D E P A R T M E N T O F T H E A R M Y T E C H N I C A L M A N U A L

DS, GS, AND DEPOT MAINTENANCE MANUAL

PHOTOGRAPHIC DARKROOM GROUP ES-38B

This copy is a reprint which includes current pages from Changes 1 and 2.

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y
JUNE 1970

WARNING

Be careful when working on the 115-volt and 220-volt line connections. Serious INJURY or DEATH may result from contact with these terminals.

DON'T TAKE CHANCES!

TECHNICAL MANUAL
No. 11-6740-282-35

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 27 June 1970

Direct Support, General Support, and Depot Maintenance Manual

PHOTOGRAPHIC DARKROOM GROUP ES-38B

(NSN 6780-00-242-5756) **AND-ES-38c** (NSN 6780-01-057-5621)

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual covers direct support, general support, and depot maintenance for Photographic Darkroom Group ES-38B and ES-38C. All references to ES-38B apply equally to ES-38C unless otherwise indicated. It includes instructions for troubleshooting, testing, and repairing the equipment, replacing maintenance parts, and repairing specified maintenance parts. Also included are the tools and test equipment required for maintenance. Direct and general support and depot maintenance repair parts are listed in appendix B.

b. The complete technical manual for this equipment includes TM 11-6740-282-12.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

NOTE

For applicable forms and records, refer to TM 11-6740-282-12.

c. The following publications cover all levels of maintenance for the equipments contained in the darkroom:

(1) TM 11-6740-278-12, Processing Machine, Photographic Film and Paper EH-29B.
(2) TM 11-6740-278-35, Processing Machine, Photographic Film and Paper EH-29B.
(3) TM 11-6740-279-12, Printer, Contact, Photographic, Continuous EN-6C.
(4) TM 11-6740-279-12, Printer, Contact, Photographic, Continuous EN-6C.
(5) TM 11-6740-280-12, Photographic Projection Printer EN-36B.
(6) TM 11-6740-280-35, Photographic Projection Printer EN-36B.
(7) TM 11-6740-281-12, Photographic Contact Printer EN-100A.
(8) TM 11-6740-281-35, Photographic Contact Printer EN-100A.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports used by maintenance personnel at all maintenance levels are listed and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packing Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030. 29A, and DSAR 4515.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75/18/MCO P4610.19C and DLAR 4500.15.

1-3.1. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and should be mailed direct to Commander, US Army Communications and Electronics Materiel Readiness Command and Fort Monmouth, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using SF 368, Quality Deficiency Report. Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed direct to Commander, US Army Communications and Electronics Materiel and Readiness Command and Fort Monmouth, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

Section II. FUNCTIONING OF UTILITY SYSTEMS

1-4. Fuel System
(fig. 1-1)

a. The fuel system consists of a 5-gallon fuel can, fuel filter, fuel control valve, fuel lines, and associated fittings. In addition, the space and water heaters contain solenoids, valves, and fuel pumps for control and regulations of their respective requirements (para 1-7 and 1-8).

b. The 5-gallon can and fuel filter are mounted on the exterior of the forward wall. Fuel is gravity-fed, on demand, from the fuel can into the filter where all foreign particles are removed.

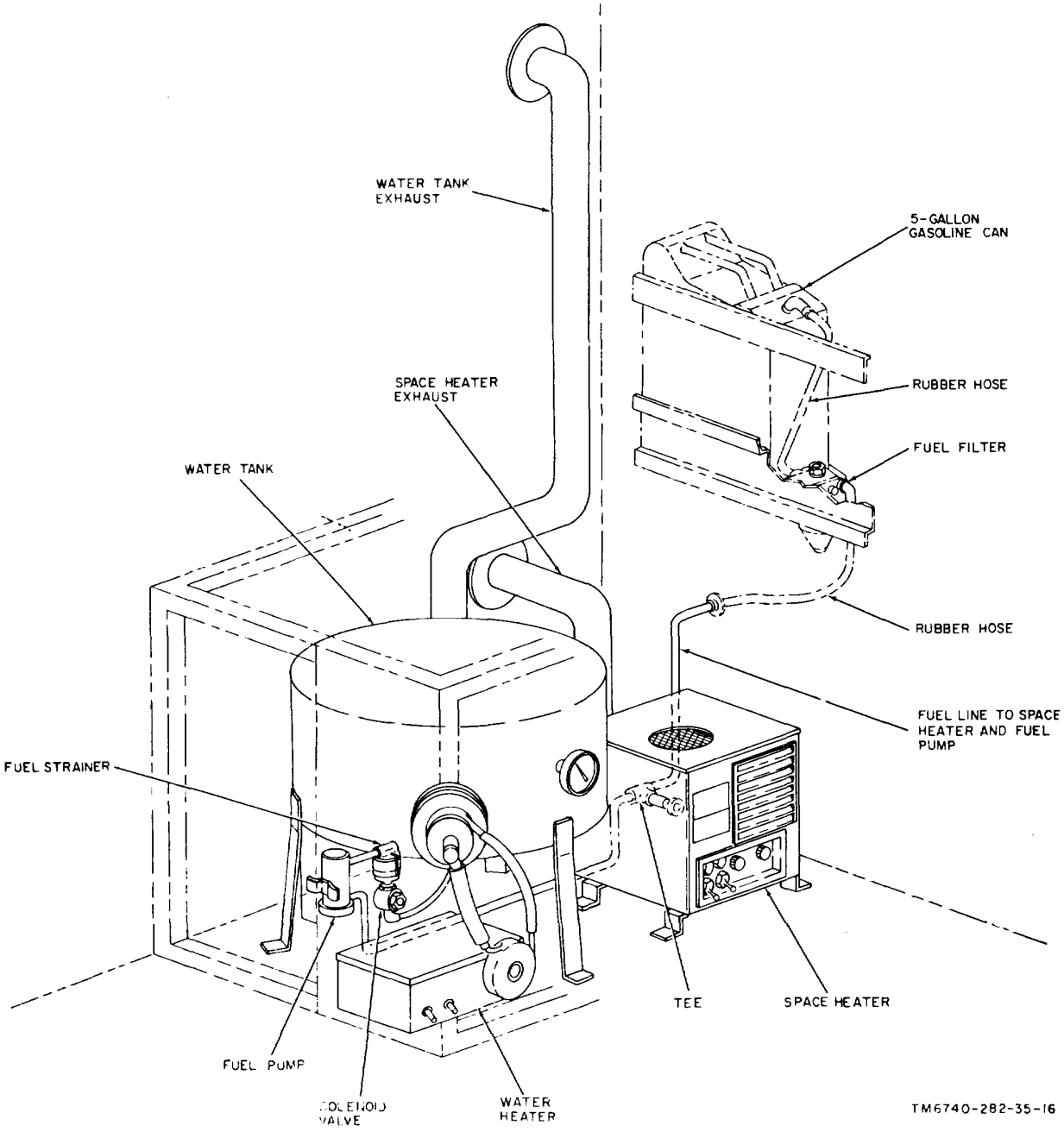


Figure 1-1. Fuel supply system, routing diagram.

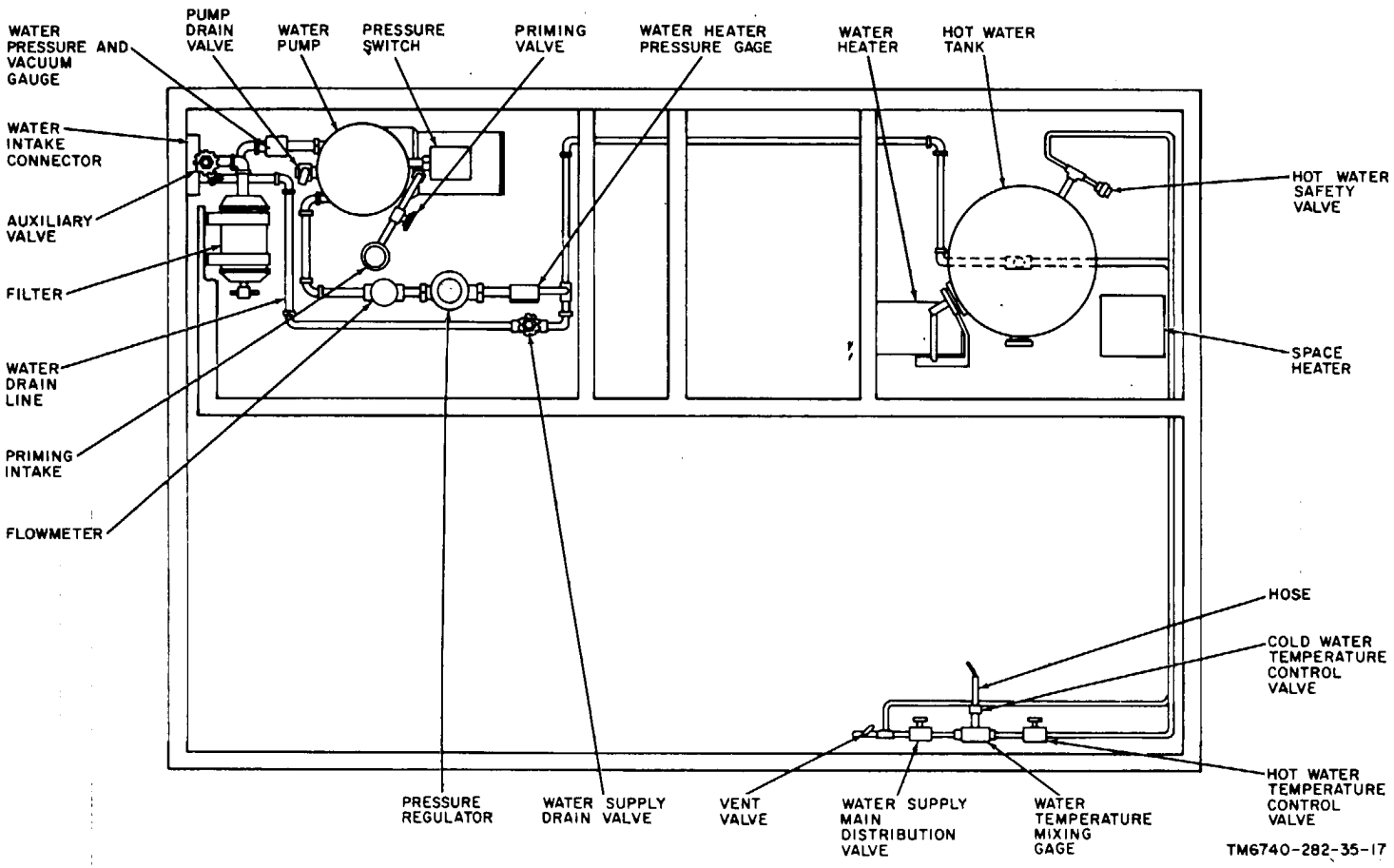


Figure 1-2. Water supply system, routing diagram.

The fuel is then gravity-transferred via the exterior fuel line, through a fitting in the forward wall, to the interior of the shelter. A fuel valve in the line controls the fuel to the space and water heaters. The demand and control functioning of the fuel in the space and water heaters is discussed in detail in paragraphs 1-7 and 1-8.

c. The evacuation of gas fumes and soot from the space and water heaters is accomplished by the water heater and space heater exhaust vents. The water heater exhaust vent is located at the upper, forward roadside wall. The space heater exhaust vent is located at the lower, forward roadside wall.

1-5. Water Supply and Heating System (fig. 1-2)

a. The water supply system consists of a water pump (including its internal controls), water filter, flowmeter, pressure regulator, pressure gauges, water heater (including its internal controls), mixing temperature gauge, and associated control valves and plumbing.

b. The darkroom is capable of accepting water from a pressurized source or from a natural body of water. If the water is drawn from a pressurized source, and it the source pressure is 40 psi or greater, the water pump is automatically deactivated by the pressure switch. If the pressure is below 40 psi, the pump is activated.

c. If water is supplied by a natural body of water (river, stream, lake), the float assembly and anchor and nylon rope are used for water pickup (TM 11-6740-282-12).

d. Water is supplied to the darkroom through the water intake connector, located at the lower left of the rear wall. The auxiliary valve controls the water intake. The water is supplied from the auxiliary valve to the filter, where all foreign particles are removed. The water pressure and vacuum gauge, between the filter and the water pump indicates the pressure of the intake water.

e. The water pump is a positive displacement, electrically operated pump. The operation of the pump is controlled by the pressure switch. The pressure switch senses pressure in excess of 40 psi and deactivates the pump. Intake pressure of less than 40 psi does not affect the pressure switch and operates the pump. A priming cup and priming water control valve are provided to effect a wet start for the pump. The pump drain valve is used to purge the pump for storage or maintenance.

f. The water is pumped from the water pump through a flowmeter (where water flow can be monitored), to the pressure regulator where the water pressure is reduced and stabilized at 40 psi. The water heater pressure gauge, at the output of the regulator is used as a visual check of system pressure and regulator operation.

g. The output of the pressure regulator is fed to the water heater and to the cold water temperature control valve. The water that is fed to the water heater is heated and fed to the hot water temperature control valve. The hot water pressure relief valve automatically blows (out to the exterior of the darkroom) if pressure in excess of safe operating limits builds up within the hot water tank. Detailed functioning of the water heater is discussed in paragraph 1-7.

h. The hot and cold water temperature control valves control the relative volume of hot and cold water to be fed to the main distribution valve. The water temperature mixing gauge indicates the temperature of the mixed hot and cold water. The main distribution valve controls the output of the water supply system.

i. The water supply drain valve controls the water in the water supply lines for purging.

1-6. Space Heating and Air Conditioning System

a. The space heating and air-conditioning system consists of a space heater, two air conditioners, an exhaust blower, and three control thermostats.

b. When heating of the darkroom is required, air is drawn into the heater, heated, and blown into the darkroom area. The space heater is thermostatically controlled to a preset comfort temperature condition. The exhaust blower is used in conjunction with the space heater to exhaust used air from the darkroom. Detailed functioning of the space heater is discussed in paragraph 1-8.

c. When cooling of the darkroom is required, two thermostatically controlled air conditioners are used to cool the air within the darkroom. The air is cooled and pumped into the darkroom area. At the same time, used air is drawn into the air conditioner, filtered, cooled, and recirculated. Detailed functioning of the air conditioners is discussed in paragraph 1-9.

Section III. FUNCTIONING OF COMPONENTS

1-7. Water Heater
(figs. 1-3 and 1-4)

a. The water heater consists of a fuel supply system, power supply and control circuits, burner head, air motor and blower, and heat exchanger. Heat is generated by a flame in the heat exchanger and is transmitted to the water by conduction.

b. Fuel is drawn into the combustion air stream at the mixer block where a simple needle valve adjustment provides the proper fuel-air mixture. This mixture is introduced into the heat exchanger through a perforated plate in the burner head. Ignition is established by the combination of a hot wire glow plug and a spark igniter. The igniter plug becomes powered when the ON-OFF switch is set to ON. Spark ignition is continuous during entire heater operation thus assuring continuity of operation. For extremely low temperature starting, the hot wire glow plug is energized to heat the air in the burner head until ignition can be effected. The aquastat controls the temperature of the water by cycling the heater operation on and off as required. The overheat switch prevents operation of the heater if the temperature in the burner head or heat exchanger exceed safe operating limits.

c. Fuel for the water heater is provided by an electrically operated fuel pump which pumps fuel from the fuel strainer. The pump operates from a 24 vdc transformer-rectifier power supply. Fuel is fed to the float bowl where the action of the float keeps the level of the demand fuel constant. A solenoid operated fuel valve controls the flow of fuel to the carburetor. The carburetor is a simple needle valve arrangement that controls the fuel-air mixture to the burner head.

d. Electrical power is supplied to the water heater through an auto-reset circuit breaker and the ON-OFF switch. In case of an overload in the water heater, the auto-reset circuit breaker opens and remains open until the overload condition is removed, at which time it closes automatically.

e. When the temperature of the water is below the setting of the aquastat, and provided the water level is above the liquid level safety switch, power is applied to the heat exchanger motor, COLD START switch, and the overheat thermostat. The overheat thermostat is normally closed, permitting power to be applied to the fuel valve solenoid. This allows fuel to flow to the burner head. The heat exchanger motor drives a pump that supplies air to the burner head for mixture with the fuel (primary air) and also to the heat exchanger to maintain the flame (secondary air). Power is also applied to the sparkplug igniter, causing ignition of the fuel-air mixture in the burner head. The draft created by secondary air maintains the flame and directs it toward the exhaust.

f. Under cold conditions, the COLD START switch is activated. This applies power to the hot wire glow plug which preheats the burner head until ignition can be accomplished. In case of an overheat condition, the overheat thermostat opens, removing power from the fuel valve solenoid and igniter, inhibiting fuel flow and combustion.

1-8. Space Heater
(figs. 1-5, 1-6, and 1-7)

a. Fuel is drawn into the spacer heater through the strainer where it is gravity-fed to the fuel pump. The fuel pump is a positive feed electrically operated pump that supplies fuel tinder pressure to the float bowl. The float bowl keeps constant level of fuel for the space heavier fuel demand system. A solenoid operated fuel valve, between the float and the carburetor controls the flow of fuel to the needle valve carburetor. The carburetor controls the distribution of fuel to the burner head.

b. When the space heater is operating, air is drawn into the side of the unit by the blower, blown over the. heat exchanger external surfaces, and vented into the darkroom. Fumes and smoke are removed from the system through the exhaust.

c. Electrical power is applied to the space heater through the RESET (S2) and ON OFF (S1) switches. When the ON-OFF switch (SI) is set to ON, power is applied to the HEATER THERMOSTAT (on the roadside wall). When the temperature of the darkroom falls below the setting of the thermostat, power is applied to the thermal element (S7) (through a set of normally-closed contacts of relay K1) of time de- lay switch (S8) and to the contacts of time de-

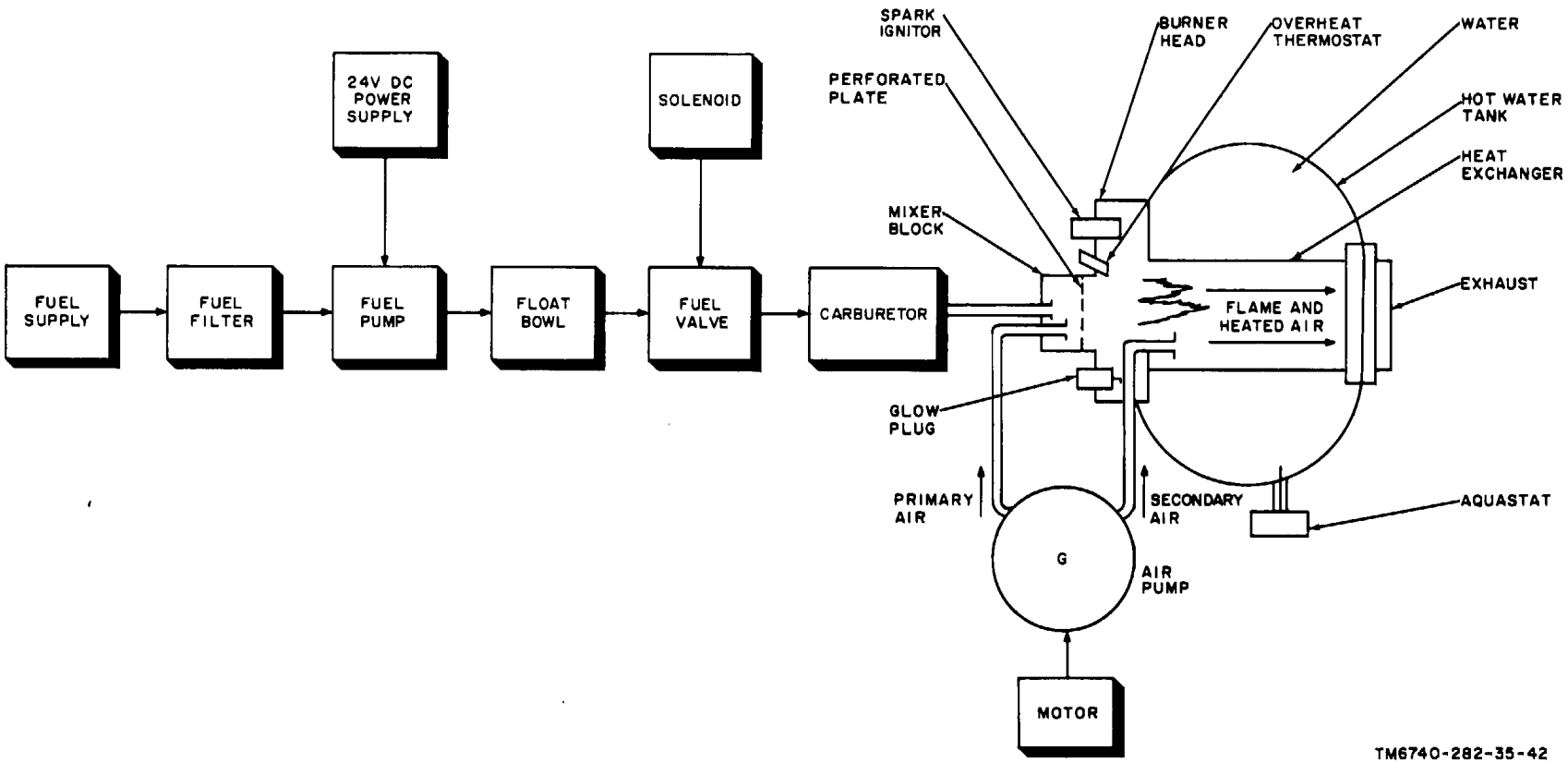


Figure 1-3. Water heater, functional diagram.

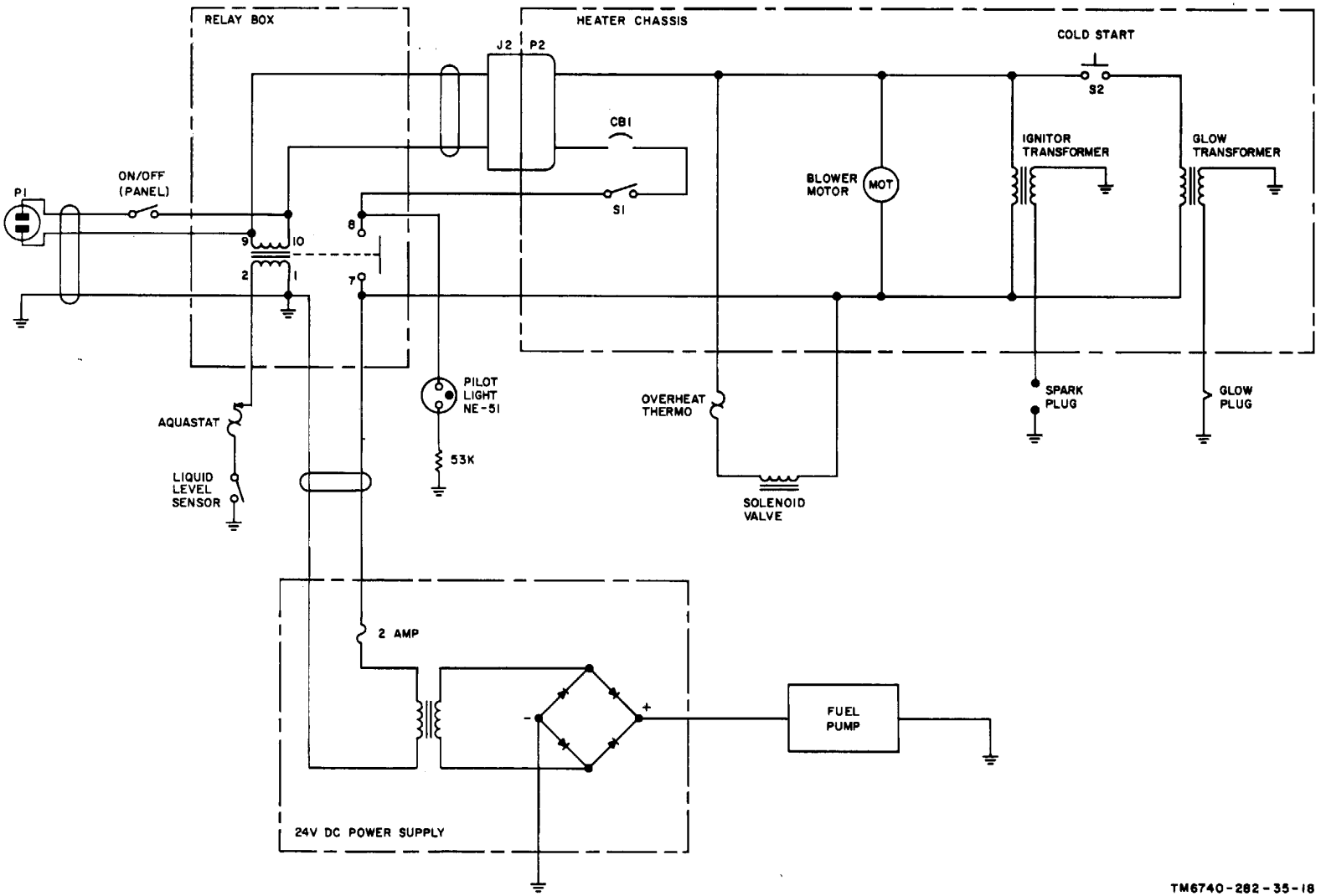


Figure 1-4. Water heater, schematic diagram.

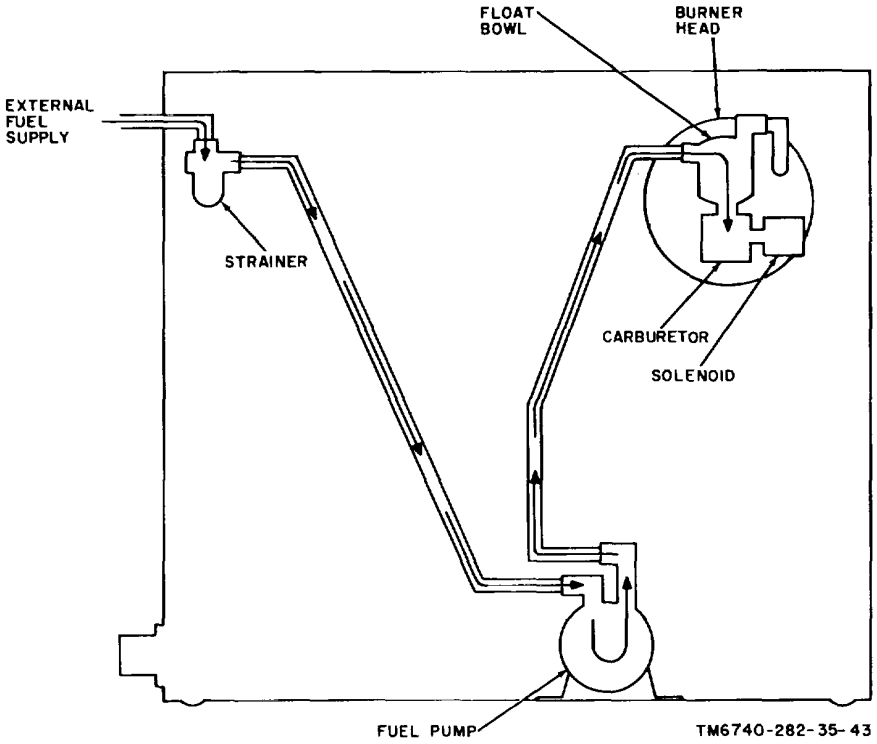


Figure 1-5. Space heater fuel system, functional diagram.

lay switch (S8). Power is also applied to the glow plug (HR2) to prewarm the burner head. After a time delay of 30 seconds, the contacts of the time delay switch (S8) close, applying power to the blower motor (B1) (through a set of normally-closed contacts of relay Ki and through the motor protector switch (S4) and to the fuel pump (L2) fuel valve solenoid L1 and igniter El. Fuel flows through the fuel valve, through the carburetor, to the burner head where it is ignited. In case of overload in the blower motor, the motor protector switch (S4) removes power from the motor. In case of an overheat condition, the overheat thermostat (S5) opens, inhibiting fuel flow and ignition.

d. In addition, when the ON-OFF switch (S1) is set to ON, power is applied to the fuel thermostat (S6). If the temperature of the fuel is below the temperature setting of the thermostat, power is applied to the fuel heaters (HR1) to preheat the fuel.

e. After 30 seconds of exposure to the direct flame at the burner head, the thermocouple (S3) closes, applying power to pull-in relay K1. When relay K1 is energized, power is removed from the thermal element (S7) of the time delay switch (S8), the contacts of the delay switch (S8) are opened, power to the solenoid (L1) fuel pump (L2) and igniter (El) is routed through different contacts of relay K1 (bypassing the time delay switch S8), power is removed from the glow plug (HR2), and power continues to be applied to the blower motor through a different set of contacts of relay K1.

f. If there is a flame-out (or if ignition did not take place initially), the thermocouple S3 opens and relay K1 drops out. Power is reapplied to the thermal element (S7) of the time delay switch (S8), reinitiating the starting cycle. If a flame is not produced in 1 minute, the thermal element (S7) of the time delay switch (S8) causes the reset switch (S2) to open, removing power from the spacer heater. The blower motor operates during the time delay to clear smoke and fumes from the system.

1-9. Air Conditioners
(fig. 1-8)

Each air conditioner is controlled by a separate thermostat and selector switch (OFF-FAN-COOL switch). Each air conditioner contains a

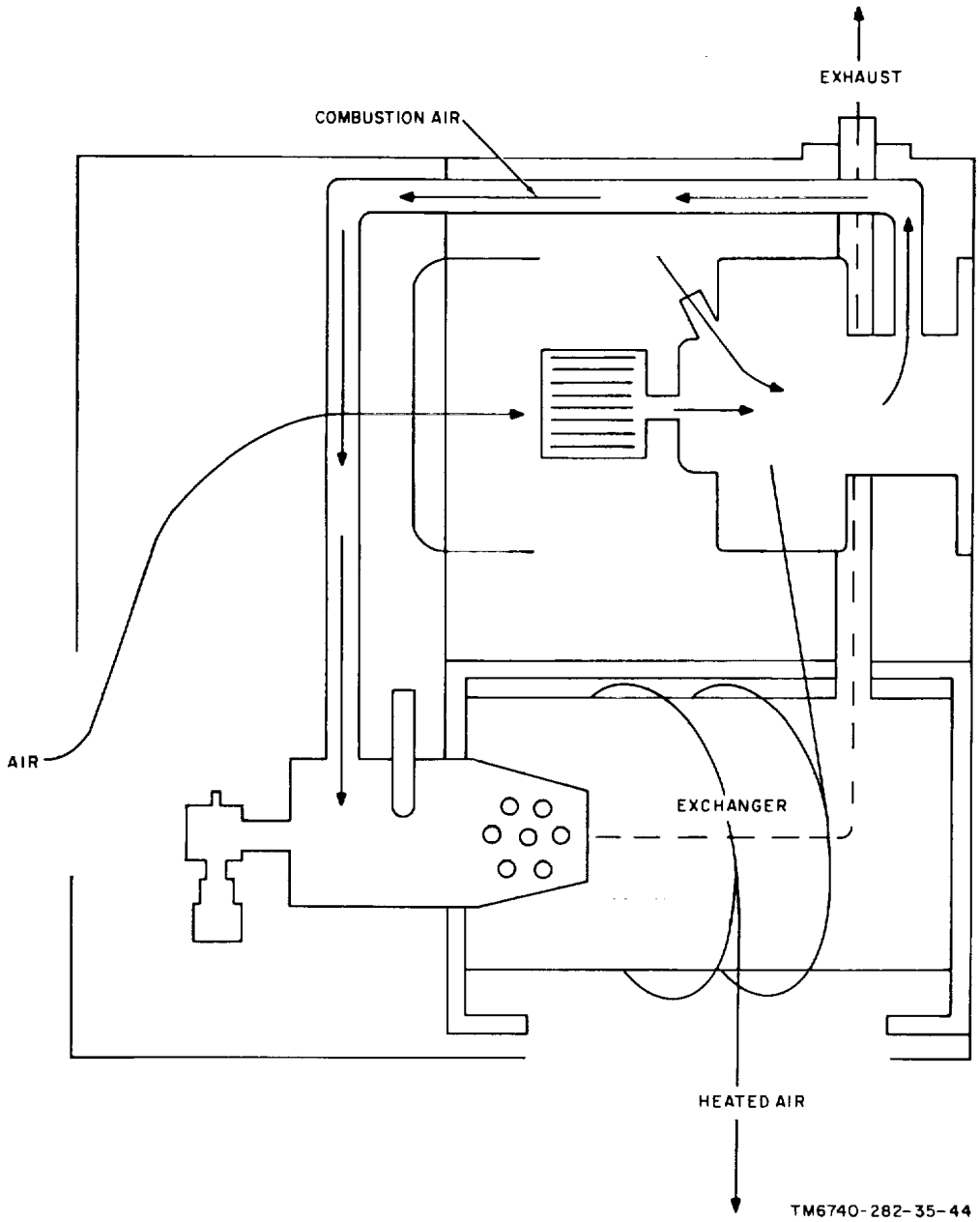


Figure 1-6. Space heater airflow, functional diagram.

controlled by the selector switch and the compressor motor is controlled by the combined settings of the selector switch and thermostat. All power to the air conditioners is applied through the thermostat assembly. but the thermal relay can only interrupt power to the compressor motor circuit. Power is applied to the thermal relay from the thermostat which, in turn, receives power when the OFF-FAN-COOL switch is in the cool position.

PARAGRAPH 1-10 is deleted.

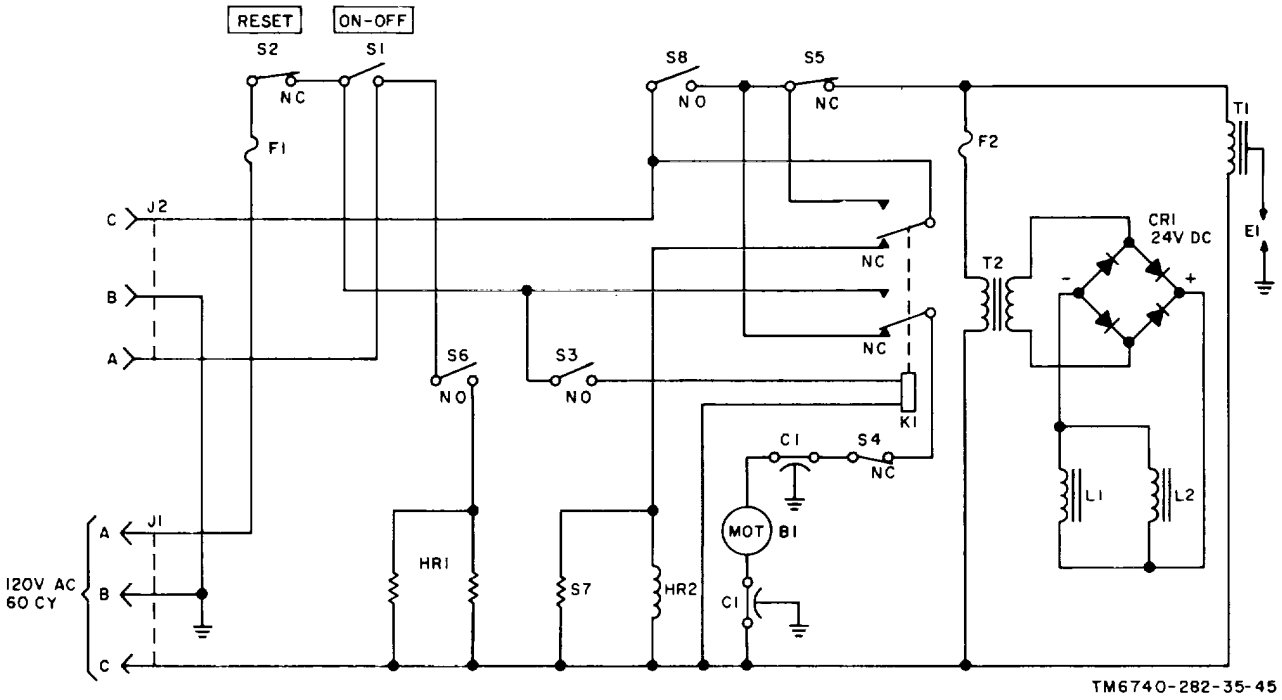


Figure 1-7. Space heater, schematic diagram.

1-11. Plotting Table

(fig. 1-11)

a. The plotting table consists of a transport

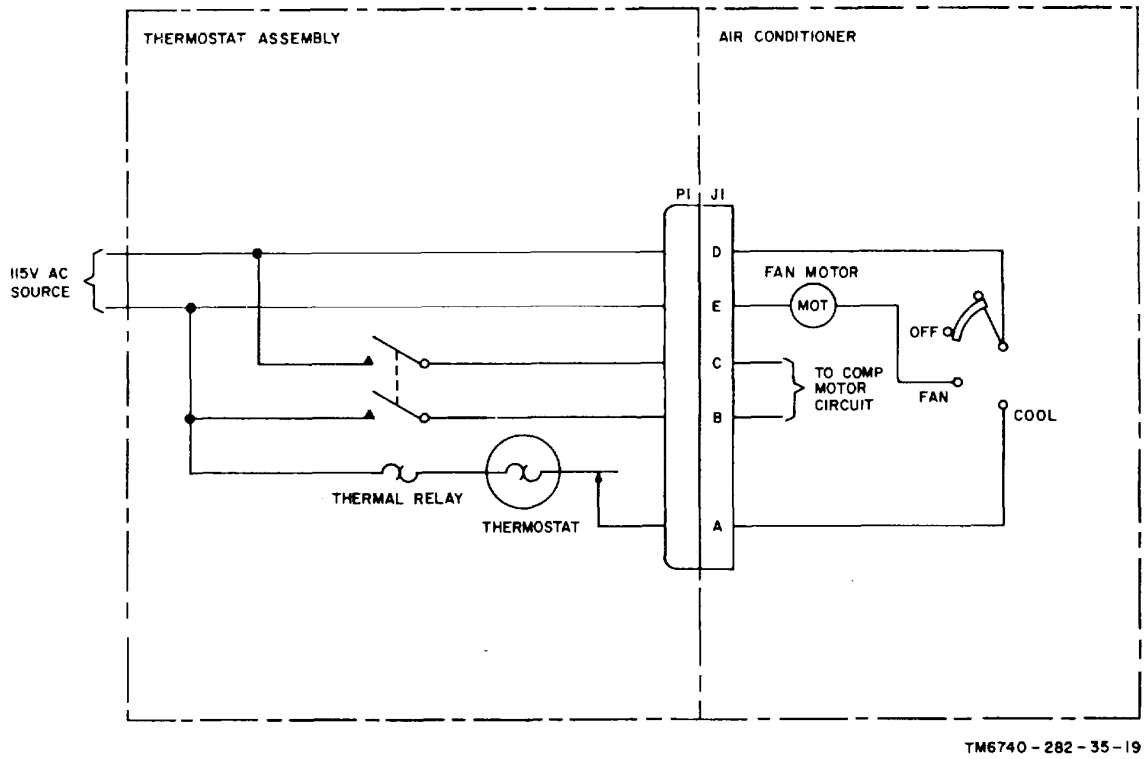


Figure 1-8. Air conditioner-thermostat, schematic diagram.

mechanism and lamp circuit. The transport mechanism consists of a set of right- and left- hand drive and idling brackets mounted on each end of the plotting table. Each drive bracket has a keyed spindle that engages the film spools. The spindles on the idling brackets are spring-loaded to facilitate loading of film spools. A tension adjusting screw, on each bracket, permits adjustment of the tension applied to its respective spindle, to minimize the possibility of backlash. Feed and takeup can be alternated in either direction, depending on which drive bracket crank is rotated.

b. The plotting table lamp circuit includes two twin ballasts RT1 and RT2, four lamp starters, and four fluorescent lamps DS1 through DS4. Power is applied to the plotting table through connector P1. Switch S1 controls the power to the lamp circuit.

1-12. Jet Mixer-Distributer

(figs. 1-12 and 1-13)

a. The jet mixer-distributer is used to remove liquid solutions from processing tanks (input), circulate the solution for mixing and air replenishment, and pump the solution for storage, return, or waster discharge.

b. The jet mixer-distributer consists of an electric pump, mixing tank, and three control valves. Electrical power is applied to the pump motor through the PUMP switch. Speed control is accomplished by the HIGH-LOW SPEED switch. In the HIGH position, power is applied directly to the pump motor for maximum speed. In the LOW position, power is applied through a voltage dropping resistor, reducing the speed of the pump motor.

c. To accomplish intake of solution from a processing tank, the INTAKE valve opened and

Figures 1-9 and 1-10 are deleted.

the CIRCULATE and CIRCULATE-DISCHARGE valves are closed. Solution is gravity-fed into the intake, through the INTAKE valve, and is then pumped into the mixing tank.

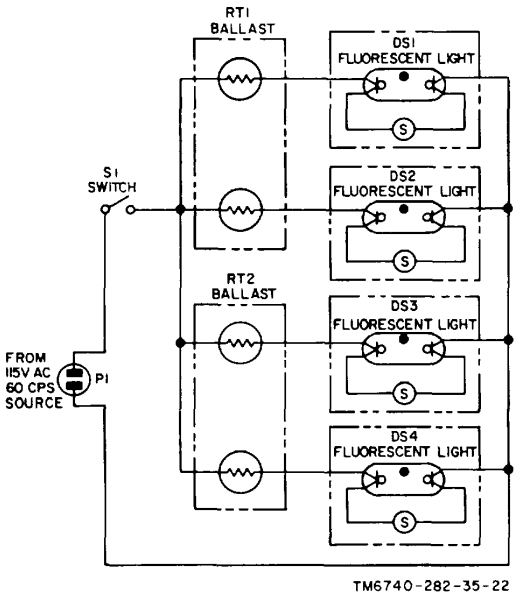


Figure 1-11. Plotting table, schematic diagram.

DISCHARGE valves are closed and the CIRCULATE valve is opened. Solution is gravity fed from the bottom of the mixing tank, through the CIRCULATE valve, and is then pumped into the side of the mixing tank. The pressure of the solution being pumped into the mixing tank is in the form of a jet action, causing air circulation and mixing to take place.

e. To discharge solution from the mixing tank, the INTAKE valve is closed and the CIRCULATE and CIRCULATE-DISCHARGE valves are opened. Solution is gravity fed from the bottom of the mixing tank, through the circulate valve, to the pump. The pump pressure feeds the solution to the discharge hose through the CIRCULATE-DISCHARGE valve.

1-13. Processor
Detailed functioning of the processor is contained in TM 11-6740-278-35.

1-14. Projection Printer
Detailed functioning of the projection printer is contained in TM 11-6740-280-35.

1-15. Continuous Contact Printer
Detailed functioning of the continuous contact printer is contained in TM 11-6740-279-35.

1-16. Contact Printer
Detailed functioning of the contact printer is contained in TM 11-6740-281-35.

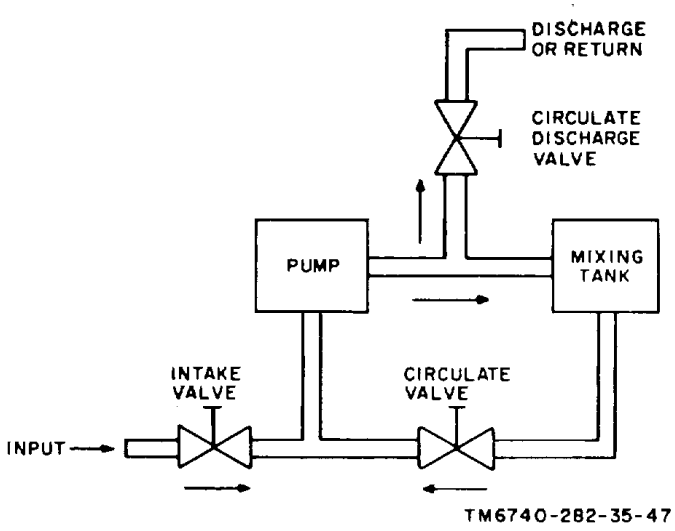


Figure 1-12. Jet mixer-distributer, functional diagram.

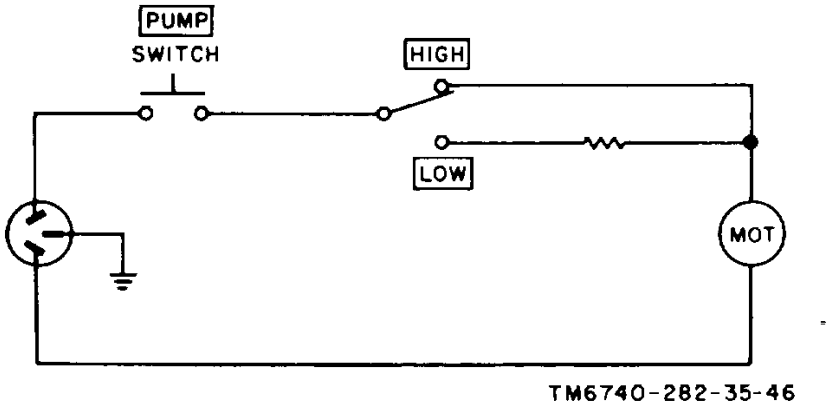


Figure 1-13. Jet mixer-distributer, schematic diagram.

CHAPTER 2
TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING INFORMATION

WARNING

Be extremely careful when troubleshooting or repairing the darkroom. Voltages are high as 220 volts are present internally. Use insulated test probes when making the required voltage measurements. Always disconnect the power cord from the equipment before touching any of the internal parts.

2-1. General Instructions

a. Troubleshooting at direct support, general support, and depot maintenance categories includes all the techniques described for organizational maintenance, and any special or additional techniques required to isolate a defective part. The direct support, general support, and depot maintenance procedures are not complete in themselves but supplement the organizational maintenance procedures contained in the operational and organizational maintenance manual (TM 11-6740-282-12). The systematic troubleshooting procedure, which begins with the operational and sectionalization checks at the organizational category, must be completed by further localizing and isolating techniques. Section II of this chapter contains operational testing and troubleshooting and chapter 3 provides detailed repair data.

b. Troubleshooting of the darkroom and its components may be performed while the equipment is operating, or, if necessary, after the equipment (or part of it) has been removed from service. When trouble occurs, certain observations and measurements can be made that will help to determine the source of trouble. Trouble shooting at the organizational category is usually performed while the equipment is operating. Troubleshooting at a higher category of maintenance is usually performed with the component removed from the equipment with which it is normally associated. Paragraphs 2-2 through 2- 14 describe the systematic procedures to be followed which will enable maintenance personnel to isolate the cause of trouble and correct the fault.

2-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective equipment is to sectionalize the fault. Sectionalization means tracing the fault to the major component. Refer to TAI 11-6710-282-12 for electrical sectionalization procedures. Sectionalization to a mechanical component is accomplished by detailed inspection. The second step is to localize the fault to the defective subassembly or assembly. The third step, isolation, means tracing the fault to the defective part. Some faults, such as a defective chain and sprocket assembly or binding of mechanical components in the chopper can often be indoted by sight, touch, or hearing; however, the majority of faults must be isolated by detailed electrical and mechanical checks.

b. Sectionalization Checks. After the trouble has been sectionalized, make a general operational test (paras 2-4 through 2-13) of the suspected unit. The general operational test serves as a check of the sectionalizing checks.

(1) *Visual Inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits or components. All visual signs should be analyzed to help localize the fault to a particular assembly or subassembly. Mechanical faults are not often localized through visual inspection.

(2) *Pluckout parts*. Defective lamps and other pluckout parts may be the cause of the

trouble incurred. After checking a suspected unit, remove and test all pluckout parts suspected of being faulty (TM 11-6740-282-12). Replace each defective part with an identical part known to be good.

c. Localization and Isolation. The operational tests (paras 2-4 through 2-13) will aid in localizing the trouble. First localize the trouble to an assembly or subassembly; then, isolate the trouble within that assembly or subassembly by electrical and mechanical checks, as required. Use the following methods of trouble localization and induction:

(1) *Troubleshooting charts.* The trouble symptoms in the charts (paras 2-15 through 2-24) will aid in localizing trouble to a component part.

(2) *Voltage and resistance measurements.* Voltage and resistance measurements help to locate hard-to-find troubles in the processor electrical system. Use the resistor, inductor, and capacitor color code (fig. 5-1) to find the values of electrical components. Use-the wiring diagrams and schematic diagrams to find normal readings, and compare them with the readings taken.

(3) *Intermittent trouble check*. In all tests, the possibility of intermittent troubles to should not be overlooked. Intermittent troubles often may be made evident by tapping or jarring the part or equipment. Check the wiring and connections between the assemblies of the equipment.

2-3. Tools and Test Equipment Required

The following tools and test equipment are required for maintenance of the shelter:

a. Multimeter AN/URM-105.

b. Multimeter TS-352B/U.

c. Toolkit, Photographic Repairman TK-77/GF.

d. Toolkit, Photographic Repairman TK-109/GF.

e. Toolkit, Photographic Repairman FM-145.

Section II. Direct Support and Troubleshooting

2-4. General Operational Check of Shelter Electrical System

a. Remove all power cables from wall outlets and space heater and air conditioners.

b. Remove external input power cable.

c. Set all circuit breakers to ON.

d. Make the following continuity checks at the power input connector:

(1) Pin 4 to pin 1 ---------- 200 + 20
(2) Pin 4 to pin 2 ---------- 30 + 5
(3) Pin 4 to pin 3 ---------- Infinite
(4) Pin 1 to pin 2 ---------- 200 + 20
(5) Pin 1 to pin 3 ---------- Infinite
(6) Pin 2 to pin 3 ---------- Infinite
(7) Pin 4 to ground rod ---------- 0 + 1

e. Set all circuit breakers to OFF.

f. Connect external input power plug.

g. Set BLACKOUT-NORMAL switch to NORMAL.

h. Set WHITE LIGHTS-SAFELIGHT switch to WHITE LIGHTS.

i. Set CB1 and CB6 to ON. Fluorescent lights should go on.

j. Push buzzer switch. Buzzer should sound.

k. Set BLACKOUT - NORMAL switch to BLACKOUT.

l. Open door. Fluorescent lights should go out.

m. Close door. Fluorescent lights should go on.

n. Set BLACKOUT-NORMAL switch to NORMAL.

o. Set WHITE LIGHTS-SAFELIGHT switch to SAFELIGHT.

p. Connect a test lamp in at each SAFELIGHT outlet. Test lamp should light at each outlet.

q. Set WHITE LIGHTS-SAFELIGHT switch to WHITE LIGHTS.

r. Set CB2 to ON.

s. At the PROCESSOR #1 4-wire outlet, check for the following voltages:

(1) Pin 1 and pin 2 ---------- 120 volts
(2) Pin 2 and pin 3 ---------- 120 volts
(3) Pin 1 and pin 3 ---------- 210 volts

(4) Pin 2 and pin 4 ----------0 volts

t. Set CB2 to OFF.

u. Connect the power cables to each of the air conditioners.

v. Set each of the AIR COND THERMOSTAT controls to their lowest temperature settings.

w. Set the OFF-FAN-COOL switches on each of the air conditioners to OFF.

x. Set CB3 to ON.

y. Set roadside AIR COND THERMOSTAT to 5° above room temperature.

z. Set roadside air conditioner OFF-FAN-COOL switch to FAN. Only the fan should operate.

aa. Set roadside air conditioner OFF-FAN-COOL switch to COOL. Compressor should operate and cool air should flow.

ab. Set roadside AIR COND THERMOSTAT below room temperature. Compressor should stop and only fan should operate.

ac. Set roadside air-conditioner OFF-FAN-COOL switch to OFF, AIR COND THERMOSTAT to lowest temperature setting, and CB3 to OFF.

ad. Perform steps y through ac for the curbside air conditioner using CB4.

ae. Set CB5 to ON and check for the same voltages obtained in step s above at the PROCESSOR #2 4-wire outlet.

af. Set CB5 to OFF.

ag. Set CB7 to ON.

ah. Connect a test lamp across each of the UTILITIES (except BLOWER) connectors. The test lamp should light at each connector.

ai. Set water pump maintenance LIGHT switch to OFF.

ak. Momentarily set WATER PUMP switch to ON. Water pump should operate.

al. Set WATER PUMP switch to OFF.

am. Set BLOWER switch to ON. Exhaust blower should operate.

an. Set BLOWER switch to OFF.

ao. Set CB7 to OFF.

ap. Set CB8 to ON.

aq. Check voltage at HOT WATER HEATER and SPACER HEATER outlets. Voltage should be 120 volts.

ar. Set CB8 to OFF.

as. Set CB9 to ON.

at. Connect a test lamp across the terminals of the EN-36B outlet. The test lamp should go on.

au. Set CB9 to OFF.

av. Set CB10 to ON.

aw. Connect a test lamp across the terminals of the EN-100A outlet. The test lamp should light.

ax. Set CB10 to OFF.

ay. Set CB11 to ON.

az. Connect a test lamp across the terminals of the EN-6C outlet. The test lamp should go on.

ba. Set CB11 to OFF.

bb. Set CB12 to ON.

bc. At the PROCESSOR #1 TEMP CONTROL outlet, check for the following voltages:

(1)	Pin 1 and pin 2	120 volts
(2)	Pin 1 and pin 3	120 volts
(3)	Pin 2 and pin 3	0 volts

bd. Set CB12 to OFF.

be. Set CB13 to ON and check for the voltages given in be above at the PROCESSOR #2 TEMP CONTROL outlet.

bf. Set CB13 to OFF.

bg. Set CB14 to ON.

bh. Check voltage at the outside auxiliary electrical connectors. Voltage at each connector should be 120 volts.

bi. Set CB14 to OFF.

bj. Set HEATER THERMOSTAT to NO HEAT.

bk. Check continuity at SPACE HEATER THERMOSTAT outlet. Resistance should be infinite.

bl. Set HEATER THERMOSTAT to 50 above room temperature and check continuity at SPACE HEATER THERMOSTAT outlet. Resistance should be zero.

bm. Set HEATER THERMOSTAT to NO HEAT.

2-5. General Operational Check of Fuel System

a. Fill the 5-gallon can, on the forward wall of the shelter, with gasoline.

b. Remove the gasoline input fitting from the fuel filter at the water heater.

c. Place a cup below the water heater gasoline line input fitting and direct the output of the gasoline into the cap.

d. Open the main fuel valve. Fuel should be clean and flow freely into the cup.

e. Close the main fuel valve.

f. Replace the gasoline line fitting at the water heater filter.

g. Perform b through f above for the gasoline line at the space heater fuel filter. The gasoline should be clean and flow freely.

2-6. General Operational Check of Water System

a. Connect a nonpressurized water supply to the darkroom water intake connector.

b. Close water supply drain valve.

c. Close valves on hot water tank.

d. Close hot water temperature control valve and open cold water temperature control valve and water supply main distribution valve.

e. Check that output hose is in sink and that sink drain is connected to chemical drain line.

f. Prime pump and set WATER PUMP switch to ON. Pump should operate.

g. Open auxiliary valve. Waterflow should be visible in flowmeter. Water heater pressure gauge should indicate 40 psi maximum and water should flow from output hose.

NOTE

It is normal for pump to stop operating if water supply pressure and vacuum gauge indicates 40 psi.

h. Close cold water temperature control valve and open hot water tank and hot water temperature control valves. Waterflow should stop when cold water temperature control valve is closed and begin again when hot water valves are opened.

i. Close water supply main distribution valve. Water should stop flowing from output hose and water pump should stop when water pressure and vacuum gauge reaches 40 psi.

j. Close all valves and remove water supply connection.

k. Open water supply drain valve. Water should drain out of system through water supply drain connector.

l. Close water supply drain valve and set WATER PUMP switch to OFF.

2-7. General Operational Check of Space Heater

a. Set space heater thermostat to 5° below room temperature.

b. Set space heater ON-OFF switch to ON. Fuel pump should operate.

c. In 30 to 60 seconds blower should operate and gray smoke should be seen at exhaust.

d. In several minutes hot air should be felt at the air output in front of unit.

e. Set space ON-OFF switch at OFF. Blower should operate until unit cools.

2-8. General Operational Check of Water Heater

a. Check that hot water tank is empty.

b. Set aquastat at #4.

c. Set water heater power ON-OFF switch to ON and auxiliary panel water heater ON-OFF switch to ON. Nothing should operate and POWER INDICATOR LIGHT should go ON.

d. Set switches to OFF.

e. Fill hot water tank with water.

f. Set water heater power ON-OFF switch at ON. Nothing should operate.

g. Set auxiliary panel water heater ON-OFF switch to ON. Blower and fuel pump should operate, burner should ignite, and a gray smoke should be seen at exhaust pipe.

h. Water temperature gauge should indicate an increase in water temperature to 90° then water heater should stop operating.

i. Wait several minutes. When water temperature falls below 90°, water heater should begin operating again.

j. Set switches at OFF and drain hot water tank.

2-9. General Operational Check of Exhaust Blower

a. Set BLOWER switch to ON. Blower should operate.

b. Set BLOWER switch to OFF.

2-10. General Operational Check of Air Conditioners

NOTE

Perform the following procedures on the roadside and curbside air conditioners.

a. Set OFF-FAN-COOL switch to FAN. Only fan should operate.

b. Set AIR COND THERMOSTAT to the highest temperature setting.

c. Set OFF-FAN-COOL switch to COOL and slowly lower AIR COND THERMOSTAT setting. Compressor should come on as thermostat is moved through room temperature setting.

d. Check operation of CLOSED-FRESH AIR-OPEN control.

e. Set OFF-FAN-COOL switch to OFF.

2-1 1. General Operational Check of Jet Mixer-Distributer

a. Close intake valve.

b. Open circulate valve.

c. Lift circulate-discharge valve.

d. Fill mixer tank with water.

e. Set SPEED switch to LOW.

f. Set mixer pump switch to ON. Water should circulate within mixer.

g. Set SPEED switch to HIGH. Water should circulate at a faster speed.

h. Connect the mixer output hose to a sink or drain.

i. Set discharge-circulate valve to the down position. Water should discharge from tank.

j. Set mixer pump switch to OFF when there is approximately 1 gallon of water left in mixer tank.

k. Close circulate valve.

l. Open intake valve.

m. Set discharge-circulate valve to the up position.

n. Fill a can with approximately 10 gallons of water.

o. Insert the mixer intake hose into the can.

p. Set mixer pump switch to ON. Water should be drawn from the can into the mixer.

q. Set mixer pump switch to OFF, empty mixer of water, close intake valve, and open circulate valve.

2-12. General Operational Check of Plotting Table

a. Install feed and takeup bracket assemblies on plotting table. Bracket assemblies should slide freely on guide rails.

b. Tighten bracket thumbscrews so that brackets are held firmly in place. Cranks on drive bracket assemblies should turn easily and idler bracket rollers should turn freely.

c. Set power switch to ON. Fluorescent lights should go on.

d. Set power switch to OFF.

e. Load a roll of leader into the brackets.

f. Move the leader from one spool to the other and back. Leader should transfer easily.

g. Remove leader roll and brackets.

Paragraph 2-13 is deleted.

2-14. Localizing and Isolating Troubles

a. General. If the proper results are not obtained when performing the operational checks (paras 2-4 through 2-13), the trouble should be localized to an assembly, subassembly, or component. The operational checks (paras 2-4 through 2-13) are more detailed than the operational organizational checks and services (TM 11-6740-282-12) and should be used to supplement those procedures to localize and isolate a malfunction.

b. Use of Chart. The troubleshooting chart is designed to supplement the checks and services and troubleshooting in TM 11-6740-282-12. Only those troubles which are a result of operational malfunction and are referred to from the organizational category troubleshooting chart are listed for localization and isolation at this level of maintenance. Troubles due to physical damage should be localized and isolated by careful inspection.

c. Troubleshooting Chart. The troubleshooting chart lists the symptoms which the maintenance man observes during operation, preventive maintenance checks and services, or during the operation of checks (paras 2-4 through 2-13). The probable cause listed in the troubleshooting charts is presumed to exist after all lower category trouble-shooting procedures and corrective measures have been performed. Corrective action procedures are recommended for each probable cause.

2-15. Electrical System Troubleshooting Chart

(fig. 2-1)

Figure 2-1. Shelter, wiring diagram.

(Located in back of manual.)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	CB1 trips OFF but all other circuit breakers remain ON.	Defective circuit between CB1 and external power input connector.	Check circuits between CB1A, CB1B, CB1C, ground bus, FL-4, FL-3, FL-2, FL-1, and external power input connector. Replace defective wiring, filter, connector, or circuit breaker (para 3-3a).
2	CB6 trips OFF	a. Defective fluorescent light filter. b. Defective circuit between CB6 and fluorescent lights and/or safelights.	a. Check filter capacitors and replace if b. Check circuit between ground bus, WHITE LIGHTS-SAFELIGHT switch, BLACKOUT-NORMAL switch, SAFELIGHT outlet, door interlock and fluorescent lights fixture. Replace defective wiring, outlet, switch or circuit breaker (para 3-3).
		c. Defective buzzer circuit----------	c. Check circuit between CB6, transformer, buzzer switch, and buzzer. Replace defective wiring, buzzer, transformer, switch, or circuit breaker.
3	CB2 trips OFF.	Defective circuit between CB2 and PROCESSOR #1 outlet.	Check circuit between CB2A, CB2B, and PROCESSOR #1 outlet. Re-

Item No.	Symptom	Probable Cause	Checks and Corrective Action
			place defective wiring, outlet, or circuit breaker (para 3-3a.)
4	CB3 trips OFF.	Defective circuit between roadside air conditioner and CB3.	Check circuit between CB3, roadside AIR COND THERMOSTAT, and roadside air conditioner. Replace defective wiring, relay, thermostat, connector, or circuit breaker (para 3-3a).
5	CB4 trips OFF.	Defective circuit between CB4 and curbside air conditioner.	Check circuit between CB4, curbside AIR COND THERMOSTAT, and connector. Replace defective wiring, relay, thermostat, connector, or circuit breaker (para 3-3a).
6	CB5 trips OFF.	Defective circuit between CB6 and PROCESSOR #2 outlet.	Check circuit between CB5A, CB5B, and PROCESSOR # outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a.)
7	CB7 trips OFF.	*a.* Defective circuit between CB7 and UTILITIES outlets.	*a.* Check circuit between CB7 and utilities outlets. Replace defective wiring, outlet, or circuit breaker (para 3-3a.).
		b. Defective circuit between CB7 and exhaust blower.	*b.* Check circuit between CB7, BLOWER switch, and exhaust blower motor. Replace defective wiring, switch, or circuit breaker (para 3-3a).
		c. Defective exhaust blower motor	*c.* Replace exhaust blower motor (para 3-3a).
		d. Defective circuit between CB7 and water pump.	*d.* Check circuit between circuit breaker, maintenance lamp, WATER PUMP switch, and water pump. Replace defective wiring, lamp, switch, or circuit breaker (para 3-3a).
		e. Defective water pump motor	*e.* Replace water pump motor (para 3-3a).
8	CB8 trips OFF.	Defective circuit between CB8 and space heater panel or water heater.	Check circuit between CRB, space heater thermostat, space heater panel, space heater thermostat, and space heater. Replace defective wiring, connector, space heater thermostat, or circuit breakers (para 3-3a).
9	CB9 trips OFF.	Defective circuit between CB9 and EN-36B outlet.	Check circuit between CR9 and EN-36B outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a).
10	CB10 trips OFF.	Defective circuit between CB10 and EN-100A outlet.	Check circuit between CB10 and EN-100A outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a).
11	CB11 trips OFF.	Defective circuit between CB11 and EN-60 outlet.	Check wiring between CB11 and EN-60 outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a).
12	CB12 trips OFF.	Defective circuit between CB12 and PROCESSOR #1 TEMP CONTROL outlet.	Check circuit between CB12 and PROCESSOR # I TEMP CONTROL outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a).

Item No.	Symptom	Probable Cause	Checks and Corrective Action
13	CB13 trips OFF	Defective circuit between CB13 and PROCESSOR #2 TEMP CONTROL outlet.	Check circuit between CB13 and PROCESSOR #2 TEMP CONTROL outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a).
14	CB14 trips OFF.	Defective circuit between CB14 and external convenience outlet.	Check wiring between CB14 and external convenience outlet. Replace defective wiring, outlet, or circuit breaker (para 3-3a).

2-16. Fuel System Troubleshooting Chart

(fig. 1-1)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	No fuel flow between gasoline can and full float.	Clogged gasoline can output.	Remove gasoline can and flush with clean gasoline.
2	Dirt in fuel float.	Dirt in gasoline can	Remove gasoline can and flush with clean gasoline.
3	No fuel flow between fuel float and main fuel valve.	*a.* Clogged fuel line or fitting between fuel float and valve.	*a.* Clean fuel lines with gasoline.
		b. Defective float.	*b.* Replace float (para 3-3b).
4	No fuel flow to heaters	*a.* Clogged fuel lines between valve and heaters.	*a.* Clean fuel lines with gasoline.
		b. Defective main fuel valve	*b.* Replace valve (para 3-3b).

2-17. Water System Troubleshooting Chart

(fig. 1-2)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	No waterflow to pump	*a.* Excessive dirt in filter	*a.* Clean filter under running water.
		b. Clogged plumbing.	*b.* Flush plumbing.
		c. Defective auxiliary valve	*c.* Replace valve (para 3-3c).
2	Water flows but no vacuum pressure indication.	Defective pressure and vacuum gauge.	Replace pressure and vacuum gauge (para 3-3*c*).
3	Pump does not operate	*a.* Pressure switch out of adjustment.	*a.* Adjust pressure switch (para 3-12).
		b. Defective pressure witch	*b.* Replace pressure switch (para (3-3*c*).
		c. Defective pump	*c.* Replace pump (para 3-3*c*).
4	Pump operators but water is not pumped.	Pump improperly primed.	*a.* Fill priming cup with water. *b.* Open priming valve. *c.* When pump is operating, close priming valve.
5	Pressure in excess of 40 psi	*a.* Pressure regulator out of adjustment.	*a.* Adjust pressure regulator (para 3-18).
		b. Defective pressure regulator	*b.* Replace pressure regulator (para 3-3*c*)
6	Water flows but no pressure indication.	Defective water heater pressure gauge.	Replace water heater pressure gauge (para 3-3*c*).
7	No cold waterflow	*a.* Clogged plumbing	*a.* Flush plumbing.
		b. Defective cold water valve	*b.* Replace hot water valve (para 3-3*c*).
8	No hot waterflow	*a.* Clogged plumbing	*a.* Flush plumbing.
		b. Defective hot water valve	*b.* Replace hot water valve (para (3-3*c*).
		c. Defective main distribution valve	*c. Replace main distribution valve (para 3-3*c*).*

2-18. Space Heater Troubleshooting Chart

Refer to TM 11-6740-282-12 for detailed troubleshooting procedures for the space heater.

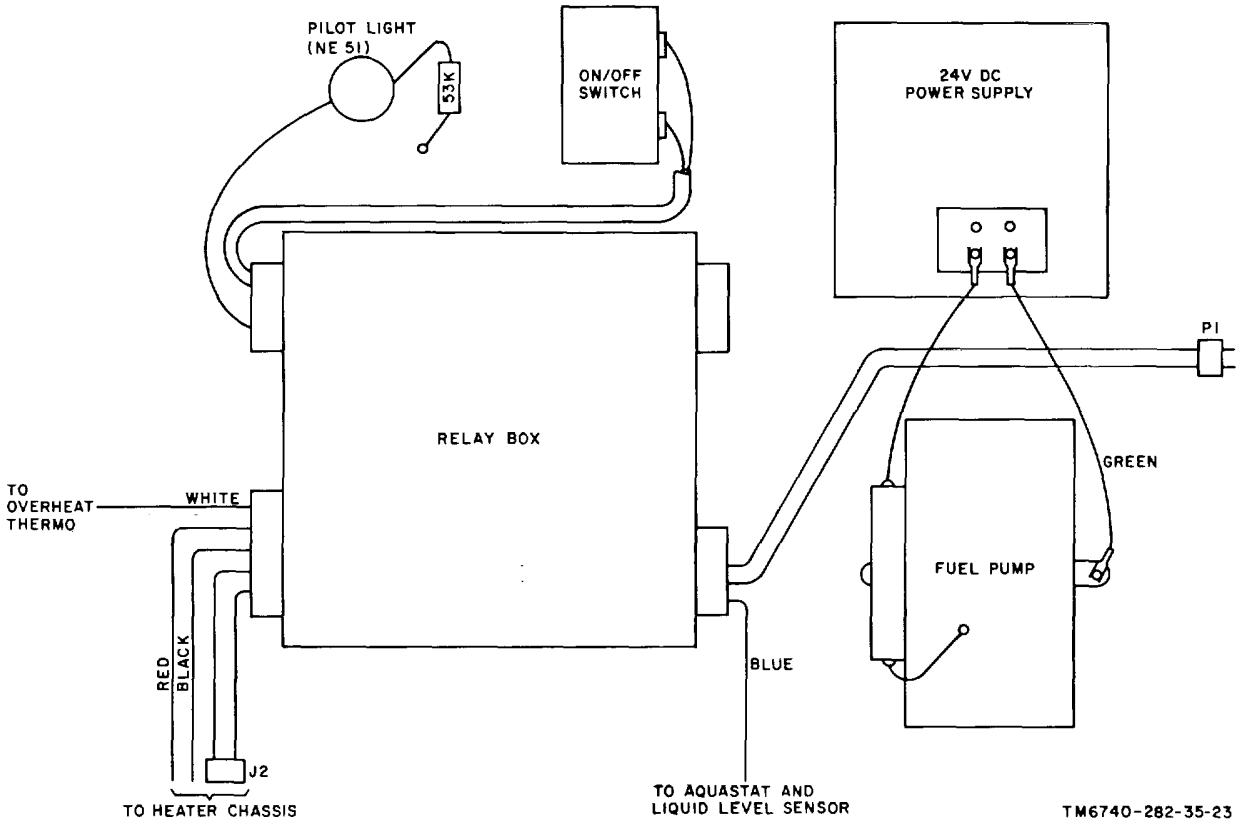


Figure 2-2. Water heater, wiring diagram.

2-19. Water Heater Troubleshooting Chart

(fig. 2-2)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	Heater fails to start	a. No fuel ----------	a. Test for fuel flow by removing gas line nut at mixer needle valve and pushing line downward. If there is no evidence of fuel at this point, check all lines and fittings for air leaks. Clean all strainers. Be sure solenoid valve is operating. If it does not operate, replace and check. Also be sure overheat thermostat on head is closed and making good contact (para 3-4).
		b. Glow plug burned out----------	b. This is particularly true at extreme cold temperatures. Replace glow plug (para 3-4). When functioning properly it

Item No.	Symptom	Probable Cause	Checks and Corrective Action
			will be hot to the touch within a few seconds.
		c. Spark igniter not operating----------	*c.* Look through sight glass to see if spark can be seen. If no spark, check connections to and from transformer. Check for spark by grounding high tension lead to frame. If spark is apparent on ground, check igniter for cracks in insulation and straightness of electrode. Electrode must be in the center of the hole in the perforated plate. Spark gap should be .065. (para 3-16). **Caution:** Never try to clean or adjust spark igniter gap without removing burner head.
		d. Plugged exhaust holes----------	*d.* Clean out holes in perforated plate in exhaust nipple. This can also cause reduced heat output.
		e. Plugged holes in burner head----------	e. Remove burner head and clean out all holes and orifices. Replace perforated plate, if burned or distorted.
		f. Plugged or pinched overflow lines. ----------	*f.* Correct line or replace. This line must be open in order to provide venting of fuel bowl (para 3-4).
2	Heater goes out during operation	*a.* Interrupted flow of fuel ----------	*a.* Fuel line restricted or air leaks in fuel line. Clean all strainers. Tighten all fittings.
		b. Plugged or pinched overflow lines. ----------	*b.* Correct or replace (para 3-4). The line must be open to assure venting of float bowl.
		c. Improper needle adjustment ----------	*c.* Opening or closing needle valve adjusting screw an additional half turn usually eliminates troubles. Proper adjustment is indicated by clear yellow flame-smoky yellow flame indicates too rich mixture-weak, wavering flame, too lean mixture. Final adjustment should be made when heater is hot (para 3-15).
		d. Plugged holes in burner head----------	*d.* As head becomes dirty, flame operation is affected. Remove head from exchanger (para 3-4). Clean all ports and openings.
		e. Spark igniter with either intermittent, weak, or no spark.----------	*e.* See item 1*c*. Clean igniter or install new igniter, adjusting gap (para 3-4).
		f. Overheat thermostat on head open.----------	*f.* Inspect for cause of overheat condition.
		g. Aquastat disconnected or circuit open.----------	*g.* Check aquastat circuit. Replace defective part (para 3-4).

Item No.	Symptom	Probable Cause	Checks and Corrective Action
		h. Liquid level safety switch disconnected or open.	*h.* Check liquid level circuit.
3	Heater pops or backfires when starting.	*a.* Heater barrier washer missing from mixer assembly.	*a.* Bakelite type washer must be located between venturi in mixer and threaded adapter located on burner casting to prevent mixer block from becoming too hot when heater is burning.
		b. Weak or intermittent spark	*b.* See Item 1*c*.

2-20. Exhaust Blower Troubleshooting Chart

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	Blower motor does not operate	a. Defective or worn brushes b. Defective blower motor	a. Replace bushes. b. Perform continuity checks across motor windings. If open or short condition exists, replace motor (para 3-3d).
2	Noisy blower operation	a. Dirt in blower housing	a. Remove blower and clean from blades and blower interior.

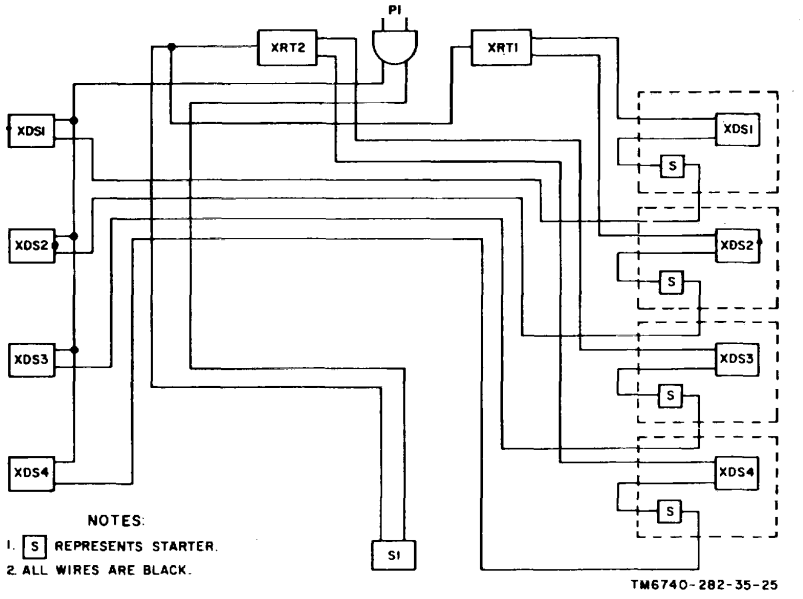


Figure 2-3. Plotting table, wiring diagram.

2-21. Air Conditioners Troubleshooting Chart

(fig. 1-8)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	Fan motor runs but compressor does not operate regardless of thermostat setting or temperature of darkroom.	*a.* Defective relay *b.* Defective thermostat	*a.* Replace relay (para 3-5). *b.* Replace thermostat.
2	Compressor operates at all times regardless of setting of thermostat or temperature of darkroom.	*a.* Defective thermostat *b.* Defective wiring	*a.* Replace thermostat (para 3-5). *b.* Check circuit wiring of thermostat. Replace defective component (para 3-5).

2-22. Jet Mixer Troubleshooting Chart

(fig. 1-13)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	Jet mixer pump does not operate.	*a.* Defective wiring *b.* Defective or worn pump motor *c.* Defective HIGH-LOW switch brushes *d.* Defective ON-OFF switch *e.* Defective pump motor	*a.* Check mixer circuit wiring. Replace defective wiring. *b.* Replace brushes (para 3-6). *c.* Replace switch (para 3-6). *d.* Replace switch (para 3-6). *e.* Replace pump motor (para 3-6).
2	Jet mixer operates in high speed but not in low speed.	Open resistor	Replace resistor (para 3-6).
3	Jet mixer operates in high speed regardless of HIGH-LOW switch setting.	Shorted resistor	Replace resistor (para 3-6).
4	No water intake when in intake mode.	Defective intake valve	Replace valve (para 3-6).
5	No water circulation when in circulate mode.	Defective circulate valve	Replace circulate valve (para 3-6).
6	No water discharge when in discharge mode.	Defective circulate-discharge valve	Replace valve (para 3-6).

2-23. Plotting Table Troubleshooting Chart

(fig. 2-3)

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	One or more of fluorescent	Defective starter	Replace starter (para 3-7).
2	Fluorescent lamp fails to start	*a.* Defective starter *b.* Defective lamp	*a.* Replace starter (para 3-7). *b.* Replace lamp (para 3-7).
3	All lamps fail to operate	*a.* Defective ballast *b.* Defective wiring	*a.* Replace ballast (para 3-7). *b.* Inspect wiring for loose or broken connections. Rewire circuit as required.

Paragraph 2-24 is deleted.

Item No.	Symptom	Probable Cause	Checks and Corrective Action
		c. Defective motor	*c.* Perform continuity checks across motor windings. If an open or short condition exists, replace motor (para 3-8).
		d. Worn motor brushes	*d.* Replace brushes (para 3-8).
2	Flywheel turns but rollers do not operate.	*a.* Defective flexible coupling	*a.* Replace flexible coupling (para 3-8).
		b. Broken drive chain	*b.* Replace drive chain (para 3-8).
		c. Defective relay	*c.* Replace relay (para 3-8).
		d. Defective solenoid	*d.* Replace solenoid (para 3-8).
		e. Defective transmission	*e.* Replace transmission (para 3-8).
3	Drive rollers operate but flywheel does not turn.	Small or large V-belt out of adjustment or broken.	Adjust or replace defective V-belt. Refer to TM 11-6740-282-12.
4	Blades complete more than one cycle.	*a.* Microswitch cam out of adjustment.	*a.* Adjust microswitch cam (para 3-17).
		b. Defective relay	*b.* Replace relay (para 3-8).
		c. Defective microswitch	*c.* Replace microswitch (para 3-8).
		d. Defective solenoid	*d.* Replace solenoid (para 3-8).
		e. Defective single revolution clutch.	*e.* Replace single revolution clutch (para 3-8).
5	Knife blades bind	*a.* Upper knife out of adjustment	*a.* Adjust upper knife (para 3-11).
		b. Defective knife tension springs	*b.* Replace knife tension springs
6	Speed does not vary smoothly when speed control handle is advanced.	*a.* Speed control linkage out of adustment.	*a.* Adjust speed control linkage (para 3-11).
		b. Defective speed control lever arm spring.	*b.* Replace speed control lever arm spring (para 3-8).
		c. Defective transmission	*c.* Replace transmission (para 3-8).
7	Rollers bind	Defective roller	Inspect rollers for distortion. Replace defective roller (para 3-8).
8	Operation of FORWARD-REVERSE lever does not cause rollers to change direction.	*a.* FORWARD-REVERSE lever out of adjustment.	*a.* Adjust direction control linkage (para 3-11).
		b. Defective transmission	*b.* Replace transmission (para 3-8).
9	Paper jams and tears	Idler roller cam out of adjustment	Adjust idler roller cam (para 3-17).
10	Paper not completely cut through.	*a.* Knife blades out of adjustment	*a.* Adjust knife blades (para 3-17).
		b. Eccentric collars out of adjustment.	*b.* Adjust eccentric collars (para 3-17).
11	Paper raggedly cut	Knife blade dull, cracked, or broken	Replace knife blade (para 3-8).
12	Blades do not operate	*a.* Defective pushbutton switch	*a.* Replace pushbutton switch (para 3-8).
		b. Defective relay	*b.* Replace relay (para 3-8).

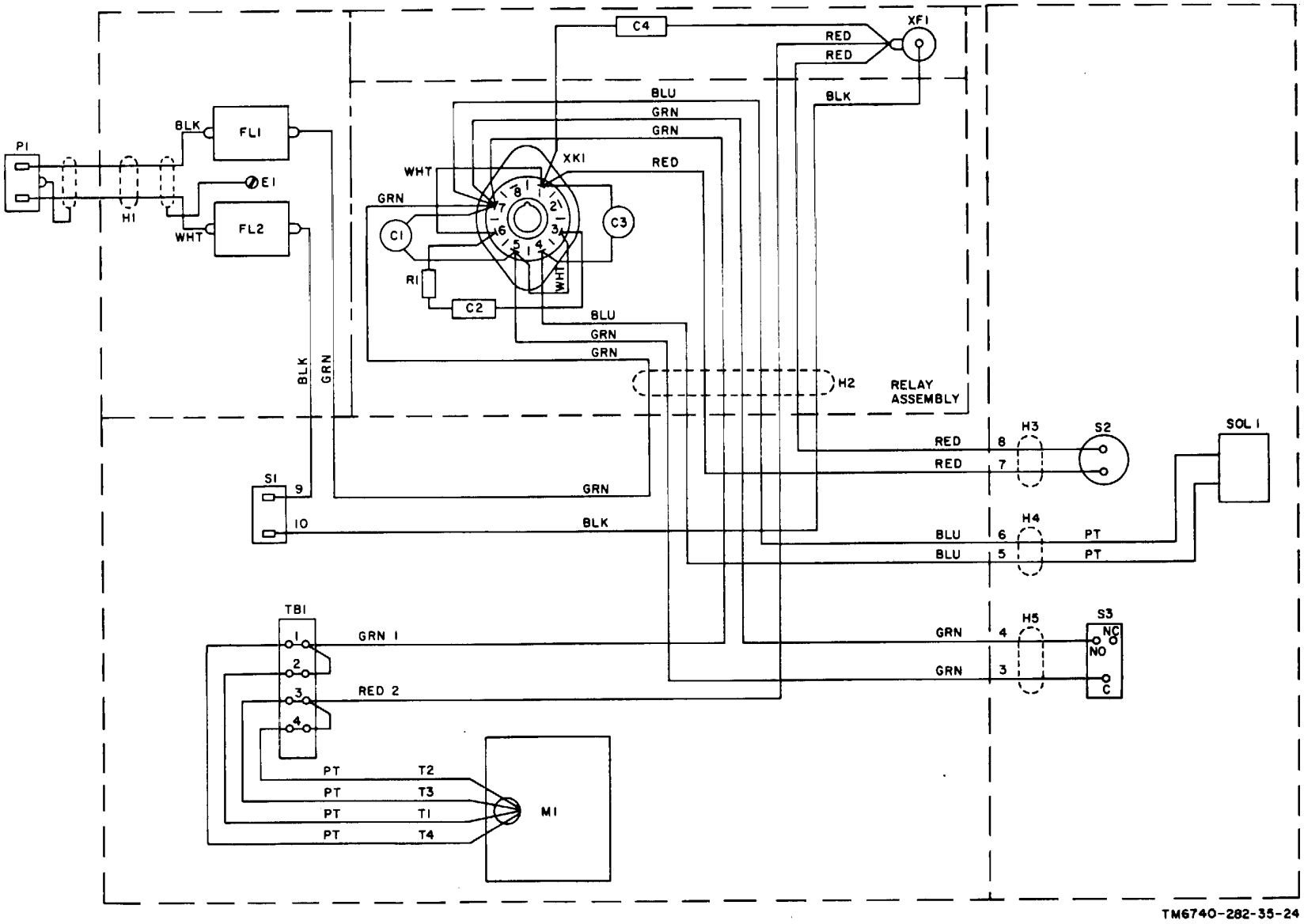


Figure 2-4. Chopper, wiring diagram.

CHAPTER 3

REPAIRS AND ALIGNMENT

Section I. REPAIRS

3-1. General Parts Replacement Techniques

Most of the parts of the processor can be reached easily and replaced without special procedures. Paragraphs 3-3 through 3-14 provide detailed disassembly instructions for the assemblies and subassemblies of the processor; however, since it is not necessary to perform a complete disassembly when particular parts are found to be defective, the disassembly procedure and the exploded view should be used as aids for removal and replacement of defective parts.

3-2. Considerations Before Disassembly

Sectionalizing trouble in the darkroom (para 2-4) can simplify repairs by limiting the work to the defective area. Repairs that can be made by disassembly of the particular parts that operate as a group to perform a function are outlined in a through k below. After disassembling the assembly, refer only to the paragraphs that contain instructions concerning the defective area. Replace the defective part or parts; then reassemble the assembly.

a. Darkroom Assemblies. Maintenance of assemblies and subassemblies that are directly subordinate to the darkroom (assemblies that cannot function when separated from the darkroom) is provided in paragraph 3-3. Included in this category are the following:

(1) Electrical system (para 3-3a, figs. 3-3 through 3-7).

(2) Fuel system (para 3-3b, figs. 1-1 and 3-8).

(3) Water supply system (para 3-3c, figs. 1-2 and 3-4).

(4) Exhaust blower (para 3-3d, fig. 3-10).

(5) Processor leveling assembly (para 3-3e, fig. 3-11).

(6) Liquid level control (para 3-3f, fig. 3-12).

b. Water Heater. Refer to paragraph 3-4 and figures 3-13 and 3-14 for repair and alignment instructions for the water heater.

c. Space Heater. Refer to TM 11-6740-282-12 for repair and alignment instructions for the space heater.

d. Air Conditioners. Refer to paragraph 3-5 and figures 3-15 and 3-16 for repair and alignment instructions for the air conditioners.

e. Jet Mixer-Distributor. Refer to paragraph 3-6 and figure 3-17 for repair and alignment instructions for the jet-mixer distributor.

f. Plotting Table. Refer to paragraph 3-7 and figures 3-18 and 3-19 for repair and alignment instructions for the plotting table.

g. Processor. Refer to TM 11-6740-278-35 for repair and alignment instructions for the processor.

h. Projection Printer. Refer to TM 11-6740-280-35 for repair and alignment instructions for the projection printer.

i. Continuous Printer. Refer to TM 11-6740-279-35 for repair and alignment instructions for the continuous printer.

j. Contact Printer. Refer to TM 11-6740-281-35 for repair and alignment instructions for the contact printer.

3-3. Darkroom Assemblies

Figures 3-1 and 3-2 illustrate the interior of the darkroom including all assemblies and components. With the exception of adequate manpower and moving facilities, no special instructions are required for dismantling and installation of assemblies to and from the darkroom. Repair in-

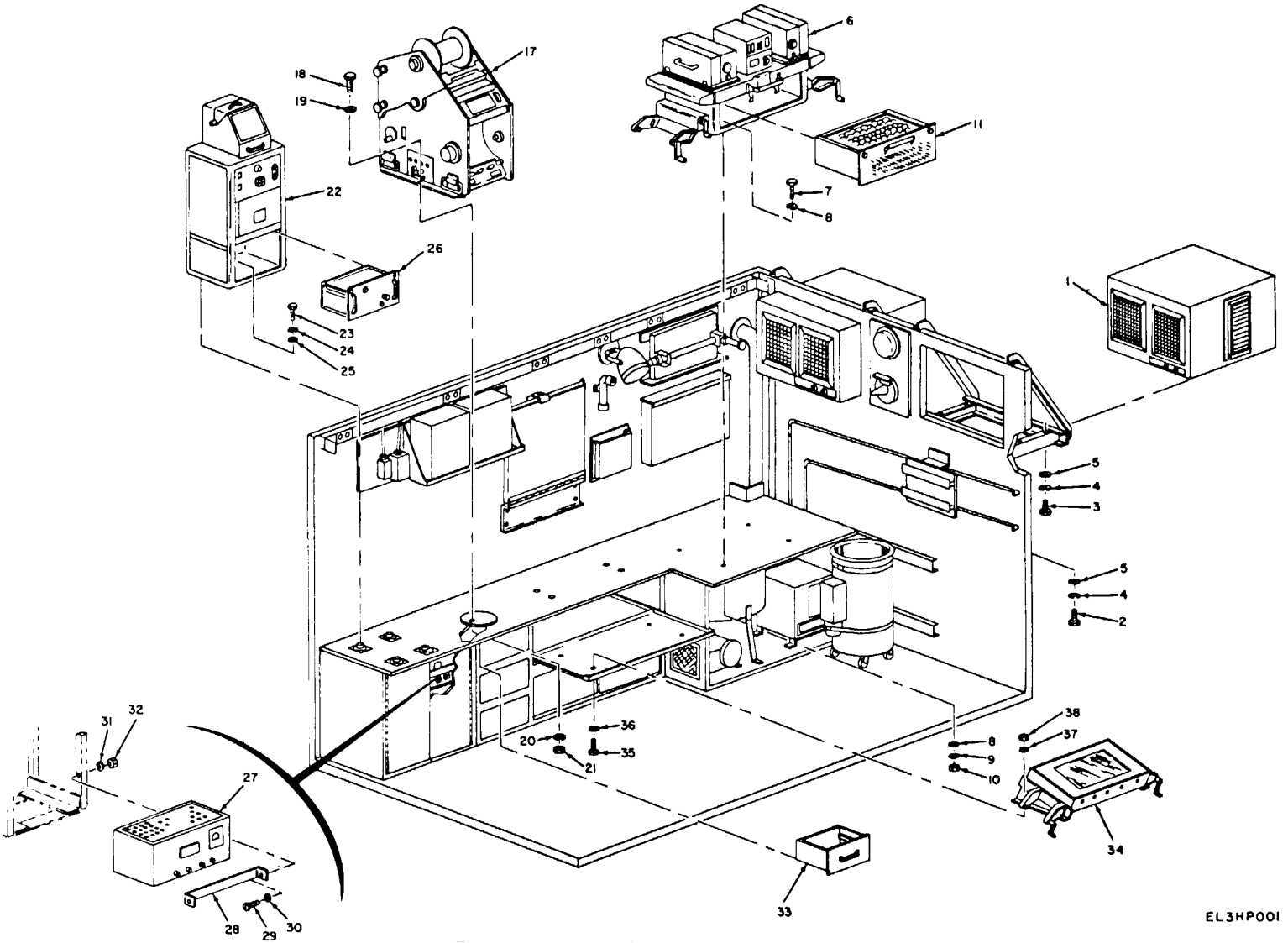


Figure 3-1. Darkroom dismantling, roadside view.

1 Air conditioner (A3, A4)
2 Cap screw, soc hd, cres, 5/16-18 X 1 ½ in. lg
3 Capscrew, hex hd, stl, cad pl, 5/16-18 x 1 ½ in. lg
4 Lockwasher, split, stl, 5/8 in.
5 Flat washer, stl, 5/8 in.
6 Photographic Contact Printer EN-100A (Unit 6)
7 Machine scre, pan hd, stl, cres, ¼-20-X 2 in. lg
8 Flat washer, stl, ¼ in.
9 Lockwasher, split, stl, ¼ in.
10 Plain hexagon nut, cres ¼-20 (6H1)
11 Drawer assembly (p/o item 6)
12 Not used.
13 Not used.
14 Not used.
15 Not used.
16 Not used.
17 Printer, Contact, Photographic, Continuous EN-6C (Unit 5)
18 Cap screw, hex hd, stl, cad pl, 7/16-14 x 2 ¼ in. lg (5H2)
19 Flat washer, cres, 7/16 in. (5H3)
20 Lockwasher, split, stl, 7/16 in. (5H4)
21 Plain hexagon nut, cres, 7/16-14 (5H1)
22 Photographic Projection Printer EN-36B (Unit 2)
23 Machine scre, hex hd, cres, ¼-20 x 1 in. lg (2H1)
24 Lockwasher, split, stl, ¼ inc. (2H2)
25 Flat washer, stl, ¼ in. (2H3)
26 Drawer assembly (p/o item 22)
27 Voltage regulator (A122)
28 "A" cabinet bar assembly (A5)
29 Screw (A5H2)
30 Washer (A5H2)
31 Lockwasher (A5H4)
32 Nut (A5H1)
33 Drawer assembly (A32A7)
34 Photographic Film Plotting Table AR-92B (A121)
35 Screw (A121H2)
36 Washer (A121H3)
37 Lockwasher (A121H4)
38 Nut (A121H1)

Figure 3-1. - Continued

structions for the assemblies and components of the darkroom that require special handling are given in a through f below.

NOTE

The servoamplifier on Printer, Contact, Photographic, Continuous EN-6C has to be removed before the EN-6C can be removed from the darkroom.

a. Electrical System Repair. No special instructions are required for replacement of wiring or outlets of the darkroom. Repair instructions for the assemblies of the electrical system are given in (1) through (5) below (fig. 3-3).

WARNING

High voltage is present in the darkroom. Set the applicable circuit breaker to OFF or remove power from darkroom before proceeding with repair of any component in the electrical system.

(1) Circuit breaker replacement (fig. 3-4).

(a) Remove the power cable from the power entrance panel.

(b) Remove the screws (2) and cover (1).

(c) Pry the circuit breakers (3, 4, and 5) in an upward direction far enough to release the breaker holding clip.

(d) Lift the circuit breaker so that the breaker flange slips from flange mount.

(e) Inspect all parts for signs of damage or overheating and replace defective circuit breaker.

(f) Install the circuit breakers (3, 4, and 5) so that the breaker flange and breaker holding clip are firmly in place.

(g) Install the cover (1) and secure it with screw (2).

(h) Connect the power cable to the circuits.

(2) Buzzer and buzzer transformer replacement (fig. 3-4).

(a) Disconnect the power cable from the power entrance panel.

(b) Remove the screw (2) that secures the cover (1) to the circuit breaker box (14).

(c) Tag and disconnect the leads connected to the buzzer (10) and the buzzer transformer (6).

(d) Remove the buzzer transformer (6) by removing the attaching screws (7), lockwashers (8), and nuts (9).

(e) Remove the buzzer (10) by removing the attaching screws (11), lockwasher (12), and nuts (13).

(f) Inspect all parts for signs of damage or overheating and replace defective parts.

(g) Install the buzzer transformer (6) and secure it with the screws (7), lockwashers (8), and nuts (9).

(h) Install the buzzer (10) and secure it with the screws (11), lockwashers (12), and nuts (13).

(i) Using the tags and the wiring diagrams as guides, connect all leads to the buzzer transformer and buzzer.

(j) Install the cover (1) on the circuit breaker box (14) and secure it with the screw (2).

(k) Connect the power cable to the power

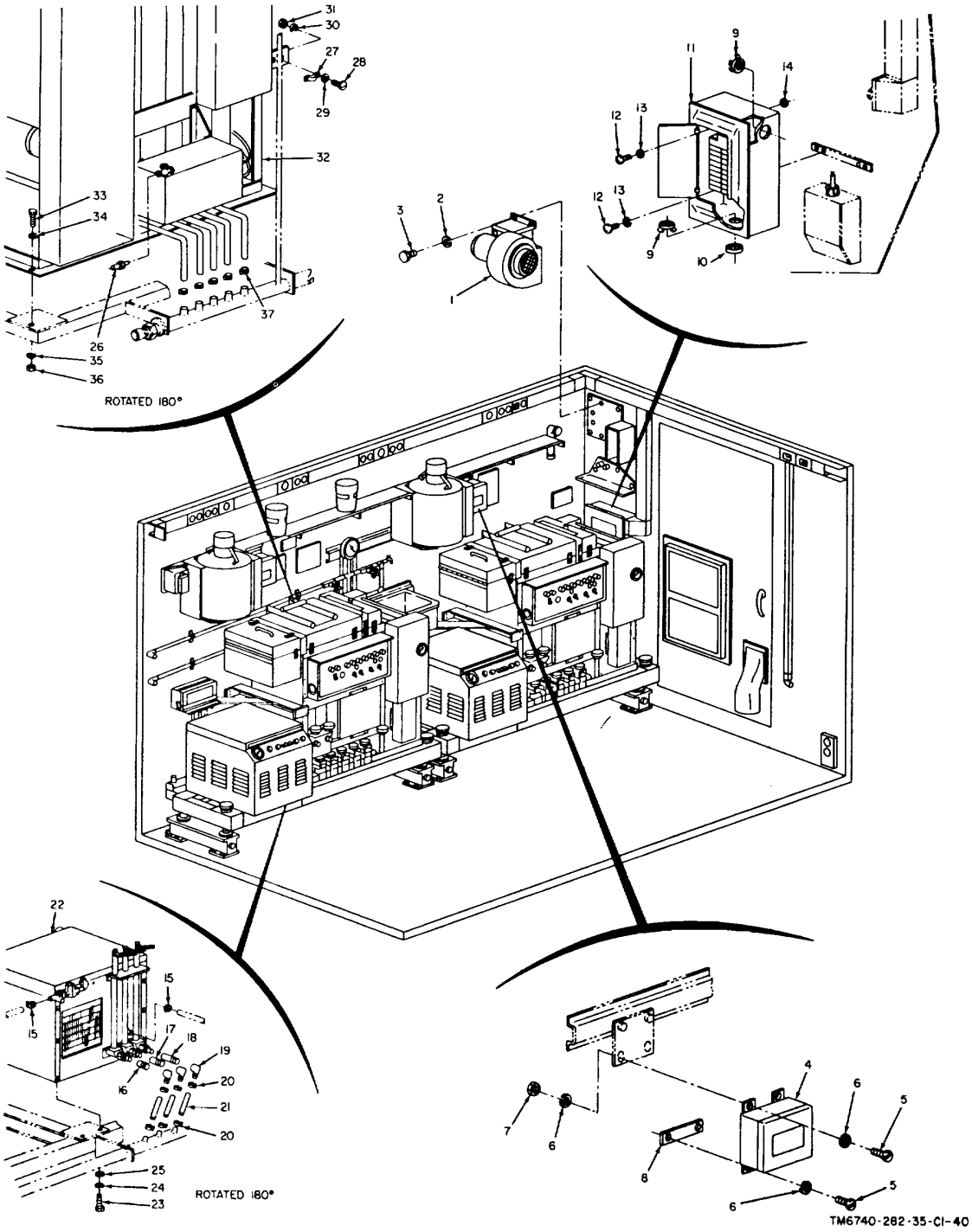


Figure 3-2. Darkroom dismantling, curbside view.

1 Blower fan assembly (A49)
2 Screw (A49H1)
3 Lockwasher (A49H2)
4 Liquid level control assembly (A72)
5 Screw (A72H2)
6 Lockwasher (A72H3)
8 Plate (MP239, MP240)
9 Locknut (H100, H101)
10 Spacer (MP311)
11 Circuit breaker box assembly (A9)
12 Screw (A9H1)
13 Lockwasher (A9H9)
14 Spacer (A9H2)
15 Clamp (MP73, MP74)
16 Nipple (MP209)
17 Nipple (MP207)
18 Nipple (MP205)
19 Elbow (MP162, MP163, MP164)
20 Clamp (MP75, MP76, MP77, MP78, MP79, MP80)
21 Hose (MP194)
22 Photographic Processing Temperature Control Unit FH-B33 (Unit 3)
23 Machine screw, hex hd, stl, ¼-20 x 5/8 in. lg (3H1)
24 Lockwasher, split, cres, 1/4 in. (3H2)
25 Flat washer, cres, 1/4 in. (3H3)
26 Sensor (A94, A95)
27 Clamp assembly (A40, A41)
28 Screw (A40H2)
29 Washer (A40H3)
30 Lockwasher (A40H4)
31 Nut (A40H1)
32 Photographic Film and Paper Processing Machine EH-48B (Unit 4)
Machine screw, hex hd, stl, 1/4-20 x 1 in. lg (4H2)
34 Flat washer, cres, 1/4 in. (4H3)
35 Lockwasher, split, cres, 1/4 in. 4H4)
36 Plain hexagon nut, cres, 1/4-20 (4H1)
37 Clamp (MP81, MP82, MP83, MP84, MP85)

Figure 3-2. - Continued

entrance panel and check the buzzer circuit.

(3) Buzzer pushbutton replacement (fig. 3-5).

(a) Deenergize circuit breaker CB6.

(b) Unscrew buzzer having cap (1) from buzzer housing (5).

(c) Remove two pushbutton switch mounting screws (3).

(d) Slide the pushbutton switch (2) out of buzzer housing (5) and remove wires.

(e) Remove two sheet metal screws that secure housing to bulkhead.

(f) Remove gasket (4).

(g) Check pushbutton switch, housing, and gasket for defects and replace if necessary.

(h) Install gasket (4) and housing (5) and secure with the screws removed in (1) b above.

(i) Connect wires to pushbutton switch (2), slide the switch (2) into buzzer housing (5) and secure switch with two screws (3).

(j) Install the buzzer housing cap (1) on the buzzer housing (5) and energize circuit breaker CB6.

(4) *Power connection box repair* (fig. 3-6).

(a) The wiring of the power connection box is accessible from the interior of the darkroom by removing screws (22), lockwashers (23), and cover (21).

(b) Connector (1) is replaced by opening cover (6) and removing screws (2), washers (31, lockwashers (4), and nuts (5).

(c) Connector (15) is replaced by removing the electrical wiring and unscrewing the connector (15) from adapter (16).

(d) Before replacing filters (27), tag and disconnect wiring. Then remove screws (28), lockwashers (29), and nuts (30).

(e) Before replacing filters (33), tag and disconnect wiring. Then remove screws (34), lockwashers (35), and nuts (36).

(5) *Telephone jacks repair* (fig. 3-7).

(a) Remove the four sheet metal screws (6) that secure the plastic plate (5) to the darkroom bulkhead.

(b) Lift the plastic plate (5) far enough away from the bulkhead to unsolder the wires from the terminals.

(c) Remove nuts (2), lockwashers (3), and washers (4) from the terminals (1).

(d) Tag and unsolder wires from the terminals (7).

(e) Remove nuts (8), nylon washers (9), and rubber washers (10) from terminals (7).

(f) Remove the terminals (7).

(g) Remove the nylon washers (11) and rubber washers (12) from the terminals (7).

(h) Inspect all parts-for signs of damage and replace defective parts.

(i) Install nylon washers (11) and rubber washers (12) on terminals (7).

(j) Install terminals (7) on outside of shelter.

(k) Install the nuts (8), nylon washers (9), and rubber washers (10) on terminals (7).

(I) Connect and solder the wires on the terminals (7).

(m) Install the nuts (2), lockwashers (3), and flat washers (4) on the terminals (1).

(n) Install the four sheet metal screws (6) that secure the plastic plate (5) to the bulkhead.

b. Fuel System Repair.

(1) *Fuel lines and hoses* (fig. 1-1). All repairs to the fuel system are performed by removing and replacing sections of threaded tubing, connectors, or hoses and removing the filter. No

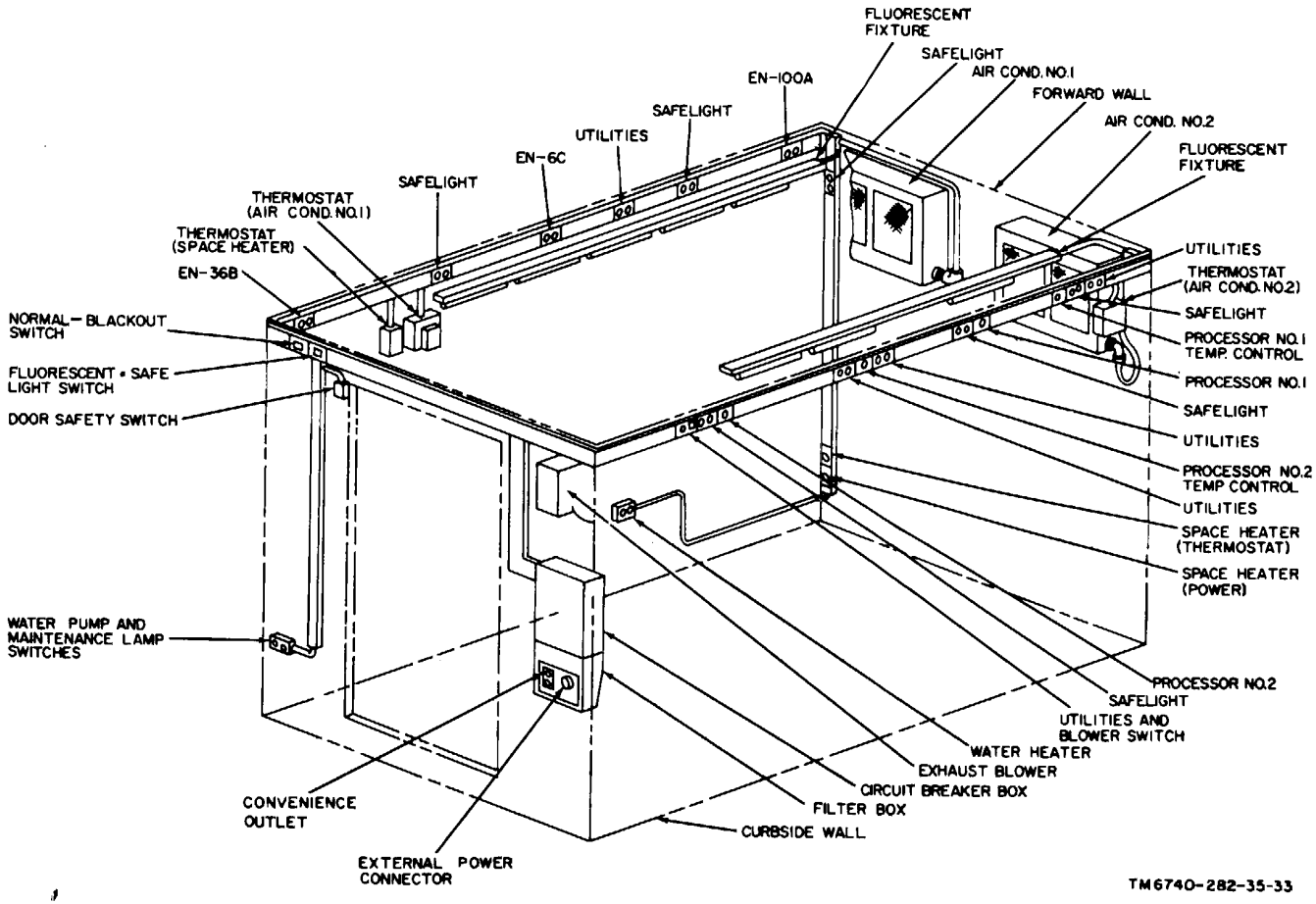
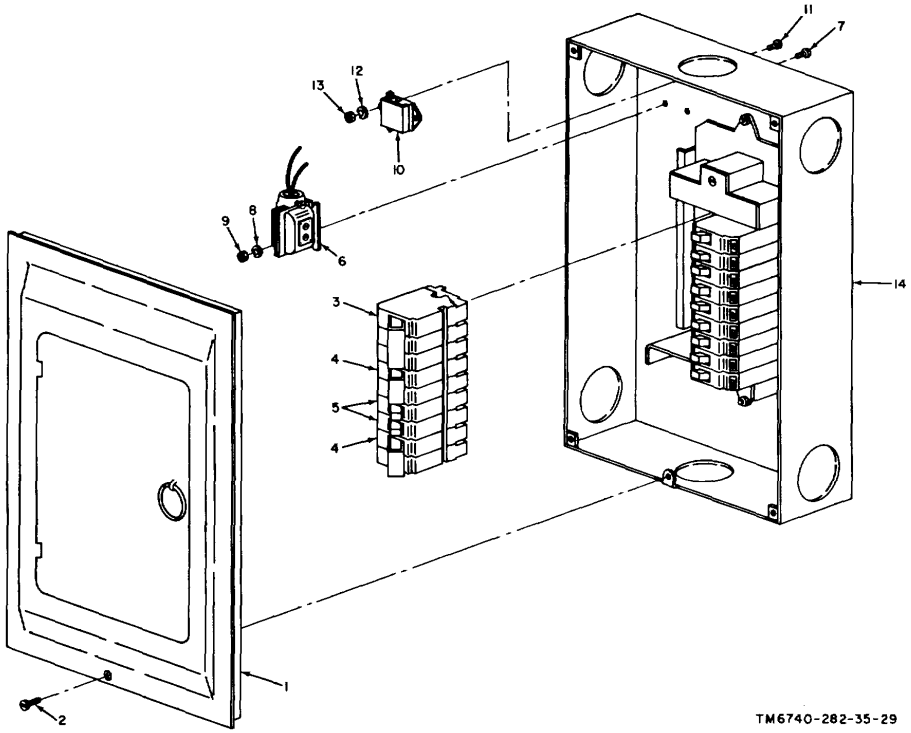
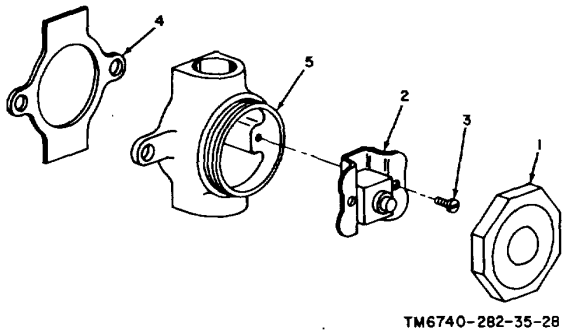


Figure 3-3. Darkroom electrical outlet



1 Cover (MP1)
2 Screw (p/o item 14)
3 Circuit breaker (CB1)
4 Circuit breaker (CB2, CB5)
5 Circuit breaker (CB3, CB4, CB6, CB7, CB8, CB9, CB10, CB11, CB12, CB13, CB14)
6 Transformer (T1)
7 Screw (H8)
8 Lockwasher (H9)
9 Nut (H7)
10 Buzzer (DS1)
11 Screw (H5)
12 Lockwasher (H6)
13 Nut (H4)
14 Box MP1)

Figure 3-4. Circuit breaker panel, exploded view.



1 Cap
2 Pushbutton
3 Screw
4 Gasket
5 Housing

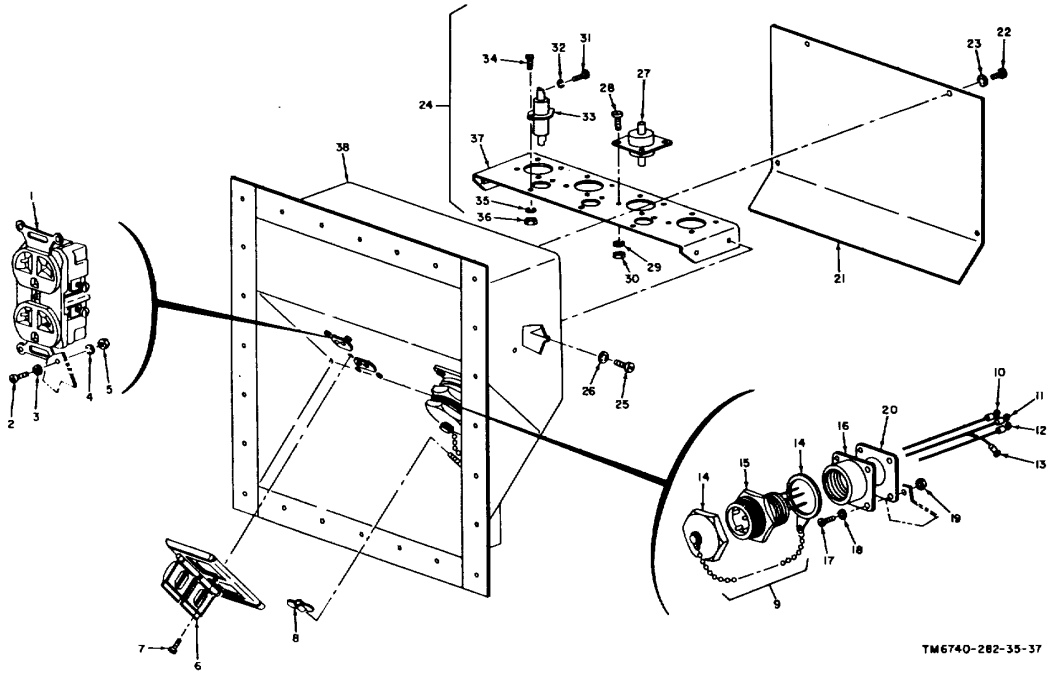
Figure 3-5. Buzzer pushbotton, exploded view.

special instructions are required for replacement of tubing or hoses.

WARNING

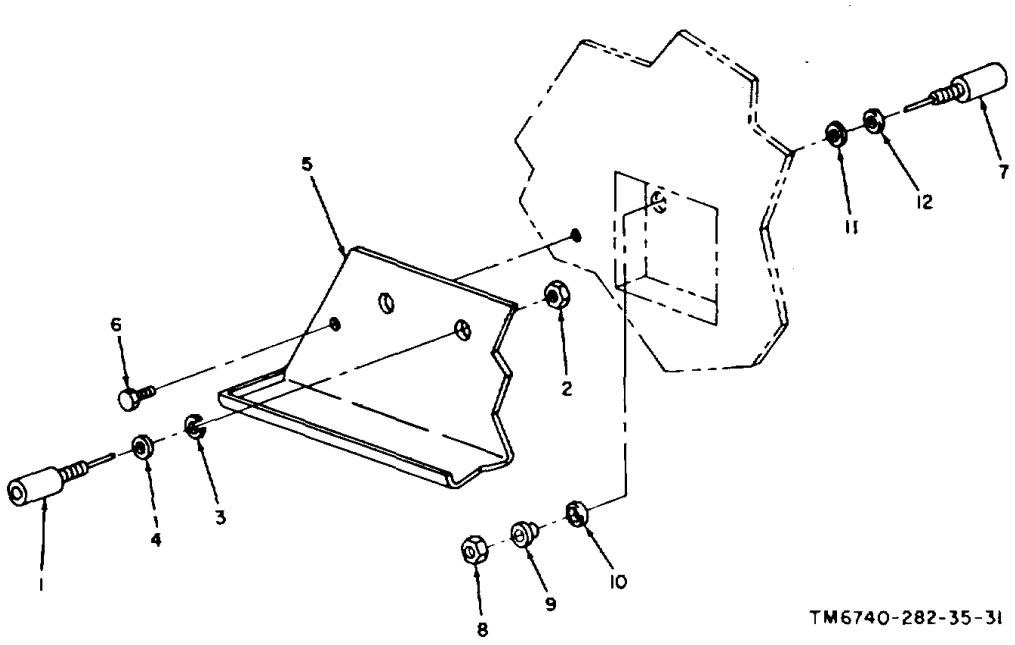
Do not attempt to disconnect or loosen any parts of the fuel line within the darkroom while either exhaust pipe is hot. Stop both heaters and allow at least 30 minutes before disconnecting any part.

(2) *Fuel can bracket and filter assembly* (fig. 3-8). No special instructions are required for repair of the fuel can bracket. To remove the fuel filter (9) remove the fuel lines and screws (10). Replace a defective filter (9) with a known good replacement, secure it in place with screws (10), and reinstall the fuel lines.



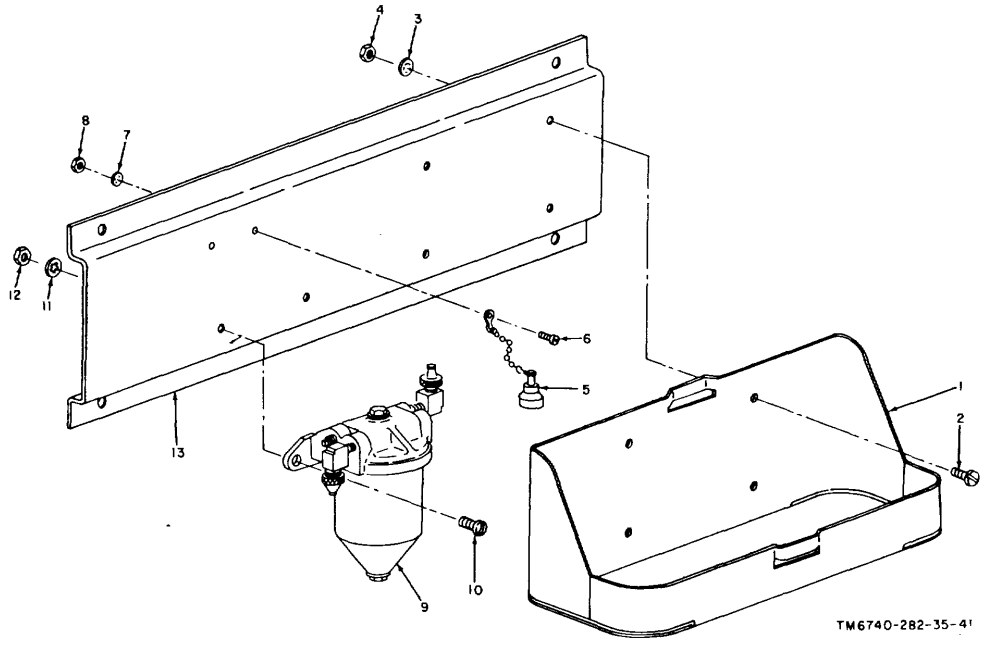
1 Connector (J1)12
2 Screw (H6)
3 Washer (H7)13
4 Lockwasher (H8)
5 Nut (H4)
6 Cover (MP3)
7 Screw (H5)
8 Wingnut (H11)
9 Electrical receptacle wiring assembly (W2)
10 Electrical lead assembly (W2W1)
11 Electrical lead assembly (W2W2)
12 Electrical lead assembly (W2W3)
13 Electrical lead assembly (W2W4)
14 Cap and chain (p/o item 9)
15 Connector (W2J1)
16 Adapter (MP1)
17 Screw (H2)
18 Lockwasher (H3)
19 Nut (H1)
20 Gasket (p/o item 16)
21 Cover (MP2)
22 Screw (H9)
24 Filter chassis assembly (A1)
25 Screw (A1H1)
26 Lockwasher (A1H2)
27 Filter (A1FL1, A1FL2, A1FL3, A1FL4)
28 Screw (A1H9)
29 Lockwasher (A1H10)
30 Nut (A1H8)
31 Screw (A1H4)
32 Lockwasher (A1H7)
33 Filter (A1FL5, A1FL6, A1FL7)
34 Screw (A1H5)
35 Lockwasher (A1H6)
36 Nut (A1H3)
38 Electrical cutout weldment (A2)

Figure 3-6. Power connection box, exploded view.



1	Terminal	5	Plate	9	Nylon washer
2	Nut	6	Screw	10	Rubber washer
3	Lockwasher	7	Terminal	11	Nylon washer
4	Washer	8	Nut	12	Rubber washer

Figure 3-7. Telephone jacks, exploded view.



1	Bracket (MP1)	6	Screw (H5)	10	Screw (A1H2)
2	Screw (H2)	7	Lockwasher (H6)	11	Lockwasher (A1H3)
3	Lockwasher (H3)	8	Nut (H4)	12	Nut (A1H1)
4	Nut (H1)	9	Fuel Filter assembly (A1)	13	Bracket (MP4)
5	Coupling cap (MP2, MP3)				

Figure 3-8. Fuel can bracket and filter assembly, exploded view.

c. Water Supply System Repair.

(1) *Plumbing, gauges, and valves* (fig. 1-2). No special instructions are required for the removal and replacement of the plumbing, gauges, and valves. Prior to removal of any component, drain the water supply system.

(2) *Water plump replacement* (fig. 1-2).

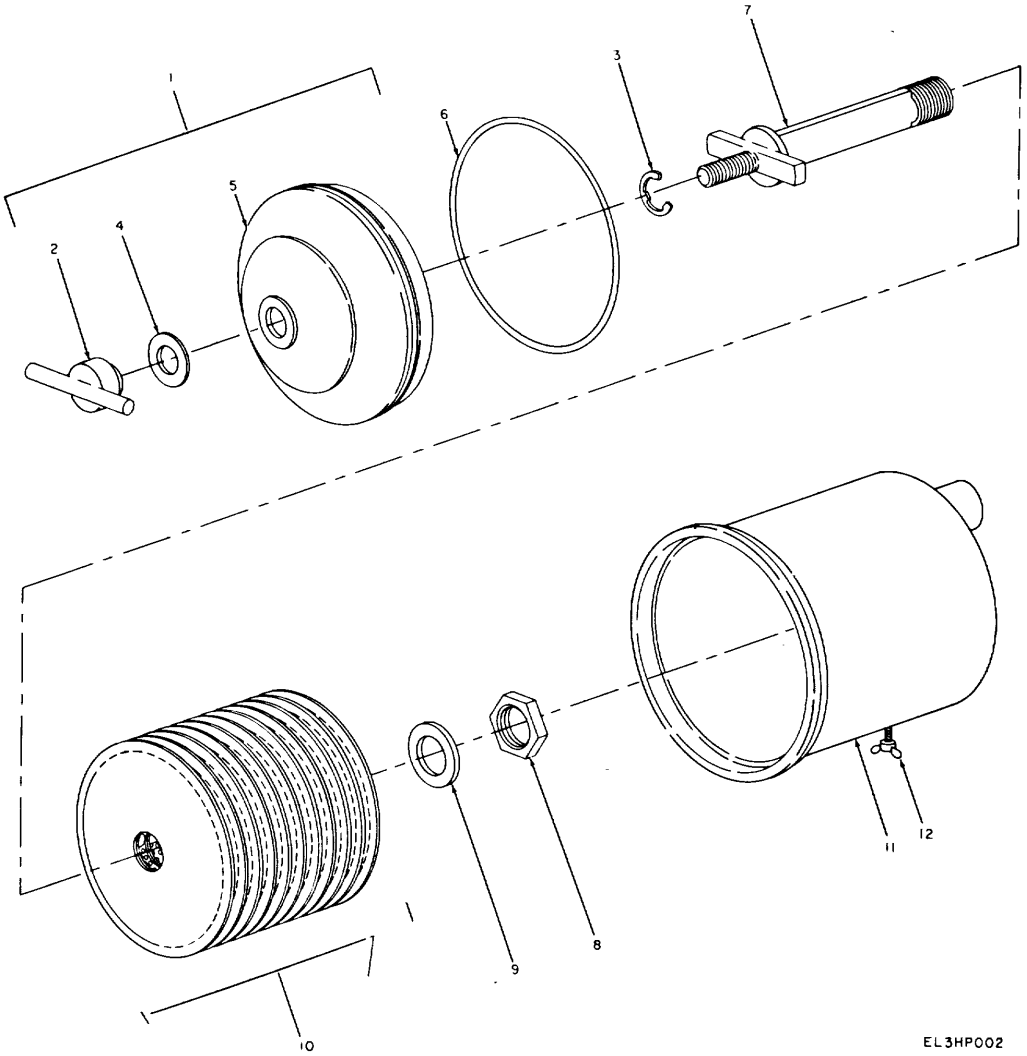
(a) Close +he water supply valve.

(b) Open the water supply drain valve and the drain valve on the water pump.

(c) Disconnect the water pump and pressure switch from the power source.

(d) Disconnect the water pipes from the water pump.

(e) Remove the water pipe in front of



1	Cap assembly	5	Cap	9	Gasket
2	Handle	6	O-ring	10	Filter
3	Retaining ring	7	Post	11	Housing
4	Gasket	8	Nut	12	Petcock (ES-38C only

Figure 3-9. Water filter, exploded view.

the pump, including the flowmeter, pressure regulator, and pressure gage.

(f) Remove the bolts that mount the water pump and remove the pump.

(g) Install the new pump and secure it with the bolts.

(h) Using figure 1-2 as a guide, connect the appropriate water pipes to the pump and install the flowmeter, pressure regulator, and pressure gage. Use pipe sealing compound on threaded sections.

(i) Connect the water pump and pressure switch to the voltage source.

(j) Close the water drain valve and the drain valve on the water pump.

(k) Open the water supply valve, check for leaks, and verify that all equipment is functioning properly.

(3) *Water filter repair* (fig. 3-9).

(a) Remove cap assembly (1).

(b) Inspect gasket (4) for damage. If replacement is required, remove retaining ring (3), handle (2), and gasket (4).

(c) Inspect O-ring (6) for damage and replace if necessary.

(d) Remove post (7) (with filter attached), nut (8), gasket (9), and filter (10).

(e) Inspect gasket (9) for damage and replace if necessary.

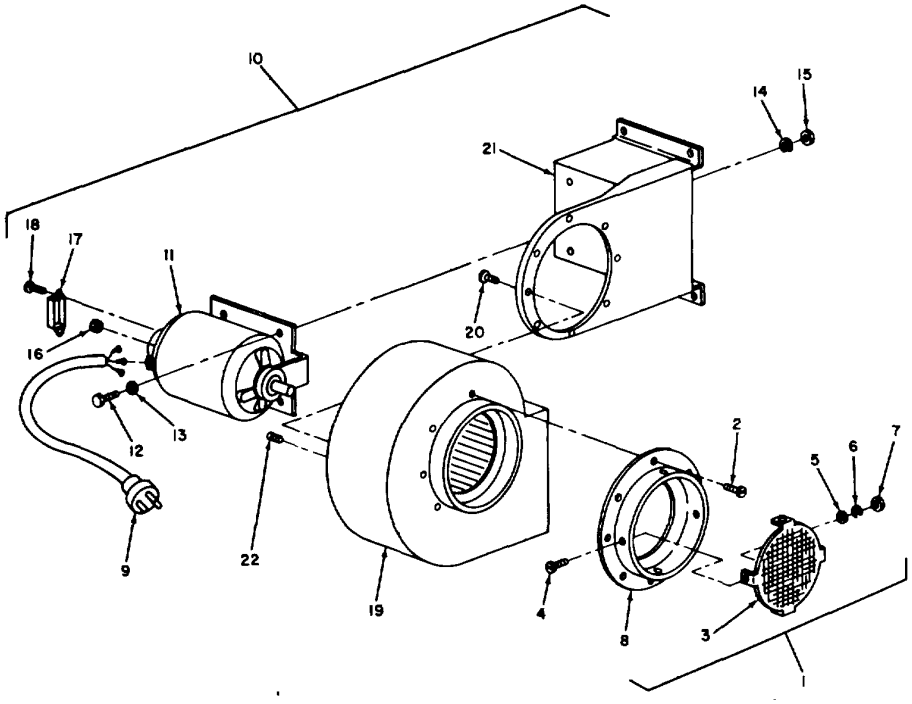
(f) Replace or clean filter as required. Insert cleaned or replacement filter (10) over post (7) and secure with gasket (9) and nut (8).

(g) Assemble handle (2), gasket (4), retaining ring (3) and 0-ring (6) and cap (5).

(h) Assemble post (7) with filter attached to housing (11) and install cover assembly (1).

d. Exhaust Blower Repair (fig. 3-10).

(1) *Disassembly*.



1 Shroud and screen assembly (A2)
2 Screw (A2H5)
3 Screen (A2MP1)
4 Screw (A2H2)
5 Washer (A2H3)
6 Lockwasher (A2H4)
7 Nut (A2H1)
8 Shroud (A2MP2)
9 Cable assembly (W1)
10 Blower fan modification (A1)
11 Motor (A1B1)
12 Screw (A1H6)
13 Washer (A1H6)
14 Lockwasher (A1H7)
15 Nut (A1H4)
16 Nut (A1MP2)
17 Cover (A1MP4)
18 Screw (A1H3)
19 Blower (A1B2)
20 Screw (A1H1)
21 Base (A1MP3)
22 Setscrew (A1H2)

Figure 3-10. Exhaust blower, exploded view.

(a) Remove screws (2) and shroud and screen assembly (1).

(b) Remove screws (4), washers (5), lockwashers (6), nuts (7), and screen (3) from shroud (8).

(c) Remove screws (18), cover (17), nuts (16) and disconnect cable (9).

(d) Loosen setscrews (22) on impeller coupling.

(e) Remove screws (12), washers (13), lockwashers (14, nuts (15), and motor (11).

(f) Remove screws (20) and blower (19) from base (21).

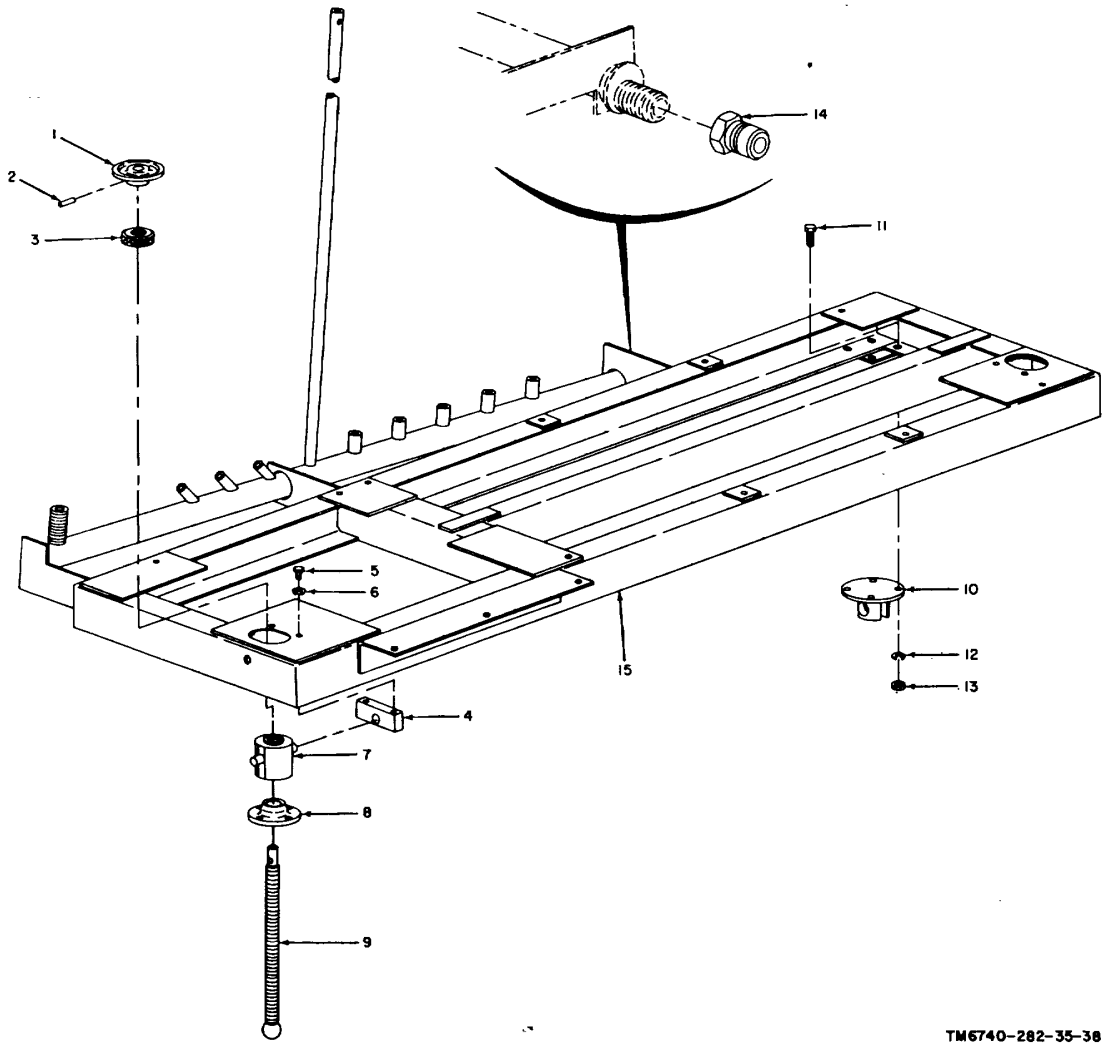
(2) *Assembly.*

(a) Assemble blower (19) to base (21) using screws (20).

(b) Assemble motor (11) using screws (12), washers (13), lockwashers (14), and nuts (15).

(c) Connect cable (9) and assemble nuts (16), cover (17), and screws (18).

(d) Assemble screen (3) to shroud (8)



1 Handwheel (MP6, MP7)
2 Pin (H5)
3 Locknut (H9, H10)
4 Support block (MP1, MP2)
5 Screw (H3)
6 Lockwasher (H4)
7 Swivel block (MP3, MP4)
8 Socket (MP10, MP11)
9 Leveling screw (H11, H12)
10 Hinge (MP8, MP9)
11 Screw (H7)
12 Lockwasher (H8)
13 Nut (H6)
14 Coupling (MP5)
15 Base (A1)

Figure 3-11. Processor leveling base assembly, exploded view.

using screws (4), washers (5), lockwashers (6), and nuts (7).

(e) Assemble shroud and screen assembly (1) using screws (2).

e. Processor Leveling Base Assembly Repair (fig. 3-11).

(1) *Disassembly.*

(a) Remove pins (2) and handwheel (1).

(b) Remove screws (5), lockwashers (6), and support block (4).

(c) Remove locknuts (3), leveling screws (9), sockets (8), and swivel blocks (7).

(d) Remove nuts (13), lockwashers (12), screws (11), and hinges (10).

(e) Remove couplings (14) from base (15).

(2) Assembly.

(a) Assemble couplings (14) to base (15).

(b) Assemble hinges (10) using screws (11), lockwashers (12) and nuts (13).

(c) Assemble swivel blocks (7), sockets (8), leveling screws (9), and locknuts (3).

(d) Assemble support blocks (4) using screws (5) and lockwashers (6).

(e) Assemble handwheels (1) using pins (2).

f. Liquid Level Control Assembly Repair. No special instructions are required for repair of the liquid level control. If a malfunction occurs beyond the repair of the items shown in figure 3-12, replace the entire assembly.

3-4. Water Heater and Power Supply Repair

(figs. 3-13 and 3-14)

No special instructions are required for replacement of the components of the water heater and power supply except for the replacement of the solenoid valve. Replace a defective solenoid valve as follows:

a. Disconnect the line voltage connector from the immersion heater.

b. Remove the cover on the heater chassis.

c. Tag and disconnect the lead connected between the solenoid valve and the terminal board in the heater chassis.

d. Tag and disconnect the lead between the solenoid valve and the overheat thermostat.

e. Disconnect the fuel lines that are connected to the solenoid valve and remove it.

f. Connect the fuel lines to the new solenoid valve as shown in figure 3-13.

g. Connect the upper lead to the overheat thermostat and the lower lead to TB1-3 in the heater chassis.

h. Replace the cover on the heater chassis.

i. Connect the heater to the line voltage source and check the operation of the system.

3-5. Air Conditioner Repair

a. Air-Conditioner Modification Repair (fig. 3-15). No special instructions are required for repair of the air-conditioner modification. If a malfunction occurs beyond the components shown in figure 3-15, replace the air conditioner.

b. Disassembly of Air-Conditioning Thermostat (fig. 3-16).

(1) Remove screw at bottom of thermostat (3) and thermostat body (1).

(2) Remove screws (4) and thermostat (3).

(3) Remove screws (10) and cover (9).

(4) Remove screws (6), lockwashers (7), nuts (8), and bracket (5).

(5) Remove lock nut (12) and bushing (11).

(6) Remove hardware securing relay (13) to wall and remove relay (13).

c. Assembly of Air-Conditioning Thermostat (fig. 3-16).

(1) Assemble relay (13) to wall.

(2) Assemble bushing (11) using locknut (12).

(3) Assemble bracket (5) using screws (6), lockwashers (7), and nuts (8).

(4) Assemble cover (9) using screws (10).

(5) Assemble thermostat (3) using screws (4).

(6) Assemble thermostat body (1) and tighten screw at bottom of thermostat body (3).

3-6. Mixer-Distributer Repair

a. Disassembly. (fig.3-17)

(1) Remove clamp (2) and tube (1).

(2) Remove clamp (4) and hose (3).

(3) Remove clamps (6) and hose (5).

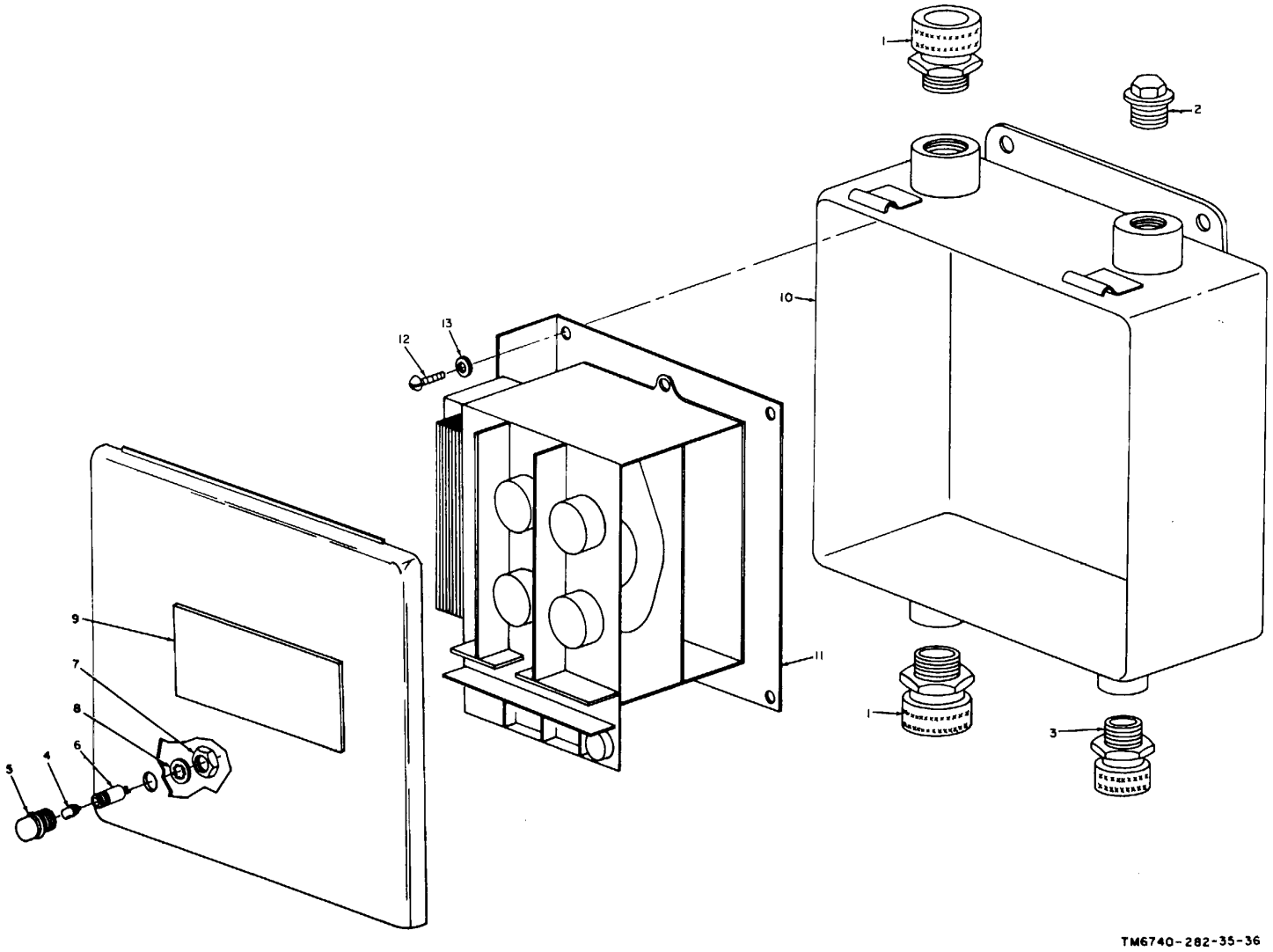


Figure 3-12. Liquid level control, exploded view.

1 Bushing (MP2, MP3)
2 Plug (MP5)
3 Bushing (MP1)
4 Lamp (DS1)
5 Lens (p/o item 6)
6 Lampholder (XDS1)
7 Nut (p/o item 5)
8 Lockwasher (p/o item 5)
9 Identification plate (MP6)
10 Liquid level control (MP4)
11 Relay
12 Screw
13 Lockwasher

Figure 3-12. -Continued

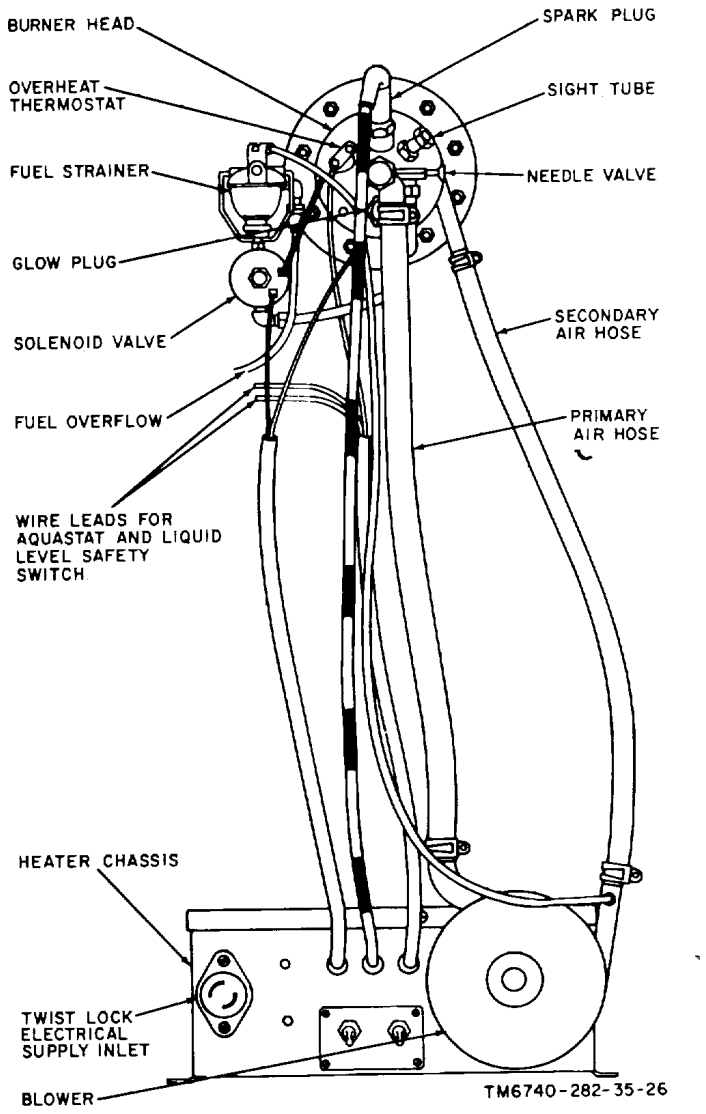
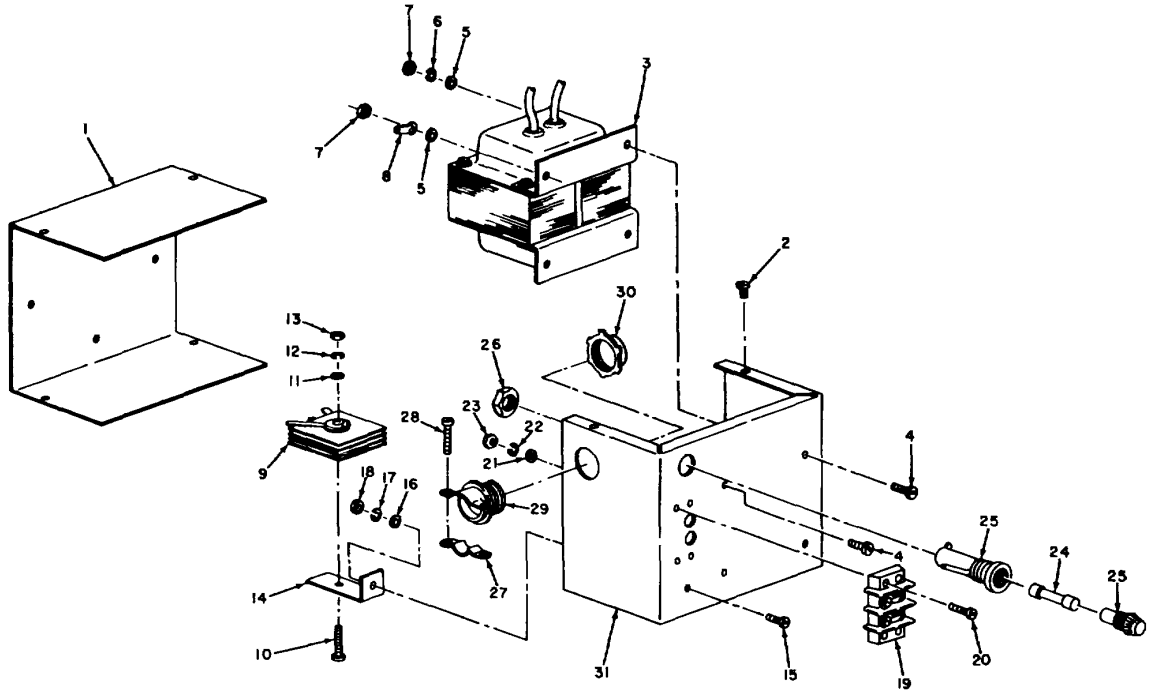


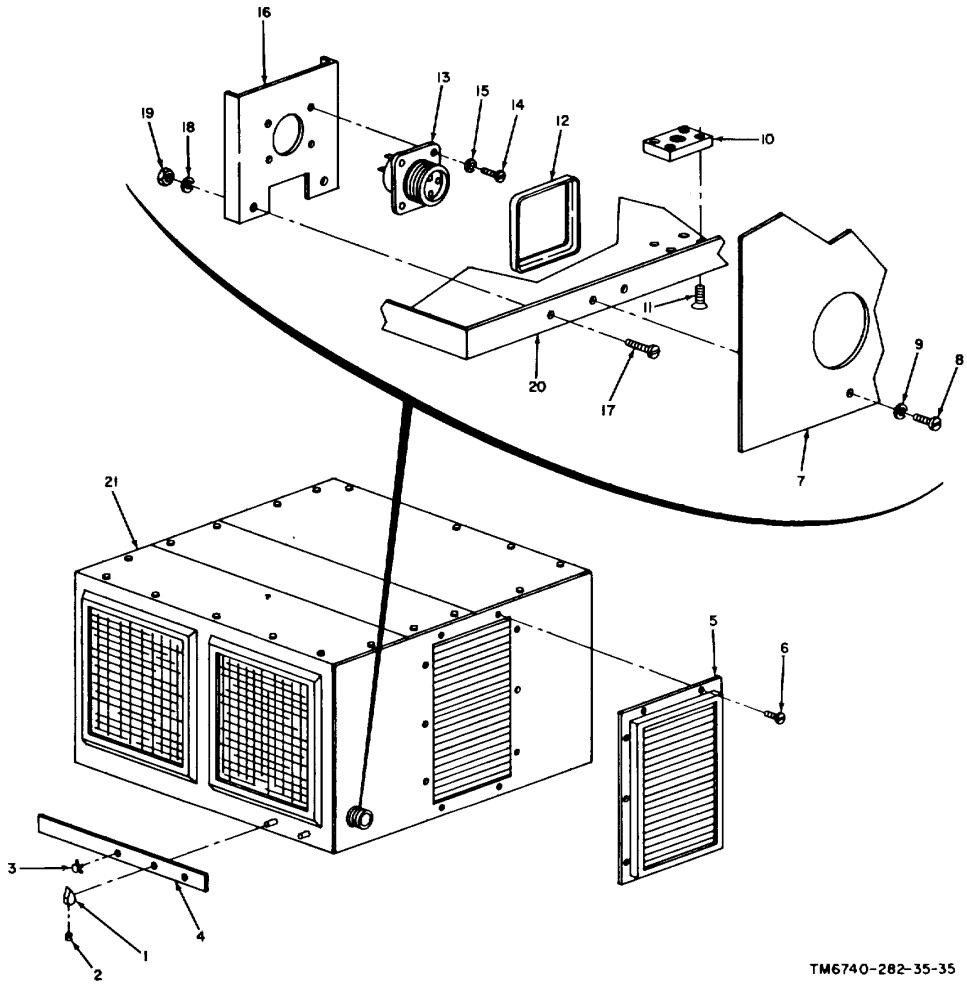
Figure 3-13. Water heater.



1 Cover (MP5)
2 Screw (H7)
3 Transformer (T1)
4 Screw (H1S)
5 Washer (H19)
6 Lockwasher (H20)
7 Nut (H17)
8 Lug (E1)
9 Rectifier (CR1)
10 Screw (H10)
11 Washer (H11)
12 Lockwasher (H12)
13 Nut (H9)
14 Bracket (MP2)
15 Screw(H2)
16 Washer (H3)
17 Lockwasher (H4)
18 Nut (H1)
19 Terminal board (TB1)
20 Screw (H14)
21 Washer (H15)
22 Lockwasher (H16)
23 Nut (H13)
24 Fuse (F1)
25 Fuse holder (XF1)
26 Nut (H18)
27 Clamp (MP3)
28 Screw (H5)
29 Clamp (MP4)
30 Nut (H6)

Figure 3-14. 24v power supply, exploded view.

(4) Remove valve (7).
(5) Remove clamps (9) and hose (8).
(6) Remove clamps (11) and hose (10).
(7) Remove nipple (13) and elbow (14).
(8) Remove nut (16) and knob (15).
(9) Remove nut (23) and knob (22).
(10) Remove nipples (18 through 21) from valve assemblies (12 and 17).
(11) Remove screws (25) and motor housing assembly (24).
(12) Remove boot (29), nuts (31 and 32), and switch (30).
(13) Remove nuts (34), lockwasher (35), key (36), and switch (33).
(14) Remove nuts (41), lockwasher (40), screw (39), bracket (38), and resistor (37).
(15) Remove cord and plug assembly (42) and grommet (43).
(16) Remove screw (45), plate (44), and motor and pump assembly (46).
(17) Remove cover (47) and deflector assembly (48).
(18) Remove casters (50 and 51) from tank assembly (52).



1 Knobs (p/o item 21) (MP6, MP7)
2 Setscrew (p/o item 1) (H2)
3 Plug button (MP3)
4 Instruction plate (MP5)
5 Lightbaffle assembly (A1)
6 Screw (A1H1)
7 Plate assembly (A2)
8 Screw (p/o item 21) (A2H1)
9 Washer (p/o item 21) (A2H2)
10 Block (MP1, MP2)
11 Screw (H1)
12 Gasket (A3MP2)
13 Connector (A3J1)
14 Screw (A3H1)
15 Lockwasher (A3H2)
16 Bracket (A3MP1)
17 Screw (p/o item 21) (A3H4)
18 Lockwasher (p/o item 21) (A3H5)
19 Nut (p/o item 21) (A3H3)
20 Pan (MP4)
21 Air conditioner

Figure 3-15. Modified air conditioner, exploded view.

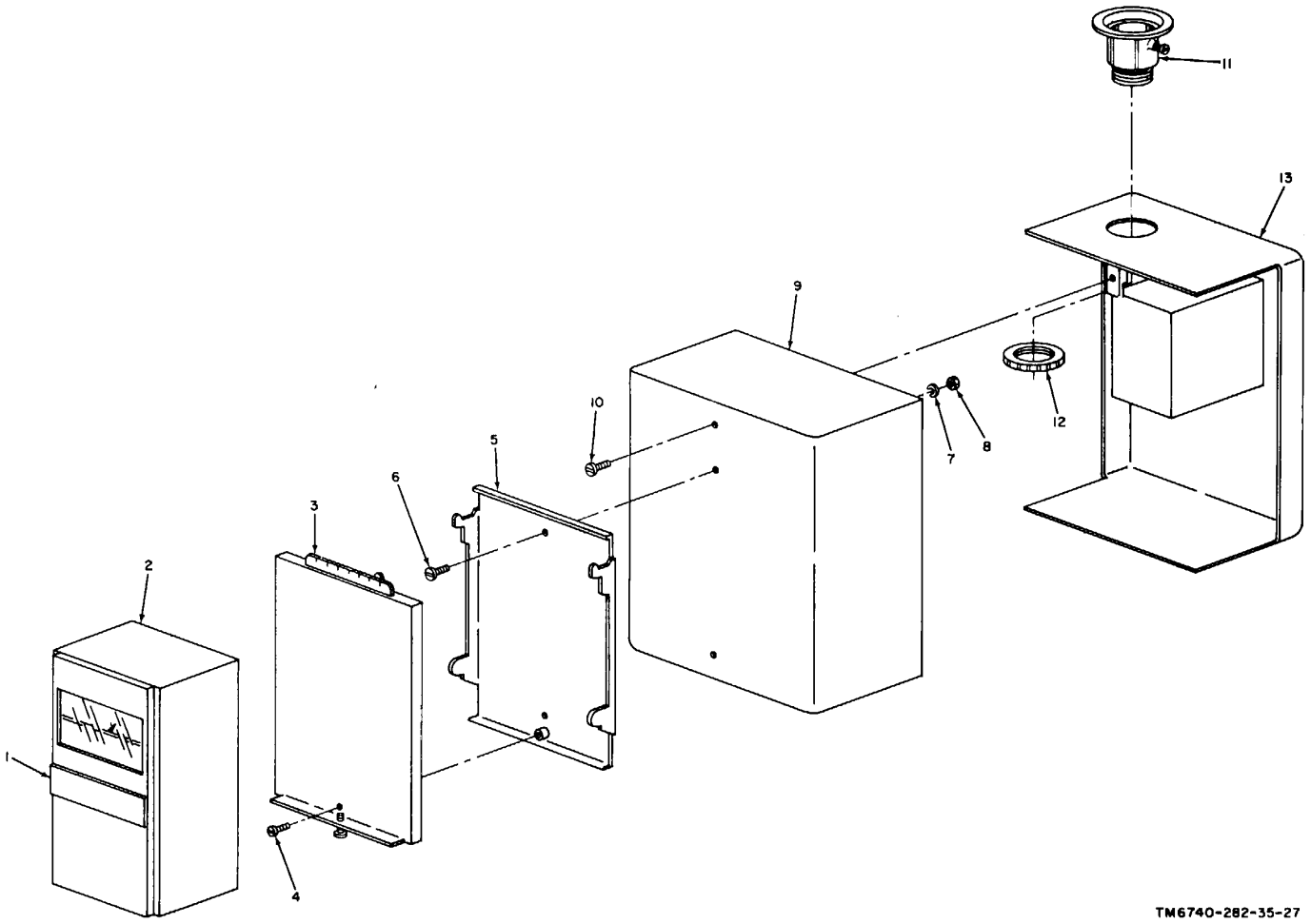


Figure 3-16. Air-Conditioner thermostat, exploded view.

b. Assembly.

(1) Assemble casters (50 and 51) to tank assembly (52).

(2) Assemble deflector assembly (48) and cover (47).

(3) Assemble motor and pump assembly (46) using plate (44) and screw (45).

(4) Assemble grommet (43) and cord and plug assembly (42).

(5) Assemble resistor (37) using bracket (38), screw (39), lockwasher (40), and nut (41).

(6) Assemble switch (33) using key (36), lockwasher (35), and nuts (34).

(7) Assemble switch (30) using nuts (31 and 32) and boot (29).

(8) Assemble motor housing assembly (24) using screws (25).

(9) Assemble nipples (18 through 21) to valve assemblies (12 and 17).

(10) Assemble knob (22) using nut (23).

(11) Assemble knob (15) using nut (10).

(12) Assemble elbow (14) and nipple (13).

(13) Assemble hose (10) using clamp (11).

(14) Assemble hose (8) using clamps (9).

(15) Assemble valve (7).

(16) Assemble hose (5) using clamps (6).

(17) Assemble hose (3) using clamp (4).

(18) Assemble tube (1) using clamp (2).

3-7. Plotting Table Repair

a. Disassembly of Plotting Table (fig. 3-18).

(1) Remove screws (2) and tabs (1).

(2) Carefully remove glass (3).

(3) Remove gaskets (4 and 5).

(4) Remove pivots (7), washers (8 and 9), and rollers (6).

(5) Remove screws (11) and cover assembly (10).

(6) Remove lamps (12).

(7) Remove screws (17), washers (18), lockwashers (19), nuts (20), lugs (15 and 16), lamp holders (13), and paper shims (14).

(8) Remove starters (21).

(9) Remove screws (23), washers (24), lockwashers (25), nuts (26), and sockets (22).

(10) Remove screws (28), washers (29), lockwashers (30), nuts (31), and ballasts (27).

(11) Remove cable assembly (32).

(12) Remove connectors (33 and 34).

(13) Remove screws (36), washers (37), lockwashers (38), nuts (39), lug (40), and connector (35).

(14) Remove screws (42), washers (43), lockwashers (44), nuts (45), and identification plate (41).

(15) Remove nuts (47), washer (48), key (49), and switch (46).

(16) Remove screws (51), nuts (52), and right-hand rail and bracket assembly (50) from box assembly (56).

(17) Remove screws (54), nuts (55), and left-hand rail and bracket assembly (53) from box assembly (56).

b. Disassembly of Rail and Bracket Assembly (fig. 3-19).

(1) Loosen thumbscrews (8 and 11) and remove bracket assembly (10) and bracket assembly (1) from rail (24).

(2) Remove pin (3), sleeve (2), and spring (4).

(3) Remove pin (6), knob (5), and spindle (7).

(4) Remove thumbscrew (8) from bracket (9).

(5) Remove thumbscrew (11) from bracket (23).

(6) Remove pin (13), crank assembly (12), and spindle assembly (17).

(7) Remove pin (14), handle (15), and arm (16).

(8) Remove pin (19), key (18), and spindle (20).

(9) Remove thumbscrew (21) and brake (22).

c. Assembly of Rail and Bracket Assembly (fig. 3-19).

(1) Assemble thumbscrew (21) and brake (22).

(2) Assemble key (18) to spindle (20) using pin (19).

(3) Assemble arm (16), handle (15), and pin (14).

(4) Assemble crank assembly (12) and spindle assembly (17) using pin (13).

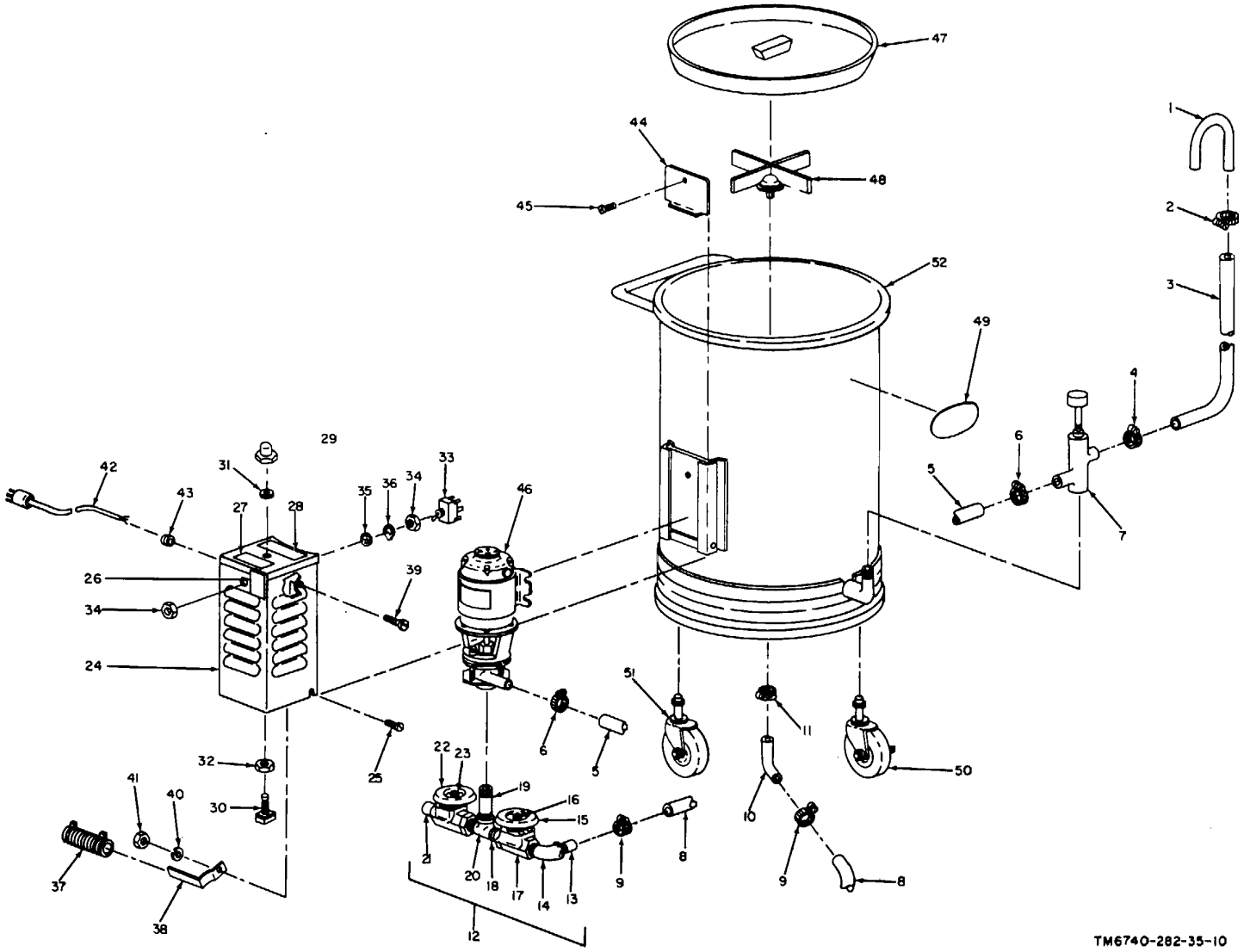


Figure 3-17. Mixer distributer, exploded view.

1 Tube (MP28)
2 Clamp (MP12)
3 Hose (MP23)
4 Clamp (MP13)
5 Hose (MP24(
6 Clamp (MP14)
7 Control valve (MP29)
8 Hose (MP25)
9 Clamp (MP15)
10 Hose (MP19)*
11 Clamp (MP16)
12 Valve assembly (A8)
13 Nipple (A8MP4, A8MP5)
14 Elbow (A8MP1)
15 Knob (A8MP2), A8MP3)
16 Nut (A8A1H1)
17 Valve assy (A8A1, A8A2)
18 Nipple (A8MP6)
19 Nipple (A8MP4)
20 Nipple (A8MP7)
21 Nipple (A8MP5)
22 Knob (A8MP2)
23 Nut (A8A1H1)
24 Motor housing assembly (A4)
25 Screw (A4H1)
26 Nameplate (A4MP)
27 Nameplate (A4MP21
28 Nameplate (A4MP3)
29 Boot (MP1)
30 Switch (S1)
31 Nut (H1)
32 Locknut (H2)
33 Switch (S2)
34 Nut (H4)
35 Lockwasher (H5)
36 Key (H3)
37 Coil (L1)
38 Bracket (MP2, MP3)
39 Screw (H2)
40 Lockwasher (H3)
41 Nut (H1)
42 Cord and plug assembly (W1)
43 Grommet (MP21)
44 Plate (A1)
45 Screw (p/o item 44)
46 Motor and pump assembly (A5)
47 Cover (MP18)
48 Deflector assembly (A3)
49 Nameplate (MP27)
50 Caster (P8, MPS9, MP10, MP11)
51 Caster (MP4, MP5, MP6, MP7)
52 Tank assembly (A7}

Figure 3-17. - Continued

(5) Assemble thumbscrew (11) to bracket (23).

(6) Assemble thumbscrew (8) to bracket (9).

(7) Assemble knob (5) and spindle (7) using pin (6).

(8) Assemble spring (4) and sleeve (2) using pin (3).

(9) Assemble bracket assemblies (1 and 10) to rail (24) and tighten thumbscrews (8 and 11).

d. Assembly of Plotting Table (fig. 3-18).

(1) Assemble left-hand rail and bracket assembly (53) to box assembly (56) using screws (54) and nuts (55).

(2) Assemble right-hand rail and bracket assembly (50) to box assembly (56) using screws (51) and nuts (52).

(3) Assemble switch (46) using nuts (47), washer (48), and key (49).

(4) Assemble identification plate (41) using screws (42), washers (A3), lockwashers (44) and nuts (45).

(5) Assemble connector (35) and lug (40) using screws (36), washers (37), lockwashers (38), and nuts (39).

(6) Assemble connectors (33 and 34).

(7) Assemble cable assembly (32).

(8) Assemble ballasts (27) using screws (28), washers (29), lockwashers (30), and nuts (31).

(9) Assemble sockets (22) using screws (23) washers (24), lockwashers (25), and nuts (26).

(10) Assemble starters (21).

(11) Assemble lampholders (13), paper shims (14), and legs (15 and 16) using screws (17), washers (18), lockwashers (19), and nuts (20).

(12) Assemble lamps (12).

(13) Assemble cover assembly (10) using screws (11).

(14) Assemble idlers 16) using pivots 17) and washers (8 and 9).

(15) Assemble gaskets (4 and 5).

(16) Carefully assemble glass (3) using tabs (1) and screws (2).

Paragraph 3-8 is deleted.

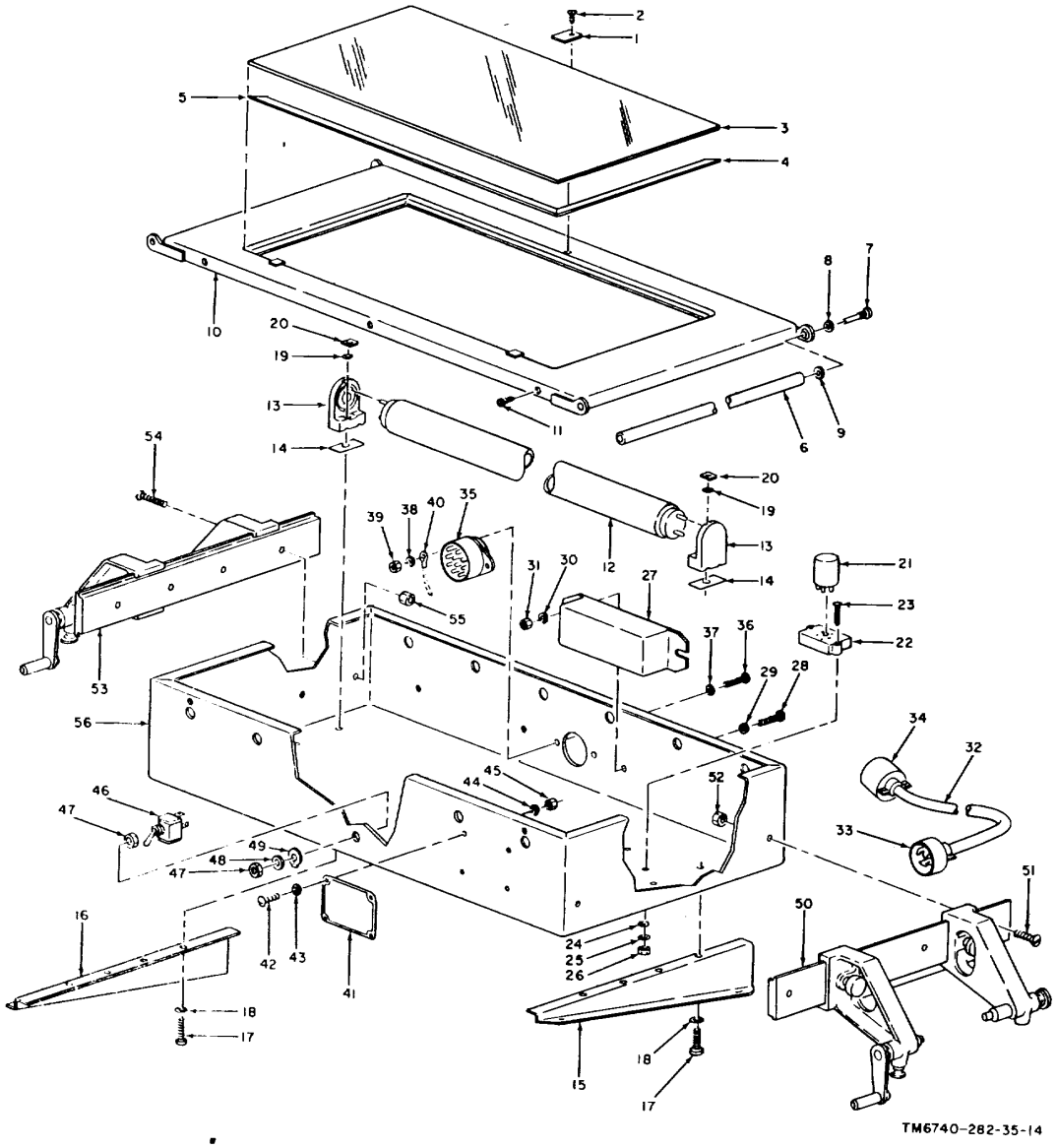
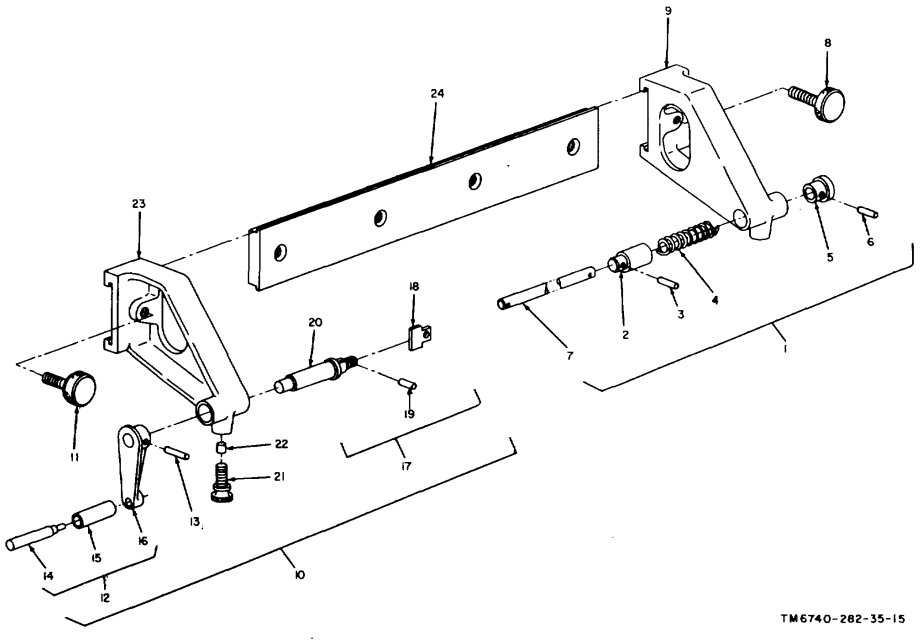


Figure 3-18. Plotting table, exploded view.

1 Tab (MP12)
2 Screw (H28)
3 Glass (MP3)
4 Gasket (MP2)
5 Gasket (MP1)
6 Roller (MP10)
7 Pivot (MP11)
8 Washer (H23)
9 Washer (H22)
10 Cover assembly (A6)
11 Screw (A6H1)
12 Lamp (DS1, DS2, DS3, DS4)
13 Lampholder (XDS1A, XDS1B, XDS2A, XDS2B, XDS3A, XDS3B, XDS4A, XDS4B)
14 Paper (p/o 1A121)
15 Leg, right-hand (MP5)
16 Leg, left-hand (MP4)
17 Screw (H13)
18 Washer (H14)
19 Lockwasher (H15)
20 Nut (H29)
21 Starter (S1, S2, S3, S4)
22 Socket (XS1, XS2, XS3, XS4)
23 Screw (H25)
24 Washer (H26)
25 Lockwasher (H27)
26 Nut (H24)
27 Ballast (RT1, RT2)
28 Screw (H6)
29 Washer (H7)
30 Lockwasher (H8)
31 Nut (H5)
32 Cable assembly (W1)
33 Connector (W1P2)
34 Connector (W1P1)
35 Connector (J1)
36 Screw (H10)
37 Washer (H11)
38 Lockwasher (H12)
39 Nut (H9)
40 Lug (E1)
41 Identification plate (MP6)
42 Screw (H17)
43 Washer (H18)
44 Lockwasher (H19)
45 Nut (H16)
46 Switch (S5)
47 Nut (H31)
48 Washer (H32)
49 Key (H30)
50 Rail and bracket assembly, right-hand (A4, A5)
51 Screw (H21)
52 Nut (H20)
53 Rail and bracket assembly, left-hand (A2, A3)
54 Screw (H21)
55 Nut (H20)
56 Box assembly (A1)

Figure 3-18. -Continued



1 Right-hand bracket assembly (as shown) (A3, A5) Left-hand bracket assembly (opposite as shown) (A5)
2 Sleeve (A3MP4)
3 Pin (A3MP3)
4 Spring (A3MP5, A5MS)
5 Knob (A3MP2, A5MP2)
6 Pin (A3MP3)
7 Spindle (A3MP5, A5MP5)
8 Thumbscrew (A3H1, A5H1)
9 Right-hand bracket (as shown) (A3MP1, A5MP1) Left-hand bracket (opposite as shown)
10 Left-hand bracket assembly (as shown) (A2, A4)
11 Thumbscrew (A2H1, A4H1)
12 Crank assembly (A2A1, A4A1)
13 Pin (A2MP3, A4MP3)
14 Pin (A2A1MP3, A4A1MP3)
15 Handle (A2A1MP2, A4A1MF2)
16 Arm (A2A1MP1, A4A1MP1)
17 Spindle assembly (A2A2, A4A2)
18 Key (A2A2MP1, A4A2MP1)
19 Pin (A2A2MP2, A4A2MP2)
20 Spindle (A2A2MP3, A4A2MP3)
21 Thumbscrew (A2H2, A4H2)
22 Brake (A2MP2, A4MP2)
23 Left-hand bracket (as shown) (A2MP1, A4MP1)
24 Rail (MP7)

Figure 3-19. Rail and bracket assembly, exploded view.

Figures 3-20 through 3-31 on pages 3-24, 3-26, 3-28, and 3-31 through 3-37, respectively, are deleted.

3-9. Disassembly of Exhaust Motor (fig. 3-33)

a. Remove nut (1) and bolt (2) from motor.

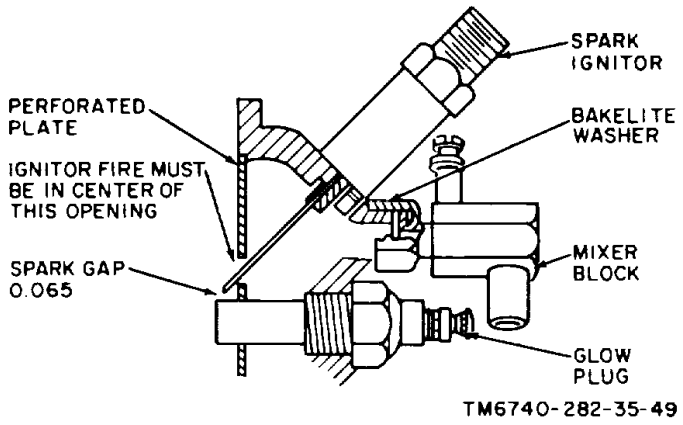
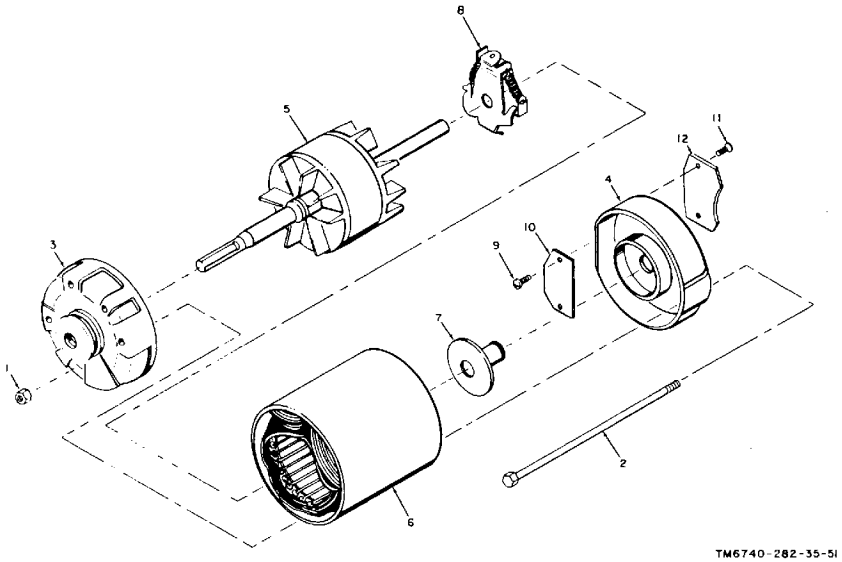


Figure 3-32. Water heater, burner head section.



1 Nut	5 Armature	9 Screw
2 Bolt	6 Stator	10 Terminal
3 Front endbell	7 Washer	11 Screw
4 Rear endbell	8 Switch assembly	12 Plate

Figure 3-33. Exhaust motor, exploded view.

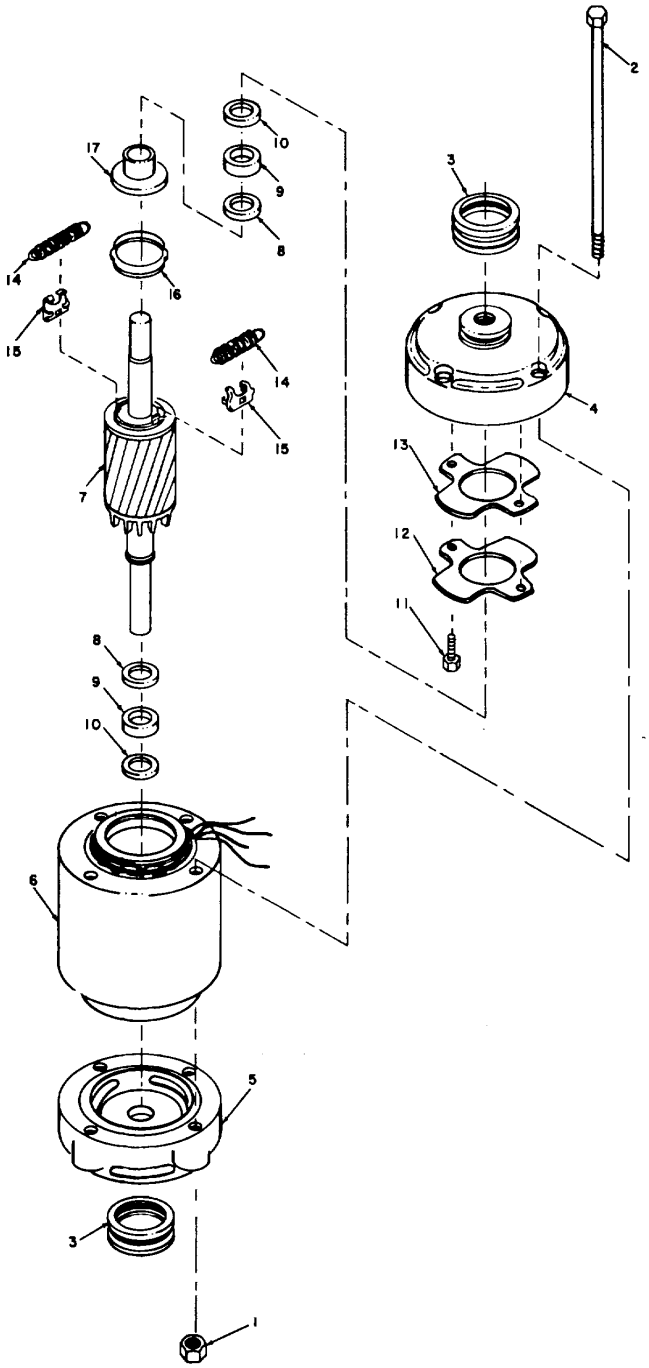


Figure 3-34. Chopper motor, exploded view.

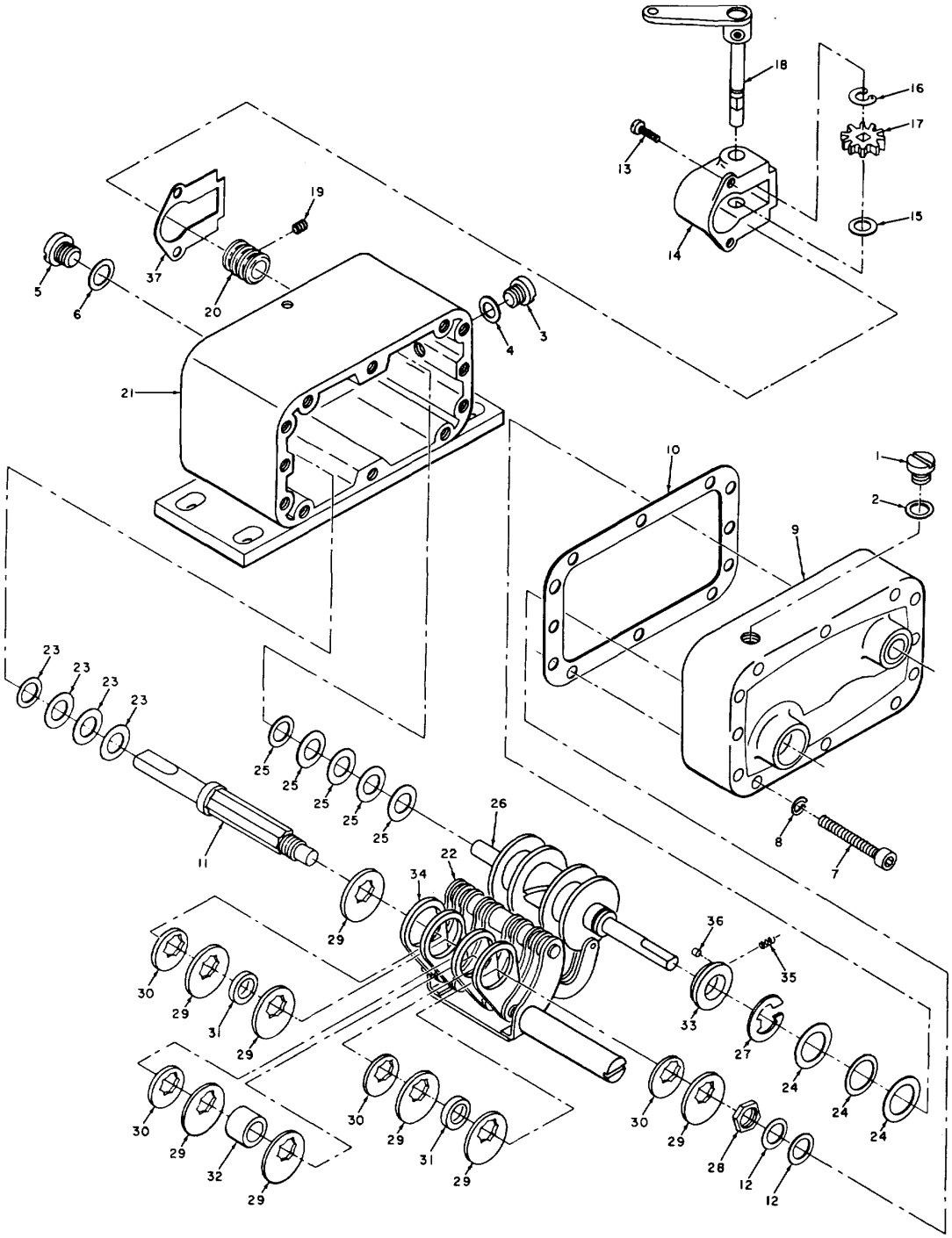


Figure 3-35. Chopper transmission, exploded view.

b. Remove front and rear endbell (3 and 4) from stator (6).

c. Remove armature (5) from stator (6).

d. Remove washer (7) and switch assembly (8) from armature (5).

e. Remove screw (9) and terminal (10) from rear endbell (4).

f. Remove screw (11) and plate (12) from rear endbell (4).

3-10. Reassembly of Motor (fig. 3-33)

a. Attach plate (12) to endbell (4) and secure with screw (11).

b. Attach terminal (10) to endbell (4) and secure with screw (9).

c. Attach switch (8) and washer (7) to armature (5).

d. Place armature (5)in stator (6).

e. Attach stator (6) in front and rear endbell (3 and 4), and secure with bolt (2) and nut (1).

Figures 3-34 and 3-35 are deleted.

Paragraphs 3-11 through 3-14 are deleted.

Section II. ALIGNMENT

3-15. Water Heater Needle Valve Adjustment

(fig. 3-13)

a. Start the immersion heater by decreasing the amount of hot water in the tank. (Check that all heater switches are at ON and the fuel supply is adequate.)

b. If the immersion heater will not start, open and close the needle valve adjustment screw until it does start.

c. Allow a few minutes for warmup, and then open or close the adjustment screw while observing the flame through the sight tube. Proper adjustment is indicated by a clear yellow flame. A smoky yellow flame is an indication that too much fuel is supplied, and a weak, wavering flame indicates that not enough fuel is supplied.

3-16. Water Heater Spark Gap Adjustment

(fig. 3-32)

a. Allow the immersion heater to cool, and then remove the burner head by removing the attaching screws.

b. Check the spark plug electrode for bends and verify that the electrode passes through the center of the hole. If necessary, straighten or align the electrode or replace the spark plug.

c. Adjust the spark gap to 0.065 inch.

d. Install the burner head, and check the operation of the immersion heater.

Paragraph 3-17 is deleted.

3-18. Water System Adjustments

a. Pressure Regulator Adjustment.

NOTE

The following adjustment should be performed using a local pressurized water supply.

(1) Open water supply auxiliary valve.

(2) Direct water output hose into sink.

(3) Open hot and cold water temperature mixing valves.

(4) Open water supply main distribution valve.

(5) Loosen nut on top of pressure regulator and turn adjustment screw counterclockwise until a pressure of 40 psi is indicated on water heater pressure gauge.

(6) Tighten nut on top of pressure regulator and recheck for 40 psi.

(7) Close all valves.

b. Water Pump Pressure Switch Adjustment.

(1) Connect an unpressurized water supply to the shelter water inlet connector.

(2) Open auxiliary valve.

(3) Open hot and cold water temperature mixing valves.

(4) Connect water output hose to sink.

(5) Open water supply main distribution valve.

(6) Remove cover of water pump pressure switch.

(7) Set PUMP switch to ON and prime pump.

(8) When pump is primed and operating, close hot and cold water temperature mixing valves.

(9) Adjust pressure switch center nut counterclockwise until pump stops at 40 psi pressure.

NOTE

It may be necessary to partially drain water system to accomplish this adjustment.

(10 Partially drain water system and check that pump stops at 40 psi.

(11) Set PUMP switch to OFF, remove unpressurized water supply, cover switch, and set all valves to closed.

CHAPTER 4

TESTING PROCEDURES

4-1. General

a. Testing procedures are prepared for use by Electronic Field Maintenance Shops and Signal Service Organizations responsible for general support maintenance of electronic equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that repaired equipment must meet before it is returned to the using organization. The testing procedures may also be used as a guide for the testing of equipment that has been repaired at the direct support category of maintenance. A summary of the performance standards is given in paragraph 4-14.

b. Perform each test in sequence; do not vary the sequence. For each step, perform all actions in the Test equipment and Equipment under test columns; then perform each specific test procedure and verify it against its performance standard.

4-2. Modification Work Orders

The performance standards listed in the following charts assume that all applicable work orders have been performed. A listing of current modification work orders will be found in DA Pam 310-7.

4-3. Physical Tests and Inspection

a. *Test Equipment and Materials.* None.

b. *Test Connections and Conditions.* None.

c. Procedure.

Step No.	Control settings	Test equipment		Equipment under test	Test procedure	Performance standard
1	N/A	N/A	N/A	---	Operate fresh air intake vent (open and close).	Fresh air vent should open and close easily and should be free of obstructions.
2	N/A	N/A	N/A	---	Check padlock and chain for presence and security.	Padlock should be on chain and mounted securely.
3	N/A	N/A	N/A	----	Open and close entrance door several times.	Door hinges should operate smoothly.
4	N/A	N/A	N/A	---	Open and close light-tight film delivery door.	Light-tight film delivery door should be firmly seated when closed.
5	N/A	N/A	N/A	---	Operate entrance door handle	Entrance door handle should operate smoothly.
6	N/A	N/A	N/A	---	Open and close blower exhaust vent door.	Blower exhaust vent door should operate smoothly and should be free of obstructions.
7	N/A	N/A	N/A	---	Open and close telephone jacks access door.	Telephone jacks access door should operate smoothly and should seat firmly when closed.
8	N/A	N/A	N/A	---	Check water intake and drain connectors and hoses.	Connectors should be securely in-stalled, caps should be on chains and secure, and hoses should be free of damage.
9	N/A	N/A	N/A	---	Check power entrance panel	Connectors should be securely in-stalled and cover should be installed when connectors are not in use.
10	N/A	N/A	N/A	---	Inspect chemical drain connector	Chemical drain connector should be free of obstructions.
11	N/A	N/A	N/A	---	Inspect water heater exhaust vent	Water heater exhaust vent should be free of obstructions.
12	N/A	N/A	N/A	---	Inspect spacer heater exhaust vent	Space heater exhaust vent should be free of obstructions.
13	N/A	N/A	N/A	---	Inspect hot water safety valve	Hot water safety valve should be free of obstructions.
14	N/A	N/A	N/A	---	Inspect exhaust condensation chains.	Hot water heater and space heater exhaust condensation drains should be free of obstruction.
15	N/A	N/A	N/A	---	Inspect gasoline can	Gasoline can should be firmly strapped in position.
16	N/A	N/A	N/A	---	Inspect fuel Hose, fuel filter, and fuel line connector.	Fuel hose, filter, and connector should be secure.

17	N/A	N/A	--- Inspect air conditioner louvers	Air conditioner louvers should be clean and free of obstructions.	
18	N/A	N/A	--- Inspect air conditioner condensation drains.	Air conditioner condensation drains should be free of obstructions.	
19	N/A	N/A	--- Inspect walls, overhead, and deck	Walls, overhead, and deck should be free of damage.	
20	N/A	N/A	--- Inspect shelves and brackets	Shelves and brackets should be secure.	
21	N/A	N/A	--- Inspect cabinet drawers and doors.	Cabinet drawers and doors should be secure and operate smoothly.	
22	N/A	N/A	--- Inspect electrical connectors and cables.	Connector should be secure and cables should be free of damage.	
23	N/A	N/A	--- Inspect mountings and fittings	Mountings and fittings should be secure.	
24	N/A	N/A	--- Check wall mounted items	Wall mounted items should be secure.	
25	N/A	N/A	--- Inspect clock	Clock should be wound and show correct time.	
26	N/A	N/A	--- Inspect exhaust blower intake	Exhaust blower intake should be free of obstructions.	
27	N/A	N/A	--- Inspect air conditioner output vents.	Air conditioner output vents should be clean and free of obstructions.	

4-4. Electrical System Test

a. Test Equipment and Materials. Test lamp and Multimeter AN/URM-105.
b. Test Connections and Conditions. None.
c. Procedure.

Step No.	Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	N/A	CB1 at: ON	*a.* Set normal-BLACKOUT switch to NORMAL.	*a.* None.
			b. Set WHITE LIGHTS-SAFE LIGHT switch to WHITE LIGHTS.	*b.* None.
			c. Set CB6 to ON	*c.* Fluorescent lights go on.
			d. Push buzzer switch.	*d.* Buzzer sounds.
			e. Set NORMAL-BLACKOUT switch to BLACKOUT.	*e.* None.
			f. Open entrance door	*f.* Fluorescent lights go out.
			g. Close entrance door	*g.* Fluorescent lights go on.
			h. Set NORMAL-BLACKOUT switch to NORMAL.	*h.* None.

Step No.	Test equipment	Equipment under test	Control settings	Test procedure	Performance standard
				i. Set WHITE LIGHTS-SAFE LIGHT switch to SAFE LIGHT.	*i.* Safe lights go on and fluorescent lights go out.
				j. Set WHITE LIGHTS-SAFELIGHT switch to WHITE LIGHTS.	*j.* Fluorescent lights to on and safelights go out.
2	N/A	CB1	at: ON	*a.* Set CB2 to ON *b.* Check voltages at PROCESSOR #1 outlet across the following pins: (1) Pin 1 and Pin 2 (2) Pin 2 and Pin 3 (3) Pin 1 and Pin 3 (4) Pin 2 and Pin 4 *c.* Set CB2 to OFF	*a.* None. *b.* The following voltages: (1) 120 volts (2) 120 volts (3) 210 volts (4) 0 volts *c.* None.
3	N/A	CB1	at: ON	*a.* Set CB3 at ON - *b.* Check voltage at roadside air conditioner power input cable. *c.* Set CB3 at OFF	*a.* None. *b.* 120 volts *c.* None.
4	N/A	CB1	at: ON	*a.* Set CB4 at ON *b.* Check voltage at curbside air *c.* Set CB4 at OFF	*a.* None. *b.* 120 volts *c.* None.
5	N/A	CB1	at: ON	*a.* Set CB5 to ON. *b.* Check voltages at PROCESSOR #2 outlet across the following pins: (1) Pin 1 and Pin 2 (2) Pin 2 and Pin 3 (3) Pin 1 and Pin 3 (4) Pin 2 and Pin 4 *c.* Set CB5 to OFF	*a.* None. *b.* The following voltages: (1) 120 volts (2) 120 volts (3) 210 volts (4) 0 volts *c.* None.
6	N/A	CB1	at: ON	a. Set CB7 to ON *b.* Connect test lamp across each of the UTILITIES (except BLOWER) outlets. *c.* Set water pump maintenance LIGHT switch to ON. *d.* Set water pump maintenance light switch to OFF. *e.* Momentarily set WATER PUMP switch to ON. *f.* Set WATER PUMP switch to OFF.	*a.* None. *b.* Test lamp lights across each outlet. *c.* Maintenance lamp lights across each outlet. *d.* Lamp goes out. *e.* Water pump motor operates. *f.* Water pump stops.

					g. Set BLOWER switch to ON	*g.* Exhaust blower operates.
					h. Set BLOWER switch to OFF	*h.* Exhaust blower stops.
					i. Set CB7 to OFF	*i.* None.
7	N/A	CB1 at:	ON	-	a. Set CB8 to ON	*a.* None.
					b. Check voltage at HOT WATER HEATER outlet.	*b.* 120 volts.
					c. Check voltage at SPACE HEATER outlet.	*c.* 120 volts.
					d. Set CB8 to OFF	*d.* None.
8	N/A	CB1 at:	ON	-	*a.* Set CB9 to ON	*a.* None.
					b. Connect test lamp across EN-36B outlet.	*b.* Test lamp lights.
					c. Set CB9 to OFF	*c.* None.
9	N/A	CB1 at:	ON	-	*a.* Set CB10 to ON	*a.* None.
					b. Connect test lamp across EN-	*b.* Test lamp lights.
					c. Set CB10 to OFF	*c.* None.
10	N/A	CB1 at:	ON	-	*a.* Set CB11 to ON	*a.* None.
					b. Connect test lamp across EN-6C outlet.	*b.* Test lamp lights.
					c. Set CB11 to OFF	*c.* None.
11	N/A	CB1 at:	ON	-	*a.* Set CB12 to ON	*a.* None.
					b. At PROCESSOR #1 TEMP CONTROL outlet check voltage across the following pins:	*b.* The following voltages:
					(1) Pin 1 and Pin 2	(1) 1120 volts
					(2) Pin 1 and Pin 3	(2) 120 volts
					(3) Pin 2 and Pin 3	(3) 0 volts
					c. Set CB12 to OFF .	*c.* None.
12	N/A	CB1 at:	ON	-	a. Set CB13 to ON	*a.* None.
					b. At PROCESSOR #2 TEMP CONTROL outlet, check voltage across the following pins:	*b.* The following voltages:
					(1) Pin 1 and Pin 2	(1) 120 volts
					(2) Pin 1 and Pine 3	(2) 120 volts
					(3) Pin 2 and Pin 3	(3) 0 volts
					c. Set CB13 to OFF	*c.* None.
13	N/A	CB1 at:	ON	-	a. Set CB14 to ON	*a.* None.
					b. Check voltage at outside auxiliary electrical connectors.	*b.* 120 volts.
					c. Set CB14 to OFF	*c.* None.

4-5. Fuel System Test

a. Test Equipment and Materials. Small waste cup.

b. Test Connections and Conditions. None.

c. Procedure.

Step No.	Test equipment	Control settings	Equipment under test	Control settings	Test procedure	Performance standard
1	N/A	N/A	-		Fill fuel system 5-gallon gasoline with gasoline.	None.
2	N/A	N/A			Remove gasoline line input fitting from water heater fuel filter.	None.
3	N/A	N/A			Place a cup below water heater gasoline line filter and direct gasoline line into cup.	None.
4	N/A	N/A			Open main fuel valve	Gasoline flows into cup.
5	N/A	N/A			Close main fuel valve	Fuel stops flowing.
6	N/A	N/A			Replace water heater gasoline line and discard gasoline in cup.	None.
7	N/A	N/A			Remove gasoline line input fitting from space heater fuel filter.	None.
8	N/A	N/A			Place a cup below space heater gasoline line fitting and direct gasoline line into cup.	None.
9	N/A	N/A			Open main fuel valve	Gasoline flows into cup.
10	N/A	N/A			Close main fuel valve	Gasoline stops flowing.
11	N/A	N/A			Replace space heater fuel line and discard gasoline in cup.	None.

4-6. Water System Test

a. Test Equipment and Materials. Non-pressurized water supply.

b. Test Connections and Conditions. None.

c. Procedure

Step No.	Test equipment	Control settings	Equipment under test	Control settings	Test procedure	Performance standard
1	N/A	N/A			Connect a non-pressurized water supply to darkroom water intake connector.	None.

2	N/A	N/A	Set the following valves as directed: *a.* Water supply drain valve: closed. *b* Hot water tank valves: closed. *c.* Hot water temperature control valve: closed. *d.* Cold water temperature control valve: open. *e.* Water supply main distribution valve: open.	None.
3	N/A	N/A	Connect water output hose to sink	None.
4	N/A	N/A	Prime pump and set WATER PUMP switch to ON.	Water pump operates.
5	N/A	N/A	Open auxiliary valve	*a.* Water flow visible in flowmeter. *b.* Water heater pressure gauge indicates 40 psi maximum. *c.* Water flows from output hose.
6	N/A	N/A	Close cold water temperature control valve and open hot water tank and hot water temperature control valves.	Water flow stops when cold water temperature control valve is closed and begins again when when hot water valves are opened.
7	N/A	N/A	Close water supply main distribution valve.	*a.* Water stops flowing from output hose. *b.* Water pump stops when water pressure and vacuum gauge indicates 40 psi.
8	N/A	N/A	Close all valves and water supply connection.	None.
9	N/A	N/A	Open water supply drain valve	Water drains out of system.
10	N/A	N/A	Close water supply drain valve and set WATER PUMP switch to OFF.	None.

4-7. Space Heater Test

a. Test Equipment and Materials. None.

b. Test Connections and Conditions. None.

c. Procedure

Control settings

Step No.	***Test equipment***	***Equipment under test***	***Test procedure***	***Performance standard***
1	N/A	N/A	Set space heater thermostat to 5° below room temperature.	None.
2	N/A	Space heater thermostat at 5° below room temperature	Set space heater ON-OFF switch to ON.	Space heater fuel pump operates.

3	N/A	ON-OFF switch at ON		In 30 to 60 seconds monitor blower motor and exhaust. present at output.	Blower operates and gray smoke is visible at exhaust. In several minutes hot air is
4	N/A	N/A	Set ON-OFF switch to OFF .	Blower motor continues to operate until fumes	and smoke are cleared from space heater.

4-8. Water Heater Test

a. Test Equipment and Materials. None.

b. Test Connections and Conditions. None.

c. Procedure

Control settings

Step No.	***Test equipment***	***Equipment under test***	***Test procedure***	***Performance standard***
1	N/A	N/A	Check that hot water heater tank is empty.	None.
2	N/A	N/A	Set aquastat to #4	None.
3	N/A	Aquastat at: #4	Set water heater power ON-OFF and auxiliary panel ON-OFF switches to ON.	POWER INDICATOR LIGHT goes on; water heater does not operate.
4	N/A	N/A	Set switches to OFF	POWER INDICATOR LIGHT goes out.
5	N/A	N/A	Fill hot water tank with water -	None.
6	N/A	N/A	Set water heater power ON-OFF switch to ON.	Water heater does not operate.
7	N/A	Water heater power ON-OFF switch at: ON.	Set auxiliary panel ON-OFF switch to ON.	*a.* Fuel pump operates. *b.* Burner ignites. *c.* Gray smoke visible at exhaust. *d.* Water temperature gauge indicates increase in temperature until 90° and then water heater stops operating. *e.* In several minutes, when water temperature falls below 90°, water heater operates again.
8	N/A	N/A	Set switches to OFF and drain hot water tank.	None.

4-9. Exhaust Blower Test

a. Test Equipment and Materials. None.

b. Test Connections and Conditions. None.

c. Procedure

Control settings

Step No.	Test equipment	Equipment under test	Test procedure	Performance standard
1	N/A	N/A	Set BLOWER switch to ON -	Exhaust blower operates.
2	N/A	N/A	Set BLOWER switch to OFF	None.

4-10 Air Conditioners Test

a. Test Equipment and Materials. None.

b. Test Connections and Conditions. None.

c. Procedure

NOTE

Perform the following test on the road-side and curbside air conditioners.

Control settings

Step No.	Test equipment	Equipment under test	Test procedure	Performance standard
1	N/A	N/A	Set OFF-FAN-COOL switch to FAN.	Fan only operates.
2	N/A	N/A	Set AIR COND THERMOSTAT to highest temperature setting.	None.
3	N/A	AIR COND THERMOSTAT at: highest temperature setting.	Set OFF-FAN-COOL switch to COOL and slowly lower thermostat setting.	Compressor operates when thermostat is moved through room temperature setting.
4	N/A	N/A	Set OFF-FAN-COOL switch to OFF.	None.

4-11. Jet Mixer Test

a. Test Equipment and Materials. Ten gallon can.

b. Test Connections and Conditions. None.

c. Procedure

Control settings

Step No.	Test equipment	Equipment under test	Test procedure	Performance standard
1	N/A	N/A	Close intake valve, open circulate valve, and and lift circulate-discharge valve.	None.
2	N/A	N/A	Fill mixer tank with water	None.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
3	N/A	Intake valve at: closed. Circulate valve at: open. Circulate discharge valve at: up.	Set SPEED switch to LOW and pump switch to ON.	Water circulates within mixer.
4	N/A	N/A	Set SPEED switch to HIGH	Water circulates at a faster speed.
5	N/A	N/A	Connect mixer output hose to sink or drain.	None.
6	N/A	Intake valve at: closed. Circulate valve at: open.	Set discharge-circulate valve to down position.	Water discharges from mixer.
7	N/A	N/A	When there is approximately one gallon of water left in tank, set pump switch to OFF.	None.
8	N/A	N/A	Close circulate valve, open intake valve, and set discharge-circulate valve to up position.	None.
9	N/A	N/A	Fill a can with approximately 10 gallons of water.	None.
10	N/A	N/A	Insert mixer intake hose into can	None.
11	N/A	Circulate valve at: closed. Intake valve at: open Discharge-circulate valve at: up.	Set pump switch to ON	Water is drawn from can into mixer.
12	N/A	N/A	Set pump switch to OFF and empty mixer.	None.

4-12. Plotting Table Test

a. Test Equipment and Materials. None.

b. Test Connections and Conditions. None.

c. Procedure

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	N/A	N/A	Set power switch to ON -	Fluorescent lamps go on.
2	N/A	N/A	Set power switch to OFF	None.
3	N/A	N/A	Install drive and idler brackets	Brackets slide on rail and install easily.
4	N/A	N/A	Install and thread a 10-foot roll of leader.	None.
5	N/A	N/A	Operate drive brackets to move leader from one spool to another and back.	Leader transfers easily.
6	N/A	N/A	Remove leader and brackets	None.

4-14. Test Data Summary

1. Electrical System

1.	Electrical System	
	a. CB1: ON	Power applied to CB2 through CB14
	b. CB6: ON WHITE LIGHTS-SAFELIGHT switch: WHITE NORMAL-BLACKOUT switch: NORMAL	Fluorescent lights go on.
	c. Buzzer switch: Depressed	Buzzer sounds.
	d. NORMAL-BLACKOUT switch: BLACKOUT Entrance door: opened	Fluorescent lights go out.
	e. WHITE LIGHTS-SAFELIGHT switch: SAFELIGHT	Fluorescent lights go out and safelights go on.
	f. CB2 ON	Power available at PROCESSOR #1 outlet.
	g. CB3: ON	Power available at roadside air conditioner power input cable.
	h CB4: ON	Power available at curbside air conditioner power input cable.
	i. CB5: ON	Power available at PROCESSOR #2 outlet.
	j. CB7: ON	Power available at UTILITIES outlets.
	k. Water pump maintenance LIGHT switch: ON	Maintenance lamp lights.
	l. WATER PUMP switch: ON	Water pump operates.
	m. BLOWER switch: ON	Exhaust blower operates.
	n. CBR: ON	Power available at WATER HEATER and SPACE HEATER outlets.
	o. CB9: ON	Power available at EN-36B outlet.
	p. CB10: ON	Power available at EN-100A outlet.
	q. CB11: ON	Power available at EN-6C outlet.
	r. CB12: ON	Power available at PROCESSOR #1 TEMP CONTROL outlet.
	s. CB13: ON	Power available at PROCESSOR #2 TEMP CONTROL outlet.
	t. CB13: ON	Power available at outside auxiliary electrical connectors.
2. Fuel System		
	Main fuel valve: Open	Fuel flows to water heater and space heater filters.
3. Water System		
	a. Auxiliary valve: open	Water flows into system.
	b. WATER PUMP switch: ON	Water pump operates until a pressure of 40 psi is reached and automatically shuts off.
	c. Cold water temperature control Main distribution valve: Open	Cold water flows, 40 psi max.
	d. Hot water temperature control Main distribution valve: open	Hot water flows, 40 psi max. valve: open

e. Drain valve: open	Water drains from system.	

4. Space Heater

a. ON-OFF switch: ON Thermostat: 5 below room temperature	a. Fuel pump operates.	
b. 30-60 seconds	b. Blower operates and heater ignites.	
c. 1-2 minutes	c. Hot air at output.	

5. Water Heater

a. ON-OFF switch: ON Aquastat: #4	a. Fuel pump operates and louvers ignite.	
b. Several minutes	*b.* Water temperature increases to approximately 900 and heater cycles off.	
c. Water temperature: falls below 90°	c. Water heater recycles.	

6. Exhaust

BLOWER switch: ON	Exhaust blower operates.	

7. Air Conditioners

a. OFF-FAN-COOL switch: FAN	Fan only operates.	
b. OFF-FAN-COOL switch: COOL AIR COND THERMOSTAT: Below ture	Fan and compressor operate.	

8. Jet Mixer

a. Intake valve: closed Circulate valve: open Circulate-Pump switch: ON SPEED switch: LOW	*a.* Water circulates within mixer.	
b. SPEED switch: HIGH	*b.* Water circulates at a faster speed.	
c. Discharge-circulate valve: down	c. Water discharges from mixer.	
d. Circulate valve: closed Intake valve: open Circulate discharge valve: up Pump switch: ON	*d.* Water is drawn into mixer.	

9. Plotting Table

Power switch: ON	Fluorescent lights go on.	

Test data summary No. 10 is deleted.

CHAPTER 5
DEPOT OVERHAUL STANDARDS

5-1. Applicability of Depot Overhaul Standards

The tests outlined in this chapter are designed to measure the performance capability of repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

5-2. Applicable References

a. Repair Standards. Applicable procedures of the depots performing these tests and the general standards for repaired equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

b. Technical Publications. The technical publication applicable to this equipment is TM 11-6740-280-12.

c. Modification Work Orders. Perform the work specified by modification work orders pertaining to the processor before making the tests specified. DA Pam 310-7 lists all available MWO's.

5-3. Test Facilities Required

The following items, or suitable equivalents, will be used in determining compliance with the requirements of these overhaul standards.

Item	*Quantity*
Power source, 220-volt ac, 60-cps, three-phase.	
Multimeter AN,/URM-105.	1
Non-pressurized water supply.	As required

5-4. Depot Overhaul Test of Shelter Electrical System

a. Remove all power cables from wall outlets and space heater and air conditioners.

b. Remove external input power cable.

c. Set all circuit breakers to ON.

d. Make the following continuity checks at the power input connector:

(1) Pin 4 to Pin 1 ---------- 200 $\pm$ 20
(2) Pin 4 to Pin 2 ---------- 30 $\pm$ 5
(3) Pin 4 to Pin 3 ---------- Infinite
(4) Pin 1 to Pin 2 ---------- 200 $\pm$ 20
(5) Pin 1 to Pin 3 ---------- Infinite
(6) Pin 2 to Pin 3 ---------- Infinite
(7) Pin 4 to Ground Rod --------- 0 + 1

e. Set all circuit breakers to OFF.

f. Connect external input power plug from external 270-volt, 60-cps, three-phase power source to input power connector.

g. Set NORMAL-BLACKOUT switch to NORMAL.

h. Set WHITE LIGHTS-SAFELIGHT switch to WHITE LIGHTS.

i. Set CB1 and CB6 to ON. Fluorescent lights should go on.

j. Push buzzer switch. Buzzer should sound.

k. Set NORMAL-BLACKOUT switch to BLACKOUT.

l. Open door. Fluorescent lights should go out.

m. Close door. Fluorescent lights should go on.

n. Set NORMAL-BLACKOUT switch to NORMAL.

o. Set WHITE LIGHTS-SAFELIGHT switch to SAFELIGHT.

p. Connect a test lamp in at each SAFELIGHT outlet. Test lamp should light at each outlet.

q. Set WHITE LIGHTS-SAFE LIGHT switch to WHITE LIGHTS.

r. Set CB2 to ON.

s. At the PROCESSOR #1 4-wire outlet, check for the following voltages:

(1) Pin 1 and Pin 2---------- 120 volts
(2) Pin 2 and Pin 3---------- 120 volts

(3) Pin 1 and Pin 3----------210 volts
(4) Pin 2 and Pin 4----------0 volts

t. Set CB2 to OFF.

u. Connect the power cables to each of the air conditioners.

v. Set each of the AIR COND THERMOSTAT controls to their lowest temperature settings.

w. Set the OFF-FAN-COOL switches on each of the air conditioners to OFF.

x. Set CB3 to ON.

y. Set roadside AIR COND THERMOSTAT to 5° above room temperature.

z. Set roadside air conditioner OFF-FAN-COOL, switch to FAN. Only fan should operate.

aa. Set roadside air conditioner OFF-FAN-COOL, switch to COOL. Compressor should operate and cool air should flow.

ab. Set roadside AIR COND THERMOSTAT below room temperature. Compressor should stop and only fan should operate.

ac. Set roadside air conditioner OFF-FAN-COOL, switch to OFF, AIR COND THERMOSTAT to lowest temperature setting, and CB3 to OFF.

ad. Perform steps !I through ac above for the curbside air conditioner using CB4.

ae. Set CB5 to ON and check for the same voltages obtained in step *s* above at the PROCESSOR #2 foul-wire outlet.

af. Set CB5 to OFF.

ag. Set CB7 to ON.

ah. Connect a test lamp across each of the UTILITIES (except BLOWER) connectors. The test lamp should light at each connector.

ai. Set water pump maintenance LIGHT switch to OFF.

ak. Momentarily set WATER PUMP switch to ON. Water pump should operate.

al. Set WATER PUMP switch to OFF.

am. Set BLOWER switch to ON. Exhaust blower should operate.

an. Set BLOWER switch to OFF.

ao. Set CR7 to OFF.

ap. Set CB8 to ON.

aq. Check voltage at HOT WATER HEATER and SPACER HEATED outlets. Voltage should be 120 volts.

ar. Set CB8 to OFF.

as. Set CB9 to ON.

at. Connect a test lamp across the terminals of the EN-36B outlet. The test lamp should go on.

au. Set CB9 to OFF.

av. Set CB10 to ON.

aw. Connect a test lamp across the terminals of the EN-100A outlet. The test lamp should light.

ax. Set CB10 to OFF.

ay. Set CB11 to ON.

az. Connect a test lamp across the terminals of the EN-6C outlet. The test lamp should go on.

ba. Set CB11 to OFF.

bb. Set CB12 to ON.

bc. At the PROCESSOR #1 TEMP CONTROL outlet, check for the following voltages:

(1) Pin 1 and Pin 2---------- 120 volts
(2) Pin 1 and Pin 3---------- 120 volts
(3) Pin 2 and Pin 3 ---------- 0 volts

bd. Set CB12 to OFF.

be. Set CB13 to ON and check for the voltages given in be above at the PROCESSOR #2 TEMP CONTROL outlet.

bf. Set CB13 to OFF.

bg. Set CB14 to ON.

bh. Check voltage at the outside auxiliary electrical connectors. Voltage at each connector should be 120 volts.

bi. Set CB14 to OFF.

bj Set HEATER THERMOSTAT to NO HEAT

bk. Check continuity at SPACE HEATER THERMOSTAT outlet. Resistance should be infinite.

bl. Set HEATER THERMOSTAT to 5° above room temperature and check continuity at SPACE HEATER THERMOSTAT outlet. Resistance should be zero.

bm. Set HEATER THERMOSTAT to NO HEAT.

5-5. General Operational Check of Fuel System

a. Fill the five gallon can, on the forward wall of the shelter, with gasoline.

b. Remove the gasoline input fitting from the fuel filter at the water heater.

c. Place a cup below the water heater gasoline line input fitting and direct the output of the gasoline line into the cap.

d. Open the main fuel valve. Fuel should be clean and flow freely into the cup.

e. Close the main fuel valve.

f. Replace the gasoline line fitting at the water heater filter.

g. Perform b through f above for the gasoline line at the space heater fuel filter. The gasoline should be clean and flow freely.

5-6. Depot Overhaul Test of Water System

a. Connect a non-pressurized water supply to the darkroom water intake connector.

b. Close water supply drain valve.

c. Close valves on hot water tank.

d. Close hot water temperature control valve and open cold water temperature control valve and water supply main distribution valve.

e. Check that output hose is in sink and that sink drain is connected to chemical drain line.

f. Prime pump and set WATER PUMP switch to ON. Pump should operate.

g. Open auxiliary valve. Water flow should be visable in flow meter. Water heater pressure gauge should indicate 40 psi maximum and water should flow from output hose.

NOTE

It is normal for pump to stop operating if water supply pressure and vacuum gauge indicates 40 psi.

h. Close cold water temperature control valve and open hot water tank and hot water temperature control valves. Water flow should stop when cold water temperature control valve is closed and begin again when hot water valves are opened.

i. Close water supply main distribution valve. Water should stop flowing from output hose and water pump should stop when water pressure and vacuum gauge reaches 40 psi.

j. Close all valves and remove water supply connection.

k. Open water supply drain valve. Water should drain out of system through water supply drain connector.

l. Close water supply drain valve and set WATER PUMP switch to OFF.

5-7. Depot Overhaul Test of Space Heater

a. Set space heater thermostat to 5° below room temperature.

b. Set space heater ON-OFF switch to ON. Fuel pump should operate.

c. In 30 to 60 seconds blower should operate and gray smoke should be seen at exhaust.

d. In several minutes hot air should be felt at the air output in front of unit.

e. Set space ON-OFF switch at OFF. Blower should operate until unit cools.

5-8. Depot Overhaul Test of Water Heater

a. Check that hot water tank is empty.

b. Set aquastat at #4.

c. Set water heater power ON-OFF switch to ON and auxiliary panel water heater ON-OFF switch to ON. Nothing should operate and POWER INDICATOR LIGHT should go ON.

d. Set switches to OFF.

e. Fill hot water tank with water.

f. Set water heater power ON-OFF switch at ON. Nothing should operate.

g. Set auxiliary panel water heater ON-OFF switch to ON. Blower and fuel pump should operate, burner should ignite, and a gray smoke should be seen at exhaust pipe.

h. Water temperature gauge should indicate an increase in water temperature to 90° then water, heater should stop operating.

i. Wait several minutes. When water temperature falls below 90°, water heater should begin operating again.

j. Set switches at OFF and drain hot water tank.

5-9. Depot Overhaul Test of Exhaust Blower

a. Set BLOWER switch to ON. Blower should operate.

b. Set BLOWER switch to OFF.

5-10. Depot Overhaul Test of Air Conditioners

NOTE

Perform the following procedures on the roadside and curbside air conditioners.

a. Set OFF-FAN-COOL switch to FAN. Only fan should operate.

b. Set AIR COND THERMOSTAT to the highest temperature setting.

c. Set OFF-FAN-COOL switch to COOL and slowly lower AIR COND THERMOSTAT setting. Compressor should come on as thermostat is moved through room temperature setting.

d. Check operation of CLOSED-FRESH AIR-OPEN control.

e. Set OFF-FAN-COOL switch to OFF.

5-11. Depot Overhaul Test of Jet Mixer-Distributer

a. Close intake valve.

b. Open circulate valve.

c. Lift circulate-discharge valve.

d. Fill mixer tank with water.

e. Set SPEED switch to LOW.

f. Set mixer pump switch to ON. Water should circulate within mixer.

g. Set SPEED switch to HIGH. Water should circulate at a faster speed.

h. Connect the mixer output hose to a sink or drain.

i. Set discharge-circulate valve to the down position. Water should discharge from tank.

j. Set mixer pump switch to OFF when there is approximately one gallon of water left in mixer tank.

k. Close circulate valve.

l. Open intake valve.

m. Set discharge-circulate valve to the up position.

n. Fill a can with approximately 10 gallons of water.

o. Insert the mixer intake hose into the can.

p. Set mixer pump switch to ON. Water should be drawn from the can into the mixer.

q. Set mixer pump switch to OFF, empty mixer of water, close intake valve, and open circulate valve.

5-12. Depot Overhaul Test of Plotting Table

a. Install feed and takeup bracket assemblies on plotting table. Bracket assemblies should slide freely on guide rails.

b. Tighten bracket thumbscrews so that brackets are held firmly in place. Cranks on drive bracket assemblies should turn easily and idler bracket rollers turn freely.

c. Set power switch to ON. Fluorescent lights should go on.

d. Set power switch to OFF.

e. Load a roll of leader onto the brackets.

f. Move the leader from one spool to the other and back. Leader should transfer easily.

g. Remove leader roll and brackets.

Figure 5-1. Color code marking for MIL-STD resistors, inductors, and capacitors.

(Located in back of manual.)

Paragraph 5-13 is deleted.

APPENDIX A

REFERENCES

Following is a list of references applicable to DS, GS, and depot maintenance personnel of Photographic Darkroom Group ES-38B.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals, (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TM 11-5410-213-15P	Operator, Organizational, DS, GS, and Depot Maintenance Repair Parts and Special Tool Lists: Shelters, Electrical Equipment S-280A/G and S-280B/G.
TM 11-6625-203-12	Operator and Organizational Maintenance Manual: Multimeter AN/URM-105, Including Multimeter ME-77, /U. Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U.
TM 11-6740-278-12	Operator and Organizational Maintenance Manual: Processing Machine, Photographic Film and Paper EH-29B.
TM 11-6740-278-35	DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists for Processing Machine, Photographic Film and Paper EH-29B.
TM 11-6740-279-12	Operator and Organizational Maintenance Manual: Printer, Contact, Photographic, Continuous EN-6C.
TM 11-6740-279-35	DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists for Printer, Contact, Photographic, Continuous EN-6C.
TM 11-6740-280-12	Operator and Organizational Maintenance Manual: Photographic Projection Printer EN-36B.
TM 11-6740-280-35	DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists for Photographic Projection Printer EN-36B.
TM 11-6740-281-12	Operator and Organizational Maintenance Manual: Photographic Contact Printer EN-100A.
TM 11-6740-281-35	DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists for Photographic Contact Printer EN-100A.
TM 11-6740-282-12	Operator and Organizational Maintenance Manual: Photographic Darkroom Group ES-38B.

INDEX

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11-96
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11-97
11-117
11-127
11-158
11-500(AA-AC)

NG: None.
USAR: None.
For explanation of abbreviations used see AR 310-50.

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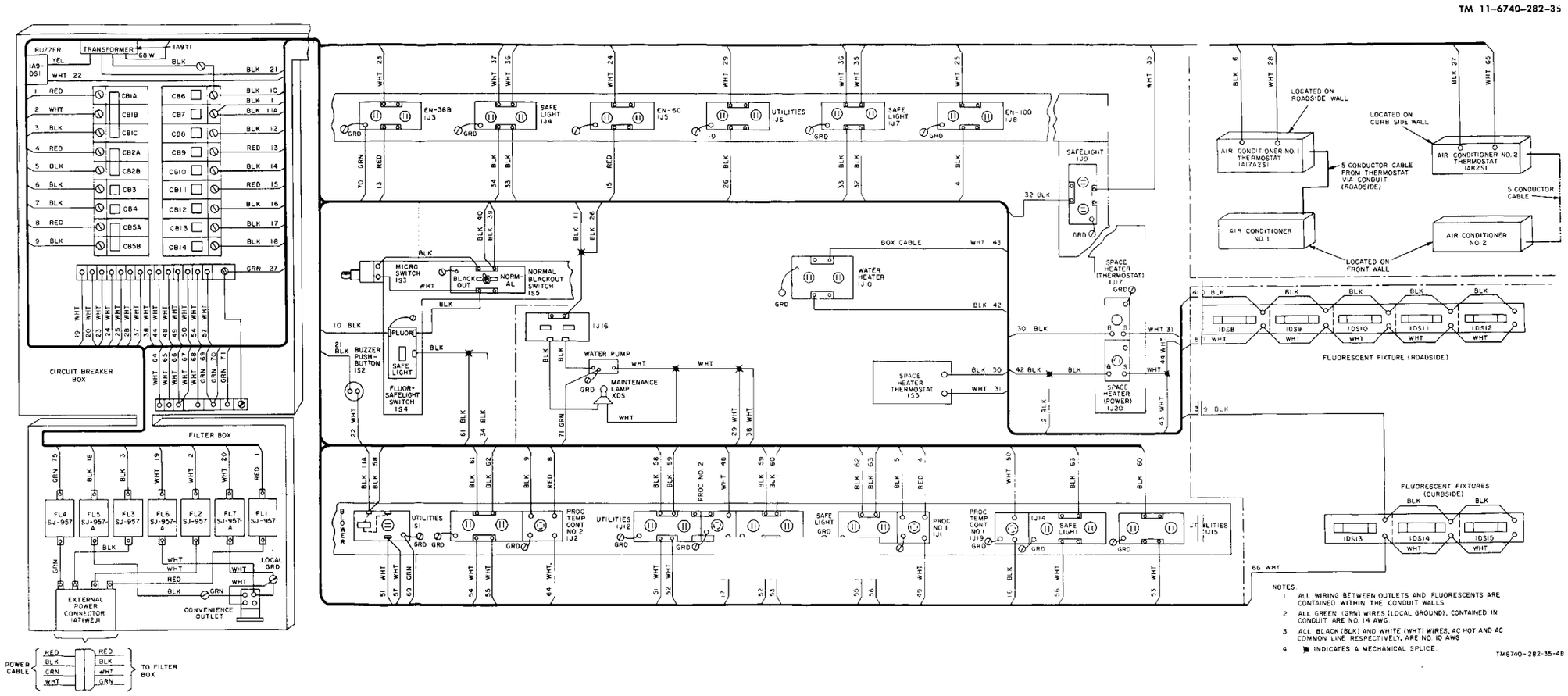
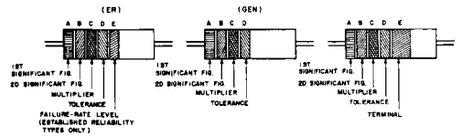


Figure 2-1. Shelter, wiring diagram.



COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.

COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM.
BLACK	0	BLACK	0	BLACK	1			BROWN	M	
BROWN	1	BROWN	1	BROWN	10			RED	P	
RED	2	RED	2	RED	100			ORANGE	R	
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	S	
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	±10 (COMP. TYPE ONLY)	WHITE		SOLDERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	±5			
BLUE	6	BLUE	6	BLUE	1,000,000	RED	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY)			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7							
GRAY	8	GRAY	8	SILVER	0.01					
WHITE	9	WHITE	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL. ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

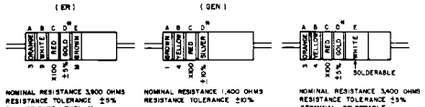
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS (THESE ARE NOT COLOR CODED)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED. IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING



NOMINAL RESISTANCE 3,900 OHMS RESISTANCE TOLERANCE ±5% FAILURE RATE LEVEL M

NOMINAL RESISTANCE 1,400 OHMS RESISTANCE TOLERANCE ±10%

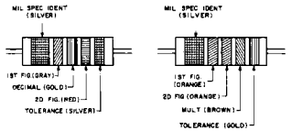
NOMINAL RESISTANCE 3,400 OHMS RESISTANCE TOLERANCE ±5% TERMINAL SOLDERABLE

COMPOSITION-TYPE RESISTORS

FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2 UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330 UH INDUCTOR ARE ILLUSTRATED

TABLE 2
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

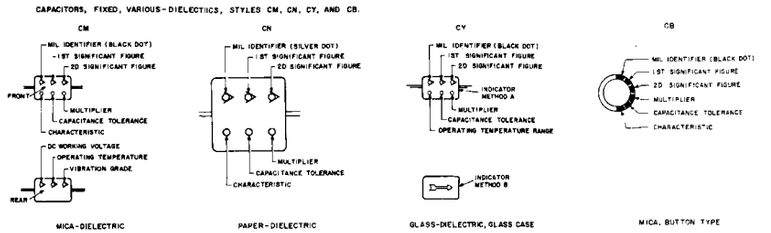


TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG	2D SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE				CHARACTERISTIC			DC WORKING VOLTAGE	OPERATING TEMP RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY, CB	0	0	1			±20%	±20%	A				-55°C to +70°C	10-55 HZ
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				-55°C to +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				-55°C to +125°C	10-2,000 CY
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55°C to +150°C	
PURPLE (VIOLET)		7	7											
GREY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN				±10%	±10%	±10%	±10%						

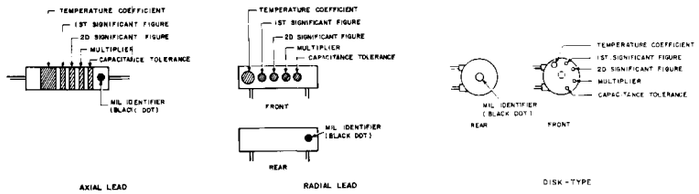


TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT[3]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	−30	1	1	10	±1%		
RED	−80	2	2	100	±2%	±0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		±5%	±0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	±10%		
GOLD	+100					±1.0 UUF	
SILVER							

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.
2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL-C-5, MIL-C-250, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.
4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE

C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS.

ESC-FM 41-3-00

Figure 5-1. Color code marking for MIL-STD resistors, inductors, and capacitors.

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