



# MP-1 Mobile Power Supply

instruction sheet

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

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## I. Description.

The MP-1 converts 12-volt d-c energy from an automobile storage battery to B+ and bias voltages necessary for operation of mobile amateur equipments, such as the KWM-1, KWM-2, or KWM-2A. The MP-1 may be used in car, boat, or plane having a 12-volt

d-c power system. Figure 7 is a schematic diagram of the MP-1 Mobile Power Supply. If the 351D-2 Mobile Mount is used, it includes a power cable for connection between the KWM-2/351D-2 combination and MP-1 supply. If the 351D-2 is not used, the 440E-1 Cable (Collins part no. 522-2051-00) is available as a separately purchased accessory. Table 1 lists the items furnished with the MP-1.

TABLE 1. EQUIPMENT SUPPLIED WITH THE MP-1 POWER SUPPLY

QUANTITY	DESCRIPTION	FUNCTION	COLLINS PART NUMBER
5	No. 10 solder lugs	Terminate one end of three power cable ground wires and both ends of two 12-volt power leads	304-1500-00
5	No. 6 solder lugs	Terminate each of five interconnecting wires of power cable and connect to terminals of TB1 on MP-1	304-0140-00
1	Cable clamp	Secure cable to prevent vibration or handling from placing stresses on terminal connections	150-1545-00
4	Sheet-metal screws no. 12 x 1	Secure heat sink mounting plate to mounting surface in vehicle	
2	30A fuses	Spares	264-0734-00

2. Installation.

a. Select a location in the car for mounting the MP-1 where it will be as cool, clean, and dry as possible. Location under the seat or on the passenger side of the fire wall is satisfactory. The sheet-metal screws supplied require 5/32-inch mounting holes. The shortest possible length of line to the battery is desirable. Under full load, the MP-1 draws approximately 25 amperes. At these current levels, voltage drop through unnecessarily long leads can be appreciable. Coupled with normal variations in primary voltage due to fluctuations in generator charging

rate, this will have an adverse effect upon MP-1 output voltage regulation.

b. Determine the necessary length of power cable to connect the MP-1 to the equipment which it is to operate. If the power supply is to provide voltages for the KWM-2/2A and the 351D-2, cut the required length of cable from the cable furnished with the mount. Attach the necessary solder lugs to the loose end of the cable for connection to the terminal board of the MP-1 Power Supply. Five no. 6 lugs are supplied with the power supply. Refer to table 1. Figure 1 shows power supply interconnections to the KWM-2/2A and 351D-2 combination.

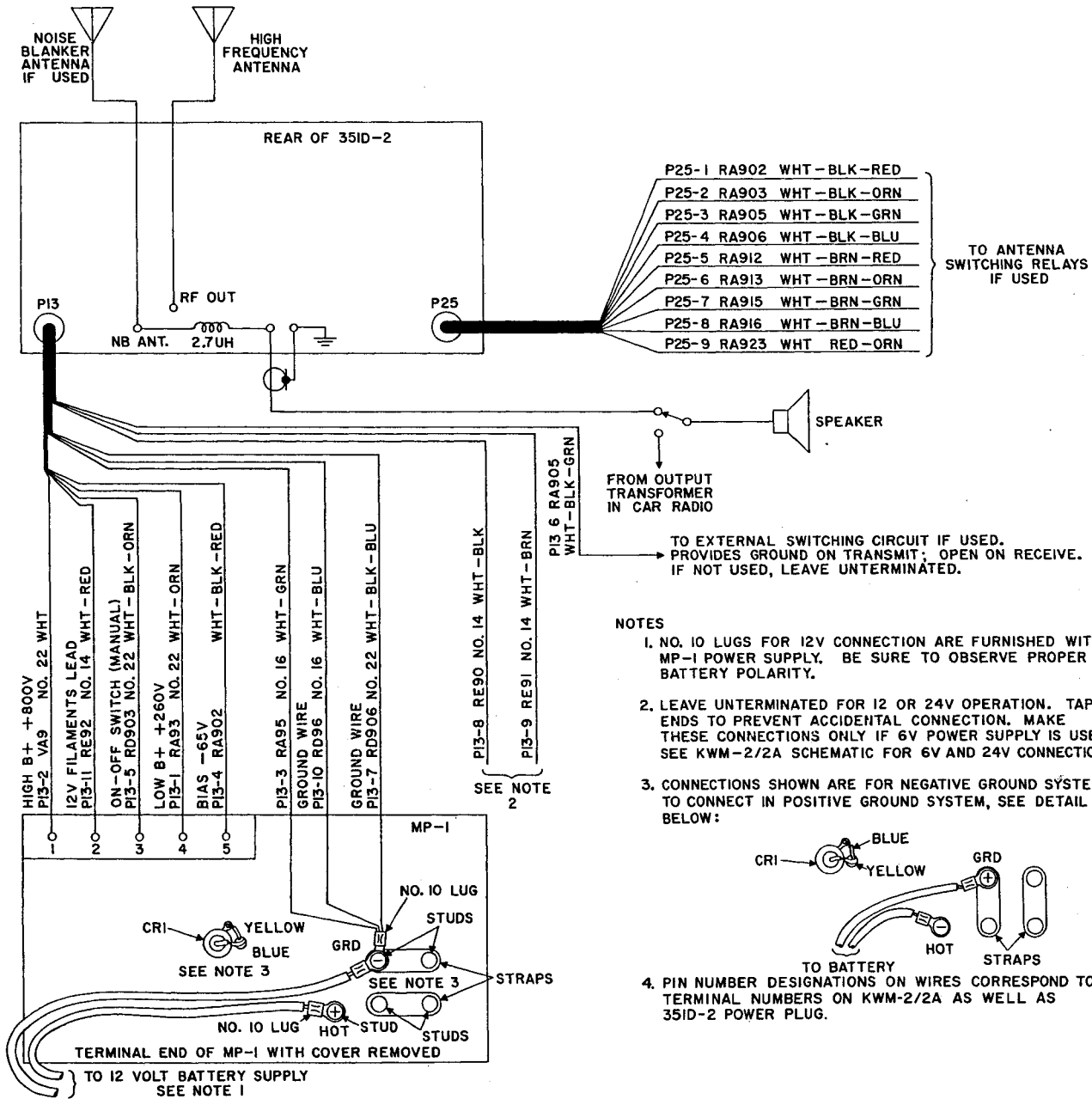


Figure 1. MP-1, KWM-2/2A, and 351D-2 Mobile Interconnections Diagram

c. Remove the cover from the MP-1 Power Supply, and make connections to the terminal board. Refer to figure 1. Two lengths of no. 10 wire are furnished with the 351D-2 for connection between power supply and battery. Cut these wires to required length, and fit with no. 10 lugs (furnished). If the 351D-2 is not used, procure the necessary wire and connect the car power supply to the studs on the MP-1. If necessary, the cable may be secured by one of the mounting screws and the cable clamp furnished.

#### NOTE

The MP-1 is connected for negative ground when shipped. Observe proper polarity or the MP-1 will not operate. See figure 1 for stud-strapping details. Be sure to reverse the yellow and blue wire connections to the stud-mounted diode, CR1, as shown in figure 1, if positive ground is to be used.

### 3. Initial Checks.

Set KWM-2/2A MIC GAIN control full counterclockwise (off) until the switch clicks. Set the OFF-ON-NB-CAL switch to ON. Set the meter switch to PLATE and the EMISSION switch to LOCK. The transceiver is in receive condition during warmup, so the meter will read full scale until filaments have come to temperature. This is normal S-meter action. When the S-meter falls back to a lower value, the circuits will have switched to transmit condition, and the meter will indicate PA plate current. Read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust the bias adjust potentiometer R11 on the power supply printed circuit board to set plate current to 40 ma. Figure 3 shows location of R11. Replace cover.

Operation of the power supply is controlled from the OFF-ON-NB-CAL switch in the KWM-2/2A. No other operating procedures are required.

### 4. Circuit Description.

Figure 7 is a schematic diagram of the MP-1 Mobile Power Supply. The MP-1 includes a 750-volt, 185-ma supply for power amplifier plate circuits, a 265-volt, 210-ma supply for all other plate circuits, and an adjustable bias supply for power amplifier grid circuits. All rectified power supply voltages are taken from windings of the same power transformer. The two transistors are connected in a multivibrator circuit which switches d-c input power to a-c power for application to the primary winding of the transformer. Oscillation of the multivibrator is sustained by feedback from the transformer primary windings. The operating frequency is approximately 900 cps and varies somewhat with fluctuations in load or supply voltage. These frequencies may be slightly audible due to acoustic radiation from the power supply chassis

and components. Output from the transformer high-voltage secondary is rectified by eight silicon rectifiers in a full-wave bridge circuit. Output from the low-voltage secondary is rectified by four silicon rectifiers in a full-wave bridge circuit. The output from the bias winding is rectified by a single silicon rectifier. The stud-mounted diode, CR1, protects the transistors from inadvertent application of wrong polarity. If the diode is not properly polarized in the relay coil lead, or if battery voltage is mistakenly applied with wrong polarity, the relay will not be energized, and the power supply will not turn on. Input current requirement is 10 to 25 amperes depending on the output load. Slow-blow fuses are NOT recommended.

### 5. Maintenance.

Maintenance of the MP-1 consists of checking and replacing silicon rectifiers and replacement of defective transistors. Silicon rectifiers are checked with an ohmmeter. Forward resistance is approximately 3 ohms, and reverse resistance is approximately 200,000 ohms. When replacing rectifiers, be certain to observe polarity as shown in figure 7. When replacement of a transistor is necessary, provide a heat sink on the leads when soldering. Using a pair of long-nosed pliers, hold the transistor lead between the point being soldered and the transistor. Hold pliers on lead, even after soldering iron has been removed, to dissipate heat in the connection. Excessive heat will damage the transistors. If it is necessary to replace an electrolytic filter capacitor, observe correct polarity. Electrolytic capacitors will be destroyed if d-c power is applied to them in wrong polarity.

### 6. Specifications.

#### Input Requirements

Voltage . . . . . 11 to 16 volts, 14 volts nominal

Current . . . . . Up to 30 amperes

#### Outputs (nominal)

Heater . . . . . 12 volts, 6.0 amp

Bias . . . . . -50 to -80 volts, adjustable (47,000-ohm load)

Low B+ . . . . . 265 volts, 210 ma

High B+ . . . . . 750 volts, 185 ma

#### Output regulation

Low voltage . . . . . 290 volts maximum at 170 ma  
265 volts minimum at 210 ma

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High voltage . . . . . 870 volts maximum at 55 ma  
695 volts minimum at 230 ma

Ripple present on outputs

Bias . . . . . Less than 0.35 volt peak to peak

Low B+ . . . . . Less than 0.2 volt peak to peak

High B+ . . . . . Less than 10 volts peak to peak

Efficiency . . . . . Approximately 80%

Operating temperature . . . . . -30°C to +60°C

Humidity . . . . . 0 to 95% at +50°C for 48 hours

Weight . . . . . 7-1/2 pounds

Dimensions . . . . . 3-3/4 x 5-3/4 x 11 inches overall

7. Parts List.

Figures 2 through 6 show parts locations.

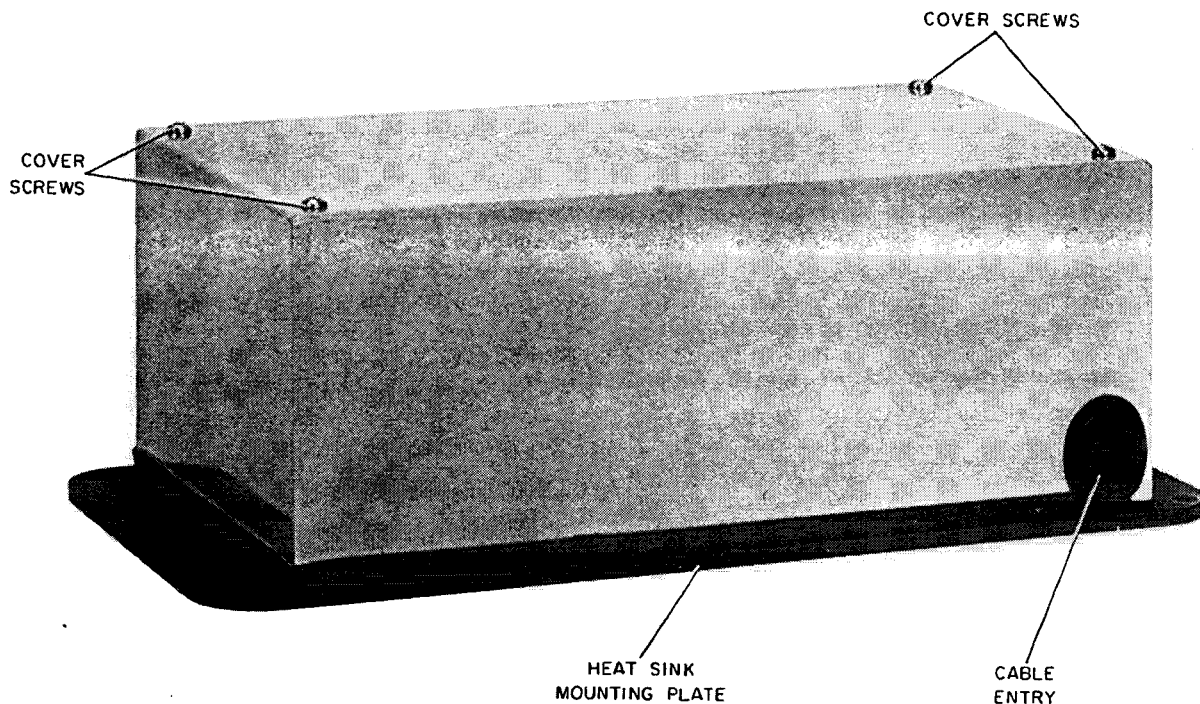


Figure 2. MP-1 Mobile Power Supply

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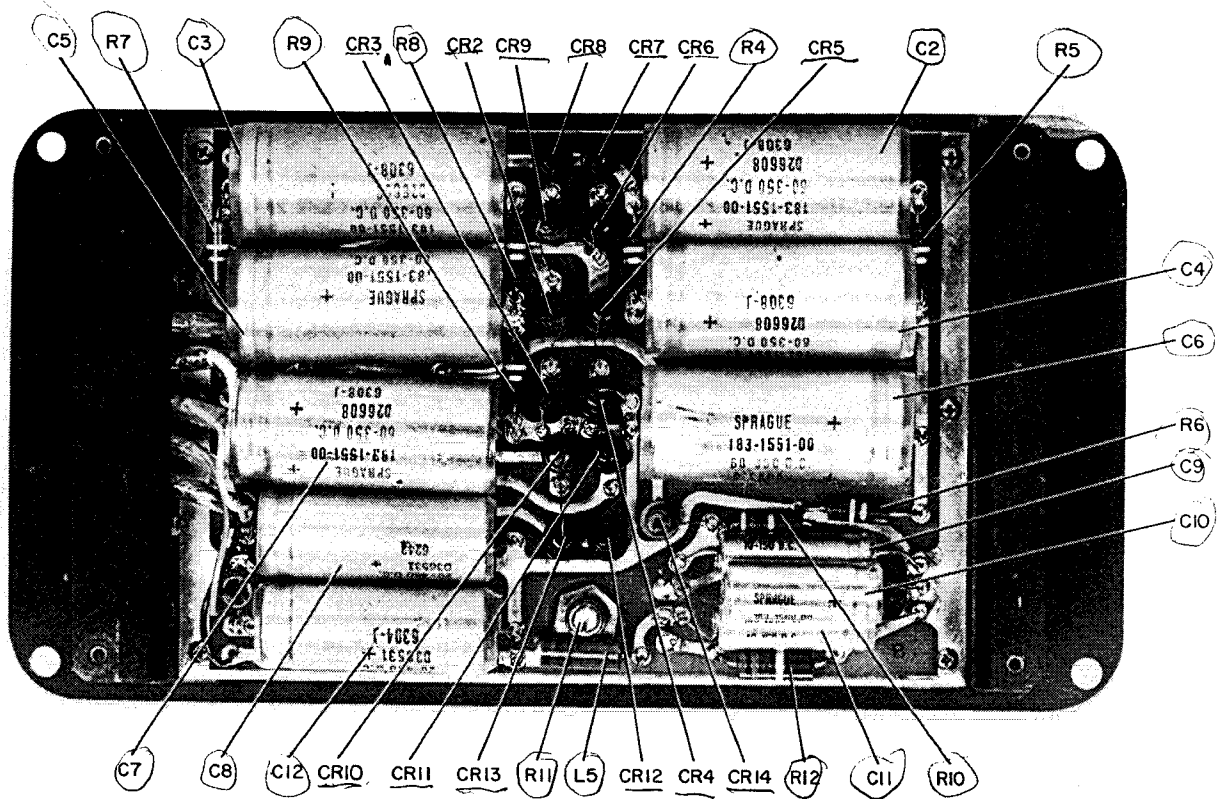


Figure 3. Top View, Cover Off, Parts Location

C580-13-P

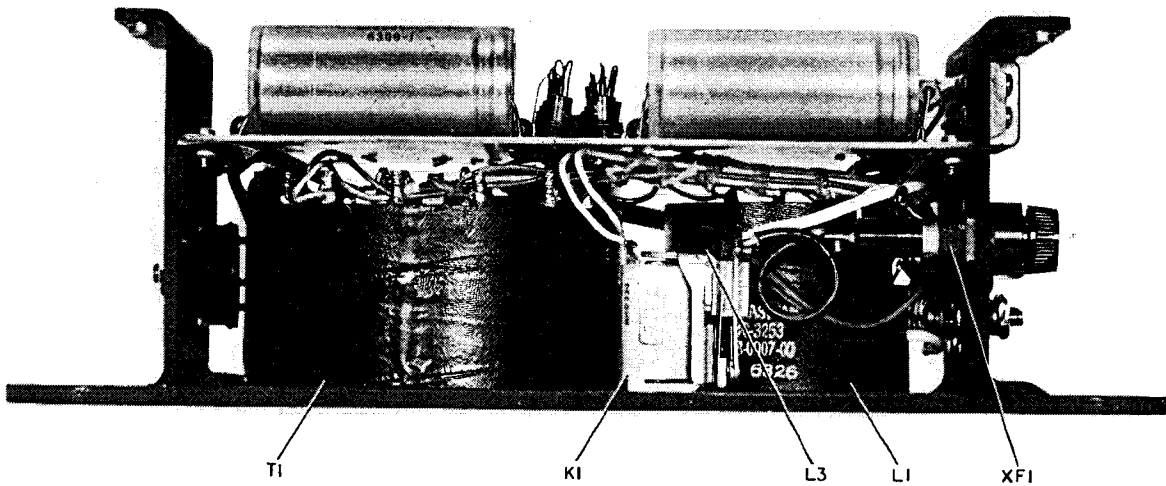


Figure 4. Left Side View, Cover Removed, Parts Location

C580-10-F

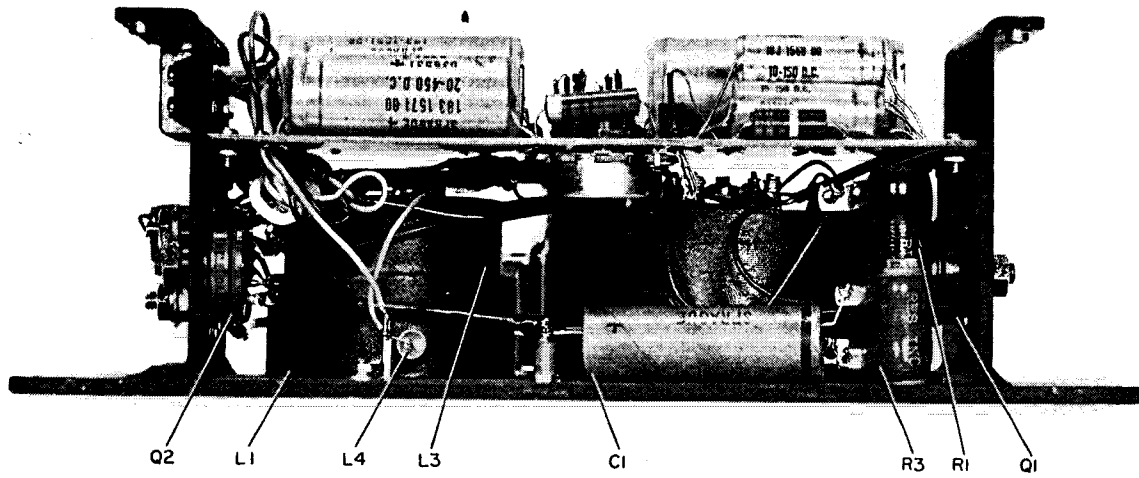


Figure 5. Right Side View, Cover Removed, Parts Location

C580-12-P

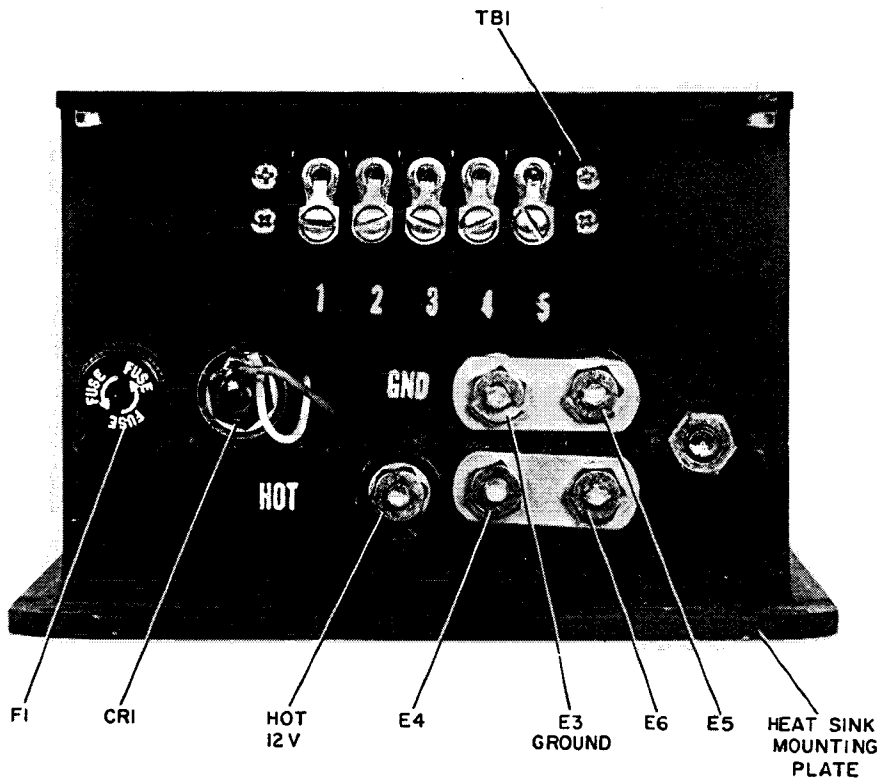


Figure 6. Terminal End View, Cover Removed

C580-11-P

ITEM	DESCRIPTION	COLLINS PART NUMBER
MP-1 MOBILE POWER SUPPLY		522-2750-00
C1	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf -10% +100%, 15 v dc; Sprague Electric Co. part no. D25814	183-1303-00
C2	CAPACITOR, FIXED, ELECTROLYTIC: 60 uf -10% +100%, 350 v dc; Sprague Electric Co. part no. D26608	183-1551-00
C3	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	183-1551-00
C4	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	185-1551-00
C5	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	183-1551-00
C6	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	183-1551-00
C7	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	183-1551-00
C8	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf -10% +100%, 450 v dc; Sprague Type DEE	183-1571-00
C9	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf -10% +100%, 150 v dc; Sprague Electric Co. part no. D33646	183-1568-00
C10	CAPACITOR, FIXED, ELECTROLYTIC: same as C9	183-1568-00
C11	CAPACITOR, FIXED, ELECTROLYTIC: same as C9	183-1568-00
C12	CAPACITOR, FIXED, ELECTROLYTIC: same as C8	183-1571-00
CR1	SEMICONDUCTOR DEVICE, DIODE: silicon; General Electric Co. part no. 1N1115	353-1610-00
CR2	SEMICONDUCTOR DEVICE, DIODE: silicon; General Electric Co. part no. 1N1491	353-1660-00
CR3 thru CR14	SEMICONDUCTOR DEVICE, DIODE: same as CR2	353-1660-00
E1	PRINTED CIRCUIT BOARD: plastic; 0.116 in. by 5.125 in. by 7.437 in. o/a dim.	549-3317-003
F1	FUSE, CARTRIDGE: brass, nickel, or bright alloy plated ferrules, glass case, 32 w; Bussmann Fuse Division of McGraw-Edison Co. part no. AGC32-30	264-0734-00
H1	GROMMET, RUBBER: for 3/16 in. panels, rubber or synthetic rubber, blank finish; 7/16 in. by 9/16 in. by 1-1/16 in.; Atlantic India Rubber Works type 2763	201-0043-00
K1	RELAY, ARMATURE: spst, normally open, 28 v max, 60 amp resistive, 75 ohms, 9 v, 0.120 amps, coil ratings; Davis Electric Co. part no. KD3D-12VDC	970-2170-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
L1	REACTOR: fixed inductance type, 6 mh inductance, 20 amp dc, 0.022 ohms dc res; Sun Air Electronics, Inc. part no. 91097	668-0007-00
L2	NOT USED - 6500/800	
L3	REACTOR: fixed inductance type, 650 mh inductance, 0.20 amp dc, 47 ohms dc; Sun Air Electronics, Inc. part no. 91085	668-0006-00
L4	COIL, RADIO FREQUENCY: single layer wound, 120 uh, 4 ohms dc res, 425 ma dc; Jeffers Electronics Division of Speer Carbon Co. part no. 10404-36	240-0194-00
L5	COIL, RADIO FREQUENCY: same as L4	240-0194-00
MP1	COVER, POWER SUPPLY: aluminum, zinc chromate primer finish; 3-15/32 in. by 5-9/16 in. by 9-3/16 in.	549-3322-004
Q1	TRANSISTOR: germanium, hermetically sealed; Minneapolis-Honeywell Regulator Co. Transistor Division part no. DA3F3	352-0320-00
Q2	TRANSISTOR: same as Q1	352-0320-00
R1	RESISTOR, FIXED, WIREWOUND: 3 ohms ±5%, 20 w; Ohmite Mfg. Co. part no. 0200L	710-4771-00
R2	NOT USED	
R3	RESISTOR, FIXED, WIREWOUND: 50 ohms ±5%, 11 w; Clarostat Manufacturing Co., Inc.	747-0225-00
R4	RESISTOR, FIXED, COMPOSITION: 0.22 megohms ±10%, 1 w; Allen Bradley type GB	745-3450-00
R5	RESISTOR, FIXED, COMPOSITION: same as R4	745-3450-00
R6	RESISTOR, FIXED, COMPOSITION: same as R4	745-3450-00
R7	RESISTOR, FIXED, COMPOSITION: same as R4	745-3450-00
R8	RESISTOR, FIXED, COMPOSITION: same as R4	745-3450-00
R9	RESISTOR, FIXED, COMPOSITION: same as R4	745-3450-00
R10	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 1 w; Allen Bradley Type GB	745-3296-00
R11	RESISTOR, VARIABLE, COMPOSITION: 5,000 ohms ±10%, 2 w; Chicago Telephone Supply Co. type 95CV	376-2376-00
R12	RESISTOR, FIXED, COMPOSITION: 6,800 ohms ±10%, 2 w; Allen Bradley type HB	745-5687-00
R13	NOT USED	
R14	RESISTOR, FIXED, COMPOSITION: 33 ohms ±10%, 2 w; MIL type RC42GF330K	745-5589-00
T1	TRANSFORMER, POWER, STEP-UP: 5, 10 v, 900 cps, 1 phase, 7.14 v, 900 cps, 1 phase, primary winding, 800 v, 185 ma, 290 v, 210 ma, 100 v, 1.4 ma, secondary winding; Sun Air Electronics, Inc. 10354	662-0034-00
TB1	TERMINAL BOARD: phenolic; barrier type w/ lug for back connection, 5 terminals; Howard B. Jones part no. 353-18-05-001	367-0013-00
XF1	FUSEHOLDER: extractor post type, 125 v, 5 amp, accommodates 3 AG cartridge fuse; Federal Code 71400; Bussmann Mfg. Co. part no. HKP1-16	265-1002-00

*PNP Transistors*

*DA3F3  
is  
ECG-23*

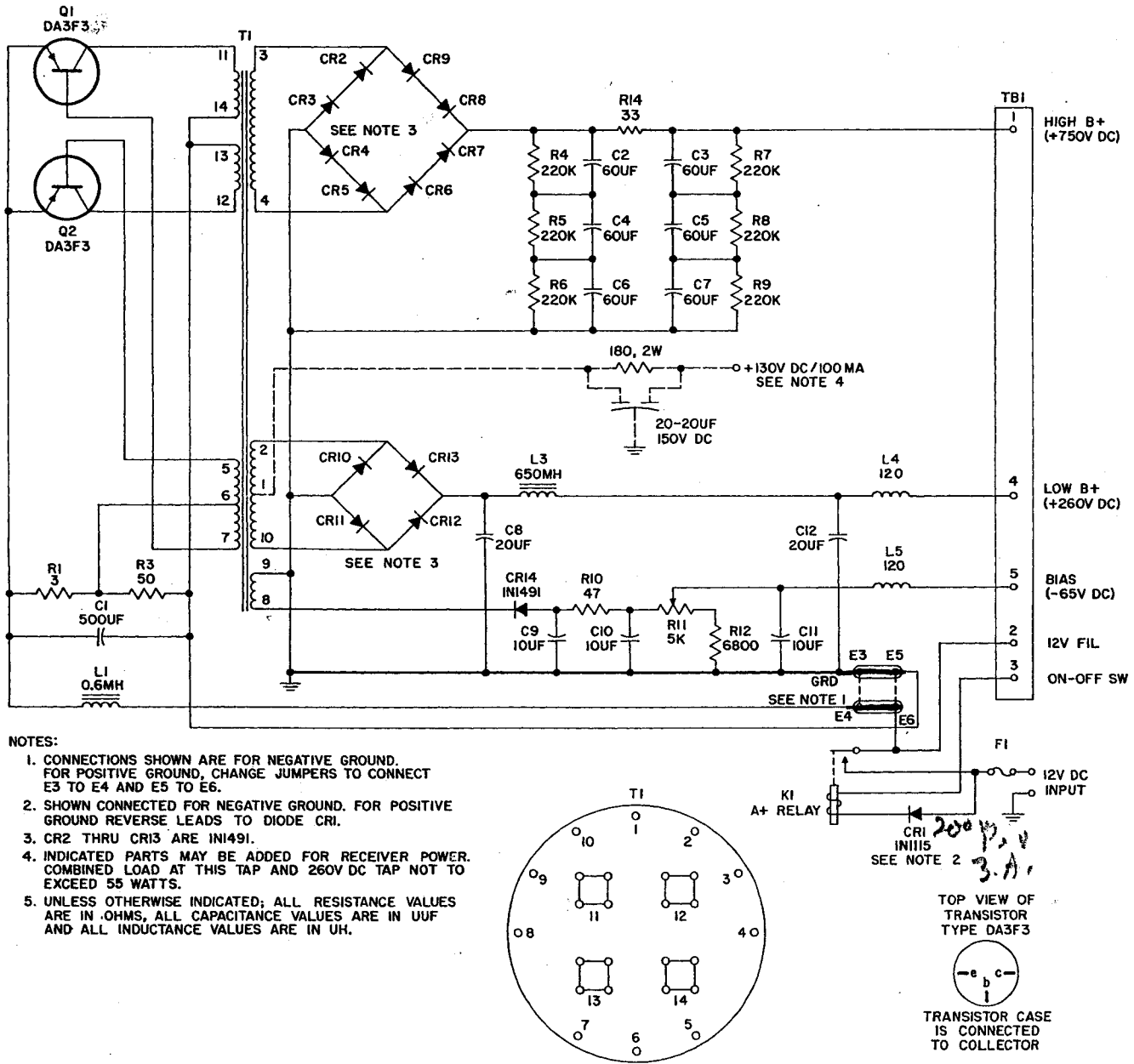


Figure 7. MP-1 Mobile Power Supply, Schematic Diagram

C580-15-5



*PNP Transistors*

*DA3F3  
E C G - 23*

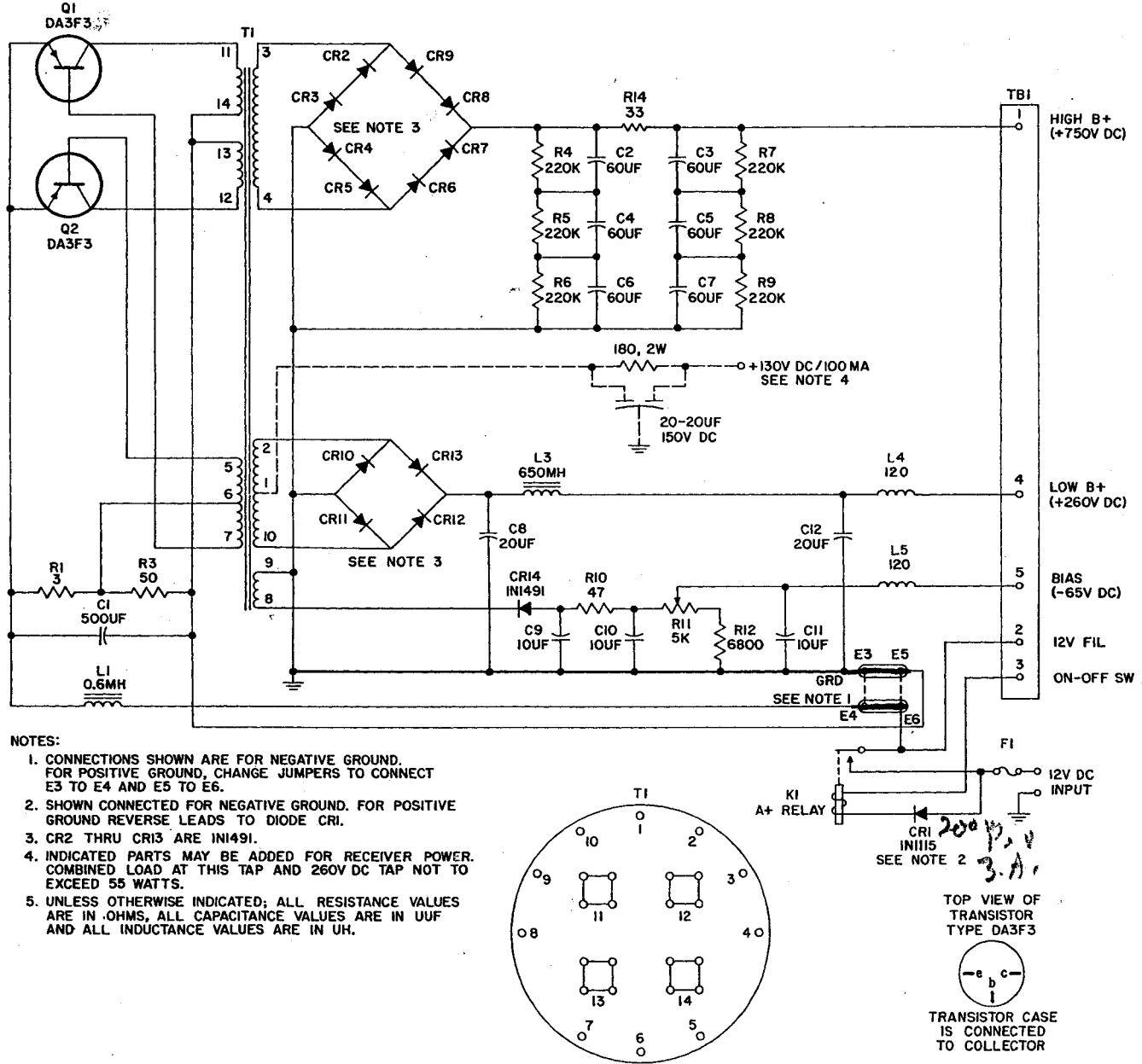


Figure 7. MP-1 Mobile Power Supply, Schematic Diagram