

**TRUCK, UTILITY, 3/4 TON GS, FFR, 12 VOLT
ELECTRICAL SYSTEM
INSTALLATION OF 24 VOLT ALTERNATOR EQUIPMENT
MODIFICATION INSTRUCTION**

Reference: AC in WM No 23615/3.

Summary

1. This instruction details the fitting of a separate 24 volt electrical system for the radio installation on 12 volt FFR Landrovers to overcome the difficulties encountered with common charging systems. For engines fitted with a Zenith carburettor, modification to the fuel pipe (detail 8) will apply.

Estimated manhours to perform: 14.0 (Initial planning only)

2. **Priority:** Group 2.
3. **Modification to be applied to:** Stocks as directed by AHQ.
4. **Item affected:** Truck, Utility, 3/4 Ton GS, FFR, 12 Volt Electrical System (6006A).
5. **Action required:** By RAEME field and base workshops in accordance with WKSP A 850.
6. **Stores required:** To be demanded through normal RAAOC channels.

Item No	D S N	Designation	Qty
	2920-66-024-5844	GENERATING SET, engine accessory, 24 V DC, FFR, Landrover comprising items 1 to 57	1
1	2920-66-025-5182	GENERATOR, ENGINE ACCESSORY, AC, 24 V, CAV model 7B24-14M/C2M	(1)
2	2920-66-025-5277	PULLEY GROOVE, alternator	(1)
3	5315-66-025-5222	KEY, WOODRUFF, shaft	(1)
4	5310-66-014-7560	NUT, SLOTTED, HEXAGON, UNF, 2B, 'A' steel, zinc coated, 3/4 in	(1)
5	5315-66-017-5937	PIN, COTTER, split, mild steel, 1/8 in by 1/2 in lg	(1)
6	2920-66-025-6476	CLAMP ASSEMBLY	(1)
7	5306-66-019-3770	BOLT, MACHINE, UNF, 2A, SAE grade 5 steel, hex hd, zinc coated, 5/16 in by 1/2 in lg	(2)
8	5310-66-019-3957	NUT, PLAIN, HEXAGON, UNF, 2B, steel formed, zinc coated 5/16 in	(3)
9	5310-66-016-5980	WASHER, LOCK, spring steel, single turn, square section, cad plated, 5/16 in	(3)
10	2920-66-025-5294	BRACKET, ENGINE ACCESSORY GENERATOR	(1)
11	5306-66-025-5289	BOLT, MACHINE, UNF, high tensile steel, 1/2 in by 4 3/4 in lg	(4)
12	2920-66-025-5276	CONNECTING LINK, RIGID, straight	(1)
13	5306-66-025-5290	BOLT, MACHINE, UNF, 2A, SAE grade 5 steel, hex hd, zinc coated, 5/16 in by 3/4 in lg	(1)
14	5306-66-025-5278	BOLT, MACHINE, UNF, 3/8 in by 7/4 in lg, steel, cad plated	(1)
15	5310-66-019-3958	NUT, PLAIN, HEXAGON, UNF, 2B, steel formed, zinc coated 3/8 in	(2)
16	5310-66-016-5995	WASHER, LOCK, spring steel, single turn, square section, cad plated, 3/8 in	(2)
17	5306-66-011-0537	BOLT, MACHINE, UNF, 2A, SAE grade 5 steel, hex hd, zinc coated, 3/8 in by 1 in lg	(1)
18	5310-66-016-8930	WASHER, FLAT, steel, rd, zinc coated, 3/8 in bolt size	(1)
19	3030-66-025-5291	BELT, V, generator drive, 55 7/16 in lg	(1)
20	5325-66-023-9495	GROMMET, RUBBER, natural rubber, 1.000 in id by 1.625 in od by 0.313 in o/a h	(1)
21	N I C	GROMMET, RUBBER, 1/2 x 3/4, Kaymac K14	(2)
22	6625-66-024-7362	AMMETER, 60-0-60, less shunt	(1)
23	6625-66-025-5272	GUARD, AMMETER	(1)
24	N I C	SCREW, No 10-32 UNF x 1/2 in lg, binding hd, steel	(16)
25	5310-66-015-5026	NUT, PLAIN, HEXAGON, UNF, 2B, 'A' steel, zinc coated, No 10	(18)

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Item No	D S N	Designation	Qty
26	N I C	WASHER, LOCK, internal teeth, 3/16 in, steel, cad plated	(18)
27	5975-66-025-5293	ADAPTOR ASSEMBLY, ELECTRICAL CONDUIT	(2)
28	5975-66-025-5283	CONDUIT, METAL, FLEXIBLE, 3/4 in by 8 ft 4 in lg	(1)
29	2590-66-025-5271	LEAD, ELECTRICAL, positive, 97/012, 9 ft lg	(1)
30	2590-66-025-5270	LEAD, ELECTRICAL, negative, 97/012, 9 ft lg	(1)
31	2590-66-025-5266	LEAD, ELECTRICAL, positive, 40/0076, 9 ft lg	(1)
32	2590-66-025-5267	LEAD, ELECTRICAL, negative, 40/0076, 9 ft lg	(1)
33	N I C	CLAMP, CABLE, 7/8 in (Utilux, H1003)	(2)
34	N I C	SCREW, 1/4 UNF x 3/4 in lg, binding hd, steel, cad plated	(4)
35	5310-66-015-5121	NUT, PLAIN, HEXAGON, UNF, 2B, 'P' steel, cad plated, 1/4 in	(4)
36	N I C	WASHER, LOCK, internal teeth, 1/4 in, steel, cad plated	(4)
37	5975-66-025-5284	CONDUIT, METAL, FLEXIBLE, 1/2 in by 7 ft 9 in lg	(1)
38	5975-66-025-5285	FERRULE, ELECTRICAL, CONDUIT, 1/2 in	(2)
39	2590-66-025-5269	LEAD, ELECTRICAL, 9 ft lg, 40/0076, positive	(1)
40	2590-66-025-5268	LEAD, ELECTRICAL, negative, 40/0076, 9 ft lg	(1)
41	N I C	CLAMP, CABLE, 1/2 in	(4)
42	N I C	CLAMP, LOOP	(3)
43	N I C	CONNECTOR (AMP 34114)	(2)
44	2920-66-025-5247	REGULATOR, ENGINE GENERATOR, screened, CAV model 446-24-2	(1)
45	2590-66-025-5265	LEAD, ELECTRICAL, negative, 47/012, 11 in lg	(3)
46	5310-66-022-0661	NUT, SELF-LOCKING, HEXAGON, UNF, 2B, steel, cad plated, passivated, 1/4 in, w/nylon insert	(4)
47	NOT USED		
48	5920-66-025-5273	FUSE BOX	(1)
48A	5920-66-025-5286	FUSE, CARTRIDGE, English Electric type GS 150/75	(2)
49	N I C	SCREW, No 10-32 UNF x 3/4 in lg, binding hd, steel, cad plated	(2)
50	NOT USED		
51	6110-66-025-5292	DISTRIBUTION BOX	(1)
51A	6625-66-025-5274	SHUNT, INSTRUMENT, 60 amp at 75 mV	(1)
52	NOT USED		
53	NOT USED		
54	2920-66-025-6477	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, BRANCHED	(1)
55	5310-00-167-0835	WASHER, FLAT, steel, rd, cad plated, 1/4 in bolt size, 1/2 in od by 0.032 in thk	(1)
56	N I C	PLATE, designation	(1)
57	N I C	PACKING, preformed	(1)

NOTE: Replenishment of NIC items will be by acceptable alternatives or by local purchase.

7. Additional items to those shown in para 6 are required when a Zenith carburettor is fitted.

Item No	D S N	Designation	Qty
58	4710-66-013-2221	TUBE, COPPER, seamless, 1/4 in by 20 SWG (0.036 in)	6 inches
59	4730-66-017-7149	NUT, tube coupling, 1/4 in	1
60	4730-66-017-3057	SLEEVE, COMPRESSION - Tube, hose fitting 1/4 in	1
61	2530-66-018-0210	NUT, tube 1/4 in - P 2577	1

8. **Stores removed.** To be disposed of in accordance with GEN P 050-P 059 series.

a.	3030-66-016-0578	BELT 'V', matched set, fan and generator, matched prs	Qty	1
b.	5306-66-016-7465	BOLT, internally relieved, body special, cylinder hd to block, short		4
c.	N I C	ENGINE lifting eye		1

Detail

NOTE: All figures in brackets refer to items listed in para 6 and 7.

9.
 - a. Manufacture the fuel extension tube as detailed in fig 12. Ensure that the tube (58) does not extend more than 3/16 inch into the inverted nut (61) before silver soldering.
 - b. Disconnect the fuel line at the carburettor, and fit the modified tube assembly. Do not tighten the tube nut at the carburettor.
 - c. Remove the fuel line and anchor clip from the water pump and detach the anchor clip from the fuel line.
 - d. Remove the front rocker cover screw and enlarge the hole in the anchor clip to suit the screw.
 - e. Loosen both the fuel line anchor clip at the distributor, and the nut at the outlet union of the petrol pump.
 - f. Turn the outlet union downwards about 60 degrees. At the same time, feed the fuel line through the line anchor towards the fuel pump until the fuel line is clear of the fan shroud. Ensure that there are no sharp bends in the fuel line.
 - g. Tighten the petrol pump outlet nut and the anchor clip at the distributor.
 - h. Refit the modified anchor clip at the fuel line and fit to the rocker cover. Leave the screw loose.
 - i. Ensure that there are no sharp bends in the fuel line at the carburettor end and tighten the tube nut on the carburettor.
 - j. Secure the anchor clip on the rocker cover.
10.
 - a. Disconnect the earth connection from the vehicle battery.
 - b. Fit the pulley (2) to the alternator (1) using the key (3), nut (4) and split pin (5).
 - c. Attach the clamp assembly (6) to the alternator using the bolts (7), nuts (8) and spring washers (9) in the position indicated in figs 1, 2 and 3.
 - d. Bend the end of the fan cowl to clear the new alternator belt (figs 1, 2 and 3).
 - e. Loosen the 12 volt generator mountings, remove the front fan belt and reset the generator position for the correct belt tension on the rear belt.

NOTE: The tension is correct when it is possible to depress the belt by thumb approximately 1/2 inch to 1 inch (12 mm to 25 mm) at a point midway between the fan and crankshaft pulleys.

11. Remove the engine lifting eye from the front of the cylinder head and remove the front four accessible cylinder head bolts.
12. Fit the bracket (10) using the four high tensile bolts (11) and the two bolts removed from the lifting eye (fig 1).
13. Remove the bolt holding the wiring harness clip on the front of the water pump and fit the stay (12) under this bolt.
14. Attach the wiring clips to the stay using bolt (13), nut (8) and lock washer (9). (Refer to fig 2.)
15. Mount the clamp and the alternator on the bracket using bolt (14), nut (15) and lock washer (16) (fig 1).

NOTE: The bolt head must be at the rear of the bracket.

16. Attach the stay to the clamp using bolt (17), nut (15), flat washer (18) and lock washer (16) (fig 3).
17. Check for correct alignment between the alternator pulley and the existing engine pulleys. Loosen the clamp bolts and reposition the alternator in the clamp, if required.

NOTE: The position of the grease nipple on the alternator relative to the clamp hinge must be as shown in fig 2 to ensure that the cable outlet clears the carburettor.

18. Fit the vee belt (19) over the front engine pulleys and the alternator pulley and tighten the belt by swinging up the alternator. Lock the alternator in position by tightening the bolts at each end of the stay and the clamp hinge bolt.

NOTE: Correct belt tension allows less than 1 inch total movement in the belt between the fan pulley and the alternator pulley. The belt must be kept extremely tight to prevent belt slip.

19. Referring to fig 4, mark out and drill:
 - a. Two 7/32 inch holes for cable clamps in the wall behind the passenger seat.
 - b. One 3/4 inch hole in the top of the mudguard from under the vehicle and fit grommet (21) in the hole.
 - c. Four 9/32 inch holes in the driving compartment for mounting the screened control box (44).
 - d. One 1-5/16 inch hole in the side of the left hand mudguard from the cargo compartment and fit grommet (20) in the hole.
 - e. One 7/32 inch hole for the upper cable clamp (41).
 - f. One 9/32 inch hole and install earth stud (34, 35, 36 and 55).
 - g. Position the terminal box (51) and the cable assembly, special purpose (54) as indicated and drill the eight 7/32 inch mounting holes.
 - h. Remove the rubbing strip indicated by drilling the rivet heads. Remove any rivets which prevent the screened control box fitting flat against the wall.

20. Referring to fig 5:
 - a. Unscrew the ammeter panel and cut a 2½ inch diameter hole.
 - b. Mark out and drill two 7/32 inch holes in the ammeter panel.
21. Fit the ammeter (22) and guard (23) using screws (24), nuts (25) and lock washers (26).
22. Mark out and drill:
 - a. One ¾ inch hole in the fire wall (fig 6).
 - b. A pilot hole in the channel below the left door and enlarge the 9/32 inch diameter hole (fig 9).
 - c. Two 7/32 inch holes in the foot rest (fig 7).
 - d. One 7/32 inch hole in the panel at the right of the foot rest and one 9/32 inch hole in the floor panel (fig 10).
23. Bend the panel below the left front mudguard away from the bracket to allow the ¾ inch conduit to pass through (fig 8):
 - a. Attach one adaptor, electrical, conduit (27) to the ¾ inch conduit (28). Fit the packing, preformed (57) into the groove in the adaptor.
 - b. Feed the plain ends of the leads (29, 30, 31 and 32) into the ¾ inch conduit through the adaptor.
 - c. Remove the generator terminal cover and connect the leads to the terminals as indicated in the circuit diagram (fig 11). Fit the flange of the adaptor into the groove in the generator outlet and loosely refit the terminal cover.
 - d. Feed the free end of the conduit through the mudguard panel, bent in para 21 above, and clamp the conduit below the sloping footrest using the clamp (33), screw (24), nut (25) and lock washer (26) (fig 7).
 - e. Fit a grommet (21) into the ¾ inch hole drilled in the fire wall (refer to fig 6).
 - f. Fit the ½ inch conduit (37) through the grommet (21) to protrude 1½ inches into the rear of the ammeter panel and attach a ferrule (38) to the end of the conduit.
 - g. Feed two leads (39, 40) into the conduit to leave the lugs and approximately 9 inches of lead protruding.
 - h. Connect the red lead to the ammeter terminal marked with a + sign and connect the black lead to the other terminal. Refit the ammeter panel.
 - i. Clamp the ½ inch conduit using two clamps (41) with screws (34), nuts (35) and lock washers (26) (fig 7).
 - j. Clamp both conduits below the floor panel and to the channel under the door using three clamps (42) with screws (34), nuts (35) and lock washers (36) (figs 9 and 10).
 - k. Slide a clamp (41) over the ½ inch conduit and feed 6½ inches of the conduit through the grommet in the top of the rear mudguard and clamp the end to the wall using the clamp (41), with screw (24), nut (25) and lock washer (26) (fig 4).
 - l. Fit a ferrule (28) to the end of the conduit and clamp the conduit under the mudguard using the clamp (41), nut (25) and lock washer (26).
 - m. Slide a clamp (33) over the ¾ inch conduit through the large grommet in the side of the rear mudguard.
 - n. Remove the coupling nut from the regulator unit (44) and slide it over the conduit. Attach an adaptor, electrical, conduit (27) to the end of the conduit.
24. Remove the cover from the screened control box (44). Trim the four leads coming from the ¾ inch conduit to the required length and attach to terminals in the box in accordance with the circuit diagram (fig 11).
 - a. Using a suitable multimeter set on the low ohms scale check for correct connections between corresponding terminals on the generator and the screened control box terminals (fig 11).
 - b. Refit the terminal cover on the generator and the cover on the screened control box and attach the conduit to the control box.
 - c. Connect one lead (45) to the box earth terminal stud and one to the B-terminal. Bolt the box to the wall using the four self locking nuts (46) and push back into the mudguard any excess ¾ inch conduit (fig 4).
 - d. Attach the clamp (33) below the mudguard using the screw (24), nut (25) and lock washer (26) (fig 4).
 - e. Remove the cover of the fuse box (48) and positioning the fuse box drill the two 7/32 inch mounting holes (fig 4).
 - f. Attach the fuse box using the screws (29), nuts (25) and lock washers (26) and replace cover.
 - g. Connect the right hand lead from the fuse box to the B+ terminal on the screened control box.
 - h. Connect the shunt (51A), if not already fitted, across the rear of the B+ and Tx terminals on the terminal box (51) (fig 13).
 - i. Attach the connectors (43) to the leads from the ½ inch conduit, connect the red lead and the left hand lead from the fuse box to the rear of the Tx terminal on the terminal box and the connector on the cable assembly, special purpose, to the rear of the B+ terminal.
 - j. Attach a lead (45) to the rear of the B+ terminal on the terminal box and mount the terminal box and the cable assembly, special purpose on the wall using screws (24), nuts (25) and lock washers (26) (fig 4).
25. Fix the plate, designation (56) beside the ammeter (fig 5).
26. Reconnect the vehicle battery earth, start the engine and run at a fast idle.
27. Check for approximately 28 volts dc between the B+ and B- terminals in the rear of the vehicle.
28. Touch up any scratched or unpainted surfaces in accordance with WKSP B 700.

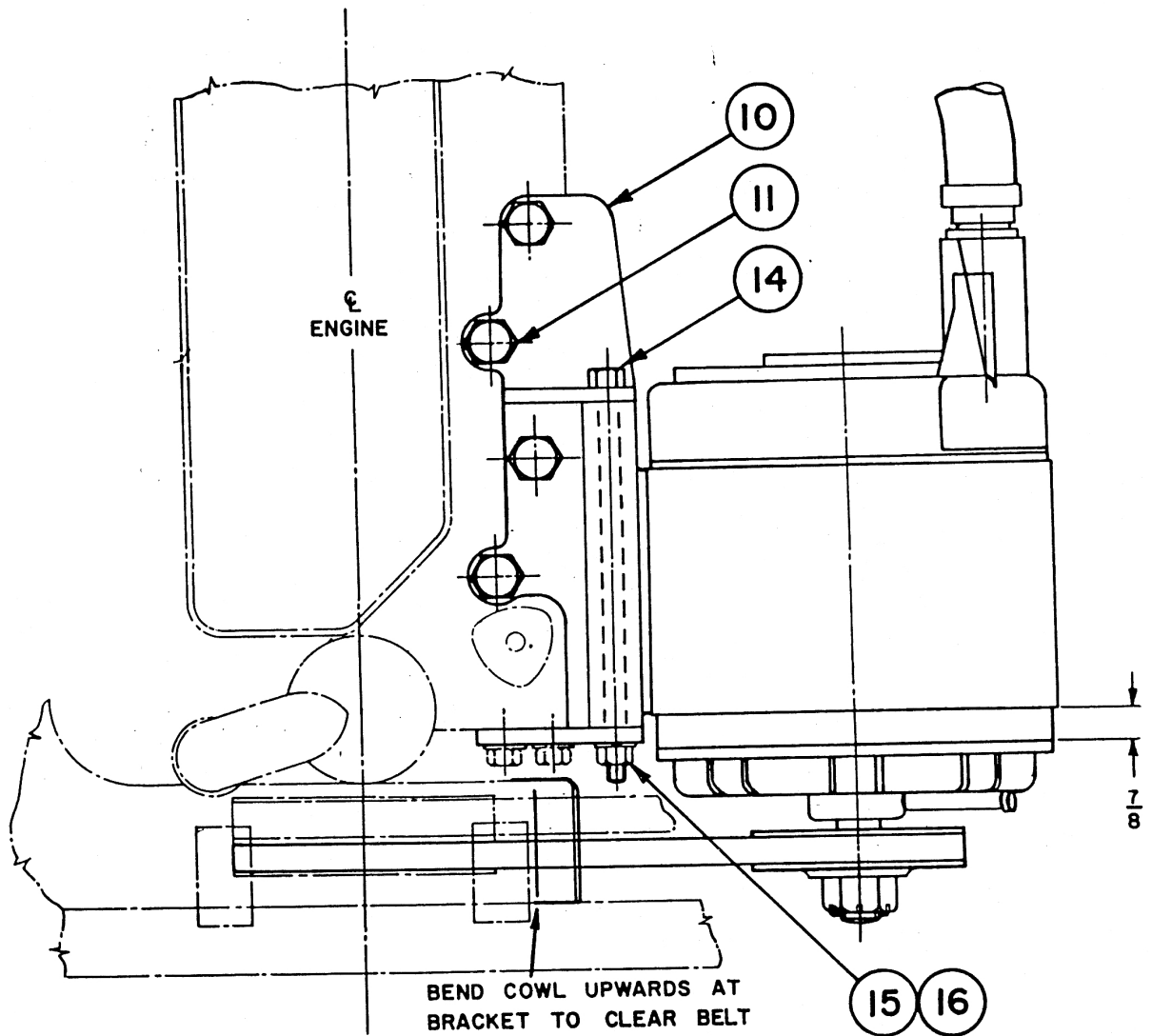


FIG 1 - FITTING OF ALTERNATOR TO ENGINE - PLAN

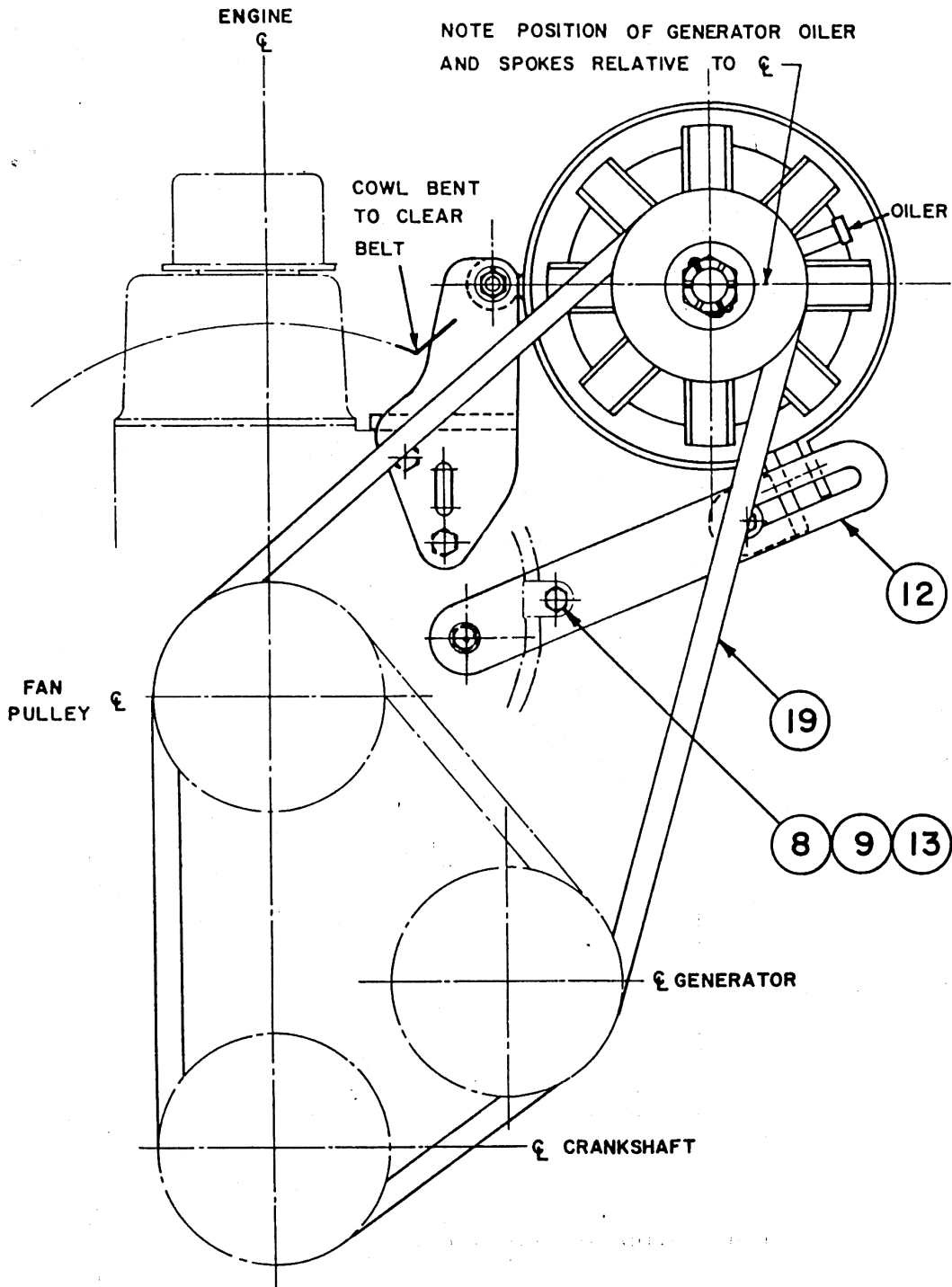


FIG 2 - FITTING OF ALTERNATOR TO ENGINE - END ELEVATION

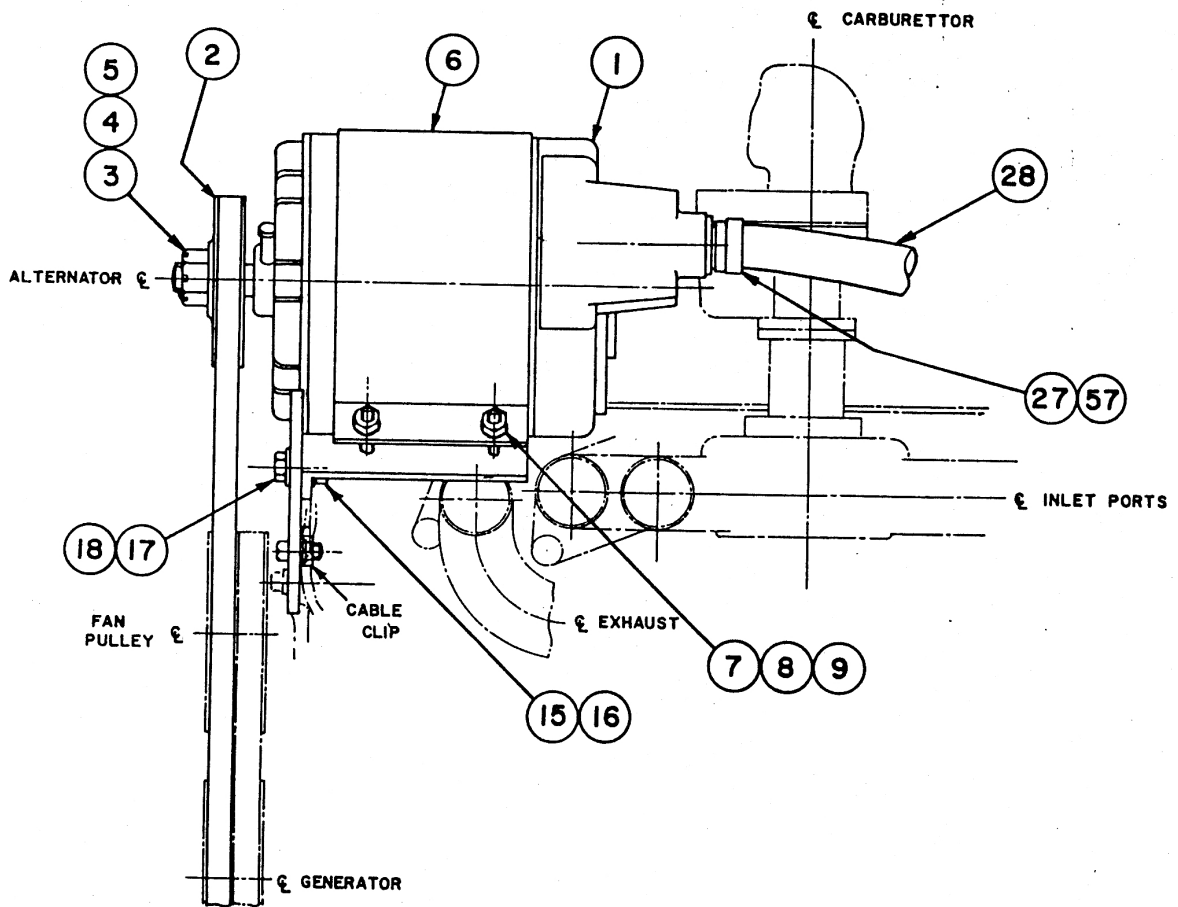


FIG 3 - FITTING OF ALTERNATOR TO ENGINE - SIDE ELEVATION

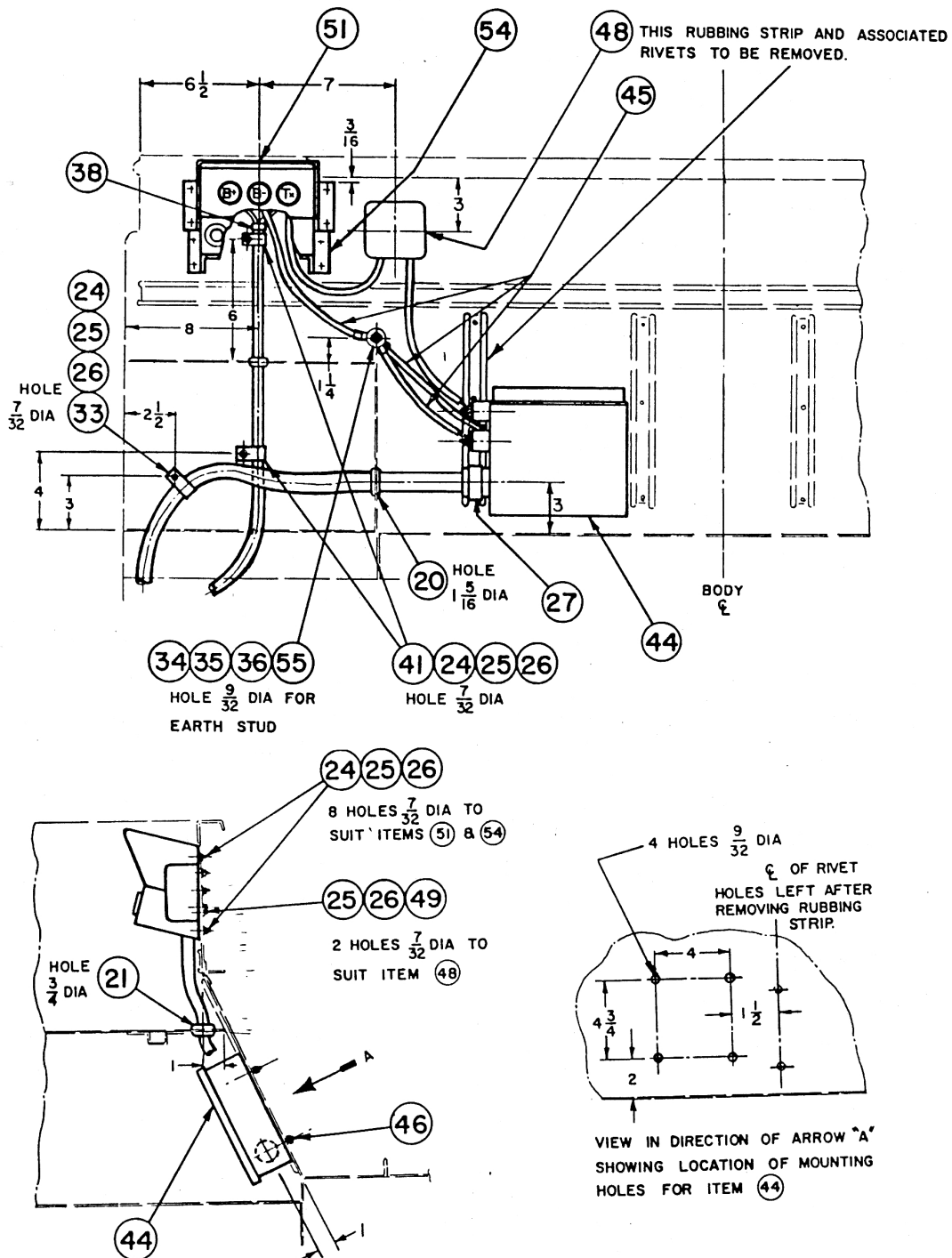


FIG 4 - FITTING DETAILS FOR REGULATOR, DISTRIBUTION AND FUSE BOX

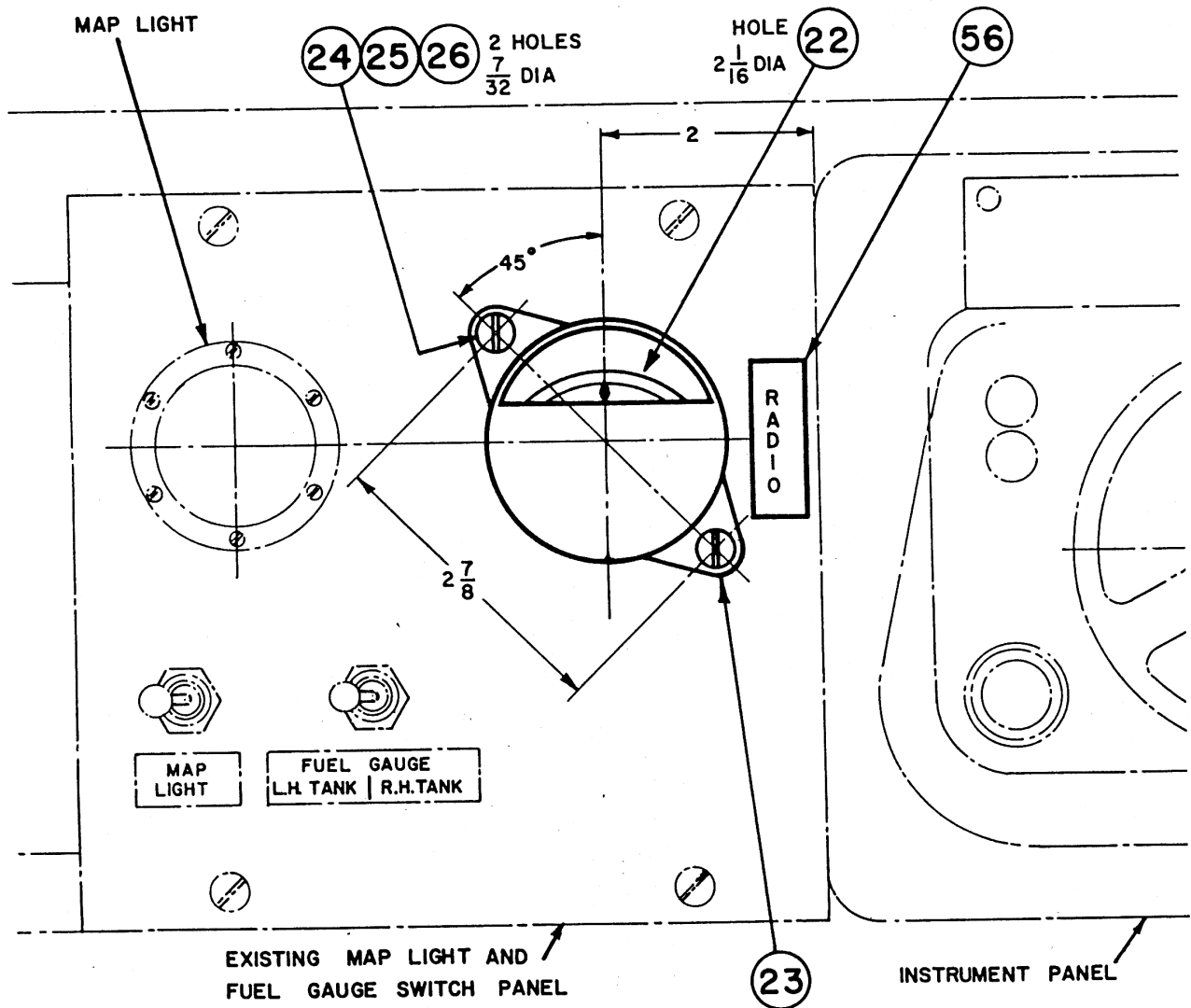


FIG 5 - FITTING DETAILS FOR AMMETER

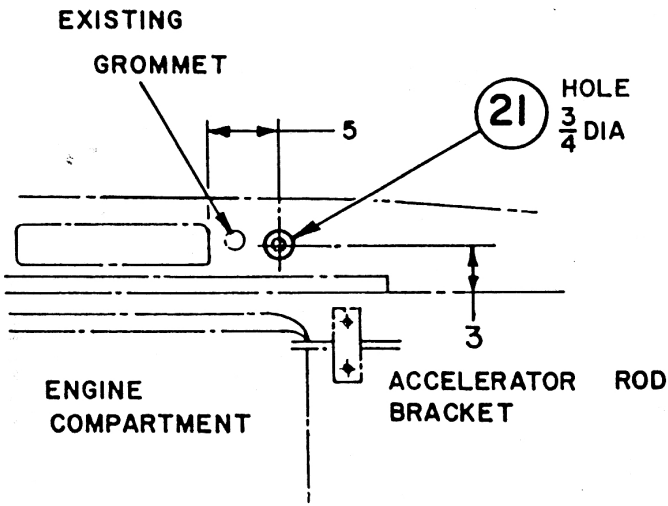


FIG 6 - POSITIONING OF GROMMET -
FIRE WALL - ENGINE COMPARTMENT

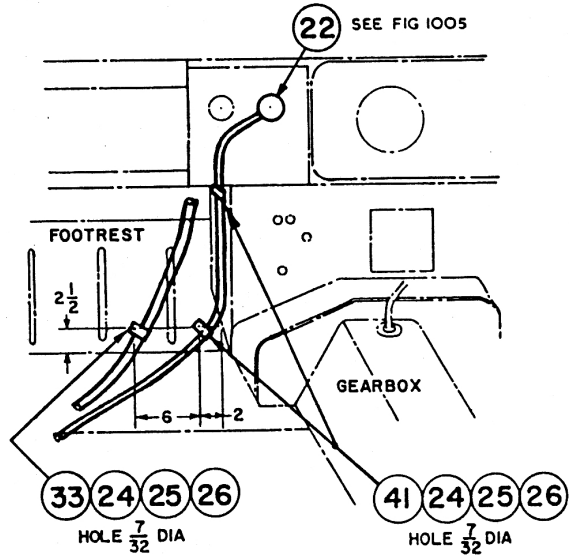


FIG 7 - CONDUIT CLAMPING - FOOTREST

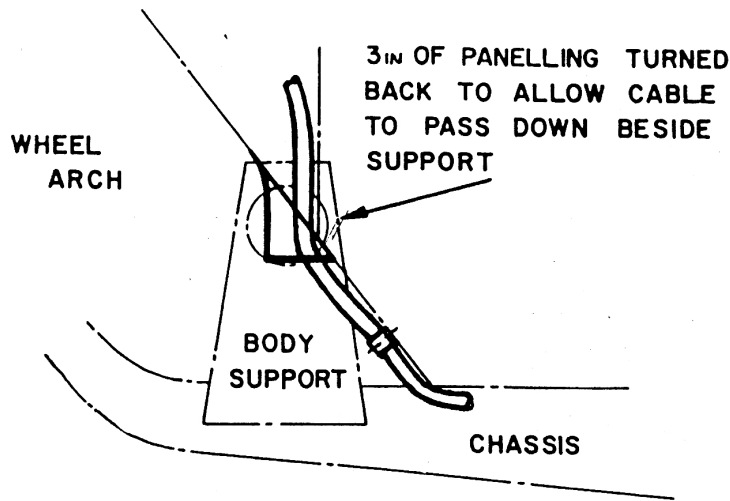


FIG 8 - PANEL - MUDGUARD

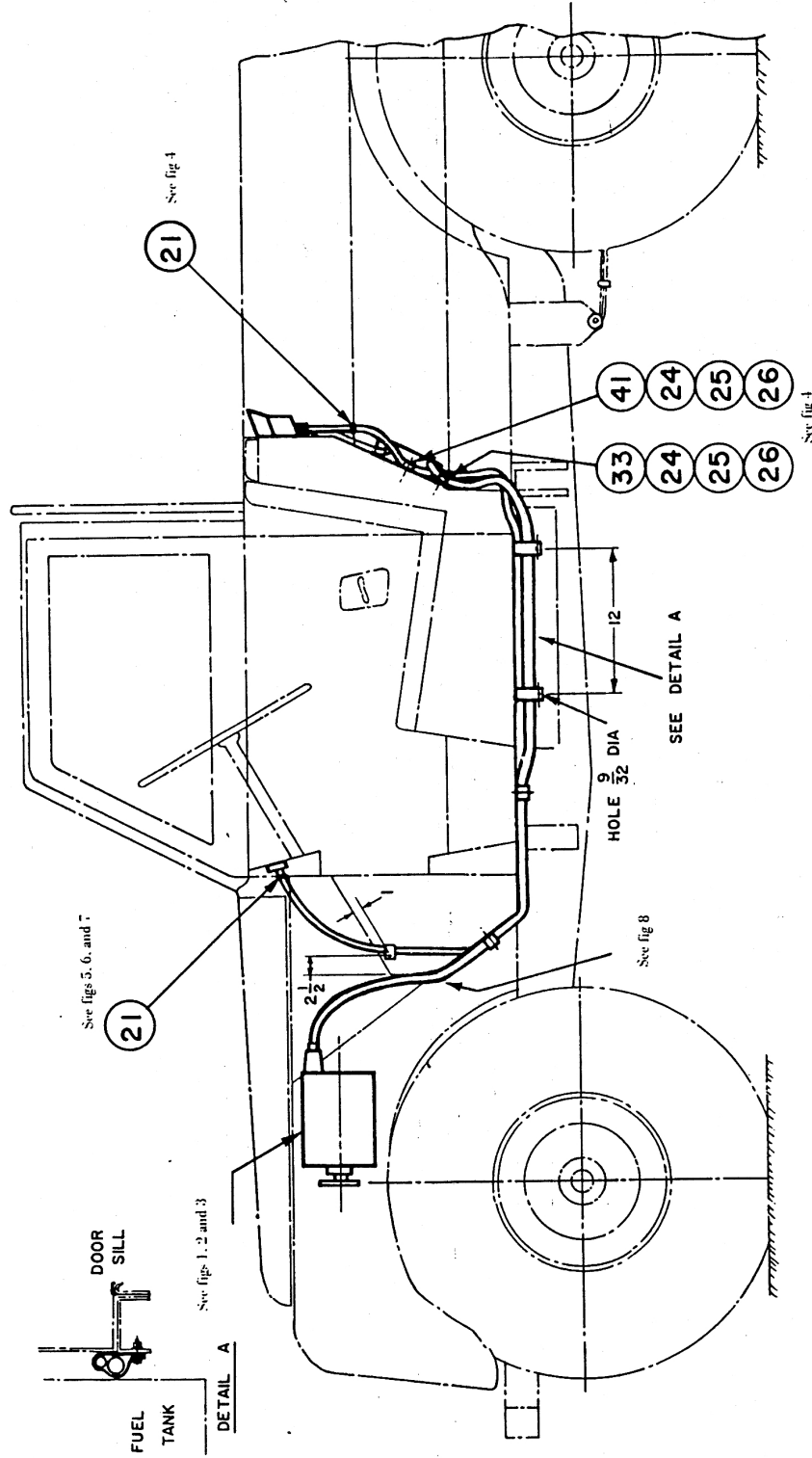


FIG 9 - CONDUIT LAYOUT - ELEVATION

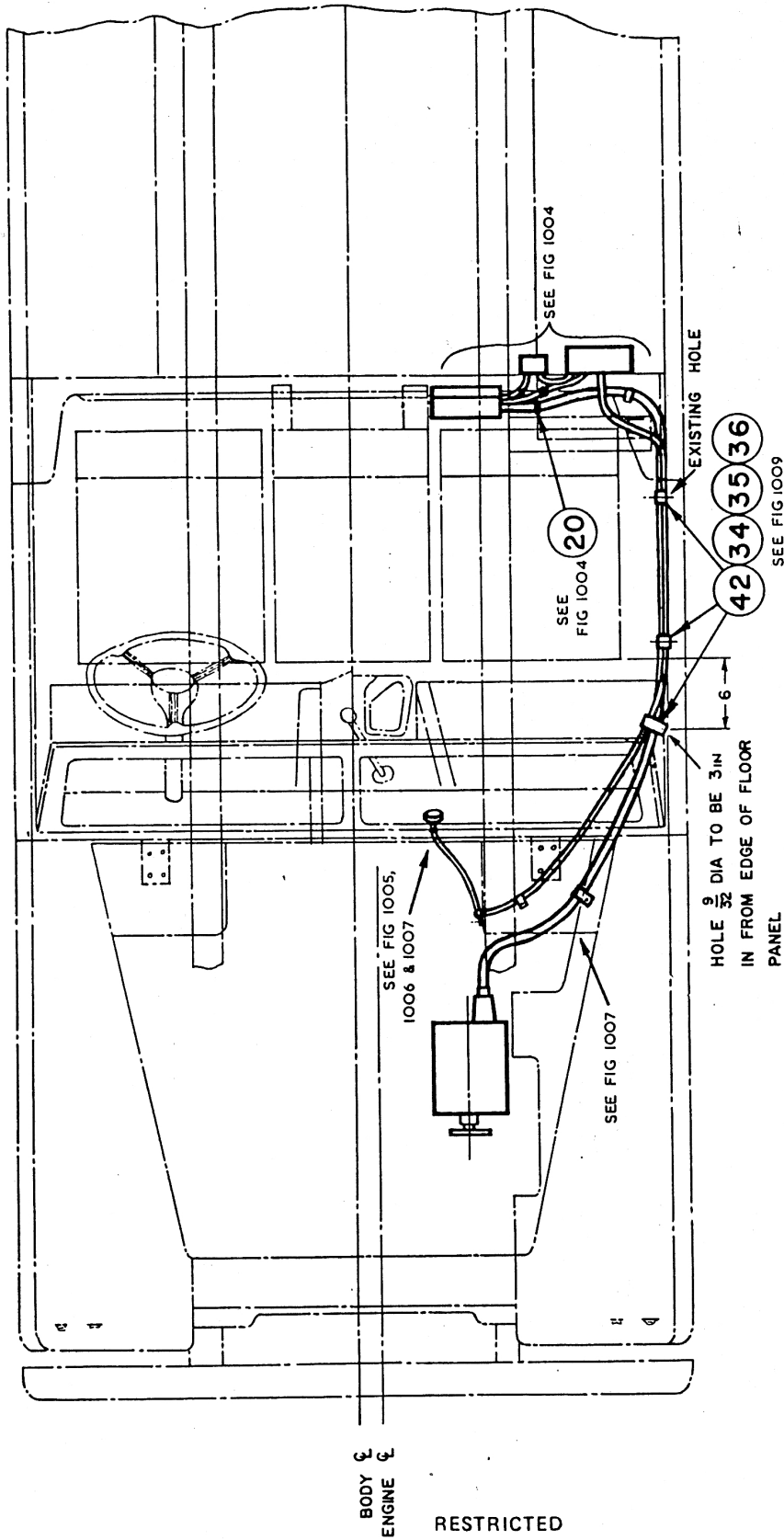


FIG 10 - CONDUIT LAYOUT - PLAN

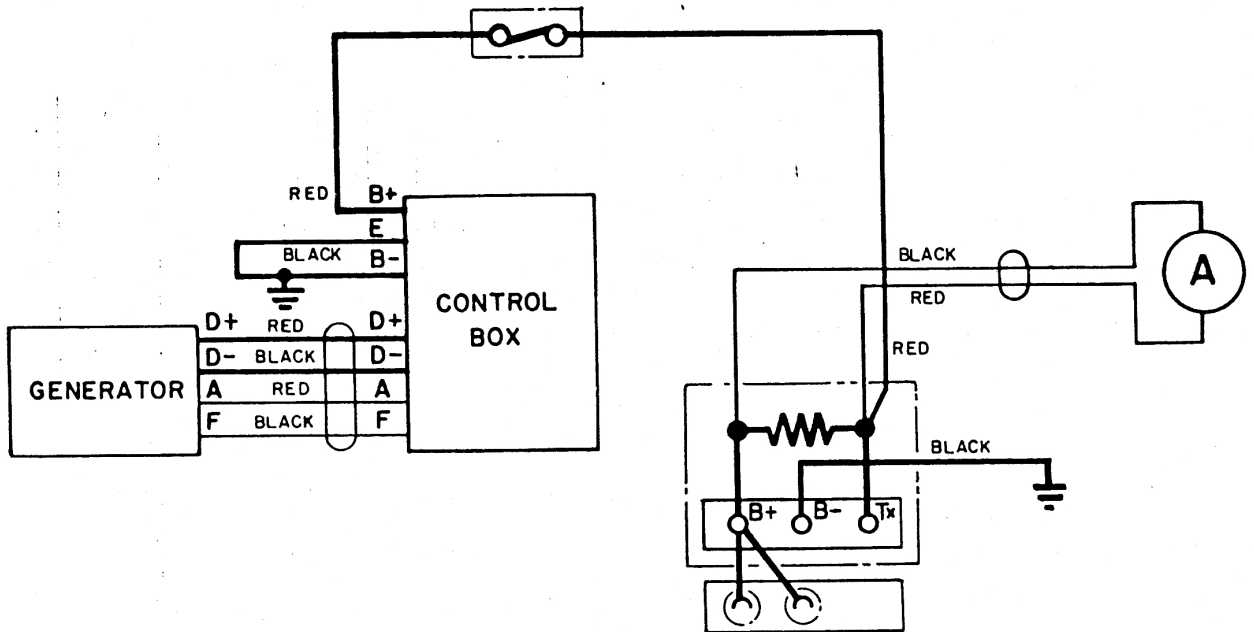


FIG 11 - SCHEMATIC WIRING DIAGRAM

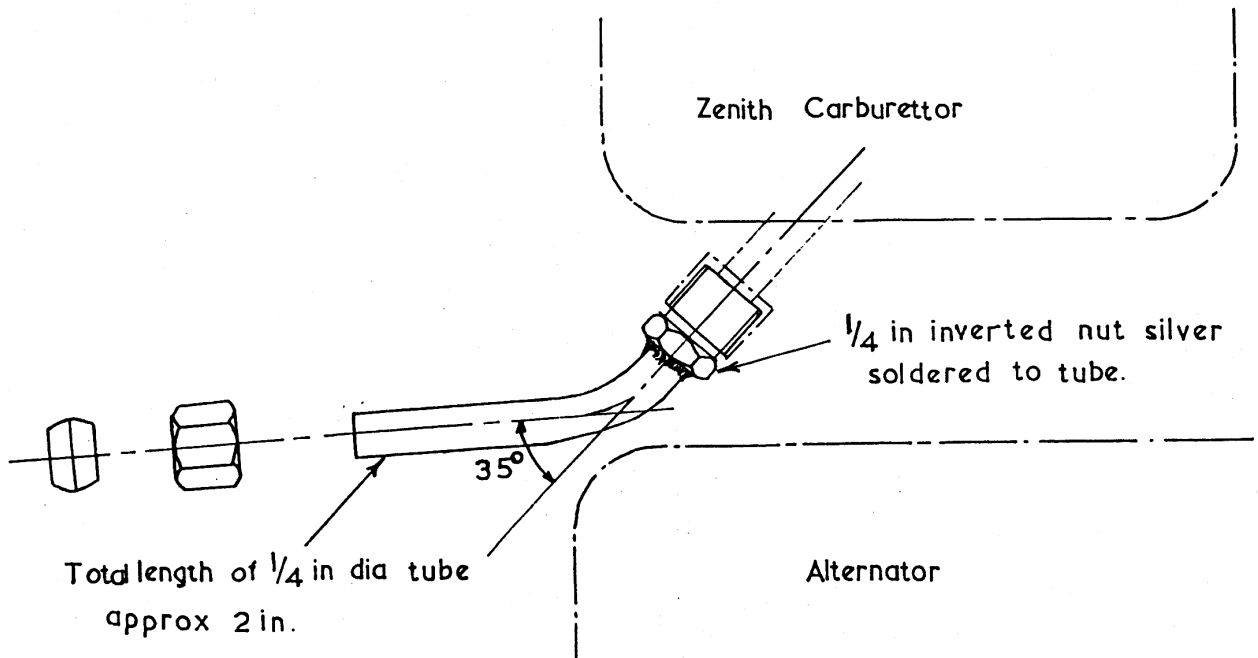


FIG 12 - FUEL LINE EXTENSION TUBE

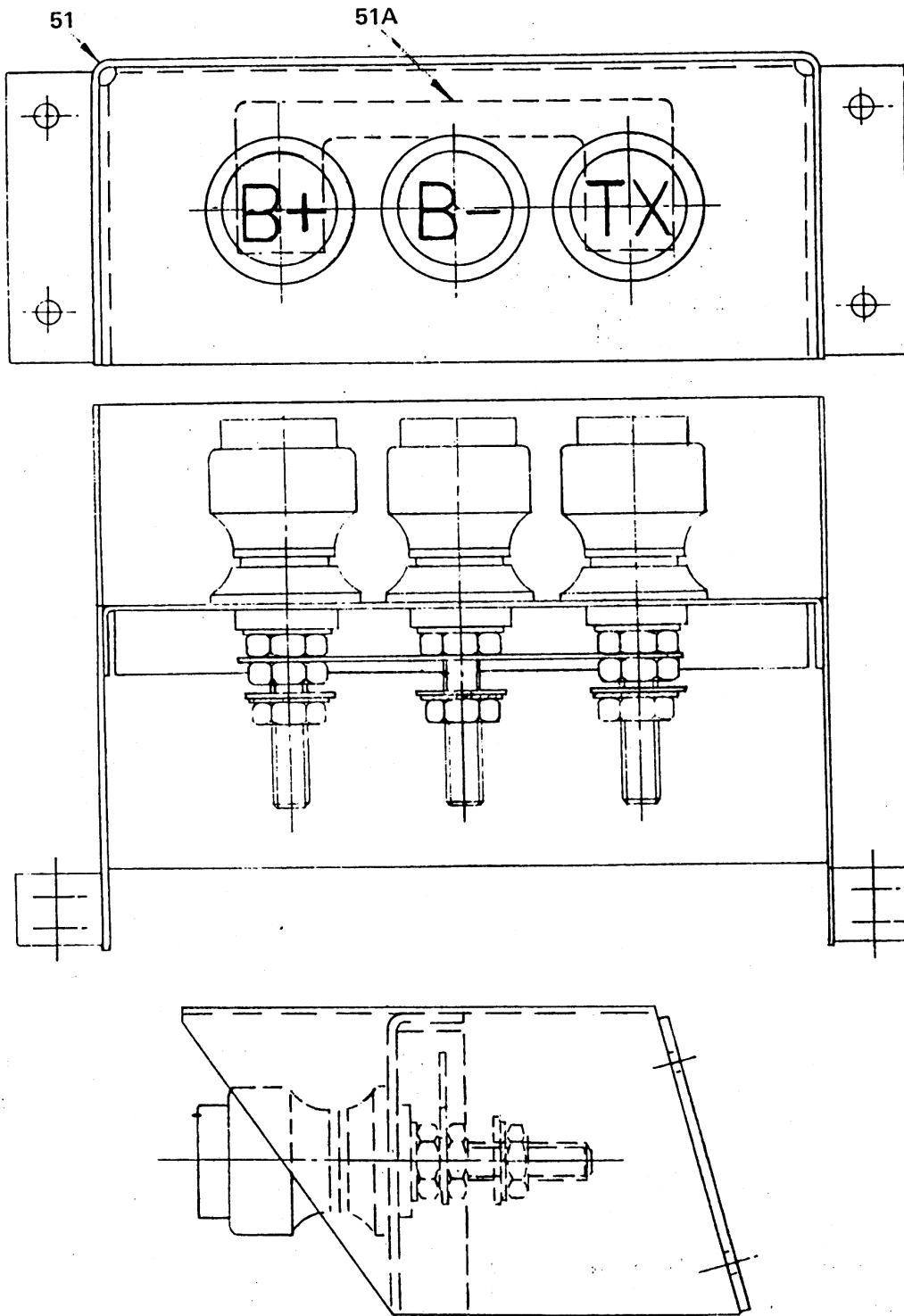


FIG 13 - CONNECTION OF SHUNT
(TSU 275/70)

END

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