AIR-GROUND RADIO
PRIVATE SYSTEMS
ECHO-FOX UHF RADIO SYSTEM
TESTS
STATION POWER SUPPLY

CONTENTS PAGE

1. GENERAL

1.01 This section provides a program of routine maintenance procedures for the station power supply. Tables are also included for locating faults and clearing troubles within the power supply.

1.02 The station power supply in conjunction with the transmitter-exciter and the receiver, is operated on a 24-hour per day basis with primary power applied. Permission must be obtained from the control office before maintenance may be performed.

1.03 Meter readings must be maintained at the station location. A record should be maintained of all adjustments, part replacements, repairs, and wiring or apparatus changes (modifications).

2. APPARATUS

2.01 The following test apparatus is required for performing the tests outlined in this section.

1—KS-14510 Volt-Ohm-Milliammeter (VOM)

3. ROUTINE MAINTENANCE AND FAULT LOCATION

3.01 The station power supply provides high and low voltages to both the receiver and the transmitter-exciter. The audio input and output to the station are also wired into a power supply mounted terminal strip. For Echo-Fox systems, an extra terminal strip (TB503) accomodates the wideband lines. This part outlines routine maintenance procedures for the power supply. These procedures are designed to maintain optimum performance for both units; they include a routine check of all output voltages, instructions for properly adjusting the voltage controlling potentiometers, and periodic maintenance procedures for the blower and the power supply relays. A visual and mechanical inspection of the power supply for loose, broken, burned, and/or other damaged components should also be made.

3.02 If maintenance is required or a malfunction occurs that would require removing the station from operation, the control office must be notified and permission obtained to cease operation until the maintenance procedure has been completed.

Note: The following voltage adjustments have been made at the manufacturer's location during final checkout. Each voltage should be measured and the potentiometer adjusted, if necessary, during routine maintenance. Use a KS-14510 VOM for all measurements.

STEP	PROCEDURE
	Warning: High voltages are present in the power supply.
	Regulated −20 Volt Adjustment
1	Measure the regulated −20 volt supply at jacks J1(−) and J2(+) on regulator board A504. The VOM should indicate −20.0 ±1.0 volts. If this voltage is not indicated, adjust potentiometer R3 until the correct voltage is measured on the VOM.
	Regulated 13.4-Volt Adjustment
2	Measure the regulated 13.4-volt supply at jacks J1(+) and J2(−) on regulator board A503. The VOM should indicate 13.4 ±0.67 volts. If the correct voltage is not indicated, adjust potentiometer R6 until the proper voltage is measured on the VOM.
	Regulated 10.0-Volt Adjustment
3	The 10.0-volt regulated potential may be read directly on the meter panel RECEIVER meter. Set the RECEIVER switch on the meter switching panel to position J (10 volts). The meter should indicate 10.0 ±0.5 volts on the 0 to 15 volt scale. If the correct voltage is not measured on the meter, adjust potentiometer R11 on the A502 board until the correct voltage is observed. This voltage may be measured with a VOM connected across punching 7 (+) and 12 (−) of TB501.
	Blower Maintenance
4	The blower unit that is used for cooling the transmitter-exciter should be cleaned and lubricated periodically to maintain maximum efficiency. The motor bearing must be lubricated every 3 months.
5	The blower must be removed from the chassis for lubrication. This may be done as follows: (a) Remove the receiver from the chassis. (b) Remove the three screws holding the front cover of the air duct. Remove the cover. (c) On the rear of the chassis, remove the two screws holding the blower assembly. (d) Holding the blower assembly with the impeller side down, carefully cut or tear away the portion of the gummed label covering the shaft end seal. (e) Using a small screwdriver, remove the end seal.
6	While holding the blower (shaft vertical with impeller down), fill the space around the end of the shaft with a good grade of light instrument oil such as Aeroshell Fluid No. 12 or ESSO P38; 3-IN-1 oil may also be used. Allow the bearing to absorb the oil for a short period of time; manually turn the shaft to aid absorption before replacing the end seal.

STEP	PROCEDURE
7	Remount the blower and receiver by reversing the procedure of Step 5.
	Relay Maintenance
8	The relays used in this system should be inspected periodically to ensure maximum operating efficiency. If the relay contacts become pitted or contact insulation develops, the contacts should be cleaned with a burnishing tool to smooth out metallic deposits and to remove the insulating film. The multicontact relays sould be inspected for equal contact spacing (approximately 0.010 to 0.020 inch), so that contact pressure will be equal when energized. ***Caution: Do not lubricate relay bearings. Lubricated bearings will collect dust and grit and thus will wear more rapidly than nonlubricated bearings.***

3.03 Table A is a reference listing of voltage measurement test points for the station power supply. Table B is a list of faults that may occur in the station power supply and the possible components that might be defective in relation to a particular fault. Figure 1 illustrates the station power supply schematically.

TABLE A
VOLTAGE CHECKS

TEST POINT (NOTE 1)	MEASUREMENT
RECEIVER	
TB501-16 (Note 2)	10 ± 0.5 volts
TB501-8	13.4 ± 0.67 volts
TB12-5	10 ± 0.5 volts
TRANSMITTER	
K501-2L	300 ± 30 volts
TB1-4	300 ± 30 volts (Note 3) 665 ± 67 volts (Note 4)
TB11-1	−45 ± 4.5 volts
A504-J1	−20 ± 1.0 volts

Note 1: Transmitter must be keyed to load power supply, and if keyed for prolonged period, it should be connected to a dummy load.

Note 2: Voltage at TB501-16 is not used in Echo-Fox application. The receiver is connected directly to +10V via P443-2, TB501-7, and TB2-7.

Note 3: F502 is removed when the exciter is used to drive the base station power amplifier, which is the normal situation for Echo-Fcx.

Note 4: With F502 installed, the exciter is rated for a 60-watt output. The fuse would be installed at Echo-Fox stations in an emergency such as the station power amplifier failing. In such a case the exciter may be connected directly to the antenna. With an exciter output of 60 watts, the station's ERP would be reduced 6 dB.

TABLE B

FAULT LOCATION

SYMPTOM	POSSIBLE DEFECT
BASIC POWER SUPPLY	
No output voltages at P101 and P443	Open Fuse F501; defective switch S501; T501 primary open or shorted; relay contact K501; open interlock circuit.
No high B+	Shorted CR519, C501, C502, C503, C504, A501 — CR1 through CR4, T501; open A501 — CR1 through CR4, F502, L501, T501.
No low B+	Shorted CR520, A501 — CR5 through CR8, C505, C506, T501; open A501 — CR5 through CR8, F503, L502, T501.
No −45 volts	Shorted CR509, CR510, C508, C507, T501; open L503, T501.
No 13.4 volts	Shorted CR515, CR516, CR517, Q502, Q504, C509, C510, T501; open F504, L504, T501.
Output voltages low	Open diodes; excessive load.
Excessive output ripple	Open diodes, C501, C502, C503, C504, C505, C506, C507, C508, C509, C510, CR519.
10-VOLT REGULATOR	
No 10-volt output	Open Q503, DS1, CR2; shorted C4; no 12 volts input.
Output voltage high; cannot adjust with R4	Open VR4; defective R11.
Very low output voltage	Shorted VR4.
Output equals input volts	Shorted Q503.
−20-VOLT REGULATOR	
No −20 volt output	Open Q501, R1; shorted Q1 and/or VR1; no −45 volts at TB11-2 (R1).
Very low output voltage	Shorted Q501 or VR1.
Output too high; cannot adjust with R3	Open VR1, Q501, R1, R2, R3.
Output voltage equals input voltage	Shorted Q1.

Note: Use a KS-14510 voltmeter for all measurements.

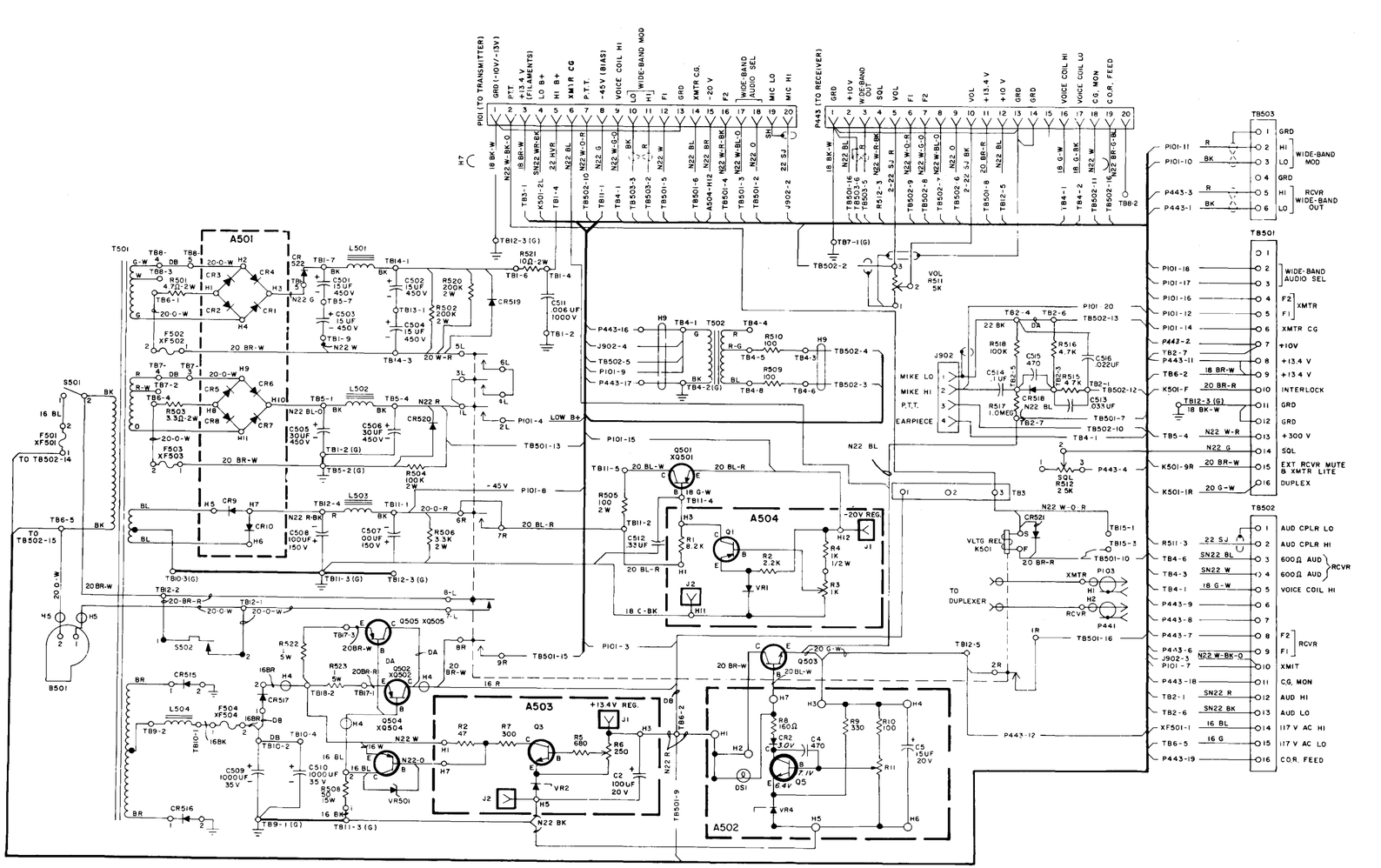

Fig. 1—Station Power Supply, Wiring Diagram