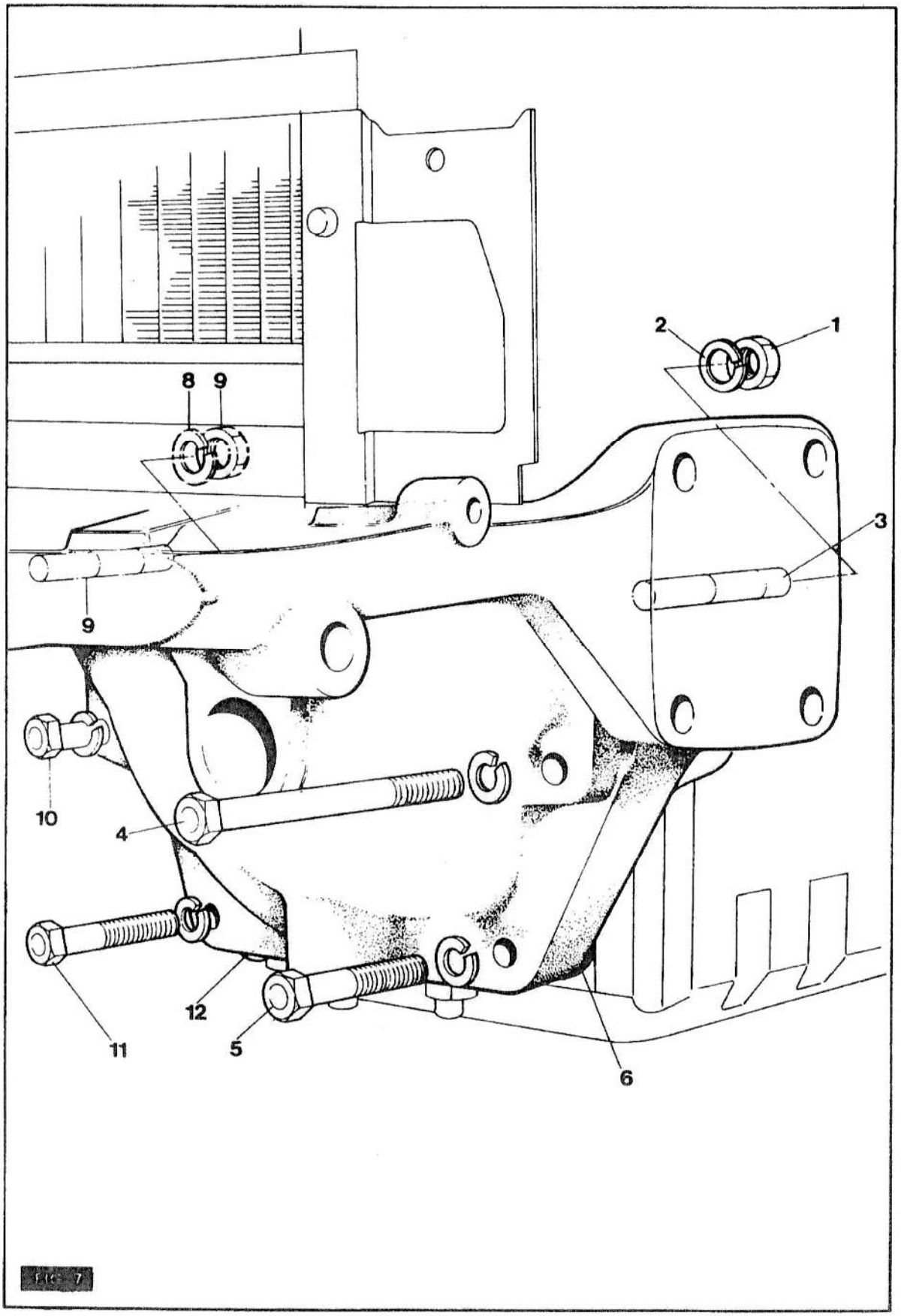


FIG 7

AXLE SUPPORT BRACKET

Removal and Replacement

21. Support the axle beam on a jack independently of the casting and take the weight of the casting on a suitable lifting apparatus.
22. Remove the pivot pin retaining bolt from the axle support casting and extract the pivot pin complete with retainer.
23. Lift off the support casting, gather up the shims and thrust washer which are released from between the axle beam and the support casting.
24. Replacement is a reversal of the removal procedure.

Notes

a. The dimension 'A' in Fig. 4 must be maintained.
b. When the casting is bolted to the engine, ensure that the bolts are fitted in their correct respective locations and that they are tightened to a torque of 100—125 lb. ft. (13.83—17.28 kg m).
c. Shims should be refitted in the joint between the support casting and the engine (11) Fig. 7 to provide a float of .010 in. (0.25 mm).

KEY TO FIG 7

L. H. SIDE
1. Nut $\frac{5}{8}$" —18 UNF
2. Washer Lock $\frac{5}{8}$"
3. Stud 3 $\frac{1}{8}$ " LG
4. Bolt $\frac{5}{8}$" " UNC x 5¼" LG
5. Bolt $\frac{5}{8}$" " UNC x 2¾" L
6. Shims

R. H. SIDE
7. Nut $\frac{5}{8}$" —18 UNF
8. Washer Lock $\frac{5}{8}$"
9. Stud 3 $\frac{3}{8}$ LG
10. Bolt $\frac{5}{8}$" UNC x 5$\frac{1}{2}$" LG
11. Bolt $\frac{5}{8}$" UNC x 2$\frac{3}{4}$" LG
12. Shims

CONTENTS

LIST OF ILLUSTRATIONS

STEERING

GENERAL

A full power steering system, operating on the front wheels, is fitted as standard equipment on the MF 50B Tractor Digger Loader.

The Steering System comprises; an engine driven pump, control valve, hoses and piping and a double acting hydraulic ram.

The gear type pump, bolted to the engine timing case and driven by the timing gears, draws hydraulic oil from the reservoir, which is attached to the rear of the pump. Oil is pumped

STEERING WHEEL

Removal and Replacement (5B/1)

1. Detach the cap from the centre of the steering wheel and remove the nut securing the steering wheel to the steering shaft.
2. (Fig. 2) Pull the wheel off the splined shaft using tool MF 268. Remove the cap spring and grommeti from the steering column.
3. Replacement is a reversal of the above procedure.

STEERING COLUMN

Removal and Replacement (5B/2)

1. Disconnect the battery.
2. Remove the hood assembly as described in operation 3A/1.
3. Remove the steering wheel as described in operation 5B/1.
4. (Fig. 3) Remove the nut securing the heater cable to the heater control quadrant, and the two bolts securing the control quadrant to the underside of the instrument panel.
5. Remove four screws and lock washers, securing the instrument panel in position.
6. Disconnect the speedometer drive cable, the oil pressure gauge pipes and all the electrical connections to the underside of the instrument panel. The location of all these connections should be carefully noted in order to facilitate reassembly.
7. Lift the instrument panel clear.
8. Remove the four screws and lock washers which secure the instrument panel cowl in position.
9. Remove the instrument panel cowl.
10. Remove four screws and lock washers securing the instrument panel support.
11. Remove the instrument panel support.
12. The fuse box can now be removed as described in operation 4A/8.
13. Remove two screws and lockwashers securing the bulkhead to the cowl support bar assembly and two nuts and lock washers securing the rubber bulkhead mounting to the fuel tank support assembly.
14. Lift the bulkhead clear, complete with rubber mounting.
15. Check rubber mounting for wear and replace if excessively worn.
16. Remove the four bolts securing the steering column to the steering box remove the column together with shims and joint.
17 Replacement is a reversal of the above procedure.

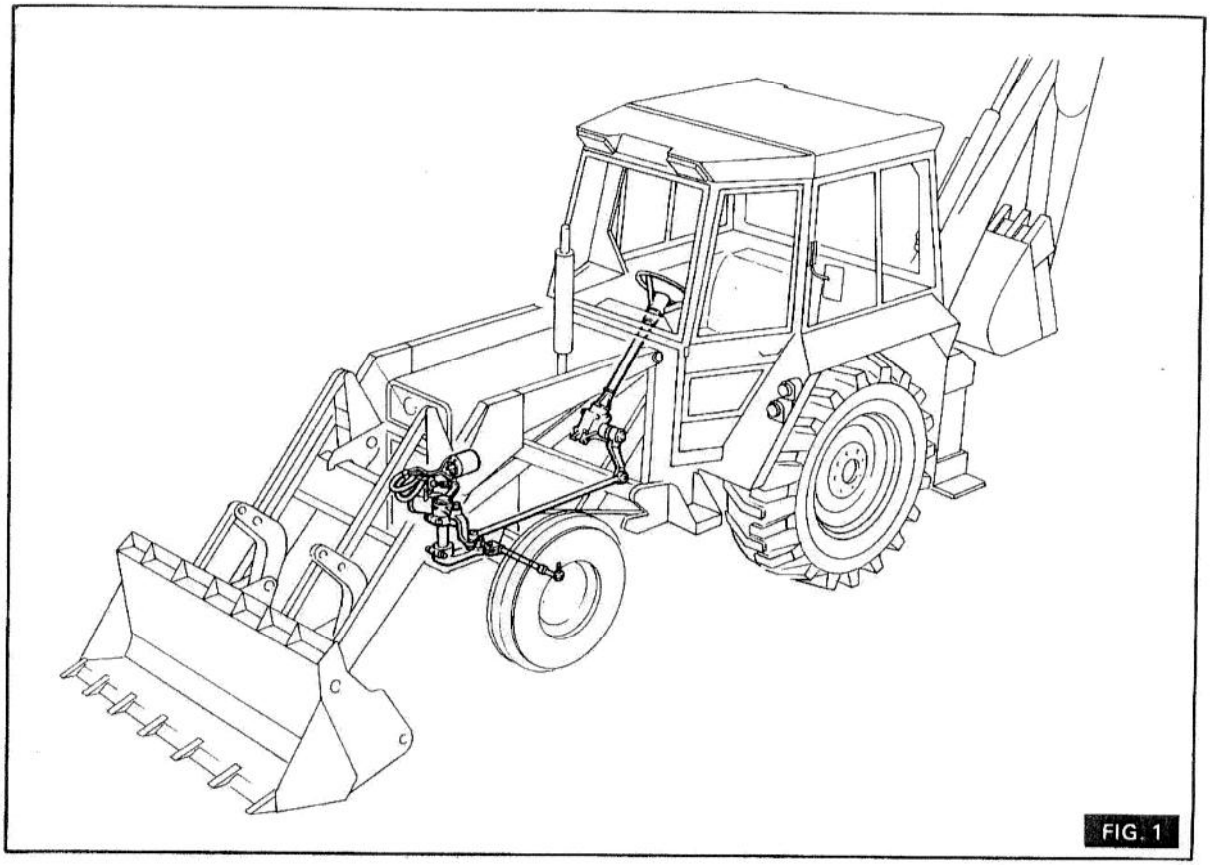


FIG. 1

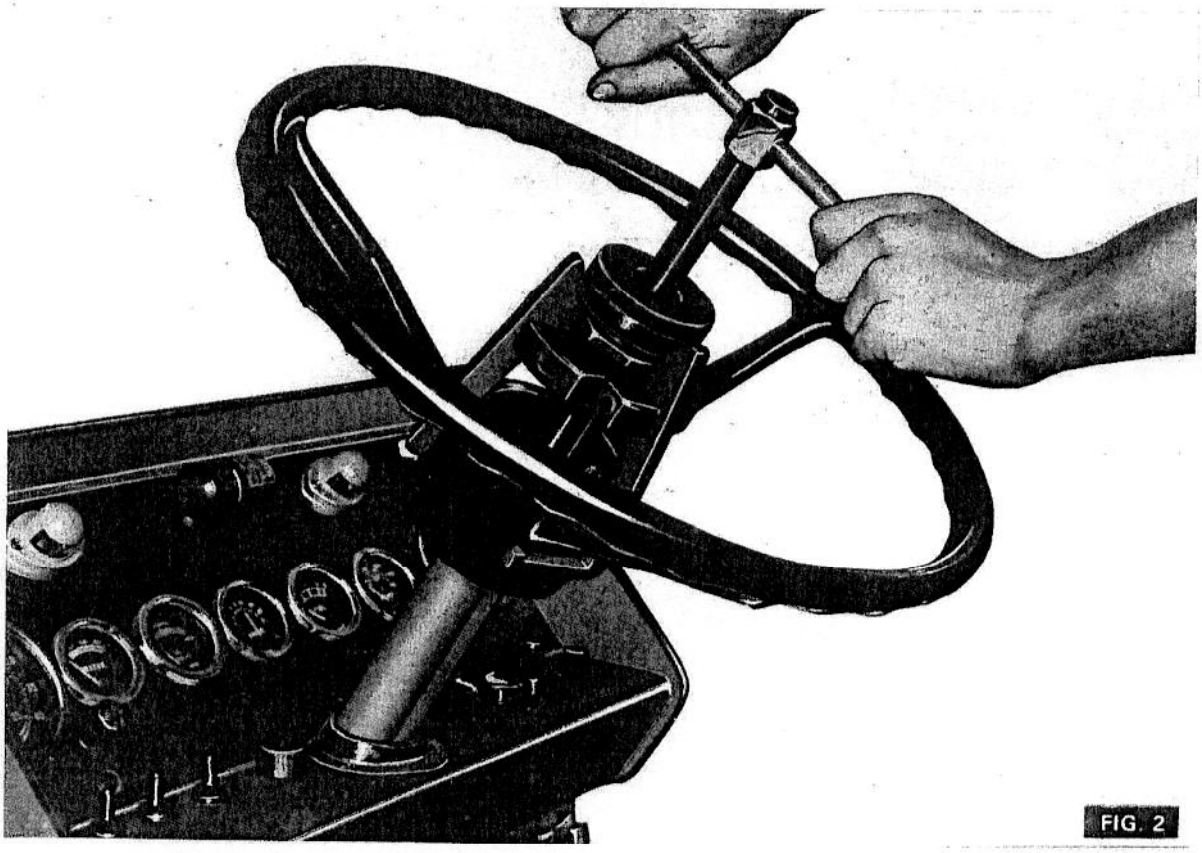


FIG. 2

STEERING BOX

Removal and Replacement (5B/3)

1. Remove the steering wheel as described in operation 5B/1.
2. Remove the steering column as described in operation 5B/2.
3. Remove the two upper nuts securing the fuel tank rear rubber mountings. Insert suitable wedges between the fuel tank and the engine rocker cover.
4. Turn off the fuel supply.
5. (Fig. 4) Disconnect the pipe connecting the primary to the secondary fuel filter at the secondary filter.
6. Disconnect the fuel pipe, from the secondary fuel filter to the injector on top of the filter.
7. Disconnect two pipes from the secondary filter to the fuel pump.
8. Remove two bolts securing the secondary filter to the fuel tank support assembly.
9. Disconnect the throttle linkage by removing the split pin securing the foot throttle rod to the quadrant and release the rod at the right hand side of the steering box.
10. Disconnect the left hand throttle rod assembly from its lever by releasing the clip (1 Fig. 5).
11. Remove two bolts each side of the steering box securing the bulkhead to the steering box.
12. Disconnect the drag link from the lower drop arm.
13. Remove the bulkhead.
14. (Fig 6) Remove the nut and spring washer securing the drop arm and pull off the drop arm; using tool 6312 Detach the sealing washer from the rocker shaft.
15. Remove two bolts securing the front of the steering box to the cylinder block and two bolts securing the rear of the box to the transmission housing.
16. Lift the steering box off the tractor.
17. Replacement is a reversal of the above procedure.

Note

The master splines on the rocker shaft and drop arm must be correctly aligned when refitting.

STEERING BOX

Disassembly (5B/4)

1. Remove the steering box from the machine as described in operation 5B/3.
2. (Fig. 7) Remove the plug (7) from the left hand side of the box and drain off the oil.
3. Remove four bolts (12) and spring washers (11) securing the side cover (10) to the box (6) Detach the cover (10) and joint (9).
4. Withdraw the rocker shaft (3) from the steering box.(6)
5. Withdraw the steering shaft (3) together with the upper bearing cup (1) and upper bearing (2) from the steering box.
6. Remove the lower bearing (4) from the steering box.
7. Pull out the peg (8) from the rocker shaft.
8. Replace the rocker shaft oil seal (14) and the steering shaft lower bearing cup. (5)

STEERING BOX

Reassembly (5B/5)

1. Refit the lower bearing cup (5) and lower bearing to the steering box.
2. (Fig. 8) Position the upper bearing (2) and upper bearing cup (1) onto the steering shaft.
3. Lower the steering shaft into the steering box locating the bottom end of the shaft onto its lower bearing. Fit the upper bearing cup onto its bore in the steering box.
4. (Fig. 7) Refit the peg (8) to the rocker shaft (13). Assemble the rocker shaft into the box, locating the peg into its thread on the column.
5. Refit the side cover (10) and joint (9) and secure in position with four bolts (12) and spring washers (11).
6. Refill the steering box with recommended oil and refit the filler plug.
7. Refit the steering box to the machine as described in operation 5B/3.

STEERING BOX ROCKER SHAFT BUSHES

Removal (5B/6)

1. Disassemble the steering box as described in operation 5B/4.
2. Using tool MF 263 and 263-2 (together with a bar 6" long, 1" wide, 5/8" thick and suitably radiused to suit main tool MF 263 for the inner bush only(as shown in Fig. 9), cut a thread into the bush by turning the upper handle fully clockwise.
3. Remove the bush by turning the lower handle clockwise.

STEERING BOX ROCKER SHAFT BUSHES

Replacement (5B/7)

1. (Fig. 10) Position the new bush squarely over its bore and drive the bush in using tool MF 263-2 and 550 handle.
2. (Fig. 11) Ream the bushes in position using tool MF 264 and 264-1. Remove all metal cuttings.

DRAG LINK

Removal and Replacement (5B/8)

1. Turn the wheels to the full right hand lock.
2. Remove the two nuts securing the drag link ends to the steering box drop arm and the upper steering arm.
3. Release the tapered ball pins and detach the drag link.
4. Replacement is a reversal of the above procedure.

STEERING CYLINDER, VALVE ASSEMBLY, ARMS AND SHAFT

Removal and Replacement (5B/9)

1. Remove the front grille assembly
2. Turn the wheels to the full right hand lock.
3. (Fig. 12) Remove the bolt (1) nut and spring washer securing the lower crank arm to the main steering shaft.
4. Remove two banjo bolts and copper washers securing the hoses to the valve assembly. Allow oil to drain out of the hoses.
5. Remove the nut (2) and release the drag link from the upper steering arm.
6. Remove the split pin (3), retaining the ram arm pivot (4), withdraw the pivot pin and push the ram arm (5) out of its bore in the front engine support.
7. (Fig. 13) Lift the cylinder, valve assembly, steering arms and shaft up from the front engine support and tap the lower crank arm off the main steering shaft.
8. Replacement is a reversal of the above procedure. Top up the power steering reservoir.

Note

Ensure that the hoses are connected up correctly. Align the master splines on the lower crank arm and main steering shaft.

KING PIN BUSHES see SBulletin 50B/1500/25 for { MF263-5 Bush Remover/Replacer; MF264-8 Reamer & Pilot }

MAIN STEERING SHAFT BUSHES

Removal (5B/10)

3

1. (Fig. 14) Using tool MF 263 and 263-2, cut a thread into the bush by turning the upper handle fully clockwise.
2. Remove the bush by turning the lower handle clockwise.

897235 Bush is 1⅞" I/D.

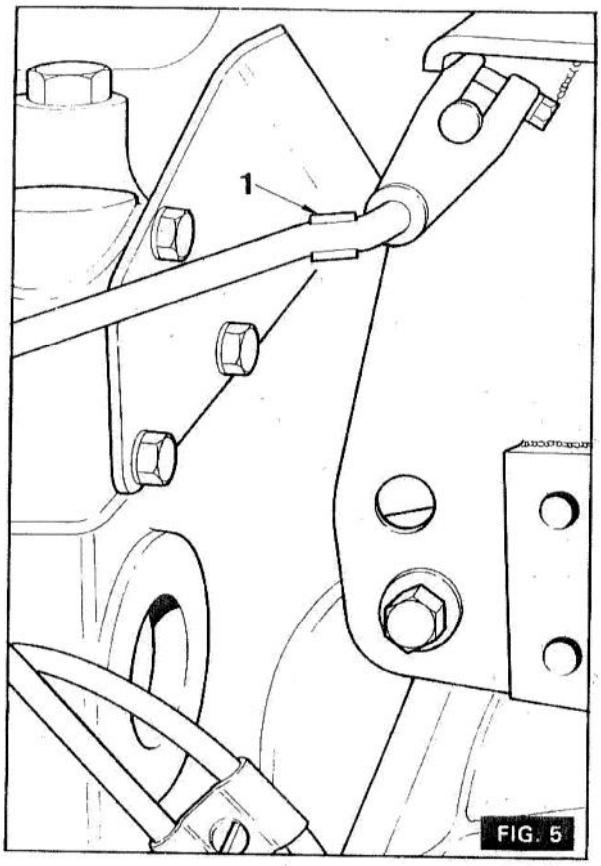
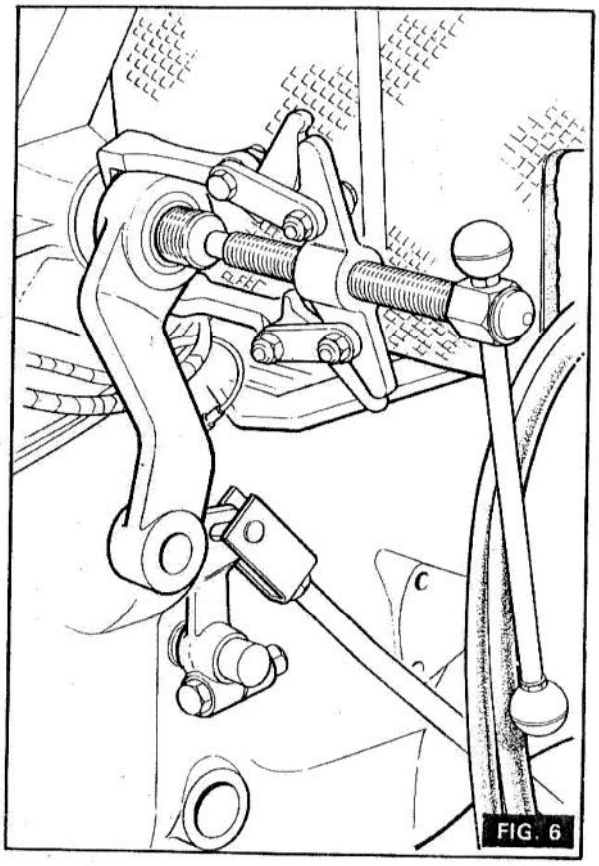


FIG. 5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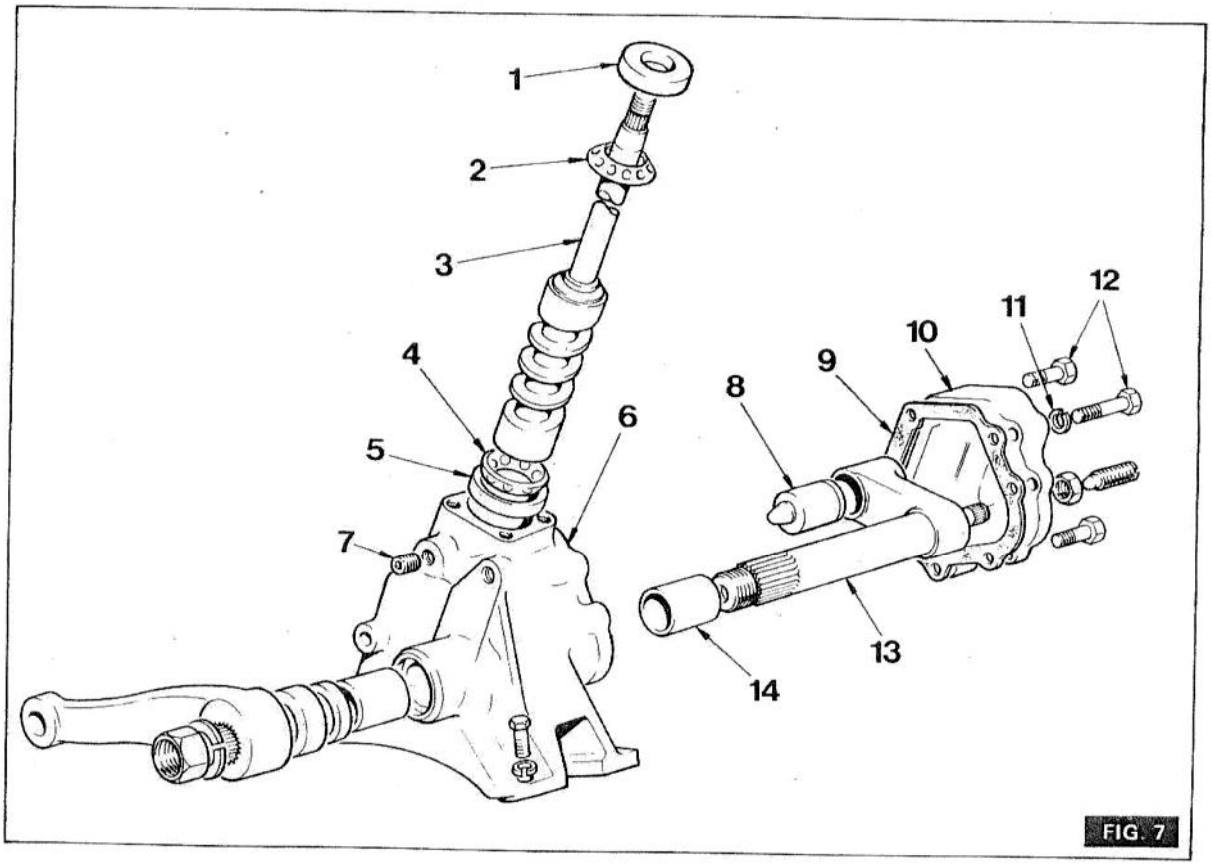


FIG. 7

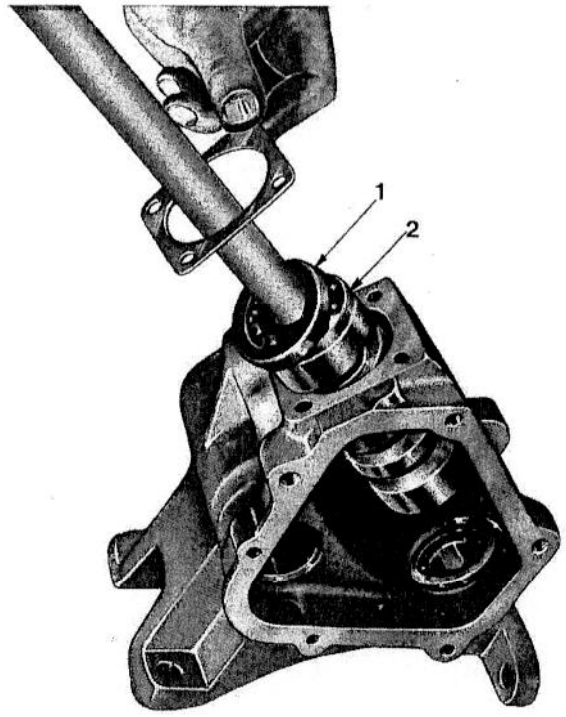


FIG. 8

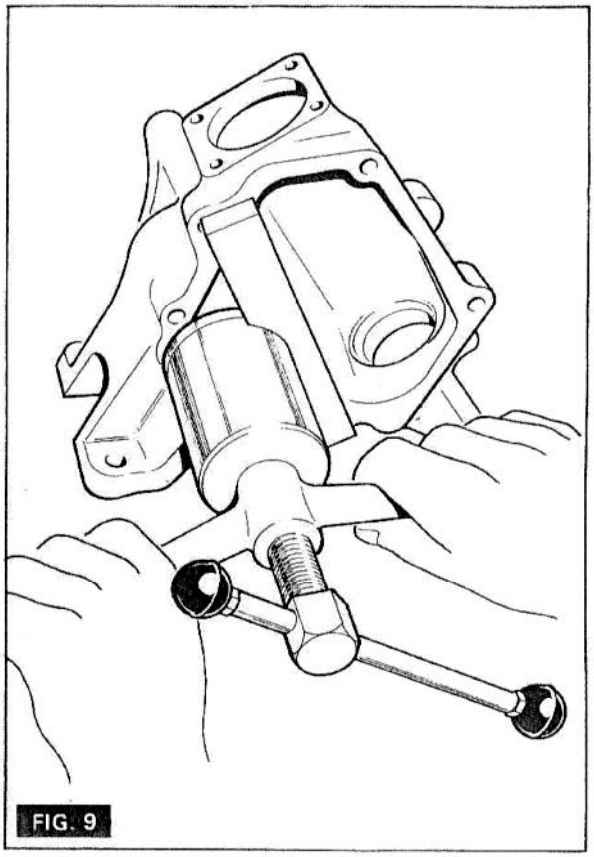


FIG. 9

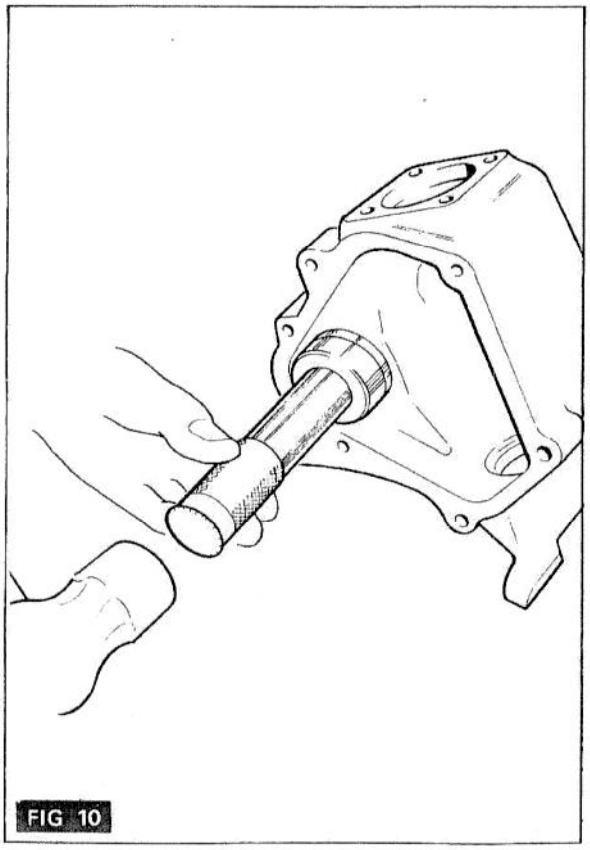


FIG. 10

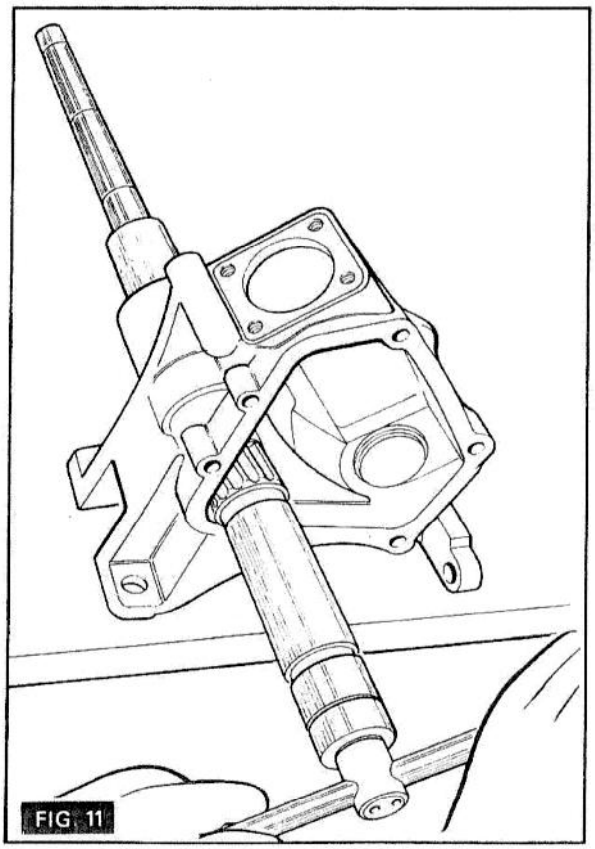


FIG. 11

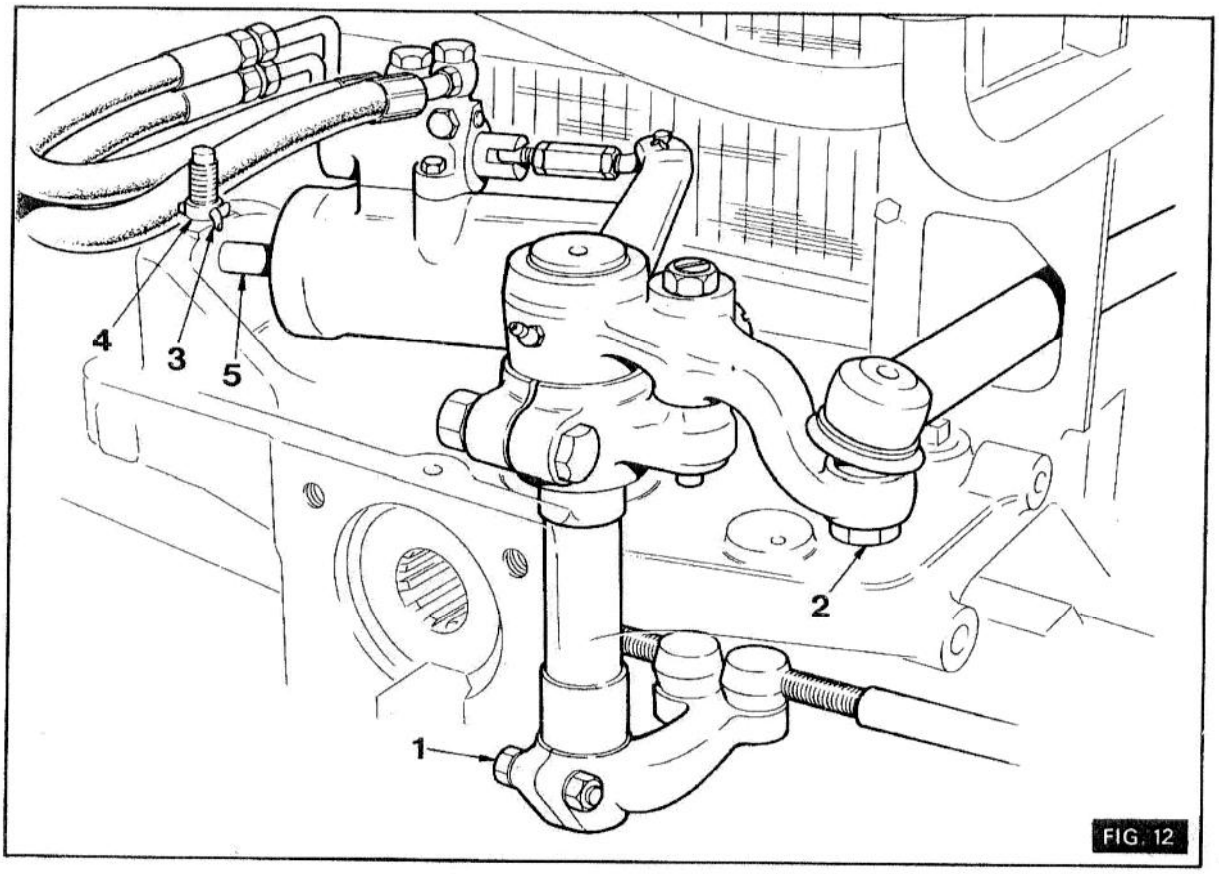
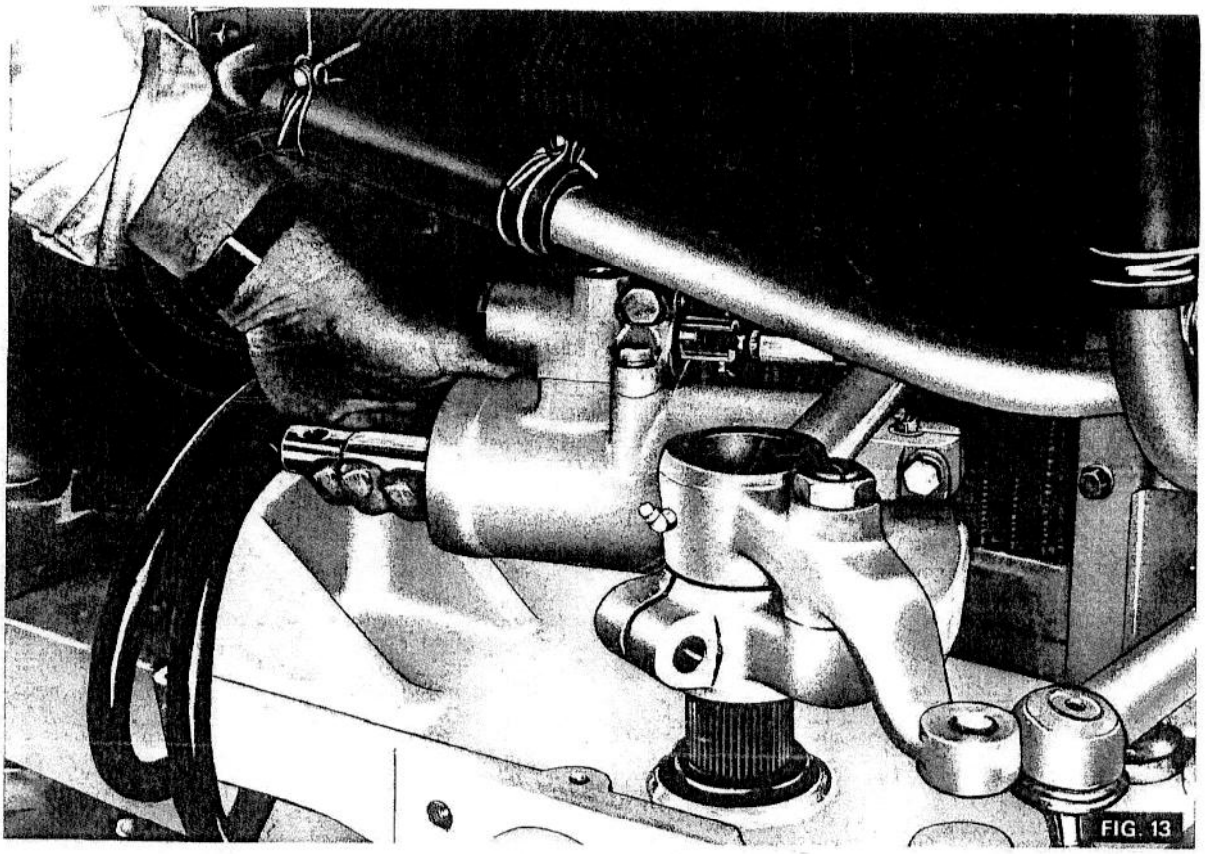


FIG. 12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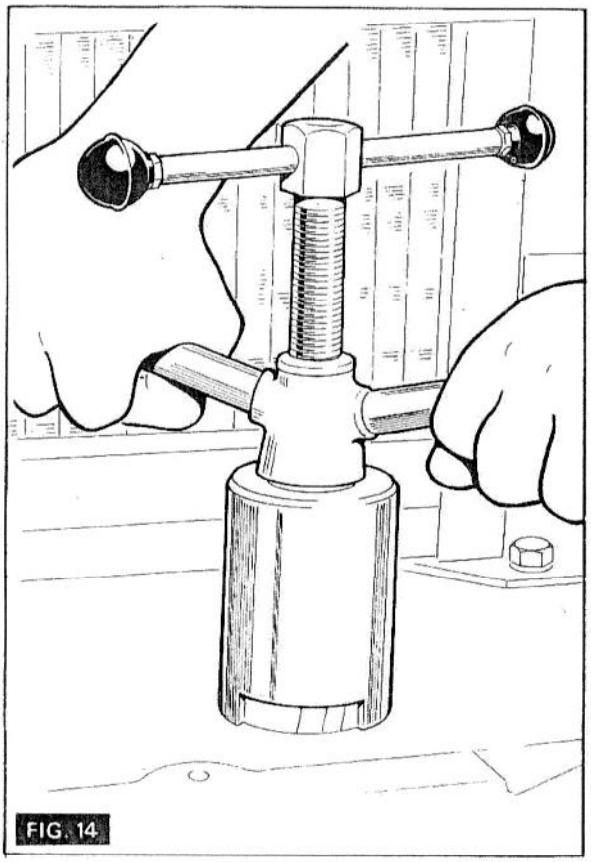


FIG. 14

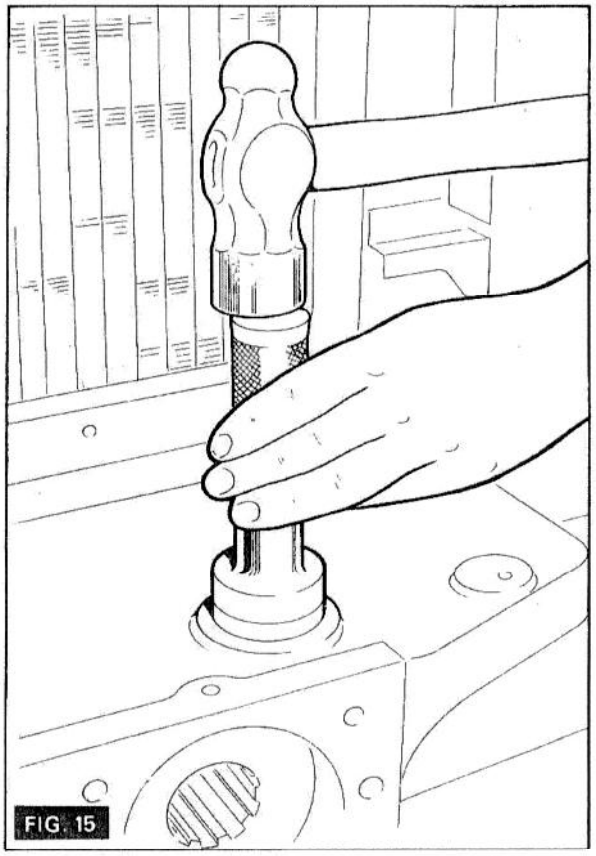


FIG. 15

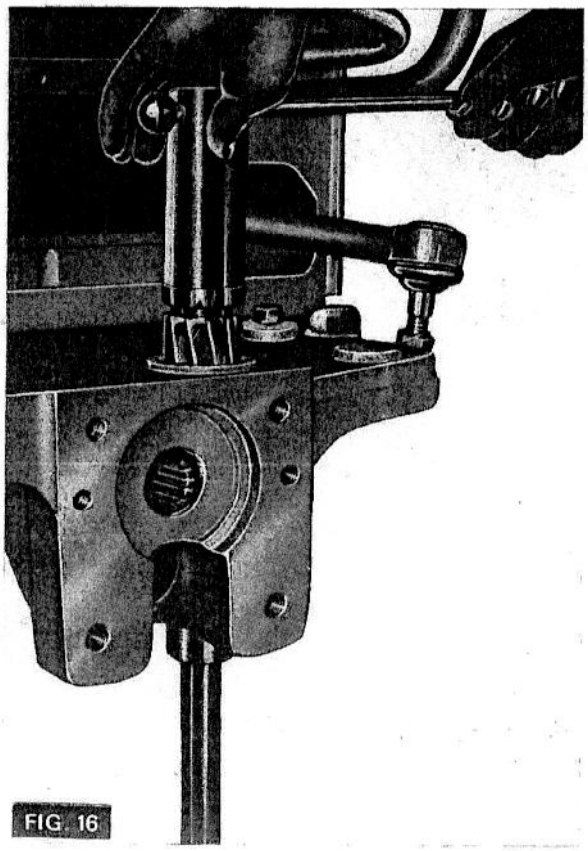


FIG. 16

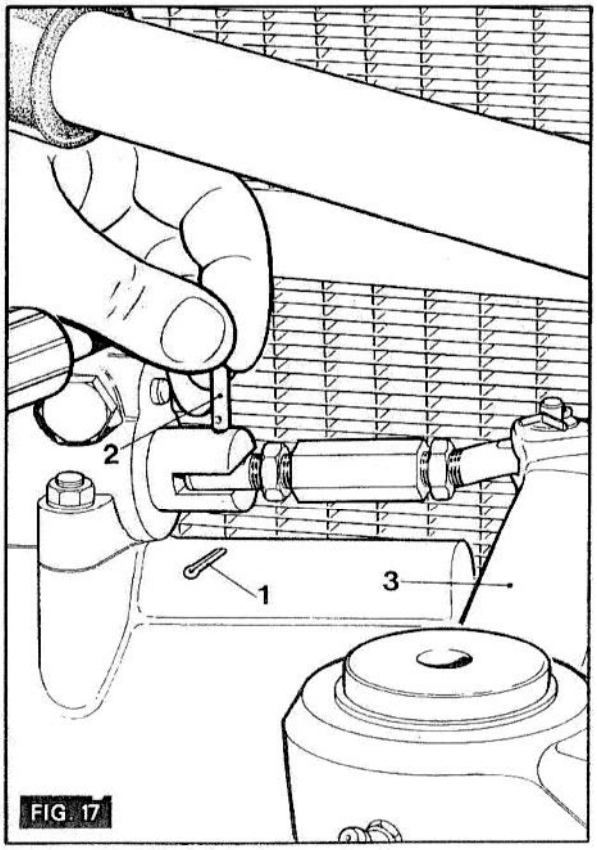


FIG. 17

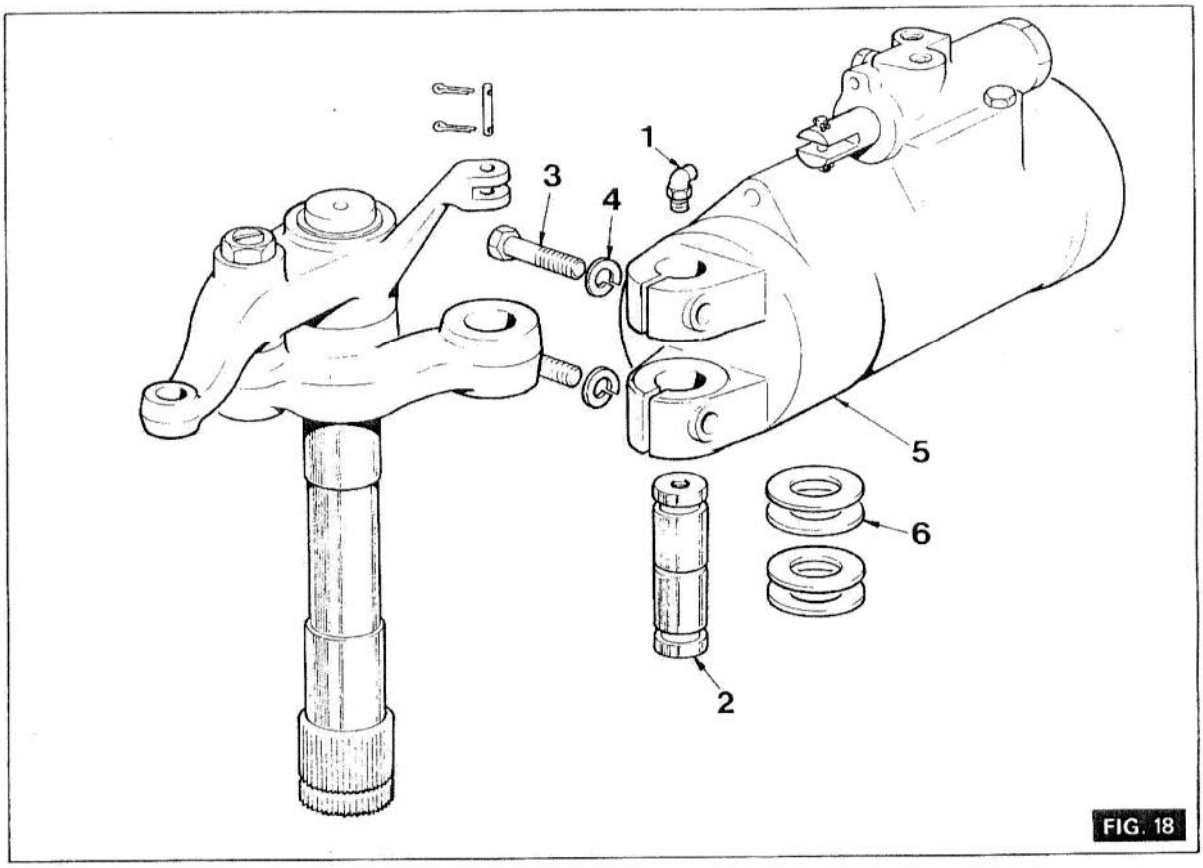
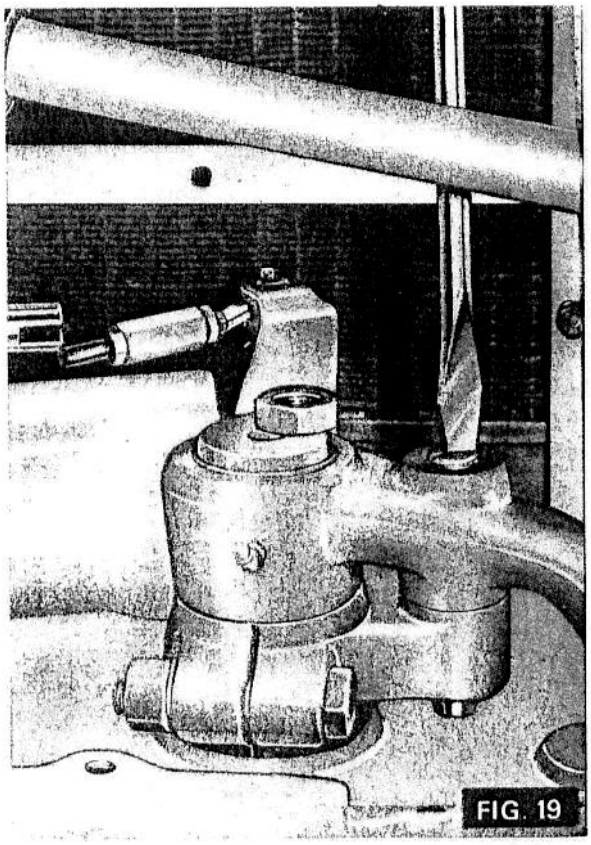


FIG. 18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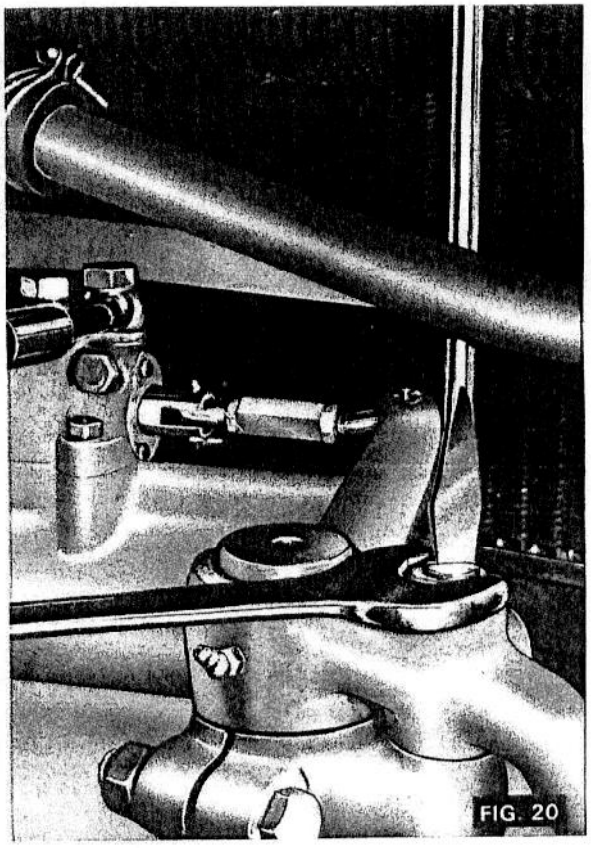


FIG. 20

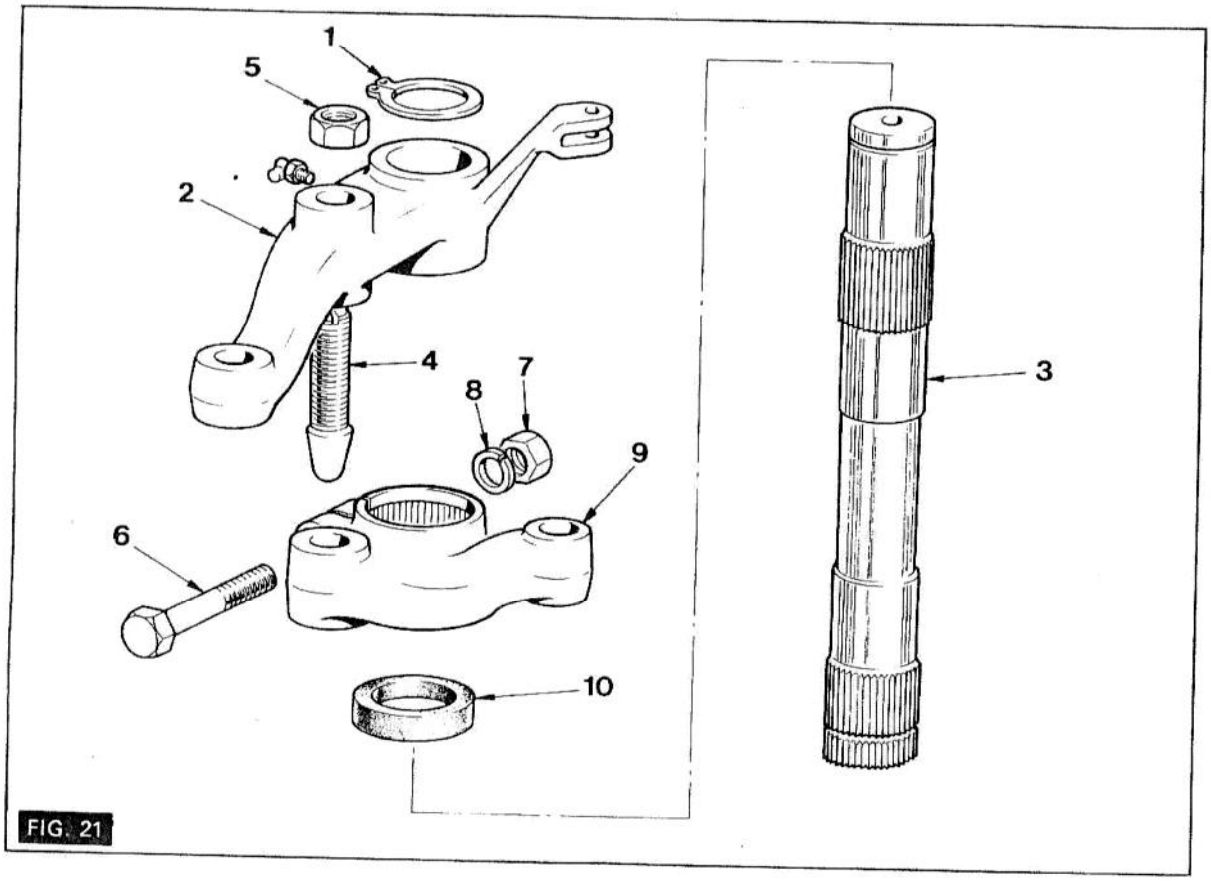


FIG. 21

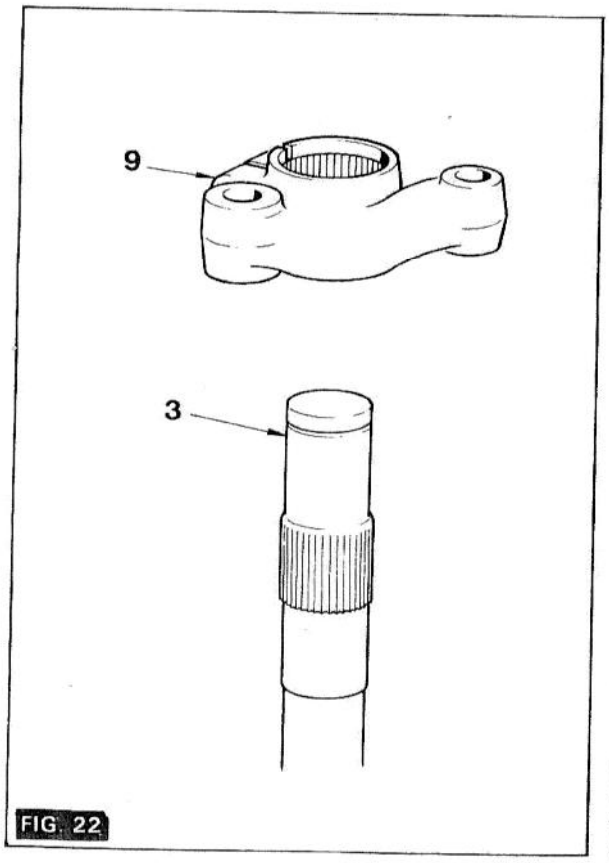
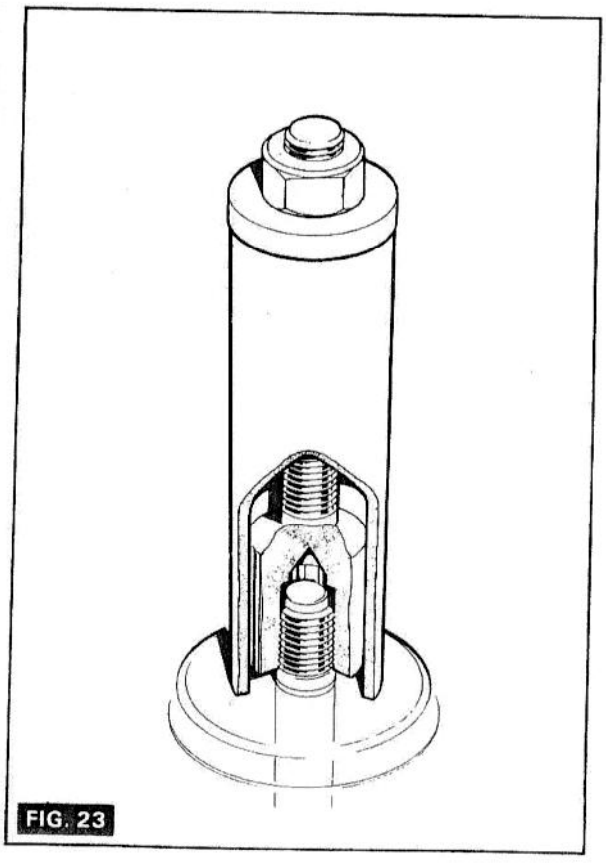


FIG. 22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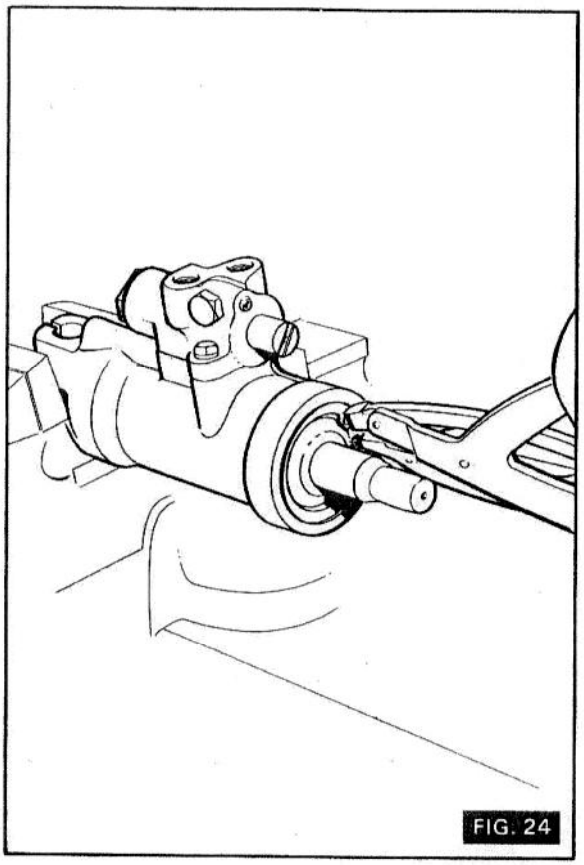

FIG. 24

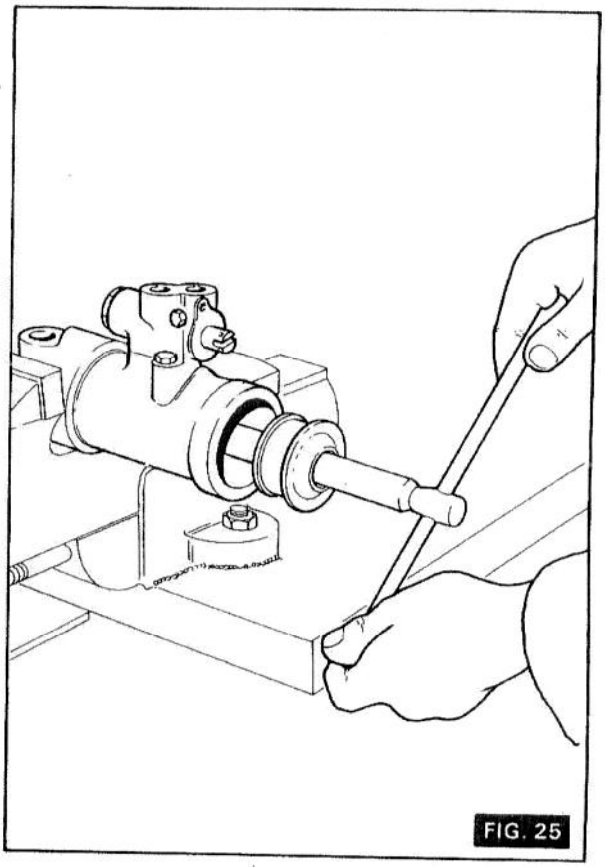

FIG. 25

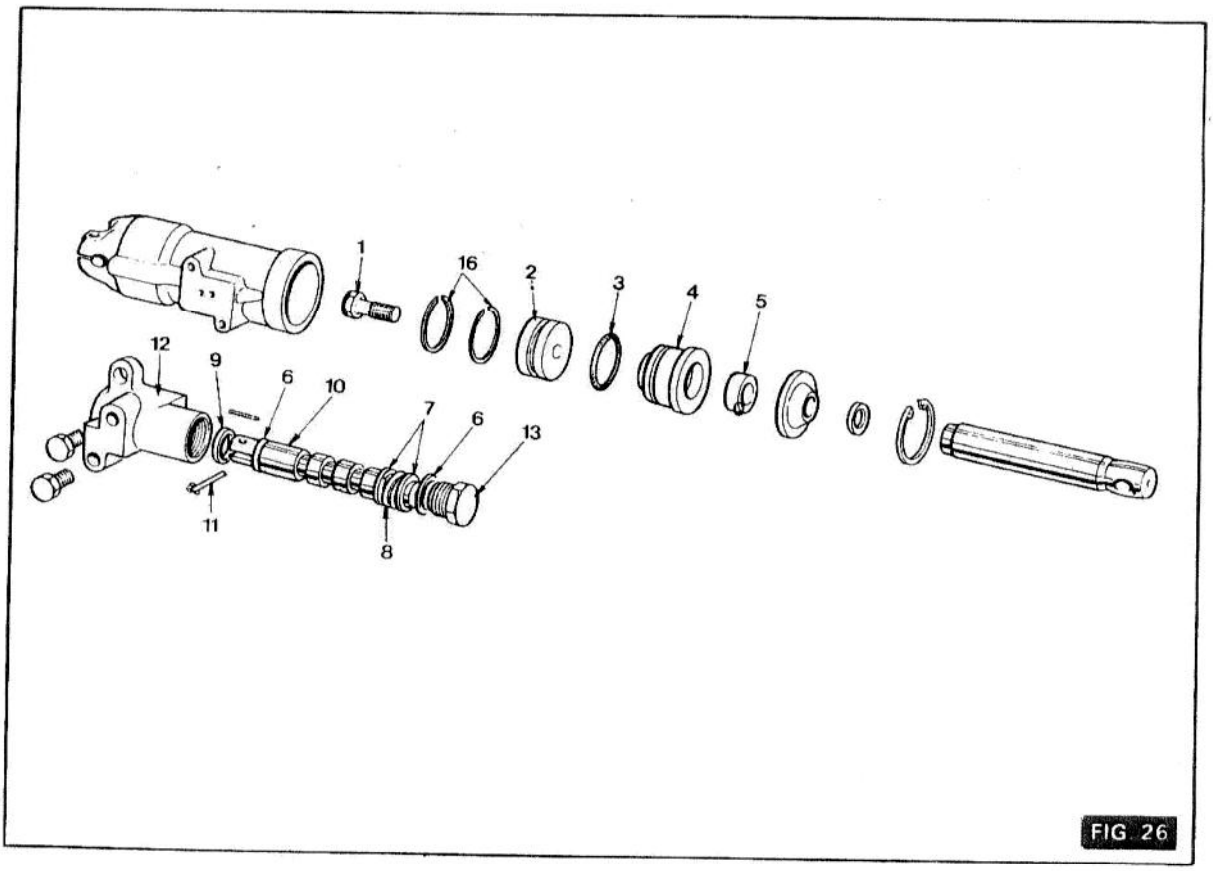

FIG. 26

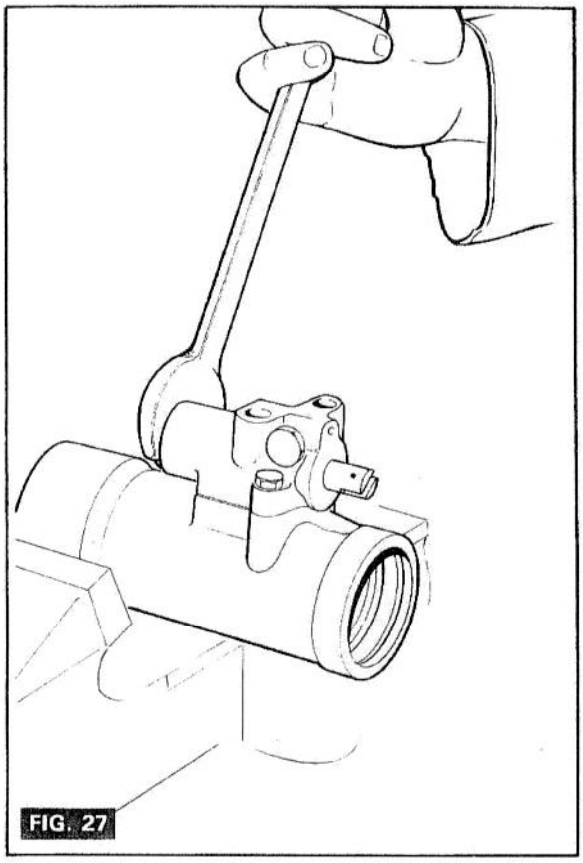

FIG. 27

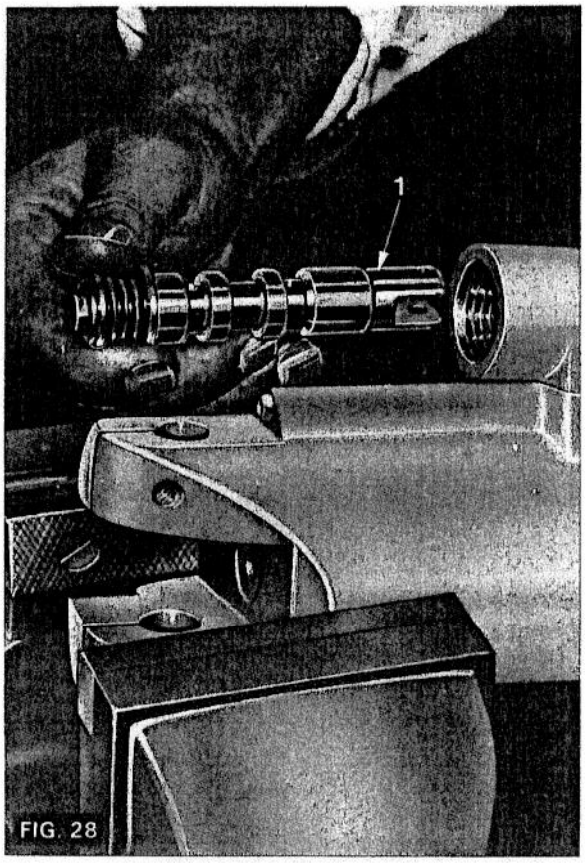

FIG. 28

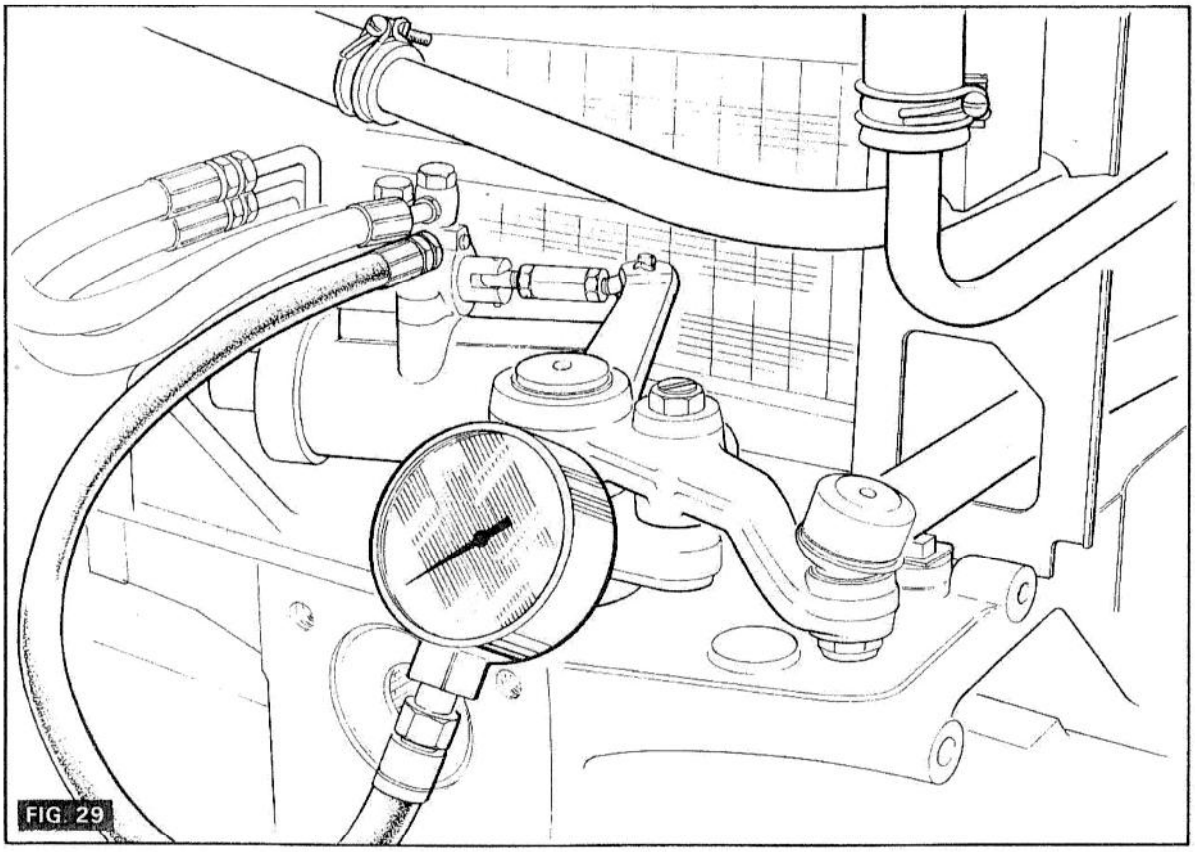

FIG. 29

MAIN STEERING SHAFT BUSHES

Replacement (5B/11)

1. (Fig. 15) Position the new bush squarely over its bore and drive the bush in, using tool MF 263-2 and 550 handle.
2. (Fig. 16) Ream the bushes in position, using tool MF 264 and 264-2. Remove all metal cuttings.

CYLINDER AND VALVE ASSEMBLY TO STEERING ARMS

Removal and Replacement (5B/12)

1. Remove the complete assembly from the front engine support, as described in operation 5B/9.
2. (Fig. 17) Remove the lower split pin (1) securing the valve link pin (2) to the upper steering arm (3). Withdraw the valve link pin (2).
3. (Fig. 18) Remove the grease nipple (1) from the cylinder pivot pin (2).
4. Remove two setscrews (3) and spring washers (4) securing the cylinder pivot pin, (2) to the cylinder end casting (5).
5. Withdraw the pivot pin and collect the shims (6) fitted between the cylinder and arm.
6. Replacement is a reversal of the above procedure.

Note

The main steering arm and cylinder must be shimmed to give not more than 0.007" (0.179 mm.) end float. Shims are available in two sizes : 0.003"/0.005" (0.076/0.127 mm.) and 0.020"/0.022" (0.508/0.509 mm.).

CONTROL VALVE CLEARANCE

Adjustment (5B/13)

1. (Fig. 19) Disconnect the upper steering arm link from the spool valve fork. Fully tighten the adjusting pin.
2. Slacken the two locknuts and turn the valve adjusting sleeve until the pin passes freely through the spool valve fork and link. Fit the pin and secure with the split pin. Tighten the locknuts.
3. (Fig. 20) Slacken off the adjusting pin seven complete turns and tighten the locknut.

STEERING ARMS

Removal and Replacement (5B/14)

1. (Fig.21) Remove the circlip (1) retaining the upper arm (2) onto the shaft (3). Lift off the arm (2), adjusting pin (4) and locknut (5).
2. Remove the bolt (6), nut (7) and spring washer (8)securing the main steering arm (9) to the shaft (3). Lift off the arm (9) and seal (10).
3. Drive out the bush from the main steering arm, using tool 550 handle and drift MF 203A/1.
4. Replacement is a reversal of the above procedure.

Note

The main steering arm (9) has a master spline which must be aligned with a master spline on the shaft (3) on assembly (Fig. 22). Set the adjustment pin (4) as described in operation 5B/13.

CONTROL VALVE

Disassembly (5B/15)

1 Remove the steering cylinder, valve assembly, arms and shaft from the front engine support, as described in operation 5B/9.
2 Remove the steering cylinder and valve assembly from the steering arm, as described in operation 5B/12
3 Hold the cylinder assembly securely in a clamp or vice.
4 (Fig 24) Remove the circlip retaining the steering cylinder piston in position.
5 (Fig 25) Remove the ram, complete with piston from the cylinder.
6 (Fig 26) Hold the ram securely in a clamp or vice. Remove the bolt (1), slide off the piston (2). "O" ring (3) the second piston half (4) and seal (5).
7 Slide the retainer of the piston ram and remove the wiper ring.

SPOOL VALVE ASSEMBLY

Disassembly (5B/16)

1. (Fig. 27) With the cylinder body suitably held in a clamp or vice, remove the valve securing bolt.
2. (Fig. 28) Withdraw spool assembly (1).
3. Remove two bolts and washers securing the valve body to the cylinder body.
4. Remove the retaining screw (2) from the spool assembly.
5. Remove the relief valve from the valve body.

Reassembly (5B/17)

1. Examine all the component parts of the assembly for damage or excessive wear. Thoroughly clean all the parts.
2. When reassembling the relief valve, renew the bonded seal.
3. When fitting the valve body to the cylinder body fit new "O" rings in the top of the cylinder body. Bolt the valve to the cylinder.
4. (Fig. 26) When reassembling the spool assembly fit new "O" rings (6), fit new washers (7) either side of spring (8), a new back up washer (9) and secure on spool rod (10) with screw (11).
5. Refit the spool assembly to the valve body (12).
6. Refit the valve securing bolt (13).

CONTROL VALVE

Reassembly (5B/18)

1 Examine all the component parts of the assembly for damage or excessive wear. Thoroughly clean all the parts.
2 (Fig 26) Fit a new wiper ring (14) to the retainer (15).
3 Lubricate the piston rod with clean hydraulic oil and slide the retainer onto the rod.
4 Fit a new seal (5) and new "O" ring (3) to piston head (4). Place the assembly onto the piston rod. Fit the piston rings (16) to the second piston half (2), and replace the piston half on the rod.
5 Lock in place with the piston belt and tighten the piston bolt with a torque load of ??
6 Lubricate the outer edges of the piston assembly, insert the piston and rod assembly into the cylinder, taking great care not to damage the seals in the process.
7 Lock the piston assembly in position in the cylinder housing with the circlip.
8 Refit the pivot pin between the steering cylinder and arm, using the number of shims required to give the required end float. The end float is not to exceed 0.007 in (0.179 mm).
9 Refit the two bolts and washers securing the cylinder pivot pin to the cylinder end casting.
10 Refit the greaser to the top of the cylinder pivot pin.
11 Refit the steering arms as described in operation 5B/14.
12 Refit the valve link pin to the upper steering arm and secure with two split pins.
13 Refit the steering cylinder, valve assembly, arms and shaft as described in items 1–6 of operation 5B/9.

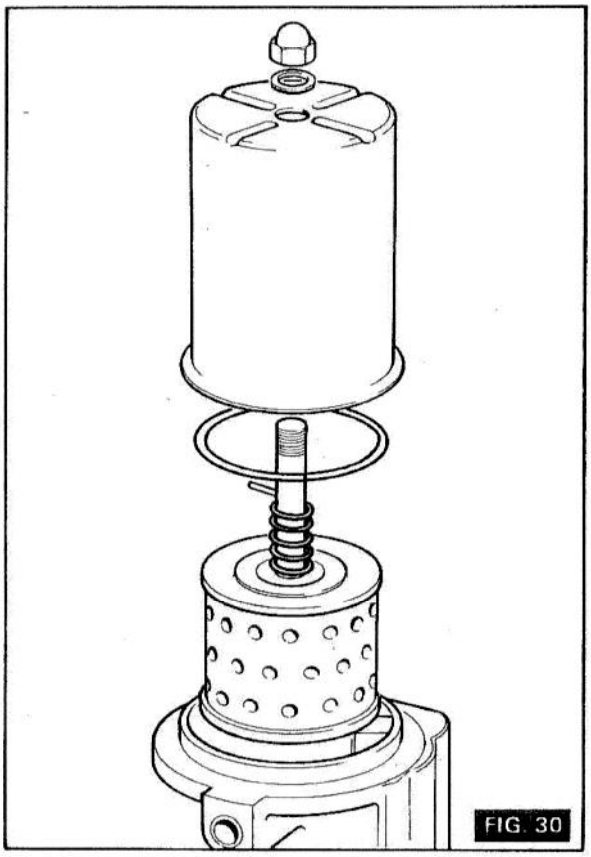
FIG. 30

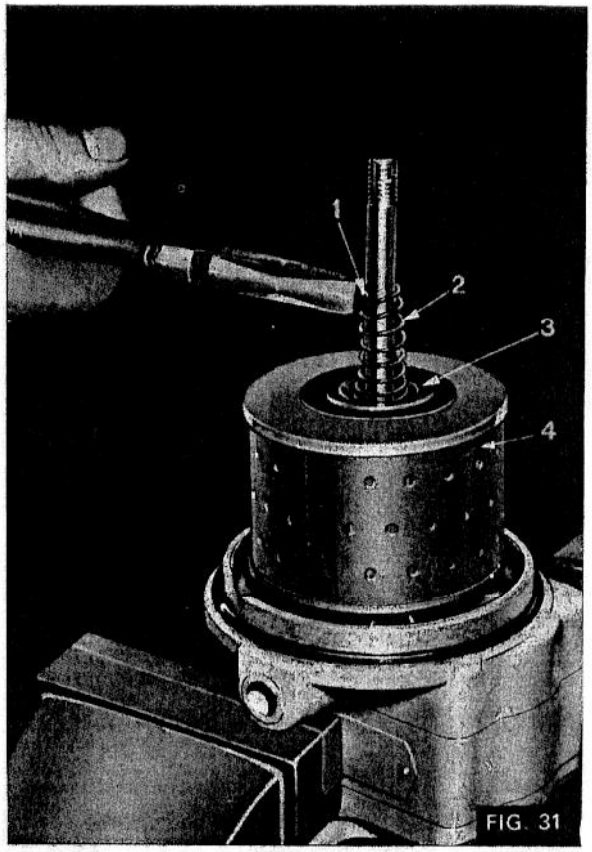

FIG. 31

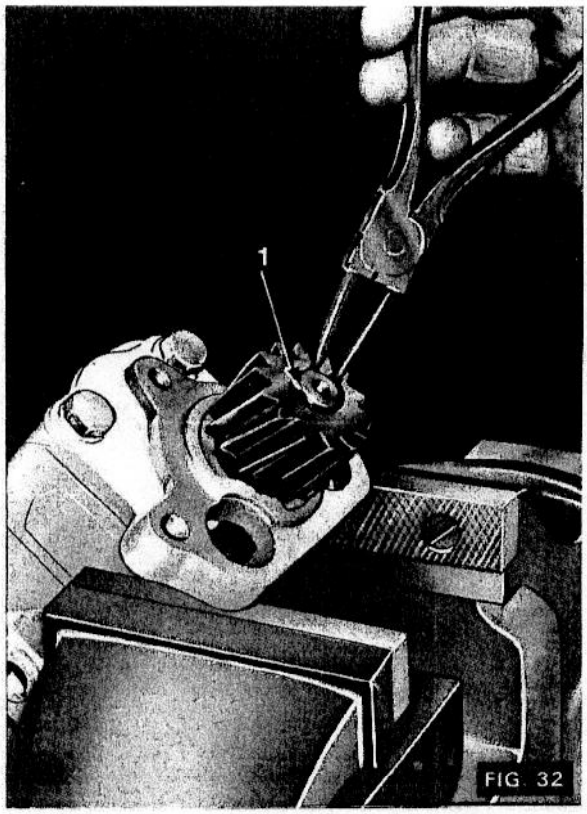

FIG. 32

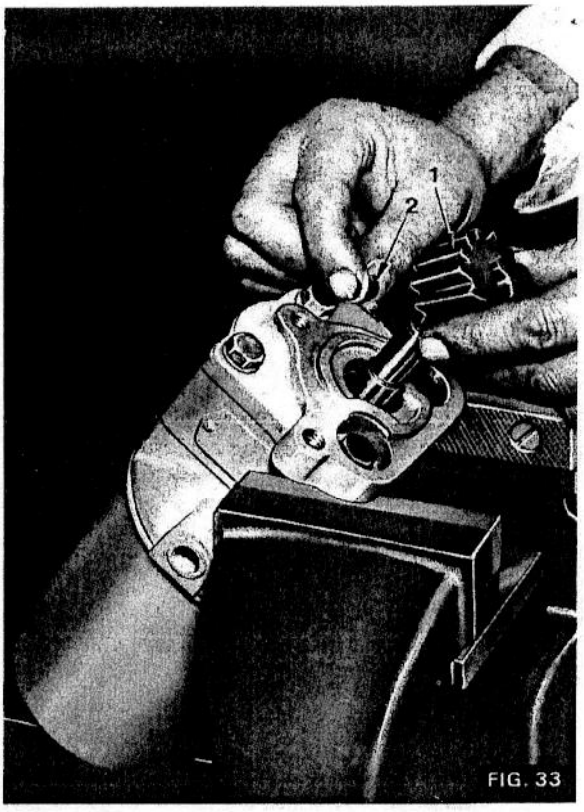

FIG. 33

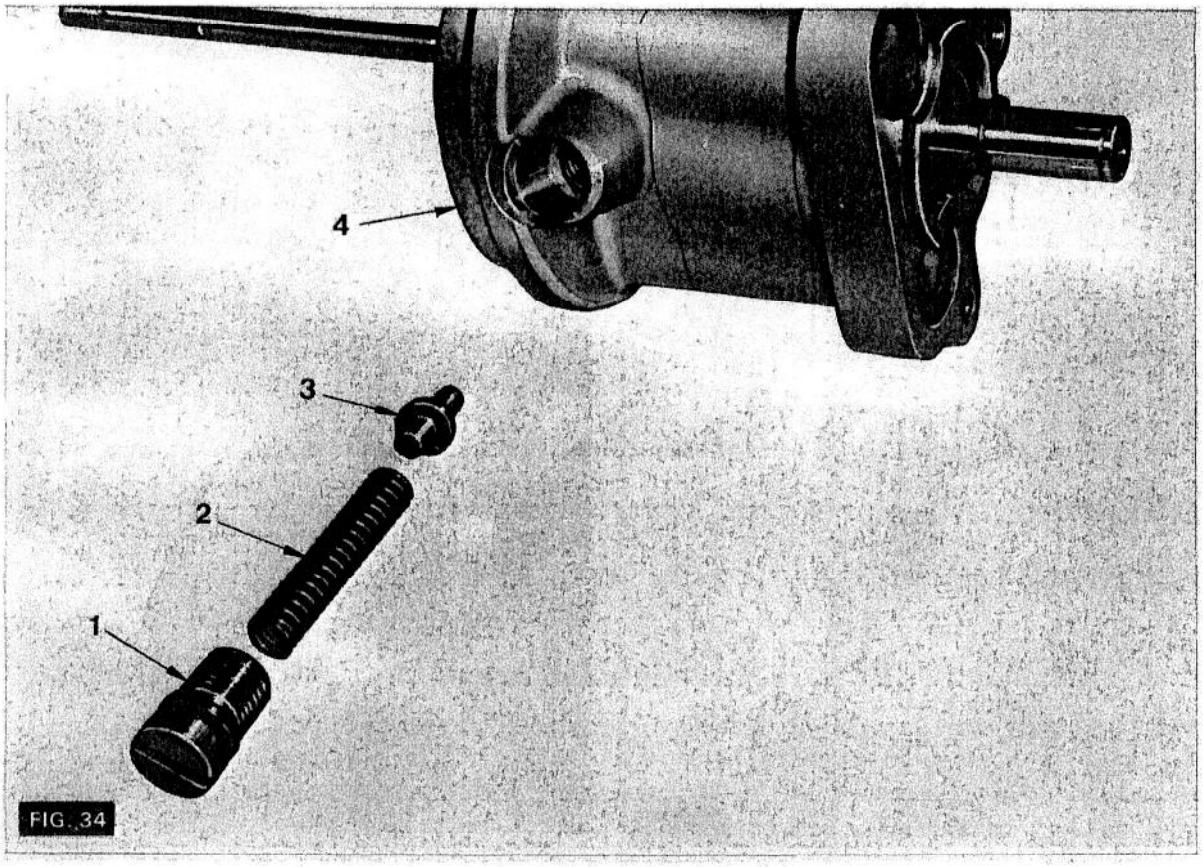

FIG. 34

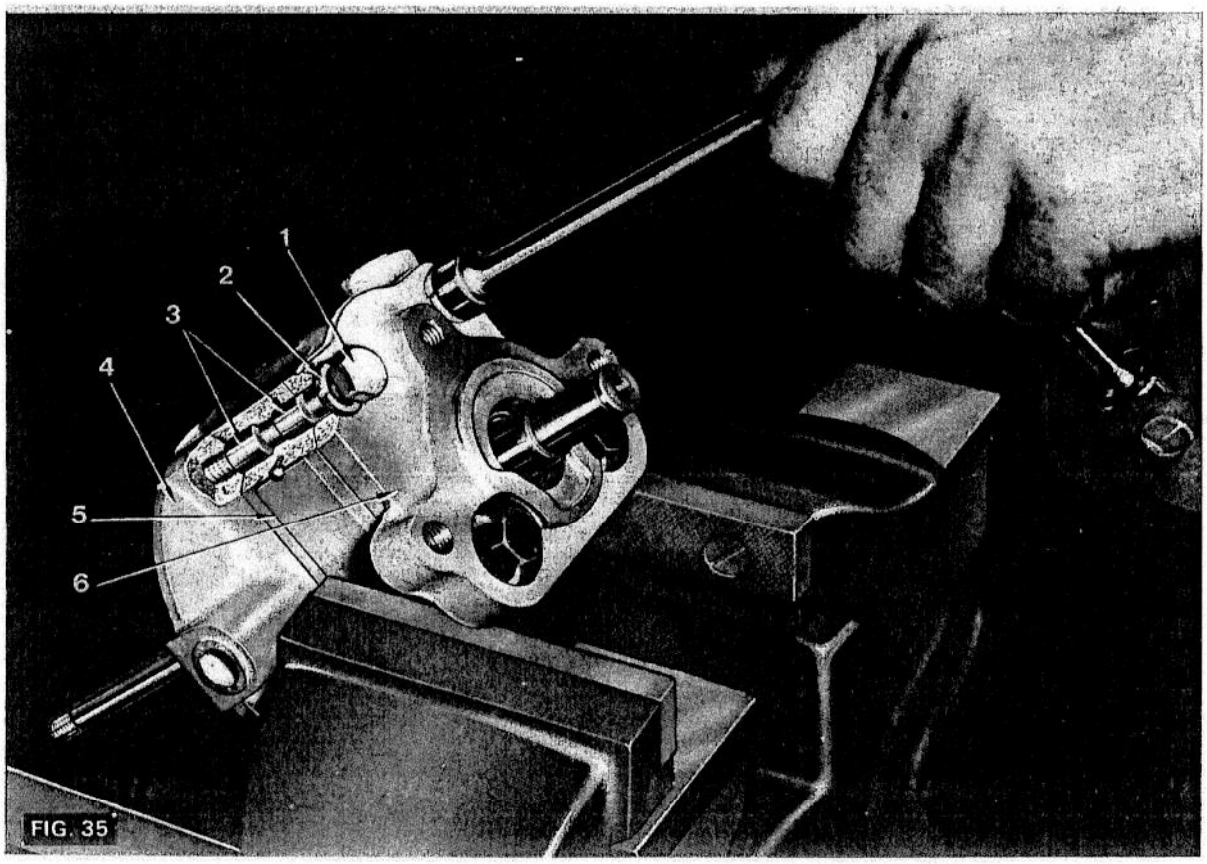

FIG. 35

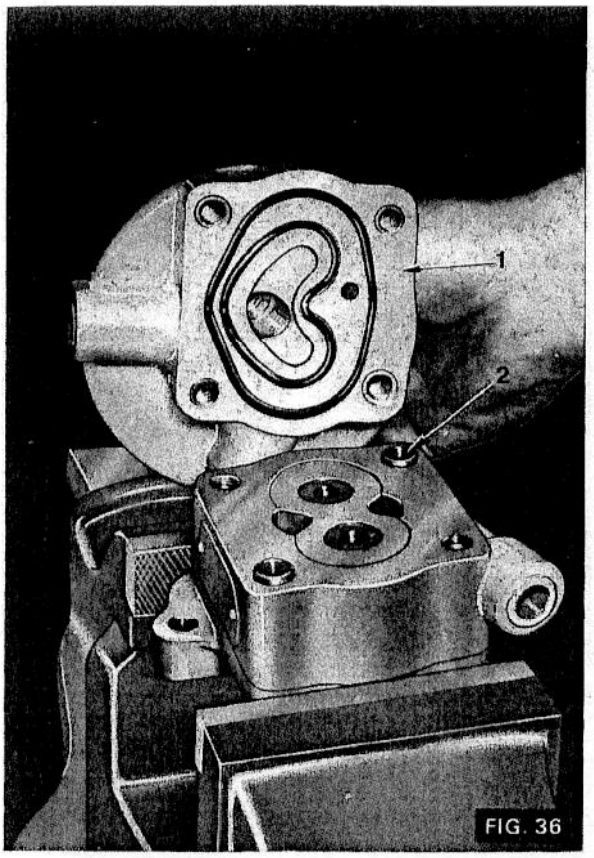

FIG. 36

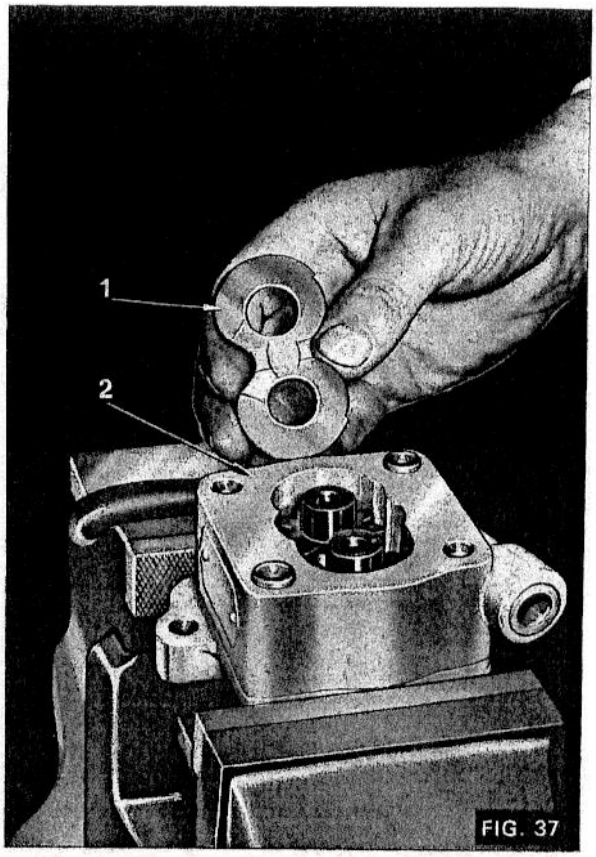

FIG. 37

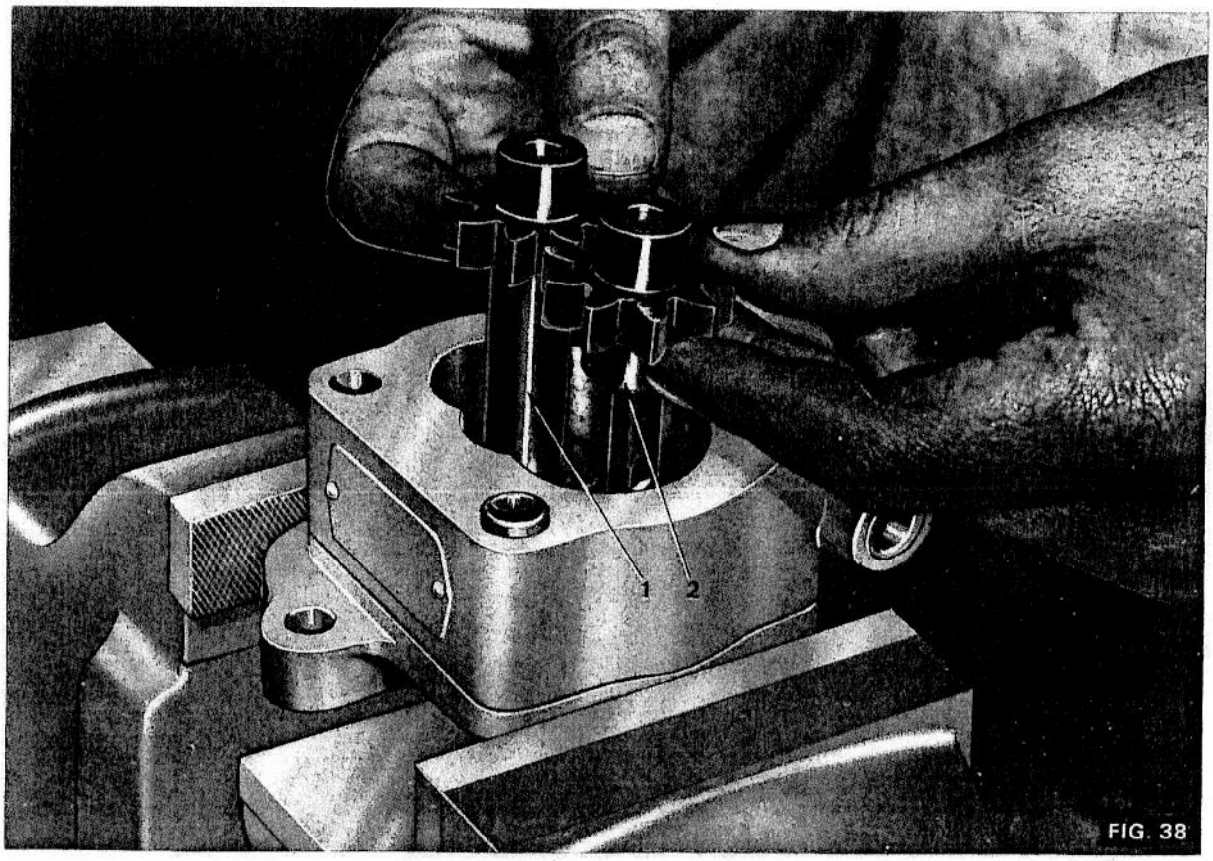

FIG. 38

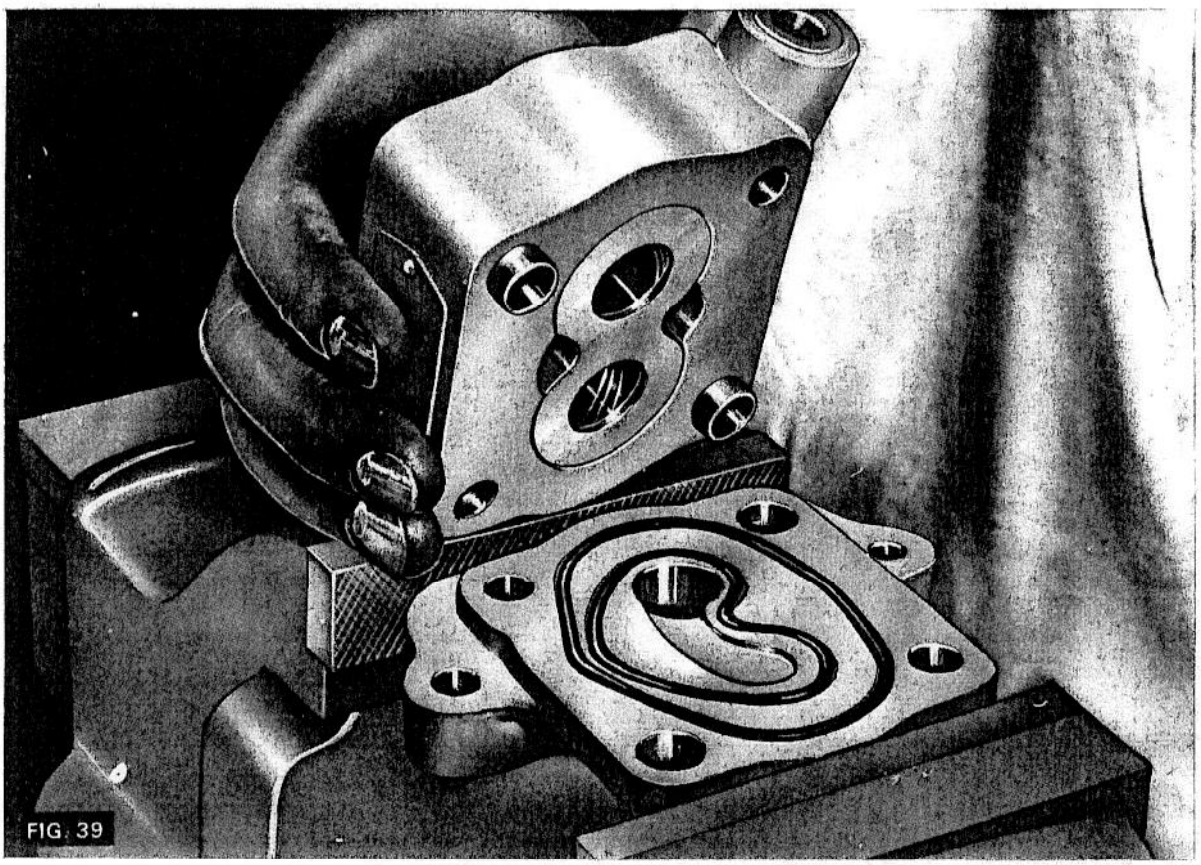

FIG. 39

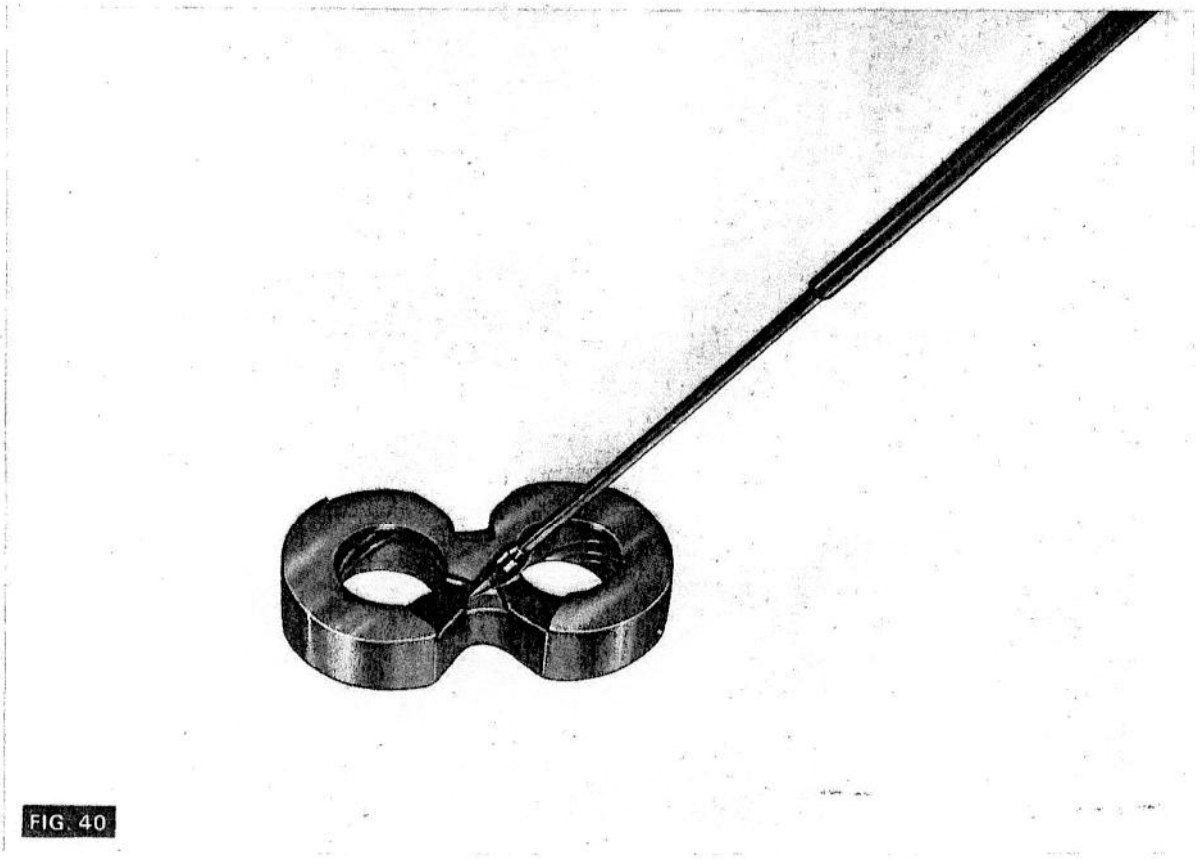

FIG. 40

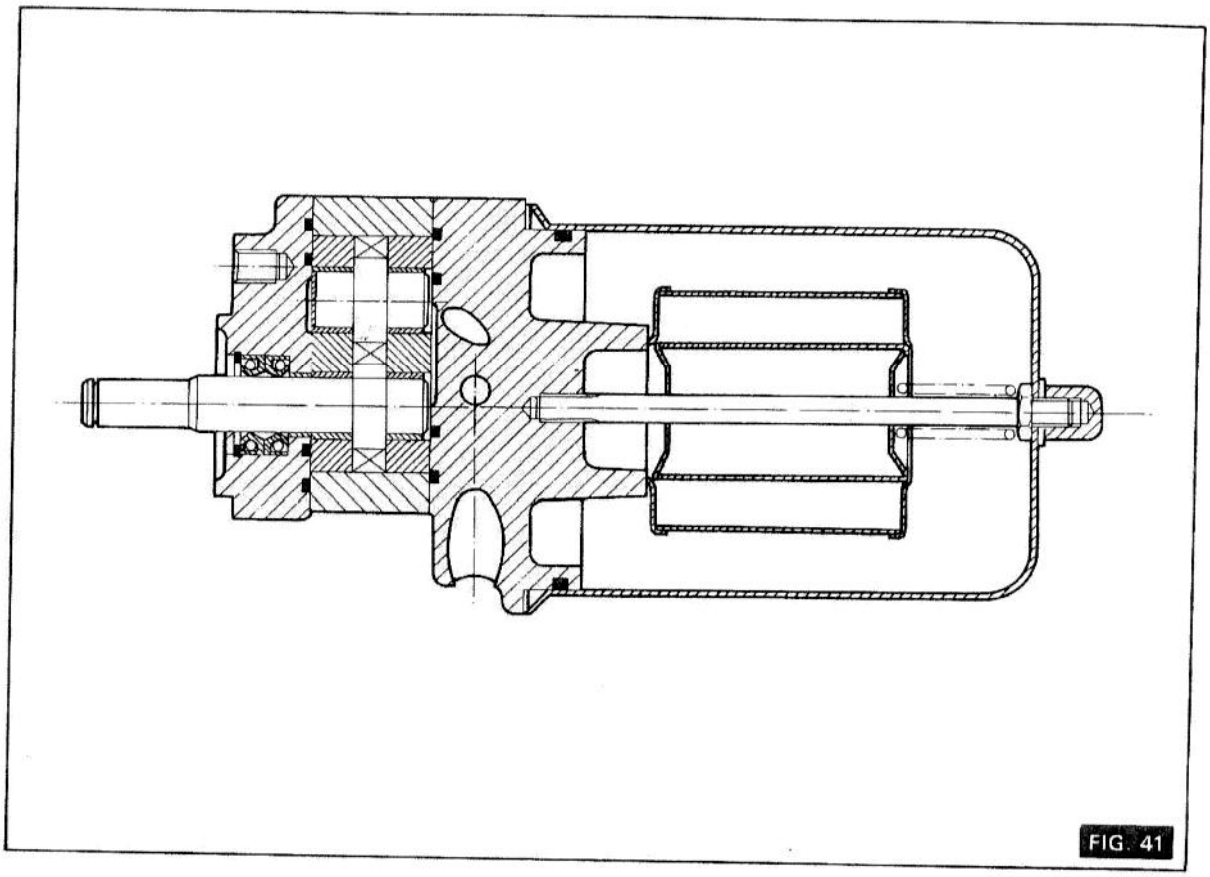

FIG. 41

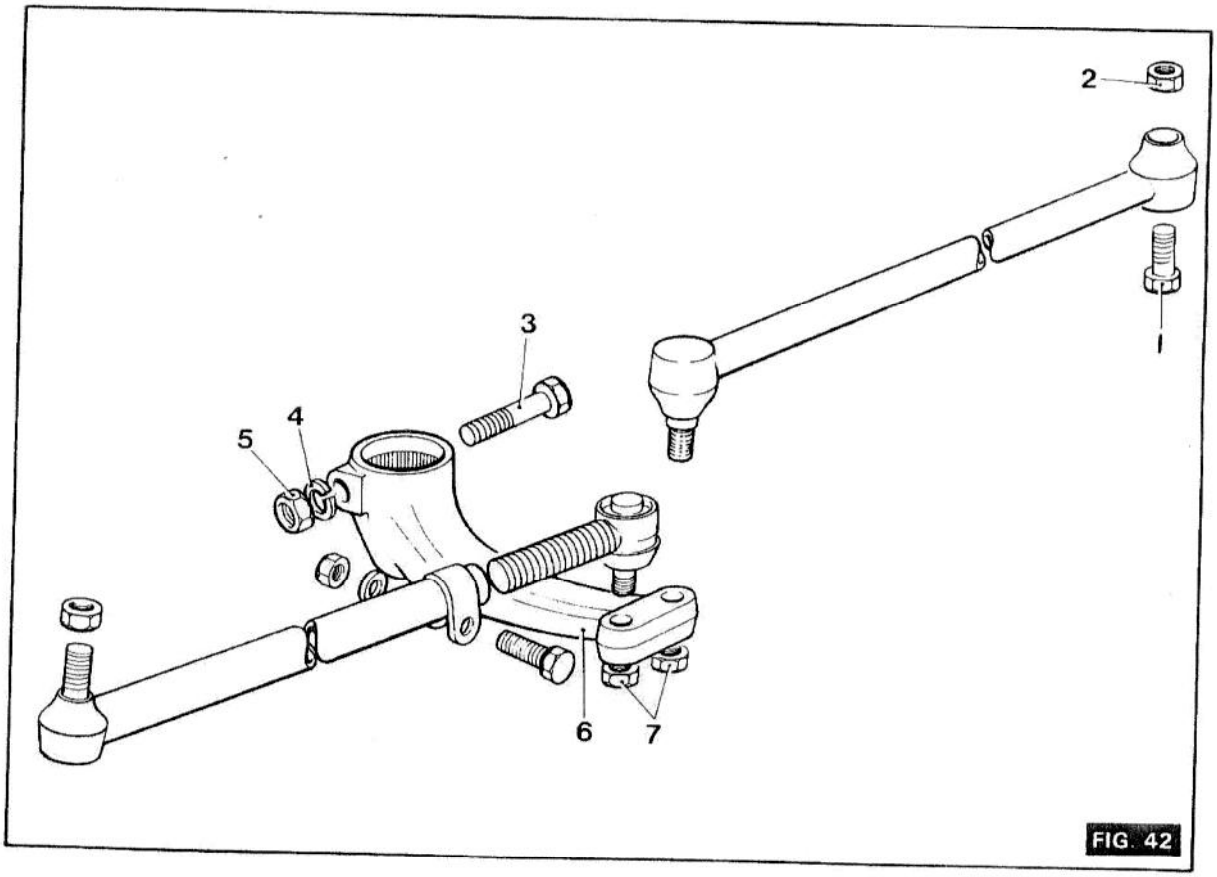

FIG. 42

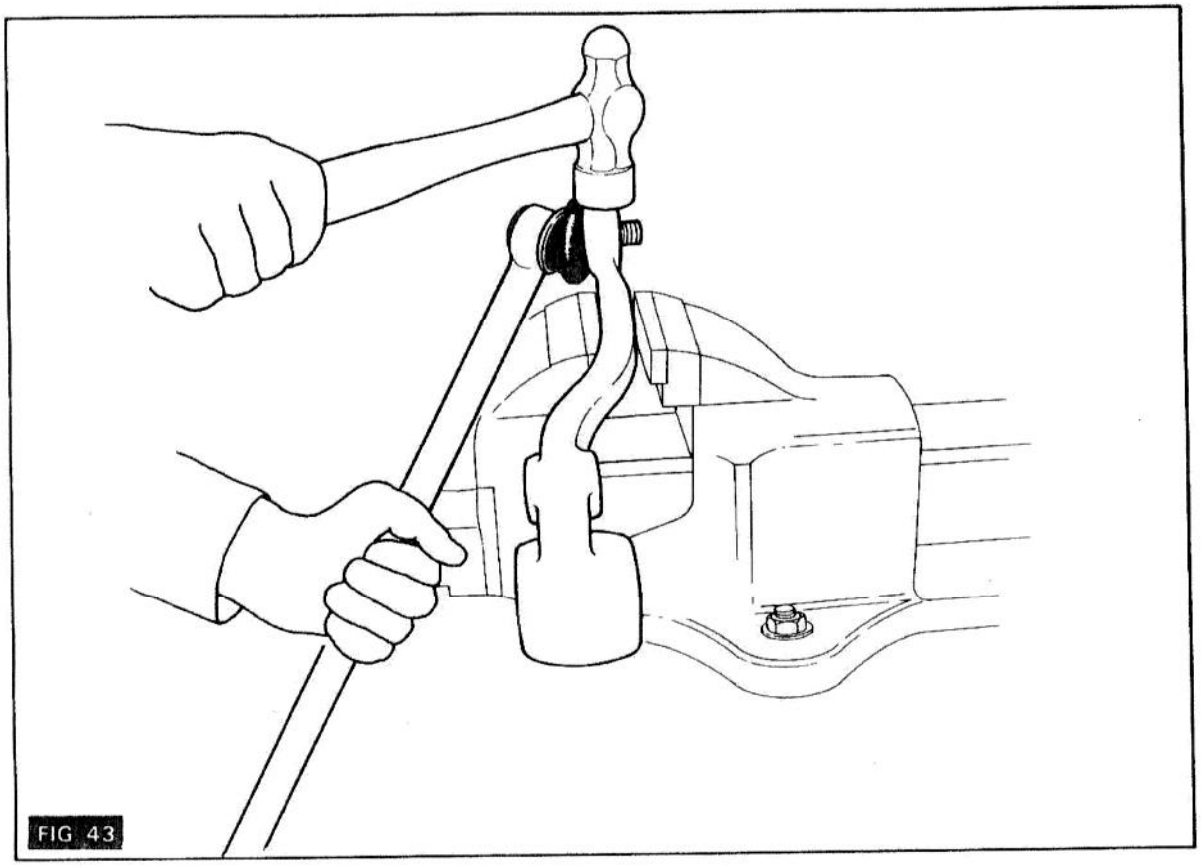

FIG 43

STANDARD TRANSMISSION

CONTENTS

LIST OF ILLUSTRATIONS

TRANSMISSION STANDARD

General

The transmission assembly provides three forward gears and one reverse gear. An additional lower range of gears is obtained from a planetary reduction unit. This combination produces a total of six forward gears and two reverse gears.

There are two gear levers – the gear shift lever for the change speed gears, and the dual range selector lever for the reduction unit. The three forward gears and one reverse gear are indicated by cast figures on the top of the gear shift lever. The high, start (neutral) and low ranges of the dual range selector lever are also indicated by letters on the lever. The dual range selector lever must be in its start (neutral) position to close the starter motor circuit and so allow the tractor to be started. Low or high range must be selected before the tractor will move. When low range is engaged, the reduction unit is also engaged and effects a 4:1 reduction of all transmission speeds.

The reduction unit is coupled to the rear (output) end of the transmission main shaft. The planet pinion carrier assembly rotates inside a ring gear which is bolted to the transmission housing. When the reduction unit is disengaged (dual range selector lever in high), the main drive through the tractor is coupled directly to the transmission mainshaft. When the reduction unit is engaged (dual range selector lever in low), the main drive through the tractor is coupled to the planet carrier assembly, and the drive is through the planet gears.

DATA

Number of forward speeds	6
Number of reverse speeds	2
Reduction unit ratio	4:1
Oil Capacity includes transmission, centre housing and rear axle	6.5 imp. galls. (7.8 U.S. Galls., 29.54 L.)

TRANSMISSION FROM ENGINE

Removal (6A/1)

1. Remove the hood assembly.
2. Insert wooden wedges between the upper side of the axle and the axle support casting.
3. Remove the drag link from the steering box drop arm.
4. Release the fuel tank rear mountings.
5. Position the rails of dismantling stand MF 27X and support the engine sump and transmission housing on rail trolleys.
6. Disconnect the battery leads.
7. Disconnect the wiring from the thermostart, starter motor, alternator, horn, lights and neutral safety switch.
8. Disconnect heater hoses at water pump.
9. Disconnect the water temperature gauge wire, oil pressure, gauge pipe, tachourmeter cable, tube for the air filter restriction indicator, fuel sender unit wire.
10. Disconnect the fuel cut off cable.
11. Release all harness securing clips.
12. Switch off the fuel and disconnect the fuel pipes at the injection pump.
13. Disconnect the fuel pipe between primary and secondary fuel filters.
14. Disconnect the throttle control rod from the injection pump.
15. Remove the starter motor.
16. Remove two bolts and spring washers securing the steering box to the engine.
17. Remove the bolts securing the engine to the transmission housing.
18. Push the rear part of the machine out of engagement with the engine.
19. Fit support stand MF 27G to the front of the transmission housing and secure with two bolts each side.

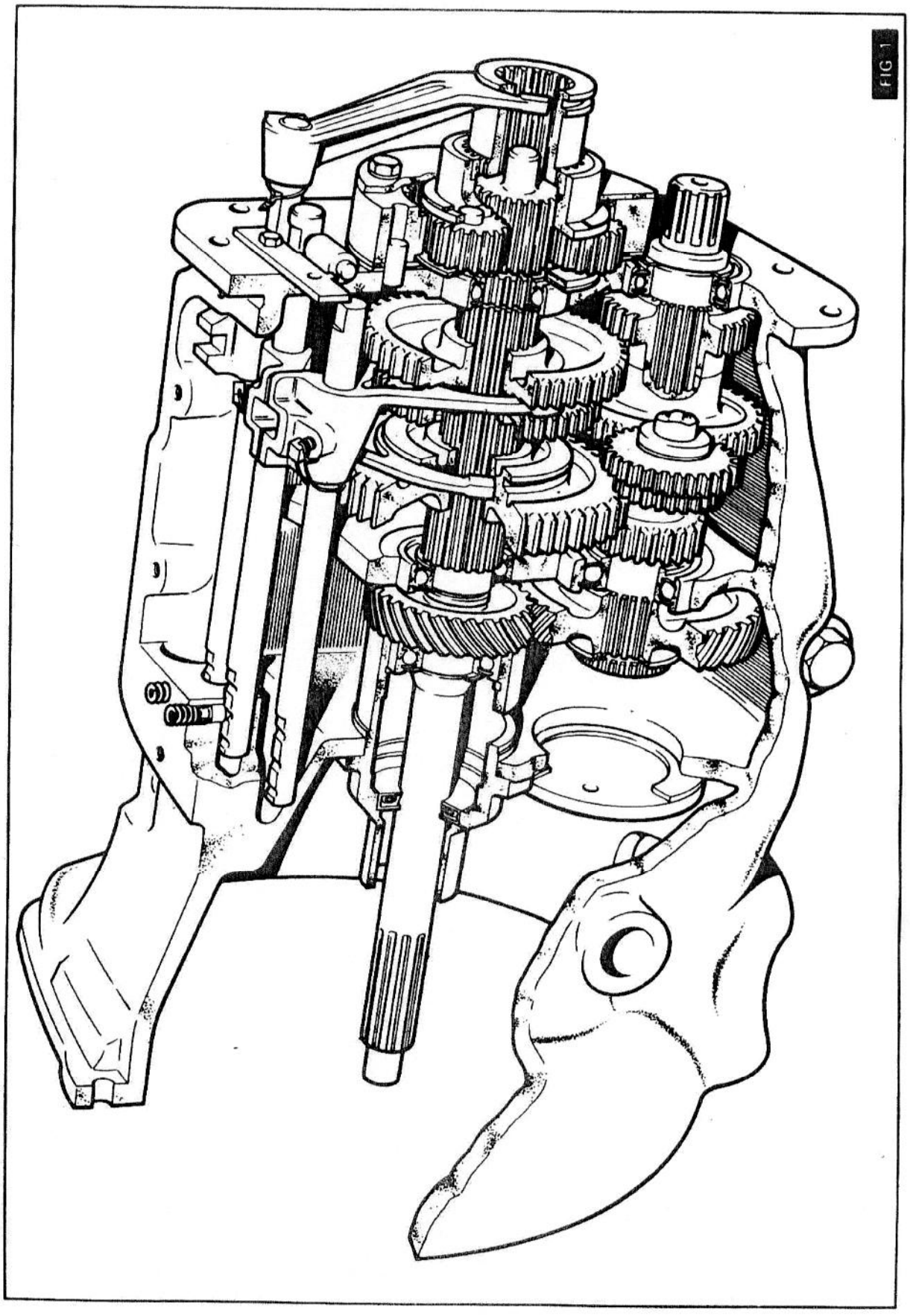
FIG 1

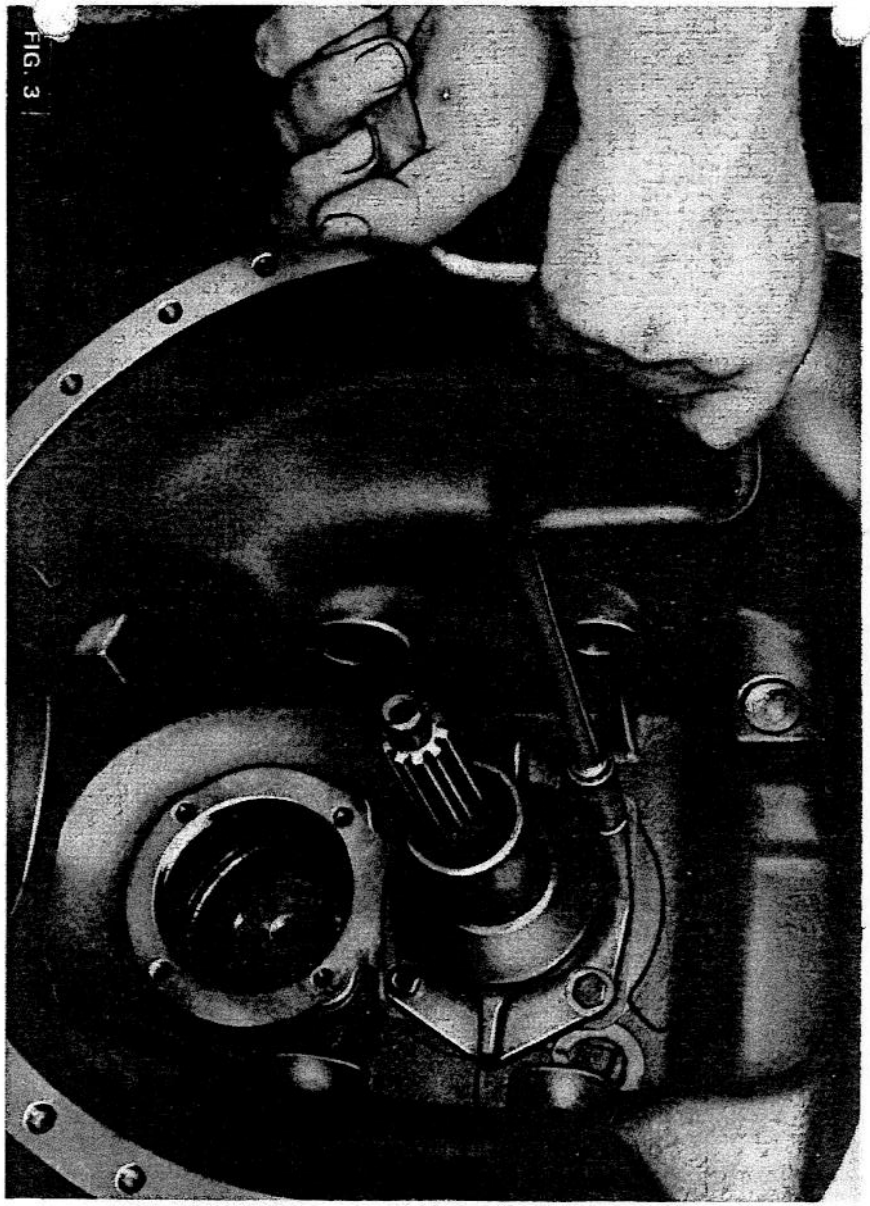

FIG. 3

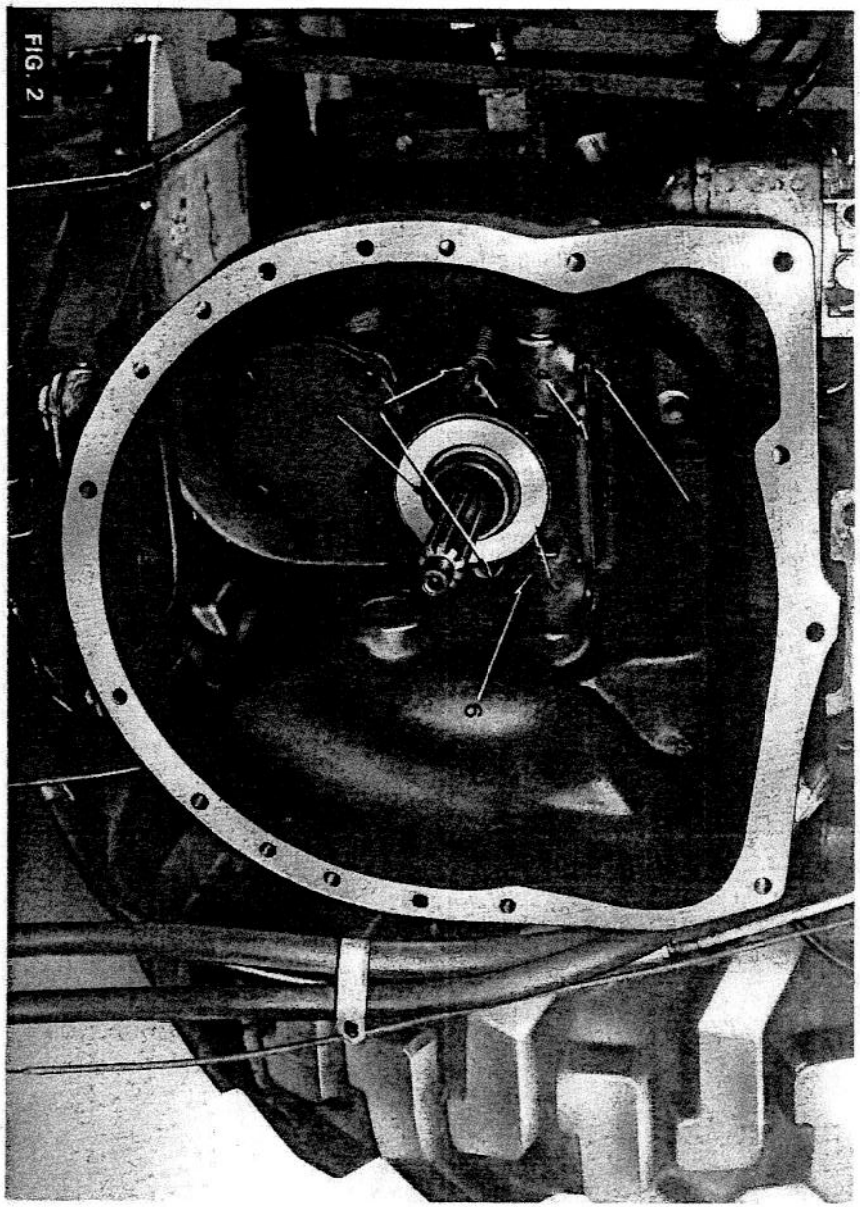

FIG. 2

TRANSMISSION TO ENGINE

Replacement (6A/2)

1. Support the transmission on a rail trolley.
2. Remove support stand MF 27G from the front of the transmission housing.
3. Wedge the rear part of the fuel tank in a slightly raised position.
4. Align the transmission with the engine then using guide studs join the two halves together.
5. Bolt the engine to the transmission housing and refit the starter motor.
6. Replace the two bolts and washers securing the steering box to the engine.
7. Remove the wedge from under the fuel tank and bolt the fuel tank to the tank support bracket.
8. Reconnect the fuel pipe between the primary and secondary fuel filters and the fuel pipes at the injection pump.
9. Reconnect the throttle rod at the injection pump, fuel cut-off cable, tachourmeter cable, oil pressure pipe, water temperature gauge wire and blockage indicator tube.
10. Reconnect the wiring to the thermostart, alternator, starter motor, horn, lights, fuel sender unit and neutral safety switch. Connect battery leads.
11. Secure wiring harness with clips.
12. Reconnect the heater hoses at the water pump.
13. Fit the drag link back onto the drop arm.
14. Remove the wooden wedges from between the axle and the axle support casting then remove the rail trolley.
15. Replace the hood.
16. Switch on the fuel and bleed the fuel system.
17. Top up the radiator with water.

MAIN DRIVE SHAFT AND RETAINER UNIT

Removal and Refitting (6A/3)

1. Split the machine between the engine and transmission as stated in operation 6A/1.
2. (Fig. 2) Release the two springs (1) securing the release bearing carrier (2) then slide the carrier and bearing assembly off the input shaft retainer (3).
3. Release the locking wire (4) and remove the two locking pegs (5) from the clutch release shafts and fork (6).
4. Remove the clutch release shafts and forks.
5. (Fig. 3) Remove the four bolts securing the main drive shaft retainer then remove the main drive shaft and retainer assembly, complete with gasket.
6. Replacement is a reversal of the above procedure.

Disassembly and Reassembly (6A/4)

1. Remove the drive shaft and retainer as described in operation 6A/3.
2. (Fig. 4) Remove the snap ring (1) that secures the bearing and drive shaft assembly (2) to the retainer (3).
3. Drive the shaft with its bearing out of the retainer.
4. Extract the snap ring (4).
5. Carefully remove the oil seal (5) from the retainer.
6. Reassembly is a reversal of the above procedure. Using tool MF 179 and handle 550 to replace the oil seal. (Fig. 5).

Note

When reassembling the main input shaft with the retainer, use tool MF 177 to protect the oil seal.

TRANSMISSION ASSEMBLY

Removal (6A/5)

1. Split the machine between engine and transmission as stated in operation 6A/1.

TRANSMISSION ASSEMBLY

Removal . . . Cont'd

2. Drain off the oil in the transmission and centre housing.
3. Remove steering wheel as described in operation 5B/1.
4. Unscrew the four bolts which secure the instrument panel and bulkhead to the fuel tank support frame.
5. Lift the complete instrument panel and bulkhead from the steering column.
6. Remove the fuel tank support frame.
7. Remove the steering box and column from the top of the transmission case.
8. Disconnect the clutch pedal operating rod from the clutch release shaft.
9. Disconnect both the left and right hand brake operating shafts.
10. Unbolt and remove the brake pedal stop from the top of the transmission case.
11. Remove the three nuts from the studs which secure the brake and clutch lever assembly to the underside of the transmission housing and lower the complete assembly to the floor.
12. Support the centre housing on a trolley jack.
13. Support the transmission housing with suitable lifting gear then remove the bolts which secure the transmission housing to the centre housing.
14. Push rear part of machine out of engagement with the transmission.
15. Fasten support stands MF 27G to the front and rear of the housing.

Replacement (6A/6)

1. Support the transmission assembly with suitable lifting gear and remove the stands MF 27G.
2. Fit the rear drive shaft to the gearbox then the shear tube to the rear drive shaft.
3. Push the centre housing into engagement with the transmission, simultaneously aligning the shear tube splines into the rear axle pinion splines.
4. The end float between the rear drive shaft and the mainshaft must be governed to 0.015" to 0.100" (0.38 mm to 2.54 mm) by fitting the split pin to the appropriate hole in the shear tube.
5. Bolt the transmission to the centre housing.
6. Fit the brake and clutch lever assembly to the underside of the transmission case and secure with the three studs and nuts.
7. Connect the brake linkage and clutch operating rods.
8. Replace the brake pedal stop onto the transmission housing.
9. Refit the steering box and column to the housing cover.
10. Bolt the tank support frame to the steering box.
11. Replace the instrument panel and bulkhead over the steering column and secure to the fuel tank support frame.
12. Replace steering wheel as described in operation 5B/1.
13. Reassemble the engine to transmission as stated in operation 6A/2.
14. Refill the transmission and centre housing with a recommended oil.
15. Check the brakes and clutch, adjust if necessary.

TRANSMISSION

Disassembly (6A/7)

A Preparation

1. Remove the transmission assembly from the machine and fix onto stands as stated in operation 6A/5.
2. Remove the main drive shaft and retainer unit as stated in operation 6A/3.
3. Remove the transmission cover complete with shift levers (for removal of levers from cover see operations 6A/9 and 6A/10).

B Clutch Release

1. Remove clutch release bearing, shafts and fork as stated in operation 6A/3.

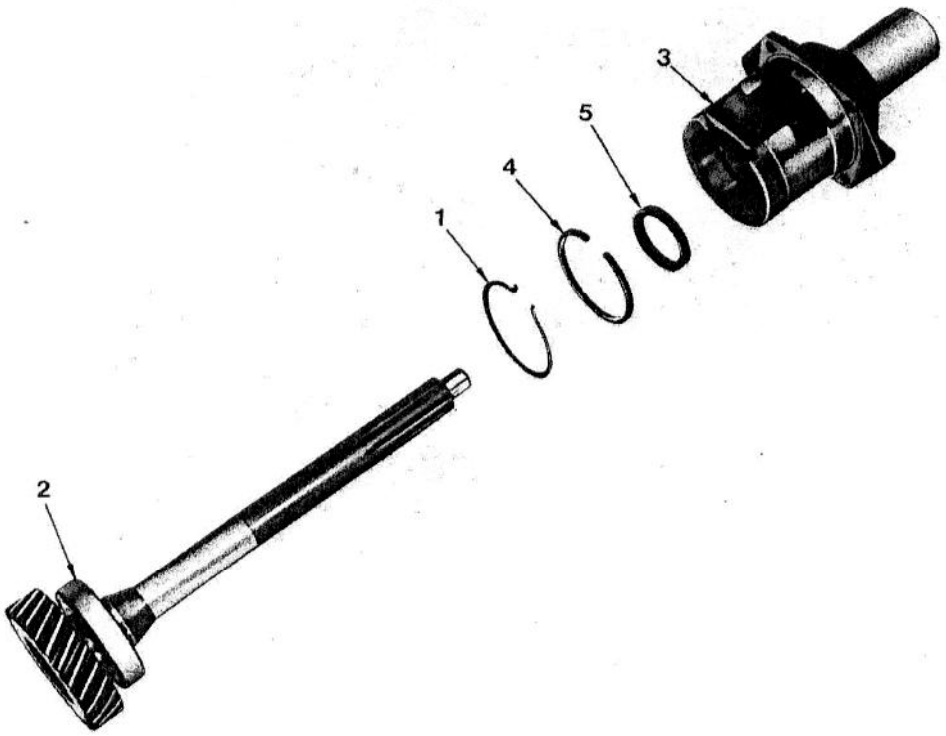

FIG. 4

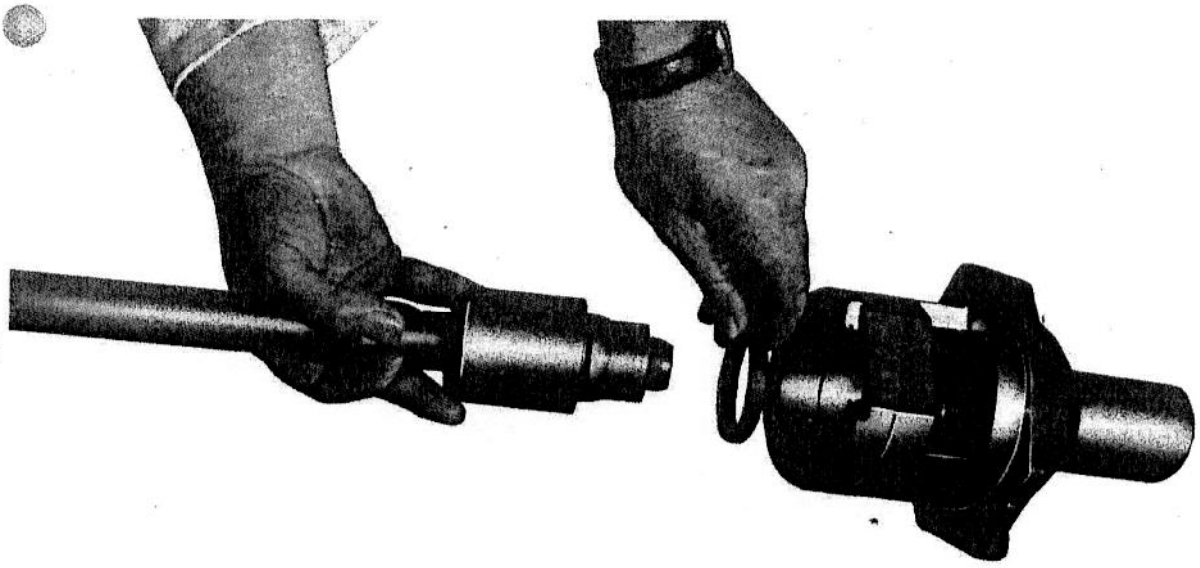

FIG. 5

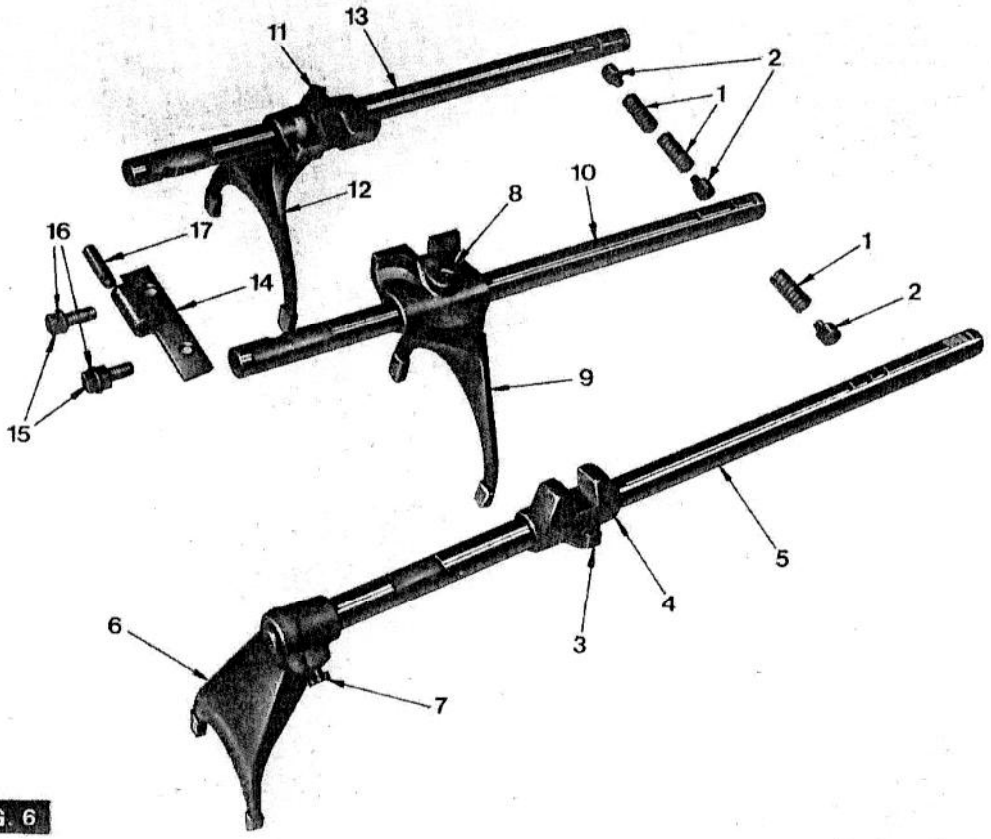

FIG. 6

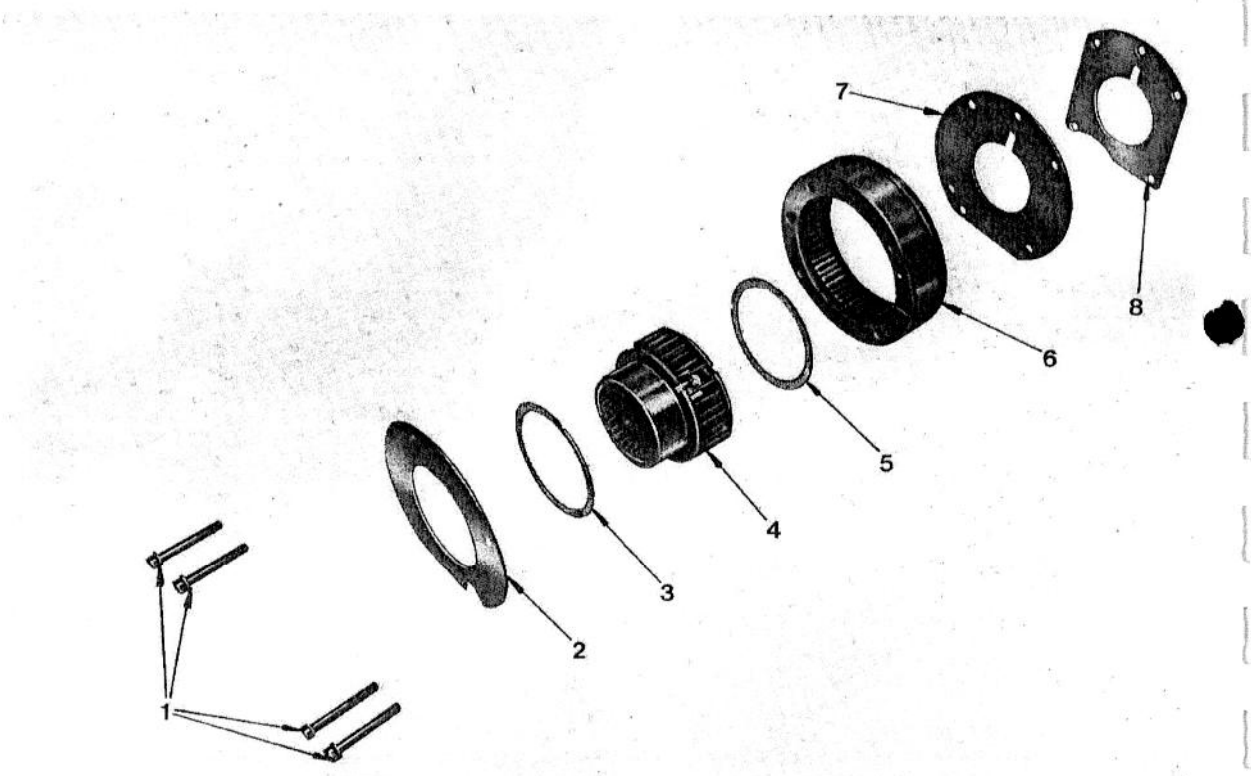

FIG. 7

TRANSMISSION

Disassembly . . . Cont'd

C Shift Rail and Forks

1. (Fig. 6) Remove the locking wire from the 1st/Rev. shift rail (10), the 2nd/3rd shift rail (13), and from the rear end of the high/low shift rail (5).
2. Remove the locking peg (7) from the high/low shift fork (6), detach the fork and coupler (4).
3. Remove the gear lever stop plate (14) and interlock (17), by unscrewing the two bolts (16) and spring washers (15).
4. Lift out the three shift rail springs (1) and plungers (2).
5. Remove the locking pegs (8) (11) from the 1st/Rev. fork (9) and the 2nd/3rd fork (12).
6. Slide the 1st/Rev. shift rail (10) and the 2nd/3rd shift rail (13) rearwards out of the transmission housing. Lift out the 1st/Rev. shift fork (9) and the 2nd/3rd shift fork (12).
7. Release the locking wire and remove the locking peg (3) from the high/low shift selector (4).
8. Slide the high/low shift rail (5) rearwards out of the transmission housing then lift out the high/low shift selector (4).

D Epicyclic Reduction Unit

1. (Fig. 7) Remove the four bolts and spring washers (1) which secure the unit to the rear of the transmission housing.
2. Remove the rear cover plate (2) thrust washer (3) planet pinion carrier assembly (4), planet ring gear (5), thrust washer (6), front cover plate (7) and shim (8).

E Main Drive Shaft and Retainer Unit

1. Remove and disassemble unit as described in operations 6A/3 and 6A/4.

F Mainshaft

1. (Fig. 8) Remove the snap ring (1) from the front end of the mainshaft.
2. (Fig. 9) Suitably wedge the mainshaft 1st and 2nd/3rd gears and drive the mainshaft rearwards out of its front bearing.
3. (Fig. 8) Withdraw the mainshaft (2) with its rear bearing. (3).
4. Lift out the mainshaft, 1st gear (4) and 2nd/3rd gear (5).
5. Remove main shaft front bearing (6).

G Countershaft

1. Remove the countershaft cover by removing the 4 securing bolts.
2. (Fig. 10) Remove the snap ring (1) from the front end of the countershaft (2).
3. Slide the constant mesh gear (3) off the front of the countershaft and lift out the gear.
4. Remove the snap ring (4) from the rear end of the countershaft forwards out of its rear bearing.
5. Lift out the countershaft (2) with its front bearing (6) then lift out the countershaft 2nd gear (7) and 3rd gear (8).
6. Remove the countershaft rear bearing (5).

H Reverse Idler Gear and Shaft

1. (Fig. 11) Release the tabwasher (1), then remove the bolt (2) and reverse shaft stop (3).
2. Withdraw the reverse shaft (4) slightly rearwards. Insert a dummy shaft 1" dia. by 2⅛" long (25.4 mm x 55.56 mm), into the front of the reverse shaft bore and push out the reverse shaft rearwards with the dummy shaft. This enables the reverse cluster gear assembly to be removed without dropping the 56 bearing rollers (5).

TRANSMISSION

H Reverse Idler Gear and Shaft . . . Cont'd

3. Lift out the reverse cluster gear assembly with spacer (6), washer (7), washer (8) and dummy shaft.
4. The reverse cluster gear (9) is dismantled by removing the spacer (6) washer (7), washer (8), dummy shaft, roller retainers (10), 56 rollers (5) and roller spacer (11).

J Bearings

1. (Fig. 12) Press the bearings off the mainshaft, countershaft, main drive shaft using multi-purpose bearing remover/replacer tool MF 220-25 and press.

Reassembly (6A/8)

A Reverse Idler Gear and Shaft

1. (Fig. 11) Assemble to the reverse idler gear (9) the roller spacer (11), 56 rollers (5) (using grease to retain them), roller retainers (10), dummy shaft, washer (7), washer (8) and spacer (6). Ensure the spacer (6) is next to the larger gear.
2. Position the reverse roller gear assembly into the transmission housing with the larger gear to the rear.
3. Push the shaft (4) through the gear (9) and remove the dummy shaft.
4. Fit the reverse shaft stop (3) to the slot in the shaft and secure with the bolt (2) and tabwasher (1).

B Countershaft

1. (Fig. 10) Position the countershaft 2nd gear (7) and 3rd gear (8) into the transmission housing with their bosses together. The smaller 2nd gear fits to the rear.
2. Fix the countershaft (2) with its front bearing (6) through the front of the transmission housing and slide the 2nd and 3rd gears onto the splines of the countershaft.
3. Fit the countershaft rear bearing (5) into its bore, attach a suitable bearing retainer plate to the transmission housing (Fig. 13) to prevent the countershaft bearing from being ejected when the countershaft is driven rearwards into this bearing.
4. Drive the countershaft rearwards until the rear snap ring can be fitted to the end of the countershaft.
5. Detach the bearing retainer plate from the rear of the housing and fit the snap ring (4) to the countershaft.
6. Assemble the constant mesh gear (3) (with boss forward) to the splines on the front end of the countershaft.
7. Refit the snap ring (1) to the front end of the countershaft.
8. Refit the countershaft cover securing it with the four bolts.

C Mainshaft

1. (Fig. 8) Fit the mainshaft front bearing (6) to its housing. The shield must face forward.
2. Place the mainshaft 1st gear (4) and 2nd/3rd gear (5) in position. The bosses must be together.
3. Fit the mainshaft (2) with its rear bearing (3) through the rear of the transmission housing and assemble the mainshaft 1st and 2nd/3rd gears to their splines on the mainshaft.
4. Assemble the main drive shaft retainer assembly as stated in operation 6A/4 temporarily refit the assembly and secure with the four bolts. This will retain the mainshaft front bearing when the mainshaft is driven forwards into the front bearing.
5. Remove the mainshaft rear bearing outer snap ring and drive the mainshaft forwards into its front bearing until the mainshaft front snap ring (1) can be fitted to its groove.
6. Remove the main drive shaft and retainer assembly.
7. Fit the snap ring (1) to the front end of the shaft.
8. Refit the mainshaft rear bearing outer snap ring.