DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE MANUAL

INDICATOR, OUTLET VALVE LEAKAGE, M4A1 (END ITEM CODE 667)

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
FEBRUARY 1964

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CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *4 November 1964*

DS, GS, and Depot Maintenance Manual

INDICATOR, OUTLET VALVE LEAKAGE, M4A1

(END ITEM CODE 667)

TM 3-6665-209-35, 20 February 1964, is changed

The title is changed as shown above.

All references in this manual to "third echelon" are changed to read **direct support.**

All references to "fourth echelon" are changed to read **general support.**

All references to "fifth echelon" are changed to read *depot*. References to the term "echelons" of maintenance are changed to read *categories* of maintenance.

12. Motor and Pump Assembly

* * * * *

b. Removal.

* * * * *

(5) Remove five nuts (34), flat washers (33), and rubber tube spacers (32 and 46) underneath the chassis base.

(6) Remove four screws (36) from the motor base and lift the motor and blower assembly off the top of the chassis base being careful not to damage the threads on the stud of the selector valve and blower adapter (47) that extends through the chassis base.

c. Installation.

(1) (Superseded) Position the motor and pump assembly over the rubber tube cushions (35 and 45) on the chassis base with the holes in the motor base in line with the motor mounting holes in the chassis base. Make certain the $^{5}/_{8}$-inch long rubber tube cushion (45) is positioned over the selector valve and blower adapter mounting hole.

(2) (Superseded) Insert four screws (36) through the motor base, the rubber tube cushions (35), and the mounting holes in the chassis. Place five rubber tube spacers (32 and 46), flat washers (33), and nuts (34) on the screws and the selector valve stud. Tighten the nuts.

Note

The rubber tube spacer (46) used on the selector valve stud is $^{1}/_{16}$-inch thick. The other four rubber tube spacers (32) are ½-inch thick.

* * * * *

18. Description

The test probe * * * installed into facepieces. A rubber tube (19), 36 inches long, extends from the test probe handle (24) to the screw assembly (17) which fits into the rubber tube. A mask testing bracket (18), threaded onto the screw assembly, enables an airtight connection to be made when the bracket and screw assembly are attached to the VALVE fixture on the indicator front panel. Electrical wires (21) housed in insulation sleeving (16), 42 inches long, extend from the trigger switch (2) and terminate at the electrical plug connector (13). This plug connector *** the VALVE fixture.

19. Maintenance

a. Disassembly.

(1) Remove the two hose clamps (20, fig. 10) which secure the insulation sleeving (16) and the rubber tube (19) in the insulation sleeving (22).

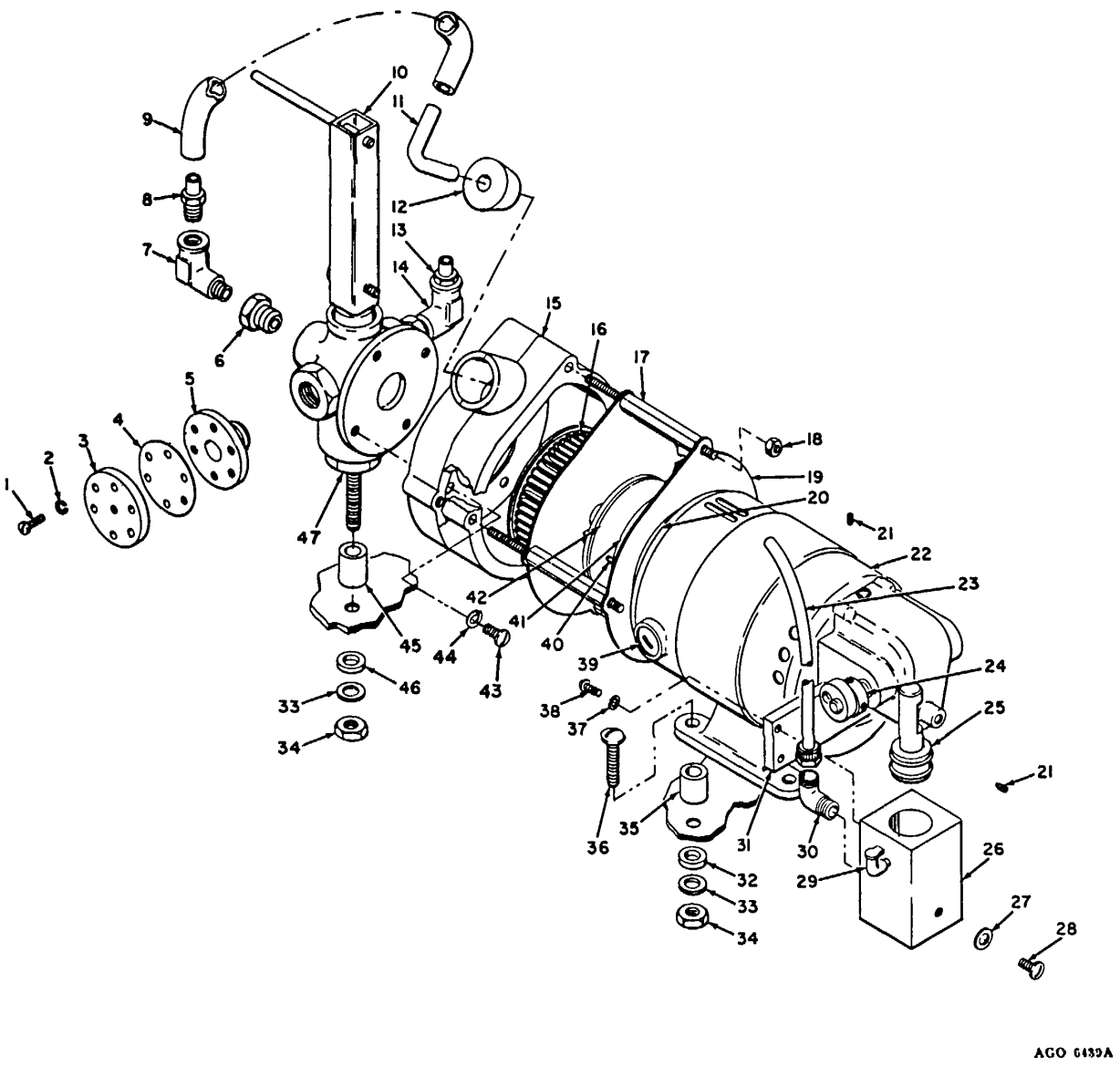


Figure 6. (Superseded) Motor and pump assembly.

1 Screw
2 Lockwasher
3 Filter cap
4 Orifice filter
5 Filter mounting flange
6 Bushing
7 Elbow
8 Adapter
9 Rubber tubing
10 Valve handle
11 Copper tubing
12 Stopper
13 Pipe-to-hose straight adapter
14 Elbow
15 Blower housing
16 Impeller
17 Blower housing spacer
18 Nut
19 Blower mounting plate
20 Motor mount disk
21 Setscrew
22 Motor
23 Plastic tubing
24 Pump cam
25 Pump piston
26 Pump cylinder
27 Fiber washer
28 Screw
29 Oil cup
30 Elbow
31 Pump mounting bracket
32 Rubber tube spacer
33 Flat washer
34 Nut
35 Rubber tube cushion
36 Screw
37 Lockwasher
38 Screw
39 Motor electrical brush
40 Governor electrical brush
41 Governor plate
42 Governor assembly
43 Screw
44 Lockwasher
45 Rubber tube cushion
46 Rubber tube spacer
47 Selector valve-and-blower adapter

Figure 6-Continued.

(2) Pull the screw assembly **(17)** and the mask testing bracket **(18)** as a unit from the rubber tube **(19)**. Unscrew the screw * * * mask testing bracket.
(3) Pull the other end of the rubber tube (19) from the adapter (23).

Caution

(Added) Be careful not to pull the electrical wires (21) which are still connected out of the test probe handle (24).

(4) (Superseded) Loosen both screws (15) that secure the plug connector shell around the insulation sleeving (16). Remove the pin (14) from the plug connector (13). Slide the plug connector shell clear of the wire terminals. Pull back the electrical sleeving (16). Unsolder the two electrical wires (21) from the terminals on the plug connector (13) and remove the plug connector.
(5) Pull the insulation sleeving (22) from the insulation sleeving **(16)** and the rubber tube **(19).** Only the insulation sleeving **(16) and the electrical wires (21) remain** connected to the test probe assembly.
(6) Remove four screws (12) which secure the switch cover (11) to the test probe handle **(24)** and remove the switch cover.
(7) Remove two screws (8) and lockwashers (7) which hold the trigger (10) and the trigger spring (6) to the test probe handle (24). Remove the trigger * * * as a unit.
(8) Remove the two screws (1) which secure the sensitive switch (2) in the test probe handle **(24).** Work the sensitive *** the switch cover. Disconnect the two electrical wires **(21)** from the terminals of the sensitive switch (2) by loosening the two terminal mounting screws. Pull the insulation sleeving **(16)** with the electrical wires **(21)** from the butt end of the test probe handle **(24).**
(9) Unscrew the **pipe-to-hose straight adapter (23)** from the test probe handle **(24).**

* * * * *

b. Cleaning and Inspection.

* * * * *

(3) Check the condition * * * or otherwise defective.

Note

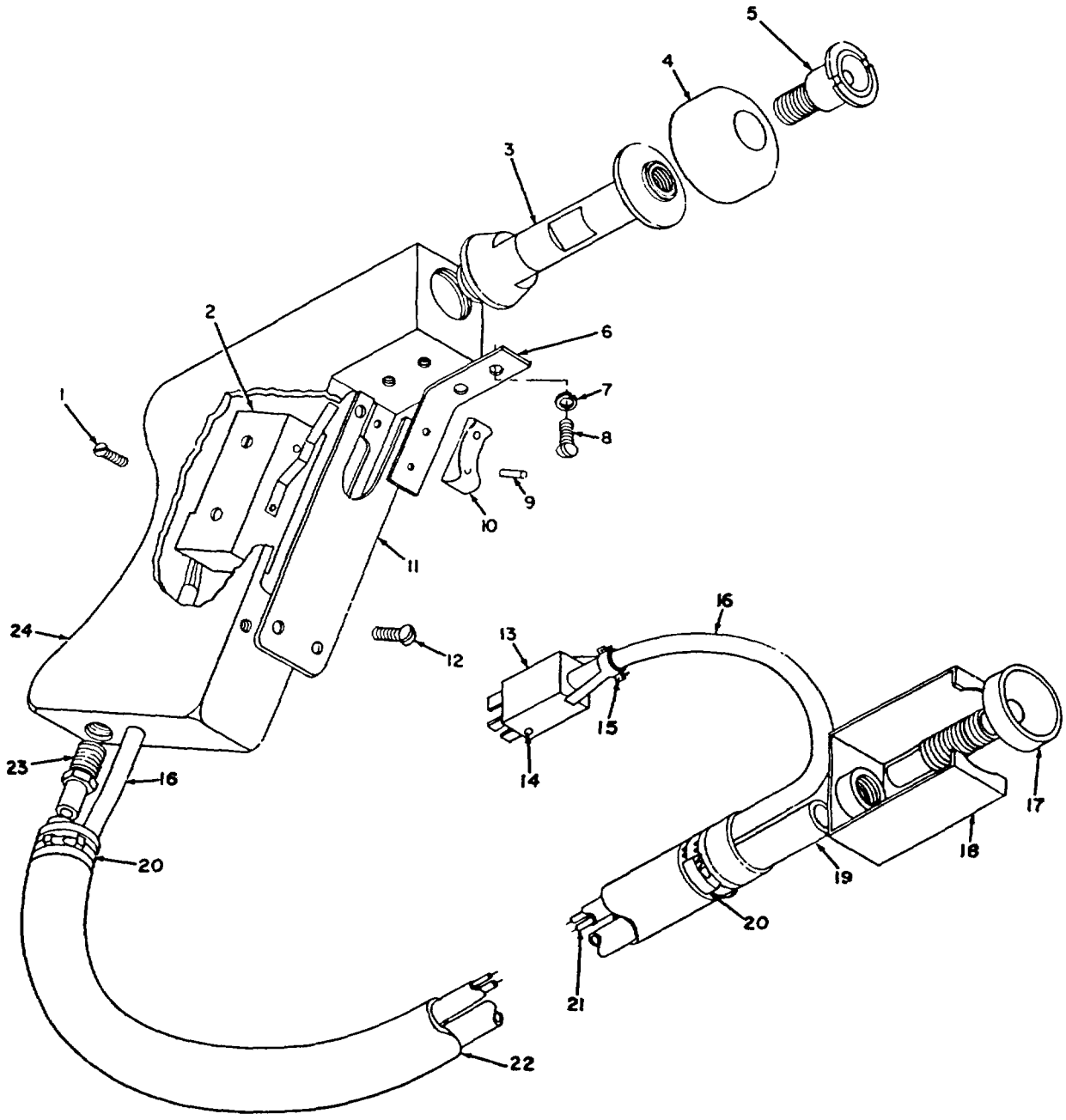
(Added) If new hose is being used, clean the interior of the hose of any foreign matter by use of dry compressed air.

* * * * *

c. Assembly.

* * * * *

(2) Screw the pipe-to-hose straight adapter **(23)** into the butt end of the test probe handle **(24).**
(3) Tape the insulation sleeving **(16)** and the rubber tube **(19)** together and feed them through the insulation sleeving **(22).**



1 Screw
2 Sensitive switch
3 Test probe barrel
4 Test valve adapter
5 Mask tip screw
6 Trigger spring
7 Lockwasher
8 Screw
9 Rivet
10 Test probe trigger
11 Switch cover
12 Screw
13 Plug connector
14 Pin
15 Screw
16 Insulation sleeving
17 Screw assembly
18 Mask testing bracket
19 Rubber tube
20 Hose clamp
21 Electrical wires
22 Insulation sleeving
23 Pipe-to-hose straight adapter
24 Test probe handle

Figure 10. (Superseded) Test probe assembly.

(4) Insert the insulation sleeving (16) with two electrical wires **(21)** through the hole in the butt end of the test probe handle **(24).** Connect both wire * * * test probe handle. Secure the sensitive switch **(2)** to the test probe handle **(24)** with two screws (1).
(5) Position the trigger spring (6) with the test probe trigger (10) attached to it on the test probe handle **(24)** and secure it in place with two screws (8) and lockwashers (7).
(6) Position the switch cover (11) on the test probe handle **(24)** and secure it in place with four screws (12).
(7) Insert one end of the rubber tube **(19)** over the pipe-to-hose straight adapter **(23)** and pull the insulation sleeving **(22)** up to the adapter. Secure the insulation sleeving.
(8) Insert the other end of the insulation sleeving **(16)** with both electrical wires **(21)** through the hose clamp. Insert the electrical wires through the clamp *of* the plug connector (13) and solder both wire ends to the two terminals on the plug connector. Pull the insulation sleeving over the two electrical wires **and pull the plug connector shell over the terminals. Tighten both screws (15) that secure the plug connector clamp to the insulation sleeving (16). Replace the pin (14) in the plug connector (13).**
(9) Thread the screw assembly **(17)** into the mask testing bracket **(18)** and insert the open end of the rubber tube **(19)** over the screw assembly **(17).** Pull the insulation sleeving **(22)** taut and secure it in place with the hose clamp **(20).**

19.1 Cleaning Solenoid Valve Seats (Added)

a. General. Every 6 months the solenoid valves must be disassembled and the solenoid valve seats cleaned. Dust particles or foreign matter prevent the seat from sealing tightly. A wrench nut (fig. 10.1) has been added to the direct support maintenance E12 shop equipment set (FSN 4940-013-7045). The wrench nut is used to disassemble the solenoid valve to clean the seat.

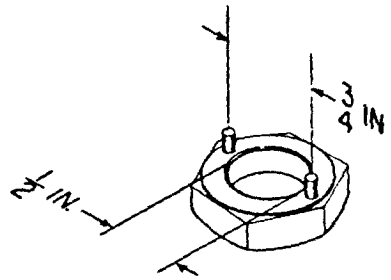


Figure 10.1. (Added) Wrench nut.

Note

The E12 shop equipment is being developed. Until the set becomes available, the wrench nut (shown in fig. 10.1) can be made locally.

b. Disassembly (Typical).
(1) Use an adjustable wrench and remove the locknut at the top of the solenoid valve. The nut holds the identification plate and the cover on the valve body.
(2) Lift off the identification plate and the cover. The solenoid is an integral part of the cover and comes off with it.
(3) Lift off the black bakelite flat washer.
(4) Use the wrench nut and slip it over the valve shaft and position the two prongs into the two recesses in the valve. Use an adjustable wrench and unscrew the valve from the valve body.
(5) Use a lint-free cloth and wipe off the valve seat and the recesses of the valve itself. Avoid getting dirt or perspiration into the valve during cleaning and reassembly.

c. Assembly (Typical).
(1) Orient the valve seat over the valve body opening and screw the valve seat into the valve body wrench tight using the wrench nut (fig. 10.1).
(2) Place the black bakelite flat washer around the valve shaft.
(3) Fit the cover over the top of the valve shaft and drop it in place.
(4) Place the identification plate on top of the cover.

(5) Install the locknut and draw it up wrench tight. Return the wrench nut (fig. 10.1) to the E12 shop equipment set.

* * * * *

26. Motor and Pump Assembly

* * * * * *

b. Maintenance.

(1) *Removal and disassembly.*

* * * * *

*(b).*1 (Added) Remove four nuts (18) and screw blower housing spacers (17) from blower housing (15).

*(b).*2 (Added) Remove four screws (43) and lockwashers (44) that secure the selector valve-and-blower adapter (47) to the blower housing (15).

(c) Unscrew the adapter * * * from the elbow (14). Remove the elbow (7) from the bushing (6) and the elbow (14) from the selector valve-and-blower adapter **(47).** Remove the bushing (6) from the selector valve-and-blower adapter **(47).**

(d) Unscrew the filter mounting flange (5) from the selector valve-and-blower adapter **(47).** Remove six screws * * * filter mounting flange (5).

(e) Remove four screws **(43)** and lockwashers **(44)** that secure the selector valve-and-blower adapter **(47)** to the blower housing (15) and remove the selector valve. The valve handle (10) * * * from the valve.

* * * * *

(3) *Assembly and installation.*

* * * * *

(h) (Superseded) Install four screws (43) and lockwashers (44) that secure the selector valve-and-blower adapter (47) to the blower housing (15). Secure the blower housing (15) over the impeller (16) by screwing four blower housing spacers (17) into the tapped holes in the blower housing. Secure the blower housing (15) to the blower mounting plate (19) by installing four nuts (18).

* * * * *

(j) (Superseded) If the valve handle (10) was removed, install it on the selector valve and secure it in place with the screw provided.

(k) Position the orifice * * * lockwashers (2) and screws (1). Screw the filter mounting flange (5) into the selector valve-and-blower adapter **(47).**

(l) Screw the bushing (6) into the selector valve-and-blower adapter **(47).** Screw the elbow * * * into the elbow (14).

* * * * *

By Order of the Secretary of the Army:

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Chief of Staff.

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Edgewood (50)
PG (5)
Units org under fol TOE:
3-47 (1)
3-147 (1)
3-500 EA-AB (1)

NG: State AG (3) Div (1)

USAR: None.

For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL

No. 3-665-209-35

DEPARTMENT OF THE ARMY
HEADQUARTERS
WASHINGTON, D.C., *20 February 1964*

FIELD AND DEPOT MAINTENANCE MANUAL

INDICATOR, OUTLET VALVE LEAKAGE, M4A1

(END ITEM CODE 667)

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

This manual is published for the use of personnel responsible for third, fourth, and fifth echelon maintenance of the M4A1 outlet valve leakage indicator (fig. 1). It contains information on the repair and replacement of major units of the indicator. Hereinafter this equipment will be referred to as an indicator.

2. Appendix

This appendix contains a list of current references.

3. Record and Report Forms

a. use the appropriate forms prescribed by TM 38-750.

b. The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manual 7, 8, or 9) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding General, U.S. Army Edgewood Arsenal, ATTN: SMUEA-EIS-EM-P, Edgewood Arsenal, Maryland 21010. One information copy will be provided to the individual's immediate supervisor (e.g., officer, noncommissioned officer, or supervisor).

c. Use DD Form 6 to report damaged or improper shipment of materiel.

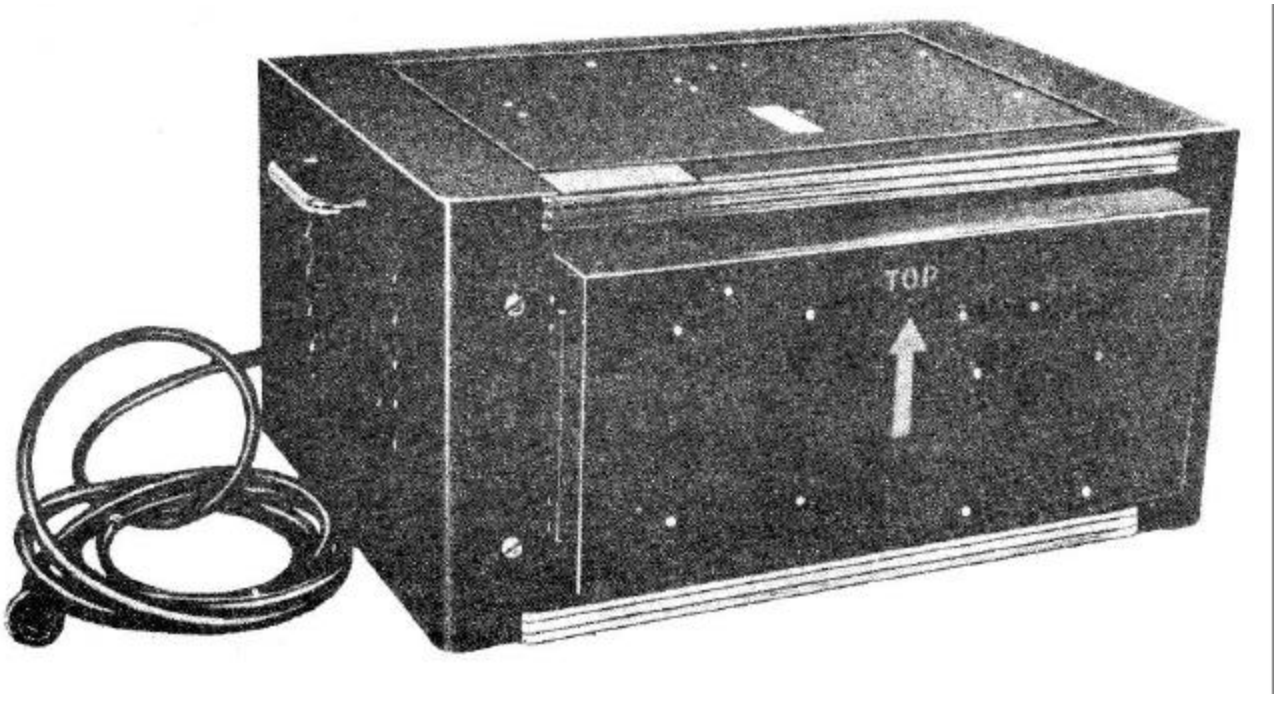


Figure 1. M4A1 outlet valve leakage indicator, right front view.

4. Allocation of Maintenance

The maintenance allocation chart for the indicator is contained in TM 3-6665-209-12. Use the maintenance allocation chart to determine the echelon that is authorized to perform the required maintenance operation.

Section II. DESCRIPTION AND DATA

5. Description

The M4A1 outlet valve leakage indicator is a testing apparatus used to check the leakage of various outlet valves. The outlet valves may or may not be installed in personnel masks. The description of the indicator, its parts, and its operation is contained in TM 3-6665-209-12. Refer to that manual for descriptive information. Components on which maintenance is authorized are described elsewhere in this manual.

6. Recommended Wrench Torque for Steel Nuts and Bolts

National fine		National coarse	
Thread size	Torque (pound-feet)	Thread size	Torque (pound-feet)
8-32	1 to 2	8-32	1 to 2
10-32	1 to 2	10-24	1 to 2
1/4-28	5 to 8	1/4-20	4 to 6
5/16-24	10 to 15	5/16-18	8 to 12
3/8-24	18 to 27	3/8-15	15 to 22
7/16-20	28 to 42	7/16-14	24 to 36
1/2-20	45 to 58	1/2-13	37 to 56
9/16-18	64 to 97	9/16-12	56 to 83
5/8-18	98 to 138	5/8-11	75 to 112
3/4-16	158 to 242	3/4-10	137 to 200
7/8-14	258 to 384	7/8-9	216 to 316
1-14	400 to 600	1-8	316 to 484

CHAPTER 2

FIELD MAINTENANCE INSTRUCTIONS-THIRD ECHELON

Section I. CHASSIS GROUP

7. Chassis Assembly

a. Description. The chassis assembly contains virtually all of the components of the indicator with the exception of the cabinet assembly, the panel cover assembly including the test probe assembly, and the accessories provided. All of the piping and wiring are contained in the chassis assembly making the chassis assembly a self-contained unit which could be used without any other indicator components to conduct the outlet leakage tests.

b. Functioning. (fig. 2). Outlet valves to be tested are subjected to the test cycle accomplished within the chassis assembly. The test cycle functions as follows: With power supplied to the electrical receptacle connector J3, the manual selector valve and the selector switch S8 placed in the proper mode (vacuum or pressure), the mode switch S4 placed in the NORM position, the LINE switch S6 and the PUMP switch S5 placed in the ON position, the test cycle is begun by pushing in on the VALVE fixture (or by closing the switch on the test probe assembly or the holding fixture) to close the valve test switch S3. The interval timer M1 is energized as is the test cycle timer M2 and the holding relay K1. Since the solenoid valve L3 is not energized, pulsations from the pump are applied to the outlet valve under test. After 1 $^{3}/_{4}$ seconds, the switch on the interval timer M1 moves to the normally open side thereby energizing the solenoid valve L2 and permitting current to flow through the closed contacts of the keying relay K2 to light the ACCEPT light DS3. The solenoid valve L4 shuts off the pump air and the solenoid valve L2 opens permitting the test pressure or vacuum to be applied to the outlet under test. If the leakage of the outlet valve exceeds the allowable limit. the diaphragm switch S1 closes actuating the keying relay K2 through the electron tube V1 thereby switching current from the ACCEPT light DS3 to the REJECT light DS4 and the electric bell DS5 if the bell switch S7 is closed. After approximately six seconds, the switch contacts of the test cycle timer M2 open deenergizing the holding relay K1 which shuts off the power and completes the test cycle.

c. Maintenance. Third echelon maintenance personnel are authorized to replace the rubber and copper tubing, water manometer, nameplate, valve and blower adapter, various pipe fittings, rubber grommets, power cord, and the CALIBRATE knob shaft lock. They also are authorized to replace the electric bell (par. 8), fuse holder (par. 9), indicator lights (par. 10), balance orifice holder (par. 11), motor and pump assembly (par. 12), plug cocks, and air shutoff valve assembly (par. 13). Third echelon maintenance personnel are authorized to repair the cabinet assembly. Before installing a new or rebuilt part, make certain it is clean and functions properly. Use paint thinner, volatile mineral spirits, or dry-cleaning solvent to clean dirt, grease, or oil from all parts. Check electrical network for worn, frayed, or loose wire connections and for serviceability.

8. Electric Bell

a. Description. The electric bell DS5 (25, fig. 3) is mounted on the underside of the chassis base. It is operated by a 6-volt, 60 cps, AC at 1.2 amperes power circuit from the bell transformer T2 (28). The electric bell DS5 rings when the bell toggle switch S7 (22) is in the on position and the REJECT light DS4 (8, fig. 4) lights. The bell is a nonadjustable electric bell.

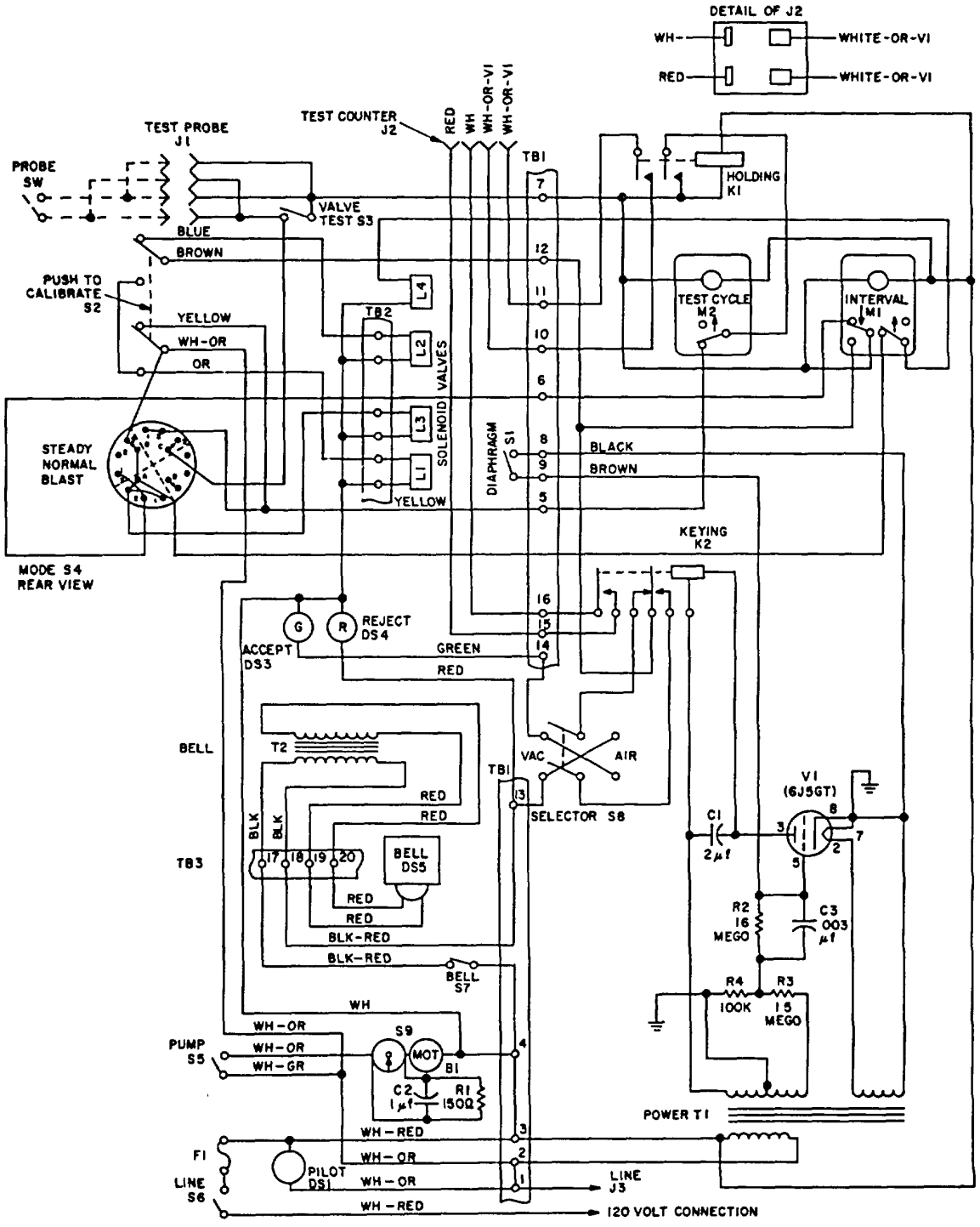


Figure 2. M4A1 outlet valve leakage indicator wiring diagram.

b. Removal.

(1) Remove the chassis assembly (TM 3-6665-209-12).

(2) Pry the cover from the electric bell DS5 (25, fig. 3) and disconnect the electrical wires at the two terminals. Pull the wires through the grommet (38) in the cover.

(3) Remove two machine screws which secure the electric bell DS5 (25) to the chassis base (16) and remove the electric bell DS5.

c. Installation.

(1) Position the electric bell DS5 (25, fig. 3) over the mounting holes on the underside of the chassis base (16) and secure the electric bell DS5 with two machine screws.

(2) Insert both electrical wires through the grommet (38) from the outside of the cover to the inside of the cover and then connect the wires to the two terminals of the electric bell DS5.

(3) Press the cover in place over the electric bell DS5.

(4) Replace the chassis assembly (TM 3-6665-209-12).

9. Fuse Holder

a. Description. The fuse holder XF1 (39, fig. 4) provides the housing and the means of mounting the fuse F1 (38) into the indicator. It is a miniature fuse extractor post for a type 3AG, 5 ampere, 250-volts rating fuse F1. The fuse holder XF1 is located inside the chassis base and provides a convenient method for replacing the fuse F1.

b. Removal.

(1) Remove the chassis assembly (TM 3-6665-209-12).

(2) Unsolder the electrical wires from the two terminals on the fuse holder XF1 (19, fig. 3).

(3) Unscrew and remove the locknut (20) which secures the fuse holder to the inside of the chassis base (16).

(4) Pull the fuse holder XF1 through its mounting hole in the chassis base.

c. Cleaning and Inspection. Make certain the terminal lugs on the outside of the fuse holder XF1 and the contacts for the fuse F1 within the fuse holder XF1 are clean and provide good electrical contact.

d. Installation.

(1) Unscrew the locknut (20, fig. 3) from the assembled fuse holder XF1 (19) and insert the base end of the fuse holder XF1 through its mounting hole in the chassis base (16) so that the terminal lugs are exposed on the underside of the chassis.

(2) Replace and tighten the locknut to secure the fuse holder XF1 (19) to the chassis base (16).

(3) Solder the electrical wires to the terminal lugs of the fuse holder XF1.

(4) Insert the fuse F1 (38, fig. 4) in the fuse holder XF1 (TM 3-6665-20912).

(5) Replace the chassis assembly (TM 3-6665-209-12).

10. Indicator Lights

a. Description. Three indicator lights are on the indicator-the PILOT light DS1 (24, fig. 4), the ACCEPT light DS3 (7), and the REJECT light DS2 (8). When lit, the incandescent lamp (27) in the PILOT light DS1 indicates through the green PILOT light lens (31, fig. 3) that current is being provided to the indicator. When lit, the incandescent lamp (9) in the REJECT light DS2 indicates through the red lens (8) that leakage is excessive in a test outlet valve and when lit, the incandescent lamp in the ACCEPT light DS3 indicates through the green lens (10) that a test outlet valve is within leakage limits.

b. Removal.

(1) Remove the chassis assembly (TM 3-6665-209-12).

(2) Unsolder the electrical wires from the two terminals on the PILOT light DS1 (24, fig. 4), the ACCEPT light DS3 (7), and the REJECT light DS2 (8).

(3) Remove the indicator lamp (27) from PILOT light (24) and remove

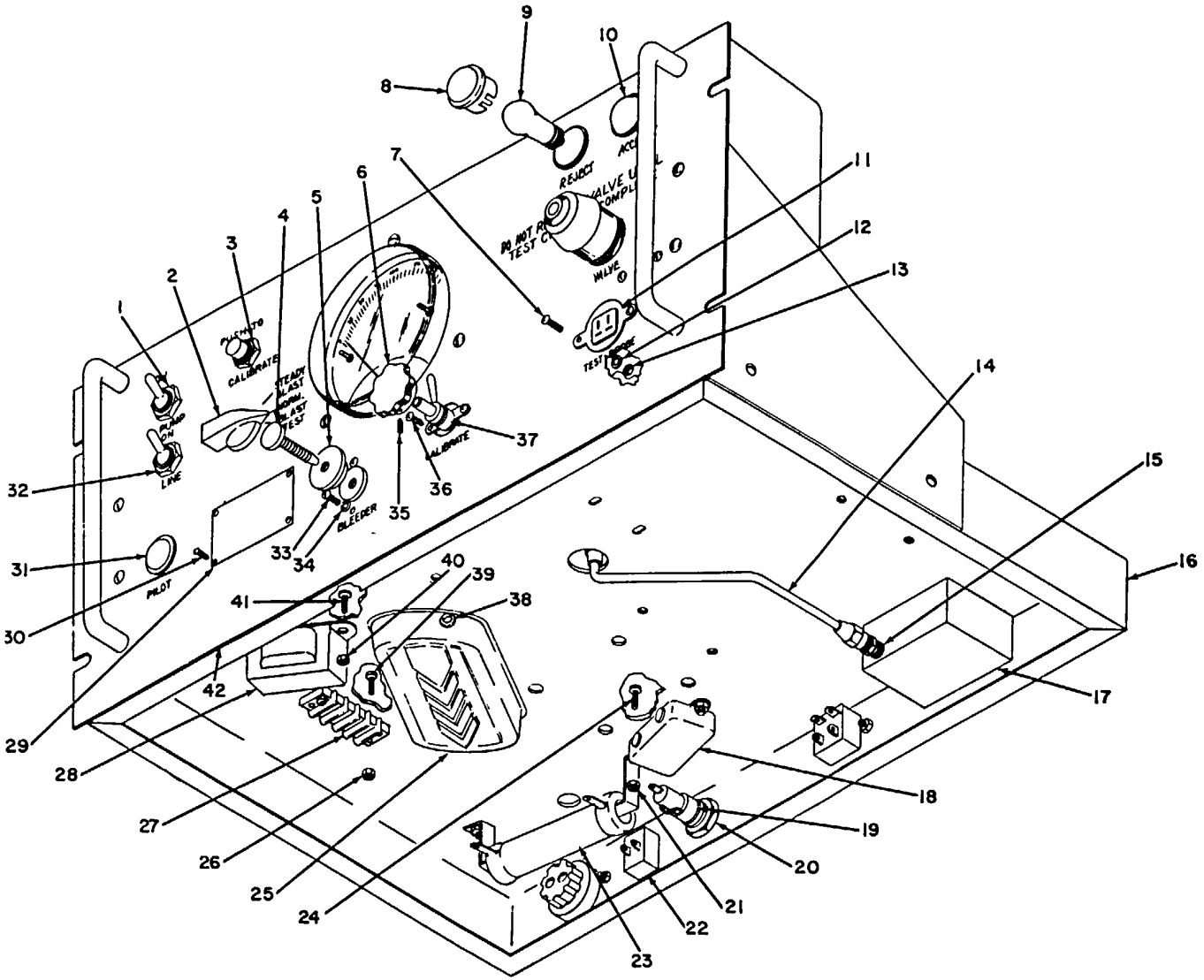


Figure 3. Chassis assembly, front and bottom view.

1 Locknut
2 Knob
3 Locknut
4 Bleeder adjust screw
5 Bleeder locknut
6 Knob
7 Screw
8 Lens (red)
9 Incandescent lamp
10 Lens (green)
11 TEST PROBE receptacle connector J1
12 Lockwasher
13 Nut
14 Copper tube
15 Half union
16 Chassis base
17 Orifice block
18 Radio noise suppression capacitor C2
19 Fuse holder XF1
20 Locknut
21 Nut
22 Bell toggle switch S7
23 Governor resistor R1
24 Screw
25 Electric bell DS5
26 Nut
27 Terminal board TB3
28 Bell transformer T2
29 Nameplate
30 Drive screw
31 Lens (green)
32 Locknut
33 Screw
34 Lockwasher
35 Setscrew
36 Drive Screw
37 Shaft lock
38 Grommet
39 Screw
40 Nut
41 Screw
42 Front panel

Figure 3 -Continued.

the locknut from the bushing over which the light is mounted. Remove the PILOT light from the rear of the front panel and remove the green lens (31, fig. 3) with its bushing from the front of the front panel.

(4) Remove the locknut from both the ACCEPT and REJECT lights (7 and 8, fig. 4) and push the lights through their mounting holes in the front panel (42, fig. 3). Pull the red lens (8) from the REJECT light and remove the incandescent lamp (9). Pull the green lens (10) from the ACCEPT light and remove the incandescent lamp.

c. Cleaning and Inspection. Make certain the terminal lugs and the lamp contacts are clean and will provide good electrical contact. Clean the lens and see that the lens fits securely in the light.

d. Installation.

(1) Insert the ACCEPT and REJECT lights (7 and 8, fig. 4) through their mounting holes in the front panel (42, fig. 3). Secure them in position with their locknuts.

(2) Insert the green pilot light lens (31) with its bushing in its mounting hole in the front panel and install the PILOT light (24, fig. 4) over the bushing. Secure the PILOT light in position with its locknut.

(3) Solder the proper two electrical wires to the terminals of the ACCEPT light (7), the REJECT light (8) and PILOT light (24).

(4) Screw the incandescent lamps (9, fig. 3) and (27, fig. 4) into their respective light sockets.

(5) Press the lens (8 and 10, fig. 3) of the ACCEPT and REJECT lights into place on the front panel (42).

(6) Replace the chassis assembly (TM 3-6665-209-12).

11. Balance Orifice Holder

a. Description. The balance orifice holder (5, fig. 5) is located over the calibrator assembly and houses balance orifices 03 and 04 (2). Two balance orifices, used as a matched pair, are installed to distribute the vacuum evenly to the two sides of the diaphragm switch S1 in the calibrator. For all cases, during use, the pair of balance orifices must pass air at a rate exceeding the amount of air passed by the comparison orifices 01 and 02 used elsewhere in the equipment.

b. Removal.

(1) Remove the chassis assembly (TM 3-6665-209-12).

(2) Disconnect the flared tube nut at the coupling adapter (4, fig. 5) that connects the balance orifice holder (5) with the copper tubing (11, fig. 4) that connects to the bleeder housing (56).

(3) Disconnect the flare tube nut (6, fig. 5) at the pipe to tube elbow that connects into the calibrator housing.

(4) Disconnect the flared tube nut (7) at the coupling adapter on top of the pipe cross and remove the balance orifice holder as a unit.

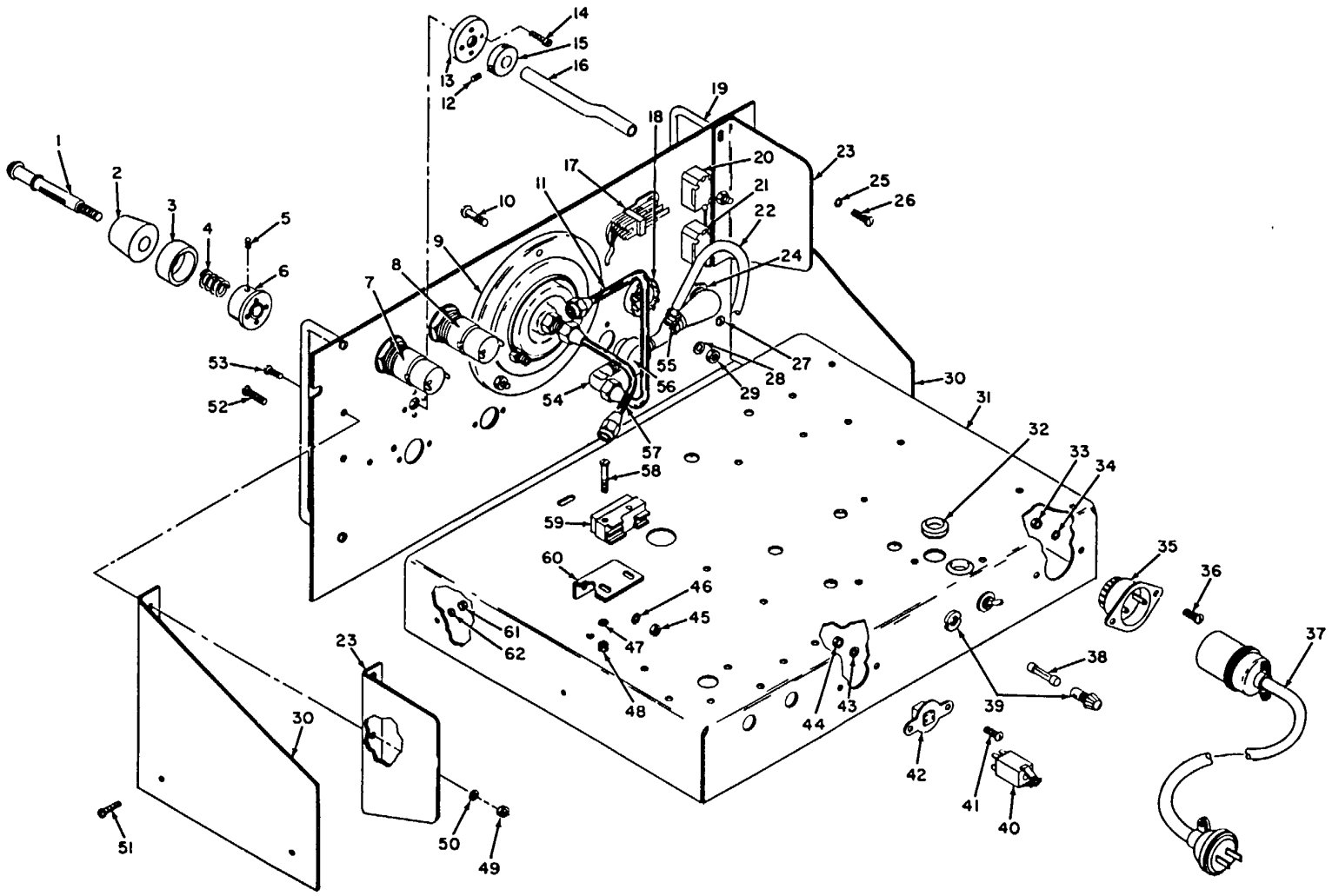


Figure 4. Chassis assembly, rear view.

1 Test valve plunger
2 Test valve adapter
3 Test valve sleeve
4 Test valve spring
5 Setscrew
6 Test valve bushing
7 ACCEPT light DS3
8 REJECT light DS2
9 Pressure gage
10 Screw
11 Copper tubing
12 Setscrew
13 Test valve flange
14 Screw
15 Test valve collar
16 Rubber tubing
17 PUSH TO CALIBRATE switch S2
18 Mode switch S4
19 Panel handle
20 PUMP toggle switch S5
21 LINE toggle switch S6
22 Rubber tubing
23 Panel guide bracket
24 PILOT light DS1
25 Lockwasher
26 Screw
27 Incandescent lamp
28 Lockwasher
29 Nut
30 Bracket
31 Chassis base
32 Rubber grommet
33 Nut
34 Lockwasher
35 Line receptacle connector J3
36 Screw
37 Power cord
38 Fuse F1
39 Fuse holder XF1
40 Electrical plug connector
41 Screw
42 Test counter receptacle connector J2
43 Lockwasher
44 Nut
45 Nut
46 Lockwasher
47 Lockwasher
48 Nut
49 Nut
50 Lockwasher
51 Screw
52 Screw
53 Screw
54 Elbow
55 Adapter
56 Bleeder housing
57 Copper tubing
58 Screw
59 Valve test switch S3
60 Switch bracket
61 Nut
62 Lockwasher

Figure 4-Continued.

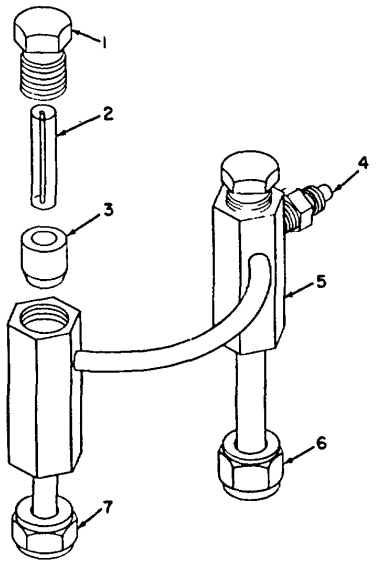
c. Disassembly.

(1) Remove both balance orifice caps (1).

(2) Remove the orifice 04 (2) from the rubber tubing (3) that is inside the balance orifice holder.

(3) Remove the orifice 03 from the rubber tubing that is inside the balance orifice holder.

(4) Remove the $^{1}/_{2}$-inch long rubber tubing (3) from the bottom of each chamber of the balance orifice holder.



1 Balanced orifice cap
2 Orifice 04
3 Rubber tubing
4 Coupling adapter
5 Balance orifice holder
6 Flared tube nut
7 Flared tube nut

Figure 5. Balance orifice holder.

d. Cleaning and Inspection.

(1) Clean the orifices 03 and 04 with clean dry compressed air. Make certain all passages within the balance orifice holder are clean.

(2) Inspect both rubber tubings for deterioration and damage. The rubber tubings are used to mount the orifices and to provide airtight seals within the balance orifice holder thus making all air pass through the capillary opening.

(3) Inspect the balanced orifice caps, coupling adapters, flared tube nuts, and balance orifice holder for damage.

e. Assembly.

(1) Select the balance orifices 03 and 04 (2) according to table I of TM 3-6665-209-12. The milliliters per minute number and the word FLOW with an arrow are etched on each orifice.

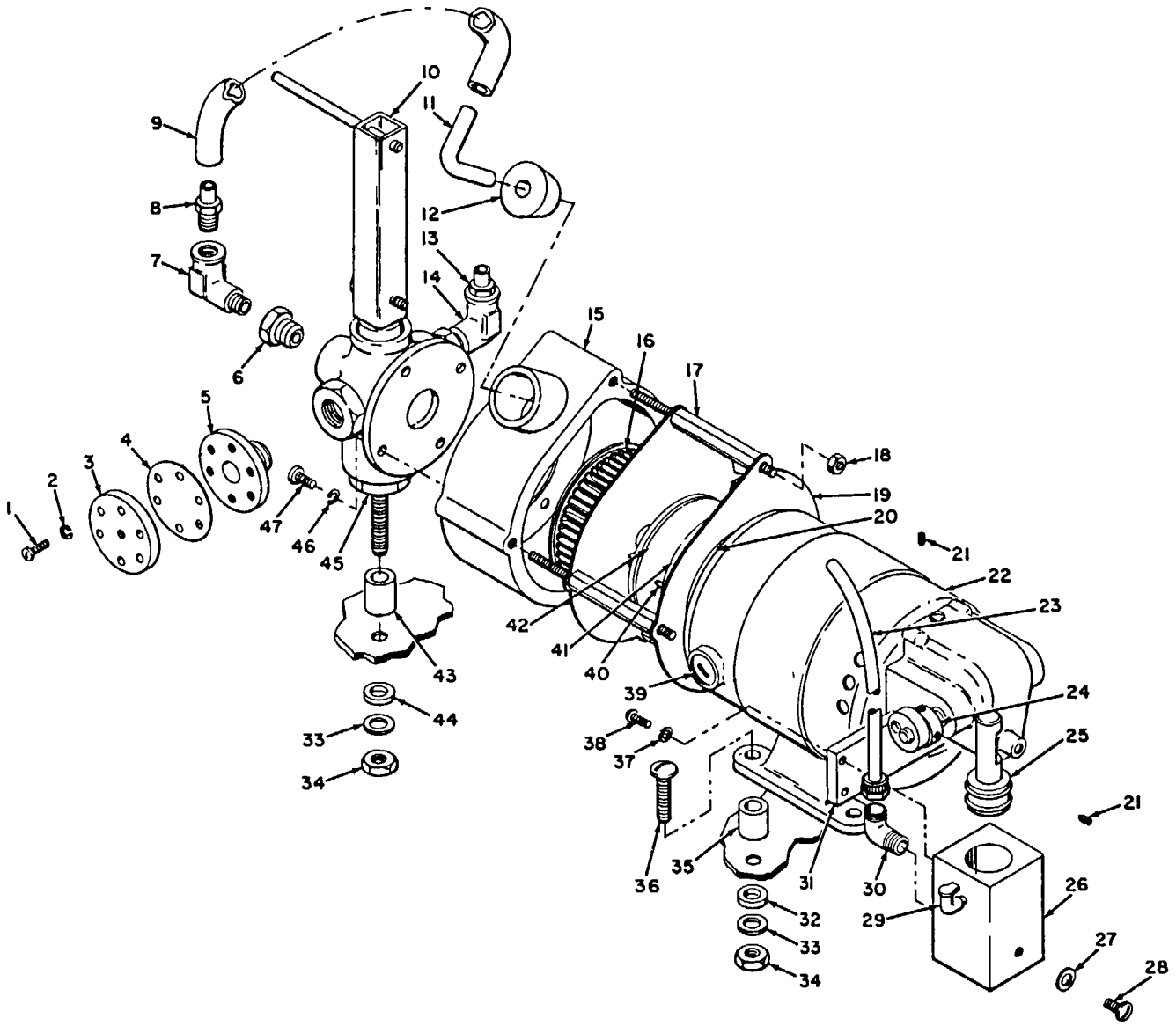


Figure 6. Motor and pump assembly.

1 Screw
2 Lockwasher
3 Filter cap
4 Orifice filter
5 Filter mounting flange
6 Bushing
7 Elbow
8 Adapter
9 Rubber tubing
10 Valve handle
11 Copper tubing
12 Stopper
13 Pipe to hose straight adapter
14 Elbow
15 Blower housing
16 Impeller
17 Blower housing spacer
18 Nut
19 Blower mounting plate
20 Motor mount disk
21 Setscrew
22 Motor
23 Plastic tubing
24 Pump cam
25 Pump piston
26 Pump cylinder
27 Fiber washer
28 Screw
29 Oil cup
30 Elbow
31 Pump mounting bracket
32 Rubber tube spacer
33 Flat washer
34 Nut
35 Rubber tube cushion
36 Screw
37 Lockwasher
38 Screw
39 Motor electrical brush
40 Governor electrical brush
41 Governor plate
42 Governor assembly
43 Rubber tube cushion
44 Rubber tube spacer
45 Selector valve and blower adapter
46 Lockwasher
47 Screw

Figure 6-Continued.

(2) Insert the rubber tubing (3) over each orifice and install them into their proper chambers of the balance orifice holder (5) while keeping in mind the direction of air flow within the indicator.
(3) Install both the balance orifice caps (1).

f. Installation.
(1) Position the balance orifice holder over the calibrator assembly and connect the flared tube nut (6) to the pipe to tube elbow that connects into the calibrator housing.
(2) Connect the flared tube nut (7) to the coupling adapter on top of the pipe cross.
(3) Connect the flared tube nut to the coupling adapter (4).
(4) Replace the chassis assembly (TM 3-6665-209-12).

12. Motor and Pump Assembly

a. Description. The motor and pump assembly contains the motor, gear train, pump, blower, selector valve and blower adapter, and electrical connectors. As the motor shaft rotates, the blower either supplies a constant pressure, or pulls a vacuum from the diaphragm in the calibrator assembly, depending on the position of the selector valve. At the other end of the motor, the pump is driven through a gear train housed at the same end of the motor.

b. Removal.
(1) Remove the chassis assembly (TM 3-6665-209-12).
(2) Pull the rubber tubing (22, fig. 4) from the pipe to hose straight adapter (13, fig. 6).
(3) Unscrew the coupling nut of the plastic tubing (23) from the elbow (30).
(4) Unsolder the electrical wires leading to the motor at their terminal connections. There are four wires to be unsoldered. Tag each wire to assure proper connection during installation.
(5) Remove five nuts (34), flat washers (33), and rubber tube spacers (32 and 44) underneath the chassis base.
(6) Remove four screws (36) from the motor base and lift the motor and blower assembly off the top of the chassis base being careful not to damage the threads on the stud of the selector valve and blower adapter (45) that extends through the chassis base.

c. Installation.
(1) Position the motor and pump assembly over the rubber tube cushions (35 and 43) on the chassis base with the holes in the motor base in line with the motor mounting holes in the chassis base. Make certain the $^{5}/_{8}$-inch long cushion (43) is positioned over the selector valve mounting hole.

(2) Insert four screws (36) through the motor base, the cushions (35) and the mounting holes in the chassis. Insert five rubber tube spacers (32 and 44), flat washers (33) and nuts (34) onto the screws and the selector valve stud. Tighten the nuts.

Note

The rubber tube spacer (44) used on the selector valve stud is $^1/_{16}$-inch thick. The other four spacers (32) are $^1/_8$-inch thick.

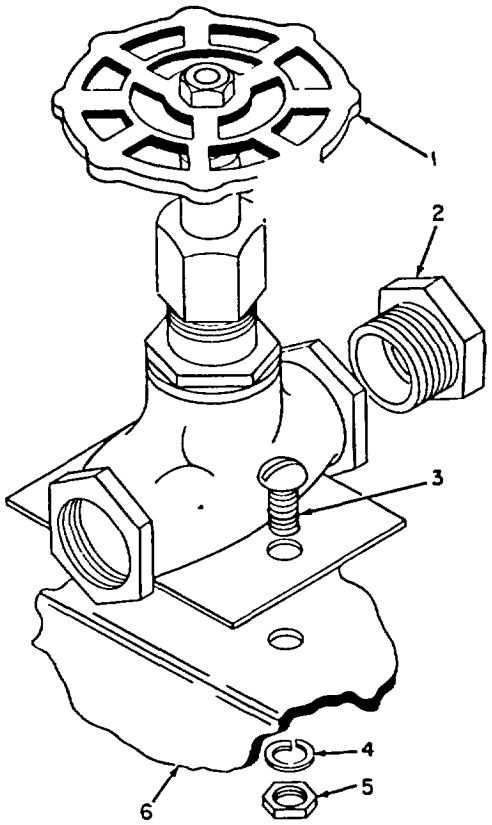
(3) Solder the four wires to the tagged terminal points.
(4) Screw the coupling nut of the plastic tubing (23) to the elbow (30).
(5) Install the end of the rubber tubing (22, fig. 4) over the pipe to hose straight adapter (13, fig. 6).
(6) Replace the chassis assembly (TM 3-6665-209-12).

13. Air Shutoff Valve Assembly

a. Description. The air shutoff valve assembly (1, fig. 7) is a hand operated $^3/_8$-inch globe air valve with a mounting plate silver soldered to its base. The valve, located near the pump of the motor and pump assembly, is used to control the volume of compressed air into the indicator.

b. Removal.
(1) Remove the chassis assembly (TM 3-6665-209-12).
(2) Disconnect the tube coupling nut at the end of the copper tubing that connects to the elbow on the air outlet side of the valve.
(3) Remove two nuts (5), lockwashers (4), and screws (3) that attach the valve assembly (1) to the chassis base (6).
(4) Unscrew the pipe bushings (2) from each side of the valve assembly (1).

c. Installation.
(1) Screw the pipe bushings (2) into each side of the valve assembly (1). Screw the elbow into the pipe bushing on the air outlet side of the valve.



1 Valve assembly
2 Pipe bushing
3 Screw
4 Lockwasher
5 Nut
6 Chassis base

Figure 7. Air shutoff valve assembly.

Note

Before installing any threaded pipe connection, apply lead compound around the the threads to form a seal.

(2) Position the valve assembly (1), with its air outlet side towards the solenoid valves, over the mounting holes in the chassis base (6).
(3) Secure the valve assembly to the chassis base with two screws (3), lockwashers (4), and nuts (5).
(4) Screw the copper tubing coupling nut onto the elbow.
(5) Replace the chassis assembly (TM 3-6665-209-12).

Section II. CABINET ASSEMBLY

14. Description

The cabinet assembly (fig. 8) serves as the housing for the indicator. It is rectangular in shape and is provided with handles (20) for carrying purposes. A hinged cabinet lid (8) at the top of the cabinet (1) is furnished for easy access into the top of the chassis assembly. The cabinet lid, which is equipped with an integral catch and lock fastener (10), also contains a wiring diagram (16) of the indicator. The test probe assembly, while not a part of the cabinet assembly, is stowed in the cabinet lid when the indicator is not in use. The entire cabinet, except hardware items, is painted with a black wrinkle paint.

15. Maintenance

a. Removal.

(1) Remove the panel cover assembly and disconnect the power cord.
(2) Remove four capscrews (23, fig. 8) and pull the chassis assembly from the cabinet assembly.
(3) Open the cabinet lid (8) and remove the test probe assembly.

b. Disassembly.

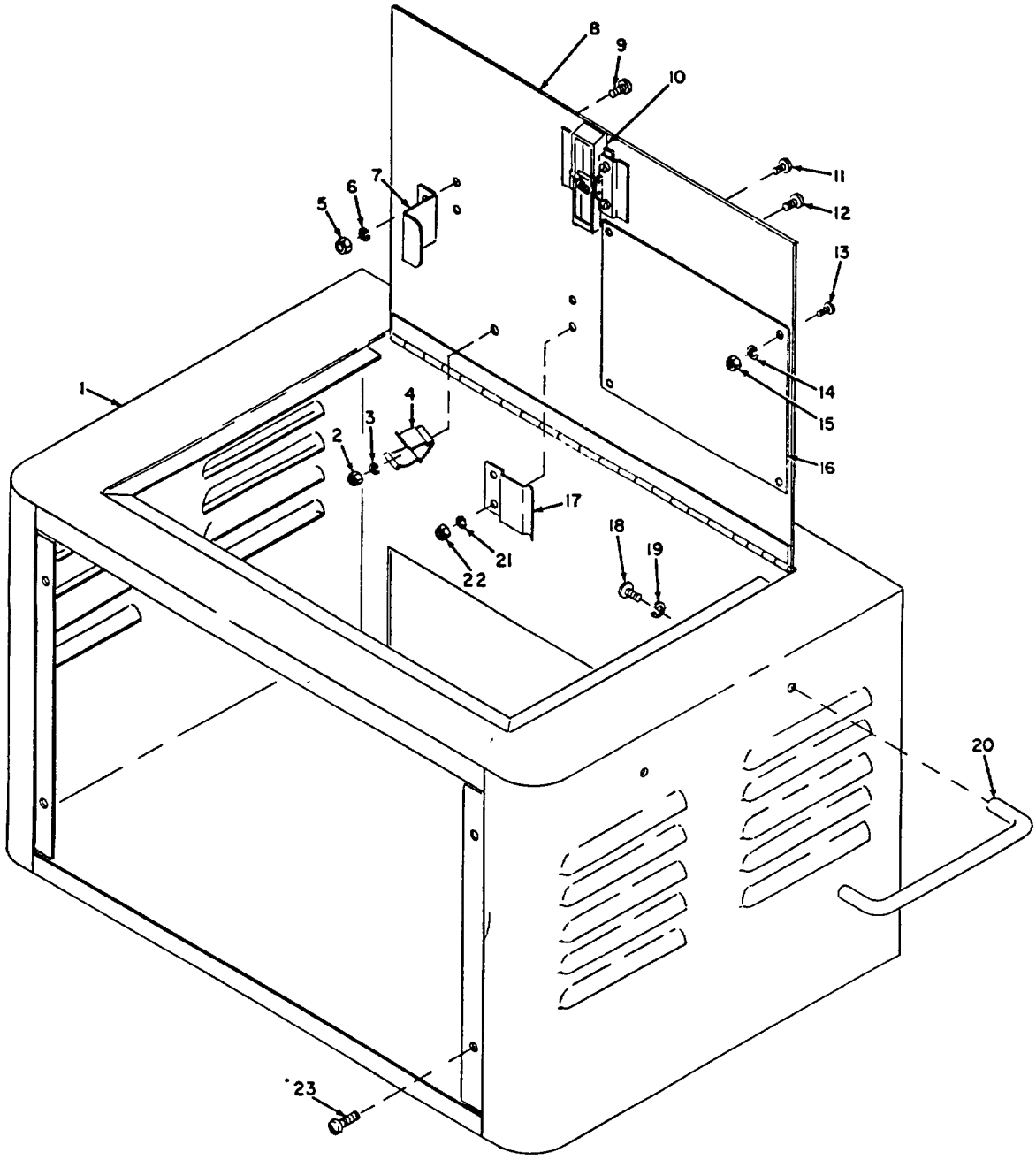
(1) Remove one nut (2), lockwasher (3), and screw (11) which secures the probe barrel clip (4) to the cabinet lid (8) and remove the clip.
(2) Remove two nuts (5), lockwashers (6), and screws (9) which secure the probe retaining bracket (7) to the cabinet lid (8) and remove the bracket.
(3) Remove two nuts (22), lockwashers (21), and screws (12) which secure the bracket spring (17) to the cabinet lid (8) and remove the spring.
(4) Remove four nuts (15), lockwasher (14), and screws (13) which secure the wiring diagram (16) to the cabinet lid (8) and remove the diagram.
(5) Remove two screws (18) and lockwashers (19) which secure each handle (20) to the cabinet (1). Perform this step to remove both handles.

c. Assembly.

(1) Position each handle (20) over its mounting holes in the side of the cabinet (1) and secure each handle with two lockwashers (19) and screws (18).
(2) Position the wiring diagram (16) over its mounting holes in the cabinet lid (8) making sure the bottom of the diagram is toward the hinged end of the lid. Secure with four screws (13), lockwashers (14), and nuts (15).
(3) Position the bracket spring (17) over its mounting holes making certain the spring faces toward the wiring diagram (16). Secure with two screws (12), lockwashers (21) and nuts (22).
(4) Position the probe retaining bracket (7) over its mounting holes and secure with two screws (9), lockwashers (6), and nuts (5).
(5) Position the probe barrel clip (4) over its mounting hole and secure with one screw (11), lockwasher (3), and nut (2). The clip must be turned at an angle to receive the test probe barrel.

d. Installation.

(1) Install the test probe assembly in the cabinet lid (8) by means of the probe barrel clip (4), probe retaining bracket (7), and bracket spring (17).
(2) Slide the chassis assembly into the cabinet assembly and secure the chassis assembly with four washers and capscrews (23).
(3) Replace the panel cover assembly and the power cord.



1	Cabinet	9	Screw	17	Bracket spring
2	Nut	10	Catch and lock fastener	18	Screw
3	Lockwasher	11	Screw	19	Lockwasher
4	Probe barrel clip	12	Screw	20	Handle
5	Nut	13	Screw	21	Lockwasher
6	Lockwasher	14	Lockwasher	22	Nut
7	Probe retaining bracket	15	Nut	23	Capscrew
8	Cabinet lid	16	Wiring diagram		

Figure 8. Cabinet assembly.

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Section III. PANEL COVER ASSEMBLY

16. Description

The panel cover assembly (fig. 9) is used to protect the front panel of the indicator when the indicator is not being used and also to stow the water manometer (23) and the spare sized pyrex orifices (16). It has a black wrinkle finish like the cabinet assembly and is rectangular in shape.

17. Maintenance

Note

Replacement of the panel cover (5, fig. 9), the cover handle (8), the vacuum diagram (6), the manometer mounting plate (4), and the cover retaining spring (27) is not authorized at this maintenance level. However, the removal of some of these components is necessary in order to replace authorized components.

a. Disassembly.

(1) Pull the panel cover assembly from the front panel of the indicator.
(2) Pull the manometer mounting plate (4) from the four clips (19) which secure it to the panel cover (5). Release the rubber tubing (22) out from under the four retaining straps (18).
(3) Pull the end of the rubber tubing (22) from the water manometer (23) and remove the manometer from the three clips (2).
(4) Remove the two screws (24) which secure the manometer scale (3) to the manometer mounting plate (4) and remove the manometer.
(5) Remove the three screws (1) which secure the three clips (2) to the mounting plate (4) and remove the clips.
(6) Remove the four nuts (21), lockwashers (20), and screws (17), and remove the four clips (19) and the four retaining straps (18).
(7) Remove the four nuts (10), lockwashers (9), and screws (7) which secure the vacuum diagram (6) to the cover (5) and remove the diagram.
(8) Remove each sized pyrex orifice (16) from its clip (13). Remove each clip by removing two nuts (15), lockwashers (14), and screws (11).
(9) Remove eight nuts (25), lockwashers (26); and screws (28) which secure the four cover retaining springs (27) to the panel cover (5), and remove the springs.
(10) Remove two screws (12) from each cover handle (8) and remove the two handles from the panel cover.

b. Installation.

(1) Position the two cover handles (8) over their respective mounting holes on the outside of the panel cover (5) and secure each cover handle with two screws (12). If necessary, file off the exposed end of the screws and touchup with paint.
(2) Position the four cover retaining springs (27) in the panel cover (5) and secure each spring with two screws (28), lockwashers (26), and nuts (25).
(3) Position each clip (13) in the panel cover (5) and secure each clip with one screw (11), lockwasher (14), and nut (15). Insert a sized pyrex orifice (16) in each clip.
(4) Position the vacuum diagram (6) in the panel cover and secure it in place with four screws (7), lockwashers (9), and nuts (10).
(5) Position four clips (19) over four retaining straps (18) and secure each set to the panel cover with one screw (17), lockwasher (20), and nut (21).
(6) Position the three clips (2) on the mounting plate (4) and secure each clip in place with one screw (1).
(7) Place the manometer scale (3) on the mounting plate (4) and secure with two screws (24).
(8) Insert one end of the rubber tubing (22) over one end of the water manometer (23) and insert the water manometer in three clips (2) on the mounting plate.
(9) Press the mounting plate with the water manometer attached to it between the four clips (19) to retain

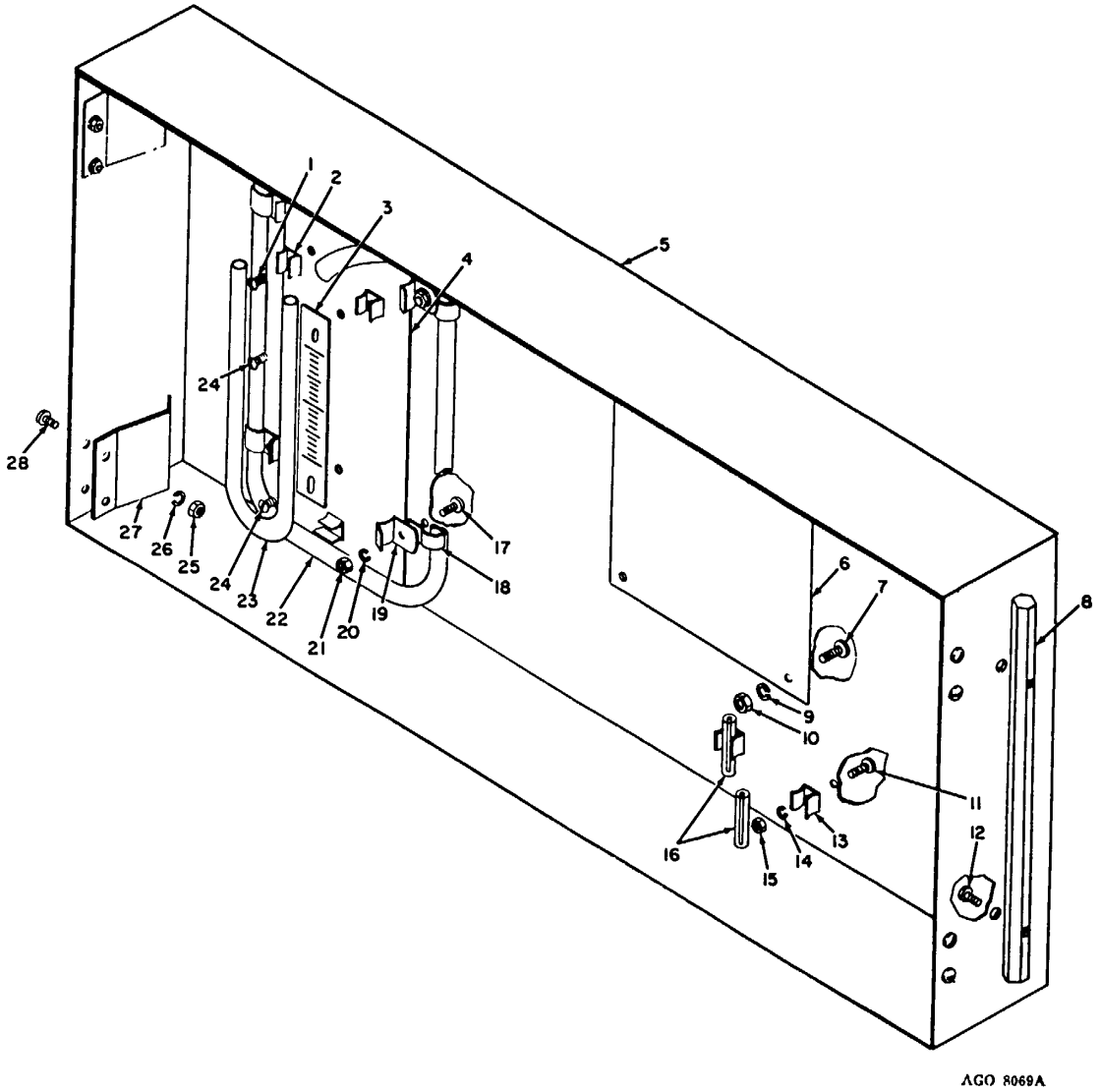


Figure 9. Panel cover assembly.

1 Screw
2 Clip
3 Manometer scale
4 Manometer mounting plate
5 Panel cover
6 Vacuum diagram
7 Screw
8 Cover handle
9 Lockwasher
10 Nut
11 Screw
12 Screw
13 Clip
14 Lockwasher
15 Nut
16 Sized pyrex orifice
17 Screw
18 Retaining strap
19 Clip
20 Lockwasher
21 Nut
22 Rubber tubing
23 Water manometer
24 Screw
25 Nut
26 Lockwasher
27 Cover retaining spring
28 Screw

Figure 9-Continued.

it in the panel cover. Thread the other end of the rubber tubing (22) through the four retaining straps (18).

(10) Insert the panel cover assembly over the front panel of the indicator in a manner similar to that shown in figure 1 and press it into place.

Section IV. TEST PROBE ASSEMBLY

18. Description

The test probe assembly (fig. 10) is a metal pistol shaped accessory adapted to serve as a means of testing outlet valves which have been installed into facepieces. A rubber tube (17), 36 inches long, extends from the test probe handle (22) to the screw assembly (I5) which fits into the rubber tube. A mask testing bracket (16), threaded onto the screw assembly, enables an airtight connection to be made when the bracket and screw assembly are attached to the VALVE fixture on the indicator front panel. Electrical wires (19) housed in insulation sleeving (14), 42 inches long, extends from the trigger switch (2) and terminates at the electrical plug connector (13). This plug connector attaches to the TEST PROBE receptacle connector J1 on the indicator front panel. The test probe barrel (3) is equipped with a test valve adapter (4) that is held in place by a mask tip screw (5) to assure an airtight fit in the outlet valve being tested. With the test probe assembly connected to the indicator as described above, a test cycle is initiated by squeezing the test probe trigger (10) which closes the contacts of the sensitive switch (2). The valve test switch S3 (59, fig. 4) is bypassed enabling the test of the outlet valve to be conducted without depressing the VALVE fixture.

19. Maintenance

a. Disassembly.

(1) Remove the two hose clamps (18, fig. 10) which secure the insulation sleeving (14) and the rubber tube (17) in the insulation sleeving (20).

(2) Pull the screw assembly (15) and the mask testing bracket (16) as a unit from the rubber tube (17). Unscrew the screw assembly from the mask testing bracket.

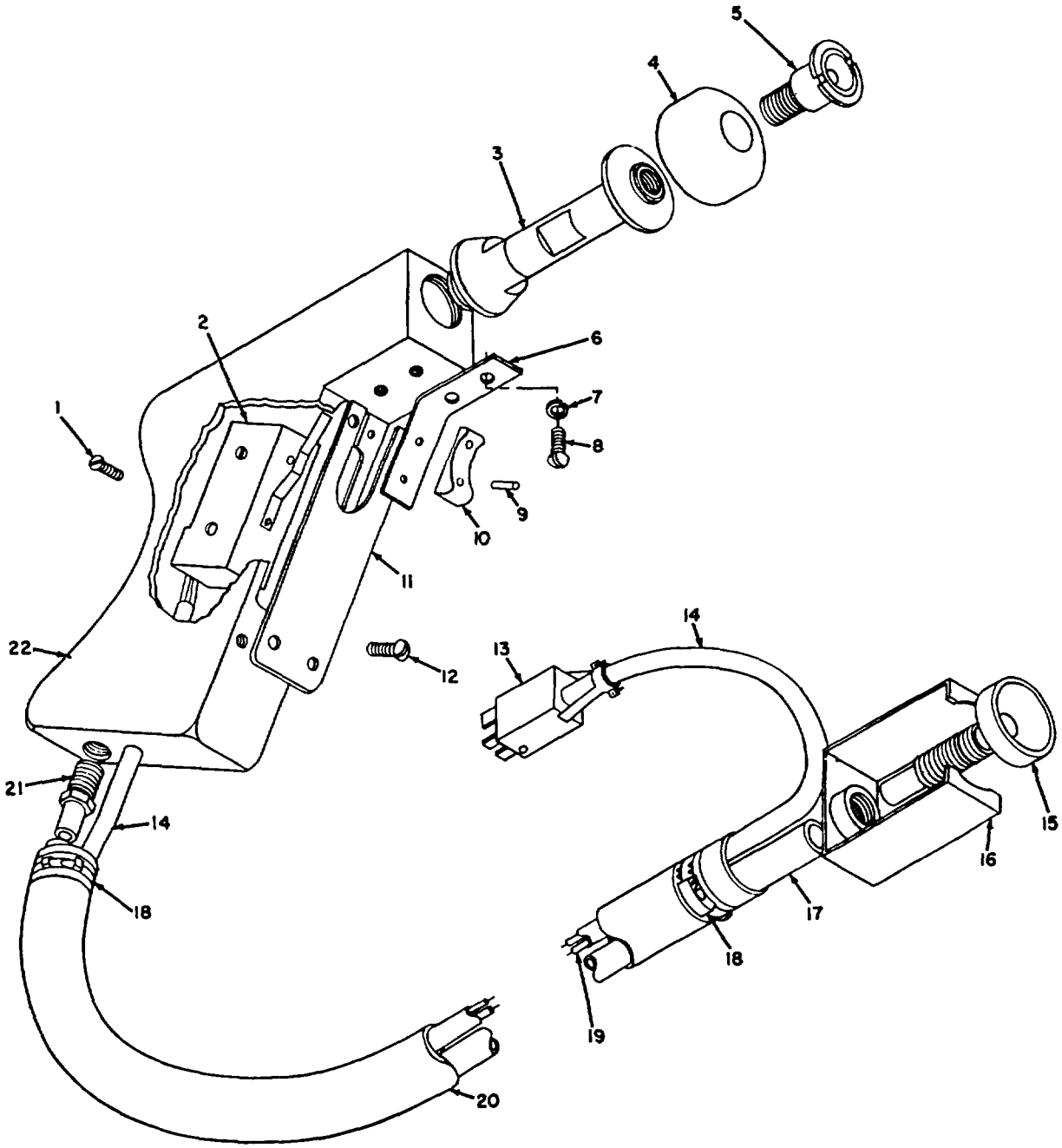
(3) Pull the other end of the rubber tube (17) from the adapter (21).

(4) Loosen the cable clamp on the plug connector (13) and pull back the insulation sleeving (14). Unsolder the two electrical wires (19) from the terminals on the plug connector (13) and remove the plug connector.

(5) Pull the insulation sleeving (20) from the insulation sleeving (14) and the rubber tube (17). Only the insulation sleeving (14) remains connected to the test probe assembly.

(6) Remove four screws (12) which secure the switch cover (11) to the test probe handle (22) and remove the switch cover.

(7) Remove two screws (8) and lockwashers (7) which hold the trigger



1 Screw
2 Sensitive switch
3 Test probe barrel
4 Test valve adapter
5 Mask tip screw
6 Trigger spring
7 Lockwasher
8 Screw
9 Rivet
10 Test probe trigger
11 Switch cover
12 Screw
13 Plug connector
14 Insulation sleeving
15 Screw assembly
16 Mask testing bracket
17 Rubber tube
18 Hose clamp
19 Electrical wires
20 Insulation sleeving
21 Pipe to hose straight adapter
22 Test probe handle

Figure 10. Test probe assembly.

(10) and the trigger spring (6) to the test probe handle (22). Remove the trigger and trigger spring as a unit.

(8) Remove the two screws (1) which secure the sensitive switch (2) in the test probe handle (22). Work the sensitive switch out through the opening of the test probe handle normally covered by the switch cover. Disconnect the two electrical wires (19) from the terminals of the sensitive switch (2) by loosening the two terminal mounting screws. Pull the insulation sleeving (14) with the wires (19) from the butt end of the test probe handle (22).

(9) Unscrew the adapter (21) from, the test probe handle (22).

(10) Unscrew and remove the mask tip screw (5) from the test probe barrel (3). Remove the test valve adapter (4) from the test probe barrel.

b. Cleaning and Inspection.

(1) Clean all parts with dry-cleaning solvent and wipe dry with a clean, soft cloth.

(2) Inspect the test probe handle for cracks and any defects which may affect its operation.

(3) Check the condition of the sleeving and the rubber hose. Replace if deteriorated or otherwise defective.

(4) Check the pipe to hose straight adapter, screw assembly, mask testing bracket, and test probe handle for burrs, sharp edges, and worn or damaged threads.

c. Assembly.

(1) Fit the test valve adapter (4) on the mask tip screw (5) and insert and tighten the screw in the test probe barrel (3).

(2) Screw the pipe to hose straight adapter (21) into the butt end of the test probe handle (22).

(3) Tape the insulation sleeving (14) and the rubber tube (17) together and feed them through the insulation sleeving (20).

(4) Insert the insulation sleeving (14) with two electrical wires (19) through the hole in the butt end of the test probe handle (22). Connect both wire ends to the terminals of the sensitive switch (2). Install the sensitive switch in the test probe handle. Secure the sensitive switch (2) to the test probe handle (22) with two screws (1).

(5) Position the trigger spring (6) with the test probe trigger (10) attached to it on the test probe handle (22) and secure it in place with two screws (8) and lockwashers (7).

(6) Position the switch cover (11) on the test probe handle (22) and secure it in place with four screws (12).

(7) Insert one end of the rubber tube (17) over the pipe to hose straight adapter (21) and pull the insulation sleeving (20) up to the adapter. Secure the insulation sleeving.

(8) Insert the other end of the insulation sleeving (14) with both electrical wires (19) through the hose clamp. Insert the electrical wires through the clamp on the plug connector (13) and solder both wire ends to the two terminals on the plug connector. Pull the insulation sleeving over the two wires and tighten the plug connector clamp.

(9) Thread the screw assembly (15) into the mask testing bracket (16) and insert the open end of the rubber tube (17) over the screw assembly (15). Pull the insulation sleeving (20) taut and secure it in place with the hose clamp (18).

CHAPTER 3

FIELD MAINTENANCE INSTRUCTIONS-FOURTH ECHELON

Section I. GENERAL

20. Special Tools

No special tools are required for fourth echelon maintenance of the indicator.

21. Equipment

No special equipment is required for fourth echelon maintenance of the indicator.

22. Painting

a. General. Fourth echelon personnel are authorized to repaint the indicator as necessary. Refer to TM 9-213 for painting instructions for field use.

b. Paints to be Used.

(1) *Primer.* Use synthetic paint primer before painting any surface requiring a painted finish.

(2) *Exterior paint.* Repaint exterior surfaces of components which require paint with black wrinkle paint.

Section II. CHASSIS GROUP

23. Chassis Assembly

a. Description. The chassis assembly is the major unit of the indicator. It is described in paragraph 7 while its subassemblies are described in the succeeding paragraphs.

b. Maintenance. Fourth echelon maintenance personnel are authorized to replace all components of the chassis assembly. Maintenance of those components not authorized to lower echelons of maintenance personnel will be covered in the following paragraphs. The procedures below describe the complete dismantling of the chassis assembly. However, disassembly procedures for the electric chassis assembly, the calibrator assembly, and the motor and pump assembly are covered in separate paragraphs.

(1) *Removal and disassembly.*

(a) Chassis assembly. Remove the chassis assembly (TM 3-6665-209-12).

(b) Electric bell DS5. Remove the electric bell DS5 (par. 8).

(c) Fuse holder XF1. Remove the fuse holder XF1 (par. 9).

(d) Indicator lights. Remove the indicator lights (par. 10).

(e) Balance orifice holder. Remove the balance orifice holder (par. 11).

(f) Motor and pump assembly. Remove the motor and pump assembly (par. 12).

(g) Air shutoff valve assembly. Remove the air shutoff valve assembly (par. 13).

(h) Electric chassis assembly. Remove the electric chassis assembly (TM 3-6665-209-12).

(i) Calibrator assembly. Remove the calibrator assembly (par. 25).

(j) Pressure gage.

1. Disconnect the tube coupling nut that connects the copper tubing (57, fig. 4) to the center connection of the pressure gage (9).

2. Remove three nuts (29), lockwashers (28), and screws (10) which secure the pressure gage to the front panel (42, fig. 3). Work the pressure gage out through the rear of the front panel.

(k) VALVE fixture.

1. Pull the rubber tubing (16, fig. 4)

from the end of the test valve plunger (1) and loosen the two setscrews (12) in the test valve collar (15) and the one setscrew (5) in the test valve bushing (6).

2. Pull the test valve plunger (1) with the test valve adapter (2) as a unit from the VALVE fixture. The test valve sleeve (3) and the test valve spring (4) will also come off at this time.
3. Remove four screws (14) from the test valve flange (13). Remove the test valve flange and the test valve bushing (6) from the front panel (42, fig. 3).

(l) Valve test switch S3.

1. Unsolder two wires at the terminals of the valve test switch S3 (59, fig. 4).
2. Remove two nuts (45) lockwashers (46), and screws (52) and remove the switch bracket (60) from the front panel.
3. Remove two screws (58) and remove the valve test switch S3 (59) from the switch bracket (60).

(m) PUSH TO CALIBRATE switch S2.

1. Mark the electrical wires leading to the PUSH TO CALIBRATE switch S2 (17) and unsolder the wires at the switch terminals.
2. Unscrew the locknut (3, fig. 3) from the switch and remove the switch from the front panel (42).

(n) Mode switch S4.

1. Mark the wires leading to the mode switch S4 (18, fig. 4) and unsolder the wires at the switch terminals.
2. Work the knob (2, fig. 3) from the switch shaft and unscrew the switch locknut. Remove the switch from the front panel.

(o) Toggle switches S5 and S6.

1. Mark the wires leading to the PUMP toggle switch S5 (20, fig. 4) and the LINE toggle switch S6 (21).
2. Unsolder the wires at the switch terminals and remove the locknut (1, fig. 3) on each switch. Remove the switches from the front panel.

(p) TEST PROBE receptacle connector J1.

1. Mark the wires leading to the TEST PROBE receptacle connector J1 (11) and unsolder the four wires at the connector terminals.
2. Remove two screws (7) and remove the receptacle connector J1.

(q) BLEEDER valve control.

1. Pull the rubber tubing (22, fig. 4) from the adapter (55). Disconnect the tube coupling nut that connects the copper tubing (11) to the elbow (54).
2. Loosen the bleeder locknut (5, fig. 3) and remove the bleeder adjust screw (4) from the bleeder housing (56, fig. 4).
3. Remove two screws (33, fig. 3) and lockwashers (34) and remove the bleeder housing (56, fig. 4) along with the attaching elbows (54) and adapter (55) as a unit. If necessary remove the elbows and the adapter.

(r) Line receptacle connector JS.

1. Loosen the two terminal screws that attach the electrical wires to the line receptacle connector J3 (35). Remove the electrical wires from the line receptacle connector J3.
2. Remove the two nuts (33), lockwashers (34), and screws (36) that attach the line receptacle connector to the chassis base and pull the connector out of the opening in the chassis base.

(s) Bell toggle switch S7.

1. Unsolder the wires at the bell toggle switch S7 (22, fig. 3).
2. Unscrew the locknut on the switch and remove the switch from the chassis base.

(t) Orifice block.

1. Remove the two orifice housings (25, fig. 11) and both F2-inch long rubber tubes (23) from each port in the orifice block.
2. Disconnect the tube coupling nuts that connect the copper tube (35) and the copper tube (14, fig. 3) to

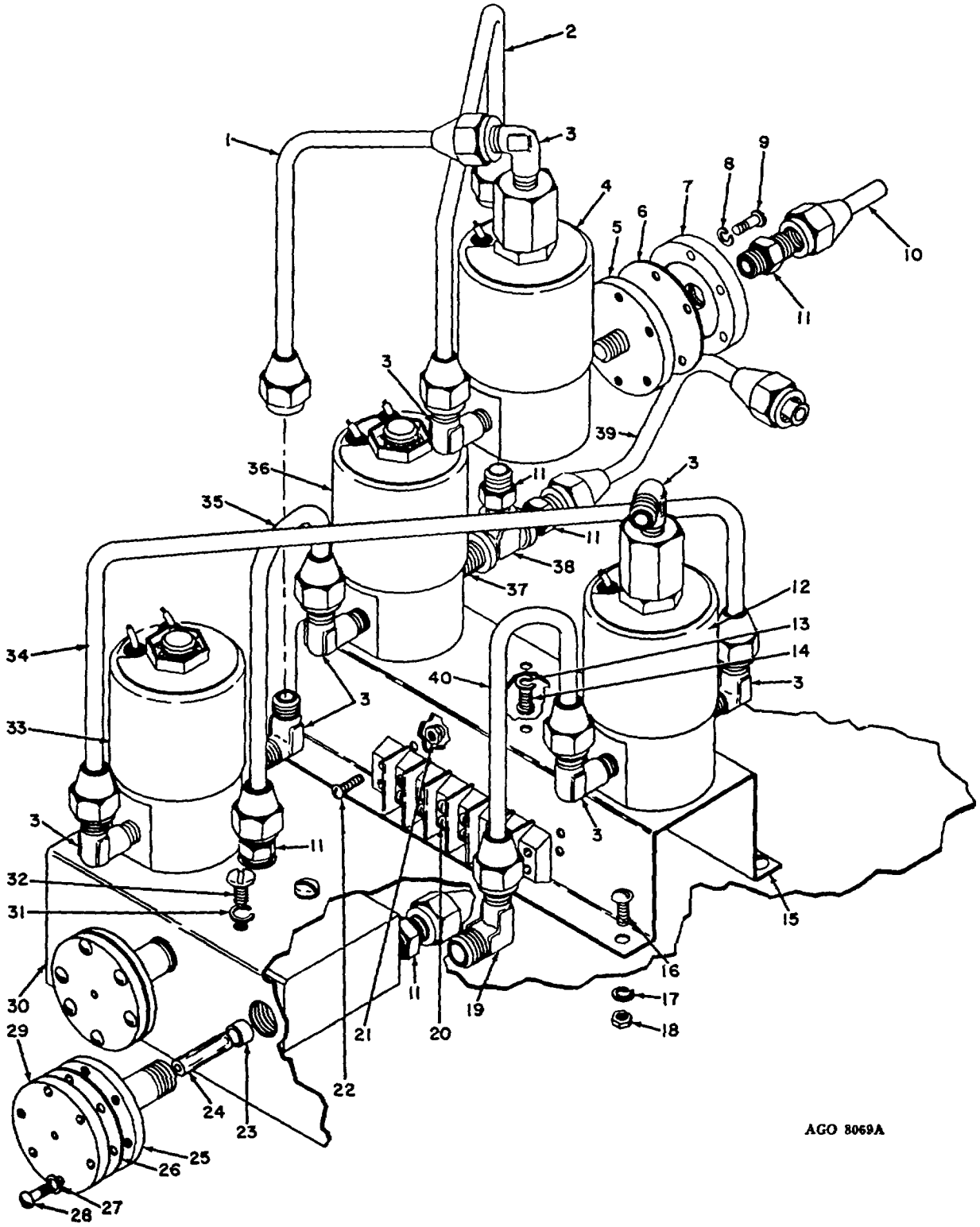


Figure 11. Chassis assembly-solenoid valves.

1 Copper tube
2 Copper tube
3 Elbow
4 Solenoid valve L2
5 Filter mounting flange
6 Filter FL1
7 Filter holder
8 Lockwasher
9 Screw
10 Rubber hose adapter
11 Adapter
12 Solenoid valve L3
13 Lockwasher
14 Screw
15 Valve mounting bracket
16 Screw
17 Lockwasher
18 Nut
19 Elbow
20 Terminal board TB2
21 Nut
22 Screw
23 Rubber tube
24 Comparison orifice 02
(Comparison orifice 01 not shown)
25 Orifice housing
26 Filter FL3
(Filter FL2 not shown)
27 Lockwasher
28 Screw
29 Filter cap
30 Chassis base
31 Lockwasher
32 Screw
33 Solenoid valve L4
34 Copper tube
35 Copper tube
36 Solenoid valve L1
37 Nipple
38 Pipe tee
39 Copper tube
40 Copper tube

Figure 11-Continued.

the two adapters (11, fig. 11) at the orifice block.

3. Remove two screws (32) and lockwashers (31) and remove the orifice block from the chassis base.

(u) Test counter receptacle connector J2.

1. Mark the wires leading to the test counter receptacle connector J2 (42, fig. 4) and unsolder four wires at the connector terminals.

2. Remove two nuts (44), lockwashers (43), and screws (41) and remove the connector from the chassis base.

(v) Governor resistor R1 and radio noise suppression capacitor C2.

1. Mark the wires leading to the governor resistor R1 (23, fig. 3) and the radio noise suppression capacitor C2 (18) and unsolder the wires at their respective terminals.
2. Remove three nuts (21) and screws (24) and remove the resistor R1 and the capacitor C2 from the chassis base.

(w) Bell transformer T2 and terminal board TBS.

1. Loosen four screws on the terminal board TB3 (27) and remove the two wires leading to the bell transformer T2 (28) and the two wires leading to the bell toggle switch (22) from the terminal board TB3.

2. Remove two nuts (26) and screws (39) and remove the terminal board TB3 (27) from the chassis base.

3. Remove two nuts (40) and two screws (41) which secure the bell transformer T2 (28) to the chassis base (16) and remove the transformer T2.

(x) Solenoid valves and related parts.

1. Mark the wires leading to the terminal board TB2 (20, fig. 11) and loosen the screws on the terminal board to remove the wire terminals.

2. Disconnect the tube coupling nuts that-connect copper tubes (1, 2, 34, 35, 39, and 40) and rubber hose adapter (10) to the various elbows (3) and adapters (11) on the solenoid valves. Remove the copper tubes.

3. Remove the four nuts (18), lockwashers (17), and screws (16) which secure the valve mounting bracket (15) to the chassis base (30) and remove the bracket with the three solenoid valves.

4. Remove each solenoid valve (4, 12, 33, and 36) by removing two screws (14) and lockwashers (13).

5. Unscrew the elbows (3) from the solenoid valves L1 (36). L2 (4), L3 (12), and L4 (33).

6. Unscrew the nipple (37) with the pipe tee (38) and the adapters (11) from the solenoid valve L1 (36).

7. Unscrew the filter mounting flange (5) with the filter FL1 (6), the filter holder (7), and the adapter (11) from the solenoid valve L2 (4).

8. Remove four nuts (21) and screws (22) which secure the terminal board TB2 (20) to the valve mounting bracket (15) and remove the terminal board.

(y) Front panel and related parts.

1. Remove four nuts (61, fig. 4), lockwashers (62), and screws (51) which secure the bracket (30) to the chassis base (31). Remove the front panel with its attaching parts from the chassis base.

2. Remove two nuts (49), lockwashers (50), and screws (53) from each panel guide bracket (23) and remove both the panel guide brackets and the brackets (30) from the front panel.

3. Remove the screws (26) and lockwashers (25) from each panel handle (19) and remove the two handles from the front panel.

(2) *Cleaning and inspection.*

(a) Clean all parts with dry-cleaning solvent and wipe dry with a clean, dry cloth.

(b) Check all wires for broken or cracked insulation. If wire is damaged or there is doubt as to its condition, replace the wire.

(c) Inspect all copper tubes for dents and cracks. If tubes are damaged in any way, replace the tubes.

(d) Inspect the rubber tubes, washers, and grommets for breaks and deterioration. Replace them if there is any evidence of damage.

(e) Inspect the terminals of the switches and terminal boards for good electrical conductivity.

(f) Inspect the threads of all components for burrs or other damage. If threads are damaged on nuts, screws, or pipe fittings, replace the damaged item. If threads are damaged on such components as solenoid valves, retap the threaded holes.

(g) Check the front panel, the chassis base, and the brackets for burrs, bends, and distortion. Replace them if their condition cannot be corrected. Make certain all markings on the front panel are legible. Repaint if necessary.

(h) Apply 115 volts A.C. to the solenoid valves L1 and L4. Each valve should close when current is applied.

(i) Apply 115 volts A.C. to the solenoid valves L2 and L3. Each valve should open when current is applied.

(j) Check the pressure gage setting. The gage pointer should be on zero of the graduated scale. If necessary, adjust in accordance with paragraph 23b(4).

(k) Check the length of the test valve spring. It should measure three quarters of an inch.

(3) *Assembly and installation.*

(a) Front panel and related parts.

1. Install two panel handles (19, fig. 4) on the front panel (42, fig. 3) and secure each handle in place with two lockwashers (25, fig. 4) and screws (26).

2. Position a bracket (30) and a panel guide bracket (23) on each side of the front panel and secure each set of brackets in place with two screws (53), lockwashers (50), and nuts (49).

3. Position the front panel with its related parts on the chassis base (31) and secure each bracket (30) to the chassis base with two screws (51), lockwashers (62), and nuts (61).

(b) Solenoid valves and related parts.

1. Position the terminal board TB2 (20, fig. 11) on the valve mounting bracket (15) and secure it in place with four screws (22) and nuts (21).

2. Screw the filter mounting flange (5) with the filter FL1 (6), the filter holder (7), and the adapter (11) into the solenoid valve L2 (4).

Note

Before installing the flange or any other threaded pipe connection, apply

lead compound around the threads to form a seal.

3. Screw the nipple (37) with the pipe tee (38) and the adapters (11) into the solenoid valve L1 (36).
4. Screw the elbows (3) into the solenoid valves L1 (36), L2 (4), L3 (12), and L4 (33).
5. Install the solenoid valve L4 (33) on the chassis base (30) and install the solenoid valves L1 (36), L2 (4), and L3 (12) on the valve mounting bracket (15). Secure each solenoid valve in place with two screws (14) and lockwashers (13).
6. Install the valve mounting bracket (15) on the chassis base (30) and secure it in place with four screws (16), lockwashers (17), and nuts (18).
7. Connect the tube coupling nuts of the copper tubes (1, 2, 34, 35, 39, and 40) and the rubber tube adapter (10) to the various elbows (3) and adapters (11) on the solenoid valves.
8. Connect the marked wires to the proper terminals on the terminal board TB2 (20) and secure with the terminal screws.

Note

If there is any doubt about the wire connections, refer to the wiring diagram (fig. 2).

(c) *Bell transformer T2 and terminal board TB3.*
1. Position the bell transformer T2 (28, fig. 3) on the chassis base (16) and secure it in place with two screws (41) and nuts (40).
2. Position the terminal board TB3 (27) on the chassis base (16) and secure it in place with two screws (39) and nuts (26).
3. Connect the two electrical wires leading to the bell transformer T2 to the two terminals on the terminal board TB3. Connect the two electrical wires leading from the bell toggle switch S7 (22) to the same two terminals to which the bell transformer T2 wires are connected.

(d) *Governor resistor R1 and radio noise suppression capacitor C2.*
1. Install the governor resistor R1 (23) and the radio noise suppression capacitor C2 (18) to the bottom of the chassis base (16) and secure them in place with three screws (24) and nuts (21).
2. Solder the wires leading to the resistor and the capacitor at the proper terminals. Refer to the wiring diagram (fig. 2).

(e) *Test counter receptacle connector J2.*
1. Install the test counter receptacle connector J2 (42, fig. 4) at the rear of the chassis base (31) and secure it in place with two screws (41), lockwashers (43), and nuts (44).
2. Solder the four wires leading to the test counter receptacle connector J2 to their respective terminals. Refer to the wiring diagram (fig. 2).

(f) *Orifice block.*
1. Position the orifice block (17, fig. 3) in the bottom of the chassis base (16) and secure it in place with two screws (32, fig. 11) and lockwashers (31).
2. If previously removed install two adapters (11) in the orifice block.

Note

Before installing the adapter or any other threaded pipe connection, apply lead compound around the threads to form a seal.

3. Connect the copper tubes (35) and (14, fig. 3) to the adapters with their tube coupling nuts.
4. Install a $^{1}/_{2}$-inch long rubber tube (23, fig. 11) over each comparison orifice (24) and insert the orifice in the orifice block. Each pyrex orifice is marked with the word FLOW plus an arrow. Install each orifice with the arrow pointing in the same direction as the indicator airflow at this location.

Note

The comparison orifice 01 is next to the solenoid valve L4 (33) and the comparison orifice 02 is next to the air shutoff valve assembly.

5. Screw both orifice housings (25) over the exposed ends of the orifices 01 and 02 and into the orifice block.

(g) *Bell toggle switch S7.*

1. Install the bell toggle switch S7 (22, fig. 3) in the rear of the chassis base (16) and secure it in place with its locknut.
2. Replace the two wires previously removed and solder them to the switch terminals.

(h) *Line receptacle connector JS.*

1. Install the line receptacle connector J3 (35, fig. 4) in the rear of the chassis base (31) and secure it in place with two screws (36), lock washers (34), and nuts (33).
2. Replace the two wires previously removed by fastening them to their respective terminals and tightening the two terminal screws.

(i) *BLEEDER valve control.*

1. If previously removed, install two elbows (54) in the bleeder housing (56) and install the adapter (55) in the elbow on the right of the housing.

Note

Before installing the elbows, adapter, or any other threaded pipe connection, apply lead compound around the threads to form a seal.

2. Install the bleeder housing (56) with the attaching elbows (54) and adapter (55) in place to the back of the front panel (42, fig. 3) and secure it in place with two screws (33) and lockwashers (34).
3. Thread the bleeder locknut (5) onto the bleeder adjust screw (4) and then thread the bleeder adjust screw into the bleeder housing (56, fig. 4).
4. the copper tubing (11) to the elbow (54) with its tube coupling nut. Install the rubber tubing (22) onto the adapter (55).

(j) *TEST PROBE receptacle connector J1.*

1. Install the TEST PROBE receptacle connector J1 (11, fig. 3) into the front panel (42) and secure it in place with two screws (7).
2. Solder the four electrical wires leading to the connector to their respective terminals. Refer to the wiring diagram (fig. 2).

(k) *Toggle switches S5 and S6.*

1. Install the PUMP toggle switch S5 (20, fig. 4) and the LINE toggle switch S6 (21) adjust the back of the front panel (42, fig. 3) and secure each switch in place with a locknut (1) installed from the front of the front panel.
2. Replace the two electrical wires previously removed from each switch and solder them to their respective switch terminals. Refer to the wiring diagram (fig. 2).

(I) *Mode switch S4.*

1. Install the mode switch S4 (18, fig. 4) against the back of the front panel (42, fig. 3) and secure it in place with the switch locknut installed from the front of the front panel.
2. Aline the notch in the knob (2) so that it will position the mode switch S4 to the three positions marked on the face of the front panel and then insert the knob on the switch shaft.
3. Replace the wires previously removed and solder them to their respective switch terminals. Refer to the wiring diagram (fig. 2).

(m) *PUSH TO CALIBRATE switch S2.*

1. Install the PUSH TO CALIBRATE switch S2 (17, fig. 4) against the back of the front panel (42, fig. 3) and secure it in place with a locknut (3) installed from the front of the front panel.
2. Replace the wires previously removed and solder them to their respective switch terminals. Refer to the wiring diagram (fig. 2).

(n) *Valve test switch S3.*

1. Install the valve test switch S3 (59, fig. 4) on the switch bracket (60) and secure it in place with two screws (58), lockwashers (47), and nuts (48).

2. Mount the switch bracket to the back of the front panel and secure it in place with two screws (52), lockwashers (46), and nuts (45).
3. Replace the two wires previously removed and solder them to their respective switch terminals. Refer to the wiring diagram (fig. 2).

(o) VALVE fixture.
1. Position the test valve bushing (6, fig. 4) against the face of the front panel and the test valve flange (13) against the back of the front panel (42, fig. 3). Secure them in place with four screws (14, fig. 4).
2. Insert the test valve plunger (1) into the -test valve adapter (2), the test valve sleeve (3), and the test valve spring (4). Then install the test valve plunger with these components assembled to it as a unit into the test valve bushing (6) and the test valve flange (13). Aline the slot of the test valve plunger (1) with the setscrew (5) and screw the setscrew into the slot.
3. Install the test valve collar (15) over the exposed end of the test valve plunger (1) and with the test valve plunger in its restricted position, place the test valve collar against the test valve flange (13) and connect these together by tightening the two setscrews (12).
4. Install the rubber tubing (16) over the protruding end of the test valve plunger (1) in the back of the front panel.

(p) Pressure gage.
1. Install the pressure gage (9) in the rear of the front panel and secure it in place with three screws (10), lockwashers (28), and nuts (29).
2. Connect the copper tubing (57) to the center connection at the back of the pressure gage (9) with its tube coupling nut.

Note

Before installing the tube coupling nut, apply lead compound to the threads of the center connection to form a seal.

(q) Calibrator assembly. Install the calibrator assembly (par. 25).
(r) Electric chassis assembly. Install the electric chassis assembly (TM 3-665-209-12).
(s) Air shutoff valve assembly. Install the air shutoff valve assembly (par. 13).
(t) Motor and pump assembly. Install the motor and pump assembly (par. 12).
(u) Balance orifice holder. Install the balance orifice holder (par. 11).
(v) Indicator lights. Install the indicator lights (par. 10).
(w) Fuse holder XF1. Install the fuse holder XF1 (par. 9).
(z) Electric bell DS5. Install the electric bell DS5 (par. 8).
(y) Chassis assembly. Install the chassis assembly into the cabinet assembly (TM 3-6665-209-12).

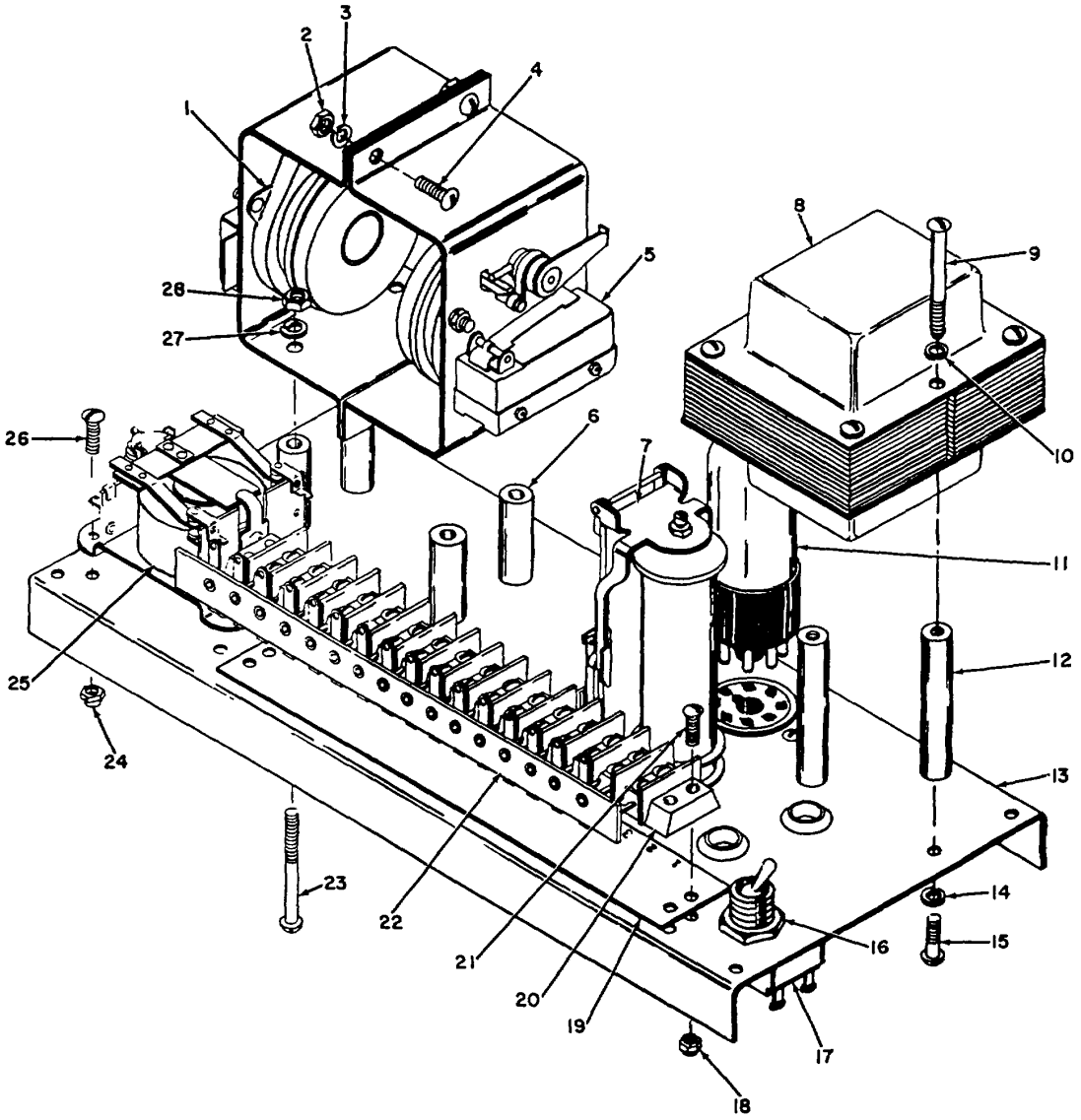
(4) *Adjustment.*
(a) Pressure gage. The pressure gage may be adjusted before or after its installation into the chassis assembly.
1. Rotate the clear plastic dial cover counterclockwise approximately one-quarter turn.

Note

The dial cover is seated in a rubber gasket and this tight fitting may make it difficult to turn the cover from its present position.

2. Remove the cover from the pressure gage.
3. Turn the knurled screw at the base of the gage identified as ZERO SET until the gage pointer is alined on the zero of the graduated scale.
4. After adjustment is made, install the clear plastic dial cover to the gage body and rotating it clockwise approximately one-quarter turn.

(b) Calibration. Calibrate the chassis assembly in accordance with the instructions contained in TM 366-.5-092.



1 Interval timer M1
2 Nut
3 Lockwasher
4 Screw
5 Test cycle timer M2
6 Spacer
7 Keying relay K2
8 Power transformer T1
9 Screw
10 Lockwasher
11 Electron tube V1
12 Rod
13 Electrical chassis
14 Lockwasher
15 Screw
16 Locknut
17 Selector switch S8
18 Nut
19 Designation plate
20 Terminal board TB1
21 Screw
22 Fanning strip
23 Screw
24 Nut
25 Holding relay K1
26 Screw
27 Lockwasher
28 Nut

Figure 12. Electric chassis assembly, top view.

24. Electric Chassis Assembly

a. Description. The electric chassis assembly is a subassembly of the chassis assembly and contains most of the electrical components of the indicator. By itself, the electric chassis assembly performs no specific function. However, the components mounted on the electrical

chassis have specific functions which are described in TM 3-6665-209-12. The electrical chassis (13, fig. 12) is an anodized aluminum alloy flanged plate that is mounted on four spacers (6, fig. 13) attached to the top of the chassis base. These spacers elevate the electrical chassis above the chassis base permitting room for the electrical parts and wires located on the underside of the chassis. The interval timer M1 (1, fig. 12), test cycle timer M2 (5), keying relay K2 (7), electron tube V1 (11), power transformer T1 (8), selector switch S8 (17), terminal board TB1 (20), and holding relay K1 (25) are mounted on the upper side of the electrical chassis. Beneath the electrical chassis are mounted the electron tube socket (10, fig. 13), resistor R4 (12), capacitor C3 (13), resistor R2 (14), resistor R3 (16), and capacitor C1 (17).

b. Maintenance. Fourth echelon maintenance personnel are authorized to disassemble the electric chassis assembly. However, the individual components are not reparable and must be replaced if they are defective.

(1) *Removal.* Remove the electric chassis assembly as described in TM 3-6665209-12.

(2) *Disassembly.*

(a) Interval timer M1 and test cycle timer M2.

1. Mark the five wires leading to the interval timer M1 (1, fig. 12) and the four wires leading to the test cycle timer M2 (5). Unsolder the wires at their terminals on the timers.

2. Remove four nuts (28), lockwashers (27), and screws (23) and remove the housing which contains the interval timer M1 (1) and the test cycle timer M2 (5). Remove the four spacers (6).

3. Remove three nuts (2), lockwashers (3), and screws (4) and separate the interval timer M1 (1) from the test cycle timer M2 (5).

(b) Keying relay K2.

1. Mark all wires leading to the keying relay K2 (7) and unsolder the wires at .their terminals on the relay.

2. Remove two screws (2, fig. 13) and lockwashers (3) from the bottom of the electrical chassis (1g) and remove the keying relay K2 (7, fig. 12).

(c) Power transformer T1.

1. Mark the eight wires leading to the power transformer T1 (8) and disconnect two wires leading from the transformer at terminals 2 and 3 on the terminal board TB1 (20) by loosening the terminal screws and removing the wires. Unsolder the remaining six wires at the terminals of the transformer.

2. Remove two screws (9) and lockwashers (10) which secure the power transformer T1 (8) to the two rods (12). Remove the transformer.

3. Remove two screws (15) and lockwashers (14) to remove both the rods (12) from the electrical chassis (13).

(d) Selector switch S8.

1. Mark the four wires leading to the selector switch S8 (17) and unsolder them from the terminals on the switch.

2. Remove the locknut (16) from the selector switch S8 (17) atop the electrical chassis and remove the switch from the underside of the electrical chassis (13).

(e) Terminal board TB1.

1. Make certain all wires leading to the terminal board TB1 (20) are marked and loosen the terminal screws. Remove all wires leading to the terminal board.

2. Remove four nuts (18) and screws (21) and remove the terminal board TB1 (20) and the designation plate (19) from the electrical chassis (13).

Note

The fanning strip (22) is removed when the electric chassis assembly is removed (TM 3-6665-209-12).

(f) Holding relay K1.

1. Mark all wires leading to the holding relay K1 (25) and unsolder

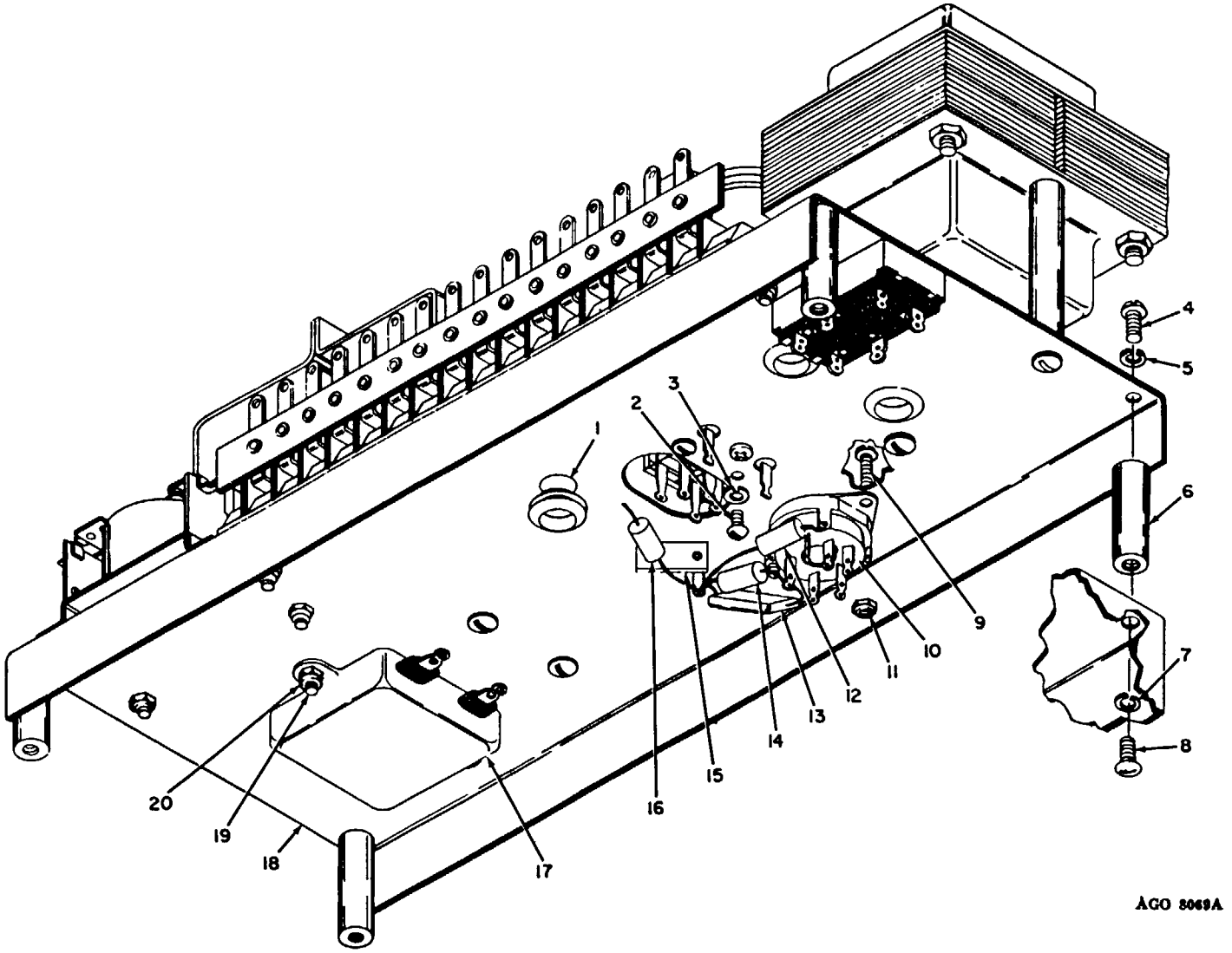


Figure 13. Electric chassis assembly, bottom view.

1 Grommet
2 Screw
3 Lockwasher
4 Screw
5 Lockwasher
6 Spacer
7 Lockwasher
8 Screw
9 Screw
10 Electron tube socket
11 Nut
12 Resistor R4
13 Capacitor C3
14 Resistor R2
15 Terminal board
16 Resistor R3
17 Capacitor C1
18 Electrical chassis
19 Screw
20 Nut

Figure 13-Continued.

the wires at their terminals on the relay.

2. Remove four nuts (24) and screws (26) and remove the holding relay K1 (25) from the electrical chassis (13).

(g) Capacitor C1.

1. Unsolder the two wires leading to the terminals of the capacitor C1 (17, fig. 13).

2. two nuts (20) and screws (19) and remove the capacitor C1 (17) from the electrical chassis (18).

(h) Capacitor C3 and resistors R2, R3, and R4.

1. Unsolder the wire leads of the capacitor C3 (13) resistor R2 (14), resistor R3 (16), and resistor R4 (12) from the terminal board (15).

Note

The terminal board (15) (terminal strip-lug) is mounted to the electrical chassis (18) at any convenient location. It may be secured at one of the mounting holes of the electron tube socket (10) or a separate mounting hole may be drilled in the chassis for this terminal board. If the terminal board (15) was not released when prior components were removed, remove the mounting hardware which secures it to the chassis.

2. Unsolder the other wire leads of the capacitor C3 (13) and resistor R2 (14) from terminal 5 of the electron tube socket (10).

3. Unsolder the other wire lead of the resistor R4 (12) from the ground terminal on the electron tube socket (10).

4. Unsolder the other wire lead of the resistor R3 (16) from its connection with the electrical wire leading to the power transformer T1 (8, fig. 12).

Note

The wire leads of the resistor R3 (16, fig. 13) may be soldered to terminals 1 and 6 of the electron tube socket (10). These terminals are not used in the electron tube circuit and therefore may be used to support the resistor R3. A wire lead from the terminal board (15) (terminal strip-lug) also would be soldered to terminal 6 of the electron tube socket and a wire lead from the power transformer T1 (8, fig. 12) would be soldered to terminal 1 of the electron tube socket.

(i) Electron tube socket.

1. If not already previously removed, pull the electron tube V1 (11) from its electron tube socket (10, fig. 13).

2. Mark all wires leading to the electron tube socket and unsolder the wires at their terminals on the socket.

3. Remove two nuts (11) and screws (9) and remove the electron tube socket (10) from the electrical chassis (18).

(3) Cleaning and inspection.

(a) Clean all parts with dry-cleaning solvent and wipe dry with a-clean, dry cloth.

(b) Check all wires for broken or cracked insulation. If wire is damaged or there is doubt as to its condition, replace the wire.

(c) Inspect the terminals of the switch, timers, relays, and terminal boards for good electrical conductivity. Inspect the relay contacts for cleanliness.

(d) Inspect the grommets (1) for wear or deterioration. Replace if necessary.

(e) Inspect the threads of all components for burrs or other damage. Replace those parts with damaged threads.

(f) Inspect the electrical chassis for burrs, dents, and distortion. Straighten or replace if necessary.

(4) *Assembly.*

(a) Electron tube socket.

1. Install the electron tube socket (10, fig. 13) in its mounting hole against the underside of the electrical chassis (18) and secure it in place with two screws (9) and nuts (11).

2. Solder the marked wires previously removed to their respective terminals on the socket. Refer to the wiring diagram (fig. 2).

3. Install the electron tube V1 (11, fig. 12).

(b) Capacitor CS and resistors R2, R3, and R4.

1. Install the terminal board (15, fig. 13) (terminal strip-lug) on the electrical chassis (18) and secure it in place with its mounting hardware.

Note

This terminal board may be mounted in any convenient location on the bottom of the electrical chassis. It may be mounted on one of the screws (9).

2. Solder one wire lead each of the capacitor C3 (13,), resistor R2 (14), resistor R3 (16), and resistor R4 (12) to the terminal board (15) (terminal strip-lug).

3. Solder the other wire leads of the capacitor C3 (13) and resistor R2 (14) to terminal 5 of the electron tube socket (10).

4. the other wire lead of the resistor R4 (12) to the ground terminal on the electron tube socket (10).

5. Solder the other wire lead of the resistor R3 (16) to its connection with the electrical wire leading to the power transformer T1 (8, fig. 12).

Note

The wire leads of the resistor R3 (16, fig. 13) may be soldered to terminals 1 and 6 of the electron tube socket (10). These terminals are not used in the electron tube circuit and therefor may be used to support the resistor R3. A wire lead from the terminal board (15) also would be soldered to terminal 6 and a wire lead from the power transformer T1 (8, fig. 12) would be soldered to terminal 1. Refer to the wiring diagram (fig. 2).

(c) Capacitor C1.

1. Install the capacitor C1 (17, fig. 13) on the bottom of the electrical chassis (18) and secure it in place with two screws (19) and nuts (20).

2. Solder the two electrical wires leading to the capacitor C1 (17) to the capacitor terminals.

(d) Holding relay K1.

1. Install the holding relay K1 (25, fig. 12) on the top of the electrical chassis (13) and secure it in place with four screws (26) and nuts (24).

2. Solder the wires leading to the holding relay K1 to their respective relay terminals. Refer to the wiring diagram (fig. 2).

(e) Terminal board TB1.

1. Position the designation plate (19, fig. 12) on the top of the electrical chassis (13) and secure the terminal board TB1 (20) over the designation plate with four screws (21) and nuts (18).

2. Install the marked wires to their respective terminals on the terminal board TB1 (20) and tighten the terminal screws. Refer to the wiring diagram (fig. 2).

Note

The fanning strip (22) is installed when the electric chassis assembly is installed (TM 3-6665-209-12).

(i) Selector switch S8.

1. Insert the selector switch S8 (17, fig. 12) in its mounting hole from the underside of the electrical chassis (13) and secure it in place with the locknut (16) from the top of the electrical chassis.

2. Solder the marked wires leading to the selector switch S8 (17) to their respective switch terminals. Refer to the wiring diagram (fig. 2).

(g) Power transformer T1.

1. If the two rods (12, fig. 12) were removed, install the two rods on the top of the electrical chassis (13) and secure them in place to the chassis with two lockwashers (14) and screws (15).

2. Position the power transformer T1 (8) on both rods (12) and secure it in place with two lockwashers (10) and screws (9).

3. Connect the two transformer wires previously removed from the terminal board TB1 (20) to terminals 2 and 3 of the terminal board by tightening the terminal screws. Solder the remaining wires to the terminals of the power transformer T1. Refer to the wiring diagram (fig. 2).

(h) Keying relay K2.

1. Install the keying relay K2 (7, fig. 12) on the top of the electrical chassis (13) and, from the bottom of the chassis, secure it in place with two lockwashers (3, fig. 13) and screws (2).

2. Solder the marked wires leading to the keying relay K2 to their respective terminals. Refer to the wiring diagram (fig. 2).

(i) Interval timer M1 and test cycle timer M2.

1. Place the interval timer M1 (1, fig. 12) against the test cycle timer M2 (5) and secure the housings of the two timers together with three screws (4), lockwashers (3), and nuts (2).

2. Position the four spacers (6) on the top of the electrical chassis (3) and position the housing which contains the two timers on the spacers. Secure in place with four screws (23), lockwashers (27), and nuts (28).

3. Solder the marked wires leading to the interval timer M1 and the test cycle timer M2 to their respective terminals. Refer to the wiring diagram (fig. 2).

Note

Two electrical wires are not connected to the interval timer M1 until the electric chassis assembly is installed on the chassis assembly (TM 3-6665-209-12).

(5) *Installation.* Install the electric chassis assembly to the chassis assembly as described in TM 3-6665-209-12.

25. Calibrator Assembly

a. Description and Function. The calibrator assembly (fig. 14), a subassembly of the chassis assembly, is used to calibrate the indicator. It consists of a diaphragm (5), calibrator plate (4), calibrator housing (8), calibrator bracket (16), needle assembly (15), contactor needle bushing (12), contactor insulator (13), worm (24), worm shaft (21j, spring (22), two crosses (2 and 40), two plug cocks (43 and 45), stop shaft (25), and associated hardware. By loosening the shaft lock (37, fig. 3) and turning the knob (6), the worm shaft (21, fig. 14) is rotated imparting motion to the needle assembly (15) through the worm (24). As the needle assembly turns, the silver contact on the end of the needle assembly shaft moves toward or away from the silver button soldered to the center of the diaphragm (5) depending on the direction of rotation of the CALIBRATE knob. The amount of gap "set in" between the silver button of the diaphragm and the silver contact of the needle assembly is always small. Therefore, only a small amount of rotation of the calibrate knob is necessary to move the needle assembly and close the gap. Calibration procedure of the indicator is described in TM 3-6665-209-12. During use of the indicator, the amount of gap existing between the silver contact of the needle assembly and the silver button of the diaphragm depends on two things: first, the setting as "set in" and second, upon the pressure differential on both sides of the diaphragm. The calibrator assembly is sensitive to the amount of pressure or vacuum applied against the diaphragm. Elsewhere from the indicator, while in use, a measured amount of air (pressure or vacuum) is directed to the

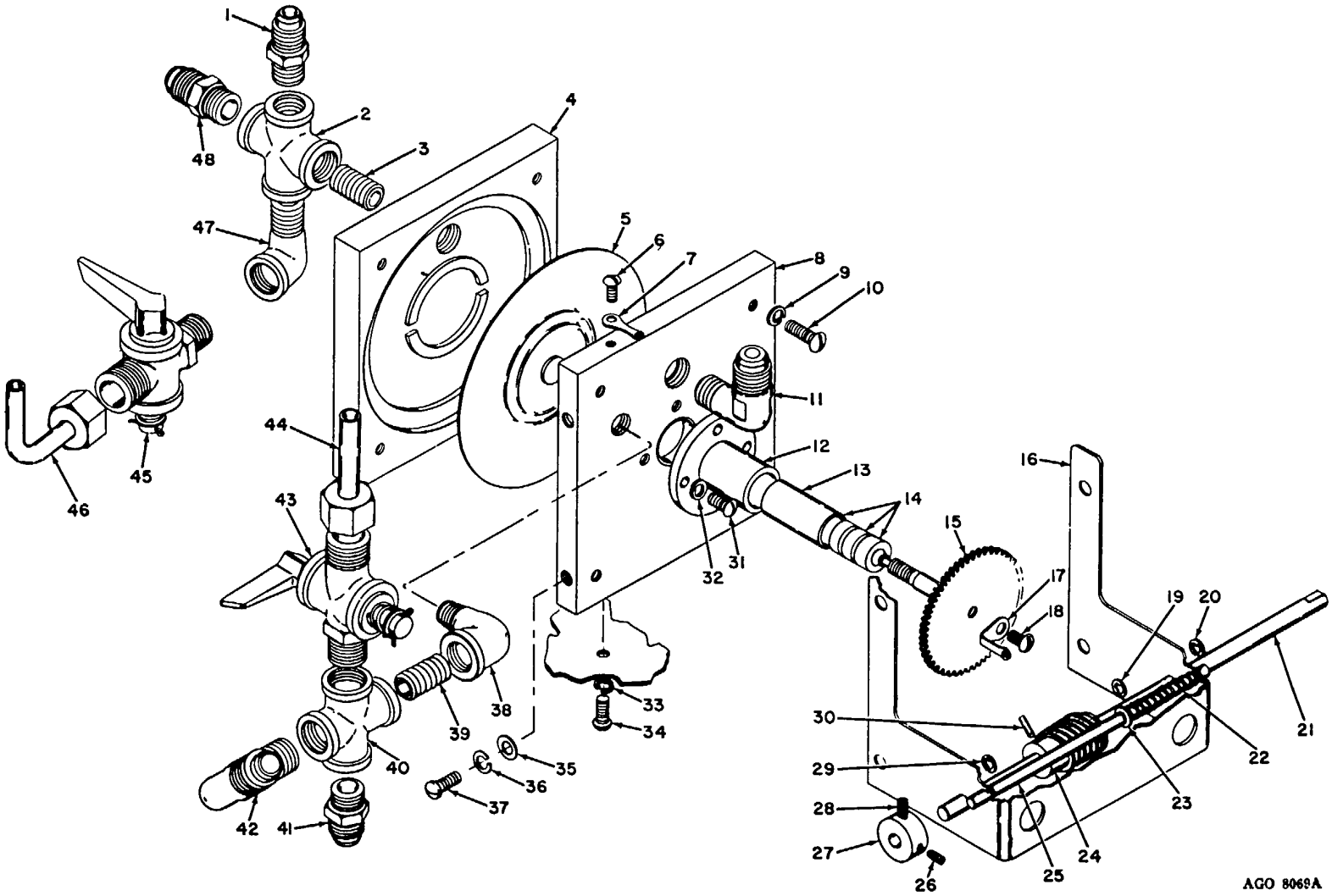


Figure 14. Calibrator assembly.

1 Adapter
2 Cross
3 Nipple
4 Calibrator plate
5 Diaphragm
6 Screw
7 Terminal lug
8 Calibrator housing
9 Lockwasher
10 Screw
11 Pipe to tube elbow
12 Contactor needle bushing
13 Contactor insulator
14 Grommet
15 Needle assembly
16 Calibrator bracket
17 Terminal lug
18 Screw
19 Retaining ring
20 Retaining ring
21 Worm shaft
22 Spring
23 Flat washer
24 Worm
25 Stop shaft
26 Setscrew
27 Worm shaft collar
28 Setscrew
29 Retaining ring
30 Pin
31 Screw
32 Lockwasher
33 Lockwasher
34 Screw
35 Flat washer
36 Lockwasher
37 Screw
38 Elbow
39 Nipple
40 Cross
41 Adapter
42 Elbow
43 Plug cock
44 Copper tube
45 Plug cock
46 Copper tube
47 Elbow
48 Adapter

Figure 14-Continued.

diaphragm. Too much air leakage causes the silver button of the diaphragm to touch the silver contact of the needle assembly, thereby closing an electrical circuit. This circuit is referred to as diaphragm switch S1 on the electrical wiring diagram (fig. 2). One terminal lug (7, fig. 14) of the diaphragm switch S1 is on top of the calibrator housing (8) and the other terminal lug (17) is at the end of the needle assembly (15). The two plug cocks (43 and 45) serve as a means to attach the water manometer to the calibrator assembly so that the vacuum or pressure balance on the two sides of the diaphragm may be checked.

b. Maintenance.

(1) *Removal.*

(a) Remove the chassis assembly (TM 3-6665-209-12).

(b) Remove the balance orifice holder (par. 11).

(c) Remove the screw (18, fig. 14) and remove the terminal lug (7) with its attached wire from the needle assembly (15).

(d) Remove the screw (6) and remove the terminal lug (7) with its attached wire from the calibrator housing (8).

(e) Loosen the setscrew (35, fig. 3) and pull the knob (6) from the end of the worm shaft (21, fig. 14).

(f) Loosen the shaft lock (37, fig. 3) and remove the two drive screws (36) which secure the shaft lock to the front panel (42). Remove the shaft lock from the front panel.

(g) Disconnect the tube coupling nut that connects the copper tubing (57, fig. 4) to the elbow (42, fig. 14).

(h) Disconnect the tube coupling nut that connects the copper tube (14, fig. 3) to the adapter (41, fig. 14).

(i) Disconnect the tube coupling nut that connects the copper tube (39, fig. 11) to the adapter (48, fig. 14).

(j) Remove two screws (34) and lockwashers (33) that secure the calibrator housing (8) to the chassis base.

(k) Remove the calibrator assembly from the chassis base.

(2) *Disassembly.*

(a) Remove four screws (37), lockwashers (36), and flat washers (35) that secure the calibrator bracket (16) to the calibrator housing (8). Remove the bracket with the parts assembled to it.

(b) Loosen the setscrew (26) and remove the worm shaft collar (27) from the worm shaft (21).

Note

The setscrew (28) is used as a stop. Since it is secured with electrical insulating compound (glyptal), do not remove it unless it is loose or damaged.

(c) Use a nail set or punch and drive the pin (30) from the worm (24) and the worm shaft (21). Hold the worm and pull the worm shaft from the worm and through its mounting holes in the calibrator bracket.

(d) Push the end of the stop shaft (25) in so that the spring (22) is compressed and there is clearance between the calibrator bracket (16) and the retaining rings (20 and 29). Remove these two retaining rings. Then hold the spring (22) and remove the retaining ring (19).

(e) Slide the stop shaft (25) from the calibrator bracket (16) and catch the flat washer (23) and the spring (22) as they are pushed from the shaft by the bracket.

(f) Unthread and remove the needle assembly (15) from the contactor insulator (13) pressed into the contactor needle bushing (12). The grommets (14) may remain on the shaft of the needle assembly. Remove the grommets from the shaft or from the inside of the contactor insulator.

(g) Remove four screws (31) and lockwashers (32) that secure the contactor needle bushing (12) to the calibrator housing (8). Remove the bushing with the contactor insulator (13). Pull the insulator from the bushing with a bearing puller.

(h) Remove the pipe to tube elbow (11) from the calibrator housing (8).

(i) Disconnect the tube coupling nuts that connect the copper tube (46) to the plug cock (45) and the copper tube (44) to the plug cock (43). Remove the copper tubes and their coupling nuts.

(j) Remove the adapter (41), elbow (42), and plug cock (43) from the cross (40). Unscrew the cross from the nipple (39) and unscrew the nipple from the elbow (38). Unscrew the elbow (39) from the calibrator housing (8).

(*k*) Unscrew the cross (2) with the two adapters (1 and 48), elbow (47), and plug cock (45) from the nipple (3). Remove these components from the cross and remove the nipple (3) from the calibrator plate (4).

(l) Remove four screws (10) and lockwashers (9) that secure the calibrator housing (8) to the calibrator plate (4). Separate the housing and plate and remove the diaphragm (5).

(3) *Cleaning and inspection.*

(a) Clean all parts with dry-cleaning solvent and wipe dry with a clean, dry cloth.

(b) Make certain the solder joints at the terminal lugs provide good electrical conductivity.

(c) Inspect the worm shaft, stop shaft, and calibrator bracket for distortion. Replace the component if it is bent or damaged in any way.

(d) Inspect the needle assembly and worm for missing or damaged teeth. Replace a component if it's damaged in any way.

(e) Check the free length of the spring. It should measure $1^{1}/_{2}$ inches.

(f) Replace the contactor insulator and grommets regardless of their apparent condition.

(g) Handle the calibrator plate (4) and the calibrator housing (8) with extreme care. The concentricity, flatness, and surface finishes are critical. If there are burrs, scratches, or any other internal surface defects, replace the component.

(h) Inspect the diaphragm. Its surface must be smooth and free of dents, wrinkles, and pin holes.

(i) Inspect the silver button on the diaphragm and the silver tip on the needle assembly. Make certain no solder is on the front surface of the button and that the spherical radius of the tip is polished.

(j) Inspect the threads of all components for burrs or other damage. If the threads are damaged on nuts, screws, or pipe fittings, replace the damaged item. If the threads are damaged on such components as the

calibrator plate or housing, retap the threaded holes.

(4) *Assembly.*

(a) Make certain that the diaphragm (5), calibrator plate (4), and the calibrator housing (8) are clean and free of dirt. Apply a light coat of silicon grease as a seal about the edge of the diaphragm, and position the diaphragm in the recess of the calibrator plate (4) with the button of the diaphragm (5) facing away from the calibrator plate. Position the calibrator housing (6) over the diaphragm onto the plate and secure the three components together with four lockwashers (9) and screws (10).

(b) Install the nipple (3) in the calibrator plate (4) and install the adapters (1 and 48) and the elbow (47) into the cross (2). Install the plug cock (45) into the elbow (47) and install the cross with its attached parts onto the nipple (3).

Note

Before installing any threaded pipe connection, apply lead compound around the threads to form a seal.

(c) Install the adapter (41), the elbow (42), and the plug cock (43) in the cross (40). Install the elbow (38) in the calibrator housing (8) and install the nipple (39) in the elbow (38). Install the cross with its attached parts onto the nipple (39).

(d) Install the copper tube (44) on the plug cock (43) and the copper tube (46) on the plug cock (45) by connecting the tube coupling nuts to the respective plug cocks.

(e) Install the pipe to tube elbow (11) in the calibrator housing (8).

(f) Apply a light coat of silicon grease to the contactor insulator (13). With the threaded end of the contactor insulator positioned so that it will be at the flanged end of the contactor needle bushing (12) when the two components are assembled, press the contactor insulator into the needle bushing until the ends of the contactor insulator and the needle bushing are flush.

(g) Make certain the flanged mating surface of the contactor needle bushing (12) is clean and apply a light coat of silicon grease to the flange. This grease will serve as a seal against possible leakage. Position this bushing with the contactor insulator (13) against the calibrator' housing (8) and secure them in place with four lockwashers (32) and screws (31).

(h) Coat three grommets (14) with silicon grease and install the grommets over the shaft end of the needle assembly (15). Insert and thread the needle assembly with the three grommets into the contactor insulator (13).

(i) Insert the top shaft (25) in its mounting holes in the calibrator bracket (16) and install the spring (22) and the flat washer (23) on the shaft between the two sides of the bracket.

Note

The longest end of the shaft must extend beyond the bracket on the same side of the calibrator assembly as the plug cock (43).

(j) Install the retaining rings (19, 20, and 29) in their respective slots in the stop shaft (25). The retaining ring (20) will be outside the calibrator bracket (16) while the retaining ring (29) will be inside the calibrator bracket. The retaining ring (19) will secure the flat washer (23) and the spring (22).

(*k*) Insert the worm shaft (21) through its mounting holes in the calibrator bracket (16) making certain the large diameter end of the shaft will protrude through the front panel when the calibrator assembly is installed. As the shaft is inserted in the bracket, install the worm (24) on the worm shaft. Aline the hole in the worm (24) with the hole in the worm shaft (21) and secure the worm and the worm shaft with the pin (.10).

(*l*) Install the worm shaft collar (27) on the end of the worm shaft (21) and secure it in place with the setscrew (26).

Note

If previously removed, install the setscrew (28) and secure it in place with glyptal. This setscrew serves as a stop and must protrude so that it will strike the stop shaft (25).

(m) Install the calibrator bracket (16) with its assembled parts on the calibrator housing (8). Secure with four flat washers (35), lockwashers (36), and screws (37).

(5) *Installation.*

(a) Position the calibrator assembly on the chassis base making certain that the worm shaft (21) extends through the hole marked CALIBRATE on the front panel (42, fig. 3).

(b) Secure the calibrator housing (8, fig. 14) to the chassis base with two lockwashers (33) and screws (34).

(c) Connect the copper tube (39, fig. 11) to the adapter (48, fig. 14) with its tube coupling nut.

Note

Before installing any threaded pipe connection, apply lead compound around the threads to form a seal.

(d) Connect the copper tube (14, fig. 3) to the adapter (41, fig. 14) with its tube coupling nut.

(e) Connect the copper tubing (57, fig. 4) to the elbow (42, fig. 14) with its tube coupling nut.

(f) Install the shaft lock (37, fig. 3) over the worm shaft (21, fig. 14) and secure it in place to the front panel (42, fig. 3) with two drive screws (36). Tighten the shaft lock (37).

(g) Install the knob (6) over the end of the worm shaft (21, fig. 14) and position the threaded hole in the knob over the fiat portion of the shaft. Secure the knob to the shaft with its setscrew (35, fig. 3).

(h) Install the terminal lug (7, fig. 14) with its attached wire on the calibrator housing (8) and secure it in place with the screw (6).

(i) Install the terminal lug (17) with its attached wire on the needle assembly (15) and secure it in place with the screw (18).

(j) Install the balance orifice holder (par. 11).

(k) Install the chassis assembly (TM 3-6665-209-12).

26. Motor and Pump Assembly

a. Description and Function. The motor and pump assembly (fig. 6), a subassembly of the chassis assembly, draws a vacuum or furnishes pressure to the calibrator assembly and provides a supply of air to the solenoid valve L3. Depending upon the position of the selector valve (45), the indicator will operate under vacuum or pressure. In the vacuum position, air is drawn from the calibrator assembly through the bleeder housing and into the blower through the elbow (14) at the side of the selector valve. At the same time air is forced through the rubber tubing (9) and to the atmosphere through the orifice filter (4). In the pressure position, air is drawn through the orifice filter (4) into the blower and then is under pressure through the rubber tubing (9) and the elbow (14) at the side of the selector valve to the calibrator assembly. The impeller (16) rotates in but one direction. However, the direction of the stream of air is determined by the position of the selector valve, and this enables the indicator to operate under a vacuum or pressure condition. Rotational speed of the impeller is controlled by the limitations of the motor. Should it become impossible to build up a one-inch pressure even after bleed air has been decreased as far as possible, the motor speed may be increased by adjusting the governor as described in TM 3-6665-209-12.

At the other end of the motor, a reciprocating pump is driven through a reduction gear box. This pump furnishes air through the plastic tubing (23) to the solenoid valve L3 where the air is passed on to the component under test for conditioning purposes. The pump operates continuously; however air is cut off from the outlet valve under test when the solenoid valve L3 is energized by the interval timer M1.

b. Maintenance.

(1) *Removal and disassembly.*

(a) Remove the motor and pump assembly (par. 12).

(b) Pull the rubber tubing (9, fig. 6) from the adapter (8) and the copper tubing (11). Pull the copper tubing from the stopper (12) and the stopper from the blower housing (15).

(c) Unscrew the adapter (8) from the elbow (7) and the pipe to hose straight adapter (13) from the elbow (14). Remove the elbow (7) from the bushing (6) and the elbow (14) from the selector valve and blower adapter (45). Remove the bushing (6) from the selector valve and blower adapter (45).

(d) Unscrew the filter mounting flange (5) from the selector valve and blower adapter (45). Remove six screws (1) and lockwashers (2) from the filter cap (3) and separate the filter cap orifice filter (4), and filter mounting flange (5).

(e) Remove four screws (47) and lockwashers (46) that secure the selector valve and blower adapter (45) to the blower housing (15) and remove the selector valve. The valve handle (10) may be removed by removing the screw that secures it to the selector valve and lifting the handle from the valve.

(f) Loosen the setscrew in the impeller (16) and remove the impeller from the motor shaft.

(g) Remove four nuts (18) and pull the blower housing (15) with the blower housing spacers (17) from the blower mounting plate (19). Unscrew the four blower mounting spacers (17) from the blower housing (15) and remove the blower housing plate, an integral part of the blower housing.

(h) Loosen the setscrew in the governor assembly (42) and remove the assembly from the motor shaft. Remove the two governor electrical brushes (40) from the governor plate (41) and remove the two screws that secure the governor plate, blower mounting plate (19), and motor mount disk (20) to the motor (22). Remove these components from the motor.

Note

The governor assembly and governor plate are stocked items. Keep these components intact and replace upon assembly.

(i) Remove the two motor electrical brushes (39) from the motor (22). After unscrewing the brush caps, withdraw the brushes from the motor.

(j) Unscrew the coupling nut of the plastic tubing (23) from the elbow (30) and remove the plastic tubing.

(*k*) Remove, four screws (38) and lockwashers (37) that secure the pump cylinder (26) to the pump mounting bracket (31) and remove the pump cylinder with the pump piston (25).

(l) Slide the pump piston (25) from the pump cylinder (26) and remove the screw (28) and fiber washer (27) from the cylinder. Remove the oil cup (29) and the elbow (30) from the pump cylinder (26).

(*m*) Loosen two setscrews (21) and slide the pump cam (24) from the shaft extending from the reduction gear box.

(*n*) If the pump mounting bracket (31) requires replacement, remove the three screws and lockwashers that secure it and the reduction gear box to the motor (22).

Note

When removing the pump mounting bracket, hold the reduction gear box against the motor so that they do not become unmeshed. immediately replace the lockwashers and screws after the bracket is removed.

(2) *Cleaning and inspection.*

(a) Clean all parts with dry-cleaning solvent and wipe dry with a clean, dry cloth.

(b) Inspect the impeller for damaged blades or other damage. Replace the impeller if necessary.

(c) Inspect the motor and governor electrical brushes. Replace the brushes if worn.

(d) Inspect the rubber tubing, plastic tubing, stopper, and rubber tube cushions and spacers for damage and deterioration. Replace any defective component.

(e) Inspect the pump cylinder and piston for scoring and fit.

(f) Inspect the selector valve, blower housing, and motor for cracks and other damage which might affect their function. Replace inoperative components.

(g) Inspect the blower housing spacers, blower mounting plate, and other components for distortion, burrs, and other damage. Repair if possible or replace damaged components.

(h) Inspect the threads of all components for burrs or other damage. If the threads are damaged on nuts, screws, or pipe fittings, replace the damaged item. If the threads are damaged on such components as the blower housing, retap the threaded holes.

(i) Replace the fiber washer and filter.

(3) *Assembly and installation.*

(a) Hold the reduction gear box in position on the motor (22) and install the three screws and lockwashers that secure it in place. Install the pump mounting bracket (31) on the gear box and secure the bracket and gear box to the motor with the three lockwashers and screws.

(b) Install the pump cam (24) on the shaft extending from the reduction gear box and secure it in place with two setscrews (21).

(c) Install the fiber washer (27) and screw (28) in the pump cylinder (26). Install the oil cup (29) and the pump piston (25) in the cylinder. Screw the elbow (30) into the cylinder

Note

Before installing any threaded pipe connection, apply lead compound around the threads to form a seal.

(d) Position the flat of the pump piston (25) over the pump cam (24) and aline the four mounting holes in the pump mounting bracket (31) with the four threaded holes in the pump cylinder (26). Secure the pump cylinder to the pump mounting bracket with four lockwashers (37) and screws (38).

(e) Install the plastic tubing (23) on the elbow (30) and secure it in place with the tubing coupling nut.

(f) Install the two motor electrical brushes (39) in the motor (22) and secure them in place with the two brush caps.

(g) Install the motor mount disk (20), blower mounting plate (19), and governor plate (41) over the motor shaft and secure them to the motor (22) with the two screws provided. Install the governor assembly (42) over the motor shaft and insert the two governor electrical brushes (40), spring end first, into the two recesses in the governor plate. Slide the governor assembly against the governor electrical brushes and secure the governor assembly to the motor shaft by tightening the setscrew in the governor assembly.

(h) Position the blower housing plate, an integral part of the blower housing (15), on the blower housing and install the four blower housing spacers (17) into the threaded holes of the blower housing. Insert the assembled spacers through the holes in the periphery of the blower mounting plate (19) and secure the spacers to the plate with four nuts (18).

(i) Install the impeller (16) on the motor shaft and secure it in place with its setscrew. Apply glyptal to the setscrew to prevent loosening.

(j) Position the selector valve and blower adapter (45) on the blower

housing (15) and secure it in place with four lockwashers (46) and screws (47). If the valve handle (10) was removed, install it on the selector valve and secure it in place with the screw provided.

(k) Position the orifice filter (4) on the filter mounting flange (5 and place the filter cap (3) over the filter and flange. Aline the holes in the components and secure the cap to the flange with six lockwashers (2) and screws (1). Screw the filter mounting flange (5) into the selector valve and blower adapter (45).

(l) Screw the bushing (6) into the selector valve and blower adapter (45). Screw the elbow (7) into the bushing and the elbow (14) into the selector valve. Screw the pipe to hose straight adapter (13) into the elbow (14).

(*m)* Install the copper tubing (11) into the stopper (12) and insert the stopper into the blower housing (15). Install the rubber tubing (9) over the adapter (8) and the copper tubing (11).

(n) Fill the pump cylinder (26) through the oil cup (29) with light machine oil.

(o) Install the motor and pump assembly (par. 12).

Section III. CABINET, PANEL COVER, AND TEST PROBE ASSEMBLIES

27. Cabinet Assembly

The cabinet assembly (fig. 8), described in paragraph 14, is maintained by third echelon maintenance personnel. However, replacement of the handles (20) is authorized to fourth echelon maintenance personnel. Although the handles may be removed during third echelon maintenance (par. 15), new handles must be requisitioned from fourth echelon maintenance personnel.

28. Panel Cover Assembly

The panel cover assembly (fig. 9) described in paragraph 16, is maintained by third echelon maintenance personnel. Although the cover retaining springs (27) are not authorized for replacement at the third echelon maintenance level, their removal and installation are described in paragraph 17. Should these components require replacement, fourth echelon maintenance personnel must requisition the replacement part.

29. Test Probe Assembly

The test probe assembly (fig. 10), described in paragraph 18, is maintained by third echelon maintenance personnel except for the test probe barrel (3), mask testing bracket (16), trigger spring (6), and test probe trigger (10) which are authorized for replacement at the fourth echelon maintenance level. Removal and installation of these items are part of the disassembly and assembly procedures performed by third echelon maintenance personnel as described in paragraph 19. In these procedures, the test probe trigger (10) and trigger spring (6) are removed as an assembly. If the trigger is loose or the spring is distorted or damaged in any way, proceed as follows:

a. Drill two rivets (9) from the test probe trigger (10) and the trigger spring (6) using a No. 51 drill. Remove the trigger from the spring.

b. Position the test probe trigger (10) on the trigger spring (6) and insert two flat head rivets (9) through the mating holes of the spring and the trigger. Upset the end of each rivet to secure the trigger to the spring.

CHAPTER 4

DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

30. Special Tools

No special tools are required for fifth echelon maintenance of the indicator.

31. Equipment

No special equipment is required for fifth echelon maintenance of the indicator.

32. Painting

Depot maintenance personnel are authorized to repaint the indicator as necessary. Refer to paragraph 22.

Section II. CABINET AND PANEL COVER ASSEMBLIES

33. Cabinet Assembly

The cabinet assembly (fig. 8), described in paragraph 14, is maintained by third echelon maintenance personnel except for the handles (20) which are authorized for replacement by fourth echelon maintenance personnel, and the cabinet (1) and cabinet assembly itself which are authorized for replacement by fifth echelon maintenance personnel only. Should the cabinet or the cabinet and all the components which make up the cabinet assembly require replacement, the new components must be requisitioned by fifth echelon maintenance personnel.

34. Panel Cover Assembly

The panel cover assembly (fig. 9), described in paragraph 16, is maintained by third echelon maintenance personnel except for the cover retaining springs (27) which are authorized for replacement by fourth echelon maintenance personnel, and the panel cover (5), cover handle (8), vacuum diagram (6), and manometer mounting plate (4) which are authorized for replacement by fifth echelon maintenance personnel. Removal and installation of these components are described in paragraph 17. However, should replacement of these components be required, they must be requisitioned by fifth echelon maintenance personnel.

APPENDIX

REFERENCES

AR 750-5	Maintenance of Supplies and Equipment-Organization, Policies, and Responsibilities for Maintenance Operation.
FM 5-25	Explosives and Demolitions.
TM 3-6665-209-12	Operator and Organizational Maintenance Manual, Indicator, Outlet Valve Leakage, M4A1.
TM 3-6665-209-20P	Organizational Maintenance Repair Parts and Special Tool Lists for Indicator, Outlet Valve Leakage, M4A1.
TM 3-6665-209-35P	Field and Depot Maintenance Repair Parts and Special Tool Lists for Indicator, Outlet Valve Leakage, M4A1.
TM 9-213	Painting Instructions for Field Use.
TM 38-750	The Army Equipment Record System and Procedures.

By Order of the Secretary of the Army:

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Chief of Staff.

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Dep (OS) (5)
USAARMC (2)
USAAMC (2)
USA Engr Cen (2)
USAIC (2)
USAOSA (2)
POE (1)
USA Tml Comd (1)
Army Tml (1)
Arsenals (3) except
  Edgewood (50)
PG (5)
Units org under fol TOE:
  3-47 (1)
  3-147 (1)
  3-500-EA-EB (1)

NG: State AG (3) ; Div (1).
USAR: None.
For explanation of abbreviations used, see AR320-50.

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TM 3-6665-209-35 INDICATOR, OUTLET VALVE LEAKAGE, M41-1964