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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL, FIELD, AND DEPOT MAINTENANCE MANUAL

SPECTRUM ANALYZER SET AN/UPM-84

HEADQUARTERS, DEPARTMENT OF THE ARMY

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NG: State AG (3).
USAR: None.
For explanation of abbreviations used, see AR 320-50.

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (cont)

LIST OF TABLES

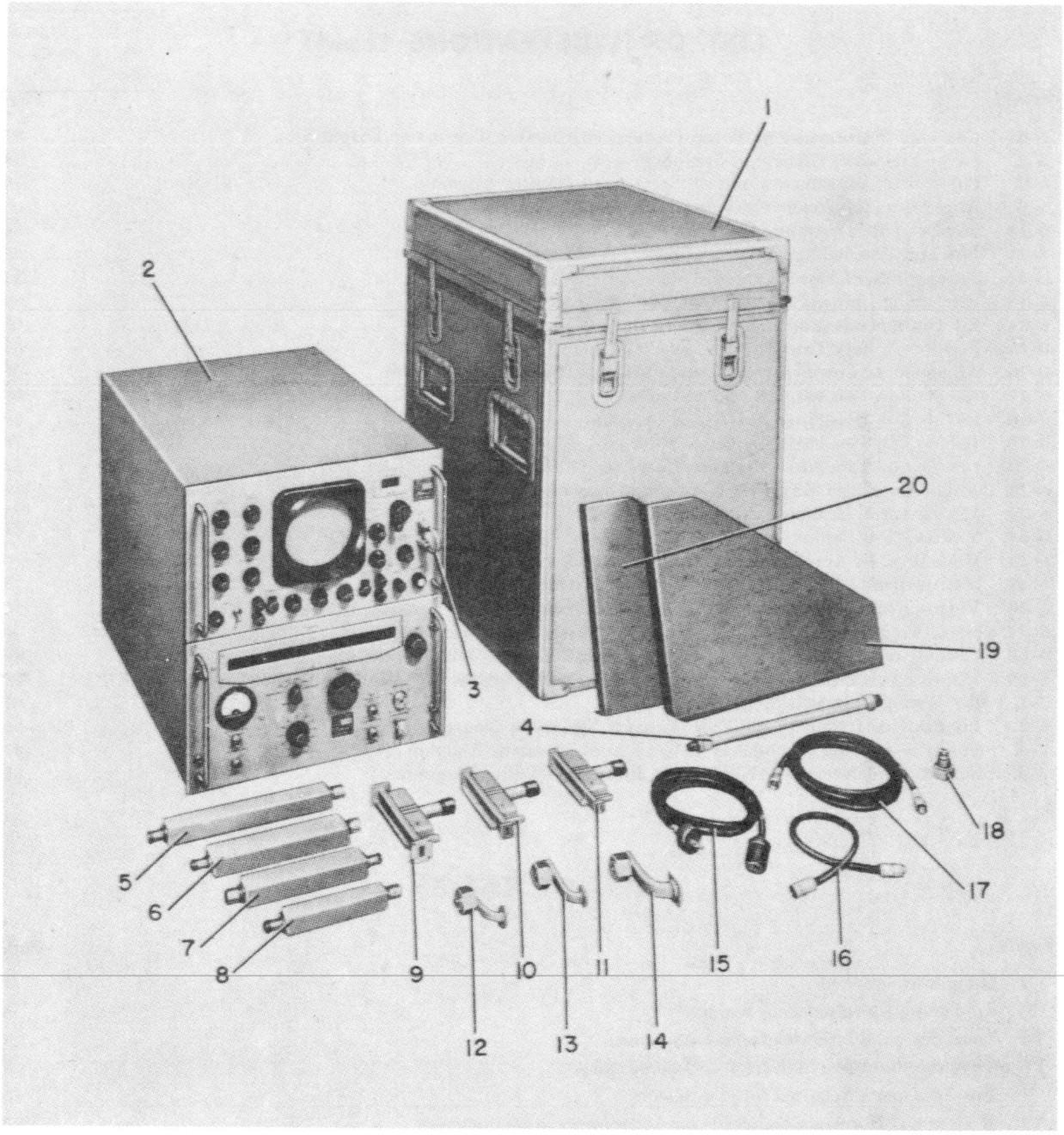


Figure 1–1. Spectrum Analyzer Set AN/UPM-84 Components

KEY TO LEGEND FOR FIGURE 1-1

Index No.	Description	Type Designation
1	Electronic Equipment Case	CY-2074/UPM-84
2	Spectrum Analyzer	TS-1011/UPM-84
3	R-f Cable Assembly	CG-1525/U (0 ft 3 in.)
4	Bandpass Filter, 750 to 1350 mc	F-338/UPM-84
5	Bandpass Filter, 1175 to 2250 mc	F-341/UPM-84
6	Bandpass Filter, 2000 to 3900 mc	F-337/UPM-84
7	Bandpass Filter, 3375 to 7375 mc	F-336/UPM-84
8	Bandpass Filter, 6100 to 12,100 mc	F-335/UPM-84
9	Variable Attenuator, 12.4 to 18.0 kmc	CN-409/UPM-84
10	Variable Attenuator, 18.0 to 26.5 kmc	CN-411/UPM-84
11	Variable Attenuator, 26.5 to 40.0 kmc	CN-410/UPM-84
12	Coax to Waveguide Adapter, 26.5 to 40.0 kmc	UG-1239/UPM-84
13	Coax to Waveguide Adapter, 18.0 to 26.5 kmc	UG-1240/UPM-84
14	Coax to Waveguide Adapter, 12.4 to 18.0 kmc	UG-1241/UPM-84
15	Electrical Power Cable Assembly	CX-3974/U (10 ft 0 in.)
16	R-f Cable Assembly	CG-1526/U (1 ft 6 in.)
17	R-f Cable Assembly	CG-1526/U (6 ft 0 in.)
18	R-f Cable Adapter, 2 to 12.4 kmc	UG-1242/UPM-84
19	Rack Mounting Bracket, Left Side	D108774
20	Rack Mounting Bracket, Right Side	D108775

WARNING

This equipment employs high voltages (plus and minus 2400 volts dc) which are dangerous to life. OPERATING PERSONNEL MUST, AT ALL TIMES, OBSERVE ALL SAFETY REGULATIONS. Do not change tubes or make adjustments inside the equipment unless the power cable assembly is disconnected. Although bleeder circuits are used to prevent capacitors from retaining charges after power has been disconnected, *always* discharge and ground circuits before touching them, to avoid casualties.

INTRODUCTION

This handbook provides service instructions for Spectrum Analyzer Set AN/UM-84. The handbook was prepared in accordance with Specifications MIL-H-5474A and MIL-H-6757A. Applicable standards are MIL-STD-15A for Electrical and Electronic Symbols, and MIL-STD-16A for Electrical and Electronic Reference Designations. Abbreviations used are in accordance with Air Force-Navy Aeronautical Bulletin No. 261.

SECTION I
DESCRIPTION AND LEADING PARTICULARS

1–1. PURPOSE OF HANDBOOK.

1–2. This publication comprises service instructions for Spectrum Analyzer Set AN/UPM-84, manufactured by Polarad Electronics Corp., Long Island City, N. Y., under Contract Numbers AF33(604)-11469 and AF33(604)-14739. It includes a general description of the equipment, preparation for use and reshipment, a theory of operation section, in addition to servicing and maintenance procedures on both the organizational and field levels. Sections I through VII of this handbook apply to the above equipment. Additional models will be covered in Section VIII by the use of Difference Data Sheets. Service instructions for models included in section VIII are the same as the procedures given in sections I through VII, except for the specific differences noted by the applicable Difference Data Sheets.

1–3. PURPOSE OF THE EQUIPMENT.

1–4. Spectrum Analyzer Set AN/UPM-84 is designed to provide a rapid and accurate spectral display of the frequency distribution of energy in r-f signals over the frequency range of 10 mc to 40,880 mc. CW and modulated radio signals are displayed as a spectrum on the cathode-ray tube screen with power amplitude plotted on the vertical axis, against frequency on the horizontal axis. Specific uses of the equipment are:

a. Observing and measuring side bands associated with amplitude and frequency modulated signals.

b. Determining the presence of radio and/or radar signals over the frequency range from 10 to 40,880 mc.

c. Determining the type of modulation in radio and/or radar signals.

d. Checking and observing the tracking of r-f components of a radar system; for example, tracking transmitter and receiver.

e. Determining r-f signal characteristics, such as frequency modulation, pulse width, and pulse shape, by spectrum analysis techniques.

f. Measuring noise spectra.

g. Determining attenuation, insertion loss, and gain characteristics of r-f components.

h. Checking for parasitic oscillations.

i. Testing for interference radiation and spurious signals of generators and receiver local-oscillators.

j. Checking a transmitter or signal generator for continuous output throughout its tuning range (checking for "holes").

k. Measuring the frequency drift of oscillators.

l. Sensitive indicator for voltage standing-wave ratio measurements.

1–5. MAJOR COMPONENTS. *(See figure 1–1.)*

1–6. Spectrum Analyzer Set AN/UPM-84 consists of Spectrum Analyzer TS-1011/UPM-84, Electronic Equipment Case CY-2074/UPM-84, and the various cable assemblies, variable attenuators, bandpass filters, and adapters listed in table I and illustrated in figure 1-1. These components form a complete complement of the equipment.

TABLE I. EQUIPMENT SUPPLIED

Qty. per Equip.	Name of Unit	Type Designation	Overall Dimensions			Volume	Weight
			Length	Width	Height		
1	Spectrum Analyzer	TS-1011/UPM-84	26-1/8	17-1/4	19-1/4	5 ft	144
1	Electronic Equipment Case	CY-2074/UPM-84	31	23-1/8	20-3/4	8.6 ft	73
1	Variable Attenuator (12.4 to 18.0 kmc)	CN-409/UPM-84	6	4-1/4	1-5/16	33.5	0.62
1	Variable Attenuator (18.0 to 26.5 kmc)	CN-411/UPM-84	6	4-1/8	7/8	21.6	0.56

Note. Unless otherwise stated, dimensions are in inches, volume is in cubic inches, weight is in pounds.

TABLE I. EQUIPMENT SUPPLIED (c nt)

Qty. per Equip.	Name of Unit	Type Designation	Overall Dimensions			Volume	Weight
			Length	Width	Height		
1	Variable Attenuator (26.5 to 40.0 kmc)	CN-410/UPM-84	6	4-1/8	3/4	18.5	0.56
1	Bandpass Filter (750 to 1350 mc)	F-338/UPM-84	15-3/4	1 dia	——	15.75	0.69
1	Bandpass Filter (1175 to 2250 mc)	F-341/UPM-84	12-3/8	1-5/16	1	16.38	1.44
1	Bandpass Filter (2000 to 3900 mc)	F-337/UPM-84	9-3/8	1-5/16	1	12.27	1.12
1	Bandpass Filter (3375 to 7375 mc)	F-336/UPM-84	10-1/2	1-11/16	1	17.75	1.69
1	Bandpass Filter (6100 to 12,100 mc)	F-335/UPM-84	8	1	1	8	0.89
1	Cable Assy R-f (for interconnecting ATTENUATOR OUTPUT and DIRECT INPUT panel jack)	CG-1526/U (1 ft 6 in.)	18	1/2 dia	——	——	0.44
1	Cable Assy, R-f (for signal input connection)	CG-1526/U (6 ft 0 in.)	72	1/2 dia	——	——	1
1	Cable Assy, R-f (for interconnecting MIXER OUTPUT and IF INPUT panel jacks)	CG-1525/U (0 ft 3 in.)	3	1/2 dia	——	——	0.06
1	Electrical Power Cable Assembly	CX-3974/U (10 ft 0 in.)	120	7/16 dia	——	——	1
1	Coax to Waveguide Adapter (12.4 to 18.0 kmc)	UG-1241/UPM-84	4	1-3/8	1-1/4	6.6	0.44
1	Coax to Waveguide Adapter (18.0 to 26.5 kmc)	UG-1240/UPM-84	3-1/4	1-3/8	7/8	4	0.44
1	Coax to Waveguide Adapter (26.5 to 40.0 kmc)	UG-1239/UPM-84	3	1-3/8	3/4	3	0.38
1	R-f Cable Adapter (for type "N" input, 2 to 12.4 kmc)	UG-1242/UPM-84	1-3/4	1-3/8	1-3/8	3.3	0.38
1	Rack Mtg Bracket, Right Side	D108775	19	2-1/8	14	546	3.69
1	Rack Mtg Bracket, Left Side	D108774	19	2-1/8	14	546	3.69

Note. Unless otherwise stated, dimensions are in inches, volume is in cubic inches, weight is in pounds.

1–7. DESCRIPTION OF SPECTRUM ANALYZER TS-1011/UPM-84. *(See figure 1–2.)*

1–8. INTRODUCTION. The spectrum analyzer is a self-contained compact unit, consisting of a panel and chassis assembly which houses the display unit, and a removable r-f tuning unit. The display unit panel occupies the upper front half of the equipment frame, and serves as a mounting for the operating controls, cathode-ray tube, power indicating lamps, and two coaxial jacks. The bottom section of the frame has a panel opening, which is designed to accept the removable r-f tuning unit. In operation, the r-f tuning unit is inserted into the bottom portion of the frame so that the two front panels combine to appear as a single assembly.

1–9. DISPLAY UNIT CIRCUITS. Mounted on the display unit chassis are the following circuits:

a. The high and low voltage power supplies,
b. The cathode-ray tube,
c. The spectrum calibrator,
d. The wide band i-f amplifier,
e. The narrow band i-f amplifier,
f. The sweep frequency generator and filter,
g. The video circuitry.

1–10. R-F TUNING UNIT CIRCUITS. Mounted on the r-f tuning unit are the following major circuits:

a. A transmission line local oscillator, for operation over bands 1, 2 and 3, with its associated crystal mixer.

b. A klystron local oscillator, for operation over bands 4 through 8, with its associated crystal mixer.

c. A 163-mc low pass filter.

d. A 180-mc low pass filter.

e. Two r-f attenuators.

f. A metering circuit for monitoring output voltages and local oscillator crystal current.

g. The mechanical drive assemblies for tuning the two local oscillators simultaneously.

1–11. FUNCTION OF THE R-F TUNING UNIT. *(See figure 1–2).* The removable r-f tuning unit provides r-f power to heterodyne with incoming signals over the frequency range from 10 to 40,880 mc. This wide frequency range is obtained by utilizing the fundamental, second, and fourth harmonics of a low-frequency local oscillator to cover the frequency range from 10 to 2120 mc. The tuning range from 2000 to 40,880 mc is covered by employing the fundamental, second, third, sixth, and ninth harmonics of a high-frequency klystron local-oscillator. The full frequency range of the instrument is covered in eight bands, with each band having a separate scale engraved on the FREQUENCY dial drum, mounted near the top center of the tuning unit panel. The setting of the BAND SELECTOR control, located to the right of the dial drum, determines which frequency scale is in use. In addition, this control selects the output of either the low- or the high-frequency local-oscillator for heterodyning with the incoming r-f signal, as shown in table II. In bands 1 through 3, the output of the low-frequency oscillator is utilized; in bands 4 through 8, the output of the high-frequency oscillator is employed. A rotary TUNING control, located at the right center section of the panel, permits tuning of the local-oscillators throughout the full frequency range of each dial scale.

1–12. DESCRIPTION OF THE PANEL ASSEMBLIES.

1–13. THE DISPLAY UNIT PANEL ASSEMBLY. All operating controls, indicators, fuses, and signal receptacles for the display unit are located on the upper panel assembly of the spectrum analyzer, and are marked in blue lettering on a gray background, to identify their function or value. One control, designated TUNING, is mounted in the upper right section of the panel. This control tunes the spectrum calibrator circuit, whose output is used as a frequency marker on the display. The dial is engraved DIFFERENCE FREQ-MCS, having a zero at its center point, and is calibrated at 0.2 mc intervals to both the left and right of the center point. Variation of $\pm$ 12.5 mc from the center frequency of the i-f bandpass can be obtained by rotation of the TUNING knob, when the main tuning dial is varied over the range from 55 to 40,880 mc. (When tuning

TABLE II. R-F TUNING UNIT FREQUENCY BANDS

Band	Tuning Range (in mc)	Local Oscillator Employed	Local Oscillator Harmonic Employed
1	10- 410	Low frequency	Fundamental
2	250- 980	Low frequency	Second
3	700- 2,120	Low frequency	Fourth
4	2,000- 4,400	High frequency	Fundamental
5	4,200- 8,900	High frequency	Second
6	6,300-13,500	High frequency	Third
7	12,800-27,200	High frequency	Sixth
8	19,250-40,880	High frequency	Ninth

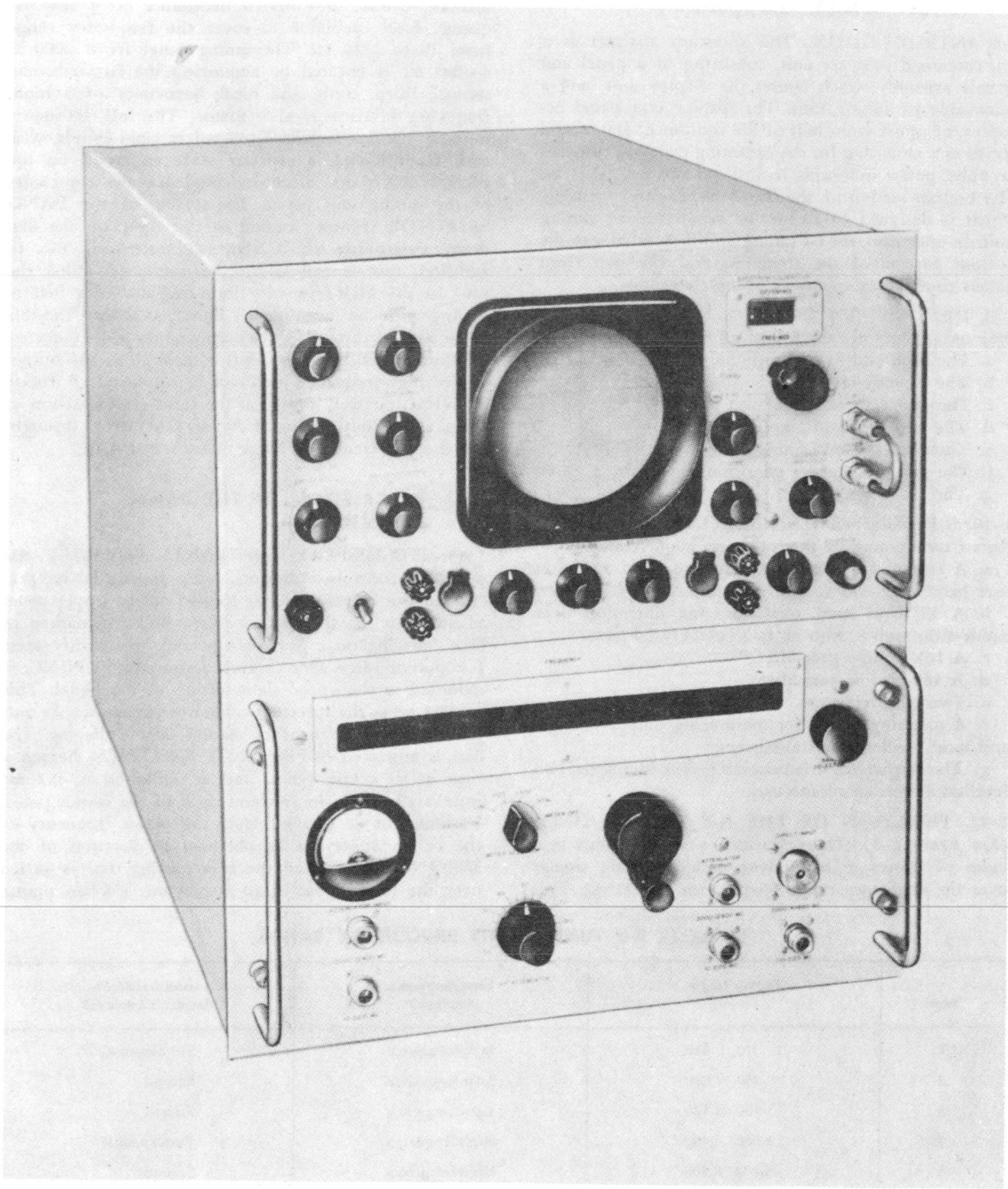


Figure 1–2. Spectrum Analyzer TS-1011/UPM-84, within Instrument Case

over the signal frequency range from 10 to 55 mc, the useful variation of the spectrum calibrator circuit is ± 2.5 mc, since the available display is then 5 mc.) By this means, the frequency difference between adjacent spectrum responses can be determined. A CALIBRATOR AMPLITUDE control permits variation in amplitude of the calibrating signal from zero to maximum deflection on the cathode-ray tube screen. In addition to the conventional controls available for use with a precision oscilloscope, the display unit permits variation of the following circuit parameters:

a. The gain of the i-f amplifier, by means of an IF ATTEN-DB selector, which is step-variable in six db increments, from zero to 60 db.

b. The centering of the spectrum on the screen, by means of both a COARSE and a FINE SPECTRUM CENTERING control.

c. The width of the spectrum displayed on the screen, over the range from 500 kc to 25 mc, by means of a SPECTRUM WIDTH control.

1-14. Two coaxial type BNC connectors, designated MIXER OUTPUT and IF INPUT, are mounted at the right side of the display unit panel. In operation, a three-inch r-f cable assembly, supplied with the equipment, must be interconnected between these two connectors. By means of this jumper connection, the output of the r-f tuning unit is applied to the input of the display unit. The two connectors serve as conveniently accessible terminal points for checking the operation of the spectrum analyzer. If investigation of the spectrum contributed by a particular pulse within a pulse group is desired, the two connectors serve the added convenience of permitting external pulse analysis test equipment (such as the Polarad Model SD-1 Multipulse Spectrum Selector, or equivalent) to be interposed between the MIXER OUTPUT and IF INPUT jacks.

1-15. THE R-F TUNING UNIT PANEL ASSEMBLY. In addition to the BAND SELECTOR and TUNING controls, the r-f tuning unit panel assembly also mounts the following controls and connectors:

a. Two r-f attenuators, of the continuously variable type. One is operative when r-f signals in the frequency range from 10 to 2120 mc are applied to the tuning unit; the other operates over the frequency range from 2000 to 12,400 mc.

b. A six-position METER SELECTOR, which is used to select particular power supply voltages, or the mixer crystal current, for monitoring on the panel-mounted meter.

c. Six input connectors. Two of these, designated ATTENUATOR INPUT, are used when high-level signals (greater than −20 dbm) in the discrete frequency ranges of 10 to 2120 mc, or 2000 to 12,400 mc, are to be applied to the self-contained r-f attenuators within the spectrum analyzer. Two connectors, designated ATTENUATOR OUTPUT, make the attenuated r-f signal accessible for connection to the direct input of the spectrum analyzer. Two additional connectors, at the extreme right side of the panel, are designated DIRECT INPUT. The lower input jack accepts low-level signals in the frequency range 10 to 2120 mc; the upper input jack accepts low-level signals in the frequency range 2000 to 40,880 mc. One of the coaxial-to-waveguide adapters (UG-1239/UPM-84, UG-1240/UPM-84, or UG-1241/UPM-84) or the r-f cable adapter (UG-1242/UPM-84) may be attached to the upper input jack, depending on the frequency range under measurement. *(See table I.)*

1-16. ELECTRONIC EQUIPMENT CASE CY-2074/UPM-84. *(See figure 1-1.)*

1-17. A shock-resistant and waterproof transit case, of aluminum-clad construction, is supplied for storing and shipment of the components of Spectrum Analyzer Set AN/UPM-84. The equipment case has a removable cover and four carrying handles, two at each side of the case. The cover is secured to the case by eight clamp fasteners. Compartments within the case are used for stowage of the accessory cable assemblies, variable attenuators, bandpass filters, adapters, and handbooks supplied with Spectrum Analyzer Set AN/UPM-84.

1-18. ACCESSORIES. *(See figure 1-1.)*

1-19. ELECTRICAL POWER CABLE ASSEMBLY CX-3974/U (10 ft 0 in.). Input power for Spectrum Analyzer TS-1011/UPM-84 is applied from a 115-volt, 50 to 1000 cps, power source via a detachable rubber-covered light-duty electrical power cable assembly. One termination is a standard two-socket female connector, for mating the a-c input receptacle located at the rear of the equipment chassis. The other termination is a standard two-prong connector, for mating a 115-volt, 50 to 1000 cps, power source outlet.

1-20. R-F CABLE ASSEMBLIES. Three r-f cable assemblies, each of different lengths, are provided, as described below:

a. R-f Cable Assembly CG-1526/U (1 ft 6 in.) consists of type RG-9A/U coaxial cable, terminated with type UG-21D/U connectors at each end. This cable assembly is used as a jumper to connect the output of the self-contained r-f attenuators to the appropriate DIRECT INPUT jack. The jumper interconnects the lower two jacks, on the r-f tuning unit front panel, when analyzing signals in the 10 to 2120 mc range. The same jumper may also be used to interconnect the upper two jacks, on the r-f tuning unit front panel, when analyzing signals in the 2000 to 12,400 mc range, provided the type "N" R-f Cable Adapter UG-1242/UPM-84 is connected to the DIRECT INPUT jack.

b. R-f Cable Assembly CG-1526/U (6 ft 0 in.) consists of type RG-9A/U coaxial cable, terminated at each end with a type UG-21D/U connector. This cable assembly is used for interconnecting the signal under measurement to the input of the spectrum analyzer.

When analyzing high-level signals, having an amplitude greater than −20 dbm, in the frequency range from 10 mc to 12,400 mc, this r-f cable assembly may be employed to couple the signal to the appropriate ATTENUATOR INPUT jack. If spurious signals are present on the incoming signal, due to an external interfering source, one of the bandpass filters (table I) may be placed in series with R-f Cable Assembly CG-1526/U. When analyzing low-level signals having an amplitude less than −20 dbm, in the 10 to 12,400 mc frequency range, the same r-f cable assembly is used to couple the incoming signal directly to the proper DIRECT INPUT jack.

c. R-f Cable Assembly CG-1525/U (0 ft 3 in.) consists of type RG-71/U coaxial cable, terminated at each end with BNC series UG-260A/U connectors. This cable assembly is used as a jumper to interconnect the MIXER OUTPUT and IF INPUT jacks, located at the right section of the display unit front panel.

1–21. ADAPTERS. Four adapters are provided for connection to the 2000-40,880 MC DIRECT INPUT jack on the r-f tuning unit panel. One of the following adapters is required when analyzing signals in the vhf or ehf part of the spectrum, as described below:

a. R-f Cable Adapter UG-1242/UPM-84 consists of a type "N" connector, with a large hex nut having internal threads that mate the 2000-40,880 MC DIRECT INPUT jack. This adapter is used when the incoming signal falls within the frequency range from 2000 to 12,400 mc. The signal is coupled through R-f Cable Assembly CG-1526/U (6 ft 0 in.), or any other type "N" coaxial termination, to the input of the adapter.

b. Coax-to-Waveguide Adapter UG-1241/UPM-84 is a rigid waveguide coupling, which is used to couple signals over the frequency range 12,400 to 18,000 mc to the input of the spectrum analyzer.

c. Coax-to-Waveguide Adapter UG-1240/UPM-84 is a rigid waveguide coupling, which is used to couple signals over the frequency range from 18,000 to 26,500 mc to the input of the spectrum analyzer.

d. Coax-to-Waveguide Adapter UG-1239/UPM-84 is another rigid waveguide coupling, which is used to couple signals over the frequency range from 26,500 to 40,880 mc to the input of the spectrum analyzer.

1–22. VARIABLE ATTENUATORS. Three external variable r-f attenuators are provided for use with high-level incoming signals, when operating in the following discrete frequency ranges:

a. From 12,400 to 18,000 mc, Variable Attenuator CN-409/UPM-84 may be inserted between the incoming signal and Coax-to-Waveguide Adapter UG-1241/UPM-84. *(See paragraph 1-21b.)*

b. From 18,000 to 26,500 mc, Variable Attenuator CN-410/UPM-84 may be inserted between the incoming signal and Coax-to-Waveguide Adapter UG-1240/UPM-84. *(See paragraph 1-21c.)*

c. From 26,500 to 40,880 mc, Variable Attenuator CN-411/UPM-84 may be inserted between the incoming signal and Coax-to-Waveguide Adapter UG-1239/UPM-84. *(See paragraph 1-21d.)*

1–23. BANDPASS FILTERS. Five bandpass filters are provided for insertion in the signal input line to the spectrum analyzer, to eliminate spurious or other undesired responses (due to external signals) from appearing on the spectrum display. These are:

a. Bandpass Filter F-338/UPM-84, for signal analysis over the 750 to 1350 mc frequency range.

b. Bandpass Filter F-341/UPM-84, for signal analysis over the 1175 to 2250 mc frequency range.

c. Bandpass Filter F-337/UPM-84, for signal analysis over the 2000 to 3900 mc frequency range.

d. Bandpass Filter F-336/UPM-84, for signal analysis over the 3375 to 7375 mc frequency range.

e. Bandpass Filter F-335/UPM-84, for signal analysis over the 6100 to 12,100 mc frequency range.

1–24. RACK MOUNTING BRACKETS. A pair of steel rack mounting brackets is supplied, to enable mounting the spectrum analyzer in a standard 19-inch relay rack, if desired. This type of mounting permits operation of the spectrum analyzer within its dust cover. One bracket is designed for mounting to the right side of the relay rack; the other bracket is designed for mounting to the left side of the relay rack. Each bracket is secured to the bottom of the spectrum analyzer by means of three No. 10-32 screws.

1–25. ELECTRON TUBE, FUSE, AND INDICATOR LAMP COMPLEMENT.

1–26. Table III lists the types, quantities, and functions of the entire complement of electron tubes (including crystal diodes), fuses, and indicator lamps employed in the equipment. The table is arranged in numerical sequence, by the first occurrence of reference symbol. Thus, V1 listing occurs first in the tabulation. V2 and V610 are grouped together, as the second listing, because both reference symbols employ the same type (6X4W) electron tube. The listing then continues, in similar fashion, by increasing order of reference symbol appearance.

TABLE III. TUBE, FUSE, AND INDICATOR LAMP COMPLEMENT

TUBES

Ref. Symbol	Type	Qty.	Function
V1	6BL6	1	Reflex klystron local oscillator.
V2, V610	6X4W	2	V2: Protective diode, V610: Bias rectifier.
V3, V301	6AF4A	2	V3: Tuned transmission line local oscillator. V301: Spectrum calibrator oscillator.
V101, V102, V103	6J4WA	3	V101: 160 mc i-f amplifier, V102: 171 mc i-f amplifier, V103: 149 mc i-f amplifier.
V104, V201, V404	5654/6AK5W/ 6096	3	V104: 64 mc i-f amplifier, V201: 64 mc i-f amplifier, V404: Frequency tripler, 224 mc sweeper output.
V202, V203	5750/6BE6W	2	V202: Third mixer, 6 mc output, V203: Fourth mixer, 500 kc output.
V204, V205 V402	6186/6AG5WA	3	V204: 500 kc i-f amplifier, V205: 500 kc i-f amplifier, V402: 74.7 mc sweeper amplifier.
V401, V502, V503, V507	5814WA	4	V401: Sweep amplifier, V502A: Sawtooth amplifier, V502B: Blanking amplifier. V503: Blanking multivibrator, V507A: Phantastron cathode follower, V507B: Intensifier Amplifier.
V403	6AN5	1	74.7 mc sweeper amplifier.
V501	5751WA	1	Horizontal amplifier.
V504, V505	6AU6WA	2	Vertical amplifiers.
V506	5725/6AS6W/ 6187	1	Phantastron sweep oscillator.
V508, V603, V612,V614	12AT7WA	4	V508: Sweeper driver stage, V603: Reflector supply voltage control stage, V612, V614: 300-volt supply voltage control stages.
V601, V608, V609	5R4WGA	3	V601: Reflector supply full-wave rectifier, V608, V609: 300-volt supply full-wave rectifiers.
V602, V616	6098/6AR6WA	2	V602: Reflector supply series regulator, V616: Cathode-ray tube supply high-voltage oscillator.
V604, V605, V606, V615	OA2WA	4	V604, V605, V606: Reflector supply voltage reference stages, V615: Bias supply voltage regulator.
V607	OB2WA	1	Reflector supply voltage reference stage.
V611, V613	6080WA	2	300-volt supply series regulators.
V617, V618	1Z2	2	Cathode-ray tube supply, halfwave rectifiers.
V619	5ADP7	1	Cathode-ray tube.
TOTAL		44	

TABLE III. TUBE, FUSE, AND INDICATOR LAMP COMPLEMENT (c nt)

Ref. Symbol	Type	Qty.	Function
CRYSTAL DIODES			
CR1	1N78	1	Klystron local-oscillator crystal mixer.
CR2	1N21B	1	Tuned transmission line local-oscillator crystal mixer.
CR3, CR201, CR501	1N69	3	CR3: Line voltage rectifier, metering circuit. CR201: Video detector. CR501: Shaping diode.
CR101	1N82	1	64 mc crystal mixer.
TOTAL		6	
FUSES			
F601, F602	FO2G5R00A	2	Active power line protective fuses.
F603, F604	FO2G5R00A	2	Spares.
TOTAL		4	
INDICATOR LAMPS			
DS1, DS2, DS3, DS4, DS602, DS603, DS604, DS605, DS606	G.E. No. 47	9	DS1 through DS4: Tuning dial illuminators. DS602: POWER on pilot lamp. DS603 through DS606: Cathode-ray tube graticule illuminators.
DS601	AN3121-1819	1	KLYSTRON on pilot lamp.
TOTAL		10	

1–27. GENERAL. *(See figure 1–3.)*

1–28. The controls, indicators, and connectors to which reference is made in the operating procedures are shown in figure 1-3; their functions are listed in table IV.

1–29. POWER CONNECTION. *(See figure 1–4.)*

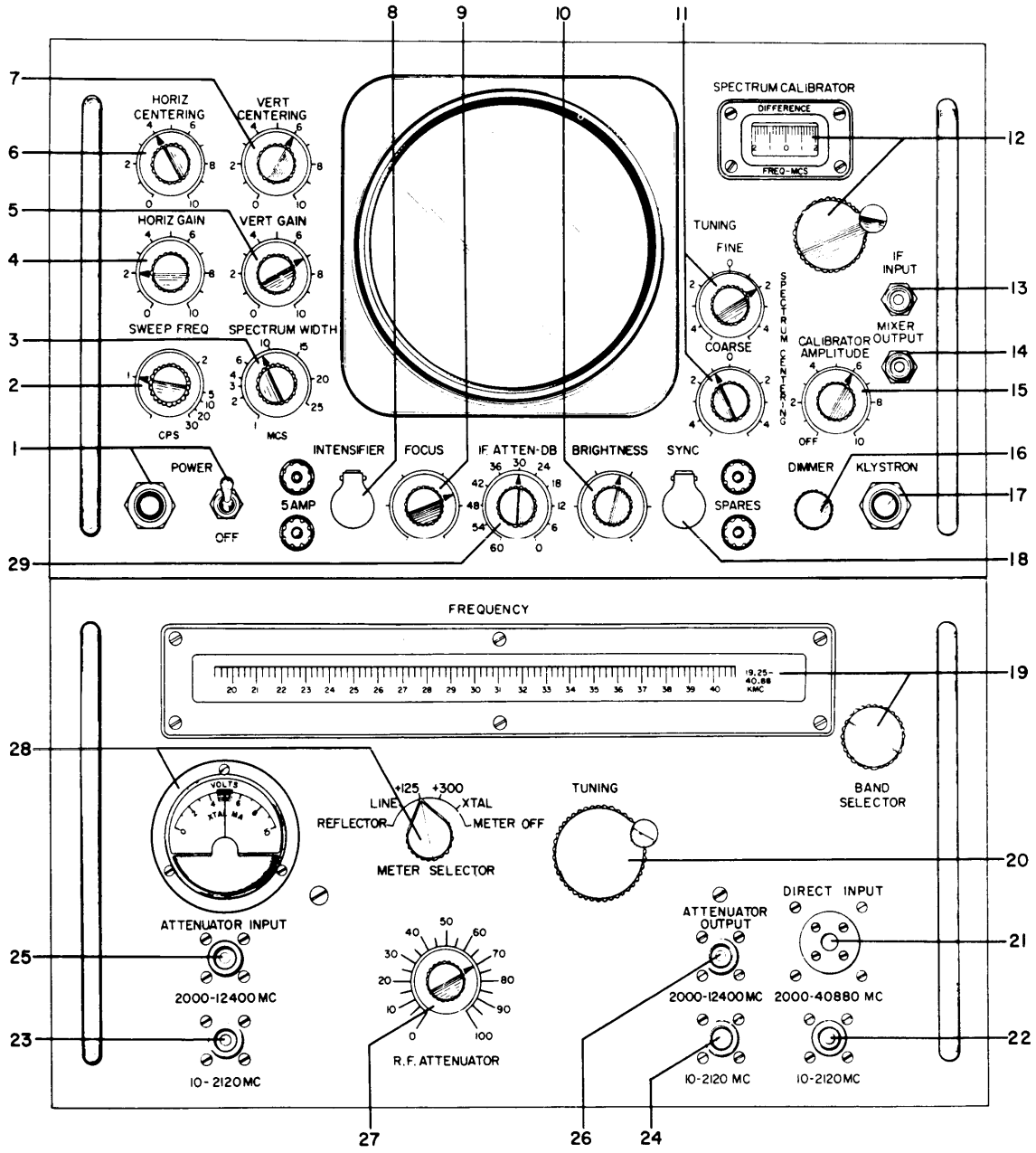
1–30. Apply operating power to the spectrum analyzer as directed in the following steps:

a. Connect a nominal 115-volt, 50 to 1000 cps, power source to the power input receptacle, at the rear of the instrument case, via Electrical Power Cable Assembly CX-3974/U (10 ft 0 in.).

b. Place the POWER-OFF switch to the POWER position; illumination of the POWER pilot lamp, at the left side of the display unit panel, indicates that the low-voltage circuits are energized. After a 45-second delay, the KLYSTRON pilot lamp, at the right side of the panel, should become illuminated. This indication shows that the klystron power supply is energized.

1–31. OPERATING CONTROLS, INDICATORS, AND CONNECTORS.

1–32. Table IV lists the panel designation, index number of figure 1–3, and the function of all operating controls, indicators, and connectors located on the equipment front panel.



1. POWER-OFF switch and POWER pilot lamp
2. SWEEP FREQ-CPS control
3. SPECTRUM WIDTH-MCS control
4. HORIZ GAIN control
5. VERT GAIN control
6. HORIZ CENTERING control
7. VERT CENTERING control
8. INTENSIFIER control
9. FOCUS control
10. BRIGHTNESS control
11. SPECTRUM CENTERING FINE and COARSE controls
12. SPECTRUM CALIBRATOR dial and TUNING control
13. IF INPUT connector
14. MIXER OUTPUT connector
15. CALIBRATOR AMPLITUDE control
16. DIMMER control
17. KLYSTRON pilot lamp
18. SYNC control
19. FREQUENCY dial and BAND SELECTOR control
20. TUNING control
21. DIRECT INPUT: 2000-40,880 MC jack
22. DIRECT INPUT: 10-2120 MC jack
23. ATTENUATOR INPUT: 10-2120 MC jack
24. ATTENUATOR OUTPUT: 10-2120 MC jack
25. ATTENUATOR INPUT: 2000-12,400 MC jack
26. ATTENUATOR OUTPUT: 2000-12,-400 MC jack
27. R-F ATTENUATOR control
28. METER SELECTOR and Monitoring Meter
29. IF ATTEN-DB selector

Figure 1–3. Spectrum Analyzer TS-1011/UPM-84, Operating Controls and Conn ctors

TABLE IV. OPERATING CONTROLS, INDICATORS, AND CONNECTORS

Panel Designation	Index No.	Function
POWER-OFF switch and POWER pilot lamp	1	POWER-OFF switch closes the circuit in the primary of the power transformers to apply a-c power via power cable assembly supplied. Illumination of pilot lamp indicates that low-voltage power supplies are energized.
SWEEP FREQ-CPS	2	Provides an adjustable sweep repetition rate, from 1 to 30 cps.
SPECTRUM WIDTH-MCS	3	Provides an adjustable spectrum display, from 500 kc to 25 mc.
HORIZ GAIN	4	Varies the gain of the horizontal deflection amplifier, to change the width of the horizontal trace on the cathode-ray tube (hereafter referred to as crt).
VERT GAIN	5	Varies the gain of the vertical deflection amplifier, to change the height of the display appearing on the crt.
HORIZ CENTERING	6	Shifts the trace left or right on the crt.
VERT CENTERING	7	Shifts the trace up or down on the crt.
INTENSIFIER	8	Sets the level of intensification of the signal displayed on the crt.
FOCUS	9	Provides control over the sharpness of the crt trace.
BRIGHTNESS	10	Controls the intensity of the trace on the crt.
SPECTRUM CENTERING FINE and COARSE controls	11	Controls the center frequency of the 224 mc sweep frequency generator.
SPECTRUM CALIBRATOR dial and TUNING control	12	Rotation of the TUNING control permits relocating the calibrating marker pip within ± 12.5 mc of the i-f bandpass. Variation from center frequency is shown on the dial.
IF INPUT connector	13	Provides convenient terminal point for injecting the output of the r-f tuning unit, or an external test signal, into the display unit circuits.
MIXER OUTPUT connector	14	Provides convenient terminal point for access to the output of the r-f tuning unit.
CALIBRATOR AMPLITUDE	15	Controls the height of the calibrating pip on the screen, or removes the calibrating pip when control is rotated to its counterclockwise OFF position.
DIMMER	16	Controls illumination of the crt graticule.
KLYSTRON pilot lamp	17	Illumination of pilot lamp indicates that the klystron high-voltage power supply is energized.
SYNC	18	Varies the synchronizing voltage, to lock the sawtooth generator to submultiple of the line frequency.
FREQUENCY dial and BAND SELECTOR control	19	This control selects the proper scale on the FREQUENCY drum, corresponding to the r-f input signal under measurement.
TUNING	20	Controls the operating frequency, as indicated on the direct-reading FREQUENCY scale.

TABLE IV. OPERATING CONTROLS, INDICATORS, AND CONNECTORS (cont)

Panel Designation	Index No.	Function
DIRECT INPUT: 2000-40,880 MC	21	R-f input connection for low-level signal, within the frequency range indicated. This connection utilizes the maximum sensitivity of the instrument.
DIRECT INPUT: 10-2120 MC	22	R-f input connection for low-level signal, within the frequency range indicated. This connection utilizes the maximum sensitivity of the instrument.
ATTENUATOR INPUT: 10-2120 MC	23	R-f input connection for high-level signal (greater than −20 dbm) in the frequency range indicated. This connection utilizes the internal attenuator.
ATTENUATOR OUTPUT: 10-2120 MC	24	Provides convenient access to the attenuated r-f signal, in the frequency range indicated.
ATTENUATOR INPUT: 2000-12,400 MC	25	R-f input connection for high-level signal (greater than −20 dbm) in the frequency range indicated. This connection utilizes the internal attenuator.
ATTENUATOR OUTPUT: 2000-12,400 MC	26	Provides convenient access to the attenuated r-f signal, in the frequency range indicated.
R-F ATTENUATOR	27	Provides a means of attenuating an input signal connected to either ATTENUATOR INPUT jack, over the range from zero to 100 db.
METER SELECTOR and Monitoring Meter	28	Provides a means of monitoring any one of four voltages and the first crystal mixer current, when the selector is in any position other than METER OFF.
IF ATTEN-DB	29	Controls the gain of the narrow-band i-f amplifier, in 6 db steps over the range zero to 60 db.

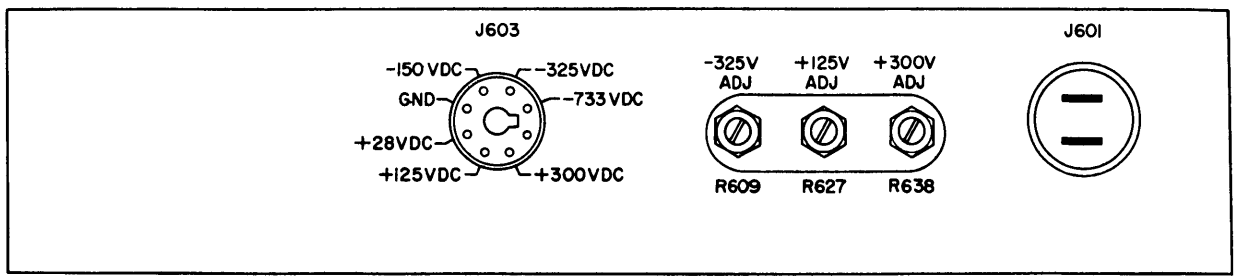


Figure 1-4. Connectors and Adjustment Controls, Rear of Instrument

1–33. GENERAL ELECTRICAL CHARACTERISTICS.

1–34. The general electrical characteristics, capabilities, and limitations of the spectrum analyzer are listed below:

a. Frequency Range	10 to 40,880 mc, covered in eight bands.
b. Power Requirements	103.5 to 126.5 volts rms ac, 50 to 1000 cps, 380 watts power consumption.
c. Spectrum Display	Power on the vertical axis, versus frequency on the horizontal axis.
d. Resolution Bandwidth (at the 3 db points)	20 kc at all frequencies.
e. Frequency Dispersion:	
Over the tuning range from 10 to 55 mc	500 kc to 5 mc, adjustable.
Over the tuning range from 55 mc to 40,880 mc	500 kc to 25 mc, adjustable.
f. Sweep Repetition Rate	1 to 30 cps, adjustable.
g. Sweeper Frequency	224 mc center frequency, capable of ± 12.5 mc deviation.
h. Synchronization	Internal line frequency.
i. Intermediate Frequencies:	
First i-f	160 mc center frequency with a bandwidth of 25 mc.
Second i-f	64 mc.
Third i-f	6 mc.
Fourth i-f	500 kc.
j. Spectrum Calibrator Frequency	160 mc center frequency with a tuning range of ± 12.5 mc.
k. Spectrum Calibrator Accuracy	± 5% of the available display, or ± 1 mc for the maximum display.
l. Frequency Accuracy	± 1% of the fundamental local-oscillator frequency.
m. Sensitivity (Minimum Discernible Signal):	
10 mc to 150 mc	— 63 dbm.
150 mc to 300 mc	— 57 dbm.
350 mc to 1,000 mc	— 51 dbm.
1,000 mc to 2,000 mc	— 50 dbm.
2,000 mc to 16,000 mc	— 40 dbm.
16,000 mc to 40,880 mc	— 40 dbm. nominal
n. R-f Attenuation:	
From 10 mc to 12,400 mc	100 db, uncalibrated, continuously variable through the use of two self-contained attenuators.
From 12,400 mc to 40,880 mc	Uncalibrated; 3 external attenuators supplied (40 db range).
o. I-f attenuation	From 0 to 60 db, step-variable in nominal 6 db increments.
p. Cathode-ray Tube	5 inch, phosphor coating.
q. Operating Temperature Range	0 degrees C (32 degrees F) to 55 degrees C (131 degrees F).

SECTION II

TEST EQUIPMENT AND SPECIAL TOOLS

2–1. TEST EQUIPMENT.

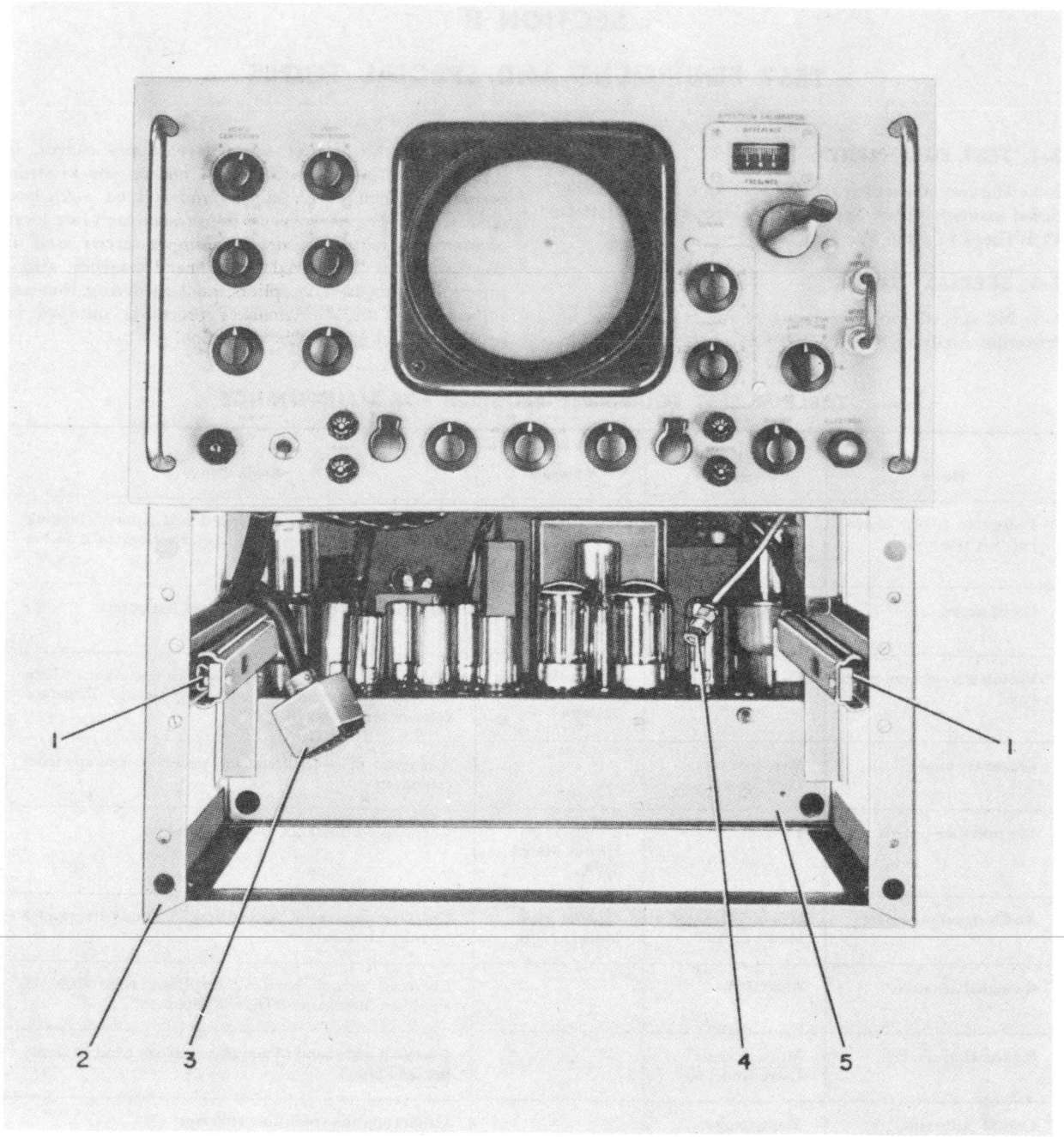
2–2. The test equipment required for field and organizational maintenance of Spectrum Analyzer Set AN/UPM-84 is listed in table V.

2–3. SPECIAL TOOLS.

2–4. No special tools are required for maintenance of Spectrum Analyzer Set AN/UPM-84. A spanner wrench, mounted at the rear of the power supply chassis, is supplied for loosening the barrel nut on the klystron oscillator assembly. A set of four splined wrenches, mounted on the rear cover of the transmission-line local oscillator, is supplied for loosening set screws used in the equipment. Standard socket head wrenches, aligning tools, screwdrivers, pliers, and a soldering iron are sufficient for the maintenance procedures outlined in sections V and VI of this handbook.

TABLE V. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

Name	AN Type or Mfr's Designation	Alternate	Application
Voltmeter 20,000 ohms-per-volt sensitivity	Multimeter TS-352/U	Simpson 260	Checking voltages at designated test points; checking voltage and resistance measurements from tube socket terminals to chassis ground.
Oscilloscope	AN/USM-24	Tektronix Model 531	Observing waveforms at designated test points.
Voltmeter, vacuum-tube type	TS-505/U	RCA Voltohmyst Senior, Model WV98A	Checking voltages at high impedance test points, where loading of conventional voltmeter would introduce error in measurement.
Frequency meter	Measurements Corp. Model 59		Alignment of sweep frequency generator and spectrum calibrator.
Electron tube tester	TV-2/U	TV-3B/U or Hickok Model 547A	Checking performance of electron tubes.
Audio signal generator	Hewlett-Packard Model 200CD	General Radio Model 1210B	Checking response of vertical amplifier and performance of video circuits.
R-f signal generator	AN/USM-44		Checking narrow band i-f amplifier, wide band i-f amplifier, attenuator AT4, and filters.
R-f signal generator	Measurements Corp. Model 80		Checking wide band i-f amplifier, narrow band i-f amplifier, and filters.
Crystal calibrator	Measurements Corp. Model 111B		Calibrating the spectrum calibrator.
R-f signal generator	AN/URM-34		Checking performance of attenuator AT3.
High-frequency receiver	AN/APR-4		Checking alignment of filters.
Crystal test set	TS-268/UP	AIL Model 390A	Checking crystals in r-f tuning unit and in display unit.
Wavemeter	Polarad Model FS		Checking performance of klystron local oscillator.



1. Roller Slide and Track Assembly
2. Frame Assembly
3. Power Connector P36
4. Coaxial Connector P21
5. Power Supply Chassis

Figure 3–1. Spectrum Analyzer TS-1011/UPM-84, showing R-f Tuning Unit Removed from Frame

SECTION III

PREPARATION FOR USE AND RESHIPMENT

3–1. PREPARATION FOR USE.

3–2. Spectrum Analyzer Set AN/UPM-84 is complete in one portable unit and is ready for use upon delivery. No permanent or special installation procedures are necessary. Upon delivery, the equipment should be checked however, to make certain that no damage has occurred during shipment. To prepare the equipment for operation, proceed as directed in the following steps:

WARNING

The packaged equipment, including Electronic Equipment Case CY-2074/UPM-84, weighs approximately 225 pounds. It is strongly recommended that two personnel be employed at all times in lifting, unpacking, transporting, and repacking the equipment.

a. Grasp Electronic Equipment Case CY-2074/UPM-84 by its four recessed handles. Place the equipment case on a work bench so that its widest dimension (23-1/8 inches) is resting on the bench.

b. Allow approximately eight inches, at the forward end of the equipment case, to protrude beyond the front edge of the work bench. This arrangement will permit the latches, which secure the cover to the equipment case, to be accessible.

c. Unlatch the eight fasteners from the cover of Electronic Equipment Case CY-2074/UPM-84. Lift the cover from the front end of the case and place the cover on the work bench.

d. With two men working at opposite sides of the equipment case, grasp the two front handles on the upper (display) unit. Carefully slide Spectrum Analyzer TS-1011/UPM-84 forward and out of the equipment case. Place the spectrum analyzer on the work bench in a convenient position near the equipment to be tested, but outside of any direct, strong, r-f field.

3–3. INSPECTION OF MAJOR COMPONENTS.

(See Figure 3–1.)

3–4. SPECTRUM ANALYZER TS-1011/UPM-84. To perform a visual inspection of the spectrum analyzer, proceed as directed in the following steps:

a. Access to the components of the r-f tuning unit may be obtained by first setting the tuning dial to the extreme high frequency end, and then loosening the four captive screws (located under the handles on the front panel). Then carefully withdraw the tuning unit, on its roller slide and track, from the main chassis. The two chassis may then be completely separated by disconnecting power connector P36 (3, figure 3–1) and coaxial connector P21 (4, figure 3–1) from their mating receptacles on the r-f tuning unit. Examine the tuning unit assembly for any evidence of damage to components. Check rotation of the TUNING control for any signs of binding or excessive backlash. Check the klystron assembly for signs of mechanical misalignment or rough handling. (Refer to figures 6–13 and 6–14 for top and bottom views of the r-f tuning unit.)

b. Access to all other components may then be obtained by removing the instrument case. To remove the case, turn the four camloc fasteners, located at the rear of the instrument, a half-turn counterclockwise and slide the main chassis out of the case. Examine the subassemblies of the display unit for any evidence of damage to components or tube breakage. Make certain that all tubes are firmly seated in their sockets. (Refer to figures 5–1 through 5–3 for top, left, and right side views of the equipment.)

c. Upon completion of visual and mechanical inspection, replace the display unit within its instrument case. Place the r-f tuning unit directly in front of the display unit, and reconnect power connector P36 (3) and coaxial connector P21 (4) to their respective jacks on the r-f tuning unit. Then slide the r-f tuning unit back into the frame assembly (5). Secure the r-f tuning unit to the frame assembly by tightening the four front panel captive screws in place.

3–5. ACCESSORIES. Refer to figure 1–1 and to table I for a complete listing of the various cable assemblies, variable attenuators, bandpass filters, and adapters supplied with the equipment. Remove the accessories from the test set case. Visually inspect each component for cut or frayed insulation, kinks in wiring, and/or bent electrical contacts. No attempt should be made, at this time, to disassemble the accessories for a visual inspection of the components within the housings. If no obvious repairs are required, replace all accessories and cable assemblies into the proper compartments of the case, so that they will be readily accessible when required for a particular test set-up.

3–6. PREPARATION FOR RESHIPMENT.

3–7. To prepare the spectrum analyzer for reshipment, proceed as directed below:

a. Remove the electrical power cable assembly from the power source outlet and from the POWER INPUT receptacle on the spectrum analyzer rear panel. Stow the electrical power cable assembly in the proper compartment of the test set case.

b. Disconnect cords, adapters, attenuators, etc., between any external equipment which has been undergoing tests, and from the input jacks of the spectrum analyzer. Stow the accessories in the test set case storage compartment.

c. After checking that all cable assemblies, cords, and accessories have been removed from the equipment and stored in the test set case, place the test set case on the work bench. Grasp the spectrum analyzer by the handles provided on the front panel, and slide it into the main compartment of the test set case. Place the cover over the top of the case, and latch the eight clasps on the main body of the case securely to the catches on the cover. The equipment is now ready for transit.

SECTION IV

THEORY OF OPERATION

4-1. BRIEF CIRCUIT DESCRIPTION.

(See figure 4-1.)

4-2. INTRODUCTION. Spectrum Analyzer Set AN/UPM-84 is a multiple-conversion, superheterodyne receiver, covering the range of 10 mc to 40,880 mc in eight overlapping bands. The instrument provides a cathode-ray tube display of power, as a function of frequency, of an r-f signal lying within its tuning range. The high resolution of the instrument permits accurate measurements of signals, at small frequency increments. Analysis of all conventional types of a-m, f-m, and pulsed r-f signals can be made. The spectrum analyzer consists essentially of an r-f tuner, a wide band amplifier (160 mc center frequency), a narrow band amplifier (20 kc final bandwidth), a sweep frequency generator, a spectrum calibrator, video and sweep circuitry for the visual display, and five power supplies.

4-3. R-F TUNER. The r-f tuner consists of two variable r-f attenuators, two crystal mixers, two local oscillators, two low-pass filters, and a precision drive mechanism for simultaneous tracking of the local oscillators with rotation of the tuning control. Special shielding is provided to minimize leakage radiation, and to permit satisfactory operation in the presence of high-powered transmitters.

a. The two r-f attenuators serve to attenuate high level r-f signals applied to the crystal mixers. The first attenuator covers the range from 10 mc to 2120 mc; the second attenuator covers the range from 2000 mc to 12,400 mc. For the range 12,400 mc to 40,880 mc, three external attenuators are employed. (See figure 1-1.)

b. The crystal mixers convert the incoming r-f signal to a frequency of 160 mc, for amplification by the wide band amplifier. The r-f signals are applied to the appropriate DIRECT INPUT jack, which couples the input signal to the proper mixer. For the first three bands, covering the signal frequency range from 10 to 2120 mc, crystal mixer CR2 is used. For the remaining five bands, covering the signal frequency range from 2000 to 40,880 mc, CR1 functions as the crystal mixer.

c. The low-frequency local oscillator consists of a transmission line oscillator circuit, employing a uhf triode. For high frequency operation, a klystron local oscillator is employed, with rotation of the tuning control automatically tracking cavity length, klystron voltage, and tuning scale indication. Simultaneous tuning of the low-frequency and high-frequency local oscillators is accomplished by means of a precision mechanical drive system.

d. The wide band and narrow band low-pass filters serve to suppress any spurious beat frequencies caused between any oscillator harmonics and incoming r-f signal harmonics. The narrow band filter also serves to limit the bandwidth of the i-f signal, when tuning the spectrum analyzer over the signal frequency range from 10 to 55 mc.

4-4. WIDE BAND I-F AMPLIFIER. The wide band i-f amplifier is a stagger-tuned triplet, which offers some selectivity to the i-f signal and also serves to raise the i-f signal level to a value suitable for reconversion and display of video information. The 160-mc output of the stagger-tuned triplet stage is applied to a second crystal mixer (CR101), for heterodyning with the output of the sweep frequency generator, which operates at a center frequency of 224 mc. The resultant 64-mc signal is applied to the narrow-band i-f amplifier.

4-5. SWEEP FREQUENCY GENERATOR. The sweep frequency generator is a swept signal local oscillator, whose center frequency and frequency deviation may be varied linearly with respect to time. The sweep frequency generator consists of a sawtooth swept oscillator, several tuned amplifiers that multiply the swept oscillator frequency to the final 224-mc center frequency, and a band-pass filter to suppress spurious responses. The change in center frequency is set by the front panel SPECTRUM CENTERING COARSE and FINE controls, while the sweep deviation is varied by means of a SPECTRUM WIDTH control. The output of the sweep frequency generator is fed to the second crystal mixer (CR101), and heterodynes with the output of the wide band amplifier to produce the second intermediate frequency of 64 mc.

4-6. NARROW BAND I-F AMPLIFIER. The narrow band i-f amplifier serves to amplify the 64 mc signal from the wide band i-f amplifier, and to produce a final i-f center frequency of 500 kc. Two converter stages are employed within the narrow band i-f amplifier to effect the conversion of the incoming 64 mc signal to the final i-f center frequency of 500 kc. The first converter stage heterodynes the amplified 64 mc signal with the second harmonic (58 mc) of a 29 mc crystal oscillator, to produce a 6 mc carrier. The 6 mc carrier is then mixed, in the second converter, with a 6.5 mc local oscillator to produce the final center frequency of 500 kc. This signal is amplified and detected by CR201, to yield the desired video information. The overall bandwidth of this amplifier is narrow (20 kc), resulting in a video display of high resolution, constant over the

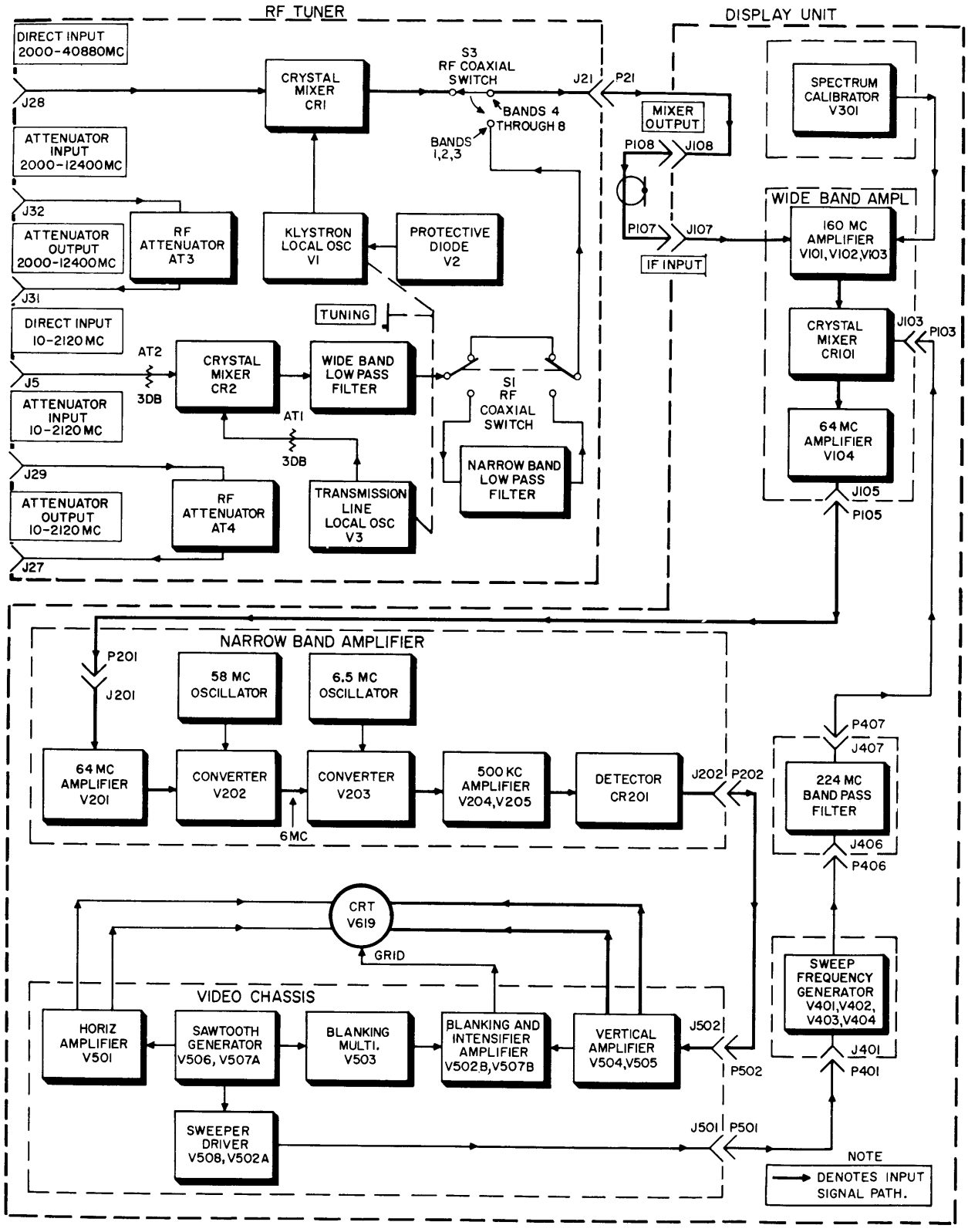


Figure 4–1. Spectrum Analyzer S t AN/UPM-84, Overall Block Diagram

entire tuning range of 10 to 40,880 mc. The output of the final i-f amplifier is detected by a crystal diode (CR201), and applied to the amplifiers within the video chassis.

4–7. VIDEO CHASSIS. The video chassis includes circuitry for amplifying the detected i-f signal before it is applied to the cathode-ray tube, for developing the necessary sweep voltages, for intensifying the video information displayed on the screen and for blanking out the sweep retrace. The sawtooth sweep voltage drives the horizontal deflection amplifiers, as well as the sweep frequency generator driver circuit. The sawtooth sweep generator can be synchronized with the applied a-c line voltage. Provision is made for front panel control of the amplitude of the synchronizing voltage.

4–8. SPECTRUM CALIBRATOR. The main function of the spectrum calibrator is to provide a variable-frequency marker pip, on the cathode-ray tube display, for calibrating the spectrum and for making vernier frequency measurements. A subsidiary purpose is to obtain a fast, visual check of i-f and video system performance. These measurements may be required in determining: the side-band frequencies present in the portion of the spectrum displayed, frequency separation of adjacent signals, spectrum width or relative amplitude of side lobes. A dial, designated DIFFERENCE FREQ-MCS, is engraved at 0.2 mc increments over the entire sweep range. The dial covers limits from zero (referred to center of display) to 12.5 mc each side of zero. The spectrum calibrator TUNING control is used for locating the calibrating pip at any desired point on the display. Provision is made for front panel control of the amplitude of the calibrating pip.

4–9. POWER SUPPLIES. Included in the display unit are five power supplies. Low ripple content and a high degree of regulation on the regulated supplies assure a low percentage of amplitude and frequency modulation. The basic circuits include the following:

a. One regulated supply for developing the negative potentials for the klystron cathode and reflector.

b. One dual supply for providing the positive potentials required by the various circuits in the display unit, and by the transmission-line local oscillator.

c. A third supply for providing the negative low-voltage bias potentials required in the video chassis circuits.

d. A fourth supply for developing the high-voltages required by the cathode-ray tube.

e. A fifth supply for developing plus 28 volts dc, for operation of the relays within the instrument.

4–10. R-F CIRCUITS FOR BANDS 1 TO 3, DETAILED DESCRIPTION. *(See figure 7–1.)*

4–11. SIGNAL PATH. The low frequency bands (one through three) cover the frequency range from 10 mc to 2120 mc. For these bands of operation, two types of input are available.

a. DIRECT INPUT. When observing low-level signals (−20 dbm or below), the r-f signal is applied to DIRECT INPUT jack J5. This jack is internally connected to a three-db pad, designated AT2, for isolation purposes. The signal is applied to crystal mixer CR2, through a type UG-28/U tee adapter. Reference to figure 7–1 shows that the tee adapter mates with the signal input jack J6, crystal mixer jack J7, and local-oscillator output jack J4. Coaxial cable W5, which terminates in mating plug P3 and jack J4, interconnects the output of the local oscillator to the input of the tee adapter.

b. ATTENUATOR INPUT. When observing high-level signals (−20 dbm or higher), r-f attenuator AT4 is employed to couple the signal to DIRECT INPUT jack J5. This connection reduces the possibility of mixer CR2 burnout and simultaneously brings the signal level within the dynamic signal handling ability of the spectrum analyzer. When employing r-f attenuator AT4, connection is made to ATTENUATOR INPUT jack J29. The attenuator is a piston type waveguide-beyond-cutoff device, and employs mutual inductance coupling to provide a means of controlling the amplitude of the signal applied to crystal mixer CR2. The attenuated r-f signal is present at front panel ATTENUATOR OUTPUT jack J27. By attaching R-F Cable Assembly CG-1526/U (1 ft 6 in.) between the ATTENUATOR OUTPUT jack and the DIRECT INPUT jack, the attenuated signal is coupled to fixed pad AT2. Signal attenuation up to 100 db may be obtained by means of RF ATTENUATOR AT4. The signal path is then identical to that described in sub-paragraph a, above.

4–12. TRANSMISSION-LINE LOCAL OSCILLATOR DESCRIPTION. (See figure 4–2.) The local oscillator for bands 1, 2, and 3 consists of a high frequency triode (V3) employed as a transmission-line type of uhf oscillator. This oscillator utilizes a resonant section of transmission line as its tuned circuit. Tuning is accomplished by changing the position of an r-f shorting bar on a parallel-track transmission line. The method of tuning varies the inductance in the tuned-plate circuit, to resonate with the sum of capacitor C3 and the stray plate-grid capacitance. Trimmer capacitor C1 is provided to insure proper tracking over the entire frequency

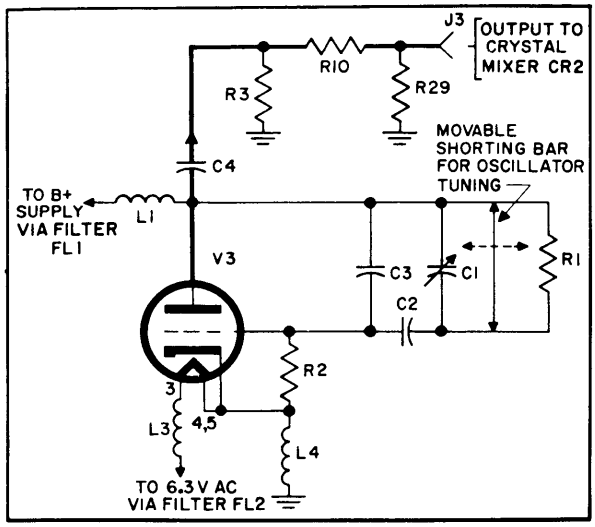


Figure 4–2. Transmission Line Oscillator, Simplified Schematic

range. In band 1 operation, V3 oscillates at a fundamental frequency of 160 mc above the incoming signal. For bands 2 and 3, the second and fourth harmonics are employed, respectively, to mix with the incoming signal. The output of the oscillator is coupled to the type UG-28/U tee adapter by a fixed attenuator network, formed by C4, R3, R10 and R29. Both plate and filament supplies are carefully filtered to minimize incidental amplitude and frequency modulation of the displayed spectrum.

4–13. R-F CIRCUITS FOR BANDS 4 TO 8, DETAILED DESCRIPTION. *(See figure 7–1.)*

4–14. SIGNAL PATH. The five high frequency bands, 4 through 8, cover the frequency range from 2000 mc to 40,880 mc. In bands 4, 5, and a portion of band 6 (covering a frequency range of 2000 to 12,400 mc), two types of input are available.

a. DIRECT INPUT. When observing low-level signals (−20 dbm or below), the r-f signal is applied through DIRECT INPUT jack J28 to crystal mixer CR1. The signal from klystron local oscillator V1 is coupled directly to crystal mixer CR1, to heterodyne with the incoming signal.

b. ATTENUATOR INPUT. When observing high-level signals (−20 dbm or higher), r-f attenuator AT3 is employed to couple the signal to DIRECT INPUT jack J28. This connection reduces the possibility of mixer CR1 burnout and simultaneously brings the signal level within the dynamic signal handling ability of the spectrum analyzer. When employing r-f attenuator AT3, connection is made to ATTENUATOR INPUT jack J31. This attenuator is a piston type waveguide-beyond-cutoff device and is similar in design to AT4 (previously described in paragraph 4-11). Both AT3 and AT4 are ganged together, and move simultaneously as the RF ATTENUATOR control is rotated. The attenuated r-f output signal is accessible at front panel ATTENUATOR OUTPUT jack J32. By attaching R-F Cable Assembly CG-1526/U (1 ft 6 in.) between the ATTENUATOR OUTPUT jack and the DIRECT INPUT jack, the attenuated signal is coupled directly to crystal mixer CR1. Signal attenuation up to 100 db may be obtained by means of RF ATTENUATOR AT3.

c. When observing high-level signals in the higher bands (namely the upper end of band six, as well as bands seven and eight, covering a wave-guide frequency range of 12,400 to 40,880 mc), external attenuators are employed. Table I lists three variable attenuators supplied to cover the frequency range of 12.4 to 40.0 kmc. Three coax-to-waveguide adapters for use with the above attenuators are also listed.

4–15. KLYSTRON LOCAL OSCILLATOR DESCRIPTION. (See figures 4–3 and 4–4.) The local oscillator employed for bands 4 through 8 is a klystron tube, V1, shown in figure 4–3. The klystron oscillator circuit is that of a velocity modulation tube, operating in an external resonant cavity. The cavity employed is in the form of a coaxial transmission line, and consists of two cylinders, one inside the other. The klystron tube is

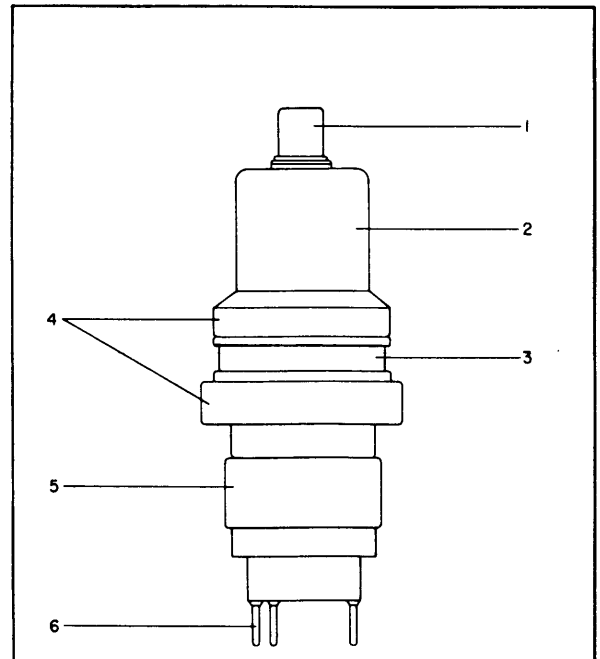


Figure 4–3. Klystr n Tube, Outlin Drawing

inserted at one end of this line so that the outer cylinder makes contact with the first interaction grid (so termed because it is closer to the cathode). The inner cylinder makes contact with the second interaction grid. At the other end of the cavity, the circuit is completed by a movable non-contacting shorting plunger of special construction. The position of this movable short determines the resonant frequency of the cavity.

a. Reference to figure 4-4 shows that the cathode of klystron V1 is fixed. The reflector voltage is varied by the tracking potentiometer, as the operating frequency is changed. The maximum reflector voltage is limited by the reflector supply and by the setting of HIGH LIMIT ADJUST control R7. The minimum reflector voltage is determined by the setting of LOW LIMIT ADJUST control R5. Thus, the reflector is always maintained negative, with respect to the cathode.

b. For this reason, the electrons that pass through the resonator grids encounter a strong decelerating field and are slowed to a stop; they are then accelerated in the reverse direction towards the cathode. A bunching process is thus caused by the accelerating and decelerating action. If the r-f energy extracted from the electrons by the cavity on the return trip exceeds that lost in the cavity, the excess energy is available as useful output power and the tube functions as an oscillator.

c. In order to maintain the proper phase between the r-f oscillations and the return of bunched electrons to the cavity as the frequency is changed, the plunger is ganged with tracking potentiometer R6. This circuit constitutes the bleeder for the klystron reflector supply. Protective diode V2, a duo-diode tube, is connected between the cathode and the reflector. This tube serves to keep the reflector from going positive with respect to the cathode, and possibly damaging the klystron.

4-16. LOW PASS FILTERS.

(See figures 4-5 and 4-6.)

4-17. DESCRIPTION. When operating in bands 1 through 3, either one or two low pass filters are connected in series with the output of crystal mixer CR2. These filters are essential to prevent spurious signals (developed by the crystal mixers because of oscillator or signal feedthrough) from passing through the i-f amplifiers and ultimately appearing on the display. Two separate filters are provided. One is a wide-band low pass type, which is permanently across the output of crystal mixer CR2; the other is a narrow-band low pass type, which is switched in series with the wide-band low pass filter only when operating in the 10 mc to 55 mc portion of band one.

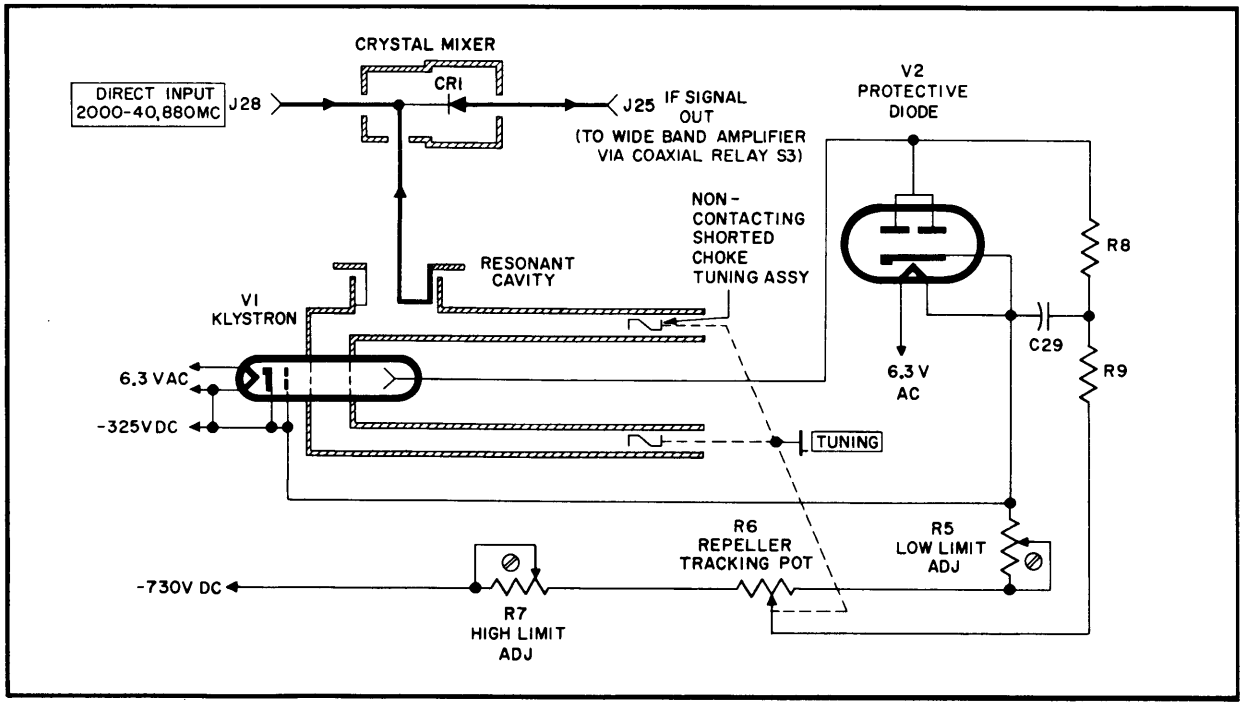


Figure 4-4. Klystron Local-Oscillat r, Simplifi d Schematic

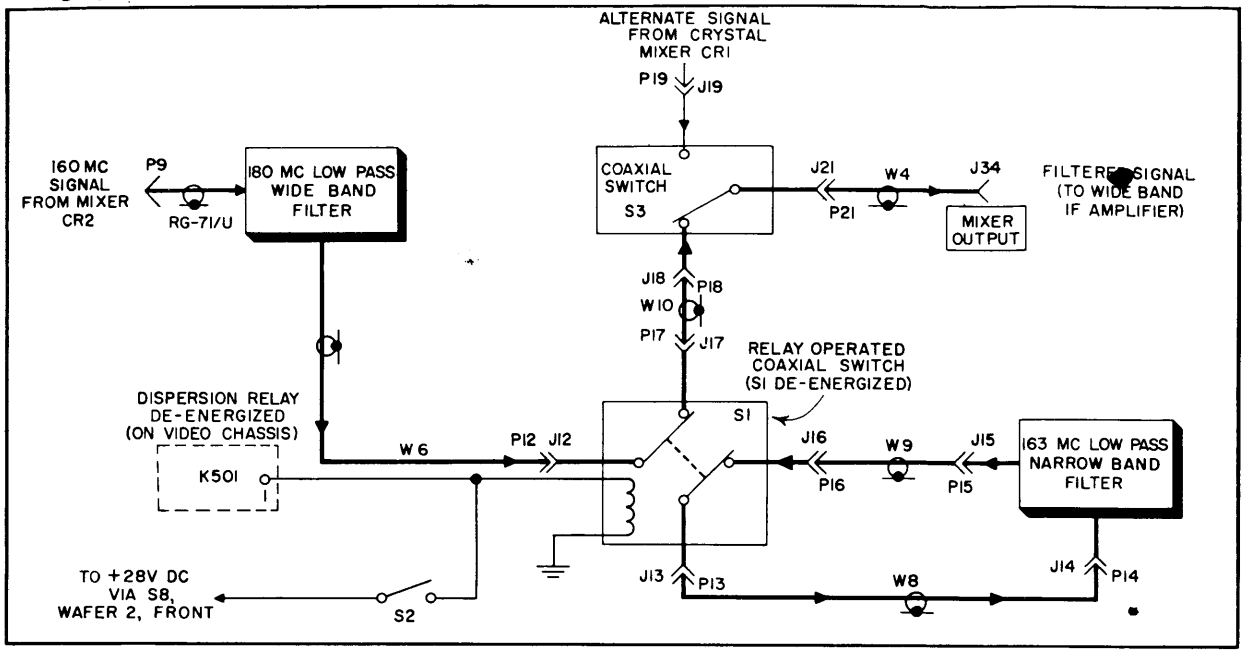


Figure 4–5. R-f Tuning Unit Relay Circuits, 55-2120 Mc Operation, with Relay S1 De-energized

a. The wide-band low pass filter is nominally tuned to 180 mc and is connected to the output of crystal mixer CR2. (See figure 4–5.) The signal from the output of CR2 is coupled by way of mating connectors J9 and P9 to the input of the 180 mc filter. This filter serves to attenuate spurious signals (developed in crystal mixer CR2) and extraneous oscillator signals from passing through to the i-f amplifiers. At the same time, the desired i-f frequency, centered at 160 mc, is allowed to pass with little attenuation.

b. The narrow-band low pass filter is nominally tuned to 163 mc, and is connected in series with the output of the 180 mc filter only when operating over the frequency range of 10 to 55 mc. (See figure 4–6.) This filter serves to reduce the overall i-f channel width to 5 mc. It also eliminates spurious responses due to the local oscillator, when the local oscillator is tuned in the vicinity of 160 mc during operation at the low end of the tuning dial.

4–18. R-F TUNING UNIT SWITCHING CIRCUITRY.

(See figures 4–5, 4–6 and 7–1.)

4–19. INTRODUCTION. When rotated to bands 1, 2, and 3, contacts on the BAND SELECTOR apply B-plus voltage to transmission-line local oscillator V3, and energize coaxial switch S3. The contacts of switch S3 then permit the output of the low-frequency crystal mixer CR2 to be available at MIXER OUTPUT jack J34. When operating over the 10 mc to 55 mc portion of band 1, other BAND SELECTOR contacts energize coaxial switch S1, which places the 163-mc low pass filter in series with the 180-mc low pass filter. (See figure 4–6.) With the BAND SELECTOR rotated to bands 4 through 8, both the 163-mc and the 180-mc low pass filters are not in use, and coaxial switch S3 is de-energized. The contacts of switch S3 then permit the output of the high-frequency crystal mixer CR1 to be available at MIXER OUTPUT jack J34. A detailed circuit analysis follows.

a. B-PLUS SWITCHING TO V3. (See figure 7–1.) With the BAND SELECTOR set to bands 1, 2, and 3, the positive 125-volt potential available at pin B of power connector J36 is coupled through terminal 8 of wafer 2, rear section, of switch S8B to terminals 5, 6, or 7. B-plus voltage is then applied through filter FL1, resistor R4, feedthrough capacitor C5, and choke L1 to the plate of transmission-line oscillator V3. This oscillator is inoperative in bands 4 through 8, since the 125-volt supply bus is opened by switch S8B when the switch is rotated further clockwise beyond switch terminal number 7.

b. 28-VOLT SWITCHING TO COAXIAL SWITCH S3. With the BAND SELECTOR set to bands 1, 2, and 3, the positive 28-volt potential available at pin E of power connector J36 is coupled through terminal 1 of wafer 2, front section, of switch S8A to terminals 2, 3, and 4. Energizing power is then applied across the coil of coaxial switch S3 and chassis ground, closing the circuit from input connector J18 to output connector J21. Under this condition, the output of the low-frequency crystal mixer CR2 is applied through the moving contact of coaxial switch S3, and through coaxial cable W4, to MIXER OUTPUT jack J34. With switch section S8A rotated to bands 4 through 8 (corresponding to S8A terminals 5 through 9), the 28-volt bus is opened and coaxial switch S3 is de-energized. With S3 in its

de-energized condition, the output of the high-frequency crystal mixer CR1 is applied through input connector J19 and the moving contact of S3 to output connector J21. The signal is again coupled through coaxial cable W4 to MIXER OUTPUT jack J34.

c. NARROW DISPERSION ENABLING SWITCH S2. With BAND SELECTOR S8A rotated to band 1 position and with the TUNING dial set within the frequency range from 10 mc to 55 mc (figure 4–6), the cam-actuated microswitch S2 is closed. Under this condition, the positive 28-volt potential available at terminal 10 of switch section S8A is applied to two additional circuits. One circuit consists of the coil of coaxial switch S1, which will then be energized. In the 10 mc to 55 mc portion of band 1, the output of the 180-mc low pass filter is coupled through coaxial cable W7 to S1 connector J12; one moving contact within the coaxial switch provides a closed path from input connector J12 to output connector J13. The signal is then applied through coaxial cable W8 and input connector J14 to the 163-mc low pass filter; the filtered signal is coupled from output connector J15 and coaxial cable W9 to input connector J16 of coaxial switch S1. A second moving contact within switch S1 provides a closed path to output connector J17; coaxial cable W10 applies the filtered signal to the input of coaxial switch S3. The second circuit that is energized by the closing of microswitch S2 is relay K501, located on the video chassis in the display unit. The coil of relay K501 is energized by 28 volts dc, which is coupled through pins L of J36-P36. A jumper interconnects pin L of P36 to pin L of P503 on the power supply; this connection is continued through pin L of J503 to the coil of relay K501. This relay controls the dispersion limits of the sweep frequency generator, as described in paragraph 4–28.

d. CRYSTAL CURRENT SWITCHING. With BAND SELECTOR S8C rotated to band 1, 2, or 3, the rectified crystal current from pin R of power connector J36 is coupled through XTAL I SET control R28 to switch terminal 2, 3, or 4. Under this condition, switch S8C terminal 1 applies the current from the low-frequency crystal mixer CR2 to meter M1 via METER SELECTOR S5. With BAND SELECTOR S8C rotated to bands 4 through 8, the rectified crystal current is coupled through XTAL I SET control R21 to switch terminals 5 through 9. Under this condition, switch S8C terminal 1 applies the current from the high-frequency crystal mixer CR1 to meter M1. (For instructions on adustment of the crystal current set controls, see paragraph 6–21.)

4–20. WIDE BAND I-F AMPLIFIER.

(See figure 4–7.)

4–21. CIRCUIT ANALYSIS. The 160 mc i-f signal is applied from MIXER OUTPUT jack J34 to IF INPUT jack J107 by way of R-f Cable Assembly CG-1525/U (0 ft 3 in.). This is an accessory cable and serves as an external jumper connection between the output of the tuning unit and the input to the wide band i-f amplifier. This connection provides a flexible arrangement by which external test signals may be coupled to the i-f amplifier input.

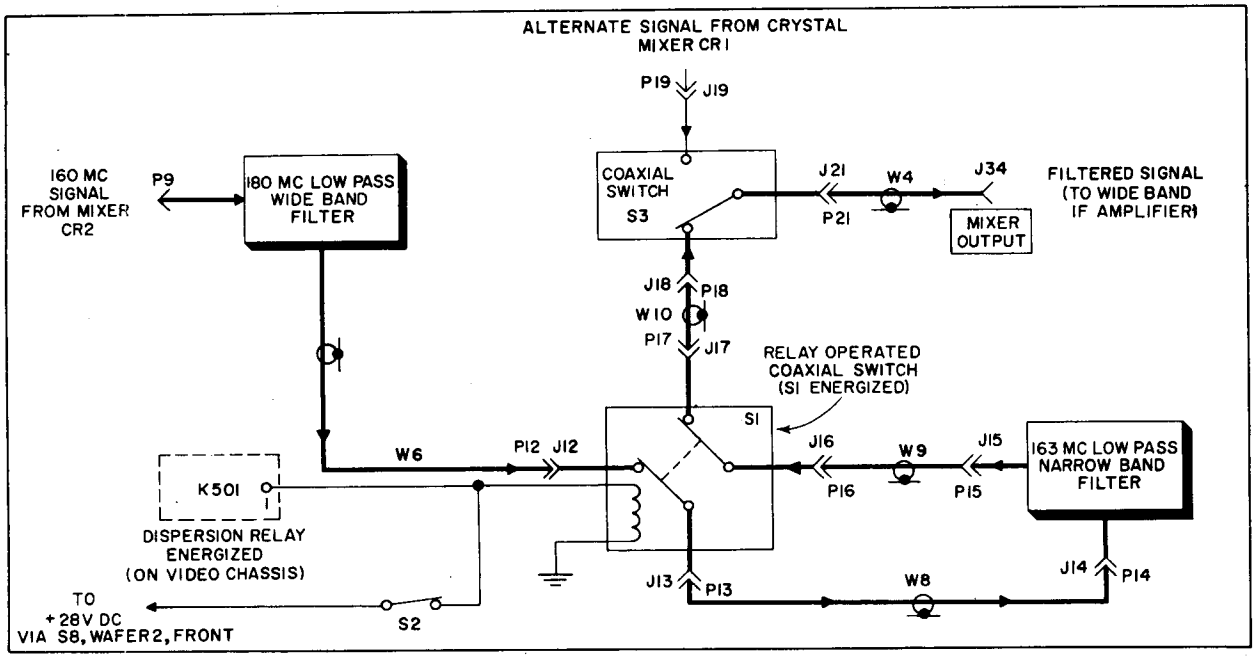


Figure 4–6. R-f Tuning Unit Relay Circuits, 10-55 Mc Operation, with Relay S1 Energized

AMPLIFIER V101 6J4WA

AMPLIFIER V102 6J4WA

AMPLIFIER V103 6J4WA

UG-260B/U P34 (TO (MIXER OUTPUT JACK)

UG-260B/U

UG-910/U

UG-260B/U

P107 J107 IF INPUT

RG-71/U W101 CG-1525/U (OFT 3IN)

P108 J108 W102

FL101

J109

P109

W103 RG71/U

UG-260B/U

P102

UG-260B/U

J102 160MC INPUT

UG-1094/U

C101 0.5

R100 51 5%

J101 UG-1094/U MARKER INPUT (MATES CONNECTOR P101 ON SPECTRUM CALIBRATOR)

C102 820

C103 5

L105 64MC

L106 1.8

C108 1000

R101 68

L101 5

L102 5

L103 5

L104 5

C104 1000

C105 1000

C106 1000

R103 100

C107 1000

T101 160MC

L109 5

R102 68

C111 1000

L107 3.6

L108 3.6

C109 1000

L111 0.8

C112 1000

T102 171 MC

L115 5

R104 68

C114 1000

L112 3.6

L113 3.6

C113 1000

L114 0.8

C115 1000

T103 149MC

L118 5

CR101 IN82

C118 33

L116 3.6

L117 3.6

C116 1000

R106 56

R105 39

L119 5

C117 820

C129 1000

J103 UG-1094/U SWEEPER INPUT

Figure 4–7. Wide Band I-f Amplifier, Schematic Diagram

IFIER
02
4WA

AMPLIFIER
V103
6J4WA

MIXER-AMPLIFIER
V104
5654/6AK5W/6096

L115
5
T102
171 MC
C115
1000
T103
149MC
L118
5
CR101
1N82
C119
1000
R107
4700
T104
64MC
L124
5
C127
1000
C123
47
J105
UG-1094/U
64MC OUTPUT
TO
NARROW BAND IF AMPL.,
VIA CABLE W104
R104
68
C114
1000
C118
33
L122
64MC
C124
820
C125
820
R108
330
C121
820
+125V DC
GND
FIL.RET.
NC
FIL.6.3V AC
XTAL CURRENT
I.F.ATT.
P106
L113
3.6
L116
3.6
L117
3.6
R106
56
R105
39
L119
5
L114
0.8
L121
0.8
L125
0.8
C128
1000
J104
XTAL
C113
1000
C116
1000
L123
5
C117
820
C122
820
C126
1000
R109
51
5%
C129
1000
L126
5
C131
1000
C130
820
J103
UG-1094/U
SWEEPER INPUT

NOTE
DENOTES MAIN SIGNAL PATH.

a. The i-f input signal applied to J107 is fed through mating connectors P108 and J108 to filter FL101. This is a low pass filter tuned to 160 mc, and is useful in excluding spurious frequencies from the input to the wide band amplifier. The signal is then fed through mating connectors J109 and P109, P102 and J102, to the input of V101, the first stage of the wide band i-f amplifier. The network formed by L101 through L104 in series, and shunt capacitors C104, C105 and C106, constitute a low pass filter. The low pass filter acts as the d-c return for the rectified crystal current of CR1 and CR2. The 160 mc signal at J102 is directed to the cathode of V101 through C102, which acts as a much lower impedance to the signal than the low pass filter. The output of the low pass filter terminates at pin H of plug P106 on the wide band i-f amplifier assembly. Crystal current, developed in either high frequency crystal CR1 or low frequency crystal CR2, is coupled through the low-pass filter to pin H, and to meter M1 through METER SELECTOR S5.

b. The i-f input signal is applied to the cathode of V101. This tube acts as an impedance transformer, matching the input of the amplifier to the cable that transmits the signals present in the output of the r-f tuning unit. Tubes V101, V102, and V103 comprise a stagger-tuned triplet amplifier, tuned respectively to 160 mc, 171 mc, and 149 mc, to produce adequate gain over a 25-mc bandwidth. It should be noted that one feature of the three amplifier stages, V101 through V103, is the use of grounded grid circuitry. A series resonant circuit, consisting of C103 and L105, between cathode and ground, is tuned to 64 mc. This series resonant circuit traps any 64-mc component present at the input to the i-f amplifier. The amplified output from V101 appears across T101, which is the tuned circuit of V101. This signal is coupled from the plate of V101 to the cathode of tube V102. Transformer T102, tuned to 171 mc, couples the amplified signal from V102 to the cathode of amplifier V103.

c. T103 applies a signal which is the combined response of the stagger-tuned triplet and the sweeper voltage (applied through resistor R106 via SWEEPER INPUT jack J103) to crystal mixer CR101. A resultant second intermediate frequency (centered at 64 mc) is obtained by the heterodyning of the sweeper output and the wide band signal developed at the output of T103. For example, at the instant that the sweeper is producing 235 mc, a 171 mc input to the wide band amplifier will produce an output of 64 mc. Rectified crystal current is directed through the low pass filter network, consisting of L119 and L123 in series, and shunt capacitors C117 and C126. Crystal current readings may be conveniently obtained at XTAL jack J104. This termination is useful for alignment of the wide band i-f amplifier assembly. (See paragraph 6-9.)

d. The 64 mc second i-f output of crystal mixer CR101 is resonated by means of variable inductor L122. This tuned circuit is connected to the grid, pin 1, of V104. The second i-f frequency, centered at 64 mc, is amplified and tuned by means of T104. The resultant second i-f signal is coupled by way of T104 to the 64 mc output jack, J105.

4–22. NARROW BAND I-F AMPLIFIER.

(See figure 4–8.)

4–23. CIRCUIT ANALYSIS. The output of the wide band i-f amplifier is applied to the input of the narrow band i-f amplifier by way of cable W104, via jack J201, to input transformer T201. This transformer is tuned to 64 mc, the signal frequency at the output of the wide band i-f amplifier.

a. The 64-mc signal which appears across the secondary of T201 is applied to the grid of V201. The amplified signal appears across the resonant network in the plate of V201, consisting of capacitor C205 and variable inductor L202. This signal is coupled to grid number three (pin 7) of converter tube V202 through capacitor C209.

b. Tube V202 is connected as a pentagrid converter, in which the local oscillator is crystal-controlled by Y201. Crystal Y201 is connected between pins 1 and 6, with pin 6 acting as a tuned plate and pin 1 as the grid of a triode oscillator. The oscillator output is coupled through the electron stream to modulate the incoming 64-mc signal. Since transformer T206 is tuned to 6 mc, only the second harmonic of the crystal oscillator can heterodyne with the incoming 64-mc signal to produce an output of $64 - (29 \times 2) = 6$ mc. The resultant 6-mc signal is coupled to grid number three (pin 7) of converter V203, where the fourth and final conversion of the i-f signal takes place. A 6.5-mc oscillator circuit, consisting of capacitors C224, C227, and inductor L213, is connected to the oscillator grid pin 1 of V203. This 6.5-mc signal heterodynes with the 6-mc i-f signal to produce the final difference frequency of 500 kc.

c. Tubes V204 and V205, in cascade, amplify the 500 kc i-f signal to a level sufficient, after detection, to drive the vertical amplifiers. The output of V205 is coupled by capacitors C246 to crystal diode CR201, which detects the i-f signal and produces a voltage proportional to the amplitude of the applied i-f signal. This detected signal is coupled to the vertical amplifier for visual display. The resolution of the spectrum analyzer is 20 kc, constant at all signal frequencies, at the 3 db points. This resolution, determined by the bandwidth of the 500 kc stages of the narrow band amplifier and the characteristics of the video amplifier, permits distinguishing between two signals closely spaced in the frequency spectrum.

AMPLIFIER
V201
5654/6AK5W/6096

CONVERTER
V202
5750/6BE6W

CONVERTER
V203
5750/6BE6W

AMPLIFIER
V204
6186/6AG5WA

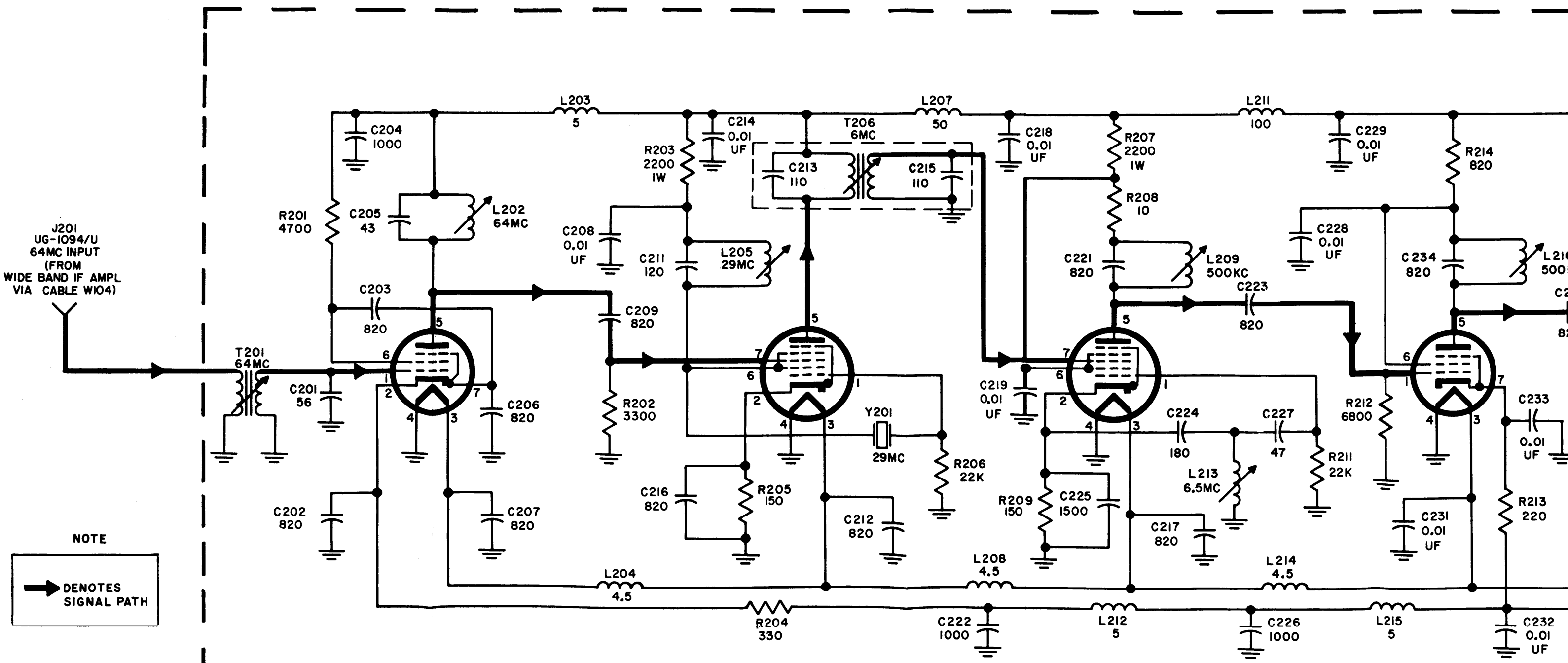


Figure 4–8. Narrow Band I-f Amplifi r, Schematic Diagram

CONVERTER

V203
5750/6BE6W

AMPLIFIER

V204
6186/6AG5WA

AMPLIFIER

V205
6186/6AG5WA

C218 0.01 UF
R207 2200 1W
R208 10
C221 820
L209 500KC
L211 100
C223 820
C228 0.01 UF
C229 0.01 UF
R214 820
C234 820
L216 500KC
L217 100
C235 820
C236 0.01 UF
C237 0.01 UF
R217 10K
C245 820
L219 500KC
R218 820
L221 100
C246 820
CR201 IN69
C247 0.01 UF
C248 1000
J202 UG-1094/U (VIDEO OUTPUT TO VERT AMPL V505, VIA CABLE W501)
L222 2.5UH
R219 33K
C249 51
C251 1000
C252 1000
+125V DC
VIDEO RETURN
NC
GND
FIL.RET.
FIL. 6.3V AC
IF ATTENUATOR
P203
C219 0.01 UF
C224 180
C227 47
R211 22K
L213 6.5MC
R209 150
C225 1500
C217 820
R212 6800
C231 0.01 UF
C233 0.01 UF
R213 220
R215 6800
R216 220
C239 0.01 UF
C242 0.01 UF
L208 4.5
L214 4.5
L212 5
C226 1000
L215 5
C232 0.01 UF
L218 100
C238 0.01 UF
L223 100
C243 0.01 UF
C244 1000

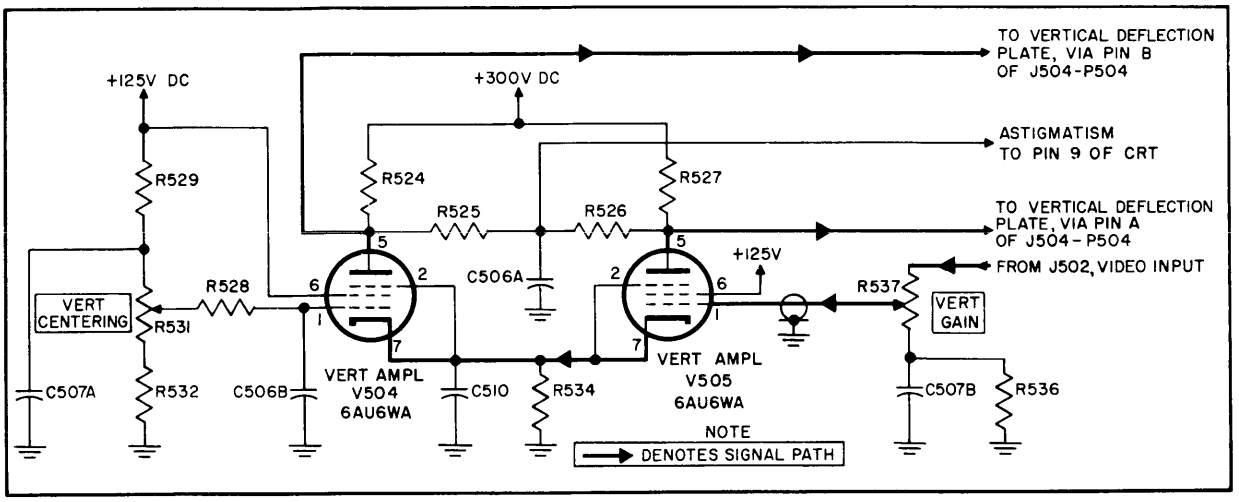


Figure 4–9. Vertical Amplifier Circuit, Simplified Schematic

4–24. VIDEO CIRCUITS.

(See figures 4–9 through 4–14.)

4–25. VERTICAL AMPLIFIER. (See figure 4–9.) Video information, developed at the output of the narrow band i-f amplifier by means of crystal rectifier CR201, is coupled to the input of video amplifiers V504 and V505. The signal path is through the video output jack J202 to mating connector P202, and connecting cable W501. The signal is then coupled through mating connectors P502 and J502 to the VERT GAIN control. VERT GAIN control R537 is connected to the control grid, pin 1, of V505. Video information applied to the grid is cathode-coupled to V504. Both V504 and V505 operate as cathode-coupled push-pull balanced deflection amplifiers, in which the overall sensitivity is controlled by the front panel VERT GAIN control R537. The use

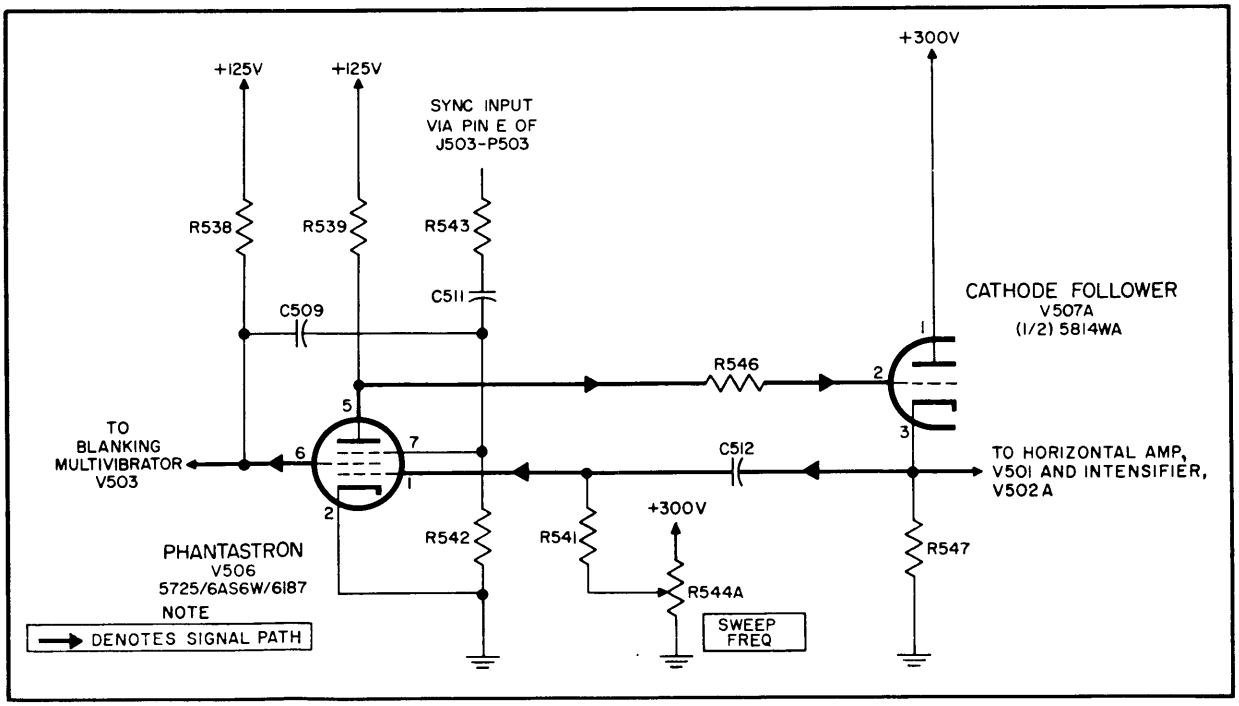


Figure 4–10. Sawtooth Generator Circuit, Simplified Schematic

of balanced amplifiers insures proper linearity and minimum distortion of the displayed video on the screen. The vertical positioning is effected by means of the front panel VERT CENTERING control, R531. Video output from V504 and V505 is directly coupled to the vertical deflection plates through pins A and B of mating connectors J504 and P504. Direct coupling has a twofold advantage: it provides broadband frequency response down to d-c operation; at the same time, direct coupling permits instantaneous trace positioning.

4–26. SAWTOOTH GENERATOR. (See figures 4–10 and 4–11.) Tube V506 and the cathode follower V507A, combine to form a free-running phantastron sawtooth generator.

a. The function of the sawtooth generator is to provide the timing reference voltage for the horizontal amplifier V501, the blanking multivibrator V503, and the sweeper driver V508. This sawtooth frequency is adjustable over a range of at least 1 to 30 cps, by means of the front panel SWEEP FREQ control R544A. Synchronization with the internal power line frequency may be set with SYNC control, R645.

b. Phantastron V506 employs a pentode with two control grids. The suppressor grid has a sharp cut-off characteristic, and is used as an independent control element. Initially, at the beginning of the cycle, the screen grid, pin 6, is conducting heavily, with the suppressor grid, pin 7, effectively cutting off the plate current, as shown in figures 4–11a, b, and c. The instantaneous plate voltage (see figure 4–11a) is at a maximum. At the same time, the control grid, pin 1 (see figure 4–11d), is at zero bias due to the positive voltage return of grid resistors R541 and R544A, in series. The presence of any transient negative pulse at the plate, pin 5, of V506 is fed back to the control grid of V506 via cathode follower V507A. This action causes the screen current to fall, resulting in a simultaneous rise in screen voltage (see figure 4–11c). This voltage change is coupled by way of C509 to the suppressor grid, pin 7, which now acts to initiate and maintain plate current. The plate current now rises (e_p falls) at a constant rate determined by the RC constant in V506 grid circuit, consisting of C512, R541, and R544A. Phantastron linearity is obtained by the feedback between plate, pin 5, and grid, pin 1. Feedback tends to maintain a constant current through the grid capacitor. The rise in plate current (or fall in plate voltage) continues, as shown in figure 4–11a, until the plate-cathode potential is too small to maintain sufficient gain around the loop. At this point, the control grid voltage reverts to its normal zero bias condition, causing the screen and suppressor potentials to be restored to their original conditions. The plate current now starts to fall (plate voltage rises rapidly) until the plate voltage reaches the original maximum value. The presence of a synchronizing voltage at the suppressor grid insures that oscillations will quickly reach an equilibrium value and maintain a constant sawtooth rate, determined by the setting of SWEEP FREQ control R544A.

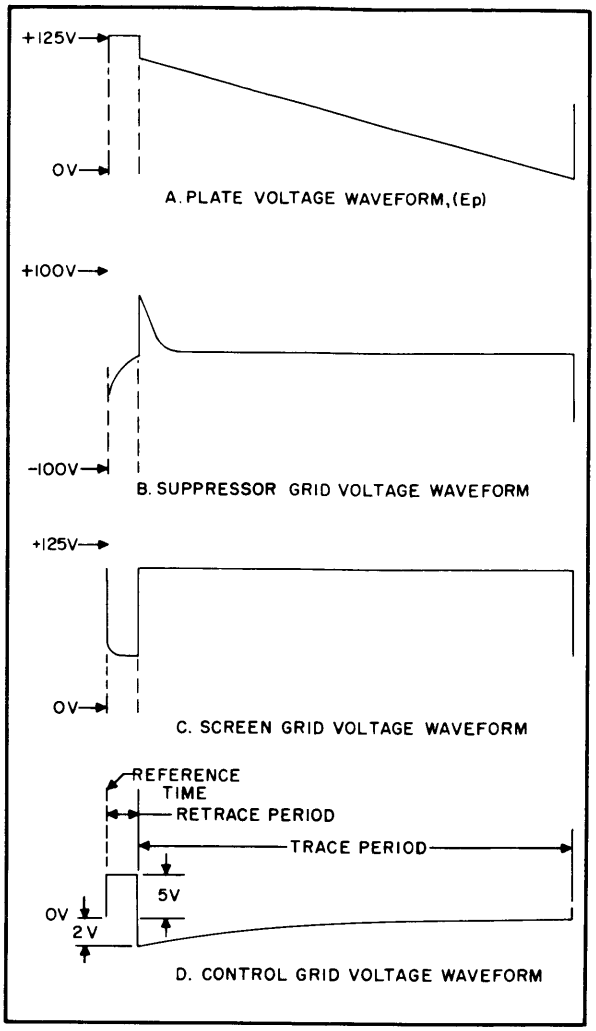


Figure 4–11. Sawtooth Generator Circuit, Ladder Diagram

4–27. HORIZONTAL AMPLIFIER. (See figure 4–12.) The sawtooth voltage, whose frequency is variable from 1 to 30 cps, provides the input signal to the horizontal amplifier. This sawtooth signal is derived at the cathode, pin 3, of V507A. Capacitor C501 serves to couple the signal to HORIZ GAIN control, R508, and blocks d-c voltage from V507A cathode. The capacitance of C501 is a low reactance over the range of 1 to 30 cps. HORIZ GAIN control R508 is connected to the control grid, pin 7, of V501, which is a twin-triode amplifier, functioning as a cathode-coupled push-pull balanced amplifier. A sawtooth voltage applied to the grid, pin 7, is cathode-coupled to the grid, pin 2, of the second triode stage. The resultant amplified output of V501 is applied to the horizontal plates of the cathode-ray tube. The use of balanced amplifiers insures proper linearity and minimum distortion of the horizontal sweep voltage. Horizontal positioning of the trace is effected by means of the front panel HORIZ CENTERING control, R502.

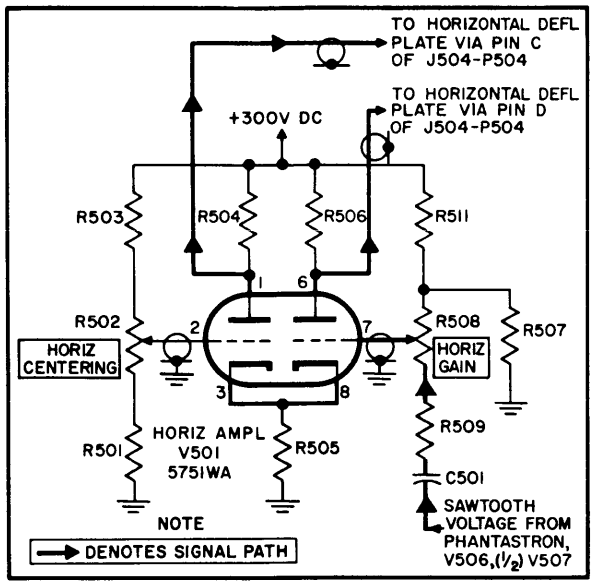


Figure 4–12. Horizontal Amplifier Circuit, Simplified Schematic

The horizontal output of V501 is directly coupled to the horizontal deflection plates through pins C and D of mating connectors J504 and P504. Direct coupling assures stable operation at low sweep frequencies.

4–28. SWEEPER-DRIVER. (See figure 4–13.) The sawtooth generator output (previously developed in phantastron stages V506 and V507A) is also applied through divider resistors, R572 and R573, to the input of V502A. The amplified sawtooth output is then applied to the pre-set WIDE DISPERSION control, R553, or to the pre-set NARROW DISPERSION control, R554. Narrow dispersion is selected by contacts 2 and 4 of relay K501, when operating on band 1 over the tuning range from 10 to 55 mc. Wide dispersion is selected by contacts 2 and 3 of relay K501, for the remaining portion of band one and the seven higher bands. When operating in band 1 from 10 to 55 mc, relay K501 is energized by microswitch S2, which is driven by a cam on the main tuning shaft. (See paragraph 4-19c.) The output of either pre-set control is then applied to SPECTRUM WIDTH control R558, which determines the amplitude of sawtooth voltage applied to sweeper driver V508. Variation of the applied sawtooth voltage to V508 determines the width of the r-f spectrum displayed on the screen. The width of the r-f spectrum, with relay K501 de-energized, may be as narrow as 500 kc, or as wide as 25 mc when tuning over the frequency range from 55 to 40,880 mc. When the 10 to 55 mc range of the spectrum analyzer is used, relay K501 is automatically energized to limit the maximum pass band displayed to 5 mc. Control of the spectrum centering is provided by the front panel FINE control R564, and COARSE control, R565. The amplified sawtooth output of sweeper driver V508 is now applied to the input of the sweep frequency generator.

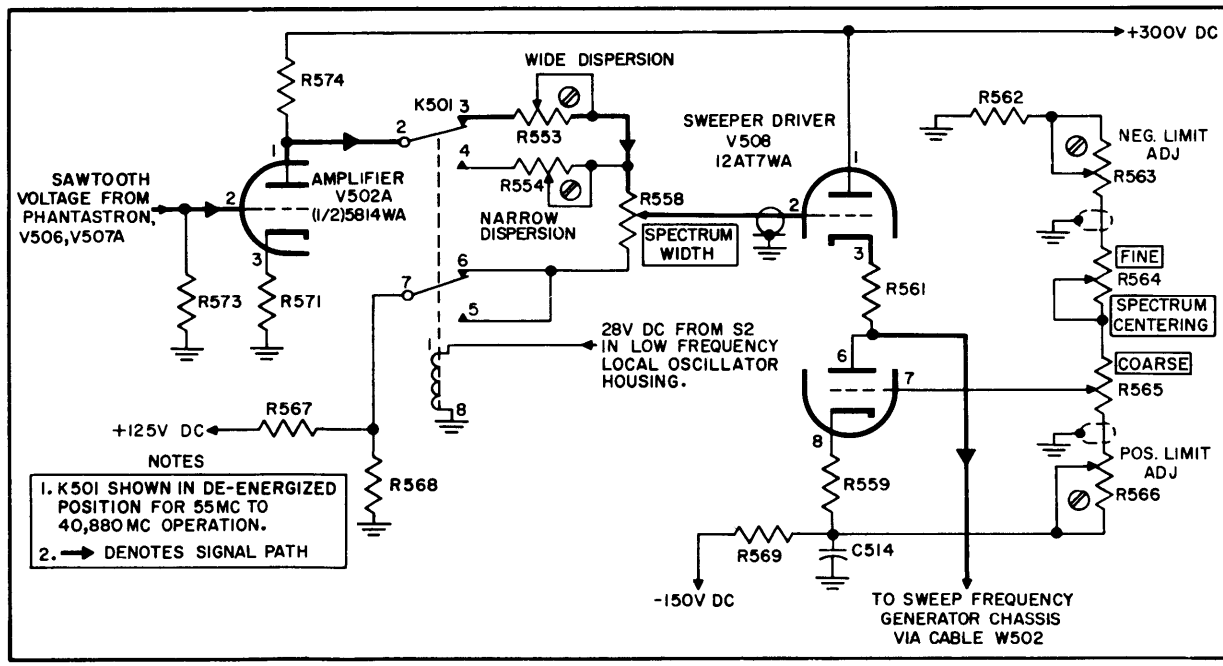


Figure 4–13. Sweeper Driver Circuit, Simplified Schematic

4–29. BLANKING MULTIVIBRATOR. (See figure 4–14.) A third part of the output of the sawtooth generator circuit (V506 and V507A) consists of a square-wave voltage derived from the screen grid of phantastron V506. (See figure 4–11c.) This waveform triggers blanking multivibrator V503, by applying the square-wave voltage through crystal diode CR501 to the grid, pin 7, of V503. The polarity of CR501 is such as to allow only the negative-going waveform to produce an output signal at the grid of V503. The signal thereby developed corresponds to the start of the retrace period of the sweep voltage. Tube V503 functions as a one-shot cathode-coupled multivibrator, which amplifies and sharpens the blanking pulse output. For proper blanking, the width of this pulse must be adjusted to correspond to the retrace period. This is automatically adjusted by the ganged connection of potentiometer R544B to SWEEP FREQ control R544A. Control R517 is factory pre-set to adjust the tracking of R544B with respect to the sweep frequency control. The amplified output of the blanking multivibrator is coupled by capacitor C503 to the grid, pin 7, of V502B, where the signal is amplified and inverted. After inversion, the output signal is of negative polarity, and blanks the electron beam for the duration of the sweep retrace. This blanking potential is developed at pin 6 of V502 and is applied, through pin N of connector J503, to the control grid of the cathode-ray tube.

4–30. INTENSIFIER AMPLIFIER. (See figure 4–14.) The function of the intensifier-amplifier is to provide an adjustable level of pulse brightening, during the trace period. This is accomplished by applying negative video pulses, derived at the plate, pin 5, of V505 to the input of amplifier V507B. These negative pulses are then amplified and phase inverted. The resulting positive pulses are coupled through R514 to the intensity grid of the display tube via pin N of J503. The intensity grid is driven positive, during pulse reception, for automatic brightening. The intensity grid is driven negative during the retrace period for automatic blanking, as discussed in paragraph 4-29. Both blanking and intensifier signals are available at the plate, pin 6, of V502B.

4–31. SWEEP FREQUENCY GENERATOR.

(See figure 4–15.)

4–32. INTRODUCTION. The function of the sweep frequency generator is to convert the sawtooth output of the sweeper driver V508 (in the video chassis) into a swept frequency centered at 224 mc. The amount of sweep, or deviation, is determined by the amplitude of the applied sawtooth voltage. Adjustment of the amplitude is obtained by SPECTRUM WIDTH control R558. The center frequency is determined by the setting of SPECTRUM CENTERING COARSE and FINE controls R565 and R564, respectively.

a. The sweep frequency generator consists of four stages: V401, V402, V403 and V404.

b. V401 is a cathode-follower driver, whose cathode load is the primary of a saturable reactor. This device is a magnetic-core transducer, which produces a linear inductance change in its secondary, when the primary is excited by a varying d-c current. When cathode follower V401 is driven by a sawtooth voltage, a linear inductance variation (with respect to time) is developed at the reactor output.

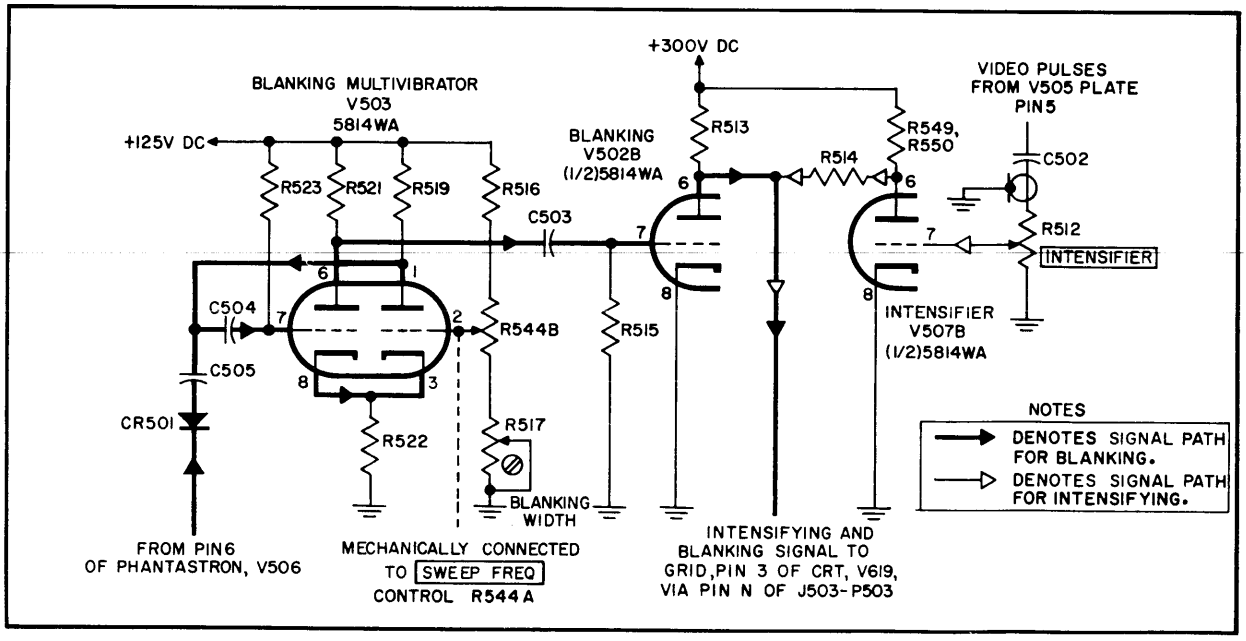


Figure 4–14. Blanking and Intensifier Circuits, Simplified Sch matic

c. When the primary current through the saturable reactor is constant, the secondary appears as a fixed inductance. V402 is connected to function as an electron-coupled oscillator, with the secondary of T200 and variable capacitor C404 making up the tuned-grid circuit. Feedback is obtained through the screen and control grid capacitance. The plate-tuned circuit consists of L403, which is tuned to 74.7 mc. Resistor R408 serves to broaden the frequency response. With a sawtooth input signal applied to V401, the reactor secondary acts as a varying inductance, resulting in a frequency deviation of the 74.7 mc output. Since the frequency deviation is proportional to the rate at which the inductance varies, a change in the amplitude of the applied sawtooth voltage results in a linear change in deviation. Variation of the front panel SPECTRUM WIDTH control changes the amplitude of the applied sawtooth voltage, which in turn, varies the deviation of the 74.7 mc carrier at the plate of V402. The FINE and COARSE SPECTRUM CENTERING controls (R564 and R565 on the video chassis) permits shifting the 74.7 mc center frequency, by changing the operating point of cathode follower V401. The quiescent inductance value, developed by the reactor, is then changed, and the center frequency is shifted. RT401 is a non-linear resistance which compensates for ambient temperature changes in the vicinity of V401.

d. The amplified frequency-modulated output (with a nominal center frequency of 74.7 mc) is now applied to the input of buffer-amplifier V403. This stage amplifies and isolates the 74.7 mc output from load variations in the succeeding stage.

e. The amplified 74.7 mc output is then applied to V404, which acts as a frequency tripler and amplifier, producing a frequency-modulated output having a nominal center frequency of 224 mc.

4–33. SWEEPER FILTER. (See figure 7–2.) The sweep frequency generator output signal, centered at 224 mc, is coupled to the sweeper filter input via mating connectors J405 and P405 by way of cable W402. This circuit acts as a band-pass filter to pass the nominal 224 mc ± 12.5 mc desired output, and to suppress all other frequencies originating in the sweep frequency generator. The response over a pass band of approximately

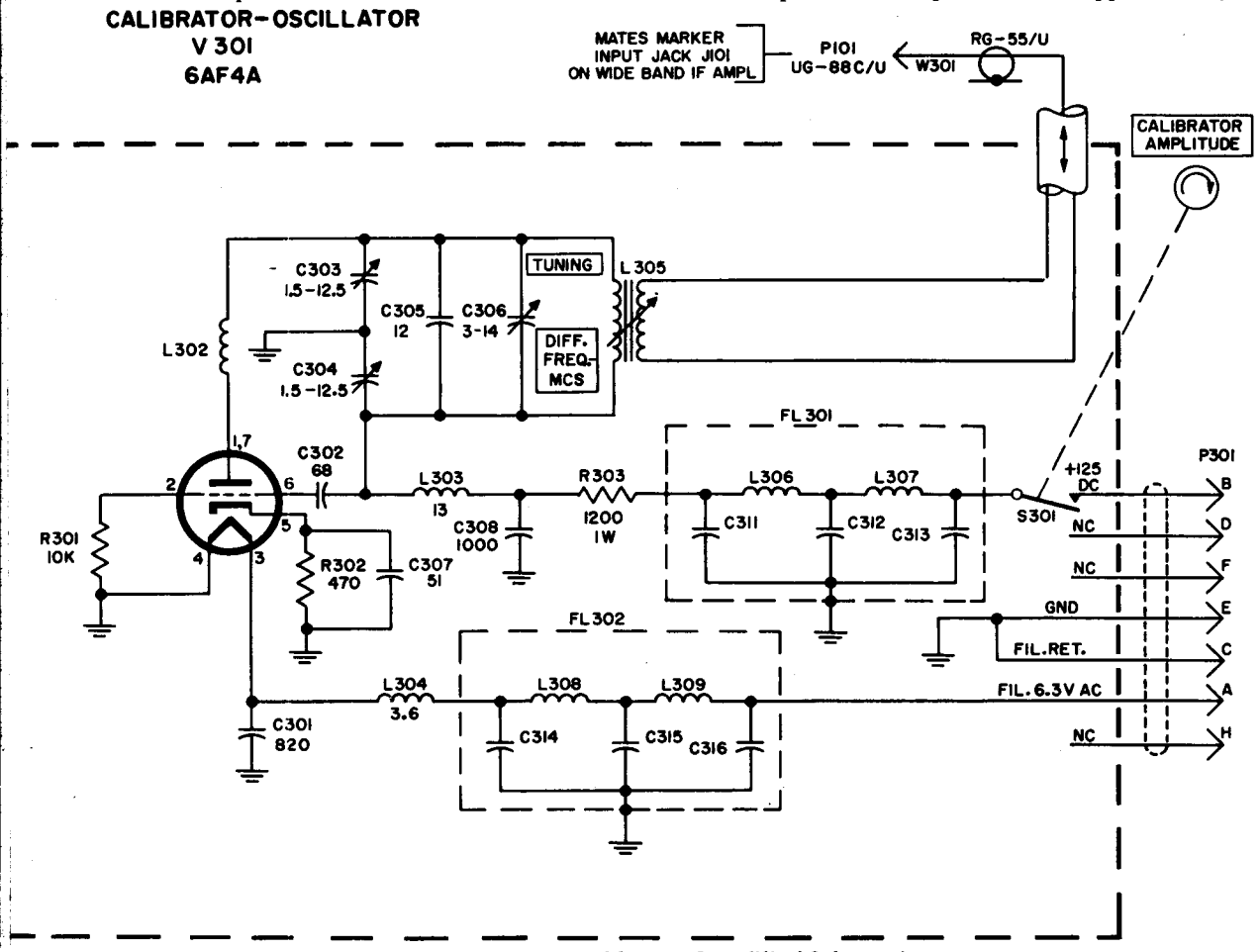


Figure 4–16. Spectrum Calibrator, Simplified Schematic

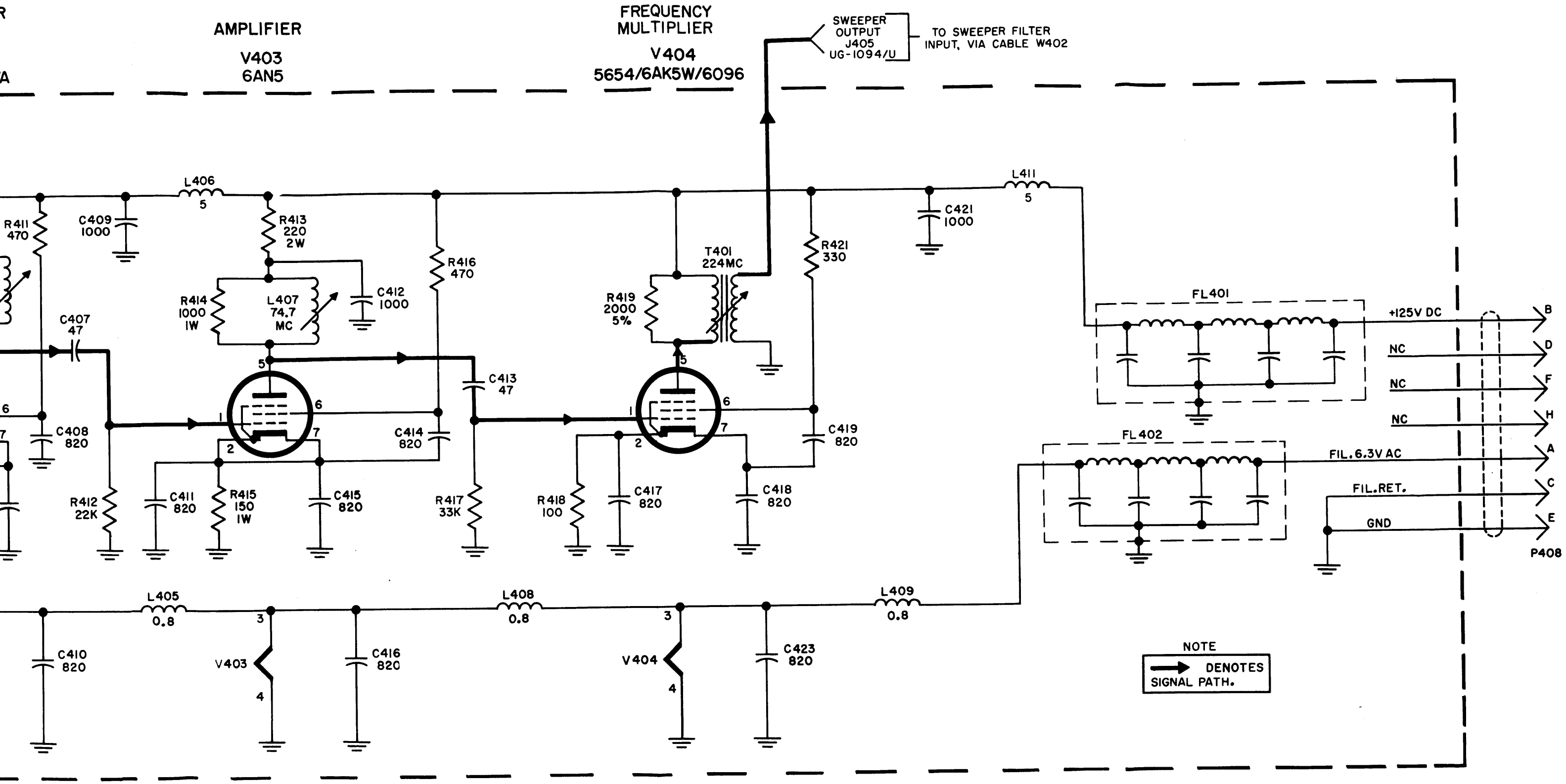
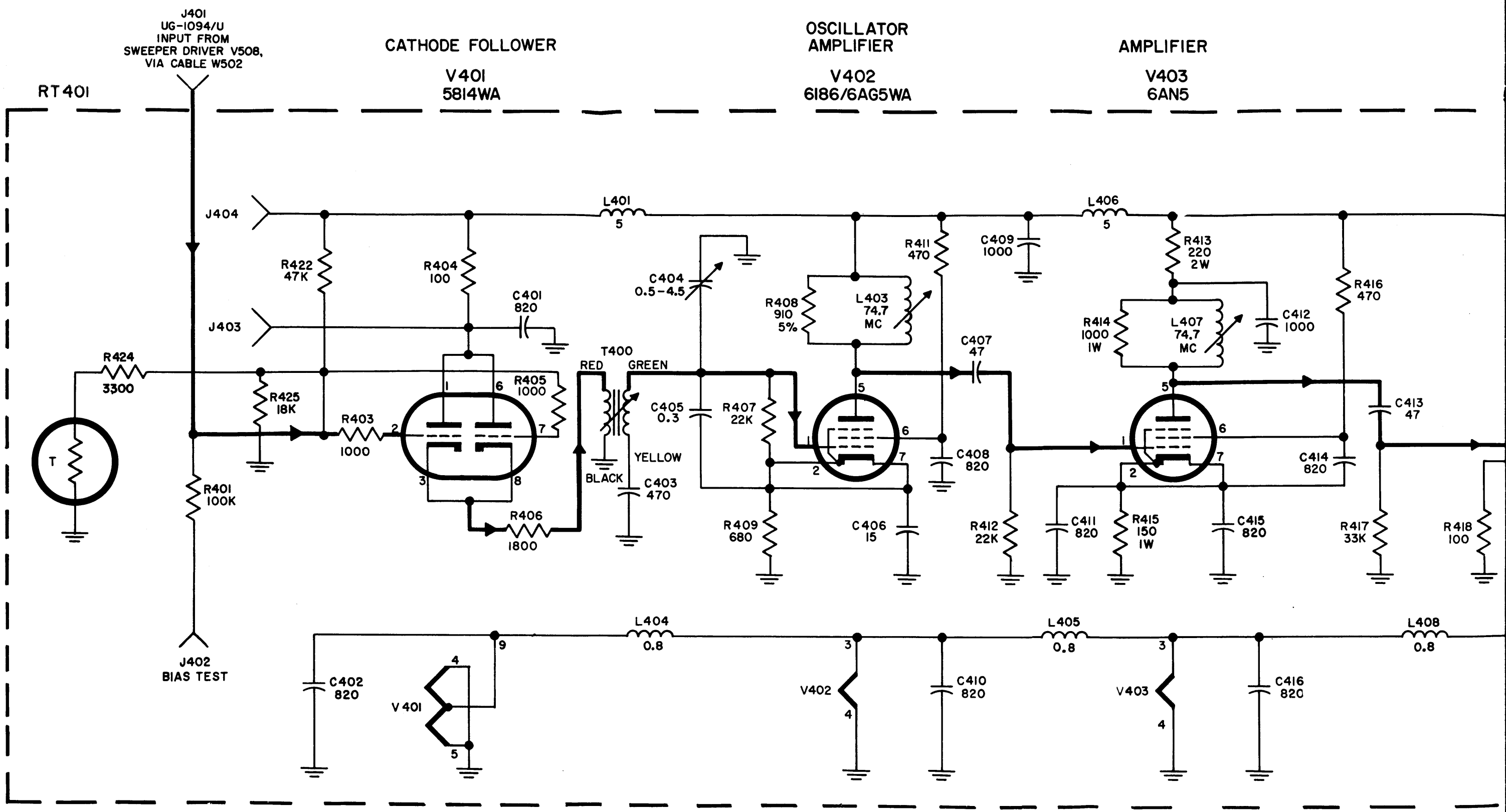


Figure 4–15. Sweep Frequency Generator, Schematic Diagram


J401
UG-1094/U
INPUT FROM
SWEEPER DRIVER V508,
VIA CABLE W502
RT401
CATHODE FOLLOWER
V401
5814WA
OSCILLATOR
AMPLIFIER
V402
6186/6AG5WA
AMPLIFIER
V403
6AN5
J404
J403
J402
BIAS TEST
R422
47K
R404
100
C401
820
L401
5
L406
5
C409
1000
R411
470
R413
220
2W
R416
470
R424
3300
R425
18K
R403
1000
R405
1000
T400
RED
GREEN
YELLOW
BLACK
C404
0.5-4.5
C405
0.3
C403
470
R401
100K
R406
1800
R408
910
5%
L403
74.7
MC
C407
47
R414
1000
1W
L407
74.7
MC
C412
1000
C413
47
C414
820
R407
22K
C408
820
R409
680
C406
15
R412
22K
C411
820
R415
150
1W
C415
820
R417
33K
R418
100
C402
820
V401
L404
0.8
L405
0.8
L408
0.8
V402
C410
820
V403
C416
820

25 mc presents a maximum insertion loss of approximately 2 db. The output of the sweeper filter is coupled through cable W401, and mating connectors P103-J103, to V103, in the wide band i-f amplifier.

4–34. SPECTRUM CALIBRATOR. *(See figure 4–16.)*

4–35. DESCRIPTION. V301 is connected as a high-frequency Colpitts oscillator, tuned to a center frequency of 160 mc. The spectrum calibrator provides a variable frequency pip, for calibrating the spectrum display and for determining small frequency differences. It also provides a quick visual check of i-f and video amplifier operation.

a. Frequency variations of up to plus or minus 12.5 mc may be obtained by variation of the front panel DIFFERENCE FREQ-MCS control, C306. Both the plate and filament supplies to V301 are carefully filtered by means of shielded low-pass filters (FL301 and FL302), as a means of preventing oscillator leakage. Filtering minimizes feedback of the 160 mc calibrating signal through the power supply circuits. The spectrum calibrator is mounted in a shielded assembly, to minimize radiation leakage to adjacent circuitry. The 160 mc output is fully adjustable from minimum to maximum by rotation of the front panel CALIBRATOR AMPLITUDE control.

b. Power is applied to the spectrum calibrator through a harnessed cable assembly which is terminated in connector P301. This connector mates with the receptacle J301, on the main chassis frame.

4–36. POWER SUPPLIES.

4–37. INTRODUCTION. A block diagram of the various power supplies and their interconnections is shown in figure 4–17. Five power supplies are included in the display unit, and include the following circuits:

a. A negative high-voltage supply of minus 733 and minus 325 volts, to provide power to the klystron oscillator.

b. A dual positive supply of plus 300 and plus 125 volts, for use by the various circuits in the display unit, and in the transmission-line local oscillator circuitry.

c. A negative low-voltage bias supply of minus 150 volts, for use by the various circuits in the video chassis.

d. An r-f oscillator type of supply, for developing the high voltages required by the cathode-ray tube.

e. A selenium full-wave rectifier, which develops plus 28 volts dc for operation of the relays within the instrument.

4–38. KLYSTRON SUPPLY, DESCRIPTION. (See figure 4–18.) Since klystron output stability is highly dependent upon a well-regulated power source for cathode and reflector potentials, an electronically-regulated supply is employed. The klystron power supply consists of rectifier tube V601, series regulator tube V602, control tube V603, and voltage reference diodes V604 through V607.

a. In operation, transformer T601 is energized after time delay relay K602 completes its delay cycle. (See figure 7–3.) A fixed time delay is required before application of klystron potentials, to permit adequate temperature stabilization of the klystron filament. The high voltage a-c potential (developed by transformer T601) is applied to pins 4 and 6 of full-wave rectifier V601, to produce approximatetly 800 volts of unregulated d-c potential across filter capacitor C601. The unregulated voltage is applied to the plate of V602, the series regulator.

b. V602 regulates by simulating a variable resistance in series with the supply voltage. The difference between the supply (or input) voltage and the regulated output is the plate-to-cathode voltage drop across the series tube. When the regulator is operating, an increase in input voltage results in an increase of the negative grid-to-cathode bias. The plate-to-cathode drop across the tube is thereby increased (with the load current constant), causing the output voltage to remain unchanged. When the input voltage drops, the negative grid-to-cathode bias is reduced by the action of control tube V603; the series tube then functions as a smaller effective series resistor, its plate-cathode voltage decreases, and the output voltage remains essentially constant. The action is similar for output load voltage variations.

c. V603 is a twin-triode cascode amplifier, capable of high gain and wide frequency response. V604 is the reference tube, which maintains a constant potential of 150 volts. The overall result is high stability and improved ripple reduction.

d. Reference diodes V605, V606, and V607 (in series) develop a constant voltage of 405 volts. This potential, when added to the minus 325-volt supply, produces the necessary minus 733 volts for the klystron reflector.

4–39. BIAS SUPPLY, DESCRIPTION. (See figure 7–3.) The input to rectifier V610 is obtained from pin 3 of T602. A-c voltage is applied to the cathode in a half-wave rectifier circuit, to produce a negative unregulated voltage output. This output is filtered by a low pass RC filter and is applied to the plate of V615, the voltage regulator. The negative bias supply of 150 volts is available for the sweeper driver, in the display unit. The bias voltage is also used as the reference potential for the dual positive supplies discussed in paragraph 4-40.

4–40. DUAL POSITIVE SUPPLY, DESCRIPTION. (See figures 4–17 and 7–3.) A dual electronically-regulated supply of plus 125 and plus 300 volts is provided for the circuits in the display unit and for the transmission-line local oscillator.

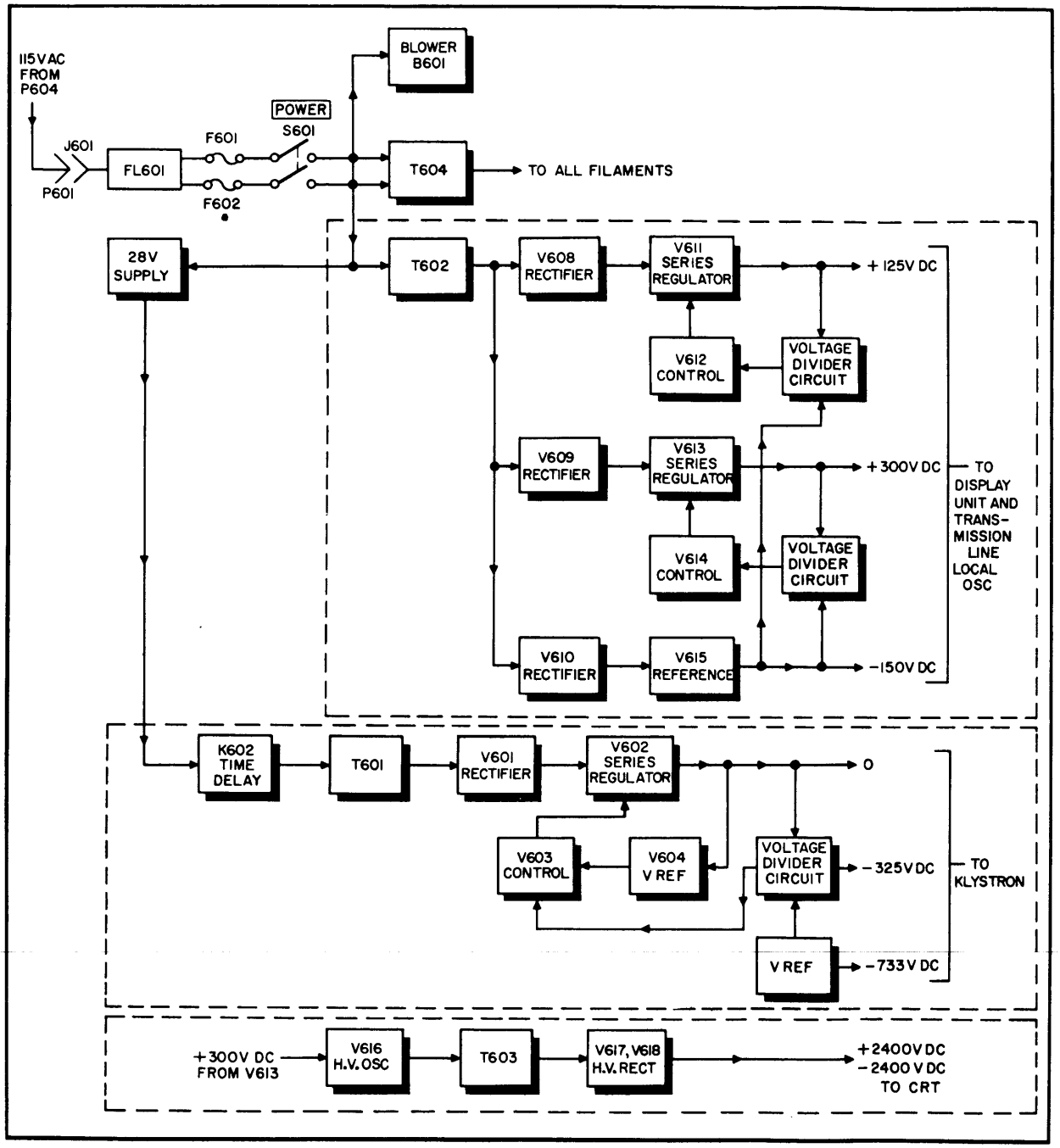


Figure 4–17. Power Supplies, Simplified Block Diagram

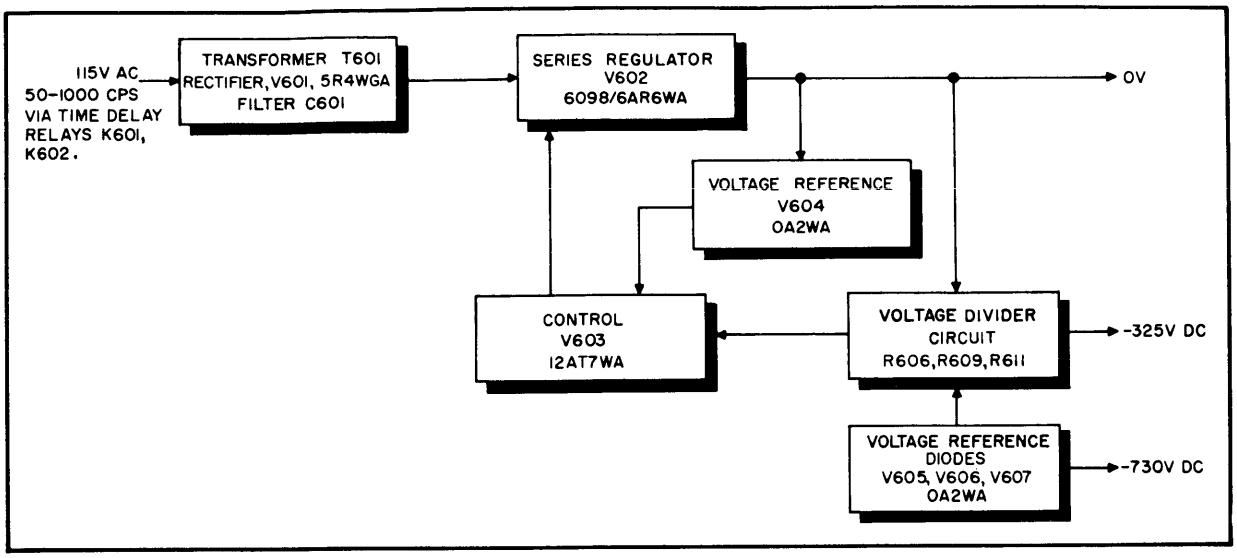


Figure 4–18. Klystron Power Supply, Simplified Block Diagram

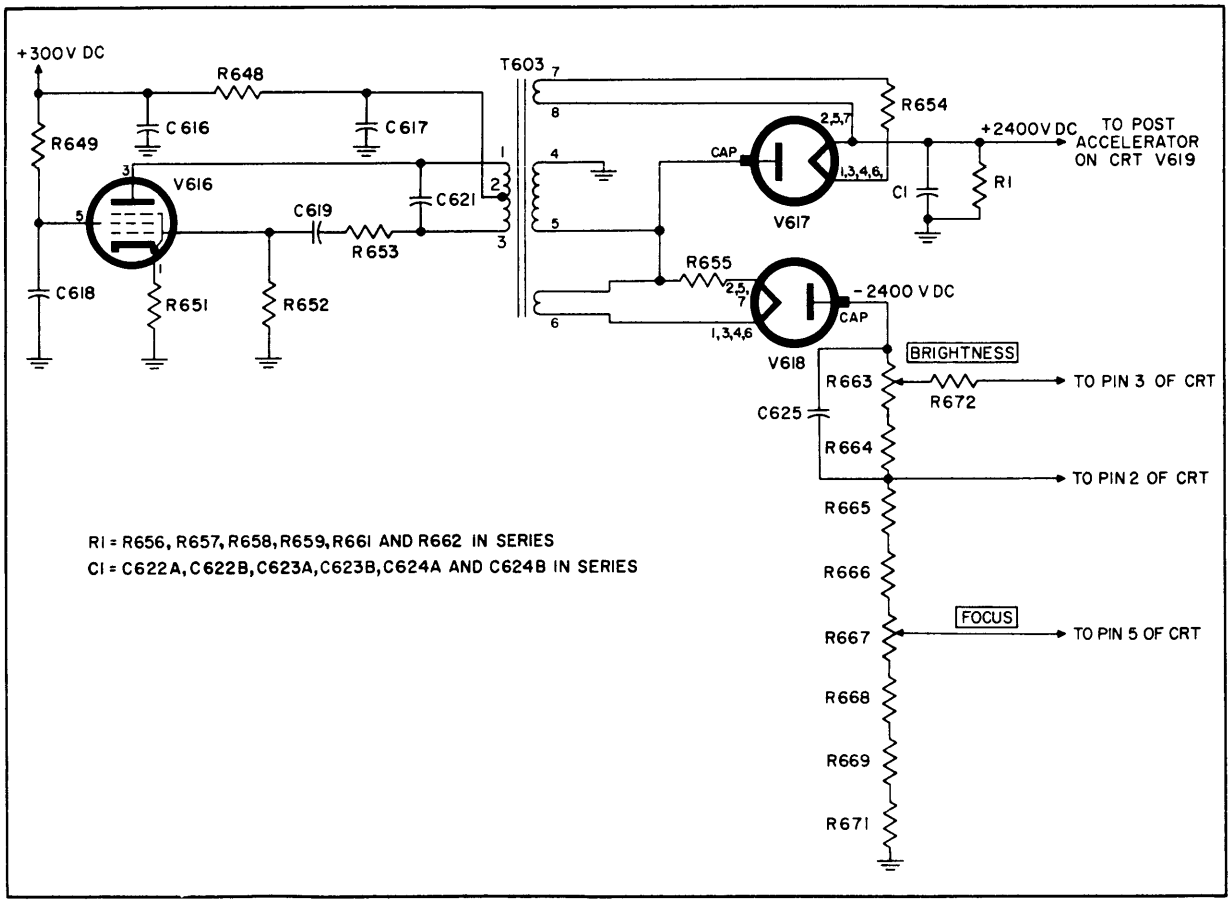


Figure 4–19. R-f Oscillator Power Supply, Simplified Schematic

a. The 125-volt supply consists of transformer T602, full-wave rectifier V608, series regulator V611, control tube V612, and voltage divider circuit R626, R627, and R628, in series. The reference potential is obtained from V615, as described in paragraph 4-39. Functionally, the circuit is similar to that of the klystron supply.

b. The 300-volt supply consists of transformer T602, full-wave rectifier V609, series tube V613, regulator amplifier V614, and voltage divider circuit R637, R638, and R639, in series. The reference potential is obtained from V615, with circuit functioning similar to that of the klystron supply.

4–41. R-F OSCILLATOR SUPPLY, DESCRIPTION. (See figure 4–19.) For the high-voltage low-current requirements of the cathode-ray tube, an r-f oscillator supply is employed. A simplified schematic of the oscillator-rectifier portion of the supply is shown in figure 4–19.

a. High-frequency oscillations are developed in the Hartley-type circuit, by the use of close coupled plate-grid windings on transformer T603. When power is initially applied to the anode circuit of oscillator tube V616, a voltage drop appears across the plate winding, terminals 1 and 2, of transformer T603. By transformer action, a voltage is induced into the grid winding, terminals 2 and 3, causing an oscillatory current to flow through C621. The frequency of oscillation is determined by the inductance of the entire winding and the capacitance of C621. By coupling a voltage back to the grid, sustained oscillations are developed, with the 300-volt supply delivering sufficient power to compensate for circuit losses.

b. The secondary of transformer T603 consists of many turns of fine wire, resulting in a high step-up ratio. Rectifiers V617 and V618 are arranged in a voltage doubler circuit to produce potentials of plus 2400 and minus 2400 volts, with respect to ground. These potentials are applied to the various accelerating and control grids of V619, the cathode-ray tube. Discharge resistors are provided across the positive 2400 volts, as a means of quickly discharging the high potential when power is disconnected. The bleeder network in the negative supply permits adjustment of the various accelerating and control voltages applied to V619. This circuit arrangement also assures discharge of the negative high-voltage. These bleeder resistances minimize the possibility of shock hazard when attempting to service the equipment.

c. The front panel BRIGHTNESS control, R663, maintains the control grid at the proper negative potential with respect to cathode. The front panel FOCUS control, R667, adjusts the potential on grids 2 and 4, to cause proper convergence of the electron beam. The accelerating anode, through connector P605, is connected directly to the plus 2400-volt output of V617.

4–42. POSITIVE 28 VOLT SUPPLY. (See figure 7–3.) The 28 volt supply consists of transformer T605, selenium bridge rectifier CR601, and filter capacitor C628. This supply is used to energize time delay relay K601 in the primary of the klystron power supply, dispersion relay K501 on the video chassis, and coaxial switches S1 and S3 within the tuning unit.

SECTION V

ORGANIZATIONAL MAINTENANCE

5–1. SCOPE.

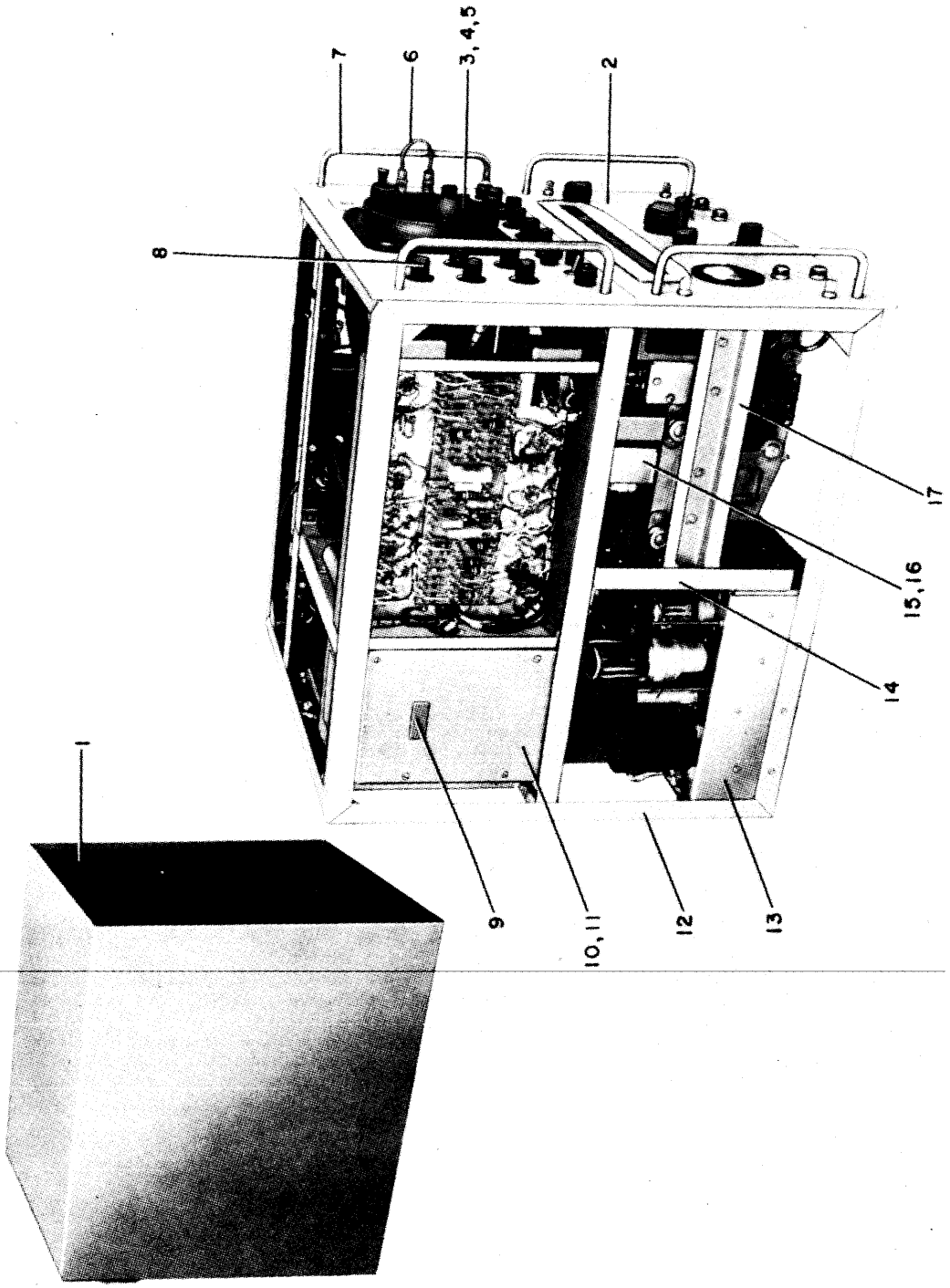
5–2. This section discusses maintenance which may be performed on Spectrum Analyzer Set AN/UPM-84 at the organizational level. Procedures are described covering replacement of protective fuses, pilot and indicator lamps, and tubes. Other repairs requiring the use of relatively simple test equipment are also described. Minimum performance standards are given as an aid in localizing substandard operation. A preliminary inspection procedure is given to aid in a visual analysis of conditions that lead to premature breakdown. Methods for systematically isolating electrical defects, as well as an inspection schedule to insure uninterrupted operation, are included.

5–3. MINIMUM PERFORMANCE STANDARDS FOR ORGANIZATIONAL MAINTENANCE.

5–4. Minimum performance standards for organizational maintenance and methods of checking them are given in table VI.

TABLE VI. MINIMUM PERFORMANCE STANDARDS FOR ORGANIZATIONAL MAINTENANCE

Operational Characteristic	Test	Minimum Standard
1. Front panel indicators.	Power switch thrown to POWER position.	Panel pilot light on. Bezel lights on. Blower on. Klystron indicator on, after 45 second delay.
2. Dimmer.	Vary DIMMER control throughout its range.	Screen scale illumination varies from zero to full intensity.
3. Oscilloscope operation.	a. Vary VERT CENTERING and HORIZ CENTERING controls throughout their ranges. b. Adjust BRIGHTNESS and FOCUS controls to obtain sweep trace of suitable brightness and sharpness on screen. c. Vary HORIZ GAIN control throughout its range. d. Vary SWEEP FREQ control throughout its range. e. Vary VERT GAIN control throughout its range, with any convenient low-level signal applied to DIRECT INPUT jack J5.	a. Set the controls so that the sweep trace is positioned approximately one inch below center of screen. b. Sweep trace line becomes sharpened and retrace disappears. c. Sweep length narrows and expands on screen. Set control to obtain a trace four inches wide. d. Sweep trace varies from low frequency (1 cps) with perceptible flicker, to high frequency (30 cps) without flicker. e. Pattern height increases and contracts on screen, as VERT GAIN control is rotated.
4. Monitoring meter.	a. Set METER SELECTOR to REFLECTOR position. b. Set METER SELECTOR to LINE position. c. Set METER SELECTOR to + 125 position. d. Set METER SELECTOR to + 300 position. e. Set METER SELECTOR to XTAL position.	a. Pointer deflects to midscale, in shaded VOLTS scale region. b. Same as above. c. Same as above. d. Same as above. e. Pointer deflects on-scale; reading varies with setting of TUNING control.



Figur 5-1. Spectrum Analyzer TS-1011/UPM-84, Rem ved fr m Instrument Case, Left Side View

TABLE VI. MINIMUM PERFORMANCE STANDARDS FOR ORGANIZATIONAL MAINTENANCE (cont)

Operational Characteristic	Test	Minimum Standard
5. Spectrum calibrator operation.	a. Energize spectrum calibrator by rotating CALIBRATOR AMPLITUDE control to extreme clockwise position. b. With DIFFERENCE FREQ-MCS control set to zero, and SPECTRUM WIDTH control set to extreme clockwise position, adjust COARSE and FINE tuning controls. c. Rotate DIFFERENCE FREQ-MCS scale to its fully clockwise limit; then to its counterclockwise limit.	a. Calibrating pip height varies from minimum to maximum; height is determined by setting of VERT GAIN and IF. ATTEN-DB controls. b. Calibrator pip position varies as DIFFERENCE FREQ-MCS control is rotated. c. Calibrator pip varies from center to extreme left; then back through center to extreme right side of screen. Readjust pip to appear at center of screen.
6. SPECTRUM WIDTH control.	Vary SPECTRUM WIDTH control throughout its range.	Width of calibrator pip varies from narrow to broad display.
7. INTENSIFIER control.	Vary INTENSIFIER (screwdriver-slotted) control throughout its range.	Brightness of displayed pips varies with respect to trace. Adjust for contrast.
8. SYNC control.	Vary SYNC (screwdriver-slotted) control throughout its range.	Varies sync amplitude to lock the sweep frequency generator. Adjust to approximately 30% rotation, from counterclockwise position.
9. IF. ATTEN-DB control.	Vary IF. ATTEN-DB control throughout its range.	Varies sensitivity and gain of the i-f amplifier. Adjust to give noise of desired height on screen (approximately 1/4 inch).
10. R.F. ATTENUATOR control.	Control of attenuation of the input signal in the frequency range from 10 to 2120 mc, and from 2000 to 12,400 mc. Rotate the R.F. ATTENUATOR control.	0—100 db, continuously variable; maximum insertion loss 40 db; not less than 100 db attenuation at maximum attenuator setting.
11. BAND SELECTOR.	Rotate the BAND SELECTOR to each of its eight positions.	Band 1— 10 — 410 mc. Band 2—250 — 980 mc. Band 3—700 —2120 mc. Band 4— 2.0 — 4.4 kmc. Band 5— 4.2 — 8.9 kmc. Band 6— 6.3 — 13.5 kmc. Band 7— 12.8 — 27.2 kmc. Band 8— 19.25— 40.88kmc.

5–5. PRELIMINARY INSPECTION.

5–6. GENERAL. Preliminary inspection should be performed on the spectrum analyzer, while it is turned off, in an effort to correct conditions which might lead to a breakdown. The most frequent cause of premature breakdown of components is usually caused by overheating due to improper ventilation, the accumulation of dust and dirt, and/or loose connections and fittings. Inspection should be carried out with a view toward finding evidence of these conditions. Table VII lists the preliminary inspection procedures.

KEY TO LEGEND FOR FIGURE 5–1

1. Case Assembly
2. Tuning Head and Panel Assembly
3. Bezel
4. Scale, Calibrated
5. Gasket, Rubber
6. Cable Assembly, W101
7. Handle
8. Knob, Round
9. Decal
10. Shield, Front
11. Cathode Ray-Tube Power Supply Chassis Assembly
12. Frame Assembly
13. Power Supply Chassis Assembly
14. Angle
15. Connector, Plug, P36
16. Hood, Connector
17. Channel Assembly, Slide Mount

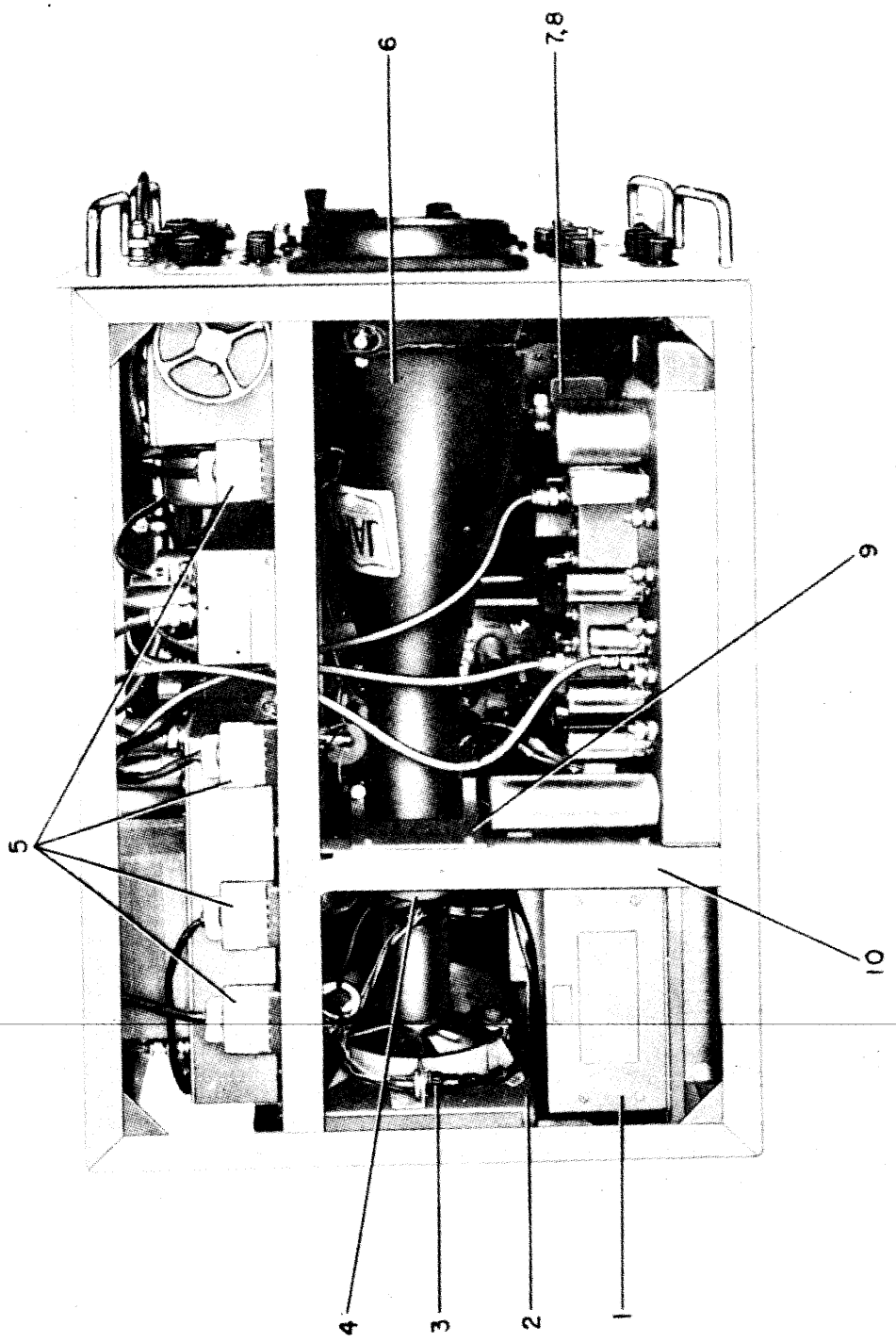


Figure 5-2. Spectrum Analyzer TS-1011/UPM-84, Top Vi w

WARNING

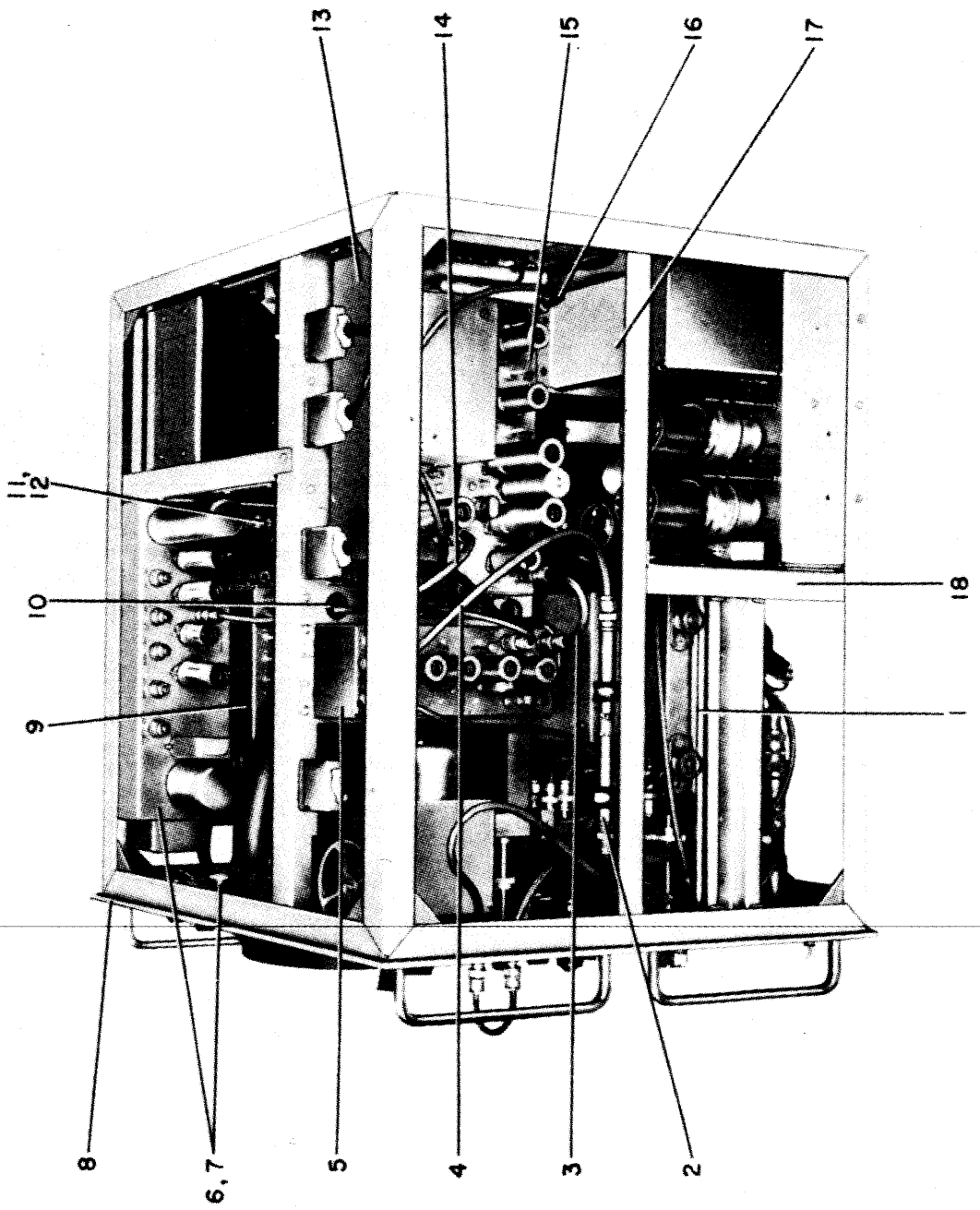
The operation of this equipment involves the use of high voltages (plus and minus 2400 volts) which are dangerous to life. Remove operating power by disconnecting the power cable assembly from power input receptacle J601, at the rear of the chassis, before starting inspection.

TABLE VII. PRELIMINARY INSPECTION PROCEDURE

What to Inspect	Defects to Look For	Remedies	Precautions
Electrical power cable Assembly W601, plugs P601 and P604, a-c receptacle J601.	Kinks in the cable, cuts, deteriorations and fraying of the rubber insulation. Loose connections. Dirt, oil, grease, corrosion.	Replace the cable if beyond repair. Resolder connections or replace cable. Clean with cloth moistened with cleaning solvent Fed. Spec. No. P-S-661, if necessary.	
Instrument Case.	Dirt and corrosion. Dirty filter.	Clean with cleaning solvent Fed. Spec. No. P-S-661. Clean or replace.	
Meter M1.	Bent indicator, cracked case or broken glass.	Replace the meter.	Meter M1 is hermetically sealed. Replace, if cracked.
Knobs, screws, connectors, handles.	Looseness.	Tighten.	Do not overtighten as this will strip threads.
Switches.	Looseness. Inability to change position.	Tighten mounting screws and nuts. If defective, switches must be replaced.	
Fuses.	Dirty fuse caps. Check empty spare fuse holders on front of panel.	Clean with cloth. Insert 5 amp. 250 v. fuses.	
Panel and Chassis.	Dirt, corrosion, moisture, rust.	Remove loose dirt and dust with a brush or low air pressure. Remove dirt and grease on the chassis or panel with a brush or cloth moistened in cleaning fluid.	
Mounting screws and clamps.	Looseness.	Tighten.	Do NOT vary the slotted shafts of variable resistors on the tuning unit or display unit, or the tuning screws of coils on the subchassis.

KEY TO LEGEND FOR FIGURE 5-2

1. Shield Assembly, Rear
2. Blower Assembly
3. Connector, Plug, P602
4. Socket, Cathode-ray Tube
5. Connector, Receptacle, J106, J203, J301, J408
6. Tube, Electron, V619
7. Connector, Plug, P503
8. Hood, Connector
9. Bracket Assembly, Cathode-ray tube Mount
10. Angle



Figur 5–3. Sp ctrum Analyzer TS-1011/UPM-84, Right Side View

TABLE VII. PRELIMINARY INSPECTION PROCEDURE (cont)

What to Inspect	Defects to Look For	Remedies	Precautions
Wiring.	Loose wires. Frayed, worn or missing insulation.	Resolder, recable or reclamp. Rewire, as necessary.	
Solder joints.	Loose or cold solder connections. Corroded.	Resolder. Clean and resolder.	
Resistor and capacitor mounting boards.	Loose mounting.	Tighten mounting screws and nuts.	
Resistors.	Cracks, chipping, blistering, discolorations and other signs of overheating.	Replace with resistor of correct value. (See figures 7-1 through 7-3.)	Be certain that overheating is not due to other defective components, such as leaky capacitors.
Capacitors.	Leaks, bulges, signs of discolorations. Loose mounting bracket.	Replace capacitor. Tighten nuts holding bracket.	
METER SELECTOR S5, BAND SELECTOR S8, IF. ATTEN-DB control S602.	Bent contacts. Broken contacts. Dirty or corroded contacts.	Re-bend with tweezers. Replace contacts or entire switch. Clean with cloth moistened with trichlorethylene, MIL-T-7003.	Avoid prolonged contact with skin.
Tubes, except klystron local-oscillator.	Poor seating. Cold tubes or other symptoms of open filaments. Overheating caused by internal shorts.	Press tubes firmly in sockets. Replace. Replace.	Allow tubes to cool. Do not jiggle tubes, or partially withdraw them from sockets. Such movements tend to weaken tube pins and to spread the contacts in the sockets. Replacement of the klystron is a field maintenance operation. (See section VI.)
Tube Shields.	Looseness. Missing shields.	Press into position. Replace.	
Tube Sockets.	Looseness. Cracks, chips.	Tighten mounting. Replace sockets if necessary.	
Oscillator Drive.	Remove tuning unit by means of four captive screws. Dust, dirt and foreign matter in oscillator gear drive. Slippage in frequency dial drum. Catching or jamming when tuning control knob is turned. Bent or broken gears or gear teeth.	Clean; remove any foreign matter. Tighten, readjust. Replace gears. (See applicable Illustrated Parts Breakdown for disassembly procedure.)	Avoid use of compressed air, as this may force particles into other critical assemblies. Do not use force.

KEY TO LEGEND FOR FIGURE 5-3

1. Slide Assembly
2. Filter, FL101
3. Cable Assembly, W104
4. Cable Assembly, W103
5. Wide Band Chassis and Cover Assembly
6. Potentiometer Mounting Assembly
7. Video Amplifier Chassis Assembly
8. Upper Panel Assembly
9. Sweeper Filter Chassis and Cover Assembly
10. Grommet
11. Connector, Plug, P504
12. Hood, Connector
13. Sweeper Assembly
14. Cable Assembly, W502
15. Narrow Band Chassis and Cover Assembly
16. Cable Assembly, W501
17. Cover Assembly, Transformer
18. Angle

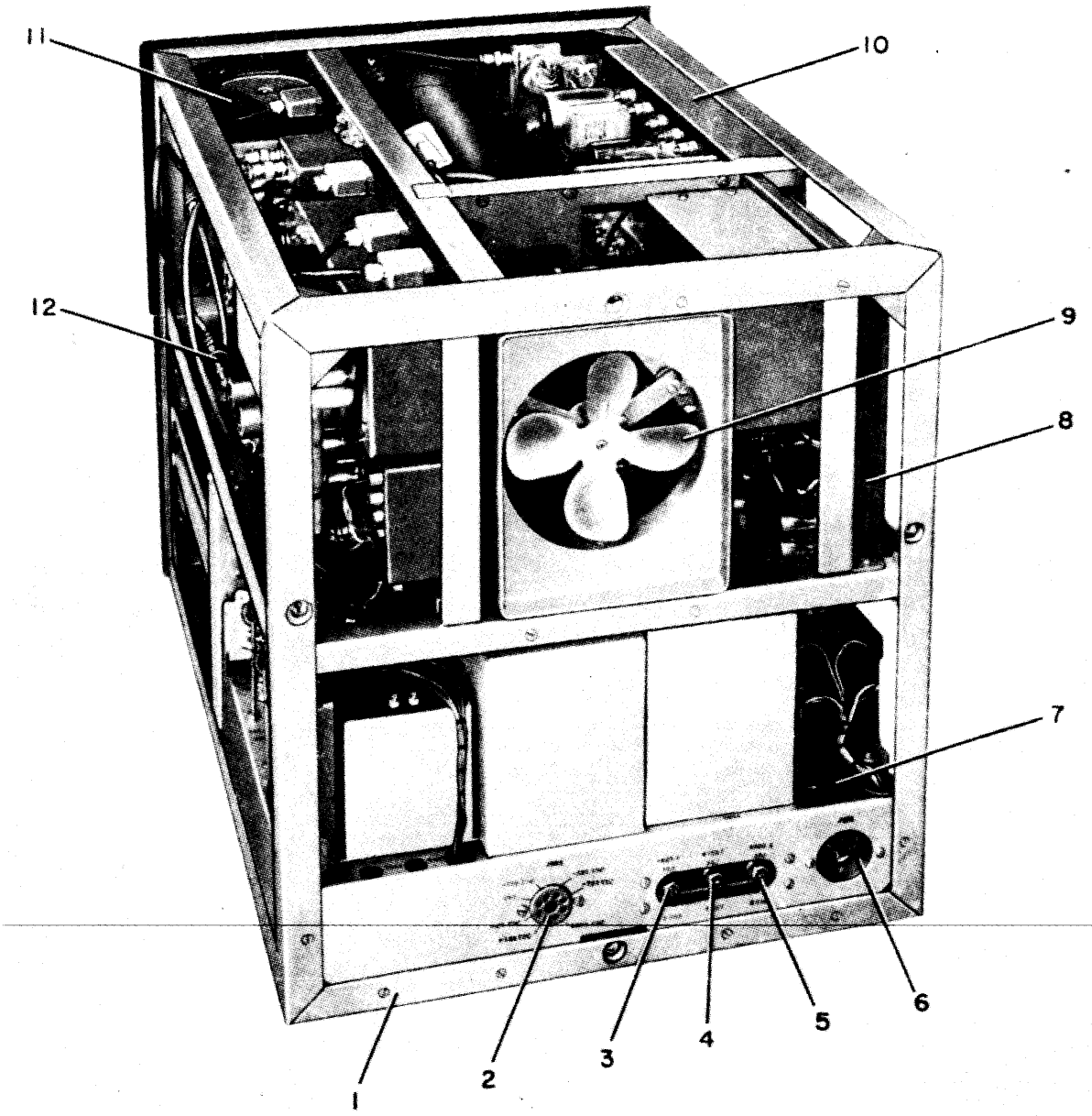


Figure 5–4. Sp ctrum Analyz r TS-1011/UPM-84, R ar Vi w of Chassis

5-7. ACCESS TO EQUIPMENT. (See figures 5-1 through 5-4.) Access to the components of the r-f tuning unit may be obtained by rotating the four captive screws (located on the tuning unit front panel) until they are free from the frame. Then, carefully withdraw the tuning unit from the front of the panel, sliding it along the tracks provided on the main chassis. The tuning unit may then be electrically disconnected from the main chassis by removing the multi-pin connector, P36, from its mating receptacle J36, which is accessible at the rear left section of the r-f tuning unit. Then disconnect coaxial connector P21 from connector J21 located on coaxial switch S3. Withdraw the tuning unit from the frame and place the unit on a clean work bench. Access to all major assemblies and components mounted on the main chassis is obtained by removal of the main chassis dust cover. To remove the dust cover, rotate the camloc fasteners, located at the rear of the equipment, a half-turn counterclockwise. Then slide the main chassis out of the dust cover. Refer to figures 5-1 through 5-4 for left, top, right, and rear views of the main chassis, which identify the major assemblies mounted on the main chassis. Refer to figure 7-4 for the interunit cabling diagram.

5-8. TROUBLE ANALYSIS FOR ORGANIZATIONAL MAINTENANCE.

5-9. Failure of Spectrum Analyzer Set AN/UPM-84 to meet a minimum performance standard, as given in table VI, will require an analysis of the possible causes of malfunctioning. A review of the operating theory, as discussed in section IV, will be helpful before attempting to service this equipment. Refer to Table VIII, Trouble Analysis for Organizational Maintenance, for a step-by-step procedure in which the cause of trouble may be localized to the power supplies, the video circuitry, the sweep frequency generator, the narrow band i-f amplifier, the wide band i-f amplifier, the spectrum calibrator, or the r-f tuning unit. A defect within a stage may be located by voltage and resistance measurements. In trouble-shooting within the equipment, observe the following precautions:

a. Use clip leads at the ends of voltmeter test prods for all voltage checks.

b. Be certain that equipment power is *off* when attaching the test prod leads to circuit components.

c. Make sure all cable plugs are properly connected.

d. After observing the above, apply power to the spectrum analyzer, and wait for approximately 15 minutes to allow the equipment to warm up.

e. Turn power *off* before removing test prods from circuit components.

f. Refer to figures 6-24 through 6-29 for normal voltage and resistance measurements at the tube socket terminals mounted on the main chassis.

g. Refer to figures 7-1 through 7-3 to locate test points on the display unit and the tuning unit.

KEY TO LEGEND FOR FIGURE 5-4

1. Frame Assembly
2. Test Jack, J603
3. −325 V ADJ Control, R609
4. +125 V ADJ Control, R627
5. +300 V ADJ Control, R638
6. Power Jack, J601
7. Power Supply, Main Chassis
8. Cathode-Ray Tube, High Voltage Power Supply
9. Blower, B601
10. Video Chassis
11. Spectrum Calibrator Dial
12. 160 MC Filter

TABLE VIII. TROUBLE ANALYSIS PROCEDURE FOR ORGANIZATIONAL MAINTENANCE

Step	Test Point	Test Equipment	Control Settings and Instructions	Normal Indication	If Indication is Normal	If Indication is Abnormal
1.	Power Source	A-c voltmeter TS-352/U	—	105-125 v ac.	Proceed with step 2.	Trouble is in a-c power source.
2.	Ends of Electrical Power Cable Assembly CX-3974/U (10 ft 0 in.)	Ohmmeter TS-352/U	Cable removed from spectrum analyzer and power source.	Continuity from end to end, each lead. Infinite resistance between leads.	Proceed with step 3.	Open or shorted power cable assembly.
3.	★1 (See figure 7-3)	A-c voltmeter TS-352/U	Electrical power cable assembly connected between power source and spectrum analyzer; POWER switch on.	105-125 v ac.	Proceed with step 4.	No voltage indicates defective switch S601, open fuse(s) F601-602, open filter FL601, poor contact J601.
4.	Visual	None	POWER switch on.	POWER indicator on. Bezel lights on.	Proceed with step. 5	Check for continuity at transformer T604, terminals 1 and 2.
5.	★2 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	28 v dc, nominal.	Proceed with step 6.	Trouble is in selenium rectifier CR601, shorted capacitor C628, open transformer T605, or shorted load.
6.	★3 (See figure 7-3)	A-c voltmeter TS-352/U	POWER switch on.	105-125 v ac after 45 second delay. KLYSTRON indicator on.	Proceed with step 7.	Trouble is in thermal time delay relay K602 or K601.
7.	★4 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	+75 v dc nominal.	Proceed with step 8.	Open transformer T601, defective rectifier V601, shorted capacitor C601, or defective associate components.
8.	★5 (See figure 7-3) Visual	D-c voltmeter TS-352/U —	POWER switch on.	Minus 325 v dc. Brightness of regulator tubes V605, V606, V607.	Proceed with step 9.	Adjust control R609. If voltage is adjustable but range is incorrect, trouble may be in V602, V604, V605, V606, or V607 circuitry. If voltage is not adjustable and range is incorrect, trouble may be in V603, as well as above tubes. Trouble may be defective capacitor C603 or associated resistors, R612 through R616. Same as above.
9.	★6 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	Minus 300 v dc nominal.	Proceed with step 10.	Open transformer T602, defective rectifier V610.

TABLE VIII. TROUBLE ANALYSIS PROCEDURE FOR ORGANIZATIONAL MAINTENANCE (cont)

Step	Test Point	Test Equipment	Control Settings and Instructions	Normal Indication	If Indication is Normal	If Indication is Abnormal
10.	7 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	Minus 150 v dc.	Proceed with step 11.	Open transformer T602, defective rectifier V610, open resistor R641, R643, R644. Shorted capacitor C613, C614 or C615. Defective tube V615.
11.	8 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	+200 v dc nominal.	Proceed with step 12.	Defective rectifier V608, shorted capacitor C606.
12.	9 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	+125 v dc.	Proceed with step 13.	Defective control R627, associated resistors, and capacitors, defective tubes V612, V611.
13.	10 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	+370 v dc nominal.	Proceed with step 14.	Defective rectifier V609, shorted capacitor C607.
14.	11 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	+300 v dc.	Proceed with step 15.	Defective control R638, associated resistors and capacitors, defective tubes V613, V614.
15.	12 (See figure 7-3)	D-c voltmeter TS-352/U	POWER switch on.	+300 v dc.	Proceed with step 16.	Open resistors, R648, or poor contact at pins X of J606-P606 to +300 v dc bus.
16.	13 (See figure 7-3)	VTVM TS-505/U	POWER switch on.	+400 v dc.	Proceed with step 17.	Open transformer T603, defective rectifier tube V617, shorted high-voltage leads. Defective V616 or associated resistors or capacitors.
17.	14 (See figure 7-3)	VTVM TS-505/U	POWER switch on.	Minus 400 v dc nominal.	Proceed with step 18.	Defective rectifier V618, shorted C627, open bleeder resistors or controls R663-R668. Shorted high-voltage leads.
18.	Visual (See figure 7-2)	None	POWER switch on. Observe screen for trace.	Normal trace approximately 4 in. long.	Proceed with step 19.	If only a bright spot is visible, and BRIGHTNESS and FOCUS controls functioning normally, difficulty is caused by absence of horizontal sawtooth voltage. Check sawtooth generator V506, V507A or associated resistors and capacitors; also check horizontal amplifier V501 or its associated components.

TABLE VIII. TROUBLE ANALYSIS PROCEDURE FOR ORGANIZATIONAL MAINTENANCE (cont)

Step	Test Point	Test Equipment	Control Settings and Instructions	Normal Indication	If Indication is Normal	If Indication is Abnormal
19.	Visual (See figure 7-2)	None	Vary HORIZ GAIN and HORIZ CENTERING controls and observe screen for normal action.	HORIZ GAIN widens and narrows trace length. HORIZ CENTERING positions trace to left or right.	Proceed with step 20.	Failure to obtain normal control may be due to defective potentiometers, amplifier V501 or associated resistors or capacitors. Check sawtooth generator V506 and V507A, resistors and capacitors.
20.	Visual (See figure 7-2)	None	Vary VERT GAIN and VERT CENTERING control and observe screen for normal action.	VERT GAIN increases or contracts height of display. VERT CENTERING positions trace up or down.	Proceed with step 21.	Failure to obtain normal control may be due to defective potentiometers, amplifier tubes V504 or V505 or associated resistors and capacitors.
21.	★15 (See figure 7-2)	Oscilloscope AN/USM-24	Vary SPECTRUM WIDTH and SWEEP FREQ controls.	Sawtooth output frequency 1-30 cps, controllable by SWEEP FREQ control; amplitude controlled by SPECTRUM WIDTH control.	Proceed with step 22.	Defective sweeper driver tube V508 or V502A and V507A; open or dirty contacts on relay K501; defective SPECTRUM WIDTH control R558; or SWEEP FREQ control R544A.
22.	★16 (See figure 7-2)	Frequency meter (Measurements Corp. Model 59)	Disconnect P405 and vary COARSE SPECTRUM CENTERING control. (Attach output coil to J405 for adequate indication.)	Observe frequency deviation in the vicinity of 224 mc.	Proceed with step 23.	Defective sweep frequency generator, check V401; oscillator V402; amplifier V403; tripler V404; and associated components.
23.	★17 (See figure 7-2)	Frequency meter (Measurements Corp. Model 59)	Energize spectrum calibrator; set SPECTRUM WIDTH to minimum. Remove cover of spectrum calibrator and place probe of frequency meter near oscillator coil.	Observe meter indication in vicinity of 160 mc.	Proceed with step 24.	Defective spectrum calibrator. Check V301 oscillator and associated components.
24.	★19 (See figure 7-2)	Signal Generator AN/USM-44	Apply 64 mc signal to J201. Set VERT GAIN at maximum; adjust I.F. ATTEN-DB for best readings.	Observe video signal at output jack J202.	Proceed with step 25.	Defective narrow band i-f amplifier. Check tubes V201, V202, V203, V204, V205, and mixer CR201.
25.	★18 (See figure 7-2)	None	Reconnect jacks J201 and J203. Energize spectrum calibrator and set SPECTRUM WIDTH to maximum. Vary DIFF FREQ-MCS tuning control; adjust CALIBRATOR AMPLITUDE for best readings.	Observe calibrator pip on screen.	Proceed with step 26.	Defective wide band i-f amplifier. Check grounded grid amplifiers V101, V102, V103, mixer CR101 and V104.
26.	Visual (See figure 7-3)	None	Adjust IF. ATTEN-DB in steps.	Observe change in noise height on screen.	Proceed with step 27.	Defective I. F. ATTEN-DB control. Check resistor network on S602. Check J203 and P203, pins D, for secure mating.

TABLE VIII. TROUBLE ANALYSIS PROCEDURE FOR ORGANIZATIONAL MAINTENANCE (cont)

Step	Test Point	Test Equipment	Control Settings and Instructions	Normal Indication	If Indication is Normal	If Indication is Abnormal
27.	Visual (See figures 7–1 and 7–2)	None	BAND SELECTOR in bands 1-3; METER SELECTOR on XTAL.	Check for XTAL current indication as TUNING control is rotated through each of bands 1-3; abrupt discontinuities of XTAL current (in which pointer falls to zero) is abnormal, and indicates loss of oscillation.	Proceed with step 28.	Defective transmission-line local oscillator V3; replacement is a field maintenance repair. Defective crystal mixer CR2, dirty contacts on S5, S8; open potentiometer R28; check pin R on J36 and P36, pin D on J203 and P203, pin H on J106. Check for open-circuited wide band and narrow band filters. Check continuity of coaxial switches S1 and S3. Check M1 meter.
28.	Visual (See figures 7–1 and 7–2)	None	BAND SELECTOR in bands 4-8; METER SELECTOR on XTAL.	Check for XTAL current indication as TUNING control is rotated through each of bands 4-8; abrupt discontinuities of XTAL current (in which pointer falls to zero) is abnormal, and indicates loss of oscillation.	Proceed with step 29.	Defective klystron local oscillator V1. Replacement is a field maintenance repair. Defective crystal mixer CR1, dirty contacts on S5, S8, open potentiometer R21. Check pin R on J36. Check for continuity of coaxial switches S1 and S3. Check M1 meter.
29.	Visual (See figure 7–1)	Signal Generator AN/USM-44 or equivalent signal generator	BAND SELECTOR in band 1, Cable CG-1526/U (1 ft 6 in.) connected between ATTENUATOR OUTPUT 10-2120 MC and DIRECT INPUT. Apply a 400 mc test signal to ATTENUATOR INPUT 10-2120 MC jack.	Check for linear attenuation, as observed on screen. Compare with calibrated attenuator or signal generator.	Proceed with step 30.	Check jacks J27, P26, J26, J29 and J5 for firm connections. Replacement of attenuator AT4 is a field maintenance repair.
30.	Visual (See figure 7–1)	Signal Generator AN/URM-34 or equivalent highfrequency signal generator	BAND SELECTOR in band 4. Shift cable to high frequency jacks. Apply a 4 kmc test signal to ATTENUATOR INPUT 2000-12,400 MC jack.	Check for linear attenuation, as observed on screen. Compare with calibrated attenuator or signal generator.		Check jacks J31, P33, J33, J32 and J28, for firm connections. Replacement of attenuator AT3 is a field maintenance repair.

5–10. CHECKING THE DC POWER SUPPLIES.

5–11. GENERAL. All dc power to operate the vacuum tubes within the Spectrum Analyzer is developed by four electronic power supplies. A bridge-type selenium rectifier is employed to supply 28 volts for operation of the various control relays. The four electronic power supplies consist of the minus 733 and 325 volt supply for the klystron, the dual positive supplies of 300 and 125 volts for the display unit, the negative bias supply of 150 volts for the display unit, and the plus and minus 2400 volt supply for the cathode-ray tube. (Refer to paragraph 4–36 for a detailed circuit description, to figure 4–17 for a functional block diagram, and to figure 7–3 for the overall schematic diagram.)

5–12. ADJUSTMENT PROCEDURE. (See figure 5–4.) The outputs of the various supplies, with the exception of the high voltage cathode-ray tube supply, are available for test at J603, located at the rear of the main chassis. Adjustment controls R609, R627, R638 are available for adjusting the output potentials of the electronically regulated supplies. For this test procedure,

clip leads may be removed from the ends of the voltmeter test prods, since readings may be safely obtained by inserting the voltmeter test prods into the appropriate pins provided on J603. Moreover, it is unnecessary to turn power OFF between tests, providing care is exercised in handling the test equipment. With the power switch ON and after allowing a 45 second delay for the klystron indicator to light, perform the following tests and adjustments:

a. Pins 1 and 2 (proceeding counterclockwise from the keyway of the octal socket) are test points for the negative 733 and 325 volt klystron supply. Adjust R609 for correct operating potentials. These potentials are mutually dependent upon each other; the inability to obtain normal reading of one supply will usually adversely affect the other. Refer to table VIII if abnormal readings are observed.

b. Pin 3 is the test point for the negative bias supply of 150 volts. No adjustment is available since this potential is developed by the gas reference tube V615. Abnormal indication at pin 3 will usually be accompanied by abnormal indications at pins 6 and 7 since these are dependent upon the negative 150 volt reference. Refer to table VIII if abnormal readings are observed.

c. Pin 5 is the test point for the + 28 v supply for all control relays. No adjustment is available since this potential is obtained directly from a selenium full-wave bridge.

d. Pins 6 and 7 are test points for the positive supplies for the display unit. Adjust R627 and R638 to obtain readings of +125 volts and +300 volts respectively. These readings will only be obtainable if the reading previously observed at pin 3 was minus 150 volts. Refer to table VIII if abnormal readings are obtained.

5–13. LUBRICATION.

5–14. GENERAL. Oilite bearings are used on those parts of the equipment which have moving parts. These bearings require no further lubrication during the life of the equipment. Under severe salt-air conditions, a small amount of liquid, light, petrolatum, Specification No. AN-P-51 may be applied to the contacts of the two wafer switches, consisting of the METER SELECTOR S5, and the BAND SELECTOR S8, after first cleaning with trichlorethylene, Specification MIL-T-7003. These wafers are accessible in the r-f tuning unit. Similar lubrication should be applied to the IF. ATTEN DB

TABLE IX. INSPECTION SCHEDULE

W = Weekly M = Monthly Q = Quarterly

Component	Inspection	Schedule
Blower B601.	Screen free of accumulated dust. Bearings lubricated.	M
Electrical power cable assembly CX-3974/U (10 ft 0 in.)	Refer to table VII.	W
Front panel and front panel controls; operating and spare fuses.	Refer to table VII.	M
Bezel and graticule.	Clean accumulated dust and dirt.	W
Rear of panel, top and bottom of chassis.	Connections mechanically secure and not corroded. Locking nuts tight. Klystron oscillator attenuator drive assembly, oscillator cam follower, push rods, and frequency dial drum, clean and moving freely.	M
Resistors and capacitors.	Refer to table VII.	M
Tubes, except transmission-line local oscillator within housing, cathode-ray tube and klystron tube.	Refer to table VII.	M
Cathode-ray tube socket.	Socket making good electrical contact with tube base. Socket clear of accumulated dust and dirt. Check with power disconnected.	M
Wiring.	Wires properly insulated, harnessed, and securely clamped.	Q

wafer switch located behind the front panel in the display unit. Avoid application of excessive amounts of lubricant; also avoid prolonged skin contact with trichlorethylene.

5–15. INSPECTION SCHEDULE.

5–16. Spectrum Analyzer TS-1011/UPM-84 is a precision instrument with carefully calibrated frequency indicators. It is essential that the equipment be maintained in proper operating condition so that it may perform its functions with the required accuracy. Periodic checks will serve to insure reliable performance of the equipment. Table IX lists the parts requiring inspection, the times at which inspection is required, and the specific conditions or operations to be performed.

SECTION VI

FIELD MAINTENANCE

6–1. SCOPE.

6–2. This section of the handbook discusses maintenance which may be performed on Spectrum Analyzer Set AN/UPM-84 at the field level. Minimum performance standards, a trouble-shooting chart, and repair and alignment procedures are described. Reference should be made to table VIII, for a systematic means of localizing difficulties once they arise.

6–3. MINIMUM PERFORMANCE STANDARDS FOR FIELD MAINTENANCE.

6–4. Minimum performance standards for field maintenance and methods for checking them are given in table XI. Performance data of the spectrum analyzer depend upon the settings of the following controls. Adjust as indicated in table X, below, before attempting to obtain data, unless otherwise noted.

a. Failure to meet a minimum performance standard, as given in table XI, will require an analysis of the possible causes of equipment failure. The theory of operation of this equipment, as given in section IV of this handbook, should be thoroughly understood before attempting to analyze trouble in the spectrum analyzer.

b. Table XIV, Electronic Trouble Analysis, lists possible troubles, probable causes, and suggested remedies, as referenced to figures 7–1 through 7–3. Major test points are shown in these illustrations.

c. Table XV, Secondary Test Point Trouble-Shooting Chart, tabulates secondary test points shown in the video schematic portion of figure 7–2. Included are test points and typical waveforms.

d. Refer to figures 6–24 through 6–29 for voltage and resistance measurements within the electronic assemblies of the display unit.

TABLE X. FRONT PANEL CONTROL SETTINGS

Control	Setting
POWER	ON
SPECTRUM WIDTH	25 mc
SWEEP FREQ	30 cps
IF ATTEN-DB	Set at a convenient level for 1 inch of noise.
SYNC	30% clockwise
VERT GAIN	50% clockwise
HORIZ GAIN	Trace length set to full screen diameter.

TABLE XI. MINIMUM PERFORMANCE STANDARDS FOR FIELD MAINTENANCE

Circuit Characteristic	Test Condition	Applied To	Normal Reading
Vertical amplifier gain.	Apply test signal of ½ volt rms, 20 to 10,000 cps, from an audio frequency signal generator. (See figure 6–1.)	Jack J502 on video chassis.	Approximately two-inch deflection on screen. (See paragraph 6–5.)
Gain of narrow band i-f amplifier.	64 mc (nominal), 30% modulated at 400 cps, 150 microvolt amplitude. (See figure 6–2.)	Jack J201 on narrow band i-f amplifier chassis.	Overall gain of 20,000 at J202 (3 VAC). (See paragraph 6-7.)
Gain of wide band i-f amplifier.	160 mc (nominal), 30% modulated at 400 cps, at 2 to 3 microvolts amplitude. (See figure 6–4.)	Jack J102 on wide band i-f amplifier chassis.	Overall gain of 50 at J105. (See paragraph 6–9.)
Sweep frequency generator operation.	28 volts dc, capable of being varied plus or minus 14 volts. (See figure 6–6.)	Jack J401 on sweep frequency generator chassis.	Minimum frequency deviation of 211 to 236 mc, with an output voltage of at least one volt rms, at 224 mc. (See paragraph 6–11.)
Spectrum calibrator operation.	Crystal calibrator marker, 10 mc and 1 mc. (See figure 6–9.)	IF INPUT jack J107, on display unit panel.	Spectrum calibrator pip tracks to ± 0.5 mc from −12.5 to +12.5 mc. (See paragraph 6–13.)
Sweeper filter response.	224 mc (nominal), 30% modulated at 400 cps. (See figures 6–10 and 6–11.)	Plug P405 on the sweep frequency generator chassis. Apply signal via a 50 to 100 ohm pad.	Response over passband of 212-236 mc should have a maximum insertion loss of 2 db across a 100 to 50 ohm pad at output of filter. (See paragraph 6–16.)
Klystron oscillator operation.	Rotate BAND SELECTOR to band 4 and tune to approximately 2000 mc. Check klystron tracking over the band by means of a wavemeter, such as Polarad Model FS.	DIRECT INPUT jack J28, on r-f tuning unit.	With METER SELECTOR set to XTAL, tracking of wavemeter results in a dip on front panel meter. The indicated frequency on the wavemeter is always 160 mc higher than indicated on the dial. (See paragraph 6–18 for klystron adjustments.)
Low frequency local-oscillator operation.	Rotate BAND SELECTOR to band 1 and tune to approximately 100 mc. Check low frequency oscillator tracking over the band by means of a frequency meter, such as Measurements Corp. Model 59. (See figure 6–16.)	DIRECT INPUT jack J5, on the r-f tuning unit, using antenna to couple the frequency meter to the spectrum analyzer input.	Tracking results in a peak indication on meter M1. The indication on the frequency meter is always 160 mc higher than indicated on the dial. (See paragraph 6-23 for low-frequency oscillator adjustments.)
180 mc low pass filter alignment.	180 mc (nominal), 30% modulated at 400 cps. (See figures 6–17 and 6–18.)	Plug P92 through a 50 to 100 ohm pad. (See 8, figure 6–14.)	With output of filter coupled through a 100 to 50 ohm pad to a calibrated receiver, a maximum insertion loss (of the filter itself) of 9 db at 180 mc should be observed. Attenuation from the maximum response should be less than 1.5 db at 175 mc and more than 7.5 db at 185 mc. (See paragraph 6–23.)
163 mc low pass filter alignment.	163 mc (nominal), 30% modulated at 400 cps. (See figures 6–20 and 6–21.)	Jack J14 through a 50 to 100 ohm pad. Jack J14 is available on the 163 mc filter subassembly to the rear of the frequency dial drum. (See 10, figure 6–13.)	With output of filter coupled through a 100 to 50 ohm pad to a calibrated receiver, a maximum insertion loss (of the filter itself) of 6 db at 163 mc should be observed. Loss should drop no more than 3 db below maximum at 157.5 and 162.5 mc. (See paragraph 6–27.)

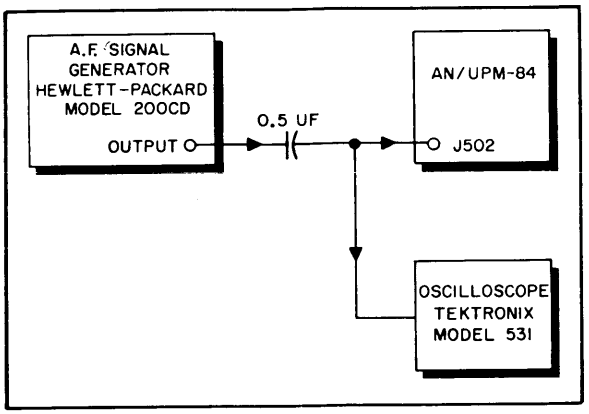


Figure 6–1. Checking Gain of Vertical Amplifier, Test Set-up Diagram

6–5. CHECKING GAIN OF VERTICAL AMPLIFIER.

6–6. To determine whether the spectrum analyzer meets the minimum standards of vertical amplifier gain, set up the test equipment as shown in figure 6–1. Measure the frequency response, with the front panel controls as indicated in table X. A frequency response which is uniform within 2 db, from 20 cps to 8 kc, indicates satisfactory equipment performance. To check the frequency response, proceed as follows:

a. Set the audio frequency signal generator at 1000 cps.

b. Adjust the signal generator output to yield a 2-inch peak-to-peak signal on the spectrum analyzer display.

c. Note the input level (using the built-in calibrator on the Tektronix Model 531 Oscilloscope, or on an external voltmeter).

d. Vary the signal generator frequency control throughout the range 20 to 10,000 cps, and adjust the input level to yield a 2-inch deflection at each test frequency. Failure to obtain a proper frequency response indicates the need for service. Replace vertical amplifier tubes V504 and V505. If unable to obtain proper response, refer to figure 6–26 for voltage and resistance measurements within the vertical amplifier to isolate the difficulty.

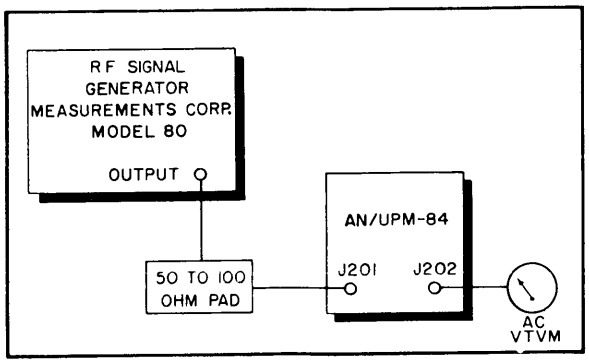


Figure 6–2. Checking Gain f Narrow Band I-f Amplifier, Test Set-up Diagram

6–7. CHECKING GAIN OF NARROW BAND I-F AMPLIFIER.

6–8. To check the minimum standards for the narrow band i-f amplifier, set up the test equipment as shown in figure 6–2. Also refer to figure 6–3 for an exploded view of the narrow band i-f amplifier to identify the various controls and adjustments. The parenthetical numbers which follow refer to the index numbers of figure 6–3. Measure the gain of the narrow band i-f amplifier at 64 mc. A gain of approximately 20,000 indicates satisfactory equipment performance. Failure to obtain this indication shows the need for re-alignment. Proceed as directed in the following steps:

a. Set the r-f signal generator to 64 mc, 30 percent modulated at 400 cps. Adjust the output to 150 microvolts and apply the signal output to J201 (16).

b. Tune the signal generator slightly, to obtain maximum output.

c. Peak transformers T201 (18), L202 (17), L205 (19), T206 (21), L209 (22), L213 (20), L216 (22) and L219 (22) by observing the pointer of the a-c vtvm for maximum deflection.

d. Reduce the output of the signal generator, as required, to avoid overloading the narrow band i-f amplifier.

e. Retune the signal generator occasionally for maximum output.

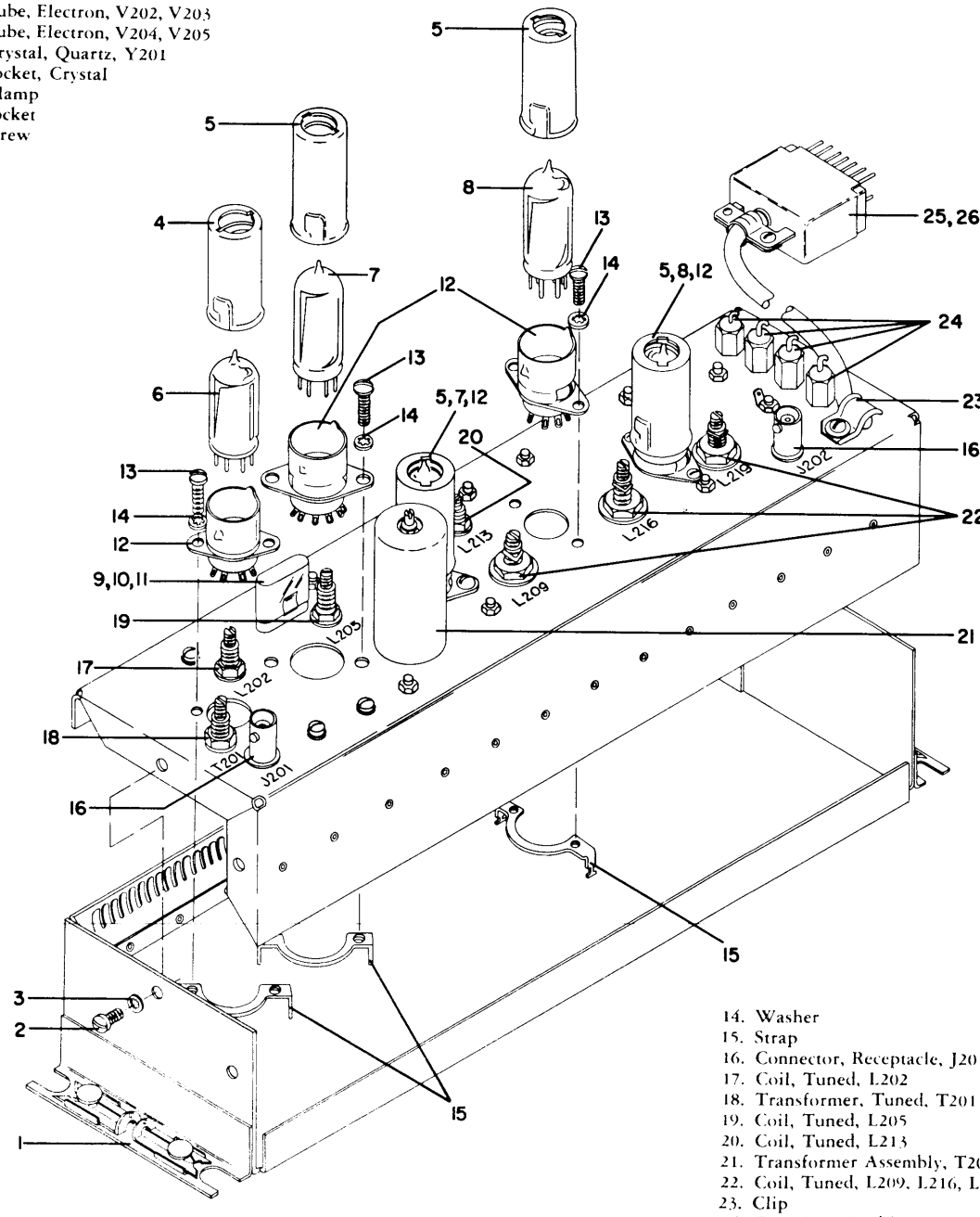
f. When alignment is complete, reconnect P202 to J202 (16.)

6–9. CHECKING THE GAIN OF THE WIDE BAND I-F AMPLIFIER.

6–10. To check for minimum standards of wide band i-f amplifier gain, set up the equipment as shown in figure 6–4. Also refer to figure 6–5 for an exploded view of the wide band i-f amplifier chassis. The parenthetical numbers which follow refer to the index numbers of figure 6–5. Measure the gain of the wide band i-f amplifier over the pass band from 150 to 170 mc. A gain of approximately 50, at 160 mc, indicates satisfactory equipment performance. Failure to obtain this indication shows the need for re-alignment. Proceed as directed in the following steps:

a. Tune the Measurement Corp. Model 80 R-f Signal Generator to 160 mc and connect the output to J102 (12) by means of the 50-to-100 ohm pad. Do not apply operating power to the AN/USM-44 Signal Generator at this time.

1. Dust Cover Assembly
2. Screw
3. Washer
4. Shield, Electron Tube
5. Shield, Electron Tube
6. Tube, Electron, V201
7. Tube, Electron, V202, V203
8. Tube, Electron, V204, V205
9. Crystal, Quartz, Y201
10. Socket, Crystal
11. Clamp
12. Socket
13. Screw



14. Washer
15. Strap
16. Connector, Receptacle, J201, J202
17. Coil, Tuned, L202
18. Transformer, Tuned, T201
19. Coil, Tuned, L205
20. Coil, Tuned, L213
21. Transformer Assembly, T206
22. Coil, Tuned, L209, L216, L219
23. Clip
24. Capacitor, Feedthrough, C244, C248, C251, C252
25. Connector, Plug, P203
26. Hood

Figure 6–3. Narrow Band I-f Amplifier, Exploded View

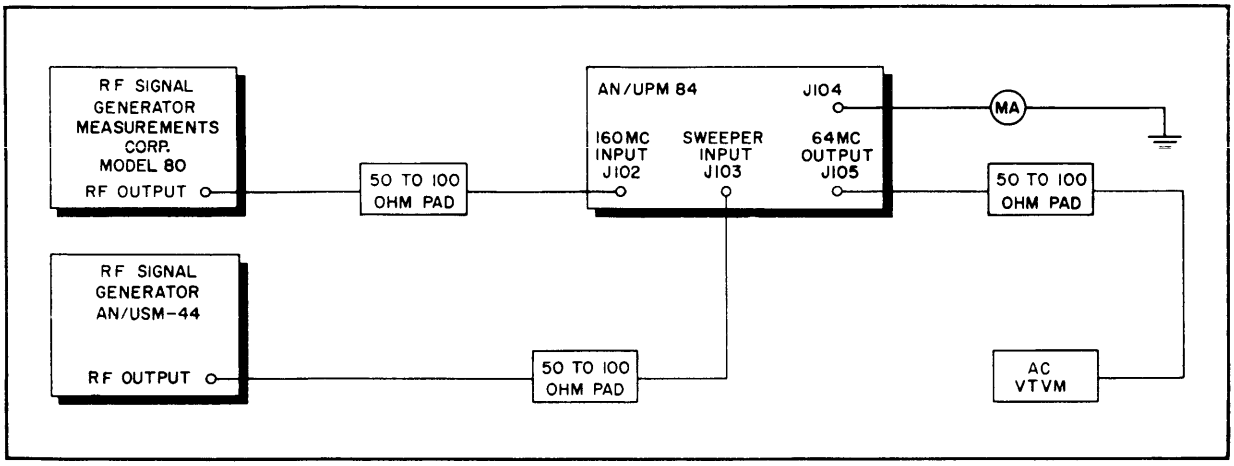


Figure 6–4. Checking Gain of Wide Band I-f Amplifier, Test Set-up Diagram

b. Set the r-f output level of the Measurement Corp. Model 80 Signal Generator to cause the meter, connected to J104 (14), to indicate approximately 0.4 milliampere.

c. Peak transformers T101 (20), T102 (19), and T103 (18), to obtain a maximum indication on the milliammeter when applying test frequencies of 160 mc, 171 mc, and 149 mc, respectively. A minimum current indication of approximately 0.4 milliampere should be maintained during alignment adjustments, to assure uniform gain over the passband.

d. Check the i-f response for a nominal bandwidth of 25 mc (about a center frequency of 160 mc) to yield a maximum of 3 db fall-off at plus or minus 12.5 mc. Readjust T101 (20), T102 (19), and T103 (18), if necessary, to obtain correct frequency response.

e. Apply operating power to the AN/USM-44, and remove power from the Measurement Corp. Model 80 R-f Signal Generator.

f. Check the 64 mc stage by setting the AN/USM-44 Signal Generator to 64 mc, and applying the test signal to the SWEEPER INPUT jack, J103 (12).

g. Peak L122 (17) and T104 (16) for maximum indication on the vtvm.

h. Remove the output cable of the Measurement Corp. Model 80 R-f Signal Generator from the 160 MC INPUT jack, J102.

i. Shift the output of the AN/USM-44 Signal Generator from the SWEEPER INPUT jack, J103, to the 160 MC INPUT jack, J102. Apply the maximum amplitude test signal available, at 64 mc, and tune L105 (21) for a voltage minimum.

j. Check the overall operation of the wide band i-f amplifier by applying test signals, as shown in figure 6–4, of 224 mc to the SWEEPER INPUT jack, J103, and of 160 mc to the 160 MC INPUT jack, J102, simultaneously.

k. Temporarily remove power from the Measurement Corp. Model 80 R-f Signal Generator. Adjust the level of the 224 mc signal at J103 until a reading of 0.4 milliampere is obtained at J104.

l. Reapply power to the Model 80 R-f Signal Generator. Vary the signal generator tuning slightly, in the vicinity of 160 mc, until a response is obtained on the vtvm at J105. Set the amplitude control of the Model 80 R-f Signal Generator to produce a reading of 0.5 volt.

m. Retrim coil L122 (17) and transformer T104 (16) for a maximum indication on the vtvm, if necessary.

n. Recheck the overall performance of the wide band amplifier as directed in step j, above. An overall gain of 50 indicates satisfactory equipment performance.

6–11. CHECKING PERFORMANCE OF SWEEP FREQUENCY GENERATOR.

6–12. To check for minimum standards of the sweep frequency generator, set up the test equipment as shown in figure 6–6. Also refer to figure 6–7 for an exploded view of the sweep frequency generator chassis. The parenthetical numbers which follow apply to the index numbers of figure 6–7. Measure the output of the sweep frequency generator with an a-c vtvm connected across the 100 ohm termination. An output reading of 1 volt at 224 mc, down 15% at 211.5 and 236.5 mc, indicates satisfactory equipment performance. Failure to obtain this indication shows need for realignment. Proceed as directed in the following steps:

1. Shield, Electron tube
2. Shield, Electron tube
3. Tube, Electron, V104
4. Tube, Electron, V101, V102, V103
5. Dust Cover Assembly
6. Screw
7. Washer
8. Socket, Electron tube
9. Screw
10. Washer
11. Strap, Nut
12. Connector, Receptacle, J101, J102, J103, J105
13. Capacitor, Feedthrough, C127, C128, C129, C131
14. Jack, Test, J104
15. Lug, Terminal
16. Transformer, Tuned, T104
17. Coil, Tuned, L122
18. Transformer, Tuned, T103
19. Transformer, Tuned, T102
20. Transformer, Tuned, T101
21. Coil, Tuned, L105
22. Connector, Plug, P106
23. Hood

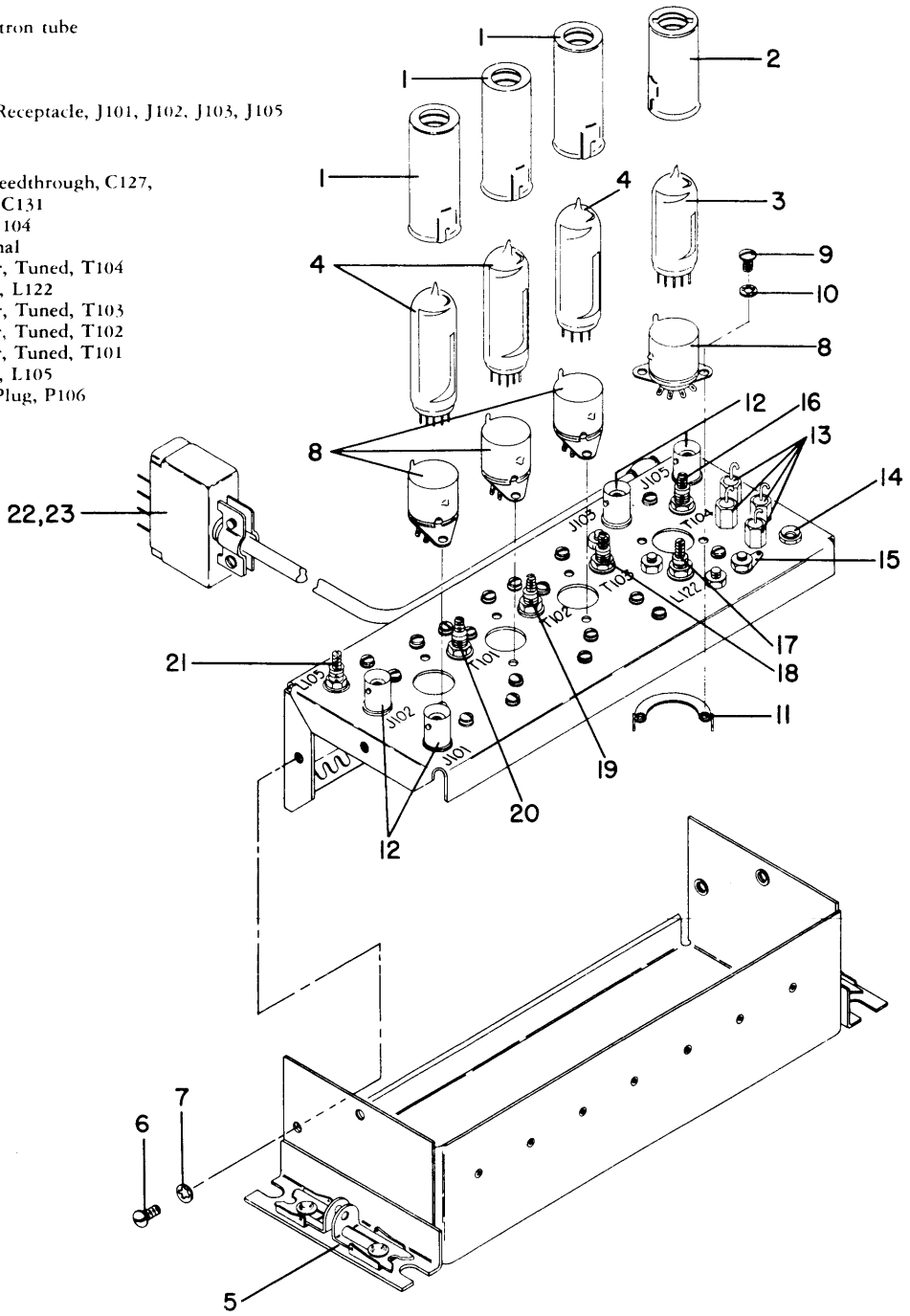


Figure 6–5. Wide Band I-f Amplifier, Expl ded View

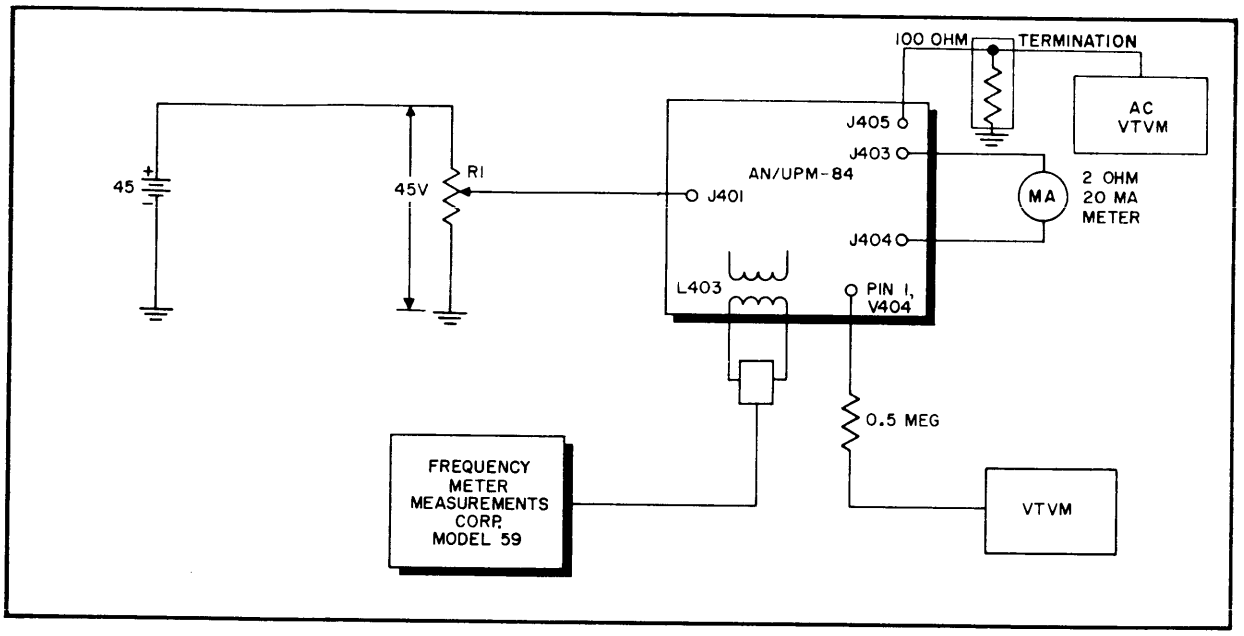


Figure 6–6. Checking Performance of Sweep Frequency Generator, Test Set-up Diagram

a. Connect the variable d-c voltage to J401 (46). Adjust this voltage to obtain an indication of 9.5 milliamperes on the meter connected between J403 (44) and J404 (44).

b. Vary trimmer capacitor C404 (39) to obtain an indication of 74.7 mc, in the vicinity of variable inductor L403 (38), employing the frequency meter.

c. Tune inductor L403 to obtain a maximum indication on the vtvm, at the grid, pin 1, of V403. Retrim C404, if necessary, as directed in step b.

d. Adjust the variable d-c voltage, by rotation of R1, to obtain readings over the limits of 70.5 and 78.8 mc on the frequency meter. Record the milliammeter readings.

e. Remove the frequency meter from the test set-up.

f. Connect the vtvm to the grid, pin 1, of V404. Tune the inductor (37) to center the response as potentiometer R1 is varied through its operating range.

g. Using the vtvm connected to SWEEPER OUT-

TABLE XII. SWEEP FREQUENCY GENERATOR ALIGNMENT DATA

(Average Values)

Test Point	Test Frequency		
	211.5	224	236.5
Output frequency of L403	70.5 mc	74.7 mc	78.9 mc
D-c input to jack J401	20 v	33 v	43 v
Variable inductor current (at J403 and J404)	6.5 ma	9.5 ma	12.5 ma
Oscillator grid-to-cathode voltage, V402	−3.0 v	−2.85 v	−2.5 v
Tripler grid, V404	−13.0 v	16.0 v	−13.0 v
Output, 100-ohm load across jack J405 to ground	0.98 v ac	1.05 v ac	0.92 v ac

1. Shield Assembly
2. Screw
3. Washer
4. Gasket, Metex
5. Screw
6. Washer
7. Gasket, Metex
8. Shield, Electron tube
9. Shield, Electron tube
10. Shield, Electron tube
11. Tube, Electron, V401
12. Tube, Electron, V402
13. Tube, Electron, V403
14. Tube, Electron, V404
15. Socket, Electron tube
16. Screw
17. Washer
18. Strap, Nut
19. Socket, Electron tube
20. Screw
21. Washer
22. Strap, Nut
23. Post
24. Screw
25. Washer
26. Post
27. Lug, Terminal
28. Post
29. Clip
30. Screw
31. Washer
32. Washer
33. Connector, Plug, P408
34. Hood
35. Filter Assembly, FL401, FL402
36. Transformer, Tuned, T401
37. Coil, Tuning, L407
38. Coil, Tuning, L403
39. Capacitor, Variable, C404
40. Saturable Reactor, T400
41. Nut, Hex
42. Washer
43. Plate Assembly
44. Jack, Test, J403, J404
45. Jack, Test, J402
46. Connector, Receptacle J401, J405

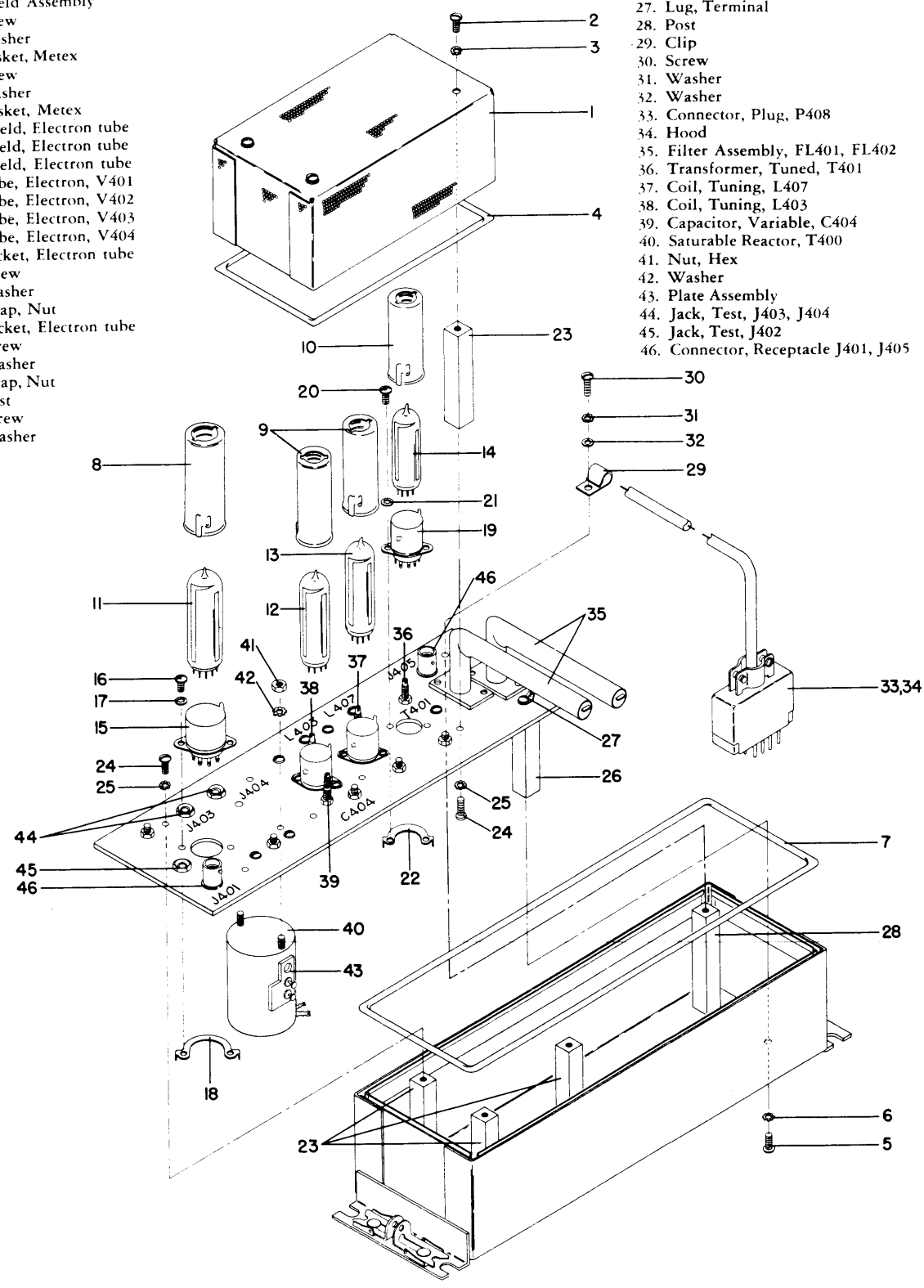


Figure 6–7. Swe p Frequency Generator, Explod d View

PUT jack J405 (46), tune transformer T401 (36) for a maximum output in the vicinity of 224 mc (the third harmonic of 74.7 mc), with the milliammeter indication at the center of the range. Check the final output frequency of 224 mc by locating the frequency meter in the vicinity of T401. (The frequency meter is now being used as an absorption meter.) Check the response over the frequency range.

h. Typical readings obtained when aligning the sweep frequency generator are listed in table XII.

6–13. CHECKING PERFORMANCE OF THE SPECTRUM CALIBRATOR.

6–14. To check the minimum performance standards of the spectrum calibrator circuit, observe the pip on the self-contained display of the spectrum analyzer. Use a crystal calibrator, such as Measurements Corp. Model 111-B, or equivalent, to obtain markers at 1 mc and 10 mc. Refer to figure 6–8 for a view showing location of the adjustment controls. Set up the test equipment as shown in figure 6–9, and proceed as follows.

a. Remove R-f Cable Assembly CG-1525/U (0 ft 3 in.) from the front panel of the display unit, to gain access to I-F INPUT jack J107.

b. Apply the output of the crystal calibrator to I-F INPUT jack J107.

c. Place the crystal calibrator MEGACYCLES control to the 10 MC position. Be sure that the spectrum analyzer SPECTRUM WIDTH control is set to its maximum clockwise position. With the spectrum analyzer tuned to any frequency above 55 mc, a bandpass of 25 mc is available on the screen.

d. Observe the screen of the cathode-ray tube to locate the 150, 160, and 170 mc crystal markers.

e. Use a wax marking pencil to inscribe the location of the 150 mc and 170 mc markers on the cathode-ray tube screen.

f. Rotate the crystal calibrator MEGACYCLES control to the 1 MC position and mark the location of the 147, 148, 172, and 173 mc markers.

g. Rotate the CALIBRATOR AMPLITUDE control to its approximate mid-position. Set the control to obtain convenient height of signal pip.

h. Vary the SPECTRUM CALIBRATOR TUNING control to the minus 12.5 mc position.

i. If the spectrum calibrator pip falls midway between the 147 and 148 mc markers (from the Measurements Corp. Model 111-B crystal calibrator), the spectrum calibrator circuit is operating satisfactorily at the low end of its frequency excursion.

j. Vary the SPECTRUM CALIBRATOR TUNING control to the plus 12.5 mc position.

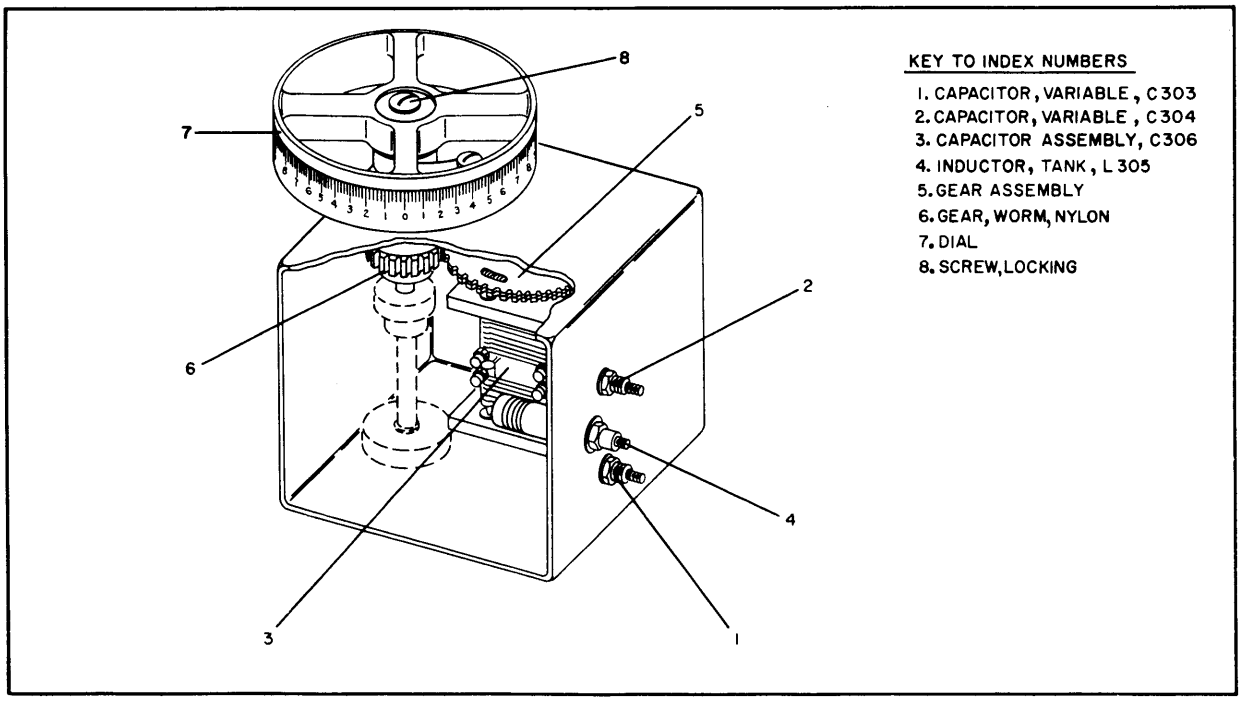


Figure 6–8. Location of Adjustment Controls, Spectrum Calibrator Assembly

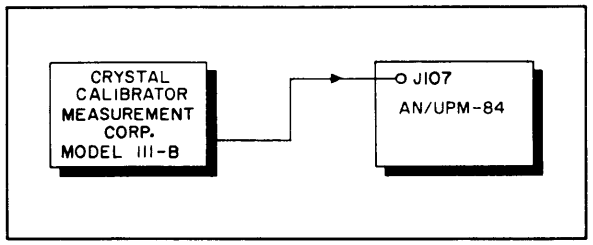


Figure 6–9. Alignment of Spectrum Calibrator, Test Set-up Diagram

k. If the spectrum calibrator pip falls midway between the 172 and 173 mc markers, the spectrum calibrator circuit is also operating satisfactorily at the high end of its frequency excursion.

l. In the event that the alignment error of the spectrum calibrator is greater than 0.5 mc, realignment will be required. Proceed as directed in paragraph 6–15. The parenthetical numbers which follow refer to the index numbers of figure 6–8.

6–15. To realign the spectrum calibrator circuit, proceed as directed in the following steps:

a. Turn the tuning knob to produce a dial reading of −12.5 mc.

b. Adjust L305 (4) to cause the spectrum calibrator pip to coincide with the −12.5 mc marker.

c. Turn the tuning knob to produce a dial reading of +12.5 mc.

d. Adjust the C303 (1) and C304 (2) simultaneously, so that the spectrum calibrator pip coincides with the +12.5 mc marker.

e. Alternately adjust the plus and minus limits until the calibration is correct. If unable to obtain calibration within the limits described in paragraph 6–14, above, mechanical realignment will be required. Proceed as directed in steps f through v.

f. Remove the cover from the calibrator housing by removing four nuts and lock washers.

CAUTION

Always remove operating power from the equipment before attempting to readjust gears within the spectrum calibrator housing. Failure to observe this precaution may result in shock, due to the presence of +125 volts in the vicinity of the gear mechanism. Reapply operating power in making electrical adjustments, using care and insulated alignment tools.

g. Adjust C303 (1) and C304 (2) so that the tops of the adjusting screws are approximately one-quarter inch above their locking bushings.

h. Loosen the nylon driver gear (6), so that variable capacitor C306 (3) is free to move with respect to the tuning knob.

i. Set the variable capacitor (3) at its maximum capacitance value by rotating its associated split gear (5).

j. Set the nylon gear (6) (previously loosened) so that the counter clockwise stop is at the maximum capacitance value.

k. Loosen the dial locking screw (8) and set the dial (7) at the −12.5 mc point, maintaining the variable capacitor at its maximum capacitance position.

l. Retighten all set screws and reapply operating power.

m. Rotate the tuning knob, so that the dial reads −8.5 mc and tune L305 to produce a marker frequency of 147.5 mc.

n. Disconnect power and reset the nylon driver gear (6) so that the stop is just below the 147.5 mc point. Reset the dial to read −12.5 mc at the 147.5 mc point.

o. Replace the cover and apply operating power.

p. Rotate the tuning knob to give a dial reading of +12.5 mc and tune both C303 (1) and C304 (2) simultaneously to line up the 172.5 mc marker.

q. Repeat steps n and p until the dial tracks at 147.5 and 172.5 mc. Reset the nylon gear (6) and dial (7) to center the range within the stops, if necessary.

r. Check the calibration every 2.0 mc. If the center calibration region is out of tolerance limits, tracking may be improved by the following procedure:

s. Turn the tuning knob to read −12.5 mc.

t. Reset the dial slightly and rotate the tuning knob again for −12.5 mc dial setting.

u. Retune L305 (4) for 147.5 mc output.

v. Repeat steps p, q and r.

6–16. CHECKING ATTENUATION OF THE SWEEPER FILTER CHASSIS.

See figures 6–10 through 6–12.

6–17. To check the performance of the sweeper filter chassis, measure the bandpass characteristic, with the cover on. A measured response over the passband having a maximum insertion loss of 2 db indicates satisfactory equipment performance. At 185 mc, a response having a

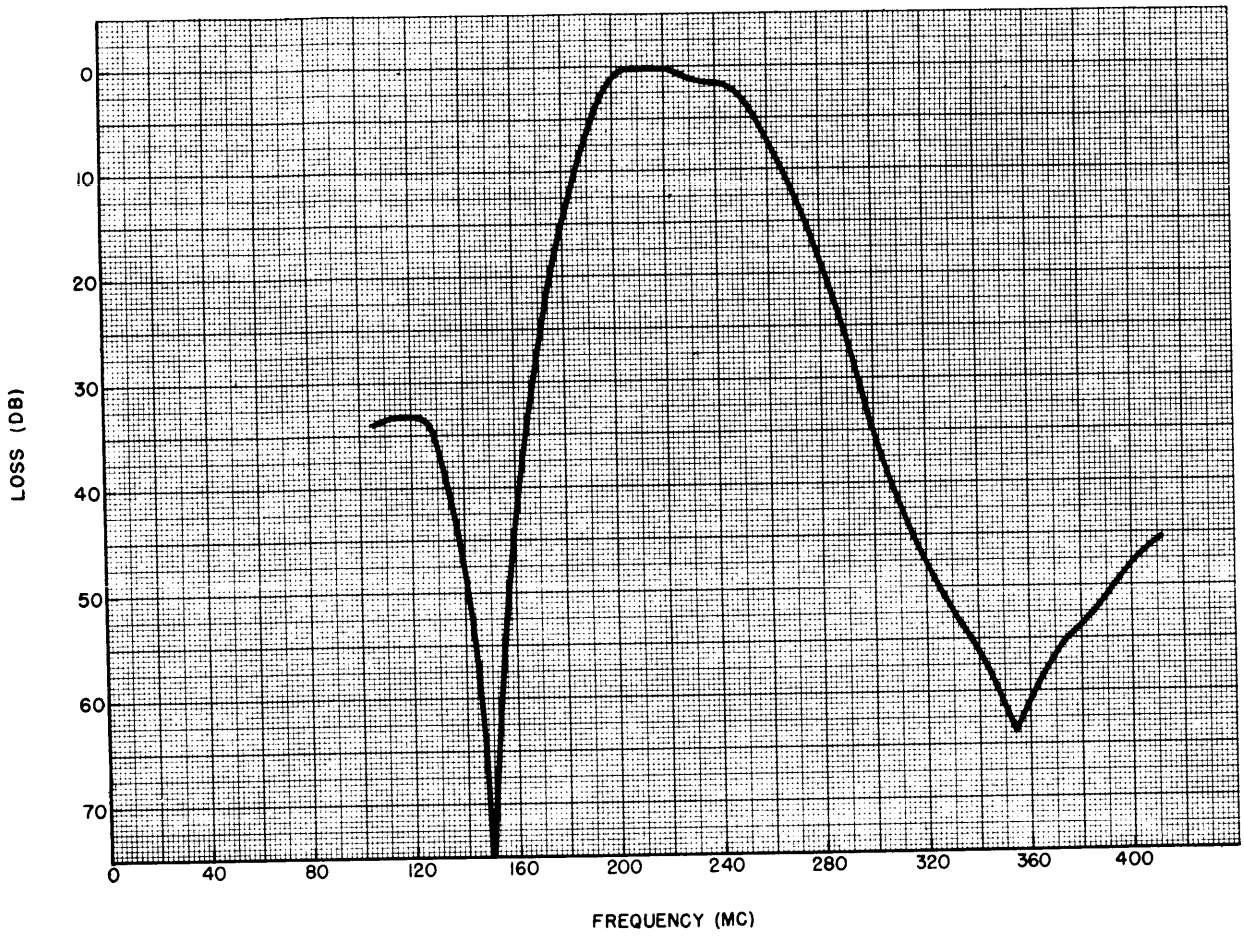


Figure 6–10. Sweeper Filter, Response Curve

minimum attenuation of 7.5 db is satisfactory. At 270 mc, a response having a minimum attenuation of 10 db is satisfactory. Refer to figure 6–10 for the applicable response curve. If the sweeper filter chassis fails to meet the minimum performance standards outlined above, realignment will be required. Realignment of the sweeper filter chassis should be attempted only by those technicians competent in bandpass filter techniques, and only after the need for realignment has been definitely established. The technique employed in the alignment of the sweeper filter is to check the response of each major section. The sweeper filter consists of a low pass section (series inductances L454 and L455 with associated shunt elements) and a high pass section (C451 and C452 with associated shunt elements). The test procedure consists of checking the response provided by each section. Set up the test equipment as shown in figure 6–11. Refer to figure 6–12 for an exploded view of the sweeper filter chassis. The parenthetical numbers which follow apply to the index numbers of figure 6–12. Proceed as follows:

a. Loosen the lock nuts for variable capacitors C450, C453, C454 and C456 (11).

b. Set the signal generator and receiver to 148 mc and apply a test signal to connector P405 (10).

c. Slightly detune L452 (14) by inserting an iron or brass slug into coil L452.

d. If the setting of C450 (11) is correct, minimum power transfer will be observed at the output of the receiver.

e. Adjust C450 (11), if required, for minimum power transfer.

f. Insert the iron or brass slug into L450 (16) and adjust C453 (11) for minimum transfer of power.

g. Set the signal generator and receiver to 339 mc, and insert an iron or brass slug into L456 (12).

h. If the setting of C454 (11) is correct, minimum transfer of power will be observed.

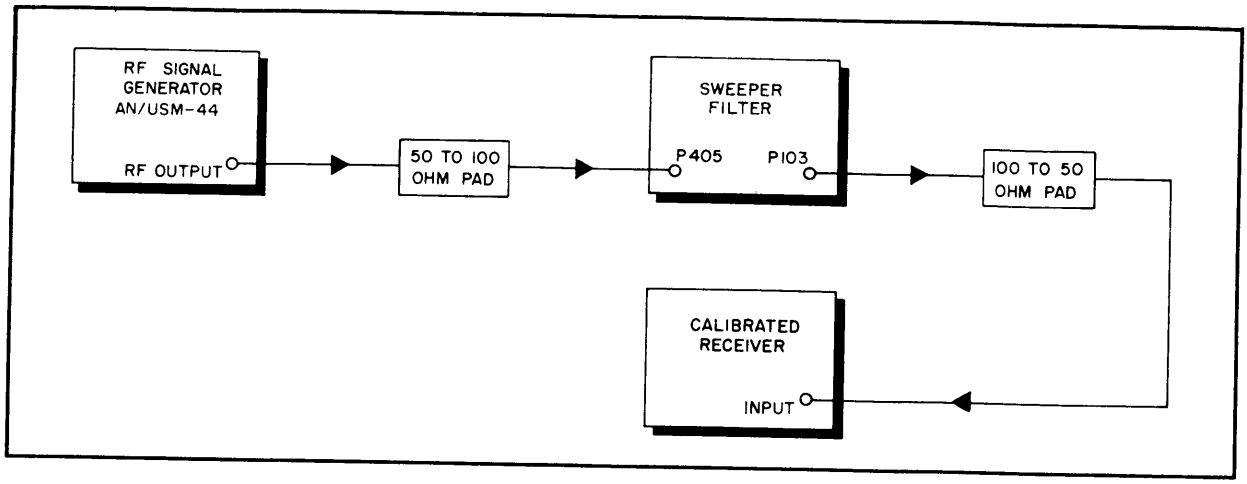


Figure 6–11. Checking Attenuation of Sweeper Filter, Test Set-up Diagram

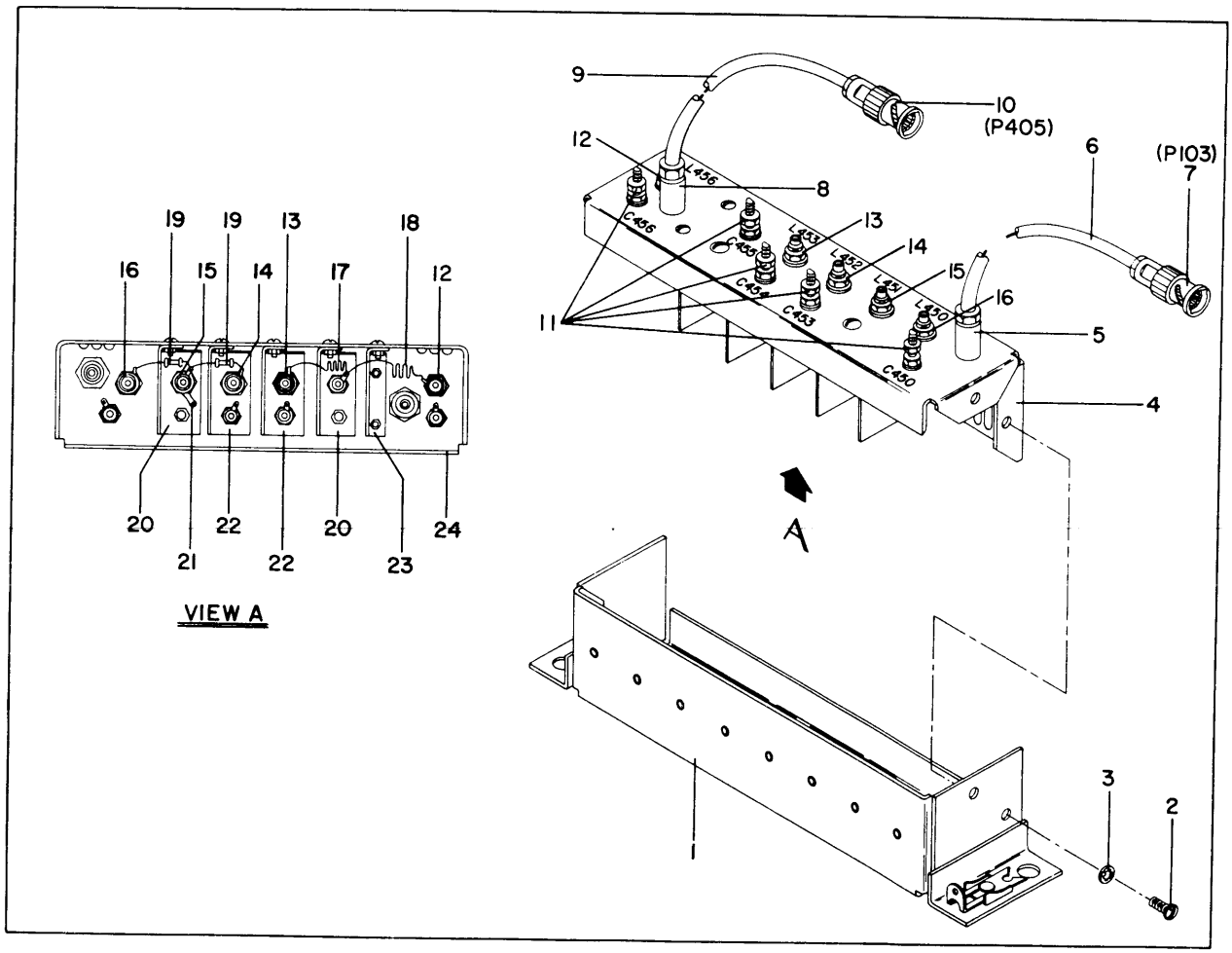


Figure 6–12. Sweeper Filter Chassis, Exploded View

i. Adjust C454 (11), if required, for minimum power transfer.

j. Detune L453 (13) by means of the slug.

k. If the setting of C456 (11) is correct, minimum transfer of power will be observed.

l. Adjust C456 (11), if required, for minimum power transfer.

m. If the measured bandpass characteristic is satisfactory, carefully retighten all lock nuts to avoid disturbing any settings.

6–18. CHECKING KLYSTRON OSCILLATOR OPERATION.

6–19. If the klystron oscillator fails to provide a satisfactory indication of minimum performance standards as outlined in table XI, klystron tube V1 may require replacement. Before attempting to replace the klystron tube, make certain that operating power is turned *off*. Remove the r-f tuning unit from the main chassis. Refer to figures 6–13 and 6–14, top and bottom views of the r-f tuning unit. Proceed as follows:

a. Loosen the adjustable clamp (5, figure 6–14) which secures the back cover to the klystron oscillator assembly (3, figure 6–14), and gently pull out the four-pin klystron base socket.

b. Use the spanner wrench supplied with the equipment to loosen the barrel lock nut at the end of the klystron oscillator assembly (3). Do not remove the lock nut completely.

c. Grasp the projecting end of the klystron tube, gently rotating it in a clockwise direction while simultaneously withdrawing the tube from its spring finger holders within the cavity.

d. Insert the replacement tube carefully within the center of the cavity, and press it all the way in, rotating clockwise against a noticeable resistance as the internal contact ring-fingers make engagement, until it meets a positive stop.

e. Re-tighten the large knurled collar, using the spanner wrench.

f. Connect the socket to the base of the klystron tube. Use care to avoid breaking or bending the tube pins as the socket can be forced on in the wrong position. (The tube will not operate in this case.)

g. Replace the cover and securely fasten it to the klystron oscillator assembly (3, figure 6–14) by means of the adjustable clamp.

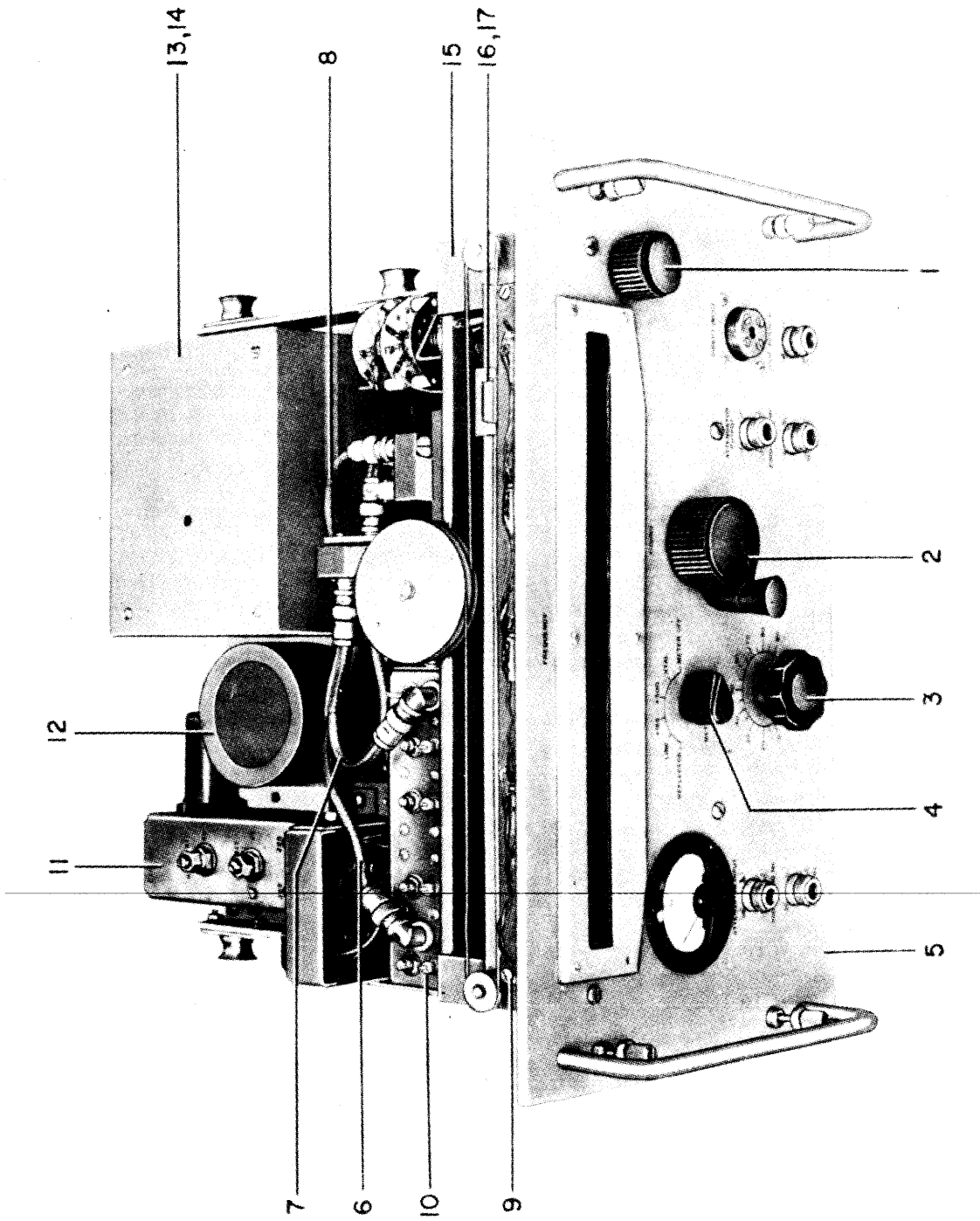
6–20. REPELLER VOLTAGE TRACKING ADJUSTMENTS. The repeller voltage tracking procedure which follows is based on the understanding that the spectrum analyzer has been previously aligned and operating satisfactorily, but that the klystron tube has been changed. Before making any adjustments, check over the band for crystal current. The tracking adjustment of the previous tube may be satisfactory for the replacement tube. To set the repeller tracking voltages, if required, a test set-up (as indicated in figure 6–15) and a high gain oscilloscope will be necessary. Proceed as directed in the following steps:

a. Check the power supply reflector voltage at test jack J603 (see figure 5–4). With operating power disconnected, insert the test prods of a 20,000 ohm-per-volt multimeter into the −733 V DC and the −325 V DC sockets. Re-apply operating power, and observe the multimeter for an indication of 408 volts. If this indication is obtained, no power supply adjustments are required. Remove the meter prods from the test jack.

b. If an indication of −408 volts is not present (step a, above), disconnect operating power from the spectrum analyzer. Connect the negative test prod of the meter to the −325 V DC socket, and connect the positive test prod to chassis ground. Reconnect operating power. Carefully rotate the shaft of the −325 V ADJ control R609 (figure 5–4) to obtain a precise indication of −325 volts on the external voltmeter.

KEY TO INDEX NUMBERS FOR FIGURE 6–12

1. Cover and Fastener Assembly
2. Screw
3. Washer
4. Chassis Assembly
5. Connector, Feedthrough
6. Cable, Coaxial
7. Connector, Plug, P103
8. Connector, Feedthrough
9. Cable, Coaxial
10. Connector, Plug, P405
11. Capacitor, Variable, C450, C453, C454, C455, C456
12. Coil, L456
13. Coil, L453
14. Coil, L452
15. Coil, L451
16. Coil, L450
17. Coil, L454
18. Coil, L455
19. Capacitor, Fixed, C451, C452
20. Shield
21. Lug, Terminal
22. Shield
23. Shield
24. Chassis and Fastener Assembly



Figur 6-13. R-f Tuning Unit and Panel Assembly, Top View

c. Disconnect operating power from the equipment. Reinsert the meter prods into the —325 V DC and the —733 V DC sockets of the test jack. A precise indication of —408 volts, on the external voltmeter, indicates satisfactory operation of the reflector power supply. Failure to obtain this indication indicates the need for trouble-shooting voltage reference stages V605, V606 and V607, on the main chassis.

d. After the reflector power supply is known to be operating satisfactorily, disconnect operating power from the spectrum analyzer.

e. Connect the external modulating circuit (figure 6–15) to the reflector test jacks J22 and J23, located on the tuning unit. (See figure 7–1.)

f. Connect the output of the phase shifting circuit (figure 6–15) to the EXT HORIZ SWEEP INPUT of the external high-gain oscilloscope.

g. Connect the output of the spectrum analyzer crystal mixer to the vertical input of the high-gain oscilloscope. (The crystal mixer output is conveniently accessible at the MIXER OUTPUT jack, on the display unit front panel.)

h. Refer to table XIII to set the repeller tracking voltages.

TABLE XIII. SETTING THE REPELLER TRACKING VOLTAGES

Step	Adjustment	Adjustment Location	Normal Indication
1	Set power switch to ON position. Wait approximately 1-minute for the delay relay to complete its cycle.	Front panel	a. POWER indicator lights. b. After a 45 second delay period, the KLYSTRON indicator lights.
2	Rotate BAND SELECTOR to band 4.	Front panel	2000-4400 mc scale is visible on the frequency drum.
3	Rotate TUNING knob to set frequency dial to high end.	Tuning unit front panel.	4400 mc calibration mark appears under the index hairline.
4	Adjust the modulation amplitude and phase control potentiometers. (See figure 6–15.)	External circuit (figure 6–15.)	A single mode pattern appears on the screen.
5	Adjust the HIGH-LIMIT ADJ screwdriver control R7.	R-f tuning unit (11, figure 6–13).	The mode moves to the center of the screen.
6	Rotate TUNING knob to set frequency dial to low end.	Tuning Unit front panel.	2000 mc calibration mark appears under the index hairline.
7	Increase the modulation amplitude and adjust the phase control.	External circuit (figure 6–15).	A single mode pattern appears on the screen.
8	Adjust the LOW-LIMIT ADJ screwdriver control R5.	R-f tuning unit (11, figure 6–13).	The mode moves to the center of the screen.
9	Repeat adjustments. The modes must remain centered as the oscillator is tuned through the entire band.		

KEY TO INDEX NUMBERS FOR FIGURE 6–13

1. Knob, Round
2. Knob, Crank
3. Knob, Round
4. Knob, Pointer
5. Panel Assembly
6. Cable Assembly, W9
7. Cable Assembly, W8
8. Cable Assembly, W10
9. Bracket Assembly
10. 163 Mc Filter and Bracket Assembly
11. Tracking Chassis Assembly
12. Potentiometer Assembly, R6
13. Oscillator Plate Assembly
14. Cover and Wrench Assembly
15. Dial Mount Assembly
16. Slide and Bracket Assembly
17. Pointer

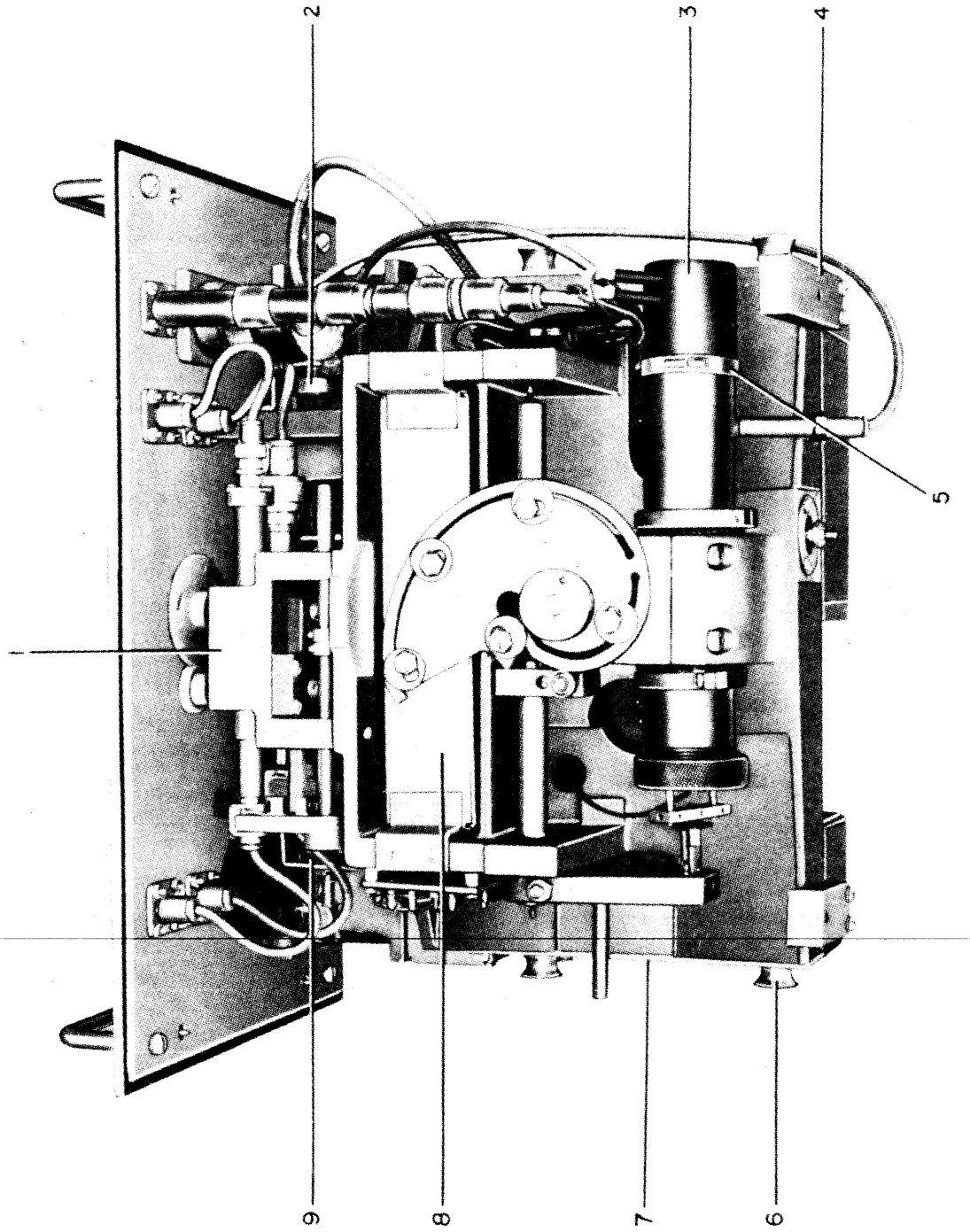


Figure 6-14. R-f Tuning Unit and Panel Assembly, Bott m View

KEY TO INDEX NUMBERS FOR FIGURE 6-14

1. Attenuator Drive Assembly
2. Bracket Assembly
3. Klystron Oscillator Assembly
4. Block
5. Klystron Oscillator Clamp
6. Roller Assembly
7. Plate
8. 180 Mc Low Pass Filter
9. Bracket Assembly

6-21. ADJUSTMENT OF CRYSTAL CURRENT SET, BAND 1 AND BAND 4, CONTROLS.

6-22. To adjust the internal CRYSTAL CURRENT SET controls R28 and R21, rotate the front panel METER SELECTOR to its XTAL position. Proceed as directed in the following steps:

a. Disconnect all signal input cables from the input jack, on the tuning unit front panel.

b. Rotate the BAND SELECTOR to band 1. The 10-410 mc scale will be visible on the FREQUENCY drum.

c. Vary the TUNING control, on the tuning unit front panel, from the low to the high frequency end of its travel. Simultaneously, observe the pointer deflection of the panel-mounted meter. A pointer deflection within the limits of 0.2 to 10 milliamperes, throughout the frequency range 10 to 410 mc, indicates satisfactory crystal current for band 1 operation.

d. Failure to obtain this indication shows the need for readjusting CRYSTAL CURRENT SET, BAND 1, control R28. Reset the shaft of the potentiometer to obtain a meter pointer deflection from 0.2 to 10 milliamperes throughout the frequency range of band 1.

e. Perform the same sequence of operations for band 4, being sure to rotate the BAND SELECTOR so that the 2000-4400 mc scale is visible on the FREQUENCY drum.

f. Failure to obtain satisfactory meter indication shows the need for readjusting CRYSTAL CURRENT SET, BAND 4, control R21. Reset the potentiometer to obtain a meter pointer deflection from 0.2 to 10 milliamperes throughout the frequency range of band 4.

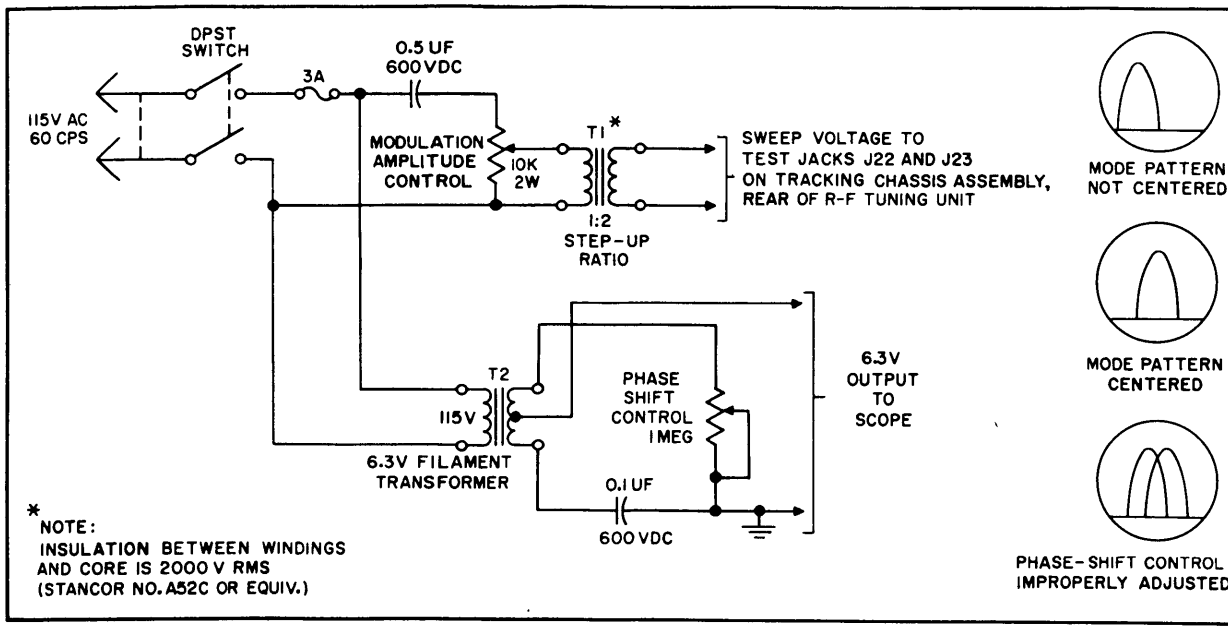


Figure 6-15. Rep ller V ltage Tracking, Test Set-up Diagram

6–23. CHECKING LOW FREQUENCY LOCAL-OSCILLATOR OPERATION.

6–24. If the low frequency local-oscillator fails to provide a satisfactory indication of minimum performance standards as outlined in table XI, oscillator tube V3 may require replacement. Since realignment may be required if V3 is replaced, the technician must make certain that the oscillator tube is the source of difficulty, rather than incorrect applied potentials or other defects. Refer to paragraph 5–10 for the procedure to be followed in adjustments and tests on the power supplies. The following procedure should be employed in replacing and aligning the low frequency local-oscillator. Refer to figure 5–16 for a test equipment hook-up, and to figure 6–13 for a top view of the tuning unit.

a. Remove the cover and wrench assembly (14, figure 6–13). Remove the defective tube and insert a replacement tube in the tube socket. Energize the equipment and allow a ten-minute warm-up period.

b. Set the METER SELECTOR to XTAL position, and rotate the BAND SELECTOR to Band 1.

c. Crystal current should be observed throughout Band 1. The meter pointer deflection will vary as the TUNING dial is rotated; normal deflection is 1/4 to 3/4 full scale. If crystal current indications are low, meter sensitivity may be increased by means of XTAL CURRENT SET, BAND 1 control, R28. (See paragraph 6–21.) Failure to obtain any meter readings indicates a defective tube V3, or other electrical component within the local-oscillator circuit.

d. If crystal current is normal, set the signal generator (figure 6–16) to 410 mc, at approximately —40 dbm output, and apply the output to DIRECT INPUT jack J5. The indicator pointer should be accurately referenced to the calibrated scale. Make certain to approach the 410 mc mark on the FREQUENCY drum in a clockwise direction, to minimize backlash errors.

e. Energize the spectrum calibrator circuit by rotating the CALIBRATOR AMPLITUDE control clockwise, beyond its OFF position. Set the SPECTRUM WIDTH control to display 6 megacycles.

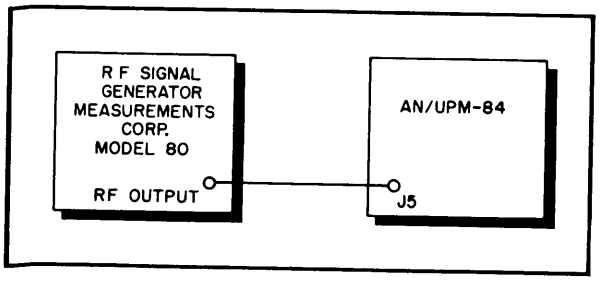


Figure 6–16. Alignment f Low Fr quency L cal-Oscillator, Test Set-up Diagram

f. Observe the spectrum analyzer display for the appearance of two pips: one pip represents the calibrator output; the second represents the signal generator output. If both pips coincide within one percent on the screen, no further adjustments at the high frequency end of the dial are required. If the two pips do not coincide, proceed as directed in steps g through l.

g. Loosen the two set screws which secure the arm to the local-oscillator shaft. Reposition the arm, while observing the screen for the coincidence of the two pips. Before locking the arm in this position, place the dust cover over the oscillator assembly and observe the direction of displacement of the signal generator pip on the cathode-ray tube screen.

h. Remove the dust cover again, and reposition the arm slightly, to compensate for the presence of the dust cover. Now check that the two pips coincide, and lock the arm in position. Repeat this procedure, as required, to obtain coincidence of the two pips. This completes the high-frequency calibration procedure.

i. Now tune the signal generator to approximately 60 mc, at —40 dbm output, and rotate the tuning dial to 60 mc. Be sure to rotate the knob approximately 10 mc below the desired 60 mc setting. Then approach the 60 mc setting in a clockwise rotation of the dial, to minimize backlash.

j. Check for coincidence of signal pip and marker pip, by observing the screen. (Be sure that the dust cover is in place over the local-oscillator assembly.) If the signal pip and marker pip are separated by 2 mc or less, no further adjustments are necessary. However, if the indication exceeds this limit, further adjustment is required, as follows:

WARNING

In the following procedure, be sure to use an insulated screwdriver, to avoid electrical shock to maintenance personnel. Trimmer capacitor C1 operates at plus 125 volts potential.

k. With the dust cover off, vary trimmer capacitor C1 in that direction which causes the signal pip to approach coincidence with the marker pip. Replace the dust cover, and check whether the signal generator pip and marker pip are now within a 2 mc spacing of each other. If so, the adjustment is complete.

l. Check the high end of the frequency dial for coincidence of marker pip and signal generator pip, within the limits of ±1% of the fundamental oscillator frequency. For example, at 20 mc, the local oscillator is at 180 mc. Therefore, an acceptable limit of tolerance is ±1.8 mc. However, at a TUNING dial setting of 400 mc, the local oscillator is at 560 mc. Therefore, an acceptable limit of tolerance is ±5.6 mc.

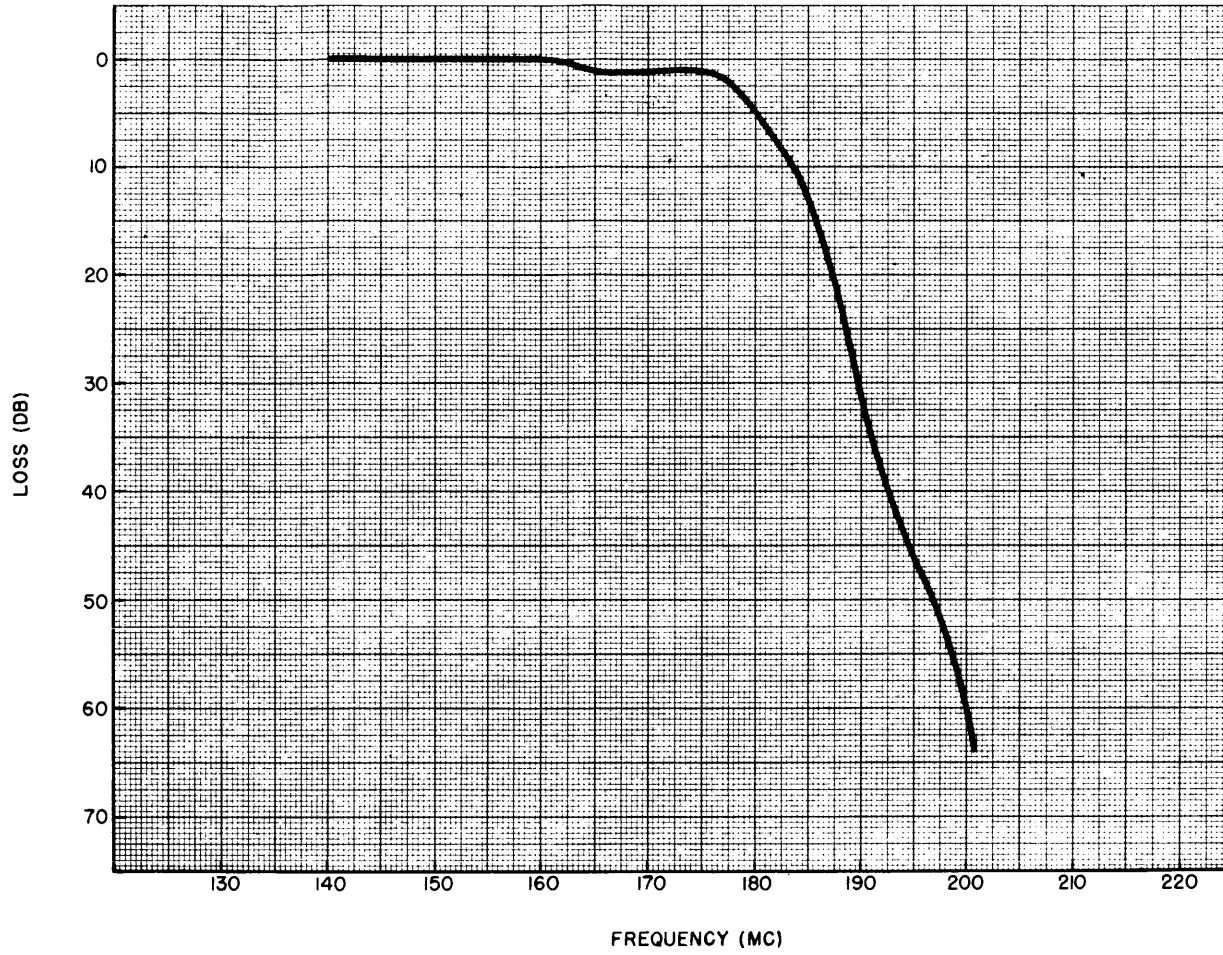


Figure 6–17. 180 Mc Low Pass Filter, Response Curve

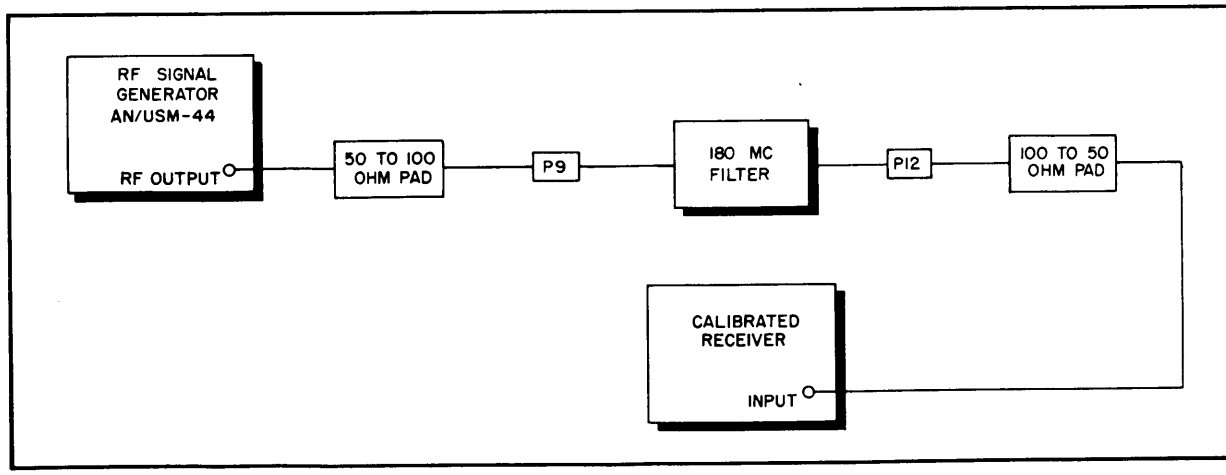
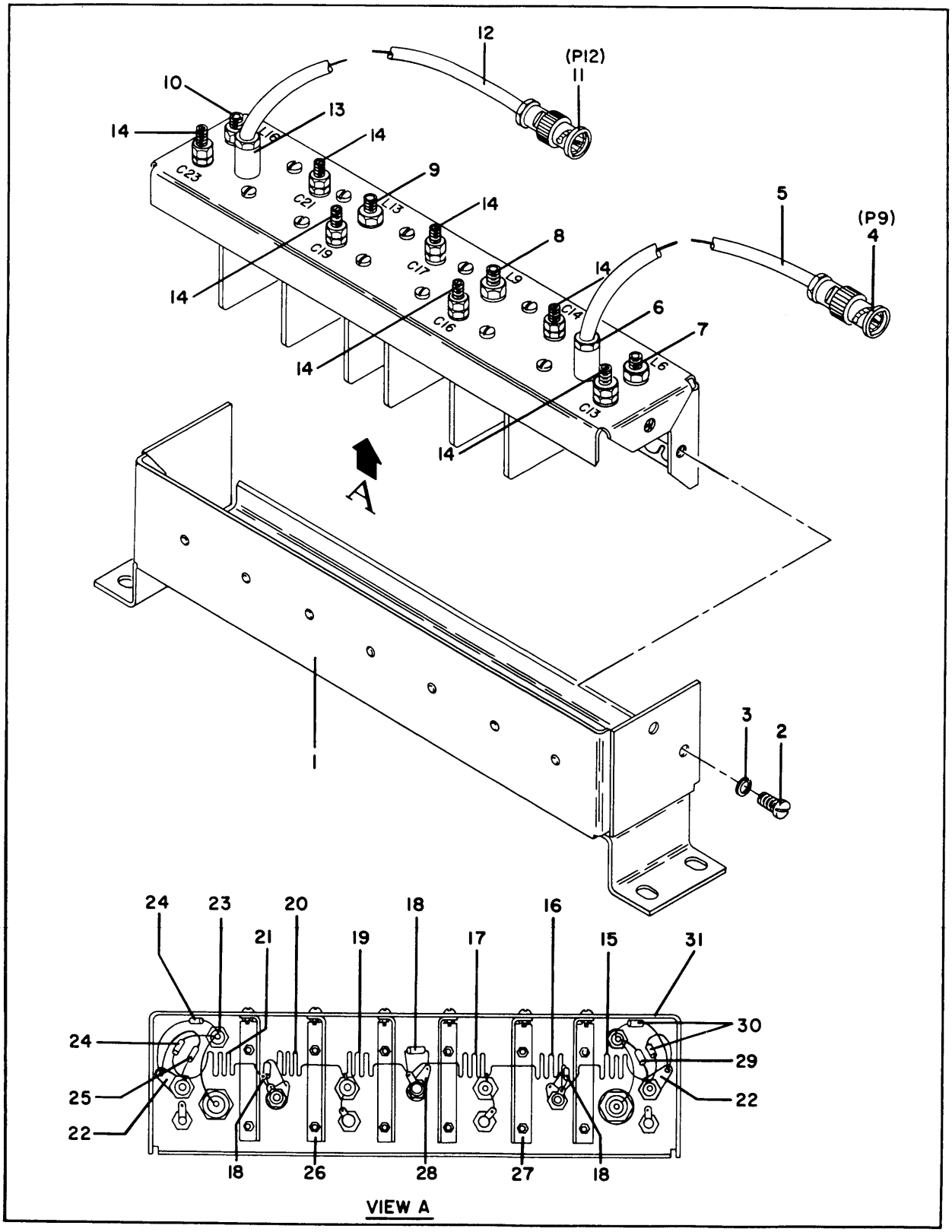


Figure 6–18. 180 Mc L w Pass Filter, Test Set-up Diagram



Figur 6–19. 180 Mc L w Pass Filt r, Expl d d Vi w

6–25. 180 MC LOW PASS FILTER ALIGNMENT.

(See figures 6–17 through 6–19.)

6–26. To check the performance of the 180 mc low pass filter, measurement of the band pass characteristic will be required. With the dust cover on, and the filter removed from the tuning unit, a measured response over the passband having a maximum insertion loss (including internal pad) of 9 db at 180 mc indicates satisfactory performance. At 175 mc, a response having a minimum attenuation of 1.5 db is satisfactory. At 185 mc, a response having an attenuation greater than 7½ db is satisfactory. Refer to figure 6–17 for the applicable response curve. If the 180 mc low pass filter fails to meet the minimum performance standards outlined above, realignment will be required. The same precautions discussed in paragraph 6–17 apply to alignment of the 180 mc filter. Referring to figure 6–18, set up the test equipment after removing the filter from the tuning unit. Refer to figure 6–19 for an exploded view of the 180 mc low pass filter. The 180 mc filter is accessible at the bottom of the tuning unit and is located between the klystron tuning cam and the dual attenuator drive assembly. (See item 8, figure 6–14.) Rotate the TUNING dial to the high frequency end, so that the tuning cam will not obstruct removal of the 180 mc low pass filter. Proceed with the following tests and adjustments. (All references are to figure 6–19.)

a. Loosen the lock nuts on capacitors C13, C16, C19 and C23 (14).

b. Short out coils L8 (20), L11 (19), L12 (19), L14 (16), and L15 (15), with a single short jumper.

c. Set the signal generator and receiver to an operating frequency of 240 mc and apply a test signal to P9 (4).

d. Slightly detune L16 (10) by inserting an iron or brass slug into the coil.

e. If the value of C13 (14) is correct, minimum transfer of power will be observed at the output of the receiver. Adjust C13 (14), if required, for minimum transfer of power.

f. Insert the iron or brass slug into L6 (7), and observe the output of the receiver for minimum transfer of power.

g. Adjust C23 (14), if required, for minimum transfer of power.

h. Short out L7 (21) and L12 (17), L14 (16), L15 (15) using two short jumpers.

i. Set the signal generator to 213 mc.

j. Using the same procedure as outlined in steps d through h, adjust the value of C16 (14) as required for minimum transfer of power.

k. Short out L7 (21), L8 (20), L11 (19), and L 15 (15) using two short jumpers.

l. Set the signal generator to 220 mc.

m. Using the same procedure as outlined in steps d through h, adjust the value of C19 (14) as required for minimum transfer of power.

n. Set C14, C17 and C21 (14) tuning screws to approximately one-quarter inch above the top of the locking bushing.

o. Check the response over the band, with the dust cover on. If the response is not as specified, readjust C14, C17 and C21 (14) as required.

p. Retighten all lock nuts, being careful to avoid disturbing previous adjustments.

6–27. 163 MC LOW PASS FILTER ALIGNMENT.

(See figures 6–20 through 6–22.)

6–28. To check the performance of the 163 mc low pass filter, measurement of the band pass characteristic will be required. The 163 mc filter may be measured without removing it from the tuning unit, since the filter is readily available at the top of the tuning unit, behind the frequency dial drum. (See 10, figure 6–13.) A measured response over the band having an attenuation of less than 4db (with respect to the maximum response point) at 157.5 and 162.5 mc indicates satisfactory performance. An insertion loss over the above frequency band of less than 6 db is satisfactory. Refer to figure 6–20 for the applicable response curve. If the

KEY TO INDEX NUMBERS FOR FIGURE 6–19

1. Cover Assembly
2. Screw
3. Washer
4. Connector, Plug, P9
5. Cable, Coaxial
6. Connector, Cable termination
7. Coil, R-f, L6
8. Coil, R-f, L9
9. Coil, R-f, L13
10. Coil, R-f, L16
11. Connector, Plug, P12
12. Cable, Coaxial
13. Connector, Cable termination
14. Capacitor, Variable, C13, C14, C16, C17, C19, C21, C23
15. Coil, R-f, L15
16. Coil, R-f, L14
17. Coil, R-f, L12
18. Capacitor, Fixed, C15, C18, C22
19. Coil, R-f, L11
20. Coil, R-f, L8
21. Coil, R-f, L7
22. Lug, Terminal
23. Standoff
24. Resistor, Fixed, R26, R27
25. Resistor, Fixed, R25
26. Shield
27. Shield
28. Lug, Terminal
29. Resistor, Fixed, R23
30. Resistor, Fixed, R22, R24
31. Chassis Subassembly

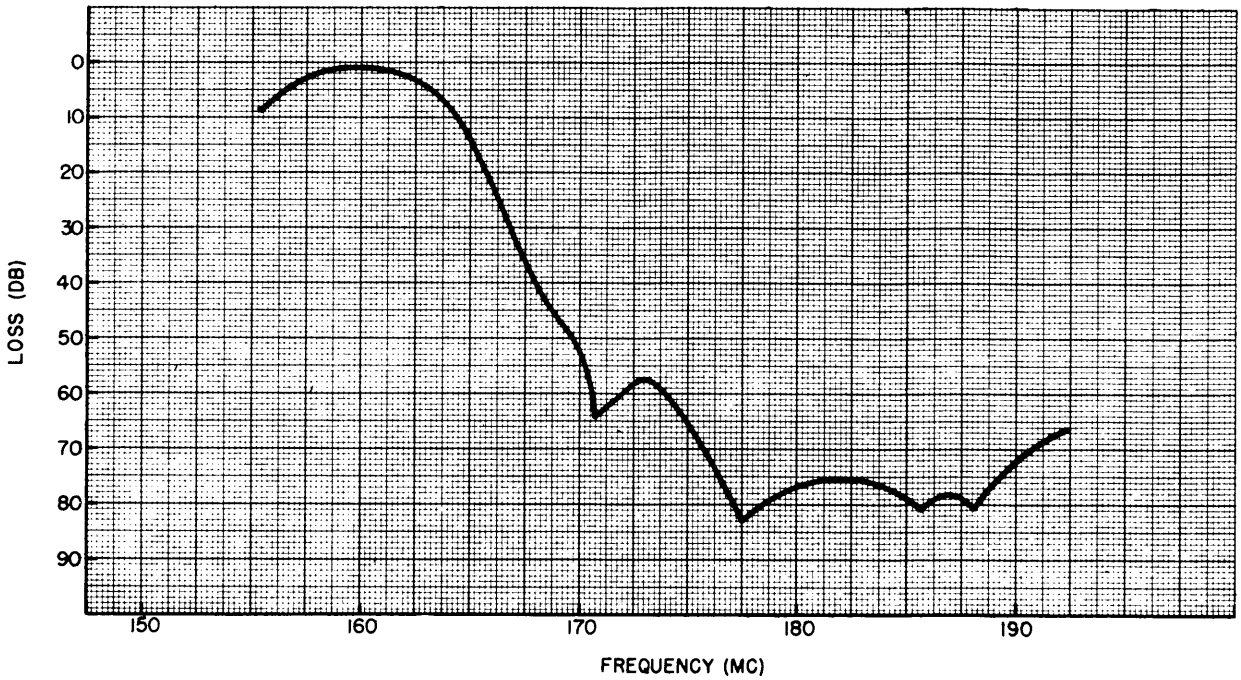


Figure 6–20. 163 Mc Low Pass Filter, Response Curve

163 mc low pass filter fails to meet the minimum performance standards outlined above, realignment will be required. The same precautions discussed in paragraph 6–17 apply to alignment of the 163 mc filter. Set up the equipment as shown in figure 6–21. Refer to figure 6–22 for an exploded view of the 163 mc filter assembly, for identification of the various adjustments. Proceed as follows. (All references are to figures 6–22.)

a. Loosen the lock nuts for variable capacitors C25, C26, C27 and C28 (10).

b. Set the slug of L25 (15) all the way in.

c. Set the signal generator and receiver to an operating frequency of 188 mc.

d. If the value of C25 (12) is correct, minimum transfer of power should be observed. If this is not the case, adjust C25 (10) to the proper value of capacitance.

e. For C26 (10), set the frequency at 177.5 mc; for C27 set to 171 mc; and for C28 set to 186 mc.

f. Vary the slug of L25 (15) until the response at 157 mc has the same value as at 163 mc.

g. Retighten all lock nuts, being careful to avoid disturbing previous adjustments.

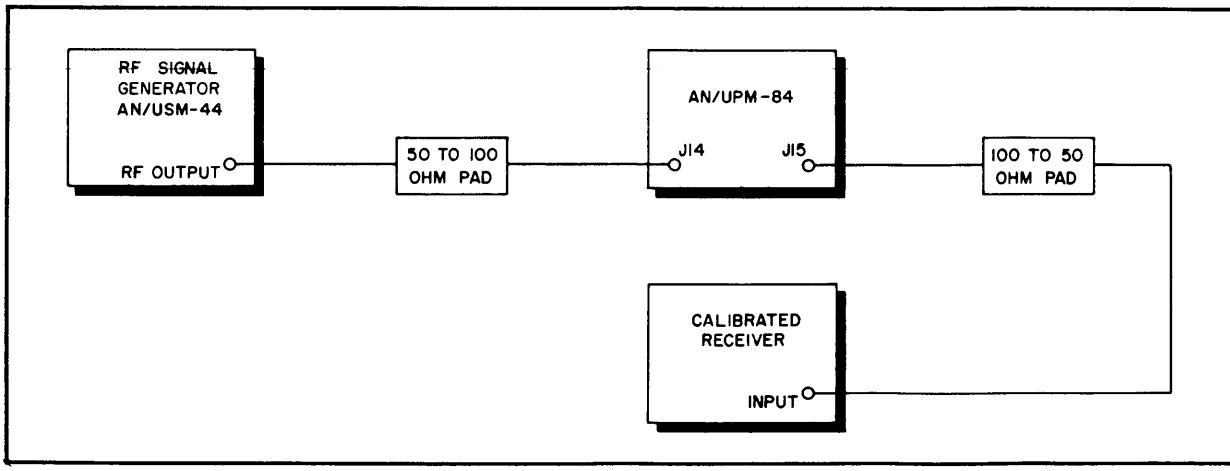
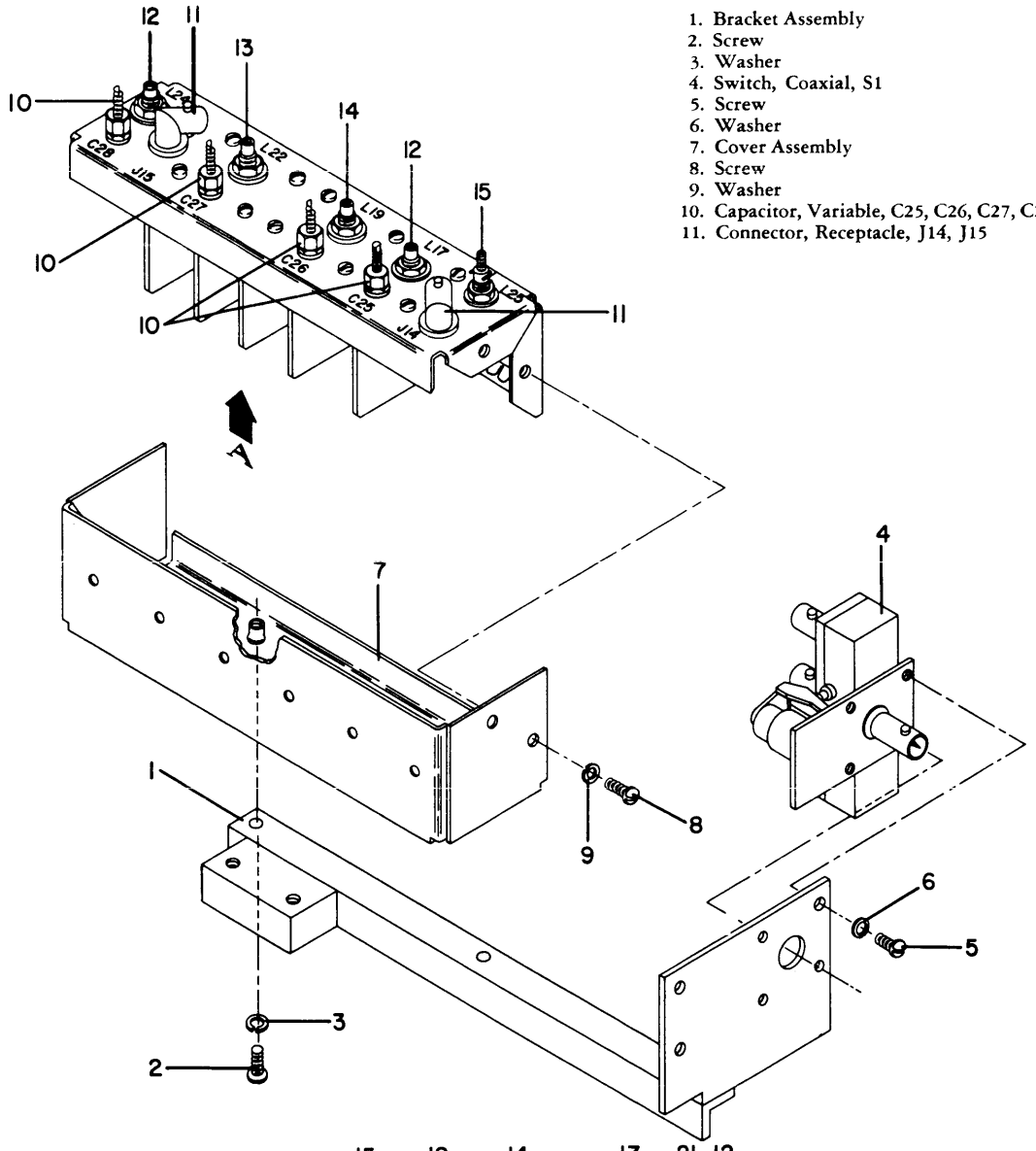


Figure 6–21. Alignm nt of 163 Mc Filter, Test Set-up Diagram



Figur 6–22. 163 Mc Filt r, Expl ded Vi w

6–29. LOW PASS FILTER FL101.

6–30. .This non-adjustable filter is used to suppress internal spurious responses. A flat response over the frequency range of 100 to 250 mc, with an insertion loss of less than 2 db, and a minimum attenuation of 9 db at 400 mc and 20 db at 500 mc, indicates satisfactory filter performance.

6–31. CHECKING PERFORMANCE OF VIDEO CHASSIS.

6–32. GENERAL. The video chassis of Spectrum Analyzer TS-1011/UPM-84 consists of circuitry similar to that in a conventional oscilloscope. Refer to table XV, Secondary Test Point Trouble Shooting Chart, for typical waveforms to be observed at each stage within the video chassis. The absence of an appropriate waveform at the point indicated signifies an operational defect. Analysis of the stage, by means of voltage and resistance measurements (figures 6–24 through 6–29) will usually quickly find the cause of substandard performance. Reference should also be made to figure 6–23 for an exploded view of the video chassis.

6–33. ADJUSTMENT OF PRE-SET VIDEO CHASSIS CONTROLS. Normally, the pre-set controls within the video chassis will not require readjustment. However, if the spectrum analyzer fails to meet minimum performance standards with respect to blanking, or spectrum centering and width, readjustment will be necessary. Do not tamper with these controls unless absolutely certain that all other tests and adjustments indicate that their setting is incorrect. Review section IV, which discusses theory and operation of the blanking multivibrator, for the function of BLANKING WIDTH control R517 (21, figure 6–23). Similarly, the discussion on the sweeper driver should be reviewed for the function of WIDE DISPERSION control R553 (20), NARROW DISPERSION control R554 (19), the front panel SPECTRUM WIDTH control, the chassis NEG. LIMIT ADJUST control R563 (22), and POS. LIMIT ADJUST R566 (21).

6–34. ADJUSTMENT OF BLANKING WIDTH CONTROL.

(See figure 6–23.)

6–35. To adjust the BLANKING WIDTH control R517 (21), remove the video signal input connector P502 from input jack J502, on the video chassis, and proceed as follows:

a. Apply a sine wave through a capacitor to J502.

b. Set the SWEEP FREQ control to minimum (maximum counterclockwise).

c. Adjust R517, if necessary, until the retrace disappears from the screen.

d. Recheck at 30 cycles and one cycle sweep.

e. Reconnect P502 to J502.

6–36. ADJUSTMENT OF DISPERSION CONTROLS.

(See figure 6–23.)

6–37. To adjust the WIDE DISPERSION control R553 (20) or the NARROW DISPERSION control R554 (19), remove input plug P102 from jack J102, on the wide band i-f amplifier chassis, and proceed as follows:

a. Apply a 160 mc signal, of known accuracy, to jack J102.

b. Energize the spectrum calibrator and allow a 30 minute warm-up period.

c. Adjust the SPECTRUM CENTERING controls to center the 160 mc signal on the display screen.

d. Set the DIFFERENCE FREQ-MCS dial to "0", and superimpose the calibrator pip on the 160 mc signal. If it does not superimpose, recalibrate the marker. (Refer to paragraph 6–13.)

e. Set the SPECTRUM WIDTH control to maximum.

f. Rotate the DIFFERENCE FREQ-MCS dial 12.5 mcs clockwise, and then counterclockwise, from its center setting ($\pm$2.5 mc for the narrow dispersion control). The calibrator pip should move to one end of the display screen, and then to the other.

g. If necessary, adjust the WIDE and NARROW DISPERSION controls to obtain dispersions of 25 and 5 mcs respectively. If unable to do so, check the sweep linearity and readjust the linearity, if required.

h. Reconnect plug P102 to jack J102.

6–38. ADJUSTMENT OF LIMIT CONTROLS.

(See figure 6–23.)

6–39. To adjust the NEGATIVE LIMIT control R563 (22) and the POSITIVE LIMIT control R566 (21), proceed as follows:

a. Set the DIFFERENCE FREQ-MCS dial at "0".

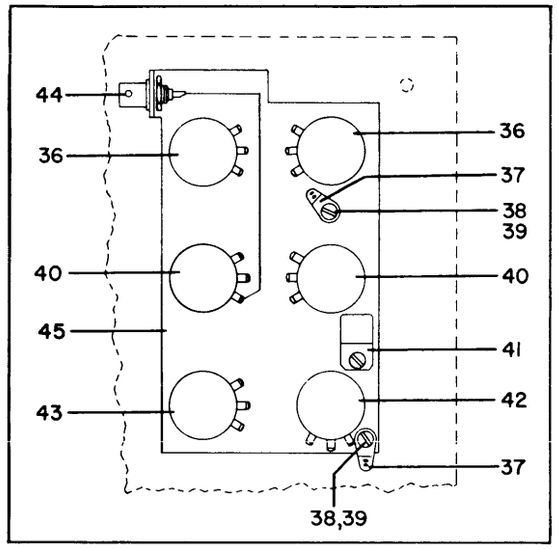
b. Rotate the SPECTRUM CENTERING COARSE control fully clockwise, and then counterclockwise. The calibrator pip should move to one extreme end of the screen and then to the other.

c. If necessary, vary the limit adjustments R563 and R566 until the calibrator pip is set at the ends of the screen, with full rotation of the SPECTRUM CENTERING COARSE control.

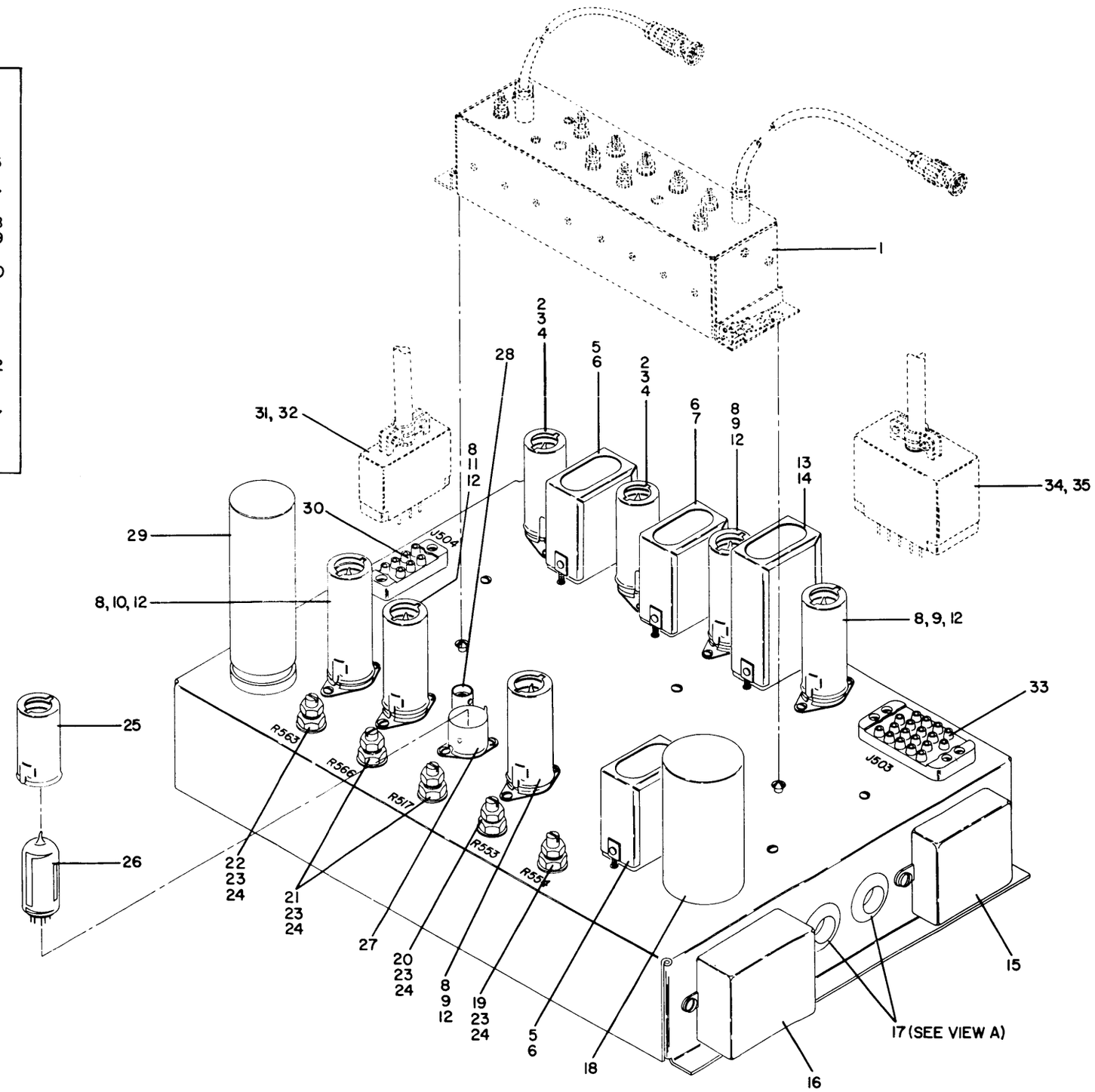
6–40. ELECTRONIC TROUBLE ANALYSIS.

(See figures 6–24 through 6–29.)

6–41. Table XIV lists the most probable troubles, causes, and suggested remedial steps that may be encountered in servicing the equipment. The references given in this table will aid in tracing the cause of failure to the defective major circuit. Figures 6–24 through 6–29 are supplied as a convenient means of checking voltage and resistance measurements from tube socket terminals to chassis ground. For checking waveforms at particular secondary test points within the video chassis, refer to table XV for representative waveforms at the designated tube socket terminals.

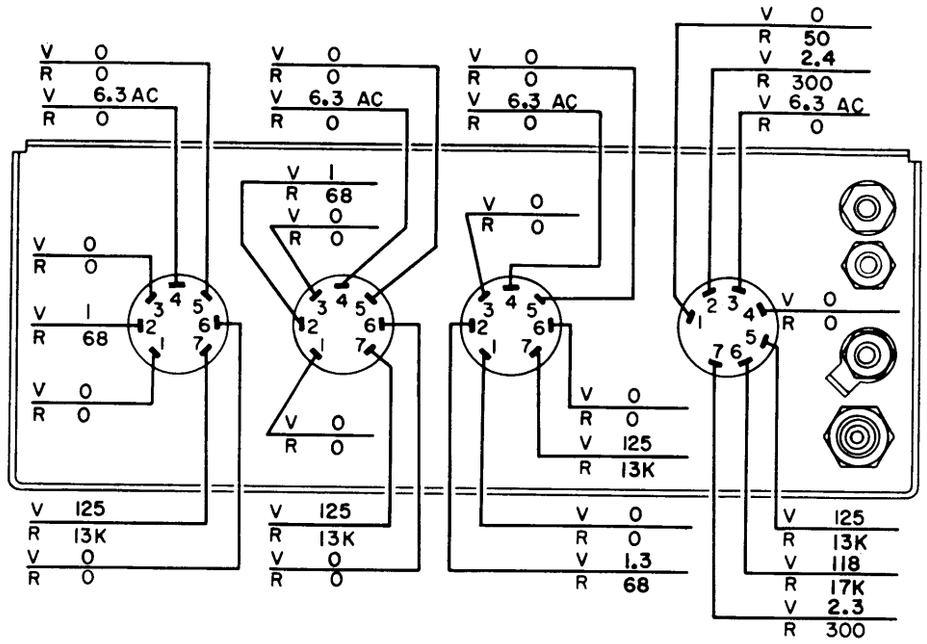


POTENTIOMETER MOUNTING ASSEMBLY
VIEW A



1. Chassis Assembly
2. Shield, Electron tube
3. Tube, Electron, V504, V505
4. Socket, Electron tube
5. Capacitor, Fixed, C506, C507
6. Bracket
7. Capacitor, Fixed, C502
8. Shield, Electron tube
9. Tube, Electron, V502, V503, V507
10. Tube, Electron, V501
11. Tube, Electron, V508
12. Socket, Electron tube
13. Capacitor, Fixed, C503
14. Bracket
15. Capacitor, Fixed, C501
16. Capacitor, Fixed, C508
17. Grommet
18. Relay, K501
19. Resistor, Variable, R554
20. Resistor, Variable, R553
21. Resistor, Variable, R517, R566
22. Resistor, Variable, R563
23. Bushing, Extension
24. Shaft Lock
25. Shield, Electron tube
26. Tube, Electron, V506
27. Socket, Electron tube
28. Connector, Receptacle, J501
29. Capacitor, Fixed, C514
30. Connector, Receptacle, J504
31. Connector, Plug, P504
32. Hood, Connector
33. Connector, Receptacle, J503
34. Connector, Plug, P503
35. Hood, Connector
36. Resistor, Variable, R502, R531
37. Lug, Terminal
38. Screw
39. Nut
40. Resistor, Variable, R508, R537
41. Clamp
42. Resistor, Variable, R544
43. Resistor, Variable, R558
44. Connector, Receptacle, J502
45. Lettering Plan, Plate

Figure 6–23. Vide Chassis, Exploded Vi w



KEY TO SYMBOLS	
V	INDICATES DC VOLTAGE TO GROUND UNLESS OTHERWISE SPECIFIED.
AC	INDICATES AC VOLTAGE TO GROUND UNLESS OTHERWISE SPECIFIED.
R	INDICATES DC RESISTANCE TO GROUND, WITH ELECTRICAL CABLING TO MAIN CHASSIS CONNECTED.

NOTES

1. IF ATTEN-DB CONTROL SET TO 0.
2. TRIPLETT MODEL 630-A MULTIMETER USED:
   A.) FOR AC MEASUREMENTS, 5000 OHMS/VOLT.
   B.) FOR DC MEASUREMENTS, 20,000 OHMS/VOLT.

Figure 6–24. Wide Band I-f Amplifier, Voltage and Resistance Measurements

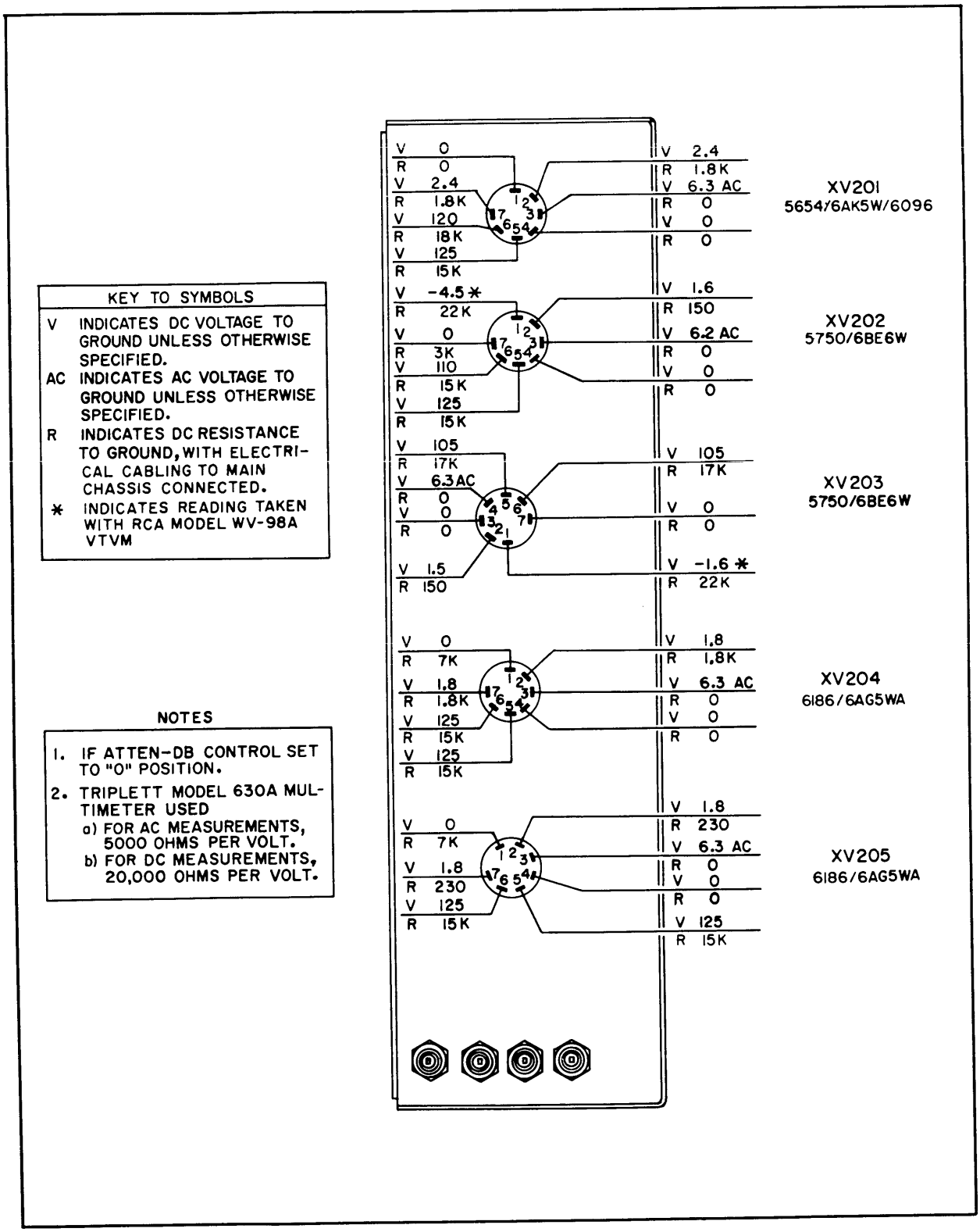


Figure 6–25. Narrow Band I-f Amplifier, Voltag and Resistance Measurements

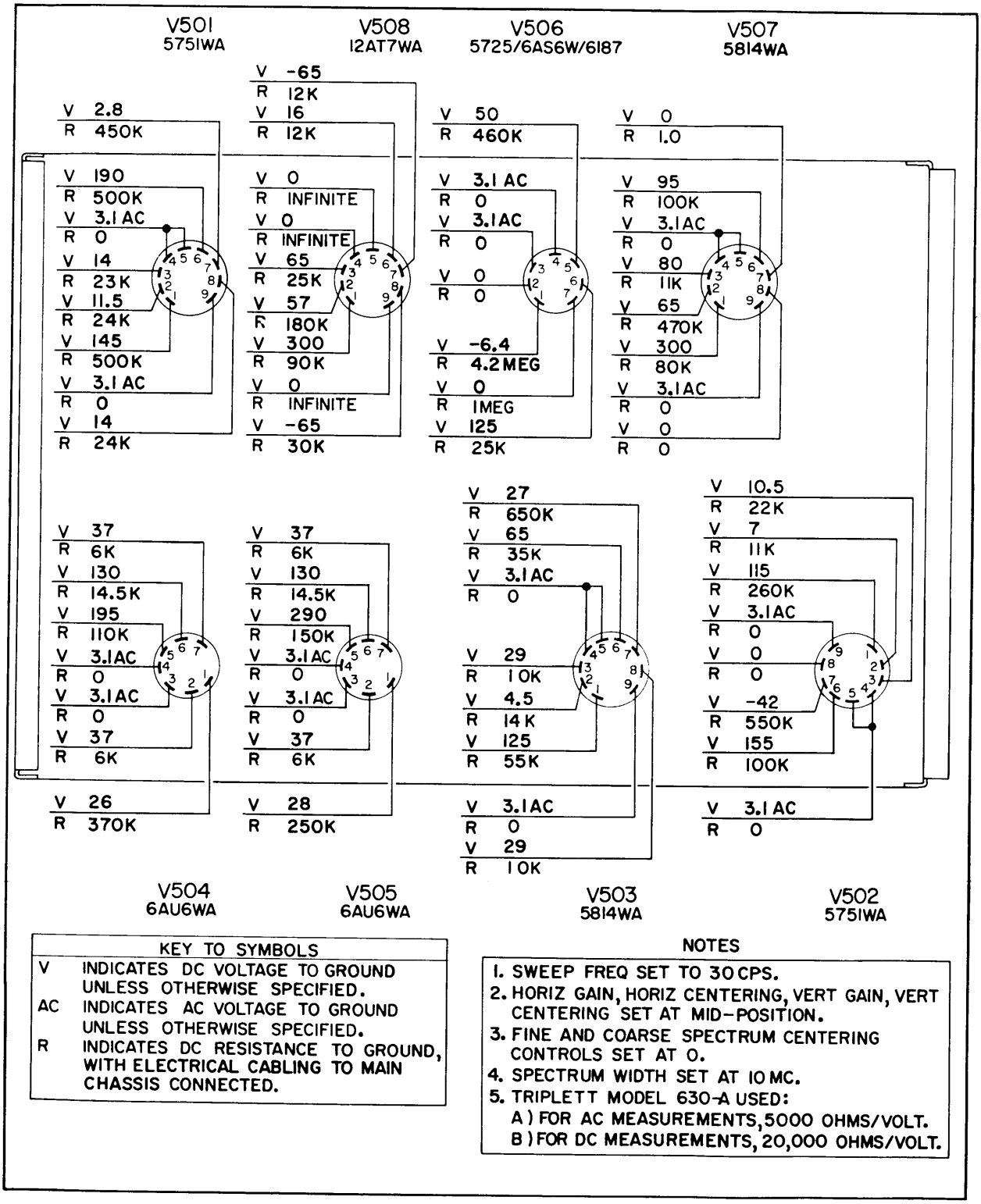
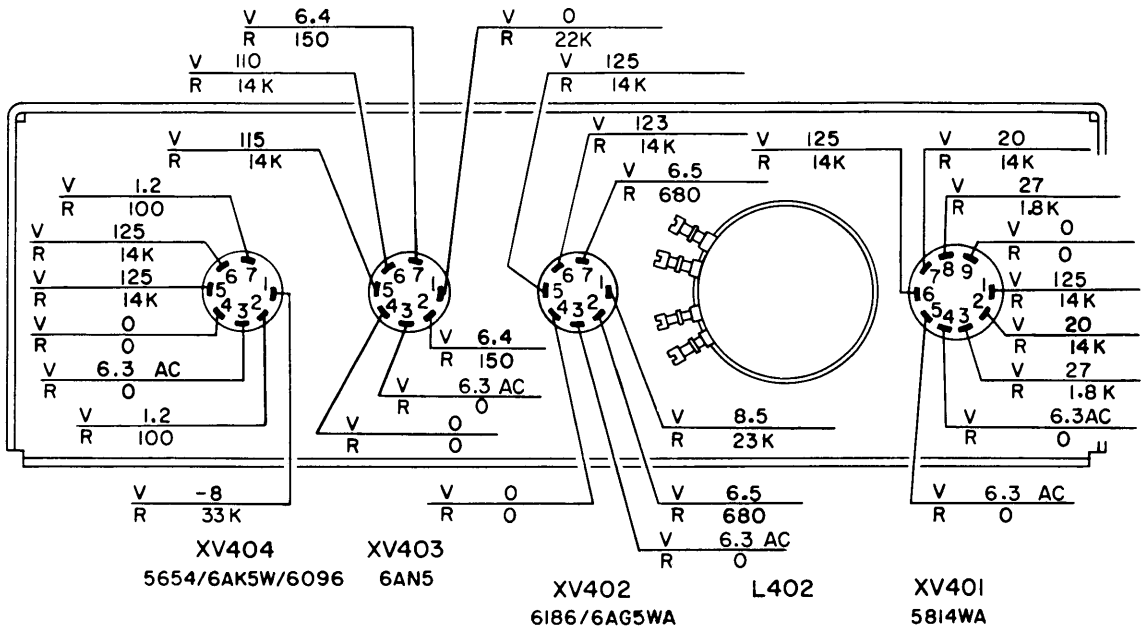


Figure 6–26. Video Circuits, Voltage and Resistance Measurements

TABLE XIV. ELECTRONIC TROUBLE ANALYSIS

Trouble	Probable Cause	Remedy
Low intensity of spectrum or no trace.	High voltage cathode-ray tube power supply.	Make certain that high voltage lead P605 is connected to V619. Check V619 for open filament. Check V619 pin 3 for negative potential with respect to cathode, pin 2, as BRIGHTNESS control is varied. Make certain that P504 is mating securely with J504 on video chassis.
Hum on base line.	Low voltage power supply.	Check voltage and ripple of the +125 volt and +300 volt outputs. Ripple should not exceed 50 mc peak on the +125 volt supply, and 300 mc peak on the +300 volt supply.
Noise normal but no signal on bands 4-8.	Klystron power supply inoperative. Defective klystron. Defective crystal mixer CR1.	Check delay relays K601, K602. Check for +28 volts at pin 8 of K602, and terminal 1 of relay K601. Klystron delay light on, but no power output, indicates defective K601 coil or contacts. Replace klystron tube. Replace crystal.
Noise normal, but no signal on bands 1-3.	Defective crystal mixer CR2. Defective transmission-line local oscillator.	Replace crystal. Replace V3 oscillator.
Spot fixed in center of screen.	Low voltage power supply.	Check +125 volt supply.
No horizontal deflection.	Horizontal sweep circuits.	Check for sawtooth waveform at J402, on sweep frequency generator chassis. Refer to figure 4-11 for characteristic curves at pins of sawtooth generator V506. Check SWEEP FREQ control R544A for 1 to 30 cps output.
No vertical deflection.	Wide band i-f; narrow band i-f; sweep frequency generator; and/or vertical amplifier.	Check the wide band i-f amplifier, the narrow band i-f amplifier, and the sweep frequency generator; realign, if necessary. Check the vertical amplifier.
Poor amplitude linearity.	Wide band i-f amplifier defective or out of alignment. Sweep frequency generator out of alignment.	Replace defective tube or realign, as required. Readjust C404 on sweep frequency generator chassis, and/or realign.
Poor frequency linearity.	Misalignment of sweep frequency generator.	Refer to alignment procedure, paragraph 6-11.
Low noise level; spectrum appears when signal is applied.	Low gain.	Check the gain of the vertical deflection amplifiers, narrow band i-f amplifier, wide band i-f amplifier, mixer CR101, and sweep frequency generator. Refer to appropriate alignment procedures (section VI).
Inability to obtain full dispersion.	Incorrect setting of dispersion limit potentiometers. Defective sweeper driver, sweep frequency generator, relay K501, or cathode follower driver V401.	Readjust potentiometers R553 or R554 for uniform dispersion. Replace defective component; realign sweep frequency generator.
No marker, but r-f signal appears on screen.	Spectrum calibrator inoperative.	Replace oscillator V301; realign.
Low signal-to-noise ratio.	Defective crystal mixer in tuning unit. Incorrect klystron anode voltage.	Replace CR2 for bands 1-3; replace CR1 for bands 4-8. Readjust −325 V ADJ control R609, available at rear of chassis. (See figure 5-4.)



KEY TO SYMBOLS	
V	INDICATES DC VOLTAGE TO GROUND UNLESS OTHERWISE SPECIFIED.
AC	INDICATES AC VOLTAGE TO GROUND UNLESS OTHERWISE SPECIFIED.
R	INDICATES DC RESISTANCE TO GROUND, WITH ELECTRICAL CABLING TO MAIN CHASSIS CONNECTED.

NOTES

1. SWEEP FREQ SET TO 25 CPS.
2. SPECTRUM WIDTH SET TO 25MC.
3. TRIPLETT MODEL 630-A MULTI-METER USED.
   a) FOR AC MEASUREMENTS, 5000 OHMS PER VOLT.
   b) FOR DC MEASUREMENTS, 20,000 OHMS PER VOLT.

Figure 6–27. Sweep Frequency Generator, Voltage and Resistance Measurements

TABLE XIV. ELECTRONIC TROUBLE ANALYSIS (c nt)

Trouble	Probable Cause	Remedy
No r-f sensitivity for portions of the tuning range (dead spots).	Local oscillator tube in r-f tuning unit defective.	Readjust klystron reflector tracking, or replace klystron. Check operation of transmission-line oscillator. See adjustment procedure, section VI.
Overheating.	Dirty filter.	Replace.
Rotating HORIZ GAIN changes the horizontal position.	D-c balance not properly set.	Readjust HORIZ. CENTERING control.
Signal "break-up." (Unusually high incidental fm.)	Defective cathode follower V401 or oscillator-amplifier V402, in sweep frequency generator. Excessive ripple in klystron power supply.	If the incidental fm is more than 20 kc, replace V401 and/or V402. If fm is less than 20 kc, check klystron power supply for ripple. With no external signal, use the calibrator pip as the applied signal and measure the incidental fm. (See applicable Handbook Operation Instructions.)
Low noise level and no signal.	Defective wide band i-f amplifier, sweep frequency generator, or sweeper driver circuitry. Sweep frequency generator.	Check for presence of calibrating pip. If marker appears, trouble is in the wide band amplifier. If the pip does not appear, trouble is in the sweep frequency generator or the sweeper driver. Check for sawtooth voltage at J402. If present, check the sweep frequency generator. If sawtooth is not present, check the sweeper driver circuitry.
Calibrator pip cannot be centered with the DIFFERENCE FREQ-MCS dial set at zero.	Defective or misadjusted positive or negative limit potentiometer in sweeper driver stage.	Readjust R566 and/or R563, if required. (See paragraph 6–38.)

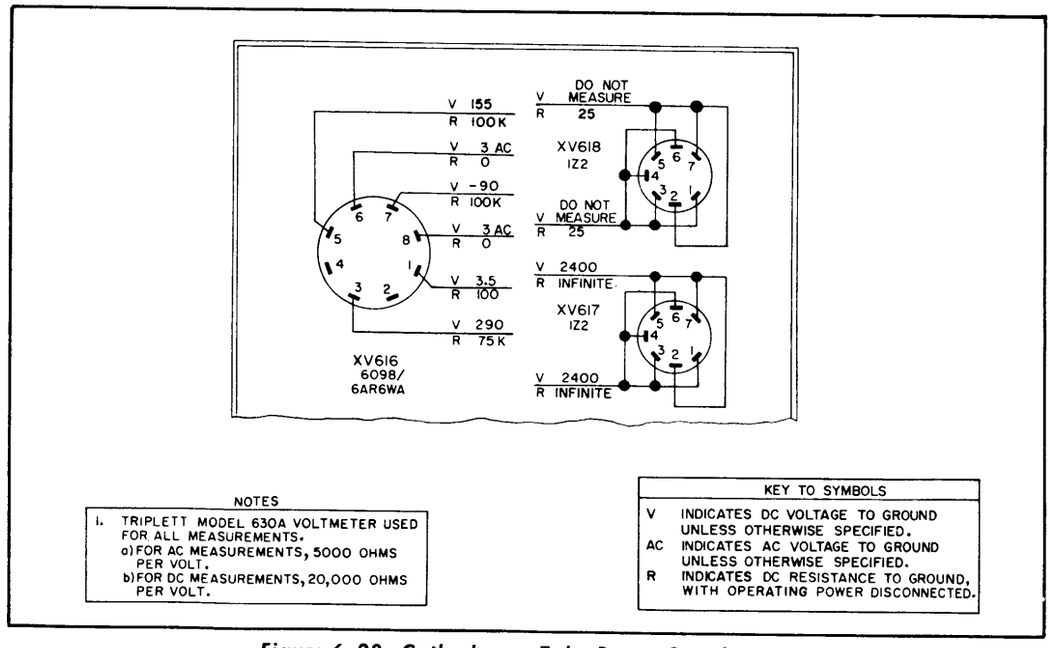
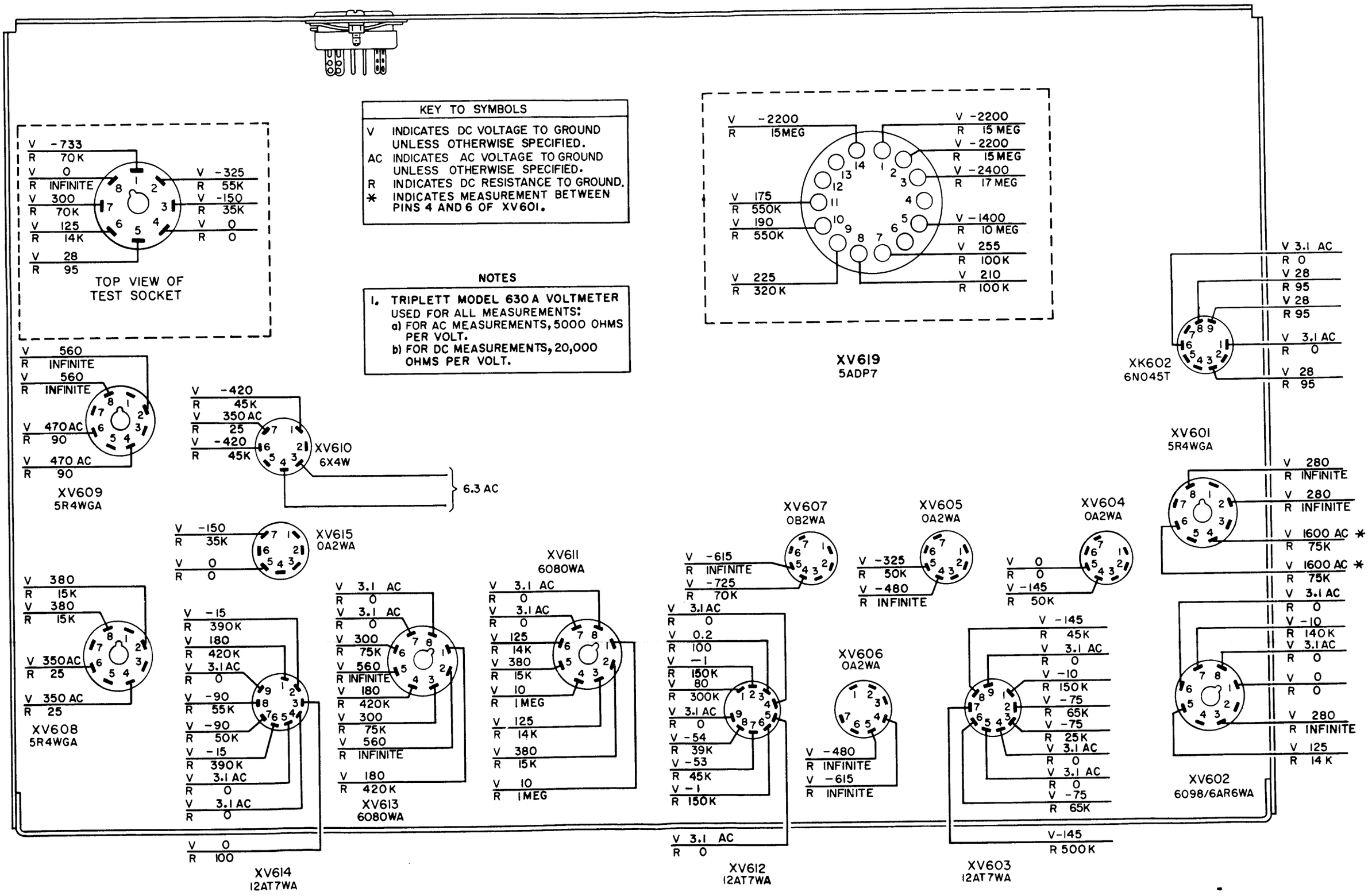


Figure 6–28. Cath de-ray Tube P wer Supply, Voltage and Resistance Measur m nts



Figur 6–29. Main Chassis Pow r Supply Circuits, Voltage and Resistanc M asurem nts

TABLE XV. SECONDARY TEST POINT TROUBLE SHOOTING CHART

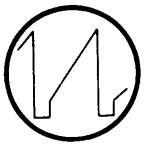
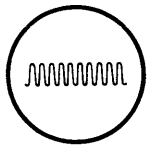
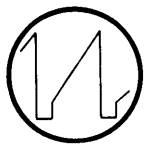
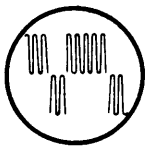
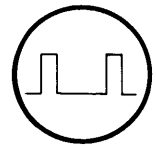
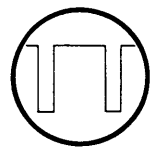
Secondary Test Point	Observed at	Indication	Application Note
Ⓐ	Pin 5, V506		Sawtooth frequency, adjustable from 1-30 cps, determined by setting of SWEEP FREQ control R544A. Also see figure 4–11.
Ⓑ	Pin 3, V507A	Same as above.	Same as above.
Ⓒ	Pin 6, V501		Sawtooth, same as above, but inverted; amplitude determined by setting of HORIZ GAIN control R508.
Ⓓ	Pin 1, V501		Same waveform as test point A; amplitude determined by setting of HORIZ GAIN control R508.
Ⓔ	Pin 5, V505		Apply test signal as per paragraph 6–5; amplitude determined by setting of VERT GAIN control R537.
Ⓕ	Pin 5, V504	Same as above.	Same as above.
Ⓖ	Pin 1, V502A	Same as test point C.	Sawtooth, same as test point C.
Ⓗ	Pin 6, V508		Sawtooth, same as above; amplitude determined by setting of pre-set WIDE DISP. and NARROW DISP. controls and front panel SPECTRUM WIDTH control.
Ⓘ	Pin 6, V507B		Test signal applied as per paragraph 6–5. Amplitude determined by setting of INTENSIFIER control R512.

TABLE XV. SECONDARY TEST POINT TROUBLE SHOOTING CHART (Cont)

Secondary Test Point	Observed at	Indication	Application Note
Ⓙ	Pin 6, V503		Rectangular wave, width determined by setting of R544B, which is ganged to SWEEP FREQ control, R544A. Width is also controlled by pre-set BLANKING WIDTH control, R517.
Ⓚ	Pin 6, V502B		Adjust INTENSIFIER control to extreme counterclockwise position. Signal same as test point J, but inverted and amplified.

Note: Refer to Figure 7-2; employ Tektronix 531 Scope for measurements.

SECTION VII

DIAGRAMS

7-1. SCOPE.

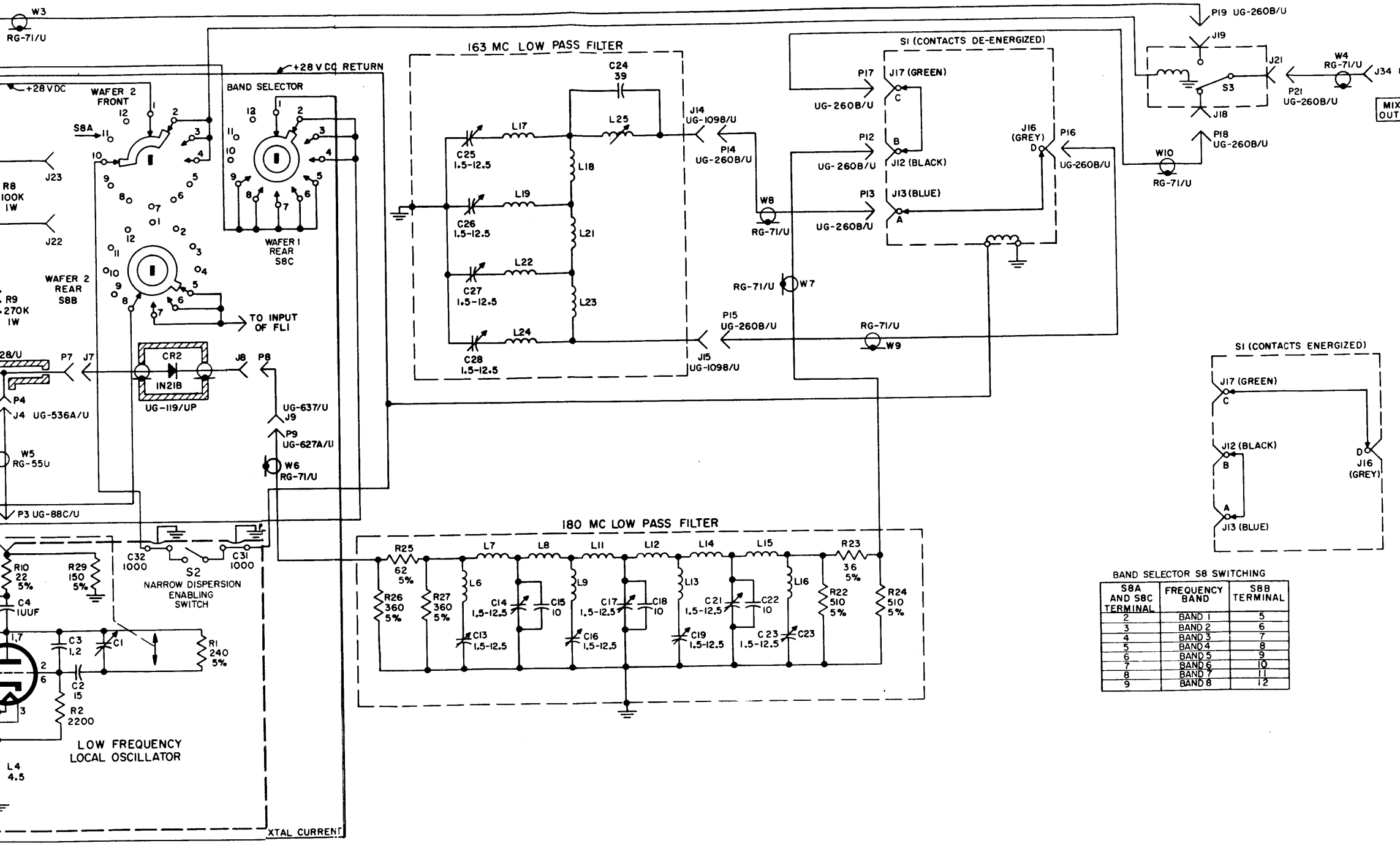
7-2. This section of the handbook contains four diagrams. All electronic reference designations are in accordance with Military Standard MIL-STD-16A. Electronic symbols employed in the schematic diagrams are in accordance with Military Standard MIL-STD-15A. The system of test points employed in figures 7-2 and 7-3 are those called for by Specification MIL-H-6757A(ASG). Major test points are referenced in table VIII of this handbook; secondary test points are referenced in table XV. The following is a list of the diagrams which appear in this section:

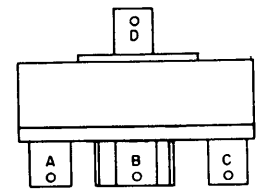
a. FIGURE 7-1, R-F TUNING UNIT SCHEMATIC DIAGRAM. The series of reference symbols employed is from 1 to 99. This diagram includes the two local-oscillators, the 163-mc low pass filter, the 180-mc low pass filter, relays S1 through S3, and the two r-f attenuator circuits, AT3 and AT4. The METER SELECTOR circuit, including meter M1, is also shown in this illustration.

b. FIGURE 7-2, INTERMEDIATE-FREQUENCY AND VIDEO CIRCUITS SCHEMATIC DIAGRAM. The three-inch jumper cable, designated R-f Cable Assembly CG-1525/U (0 ft 3 in.), with its connector P34, is shown in the upper left corner of the diagram. Thereafter, the series of reference symbols employed is from 101 to 599. This diagram includes the 160-mc filter FL101, the wide band i-f amplifier circuit, the narrow band i-f amplifier circuit, the spectrum calibrator circuit, the sweep frequency generator and filter circuits, and the video circuits.

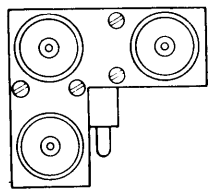
c. FIGURE 7-3, POWER SUPPLY AND CATHODE-RAY TUBE CIRCUITS SCHEMATIC DIAGRAM. The series of reference symbols employed is from 601 to 699. This diagram includes the reflector power supply circuit, the 300-volt and bias supply circuits, the high-voltage supply oscillator circuit, and the cathode-ray display tube circuits. Two interconnecting jacks and plugs are used in this diagram, and are designated J606-P606 and J607-P607. These connectors provide a convenient means of breaking the circuit connections to the power supplies, and facilitate servicing of the equipment.

d. FIGURE 7-4, SPECTRUM ANALYZER SET AN/UPM-84, INTER-UNIT CABLING DIAGRAM. This diagram illustrates the various interconnections between major sub-chassis of the equipment. Frequent reference should be made to this diagram in servicing the equipment, as a means of localizing trouble to defective or open cabling connections. Both r-f coaxial cable assemblies and harnessed power cable assemblies are shown in the illustration.





END VIEW OF RF COAXIAL SWITCH SI
(RELAY COIL TO REAR OF CONNECTOR "B")



TOP VIEW OF RF COAXIAL SWITCH

NOTES

1. UNLESS OTHERWISE INDICATED:
   A.) ALL RESISTANCE VALUES ARE IN OHMS, 1/2 WATT, ± 10%. (K=1000)
   B.) ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS,
   C.) ALL COIL VALUES ARE IN MICROHENRIES.
2. ☐ INDICATES EQUIPMENT FRONT PANEL MARKING.
3. S1 IS ENERGIZED ONLY IN THE 10-55MC RANGE OF BAND 1.
4. S2, LOCATED WITHIN LOW BAND LOCAL OSCILLATOR HOUSING, IS A CAM DRIVEN MICROSWITCH, AND IS OPEN IN ALL POSITIONS EXCEPT THE 10-55 MC RANGE.
5. S3 IS ENERGIZED IN BANDS 1 THROUGH 3, TO CLOSE THE SIGNAL PATH BETWEEN CONNECTORS J18 AND J21.

BAND SELECTOR S8 SWITCHING

S8A AND S8C TERMINAL	FREQUENCY BAND	S8B TERMINAL
2	BAND 1	5
3	BAND 2	6
4	BAND 3	7
5	BAND 4	8
6	BAND 5	9
7	BAND 6	10
8	BAND 7	11
9	BAND 8	12

Figure 7-1. R-f Tuning Unit, Schematic Diagram

XTAL CURRENT

LOW FREQUENCY LOCAL OSCILLATOR

6AF4A V3

L4 4.5

R2 2200

C2 15

C3 1.2

C1

R1 240 5%

L3 0.8

FL2

FL1

C5 1000

L1 1.7

R4 1500 2W

C4 .1UUF

R3 150 5%

R10 22 5%

R29 150 5%

J3 UG-290A/U

S2 NARROW DISPERSION ENABLING SWITCH

C32 1000

C31 1000

TO SB8 5,6,7

OFF

XTAL

LINE

+125

+300

REFL

METER SELECTOR S5

M1

R19 22K

R18 422K 2W 1%

R17 511K 2W 1%

R16 511K 2W 1%

R11 2400 5%

CR3 IN69

DS1 DS2 DS3 DS4

GND

6.3V AC

+300V DC

XTAL CURRENT

6.3V AC

+125V DC

-733V DC

-325V DC

6.3V AC

+28V DC

+28V DC RETURN

J36

R12 316K 1W 1%

R13 287K 1W 1%

R28 1000

XTAL I SET BAND 1

R21 1000

XTAL I SET BAND 4

R15 619K 1%

R14 422K 1%

+125V DC

P3 UG-88C/U

TUNING

W5 RG-55U

W6 RG-71/U

P9 UG-627A/U

J9 UG-637/U

UG-119/UP

IN21B CR2

P8 J8 P7 J7

P4 J4 UG-536A/U

P6 J6 UG-28/U

DIRECT INPUT 10-2120MC J5

AT2 3DB

R6 100K 12W

R7 50K HIGH LIMIT ADJ

R5 50K LOW LIMIT ADJ

R9 270K 1W

R8 100K 1W

C29 0.1UF

J22 J23 J24 P24

WAFER 2 REAR SB8

TO INPUT OF FL1

PROTECTIVE DIODE V2 6X4W

KLYSTRON LOCAL OSCILLATOR V1 6BL6

WAFER 2 FRONT S8A

WAFER 1 REAR S8C

BAND SELECTOR

+28V DC

+28V DC RETURN

J28 DIRECT INPUT 2000-4088MC

CR1 IN78

J25 P25 W3 RG-71/U

RF ATTENUATOR AT3

RF ATTENUATOR AT4

J32 J33 P33 UG-536A/U W1 J31 RG-55/U

J29 J26 P26 UG-88C/U W2 J27 RG-55/U

L18 L7 L8 R25 62 5%

C13 1.5-12.5

C14 1.5-12.5

C15 10

R26 360 5%

R27 360 5%

L6

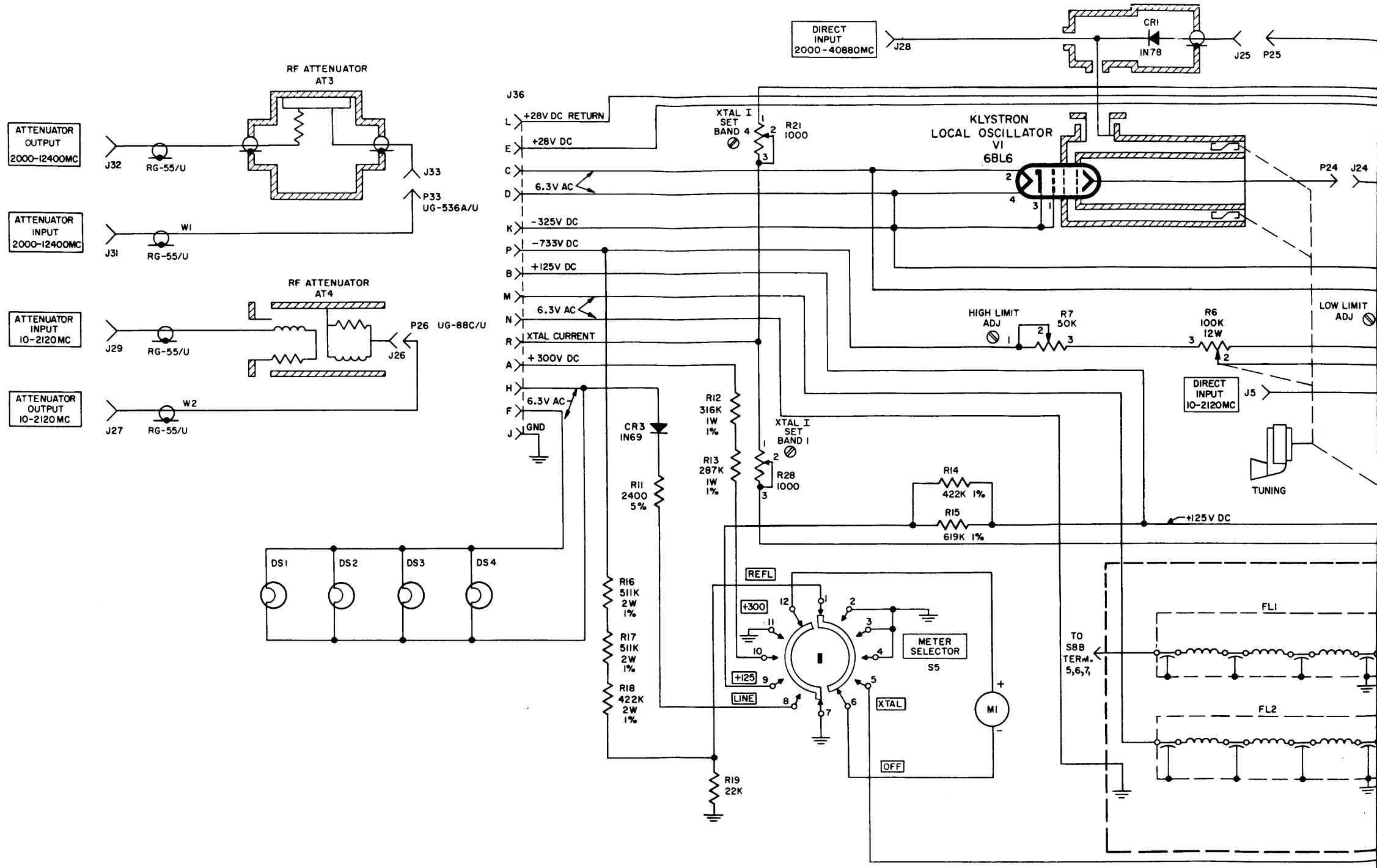
C26 1.5-12.5

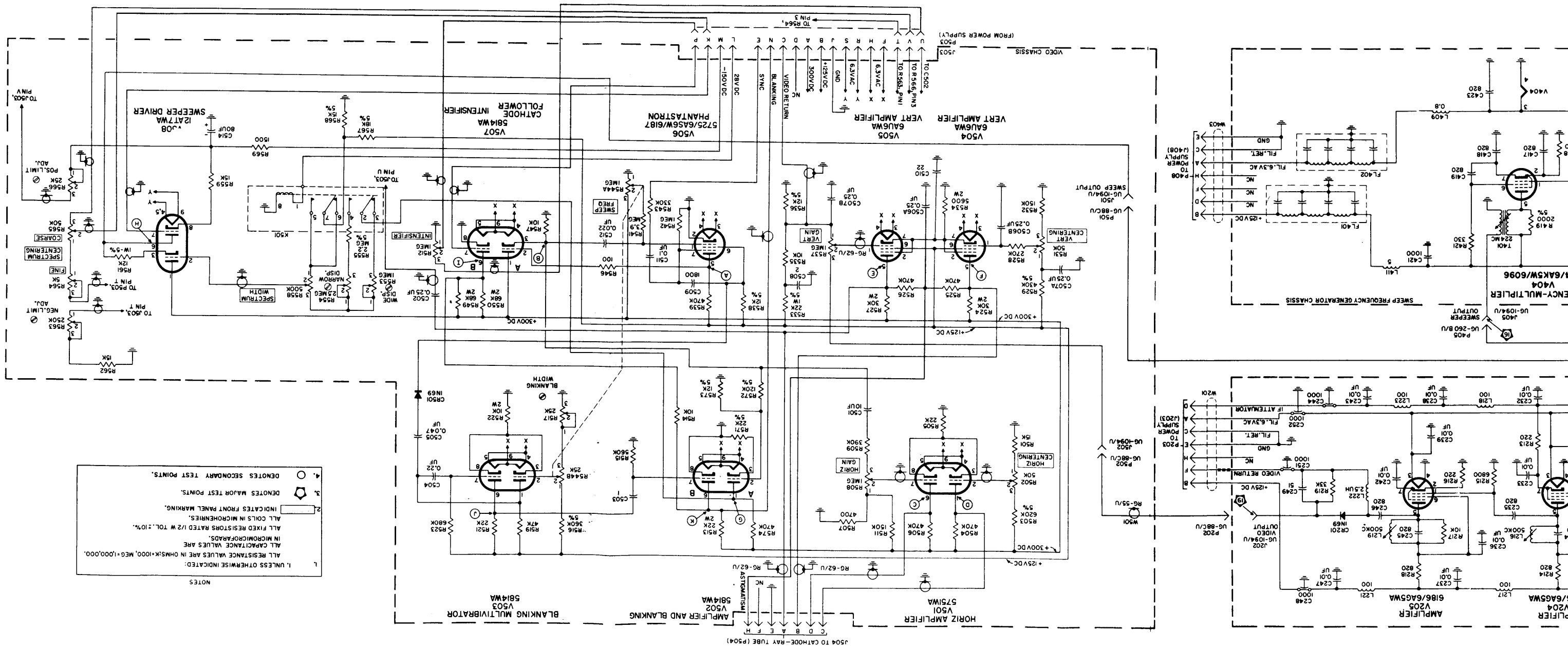
C27 1.5-12.5

C28 1.5-12.5

L17 L19 L22 L24

163 MC LOW PA


RF ATTENUATOR AT3
ATTENUATOR OUTPUT 2000-12400MC
J32
RG-55/U
J33
P33 UG-536A/U
ATTENUATOR INPUT 2000-12400MC
J31
W1
RG-55/U
RF ATTENUATOR AT4
ATTENUATOR INPUT 10-2120MC
J29
RG-55/U
P26 UG-88C/U
J26
ATTENUATOR OUTPUT 10-2120MC
J27
W2
RG-55/U
DS1
DS2
DS3
DS4
DIRECT INPUT 2000-40880MC
J28
CR1 IN78
J25
P25
J36
L +28V DC RETURN
E +28V DC
C
D 6.3V AC
K -325V DC
P -733V DC
B +125V DC
M
N 6.3V AC
R XTAL CURRENT
A +300V DC
H
F 6.3V AC
J GND
XTAL I SET BAND 4
R21 1000
KLYSTRON LOCAL OSCILLATOR VI 6BL6
P24
J24
HIGH LIMIT ADJ
R7 50K
R6 100K 12W
LOW LIMIT ADJ
DIRECT INPUT 10-2120MC
J5
TUNING
CR3 IN69
R11 2400 5%
R12 316K 1W 1%
R13 287K 1W 1%
XTAL I SET BAND 1
R28 1000
R14 422K 1%
R15 619K 1%
+125V DC
R16 511K 2W 1%
R17 511K 2W 1%
R18 422K 2W 1%
R19 22K
REFL
+300
+125
LINE
XTAL
OFF
METER SELECTOR S5
M1
TO S8B TERM. 5,6,7,
FL1
FL2


VIDEO CHASSIS
J503
P503
(FROM POWER SUPPLY)
TO R564, PIN 3
TO C502
TO R566, PIN 1
TO R565, PIN 1
6.3VAC
GND
+125V DC
300V DC
VIDEO RETURN
BLANKING
SYNC
NC
-150V DC
285 VDC
V504
6AU6WA
VERT AMPLIFIER
V505
6AU6WA
VERT AMPLIFIER
V506
5725/6AS6W/6187
PHANTASTRON
V507
5814WA
CATHODE FOLLOWER
INTENSIFIER
V508
12AT7WA
SWEEPER DRIVER
TO J503, PIN V
TO J503, PIN U
TO J503, PIN T
NEG. LIMIT ADJ.
POS. LIMIT ADJ.
SPECTRUM CENTERING
COARSE
FINE
SPECTRUM WIDTH
WIDE DISP.
NARROW DISP.
INTENSIFIER
SWEEP FREQ
VERT GAIN
HORIZ GAIN
HORIZ CENTERING
VERT CENTERING
SWEEP OUTPUT
J501
P501
UG-109A/U
UG-88C/U
J502
P502
UG-88C/U
UG-109A/U
RG-55/U
W501
RG-62/U
J504 TO CATHODE-RAY TUBE (P504)
HORIZ AMPLIFIER
V501
5751WA
AMPLIFIER AND BLANKING
V502
5814WA
BLANKING MULTIVIBRATOR
V503
5814WA
ASTIGMATISM
NC
+300V DC
+125V DC
-300V DC
BLANKING WIDTH
NOTES
1. UNLESS OTHERWISE INDICATED:
ALL RESISTANCE VALUES ARE IN OHMS(K=1000, MEG=1,000,000.
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.
ALL FIXED RESISTORS RATED 1/2 W TOL. ±10%.
ALL COILS IN MICROHENRIES.
2. INDICATES FRONT PANEL MARKING.
3. DENOTES MAJOR TEST POINTS.
4. DENOTES SECONDARY TEST POINTS.
SWEEP FREQUENCY GENERATOR CHASSIS
P403
UG-260 B/U
J405
SWEEPER OUTPUT
UG-109A/U
V404
6AU6W/6AK5W/6096
FREQUENCY-MULTIPLIER
V403
6AU6WA
AMPLIFIER
V204
6186/6AG5WA
AMPLIFIER
V205
6186/6AG5WA
P408
TO POWER SUPPLY (J408)
W403
W201
W204
FIL. 6.3V AC
FIL. RET.
GND
NC
+125V DC
VIDEO RETURN
IF ATTENUATOR
P203
TO POWER SUPPLY (J203)
P202
UG-88C/U
J202
UG-109A/U
VIDEO OUTPUT
CR201
1N69
FL401
FL402

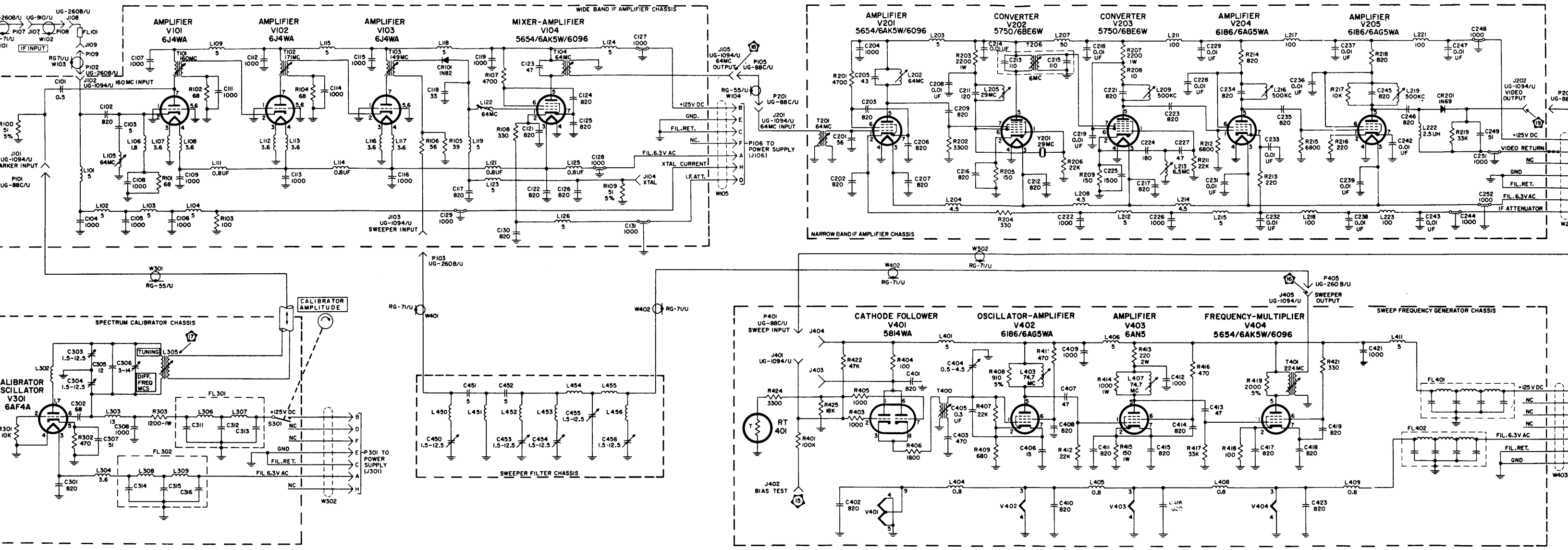


Figure 7–2. Intermediate-frequency and Video Circuits, Schematic Diagram

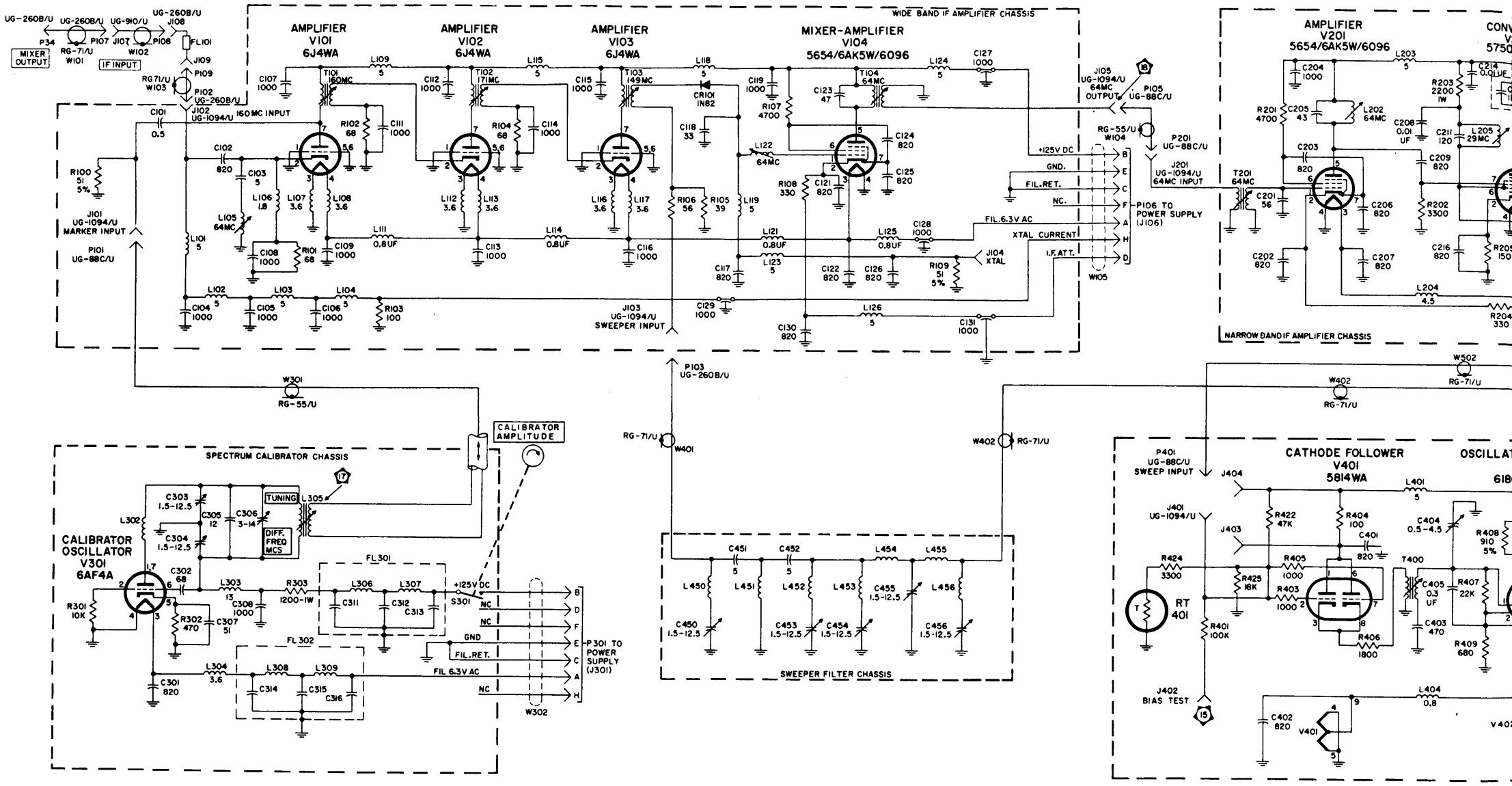
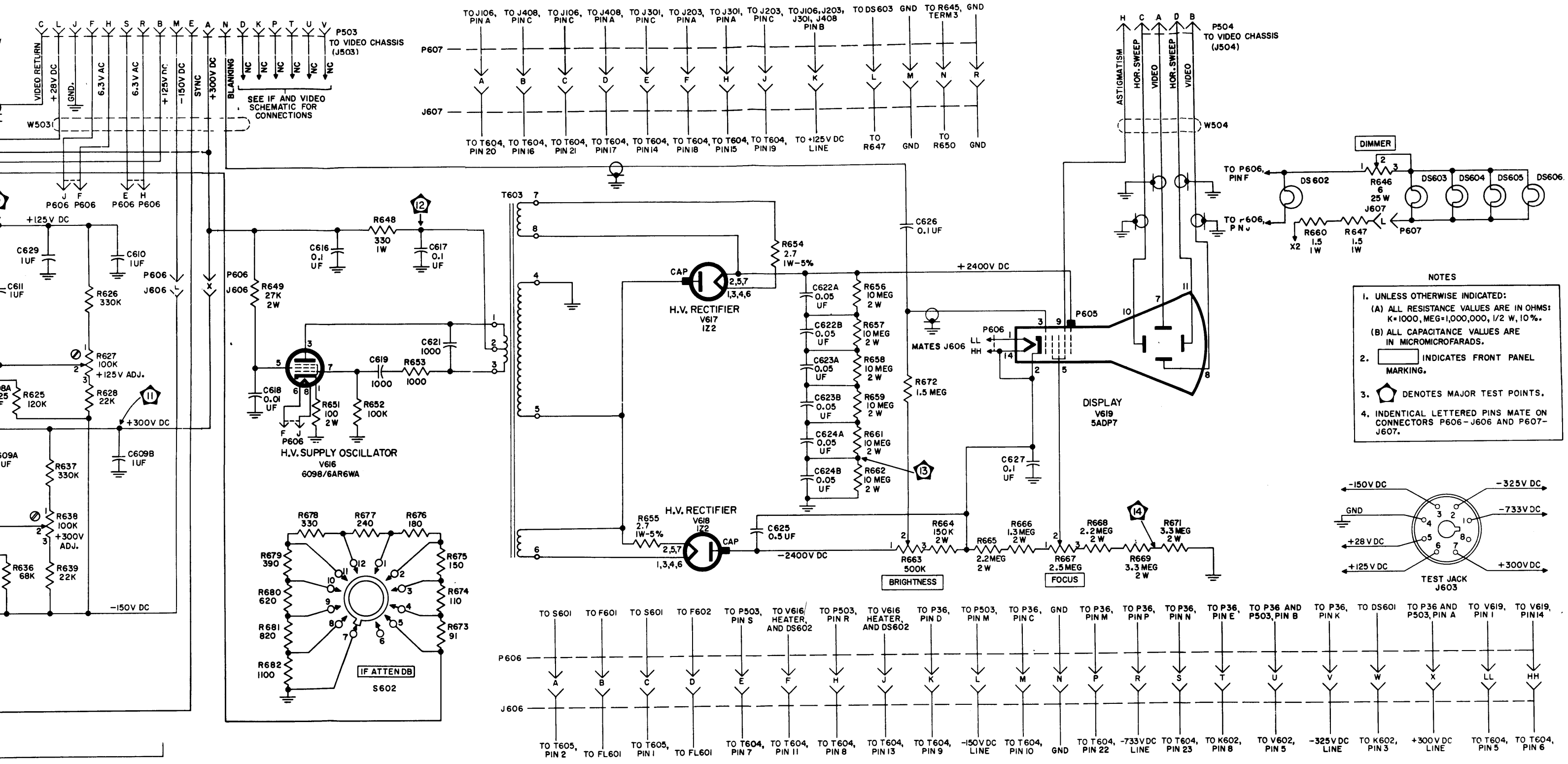


Figure 7–2. Intermediate-frequency and Video Circuits, Schematic Diagram



NOTES

1. UNLESS OTHERWISE INDICATED:
   (A) ALL RESISTANCE VALUES ARE IN OHMS: K=1000, MEG=1,000,000, 1/2 W, 10%.
   (B) ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.
2. ▭ INDICATES FRONT PANEL MARKING.
3. ⬠ DENOTES MAJOR TEST POINTS.
4. INDENTICAL LETTERED PINS MATE ON CONNECTORS P606-J606 AND P607-J607.

Figure 7-3. Power Supply and Cathode-ray Tube Circuits, Schematic Diagram

J408 TO SWEEP FREQUENCY GENERATOR (P408)

J106 TO WIDE BAND IF (P106)

P36 TO RF TUNING UNIT (J36)

J203 TO NARROW BAND IF (P203)

SEE IF AND VIDEO SCHEMATIC FOR CONNECTIONS

+28 V DC

P607 P607

P606 J606

P606 P606

P606 P606

P606 P606

P607 J607

P606 P606

P606 P606

W503

T601

RECTIFIER V601 5R4WGA

SERIES REGULATOR V602 6098/6AR6WA

VOLTAGE REFERENCE V604 0A2WA

PIN 13 PIN 14

TO T602

C601 4UF

CONTROL V603 12AT7WA

R601 150K 1W

R602 68K 2W

R603 33K 2W

R604 33K 2W

R605 470K

C602 0.5 UF

R606 47K 1W

C604 0.05 UF

R607 33K 2W

R608 33K 2W

R609 50K -325V ADJ.

R611 68K 1W

-325V DC

R612 4700 2W

R613 4700 2W

R614 4700 2W

R615 4700 2W

R616 4700 2W

C603 0.05UF

C605 2UF

VOLTAGE REFERENCE V605 0A2WA

VOLTAGE REFERENCE V606 0A2WA

VOLTAGE REFERENCE V607 0B2WA

-733V DC

V610

J606

TO V619 PINS 1 AND 14

TO P503 PINS S AND R

TO P36 PINS D AND C

J607

TO J301 PINS A AND C

TO J408 PINS A AND C

TO J203 PINS A AND C

TO J106 PINS A AND C

TO P36 PINS M AND N

V602 V603 V611 V612 V613 V614

X1 X2

J606 P606 J F N

TO V616 HEATER AND DS602

REFLECTOR SUPPLY

T605

YELLOW RED BLACK YELLOW

CR601

C628 100 UF

T602

RECTIFIERS V608 5R4WGA

V609 5R4WGA

C606 80UF

C607 10UF

BIAS RECTIFIER V610 6X4W

C632 0.5 UF

P602

E B D J602

B601

J607 R M N P607

SYNC

R645 100K

R650 3.3 1W 5%

R642 3.3 1W

R641 5K 10W

R643 3100 10W

R644 3100 10W

C612 4UF

C613 4 UF

C614 4 UF

C615 0.1 UF

VOLTAGE REGULATOR V615 0A2WA

-150V DC

R618 100

R619 100

SERIES REGULATOR V611 6080WA

R610 2000 40W

C620 1000

R683 1MEG

C630 0.01UF

CONTROL V612 12AT7WA

R621 270K

R623 100

R622 150K

C611 1UF

C629 1UF

C610 1UF

R626 330K

R627 100K +125V ADJ.

R628 22K

R624 68K

C608A 0.25 UF

R625 120K

+125V DC

+300V DC

C609B 1UF

SERIES REGULATOR V613 6080WA

R631 100

R640 100

R684 4.3MEG

R632 330K

CONTROL V614 12AT7WA

R633 390K

R634 100

C609A 1UF

R637 330K

R638 100K +300V ADJ.

R639 22K

R635 120K

C608B 0.25 UF

R636 68K

300 VOLT AND BIAS SUPPLIES

R649 27K 2W

C618 0.01 UF

H.V. SUPPL

6098/

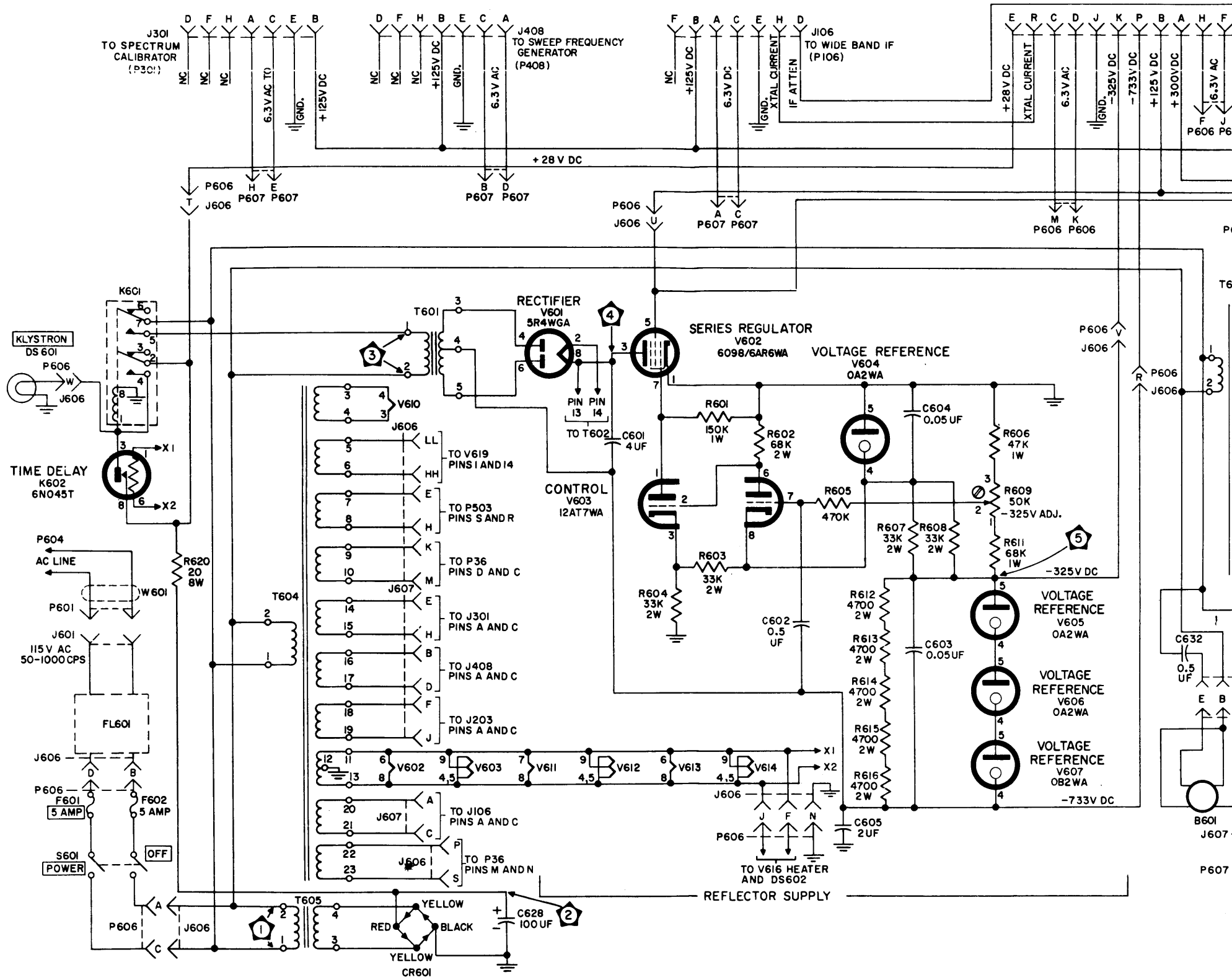
R678 330

R679 390

R680 620

R681 820

R682 1100



Changed 1 March 1960

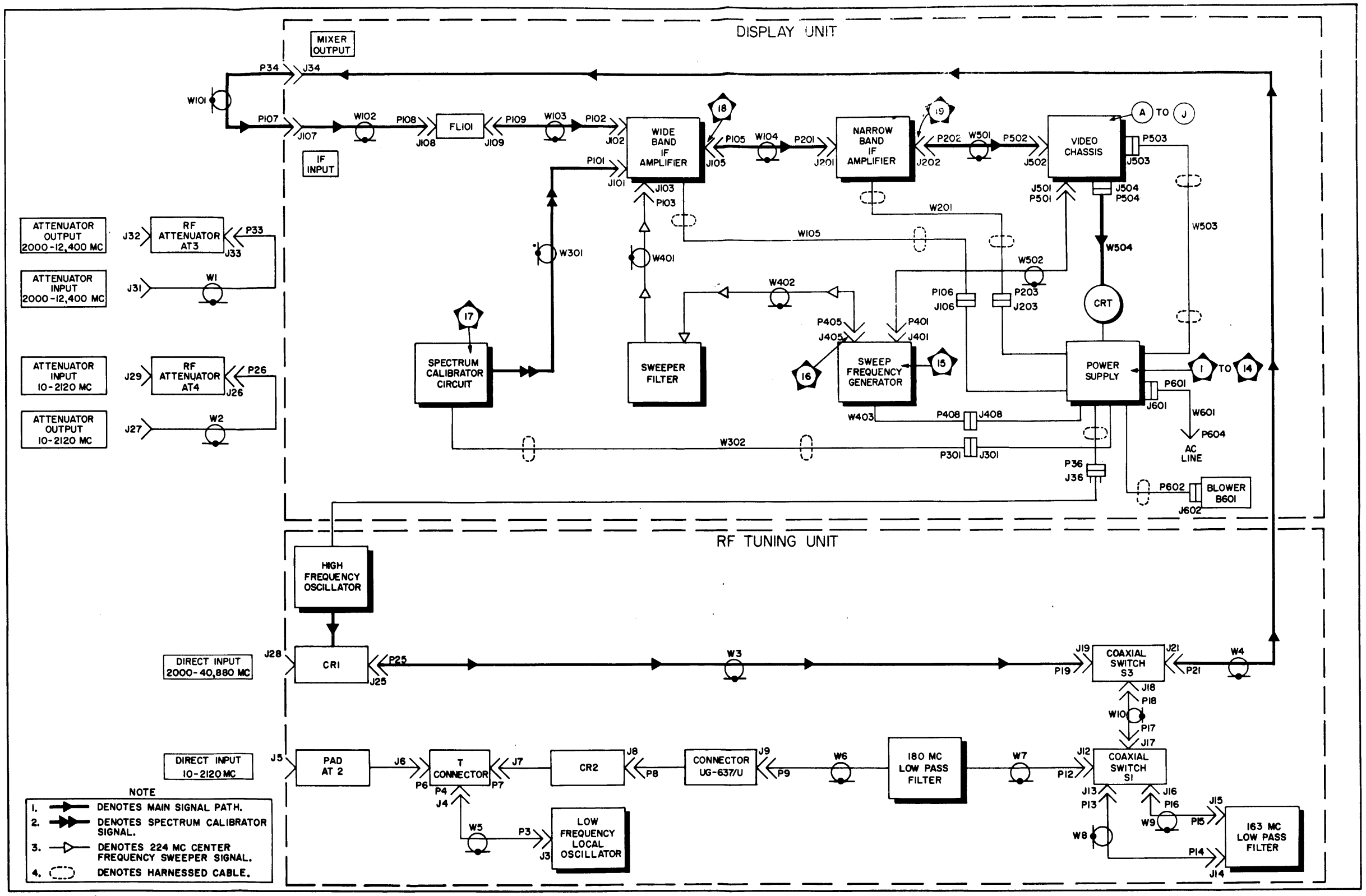


Figure 7–4. Spectrum Analyzer Set AN/UPM-84, Inter-unit Cabling Diagram

APPENDIX I

ILLUSTRATED PARTS BREAKDOWN

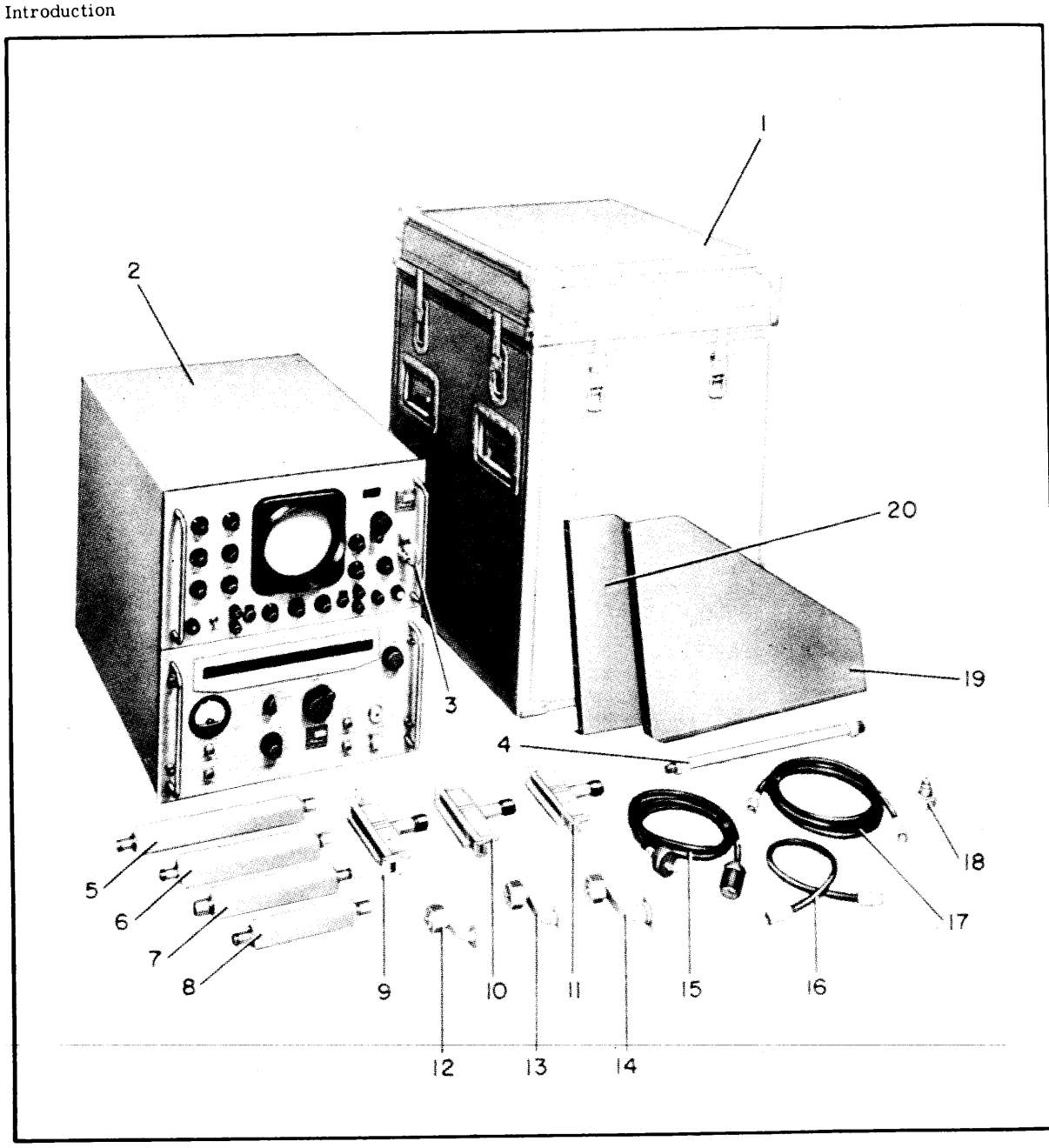


Figure 1. Spectrum Analyzer Set AN/UPM-84 Components

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1-	AN/UPM-84	SPECTRUM ANALYZER SET	1	
-1	CY-2074/UPM-84	. CASE, Electronic equipment	1	
-2	TS-1011/UPM-84	. SPECTRUM ANALYZER (See figures 2 through 21 for breakdown)	1	
-3	CG-1525/U (0 ft 3 in.)	. CABLE ASSY, R-f (See figure 2 for breakdown) . .	1	
-4	F-338/UPM-84	. FILTER, Bandpass, 750 to 1350 mc	1	
-5	F-341/UPM-84	. FILTER, Bandpass, 1175 to 2250 mc	1	
-6	F-337/UPM-84	. FILTER, Bandpass, 2000 to 3900 mc	1	
-7	F-336/UPM-84	. FILTER, Bandpass, 3375 to 7375 mc	1	
-8	F-335/UPM-84	. FILTER, Bandpass, 6100 to 12, 100 mc	1	
-9	CN-409/UPM-84	. ATTENUATOR, Variable, 12.4 to 18.0 kmc	1	
-10	CN-411/UPM-84	. ATTENUATOR, Variable, 18.0 to 26.5 kmc	1	
-11	CN-410/UPM-84	. ATTENUATOR, Variable, 26.5 to 40.0 kmc	1	
-12	UG-1239/UPM-84	. ADAPTER, Coax to waveguide, 26.5 to 40.0 kmc .	1	
-13	UG-1240/UPM-84	. ADAPTER, Coax to waveguide, 18.0 to 26.5 kmc .	1	
-14	UG-1241/UPM-84	. ADAPTER, Coax to waveguide, 12.4 to 18.0 kmc .	1	
-15	CX-3974/U (10 ft 0 in.)	. CABLE ASSY, Electrical power (See figure 23 for breakdown) .	1	
-16	CG-1526/U (1 ft 6 in.)	. CABLE ASSY, R-f (See figure 22 for breakdown) . .	1	
-17	CG-1526/U (6 ft 0 in.)	. CABLE ASSY, R-f (See figure 22 for breakdown) . .	1	
-18	UG-1242/UPM-84	. ADAPTER, R-f cable, 2 to 12.4 kmc	1	
-19	D108774	. BRACKET, Rack mounting, left side	1	
-20	D108775	. BRACKET, Rack mounting, right side	1	

SECTION I
INTRODUCTION

1-1. GENERAL.

1-2. This Illustrated Parts Breakdown lists and illustrates the parts of Spectrum Analyzer Set AN/UPM-84 (USAF Stock No. 7CAC-040925) manufactured by Polarad Electronics Corp., L. I. C., N. Y.

1-3. GROUP ASSEMBLY PARTS LIST.

1-4. The Group Assembly Parts List, Section II, lists the assemblies, subassemblies, and detail parts of the equipment. Each assembly is listed in its order of disassembly and is followed immediately by its component parts, properly indented to show their relationship to the assembly. Attaching parts are listed immediately following the parts which they attach. Each parts list is used in conjunction with its exploded view. Index numbers on the exploded views correspond to the index numbers listed in the figure and index number column. Any part can, therefore, be identified if the description, part number, or physical configuration is known.

1-5. PART NUMBER COLUMN. This column lists the Polarad Electronics Corp. part numbers except where AN (Army-Navy), JAN (Joint Army-Navy), MIL (Military Standard), or vendors' part numbers are used.

1-6. DESCRIPTION COLUMN. This column shows the basic name followed by an identifying description of each listed part. The indentions headed "1" through "7" in the Description column are provided to show the relationship of parts and subassemblies to assemblies.

1-7. ATTACHING PARTS. Items used to attach parts or assemblies to each other are designated "ATTACHING PARTS" and are listed immediately after the item they attach. The symbol "---*---" is used to denote the end of the attaching parts and the continuation of the listing.

1-8. VENDOR'S CODE. When a part is neither a Polarad Electronics Corp. nor a government standard part, a code symbol denoting the manufacturer from whom the part can be procured is given in parenthesis following the description of the part. The vendors' code symbols used in this parts breakdown, and the manufacturer to which each applies, are listed in table I.

TABLE I. VENDORS' CODES

Code Symbol	Name and Address
ALP	Alden Products Company Brockton, Mass.
ATV	Amperite Company New York, N. Y.
BC	Breeze Corporation, Inc. Newark, N. J.
BGW	Boston Gear Works Inc. Div. Murray Co. of Texas Quincy, Mass.
BLC	The Barry Corporation Watertown, Mass.
CGT	Cambridge Thermionic Corp. Cambridge, Mass.
CIN	Cinch Manufacturing Company Chicago, Ill.
COPC	Condenser Products Company Chicago, Ill.
DAKN	Danbury-Knudsen Inc. Danbury, Conn.
DLC	Dial Light Corp. of America Brooklyn, N. Y.
DLPC	Driv-Lok Company Chicago, Ill.
EBY	Hugh H. Eby Inc. Philadephia, Pa.
ERC	Erie Resistor Corporation Erie, Pa.
GE	General Electric Company Schenectady, N. Y.
IPC	Industrial Products Company Div. of Knudsen Inc. Danbury, Conn.
MAI	Marion Electrical Instrument Co. Manchester, N. H.

TABLE I. VENDORS' CODES (cont)

Code Symbol	Name and Address
METC	Metal Textile Corporation Roselle, N. J.
MLL	James Millen Mfg. Co., Inc. Malden, Mass.
MSG	Mendelsohn Speed Gun Co. Bloomfield, N. J.
NAC	National Company, Inc. Malden, Mass.
ND	New Departure Division General Motors Corporation Bristol, Conn.
RAY	Raytheon Mfg. Company Waltham, Mass.
SH	Shakeproof Inc. Div. Ill. Tool Works Chicago, Ill.
TTE	Times Facsimile Corporation New York, N. Y.
UCI	The Ucinite Company Newtownville, Mass.
VTE	Victory Engineering Company Los Angeles, Calif.
WAL	Ward Leonard Electric Co. Mount Vernon, N. Y.
WIM	J. H. Williams Company Buffalo, N. Y.
WIQ	Winchester Electronics Co. Glenbrook, Conn.
WKI	Waldes-Kohinoor Inc. Long Island City, N. Y.
WMPC	Whitehead Metal Products Co., Inc. New York, N. Y.

1-9. UNITS PER ASSEMBLY COLUMN. This column lists the quantity of assemblies, subassemblies, or parts required in the immediately preceding assembly of which the given item is a component. The quantities specified, therefore, are not necessarily the total used per equipment. Refer to the Numerical Index, Section III, for the total quantities used per equipment. Nonprocurable parts or assemblies receive the abbreviation "NP". For replacement refer to the next higher assembly (NHA). REF indicates that the assembly was pictured completely assembled on a preceding illustration, and is now exploded on the illustration on which it is referenced.

1-10. USABLE ON CODE COLUMN. This column is not applicable to this parts breakdown.

1-11. NUMERICAL INDEX.

1-12. Section III, Numerical Index, is compiled in accordance with the alphabetical-numerical part number filing system described below.

a. Part number numerical arrangement starts with the left-hand column and continues from left to right, one column at a time, until the part number numerical arrangement is determined.

b. The order of precedence in part number numerical arrangement is as follows:

Space (blank column)
Diagonal (slant) /
Point (period)
Dash (-)
Letters A through Z
Numerals 0 through 9

NOTE

Alphabetical O's are considered as numerical zeros.

1-13. The Numerical Index is an index to the Group Assembly Parts List (Section II). The part numbers are listed in alphabetical-numerical sequence as described in paragraph 1-12 above. "No Number" parts are listed alphabetically by their principle identifying noun, and precede the part numbers in the index. The figure and index listings are complete for all nonstandard parts. For government standard parts, the listing is limited to the first reference to the part in the Group Assembly Parts List. The Quantity Per Article column indicates the total quantity of the part used in the equipment. When the stock number of an item does not appear in the Illustrated Parts Breakdown, reference should be made to the S-00-1 Master Numerical Index.

1-14. The Figure and Index Number column is arranged with reference to the proper figure number in Section II, followed by the index number in that illustration. For example, a listing such as 3-3 indicates that knobs 70-3-2G occur on figure 3, index number 3.

1-15. SOURCE CODING.

1-16. Source coding, as applied to the numerical index, has been assigned by department representatives.

1-17. SOURCE CODE DEFINITIONS.

1-18. CODE "P" - PARTS UNDER INVENTORY STOCK CONTROL.

a. CODE "P" is applied to parts which are procured in view of relatively high usage. Code "P" parts may be requisitioned and installed by any maintenance level, unless followed by the letter "O", which restricts requisition and replacement to Depot (O&R) level only. Restricted service manufacture is considered practicable but only after an attempt has been made to procure from Supply Sources. In lieu of Procurement of "P" Coded parts, the Department may designate a Depot (O&R) level activity to manufacture supply requirements for the Program.

b. CODE "P1" is applied to parts which are very difficult or uneconomical to manufacture. Service manufacture is considered impracticable. Code P1 parts may be requisitioned and installed by any maintenance level, unless followed by the letter "O", which restricts requisition and replacement to Depot (O&R) level only.

1-19. CODE "M" MANUFACTURE, PARTS NOT PROCURED.

a. CODE "M" is applied to parts which are within the facilities of any activity to manufacture. Procurement and stocking are not justified in view of the relatively low usage, or storage and installation factors, of these parts. Needs are to be met by local manufacture as required.

b. CODE "M1" is applied to parts which can be manufactured only by utilizing the facilities of the Depot (O&R) activity. Procurement and stocking of these parts are not justified in view of their relatively low usage and installation factors. The needs of all activities are to be met through salvage, or by Depot (O&R) level manufacture.

1-20. CODE "A" ASSEMBLE - ASSEMBLY NOT PROCURED.

a. CODE "A" is applied to assemblies made up of two or more units each of which carry individual part numbers and description, and which may be assembled by any Maintenance level.

b. CODE "A1" is applied to assemblies made up of two or more parts each of which carry individual part numbers and description, and which may be assembled only by activities having Depot (O&R) facilities.

1-21. CODE "X" PARTS CONSIDERED IMPRACTICABLE FOR MANUFACTURE OR PROCUREMENT.

a. CODE "X" is applied to parts which, if required, would suggest extensive equipment reconditioning. The need of a part or parts coded "X" should normally result in a recommendation to retire the equipment from Service.

b. CODE "X1" is applied to parts for which procurement of the next larger assembly is justified; e.g., an integral detail part, such as welded segments, inseparable from its assembly; a part machined in a matched set; or a part of an assembly which, if required, would suggest extensive reconditioning of each assembly.

c. CODE "X2" is applied to parts which are neither procured nor stocked. Activities requiring such parts shall attempt to obtain from salvage; if not obtainable from salvage, such parts shall be requisitioned through normal supply channels with supporting justification for so doing.

1-22. CODE * PARTS NOT PROCURED, MANUFACTURED OR STOCKED.

a. CODE * applies to installation drawings, diagrams, instructions or field service drawings, basic drawing numbers which cannot be procured or manufactured and obsolete parts.

1-23. REFERENCE DESIGNATION INDEX.

1-24. The Reference Designation Index, Section IV, serves as a cross reference between the reference designation numbers and the Group Assembly Parts List. The same method of referencing index numbers, as described in paragraph 1-14, applies to section IV.

1-25. USE OF THE PARTS BREAKDOWN.

1-26. FINDING THE NOMENCLATURE AND ILLUSTRATION WHEN THE PART NUMBER IS KNOWN.

a. Locate the part number in the Numerical Index to obtain the applicable figure and index number.

b. Refer to the figure and index number in the Group Assembly Parts List and read the nomenclature and description in the Description column.

c. Locate the index number on the designated illustration.

1-27. FINDING THE PART NUMBER AND NOMENCLATURE WHEN THE PART CAN BE IDENTIFIED ON THE EXPLODED VIEW.

a. Refer to the exploded view on which the part appears and find its index number.

b. Locate the index number in the corresponding parts list and read the part number and nomenclature in the appropriate columns.

1-28. FINDING THE PART NUMBER AND DESCRIPTION OF A PART IF ONLY THE REFERENCE SYMBOL IS KNOWN.

a. Turn to Section IV, Reference Designation Index, and locate the reference symbol listing of the part in question. Opposite this reference symbol, find the figure and index number under which the part is listed.

b. In the Group Assembly Parts List, find the listing of the desired part, with the description and illustration.

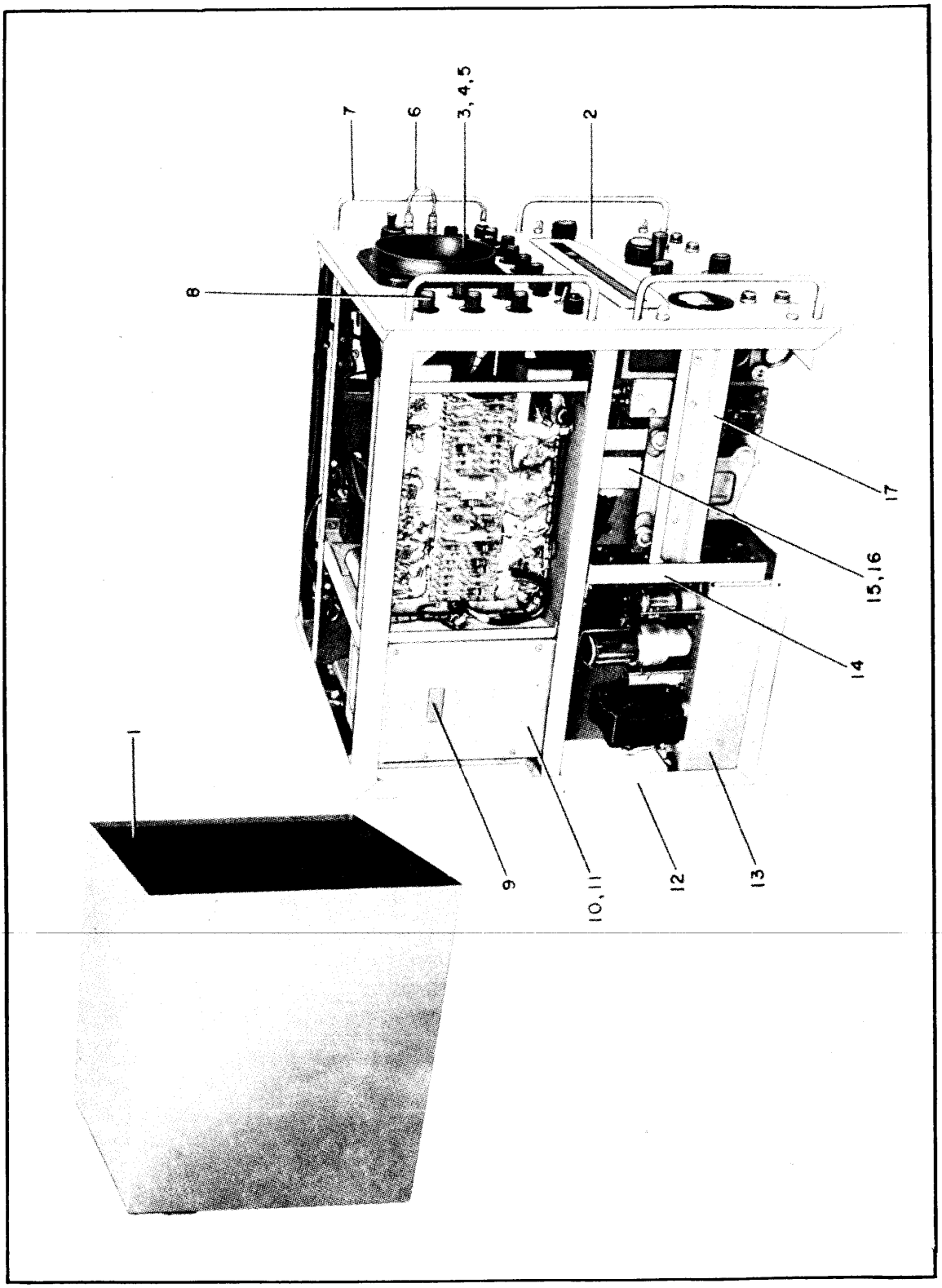


Figure 2. Spectrum Analyzer Assembly, Left Side View (Sheet 1 of 3 Sheets), Index Nos. 1 through 17

SECTION II

GROUP ASSEMBLY PARTS LIST

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM ANALYZER ASSEMBLY		
2-	D108835	SPECTRUM ANALYZER ASSEMBLY	1	
-1	D101128	. CASE ASSEMBLY	1	
-2	E102202	. TUNING HEAD AND PANEL ASSEMBLY (see figure 13 . for breakdown)	1	
2-	E108753	. FRAME AND CHASSIS ASSEMBLY	1	
-3	C-JAN-1327	. . BEZEL, Al black anodized finish, 6-1/4 sq by 5-1/4. in. ID (Jan Hardware Mfg. Co., Brooklyn, N. Y.)	1	
		ATTACHING PARTS		
	AN505-6-12	. . SCREW	4	
	AN936B6	. . WASHER	4	
	AN340-6	. . NUT	4	
		---*---		
-4	C105787	. . SCALE, Calibrated	1	
-5	C-JAN-1353-21	. . GASKET, Rubber, 5-11/32 ID by 6-1/8 in. OD (Jan. . Hardware Mfg. Co., Brooklyn, N. Y.)	1	
-6	A108830	. . RF CABLE ASSY, CG-1525/U (0 ft 3 in.)	1	
	UG-260B/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608) . . .	2	
	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	4 in.	
-7	B100460	. . HANDLE	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, . . 12-24 by 5/8 in. lg	4	
	Coml	. . WASHER, Lock, ext tooth, stainless steel, passivated for No. 12 bolt	4	
		---*---		
-8	70-3-2G	. . KNOB, Rd, matte finish, 0.721 dia by 0.803 in. lg(RAY)	6	
-9	AP24440	. . DECAL	2	
-10	C107094	. . SHIELD, Front	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, . 8-32 by 3/8 in. lg	4	
	AN936B8	. . WASHER	4	
		---*---		
-11	C107101	. . CRT POWER SUPPLY CHASSIS ASSEMBLY (see . . . figure 10 for breakdown)	1	
		ATTACHING PARTS		
	AN505-6-6	. . SCREW	2	
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, . . 6-32 by 3/8 in. lg	2	
	AN936B6	. . WASHER	2	
	AN340-6	. . NUT	2	
		---*---		

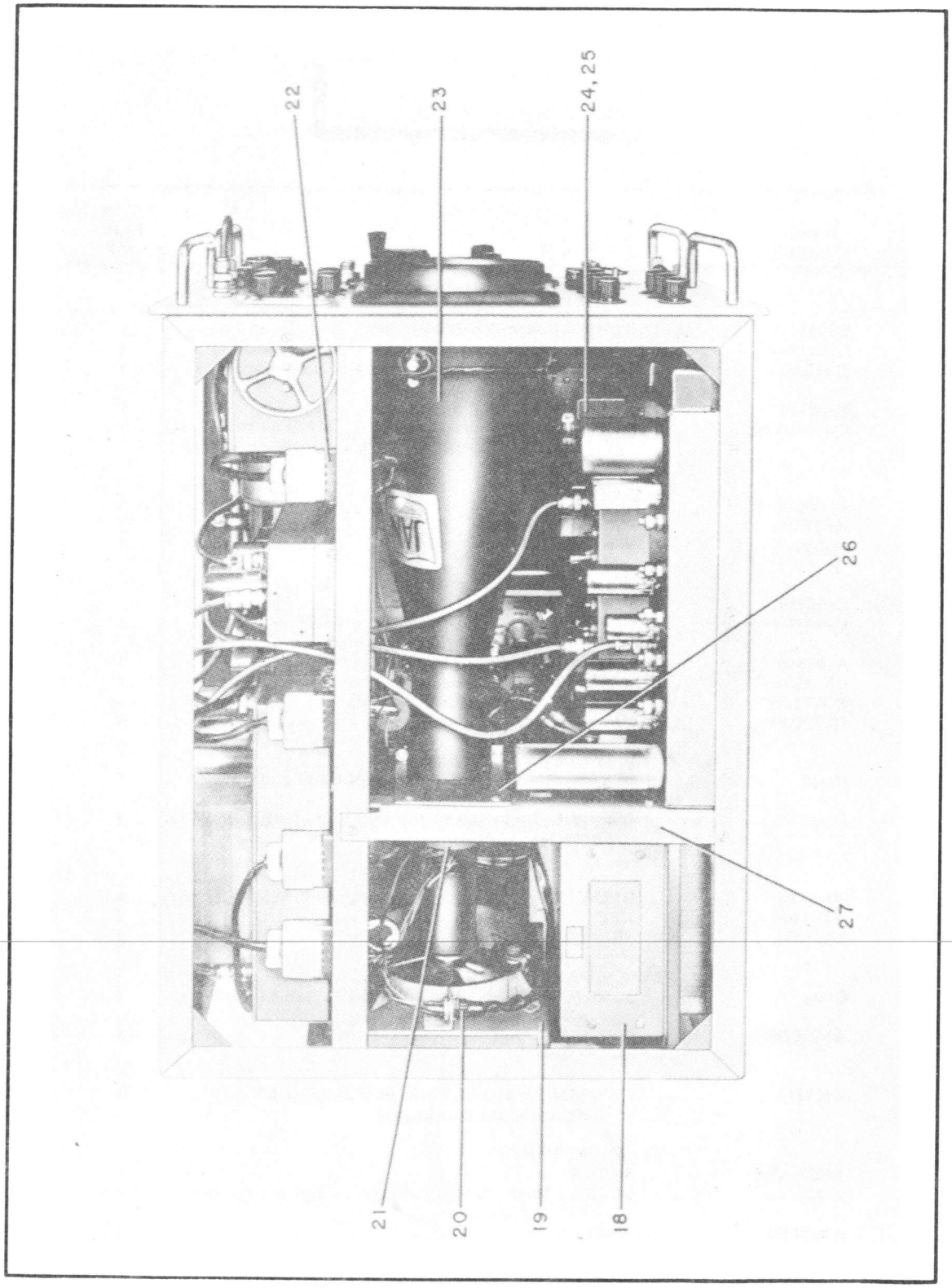


Figure 2. Spectrum Analyzer Assembly, Top View (Sheet 2 of 3 Sheets), Index Nos. 18 through 27

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM ANALYZER ASSEMBLY (cont)		
2-12	D100855	. . FRAME ASSEMBLY	1	
-13	E101962	. . POWER SUPPLY CHASSIS ASSEMBLY (See figure 11 for breakdown)	1	
		ATTACHING PARTS		
	AN505-6-6	. . SCREW	12	
	AN936B6	. . WASHER	12	
	AN340-6	. . NUT	12	
		---*---		
-14	B100783	. . ANGLE	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	4	
	AN936B6	. . WASHER	4	
	AN340-6	. . NUT	4	
		---*---		
-15	MS24033	. . CONNECTOR, Plug	1	
-16	A18H	. . HOOD, Connector, 2-7/64 lg by 2-1/32 high by 1-7/64 in. wide with 17/32 in. dia cable opening (WIQ)	1	
-17	B100776	. . CHANNEL ASSEMBLY, Slide mount	2	
		ATTACHING PARTS		
	AN505-6-6	. . SCREW	4	
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	4	
	AN936B6	. . WASHER	4	
	AN960-6	. . WASHER	4	
	AN340-6	. . NUT	8	
		---*---		
-18	B107093	. . SHIELD ASSEMBLY, Rear	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	6	
		---*---		
-19	C103301	. . BLOWER ASSEMBLY (see figure 12 for breakdown)	1	
		ATTACHING PARTS		
	AN505-6-6	. . SCREW	2	
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	2	
	AN936B6	. . WASHER	2	
	AN340-6	. . NUT	2	
		---*---		
-20	M5S-LS	. . CONNECTOR, Plug, 5 contacts, with hood part No. H19S (WIQ)	1	
-21	CMG49920	. . SOCKET, Crt, Navy type (same as CIN Part No. 9453-14)	1	
-22	MS24027	. . CONNECTOR, Receptacle	4	
		ATTACHING PARTS		
	AN500-6-8	. . SCREW	8	
	AN935-6	. . WASHER	8	
	AN340-6	. . NUT	8	
		---*---		

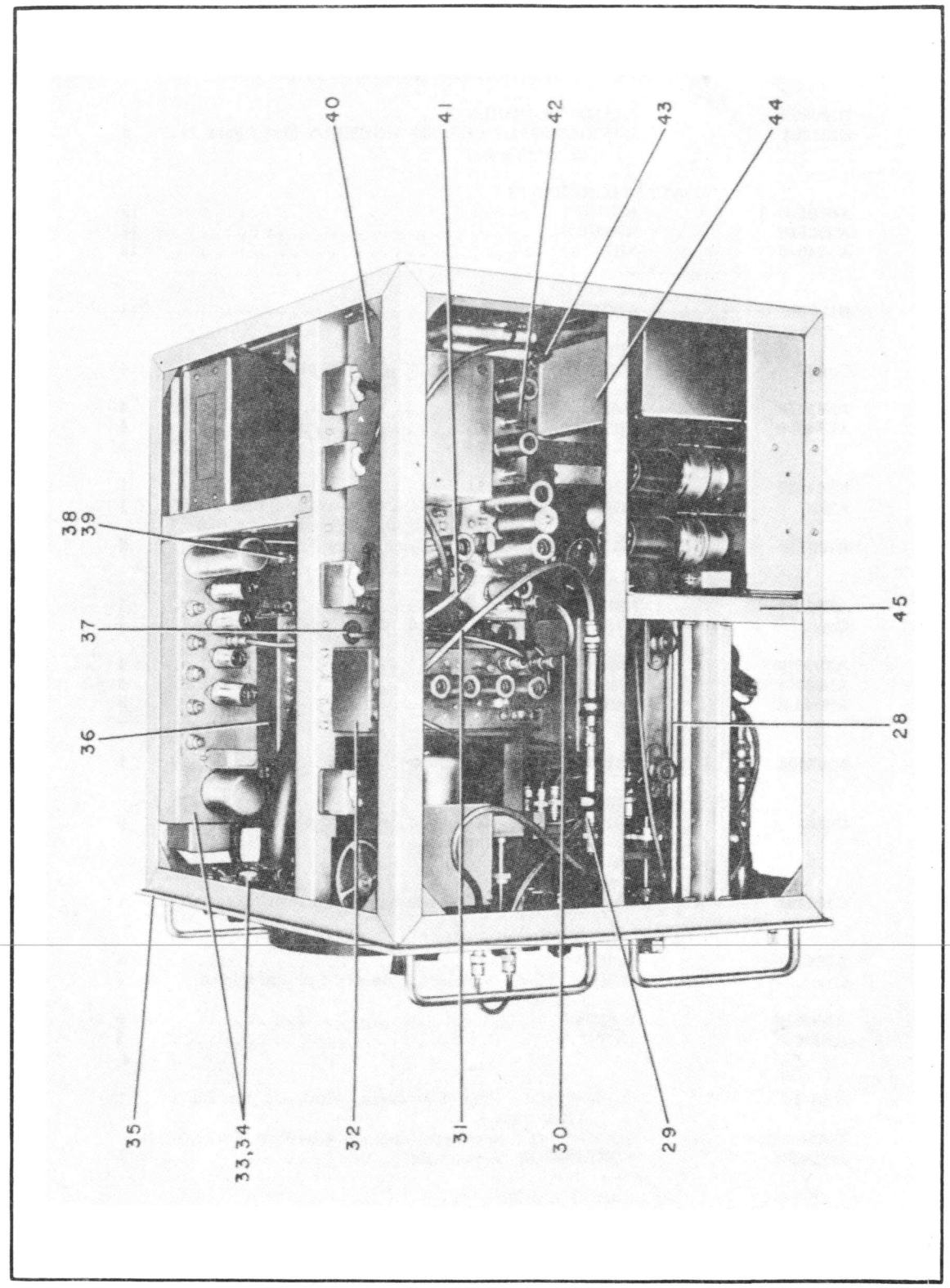


Figure 2. Spectrum Analyzer Assembly, Right Side View (Sheet 3 of 3 Sheets), Index Nos. 28 through 45

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM ANALYZER ASSEMBLY (cont)		
2-23	5ADP7	. . TUBE, Electron (MIL-E-1C)	1	
-24	MS24033	. . CONNECTOR, Plug	1	
-25	A18H	. . HOOD, Connector 2-7/64 lg by 2-1/32 high by 1-7/64 in. wide with 17/32 in. dia cable opening (WIQ)	1	
-26	B100773	. . BRACKET ASSEMBLY, Crt mount	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/2 in. lg	4	
	AN936B8	. . WASHER	4	
	AN960-8	. . WASHER	4	
	AN340-8	. . NUT	4	
		---*---		
-27	B100781	. . ANGLE	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
	AN505-6-6	. . SCREW	2	
	AN936B6	. . WASHER	5	
	AN340-6	. . NUT	5	
		---*---		
-28	B108755	. . SLIDE ASSEMBLY	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 3/8 in. lg	10	
	AN936B8	. . WASHER	10	
	AN340-8	. . NUT	10	
		---*---		
-29	A27611	. . FILTER, 160 mc low pass	1	
		ATTACHING PARTS		
	MS21919DG8	. . CLAMP	2	
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/2 in. lg	2	
	AN936B8	. . WASHER	2	
	AN960-8	. . WASHER	2	
	AN340-8	. . NUT	2	
		---*---		
-30	A108832	. . CABLE ASSEMBLY	1	
	UG-88C/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608)	2	
	RG-55/U	. . . CABLE, Coaxial (MIL-C-17B)	7 in.	
-31	A108834	. . CABLE ASSEMBLY	1	
	UG-260B/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608)	2	
	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	12 in.	
-32	C102154	. . WIDE BAND CHASSIS AND COVER ASSEMBLY (see figure 6 for breakdown)	1	
2-	D110348	. . VIDEO CHASSIS AND POTENTIOMETER ASSEMBLY (see figure 9 for breakdown)	1	
-33	B102500	. . . POTENTIOMETER MOUNTING ASSEMBLY	1	
		ATTACHING PARTS		
	Coml	. . . NUT, Hex, steel Cd pl and iridite, 3/8-32 by 1/2 across flats by 3/32 in. thick	4	
	AN936A616	. . . WASHER	4	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM ANALYZER ASSEMBLY (cont)		
2-34	D101561	. . . VIDEO AMPLIFIER CHASSIS ASSEMBLY	1	
		ATTACHING PARTS		
	AN505-6-6	. . . SCREW	3	
	Coml	. . . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
	AN936B6	. . . WASHER	6	
	AN340-6	. . . NUT	6	
		---*---		
-35	D107391	. . UPPER PANEL ASSY (see figure 3 for breakdown) . .	1	
-36	B102279	. . SWEEPER FILTER CHASSIS AND COVER ASSY . . . . (see figure 8 for breakdown)	1	
-37	AN931-10-14	. . GROMMET	4	
-38	MS24028	. . CONNECTOR, Plug	1	
-39	A7H-28	. . HOOD, Connector, 1-21/32 lg with 7/16 in. dia hole . (WIQ)	1	
-40	B106739	. . SWEEPER ASSEMBLY (see figure 7 for breakdown) .	1	
-41	A108833	. . CABLE ASSEMBLY	1	
	UG-88C/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608) . . .	2	
	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	19 in.	
-42	C102078	. . NARROW BAND CHASSIS AND COVER ASSEMBLY . . (see figure 5 for breakdown)	1	
-43	A108831	. . CABLE ASSEMBLY	1	
	UG-88C/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608) . . .	2	
	RG-55/U	. . . CABLE, Coaxial (MIL-C-17B)	42 in.	
-44	B110052	. . COVER ASSEMBLY, Transformer	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, . 6-32 by 3/8 in. lg	4	
		---*---		
-45	B100780	. . ANGLE	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, . . 6-32 by 3/8 in. lg	4	
	AN936B6	. . WASHER	4	
	AN340-6	. . NUT	4	
		---*---		

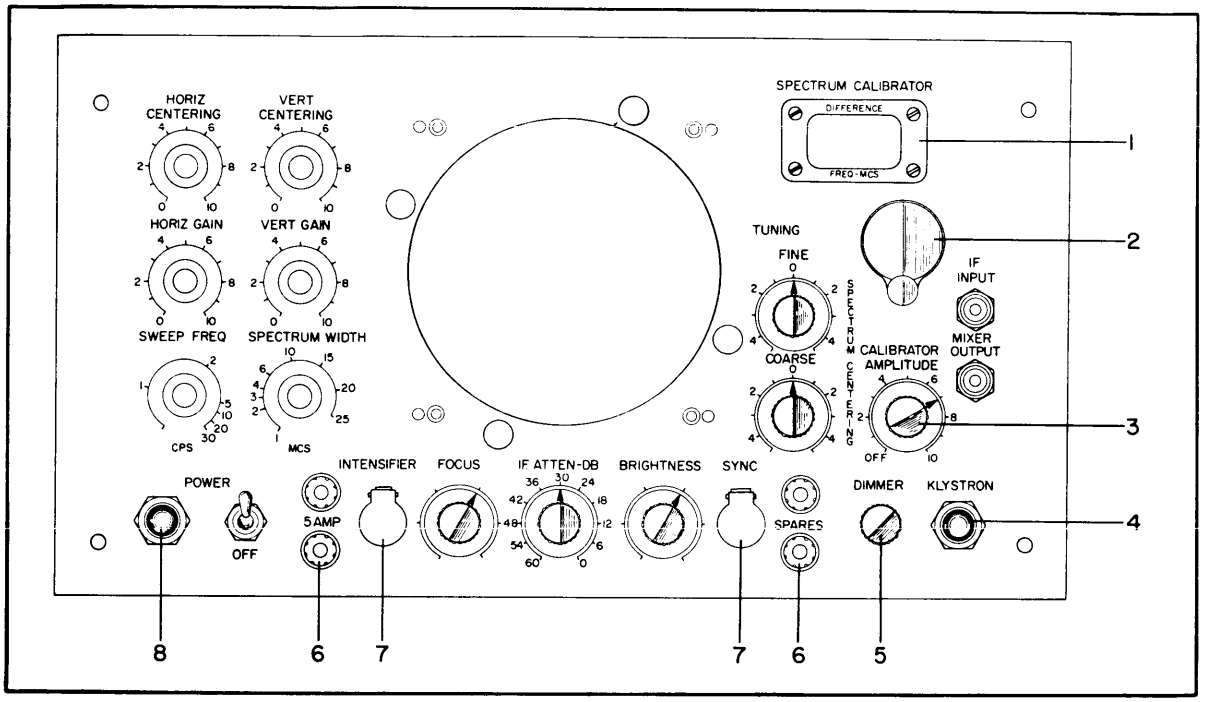


Figure 3. Upper Panel Assembly, Front View (Sheet 1 of 2 Sheets), Index Nos. 1 through 8

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		UPPER PANEL ASSEMBLY		
3-	D107391	PANEL ASSEMBLY, Upper (see 35, figure 2 for next higher assembly)	REF	
-1	A101162	. WINDOW ASSEMBLY, Spectrum Calibrator	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	4	
	AN935-4	. WASHER	4	
		---*---		
-2	125-6-2G	. KNOB, Crank, round skirt, matte finish, 1.269 dia by 1.379 in. lg (RAY)	1	
-3	70-3-2G	. KNOB, Round, matte finish, 0.721 dia by 0.803 in. lg with dial skirt (RAY)	6	
-4	AN3121-1819	. LAMP, Incandescent	1	
-5	70-2-2G	. KNOB, Round, matte finish, 0.721 dia by 0.803 in. lg with round skirt (RAY)	1	
-6	F02G5R00A	. FUSE, 5 amp rating (MIL-F-15160C)	4	
-7	AP20207	. COVER	2	
-8	MS15571-2	. LAMP, Incandescent	1	

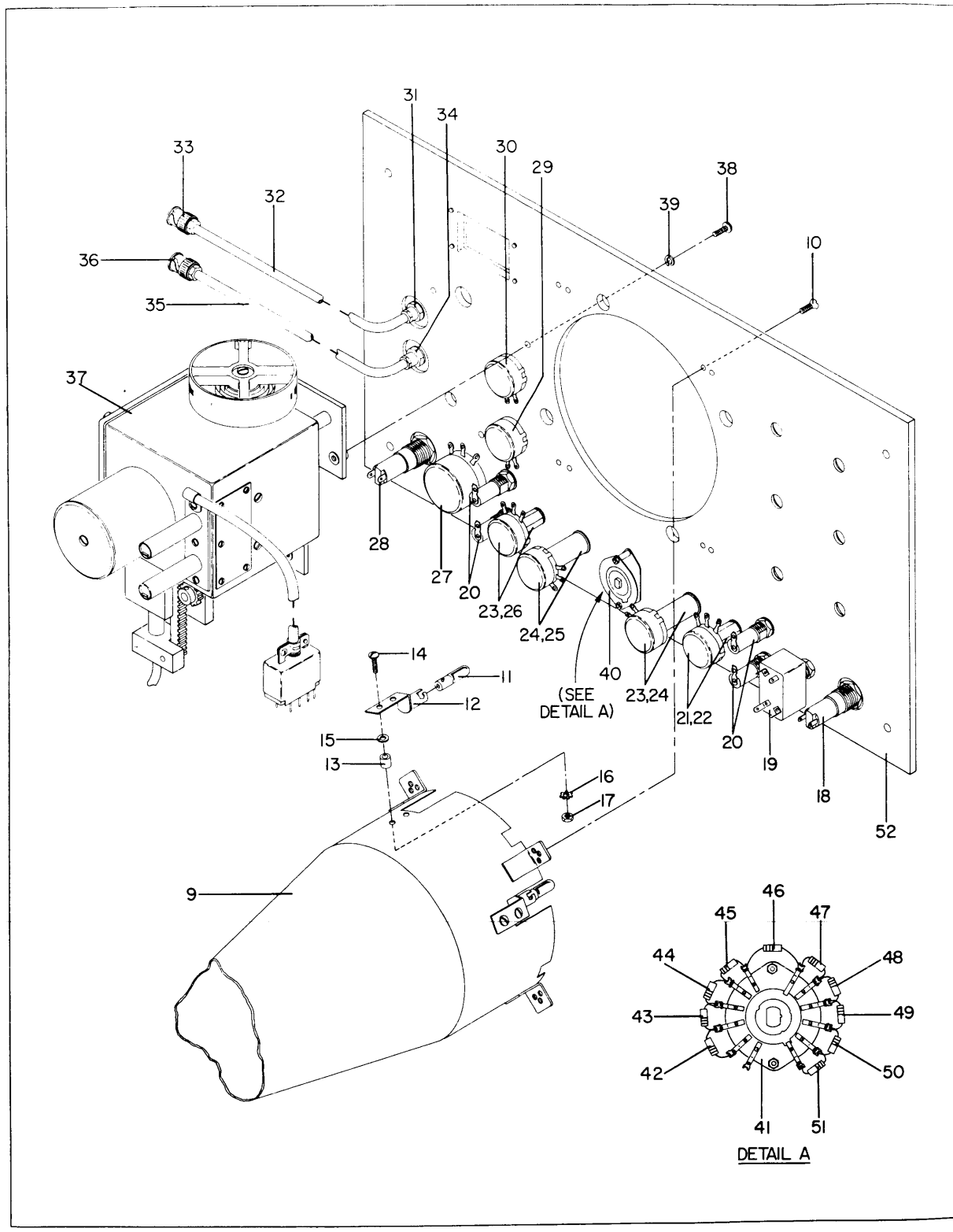


Figure 3. Upper Panel Assembly, Rear View (Sheet 2 of 2 Sheets), Index Nos. 9 through 52

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		UPPER PANEL ASSEMBLY (cont)		
3-9	D-JAN1354	SHIELD, Crt, 14-15/16 in. lg (Jan Hardware Mfg. Co., Brooklyn, N. Y.)	1	
		ATTACHING PARTS		
-10	AN505-6-6	. SCREW	4	
		---*---		
-11	MS15571-2	. LAMP, Incandescent	4	
-12	LH22XX0	. LAMPHOLDER (MIL-L-3661) (per MS90282)	4	
-13	B510169	. SPACER	8	
		ATTACHING PARTS (for items 12 and 13)		
-14	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	8	
-15	AN960-6	. WASHER	8	
-16	AN936B6	. WASHER	8	
-17	AN340-6	. NUT	8	
		---*---		
-18	922210-111	. LIGHTHOLDER, Light-weight, red lens (DLC)	1	
-19	MS35059-9	. SWITCH, Toggle, type ST52K (JAN-S-23A)	1	
-20	FHN20G	. FUSEHOLDER (per MIL-STD-242A)	4	
-21	RV4NATSD105A	. RESISTOR, Variable (MIL-R-94A)	1	
-22	A507502	. BUSHING, Extension	2	
-23	RV4NATSB255A	. RESISTOR, Variable (MIL-R-94A)	1	
-24	B510012	. STANDOFF	2	
-25	RV4NATSB504A	. RESISTOR, Variable (MIL-R-94A)	1	
-26	RV4NATSD104A	. RESISTOR, Variable (MIL-R-94A)	1	
-27	RP101RD6R0KK	. RESISTOR, Variable (MIL-R-22A)	1	
-28	922210-115	. LIGHTHOLDER, Light-weight, white lens (DLC)	1	
-29	RV4NATSD503A	. RESISTOR, Variable (MIL-R-94A)	1	
-30	RV4NATSD502A	. RESISTOR, Variable (MIL-R-94A)	1	
3-	A108817	. CABLE ASSEMBLY	1	
-31	UG-910/U	. . CONNECTOR, Receptacle, BNC type (MIL-C-3608)	1	
-32	RG-71/U	. . CABLE, Coaxial (MIL-C-17B)	14-1/2 in.	
-33	UG-260B/U	. . CONNECTOR, Plug, BNC type (MIL-C-3608)	1	
3-	A108818	. CABLE ASSEMBLY	1	
-34	UG-910/U	. . CONNECTOR, Receptacle, BNC type (MIL-C-3608)	1	
-35	RG-71/U	. . CABLE, Coaxial (MIL-C-17B)	8 in.	
-36	UG-260B/U	. . CONNECTOR, Plug, BNC type (MIL-C-3608)	1	
-37	C101138	. SPECTRUM CALIBRATOR (see figure 4 for breakdown)	1	
		ATTACHING PARTS		
-38	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 3/8 in. lg	3	
-39	AN935-8	. WASHER	3	
		---*---		
-40	B108018	. SWITCH ASSEMBLY	1	
-41	C108017	. . SWITCH, Rotary	1	
-42	RC20GF910J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-43	RC20GF111J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-44	RC20GF151J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-45	RC20GF181J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-46	RC20GF241J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-47	RC20GF331J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-48	RC20GF391J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-49	RC20GF621J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-50	RC20GF821J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-51	RC20GF112J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-52	D102846	. LETTERING PLAN, Panel	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM CALIBRATOR		
4-	C101138	SPECTRUM CALIBRATOR (see 37, figure 3 for next higher assembly)	REF	
-1	A101734	. CAP ASSEMBLY	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/16 in. lg	1	
-3	AN936A6	. WASHER	1	
		---*---		
-4	TS102U01	. SHIELD, Electron tube (JAN-S-28A)	1	
-5	6AF4A	. TUBE, Electron (MIL-E-1C)	1	
4-	B101547	. MARKER BOX ASSEMBLY	1	
-6	A101497	. . FILTER AND TUBE ASSEMBLY	1	
		ATTACHING PARTS		
-7	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 2-56 by 1/4 in. lg	3	
-8	AN936A2	. . WASHER	3	
		---*---		
-9	No Number	. . CLIP, Nylon, 3/16 in. dia by 0.036 in. thick(WMPC)	1	
-10	B106778	. . BOX, Marker	1	
4-	A102603	. MICRO SWITCH ASSEMBLY	1	
-11	B100128	. . PLATE ASSEMBLY	1	
		ATTACHING PARTS		
-12	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/2 in. lg	3	
-13	AN936A8	. . WASHER	3	
		---*---		
-14	AN3234-1	. . SWITCH, Micro, spst	1	
		ATTACHING PARTS		
-15	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/4 in. lg	2	
-16	AN960-4	. . WASHER	2	
-17	AN935-4	. . WASHER	2	
-18	AN340-4	. . NUT	2	
		---*---		
-19	No Number	. PIN, Driv-loc, steel Cd pl and iridite, type A, 1/16 dia by 1/2 in. lg (DLPC)	2	
-20	AP18232-1	. BEARING	2	
-21	77-R-4	. BEARING, Ball, 1/4 in. bore, double shield (ND)	2	
-22	A100137	. HOUSING, Bearing	1	
		ATTACHING PARTS		
-23	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	3	
-24	AN936A4	. WASHER	3	
		---*---		
-25	A100229	. POST	1	
		ATTACHING PARTS		
-26	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	2	
-27	AN936A4	. WASHER	2	
		---*---		

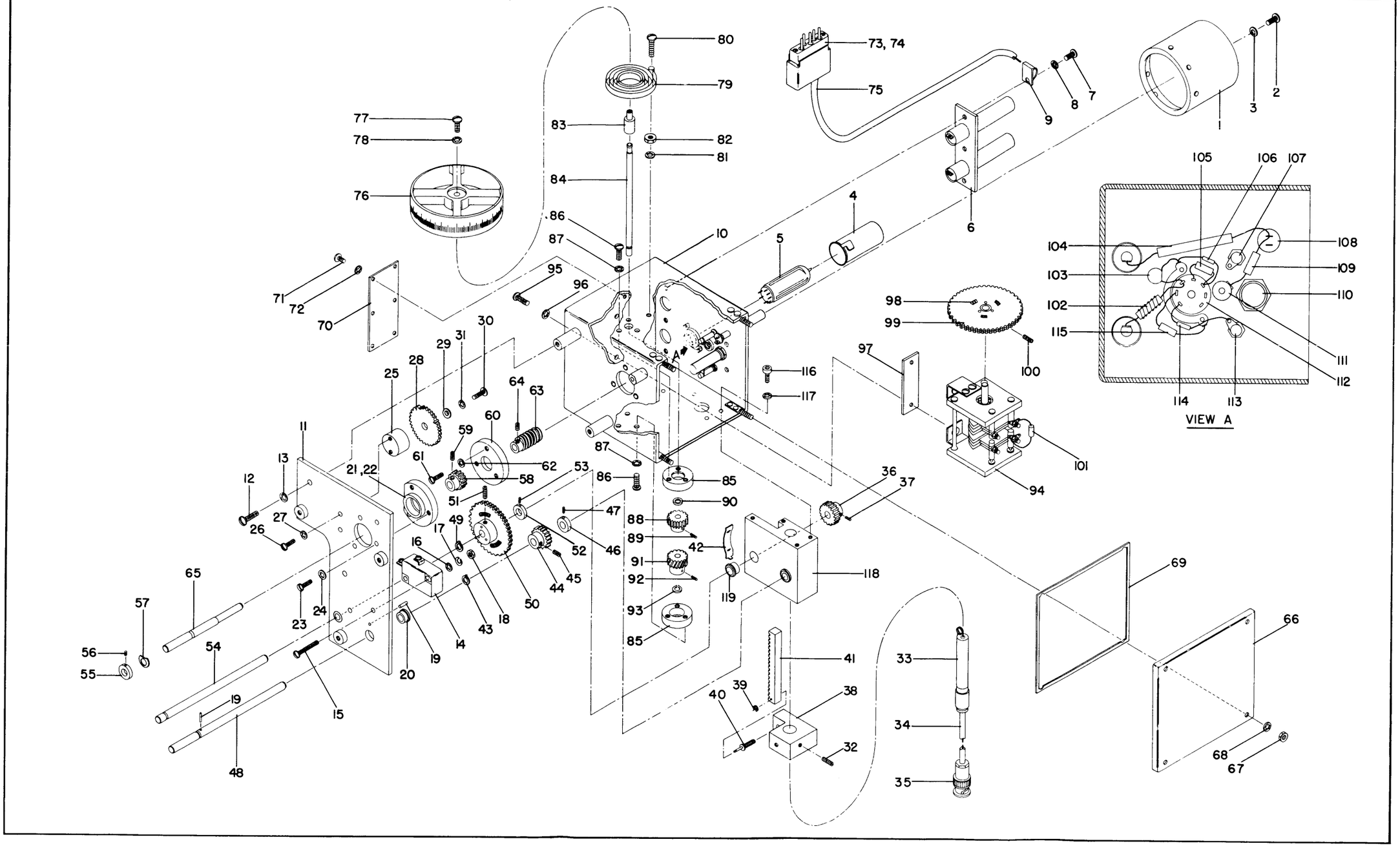


Figure 4. Spectrum Calibrator, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM CALIBRATOR (cont)	•	
4-28	B501709	. GEAR, Idler stop	1	
-29	AN960-4	. WASHER	1	
		ATTACHING PARTS		
-30	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	1	
-31	AN936A4	. WASHER	1	
		---*---		
4-	B101225	. ATTENUATOR PROBE CABLE ASSEMBLY	1	
		ATTACHING PARTS		
-32	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-33	A101223	. . PROBE ASSEMBLY	1	
-34	RG-55/U	. . CABLE, Coaxial	18 in.	
-35	UG-88C/U	. . CONNECTOR, Plug, BNC type (MIL-C-3608)		
-36	A100142	. GEAR	1	
		ATTACHING PARTS		
-37	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-38	A100230	. YOKE, Probe	1	
-39	X5133-11	. RING, Retaining, steel Cd pl and iridite, 0.076 in. ID (WKI)	1	
-40	AP17024	. PIN, Attenuator rack	1	
-41	A504413	. RACK	1	
-42	AP16962	. SPRING, Rack guide	1	
-43	5100-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.225 in. free dia (WKI)	1	
-44	A100143	. GEAR	1	
		ATTACHING PARTS		
-45	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-46	A100239	. COLLAR	1	
		ATTACHING PARTS		
-47	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-48	A100124	. SHAFT	1	
-49	5100-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.225 in. free dia (WKI)	1	
-50	A101277	. GEAR ASSEMBLY	1	
		ATTACHING PARTS		
-51	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-52	A100239	. COLLAR	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM CALIBRATOR (cont)		
		ATTACHING PARTS		
4-53	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-54	A100123	. SHAFT	1	
-55	A100239	. COLLAR	1	
		ATTACHING PARTS		
-56	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-57	3539-14	. WASHER, Spring, steel Cd pl, 1/4 ID by 7/16 in. OD(SH)	1	
-58	AK50023	. GEAR	1	
		ATTACHING PARTS		
-59	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 3/16 in. lg	2	
		---*---		
-60	A100231	. HOUSING, Bearing	1	
		ATTACHING PARTS		
-61	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	3	
-62	AN936A4	. WASHER	3	
		---*---		
-63	A100139	. WORM	1	
		ATTACHING PARTS		
-64	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 4-40 by 1/8 in. lg	1	
		---*---		
-65	A101858	. SHAFT	1	
-66	B100130	. COVER	1	
		ATTACHING PARTS		
-67	AN340-4	. NUT	4	
-68	AN936A4	. WASHER	4	
		---*---		
-69	A101994	. GASKET	1	
-70	A100925	. PLATE	1	
		ATTACHING PARTS		
-71	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 2-56 by 3/16 in. lg	6	
-72	AN936A2	. WASHER	6	
		---*---		
4-	A109625	. CABLE ASSEMBLY	1	
-73	MS24028	. . CONNECTOR, Plug, 7-pin	1	
-74	A7H	. . HOOD, 1-21/32 lg with 5/16 in. dia hole (WIQ)	1	
-75	B512812	. . TUBING, Vinyl, 8 in. lg	1	
4-	C101139	. BOX ASSEMBLY, Marker oscillator	1	
-76	B100126	. . DIAL	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM CALIBRATOR (cont)		
		ATTACHING PARTS		
4-77	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/2 in. lg	1	
-78	AN936A8	. . WASHER	1	
		---*---		
-79	A100234	. . SPRING	1	
		ATTACHING PARTS		
-80	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	1	
-81	AN936A6	. . WASHER	1	
-82	AN340-6	. . NUT	1	
		---*---		
-83	A101418	. . HUB	1	
-84	A100161	. . SHAFT	1	
-85	A100140	. . HOUSING, Bearing	2	
		ATTACHING PARTS		
-86	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	6	
-87	AN936A4	. . WASHER	6	
		---*---		
-88	A100162	. . GEAR, Worm	1	
		ATTACHING PARTS		
-89	Coml	. . SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 3/16 in. lg	2	
		---*---		
-90	A100163	. . SPACER	1	
-91	A100616	. . GEAR, Spur	1	
		ATTACHING PARTS		
-92	Coml	. . SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 3/16 in. lg	2	
		---*---		
-93	5133-18-MI	. . RING, Retaining, steel Cd pl and iridite, 0.145 in. free dia (WKI)	1	
-94	A106578	. . CAPACITOR ASSEMBLY	1	
		ATTACHING PARTS		
-95	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	2	
-96	AN936A4	. . WASHER	2	
		---*---		
-97	A101735	. . SPACER	1	
-98	A519901	. . SPRING	3	
-99	A101276	. GEAR ASSEMBLY	1	
		ATTACHING PARTS		
-100	Coml	. . SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-101	CC20CH120J	. . CAPACITOR, Fixed (JAN-C-20A)	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SPECTRUM CALIBRATOR (cont)		
4-102	A103758	. . CHOKE, Filament	1	
-103	CK60Y821Z	. . CAPACITOR, Fixed (MIL-C-11015A)	1	
-104	RC32GF122J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-105	RC20GF471K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-106	CC30CH510J	. . CAPACITOR, Fixed (JAN-C-20A)	1	
-107	CST50	. . CAPACITOR, Var, trimmer, 1.5 - 12.5 uuf (CGT). .	1	
-108	CB21QX102K	. . CAPACITOR, Fixed (MIL-C-10950A)	1	
-109	A103757	. . CHOKE, Plate	1	
-110	A103759	. . INDUCTOR, Tank, 160 mc	1	
		ATTACHING PARTS		
	Coml	. . NUT, Hex, steel Cd pl and iridite, 1/4-28 by 3/8 across flats by 3/32 in. thick	1	
	AN936A416	. . WASHER	1	
		---*---		
-111	CB11PX680K	. . CAPACITOR, Fixed (MIL-C-10950A)	1	
-112	TS102P01	. . SOCKET, Electron tube (JAN-S-28A)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	2	
	AN936A4	. . WASHER	2	
	T1060P27-5	. . STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide (CIN)	1	
		---*---		
-113	CST50	. . CAPACITOR, Var, trimmer, 1.5 - 12.5 uuf (CGT). .	1	
-114	A103756	. . PARASITIC SUPPRESSOR	1	
-115	RC20GF103K	. . RESISTOR, Fixed (MIL-R-11B)	1	
4-	A100125	. . GUIDE RACK ASSEMBLY	1	
		ATTACHING PARTS		
-116	Coml	. . SCREW, Socket hd, cup type, steel Cd pl and iridite, 4-40 by 5/16 in. lg	4	
-117	AN936A4	. . WASHER	4	
		---*---		
-118	B100127	. . . GUIDE RACK	1	
-119	AP18232-1	. . . BEARING	2	

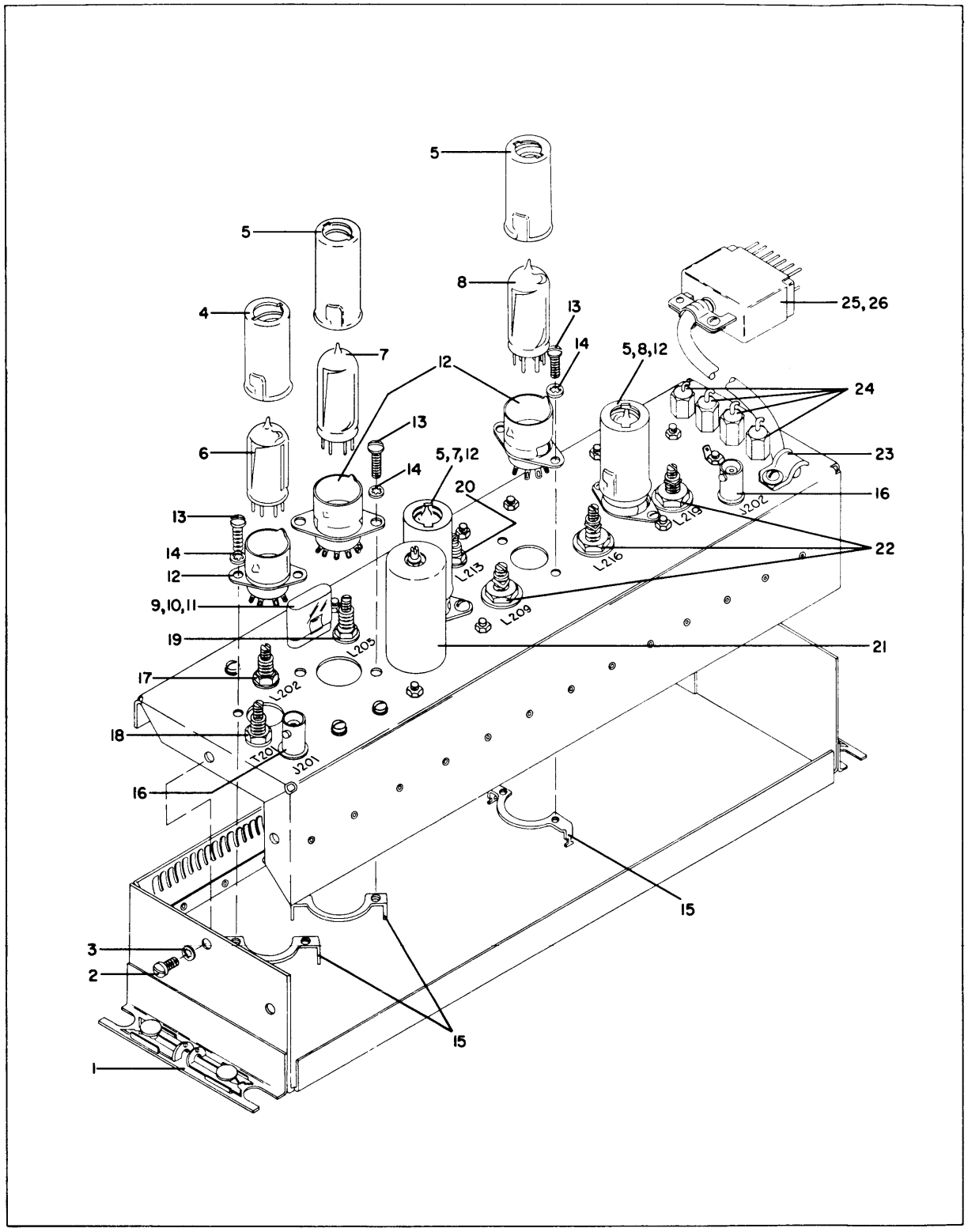


Figure 5. Narrow Band Chassis and Cover Assembly, Top Exploded View (Sheet 1 of 2 Sheets), Index Nos. 1 through 26

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		NARROW BAND CHASSIS AND COVER ASSEMBLY		
5-	C102078	CHASSIS AND COVER ASSEMBLY, Narrow band (see 42, figure 2 for next higher assembly)	REF	
-1	C102077	. DUST COVER ASSEMBLY	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
-3	AN936A6	. WASHER	4	
		---*---		
-4	TS102U01	. SHIELD, Electron tube (JAN-S-28A)	1	
-5	TS102U02	. SHIELD, Electron tube (JAN-S-28A)	4	
-6	5654/6AK5W/ 6096	. TUBE, Electron (MIL-E-1C)	1	
-7	5750/6BE6W	. TUBE, Electron (MIL-E-1C)	2	
-8	6186/6AG5WA	. TUBE, Electron (MIL-E-1C)	2	
-9	CR-23/U	. CRYSTAL, Quartz, 29 mc (MIL-C-3098A)	1	
5-	C102065	. CHASSIS ASSEMBLY	1	
-10	33302	. . SOCKET, Crystal (MLL)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/2 in. lg	1	
	AN935-4L	. . WASHER	1	
	AN340-4	. . NUT	1	
	A113702	. . WASHER, Insulating	1	
		---*---		
-11	AK50106	. . CLAMP	1	
-12	TS102P01	. . SOCKET, Electron tube, 7-pin (JAN-S-28A)	5	
		ATTACHING PARTS		
-13	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	10	
-14	AN936A4	. . WASHER	10	
-15	T1060P27-5	. . STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide (CIN)	5	
		---*---		
-16	UG-1094/U	. . CONNECTOR, Receptacle, BNC type (MIL-C-3608)	2	
-17	A100969	. . COIL, Tuned	1	
-18	A101007	. . TRANSFORMER, Tuned	1	
-19	A100822	. . COIL, Tuned	1	
-20	A100970	. . COIL, Tuned	1	
		ATTACHING PARTS (for items 17 through 20)		
	Coml	. . NUT, Hex, 10-32, steel Cd pl and iridite, 0.368 across flats by 0.123 in. thick	4	
	AN936A10	. . WASHER	4	
		---*---		
-21	B106482	. . TRANSFORMER ASSEMBLY, I-f	1	
		ATTACHING PARTS		
	AN340-6	. . NUT	2	
	AN936A6	. . WASHER	2	
		---*---		
-22	A100919	. . COIL, Tuned	3	

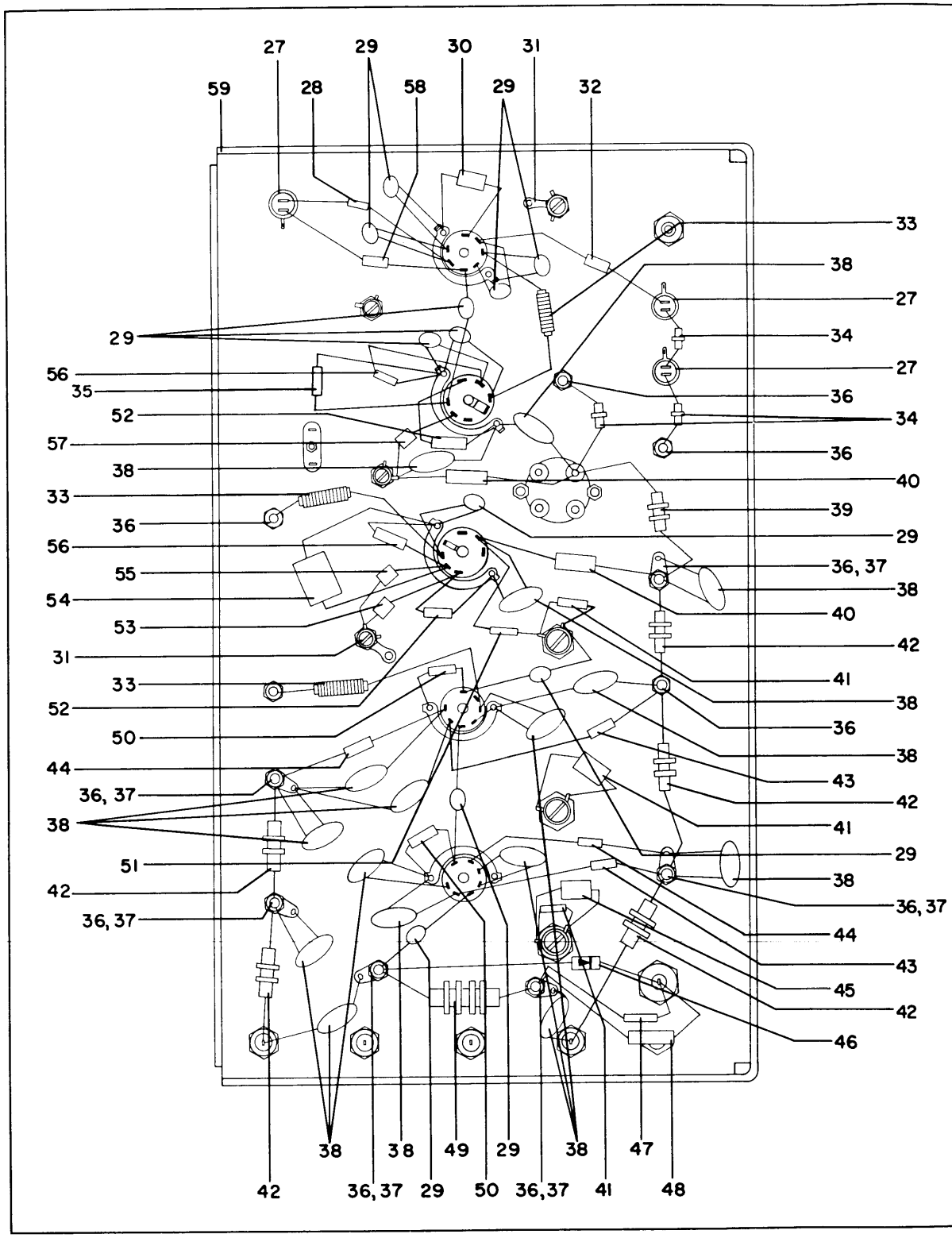


Figure 5. Narrow Band Chassis and Cover Assembly, Bottom View (Sheet 2 of 2 Sheets), Index Nos. 27 through 59

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		NARROW BAND CHASSIS AND COVER ASSEMBLY (cont)		
		ATTACHING PARTS		
	Coml	. . NUT, Hex, 1/4-28, steel Cd pl and iridite, 3/8 across flats by 3/32 in. thick	3	
	AN936A416	. . WASHER	3	
		---*---		
5-23	No Number	. . CLIP, Nylon, 3/16 dia by 0.036 in. thick (WMPC)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	1	
	AN960-6L	. . WASHER	1	
	AN936A6	. . WASHER	1	
	AN340-6	. . NUT	1	
		---*---		
-24	327	. . CAPACITOR, Feedthru, 1000 uuf ±20%, 500 vdcw(ERC)	4	
		ATTACHING PARTS		
	No Number	. . NUT, Hex, 1/4-28, steel Cd pl (ERC)	4	
	AN936B416	. . WASHER	4	
		---*---		
5-	A107614	. . CABLE ASSEMBLY	1	
-25	MS24028	. . . CONNECTOR, Plug	1	
-26	A7H	. . . HOOD, 1-21/32 lg with 5/16 in. dia hole (WIQ)	1	
-27	CB21QX102K	. . CAPACITOR, Fixed (MIL-C-10950A)	3	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 3-48 by 3/16 in. lg	3	
	AN936A3	. . WASHER	3	
		---*---		
-28	RC20GF472K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-29	CK60Y821Z	. . CAPACITOR, Fixed (MIL-C-11015A)	11	
-30	CM15C560J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-31	2103-10-00	. . LUG, Terminal, phos bronze, 53/64 lg with 0.195 in. dia screw hole (SH)	2	
-32	RC20GF331K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-33	A24893	. . CHOKE	3	
-34	A100676	. . CHOKE	3	
-35	RC20GF332K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-36	X1942-X	. . TERMINAL, Insulated, ceramic, Cd pl finish, 6-32 thd by 25/32 in. lg (CGT)	11	
		ATTACHING PARTS		
	AN936A6	. . WASHER	11	
	AN340-6	. . NUT	11	
		---*---		
-37	2104-06-00	. . LUG, Terminal, phos bronze, 0.142 ID by 41/64 in. lg for No. 6 screw size (SH)	7	
-38	CK63Y103Z	. . CAPACITOR, Fixed (MIL-C-11015A)	16	
-39	A101170	. . CHOKE	1	
-40	RC32GF222K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-41	CM20C821J	. . CAPACITOR, Fixed (MIL-C-5A)	3	
-42	A101169	. . CHOKE	5	
-43	RC20GF821K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-44	RC20GF221K	. . RESISTOR, Fixed (MIL-R-11B)	2	

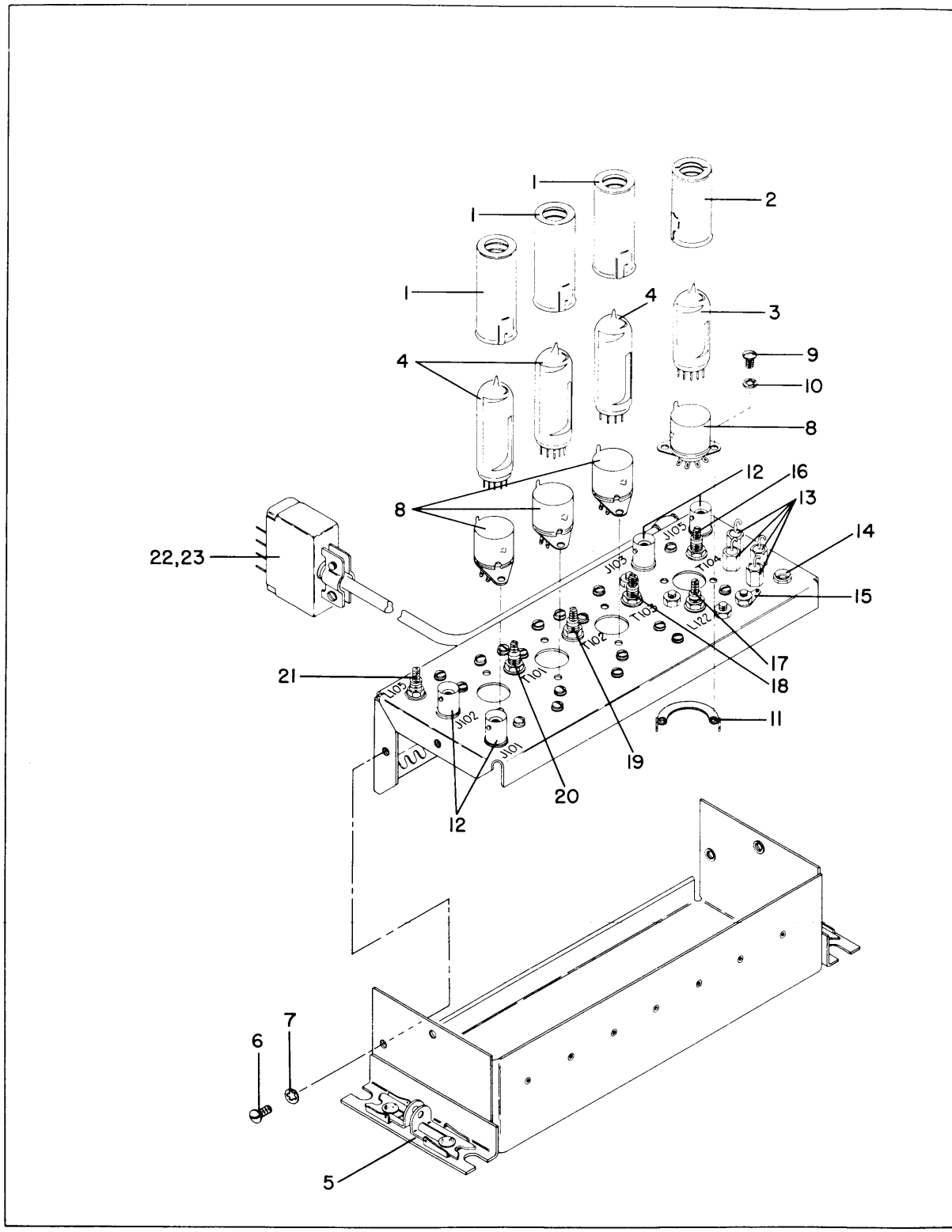


Figure 6. Wide Band Chassis and Cover Assembly, Top Exploded View (Sheet 1 of 2 Sheets), Index Nos. 1 through 23

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		NARROW BAND CHASSIS AND COVER ASSEMBLY (cont)		
5-45	RC20GF103K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-46	1N69	. . CRYSTAL, Rectifier (MIL-E-1C)	1	
-47	RC20GF333K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-48	CC21UJ510J	. . CAPACITOR, Fixed (MIL-C-20A)	1	
-49	R-50	. . CHOKE, R-f, 4 sections, 2.5 mh, wound on 1 in. lg form and has a max dia of 15/32 in. (NAC)	1	
-50	RC20GF682K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-51	RC20GF100K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-52	RC20GF223K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-53	CM15C470J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-54	CM30E152J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-55	CM15C181J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-56	RC20GF151K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-57	CM15C121J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-58	CM15C430J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-59	B102064	. . FASTENER ASSEMBLY, Chassis	1	
		WIDE BAND CHASSIS AND COVER ASSEMBLY		
6-	C102154	CHASSIS AND COVER ASSY, Wide band (see 32, fig. 2 for NHA)	REF	
-1	TS102U02	. SHIELD, Electron tube (JAN-S-28A)	3	
-2	TS102U01	. SHIELD, Electron tube (JAN-S-28A)	1	
-3	5654/6AK5W/ 6096	. TUBE, Electron (MIL-E-1C)	1	
-4	6J4WA	. TUBE, Electron (MIL-E-1C)	3	
-5	B102099	. DUST COVER ASSEMBLY	1	
		ATTACHING PARTS		
-6	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
-7	AN936A6	. WASHER	4	
		---*---		
6-	C102153	. CHASSIS ASSEMBLY	1	
-8	TS102P01	. . SOCKET, Electron tube, 7-pin (JAN-S-28A)	4	
		ATTACHING PARTS		
-9	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	8	
-10	AN936A4	. . WASHER	8	
-11	T1060P27-5	. . STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide (CIN)	4	
		---*---		
-12	UG-1094/U	. . CONNECTOR, Receptacle (MIL-C-3608)	4	
-13	327	. . CAPACITOR, Feedthru, ceramic, 1000 uuf ±20%, 500 vdcw (ERC)	4	
		ATTACHING PARTS		
	No Number	. . NUT, Hex, 1/4-28, steel Cd pl (ERC)	4	
	AN936B416	. . WASHER	3	
		---*---		
-14	118930-G	. . JACK, Test, blue, 1000 v 5 amp, 9/32 in. OD (UCI)	1	
-15	2104-06-00	. . LUG, Terminal, 0.142 ID by 41/64 in. lg for No. 6 screw size (SH)	1	
-16	A101141	. . TRANSFORMER, Tuned	1	
-17	A100671	. . COIL, Tuned	1	
-18	A100669	. . TRANSFORMER, Tuned	1	
-19	A100668	. . TRANSFORMER, Tuned	1	

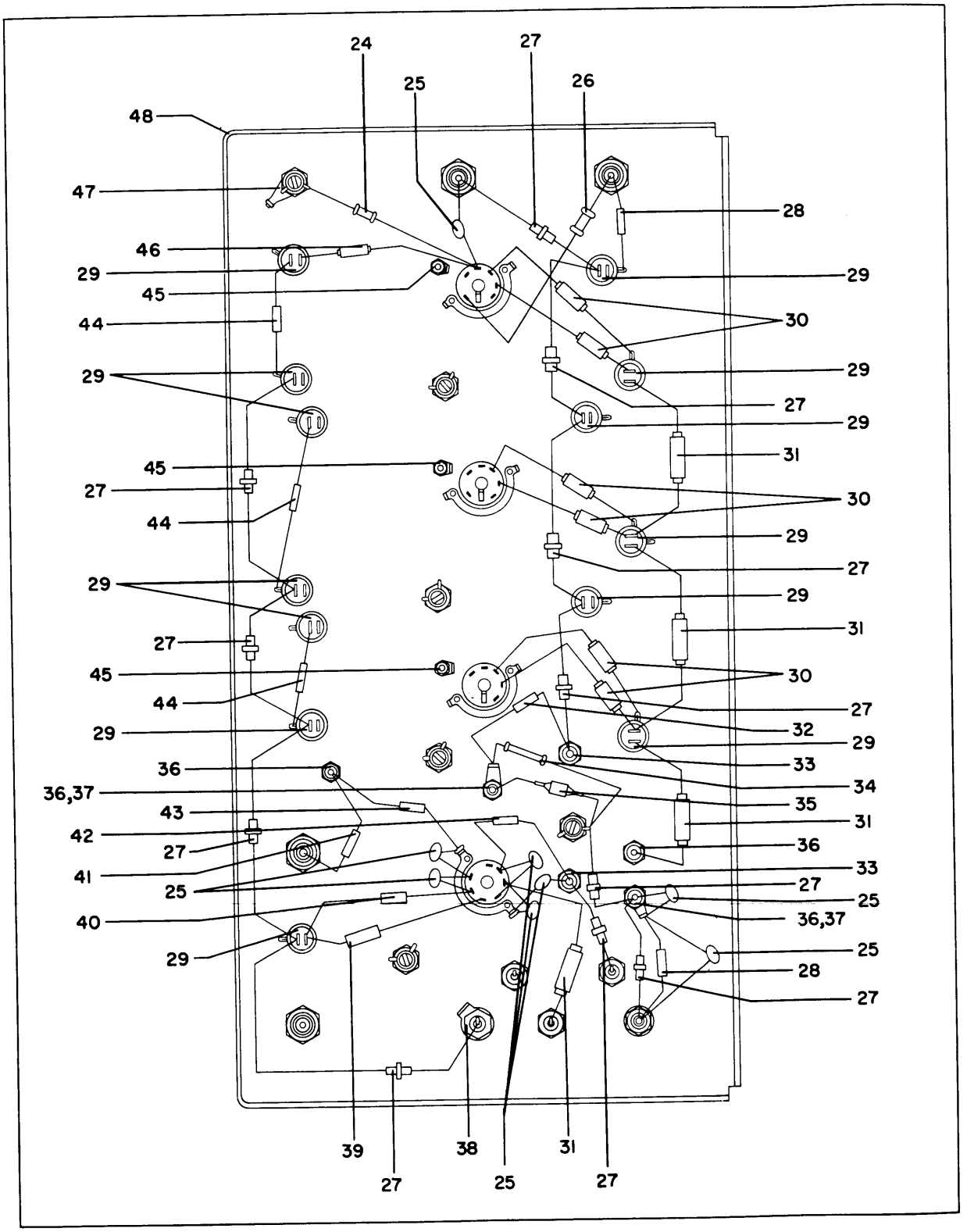


Figure 6. Wide Band Chassis and Cover Assembly, Bottom View (Sheet 2 of 2 Sheets), Index Nos. 24 through 48

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		WIDE BAND CHASSIS AND COVER ASSEMBLY (cont)		
6-20	A100667	. . TRANSFORMER, Tuned	1	
-21	A100672	. . COIL, Tuned	1	
		ATTACHING PARTS (for items 16 through 21)		
	Coml	. . NUT, Hex, 10-32, steel Cd pl and iridite, 0.368 across flats by 0.123 in. thick	6	
	AN936A10	. . WASHER	6	
		---*---		
6-	A107633	. . CABLE ASSEMBLY	1	
-22	MS24028	. . . CONNECTOR, Plug	1	
-23	A7H	. . . HOOD, 1-21/32 lg with 5/16 in. dia hole (WIQ)	1	
-24	CC20CH050D	. . CAPACITOR, Fixed (MIL-C-20A)	1	
-25	CK60Y821Z	. . CAPACITOR, Fixed (MIL-C-11015A)	8	
-26	CC20CK0R5C	. . CAPACITOR, Fixed (MIL-C-20A)	1	
-27	A100676	. . CHOKE	11	
-28	RC20GF510J	. . RESISTOR, Fixed (MIL-R-11B)	2	
-29	CB21QX102K	. . CAPACITOR, Fixed (MIL-C-10950A)	13	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 3-48 by 3/16 in. lg	13	
	AN936A3	. . WASHER	13	
		---*---		
-30	A100673	. . CHOKE	6	
-31	A100674	. . CHOKE	4	
-32	RC20GF101K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-33	760	. . STANDOFF, Turret type, molded melamine body, 15/16 lg by 1/4 in. dia (WIQ)	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	2	
	AN936A4	. . WASHER	2	
		---*---		
-34	CC25CH330J	. . CAPACITOR, Fixed (JAN-C-20A)	1	
-35	1N82	. . CRYSTAL DIODE, Uhf (MIL-E-1C)	1	
-36	X1942-X	. . TERMINAL, Insulated, ceramic, Cd pl finish, 6-32 thd by 25/32 in. lg (CGT)	4	
		ATTACHING PARTS		
	AN340-6	. . NUT	4	
	AN936A6	. . WASHER	2	
		---*---		
-37	2104-06-00	. . LUG, Terminal, phos bronze, 0.142 ID by 41/64 in. lg for No. 6 screw size (SH)	2	
-38	2109-14-01	. . TERMINAL, Locking, phos bronze, 3/4 in. lg for 1/4 in. dia screw (SH)	1	
-39	CM15C470J	. . CAPACITOR, Fixed (MIL-C-5A)	1	
-40	RC20GF472K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-41	RC20GF560K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-42	RC20GF331K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-43	RC20GF390K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-44	RC20GF680K	. . RESISTOR, Fixed (MIL-R-11B)	3	
-45	2104-04-00	. . LUG, Terminal, phos bronze, 0.116 ID by 41/64 in. lg for No. 4 screw size (SH)	3	

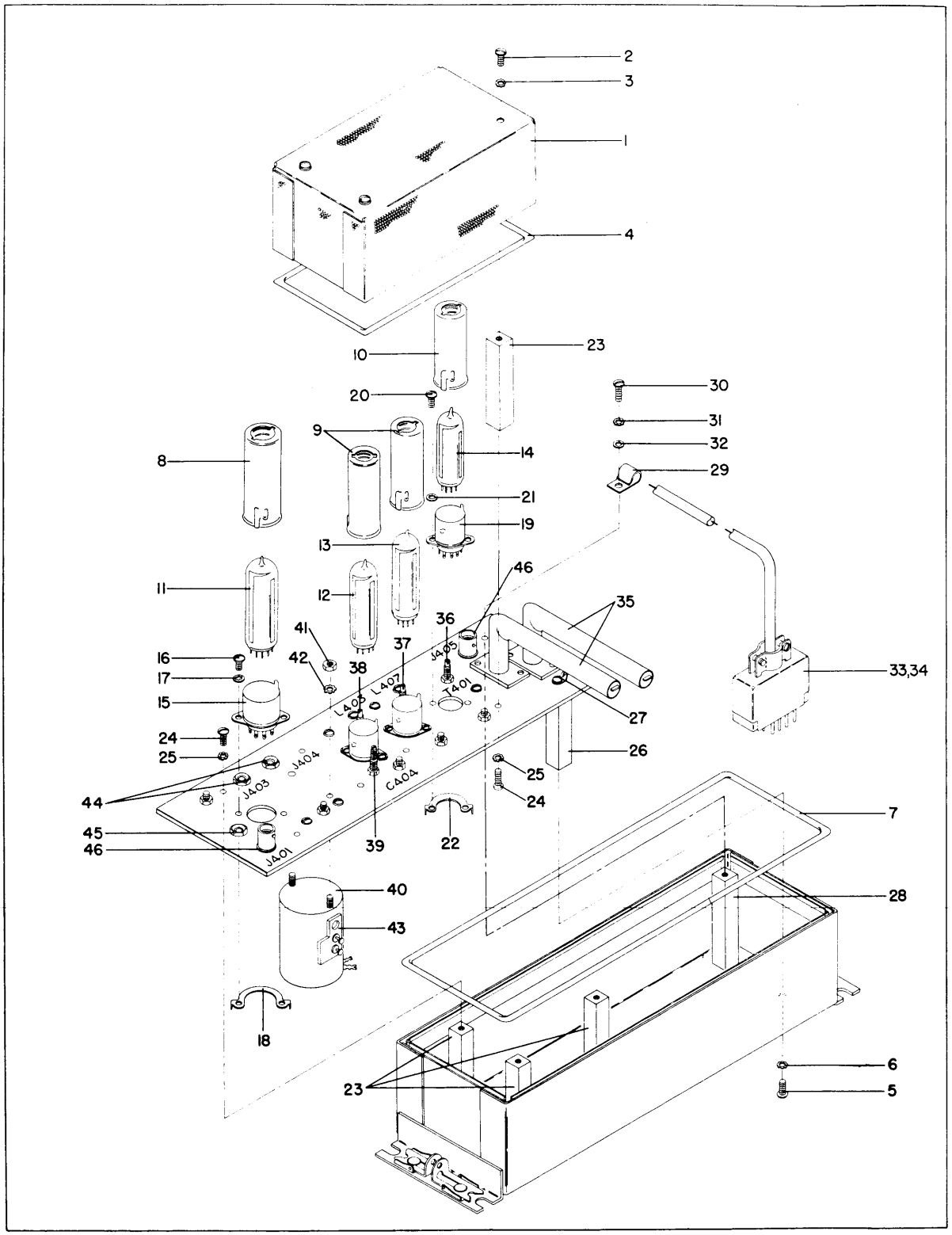


Figure 7. Sweeper Assembly, Top Exploded View (Sheet 1 of 2 Sheets), Index Nos. 1 through 46

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		WIDE BAND CHASSIS AND COVER ASSEMBLY (cont)		
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	3	
	AN340-4	. . NUT	3	
		---*---		
6-46	A100675	. . CHOKE	1	
-47	2103-10-00	. . LUG, Terminal, phos bronze, 53/64 in. lg for No. 10 screw size (SH)	1	
-48	B102107	. . FASTENER ASSEMBLY	1	
		SWEEPER ASSEMBLY		
7-	B106739	SWEEPER ASSEMBLY (see 40, figure 2, for next higher assy)	REF	
-1	B106613	. SHIELD ASSEMBLY	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/4 in. lg	3	
-3	AN936B8	. WASHER	3	
		---*---		
-4	10-006B	. . GASKET, Metex, 1/8 in. dia (METC)	14-3/4 in.	
7-	C106722	. COVER AND FASTENER ASSEMBLY	1	
		ATTACHING PARTS		
-5	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/4 in. lg	5	
-6	AN936B8	. WASHER	5	
		---*---		
-7	10-006B	. . GASKET, Metex, 1/8 in. dia (METC)	25-1/2 in.	
-8	TS103U02	. SHIELD, Electron tube (JAN-S-28A)	1	
-9	TS102U02	. SHIELD, Electron tube (JAN-S-28A)	2	
-10	TS102U01	. SHIELD, Electron tube (JAN-S-28A)	1	
-11	5814WA	. TUBE, Electron (MIL-E-1C)	1	
-12	6186/6AG5WA	. TUBE, Electron (MIL-E-1C)	1	
-13	6AN5	. TUBE, Electron (MIL-E-1C)	1	
-14	5654/6AK5W/ 6096	. TUBE, Electron (MIL-E-1C)	1	
7-	C106670	. CHASSIS ASSEMBLY	1	
-15	TS103P01	. . SOCKET, Electron tube (JAN-S-28A)	1	
		ATTACHING PARTS		
-16	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	2	
-17	AN936A4	. . WASHER	2	
-18	20K14167P27-5	. . STRAP, Nut, brs Cd pl, 1-11/32 lg by 17/32 in. wide (CIN)	1	
		---*---		
-19	TS102P01	. . SOCKET, Electron tube (JAN-S-28A)	3	
		ATTACHING PARTS		
-20	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	6	
-21	AN936A4	. . WASHER	6	
-22	T1060P27-5	. . STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide(CIN)	3	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SWEEPER ASSEMBLY (cont)		
7-23	C504526	. . POST	6	
		ATTACHING PARTS		
-24	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 5/16 in. lg	6	
-25	AN936B8	. . WASHER	6	
		---*---		
-26	C504526	. . POST	1	
-27	2104-08-00	. . LUG, Terminal, phos bronze, 41/64 in. lg for No. 8 screw size (SH)	1	
		ATTACHING PARTS (for items 26 and 27)		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 5/16 in. lg	1	
		---*---		
-28	C504526	. . POST	1	
-29	No Number	. . CLIP, Nylon, 3/16 dia by 0.060 in. thick (WMPC)	1	
		ATTACHING PARTS (for items 28 and 29)		
-30	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 5/16 in. lg	1	
-31	AN936B8	. . WASHER	1	
-32	AN960-8	. . WASHER	1	
		---*---		
7-	A106886	. . CABLE ASSEMBLY	1	
-33	MS24028	. . . CONNECTOR, Plug, 7-pin (MIL-STD-242A)	1	
-34	A7H	. . . HOOD, 1-21/32 lg with 5/16 in. dia hole (WIQ)	1	
-35	B106549	. . FILTER ASSEMBLY	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	4	
	AN936A4	. . WASHER	4	
		---*---		
-36	A100825	. . TRANSFORMER, Tuned	1	
-37	A100824	. . COIL, Tuning	1	
-38	A100823	. . COIL, Tuning	1	
		ATTACHING PARTS (for items 36, 37 and 38)		
	Coml	. . NUT, Hex, steel Cd pl and iridite, 10-32 by 0.368 across flats by 0.123 in. thick	3	
	AN936A10	. . WASHER	3	
		---*---		
-39	CST-6	. . CAPACITOR, Var, ceramic trimmer, 0.5 to 4.5 uuf (CGT)	1	
		ATTACHING PARTS		
	AN340-8	. . NUT	1	
		---*---		
-40	PF-7W2MM	. . INCREDUCTOR, Variable inductor, 1-1/2 dia by 1-7/8 in. high (VARI-L Co., Inc., Stamford, Conn.)	1	

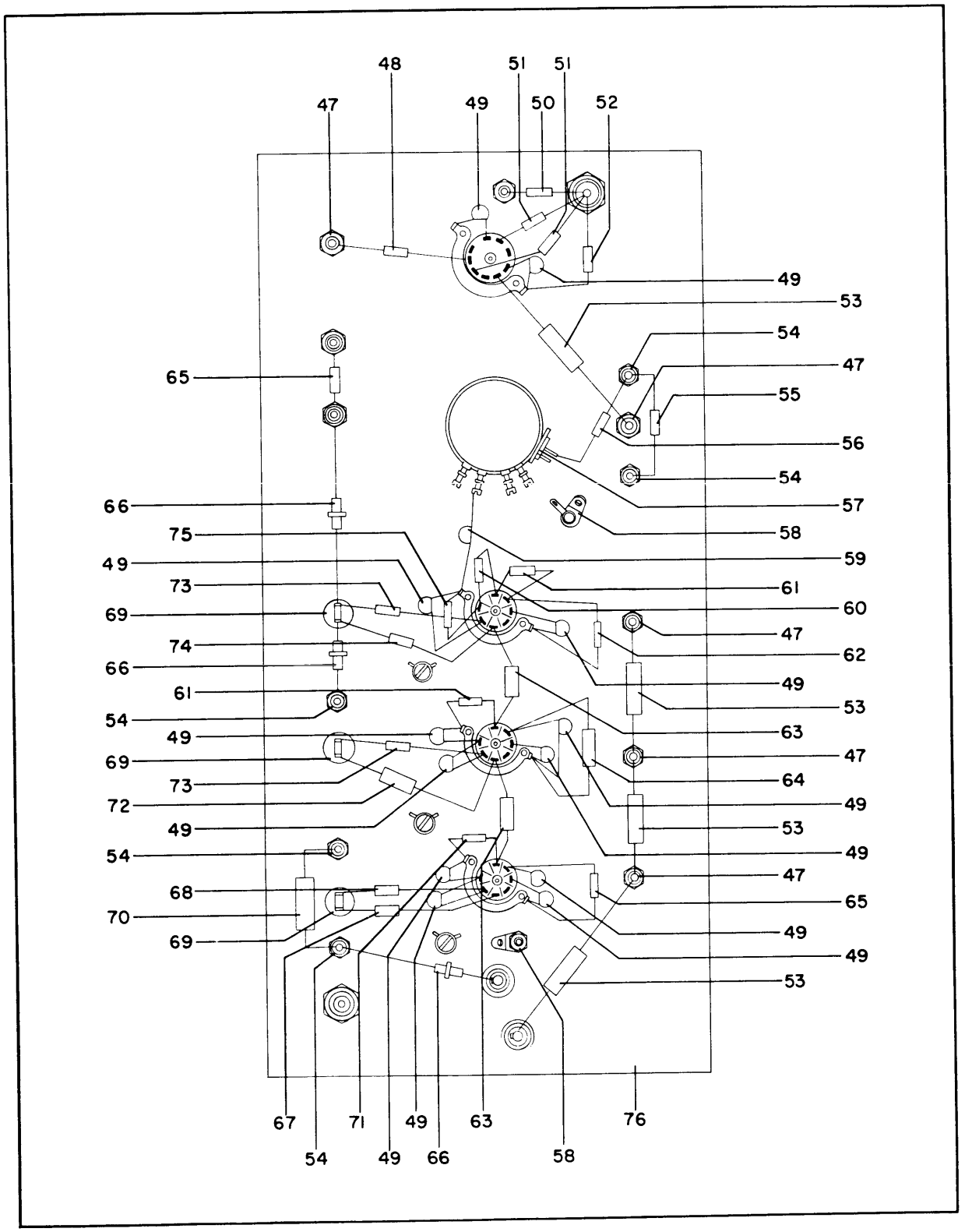


Figure 7. Sweeper Assembly, Bottom View (Sheet 2 of 2 Sheets), Index Nos. 47 through 76

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SWEEPER ASSEMBLY (cont)		
		ATTACHING PARTS		
7-41	Coml	. . NUT, Hex, steel Cd pl and iridite, 8-32 by 0.338 across flats by 0.123 in. thick	2	
-42	AN936B8	. . WASHER	2	
		---*---		
-43	A106815	. . PLATE ASSEMBLY	1	
-44	118930B	. . JACK, Test, red, straight type (UCI)	2	
-45	118930C	. . JACK, Test, black, straight type (UCI)	1	
-46	UG-1094/U	. . CONNECTOR, Receptacle (MIL-C-3608)	2	
-47	X1942-X	. . TERMINAL, Insulated, ceramic, Cd pl finish, 6-32 thd by 25/32 in. lg (CGT)	5	
		ATTACHING PARTS		
	AN340-6	. . NUT	5	
	AN936B6	. . WASHER	5	
		---*---		
-48	RC20GF182K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-49	CK60Y821Z	. . CAPACITOR, Fixed (MIL-C-11015A)	12	
-50	RC20GF104K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-51	RC20GF102K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-52	RC20GF183K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-53	A100674	. . CHOKE	4	
-54	760	. . STANDOFF, Turret type, 4-40 thd, 15/16 in. lg (WIQ)	5	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	5	
	AN936A4	. . WASHER	5	
		---*---		
-55	RC20GF473K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-56	RC20GF332K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-57	51A2	. . THERMISTOR, Glass coated bead, thermal time constant two seconds (VTE)	1	
-58	2104-06-00	. . LUG, Terminal, phos bronze, 0.142 ID by 41/64 in. lg for No. 6 screw size (SH)	2	
-59	CK60Y471Z	. . CAPACITOR, Fixed (MIL-C-11015A)	1	
-60	CC20CJ030C	. . CAPACITOR, Fixed (MIL-C-20A)	1	
-61	RC20GF223K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-62	RC20GF681K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-63	CC21UJ470J	. . CAPACITOR, Fixed (MIL-C-20A)	2	
-64	RC32GF151K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-65	RC20GF101K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-66	A100676	. . CHOKE	3	
-67	RC20GF202J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-68	RC20GF331K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-69	CB21QX102K	. . CAPACITOR, Fixed (MIL-C-10950A)	3	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 3-48 by 3/16 in. lg	3	
	AN936A3	. . WASHER	3	
		---*---		
-70	RC42GF221K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-71	RC20GF333K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-72	RC32GF102K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-73	RC20GF471K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-74	RC20GF911J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-75	CC20CH150J	. . CAPACITOR, Fixed (MIL-C-20A)	1	
-76	B106682	. . LETTERING PLAN, Chassis	1	

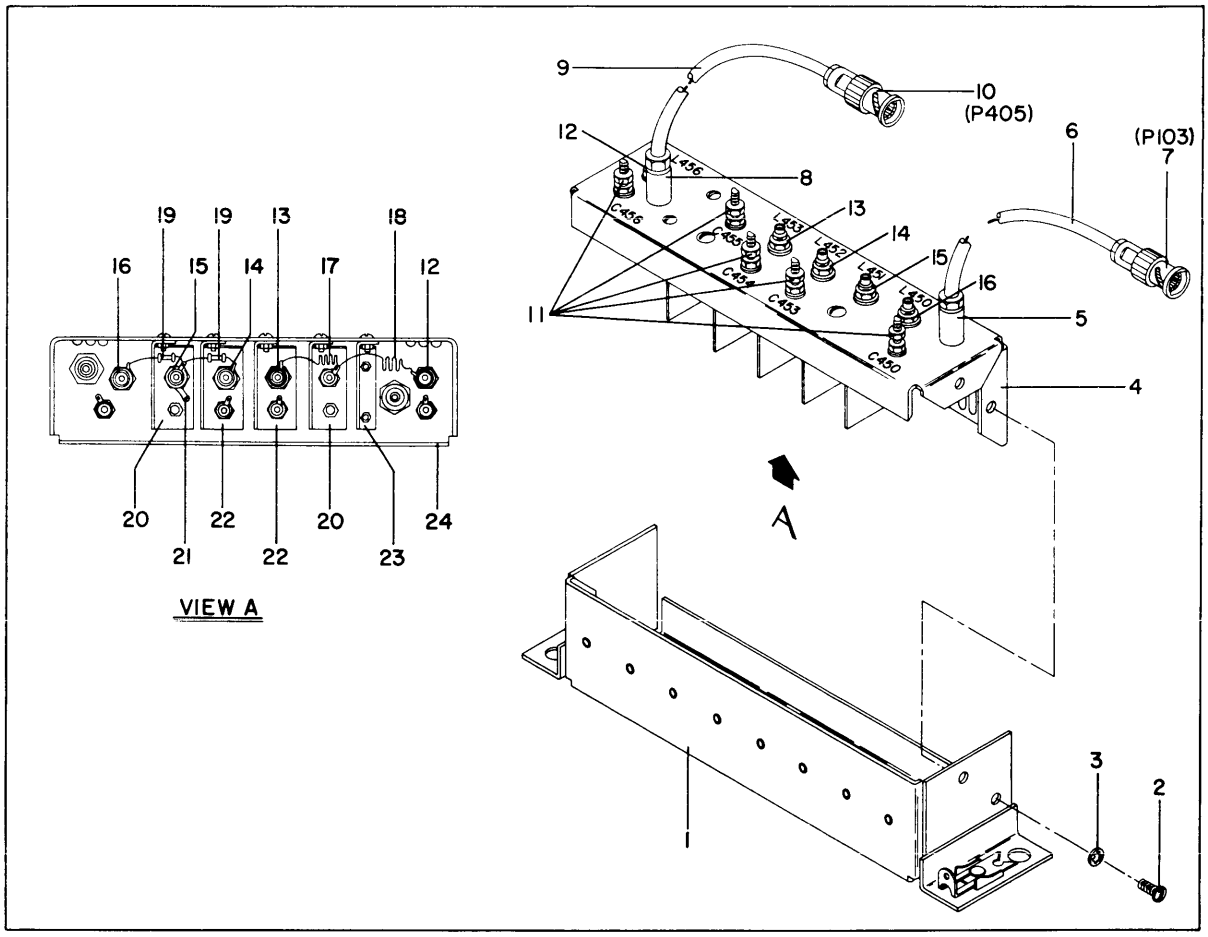
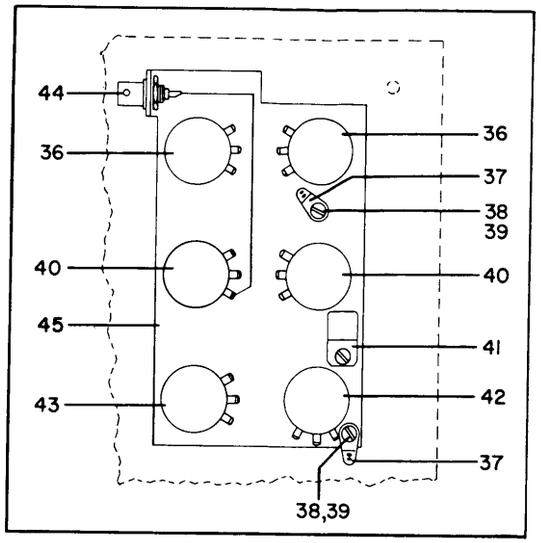


Figure 8. Sweeper Filter Assembly, Exploded View

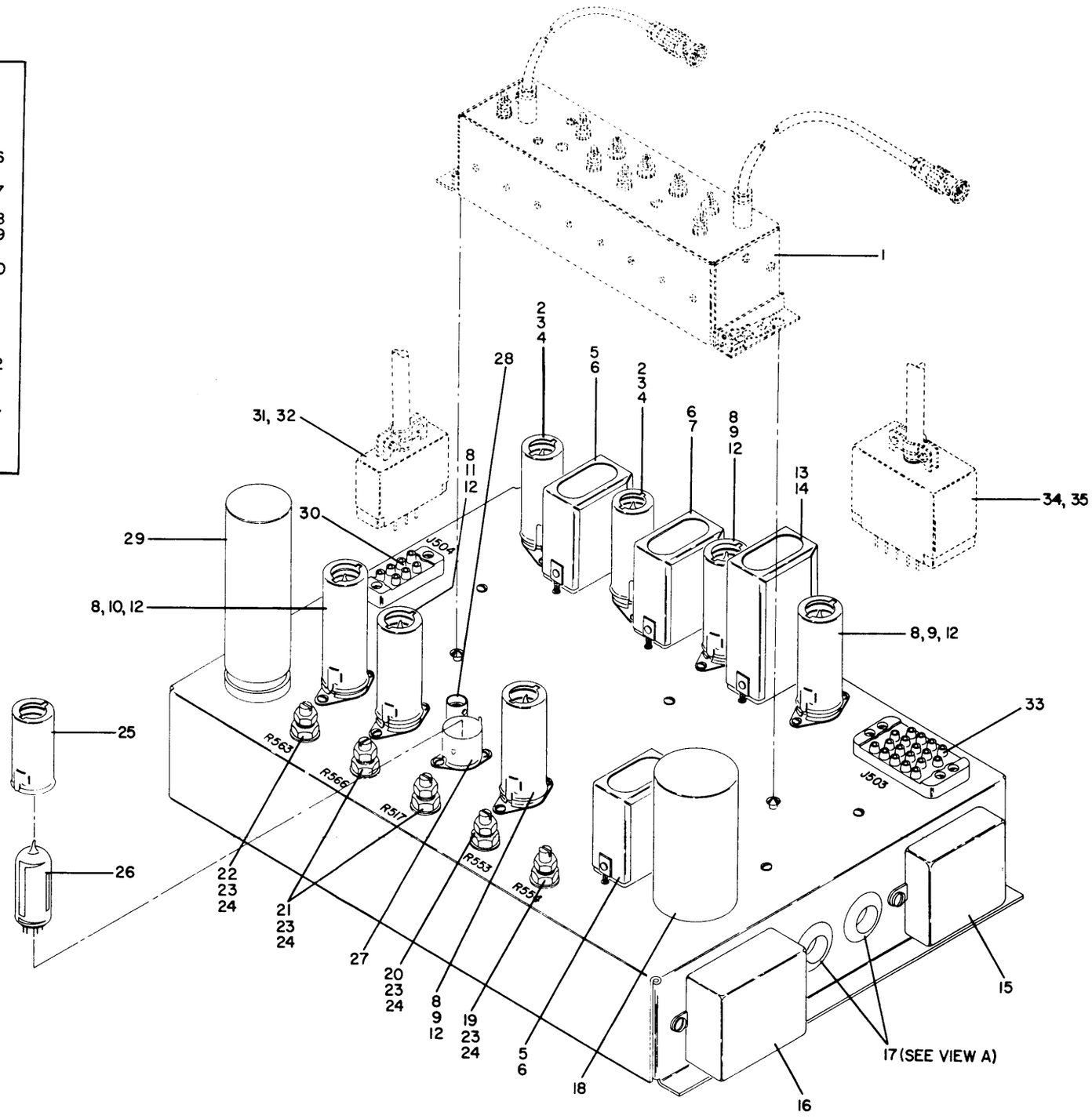
FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SWEEPER FILTER ASSEMBLY		
8-	B102279	FILTER ASSEMBLY, Sweeper (see 36, figure 2, for next higher assembly)	REF	
-1	B102280	. COVER AND FASTENER ASSEMBLY	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
-3	AN936A6	. WASHER	4	
		---*---		
-4	C102283	. CHASSIS ASSEMBLY	1	
8-	A108383	. . CABLE ASSEMBLY	1	
-5	MX-1530/U	. . . CONNECTOR, Feedthru	1	
-6	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	30 in.	
-7	UG-260B/U	. . . CONNECTOR, Plug (MIL-C-3608)	1	
8-	A108382	. . CABLE ASSEMBLY	1	
-8	MX-1530/U	. . . CONNECTOR, Feedthru	1	
-9	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	24 in.	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SWEEPER FILTER ASSEMBLY (cont)		
8-10	UG-260B/U	. . . CONNECTOR, Plug (MIL-C-3608)	1	
-11	CST-50	. . CAPACITOR, Variable, 1.5 to 12.5 uuf, 500 vdcw (CGT)	5	
		ATTACHING PARTS		
	No Number	. . NUT, Hex, (supplied with Part No. CST-50)	5	
	AN340-8	. . NUT	5	
	AN936A8	. . WASHER	5	
		---*---		
-12	A107150	. . COIL	1	
-13	A107147	. . COIL	1	
-14	A107146	. . COIL	1	
-15	A107145	. . COIL	1	
-16	A107144	. . COIL	1	
		ATTACHING PARTS (for items 12 through 16)		
	Coml	. . NUT, Hex, 10-32, steel Cd pl and iridite, 3/8 across flats by 1/8 in. thick	5	
	AN936A10	. . WASHER	5	
		---*---		
-17	A107148	. . COIL	1	
-18	A107149	. . COIL	1	
-19	CC20CH050C	. . CAPACITOR, Fixed (JAN-C-20A)	2	
-20	A101021	. . SHIELD	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	4	
	AN935-4	. . WASHER	4	
	AN340-4	. . NUT	4	
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	2	
	AN936B6	. . WASHER	2	
	AN340-6	. . NUT	2	
		---*---		
-21	2103-10-00	. . LUG, Terminal, phos bronze, 53/64 in. lg for 0.195 in. screw hole (SH)	2	
-22	A101021	. . SHIELD	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	4	
	AN935-4	. . WASHER	4	
	AN340-4	. . NUT	4	
		---*---		
-23	A101020	. . SHIELD	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	4	
	AN935-4	. . WASHER	4	
	AN340-4	. . NUT	4	
		---*---		
-24	B102283	. . CHASSIS AND FASTENER ASSEMBLY	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		VIDEO CHASSIS AND POTENTIOMETER ASSEMBLY		
9-	D110348	VIDEO CHASSIS AND POTENTIOMETER ASSEMBLY (see figure 2 for next higher assembly)	REF	
-1	B102279	. FILTER ASSY, Sweeper (see fig. 2 for NHA)	REF	
9-	D101561	. CHASSIS ASSEMBLY	REF	
-2	TS102U02	. . SHIELD, Electron tube (JAN-S-28A)	2	
-3	6AU6WA	. . TUBE, Electron (MIL-E-1C)	2	
-4	TS102P01	. . SOCKET, Electron tube, 7 pin (JAN-S-28A)	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	4	
	AN936A4	. . WASHER	4	
	T1060P27-5	. . STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide (CIN)	2	
		---*---		
-5	CP61B6EF254K	. . CAPACITOR, Fixed (MIL-C-25A)	2	
-6	CP06SA3	. . BRACKET (MIL-C-25A)	3	
-7	CP61B1EF254K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
-8	TS103U02	. . SHIELD, Electron tube (JAN-S-28A)	5	
-9	5814WA	. . TUBE, Electron (MIL-E-1C)	3	
-10	5751WA	. . TUBE, Electron (MIL-E-1C)	1	
-11	12AT7WA	. . TUBE, Electron (MIL-E-1C)	1	
-12	TS103P01	. . SOCKET, Electron tube (JAN-S-28A)	5	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	10	
	AN936A4	. . WASHER	10	
	20K14167P27-5	. . STRAP, Nut, brs Cd pl, 1-11/32 lg by 17/32 in. wide (CIN)	5	
		---*---		
-13	CP61B1FF105K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
-14	CP06SA5	. . BRACKET (MIL-C-25A)	1	
-15	CP55B1EB205K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
-16	CP55B1FB106K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
		ATTACHING PARTS (for items 15 and 16)		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 3/8 in. lg	4	
	AN936B8	. . WASHER	4	
	AN340-8	. . NUT	4	
		---*---		
-17	AN931-10-14	. . GROMMET	2	
-18	AN3307-1	. . RELAY	1	
		ATTACHING PARTS		
	AN936A6	. . WASHER	2	
	AN340-6	. . NUT	2	
		---*---		
-19	A101794	. . RESISTOR, Variable	1	
-20	A101795	. . RESISTOR, Variable	1	
-21	A101796	. . RESISTOR, Variable	2	
-22	A101797	. . RESISTOR, Variable	1	
-23	A507501	. . BUSHING, Extension	5	
		ATTACHING PARTS (for items 19 through 23)		
-24	AK5100	. . SHAFT LOCK	5	
		---*---		



POTENTIOMETER MOUNTING ASSEMBLY
VIEW A



Figur 9. Video Chassis and Potentiometer Assembly, Top Exploded View (Sheet 1 of 2 Sheets), Index Nos. 1 through 45

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		VIDEO CHASSIS AND POTENTIOMETER ASSEMBLY (cont)		
9-25	TS102U01	. . SHIELD, Electron tube (JAN-S-28A)	1	
-26	5725/6AS6W/ 6187	. . TUBE, Electron (MIL-E-1C)	1	
-27	TS102P01	. . SOCKET, Electron tube (JAN-S-28A)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	2	
	AN936A4	. . WASHER	2	
	T1060P27-5	. . STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide(CIN)	1	
		---*---		
-28	UG-1094/U	. . CONNECTOR, Receptacle (MIL-C-3608)	1	
-29	CE41F800R	. . CAPACITOR, Fixed (MIL-C-62A)	1	
		ATTACHING PARTS		
	Coml	. . NUT, Hex, 7/8-16, steel Cd pl and iridite, 1-1/8 across flats by 5/32 in. thick	1	
	Coml	. . WASHER, Lock, internal tooth, steel Cd pl and iridite, for 7/8 in. dia bolt	1	
		---*---		
-30	MS24027	. . CONNECTOR, Receptacle, 7 contacts	1	
		ATTACHING PARTS		
	AN500A4-8	. . SCREW	2	
	AN936A4	. . WASHER	2	
	AN340-4	. . NUT	2	
		---*---		
-31	MS24028	. . CONNECTOR, Plug (see 29, figure 2, for next higher assembly)	REF	
-32	A7H-28	. . HOOD, Connector, 1-21/32 lg with 7/16 in. dia cable opening (see 30, figure 2, for next higher assy) (WIQ)	REF	
-33	MS24034	. . CONNECTOR, Receptacle	1	
-34	MS24033	. . CONNECTOR, Plug (see 27, figure 2, for next higher assembly)	REF	
-35	A18H	. . HOOD, Connector, 2-7/64 lg with 17/32 in. dia cable opening (see 28, figure 2, for next higher assy) (WIQ)	REF	
9-	B102500	. . POTENTIOMETER MOUNTING ASSEMBLY	REF	
-36	RV4NATSD503A	. . . RESISTOR, Variable (MIL-R-94A)	2	
-37	2101-06-00	. . . LUG, Terminal, phos bronze, 7/8 in. lg for No. 6 screw size (SH)	2	
		ATTACHING PARTS		
-38	Coml	. . . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/16 in. lg	2	
-39	AN340-6	. . . NUT	2	
		---*---		
-40	RV4NATSD105A	. . . RESISTOR, Variable (MIL-R-94A)	2	
-41	B511504	. . . CLAMP	1	
		ATTACHING PARTS		
	Coml	. . . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	1	
	AN936B6	. . . WASHER	1	
	AN960-6	. . . WASHER	1	
		---*---		

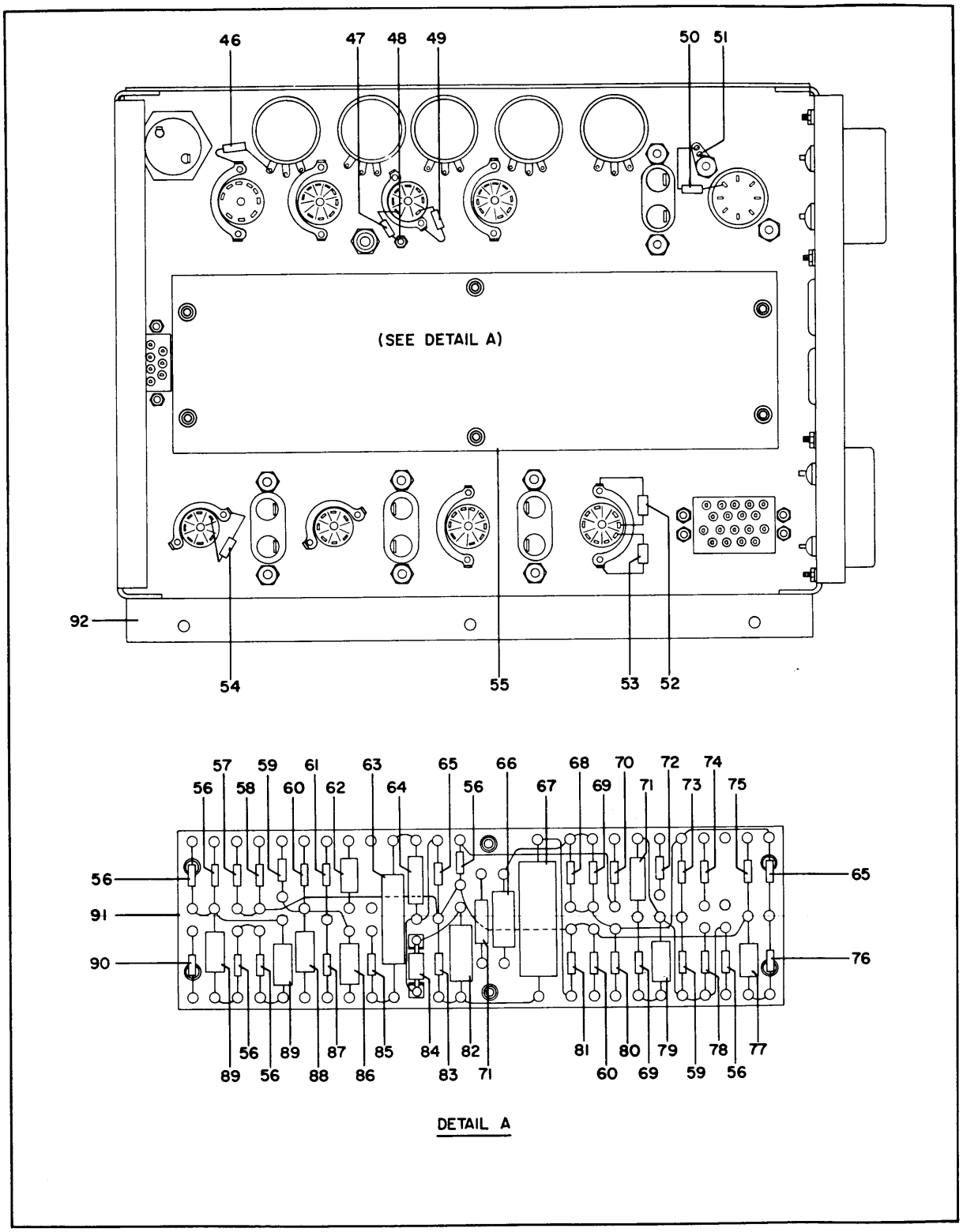


Figure 9. Video Chassis and Potentiometer Assembly, Bottom View (Sheet 2 of 2 Sheets), Index Nos. 46 through 92

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		VIDEO CHASSIS AND POTENTIOMETER ASSEMBLY (cont)		
9-42	A106973	. . . RESISTOR, Variable	1	
-43	RV4NATSD504A	. . . RESISTOR, Variable (MIL-R-94A)	1	
-44	UG-1094/U	. . . CONNECTOR, Receptacle (MIL-C-3608)	1	
-45	B100918	. . . LETTERING PLAN, Plate	1	
-46	RC20GF153K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-47	RC20GF395K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-48	A506701	. . STANDOFF, Turret type	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	1	
	AN936A4	. . WASHER	1	
		---*---		
-49	RC20GF105K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-50	RC20GF153J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-51	2104-06-00	. . LUG, Terminal, phos bronze, 41/64 in. lg for No. 6 screw size (SH)	1	
-52	RC20GF123J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-53	RC20GF223J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-54	CC20CH220J	. . CAPACITOR, Fixed (MIL-C-20A)	1	
-55	C100385	. . TERMINAL BOARD ASSEMBLY	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/16 in. lg	6	
	AN936B6	. . WASHER	6	
		---*---		
-56	RC20GF474K	. . . RESISTOR, Fixed (MIL-R-11B)	6	
-57	RC20GF364J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-58	RC20GF183J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-59	RC20GF154K	. . . RESISTOR, Fixed (MIL-R-11B)	2	
-60	RC20GF223K	. . . RESISTOR, Fixed (MIL-R-11B)	2	
-61	RC20GF153K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-62	RC32GF123J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-63	CN43EE104M	. . . CAPACITOR, Fixed (MIL-C-91A)	1	
-64	CM30B182M	. . . CAPACITOR, Fixed (MIL-C-5A)	1	
-65	RC20GF123J	. . . RESISTOR, Fixed (MIL-R-11B)	2	
-66	CP05A1EE223K	. . . CAPACITOR, Fixed (MIL-C-25A)	1	
-67	CP05A1EE224K	. . . CAPACITOR, Fixed (MIL-C-25A)	1	
-68	RC20GF124J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-69	RC20GF103K	. . . RESISTOR, Fixed (MIL-R-11B)	2	
-70	RC20GF101K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-71	RC42GF683K	. . . RESISTOR, Fixed (MIL-R-11B)	2	
-72	RC20GF394K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-73	RC20GF472K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-74	RC20GF225J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-75	RC20GF434J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-76	RC20GF103K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-77	RC32GF223J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-78	RC20GF624J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-79	RC42GF223K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-80	RC20GF564K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-81	RC20GF684K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-82	CP05A1KE473K	. . . CAPACITOR, Fixed (MIL-C-25A)	1	
-83	RC20GF473K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-84	1N69	. . . CRYSTAL (MIL-E-1C)	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		VIDEO CHASSIS AND POTENTIOMETER ASSEMBLY (cont)		
9-85	RC20GF334K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-86	RC42GF103K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-87	RC20GF152K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-88	RC42GF562K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-89	RC42GF303J	. . . RESISTOR, Fixed (MIL-R-11B)	2	
-90	RC20GF274K	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-91	B100384	. . . LETTERING PLAN, Terminal board	1	
-92	C106930	. . CHASSIS AND STUD ASSEMBLY	1	
		CRT POWER SUPPLY CHASSIS ASSEMBLY		
10-	C107101	CHASSIS ASSY, CRT power supply (see 11, fig. 2 for NHA)	REF	
-1	3T	. HAT, Tube clamp, stainless steel, 1-1/2 OD by 2-1/8 in. lg (TTE)	1	
-2	6098/6AR6WA	. TUBE, Electron (MIL-E-1C)	1	
-3	901L	. CAP, Tube, high voltage, 1/2 dia by 23/32 in. lg (ALP)	2	
-4	8292	. SHIELD, High voltage, low loss phenolic, 1-31/32 in. high (EBY)	2	
-5	1Z2	. TUBE, Electron (MIL-E-1C)	2	
-6	AN931-3-5	. GROMMET	1	
-7	8290	. SOCKET, Electron tube, high voltage, low loss, phenolic (EBY)	2	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	4	
	AN936B6	. WASHER	4	
		---*---		
-8	B28817	. TRANSFORMER	1	
		ATTACHING PARTS		
	AN340-6	. NUT	4	
	AN936B6	. WASHER	4	
	AN960-6	. WASHER	4	
		---*---		
-9	A107089	. LETTERING PLAN, Board	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	5	
	AN936B6	. WASHER	5	
	AN340-6	. NUT	5	
		---*---		
-10	TS101P01	. SOCKET, Electron tube (JAN-S-28A)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	2	
	AN936B6	. WASHER	2	
	AN340-6	. NUT	2	
		---*---		
-11	32	. POST, Tube clamp, stainless steel, 8-32 by 3-1/4 in. lg (TTE)	1	
-12	ASG104-4M	. CAPACITOR, Fixed, 0.1 uf, 4000 v, plasticon, plastic dielectric (COPC)	2	
-13	2104-06-00	. LUG, Terminal, phos bronze, 41/64 in. lg for No. 6 screw size (SH)	4	
		ATTACHING PARTS (for items 12 and 13)		
	AN340-6	. NUT	4	
		---*---		

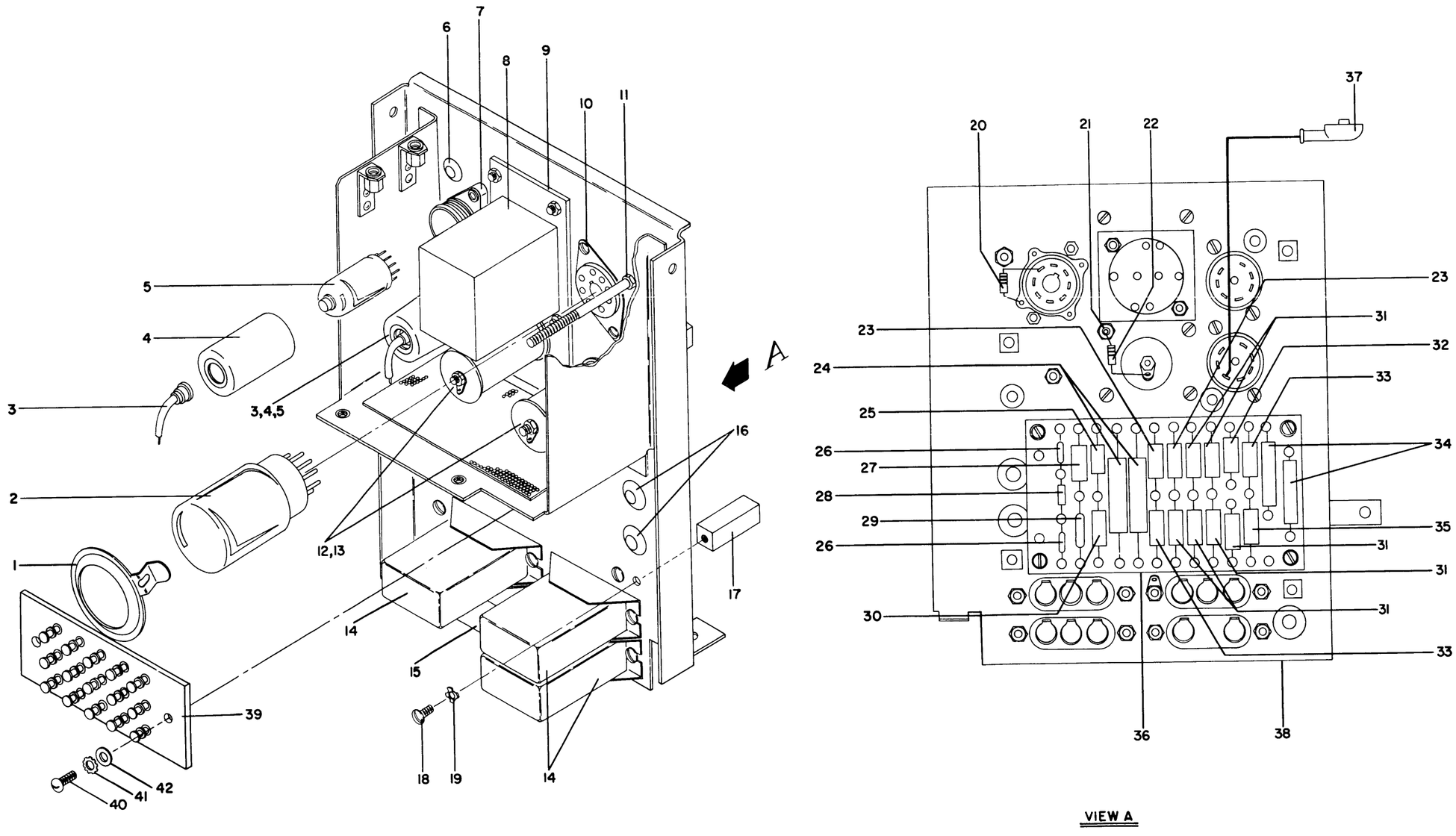


Figure 10. CRT Power Supply Chassis Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		CRT POWER SUPPLY CHASSIS ASSEMBLY (cont)		
10-14	CP69B4FG503M	. CAPACITOR, Fixed (MIL-C-25A)	3	
-15	CP69B1FG504M	. CAPACITOR, Fixed (MIL-C-25A)	1	
		ATTACHING PARTS (for items 14 and 15)		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	8	
	AN936B6	. WASHER	8	
	AN340-6	. NUT	8	
		---*---		
-16	AN931-4-7	. GROMMET	3	
-17	C504529	. POST	4	
		ATTACHING PARTS		
-18	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/4 in. lg	4	
-19	AN936B8	. WASHER	4	
		---*---		
-20	RC20GF104K	. RESISTOR, Fixed (MIL-R-11B)	1	
-21	X1942-X	. TERMINAL, Insulated, ceramic, Cd pl finish, 6-32 thd by 25/32 in. lg (CGT)	1	
		ATTACHING PARTS		
	AN340-6	. NUT	1	
		---*---		
-22	RC20GF155K	. RESISTOR, Fixed (MIL-R-11B)	1	
10-	B100492	. TERMINAL BOARD ASSEMBLY	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	4	
	AN960-6	. WASHER	4	
	AN936B6	. WASHER	4	
		---*---		
-23	RC42GF335K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-24	CN43EE104M	. . CAPACITOR, Fixed (MIL-C-91A)	2	
-25	RC32GF331K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-26	CK61Y102Z	. . CAPACITOR, Fixed (MIL-C-11015A)	2	
-27	RC42GF101K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-28	RC20GF102K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-29	CK63Y103Z	. . CAPACITOR, Fixed (MIL-C-11015A)	1	
-30	RC42GF273K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-31	RC42GF106K	. . RESISTOR, Fixed (MIL-R-11B)	6	
-32	RC42GF135K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-33	RC42GF225K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-34	RU4B2R7J	. . RESISTOR, Fixed (JAN-R-184)	2	
-35	RC42GF154K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-36	A100493	. . LETTERING PLAN, Board	1	
-37	118525	. CONNECTOR, ANODE (UCI)	1	
-38	C107097	. CHASSIS SUB-ASSEMBLY	1	
-39	A114128	. TERMINAL BOARD ASSEMBLY, Junction	1	
		ATTACHING PARTS		
-40	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	2	
-41	AN936B6	. WASHER	2	
-42	AN960-6	. WASHER	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER SUPPLY CHASSIS ASSEMBLY		
11-	E101962	CHASSIS ASSEMBLY,, Power supply (see 13, figure 2, for next higher assembly)	REF	
-1	AN931-9-13	. GROMMET	1	
-2	B28843	. TRANSFORMER	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 10-32 by 1/2 in. lg	4	
	AN936B10	. WASHER	4	
	AN960-10L	. WASHER	4	
	AN340-10	. NUT	4	
		---*---		
-3	B28822	. TRANSFORMER	1	
-4	B102883	. TRANSFORMER	1	
		ATTACHING PARTS (for items 3 and 4)		
	AN340-416	. NUT	8	
	AN936B416	. WASHER	8	
	AN960-416L	. WASHER	8	
		---*---		
-5	6RS25PB1ABH1	. RECTIFIER, Selenium, 45 vac, 35 vdc, 0.125 amps dc(GE)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
	AN936B6	. WASHER	4	
	AN340-6	. NUT	4	
		---*---		
	A100510	. PLATE	2	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
	AN936B6	. WASHER	4	
		---*---		
-6	CP70B1FH205K	. CAPACITOR, Fixed (MIL-C-25A)	1	
	CP07SB5	. BRACKET (MIL-C-25A)	1 pr	
		ATTACHING PARTS		
	AN363-1032	. NUT	2	
		---*---		
-7	CP70B1FH405K	. CAPACITOR, Fixed (MIL-C-25A)	1	
	CP07SC4	. BRACKET (MIL-C-25A)	1 pr	
		ATTACHING PARTS		
	AN363-1032	. NUT	2	
		---*---		
-8	CE41F800K	. CAPACITOR, Fixed (MIL-C-62A)	1	
-9	CE41C101H	. CAPACITOR, Fixed (MIL-C-62A)	1	
-10	B100118	. TRANSFORMER	1	
		ATTACHING PARTS		
	AN340-10	. NUT	4	
	AN936B10	. WASHER	4	
	AN960-10L	. WASHER	4	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER SUPPLY CHASSIS ASSEMBLY (cont)		
11-11	CP70E1FF106K	. CAPACITOR, Fixed (MIL-C-25A)	1	
	CP07SC4	. BRACKET (MIL-C-25A)	1 pr	
		ATTACHING PARTS		
	AN363-1032	. NUT	2	
		---*---		
-12	MS24022	. CONNECTOR, Plug	1	
-13	MRE 34H	. HOOD, Connector, with 21/32 in. dia cable opening(WIQ)	1	
-14	MS24020	. CONNECTOR, Plug	1	
-15	MRE 26H	. HOOD, Connector, with 3/8 in. dia cable opening(WIQ)	1	
-16	15Y	. HAT, Top, stainless steel, passivated (TTE)	3	
-17	32	. POST, Stainless steel, passivated, 8-32 thd by 3-1/4 in. lg (TTE)	6	
-18	5R4WGA	. TUBE, Electron (MIL-E-1C)	3	
-19	TS101P01	. SOCKET, Electron tube (JAN-S-28A)	3	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	6	
	AN935-6	. WASHER	6	
	AN340-6	. NUT	6	
		---*---		
-20	TS102U03	. SHIELD, Electron tube (JAN-S-28A)	6	
-21	6X4W	. TUBE, Electron (MIL-E-1C)	1	
-22	OA2WA	. TUBE, Electron (MIL-E-1C)	4	
-23	OB2WA	. TUBE, Electron (MIL-E-1C)	1	
-24	TS102P01	. SOCKET, Electron tube (JAN-S-28A)	6	
		ATTACHING PARTS		
-25	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	12	
-26	AN936A4	. WASHER	12	
-27	T1060P27-5	. STRAP, Nut, brs Cd pl, 1-1/8 lg by 15/32 in. wide (CIN)	6	
		---*---		
-28	TS103U02	. SHIELD, Electron tube (JAN-S-28A)	3	
-29	12AT7WA	. TUBE, Electron (MIL-E-1C)	3	
-30	TS103P01	. SOCKET, Electron tube (JAN-S-28A)	3	
		ATTACHING PARTS		
-31	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	6	
-32	AN936A4	. WASHER	6	
-33	20K14167P27-5	. STRAP, Nut, brs Cd pl, 1-11/32 lg by 17/32 in. wide (CIN)	3	
		---*---		
-34	AN931-7-11	. GROMMET	4	
-35	6856-005-000	. PIN, Guide, 1-13/16 lg by 3/4 in. wide (BLC)	2	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/4 in. lg	8	
	AN935-8	. WASHER	8	
		---*---		
-36	3	. HAT, Top, stainless steel, passivated (TTE)	3	
-37	42	. POST, Stainless steel, passivated, 8-32 thd by 4-1/4 in. lg (TTE)	3	
-38	6080WA	. TUBE, Electron (MIL-E-1C)	2	
-39	6098/6AR6WA	. TUBE, Electron (MIL-E-1C)	1	
-40	TS101P01	. SOCKET, Electron tube (JAN-S-28A)	3	

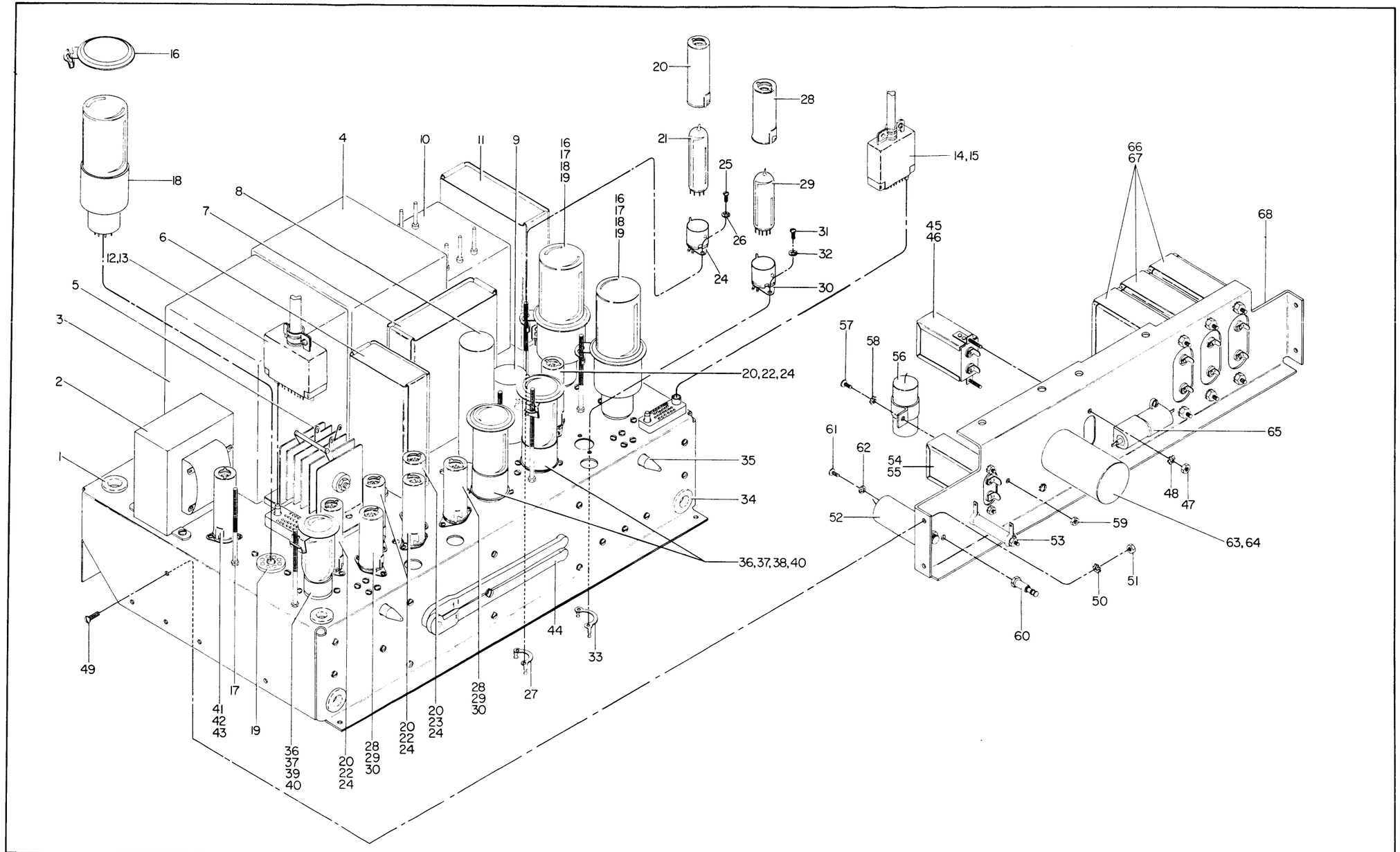


Figure 11. Power Supply Chassis Assembly, Top Exploded View (Sheet 1 of 2 Sheets), Index Nos. 1 through 68

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER SUPPLY CHASSIS ASSEMBLY (cont)		
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	6	
	AN935-6	. WASHER	6	
	AN340-6	. NUT	6	
		---*---		
11-41	TS103U03	. SHIELD, Electron tube (JAN-S-28A)	1	
-42	6N045T	. RELAY, Thermal, time delay, spst, 115 v, 3 amp, plug-in type, 45 sec closing time (ATV)	1	
-43	TS103P01	. SOCKET, Electron tube (JAN-S-28A)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	2	
	AN936A4	. WASHER	2	
	20K14167P27-5	. STRAP, Nut, brs Cd pl, 1-11/32 lg by 17/32 in. wide (CIN)	1	
		---*---		
-44	482	. WRENCH, Spanner, adjustable, 2 in. capacity, steel, 6-1/4 in. lg (WIM)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/8 in. lg	1	
	AN936B6	. WASHER	1	
	AN960-6	. WASHER	1	
		---*---		
-45	CP61B6EF254M	. CAPACITOR, Fixed (MIL-C-25A)	1	
-46	CP06SA4	. BRACKET (MIL-C-25A)	1 pr	
		ATTACHING PARTS		
-47	AN340-6	. NUT	2	
-48	AN936B6	. WASHER	2	
		---*---		
11-	D101817	. STIFFENER CHASSIS ASSEMBLY	1	
		ATTACHING PARTS		
-49	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	4	
-50	AN936B6	. WASHER	4	
-51	AN340-6	. NUT	4	
		---*---		
-52	CP11A1EE105K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
-53	RW29G200	. . RESISTOR, Fixed (MIL-R-26B)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 2 in. lg	1	
	AN960-6	. . WASHER	1	
	AN936B6	. . WASHER	1	
	929	. . WASHER, Mica, 11/64 ID by 15/32 OD by 1/32 in. thick (WAL)	1	
	AN340-6	. . NUT	1	
		---*---		
-54	CP61B1FG504K	. . CAPACITOR, Fixed (MIL-C-25A)	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER SUPPLY CHASSIS ASSEMBLY (cont)		
11-55	CP06SA5	. . BRACKET (MIL-C-25A)	1	
		ATTACHING PARTS		
	AN340-6	. . NUT	2	
	AN936B6	. . WASHER	2	
		---*---		
-56	CP10A1EE105K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
		ATTACHING PARTS		
-57	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	1	
-58	AN936B6	. . WASHER	1	
-59	AN340-6	. . NUT	1	
		---*---		
-60	760	. . STANDOFF, Turret type, 15/16 in. lg (WIQ)	1	
		ATTACHING PARTS		
-61	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	1	
-62	AN936A4	. . WASHER	1	
		---*---		
-63	AN3307-1	. . RELAY	1	
		ATTACHING PARTS		
	AN340-6	. . NUT	2	
	AN936B6	. . WASHER	1	
		---*---		
-64	2101-06-00	. . LUG, Terminal, phos bronze, 7/8 in. lg for No. 6 screw size (SH)	1	
-65	RH50V202H	. . RESISTOR, Fixed (MIL-R-18546BSHIPS)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	2	
	AN936A4	. . WASHER	2	
	AN340-4	. . NUT	2	
		---*---		
-66	CP70B1FF405K	. . CAPACITOR, Fixed (MIL-C-25A)	3	
-67	CP07SB3	. . BRACKET (MIL-C-25A)	3 pr	
		ATTACHING PARTS		
	AN363-1032	. . NUT	6	
	AN936B10	. . WASHER	6	
		---*---		
-68	C100915	. . LETTERING PLAN, Bracket	1	
-69	AN931-5-9	. GROMMET	2	
-70	TS101P01	. SOCKET, Octal (JAN-S-28A)	1	
11-	B101823	. BRACKET ASSEMBLY	1	
		ATTACHING PARTS		
-71	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	4	
	AN936B6	. WASHER	4	
	AN340-6	. NUT	4	
		---*---		

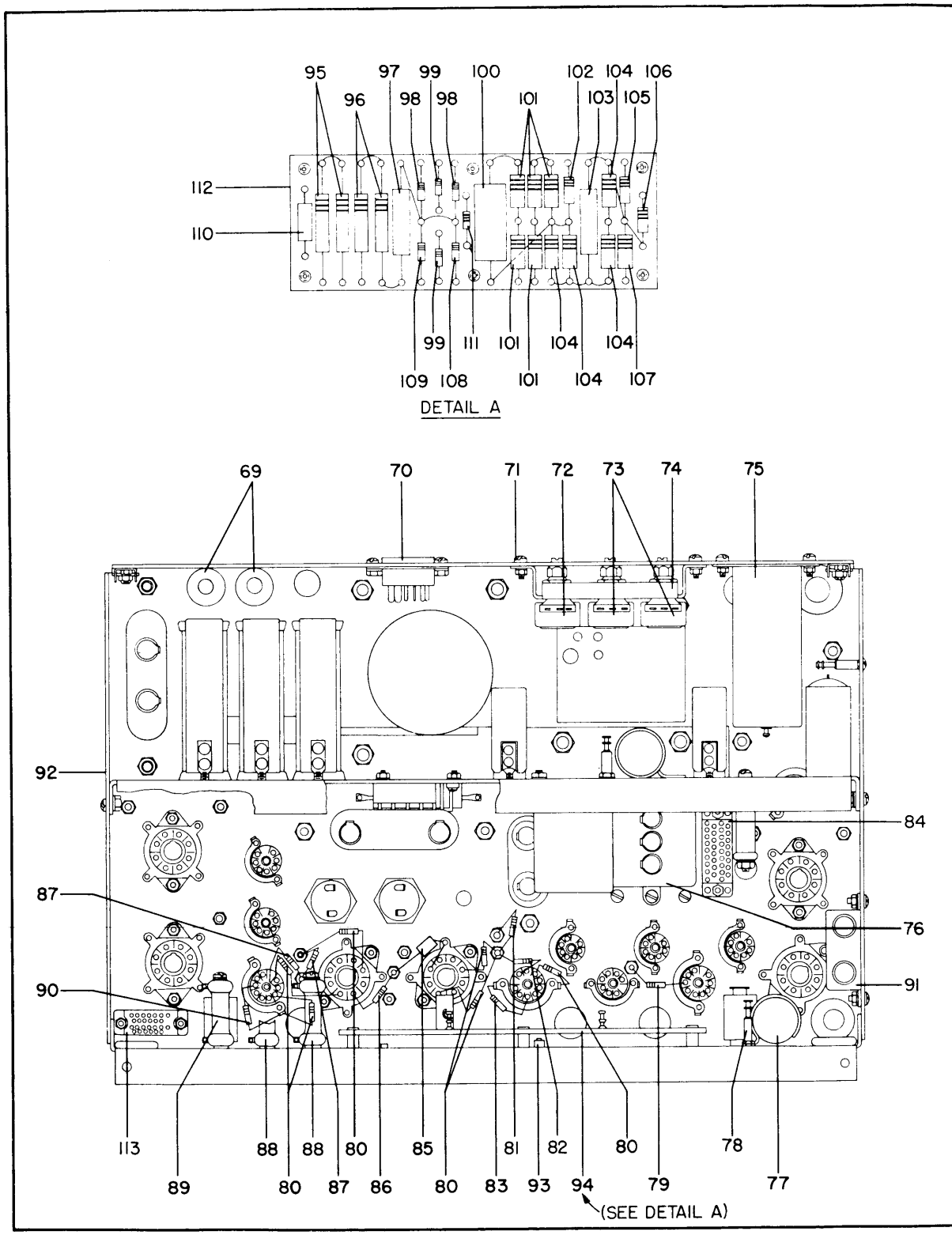


Figure 11. Power Supply Chassis Assembly, Bottom View (Sheet 2 of 2 Sheets), Index Nos. 69 through 113

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER SUPPLY CHASSIS ASSEMBLY (cont)		
11-72	RV4NATSD503A	. . RESISTOR, Variable (MIL-R-94A)	1	
-73	RV4NATSD104A	. . RESISTOR, Variable (MIL-R-94A)	2	
-74	A100963	. . BRACKET	1	
-75	A108217	. LINE FILTER	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	2	
	AN936B6	. WASHER	2	
	AN340-6	. NUT	2	
		---*---		
-76	CP54B4EF105K	. CAPACITOR, Fixed (MIL-C-25A)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	2	
	AN936B6	. WASHER	2	
		---*---		
-77	CP10A1EE105K	. CAPACITOR, Fixed (MIL-C-25A)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	1	
	AN936B6	. WASHER	1	
	AN340-6	. NUT	1	
		---*---		
-78	760	. STANDOFF, Turret type, 15/16 in. lg (WIQ)	8	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	8	
	AN936A4	. WASHER	8	
		---*---		
-79	RC20GF474K	. RESISTOR, Fixed (MIL-R-11B)	1	
-80	RC20GF101K	. RESISTOR, Fixed (MIL-R-11B)	6	
-81	RC20GF435K	. RESISTOR, Fixed (MIL-R-11B)	1	
-82	RC20GF105K	. RESISTOR, Fixed (MIL-R-11B)	1	
-83	RC20GF683K	. RESISTOR, Fixed (MIL-R-11B)	1	
-84	MS24021	. CONNECTOR, Receptacle	1	
-85	CM20C102J	. CAPACITOR, Fixed (MIL-C-5A)	1	
-86	RC20GF274K	. RESISTOR, Fixed (MIL-R-11B)	1	
-87	RC20GF334K	. RESISTOR, Fixed (MIL-R-11B)	2	
-88	RW31G312	. RESISTOR, Fixed (MIL-R-26B)	2	
-89	RW31G502	. RESISTOR, Fixed (MIL-R-26B)	1	
		ATTACHING PARTS (for items 88 and 89)		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 2 in. lg	3	
	AN936B6	. WASHER	3	
	929	. WASHER, Mica, 11/64 ID by 15/32 OD by 1/32 in. thick (WAL)	3	
	AN960-6	. WASHER	3	
	AN340-6	. NUT	3	
		---*---		
-90	RC20GF124K	RESISTOR, Fixed (MIL-R-11B)	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER SUPPLY CHASSIS ASSEMBLY (cont)		
11-91	CP53B1EF504K	. CAPACITOR, Fixed (MIL-C-25A)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel, Cd pl and iridite, 6-32 by 3/8 in. lg	2	
	AN936B6	. WASHER	2	
	AN340-6	. NUT	2	
		---*---		
-92	D100914	. LETTERING PLAN, Chassis	1	
-93	X1246-C 1/8	. STANDOFF, Rivet type, brs Cd pl and iridite, 6-32 tap, 17/64 in. lg (CGT)	1	
-94	C101015	. TERMINAL BOARD ASSEMBLY	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel, Cd pl and iridite, 6-32 by 3/8 in. lg	6	
	AN936B6	. WASHER	6	
		---*---		
-95	RU4B1R5J	. . RESISTOR, Fixed (JAN-R-184)	2	
-96	RU4B3R3J	. . RESISTOR, Fixed (JAN-R-184)	2	
-97	CN43EE104M	. . CAPACITOR, Fixed (MIL-C-91A)	1	
-98	RC20GF223K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-99	RC20GF334K	. . RESISTOR, Fixed (MIL-R-11B)	2	
-100	CP26A1EF503K	. . CAPACITOR, Fixed (MIL-C-25A)	1	
-101	RC42GF472K	. . RESISTOR, Fixed (MIL-R-11B)	5	
-102	RC32GF683K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-103	CN43AE503M	. . CAPACITOR, Fixed (MIL-C-91A)	1	
-104	RC42GF333K	. . RESISTOR, Fixed (MIL-R-11B)	4	
-105	RC32GF154K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-106	RC32GF473K	. . RESISTOR, Fixed (MIL-R-11B	1	
-107	RC42GF683K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-108	RC20GF124K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-109	RC20GF683K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-110	CN35AF103M	. . CAPACITOR, Fixed (MIL-C-91A)	1	
-111	RC20GF154K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-112	B101014	. . LETTERING PLAN, Board	1	
-113	MS24019	. CONNECTOR, Receptacle	1	
		BLOWER ASSEMBLY		
12-	C103301	BLOWER ASSEMBLY .(see 21, fig. 2 for NHA)	REF	
-1	B108068	. SPIDER	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 10-32 by 3/8 in. lg	3	
-3	AN936B10	. WASHER	3	
		---*---		
-4	B511506	. FAN	1	
		ATTACHING PARTS		
-5	Coml	. SCREW, Set, steel Cd pl, 10-32 by 3/16 in. lg	1	
		---*---		
-6	NBC-K15-8	. MOTOR, Blower, 115 vac, 50-1000 cps, single phase, 2500 rpm (Rotating Components, Inc., Brooklyn, N.Y.)	1	

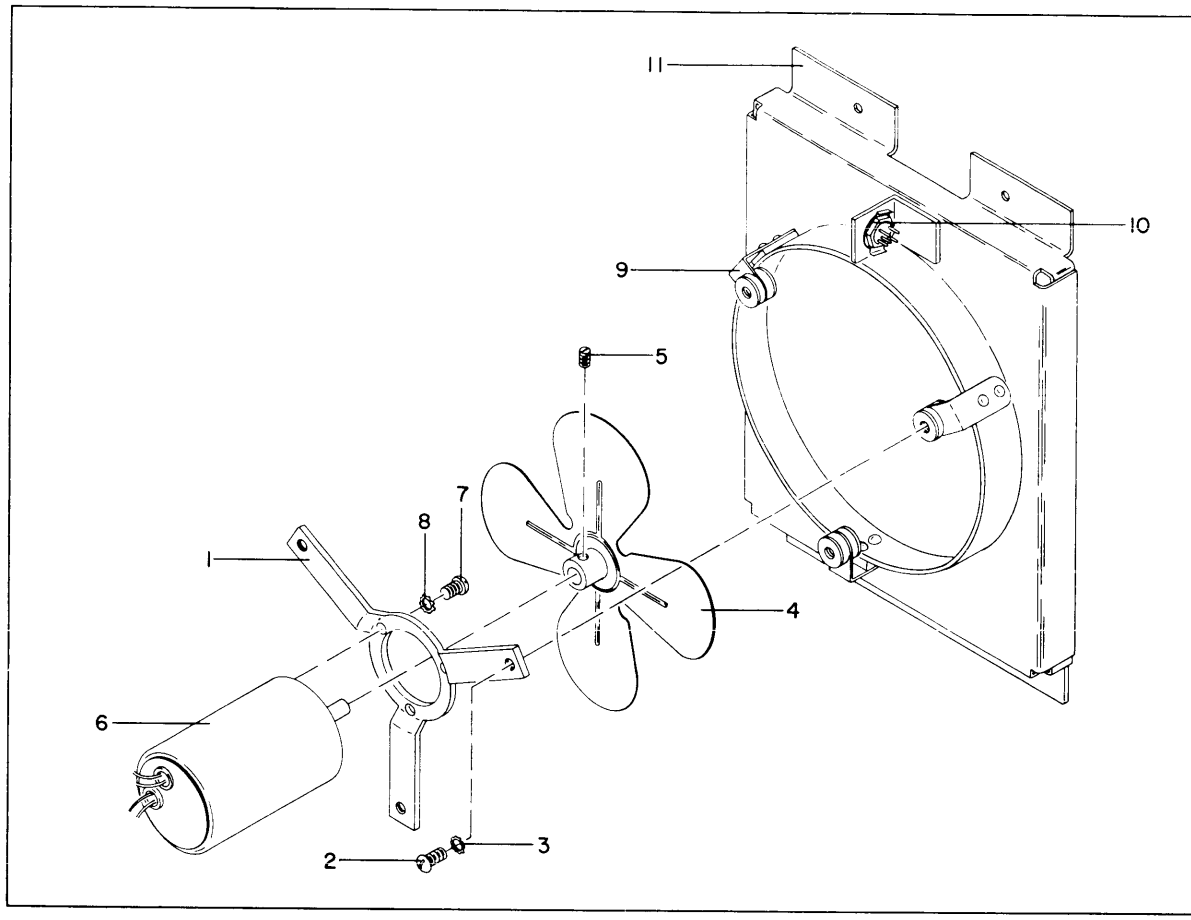


Figure 12. Blower Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		BLOWER ASSEMBLY (cont)		
		ATTACHING PARTS		
12-7	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
-8	AN936B6	. WASHER	3	
		---*---		
-9	154458	. MOUNT, Shock, 1-5/32 lg by 1/2 in. wide with 10-32 thd hole (UCI) .	3	
		ATTACHING PARTS		
	AN470A4-6	. RIVET	6	
	A108066	. SPACER	3	
		---*---		
-10	M5P-LRN	. CONNECTOR, Receptacle, 5 male contacts (WIQ) . . .	1	
-11	C100541	. BOX ASSEMBLY	1	

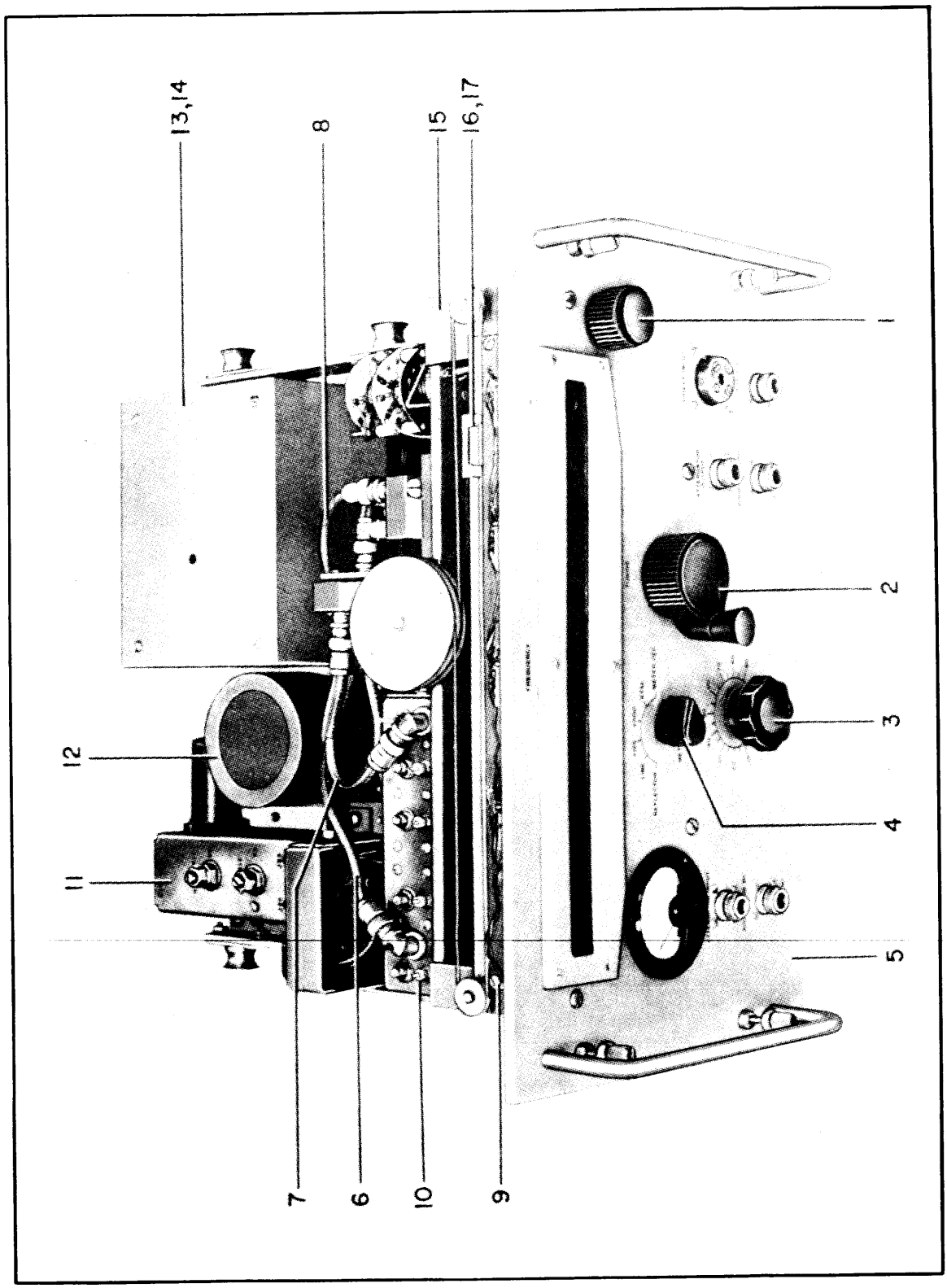


Figure 13. Tuning Head and Panel Assembly (Sheet 1 of 2 Sheets), Index Nos. 1 through 17

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		TUNING HEAD AND PANEL ASSEMBLY		
13-	E102202	TUNING HEAD AND PANEL ASSY (see 2, fig. 2, for NHA) . .	REF	
-1	125-2-2G	. KNOB, Rd, with skirt, 1.269 dia by 0.870 in. lg (RAY) . .	1	
-2	175-6-2G	. KNOB, Crank, with round skirt (RAY)	1	
-3	90-3-2G	. KNOB, Rd, with dial skirt, 0.928 dia by 1.027 in. lg (RAY)	1	
-4	70-5-2G	. KNOB, Pointer, with rd skirt, 0.721 dia by 0.063 in. lg(RAY)	1	
-5	D102087	. PANEL ASSEMBLY (see figure 14 for breakdown).	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 10-32 by 1/2 in. lg	4	
		---*---		
-6	C503342	. CABLE ASSEMBLY	1	
	UG-260B/U	. . CONNECTOR, Plug (MIL-C-3608)	2	
	RG-71/U	. . CABLE, Coaxial (MIL-C-17B)	12 in.	
-7	C503340	. CABLE ASSEMBLY.	1	
	UG-260B/U	. . CONNECTOR, Plug, BNC type (MIL-C-3608).	2	
	RG-71/U	. . CABLE, Coaxial (MIL-C-17B)	4-1/8 in.	
-8	C503341	. CABLE ASSEMBLY	1	
	UG-260B/U	. . CONNECTOR, Plug, BNC type (MIL-C-3608)	2	
	RG-71/U	. . CABLE, Coaxial (MIL-C-17B)	10-1/4 in.	
13-	F100642	. TUNING HEAD SUBASSEMBLY	1	
-9	B101789	. . BRACKET ASSEMBLY	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/8 in. lg	2	
	AN935-6	. . WASHER	2	
	B510164	. . SPACER	2	
		---*---		
	708	. . . LAMPHOLDER, Miniature bayonet (DLC)	4	
	47	. . . LAMP, Incandescent, T-3-1/4 (GE)	4	
	C105465	. . . BRACKET	1	
-10	B102408	. . 163 MC FILTER AND BRACKET ASSEMBLY (see . . . figure 17 for breakdown)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Cap, socket hd, CRES, passivated, 6-32 by . . 5/8 in. lg	2	
	AN935-6	. . WASHER	2	
		---*---		
13-	C105064	. . OSCILLATOR AND TRACKING SYSTEM ASSEMBLY . . (see figure 16 for breakdown)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, . . 8-32 by 7/16 in. lg	6	
	AN936A8	. . WASHER	6	
		---*---		
-11	C100815	. . . TRACKING CHASSIS ASSEMBLY	1	
-12	B100806	. . . POTENTIOMETER ASSEMBLY	1	
-13	C105063	. . . OSCILLATOR PLATE ASSEMBLY	1	
-14	B110525	. . COVER AND WRENCH ASSEMBLY	1	

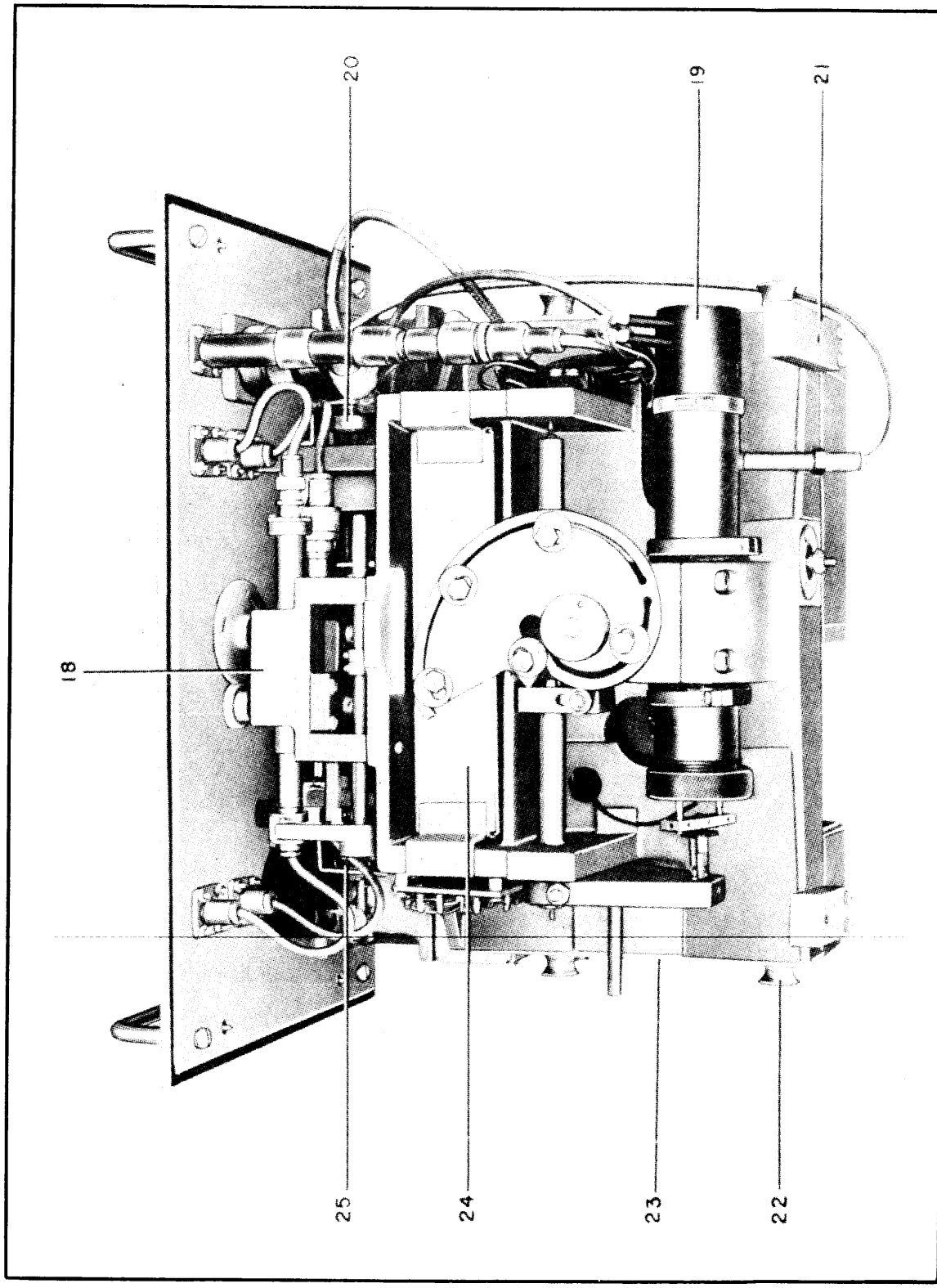


Figure 13. Tuning Head and Panel Assembly (Sheet 2 of 2 Sheets), Index Nos. 18 through 25

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		TUNING HEAD AND PANEL ASSEMBLY (cont)		
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/16 in. lg	4	
	1106-00	. . WASHER, Lock, ext tooth, stainless steel, passivated for No. 6 bolt (SH)	4	
		---*---		
13-15	D100308	. . DIAL MOUNT ASSEMBLY (see figure 15 for breakdown)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Cap, socket hd, CRES, passivated, 10-32 by 3/4 in. lg	4	
	AN935-10	. . WASHER	4	
		---*---		
-16	A106053	. . SLIDE AND BRACKET ASSEMBLY	1	
-17	A106088	. . POINTER	1	
13-	F100461	. . OSCILLATOR DRIVE ASSY (see fig. 19 for breakdown).	1	
-18	D28839	. . . ATTENUATOR DRIVE ASSEMBLY (see figure 21 for breakdown)	1	
		ATTACHING PARTS		
	B513919	. . . SCREW, Socket hd, CRES, 8-32 by 3/4 in. lg	3	
	AN935-8	. . . WASHER	3	
		---*---		
-19	CP21672	. . . KLYSTRON OSCILLATOR ASSEMBLY (see figure 20 for breakdown)	1	
-20	A109355	. . BRACKET ASSEMBLY	1	
		ATTACHING PARTS		
	AN505-8-6	. . SCREW	2	
	AN935-6	. . WASHER	2	
		---*---		
.	RV4NATSD102A	. . . RESISTOR, Variable (MIL-R-94A)	1	
	AK5100	. . . LOCK SHAFT	1	
	A109354	. . . BRACKET, Lettering	1	
-21	A100844	. . BLOCK	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1 in. lg	4	
	AN935-8	. . WASHER	4	
		---*---		
13-	A100852	. . PLATE ASSEMBLY	1	
-22	A100655	. . . ROLLER ASSEMBLY	2	
		ATTACHING PARTS		
	AN505-8-7	. . . SCREW	4	
	AN340-8	. . . NUT	4	
	AN935-8	. . . WASHER	4	
		---*---		
-23	A100851	. . . PLATE	1	
		ATTACHING PARTS		
	AN505-8-6	. . . SCREW	3	
		---*---		
-24	B102403	. . 180 MC LOW PASS FILTER (see fig. 18 for breakdown)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	4	
	AN935-6	. . WASHER	4	
		---*---		

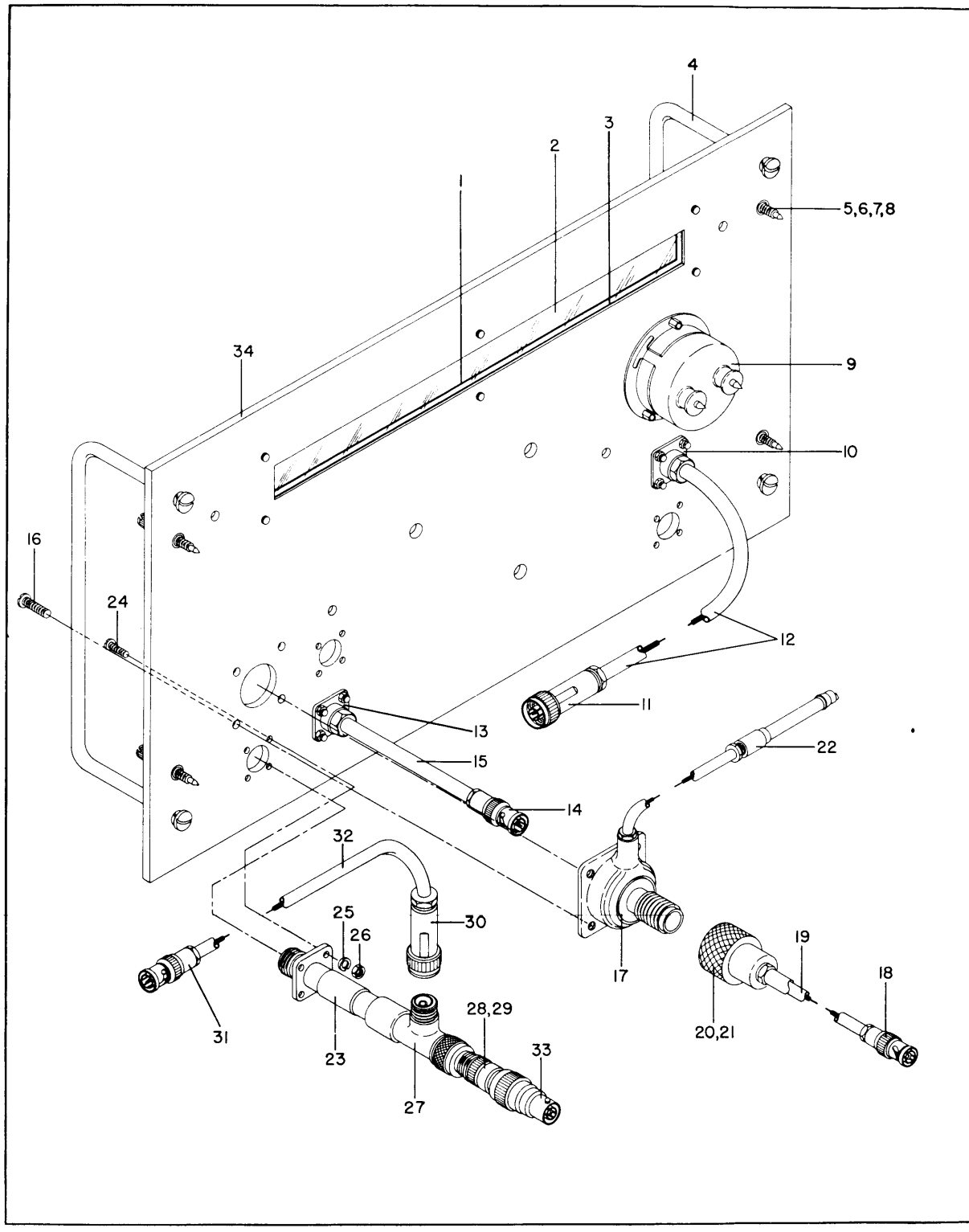


Figure 14. Lower Panel Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		TUNING HEAD AND PANEL ASSEMBLY (cont)		
13-25	A108845	. . BRACKET ASSEMBLY	1	
		ATTACHING PARTS		
	AN505-8-6	. . SCREW	2	
	AN935-6	. . WASHER	2	
		---*---		
	RV4NATSD102A	. . . RESISTOR, Variable (MIL-R-94A)	1	
	AK5100	. . . LOCK SHAFT	1	
	A109353	. . . BRACKET, Lettering	1	
		LOWER PANEL ASSEMBLY		
14-	D102087	PANEL ASSY, Lower (see 5, fig. 13 for NHA)	REF	
-1	C100439	. WINDOW, Dial	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 5/16 in. lg	6	
		---*---		
-2	A101971	. PLATE, Glass	1	
-3	A109395	. METEX	27 in.	
-4	B100460	. HANDLE	2	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 12-24 by 5/8 in. lg	4	
	Coml	. WASHER, Split lock, steel Cd pl and iridite, for No. 12 bolt	4	
		---*---		
-5	A102525	. INSERT	4	
-6	A102527	. GASKET	4	
-7	A102526	. RETAINER	4	
-8	A102524	. SCREW	4	
-9	HS2-2-1/2"	. METER (MAI)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, black anodized, 4-40 by 3/8 in. lg	3	
	AN340-4	. NUT	3	
	AN935-4	. WASHER	3	
		---*---		
14-	C503337	. CABLE ASSEMBLY	1	
-10	MS2016	. . CONNECTOR, Receptacle, one female contact (MSG)	1	
-11	UG-536A/U	. . CONNECTOR, Plug, N Series (MIL-C-71A)	1	
-12	RG-55/U	. . CABLE, Coaxial (MIL-C-17B)	16 in.	
14-	C503338	. CABLE ASSEMBLY	1	
-13	MS2016	. . CONNECTOR, Receptacle, one female contact (MSG)	1	
-14	UG-88C/U	. . CONNECTOR, Plug, BNC (MIL-C-3608)	1	
-15	RG-55/U	. . CABLE, Coaxial (MIL-C-17B)	3-1/2 in.	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		LOWER PANEL ASSEMBLY (cont)		
14-	D102713	. MIXER ASSEMBLY	1	
		ATTACHING PARTS		
-16	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/8 in. lg	4	
		---*---		
-17	BP24030	. . BODY ASSEMBLY, Bushing	1	
14-	B102712	. . MIXER CONNECTOR ASSEMBLY	1	
-18	UG-260B/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608)	1	
-19	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	8-1/2 in.	
-20	AP24032	. . . NUT	1	
-21	1N78	. . . CRYSTAL, Cartridge (MIL-E-1C)	1	
-22	B108071	. . CABLE AND PROBE ASSEMBLY	1	
-23	A26581	. ATTENUATOR ASSEMBLY	1	
		ATTACHING PARTS		
-24	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 7/16 in. lg	4	
-25	AN935-4	. WASHER	4	
-26	AN340-4	. NUT	4	
		---*---		
-27	44250	. ADAPTER, Tee, 1-3/4 lg by 1-1/4 in. wide (IPC)	1	
-28	UG-119/UP	. ADAPTER, Type N to type UHF	1	
-29	1N21B	. CRYSTAL, Rectifier (MIL-E-1C)	1	
14-	C503339	. CABLE ASSEMBLY	1	
-30	UG-536A/U	. . CONNECTOR, Plug, N Series (MIL-C-71A)	1	
-31	UG-88C/U	. . CONNECTOR, Plug, BNC type (MIL-C-3608)	1	
-32	RG-55/U	. . CABLE, Coaxial (MIL-C-17B)	10 in.	
-33	UG-637/U	. ADAPTER (MS35282 SigC)	1	
-34	D100610	. MARKING, Panel	1	
		DIAL MOUNT ASSEMBLY		
15-	D100308	DIAL MOUNT ASSEMBLY (see 15, figure 13 for next higher assembly)	REF	
-1	A100304	. SHAFT, Indicator drive	1	
		ATTACHING PARTS		
-2	5133-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.207 in. free dia (WKI)	1	
		---*---		
-3	A100306	. PULLEY	1	
-4	A106105	. SPRING, Pulley	1	
-5	A100305	. PULLEY	1	
		ATTACHING PARTS		
-6	AN565D8H5	. SCREW, Set	2	
		---*---		
-7	A101880	. GEAR, Worm	1	
		ATTACHING PARTS		
-8	AN565D8H3	. SCREW, Set	2	
		---*---		

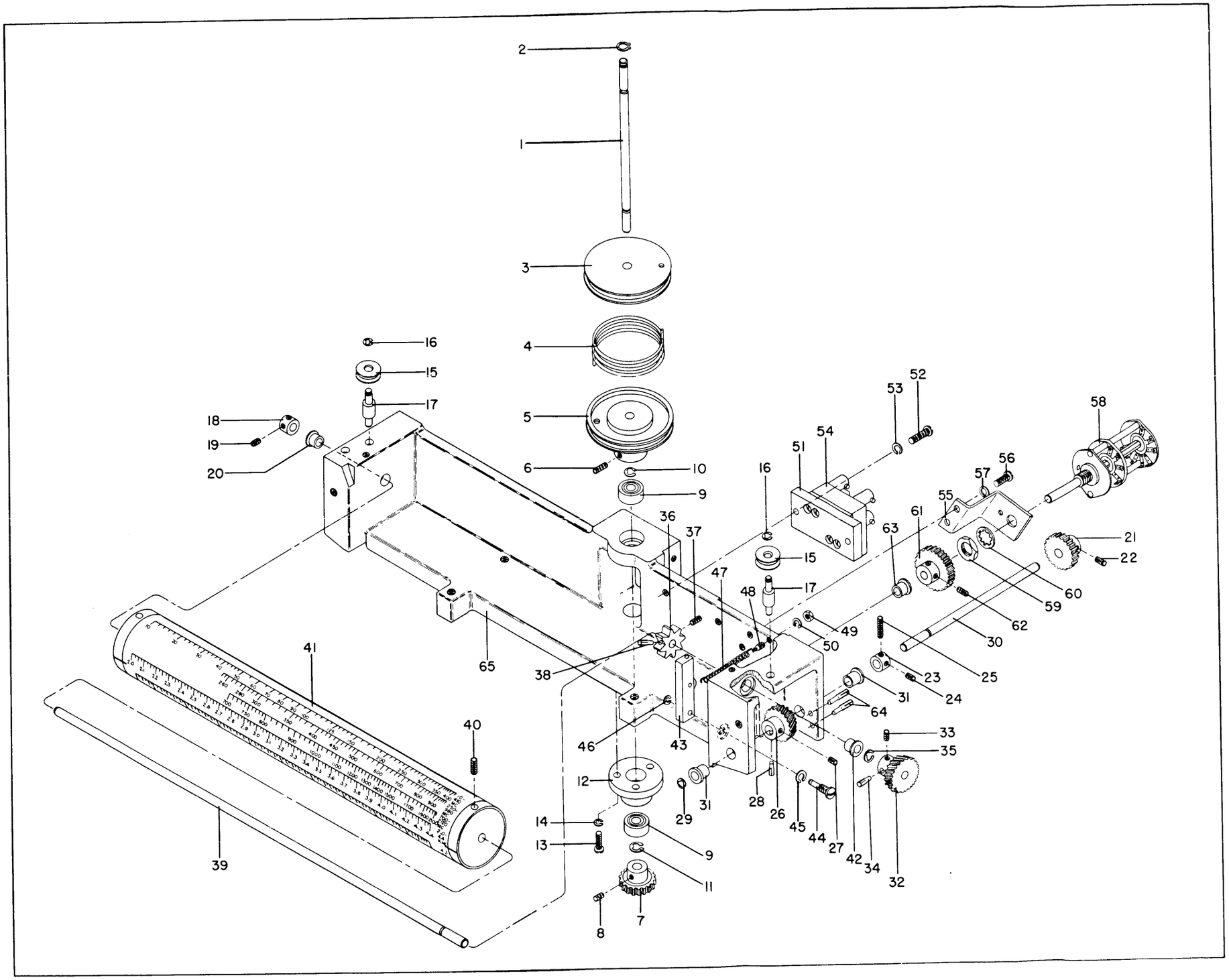


Figure 15. Dial Mount Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		DIAL MOUNT ASSEMBLY (cont)		
15-9	R-4-A	. BEARING, Stainless steel, 1/4 bore by 3/4 in. dia (ND)	2	
		ATTACHING PARTS		
-10	5133-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.207 in. free dia (WKI)	1	
-11	5101-25	. RING, Retaining, carbon spring steel, 0.250 in. dia(WKI)	1	
		---*---		
-12	A100307	. HUB	1	
		ATTACHING PARTS		
-13	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 7/16 in. dia	3	
-14	AN935-6	. WASHER	3	
		---*---		
-15	A100303	. PULLEY	2	
		ATTACHING PARTS		
-16	5133-18-MI	. RING, Retaining, steel Cd pl and iridite, 0.145 in. free dia (WKI)	2	
		---*---		
-17	A100302	. SHAFT	2	
-18	A514802	. COLLAR	1	
		ATTACHING PARTS		
-19	AN565D8H2	. SCREW, Set	2	
		---*---		
-20	FB-46-2	. BEARING, Flanged, 1/4 ID by 3/8 in. OD (BGW)	1	
-21	A109878	. GEAR	1	
		ATTACHING PARTS		
-22	AN565D6H3	. SCREW, Set	2	
		---*---		
-23	A514802	. COLLAR	1	
		ATTACHING PARTS		
-24	AN565D8H2	. SCREW, Set	1	
-25	AN565D8H8	. SCREW, Set	1	
		---*---		
-26	A100297	. GEAR, Dial drum	1	
		ATTACHING PARTS		
-27	AN565D8H3	. SCREW, Set	2	
-28	No Number	. PIN, Driv-loc, steel Cd pl and iridite, type A, 1/16 dia by 1/2 in. lg (DLPC)	1	
		---*---		
-29	5133-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.207 in.free dia (WKI)	1	
-30	A100301	. SHAFT, Dial drive	1	
-31	FB-46-2	. BEARING, Flanged, 1/4 ID by 3/8 in. OD (BGW)	2	
-32	A100297	. GEAR, Dial drum	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		DIAL MOUNT ASSEMBLY (cont)		
		ATTACHING PARTS		
15-33	AN565D8H3	. SCREW, Set	2	
-34	No Number	. PIN, Driv-loc, steel Cd pl and iridite, type A, 1/16 dia by 1/2 in. lg (DLPC)	1	
		---*---		
-35	5133-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.207 in. free dia (WKI)	1	
-36	A100296	. WHEEL, Detent	1	
		ATTACHING PARTS		
-37	AN565D4H2	. SCREW, Set	1	
-38	No Number	. PIN, Driv-loc, steel Cd pl and iridite, type A, 1/16 dia by 1/2 in. lg (DLPC)	1	
		---*---		
-39	A100295	. SHAFT, Dial	1	
		ATTACHING PARTS		
-40	AN565D10H6	. SCREW, Set	4	
		---*---		
-41	B100292	. DIAL DRUM ASSEMBLY	1	
-42	FB-46-2	. BEARING, Flanged, 1/4 ID by 3/8 in. OD (BGW)	1	
-43	A100298	. PIVOT ARM ASSEMBLY	1	
		ATTACHING PARTS		
-44	A100318	. PIVOT	1	
-45	AN935-10	. WASHER	1	
-46	5133-12-MI	. RING, Retaining, steel Cd pl and iridite, 0.094 in. free dia (WKI)	1	
		---*---		
-47	A109431	. SPRING	1	
-48	A23478	. LUG, Spade	1	
		ATTACHING PARTS		
-49	AN340-4	. NUT	1	
-50	AN935-4	. WASHER	1	
		---*---		
-51	A109881	. PLATE	1	
		ATTACHING PARTS		
-52	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	2	
-53	AN935-6	. WASHER	2	
		---*---		
-54	CR22	. SWITCH, Coaxial, spdt, 26 vdc, 100 w, non-shorting contacts (DAKN)	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 5/16 in. lg	4	
	AN935-4	. WASHER	4	
		---*---		
-55	A109880	. BRACKET	1	

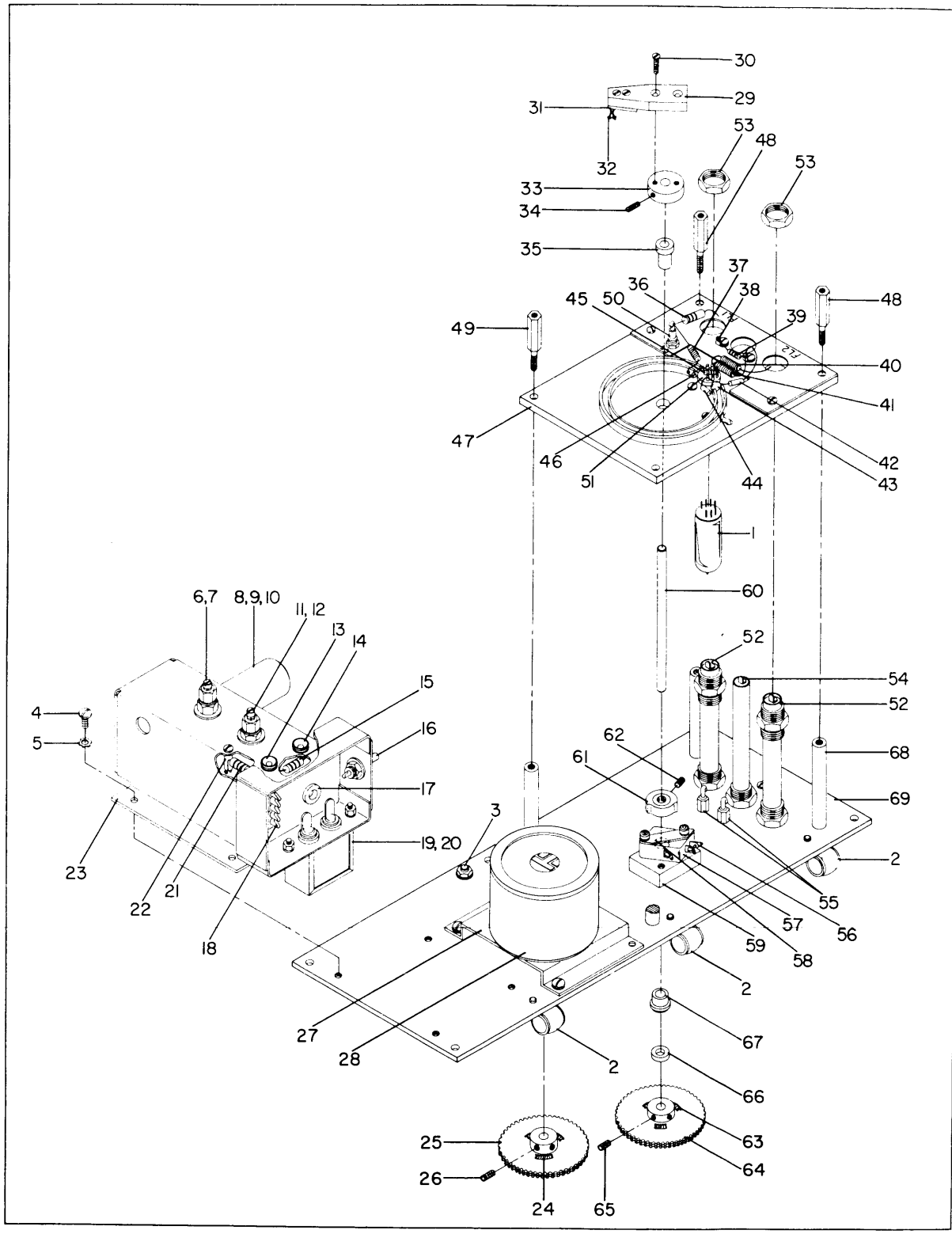


Figure 16. Oscillator and Tracking System Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		DIAL MOUNT ASSEMBLY (cont)		
		ATTACHING PARTS		
15-56	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	2	
-57	AN935-6	. WASHER	2	
		---*---		
-58	C110057	. SWITCH	1	
		ATTACHING PARTS		
-59	Coml	. NUT, Hex, brs nickel pl, 3/8-32 by 1/2 across flats by 3/32 in. thick	1	
-60	AN936A616	. WASHER	1	
		---*---		
-61	A109879	. GEAR	1	
		ATTACHING PARTS		
-62	AN565D6H3	. SCREW, Set	2	
		---*---		
-63	FB-46-2	. BEARING, Flanged, 1/4 ID by 3/8 in. OD (BGW)	1	
-64	No Number	. PIN, Driv-loc, steel Cd pl and iridite, type A, 1/8 dia by 9/16 in. lg (DLPC)	2	
-65	D100291	. DIAL MOUNT, Machining	1	
		OSCILLATOR AND TRACKING SYSTEM ASSEMBLY		
16-	C105064	OSCILLATOR AND TRACKING SYSTEM ASSEMBLY (see figure 13 for next higher assembly)	REF	
-1	6AF4A	. TUBE, Electron (MIL-E-1C)	1	
-2	No Number	. CLIP, Nylon, 3/8 in. dia by 0.036 in. thick (WMPC)	3	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 3/8 in. lg	3	
	AN936B8	. WASHER	3	
	AN960-8	. WASHER	3	
		---*---		
-3	A106002	. STUD, Threaded	1	
		ATTACHING PARTS		
	Coml	. NUT, Hex, steel Cd pl and iridite, 10-32 by 0.368 across flats by 0.123 in. thick	1	
	AN935-10	. WASHER	1	
	AN960-10	. WASHER	1	
		---*---		
16-	C100815	. TRACKING CHASSIS ASSY (see 11, fig. 13 for NHA)	REF	
		ATTACHING PARTS		
-4	Coml	. SCREW, Mach, binding hd, steel Cd pl, 8-32 by 1/4 in. lg	4	
-5	1108-00	. WASHER, Lock, ext tooth, stainless steel, passivated for No. 8 bolt (SH)	4	
		---*---		
-6	RV4NATSD503A	. . RESISTOR, Variable (MIL-R-94A)	1	
-7	AK5100	. . LOCK, Shaft	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR AND TRACKING SYSTEM ASSEMBLY (cont)		
16-8	8292	. . SHIELD, Electron tube, low-loss phenolic, 1-31/32 in. high with phos bronze spring (EBY)	1	
-9	6X4W	. . TUBE, Electron (MIL-E-1C)	1	
-10	8290	. . SOCKET, Electron tube, high voltage, low-loss phenolic with silver pl beryllium copper contacts (EBY)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl, 6-32 by 3/8 in. lg	2	
	AN936A6	. . WASHER	2	
		---*---		
-11	RV4NATSA503A	. . RESISTOR, Variable (MIL-R-94A)	1	
-12	AK5079-B-1	. . COUPLING ASSEMBLY, Insulated, 1-27/32 lg by 11/16 in. dia locking type with 9/16 in. lg bushing (Jan. Hardware Co., Brooklyn, N. Y.)	1	
-13	118930C	. . JACK, Test, black, straight type, one female connector (UCI)	1	
-14	118930B	. . JACK, Test, red, straight type, one female connector (UCI)	1	
-15	RC32GF104K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-16	PM1SLRN	. . CONNECTOR, Single contact, with lock ring and nut, 3/4 in. lg (WIQ)	1	
-17	AN931-4-7	. . GROMMET	1	
-18	MS24034	. . CONNECTOR, Receptacle	1	
		ATTACHING PARTS		
	AN500A4-6	. . SCREW	4	
	AN936A4	. . WASHER	4	
	AN340-4	. . NUT	4	
		---*---		
-19	CP61B1FG104M	. . CAPACITOR, Fixed (MIL-C-25A)	1	
-20	CP06FA2	. . BRACKET (MIL-C-25A)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	2	
	AN364-632	. . NUT, Self-locking	2	
		---*---		
-21	RC32GF274K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-22	753	. . STANDOFF, Terminal, molded melamine body, 23/32 lg by 1/4 in. dia (WIQ)	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/16 in. lg	1	
	AN936A4	. . WASHER	1	
		---*---		
-23	C100834	. . LETTERING PLAN, Tracking chassis	1	
16-	B100806	. POTENTIOMETER ASSY (see 12, fig. 13 for NHA)	REF	
-24	A519901	. . SPRING	3	
-25	A100483	. . GEAR ASSEMBLY	1	
		ATTACHING PARTS		
-26	AN565D6H4	. . SCREW, Set	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR AND TRACKING SYSTEM ASSEMBLY (cont)		
16-27	A102558	. . BRACKET	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/4 in. lg	3	
	1108-00	. . WASHER, Lock, ext tooth, stainless steel, passivated for No. 8 bolt (SH)	3	
		---*---		
-28	CP17230	. . POTENTIOMETER, Tracking	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/16 in. lg	3	
	AN936B6	. . WASHER	3	
		---*---		
16-	C105063	. OSCILLATOR PLATE ASSEMBLY	REF	
-29	A28778	. . ARM, Rotor	1	
		ATTACHING PARTS		
-30	AN505-4-8	. . SCREW	2	
		---*---		
-31	A107385	. . PLATE	1	
-32	BP23120	. . CONTACT ASSEMBLY, Short	1	
		ATTACHING PARTS (for items 31 and 32)		
	AN505-4-8	. . SCREW	2	
	AN936B4	. . WASHER	2	
	AN960-4	. . WASHER	2	
	AN340-4	. . NUT	2	
		---*---		
-33	A28780	. . HUB, Rotor	1	
		ATTACHING PARTS		
-34	Coml	. . SCREW, Set, multiple spline hd, 8-32 by 1/4 in. lg	2	
		---*---		
-35	AP21651-1	. . BEARING	1	
-36	RC42GF152K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-37	A24132	. . COIL, R-f	1	
-38	2104-04-00	. . TERMINAL, Lug, phos bronze, 0.116 ID by 41/64 in. lg for No. 4 screw size (SH)	3	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/8 in. lg	3	
	AN340-4	. . NUT	3	
		---*---		
-39	RC20GF151J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-40	A100674	. . COIL, R-f	1	
-41	A24893	. . COIL, R-f	1	
-42	CC20CK010C	. . CAPACITOR, Fixed (JAN-C-20A)	1	
-43	CB11NX150K	. . CAPACITOR, Fixed (MIL-C-10950A)	1	
-44	CC20CK1R2C	. . CAPACITOR, Fixed (JAN-C-20A)	1	
-45	RC20GF222K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-46	RC20GF241J	. . RESISTOR, Fixed (MIL-R-11B)	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR AND TRACKING SYSTEM ASSEMBLY (cont)		
16-47	C105062	. . OSCILLATOR PLATE ASSEMBLY	1	
		ATTACHING PARTS		
-48	A28777-2	. . SPACER, Cover	2	
-49	A28777-1	. . SPACER, Cover	2	
		---*---		
-50	327	. . . CAPACITOR, Feed thru, 1000 uuf ±20%, 500 vdcw (ERC) .	1	
		ATTACHING PARTS		
	No Number	. . . NUT, Hex, 1/4-28, steel Cd pl (ERC)	1	
	1114-5	. . . WASHER, Lock, ext tooth, steel Cd pl, for 1/4 in. dia bolt (SH)	1	
		---*---		
-51	53D20911	. . . SOCKET, Electron tube, 7 pin miniature (CIN) . . .	1	
	AP23904	. . . RETAINER, Tube	1	
-52	A104838	. . FILTER ASSEMBLY	2	
		ATTACHING PARTS		
-53	AP22365	. . NUT	8	
		---*---		
-54	A104843	. . HOUSING ASSEMBLY	1	
		ATTACHING PARTS		
	A105030	. . NUT	1	
		---*---		
	UG-290A/U	. . . CONNECTOR, Receptacle (MIL-C-3608)	1	
	RC20GF220J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
	RC20GF151J	. . . RESISTOR, Fixed (MIL-R-11B)	1	
-55	327	. . CAPACITOR, Feed thru, 1000 uuf, ±20%, 500 vdcw(ERC)	2	
		ATTACHING PARTS		
	No Number	. . NUT, Hex, 1/4-28, steel Cd pl (ERC)	2	
	1114-5	. . WASHER, Lock, ext tooth, steel Cd pl, for 1/4 in. dia bolt (SH)	2	
		---*---		
-56	2104-04-00	. . TERMINAL, Lug, phos bronze, 0.116 ID by 41/64 in. lg (SH)	3	
-57	AN3234-1	. . SWITCH, Micro	1	
-58	AP16904	. . ACTUATOR	1	
		ATTACHING PARTS (for items 57 and 58)		
	Coml	. . SCREW, Cap, socket hd, carbon steel Cd pl and iridite, 4-40 by 3/4 in. lg	2	
	AN935-4	. . WASHER	2	
		---*---		
-59	A101984	. . BLOCK	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/8 in. lg	2	
	AN935-8	. . WASHER	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR AND TRACKING SYSTEM ASSEMBLY (cont)		
16-60	A102382	. . SHAFT	1	
-61	A105290	. . CAM ASSEMBLY	1	
		ATTACHING PARTS		
-62	Coml	. . SCREW, Set, multiple spline hd, alloy steel Cd pl, 4-40 by 1/8 in. lg	2	
		---*---		
-63	A519901	. . SPRING	3	
-64	A100483	. . GEAR ASSEMBLY	1	
		ATTACHING PARTS		
-65	AN565D6H4	. . SCREW, Set	2	
		---*---		
-66	A100477	. . SPACER	1	
16-	C105061	. . PLATE ASSEMBLY, Mounting	1	
-67	FB46-3	. . . BEARING, Flanged, 1/4 ID by 3/8 in. OD (BGW)	1	
-68	A28776	. . . SPACER, Plate	4	
-69	C105060	. . . LETTERING PLAN, Plate	1	
		163 MC FILTER AND BRACKET ASSEMBLY		
17-	B102408	FILTER AND BRACKET ASSEMBLY, 163 mc (see 10, figure 13, for next higher assembly)	REF	
-1	B102240	. BRACKET ASSEMBLY	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/16 in. lg	2	
-3	AN935-6	. WASHER	2	
		---*---		
-4	CR-56BNC	. SWITCH, Coaxial, for type BNC connector, remote type (DAKN)	1	
		ATTACHING PARTS		
-5	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	4	
-6	AN935-4	. WASHER	4	
		---*---		
17-	B102491	. CHASSIS AND COVER ASSEMBLY	1	
-7	B102493	. . COVER ASSEMBLY	1	
		ATTACHING PARTS		
-8	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
-9	AN935-6	. . WASHER	4	
		---*---		
17-	C102494	. . CHASSIS ASSEMBLY	1	
-10	CST-50	. . . CAPACITOR, Variable, 1.5 to 12.5 uuf, 500 vdcw (CGT)	4	

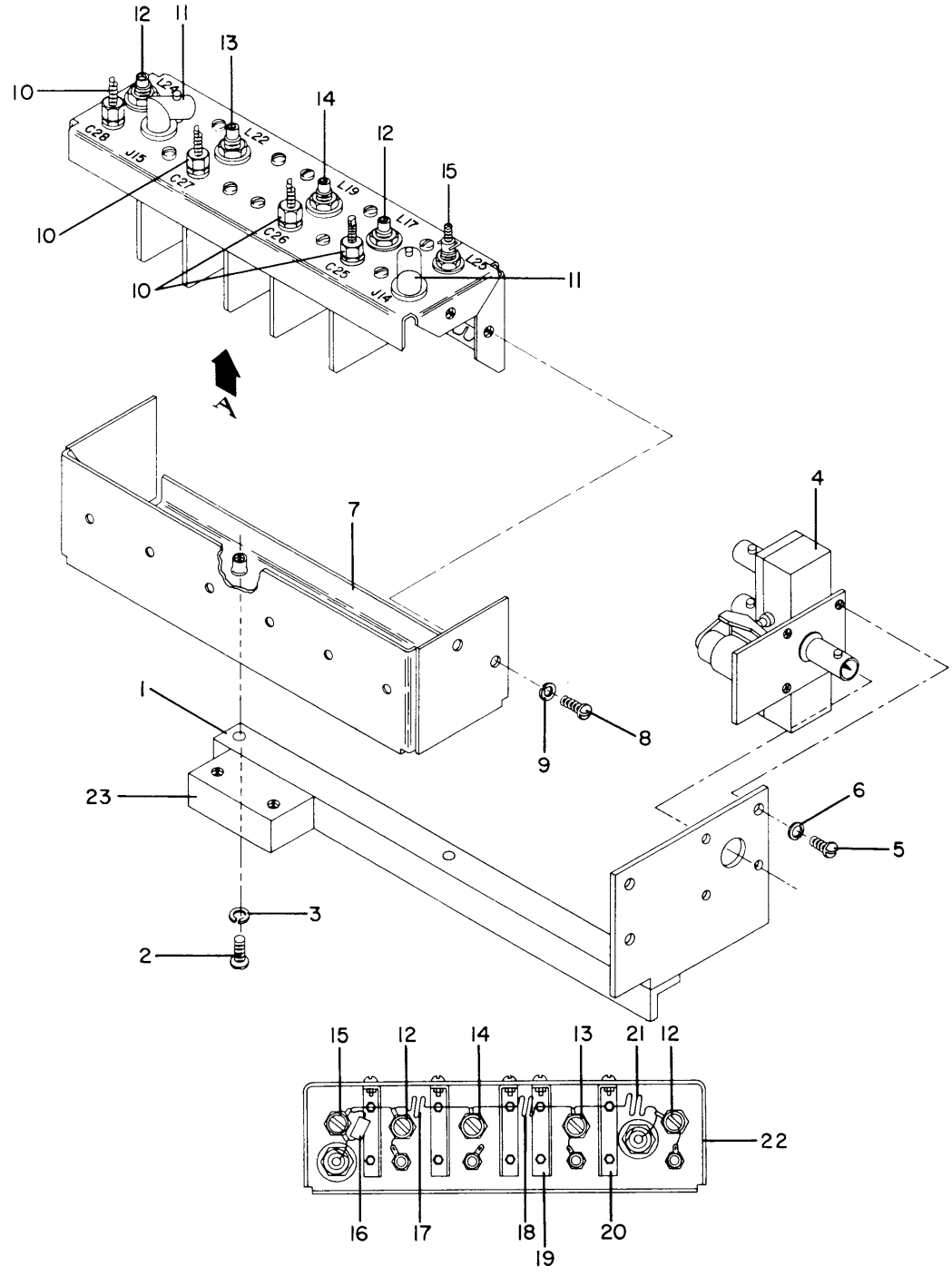


Figure 17. 163 Mc Filter and Bracket Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		163 MC FILTER AND BRACKET ASSEMBLY (cont)		
		ATTACHING PARTS		
	AN340-8	. . . NUT	4	
	Coml	. . . NUT, Hex, compression, 8-32 (supplied with capacitor CST-50)	4	
	AN936A8	. . . WASHER	4	
		---*---		
17-11	UG-1098/U	. . . CONNECTOR, Receptacle, BNC (MS35179 SigC)	2	
		ATTACHING PARTS		
	Coml	. . . NUT, Hex, 3/8-32, steel Cd pl and iridite, 1/2 across flats by 3/32 in. thick	2	
	AN936A616	. . . WASHER	2	
		---*---		
-12	A107466	. . . COIL, R-f	2	
-13	A107162	. . . COIL, R-f	1	
-14	A107160	. . . COIL, R-f	1	
-15	A107164	. . . COIL, R-f	1	
		ATTACHING PARTS (for items 12, 13, 14 and 15)		
	Coml	. . . NUT, Hex, 1/4-28, steel Cd pl and iridite, 0.430 across flats by 0.185 in. thick	5	
	AN936A416	. . . WASHER	5	
		---*---		
-16	CM15B390K	. . . CAPACITOR, Fixed (MIL-C-5A)	1	
-17	A107159	. . . COIL, R-f	1	
-18	A107161	. . . COIL, R-f	1	
-19	A101029	. . . SHIELD	3	
-20	A101030	. . . SHIELD	2	
		ATTACHING PARTS (for items 19 and 20)		
	Coml	. . . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	20	
	AN935-4	. . . WASHER	20	
	AN340-4	. . . NUT	20	
		---*---		
-21	A107163	. . . COIL, R-f	1	
-22	B102492	. . . CHASSIS AND FASTENER ASSEMBLY	1	
-23	A102238	. BLOCK	1	
		ATTACHING PARTS		
	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	2	
	AN935-6	. WASHER	2	
		---*---		
		180 MC LOW PASS FILTER ASSEMBLY		
18-	B102403	CHASSIS AND COVER ASSEMBLY (see 24, figure 13, for next higher assembly)	REF	
-1	B102400	. COVER ASSEMBLY	1	
		ATTACHING PARTS		
-2	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/4 in. lg	4	
-3	AN935-6	. WASHER	4	
		---*---		
18-	C102402	. CHASSIS ASSEMBLY	1	
18-	A107122	. . CABLE ASSEMBLY	1	
-4	UG-627A/U	. . . CONNECTOR, Plug, C Series (MS35286 SigC)	1	

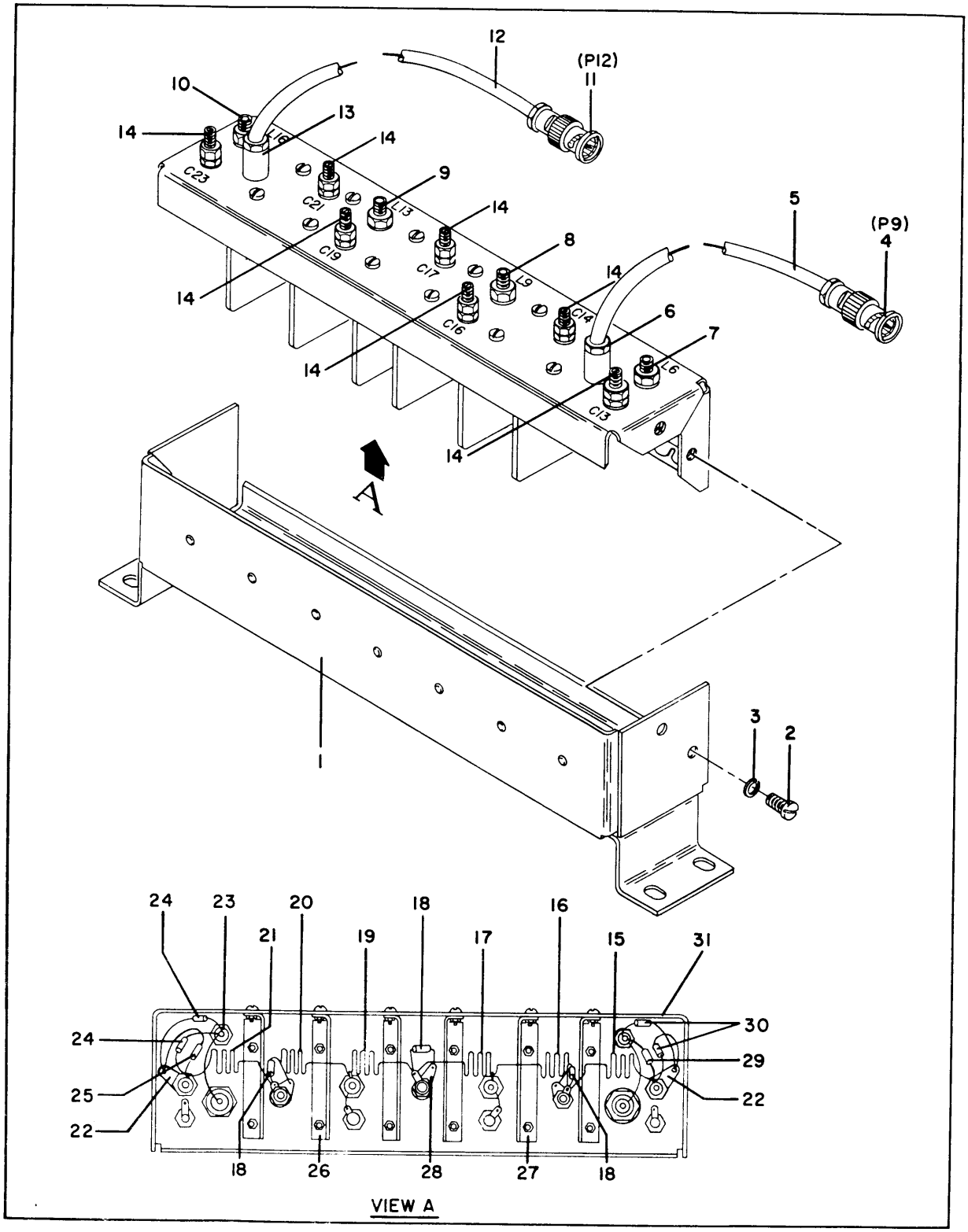


Figure 18. 180 Mc Low Pass Filter Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		180 MC LOW PASS FILTER ASSEMBLY (cont)		
18-5	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	13 in.	
-6	MX-1530/U	. . . CONNECTOR, Cable termination	1	
-7	A107356	. . COIL, R-f	1	
-8	A107359	. . COIL, R-f	1	
-9	A107362	. . COIL, R-f	1	
-10	A107365	. . COIL, R-f	1	
		ATTACHING PARTS (for items 7, 8, 9 and 10)		
	Coml	. . NUT, Hex, 10-32, steel Cd pl and iridite, 0.368 across flats by 0.123 in. thick	4	
	AN936A10	. . WASHER	4	
		---*---		
18-	A107123	. . CABLE ASSEMBLY	1	
-11	UG-260B/U	. . . CONNECTOR, Plug, BNC type (MIL-C-3608)	1	
-12	RG-71/U	. . . CABLE, Coaxial (MIL-C-17B)	9 in.	
-13	MX-1530/U	. . . CONNECTOR, Cable termination	1	
-14	CST-50	. . CAPACITOR, Variable, 1.5 to 12.5 uuf, 500 vdcw(CGT)	7	
		ATTACHING PARTS		
	AN340-8	. . NUT	7	
	AN936A8	. . WASHER	7	
		---*---		
-15	A107364	. . COIL, R-f	1	
-16	A107363	. . COIL, R-f	1	
-17	A107361	. . COIL, R-f	1	
-18	CC20CH100D	. . CAPACITOR, Fixed (JAN-C-20A)	3	
-19	A107360	. . COIL, R-f	1	
-20	A107358	. . COIL, R-f	1	
-21	A107357	. . COIL, R-f	1	
-22	2103-10-00	. . LUG, Terminal, phos bronze, 53/64 in. lg for No. 10 screw size (SH)	2	
-23	766	. . STANDOFF, Turret type, 1/4 dia by 23/32 in. lg(WIQ)	2	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 3/16 in. lg	2	
		---*---		
-24	RC20GF361J	. . RESISTOR, Fixed (MIL-R-11B)	2	
-25	RC20GF620J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-26	A101025	. . SHIELD	3	
-27	A101020	. . SHIELD	3	
		ATTACHING PARTS (for items 26 and 27)		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 4-40 by 1/4 in. lg	24	
	AN935-4	. . WASHER	24	
	AN340-4	. . NUT	24	
		---*---		
-28	2104-08-00	. . LUG, Terminal, phos bronze, 41/64 in. lg for No. 8 screw size (SH)	3	
-29	RC20GF360J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-30	RC20GF511J	. . RESISTOR, Fixed (MIL-R-11B)	2	
-31	B102401	. . CHASSIS SUBASSEMBLY	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR DRIVE ASSEMBLY		
19-	F100461	OSCILLATOR DRIVE ASSEMBLY (see figure 13, for next higher assembly)	REF	
-1	B100436	. CAM ASSEMBLY	1	
		ATTACHING PARTS		
-2	AN565D8H7	. SCREW, Set	2	
		---*---		
-3	A100433	. PLATE, Bearing	1	
		ATTACHING PARTS		
-4	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
-5	AN936B6	. WASHER	3	
		---*---		
-6	77-R-6	. BEARING, Ball, double shield, 3/8 in. bore (ND)	1	
19-	B100854	. TERMINAL BOARD ASSEMBLY	1	
		ATTACHING PARTS		
-7	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1 in. lg	4	
-8	AN936B6	. WASHER	4	
		---*---		
-9	1N69	. . CRYSTAL (MIL-E-1C)	1	
-10	RN30X5113F	. . RESISTOR, Fixed (MIL-R-10509A)	2	
-11	RC20GF242J	. . RESISTOR, Fixed (MIL-R-11B)	1	
-12	RN30X4223F	. . RESISTOR, Fixed (MIL-R-10509A)	1	
-13	RN25X3163F	. . RESISTOR, Fixed (MIL-R-10509A)	1	
-14	RN20X4223F	. . RESISTOR, Fixed (MIL-R-10509A)	1	
-15	RN20X6193F	. . RESISTOR, Fixed (MIL-R-10509A)	1	
-16	RN25X2873F	. . RESISTOR, Fixed (MIL-R-10509A)	1	
-17	RC20GF223K	. . RESISTOR, Fixed (MIL-R-11B)	1	
-18	A100853	. . LETTERING PLAN, Board	1	
-19	AP13585	. SPRING	2	
-20	B507204	. SPRING, Yoke	1	
-21	B110674	. YOKE, Machining	1	
		ATTACHING PARTS		
-22	AN340-416	. NUT	1	
-23	AN935-416	. WASHER	1	
-24	AP22309	. STUD	1	
		---*---		
-25	AK50119	. PLUG, Spring	1	
-26	AP10572	. LUG, Spade	3	
-27	AP22345	. SCREW, Set	1	
		ATTACHING PARTS		
-28	AN565D6H4	. SCREW, Set	1	
		---*---		
-29	A101562	. SCREW, Link	1	
		ATTACHING PARTS		
-30	AN565D4H3	. SCREW, Set	1	
		---*---		
-31	AK5388	. PLATE, Spring retainer	1	

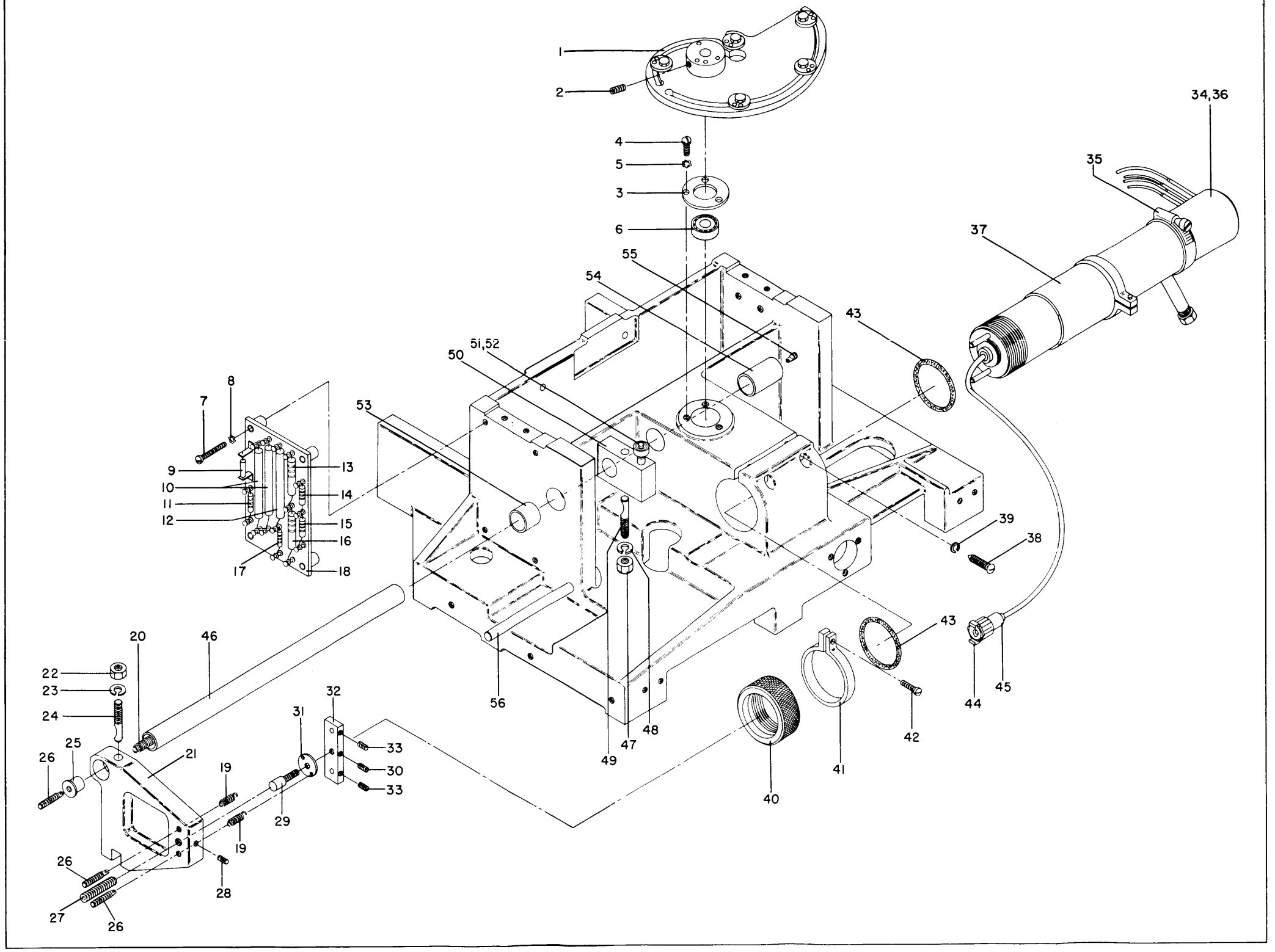


Figure 19. Oscillator Drive Assembly, Bottom Exploded View (Sheet 1 of 2 Sheets), Index Nos. 1 through 56

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR DRIVE ASSEMBLY (cont)		
19-32	AP20051	YOKE, Push rod	1	
		ATTACHING PARTS		
-33	AN565D4H3	. SCREW, Set	2	
		---*---		
-34	B101548	. COVER AND SOCKET ASSEMBLY, Klystron	1	
		ATTACHING PARTS		
-35	QS200-M24S	. CLAMP, Tube, cover (BC)	1	
		---*---		
-36	6BL6	. TUBE, Electron (MIL-E-1C)	1	
-37	CP21672	. OSCILLATOR ASSEMBLY, Klystron (see figure 20 for breakdown)	REF	
		ATTACHING PARTS		
-38	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 10-32 NF-2 by 7/8 in. lg	2	
-39	AN935-10	. WASHER	2	
		---*---		
-40	AP17847	. . NUT, Barrel lock	1	
-41	AP19415	. CLAMP, Seal	1	
		ATTACHING PARTS		
-42	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	1	
		---*---		
-43	10-006-B	. SEAL, Metex, monel, 1/8 dia by 3-3/16 in. lg (METC).	6-3/8 in.	
-44	PM1PLS	. CONNECTOR, Plug, with lock spring (WIQ)	1	
-45	H10	. HOOD, Connector, melamine body, 3/4 in. lg (WIQ)	1	
-46	A510601	. SHAFT, Yoke guide	1	
		ATTACHING PARTS		
-47	AN340-416	. NUT	1	
-48	AN935-416	. WASHER	1	
-49	AP22309	. STUD	1	
		---*---		
19-	A100459	. CAM FOLLOWER	1	
-50	A28603	. . BLOCK	1	
-51	SS-77-R-3	. . BEARING, Ball, double shield, stainless steel, 3/16 in. bore (ND)	1	
-52	A101125	. . SHAFT, Bearing	1	
-53	B-1012-4	. BEARING, Plain cylindrical, 5/8 ID by 3/4 OD by 1/2 in. lg (BGW)	1	
-54	B-1012-8	. BEARING, Plain cylindrical, 5/8 ID by 3/4 OD by 1 in. lg (BGW)	1	
-55	AP10572	. LUG, Spade	1	
-56	A501011	. SHAFT	1	
		ATTACHING PARTS		
	AN565D6H4	. SCREW, Set	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR DRIVE ASSEMBLY (cont)		
19-57	A101879	. SPRING	1	
-58	A101883	. CABLE ASSEMBLY	1	
-59	A100469	. GEAR, Spur	1	
		ATTACHING PARTS		
-60	AN565D8H2	. SCREW, Set	2	
		---*---		
-61	A101881	. GEAR ASSEMBLY, Worm	1	
		ATTACHING PARTS		
-62	Coml	. SCREW, Set, multiple spline hd, cup point, 10-32 by 1/2 in. lg	2	
		---*---		
-63	A100433	. PLATE, Bearing	1	
		ATTACHING PARTS		
-64	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
-65	AN936B6	. WASHER	3	
		---*---		
-66	SS-77-R-6	. BEARING, Ball, double shield, stainless steel, 3/8 in. bore (ND)	1	
-67	5100-37-MI	. RING, Retaining, steel Cd pl and iridite, 0.338 in. free dia (WKI)	2	
-68	A100431	. SHAFT	1	
-69	C110183	. SWITCH, Rotary, band selector	1	
		ATTACHING PARTS		
-70	Coml	. NUT, Hex, 3/8-32, steel Cd pl and iridite, 1/2 across flats by 3/32 in. thick	1	
-71	AN936A616	. WASHER	1	
		---*---		
-72	B501713	. GEAR, Idler stop	1	
		ATTACHING PARTS		
-73	5133-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.207 in. ID (WKI)	1	
		---*---		
-74	A100805	. STUD, Idler gear	1	
		ATTACHING PARTS		
-75	B513917	. SCREW, Cap, button hd	1	
-76	AN935-8	. WASHER	1	
-77	AN960-8	. WASHER	1	
		---*---		
-78	SS-77-R-4-A	. BEARING, Ball, double shield, stainless steel, 1/4 in. bore (ND)	1	
		ATTACHING PARTS		
-79	5100-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.225 in. free dia (WKI)	1	
		---*---		
-80	A100808	. HOUSING, Bearing	1	

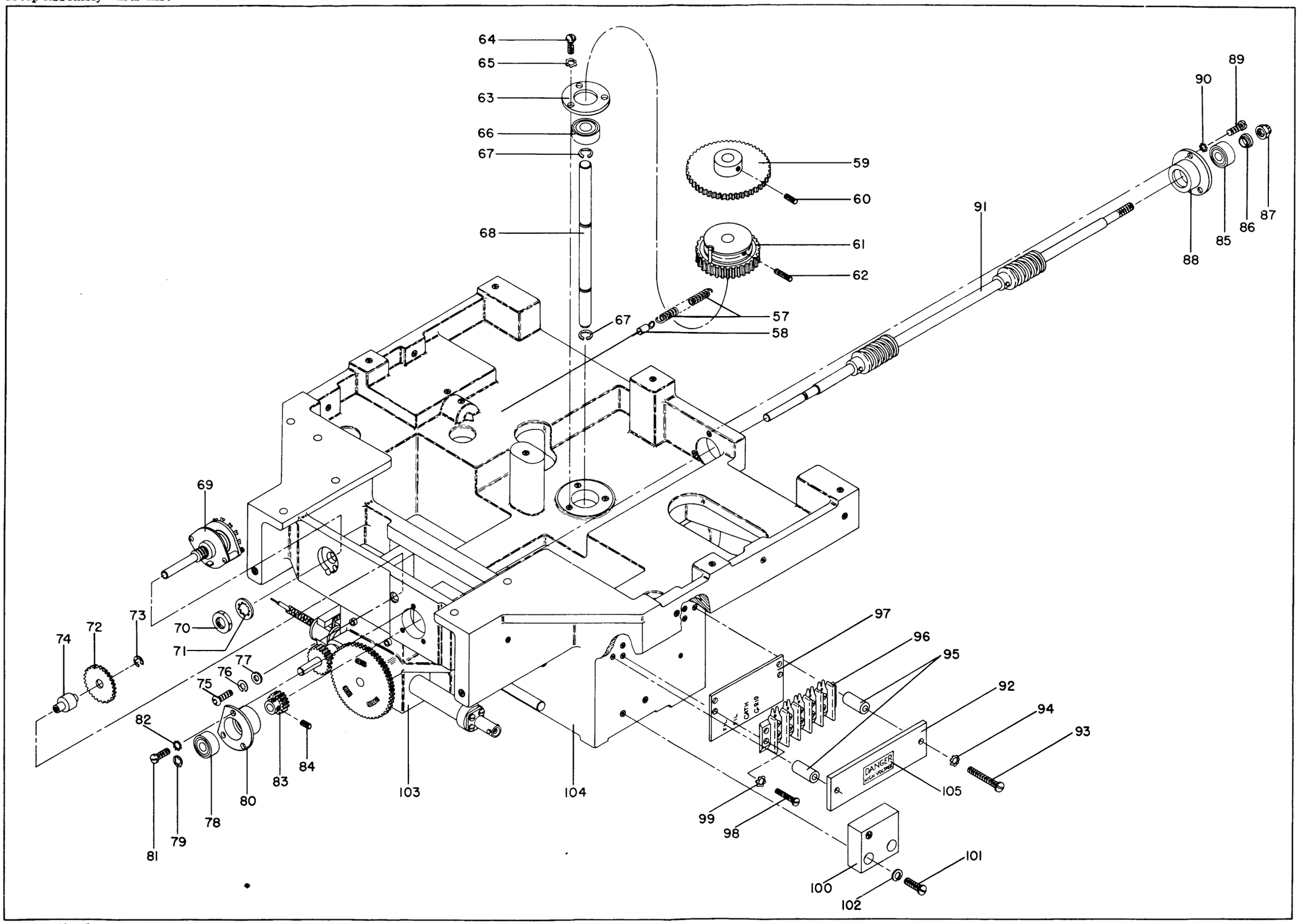


Figure 19. Oscillator Drive Assembly, Top Exploded View (Sheet 2 of 2 Sheets), Index Nos. 57 through 105

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR DRIVE ASSEMBLY (cont)		
19-57	A101879	. SPRING	1	
-58	A101883	. CABLE ASSEMBLY	1	
-59	A100469	. GEAR, Spur	1	
		ATTACHING PARTS		
-60	AN565D8H2	. SCREW, Set	2	
		---*---		
-61	A101881	. GEAR ASSEMBLY, Worm	1	
		ATTACHING PARTS		
-62	Coml	. SCREW, Set, multiple spline hd, cup point, 10-32 by 1/2 in. lg	2	
		---*---		
-63	A100433	. PLATE, Bearing	1	
		ATTACHING PARTS		
-64	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
-65	AN936B6	. WASHER	3	
		---*---		
-66	SS-77-R-6	. BEARING, Ball, double shield, stainless steel, 3/8 in. bore (ND)	1	
-67	5100-37-MI	. RING, Retaining, steel Cd pl and iridite, 0.338 in. free dia (WKI)	2	
-68	A100431	. SHAFT	1	
-69	C110183	. SWITCH, Rotary, band selector	1	
		ATTACHING PARTS		
-70	Coml	. NUT, Hex, 3/8-32, steel Cd pl and iridite, 1/2 across flats by 3/32 in. thick	1	
-71	AN936A616	. WASHER	1	
		---*---		
-72	B501713	. GEAR, Idler stop	1	
		ATTACHING PARTS		
-73	5133-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.207 in. ID (WKI)	1	
		---*---		
-74	A100805	. STUD, Idler gear	1	
		ATTACHING PARTS		
-75	B513917	. SCREW, Cap, button hd	1	
-76	AN935-8	. WASHER	1	
-77	AN960-8	. WASHER	1	
		---*---		
-78	SS-77-R-4-A	. BEARING, Ball, double shield, stainless steel, 1/4 in. bore (ND)	1	
		ATTACHING PARTS		
-79	5100-25-MI	. RING, Retaining, steel Cd pl and iridite, 0.225 in. free dia (WKI)	1	
		---*---		
-80	A100808	. HOUSING, Bearing	1	

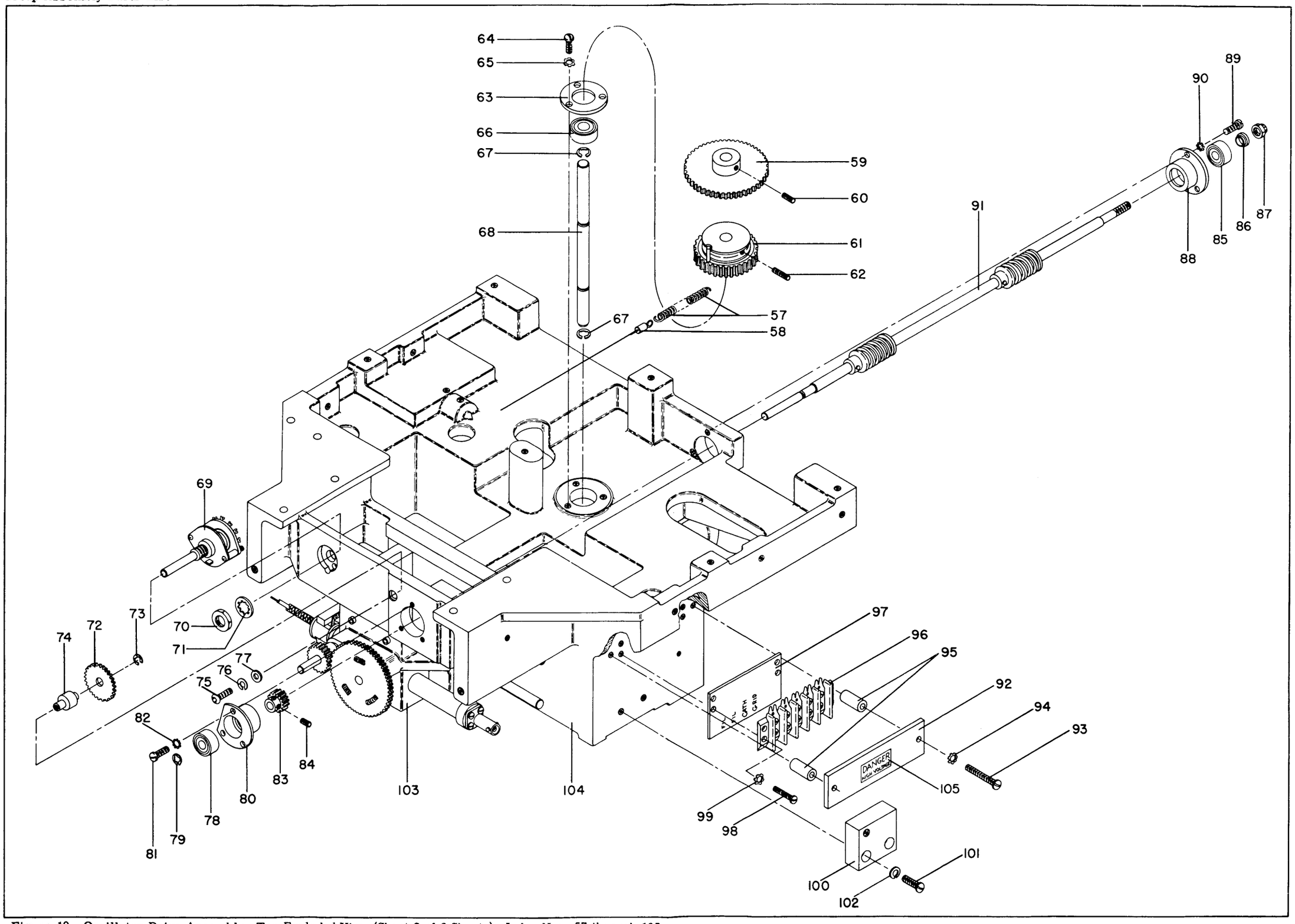


Figure 19. Oscillator Drive Assembly, Top Exploded View (Sheet 2 of 2 Sheets), Index Nos. 57 through 105

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		OSCILLATOR DRIVE ASSEMBLY (cont)		
		ATTACHING PARTS		
19-81	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
-82	AN936B6	. WASHER	3	
		---*---		
-83	AK50023	. GEAR ASSEMBLY	1	
		ATTACHING PARTS		
-84	Coml	. SCREW, Set, multiple spline hd, cup point, steel Cd pl and iridite, 6-32 by 3/16 in. lg	2	
		---*---		
-85	SS-77-R-4-A	. BEARING, Ball, double shield, stainless steel, 1/4 in. bore (ND)	1	
		ATTACHING PARTS		
-86	A23643	. WASHER	1	
-87	AN364-428	. NUT	1	
		---*---		
-88	A100434	. HOUSING, Bearing	1	
		ATTACHING PARTS		
-89	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 3/8 in. lg	3	
-90	AN936B6	. WASHER	3	
		---*---		
-91	B100447	. SHAFT ASSEMBLY	1	
-92	A102604	. PLATE	1	
		ATTACHING PARTS		
-93	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1 in. lg	2	
-94	AN936B6	. WASHER	2	
-95	B510157	. SPACER	2	
		---*---		
-96	A101498	. TERMINAL STRIP ASSEMBLY	1	
-97	A102605	. SPACER, Lettering	1	
		ATTACHING PARTS (for items 96 and 97)		
-98	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/8 in. lg	4	
-99	AN936B6	. WASHER	4	
		---*---		
-100	A104979	. BLOCK	1	
		ATTACHING PARTS		
-101	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 1/2 in. lg	2	
-102	AN935-8	. WASHER	2	
		---*---		
-103	D28839	. ATTENUATOR DRIVE ASSEMBLY (see figure 21 for breakdown)	REF	
		ATTACHING PARTS		
	B513919	. SCREW, Cap, button hd	REF	
	AN935-8	. WASHER	REF	
		---*---		
-104	F100389	. TUNING HEAD, Machining	1	
-105	AP24440	. DECAL	1	

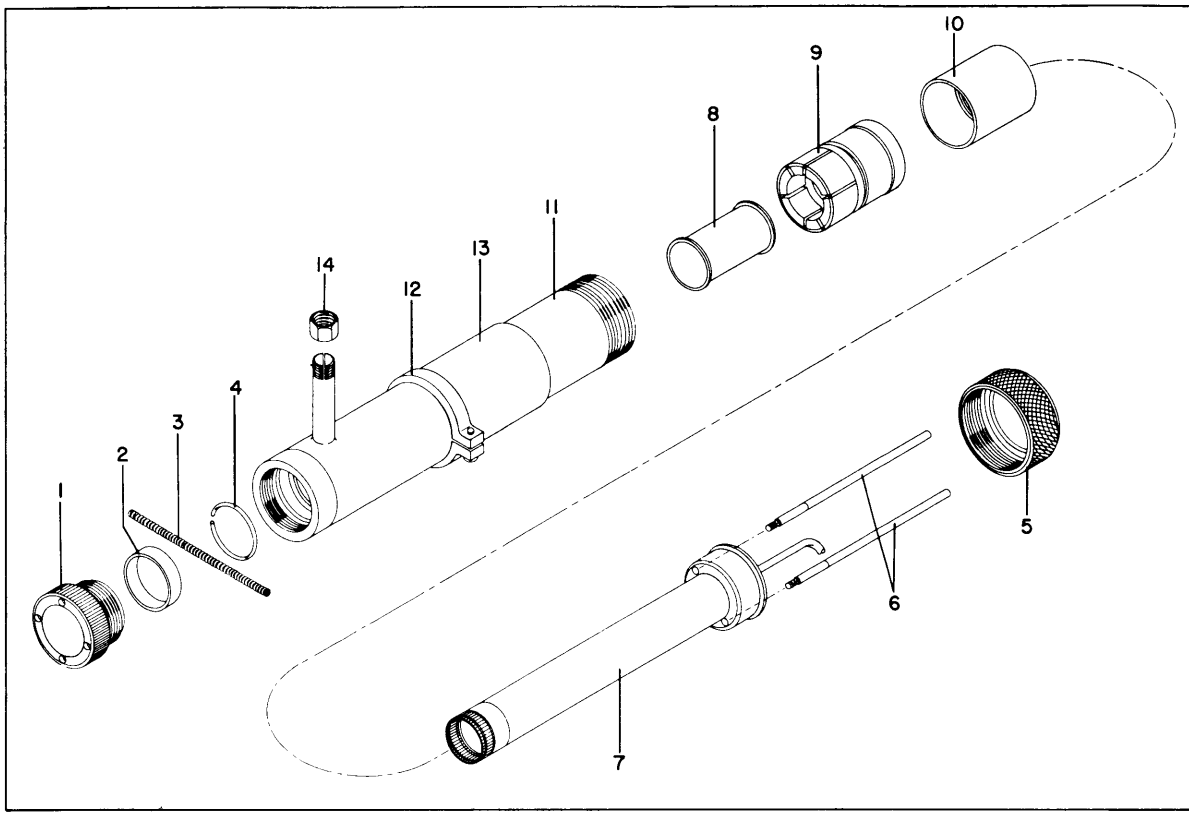


Figure 20. Klystron Oscillator Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		KLYSTRON OSCILLATOR ASSEMBLY		
20-	CP21672	OSCILLATOR ASSEMBLY, Klystron (see 37, figure 19, . . for next higher assembly)	REF	
-1	AP17839	. NUT, Retaining	1	
-2	AP17842	. WASHER, Retaining	1	
-3	AP17505	. SPRING, Contact	1	
-4	AP18258	. CORE, Contact spring	1	
-5	AP17847	. NUT, Barrel lock (see 40, fig. 19)	REF	
-6	AP18871-2	. PUSH ROD ASSEMBLY	2	
-7	BP18265-2	. INNER CONDUCTOR ASSEMBLY	1	
-8	AP18311-2	. SLEEVE, Bearing	1	
-9	B27379	. CHOKE BODY ASSEMBLY	1	
-10	AP18303	. SLEEVE, Outer	1	
-11	BP21671	. BARREL ASSEMBLY AND USCON CLOTH	1	
-12	AP19415	. . CLAMP, Seal	1	
		ATTACHING PARTS		
	Coml	. . SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 1/2 in. lg	1	
		---*---		
-13	BP20013	. . SEAL, Uscon cloth	1	
-14	AP20563	. NUT, Lock	1	

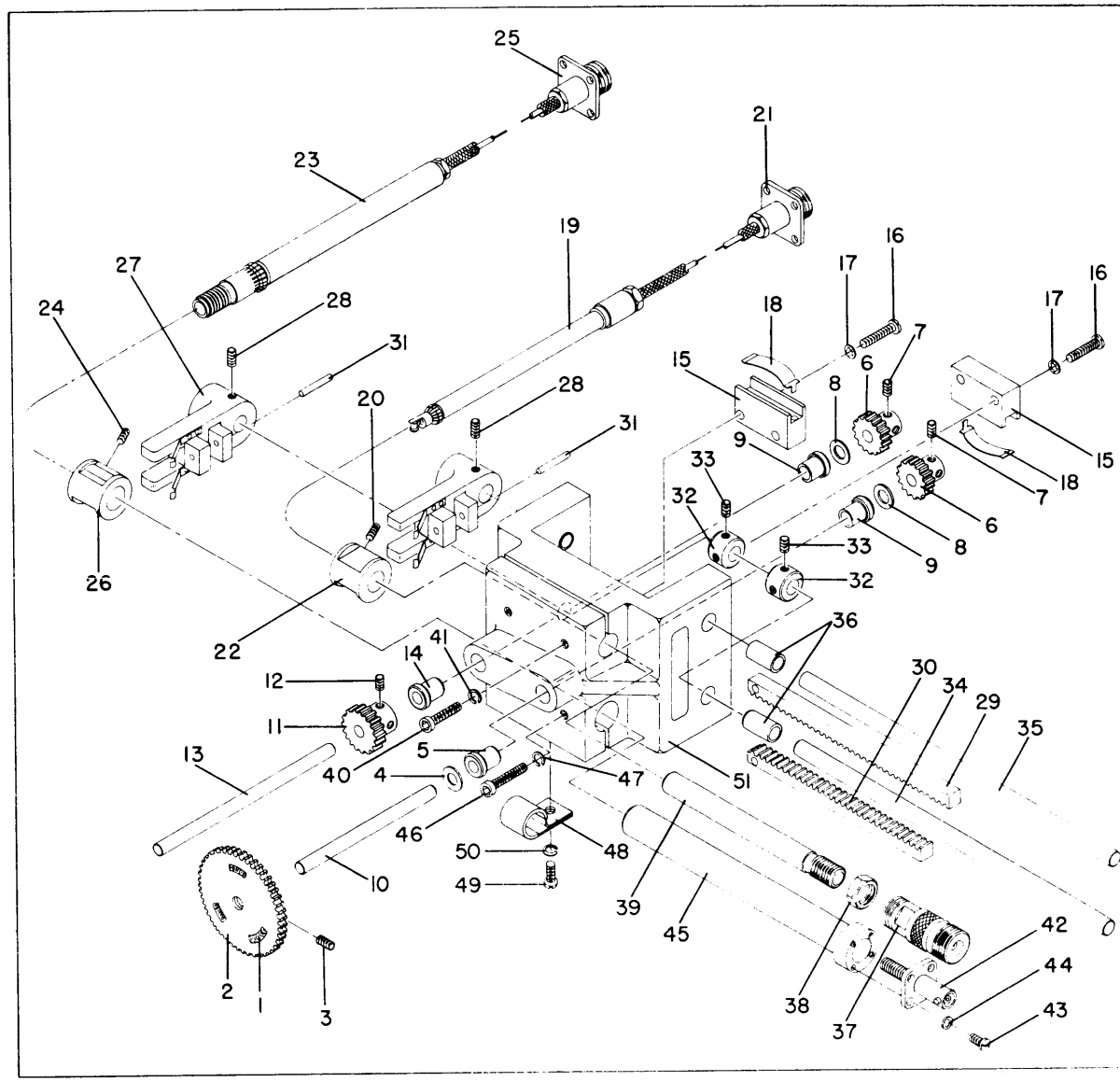


Figure 21. Attenuator Drive Assembly, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		ATTENUATOR DRIVE ASSEMBLY		
21-	D28839	ATTENUATOR DRIVE ASSEMBLY (see 103, figure 19, for next higher assembly)	REF	
-1	A519901	. SPRING	3	
-2	A100483	. SPLIT GEAR ASSEMBLY	1	
		ATTACHING PARTS		
-3	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/4 in. lg . . .	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		ATTENUATOR DRIVE ASSEMBLY (cont)		
21-4	AN960C416L	. WASHER	1	
-5	FB-46-3	. BEARING, Flanged, 1/4 ID by 3/8 OD by 3/8 in. lg(BGW)	1	
-6	A28824	. GEAR	2	
		ATTACHING PARTS		
-7	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	4	
		---*---		
-8	AN960C416L	. WASHER	2	
-9	FB-46-3	. BEARING, Flanged, 1/4 ID by 3/8 OD by 3/8 in. lg, flange OD 1/2 by 3/64 in. thick (BGW)	2	
-10	A501106	. SHAFT	1	
-11	A100814	. GEAR	1	
		ATTACHING PARTS		
-12	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 6-32 by 1/8 in. lg	2	
		---*---		
-13	A501102	. SHAFT	1	
-14	FB-46-3	. BEARING, Flanged, 1/4 ID by 3/8 OD by 3/8 in. lg(BGW)	1	
-15	A28826	. GUIDE, Rack	2	
		ATTACHING PARTS		
-16	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 6-32 by 5/8 in. lg	4	
-17	AN936A6	. WASHER	4	
		---*---		
-18	AK5509	. SPRING	2	
-19	B28835	. CABLE AND ATTENUATOR PROBE ASSEMBLY	1	
		ATTACHING PARTS		
-20	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 4-40 by 3/16 in. lg	2	
		---*---		
-21	MS2016	. . CONNECTOR, Receptacle, one female contact (MSG)	1	
-22	A102103	. COUPLING	1	
-23	BP28838	. PROBE ASSEMBLY	1	
		ATTACHING PARTS		
-24	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 4-40 by 3/16 in. lg	2	
		---*---		
-25	MS2016	. . CONNECTOR, Receptacle, one female contact (MSG)	1	
-26	A102103	. COUPLING	1	
-27	A28828	. YOKE ASSEMBLY	2	
		ATTACHING PARTS		
-28	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 8-32 by 1/4 in. lg	4	
		---*---		
-29	A504401	. RACK	1	
-30	A504402	. RACK	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		ATTENUATOR DRIVE ASSEMBLY (cont)		
		ATTACHING PARTS (for items 29 and 30)		
21-31	B523330	. PIN	2	
		---*---		
-32	AP13456	. COLLAR	2	
		ATTACHING PARTS		
-33	Coml	. SCREW, Set, socket hd, cup point, steel Cd pl and iridite, 8-32 by 1/8 in. lg	4	
		---*---		
-34	A501009	. ROD	1	
-35	A501009	. ROD	1	
-36	B-56-4	. BEARING, Plain, 5/16 ID by 3/8 OD by 1/2 in. lg(BGW)	4	
-37	AP23978	. CONNECTOR ASSEMBLY	1	
-38	AP23967	. NUT	1	
-39	A28823	. TUBE	1	
		ATTACHING PARTS		
-40	Coml	. SCREW, Cap, socket hd, steel Cd pl and iridite, 8-32 by 3/4 in. lg	2	
-41	AN935-8	. WASHER	2	
		---*---		
-42	AP23841	. ATTENUATOR COIL ASSEMBLY	1	
		ATTACHING PARTS		
-43	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 2-56 by 3/16 in. lg	4	
-44	AN936A2	. WASHER	4	
		---*---		
-45	A28830	. TUBE ASSEMBLY	1	
		ATTACHING PARTS		
-46	Coml	. SCREW, Cap, socket hd, steel Cd pl and iridite, 8-32 by 7/8 in. lg	2	
-47	AN935-8	. WASHER	2	
		---*---		
-48	MS9024-06	. CLAMP, Cushioned	1	
		ATTACHING PARTS		
-49	Coml	. SCREW, Mach, binding hd, steel Cd pl and iridite, 8-32 by 5/16 in. lg	1	
-50	AN935-8	. WASHER	1	
		---*---		
-51	C101253	. SUPPORT	1	

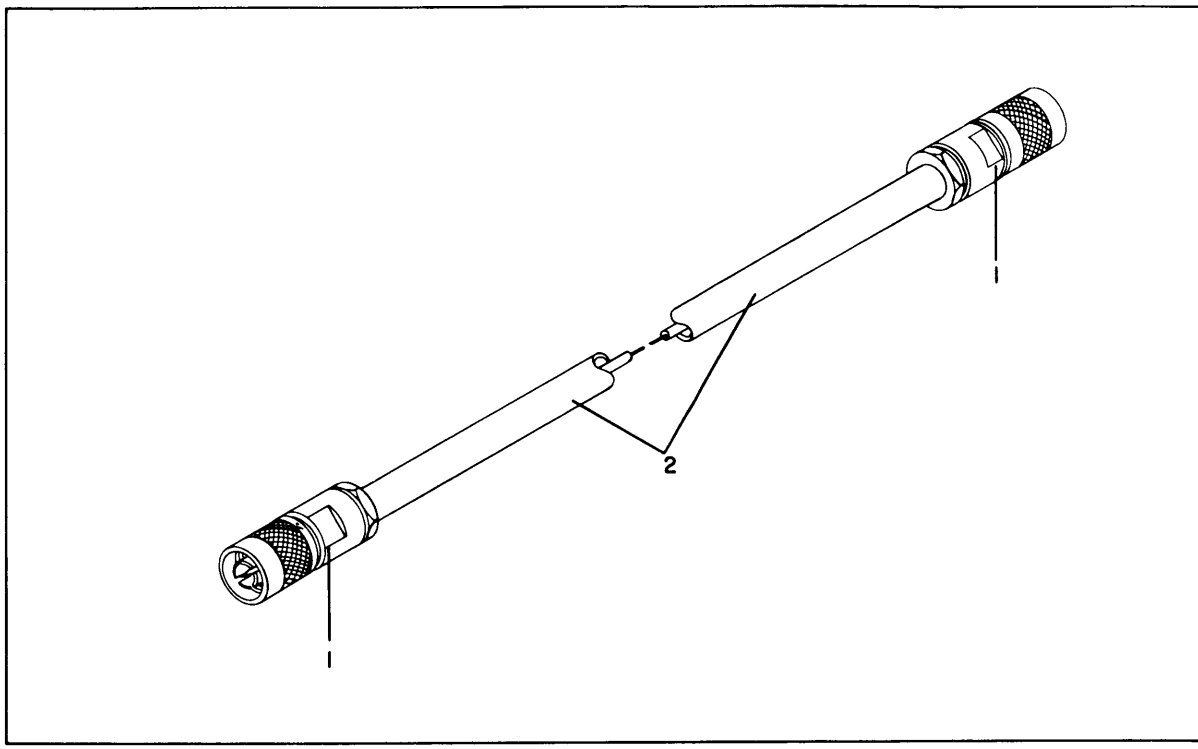


Figure 22. R-f Cable Assembly, CG-1526/U

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		RF CABLE ASSEMBLY CG-1526/U		
22-	A109816	RF CABLE ASSEMBLY CG-1526/U (1 ft 6 in.)	1	A
22-	A109817	RF CABLE ASSEMBLY CG-1526/U (6 ft 0 in.)	1	B
-1	UG-21D/U	. CONNECTOR, Plug (MIL-C-71A)	2	
-2	RG-9B/U	. CABLE, R-f (MIL-C-17B)	18 in.	A
-2	RG-9B/U	. CABLE, R-f (MIL-C-17B)	6 ft	B

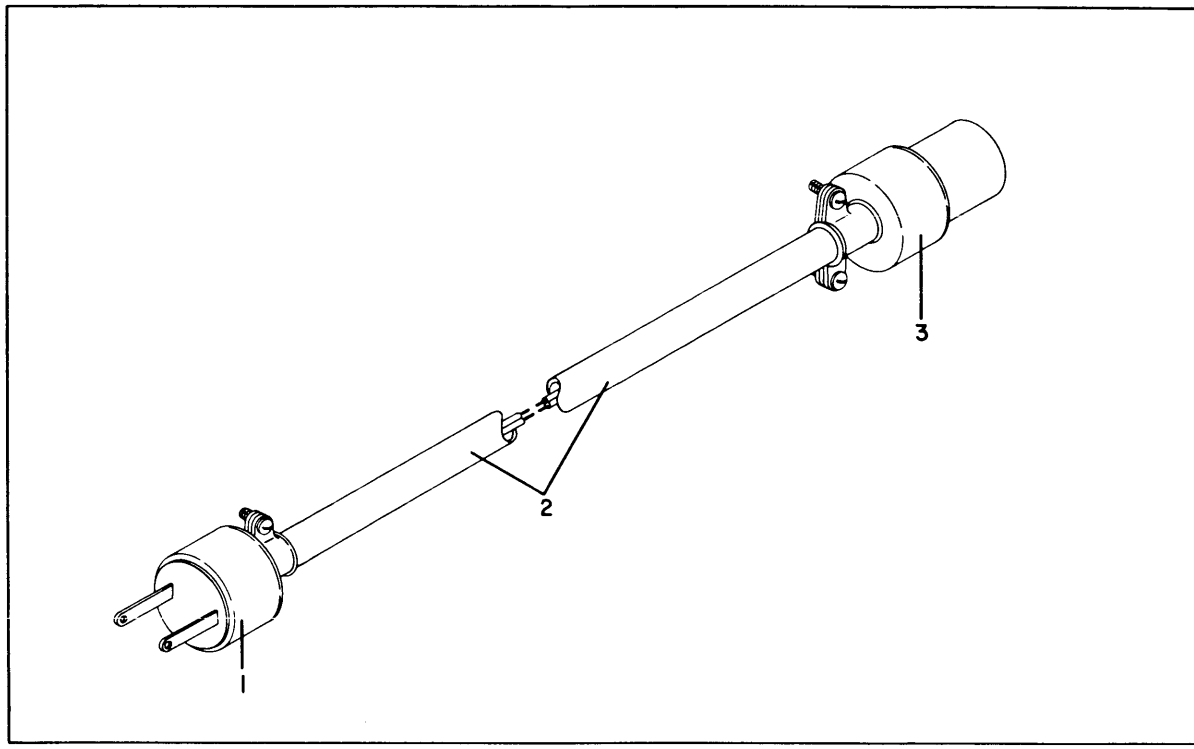


Figure 23. Electrical Power Cable Assembly, CX-3974/U

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		ELECTRICAL POWER CABLE ASSEMBLY CX-3974/U		
23-	A109818	ELECTRICAL POWER CABLE ASSEMBLY CX-3974/U . . .	1	
-1	AP16058	. CONNECTOR, Plug	1	
-2	A111056	. CABLE	10 ft	
-3	AK5593	. CONNECTOR, Plug	1	

SECTION III

NUMERICAL INDEX

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	CLIP		4-9	2	
			5-23		
	CLIP		7-29	1	
	CLIP		16-2	3	
	NUT		2-33	8	
			15-59		
			17-11		
			19-70		
	NUT		4-110	4	
			5-22		
	NUT		5-20	23	
			6-21		
			7-38		
			16-3		
			18-10		
			18-16		
	NUT		5-24	11	
			6-13		
			16-50		
			16-55		
	NUT		7-41	2	
	NUT		8-11	5	
	NUT		9-29	1	
	NUT		17-10	4	
	NUT		17-15	5	
	PIN		4-19	5	
			15-28		
			15-34		
			15-38		
	PIN		15-64	1	
	SCREW		2-7	8	
			14-4		
	SCREW		2-10	24	
			2-28		
			3-38		
			9-16		
			16-2		
	SCREW		2-11	95	
			2-14		
			2-17		
			2-18		
			2-19		
			2-27		
			2-34		
			2-44		
			2-45		
			5-23		
			10-		
			10-7		
			10-9		
			10-10		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity Per Article	Microfilm Index
	SCREW (cont)		10-15		
			10-40		
			11-57		
			11-77		
			11-91		
			11-94		
			12-7		
			13-24		
			15-56		
			16-10		
			16-20		
			17-23		
			19-4		
			19-64		
			19-81		
			19-89		
	SCREW		2-26	12	
			2-29		
			4-12		
			4-77		
			19-101		
	SCREW		3-1	29	
			4-23		
			4-26		
			4-30		
			4-61		
			4-86		
			4-95		
			11-65		
			14-9		
			16-38		
	SCREW		3-14	21	
			4-80		
			11-49		
			11-71		
			15-52		
			19-42		
			20-12		
	SCREW		4-2	16	
			9-55		
			13-14		
			16-28		
			17-2		
	SCREW		4-7	3	
	SCREW		4-15	2	
	SCREW		4-32	22	
			4-37		
			4-45		
			4-47		
			4-51		
			4-53		
			4-56		
			4-100		
			21-7		
			21-12		
	SCREW		4-59	6	
			4-89		
			4-92		
	SCREW		4-64	1	
	SCREW		4-71	10	
			21-43		
	SCREW		4-112	148	
			5-13		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity Per Article	Microfilm Index
	SCREW (cont)		6-9		
			6-33		
			6-45		
			7-16		
			7-20		
			7-35		
			7-54		
			8-20		
			8-22		
			8-23		
			9-4		
			9-12		
			9-27		
			9-48		
			11-25		
			11-31		
			11-43		
			11-61		
			11-78		
			17-5		
			17-20		
			18-27		
	SCREW		4-116	4	
	SCREW		5-2	47	
			6-6		
			8-2		
			8-20		
			9-41		
			11-5		
			11-19		
			11-40		
			11-75		
			11-76		
			17-8		
			18-2		
	SCREW		5-10	1	
	SCREW		5-27	19	
			6-29		
			7-69		
	SCREW		7-2	27	
			7-5		
			10-18		
			11-35		
			16-4		
			16-27		
	SCREW		7-24	9	
			7-27		
			7-30		
			21-49		
	SCREW		9-38	2	
	SCREW		11-2	8	
			13-5		
	SCREW		11-44	15	
			13-9		
			14-16		
			19-98		
			21-16		
	SCREW		11-53	4	
			11-89		
	SCREW		12-2	3	
	SCREW		12-5	1	
	SCREW		13-	6	
	SCREW		13-10	2	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity Per Article	Microfilm Index
	SCREW		13-15	4	
	SCREW		13-21	4	
	SCREW		14-1	10	
			15-54		
	SCREW		14-24	4	
	SCREW		15-13	3	
	SCREW		16-22	3	
			18-23		
	SCREW		16-34	2	
	SCREW		16-58	2	
	SCREW		16-59	2	
	SCREW		16-62	2	
	SCREW		19-7	6	
			19-93		
	SCREW		19-38	2	
	SCREW		19-62	2	
	SCREW		19-84	2	
	SCREW		21-3	2	
	SCREW		21-20	4	
			21-24		
	SCREW		21-28	4	
	SCREW		21-33	4	
	SCREW		21-40	2	
	SCREW		21-46	2	
	WASHER		2-7	4	
	WASHER		9-29	1	
	WASHER		14-4	4	
	AK50023		4-58	2	
			19-83		
	AK50106		5-11	1	
	AK50119		19-25	1	
	AK5079-B-1		16-12	1	
	AK5100		9-24	8	
			13-20		
			13-25		
			16-7		
	AK5388		19-31	1	
	AK5509		21-18	2	
	AK5593		23-3	1	
	AN3121-1819		3-4	1	
	AN3234-1		4-14	2	
	AN3307-1		9-18	2	
	AN340-10		11-2	8	
	AN340-4		4-18	87	
	AN340-416		11-4	10	
	AN340-6		2-3	117	
	AN340-8		2-26	41	
	AN363-1032		11-6	12	
	AN364-428		19-87	1	
	AN364-632		16-20	2	
	AN470A4-6		12-9	6	
	AN500-6-8		2-22	8	
	AN500A4-6		16-18	4	
	AN500A4-8		9-30	2	
	AN505-4-8		16-30	4	
	AN505-6-12		2-3	4	
	AN505-6-6		2-11	29	
	AN505-8-6		13-20	7	
	AN505-8-7		13-22	4	
	AN565D10H6		15-40	4	
	AN565D4H2		15-37	1	
	AN565D6H3		15-22	7	
	AN565D6H4		16-26	7	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	AN565D8H2		15-19	5	
	AN565D8H3		15-8	6	
	AN565D8H5		15-6	2	
	AN565D8H7		19-2	2	
	AN565D8H8		15-25	1	
	AN931-10-14		2-37	6	
	AN931-3-5		10-6	1	
	AN931-4-7		10-16	4	
	AN931-5-9		11-69	2	
	AN931-7-11		11-34	4	
	AN931-9-13		11-1	1	
	AN935-10		13-15	8	
	AN935-4		3-1	80	
	AN935-4L		5-10	1	
	AN935-416		19-23	2	
	AN935-6		2-22	51	
	AN935-8		3-39	32	
	AN936A10		5-20	22	
	AN936A2		4-8	13	
	AN936A3		5-27	19	
	AN936A4		4-24	119	
	AN936A416		4-110	9	
	AN936A6		4-3	38	
	AN936A616		2-33	8	
	AN936A8		4-13	26	
	AN936B10		11-2	17	
	AN936B4		16-32	2	
	AN936B416		5-24	15	
	AN936B6		2-3	162	
	AN936B8		2-10	48	
	AN960-10		16-3	1	
	AN960-10L		11-2	8	
	AN960-4		4-16	5	
	AN960-416L		11-4	8	
	AN960-6		2-17	28	
	AN960-6L		5-23	1	
	AN960-8		2-26	11	
	AN960C416L		21-4	3	
	AP10572		19-26	4	
			19-55		
	AP13456		21-32	2	
	AP13585		19-19	2	
	AP16058		23-1	1	
	AP16904		16-58	1	
	AP16962		4-42	1	
	AP17024		4-40	1	
	AP17505		20-3	1	
	AP17839		20-1	1	
	AP17842		20-2	1	
	AP17847		19-40	1	
			20-5	Ref	
	AP18232-1		4-20	4	
			4-119		
	AP18258		20-4	1	
	AP18303		20-10	1	
	AP18311-2		20-8	1	
	AP18871-2		20-6	2	
	AP19415		19-41	2	
			20-12		
	AP20051		19-32	1	
	AP20207		3-7	2	
	AP20563		20-14	1	
	AP21651-1		16-35	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	AP22309		19-24	2	
			19-49		
	AP22345		19-27	1	
	AP22365		16-53	8	
	AP23841		21-42	1	
	AP23904		16-51	1	
	AP23967		21-38	1	
	AP23978		21-37	1	
	AP24032		14-20	1	
	AP24440		2-9	3	
			19-105		
	ASG104-4M		10-12	2	
	A100123		4-54	1	
	A100124		4-48	1	
	A100125		4-	1	
	A100137		4-22	1	
	A100139		4-63	1	
	A100140		4-85	2	
	A100142		4-36	1	
	A100143		4-44	1	
	A100161		4-84	1	
	A100162		4-88	1	
	A100163		4-90	1	
	A100229		4-25	1	
	A100230		4-38	1	
	A100231		4-60	1	
	A100234		4-79	1	
	A100239		4-46	3	
			4-52		
			4-55		
	A100295		15-39	1	
	A100296		15-36	1	
	A100297		15-26	2	
			15-32		
	A100298		15-43	1	
	A100301		15-30	1	
	A100302		15-17	2	
	A100303		15-15	2	
	A100304		15-1	1	
	A100305		15-5	1	
	A100306		15-3	1	
	A100307		15-12	1	
	A100318		15-44	1	
	A100431		19-68	1	
	A100433		19-3	2	
			19-63		
	A100434		19-88	1	
	A100459		19-	1	
	A100469		19-59	1	
	A100477		16-66	1	
	A100483		16-25	3	
			16-64		
			21-2		
	A100493		10-36	1	
	A100510		11-5	2	
	A100616		4-91	1	
	A100655		13-22	2	
	A100667		6-20	1	
	A100668		6-19	1	
	A100669		6-18	1	
	A100671		6-17	1	
	A100672		6-21	1	
	A100673		6-30	6	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	A100674		6-31	9	
			7-53		
			16-40		
	A100675		6-46	1	
	A100676		5-34	17	
			6-27		
			7-66		
	A100805		19-74	1	
	A100808		19-80	1	
	A100814		21-11	1	
	A100822		5-19	1	
	A100823		7-38	1	
	A100824		7-37	1	
	A100825		7-36	1	
	A100844		13-21	2	
	A100851		13-23	1	
	A100852		13-	1	
	A100853		19-18	1	
	A100919		5-22	3	
	A100925		4-70	1	
	A100963		11-74	1	
	A100969		5-17	1	
	A100970		5-20	1	
	A101007		5-18	1	
	A101020		8-23	4	
			18-27		
	A101021		8-20	4	
			8-22		
	A101025		18-26	3	
	A101029		17-19	3	
	A101030		17-20	2	
	A101125		19-52	1	
	A101141		6-16	1	
	A101162		3-1	1	
	A101169		5-42	5	
	A101170		5-39	1	
	A101223		4-33	1	
	A101276		4-99	1	
	A101277		4-50	1	
	A101418		4-83	1	
	A101497		4-6	1	
	A101498		19-96	1	
	A101562		19-29	1	
	A101734		4-1	1	
	A101735		4-97	1	
	A101794		9-19	1	
	A101795		9-20	1	
	A101796		9-21	2	
	A101797		9-22	1	
	A101858		4-65	1	
	A101879		19-57	1	
	A101880		15-7	1	
	A101881		19-61	1	
	A101883		19-58	1	
	A101971		14-2	1	
	A101984		16-59	1	
	A101994		4-69	1	
	A102103		21-22	2	
			21-26		
	A102238		17-23	1	
	A102382		16-60	1	
	A102524		14-8	4	
	A102525		14-5	4	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	A102526		14-7	4	
	A102527		14-6	4	
	A102558		16-27	1	
	A102603		4-	1	
	A102604		19-92	1	
	A102605		19-97	1	
	A103756		4-114	1	
	A103757		4-109	1	
	A103758		4-102	1	
	A103759		4-110	1	
	A104838		16-52	2	
	A104843		16-54	1	
	A104979		19-100	1	
	A105030		16-54	1	
	A105290		16-61	1	
	A106002		16-3	1	
	A106053		13-16	1	
	A106088		13-17	1	
	A106105		15-4	1	
	A106578		4-94	1	
	A106815		7-43	1	
	A106886		7-	1	
	A106973		9-42	1	
	A107089		10-9	1	
	A107122		18-	1	
	A107123		18-	1	
	A107144		8-16	1	
	A107145		8-15	1	
	A107146		8-14	1	
	A107147		8-13	1	
	A107148		8-17	1	
	A107149		8-18	1	
	A107150		8-12	1	
	A107159		17-17	1	
	A107160		17-14	1	
	A107161		17-18	1	
	A107162		17-13	1	
	A107163		17-21	1	
	A107164		17-15	1	
	A107356		18-7	1	
	A107357		18-21	1	
	A107358		18-20	1	
	A107359		18-8	1	
	A107360		18-19	1	
	A107361		18-17	1	
	A107362		18-9	1	
	A107363		18-16	1	
	A107364		18-15	1	
	A107365		18-10	1	
	A107385		16-31	1	
	A107466		17-12	2	
	A107614		5-	1	
	A107633		6-	1	
	A108066		12-9	3	
	A108217		11-75	1	
	A108382		8-	1	
	A108383		8-	1	
	A108817		3-	1	
	A108818		3-	1	
	A108830		2-6	1	
	A108831		2-43	1	
	A108832		2-30	1	
	A108833		2-41	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	A108834		2-31	1	
	A108845		13-25	1	
	A109353		13-25	1	
	A109354		13-20	1	
	A109355		13-20	1	
	A109395		14-3	27 in.	
	A109431		15-47	1	
	A109625		4-	1	
	A109816		22-	1	
	A109817		22-	1	
	A109818		23-	1	
	A109878		15-21	1	
	A109879		15-61	1	
	A109880		15-55	1	
	A109881		15-51	1	
	A111056		23-2	120 in.	
	A113702		5-10	1	
	A114128		10-39	1	
	A18H		2-16	2	
			2-25		
			9-35	Ref	
	A23478		15-48	1	
	A23643		19-86	1	
	A24132		16-37	1	
	A24893		5-33	4	
			16-41		
	A26581		14-23	1	
	A27611		2-29	1	
	A28603		19-50	1	
	A28776		16-68	4	
	A28777-1		16-49	2	
	A28777-2		16-48	2	
	A28778		16-29	1	
	A28780		16-33	1	
	A28823		21-39	1	
	A28824		21-6	2	
	A28826		21-15	2	
	A28828		21-27	2	
	A28830		21-45	1	
	A501009		21-34	2	
			21-35		
	A501011		19-56	1	
	A501102		21-13	1	
	A501106		21-10	1	
	A504401		21-29	1	
	A504402		21-30	1	
	A504413		4-41	1	
	A506701		9-48	1	
	A507501		9-23	5	
	A507502		3-22	2	
	A510601		19-46	1	
	A514802		15-18	2	
			15-23		
	A519901		4-98	12	
			16-24		
			16-63		
			21-1		
	A7H		4-74	4	
			5-26		
			6-23		
			7-34		
	A7H-28		2-39	1	
			9-32	Ref	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	B-1012-4		19-53	1	
	B-1012-8		19-54	1	
	B-56-4		21-36	4	
	BP18265-2		20-7	1	
	BP20013		20-13	1	
	BP21671		20-11	1	
	BP23120		16-32	1	
	BP24030		14-17	1	
	BP28838		21-23	1	
	B100118		11-10	1	
	B100126		4-76	1	
	B100127		4-118	1	
	B100128		4-11	1	
	B100130		4-66	1	
	B100292		15-41	1	
	B100384		9-91	1	
	B100436		19-1	1	
	B100447		19-91	1	
	B100460		2-7	4	
			14-4		
	B100492		10-	1	
	B100773		2-26	1	
	B100776		2-17	2	
	B100780		2-45	1	
	B100781		2-27	1	
	B100783		2-14	1	
	B100806		13-12	1	
			16-	Ref	
	B100854		19-	1	
	B100918		9-45	1	
	B101014		11-112	1	
	B101225		4-	1	
	B101547		4-	1	
	B101548		19-34	1	
	B101789		13-9	1	
	B101823		11-	1	
	B102064		5-59	1	
	B102099		6-5	1	
	B102107		6-48	1	
	B102240		17-1	1	
	B102279		2-36	1	
			8-	Ref	
			9-1	Ref	
	B102280		8-1	1	
	B102283		8-24	1	
	B102400		18-1	1	
	B102401		18-31	1	
	B102403		13-24	1	
			18-	Ref	
	B102408		13-10	1	
			17-	Ref	
	B102491		17-	1	
	B102492		17-22	1	
	B102493		17-7	1	
	B102500		2-33	1	
			9-	Ref	
	B102712		14-	1	
	B102883		11-4	1	
	B106482		5-21	1	
	B106549		7-35	2	
	B106613		7-1	1	
	B106682		7-76	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	B106739		2-40	1	
			7-	Ref	
	B106778		4-10	1	
	B107093		2-18	1	
	B108018		3-40	1	
	B108068		12-1	1	
	B108071		14-22	1	
	B108755		2-28	2	
	B110052		2-44	1	
	B110525		13-14	1	
	B110674		19-21	1	
	B27379		20-9	1	
	B28817		10-8	1	
	B28822		11-3	1	
	B28835		21-19	1	
	B28843		11-2	1	
	B501709		4-28	1	
	B501713		19-72	1	
	B507204		19-20	1	
	B510012		3-24	2	
	B510157		19-95	2	
	B510164		13-9	2	
	B510169		3-13	8	
	B511504		9-41	1	
	B511506		12-4	1	
	B512812		4-75	1	
	B513917		19-75	1	
	B513919		13-18	3	
			19-103	Ref	
	B523330		21-31	2	
	C-JAN-1327		2-3	1	
	C-JAN-1353-21		2-5	1	
	CB11NX150K		16-43	1	
	CB11PX680K		4-111	1	
	CB21QX102K		4-108	20	
			5-27		
			6-29		
			7-69		
	CC20CH050C		8-19	2	
	CC20CH050D		6-24	1	
	CC20CH100D		18-18	3	
	CC20CH120J		4-101	1	
	CC20CH150J		7-75	1	
	CC20CH220J		9-54	1	
	CC20CJ030C		7-60	1	
	CC20CKOR5C		6-26	1	
	CC20CK010C		16-42	1	
	CC20CK1R2C		16-44	1	
	CC21UJ470J		7-63	2	
	CC21UJ510J		5-48	1	
	CC25CH330J		6-34	1	
	CC30CH510J		4-106	1	
	CE41C101H		11-9	1	
	CE41F800K		11-8	1	
	CE41F800R		9-29	1	
	CK60Y471Z		7-59	1	
	CK60Y821Z		4-103	32	
			5-29		
			6-25		
			7-49		
	CK61Y102Z		10-26	2	
	CK63Y103Z		5-38	17	
			10-29		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	CMG49920		2-21	1	
	CM15B390K		17-16	1	
	CM15C121J		5-57	1	
	CM15C181J		5-55	1	
	CM15C430J		5-58	1	
	CM15C470J		5-53	2	
			6-39		
	CM15C560J		5-30	1	
	CM20C102J		11-85	1	
	CM20C821J		5-41	3	
	CM30B182M		9-64	1	
	CM30E152J		5-54	1	
	CN-409/UPM-84		1-9	1	
	CN-410/UPM-84		1-11	1	
	CN-411/UPM-84		1-10	1	
	CN35AF103M		11-110	1	
	CN43AE503M		11-103	1	
	CN43EE104M		9-63	4	
			10-24		
			11-97		
	CP05A1EE223K		9-66	1	
	CP05A1EE224K		9-67	1	
	CP05A1KE473K		9-82	1	
	CP06FA2		16-20	1	
	CP06SA3		9-6	3	
	CP06SA4		11-46	1	
	CP06SA5		9-14	2	
			11-55		
	CP07SB3		11-67	3 pr	
	CP07SB5		11-6	1 pr	
	CP07SC4		11-7	2 pr	
			11-11		
	CP10A1EE105K		11-56	2	
			11-77		
	CP11A1EE105K		11-52	1	
	CP17230		16-28	1	
	CP21672		13-19	1	
			19-37	Ref	
			20-	Ref	
	CP26A1EF503K		11-100	1	
	CP53B1EF504K		11-91	1	
	CP54B4EF105K		11-76	1	
	CP55B1EB205K		9-15	1	
	CP55B1FB106K		9-16	1	
	CP61B1EF254K		9-7	1	
	CP61B1FF105K		9-13	1	
	CP61B1FG104M		16-19	1	
	CP61B1FG504K		11-54	1	
	CP61B6EF254K		9-5	2	
	CP61B6EF254M		11-45	1	
	CP69B1FG504M		10-15	1	
	CP69B4FG503M		10-14	3	
	CP70B1FF405K		11-66	3	
	CP70B1FH205K		11-6	1	
	CP70B1FH405K		11-7	1	
	CP70E1FF106K		11-11	1	
	CR-23/U		5-9	1	
	CR-56BNC		17-4	1	
	CR22		15-54	1	
	CST-50		4-113	18	
			4-107		
			8-11		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	CST-50 (cont)		17-10		
			18-14		
	CST-6		7-39	1	
	CY-2074/UPM-84		1-1	1	
	C100385		9-55	1	
	C100439		14-1	1	
	C100541		12-11	1	
	C100815		13-11	1	
			16-	Ref	
	C100834		16-23	1	
	C100915		11-68	1	
	C101015		11-94	1	
	C101138		3-37	1	
			4-	Ref	
	C101139		4-	1	
	C101253		21-51	1	
	C102065		5-	1	
	C102077		5-1	1	
	C102078		2-42	1	
			5-	Ref	
	C102153		6-	1	
	C102154		2-32	1	
			6-	Ref	
	C102283		8-4	1	
	C102402		18-	1	
	C102494		17-	1	
	C103301		2-19	1	
			12-	Ref	
	C105060		16-69	1	
	C105061		16-	1	
	C105062		16-47	1	
	C105063		13-13	1	
			16-	Ref	
	C105064		13-	1	
			16-	Ref	
	C105465		13-9	1	
	C105787		2-4	1	
	C106670		7-	1	
	C106722		7-	1	
	C106930		9-92	1	
	C107094		2-10	1	
	C107097		10-38	1	
	C107101		2-11	1	
			10-	Ref	
	C108017		3-41	1	
	C110057		15-58	1	
	C110183		19-69	1	
	C503337		14-	1	
	C503338		14-	1	
	C503339		14-	1	
	C503340		13-7	1	
	C503341		13-8	1	
	C503342		13-6	1	
	C504526		7-23	8	
			7-26		
			7-28		
	C504529		10-17	4	
	D-JAN1354		3-9	1	
	D100291		15-65	1	
	D100308		13-15	1	
			15-	Ref	
	D100610		14-34	1	
	D100855		2-12	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	D100914		11-92	1	
	D101128		2-1	1	
	D101561		2-34	1	
			9-	Ref	
	D101817		11-	1	
	D102087		13-5	1	
			14-	Ref	
	D102713		14-	1	
	D102846		3-52	1	
	D107391		2-35	1	
			3-	Ref	
	D108774		1-19	1	
	D108775		1-20	1	
	D108835		2-	1	
	D110348		2-	1	
			9-	Ref	
	D28839		13-18	1	
			19-103	Ref	
			21-	Ref	
	E101962		2-13	1	
			11-	Ref	
	E102202		2-2	1	
			13-	Ref	
	E108753		2-	1	
	F-335/UPM-84		1-8	1	
	F-336/UPM-84		1-7	1	
	F-337/UPM-84		1-6	1	
	F-338/UPM-84		1-4	1	
	F-341/UPM-84		1-5	1	
	FB-46-2		15-20	5	
			15-31		
			15-42		
			15-63		
	FB-46-3		16-67	5	
			21-5		
			21-9		
			21-14		
	FHN20G		3-20	4	
	F02G5R00A		3-6	4	
	F100389		19-104	1	
	F100461		13-	1	
			19-	Ref	
	F100642		13-	1	
	HS2-2-1/2"		14-9	1	
	H10		19-45	1	
	LH22XXO		3-12	4	
	MRE26H		11-15	1	
	MRE34H		11-13	1	
	MS15571-2		3-8	5	
			3-11		
	MS2016		14-10	4	
			14-13		
			21-21		
			21-75		
	MS21919DG8		2-29	2	
	MS24019		11-113	1	
	MS24020		11-14	1	
	MS24021		11-84	1	
	MS24022		11-12	1	
	MS24027		2-22	5	
			9-30		
	MS24028		2-38	5	
			4-73		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	MS24028 (cont)		5-25		
			6-22		
			7-33		
			9-31	Ref	
	MS24033		2-15	2	
			2-24		
			9-34	Ref	
	MS24034		9-33	2	
			16-18		
	MS35059-9		3-19	1	
	MS9024-06		21-48	1	
	MX-1530/U		8-5	4	
			8-8		
			18-6		
			18-13		
	M5P-LRN		12-10	1	
	M5S-LS		2-20	1	
	NBC-K15-8		12-6	1	
	PF-7W2MM		7-40	1	
	PM1PLS		19-44	1	
	PM1SLRN		16-16	1	
	QS200-M24S		19-35	1	
	R-4-A		15-9	2	
	R-50		5-49	1	
	RC20GF100K		5-51	1	
	RC20GF101K		6-32	10	
			7-65		
			9-70		
			11-80		
	RC20GF102K		7-51	3	
			10-28		
	RC20GF103K		4-115	5	
			5-45		
			9-76		
			9-69		
	RC20GF104K		7-50	2	
			10-20		
	RC20GF105K		9-49	2	
			11-82		
	RC20GF111J		3-43	1	
	RC20GF112J		3-51	1	
	RC20GF123J		9-52	3	
			9-65		
	RC20GF124J		9-68	1	
	RC20GF124K		11-90	2	
			11-108		
	RC20GF151J		3-44	3	
			16-39		
			16-54		
	RC20GF151K		5-56	2	
	RC20GF152K		9-87	1	
	RC20GF153J		9-50	1	
	RC20GF153K		9-46	2	
			9-61		
	RC20GF154K		9-59	3	
			11-111		
	RC20GF155K		10-22	1	
	RC20GF181J		3-45	1	
	RC20GF182K		7-48	1	
	RC20GF183J		9-58	1	
	RC20GF183K		7-52	1	
	RC20GF202J		7-67	1	
	RC20GF220J		16-54	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	RC20GF221K		5-44	2	
	RC20GF222K		16-45	1	
	RC20GF223J		9-53	1	
	RC20GF223K		5-52	9	
			7-61		
			9-60		
			11-98		
			19-17		
	RC20GF225J		9-74	1	
	RC20GF241J		3-46	2	
			16-46		
	RC20GF242J		19-11	1	
	RC20GF274K		9-90	2	
			11-86		
	RC20GF331J		3-47	1	
	RC20GF331K		5-32	3	
			6-42		
			7-68		
	RC20GF332K		5-35	2	
			7-56		
	RC20GF333K		5-47	2	
			7-71		
	RC20GF334K		9-85	5	
			11-87		
			11-99		
	RC20GF360J		18-29	1	
	RC20GF361J		18-24	2	
	RC20GF364J		9-57	1	
	RC20GF390K		6-43	1	
	RC20GF391J		3-48	1	
	RC20GF394K		9-72	1	
	RC20GF395K		9-47	1	
	RC20GF434J		9-75	1	
	RC20GF435K		11-81	1	
	RC20GF471K		4-105	3	
			7-73		
	RC20GF472K		5-28	3	
			6-40		
			9-73		
	RC20GF473K		7-55	2	
			9-83		
	RC20GF474K		9-56	7	
			11-79		
	RC20GF510J		6-28	2	
	RC20GF511J		18-30	2	
	RC20GF560K		6-41	1	
	RC20GF564K		9-80	1	
	RC20GF620J		18-25	1	
	RC20GF621J		3-49	1	
	RC20GF624J		9-78	1	
	RC20GF680K		6-44	3	
	RC20GF681K		7-62	1	
	RC20GF682K		5-50	2	
	RC20GF683K		11-83	2	
			11-109		
	RC20GF684K		9-81	1	
	RC20GF821J		3-50	1	
	RC20GF821K		5-43	2	
	RC20GF910J		3-42	1	
	RC20GF911J		7-74	1	
	RC32GF102K		7-72	1	
	RC32GF104K		16-15	1	
	RC32GF122J		4-104	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	RC32GF123J		9-62	1	
	RC32GF151K		7-64	1	
	RC32GF154K		11-105	1	
	RC32GF222K		5-40	2	
	RC32GF223J		9-77	1	
	RC32GF274K		16-21	1	
	RC32GF331K		10-25	1	
	RC32GF473K		11-106	1	
	RC32GF683K		11-102	1	
	RC42GF101K		10-27	1	
	RC42GF103K		9-86	1	
	RC42GF106K		10-31	6	
	RC42GF135K		10-32	1	
	RC42GF152K		16-36	1	
	RC42GF154K		10-35	1	
	RC42GF221K		7-70	1	
	RC42GF223K		9-79	1	
	RC42GF225K		10-33	2	
	RC42GF273K		10-30	1	
	RC42GF303J		9-89	2	
	RC42GF333K		11-104	4	
	RC42GF335K		10-23	2	
	RC42GF472K		11-101	5	
	RC42GF562K		9-88	1	
	RC42GF683K		9-71	3	
			11-107		
	RG-55/U		2-30	96-1/2 in.	
			2-43		
			4-34		
			14-12		
			14-15		
			14-32		
	RG-71/U		2-6	168-3/8 in.	
			2-31		
			2-41		
			3-32		
			3-35		
			8-6		
			8-9		
			13-6		
			13-7		
			13-8		
			14-19		
			18-5		
			18-12		
	RG-9B/U		22-2	90 in.	
	RH50V202H		11-65	1	
	RN20X4223F		19-14	1	
	RN20X6193F		19-15	1	
	RN25X2873F		19-16	1	
	RN25X3163F		19-13	1	
	RN30X4223F		19-12	1	
	RN30X5113F		19-10	2	
	RP101RD6ROKK		3-27	1	
	RU4B1R5J		11-95	2	
	RU4B2R7J		10-34	2	
	RU4B3R3J		11-96	2	
	RV4NATSA503A		16-11	1	
	RV4NATSB255A		3-23	1	
	RV4NATSB504A		3-25	1	
	RV4NATSD102A		13-20	2	
			13-25		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	RV4NATSD104A		3-26	3	
			11-73		
	RV4NATSD105A		3-21	3	
			9-40		
	RV4NATSD502A		3-30	1	
	RV4NATSD503A		3-29	5	
			9-36		
			11-72		
			16-6		
	RV4NATSD504A		9-43	1	
	RW29G200		11-53	1	
	RW31G312		11-88	2	
	RW31G502		11-89	1	
	SS-77-R-3		19-51	1	
	SS-77-R-4-A		19-78	2	
			19-85		
	SS-77-R-6		19-66	1	
	TS-1011/UPM-84		1-2	1	
	TS101P01		10-10	8	
			11-19		
			11-40		
			11-70		
	TS102P01		4-112	22	
			5-12		
			6-8		
			7-19		
			9-4		
			9-27		
			11-24		
	TS102U01		4-4	5	
			5-4		
			6-2		
			7-10		
			9-25		
	TS102U02		5-5	11	
			6-1		
			7-9		
			9-2		
	TS102U03		11-20	6	
	TS103P01		7-15	10	
			9-12		
			11-30		
			11-43		
	TS103U02		7-8	9	
			9-8		
			11-28		
	TS103U03		11-41	1	
	T1060P27-5		4-112	22	
			5-15		
			6-11		
			7-22		
			9-4		
			9-27		
			11-27		
	UG-1094/U		5-16	10	
			6-12		
			7-46		
			9-28		
			9-44		
	UG-1098/U		17-11	2	
	UG-119/UP		14-28	1	
	UG-1239/UPM-84		1-12	1	
	UG-1240/UPM-84		1-13	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	UG-1241/UPM-84		1-14	1	
	UG-1242/UPM-84		1-18	1	
	UG-21D/U		22-1	4	
	UG-260B/U		2-6	16	
			2-31		
			3-33		
			3-36		
			8-7		
			8-10		
			13-6		
			13-7		
			13-8		
			14-18		
			18-11		
	UG-290A/U		16-54	1	
	UG-536A/U		14-11	2	
			14-30		
	UG-627A/U		18-4	1	
	UG-637/U		14-33	1	
	UG-88C/U		2-30	9	
			2-41		
			2-43		
			4-35		
			14-14		
			14-31		
	UG-910/U		3-31	2	
			3-34		
	X1246-C 1/8		11-93	1	
	X1942-X		5-36	21	
			6-36		
			7-47		
			10-21		
	X5133-11		4-39	1	
	OA2WA		11-22	4	
	OB2WA		11-23	1	
	1N21B		14-29	1	
	1N69		5-46	3	
			9-84		
			19-9		
	1N78		14-21	1	
	1N82		6-35	1	
	1Z2		10-5	2	
	10-006B		7-4	46-5/8 in.	
			7-7		
			19-43		
	1106-00		13-14	4	
	1108-00		16-5	7	
			16-27		
	1114-5		16-50	3	
			16-55		
	118525		10-37	1	
	118930B		7-44	3	
			16-14		
	118930C		7-45	2	
			16-13		
	118930G		6-14	1	
	12AT7WA		9-11	4	
			11-29		
	125-2-2G		13-1	1	
	125-6-2G		3-2	1	
	15Y		11-16	3	
	154458		12-9	3	
	175-6-2G		13-2	1	

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	20K14167P27-5		7-18	10	
			9-12		
			11-33		
			11-43		
	2101-06-00		9-37	3	
			11-64		
	2103-10-00		5-31	7	
			6-47		
			8-21		
			18-22		
	2104-04-00		6-45	9	
			16-38		
			16-56		
	2104-06-00		5-37	17	
			6-15		
			6-37		
			7-58		
			9-51		
			10-13		
	2104-08-00		7-27	4	
			18-28		
	2109-14-01		6-38	1	
	3		11-36	3	
	3T		10-1	1	
	32		10-11	7	
			11-17		
	327		5-24	11	
			6-13		
			16-50		
			16-55		
	33302		5-10	1	
	3539-14		4-57	1	
	42		11-37	3	
	44250		14-27	1	
	47		13-9	4	
	482		11-44	1	
	5ADP7		2-23	1	
	5R4WGA		11-18	3	
	51A2		7-57	1	
	5100-25-MI		4-43	3	
			4-49		
			19-79		
	5100-37-MI		19-67	2	
	5101-25		15-11	1	
	5133-12-MI		15-46	1	
	5133-18-MI		4-93	3	
			15-16		
	5133-25-MI		15-2	5	
			15-10		
			15-29		
			15-35		
			19-73		
	53D20911		16-51	1	
	5654/6AK5W/6096		5-6	3	
			6-3		
			7-14		
	5725/6AS6W/6187		9-26	1	
	5750/6BE6W		5-7	2	
	5751WA		9-10	1	
	5814WA		7-11	4	
			9-9		
	6AF4A		4-5	2	
			16-1		

Class Code or Stock Number	Part Number	AF Source Code	Figure and Index No.	Quantity per Article	Microfilm Index
	6AN5		7-13	1	
	6AU6WA		9-3	2	
	6BL6		19-36	1	
	6J4WA		6-4	3	
	6N045T		11-42	1	
	6RS25PB1ABH1		11-5	1	
	6X4W		11-21	2	
			16-9		
	6080WA		11-38	2	
	6098/6AR6WA		10-2	2	
			11-39		
	6186/6AG5WA		5-8	3	
			7-12		
	6856-005-000		11-35	2	
	70-2-2G		3-5	1	
	70-3-2G		2-8	12	
			3-3		
	70-5-2G		13-4	1	
	708		13-9	4	
	753		16-22	1	
	760		6-33	16	
			7-54		
			11-60		
			11-78		
	766		18-23	2	
	77-R-4		4-21	2	
	77-R-6		19-6	1	
	8290		10-7	3	
			16-10		
	8292		10-4	3	
			16-8		
	90-3-2G		13-3	1	
	901L		10-3	2	
	922210-111		3-18	1	
	922210-115		3-28	1	
	929		11-53	4	
			11-89		

SECTION IV

REFERENCE DESIGNATION INDEX

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
AT2	14-23		A26581
AT3	21-19		B28835
AT4	21-23		BP28838
B601	12-6		NBC-K15-8
CR1	14-21		1N78
CR2	14-29		1N21B
CR3	19-9		1N69
CR101	6-35		1N82
CR201	5-46		1N69
CR501	9-84		1N69
CR601	11-5		6RS25PB1ABH1

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
C1	16-47		C105062
C2	16-43		CB11NX150K
C3	16-44		CC20CK1R2C
C4	16-42		CC20CK010C
C5	16-50		327
C13	18-14		CST-50
C14	18-14		CST-50
C15	18-18		CC20CH100D
C16	18-14		CST-50
C17	18-14		CST-50
C18	18-18		CC20CH100D
C19	18-14		CST-50
C21	18-14		CST-50
C22	18-18		CC20CH100D
C23	18-14		CST-50
C24	17-16		CM15B390K
C25	17-10		CST-50
C26	17-10		CST-50
C27	17-10		CST-50
C28	17-10		CST-50
C29	16-19		CP61B1FG104M
C31	16-55		327
C32	16-55		327
C101	6-26		CC20CK0R5C
C102	6-25		CK60Y821Z
C103	6-24		CC20CH050D
C104	6-29		CB21QX102K
C105	6-29		CB21QX102K
C106	6-29		CB21QX102K
C107	6-29		CB21QX102K
C108	6-29		CB21QX102K
C109	6-29		CB21QX102K
C111	6-29		CB21QX102K
C112	6-29		CB21QX102K
C113	6-29		CB21QX102K
C114	6-29		CB21QX102K
C115	6-29		CB21QX102K
C116	6-29		CB21QX102K
C117	6-25		CK60Y821Z
C118	6-34		CC25CH330J
C119	6-29		CB21QX102K
C121	6-25		CK60Y821Z
C122	6-25		CK60Y821Z
C123	6-39		CM15C470J
C124	6-25		CK60Y821Z
C125	6-25		CK60Y821Z
C126	6-25		CK60Y821Z
C127	6-13		327
C128	6-13		327
C129	6-13		327
C130	6-25		CK60Y821Z
C131	6-13		327
C201	5-30		CM15C560J
C202	5-29		CK60Y821Z
C203	5-29		CK60Y821Z
C204	5-27		CB21QX102K
C205	5-58		CM15C430J
C206	5-29		CK60Y821Z
C207	5-29		CK60Y821Z
C208	5-38		CK63Y103Z
C209	5-29		CK60Y821Z
C211	5-57		CM15C121J
C212	5-29		CK60Y821Z
C214	5-38		CK63Y103Z

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
C216	5-29		CK60Y821Z
C217	5-29		CK60Y821Z
C218	5-38		CK63Y103Z
C219	5-38		CK63Y103Z
C221	5-41		CM20C821J
C222	5-27		CB21QX102K
C223	5-29		CK60Y821Z
C224	5-55		CM15C181J
C225	5-54		CM30E152J
C226	5-27		CB21QX102K
C227	5-53		CM15C470J
C228	5-38		CK63Y103Z
C229	5-38		CK63Y103Z
C231	5-38		CK63Y103Z
C232	5-38		CK63Y103Z
C233	5-38		CK63Y103Z
C234	5-41		CM20C821J
C235	5-29		CK60Y821Z
C236	5-38		CK63Y103Z
C237	5-38		CK63Y103Z
C238	5-38		CK63Y103Z
C239	5-38		CK63Y103Z
C242	5-38		CK63Y103K
C243	5-38		CK63Y103K
C244	5-24		327
C245	5-41		CM20C821J
C246	5-29		CK60Y821Z
C247	5-38		CK63Y103K
C248	5-24		327
C249	5-48		CC21UJ510J
C251	5-24		327
C252	5-24		327
C301	4-103		CK60Y821Z
C302	4-111		CB11NX680K
C303	4-113		CST-50
C304	4-107		CST-50
C305	4-101		CC20CH120J
C306	4-94		A106578
C307	4-106		CC30CH510J
C308	4-108		CB21QX102K
C401	7-49		CK60Y821Z
C402	7-49		CK60Y821Z
C403	7-59		CK60Y471Z
C404	7-39		CST-6
C405	7-60		CC20CJ030C
C406	7-75		CC20CH150J
C407	7-63		CC21UJ470J
C408	7-49		CK60Y821Z
C409	7-69		CB21QX102K
C410	7-49		CK60Y821Z
C411	7-49		CK60Y821Z
C412	7-69		CB21QY102K
C413	7-63		CC21UJ 70J
C414	7-49		CK60Y821Z
C415	7-49		CK60Y821Z
C416	7-49		CK60Y821Z
C417	7-49		CK60Y821Z
C418	7-49		CK60Y821Z
C419	7-49		CK60Y821Z
C421	7-69		CB21QX102K
C423	7-49		CK60Y821Z
C450	8-11		CST-50
C451	8-19		CC20CH050C
C452	8-19		CC20CH050C

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
C453	8-11		CST-50
C454	8-11		CST-50
C455	8-11		CST-50
C456	8-11		CST-50
C501	9-16		CP55B1FB106K
C502	9-7		CP61B1EF254K
C503	9-13		CP61B1FF105K
C504	9-67		CP05A1EE224K
C505	9-82		CP05A1KE473K
C506	9-5		CP61B6EF254K
C507	9-5		CP61B6EF254K
C508	9-15		CP55B1EB205K
C509	9-64		CM30B182M
C510	9-54		CC20CH220J
C511	9-63		CN43EE104M
C512	9-66		CP05A1EE223K
C514	9-29		CE41F800R
C601	11-7		CP70B1FH405K
C602	11-54		CP61B1FG504K
C603	11-100		CP26A1EF503K
C604	11-103		CN43AE503M
C605	11-6		CP70B1FH205K
C606	11-8		CE41F800K
C607	11-11		CP70E1FF106K
C608	11-45		CP61B6EF254M
C609	11-76		CP54B4EF105K
C610	11-77		CP10A1EE105K
C611	11-52		CP11A1EE105K
C612	11-66		CP70B1FF405K
C613	11-66		CP70B1FF405K
C614	11-66		CP70B1FF405K
C615	11-97		CN43EE104M
C616	10-24		CN43EE104M
C617	10-24		CN43EE104M
C618	10-29		CK63Y103Z
C619	10-26		CK61Y102Z
C620	11-85		CM20C102J
C621	10-26		CK61Y102Z
C622	10-14		CP69B4FG503M
C623	10-14		CP69B4FG503M
C624	10-14		CP69B4FG503M
C625	10-15		CP69B1FG504M
C626	10-12		ASG104-4M
C627	10-12		ASG104-4M
C628	11-9		CE41C101H
C629	11-56		CP10A1EE105K
C630	11-110		CN35AF103M
C632	11-91		CP53B1EF504K
DS1	13-9		47
DS2	13-9		47
DS3	13-9		47
DS4	13-9		47
FL1	16-52		A104838
FL2	16-52		A104838
FL101	2-29		A27611
FL301	4-6		A101497
FL302	4-6		A101497
FL401	7-35		B106549
FL402	7-35		B106549
FL601	11-75		A108217
F601	3-6		F02G5R00A
F602	3-6		F02G5R00A
J3	16-54		UG-290A/U

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
J4	14-30		UG-536A/U
J5	14-23		A26581
J6	14-23		A26581
J7	14-28		UG-119/UP
J8	14-28		UG-119/UP
J9	14-33		UG-637/U
J14	17-11		UG-1098/U
J15	17-11		UG-1098/U
J22	16-14		118930B
J23	16-13		118930C
J24	16-16		PM1SLRN
J25	14-17		BP24030
J26	21-42		AP23841
J27	14-13		MS2016
J28	14-17		BP24030
J29	21-25		MS2016
J31	14-10		MS2016
J32	21-21		MS2016
J33	21-37		AP23978
J34	3-31		UG-910/U
J36	16-18		MS24034
J101	6-12		UG-1094/U
J102	6-12		UG-1094/U
J103	6-12		UG-1094/U
J104	6-14		118930G
J105	6-12		UG-1094/U
J106	2-22		MS24027
J107	3-34		UG-910/U
J201	5-16		UG-1094/U
J202	5-16		UG-1094/U
J203	2-22		MS24027
J301	2-22		MS24027
J401	7-46		UG-1094/U
J402	7-45		118930C
J403	7-44		118930B
J404	7-44		118930B
J405	7-46		UG-1094/U
J408	2-22		MS24027
J501	9-28		UG-1094/U
J502	9-44		UG-1094/U
J503	9-33		MS24034
J504	9-30		MS24027
J601	11-75		A108217
J602	12-10		M5P-LRN
J603	11-70		TS101P01
J606	11-84		MS24021
J607	11-113		MS24019
K501	9-18		AN3307-1
K601	11-63		AN3307-1
K602	11-42		6N045T
L1	16-37		A24132
L3	16-40		A100674
L4	16-41		A24893
L6	18-7		A107356
L7	18-21		A107357
L8	18-20		A107358
L9	18-8		A107359
L11	18-19		A107360
L12	18-17		A107361
L13	18-9		A107362
L14	18-16		A107363
L15	18-15		A107364
L16	18-10		A107365

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
L17	17-12		A107466
L18	17-17		A107159
L19	17-14		A107160
L21	17-18		A107161
L22	17-13		A107162
L23	17-21		A107163
L24	17-12		A107466
L25	17-15		A107164
L101	6-27		A100676
L102	6-27		A100676
L103	6-27		A100676
L104	6-27		A100676
L105	6-21		A100672
L106	6-46		A100675
L107	6-30		A100673
L108	6-30		A100673
L109	6-27		A100676
L111	6-31		A100674
L112	6-30		A100673
L113	6-30		A100673
L114	6-31		A100674
L115	6-27		A100676
L116	6-30		A100673
L117	6-30		A100673
L118	6-27		A100676
L119	6-27		A100676
L121	6-31		A100674
L122	6-17		A100671
L123	6-27		A100676
L124	6-27		A100676
L125	6-31		A100674
L126	6-27		A100676
L202	5-17		A100969
L203	5-34		A100676
L204	5-33		A24893
L205	5-19		A100822
L207	5-39		A101170
L208	5-33		A24893
L209	5-22		A100919
L211	5-42		A101169
L212	5-34		A100676
L213	5-20		A100970
L214	5-33		A24893
L215	5-34		A100676
L216	5-22		A100919
L217	5-42		A101169
L218	5-42		A101169
L219	5-22		A100919
L221	5-42		A101169
L222	5-49		R-50
L223	5-42		A101169
L302	4-114		A103756
L303	4-109		A103757
L304	4-102		A103758
L305	4-110		A103759
L401	7-66		A100676
L403	7-38		A100823
L404	7-53		A100674
L405	7-53		A100674
L406	7-66		A100676
L407	7-37		A100824
L408	7-53		A100674
L409	7-53		A100674

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
L411	7-66		A100676
L450	8-16		A107144
L451	8-15		A107145
L452	8-14		A107146
L453	8-13		A107147
L454	8-17		A107148
L455	8-18		A107149
L456	8-12		A107150
M1	14-9		HS2-2-1/2"
P3	14-31		UG-88C/U
P4	14-27		44250
P6	14-27		44250
P7	14-27		44250
P8	14-33		UG-637/U
P9	18-4		UG-627A/U
P12	18-11		UG-260B/U
P13	13-7		UG-260B/U
P14	13-7		UG-260B/U
P15	13-6		UG-260B/U
P16	13-6		UG-260B/U
P17	13-8		UG-260B/U
P18	13-8		UG-260B/U
P19	14-18		UG-260B/U
P21	3-33		UG-260B/U
P24	19-44		PM1PLS
P25	14-20		AP24032
P26	14-14		UG-88C/U
P33	14-11		UG-536A/U
P34	2-6		UG-260B/U
P36	2-15		MS24033
P101	4-35		UG-88C/U
P102	2-31		UG-260B/U
P103	8-7		UG-260B/U
P105	2-30		UG-88C/U
P106	6-22		MS24028
P107	2-6		UG-260B/U
P108	3-36		UG-260B/U
P109	2-31		UG-260B/U
P201	2-30		UG-88C/U
P202	2-43		UG-88C/U
P203	5-25		MS24028
P301	4-73		MS24028
P401	2-41		UG-88C/U
P405	8-10		UG-260B/U
P408	7-33		MS24028
P501	2-41		UG-88C/U
P502	2-43		UG-88C/U
P503	2-24		MS24033
P503	9-34		MS24033
P504	2-38		MS24028
P504	9-31		MS24028
P601	23-3		AK5593
P602	2-20		M5S-LS
P604	23-1		AP16058
P606	11-12		MS24022
P607	11-14		MS24020
RT401	7-57		51A2
R1	16-46		RC20GF241J
R2	16-45		RC20GF222K
R3	16-39		RC20GF151J
R4	16-36		RC42GF152K
R5	16-6		RV4NATSD503A
R6	13-12		B100806

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
R7	16-11		RV4NATSA503A
R8	16-15		RC32GF104K
R9	16-21		RC32GF274K
R10	16-54		RC20GF220J
R11	19-11		RC20GF242J
R12	19-13		RN25X3163F
R13	19-16		RN25X2873F
R14	19-14		RN20X4223F
R15	19-15		RN20X6193F
R16	19-10		RN30X5113F
R17	19-10		RN30X5113F
R18	19-12		RN30X4223F
R19	19-17		RC20GF223K
R21	13-25		RV4NATSD102A
R22	18-30		RC20GF511J
R23	18-29		RC20GF360J
R24	18-30		RC20GF511J
R25	18-25		RC20GF620J
R26	18-24		RC20GF361J
R27	18-24		RC20GF361J
R28	13-20		RV4NATSD102A
R29	16-54		RC20GF151J
R100	6-28		RC20GF510J
R101	6-44		RC20GF680K
R102	6-44		RC20GF680K
R103	6-32		RC20GF101K
R104	6-44		RC20GF680K
R105	6-43		RC20GF390K
R106	6-41		RC20GF560K
R107	6-40		RC20GF472K
R108	6-42		RC20GF331K
R109	6-28		RC20GF510J
R201	5-28		RC20GF472K
R202	5-35		RC20GF332K
R203	5-40		RC32GF222K
R204	5-32		RC20GF331K
R205	5-56		RC20GF151K
R206	5-52		RC20GF223K
R207	5-40		RC32GF222K
R208	5-51		RC20GF100K
R209	5-56		RC20GF151K
R211	5-52		RC20GF223K
R212	5-50		RC20GF682K
R213	5-44		RC20GF221K
R214	5-43		RC20GF821K
R215	5-50		RC20GF682K
R216	5-44		RC20GF221K
R217	5-45		RC20GF103K
R218	5-43		RC20GF821K
R219	5-47		RC20GF333K
R301	4-115		RC20GF103K
R302	4-105		RC20GF471K
R303	4-104		RC32GF122J
R401	7-50		RC20GF104K
R403	7-51		RC20GF102K
R404	7-65		RC20GF101K
R405	7-51		RC20GF102K
R406	7-48		RC20GF182K
R407	7-61		RC20GF223K
R408	7-74		RC20GF911J
R409	7-62		RC20GF681K
R411	7-73		RC20GF471K
R412	7-61		RC20GF223K

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
R413	7-70		RC42GF221K
R414	7-72		RC32GF102K
R415	7-64		RC32GF151K
R416	7-73		RC20GF471K
R417	7-71		RC20GF333K
R418	7-65		RC20GF101K
R419	7-67		RC20GF202J
R421	7-68		RC20GF331K
R422	7-55		RC20GF473K
R423	7-52		RC20GF183K
R424	7-56		RC20GF332K
R502	9-36		RV4NATSD503A
R503	9-78		RC20GF624J
R504	9-56		RC20GF474K
R505	9-60		RC20GF223K
R506	9-56		RC20GF474K
R507	9-73		RC20GF472K
R508	9-40		RV4NATSD105A
R509	9-72		RC20GF394K
R511	9-59		RC20GF154K
R512	3-21		RV4NATSD105A
R513	9-79		RC42GF223K
R514	9-69		RC20GF103K
R515	9-80		RC20GF564K
R516	9-57		RC20GF364J
R517	9-21		A101796
R519	9-83		RC20GF473K
R521	9-60		RC20GF223K
R522	9-86		RC42GF103K
R523	9-81		RC20GF684K
R524	9-89		RC42GF303J
R525	9-56		RC20GF474K
R526	9-56		RC20GF474K
R527	9-89		RC42GF303J
R528	9-90		RC20GF274K
R529	9-75		RC20GF434J
R531	9-36		RV4NATSD503A
R532	9-59		RC20GF154K
R533	9-77		RC32GF223J
R534	9-88		RC42GF562K
R535	9-76		RC20GF103K
R536	9-65		RC20GF123J
R537	9-40		RV4NATSD105A
R538	9-65		RC20GF123J
R539	9-56		RC20GF474K
R541	9-47		RC20GF395K
R542	9-49		RC20GF105K
R543	9-85		RC20GF334K
R544	9-42		A106973
R546	9-70		RC20GF101K
R547	9-69		RC20GF103K
R549	9-71		RC42GF683K
R550	9-71		RC42GF683K
R553	9-20		A101795
R554	9-19		A101794
R555	9-74		RC20GF225J
R558	9-43		RV4NATSD504A
R559	9-61		RC20GF153K
R561	9-62		RC32GF123J
R562	9-46		RC20GF153K
R563	9-22		A101797
R564	3-30		RV4NATSD502A
R565	3-29		RV4NATSD503A

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
R566	9-21		A101796
R567	9-58		RC20GF183J
R568	9-50		RC20GF153J
R569	9-87		RC20GF152K
R571	9-53		RC20GF223J
R572	9-68		RC20GF124J
R573	9-52		RC20GF123J
R574	9-56		RC20GF474K
R601	11-105		RC32GF154K
R602	11-107		RC42GF683K
R603	11-104		RC42GF333K
R604	11-104		RC42GF333K
R605	11-79		RC20GF474K
R606	11-106		RC32GF473K
R607	11-104		RC42GF333K
R608	11-104		RC42GF333K
R609	11-72		RV4NATSD503A
R610	11-65		RH50V202H
R611	11-102		RC32GF683K
R612	11-101		RC42GF472K
R613	11-101		RC42GF472K
R614	11-101		RC42GF472K
R615	11-101		RC42GF472K
R616	11-101		RC42GF472K
R618	11-80		RC20GF101K
R619	11-80		RC20GF101K
R620	11-53		RW29G200
R621	11-86		RC20GF274K
R622	11-111		RC20GF154K
R623	11-80		RC20GF101K
R624	11-83		RC20GF683K
R625	11-108		RC20GF124K
R626	11-99		RC20GF334K
R627	11-73		RV4NATSD104A
R628	11-98		RC20GF223K
R631	11-80		RC20GF101K
R632	11-87		RC20GF334K
R633	11-87		RC20GF334K
R634	11-80		RC20GF101K
R635	11-90		RC20GF124K
R636	11-109		RC20GF683K
R637	11-99		RC20GF334K
R638	11-73		RV4NATSD104A
R639	11-98		RC20GF223K
R640	11-80		RC20GF101K
R641	11-89		RW31G502
R642	11-96		RU4B3R3J
R643	11-88		RW31G312
R644	11-88		RW31G312
R645	3-26		RV4NATSD104A
R646	3-27		RP101RD6ROKK
R647	11-95		RU4B1R5J
R648	10-25		RC32GF331K
R649	10-30		RC42GF273K
R650	11-96		RU4B3R3J
R651	10-27		RC42GF101K
R652	10-20		RC20GF104K
R653	10-28		RC20GF102K
R654	10-34		RU4B2R7J
R655	10-34		RU4B2R7J
R656	10-31		RC42GF106K
R657	10-31		RC42GF106K
R658	10-31		RC42GF106K

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
R659	10-31		RC42GF106K
R660	11-95		RU4B1R5J
R661	10-31		RC42GF106K
R662	10-31		RC42GF106K
R663	3-25		RV4NATSB504A
R664	10-35		RC42GF154K
R665	10-33		RC42GF225K
R666	10-32		RC42GF135K
R667	3-23		RV4NATSB255A
R668	10-33		RC42GF225K
R669	10-23		RC42GF335K
R671	10-23		RC42GF335K
R672	10-22		RC20GF155K
R673	3-42		RC20GF910J
R674	3-43		RC20GF111J
R675	3-44		RC20GF151J
R676	3-45		RC20GF181J
R677	3-46		RC20GF241J
R678	3-47		RC20GF331J
R679	3-48		RC20GF391J
R680	3-49		RC20GF621J
R681	3-50		RC20GF821J
R682	3-51		RC20GF112J
R683	11-82		RC20GF105K
R684	11-81		RC20GF435K
S1	17-4		CR-56BNC
S2	16-57		AN3234-1
S3	15-54		CR22
S5	19-69		C110183
S8	15-58		C110057
S301	4-14		AN3234-1
S601	3-19		MS35059-9
S602	3-41		C108017
TB1	19-		B100854
TB501	9-55		C100385
TB601	10-		B100492
TB602	11-94		C101015
TB603	10-39		A114128
T101	6-20		A100667
T102	6-19		A100668
T103	6-18		A100669
T104	6-16		A101141
T201	5-18		A101007
T206	5-21		B106482
T400	7-40		PF-7W2MM
T401	7-36		A100825
T601	11-10		B100118
T602	11-4		B102883
T603	10-8		B28817
T604	11-3		B28822
T605	11-2		B28843
V1	19-36		6BL6
V2	16-9		6X4W
V3	16-1		6AF4A
V101	6-4		6J4WA
V102	6-4		6J4WA
V103	6-4		6J4WA
V104	6-3		5654/6AK5W/6096
V201	5-6		5654/6AK5W/6096
V202	5-7		5750/6BE6W
V203	5-7		5750/6BE6W
V204	5-8		6186/6AG5WA
V205	5-8		6186/6AG5WA

Reference Designation	Figure Index	Class Code or Stock Number	Part Number
V301	4-5		6AF4A
V401	7-11		5814WA
V402	7-12		6186/6AG5WA
V403	7-13		6AN5
V404	7-14		5654/6AK5W/6096
V501	9-10		5751WA
V502	9-9		5814WA
V503	9-9		5814WA
V504	9-3		6AU6WA
V505	9-3		6AU6WA
V506	9-26		5725/6AS6W/6187
V507	9-9		5814WA
V508	9-11		12AT7WA
V601	11-18		5R4WGA
V602	11-39		6098/6AR6WA
V603	11-29		12AT7WA
V604	11-22		OA2WA
V605	11-22		OA2WA
V606	11-22		OA2WA
V607	11-23		OB2WA
V608	11-18		5R4WGA
V609	11-18		5R4WGA
V610	11-21		6X4W
V611	11-38		6080WA
V612	11-29		12AT7WA
V613	11-38		6080WA
V614	11-29		12AT7WA
V615	11-22		OA2WA
V616	10-2		6098/6AR6WA
V617	10-5		1Z2
V618	10-5		1Z2
V619	2-23		5ADP7
W1	14-		C503337
W2	14-		C503338
W3	14-		B102712
W4	3-		A108817
W5	14-		C503339
W6	18-		A107122
W7	18-		A107123
W8	13-7		C503340
W9	13-6		C503342
W10	13-8		C503341
W101	2-6		A108830
W102	3-		A108818
W103	2-31		A108834
W104	2-30		A108832
W105	6-		A107633
W201	5-		A107614
W301	4-34		RG-55/U
W302	4-		A109625
W401	8-		A108383
W402	8-		A108382
W403	7-		A106886
W501	2-43		A108831
W502	2-41		A108833
W601	23-		A109818
Y201	5-9		CR-23/U

APPENDIX II

MAINTENANCE ALLOCATION

1. General

a. The maintenance allocation portion of this manual assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are defined as follows:

(1) *Part or component.* Only the nomenclature or standard item name is annotated in this column. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically. Assemblies and subassemblies are in alphabetical sequence with their components listed alphabetically immediately below the assembly listing.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations. These are defined as follows:

(a) *Service.* To clean, to preserve, and to replenish fuel and lubricants.

(b) *Adjust.* To regulate periodically to prevent malfunction.

(c) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) *Replace.* To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(f) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

(g) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the Maintenance Allocation Chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are defined as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and

maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* A dagger (†) symbol placed in columns 2 and 6 indicates the echelons allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maint nance by Using Organizations

When this equipment is used by Signal service organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

3. Mounting Hardware

The basic entries of the Maintenance Allocation Chart do not include mounting hardware such as screws, nuts, bolts, washers, brackets, clamps, etc.

4. Comments or Suggestions

Any comments concerning omissions and discrepancies in this manual will be prepared on DA Form 2028 and forwarded direct to Commanding Officer, U.S. Army Signal Materiel Support Agency, ATT: SIGMS/M, Fort Monmouth, N.J.

MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
ANALYZER, SPECTRUM AN/UPM-84	service		X					Exterior only
	adjust				X	X	1 thru 17	Use tool equip
	inspect		X					Visual, exterior only
	test				X	X	1 thru 17	
	repair				X			
	align				X	X	1 thru 17	
	calibrate				X	X	1 thru 17	
	rebuild					X		
ADAPTER, COAXIAL TO WAVEGUIDE UG-1239/UPM-84	replace		X					
ADAPTER, COAXIAL TO WAVEGUIDE UG-1240/UPM-84	replace		X					
ADAPTER, COAXIAL TO WAVEGUIDE UG-1241/UPM-84	replace		X					
ADAPTER, RADIO FREQUENCY CABLE UG-1242/UPM-84	replace		X					
ATTENUATOR, VARIABLE CN-409/UPM-84	replace		X					
ATTENUATOR, VARIABLE CN-410/UPM-84	replace		X					
ATTENUATOR, VARIABLE CN-411/UPM-84	replace		X					
CABLE ASSEMBLY, POWER, ELECTRICAL CX-3974/UPM-84	replace		X					
	repair				X			
CABLE, POWER, ELECTRICAL	replace				X			
CONNECTORS	replace				X			
CABLE ASSEMBLY, RADIO FREQUENCY CG-92B/U	replace		X					
	repair				X			
CABLE, RADIO FREQUENCY	replace				X			
CONNECTORS	replace				X			
CABLE ASSEMBLY, RADIO FREQUENCY CG-546A/U	replace		X					
	repair				X			
CABLE, RADIO FREQUENCY	replace				X			
CONNECTORS	replace				X			
CASE, ELECTRICAL EQUIPMENT CY-2074/UPM-84	replace		X					
	repair				X			
	rebuild					X	Fabricate	if required
CATCH, LUGGAGE	replace				X			
COVER	repair				X			
HINGE	replace				X			
STRIKE	replace				X			
HANDLES	replace				X			

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/UPM-84 (continued)								
HINGE	replace				X			
FILTER, BAND PASS F-335/UPM-84	replace		X					
FILTER, BANDPASS F-336/UPM-84	replace		X					
FILTER, BANDPASS F-337/UPM-84	replace		X					
FILTER, BANDPASS F-338/UPM-84	replace		X					
FILTER, BANDPASS T-341/UPM-84	replace		X					
ANALYZER, SPECTRUM TS-1011/UPM-84	repair rebuild				X	X		
ADAPTER, CONNECTOR	replace				X			
ADAPTER, SWITCH ACTUATOR	replace				X			
AMPLIFIER, VIDEO	replace repair				X X			
ANGLES, SUPPORT	replace					X		Fabricate if required
ARM, PIVOT, DIAL MOUNT	replace					X		Fabricate if required
ARM, ROTOR	replace					X		Fabricate if required
ATTENUATOR, ASSEMBLY	replace				X			
ATTENUATOR, FIXED	replace				X			
ATTENUATOR, SWITCH ASSEMBLY	replace				X			
BALL, BEARING	replace					X		Procure locally
BASE, OSCILLATOR	replace					X		Fabricate if required
BEARING, BALL, ANNULAR	replace				X			
BEARING, SLEEVE	replace					X		Procure locally
BEZEL, INSTRUMENT MOUNTING	replace					X		Procure locally
BLOCK, ALUMINUM	replace					X		Fabricate if required
BLOCK ASSEMBLY	replace					X		Fabricate if required
BLOCK ASSEMBLY YOKE	replace					X		Procure locally
BLOCK, CAM FOLLOWER	replace					X		Procure locally
BLOCK, SPACER	replace					X		Fabricate if required
BLOCK TUNING HEAD GUIDE	replace					X		Procure locally
BOARD, DETAIL	replace					X		Fabricate if required
BOARD, INSULATION	replace					X		Fabricate if required
BODY ASSEMBLY, MIXER STAGE FREQUENCY	replace					X		Procure locally
BODY, CAM	replace					X		Procure locally
BOX ASSEMBLY, BLOWER MOUNTING	replace					X		Procure locally
BOX, MARKER ASSEMBLY	replace					X		Procure locally

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/UPM-84 (continued)								
BRACKETS AND BRACKET ASSEMBLIES	replace				X			Fabricate if required
BUSHING, BRASS	replace					X		Procure locally
CABLE ASSEMBLY, NARROW BAND	repair				X			
CABLE, ELECTRICAL, RADIO FREQUENCY	replace				X			
CONNECTOR, PLUG, ELECTRICAL	replace				X			
SHIELD, ELECTRICAL CONNECTOR	replace				X			
CABLE RADIO FREQUENCY	replace				X			
CABLE, STEEL	replace				X			Procure locally
CABLE AND CONNECTOR ASSEMBLYS	repair				X			
CALIBRATOR, SPECTRUM	replace				X			
CAM, CONTROL	replace					X		Procure locally
CAP, ELECTRICAL	replace				X			
CAP ASSEMBLY, FILTER	replace					X		Procure locally
CAPACITORS	replace				X			
CAPACITOR ASSEMBLY	replace				X			
CHASSIS ASSEMBLIES	replace					X		Fabricate if required
CHOKE, RADIO FREQUENCY	replace				X			
CLAMP, CABLE, ALUMINUM	replace				X			
CLAMP, CABLE, BRASS	replace				X			
CLAMP, CABLE, NYLON	replace				X			Fabricate if required
CLEVIS, ROD END	replace					X		Fabricate if required
CLIP, SPRING TENSION	replace				X			
COIL, RADIO FREQUENCY	replace				X			
COLLAR, SHAFT	replace				X			Procure locally
COMPONENT BOARD ASSEMBLY	replace				X			Fabricate if required
CONNECTOR, PLUG, ELECTRICAL	replace				X			
CONNECTOR, RECEPTACLE, ELECTRICAL	replace				X			
CONNECTOR ASSEMBLY	replace				X			
CONTACT, ELECTRICAL	replace				X			
COVERS, INCLOSURE	replace					X		Fabricate if required
COVER, JACK	replace				X			
CRYSTAL UNIT, QUARTZ	replace				X			
DECALS	replace				X			Fabricate if required
DIAL ASSEMBLY	replace					X		Procure locally
DIAL AND DRUM ASSEMBLY	replace					X		Procure locally
DIAL, SCALE	replace				X			
DRUM, DIAL	replace					X		Procure locally

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/UPM-84 (continued)								
DRUM, DIAL FREQUENCY	replace					X		Procure locally
ELECTRON TUBES	replace		X					
ELECTRON TUBES: V3,V301,V619	replace				X			
EYELET, TURNLOCK FASTENER	replace				X			
FAN AXIAL	repair				X			
FAN, ELECTRICAL ROTATING EQUIPMENT	replace				X			
MOTOR, ALTERNATING CURRENT	replace				X			
FERRULE, WIRE ROPE	replace				X			Fabricate if required
FILTER ASSEMBLY, SWEEPER	replace				X			
FILTER, LIGHT, CATHODE RAY TUBE	replace				X			
FLANGE ASSEMBLY	replace					X		Procure locally
FRAME AND WINDOW ASSEMBLY	replace				X			
FRAME ASSEMBLY, SPECTRUM ANALYZER	repair					X		Fabricate if required
FRAME, DIAL WINDOW	replace				X			
FUSE, CARTRIDGE	replace	X						
FUSEHOLDER	replace				X			
GASKETS	replace				X			
GEAR ASSEMBLY	replace				X			
GEARS	replace					X		Procure locally
GENERATOR, SWEEP	replace				X			
GROMMETS	replace				X			
GUIDE, RAIL ASSEMBLY	replace					X		Procure locally
HANDLE, BAIL	replace				X			
HOLDER, CRYSTAL UNIT	replace				X			
HOLDER, SEMI-CONDUCTOR DEVICE	replace				X			
HOUSING ASSEMBLY	replace					X		Fabricate if required
HUBS	replace					X		Procure locally
INDUCTOR, VARIABLE	replace				X			
INSULATOR BLOCK, THERMAL	replace					X		Fabricate if required
INSULATOR, BUSHING	replace					X		Fabricate if required
INSULATOR, DISK	replace					X		Fabricate if required
INSULATOR, PLATE	replace					X		Fabricate if required
INSULATOR, STANDOFF	replace				X			
JACK, TIP	replace				X			
KEY, SOCKET HEAD SCREW	replace				X			Procure locally
KLYSTRON COVER AND SOCKET ASSEMBLY	replace				X			
KNOBS	replace		X					

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/UPM-84 (continued)								
LABELS	replace				X			Fabricate if required
LAMP, INCANDESCENT	replace	X						
LAMPHOLDER	replace				X			
LEG, ELECTRICAL EQUIPMENT	replace					X		Fabricate if required
LIGHT, INDICATOR	replace				X			
LENS, INDICATOR LIGHT	replace		X					
LOCK, SHAFT	replace					X		Procure locally
MAIN FRAME ASSEMBLY	repair					X		
MIXER STAGE FREQUENCY	replace				X			
MOUNT ASSEMBLY, DIAL	replace					X		Fabricate if required
NUT, ADJUSTABLE	replace					X		Procure locally
OSCILLATOR ASSEMBLY	replace				X			
OSCILLATOR PLATE ASSEMBLY	replace				X			
PANELS	replace					X		Fabricate if required
PARTITIONS	replace					X		Fabricate if required
PINS, STEEL	replace					X		Fabricate if required
PIVOT, ARM ASSEMBLY	replace					X		Fabricate if required
PLATE ASSEMBLIES	replace					X		Fabricate if required
PLATE DESIGNATION (P/O DIAL ASSY)	replace				X			
PLATES, IDENTIFICATION	replace					X		Fabricate if required
PLUG, BUTTON	replace				X			
PLUG, DIAL END	replace					X		Fabricate if required
PLUG, SPRING ANCHOR	replace					X		Fabricate if required
POINTER, DIAL	replace					X		Fabricate if required
POST, BINDING	replace				X			Fabricate if required
POST, GEAR, SPUR	replace					X		Fabricate if required
POST, RETAINER, ELECTRON TUBE	replace				X			Fabricate if required
POWER SUPPLY	repair				X			
PROBE, WAVEGUIDE	replace				X			
PULLEY, FLAT	replace					X		Procure locally
RACK, OSCILLATOR	replace					X		Fabricate if required
RECTIFIER, METALLIC	replace				X			
RELAY, ARMATURE	replace				X			
RELAY, THERMAL	replace				X			
RESISTOR ASSEMBLY	repair				X			Fabricate if required
RESISTOR, CAPACITOR ASSEMBLY	replace				X			Fabricate if required
RESISTORS	replace				X			

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN UPM-84 (continued)								
RETAINER, CAPACITOR	replace				X			
RETAINER, CUP	replace					X		Procure locally
RETAINER, ELECTRON TUBE	replace		X					
RING, RETAINING	replace					X		Procure locally
ROLLER	replace					X		Fabricate if required
SCREWS	replace				X			Procure locally
SEMI-CONDUCTOR DEVICE, DIODE	replace				X			
SETSCREWS	replace				X			Procure locally
SHAFTS	replace					X		Fabricate if required
SHAFT AND GEAR ASSEMBLY	repair				X			
SHIELDING GASKET, ELECTRONIC	replace				X			Procure locally
SHIELD ASSEMBLY, INSULATOR	replace					X		Procure locally
SHIELD, ELECTRICAL CONNECTOR	replace				X			
SHIELD, ELECTRON TUBE	replace		X					
SHIELD, FILTER CHASSIS	replace					X		Fabricate if required
SHIMS	replace					X		Fabricate if required
SLIDE, POINTER MOUNTING	replace					X		Fabricate if required
SOCKET, CRYSTAL	replace				X			
SOCKET, ELECTRON TUBE	replace				X			
SPACERS	replace					X		Fabricate if required
SPRING, FINGER	replace				X			
SPRING, GUIDE, RACK	replace					X		Fabricate if required
SPRING, HELICAL, COMPRESSION	replace				X			
SPRING, HELICAL, EXTENSION	replace				X			
SPRING, HELICAL, TORSION	replace				X			
SPRING, LOADING, BALL BEARING (P/O TUNING HEAD)	replace				X			

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/UPM-84 (continued)								
SPRING, LOADING, BALL BEARING (P/O SPECTRUM CALIBRATOR)	replace					X		Procure locally
STOP ASSEMBLY, GEAR	replace					X		Fabricate if required
STRAP, CAM, FLEXIBLE	replace					X		Procure locally
STRAP, RETAINING	replace					X		Fabricate if required
STRAP NUT, ELECTRON TUBE SOCKET	replace				X			
STUDS	replace					X		Fabricate if required
SWITCHES	replace				X			
TERMINAL BOARD (BARRIER TYPE)	replace				X			
TERMINAL BOARDS	replace				X			Fabricate if required
TERMINAL, FEED THRU, INSULATED	replace				X			
TERMINAL, LUG	replace				X			Procure locally
TERMINAL, STANDOFF	replace				X			
TERMINAL STUD	replace				X			Procure locally
THERMISTOR ASSEMBLY	repair				X			
THUMB SCREW	replace				X			
TRACKING ASSEMBLY	repair				X			
TRANSFORMERS	replace				X			
TUBE ASSEMBLY, PROBE	replace					X		Procure locally
TUNING HEAD ASSEMBLY	repair				X			
VOLTMETER	replace				X			
WASHERS	replace				X			Procure locally
WHEEL, DETENT	replace					X		Fabricate if required
WINDOWS, VIEWING	replace				X			
WRENCH, SPANNER	replace				X			
YOKE	replace					X		Procure locally

ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH.	(3) 2ND ECH.	(4) 3RD ECH.	(5) 4TH ECH	(6) 5TH ECH	(7) TOOL CODE	(8) REMARKS
AN/UPM-84 (continued)							
AUDIO OSCILLATOR TS-382A/U				†	†	1	
MULTIMETER AN/URM-105				†	†	2	
OSCILLOSCOPE AN/USM-50				†	†	3	
PULSE GENERATOR AN/UPM-15				†	†	4	
SIGNAL GENERATOR AN/USM-44				†	†	5	
SIGNAL GENERATOR AN/URM-64				†	†	6	
SIGNAL GENERATOR AN/URM-49				†	†	7	
SIGNAL GENERATOR AN/URM-61				†	†	8	
SIGNAL GENERATOR AN/URM-52				†	†	9	
SIGNAL GENERATOR AN/URM-44				†	†	10	
SIGNAL GENERATOR AN/USM-47				†	†	11	
SIGNAL GENERATOR AN/USM-48				†	†	12	
TEST SET, ELECTRON TUBE TV-2/U					†	13	
TEST SET, ELECTRON TUBE TV-7/U				†		14	
TOOL KIT TK-21/G				†	†	15	
TOOL EQUIPMENT TE-113				†	†	16	
VOLTMETER ME-30/U				†	†	17	

ALPHABETICAL INDEX

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