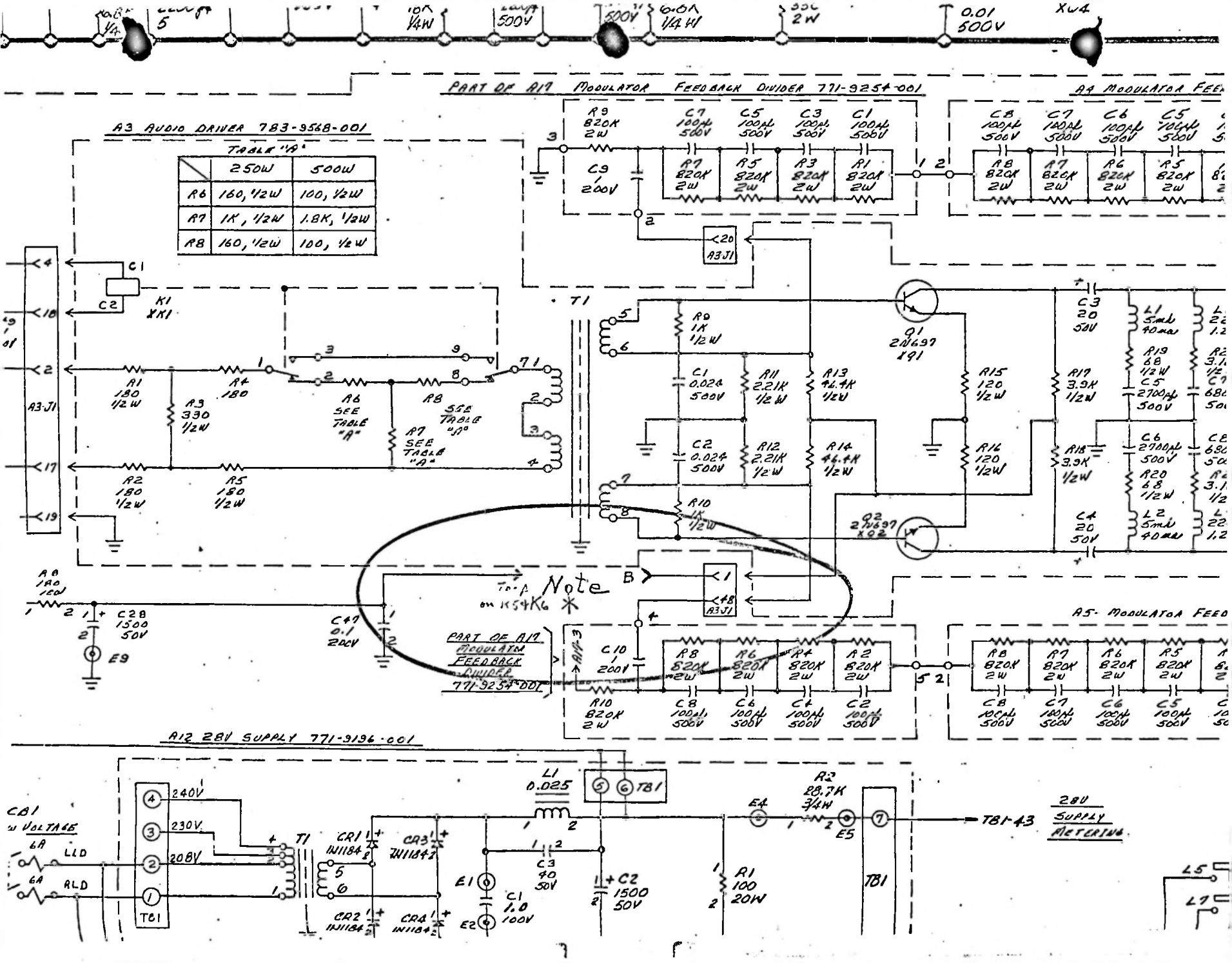
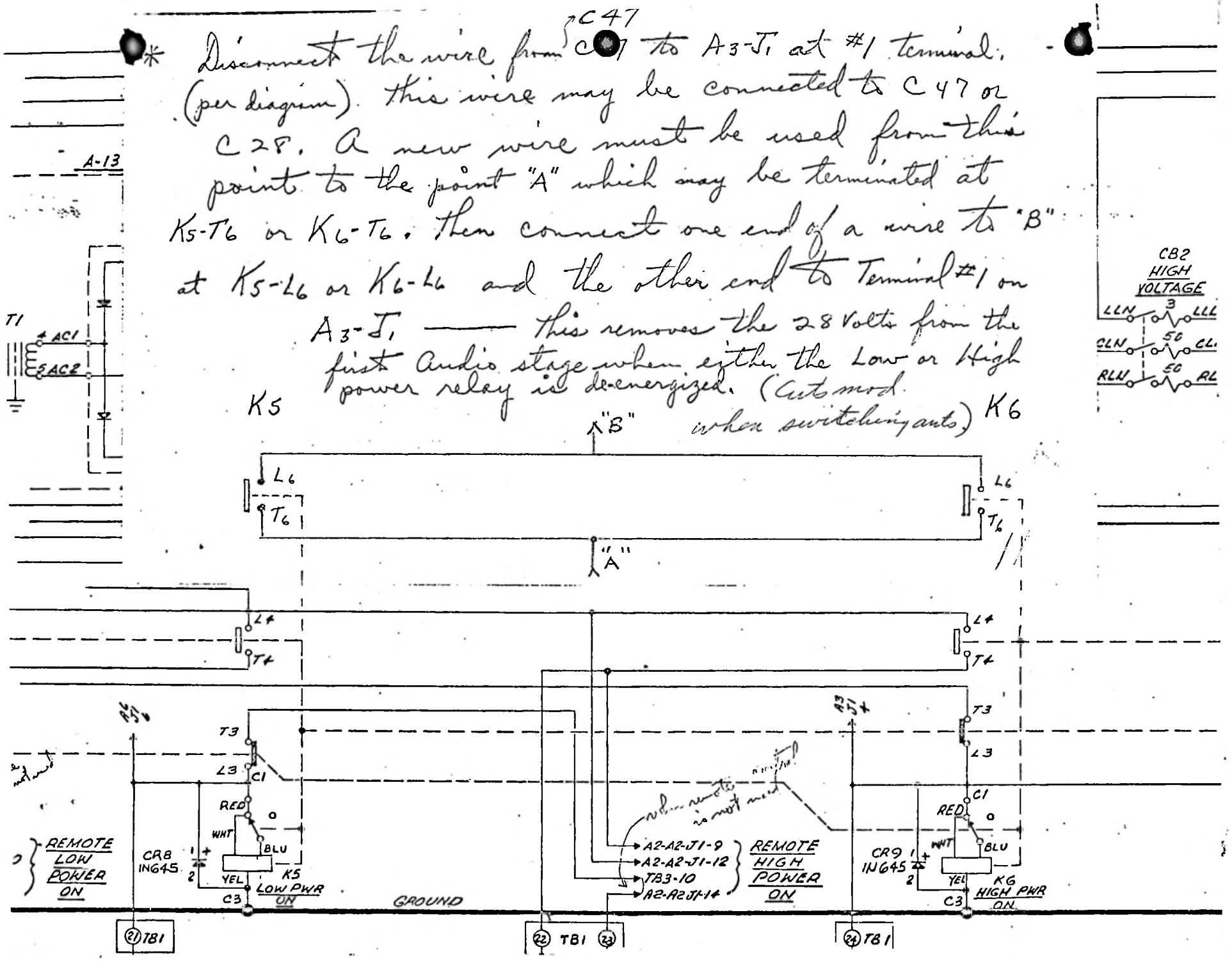

PART OF A17 MODULATOR FEEDBACK DIVIDER 771-9254-001
A4 MODULATOR FEE
A3 AUDIO DRIVER 783-9568-001
TABLE "A"
250W
500W
R6 160, 1/2W 100, 1/2W
R7 1K, 1/2W 1.8K, 1/2W
R8 160, 1/2W 100, 1/2W
A3-J1
K1 XK1
T1
Q1 2N697 A91
Q2 2N697 A92
Note To A on R54K6 *
PART OF A17 MODULATOR FEEDBACK DIVIDER 771-9254-001
A5 MODULATOR FEED
A12 28V SUPPLY 771-9196-001
CB1 W VOLTAGE
240V
230V
208V
TB1
CR1 IN1184
CR2 IN1184
CR3 IN1184
CR4 IN1184
L1 0.025
E1
E2
C1 1.0 100V
C2 1500 50V
C3 40 50V
R1 100 20W
R2 28.7K 3/4W
E4
E5
TB1-13
28V SUPPLY METERING
L5
L7

* Disconnect the wire from C47 to A3-J1 at #1 terminal. (per diagram) this wire may be connected to C47 or C28. A new wire must be used from this point to the point "A" which may be terminated at K5-T6 or K6-T6. Then connect one end of a wire to "B" at K5-L6 or K6-L6 and the other end to Terminal #1 on A3-J1 ——— this removes the 28 volts from the first Audio stage when either the Low or High power relay is de-energized. (Cuts mod when switching ants)



SIMPLIFIED PROCEDURE FOR ADJUSTING FILAMENT REGULATOR IN 820E/F-1 TRANSMITTERS

This procedure requires only a voltohmmeter capable of measuring 200 to 250 volts AC and a screwdriver.

The transmitter is tested and set up at 208V. in the factory, and when the customer has a substantially different line voltage, the filament regulator may be out of adjustment.

The connections to the variac in the simplified schematic on pages 4-7/4-8 are in error. Use the main transmitter schematic for proper connections.

The step by step procedure follows:

1. After transmitter is off the air, remove the lower right front panel.

2. Turn the "Raise Sensi" and Lower Sensi" both to minimum (CCW). Set "Voltage Adjust" to mid position.

3. Connect voltohmmeter leads between the wipers (Terminal 3) of each variac (T1A & T1B).

4. Turn on filaments. Push down variac knob and adjust for 225 to 230 VAC on meter. Continue to hold down knob. Adjust "Voltage Adjust" control and observe that drive motor and relay K1 (RAISE) operate at CCW and drive motor and K2 (LOWER) operate at CW with a small range between the two. (NOTE: If line voltage is high and range occurs at extreme end of adjustment, move wires on T1A-2 and T1B-2 to T1A-4 and T1B-4 respectively).

5. Set "Voltage Adjust" to center of the range noted above.

6. Adjust variac knob for 2 volts lower than initial setting. Hold down knob and turn "Raise Sensi" control CW until drive motor just starts.

7. Adjust variac knob for 2 volts greater than initial setting. Hold down knob and turn "Lower Sensi" control CW until drive motor just starts. This concludes the adjustment.

To verify proper operation, make the following checks:

1. Turn off filaments. Press down knob and turn variac full CCW.

2. Turn on filaments and observe that voltage returns to within 2 volts of original setting.

3. Turn off filaments. Press down knob and turn variac full CW. Repeat step 2.

If operation is not satisfactory, increase initial voltage setting 5 volts (step 4) and repeat adjustment procedure. This is necessary to compensate for high resistance in lamps DS1 and DS2.

If drive motor cycles continuously, regulator is improperly adjusted.

820E/F-5/10KW AM TRANSMITTER

SEMICONDUCTOR AND TUBE LIST

9-1-69

Quantity Complete Set	Quantity Recommended Set	CPN	Description
6	3	352-0464-010	2N2102
2	1	352-0583-010	2N3055
1	1	352-0197-000	2N697
3	2	352-3369-000	2N886
3	2	352-0631-010	2N3564
2	1	352-0626-010	2N3250
4	2	353-6468-010	C6F
1	1	353-3525-000	3N58
6	1	353-3601-020	3N85
30	4	353-2607-000	1N645
4	2	353-6467-040	1N4585
1	1	353-3132-000	1N3027B
1	1	353-3325-000	1N961B
4	2	353-1906-000	1N2611
1	1	353-3135-000	1N3030B
1	1	353-1418-000	1N2825A
1	1	353-3220-000	1N963A
1	1	353-1312-000	1N3017A
5	2	353-2906-000	1N914
2	1	353-1010-000	1N91
8	3	353-2937-000	1N746
1	1	353-3236-000	1N976A
1	1	353-6327-010	3Ø, 28V, Rectifier
2	1	353-6464-010	3Ø,Mod.Screen & PA Rectifier

Quantity Complete Set	Quantity Recommended Set	CPN	Description
2	1	353-0292-010	Mod. Screen Supply Thyrector
1	0	353-6465-010	H.V. Rectifier
0	1	353-6465-020	One leg of 353-6465-010 H.V. Rectifier

Semiconductors and transistors, 100% set including H.V. Plate rectifiers $1,064.43

Semiconductors and transistors, 100% set less H.V. Plate rectifiers $ 455.63

Semiconductors and transistors, recommended set including one leg of H.V. Plate rectifier $ 348.36

Semiconductors and transistors, recommended set, less H.V. Plate rectifiers $ 231.78

TUBES

820E-1

3	1	256-0122-000	4CX5000A
2	1	256-0200-000	6146B

100% Spare tube kit $1,495.30

Recommended spare tube kit $ 500.15

820F-1

4	1	256-0122-000	4CX5000A
2	1	256-0200-000	6146

100% Spare Tube Kit $1,990.30

Recommended spare tube kit $ 500.15

Eimac

EITEL-McCULLOUGH, INC.
SAN CARLOS, CALIFORNIA

8170
4CX5000A

RADIAL-BEAM POWER TETRODE

The Eimac 8170/4CX5000A is a compact high-power ceramic and metal tetrode cooled by forced air. It is useful as an oscillator, amplifier, or modulator at frequencies up to 110 megacycles and is particularly suited for use as a linear single-sideband amplified, class-AB$_1$ audio amplifier, or as a screen-modulated radio-frequency amplifier.

A pair of these tubes will deliver 17.5 kilowatts of audio-frequency or radio-frequency power with zero driving power. The rated plate dissipation is five kilowatts for most classes of services and six kilowatts for class-AB operation.

GENERAL CHARACTERISTICS

ELECTRICAL

	Min.	Nom.	Max.	
Filament: Thoriated Tungsten				
Voltage		7.5		volts
Current	73		78	amperes
Amplification Factor (Grid-Screen)		4.5		
▶ Direct Interelectrode Capacitances, Grounded Cathode:				
Input	108		122	uuf
Output	18		23	uuf
Feedback			1.0	uuf

▶ Direct Interelectrode Capacitances, Grounded Grid and Screen:	Min.	Max.	
Input	48	58	uuf
Output	18	23	uuf
Feedback		0.16	uuf

MECHANICAL

Base	Special concentric
Maximum Seal Temperature	250° C
Maximum Anode-Core Temperature	250° C
Recommended Socket	Eimac SK-300A
Recommended Chimney	Eimac SK-306
Operating Position	Axis vertical, base up or down
Maximum Dimensions:	
Height	9.13 inches
Diameter	4.94 inches
Cooling	Forced air
Net Weight	9.5 pounds
Shipping Weight (Approximate)	22 pounds

RADIO-FREQUENCY POWER AMPLIFIER OR OSCILLATOR (Up to 30 megacycles)

Class-C Telegraphy (Key-down conditions)

MAXIMUM RATINGS

D-C PLATE VOLTAGE	7500 MAX. VOLTS
D-C SCREEN VOLTAGE	1500 MAX. VOLTS
D-C PLATE CURRENT	3 MAX. AMPERES
PLATE DISSIPATION	5000 MAX. WATTS
SCREEN DISSIPATION	250 MAX. WATTS
GRID DISSIPATION	75 MAX. WATTS

TYPICAL OPERATION
(Frequencies below 30 megacycles)

D-C Plate Voltage	7500 volts
D-C Screen Voltage	500 volts
D-C Grid Voltage	—350 volts
D-C Plate Current	2.8 amperes
D-C Screen Current	0.5 ampere
D-C Grid Current	0.25 ampere
Peak R-F Grid Voltage	590 volts
Driving Power	150 watts
Plate Dissipation	5000 watts
Plate Output Power	16,000 watts

▶ Indicates change from sheet dated 3-15-60

RADIO FREQUENCY POWER AMPLIFIER OR OSCILLATOR (From 30 to 110 megacycles)

Class-C Telegraphy or FM Telephony (Key-down conditions)

MAXIMUM RATINGS

D-C PLATE VOLTAGE:	
30 to 60 megacycles	7000 MAX. VOLTS
60 to 110 megacycles	6500 MAX. VOLTS
D-C SCREEN VOLTAGE	1500 MAX. VOLTS
D-C PLATE CURRENT:	
30 to 60 megacycles	2.8 MAX. AMPERES
60 to 110 megacycles	2.6 MAX. AMPERES
PLATE DISSIPATION	5000 MAX. WATTS
SCREEN DISSIPATION	250 MAX. WATTS
GRID DISSSIPATION	75 MAX. WATTS

TYPICAL OPERATION (Frequencies between 88 and 108 megacycles)

D-C Plate Voltage	6500	volts
D-C Screen Voltage	750	volts
D-C Grid Voltage	—350	volts
D-C Plate Current	2.3	amperes
D-C Screen Current	0.2	ampere
D-C Grid Current	0.05	ampere
Driving Power	25	watts
Useful Output Power	10,000	watts

PLATE-MODULATED RADIO-FREQUENCY POWER AMPLIFIER

Class-C Telephony (Carrier conditions except where noted)

MAXIMUM RATINGS

D-C PLATE VOLTAGE	5000 MAX. VOLTS
D-C SCREEN VOLTAGE	1000 MAX. VOLTS
D-C PLATE CURRENT	2.5 MAX. AMPERES
PLATE DISSIPATION*	3500 MAX. WATTS
SCREEN DISSIPATION	250 MAX. WATTS
GRID DISSIPATION	75 MAX. WATTS

*Corresponds to 5000 watts at 100-percent sine-wave modulation.

TYPICAL OPERATION (Frequencies below 30 megacycles)

D-C Plate Voltage	5000	volts
D-C Screen Voltage	500	volts
Peak A-F Screen Voltage (For 100-percent modulation)	450	volts
D-C Grid Voltage	—400	volts
D-C Plate Current	1.4	amperes
D-C Screen Current	0.26	ampere
D-C Grid Current	0.05	ampere
Peak R-F Grid Voltage	520	volts
Grid Driving Power	25	watts
Plate Dissipation	1100	watts
Plate Output Power	5.8	kilowatts

SCREEN-MODULATED RADIO-FREQUENCY POWER AMPLIFIER

(Carrier conditions except where noted)

MAXIMUM RATINGS, Class-C Telephony (Per Tube)

D-C PLATE VOLTAGE	7500 MAX. VOLTS
D-C SCREEN VOLTAGE	750 MAX. VOLTS
D-C PLATE CURRENT	3.0 MAX. AMPERES
PLATE DISSIPATION	5000 MAX. WATTS
GRID DISSIPATION	75 MAX. WATTS

TYPICAL OPERATION (Frequencies below 30 megacycles, per tube)

D-C Plate Voltage	7500	7500	volts
D-C Screen Voltage	350	350	volts
Peak A-F Screen Voltage (For 100-percent modulation)	550	550	volts
D-C Grid Voltage	—300	—300	volts
D-C Plate Current	0.9	1.14	amperes
D-C Screen Current*	—0.01	—0.01	ampere
D-C Grid Current	0.015	0.03	ampere
Peak R-F Grid Voltage	350	375	volts
Grid Driving Power	7	11	watts
R-F Load Impedance	2000	1600	ohms
Plate Dissipation	4000	5000	watts
Useful Output Power	2750	3550	watts

*D-C Screen Current is a function of loading; values of plus or minus 20 milliamperes may be considered typical at carrier level.

NOTE: Two tubes can be employed under conditions listed in the first column to obtain more than five kilowatts plate output power. Likewise, three tubes can be utilized at conditions listed in the second column to obtain better than ten kilowatts output power.

AUDIO-FREQUENCY AMPLIFIER OR MODULATOR

Class-AB_1

MAXIMUM RATINGS (Per Tube)

D-C PLATE VOLTAGE	7500 MAX. VOLTS
D-C SCREEN VOLTAGE	1500 MAX. VOLTS
D-C PLATE CURRENT	4.0 MAX. AMPERES
PLATE DISSIPATION	6000 MAX. WATTS
SCREEN DISSIPATION	250 MAX. WATTS
GRID DISSIPATION	75 MAX. WATTS

TYPICAL OPERATION, two tubes

D-C Plate Voltage	4000	5000	6000	7000	volts
D-C Screen Voltage	1250	1250	1250	1250	volts
D-C Grid Voltage	—270	—280	—310	—325	volts
Max.-Signal Plate Current	5.10	4.40	4.25	3.65	amperes
Zero-Signal Plate Current	1.25	1.00	0.83	0.70	amperes
Max-Signal Screen Current	0.35	0.33	0.30	0.24	ampere
Zero-Signal Screen Current	0	0	0	0	amperes
Peak A-F Driving Voltage	250	240	270	235	volts
Driving Power	0	0	0	0	watts
Load Resistance, Plate-to-Plate	1500	2370	2940	4100	ohms
Max.-Signal Plate Dissipation	4200	4200	4200	4200	watts
Max.-Signal Plate Output Power	11,500	13,500	17,000	17,500	watts

RADIO-FREQUENCY LINEAR AMPLIFIER

Class-AB_1

MAXIMUM RATINGS

D-C PLATE VOLTAGE	7500 MAX. VOLTS
D-C SCREEN VOLTAGE	1500 MAX. VOLTS
D-C PLATE CURRENT	4.0 MAX. AMPERES
PLATE DISSIPATION	6000 MAX. WATTS
SCREEN DISSIPATION	250 MAX. WATTS
GRID DISSIPATION	75 MAX. WATTS

TYPICAL OPERATION, Peak-Envelope or Modulation-Crest Conditions, (Frequencies below 30 megacycles)

D-C Plate Voltage	7500	volts
D-C Screen Voltage	1250	volts
D-C Grid Voltage*	—300	volts
Max.-Signal Plate Current	1.9	amperes
Zero-Signal Plate Current	0.50	ampere
Max.-Signal Screen Current	0.20	ampere
Peak R-F Grid Voltage	300	volts
Driving Power	0	watts
Plate Dissipation	4200	watts
Plate Output Power**	10,000	watts

*Adjust grid voltage to obtain specified Zero-Signal plate current.
**PEP output or r-f output power at crest of modulation envelope.

NOTE: In most cases, "TYPICAL OPERATION" data are obtained by calculation from published characteristic curves and confirmed by direct tests. No allowance for circuit losses, either input or output, has been made. Exceptions are distinguished by a listing of "Useful" output power as opposed to "Plate" output power. Values appearing in these groups have been obtained from existing equipment(s) and the output power is that measured at the load.

APPLICATION

MECHANICAL

Mounting—The 4CX5000A must be operated with its axis vertical. The base of the tube may be down or up at the convenience of the circuit designer.

Socket—The Eimac SK-300A Air-System Socket is designed especially for the concentric base terminals of the 4CX5000A. The use of recommended air-flow rates through this socket provides effective forced-air cooling of the tube. Air forced into the bottom of the socket passes over the tube terminals and through an Air Chimney, the SK-306, into the anode cooling fins. The SK-300 socket may be used instead of the SK-300A, but its use will result in a slightly less efficient cooling system at high dissipation levels.

Cooling—The maximum temperature rating for the external surfaces of the 4CX5000A is 250°C. Sufficient forced-air circulation must be provided to keep the temperature of the anode at the base of the cooling fins and the temperature of the ceramic-metal seals below 250°C. Sea level air-flow requirements to maintain seal temperatures at 200°C in 50°C ambient air are tabulated below (for operation below 30 megacycles).

	SK-300A Socket		SK-300 Socket	
Plate Dissipation* (Watts)	Air Flow (CFM)	Pressure Drop (Inches of water)	Air Flow (CFM)	Pressure Drop (Inches of water)
2000	75	0.4	75	0.4
3000	105	0.7	100	0.7
4000	145	1.1	135	1.2
5000	190	1.5	165	1.8
6000	230	2.0	200	2.5

*Since the power dissipated by the filament represents about 560 watts and since grid-plus-screen dissipation can, under some conditions, represent another 200 to 300 watts, allowance has been made in preparing this tabulation for an additional 1000 watts dissipation.

The blower selected in a given application must be capable of supplying the desired air flow at a back pressure equal to the pressure drop shown above plus any drop encountered in ducts and filters.

At higher altitudes, higher frequencies, or higher ambient temperatures the flow rate must be increased to obtain equivalent cooling. The flow rate and corresponding pressure differential must be determined individually in such cases, using maximum rated temperatures as the criteria for satisfactory cooling.

Indicates change from sheet dated 3-15-60

ELECTRICAL

Filament Operation—The rated filament voltage for the 4CX5000A is 7.5 volts. Filament voltage, as measured at the socket, should be maintained at this value to obtain maximum tube life. In no case should it be allowed to deviate by more than 5 percent from the rated value.

Electrode Dissipation Ratings—The maximum dissipation ratings for the 4CX5000A must be respected to avoid damage to the tube. An exception is the plate dissipation, which may be permitted to rise above the maximum rating during brief periods, such as may occur during tuning.

Control Grid Operation—The 4CX5000A control grid has a maximum dissipation rating of 75 watts. Precautions should be observed to avoid exceeding this rating. The grid bias and driving power should be kept near the values shown in the "Typical Operation" sections of the data sheet whenever possible.

Screen-Grid Operation—The power dissipated by the screen of the 4CX5000A must not exceed 250 watts.

Screen dissipation, in cases where there is no ac applied to the screen, is the simple product of the screen voltage and the screen current. If the screen voltage is modulated, the screen dissipation will depend upon loading, driving power, and carrier screen voltage.

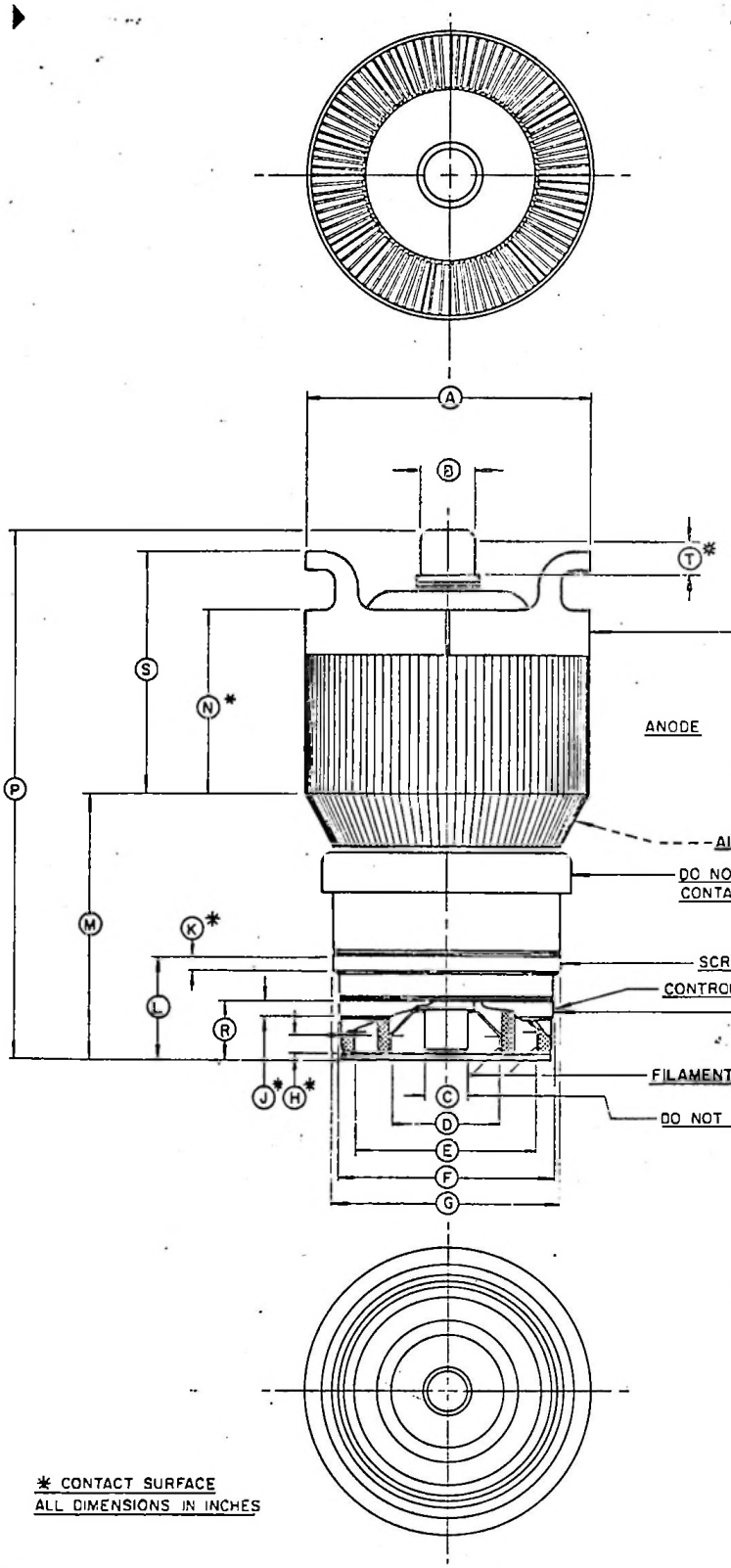
Screen dissipation is likely to rise to excessive values when the plate voltage, bias voltage, or plate load are removed with filament and screen voltages applied. Suitable protective means must be provided to limit the screen dissipation to 250 watts in the event of circuit failure.

Plate Dissipation—The plate-dissipation rating for the 4CX5000A is 5000 watts for most applications but for audio and SSB amplifier applications, the maximum allowable dissipation is 6000 watts.

When the 4CX5000A is operated as a plate-modulated r-f power amplifier, the input power is limited by conditions not connected with the plate efficiency, which is quite high. Therefore, except during tuning there is little possibility that the 3500-watt maximum plate dissipation rating will be exceeded.

Special Applications—If it is desired to operate this tube under conditions widely different from those given here, write to Power Grid Tube Marketing, Eitel-McCullough, Inc., 301 Industrial Way, San Carlos, California, for information and recommendations.

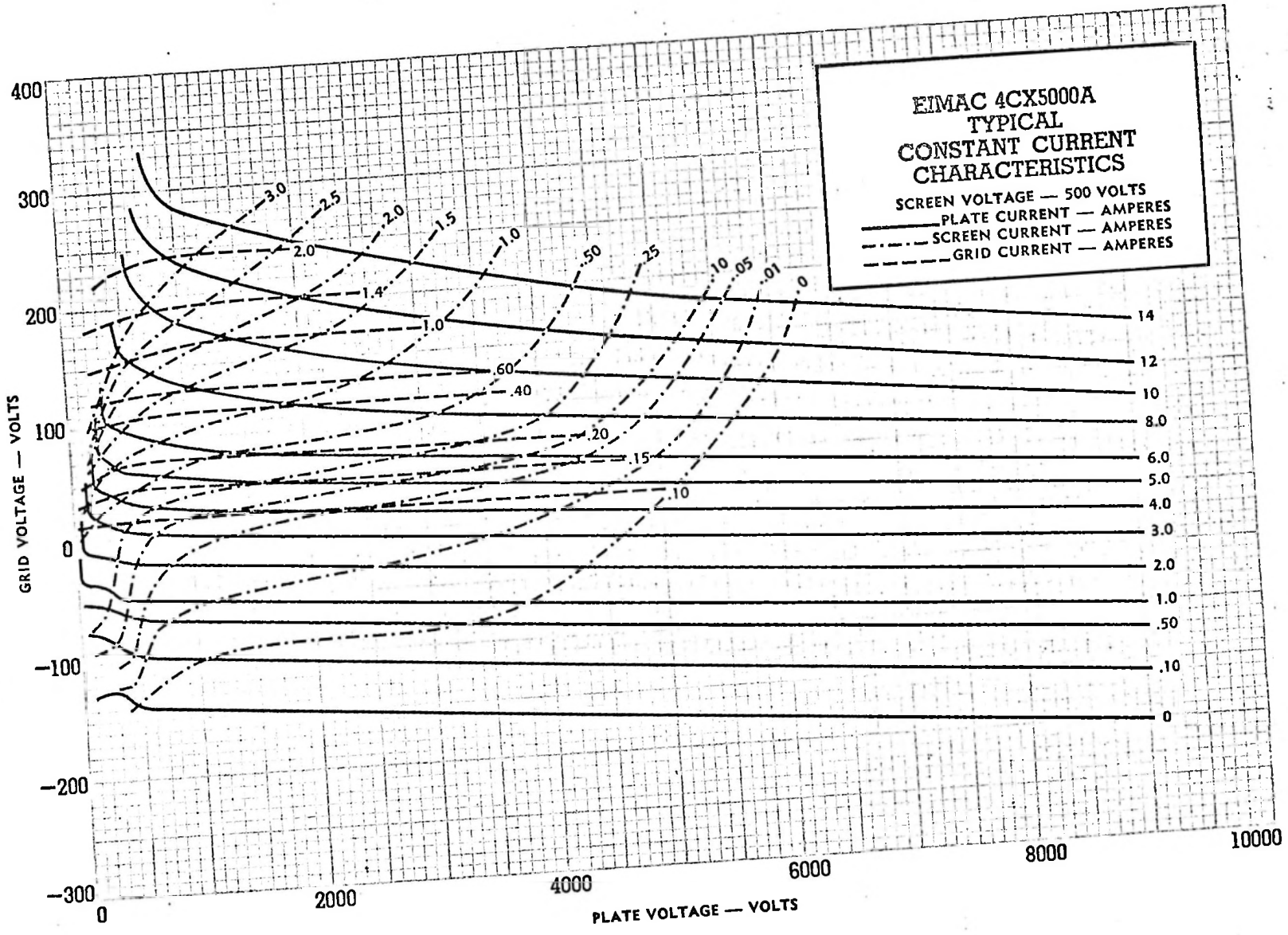
DIMENSION DATA			
REF.	NOM.	MIN.	MAX.
A		4.812	4.938
B		.855	.895
C		.720	.760
D		1.896	1.936
E		3.133	3.173
F		3.792	3.832
G		3.980	4.020
H		.188	
J		.188	
K		.188	
L		1.764	1.826
M		4.188	4.563
N		2.875	3.250
P		8.625	9.125
R		.986	1.050
S		3.875	4.250
T		.375	

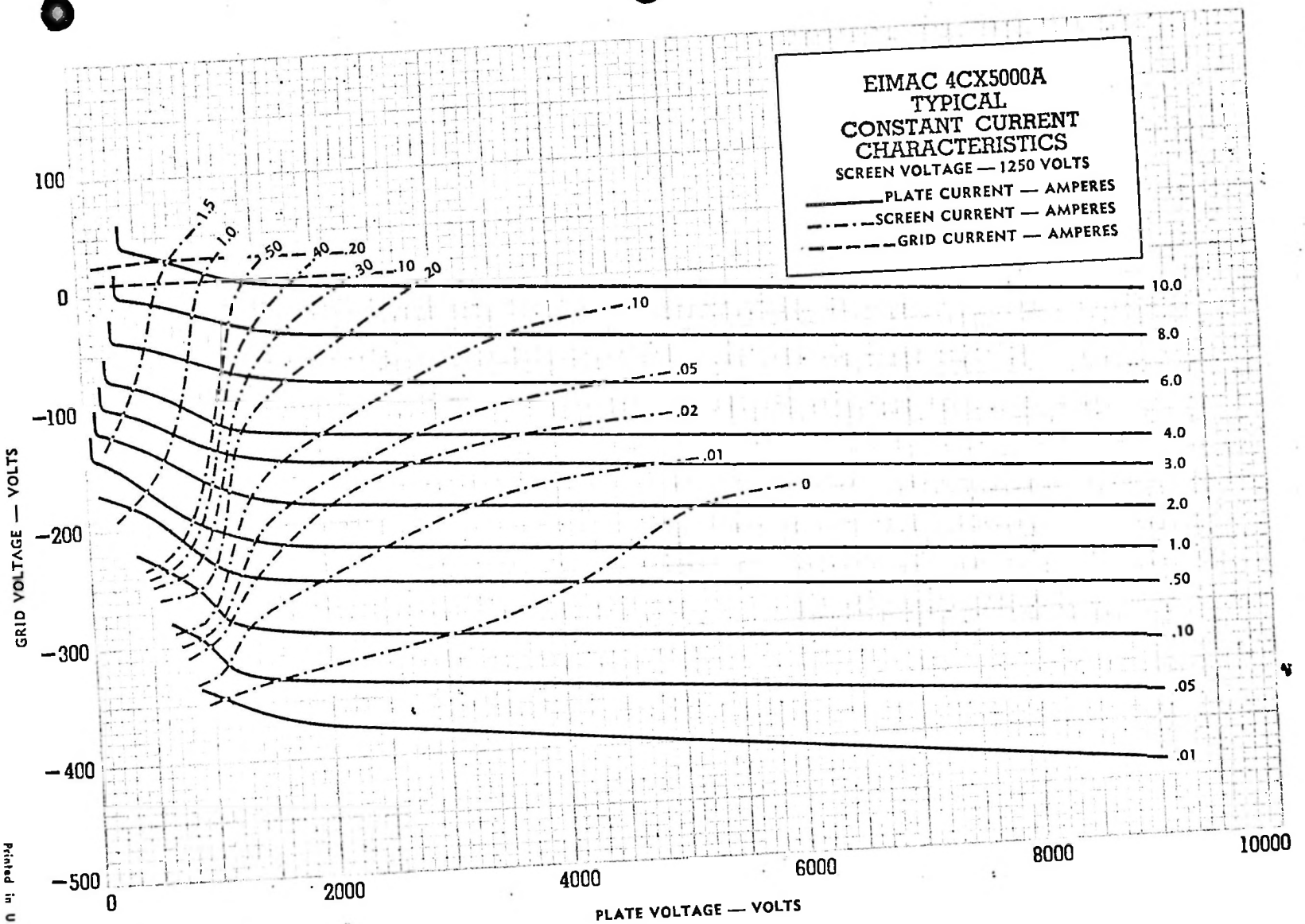


THE T.I.R. OF THE SCREEN GRID AND FILAMENT CONTACT SURFACES SHALL NOT EXCEED .040 WITH RESPECT TO THE CONTROL GRID AND ANODE CONTACT SURFACE WHEN THE LATTER SURFACES ARE ROTATED ON ROLLERS AT THE POINTS INDICATED BY THE ARROWS.

* CONTACT SURFACE
ALL DIMENSIONS IN INCHES

▶ Indicates change from sheet dated 3-15-60


EIMAC 4CX5000A
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
SCREEN VOLTAGE — 500 VOLTS
PLATE CURRENT — AMPERES
SCREEN CURRENT — AMPERES
GRID CURRENT — AMPERES
GRID VOLTAGE — VOLTS
PLATE VOLTAGE — VOLTS
400
300
200
100
0
−100
−200
−300
0
2000
4000
6000
8000
10000
3.0
2.5
2.0
1.5
1.0
.50
.25
.10
.05
.01
0
2.0
1.4
1.0
.60
.40
.20
.15
.10
14
12
10
8.0
6.0
5.0
4.0
3.0
2.0
1.0
.50
.10
0


EIMAC 4CX5000A
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
SCREEN VOLTAGE — 1250 VOLTS
PLATE CURRENT — AMPERES
SCREEN CURRENT — AMPERES
GRID CURRENT — AMPERES
GRID VOLTAGE — VOLTS
100
0
−100
−200
−300
−400
−500
PLATE VOLTAGE — VOLTS
0
2000
4000
6000
8000
10000
10.0
8.0
6.0
4.0
3.0
2.0
1.0
.50
.10
.05
.01
1.5
1.0
.50
.40
.20
.30
.10
.20
.10
.05
.02
.01
0

DCN CONTROL

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL

APPLICATION	DASH	NEXT ASSY	EQUIP
	001	782 0071 001	820E/F-1

CR	F. DATE	NS	F. DATE	CL	F. DATE	TR	F. DATE	CUST. DWG.
0		0		2166283		0		074-5033-390

AUTHENTICATION

	NAME	DATE
DRAWN BY	L B Woodring	22 JAN 68
CHECKED BY	D D MacFall	12 Feb 1968
APPROVED BY		
APPROVED BY	T E Kessler	8 Feb 1968

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA (DALLAS, TEXAS DIV.)

PROCEDURE, RELAY REWORK

CODE IDENT NO.	SIZE	
13499	A	782-0050

SCALE NONE WT SHEET 1 OF 8

D-542(1-63)

RELAY REWORK PROCEDURE

GENERAL:- THIS MODIFICATION CHANGES THE UNCOVERED RELAYS TO A COVERED PLUG-IN TYPE. THE ELECTRICAL CIRCUIT IS NOT CHANGED.

CAUTION: DO NOT BEGIN THIS MODIFICATION BEFORE READING THE ENTIRE MODIFICATION AND TEST PROCEDURE.

1. LOCATE THE REMOTE CONTROL PANEL A8 AND DISCONNECT THE WIRES FROM TB1 AND TB2.

2. REMOVE THE PANEL FROM THE TRANSMITTER.

3. MOUNT THE NEW REMOTE CONTROL PANEL A11 WITH THE SAME HARDWARE IN THE SAME LOCATION.

4. RECONNECT THE WIRES TO TB1 AND TB2 TO THE SAME TERMINALS FROM WHICH THEY WERE REMOVED.

TB1 WIRE CONNECTIONS

TERMINAL	WIRE NO.
1	W1-104
1	W1-221
2	W1-103
3	W1-100
3	W1-99
4	W1-101
4	W1-102
5	W1-134
6	01-11
7	01-11
8	W1-348

REV

TERMINAL	WIRE NO.
9	W1-94
10	W1-93
11	W1-91
12	W1-88
12	W1-87
13	W1-94
13	W1-107
14	W1-92
15	W1-85
15	W1-86
16	W1-82
16	W1-83
17	W1-164
17	W1-183
18	W1-160
18	W1-161
19	W1-162
19	W1-163
20	W1-304
21	W1-158

TB2 WIRE CONNECTIONS

TERMINAL	FUNCTION
1	COMMON
2	FILAMENT OFF
3	FILAMENT ON
4	FAIL SAFE
5	LOW PWR PLATE OFF/RESET
6	LOW PWR PLATE ON
7	HIGH PWR PLATE OFF/RESET

SIZE	CODE IDENT NO.	DWG. NO.	
A	13499	782-0050	
SCALE NONE	WT	SEE SHEET 1	SHEET 3

TERMINAL	FUNCTION
8	HIGH POWER PLATE ON
9	POWER ADJUST LOWER
10	POWER ADJUST RAISE
11	FAIL SAFE RETURN

NOTE: INSTALL AND TEST THIS CIRCUIT BEFORE PROCEDING TO STEP 5.

5. LOCATE THE RELAY CONTROL SHELF (INCLUDING K1, K3, K4, K11, K12, K13, AND K14) AND REMOVE RELAYS K1, K3, AND K4. DO NOT DISCONNECT THE WIRES FROM THESE RELAYS AS THESE SAME RELAYS WILL BE USED ON THE NEW ASSEMBLY.

6. DISCONNECT THE WIRES FROM RELAYS K11, K12, K13, AND K14. CUT THE WIRES AS CLOSE TO THE RELAY TERMINAL AS POSSIBLE.

7. REMOVE THE RELAY CONTROL SHELF. (INCLUDING RELAYS K11 THRU K14).

8. MOUNT THE NEW RELAY CONTROL SHELF IN THE SAME LOCATION WITH THE SAME HARDWARE.

9. REMOUNT RELAYS K1, K3 AND K4 IN THE SAME RELATIVE POSITIONS ON THE NEW ASSEMBLY.

10. RECONNECT THE WIRES TO K11, K12, K13 AND K14 AS SHOWN IN THE FOLLOWING TABLE.

TERMINAL	WIRE NO.
XK11-7	W1-151
XK11-9	W1-165
XK11-2	W1-152
XK11-1	W1-153
XK11-1	W1-155

REV

TERMINAL	WIRE NO.
E67	W1-150
E68	W1-146
E68	W1-147
XK12-7	W1-152
XK12-9	W1-168
XK12-2	W1-151
XK12-1	W1-156
XK12-1	W1-166
E69	W1-157
E70	W1-147
E70	W1-148
XK13-3	01-182
XK13-3	W1-209
XK13-7	W1-154
XK13-9	W1-170
XK13-2	W1-155
XK13-1	W1-159
XK13-1	W1-166
E71	W1-160
E72	W1-148
E72	W1-149
XK14-3	01-182
XK14-7	W1-155
XK14-9	W1-171
XK14-2	W1-154
XK14-1	W1-159
E73	W1-162
E74	W1-149

SIZE	CODE IDENT NO.	DWG. NO.	
A	13499	782-0050	
SCALE NONE	WT	SEE SHEET 1	SHEET 5

RELAY CIRCUIT TEST

GENERAL: CHECK THE OPERATION OF THE NEWLY INSTALLED RELAY CIRCUITS AS FOLLOWS.

1. APPLY A VOLTAGE TO THE REMOTE RELAY CONTROL CIRCUITS AND OBSERVE THE OPERATION OF THE TRANSMITTER. A VOLTAGE OF 24VDC, 48VDC, OR 115VAC WILL OPERATE THE REMOTE CONTROL RELAYS. (SEE DATA SHEET.)

2. CHECK THE OPERATION OF THE AUTOMATIC TUNING CIRCUIT RELAYS BY TURNING ON THE TRANSMITTER AND CHANGING THE LOADING. RELAY K15 OR K16 SHOULD OPERATE.

3. WHEN RELAY K16 IS OPERATED THE CONTACTS SHOULD OPERATE RELAY K12.

4. WHEN RELAY K15 IS OPERATED THE CONTACTS SHOULD OPERATE RELAY K11.

5. TURN THE MANUAL-AUTOMATIC SWITCH TO MANUAL. OPERATE PA TUNING SWITCH S9 TO THE LOWER POSITION. RELAY K11 SHOULD OPERATE. THE TUNING MOTOR SHOULD RUN.

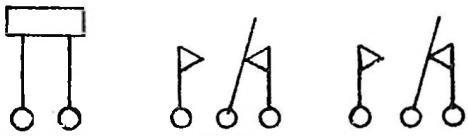
6. TURN SWITCH S9 TO THE RAISE POSITION. RELAY K12 SHOULD OPERATE AND THE TUNING MOTOR SHOULD RUN IN THE OPPOSITE DIRECTION FROM ABOVE.

7. OPERATE PA LOADING S10 SWITCH TO THE LOWER POSITION. RELAY K13 SHOULD OPERATE AND THE LOADING MOTOR RUN.

8. TURN S10 TO THE RAISE POSITION. RELAY K14 SHOULD OPERATE AND THE LOADING MOTOR RUN IN THE OPPOSITE DIRECTION.

NOTE: THE PRECEDING MODIFICATION TO THE RELAY CIRCUITS ABOVE IS A MECHANICAL ONE ONLY. THE ELECTRICAL COMPONENTS SHOULD OPERATE THE SAME AFTER THE CHANGE AS BEFORE. SHOULD TROUBLE BE INCURRED DURING TESTING USE THE SCHEMATIC FOR

TROUBLE SHOOTING. THE RELAY TERMINAL NUMBERS ARE CHANGED AS FOLLOWS.



X1	X2	R3	R2	R1	L3	L2	L1	OLD NUMBERS
C1	C2	3	1	2	9	7	8	NEW NUMBERS

TEST DATA SHEET

1. REMOTE PANEL

PIN 2.	FIL OFF	OK _____
PIN 3.	FIL ON	OK _____
PIN 4.	FAIL SAFE	OK _____
PIN 5.	LO PWR PLATE OFF/RESET	OK _____
PIN 6.	LO PWR PLATE ON	OK _____
PIN 7.	HI PWR PLATE OFF/RESET	OK _____
PIN 8.	HI PWR PLATE ON	OK _____
PIN 9.	PWR ADJ LOW	OK _____
PIN 10.	PWR ADJ RAISE	OK _____

2. AUTOMATIC TUNING

K15	OK _____
K16	OK _____
K12	OK _____
K11	OK _____

3. MANUAL TUNING

K11	OK _____

TUNING MOTOR	OK_____
K12	OK_____
TUNING MOTOR	OK_____

4. MANUAL LOADING

K13	OK_____
LOADING MOTOR	OK_____
K14	OK_____
LOADING MOTOR	OK_____

SIGNED _____

DATE _____

TX TYPE NO. _____

TX SERIAL NO. _____

SIZE	CODE IDENT NO.	DWG. NO.
A	13499	782-0050
SCALE NONE	WT	SEE SHEET 1	SHEET 8

DATA GROUP	NAME	DESCRIPTION	P	ENGINEER	C/I	CR	NO	DL	TO	ALT/L	ADD	DEL	ADD	DEL	SEQNO
7820071001	KIT	RELAY REWORK		PROPRIETARY L E KEISER	COMPLETE	0	0	3	0		N73684		7011		01 L
		THIS KIT CAN BE USED FOR FIELD REPLACEMENT OF									N73684		7011		001001 M
		RELAYS WITH THE COVERED TYPE ON 8206/F-1									N73684		7011		002701 M
		NEXT ASSY 522-3291-000/522-3291-000									N73684		7011		184401 M

ITEM CALLOUT	NAME	DESCRIPTION / WIRE CODE	QTY	REF DES / WIRE FUNCTION	LEAD T CONNECTION TERM	LEAD T CONNECTION TERM	ADD	DEL	ADD	DEL	SEQNO
002 7820061001	PANEL	REMOTE CONTR	1.00				N73684		7011		246101 P
003 7820059001	SHELF	RELAY CONTRO	1.00				N73684		7011		327801 P
004 7820050001	PROCED	INSTALLATION	0.00				N73684		7011		400501 P
		ASSEMBLE 2 AND 3 USING 4					N73684		7011		491201 R
001 7820070001	REF DWG		1.00				N73684		7011		572901 P
004 7820050001	PROCED	INSTALLATION	1.00				N73684		7011		654601 P
005 0740040003	ENVELOPE		1.00				N73684		7011		736301 P
		PLACE ITEMS 1 AND 4 IN ITEM 5 AND SHIP WITH KIT					N73684		7011		818001 R

ITEM CALLOUT	NAME	DESCRIPTION	P	U/M	QTY	NHM	ALT	LTR	PREF	EXEMPT	ADD	DEL	ADD	DEL	SEQNO
005 0740040003	ENVELOPE			00	1.00	02					N73684		7011		01 N
004 7820050001	PROCED	INSTALLATION		00	1.00	02					N73684		7011		01 N
003 7820059001	SHELF	RELAY CONTROL		07	1.00	09					N73684		7011		01 N
002 7820061001	PANEL	REMOTE CONTROL		07	1.00	09					N73684		7011		01 N
001 7820070001	REF DWG		P	00	1.00	02					N73684		7011		01 N

LAST ITEM NO. USED 0005
N73684 7011

DATA GROUP	NAME	DESCRIPTION	P	ENGINEER	C/I	CR	NB	DL	TO	ALTL	ADD	DEL	ADD	DEL	SEQNO
7820071001	KIT	RELAY REWORK	PROPRIETARY	L E KEISER	COMPLETE	0	0	3	0		N73684		7011		01 L
		THIS KIT CAN BE USED FOR FIELD REPLACEMENT OF									N73684		7011		001001 M
		RELAYS WITH THE COVERED TYPE ON 820E/F-1									N73684		7011		082701 M
		NEXT ASSY 522-3291-000/522-3291-000									N73684		7011		104401 M

ITEM	CALLOUT	NAME	DESCRIPTION / WIRE CODE	QTY	REF DES / WIRE FUNCTION	LEAD T CONNECTION TB60	LEAD T CONNECTION TB60	ADD	DEL	ADD	DEL	SEQNO
002	7820061001	PANEL	REMOTE CONTR	1.00				N73684		7011		246101 P
003	7820059001	SHELF	RELAY CONTRO	1.00				N73684		7011		327001 P
004	7820050001	PROCED	INSTALLATION	0.00				N73684		7011		409501 P
			ASSEMBLE 2 AND 3 USING 4					N73684		7011		491201 R
001	7820070001	REF DWG		1.00				N73684		7011		572901 P
004	7820050001	PROCED	INSTALLATION	1.00				N73684		7011		654601 P
005	0740040003	ENVELOPE		1.00				N73684		7011		736301 P
			PLACE ITEMS 1 AND 4 IN ITEM 5 AND SHIP WITH KIT					N73684		7011		818001 R

ITEM	CALLOUT	NAME	DESCRIPTION	P	U/M	QTY	MNM	ALT	LTR	PREF	EXEMPT	ADD	DEL	ADD	DEL	SEQNO
005	0740040003	ENVELOPE			00	1.00	02					N73684		7011		01 N
004	7820050001	PROCED	INSTALLATION		00	1.00	02					N73684		7011		01 N
003	7820059001	SHELF	RELAY CONTROL		07	1.00	09					N73684		7011		01 N
002	7820061001	PANEL	REMOTE CONTROL		07	1.00	09					N73684		7011		01 N
001	7820070001	REF DWG		P	00	1.00	02					N73684		7011		01 N

LAST ITEM NO. USED 0005
N73684 7011

820 E
PLATE
XFMR

REV B

1. ELECTRICAL REQUIREMENTS:

1.1. SUPPLY VOLTAGE: 208, 230, OR 240 VOLTS RMS PLUS OR MINUS 5% LINE TO LINE, THREE PHASE.

1.2. SUPPLY FREQUENCY: 50 TO 60 CPS.

1.3. PRIMARY CONNECTIONS:

INPUT VOLTS	INPUT TERMINAL	CONNECT
240 DELTA	1,6,11	15 TO 1, 5 TO 6, 10 TO 11
230 DELTA	2,7,12	15 TO 2, 5 TO 7, 10 TO 12
208 DELTA	3,8,13	15 TO 3, 5 TO 8, 10 TO 13
240 WYE	1,6,11	4 TO 9 TO 14
230 WYE	2,7,12	4 TO 9 TO 14
208 WYE	3,8,13	4 TO 9 TO 14

1.4. OUTPUT VOLTAGE AND CURRENT: (SEE SCHEMATIC DIAGRAM ON SHEET 5) WITH THE SECONDARY CONNECTED AND LOADED AS SHOWN IN THE APPLICATION CIRCUIT ON SHEET 4, AND WITH THE PRIMARY CONNECTIONS AND INPUT AS SPECIFIED IN PARAGRAPH 1.3. ABOVE, THE OUTPUT SHALL BE AS FOLLOWS:
PRIMARY CONNECTED IN DELTA; 5100 VDC PLUS OR MINUS 1% AT 2.74 A
PRIMARY CONNECTED IN WYE; 2350 VDC PLUS OR MINUS 1% AT 1.5 A

1.5. IMPEDANCE: 4.5% MINIMUM AND 5% MAXIMUM AT RATED KVA WITH DELTA INPUT.

1.6. DC VOLTAGE REGULATION: THE DC REGULATION SHALL NOT EXCEED 2.5 % FOR A LOAD CHANGE FROM 1.9 ADC TO 2.74 ADC.

1.7. PHASE BALANCE: WHEN CHECKED AT FULL LOAD, THE LINE TO LINE OUTPUT VOLTAGE OF EACH PHASE OF EACH SECONDARY SHALL BE WITHIN 0.5 % OF THE AVERAGE VOLTAGE OF THE THREE PHASES OF EACH SECONDARY.

1.8. OUTPUT BALANCE: THE AVERAGE OUTPUT VOLTAGE OF EACH SECONDARY AT FULL LOAD, AS CALCULATED IN 1.7 ABOVE, SHALL BE WITHIN 0.5%.

1.9. SHIELDING: THE TRANSFORMER SHALL HAVE AN ELECTROSTATIC SHIELD BETWEEN PRIMARY AND SECONDARY WINDINGS TO PROVIDE A MINIMUM OF 20 DB SHIELDING. THE SHIELD SHALL BE CONNECTED TO THE CORE AND MOUNTING BRACKET.

1.10. DIELECTRIC STRENGTH: PRIMARY -- 1000 VRMS, 60 CPS
SECONDARY -- 7500 VRMS, 60 CPS

1.11. INSULATION RESISTANCE: 1000 MEGOHMS MINIMUM AT 500 VDC MEASURED BETWEEN WINDINGS AND BETWEEN WINDINGS AND CORE.

1.12. CORONA: THERE SHALL BE NO EVIDENCE OF CORONA WHEN TESTED IN ACCORDANCE WITH MIL-T-27 "INSULATION" METHOD, EXCEPT FREQUENCY SHALL BE 400 CPS. THIS TEST SHALL BE PERFORMED WITH A DELTA CONNECTED PRIMARY.

SIZE	CODE IDENT NO.	DWG. NO.
A	13499	664-0094

SCALE NONE | WT | SEE SHEET 1 | SHEET 2

REV —

1.13. TEMPERATURE RISE: THE TEMPERATURE RISE OF ANY WINDING SHALL NOT EXCEED 80°C ABOVE AN OPERATING AMBIENT OF PLUS 50°C WITH THE UNIT OPERATED AT NOMINAL INPUT VOLTAGE, MINIMUM SUPPLY FREQUENCY, RATED LOAD AND SPECIFIED DUTY CYCLE.

1.14. DUTY CYCLE: CONTINUOUS.

2. ENVIRONMENTAL REQUIREMENTS:

2.1. ALTITUDE: SEA LEVEL TO 10,000 FEET.

2.2. AMBIENT TEMPERATURE: OPERATING -- MINUS 25°C TO PLUS 50°C.
NON-OPERATING -- MINUS 25°C TO PLUS 130°C.

2.3. MOISTURE RESISTANCE: MOISTURE RESISTANCE TEST SHALL BE CONDUCTED IN ACCORDANCE WITH PARAGRAPH 7 OF EIA STANDARD RS-180 AMENDED AS FOLLOWS:

a) PRE-HUMIDITY TEMPERATURE CYCLING; IN ACCORDANCE WITH EIA STANDARD RS-180 EXCEPT THE TEMPERATURE EXTREMES SHALL BE LIMITED TO -25°C AND PLUS 65°C.
b) HUMIDITY RUN; 96 HOURS IN A TEMPERATURE OF PLUS 65°C AND A RELATIVE HUMIDITY OF 95%. A POLARIZING VOLTAGE OF 100 VOLTS DC SHALL BE APPLIED BETWEEN WINDINGS AND MOUNTING SURFACE, POSITIVE TO WINDINGS.
c) PROOF OF PERFORMANCE; PER EIA STANDARD RS-180 AMENDED AS FOLLOWS:
   1) DIELECTRIC STRENGTH: PRIMARY -- 800 VOLTS RMS, 60 CPS.
      SECONDARY -- 6000 VOLTS RMS, 60 CPS.

3. MECHANICAL REQUIREMENTS:

3.1. CONSTRUCTION: OPEN FRAME, IMPREGNATED FOR MOISTURE RESISTANCE.

3.2. TERMINALS: SCREW TYPE. DETAIL IS OPTIONAL BUT TERMINALS SHALL BE APPROVED BY COLLINS RADIO COMPANY OR THE PRIME CONTRACTOR, IF OTHER THAN COLLINS, BEFORE PROCEEDING WITH PRODUCTION QUANTITIES.

3.3. INTERNAL CONNECTIONS: IN NO CASE SHALL INTERNAL ELECTRICAL CONNECTIONS BE SOLELY DEPENDENT UPON A MECHANICAL JOINT; HOWEVER, ALL ELECTRICAL CONNECTIONS SHALL BE MECHANICALLY SECURE BEFORE SOLDERING.

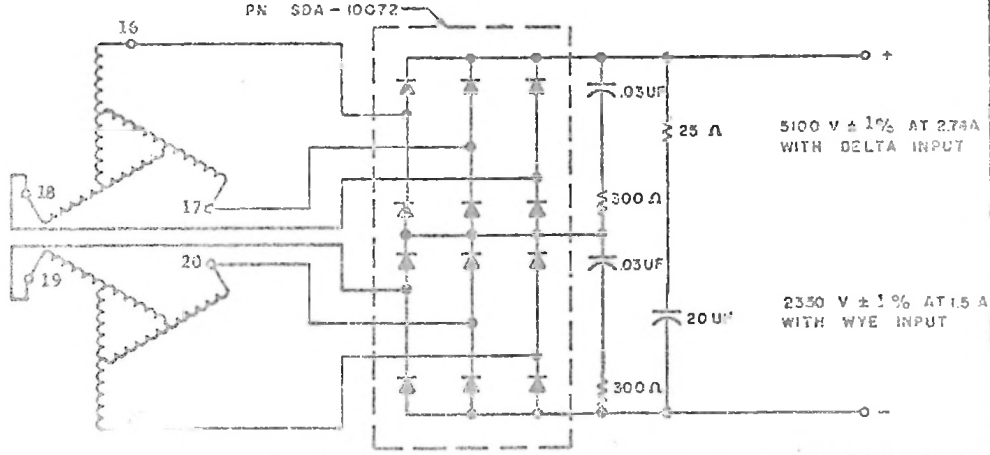
3.4. FINISH: MANUFACTURER'S STANDARD FINISH.

3.5. MARKINGS: AS A MINIMUM REQUIREMENT, THE UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE FOLLOWING:

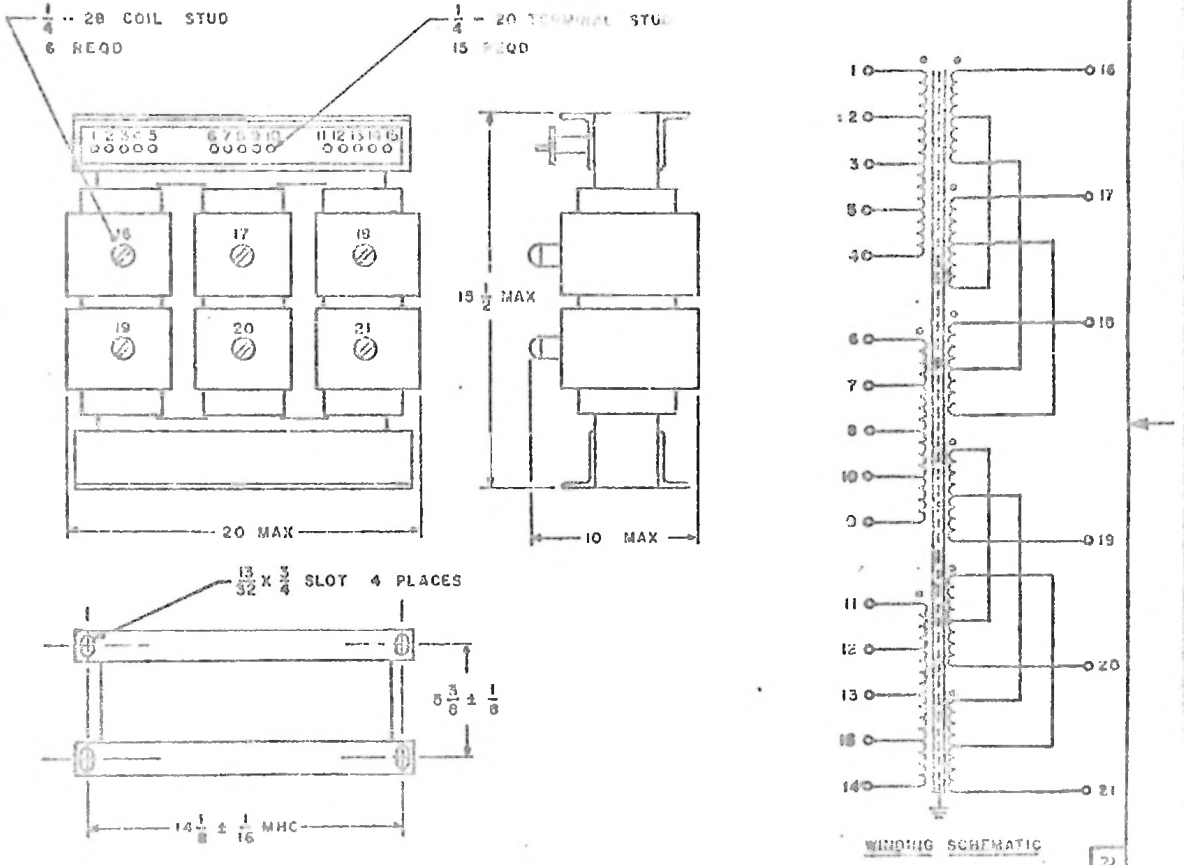
a) COLLINS RADIO COMPANY PART NUMBER AND LATEST REVISION LETTER, IF ANY.
b) MANUFACTURER'S NAME AND/OR TRADEMARK.
c) MANUFACTURER'S PART NUMBER.
d) TERMINAL IDENTIFICATION.

REV B

HIGH VOLTAGE SILICON
RECTIFIER STACKS
MOTOROLA (CODE IDENT 04713)
PN SDA-10072



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES .X ± .1 .XX ± .03 .XXX ± .010	CODE IDENT NO 13499	SIZE A	664-0094
	SCALE NONE	WT See sheet 1	SHEET 4



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES

CODE IDENT NO 13499 | SIZE A

SCALE NONE | WT

664-094

SHEET 2

REV

009-1783*

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
A	A66771-para 2.3, was, Clockwise...; para 2.7.2, was, ... 0.185 inches...; corrected vendor pn for dash number -010; 6 3/4 dimension on sheet 4, was, 6 3/8 and rotation was clockwise.	9 Dec 1965	KLM

DESCRIPTION: Direct connected ventilating fan and motor assembly for use in commercial electronic equipment.

NOTICE: This drawing shall be interpreted in accordance with standards prescribed by MIL-D-70327.
The class designation and the symbols CAL, TA, CR, RA, SSA and NSR which may appear on this drawing are for internal use only by the Collins Radio Company and are not related to the engineering data contained herein.

*DASH NUMBER: See Table.
*WHEN REFERRING TO COLLINS PART NUMBER, SPECIFY DRAWING NUMBER FOLLOWED BY APPLICABLE DASH NUMBER. WHEN PART NUMBER APPEARS AS 009-1783-XX9, MILITARY INSPECTION IS REQUIRED.

Peerless Electric Co., Warren, Ohio	46175		See Table.
VENDOR	CODE IDENT. NO.		VENDOR P/N

CLASS 2C | CAL CHANGE 22 FEB 1964 | SPECIFICATION CONTROL DRAWING | ENGRG PN NONE

	NAME	DATE
PREP BY	E. W. Allen 1s	5 Feb 1965
CHK BY	K. L. Mussi	10 Feb 1965
PROJ CHK		
PROJ ENGR	R. J. Burkett	13 Oct 1965
DWG DATE		

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

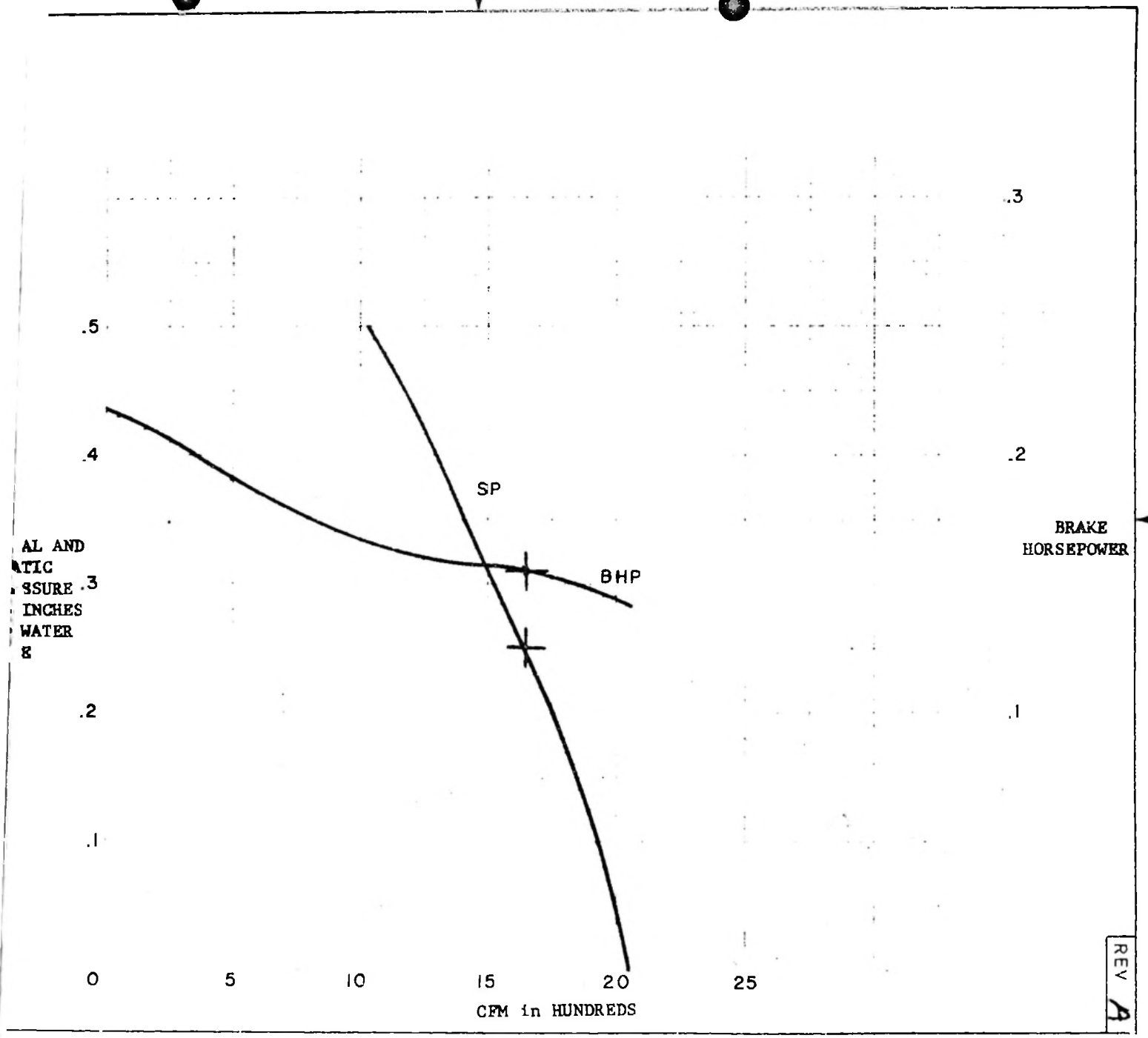
820E/F B2

FAN, VENTILATING, PROPELLER

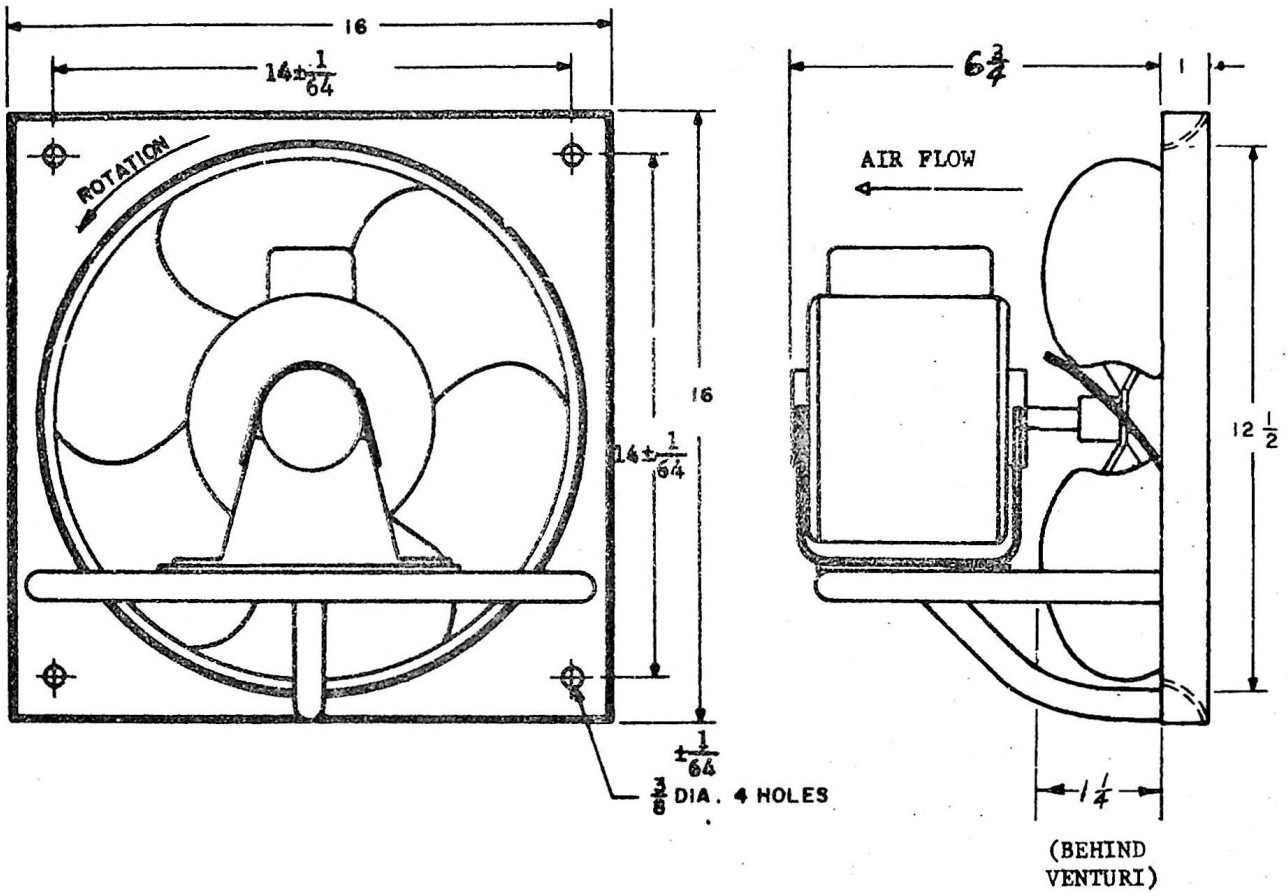
CABINET FAN

CODE IDENT NO.	SIZE	DRAWING NUMBER
13499	A	009-1783*

SCALE NONE | WT | SHEET 1 of 5


.5
.4
.3
.2
.1
0
5
10
15
20
25
SP
BHP
.3
.2
.1
BRAKE
HORSEPOWER
AL AND
TIC
SSURE
INCHES
WATER
E
CFM in HUNDREDS
REV A

REV A



820 E/F

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± 1/ ±NA ±NA

SIZE	CODE IDENT NO.	DWG. NO.
A	13499	009-1783

SC ONE T

2.10. MARKINGS: The units shall be permanently and legibly marked with the following information:

(a) Manufacturer's name or symbol.
(b) Manufacturer's part number.
(c) Date code or serial number.
(d) Rated voltage, current and frequency.
(e) Capacitance value and voltage.
(f) Speed.
(g) Maximum temperature rise or ambient temperature.
(h) Duty cycle.
(i) Direction of rotation.
(j) Collins Part Number.

3. ENVIRONMENTAL REQUIREMENTS:

3.1. TEMPERATURE RANGE: -25°C to +45°C operating and storage.

3.2. ALTITUDE: 0 to 7000 feet operating and storage.

3.3. HUMIDITY: 24 hours at 90 to 95% relative humidity in accordance with MIL-STD-202, Method 103, Test Condition B.

TABLE

NUMBER	DESCRIPTION	VENDOR PN
-010	Complete assembly	PVS-1 SPEC EX 6527
-020	Motor only	5KCP39GG3334S
-030	Blade only	BS201788 x 1/2 CW

820E1F

REV A

1. ELECTRICAL REQUIREMENTS:

1.1. VOLTAGE: 208/260 V RMS ± 5%, single phase; 50/60 CPS.

1.2. CURRENT: 1.8 amperes, nominal, full load.
14.7 amperes, nominal, locked rotor.

1.3. OUTPUT POWER: 1/4 HP.

1.4. INPUT POWER: 342 watts nominal.

1.5. INSULATION RESISTANCE: 10 megohms minimum with 500 VDC applied between windings and frame.

1.6. CAPACITOR: The unit shall be supplied with a 4 µF, 370 V AC, oil filled capacitor mounted on the motor housing.

1.7. DIELECTRIC STRENGTH: 900 V RMS, 60 CPS for one minute or 1080 V RMS, 60 CPS, for one second between windings and frame.

1.8. DUTY CYCLE: Continuous.

1.9. TEMPERATURE RISE: The maximum temperature rise shall not exceed 40°C above an ambient of +45°C.

2. MECHANICAL REQUIREMENTS:

2.1. PHYSICAL DIMENSIONS: See drawing on sheet 4.

2.2. PROPELLER: 12 inches diameter, nominal, 6 blades.

2.3. ROTATION: CCW facing terminal end of motor.

2.4. BLAST: Reverse, air over motor. See drawing on sheet 4.

2.5. SPEED: 1650 RPM when supplied from 60 CPS source; 1375 RPM when supplied from 50 CPS source.

2.6. INSULATION: The motor insulation shall be NEMA Standard Class A or better.

2.7. AIR DELIVERY: See Curve.

2.7.1. 60 CPS: 1650 CFM delivering into 1/4 inches of water static pressure, 2050 CFM delivering into free air.

2.7.2. 50 CPS: 1375 CFM delivering into 0.174 inches of water static pressure, 1700 CFM delivering into free air.

2.8. TERMINALS: The unit shall be supplied with two 12 IN. min long insulated wire leads.

2.9. BEARINGS: The motor shall be supplied with bronze sleeve bushings permanently lubricated for the life of the unit.

SIZE	CODE IDENT NO.	DWG. NO.
A	13499	009-1783

SCALE 10NE

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
A	A61258-added dimension .218 and 1.250 on sheet 4.	7 Apr 1965	RAC
B	A67517-Changed PN to XB-2372, changed inrush current, sealed current, starting resistance, & holding resistance from 4.8 amp, 40 ma, 6 ohms, & 770 ohms respectively.	17 Jan 1966	PL

DESCRIPTION: Contactor, seven-pole, open type with DC coil, 75 ampere main contacts.

*DASH NUMBER: -010.

*NOTICE: WHEN REFERRING TO COLLINS PART NUMBER, SPECIFY DRAWING NUMBER FOLLOWED BY APPLICABLE DASH NUMBER. WHEN PART NUMBER APPEARS AS 401-1687-XX9, MILITARY INSPECTION IS REQUIRED.

This drawing shall be interpreted in accordance with standards prescribed by MIL-D-70327.

The class designation and the symbols CAL, TA, CR, RA, NSR, and SSA which may appear on this drawing are for internal use only by the Collins Radio Company and are not related to the engineering data contained herein.

Rowan Control, Baltimore, Md. TA	52090	B	XB-2372
VENDOR	CODE IDENT. NO.	VENDOR TYPE	VENDOR P/N

CLASS 2C	CAL CHANGE 17 Feb 1965	SPECIFICATION CONTROL DRAWING	ENGRG PN NONE

NAME	DATE
PREP BY R.A. Colaguori da	15 FEB 1965
CHK BY Paul Fallin	15 FEB 1968
PROJ CHK X X X X X X X X X X X X X	
PROJ ENGR C Fallin RPB	22 FEB 1965
DWG DATE 23 FEB 1965	

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

RELAY, ARMATURE

K5 & K6 PLATE CONTS 820E/

CODE IDENT NO.	SIZE	DRAWING NUMBER
13499	A	401-1687*

SCALE NONE	WT CALC: 10 LBS.	SHEET 1 of 4

REV B

1. ELECTRICAL REQUIREMENTS:

1.1 CONTACT DATA:

ARRANGEMENT	CONTACT RATING	SIZE AND MATERIAL
3A	75 amperes at 28 VDC or 250 VAC	As Required
3B	10 amperes at 28 VDC or 250 VAC	As Required
1A	10 amperes at 28 VDC or 250 VAC	As Required
** 1C (Microswitch)	10 amperes at 28 VDC or 250 VAC	As Required

1.2 COIL DATA:

1.2.1 TYPE: 52S.

1.2.2 NOMINAL VOLTAGE: 28 volts DC.

1.2.3 MAXIMUM VOLTAGE: 30 volts DC.

1.2.4 PULL IN VOLTAGE: 22 volts DC maximum at +25°C.

1.2.5 DROP-OUT VOLTAGE: 14 volts DC maximum.

1.2.6 INRUSH CURRENT: 6.8 amperes maximum at 30 volts DC.

1.2.7 SEALED CURRENT: 55 milliamperes. maximum.

1.2.8 STARTING RESISTANCE: 4.5 ohms ± 10% at +25°C.

1.2.9 HOLDING RESISTANCE: 573 ohms ± 10% at 25°C.

1.2.10 DUTY CYCLE: Continuous at maximum coil voltage over specified ambient temperature range.

1.2.11 TEMPERATURE RISE: 28°C over ambient at maximum rated load.

1.2.12 LIFE EXPECTANCY: 50,000 operations minimum at rated load (6 operations per minute maximum).

2. ENVIRONMENTAL REQUIREMENTS:

2.1 AMBIENT TEMPERATURE RANGE: -30°C to +55°C operating and storage.

2.2 ALTITUDE: Sea level to 10,000 feet.

2.3 DIELECTRIC STRENGTH: Relay shall meet all the requirements of this specification after being subjected to a potential of 1500 volts RMS, 60 CPS for 60 seconds minimum between mutually insulated terminals and between insulated terminals and frame.

K5 & K6 PLATE CONTS 820 E/F

**The microswitch is part of the DC coil circuit.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± NA DECIMALS ± NA ANGLES ± NA	CODE IDENT NO 13499	SIZE A	DRAWING NUMBER 401-1687	
	SCALE NONE	WT See Sheet 1		SHEET 2 OF 4

PD-446-C (Rev. 6-61) SPECIFICATION – CONTINUATION SHEET

2.4 HUMIDITY: Relay shall meet all the requirements of this specification after being subjected to 90 to 95% relative humidity at 40°C for 48 hours followed by a 4 to 8 hour drying period.

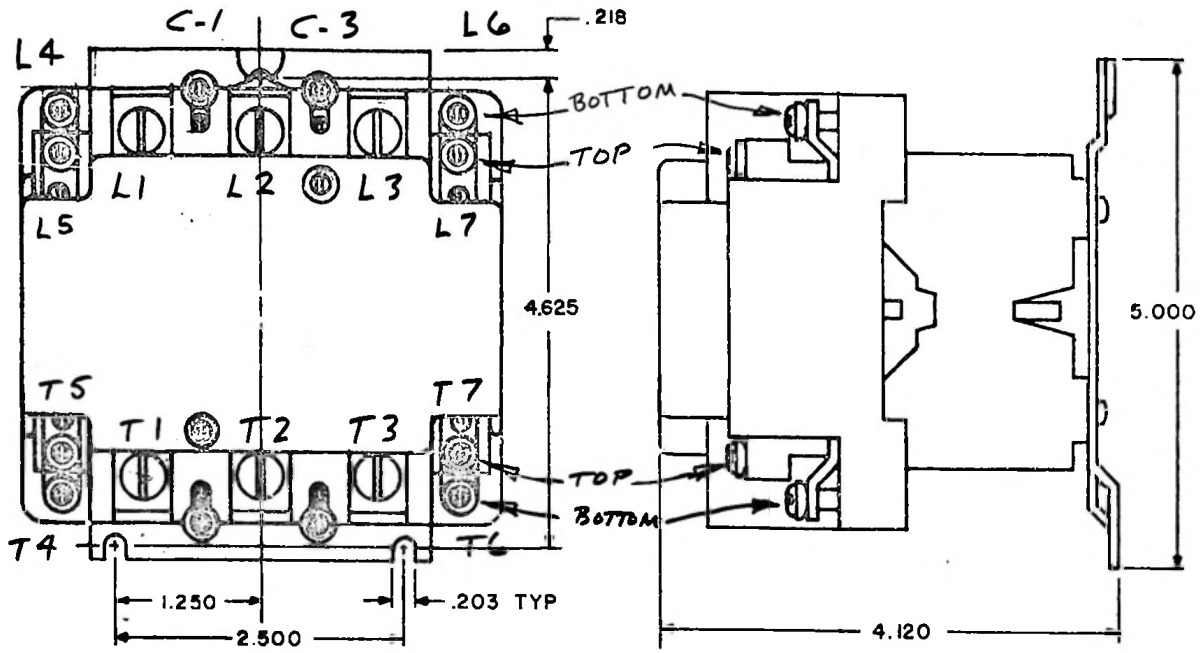
3. MECHANICAL REQUIREMENTS:

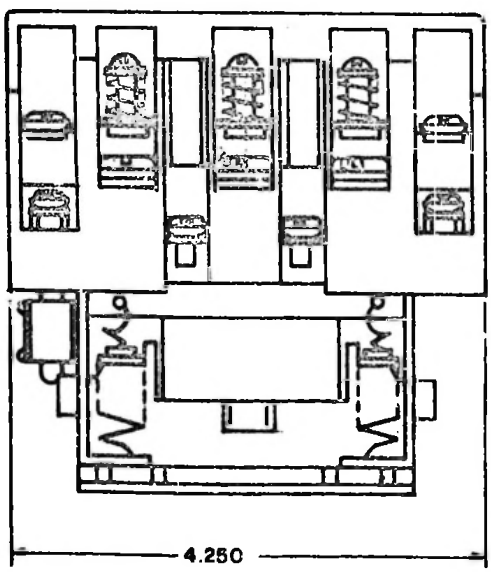
3.1 DIMENSIONAL AND SCHEMATIC DRAWING: See sheet 4.

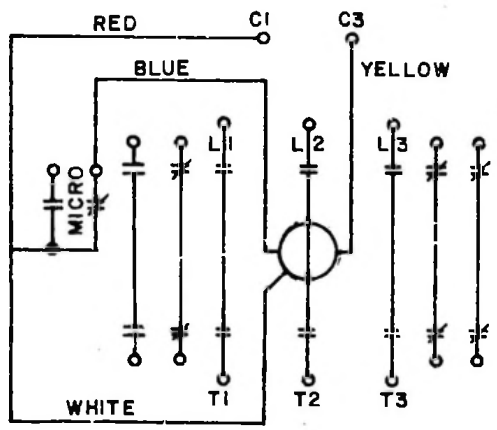
3.2 MARKINGS: The units shall be permanently and legibly marked with the manufacturer's name and/or trademark, manufacturer's part number, nominal coil voltage and frequency, contact current and voltage rating, and terminal identification.

K5 & K6
820 E/F

REV B







WIRING DIAGRAM

K5 & K6

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± NA DECIMALS ± .005 ANGLES ± NA	CODE IDENT NO. 13499	SIZE A	DRAWING NUMBER 401-1687
	SCALE NONE	WT See Sheet 1	SHEET 4 OF 4

PD-446-8" (Rev. 6-81) SPECIFICATION – CONTINUATION SHEET

008-4033-271

DAB (11-02-02-89)

NOTICE:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THE CLASS DESIGNATION AND THE SYMBOLS CAL, TA, CR, RA, SSA AND NSR WHICH MAY APPEAR ON THIS DRAWING ARE FOR INTERNAL USE ONLY BY THE COLLINS RADIO COMPANY AND ARE NOT RELATED TO THE ENGINEERING DATA CONTAINED HEREIN.
3. THE SYMBOL — IN THE REV STATUS BLOCK DENOTES ORIGINAL ISSUE.

DWG DATE 22 MAR 1965

REVISIONS

LTR	DESCRIPTION	DATE	APPROVED

DESCRIPTION: Contactor, five-pole, open type with DC coil, 25 ampere main contacts, 10 ampere auxiliary contacts.

*DASH NUMBER: -010.

*WHEN REFERRING TO COLLINS PART NUMBER, SPECIFY DRAWING NUMBER FOLLOWED BY APPLICABLE DASH NUMBER. WHEN PART NUMBER APPEARS AS 401-1688-XX9, MILITARY INSPECTION IS REQUIRED.

SUGGESTED SOURCES OF SUPPLY	CODE IDENT	VENDOR TYPE	VENDOR PN
Rowan Control, Baltimore, Md. TH	52090	B	B-230-11-C

REV STATUS OF SHEETS																								
REV	-	-	-	-																				
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

CLASS 2C	CAL CHANGE DATE 21 SEP 1965	SPECIFICATION CONTROL DRAWING	ENGRG PN NONE

UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES TOL ON FRACTIONS ± NA DEC .005 ANGLES ± NA

MATERIAL:

AS REQUIRED

	NAME	DATE
PREP	R.A. Colapret 1st	24 FEB 1965
CHK	P. LaPelle	26 FEB 1965
PROJ	C. Fellner RFA	16 MAR 1965

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA

RELAY, ARMATURE

K2 K7

SIZE	CODE IDENT NO.	DWG NO.
A	13499	401-1688*

SCALE NONE	WT CALC: 1.5 LBS	SHEET 1 OF 4

1. ELECTRICAL REQUIREMENTS:

1.1. CONTACT DATA:

ARRANGEMENT	CONTACT RATING	SIZE AND MATERIAL
3A	25 amperes at 28 VDC or 250 VAC	As Required
1A	10 amperes at 28 VDC or 250 VAC	As Required
1B	10 amperes at 28 VDC or 250 VAC	As Required
*1C (Microswitch)	10 amperes at 28 VDC or 250 VAC	As Required

1.2. COIL DATA:

1.2.1. TYPE: 75N or equal.

1.2.2. NOMINAL VOLTAGE: 28 volts DC.

1.2.3. MAXIMUM VOLTAGE: 30 volts DC.

1.2.4. PULL-IN VOLTAGE: 22 volts DC maximum at +25°C.

1.2.5. DROP-OUT VOLTAGE: 11 volts DC maximum.

1.2.6. INRUSH CURRENT: 5.2 amperes.

1.2.7. SEALED CURRENT: 100 milliamperes.

1.2.8. STARTING RESISTANCE: 5.8 ohms ± 20% at +25°C.

1.2.9. HOLDING RESISTANCE: 289 ohms ± 10% at 25°C.

1.2.10. DUTY CYCLE: Continuous at maximum coil voltage over specified ambient temperature range.

1.2.11. TEMPERATURE RISE: 26°C over ambient at maximum rated load.

1.2.12. LIFE EXPECTANCY: 100,000 operations minimum at rated load (6 operations per minute maximum).

2. ENVIRONMENTAL REQUIREMENTS:

2.1. AMBIENT TEMPERATURE RANGE: -30°C to +55°C operating and storage.

2.2. ALTITUDE: Sea level to 7,000 feet.

2.3. DIELECTRIC STRENGTH: Relay shall meet all the requirements of this specification after being subjected to a potential of 1500 volts RMS, 60 CPS for 60 seconds minimum between mutually insulated terminals and between insulated terminals and frame.

*The microswitch is part of the DC coil circuit.

K2 & K7
820E/F
FIL # 3 R.

SIZE	CODE IDENT NO.	DWG. NO.	
A	13499	401-1688	
SCALE NONE	WT	SEE SHEET 1	SHEET 2 OF 4

2.4. HUMIDITY: Relay shall meet all the requirements of this specification after being subjected to 90 to 95% relative humidity at 40°C for 48 hours followed by a 4 to 8 hour drying period.

3. MECHANICAL REQUIREMENTS:

3.1. DIMENSIONAL AND SCHEMATIC DRAWING: See sheet 4.

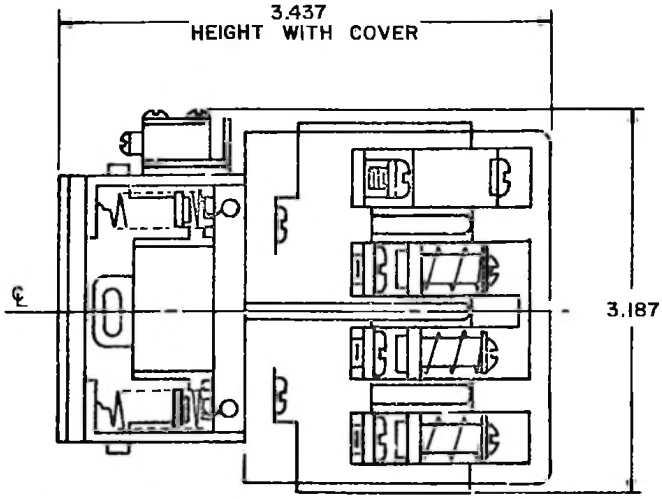
3.2. TERMINALS: All terminals shall be screw type.

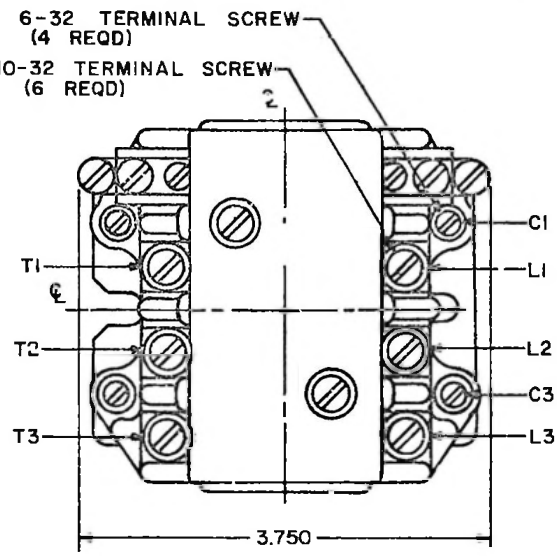
3.3. MARKINGS: The units shall be permanently and legibly marked with the manufacturer's name and/or trademark, manufacturer's part number, nominal coil voltage and frequency, contact current and voltage rating, and terminal identification.

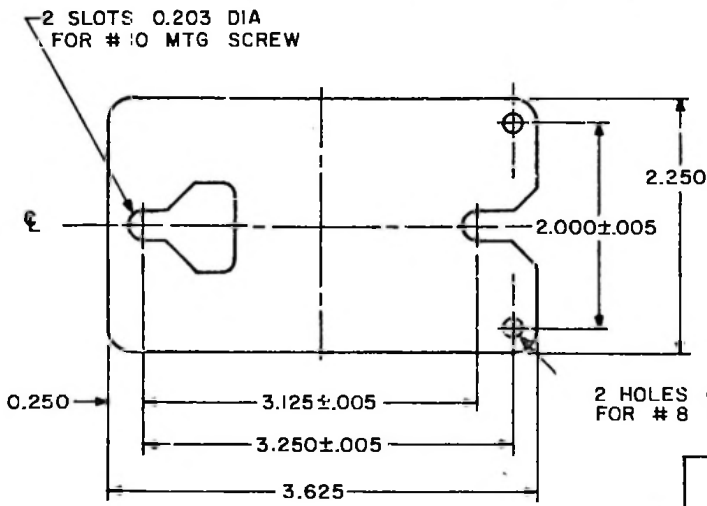
K2 & K7
820 E/F
FIL & SCR

SIZE	CODE IDENT NO.	DWG. NO.	
A	13499	401-1688	
SCALE NONE	WT	SEE SHEET 1	SHEET 3 OF 4

REV —

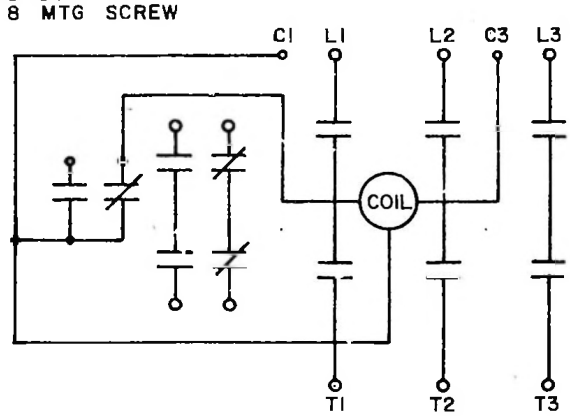






MOUNTING PLATE

2 HOLES 0.173 DIA
FOR #8 MTG SCREW

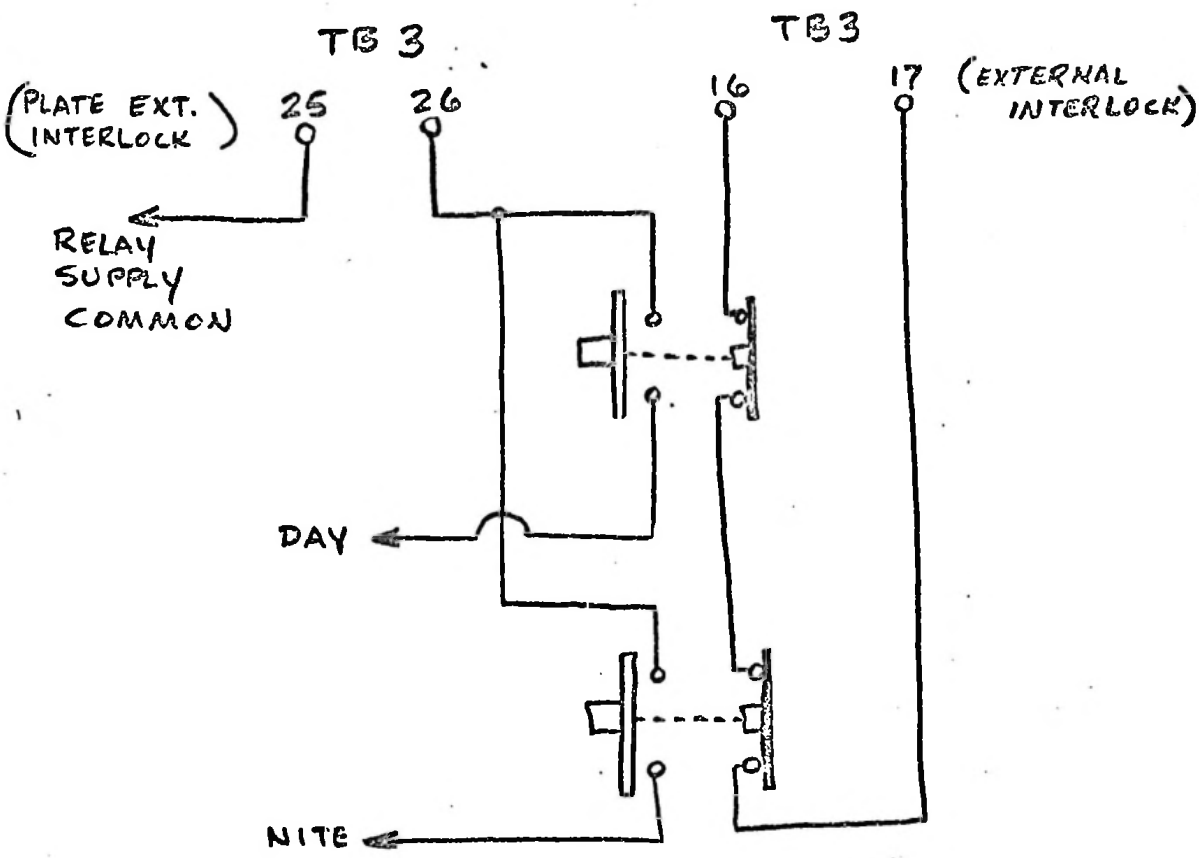


WIRING DIAGRAM

K2 & K7
820E/F
FIL & SCR.

SIZE	CODE IDENT NO.	DWG. NO.	
A	13499	401-1688	
SCALE NONE	WT	SEE SHEET 1	SHEET 4 of 4

(11-03-02-8-)



INTERLOCK CIRCUIT TO TURN OFF PLATE POWER WHILE SWITCHING PHASOR. (820E/F-1)

product support

SERVICEBULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 1

EQUIPMENT SERIES: 820E/F

DATE: 5-19-66

EQUIPMENT TYPE: 820E-1 and 820F-1 BROADCAST TRANSMITTERS

SUBJECT: ADDITIONAL PROTECTION FOR THE SCS/S IN THE DISCRIMINATOR CIRCUIT

The modification described in this bulletin involves the insertion of resistors in series with the capacitors across K15 and K16 in the discriminator circuit. This will provide additional protection to Q1 and Q2.

This modification applies to 820E-1 serial numbers 1 through 3, 5 through 8 and to 820F-1 serial number 1.

MODIFICATION PROCEDURE:

1. Remove C133 and C134 from the terminals of K15 and K16. Refer to figure 1.
2. Locate and drill four .125 holes as shown in figure 2.
3. Install four standoffs (306-0976-000) using a No. 4 lock-washer (310-027-000) under each standoff and secure with a 4-40 x 5/16 PPH screw (343-0134-000).
4. Connect C133 and C134 as shown in figure 3. Be sure and observe polarity.
5. Connect 47-ohm 1-watt resistors (745-3296-000), R182 and R183 as shown.
6. Connect the negative side of C133 and C134 to K15 and K16 terminals with No. 22 DA wire (439-7071-000).
7. Figure 4 is a revised schematic.

PARTS REQUIRED:

The following parts are required:

QTY	DESCRIPTION	COLLINS PART NUMBER
2	Resistors, 47 ohm 1 watt 10%	745-3296-000
4	Standoff/insulators	306-0976-000
4	Washers, lock No. 4	310-0279-000
4	Screws 4-40 x 5/16 PPH	343-0134-000
1 ft	No. 22 DA wire	439-7071-000

The parts required for this modification are included with this service bulletin.

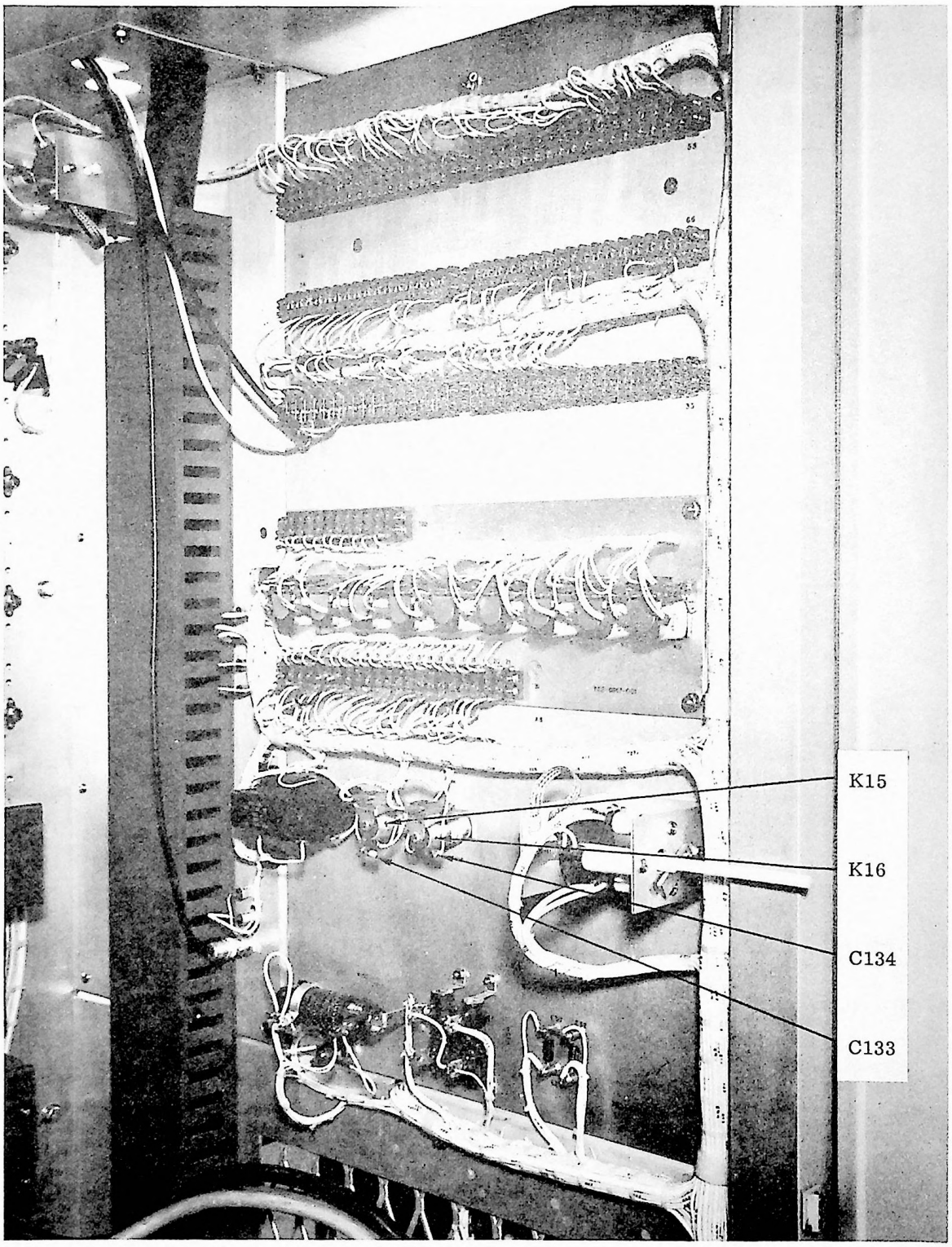


Figure 1. Relay Location

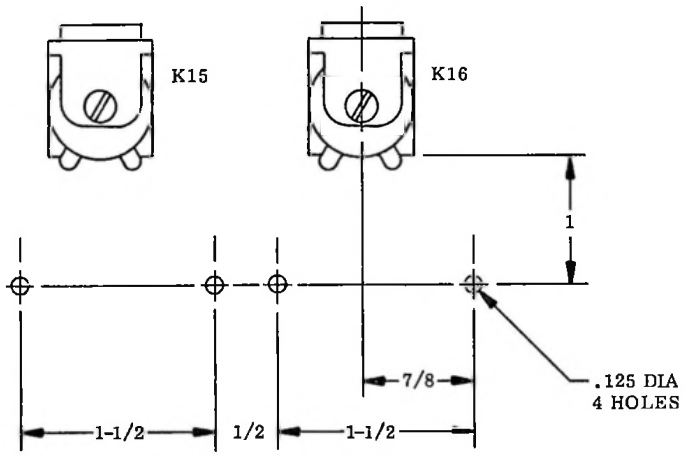


Figure 2. Hole Location

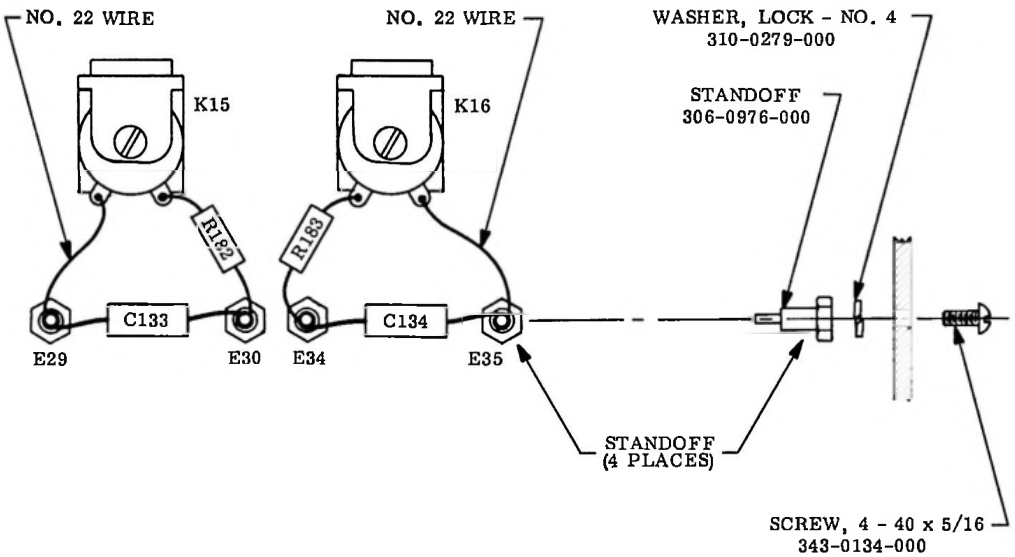


Figure 3. Component Mounting

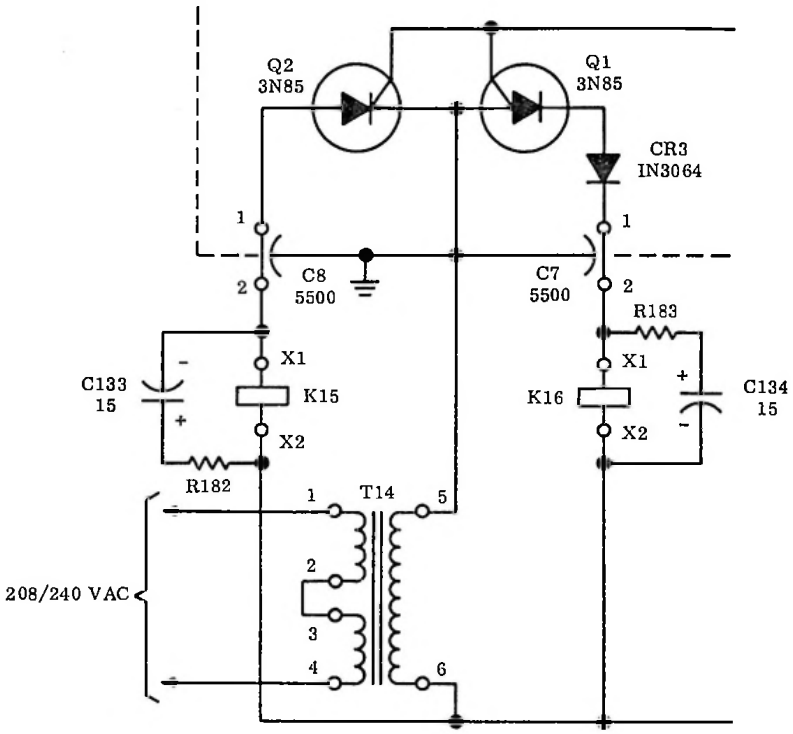


Figure 4. Revised Schematic

product support

SERVICEBULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 2

EQUIPMENT SERIES: 820E/F

DATE: 6-14-66

EQUIPMENT TYPE: 820E-1 and 820F-1
BROADCAST TRANSMITTER

SUBJECT: IMPROVED SHAFT COUPLING.

The modification described in this bulletin eliminates slipping of the shaft coupling between the motors and the tuning and loading capacitors. This is accomplished by installing a new, modified shaft coupling between each motor and capacitor.

This modification is recommended for all units.

MODIFICATION PROCEDURE:

1. Shut transmitter down and remove all power.
2. Remove back cover to output section of power amplifier.
3. Loosen set screws that secure the coupling to the motor and tuning capacitor shaft.
4. Remove four screws that secure the tuning motor to the shelf.
5. Let motor down and remove the coupling from the shaft.
6. Install modified coupling, 015-3062-040, on motor shaft.
7. Place motor in position, making sure that the coupling is aligned on the tuning capacitor shaft.
8. Secure motor to the shelf using screws removed in step 4.
9. Tighten all four set screws, 328-5044-000, in coupling.
10. Repeat steps 3 through 9 for the loading capacitor and associated motor.
11. Figure 1 is a drawing of the modified coupling, 015-3062-040.

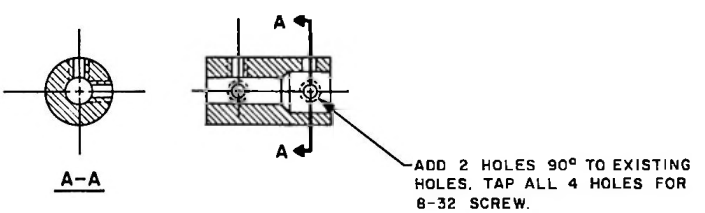


Figure 1

PARTS REQUIRED:

The following parts are required for this modification:

QUANTITY	DESCRIPTION	COLLINS PART NUMBER
2	Shaft Coupling, Modified	015-3062-040
8	Set screw, 8-32 x 1/4	328-5044-000

The parts required for this modification are included with this service bulletin.

product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 3

EQUIPMENT SERIES: 820E/F

DATE: 8-17-66

EQUIPMENT TYPE: 820E-1 and 820F-1 BROADCAST TRANSMITTERS

SUBJECT: IMPROVED RELIABILITY OF MODULATOR

The modification described in this bulletin improves reliability of the modulator by replacing the screen stabilization resistors in the modulator, adjusting the modulator and power amplifier arc gaps, and rerouting one lead of the rf choke in the power amplifier plate voltage circuit.

This modification is recommended for all units.

MODIFICATION PROCEDURE:

Refer to figure 6-1, sheet 3 of 19, in the instruction book on the 820/F-1 Broadcast Transmitter, and to figure 1 in this bulletin for the following steps:

1. Remove R113, 33-ohm, 2-watt resistor from E33 to XV1.
2. Remove R123, 33-ohm, 2-watt resistor from E33 to XV2.
3. Install new R113, 50-ohm, 16.5-watt resistor (712-0129-000) between E33 and XV1.
4. Install new R123, 50-ohm, 16.5-watt resistor (712-0129-000) between E33 and XV2.
5. Check all connections.
6. Respace the arc gaps under the tube sockets E14, E15, E16 and E17 to 0.070 inch. A number 50 drill can be used as a gauge.
7. Route the top lead (outside of winding) away from the pi winding of rf choke L13. Refer to figure 2. The location of L13 is shown in figure 6-1, sheet 16 of 19, in the instruction book on the 820E/F-1 Broadcast Transmitter.

PARTS REQUIRED:

QUANTITY	DESCRIPTION	COLLINS PART NUMBER
2	Resistors, 50-ohm, 16.5-watt	712-0129-000

The parts required for this modification are included with this service bulletin.

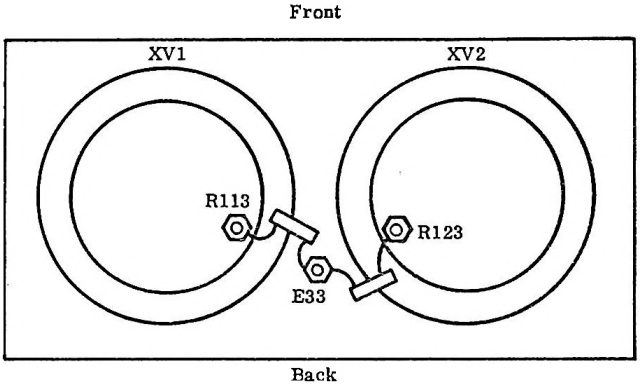


Figure 1. Location of Screen Stabilization Resistors

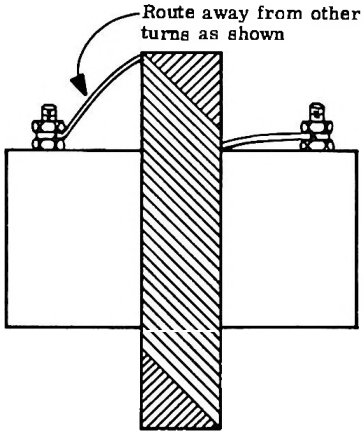


Figure 2. L13 Top Lead Routing

product support

COLLINS

SERVICEBULLETIN

COLLINS RADIO COMPANY

CORRECTED COPY

27 February 1967

SERVICE BULLETIN NO.4

EQUIPMENT SERIES: 820E/F

EQUIPMENT TYPE: 820E-1 and 820F-1 Broadcast Transmitters

SUBJECT: Selective Operation of the Automatic Tuning Circuit

The modification described in this service bulletin revises the wiring of the automatic tuning circuit to prevent operation of the automatic tuning relays until changing the transmitter loading.

This modification is recommended for all units.

1. MODIFICATION PROCEDURE

a. Remove power from the transmitter. Refer to figure 1 during the following steps.

b. Remove the W1-209 wire from CB4-LLD and discard as it is no longer used.

c. Remove the W1-210 wire from CB4-RLD and discard as it is no longer used.

d. Remove the W1-210 wire from T14-2 and discard as it is no longer used.

e. Remove the W1-209 wire from T14-1 and discard as it is no longer used.

f. Run a new W1-210 between CB1-CLD and T14-2. Route this wire through the cable clamps, concealing and lacing as required.

g. Connect W1-210 to CB1-CLD and T14-2.

h. Run a new W1-209 between K13-R3 and T14-1. Route through cable clamps, concealing and lacing as required.

i. Connect W1-209 to K13-R3 and T14-1.

j. Connect K13-R3 to K14-R3 with No. 20 wire, 439-8003-000.

k. Figure 2 is a revised schematic diagram of the changes made in the automatic tuning circuit.

CORRECTED COPY

2. PARTS REQUIRED

Modification Kit 762-9045-003 consists of the following parts:

QUANTITY	DESCRIPTION	COLLINS PART NUMBER
10 feet	W1-209	762-9045-001
10 feet	W1-210	762-9045-002
1 foot	No. 20 wire	439-8003-000

The parts required for this modification are included with this service bulletin.

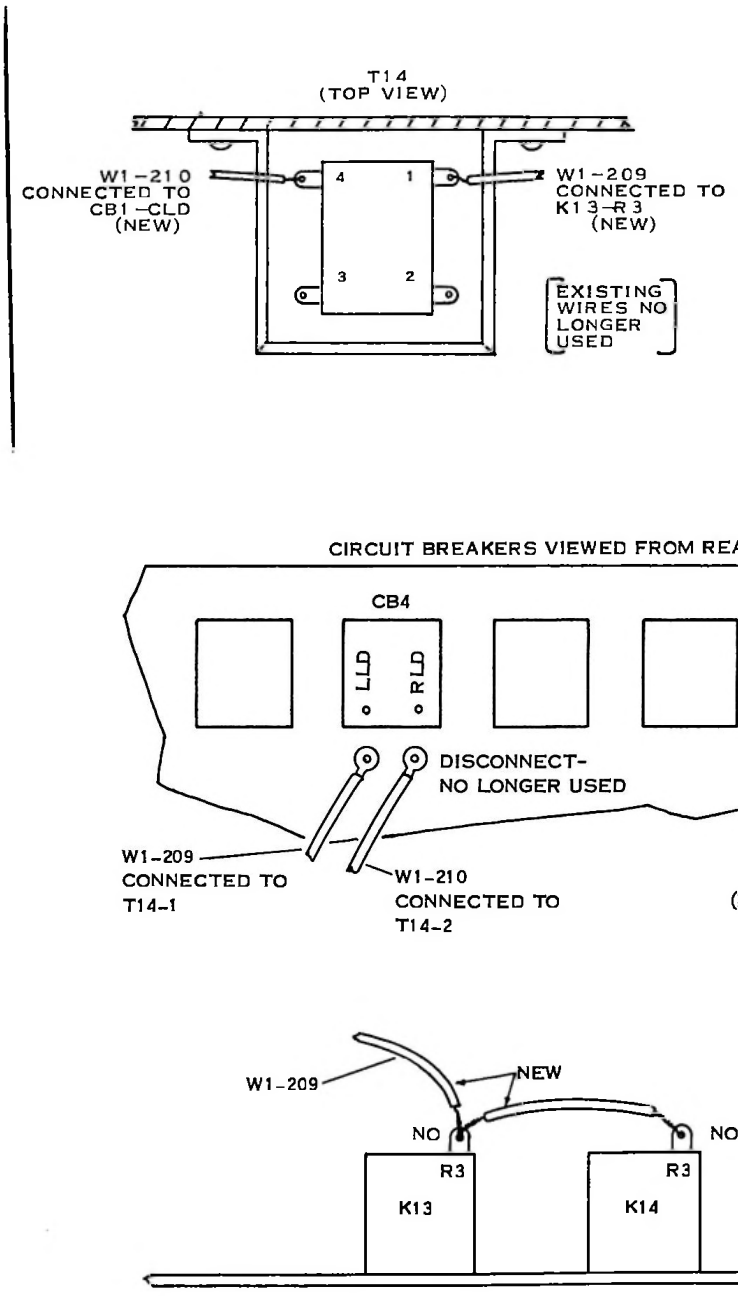


Figure 1. Pictorial of Wiring Changes

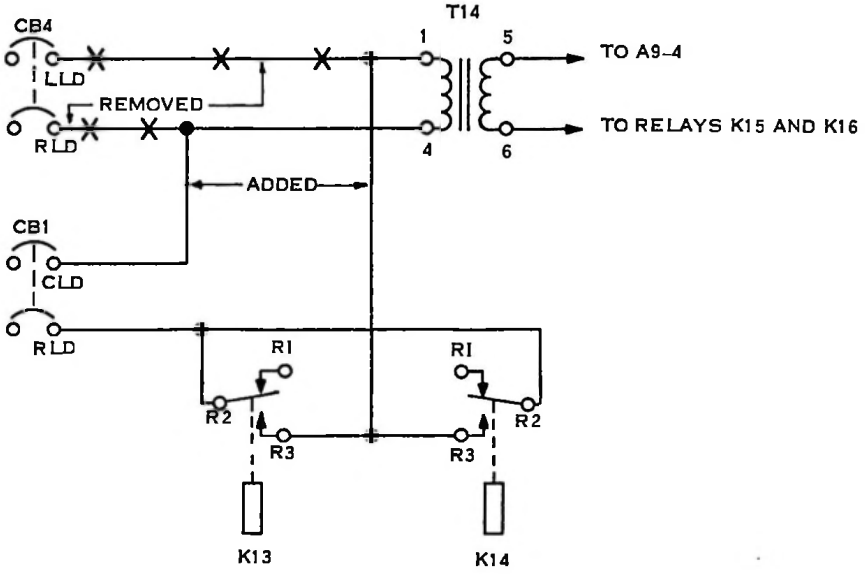


Figure 2. Revised Schematic Showing Circuit Changes

product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

CORRECTED COPY

27 February 1967

SERVICE BULLETIN NO. 4

EQUIPMENT SERIES: 820E/F

EQUIPMENT TYPE: 820E-1 and 820F-1 Broadcast Transmitters

SUBJECT: Selective Operation of the Automatic Tuning Circuit

The modification described in this service bulletin revises the wiring of the automatic tuning circuit to prevent operation of the automatic tuning relays until changing the transmitter loading.

This modification is recommended for all units.

1. MODIFICATION PROCEDURE

a. Remove power from the transmitter. Refer to figure 1 during the following steps.

b. Remove the W1-209 wire from CB4-LLD and discard as it is no longer used.

c. Remove the W1-210 wire from CB4-RLD and discard as it is no longer used.

d. Remove the W1-210 wire from T14-2 and discard as it is no longer used.

e. Remove the W1-209 wire from T14-1 and discard as it is no longer used.

f. Run a new W1-210 between CB1-CLD and T14-2. Route this wire through the cable clamps, concealing and lacing as required.

g. Connect W1-210 to CB1-CLD and T14-2.

h. Run a new W1-209 between K13-R3 and T14-1. Route through cable clamps, concealing and lacing as required.

i. Connect W1-209 to K13-R3 and T14-1.

j. Connect K13-R3 to K14-R3 with No. 20 wire, 439-8003-000.

k. Figure 2 is a revised schematic diagram of the changes made in the automatic tuning circuit.

CORRECTED COPY

2. PARTS REQUIRED

Modification Kit 762-9045-003 consists of the following parts:

QUANTITY	DESCRIPTION	COLLINS PART NUMBER
10 feet	W1-209	762-9045-001
10 feet	W1-210	762-9045-002
1 foot	No. 20 wire	439-8003-000

The parts required for this modification are included with this service bulletin.

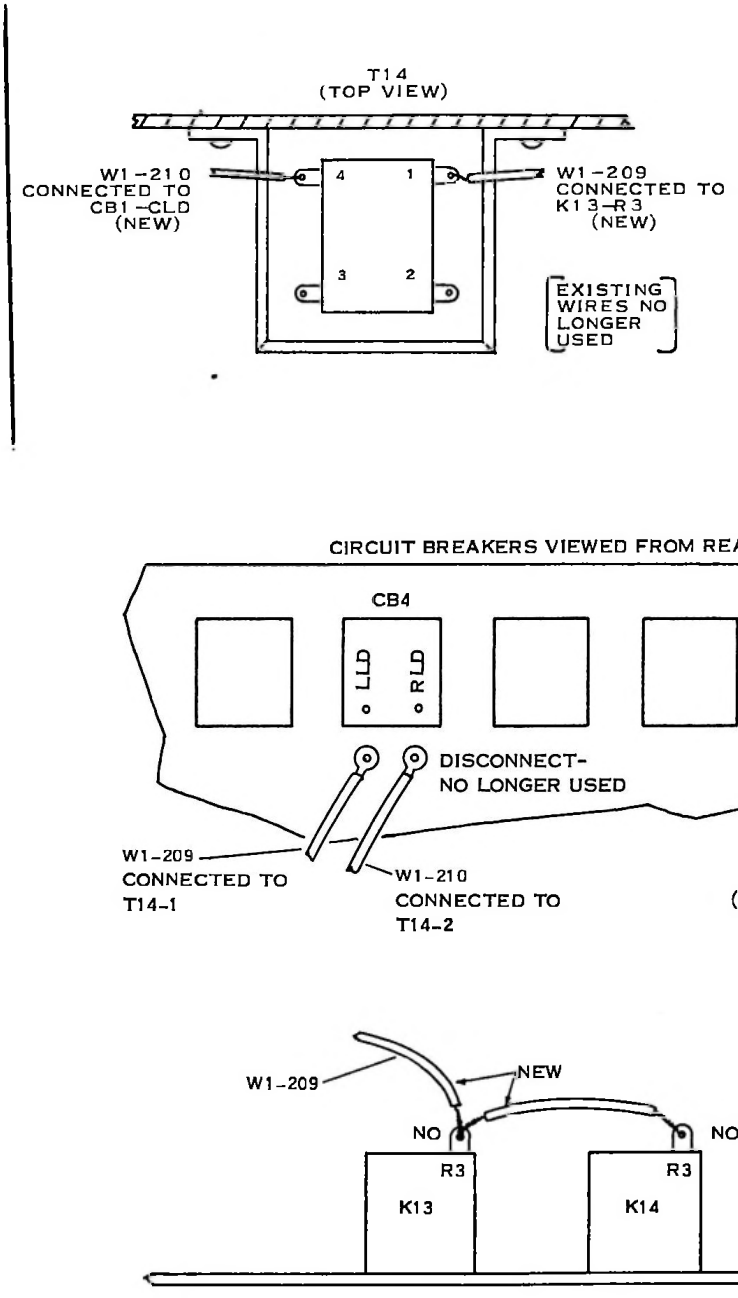


Figure 1. Pictorial of Wiring Changes

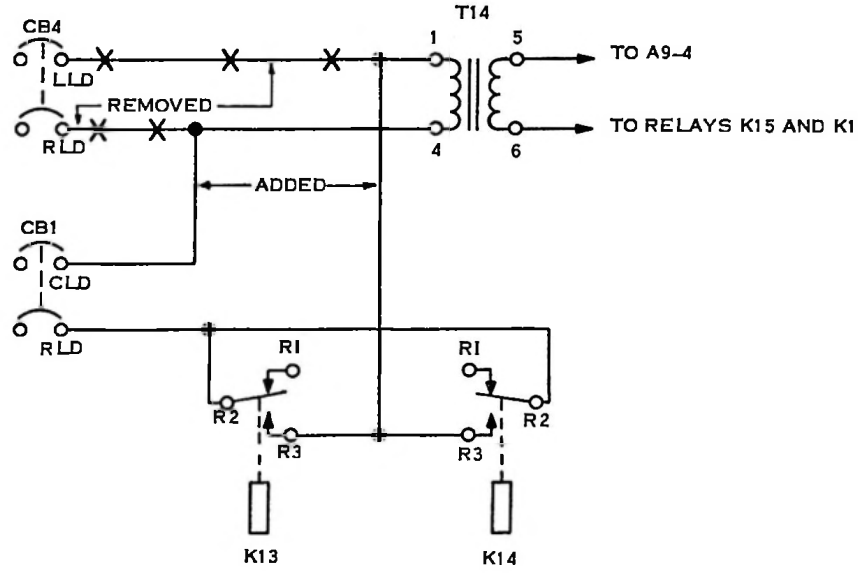


Figure 2. Revised Schematic Showing Circuit Changes

product support

COLLINS

TECHNICAL BULLETIN

COLLINS RADIO COMPANY / DALLAS, TEXAS

1 May 1968

SERVICE BULLETIN NO. 5

EQUIPMENT SERIES: 820E/F

EQUIPMENT TYPE: 820E-1 and 820F-1 AM Broadcast Transmitter

SUBJECT: Plate Voltage Metering Resistors

The purpose of the modification described in this bulletin is to prevent failure of the plate metering circuit.

This modification applies to 820E-1 serial numbers 1 through 31 and to serial numbers 1 through 25 on the 820F-1.

1. MODIFICATION PROCEDURE

a. Remove all wires from R157 and R158.
b. Remove resistors and clamps from standoffs. Do not remove standoffs.
c. Carefully unsolder white wire from terminal of arc-gap assembly E3. The other end of this wire was connected to R158.
d. Mount new resistor board assembly (782-0045-001) on the four stand-offs previously used to mount R157 and R158.
e. Remove the lugs from the two white high-voltage wires that were removed from R157.
f. Restrip these wires and connect to terminal on left side of new resistor board (solder).
g. Strip wire (white) supplied with board, and solder one end to terminal of E3 and the other end to the right hand terminal of new resistor board. This completes the modification.

2. PARTS REQUIRED

QUANTITY	DESCRIPTION	COLLINS PART NUMBER
1	Resistor Board Assembly	782-0045-001
1	12 inches wire	A16PD00X9XXX

The parts required for this modification are included with this bulletin. This assembly will be sent on a no-charge basis if request is received by Collins Radio Company, Service Parts Department, before July 1, 1968.

523-0556832-001431
1 April 1966

COLLINS

instruction book

STOLEN FROM
A.R. NOTT

AM. Broadcast Transmitter 820E/F-1

This Manual Includes:

AM. Broadcast Transmitter 820E/F-1
AM. Broadcast Exciter 310W-1

820 E 522-3291-000

820 F 522-3292-000

Collins Radio Company | Dallas, Texas
Printed in U. S. A.

table of contents

table of contents (cont)

table of contents (cont)

list of illustrations

list of illustrations (cont)

list of tables

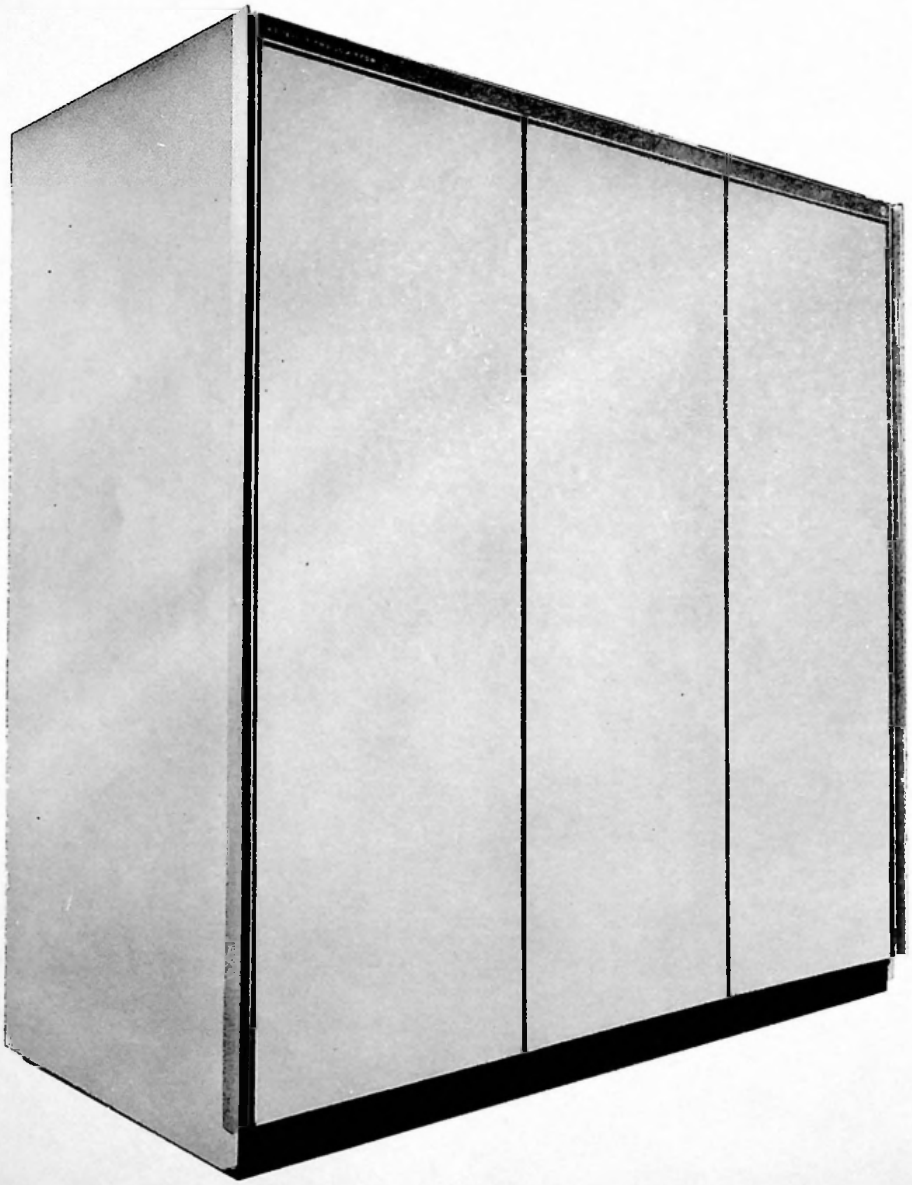


Figure 1-1. AM. Broadcast Transmitter 820E/F-1

section 1

general description

1.1 GENERAL DESCRIPTION.

1.2 INTRODUCTION.

AM. Broadcast Transmitter 820E/F-1 is a high-fidelity, amplitude-modulated transmitter (figure 1-1) that operates in the frequency range from 540 to 1600 kc with a nominal power output of 5 kw for the E-1 model and 10 kw for the F-1 model. The frequency source of the 820E/F-1 is AM. Broadcast Exciter 310W-1. Theory of operation and maintenance information for the 310W-1 is located in the unit instructions bound in the back of this manual.

1.3 PHYSICAL DESCRIPTION.

The 820E/F-1 consists of a three-bay cabinet, an extended control panel, and an rf exciter (310W-1). All components, except the extended control panel and the 310W-1 are contained in the cabinet. In some installations, however, the extended control panel and the 310W-1 are mounted in the top portion of the right-hand bay (viewed from the front). When mounted external to the cabinet, the extended control panel and the 310W-1 fit a standard 19-inch equipment rack. Fifty feet of interconnecting cable is provided when these two units are mounted in an adjacent speech rack or control console. If desired, the cable distance can be increased to 250 feet. All meters, control devices, and indicators are located on the extended control panel.

The three-bay cabinet is divided into three functional rack sections: (1) The left section (viewed from front) contains the modulator and audio driver amplifier stages; (2) the center section contains the power amplifier and rf driver stages; (3) the right section contains the control and overload circuits, customer wiring terminations, and low-voltage power supplies. The output network and high-voltage components are located in the left and center sections. Double rear doors provide access to the output network section and the high-voltage transformer area. The doors are provided with rf weather stripping for a good electrical seal. In addition, the output network section has an aluminum cover. Access to the modulator, audio driver amplifier, rf driver, and power amplifier is provided by separate hinged doors on the front. A rear door, a hinged front door, and a movable front panel provide access to the right section. Three outer front doors are for appearance only.

The entire cabinet, except the modulator and power amplifier plenum chambers, is flushed by a cabinet cooling fan which draws air through a rear filter. A portion of the air is picked up by a centrifugal blower and applied through separate air plenum chambers to the large tubes. The remainder of the air is exhausted via grills in the top of the output network enclosure except for a small portion which is exhausted through an outlet near the top of the right section.

1.4 FUNCTIONAL DESCRIPTION.

The 820E/F-1 consists of an rf exciter (310W-1), an rf driver, an audio driver, a modulator, a power amplifier, an output network, power supplies, and control circuits. Rf energy from the 310W-1 is applied to the rf driver which raises it to a level sufficient to drive the power amplifier. Audio from an external source is applied to the audio driver, amplified, and coupled to the modulator. From the modulator, amplified audio is coupled to the plate and screen circuits in the power amplifier, modulating the rf energy. An impedance-matching output network couples the modulated rf energy from the power amplifier to a 50-ohm antenna.

For personnel protection, each rear door, hinged front door, and access panel is equipped with a control circuit interlock switch. In addition, each compartment in which high voltage is present is equipped with a spring-operated switch which grounds the high-voltage transformers and capacitors in that particular compartment. Overload protection is furnished by magnetic circuit breakers and overload sensor circuits.

1.5 TECHNICAL CHARACTERISTICS.

Frequency Range:
540 to 1600 kc

Power Output:
820E-1
5500 watts (1100 watts reduced power)

820F-1
10,600 watts (5500 watts reduced power)

Frequency Stability:
±5%, 0° to +35°C (+32° to +95°F)
±10%, -10° to +45°C (+14° to +203°F)
±20%, -25° to +45°C (-13° to +113°F)

Output Impedance:
50 ohms, unbalanced

Audio Input Impedance:
150/600 ohms, balanced

Audio Input Level:
+10 dbm ±2 db

Audio Frequency Response:
±1 db, 100 to 7500 cps
±2 db, 50 to 10,000 cps

Audio Harmonic Distortion:
Less than 3%, 50 to 7500 cps

Carrier Shift:
Less than 3%, 0 to 100% modulation

Residual Noise Level:
60 db below 100% modulation

Modulation Type:
High-level plate

Ambient Temperature Range:
-25° to +45°C

Ambient Humidity Range:
Up to 95%

Altitude Range:
Up to 7000 feet

Power source:
208/240 volts, 3-phase, 50/60 cps

Combined Voltage Variation and Regulation Tolerance:
±5%

Power Requirement at 5500 Watts, 100% Modulation:
18.5 kw, 0.98 power factor

Power Requirement at 10,600 Watts, 100% Modulation:
32 kw, 0.97 power factor

section 2

installation

2.1 GENERAL.

Carefully inspect the shipping crates for signs of damage incurred during transit. If damage is found, contact the transportation company for further instructions. Do not throw away the shipping crates. Refer to table 2-1 for a list of test equipment required for adjustment of the transmitter.

2.2 UNPACKING.

The transmitter three-bay cabinet is shipped in a skid-type crate with the unpacking instructions stenciled on the sides. In general, cut and remove the steel straps from around the crate. Using a nail puller, remove the row of nails from the sides near the bottom of the crate. Lift the whole crate assembly (top and four sides) from the base. Unbolt the cabinet from the base.

Small components and subassemblies are packed in regular boxes. To open, remove the nails from the top cover and lift the cover off. The high-voltage transformer, modulation transformer, and modulation reactor are each shipped in separate crates. Remove the top cover and four sides from each of these crates.

2.3 PREINSTALLATION.

2.3.1 POWER AND CONTROL WIRES.

a. Place the control cable (A1W1), the RG-58C/U coaxial cable (A10W12), and the customer-furnished wires of groups B and C in the proper position (figure 2-1).

Note

The cables and wires can be brought into the transmitter cabinet either from the bottom or top depending upon the customer facilities.

b. Connect one end of the customer-furnished, 4-inch wide ground strap to the station ground block.

c. Place the other end of the strap at a point where the cabinet will be located.

2.3.2 POWER SOURCE.

a. For the 820E-1, provide a 208/240-volt, three-phase power source capable of producing 20 kw (35 kw for the 820F-1).

TABLE 2-1. TEST EQUIPMENT REQUIRED

ITEM	MANUFACTURER
Multimeter	Triplett 630-NA
Oscilloscope (used when performing the filament voltage regulator adjustments in section 5)	Tektronix 553 or 545A
Variable power supply	Electro Products Lab Model EFB
Test circuit number 1	Figure 2-5 (locally fabricated)
Test circuit number 2	Figure 2-6 (locally fabricated)
Wooden yardstick or equivalent	

b. Provide a primary disconnect fused for 60 amperes per leg (820E-1) or 100 amperes per leg (820F-1).

c. Connect a power cable to the power terminals on the wall disconnect switch.

2.4 ASSEMBLY.

a. Place the cabinet in the desired location. Ensure that the wires and cables (paragraph 2.3.1) are accessible when the cabinet is in position. (See figure 2-1.)

WARNING

Be sure that the primary disconnect switch is open and the fuses are removed.

b. Remove the lower right front panel from the cabinet.

c. Pull the control wires and cables (groups A, B, and C, figure 2-1) through the access hole in the bottom (or top) of the cabinet and place them in the customer wiring duct, located on the left wall of the right bay.

d. Install extended control panel A1 and AM. Broadcast Exciter 310W-1 in the equipment rack or console.

e. Install transformers T9 and T12, reactor L4, blower B1, and resistors R157, R158, and R33 in the proper position in the high-voltage compartment (figure 6-1, sheet 11 of 19). Secure the units with the hardware provided.

f. Remove the back panel from the output network compartment.

g. Attach inductor L14 to the top of the output network compartment using the four standoffs and associated hardware. Connect the interconnecting straps to the terminals, located on either end of the coil.

h. Install the modulator, rf driver, and power amplifier tubes.

CAUTION

When installing the modulator and power amplifier tubes, ensure that the tubes are properly seated in the tube sockets. After closing the snap lock on the air chimney, check that the air chimney fits flush against the tube.

i. Remove the top cover from the 310W-1 and install the two crystals (Y1 and Y2).

CAUTION

Be careful when installing the crystals. Rough handling may prevent the crystals from operating properly.

2.5 WIRING.

2.5.1 HIGH-VOLTAGE COMPARTMENT.

a. Attach interconnecting wires to the proper terminals on reactor L4, blower B1, and transformer T12 by matching the numbers on the wires to the numbers on the terminals.

b. Connect the wires to the proper terminals on transformer T9 as shown in figure 2-2.

2.5.2 EXTENDED CONTROL PANEL A1.

a. Connect one end of the 33-pair, shielded cable A1W1, to terminal board TB1, located on the left wall of the right bay (figures 2-1 and 2-3).

b. Connect the other end of A1W1 to terminal board TB1, located on the back of extended control panel A1.

c. Using a jumper and ohmmeter, check that each wire connected to terminals of A1TB1 (panel A1) is connected to the matching terminal of TB1 in the transmitter cabinet.

2.5.3 AM. BROADCAST EXCITER 310W-1.

a. Connect one end of the RG-58C/U coaxial cable to jack J9, located on the left wall of the right bay (figures 2-1 and 2-4).

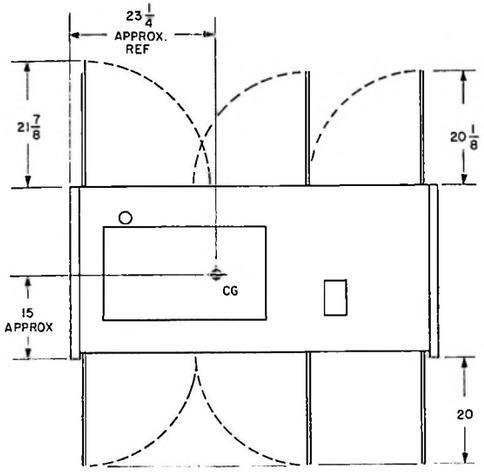
b. Connect the other end of W12 to 50 OHM OUTPUT jack J1, located on the back of AM. Broadcast Exciter 310W-1.

c. Connect a wire from terminal 65 of A1TB1 to the 28VDC positive lug located on the back of the 310W-1.

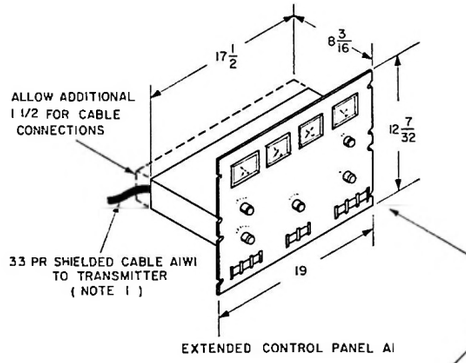
d. Connect a wire from terminal 31 of A1TB1 to the 28VDC ground lug located on the back of the 310W-1.

2.5.4 AUDIO INPUT, FREQUENCY MONITOR, AND MODULATION MONITOR.

a. Connect one end of the shielded audio input cable to terminals 1, 2, and 3 of TB3 as shown in figure 2-4.

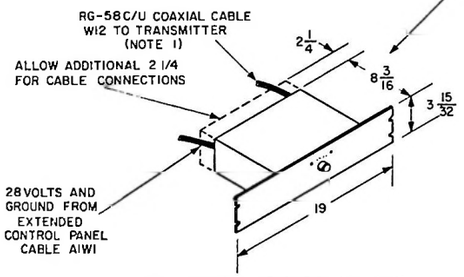


FRONT
TOP VIEW



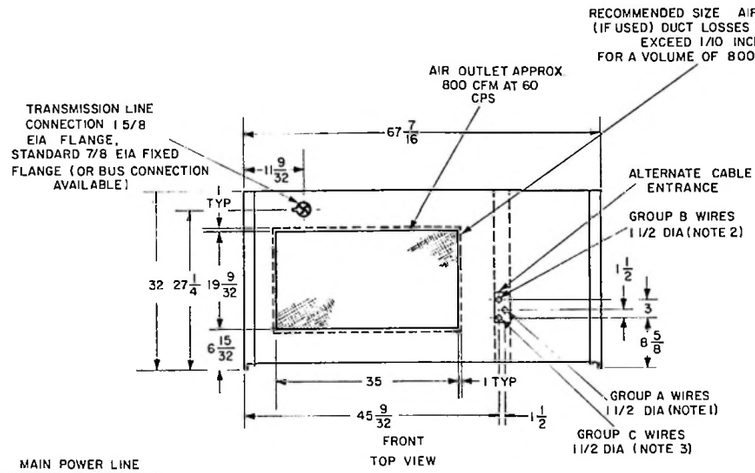
EXTENDED CONTROL PANEL A1

FOR INSTALLATION IN CUSTOMER'S EQUIPMENT RACK OR CONSOLE MAY BE LOCATED UP TO 250 FT. FROM TRANSMITTER

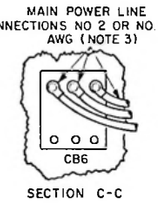


AM. BROADCAST EXCITER 310W-1 (A10)

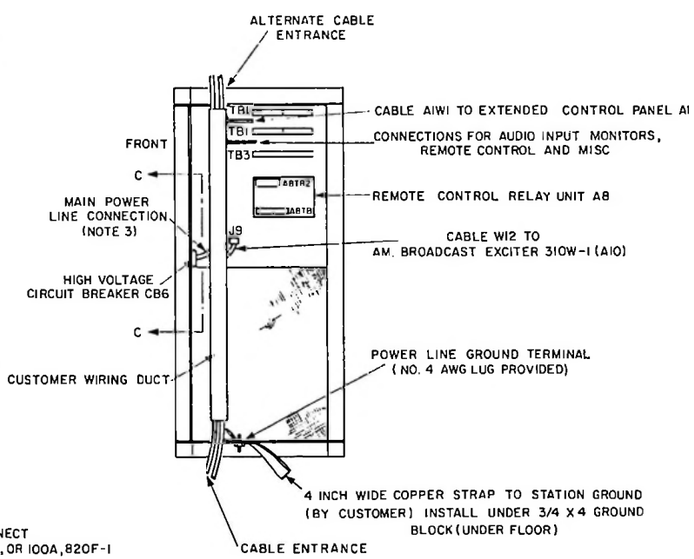
NOTES:
1. GROUP A WIRES: 33 PR SHIELDED CABLE TO EXTENDED CONTROL PANEL A1 (50 FT PROVIDED) RG-58 C/U COAXIAL CABLE TO 310W-1 (50 FT PROVIDED)
2. GROUP B WIRES: AUDIO INPUT - TWISTED, SHIELDED PAIR CABLE; MODULATION MONITOR - RG-58 C/U COAXIAL CABLE; FREQUENCY MONITOR - RG-58 C/U COAXIAL CABLE; REMOTE CONTROL AND MISC. INTERLOCKS - MAX OF 30 NO 20 WIRES (IF NEEDED)
3. GROUP C WIRES: 208/240V, 3 PHASE POWER INPUT FUSED AT WALL DISCONNECT BOX (BY CUSTOMER) FOR 60A, 820E-1, OR 100A, 820F-1
   3 NO. 4 AWG WIRES FOR TYPE 820E-1
   3 NO 2 AWG WIRES FOR TYPE 820F-1
   1 NO. 4 AWG WIRE
4. GROUPS B AND C WIRES ARE CUSTOMER FURNISHED
5. WEIGHT: 820E-1, 2,000 LBS APPROX.
   820F-1, 2,450 LBS APPROX
6. UNLESS OTHERWISE INDICATED: ALL DIMENSIONS ARE IN INCHES



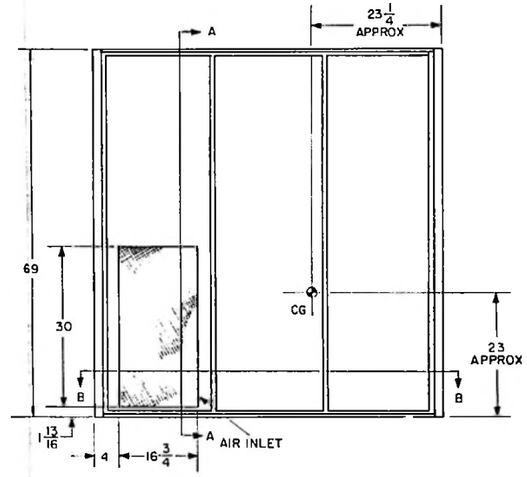
FRONT
TOP VIEW



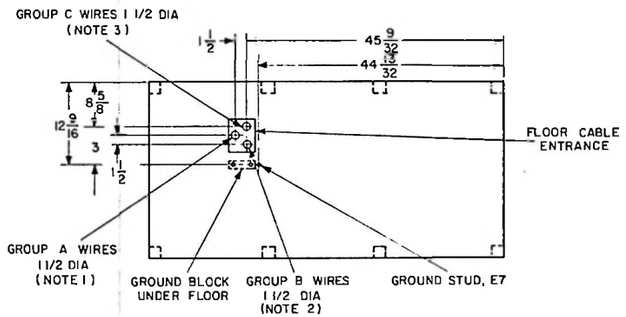
SECTION C-C



SECTION A-A

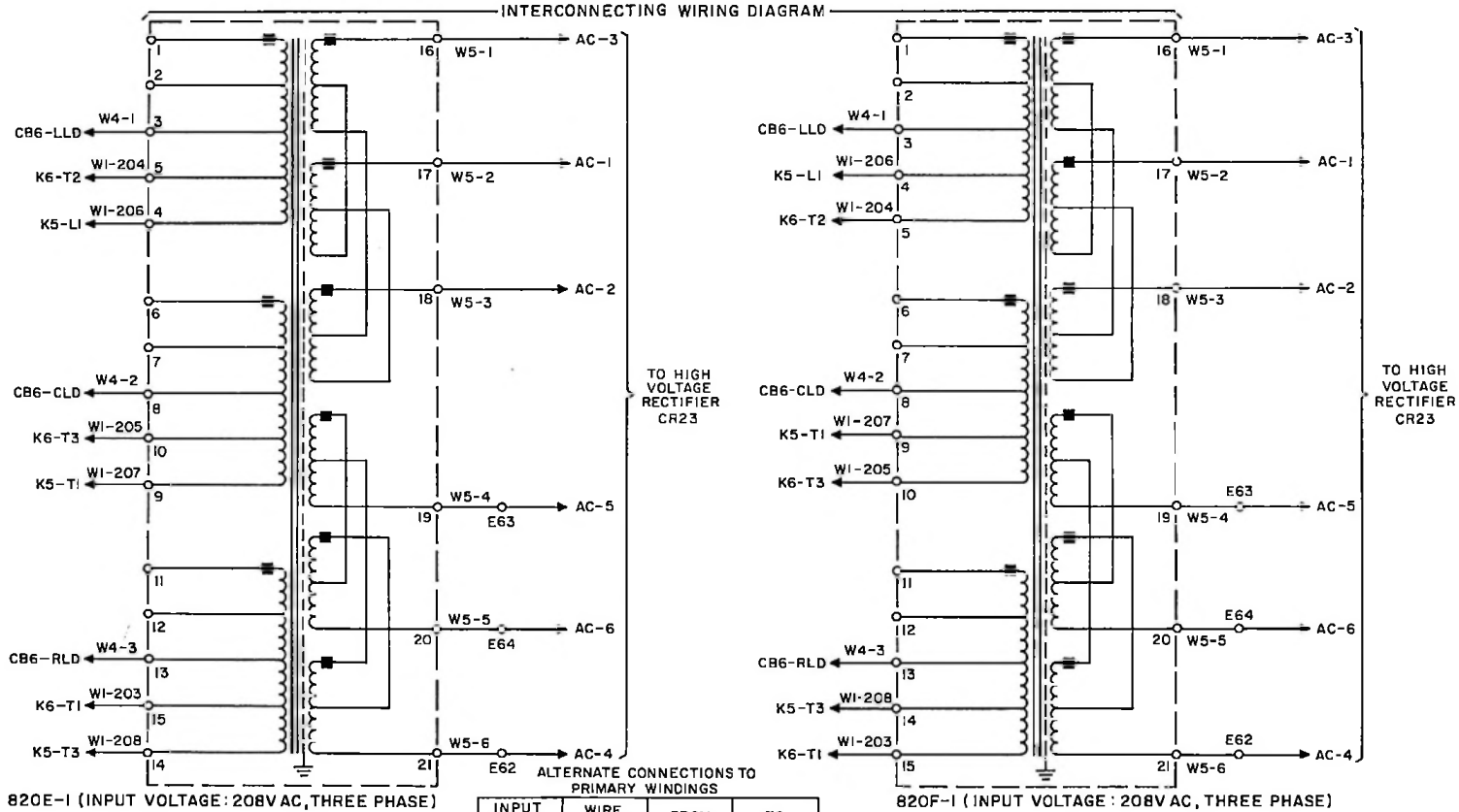


REAR VIEW

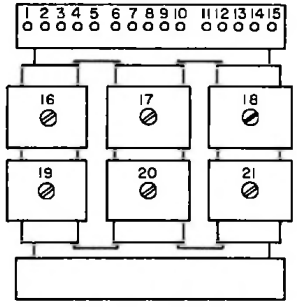


SECTION B-B

Figure 2-1. Outline Dimensions and Installation Details



TERMINAL LOCATION



ALTERNATE CONNECTIONS TO PRIMARY WINDINGS

INPUT VOLTAGE	WIRE NUMBER	FROM	TO
230	W4-1	CB6-LLD	T9-2
	WI-204	K6-T2	T9-5
	WI-206	K5-LI	T9-4
	W4-2	CB6-CLD	T9-7
	WI-205	K6-T3	T9-10
	WI-207	K5-TI	T9-9
	W4-3	CB6-RLD	T9-12
	WI-203	K6-TI	T9-15
230	WI-208	K5-T3	T9-14
240	W4-1	CB6-LLD	T9-1
	WI-204	K6-T2	T9-5
	WI-206	K5-LI	T9-4
	W4-2	CB6-CLD	T9-6
	WI-205	K6-T3	T9-10
	WI-207	K5-TI	T9-9
	W4-3	CB6-RLD	T9-11
	WI-203	K6-TI	T9-15
240	WI-208	K5-T3	T9-14

NOTES:
1. DETERMINE INPUT VOLTAGE AND CONNECT PRIMARY OF TRANSFORMER T9 AS SHOWN IN WIRING DIAGRAMS OR CHART.
2. CONNECT SECONDARY OF TRANSFORMER T9 AS SHOWN IN WIRING DIAGRAM

Figure 2-2. High-Voltage Transformer T9, Interconnecting Wiring Diagram

b. Connect the other end of the audio input cable to the customer-furnished audio equipment.

c. Connect one end of the modulation monitor cable (RG-58C/U) to terminal 6 of TB3. Connect the shield to terminal 5 of TB3.

d. Connect one end of the frequency monitor cable (RG-58C/U) to terminal 4 of TB3. Connect the shield to terminal 5 of TB3.

e. Connect the remaining ends of the modulator and frequency monitor cables to the customer-furnished equipment.

2.5.5 PRIMARY POWER.

a. Connect the three-wire power cable to the terminals on the back of HIGH VOLTAGE circuit breaker CB6 (figure 2-4).

b. Connect the power ground to terminal E7.

2.5.6 RF OUTPUT CONNECTION.

a. Connect the rf coaxial cable (50-ohm) to the transmission line connector, located on the top of the output network (figure 2-1).

b. Connect the other end of the coax to the antenna.

2.5.7 REMOTE OPERATION.

a. If remote operation of the transmitter is desired, remove the jumpers from terminals 1 and 2, 5 and 6, 7 and 8, 9 and 10, 13 and 14 of TB1, located on remote control panel A8 (figure 2-1).

b. Connect one end of the remote wires to the terminals of A8TB2 as shown in figure 2-4.

c. Connect the other end of the remote wires to the customer-furnished remote equipment.

2.6 INITIAL ADJUSTMENTS AND CHECKS.

2.6.1 ADJUSTMENTS.

2.6.1.1 ARC GAPS.

a. Inspect all arc gaps for burrs, scratches, or sharp edges. If any exist, remove them with crocus cloth.

b. Adjust arc gaps E14, E15, E16, and E17 for 0.010-inch spacing.

Note

E17 is used only in the 820F-1.

c. Adjust the arc gaps located on reactor L4 and transformer T12 for 0.10-inch spacing.

2.6.1.2 HIGH-VOLTAGE GROUNDING SWITCHES.

a. Connect an ohmmeter between ground and the positive side of the high-voltage power supply (CR23).

b. Open and close each of the following doors: power amplifier door, modulator door, right rear door, and center rear door. Note that a high resistance (not less than 75K) exists when all the doors are closed. As each door is opened, note that the high resistance goes to a low resistance (not more than 100 ohms for front doors and not more than 2 ohms for rear doors). Adjust the appropriate grounding switch, if necessary.

c. Connect an ohmmeter between ground and the positive side of the power amplifier screen supply (CR21).

d. Open and close each of the following: right front door, right front panel, power amplifier door, right rear door, center rear door, and left rear door. Note that a high resistance (not less than 15K) exists when all the doors are closed. As each door is opened, note that the high resistance goes to a low resistance (not more than 50 ohms). Adjust the appropriate grounding switch, if necessary.

e. Connect an ohmmeter between ground and terminal 1 of resistor R26.

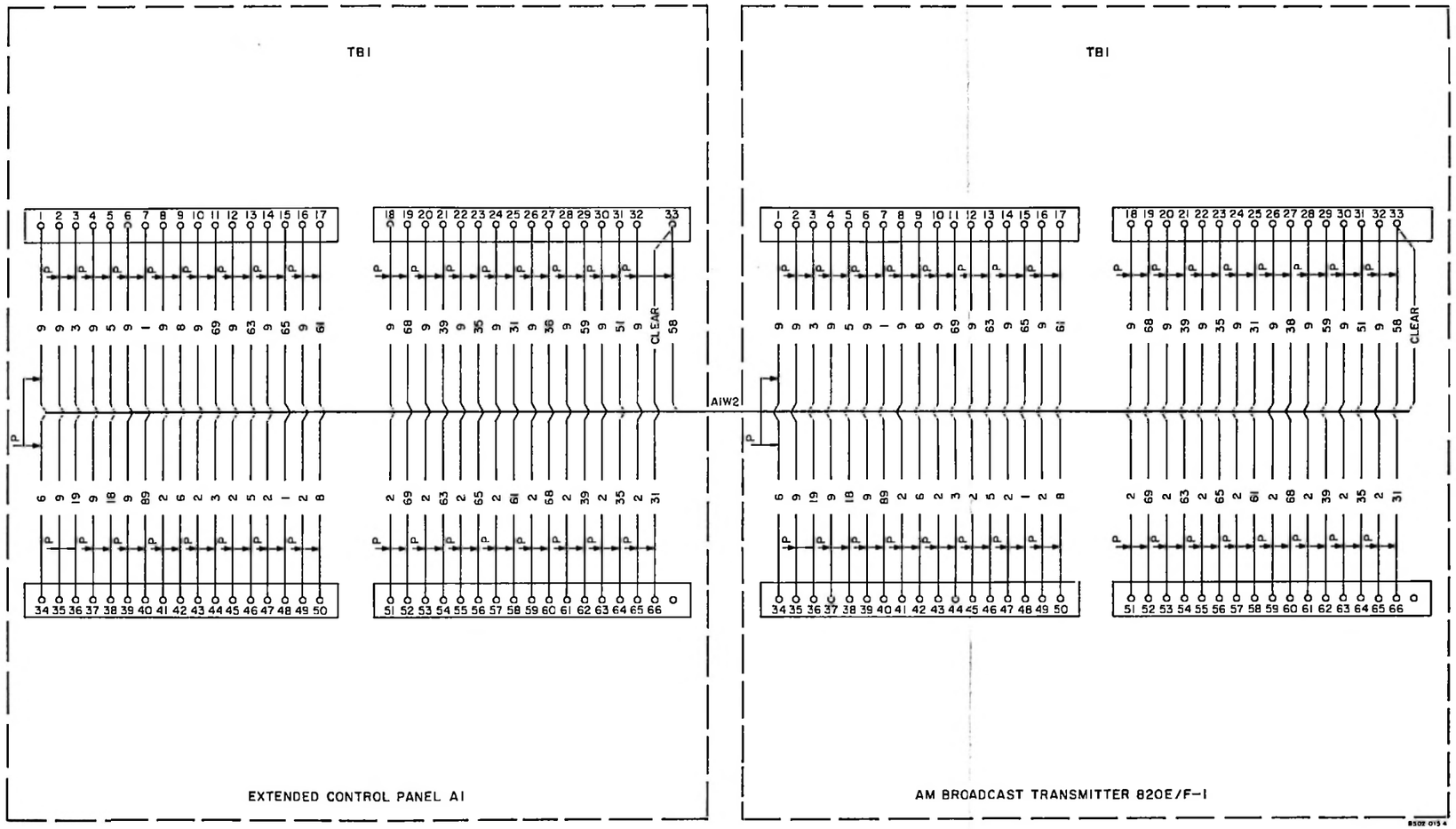
f. Open and close the rf driver door. Note that a high resistance (not less than 5K) exists when the door is closed and a low resistance (not more than 2 ohms) exists when the door is opened. Adjust the grounding switch, if necessary.

g. Connect an ohmmeter between ground and the positive side of the modulator screen power supply (CR19).

h. Open and close each of the following: right front door, right front panel, modulator door, and left rear door. Note that a high resistance (not less than 5K) exists when all the doors are closed. As each door is opened, note that the high resistance goes to a low resistance (not more than 80 ohms). Adjust the appropriate ground switch, if necessary.

i. Connect an ohmmeter between ground and terminal 2 of bias supply diode CR16.

j. Open and close each of the following: right front door, right front panel, power amplifier door, modulator door, and left rear door. Note that a high resistance (not less than 1200 ohms) exists when all doors are closed. As each door is opened, note that the high resistance goes to a low resistance (not more than 160 ohms). Adjust the appropriate grounding switch, if necessary.



NOTES:
1. THE FIRST NUMERAL INDICATES THE COLOR OF THE WIRE BODY AND THE SECOND NUMERAL INDICATES THE COLOR OF THE TRACER.

COLOR CODE	
NUMBER	COLOR
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	VIOLET
8	GRAY (SLATE)
9	WHITE

2. WIRES ARE CONNECTED POINT TO POINT (FOR EXAMPLE: TB1-1 CONNECTS TO A1TB-1, TB1-2 CONNECTS TO A1TB1-2, ETC.)

Figure 2-3. Extended Control Panel A1, Interconnecting Wiring Diagram

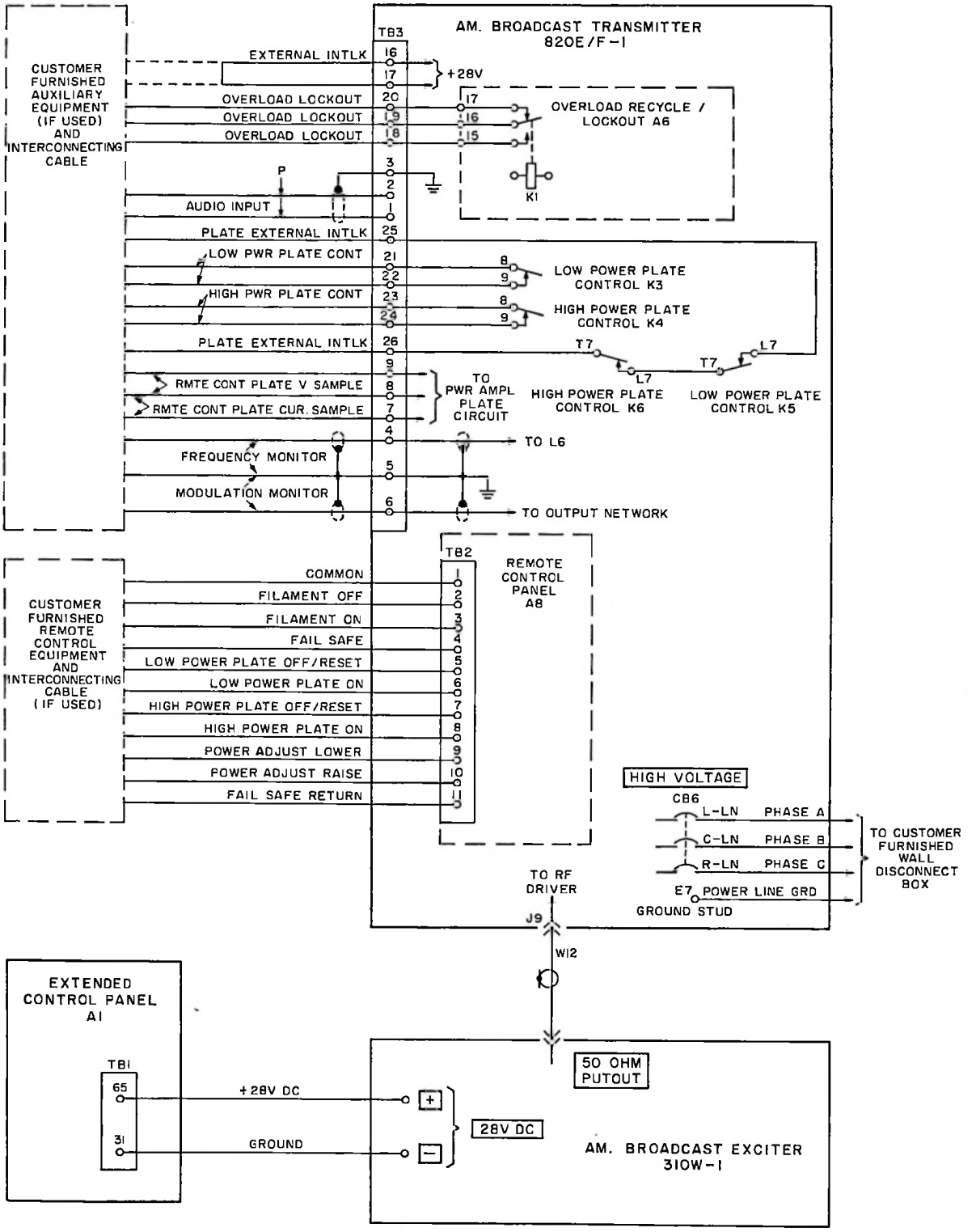


Figure 2-4. Customer-Furnished Auxiliary Equipment, Interconnecting Wiring Diagram

k. Connect an ohmmeter between ground and terminal 1 of resistor R13.

l. Open and close the rf driver door. Note that a high resistance (not less than 1K) exists when the door is closed and a low resistance (not more than 2 ohms) exists when the door is opened. Adjust the grounding switch, if necessary.

2.6.2 CHECKS.

2.6.2.1 ELECTROLYTIC CAPACITOR GROUND.

a. Open all the grounding switches.

b. Using an ohmmeter, check for a low resistance (not more than 2 ohms) between ground and the negative terminals of capacitors C1, C10, C13, C14, C117, and C125.

c. Using an ohmmeter, check for a low resistance (not more than 15 ohms) between ground and the positive terminal of capacitor C4.

2.6.2.2 PRIMARY POWER LINE (AC).

a. Turn on all the circuit breakers located on the front panel of the transmitter cabinet.

b. Using an ohmmeter, check for a high resistance (not less than 100K) between ground and each phase of the power line input with relays K2, K5, and K6, and K7 manually operated one at a time.

c. Open the circuit breakers.

2.6.2.3 POWER AMPLIFIER AND MODULATOR FILAMENTS.

a. Using an ohmmeter, check for a low resistance (not more than 6 ohms) between ground and each filament terminal on the base of the power amplifier tube socket.

b. Using an ohmmeter, check for a low resistance (not more than 10 ohms) between ground and each filament terminal on the base of the modulator tube socket.

2.6.2.4 POWER AMPLIFIER PLATE CIRCUIT.

a. Connect a jumper between terminals 49 and 50 of terminal board TB1.

b. Connect an ohmmeter between terminal 2 of resistor R158 and ground. Note that a resistance of 12K exists.

c. Remove the jumper from terminals 49 and 50.

2.7 CONTROL CIRCUIT OPERATION AND ADJUSTMENT.

2.7.1 INITIAL CIRCUIT HOOKUP.

a. Connect a jumper between contacts C and NO of BIAS SUPPLY circuit breaker CB4.

b. Check that all circuit breakers on the front panel of the transmitter cabinet are off.

c. Install the fuses in the primary disconnect switch.

d. Turn on the disconnect switch.

e. Check that three-phase power is present at the terminals on the back of HIGH VOLTAGE circuit breaker CB6.

f. Close all the doors and panels on the transmitter cabinet.

2.7.2 FILAMENT CIRCUIT.

2.7.2.1 FILAMENT CONTROL OPERATION.

a. Turn on 28 V SUPPLY circuit breaker CB1. Observe that the FILAMENT OFF, DOORS, and PLATE OFF/RESET lamps light.

b. Using a multimeter, measure the voltage between terminal 27 of terminal board TB1 (extended control panel A1) and ground. Note that between 26 and 30 volts dc (output of the 28-volt dc power supply) is present.

c. Set the TEST METER 2 function switch to 28V SUPPLY V, 30V. Note that the voltage indicated on TEST METER 2 is within ±5 percent of the voltage measured in step b. above.

d. Open and close each of the eight doors on the transmitter cabinet. Each time a door is opened, note that the DOORS lamp goes off.

e. Remove the right front panel of the transmitter cabinet. Note that the DOORS lamp goes off. Replace the panel.

f. Open the center rear door and disable the door interlock switch.

g. Remove the grounding stick. Note that the DOORS lamp goes off.

h. Replace the grounding stick.

i. Turn on BLOWERS circuit breaker CB2 and FILAMENTS circuit breaker CB3.

j. Open the left rear door and disable the door interlock switch.

k. Press the FILAMENT ON pushbutton. Note that the blower and fan start running. After the blower and fan come up to operating speed, note that the AIR and FILAMENT ON lamps light and the FILAMENT OFF lamp goes off. Also note that relay K2 energizes.

l. Manually open the blower and fan air switches one at a time. Note that K2 deenergizes after a slight delay (approximately 0.5 second) each time one of

the switches is opened. Each time K2 deenergizes, observe that the AIR and FILAMENT ON lamps go off and that the FILAMENT OFF lamp lights.

m. Close the rear doors.

2.7.2.2 FILAMENT VOLTAGE ADJUSTMENT.

a. Perform the filament voltage regulator adjustment in paragraph 5.6.1.

b. Connect a multimeter to the MOD 1 FIL VOLT jacks.

c. Adjust the MOD 1 FIL VOLT potentiometer for an indication of 7.2 volts ac on the multimeter.

d. Connect a multimeter to MOD 2 FIL VOLT jacks.

e. Adjust the MOD 2 FIL VOLT potentiometer for an indication of 7.2 volts ac on the multimeter.

f. Connect a multimeter to the PA 1 FIL VOLT jacks.

g. Adjust the PA 1 FIL VOLT potentiometer for an indication of 7.2 volts ac on the multimeter.

h. Connect a multimeter to the PA 2 FIL VOLT jacks (820F-1 only).

i. Adjust the PA 2 FIL VOLT potentiometer for an indication of 7.2 volts ac on the multimeter.

2.7.2 PLATE CONTROL OPERATION.

a. Press the LOW POWER ON pushbutton. Observe that relays K3, K5, and K7 energize in sequence. Also observe that the LOW POWER ON lamp lights and the PLATE OFF/RESET lamp goes off.

b. Press the PLATE OFF/RESET pushbutton. Observe that the LOW POWER ON lamp goes off and that the PLATE OFF/RESET lamp lights.

c. Press the HIGH POWER ON pushbutton. Observe that relays K4, K6, K7, K8, K9, and K10 energize in sequence. Note that the HIGH POWER ON lamp lights and that the PLATE OFF/RESET lamp goes off.

2.7.3 OVERLOAD CIRCUIT.

2.7.3.1 OVERLOAD OPERATION.

a. Open the left rear door and disable the interlock switch.

b. Press the LOW POWER ON pushbutton. Note that the FILAMENT ON, DOORS, AIR and LOW POWER ON lamps light.

Note

If any of the overload circuits fail to operate properly, perform the appropriate adjustment procedure located in paragraph 2.7.3.2.

c. Using a portable power supply, apply 5 volts dc between terminals 9 (positive) and 15 (negative) of power amplifier overload sensor A2. Observe that relays K5 and K7 deenergize momentarily (approximately 0.5 second), reenergize (approximately 50 ms), and again deenergize with no further action.

Note

The first time K5 deenergizes, the LOW POWER ON lamp goes off and the PLATE OFF/RESET, PA OVLD, and LAMP RESET lamps light. When K5 reenergizes, the LOW POWER ON lamp lights and the PLATE OFF/RESET lamp goes off. However, the PA OVLD and LAMP RESET lamps remain lighted until the LAMP RESET pushbutton is pressed.

d. Disconnect the portable power supply from terminals 9 and 15.

e. Press the LAMP RESET pushbutton. Note that the PA OVLD and LAMP RESET lamps go off.

f. Press the PLATE OFF/RESET pushbutton.

g. Press the LOW POWER ON pushbutton. Note that the LOW POWER ON lamp lights and the PLATE OFF/RESET lamp goes off.

h. Repeat steps c. through g. except connect the portable power supply to terminals 9 (positive) and 15 (negative) of modulator 1 overload sensor A3. Also, observe MOD 1 lamp instead of the PA OVLD lamp.

i. Repeat steps c. through g., except connect the portable power supply to terminals 9 (positive) and 15 (negative) of modulator 2 overload sensor A4. Also, observe MOD 2 lamp instead of the PA OVLD lamp.

j. Repeat steps c. through g., except connect the portable power supply to terminals 9 (negative) and 15 (positive) of dc overload sensor A5. Also, observe the DC OVLD lamp instead of the PA OVLD lamp.

k. Repeat steps c. through j., except operate the HIGH POWER ON pushbutton instead of the LOW POWER ON pushbutton, and observe the HIGH POWER ON lamp instead of the LOW POWER ON lamp.

2.7.3.2 OVERLOAD CIRCUIT ADJUSTMENT.

2.7.3.2.1 POWER AMPLIFIER OVERLOAD SENSOR A2.

a. Press the LOW POWER ON pushbutton. Note that the HIGH POWER ON lamp goes off and the LOW POWER ON lamp lights.

b. Set potentiometer A2R1 to counterclockwise stop.

c. Connect a portable power supply, with a multimeter in series, to terminals 9 (positive) and 15 (negative) of power amplifier overload sensor A2.

d. Increase the output voltage of the portable power supply until 2 amp dc (820E-1) or 3 amp dc (820F-1) is indicated on the multimeter.

e. Turn A2R1 clockwise until relay A2K1 energizes. When A2K1 energizes, the PA OVLD, LAMP RESET, and PLATE OFF/RESET lamps light, and the LOW POWER ON lamp goes off.

f. Press the PLATE OFF/RESET, LAMP RESET, and LOW POWER ON pushbuttons.

2.7.3.2.2 MODULATOR 1 OVERLOAD SENSOR A3.

a. Set potentiometer A3R1 to counterclockwise stop.

b. Connect a portable power supply, with a multimeter in series, to terminals 9 (positive) and 15 (negative) of modulator 1 overload sensor A3.

c. Increase the output voltage of the portable power supply until 1.2 amp dc (820E-1) or 1.5 amp dc (820F-1) is indicated on the multimeter.

d. Turn A3R1 clockwise until relay A3K1 energizes. When A3K1 energizes, the MOD 1, LAMP RESET, and PLATE OFF/RESET lamps light and the LOW POWER ON lamp goes off.

e. Press the PLATE OFF/RESET, LAMP RESET, and LOW POWER ON pushbuttons.

2.7.3.2.3 MODULATOR 2 OVERLOAD SENSOR A4.

a. Set potentiometer A4R1 to counterclockwise stop.

b. Connect a portable power supply, with a multimeter in series, to terminals 9 (positive) and 15 (negative) of modulator 2 overload sensor A4.

c. Increase the output voltage of the portable power supply until 1.2 amp dc (820E-1) or 1.5 amp dc (820F-1) is indicated on the multimeter.

d. Turn A4R1 clockwise until relay A4K1 energizes. When A4K1 energizes, the MOD 2, LAMP RESET, and PLATE OFF/RESET lamps light and the LOW POWER ON lamp goes off.

e. Press the PLATE OFF/RESET, LAMP RESET

e. Press the PLATE OFF/RESET, LAMP RESET, and LOW POWER ON pushbuttons.

2.7.3.2.4 DC OVERLOAD SENSOR A5.

a. Set potentiometer A4R1 to counterclockwise stop.

b. Connect a portable power supply, with a multimeter in series, to terminals 9 (negative) and 15 (positive) of dc overload sensor A5.

c. Increase the output voltage of the portable power supply until 3.5 amp dc (820E-1) or 5.5 amp dc (820F-1) is indicated on the multimeter.

d. Turn A5R1 clockwise until relay A5K1 energizes. When A5K1 energizes, the DC OVLD, LAMP RESET, and PLATE OFF/RESET lamps light and the LOW POWER ON lamp goes off.

e. Press the PLATE OFF/RESET, LAMP RESET, and LOW POWER ON pushbuttons.

2.8 FINAL CHECKS AND ADJUSTMENTS.

2.8.1 OPERATING VOLTAGE.

a. Check that all doors and panels are closed. Ensure that the jumper connected between contacts C and NO of BIAS SUPPLY circuit breaker CB4 has been removed.

b. Turn on all circuit breakers. Observe that the FILAMENT OFF, PLATE OFF/RESET, and DOORS lamps light.

c. Press the LOW POWER ON pushbutton. Observe that the FILAMENT OFF and PLATE OFF/RESET lamps go off and the FILAMENT ON, AIR, and LOW POWER ON lamps light. Note that rf current flow is indicated on the auxiliary meter. (Allow 60 seconds warmup time.)

d. Using TEST METER 1, TEST METER 2, and associated function selector switches, check the voltage and current present in the various circuits. Refer to table 3-2 for correct values.

e. Measure the power amplifier plate voltage and current using the PLATE VOLTAGE and PLATE CURRENT meters. Refer to table 3-2 for the correct values.

f. Press the HIGH POWER ON pushbutton. Note that the LOW POWER ON lamp goes off and the HIGH POWER ON lamp lights.

g. Repeat steps d. and e.

h. Press the FILAMENT OFF pushbutton.

2.8.2 POWER AMPLIFIER NEUTRALIZATION.

a. Open the center and right rear doors and disable the interlock and high-voltage grounding switches.

b. Remove the cover from the output network.

c. Open the power amplifier door and disable the interlock and high-voltage shorting switches.

d. Connect the rf output of the 310W-1 to test circuit number 1(figure 2-5).

e. Connect the output of test circuit number 1 to the power amplifier plate circuit.

f. Connect test circuit number 2 (figure 2-6) to terminals 1 and 2 of PA GRID TUNING capacitor C83.

g. Connect a multimeter (0.3-volt dc scale) to the output of test circuit number 2.

h. Press the FILAMENT ON pushbutton.

i. Adjust PA GRID TUNING capacitor C83 until peak voltage is indicated on the multimeter. Ensure that C83 is at some point within its range and is not fully open or closed after adjustment.

j. Loosen the nuts that lock the variable plate of capacitor C99.

k. Using a wooden yardstick or similar nonconductor, gently tap on the variable plate of C99 until a null voltage is indicated on the multimeter (not more than 50 mv).

l. Lock the variable plate of C99.

m. Disconnect test circuits number 1 and 2 from the plate and grid circuits of the power amplifier.

2.8.3 POWER AMPLIFIER GRID TUNING.

a. Press the LOW POWER ON pushbutton.

b. Connect a multimeter to the DRIVER CATH CUR jacks.

c. Set the TEST METER 1 function switch to DRIVER 1K, 150MA and the TEST METER 2 function switch to DRIVER 2K, 150MA.

d. Adjust DRIVER GRID TUNING capacitor C76 for maximum driver cathode current as indicated on TEST METERS 1 and 2 (between 70 and 80 ma). Note that approximately 2.4 volts dc is indicated on the multimeter.

e. Connect a multimeter to the PA GRID TUNING jacks.

f. Set the TEST METER 1 function switch to PA GRID I, 150MA. Adjust PA GRID TUNING capacitor C83 for maximum current (not less than 65 ma) as indicated on TEST METER 1. Note that the voltage indicated on the multimeter is not less than 0.325 volt dc.

g. Disconnect the multimeter.

h. Press the FILAMENT OFF pushbutton.

2.8.4 MODULATOR STATIC CURRENT ADJUSTMENT.

a. Press the HIGH POWER ON pushbutton.

b. Set the TEST METER 1 function switch to MOD 1K, 1.5A.

c. Adjust the MOD 1 BIAS potentiometer for a 0.4-amp (820F-1) or 0.3-amp (820E-1) indication on TEST METER 1.

d. Set the TEST METER 2 function switch to MOD 2K, 1.5A.

e. Adjust the MOD 2 BIAS potentiometer for a 0.4-amp (820F-1) or 0.3-amp (820E-1) indication on TEST METER 2.

f. Press the LOW POWER ON pushbutton.

g. Adjust the REDUCED PWR BIAS potentiometer for a 0.4-amp (820F-1) or 0.2-amp (820E-1) indication on TEST METER 2.

h. Set the TEST METER 1 function switch to MOD 1K, 1.5A. Note that the voltage level obtained in step g. is indicated on TEST METER 1.

2.8.5 RF POWER OUTPUT AND MODULATION MONITOR ADJUSTMENTS.

a. Press the HIGH POWER ON pushbutton.

b. Set the TUNING switch to AUTO.

c. Operate the PA LOADING switch until 14.4 amp (820F-1) or 10.4 amp (820E-1) is indicated on the rf line current meter.

d. Press the LOW POWER ON pushbutton. Note that 10.4 amp (820F-1) or 4.64 amp (820E-1) is indicated on the rf line current meter.

e. Press the HIGH POWER ON pushbutton.

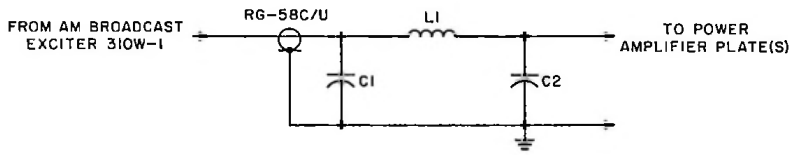
f. Apply a 1000-cps signal to the audio input connections.

g. Increase the audio level until the carrier is modulated 100 percent as indicated on the modu-

lation monitor. If the carrier indication is not within range of the modulation monitor control, adjust the taps on inductor L18 until the desired range is obtained.

h. Press the LOW POWER ON pushbutton. Adjust capacitor C106 until a carrier indication of 100 is observed on the modulation monitor.

i. Press the FILAMENT OFF pushbutton.

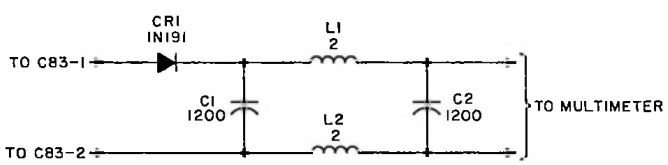


SCHEMATIC DIAGRAM

COMPONENT VALUES FOR EACH OPERATING FREQUENCY						
FREQUENCY	820F-1			820E-1		
	L1	C1	C2	L1	C1	C2
540-650 KC	27	12,000	2700	39	12,000	2000
650-780 KC	22	10,000	2200	33	10,000	1500
780-935 KC	18	8200	2000	27	8200	1500
935-1120 KC	18	6800	1500	22	6800	1000
1120-1340 KC	15	5600	1500	22	5600	1000
1340-1620 KC	12	4700	1000	18	4700	820

NOTES:
UNLESS OTHERWISE INDICATED:
ALL INDUCTANCE VALUES ARE IN MICROHENRIES
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS

Figure 2-5. Test Circuit Number 1, Power Amplifier Neutralization



NOTES:
UNLESS OTHERWISE INDICATED:
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
ALL INDUCTANCE VALUES ARE IN MICROHENRIES

Figure 2-6. Test Circuit Number 2, Power Amplifier Neutralization

section 3

operation

3.1 GENERAL.

The 820E/F-1 turnon sequence is controlled automatically. Indicator lamps show the status of the various circuits during the turnon sequence. A thorough understanding of each control and indicator is recommended before operating the 820E/F-1. Table 3-1 describes the function of each control, indicator, and connector located on the front panels of the 820E/F-1 (figure 3-1 and 3-2). Refer to the unit instructions bound in the back of this manual for a functional description of the 310W-1 controls.

3.2 SEMIAUTOMATIC TURNON PROCEDURE.

a. Turn on the station exhaust fans (if used).

b. Ensure that all interlocked doors and panels are closed and the shorting stick is in place.

c. Set all circuit breakers to ON. Note that the FILAMENT OFF, PLATE OFF/RESET, and DOORS indicator lamps light.

d. Set TEST METER 2 function switch to 28V SUPPLY V, 30 V. Note that 27 to 29 volts is indicated on TEST METER 2.

TABLE 3-1A. DESCRIPTION OF CONTROLS, INDICATORS, AND CONNECTORS

ITEM NO. (figure 3-1)	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
	TRANSMITTER CABINET FRONT PANEL	
1	MOD 2 FIL VOLT potentiometer R10	Controls the primary voltage to modulator 2, filament transformer T6.
2	MOD 1 FIL VOLT potentiometer R9	Controls the primary voltage to modulator 1, filament transformer T5.
3	MOD 1 HUM BAL potentiometer R114	Shifts the balance of the modulator 1, filament circuit to minimize the hum caused by ac filament voltage.
4	MOD 1 CATH CUR jacks J14 and J15	Provides connection to the modulator 1, cathode circuit for making current measurements.
5	MOD 1 FIL VOLT jacks J5 and J6	Provides connection to the secondary circuit of modulator 1, filament transformer T5 for making filament voltage measurements.
6	MOD 1 DRIVE potentiometer R105	Controls the level of the audio signal applied from the audio driver to the grid of modulator 1.
7	MOD 1 BIAS potentiometer R109	Controls the level of the bias voltage applied to the grid of modulator 1.
8	REDUCED PWR BIAS potentiometer R173	Controls the level of the bias voltage applied to the grid of modulators 1 and 2 during reduced power operation.

TABLE 3-1A. DESCRIPTION OF CONTROLS, INDICATORS, AND CONNECTORS (Cont)

ITEM NO. (figure 3-1)	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
9	MOD 2 BIAS potentiometer R110	Controls the level of the bias voltage applied to the grid of modulator 2.
10	MOD 2 DRIVE potentiometer R108	Controls the level of the audio signal applied from the audio driver to the grid of modulator 2.
11	MOD 2 FIL VOLT jacks J7 and J8	Provides connection to the secondary circuit of modulator 2, filament transformer T6 for making filament voltage measurements.
12	MOD 2 CATH CUR jacks J16 and J17	Provides connection to the modulator 2 cathode circuit for making current measurements.
13	MOD 2 HUM BAL potentiometer R121	Shifts the balance of the modulator 2, filament circuit to minimize the hum caused by ac filament voltage.
14	PA GRID CURRENT jacks J12 and J13	Provides connection to the bias supply return for monitoring the power amplifier grid current.
15	PA 2 FIL VOLT jacks J3 and J4	Provides connection to the secondary circuit of power amplifier 2, filament transformer T4 for making filament voltage measurements.
16	PA GRID TUNING capacitor C83	Controls the tuning of the power amplifier grid circuit.
17	PA 1 FIL VOLT jacks J1 and J2	Provides connection to the secondary circuit of power amplifier 1, filament transformer T3 for making filament voltage measurements.
18	PA SCREEN VOLT X1000 jacks J19 and J20	Provides connection to a voltage-divider circuit in the power amplifier screen circuit for making screen voltage measurements. Actual screen voltage is 1000 times the meter reading.
19	DISCR BAL jacks J21 and J22	Provides connection to the output of the phase discriminator for monitoring the error voltage.
20	DRIVER CATH CUR jacks J10 and J11	Provides connection to the cathode circuit of the rf driver for making current measurements.
21	DRIVER GRID TUNING capacitor C72	Controls the tuning of the rf driver grid circuit.
22	PA 1 FIL VOLT potentiometer R7	Controls the primary voltage to power amplifier 1, filament transformer T3.
23	PA 2 FIL VOLT potentiometer R8	Controls the primary voltage to power amplifier 2, filament transformer T4.
24	BIAS SUPPLY circuit breaker CB4	A magnetic-type circuit breaker that protects the bias power supply from excessive current.
25	SCREEN SUPPLY circuit breaker CB5	A magnetic-type circuit breaker that protects the modulator and screen power supplies from excessive current.

TABLE 3-1A. DESCRIPTION OF CONTROLS, INDICATORS, AND CONNECTORS (Cont)

ITEM NO. (figure 3-1)	CONTROL, INDICATOR, OR CONNECTOR	FUNCTION
26	FILAMENTS circuit breaker CB3	A magnetic-type circuit breaker that protects the filament circuits from excessive current.
27	BLOWERS circuit breaker CB2	A magnetic-type circuit breaker that protects the blower motors from excessive current.
28	FILAMENT HOURS meter M1	Indicates the total number of hours that filament voltage has been applied to the rf driver, modulator, and power amplifier tubes.
29	+28V SUPPLY circuit breaker CB1	A magnetic-type circuit breaker that protects the 28-volt dc power supply and the tuning and loading motors from excessive current.
30	HIGH VOLTAGE circuit breaker CB6	A magnetic-type circuit breaker that protects the high-voltage power supply from excessive current.

TABLE 3-1B. DESCRIPTION OF CONTROLS, INDICATORS, AND CONNECTORS

REF DESIG (figure 3-2)	CONTROL OR INDICATOR	FUNCTION
EXTENDED CONTROL PANEL A1		
S1/DS1	FILAMENT OFF	S1: A normally closed pushbutton switch that breaks the 28-volt dc control line when pushed. This action starts an automatic sequence that turns the transmitter off. DS1: Lights when the 28-volt dc power supply is turned on. Goes out when the filament and bias control circuits are actuated.
S1/DS2	FILAMENT ON	S2: A normally open pushbutton switch that applies 28 volts dc to the filament and bias control circuits when pushed. DS2: Lights when the filament, bias, and blowers control circuits are actuated.
DS3	DOORS/AIR	DOORS lamp: Lights when all interlocked doors and panels are closed. AIR lamp: Lights when the blower and fan attain their normal operating speed providing the proper amount of air flow.

TABLE 3-1B. DESCRIPTION OF CONTROLS, INDICATORS, AND CONNECTORS (Cont)

REF DESIG (figure 3-2)	CONTROL OR INDICATOR	FUNCTION
DS4	PA OVLD/MOD 1/MOD 2	PA OVLD lamp: Lights when a temporary or sustained overload occurs in the power amplifier circuit. Remains lighted until extinguished by pushing LAMP RESET pushbutton switch S5. MOD 1 lamp: Lights when a temporary or sustained overload occurs in the modulator 1 circuit. Remains lighted until extinguished by pushing LAMP RESET pushbutton switch S5. MOD 2 lamp: Lights when a temporary or sustained overload occurs in the modulator 2 circuit. Remains lighted until extinguished by pushing LAMP RESET pushbutton switch S5.
DS5/S5	DC OVLD/LAMP RESET	DC OVLD lamp: Lights when a temporary or sustained overload occurs in the high-voltage power supply circuit. Remains lighted until extinguished by pushing LAMP RESET pushbutton switch S5. LAMP RESET lamp: Lights in conjunction with the PA OVLD, MOD 1, MOD 2, or DC OVLD lamp. Remains lighted until extinguished by pushing LAMP RESET pushbutton switch S5. LAMP RESET pushbutton switch: Breaks the 28-volt dc line going to the MOD 1, MOD 2, DC OVLD, and LAMP RESET lamps when pushed. This action resets each of the overload lamp circuits.
S8/DS8	PLATE OFF/RESET	PLATE OFF/RESET pushbutton switch S8: A normally closed pushbutton switch that performs two distinct functions when pushed: 1. Breaks the 28-volt dc control line going to the high- and low-power plate control circuits. This action turns off the plate and screen power supplies. 2. Breaks the 28-volt dc line going to the overload recycle/lockout unit. This action resets the unit. PLATE OFF/RESET lamp: Lights when the plate and screen voltage power supplies are turned off.
S6/DS6	LOW POWER ON	S6: When pushed, automatically starts a sequence that sets the transmitter to the reduced power mode of operation. DS6: Lights when the transmitter is in the reduced power mode of operation.
S7/DS7	HIGH POWER ON	S7: When pushed, automatically starts a sequence that sets the transmitter to full power mode of operation.

TABLE 3-1B. DESCRIPTION OF CONTROLS, INDICATORS, AND CONNECTORS (Cont)

REF DESIG (figure 3-2)	CONTROL OR INDICATOR	FUNCTION
		DS7: Lights when transmitter is in the full power mode of operation.
S10	PA LOADING	Lowers or raises the level of the rf output power.
M4/S4	TEST METER 2 and function switch S4	TEST METER 2, in conjunction with function switch S4, permits monitoring of the various voltages and current levels in the transmitter.
M3	PLATE VOLTAGE	Indicates the power amplifier plate voltage.
M2	PLATE CURRENT	Indicates the power amplifier plate current.
M1/S3	TEST METER 1 and function switch S3	TEST METER 1, in conjunction with function switch S3, permits monitoring of the various voltages and current levels in the transmitter.
S9	PA TUNING	Tunes the plate tank circuit of the power amplifier stage. This control is operative only when TUNING control S11 is set to MANUAL.
S11	TUNING	Selects either manual or automatic operation of the tuning function. When set to MANUAL, tuning of the power amplifier is accomplished by operating PA TUNING control S9. When set to automatic, tuning in accomplished automatically by operating PA LOADING control S10.

e. Check to see that the CRYSTAL SELECTOR switch on the 310W-1 is set to the proper position.

f. Press the FILAMENT ON pushbutton switch. Note that the main blower and cabinet fan starts running. When the blower and fan come up to normal operating speed, observe that the FILAMENT OFF indicator lamp goes off and that the FILAMENT ON and AIR indicator lamps light.

g. Press the HIGH POWER ON pushbutton switch. (If reduced power operation is desired, press the LOW POWER ON pushbutton switch.) Note that the HIGH POWER ON indicator lamp lights and that the PLATE OFF/RESET indicator lamp goes off.

h. Using TEST METER 1, TEST METER 2, and associated function switches, check for proper voltages and current present in the various circuits. (Allow 60 seconds warmup time.) Refer to table 3-2 for typical meter readings.

i. Note the indications on the PLATE CURRENT and PLATE VOLTAGE meters. Refer to table 3-2 for typical meter readings.

j. Check that the rf line current is at the correct value (table 3-2). If loading is required, set the TUNING switch to AUTOMATIC and operate the PA LOADING switch until the rf line current is at the correct value.

k. Using a multimeter, check for the correct voltages at the jacks on front of the transmitter cabinet. Refer to table 5-1 for the correct readings. If adjustments are necessary, refer to the appropriate paragraph in section 2.

3.3 AUTOMATIC TURNON PROCEDURE.

a. Perform steps 3.2a through 3.2e.

b. Press the HIGH POWER ON pushbutton switch. (If reduced power operation is desired, press the LOW POWER ON pushbutton switch.) Note that the main blower and cabinet fan starts running. When the blower and fan come up to normal operating speed, observe that the FILAMENT OFF and PLATE OFF/RESET indicator lamps go off and that the FILAMENT ON, AIR, and HIGH POWER ON indicator lamps light.

c. Perform steps 3.2h through 3.2k.

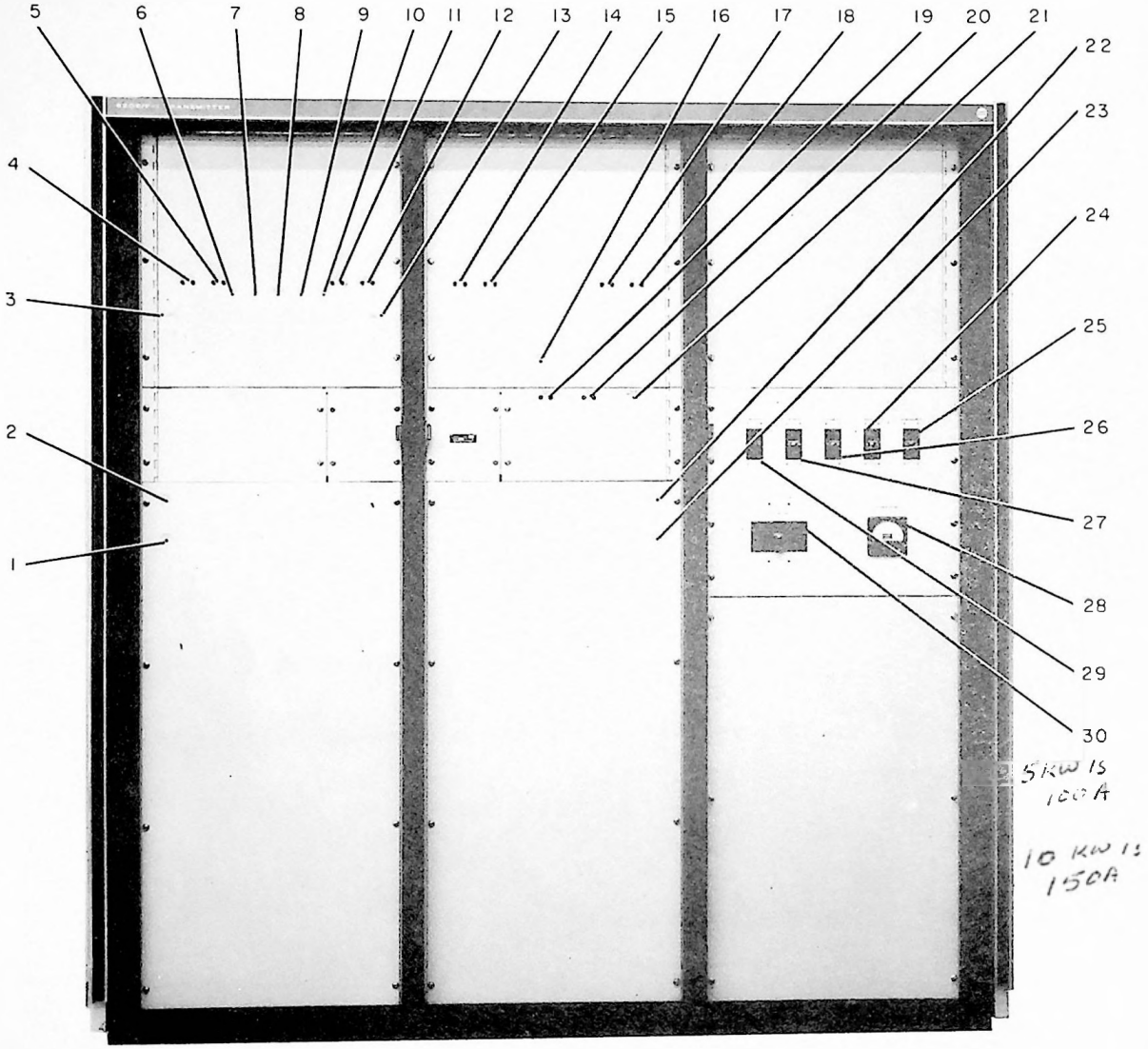


Figure 3-1. AM. Broadcast Transmitter 820E/F-1, Front Panel Controls, Connector, and Indicator

3.4 REDUCED POWER (CUTBACK) OPERATION.

Changeover from full power to reduced power operation is accomplished automatically by pressing the LOW POWER ON pushbutton switch. After pressing the LOW POWER ON pushbutton switch, observe that the HIGH POWER ON indicator lamp goes off and that the LOW POWER ON indicator lamp lights. To go back to full power operation simply press the HIGH POWER ON pushbutton switch.

3.5 SHUTDOWN PROCEDURE.

3.5.1 EMERGENCY OFF.

A complete shutdown of the transmitter is accomplished by setting the 28V SUPPLY circuit breaker to OFF. This action starts an automatic sequence that turns off the transmitter. To remove all voltage present in the cabinet, set all the circuit breakers to OFF. The modulator and power amplifier tubes do not require additional cooling after power is removed from them, therefore, the cabinet fan and main blower are automatically turned off.

3.5.2 MANUAL TURN OFF.

The transmitter is normally turned off by pressing the FILAMENT OFF pushbutton switch. After pressing the FILAMENT OFF pushbutton switch, observe that the HIGH POWER ON (or LOW POWER ON), FILAMENT ON, and AIR indicator lamps go off and that the

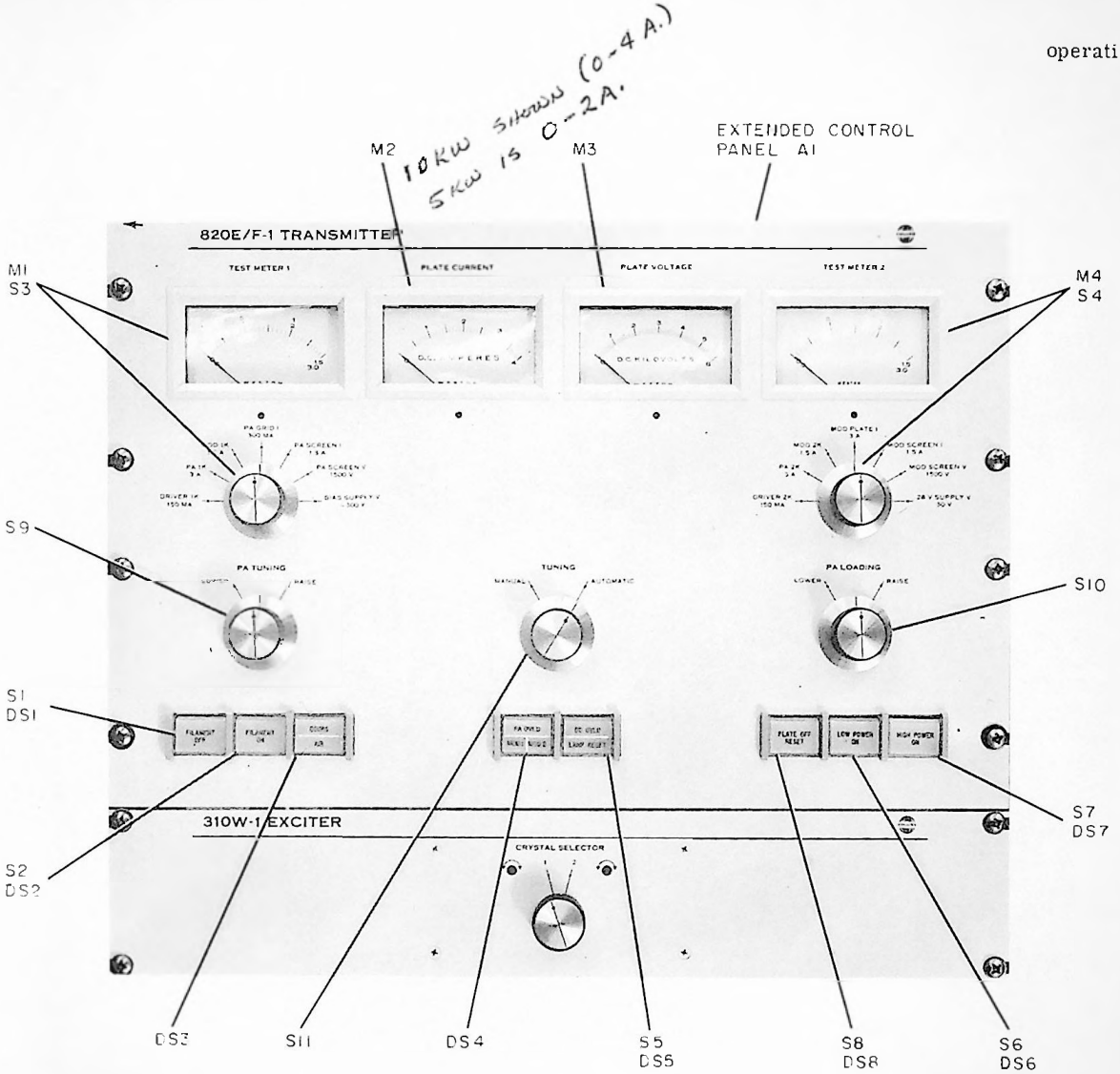


Figure 3-2. Extended Control Panel A1, Front Panel Controls and Indicators

PLATE OFF/RESET and FILAMENT OFF indicator lamps light. If only the plate and screen voltage is to be turned off, refer to paragraph 3.5.3.

3.5.3 PLATE VOLTAGE OFF.

Removal of plate and screen voltage is accomplished by pressing the PLATE OFF/RESET pushbutton switch. After pressing the PLATE OFF/RESET pushbutton switch, observe that the HIGH POWER ON (or the LOW POWER ON) indicator lamp goes off and that the PLATE OFF/RESET indicator lamp lights. Also observe that the current and voltage indicated on the PLATE CURRENT and PLATE VOLTAGE meter drops to zero.

3.6 OVERLOAD RECYCLING.

Current overloads occurring in either the modulator or power amplifier tubes, or in the high-voltage power supply will momentarily remove and restore the plate and screen voltage. The associated overload indicator lamp and the LAMP RESET indicator lamp light, indicating which circuit had the overload. If a second overload occurs within approximately 1/2 minute, plate and screen voltage is removed until the fault is corrected. To restore power, first press the PLATE OFF/RESET pushbutton switch and then press the HIGH POWER ON (or LOW POWER ON) pushbutton switch. To turn off the overload indicator lamp and the LAMP RESET indicator lamp, press the LAMP RESET pushbutton switch.

TABLE 3-2. TYPICAL METER READINGS

POSITION OF FUNCTION SWITCH S3	FUNCTION	820E-1		820F-1	
		REDUCED POWER	FULL POWER	REDUCED POWER	FULL POWER
TEST METER 1					
DRIVER 1K, 150 MA	Rf driver 1 cathode current	70 to 80 ma	70 to 80 ma	80 to 120 ma	80 to 120 ma
PA 1K, 3A	Power amplifier 1 cathode current	0. 8 to 1. 2 amp	1. 7 to 2. 0 amp	1. 15 to 1. 45 amp	1. 5 to 1. 9 amp
MOD 1K, 1. 5A	Modulator 1 cathode current (unmodulated)	0. 2 amp	0. 3 amp	0. 4 amp	0. 4 amp
	Modulator 1 cathode current (1000 cps, modulated 100%)	0. 25 to 0. 40 amp	0. 6 to 0. 8 amp	0. 6 to 0. 9 amp	1. 1 to 1. 4 amp
PA GRID I, 300 MA	Power amplifier grid current	65 to 100 ma	65 to 100 ma	80 to 140 ma	80 to 140 ma
PA SCREEN I, 1. 5 A	Power amplifier screen current	0. 20 to 0. 35 amp	0. 25 to 0. 40 amp	0. 25 to 0. 50 amp	0. 40 to 0. 65 amp
PA SCREEN V, 1500 V	Power amplifier screen voltage	850 volts	850 volts	850 volts	850 volts
BIAS SUPPLY V, -300 V	Bias power supply voltage	240 volts	240 volts	240 volts	240 volts
POSITION OF FUNCTION SWITCH S4	FUNCTION	820E-1		820F-1	
		REDUCED POWER	FULL POWER	REDUCED POWER	FULL POWER
TEST METER 2					
DRIVER 2K, 150 MA	Rf driver 2 cathode current	70 to 80 ma	70 to 80 ma	80 to 120 ma	80 to 120 ma
PA 2K, 3A	Power amplifier 2 cathode current	Not used	Not used	1. 15 to 1. 45 amp	1. 5 to 1. 9 amp
MOD 2K, 1. 5A	Modulator 2 cathode current (unmodulated)	0. 2 amp	0. 3 amp	0. 4 amp	0. 4 amp
	Modulator 2 cathode current (1000 cps, modulated 100%)	0. 25 to 0. 40 amp	0. 6 to 0. 8 amp	0. 6 to 0. 9 amp	1. 1 to 1. 4 amp
MOD PLATE I, 3A	Modulator plate current (unmodulated)	0. 4 amp	0. 6 amp	0. 8 amp	0. 8 amp
	Modulator plate current (1000 cps, modulated 100%)	0. 5 to 0. 8 amp	1. 2 to 1. 6 amp	1. 2 to 1. 8 amp	2. 2 to 3. 0 amp

TABLE 3-2. TYPICAL METER READINGS (Cont)

POSITION OF FUNCTION SWITCH S4	FUNCTION	820E-1		820F-1	
		REDUCED POWER	FULL POWER	REDUCED POWER	FULL POWER
MOD SCREEN I, 1.5 A	Modulator screen current (unmodulated)	0 amp	0 amp	0 amp	0 amp
	Modulator screen current (1000 cps, modulated 100%)	Not more than 0.04 amp	Not more than 0.05 amp	Not more than 0.10 amp	Not more than 0.1 amp
MOD SCREEN V, 1500 V	Modulator screen voltage	875 volts	875 volts	875 volts	875 volts
28V SUPPLY V, 30 V	28-volt dc power supply voltage	27 to 29 volts	27 to 29 volts	27 to 29 volts	27 to 29 volts
METER	FUNCTION	820E-1		820F-1	
		REDUCED POWER	FULL POWER	REDUCED POWER	FULL POWER
POWER AMPLIFIER AND RF OUTPUT METERS					
PLATE CURRENT	Power amplifier plate current	0.55 to 0.75 amp	1.35 to 1.55 amp	1.8 to 2.2 amp	2.6 to 3.0 amp
PLATE VOLTAGE	Power amplifier plate voltage	2.2 to 2.4 kv	5.0 to 5.2 kv	3.5 to 3.7 kv	5.0 to 5.2 kv
Auxiliary (connected to rf output coaxial cable)	Rf line current (unmodulated)	4.64 amp	10.4 amp	10.4 amp	14.4 amp
	Rf line current (1000 cps, modulated 100%)	5.60 to 5.66 amp	12.5 to 12.7 amp	12.5 to 12.7 amp	17.3 to 17.6 amp

section 4

principles of operation

4.1 GENERAL.

AM. Broadcast Transmitter 820E/F-1 consists of a frequency-determining device, an rf driver, a power amplifier, a modulator driver, a modulator, power supplies, an automatic filament voltage regulator, an automatic tuning circuit, and control circuits (figure 4-1). Paragraph 4.2 describes the functional relationship of the various circuits. Paragraphs 4.3 through 4.7 contain detailed circuit theory. During the following discussions, refer when necessary to the overall schematic diagram located in the envelope inside the back cover of this manual.

4.2 BLOCK DIAGRAM DISCUSSION.

The rf driver is a tuned-grid, tuned-plate amplifier consisting of two parallel-connected 6146B tubes. A low-level rf signal, obtained from AM. Broadcast Exciter 310W-1, is applied to the rf driver, amplified, and routed to the power amplifier. The rf signal is amplified in the power amplifier by two parallel-connected 4CX5000A tubes and routed through the output network to a 50-ohm transmission line connection. Manual tuning and loading of the output network is accomplished by motors B3 and B4 in response to tuning and loading control signals from extended control panel A1. Automatic tuning of the output network is accomplished by a signal from tuning control A9 to motor B3 during manual loading of the output network. Modulation of the rf signal is accomplished by a high-level audio signal applied to the plate and screen circuits of the two 4CX5000A tubes in the power amplifier. The audio signal used to modulate the rf signal is obtained from an external source, amplified by modulator drivers Q1 through Q6, and applied to the modulator. The modulator, consisting of two 4CX5000A tubes connected in push-pull, raises the audio signal to a level sufficient to modulate the tubes. Filament voltage for the tubes located in the rf driver, power amplifier, and modulator sections is obtained from transformers T2 through T6. The input voltage to the transformers is regulated by automatic filament voltage regulator A7. Overcurrent sensing for the modulator, 5.1-kv power supply, and the power amplifier is furnished by overload sensors A2 through A5. When a current overload occurs, the appropriate sensor detects the overload and routes an overload signal to the plate control circuits and to overload recycle/lockout unit A6. Unit A6 applies a lockout signal to the control circuits in the event of consecutive overloads.

4.3 RF CIRCUITS.

4.3.1 GENERAL.

The rf section of the 820E/F-1 consists of AM. Broadcast Exciter 310W-1, an rf driver, a power amplifier, an output network, and an automatic tuning control unit. Circuit operation is discussed in paragraphs 4.3.2 through 4.3.5. Circuit operation of the 310W-1 is described in the unit instructions bound in the back of this manual.

4.3.2 RF DRIVER.

The rf driver is a tuned-grid, tuned-plate, class C amplifier consisting of two parallel-connected 6146B tubes (V3 and V4) and associated components. Jack J9 couples a low-level rf signal from the 310W-1 through a tuned input transformer to the grid circuits of tubes V3 and V4. Tubes V3 and V4 amplify the rf signal and route it to the power amplifier. Protective bias is applied to the grids to prevent excessive plate current in the event drive is lost. Diodes CR25 and CR26 isolate the protective bias supply from the self-bias, which is at a higher negative voltage during normal operation. Bridge neutralization is accomplished via capacitors C73 and C74.

4.3.3 POWER AMPLIFIER.

The power amplifier is a class C amplifier consisting of either one or two 4CX5000A tubes (V5, V6) and associated components. The 820E-1 (5-kw transmitter) uses one tube (V5), and the 820F-1 (10-kw transmitter) uses two tubes (V5 and V6) connected in parallel. An rf signal from the rf driver tank circuit is applied to the grid circuit of V5 and V6 (if used), amplified, and routed to the output network.

The driver tank circuit is a parallel-resonant network which is adjusted for maximum power amplifier grid current. The frequency monitor sample is derived from the tank coil. The power amplifier is neutralized by a bridge circuit in conjunction with neutralizing capacitor C99. Capacitor C99 is an aluminum unit which has two capacitor divider sections. One section serves as a capacitive divider for the neutralizing

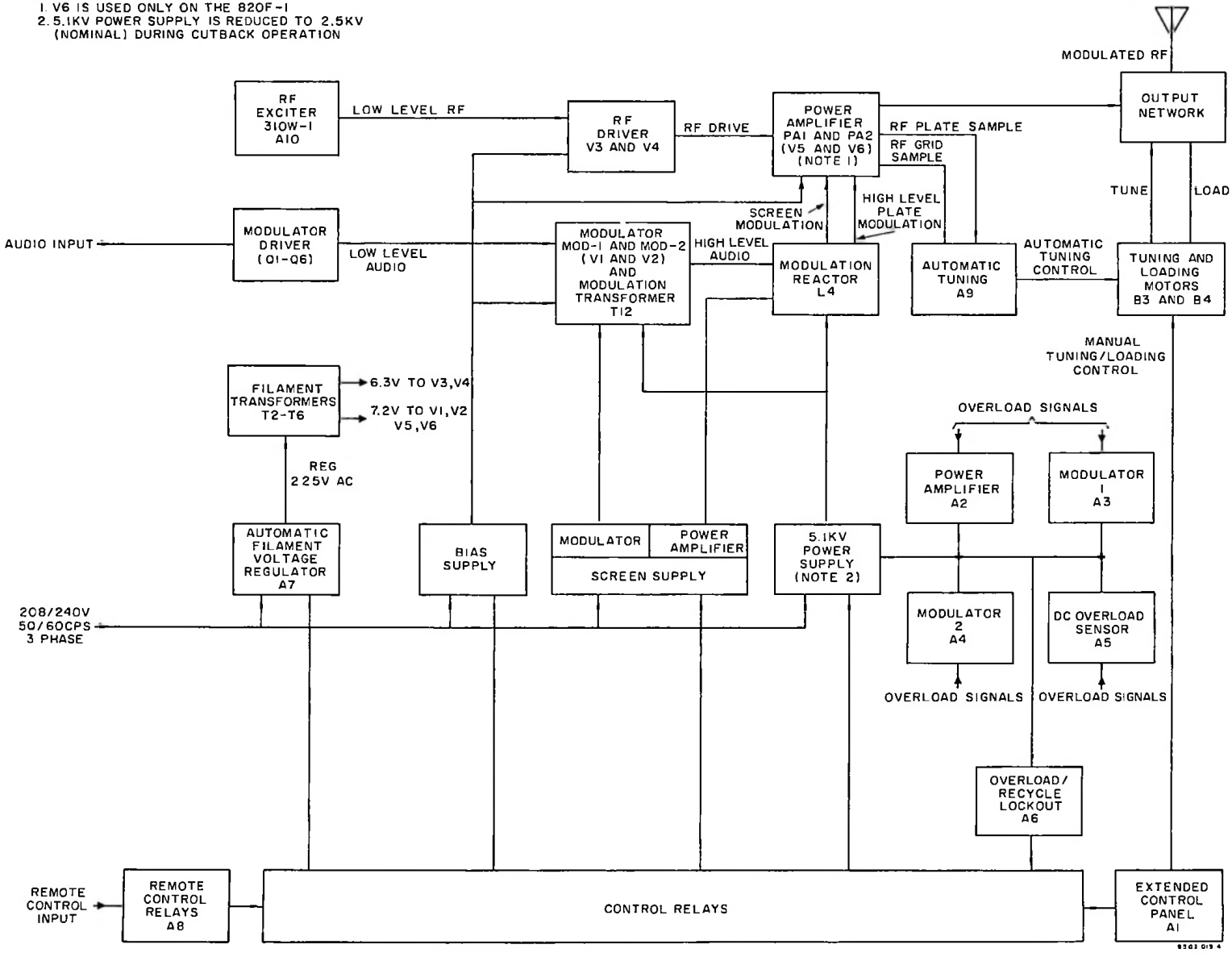


Figure 4-1. Functional Block Diagram

circuit. The second section provides a sample of rf plate voltage for automatic tuning control unit A9 (paragraph 4.3.5.3).

A combination of fixed and drive bias is used in the power amplifier. The fixed bias is high enough to protect the tubes if the drive is lost.

Modulation of the rf signal occurs when a high-level audio signal, obtained from transformer T12 and reactor L4 is applied to the plate and screen circuits of V5 and V6. Screen modulation is accomplished by the self-modulating effect of series resistors R145 and R152 in conjunction with an auxiliary winding on modulator reactor L4. Resistors R146 and R139A, B also produce self-modulation, but are primarily used to adjust the dc screen voltage for proper tube operation. During reduced power operation, R139A, B are switched in to lower the power amplifier screen voltage.

4.3.4 OUTPUT NETWORK.

The output network consists of five L-networks and a shunt second harmonic trap circuit. The five L-networks, consisting of capacitors C102, C103, and C105 and inductors L14, L15, and L17, match the plate impedance of the power amplifier to the 50-ohm transmission line connection, and provide harmonic attenuation and proper phase shift between the two points. The shunt second harmonic trap circuit consisting of capacitor C104 and inductor L16, is tuned to series resonance, providing additional suppression of second harmonic emission. An rf sample for monitoring modulation is obtained from inductor L18.

Motor-driven variable vacuum capacitors C102A and C105A provide tuning and loading, respectively, of the power amplifier. The two capacitors are controlled from extended control panel A1. The power amplifier loading control adjusts the transmitter power output and may be operated from a distant studio in the event of remote installations.

The Q of the network plus the series-blocking capacitor prevent the plate current "dips" from occurring at the point of maximum power output (unity power factor) during plate tuning. Therefore, it is necessary to adjust the network for the best efficiency at the particular point of power output. To facilitate this adjustment and to avoid extension of the plate-tuning functions to a remote control unit, a phase discriminator is used to automatically adjust the plate-tuning control to unity power factor (paragraph 4.3.5.3).

4.3.5 POWER AMPLIFIER PLATE LOADING AND TUNING.

4.3.5.1 MANUAL TUNING. Manual tuning of the power amplifier plate circuit is accomplished by a motor-driven capacitor located in the output network (paragraph 4.3.4). Setting TUNING switch A1S11 to MANUAL applies 28 volts dc through contacts C and 1 of A1S11 to contact C of PA TUNING switch A1S9 (figure 4-2). Setting A1S9 to LOWER applies 28 volts dc through contacts C and 1 of A1S9 and terminals 9 of A1TB1 and TB1 to pin X1 of relay K11. Relay K11 energizes, applying 240 volts ac through contacts R1 and R2 of K12, contacts L2 and L3 of K11, and terminal 1 of TB7 to motor B3. Motor B3 runs, turning capacitor C102A counterclockwise and increasing the capacitance. Releasing A1S9 removes 28 volts dc from K11, which deenergizes, stopping B3. Setting A1S9 to RAISE applies 28 volts dc through contacts C and 3 of A1S9 and terminals 8 of A1TB1 and TB1 to pin X1 of relay K12. Relay K12 energizes, applying 240 volts ac through contacts R1 and R2 of K11, contacts L2 and L3 of K12, and terminal 3 of TB7, to motor B3. Motor B3 runs, turning C102A in the opposite direction, thus decreasing capacitance.

4.3.5.2 MANUAL LOADING. Manual loading of the power amplifier plate circuit is accomplished by a motor-driven capacitor located in the output network (paragraph 4.3.4). Setting PA LOADING switch A1S10 to LOWER applies 28 volts dc through contacts C and 1 of A1S10A and terminals 5 of A1TB1 and TB1 to pin X1 of relay K13 (figure 4-3). Relay K13 energizes, applying 240 volts ac through contacts R1 and R2 of K14, contacts L2 and L3 of K13, and terminal 1 of TB8, to motor B4. Motor B4 runs, turning capacitor C105A counterclockwise and increasing the capacitance. Releasing A1S10 removes 28 volts dc from K13, which deenergizes, thus stopping motor B4. Setting A1S10 to RAISE applies 28 volts dc through contacts C and 3 of A1S10A and terminals 4 of A1TB1 and TB1 to pin X1 of relay K14. Relay K14 energizes, applying 240 volts ac through contacts R1 and R2 of K13, contacts L2 and L3 of K14, and terminal 3 of TB8 to motor B4. Motor B4 turns capacitor C105A in the opposite direction and decreases the capacitance.

4.3.5.3 AUTOMATIC TUNING. Automatic tuning of the power amplifier plate circuit occurs simultaneously with manual loading when TUNING switch A1S11 is set to AUTOMATIC. The automatic tuning sequence is the same as the manual tuning sequence, except relays K11 and K12 are controlled by contacts L2, L3 of relays K15 and K16, respectively (figure 4-2).

Relays K15 and K16 are operated by switches A9Q2 and A9Q1, respectively, in response to a dc voltage (positive or negative) from the phase discriminator. The phase discriminator provides a dc voltage when the phase relation between the grid and plate of the power amplifier tube is not exactly 180°.

The circulating current in the power amplifier grid tank circuit (L6 and C83) induces a voltage in toroid coil L21 that is 90° out of phase with the voltage in the tank circuit. Because the impedance of the toroid secondary circuit is primarily the inductive reactance of the toroid, the secondary current is in phase with the primary current. The secondary current produces voltages E_a E_b (figure 4-2) across resistors A9R2 and A9R1. Voltage E_c is obtained from the

output of the power amplifier stage. Capacitor C99 couples a sample of the power amplifier plate voltage through phase balance control A9R6 to the junctions of the bypass capacitors A9C2 and A9C3 in the phase discriminator. When the power amplifier plate circuit is tuned to resonance, the power amplifier plate voltage is exactly 180° out of phase with the grid voltage. The phase relationships at resonance are shown in vector diagram A, figure 4-2. At resonance, diodes A9CR2 and A9CR1 conduct equally during opposite half cycles, producing resultant voltages E_1 and E_2. Since E_c is exactly 90° out of phase with E_a and E_b, the dc currents in the diode loads are equal and flowing in opposite direction which produces zero output E_o. When E_c is not exactly 90° out of phase with E_a and E_b, the voltages across the two diodes are unequal in magnitude. This unbalanced condition causes the dc currents in the diode loads to be unequal and produces an output. Depending on whether the plate tank circuit is above or below resonance, the phase relationship between E_1, E_2, and E_c will be as shown in vector diagram B or C, figure 4-2.

The output of the phase discriminator is coupled through inductor A9L1 and resistor A9R5 to the gate circuit of switches A9Q1 and A9Q2. Diodes A9CR4 and A9CR5 serve as clippers to provide a 60-cps square wave for biasing the diode gates. The result is greater discriminator sensitivity. A negative voltage causes A9Q1 to conduct, energizing relay K16. A positive voltage causes A9Q2 to conduct, energizing relay K15. Diode A9CR3 prevents inadvertant operation of A9Q1 during positive half cycles of the control voltage obtained from transformer T14. Depending on which relay, K15 or K16, is energized, motor B3 turns either clockwise or counterclockwise, driving capacitor C102 until the power amplifier plate circuit approaches resonance. At resonance the voltage present at DISCR BAL jacks J21 and J22 is within the range ±0.08 volt dc.

4.4 AUDIO CIRCUIT.

The audio circuit consists of an input attenuator, a modulator driver, a modulator, and associated components. Audio is routed from an external source through the input attenuator and coupling transformer T10 to the modulator driver. Resistors R37 through R41 form a fixed H-pad attenuator which provides a minimum isolation of 6 db from the source. Resistors R42, R43, and R44 are switched into the circuit by audio input relay K8 during reduced power operation. This action equalizes the audio drive level between the two operational modes. The modulator driver, consisting of push-pull, direct-coupled transistors Q1 through Q6 and operating in class A, raises the audio to a level sufficient to drive the modulator. The high-level modulator, consisting of V1 and V2 connected in push-pull and operating in class AB, amplifies the audio and routes it through output transformer T12 to the power amplifier (paragraph 4.3.3). Individual controls are provided for adjusting the modulator-fixed bias for the desired level of unmodulated static cathode current in each tube. Controls are also provided for adjusting the dynamic balance of the grid drive and filament hum. Frequency response is improved by applying negative feedback from the plates of V1 and V2 to the secondary circuit of T10.

The transmitter power output is changed during cutbacks by reducing the power amplifier plate voltage. Since the modulator plate voltage is also reduced, it is necessary to lower the modulator screen voltages to maintain linear operation. Relay K17 performs this operation by switching the tube circuit connections to voltage dividers in the respective power supplies. The bias voltage divider is adjusted by potentiometer R173 to maintain the proper modulator static current.

4.5 POWER SUPPLIES.

4.5.1 GENERAL.

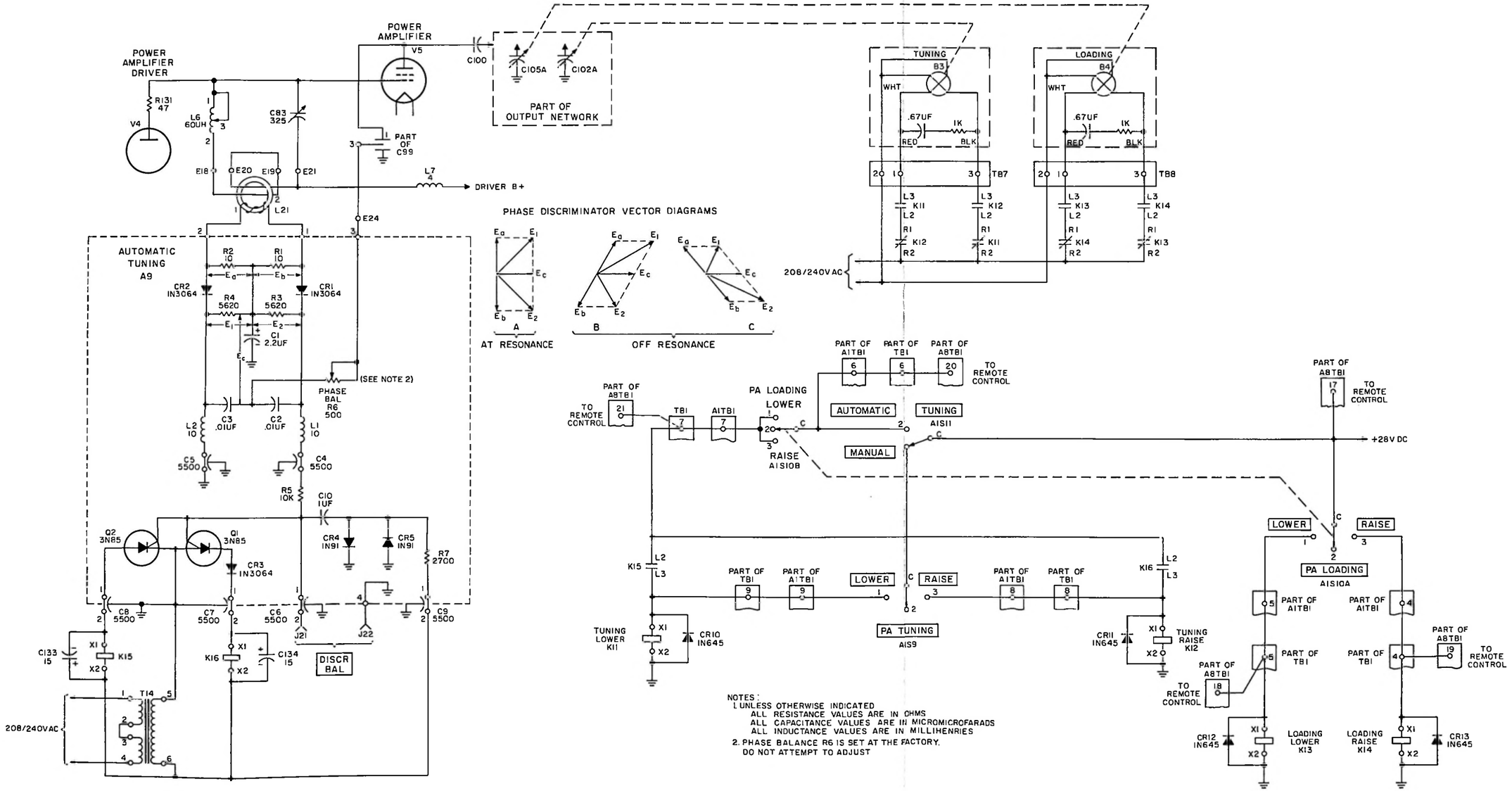
The 820E/F-1 contains a +28-volt dc power supply, a bias power supply, a high-voltage power supply, a modulator screen power supply, a power amplifier screen power supply, and a filament power supply. Dc power supply outputs are monitored by meters located on extended control panel A1.

4.5.2 +28-VOLT DC POWER SUPPLY.

The +28-volt dc power supply consists of a circuit breaker, a transformer, and a full-wave bridge rectifier. The power supply furnishes operating voltage for the control circuits, the modulator driver, indicator lamps, filament voltage regulator A7, and AM. Broadcast Exciter 310W-1. Three-phase, 208/240-volt ac power is coupled through +28V SUPPLY circuit breaker CB1 and three-phase transformer T1 to a three-phase, full-wave bridge (CR14) consisting of six diodes. The full-wave bridge rectifies the three-phase ac and applies it to the appropriate circuit. Filtering is not included in the power supply, however, the modulator driver, filament regulator, and rf exciter each have their own filter networks. Diode CR30, resistor R137, and capacitor C125 maintain a constant 28 volts dc to the overload sensor circuits, ensuring that the relays in the sensor circuits have a full 28 volts dc present during periods of extreme overloads which cause supply line fluctuations.

4.5.3 BIAS POWER SUPPLY.

The bias power supply consists of a circuit breaker, a transformer, a full-wave bridge rectifier, and an LC filter network. Single-phase, 208/240 volts ac is applied from FILAMENTS circuit breaker CB3 and contacts of relay K2 through BIAS SUPPLY circuit breaker CB4 and transformer T7 to a full-wave bridge rectifier. The full-wave bridge rectifier, consisting of diodes CR15 through CR18, rectifies the



NOTES:
1. UNLESS OTHERWISE INDICATED
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
   ALL INDUCTANCE VALUES ARE IN MILLIHENRIES
2. PHASE BALANCE R6 IS SET AT THE FACTORY. DO NOT ATTEMPT TO ADJUST

Figure 4-2. Automatic Tuning Circuit, Simplified Schematic Diagram

NOTES:
1. UNLESS OTHERWISE INDICATED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
2. VARIABLE AUTOTRANSFORMER A7T1 AND RESISTORS A7R1, A7R2 AND A7R3 ARE LOCATED ON SUBASSEMBLY A7. ALL OTHER COMPONENTS ARE LOCATED ON SUBASSEMBLY A7A1
3. FILAMENT TRANSFORMER T4 USED ONLY IN 820F-1

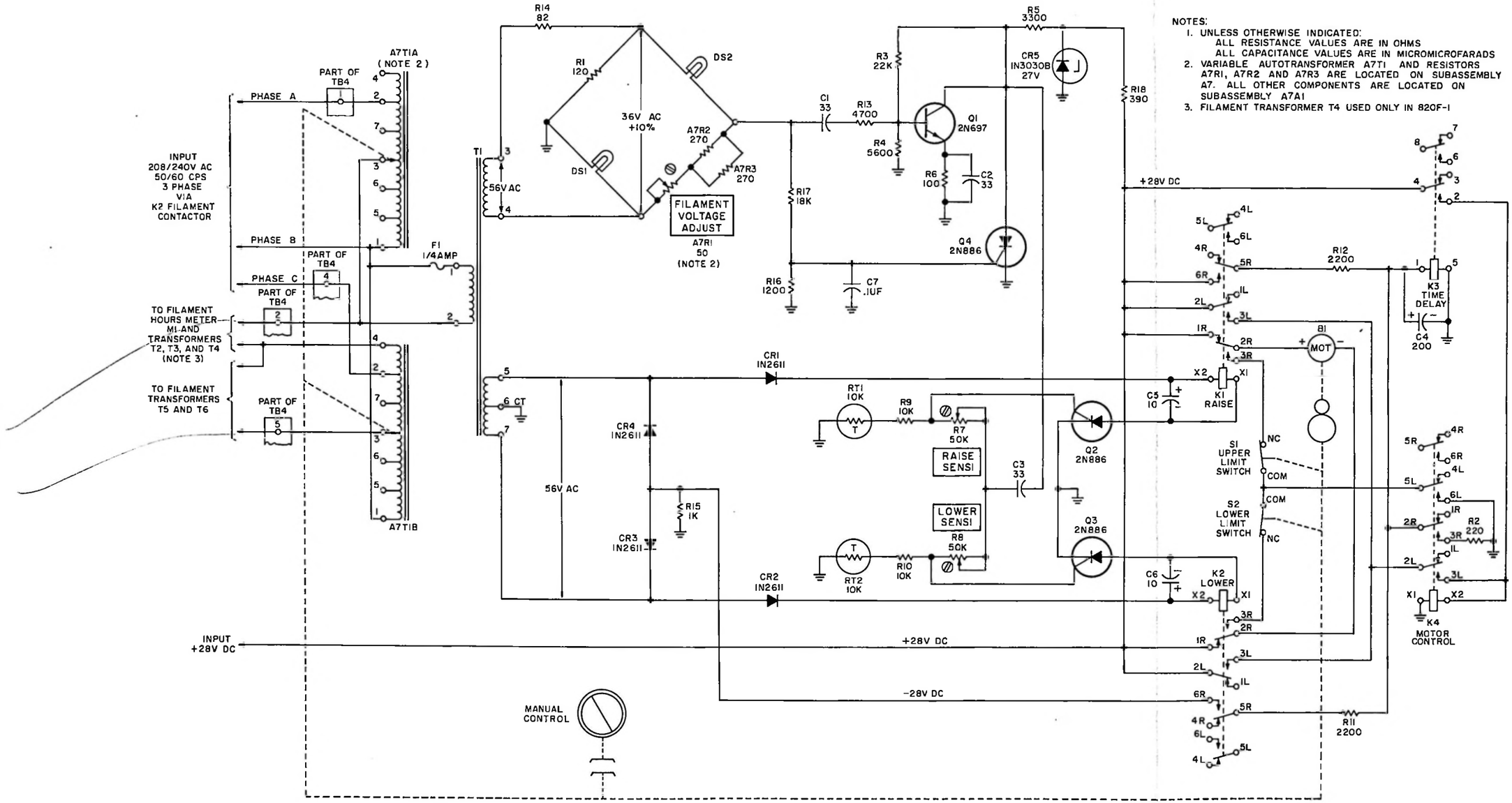


Figure 4-3. Automatic Filament Control. Simplified Schematic Diagram

transformer secondary voltage and applies it to a filter network (inductor L1 and capacitor C4). From the filter network, -240 volts dc is routed to the grid circuits of the modulator and power amplifier tubes. Approximately -65 volts dc, obtained from the junction of bleeder resistors R13 and R14, is applied to the grid circuit of the rf driver as protective bias. During reduced power (cutback) operation, bias voltage applied to the grid circuit of the modulator tubes is reduced through divider circuit R172, R173, and R174. During full power operation, relay K17 energizes, applying the full 240 volts dc to the grid circuit of the modulator tubes through contacts R1 and R2 of relay K17.

Opening the left rear door, the right front door, the right front panel, the power amplifier door, or the modulator door disables the bias power supply and shorts the -240-volt dc line to ground through the associated grounding switch; S22 (left rear door), S23 (right front door), S10 (right front panel), S20 (power amplifier door) or S19 (modulator door).

4.5.4 HIGH-VOLTAGE POWER SUPPLY.

The high-voltage power supply consists of a circuit breaker, a transformer, a six-phase, full-wave bridge rectifier, and a filter network. Three-phase, 208/240-volt ac power is applied through HIGH VOLTAGE circuit breaker CB6 to the primary of transformer T9 and to the normally open contacts of high-power plate contactor K6 and low-power plate contactor K5. (Refer to paragraph 4.6 for a discussion on the operation of contactors K5 and K6.) During high-power plate operation, contacts of contactor K6 close, connecting the primary of T9 in a delta configuration. This configuration allows full power to be transferred to the dual, three-phase secondary of T9. (For reduced power plate (cutback) operation, contacts of contactor K5 close, connecting the primary of T9 in a wye configuration with separate taps used for correct plate voltage in lower power). From the dual, three-phase secondary of T9, voltage is applied to the six-phase bridge rectifier (CR23). The output of the rectifier is routed to a filter network consisting of resistor R23 and capacitor C9. The high ripple frequency obtained using six-phase rectification permits elimination of a filter choke. The output of the filter network (5100 volts dc for high-power plate operation, reduced to 2350 volts dc (820E-1) or 3650 volts dc (820F-1) for low-power plate operation), is applied to the plate circuits of the modulator and power amplifier tubes.

Opening the right rear door, the center rear door, the modulator door, or the power amplifier door disables the high-voltage power supply and shorts the high-voltage line to ground through the associated grounding switch S11 (right and center rear door) or S18 (modulator and power amplifier door).

4.5.5 MODULATOR AND POWER AMPLIFIER SCREEN POWER SUPPLIES.

4.5.5.1 GENERAL. The modulator and power amplifier screen power supplies receive operating voltage from the dual secondary windings of transformer T8. The 3-phase, 208/240-volt ac input to the primary of T8 is routed from HIGH VOLTAGE circuit breaker CB6 through SCREEN SUPPLY circuit breaker CB5 and contacts of screen contactor K7 (when energized). (Refer to paragraph 4.6 for a discussion on the operation of contactor K7.) Both power supplies are similar, but not identical; therefore they are discussed separately in paragraphs 4.5.5.2 and 4.5.5.3.

4.5.5.2 MODULATOR SCREEN POWER SUPPLY. Three-phase ac voltage is coupled from secondary terminals 15, 16, and 17 of transformer T8 to the three-phase, full-wave bridge rectifier (CR19). The ac voltage is rectified by CR19 and applied to an LC filter network consisting of inductor L2 and capacitor C5. After filtering, approximately 850 volts dc is coupled through contacts of reduced power relay K17 to the modulator screen circuit. During high-power operation, relay K17 is energized, closing contacts L1 and L2. This action connects 850 volts dc directly to the modulator screen circuit. During low-power operation, relay K17 deenergizes opening contacts L1 and L2 and routing 850 volts dc to a network consisting of resistors R175 and R176 and capacitor C90. Approximately 400 volts dc is connected from the divider through contacts L3 and L2 of relay K17 to the modulator screen circuit.

Opening the right front door, the right front panel, the left rear door, or the modulator door disables the modulator screen power supply and shorts the 850-volt dc line to ground through the associated grounding switch, S23 (right front door), S10 (right front panel), S22 (left rear door), or S19 (modulator door).

Resistor R18 and Thyrector CR20, connected across inductor L2, serve as a transient suppressor. The suppressor protects the diodes in the bridge rectifier from excessive voltage peaks.

4.5.5.3 POWER AMPLIFIER SCREEN POWER SUPPLY. Three-phase ac voltage is coupled from secondary terminals 10, 11, and 12 of transformer T8 to three-phase, full-wave bridge rectifier CR21. Bridge rectifier CR21 rectifies the ac voltage and connects it to an LC filter network consisting of inductor L3 and capacitor C6. After filtering, 850 volts dc is routed to a bleeder divider consisting of resistors R25 and R26 and through dropping resistors R139 and R146 to the power amplifier screen circuit. From the junction of R25 and R26, 180 volts dc is connected to the rf driver screen circuit. Opening the rf driver door disables the power supply and shorts the

180-volt dc line to ground through switch S21. During full power operation, relay K9 energizes, routing 850 volts dc through contacts 1 or 2 and R146 to the power amplifier screen circuit. During reduced power operation, resistors R139A and R139B are inserted into the circuit, providing additional control of the reduced power output level.

Opening any rear door, the right front door, the right front panel, or the power amplifier disables the power supply and shorts the 900-volt dc line to ground through the associated grounding switch which may be S22 (left rear door), S11 (right/center rear door), S23 (right front door), or S10 (right front panel).

Resistor R24 and Thyrector CR22, connected across inductor L3, serve as a transient suppressor. The suppressor protects the diodes in the bridge rectifier from excessive voltage peaks.

4.5.6 AUTOMATIC FILAMENT VOLTAGE REGULATOR.

4.5.6.1 GENERAL. Automatic filament voltage regulator A7 detects and compensates for sustained fluctuations in the input ac voltage. The fluctuations are detected by a balanced bridge circuit, which, in conjunction with a motor control circuit, adjusts the setting of two variable transformers for a constant output of 225 volts ac. The 225 volts ac is routed to filament transformers T2 through T6 and filament hours meter M1. Refer to figure 4-3 as needed during the following discussions.

4.5.6.2 DETECTOR CIRCUIT. In A7A1 a sample of the input ac voltage is applied from terminals 3 and 4 of transformer T1 to a resistive bridge circuit consisting of lamps DS1 and DS2, resistors R1, A7R2, and A7R3, and filament voltage adjust potentiometer A7R1. Potentiometer A7R1, connected in series with A7R2 and A7R3, is set for no signal at the junction of capacitor C1 and resistor R17 with respect to ground when the output of variable transformer A7T1 is 225 volts ac. When the input ac voltage increases, the voltage dropped across the bridge circuit increases, which causes more current to flow through the components located in the legs of the bridge circuit. The increased current flow causes the filament resistance of DS1 and DS2 to increase. The increased resistance of the filaments unbalances the bridge circuit and applies an ac signal, in phase with the ac voltage dropped across the bridge circuit, to the junction of C1 and R17. From C1 and R17, the ac signal is coupled to the base of transistor Q1. Transistor Q1 amplifies and phase shifts the ac signal 180°. From Q1, the inverted ac signal is routed through capacitor C3 to the gate circuits of controlled rectifiers Q2 and Q3.

Another sample of the input ac voltage is applied from terminals 5 and 6 of T1 through diodes CR1 and CR2 to raise relay K1 and lower relay K2, respectively. Because of CR1 and CR2, only positive half cycles of the ac voltage are applied to K1 and K2. As the input ac voltage increases, positive half cycles are connected through K2 to the cathode of Q3. The in-phase ac signal present at the gate of Q3 allows Q3 to conduct, energizing K2. Capacitor C6 discharges during negative half cycles keeping K2 energized. The ac signal present at the gate of Q2 is out of phase with the half cycles connected through K1 to the cathode of Q2, preventing Q2 from conducting. This action prevents K1 from energizing.

Operation of the detector circuit under low ac filament voltage conditions is similar to the operation during high-voltage conditions, with the following exceptions. The sample ac voltage dropped across the resistive bridge circuit is 180° out of phase with the ac signal at the junction of C1 and R17. The out-of-phase ac signal prevents Q3 from conducting, but allows Q2 to conduct. This action energizes K1, but not K2.

If DS1 or DS2 burns out, a large ac signal will appear at the base of Q1. As a result, the drive motor would run to either end stop, trying to compensate for an erroneous indication of a very high or low ac filament voltage. To prevent this type of malfunction, a protective circuit is connected to the output of Q1. When a large ac signal is applied to the base of Q1, the same ac signal is applied to the protective circuit which consists of voltage divider R17 and R16 and controlled rectifier Q4. From the junction of R17 and R16, the ac signal is connected to the gate of Q4 causing it to conduct. When Q4 conducts, the output of Q1 is shunted to ground preventing K1 or K2 from energizing. This action prevents the drive motor from operating.

4.5.6.3 MOTOR CONTROL CIRCUITS. The motor control circuits which operate to lower or raise the ac filament voltage are similiar; therefore, only the raise control circuit is discussed in detail. Under low ac filament conditions, raise relay K1 energizes, connecting +28 volts dc through contacts 6R and 5R to a time-delay circuit, consisting of resistor R12, capacitor C4, and the coil of relay K3. Relay K1 must remain energized for 1.5 seconds before the time-delay circuit allows K3 to energize. The time delay assures that only sustained fluctuations of the ac filament voltage will allow the drive motor to operate. After 1.5 seconds, K3 energizes, applying +28 volts dc through contacts 4 and 2 to motor control relay K4 causing K4 to energize. Energizing K4 connects ground through contacts 3R and 2R to the time-delay circuit which deenergizes K3 and discharges C4. Relay K4 remains energized by the +28 volts dc applied through contacts 2L and 3L of K1 to self-holding contacts 2L and 3L of K4. Ground is also routed through resistor R2, contacts 6L and 5L of K4, upper limit switch S1, and contacts 3R and 2R of K1 to drive motor B1. Operating voltage, +28 volts dc, is connected through contacts 1R and 2R of lower relay K2 to B1, causing B1 to run. Motor B1 runs, driving the rotor on variable transformer A7T1 until the ac filament voltage is raised to 225 volts ac.

The motor control circuit which lowers the ac filament voltage operates in a manner similar to the motor control circuit which raises the ac filament voltage with the following exceptions. The operating voltage is -28 volts dc instead of +28 volts dc. The -28 volts dc is obtained from a circuit consisting of diodes CR3 and CR4 and resistor R15. Minus 28 volts dc is used instead of +28 volts dc to lower the ac filament voltage and assure that transients on the input ac voltage line will not shorten the time delay.

4.6 CONTROL, PRIMARY POWER DISTRIBUTION, AND OVERLOAD CIRCUITS.

4.6.1 GENERAL.

The control circuit consists of relays, momentary pushbutton switches, and interlock devices. Two types of operation are available, semiautomatic and automatic. Application of primary power, for both semiautomatic and automatic operation, is controlled by circuit breakers and relay contacts. Overload circuits protect internal circuits from damage caused by voltage surges. Refer to figure 4-4 as needed during the discussions located in paragraphs 4.6.2 through 4.6.4. For the discussions, it is assumed that 28V SUPPLY circuit breaker CB1, BLOWERS circuit breaker CB2, FILAMENTS circuit breaker CB3, HIGH VOLTAGE circuit breaker CB6, BIAS SUPPLY circuit breaker CB4, SCREEN SUPPLY circuit breaker CB5, and all interlock switches are actuated.

4.6.2 SEMIAUTOMATIC OPERATION.

4.6.2.1 GENERAL. Semiautomatic operation of the 820E/F-1 consists of pushing two switches in sequence. The first pushbutton, FILAMENT ON switch A1S2, controls relays which apply operating voltage to AM. Broadcast Exciter 310W-1, the modulator driver, the automatic tuning circuit, the blower motors, and the filament and bias power supplies. The second pushbutton, HIGH POWER ON switch A1S7 or LOW POWER ON switch A1S6, controls relays which apply operating voltage to the screen and plate power supplies and connect audio, power amplifier screen, modulator monitor taps, and modulator grid and screen circuits for the desired configuration.

4.6.2.2 FILAMENT VOLTAGE CONTROL CIRCUIT. Pushing FILAMENT ON switch A1S2 applies 28 volts dc from the 28-volt dc power supply through door interlock switches S1 through S9 and S14, terminals 1 and 2 of A8TB1, terminals 17 of TB1 and A1TB1, FILAMENT OFF switch A1S1, switch A1S2, and terminal 14 of A1TB1 and TB1 to blowers relay K1. Relay K1 energizes, applying 28 volts dc through holding contacts 1 and 2 and keeping K1 energized after A1S2 is released. (Relay K1 can be deenergized by activating A1S1, which breaks the 28-volt dc line.) From energized contacts 3 and 6 of K1, 28 volts dc is routed to normally open contact L5 of filament bias relay K2 and to normally open contact C of blower air switch S12. Operating voltage is routed through energized contacts 7 and 10 of K1 to blowers B1 and B2, causing them to run. When B1 and B2 attain their normal operating speed, S12 and fan air switch S13 close, routing 28 volts dc to AIR indicator A1DS3 and through the auxiliary switch on FILAMENTS circuit breaker CB3 to relay K2. Relay K2 energizes, applying 28 volts dc through energized contacts L5 and T5 of K2 to FILAMENT ON indicator A1DS2, the 310W-1, modulator driver Q1-Q6, and auxiliary switch contact C of BIAS SUPPLY circuit breaker CB4. From contact N.O. of CB4, 28 volts dc is routed through normally closed contacts R2 and R1 of overload relays A2K1, A3K1, A4K1, A5K1, and normally closed contacts of A6K1 (terminals 1 of 4 of A6) to normally open contacts 7 and 10 of low and high power plate contactors K3 and K4, respectively. (Refer to paragraphs 4.6.2.3, and 4.6.2.4, respectively, for a discussion on the operation of K4 and K3.) Operating voltage for automatic filament voltage regulator A7, the automatic tuning circuit, and the bias power supply is routed from FILAMENT circuit breaker CB3 through energized contacts L1-T1, L2-T2, and L3-T3 of K2. FILAMENT OFF indicator A1DS1, normally lighted when K2 is deenergized, goes out when contacts L4 and T4 of K2 open, indicating that filament voltage has been applied to the tubes. Capacitor C1, in conjunction with resistor R1 and diode CR2, prevents K2 from deenergizing during intermittent operation of air switches S12 and S13 caused by turbulence in the air flow or during temporary voltage overloads.

4.6.2.3 HIGH-POWER CONTROL CIRCUIT. Operating voltage, 28 volts dc, for the low- and high-power control circuit is routed from contact C of FILAMENT OFF switch A1S1 through PLATE OFF RESET switch A1S8, terminals 16 of A1TB1 and TB1, remote control panel A8, normally closed contacts 5 and 8 of relay A6K1 to the low- and high-power relay control circuits, respectively. Pushing HIGH POWER ON switch A1S7, applies 28 volts dc to high-power plate control contactor K4. Holding contacts 1 and 2 of K4 keep K4 energized after S7 is released. Normally closed contacts 4 and 5 of K4 open, preventing the low-power circuit from being activated while the high-power circuit is in operation. Contacts 7 and 10 of K4 connect 28 volts dc to audio input relay K8, power amplifier screen relay K9, modulator monitor relay K10, and modulator-reduced power relay K17. Contacts 7 and 10 also connect 28 volts dc through normally closed contacts T4 and L4 of low-power relay K5 to high-power contactor K6 and HIGH POWER ON indicator A1DS7. Contactor K6 energizes, applying 28 volts dc through contacts L5 and T5, to screen contactor K7. In addition, contacts L1-T1, L2-T2, and L3-T3 of K6 close, connecting the primary of high-voltage supply transformer T9 in a delta configuration for the desired output voltage. Energizing K7 connects operating voltage through contacts L1-T1, L2-T2, and L3-T3 of K7 to the primary windings of modulator and power amplifier screen transformer T8. Normally closed contacts T4 and L4 of K6 open preventing low-power plate relay K5 from being energized while K6 is energized. When

either K5 or K6 energizes, the 28-volt dc line to PLATE OFF RESET lamp A1DS8 opens causing the lamp to go off. This action indicates that plate voltage has been applied to the tubes.

4.6.2.4 LOW-POWER CONTROL CIRCUIT. Operation of the low-power control circuit is similiar to the operation of the high-power control circuit with the following exceptions. Pushing LOW POWER ON switch A1S6 breaks the 28-volt dc line going to high-power plate contactor K4. Deenergizing K4 removes energizing voltage from audio input relay K8, power amplifier screen relay K9, modulator monitor relay K10, modulator-reduced power relay K17, and high-power plate contactor. In addition, 28 volts dc is routed through normally closed contacts 4 and 5 of K4 to K3. Contactor K3 energizes, closing normally open contacts 7 and 10, which connect 28 volts dc through normally closed contacts T4 and L4 of K6 to low-power plate contactor K5 and LOW POWER ON indicator A1DS6. Energizing K5 closes normally open contacts L5 and T5, applying 28 volts dc to modulator screen contactor K7 and keeping K7 energized. Contacts T3-L3 and T1-L1 of K5 connect high-voltage supply transformer T9 in a wye configuration for the desired output voltage. Normally closed contacts 4 and 5 of K3 and normally closed contacts T4 and L4 of K5 open, preventing the high-power plate control and high-power plate circuits, respectively, from energizing while the low-power circuit is in operation.

4.6.2.5 PLATE-OFF CONTROL CIRCUIT. Plate and screen voltages are removed from the modulator and power amplifier tubes by operating PLATE OFF RESET switch A1S8. (For clarity, assume that the 820E/F-1 is in the high-power mode of operation.) Pushing A1S8 breaks the 28-volt dc line going to high-power contactor K4. Deenergizing K4 removes energizing voltage from audio input relay K8, power amplifier screen relay K9, modulator monitor relay K10, modulator-reduced power relay K17, high-power contactor K6, and screen relay K7. Because of the mechanical characteristics of K6 and K7, K7 drops out first, removing screen voltage from the modulator and power amplifier tubes before removing plate voltage.

4.6.3 AUTOMATIC OPERATION.

4.6.3.1 AUTOMATIC TURN-ON. Automatic turn-on of the 820E/F-1 is performed by pushing either HIGH POWER ON switch A1S7 or LOW POWER ON switch A1S6. Pushing A1S7 or A1S6 performs the same functions as described in paragraph 4.6.2.3 with the additional action of applying 28 volts dc through energized contacts 3 and 6 of high-power plate control relay K4 or low-power plate control relay K3, respectively, to blower relay K1. This action accomplishes the same functions as pushing FILAMENT ON switch A1S2. After K1 energizes, the sequence of operation is the same as that described in paragraphs 4.6.2.2 and 4.6.2.3, above. Regardless of which mode of operation is chosen, the control circuits sequence properly, first applying filament and bias voltages and then plate and screen voltages. Because of the characteristics of the tubes used, protective time-delay circuits are not required. Therefore, the only delay during transmitter turn-on is limited to the length of time required for the rf driver tube warm up.

4.6.3.2 AUTOMATIC TURN-OFF. Automatic turn-off of the 820E/F-1 is accomplished by pushing FILAMENT OFF switch A1S1. Pushing A1S1 breaks the 28-volt dc line to blower relay K1 and the low- and high-power plate control circuits. Disconnecting 28 volts dc from the plate control circuits performs the same function as actuating PLATE OFF RESET switch A1S8 (paragraph 4.6.2.5). Deenergizing K1 removes operating voltage from blowers B1 and B2, the 310W-1, modulator driver, and filament bias relay K2. Deenergizing K2 removes filament and bias voltages from the tubes.

4.6.4 OVERLOAD CIRCUITS.

4.6.4.1 GENERAL. The overload circuits consist of four overload sensors, associated indicator lamps with memory control circuits, and an overload recycle/lockout circuit. The overload sensors detect temporary or sustained current surges in the power amplifier and modulator tubes and in the high-voltage dc supply. A temporary surge, detected by the appropriate sensor, lights the associated indicator lamp, showing where the overload occurred. In addition, the plate and screen relays drop out for approximately 0.5 second. A repeated or sustained overload, occurring within an approximate half-minute interval, operates the overload recycle/lockout circuit. Activating the lockout circuit removes 28 volts dc from the low- or high-power control relays, turning the 820E/F-1 off. A detailed discussion of an overload sensor, an indicator lamp circuit, and the overload recycle/lockout circuit is contained in paragraph 4.6.4.2. Since the operation of all four sensors and associated indicator lamp circuits is similiar, only the power amplifier overload circuit is discussed. Refer to figure 4-5 during the following discussion.

4.6.4.2 OPERATION OF OVERLOAD SENSOR, INDICATOR, AND RECYCLE/LOCKOUT CIRCUITS. Assume that a current surge occurs in the power amplifier tube circuit. When this happens, increased current flows through parallel-connected sampling resistor R150 and potentiometer A2R1. The increased current flow increases the voltage dropped across R150 and A2R1. This increased voltage is routed through the input filter circuit, consisting of inductor A2L1, resistors A2R2 through A2R4, capacitors A2C1 and A2C2, and diode A2CR1 to the gate of controlled switch A2Q1. Switch A2Q1 conducts, completing a dc ground return path for the 28 volts dc applied to relay A2K1 via Zener diode A2CR3. (Diode A2CR3 also maintains a voltage threshold for isolating the incoming gate signal.) Relay A2K1 energizes, closing contacts R5 and R6, L2 and L3, and R2 and R3. Closing contacts L2 and L3 applies 28 volts dc via

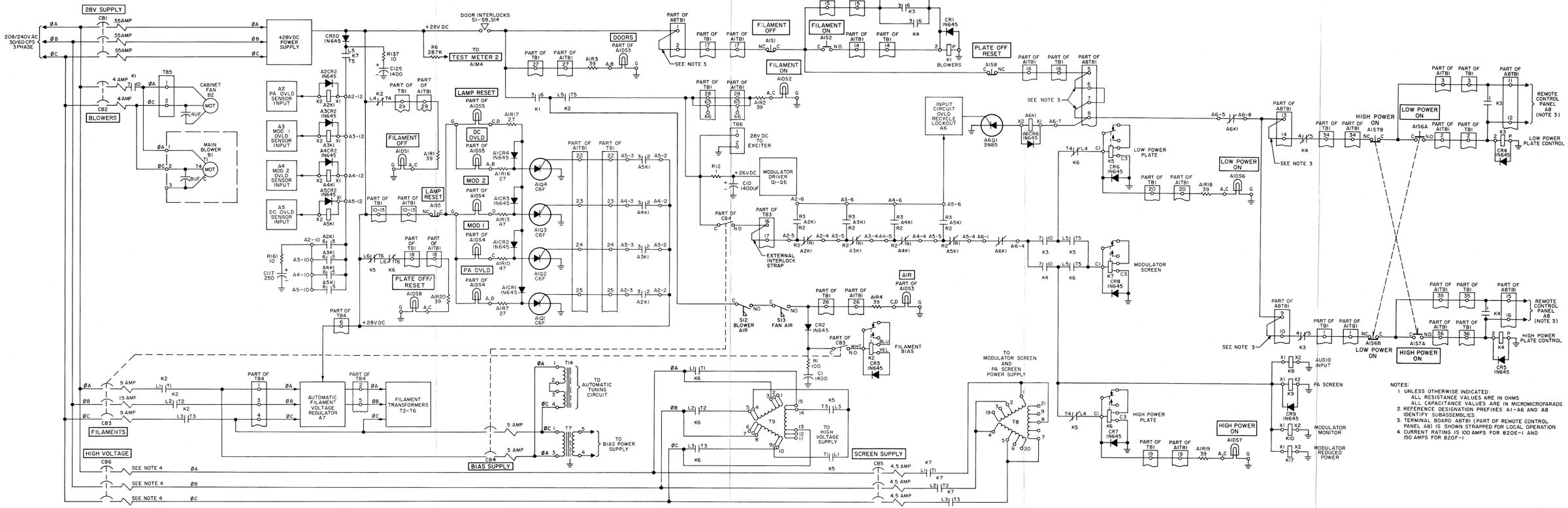


Figure 4-4. Control Circuits, Simplified Schematic Diagram

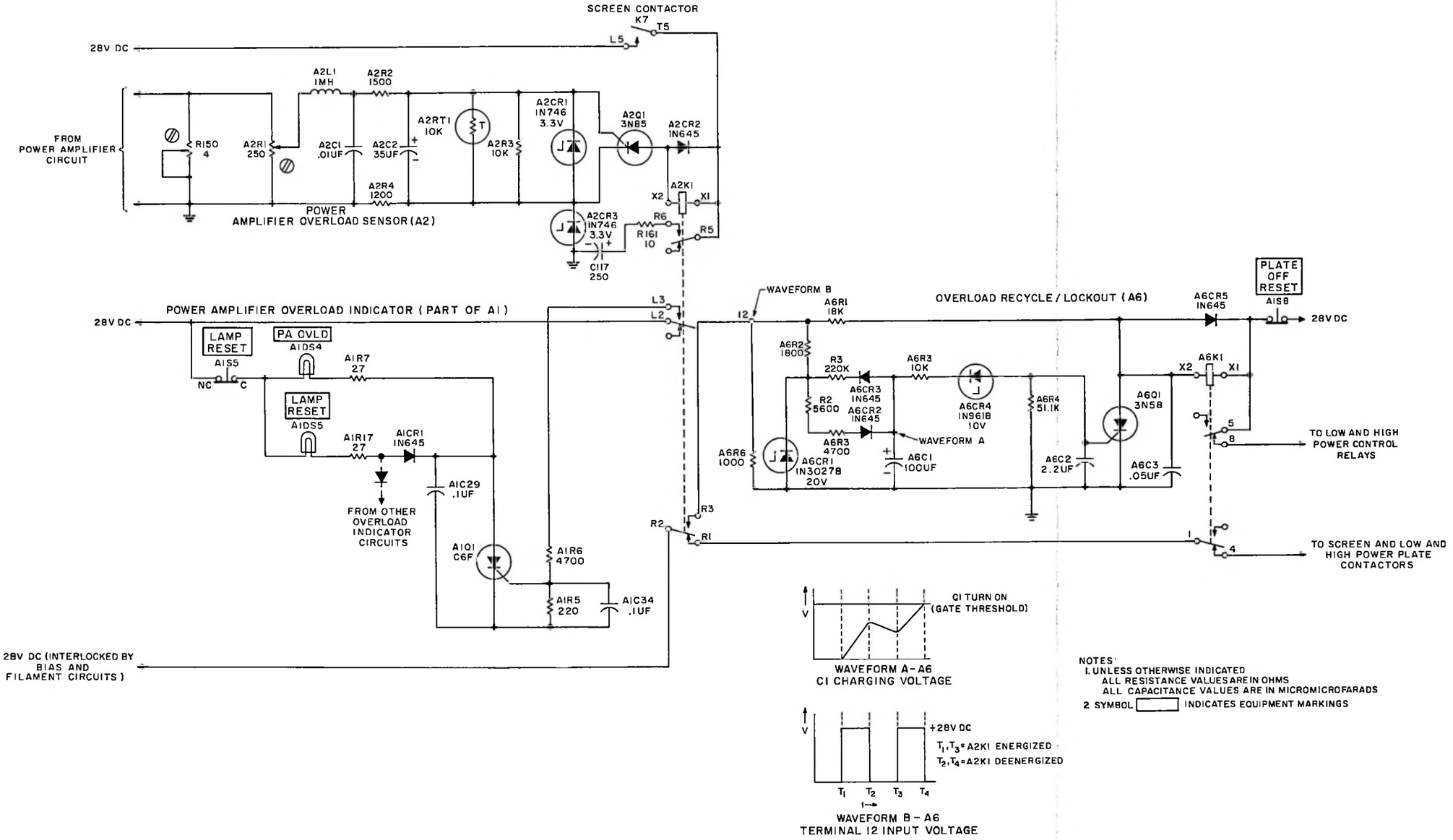


Figure 4-5. Typical Overload Circuit, Simplified Schematic Diagram

resistor divider A1R6 and A1R5 to the gate circuit of controlled rectifier A1Q1. Rectifier A1Q1 conducts, completing a dc ground return path for 28 volts dc applied to PA OVLD indicator lamp A1DS4 and LAMP RESET indicator lamp A1DS5. Lamps A1DS4 and A1DS5 light, indicating an overload condition, and remain on until manually extinguished by LAMP RESET switch A1S5. Closing contacts 5 and 6 charges capacitor C117 to 28 volts dc. Contacts R1 and R2 remove 28 volts dc from the modulator screen and low- or high-power plate contactors, and contacts R2 and R3 connect 28 volts dc to the overload recycle/lockout circuit. Deenergizing the modulator screen relay removes 28 volts dc from A2K1 by opening contacts L5 and T5 of K7. Normally, A2K1 would deenergize instantly, but on removing the 28 volts dc, C117 discharges slowly through A2K1 delaying its dropout for approximately 0.5 second, preventing spurious operation of the plate contactors.

While A2K1 is energized, the 28 volts dc applied to the overload recycle/lockout circuit is routed through terminal 12 of A6 (waveform B, figure 4-5) to a time-delay circuit consisting of resistors A6R2, R2, A6R5, diode A1CR2, and capacitor A6C1. Capacitor A6C1 charges (waveform A, figure 4-5) for approximately 0.5 second until A2K1 opens contacts R5 and R6, L2 and L3, and R2 and R3. Opening contacts R2 and R3, removes 28 volts dc from the time-delay circuit input. Because of the short time in which voltage was applied to the time-delay circuit, A6C1 did not charge to a level sufficient to turn on controlled switch A6Q1. Therefore, A6K1 remained deenergized permitting 28 volts dc to be routed through normally closed contacts 1 and 4 to the modulator screen and low- or high-power plate contactors. PA OVLD indicator lamp A1DS4 and LAMP RESET lamp A1DS5 remain on indicating that an overload did occur, until LAMP RESET switch A1S5 is pushed.

Removing 28 volts dc from the time-delay circuit permits A6C1 to discharge through diode A6CR3, and resistors R3, A6R2, and A6R6. Because of the longer time constant in the discharge path, A6C1 discharges very slowly. If another overload occurs later, the sequence explained in the above paragraph is repeated. However, if the next overload occurs within a short time, the charge still retained by A6C1 is reinforced by an additional charge as shown in waveform A. The resultant charge is sufficient to drive A6Q1 into conduction, energizing A6K1. Energizing A6K1 opens contacts 5 and 8, removing 28 volts dc from the low- or high-power control relay. In addition, the modulator screen and low- or high-power plate relays are kept deenergized by opened contacts 1 and 4. The above action turns the 820E/F-1 off. To reset the recycle/lockout circuit, PLATE OFF RESET switch is pushed opening the 28-volt dc line.

4.7 REMOTE CONTROL, EXTERNAL INTERLOCK, METERING CIRCUITS.

4.7.1 REMOTE CONTROL.

The 820E/F-1 can be installed for remote operation at an unattended site. If installed at an unattended site, remote control panel A8 is used. Panel A8 contains nine relays that are controlled from a distant studio in the conventional manner. The relays perform the following functions: filament on/off, high-power on/plate off-reset, low-power on/plate off-reset, power amplifier loading raise/lower, and remote control failsafe. The relays operate from either 115 volts ac, 28 volts dc, or 48 volts dc.

4.7.2 EXTERNAL INTERLOCK.

Terminal board TB3 provides connections to various closed loops in the control circuits. The closed loops, interlocked by contacts of the control relays, can be used to control the operation of different pieces of equipment that may be used with the 820E/F-1. Functional operation of the closed loops include overload/recycle lockout, low- and high-power external interlock, and plate external interlock.

4.7.3 METERING CIRCUIT.

All metering circuits in the 820E/F-1 are operated at or near ground potentials (figure 4-6). The outputs from the metering circuits are connected to meters located on extended control panel A1 and to test jacks located on front of the transmitter cabinet. Remote monitoring of the power amplifier plate voltage and grid current is available using built-in meter shunts. Equal level sampling of the modulation, at both reduced and full power operation, is obtained from a monitor sampling coil. The coil has two adjustable taps which are switched to a common lead during power changeover.

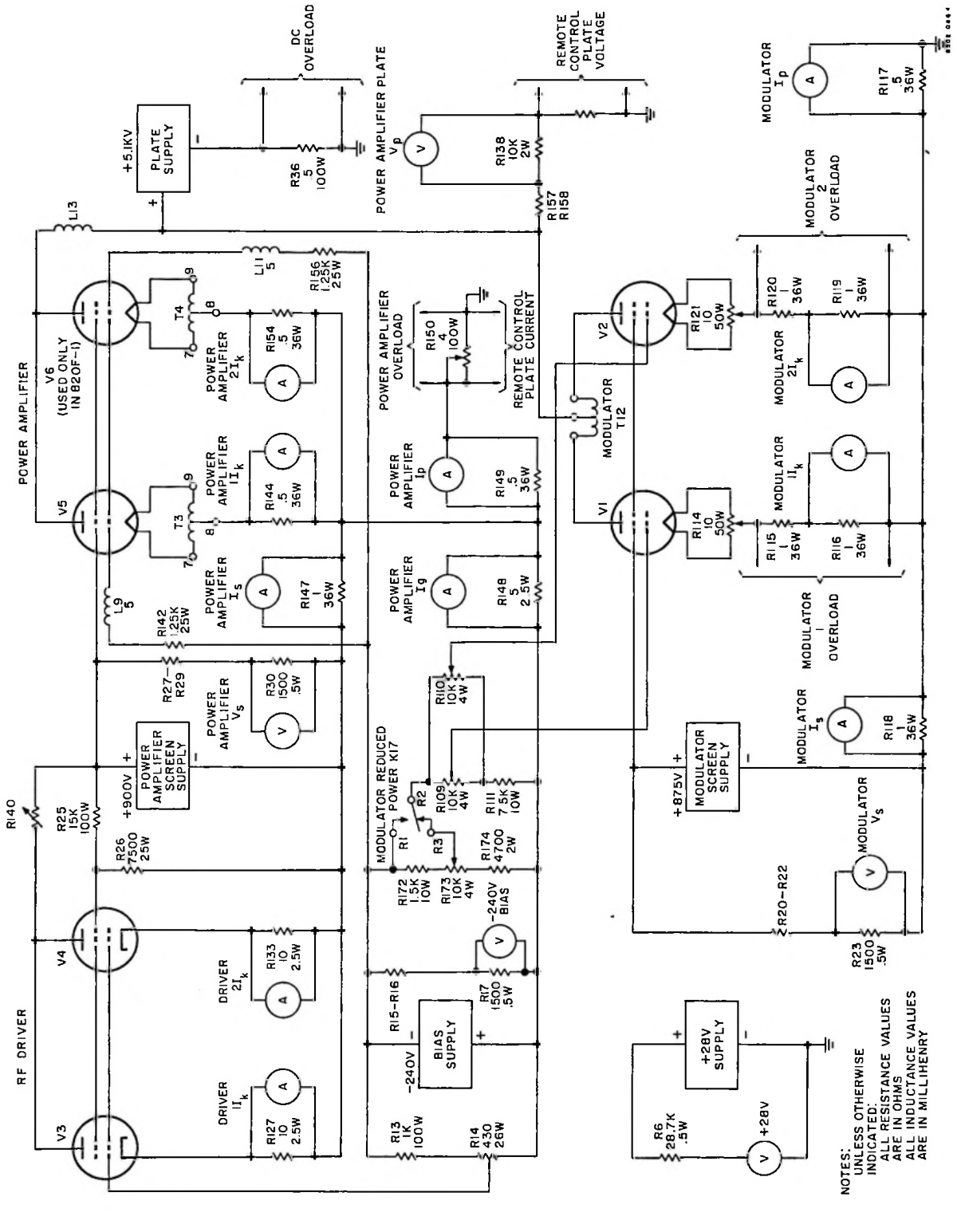


Figure 4-6. Metering Circuits, Simplified Schematic Diagram

section 5

maintenance

5.1 GENERAL.

AM. Broadcast Transmitter 820E/F-1 has been carefully inspected and adjusted at the factory in order to reduce maintenance to a minimum. However, to ensure peak performance, adhere to a regular schedule of periodic checks and maintenance procedures. Refer to the parts list, section 6, for the location of components in the 820E/F-1.

WARNING

Before working inside the 820E/F-1, unless otherwise instructed, turn off the primary power. Using the shorting stick, discharge all large capacitors.

5.2 CLEANING.

Clean the 820E/F-1 whenever a perceptible quantity of dust accumulates at any point inside the equipment. A solvent consisting of the following mixture may be used as a cleaning material.

Methylene chloride, 25 percent

Perchloroethylene, 5 percent

Drycleaning solvent, 70 percent by volume

5.2.1 GENERAL CLEANING PROCEDURES.

To clean the 820E/F-1, proceed as follows:

a. Remove dust from chassis, panels, and components with a soft-bristled brush.

b. Clean flat surfaces and accessible areas with a lintless cloth moistened with solvent, removing any foreign matter adhering to the equipment. Dry with a clean, dry, lintless cloth.

c. Wash switch contacts and the less accessible areas with solvent lightly applied with a small soft-bristled brush.

d. Use a burnishing tool on relay contacts if contacts are corroded or pitted. Apply solvent lightly to relay contacts with a small soft-bristled brush. Dry with a clean, dry, soft-bristled brush.

e. Using a dry, oil-free jet of air, clean the dust accumulated on the modulator and power amplifier tubes.

5.2.2 AIR FILTER.

The 820E/F-1 is furnished with a permanent-type air filter. The filter should be cleaned whenever a perceptible quantity of dust and dirt accumulates on the filter element. To remove and clean the air filter, proceed as follows:

a. Open the left rear door of the 820E/F-1.

b. Remove the cross-wire brace that holds the filter in place.

c. Remove the filter from the filter-mounting bracket.

d. Using a vacuum cleaner, remove the heavy dust accumulated on the filter element. The dust should be removed from the input side.

e. After the heavy dust accumulation is removed, pass a fine stream of water through the filter in a direction opposite that of air flow.

f. Wash the filter in a solution of hot water and detergent.

g. After the filter is dry, replace in its bracket and secure with the cross-wire brace.

h. Close the left rear door.

5.3 INSPECTION.

Perform periodic visual inspection of the 820E/F-1 at least once each month. Inspect all metal parts for rust, corrosion, and general deterioration. Check wiring and components for signs of over-heating. Check the blower and cabinet fan for normal operation. Check all operating controls for smoothness of operation. Check all connections and tighten any nuts, bolts, or screws that are loose.

5.4 LUBRICATION.

5.4.1 FILAMENT VOLTAGE REGULATOR A7.

Using MOLYKOTE® type G grease, lubricate the teeth of the drive gears. Apply the grease liberally to the gear teeth, and then wipe off the excess. Lubricate approximately once a year. The bearings of the drive motor are sealed and do not require lubrication.

5.4.2 TUNING AND LOADING DRIVE MOTORS B3 AND B4.

Using light oil, lubricate the washer stack located on the shafts of tuning motor B3 and loading motor B4. Lubricate approximately once every 6 months, if necessary. Two drops of oil on each shaft should be sufficient. The bearings of motors B3 and B4 are sealed and do not require lubrication.

5.4.3 CABINET FAN AND MAIN BLOWER.

The bearings of the cabinet fan and the main blower are sealed and do not require lubrication.

5.5 TROUBLESHOOTING.

If the 820E/F-1 fails to start or if a failure occurs during normal operation, each circuit should be checked in the order in which it is made operative. The primary control circuit schematic, figure 4-4, should be of assistance in locating troubles in the control circuits. Front panel meter reading, table 3-2, is also useful for isolating failures that may occur. Nominal voltage and current readings in the 820E/F-1 are located in table 5-1. Refer to tables 5-2 through 5-4 for the values of inductors and capacitors located in tuned circuits for each of the various broadcast operating frequencies. Refer to the schematic diagram, located in the envelope inside the back cover of this manual, as needed when troubleshooting the 820E/F-1.

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5.6 ADJUSTMENTS.

5.6.1 FILAMENT VOLTAGE REGULATOR.

a. Remove the lower right front panel of the 820E/F-1.

b. Pull out interlock switch S1.

c. Activate the 28V SUPPLY, BLOWERS, AND FILAMENTS circuit breakers.

d. Press the FILAMENT ON pushbutton located on the extended control panel.

e. Connect a multimeter between terminals 1 and 3 of variable transformer A7T1A.

f. Push the manual control down to disengage the drive motor from the gear assembly and insert a wooden spacer between the gear assembly and the mounting plate to prevent the gears assembly from engaging the drive motor gear.

CAUTION

Be sure the wooden spacer is properly inserted between the gear assembly and the mounting plate before performing the procedure. Damage may occur if the drive motor gear inadvertently engages the gear assembly.

TABLE 5-1. NOMINAL VOLTAGE LEVELS (UNMODULATED)

FUNCTION	TEST POINT	820E-1 MODE OF OPERATION		820F-1 MODE OF OPERATION	
		HIGH POWER	LOW POWER	HIGH POWER	LOW POWER
Modulator 1 grid voltage	V1 grid to ground	-200 vdc	-95 vdc	-190 vdc	-140 vdc
Modulator 2 grid voltage	V2 grid to ground	-200 vdc	-95 vdc	-190 vdc	-140 vdc
Modulator screen voltage	E33 to ground	875 vdc	450 vdc	875 vdc	690 vdc
Driver 1 grid bias voltage	R128-1 to ground	-65 vdc	-65 vdc	-65 vdc	-65 vdc
Driver 2 grid bias voltage	R136-1 to ground	-65 vdc	-65 vdc	-65 vdc	-65 vdc

TABLE 5-1. NOMINAL VOLTAGE LEVELS (UNMODULATED) (Cont)

FUNCTION	TEST POINT	820E-1 MODE OF OPERATION		820F-1 MODE OF OPERATION	
		HIGH POWER	LOW POWER	HIGH POWER	LOW POWER
Driver screen voltage	E25 to ground	180 vdc	180 vdc	200 vdc	200 vdc
Driver plate voltage	R140-1 to ground	575 vdc	575 vdc	550 vdc	550 vdc
Power amplifier 1 grid bias voltage	R142-1 to ground	-325 vdc	-325 vdc	-300 vdc	-300 vdc
Power amplifier 2 grid bias	R156-1 to ground	Not used	Not used	-300 vdc	-300 vdc
Modulator 1 filament voltage	MOD 1 FIL VOLT (J5 to J6)	7.2 vac	7.2 vac	7.2 vac	7.2 vac
Modulator 2 filament voltage	MOD 2 FIL VOLT (J7 to J8)	7.2 vac	7.2 vac	7.2 vac	7.2 vac
Power amplifier 1 filament voltage	PA 1 FIL VOLT (J1 to J2)	7.2 vac	7.2 vac	7.2 vac	7.2 vac
Power amplifier 2 filament voltage	PA 2 FIL VOLT (J3 to J4)	Not used	Not used	7.2 vac	7.2 vac
Modulator 1 cathode voltage	MOD 1 CATH CUR (J14 to J15)	0.3 vdc	0.2 vdc	0.4 vdc	0.4 vdc
Modulator 2 cathode voltage	MOD 2 CATH CUR (J17 to J16)	0.3 vdc	0.2 vdc	0.4 vdc	0.4 vdc
Power amplifier grid voltage	PA GRID CURRENT (J12 to J13)	*Nlt 0.325 vdc	Nlt 0.325 vdc	Nlt 0.325 vdc	Nlt 0.325 vdc
**Power amplifier screen voltage	PA SCREEN VOLTAGE X1000 (J19 to J20)	450-600 vdc		450-600 vdc	
Power amplifier driver cathode voltage	DRIVER CATH CUR (J10 to J11)	2.4 vdc		2.4 vdc	
Q5 emitter voltage	R53 to ground	4 vdc		4 vdc	
Q6 emitter voltage	R54 to ground	4 vdc		4 vdc	

* Not less than

** Actual voltage is 1000 times meter reading.

g. Using the manual control, adjust variable transformer A7T1A for a 225-volt ac indication on the multimeter.

h. Turn filament voltage adjust potentiometer A7R1 counterclockwise until the drive motor operates. Note the setting of A7R1.

i. Turn A7R1 clockwise until the drive motor stops and then starts operating again. Note the setting of A7R1.

j. Set A7R1 between the two settings noted in steps h. and i. above.

k. Connect an oscilloscope between RAISE SENSI potentiometer A7A1R7 and ground.

l. Adjust A7R1 until waveform A, figure 5-1, is obtained. Ensure that each half cycle of the waveform is symmetrical. The symmetrical waveform indicates that A7R1 is set properly for an output of 225 volts ac from variable transformer A7T1A.

m. Adjust the manual control for an indication of 227 volts ac on the multimeter.

n. Adjust LOWER SENSI potentiometer A7A1R8 until waveform B, figure 5-1, is obtained. Note that the drive motor operates.

o. Adjust the manual control for an indication of 223 volts ac on the multimeter. Note that the drive motor stops.

p. Adjust RAISE SENSI potentiometer A7A1R7 until waveform C, figure 5-1, is obtained. Note that the drive motor operates.

q. Adjust the manual control for an indication of 225 volts ac on the multimeter. Note that the drive motor stops and a symmetrical waveform (waveform A) is displayed on the oscilloscope.

r. If a symmetrical waveform is not obtained, readjust A7R1 and repeat steps m. through p. until the symmetrical waveform is obtained.

Note

It may be necessary to repeat steps m. through p. several times before the desired waveform is obtained.

5.6.2 ARC GAPS.

a. Check arc gaps E14, E15, E16, and E17 (820F-1 model only) for spacing of 0.010 inch. Adjust if necessary.

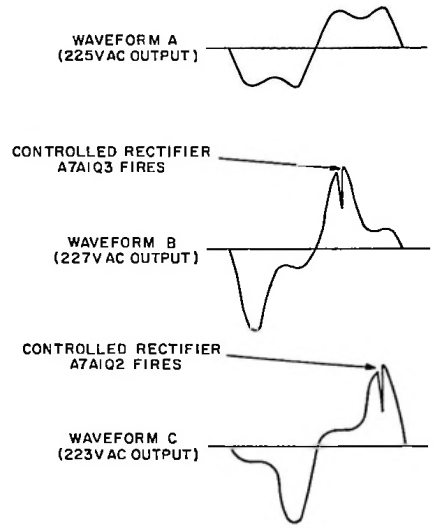


Figure 5-1. Error Amplifier A7A1Q1, Output Waveform

b. Check arc gaps located on inductor L4 and transformer T12 for spacing of 0.1 inch. Adjust if necessary.

5.6.3 DISCRIMINATOR BALANCE.

CAUTION

Balancing the discriminator output is very critical. Do not attempt the discriminator balance procedure unless absolutely necessary.

a. Turn on all circuit breakers on the 820E/F-1.

b. Open the rf driver door.

c. Push in the plunger on the rf driver door interlock switch (S21) and secure with the lever.

d. Close the rf driver door interlock switch (S9).

e. Press the LOW POWER ON pushbutton.

f. Connect a vacuum-tube voltmeter (vtvm) to DISCR BAL jacks J21 and J22.

g. Zero the discriminator output voltage indicated on the vtvm using phase balance potentiometer A9R6. Note that the plate current indicated on the PLATE CURRENT meter is not excessive (table 3-1).

TABLE 5-2. COMPONENT VALUES OF 820E-1 OUTPUT NETWORK

$X_c = 200\Omega$ $X_c = 33\Omega$ $X_c = 42\Omega$ $X_L = 257\Omega$ $X_L = 119\Omega$ $X_L = 86\Omega$

FREQUENCY (kc)	C102A (pf)	C102B (pf)	C103A (pf)	C103B (pf)	C103C (pf)	C103D (pf)	C104 (pf)	C105A (pf)	C105B (pf)	C105C (pf)	C105D (pf)	L14 (uh)	L15 (uh)	L16 (uh)	L17 (uh)
540-570	25 to 1000 (variable)	1000	3000	3000	3000	None	1000	25 to 1000 (variable)	2400	2000	2000	120	50	26	28
580-590				3000	2000		820		2400		2000				
600-640				3000			680		2000		1500				
650-680				2000			680			2000	1500				
690-710			3000				680			1500	1200				
720-790			2400				510		2000	1500					
800-810				2000	2000				1500	1500		120			
820-840		1000		2400	1000					1200		60			
850-880		500	2400	2400	1000					1200					
890-960			2000	2000	1200		510		1500	1200	1200		50		
970-980			2000	2000	1200		390		1000	1000	1000		28		
990-1050			1800	1800	1000									26	28
1060-1110			1500	1500	1500	None								15	15
1120-1220			1200	1200	1200	510			1000	1000	1000				
1230-1250			1200	1200	1200	510	390		750	750	750				
1260-1290		500	1000	1000	820	820	270								
1300-1410		None	1000	1000	820	820									
1420-1530			820	820	820	820									
1540-1600	25 to 1000 (variable)	None	750	750	750	750	270	25 to 1000 (variable)	750	750	750	60	28	15	15

820F-1

TABLE 5-3. COMPONENT VALUES OF 820F-1 OUTPUT NETWORK

$X_C = 142\ \Omega$ $X_C = 33\ \Omega$ $X_C = 42\ \Omega$ $X_L = 199\ \Omega$ $X_L = 119\ \Omega$ $X_L = 86\ \Omega$

FREQUENCY (kc)	C102A (pf)	C102B (pf)	C103A (pf)	C103B (pf)	C103C (pf)	C103D (pf)	C104 (pf)	C105A (pf)	C105B (pf)	C105C (pf)	C105D (pf)	L14 (uh)	L15 (uh)	L16 (uh)	L17 (uh)
540-570	25 to 1000 (variable)	1000	3000	3000	3000	None	1000	25 to 1000 (variable)	2400	2000	2000	120	50	26	28
580-590			3000	3000	2000	None	820		2400		2000	120			
600-620			3000	3000		None	680		2000		1500	120			
630-680			2000	2000		1500	680			2000	1500	60			
690-710			2000	2000		750	680			1500	1200				
720-760			2000	2000	2000	750	510								
770-790			1500	1500	1500	1500			2000						
800-810		1000				1500			1500	1500					
820-860		500				1500			1500	1200					
870-960			1500	1500	1500	820	510		1500	1200	1200		50		
970-1030			1200	1200	1200	1200	390		1000	1000	1000		28		
1040-1050			1200	1200	1200	1000								26	28
1060-1100			1200	1200	1200	1000								15	15
1110-1210			1000	1000	1000	1000									
1220-1230						820			1000	1000	1000				
1240-1250							390		750	750	750	60			
1260-1290		500					270					30			
1300-1330		None	1000	1000	1000	820									
1340-1470		None	820	820	820	750									
1480-1600	25 to 1000 (variable)	None	750	750	750	750	270	25 to 1000 (variable)	750	750	750	30	28	15	15

TABLE 5-4. COMPONENT CONNECTION* OF COMPLEMENTARY FILTER, DRIVER GRID, AND POWER AMPLIFIER GRID CIRCUITS

FREQUENCY (kc)	C70A (1000 pf)	C70B (680 pf)	C70C (470 pf)	C71A (1000 pf)	C71B (680 pf)	C71C (470 pf)	C84A (180 pf)	C84B (240 pf)	C84C (480 pf)	C107A (100 pf)	C107B (100 pf)	C107C (200 pf)	C107D (300 pf)	C107E (390 pf)	L5A (12 uh)	L5B (8. 2 uh)	L5C (5. 6 uh)	L6 ACTIVE TURNS	
																		820E-1	820F-1
540	X			X			X	X	X		X		X	X	X			56	55
550-570	X			X			X	X	X		X	X		X	X			54	53
580-590	X			X			X	X	X		X	X		X	X			54	49
600	X			X			X	X	X			X		X	X			52	47
610-620	X			X				X	X			X		X	X			54	50
630-640	X			X				X	X			X		X	X			54	47
650-670	X			X				X	X		X			X	X			50	45
680-700	X			X			X		X		X			X	X			49	43
710-730	X			X			X		X		X			X	X			44	40
740-770	X			X			X		X					X	X			44	38
780-830		X			X				X				X			X		44	39
840-860		X			X				X				X			X		40	35
870-900		X			X		X	X					X			X		46	35
910-940		X			X		X	X		X	X					X		43	33
950-990		X			X		X	X		X	X					X		41	31
1000-1020		X			X			X		X	X					X		39	32
1030-1080		X			X			X		X						X		37	31
1090-1110		X			X			X		X						X		34	28
1120-1150			X			X		X		X							X	32	32
1160-1200			X			X	X			X							X	30	27
1210-1300			X			X				X							X	37	30
1310-1450			X			X											X	32	28
1460-1600			X			X											X	29	24

* X-Denotes component connected in circuit.

h. Press the HIGH POWER ON pushbutton. Note the discriminator output voltage indicated on the vtvm. If the output is zero, proceed to step j. If not zero, proceed with step i.

Note

In some cases, the discriminator output will not be zero in both the LOW POWER ON and the HIGH POWER ON modes of operation. If not zero, a compromise adjustment of phase balance potentiometer A9R6 must be made which will minimize the deviation from zero.

i. Alternately pressing the LOW POWER ON and HIGH POWER ON pushbuttons, adjust phase balance potentiometer A9R6 until the discriminator output voltage at both power levels have equal amplitude and are opposite in polarity. (A slight adjustment of the PA TUNING control may be necessary for optimum setting.) Note that the HIGH POWER ON mode discriminator output is not more than -0.08 volt dc and the LOW POWER ON mode discriminator output is not more than 0.08 volt dc.

j. Tighten the locknut on phase balance potentiometer A9R6.

k. Set the TUNING switch to AUTOMATIC.

l. Alternately set the PA LOADING switch to LOWER and RAISE. Note that voltages of both polarities are produced by the discriminator.

m. Set the PA LOADING switch first to LOWER and then to RAISE. Note that initiation of tuning occurs at approximately ±0.25 volt dc. (Tuning is evidenced by the discriminator voltage going toward zero as loading is accomplished.)

n. Press the FILAMENT OFF pushbutton.

o. Disconnect the vtvm from DISCR BAL jacks J21 and J22.

p. Close the rf driver door.

5.7 REPLACEMENT OF PARTS.

5.7.1 METERS LOCATED ON EXTENDED CONTROL PANEL A1.

a. Remove the eight screws that secure the extended control panel to the rack.

b. Carefully remove the extended control panel from the rack and set it on an adjacent table or bench.

Note

The length of the cable connected to the back of the panel is sufficient to allow the panel to be extended a short distance from the rack.

c. Tag and remove the two wires from the back of the meter.

d. Remove the screw from each of the two triangular brackets that secure the meter to the panel. Remove the two brackets.

e. Carefully remove the meter from the panel.

f. Place the new meter in position and secure with the two triangular brackets.

g. Connect the two wires to the back of the meter.

h. Place the extended control panel in position on the rack and secure with the eight screws.

5.7.2 REPLACEMENT OF BRUSHES IN FILAMENT VOLTAGE REGULATOR VARIABLE TRANSFORMERS A7T1A AND A7T1B.

Inspect the brushes in variable transformers A7T1A and A7T1B every 6 months. If the brush in either transformer shows excessive wear, replace the brush. Install the new brush as follows:

a. Remove the lower right front panel of the 820E/F-1.

b. Remove the brush cover plate on the regulator.

c. Remove the two binding head screws that hold the brush assembly in the brush holder.

d. Extract the brush assembly from the brush holder.

e. Slide a new brush assembly (Superior Electric RB-LW136) into the brush holder and secure with the two binding head screws.

f. Raise the brush and insert a piece of crocus cloth or very fine sandpaper between the commutator surface and the brush. Ensure that the abrasive side is against the brush.

g. Release the brush and rotate the brush holder through a short arc. Blow out the excess carbon dust.

h. Remove the crocus cloth or sandpaper and rotate the brush holder through several revolutions.

Note that the brush travels smoothly over the entire commutator surface.

i. Replace the brush cover plate.

j. Replace the lower right front panel on the 820E/F-1.

5.7.3 REPLACEMENT OF LAMPS LOCATED ON EXTENDED CONTROL PANEL A1.

Lamps are located inside each of the pushbutton switches on the front of extended control panel A1. To replace a lamp in any of the pushbuttons, the sequence is as follows:

a. Pull on the pushbutton until a click is heard.

b. Rotate the pushbutton counterclockwise 90°.

c. Pull on the pushbutton until it clears the panel.

d. Remove the defective lamp from its holder and replace with a new lamp (type 327).

e. Replace the pushbutton in its holder and rotate clockwise 90°.

f. Press the pushbutton in until it is seated properly.

5.7.4 REPLACEMENT OF CIRCUIT BREAKERS.

a. Open the right front door on the 820E/F-1.

Note

If the 310W-1 and extended control panel A1 are installed instead of the right front door, it will take two people to remove and replace a circuit breaker, one to remove the screws from the front and the second to lift the circuit breaker out the back.

b. Tag and disconnect the wires on the back of the circuit breaker.

c. Remove the four screws that secure the circuit breaker to the panel.

d. Slide the circuit breaker out the back of the panel.

e. Place the new circuit breaker in the proper position on the panel and secure with the four screws.

f. Connect the wires to the back of the circuit breaker. Ensure that the wires are connected to the correct terminals.

g. Close the right front door.

5.8 ORDERING REPLACEMENT PARTS.

Replacement and spare parts may be ordered from the following address:

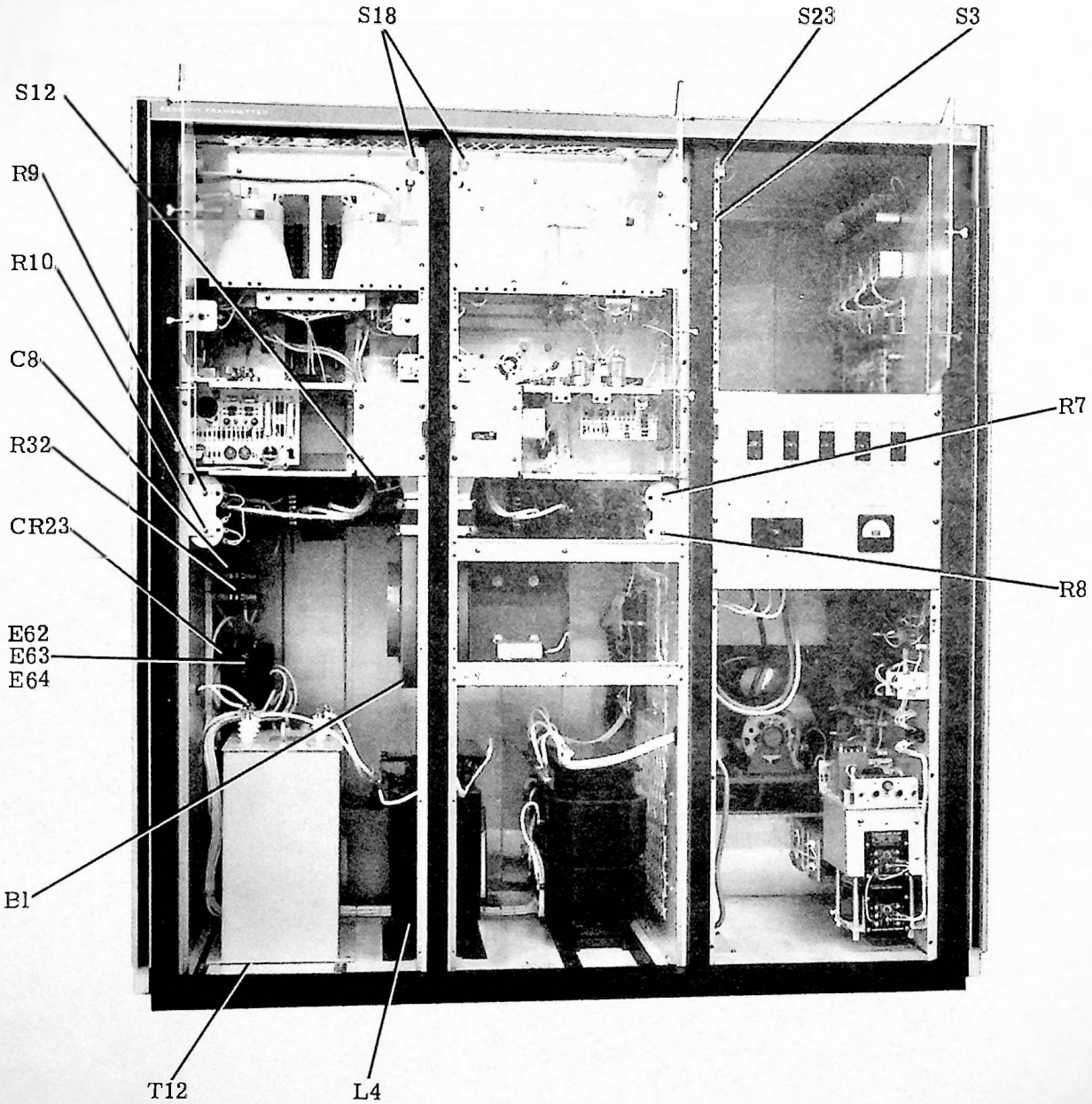
Collins Radio Company
Service Parts Department
Dallas, Texas 75207

Be sure to state the type and serial number of the equipment, the item number, part number, and quantity desired.

section 6

parts list

This section contains a complete list of replaceable electrical parts for the 820E/F-1 Transmitter.



Front View

Figure 6-1. 820E/F-1 Transmitter (Sheet 1 of 19)

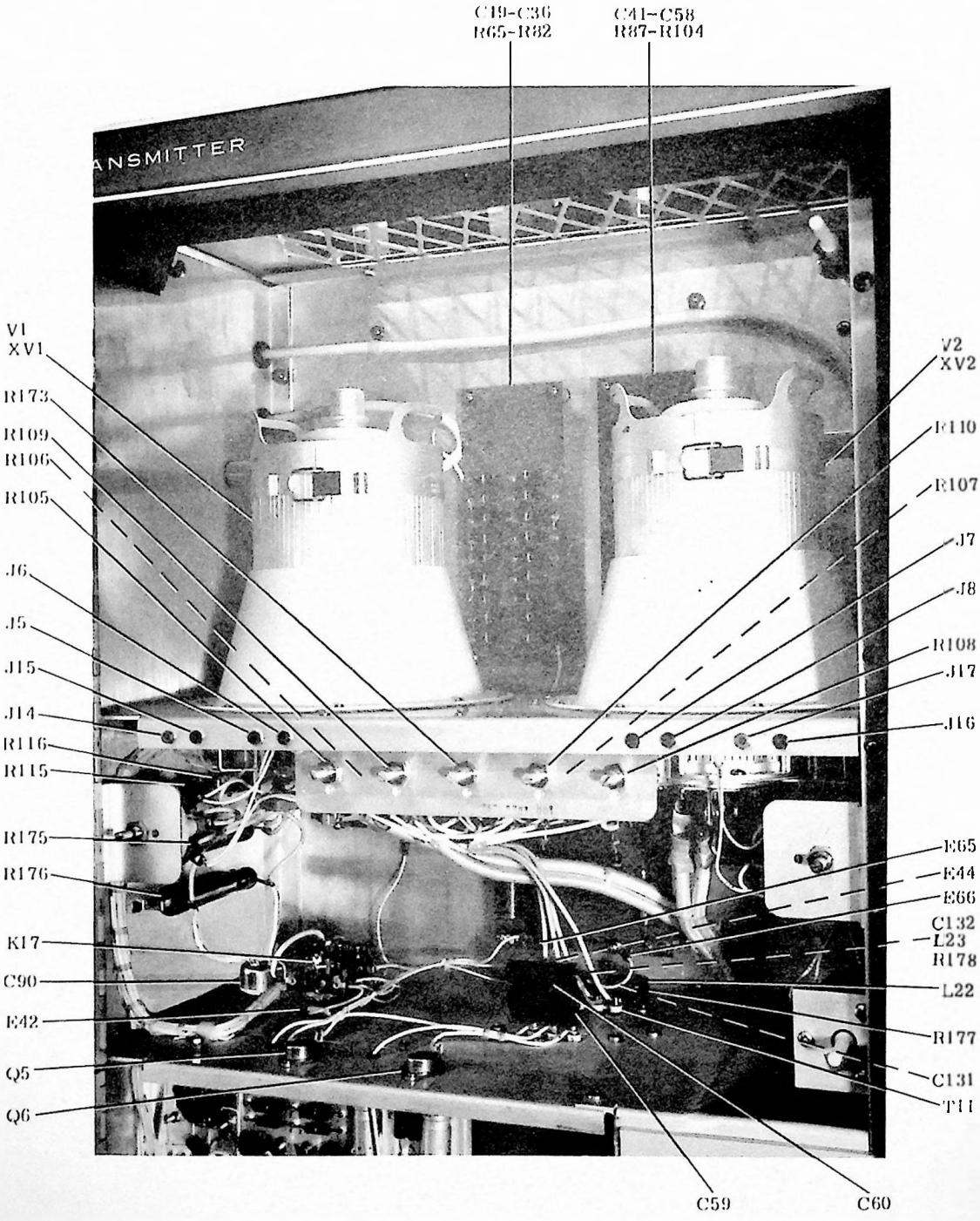
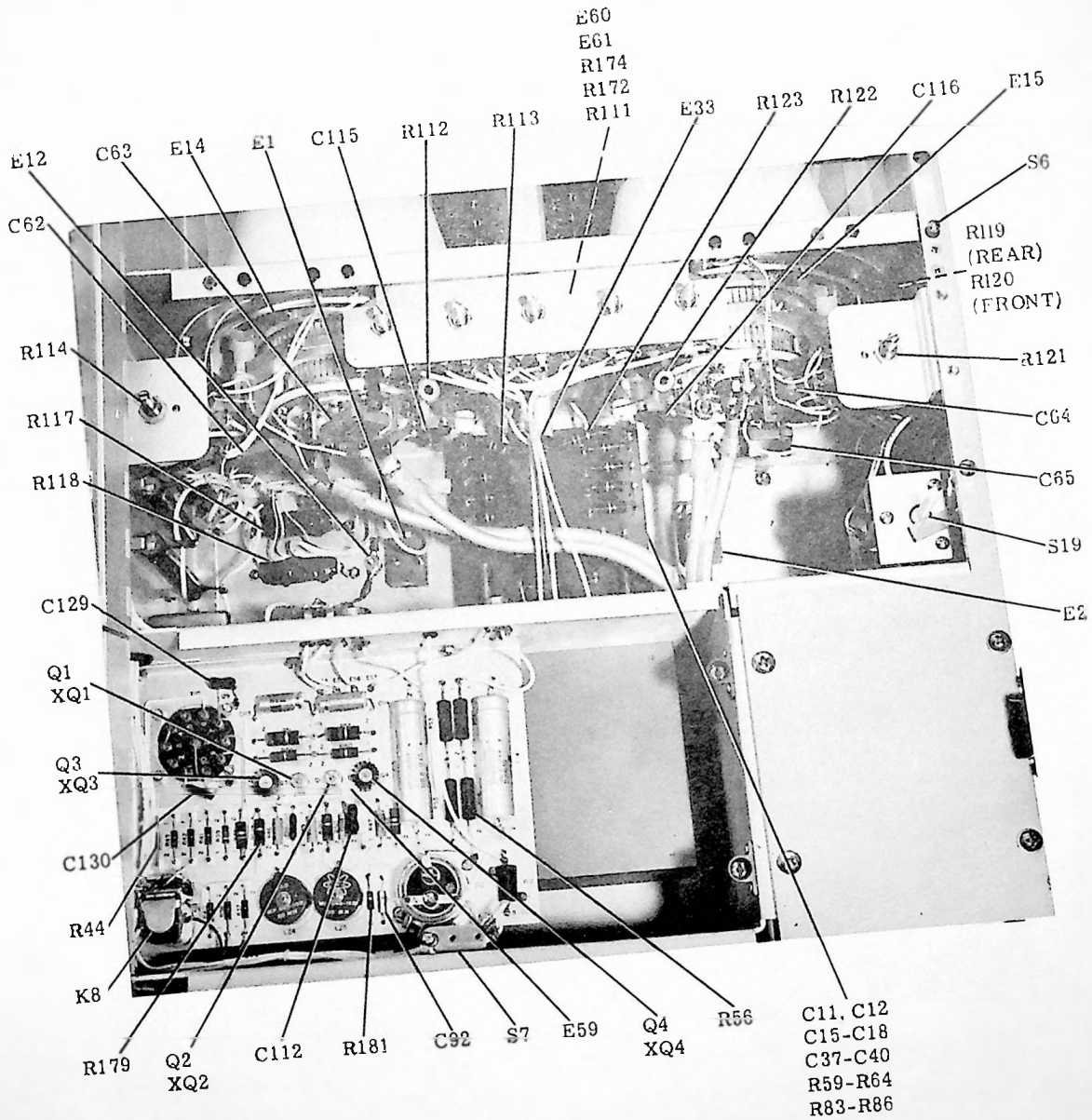
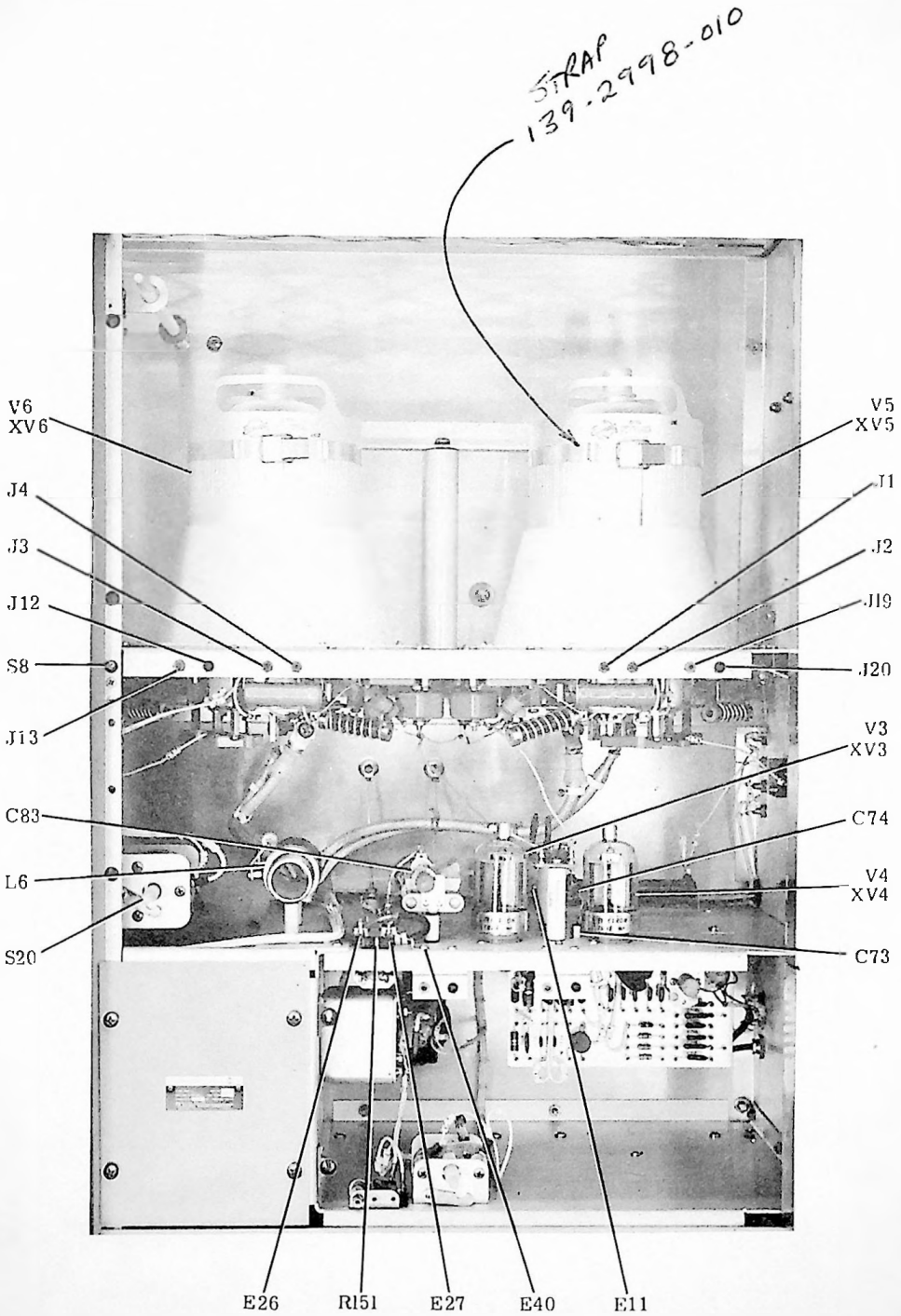


Figure 6-1. 820E/F-1 Transmitter (Sheet 2 of 19)



Components With Symbols Which Cannot Be Seen are Keyed

Figure 6-1. 820E/F-1 Transmitter (Sheet 3 of 19)



820F-1 Version Shown

Figure 6-1. 820E/F-1 Transmitter (Sheet 4 of 19)

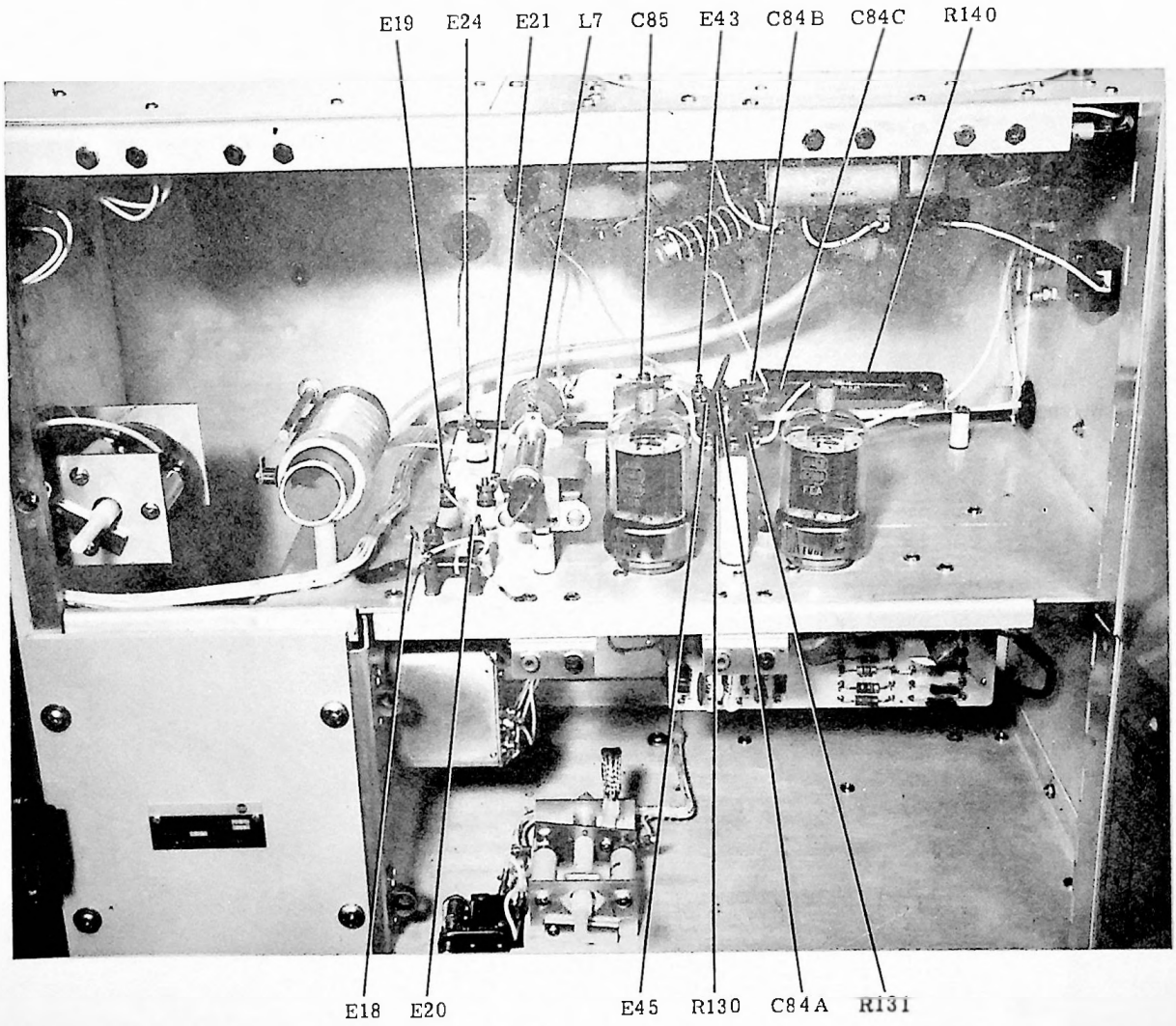
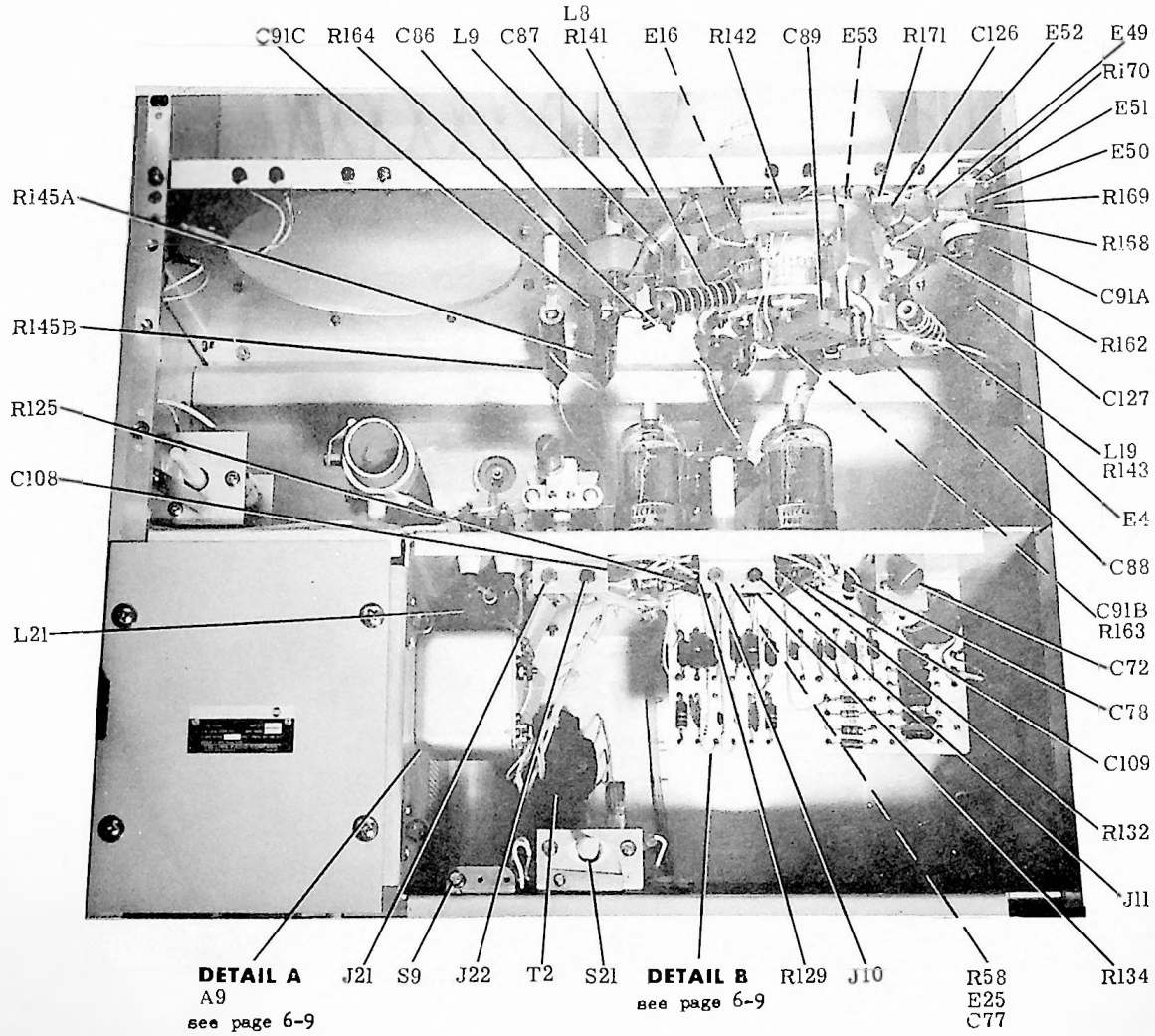
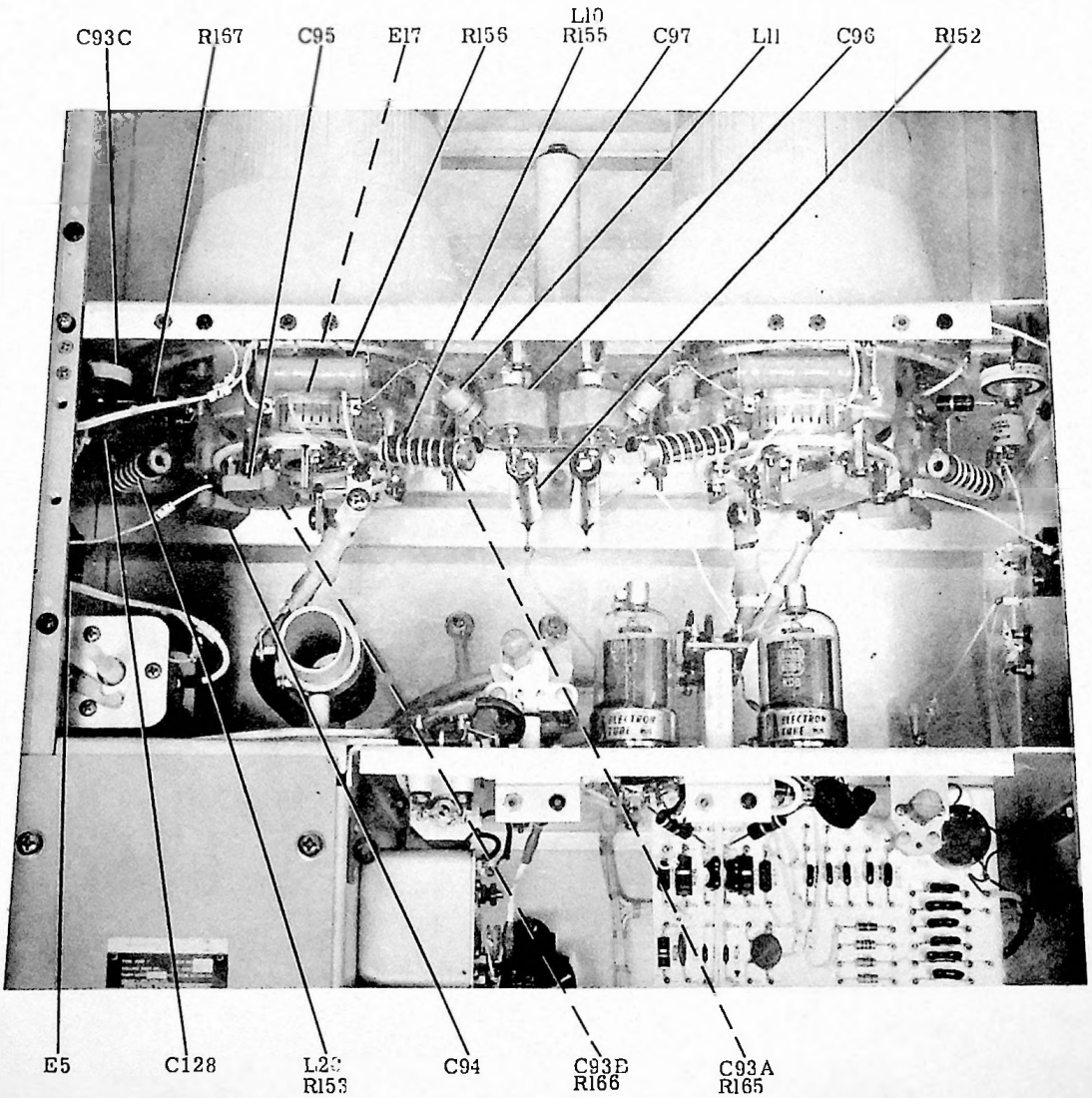


Figure 6-1. 820E/F-1 Transmitter (Sheet 5 of 19)



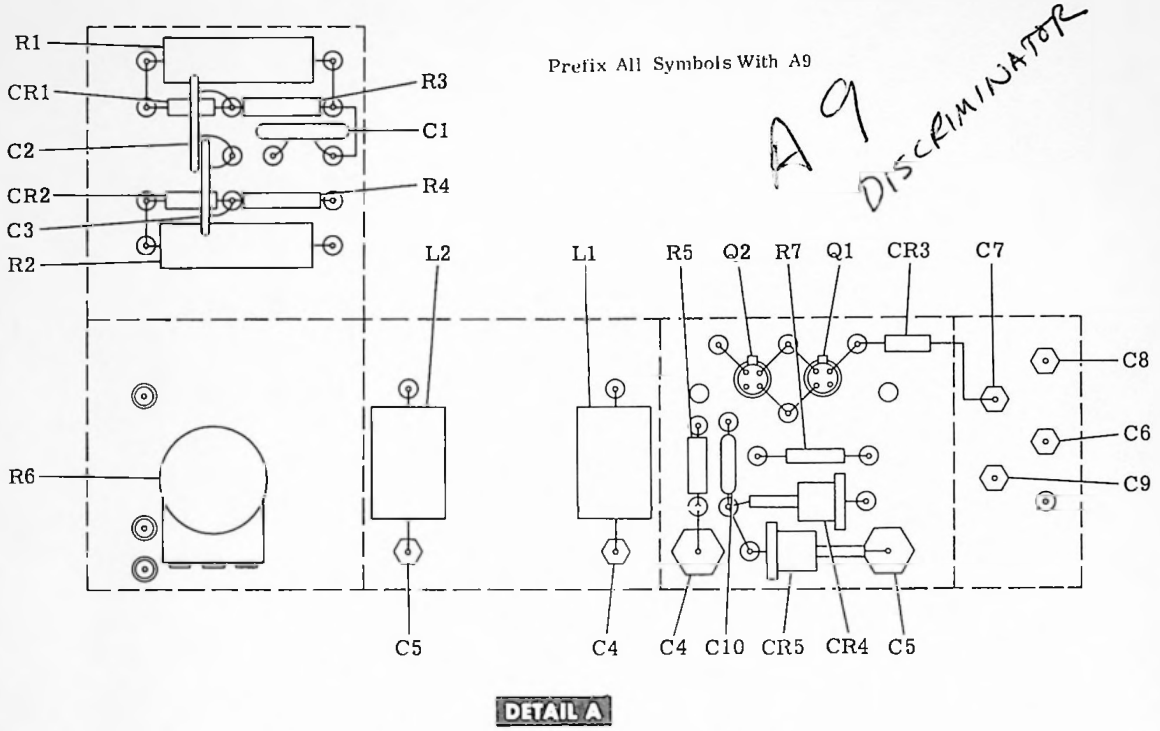
820E-1 Version Shown

Figure 6-1. 820E/F-1 Transmitter (Sheet 6 of 19)



820F-1 Version Shown
Only Parts Added to 820F-1 are Keyed

Figure 6-1. 820E/F-1 Transmitter (Sheet 7 of 19)



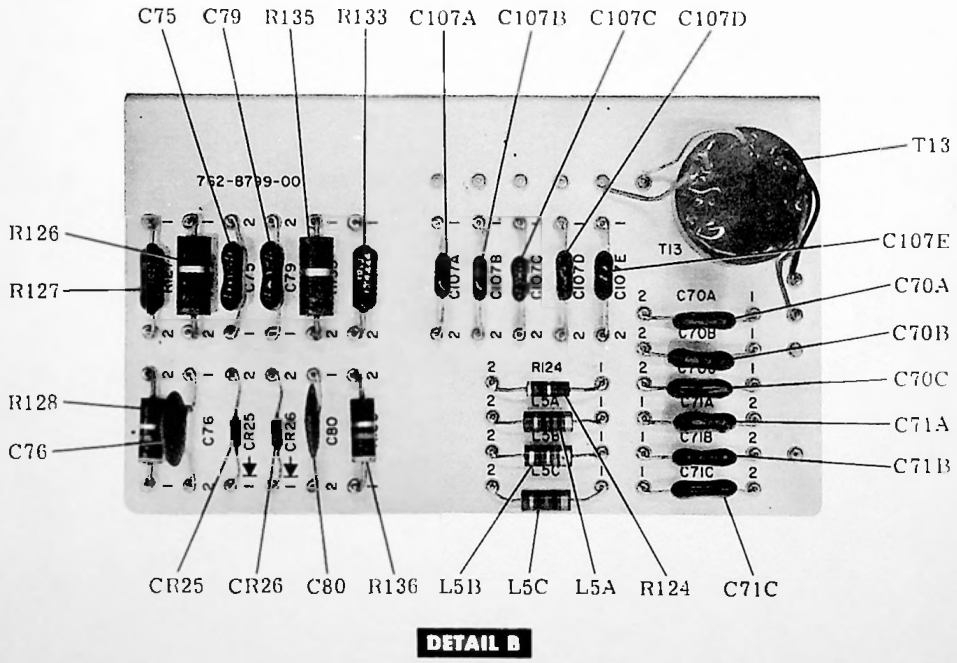


Figure 6-1. 820E/F-1 Transmitter (Sheet 8 of 19)

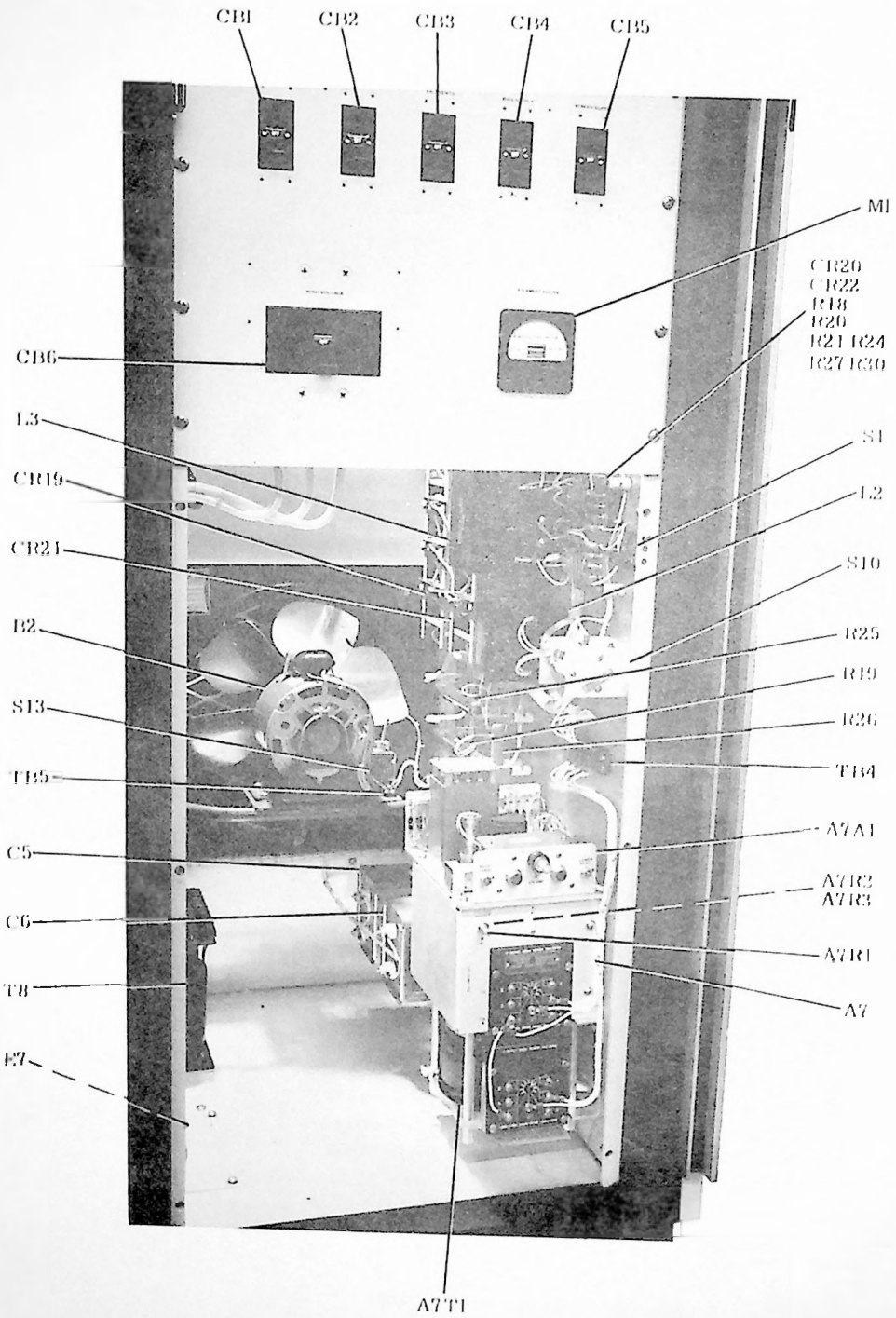
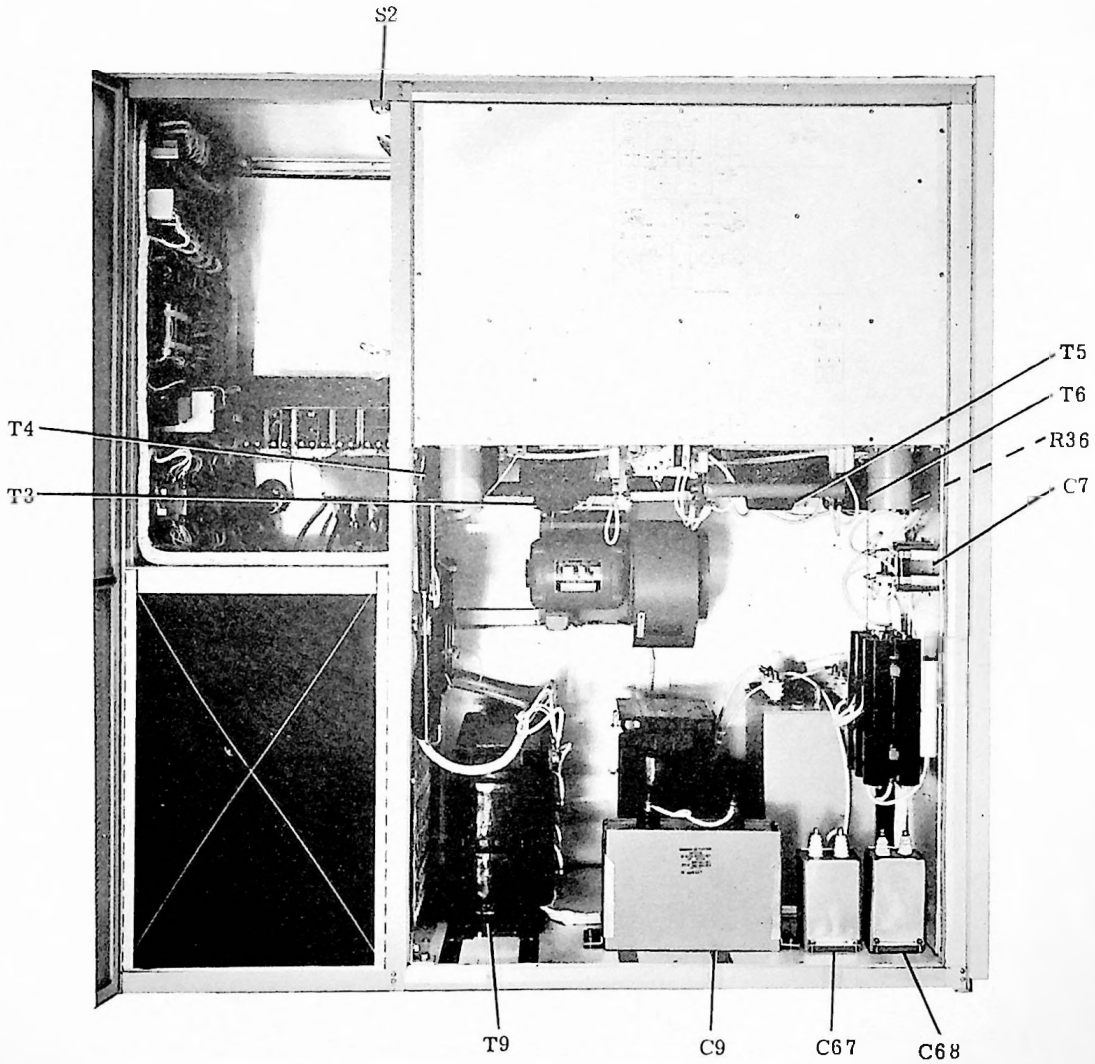


Figure 6-1. 820E/F-1 Transmitter (Sheet 9 of 19)



Rear View
820F-1 Version Shown

Figure 6-1. 820E/F-1 Transmitter (Sheet 10 of 19)

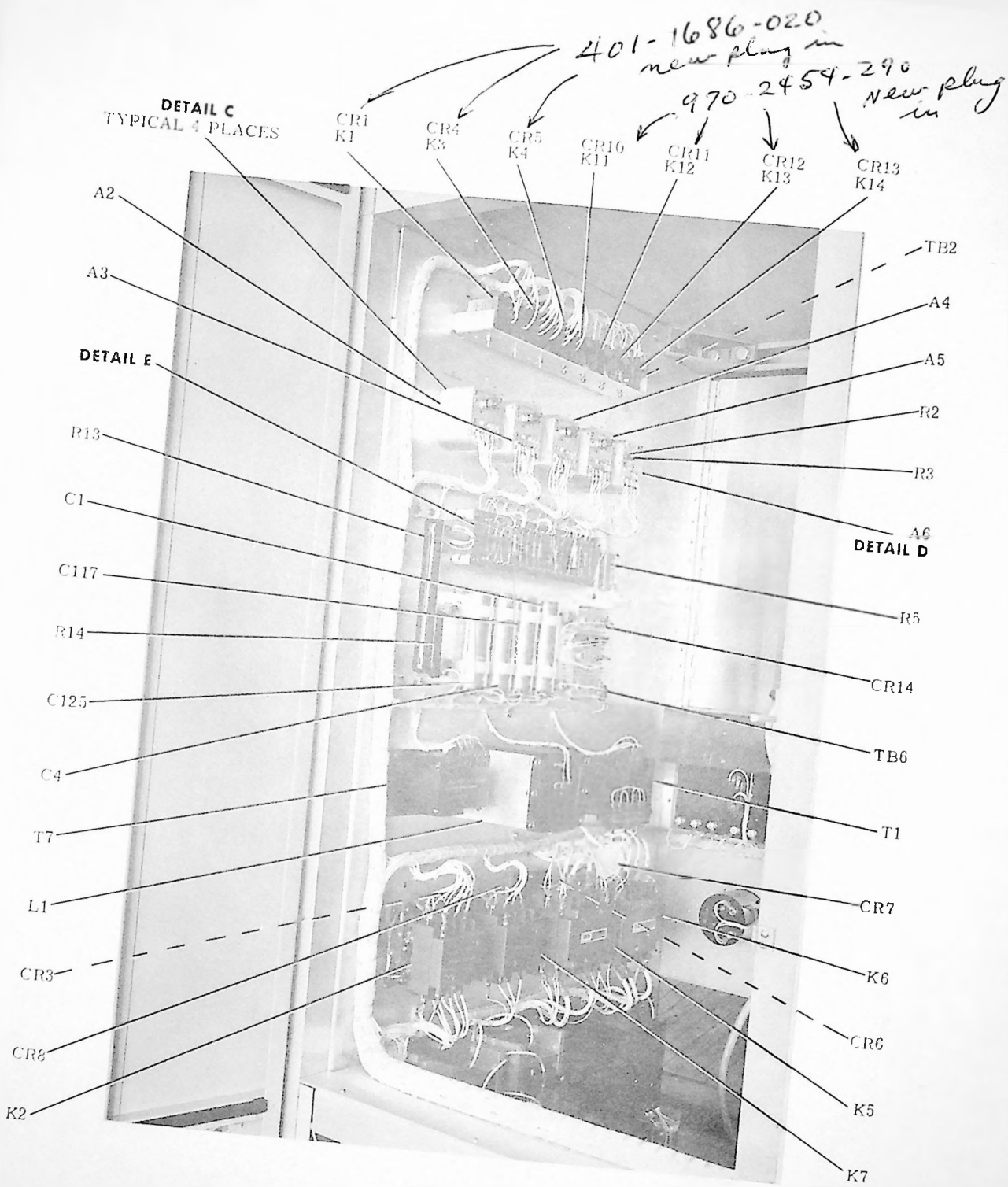
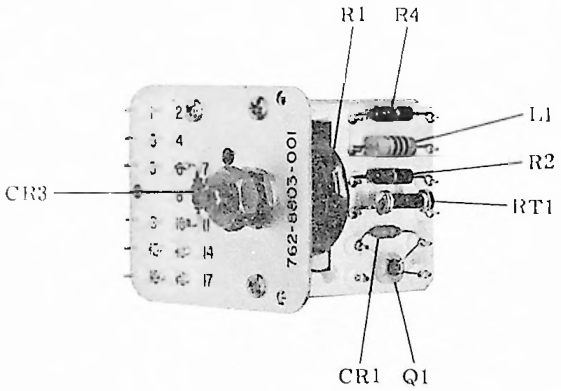


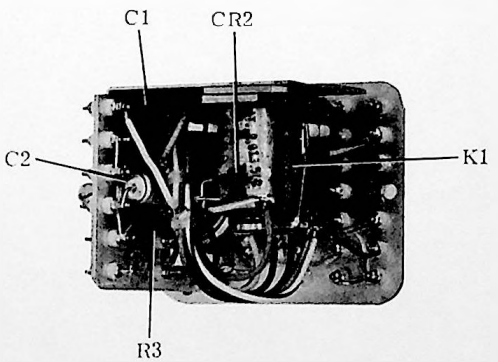
Figure 6-1. 820E/F-1 Transmitter (Sheet 11 of 19)

DETAIL C
FRONT VIEW



A2 THROUGH A5
Prefix All Symbols With A2

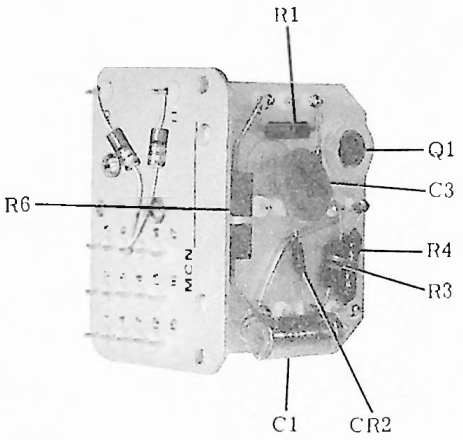
DETAIL C
REAR VIEW



A2 THROUGH A5
Prefix All Symbols With A2

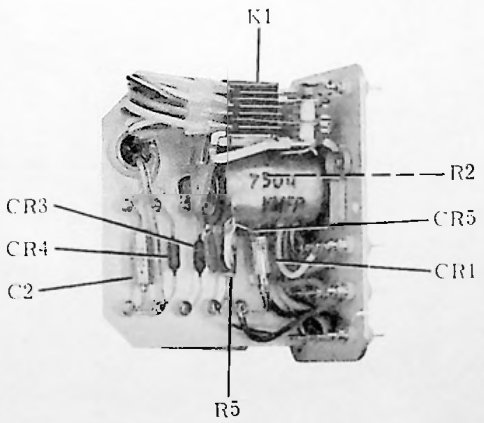
Figure 6-1. 820E/F-1 Transmitter (Sheet 12 of 19)

DETAIL D
FRONT VIEW



A6
Prefix All Symbols With A6

DETAIL D
REAR VIEW



A6
Prefix All Symbols With A6

Figure 6-1. 820E/F-1 Transmitter (Sheet 13 of 19)

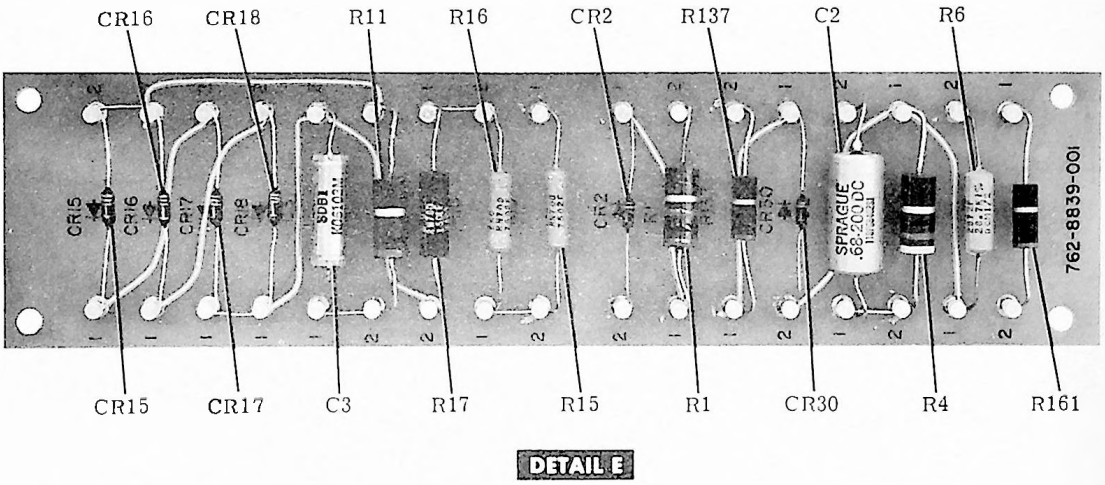


Figure 6-1. 820E/F-1 Transmitter (Sheet 14 of 19)

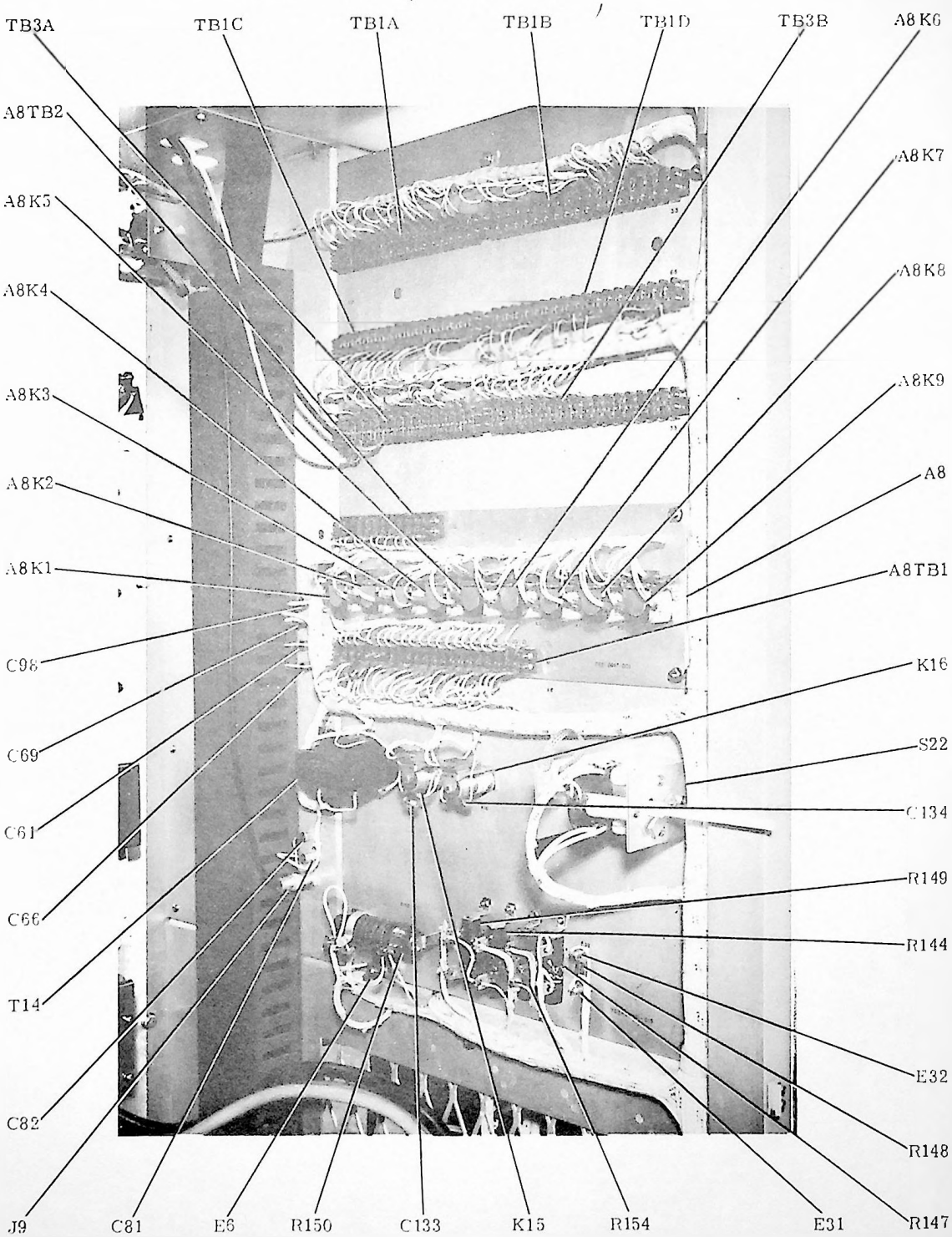


Figure 6-1. 820E/F-1 Transmitter (Sheet 15 of 19)

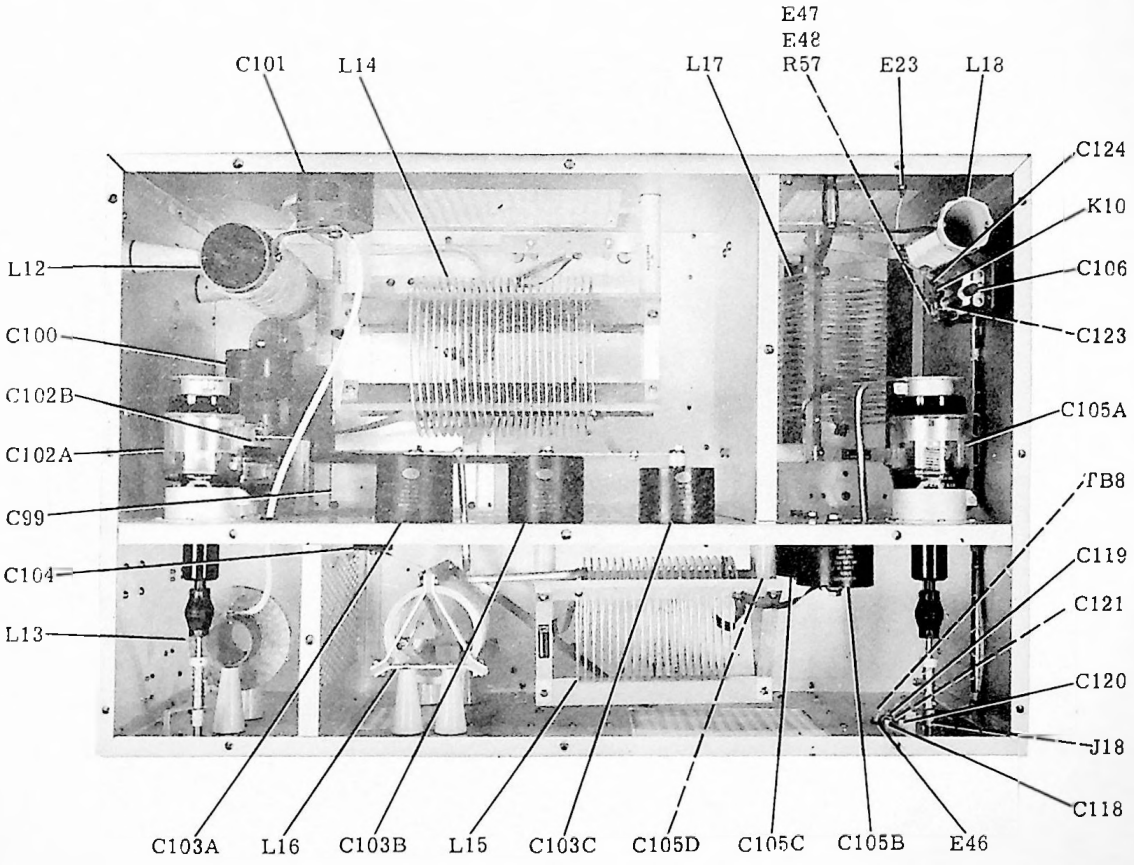
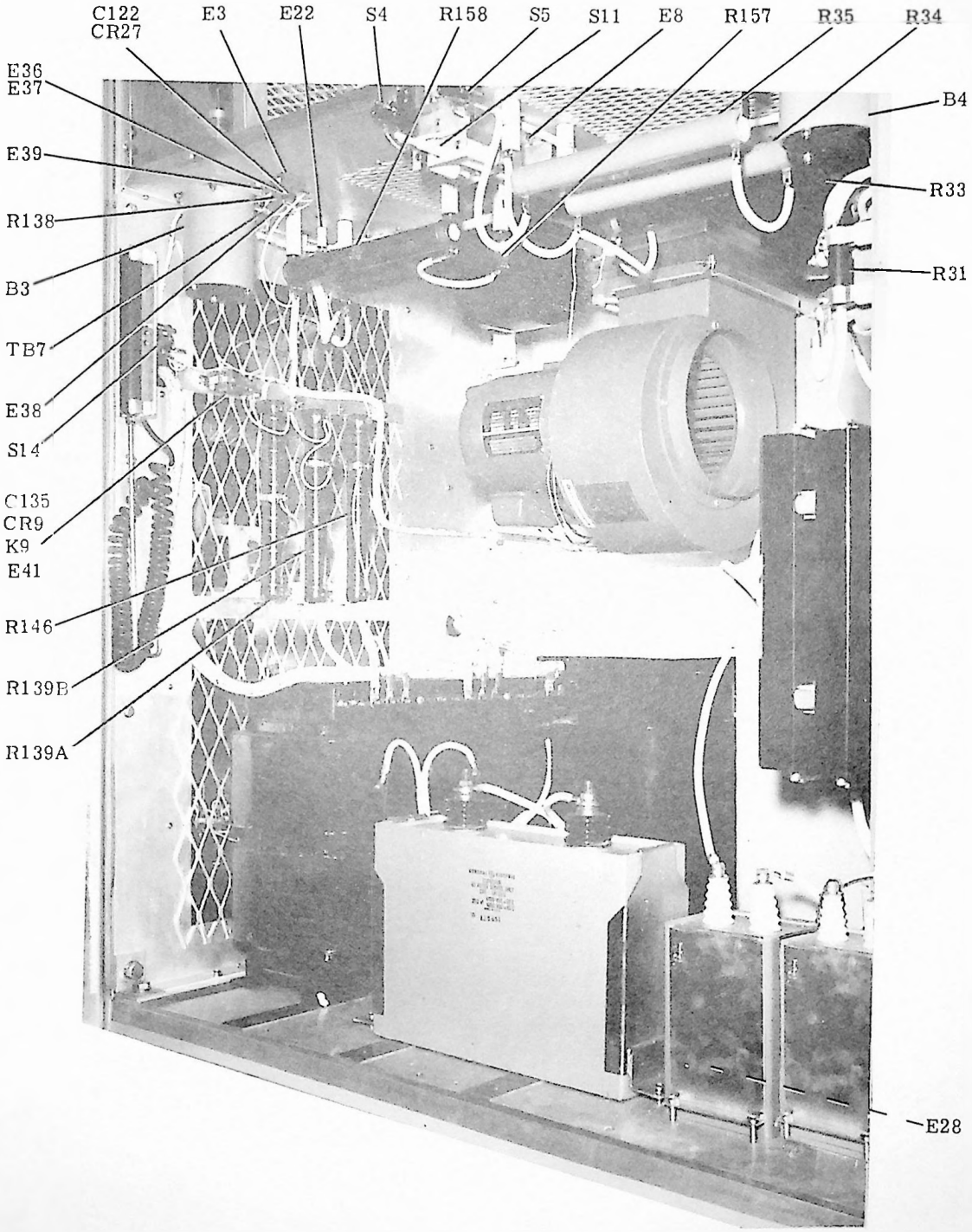
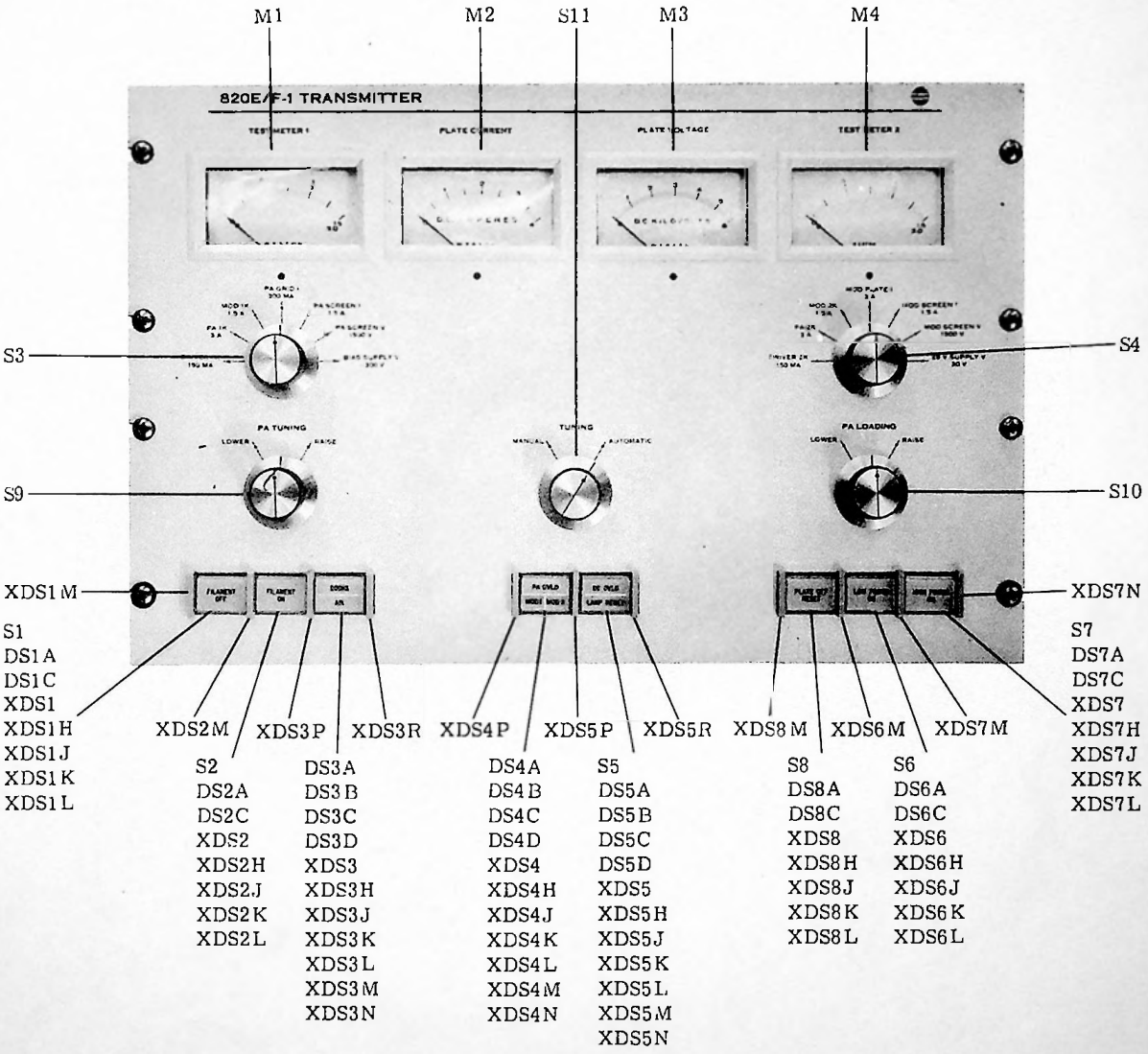


Figure 6-1. 820E/F-1 Transmitter (Sheet 16 of 19)



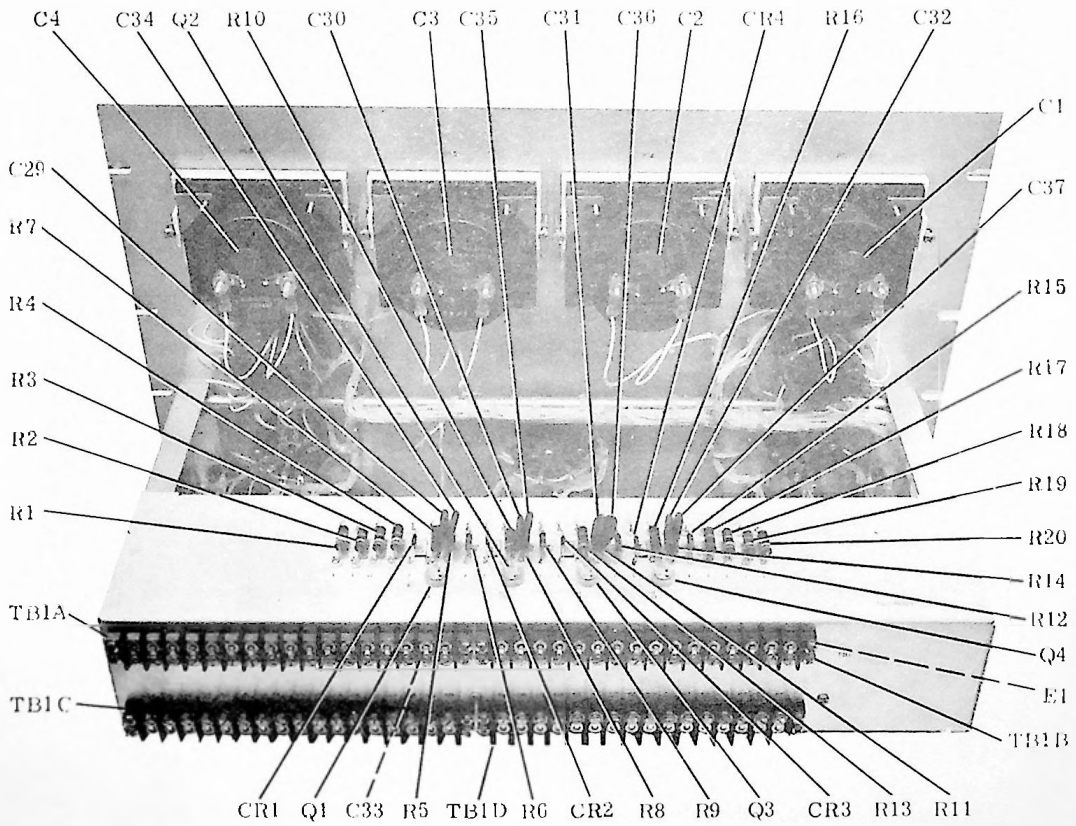
820F-1 Version Shown

Figure 6-1. 820E/F-1 Transmitter (Sheet 17 of 19)



A1
Prefix All Symbols With A1

Figure 6-1. 820E/F-1 Transmitter (Sheet 18 of 19)



Prefix All Symbols with A1

Figure 6-1. 820E/F-1 Transmitter (Sheet 19 of 19)

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
		820E/F-1 Transmitter			522-3291-000 E 522-3292-000 F
B	1	MAIN BLOWER	FAN	1150CFM/FREE AIR D8C	009-1782-010
B	2	CABINET	FAN	1230CFM/FREE AIR	009-1783-010
B	3	TUNING	MOTOR 50CPS	208/230VAC 72RPM	230-0553-150
B	3	TUNING	MOTOR 50CPS	208/230VAC 72RPM	230-0553-150
B	3	TUNING	MOTOR 60CPS	208/230VAC 72RPM	230-0553-140
B	4	LOADING	MOTOR 50CPS	208/230VAC 72RPM	230-0553-150
B	4	LOADING	MOTOR 50CPS	208/230VAC 72RPM	230-0553-150
B	4	LOADING	MOTOR 60CPS	208/230VAC 72RPM	230-0553-140
C	1	TIME DELAY	CAPACITOR	1400MF 50V	184-2516-000
C	2	28V SUPPLY SUPPRESSOR	CAPACITOR	0.68MF 200V	951-0087-000
C	3	BIAS SUPPLY SUPPRESSOR	CAPACITOR	0.01MF 600V	931-4572-000
C	4	BIAS SUPPLY FILTER	CAPACITOR	250MF 300V	184-2536-000
C	5	MOD SCRN SUPPLY FILTER	CAPACITOR	25MF 1.5KV	930-0770-020
C	6	PA SCRN SUPPLY FILTER	CAPACITOR	25MF 1.5KV	930-0770-020
C	7	HIGH VOLT SUPPRESSOR	CAPACITOR	0.03MF 7.5KV	930-0776-010
C	8	HIGH VOLT SUPPRESSOR	CAPACITOR	0.03MF 7.5KV	930-0776-010
C	9	HIGH VOLTAGE FILTER	CAPACITOR	20MF 6KV	930-0766-010
C	10	AUDIO DVR FILTER	CAPACITOR	1400MF 50V	184-2516-000
C	11	FEEDBACK COUPLING	CAPACITOR	0.02MF 1KV	931-0022-000
C	12	FEEDBACK COUPLING	CAPACITOR	0.02MF 1KV	931-0022-000
C	13	Q5 BYPASS	CAPACITOR	1000MF 10V	184-5010-000
C	14	Q6 BYPASS	CAPACITOR	1000MF 10V	184-5010-000
C	15	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	16	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	17	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	18	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	19	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	20	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	21	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	22	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	23	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	24	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	25	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	26	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	27	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	28	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	29	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	30	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	31	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	32	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	33	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	34	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	35	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	36	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	37	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	38	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	39	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	40	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	41	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	42	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	43	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	44	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	45	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	46	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	47	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	48	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	49	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	50	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	51	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	52	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	53	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	54	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	55	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	56	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	57	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	58	FEEDBACK NETWORK	CAPACITOR	27PF 500V	912-2774-000
C	59	V1 GRID BYPASS	CAPACITOR	0.1MF 600V	931-5511-000
C	60	V2 GRID BYPASS	CAPACITOR	0.1MF 600V	931-5511-000
C	61	PA GRID CURRENT BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1292-000
C	62	V1 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
C	63	V1 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	64	V2 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	65	V2 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	66	PA GRIC CURRENT BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1292-000
C	67	MOD COUPLING	CAPACITOR	2MF 6KV	930-0327-000
C	68	10KW MOD COUPLING	CAPACITOR	2MF 6KV	930-0327-000
C	69	RF DVR PLATE BYPASS	CAPACITOR	2200PF 2KV FEEDTHRU	913-4845-000
C	70A	RF DVR COMP FILTER	CAPACITOR	1000PF 500V	912-3001-000
C	70B	RF DVR COMP FILTER	CAPACITOR	680PF 500V	912-2989-000
C	70C	RF DVR COMP FILTER	CAPACITOR	470PF 500V	912-2974-000
C	71A	RF DVR COMP FILTER	CAPACITOR	1000PF 500V	912-3001-000
C	71B	RF DVR COMP FILTER	CAPACITOR	680PF 500V	912-2989-000
C	71C	RF DVR COMP FILTER	CAPACITOR	470PF 500V	912-2974-000
C	72	DVR GRID TUNING	CAPACITOR	140PF VARIABLE	922-3910-010
C	73	RF DVR NEUTING BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1294-000
C	74	RF DVR NEUTING	CAPACITOR	10PF 2KV	913-4965-000
C	75	V3 GRID COUPLING	CAPACITOR	2200PF 500V	912-3025-000
C	76	V3 GRID BYPASS	CAPACITOR	0.01MF 500V	913-3013-000
C	77	V3 SCREEN BYPASS	CAPACITOR	3300PF 500V	912-3040-000
C	78	V4 SCREEN BYPASS	CAPACITOR	3300PF 500V	912-3040-000
C	79	V4 GRID COUPLING	CAPACITOR	2200PF 500V	912-3025-000
C	80	V4 GRID BYPASS	CAPACITOR	0.01MF 500V	913-3013-000
C	81	RF DVR BIAS BYPASS	CAPACITOR	5600PF 500V FEEDTHRU	913-1295-000
C	82	RF DVR SCRN BYPASS	CAPACITOR	5600PF 500V FEEDTHRU	913-1295-000
C	83	PA GRID TUNING	CAPACITOR	325PF VARIABLE 500V	922-1400-000
C	84A	PA GRID TUNE PADDING	CAPACITOR	180PF 1.5KV	913-3751-000
C	84B	PA GRIC TUNE PADDING	CAPACITOR	240PF 1.5KV	913-3752-000
C	84C	PA GRID TUNE PACDING	CAPACITOR	480PF 1.5KV	913-3744-000
C	85	RF DVR PLATE BYPASS	CAPACITOR	0.01MF 2.5KV	937-2024-000
C	86	V5 GRIC COUPLING	CAPACITOR	0.01MF 2.5KV	937-2024-000
C	87	V5 GRID BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	88	V5 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	89	V5 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	90	MOD SCRN FILTER	CAPACITOR	4MF 1KV	930-0055-000
C	91A	V5 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	91B	V5 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	91C	V5 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	92	BYPASS	CAPACITOR	2.2MF 35V	184-7704-000
C	93A	V6 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	93B	V6 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	93C	V6 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	94	V6 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	95	V6 FIL BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	96	V6 GRID COUPLING	CAPACITOR	0.01MF 2.5KV	937-2024-000
C	97	V6 GRID BYPASS	CAPACITOR	0.01MF 600V	936-0316-000
C	98	PA BIAS BYPASS	CAPACITOR	5600PF 500V FEEDTHRU	913-1295-000
C	99	PA NEUTING + AUTO TUNE	CAPACITOR	FIXED,DUAL SECTION	762-8816-001
C	100	5KW PA PLATE BLOCKING	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	100	10KW PA PLATE BLOCKING	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	101	5KW PA PLATE BYPASS	CAPACITOR	510PF 20KV MICA	912-4127-010
C	101	10KW PA PLATE BYPASS	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	102A	PA PLATE TUNING	CAPACITOR	25-1000PF 10KV UCSX	919-0127-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 540-840 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	5KW 850-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 540-810 PL TUN	CAPACITOR	1000PF 10KV MC1	919-0150-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	102B	10KW 820-1290 PL TUN	CAPACITOR	500PF 10KV MC1	919-0148-000
C	103A	5KW 540-710 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103A	5KW 540-710 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103A	5KW 540-710 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103A	5KW 540-710 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103A	5KW 540-710 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103A	5KW 720-880 OUT NET	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	103A	5KW 720-880 OUT NET	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	103A	5KW 720-880 OUT NET	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	103A	5KW 720-880 OUT NET	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	103A	5KW 890-980 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103A	5KW 890-980 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103A	5KW 990-1050 OUT NET	CAPACITOR	1800PF 15KV MICA	912-4127-070
C	103A	5KW 1060-1110 OUT NET	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	103A	5KW 1120-1250 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103A	5KW 1120-1250 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103A	5KW 1260-1410 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103A	5KW 1260-1410 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103A	5KW 1420-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103A	5KW 1540-1600 OUT NET	CAPACITOR	750PF 20KV MICA	912-4127-020
C	103A	10KW 540-620 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090
C	103A	10KW 540-620 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090
C	103A	10KW 540-620 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090
C	103A	10KW 630-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103A	10KW 630-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103A	10KW 630-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103A	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103A	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103A	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103A	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103A	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103A	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103A	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103A	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103A	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103A	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103A	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103A	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103A	10KW 1340-1470 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103A	10KW 1480-1600 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	103B	5KW 540-640 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103B	5KW 540-640 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103B	5KW 540-640 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103B	5KW 650-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103B	5KW 650-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103B	5KW 650-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103B	5KW 650-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103B	5KW 820-880 OUT NET	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	103B	5KW 820-880 OUT NET	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	103B	5KW 890-980 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103B	5KW 890-980 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103B	5KW 990-1050 OUT NET	CAPACITOR	1800PF 15KV MICA	912-4127-070
C	103B	5KW 1060-1110 OUT NET	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	103B	5KW 1120-1250 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103B	5KW 1120-1250 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103B	5KW 1260-1410 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103B	5KW 1260-1410 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103B	5KW 1420-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103B	5KW 1540-1600 OUT NET	CAPACITOR	750PF 20KV MICA	912-4127-020
C	103B	10KW 540-620 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
C	103B	10KW 540-620 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090
C	103B	10KW 540-620 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090
C	103B	10KW 630-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103B	10KW 630-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103B	10KW 630-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103B	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103B	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103B	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103B	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103B	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103B	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103B	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103B	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103B	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103B	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103B	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103B	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103B	10KW 1340-1470 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103B	10KW 1480-1600 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	103C	5KW 540-570 OUT NET	CAPACITOR	3000PF 12KV MICA	912-4127-100
C	103C	5KW 580-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103C	5KW 580-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103C	5KW 580-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103C	5KW 580-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103C	5KW 580-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103C	5KW 580-810 OUT NET	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	103C	5KW 820-880 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103C	5KW 820-880 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103C	5KW 890-980 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103C	5KW 890-980 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103C	5KW 990-1050 OUT NET	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	103C	5KW 1060-1110 OUT NET	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	103C	5KW 1120-1250 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103C	5KW 1120-1250 OUT NET	CAPACITOR	1200PF 15KV MICA	912-4127-050
C	103C	5KW 1260-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103C	5KW 1260-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103C	5KW 1260-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103C	5KW 1540-1600 OUT NET	CAPACITOR	750PF 20KV MICA	912-4127-020
C	103C	10KW 540-570 OUT NET	CAPACITOR	3000PF 20KV MICA	912-4128-090
C	103C	10KW 580-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103C	10KW 580-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103C	10KW 580-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103C	10KW 580-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103C	10KW 580-760 OUT NET	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	103C	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103C	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103C	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103C	10KW 770-960 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103C	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103C	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103C	10KW 970-1100 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	103C	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103C	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103C	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103C	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103C	10KW 1110-1330 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103C	10KW 1340-1470 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103C	10KW 1480-1600 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	103D	5KW 1120-1250 OUT NET	CAPACITOR	510PF 20KV MICA	912-4127-010
C	103D	5KW 1120-1250 OUT NET	CAPACITOR	510PF 20KV MICA	912-4127-010
C	103D	5KW 1260-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103D	5KW 1260-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103D	5KW 1260-1530 OUT NET	CAPACITOR	820PF 20KV MICA	912-4127-030
C	103D	5KW 1540-1600 OUT NET	CAPACITOR	750PF 20KV MICA	912-4127-020
C	103D	10KW 630-680 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103D	10KW 690-760 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	103D	10KW 690-760 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	103D	10KW 770-860 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103D	10KW 770-860 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103D	10KW 770-860 OUT NET	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	103D	10KW 870-960 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103D	10KW 970-1030 OUT NET	CAPACITOR	1200PF 25KV MICA	912-4128-050

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
C	103D	10KW 1040-1210 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103D	10KW 1040-1210 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103D	10KW 1040-1210 OUT NET	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	103D	10KW 1220-1330 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103D	10KW 1220-1330 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103D	10KW 1220-1330 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103D	10KW 1220-1330 OUT NET	CAPACITOR	820PF 30KV MICA	912-4128-030
C	103D	10KW 1340-1600 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	103D	10KW 1340-1600 OUT NET	CAPACITOR	750PF 30KV MICA	912-4128-020
C	104	5KW 540-570 TRAP	CAPACITOR	1000PF 5KV MICA	912-4125-060
C	104	5KW 580-590 TRAP	CAPACITOR	820PF 5KV MICA	912-4125-050
C	104	5KW 600-710 TRAP	CAPACITOR	680PF 5KV MICA	912-4125-040
C	104	5KW 600-710 TRAP	CAPACITOR	680PF 5KV MICA	912-4125-040
C	104	5KW 600-710 TRAP	CAPACITOR	680PF 5KV MICA	912-4125-040
C	104	5KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	5KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	5KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	5KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	5KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	5KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	5KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	5KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	5KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	5KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	5KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	5KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	5KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	5KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	10KW 540-570 TRAP	CAPACITOR	1000PF 5KV MICA	912-4125-060
C	104	10KW 580-590 TRAP	CAPACITOR	820PF 5KV MICA	912-4125-050
C	104	10KW 600-710 TRAP	CAPACITOR	680PF 5KV MICA	912-4125-040
C	104	10KW 600-710 TRAP	CAPACITOR	680PF 5KV MICA	912-4125-040
C	104	10KW 600-710 TRAP	CAPACITOR	680PF 5KV MICA	912-4125-040
C	104	10KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	10KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	10KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	10KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	10KW 720-960 TRAP	CAPACITOR	510PF 5KV MICA	912-4125-030
C	104	10KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	10KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	10KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	10KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	10KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	10KW 970-1250 TRAP	CAPACITOR	390PF 5KV MICA	912-4125-010
C	104	10KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	10KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	10KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	104	10KW 1260-1600 TRAP	CAPACITOR	270PF 5KV MICA	912-4125-130
C	105A	PA PLATE LOADING	CAPACITOR	25-1000PF 15KV UCSX	919-0127-~~000~~-010
C	105B	5KW 540-590 PL LOAD	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	105B	5KW 540-590 PL LOAD	CAPACITOR	2400PF 12KV MICA	912-4127-090
C	105B	5KW 600-790 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	105B	5KW 600-790 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	105B	5KW 600-790 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	105B	5KW 600-790 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C	105B	5KW 800-960 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	105B	5KW 800-960 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	105B	5KW 800-960 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	105B	5KW 800-960 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C	105B	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	105B	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	105B	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	105B	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C	105B	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105B	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105B	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105B	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105B	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105B	10KW 540-590 PL LOAD	CAPACITOR	2400PF 20KV MICA	912-4128-080
C	105B	10KW 540-590 PL LOAD	CAPACITOR	2400PF 20KV MICA	912-4128-080
C	105B	10KW 600-790 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	105B	10KW 600-790 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
C 105B	10KW 600-790 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105B	10KW 600-790 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105B	10KW 600-790 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105B	10KW 800-960 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105B	10KW 800-960 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105B	10KW 800-960 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105B	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105B	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105B	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105B	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105B	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105B	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105B	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105B	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105B	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105B	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105C	5KW 540-680 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C 105C	5KW 540-680 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C 105C	5KW 540-680 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C 105C	5KW 540-680 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C 105C	5KW 690-810 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C 105C	5KW 690-810 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C 105C	5KW 690-810 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C 105C	5KW 810-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105C	5KW 810-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105C	5KW 810-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105C	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105C	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105C	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105C	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105C	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105C	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105C	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105C	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105C	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105C	10KW 540-680 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105C	10KW 540-680 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105C	10KW 540-680 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105C	10KW 540-680 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C 105C	10KW 690-810 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105C	10KW 690-810 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105C	10KW 690-810 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105C	10KW 690-810 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C 105C	10KW 820-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C 105C	10KW 820-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C 105C	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105C	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105C	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105C	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105C	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C 105C	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105C	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105C	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105C	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105C	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C 105D	5KW 540-590 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C 105D	5KW 540-590 PL LOAD	CAPACITOR	2000PF 15KV MICA	912-4127-080
C 105D	5KW 600-680 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C 105D	5KW 600-680 PL LOAD	CAPACITOR	1500PF 15KV MICA	912-4127-060
C 105D	5KW 690-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105D	5KW 690-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105D	5KW 690-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105D	5KW 690-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105D	5KW 690-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105D	5KW 690-960 PL LOAD	CAPACITOR	1200PF 15KV MICA	912-4127-050
C 105D	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105D	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105D	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105D	5KW 970-1220 PL LOAD	CAPACITOR	1000PF 20KV MICA	912-4127-040
C 105D	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105D	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C 105D	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
C	105D	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105D	5KW 1230-1600 PL LOAD	CAPACITOR	750PF 20KV MICA	912-4127-020
C	105D	10KW 540-590 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	105D	10KW 540-590 PL LOAD	CAPACITOR	2000PF 20KV MICA	912-4128-070
C	105D	10KW 600-680 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	105D	10KW 600-680 PL LOAD	CAPACITOR	1500PF 25KV MICA	912-4128-060
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1200PF 25KV MICA	912-4128-050
C	105D	10KW 690-960 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	105D	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	105D	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	105D	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	105D	10KW 970-1230 PL LOAD	CAPACITOR	1000PF 30KV MICA	912-4128-040
C	105D	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C	105D	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C	105D	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C	105D	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C	105D	10KW 1240-1600 PL LOAD	CAPACITOR	750PF 30KV MICA	912-4128-020
C	106	MOD MONITOR ADJUST	CAPACITOR	325PF VARIABLE 500V	922-1400-000
C	107A	DVR GRID TUNE PADDING	CAPACITOR	100PF 500V	912-2816-000
C	107B	DVR GRID TUNE PADDING	CAPACITOR	100PF 500V	912-2816-000
C	107C	DVR GRID TUNE PADDING	CAPACITOR	200PF 500V	912-2837-000
C	107D	DVR GRID TUNE PADDING	CAPACITOR	300PF 500V	912-2849-000
C	107E	DVR GRID TUNE PADDING	CAPACITOR	390PF 500V	912-2858-000
C	108	V3 CATHODE BYPASS	CAPACITOR	0.1MF 500V	913-3152-000
C	109	V4 CATHODE BYPASS	CAPACITOR	0.1MF 500V	913-3152-000
C	110	FREQ MON COUPLING	CAPACITOR	0.05MF 1KV	913-3153-000
C	111	AUDIO DVR INPUT BYPASS	CAPACITOR	500PF 500V	912-2977-000
C	112	AUDIO DVR INPUT BYPASS	CAPACITOR	500PF 500V	912-2977-000
C	113	Q3 COLLECTOR BYPASS	CAPACITOR	115MF 12V	183-1160-000
C	114	Q4 COLLECTOR BYPASS	CAPACITOR	115MF 12V	183-1160-000
C	115	V1 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	116	V2 SCREEN BYPASS	CAPACITOR	3300PF 2.5KV	913-2830-000
C	117	TIME DELAY	CAPACITOR	250MF 300V	184-2536-000
C	118	OUTPUT I MTRING BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1292-000
C	119	OUTPUT I MTRING BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1292-000
C	120	K10 COIL BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1292-000
C	121	K10 COIL BYPASS	CAPACITOR	1000PF 500V FEEDTHRU	913-1292-000
C	122	CR27 RF BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
C	123	MOD MON PADDING	CAPACITOR	330PF 500V	912-2852-000
C	124	MOD MON COUPLING	CAPACITOR	330PF 500V	912-2852-000
C	125	28V STABILIZING	CAPACITOR	1400MF 50V	184-2516-000
C	126	PA SCREEN METER	CAPACITOR	0.1MF 200V	913-3681-000
C	127	V5 GRID TRAP	CAPACITOR	240PF 2.5KV	913-0846-000
C	128	V6 GRID TRAP	CAPACITOR	240PF 2.5KV	913-0846-000
C	129	INPUT COMPENSATING	CAPACITOR	820PF 500V	912-2995-000
C	130	INPUT COMPENSATING	CAPACITOR	820PF 500V	912-2995-000
C	131	FEEDBACK COMPENSATING	CAPACITOR	1800PF 500V	912-3333-000
C	132	FEEDBACK COMPENSATING	CAPACITOR	1800PF 500V	912-3333-000
C	133	K15 BYPASS	CAPACITOR	24MF 50V	183-1173-000
C	134	K16 BYPASS	CAPACITOR	24MF 50V	183-1173-000
C	135	HIGH FREQ BYPASS	CAPACITOR	0.047MF 1KV	913-4684-000
CB	1	28V SUPPLY	CKT BREAKER	0.55A 3P CURVE 3	260-4038-030
CB	2	BLOWERS	CKT BREAKER	4A 2P CURVE 1	260-1709-000
CB	3	FILAMENTS	CKT BREAKER	9-15-9A 3P CURVE 3	260-4037-090
CB	4	BIAS SUPPLY	CKT BREAKER	0.5A 2P CURVE 3	260-4036-090
CB	5	SCREEN SUPPLY	CKT BREAKER	4.5A 3P CURVE 3	260-4038-090
CB	6	5KW HIGH VOLTAGE	CKT BREAKER	100A 3P	260-4055-010
CB	6	10KW HIGH VOLTAGE	CKT BREAKER	150A 3P	260-4055-020
CR	1	K1 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	2	TIME DELAY BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	3	K2 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	4	K3 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	5	K4 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	6	K5 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
CR	7	K6 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	8	K7 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	9	K9 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	10	K11 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	11	K12 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	12	K13 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	13	K14 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	14	28V SUPPLY	RECTIFIER	3 PHASE 28V	353-6327-010
CR	15	BIAS SUPPLY	RECTIFIER	1N4585 800PIV 600MA	353-6467-040
CR	16	BIAS SUPPLY	RECTIFIER	1N4585 800PIV 600MA	353-6467-040
CR	17	BIAS SUPPLY	RECTIFIER	1N4585 800PIV 600MA	353-6467-040
CR	18	BIAS SUPPLY	RECTIFIER	1N4585 800PIV 600MA	353-6467-040
CR	19	MOD SCREEN SUPPLY	RECTIFIER	3 PHASE 2500PIV	353-6464-010
CR	20	MOD SCRN SUPPLY SUPPR	THYRECTOR	6RS21VR6D 120V	353-0292-010
CR	21	PA SCREEN SUPPLY	RECTIFIER	3 PHASE 2500PIV	353-6464-010
CR	22	PA SCRN SUPPLY SUPPR	THYRECTOR	6RS21VR6D 120V	353-0292-010
CR	23	HIGH VOLTAGE	RECTIFIER	6LEGS,5000PIV/LEG	353-6465-010
CR	24	NOT USED		NOT USED	
CR	25	V3 BIAS BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	26	V4 BIAS BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
CR	27	PL VOLT METER PROTECT	DIODE	1N976A 43V ZENER	353-3236-000
CR	28	NOT USED		NOT USED	
CR	29	NOT USED		NOT USED	
CR	30	BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
E	1	V1 FIL	SPARK GAP	350V CARBON FILLED	762-8880-001
E	2	V2 FIL	SPARK GAP	350V CARBON FILLED	762-8880-001
E	3	PL VOLTAGE METER	SPARK GAP	350V CARBON FILLED	762-8880-001
E	4	V5 FIL	SPARK GAP	350V CARBON FILLED	762-8880-001
E	5	V6 FIL	SPARK GAP	350V CARBON FILLED	762-8880-001
E	6	CONTROL BAY GROUND	TERMINAL	1-1/8 IN 1/4-20NPB	343-0371-000
E	7	FLOOR CHASSIS GROUND	TERMINAL	1-1/8 IN 1/4-20NPB	343-0371-000
E	8	HV GROUND	TERMINAL	1-1/8 IN 1/4-20NPB	343-0371-000
E	9	NOT USED		NOT USED	
E	10	NOT USED		NOT USED	
E	11	PA SCRN MODULATION	TERMINAL	CERAMIC INSULATED	762-8843-001
E	12	MOD GROUND	TERMINAL	1 IN 1/4-20 NPB	343-0370-000
E	13	NOT USED		NOT USED	
E	14	V1 SCRN	SPARK GAP	2KV	762-8885-001
E	15	V2 SCRN	SPARK GAP	2KV	762-8885-001
E	16	V5 SCRN	SPARK GAP	2KV	762-8885-001
E	17	V6 SCRN	SPARK GAP	2KV	762-8885-001
E	18	A9 CONNECT	TERMINAL	CERAMIC INSULATED	762-8843-001
E	19	A9 CONNECT	TERMINAL	CERAMIC INSULATED	762-8843-001
E	20	A9 CONNECT	TERMINAL	CERAMIC INSULATED	762-8843-001
E	21	A9 CONNECT	TERMINAL	CERAMIC INSULATED	762-8843-001
E	22	750V PLATE CONNECT	TERMINAL	1/2X1 IN STAND-OFF	190-0018-000
E	23	MOD MON GROUND	TERMINAL	5/8 IN 8-32NPB	343-0312-000
E	24	A9 CONNECT	TERMINAL	CERAMIC INSULATED	762-8843-001
E	25	RF DVR SCRN CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	26	FREQ MON	TERMINAL	SOLDER TYPE	306-0976-000
E	27	FREQ MON GROUND	TERMINAL	SOLDER TYPE	306-0976-000
E	28	MOD COUPLING GROUND	TERMINAL	1/2 IN 8-32NPB	343-0311-000
E	29	PA SCRN CURR METER	TERMINAL	SOLDER TYPE	306-0976-000
E	30	PA SCRN CURR METER	TERMINAL	SOLDER TYPE	306-0976-000
E	31	PA GRID CURR METER	TERMINAL	SOLDER TYPE	306-0976-000
E	32	PA GRID CURR METER	TERMINAL	SOLDER TYPE	306-0976-000
E	33	MOD SCREEN CONNECT	TERMINAL	1/2X2 IN STAND-OFF	190-0021-000
E	34	R118 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	35	R118 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	36	CR27 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	37	CR27 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	38	R138 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	39	R138 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	40	E27 CONNECT	TERMINAL	SOLDER TYPE	304-0318-000
E	41	K9 CONNECT	TERMINAL	SOLDER TYPE	304-0318-000
E	42	K17 GND CONNECT	TERMINAL	SOLDER TYPE	304-0318-000
E	43	C83-2 CONNECT	TERMINAL	PRESS IN	304-0082-000
E	44	MOD INPUT GROUND	TERMINAL	SOLDER TYPE	304-0319-000
E	45	C83-1 CONNECT	TERMINAL	PRESS IN	304-0082-000
E	46	AUX METER CONNECT	TERMINAL	1/2 IN 8-32NPB	343-0311-000

SINGLE LEG 15-020

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
E	47	MOD MON	TERMINAL	SOLDER TYPE	306-0976-000
E	48	MOD MON GROUND	TERMINAL	SOLDER TYPE	306-0976-000
E	49	R168 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	50	R168/R169 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	51	R169/R170 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	52	R170 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	53	PA SCRN METER GND	TERMINAL	SOLDER TYPE	304-0318-000
E	54	C11 CONNECT	TERMINAL	PRESS IN	306-1270-000
E	55	C12 CONNECT	TERMINAL	PRESS IN	306-1270-000
E	56	Q5-B CONNECT	TERMINAL	PRESS IN	306-1270-000
E	57	Q6-B CONNECT	TERMINAL	PRESS IN	306-1270-000
E	58	Q1-E/Q3-B CONNECT	TERMINAL	PRESS IN	306-1270-000
E	59	Q2-E/Q4-B CONNECT	TERMINAL	PRESS IN	306-1270-000
E	60	R174 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	61	R174 CONNECT	TERMINAL	SOLDER TYPE	306-0976-000
E	62	CR23-AC1 CONNECT	TERMINAL	CERAMIC	190-0021-000
E	63	CR23-AC2 CONNECT	TERMINAL	CERAMIC	190-0021-000
E	64	CR23-AC3 CONNECT	TERMINAL	CERAMIC	190-0021-000
E	65	FEEDBACK CONNECT	TERMINAL	SCREW TYPE	306-0197-000
E	66	FEEDBACK CONNECT	TERMINAL	SCREW TYPE	306-0197-000
J	1	PA 1 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	2	PA 1 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	3	PA 2 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	4	PA 2 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	5	MOD 1 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	6	MOD 1 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	7	MOD 2 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	8	MOD 2 FIL VOLTAGE	TEST JACK	GREEN TIP	360-0153-000
J	9	RF INPUT	CONNECTOR	UG-909A/U BNC	357-9248-000
J	10	DRIVER CATHODE CURRENT	TEST JACK	RED TIP	360-0150-000
J	11	DRIVER CATHODE CURRENT	TEST JACK	BLACK TIP	360-0151-000
J	12	PA GRID CURRENT	TEST JACK	BLACK TIP	360-0151-000
J	13	PA GRID CURRENT	TEST JACK	RED TIP	360-0150-000
J	14	MOD 1 CATH CURRENT	TEST JACK	RED TIP	360-0150-000
J	15	MOD 1 CATH CURRENT	TEST JACK	BLACK TIP	360-0151-000
J	16	MOD 2 CATH CURRENT	TEST JACK	BLACK TIP	360-0151-000
J	17	MOD 2 CATH CURRENT	TEST JACK	RED TIP	360-0150-000
J	18	MODULATION MONITOR	CONNECTOR	UG909A/U BNC	357-9248-000
J	19	PA SCREEN VOLTAGE	TEST JACK	RED TIP	360-0150-000
J	20	PA SCREEN VOLTAGE	TEST JACK	BLACK TIP	360-0151-000
J	21	DISCR BAL	TEST JACK	RED TIP	360-0150-000
J	22	DISCR BAL	TEST JACK	BLACK TIP	360-0151-000
K	1	BLOWERS	RELAY	28VDC 2A 2B + NO AUX	401-1686-010
K	2	FILAMENTS/BIAS	RELAY	28VDC 3A + 1A 1B AUX	401-1688-010
K	3	LOW PWR PLATE CONTROL	RELAY	28VDC 2A 2B + NO AUX	401-1686-010
K	4	HIGH PWR PLATE CONTROL	RELAY	28VDC 2A 2B + NO AUX	401-1686-010
K	5	LOW PWR PLATE	RELAY	28VDC 3A + 1A 3B AUX	401-1687-010
K	6	HIGH PWR PLATE	RELAY	28VDC 3A + 1A 3B AUX	401-1687-010
K	7	SCREEN	RELAY	28VDC 3A + 1A 1B AUX	401-1688-010
K	8	AUDIO INPUT	RELAY	28VDC/115VAC COIL 2C	972-1347-000
K	9	PA SCREEN	RELAY	28VDC/115VAC COIL 2C	970-2438-030
K	10	MODULATION MONITOR	RELAY	28VDC 2C	970-2437-080
K	11	TUNING LOWER	RELAY	28VDC/115VAC COIL 2C	972-1347-000
K	12	TUNING RAISE	RELAY	28VDC/115VAC COIL 2C	972-1347-000
K	13	LOADING LOWER	RELAY	28VDC/115VAC COIL 2C	972-1347-000
K	14	LOADING RAISE	RELAY	28VDC/115VAC COIL 2C	972-1347-000
K	15	AUTO TUNE LOWER	RELAY	1.5K OHM 4.5 MA COIL	408-1193-000
K	16	AUTO TUNE RAISE	RELAY	1.5K OHM 4.5 MA COIL	408-1193-000
K	17	MOD REDUCED POWER	RELAY	24VDC 3C	970-2259-000
L	1	BIAS SUPPLY FILTER	INDUCTOR	12HY 200MA	668-0077-010
L	2	MOD SCRN SUPPLY FILTER	INDUCTOR	4HY 400MA E-14299	668-0070-010
L	3	PA SCRN SUPPLY FILTER	INDUCTOR	4HY 1A E-14300	668-0071-010
L	4	5KW MODULATION	INDUCTOR	30HY + AUX WINDING	668-0080-010
L	4	10KW MODULATION	INDUCTOR	15HY + AUX WINDING	668-0079-010
L	5A	RF DVR COMP FILTER	INDUCTOR	12UHY 450MA	240-1601-000
L	5B	RF DVR COMP FILTER	INDUCTOR	8.2UHY 600MA	240-1599-000

25A CONTS

75A. CONTS.

25A. CONT

235-1318-030 ARC GAP

RELAY CODE { A = N.O. B = N.C. C = SPDT

ARC GAP 235-1318-020

762-8820-001

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
L	5C	RF CVR COMP FILTER	INDUCTOR	5.6UHY 850MA	240-1597-000
L	6	PA GRID TUNING	INDUCTOR	60UHY WITH 2 ADJ TAP	762-8932-001
L	7	RF DVR PLATE CHOKE	INDUCTOR	4MHY 400MA	240-9006-000
L	8	V5 GRID PARASITIC TRAP	INDUCTOR	0.17UHY	762-8820-001
L	9	V5 GRIC CHOKE	INDUCTOR	5MHY 105MA	~~240-0843-000~~
L	10	V6 GRID PARASITIC TRAP	INDUCTOR	0.17UHY	762-8820-001
L	11	V6 GRIC CHOKE	INDUCTOR	5MHY 105MA	~~240-0843-000~~
L	12	PA PLATE CHOKE	INDUCTOR	4MHY 4A	762-8801-002
L	13	5KW PA PLATE CHOKE	INDUCTOR	17MHY 4A	762-8800-002
L	13	10KW PA PLATE CHOKE	INDUCTOR	4.3MHY 4A	762-8800-003
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 540-810 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	5KW 820-1600 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 540-620 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	10KW 540-620 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	10KW 540-620 OUT NET	INDUCTOR	120UHY 1/2 IN RIBBON	980-0062-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 630-1250 OUT NET	INDUCTOR	60UHY 1/2 IN RIBBON	980-0063-000
L	14	10KW 1260-1600 OUT NET	INDUCTOR	30UHY 1/2 IN RIBBON	980-0064-000
L	14	10KW 1260-1600 OUT NET	INDUCTOR	30UHY 1/2 IN RIBBON	980-0064-000
L	14	10KW 1260-1600 OUT NET	INDUCTOR	30UHY 1/2 IN RIBBON	980-0064-000
L	14	10KW 1260-1600 OUT NET	INDUCTOR	30UHY 1/2 IN RIBBON	980-0064-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	5KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000

REPLACE WITH MILLER 4539 C/N 240-0386-010

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 540-960 OUT NET	INDUCTOR	50UHY 1/2 IN RIBBON	980-0050-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	15	10KW 970-1600 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	5KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 540-1050 TRAP	INDUCTOR	26UHY 3/8 IN RIBBON	980-0127-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	16	10KW 1060-1600 TRAP	INDUCTOR	15UHY 3/8 IN RIBBON	980-0126-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	5KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 540-1050 OUT NET	INDUCTOR	28UHY 1/2 IN RIBBON	980-0049-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	17	10KW 1060-1600 OUT NET	INDUCTOR	15UHY 1/2 IN RIBBON	980-0132-000
L	18	MOD MON SAMPLING	INDUCTOR	81.5UHY	762-8908-001
L	19	V5 GRID TRAP	INDUCTOR	0.17UHY	762-8820-001
L	20	V6 GRID TRAP	INDUCTOR	0.17UHY	762-8820-001
L	21	CURRENT SENSING	INDUCTOR	150UH TOROID	762-8819-003
L	22	FEEDBACK COMPENSATING	INDUCTOR	30MH	240-0431-000
L	23	FEEDBACK COMPENSATING	INDUCTOR	30MH	240-0431-000
L	24	FEEDBACK COMPENSATING	INDUCTOR	30MH	240-0431-000
L	25	FEEDBACK COMPENSATING	INDUCTOR	30MH	240-0431-000
M	1	FILAMENT HOURS	METER 50CPS	230VAC 9999.9HRS	458-0190-010
M	1	FILAMENT HOURS	METER 50CPS	230VAC 9999.9HRS	458-0190-010
M	1	FILAMENT HOURS	METER 60CPS	230VAC 9999.9HRS	458-0190-000
Q	1	FIRST AUDIO	TRANSISTOR	2N2102 NPN 5W	352-0646-010
Q	2	FIRST AUDIO	TRANSISTOR	2N2102 NPN 5W	352-0646-010
Q	3	SECOND AUDIO	TRANSISTOR	2N2102 NPN 5W	352-0646-010
Q	4	SECOND AUDIO	TRANSISTOR	2N2102 NPN 5W	352-0646-010
Q	5	AUDIO DVR	TRANSISTOR	2N3055 NPN 115W	352-0583-010
Q	6	AUDIO DVR	TRANSISTOR	2N3055 NPN 115W	352-0583-010
R	1	TIME DELAY LIMITING	RESISTOR	100 OHM 2W 10PC	745-5610-000
R	2	RECYCLE DELAY CHARGE	RESISTOR	5.6K OHM 1/2W 10PC	745-1384-000
R	3	RECYCLE DELAY DISCHG	RESISTOR	220K OHM 1/2W 10PC	745-1408-000
R	4	28V SUPPLY SUPPRESSOR	RESISTOR	47 OHM 2W 10PC	745-5596-000
R	5	28V SUPPLY BLEEDER	RESISTOR	150 OHM 25W 5PC	710-3150-010
R	6	28V SUPPLY METERING	RESISTOR	28.7K OHM 1/2W 1PC	705-7666-000
R	7	PA 1 FIL VOLT ADJUST	RESISTOR	5 OHM 75W POT	737-0027-000
R	8	PA 2 FIL VOLT ADJUST	RESISTOR	5 OHM 75W POT	737-0027-000
R	9	MOD 1 FIL VOLT ADJUST	RESISTOR	5 OHM 75W POT	737-0027-000
R	10	MOD 2 FIL VOLT ADJUST	RESISTOR	5 OHM 75W POT	737-0027-000
R	11	BIAS SUPPLY SUPPRESSOR	RESISTOR	1K OHM 2W 10PC	745-5652-000
R	12	AUDIO DVR 28V LIMITING	RESISTOR	1 OHM 10W 1PC	747-8950-000
R	13	BIAS SUPPLY BLEEDER	RESISTOR	1K OHM 100W 5PC	710-9290-000
R	14	BIAS SUPPLY BLEEDER	RESISTOR	430 OHM 26W 5PC	747-1793-000
R	15	BIAS SUPPLY METER	RESISTOR	75K OHM 3/4W 1PC	705-7686-000
R	16	BIAS SUPPLY METER	RESISTOR	75K OHM 3/4W 1PC	705-7686-000
R	17	BIAS SUPPLY METER	RESISTOR	1.5K OHM 1/2W 1PC	705-7811-000
R	18	THYRECTOR LIMITING	RESISTOR	100 OHM 10W 5PC	710-2900-000
R	19	MOD SCRN SUP BLEEDER	RESISTOR	20K OHM 100W 5PC	710-9299-000
R	20	MOD SCRN SUPPLY METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R	21	MOD SCRN SUPPLY METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R	22	MOD SCRN SUPPLY METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R	23	MOD SCRN SUPPLY METER	RESISTOR	1.5K OHM 1/2W 1PC	705-7811-000
R	24	THYRECTOR LIMITING	RESISTOR	100 OHM 10W 5PC	710-2900-000
R	25	PA SCRN SUPPLY BLEEDER	RESISTOR	15K OHM 100W 5PC	710-9298-000
R	26	PA SCRN SUPPLY BLEEDER	RESISTOR	7.5K OHM 25W 5PC	710-0068-000
R	27	PA SCRN SUPPLY METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
R 28	PA SCRN SUPPLY METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R 29	PA SCRN SUPPLY METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R 30	PA SCRN SUPPLY METER	RESISTOR	1.5K OHM 1/2W 1PC	705-7811-000
R 31	HIGH VOLT SUPPRESSOR	RESISTOR	300 OHM 15W 10PC	712-4401-120
R 32	HIGH VOLT SUPPRESSOR	RESISTOR	300 OHM 15W 10PC	712-4401-120
R 33	HV FILTER CAP LIMITING	RESISTOR	25 OHM 90W 10PC	712-4401-150
R 34	HV SUPPLY BLEEDER	RESISTOR	50K OHM 200W 5PC	710-3138-320
R 35	HV SUPPLY BLEEDER	RESISTOR	50K OHM 200W 5PC	710-3138-320
R 36	DC OVLD SHUNT	RESISTOR	0.5 OHM 100W10PC	710-5076-050
R 37	5KW AUDIO INPUT PAD	RESISTOR	200 OHM 1/2W 5PC	745-1322-000
R 37	10KW AUDIO INPUT PAD	RESISTOR	160 OHM 1/2W 5PC	745-1319-000
R 38	5KW AUDIO INPUT PAD	RESISTOR	200 OHM 1/2W 5PC	745-1322-000
R 38	10KW AUDIO INPUT PAD	RESISTOR	160 OHM 1/2W 5PC	745-1319-000
R 39	5KW AUDIO INPUT PAD	RESISTOR	240 OHM 1/2W 5PC	745-1326-000
R 39	10KW AUDIO INPUT PAD	RESISTOR	360 OHM 1/2W 5PC	745-1333-000
R 40	5KW AUDIO INPUT PAD	RESISTOR	200 OHM 1/2W 5PC	745-1322-000
R 40	10KW AUDIO INPUT PAD	RESISTOR	160 OHM 1/2W 5PC	745-1319-000
R 41	5KW AUDIO INPUT PAD	RESISTOR	200 OHM 1/2W 5PC	745-1322-000
R 41	10KW AUDIO INPUT PAD	RESISTOR	160 OHM 1/2W 5PC	745-1319-000
R 42	5KW AUDIO CUTBACK PAD	RESISTOR	220 OHM 1/2W 5PC	745-1323-000
R 42	10KW AUDIO CUTBACK PAD	RESISTOR	100 OHM 1/2W 5PC	745-1309-000
R 43	5KW AUDIO CUTBACK PAD	RESISTOR	680 OHM 1/2W 5PC	745-1344-000
R 43	10KW AUDIO CUTBACK PAD	RESISTOR	1.8K OHM 1/2W 5PC	745-1362-000
R 44	5KW AUDIO CUTBACK PAD	RESISTOR	220 OHM 1/2W 5PC	745-1323-000
R 44	10KW AUDIO CUTBACK PAD	RESISTOR	100 OHM 1/2W 5PC	745-1309-000
R 45	AUDIO INPUT LOADING	RESISTOR	27K OHM 1W 10PC	745-3412-000
R 46	5KW AUD INPT LOADING	RESISTOR	3.48K OHM 1/4W 1PC	705-6622-000
R 46	10KW AUD INPT LOADING	RESISTOR	4.2K OHM 1/4W 1PC	705-6626-000
R 47	5KW AUD INPT LOADING	RESISTOR	3.48K OHM 1/4W 1PC	705-6622-000
R 47	10KW AUD INPT LOADING	RESISTOR	4.22K OHM 1/4W 1PC	705-6626-000
R 48	AUDIO INPUT LOADING	RESISTOR	27K OHM 1W 10PC	745-3412-000
R 49	5KW FEEDBACK LOADING	RESISTOR	7.5K OHM 1/4W 1PC	705-6638-000
R 49	10KW FEEDBACK LOADING	RESISTOR	9.09K OHM 1/4W 1PC	705-6642-000
R 50	5KW FEEDBACK LOADING	RESISTOR	7.5K OHM 1/4W 1PC	705-6638-000
R 50	10KW FEEDBACK LOADING	RESISTOR	9.09K OHM 1/4W 1PC	705-6642-000
R 51	Q3 COLLECTOR	RESISTOR	100 OHM 2W 10PC	745-5610-000
R 52	Q4 COLLECTOR	RESISTOR	100 OHM 2W 10PC	745-5610-000
R 53	Q5 EMITTER	RESISTOR	2 OHM 5W 1PC	747-9744-000
R 54	Q6 EMITTER	RESISTOR	2 OHM 5W 1PC	747-9744-000
R 55	Q5 EMITTER	RESISTOR	2 OHM 5W 1PC	747-9744-000
R 56	Q6 EMITTER	RESISTOR	2 OHM 5W 1PC	747-9744-000
R 57	MOD MON LOADING	RESISTOR	1K OHM 2W 10PC	745-5652-000
R 58	RF DVR CATH CURR METER	RESISTOR	15 OHM 2W 10PC	745-5575-000
R 59	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 60	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 61	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 62	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 63	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 64	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 65	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 66	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 67	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 68	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 69	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 70	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 71	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 72	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 73	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 74	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 75	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 76	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 77	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 78	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 79	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 80	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 81	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 82	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 83	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 84	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 85	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 86	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 87	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
R 88	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 89	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 90	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 91	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 92	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 93	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 94	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 95	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 96	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 97	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 98	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 99	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 100	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 101	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 102	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 103	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 104	FEEDBACK NETWORK	RESISTOR	200K OHM 2W 5PC	745-5748-000
R 105	MOD 1 DRIVE ADJ	RESISTOR	1K OHM 4W POT	377-0716-080
R 106	MOD 1 DRIVE LOAD	RESISTOR	3.3K OHM 10W 5PC	746-8000-070
R 107	MOD 2 DRIVE LOAD	RESISTOR	3.3K OHM 10W 5PC	746-8000-070
R 108	MOD 2 DRIVE ADJ	RESISTOR	1K OHM 4W POT	377-0716-080
R 109	MOD 1 BIAS ADJ	RESISTOR	10K OHM 4W POT	377-0716-120
R 110	MOD 2 BIAS ADJ	RESISTOR	10K OHM 4W POT	377-0716-120
R 111	MOD BIAS DROPPING	RESISTOR	7.5K OHM 10W 5PC	710-2932-000
R 112	V1 GRID STABILIZING	RESISTOR	50 OHM 16.5W 10PC	712-0129-000
R 113	V1 SCRN STABILIZING	RESISTOR	50 ~~33~~ OHM ~~2W 10PC~~ 16.5W	~~745-5589-000~~ 712-0129-000
R 114	MOD 1 HUM BAL ADJ	RESISTOR	10 OHM 50W POT	735-1013-500
R 115	MOD 1 OVLD SHUNT	RESISTOR	1 OHM 36W 10PC	710-5076-040
R 116	MOD 1 CATH CURR METER	RESISTOR	1 OHM 36W 1PC	710-5076-010
R 117	MOD PLATE CURR METER	RESISTOR	0.5 OHM 36W 1PC	710-5076-030
R 118	MOD SCRN CURR METER	RESISTOR	1 OHM 36W 1PC	710-5076-010
R 119	MOD 2 CATH CURR METER	RESISTOR	1 OHM 36W 1PC	710-5076-010
R 120	MOD 2 OVLD SHUNT	RESISTOR	1 OHM 36W 10PC	710-5076-040
R 121	MOD 2 HUM BAL ADJ	RESISTOR	10 OHM 50W POT	735-1013-500
R 122	V2 GRID STABILIZING	RESISTOR	50 OHM 16.5W 10PC	712-0129-000
R 123	V2 SCRN STABILIZING	RESISTOR	50 ~~33~~ OHM ~~2W 10PC~~ 16.5W	~~745-5589-000~~ 712-0129-000
R 124	RF OVR COMP FILT LOAD	RESISTOR	47 OHM 1/2W 10PC	745-1296-000
R 125	V3 GRID STABILIZING	RESISTOR	47 OHM 2W 10PC	745-5596-000
R 126	V3 GRID	RESISTOR	6.8K OHM 2W 10PC	745-5687-000
R 127	V3 CATHODE	RESISTOR	10 OHM 2.5W 1PC	746-9442-000
R 128	V3 GRID	RESISTOR	47K OHM 1W 10PC	745-3422-000
R 129	V3 SCRN STABILIZING	RESISTOR	100 OHM 1W 5PC	745-3310-000
R 130	V3 PL PARASITIC SUPPR	RESISTOR	47 OHM 2W 10PC	745-5596-000
R 131	V4 PL PARASITIC SUPPR	RESISTOR	47 OHM 2W 10PC	745-5596-000
R 132	V4 SCRN STABILIZING	RESISTOR	100 OHM 1W 5PC	745-3310-000
R 133	V4 CATHODE	RESISTOR	10 OHM 2.5W 1PC	746-9442-000
R 134	V4 GRID STABILIZING	RESISTOR	47 OHM 2W 10PC	745-5596-000
R 135	V4 GRID	RESISTOR	6.8K OHM 2W 10PC	745-5687-000
R 136	V4 GRID	RESISTOR	47K OHM 1W 10PC	745-3422-000
R 137	28V STABILIZING	RESISTOR	10 OHM 1W 10PC	745-3268-000
R 138	PLATE VOLTAGE METER	RESISTOR	10K OHM 2W 10PC	745-5694-000
R 139A	5KW PA SCREEN	RESISTOR	1.5K OHM 200W ADJ	716-0055-070
R 139A	10KW PA SCREEN	RESISTOR	1K OHM 200W ADJ	716-0055-060
R 139B	5KW PA SCREEN	RESISTOR	1.5K OHM 200W ADJ	716-0055-070
R 140	5KW DRIVER PLATE	RESISTOR	2.5K OHM 50W 5PC	710-3374-000
R 140	10KW DRIVER PLATE	RESISTOR	1.5K OHM 50W 5PC	710-3372-000
R 141	V5 GRID PARASITIC TRAP	RESISTOR	50 OHM 16.5W 10PC	712-0129-000
R 142	V5 GRID	RESISTOR	1.25K OHM 25W 5PC	710-0059-000
R 143	V5 GRID TRAP	RESISTOR	50 OHM 16.5W 10PC	712-0129-000
R 144	V5 CATH CURR METER	RESISTOR	0.5 OHM 36W 1PC	710-5076-030
R 145A	5KW V5 SCREEN	RESISTOR	250 OHM 50W 5PC	710-3367-000
R 145A	10KW V5 SCREEN	RESISTOR	500 OHM 50W 5PC	710-3368-000
R 145B	5KW V5 SCREEN	RESISTOR	250 OHM 50W 5PC	710-3367-000
R 146	5KW PA SCREEN	RESISTOR	500 OHM 200W ADJ	716-0055-050
R 146	10KW PA SCREEN	RESISTOR	250 OHM 200W ADJ	716-0055-040
R 147	PA SCRN CURR METER	RESISTOR	1 OHM 36W 1PC	710-5076-010
R 148	PA GRID CURR METER	RESISTOR	5 OHM 2.5W 1PC	746-9441-000
R 149	PA PLATE CURR METER	RESISTOR	0.5 OHM 36W 1PC	710-5076-030
R 150	PA OVLD SHUNT	RESISTOR	4 OHM 100W 10PC	710-5076-060
R 151	FREQ MON LOAD	RESISTOR	1K OHM 2W 10PC	745-5652-000
R 152	V6 SCREEN	RESISTOR	500 OHM 50W 5PC	710-3368-000
R 153	V6 GRID TRAP	RESISTOR	50 OHM 16.5W 10PC	712-0129-000

SYMBOL		FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
R	154	V6 CATH CURR METER	RESISTOR	0.5 OHM 36W 1PC	710-5076-030
R	155	V6 GRID PARASITIC TRAP	RESISTOR	50 OHM 16.5W 10PC	712-0129-000
R	156	V6 GRID	RESISTOR	1.25K OHM 25W 5PC	710-0059-000
R	157	PLATE VOLTAGE METER	RESISTOR	1.5M OHM 25W	732-0051-010
R	158	PLATE VOLTAGE METER	RESISTOR	1.5M OHM 25W	732-0051-010
R	159	Q3 LOAD	RESISTOR	150 OHM 1W 10PC	745-3317-000
R	160	Q4 LOAD	RESISTOR	150 OHM 1W 10PC	745-3317-000
R	161	TIME DELAY LIMITING	RESISTOR	10 OHM 1W 10PC	745-3268-000
R	162	V5 SCRN PARASITIC SUPP	RESISTOR	10 OHM 2W 10PC	745-5568-000
R	163	V5 SCRN PARASITIC SUPP	RESISTOR	10 OHM 2W 10PC	745-5568-000
R	164	V5 SCRN PARASITIC SUPP	RESISTOR	10 OHM 2W 10PC	745-5568-000
R	165	V6 SCRN PARASITIC SUPP	RESISTOR	10 OHM 2W 10PC	745-5568-000
R	166	V6 SCRN PARASITIC SUPP	RESISTOR	10 OHM 2W 10PC	745-5568-000
R	167	V6 SCRN PARASITIC SUPP	RESISTOR	10 OHM 2W 10PC	745-5568-000
R	168	PA SCREEN METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R	169	PA SCREEN METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R	170	PA SCREEN METER	RESISTOR	249K OHM 3/4W 1PC	705-7711-000
R	171	PA SCREEN METER	RESISTOR	750 OHM 3/4W 1PC	705-7590-000
R	172	MOD BIAS DROPPING	RESISTOR	1.5K OHM 10W 5PC	710-2930-000
R	173	REDUCED PWR BIAS ADJ	RESISTOR	10K OHM 4W POT	377-0716-120
R	174	MOD BIAS DIVIDER	RESISTOR	4.7K OHM 2W 10PC	745-5680-000
R	175	5KW MOD SCRN DIVIDER	RESISTOR	7.5K OHM 50W 5PC	710-3378-000
R	175	10KW MOD SCRN DIVIDER	RESISTOR	2K OHM 50W 5PC	710-3373-000
R	176	MOD SCRN DIVIDER	RESISTOR	7.5K OHM 50W 5PC	710-3378-000
R	177	FEEDBACK COMPENSATING	RESISTOR	2.2K OHM 1W 10PC	745-3366-000
R	178	FEEDBACK COMPENSATING	RESISTOR	2.2K OHM 1W 10PC	745-3366-000
R	179	FEEDBACK COMPENSATING	RESISTOR	1K OHM 1W 10PC	745-3352-000
R	180	FEEDBACK COMPENSATING	RESISTOR	1K OHM 1W 10PC	745-3352-000
R	181	LIMITING	RESISTOR	2.2K OHM 1/2W 10PC	745-1366-000
S	1	RT FRONT PANEL INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	2	LEFT REAR DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	3	RT FRONT DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	4	CENTER REAR DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	5	RT REAR DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	6	MODULATOR DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	7	AUDIO DVR DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	8	PA DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	9	RF DVR DOOR INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	10	RT FRONT PANEL GROUND	SWITCH	3 POLE HV	762-8837-001
S	11	RT/CTR REAR DR GROUND	SWITCH	3 POLE HV	762-8836-001
S	12	BLOWER AIR	SWITCH	SPDT 1000FPM	266-8309-000
S	13	FAN AIR	SWITCH	SPDT 1800FPM	266-8311-000
S	14	GROUNDING STICK INTLK	SWITCH	SPDT TYPE 2AC2	266-0013-000
S	15	NOT USED		NOT USED	
S	16	NOT USED		NOT USED	
S	17	NOT USED		NOT USED	
S	18	PA/MOD HV GROUND	SWITCH	2 POLE HV	762-8898-001
S	19	MOD DOOR GROUND	SWITCH	3 POLE HV	762-8837-004
S	20	PA DOOR GROUND	SWITCH	3 POLE HV	762-8837-002
S	21	RF DVR DOOR GROUND	SWITCH	2 POLE HV	762-8840-001
S	22	LEFT REAR DOOR GROUND	SWITCH	3 POLE HV	762-8837-003
S	23	RT FRONT DOOR GROUND	SWITCH	3 POLE HV	762-8837-002
T	1	28V SUPPLY	TRANSFORMER	27.5V 4.75A E-14331	664-0096-010
T	2	DRIVER FILAMENTS	TRANSFORMER	6.3V 2.25A E-14312	662-0221-010
T	3	PA 1 FILAMENT	TRANSFORMER	7.8V 75A E-9186A	662-0213-000
T	4	PA 2 FILAMENT	TRANSFORMER	7.8V 75A E-9186A	662-0213-000
T	5	MODULATOR 1 FILAMENT	TRANSFORMER	7.8V 75A E-9186A	662-0213-000
T	6	MODULATOR 2 FILAMENT	TRANSFORMER	7.8V 75A E-9186A	662-0213-000
T	7	BIAS SUPPLY	TRANSFORMER	250VDC 165MA E-14301	662-0218-010
T	8	SCREEN SUPPLY	TRANSFORMER	850V/850V E-14617	664-0093-010
T	9	5KW HIGH VOLTAGE	TRANSFORMER	5100V 5.15A E-14268	664-0094-010
T	9	10KW HIGH VOLTAGE	TRANSFORMER	5100V 2.74A E-14269	664-0095-010
T	10	AUDIO INPUT	TRANSFORMER	TYPE 81-2	667-0180-000
T	11	AUDIO DVR OUTPUT	TRANSFORMER	12W E-14313	667-9531-010
T	12	5KW MODULATION	TRANSFORMER	3.75KW E-14270	667-0159-010
T	12	10KW MODULATION	TRANSFORMER	7.5KW E-14272	667-0158-010
T	13	RF DRIVER INPUT	TRANSFORMER	132UHY	762-8808-002
T	14	AUTO TUNE POWER	TRANSFORMER	26V 0.75A	662-0057-000
TB	1A	EXTENDED CONTROL PANEL	TERMINAL BRD	16 TERMINAL	367-0128-000
TB	1B	EXTENDED CONTROL PANEL	TERMINAL BRD	17 TERMINAL	367-0129-000
TB	1C	EXTENDED CONTROL PANEL	TERMINAL BRD	16 TERMINAL	367-0128-000

REPLACED BY ASSY 782-0045-001 150K 14W. 20 IN SERIES

725-0005-300 RESISTORS.

CAP 235-1318-040

CAP 235-1318-010

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
TB 10	EXTENDED CONTROL PANEL	TERMINAL BRD	17 TERMINAL	367-0129-000
TB 2	AUX METERING	TERMINAL BRD	3 TERMINAL	367-0119-000
TB 3A	EXTERNAL CONNECTION	TERMINAL BRD	16 TERMINAL	367-0128-000
TB 3B	EXTERNAL CONNECTION	TERMINAL BRD	17 TERMINAL	367-0129-000
TB 4	FIL VOLTAGE REGULATOR	TERMINAL BRD	7 TERMINAL	367-4070-000
TB 5	CABINET FAN	TERMINAL BRD	2 TERMINAL	367-0001-000
TB 6	EXCITER SUPPLY	TERMINAL BRD	2 TERMINAL	367-0001-000
TB 7	B3 CONNECTING	TERMINAL BRD	3 TERMINAL	367-0119-000
TB 8	B4 CONNECTING	TERMINAL BRD	3 TERMINAL	367-0119-000
V 1	MOD 1	TUBE	4CX5000A	256-0122-000
V 2	MOD 2	TUBE	4CX5CC0A	256-0122-000
V 3	RF DRIVER	TUBE	6146B	256-0200-010
V 4	RF DRIVER	TUBE	6146B	256-0200-010
V 5	PA 1	TUBE	4CX5000A	256-0122-000
V 6	PA 2	TUBE	4CX5CC0A	256-0122-000
XQ 1	Q1 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 2	Q2 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 3	Q3 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 4	Q4 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XV 1	MOD 1 TUBE	SOCKET	SK-300A	220-1382-000
XV 2	MOD 2 TUBE	SOCKET	SK-300A	220-1382-000
XV 3	RF DVR TUBE	SOCKET	OCTAL MICA FILLED	220-1121-000
XV 4	RF DVR TUBE	SOCKET	OCTAL MICA FILLED	220-1121-000
XV 5	PA 1 TUBE	SOCKET	SK-300A	220-1382-000
XV 6	PA 2 TUBE	SOCKET	SK-300A	220-1382-000
A 1	5KW CONTROL PANEL	ASSEMBLY	EXTENDED CONTROL PNL	762-8850-001
A 1	10KW CONTROL PANEL	ASSEMBLY	EXTENDED CONTROL PNL	762-8850-002
A 1 C 1	M1 BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 2	M2 BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 3	M3 BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 4	M4 BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 5	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 6	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 7	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 8	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 9	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 10	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 11	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 12	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 13	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 14	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 15	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 16	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 17	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 18	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 19	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 20	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 21	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 22	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 23	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 24	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 25	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 26	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 27	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 28	METERING BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 29	Q1 TRANSIENT SUPP	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 30	Q2 TRANSIENT SUPP	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 31	Q3 TRANSIENT SUPP	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 32	Q4 TRANSIENT SUPP	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 33	28V TRANSIENT SUPP	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 34	Q1 GATE BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1 C 35	Q2 GATE BYPASS	CAPACITOR	0.1MF 200V	913-3681-000

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
A 1C 36	Q3 GATE BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1C 37	Q4 GATE BYPASS	CAPACITOR	0.1MF 200V	913-3681-000
A 1CR 1	DS4A LAMP BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A 1CR 2	DS4C LAMP BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A 1CR 3	DS4D LAMP BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A 1CR 4	DS5A LAMP BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A 1DS 1A	FILAMENT OFF	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 1C	FILAMENT OFF	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 2A	FILAMENT ON	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 2C	FILAMENT ON	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 3A	DOORS	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 3B	DOORS	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 3C	AIR	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 3D	AIR	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 4A	PA OL	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 4B	PA OL	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 4C	MOD1 OL	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 4D	MOD2 OL	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 5A	DC OL	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 5B	DC OL	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 5C	LAMP RESET	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 5D	LAMP RESET	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 6A	LOW PWR ON	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 6C	LOW PWR ON	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 7A	HIGH PWR ON	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 7C	HIGH PWR ON	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 8A	PLT OFF/RESET	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1DS 8C	PLT OFF/RESET	LAMP	TYPE 327 28V 40MA	262-0179-000
A 1E 1	GROUND	TERMINAL	SOLDER TYPE	304-0318-000
A 1M 1	TEST METER 1	METER	1MA 1.5KOHM 0-1.5/3	458-0783-050
A 1M 2	5KW PLATE CURRENT	METER	1MA 1KOHM 0-2AMP DC	458-0783-080
A 1M 2	10KW PLATE CURRENT	METER	1MA 2KOHM 0-4AMP DC	458-0783-070
A 1M 3	PLATE VOLTAGE	METER	2MA 1KOHM 0-6KV DC	458-0783-060
A 1M 4	TEST METER 2	METER	1MA 1.5KOHM 0-1.5/3	458-0783-050
A 1Q 1	PA OL INDICATION	SC RECTIFIER	C6F 50PIV 600MA	353-6468-010
A 1Q 2	MOD 1 OL INDICATION	SC RECTIFIER	C6F 50PIV 600MA	353-6468-010
A 1Q 3	MOD 2 OL INDICATION	SC RECTIFIER	C6F 50PIV 600MA	353-6468-010
A 1Q 4	DC OL INDICATION	SC RECTIFIER	C6F 50PIV 600MA	353-6468-010
A 1R 1	DS1A+C LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000
A 1R 2	DS2A+C LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000
A 1R 3	DS3A+B LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000
A 1R 4	DS3C+C LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000
A 1R 5	Q1 GATE DIVIDER	RESISTOR	220 OHM 1/2W 10PC	745-1324-000
A 1R 6	Q1 GATE DIVIDER	RESISTOR	4.7K OHM 1/2W 10PC	745-1380-000
A 1R 7	DS4A+B LAMP DROPPING	RESISTOR	27 OHM 1W 10PC	745-3286-000
A 1R 8	Q2 GATE DIVIDER	RESISTOR	220 OHM 1/2W 10PC	745-1324-000
A 1R 9	Q2 GATE DIVIDER	RESISTOR	4.7K OHM 1/2W 10PC	745-1380-000
A 1R 10	DS4C LAMP DROPPING	RESISTOR	47 OHM 1W 10PC	745-3296-000
A 1R 11	Q3 GATE DIVIDER	RESISTOR	220 OHM 1/2W 10PC	745-1324-000
A 1R 12	Q3 GATE DIVIDER	RESISTOR	4.7K OHM 1/2W 10PC	745-1380-000
A 1R 13	DS4D LAMP DROPPING	RESISTOR	47 OHM 1W 10PC	745-3296-000
A 1R 14	Q4 GATE DIVIDER	RESISTOR	220 OHM 1/2W 10PC	745-1324-000
A 1R 15	Q4 GATE DIVIDER	RESISTOR	4.7K OHM 1/2W 10PC	745-1380-000
A 1R 16	DS5A+B LAMP DROPPING	RESISTOR	27 OHM 1W 10PC	745-3286-000
A 1R 17	DS5C+D LAMP DROPPING	RESISTOR	27 OHM 1W 10PC	745-3286-000
A 1R 18	DS6A+C LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000
A 1R 19	DS7A+C LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000
A 1R 20	DS8A+C LAMP DROPPING	RESISTOR	39 OHM 1W 10PC	745-3293-000

* NOTE: REPLACE 327 lamps with 387 (6000HR) (25,000 HRS)
CPN 262-0179-010

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
A 1 S 1	FILAMENT OFF	SWITCH	SPDT 5A TYPE 12-327	266-6806-100
A 1 S 2	FILAMENT ON	SWITCH	SPDT 5A TYPE 12-327	266-6806-100
A 1 S 3	TEST METER 1	SWITCH	2 POLE 7 POS ROTARY	259-1949-000
A 1 S 4	TEST METER 2	SWITCH	2 POLE 7 POS ROTARY	259-1949-000
A 1 S 5	LAMP RESET	SWITCH	SPDT 5A TYPE 12-327	266-6806-100
A 1 S 6	LOW POWER ON	SWITCH	DPDT 5A TYPE 12-C	266-6806-110
A 1 S 7	HIGH POWER ON	SWITCH	DPDT 5A TYPE 12-C	266-6806-110
A 1 S 8	PLATE OFF/RESET	SWITCH	SPDT 5A TYPE 12-327	266-6806-100
A 1 S 9	PA TUNING	SWITCH	2 POLE 3 POS SPG RET	259-1980-000
A 1 S 10	PA LOADING	SWITCH	2 POLE 3 POS SPG RET	259-1980-000
A 1 S 11	AUTO/MAN TUNING	SWITCH	1 POLE 3 POS ROTARY	259-1321-000
A 1 TB 1A	CONNECTING	TERMINAL BRD	17 Y TERMINAL	367-0025-000
A 1 TB 1B	CONNECTING	TERMINAL BRD	16 Y TERMINAL	367-0024-000
A 1 TB 1C	CONNECTING	TERMINAL BRD	17 Y TERMINAL	367-0025-000
A 1 TB 1D	CONNECTING	TERMINAL BRD	16 Y TERMINAL	367-0024-000
A 1 XDS 1	FILAMENT OFF LAMP	HOLDER	TYPE 12-1 SW-LT UNIT	266-6806-010
A 1 XDS 1H	FILAMENT OFF LAMP	INSERT	TYPE 12-240-13	266-6806-270
A 1 XDS 1J	FILAMENT OFF LAMP	LENS + BASE	TYPE 12-250 DISPLAY	266-6806-230
A 1 XDS 1K	DS1A COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 1L	DS1C COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 1M	XDS1 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 2	FILAMENT ON LAMP	HOLDER	TYPE 12-1 SW-LT UNIT	266-6806-010
A 1 XDS 2H	FILAMENT ON LAMP	INSERT	TYPE 12-240-13	266-6806-280
A 1 XDS 2J	FILAMENT ON LAMP	LENS + BASE	TYPE 12-250 DISPLAY	266-6806-230
A 1 XDS 2K	DS2A COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 2L	DS2C COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 2M	XDS1/XDS2 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 3	DOORS/AIR LAMP	HOLDER	TYPE 12-22 IND UNIT	266-6806-020
A 1 XDS 3H	DOORS/AIR LAMP	INSERT	TYPE 12-240-16	266-6806-290
A 1 XDS 3J	DOORS/AIR LAMP	LENS + BASE	TYPE 12-252 DISPLAY	266-6806-250
A 1 XDS 3K	DS3A COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 3L	DS3B COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 3M	DS3C COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 3N	DS3D COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 3P	XDS2/XDS3 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 3R	XDS3 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 4	PA/MOD OL LAMP	HOLDER	TYPE 12-22 IND UNIT	266-6806-020
A 1 XDS 4H	PA/MOD OL LAMP	INSERT	TYPE 12-240-60	266-6806-300
A 1 XDS 4J	PA/MOD OL LAMP	LENS + BASE	TYPE 12-257 DISPLAY	266-6806-260
A 1 XDS 4K	DS4A COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 4L	DS4B COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 4M	DS4C COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 4N	DS4D COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 4P	XDS4 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 5	DC OL/LAMP RESET LAMP	HOLDER	TYPE 12-1 SW-LT UNIT	266-6806-010
A 1 XDS 5H	DC OL/LAMP RESET LAMP	INSERT	TYPE 12-240-16	266-6806-310
A 1 XDS 5J	DC OL/LAMP RESET LAMP	LENS + BASE	TYPE 12-252 DISPLAY	266-6806-250
A 1 XDS 5K	DS5A COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 5L	DS5B COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 5M	DS5C COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 5N	DS5D COLOR FILTER	BOOT	TYPE 12-Y YEL FILTER	266-6806-050
A 1 XDS 5P	XDS4/XDS5 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 5R	XDS5 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 6	LOW POWER ON LAMP	HOLDER	TYPE 12-1 SW-LT UNIT	266-6806-010
A 1 XDS 6H	LOW POWER ON LAMP	INSERT	TYPE 12-240-13	266-6806-320
A 1 XDS 6J	LOW POWER ON LAMP	LENS + BASE	TYPE 12-250 DISPLAY	266-6806-230
A 1 XDS 6K	DS6A COLOR FILTER	BOOT	TYPE 12-R RED FILTER	266-6806-060
A 1 XDS 6L	DS6C COLOR FILTER	BOOT	TYPE 12-R RED FILTER	266-6806-060
A 1 XDS 6M	XDS8/XDS6 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 7	HIGH POWER ON LAMP	HOLDER	TYPE 12-1 SW-LT UNIT	266-6806-010
A 1 XDS 7H	HIGH POWER ON LAMP	INSERT	TYPE 12-240-13	266-6806-330
A 1 XDS 7J	HIGH POWER ON LAMP	LENS + BASE	TYPE 12-250 DISPLAY	266-6806-230
A 1 XDS 7K	DS7A COLOR FILTER	BOOT	TYPE 12-R RED FILTER	266-6806-060
A 1 XDS 7L	DS7C COLOR FILTER	BOOT	TYPE 12-R RED FILTER	266-6806-060
A 1 XDS 7M	XDS6/XDS7 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
A 1 XDS 7N	XDS7 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 1 XDS 8	PLT OFF/RESET LAMP	HOLDER	TYPE 12-1 SW-LT UNIT	266-6806-010
A 1 XDS 8H	PLT OFF/RESET LAMP	INSERT	TYPE 12-240-13	266-6806-340
A 1 XDS 8J	PLT OFF/RESET LAMP	LENS + BASE	TYPE 12-250 DISPLAY	266-6806-230
A 1 XDS 8K	DS8A COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 8L	DS8C COLOR FILTER	BOOT	TYPE 12-G GRN FILTER	266-6806-040
A 1 XDS 8M	XDS8 SUPPORT	BARRIER	TYPE 12-S2 GRAY	266-6806-030
A 2	PA SENSOR	ASSEMBLY	OVERLOAD SENSOR	762-8834-001
A 2 C 1	RF FILTER	CAPACITOR	0.01MF 500V	913-1188-000
A 2 C 2	FILTER	CAPACITOR	35MF 6V	183-1187-000
A 2 CR 1	PEAK LIMITING	DIODE	1N746 3.3V ZENER	353-2937-000
A 2 CR 2	TRANSIENT SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
A 2 CR 3	DC RETURN	DIODE	1N746 3.3V ZENER	353-2937-000
A 2 K 1	OVERLOAD	RELAY	48V COIL 4C	970-2230-000
A 2 L 1	RF FILTER CHOKE	INDUCTOR	1MHY 104MA	240-2540-000
A 2 Q 1	OVLD SENSING	SC SWITCH	3N85	353-3601-020
A 2 R 1	SENSITIVITY ADJ	RESISTOR	250 OHM 2W POT	380-2765-000
A 2 R 2	LIMITING	RESISTOR	1.5K OHM 1/2W 10PC	745-1359-000
A 2 R 3	LOAD	RESISTOR	10K OHM 1/2W 10PC	745-1394-000
A 2 R 4	LIMITING	RESISTOR	1.2K OHM 1/2W 10PC	745-1356-000
A 2 RT 1	COMPENSATING	THERMISTOR	10K OHM 1/2W 1950B	714-0182-000
A 3	MOD 1 SENS SAME AS A2	ASSEMBLY	OVERLOAD SENSOR	762-8834-001
A 4	MOD 2 SENS SAME AS A2	ASSEMBLY	OVERLOAD SENSOR	762-8834-001
A 5	DC SENSOR SAME AS A2	ASSEMBLY	OVERLOAD SENSOR	762-8834-002
A 6	RECYC TIMER/LOCKOUT	ASSEMBLY	RECYC TIMER/LOCKOUT	762-8901-002
A 6 C 1	Q1 GATE BYPASS	CAPACITOR	100MF 20V	184-7721-000
A 6 C 2	TIME DELAY	CAPACITOR	2.2MF 35V	184-7704-000
A 6 C 3	Q1 BYPASS	CAPACITOR	0.05MF 100V	913-3679-000
A 6 CR 1	20V INPUT REFERENCE	DIODE	1N3027B 20V ZENER	353-3132-000
A 6 CR 2	INPUT BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A 6 CR 3	INPUT BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A 6 CR 4	Q1 TRIGGERING	DIODE	1N961B 10V ZENER	353-3325-000
A 6 CR 5	K1 ARC SUPPRESSING	DIODE	1N645 225PIV 400MA	353-2607-000
A 6 K 1	RECYCLE/LOCKOUT	RELAY	48V COIL 4C	970-2230-000
A 6 Q 1	RECYCLE/LOCKOUT TRIG	SC SWITCH	3N58 40PIV 100MA CANT GET	353-3525-000
A 6 R 1	DROPPING	RESISTOR	18K OHM 1/2W 10PC	745-1405-000
A 6 R 2	INPUT DIVIDER	RESISTOR	1.8K OHM 1/2W 10PC	745-1363-000
A 6 R 3	GATE LIMITING	RESISTOR	10K OHM 1/2W 10PC	745-1394-000

RING 352-9904-000
SOCKET 352-9918-000
3N81 TRANSISTOR 353-3675-010

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
A6 R 4	GATE RETURN	RESISTOR	51.1K OHM 1/2W 1PC	705-7178-000
A6 R 5	INPUT LIMITING	RESISTOR	68K OHM 1/2W 10PC	745-1429-000
A6 R 6	INPUT DIVIDER	RESISTOR	1K OHM 2W 10PC	745-5652-000
A7	FILAMENT REGULATOR	ASSEMBLY	VOLTAGE REGULATOR	762-8835-001
A7 R 1	VOLTAGE ADJUST	RESISTOR	50 OHM 10PC 2W POT	750-0533-000
A7 R 2	INPUT BRIDGE	RESISTOR	270 OHM 10PC 2W	745-5628-000
A7 R 3	INPUT BRIDGE	RESISTOR	270 OHM 10PC 2W	745-5628-000
A7 T 1	FIL VOLTAGE ADJUST	TRANSFORMER	VARIABLE SUP 226U-2	664-4010-010
A7A 1	CONTROL DRIVE	ASSEMBLY	CONTROL DRIVE	554-4758-004
A7A 1B 1	DRIVE	MOTOR	28VDC 300MA	230-0367-000
A7A 1C 1	Q1 BLOCKING	CAPACITOR	33MF 10VDC	184-7382-000
A7A 1C 2	Q1 EMITTER BYPASS	CAPACITOR	33MF 10VDC	184-7382-000
A7A 1C 3	COUPLING	CAPACITOR	33MF 10VDC	184-7382-000
A7A 1C 4	K3 DELAY	CAPACITOR	200MF 25VDC	184-7961-000
A7A 1C 5	K1 BYPASS	CAPACITOR	10MF 50VDC	183-1368-000
A7A 1C 6	K2 BYPASS	CAPACITOR	10MF 50V	183-1368-000
A7A 1C 7	Q4 GATE BYPASS	CAPACITOR	0.1MF 100VDC	913-3681-000
A7A 1CR 1	RAISE SUPPLY RECTIFY	DIODE	1N2611 200PIV 750MA	353-1906-000
A7A 1CR 2	LOWER SUPPLY RECTIFY	DIODE	1N2611 200PIV 750MA	353-1906-000
A7A 1CR 3	-28VDC RECTIFYING	DIODE	1N2611 200PIV 750MA	353-1906-000
A7A 1CR 4	-28VDC RECTIFYING	DIODE	1N2611 200PIV 750MA	353-1906-000
A7A 1CR 5	+28VDC TRANSIENT SUPPR	DIODE	1N3030B 27V ZENER	353-3135-000
A7A 1DS 1	INPUT BRIDGE	LAMP	28V 0.17AMP T-3-1/4	262-3270-000
A7A 1DS 2	INPUT BRIDGE	LAMP	28V 0.17AMP T-3-1/4	262-3270-000
A7A 1F 1	AC LINE INPUT	FUSE	0.250AMP 250V 3AG	264-4240-000
A7A 1K 1	RAISE	RELAY	28VDC/115VAC COIL 3C	970-2230-000
A7A 1K 2	LOWER	RELAY	28VDC/115VAC COIL 3C	970-2230-000
A7A 1K 3	TIME DELAY	RELAY	28VDC/115VAC COIL 2C	974-0464-000
A7A 1K 4	MOTOR CONTROL	RELAY	28VDC/115VAC COIL 3C	970-2230-000
A7A 1Q 1	INPUT AMPLIFIER	TRANSISTOR	2N697 NPN 2W	352-0197-000
A7A 1Q 2	RAISE SENSING	SC RECTIFIER	2N886 60PIV 200MA	353-3369-000
A7A 1Q 3	LOWER SENSING	SC RECTIFIER	2N886 60PIV 200MA	353-3369-000
A7A 1Q 4	LAMP BURN OUT PROTECT	SC RECTIFIER	2N886 60PIV 200MA	353-3369-000
A7A 1R 1	INPUT BRIDGE	RESISTOR	120 OHM 6.5W 5PC	747-5442-000
A7A 1R 2	C4 CURRENT LIMITING	RESISTOR	220 OHM 1/2W 10PCW	745-1324-000
A7A 1R 3	Q1 DIVIDER	RESISTOR	22K OHM 1/2W 10PC	745-1408-000
A7A 1R 4	Q1 BIAS	RESISTOR	5.6K OHM 1/2W 10PC	745-1384-000
A7A 1R 5	+28VDC LIMITING	RESISTOR	3.3K OHM 1/2W 10PC	745-1373-000
A7A 1R 6	Q1 EMITTER	RESISTOR	100 OHM 1/2W 10PC	745-1310-000
A7A 1R 7	RAISE SENS ADJUST	RESISTOR	50K OHM 1/2W 20PC	380-2909-000
A7A 1R 8	LOWER SENS ADJUST	RESISTOR	50K OHM 1/2W 20PC	380-2909-000
A7A 1R 9	RAISE SENS DIVIDER	RESISTOR	10K OHM 1/2W 10PC	745-1394-000
A7A 1R 10	LOWER SENS DIVIDER	RESISTOR	10K OHM 1/2W 10PC	745-1394-000
A7A 1R 11	K3 -28VDC LIMIT	RESISTOR	2.2K OHM 1W 10PC	745-3366-000
A7A 1R 12	K3 +28VDC LIMIT	RESISTOR	2.2K OHM 1W 10PC	745-3366-000
A7A 1R 13	Q1 INPLT	RESISTOR	4.7K OHM 1/2W 10PC	745-1380-000
A7A 1R 14	INPUT BRIDGE LIMIT	RESISTOR	82 OHM 11W 5PC	746-6142-000
A7A 1R 15	-28VDC LOAD	RESISTOR	1K OHM 2W 10PC	745-5652-000
A7A 1R 16	Q4 GATE	RESISTOR	1.2K OHM 1/2W 10PC	745-1356-000

KIT TO CONVERT RELAYS (A8-ALL & K1, 3, 4, 12 & 13) TO PLUG IN TYPE CPN 782-0071-001

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
A7A 1R 17	Q4 GATE LIMITING	RESISTOR	18K OHM 1/2W 10PC	745-1405-000
A7A 1R 18	+28VDC INPUT LIMIT	RESISTOR	390 OHM 1/2W 10PC	745-1335-000
A7A 1RT 1	Q2 COMPENSATING	THERMISTOR	10K OHM 1/2W 10PC	714-1738-000
A7A 1RT 2	Q3 COMPENSATING	THERMISTOR	10K OHM 1/2W 10PC	714-1738-000
A7A 1S 1	RAISE LIMIT	SWITCH	SPDT 6AMP 28VDC	260-0025-000
A7A 1S 2	LOWER LIMIT	SWITCH	SPDT 6AMP 28VDC	260-0025-000
A7A 1T 1	INPUT VOLTAGE	TRANSFORMER	47-420CPS	662-0113-000
A7A 1XDF 1	AC LINE INPUT FUSE	HOLDER	INDICATING	265-1072-000
A7A 1XDS 1	INPUT BRIDGE LAMP	SOCKET	GREEN LAMP	262-0919-000
A7A 1XDS 2	INPUT BRIDGE LAMP	SOCKET	GREEN LAMP	262-0919-000
A8	REMOTE CONT RELAY PNL	ASSEMBLY	REM CONT RELAY PNL	762-8847-001
A8 K 1	FIL OFF	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 2	FIL ON	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 3	FAIL SAFE	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 4	LOW PWR PL OFF/RESET	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 5	LOW PWR PL ON	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 6	HIGH PWR PL OFF/RESET	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 7	HIGH PWR PL ON	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 8	PWR ADJ LOWER	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 K 9	PWR ADJ RAISE	RELAY	28VDC/115VAC COIL 2C	972-1347-000
A8 TB 1	RMTE CTL INTER CONNECT	TERMINAL BRD	21 TERMINAL	367-0132-000
A8 TB 2	RMTE CTL EXT CONNECT	TERMINAL BRD	11 TERMINAL	367-0123-000
A9	AUTO TUNE	ASSEMBLY	AUTO TUNE	762-8919-001
A9 C 1	BYPASS	CAPACITOR	2.2MF 25V	913-3812-000
A9 C 2	BYPASS	CAPACITOR	0.01MF 500V	912-2735-000
A9 C 3	BYPASS	CAPACITOR	0.01MF 500V	912-2735-000
A9 C 4	BYPASS	CAPACITOR	5500PF 200V FEEDTHRU	241-0441-000
A9 C 5	BYPASS	CAPACITOR	5500PF 200V FEEDTHRU	241-0441-000
A9 C 6	BYPASS	CAPACITOR	5500PF 200V FEEDTHRU	241-0441-000
A9 C 7	BYPASS	CAPACITOR	5500PF 200V FEEDTHRU	241-0441-000
A9 C 8	BYPASS	CAPACITOR	5500PF 200V FEEDTHRU	241-0441-000
A9 C 9	BIAS INPUT	CAPACITOR	5500PF 200V FEEDTHRU	241-0441-000
A9 C 10	BIAS COUPLING	CAPACITOR	1.0MF 25V	913-3810-000
A9 CR 1	SIGNAL RECTIFYING	DIODE	1N3064 50PIV 75MA	353-2607-000
A9 CR 2	SIGNAL RECTIFYING	DIODE	1N3064 50PIV 75MA	353-2607-000
A9 CR 3	BLOCKING	DIODE	1N645 225PIV 400MA	353-2607-000
A9 CR 4	BIAS CLIPPING	DIODE	1N91	353-1010-000
A9 CR 5	BIAS CLIPPING	DIODE	1N91	353-1010-000
A9 L 1	FILTER CHOKE	INDUCTOR	10MH 104MA	240-0844-000
A9 L 2	FILTER CHOKE	INDUCTOR	10MH 104MA	240-0844-000
A9 Q 1	RAISE SENSING	SC SWITCH	3N85	353-3601-020
A9 Q 2	LOWER SENSING	SC SWITCH	3N85	353-3601-020

PLUG-INS FOR ALL A8 24/48/115 V " 6V " 970-2454-250 (3C) - ~~5000~~ 290 " (2C)

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
A 9 R 1	LOADING	RESISTOR	10 OHM 3W 3PC	705-1434-010
A 9 R 2	LOADING	RESISTOR	10 OHM 3W 3PC	705-1434-010
A 9 R 3	LOADING	RESISTOR	5.6K OHM 1/4W 1PC	705-7132-000
A 9 R 4	LOADING	RESISTOR	5.6K OHM 1/4W 1PC	705-7132-000
A 9 R 5	DISC ISOLATION	RESISTOR	10K OHM 1/2W 10PC	745-1394-000
A 9 R 6	PHASE BALANCE	RESISTOR	500 OHM 1/2W POT	380-2903-000
A 9 R 7	BIAS DROPPING	RESISTOR	2.7K OHM 1/2W 10PC	745-1370-000
A10	AM. BROADCAST	EXCITER	310W-1 /GRAY PNL/	758-5207-002
A10	AM. BROADCAST	EXCITER	310W-1 /WHITE PNL/	758-5207-001
	SEE COLLINS 310W-1 INSTRUCTION MANUAL. COLLINS PART NO. 523-0556833-001438.			
	FILTER, BACK DOOR AIR			762-8675-008

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FROM						TO							
FC UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION	
U2				NOT USED					01	158		NOT USED	
U2				NOT USED					01	160		NOT USED	
U2				NOT USED					01	163		NOT USED	
U2				NOT USED					01	162		NOT USED	
U2				NOT USED					01	164		NOT USED	
U2				NOT USED					01	165		NOT USED	
U2				NOT USED					01	167		NOT USED	
U2				NOT USED					01	166		NOT USED	
U2				NOT USED					01	168		NOT USED	
U2				NOT USED					01	169		NOT USED	
U2				NOT USED					01	171		NOT USED	
U2				NOT USED					01	172		NOT USED	
U2				NOT USED					01	173		NOT USED	
U2				NOT USED					01	175		NOT USED	
U2				NOT USED					01	174		NOT USED	
U2				NOT USED					01	176		NOT USED	
U2				NOT USED					01	177		NOT USED	
U2				NOT USED					01	180A		NOT USED	
U2				NOT USED					01	180S		NOT USED	
U2				NOT USED					W 1	3		NOT USED	
U2				NOT USED					W 1	2		NOT USED	
U2				NOT USED					W 1	1		NOT USED	
U2				NOT USED					W 1	177		NOT USED	
U2				NOT USED					W 1	179		NOT USED	
U2				NOT USED					W 1	178		NOT USED	
U2				NOT USED					W 1	175		NOT USED	
U2				NOT USED					W 1	216		NOT USED	
U2				NOT USED					W 1	227		NOT USED	
U2				NOT USED					W 1	311		NOT USED	
U2				NOT USED					W 1	321		NOT USED	
U2				NOT USED					W 1	326		NOT USED	
U2				NOT USED					W 1	337		NOT USED	
U2				NOT USED					W 1	314		NOT USED	
U2				NOT USED					W 1	316		NOT USED	
U2				)					W 1	343		NOT USED	
U2				USED					W 1	332		NOT USED	
U2				NOT USED					W 1	339		NOT USED	
U2				NOT USED					W 1	338		NOT USED	
U2				NOT USED					W 1	364		NOT USED	
U2				NOT USED				A 1	01	7		NOT USED	
U2				NOT USED				A 1	01	6		NOT USED	
U2				NOT USED				A 1	01	8		NOT USED	
U2				NOT USED				A 1	01	3		NOT USED	
U2				NOT USED				A 1	01	2		NOT USED	
U2				NOT USED				A 1	01	5		NOT USED	
U2				NOT USED				A 1	01	4		NOT USED	
U2	B 1	1	E C		K 1	10			W 1	41	A18P800X9XXX	PHASE A MAIN BLOWER	
U2	B 1	2	E C		TB 5	2	E 8		W 1	192	A16P800X9XXX	PHASE C MAIN BLOWER	

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FC	FROM UNIT	FROM SYM	FROM PIN	FROM CONN	TO UNIT	TO SYM	TO PIN	TO CONN	CABLE	WIRE	WIRE CODE	FUNCTION
U1		C 1	1	E C		R 1	2		W 1	184	A20PB00X9XXX	AIR INTLK CKT
U2		C 1	2	E C		TB 6	2	E A	W 1	198	A16PB00X9XXX	GROUND
U1		C 1	2	E C		R 5	2		W 1	253	A20PB00X9XXX	GROUND
U2		C 1	2	E C		C 117	2	E C	W 1	353	A20PB00X9XXX	CONTROL CKT GND
U2		C 2	2			R 5	2		W 1	347	A16PB00X9XXX	GROUND
U2		C 3	2			R 14	2		W 1	53	A20PB00X9XXX	BIAS SUPPLY RETURN
U1		C 3	2			R 111	2		W 1	255	A16PB00X9XXX	BIAS SUPPLY RETURN
U1		C 3	2			E 31	1		W 1	281	A16PB00X9XXX	BIAS SUPPLY RETURN
U1		C 4	1	E C		R 14	2		W 1	52	A20PB00X9XXX	BIAS SUPPLY RETURN
U2		C 4	2	E C		R 13	1		W 1	49	A20PB00X9XXX	-250V BIAS SUPPLY
U2		C 4	2	E C		L 1	2		W 1	48	A20PB00X9XXX	-250V BIAS SUPPLY
U2		C 5	1	E D		R 19	1		W 1	194	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U2		C 5	2	E D		R 19	2		W 1	195	A16PB00X9XXX	MOD SCRN SUP RETURN
U2		C 6	1	E D		R 25	1		W 1	199	A16PD00X9XXX	PA SCRN PWR SUPPLY
U2		C 6	2	E D		R 26	2		W 1	200	A16PB00X9XXX	PA SCRN SUP RETURN
U2		C 7	1	E Q		R 31	2	E Q	06	7		HIGH VOLT SUPPLY
U2		C 7	2	E Q		C 8	1	E Q	06	5		HIGH VOLT SUPPLY
U1		C 8	1	E Q		C 7	2	E Q	06	5		HIGH VOLT SUPPLY
U2		C 8	1	E Q		CR 23	CT1		W 5	11		HIGH VOLT SUPPLY
U1		C 8	2	E Q		R 32	1	E Q	06	6		HIGH VOLT SUPPLY
U2		C 9	1	E U		R 33	2	E Q	W 5	8		HIGH VOLT SUPPLY
U1		C 9	2	E U		CR 23	NEG		W 5	9		HV SUPPLY RETURN
U2		C 61	1			E 31	1		W 1	329	A18PB00X9XXX	PA GRID CURR
U1		C 61	2			J 12	1		W 1	173	A18PB00X9XXX	PA GRID CURR
U2		C 66	1			E 32	1		W 1	328	A18PB00X9XXX	PA GRID CURR
U1		C 66	2			J 13	1		W 1	174	A18PB00X9XXX	PA GRID CURR
U1		C 67	1	E T		C 68	1	E T	01	49		10KW MOD CKT
U2		C 67	1	E T		T 12	5	E T	01	58		MOD OUTPUT CKT
U1		C 67	2	E T		C 68	2	E T	01	50		10KW MOD CKT
U1		C 67	2	E T		E 28	1	E Q	01	59		MOD OUTPUT CKT
U2		C 68	1	E T		C 67	1	E T	01	49		10KW MOD CKT
U2		C 68	2	E T		C 67	2	E T	01	50		10KW MOD CKT
U2		C 69	1			L 3	2		W 1	244	A16PD00X9XXX	DVR SCRN SUPPLY
U2		C 69	1			E 22	1	E D	W 1	254	A16PD00X9XXX	BIAS SUPPLY
U1		C 69	2			R 140	2		05	23	A16PB00X9XXX	DRIVER PLATE SUPPLY
U1		C 72	1			T 13	3	(GRN)	05	17	Z22TM00XXXXX	RF DRIVER INPUT
U1		C 72	2			T 13	4	(WHT)	05	16	Z22TM00XXXXX	RF DRIVER INPUT
U1		C 73	2			T 13	4	(WHT)	05	15	Z22TM00XXXXX	RF DRIVER INPUT
U2		C 81	1			R 14	1		W 1	247	A20PB00X9XXX	-60V BIAS SUPPLY
U1		C 81	2			CR 26	1		W 1	317	A18PB00X9XXX	RF DVR GRID CKT
U2		C 82	1			R 25	2		W 1	245	A16PB00X9XXX	PA SCRN PWR SUPPLY
U1		C 82	2			E 25	1		W 1	318	A18PB00X9XXX	RF DVR GRID CKT
U2		C 83	1			E 45	1		05	2	Z16TM00XXXXX	PA GRID TUNING CKT
U1		C 83	1			L 6	1		05	8	Z16TM00XXXXX	PA GRID TUNING CKT
U1		C 83	2			E 21	1		05	3	Z16TM00XXXXX	PA GRID TUNING CKT
U2		C 85	1	E B		R 140	1		05	7	A16PB00X9XXX	DVR PLT CKT
U2		C 85	1	E X		L 7	2		05	6	Z16TM00XXXXX	DVR PLT BYPASS

section 7

wire list

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FROM					TO							
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2					NOT USED					01	103		NOT USED
U2					NOT USED					01	102		NOT USED
U2					NOT USED					01	104		NOT USED
U2					NOT USED					01	105		NOT USED
U2					NOT USED					01	107		NOT USED
U2					NOT USED					01	106		NOT USED
U2					NOT USED					01	108		NOT USED
U2					NOT USED					01	109		NOT USED
U2					NOT USED					01	111		NOT USED
U2					NOT USED					01	110		NOT USED
U2					NOT USED					01	115		NOT USED
U2					NOT USED					01	123		NOT USED
U2					NOT USED					01	124		NOT USED
U2					NOT USED					01	125		NOT USED
U2					NOT USED					01	127		NOT USED
U2					NOT USED					01	126		NOT USED
U2					NOT USED					01	128		NOT USED
U2					NOT USED					01	129		NOT USED
U2					NOT USED					01	131		NOT USED
U2					NOT USED					01	130		NOT USED
U2					NOT USED					01	132		NOT USED
U2					NOT USED					01	133		NOT USED
U2					NOT USED					01	135		NOT USED
U2					NOT USED					01	134		NOT USED
U2					NOT USED					01	136		NOT USED
U2					NOT USED					01	137		NOT USED
U2					NOT USED					01	139		NOT USED
U2					NOT USED					01	138		NOT USED
U2					NOT USED					01	140		NOT USED
U2					NOT USED					01	141		NOT USED
U2					NOT USED					01	143		NOT USED
U2					NOT USED					01	142		NOT USED
U2					NOT USED					01	144		NOT USED
U2					NOT USED					01	145		NOT USED
U2					NOT USED					01	147		NOT USED
U2					NOT USED					01	146		NOT USED
U2					NOT USED					01	148		NOT USED
U2					NOT USED					01	149		NOT USED
U2					NOT USED					01	151		NOT USED
U2					NOT USED					01	150		NOT USED
U2					NOT USED					01	152		NOT USED
U2					NOT USED					01	153		NOT USED
U2					NOT USED					01	155		NOT USED
U2					NOT USED					01	154		NOT USED
U2					NOT USED					01	156		NOT USED
U2					NOT USED					01	157		NOT USED
U2					NOT USED					01	159		NOT USED

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2					NOT USED					01	4		NOT USED
U2					NOT USED					01	5		NOT USED
U2					NOT USED					01	7		NOT USED
U2					NOT USED					01	6		NOT USED
U2					NOT USED					01	12		NOT USED
U2					NOT USED					01	13		NOT USED
U2					NOT USED					01	14		NOT USED
U2					NOT USED					01	19		NOT USED
U2					NOT USED					01	20		NOT USED
U2					NOT USED					01	25		NOT USED
U2					NOT USED					01	26		NOT USED
U2					NOT USED					01	39		NOT USED
U2					NOT USED					01	40		NOT USED
U2					NOT USED					01	43		NOT USED
U2					NOT USED					01	42		NOT USED
U2					NOT USED					01	44		NOT USED
U2					NOT USED					01	45		NOT USED
U2					NOT USED					01	48		NOT USED
U2					NOT USED					01	51		NOT USED
U2					NOT USED					01	61		NOT USED
U2					NOT USED					01	62		NOT USED
U2					NOT USED					01	63		NOT USED
U2					NOT USED					01	65		NOT USED
U2					NOT USED					01	64		NOT USED
U2					NOT USED					01	66		NOT USED
U2					NOT USED					01	67		NOT USED
U2					NOT USED					01	69		NOT USED
U2					NOT USED					01	68		NOT USED
U2					NOT USED					01	75		NOT USED
U2					NOT USED					01	76		NOT USED
U2					NOT USED					01	79		NOT USED
U2					NOT USED					01	78		NOT USED
U2					NOT USED					01	83		NOT USED
U2					NOT USED					01	82		NOT USED
U2					NOT USED					01	85		NOT USED
U2					NOT USED					01	84		NOT USED
U2					NOT USED					01	87		NOT USED
U2					NOT USED					01	86		NOT USED
U2					NOT USED					01	89		NOT USED
U2					NOT USED					01	88		NOT USED
U2					NOT USED					01	90		NOT USED
U2					NOT USED					01	95		NOT USED
U2					NOT USED					01	96		NOT USED
U2					NOT USED					01	97		NOT USED
U2					NOT USED					01	99		NOT USED
U2					NOT USED					01	98		NOT USED
U2					NOT USED					01	100		NOT USED
U2					NOT USED					01	101		NOT USED

FC	FROM UNIT	FROM SYM	FROM PIN	FROM CONN	TO UNIT	TO SYM	TO PIN	TO CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		C 87	1			R 142	1			04	7	Z16TM00XXXXX	PA1 GRID BYPASS
U2		C 90	1			R 176	1			01	179	A16PD00X9XXX	MOD SCRN RED PWR
U1		C 90	2			R 176	2			01	181	A16PD00X9XXX	MOD SCRN RED PWR
U2		C 97	1			R 156	1			04	9	Z16TM00XXXXX	PA2 GRID BYPASS
U2		C 98	1			L 1	2		W	1	248	A20PB00X9XXX	-250V BIAS SUPPLY
U1		C 98	1			S 19	1	E C	W	1	322	A18PB00X9XXX	-250V BIAS SUPPLY
U1		C 98	2			R 142	2			04	15	A18PB00X9XXX	PA GRID BIAS
U1		C 98	2			S 20	1	E C	W	1	235	A18PB00X9XXX	SHORTING SWITCH
U1		C 99	2	E X		L 7	1			05	21	Z16TM00XXXXX	NEUTRALIZING
U1		C 99	3	E X		E 24	2			05	22	Z16TM00XXXXX	AUTO TUNE CKT
U1		C 101	1	E U		L 13	1	E Q		01	60		PA OUTPUT CKT
U2		C 106				C 118	1		W	14	4A	FUTURE USE	FUTURE USE
U2		C 106				E 46	1		W	14	4S	FUTURE USE	FUTURE USE
U2		C 106				C 119	1		W	14	4B	FUTURE USE	FUTURE USE
U1		C 106	1			L 18	2			01	38	Z22TM00XXXXX	MOD MON CKT
U1		C 106	2			K 10	R 3			01	37	Z22TM00XXXXX	MOD MON CKT
U1		C 115	1	E M		XV 1	S	E B		02	1	A16PB00X9XXX	MOD1 SCRN BYPASS
U1		C 116	1	E M		XV 2	S	E B		02	2	A16PB00X9XXX	MOD2 SCRN BYPASS
U2		C 117	1	E C		R 161	2		W	1	341	A20PB00X9XXX	TIME DELAY
U1		C 117	2	E C		C 1	2	E C	W	1	353	A20PB00X9XXX	CONTROL CKT GND
U2		C 117	2	E C		C 125	2	E C	W	1	349	A20PB00X9XXX	CONTROL CKT GND
U2		C 118	1			TB 3	10	E A	W	1	303A		FUTURE USE
U1		C 118	1			C 106			W	14	4A	FUTURE USE	FUTURE USE
U2		C 119	1			TB 3	11	E A	W	1	303B		FUTURE USE
U1		C 119	1			C 106			W	14	4B	FUTURE USE	FUTURE USE
U2		C 120	1			K 4	10		W	1	240	A20PB00X9XXX	PWR CHG RELAYS
U1		C 120	2			K 10	X 1		W	14	2	A20PB00X9XXX	MOD MON CKT
U1		C 121	1			E 8	1	E F	W	1	344	A20PB00X9XXX	GROUND
U2		C 121	2			K 10	X 2		W	14	1	A20PB00X9XXX	CONTROL CKT GND
U2		C 125	1	E C		R 137	2		W	1	172	A22PB00X9XXX	TIME DELAY
U1		C 125	2	E C		C 117	2	E C	W	1	349	A20PB00X9XXX	CONTROL CKT GND
U1		CB 1	CLD	E M		T 1	4	E B	W	1	34	A16PB00X9XXX	PHASE B TO 28V XMFR
U1		CB 1	CLD	E N		TB 7	2	E A	W	1	167	A20PB00X9XXX	AC TO TUNING CKT
U2		CB 1	CLN	E G		CB 3	CLN	E G	W	3	8	A08VB00X9XXX	28V PWR INPUT
U1		CB 1	LLD	E M		T 1	1	E B	W	1	33	A16PB00X9XXX	PHASE A TO 28V XMFR
U2		CB 1	LLN	E G		CB 2	LLN	E G	W	3	6	A08VB00X9XXX	28V PWR INPUT
U1		CB 1	RLD	E M		T 1	7	E B	W	1	35	A16PB00X9XXX	PHASE C TO 28V XMFR
U1		CB 1	RLD	E N		K 11	R 2		W	1	153	A20PB00X9XXX	AC TO TUNING CKT
U2		CB 1	RLN	E G		CB 2	RLN	E G	W	3	7	A08VB00X9XXX	28V PWR INPUT
U1		CB 2	LLD	E N		K 1	7		W	1	39	A18PB00X9XXX	PHASE A BLOWERS CONT
U1		CB 2	LLN	E G		CB 1	LLN	E G	W	3	6	A08VB00X9XXX	28V PWR INPUT
U2		CB 2	LLN	E G		CB 3	RLN	E G	W	3	4	A08VB00X9XXX	BLOWER PWR INPUT
U1		CB 2	RLD	E N		TB 5	2	E A	W	1	42	A18PB00X9XXX	PHASE C CABINET FAN
U2		CB 2	RLN	E G		CB 3	LLN	E G	W	3	5	A08VB00X9XXX	BLOWER PWR INPUT
U1		CB 2	RLN	E G		CB 1	RLN	E G	W	3	7	A08VB00X9XXX	28V PWR INPUT
U1		CB 3	C	E A		CR 2	1		W	1	55	A20PB00X9XXX	FIL AIR INTLK
U2		CB 3	NO	E A		K 2	C 1		W	1	54	A20PB00X9XXX	FIL AIR INTLK
U1		CB 3	CLD	E M		K 2	L 2	E M	W	1	5	A14VA00X9XXX	PHASE B TO FIL CONT

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM				TO							
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		CB 3	CLN	E G		CB 6	CLN	E H		W 3	2	A08VB00X9XXX	FILAMENT PWR INPUT
U1		CB 3	CLN	E G		CB 1	CLN	E G		W 3	8	A08VB00X9XXX	28V PWR INPUT
U1		CB 3	LLD	E M		K 2	L 3	E M		W 1	4	A14VA00X9XXX	PHASE A TO FIL CONT
U2		CB 3	LLN	E G		CB 6	RLN	E H		W 3	3	A08VB00X9XXX	FILAMENT PWR INPUT
U1		CB 3	LLN	E G		CB 2	RLN	E G		W 3	5	A08VB00X9XXX	BLOWER PWR INPUT
U1		CB 3	RLD	E M		K 2	L 1	E M		W 1	6	A14VA00X9XXX	PHASE C TO FIL CONT
U2		CB 3	RLN	E G		CB 6	LLN	E H		W 3	1	A08VB00X9XXX	FILAMENT PWR INPUT
U1		CB 3	RLN	E G		CB 2	LLN	E G		W 3	4	A08VB00X9XXX	BLOWER PWR INPUT
U1		CB 4	C	E A		TB 1B	28	E A		W 1	58	A22PB00X9XXX	FIL ON LAMP
U2		CB 4	C	E B		K 2	T 5	E B		W 1	59	A16PB00X9XXX	BIAS INTLK
U1		CB 4	NO	E B		TB 3	16	E B		W 1	129	A16PB00X9XXX	EXTRNL INTLK
U1		CB 4	LLD	E M		T 14	1			W 1	209	A16PB00X9XXX	AUTO TUNE XMFR INPUT
U1		CB 4	LLD	E N		T 7	2	E A		W 1	43	A20PB00X9XXX	PHASE A TO BIAS XMFR
U2		CB 4	LLN	E M		K 2	T 1	E M		W 1	25	A16PB00X9XXX	PHASE A TO BIAS BKR
U1		CB 4	RLD	E M		T 14	4			W 1	210	A16PB00X9XXX	AUTO TUNE XMFR INPUT
U1		CB 4	RLD	E N		T 7	1	E A		W 1	44	A20PB00X9XXX	PHASE C TO BIAS XMFR
U2		CB 4	RLN	E M		K 2	T 3	E M		W 1	28	A16PB00X9XXX	PHASE C TO BIAS BKR
U1		CB 5	CLD	E M		K 7	L 2	E M		W 1	8	A16PB00X9XXX	PHASE B TO SCRN CONT
U2		CB 5	CLN	E G		CB 6	CLD	E H		W 3	10	A08VB00X9XXX	PHASE B TO SCRN BKR
U1		CB 5	LLD	E M		K 7	L 1	E M		W 1	7	A16PB00X9XXX	PHASE A TO SCRN CONT
U2		CB 5	LLN	E G		CB 6	LLD	E H		W 3	9	A08VB00X9XXX	PHASE A TO SCRN BKR
U1		CB 5	RLD	E M		K 7	L 3	E M		W 1	9	A16PB00X9XXX	PHASE C TO SCRN CONT
U2		CB 5	RLN	E G		CB 6	RLD	E H		W 3	11	A08VB00X9XXX	PHASE C TO SCRN BKR
U1		CB 6	CLD	E H		K 6	L 2	E H		W 1	31	A08VB00X9XXX	PHASE B HV PL CONT
U1		CB 6	CLD	E H		CB 5	CLN	E G		W 3	10	A08VB00X9XXX	PHASE B TO SCRN BKR
U1		CB 6	CLD	E I		T 9	8	E I		W 4	2	A04VB00X9XXX	HIGH VOLT XFMR INPUT
U1		CB 6	CLN	E H		CB 3	CLN	E G		W 3	2	A08VB00X9XXX	FILAMENT PWR INPUT
U1		CB 6	LLD	E H		K 6	L 1	E H		W 1	30	A08VB00X9XXX	PHASE A HV PL CONT
U1		CB 6	LLD	E H		CB 5	LLN	E G		W 3	9	A08VB00X9XXX	PHASE A TO SCRN BKR
U1		CB 6	LLD	E I		T 9	3	E I		W 4	1	A04VB00X9XXX	HIGH VOLT XFMR INPUT
U1		CB 6	LLN	E H		CB 3	RLN	E G		W 3	1	A08VB00X9XXX	FILAMENT PWR INPUT
U1		CB 6	RLD	E H		K 6	L 3	E H		W 1	32	A08VB00X9XXX	PHASE C HV PL CONT
U1		CB 6	RLD	E H		CB 5	RLN	E G		W 3	11	A08VB00X9XXX	PHASE C TO SCRN BKR
U1		CB 6	RLD	E I		T 9	13	E I		W 4	3	A04VB00X9XXX	HIGH VOLT XFMR INPUT
U1		CB 6	RLN	E H		CB 3	LLN	E G		W 3	3	A08VB00X9XXX	FILAMENT PWR INPUT
U2		CR 2	1			CB 3	C	E A		W 1	55	A20PB00X9XXX	FIL AIR INTLK
U1		CR 2	2			TB 1B	26	E A		W 1	189	A20PB00X9XXX	AIR LAMP
U2		CR 14	AC1			T 1	10	E B		W 1	36	A16PB00X9XXX	AC TO 28V RECT
U2		CR 14	AC2			T 1	11	E B		W 1	37	A16PB00X9XXX	AC TO 28V RECT
U2		CR 14	AC3			T 1	12	E B		W 1	38	A16PB00X9XXX	AC TO 28V RECT
U1		CR 14	NEG	E B		E 6	1	E F		W 1	251	A16PB00X9XXX	GROUND
U1		CR 14	NEG	E B		R 5	2			W 1	354	A16PB00X9XXX	GROUND
U1		CR 14	POS	E B		TB 1A	13	E B		W 1	57	A16PB00X9XXX	+28 VOLTS
U1		CR 14	POS	E B		R 4	1			W 1	345	A16PB00X9XXX	+28 VOLTS
U2		CR 15	2			L 1	1			W 1	47	A20PB00X9XXX	-250V BIAS SUPPLY
U2		CR 17	2			T 7	4	E A		W 1	45	A20PB00X9XXX	BIAS SUPPLY RECT
U2		CR 18	2			T 7	5	E A		W 1	46	A20PB00X9XXX	BIAS SUPPLY RECT

	FROM					TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		CR 19	AC1	E	B		T 8	16	E	B		W 1	16	A16PD00X9XXX	AC TO MOD SCRN RECT
U1		CR 19	AC2	E	B		T 8	17	E	B		W 1	17	A16PD00X9XXX	AC TO MOD SCRN RECT
U1		CR 19	AC3	E	B		T 8	18	E	B		W 1	18	A16PD00X9XXX	AC TO MOD SCRN RECT
U1		CR 19	NEG	E	A		R 23	2				W 1	197	A20PB00X9XXX	MOD SCRN SUP RETURN
U2		CR 19	NEG	E	B		R 19	2				W 1	196	A16PB00X9XXX	MOD SCRN SUP RETURN
U1		CR 19	POS	E	B		L 2	1				W 1	20	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U2		CR 20	2				R 19	1				W 1	24	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U2		CR 20	2				L 2	2				W 1	193	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		CR 21	AC1	E	B		T 8	10	E	B		W 1	13	A16PD00X9XXX	AC TO PA SCRN RECT
U1		CR 21	AC2	E	B		T 8	11	E	B		W 1	14	A16PD00X9XXX	AC TO PA SCRN RECT
U1		CR 21	AC3	E	B		T 8	12	E	B		W 1	15	A16PD00X9XXX	AC TO PA SCRN RECT
U1		CR 21	NEG	E	A		R 30	2				W 1	202	A20PB00X9XXX	PA SCRN SUP RETURN
U1		CR 21	NEG	E	B		R 26	2				W 1	201	A16PB00X9XXX	PA SCRN SUP RETURN
U1		CR 21	POS	E	B		L 3	1				W 1	19	A16PD00X9XXX	PA SCRN PWR SUPPLY
U2		CR 22	2				L 3	2				07	7	A16PD00X9XXX	PA SCRN PWR SUPPLY
U1		CR 22	2				S 22	1	E	D		W 1	300	A16PD00X9XXX	SHORTING SWITCH
U2		CR 23	AC1				T 9	17	E	Q		W 5	2		AC TO HV RECT
U2		CR 23	AC2				T 9	18	E	Q		W 5	3		AC TO HV RECT
U2		CR 23	AC3				T 9	16	E	Q		W 5	1		AC TO HV RECT
U2		CR 23	AC4				E 62	1	E	Q		06	1		AC TO HV RECT
U2		CR 23	AC5				E 63	1	E	Q		06	2		AC TO HV RECT
U2		CR 23	AC6				E 64	1	E	Q		06	3		AC TO HV RECT
U1		CR 23	CT1				CR 23	CT2				06	4	A16PD00X9XXX	HIGH VOLT SUPPLY
U1		CR 23	CT1				C 8	1	E	Q		W 5	11		HIGH VOLT SUPPLY
U2		CR 23	CT2				CR 23	CT1				06	4	A16PD00X9XXX	HIGH VOLT SUPPLY
U1		CR 23	NEG				R 32	2	E	Q		06	9	A16PD00X9XXX	HIGH VOLT SUPPLY
U2		CR 23	NEG				C 9	2	E	U		W 5	9		HV SUPPLY RETURN
U1		CR 23	POS				R 31	1	E	Q		06	8		HIGH VOLT SUPPLY
U1		CR 25	1				S 21	1	E	C		W 1	319	A18PB00X9XXX	SHORTING SWITCH
U2		CR 26	1				C 81	2				W 1	317	A18PB00X9XXX	RF DVR GRID CKT
U2		CR 30	1				K 7	L 5	E	A		W 1	128	A20PB00X9XXX	TIME DELAY
U2		CR 30	2				K 5	L 6	E	B		W 1	181	A16PB00X9XXX	+28 VOLTS
U1		E 1	1				XV 1	Y 1	E	B		02	9	A16PB00X9XXX	MOD1 CATH PROTECT
U1		E 2	1				XV 2	Z 1	E	B		02	10	A16PB00X9XXX	MOD2 CATH PROTECT
U1		E 3	1				E 36	1				01	21	A22PB00X9XXX	PA PLT VOLT MTR
U2		E 3	1				R 158	2	E	B		01	31	A16PD00X9XXX	PA PLT VOLT MTR
U1		E 4	1				XV 5	W 1	E	B		04	13	A16PB00X9XXX	PA1 CATH PROTECT
U1		E 5	1				XV 6	X 1	E	B		04	14	A16PB00X9XXX	PA2 CATH PROTECT
U2		E 6	1	E	E	A 2		8				W 1	250	A20PB00X9XXX	CONTROL CKT GND
U2		E 6	1	E	F		R 150	2				01	119	A16PB00X9XXX	PA CATH RET
U2		E 6	1	E	F		TB 1B	30	E	B		W 1	211	A16PB00X9XXX	GROUND
U2		E 6	1	E	F		CR 14	NEG	E	B		W 1	251	A16PB00X9XXX	GROUND
U2		E 6	1	E	F		K 2	C 3	E	B		W 1	252	A16PB00X9XXX	CONTROL CKT GND
U2		E 8	1	E	E		E 37	1				W 1	299	A20PB00X9XXX	GROUND
U2		E 8	1	E	E		R 36	2				W 1	302	A16PD00X9XXX	GROUND
U2		E 8	1	E	F		R 35	2				01	36	A16PD00X9XXX	GROUND
U2		E 8	1	E	F		C 121	1				W 1	344	A20PB00X9XXX	GROUND
U2		E 11	1	E	Q		L 4	1	E	Q		W 6	3	A16PD00X9XXX	MODULATOR OUTPUT

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM					TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		E 12	1	E	E		R 59	2				01	77	A16PB00X9XXX	FEEDBACK GND RET
U2		E 12	1	E	F		R 117	2				01	73	A16PB00X9XXX	MOD CATH RET
U2		E 18	1				L 6	2				05	9	Z16TM00XXXXX	PA GRID TUNING CKT
U1		E 18	2	E	X		E 19	2	E	X		05	26	Z18TM00XXXXX	PA GRID TUNING CKT
U1		E 19	1				E 20	1				05	1	Z16TM00XXXXX	PA GRID TUNING CKT
U2		E 19	2	E	X		E 18	2	E	X		05	26	Z18TM00XXXXX	PA GRID TUNING CKT
U2		E 20	1				E 19	1				05	1	Z16TM00XXXXX	PA GRID TUNING CKT
U1		E 20	2	E	X		E 21	2	E	X		05	27	Z18TM00XXXXX	PA GRID TUNING CKT
U2		E 21	1				L 7	1				05	4	Z16TM00XXXXX	PA GRID TUNING CKT
U2		E 21	1				C 83	2				05	3	Z16TM00XXXXX	PA GRID TUNING CKT
U2		E 21	2	E	X		E 20	2	E	X		05	27	Z18TM00XXXXX	PA GRID TUNING CKT
U2		E 22	1	E	B		K 9	1				01	113	A16PD00X9XXX	PA SCRN RED PWR
U1		E 22	1	E	C		S 11	2			W	1	315	A16PD00X9XXX	SHORTING SWITCH
U1		E 22	1	E	D		C 69	1			W	1	254	A16PD00X9XXX	BIAS SUPPLY
U2		E 23	1	E	Y		L 18	8	E	X		01	24	Z16TM00XXXXX	MOD MON CKT
U1		E 24	1	E	A	A 9		3				05	19	A18PB00X9XXX	AUTO TUNE CKT
U2		E 24	2				C 99	3	E	X		05	22	Z16TM00XXXXX	AUTO TUNE CKT
U2		E 25	1				C 82	2			W	1	318	A18PB00X9XXX	RF DVR GRID CKT
U2		E 25	1				S 21	2	E	D	W	1	320	A16PB00X9XXX	SHORTING SWITCH
U2		E 26	1				TB 3	4	E	A	W	1	291A	RG-58C/U	FREQ MONITOR
U1		E 27	1				E 40	1				05	20	B16BA00XXXXX	FREQ MON GND
U2		E 27	1				TB 3	5	E	A	W	1	291S	RG-58C/U	FREQ MONITOR
U2		E 28	1	E	Q		C 67	2	E	T		01	59		MOD OUTPUT CKT
U2		E 29	1				TB 1C	44	E	A	W	1	261	A22PB00X9XXX	PA SCRN MTR
U2		E 29	1				R 30	2			W	1	284	A16PD00X9XXX	PA SCRN SUP RETURN
U2		E 30	1				E 32	1				01	120	B18BA00XXXXX	PA BIAS/SCRN RET
U2		E 30	1				R 144	2				01	121	A16PB00X9XXX	PA BIAS/SCRN RET
U2		E 31	1				TB 1C	43	E	A	W	1	260	A22PB00X9XXX	PA GRID CURR MTR
U2		E 31	1				C 3	2			W	1	281	A16PB00X9XXX	BIAS SUPPLY RETURN
U1		E 31	1				C 61	1			W	1	329	A18PB00X9XXX	PA GRID CURR
U1		E 32	1				E 30	1				01	120	B18BA00XXXXX	PA BIAS/SCRN RET
U1		E 32	1				C 66	1			W	1	328	A18PB00X9XXX	PA GRID CURR
U2		E 33	1	E	D		K 17	L 2			W	1	361	A16PD00X9XXX	MOD RED PWR
U2		E 34	1				TB 1D	57	E	A	W	1	268	A22PB00X9XXX	MOD SCRN MTR
U2		E 34	1				R 23	2			W	1	282	A16PD00X9XXX	MOD SCRN SUP RETURN
U2		E 34	1				R 176	2			W	1	365	A16PD00X9XXX	MOD RED PWR
U2		E 35	1				R 117	1				01	74	A16PB00X9XXX	MOD SCRN RET
U2		E 36	1				E 3	1				01	21	A22PB00X9XXX	PA PLT VOLT MTR
U2		E 36	1				TB 1C	49	E	A	W	1	271	A22PB00X9XXX	PA PLT VOLT MTR
U1		E 37	1				E 39	1				01	22	A22PB00X9XXX	PA PLT VOLT MTR GND
U1		E 37	1				E 8	1	E	E	W	1	299	A20PB00X9XXX	GROUND
U2		E 38	1				TB 1D	50	E	A	W	1	272	A22PB00X9XXX	PA PLT VOLT MTR
U1		E 38	1				TB 3	9	E	A	W	1	294	A22PB00X9XXX	REMOTE PLT VOLT OUT
U2		E 39	1				E 37	1				01	22	A22PB00X9XXX	PA PLT VOLT MTR GND
U2		E 39	1				TB 3	8	E	A	W	1	288	A22PB00X9XXX	REMOTE PLT VOLT OUT
U2		E 40	1				E 27	1				05	20	B16BA00XXXXX	FREQ MON GND
U2		E 41	1				K 9	X 2				01	112	A22PB00X9XXX	K9 GND RET

	FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		E 42	1			K 17	X 2			03	1	A20PB00X9XXX	K17 GND RET
U2		E 43	1			L 7	1			05	5	Z16TM00XXXXX	PA GRID TUNING CKT
U1		E 45	1			C 83	1			05	2	Z16TM00XXXXX	PA GRID TUNING CKT
U2		E 46	1			TB 3	12	E A		W 1	303S		FUTURE USE
U1		E 46	1			C 106				W 14	4S	FUTURE USE	FUTURE USE
U1		E 47	1			K 10	R 2			01	35	Z22TM00XXXXX	MOD MON CKT
U2		E 47	1			J 18	A			W 14	3A	RG-58C/U	MOD MON CKT
U1		E 48	1			L 18	8	E X		01	23	Z16TM00XXXXX	MOD MON CKT
U2		E 48	1			J 18	S			W 14	3S	RG-58C/U	MOD MON CKT
U2		E 49	1			XV 5	S	E B		04	2	A16PB00X9XXX	SCRN METERING
U1		E 52	1			J 19	1			04	5	A16PB00X9XXX	SCRN METERING
U1		E 53	1			J 20	1			04	6	A16PB00X9XXX	SCRN METERING GND
U1		E 54	1			E 65	1	E B		03	9	A16PB00X9XXX	AUDIO DRIVER CKT
U1		E 55	1			E 66	1	E B		03	10	A16PB00X9XXX	AUDIO DRIVER CKT
U2		E 56	1			Q 5	B			03	5	A22PB00X9XXX	AUDIO DRIVER CKT
U2		E 57	1			Q 6	B			03	6	A22PB00X9XXX	AUDIO DRIVER CKT
U2		E 60	1			R 173	3			02	5	A18PB00X9XXX	MOD RED PWR
U2		E 61	1			R 111	2			02	3	A18PB00X9XXX	MOD RED PWR
U1		E 62	1	E Q		CR 23	AC4			06	1		AC TO HV RECT
U2		E 62	1	E Q		T 9	21	E Q		W 5	6		AC TO HV RECT
U1		E 63	1	E Q		CR 23	AC5			06	2		AC TO HV RECT
U2		E 63	1	E Q		T 9	19	E Q		W 5	4		AC TO HV RECT
U1		E 64	1	E Q		CR 23	AC6			06	3		AC TO HV RECT
U2		E 64	1	E Q		T 9	20	E Q		W 5	5		AC TO HV RECT
U2		E 65	1	E B		E 54	1			03	9	A16PB00X9XXX	AUDIO DRIVER CKT
U2		E 66	1	E B		E 55	1			03	10	A16PB00X9XXX	AUDIO DRIVER CKT
U2		J 1	1			XV 5	W 1	E A		04	3	A18PB00X9XXX	PA1 FIL TEST PT
U2		J 2	1			XV 5	W 2	E A		04	4	A18PB00X9XXX	PA1 FIL TEST PT
U2		J 3	1			XV 6	X 1	E A		04	10	A18PB00X9XXX	PA2 FIL TEST PT
U2		J 4	1			XV 6	X 2	E A		04	11	A18PB00X9XXX	PA2 FIL TEST PT
U1		J 5	1			XV 1	Y 1	E B		02	11	A16PB00X9XXX	MOD1 FIL TEST PT
U2		J 5	1			R 114	3			02	12	A16PB00X9XXX	MOD1 HUM BAL
U1		J 6	1			XV 1	Y 2	E B		02	13	A16PB00X9XXX	MOD1 FIL TEST PT
U2		J 6	1			R 114	1			02	14	A16PB00X9XXX	MOD1 HUM BAL
U1		J 7	1			R 121	1			02	16	A16PB00X9XXX	MOD2 HUM BAL
U1		J 7	1			XV 2	Z 1	E B		02	15	A16PB00X9XXX	MOD2 FIL TEST PT
U1		J 8	1			XV 2	Z 2	E B		02	17	A16PB00X9XXX	MOD2 FIL TEST PT
U1		J 8	1			R 121	3			02	18	A16PB00X9XXX	MOD2 HUM BAL
U1		J 9	A			T 13	1	(BLU)		05	14A	RG-58C/U	RF DRIVER INPUT
U2		J 9	A	E P	A10	J 1	A	E P		W 12	1A	RG-58C/U	EXCITER CONNECT
U1		J 9	S			T 13	2	(BLK)		05	14S	RG-58C/U	RF DRIVER INPUT
U2		J 9	S		A10	J 1	S			W 12	1S	RG-58C/U	EXCITER CONNECT
U1		J 10	1			R 136	2			W 1	323	A18PB00X9XXX	DVR CATH RET
U1		J 11	1			R 26	2			W 1	293	A16PB00X9XXX	DVR CATH RET
U2		J 12	1			C 61	2			W 1	173	A18PB00X9XXX	PA GRID CURR
U2		J 13	1			C 66	2			W 1	174	A18PB00X9XXX	PA GRID CURR
U1		J 14	1			R 116	1			W 1	330	A22PB00X9XXX	MOD1 CATH CURR
U1		J 15	1			R 116	2			W 1	331	A22PB00X9XXX	MOD1 CATH CURR

	FROM					TO							
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		J 16	1			R 119	2			W 1	335	A22PB00X9XXX	MOD2 CATH CURR
U2		J 17	1			R 119	1			W 1	336	A22PB00X9XXX	MOD2 CATH CURR
U1		J 18	A			E 47	1			W 14	3A	RG-58C/U	MOD MON CKT
U2		J 18	A	E P		TB 3	6	E A		W 1	290A	RG-58C/U	MOD MON CKT
U2		J 18	S			TB 3	5	E A		W 1	290S	RG-58C/U	MOD MON CKT
U1		J 18	S			E 48	1			W 14	3S	RG-58C/U	MOD MON CKT
U2		J 19	1			E 52	1			04	5	A16PB00X9XXX	SCRN METERING
U2		J 20	1			E 53	1			04	6	A16PB00X9XXX	SCRN METERING GND
U2		J 21	1		A 9	C 6	2			05	18A	A20PB90V9XXX	AUTO TUNE TEST JACK
U2		J 22	1		A 9		4			05	18S	A20PB90V9XXX	AUTO TUNE TEST JACK
U1		K 1	P			K 3	P			W 1	143	A20PB00X9XXX	CONTROL CKT GND
U1		K 1	P		A 6		2			W 1	249	A20PB00X9XXX	CONTROL CKT GND
U2		K 1	1			K 3	3			W 1	97	A20PB00X9XXX	BLOWER HOLD
U1		K 1	1		A 8	TB 1	3	E A		W 1	99	A20PB00X9XXX	REMOTE FIL ON
U2		K 1	2			K 3	6			W 1	98	A20PB00X9XXX	BLOWER HOLD
U1		K 1	2		A 8	TB 1	4	E A		W 1	101	A20PB00X9XXX	REMOTE FIL ON
U1		K 1	3			TB 1B	27	E B		W 1	103	A16PB00X9XXX	DOORS LAMP
U1		K 1	6			K 2	L 5	E B		W 1	106	A16PB00X9XXX	BLOWER INTLK
U2		K 1	7			CB 2	LLD	E N		W 1	39	A18PB00X9XXX	PHASE A BLOWERS CONT
U1		K 1	10			TB 5	1	E A		W 1	40	A18PB00X9XXX	PHASE A CABINET FAN
U1		K 1	10			B 1	1	E C		W 1	41	A18PB00X9XXX	PHASE A MAIN BLOWER
U1		K 2	C 1			CB 3	NO	E A		W 1	54	A20PB00X9XXX	FIL AIR INTLK
U1		K 2	C 3	E B		K 7	C 3	E B		W 1	145	A16PB00X9XXX	CONTROL CKT GND
U1		K 2	C 3	E B		E 6	1	E F		W 1	252	A16PB00X9XXX	CONTROL CKT GND
U2		K 2	L 1	E M		CB 3	RLD	E M		W 1	6	A14VA00X9XXX	PHASE C TO FIL CONT
U2		K 2	L 2	E M		CB 3	CLD	E M		W 1	5	A14VA00X9XXX	PHASE B TO FIL CONT
U2		K 2	L 3	E M		CB 3	LLD	E M		W 1	4	A14VA00X9XXX	PHASE A TO FIL CONT
U1		K 2	L 4	E A		R 5	1			W 1	127	A20PB00X9XXX	+28 VOLTS
U1		K 2	L 5	E A		S 12	C			W 1	185	A20PB00X9XXX	AIR INTLK CKT
U2		K 2	L 5	E B		K 1	6			W 1	106	A16PB00X9XXX	BLOWER INTLK
U1		K 2	T 1	E M		CB 4	LLN	E M		W 1	25	A16PB00X9XXX	PHASE A TO BIAS BKR
U1		K 2	T 1	E M		TB 4	1	E B		W 1	26	A14VA00X9XXX	PHASE A TO VOLT REG
U1		K 2	T 2	E M		TB 4	3	E B		W 1	27	A14VA00X9XXX	PHASE B TO VOLT REG
U1		K 2	T 2	E M		T 5	4	E B		W 1	230	A14VA00X9XXX	FIL XFMR FEED COMM
U1		K 2	T 3	E M		TB 4	4	E B		W 1	29	A14VA00X9XXX	PHASE C TO VOLT REG
U1		K 2	T 3	E M		CB 4	RLN	E M		W 1	28	A16PB00X9XXX	PHASE C TO BIAS BKR
U1		K 2	T 4	E A		TB 1B	29	E A		W 1	56	A22PB00X9XXX	FIL OFF LAMP
U2		K 2	T 5	E A		TB 6	1	E A		W 1	51	A16PB00X9XXX	EXCITER +28V
U1		K 2	T 5	E B		CB 4	C	E B		W 1	59	A16PB00X9XXX	BIAS INTLK
U1		K 3	P			K 4	P			W 1	144	A20PB00X9XXX	CONTROL CKT GND
U2		K 3	P			K 1	P			W 1	143	A20PB00X9XXX	CONTROL CKT GND
U1		K 3	1		A 8	TB 1	11	E A		W 1	90	A20PB00X9XXX	REMOTE LOW PWR ON
U1		K 3	2		A 8	TB 1	12	E A		W 1	87	A20PB00X9XXX	REMOTE LOW PWR ON
U1		K 3	3			K 4	3			W 1	96	A20PB00X9XXX	BLOWER HOLD
U1		K 3	3			K 1	1			W 1	97	A20PB00X9XXX	BLOWER HOLD
U1		K 3	4		A 8	TB 1	10	E A		W 1	93	A20PB00X9XXX	REMOTE LOW PWR ON
U1		K 3	5			TB 1A	1	E A		W 1	89	A20PB00X9XXX	LOW PWR ON SW

	FROM						TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		K 3	6			K 1	2			W 1	98	A20PB00X9XXX	BLOWER HOLD
U1		K 3	6			K 4	6			W 1	95	A20PB00X9XXX	BLOWER HOLD
U1		K 3	7			K 4	7			W 1	77	A16PB00X9XXX	PLATE INTLK
U2		K 3	7		A 6		4			W 1	180	A16PB00X9XXX	PLATE INTLK
U1		K 3	8			TB 3	21	E B		W 1	81	A16PB00X9XXX	LOW PWR EXTRNL INTLR
U1		K 3	9			TB 3	22	E B		W 1	80	A16PB00X9XXX	LOW PWR EXTRNL INTLK
U2		K 3	10			K 5	L 5	E B		W 1	75	A16PB00X9XXX	PLATE INTLK
U2		K 4	P			K 3	P			W 1	144	A20PB00X9XXX	CONTROL CKT GND
U1		K 4	P			K 11	X 2			W 1	146	A20PB00X9XXX	CONTROL CKT GND
U1		K 4	1		A 8	TB 1	15	E A		W 1	85	A20PB00X9XXX	REMOTE HIGH PWR ON
U1		K 4	2		A 8	TB 1	16	E A		W 1	82	A20PB00X9XXX	REMOTE HIGH PWR ON
U2		K 4	3			K 3	3			W 1	96	A20PB00X9XXX	BLOWER HOLD
U1		K 4	4		A 8	TB 1	14	E A		W 1	92	A20PB00X9XXX	REMOTE HIGH PWR ON
U1		K 4	5			TB 1C	34	E A		W 1	84	A20PB00X9XXX	HIGH PWR ON SW
U2		K 4	6			K 3	6			W 1	95	A20PB00X9XXX	BLOWER HOLD
U2		K 4	7			K 3	7			W 1	77	A16PB00X9XXX	PLATE INTLK
U1		K 4	8			TB 3	23	E B		W 1	79	A16PB00X9XXX	HI PWR EXTRNL INTLK
U1		K 4	9			TB 3	24	E B		W 1	78	A16PB00X9XXX	HI PWR EXTRNL INTLK
U2		K 4	10			K 6	L 5	E B		W 1	76	A16PB00X9XXX	PLATE INTLK
U1		K 4	10			C 120	1			W 1	240	A20PB00X9XXX	PWR CHG RELAYS
U1		K 5	C 1	E A		K 6	L 4	E A		W 1	66	A18PB00X9XXX	PLATE INTLK CKT
U1		K 5	C 3	E A		K 6	C 3	E A		W 1	63	A18PB00X9XXX	CONTROL CKT GND
U2		K 5	C 3	E A		K 7	C 3	E A		W 1	62	A18PB00X9XXX	CONTROL CKT GND
U2		K 5	L 1	E G		K 5	L 3	E G		07	5	A08VB00X9XXX	LOW POWER RELAY
U1		K 5	L 1	E H		T 9	4	E H		W 1	206	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U1		K 5	L 3	E G		K 5	L 1	E G		07	5	A08VB00X9XXX	LOW POWER RELAY
U1		K 5	L 4	E A		TB 18	19	E A		W 1	65	A22PB00X9XXX	HIGH PWR ON LAMP
U1		K 5	L 4	E A		K 6	C 1	E A		W 1	64	A18PB00X9XXX	PLATE INTLK
U1		K 5	L 5	E A		K 6	T 4	E A		W 1	69	A18PB00X9XXX	PLATE INTLK
U1		K 5	L 5	E B		K 3	10			W 1	75	A16PB00X9XXX	PLATE INTLK
U1		K 5	L 6	E A	A 2		2			W 1	182	A20PB00X9XXX	+28 VOLTS
U1		K 5	L 6	E B		CR 30	2			W 1	181	A16PB00X9XXX	+28 VOLTS
U1		K 5	L 7	E B		TB 3	25	E B		W 1	74	A16PB00X9XXX	PLT EXTERNAL INTLK
U1		K 5	T 1	E H		T 9	9	E H		W 1	207	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U1		K 5	T 3	E H		T 9	14	E H		W 1	208	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U1		K 5	T 4	E A		K 6	L 5	E A		W 1	68	A18PB00X9XXX	PLATE INTLK
U1		K 5	T 4	E A		K 9	X 1			W 1	238	A20PB00X9XXX	PWR CHG RELAYS
U1		K 5	T 5	E A		K 6	T 5	E A		W 1	61	A18PB00X9XXX	SCRN CONT FEED
U2		K 5	T 5	E A		K 7	C 1	E A		W 1	60	A18PB00X9XXX	SCRN CONT FEED
U1		K 5	T 6	E A		K 6	L 6	E A		W 1	70	A22PB00X9XXX	PLT OFF/RESET LAMP
U1		K 5	T 7	E B		K 6	L 7	E B		W 1	71	A16PB00X9XXX	PLATE EXT INTLK
U2		K 6	C 1	E A		K 5	L 4	E A		W 1	64	A18PB00X9XXX	PLATE INTLK
U2		K 6	C 3	E A		K 5	C 3	E A		W 1	63	A18PB00X9XXX	CONTROL CKT GND
U2		K 6	C 3	E A		TB 4	7	E A		W 1	286	A20PB00X9XXX	GROUND
U2		K 6	L 1	E H		CB 6	LLD	E H		W 1	30	A08VB00X9XXX	PHASE A HV PL CONT
U2		K 6	L 2	E H		CB 6	CLD	E H		W 1	31	A08VB00X9XXX	PHASE B HV PL CONT
U2		K 6	L 3	E H		CB 6	RLD	E H		W 1	32	A08VB00X9XXX	PHASE C HV PL CONT
U2		K 6	L 4	E A		K 5	C 1	E A		W 1	66	A18PB00X9XXX	PLATE INTLK CKT

FROM						TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		K 6	L 4	E A		TB 1B	20	E A		W 1	67	A22PB00X9XXX	LOW PWR ON LAMP
U2		K 6	L 5	E A		K 5	T 4	E A		W 1	68	A18PB00X9XXX	PLATE INTLK
U1		K 6	L 5	E B		K 4	10			W 1	76	A16PB00X9XXX	PLATE INTLK
U2		K 6	L 6	E A		K 5	T 6	E A		W 1	70	A22PB00X9XXX	PLT OFF/RESET LAMP
U2		K 6	L 7	E B		K 5	T 7	E B		W 1	71	A16PB00X9XXX	PLATE EXT INTLK
U1		K 6	T 1	E H		T 9	15	E H		W 1	203	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U1		K 6	T 2	E H		T 9	5	E H		W 1	204	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U1		K 6	T 3	E H		T 9	10	E H		W 1	205	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U2		K 6	T 4	E A		K 5	L 5	E A		W 1	69	A18PB00X9XXX	PLATE INTLK
U2		K 6	T 5	E A		K 5	T 5	E A		W 1	61	A18PB00X9XXX	SCRN CONT FEED
U1		K 6	T 6	E A		TB 1B	18	E A		W 1	72	A22PB00X9XXX	PLT OFF/RESET LAMP
U1		K 6	T 7	E B		TB 3	26	E B		W 1	73	A16PB00X9XXX	PLT EXTERNAL INTLK
U1		K 7	C 1	E A		K 5	T 5	E A		W 1	60	A18PB00X9XXX	SCRN CONT FEED
U1		K 7	C 3	E A		K 5	C 3	E A		W 1	62	A18PB00X9XXX	CONTROL CKT GND
U2		K 7	C 3	E B		K 2	C 3	E B		W 1	145	A16PB00X9XXX	CONTROL CKT GND
U2		K 7	L 1	E M		CB 5	LLD	E M		W 1	7	A16PB00X9XXX	PHASE A TO SCRN CONT
U2		K 7	L 2	E M		CB 5	CLD	E M		W 1	8	A16PB00X9XXX	PHASE B TO SCRN CONT
U2		K 7	L 3	E M		CB 5	RLD	E M		W 1	9	A16PB00X9XXX	PHASE C TO SCRN CONT
U1		K 7	L 5	E A		CR 30	1			W 1	128	A20PB00X9XXX	TIME DELAY
U1		K 7	T 1	E M		T 8	1	E B		W 1	10	A16PB00X9XXX	PHASE A TO SCRN XMFR
U1		K 7	T 2	E M		T 8	4	E B		W 1	11	A16PB00X9XXX	PHASE B TO SCRN XMFR
U1		K 7	T 3	E M		T 8	7	E B		W 1	12	A16PB00X9XXX	PHASE C TO SCRN XMFR
U2		K 7	T 5	E A	A 2		12			W 1	119	A20PB00X9XXX	OVLD CKT
U2		K 8	X 1			K 17	X 1			W 1	357	A20PB00X9XXX	PWR CHG RELAYS
U2		K 8	X 2			TB 3	3	E A		W 1	21S		AUDIO INPUT GND
U1		K 9	1			E 22	1	E B		01	113	A16PD00X9XXX	PA SCRN RED PWR
U1		K 9	2			R 146	3			01	114	A16PD00X9XXX	PA SCRN RED PWR
U2		K 9	X 1			K 5	T 4	E A		W 1	238	A20PB00X9XXX	PWR CHG RELAYS
U1		K 9	X 1			K 17	X 1			W 1	239	A20PB00X9XXX	PWR CHG RELAYS
U1		K 9	X 2			E 41	1			01	112	A22PB00X9XXX	K9 GND RET
U2		K 10	R 2			E 47	1			01	35	Z22TM00XXXXX	MOD MON CKT
U2		K 10	R 3			C 106	2			01	37	Z22TM00XXXXX	MOD MON CKT
U2		K 10	X 1			C 120	2			W 14	2	A20PB00X9XXX	MOD MON CKT
U1		K 10	X 2			C 121	2			W 14	1	A20PB00X9XXX	CONTROL CKT GND
U1		K 11	L 2			K 12	R 1			W 1	151	A20PB00X9XXX	TUNING CKT
U1		K 11	L 3			TB 7	1	E A		W 1	165	A20PB00X9XXX	TUNING CKT
U1		K 11	R 1			K 12	L 2			W 1	152	A20PB00X9XXX	TUNING CKT
U2		K 11	R 2			CB 1	RLD	E N		W 1	153	A20PB00X9XXX	AC TO TUNING CKT
U1		K 11	R 2			K 12	R 2			W 1	156	A20PB00X9XXX	TUNING CKT
U1		K 11	X 1			TB 1A	9	E A		W 1	150	A20PB00X9XXX	PA TUNING LOWER SW
U1		K 11	X 2			K 12	X 2			W 1	147	A20PB00X9XXX	CONTROL CKT GND
U2		K 11	X 2			K 4	P			W 1	146	A20PB00X9XXX	CONTROL CKT GND
U2		K 12	L 2			K 11	R 1			W 1	152	A20PB00X9XXX	TUNING CKT
U1		K 12	L 3			TB 7	3	E A		W 1	168	A20PB00X9XXX	TUNING CKT
U2		K 12	R 1			K 11	L 2			W 1	151	A20PB00X9XXX	TUNING CKT
U2		K 12	R 2			K 11	R 2			W 1	156	A20PB00X9XXX	TUNING CKT
U1		K 12	R 2			K 13	R 2			W 1	166	A20PB00X9XXX	TUNING CKT

	FROM				TO							
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		K 12	X 1			TB 1A	8	E A		W 1	157	A20PB00X9XXX	PA TUNE RAISE SW
U2		K 12	X 2			K 11	X 2			W 1	147	A20PB00X9XXX	CONTROL CKT GND
U1		K 12	X 2			K 13	X 2			W 1	148	A20PB00X9XXX	CONTROL CKT GND
U1		K 13	L 2			K 14	R 1			W 1	154	A20PB00X9XXX	LOADING CKT
U1		K 13	L 3			TB 8	1	E A		W 1	170	A20PB00X9XXX	LOADING CKT
U1		K 13	R 1			K 14	L 2			W 1	155	A20PB00X9XXX	LOADING CKT
U1		K 13	R 2			K 14	R 2			W 1	159	A20PB00X9XXX	LOADING CKT
U2		K 13	R 2			K 12	R 2			W 1	166	A20PB00X9XXX	TUNING CKT
U1		K 13	X 1		A 8	TB 1	18	E A		W 1	160	A20PB00X9XXX	REMOTE PWR ADJ
U1		K 13	X 2			K 14	X 2			W 1	149	A20PB00X9XXX	CONTROL CKT GND
U2		K 13	X 2			K 12	X 2			W 1	148	A20PB00X9XXX	CONTROL CKT GND
U2		K 14	L 2			K 13	R 1			W 1	155	A20PB00X9XXX	LOADING CKT
U1		K 14	L 3			TB 8	3	E A		W 1	171	A20PB00X9XXX	LOADING CKT
U2		K 14	R 1			K 13	L 2			W 1	154	A20PB00X9XXX	LOADING CKT
U2		K 14	R 2			K 13	R 2			W 1	159	A20PB00X9XXX	LOADING CKT
U1		K 14	X 1		A 8	TB 1	19	E A		W 1	162	A20PB00X9XXX	REMOTE PWR ADJ
U2		K 14	X 2			K 13	X 2			W 1	149	A20PB00X9XXX	CONTROL CKT GND
U2		K 15	L 2			TB 1A	7	E A		W 1	242	A20PB00X9XXX	AUTO TUNE CKT
U1		K 15	L 2			K 16	L 2			W 1	310	A22PB00X9XXX	AUTO TUNE CKT
U2		K 15	L 3			TB 1A	9	E A		W 1	241	A20PB00X9XXX	AUTO TUNE CKT
U1		K 15	X 1		A 9	C 8	2			W 1	308	A22PB00X9XXX	AUTO TUNE CKT
U1		K 15	X 2			K 16	X 2			W 1	305	A22PB00X9XXX	AUTO TUNE CKT
U2		K 15	X 2			T 14	6			W 1	306	A22PB00X9XXX	AUTO TUNE CKT
U2		K 16	L 2			K 15	L 2			W 1	310	A22PB00X9XXX	AUTO TUNE CKT
U2		K 16	L 3			TB 1A	8	E A		W 1	243	A20PB00X9XXX	AUTO TUNE CKT
U1		K 16	X 1		A 9	C 7	2			W 1	309	A22PB00X9XXX	AUTO TUNE CKT
U2		K 16	X 2			K 15	X 2			W 1	305	A22PB00X9XXX	AUTO TUNE CKT
U2		K 17	L 1			R 175	1			W 1	363	A16PD00X9XXX	MOD RED PWR
U1		K 17	L 2			E 33	1	E D		W 1	361	A16PD00X9XXX	MOD RED PWR
U2		K 17	L 3			R 175	2			W 1	362	A16PD00X9XXX	MOD RED PWR
U2		K 17	R 1			R 172	1			W 1	358	A18PB00X9XXX	MOD RED PWR
U1		K 17	R 2			R 110	1			W 1	359	A18PB00X9XXX	MOD RED PWR
U1		K 17	R 3			R 173	2			W 1	360	A18PB00X9XXX	MOD RED PWR
U2		K 17	X 1			K 9	X 1			W 1	239	A20PB00X9XXX	PWR CHG RELAYS
U1		K 17	X 1			K 8	X 1			W 1	357	A20PB00X9XXX	PWR CHG RELAYS
U1		K 17	X 2			E 42	1			03	1	A20PB00X9XXX	K17 GND RET
U1		L 1	1			CR 15	2			W 1	47	A20PB00X9XXX	-250V BIAS SUPPLY
U1		L 1	2			C 4	2	E C		W 1	48	A20PB00X9XXX	-250V BIAS SUPPLY
U1		L 1	2			C 98	1			W 1	248	A20PB00X9XXX	-250V BIAS SUPPLY
U2		L 2	1			CR 19	POS	E B		W 1	20	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		L 2	1			R 18	1			W 1	22	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		L 2	2			CR 20	2			W 1	193	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		L 2	2			S 19	2	E D		W 1	246	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		L 3	1			R 24	1			07	6	A16PD00X9XXX	PA SCRN PWR SUPPLY
U2		L 3	1			CR 21	POS	E B		W 1	19	A16PD00X9XXX	PA SCRN PWR SUPPLY
U1		L 3	2			CR 22	2			07	7	A16PD00X9XXX	PA SCRN PWR SUPPLY
U2		L 3	2			R 25	1			W 1	23	A16PD00X9XXX	PA SCRN PWR SUPPLY
U1		L 3	2			C 69	1			W 1	244	A16PD00X9XXX	DVR SCRN SUPPLY

FROM						TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		L 4	1	E	Q		E 11	1	E	Q		W 6	3	A16PD00X9XXX	MODULATOR OUTPUT
U2		L 4	2	E	Q		R 146	1				W 6	2	A16PD00X9XXX	MODULATOR OUTPUT
U2		L 4	3	E	Q		R 157	1	E	Q		W 6	1		MODULATOR OUTPUT
U2		L 4	3	E	T		T 12	4	E	T		01	53		MOD OUTPUT CKT
U2		L 4	4	E	Q		T 12	2	E	T		01	41		MOD OUTPUT CKT
U1		L 6	1				L 6	3				01	161	B16BA00XXXXX	DVR PLT CKT
U2		L 6	1				C 83	1				05	8	Z16TM00XXXXX	PA GRID TUNING CKT
U1		L 6	2				E 18	1				05	9	Z16TM00XXXXX	PA GRID TUNING CKT
U2		L 6	3				L 6	1				01	161	B16BA00XXXXX	DVR PLT CKT
U1		L 7	1				E 21	1				05	4	Z16TM00XXXXX	PA GRID TUNING CKT
U1		L 7	1				E 43	1				05	5	Z16TM00XXXXX	PA GRID TUNING CKT
U2		L 7	1				C 99	2	E	X		05	21	Z16TM00XXXXX	NEUTRALIZING
U1		L 7	2				C 85	1	E	X		05	6	Z16TM00XXXXX	DVR PLT BYPASS
U2		L 12	2	E	Q		S 18	1				01	55		HIGH VOLT GROUND SW
U2		L 13	1	E	Q		C 101	1	E	U		01	60		PA OUTPUT CKT
U2		L 13	2	E	Q		R 157	1	E	Q		W 6	4		MODULATOR OUTPUT
U2		L 18	2				C 106	1				01	38	Z22TM00XXXXX	MOD MON CKT
U2		L 18	8	E	X		E 48	1				01	23	Z16TM00XXXXX	MOD MON CKT
U1		L 18	8	E	X		E 23	1	E	Y		01	24	Z16TM00XXXXX	MOD MON CKT
U1		M 1	1	E	N		T 2	1				W 1	225	A20PB00X9XXX	DVR FIL VOLT XMFR
U2		M 1	1	E	N		TB 4	3	E	A		W 1	223	A20PB00X9XXX	240VAC FIL HRS METER
U1		M 1	2	E	N		T 2	3				W 1	224	A20PB00X9XXX	DVR FIL VOLT XMFR
U2		M 1	2	E	N		TB 4	2	E	A		W 1	222	A20PB00X9XXX	240VAC FIL HRS METER
U1		Q 5	B				E 56	1				03	5	A22PB00X9XXX	AUDIO DRIVER CKT
U1		Q 5	C	E	B		T 11	3				03	2	A16PB00X9XXX	MOD DVR OUTPUT
U1		Q 5	E				R 53	1				03	7	A22PB00X9XXX	AUDIO DRIVER CKT
U1		Q 6	B				E 57	1				03	6	A22PB00X9XXX	AUDIO DRIVER CKT
U1		Q 6	C	E	B		T 11	1				03	3	A16PB00X9XXX	MOD DVR OUTPUT
U1		Q 6	E				R 54	1				03	8	A22PB00X9XXX	AUDIO DRIVER CKT
U2		R 1	2				C 1	1	E	C		W 1	184	A20PB00X9XXX	AIR INTLK CKT
U2		R 4	1				CR 14	POS	E	B		W 1	345	A16PB00X9XXX	+28 VOLTS
U2		R 4	1				R 5	1				W 1	346	A16PB00X9XXX	+28 VOLTS
U2		R 5	1				K 2	L 4	E	A		W 1	127	A20PB00X9XXX	+28 VOLTS
U1		R 5	1				S 1	C	E	B		W 1	212	A16PB00X9XXX	DOORS INTLK CKT
U1		R 5	1				R 4	1				W 1	346	A16PB00X9XXX	+28 VOLTS
U2		R 5	2				C 1	2	E	C		W 1	253	A20PB00X9XXX	GROUND
U1		R 5	2				C 2	2				W 1	347	A16PB00X9XXX	GROUND
U2		R 5	2				CR 14	NEG	E	B		W 1	354	A16PB00X9XXX	GROUND
U1		R 6	2				TB 1D	59	E	A		W 1	142	A22PB00X9XXX	+28V MTR
U1		R 7	1				R 7	2				01	27	Z16TM00XXXXX	PA1 FIL VOLT ADJ
U1		R 7	1				R 8	1				01	32	A14VA00X9XXX	PA FIL VOLT ADJ
U2		R 7	1				TB 4	2	E	B		W 1	226	A14VA00X9XXX	PA FIL XFMR FEED
U2		R 7	2				R 7	1				01	27	Z16TM00XXXXX	PA1 FIL VOLT ADJ
U1		R 7	3				T 3	4	E	B		W 1	228	A14VA00X9XXX	PA1 FIL VOLT ADJ
U1		R 8	1				R 8	2				01	28	Z16TM00XXXXX	PA2 FIL VOLT ADJ
U2		R 8	1				R 7	1				01	32	A14VA00X9XXX	PA FIL VOLT ADJ
U2		R 8	2				R 8	1				01	28	Z16TM00XXXXX	PA2 FIL VOLT ADJ

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		R 8	3			T 4	4	E B		W 1	229	A14VA00X9XXX	PA2 FIL VOLT ADJ
U1		R 9	1			R 9	2			01	29	Z16TM00XXXXX	MOD1 FIL VOLT ADJ
U1		R 9	1			R 10	1			01	33	A14VA00X9XXX	MOD FIL VOLT ADJ
U2		R 9	1			TB 4	5	E B		W 1	234	A14VA00X9XXX	MOD FIL XFMR FEED
U2		R 9	2			R 9	1			01	29	Z16TM00XXXXX	MOD1 FIL VOLT ADJ
U1		R 9	3			T 5	1	E B		W 1	237	A14VA00X9XXX	MOD2 FIL VOLT ADJ
U1		R 10	1			R 10	2			01	30	Z16TM00XXXXX	MOD2 FIL VOLT ADJ
U2		R 10	1			R 9	1			01	33	A14VA00X9XXX	MOD FIL VOLT ADJ
U2		R 10	2			R 10	1			01	30	Z16TM00XXXXX	MOD2 FIL VOLT ADJ
U1		R 10	3			T 6	4	E B		W 1	236	A14VA00X9XXX	MOD2 FIL VOLT ADJ
U2		R 12	1			TB 1B	28	E A		W 1	283	A20PB00X9XXX	AUDIO DVR +28V
U1		R 12	2			T 11	2			03	4	A16PB00X9XXX	AUDIO DRIVER CKT
U1		R 13	1			C 4	2	E C		W 1	49	A20PB00X9XXX	-250V BIAS SUPPLY
U1		R 13	1			R 15	1			W 1	50	A20PB00X9XXX	-250V BIAS SUPPLY
U1		R 13	1			S 22	2	E D		W 1	285	A16PB00X9XXX	SHORTING SWITCH
U1		R 13	2			R 14	1			07	1	A22PB00X9XXX	BIAS SUPPLY
U2		R 14	1			R 13	2			07	1	A22PB00X9XXX	BIAS SUPPLY
U1		R 14	1			C 81	1			W 1	247	A20PB00X9XXX	-60V BIAS SUPPLY
U2		R 14	2			C 4	1	E C		W 1	52	A20PB00X9XXX	BIAS SUPPLY RETURN
U1		R 14	2			C 3	2			W 1	53	A20PB00X9XXX	BIAS SUPPLY RETURN
U2		R 15	1			R 13	1			W 1	50	A20PB00X9XXX	-250V BIAS SUPPLY
U2		R 15	1			S 10	2	E D		W 1	301	A16PB00X9XXX	SHORTING SWITCH
U1		R 17	1			TB 1C	46	E A		W 1	141	A22PB00X9XXX	BIAS VOLTAGE MTR
U2		R 18	1			L 2	1			W 1	22	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		R 19	1			CR 20	2			W 1	24	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		R 19	1			C 5	1	E D		W 1	194	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		R 19	2			C 5	2	E D		W 1	195	A16PB00X9XXX	MOD SCRN SUP RETURN
U1		R 19	2			CR 19	NEG	E B		W 1	196	A16PB00X9XXX	MOD SCRN SUP RETURN
U1		R 20	1			S 10	3	E D		W 1	313	A16PD00X9XXX	SHORTING SWITCH
U2		R 23	1			TB 1D	58	E A		W 1	140	A22PB00X9XXX	PA SCRN VOLT MTR
U2		R 23	2			CR 19	NEG	E A		W 1	197	A20PB00X9XXX	MOD SCRN SUP RETURN
U1		R 23	2			E 34	1			W 1	282	A16PD00X9XXX	MOD SCRN SUP RETURN
U2		R 24	1			L 3	1			07	6	A16PD00X9XXX	PA SCRN PWR SUPPLY
U1		R 25	1			L 3	2			W 1	23	A16PD00X9XXX	PA SCRN PWR SUPPLY
U1		R 25	1			C 6	1	E D		W 1	199	A16PD00X9XXX	PA SCRN PWR SUPPLY
U1		R 25	2			R 26	1			07	8	A16PB00X9XXX	PA SCRN PWR SUPPLY
U1		R 25	2			C 82	1			W 1	245	A16PB00X9XXX	PA SCRN PWR SUPPLY
U2		R 26	1			R 25	2			07	8	A16PB00X9XXX	PA SCRN PWR SUPPLY
U1		R 26	2			C 6	2	E D		W 1	200	A16PB00X9XXX	PA SCRN SUP RETURN
U2		R 26	2			CR 21	NEG	E B		W 1	201	A16PB00X9XXX	PA SCRN SUP RETURN
U2		R 26	2			J 11	1			W 1	293	A16PB00X9XXX	DVR CATH RET
U1		R 27	1			S 10	1	E D		W 1	312	A16PD00X9XXX	SHORTING SWITCH
U2		R 30	1			TB 1C	45	E A		W 1	139	A22PB00X9XXX	PA SCRN VOLT MTR
U2		R 30	2			CR 21	NEG	E A		W 1	202	A20PB00X9XXX	PA SCRN SUP RETURN
U1		R 30	2			E 29	1			W 1	284	A16PD00X9XXX	PA SCRN SUP RETURN
U2		R 31	1	E Q		CR 23	POS			06	8		HIGH VOLT SUPPLY
U1		R 31	1	E Q		R 33	1	E Q		W 5	7		HIGH VOLT SUPPLY
U2		R 31	1	E Q		T 12	2	E Q		W 5	10		HIGH VOLT SUPPLY

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM				TO							
FC UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	R 31	2	E Q		C 7	1	E Q		06	7		HIGH VOLT SUPPLY
U2	R 32	1	E Q		C 8	2	E Q		06	6		HIGH VOLT SUPPLY
U1	R 32	2	E D		R 36	1			06	10	A16PD00X9XXX	HV SUPPLY RETURN
U2	R 32	2	E Q		CR 23	NEG			06	9	A16PD00X9XXX	HIGH VOLT SUPPLY
U2	R 33	1	E Q		R 34	1			01	47		HIGH VOLT SUPPLY
U2	R 33	1	E Q		R 31	1	E Q		W 5	7		HIGH VOLT SUPPLY
U1	R 33	2	E Q		C 9	1	E U		W 5	8		HIGH VOLT SUPPLY
U1	R 34	1			R 33	1	E Q		01	47		HIGH VOLT SUPPLY
U1	R 34	1			S 11	1			01	56		HIGH VOLT GROUND SW
U1	R 34	2			R 35	1			01	46		HIGH VOLT SUPPLY
U2	R 35	1			R 34	2			01	46		HIGH VOLT SUPPLY
U1	R 35	2			E 8	1	E F		01	36	A16PD00X9XXX	GROUND
U2	R 36	1			R 32	2	E D		06	10	A16PD00X9XXX	HV SUPPLY RETURN
U2	R 36	1		A 5		9			W 1	279	A22PB00X9XXX	DC OVLD SENSOR
U2	R 36	2		A 5		15			W 1	280	A22PB00X9XXX	DC OVLD SENSOR
U1	R 36	2			E 8	1	E E		W 1	302	A16PD00X9XXX	GROUND
U2	R 37	1			TB 3	1	E A		W 1	21A		AUDIO INPUT
U2	R 38	1			TB 3	2	E A		W 1	21B		AUDIO INPUT
U2	R 53	1			Q 5	E			03	7	A22PB00X9XXX	AUDIO DRIVER CKT
U2	R 54	1			Q 6	E			03	8	A22PB00X9XXX	AUDIO DRIVER CKT
U1	R 59	2			E 12	1	E E		01	77	A16PB00X9XXX	FEEDBACK GND RET
U1	R 64	1			R 65	2			01	91	A16PD00X9XXX	MOD FEEDBACK NETWORK
U2	R 65	2			R 64	1			01	91	A16PD00X9XXX	MOD FEEDBACK NETWORK
U1	R 82	1			V 1	P	E D		01	93	A16PD00X9XXX	MOD FEEDBACK NETWORK
U1	R 86	1			R 87	2			01	92	A16PD00X9XXX	MOD FEEDBACK NETWORK
U2	R 87	2			R 86	1			01	92	A16PD00X9XXX	MOD FEEDBACK NETWORK
U1	R 104	1			V 2	P	E D		01	94	A16PD00X9XXX	MOD FEEDBACK NETWORK
U2	R 105	3			T 11	4			W 13	1	A16PB00X9XXX	MOD1 DRIVE
U2	R 108	3			T 11	7			W 13	4	A16PB00X9XXX	MOD2 DRIVE
U1	R 109	1			R 110	1			02	6	A18PB00X9XXX	MOD BIAS NETWORK
U2	R 109	2			T 11	5			W 13	2	A16PB00X9XXX	MOD1 BIAS ADJ
U1	R 109	3			R 110	3			02	7	A18PB00X9XXX	MOD BIAS NETWORK
U2	R 110	1			R 109	1			02	6	A18PB00X9XXX	MOD BIAS NETWORK
U2	R 110	1			K 17	R 2			W 1	359	A18PB00X9XXX	MOD RED PWR
U2	R 110	2			T 11	6			W 13	3	A16PB00X9XXX	MOD2 BIAS ADJ
U2	R 110	3			R 111	1			02	8	A18PB00X9XXX	MOD BIAS NETWORK
U2	R 110	3			R 109	3			02	7	A18PB00X9XXX	MOD BIAS NETWORK
U1	R 111	1			R 110	3			02	8	A18PB00X9XXX	MOD BIAS NETWORK
U1	R 111	2			E 61	1			02	3	A18PB00X9XXX	MOD RED PWR
U2	R 111	2			C 3	2			W 1	255	A16PB00X9XXX	BIAS SUPPLY RETURN
U1	R 114	1			J 6	1			02	14	A16PB00X9XXX	MOD1 HUM BAL
U1	R 114	2			R 115	1			01	70	A16PB00X9XXX	MOD1 CATH RET
U1	R 114	3			J 5	1			02	12	A16PB00X9XXX	MOD1 HUM BAL
U2	R 115	1			R 114	2			01	70	A16PB00X9XXX	MOD1 CATH RET
U2	R 115	1		A 3		9			W 1	275	A22PB00X9XXX	MOD1 OVLD SENSOR
U1	R 115	2			R 116	1			01	71	A16PB00X9XXX	MOD1 CATH RET
U2	R 116	1			R 115	2			01	71	A16PB00X9XXX	MOD1 CATH RET

FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		R 116	1			TB 1C	42	E A		W 1	259	A22PB00X9XXX	MOD1 CATH CURR MTR
U2		R 116	1			J 14	1			W 1	330	A22PB00X9XXX	MOD1 CATH CURR
U1		R 116	2			R 117	1			01	72	A16PB00X9XXX	MOD CATH RET
U2		R 116	2			TB 1C	41	E A		W 1	258	A22PB00X9XXX	MOD1 CATH CURR MTR
U2		R 116	2			J 15	1			W 1	331	A22PB00X9XXX	MOD1 CATH CURR
U2		R 117	1			R 116	2			01	72	A16PB00X9XXX	MOD CATH RET
U1		R 117	1			E 35	1			01	74	A16PB00X9XXX	MOD SCRN RET
U2		R 117	1			TB 1D	56	E A		W 1	267	A22PB00X9XXX	MOD MTR COMM PT
U2		R 117	1			R 119	2			W 1	334	A16PB00X9XXX	MOD2 CATH RET
U1		R 117	2			E 12	1	E F		01	73	A16PB00X9XXX	MOD CATH RET
U1		R 117	2			TB 1D	60	E A		W 1	187	A22PB00X9XXX	MOD PLT CURR MTR
U2		R 119	1			R 120	2			01	81	A16PB00X9XXX	MOD2 CATH RET
U2		R 119	1			TB 1D	55	E A		W 1	266	A22PB00X9XXX	MOD2 CATH CURR MTR
U1		R 119	1			J 17	1			W 1	336	A22PB00X9XXX	MOD2 CATH CURR
U2		R 119	2		A 3		15			W 1	276	A22PB00X9XXX	MOD1 OVLD SENSOR
U1		R 119	2			R 117	1			W 1	334	A16PB00X9XXX	MOD2 CATH RET
U1		R 119	2			J 16	1			W 1	335	A22PB00X9XXX	MOD2 CATH CURR
U2		R 120	1			R 121	2			01	80	A16PB00X9XXX	MOD2 CATH RET
U2		R 120	1		A 4		9			W 1	277	A22PB00X9XXX	MOD2 OVLD SENSOR
U1		R 120	2			R 119	1			01	81	A16PB00X9XXX	MOD2 CATH RET
U2		R 121	1			J 7	1			02	16	A16PB00X9XXX	MOD2 HUM BAL
U1		R 121	2			R 120	1			01	80	A16PB00X9XXX	MOD2 CATH RET
U2		R 121	3			J 8	1			02	18	A16PB00X9XXX	MOD2 HUM BAL
U1		R 124	2			XV 4	GND			W 1	324	A18PB00X9XXX	GROUND
U2		R 127	1			XV 3	4			05	10	Z22TM00XXXXX	DVR1 CATH RET
U1		R 127	1			TB 1C	38	E A		W 1	191	A22PB00X9XXX	DVR2 CATH CURR MTR
U1		R 127	2			TB 1C	37	E A		W 1	190	A22PB00X9XXX	DVR2 CATH CURR MTR
U1		R 130	2			V 3	P	E V		05	24	A16PB00X9XXX	V3 PLATE CONNECT
U1		R 131	2			V 4	P	E V		05	25	A16PB00X9XXX	V4 PLATE CONNECT
U2		R 133	1			XV 4	4			05	11	Z22TM00XXXXX	DVR2 CATH RET
U2		R 133	1			TB 1D	52	E A		W 1	263	A22PB00X9XXX	DVR2 CATH CURR MTR
U2		R 133	2			TB 1D	51	E A		W 1	262	A22PB00X9XXX	DVR2 CATH CURR MTR
U2		R 136	2			J 10	1			W 1	323	A18PB00X9XXX	DVR CATH RET
U1		R 137	2			C 125	1	E C		W 1	172	A22PB00X9XXX	TIME DELAY
U1		R 140	1			C 85	1	E B		05	7	A16PB00X9XXX	DVR PLT CKT
U2		R 140	2			C 69	2			05	23	A16PB00X9XXX	DRIVER PLATE SUPPLY
U2		R 140	2			S 20	2	E D		W 1	327	A16PD00X9XXX	SHORTING SWITCH
U1		R 142	1			C 87	1			04	7	Z16TM00XXXXX	PA1 GRID BYPASS
U1		R 142	2			R 156	2			04	8	A18PB00X9XXX	PA2 GRID BIAS
U2		R 142	2			C 98	2			04	15	A18PB00X9XXX	PA GRID BIAS
U2		R 144	1			TB 1C	40	E A		W 1	257	A22PB00X9XXX	PA1 CATH CURR MTR
U2		R 144	1			T 3	8	E D		W 1	355	A16PB00X9XXX	PA1 CATH CURR MTR
U1		R 144	2			R 149	1			01	116	A16PB00X9XXX	PA1 CATH RET
U1		R 144	2			E 30	1			01	121	A16PB00X9XXX	PA BIAS/SCRN RET
U1		R 144	2			R 154	2			01	122	A16PB00X9XXX	PA2 CATH RET
U2		R 144	2			TB 1C	39	E A		W 1	256	A22PB00X9XXX	PA1 CATH CURR MTR
U1		R 145A	1			XV 5	S	E B		04	1	A16PB00X9XXX	PA1 SCREEN LIMITING
U1		R 146	1			L 4	2	E Q		W 6	2	A16PD00X9XXX	MODULATOR OUTPUT

FROM						TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		R 146	3			K 9	2			01	114	A16PD00X9XXX	PA SCRN RED PWR
U2		R 149	1			R 144	2			01	116	A16PB00X9XXX	PA1 CATH RET
U2		R 149	1			TB 1C	47	E A		W 1	269	A22PB00X9XXX	PA PLT CURR MTR
U1		R 149	2			R 150	1			01	117	A16PB00X9XXX	PA CATH RET
U2		R 149	2			TB 1C	48	E A		W 1	270	A22PB00X9XXX	PA PLT CURR MTR
U2		R 150	1			R 149	2			01	117	A16PB00X9XXX	PA CATH RET
U1		R 150	1			R 150	3			01	118	A16PB00X9XXX	PA CATH RET
U2		R 150	1		A 2		9			W 1	273	A22PB00X9XXX	PA OVLD SENSOR
U2		R 150	1			TB 3	7	E A		W 1	292	A22PB00X9XXX	REMOTE PLT CURR OUT
U1		R 150	2			E 6	1	E F		01	119	A16PB00X9XXX	PA CATH RET
U2		R 150	2		A 2		15			W 1	274	A22PB00X9XXX	PA OVLD SENSOR
U2		R 150	2			TB 3	8	E A		W 1	289	A22PB00X9XXX	REMOTE PLT CURR OUT
U2		R 150	3			R 150	1			01	118	A16PB00X9XXX	PA CATH RET
U1		R 152	1			XV 6	S	E B		04	12	A16PB00X9XXX	PA2 SCREEN LIMITING
U2		R 154	1			TB 1D	54	E A		W 1	265	A22PB00X9XXX	PA2 CATH CURR MTR
U2		R 154	1			T 4	8	E D		W 1	356	A16PB00X9XXX	PA2 CATH CURR MTR
U2		R 154	2			R 144	2			01	122	A16PB00X9XXX	PA2 CATH RET
U2		R 154	2			TB 1D	53	E A		W 1	264	A22PB00X9XXX	PA2 CATH CURR MTR
U1		R 156	1			C 97	1			04	9	Z16TM00XXXXX	PA2 GRID BYPASS
U2		R 156	2			R 142	2			04	8	A18PB00X9XXX	PA2 GRID BIAS
U1		R 157	1	E Q		L 4	3	E Q		W 6	1		MODULATOR OUTPUT
U1		R 157	1	E Q		L 13	2	E Q		W 6	4		MODULATOR OUTPUT
U1		R 157	2	E Q		R 158	1	E Q		01	57		PA PLT VOLT METER
U2		R 158	1	E Q		R 157	2	E Q		01	57		PA PLT VOLT METER
U1		R 158	2	E B		E 3	1			01	31	A16PD00X9XXX	PA PLT VOLT MTR
U2		R 161	1		A 2		10			W 1	340	A20PB00X9XXX	TIME DELAY
U1		R 161	2			C 117	1	E C		W 1	341	A20PB00X9XXX	TIME DELAY
U2		R 172	1			S 19	1	E C		W 1	325	A18PB00X9XXX	SHORTING SWITCH
U1		R 172	1			K 17	R 1			W 1	358	A18PB00X9XXX	MOD RED PWR
U1		R 172	2			R 173	1			02	4	A18PB00X9XXX	MOD RED PWR
U2		R 173	1			R 172	2			02	4	A18PB00X9XXX	MOD RED PWR
U2		R 173	2			K 17	R 3			W 1	360	A18PB00X9XXX	MOD RED PWR
U1		R 173	3			E 60	1			02	5	A18PB00X9XXX	MOD RED PWR
U2		R 175	1			S 19	2	E D		W 1	333	A16PD00X9XXX	SHORTING SWITCH
U1		R 175	1			K 17	L 1			W 1	363	A16PD00X9XXX	MOD RED PWR
U1		R 175	2			R 176	1			01	178	A16PD00X9XXX	MOD SCRN RED PWR
U1		R 175	2			K 17	L 3			W 1	362	A16PD00X9XXX	MOD RED PWR
U2		R 176	1			R 175	2			01	178	A16PD00X9XXX	MOD SCRN RED PWR
U1		R 176	1			C 90	1			01	179	A16PD00X9XXX	MOD SCRN RED PWR
U2		R 176	2			C 90	2			01	181	A16PD00X9XXX	MOD SCRN RED PWR
U1		R 176	2			E 34	1			W 1	365	A16PD00X9XXX	MOD RED PWR
U2		S 1	C	E B		R 5	1			W 1	212	A16PB00X9XXX	DOORS INTLK CKT
U1		S 1	NO	E B		S 3	C	E B		W 1	213	A16PB00X9XXX	DOORS INTLK CKT
U1		S 2	C	E B		S 3	NO	E B		W 1	214	A16PB00X9XXX	DOORS INTLK CKT
U1		S 2	NO	E B		S 14	C	E B		W 1	215	A16PB00X9XXX	DOORS INTLK CKT
U2		S 3	C	E B		S 1	NO	E B		W 1	213	A16PB00X9XXX	DOORS INTLK CKT
U2		S 3	NO	E B		S 2	C	E B		W 1	214	A16PB00X9XXX	DOORS INTLK CKT

FROM						TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		S 4	C	E B		S 14	NO	E B		W 1	176	A16PB00X9XXX	DOORS INTLK CKT
U1		S 4	NO	E B		S 5	C	E B		01	52	A16PB00X9XXX	DOORS INTLK CKT
U2		S 5	C	E B		S 4	NO	E B		01	52	A16PB00X9XXX	DOORS INTLK CKT
U1		S 5	NO	E B		S 6	C	E B		W 1	217	A16PB00X9XXX	DOORS INTLK CKT
U2		S 6	C	E B		S 5	NO	E B		W 1	217	A16PB00X9XXX	DOORS INTLK CKT
U1		S 6	NO	E B		S 7	C	E B		W 1	218	A16PB00X9XXX	DOORS INTLK CKT
U2		S 7	C	E B		S 6	NO	E B		W 1	218	A16PB00X9XXX	DOORS INTLK CKT
U1		S 7	NO	E B		S 8	C	E B		W 1	219	A16PB00X9XXX	DOORS INTLK CKT
U2		S 8	C	E B		S 7	NO	E B		W 1	219	A16PB00X9XXX	DOORS INTLK CKT
U1		S 8	NO	E B		S 9	C	E B		W 1	220	A16PB00X9XXX	DOORS INTLK CKT
U2		S 9	C	E B		S 8	NO	E B		W 1	220	A16PB00X9XXX	DOORS INTLK CKT
U1		S 9	NO	E B	A 8	TB 1	1	E B		W 1	221	A16PB00X9XXX	DOORS INTLK CKT
U2		S 10	1	E D		R 27	1			W 1	312	A16PD00X9XXX	SHORTING SWITCH
U1		S 10	2	E D		R 15	1			W 1	301	A16PB00X9XXX	SHORTING SWITCH
U1		S 10	3	E D		S 22	3	E D		W 1	298	A16PD00X9XXX	SHORTING SWITCH
U2		S 10	3	E D		R 20	1			W 1	313	A16PD00X9XXX	SHORTING SWITCH
U2		S 11	1			R 34	1			01	56		HIGH VOLT GROUND SW
U2		S 11	2			E 22	1	E C		W 1	315	A16PD00X9XXX	SHORTING SWITCH
U2		S 12	C			K 2	L 5	E A		W 1	185	A20PB00X9XXX	AIR INTLK CKT
U1		S 12	NO			S 13	C			W 1	186	A20PB00X9XXX	AIR INTLK CKT
U2		S 13	C			S 12	NO			W 1	186	A20PB00X9XXX	AIR INTLK CKT
U1		S 13	NO			TB 1B	26	E A		W 1	188	A20PB00X9XXX	AIR LAMP
U2		S 14	C	E B		S 2	NO	E B		W 1	215	A16PB00X9XXX	DOORS INTLK CKT
U1		S 14	NO	E B		S 4	C	E B		W 1	176	A16PB00X9XXX	DOORS INTLK CKT
U1		S 18	1			S 18	2			01	54		HIGH VOLT GROUND SW
U1		S 18	1			L 12	2	E Q		01	55		HIGH VOLT GROUND SW
U2		S 18	2			S 18	1			01	54		HIGH VOLT GROUND SW
U2		S 19	1	E C		C 98	1			W 1	322	A18PB00X9XXX	-250V BIAS SUPPLY
U1		S 19	1	E C		R 172	1			W 1	325	A18PB00X9XXX	SHORTING SWITCH
U2		S 19	2	E D		L 2	2			W 1	246	A16PD00X9XXX	MOD SCRN PWR SUPPLY
U1		S 19	2	E D		R 175	1			W 1	333	A16PD00X9XXX	SHORTING SWITCH
U2		S 20	1	E C		C 98	2			W 1	235	A18PB00X9XXX	SHORTING SWITCH
U1		S 20	2	E D		R 140	2			W 1	327	A16PD00X9XXX	SHORTING SWITCH
U2		S 21	1	E C		CR 25	1			W 1	319	A18PB00X9XXX	SHORTING SWITCH
U1		S 21	2	E D		E 25	1			W 1	320	A16PB00X9XXX	SHORTING SWITCH
U1		S 22	1	E D		S 23	1	E D		W 1	296	A16PD00X9XXX	SHORTING SWITCH
U2		S 22	1	E D		CR 22	2			W 1	300	A16PD00X9XXX	SHORTING SWITCH
U2		S 22	2	E D		R 13	1			W 1	285	A16PB00X9XXX	SHORTING SWITCH
U1		S 22	2	E D		S 23	2	E D		W 1	295	A16PB00X9XXX	SHORTING SWITCH
U1		S 22	3	E D		S 23	3	E D		W 1	297	A16PD00X9XXX	SHORTING SWITCH
U2		S 22	3	E D		S 10	3	E D		W 1	298	A16PD00X9XXX	SHORTING SWITCH
U2		S 23	1	E D		S 22	1	E D		W 1	296	A16PD00X9XXX	SHORTING SWITCH
U2		S 23	2	E D		S 22	2	E D		W 1	295	A16PB00X9XXX	SHORTING SWITCH
U2		S 23	3	E D		S 22	3	E D		W 1	297	A16PD00X9XXX	SHORTING SWITCH
U1		T 1	1	E B		T 1	8	E B		07	2	A16PB00X9XXX	28V SUPPLY
U2		T 1	1	E B		CB 1	LLD	E M		W 1	33	A16PB00X9XXX	PHASE A TO 28V XMFR
U1		T 1	2	E B		T 1	4	E B		07	3	A16PB00X9XXX	28V SUPPLY
U2		T 1	4	E B		T 1	2	E B		07	3	A16PB00X9XXX	28V SUPPLY

FC	FROM UNIT	SYM	PIN	CONN		TO UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		T 1	4	E	B		CB 1	CLD	E	M		W 1	34	A16PB00X9XXX	PHASE B TO 28V XMFR
U1		T 1	5	E	B		T 1	7	E	B		07	4	A16PB00X9XXX	28V SUPPLY
U2		T 1	7	E	B		T 1	5	E	B		07	4	A16PB00X9XXX	28V SUPPLY
U2		T 1	7	E	B		CB 1	RLD	E	M		W 1	35	A16PB00X9XXX	PHASE C TO 28V XMFR
U2		T 1	8	E	B		T 1	1	E	B		07	2	A16PB00X9XXX	28V SUPPLY
U1		T 1	10	E	B		CR 14	AC1				W 1	36	A16PB00X9XXX	AC TO 28V RECT
U1		T 1	11	E	B		CR 14	AC2				W 1	37	A16PB00X9XXX	AC TO 28V RECT
U1		T 1	12	E	B		CR 14	AC3				W 1	38	A16PB00X9XXX	AC TO 28V RECT
U2		T 2	1				M 1	1	E	N		W 1	225	A20PB00X9XXX	DVR FIL VOLT XMFR
U2		T 2	3				M 1	2	E	N		W 1	224	A20PB00X9XXX	DVR FIL VOLT XMFR
U1		T 2	4				XV 3	2				05	13A	9XXX	DRIVER FILAMENT
U1		T 2	6				XV 3	7				05	13B	0XXX	DRIVER FILAMENT
U1		T 3	1	E	B		T 6	1	E	B		W 1	232	A14VA00X9XXX	DVR FIL XFMR FEED
U1		T 3	1	E	B		T 4	1	E	B		W 1	231	A14VA00X9XXX	PA2 FIL XFMR FEED
U2		T 3	4	E	B		R 7	3				W 1	228	A14VA00X9XXX	PA1 FIL VOLT ADJ
U2		T 3	7	E	I		XV 5	W 1	E	I		W 9	1	A04VB00X9XXX	PA1 FIL1
U1		T 3	8	E	D		R 144	1				W 1	355	A16PB00X9XXX	PA1 CATH CURR MTR
U2		T 3	9	E	I		XV 5	W 2	E	I		W 9	2	A04VB00X9XXX	PA1 FIL2
U2		T 4	1	E	B		T 3	1	E	B		W 1	231	A14VA00X9XXX	PA2 FIL XFMR FEED
U2		T 4	4	E	B		R 8	3				W 1	229	A14VA00X9XXX	PA2 FIL VOLT ADJ
U2		T 4	7	E	I		XV 6	X 1	E	I		W 11	1	A04VB00X9XXX	PA2 FIL1
U1		T 4	8	E	D		R 154	1				W 1	356	A16PB00X9XXX	PA2 CATH CURR MTR
U2		T 4	9	E	I		XV 6	X 2	E	I		W 11	2	A04VB00X9XXX	PA2 FIL2
U2		T 5	1	E	B		R 9	3				W 1	237	A14VA00X9XXX	MOD2 FIL VOLT ADJ
U1		T 5	4	E	B		T 6	1	E	B		W 1	233	A14VA00X9XXX	MOD2 FIL XFMR FEED
U2		T 5	4	E	B		K 2	T 2	E	M		W 1	230	A14VA00X9XXX	FIL XFMR FEED COMM
U2		T 5	7	E	I		XV 1	Y 1	E	I		W 10	1	A04VB00X9XXX	MOD1 FIL1
U2		T 5	9	E	I		XV 1	Y 2	E	I		W 10	2	A04VB00X9XXX	MOD1 FIL2
U2		T 6	1	E	B		T 3	1	E	B		W 1	232	A14VA00X9XXX	DVR FIL XFMR FEED
U2		T 6	1	E	B		T 5	4	E	B		W 1	233	A14VA00X9XXX	MOD2 FIL XFMR FEED
U2		T 6	4	E	B		R 10	3				W 1	236	A14VA00X9XXX	MOD2 FIL VOLT ADJ
U2		T 6	7	E	I		XV 2	Z 1	E	I		W 10	3	A04VB00X9XXX	MOD2 FIL1
U2		T 6	9	E	I		XV 2	Z 2	E	I		W 10	4	A04VB00X9XXX	MOD2 FIL2
U2		T 7	1	E	A		CB 4	RLD	E	N		W 1	44	A20PB00X9XXX	PHASE C TO BIAS XMFR
U2		T 7	2	E	A		CB 4	LLD	E	N		W 1	43	A20PB00X9XXX	PHASE A TO BIAS XMFR
U1		T 7	4	E	A		CR 17	2				W 1	45	A20PB00X9XXX	BIAS SUPPLY RECT
U1		T 7	5	E	A		CR 18	2				W 1	46	A20PB00X9XXX	BIAS SUPPLY RECT
U1		T 8	1	E	B		T 8	8	E	B		01	18	A16PB00X9XXX	SCREEN SUPPLY
U2		T 8	1	E	B		K 7	T 1	E	M		W 1	10	A16PB00X9XXX	PHASE A TO SCRN XMFR
U1		T 8	2	E	B		T 8	4	E	B		01	17	A16PB00X9XXX	SCREEN SUPPLY
U2		T 8	4	E	B		T 8	2	E	B		01	17	A16PB00X9XXX	SCREEN SUPPLY
U?		T 8	4	E	B		K 7	T 2	E	M		W 1	11	A16PB00X9XXX	PHASE B TO SCRN XMFR
U1		T 8	5	E	B		T 8	7	E	B		01	16	A16PB00X9XXX	SCREEN SUPPLY
U2		T 8	7	E	B		T 8	5	E	B		01	16	A16PB00X9XXX	SCREEN SUPPLY
U2		T 8	7	E	B		K 7	T 3	E	M		W 1	12	A16PB00X9XXX	PHASE C TO SCRN XMFR
U2		T 8	8	E	B		T 8	1	E	B		01	18	A16PB00X9XXX	SCREEN SUPPLY
U2		T 8	10	E	B		CR 21	AC1	E	B		W 1	13	A16PD00X9XXX	AC TO PA SCRN RECT

	FROM						TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		T 8	11	E	B		CR 21	AC2	E	B		W 1	14	A16PD00X9XXX	AC TO PA SCRN RECT
U2		T 8	12	E	B		CR 21	AC3	E	B		W 1	15	A16PD00X9XXX	AC TO PA SCRN RECT
U2		T 8	16	E	B		CR 19	AC1	E	B		W 1	16	A16PD00X9XXX	AC TO MOD SCRN RECT
U2		T 8	17	E	B		CR 19	AC2	E	B		W 1	17	A16PD00X9XXX	AC TO MOD SCRN RECT
U2		T 8	18	E	B		CR 19	AC3	E	B		W 1	18	A16PD00X9XXX	AC TO MOD SCRN RECT
U2		T 9	3	E	I		CB 6	LLD	E	I		W 4	1	A04VB00X9XXX	HIGH VOLT XFMR INPUT
U2		T 9	4	E	H		K 5	L 1	E	H		W 1	206	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U2		T 9	5	E	H		K 6	T 2	E	H		W 1	204	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U2		T 9	8	E	I		CB 6	CLD	E	I		W 4	2	A04VB00X9XXX	HIGH VOLT XFMR INPUT
U2		T 9	9	E	H		K 5	T 1	E	H		W 1	207	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U2		T 9	10	E	H		K 6	T 3	E	H		W 1	205	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U2		T 9	13	E	I		CB 6	RLD	E	I		W 4	3	A04VB00X9XXX	HIGH VOLT XFMR INPUT
U2		T 9	14	E	H		K 5	T 3	E	H		W 1	208	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U2		T 9	15	E	H		K 6	T 1	E	H		W 1	203	A08VB00X9XXX	HV SUPPLY XMFR INPUT
U1		T 9	16	E	Q		CR 23	AC3				W 5	1		AC TO HV RECT
U1		T 9	17	E	Q		CR 23	AC1				W 5	2		AC TO HV RECT
U1		T 9	18	E	Q		CR 23	AC2				W 5	3		AC TO HV RECT
U1		T 9	19	E	Q		E 63	1	E	Q		W 5	4		AC TO HV RECT
U1		T 9	20	E	Q		E 64	1	E	Q		W 5	5		AC TO HV RECT
U1		T 9	21	E	Q		E 62	1	E	Q		W 5	6		AC TO HV RECT
U2		T 11	1				Q 6	C	E	B		03	3	A16PB00X9XXX	MOD DVR OUTPUT
U2		T 11	2				R 12	2				03	4	A16PB00X9XXX	AUDIO DRIVER CKT
U2		T 11	3				Q 5	C	E	B		03	2	A16PB00X9XXX	MOD DVR OUTPUT
U1		T 11	4				R 105	3				W 13	1	A16PB00X9XXX	MOD1 DRIVE
U1		T 11	5				R 109	2				W 13	2	A16PB00X9XXX	MOD1 BIAS ADJ
U1		T 11	6				R 110	2				W 13	3	A16PB00X9XXX	MOD2 BIAS ADJ
U1		T 11	7				R 108	3				W 13	4	A16PB00X9XXX	MOD2 DRIVE
U1		T 12	1	E	T		V 2	P	E	Q		W 8	1		MOD2 PLATE CABLE
U1		T 12	2	E	Q		R 31	1	E	Q		W 5	10		HIGH VOLT SUPPLY
U1		T 12	2	E	T		L 4	4	E	Q		01	41		MOD OUTPUT CKT
U1		T 12	3	E	T		V 1	P	E	Q		W 7	1		MOD1 PLATE CABLE
U1		T 12	4	E	T		L 4	3	E	T		01	53		MOD OUTPUT CKT
U1		T 12	5	E	T		C 67	1	E	T		01	58		MOD OUTPUT CKT
U2		T 13	1	(BLU)			J 9	A				05	14A	RG-58C/U	RF DRIVER INPUT
U2		T 13	2	(BLK)			J 9	S				05	14S	RG-58C/U	RF DRIVER INPUT
U2		T 13	3	(GRN)			C 72	1				05	17	Z22TM00XXXX	RF DRIVER INPUT
U2		T 13	4	(WHT)			C 72	2				05	16	Z22TM00XXXX	RF DRIVER INPUT
U2		T 13	4	(WHT)			C 73	2				05	15	Z22TM00XXXX	RF DRIVER INPUT
U2		T 14	1				CB 4	LLD	E	M		W 1	209	A16PB00X9XXX	AUTO TUNE XMFR INPUT
U1		T 14	2				T 14	3				01	34	A16PB00X9XXX	AUTO TUNE CKT
U2		T 14	3				T 14	2				01	34	A16PB00X9XXX	AUTO TUNE CKT
U2		T 14	4				CB 4	RLD	E	M		W 1	210	A16PB00X9XXX	AUTO TUNE XMFR INPUT
U1		T 14	5			A 9		4				W 1	307	A22PB00X9XXX	AUTO TUNE CKT
U1		T 14	6				K 15	X 2				W 1	306	A22PB00X9XXX	AUTO TUNE CKT
U1		T 14	6			A 9	C 9	2				W 1	366	A18PB00X9XXX	AUTO TUNE AC FEED
U2		TB 1A	1	E	A		K 3	5				W 1	89	A20PB00X9XXX	LOW PWR ON SW
U2		TB 1A	1	E	A	A 1	TB 1A	1	E	A	A 1	W 2	33	9XXX	LOW PWR SW
U1		TB 1A	2	E	A	A 8	TB 1	12	E	A		W 1	88	A20PB00X9XXX	LOW PWR ON SW

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM						TO									
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		TB 1A	2	E	A	A 1	TB 1A	2	E	A	A 1	W 2	32	9XXX	LOW PWR SW
U1		TB 1A	3	E	A	A 8	TB 1	11	E	A		W 1	91	A20PB00X9XXX	REMOTE LOW PWR ON
U2		TB 1A	3	E	A	A 1	TB 1A	3	E	A	A 1	W 2	31	3XXX	HI/LO PWR SW COM
U1		TB 1A	4	E	A	A 8	TB 1	19	E	A		W 1	163	A20PB00X9XXX	REMOTE PWR ADJ
U2		TB 1A	4	E	A	A 1	TB 1A	4	E	A	A 1	W 2	30	9XXX	PA LOADING RAISE SW
U1		TB 1A	5	E	A	A 8	TB 1	18	E	A		W 1	161	A20PB00X9XXX	REMOTE PWR ADJ
U2		TB 1A	5	E	A	A 1	TB 1A	5	E	A	A 1	W 2	29	5XXX	PA LOADING LOWER SW
U1		TB 1A	6	E	A	A 8	TB 1	20	E	A		W 1	304	A20PB00X9XXX	REMOTE PWR ADJ
U2		TB 1A	6	E	A	A 1	TB 1A	6	E	A	A 1	W 2	28	9XXX	REMOTE PWR ADJ
U1		TB 1A	7	E	A	A 8	TB 1	21	E	A		W 1	158	A20PB00X9XXX	REMOTE PWR ADJ
U1		TB 1A	7	E	A		K 15	L 2				W 1	242	A20PB00X9XXX	AUTO TUNE CKT
U2		TB 1A	7	E	A	A 1	TB 1A	7	E	A	A 1	W 2	27	1XXX	PA LOADING SW
U2		TB 1A	8	E	A		K 12	X 1				W 1	157	A20PB00X9XXX	PA TUNE RAISE SW
U1		TB 1A	8	E	A		K 16	L 3				W 1	243	A20PB00X9XXX	AUTO TUNE CKT
U2		TB 1A	8	E	A	A 1	TB 1A	8	E	A	A 1	W 2	26	9XXX	PA TUNING RAISE SW
U2		TB 1A	9	E	A		K 11	X 1				W 1	150	A20PB00X9XXX	PA TUNING LOWER SW
U1		TB 1A	9	E	A		K 15	L 3				W 1	241	A20PB00X9XXX	AUTO TUNE CKT
U2		TB 1A	9	E	A	A 1	TB 1A	9	E	A	A 1	W 2	25	8XXX	PA TUNING LOWER SW
U1		TB 1A	10	E	A		TB 1A	11	E	A		01	8	A20PB00X9XXX	+28 VOLTS
U2		TB 1A	10	E	A	A 8	TB 1	17	E	A		W 1	183	A20PB00X9XXX	+28 VOLTS
U2		TB 1A	10	E	A	A 1	TB 1A	10	E	A	A 1	W 2	24	9XXX	EXT CONT PNL +28V
U2		TB 1A	11	E	A		TB 1A	10	E	A		01	8	A20PB00X9XXX	+28 VOLTS
U1		TB 1A	11	E	A		TB 1A	12	E	A		01	9	A20PB00X9XXX	+28 VOLTS
U2		TB 1A	11	E	A	A 1	TB 1A	11	E	A	A 1	W 2	23	69XX	EXT CONT PNL +28V
U1		TB 1A	12	E	A		TB 1A	13	E	A		01	10	A20PB00X9XXX	+28 VOLTS
U2		TB 1A	12	E	A		TB 1A	11	E	A		01	9	A20PB00X9XXX	+28 VOLTS
U2		TB 1A	12	E	A	A 1	TB 1A	12	E	A	A 1	W 2	22	9XXX	EXT CONT PNL +28V
U2		TB 1A	13	E	A		TB 1A	12	E	A		01	10	A20PB00X9XXX	+28 VOLTS
U2		TB 1A	13	E	A	A 1	TB 1A	13	E	A	A 1	W 2	21	63XX	EXT CONT PNL +28V
U2		TB 1A	13	E	B		CR 14	POS	E	B		W 1	57	A16PB00X9XXX	+28 VOLTS
U1		TB 1A	14	E	A	A 8	TB 1	4	E	A		W 1	102	A20PB00X9XXX	FIL ON SW
U2		TB 1A	14	E	A	A 1	TB 1A	14	E	A	A 1	W 2	20	9XXX	FIL ON SW
U1		TB 1A	15	E	A	A 8	TB 1	3	E	A		W 1	100	A20PB00X9XXX	FIL ON/OFF COMM
U2		TB 1A	15	E	A	A 1	TB 1A	15	E	A	A 1	W 2	19	65XX	FIL SW COMM
U1		TB 1A	16	E	A	A 8	TB 1	5	E	A		W 1	134	A20PB00X9XXX	REMOTE FAILSAFE
U2		TB 1A	16	E	A	A 1	TB 1A	16	E	A	A 1	W 2	18	9XXX	PLT OFF/RESET SW
U1		TB 1B	17	E	A	A 8	TB 1	2	E	A		W 1	105	A20PB00X9XXX	FIL OFF SW
U2		TB 1B	17	E	A	A 1	TB 1A	17	E	A	A 1	W 2	17	61XX	FIL ON SW
U2		TB 1B	18	E	A		K 6	T 6	E	A		W 1	72	A22PB00X9XXX	PLT OFF/RESET LAMP
U2		TB 1B	18	E	A	A 1	TB 1B	18	E	A	A 1	W 2	16	9XXX	PLT OFF/RESET LAMP
U2		TB 1B	19	E	A		K 5	L 4	E	A		W 1	65	A22PB00X9XXX	HIGH PWR ON LAMP
U2		TB 1B	19	E	A	A 1	TB 1B	19	E	A	A 1	W 2	15	68XX	HIGH PWR ON LAMP
U2		TB 1B	20	E	A		K 6	L 4	E	A		W 1	67	A22PB00X9XXX	LOW PWR ON LAMP
U2		TB 1B	20	E	A	A 1	TB 1B	20	E	A	A 1	W 2	14	9XXX	LOW PWR ON LAMP
U2		TB 1B	21	E	A	A 1	TB 1B	21	E	A	A 1	W 2	13	39XX	SPARE
U2		TB 1B	22	E	A	A 5		3				W 1	133	A22PB00X9XXX	DC OVLD GATE
U2		TB 1B	22	E	A	A 1	TB 1B	22	E	A	A 1	W 2	12	9XXX	DC OVLD GATE

	FROM						TO									
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2		TB 1B	23	E	A	A 4		3				W 1	132	A22PB00X9XXX	MOD2 OVLD GATE
U2		TB 1B	23	E	A	A 1	TB 1B	23	E	A	A 1	W 2	11	35XX	MOD2 OVLD GATE
U2		TB 1B	24	E	A	A 3		3				W 1	131	A22PB00X9XXX	MOD1 OVLD GATE
U2		TB 1B	24	E	A	A 1	TB 1B	24	E	A	A 1	W 2	10	9XXX	MOD1 OVLD GATE
U2		TB 1B	25	E	A	A 2		3				W 1	130	A22PB00X9XXX	PA OVLD GATE
U2		TB 1B	25	E	A	A 1	TB 1B	25	E	A	A 1	W 2	9	31XX	PA OVLD GATE
U2		TB 1B	26	E	A		S 13	NO				W 1	188	A20PB00X9XXX	AIR LAMP
U2		TB 1B	26	E	A		CR 2	2				W 1	189	A20PB00X9XXX	AIR LAMP
U2		TB 1B	26	E	A	A 1	TB 1B	26	E	A	A 1	W 2	8	9XXX	AIR LAMP
U1		TB 1B	27	E	A	A 8	TB 1	1	E	A		W 1	104	A20PB00X9XXX	REMOTE FIL OFF
U2		TB 1B	27	E	A	A 1	TB 1B	27	E	A	A 1	W 2	7	38XX	DOORS LAMP
U2		TB 1B	27	E	B		K 1	3				W 1	103	A16PB00X9XXX	DOORS LAMP
U2		TB 1B	28	E	A		CB 4	C	E	A		W 1	58	A22PB00X9XXX	FIL ON LAMP
U1		TB 1B	28	E	A		R 12	1				W 1	283	A20PB00X9XXX	AUDIO DVR +28V
U2		TB 1B	28	E	A		TB 1D	65	E	A		W 1	342	A20PB00X9XXX	EXCITER +28V
U2		TB 1B	28	E	A	A 1	TB 1B	28	E	A	A 1	W 2	6	9XXX	FIL ON LAMP
U2		TB 1B	29	E	A		K 2	T 4	E	A		W 1	56	A22PB00X9XXX	FIL OFF LAMP
U2		TB 1B	29	E	A	A 1	TB 1B	29	E	A	A 1	W 2	5	59XX	FIL OFF LAMP
U2		TB 1B	30	E	A		TB 1B	31	E	A		01	3	A20PB00X9XXX	GROUND
U2		TB 1B	30	E	A	A 1	TB 1B	30	E	A	A 1	W 2	4	9XXX	GROUND
U1		TB 1B	30	E	B		E 6	1	E	F		W 1	211	A16PB00X9XXX	GROUND
U1		TB 1B	31	E	A		TB 1B	30	E	A		01	3	A20PB00X9XXX	GROUND
U2		TB 1B	31	E	A		TB 1B	32	E	A		01	2	A20PB00X9XXX	GROUND
U2		TB 1B	31	E	A	A 1	TB 1B	31	E	A	A 1	W 2	3	51XX	GROUND
U2		TB 1B	32	E	A		TB 1B	33	E	A		01	1	A20PB00X9XXX	GROUND
U1		TB 1B	32	E	A		TB 1B	31	E	A		01	2	A20PB00X9XXX	GROUND
U2		TB 1B	32	E	A	A 1	TB 1B	32	E	A	A 1	W 2	2	9XXX	GROUND
U1		TB 1B	33	E	A		TB 1B	32	E	A		01	1	A20PB00X9XXX	GROUND
U2		TB 1B	33	E	A	A 1	TB 1B	33	E	A	A 1	W 2	1	58XX	GROUND
U2		TB 1B	33	E	A	A 1	TB 1B	33	E	A	A 1	W 2	67	XXXX	DRAIN WIRE
U2		TB 1C	34	E	A		K 4	5				W 1	84	A20PB00X9XXX	HIGH PWR ON SW
U2		TB 1C	34	E	A	A 1	TB 1C	34	E	A	A 1	W 2	34	6XXX	HIGH PWR SW
U1		TB 1C	35	E	A	A 8	TB 1	15	E	A		W 1	86	A20PB00X9XXX	REMOTE HIGH PWR ON
U2		TB 1C	35	E	A	A 1	TB 1C	35	E	A	A 1	W 2	35	9XXX	HI/LO PWR SW COM
U1		TB 1C	36	E	A	A 8	TB 1	16	E	A		W 1	83	A20PB00X9XXX	HIGH PWR ON SW
U2		TB 1C	36	E	A	A 1	TB 1C	36	E	A	A 1	W 2	36	19XX	HIGH PWR SW
U2		TB 1C	37	E	A		R 127	2				W 1	190	A22PB00X9XXX	DVR2 CATH CURR MTR
U2		TB 1C	37	E	A	A 1	TB 1C	37	E	A	A 1	W 2	37	9XXX	DVR1 CATH CURR MTR
U2		TB 1C	38	E	A		R 127	1				W 1	191	A22PB00X9XXX	DVR2 CATH CURR MTR
U2		TB 1C	38	E	A	A 1	TB 1C	38	E	A	A 1	W 2	38	18XX	DVR1 CATH CURR MTR
U1		TB 1C	39	E	A		R 144	2				W 1	256	A22PB00X9XXX	PA1 CATH CURR MTR
U2		TB 1C	39	E	A	A 1	TB 1C	39	E	A	A 1	W 2	39	9XXX	PA1 CATH CURR MTR
U1		TB 1C	40	E	A		R 144	1				W 1	257	A22PB00X9XXX	PA1 CATH CURR MTR
U2		TB 1C	40	E	A	A 1	TB 1C	40	E	A	A 1	W 2	40	89XX	PA1 CATH CURR MTR
U1		TB 1C	41	E	A		R 116	2				W 1	258	A22PB00X9XXX	MOD1 CATH CURR MTR
U2		TB 1C	41	E	A	A 1	TB 1C	41	E	A	A 1	W 2	41	2XXX	MOD1 CATH CURR MTR
U1		TB 1C	42	E	A		R 116	1				W 1	259	A22PB00X9XXX	MOD1 CATH CURR MTR
U2		TB 1C	42	E	A	A 1	TB 1C	42	E	A	A 1	W 2	42	6XXX	MOD1 CATH CURR MTR

	FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		TB 1C	43	E A		E 31	1			W 1	260	A22PB00X9XXX	PA GRID CURR MTR
U2		TB 1C	43	E A	A 1	TB 1C	43	E A	A 1	W 2	43	2XXX	PA GRID CURR MTR
U1		TB 1C	44	E A		E 29	1			W 1	261	A22PB00X9XXX	PA SCRN MTR
U2		TB 1C	44	E A	A 1	TB 1C	44	E A	A 1	W 2	44	3XXX	PA SCRN MTR COMM
U1		TB 1C	45	E A		R 30	1			W 1	139	A22PB00X9XXX	PA SCRN VOLT MTR
U2		TB 1C	45	E A	A 1	TB 1C	45	E A	A 1	W 2	45	2XXX	PA SCRN VOLT MTR
U2		TB 1C	46	E A		R 17	1			W 1	141	A22PB00X9XXX	BIAS VOLTAGE MTR
U2		TB 1C	46	E A	A 1	TB 1C	46	E A	A 1	W 2	46	5XXX	BIAS SUPPLY VOLT MTR
U1		TB 1C	47	E A		R 149	1			W 1	269	A22PB00X9XXX	PA PLT CURR MTR
U2		TB 1C	47	E A	A 1	TB 1C	47	E A	A 1	W 2	47	2XXX	PA PLT CURR MTR
U1		TB 1C	48	E A		R 149	2			W 1	270	A22PB00X9XXX	PA PLT CURR MTR
U2		TB 1C	48	E A	A 1	TB 1C	48	E A	A 1	W 2	48	1XXX	PA PLT CURR MTR
U1		TB 1C	49	E A		E 36	1			W 1	271	A22PB00X9XXX	PA PLT VOLT MTR
U2		TB 1C	49	E A	A 1	TB 1C	49	E A	A 1	W 2	49	2XXX	PA PLT VOLT MTR
U1		TB 1D	50	E A		E 38	1			W 1	272	A22PB00X9XXX	PA PLT VOLT MTR
U2		TB 1D	50	E A	A 1	TB 1C	50	E A	A 1	W 2	50	8XXX	PA PLT VOLT MTR
U1		TB 1D	51	E A		R 133	2			W 1	262	A22PB00X9XXX	DVR2 CATH CURR MTR
U2		TB 1D	51	E A	A 1	TB 1D	51	E A	A 1	W 2	51	2XXX	DVR2 CATH CURR MTR
U1		TB 1D	52	E A		R 133	1			W 1	263	A22PB00X9XXX	DVR2 CATH CURR MTR
U2		TB 1D	52	E A	A 1	TB 1D	52	E A	A 1	W 2	52	69XX	DVR2 CATH CURR MTR
U1		TB 1D	53	E A		R 154	2			W 1	264	A22PB00X9XXX	PA2 CATH CURR MTR
U2		TB 1D	53	E A	A 1	TB 1D	53	E A	A 1	W 2	53	2XXX	PA2 CATH CURR MTR
U1		TB 1D	54	E A		R 154	1			W 1	265	A22PB00X9XXX	PA2 CATH CURR MTR
U2		TB 1D	54	E A	A 1	TB 1D	54	E A	A 1	W 2	54	63XX	PA2 CATH CURR MTR
U1		TB 1D	55	E A		R 119	1			W 1	266	A22PB00X9XXX	MOD2 CATH CURR MTR
U2		TB 1D	55	E A	A 1	TB 1D	55	E A	A 1	W 2	55	2XXX	MOD2 CATH CURR MTR
U1		TB 1D	56	E A		R 117	1			W 1	267	A22PB00X9XXX	MOD MTR COMM PT
U2		TB 1D	56	E A	A 1	TB 1D	56	E A	A 1	W 2	56	65XX	MOD MTR COMM PT
U1		TB 1D	57	E A		E 34	1			W 1	268	A22PB00X9XXX	MOD SCRN MTR
U2		TB 1D	57	E A	A 1	TB 1D	57	E A	A 1	W 2	57	2XXX	MOD SCRN MTR COMM
U1		TB 1D	58	E A		R 23	1			W 1	140	A22PB00X9XXX	PA SCRN VOLT MTR
U2		TB 1D	58	E A	A 1	TB 1D	58	E A	A 1	W 2	58	61XX	MOD SCRN VOLT MTR
U2		TB 1D	59	E A		R 6	2			W 1	142	A22PB00X9XXX	+28V MTR
U2		TB 1D	59	E A	A 1	TB 1D	59	E A	A 1	W 2	59	2XXX	+28V MTR
U2		TB 1D	60	E A		R 117	2			W 1	187	A22PB00X9XXX	MOD PLT CURR MTR
U2		TB 1D	60	E A	A 1	TB 1D	60	E A	A 1	W 2	60	68XX	MTR COMM GND
U2		TB 1D	61	E A	A 1	TB 1D	61	E A	A 1	W 2	61	2XXX	SPARE
U2		TB 1D	62	E A	A 1	TB 1D	62	E A	A 1	W 2	62	39XX	SPARE
U2		TB 1D	63	E A	A 1	TB 1D	63	E A	A 1	W 2	63	2XXX	SPARE
U2		TB 1D	64	E A	A 1	TB 1D	64	E A	A 1	W 2	64	35XX	SPARE
U1		TB 1D	65	E A		TB 1D	66	E A		01	170	A20PB00X9XXX	EXCITER +28V
U1		TB 1D	65	E A		TB 1B	28	E A		W 1	342	A20PB00X9XXX	EXCITER +28V
U2		TB 1D	65	E A	A 1	TB 1D	65	E A	A 1	W 2	65	2XXX	EXCITER +28V
U2		TB 1D	66	E A		TB 1D	65	E A		01	170	A20PB00X9XXX	EXCITER +28V
U2		TB 1D	66	E A	A 1	TB 1D	66	E A	A 1	W 2	66	31XX	EXCITER +28V
U1		TB 2	1	E A		TB 3	13	E A		W 1	287A		FUTURE USE
U1		TB 2	2	E A		TB 3	14	E A		W 1	287B		FUTURE USE

	FROM					TO							
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		TB 2	3	E A		TB 3	15	E A		W 1	287S		FUTURE USE
U1		TB 3	1	E A		R 37	1			W 1	21A		AUDIO INPUT
U1		TB 3	2	E A		R 38	1			W 1	21B		AUDIO INPUT
U1		TB 3	3	E A		K 8	X 2			W 1	21S		AUDIO INPUT GND
U1		TB 3	4	E A		E 26	1			W 1	291A	RG-58C/U	FREQ MONITOR
U1		TB 3	5	E A		J 18	S			W 1	290S	RG-58C/U	MOD MON CKT
U1		TB 3	5	E A		E 27	1			W 1	291S	RG-58C/U	FREQ MONITOR
U1		TB 3	6	E A		J 18	A	E P		W 1	290A	RG-58C/U	MOD MON CKT
U1		TB 3	7	E A		R 150	1			W 1	292	A22PB00X9XXX	REMOTE PLT CURR OUT
U1		TB 3	8	E A		R 150	2			W 1	289	A22PB00X9XXX	REMOTE PLT CURR OUT
U1		TB 3	8	E A		E 39	1			W 1	288	A22PB00X9XXX	REMOTE PLT VOLT OUT
U2		TB 3	9	E A		E 38	1			W 1	294	A22PB00X9XXX	REMOTE PLT VOLT OUT
U1		TB 3	10	E A		C 118	1			W 1	303A		FUTURE USE
U1		TB 3	11	E A		C 119	1			W 1	303B		FUTURE USE
U1		TB 3	12	E A		E 46	1			W 1	303S		FUTURE USE
U2		TB 3	13	E A		TB 2	1	E A		W 1	287A		FUTURE USE
U2		TB 3	14	E A		TB 2	2	E A		W 1	287B		FUTURE USE
U2		TB 3	15	E A		TB 2	3	E A		W 1	287S		FUTURE USE
U1		TB 3	16	E B		TB 3	17	E B		01	15	A16PB00X9XXX	EXTERNAL INTLK
U2		TB 3	16	E B		CB 4	NO	E B		W 1	129	A16PB00X9XXX	EXTRNL INTLK
U2		TB 3	17	E B		TB 3	16	E B		01	15	A16PB00X9XXX	EXTERNAL INTLK
U2		TB 3	17	E B	A 2		5			W 1	123	A16PB00X9XXX	EXTRNL INTLK
U2		TB 3	18	E A	A 6		15			W 1	113	A18PB00X9XXX	OVLD EXTRNL INTLK
U2		TB 3	19	E A	A 6		16			W 1	114	A18PB00X9XXX	OVLD EXTRNL INTLK
U2		TB 3	20	E A	A 6		17			W 1	115	A18PB00X9XXX	OVLD EXTRNL INTLK
U2		TB 3	21	E B		K 3	8			W 1	81	A16PB00X9XXX	LOW PWR EXTRNL INTLR
U2		TB 3	22	E B		K 3	9			W 1	80	A16PB00X9XXX	LOW PWR EXTRNL INTLK
U2		TB 3	23	E B		K 4	8			W 1	79	A16PB00X9XXX	HI PWR EXTRNL INTLK
U2		TB 3	24	E B		K 4	9			W 1	78	A16PB00X9XXX	HI PWR EXTRNL INTLK
U2		TB 3	25	E B		K 5	L 7	E B		W 1	74	A16PB00X9XXX	PLT EXTERNAL INTLK
U2		TB 3	26	E B		K 6	T 7	E B		W 1	73	A16PB00X9XXX	PLT EXTERNAL INTLK
U2		TB 4	1	E B		K 2	T 1	E M		W 1	26	A14VA00X9XXX	PHASE A TO VOLT REG
U1		TB 4	1	E B	A 7	T 1A	2		A 7	W 1	1	A14VA00X9XXX	PHASE A TO FIL REG
U1		TB 4	2	E A		M 1	2	E N		W 1	222	A20PB00X9XXX	240VAC FIL HRS METER
U1		TB 4	2	E B		R 7	1			W 1	226	A14VA00X9XXX	PA FIL XFMR FEED
U1		TB 4	2	E B	A 7	T 1A	3		A 7	W 1	2	A14VA00X9XXX	REG TO FIL XFMR
U1		TB 4	3	E A		M 1	1	E N		W 1	223	A20PB00X9XXX	240VAC FIL HRS METER
U2		TB 4	3	E B		K 2	T 2	E M		W 1	27	A14VA00X9XXX	PHASE B TO VOLT REG
U1		TB 4	3	E B	A 7	T 1A	1		A 7	W 1	3	A14VA00X9XXX	PHASE B TO FIL REG
U2		TB 4	4	E B		K 2	T 3	E M		W 1	29	A14VA00X9XXX	PHASE C TO VOLT REG
U1		TB 4	4	E B	A 7	T 1B	2		A 7	W 1	4	A14VA00X9XXX	PHASE C TO FIL REG
U1		TB 4	5	E B		R 9	1			W 1	234	A14VA00X9XXX	MOD FIL XFMR FEED
U1		TB 4	5	E B	A 7	T 1B	3		A 7	W 1	5	A14VA00X9XXX	REG TO FIL XFMR
U1		TB 4	6	E A	A 8	TB 1	17	E A		W 1	164	A20PB00X9XXX	+28 VOLTS
U1		TB 4	7	E A		K 6	C 3	E A		W 1	286	A20PB00X9XXX	GROUND
U2		TB 5	1	E A		K 1	10			W 1	40	A18PB00X9XXX	PHASE A CABINET FAN
U2		TB 5	2	E A		CB 2	RLD	E N		W 1	42	A18PB00X9XXX	PHASE C CABINET FAN
U1		TB 5	2	E B		B 1	2	E C		W 1	192	A16PB00X9XXX	PHASE C MAIN BLOWER

	FROM					TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		TB 6	1	E	A		K 2	T 5	E	A		W 1	51	A16PB00X9XXX	EXCITER +28V
U1		TB 6	2	E	A		C 1	2	E	C		W 1	198	A16PB00X9XXX	GROUND
U2		TB 7	1	E	A		K 11	L 3				W 1	165	A20PB00X9XXX	TUNING CKT
U1		TB 7	2	E	A		TB 8	2	E	A		W 1	169	A20PB00X9XXX	AC TO LOADING CKT
U2		TB 7	2	E	A		CB 1	CLD	E	N		W 1	167	A20PB00X9XXX	AC TO TUNING CKT
U2		TB 7	3	E	A		K 12	L 3				W 1	168	A20PB00X9XXX	TUNING CKT
U2		TB 8	1	E	A		K 13	L 3				W 1	170	A20PB00X9XXX	LOADING CKT
U2		TB 8	2	E	A		TB 7	2	E	A		W 1	169	A20PB00X9XXX	AC TO LOADING CKT
U2		TB 8	3	E	A		K 14	L 3				W 1	171	A20PB00X9XXX	LOADING CKT
U2		V 1	P	E	D		R 82	1				01	93	A16PD00X9XXX	MOD FEEDBACK NETWORK
U2		V 1	P	E	Q		T 12	3	E	T		W 7	1		MOD1 PLATE CABLE
U2		V 2	P	E	D		R 104	1				01	94	A16PD00X9XXX	MOD FEEDBACK NETWORK
U2		V 2	P	E	Q		T 12	1	E	T		W 8	1		MOD2 PLATE CABLE
U2		V 3	P	E	V		R 130	2				05	24	A16PB00X9XXX	V3 PLATE CONNECT
U2		V 4	P	E	V		R 131	2				05	25	A16PB00X9XXX	V4 PLATE CONNECT
U2		XV 1	S	E	B		C 115	1	E	M		02	1	A16PB00X9XXX	MOD1 SCRN BYPASS
U2		XV 1	Y 1	E	B		E 1	1				02	9	A16PB00X9XXX	MOD1 CATH PROTECT
U2		XV 1	Y 1	E	B		J 5	1				02	11	A16PB00X9XXX	MOD1 FIL TEST PT
U1		XV 1	Y 1	E	I		T 5	7	E	I		W 10	1	A04VB00X9XXX	MOD1 FIL1
U2		XV 1	Y 2	E	B		J 6	1				02	13	A16PB00X9XXX	MOD1 FIL TEST PT
U1		XV 1	Y 2	E	I		T 5	9	E	I		W 10	2	A04VB00X9XXX	MOD1 FIL2
U2		XV 2	S	E	B		C 116	1	E	M		02	2	A16PB00X9XXX	MOD2 SCRN BYPASS
U2		XV 2	Z 1	E	B		E 2	1				02	10	A16PB00X9XXX	MOD2 CATH PROTECT
U2		XV 2	Z 1	E	B		J 7	1				02	15	A16PB00X9XXX	MOD2 FIL TEST PT
U1		XV 2	Z 1	E	I		T 6	7	E	I		W 10	3	A04VB00X9XXX	MOD2 FIL1
U2		XV 2	Z 2	E	B		J 8	1				02	17	A16PB00X9XXX	MOD2 FIL TEST PT
U1		XV 2	Z 2	E	I		T 6	9	E	I		W 10	4	A04VB00X9XXX	MOD2 FIL2
U1		XV 3	2				XV 4	2				05	12A	9XXX	DRIVER FILAMENT
U2		XV 3	2				T 2	4				05	13A	9XXX	DRIVER FILAMENT
U1		XV 3	4				R 127	1				05	10	Z22TM00XXXXX	DVR1 CATH RET
U1		XV 3	7				XV 4	7				05	12B	0XXX	DRIVER FILAMENT
U2		XV 3	7				T 2	6				05	13B	0XXX	DRIVER FILAMENT
U2		XV 4	2				XV 3	2				05	12A	9XXX	DRIVER FILAMENT
U1		XV 4	4				R 133	1				05	11	Z22TM00XXXXX	DVR2 CATH RET
U2		XV 4	7				XV 3	7				05	12B	0XXX	DRIVER FILAMENT
U2		XV 4	GND				R 124	2				W 1	324	A18PB00X9XXX	GROUND
U1		XV 5	S	E	B		E 49	1				04	2	A16PB00X9XXX	SCRN METERING
U2		XV 5	S	E	B		R 145A	1				04	1	A16PB00X9XXX	PA1 SCREEN LIMITING
U1		XV 5	W 1	E	A		J 1	1				04	3	A18PB00X9XXX	PA1 FIL TEST PT
U2		XV 5	W 1	E	B		E 4	1				04	13	A16PB00X9XXX	PA1 CATH PROTECT
U1		XV 5	W 1	E	I		T 3	7	E	I		W 9	1	A04VB00X9XXX	PA1 FIL1
U1		XV 5	W 2	E	A		J 2	1				04	4	A18PB00X9XXX	PA1 FIL TEST PT
U1		XV 5	W 2	E	I		T 3	9	E	I		W 9	2	A04VB00X9XXX	PA1 FIL2
U2		XV 6	S	E	B		R 152	1				04	12	A16PB00X9XXX	PA2 SCREEN LIMITING
U1		XV 6	X 1	E	A		J 3	1				04	10	A18PB00X9XXX	PA2 FIL TEST PT
U2		XV 6	X 1	E	B		E 5	1				04	14	A16PB00X9XXX	PA2 CATH PROTECT
U1		XV 6	X 1	E	I		T 4	7	E	I		W 11	1	A04VB00X9XXX	PA2 FIL1

	FROM						TO								
FC	UNIT	SYM	PIN	CONN			UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1		XV 6	X 2	E	A			J 4	1				04	11	A18PB00X9XXX	PA2 FIL TEST PT
U1		XV 6	X 2	E	I			T 4	9	E	I		W 11	2	A04VB00X9XXX	PA2 FIL2
U1	A 1	CR 1	1				A 1	R 7	1			A 1	01	11	B22BA00XXXXX	PA OVLD LAMP
U1	A 1	CR 1	2				A 1	CR 2	2			A 1	01	27	Z22TM00XXXXX	LAMP RESET LAMP COMM
U1	A 1	CR 2	1				A 1	R 10	1			A 1	01	24	B22BA00XXXXX	MOD1 OVLD LAMP
U1	A 1	CR 2	2				A 1	CR 3	2			A 1	01	28	Z22TM00XXXXX	LAMP RESET LAMP COMM
U2	A 1	CR 2	2				A 1	CR 1	2			A 1	01	27	Z22TM00XXXXX	LAMP RESET LAMP COMM
U1	A 1	CR 3	1				A 1	R 13	1			A 1	01	31	B22BA00XXXXX	MOD2 OVLD LAMP
U2	A 1	CR 3	2				A 1	CR 2	2			A 1	01	28	Z22TM00XXXXX	LAMP RESET LAMP COMM
U1	A 1	CR 3	2				A 1	CR 4	2			A 1	01	29	Z22TM00XXXXX	LAMP RESET LAMP COMM
U1	A 1	CR 4	1				A 1	R 16	1			A 1	01	35	B22BA00XXXXX	DC OVLD LAMP
U2	A 1	CR 4	2				A 1	CR 3	2			A 1	01	29	Z22TM00XXXXX	LAMP RESET LAMP COMM
U1	A 1	CR 4	2				A 1	R 17	2			A 1	01	30	Z22TM00XXXXX	LAMP RESET LAMP COMM
U2	A 1	E 1	1				A 1	TB 1B	33			A 1	01	25	A22PB00X9XXX	GROUND
U2	A 1	M 1	N	E	C		A 1	S 3	CB			A 1	W 1	82	A22PB00X9XXX	TEST MTR1 NEG
U2	A 1	M 1	P	E	C		A 1	S 3	CA			A 1	W 1	81	A22PB00X9XXX	TEST MTR1 POS
U2	A 1	M 2	N	E	C		A 1	TB 1C	48			A 1	W 1	60	A22PB00X9XXX	PA PLT CURR MTR
U2	A 1	M 2	P	E	C		A 1	TB 1C	47			A 1	W 1	59	A22PB00X9XXX	PA PLT CURR MTR
U2	A 1	M 3	N	E	C		A 1	TB 1C	50			A 1	W 1	62	A22PB00X9XXX	PA PLT VOLT MTR
U2	A 1	M 3	P	E	C		A 1	TB 1C	49			A 1	W 1	61	A22PB00X9XXX	PA PLT VOLT MTR
U2	A 1	M 4	N	E	C		A 1	S 4	CB			A 1	W 1	84	A22PB00X9XXX	TEST MTR2 NEG
U2	A 1	M 4	P	E	C		A 1	S 4	CA			A 1	W 1	83	A22PB00X9XXX	TEST MTR2 POS
U1	A 1	R 1	1				A 1	XDS 1	A			A 1	W 1	7	A22PB00X9XXX	FIL OFF LAMP
U2	A 1	R 1	2				A 1	TB 1B	29			A 1	W 1	21	A22PB00X9XXX	FIL OFF LAMP
U1	A 1	R 2	1				A 1	XDS 2	A			A 1	W 1	8	A22PB00X9XXX	FIL ON LAMP
U2	A 1	R 2	2				A 1	TB 1B	28			A 1	W 1	22	A22PB00X9XXX	FIL ON LAMP
U1	A 1	R 3	1				A 1	XDS 3	A			A 1	W 1	9	A22PB00X9XXX	DOORS LAMP
U2	A 1	R 3	2				A 1	TB 1B	27			A 1	W 1	23	A22PB00X9XXX	DOORS LAMP
U1	A 1	R 4	1				A 1	XDS 3	C			A 1	W 1	10	A22PB00X9XXX	AIR LAMP
U2	A 1	R 4	2				A 1	TB 1B	26			A 1	W 1	24	A22PB00X9XXX	AIR LAMP
U1	A 1	R 5	1				A 1	R 6	1			A 1	01	26	B22BA00XXXXX	Q1 GATE CKT
U1	A 1	R 5	2				A 1	R 8	2			A 1	01	36	Z22TM00XXXXX	OVLD LAMP COMM
U2	A 1	R 5	2				A 1	TB 1B	32			A 1	W 1	85	A22PB00X9XXX	GROUND
U2	A 1	R 6	1				A 1	R 5	1			A 1	01	26	B22BA00XXXXX	Q1 GATE CKT
U2	A 1	R 6	2				A 1	TB 1B	25			A 1	W 1	25	A22PB00X9XXX	PA OVLD GATE
U2	A 1	R 7	1				A 1	CR 1	1			A 1	01	11	B22BA00XXXXX	PA OVLD LAMP
U1	A 1	R 7	2				A 1	XDS 4	A			A 1	W 1	11	A22PB00X9XXX	PA OVLD LAMP
U1	A 1	R 8	1				A 1	R 9	1			A 1	01	32	B22BA00XXXXX	Q2 GATE CKT
U2	A 1	R 8	2				A 1	R 5	2			A 1	01	36	Z22TM00XXXXX	OVLD LAMP COMM
U1	A 1	R 8	2				A 1	R 11	2			A 1	01	37	Z22TM00XXXXX	OVLD LAMP COMM
U2	A 1	R 9	1				A 1	R 8	1			A 1	01	32	B22BA00XXXXX	Q2 GATE CKT
U2	A 1	R 9	2				A 1	TB 1B	24			A 1	W 1	26	A22PB00X9XXX	MOD1 OVLD GATE
U2	A 1	R 10	1				A 1	CR 2	1			A 1	01	24	B22BA00XXXXX	MOD1 OVLD LAMP
U1	A 1	R 10	2				A 1	XDS 4	C			A 1	W 1	12	A22PB00X9XXX	MOD1 OVLD LAMP
U1	A 1	R 11	1				A 1	R 12	1			A 1	01	33	B22BA00XXXXX	Q3 GATE CKT
U1	A 1	R 11	2				A 1	R 14	2			A 1	01	1	Z22TM00XXXXX	OVLD LAMP COMM
U2	A 1	R 11	2				A 1	R 8	2			A 1	01	37	Z22TM00XXXXX	OVLD LAMP COMM

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM				TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2	A 1	R 12	1		A 1	R 11	1		A 1	01	33	B22BA00XXXXX	Q3 GATE CKT
U2	A 1	R 12	2		A 1	TB 1B	23		A 1	W 1	27	A22PB00X9XXX	MOD2 OVLD GATE
U2	A 1	R 13	1		A 1	CR 3	1		A 1	01	31	B22BA00XXXXX	MOD2 OVLD LAMP
U1	A 1	R 13	2		A 1	XDS 4	D		A 1	W 1	13	A22PB00X9XXX	MOD2 OVLD LAMP
U1	A 1	R 14	1		A 1	R 15	1		A 1	01	34	B22BA00XXXXX	Q4 GATE CKT
U2	A 1	R 14	2		A 1	R 11	2		A 1	01	1	Z22TM00XXXXX	OVLD LAMP COMM
U2	A 1	R 15	1		A 1	R 14	1		A 1	01	34	B22BA00XXXXX	Q4 GATE CKT
U2	A 1	R 15	2		A 1	TB 1B	22		A 1	W 1	28	A22PB00X9XXX	DC OVLD GATE
U2	A 1	R 16	1		A 1	CR 4	1		A 1	01	35	B22BA00XXXXX	DC OVLD LAMP
U1	A 1	R 16	2		A 1	XDS 5	A		A 1	W 1	14	A22PB00X9XXX	DC OVLD LAMP
U2	A 1	R 17	1		A 1	XDS 5	C		A 1	W 1	19	A22PB00X9XXX	LAMP RESET LAMP
U2	A 1	R 17	2		A 1	CR 4	2		A 1	01	30	Z22TM00XXXXX	LAMP RESET LAMP COMM
U2	A 1	R 18	1		A 1	XDS 6	A		A 1	W 1	18	A22PB00X9XXX	LOW PWR ON LAMP
U2	A 1	R 18	2		A 1	TB 1B	20		A 1	W 1	30	A22PB00X9XXX	LOW PWR ON LAMP
U1	A 1	R 19	1		A 1	XDS 7	A		A 1	W 1	15	A22PB00X9XXX	HIGH PWR ON LAMP
U2	A 1	R 19	2		A 1	TB 1B	19		A 1	W 1	31	A22PB00X9XXX	HIGH PWR ON LAMP
U1	A 1	R 20	1		A 1	XDS 8	A		A 1	W 1	16	A22PB00X9XXX	PLT OFF/RESET LAMP
U2	A 1	R 20	2		A 1	TB 1B	18		A 1	W 1	32	A22PB00X9XXX	PLT OFF/RESET LAMP
U2	A 1	S 1	CA		A 1	TB 1A	15		A 1	W 1	35	A22PB00X9XXX	FIL SW COMM
U1	A 1	S 1	CA		A 1	S 2	CA		A 1	W 1	95	A22PB00X9XXX	FIL ON/OFF COM
U2	A 1	S 1	NCA		A 1	TB 1A	17		A 1	W 1	33	A22PB00X9XXX	FIL OFF SW
U2	A 1	S 2	CA		A 1	S 1	CA		A 1	W 1	95	A22PB00X9XXX	FIL ON/OFF COM
U2	A 1	S 2	NCA		A 1	TB 1A	14		A 1	W 1	36	A22PB00X9XXX	FIL ON SW
U1	A 1	S 3	CA		A 1	M 1	P	E C	A 1	W 1	81	A22PB00X9XXX	TEST MTR1 POS
U1	A 1	S 3	CB		A 1	M 1	N	E C	A 1	W 1	82	A22PB00X9XXX	TEST MTR1 NEG
U2	A 1	S 3	1A		A 1	TB 1C	38		A 1	W 1	50	A22PB00X9XXX	DVR1 CATH CURR MTR
U2	A 1	S 3	1B		A 1	TB 1C	37		A 1	W 1	49	A22PB00X9XXX	DVR1 CATH CURR MTR
U2	A 1	S 3	2A		A 1	TB 1C	40		A 1	W 1	52	A22PB00X9XXX	PA1 CATH CURR MTR
U2	A 1	S 3	2B		A 1	TB 1C	39		A 1	W 1	51	A22PB00X9XXX	PA1 CATH CURR MTR
U2	A 1	S 3	3A		A 1	TB 1C	42		A 1	W 1	54	A22PB00X9XXX	MOD1 CATH CURR MTR
U2	A 1	S 3	3B		A 1	TB 1C	41		A 1	W 1	53	A22PB00X9XXX	MOD1 CATH CURR MTR
U1	A 1	S 3	4A		A 1	S 3	5A		A 1	01	9	B22BA00XXXXX	METER COMM PT
U2	A 1	S 3	4B		A 1	TB 1C	43		A 1	W 1	20	A22PB00X9XXX	PA GRID CURR MTR
U2	A 1	S 3	5A		A 1	S 3	4A		A 1	01	9	B22BA00XXXXX	METER COMM PT
U2	A 1	S 3	5A		A 1	TB 1C	39		A 1	W 1	29	A22PB00X9XXX	PA SCRN CURR MTR
U1	A 1	S 3	5B		A 1	S 3	6B		A 1	01	10	B22BA00XXXXX	METER COMM PT
U2	A 1	S 3	5B		A 1	TB 1C	44		A 1	W 1	56	A22PB00X9XXX	PA SCRN MTR COMM
U2	A 1	S 3	6A		A 1	TB 1C	45		A 1	W 1	57	A22PB00X9XXX	PA SCRN VOLT MTR
U2	A 1	S 3	6B		A 1	S 3	5B		A 1	01	10	B22BA00XXXXX	METER COMM PT
U2	A 1	S 3	7A		A 1	TB 1C	43		A 1	W 1	55	A22PB00X9XXX	BIAS SUPPLY VOLT MTR
U2	A 1	S 3	7B		A 1	TB 1C	46		A 1	W 1	58	A22PB00X9XXX	BIAS SUPPLY VOLT MTR
U1	A 1	S 4	CA		A 1	M 4	P	E C	A 1	W 1	83	A22PB00X9XXX	TEST MTR2 POS
U1	A 1	S 4	CB		A 1	M 4	N	E C	A 1	W 1	84	A22PB00X9XXX	TEST MTR2 NEG
U2	A 1	S 4	1A		A 1	TB 1D	52		A 1	W 1	64	A22PB00X9XXX	DVR2 CATH CURR MTR
U2	A 1	S 4	1B		A 1	TB 1D	51		A 1	W 1	63	A22PB00X9XXX	DVR2 CATH CURR MTR
U2	A 1	S 4	2A		A 1	TB 1D	54		A 1	W 1	66	A22PB00X9XXX	PA2 CATH CURR MTR
U2	A 1	S 4	2B		A 1	TB 1D	53		A 1	W 1	65	A22PB00X9XXX	PA2 CATH CURR MTR

	FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2	A 1	S 4	3A		A 1	TB 1D	55		A 1	W 1	67	A22PB00X9XXX	MOD2 CATH CURR MTR
U1	A 1	S 4	3B		A 1	S 4	4A		A 1	01	12	Z22TM00XXXXX	METER COMM PT
U2	A 1	S 4	3B		A 1	TB 1D	56		A 1	W 1	68	A22PB00X9XXX	MOD MTR COMM PT
U2	A 1	S 4	4A		A 1	S 4	3B		A 1	01	12	Z22TM00XXXXX	METER COMM PT
U1	A 1	S 4	4A		A 1	S 4	5A		A 1	01	13	B22BA00XXXXX	METER COMM PT
U1	A 1	S 4	4B		A 1	S 4	7B		A 1	01	14	Z22TM00XXXXX	METER COMM PT
U2	A 1	S 4	5A		A 1	S 4	4A		A 1	01	13	B22BA00XXXXX	METER COMM PT
U1	A 1	S 4	5B		A 1	S 4	6B		A 1	01	15	B22BA00XXXXX	METER COMM PT
U2	A 1	S 4	5B		A 1	TB 1D	57		A 1	W 1	69	A22PB00X9XXX	MOD SCRN MTR COMM
U2	A 1	S 4	6A		A 1	TB 1D	58		A 1	W 1	70	A22PB00X9XXX	MOD SCRN VOLT MTR
U2	A 1	S 4	6B		A 1	S 4	5B		A 1	01	15	B22BA00XXXXX	METER COMM PT
U2	A 1	S 4	7A		A 1	TB 1D	59		A 1	W 1	71	A22PB00X9XXX	+28V MTR
U2	A 1	S 4	7B		A 1	S 4	4B		A 1	01	14	Z22TM00XXXXX	METER COMM PT
U2	A 1	S 4	7B		A 1	TB 1D	60		A 1	W 1	72	A22PB00X9XXX	MTR COMM GND
U1	A 1	S 5	CA		A 1	XDS 5	G		A 1	W 1	74	A22PB00X9XXX	LAMP RESET SW
U1	A 1	S 5	NCA		A 1	S 10	CA		A 1	W 1	75	A22PB00X9XXX	+28 VOLTS
U2	A 1	S 6	CA		A 1	TB 1A	3		A 1	W 1	43	A22PB00X9XXX	HI/LO PWR SW COM
U1	A 1	S 6	CA		A 1	S 7	CB		A 1	W 1	80	A22PB00X9XXX	HI/LO PWR SW COM
U1	A 1	S 6	CB		A 1	S 7	CA		A 1	W 1	79	A22PB00X9XXX	HI/LO PWR SW COM
U2	A 1	S 6	NCB		A 1	TB 1A	1		A 1	W 1	45	A22PB00X9XXX	LOW PWR SW
U2	A 1	S 6	NOA		A 1	TB 1A	2		A 1	W 1	44	A22PB00X9XXX	LOW PWR SW
U2	A 1	S 7	CA		A 1	TB 1C	35		A 1	W 1	47	A22PB00X9XXX	HI/LO PWR SW COM
U2	A 1	S 7	CA		A 1	S 6	CB		A 1	W 1	79	A22PB00X9XXX	HI/LO PWR SW COM
U2	A 1	S 7	CB		A 1	S 6	CA		A 1	W 1	80	A22PB00X9XXX	HI/LO PWR SW COM
U2	A 1	S 7	NCB		A 1	TB 1C	34		A 1	W 1	46	A22PB00X9XXX	HIGH PWR SW
U2	A 1	S 7	NOA		A 1	TB 1C	36		A 1	W 1	48	A22PB00X9XXX	HIGH PWR SW
U2	A 1	S 8	CA		A 1	TB 1A	15		A 1	W 1	73	A22PB00X9XXX	PLT OFF/RESET SW
U2	A 1	S 8	NCA		A 1	TB 1A	16		A 1	W 1	34	A22PB00X9XXX	PLT OFF/RESET SW
U2	A 1	S 9	CA		A 1	S 11	1		A 1	W 1	78	A22PB00X9XXX	TUNING MOTOR CKT
U2	A 1	S 9	1A		A 1	TB 1A	9		A 1	W 1	38	A22PB00X9XXX	PA TUNING LOWER
U2	A 1	S 9	3A		A 1	TB 1A	8		A 1	W 1	39	A22PB00X9XXX	PA TUNING RAISE
U2	A 1	S 10	CA		A 1	S 5	NCA		A 1	W 1	75	A22PB00X9XXX	+28 VOLTS
U1	A 1	S 10	CA		A 1	S 11	C		A 1	W 1	76	A22PB00X9XXX	+28 VOLTS
U1	A 1	S 10	CB		A 1	S 11	2		A 1	W 1	77	A22PB00X9XXX	REMOTE PWR ADJ
U2	A 1	S 10	1A		A 1	TB 1A	5		A 1	W 1	41	A22PB00X9XXX	PA LOADING LOWER
U1	A 1	S 10	1B		A 1	S 10	3B		A 1	01	23	B22BA00XXXXX	PA LOADING SW
U2	A 1	S 10	1B		A 1	TB 1A	7		A 1	W 1	40	A22PB00X9XXX	PA LOADING
U2	A 1	S 10	3A		A 1	TB 1A	4		A 1	W 1	42	A22PB00X9XXX	PA LOADING RAISE
U2	A 1	S 10	3B		A 1	S 10	1B		A 1	01	23	B22BA00XXXXX	PA LOADING SW
U2	A 1	S 11	C		A 1	TB 1A	10		A 1	W 1	37	A20PB00X9XXX	TUNING SW COM
U2	A 1	S 11	C		A 1	S 10	CA		A 1	W 1	76	A22PB00X9XXX	+28 VOLTS
U1	A 1	S 11	1		A 1	S 9	CA		A 1	W 1	78	A22PB00X9XXX	TUNING MOTOR CKT
U2	A 1	S 11	2		A 1	S 10	CB		A 1	W 1	77	A22PB00X9XXX	REMOTE PWR ADJ
U2	A 1	S 11	2		A 1	TB 1A	6		A 1	W 1	86	A22PB00X9XXX	REMOTE PWR ADJ
U1	A 1	TB 1A	1		A 1	S 6	NCB		A 1	W 1	45	A22PB00X9XXX	LOW PWR SW
U1	A 1	TB 1A	1	E A		TB 1A	1	E A	A 1	W 2	33	9XXX	LOW PWR SW
U1	A 1	TB 1A	2		A 1	S 6	NOA		A 1	W 1	44	A22PB00X9XXX	LOW PWR SW
U1	A 1	TB 1A	2	E A		TB 1A	2	E A	A 1	W 2	32	9XXX	LOW PWR SW

	FROM					TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 1	TB 1A	3			A 1	S 6	CA			A 1	W 1	43	A22PB00X9XXX	HI/LO PWR SW COM
U1	A 1	TB 1A	3	E	A		TB 1A	3	E	A	A 1	W 2	31	3XXX	HI/LO PWR SW COM
U1	A 1	TB 1A	4			A 1	S 10	3A			A 1	W 1	42	A22PB00X9XXX	PA LOADING RAISE
U1	A 1	TB 1A	4	E	A		TB 1A	4	E	A	A 1	W 2	30	9XXX	PA LOADING RAISE SW
U1	A 1	TB 1A	5			A 1	S 10	1A			A 1	W 1	41	A22PB00X9XXX	PA LOADING LOWER
U1	A 1	TB 1A	5	E	A		TB 1A	5	E	A	A 1	W 2	29	5XXX	PA LOADING LOWER SW
U1	A 1	TB 1A	6			A 1	S 11	2			A 1	W 1	86	A22PB00X9XXX	REMOTE PWR ADJ
U1	A 1	TB 1A	6	E	A		TB 1A	6	E	A	A 1	W 2	28	9XXX	REMOTE PWR ADJ
U1	A 1	TB 1A	7			A 1	S 10	1B			A 1	W 1	40	A22PB00X9XXX	PA LOADING
U1	A 1	TB 1A	7	E	A		TB 1A	7	E	A	A 1	W 2	27	1XXX	PA LOADING SW
U1	A 1	TB 1A	8			A 1	S 9	3A			A 1	W 1	39	A22PB00X9XXX	PA TUNING RAISE
U1	A 1	TB 1A	8	E	A		TB 1A	8	E	A	A 1	W 2	26	9XXX	PA TUNING RAISE SW
U1	A 1	TB 1A	9			A 1	S 9	1A			A 1	W 1	38	A22PB00X9XXX	PA TUNING LOWER
U1	A 1	TB 1A	9	E	A		TB 1A	9	E	A	A 1	W 2	25	8XXX	PA TUNING LOWER SW
U1	A 1	TB 1A	10			A 1	S 11	C			A 1	W 1	37	A20PB00X9XXX	TUNING SW COM
U2	A 1	TB 1A	10			A 1	TB 1A	11			A 1	W 1	93	A22PB00X9XXX	+28 VOLTS
U1	A 1	TB 1A	10	E	A		TB 1A	10	E	A	A 1	W 2	24	9XXX	EXT CONT PNL +28V
U1	A 1	TB 1A	11			A 1	TB 1A	10			A 1	W 1	93	A22PB00X9XXX	+28 VOLTS
U2	A 1	TB 1A	11			A 1	TB 1A	12			A 1	W 1	92	A22PB00X9XXX	+28 VOLTS
U1	A 1	TB 1A	11	E	A		TB 1A	11	E	A	A 1	W 2	23	69XX	EXT CONT PNL +28V
U2	A 1	TB 1A	12			A 1	TB 1A	13			A 1	W 1	91	A22PB00X9XXX	+28 VOLTS
U1	A 1	TB 1A	12			A 1	TB 1A	11			A 1	W 1	92	A22PB00X9XXX	+28 VOLTS
U1	A 1	TB 1A	12	E	A		TB 1A	12	E	A	A 1	W 2	22	9XXX	EXT CONT PNL +28V
U1	A 1	TB 1A	13			A 1	TB 1A	12			A 1	W 1	91	A22PB00X9XXX	+28 VOLTS
U1	A 1	TB 1A	13	E	A		TB 1A	13	E	A	A 1	W 2	21	63XX	EXT CONT PNL +28V
U1	A 1	TB 1A	14			A 1	S 2	NOA			A 1	W 1	36	A22PB00X9XXX	FIL ON SW
U1	A 1	TB 1A	14	E	A		TB 1A	14	E	A	A 1	W 2	20	9XXX	FIL ON SW
U1	A 1	TB 1A	15			A 1	S 1	CA			A 1	W 1	35	A22PB00X9XXX	FIL SW COMM
U1	A 1	TB 1A	15			A 1	S 8	CA			A 1	W 1	73	A22PB00X9XXX	PLT OFF/RESET SW
U1	A 1	TB 1A	15	E	A		TB 1A	15	E	A	A 1	W 2	19	65XX	FIL SW COMM
U1	A 1	TB 1A	16			A 1	S 8	NCA			A 1	W 1	34	A22PB00X9XXX	PLT OFF/RESET SW
U1	A 1	TB 1A	16	E	A		TB 1A	16	E	A	A 1	W 2	18	9XXX	PLT OFF/RESET SW
U1	A 1	TB 1A	17			A 1	S 1	NCA			A 1	W 1	33	A22PB00X9XXX	FIL OFF SW
U1	A 1	TB 1A	17	E	A		TB 1B	17	E	A	A 1	W 2	17	61XX	FIL ON SW
U1	A 1	TB 1B	18			A 1	R 20	2			A 1	W 1	32	A22PB00X9XXX	PLT OFF/RESET LAMP
U1	A 1	TB 1B	18	E	A		TB 1B	18	E	A	A 1	W 2	16	9XXX	PLT OFF/RESET LAMP
U1	A 1	TB 1B	19			A 1	R 19	2			A 1	W 1	31	A22PB00X9XXX	HIGH PWR ON LAMP
U1	A 1	TB 1B	19	E	A		TB 1B	19	E	A	A 1	W 2	15	68XX	HIGH PWR ON LAMP
U1	A 1	TB 1B	20			A 1	R 18	2			A 1	W 1	30	A22PB00X9XXX	LOW PWR ON LAMP
U1	A 1	TB 1B	20	E	A		TB 1B	20	E	A	A 1	W 2	14	9XXX	LOW PWR ON LAMP
U1	A 1	TB 1B	21	E	A		TB 1B	21	E	A	A 1	W 2	13	39XX	SPARE
U1	A 1	TB 1B	22			A 1	R 15	2			A 1	W 1	28	A22PB00X9XXX	DC OVLD GATE
U1	A 1	TB 1B	22	E	A		TB 1B	22	E	A	A 1	W 2	12	9XXX	DC OVLD GATE
U1	A 1	TB 1B	23			A 1	R 12	2			A 1	W 1	27	A22PB00X9XXX	MOD2 OVLD GATE
U1	A 1	TB 1B	23	E	A		TB 1B	23	E	A	A 1	W 2	11	35XX	MOD2 OVLD GATE
U1	A 1	TB 1B	24			A 1	R 9	2			A 1	W 1	26	A22PB00X9XXX	MOD1 OVLD GATE
U1	A 1	TB 1B	24	E	A		TB 1B	24	E	A	A 1	W 2	10	9XXX	MOD1 OVLD GATE

	FROM						TO									
FC	UNIT	SYM	PIN	CONN			UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 1	TB 1B	25				A 1	R 6	2			A 1	W 1	25	A22PB00X9XXX	PA OVLD GATE
U1	A 1	TB 1B	25	E	A			TB 1B	25	E	A	A 1	W 2	9	31XX	PA OVLD GATE
U1	A 1	TB 1B	26				A 1	R 4	2			A 1	W 1	24	A22PB00X9XXX	AIR LAMP
U1	A 1	TB 1B	26	E	A			TB 1B	26	E	A	A 1	W 2	8	9XXX	AIR LAMP
U1	A 1	TB 1B	27				A 1	R 3	2			A 1	W 1	23	A22PB00X9XXX	DOORS LAMP
U1	A 1	TB 1B	27	E	A			TB 1B	27	E	A	A 1	W 2	7	38XX	DOORS LAMP
U1	A 1	TB 1B	28				A 1	R 2	2			A 1	W 1	22	A22PB00X9XXX	FIL ON LAMP
U1	A 1	TB 1B	28				A 1	TB 1D	65			A 1	W 1	87	A22PB00X9XXX	EXCITER +28V
U1	A 1	TB 1B	28	E	A			TB 1B	28	E	A	A 1	W 2	6	9XXX	FIL ON LAMP
U1	A 1	TB 1B	29				A 1	R 1	2			A 1	W 1	21	A22PB00X9XXX	FIL OFF LAMP
U1	A 1	TB 1B	29	E	A			TB 1B	29	E	A	A 1	W 2	5	59XX	FIL OFF LAMP
U1	A 1	TB 1B	30				A 1	XDS 1	G			A 1	W 1	1	A18PB00X9XXX	GROUND
U1	A 1	TB 1B	30				A 1	TB 1B	31			A 1	W 1	90	A22PB00X9XXX	GROUND
U1	A 1	TB 1B	30	E	A			TB 1B	30	E	A	A 1	W 2	4	9XXX	GROUND
U1	A 1	TB 1B	31				A 1	XDS 6	G			A 1	W 1	4	A18PB00X9XXX	GROUND
U1	A 1	TB 1B	31				A 1	TB 1B	32			A 1	W 1	89	A22PB00X9XXX	GROUND
U2	A 1	TB 1B	31				A 1	TB 1B	30			A 1	W 1	90	A22PB00X9XXX	GROUND
U1	A 1	TB 1B	31	E	A			TB 1B	31	E	A	A 1	W 2	3	51XX	GROUND
U1	A 1	TB 1B	32				A 1	TB 1B	33			A 1	W 1	88	A22PB00X9XXX	GROUND
U2	A 1	TB 1B	32				A 1	TB 1B	31			A 1	W 1	89	A22PB00X9XXX	GROUND
U1	A 1	TB 1B	32				A 1	R 5	2			A 1	W 1	85	A22PB00X9XXX	GROUND
U1	A 1	TB 1B	32	E	A			TB 1B	32	E	A	A 1	W 2	2	9XXX	GROUND
U1	A 1	TB 1B	33				A 1	E 1	1			A 1	01	25	A22PB00X9XXX	GROUND
U2	A 1	TB 1B	33				A 1	TB 1B	32			A 1	W 1	88	A22PB00X9XXX	GROUND
U1	A 1	TB 1B	33	E	A			TB 1B	33	E	A	A 1	W 2	1	58XX	GROUND
U1	A 1	TB 1B	33	E	A			TB 1B	33	E	A	A 1	W 2	67	XXXX	DRAIN WIRE
U1	A 1	TB 1C	34				A 1	S 7	NCB			A 1	W 1	46	A22PB00X9XXX	HIGH PWR SW
U1	A 1	TB 1C	34	E	A			TB 1C	34	E	A	A 1	W 2	34	6XXX	HIGH PWR SW
U1	A 1	TB 1C	35				A 1	S 7	CA			A 1	W 1	47	A22PB00X9XXX	HI/LO PWR SW COM
U1	A 1	TB 1C	35	E	A			TB 1C	35	E	A	A 1	W 2	35	9XXX	HI/LO PWR SW COM
U1	A 1	TB 1C	36				A 1	S 7	NOA			A 1	W 1	48	A22PB00X9XXX	HIGH PWR SW
U1	A 1	TB 1C	36	E	A			TB 1C	36	E	A	A 1	W 2	36	19XX	HIGH PWR SW
U1	A 1	TB 1C	37				A 1	S 3	1B			A 1	W 1	49	A22PB00X9XXX	DVR1 CATH CURR MTR
U1	A 1	TB 1C	37	E	A			TB 1C	37	E	A	A 1	W 2	37	9XXX	DVR1 CATH CURR MTR
U1	A 1	TB 1C	38				A 1	S 3	1A			A 1	W 1	50	A22PB00X9XXX	DVR1 CATH CURR MTR
U1	A 1	TB 1C	38	E	A			TB 1C	38	E	A	A 1	W 2	38	18XX	DVR1 CATH CURR MTR
U1	A 1	TB 1C	39				A 1	S 3	2B			A 1	W 1	51	A22PB00X9XXX	PA1 CATH CURR MTR
U1	A 1	TB 1C	39				A 1	S 3	5A			A 1	W 1	29	A22PB00X9XXX	PA SCRN CURR MTR
U1	A 1	TB 1C	39	E	A			TB 1C	39	E	A	A 1	W 2	39	9XXX	PA1 CATH CURR MTR
U1	A 1	TB 1C	40				A 1	S 3	2A			A 1	W 1	52	A22PB00X9XXX	PA1 CATH CURR MTR
U1	A 1	TB 1C	40	E	A			TB 1C	40	E	A	A 1	W 2	40	89XX	PA1 CATH CURR MTR
U1	A 1	TB 1C	41				A 1	S 3	3B			A 1	W 1	53	A22PB00X9XXX	MOD1 CATH CURR MTR
U1	A 1	TB 1C	41	E	A			TB 1C	41	E	A	A 1	W 2	41	2XXX	MOD1 CATH CURR MTR
U1	A 1	TB 1C	42				A 1	S 3	3A			A 1	W 1	54	A22PB00X9XXX	MOD1 CATH CURR MTR
U1	A 1	TB 1C	42	E	A			TB 1C	42	E	A	A 1	W 2	42	6XXX	MOD1 CATH CURR MTR
U1	A 1	TB 1C	43				A 1	S 3	4B			A 1	W 1	20	A22PB00X9XXX	PA GRID CURR MTR
U1	A 1	TB 1C	43				A 1	S 3	7A			A 1	W 1	55	A22PB00X9XXX	BIAS SUPPLY VOLT MTR
U1	A 1	TB 1C	43	E	A			TB 1C	43	E	A	A 1	W 2	43	2XXX	PA GRID CURR MTR

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM					TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 1	TB 1C	44			A 1	S 3	5B			A 1	W 1	56	A22PB00X9XXX	PA SCRN MTR COMM
U1	A 1	TB 1C	44	E	A		TB 1C	44	E	A	A 1	W 2	44	3XXX	PA SCRN MTR COMM
U1	A 1	TB 1C	45			A 1	S 3	6A			A 1	W 1	57	A22PB00X9XXX	PA SCRN VOLT MTR
U1	A 1	TB 1C	45	E	A		TB 1C	45	E	A	A 1	W 2	45	2XXX	PA SCRN VOLT MTR
U1	A 1	TB 1C	46			A 1	S 3	7B			A 1	W 1	58	A22PB00X9XXX	BIAS SUPPLY VOLT MTR
U1	A 1	TB 1C	46	E	A		TB 1C	46	E	A	A 1	W 2	46	5XXX	BIAS SUPPLY VOLT MTR
U1	A 1	TB 1C	47			A 1	M 2	P	E	C	A 1	W 1	59	A22PB00X9XXX	PA PLT CURR MTR
U1	A 1	TB 1C	47	E	A		TB 1C	47	E	A	A 1	W 2	47	2XXX	PA PLT CURR MTR
U1	A 1	TB 1C	48			A 1	M 2	N	E	C	A 1	W 1	60	A22PB00X9XXX	PA PLT CURR MTR
U1	A 1	TB 1C	48	E	A		TB 1C	48	E	A	A 1	W 2	48	1XXX	PA PLT CURR MTR
U1	A 1	TB 1C	49			A 1	M 3	P	E	C	A 1	W 1	61	A22PB00X9XXX	PA PLT VOLT MTR
U1	A 1	TB 1C	49	E	A		TB 1C	49	E	A	A 1	W 2	49	2XXX	PA PLT VOLT MTR
U1	A 1	TB 1C	50			A 1	M 3	N	E	C	A 1	W 1	62	A22PB00X9XXX	PA PLT VOLT MTR
U1	A 1	TB 1C	50	E	A		TB 1D	50	E	A	A 1	W 2	50	8XXX	PA PLT VOLT MTR
U1	A 1	TB 1D	51			A 1	S 4	1B			A 1	W 1	63	A22PB00X9XXX	DVR2 CATH CURR MTR
U1	A 1	TB 1D	51	E	A		TB 1D	51	E	A	A 1	W 2	51	2XXX	DVR2 CATH CURR MTR
U1	A 1	TB 1D	52			A 1	S 4	1A			A 1	W 1	64	A22PB00X9XXX	DVR2 CATH CURR MTR
U1	A 1	TB 1D	52	E	A		TB 1D	52	E	A	A 1	W 2	52	69XX	DVR2 CATH CURR MTR
U1	A 1	TB 1D	53			A 1	S 4	2B			A 1	W 1	65	A22PB00X9XXX	PA2 CATH CURR MTR
U1	A 1	TB 1D	53	E	A		TB 1D	53	E	A	A 1	W 2	53	2XXX	PA2 CATH CURR MTR
U1	A 1	TB 1D	54			A 1	S 4	2A			A 1	W 1	66	A22PB00X9XXX	PA2 CATH CURR MTR
U1	A 1	TB 1D	54	E	A		TB 1D	54	E	A	A 1	W 2	54	63XX	PA2 CATH CURR MTR
U1	A 1	TB 1D	55			A 1	S 4	3A			A 1	W 1	67	A22PB00X9XXX	MOD2 CATH CURR MTR
U1	A 1	TB 1D	55	E	A		TB 1D	55	E	A	A 1	W 2	55	2XXX	MOD2 CATH CURR MTR
U1	A 1	TB 1D	56			A 1	S 4	3B			A 1	W 1	68	A22PB00X9XXX	MOD MTR COMM PT
U1	A 1	TB 1D	56	E	A		TB 1D	56	E	A	A 1	W 2	56	65XX	MOD MTR COMM PT
U1	A 1	TB 1D	57			A 1	S 4	5B			A 1	W 1	69	A22PB00X9XXX	MOD SCRN MTR COMM
U1	A 1	TB 1D	57	E	A		TB 1D	57	E	A	A 1	W 2	57	2XXX	MOD SCRN MTR COMM
U1	A 1	TB 1D	58			A 1	S 4	6A			A 1	W 1	70	A22PB00X9XXX	MOD SCRN VOLT MTR
U1	A 1	TB 1D	58	E	A		TB 1D	58	E	A	A 1	W 2	58	61XX	MOD SCRN VOLT MTR
U1	A 1	TB 1D	59			A 1	S 4	7A			A 1	W 1	71	A22PB00X9XXX	+28V MTR
U1	A 1	TB 1D	59	E	A		TB 1D	59	E	A	A 1	W 2	59	2XXX	+28V MTR
U1	A 1	TB 1D	60			A 1	S 4	7B			A 1	W 1	72	A22PB00X9XXX	MTR COMM GND
U1	A 1	TB 1D	60	E	A		TB 1D	60	E	A	A 1	W 2	60	68XX	MTR COMM GND
U1	A 1	TB 1D	61	E	A		TB 1D	61	E	A	A 1	W 2	61	2XXX	SPARE
U1	A 1	TB 1D	62	E	A		TB 1D	62	E	A	A 1	W 2	62	39XX	SPARE
U1	A 1	TB 1D	63	E	A		TB 1D	63	E	A	A 1	W 2	63	2XXX	SPARE
U1	A 1	TB 1D	64	E	A		TB 1D	64	E	A	A 1	W 2	64	35XX	SPARE
U2	A 1	TB 1D	65			A 1	TB 1B	28			A 1	W 1	87	A22PB00X9XXX	EXCITER +28V
U1	A 1	TB 1D	65			A 1	TB 1D	66			A 1	W 1	94	A22PB00X9XXX	EXCITER +28V
U1	A 1	TB 1D	65	E	A		TB 1D	65	E	A	A 1	W 2	65	2XXX	EXCITER +28V
U2	A 1	TB 1D	66			A 1	TB 1D	65			A 1	W 1	94	A22PB00X9XXX	EXCITER +28V
U1	A 1	TB 1D	66	E	A		TB 1D	66	E	A	A 1	W 2	66	31XX	EXCITER +28V
U1	A 1	XDS 1	A			A 1	XDS 1	C			A 1	01	16	Z22TM00XXXX	FIL OFF LAMP
U2	A 1	XDS 1	A			A 1	R 1	1			A 1	W 1	7	A22PB00X9XXX	FIL OFF LAMP
U2	A 1	XDS 1	C			A 1	XDS 1	A			A 1	01	16	Z22TM00XXXX	FIL OFF LAMP
U2	A 1	XDS 1	G			A 1	TB 1B	30			A 1	W 1	1	A18PB00X9XXX	GROUND

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE .

	FROM				TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 1	XDS 1	G		A 1	XDS 2	G		A 1	W 1	2	A22PB00x9XXX	GROUND
U1	A 1	XDS 2	A		A 1	XDS 2	C		A 1	01	17	Z22TM00XXXXX	FIL ON LAMP
U2	A 1	XDS 2	A		A 1	R 2	1		A 1	W 1	8	A22PB00X9XXX	FIL ON LAMP
U2	A 1	XDS 2	C		A 1	XDS 2	A		A 1	01	17	Z22TM00XXXXX	FIL ON LAMP
U2	A 1	XDS 2	G		A 1	XDS 1	G		A 1	W 1	2	A22PB00X9XXX	GROUND
U1	A 1	XDS 2	G		A 1	XDS 3	G		A 1	W 1	3	A22PB00X9XXX	GROUND
U1	A 1	XDS 3	A		A 1	XDS 3	B		A 1	01	18	B22BA00XXXXX	DOORS LAMP
U2	A 1	XDS 3	A		A 1	R 3	1		A 1	W 1	9	A22PB00X9XXX	DOORS LAMP
U2	A 1	XDS 3	B		A 1	XDS 3	A		A 1	01	18	B22BA00XXXXX	DOORS LAMP
U1	A 1	XDS 3	C		A 1	XDS 3	D		A 1	01	19	B22BA00XXXXX	AIR LAMP
U2	A 1	XDS 3	C		A 1	R 4	1		A 1	W 1	10	A22PB00X9XXX	AIR LAMP
U2	A 1	XDS 3	D		A 1	XDS 3	C		A 1	01	19	B22BA00XXXXX	AIR LAMP
U2	A 1	XDS 3	G		A 1	XDS 2	G		A 1	W 1	3	A22PB00X9XXX	GROUND
U2	A 1	XDS 4	A		A 1	R 7	2		A 1	W 1	11	A22PB00X9XXX	PA OVLD LAMP
U1	A 1	XDS 4	A		A 1	XDS 4	B		A 1	01	38	B22BA00XXXXX	PA OVLD LAMP
U2	A 1	XDS 4	B		A 1	XDS 4	A		A 1	01	38	B22BA00XXXXX	PA OVLD LAMP
U2	A 1	XDS 4	C		A 1	R 10	2		A 1	W 1	12	A22PB00X9XXX	MOD1 OVLD LAMP
U2	A 1	XDS 4	D		A 1	R 13	2		A 1	W 1	13	A22PB00X9XXX	MOD2 OVLD LAMP
U1	A 1	XDS 4	G		A 1	XDS 5	G		A 1	W 1	17	A22PB00X9XXX	OL/RESET LAMP COMM
U1	A 1	XDS 5	A		A 1	XDS 5	B		A 1	01	39	B22BA00XXXXX	DC OVLD LAMP
U2	A 1	XDS 5	A		A 1	R 16	2		A 1	W 1	14	A22PB00X9XXX	DC OVLD LAMP
U2	A 1	XDS 5	B		A 1	XDS 5	A		A 1	01	39	B22BA00XXXXX	DC OVLD LAMP
U1	A 1	XDS 5	C		A 1	R 17	1		A 1	W 1	19	A22PB00X9XXX	LAMP RESET LAMP
U1	A 1	XDS 5	C		A 1	XDS 5	D		A 1	01	40	B22BA00XXXXX	LAMP RESET LAMP
U2	A 1	XDS 5	D		A 1	XDS 5	C		A 1	01	40	B22BA00XXXXX	LAMP RESET LAMP
U2	A 1	XDS 5	G		A 1	XDS 4	G		A 1	W 1	17	A22PB00X9XXX	OL/RESET LAMP COMM
U2	A 1	XDS 5	G		A 1	S 5	CA		A 1	W 1	74	A22PB00X9XXX	LAMP RESET SW
U1	A 1	XDS 6	A		A 1	XDS 6	C		A 1	01	20	Z22TM00XXXXX	LOW PWR ON LAMP
U1	A 1	XDS 6	A		A 1	R 18	1		A 1	W 1	18	A22PB00X9XXX	LOW PWR ON LAMP
U2	A 1	XDS 6	C		A 1	XDS 6	A		A 1	01	20	Z22TM00XXXXX	LOW PWR ON LAMP
U1	A 1	XDS 6	G		A 1	XDS 7	G		A 1	W 1	5	A22PB00X9XXX	GROUND
U2	A 1	XDS 6	G		A 1	TB 1B	31		A 1	W 1	4	A18PB00X9XXX	GROUND
U1	A 1	XDS 6	G		A 1	XDS 8	G		A 1	W 1	6	A22PB00X9XXX	GROUND
U1	A 1	XDS 7	A		A 1	XDS 7	C		A 1	01	21	Z22TM00XXXXX	HIGH PWR ON LAMP
U2	A 1	XDS 7	A		A 1	R 19	1		A 1	W 1	15	A22PB00X9XXX	HIGH PWR ON LAMP
U2	A 1	XDS 7	C		A 1	XDS 7	A		A 1	01	21	Z22TM00XXXXX	HIGH PWR ON LAMP
U2	A 1	XDS 7	G		A 1	XDS 6	G		A 1	W 1	5	A22PB00X9XXX	GROUND
U1	A 1	XDS 8	A		A 1	XDS 8	C		A 1	01	22	Z22TM00XXXXX	PLT OFF/RESET LAMP
U2	A 1	XDS 8	A		A 1	R 20	1		A 1	W 1	16	A22PB00X9XXX	PLT OFF/RESET LAMP
U2	A 1	XDS 8	C		A 1	XDS 8	A		A 1	01	22	Z22TM00XXXXX	PLT OFF/RESET LAMP
U2	A 1	XDS 8	G		A 1	XDS 6	G		A 1	W 1	6	A22PB00X9XXX	GROUND
U2	A 2		2		A 3		2			W 1	126	A20PB00X9XXX	+28 VOLTS
U2	A 2		2			K 5	L 6	E A		W 1	182	A20PB00X9XXX	+28 VOLTS
U1	A 2		3			TB 1B	25	E A		W 1	130	A22PB00X9XXX	PA OVLD GATE
U2	A 2		4		A 3		5			W 1	122	A16PB00X9XXX	OVLD CKT
U1	A 2		5			TB 3	17	E B		W 1	123	A16PB00X9XXX	EXTRNL INTLK
U2	A 2		6		A 3		6			W 1	111	A22PB00X9XXX	OVLD CKT

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM				TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U2	A 2		8		A 3		8			W 1	138	A20P800X9XXX	OVLD SENSOR GND
U1	A 2		8			E 6	1	E E		W 1	250	A20P800X9XXX	CONTROL CKT GND
U1	A 2		9			R 150	1			W 1	273	A22P800X9XXX	PA OVLD SENSOR
U2	A 2		10		A 3		10			W 1	352	A20P800X9XXX	OVLD TIME DELAY
U1	A 2		10			R 161	1			W 1	340	A20P800X9XXX	TIME DELAY
U2	A 2		12		A 3		12			W 1	118	A20P800X9XXX	OVLD CKT
U1	A 2		12			K 7	T 5	E A		W 1	119	A20P800X9XXX	OVLD CKT
U1	A 2		15			R 150	2			W 1	274	A22P800X9XXX	PA OVLD SENSOR
U2	A 3		2		A 4		2			W 1	125	A20P800X9XXX	+28 VOLTS
U1	A 3		2		A 2		2			W 1	126	A20P800X9XXX	+28 VOLTS
U1	A 3		3			TB 18	24	E A		W 1	131	A22P800X9XXX	MOD1 OVLD GATE
U2	A 3		4		A 4		5			W 1	121	A16P800X9XXX	OVLD CKT
U1	A 3		5		A 2		4			W 1	122	A16P800X9XXX	OVLD CKT
U2	A 3		6		A 4		6			W 1	110	A22P800X9XXX	OVLD CKT
U1	A 3		6		A 2		6			W 1	111	A22P800X9XXX	OVLD CKT
U2	A 3		8		A 4		8			W 1	137	A20P800X9XXX	OVLD SENSOR GND
U1	A 3		8		A 2		8			W 1	138	A20P800X9XXX	OVLD SENSOR GND
U1	A 3		9			R 115	1			W 1	275	A22P800X9XXX	MOD1 OVLD SENSOR
U2	A 3		10		A 4		10			W 1	351	A20P800X9XXX	OVLD TIME DELAY
U1	A 3		10		A 2		10			W 1	352	A20P800X9XXX	OVLD TIME DELAY
U2	A 3		12		A 4		12			W 1	117	A20P800X9XXX	OVLD CKT
U1	A 3		12		A 2		12			W 1	118	A20P800X9XXX	OVLD CKT
U1	A 3		15			R 119	2			W 1	276	A22P800X9XXX	MOD1 OVLD SENSOR
U2	A 3		15		A 4		15			W 1	278	A22P800X9XXX	MOD2 OVLD SENSOR
U2	A 4		2		A 5		2			W 1	124	A20P800X9XXX	+28 VOLTS
U1	A 4		2		A 3		2			W 1	125	A20P800X9XXX	+28 VOLTS
U1	A 4		3			TB 18	23	E A		W 1	132	A22P800X9XXX	MOD2 OVLD GATE
U2	A 4		4		A 5		5			W 1	120	A16P800X9XXX	OVLD CKT
U1	A 4		5		A 3		4			W 1	121	A16P800X9XXX	OVLD CKT
U2	A 4		6		A 5		6			W 1	109	A22P800X9XXX	OVLD CKT
U1	A 4		6		A 3		6			W 1	110	A22P800X9XXX	OVLD CKT
U1	A 4		8		A 5		8			W 1	136	A20P800X9XXX	OVLD SENSOR GND
U1	A 4		8		A 3		8			W 1	137	A20P800X9XXX	OVLD SENSOR GND
U1	A 4		9			R 120	1			W 1	277	A22P800X9XXX	MOD2 OVLD SENSOR
U2	A 4		10		A 5		10			W 1	350	A20P800X9XXX	OVLD TIME DELAY
U1	A 4		10		A 3		10			W 1	351	A20P800X9XXX	OVLD TIME DELAY
U2	A 4		12		A 5		12			W 1	116	A20P800X9XXX	OVLD CKT
U1	A 4		12		A 3		12			W 1	117	A20P800X9XXX	OVLD CKT
U1	A 4		15		A 3		15			W 1	278	A22P800X9XXX	MOD2 OVLD SENSOR
U1	A 5		2		A 4		2			W 1	124	A20P800X9XXX	+28 VOLTS
U1	A 5		3			TB 18	22	E A		W 1	133	A22P800X9XXX	DC OVLD GATE
U2	A 5		4		A 6		1			W 1	112	A16P800X9XXX	OVLD CKT
U1	A 5		5		A 4		4			W 1	120	A16P800X9XXX	OVLD CKT
U2	A 5		6		A 6		12			W 1	108	A22P800X9XXX	OVLD CKT

	FROM					TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 5		6		A 4		6			W 1	109	A22PB00X9XXX	OVLD CKT
U2	A 5		8		A 4		8			W 1	136	A20PB00X9XXX	OVLD SENSOR GND
U2	A 5		8		A 6		2			W 1	135	A20PB00X9XXX	OVLD SENSOR GND
U1	A 5		9			R 36	1			W 1	279	A22PB00X9XXX	DC OVLD SENSOR
U1	A 5		10		A 4		10			W 1	350	A20PB00X9XXX	OVLD TIME DELAY
U1	A 5		12		A 4		12			W 1	116	A20PB00X9XXX	OVLD CKT
U1	A 5		15			R 36	2			W 1	280	A22PB00X9XXX	DC OVLD SENSOR
U1	A 6		1		A 5		4			W 1	112	A16PB00X9XXX	OVLD CKT
U1	A 6		2		A 5		8			W 1	135	A20PB00X9XXX	OVLD SENSOR GND
U2	A 6		2			K 1	P			W 1	249	A20PB00X9XXX	CONTROL CKT GND
U1	A 6		4			K 3	7			W 1	180	A16PB00X9XXX	PLATE INTLK
U2	A 6		5		A 6		7			07	9	B22BA00XXXXX	PLT CONT INTLK
U1	A 6		7		A 6		5			07	9	B22BA00XXXXX	PLT CONT INTLK
U2	A 6		7		A 8	TB 1	8	E A		W 1	348	A22PB00X9XXX	REMOTE INTLK
U2	A 6		8		A 8	TB 1	13	E A		W 1	107	A20PB00X9XXX	HI/LO PWR ON INTLK
U1	A 6		12		A 5		6			W 1	108	A22PB00X9XXX	OVLD CKT
U1	A 6		15			TB 3	18	E A		W 1	113	A18PB00X9XXX	OVLD EXTRNL INTLK
U1	A 6		16			TB 3	19	E A		W 1	114	A18PB00X9XXX	OVLD EXTRNL INTLK
U1	A 6		17			TB 3	20	E A		W 1	115	A18PB00X9XXX	OVLD EXTRNL INTLK
U1	A 7	R 1	1		A 7	R 1	2		A 7	01	2	B22BA00XXXXX	REG CONT ADJ
U2	A 7	R 1	2		A 7	R 1	1		A 7	01	2	B22BA00XXXXX	REG CONT ADJ
U2	A 7	T 1A	1			TB 4	3	E B	A 7	W 1	3	A14VA00X9XXX	PHASE B TO FIL REG
U1	A 7	T 1A	1	E D	A 7	T 1B	1	E D	A 7	01	1	A14VA00X9XXX	A7T1 CONNECT
U2	A 7	T 1A	2			TB 4	1	E B	A 7	W 1	1	A14VA00X9XXX	PHASE A TO FIL REG
U2	A 7	T 1A	3			TB 4	2	E B	A 7	W 1	2	A14VA00X9XXX	REG TO FIL XFMR
U2	A 7	T 1B	1	E D	A 7	T 1A	1	E D	A 7	01	1	A14VA00X9XXX	A7T1 CONNECT
U2	A 7	T 1B	2			TB 4	4	E B	A 7	W 1	4	A14VA00X9XXX	PHASE C TO FIL REG
U2	A 7	T 1B	3			TB 4	5	E B	A 7	W 1	5	A14VA00X9XXX	REG TO FIL XFMR
U2	A 8	K 1	L 1		A 8	TB 1	2	E A	A 8	W 1	2	A20PB00X9XXX	REMOTE FIL OFF
U2	A 8	K 1	L 2		A 8	TB 1	1	E A	A 8	W 1	1	A20PB00X9XXX	REMOTE FIL OFF
U2	A 8	K 1	X 1		A 8	TB 2	2	E A	A 8	W 1	27	A20PB00X9XXX	REMOTE FIL OFF
U1	A 8	K 1	X 2		A 8	K 2	X 2		A 8	W 1	37	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 2	L 2		A 8	TB 1	3	E A	A 8	W 1	3	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	K 2	L 3		A 8	TB 1	4	E A	A 8	W 1	4	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	K 2	X 1		A 8	TB 2	3	E A	A 8	W 1	28	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	K 2	X 2		A 8	K 1	X 2		A 8	W 1	37	A20PB00X9XXX	REMOTE COMMON
U1	A 8	K 2	X 2		A 8	K 4	X 2		A 8	W 1	38	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 3	L 2		A 8	TB 1	5	E A	A 8	W 1	5	A20PB00X9XXX	REMOTE FAILSAFE
U2	A 8	K 3	L 3		A 8	TB 1	6	E A	A 8	W 1	6	A20PB00X9XXX	REMOTE FAILSAFE
U2	A 8	K 3	X 1		A 8	TB 2	4	E A	A 8	W 1	29	A20PB00X9XXX	REMOTE FAILSAFE
U2	A 8	K 3	X 2		A 8	TB 2	11	E A	A 8	W 1	36	A20PB00X9XXX	REMOTE FAILSAFE COMM
UI	A 8	K 4	L 1		A 8	K 6	L 2		A 8	W 1	22	A20PB00X9XXX	REMOTE PLT OFF/RESET
U2	A 8	K 4	L 2		A 8	TB 1	7	E A	A 8	W 1	7	A20PB00X9XXX	REMOTE PLT OFF/RESET
U2	A 8	K 4	X 1		A 8	TB 2	5	E A	A 8	W 1	30	A20PB00X9XXX	REMOTE LOW PWR OFF
U2	A 8	K 4	X 2		A 8	K 2	X 2		A 8	W 1	38	A20PB00X9XXX	REMOTE COMMON

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM					TO								
FC	UNIT	SYM	PIN	CONN		UNIT	SYM	PIN	CONN		UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 8	K 4	X 2			A 8	K 5	X 2			A 8	W 1	39	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 5	L 2			A 8	TB 1	11	E	A	A 8	W 1	11	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	K 5	L 3			A 8	TB 1	12	E	A	A 8	W 1	12	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	K 5	R 1			A 8	TB 1	10	E	A	A 8	W 1	10	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	K 5	R 2			A 8	TB 1	9	E	A	A 8	W 1	9	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	K 5	X 1			A 8	TB 2	6	E	A	A 8	W 1	31	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	K 5	X 2			A 8	K 4	X 2			A 8	W 1	39	A20PB00X9XXX	REMOTE COMMON
U1	A 8	K 5	X 2			A 8	K 6	X 2			A 8	W 1	40	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 6	L 1			A 8	TB 1	8	E	A	A 8	W 1	8	A20PB00X9XXX	REMOTE PLT OFF/RESET
U2	A 8	K 6	L 2			A 8	K 4	L 1			A 8	W 1	22	A20PB00X9XXX	REMOTE PLT OFF/RESET
U2	A 8	K 6	X 1			A 8	TB 2	7	E	A	A 8	W 1	32	A20PB00X9XXX	REMOTE HIGH PWR OFF
U1	A 8	K 6	X 2			A 8	K 7	X 2			A 8	W 1	41	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 6	X 2			A 8	K 5	X 2			A 8	W 1	40	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 7	L 2			A 8	TB 1	15	E	A	A 8	W 1	15	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	K 7	L 3			A 8	TB 1	16	E	A	A 8	W 1	16	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	K 7	R 1			A 8	TB 1	14	E	A	A 8	W 1	14	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	K 7	R 2			A 8	TB 1	13	E	A	A 8	W 1	13	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	K 7	X 1			A 8	TB 2	8	E	A	A 8	W 1	33	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	K 7	X 2			A 8	K 6	X 2			A 8	W 1	41	A20PB00X9XXX	REMOTE COMMON
U1	A 8	K 7	X 2			A 8	K 8	X 2			A 8	W 1	42	A20PB00X9XXX	REMOTE COMMON
U1	A 8	K 8	L 2			A 8	K 9	L 3			A 8	W 1	23	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 8	L 2			A 8	TB 1	17	E	A	A 8	W 1	17	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 8	L 3			A 8	TB 1	18	E	A	A 8	W 1	18	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	K 8	R 2			A 8	K 9	R 3			A 8	W 1	24	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 8	R 2			A 8	TB 1	20	E	A	A 8	W 1	20	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	K 8	R 3			A 8	K 9	R 2			A 8	W 1	25	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 8	X 1			A 8	TB 2	9	E	A	A 8	W 1	34	A20PB00X9XXX	REMOTE PWR ADJ LOWER
U2	A 8	K 8	X 2			A 8	K 7	X 2			A 8	W 1	42	A20PB00X9XXX	REMOTE COMMON
U1	A 8	K 8	X 2			A 8	K 9	X 2			A 8	W 1	43	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 9	L 2			A 8	TB 1	19	E	A	A 8	W 1	19	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 9	L 3			A 8	K 8	L 2			A 8	W 1	23	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 9	R 2			A 8	TB 1	21	E	A	A 8	W 1	21	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 9	R 2			A 8	K 8	R 3			A 8	W 1	25	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 9	R 3			A 8	K 8	R 2			A 8	W 1	24	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	K 9	X 1			A 8	TB 2	10	E	A	A 8	W 1	35	A20PB00X9XXX	REMOTE PWR ADJ RAISE
U2	A 8	K 9	X 2			A 8	K 8	X 2			A 8	W 1	43	A20PB00X9XXX	REMOTE COMMON
U2	A 8	K 9	X 2			A 8	TB 2	1	E	A	A 8	W 1	26	A20PB00X9XXX	REMOTE COMMON
U2	A 8	TB 1	1	E	A		TB 1B	27	E	A		W 1	104	A20PB00X9XXX	REMOTE FIL OFF
U1	A 8	TB 1	1	E	A	A 8	K 1	L 2			A 8	W 1	1	A20PB00X9XXX	REMOTE FIL OFF
U2	A 8	TB 1	1	E	B		S 9	NO	E	B		W 1	221	A16PB00X9XXX	DOORS INTLK CKT
U2	A 8	TB 1	2	E	A		TB 1B	17	E	A		W 1	105	A20PB00X9XXX	FIL OFF SW
U1	A 8	TB 1	2	E	A	A 8	K 1	L 1			A 8	W 1	2	A20PB00X9XXX	REMOTE FIL OFF
U2	A 8	TB 1	3	E	A		K 1	1				W 1	99	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	TB 1	3	E	A		TB 1A	15	E	A		W 1	100	A20PB00X9XXX	FIL ON/OFF COMM
U1	A 8	TB 1	3	E	A	A 8	K 2	L 2			A 8	W 1	3	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	TB 1	4	E	A		K 1	2				W 1	101	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	TB 1	4	E	A		TB 1A	14	E	A		W 1	102	A20PB00X9XXX	FIL ON SW

B20E/F-1 U LIST FROM-TO AND TO-FROM WIRE

	FROM						TO								
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 8	TB 1	4	E A	A 8	K 2	L 3		A 8	W 1	4	A20PB00X9XXX	REMOTE FIL ON
U2	A 8	TB 1	5	E A		TB 1A	16	E A		W 1	134	A20PB00X9XXX	REMOTE FAILSAFE
U1	A 8	TB 1	5	E A	A 8	K 3	L 2		A 8	W 1	5	A20PB00X9XXX	REMOTE FAILSAFE
U1	A 8	TB 1	6	E A	A 8	TB 1	7	E A		01	11	A22PB00X9XXX	REMOTE INTLK
U1	A 8	TB 1	6	E A	A 8	K 3	L 3		A 8	W 1	6	A20PB00X9XXX	REMOTE FAILSAFE
U2	A 8	TB 1	7	E A	A 8	TB 1	6	E A		01	11	A22PB00X9XXX	REMOTE INTLK
U1	A 8	TB 1	7	E A	A 8	K 4	L 2		A 8	W 1	7	A20PB00X9XXX	REMOTE PLT OFF/RESET
U1	A 8	TB 1	8	E A	A 6		7			W 1	348	A22PB00X9XXX	REMOTE INTLK
U1	A 8	TB 1	8	E A	A 8	K 6	L 1		A 8	W 1	8	A20PB00X9XXX	REMOTE PLT OFF/RESET
U2	A 8	TB 1	9	E A	A 8	TB 1	13	E A		W 1	94	A20PB00X9XXX	REMOTE PLT OFF/RESET
U1	A 8	TB 1	9	E A	A 8	K 5	R 2		A 8	W 1	9	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	TB 1	10	E A		K 3	4			W 1	93	A20PB00X9XXX	REMOTE LOW PWR ON
U1	A 8	TB 1	10	E A	A 8	K 5	R 1		A 8	W 1	10	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	TB 1	11	E A		TB 1A	3	E A		W 1	91	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	TB 1	11	E A		K 3	1			W 1	90	A20PB00X9XXX	REMOTE LOW PWR ON
U1	A 8	TB 1	11	E A	A 8	K 5	L 2		A 8	W 1	11	A20PB00X9XXX	REMOTE LOW PWR ON
U2	A 8	TB 1	12	E A		TB 1A	2	E A		W 1	88	A20PB00X9XXX	LOW PWR ON SW
U2	A 8	TB 1	12	E A		K 3	2			W 1	87	A20PB00X9XXX	REMOTE LOW PWR ON
U1	A 8	TB 1	12	E A	A 8	K 5	L 3		A 8	W 1	12	A20PB00X9XXX	REMOTE LOW PWR ON
U1	A 8	TB 1	13	E A	A 6		8			W 1	107	A20PB00X9XXX	HI/LO PWR ON INTLK
U1	A 8	TB 1	13	E A	A 8	TB 1	9	E A		W 1	94	A20PB00X9XXX	REMOTE PLT OFF/RESET
U1	A 8	TB 1	13	E A	A 8	K 7	R 2		A 8	W 1	13	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	TB 1	14	E A		K 4	4			W 1	92	A20PB00X9XXX	REMOTE HIGH PWR ON
U1	A 8	TB 1	14	E A	A 8	K 7	R 1		A 8	W 1	14	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	TB 1	15	E A		K 4	1			W 1	85	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	TB 1	15	E A		TB 1C	35	E A		W 1	86	A20PB00X9XXX	REMOTE HIGH PWR ON
U1	A 8	TB 1	15	E A	A 8	K 7	L 2		A 8	W 1	15	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	TB 1	16	E A		TB 1C	36	E A		W 1	83	A20PB00X9XXX	HIGH PWR ON SW
U2	A 8	TB 1	16	E A		K 4	2			W 1	82	A20PB00X9XXX	REMOTE HIGH PWR ON
U1	A 8	TB 1	16	E A	A 8	K 7	L 3		A 8	W 1	16	A20PB00X9XXX	REMOTE HIGH PWR ON
U2	A 8	TB 1	17	E A		TB 4	6	E A		W 1	164	A20PB00X9XXX	+28 VOLTS
U1	A 8	TB 1	17	E A		TB 1A	10	E A		W 1	183	A20PB00X9XXX	+28 VOLTS
U1	A 8	TB 1	17	E A	A 8	K 8	L 2		A 8	W 1	17	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	TB 1	18	E A		K 13	X 1			W 1	160	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	TB 1	18	E A		TB 1A	5	E A		W 1	161	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	TB 1	18	E A	A 8	K 8	L 3		A 8	W 1	18	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	TB 1	19	E A		TB 1A	4	E A		W 1	163	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	TB 1	19	E A		K 14	X 1			W 1	162	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	TB 1	19	E A	A 8	K 9	L 2		A 8	W 1	19	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	TB 1	20	E A		TB 1A	6	E A		W 1	304	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	TB 1	20	E A	A 8	K 8	R 2		A 8	W 1	20	A20PB00X9XXX	REMOTE PWR ADJ
U2	A 8	TB 1	21	E A		TB 1A	7	E A		W 1	158	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	TB 1	21	E A	A 8	K 9	R 2		A 8	W 1	21	A20PB00X9XXX	REMOTE PWR ADJ
U1	A 8	TB 2	1	E A	A 8	K 9	X 2		A 8	W 1	26	A20PB00X9XXX	REMOTE COMMON
U1	A 8	TB 2	2	E A	A 8	K 1	X 1		A 8	W 1	27	A20PB00X9XXX	REMOTE FIL OFF
U1	A 8	TB 2	3	E A	A 8	K 2	X 1		A 8	W 1	28	A20PB00X9XXX	REMOTE FIL ON
U1	A 8	TB 2	4	E A	A 8	K 3	X 1		A 8	W 1	29	A20PB00X9XXX	REMOTE FAILSAFE
U1	A 8	TB 2	5	E A	A 8	K 4	X 1		A 8	W 1	30	A20PB00X9XXX	REMOTE LOW PWR OFF

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FC	FROM UNIT	SYM	PIN	CONN	TO UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	A 8	TB 2	6	E A	A 8	K 5	X 1		A 8	W 1	31	A20PB00X9XXX	REMOTE LOW PWR ON
U1	A 8	TB 2	7	E A	A 8	K 6	X 1		A 8	W 1	32	A20PB00X9XXX	REMOTE HIGH PWR OFF
U1	A 8	TB 2	8	E A	A 8	K 7	X 1		A 8	W 1	33	A20PB00X9XXX	REMOTE HIGH PWR ON
U1	A 8	TB 2	9	E A	A 8	K 8	X 1		A 8	W 1	34	A20PB00X9XXX	REMOTE PWR ADJ LOWER
U1	A 8	TB 2	10	E A	A 8	K 9	X 1		A 8	W 1	35	A20PB00X9XXX	REMOTE PWR ADJ RAISE
U1	A 8	TB 2	11	E A	A 8	K 3	X 2		A 8	W 1	36	A20PB00X9XXX	REMOTE FAILSAFE COMM
U2	A 9		3		E 24		1	E A		05	19	A18PB00X9XXX	AUTO TUNE CKT
U1	A 9		4		J 22		1			05	18S	A20PB90V9XXX	AUTO TUNE TEST JACK
U2	A 9		4		T 14		5			W 1	307	A22PB00X9XXX	AUTO TUNE CKT
U1	A 9	C 6	2		J 21		1			05	18A	A20PB90V9XXX	AUTO TUNE TEST JACK
U2	A 9	C 7	2		K 16	X	1			W 1	309	A22PB00X9XXX	AUTO TUNE CKT
U2	A 9	C 8	2		K 15	X	1			W 1	308	A22PB00X9XXX	AUTO TUNE CKT
U2	A 9	C 9	2		T 14		6			W 1	366	A18PB00X9XXX	AUTO TUNE AC FEED
U1	A10	J 1	A	E P	J 9		A	E P		W 12	1A	RG-58C/U	EXCITER CONNECT
U1	A10	J 1	S		J 9		S			W 12	1S	RG-58C/U	EXCITER CONNECT

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FROM				TO							
FC UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1 NOT USED									01	4		NOT USED
U1 NOT USED									01	6		NOT USED
U1 NOT USED									01	5		NOT USED
U1 NOT USED									01	7		NOT USED
U1 NOT USED									01	12		NOT USED
U1 NOT USED									01	14		NOT USED
U1 NOT USED									01	13		NOT USED
U1 NOT USED									01	19		NOT USED
U1 NOT USED									01	20		NOT USED
U1 NOT USED									01	25		NOT USED
U1 NOT USED									01	26		NOT USED
U1 NOT USED									01	40		NOT USED
U1 NOT USED									01	39		NOT USED
U1 NOT USED									01	42		NOT USED
U1 NOT USED									01	44		NOT USED
U1 NOT USED									01	43		NOT USED
U1 NOT USED									01	45		NOT USED
U1 NOT USED									01	48		NOT USED
U1 NOT USED									01	51		NOT USED
U1 NOT USED									01	61		NOT USED
U1 NOT USED									01	62		NOT USED
U1 NOT USED									01	64		NOT USED
U1 NOT USED									01	63		NOT USED
U1 NOT USED									01	65		NOT USED
U1 NOT USED									01	66		NOT USED
U1 NOT USED									01	68		NOT USED
U1 NOT USED									01	67		NOT USED
U1 NOT USED									01	69		NOT USED
U1 NOT USED									01	75		NOT USED
U1 NOT USED									01	76		NOT USED
U1 NOT USED									01	78		NOT USED
U1 NOT USED									01	79		NOT USED
U1 NOT USED									01	82		NOT USED
U1 NOT USED									01	84		NOT USED
U1 NOT USED									01	83		NOT USED
U1 NOT USED									01	85		NOT USED
U1 NOT USED									01	86		NOT USED
U1 NOT USED									01	88		NOT USED
U1 NOT USED									01	87		NOT USED
U1 NOT USED									01	89		NOT USED
U1 NOT USED									01	90		NOT USED
U1 NOT USED									01	95		NOT USED
U1 NOT USED									01	96		NOT USED
U1 NOT USED									01	98		NOT USED
U1 NOT USED									01	97		NOT USED
U1 NOT USED									01	99		NOT USED
U1 NOT USED									01	100		NOT USED

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

		FROM				TO							
FC	UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1	NOT USED									01	102		NOT USED
U1	NOT USED									01	101		NOT USED
U1	NOT USED									01	103		NOT USED
U1	NOT USED									01	104		NOT USED
U1	NOT USED									01	106		NOT USED
U1	NOT USED									01	105		NOT USED
U1	NOT USED									01	107		NOT USED
U1	NOT USED									01	108		NOT USED
U1	NOT USED									01	110		NOT USED
U1	NOT USED									01	109		NOT USED
U1	NOT USED									01	111		NOT USED
U1	NOT USED									01	115		NOT USED
U1	NOT USED									01	123		NOT USED
U1	NOT USED									01	124		NOT USED
U1	NOT USED									01	125		NOT USED
U1	NOT USED									01	126		NOT USED
U1	NOT USED									01	127		NOT USED
U1	NOT USED									01	128		NOT USED
U1	NOT USED									01	129		NOT USED
U1	NOT USED									01	130		NOT USED
U1	NOT USED									01	131		NOT USED
U1	NOT USED									01	132		NOT USED
U1	NOT USED									01	133		NOT USED
U1	NOT USED									01	134		NOT USED
U1	NOT USED									01	135		NOT USED
U1	NOT USED									01	136		NOT USED
U1	NOT USED									01	137		NOT USED
U1	NOT USED									01	138		NOT USED
U1	NOT USED									01	139		NOT USED
U1	NOT USED									01	140		NOT USED
U1	NOT USED									01	141		NOT USED
U1	NOT USED									01	142		NOT USED
U1	NOT USED									01	143		NOT USED
U1	NOT USED									01	144		NOT USED
U1	NOT USED									01	145		NOT USED
U1	NOT USED									01	146		NOT USED
U1	NOT USED									01	147		NOT USED
U1	NOT USED									01	148		NOT USED
U1	NOT USED									01	149		NOT USED
U1	NOT USED									01	150		NOT USED
U1	NOT USED									01	151		NOT USED
U1	NOT USED									01	152		NOT USED
U1	NOT USED									01	153		NOT USED
U1	NOT USED									01	154		NOT USED
U1	NOT USED									01	155		NOT USED
U1	NOT USED									01	156		NOT USED
U1	NOT USED									01	157		NOT USED

820E/F-1 U LIST FROM-TO AND TO-FROM WIRE

FROM					TO							
FC UNIT	SYM	PIN	CONN	UNIT	SYM	PIN	CONN	UNIT	CABLE	WIRE	WIRE CODE	FUNCTION
U1 NOT USED									01	158		NOT USED
U1 NOT USED									01	159		NOT USED
U1 NOT USED									01	160		NOT USED
U1 NOT USED									01	162		NOT USED
U1 NOT USED									01	163		NOT USED
U1 NOT USED									01	164		NOT USED
U1 NOT USED									01	165		NOT USED
U1 NOT USED									01	166		NOT USED
U1 NOT USED									01	167		NOT USED
U1 NOT USED									01	168		NOT USED
U1 NOT USED									01	169		NOT USED
U1 NOT USED									01	171		NOT USED
U1 NOT USED									01	172		NOT USED
U1 NOT USED									01	174		NOT USED
U1 NOT USED									01	173		NOT USED
U1 NOT USED									01	175		NOT USED
U1 NOT USED									01	176		NOT USED
U1 NOT USED									01	177		NOT USED
U1 NOT USED									01	180A		NOT USED
U1 NOT USED									01	180S		NOT USED
U1 NOT USED									W 1	3		NOT USED
U1 NOT USED									W 1	2		NOT USED
U1 NOT USED									W 1	1		NOT USED
U1 NOT USED									W 1	177		NOT USED
U1 NOT USED									W 1	178		NOT USED
U1 NOT USED									W 1	179		NOT USED
U1 NOT USED									W 1	175		NOT USED
U1 NOT USED									W 1	216		NOT USED
U1 NOT USED									W 1	227		NOT USED
U1 NOT USED									W 1	311		NOT USED
U1 NOT USED									W 1	321		NOT USED
U1 NOT USED									W 1	326		NOT USED
U1 NOT USED									W 1	337		NOT USED
U1 NOT USED									W 1	314		NOT USED
U1 NOT USED									W 1	316		NOT USED
U1 NOT USED									W 1	343		NOT USED
U1 NOT USED									W 1	332		NOT USED
U1 NOT USED									W 1	338		NOT USED
U1 NOT USED									W 1	339		NOT USED
U1 NOT USED									W 1	364		NOT USED
U1 NOT USED								A 1	01	2		NOT USED
U1 NOT USED								A 1	01	8		NOT USED
U1 NOT USED								A 1	01	7		NOT USED
U1 NOT USED								A 1	01	4		NOT USED
U1 NOT USED								A 1	01	3		NOT USED
U1 NOT USED								A 1	01	6		NOT USED
U1 NOT USED								A 1	01	5		NOT USED

AM. Broadcast Exciter 310W-1

COLLINS

unit instructions

Collins Radio Company | Dallas, Texas

523-0556833-001438
1 April 1966

1. General Description.

1.1 PURPOSE OF UNIT.

AM. Broadcast Exciter 310W-1 (figure 1) is the frequency-determining unit for a transmitter operating in the 540- to 1600-kc am. broadcast band.

1.2 UNIT DESCRIPTION.

The 310W-1 is built on a 6- by 8- by 3-1/2-inch chassis attached to a 3-1/2- by 19-inch panel. The panel can be mounted in a standard 19-inch rack. A two-position rotary switch, mounted on the front panel, selects the desired operating crystals. Each crystal oscillator frequency is adjusted by a screwdriver control on the front panel. Rf output is obtained from a BNC connector on the rear of the chassis. Operating voltage, 28 volts dc, is connected to terminals on the rear of the chassis from an external power supply.

2. Unit Characteristics.

2.1 PHYSICAL CHARACTERISTICS.

Size:
Front Panel
3-1/2 by 19 inches

Chassis Behind Front Panel
6 by 8 inches

Type of Mounting:
Standard 3-1/2- by 19-inch panel (no additional support required)

Weight:
3-1/2 pounds, approximate

Finish:
Front Panel Options
White (standard)
Gray (on special order)

Unpainted Surfaces
Clear chromate

Ventilation:
None required

2.2 OPERATING CHARACTERISTICS.

Ambient Service Conditions:
Temperature
-25° to +45°C (-13° to +113°F)

Relative Humidity
Up to 95%

Altitude
Up to 10,000 feet above msl

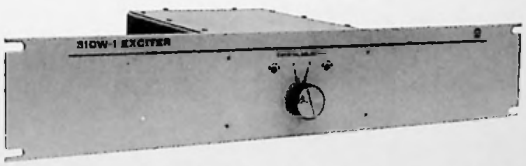
Type of Service
Continuous

2.3 ELECTRICAL CHARACTERISTICS.

Power Requirements:
28±2.8 volts dc, 0.3 amp

Output Level (Across a 50-Ohm Resistive Load):
2 watts, 24 volts peak-to-peak, nonsinusoidal

Output Impedance:
50 ohms nominal, unbalanced



B502-123-Pb

Figure 1. AM. Broadcast Exciter 310W-1

Output Frequency Range:
540 to 1600 kc

Range of Crystal Frequencies:
2160 to 4320 kc

Output Frequency Stability:
±5 cps from 0° to +35°C (+32° to +95°F)
±10 cps from -10° to +45°C (+14° to +113°F)
±20 cps from -25° to +45°C (-13° to +113°F)

RF Output:
Continuous wave, nonsinusoidal

Front Panel Controls:
CRYSTAL SELECTOR
Switch (selects the operating crystal)
Trimmer (adjusts output frequency)

3. Circuit Description.

Frequency generation at 2 or 4 times the carrier frequency is used to capitalize on the frequency range in which the quartz crystals are inherently more stable. Division by 4, using two astable multivibrator integrated circuits, provides an output frequency between 540 and 1080 kc. Division by 2, using one integrated circuit, provides output frequencies above 1080 kc.

Transistor Q1 and associated components form a Pierce oscillator (figure 3). CRYSTAL SELECTOR switch S1 selects one of two crystals, Y1 or Y2, for use in the oscillator tank circuit. The output of the oscillator is RC coupled from the emitter of Q1 to the frequency-divider driver circuits, consisting of transistors Q2 and Q3. The output of the driver circuit, taken from the collector of transistor Q3, is coupled through capacitor C14 to the input of the frequency-divider circuit. Diode CR4 clamps the negative-going peaks of the driver input to a positive level determined by Zener diode CR3. This protects the frequency-divider circuit from an excessive signal. The frequency-divider circuit, composed of astable multivibrator integrated circuits Z1 and Z2, divides the input frequency by 2 or 4, depending upon the circuit configuration. The configuration shown in the schematic diagram divides by 4. The outputs of the frequency divider, taken from pins 5 and 6 of Z1, are applied to a push-pull amplifier, consisting of transistors Q4 and Q5. From Q4 and Q5 the signal is coupled to a second push-pull amplifier, consisting of transistors Q6 and Q7. From Q6 and Q7 the signal is applied to transformer T1. Transformer T1 combines the outputs from Q6 and Q7 and applies the resultant signal to the 310W-1 load. When the load is resistive, the output is a square wave; however, when the load is an rf driver tuned circuit, the output is essentially a sine wave.

4. Maintenance.

4.1 RECOMMENDED TEST EQUIPMENT.

The following test equipment, or equivalent, is recommended for maintenance of the 310W-1.

Oscilloscope, Tektronix 545B with type-H plug-in unit

Multimeter, Triplett 630-NA

4.2 MINIMUM PERFORMANCE TEST PROCEDURES.

4.2.1 GENERAL.

Perform the procedures of paragraphs 4.2.2 and 4.2.3 after repairing the 310W-1. Before starting the procedures, check that the correct crystal is being used. (Refer to paragraph 4.2.2, steps b. and c.)

4.2.2 INITIAL TEST SETUP.

a. Remove the top cover from the 310W-1.

b. Check the following items if the output frequency is between 540 and 1080 kc.

1. Ensure that the tabs on integrated circuits Z1 and Z2 are aligned with the black marks on the chassis.

2. Multiply the exciter output frequency by 4 and check that the result matches the crystal frequency.

c. Check the following items if the output frequency is above 1080 kc.

1. Ensure that the tab on integrated circuit Z1 is aligned with the black mark on the chassis.

2. Note that Z2 is removed and a jumper is connected between E1 and E2.

3. Multiply the exciter output frequency by 2 and check that the result matches the crystal frequency.

d. Remove crystals Y1 and Y2.

e. Connect rf cable W12 to 50 OHM OUTPUT connector J1 on the back of the 310W-1.

f. Connect the other end of W12 to transmitter driver input jack. Ensure that the transmitter is turned off.

Note

If the transmitter cannot be used, the 310W-1 must be connected to a 50-ohm resistive load.

g. Connect an oscilloscope to the grid of the first driver tube in the transmitter. (If the transmitter is not used, connect the oscilloscope to the resistive load.)

h. Connect the power supply to the 28 VDC terminals on the 310W-1. (Connect a multimeter (amp scale) in series with the positive lead of the power supply.)

4.2.3 TEST PROCEDURE.

a. Note that no signal is displayed on the oscilloscope.

b. Read the indication on the multimeter. It should be not more than 0.095 amp.

c. Disconnect the power supply lead from the +28VDC terminal.

d. Install crystal Y1.

e. Set CRYSTAL SELECTOR switch S1 to 1.

f. Reconnect the multimeter to the +28VDC terminal.

g. Note the signal displayed on the oscilloscope. The signal measured should be a sine wave of not less than 180 volts peak-to-peak. (It should be not less than 24 volts peak-to-peak for a 50-ohm resistive load.)

h. Read the indication on the multimeter. It should be not more than 0.3 amp.

i. Set CRYSTAL SELECTOR switch S1 to 2. Note that the signal displayed on the oscilloscope drops to zero.

j. Disconnect the multimeter from the positive lead of the power supply.

k. Install crystal Y2 and remove crystal Y1.

l. Reconnect the multimeter to the positive lead of the power supply.

m. Note the signal displayed on the oscilloscope. It should be the same as that observed in step g.

n. Set CRYSTAL SELECTOR switch S1 to 1. Note that the signal displayed on the oscilloscope drops to zero.

o. Install crystal Y1.

p. Replace the top cover.

4.3 TROUBLESHOOTING.

The following procedures are recommended for troubleshooting the 310W-1.

a. Visually inspect the unit for loose connections and signs of component damage.

b. Make voltage measurements at the emitter, base, and collector of each transistor with 28 volts applied to the 28 VDC terminals. Refer to table 1 for the nominal voltages that should be present.

CAUTION

Ensure that all power is removed from the 310W-1 before making resistance and continuity measurements.

c. Make resistance and continuity measurements, using the schematic diagram (figure 3) as a guide.

d. Refer to the parts list (paragraph 5) for the correct defective component replacement.

4.4 REPLACEMENT AND SPARE PARTS.

Replacement and spare parts may be ordered from the following address:

Collins Radio Company
Service Parts Department
Dallas, Texas 75207

TABLE 1. VOLTAGE MEASUREMENTS

COMPONENT	*TEST POINT	VOLTS DC (nominal)	VOLTS AC (nominal) (rms)
Q1	Emitter	2.2	310 mv
	Base	2.3	0
	Collector	11.5	600 mv

TABLE 1. VOLTAGE MEASUREMENTS (Cont)

COMPONENT	*TEST POINT	VOLTS DC (nominal)	VOLTS AC (nominal) (rms)
Q2	Emitter	21.0	120 mv
	Base	22.0	240 mv
	Collector	23.5	1.3
Q3	Emitter	13.2	300 mv
	Base	12.7	1.3
	Collector	18.0	1.0
Q4	Emitter	19.0	-
	Base	19.5	-
	Collector	5.4	-
Q5	Emitter	19.0	-
	Base	19.0	-
	Collector	5.9	-
Q6	Emitter	2.2	-
	Base	1.2	-
	Collector	26.0	-
Q7	Emitter	2.2	-
	Base	1.4	-
	Collector	26.0	-
**Z1	Pin 1	19.0	-
	Pin 2	19.0	-
	Pin 3	18.0	-
	Pin 4	18.0	-
	Pin 5	19.0	-
	Pin 6	19.5	-
	Pin 7	18.0	-
	Pin 8	26.0	-

* All measurements are made from test point to chassis ground.
** If Z2 is used, the voltage measurements are the same as for Z1.

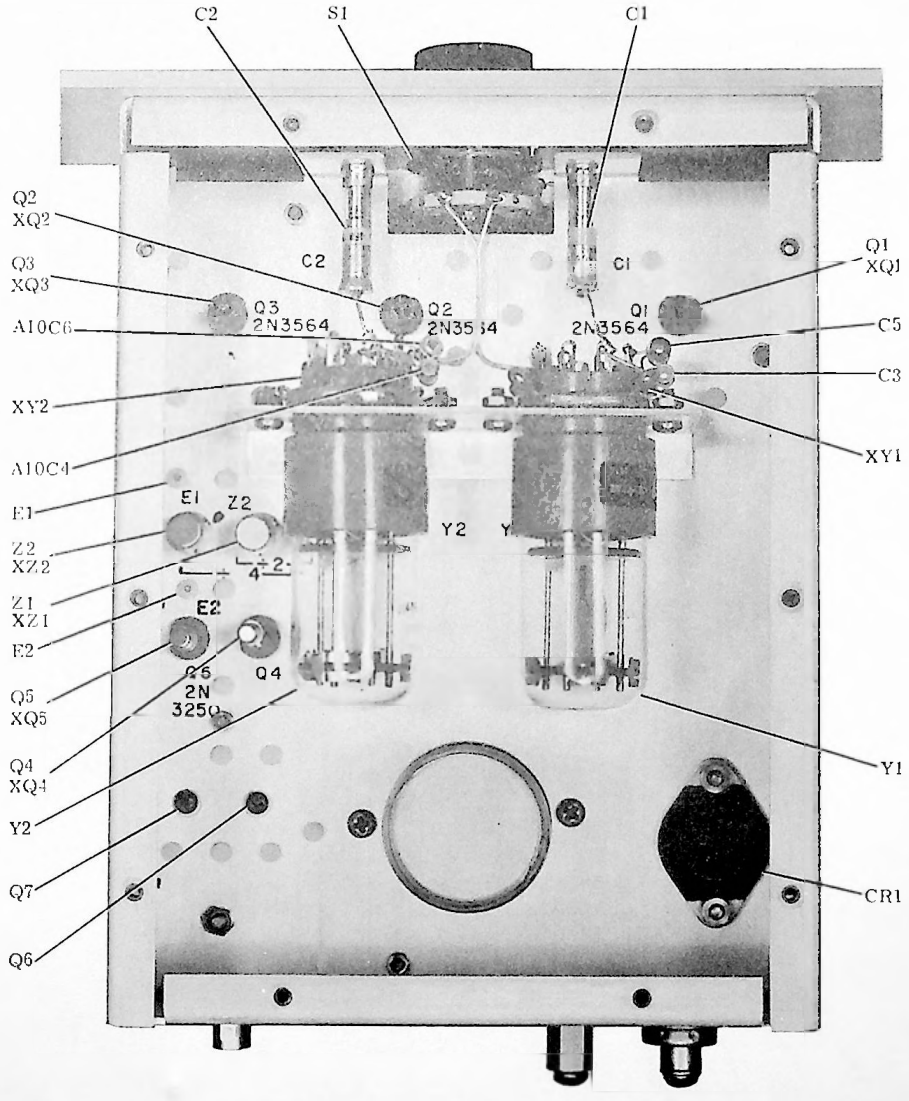


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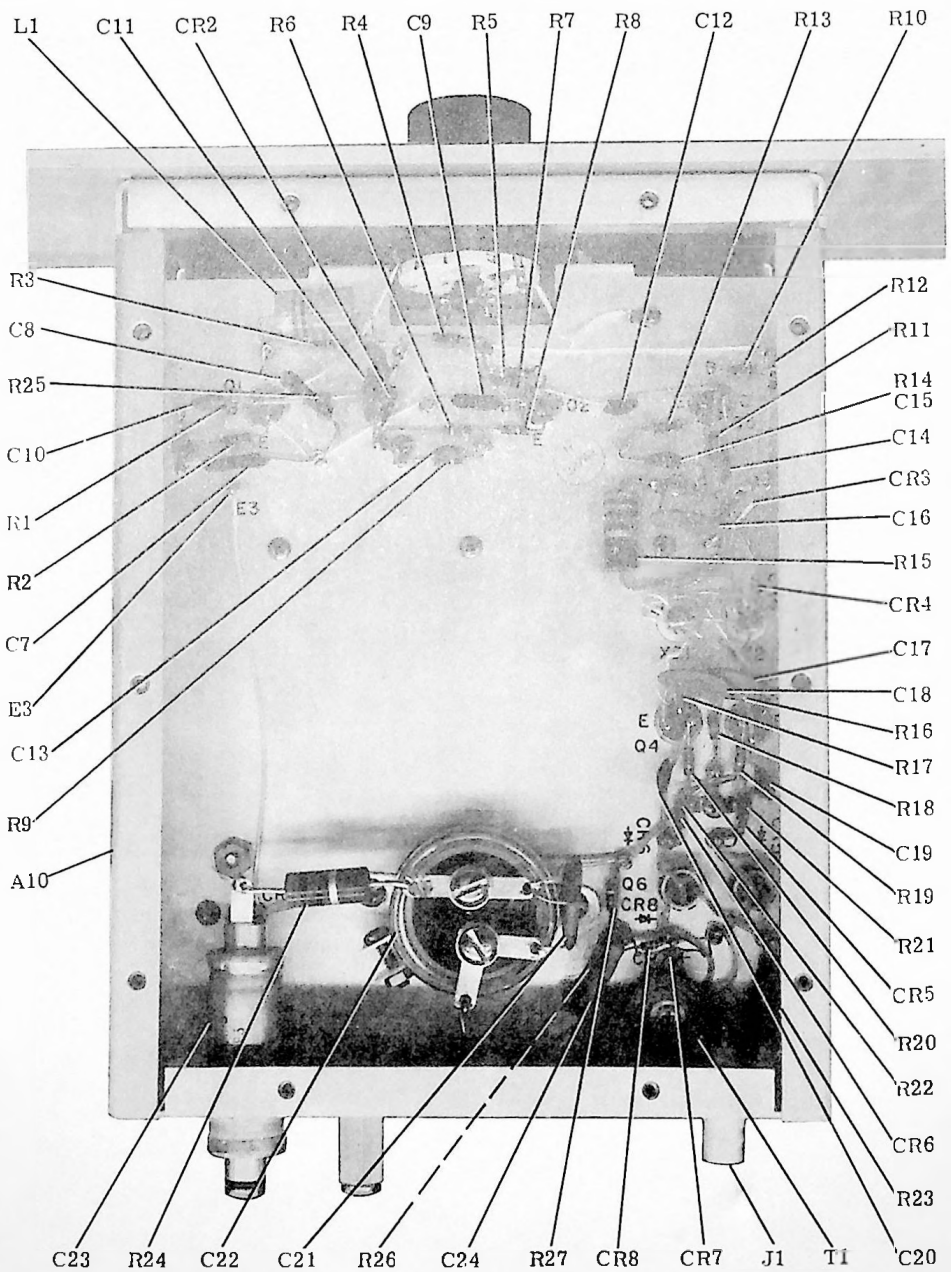
Figure 2. AM. Broadcast Exciter 310W-1, Parts Identification (Sheet 1 of 2)



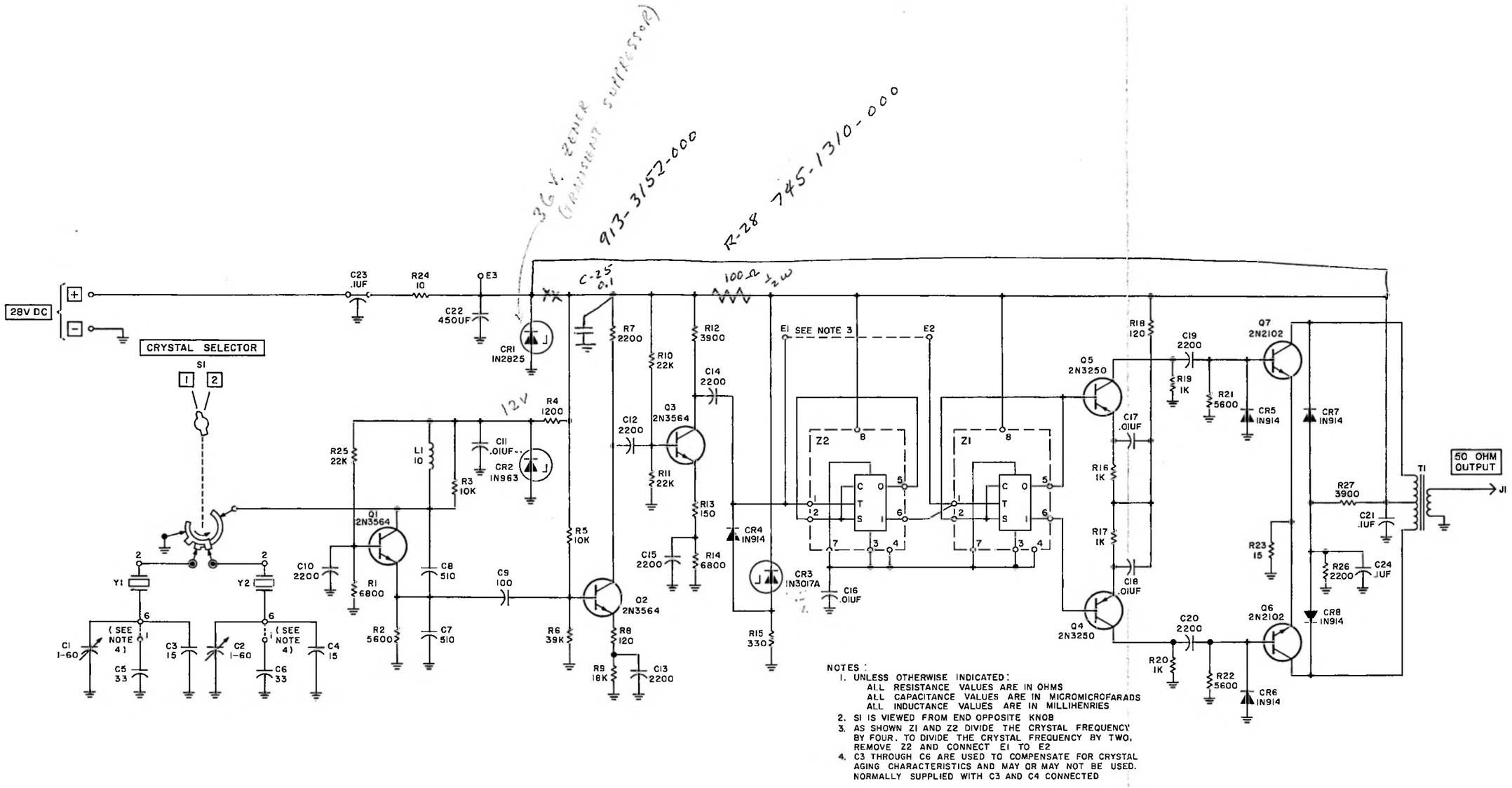
B502-042-Pb

Figure 2. AM. Broadcast Exciter 310W-1, Parts Identification (Sheet 2 of 2)

5. Parts List.

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
	AM. BROADCAST	EXCITER	310W-1 (GRAY PNL)	758-5207-002
	AM. BROADCAST	EXCITER	310W-1 (WHITE PNL)	758-5207-001
C 1	Y1 TRIMMER	CAPACITOR	1-60PF 1KV PISTON	922-3038-040
C 2	Y2 TRIMMER	CAPACITOR	1-60PF 1KV PISTON	922-3038-040
C 3	TRIMMER RANGE	CAPACITOR	15PF 500V	916-0671-000
C 4	TRIMMER RANGE	CAPACITOR	15PF 500V	916-0671-000
C 5	TRIMMER RANGE	CAPACITOR	33PF 500V	928-4012-000
C 6	TRIMMER RANGE	CAPACITOR	33PF 500V	928-4012-000
C 7	OSCILLATOR FEEDBACK	CAPACITOR	510PF 500V	912-2980-000
C 8	OSCILLATOR FEEDBACK	CAPACITOR	510PF 500V	912-2980-000
C 9	COUPLING	CAPACITOR	100PF 500V	912-2816-000
C 10	Q1 BASE BYPASS	CAPACITOR	2200PF 500V	913-3011-000
C 11	OSCILLATOR SUP BYPASS	CAPACITOR	0.01MF 500V	913-3013-000
C 12	Q2 COUPLING	CAPACITOR	2200PF 500V	913-3011-000
C 13	Q2 EMITTER BYPASS	CAPACITOR	2200PF 500V	913-3011-000
C 14	Q3 COUPLING	CAPACITOR	2200PF 500V	913-3011-000
C 15	Q3 EMITTER BYPASS	CAPACITOR	2200PF 500V	913-3011-000
C 16	BYPASS	CAPACITOR	0.01MF 500V	913-3013-000
C 17	Q5 EMITTER	CAPACITOR	0.01MF 500V	913-3013-000
C 18	Q4 EMITTER BYPASS	CAPACITOR	0.01MF 500V	913-3013-000
C 19	COUPLING	CAPACITOR	2200PF 500V	913-3011-000
C 20	COUPLING	CAPACITOR	2200PF 500V	913-3011-000
C 21	SUPPLY BYPASS	CAPACITOR	0.1MF 500V	913-3152-000
C 22	RIPPLE FILTER	CAPACITOR	450MF 50V	183-1958-000
C 23	INPUT BYPASS	CAPACITOR	0.1MF 600V	241-0006-000
C 24	BYPASS	CAPACITOR	0.1MF 500V	913-3152-000
CR 1	TRANSIENT SUPPRESSING	DIODE	1N2825A 36V ZENER	353-1418-000
CR 2	12 VOLT REFERENCE	DIODE	1N963A 12V ZENER	353-3220-000
CR 3	7.5 VOLT REFERENCE	DIODE	1N3017A 7.5V ZENER	353-1312-000
CR 4	CLAMPING	DIODE	1N914 75PIV 75MA	353-2906-000
CR 5	CLAMPING	DIODE	1N914 75PIV 75MA	353-2906-000
CR 6	CLAMPING	DIODE	1N914 75PIV 75MA	353-2906-000
CR 7	CLAMPING	DIODE	1N914 75PIV 75MA	353-2906-000
CR 8	CLAMPING	DIODE	1N914 75PIV 75MA	353-2906-000
E 1	Z2 BYPASSING	TERMINAL	FEEDTHROUGH	306-1321-000
E 2	Z2 BYPASSING	TERMINAL	FEEDTHROUGH	306-1321-000
E 3	CR1 CONNECT	TERMINAL	STANDOFF	306-1521-000
J 1	OUTPUT	CONNECTOR	BNC	357-9804-000
L 1	Q1 COLLECTOR	INDUCTOR	10 MH	240-0844-000
Q 1	OSCILLATOR	TRANSISTOR	2N3564 NPN 0.2W	352-0631-010
Q 2	AMPLIFIER	TRANSISTOR	2N3564 NPN 0.2W	352-0631-010
Q 3	FREQ DIVIDER DRIVER	TRANSISTOR	2N3564 NPN 0.2W	352-0631-010
Q 4	OUTPUT DRIVER	TRANSISTOR	2N3250 PNP 1.2W	352-0626-010
Q 5	OUTPUT DRIVER	TRANSISTOR	2N3250 PNP 1.2W	352-0626-010
Q 6	OUTPUT	TRANSISTOR	2N2102 NPN 5W	352-0646-010
Q 7	OUTPUT	TRANSISTOR	2N2102 NPN 5W	352-0646-010
R 1	Q1 BASE BIAS	RESISTOR	6.8K OHM 1/4W 10PC	745-0779-000
R 2	Q1 EMITTER	RESISTOR	5.6K OHM 1/4W 10PC	745-0776-000
R 3	SWAMPING	RESISTOR	10K OHM 1/4W 10PC	745-0785-000
R 4	DECOUPLING	RESISTOR	1.2K OHM 1/4W 10PC	745-0752-000
R 5	Q2 BASE BIAS	RESISTOR	10K OHM 1/4W 10PC	745-0785-000
R 6	Q2 BASE BIAS	RESISTOR	39K OHM 1/4W 10PC	745-0806-000
R 7	Q2 COLLECTOR	RESISTOR	2.2K OHM 1/4W 10PC	745-0761-000
R 8	Q2 EMITTER	RESISTOR	120 OHM 1/4W 10PC	745-0716-000
R 9	Q2 EMITTER	RESISTOR	18K OHM 1/4W 10PC	745-0794-000
R 10	Q3 BASE BIAS	RESISTOR	22K OHM 1/4W 10PC	745-0797-000

SYMBOL	FUNCTION	PART NAME	DESCRIPTION	PART NUMBER
R 11	Q3 BASE BIAS	RESISTOR	22K OHM 1/4W 10PC	745-0797-000
R 12	Q3 COLLECTOR	RESISTOR	3.9K OHM 1/4W 10PC	745-0770-000
R 13	Q3 EMITTER	RESISTOR	150 OHM 1/4W 10PC	745-0719-000
R 14	Q3 EMITTER	RESISTOR	6.8K OHM 1/4W 10PC	745-0779-000
R 15	Q4 AND Q5 BASE BIAS	RESISTOR	330 OHM 2W 10PC	745-5631-000
R 16	Q5 EMITTER	RESISTOR	1K OHM 1/4W 10PC	745-0749-000
R 17	Q4 EMITTER	RESISTOR	1K OHM 1/4W 10PC	745-0749-000
R 18	Q4 AND Q5 EMITTER	RESISTOR	120 OHM 1/4W 10PC	745-0716-000
R 19	Q5 COLLECTOR	RESISTOR	1K OHM 1/4W 10PC	745-0749-000
R 20	Q4 COLLECTOR	RESISTOR	1K OHM 1/4W 10PC	745-0749-000
R 21	Q7 BASE RETURN	RESISTOR	5.6K OHM 1/4W 10PC	745-0776-000
R 22	Q6 BASE RETURN	RESISTOR	5.6K OHM 1/4W 10PC	745-0776-000
R 23	Q6 AND Q7 EMITTER	RESISTOR	15 OHM 2W 10PC	745-5575-000
R 24	INPUT COUPLING	RESISTOR	10 OHM 2W 10PC	745-5568-000
R 25	Q1 BASE BIAS	RESISTOR	22K OHM 1/4W 10PC	745-0797-000
R 26	STABILIZING	RESISTOR	2.2K OHM 1/4W 10PC	745-0761-000
R 27	LIMITING	RESISTOR	3.9K OHM 1/4W 10PC	745-0770-000
S 1	CRYSTAL SELECTOR	SWITCH	ROTARY	259-2438-010
T 1	OUTPUT	TRANSFORMER		758-0328-002
XQ 1	Q1 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 2	Q2 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 3	Q3 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 4	Q4 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XQ 5	Q5 TRANSISTOR	SOCKET	4 PIN MICA FILLED	352-9872-000
XY 1	Y1 CRYSTAL	SOCKET	OCTAL	220-1121-000
XY 2	Y2 CRYSTAL	SOCKET	OCTAL	220-1121-000
XZ 1	Z1 FLIPFLOP	SOCKET	FLIPFLOP	352-9560-010
XZ 2	Z2 FLIPFLOP	SOCKET	FLIPFLOP	352-9560-010
Y 1	FREQ DETERMINING	CRYSTAL	SEE PTS	289-7021-000
Y 2	FREQ DETERMINING	CRYSTAL	SEE PTS	289-7021-000
Z 1	FREQ DIVIDING	FLIPFLOP	SN1147	351-7008-020
Z 2	FREQ DIVIDING	FLIPFLOP	SN1147	351-7008-020



NOTES :
1. UNLESS OTHERWISE INDICATED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
   ALL INDUCTANCE VALUES ARE IN MILLIHENRIES
2. S1 IS VIEWED FROM END OPPOSITE KNOB
3. AS SHOWN Z1 AND Z2 DIVIDE THE CRYSTAL FREQUENCY BY FOUR. TO DIVIDE THE CRYSTAL FREQUENCY BY TWO, REMOVE Z2 AND CONNECT E1 TO E2
4. C3 THROUGH C6 ARE USED TO COMPENSATE FOR CRYSTAL AGING CHARACTERISTICS AND MAY OR MAY NOT BE USED. NORMALLY SUPPLIED WITH C3 AND C4 CONNECTED

B502-007-4

Figure 3. AM. Broadcast Exciter 310W-1, Schematic Diagram

WIRE CODE

EXAMPLES					
A	20	TA	90	T	9123
TYPE	SIZE	STYLE	SHIELD	JACKET	COLOR

HOOKUP WIRE, STRANDED, SIZE 20 AWG, TEFLON INSULATION PER MIL-W-16878, TYPE E, (600 VOLTS), SILVER COATED CONDUCTORS, SHIELDED 90% MINIMUM COVERAGE, WITH TEFLON (FEP) OVERALL JACKET: WHITE WIRE WITH A BROWN, RED AND ORANGE TRACER

SOME POSSIBLE COMBINATIONS

A20TA00X9XXX

A20TA21T91XX

A22TB14S912X

A18PC92P9123

B26BA00XXXXX

NOTE: ALL DRAWINGS MUST SHOW A (X) IN THE VACANT FIELD OF THE CODE TO PREVENT MISINTERPRETATION.

TYPE	
CODE	DESCRIPTION
A	HOOKUP WIRE, STRANDED
B	BUS WIRE, SOLID
C	STRANDED HOOKUP WIRE, COPPERWELD, 30% COND.
D	STRANDED HOOKUP WIRE, COPPERWELD, 40% COND.
E	ELECTRICAL (CONSTRUCTION)
L	LITZ
M	MAGNET
N	NEON
T	TELEPHONE
W	TEST LEADS
Y	HOOKUP WIRE, COPPERCLAD STEEL, SOLID
Z	HOOKUP WIRE, SOLID

SIZE	
CODE	DESCRIPTION
01	1 AWG (817 x #30 IF STRANDED)
02	2 AWG (665 x #30 IF STRANDED)
03	3 AWG
04	4 AWG (133 x #25 IF STRANDED)
05	5 AWG
06	6 AWG (133 x #27 IF STRANDED)
07	7 AWG
08	8 AWG (133 x #29 IF STRANDED)
09	9 AWG
10	10 AWG (37 x #26 IF STRANDED)
11	11 AWG
12	12 AWG (19 x #25 IF STRANDED)
13	13 AWG
14	14 AWG (19 x #27 IF STRANDED)
15	15 AWG

SIZE (Cont)	
CODE	DESCRIPTION
16	16 AWG (19 x #29 IF STRANDED)
17	17 AWG
18	18 AWG (7 x #26 IF STRANDED)
19	19 AWG
20	20 AWG (7 x #28 IF STRANDED)
21	21 AWG
22	22 AWG (7 x #30 IF STRANDED)
23	23 AWG
24	24 AWG (7 x #32 IF STRANDED)
25	25 AWG
26	26 AWG (7 X #34 IF STRANDED)
27	27 AWG (7 X #35 IF STRANDED)
28	28 AWG (7 x #36 IF STRANDED)
29	29 AWG
30	30 AWG (7 x #38 IF STRANDED)
31	31 AWG
32	32 AWG (4 x #38 IF STRANDED)
33	33 AWG
34	34 AWG SOLID
35	35 AWG SOLID
36	36 AWG SOLID
37	37 AWG SOLID
38	38 AWG SOLID
39	39 AWG SOLID
40	40 AWG SOLID
41	41 AWG SOLID
42	42 AWG SOLID
43	43 AWG SOLID
44	44 AWG SOLID
45	45 AWG SOLID
46	46 AWG SOLID
47	47 AWG SOLID
48	48 AWG SOLID
49	49 AWG SOLID
50	50 AWG SOLID
51	1 AWG STRANDED (259 x #25)
52	6 AWG STRANDED (266 x #30)
53	8 AWG STRANDED (168 x #30)
54	10 AWG STRANDED (49 x #27)
55	14 AWG STRANDED (37 x #29)
56	16 AWG STRANDED (96 x #36)
57	18 AWG STRANDED (65 x #36)
58	18 AWG STRANDED (41 x #34)
59	18 AWG STRANDED (19 x #30)
60	20 AWG STRANDED (19 x #32)
61	20 AWG STRANDED (16 x #34)
62	22 AWG STRANDED (19 x #34)

SIZE (Cont)	
CODE	DESCRIPTION
63	22 AWG STRANDED (27 x #36)
64	26 AWG STRANDED (10 x #36)
65	26 AWG STRANDED (19 x #38)
66	26 AWG STRANDED (8 x #36)
67	18 AWG STRANDED (16 x #30)
68	24 AWG STRANDED (19 x #36)
70	18 AWG STRANDED (19 x #28)
71	12 AWG STRANDED (7 x .0305)
72	16 AWG STRANDED (37 x #26)
73	20 AWG STRANDED (41 x #36)
74	14 AWG STRANDED (168 x #37) (7 x 24 ROPE LAY)
75	16 AWG STRANDED (26 x #30)
76	20 AWG STRANDED (10 x #30)
77	8 AWG STRANDED (7 x .0486)
78	6 AWG STRANDED (7 x .0612)
79	18 AWG STRANDED (16 x #30)
80	36 AWG STRANDED (10 x #36)
81	14 AWG STRANDED (41 x #30)
82	2 AWG STRANDED (7 x .0974)
83	4 AWG STRANDED (7 x .0772)
84	10 AWG STRANDED (105 x #30)
85	12 AWG STRANDED (65 x #30)
86	12 AWG STRANDED (84 x #31)
87	26 AWG STRANDED (65 x #44)
88	10 AWG STRANDED (7 x .0385)
89	14 AWG STRANDED (7 x .0242)
91	0 AWG (1045 x #30 IF STRANDED)
92	00 AWG (1330 x #30 IF STRANDED)
93	000 AWG (1665 x #30 IF STRANDED)
94	0000 AWG (2109 x #30 IF STRANDED)

STYLE	
CODE	DESCRIPTION
AA	ASBESTOS, TYPE AA(BRAIDED) (300 VOLTS)
AB	ASBESTOS, PLIOFILM, GLASS YARN BRAID, LACQUERED, (1000 VOLTS)
AC	ASBESTOS, PLIOFILM, GLASS YARN BRAID, LACQUERED, (600 VOLTS)
AD	ASBESTOS, PLIOFILM, GLASS YARN BRAID, LACQUERED, (5000 VOLTS)
AE	ASBESTOS, DENSE SEAMLESS, IMPREGNATED WALL OF FELTED ASBESTOS, COVERED BY ASBESTOS BRAID. (300 VOLTS) (RHEOSTAT AND STOVE WIRE)
BA	BUS, QQ-W-343, TYPE S, SOFT OR DRAWN AND ANNEALED TIN COATED
BB	BUS, QQ-W-343, BARE ANNEALED, COPPER SOFT DRAWN
BC	BUS, QQ-W-345, TYPE I, TINNED COPPER-CLAD STEEL

STYLE (Cont)	
CODE	DESCRIPTION
BE	BUS, QQ-W-343, TYPE S, SOFT DRAWN COPPER WITH 99% MIN. PURE SILVER COATING, .001 INCH MIN. THICK
BF	BUS, 1/2 H TEMP. COPPER .001 MIN. 10KT. GOLD PLATING
BG	BUS, HARD DRAWN
BH	BUS, QQ-W-343, STRANDED ANNEALED, COPPER SOFT DRAWN
BJ	STRANDED, NICKEL PLATED ALLOY WIRE
BK	STRANDED, SOFT OR DRAWN AND ANNEALED
BL	STRANDED, MIL-W-3861, TYPE RB, CLASS K
BM	BUS, MIL-N-46026, SOLID NICKEL, ANNEALED
BN	BUS, SOLID NICKEL PER MIL-N-46026
BR	BUS MIL-19424, CLASS 2, CONDITION 4, SOLID SILVER
BS	BUS, MIL-N-46026, ANNEALED NICKEL ALLOY, GOLD PLATED
BT	BUS, QQ-W-343, TYPE S, (210-0475-00)
CA	CAMPRIC VARNISHED, GLYPTAL TREATED BRAID
EA	THERMOPLASTIC, TYPE THW (MOISTURE AND FLAME RETARDANT). NEC TYPE
EB	THERMOPLASTIC, TYPE TW (FLAME AND MOISTURE RETARDANT). NEC TYPE
EC	THERMOPLASTIC, SD COPPER COND., .010 WALL, MIN. HOOKUP
FA	POLYURETHANE, MIL-W-583, TYPE T, RD
FB	POLYURETHANE, MIL-W-583, TYPE T2, RD
FC	POLYURETHANE, MIL-W-583, TYPE T3, RD
FD	POLYURETHANE, MIL-W-583, TYPE T4, RD
FE	VINYL ACETAL, MIL-W-583, TYPE T, RD
FF	VINYL ACETAL, MIL-W-583, TYPE T2, RD
FG	VINYL ACETAL, MIL-W-583, TYPE T3, RD
FH	VINYL ACETAL, MIL-W-583, TYPE T4, RD
FJ	POLYMIDE, MIL-W-583, TYPE K (ML), RD
FK	POLYMIDE, MIL-W-583, TYPE K2 (ML), RD
FL	POLYESTER, MIL-W-583, TYPE L, RD
FM	POLYESTER, MIL-W-583, TYPE L2, RD
FN	POLYESTER, MIL-W-583, TYPE B, RD
FP	POLYESTER, MIL-W-583, TYPE B2, RD
GA	POLYURETHANE, MIL-W-583, TYPE T2, RD (3 STRANDS)
GB	POLYURETHANE, MIL-W-583, TYPE T2, RD (4 STRANDS)
GC	POLYURETHANE, MIL-W-583, TYPE T2, RD (5 STRANDS)
GD	POLYURETHANE, MIL-W-583, TYPE T2, RD (6 STRANDS)
GE	POLYURETHANE, MIL-W-583, TYPE T2, RD (7 STRANDS)
GF	POLYURETHANE, MIL-W-583, TYPE T2, RD (8 STRANDS)
GG	POLYURETHANE, MIL-W-583, TYPE T2, RD (9 STRANDS)

STYLE (Cont)	
CODE	DESCRIPTION
GH	POLYURETHANE, MIL-W-583, TYPE T2, RD (10 STRANDS)
GJ	POLYURETHANE, MIL-W-583, TYPE T2, RD (11 STRANDS)
GK	POLYURETHANE, MIL-W-583, TYPE T2, RD (13 STRANDS)
GL	POLYURETHANE, MIL-W-583, TYPE T2, RD (16 STRANDS)
GM	POLYURETHANE, MIL-W-583, TYPE T2, RD (20 STRANDS)
GN	POLYURETHANE, MIL-W-583, TYPE T2, RD (26 STRANDS)
GP	POLYURETHANE, MIL-W-583, TYPE T2, RD (32 STRANDS)
GR	POLYURETHANE, MIL-W-583, TYPE T2, RD (41 STRANDS)
GS	POLYURETHANE, MIL-W-583, TYPE T2, RD (50 STRANDS)
GT	POLYURETHANE, MIL-W-583, TYPE T2, RD (52 STRANDS)
KA	KEL-F, MIL-W-12349, (600 VOLTS), SILVER COATED COND. 125 C.
KB	KEL-F, MIL-W-12349, (1000 VOLTS), SILVER COATED COND. 125 C.
KC	KEL-F, MIL-W-12349, EXCEPT 4000 VOLTS, SILVER COATED COND. 125 C.
MA	TWO SERVINGS CELANESE, ONE SERVING COTTON WRAP, COATED WITH PLASTICIZED BUTYRATE LACQUER (300 VOLTS) (TELEPHONE TYPE)
MB	TWO SERVINGS CELLULOSE ACETATE RAYON YARN, ONE SERVING COTTON WRAP WITH PLASTICIZED CELLULOSE BUTYRATE LACQUER
PA	POLYVINYL CHLORIDE, MIL-W-16878, TYPE B (600 VOLTS) SILVER COATED COND.
PB	POLYVINYL CHLORIDE, MIL-W-16878, TYPE B (600 VOLTS) TIN COATED COND.
PC	POLYVINYL CHLORIDE, MIL-W-16878, TYPE C (1,000 VOLTS) TIN COATED COND.
PD	POLYVINYL CHLORIDE, MIL-W-16878, TYPE D (3,000 VOLTS) TIN COATED COND.
PE	POLYVINYL CHLORIDE, NON-MIL, TELEPHONE TYPE
PF	POLYVINYL CHLORIDE, JAN-C-76, TYPE WL (600 VOLTS)
PG	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRIR (1000 VOLTS)
PH	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRHV (2500 VOLTS)
PI	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRIR (600 VOLTS)
PJ	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRIR (1000 VOLTS), WITH GLASS YARN BRAID, VARNISHED AND LACQUERED
PK	POLYVINYL CHLORIDE, MIL-W-16878, TYPE B (600 VOLTS), TIN COATED COND. FUSED STRANDS

WIRE CODE (Cont)

STYLE (Cont)	
CODE	DESCRIPTION
PL	POLYVINYL CHLORIDE, MIL-W-16878, TYPE C (1,000 VOLTS), TIN COATED COND., FUSED STRANDS
PM	POLYVINYL CHLORIDE, JAN-C-76, TYPE WL, (600 VOLTS) WITH GLASS YARN BRAID, VARNISHED AND LACQUERED
PN	POLYVINYL CHLORIDE, (600 VOLTS) TIN COATED CONDUCTOR
PO	POLYVINYL CHLORIDE, TYPE SHFS, 15C1, (750 VDC)
PP	POLYETHYLENE, RF, (2600 VOLTS)
PR	POLYAMIDE (NYLON) (600 VOLTS)
PS	POLYETHYLENE, NEON SIGN TYPE, 20,000 VDC -55 C to +105 C
PT	POLYETHYLENE, COTTON BRAIDED, FLAME + MOISTURE RESISTANT, TYPE W-146, MIL SPEC 71-3189
PV	POLYVINYL CHLORIDE, MIL-W-16878, MIN. 00. (.053)
PW	POLYVINYL, HIGH FLEXIBILITY
PX	POLYVINYL, U.L. STYLE 1061, 300 V -10 C TO +80 C
RA	RUBBER, TYPE RH-RW (HEAT AND MOISTURE RESISTANT) NEC TYPE
RB	RUBBER, MIL-C-13486, TYPE I, CLASS A (30 VOLT DC) NEOPRENE JACKET, FIBER GLASS BRAID
RC	RUBBER, NEC TYPE RHH (POLYCHLOROPRENE) -40 C to +90 C
RD	RUBBER, LACQUERED COTTON BRAID (NEON CABLE) 15,000 VOLTS
RE	RUBBER, BUNA-S (TEST LEADS) MIL-W-13169
RF	RUBBER, TEST LEADS, COMM., 5000 VOLTS
SA	SILICONE, MIL-W-16878, TYPE F (600 VOLTS) TIN COATED CONDUCTOR
SB	SILICONE, MIL-W-16878, TYPE FF (1,000 VOLTS) TIN COATED CONDUCTOR
SC	SILICONE, MIL-W-16878, TYPE FFW (1,000 VOLTS) TIN COATED CONDUCTOR
SD	SILICONE, 5,000 VOLTS
SE	SILICONE, 10,000 VOLTS
SF	SILICONE, 15,000 VOLTS
SG	SILICONE, 20,000 VOLTS
SH	SILICONE, 25,000 VOLTS, +150 C.
SJ	SILICONE, 30,000 VOLTS
SK	SILICONE, 600 VOLTS, LACQUERED NYLON BRAID COVER, +105 C.
SL	SILICONE, RUBBER, 500 VOLTS, 200 C, .008 WALL
TA	TEFLON, MIL-W-16878, TYPE E, (600 VOLTS) SILVER COATED CONDUCTOR
TB	TEFLON, MIL-W-16878, TYPE E, (600 VOLTS) NICKEL COATED COPPER ALLOY CONDUCTOR (210-0229-00) (210-0230-00)
TC	TEFLON, MIL-W-16878, TYPE EE, (1,000 VOLTS) SILVER COATED CONDUCTOR

STYLE (Cont)	
CODE	DESCRIPTION
TD	TEFLON, MIL-W-16878, TYPE EE (1,000 VOLTS) NICKEL COATED COPPER ALLOY CONDUCTOR (210-0231-00) (210-0232-00)
TE	TEFLON, MIL-W-16878, TYPE ET (250 VOLTS) SILVER COATED CONDUCTOR
TF	TEFLON, MIL-W-16878, TYPE ET (250 VOLTS) NICKEL COATED CONDUCTOR
TG	TEFLON, MIL-W-16878, TYPE K (600 VOLTS) SILVER COATED CONDUCTOR
TH	TEFLON, MIL-W-16878, TYPE K (600 VOLTS) NICKEL COATED CONDUCTOR
TJ	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) SILVER COATED CONDUCTOR
TK	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) NICKEL COATED CONDUCTOR
TL	TEFLON, (3,000 VOLTS) SILVER COATED CONDUCTOR. NOT COVERED BY MIL-W-16878 BUT SIMILAR TO TYPE EE
TM	MIL-W-16878, TYPE E, (600 VOLTS) EXCEPT SOLID CONDUCTOR, SILVER PLATED
TN	TEFLON, MIL-W-16878, TYPE KT, EXCEPT 300 V SILVER PLATED ANNEALED COPPER CONDUCTOR
TP	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COND. INSULATION BONDED
TR	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0527-00) (210-0528-00) (210-0534-00) (210-0535-00) (210-0533-00)
TS	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) SILVER COATED COPPER ALLOY EXCEPT WITH A 0.001 MIN. COATING OF "ML" POLYMER OVER TEFLON (210-0424-00)
TT	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) NICKEL COATED COPPER ALLOY EXCEPT WITH A 0.001 MIN. COATING OF "ML" POLYMER OVER TEFLON (210-0278-00)
TV	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0425-00) (210-0469-00) (210-0418-00) (210-0419-00) (210-0455-00) (210-0454-00)
TW	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR
TX	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) EXCEPT NICKEL, 99.5% CONDUCTOR 1/8H, WELDABLE PER MIL-N-46026 (210-0401-00)
TY	TEFLON, MIL-W-16878, TYPE ET (250 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0522-00) 210-0537-00)
TZ	TEFLON, MIL-W-16878, TYPE EE (1,000 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0420-00) (210-0421-00) (210-0529-00) (210-0530-00)
VA	VINYL, MIL-W-5086, TYPE II, (600 VOLTS) SIZE 22-12
VB	VINYL, MIL-W-5086, TYPE II, (600 VOLTS) SIZE 0000-10
VC	VINYL, MIL-W-5086, TYPE III, (600 VOLTS) SIZE 22-12
VD	VINYL, MIL-W-5086, TYPE IV, (600 VOLTS) SIZE 0000-10

STYLE (Cont)	
CODE	DESCRIPTION
VE	VINYL, MIL-W-5086, TYPE I, (600 VOLTS) SIZE 22-12
ZA	POLYOLEFIN, IRRADIATED, MODIFIED, (300 VOLTS)
ZB	POLYOLEFIN, IRRADIATED, MODIFIED, (600 VOLTS)

SHIELD	
CODE	DESCRIPTION
00	NONE
01	BRAIDED, 3 ENDS, 36 AWG, 20 PICKS, 16 CARRIERS
02	BRAIDED, 3 ENDS, 38 AWG, 22 PICKS, 16 CARRIERS
03	BRAIDED, 4 ENDS, 36 AWG, 14 PICKS, 16 CARRIERS
04	BRAIDED, 4 ENDS, 36 AWG, 16 PICKS, 16 CARRIERS
05	BRAIDED, 4 ENDS, 38 AWG, 23 PICKS, 16 CARRIERS
06	BRAIDED, 5 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
07	BRAIDED, 5 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
08	BRAIDED, 6 ENDS, 36 AWG, 10 PICKS, 16 CARRIERS
09	BRAIDED, 6 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
10	BRAIDED, 6 ENDS, 36 AWG, 10 PICKS, 24 CARRIERS
11	BRAIDED, 6 ENDS, 36 AWG, 12 PICKS, 24 CARRIERS
12	BRAIDED, 7 ENDS, 36 AWG, 10 PICKS, 16 CARRIERS
13	BRAIDED, 7 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
14	BRAIDED, 7 ENDS, 36 AWG, 10 PICKS, 24 CARRIERS
15	BRAIDED, 8 ENDS, 33 AWG, 8 PICKS, 24 CARRIERS
16	BRAIDED, 8 ENDS, 33 AWG, 9 PICKS, 24 CARRIERS
17	BRAIDED, 8 ENDS, 34 AWG, 8 PICKS, 24 CARRIERS
18	BRAIDED, 9 ENDS, 36 AWG, 9 PICKS, 24 CARRIERS
19	BRAIDED, 9 ENDS, 36 AWG, 8.5 PICKS, 24 CARRIERS
20	BRAIDED, 9 ENDS, 36 AWG, 9 PICKS, 24 CARRIERS
21	BRAIDED, 4 ENDS, 36 AWG, 10 PICKS, 16 CARRIERS
51	SPIRAL WRAPPED 5 ENDS OF #38 AWG, 8 CARRIERS
52	SPIRAL WRAPPED 100% COVERAGE
90	90% MINIMUM COVERAGE
91	91% MINIMUM COVERAGE

SHIELD (Cont)	
CODE	DESCRIPTION
92	92% MINIMUM COVERAGE
93	93% MINIMUM COVERAGE
94	94% MINIMUM COVERAGE
95	95% MINIMUM COVERAGE
96	96% MINIMUM COVERAGE
97	97% MINIMUM COVERAGE
98	98% MINIMUM COVERAGE
99	99% MINIMUM COVERAGE

OVERALL JACKET	
CODE	DESCRIPTION
F	FIBER GLASS
L	SYNTHETIC RESIN
N	NEOPRENE
P	POLYAMIDE (NYLON)
R	RUBBER
S	TEFLON, (TFE)
T	TEFLON, (FEP)
V	VINYL, (POLYVINYL CHLORIDE)
W	IRRIDATED MODIFIED POLYOLEFIN
X	NONE

OVERALL JACKET OVER COLLINS STANDARD SHIELDED WIRE IS WHITE. ANY DEVIATION MUST BE CALLED OUT ON THE DRAWING.

COLOR	
CODE	DESCRIPTION
X	NONE
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	VIOLET
8	GREY
9	WHITE

$$X_C = \frac{1}{2\pi fC}$$

$$X_C = \frac{1}{(6.28)(10^3)(5\times10^{-9})}$$

$$X_C = \frac{1}{(6.28)(10^{-5})}$$

$$X_C = (.16)(10^5)$$

$$X_C = 1600$$


REACTANCE OF COMPONENTS INDIVIDUALLY IN OUTPUT CIRCUIT.
NOTES
1. RESISTORS: UNLESS OTHERWISE NOTED ALL RESISTANCES ARE IN OHMS; K INDICATES KILOHMS (1,000 OHMS), M INDICATES MEGOHMS (1,000,000 OHMS).
2. CAPACITORS: UNLESS OTHERWISE NOTED ALL CAPACITANCES ARE IN MICROFARADS; pf INDICATES PICOFARADS (MICRO-MICROFARADS).
3. INDUCTORS: UNLESS OTHERWISE NOTED ALL INDUCTANCES ARE IN HENRIES; mh INDICATES MILLIHENRIES. uh INDICATES MICROHENRYS.
4. NOT USED IN 820E.
5. NOT USED IN 820F.
6. DOTTED CONNECTIONS TO BE INSTALLED WHEN A8 REMOTE CONTROL PANEL NOT USED.
7. STRAP CONNECTION AT A8 TB1-5 & 6 TO BE REMOVED WHEN CUSTOMER REMOTE CONTROL WIRING INSTALLED AT A8 TB2.
REVISIONS
Blue = +28 VDC
DOTTED SOLID = 111-LO PWR CONTROL
DASHED = CONTACTORS, SCREEN & REDUCED PWR RELAYS
COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA (DALLAS, TEXAS DIV.)
SCHEMATIC DIAGRAM
TYPE 820E/F-1 TRANSMITTER
13499
J
762-8855-000
A. R. Nott

DESCRIPTION OF THE HYBRID TRANSMITTER COMBINER

This circuit consists of four 90 degree phase shifting Pi Networks connected in a bridge circuit with a network in each arm of the bridge. Three of these networks are phase delay networks and one is a phase advance network.

Where two components are connected in parallel due to the connection in the bridge circuit, they are combined in the case of like components. Since all components have the same value of reactance, the parallel connection of two capacitors results in a capacitor of one-half the reactance or twice the capacity. In the case of unlike components, that is, an inductor and a capacitor, they combine to form a parallel resonant circuit and can therefore be omitted.

The two transmitters are connected at opposite corners of the bridge, and the output transmission line is connected to the junction of two phase delay networks, while the reject load is connected to the opposite corner which is a junction of phase delay and a phase advance network.

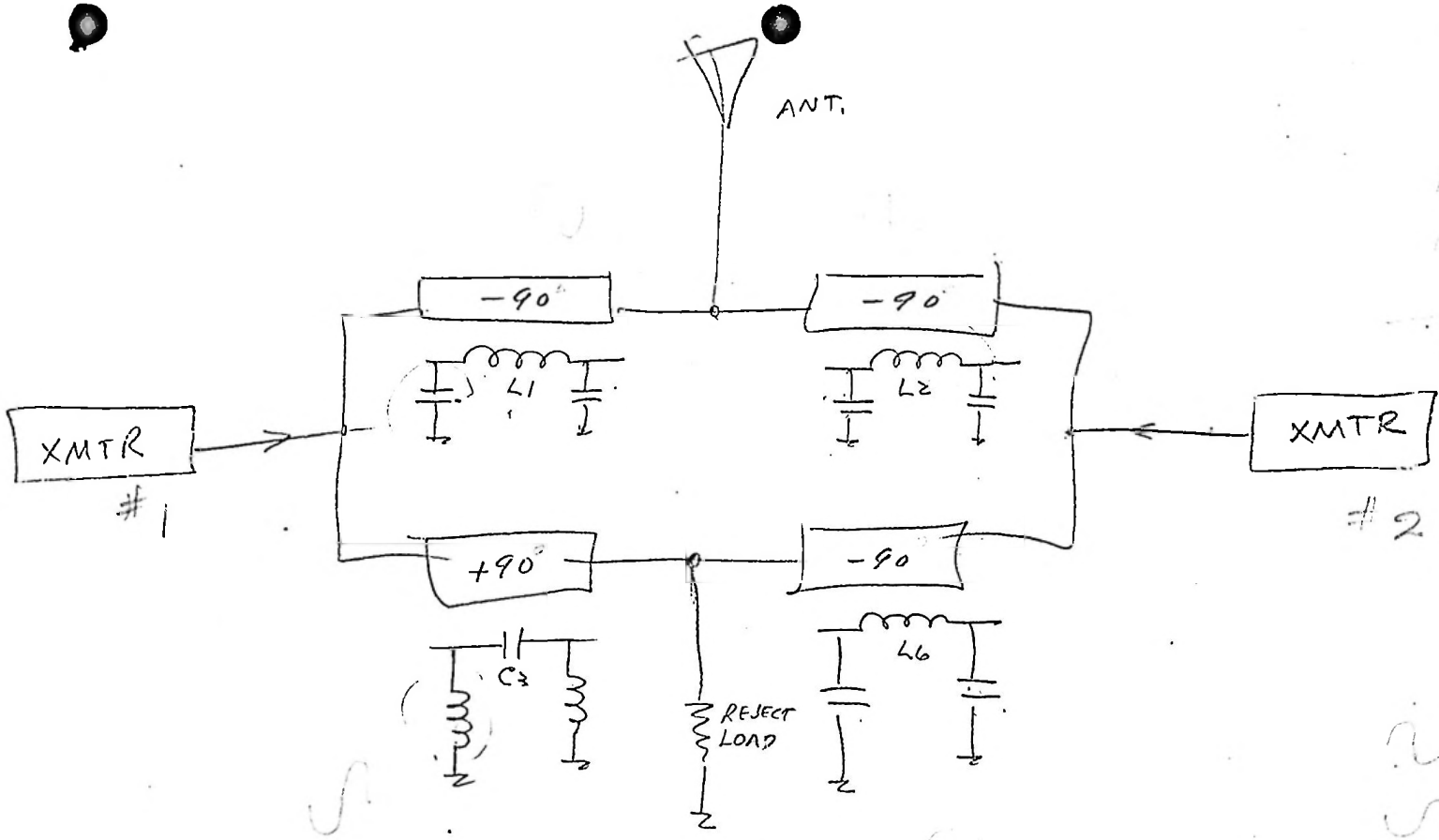
Since the output power of the two transmitters must be of the same magnitude and in phase, energy leaving one transmitter arrives at the terminal of the other transmitter delayed in phase by 180 degrees through one path of the bridge and in phase through the other path. This results in a cancellation of energy at the terminals of one transmitter due to the other so no interaction between transmitters is present.

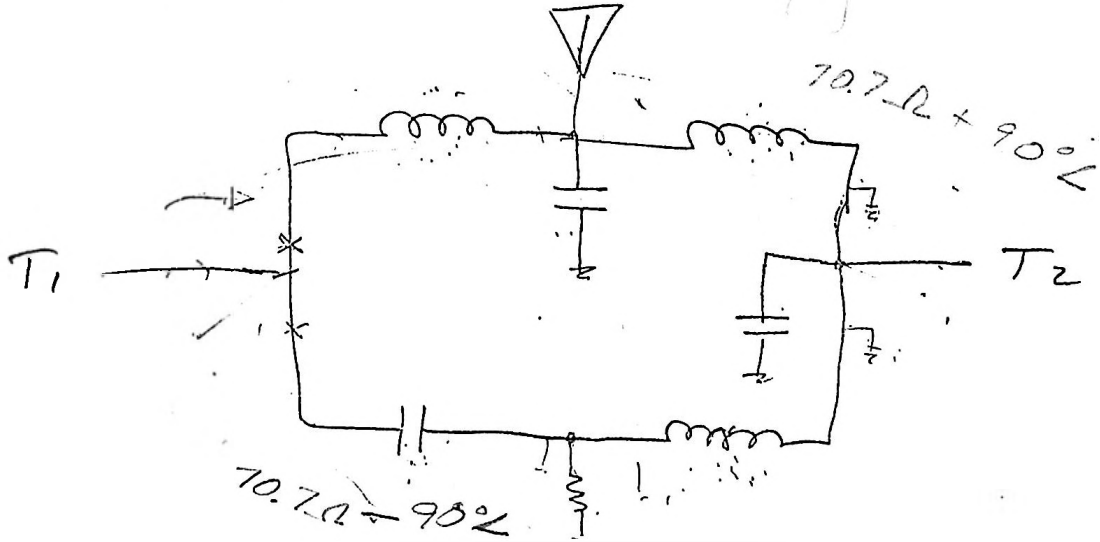
The energy at the terminal of the reject load is the resultant of the energy leaving both transmitters in phase and being delayed by 90 degrees from one transmitter and advanced by 90 degrees from the other, resulting in a cancellation of energy and no voltage is developed across the reject load.

The energy at the line terminal is the resultant of energy leaving both transmitters in phase and both being delayed by 90 degrees arrive at the line terminal in phase.

In the event of failure of one transmitter, one-half of the power from the other is dissipated in the reject load and the other half is transmitted to the transmission line.

Provision is made to switch the defective transmitter to the reject load and the operating transmitter to the transmission line.


ANT.
-90°
-90°
XMTR
#1
L1
L2
XMTR
#2
+90°
-90°
C3
L6
REJECT
LOAD


70.7Ω ∠ 90°
T1
T2
70.7Ω ∠ -90°

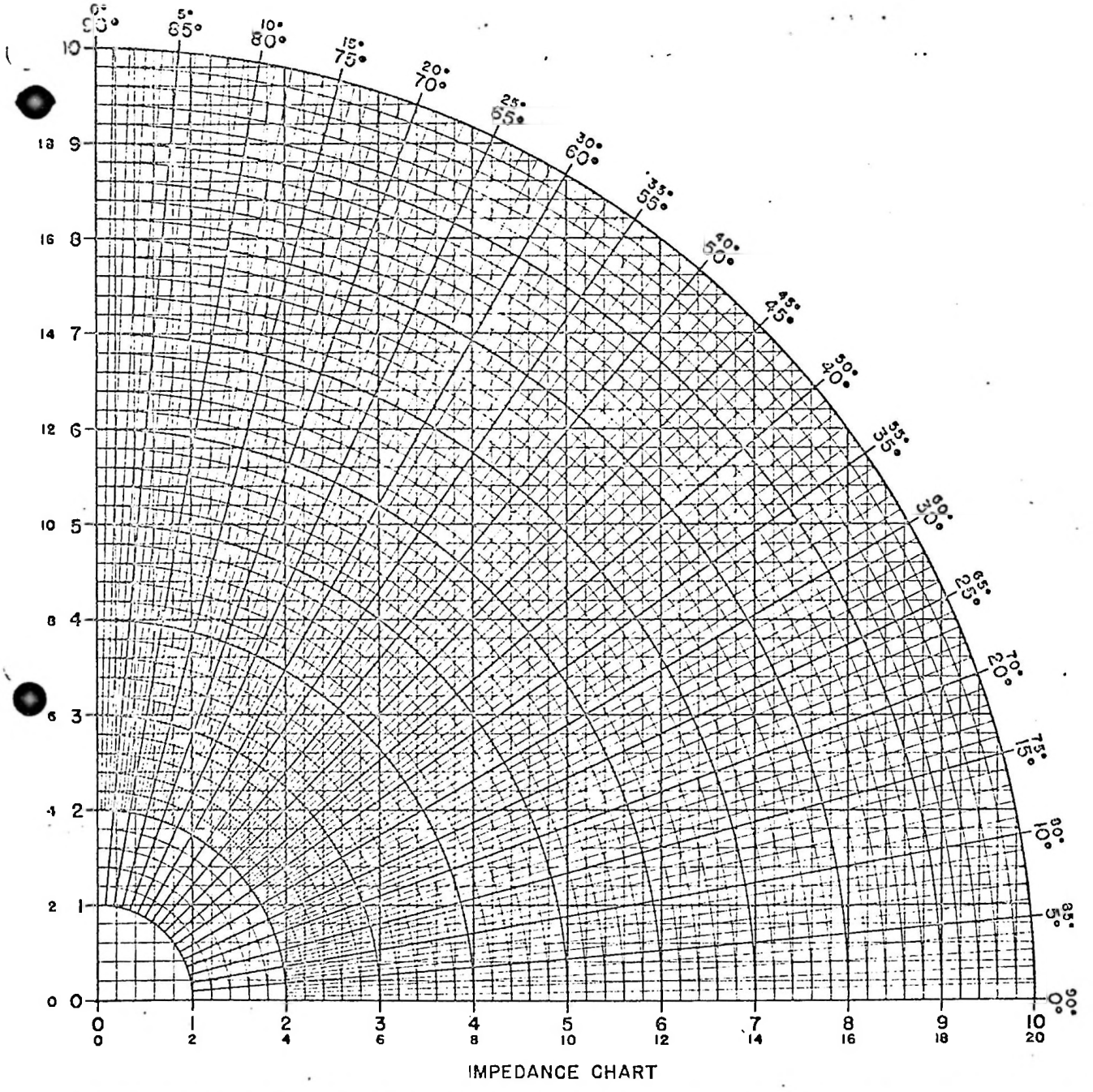


Figure 2

Chart on impedance. The coordinates of the chart have been numbered *zero* to *ten* and from *zero* to *twenty*. However, any number system can be used and the decimal point can be placed wherever desired. If the latter system is used, the numbers must be consistent. That is, they must be the same in the horizontal and vertical directions.

COLLINS

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA - DALLAS DIVISION

PRODUCTION TEST SPECIFICATION

FOR

820E/F-1 AM BROADCAST TRANSMITTERS

PART NUMBER 522-3291-000 & 522-3292-000

APPROVED BY

PROJECT ENGINEER J.W. Bailey DATE 4 Nov 65

ENGINEERING GROUP HEAD R.P. Kuschner DATE 4 Nov 65

QUALITY ASSURANCE N/A DATE

QUALITY CONTROL D. E. Hansen DATE 11-9-65 / 11-9-65

SYM	REV.NO	DATE	SH.REV	APPD	SYM	REV.NO	DATE	SH.REV	APPD
A	T45816	2-18 65	-	LEK	D	T53785	12-15 1966	LEK	
B	T47611	5-4 66	LEK		E	T-60995	2-9 1967		
C	T48344	2-7 1966	LEK		F	T-61112	2-14 67	LEK	
C_1	E.C. K-0007	12-7 1966							

REVISION DATA

CODE IDENT NO. 13499

569-2474-000

SHEET 1 OF 50

D-207 (REV. 6-63)

1.0 SCOPE

These Production Test Requirements apply to the Collins Type Number 820E/F-1 AM Broadcast Transmitters, Part Nos. 522-3291-000 and 522-3292-000, respectively. (Note that test of Type 310W-1 RF Exciter should be made separately, using referenced test specification.)

2.0 REFERENCE INFORMATION.

2.1 Specifications:

820E-1 Equipment Specification, Part No. 568-1942-000.
820F-1 Equipment Specification, Part No. 568-1943-000.
820E/F-1 Type Test Specification, Part No. 570-1218-000.
310W-1 Production Test Specification, Part No. 569-7242-000.

2.2 Publications:

820E/F-1 Instruction Manual, Part No. 523-0556832-001431.
310W-1 Instruction Manual, Part No. 523-0556833-001438.
FCC Type Acceptance Application, 820E/F-1.

2.3 Drawings:

Schematic Diagram, Part No. 762-8855-000.
Electrical Parts List, Part No. 762-8852-000.
Wire List, Part No. 762-8844-000.
Outline and Installation Drawing, Part No. 762-8886-000.

2.4 Photographs:

See 820E/F-1 Instruction Book for photographs.

3.0 TEST EQUIPMENT REQUIRED

The following equipment or their equivalents are required to perform the tests.

Item		Manufacturer	Qty.
1.	RF load, 50+j0 ohms 15 KW	States Type WG air cooled w/series mica capacitor and calibrated RF ammeter.	1
2.	RF Signal Generator	GR Type 1330-A or Hewlett-Packard 606A.	1
3.	RF Impedance Bridge	GR Type 1606-A or 916-AL.	1
4.	RF Detector	Collins 51-S.	1
5.	Multimeter	Triplett Model 630-NA multimeter of known d-c accuracy of ±1.5%. Meter is to be especially calibrated by the Test Equipment Lab, and degree of error determined for the 12 and 300 VAC scales.	1

3.0 TEST EQUIPMENT REQUIRED (Cont'd.)

Item	Manufacturer	Qty.
6. Audio Signal Generator	Hewlett-Packard 206A	1
7. Distortion & Noise Analyzer	Hewlett-Packard 330D	1
8. Oscilloscope	Tektronix Type 553 or Type 545A.	1
9. Modulation Monitor	General Radio 1931B or Metron 5063.	1
10. DC Power Supply	Electro Products Lab Model EFB.	1
11. Vacuum Tube Voltmeter	Hewlett-Packard 412A or 425A	1
12. Test Circuit 1, Fig. 2		1
13. Test Circuit 2, Fig. 3		1
14. Test Circuit 3, Fig. 4		1

4.0 TEST CONDITIONS

Unless otherwise specified, all tests shall be performed under the following conditions:

4.1 Power Supply:

208/240-volts, ±5%, 50/60 cycles, three-phase.

4.2 Ambient Temperature:

Normal factory ambient.

4.3 Ambient Humidity:

Normal factory ambient.

4.4 Ambient Atmospheric Pressure:

Normal factory ambient.

4.5 Shielding and Isolation Requirements:

None.

4.6 Operational Duty Cycle:

Continuous.

4.7 Warm-up Period:

5-Minutes.

5.0 PRELIMINARY TESTS

WARNING!

HIGH VOLTAGE

is used in this equipment.

DEATH ON CONTACT

may result if personnel
fail to observe safety precautions.

Be careful never to contact any power connection when in or near this equipment. When working inside the equipment, be sure all circuit breakers are turned OFF, and note that RED line terminal protective covers are in place on circuit breaker panel. Also, be sure to remove power at external wall disconnect switch. Always short-circuit high voltage components after removing power.

5.1 Visual Inspection:

Make certain the power input line is disconnected. Inspect the unit to determine that all materials and workmanship are in accordance with Collins Radio Standards and that the unit has been constructed in accordance with the latest drawings. Inspect equipment for loose connections and loose components. Check all carbon-block arrestors (E1, E2, E3, E4, E5*) for proper installation. Check E14, E15, E16, and E17* for spacing of 0.010 inch. Check arc gaps on L4 and T12 for a setting of 0.10 inches. Adjust all door interlock and door grounding switches for proper operation.

5.2 Ohmmeter Checks:

5.2.1 Measure the d-c resistance between ground and each of the below listed power supply terminals. A high resistance should exist. Open each of the doors listed in turn to see that the high resistance goes to a low resistance. Finally check each power supply ground return, also listed below, for a low resistance to ground.

Power Supply and Terminal	Doors to be Opened
High Voltage Supply (CR23-POS) Ground Return (CR23-NEG)	PA door, MOD door, right rear door, center rear door.
PA Screen Supply (CR21-POS) Ground Return (CR21-NEG)	Right front door, right front panel, PA door, right rear door, center rear door, left rear door.
PA Screen Supply (R26-1)	RF driver door.

*E5 and E17 in 820F only.

5.2.1 Cont'd.

Power Supply and Terminal	Doors to be Opened
Modulator Screen Supply (CR19-POS) Ground Return (CR19-NEG)	Right front door, right front panel, MOD door, left rear door.
Bias Supply (CR16-2) Ground Return (CR18-1)	Right front door, right front panel, PA door, MOD door, left rear door.
Bias Supply (R13-1)	Mod Door
(R14-1)	RF driver door
Ground Return (R14-2)	Doors closed
28V DC Supply (CR14-POS)	None.
Ground Return (CR14-NEG)	

5.2.2 Electrolytic Capacitor Ground:

Check the negative terminals of the electrolytic capacitors C1, C10, C13, C14, C117, C125 for a low resistance to ground. Check the positive terminal of C4 for low resistance to ground. All door grounding switches must be open.

5.2.3 AC Line:

Close all circuit breakers. Check each phase of the power line input for shorts to ground with each of the following relay contactors manually operated in turn: K2, K5, K6, and K7.

5.2.4 Filaments:

Inspect PA and modulator filaments for correct wiring. Check each filament at socket terminals for low resistance to ground.

5.3 Equipment Interconnections:

5.3.1 Phantom Load Connection:

Connect phantom load with series capacitor (if required) and RF ammeter, to transmitter output.

5.3.2 Extended Control Panel Connection:

Connect extended control panel to transmitter with cable A1W2. Be certain all 66 connections to A1TB1 and to TB1 are properly made. Also at this time install a temporary jumper across pins 49 and 50 of TB1 and check R158-2 for 9K to 11K ohms to ground. Remove jumper. Connect exciter to transmitter through W12 coaxial cable from J9 to A10J1. Also connect +28V and ground from extended control panel (A1TB1-65 and 31) to exciter input terminals.

5.3.3 Power Supply Transformer Taps:

Check each power supply to see that the correct transformer primary taps are connected for existing line voltage (208/230/240). Initial tap setting for filament transformers T3 through T6 should be at terminals 1 and 5.

5.3.4 Frequency Dependent Connections:

Install connecting straps required for frequency dependent components as indicated in Table 1 on sheet 7. Component connections are shown in Fig. 1. Also set tap on L6 as indicated in Table 1. Check to see that output network has been installed for particular frequency.

5.3.5 Monitor Taps:

Modulation monitor taps at L18 should be at pins 2 (reduced power) and 4 (full power) for the 820E-1. For the 820F-1, connections should be at pins 3 and 5. It is expected that some tap adjustment from these starting positions may be necessary during testing.

5.3.6 Grounding:

Connect building power line ground to transmitter ground terminal, E7.

TABLE I
FREQUENCY DEPENDENT CONNECTIONS

Frequency KC	C70A 1000pf	C70B 680pf	C70C 470pf	C71A 1000pf	C71B 680pf	C71C 470pf	C84A 130pf	C84B 240pf	C84C 480pf	C107A 47pf	C107B 100pf	C107C 200pf	C107D 300pf	C107E 390pf	L5A 12uhy	L5B 8.2uhy	L5C 5.6uhy	L6, Active Turns 820E	L6, Active Turns 820F
540	X			X			X	X	X		X		X	X	X			56	55
550-570	X			X			X	X	X	X	X	X		X	X			54	53
580-590	X			X			X	X	X		X	X		X	X			54	49
600	X			X			X	X	X			X		X	X			52	47
610-620	X			X				X	X			X		X	X			54	50
630-640	X			X				X	X			X		X	X			54	47
650-670	X			X				X	X		X			X	X			50	45
680-700	X			X			X		X		X			X	X			49	43
710-730	X			X			X		X		X			X	X			44	40
740-770	X			X			X		X					X	X			44	38
780-830		X			X				X				X			X		44	39
840-860		X			X				X				X			X		40	35
870-900		X			X		X	X					X			X		46	35
910-940		X			X		X	X				X				X		43	33
950-990		X			X		X	X				X				X		41	31

X Denotes components which are connected in circuit.

TABLE I (Cont'd)

Frequency KC	C70A	C70B	C70C	C71A	C71B	C71C	C84A	C84B	C84C	C107A	C107B	C107C	C107D	C107E	L5A	L5B	L5C	820E	820F
1000-1020		X			X			X				X				X		39	32
1030-1080		X			X			X			X					X		37	31
1090-1110		X			X			X			X					X		34	28
1120-1150			X			X		X			X						X	32	32
1160-1200			X			X	X				X						X	30	27
1210-1300			X			X					X						X	37	30
1310-1450			X			X											X	32	28
1460-1600			X			X											X	29	24

REVISION | O | A | B | C | C1 | E | F | G | H | J | K | L

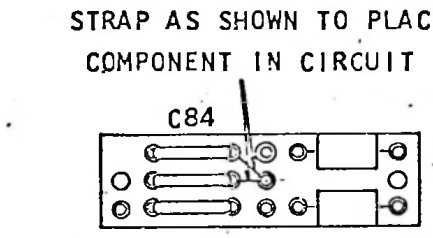
SHEET 8 OF

NO. 569-2474-000

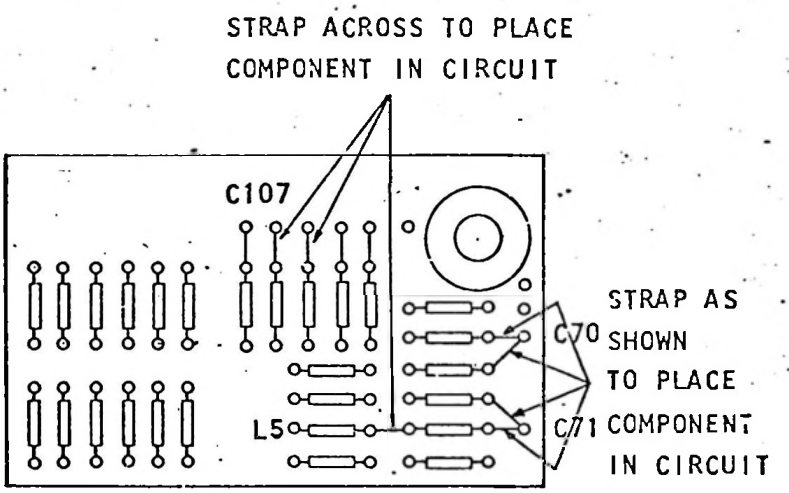
D-351 (8-62)

COLLINS

NO. 569-2474-000



COMPONENT BOARD (IN PA PLENUM)



RF DRIVER BOARD

FIGURE 1

5.4 Control Circuit Operation:

Open all circuit breakers and jumper CB4-C to CB4-NO. See that strap is installed across pins 5 and 6 of A8TB1. Connect external three phase power at CB6, and apply power.

5.4.1 Filament On:

Close breaker CB1. FILAMENT OFF, DOORS, and PLATE OFF/RESET lamps should illuminate. Meter 28V dc supply using calibrated Triplett meter. Value read should be between 26 and 30 vdc. Compare this value with that read on TEST METER 2 in 28V SUPPLY position. Difference in readings should be no more than 5%.

Open each of the eight doors in turn observing that each extinguishes the DOORS lamp. Remove the right front panel to see that it also extinguishes the DOORS lamp. Remove grounding stick to see that it also extinguishes lamp. Close breakers CB2 and CB3.

Depress FILAMENT ON button observing that blower and fan operate. After blowers come up to speed AIR lamp should illuminate and K2 should operate applying filament power. FILAMENT OFF lamp will extinguish and FILAMENT ON lamp will illuminate. Manually operate the blower and fan air switches in turn to see that K2 de-energizes after a slight time delay (about 0.5 sec.), AIR and FILAMENT ON lamps extinguish, and FILAMENT OFF lamp illuminates. Depress FILAMENT OFF button. Observe that blowers run down, FILAMENT ON and AIR lamps extinguish, and FILAMENT OFF lamp illuminates.

Again depress FILAMENT ON button. Open CB3. K2 should de-energize, FILAMENT ON lamp should extinguish, and FILAMENT OFF lamp should illuminate. Reclose CB3. Check to see that +28 VDC exists between TB6-1 and TB6-2.

Note that FILAMENT HOURS meter runs when filaments are turned on.

5.4.2 Filament Voltage Regulator Checkout:

Set potentiometers R7 through R10* at their approximate midpoints. Measure the voltage between pins 1 and 3 of the voltage regulator variac A7T1A and manually adjust variac to set this voltage at 225 ac.

CAUTION

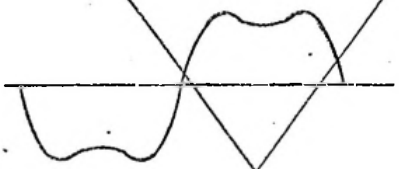
Do not allow the gear assembly to engage the driver motor gear. Be sure a suitable spacer (block of wood) is inserted between the gear assembly and the mounting plate before releasing the manual control.

Check FILAMENT VOLTAGE ADJUST potentiometer A7R1 by turning the potentiometer clockwise until the drive motor is energized and then counterclockwise until the motor is energized again. Center the

* There is no R8 in 820E, adjust R7, R9, and R10

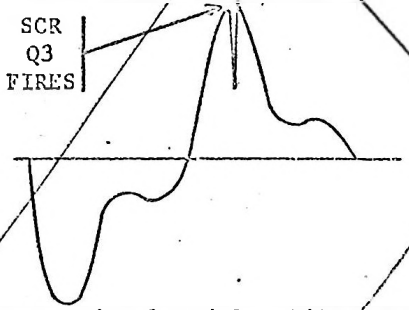
potentiometer and observe the waveform at A7A1R7 on the oscilloscope. Adjust the FILAMENT VOLTAGE ADJUST potentiometer until the waveform observed looks like the waveform shown below. The half cycles of the waveform should be identical.

AT 225 VAC



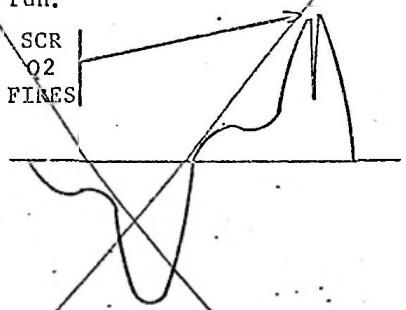
DISREGARD

Manually adjust variac again until voltage at pins 1 and 3 is 227 volts. Adjust LOWER SENSITIVITY potentiometer A7A1R8 until A7A1Q3 fires as evidenced by the waveform shown below. Drive motor should run.



ABOVE 225 VAC

Readjust variac manually to 223 volts at pins 1 and 3. Adjust RAISE SENSITIVITY potentiometer A7A1R7 until A7A1Q2 fires as evidenced by the waveform below. Drive motor should run.



BELOW 225 VAC

Adjust variac manually to 225V. If the waveform at 225V has changed readjust A7R1 and repeat adjustment of LOWER and RAISE SENSITIVITY potentiometers. Repeat this process until waveform at 225V is not greatly affected by adjusting sensitivity potentiometers. Remove the spacer and release the variac manual control.

Finally set PA and modulator filament voltages at 7.2 vac as read on calibrated Triplett by adjusting potentiometers R7 through R10. It may be necessary to change pin 4 tap connection on transformers T3 through T6 to obtain 7.2 vac at filaments.

Measure driver filament voltage between pins 4 and 6 of T2.

5.4.3 Plate On:

Check to see that a short circuit exists between pins 21 and 22 and between pins 25 and 26 of TB3. Depress LOW POWER ON button and observe that K3, K5, and K7 operate in sequence. Observe also that the short circuit between pins 21 and 22 and between pins 25 and 26 become open circuits. LOW POWER ON lamp should illuminate and PLATE OFF/RESET lamp should extinguish. Depress PLATE OFF/RESET button and observe that LOW POWER ON lamp extinguishes and PLATE OFF/RESET lamp illuminates. Depress FILAMENT OFF button and after blower and fan run down depress LOW POWER ON button and observe that the control circuits sequence through illumination of LOW POWER ON lamp. Depress FILAMENT OFF button and after blowers run down disconnect jumper between pins 16 and 17 of TB3 and replace with a switch. With switch closed depress LOW POWER ON button and after control sequencing, open switch and observe that plate and screen relays drop out followed by extinguishment of LOW POWER ON lamp and illumination of PLATE OFF/RESET lamps. Reclose switch observing that low power on condition is restored. Depress FILAMENT OFF button.

Check to see that a short circuit exists between pins 23 and 24 of TB3 and between pins 25 and 26 of TB3. Depress HIGH POWER ON button. K4 should operate followed by K6 followed by simultaneous operation of K7, K8, K9, and K10. The short circuit between pins. 23 and 24 and between pins 25 and 26 should become an open circuit. Observe also that HIGH POWER ON lamp illuminates and PLATE OFF/RESET lamp extinguishes. Depress PLATE OFF/RESET button and observe illumination of PLATE OFF/RESET lamp and extinguishment of HIGH POWER ON lamp. Depress FILAMENT OFF button and after blowers run down depress HIGH POWER ON button observing complete control circuit sequencing through illumination of HIGH POWER ON lamp. Open switch between pins 16 and 17 of TB3 and see that plate and screen relays drop out, HIGH POWER ON lamp extinguishes, and PLATE OFF/RESET lamp illuminates. Close switch observing restoration of high power on condition. Depress FILAMENT OFF button and allow blowers to run down. Replace switch between pins 16 and 17 of TB3 with jumper.

5.4.4 Overload Circuits:

Set R150 for maximum resistance (820E-1), or for approximate half resistance (820F-1). Set sensitivity potentiometers of overload sensors (R1 of A2-A5) full clockwise. Check to see a short circuit exists between pins 19 and 20 of TB3 and an open circuit between pins 18 and 19.

Depress LOW POWER ON button and with the Electro supply (Test Equipment Item 10) apply 5 vdc of the polarity indicated between each of the following points and ground in turn.

Overload	Point of Voltage Application	Polarity
PA	R150-1	Positive
MOD 1	R115-1	Positive
MOD 2	R120-1	Positive
EC	R36-1	Negative

After the application of voltage in each case, the corresponding overload lamp should illuminate, the LAMP RESET lamp should illuminate in every case, and the relays K5 and K7 should de-energize momentarily (0.5 sec.), reoperate (50 ms), and again de-energize with no subsequent action. Relay K3 should de-energize only after recycle sequence is completed. Note that relays do not recycle rapidly, but have required time delay in "off" position, before reclosing, indicating proper timing through C117. Observe that the LOW POWER ON and PLATE OFF/RESET lamps sequence in unison with the plate relay K5 whereas the overload and LAMP RESET lamps illuminate and stay on. Observe also that the short circuit between pins 19 and 20 of TB3 becomes an open circuit, and the open circuit between pins 18 and 19 becomes a short circuit. Remove Electro supply from circuit. Depress the LOW POWER ON button and observe no action. Depress PLATE OFF/RESET button followed by LOW POWER ON button and observe sequencing through illumination of LOW POWER ON lamp. Depress LAMP RESET button to extinguish overload and LAMP RESET lamps. Repeat above procedure for all four overload circuits except the check for open and short circuits involving pins 18, 19, and 20, of TB3.

Depress PLATE OFF/RESET button followed by HIGH POWER ON button to obtain sequencing through illumination of HIGH POWER ON lamp. Repeat same procedure outlined above for the PA overload only observing the same results except that the high power functions occur instead of the low.

Depress PLATE OFF/RESET button followed by LOW POWER ON button. Apply a 5 v peak voltage pulse at the same points and with the same polarity as given previously. This may be accomplished by rapidly operating the on-off control on the Electro supply. In each case the corresponding overload lamp should illuminate, the LAMP RESET lamp should illuminate, and the relays K5 and K7 should again de-energize momentarily but this time re-operate with no further action. Observe that the LOW POWER ON and PLATE OFF/RESET lamps again sequence with the plate relay K5 and that the overload and LAMP RESET lamps again illuminate and stay on. Depress LAMP RESET button to extinguish these two lamps and observe no further action. Repeat procedure for all four overloads.

Reset sensitivity potentiometers (R1 of A2-A5) to full counterclockwise. Depress LOW POWER ON button and allow circuits to sequence. Reapply d-c voltages to overload circuits at the same points of the same polarity

as before. Apply sufficient voltage to cause the correct level of current to flow in each overload condition as listed below:

Overload	Current Magnitude	
	820F-1	820E-1
PA	3.4 adc	2.0 adc
MOD-1	2.8 adc	1.2 adc
MOD-2	2.8 adc	1.2 adc
DC	5.5 adc	3.5 adc

Currents should be measured using calibrated Triplett placed in series with the Electro supply. In each case turn the applicable sensitivity potentiometer clockwise until the overload circuit trips. Reset lamps and plate relays by depressing LAMP RESET and PLATE OFF/RESET buttons after each sensitivity potentiometer is adjusted before depressing LOW POWER ON button and going on to next overload circuit adjustment.

Check for proper delay action of C125 by noting presence of +28 volts at K7-L5 after depressing FILAMENT OFF button. Turn +28 volt breaker, CB1, to "off" position and note that voltage at K7-L5 decays slowly, requiring several seconds to reach zero, indicating proper operation of C125 and CR30. Restore +28v breaker to "on."

5.4.5 Tuning and Loading - Manual:

Place tuning switch in manual position.

NOTE: The following procedure requires that the technician watch the tuning and loading variable capacitors while he operates the tuning and loading controls. If the extended control panel is out of sight, it will be necessary to connect item 12. When checking tuning control, connect red, white, and green leads of item 12 to pins 8, 9, and 10 of TB1 (PA TUNING), respectively. When checking loading control, connect item 12 to pins 4, 5, and 10 of TB1 (PA LOADING). Thus the switch of item 12 replaces the tuning and loading controls on the extended control panel and makes it unnecessary for the panel to be in sight of the operator, since the switch of item 12 is portable.

Loosen the stop washer collar on C102A motor drive assembly. Manually turn the flexible coupling to cause C102A capacity to decrease to its minimum value (capacitor plates fully open). Turn shaft back the opposite way two full turns. Position stop washers together in a helical configuration such that turning shaft in the direction to decrease capacity after the stop washer collar has been positioned and tightened will cause the washers to limit further rotation. Shaft coupling from motor shaft to extension shaft should be adjusted to limit flexure of shaft angle bracket, causing this bracket to form proper base for stop washers. With assembly in this condition, re-tighten the stop washer collar, allowing approximately 1/32" total gap between washers for proper loose fitting.

Move PA TUNING switch to LOWER position and observe that K11 energizes starting tuning motor B3 in turn causing C102A capacitance to increase. Allow motor to run until washers reach their stop, preventing further rotation. Observe that capacitor is within a few turns of maximum capacitance at this point, indicating correct operation of stop washers. Move TUNING switch to RAISE position and allow motor to run until limit stop is reached. Again move switch to LOWER position and hold until plates of C102A are approximately half their maximum distance apart.

Check PA loading assembly (C105A, B4, and associated components) in the manner preceding. Briefly, set stop washers, check for proper directional operation of B4, and check to see that limit stops function correctly. In this case, position C105A 12 turns from the LOWER stop (maximum capacitance).

5.4.6 Remote Control:

It will be necessary in the following procedure to apply 28V to various terminals of TB2. Either the transmitter 28V supply or the Electro d-c supply may be used.

Open all circuit breakers. Remove strap between pins 5 and 6 of A8TB1. Close 28 VDC supply, blowers, and filament breakers. Momentarily, apply 28V between A8TB2-3 and A8TB2-1 (common). Blowers and filaments should come on and proper lamps illuminate or extinguish.

Momentarily apply 28 VDC to A8TB2-2. Observe the filaments and blowers de-energize. Reapply voltage to pin 3. Remove 28V and after blowers come up to speed, apply 28V to pin 6 (LOW POWER PLATE ON) and then to pin 8 (HIGH POWER PLATE ON) observing no action in either case. While applying sustained 28 VDC between A8TB2-4 and -11 (FAIL-SAFE), momentarily re-apply 28V between -6 and -1 and observe that low voltage plate-on condition occurs. Remove voltage from pin 4 and observe that control circuits return to plate-off condition. Re-apply voltage to pin 4 followed by momentary application to pin 8. Control circuits should sequence through illumination of HIGH POWER ON lamp. Remove voltage from pin 4. Plate relays should drop out and circuits return to plate-off condition.

Re-apply sustained 28 VDC to A8TB2-4. Apply 28 VDC momentarily to A8TB2-6 observing low power on control circuit sequence. Momentarily apply 28 VDC to A8TB2-5 (LOW POWER PLATE OFF/RESET) and observe extinguishment of LOW POWER ON lamp and illumination of PLATE OFF/RESET lamp. Apply 28 VDC to A8TB2-8 and observe high power on sequence. Momentarily apply 28 VDC to A8TB2-7 (HIGH POWER PLATE OFF/RESET) observing illumination of PLATE OFF/RESET lamp and extinguishment of HIGH POWER ON lamp.

Check remote control loading by first applying 28V to pin 9 (POWER ADJUST LOWER) and observing C105A capacitance increase. Remove 28V and re-apply to pin 10 (POWER ADJUST RAISE), and observe C105A capacitance decrease. Remove 28VDC. Open all breakers. Manually reset C105A at 12 turns from maximum capacitance.

Reinstall strap between pins 5 and 6 of A8TB1.

5.4.7 Output Network Bridging:

In order that the PA plates be presented the correct load, it is necessary to bridge the output network at various points in the circuit, and to adjust the output network components to give the correct impedance values.

The impedance values indicated by Z_1, Z_2, Z_3, and Z_4, shown in the simplified schematic on the following page and tabulated in Table 2, should be obtained in the following manner.

Bridge the phantom antenna and record its value.

Break the network at point "X", at the output of L15. Determine impedance Z_1 by bridging the circuit at the correct frequency, and adjust L17 to yield the value of Z_1 given in Table 2. Note that C105A is to remain in the initial setting of section 5.4.5. Slight deviation from the required value for Z_1 may be compensated in the final adjustment of Z_4. Reconnect L15.

12 TURNS FROM MAX. CAPACITANCE

Next break the network at the two "X" points at the inputs of L15 and L16. Bridge the impedance Z_2 and adjust L15 until the value given in Table 2 is obtained. The two shorting taps should be equidistant from the ends of L15. The remaining tap (to L16) should later be connected in the center of L15.

Adjust the shunt trap by moving the tap of L16 until the series components L16 and C104 are in resonance at the transmitter second harmonic frequency, as indicated by a minimum impedance bridge reading at that frequency. Re-establish the connection to the input of L15. Reconnect L15 center tap connection to L15.

Break the network at point "X", at the input of L14. Bridge Z_3 and adjust L14 to obtain the impedance given in Table 2. Reconnect L14 and install output network cover.

Bridge plate impedance Z_4 by connecting at V5 anode connection from front of transmitter. With +28 volt supply energized, operate PA TUNING control to tune out reactance at Z_4. Adjust for value in Table 2 using minor readjustment of L14 and PA TUNING control. PA LOADING should not be changed for this adjustment. Record Z_4. PA TUNING and LOADING capacitors should not be moved from their final positions until section 7.4.

NEXT See P. 20 FP 6.2

FIGURE 1
SIMPLIFIED SCHEMATIC
OUTPUT NETWORK

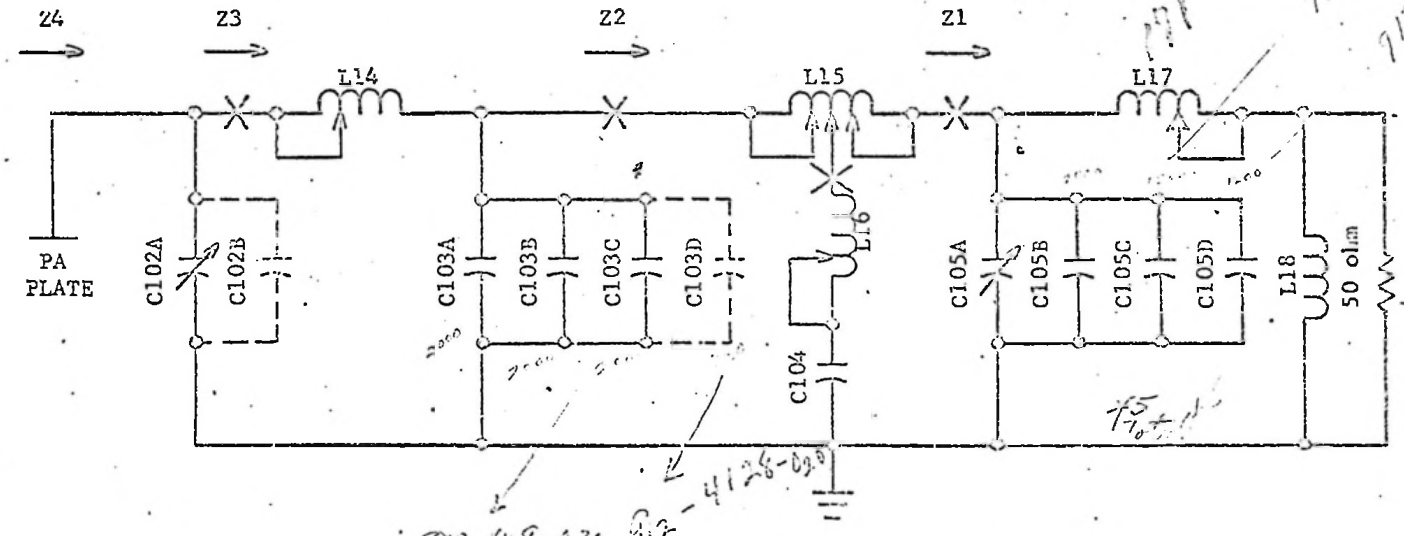


TABLE 2
OUTPUT NETWORK BRIDGING

WITH STANDARD IMPEDANCE BRIDGE

	Z1	Z2	Z3	Z4	Z_{C102}
820E-1	19.8 - j 59.4	19.8 + j 59.4	19.8 + j 200	2000 + j 0	-j 214
820F-1	19.8 - j 59.4	19.8 + j 59.4	19.8 + j 140	1000 + j 0	-j 149

WITH H.P. VECTOR IMPEDANCE BRIDGE

820E-1	62.613Ω ∠-71.56	62.613Ω ∠+71.56	200.97Ω ∠+84.34	
820F-1	"	"	141.4Ω ∠+81.95	

REVISION O A B C D E F G H J K L

SHEET 18 OF

NO. 569-2474-000

D-331 (3-62)

COLLINS

NO. 569-2474-000

5.4.8 Power Supplies:

5.4.8.1 Bias Supply

Remove jumper between CB4-C and CB4-NO. Close 28 vdc blowers, and filament breakers. Depress FILAMENT ON button. After blowers and filaments come on close bias supply breaker and read bias supply voltage on TEST METER 1. Compare with reading taken across supply output (R13-1 to R14-2) using calibrated Triplett. Readings should be within 5%. Reading on Triplett should be approximately -220 volts.

NOTE: Caution should be exercised when metering across power supplies with external meter. Open all circuit breakers and momentarily ground points across which meter is to be placed before connecting meter leads.

5.4.8.2 Plate Supply

The plate and screen power supplies should be tested with the PA and modulator tubes disconnected as follows. Open all breakers and make the following circuit modifications:

1. Remove rf driver tubes V3 and V4.
2. Remove W7 wire 1 at T12-1.
3. Remove W8 wire 1 at T12-3.
4. Remove W6 wire 4 at R157-1.
5. Remove W6 wire 3 at L4-1.
6. Disconnect R113-1 and R123-2 from modulator socket screen terminals.

With all circuit breakers closed except screen and plate supply breakers, sequence control circuits through illumination of LOW POWER ON lamp. Close plate supply breaker. Reading on PA PLATE VOLTAGE meter should be approximately 3650 volts for the 820F-1, and approximately 2300 volts for the 820E-1. Depress HIGH POWER ON button. Meter reading should be approximately 5100 volts. Open all breakers.

5.3.8.3 Modulator Screen Supply

Connect Triplett meter across points R19-1 and R19-2 and set to 1200 vdc scale. Close all breakers except screen supply breakers. Sequence control circuits through illumination of LOW POWER ON lamp. Close screen supply breaker and read approximately 850 volts on TEST METER 2 and on Triplett. Readings should be within 5%. Depress HIGH POWER ON button. Observe same readings of screen voltage. Open all breakers.

5.4.8.4 PA Screen Supply:

Repeat procedure of 5.4.7.2 except connect Triplett across R25-1 and R26-2. Nominal voltage read should be 850 VDC. PA screen voltage is read on TEST METER 1. Open all circuit breakers.

Reconnect wires and components removed in 5.4.8.2.

6. INITIAL ADJUSTMENTS

6.1 Exciter:

Set crystal selector switch to crystal 1.

6.2 PA Neutralization:

Use Test Circuit 2 in combination with the exciter to apply carrier signal to the PA plates. Use Test Circuit 3 to detect signal across the PA grid tuned circuit. The Multimeter, set on the 0.3 VDC scale, can be used to measure the detector output. Neutralize by first tuning C83 to peak detector output (note that C83 is at some point within its range and not at full open or closed after adjustment). Then adjust the variable plate of C99 to give a null reading (about 25 mv).

6.3 Potentiometer Adjustments:

Set MOD 1 and MOD 2 DRIVE potentiometers fully clockwise. Set R173, MOD 1 BIAS, and MOD 2 BIAS potentiometers fully counterclockwise. Center MOD 1 and MOD 2 HUM BAL potentiometers. Center slider on R146.

7. TEST REQUIREMENTS

7.1 Preliminary Tests:

As detailed in Section 5.

7.2 Initial Adjustments:

As detailed in Section 6.

7.3 RF Turn-On and Tuning:

7.3.1 Disconnect feedback at E65 and E66.

7.3.2 Depress FILAMENT ON button. After approximately 30 seconds, depress LOW POWER ON button and observe that r-f output current flow begins. Also note correct plate voltage and clean waveform at modulation monitor feed. Observe too that plate current is not excessive (one ampere maximum).

7.3.3 Tune driver grid by adjusting C72 for maximum driver cathode current. Observe that C72 is tuned at some point within its adjustment range, and not at fully open or closed. With calibrated oscilloscope, record the voltage from C72-1 to ground.

If maximum cathode current (and maximum oscilloscope voltage) does not occur within C72 adjustment range, padding capacitors C107A through C107E should be changed as necessary from the original values shown in Table I. It is expected that some padding change may be necessary to compensate for tolerances at T13.

7.3.4 Tune PA grid by adjusting C83 for maximum PA grid current after transmitter has stabilized with warm-up. Observe that C83 is tuned at some point within its adjustment range and not at fully open or fully closed. A slight readjustment of the L6 tap position may be required to best center the C83 adjustment. Record PA grid current. Record RF line current.

7.4 Automatic Tuning:

Place vacuum-tube voltmeter (test equipment Item 11) across DISCRIMINATOR BALANCE J21 and J22. Zero discriminator output by adjusting PHASE BAL potentiometer.

Depress HIGH POWER ON button, again observing plate voltage and output waveform, and note that plate current is not excessive. Observe also that the discriminator output is still zeroed. Record RF line current.

In some cases the discriminator output will be different in the HIGH POWER and LOW POWER modes. If this is found true, it will be necessary to find a compromise adjustment of the PHASE BAL potentiometer which will minimize the deviation from zero. By alternately depressing the HIGH POWER ON button and the LOW POWER ON button, adjust the PHASE BAL potentiometer to have equal and opposite voltage output of the discriminator for both power levels. Record values of the two discriminator voltages. Tighten the lock nut on the PHASE BAL potentiometer.

Place AUTO/MANUAL TUNING switch in AUTO position. Operate the PA LOADING switch to produce discriminator output voltages of both polarities. Observe the initiation of tuning with approximately ±0.25 volts. This is evidenced by the discriminator voltage returning toward zero as loading is continued.

7.5 Modulator Static Adjustment:

Depress HIGH POWER ON button. Adjust MOD 1 BIAS and MOD 2 BIAS potentiometers to set the modulator cathode currents to their correct value (820F-1, 0.4 adc; 820E-1, 0.3 adc). Depress LOW POWER ON button. Adjust REDUCED POWER BIAS potentiometer to set statics (820F-1, 0.4 adc; 820E-1, 0.2 adc).

7.6 Power Output:

Depress HIGH POWER ON button. With AUTO/MANUAL TUNING switch still in AUTO position, vary loading by operating PA LOADING switch. Run loading motor through its entire range and record output power at each extreme. Then set output power of 10.6 KW if transmitter is a model 820F-1, or at 5.5 KW if an 820E-1. Depress LOW POWER ON button. By adjusting R139A and R139B*, set cutback power (820F-1, 5.5 KW; 820E-1, 1.1 KW). Several intermittent adjustments may be necessary since the transmitter must be shut down for access to R139A and R139B. Again vary loading through its range and record power readings at the two extremes of loading. Return to high power operation and set output power at 10.6 KW or 5.5 KW.

*820E only.

7.6 Power Output (Cont'd.):

Connect the modulation monitor and at high power output, set carrier to 100 on monitor. Note that some adjustment of high and low power tap connections at L18 may be necessary to obtain carrier indication within range of modulation monitor control. Depress LOW POWER ON button and observe carrier indication. Adjust C106 until monitor again reads 100 carrier indication. It will be necessary to shut down transmitter intermittently to make adjustment, since C106 is not accessible with doors closed.

7.7 PA Efficiency:

Obtain PA input power as the product of plate current and plate voltage. Efficiency should be at least 72% at both high and low power operation.

7.8 Modulation Characteristics:

7.8.1 Performance Without Feedback:

7.8.1.1 Audio Frequency Distortion:

Using the distortion analyzer connected at the modulation monitor r-f input, determine audio distortion over the range 50 cps - 10 KC at 50% modulation at high power operation. Set MOD 1 and MOD 2 DRIVE potentiometers by modulating 95% at 7500 cps and adjusting one of the potentiometers to yield minimum distortion. One of the potentiometers will remain full clockwise.

CAUTION: In this step and in subsequent distortion measurements, the Type 330D distortion analyzer should be driven from the transmitter modulation monitor sample with connection made at the analyzer rf input. The modulation monitor should be disconnected during these measurements. An oscilloscope may be connected at the analyzer input, but the X10 isolation probe should be employed.

Also, make sure mod. mon. sampling coil (L18) top is set to limit rf voltage (at 100% modulation) to no more than 50 v. peak. This should be checked after the analyzer rf adjustment is set for peak indication.

7.8.1.2 Audio Frequency Response:

Measure audio frequency response over the range 30 cps to 10 KC @ 50% modulation at high power operation. This is done by maintaining 50% modulation at all frequencies and observing the variation of input level with frequency. Normalize input levels with reference to 1 KC. Response should be made holding modulation level constant as indicated on modulation monitor. (Monitor should be removed for distortion and noise tests.)

7.8.1.3 Input Level:

Determine audio input level necessary for 100% modulation at 1000 cps at high power operation.

7.8.1.4 Low Power Operation:

Repeat 7.8.1.1, 7.8.1.2, and 7.8.1.3 at low power.

7.8.2 Performance With Feedback:

Restore feedback by reconnecting leads at E65 and E66.

7.8.2.1 Input Level:

Determine input level necessary for 100% modulation at 1000 cps at high power operation. Determine and record amount of feedback.

7.8.2.2 Noise:

Check static modulator cathode currents and readjust if necessary. Determine noise level at high power operation. Minimize noise by adjusting HUM BAL potentiometers.

7.8.2.3 Distortion:

Determine distortion as in 7.8.1.1 at high power operation, except record values for 25, 50 and 95% modulation.

7.8.2.4 Response:

Measure response as in Section 7.8.1.2 at high power operation except at 50% modulation.

7.8.2.5 Carrier Shift:

At high power operation, determine carrier shift at 95% modulation, 400 cps.

7.8.2.6 Peak Dissymmetry:

Determine peak dissymmetry at high power operation, 1000 cps 95% modulation.

7.8.2.7 Low Power Operation:

Repeat Sections 7.8.2.1 through 7.8.2.6 at low power operation.

7.9 Meter and Test Point Indications:

7.9.1 Full Power Meter Readings:

Record meter indications for high power, unmodulated operation. Also

7.9.1 Full Power Meter Readings (Cont'd.):

record modulator current and output power indication at 1000 cps, 100% modulation. Note that values are closely within range for normal indications.

7.9.2 Reduced Power Meter Readings:

Repeat measurements recorded above, except for low power.

7.9.3 Test Point Voltages:

Record voltage levels at indicated test points for full power operation unmodulated. Note agreement with normal indications given in table. Several other voltage indications are given as general troubleshooting information in the tables of 8.9.3.

7.10 Heat Run:

Operate transmitter over an eight-hour period at full power output and with normal program modulation. After 30-minutes operation, remove power and check all components for signs of overheating..

After eight-hours of operation, observe that meter indications are close to those recorded in preceding section. Remove power and again check all components for signs of overheating.

7.11 Tube Serial Numbers:

Record serial numbers of tubes used at V1, V2, V5, and V6.

7.12 Special Changes:

Record any special changes made in the transmitter which deviate from standard drawing configuration.

7.13 Test Data Approval:

Obtain signature approval of test supervisor or cognizant engineer.

Type _____

Unit S/N _____

Date _____

Technician _____

8.0 TEST DATA FOR COLLINS TYPE 820E/F-1 AM BROADCAST TRANSMITTERS, PART NUMBERS 522-3291-00 and 522-3292-00.

8.1 Preliminary Tests:

8.1.1 Visual Inspection: Complete _____ Ck

Interlock and ground switches adjusted. _____ Ck

8.1.2 Ohmmeter Checks:

8.1.2.1

Item	Door Closed		Door Open		
CR23-POS	NLT	75K ohm	NMT	100 ohm (front doors)	_____ Ck
			NMT	2 ohms (rear doors)	_____ Ck
CR23-NEG			NMT	2 ohm	_____ Ck
CR21-POS	NLT	15K ohm	NMT	50 ohm	_____ Ck
CR21-NEG			NMT	10 ohm	_____ Ck
R26-1	NLT	5K ohm	NMT	2 ohm	_____ Ck
CR19-POS	NLT	5K ohm	NMT	80 ohm	_____ Ck
CR19-NEG			NMT	2 ohm	_____ Ck
CR16-2	NLT	1200 ohm	NMT	160 ohm	_____ Ck
CR18-1			NMT	15 ohm	_____ Ck
R13-1	NLT	1000 ohm	NMT	2 ohm	_____ Ck
R14-1	NLT	350 ohm	NMT	2 ohm	_____ Ck
R14-2	NMT	10 ohm			_____ Ck
CR14-POS	NLT	60 ohm			_____ Ck
CR14-NEG			NMT	2 ohm	_____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.2.2 Electrolytic Capacitor Ground:

Item	Limits	
C1	NMT 2 ohm	_____ Ck
C4	NMT 15 ohm	_____ Ck
C10	NMT 2 ohm	_____ Ck
C13	NMT 2 ohm	_____ Ck
C14	NMT 2 ohm	_____ Ck
C117	NMT 2 ohm	_____ Ck
C125	NMT 2 ohm	_____ Ck

8.1.2.3 AC Line:

Item	Limits	
K2, K5, K6, R7	NLT 100K, each line to grd.	_____ Ck

8.1.2.4 Filaments:

Item	Limits	
Modulator Filament	NMT 10 ohm	_____ Ck
PA Filaments	NMT 6 ohm	_____ Ck

8.1.3 Equipment Interconnections:

Complete _____ Ck

8.1.4 Control Circuit Operation:

Open breakers _____ Ck

Jumper CB4-C to CB4-NO _____ Ck

Strap across A8TB1, pins 5 and 6 _____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4 Control Circuit Operation: (Cont'd.)

Apply power _____ Ck

8.1.4.1 Filament On:

Item	Limits	Measured Value	
Close 28 VDC breaker			_____ Ck
Proper lamps illuminate			_____ Ck
28 VDC Supply	26 to 30 VDC	_____ VDC	
Reading difference	NMT 5%	_____ %	
Door interlock function			_____ Ck
Close blowers and filaments breakers			_____ Ck
Filaments properly energized			_____ Ck
Blower and fan interlocks function			_____ Ck
Filaments turn off correctly			_____ Ck
Filaments breaker interlock functions			_____ Ck
28 VDC between TB6, pins 1 and 2			_____ Ck
FILAMENT HOURS meter runs			_____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4.2 Filament Voltage Regulator Checkout:

	Limits	Measured Value	
Set potentiometers R7-R10			_____ Ck
Adjust variac to 225 vac			_____ Ck
Set FILAMENT VOLTAGE ADJUST potentiometer			_____ Ck
Set LOWER SENSITIVITY potentiometer			_____ Ck
Set RAISE SENSITIVITY potentiometer			_____ Ck
Final variac adjustments complete			_____ Ck
PA and modulator filaments set at 7.2 vac			_____ Ck
Driver filament voltage	6.0 to 6.6 VAC	_____ VAC	

8.1.4.3 Plate On:

Short between pins 21-22, and 25-26 of TB3	_____ Ck
Low power on function complete and correct	_____ Ck
Plate and filaments off	_____ Ck
Low power on sequence correct	_____ Ck
Filament off, jumper replaced with switch	_____ Ck
Proper action upon opening switch	_____ Ck
Low power restored after switch closed	_____ Ck
Filament off	_____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4.3 Plate On: Cont'd.

Short between pins 23-24 and 25-26 of TB3	_____ Ck
High power on complete and correct	_____ Ck
Plate turn-off complete and correct	_____ Ck
Filament off	_____ Ck
High power on sequence correct	_____ Ck
Switch open followed by proper sequence	_____ Ck
High power restored upon closing switch	_____ Ck
Filament off, jumper restored	_____ Ck

8.1.4.4 Overload Circuits:

Set R150	_____ Ck
Set potentiometers clockwise	_____ Ck
Short between 19-20, open between 18-19 of TB3	_____ Ck
Overloads function properly in all power cases at low power operation, continuous overload	_____ Ck
C117 time delay action correct	_____ Ck
PA overload operates correctly at high power	_____ Ck
Overloads function correctly in all four cases at low power operation, pulsed overload	_____ Ck
Sensitivity potentiometers set	_____ Ck
C125 time delay action correct	_____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4.5 Tuning and Loading - Manual:

Item	
Tuning switch to manual	____ Ck
Tuning capacitor stop washers set	____ Ck
Tuning motor operates correctly; capacitor set	____ Ck
Loading capacitor stop washers set	____ Ck
Loading motor operates correctly; capacitor set	____ Ck

8.1.4.6 Remote Control:

Item	
Open breakers, remove strap, and close proper breakers	____ Ck
Blowers and filaments operate	____ Ck
Filaments and blowers de-energize	____ Ck
No action upon application of 28 VDC to "Plate On". functions	____ Ck
Low power on sequence, after fail-safe energized	____ Ck
Plate off upon removal of 28 VDC from pin 4	____ Ck
High power on sequence after application of 28 VDC	____ Ck
Voltage removed from pin 4, plate relays drop out	____ Ck
Reapplication of 28 VDC to pin 4 followed by momentary application to pin 6 to initiate low power seq.	____ Ck
Momentary application of 28 VDC to pin 5 to obtain plate off condition	____ Ck
28 VDC applied to pin 8, high power on sequence	____ Ck
Application of 28 VDC to pin 7 to de-energize plates	____ Ck
Remote loading check; capacitor reset	____ Ck
Remove 28 VDC, open breakers, and reinstall strap	____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4.7 Output Network Bridging:

Item	Measured Value	
Bridge phantom antenna	_____	ohms
Break network and bridge Z_1 and set to correct value	_____	ohms
Bridge and set Z_2	_____	ohms
Adjust shunt trap	_____	ohms
Bridge and set Z_3	_____	ohms
Bridge and set Z_4	_____	ohms
Bridging complete		_____ Ck

8.1.4.8 Power Supplies:

8.1.4.8.1 Bias Supply:

Item	Limits	Measured	
Remove jumper, close correct breakers			_____ Ck
Depress FILAMENT ON button			_____ Ck
Close bias breaker, read meter	220±20 VDC	_____	VDC
Reading difference	±5%	_____	%

8.1.4.8.2 Plate Supply:

Breakers open, circuit modifications _____ Ck

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4.8.2 Plate Supply: (Continued)

Item	Limits	Measured	
With proper breakers closed, sequence control circuits			_____ Ck
Low power voltage reading	3650±200VDC (320F-1) 2300±200 VDC (320E-1)	_____ VDC	
High power voltage reading	5300±200 VDC	_____ VDC	
Open all breakers			

8.1.4.8.3 Modulator Screen Supply:

Item	Limits	Measured	
Connect test meter			_____ Ck
Close proper breakers, sequence control circuits			_____ Ck
Low Power On:			
Voltage reading	820±100 VDC	_____ VDC	
Difference in readings	±5%	_____ %	
High Power On:			
Voltage reading	820 ± 100VDC	_____VDC	
Difference in readings	± 5%	_____%	
Open Breakers			_____OK

Type _____

Unit S/N _____

Date _____

Technician _____

8.1.4.8.4 PA Screen Supply:

Item	Limits	Measured	
Connect test meter			____ Ck
Close proper breakers, sequence control circuits			____ Ck
Voltage reading	850±100 VDC	____ VDC	
Difference in readings	±5%	____ %	
Circuit connections re-established			____ Ck

8.2 Initial Adjustments:

8.2.1 Exciter:

Crystal switch set to 1 ____ Ck

8.2.2 PA Neutralization:

Item	Limits	Measured Value
Null Voltage	NMT 50 mv	____ mv

8.2.3 Potentiometer Adjustments:

Complete ____ Ck

8.3 RF Turn-On and Tuning:

8.3.1 Feedback disconnected ____ Ck

8.3.2 Low power output, correct metering and waveform. ____ Ck

8.3.3 Driver grid tuned ____ Ck

Item	Limits	Measured Value
RF grid voltage	NLT 90 V pk.	____ v pk.

Type _____

Unit S/N _____

Date _____

Technician _____

8.3.4	PA grid tuned			_____ Ck
	PA grid current	NLT 65 ma	_____ ma	
	RF line current (LOW POWER)	None	_____ amperes	

8.4 Automatic Tuning:

Item	Limits	Measured Value	
Zero discriminator			_____ Ck
RF line current (HIGH POWER)	None	_____	amperes
HIGH PWR discrim bal	NMT -0.08 VDC	_____	VDC
LOW PWR discrim bal	NMT +0.08 VDC	_____	VDC
Automatic Tuning Operates			_____ Ck

8.5 Modulator Static Adjustment:

Cathode currents set _____ Ck

8.6 Power Output:

Item	Limits	Measured Value	
High Power Output:			
Maximum Power (a)	None	_____	kw
Minimum Power (b)	None	_____	kw
Power Range (a-b)	820F-1, 2 kw 820E-1, 1 kw	_____	kw
Lower Power Output:			
R139 set			_____ Ck
Maximum Power (c)	None	_____	kw
Minimum Power (d)	None	_____	kw
Range (c-d)	820F-1, 1 kw 820E-1, 0.2 kw	_____	kw

Type _____

Unit S/N _____

Date _____

Technician _____

3.6 Power Output: Cont'd.

High Power reset at 10.6 or 5.5 kw _____ Ck

Mod Monitor Adjusted _____ Ck

3.7 PA Efficiency:

Item	High Power Limits	High Power Measured Value	Low Power Limits	Low Power Measured Value
PA Plate Current	None	_____ a	None	_____ a
PA Plate Voltage	None	_____ kv	None	_____ kv
PA Plate Input Power	820F-1,NMT 15.0 kw 820E-1,NMT 7.8 kw	_____ kw	820F-1,NMT 7.8 kw 820E-1,NMT 1.6 kw	_____ kw
Transmitter Output Power	820F-1, 10.6±0.2 kw 820E-1, 5.5±0.1 kw	_____ kw	820F-1, 5.5±0.1 kw 820E-1, 1.1±0.05 kw	_____ kw
PA Efficiency	NLT 72%	_____ %	NLT 72%	_____ %

3.8 Modulation Characteristics:

3.8.1 Performance Without Feedback:

Type _____

Unit S/N _____

Date _____

Technician _____

8.8.1.1 Audio Frequency Distortion:

Adjust for minimum distortion at 7500 cps _____Ck

Freq. (cps)	50% Mod.
50	_____%
100	_____%
400	_____%
1,000	_____%
5,000	_____%
7,500	_____%
10,000	_____%

8.8.1.2 Audio Frequency Response:

Freq. (cps)	50% Mod.
30	_____db
50	_____db
100	_____db
400	_____db
1,000	0 db
5,000	_____db
7,500	_____db
10,000	_____db

8.8.1.3 Input Level:

	Limits	Measured Value
Input in dbm	None	_____ dbm

Type _____

Unit S/N _____

Date _____

Technician _____

8.8.1.4 Low Power Operation:

8.8.1.4.1 Audio Frequency Distortion:

Freq. (cps)	50% Mod.
50	_____%
100	_____%
400	_____%
1,000	_____%
5,000	_____%
7,500	_____%
10,000	_____%

8.8.1.4.2 Audio Frequency Response:

Freq. (cps)	50% Mod.
30	_____db
50	_____db
100	_____db
400	_____db
1,000	0 db
5,000	_____db
7,500	_____db
10,000	_____db

8.8.1.4.3 Input Level:

	Limits	Measured Value
Input in dbm	None	_____ dbm

Type _____

Unit S/N _____

Date _____

Technician _____

8.8.2 Performance with Feedback:

Feedback reconnected. _____ Ck

8.8.2.1 Input Level:

	Limits	Measured Value
Input in dbm	+10±2 dbm	_____ dbm
Feedback	NLT 8 db	_____ db

8.8.2.2 Noise:

Item	Limits	Measured Value
Reset statics		_____ Ck
Minimize Noise		_____ Ck
Noise Level	NLT -60 db	_____ db

8.8.2.3 Distortion: Limits: NMT 3%

Freq. (cps)	25% Modulation	50% Modulation	95% Modulation
50	_____ %	_____ %	_____ %
100	_____ %	_____ %	_____ %
400	_____ %	_____ %	_____ %
1,000	_____ %	_____ %	_____ %
5,000	_____ %	_____ %	_____ %
7,500	_____ %	_____ %	_____ %
10,000	_____ %	_____ %	_____ %

Type _____

Unit S/N _____

Date _____

Technician _____

8.8.2.4 Response: Limits: ±1.0 db, 50 to 7500 cps
±1.5 db, 30 to 10,000 cps

Freq. (cps)	50% Modulation
30	_____ db
50	_____ db
100	_____ db
400	_____ db
1,000	0 db
5,000	_____ db
7,500	_____ db
10,000	_____ db

8.8.2.5 Carrier Shift:

Item	Limits	Measured Value
Carrier shift	NMT 2%	_____ %

8.8.2.6 Peak Disymmetry:

Item	Limits	Measured Value
Peak Disymmetry with respect to Neg. peak	NMT 2%	_____ %

8.8.2.7 Low Power Operation:

8.8.2.7.1 Input Level:

	Limits	Measured Value
Input in dbm	+10±2 dbm	_____ dbm
Feedback	NLT 8 db	_____ db

Type _____

Unit S/N _____

Date _____

Technician _____

8.8.2.7.2 Noise:

Item	Limits	Measured Value	
Reset Statics			____ Ck
Minimize Noise			____ Ck
Noise Level	NLT -60 db	____ db	

8.8.2.7.3 Distortion: Limits: NMT 3%

Freq. (cps)	25% Modulation	50% Modulation	95% Modulation
50	____ %	____ %	____ %
100	____ %	____ %	____ %
400	____ %	____ %	____ %
1,000	____ %	____ %	____ %
5,000	____ %	____ %	____ %
7,500	____ %	____ %	____ %
10,000	____ %	____ %	____ %

8.8.2.7.4 Response: Limits: ±1.0 db, 50 to 10,000 cps
±1.5 db, 30 to 10,000 cps

Freq. (cps)	50% Modulation
30	____ db
50	____ db
100	____ db
400	____ db
1,000	0 db
5,000	____ db
7,500	____ db
10,000	____ db

Type _____

Unit S/N _____

Date _____

Technician _____

8.8.2.7.5 Carrier Shift:

Item	Limits	Measured Value
Carrier Shift	NMT 2%	_____ %

8.8.2.7.6 Peak Disymmetry:

Item	Limits	Measured Value
Peak Disymmetry with respect to Neg. peak	NMT 2%	_____ %

Type _____
Unit S/N _____
Date _____
Technician _____

8.9 Meter and Test Point Indications:

8.9.1 Full Power Meter Readings:

Function	Normal Condition 820E-1	820F-1	Meter Reading
RF Line Curr* 0%	10.4 a	14.4 a	a
RF Line Curr* 100%	12.5 -- 12.7 a	17.3 -- 17.6 a	a
Plate Current	1.35--1.55a	2.6--3.0 a	a
Plate Voltage	5.0--5.2 kv	5.0--5.2 kv	kv
Dvr 1 Cath Curr	70--80 ma	80--120 ma	ma
PA 1 Cath Curr	1.7--2.0 a	1.5--1.9 a	a
Mod 1 Cath Curr 0%	0.3 a	0.4 a	a
Mod 1 Cath Curr 100%	0.6--0.8 a	1.1--1.4 a	a
PA Grid Curr	65--100 ma	80--140 ma	ma
PA Screen Curr	0.25--0.4 a	0.4--.65 a	a
PA Screen Volt	850 v	850 v	v
Bias Supply Volt	240 v	240 v	v
Dvr 2 Cath Curr	70--80 ma	80--120 ma	ma
PA 2 Cath Curr	---	1.5--1.9 a	a
Mod 2 Cath Curr 0%	0.3 a	0.4 a	a
Mod 2 Cath Curr 100%	0.6--0.8 a	1.1--1.4 a	a
Mod Plate Curr 0%	0.6 a	0.8 a	a
Mod Plate Curr 100%	1.2--1.6 a	2.2--3.0 a	a
Mod Screen Curr 0%	0 a	0 a	a
Mod Screen Curr 100%	NMT 0.05 a	NMT 0.1 a	a
Mod Screen Volt	875 v	875 v	v
28V Supply Volt	27--29 v	27--29 v	v
Power Output**	5.5 kw	10.6 kw	kw
Power Input**	NMT 7.65 kw	NMT 14.7 kw	kw
Efficiency **	NLT 72%	NLT 72%	%

*At 51 ohms load impedance.
**Calculated values.

Type _____
Unit S/N _____
Date _____
Technician _____

8.9.2 Reduced Power Meter Readings:

Function	Normal Condition 820E-1		820F-1		Meter Reading	
RF Line Curr*0%	4.64	a	10.4	a		a
RF Line Curr*100%	5.6--5.66	a	12.5--12.7	a		a
Plate Current	0.55--0.75	a	1.8--2.2	a		a
Plate Voltage	2.2--2.4	kv	3.5--3.7	kv		kv
Dvr 1 Cath Curr	70--80	ma	80--120	ma		ma
PA 1 Cath Curr	.8--1.2	a	1.15--1.45	a		a
Mod 1 Cath Curr 0%	0.2	a	0.4	a		a
Mod 1 Cath Curr 100%	0.25--0.4	a	0.6--0.9	a		a
PA Grid Curr	65--100	ma	80-140	ma		ma
PA Screen Curr	0.2--0.35	a	0.25--0.5	a		a
PA Screen Volt	850	v	850	v		v
Bias Supply Volt	240	v	240	v		v
Dvr 2 Cath Curr	70--80	ma	80--120	ma		ma
PA 2 Cath Curr	---		1.15--1.45	a		a
Mod 2 Cath Curr 0%	0.2	a	0.4	a		a
Mod 2 Cath Curr 100%	0.25--0.4	a	0.6--0.9	a		a
Mod Plate Curr 0%	0.4	a	0.8	a		a
Mod Plate Curr 100%	0.5--0.8	a	1.2--1.8	a		a
Mod Screen Curr 0%	0	a	0	a		a
Mod Screen Curr 100%	NMT 0.04	a	NMT 0.1	a		a
Mod Screen Volt	875	v	875	v		v
28V Supply Volt	27--29	v	27--29	v		v
Power Output**	1.1	kw	5.5	kw		kw
Power Input**	NMT 1.53	kw	NMT 7.65	kw		kw
Efficiency**	NLT 72%		NLT 72%			%

TEST METER 1 → TEST METER 2 →

*At 51 ohms load impedance.
**Calculated values.

8.9.3.1 Test Point Voltage Readings*:

Function	Test Points	Normal Indication: Equivalent Current 820E-1	Normal Indication: Equivalent Current 820F-1	Normal Indication: Test Point Voltage 820E-1	Normal Indication: Test Point Voltage 820F-1	Meter Reading
Mod 1 Fil Volt	J5 to J6	--	--	7.2 vac	7.2 vac	vac
Mod 2 Fil Volt	J7 to J8	--	--	7.2 vac	7.2 vac	vac
PA 1 Fil Volt	J1 to J2	--	--	7.2 vac	7.2 vac	vac
PA 2 Fil Volt	J3 to J4	--	--	--	7.2 vac	vac
Mod 1 Cath Curr	J14 to J15	0.3 a	0.4 a	0.3 v	0.4 v	v
Mod 2 Cath Curr	J17 to J16	0.3 a	0.4 a	0.3 v	0.4 v	v
PA Grid Current	J12 to J13	NLT 65 ma	NLT 65 ma	NLT 0.325v	NLT 0.325 v	v
PA Screen Volt X1000	J19 to J20	--	--	450-600 v	450-700 v	v
Discr Bal **	J21 to J22	--	--	0±0.08 v	0±0.08 v	v
Driver Cath Curr	J10 to J11	160 ma	200 ma	2.4 v	3.0 v	v
Q5 Emit Curr	R53 to Gnd	0.9a	0.9 a	3.6v	3.6 v	v
Q6 Emit Curr	R54 to Gnd	0.9a	0.9 a	3.6v	3.6 v	v

* Recorded at Full Power, Unmodulated.
**Measure with vacuum-tube voltmeter.

COLLINS
Type
Unit S/N
Date
Technician
NO. 569-2474-000

8.9.3.2 Additional Voltage Indications*:

The following voltage readings may be helpful when troubleshooting the equipment:

Function	Test Points	Normal Indication			
		820E-1		820F-1	
		Full Power	Reduced Power	Full Power	Reduced Power
Mod 1 Grid Volt	V1 grid to gnd	-200	-95	-190	-140
Mod 2 Grid Volt	V2 grid to gnd	-200	-95	-190	-140
Mod Screen Volt	E33 to gnd	875	450	875	690
Dvr 1 Grid Bias Volt	R128-1 to gnd	- 65	-65	-65	-65
Dvr 2 Grid Bias Volt	R136-1 to gnd	- 65	-65	-65	-65
Dvr Screen Volt	E25 to gnd	180	180	200	200
Dvr Plate Volt	R140-1 to gnd	575	575	550	550
PA 1 Grid Bias Volt	R142-1 to gnd	-325	-325	-300	-300
PA 2 Grid Bias Volt	R156-1 to gnd	--	--	-300	-300

* Unmodulated.

COLLINS

Type _____
Unit S/N _____
Date _____
Technician _____

Type _____

Unit S/N _____

Date _____

Technician _____

8.10 Heat Run:

30 Minutes component check _____ Ck

Meter readings correspond to previous readings _____ Ck

Eight-hour component check _____ Ck

8.11 Serial Numbers:

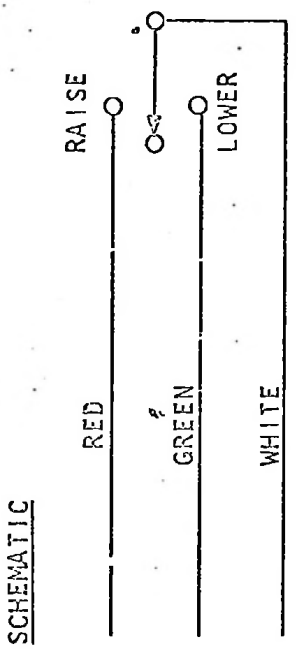
Item	Serial No.
Vacuum Tubes:	
V1, 4CX5000A	_____
V2, 4CX5000A	_____
V5, 4CX5000A	_____
V6, 4CX5000A	_____

8.12 Special Changes:

The following special changes were required for this transmitter:

9. Test Jig Schematics and Reference Sketches:

9.1 Test Circuit 1:



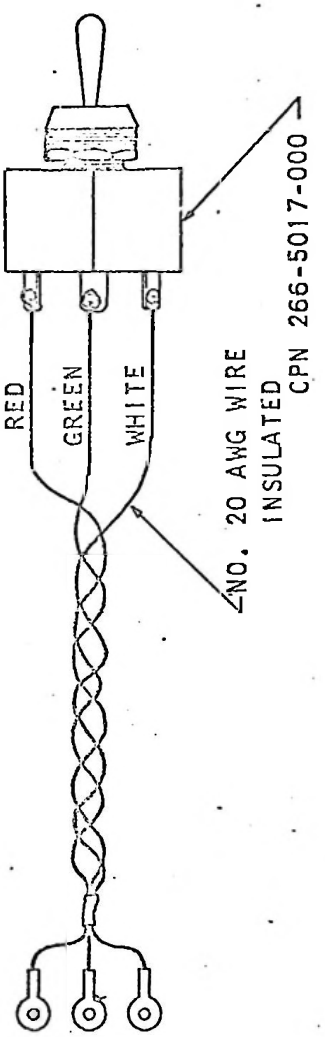
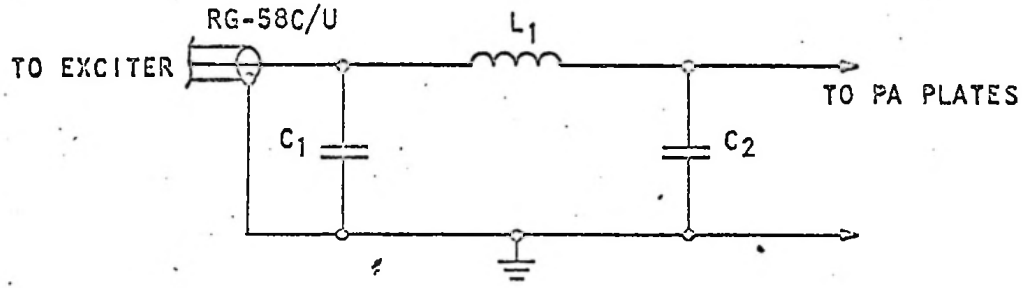


FIGURE 2

000-4544-577



	820F-1			820E-1		
FREQUENCY	L_1	C_1	C_2	L_1	C_1	C_2
540-650 KC	27 240-1620-000	12,000 912-2738-000	2700 912-3034-000	39 240-1622-000	12,000 912-2738-000	2000 912-3022-000
650-780 KC	22 240-1619-000	10,000 912-2735-000	2200 912-3025-000	33 240-1621-000	10,000 912-2735-000	1500 912-3013-000
780-935 KC	18 240-1618-000	8200 912-2729-000	2000 912-3022-000	27 240-1620-000	8200 912-2729-000	1500 912-3013-000
935-1120 KC	18 240-1618-000	6800 912-2723-000	1500 912-3013-000	22 240-1619-000	6800 912-2723-000	1000 912-3001-000
1120-1340 KC	15 240-1617-000	5600 912-2717-000	1500 912-3013-000	22 240-1619-000	5600 912-2717-000	1000 912-3001-000
1340-1620 KC	12 240-1616-000	4700 912-3052-000	1000 912-3001-000	18 240-1618-000	4700 912-3052-000	820 912-2995-000

NOTE: INDUCTANCE VALUES IN MICROHENRYS, CAPACITOR VALUES IN PICOFARADS

FIGURE 3.