SECTION 5

MAINTENANCE

5.1. INSPECTION.

5.1.1. GENERAL. - This radio equipment has been constructed of materials considered to be the best obtainable for the purpose and has been carefully inspected and adjusted at the factory to reduce maintenance to a minimum. However, a certain amount of checking and servicing will be necessary to maintain efficient and dependable operation. The following section has been written to aid in checking the equipment.

5.1.2. ROUTINE INSPECTION. - Routine inspection schedules should be set up for periodic checks of this equipment. This inspection should include examination of the mechanical system for excessive wear or binding and of the electrical system for electrical defects and deterioration of components.

If the routine inspection of the equipment is carried out faithfully, the chances of improper operation of the equipment are greatly minimized. It is suggested that this inspection be made as frequently as possible, and it should be sufficiently thorough to include all major electrical circuits of the equipment as well as the mechanical portion.

a. CLEANING. - The greatest enemy to uninterrupted service in equipment of this type is corrosion and dirt. Corrosion, itself, is accelerated by the presence of dust and moisture on the component parts of the assembly. It is impossible to keep moisture out of the equipment in certain localities, but foreign particles and dust can be periodically removed by means of a soft brush and a dry, oil-free jet of air. Remove the dust as often as a perceptible quantity accumulates in any part of the equipment. It is very important that rotating equipment, such as variable condensers and tap switches, be kept free from dust to prevent undue wear. Likewise, variable condenser plates should be kept free from dirt to avoid flashover.

One of the greatest sources of trouble in equipment located in a salt atmosphere is corrosion. Corrosion resulting from salt spray or salt laden atmosphere may cause failure of the equipment for no apparent reason. In general, it will be found that contacts such as tap switches, tube prongs, cable plug connectors, and relay contacts are most affected by corrosion. When it is necessary to operate the equipment in localities subject to such corrosive atmosphere, inspection of wiping contacts, cable plugs, relays, etc., should be made more frequently in order to keep the equipment in good condition.

b. VACUUM TUBES. - Make a check of emission characteristics of all tubes. After the emission check, examine the prongs on all tubes to make sure that they are free from corrosion. See that all tubes are replaced correctly and fully in their sockets, and a good electrical contact is made between the prong of the tube and the socket. Use caution in removing and replacing grid or plate caps on tubes so equipped. Before a tube is discarded,

make certain that the tube is at fault, and the trouble is not a loose or broken connection within the equipment. A complete set of tested tubes of the same type specified should be kept on hand at all times. If faulty operation of the transmitter is observed and tube failure suspected, each tube may be checked by replacing it with a tube known to be in good condition. Defective tubes causing an overload in power circuits may usually be located by inspection. It will be found that excessive heating or sputtering within the vacuum tubes is a good indication of a fault in the tube circuit.

If tubes have been in use for a period of time equal to or exceeding the manufacturer's tube life rating, it is suggested that they be replaced. A marked improvement in the performance of the equipment is usually noticeable after the weak tubes have been replaced.

c. PRECAUTIONS FOR SATISFACTORY TUBE LIFE.

(1) Before any tube is removed from the equipment, make certain the primary power is disconnected from the equipment.

(2) Operate all tubes within ±5% of rated filament voltage.

(3) Do not exceed the rated plate current of any tube during normal operation of the equipment.

d. TUBE REPLACEMENT PRECAUTIONS.

(1) All tubes are removed by pulling them straight away from the chassis.

(2) Remove plate cap connectors, from tubes so equipped, with great care to prevent breaking the seal around the plate cap.

(3) Before a tube is inserted, make certain that the type of tube is correct for the socket into which it is being placed.

NOTE

Changing master oscillator tubes (V001) may cause a slight change in master oscillator calibration.

e. TUBE TABLE.

SYMBOL	TYPE	FUNCTION	RATED FIL. VOLTAGE
V001	6SJ7	Master Oscillator	6.3
V101	6AK6	Buffer Amplifier	6.3
V102	6AG7	Frequency Multiplier	6.3
V103	7C5	Frequency Multiplier	6.3
V104	705	Frequency Multiplier	6.3
V105	4D32	Power Amplifier	6.3
V201	6SL7	Audio Amplifier	6.3
V202	6SN7	Audio Driver	6.3

e. TUBE TABLE (Cont.).

SYMBOL	TYPE	FUNCTION	RATED FIL. VOLTAGE
V203	807	Modulator	6.3
V204	807	Modulator	6.3
V205	6SL7GT	Sidetone Oscillator	6.3
V301	5Z4	LV Rectifier	5.0
V302	5R4GY	HV Rectifier	5.0
V303	5R4GY	HV Rectifier	5.0
V304	VR75	Bias Regulator	---
V305	OA2	Screen Voltage Limiter	---
V306	OA2	Screen Voltage Limiter	---

f. RELAYS. - All relays should be inspected at regular intervals. Check the contacts for proper alignment, pitting, and corrosion. Use a burnishing tool to clean contacts - never use sandpaper or emery cloth.

5.2. TROUBLE SHOOTING.

5.2.1. GENERAL. - The most general cause of improper operation of radio equipment is tube failure. Refer to paragraph 5.1.2.b. in this section for comments concerning vacuum tube replacement. Defective tubes causing an overload in power circuits may usually be located by inspection. High voltage arcs may be caused by bent condenser plates, corrosion, or dust. Corrosion resulting from operating the equipment in a salt laden atmosphere may cause failure of the equipment for no apparent reason.

In general, trouble encountered in radio apparatus may be isolated by means of various tests and measurements, and the section of the transmitter determined in which the trouble is located. If this is done, the components in the associated circuit may be checked and the trouble located. Refer to the tables of meter readings and resistance measurements.

No one but an authorized and competent service man equipped with proper test facilities should be permitted to service this equipment.

5.2.2. FUSES.

a. GENERAL. - This equipment is supplied with fuses of the correct rating in each position. Fuse failures should be replaced with spares only after the circuit in question has been carefully examined to make certain that no permanent fault exists. Always replace a fuse with the rating specified in the following table:

FUSE TABLE

SYMBOL	LOCATION	TYPE	RATING
F301	LV Power supply primary	Cartridge (3AG)	3 amp
F302	HV Power supply primary	Cartridge (3AG)	5 amp

5.3. ALIGNMENT.

5.3.1. GENERAL. - Should, for any reason, the exciter stages get out of alignment, it is recommended that the unit be realigned at once. Improper operation might result in damage to valuable equipment.

5.3.2. HIGH FREQUENCY OSCILLATOR. - Should trouble develop in the high frequency master oscillator, the unit should be returned to the factory for servicing. However, the unit can be serviced and realigned by persons understanding such techniques providing accurate test equipment is at hand. A crystal controlled frequency standard with outputs at 1700 and 2000 kc with an accuracy of better than 0.015 per cent, must be used for setting the band edges.

a. PROCEDURE.

(1) Apply power to the transmitter and let the MO warm up for about 30 minutes, then check the oscillator frequency on a receiver. Operate the transmitter with the emission control in the CAL position and the key closed.

(2) Couple a receiver to the output of the oscillator.

(3) Set the vernier index to exact center of the dial window.

(4) Tune receiver to output of 1700 kc freq standard.

(5) Rotate MO to vicinity of 3400 kc on the exciter dial and zero beat with the signal from the standard. Write dial reading down for use as a reference.

(6) Rotate the MO dial toward 4 mc exactly 1½ turns.

(7) Tune the receiver to the 2000-kc output of the standard.

(8) The MO should zero beat with the 2000-kc output of the standard at exactly 12 turns of the MO dial.

(9) If such is the case but the dial reading is incorrect, loosen the setscrews in the oscillator coupler and turn the dial to the correct reading (4000 kc) after which tighten the setscrews again. If the MO does not zero beat with the standard at 4 mc, proceed as follows:

(10) Read the kc difference (the difference of where the signal appeared from where it should have appeared after 12 turns) and multiply it by 5. Add this figure to the actual beat note dial setting if the beat note was less than 12 turns, or subtract it if the beat note occurred at more than 12 turns. Now set the dial to this new frequency, remove the trimmer plug from the top of the oscillator, and turn the adjustment until zero beat is again reached. It will be found that the high and low ends are very nearly 12 turns apart. Repeat the above procedure until such is the case; remember that a new reference point will occur at the low ends of the dial each time.

Examples of above operations:

No. 1

Beat note at low end of dial	= 3402 kc
Reading at which beat note should appear after 12 turns of dial	= 4002 kc
Actual dial reading	= 4003 kc
Difference frequency (4003 - 4002)	= 1 kc
Multiplied by 5	= 5 kc
Subtracted from 4003 (since beat note occurred at more than 12 turns)	= 3398 kc

After setting dial to 3998 kc and zero beating the MO to the standard with the trimmer adjustment, the low end beat note should appear at 3398 kc.

No. 2

Beat note on low end of dial	= 3398 kc
Reading at which dial should appear after 12 turns	= 3998 kc
Actual dial reading	= 3996 kc
Difference frequency (3998 - 3996)	= 2 kc
Multiplied by 5	= 10 kc
Added to 3996 (since beat note occurred at less than 12 turns of the dial)	= 4006 kc

After setting the dial at 4006 and zero beating the MO to the standard with the trimmer adjustment, the low end beat note should appear at 3406 kc.

(11) After the oscillator has been adjusted to cover the range 3400 to 4000 kc in exactly 12 turns, the coupler setscrews can be loosened and the dial set on frequency.

NOTE

The above method of adjustment is that which is used at the factory. This is a short cut method and proves very reliable. Actually, the object is to get the 1700 kc and the 2000 kc outputs of the oscillator exactly 12 turns apart, and it can be attained by using the slower method of moving the trimmer capacitor in one direction or the other and checking the results until the desired answer is obtained. Be sure to replace the trimmer cover plug after alignment.

NOTE

Somewhat greater accuracy can be obtained if the oscillator end points are set using harmonic operation, i.e., listen in the 14 or 28 mc region for the harmonics of the 1700- and 2000-kc signals and set the corresponding harmonic of the MO to zero beat with these. Do this only after obtaining a very close adjustment as outlined above.

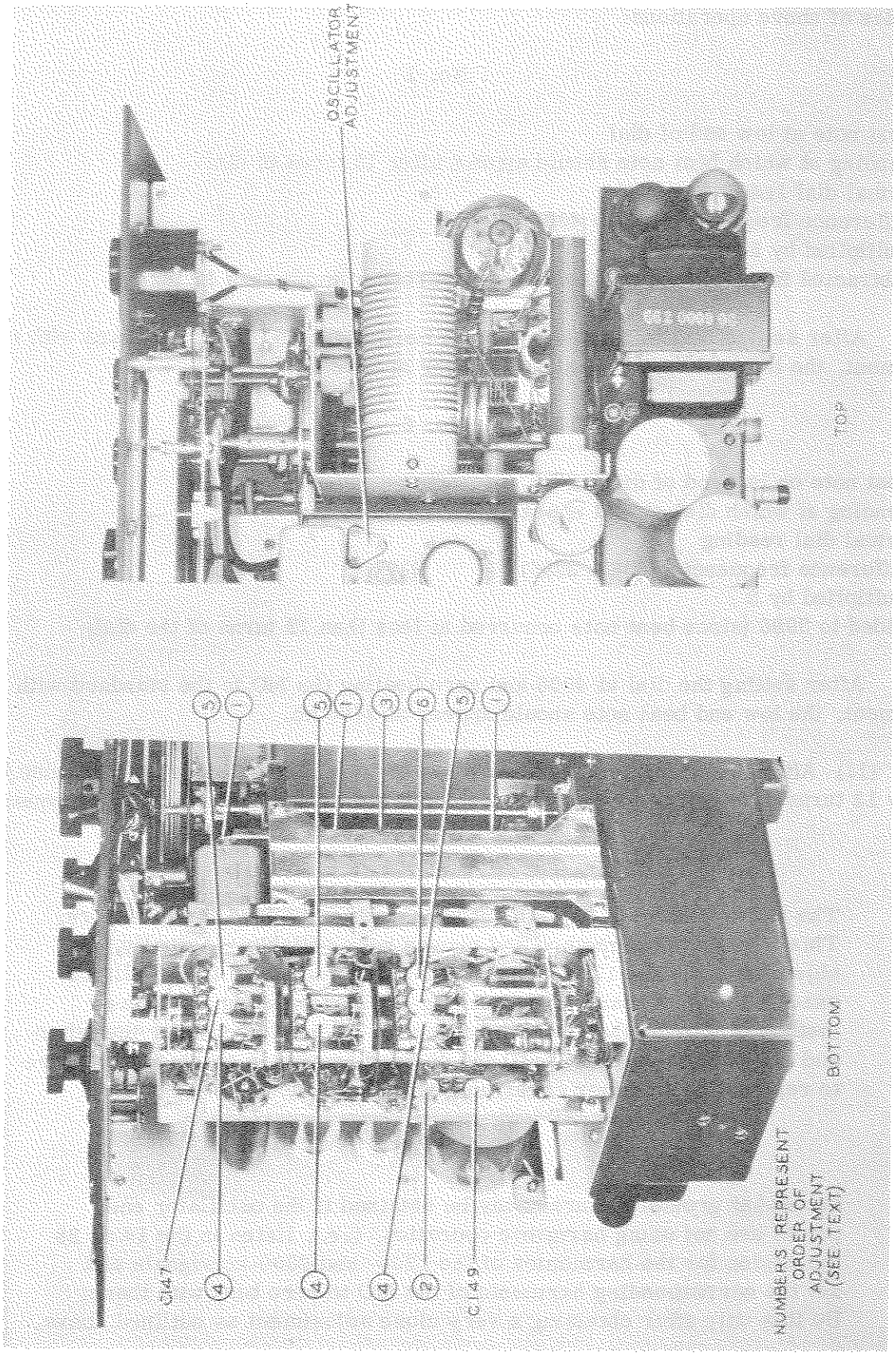

Figure 5-1. Alignment Adjustments

5.3.3. MULTIPLIER STAGES. - Should the grid drive to the final fall below 5 ma on the meter due to change of tubes or aging of components, the transmitter r-f circuits should be realigned. Proceed as outlined below only after the master oscillator has been checked and recalibrated as outlined in paragraph 5.3.2.

A small fiber screw driver and a 1/4 in. open end wrench are required for these adjustments.

a. PROCEDURE.

(1) Remove the transmitter from the cabinet and tip it up on end (r-f section up).

(2) Remove the fuse from the HV primary. (This allows the low voltage supply to be turned on while the HV supply remains turned off.)

(3) Turn the LV and HV power switches ON.

(4) Place the CW-CAL-PH switch in the PH position.

(5) Place the METER selector switch in the GRID position.

(6) Adjust for maximum grid current using the adjustments and conditions listed below in order from top to bottom of the list. (Refer to figure 5-1 for adjustment identification.)

ORDER OF ADJUSTMENT	BAND SW SET AT	TUNING SET AT	ADJUSTMENT
1	10M	28,800	3 Slugs marked "28.8"
2	40M	7,300	C150
3	40M	7,200	1 Slug marked "7.2"
4	15M	21,600	3 Trimmers marked "21.6"
5	20M	14,250	3 Trimmers marked "14.4"
6	80M	3,750 kc	1 Trimmer marked "3.6"

NOTE

In item 4 under ADJUSTMENT, the mistracking of the third multiplier plate circuit will result in low grid current when the main tuning dial is set much outside the limits of the amateur 20 meter band (14 to 14.4 mc). Proper grid current can be obtained at any frequency on the range 12.8 - 16 mc by adjustment of trimmer C139 (marked 14.4) on the third multiplier.

NOTE

If extensive multiplier alignment has been necessary, it is likely that the two spurious signal traps will need tuning. Do not touch the spurious signal tuning condensers unless this is so, since these adjustments are very critical. The spurious signal trap tuning condenser for the 80 meter

band, C149, is located on the side of the multiplier unit next to C150, see figure 5-4. These traps are tuned as follows: With the transmitter aligned as indicated in the above paragraphs, tune the transmitter for 3.5 mc output and listen with a receiver to the 1.75 mc output. Watching the receiver "S" meter, tune C147 for minimum signal. Then tune the transmitter up on 7.15 mc and listen on 3.575 mc with the receiver. Adjust C149 for minimum signal. Both of these adjustments will be very sharp and care should be taken that they are not disturbed in the least after the adjustments have been made. Replace the multiplier bottom cover.

5.3.4. MODULATOR BIAS ADJUSTMENT. - The modulator bias can be adjusted by turning the screw driver slot equipped potentiometer R305. For best distortion characteristics, the static, or resting, modulator plate current should be 55 ma with the 600 v - 700 v switch in the 700 v position. Potentiometer R305 is located within the top of the cabinet near the filter capacitors; therefore, the interlock switch will have to be held closed while making this adjustment. Take great care to avoid touching any components carrying high voltage.

The proper bias for the modulator grids is approximately minus 25 volts.

5.4. LUBRICATION. - The following parts should be lubricated annually or whenever the need arises by brushing a thin film of the indicated lubricant on the points of mechanical contact. Do not overlubricate.

(1) PA Bandswitch Contacts: MOBILE PD535A (Socony Vacuum Oil Co.)

(2) Panel Bushings: MOBILE PD535A (Socony Vacuum Oil Co.)

5.5. OSCILLATOR TUBE REMOVAL. - Replacing an oscillator tube requires the breaking of the seal around the shield, and it will then become necessary to reseal the shield. If it becomes necessary to replace an oscillator tube, use a glyptal cement or a generous application of Duco cement to reseal the shield.

5.6. DESICCANT CAPSULE. - A silica-gel tube is mounted on the top of the oscillator shield. The silica-gel absorbs moisture from within the oscillator and aids in retaining the oscillator calibration. Moisture causes the color of the silica-gel to change from blue to pink. The silica-gel tube is screwed into a hole in the shield. The plastic tube should be replaced by a new tube of silica-gel when all of the material within the tube has changed from blue to pink. New tubes of silica-gel may be ordered from the Collins Radio Co.

NOTE

The seal around the oscillator tube shield and the silica-gel tube is more easily broken if the parts are warm. This can be done safely with a light bulb or infrared lamp placed close to the oscillator.

TYPICAL TEST VOLTAGES

DC Voltages to Ground measured with Volt-ohmyst. Conditions: Phone - No Mod. Readings taken at LF end of each band.

Tube	Pin	R.F.					
		3.5	7.0	14.0	21.0	27.2	28.0
V101	6AK6						
G1	1	-17.0	-16.5	-1.0	-0.9	-1.0	-0.9
K	2, 7	1.0	1.0	2.9	2.85	2.85	2.9
P	5	235	230	230	225	225	225
G2	6	155	150	65	65	65	65
V102	6AG7						
K	1, 3, 5	2.6	2.6	3.9	3.2	3.4	3.2
G1	4	-18	-18	-36	-36	-38	-36
G2	6	220	215	205	205	205	210
P	8	230	230	220	220	225	225
V103	7C5						
P	2	235	235	215	210	215	215
G2	3						
G1	6	-24	-23	-56	-21	-69	-51
K	7	25	25	27	27	26	26
V104	7C5						
P	2	225	220	215	215	215	215
G2	3						
G1	6	-115	-110	-170	-175	-150	-150
K	7	-59	-56	-52	-52	-51	-50
V105	RK-4D32						
G2	2	285	300	300	300	295	295
K	4, 5	0	0	0	0	0	0
G1	6	-120	-100	-93	-105	-105	-102
P	Cap	690	680	690	690	690	690

DC Voltages to Ground in Audio System (Volt-ohmyst)

4D32 Plate Current = 220 MA EP = 700 V Key Down

Audio Amplifier V201, 6SL7GT				Driver V202, 6SN7GT			Modulator V203, & 4, 807			Sidetone Osc V205, 6SL7GT		
		PH	CW		PH	CW		PH	CW		PH	CW
Pin 1	G	-0.6	-0.8	G	0	0				G	-.5	-3.0
2	P	88	-0.9	P	235	235	G2	285	0	P	-.8	25
3	K	0	0	K	7.4	7.4	G1	-25	-25	K	0	0
4	G	0	0	G	0	0	K	0	0	G	-.3	-0.5
5	P	100	100	P	235	235	--	---	---	P	-.8	24
6	K	0.8	0.8	K	7.4	7.4	P	720	740	K	0	---
7												
8												

Key up - key down conditions of V105 (4D32)
CW operation
F = 7 mc

	Key up	Key down
Plate E	820	740
Plate I	0	220
Screen E	300	300

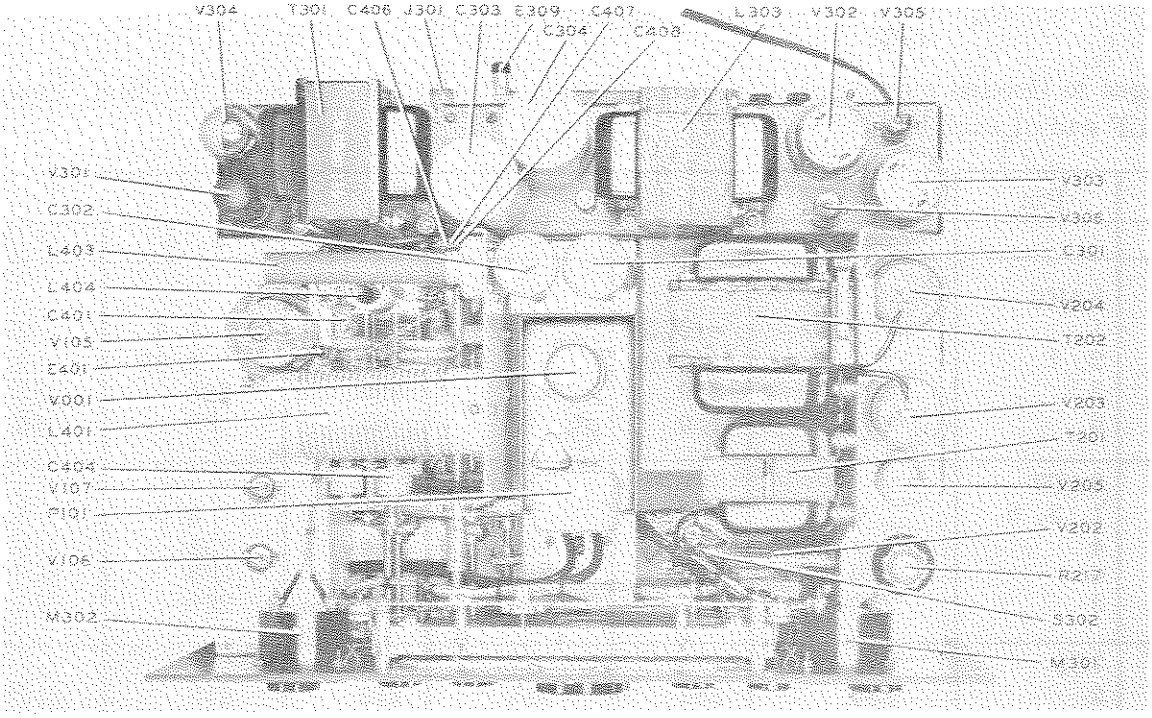

Figure 5-2. 32V-2 Parts Arrangement - Top View

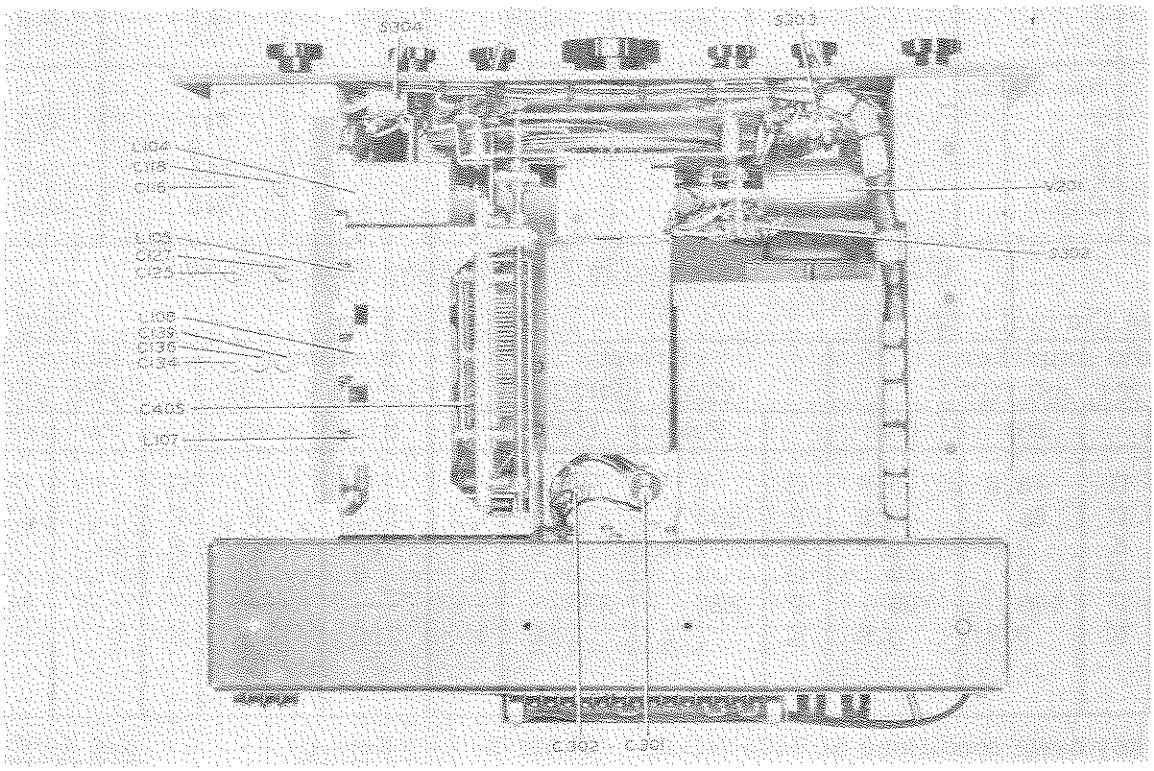

Figure 5-3. 32V-2 Parts Arrangement - Bottom View

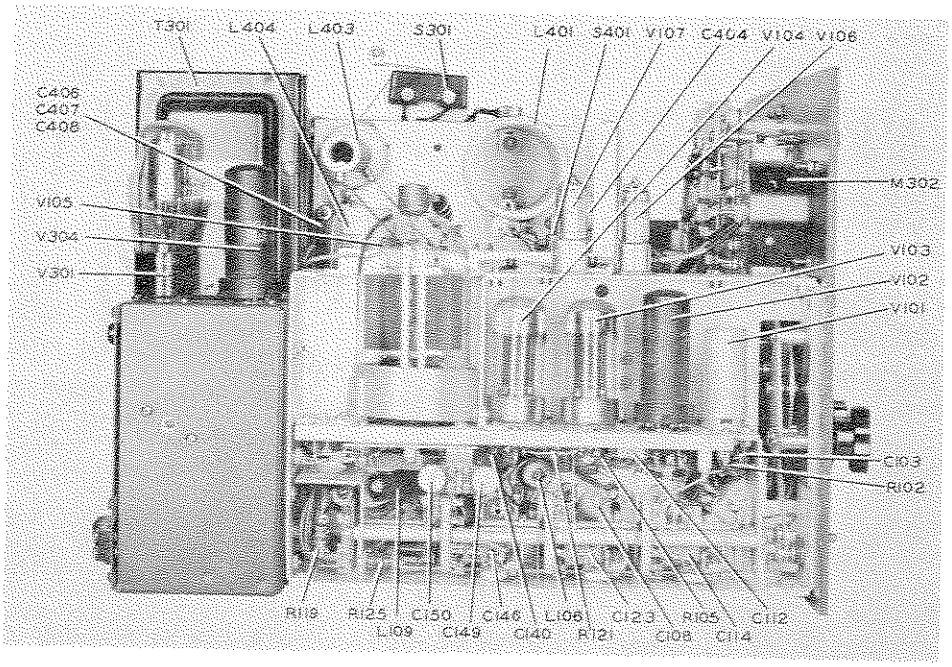

Figure 5-4. 32V-2 Parts Arrangement - Left Side Open

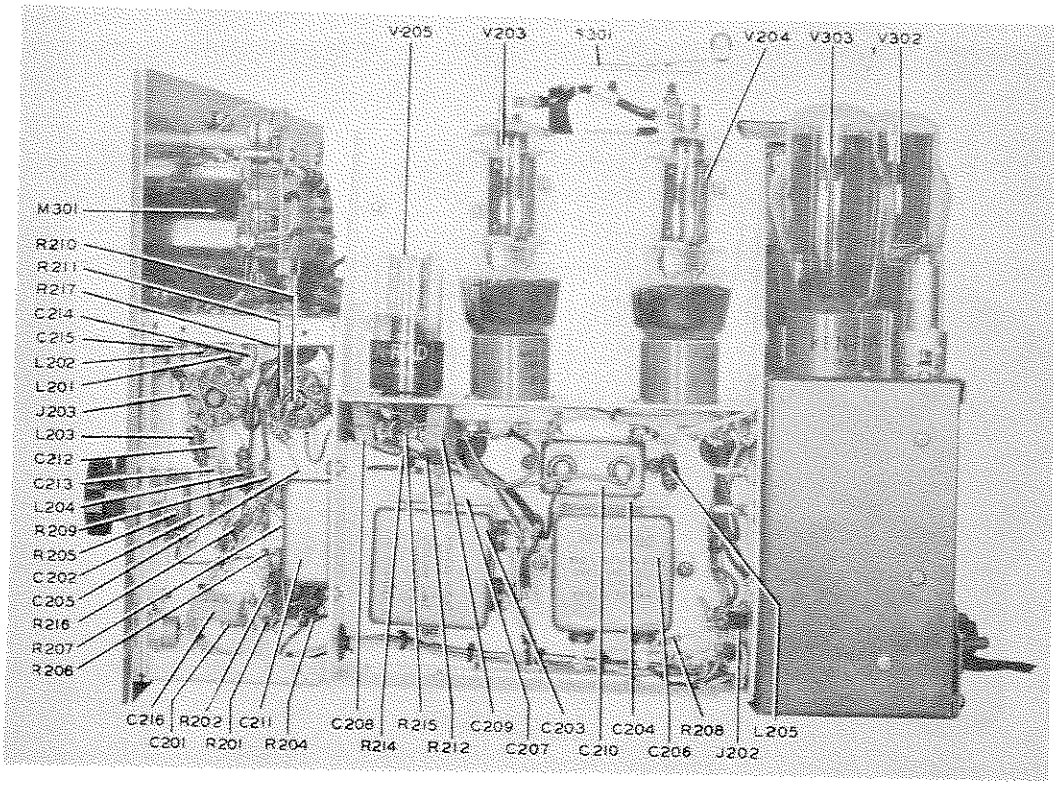

Figure 5-5. 32V-2 Parts Arrangement - Right Side Open

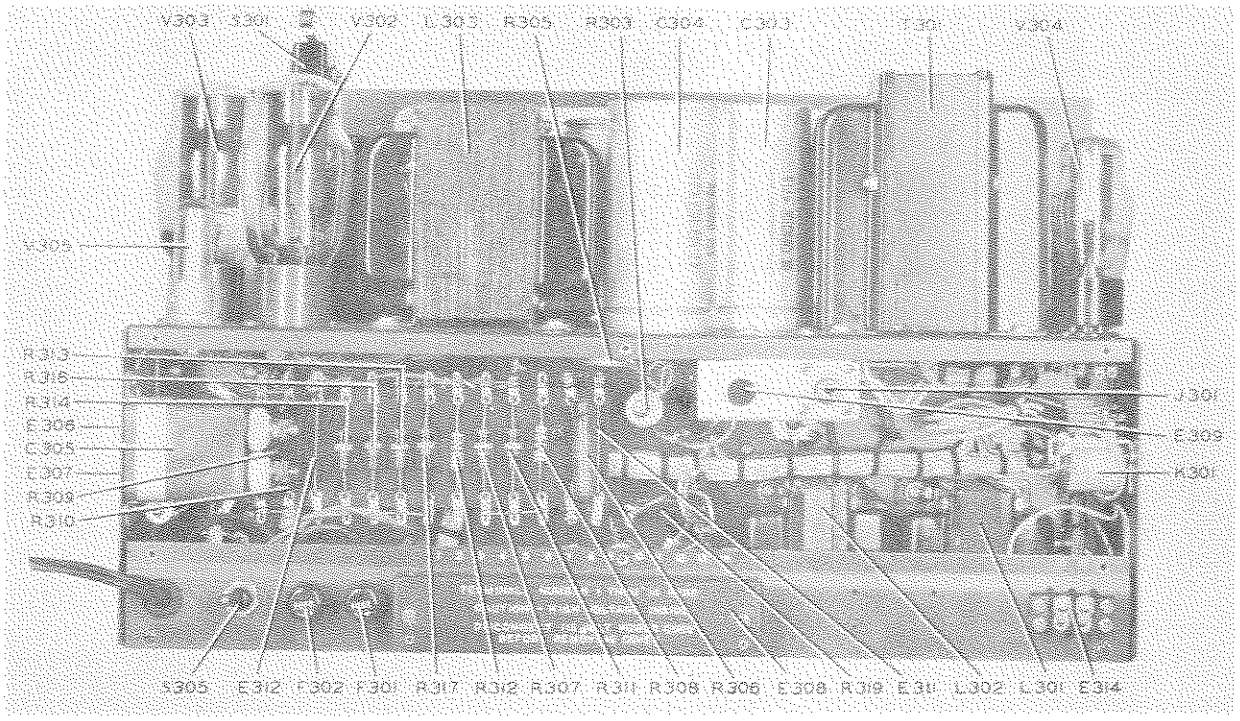

Figure 5-6. 32V-2 Parts Arrangement - Rear Open

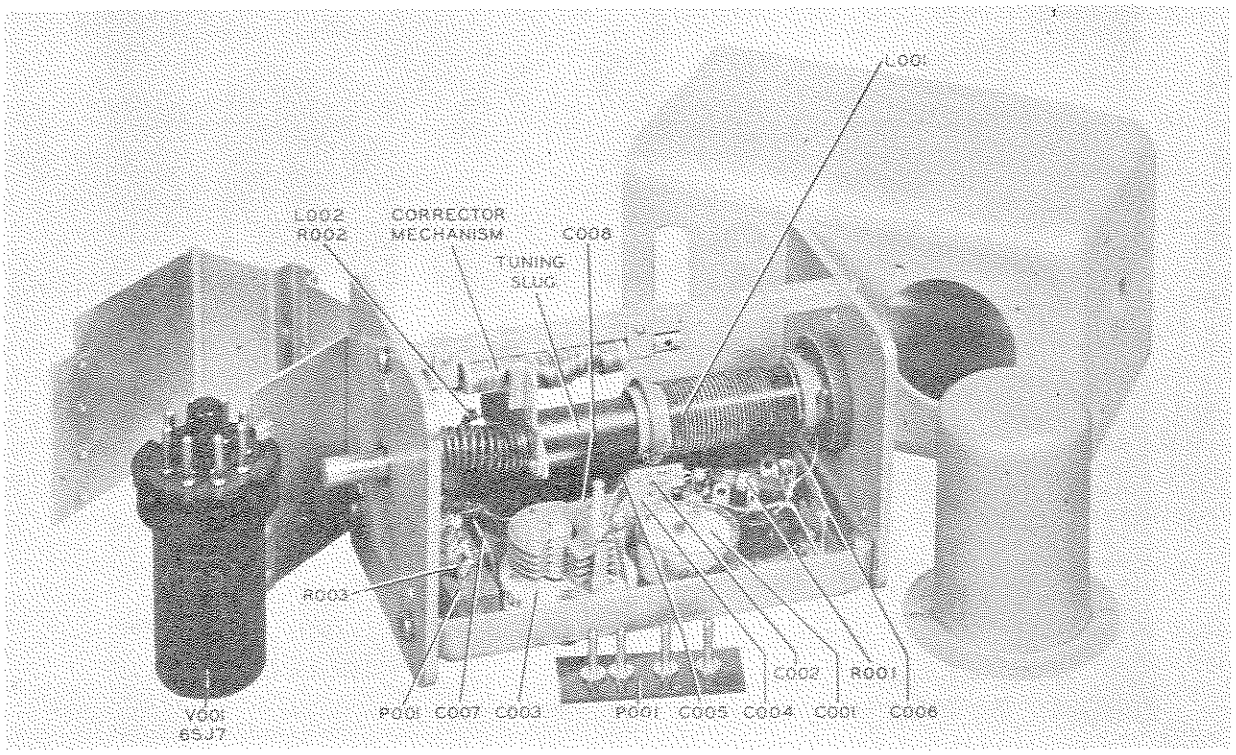

Figure 5-7. Parts Arrangement 70E-8A - Open

SECTION 6

PARTS LIST

32V-2 TRANSMITTER

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C101	Buffer Amp Coupling	CAPACITOR: Ceramic; 30 uuf ±2%; 500 wv	913 0118 00
C102	Osc Plate Filter	CAPACITOR: Ceramic; 10,000 uuf ±20%; 350 wv	913 0106 00
C103	Buffer Grid Voltage	CAPACITOR: Ceramic; 30 uuf ±2%; 500 wv	913 0118 00
C104	Buffer Cathode Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C105	Buffer Screen Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C106	Buffer Plate Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C107	1st Mult Coupling	CAPACITOR: Ceramic; 100 uuf ±10%; 500 wv	916 4003 00
C108	1st Mult Grid Bypass	CAPACITOR: Paper; 100,000 ±10%; 400 wv	931 3020 00
C109	1st Mult Cathode Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C110	1st Mult Screen Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C111	Key Click Filter	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C112	2nd Mult Coupling	CAPACITOR: Ceramic; 100 uuf ±10%; 500 wv	916 4003 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C113	1st Mult Plate Bypass	CAPACITOR: Mica; 650 uuf ±2%; 500 wv	935 5061 00
C114	1st Mult Plate Tuning	CAPACITOR: Mica; 22 uuf ±5%; 500 wv	935 0077 00
C115	1st Mult Plate Tuning	CAPACITOR: Mica; 22 uuf ±10%; 500 wv	935 0078 00
C116	1st Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C117	1st Mult Plate Tuning	CAPACITOR: Mica; 180 uuf ±5%; 500 wv	935 0116 00
C118	1st Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C119	2nd Mult Screen Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C120	2nd Mult Screen Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C121	2nd Mult Plate Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C122	3rd Mult Coupling	CAPACITOR: Ceramic; 100 uf ±10%; 500 wv	916 4003 00
C123	2nd Mult Plate Tuning	CAPACITOR: Mica; 20 uuf ±5%; 500 wv	935 0076 00
C124	2nd Mult Plate Tuning	CAPACITOR: Mica; 22 uuf ±10%; 500 wv	935 0078 00
C125	2nd Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C126	2nd Mult Plate Tuning	CAPACITOR: Mica; 150 uuf ±2%; 500 wv	935 0184 00
C127	2nd Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C128	3rd Mult Cathode Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C129	3rd Mult Screen Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C130	3rd Mult Screen Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C131	3rd Mult Plate Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C132	3rd Mult Plate Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C133	2nd Mult Cathode Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C134	3rd Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C135		CAPACITOR: Not used	
C136	3rd Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C137	3rd Mult Plate Tuning	CAPACITOR: Mica; 120 uuf ±5%; 500 wv	935 0109 00
C138		CAPACITOR: Not used	
C139	3rd Mult Plate Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C140	PA Coupling	CAPACITOR: Ceramic; 100 uuf ±10%; 500 wv	916 4003 00
C141	PA Grid Bypass	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C142	PA Screen Bypass	CAPACITOR: Mica; 1000 uuf ±20%; 2500 wv	936 0250 00
C143		CAPACITOR: Not used	

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C144	PA Filament Bypass	CAPACITOR: Mica; 500 uuf ±20%; 500 wv	912 0302 00
C145	3rd Mult Plate Blocking	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C146	3rd Mult Plate Tuning	CAPACITOR: Mica; 20 uuf ±5%; 500 wv	935 0076 00
C147	160 Meter Tap Tuning	CAPACITOR: Ceramic 8-50 uuf; 350 wv	917 1038 00
C148	80 Meter Tap Fixed Tuning	CAPACITOR: Mica; 120 uuf ±5%; 500 wv	935 0109 00
C149	80 Meter Tap Var. Tuning	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C150	L108 Trimmer	CAPACITOR: Ceramic; 8-50 uuf; 350 wv	917 1038 00
C201	Audio Input r-f Filter	CAPACITOR: Mica; 47 uuf ±20%; 500 wv	935 0093 00
C202	Audio coupling	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C203	V201 plate bypass	CAPACITOR: Paper; 2 uf ±10%; 600 wv	930 0046 00
C204	V201 plate bypass	CAPACITOR: Paper; 2 uf ±10%; 600 wv	930 0046 00
C205	Driver grid coupling	CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C206	Driver cathode bypass	CAPACITOR: Paper; 2 uf ±10%; 600 wv	930 0046 00
C207	Mod cathode bypass	CAPACITOR: Paper; 2 uf ±10%; 600 wv	930 0046 00
C208	Sidetone feedback	CAPACITOR: Mica; 10,000 uf ±10%; 300 wv	935 2117 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C209	Sidetone feedback	CAPACITOR: Mica; 10,000 mmf p/m 10%; 300 wv	935 2117 00
C210	Sidetone coupling	CAPACITOR: Paper; 0.5 uf ±20%; 600 wv	956 2086 40
C211	Audio plate decoupling	CAPACITOR: Paper; 0.5 uf ±20%; 600 wv	956 2086 40
C212	R-f bypass	CAPACITOR: Mica; 47 uuf ±20%; 500 wv	935 0093 00
C213	R-f bypass	CAPACITOR: Mica; 47 uuf ±20%; 500 wv	935 0093 00
C214	R-f bypass	CAPACITOR: Mica; 47 uuf ±20%; 500 wv	935 0093 00
C215	R-f bypass	CAPACITOR: Mica; 47 uuf ±20%; 500 wv	935 0093 00
C216		CAPACITOR: Mica; 10,000 uuf ±10%; 300 wv	935 2117 00
C301	LV rect filter	CAPACITOR: Paper; 4 uf plus 40 -15%; 600 wv	961 3005 00
C302	LV rect filter	CAPACITOR: Paper; 4 uf plus 40 -15%; 600 wv	961 3005 00
C303	HV rect filter	CAPACITOR: Paper; 8 uf ±20%; 1000 wv	930 0150 00
C304		CAPACITOR: Not used	
C305		CAPACITOR: Paper; 0.25 uuf ±10%; 2000 wv	930 7220 00
C401	PA plate blocking	CAPACITOR: Mica; 1000 uuf ±20%; 2500 wv	936 0250 00
C402	PA plate bypass	CAPACITOR: Mica; 2200 uuf ±20%; 2500 wv	936 1083 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C403	Final tuning	CAPACITOR: Variable air dielectric dual sect; 10-150 uuf per sect	920 0011 00
C403A	Part of C403	CAPACITOR: Section of C403	
C403B	Part of C403	CAPACITOR: Section of C403	
C404	Antenna network	CAPACITOR: Ceramic; 50 uuf ±10%; wv; 2500 vrms at 2 mc, 1000 v rms at 16 mc	913 4503 20
C405	Antenna loading	CAPACITOR: Variable air dielectric single sect; 15-300 uuf	920 0014 00
C406	Antenna loading	CAPACITOR: Mica; 220 uuf ±10%; 2500 wv	936 0205 00
C407	Antenna loading	CAPACITOR: Mica; 470 uuf ±5%; 2500 wv	936 0226 00
C408	Antenna loading	CAPACITOR: Mica; 220 uuf ±10%; 2500 wv	936 0205 00
E304	Wire tie point	TERMINAL: Ceramic bushing 13/32" dia x 5/16" thk w/solder lug 17/32" lg	190 1103 00
E305	Wire tie point	TERMINAL: Ceramic bushing 13/32" dia x 5/16" thk w/solder lug 17/32" lg	190 1103 00
E306	Wire tie point	TERMINAL: Ceramic bushing 13/32" dia x 5/16" thk w/solder lug 17/32" lg	190 1103 00
E307	Wire tie point	TERMINAL: Ceramic bushing 13/32" dia x 5/16" thk w/solder lug 17/32" lg	190 1103 00
E308	Rear terminal strip	CONNECTOR: 14 term, barrier type strip w/lugs on back	367 0022 00
E309	Ground connector	POST, BINDING: Push type; 1/8" wire hole	372 1400 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
E313	Wire tie point	TERMINAL: Ceramic bushing 13/32" dia x 5/16" thk w/solder lug 17/32" lg	190 1103 00
E314	Sidetone and muting	TERMINAL STRIP: Bakelite; 2 terminals	367 0010 00
E401	Parasitic suppressor	CHOKE: 3T no. 20 wire; wound on 100 ohm 2 watt resistor	503 3452 002
F301	LV and filament	FUSE: 3 amp; 250 v	264 4080 00
F302	High voltage	FUSE: 5 amp; 250 v	264 4090 00
I301	Pilot lamp	BULB: Pilot light; 110 v, 55 ma; 6 w; candelabra base; T4-1/2 bulb	262 3330 00
I302	Pilot lamp	BULB: Pilot light; 110 v, 55 ma; 6 w; candelabra base; T4-1/2 bulb	262 3330 00
I303	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I304	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I305	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I306	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I307	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I308	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I309	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I310	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
I311	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
I312	Dial lamp	BULB: Pilot light; 6 v, 0.2 amp; midget flange base; T1-3/4 bulb	262 0023 00
J101	Key	JACK: Phone single circuit, midget	260 0008 00
J102	Cable	CONNECTOR: Std octal socket	220 1850 00
J201	Microphone	CONNECTOR: 2 female contacts; wall mtg	369 1004 00
J202	Modulator	CONNECTOR: Std octal socket	220 1850 00
J203	Side-tone power	CONNECTOR: Std octal socket	220 1850 00
J301	Antenna Connector	CONNECTOR: Single round female contact	357 9005 00
K301	Carrier control	RELAY: Circuit control; contacts 1A1B1A and 2A; 48 v coil	970 1014 00
L101	Osc plate choke	COIL: R-f choke; 4 pi; duo-lat wound; 2.5 mh p/m 20%; 0.125 amp	240 2100 00
L103	Buffer plate choke	COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L104	1st Mult tuning	COIL: LF; 38T no. 28 wire	503 2896 002
L105	2nd mult tuning	COIL: MF; 17.3T no. 28 wire	503 2895 002
L106	2nd mult plate choke	COIL: R-f choke; 2 pi; duo-lat wound; 208 uh	240 6000 00
L107	3rd mult tuning	COIL: HF 7.6T no. 28 wire	503 2835 001
L108	3rd mult tuning	COIL: LF; 38T no. 28 wire	503 2896 002
L109	PA grid choke	COIL: R-f choke; 4 pi; duo-lat wound; 2.5 mh ±20%; 0.125 amp	240 2100 00
L110	3rd mult tuning	COIL: 23T no. 26 wire	503 4512 001
L111	1st mult plate choke	COIL: R-f choke; 3 pi; universal wound; 1 mh plus 20 -10%	240 0047 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
L112	3rd mult plate choke	COIL: R-f choke; 3 pi; universal wound; 1 mh plus 20 -10%	240 0047 00
L201	Side-tone input filter: choke	COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L202	Side-tone output filter choke	COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L203	Side-tone audio input r-f choke	COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L204	Audio r-f filter choke	COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L205		COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L206		COIL: R-f choke; 500 uh ±10%; 4 pi; universal wound	240 0042 00
L301	LV filter	REACTOR, FILTER: 11 hy ±15%	668 0012 00
L302	LV filter	REACTOR, FILTER: 11 hy ±15%	668 0012 00
L303	HV filter	REACTOR, FILTER: 5 hy ±15%	668 0055 00
L401	PA plate tuning	COIL: LF tank; 20T no. 14 wire	503 2892 002
L402	PA plate tuning (28 mc)	COIL: HF tank; 5T silver pl copper tubing	503 2831 001
L403	PA plate choke	COIL: R-f choke; 5 pi; duo-lat wound; 3.5 mh ±10%	504 3667 003
L404	Network coil	COIL: Output; 32 turns; no. 18 wire	503 6486 001
M301	Mult purpose	METER: 0-5 ma d-c; 50 scale div; marked 0-250, 0-500, 0-1000	458 0110 00
M302	PA plate	METER: 0-500 mc d-c; 50 scale div	450 1500 00
P101	Osc power	CONNECTOR: 4 prong plug; part of oscillator filter assem	503 2868 002

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
P201	Microphone	CONNECTOR: 2 prong plug	369 1005 00
P301	Modulator power	CONNECTOR: Std 8 term octal plug	369 1009 00
P302	R-f circuits power	CONNECTOR: Std 8 term octal plug	369 1009 00
P303	Side-tone power	CONNECTOR: Std 8 term octal plug	369 1009 00
P304		CONNECTOR: Single round male contact	357 9006 00
R101		RESISTOR: Not used	
R102	Buffer grid	RESISTOR: 22,000 ohm ±10%; 1/2 w	745 1142 00
R103	Buffer cathode	RESISTOR: 560 ohm ±10%; 1/2 w	745 1076 00
R104	Buffer screen	RESISTOR: 0.33 megohm ±10%; 1/2 w	745 1191 00
R105	V101, V102, V103 grid	RESISTOR: 0.10 megohm ±10%; 1/2 w	745 1170 00
R106	1st mult grid	RESISTOR: 0.10 megohm ±10%; 1/2 w	745 1170 00
R107	1st mult cathode	RESISTOR: 820 ohm ±10%; 1/2 w	745 1083 00
R108	1st mult screen	RESISTOR: 22,000 ohm ±10%; 1/2 w	745 1142 00
R109	1st mult plate decoupling	RESISTOR: 1000 ohm ±10%; 1 w	745 3086 00
R110	2nd mult grid	RESISTOR: 0.10 megohm ±10%; 1/2 w	745 1170 00
R111	2nd mult screen	RESISTOR: 10,000 ohm ±10%; 1/2 w	745 1128 00
R112	2nd mult plate decoupling	RESISTOR: 1000 ohm ±10%; 1 w	745 3086 00
R113	3rd mult grid	RESISTOR: 0.10 megohm ±10%; 1/2 w	745 1170 00
R114	3rd mult screen	RESISTOR: 10,000 ohm ±10%; 1/2 w	745 1128 00
R115	3rd mult plate decoupling	RESISTOR: 470 ohm ±10%; 1 w	745 3072 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
R116	3rd mult plate decoupling	RESISTOR: 370 ohm ±10%; 1 w	745 3072 00
R117	3rd mult grid stabilizer	RESISTOR: 10 ohm ±10%; 1/2 w	745 1002 00
R118	2nd mult cathode	RESISTOR: 1500 ohm ±10%; 1/2 w	745 1093 00
R119	PA grid meter shunt	RESISTOR: 6.2 ohm ±5%; 1/2 w	707 0104 00
R120	PA grid	RESISTOR: 3300 ohm ±10%; 1 w	745 3107 00
R121	3rd mult grid voltage divider	RESISTOR: 0.22 megohm ±10%; 1/2 w	745 1184 00
R122	3rd mult grid return	RESISTOR: 680 ohm ±10%; 2 w	745 5079 00
R123	PA screen stabilizer	RESISTOR: 47 ohm ±10%; 1 w	745 3030 00
R124		RESISTOR: Not used	
R125	Dial light dropping	RESISTOR: 2 ohm ±10%; 2 w	710 1070 00
R126		RESISTOR: 4600 ohm ±10%; 2 w	745 5118 00
R127		RESISTOR: 5600 ohm ±10%; 2 w	745 5118 00
R201	Audio input r-f filter	RESISTOR: 4700 ohm ±10%; 1/2 w	745 1114 00
R202	V201 grid	RESISTOR: 1.0 megohm ±10%; 1/2 w	745 1212 00
R203		RESISTOR: Not used	
R204	V201 cathode	RESISTOR: 4700 ohm ±10% 1/2 w	745 1114 00
R205	Audio gain control	RESISTOR: 0.5 megohm ±20%; 1/2 w	376 3027 00
R206	V201 plate	RESISTOR: 0.47 megohm ±10%; 1/2 w	745 1198 00
R207	V201 plate	RESISTOR: 0.47 megohm ±10%; 1/2 w	745 1198 00
R208	V201 plate decoupling	RESISTOR: 47,000 ohm ±10%; 1/2 w	745 1156 00
R209	V201 plate decoupling	RESISTOR: 47,000 ohm ±10%; 1/2 w	745 1156 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
R210	V202 grid	RESISTOR: 0.47 megohm ±10%; 1/2 w	745 1198 00
R211	V202 cathode	RESISTOR: 560 ohm ±10%; 1/2 w	745 1076 00
R212	Side-tone plate	RESISTOR: 22,000 ohm ±10%; 1/2 w	745 1142 00
R213	Side-tone plate	RESISTOR: 22,000 ohm ±10%; 1/2 w	745 1142 00
R214	Side-tone grid	RESISTOR: 4700 ohm ±10%; 1/2 w	745 1114 00
R215	Side-tone grid	RESISTOR: 10,000 ohm ±10%; 1/2 w	745 1128 00
R216	Audio decoupling	RESISTOR: 22,000 ohm ±10%; 1 w	745 3100 00
R217	Side-tone pitch control	RESISTOR: 0.5 megohm ±20%; 1/2 w	376 3027 00
R301	V105 screen dropping	RESISTOR: 12,000 ohm ±5%; 25 w	710 0366 00
R302		RESISTOR: Not used	
R303	Load stabilizing	RESISTOR: 7500 ohm ±10%; 25 w size	710 0069 00
R304	V105 screen bleeder	RESISTOR: 25,000 ohm ±10%; 25 w size	710 3254 20
R305	Mod bias control	RESISTOR: Variable; ww; 1000 ohm ±10%; 4 w	377 0007 00
R306	Bias bleeder	RESISTOR: 750 ohm ±5%; 10 w	710 1750 10
R307	LV bleeder	RESISTOR: 0.10 megohm ±5%; 2 w	745 5169 00
R308	LV meter shunt	RESISTOR: 25 ohm ±5%; 1/2 w	701 0001 00
R309	Relay voltage divider	RESISTOR: 5000 ohm ±10%; 10 w	710 1542 00
R310	Relay voltage divider	RESISTOR: 7500 ohm ±10%; 10 w	710 0033 00
R311	LV bleeder	RESISTOR: 0.10 megohm ±5%; 2 w	745 5169 00
R312	HV meter shunt	RESISTOR: 25 ohm ±5%; 1/2 w	701 0001 00
R313	HV bleeder	RESISTOR: 0.10 megohm ±5%; 2 w	745 5169 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
R314	HV bleeder	RESISTOR: 0.10 megohm ±5%; 2 w	745 5169 00
R315	Mod shunt meter	RESISTOR: Wire wound; 0.51 ohm ±5%; 1/2 w	707 0026 00
R316	HV bleeder	RESISTOR: 0.10 megohm ±5%; 2 w	745 5169 00
R317	HV bleeder	RESISTOR: 0.10 megohm ±5%; 2 w	745 5169 00
R318	Mod ind. shunt	RESISTOR: 25 ohm ±5%; 1/2 w	701 0001 00
R319		RESISTOR: 2000 ohm ±10%; 10 w	710 1242 00
R320	Series tuning	RESISTOR: Wire wound; 15 ohm ±10%; 0.25 w	710 3152 00
R321	Series tuning	RESISTOR: Wire wound; 15 ohm ±10%; 0.25 w	710 3152 00
S101	Band change switch	SWITCH: 8 pole, 5 pos, 4 sect; nonshorting	503 2923 004
S101A		SWITCH: Part of S101	
S101B		SWITCH: Part of S101	
S101C		SWITCH: Part of S101	
S101D		SWITCH: Part of S101	
S101E		SWITCH: Part of S101	
S101F		SWITCH: Part of S101	
S101G		SWITCH: Part of S101	
S101H		SWITCH: Part of S101	
S301	Cabinet lid interlock	SWITCH: SP normally open snap switch	260 0708 00
S302	Emission selector	SWITCH: Band change; 8 pole; 3 pos; 3 sect; nonshorting	259 0264 00
S302A		SWITCH: Part of S302	

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
S302B		SWITCH: Part of S302	
S302C		SWITCH: Part of S302	
S302D		SWITCH: Part of S302	
S302E		SWITCH: Part of S302	
S302F		SWITCH: Part of S302	
S302G		SWITCH: Part of S302	
S302H		SWITCH: Part of S302	
S303	High voltage switch	SWITCH: Spst toggle; 25 amp	266 1040 00
S304	Low voltage switch	SWITCH: Spst toggle; 25 amp	266 1040 00
S305	600-700 v selector	SWITCH: Dpdt toggle; 1 amp 250 v, 3 amp 125 v	260 0892 00
S306	Meter selector	SWITCH: Band change; 2 pole, 5 pos, 1 sect; nonshorting	259 0045 00
S306A		SWITCH: Part of S306	
S306B		SWITCH: Part of S306	
S307		SWITCH: Spst toggle; 3 amp 250 v	260 0857 00
S401	PA plate circuit	SWITCH: Band change; 2 pole, 5 pos, 1 sect; shorting	259 0043 00
S401A		SWITCH: Part of S401	
S401B		SWITCH: Part of S401	
S402	Antenna loading	SWITCH: Band change; 6 position, shorting type	269 1248 00
T201	Modulator input	TRANSFORMER: Driver; pri; 12,000 ohm, sec: 5300 ohm ct, freq resp 300-3500 cps ±3 db	667 0011 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
T202	Modulation	TRANSFORMER: Mod; pri; 7000 ohm ct, 100 ma d-c max, bal; sec; 500/3750 ohm, 200 ma d-c, unbal; freq resp 300/3500 cps ±3 db; 60 w	667 0010 00
T301	Low voltage	TRANSFORMER: Power; pri; 115 v sec no. 1: 850 v ct; sec no. 2: 5 v, 4 amp; sec no. 3: 5 v, 4 amp; sec no. 4: 6.3 v, 9 amp 50/60 cps	662 0009 00
T302	High voltage	TRANSFORMER: Power; 50/60 cps; pri: 115 v; sec: 1100 v ct, w/pri leads no. 1 and no. 2 on 115 v, sec leads no. 4 and no. 6 should be 1370 v rms	662 0014 00
V101	Buffer amp	TUBE: Type 6AK6; power amp pentode; miniature	254 0632 00
V102	1st multiplier	TUBE: Type 6AG7; video power amp pentode	254 0120 00
V103	2nd multiplier	TUBE: Type 7C5; beam power amp octalox	254 0217 00
V104	3rd multiplier	TUBE: Type 7C5; beam power amp octalox	254 0217 00
V105	Power amplifier	TUBE: Type RK-4D32; tetrode	256 0078 00
V106		TUBE: OA2 voltage regulator	257 0052 00
V107		TUBE: OB2 voltage regulator	257 0058 00
V201	1st and 2nd audio	TUBE: Type 6SL7GT; twin-triode amp	254 0187 00
V202	Audio driver	TUBE: Type 6SN7GT; twin-triode amp	254 0188 00
V203	Modulator	TUBE: Type 807; transmitting beam power amp	254 0391 00
V204	Modulator	TUBE: Type 807; transmitting beam power amp	254 0391 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
V205	Side-tone oscillator	TUBE: Type 6SL7GT; twin-triode amp	254 0187 00
V301	Low voltage rectifier	TUBE: Type 5Z4; full wave hi-vac	254 0110 00
V302	High voltage rectifier	TUBE: Type 5R4GY; full-wave hi-vac rect	254 0099 00
V303	High voltage rectifier	TUBE: Type 5R4GY; full-wave hi-vac rect	254 0099 00
V304	Bias voltage regulator	TUBE: Type OA3/BR-75; voltage regulator	257 0008 00
V305	Screen voltage limiter	TUBE: Type OA2; voltage limiter	257 0052 00
V306	Screen voltage limiter	TUBE: Type OA2; voltage limiter	257 0052 00
XV101	Socket for V101	SOCKET, TUBE: Miniature shielded	220 1003 00
XV102	Socket for V102	SOCKET, TUBE: Octal, bakelite	220 1850 00
XV103	Socket for V103	SOCKET, TUBE: Loktal bakelite	220 1002 00
XV104	Socket for V104	SOCKET, TUBE: Loktal bakelite	220 1002 00
XV105	Socket for V105	SOCKET, TUBE: 7 prong ceramic w/clips	220 1072 00
XV106		SOCKET, TUBE: Miniature shielded	220 1003 00
XV107		SOCKET, TUBE: Miniature shielded	220 1003 00
XV201	Socket for V201	SOCKET, TUBE: Octal, bakelite	220 1850 00
XV202	Socket for V202	SOCKET, TUBE: Octal, bakelite	220 1850 00
XV203	Socket for V203	SOCKET, TUBE: 5 prong ceramic w/clips	220 5520 00
XV204	Socket for V204	SOCKET, TUBE: 5 prong ceramic w/clips	220 5520 00
XV205	Socket for V205	SOCKET, TUBE: Octal, bakelite	220 1850 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
XV301	Socket for V301	SOCKET, TUBE: Octal, bakelite	220 1850 00
XV302	Socket for V302	SOCKET, TUBE: Octal ceramic w/clips and keyway	220 5810 00
XV303	Socket for V303	SOCKET, TUBE: Octal ceramic w/clips and keyway	220 5810 00
XV304	Socket for V304	SOCKET, TUBE: Octal, bakelite	220 1850 00
XV305	Socket for V305	SOCKET, TUBE: Miniature, 7 term	220 1003 00
XV306	Socket for V306	SOCKET, TUBE: Miniature, 7 term	220 1003 00
XF301	Holder for F301	HOLDER, FUSE: Extractor post for 1/4" x 1-1/4" fuses	265 1002 00
XF302	Holder for F302	HOLDER, FUSE: Extractor post for 1/4" x 1-1/4" fuses	265 1002 00
XI301	Mtg for I301	MTG, PILOT LIGHT: Bracket for candelabra base bulb	262 1320 00
XI302	Mtg for I302	MTG, PILOT LIGHT: Bracket for candelabra base bulb	262 1320 00
	Jewel for I302	JEWEL: Pilot light; red faceted	262 2110 00

The 70E-8A oscillator used in this equipment has been dehydrated and hermetically sealed. If servicing is required, it should be returned to the Collins Radio Company.

COLLINS