SECTION II
INSTALLATION

2.1 UNPACKING.

Be careful when uncrating the transmitter and components to avoid damaging the equipment. Inspect all units carefully. Check for loose screws and bolts. Inspect all controls, such as switches, for proper operation as far as can be determined without power applied. Examine cables and wiring, making sure that all connections are tight, and clear each other and the chassis. File any damage claims promptly with the transportation company.

2.2 TRANSMITTER LOCATION.

Place the transmitter in its permanent location before replacing the units that were removed for shipping. Figure 2-1 shows arrangements that can be made before transmitter installation to accommodate power and audio inputs, and outputs for frequency, modulation, and audio monitoring. The external wiring requirements for these inputs and outputs may be met by laying a conduit in a concrete floor or by installing a wiring trench of sufficient size. Another alternative is to build a false floor under which the necessary wires and cables can be placed. The wiring trench must accommodate a three-wire power cable, two shielded twisted pairs, one RG-58/U coaxial cable, and one RG-8/U coaxial cable. The trench should also be large enough to contain several wires from the transmitter cabinet to the ground system of the building.

Allow adequate clearance both in front and in back of the transmitter. There should be a minimum clearance of 3-1/2 feet behind the transmitter to provide sufficient room for service work.

An air duct may be run from the exhaust-air opening in the top of the transmitter, if desired, to carry heat away from the transmitter.

2.3 REPLACEMENT OF UNITS REMOVED FOR SHIPPING.

Several of the transmitter components have been removed and packed separately for safety during shipping. These include heavy units such as the high-voltage transformer, modulation transformer, high-voltage filter choke, large filter capacitors, and the small, fragile units such as tubes and crystals. Refer to the photographs in section VI for assistance in replacing these components in the transmitter. Wires and cables that were disconnected before shipping have been tagged to facilitate reconnection. If any of these tags have been lost during shipment, refer to figure 2-2 for assistance in identifying and reconnecting these leads.

The following installation procedure should be performed:

a. Set the tubes and crystals aside where they will not be damaged. These components should not be placed in the transmitter until all other units have been installed and corrected.

CAUTION

Be very careful when handling the crystals. This type of crystal is extremely fragile. Rough handling may not cause the crystal to stop oscillating, but may cause it to lose its highly important frequency versus temperature characteristics.

b. Note terminal numbers of the iron-core components before they are installed. It is sometimes difficult to identify these terminals after the components are in the transmitter.

c. Refer to figure 6-2 for proper placement of the heavy iron-core components. Install them in their proper locations in the lower part of the transmitter.

d. Measure the station line voltage. Refer to figure 2-3 and make connections to the high-voltage transformer (T107) primary terminals that most nearly correspond to this voltage. If the normal station voltage is low, use the low-voltage taps on the bias supply transformer (T105), the 575A filament transformer (T106), the main filament transformer (T108), and the low-voltage plate supply transformer (T109).

CAUTION

Dress all wires away from the high-voltage plate transformer (T107). Failure to do so may result in voltage breakdown between the wire and transformer.

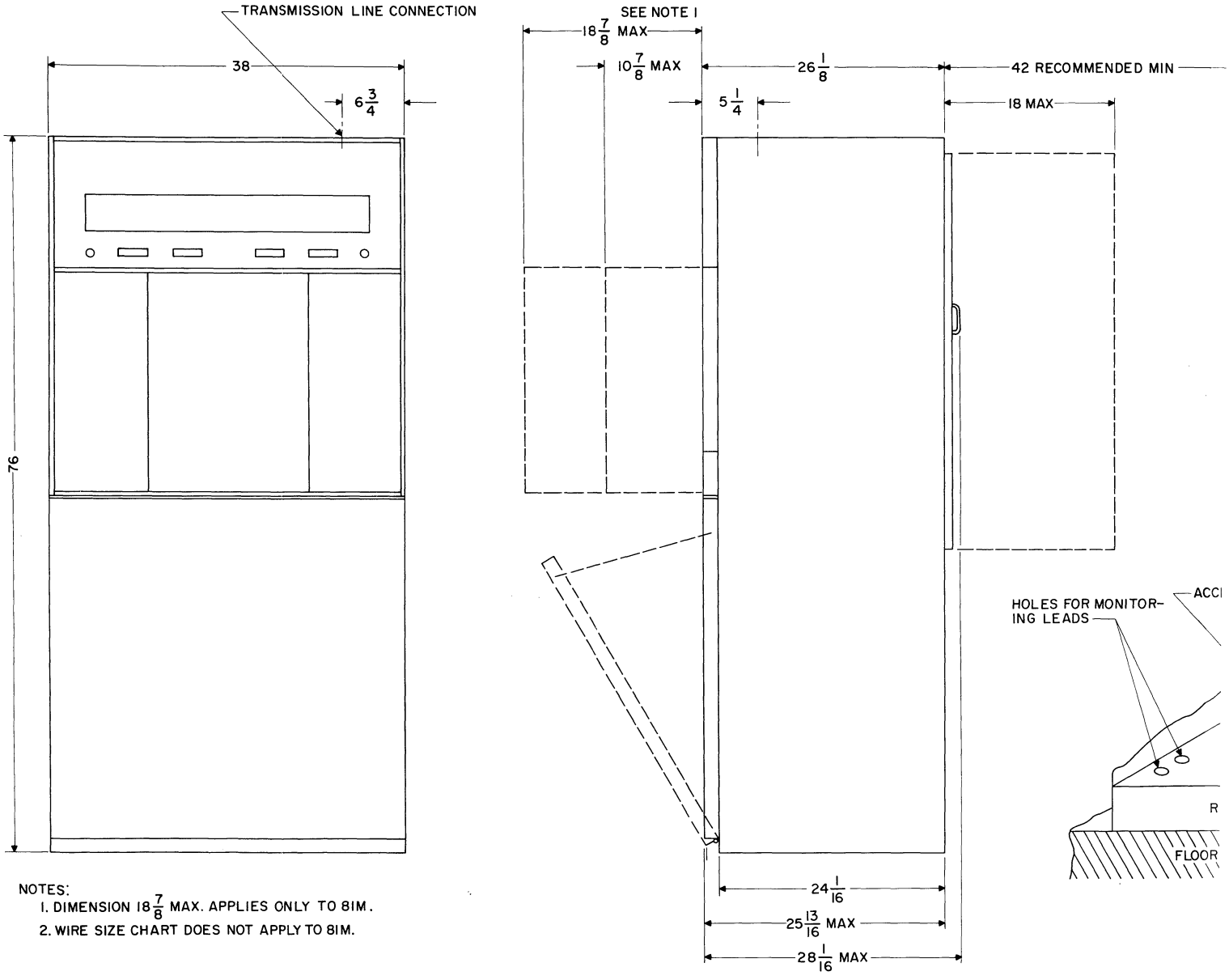
e. Refer to figure 2-2, the photographs in section VI, and the tags on the cables, and make all possible connections.

f. Install the large filter capacitors, C182 and C183, as shown in figure 6-2, and secure them in place. Make all connections to these units.

g. Remove the rear cover from the r-f output network compartment at the top of the cabinet, and check to be sure that the taps on tuning coil L108 and loading coil L109 are in the correct positions for the station

WIRE SIZES (SEE NOTE 2)

CONNECTION	RECOMMENDED WIRE
STATION POWER LINE SWITCH TO TRANSMITTER INPUT (208/230 V SINGLE PHASE 50/60 CPS SOURSE FUSED AT WALL CUT OUT BOX FOR 30 AMPERES)	TWO NO. 6 WIRES
GROUND FEED (FURTHER BONDING OF CABINET TO BUILDING GROUND WOULD BE DESIRABLE)	ONE NO. 4 BARE WIRE
FREQUENCY MONITOR FEED	ONE RG-58/U COAXIAL CABLE
MODULATION MONITOR FEED	ONE RG-8/U COAXIAL CABLE
AUDIO MONITOR FEED	ONE 2 WIRE SHIELDED LEAD
AUDIO INPUT LEAD	ONE 2 WIRE SHIELDED LEAD
TRANSMISSION LINE	$\frac{7}{8}$ RIGID OR SOLID DIELECTRIC, 50 OR 70 OHM COAXIAL CABLE



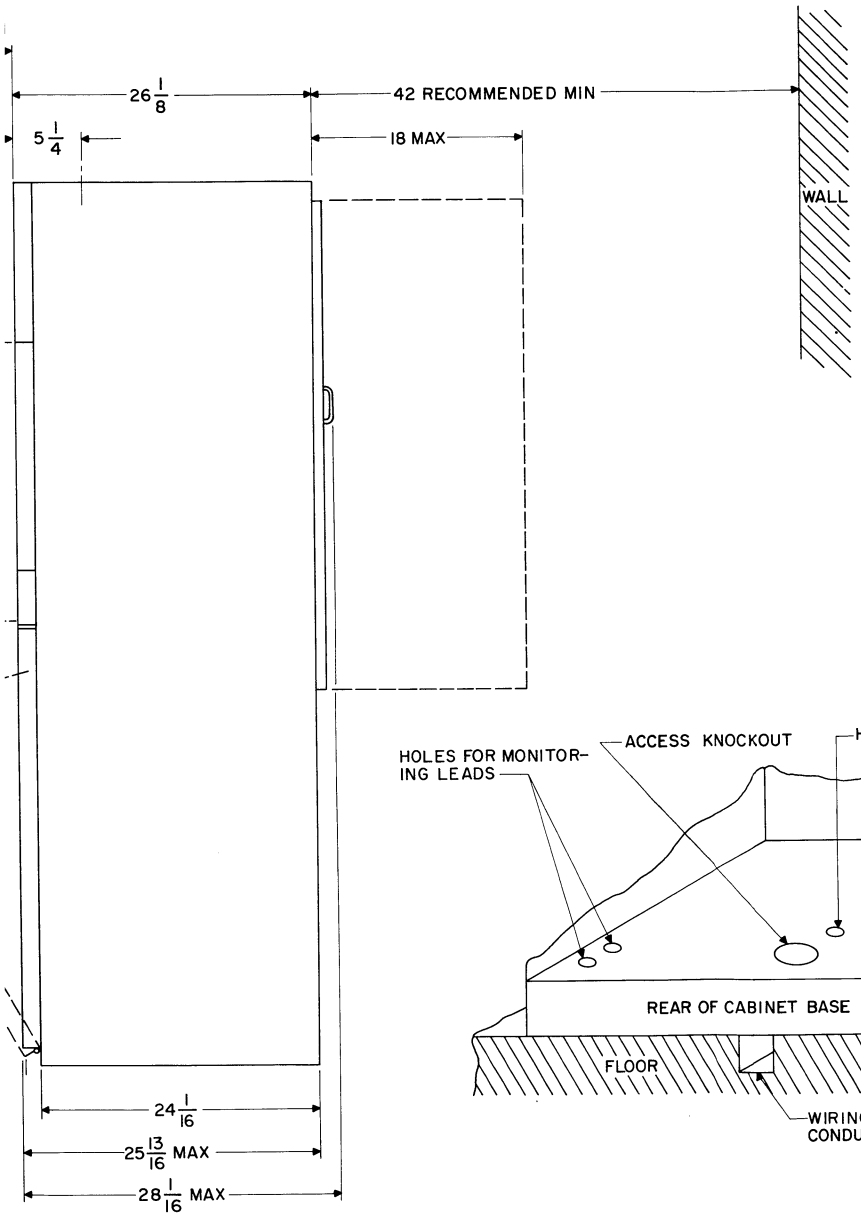
NOTES:
1. DIMENSION $18\frac{7}{8}$ MAX. APPLIES ONLY TO 81M.
2. WIRE SIZE CHART DOES NOT APPLY TO 81M.

Figure 2-1. AM Broadcast Transmitter 20V-3, Installation Diagram

RECOMMENDED WIRE

—TWO NO. 6 WIRES

—ONE NO. 4 BARE WIRE
—ONE RG-58/U COAXIAL CABLE
—ONE RG-8/U COAXIAL CABLE
—ONE 2 WIRE SHIELDED LEAD
—ONE 2 WIRE SHIELDED LEAD
—$\frac{7}{8}$ RIGID OR SOLID DIELECTRIC, 50 OR 70 OHM COAXIAL CABLE



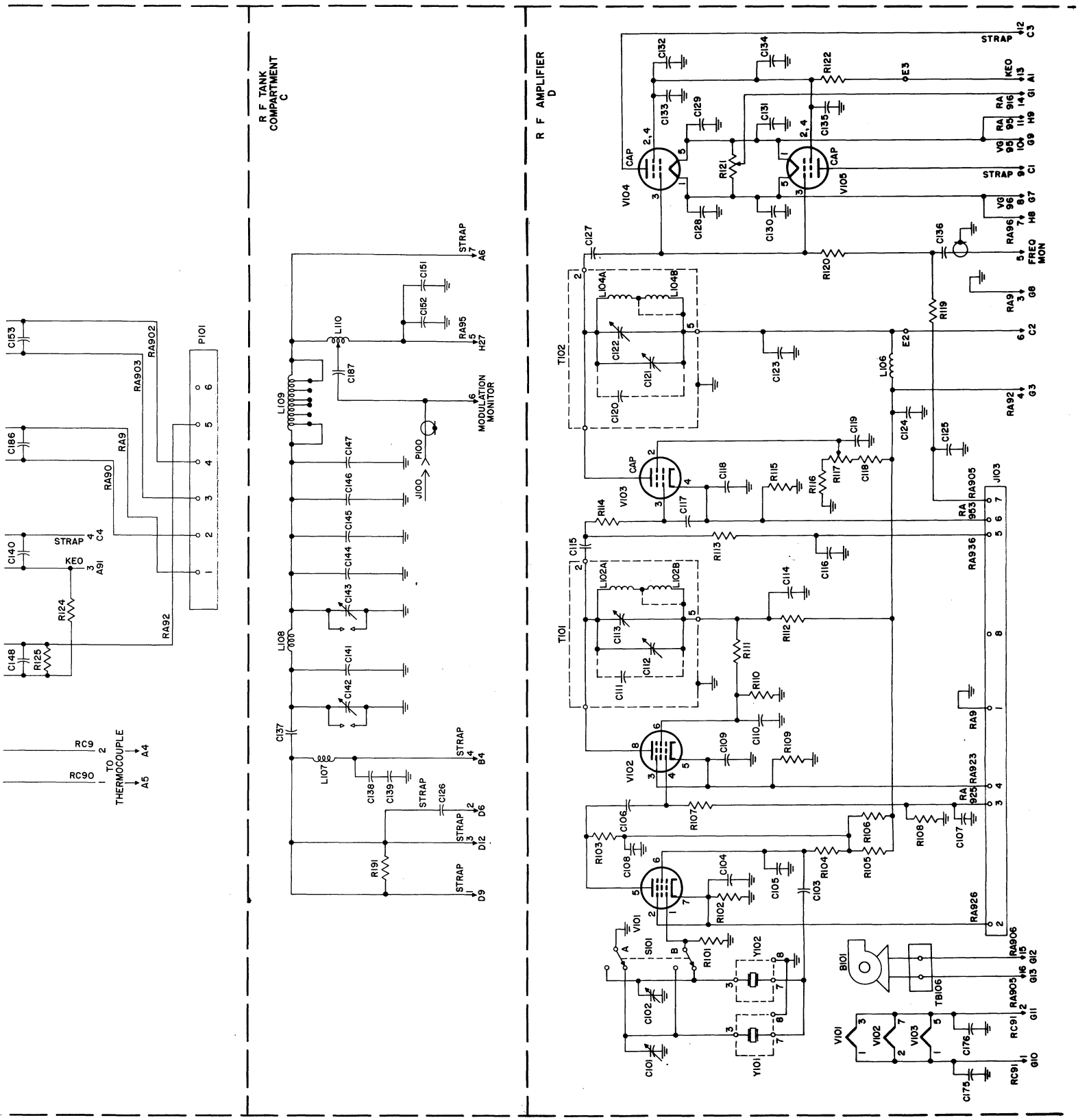
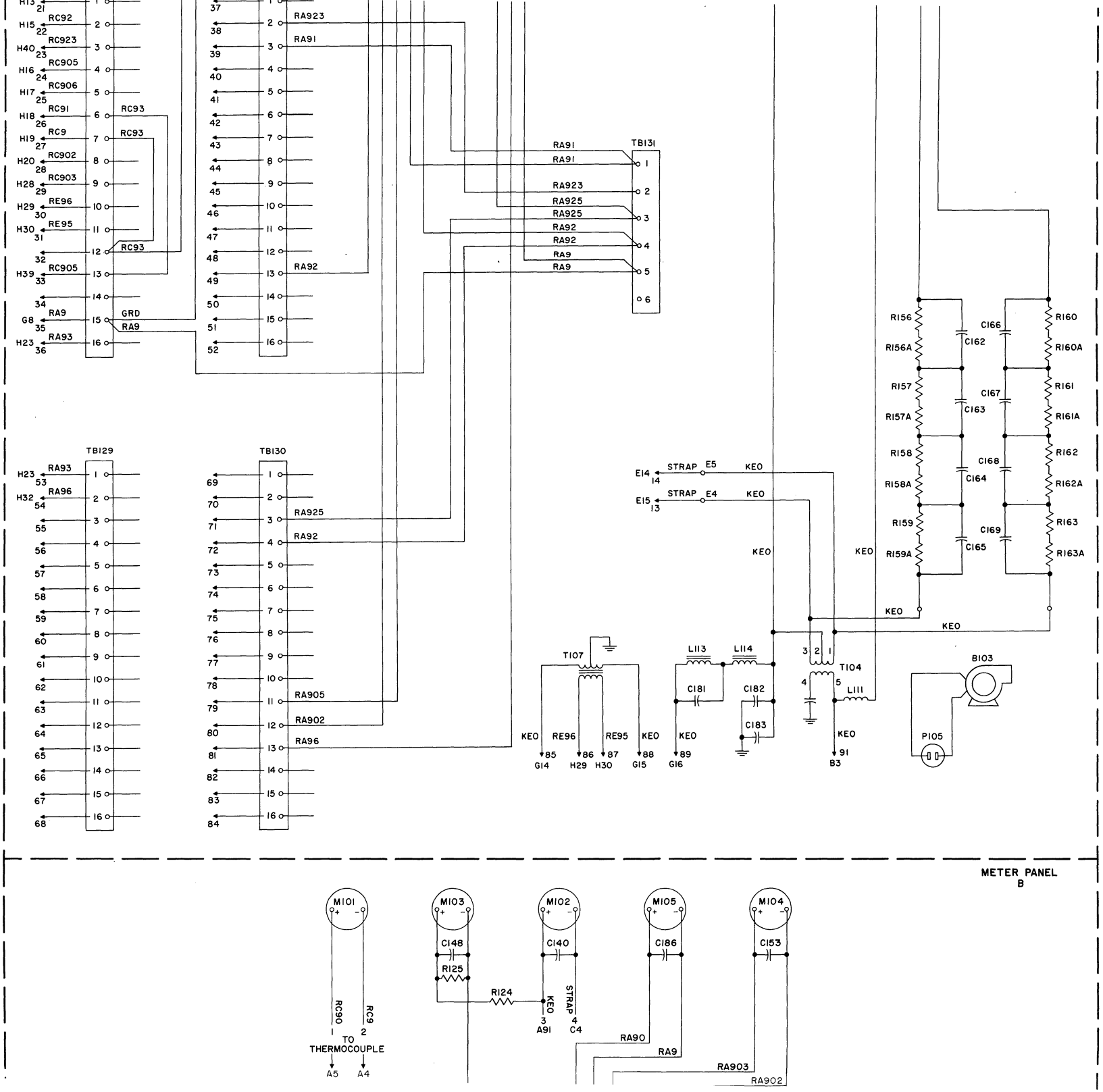
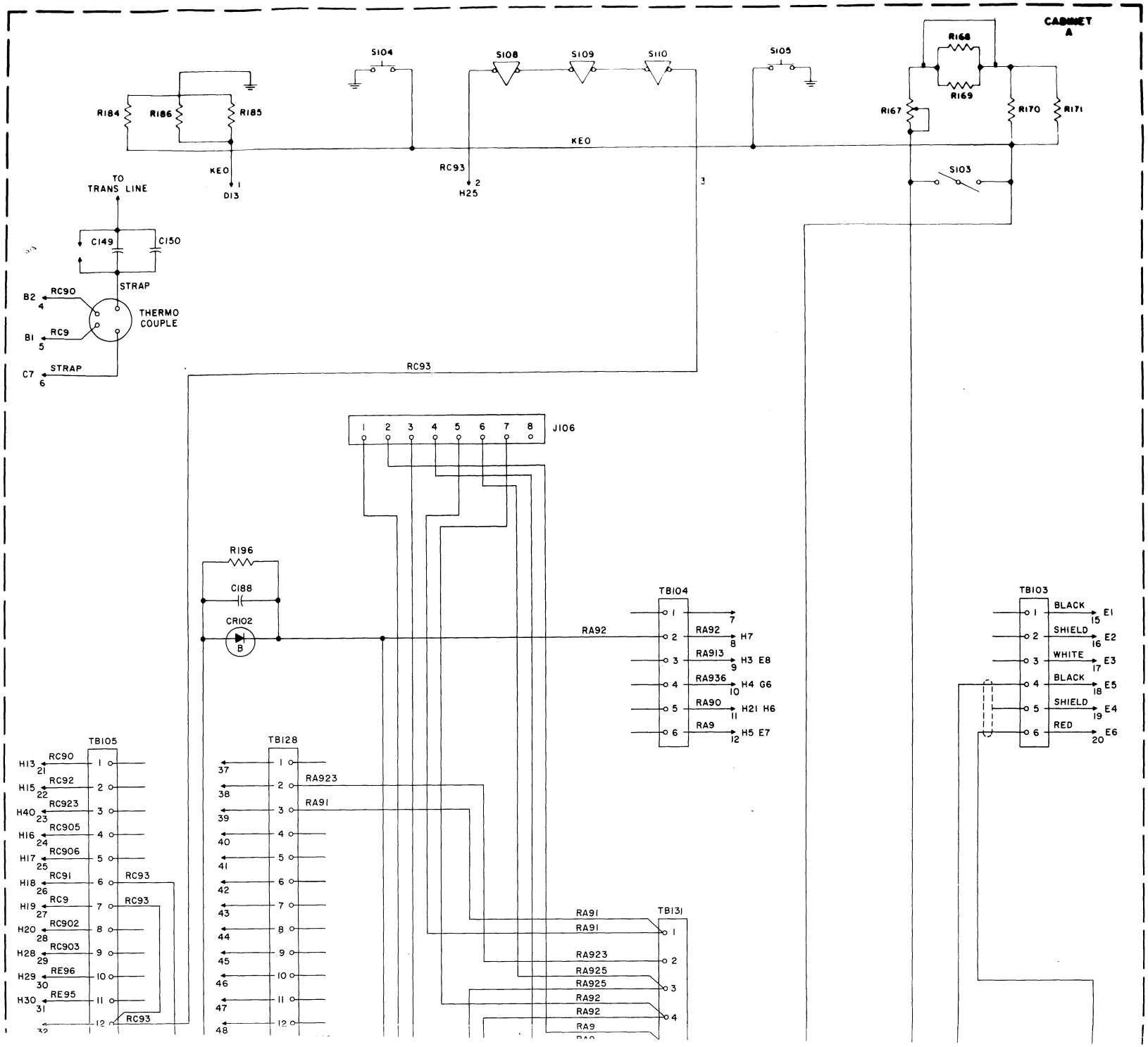


Figure 2-2. Interunit Cabling Diagram (Sheet 1 of 2)


TB129
TB130
TB131
RC92
RC923
RC905
RC906
RC91
RC93
RC9
RC902
RC903
RE96
RE95
RA9
RA93
RA96
RA923
RA925
RA92
RA905
RA902
GRD
KEO
STRAP E5
STRAP E4
R156
R156A
R157
R157A
R158
R158A
R159
R159A
R160
R160A
R161
R161A
R162
R162A
R163
R163A
C162
C163
C164
C165
C166
C167
C168
C169
T107
T104
L113
L114
L111
C181
C182
C183
B103
P105
METER PANEL B
M101
M103
M102
M105
M104
C148
C140
C186
C153
R125
R124
RC90
RC9
TO THERMOCOUPLE
A5
A4
A91
C4
RA90
RA903


CABINET A
S104
S108
S109
S110
S105
R168
R169
R167
R170
R171
R184
R186
R185
KEO
KEO
D13
RC93
H25
S103
TO TRANS LINE
C149
C150
STRAP
B2
RC90
THERMO COUPLE
B1
RC9
C7
STRAP
RC93
J106
1 2 3 4 5 6 7 8
R196
C188
CR102
B
RA92
TB104
RA92 H7
RA913 H3 E8
RA936 H4 G6
RA90 H21 H6
RA9 H5 E7
TB103
BLACK E1
SHIELD E2
WHITE E3
BLACK E5
SHIELD E4
RED E6
TB105
H13 RC90
H15 RC92
H40 RC923
H16 RC905
H17 RC906
H18 RC91
H19 RC9
H20 RC902
H28 RC903
H29 RE96
H30 RE95
RC93
RC93
TB128
RA923
RA91
RA91
RA91
RA923
RA925
RA925
RA92
RA92
RA9
TB131

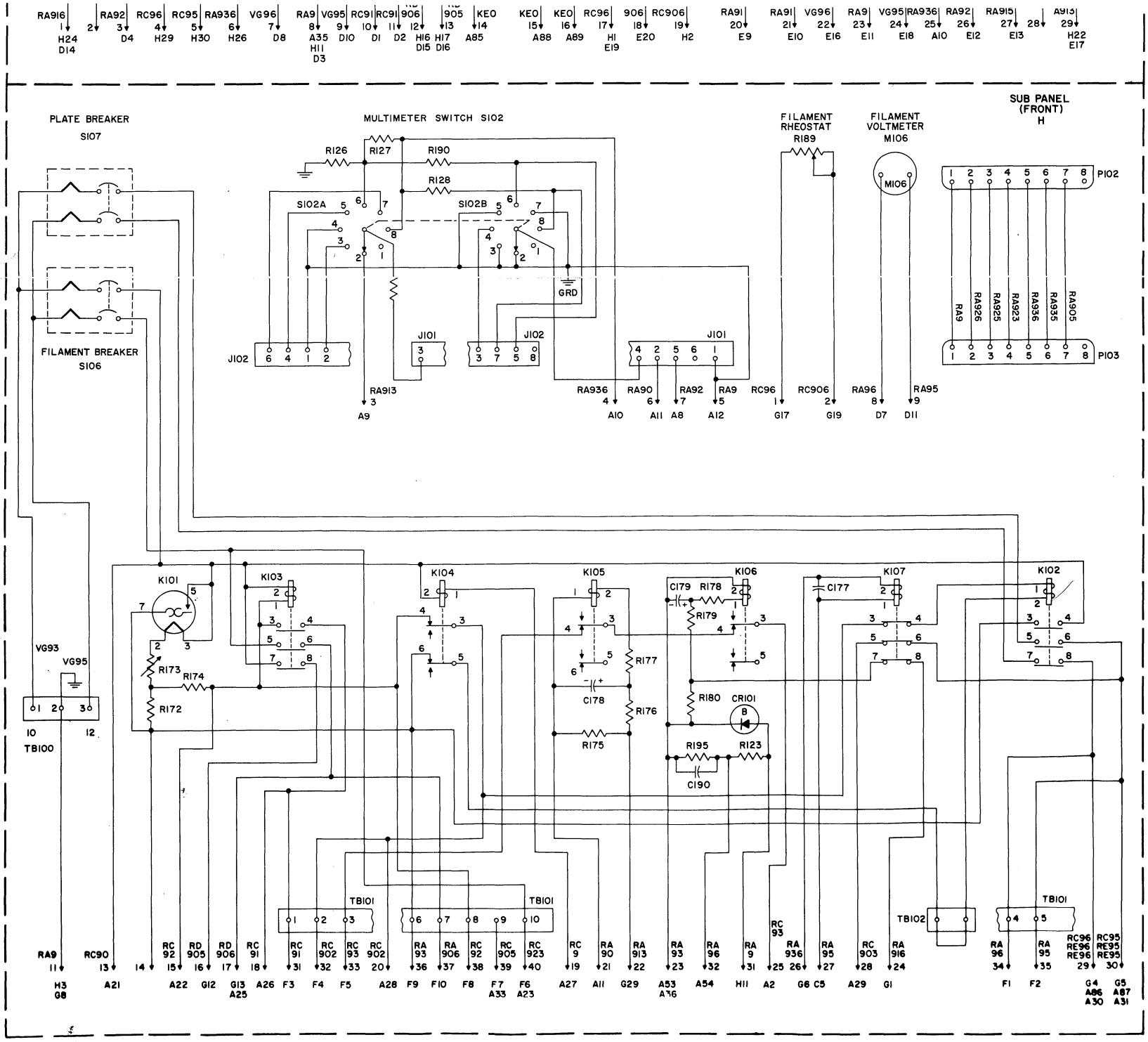
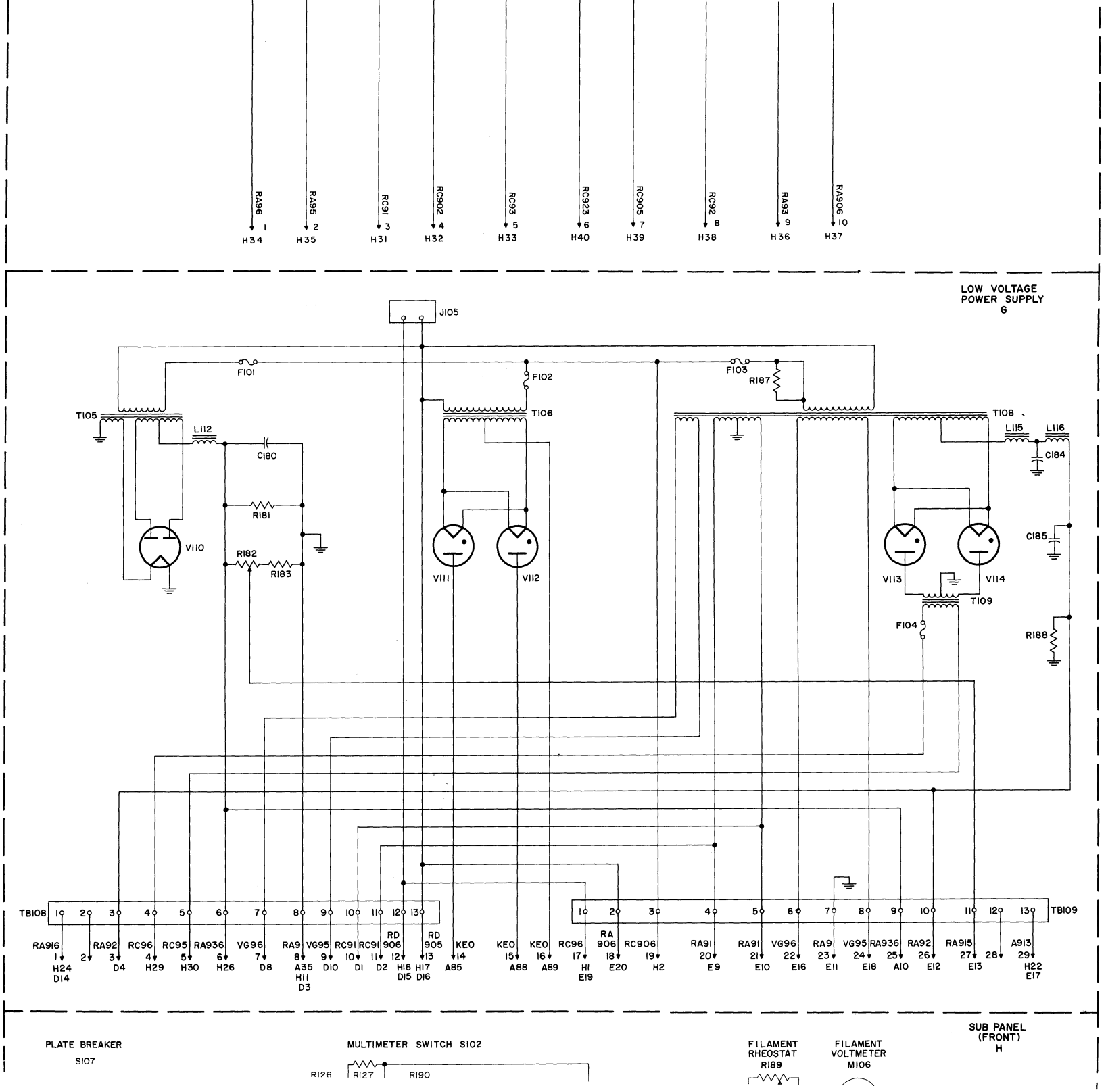


PLATE BREAKER
S107
FILAMENT BREAKER
S106
MULTIMETER SWITCH S102
R126
R127
R190
R128
S102A
S102B
GRD
J102
J101
RA913
A9
RA936
RA90
RA92
RA9
A10
A11
A8
A12
FILAMENT RHEOSTAT
R189
RC96
RC906
G17
G19
FILAMENT VOLTMETER
M106
RA96
RA95
D7
D11
SUB PANEL (FRONT)
H
P102
P103
RA9
RA926
RA925
RA923
RA936
RA935
RA905
K101
K103
K104
K105
K106
K107
K102
VG93
VG95
R173
R174
R172
TB100
C179
R178
R179
C177
R177
C178
R176
R175
R180
CR101
R195
R123
C190
TB101
TB102
RA9
RC90
RC 92
RD 905
RD 906
RC 91
RC 91
RC 902
RC 93
RC 902
RA 93
RA 906
RC 92
RC 905
RC 923
RC 9
RA 90
RA 913
RA 93
RA 96
RA 9
RC 93
RA 936
RA 95
RC 903
RA 916
RA 96
RA 95
RC96 RE96 RE96
RC95 RE95 RE95
H3 G8
A21
A22
G12
G13 A25
A26
F3
F4
F5
A28
F9
F10
F8
F7 A33
F6 A23
A27
A11
G29
A53 A36
A54
H11
A2
G6 C5
A29
G1
F1
F2
G4 A26 A30
G5 A27 A31

(2 of 2)


RA96 1 H34
RA95 2 H35
RC91 3 H31
RC902 4 H32
RC93 5 H33
RC923 6 H40
RC905 7 H39
RC92 8 H38
RA93 9 H36
RA906 10 H37
LOW VOLTAGE POWER SUPPLY G
J105
F101
F102
F103
R187
T105
T106
T108
L112
L115
L116
C180
C184
C185
R181
R182
R183
V110
V111
V112
V113
V114
T109
F104
R188
TB108
TB109
RA916 1 H24 D14
RA92 3 D4
RC96 4 H29
RC95 5 H30
RA936 6 H26
VG96 7 D8
RA9 8 A35 H11 D3
VG95 9 D10
RC91 10 D1
RC91 11 D2
RD 906 12 HI6 DI5
RD 905 13 HI7 DI6
KEO 14 A85
KEO 15 A88
KEO 16 A89
RC96 17 HI E19
RA 906 18 E20
RC906 19 H2
RA91 20 E9
RA91 21 E10
VG96 22 E16
RA9 23 E11
VG95 24 E18
RA936 25 A10
RA92 26 E12
RA915 27 E13
28
A913 29 H22 E17
SUB PANEL (FRONT) H
PLATE BREAKER S107
MULTIMETER SWITCH S102
R126
R127
R190
FILAMENT RHEOSTAT R189
FILAMENT VOLTMETER M106

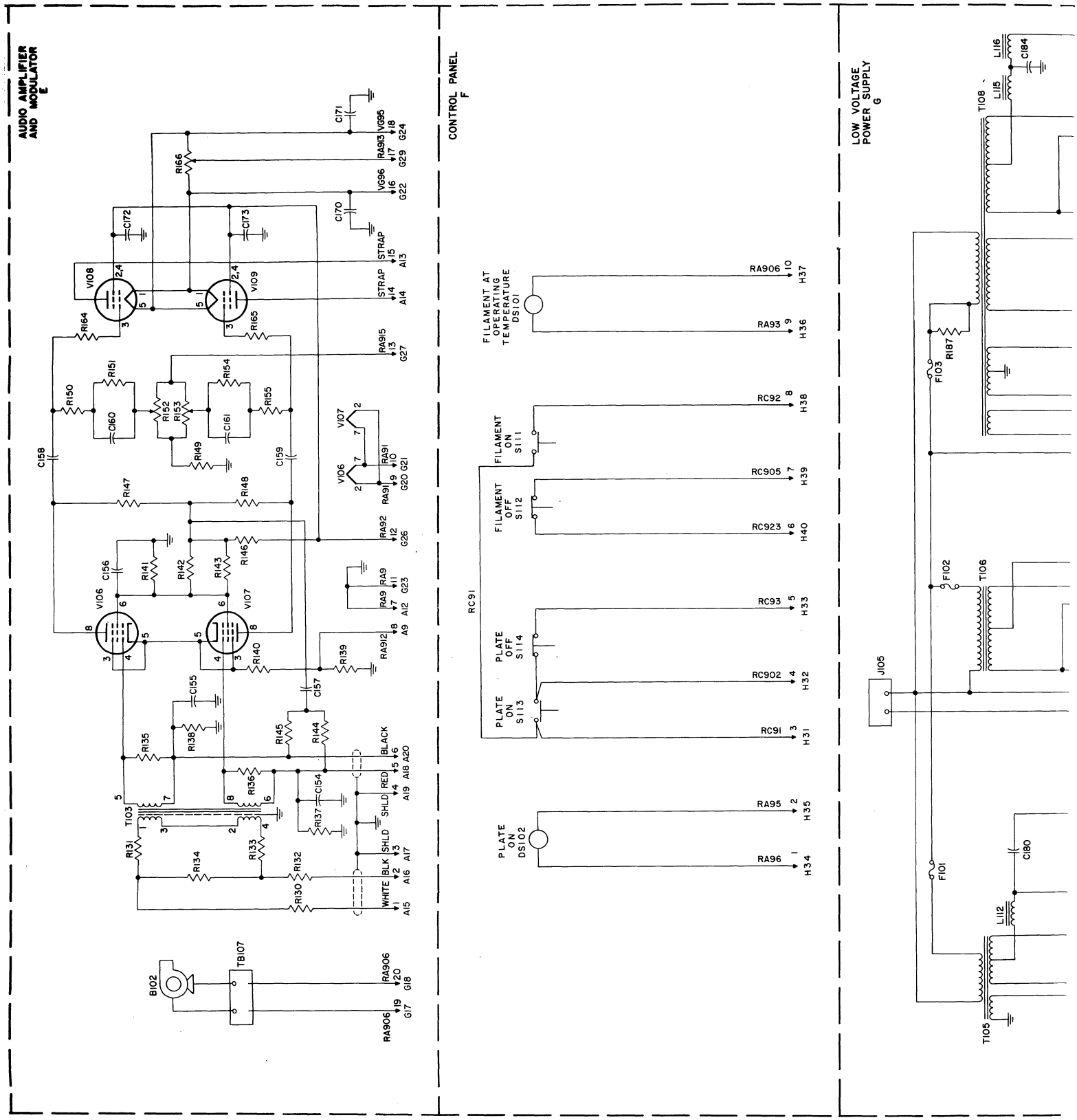


Figure 2-2. Interunit Cabling Diagram (Sheet 2 of 2)

operating frequency. Refer to the Collins Test Department data sheet for the correct tap positions. This data sheet, which is included with the transmitter, contains a record of the output network setup used for testing the transmitter at the factory. The setup may not be exactly correct for actual operating conditions at the station, but usually is near enough to permit preliminary tuning.

2.4 EXTERNAL CONNECTIONS.

Refer to figure 2-1 for assistance in making the following external connections.

a. Connect the power input cables to the transmitter. Use the proper wire size given in figure 2-1. Bring the two power wires and the neutral wire in through the rubber grommet in the power line hole in the bottom of the cabinet and run them forward to the front panel. Connect the two power wires to the two outer terminals on terminal board TB100, shown in figure 6-3. Connect the neutral wire to the center terminal on TB100.

b. Connect the audio input to the transmitter. Bring the audio signal into the cabinet on a shielded twisted pair. Connect the two audio leads to terminals 1 and 3 on terminal board TB103, shown in figure 6-2. Connect the shield to terminal 2 of TB103.

c. Bring the RG-58/U coaxial cable from the frequency monitor through the proper hole in the bottom of the cabinet and connect it to the mating plug that is connected to J104. Figure 6-5 shows the location of J104.

d. Bring the RG-8/U coaxial cable from the modulation monitor through the proper hole in the bottom of the cabinet and connect it to the mating plug that is connected to J100. Figure 6-4 shows the location of J100.

e. Bring the twisted shielded pair from the audio monitor through the proper hole in the bottom of the cabinet. Connect one wire of the pair to terminal 16 of terminal board TB105, shown in figure 6-2. Connect the other wire and the shield to terminal 15 of TB105.

f. Connect the coaxial cable leading to the antenna-tuning house to the r-f output. This connection is made to a feedthrough insulator located on the top of the transmitter. Connect the outer conductor of the coaxial cable to the ground stud next to the feedthrough insulator. Be sure that these connections are made well and are mechanically secure.

2.5 FINAL INSTALLATION PROCEDURE.

a. Again check all wiring and cable connections in the transmitter to be sure that each connection is electrically and mechanically firm. Refer to figure 2-1 and check to see that all connections are properly made. Paragraph 2.6 gives instructions for interpreting the cabling diagram.

b. Replace the rear panel on the transmitter. Insert the ventilating fan plug into the socket on the rear of the power supply chassis.

c. Place all tubes and crystals in their proper sockets. Refer to figures 6-5, 6-7, and 6-9 for correct tube placement.

d. If the transmitter is to be operated with an output power of 250 watts, remove the jumper strap that is across resistors R168 and R169. Refer to figure 6-2 for the location of this strap.

e. If the input power is 50 cycle instead of 60 cycle, replace C181 with a 0.11-microfarad capacitor. Refer to figure 6-2 for the location of C181.

f. Inspect the arc gaps listed below for proper adjustment. Set gaps as follows:

Plate tuning capacitor (C142) gap (E108) . . . 5/16 to 21/64 inch.

Loading capacitor (C143) gap (E109) . . . 1/16 to 5/64 inch.

Antenna coupling capacitor (C149) gap (E110). . . . . 1/32 to 3/64 inch.

Modulation transformer (T104) gap (E111). . . . . 1/16 to 5/64 inch.

2.6 INTERUNIT CABLING DIAGRAM.

Figure 2-2 shows the wires and cables that connect components in the transmitter. Each section of the diagram is enclosed by broken lines. These sections have been given section designation letters that appear in the upper right corner of each dotted enclosure. Although wiring between transmitter units is not shown on the diagram, the destination of this wiring is indicated by letters and numbers that appear directly below the arrow heads as shown in figure 2-4. The numbers next to the lines above the arrow heads represent the type of wires used to make the connection. The number directly adjacent to each arrow head is the number of that point in the particular section of the diagram, and does not necessarily indicate that there is a terminal bearing that number at that point in the transmitter. Where there are terminal boards with numbered terminals in the transmitter, the terminals are enclosed by a rectangle on the diagram to indicate the terminal board.

A sample wire from the cabling diagram is shown in figure 2-4. Refer to the electrical wire code chart inside the back cover. The KE0 designation indicates that a KE0 wire leaves this point. The K in KE0 indicates that the type of wire used is high-voltage, insulated cable. E indicates that the wire size is #14 AWG, and the 0 indicates that the color of the wire used is black. If a tracer was used on this wire, an additional number would be added to indicate the color of the tracer. If, for example, this wire was black with a red tracer, the designation would have been KE02. If a shield was used, the wire would have been labeled KES02, the S indicating a shield. The color code used for wires and tracers is the same as that used for resistors and capacitors.

The number 13 beside the arrow-head in figure 2-4, indicates that this is point number 13 of a particular section on the diagram.

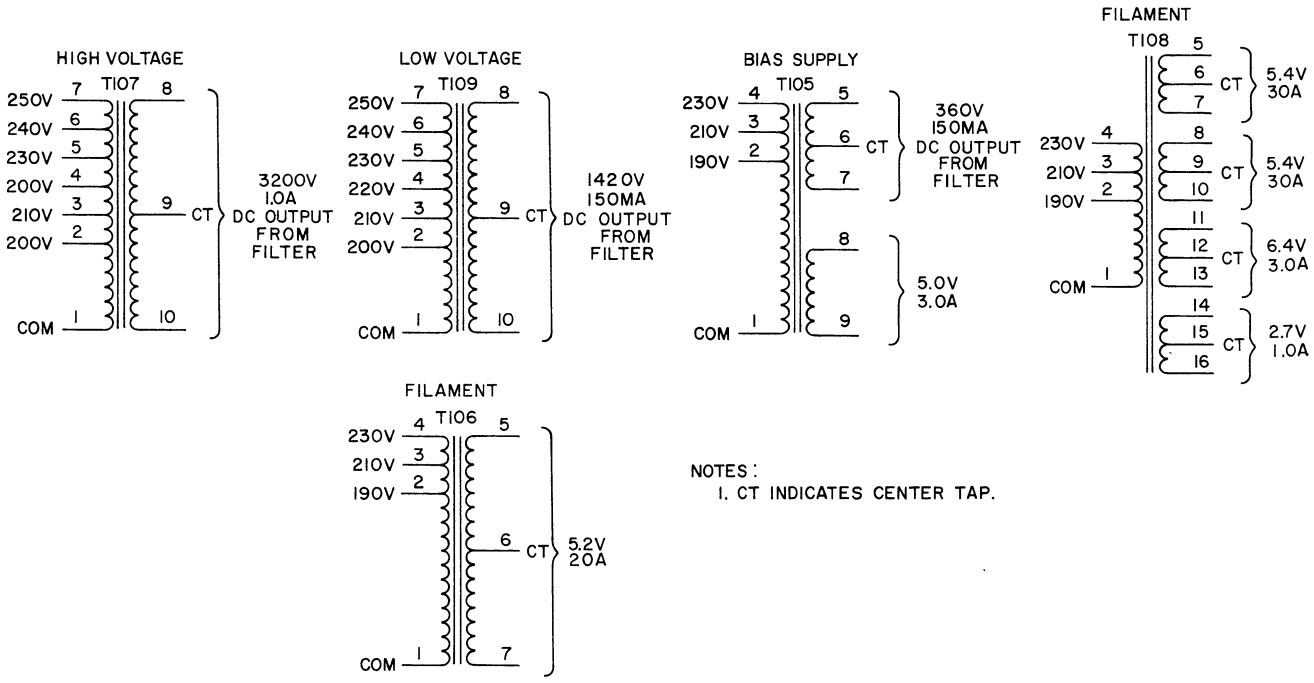


Figure 2-3. Transformer Details

A1 indicates that the wire leaving this point on the diagrams goes to point 1 in section A of the diagram.

When coaxial cable, copper straps, and other types of connecting materials except wires are used, the Electrical Wire Code is not used. Instead of using the code, the connecting material is specified by name on the diagram.

TABLE 2-1
REMOTE CONTROL CONNECTIONS

FUNCTION	TB105 TERMINALS
FILAMENT ON	2 and 6
FILAMENT OFF	6 and 13 (remove jumper)
PLATE OFF	7 and 12 (remove jumper)
PLATE ON	6 and 8
Filament-at-operating-temperature indicator (green)	4 and 5
Plate voltage indicator (red)	10 and 11

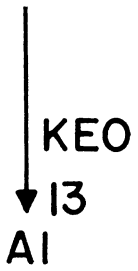


Figure 2-4. Cabling Example

2.7 REMOTE CONTROL CONNECTIONS.

Several 16-connection terminal boards, TB105, TB128, TB129, and TB131, are provided for remote control circuit connections. These terminals may be used to interlock AM Broadcast Transmitter 20V-3 with other equipment. Table 2-1 lists the numbers of terminals on TB105 that are used for remote on-off control and indication. The remote "on" switches should be of the normally-open momentary type. The "off" switches should be of the normally-closed momentary type. For simplified operation, the FILAMENT ON and PLATE OFF switches may be eliminated. When

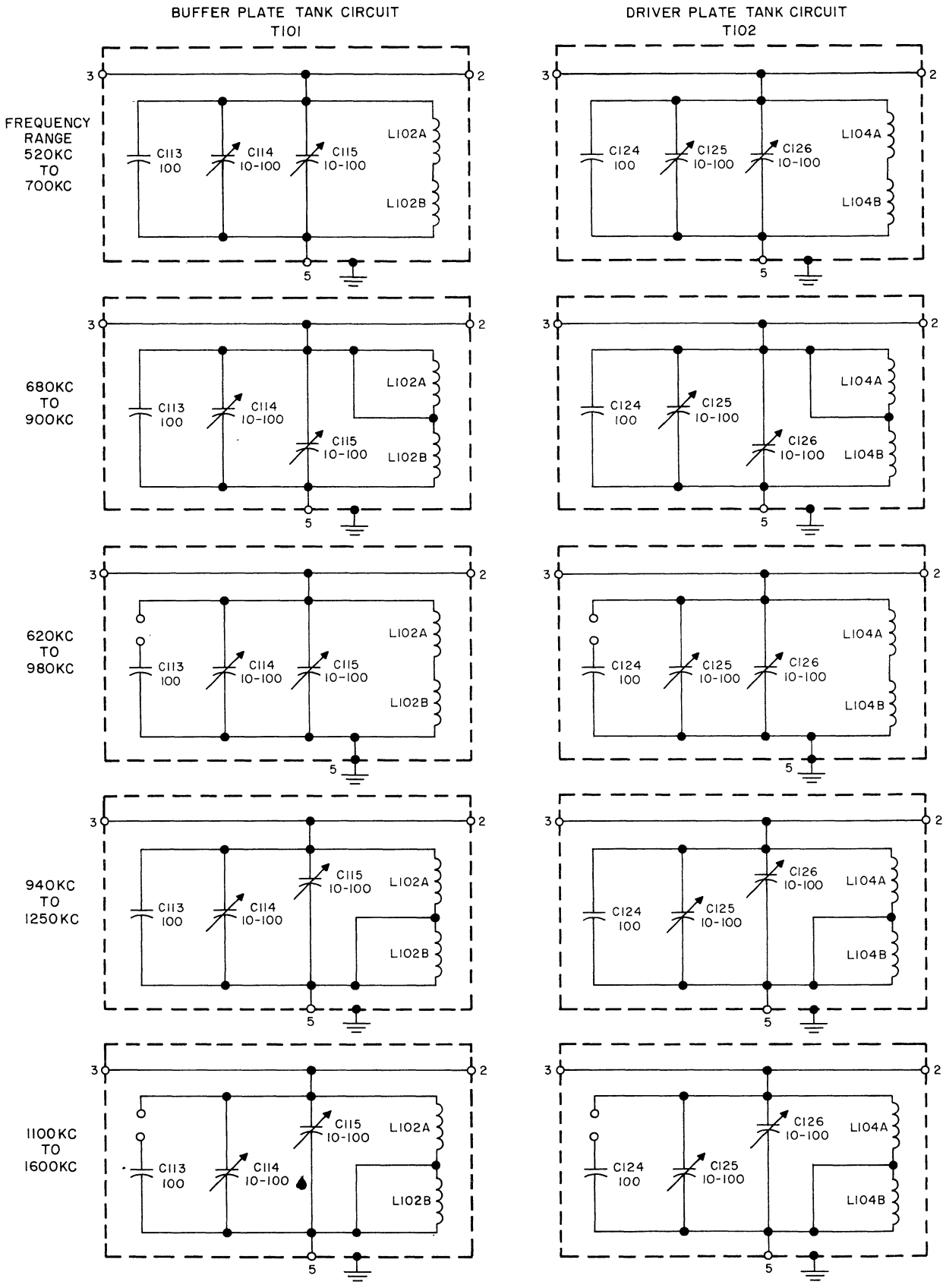


Figure 2-5. T101 and T102 Internal Connections

the PLATE ON switch is operated, both filament and plate power will be automatically applied in proper sequence. Operating the FILAMENT OFF switch will shut down all filament and plate power that may be on. The indicator lamps should be the 230-volt a-c type.

Equipment is available that will completely control and monitor transmitter operation from a remote location through standard telephone pairs. When such remote control equipment is used, necessary installation and connection information will be supplied with the equipment.

2.8 FREQUENCY CHANGE.

If the transmitter operating frequency is changed, several transmitter components and component settings must be changed. These components are: (1) the crystal, (2) some components in the r-f output network, and (3) the buffer and r-f driver plate tank circuits, T101 and T102.

Table 2-2 lists the Collins part numbers for crystals of various frequencies. Table 2-3 lists the Collins part numbers of r-f output circuit components for various frequency ranges. Figure 2-5 shows connections of T101 and T102 for various frequency ranges.

TABLE 2-2. CRYSTAL PART NUMBERS

OPERATING FREQUENCY (KC)	COLLINS PART NUMBER	OPERATING FREQUENCY (KC)	COLLINS PART NUMBER	OPERATING FREQUENCY (KC)	COLLINS PART NUMBER
540	290-1088-00	900	291-9292-00	1260	290-0672-00
550	290-0627-00	910	290-0658-00	1270	290-0673-00
560	290-0635-00	920	291-9300-00	1280	291-9289-00
570	291-9296-00	930	291-9308-00	1290	291-9284-00
580	290-0636-00	940	290-0659-00	1300	291-9291-00
590	290-0637-00	950	291-9294-00	1310	291-9282-00
600	291-9311-00	960	291-9286-00	1320	291-9320-00
610	291-9306-00	970	291-9283-00	1330	291-9285-00
620	290-0638-00	980	291-9288-00	1340	291-9319-00
630	290-0639-00	990	291-9309-00	1350	291-9290-00
640	291-9314-00	1000	290-0660-00	1360	291-9303-00
650	290-0640-00	1010	290-0626-00	1370	290-0674-00
660	290-0641-00	1020	291-9316-00	1380	291-9321-00
670	290-0633-00	1030	291-9327-00	1390	291-9281-00
680	291-9298-00	1040	290-0661-00	1400	291-9297-00
690	290-0642-00	1050	291-9302-00	1410	291-9323-00
700	290-0643-00	1060	290-0662-00	1420	291-9310-00
710	291-9329-00	1070	290-0663-00	1430	291-9312-00
720	290-0644-00	1080	291-9322-00	1440	290-0631-00
730	290-0645-00	1090	290-0664-00	1450	291-9301-00
740	290-0646-00	1100	291-9293-00	1460	291-9280-00
750	291-9295-00	1110	290-0665-00	1470	290-0629-00
760	290-0647-00	1120	290-0666-00	1480	291-9304-00
770	290-0648-00	1130	290-0667-00	1490	291-9315-00
780	290-0649-00	1140	290-0668-00	1500	290-0675-00
790	290-0650-00	1150	291-9299-00	1510	290-1076-00
800	290-0651-00	1160	290-0669-00	1520	290-1077-00
810	290-0652-00	1170	290-0630-00	1530	290-1078-00
820	290-0653-00	1180	290-0634-00	1540	290-1079-00
830	290-0654-00	1190	290-0670-00	1550	290-1080-00
840	290-0655-00	1200	290-0671-00	1560	290-1081-00
850	291-9324-00	1210	291-9325-00	1570	291-9328-00
860	290-0628-00	1220	291-9318-00	1580	291-9307-00
870	291-9326-00	1230	291-9317-00	1590	290-1082-00
880	290-0656-00	1240	291-9313-00	1600	290-1083-00
890	290-0657-00	1250	291-9305-00		

TABLE 2-3. R-F OUTPUT NETWORK COMPONENTS

FREQ KC	L107	L108	C137	C141	C144	C145	C146	C147	C152	FREQ KC
1600	571-0460-10	980-0040-00 (81 uh) or as alternate 980-0041-00 (150 uh)	913-1789-00 (750 pf) C137A	924-1022-00 (200 pf) C141A 913-1441-00 (200 pf) C141B	Out	938-2048-00 (430 pf)	938-2048-00 (430 pf)	938-2048-00 (430 pf)	Out	1600
1025										1025
1020										1020
875										875
865					938-2062-00 (820 pf)					865
725										725
715			913-1789-00 (750 pf) C137A	913-1441-00 (200 pf) C141B	938-2080-00 (2000 pf)		938-2062-00 (820 pf)	938-2062-00 (820 pf)	936-1149-00 (.022 uf)	715
675										675
665		930-0041-00 (150 uh)								665
575										575
565						938-2062-00 (820 pf)				565
550										550