SECTION 4
MAINTENANCE

This transmitter has been constructed of materials considered to be the best obtainable for the purpose and has been carefully inspected and adjusted at the factory in order to reduce maintenance to a minimum. To insure peak performance and prevent failure or impairment of operation, adhere to a definite schedule of periodic checks and maintenance procedures.

4.1. ROUTINE MAINTENANCE

a. CLEANING. The greatest enemies to uninterrupted service in equipment of this type are dirt and corrosion. Corrosion is accelerated by the presence of moisture and dust. In certain localities it is impossible to keep moisture out of the equipment, but dust can be periodically removed by means of a soft brush or a dry, oil-free jet of air. There is always a slight accumulation of dust in the vicinity of high-voltage circuits. Remove dust as often as a perceptible quantity accumulates at any point in the equipment. It is very important to keep the moving parts such as tap switches free of dust in order to prevent undue wear. In general, it will be found that tap switch contacts, tube prongs, and cable connectors are most affected by corrosion. When the equipment is operated near salt water or in other corrosive atmospheres, switches, cables, plugs, and other parts should be inspected and cleaned more frequently in order to keep the equipment in operating condition.

The air filter should be cleaned approximately every two weeks. A small vacuum cleaner is a satisfactory device for removing surface dirt. Whenever the element becomes clogged, it should be removed, washed in carbon tetrachloride, and recharged by immersing in SAE 30 oil and allowing excess oil to drain off. If your transmitter is equipped with an aluminum air filter, follow cleaning instructions printed on the side of the filter. Replacement filters are part number 009 1069 00.

Check all connections at least once each month. Tighten any nuts, bolts, or screws that may have become loose. The contacts of cable connectors should be checked to insure clean, firm mechanical and electrical connections. Interlock switches should be inspected and cleaned weekly. Moving parts such as tuning controls should be checked regularly for excessive wear.

b. LUBRICATION. The bearings of the blower motor should be lubricated monthly with SAE 10 oil. Use only a small amount of lubricant at one time since too much oil will shorten the motor's life.

NOTE

Some models are supplied with blower motors having sealed bearings. These motors, identified by the absence of an oil cup, need no lubrication.

c. ROUTINE TUBE MAINTENANCE. Do not abuse tubes by operating them above their rated conditions. Keep a record of the length of time the tubes are in use. A check on the emission of all tubes should be made at least every 1000 hours of service. Replace tubes that have been in service for a long time. Spare, pre-aged mercury vapor rectifier tubes should be available for immediate replacement purposes. In order to have these tubes ready for emergency use they should be placed in the equipment during off-the-air hours and run for twenty minutes with only the filaments lighted. This will remove the mercury coating from the tube elements. The tubes should then be carefully removed from the equipment and stored in an upright position in a place where there is no possibility that they will be inverted or agitated. When preaged tubes are placed in the equipment they should be handled carefully in order to avoid the additional twenty-minute waiting period that will be required if mercury is allowed to come in contact with the tube elements.

4.2. TROUBLE SHOOTING

The most frequent cause of trouble in equipment of this type is tube failure. Check the tubes by replacing them with tubes that are known to be good and noting any change of performance. Low emission tubes may be the cause of erratic or poor performance of the equipment. If there is any doubt concerning the emission of a tube, it should be checked. Tube failure may cause distortion or hum. A tube suspected of causing this difficulty may be checked by replacing it with a tube that is known to be in good condition.

If the transmitter fails to start, circuits should be checked in the order in which they are made operative. The Primary Control Circuit Diagram, figure 7-1, should be of assistance in locating trouble in the primary circuits. Table 4-1, Typical Meter Readings, and table 4-2, Typical Voltages and Currents, are supplied as a reference of typical voltages and currents in an average 20V-2 transmitter. A list of typical readings of all panel meters of the individual transmitter should be made as an aid to rapid trouble shooting.

4.3. ORDERING REPLACEMENT PARTS

The guarantee, on the inside front cover, contains information on ordering replacement parts.

WARNING

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF VOLTAGES THAT ARE DANGEROUS TO LIFE. OPERATING PERSONNEL SHOULD AT ALL TIMES OBSERVE PROPER SAFETY PRECAUTIONS. DO NOT MAKE ADJUSTMENTS INSIDE THE CABINET WHILE ANY OF THE POWER SUPPLIES ARE OPERATING.

Table 4-1. Typical Meter Readings

Switch	Switch Position	Meter	Meter Reading
MULTIMETER SWITCH	AUDIO CATH. 25 MA.	MULTIMETER	9 ma.
MULTIMETER SWITCH	OSC. CATH. 25 MA.	MULTIMETER	5 ma.
MULTIMETER SWITCH	1ST BUFF. GRID 2.5 MA.	MULTIMETER	0.1 ma.
MULTIMETER SWITCH	1ST BUFF. CATH. 25 MA.	MULTIMETER	6.5 ma.
MULTIMETER SWITCH	807 GRID 25 MA.	MULTIMETER	1 ma.
MULTIMETER SWITCH	807 CATH. 250 MA.	MULTIMETER	55 ma.
MULTIMETER SWITCH	P.A. GRID 25 MA.	MULTIMETER	17 ma.
POWER CHANGE	LOW (250 W)	MOD PLATE CURRENT	
		Static	120 ma.
		75% mod.*	185 ma.
POWER CHANGE	LOW (250 W)	PA PLATE VOLTAGE	1560 volts
POWER CHANGE	LOW (250 W)	PA PLATE CURRENT	245 ma.
POWER CHANGE	LOW (250 W)	R.F. LINE CURRENT	
		70 ohm load	1.89 amp.
		50 ohm load	2.24 amp.
POWER CHANGE	LOW (550 W)	MOD. PLATE CURRENT	
		Static	120 ma.
		100% mod.*	320 ma.
POWER CHANGE	LOW (550 W)	P.A. PLATE VOLTAGE	2200 volts
POWER CHANGE	LOW (550 W)	P.A. PLATE CURRENT	330 ma.
POWER CHANGE	LOW (550 W)	R.F. LINE CURRENT	
		70 ohm load	2.8 amp.
		50 ohm load	3.3 amp.
POWER CHANGE	HIGH (1100 W)	MOD. PLATE CURRENT	
		Static	120 ma.
		100% mod.*	450 ma.

*With 1000 cycle sine wave

Table 4-1. Typical Meter Readings (Cont.)

Switch	Switch Position	Meter	Meter Reading
POWER CHANGE	HIGH (1100 W)	P.A. PLATE VOLTAGE	3100 volts
POWER CHANGE	HIGH (1100 W)	P.A. PLATE CURRENT	500 ma.
POWER CHANGE	HIGH (1100 W)	R.F. LINE CURRENT	
		70 ohm load	3.95 amp.
		50 ohm load	4.7 amp.

Table 4-2. Typical Voltages and Currents

Tube	Tube	Function	Normal Operating Characteristics	
V-101	6AU6	Crystal Oscillator	Plate Voltage	250 volts
			Crystal Current	1.6 ma.
			Cathode Current	4.0 ma.
V-102	6SJ7	Buffer Amplifier	Plate Voltage	290 volts
			Screen Voltage	135 volts
			Grid Current	0.1 ma.
			Cathode Current	6.5 ma.
V-103	807	R-F Driver Amplifier	Plate Voltage	550 volts
			Screen Voltages	260 volts
			Cathode Current	55 ma.
			Grid Current	1 ma.
V-104 V-105	4-400A	Power Amplifier	Output (watts)	1100 500 watts
			Plate Voltage	3100 2200 volts
			Plate Current	500 330 ma.
			Screen Voltage	470 330 volts
			Grid Current	20 20 ma.
			Plate Efficiency	73.5% 75.8%

Table 4-2. Typical Voltages and Currents (Cont.)

Tube	Type	Function	Normal Operating Characteristics	
V-106 V-107	6SJ7	Audio Amplifier	Plate Voltage	265 volts
			Cathode Current	9 ma. total
V-108 V-109	4-400A	Modulator	Plate Voltage	3100 volts
			Cathode Current	
			No Signal	120 ma.
			100% mod (1100W)	450 ma.
			100% mod (550W)	320 ma.
V-110	5U4G	Bias Voltage Rectifier (Values are output from filter)	Voltage	-110 volts
			Current	100 ma.
V-111 V-112	575A	High Voltage Rectifier (Values are output from filter)	Voltage	3100 volts
			Current	1 amp.
V-113 V-114	866A	Low Voltage Rectifier (Values are output from filter)	Voltage	500 volts
				250 ma.

Table 4-3. Primary Power Input

	Kva	Kw	p.f.
Filaments and blowers only	0.78	0.66	85%
550 watts output, no modulation	3.28	2.45	75%
550 watts output, 100% modulation	4.0	3.2	80%
1100 watts output, no modulation	3.7	2.95	80%
1100 watts output, 100% modulation	4.82	4.0	83%