ACL

SIGNAL DISPLAY UNITS

SDU-102AP and SDU-103AP

INSTRUCTION MANUAL

T./ENG. V-1

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SECTION I

GENERAL INFORMATION

1. Introduction

Signal Display Units, types SDU-102AP and SDU-103AP, Figure 1-1, operate with appropriate receivers to provide a visual display of the spectrum tuned. The SDU-102AP will sweep an electronic tunable receiver to provide a visual display of an entire tuning band. Operating IF inputs for the SDU-102AP and SDU-103AP are 21.4 MHz and 30 MHz respectively. With this exception and that of the sweep tuning source of the SDU-102AP, they are otherwise similar.

The signal display units are supplied as complete subassembly plug-in modules. They are intended to receive general power from the receiver in which they are installed. The SDU-102AP operates in general communications receiver SR-209 and the SDU-103AP in telemetry receiver TR-110. They can also be installed in powered housing units.

Powered housing units contain low voltage power supplies to permit the signal display units to be operated out of the receiver main chassis. One unit or a pair can be installed in the PHU-201 and SDU-101. Appropriate connectors are provided for use with any receiver with a suitable IF output For a triple presentation, three SDU-103AP units (IF 30 MHz) can be installed in an SDU-105.

2. Electrical Description

Signal Display Units SDU-102AP and SDU-103AP process the undetected IF output of a receiver's tuner subassembly and display on a CRT the separate frequency components which comprise the IF results. A manually tuned receiver, will display a band of frequencies centered on the tuned input frequency. For an electronic tunable receiver, the display is of an entire tuning band.

Double conversion of the input signal to a final bandwidth of 5 KHz provides a resolution of better than 10 KHz. This means that the separating distance between signals need only be 10 KHz for them to be clearly defined.

A CENTERING control positions the display in the center of the CRT screen. To locate the center of the passband, an accurate marker pip is selectable as a frequency reference. When an optional crystal is installed, sideband markers will appear at a lower amplitude on each side of this marker. The GAIN control has no affect on marker amplitude and solely varies the vertical deflection of the display. Fully clockwise, a 10 uv CW signal at the SDU input will produce full vertical deflection. SWEEP WIDTH control varies the width of the display dc to 3 MHz. Other bandwidths are an optional feature.

Filament and high voltage requirements for CRT operation are derived from a self-contained power supply. Beam positioning and control circuits include VERT, HORIZ, INT, and FOCUS. A front panel lamp glows red when the circuits are energized.

3. Mechanical Description.

The signal display units are 3-1/2 inches high, 5 inches wide, 14 inches long, and weigh approximately 6 pounds each.

Aluminum is used as the constructing material for its light weight and rigidity. Rods connecting the front and rear panel serve as positioning guides to facilitate installation. The front panel overlay is made of anodized aluminum with a satin finish. The characters are etch-engraved and filled with enamel.

The SWEEP WIDTH, CENTERING, GAIN, VERT, HORIZ, INT, and FOCUS control, the MKR switch and the POWER lamp are on the front panel. All inputs and outputs are wired into a single 22 pin Cannon connector plug on the rear panel. The plug is guided by an alignment pin into the receptacle in the receiver or powered housing unit. The plug-in unit is secured in the receiver or powered housing unit by fastening the front panel slotted thumbscrew.

SECTION II

SPECIFICATIONS

Input Frequency	
SDU-102AP	21.4 MHz
SDU-103AP	30 MHz
Input Impedance	50 ohms
Input Bandwidth	3 MHz, 3 db down
Sweep Width	dc to 3 MHz, continuously adjustable (other bandwidths optional)
Sweep Rate	20 Hz, nominal
Display Resolution	10 KHz
Amplitude Response	± 1.5 db within any sweep width
Linearity	5% within any sweep width
Sensitivity	10 uv input for full scope deflection
Intermediate Frequency	
First	4.3 MHz
Second	455 KHz
Crystal Marker	
SDU-102AP	21.4 MHz center frequency
SDU-103AP	30 MHz center frequency
Sideband Marker	Optional, socket is provided
CRT Size	1-1/4" by 2-3/4" display area
Power Input	± 12 vdc and 115 vac, supplied from receiver or powered housing unit
Power Input Connector	Cannon type DCMF25W35
Dimensions	3-1/2" H by 5" W by 14" D
Weight	5-1/2 pounds
Finish	Gray enamel, MIL-E-15090, Color No. [illegible], Federal Standard 595

SECTION III

INSTALLATION AND OPERATION

1. Installation

A. Signal Display Unit, SDU-102AP.

Install the SDU-102AP in either front panel opening on the PHU-201 and SDU-101 and in the left side opening on the SR-209 receiver. Push the unit straight forward into the opening using the front panel handle. Rear panel connector plug, P1, Figure 3-1, must be fully seated in mating connector. Tighten front panel slotted thumbscrew to complete the installation.

The SDU-102AP as part of the SR-209 receiver provides a visual display of spectral activity intercepted by the plug-in tuning unit installed on the right. Electronic swept head, and manually operated tuning units are available. Set SR-209 POWER switch to L (left) or BOTH to energize the signal display unit. POWER lamp on SDU-102AP glows red to indicate when circuits are energized.

The SDU-102AP installed in the PHU-201 and SDU-101 will operate with any receiver that has an SDU OUTPUT, 3 MHz bandwidth centered at 21.4 MHz. All VHF and UHF receivers manufactured by ACL have this output. Connect a 50 ohm coaxial cable from the receiver's SDU OUTPUT to the SIGNAL INPUT connector on the PHU-201 or SDU-101. Energize SDU-102AP by setting POWER switch on PHU-201 or SDU-101.

B. Signal Display Unit, SDU-103AP.

Install the SDU-103AP unit in the left side opening on the TR-110 Telemetry Receiver and in any opening on the PHU-201, SDU-101 and SDU-105.

Loosen two thumbscrews and remove plate covering mounting hole in TR-110 receiver before installation. Push the unit straight forward into the opening using the front panel handle for all installations. Rear panel connector plug must be fully seated in mating connector. Tighten front panel slotted thumbscrew.

The SDU-103AP installed in the TR-110 receiver provides a visual display of a band of frequencies centered on the tuned frequency of the tuning head installed on the right. SDU-103AP is energized when AUX MODE switch on receiver is set to SDU.

The SDU-103AP installed in the PHU-201, SDU-101, and SDU-105 will operate with any receiver that has an SDU OUTPUT, 3 MHz bandwidth centered at 30 MHz. All telemetry receivers manufactured by ACL have this output. Connect a 50 ohm coaxial cable from the receiver's SDU OUTPUT to the SIGNAL INPUT connector on the PHU-201, SDU-101, or SDU-105. SDU-103AP is energized by setting POWER switch on PHU-201 and SDU-101 and the RECEIVER and POWER switch on the SDU-105.

2. Operation.

A. Operating Controls

(1) POWER: A lamp which glows red when general power is applied.

(2) MKR Switch:* In ON position, displays a marker pip for a frequency reference.

(3) GAIN Control: Adjusts vertical deflection (amplitude) of signals displayed.

(4) SWEEPWIDTH Control: Varies width of spectrum displayed. Maximum clockwise provides full sweepwidth. Decreasing positions display less of the spectrum but more of the detail.

(5) CENTERING Control: Permits spectrum displayed on CRT to be centered.

(6) INT, FOCUS, HORIZ, and VERT Controls: Beam positioning controls that do not require frequency adjustment.

*NOTE

Sideband marker pips will be displayed if a crystal has been installed in crystal holder Y2. Parallel type crystals of 32 pf shunt capacity in any frequency from 20 KHz to 1 MHz is suitable.

B. Operating Procedure.

(1) Set SWEEPWIDTH control fully clockwise.

(2) Set GAIN control midrange.

(3) Set MKR switch to ON.

(4) Adjust CENTERING control so marker pip is positioned under center scribe mark on CRT face plate.

(5) Set MKR switch to down (off) position.

(6) Set SWEEPWIDTH control as desired.

(7) Set GAIN control as desired.

C. Modulation Analysis.

(1) CW Signal: A CW signal appears as a single deflection, just like the center frequency marker.

(2) AM Signal: An AM signal appears as deflections of varying amplitude. The upper and lower sidebands start appearing when the modulation exceeds 5 KHz. An AM signal contains one upper and one lower sideband for each modulating frequency.

(3) FM Signal: An FM signal appears as a train of deflections. The center line represents the center frequency and the lines to the right and left represent the upper and lower sidebands respectively. The sideband frequency components are spaced an amount equal to the modulating frequency. The relative amplitude of the carrier and its sidebands depends on the modulation index. When the modulation index is above 0.5, the carrier energy is reduced and distributed to the sidebands. At a certain modulation index, the carrier will disappear. This carrier null indication can aid in calibrating FM signal generators and transmitters.

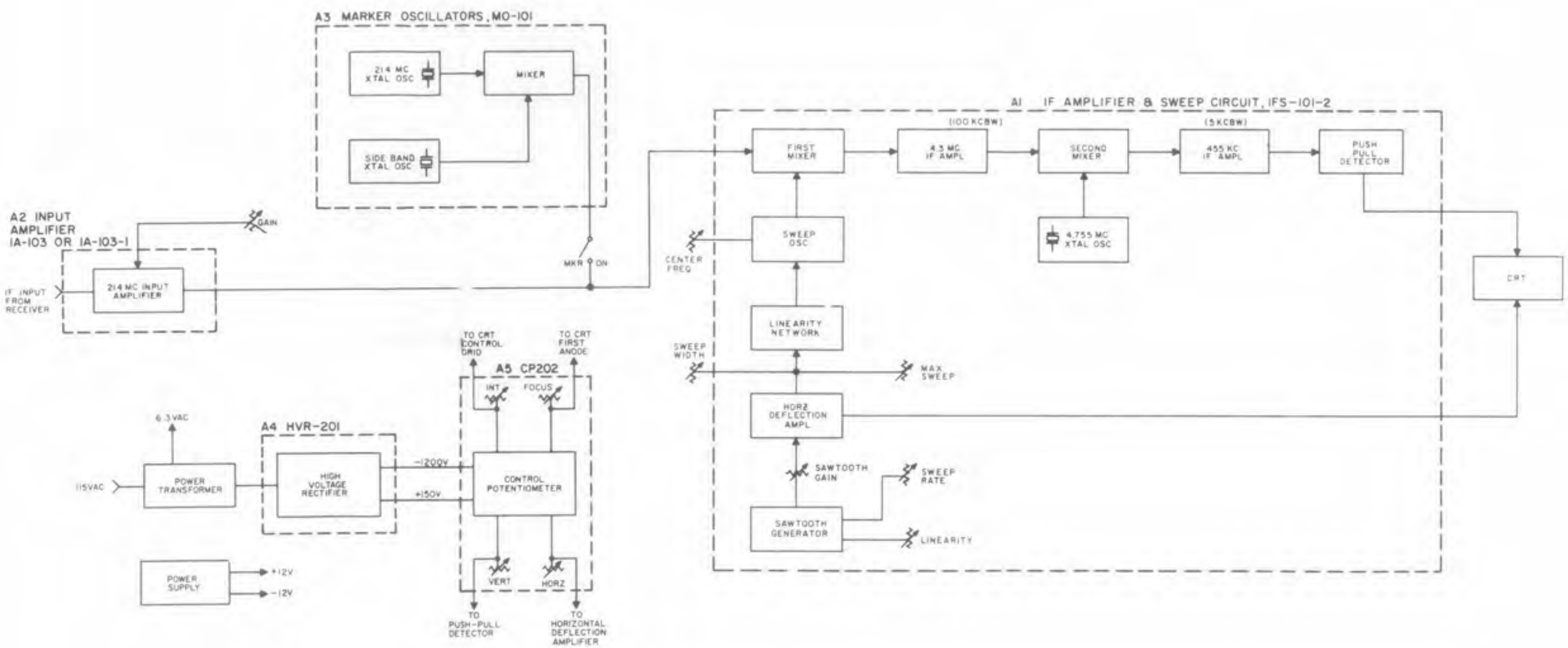

Figure 4-1. SDU-102AP and SDU-103AP
Functional Block Diagram

SECTION IV

THEORY OF OPERATION

1. Introduction

Signal Display Unit, SDU-102AP processes the 21.4 MHz IF output of electronic and manually tuned receivers so that the components which comprise the IF may be observed. Similarly, the SDU-103AP processes the 30 MHz IF output of manually tuned receivers.

The display represents the spectrum tuned by the receiver. The display for a manually tuned receiver will be of a band of frequencies centered on the tuned frequency of the receiver. The display for an electronically tuned receiver will be a plot of relative amplitude versus frequency for the entire tuning band.

To enable electronic tuning and the resultant display, the SDU-102AP has an added output (P1-13) which routes the horizontal control voltage to the receiver to sweep tune the RF circuits. There is also a marker input (P1-11) from the receiver to calibrate the display. Figure 7-6 shows these two leads added.

Common component board subassemblies are used throughout, with the exception of the input amplifier, Figure 4-1. The marker pip for the SDU-103AP is derived from the image frequency of the IF and the 21.4 MHz marker oscillator.

2. Functional Description

IF input at 21.4 or 30 MHz is amplified, bandpass filtered and applied to the first mixer. The gain of the entire signal display unit is controlled at the input stage by the GAIN control. In the first mixer, the 21.4 or 30 MHz signal is mixed with a 25.7 MHz sweep oscillator signal resulting in a 4.3 MHz IF. First mixer output is applied to the 4.3 MHz IF amplifier. This amplifier contains a double tuned output aligned at 4.3 MHz for a three db bandwidth of 100 KHz. A second mixer follows.

Conversion of the 4.3 MHz IF to a 455 KHz IF is performed by the second mixer. Here, the 4.3 MHz input signal is beat with a 4.755 MHz crystal oscillator to obtain the desired 455 KHz IF. A circuit bandwidth of 5 KHz results from employing a tuned circuit in both the emitter and collector circuit. The emitter resonant circuit consists of a ceramic filter with a 5 KHz bandwidth. Mixer output is amplified by a 455 KHz IF amplifier and fed to a push-pull detector.

The push-pull detector supplies demodulated signals of both polarities to the vertical deflection plates of the CRT. A VERT potentiometer permits positioning of the signal trace on the CRT. The signal applied to the CRT horizontal deflection plates is supplied from the sawtooth generator and horizontal deflection amplifier circuits. A HORIZ potentiometer permits positioning of the signal trace on the CRT. The sawtooth generator developes 20 Hz sawtooth waveform whose repetition rate is variable by the RATE control. The linearity of the sawtooth waveform is adjusted by the LINEARITY potentiometer.

The sawtooth generator also provides an input to the sweep oscillator. This input assures that the vertical deflection is synchronized with the horizontal sweep. The MKR-ON switch energizes a 21.4 MHz center frequency marker and the sideband marker generators whose outputs are supplied to the first mixer. Sideband markers will not be displayed however, unless a crystal has been inserted into the socket provided.

3. Input Amplifiers, IA-103 and IA-103-1.

Input amplifier IA-103 provides 21.4 MHz IF signal amplification and IA-103-1 provides 30 MHz IF signal amplification. Q1 and Q2 in cascode provide high gain, low noise and excellent stability characteristics. A nominal 50 ohm impedance match to the base of Q1 is provided by appropriate tapping of the double tuned input. L1 and resonating capacitors C1 and C2 form the primary and C3 couples the signal to the secondary containing L2, C4 and C5. C4, C5 and R4 provide an impedance match between the output of the tuned circuit and the input to Q1. Base bias for Q1 is determined by the current through R5 which is varied by the front panel GAIN control. The collector of Q1 is coupled to the emitter of Q2 by C10. Q2 collector has a double tuned circuit like the input double tuned circuit. However, parallel resistor R16 loads this tuned circuit to the required bandwidth. Secondary tuned signal is applied to the base of Q3 which is connected in cascode to Q4. The collector of Q4 is double tuned and identical in design and operation to that of Q2. Pi circuit resistors R23, R24, and R25 provide tuned circuit loading and 10 db of output signal attenuation. C25 couples filtered IF to jack J4 which connects to the IF Amplifier and Sweep Oscillator board IFS-101-2. Marker oscillator input is applied at J2 to the junction of R24, R25, and C25.

4. Marker Oscillator, MO-101.

Two marker generator citcuits provide center frequency and sideband frequency markers at the option of MKR-ON switch, SW1. Both marker generators use the Colpitts oscillator circuit configuration with Q1 providing the center frequency marker and Q2 the sideband markers. A 21.4 MHz crystal Y1, generates the center frequency marker through direct coupling to the base of Q1. If sideband markers are desired crystal Y2 must be installed to actuate sideband marker generator Q2. Transistor Q3 is the marker mixer. The center frequency marker is applied from the base of Q1 to the mixer and the sideband markers are applied from the emitter of Q2 to the mixer. The mixer output is coupled to the input amplifier via a single tuned circuit and C8. The sideband marker amplitude is adjusted by R7, and the ratio of center frequency marker amplitude to sideband marker amplitude is adjusted by R8. Adjustment of C8 affects both amplitudes, and is adjusted to prevent the center frequency marker amplitude from saturating the CRT.

5. IF Amplifier and Sweep Circuit, IFS-101-2.

A. First Mixer:

The first mixer consists of cascode connected transistors Q1 and Q2. These two transistors are dc coupled, the bias for the pair being set by R1 and R2 in the base of Q1 and R3 in the emitter of Q1. Q1 is operated in the common emitter and Q2 is operated in the common base configuration. The inputs to the mixer come from the input amplifier board across C35 and from the sweeping local oscillator to Q1 through C34. Mixing action takes place in the emitter-base junction of Q1. The resulting products are amplified by Q2 and then applied to the 4.3 MHz tank circuit containing L1 and L2. The primary of the tank circuit consists of L1 and C3 and is coupled to the secondary of the tank by C5. The secondary consists of L2 and resonating capacitors C6 and C7. C6 and C7 provide the necessary impedance matching to the following amplifier circuit. This tank circuit is resonated at 4.3 MHz and rejects the 21.4 or 30 MHz and 25.7 MHz signals present at the input of the mixer. Variable inductors L1 and L2 permit a 4.3 MHz center frequency with a 3 db bandwidth of 40 KHz. TP2 permits connection of test equipment for the tuned circuit alignment.

B. 4.3 MHz Amplifier.

Q3 and Q4 in cascode comprise the 4.3 MHz amplifier stage. The output of Q3 is coupled by C9 to the emitter of grounded base amplifier Q4. R9 permits a gain adjustment to standardize the IFS-101-2 module. Q4 output is developed across a double tuned circuit and applied to second mixer Q5. This double tuned network is similar to that between the first mixer and the 4.3 MHz IF amplifier. TP3 permits connection of test equipment for alignment.

C. Crystal Oscillator and Second Mixer:

Crystal oscillator Q6 and second mixer Q5, convert the 4.3 MHz IF to a final IF of 445 KHz. Q6 operates at a frequency of 4.755 MHz which is controlled by crystal Y1. R15 and R16 provide bias for the circuit. C16 couples the 4.755 MHz signal to the base of Q5. Here the 4.755 MHz signal is mixed with the 4.3 MHz IF signal developed across C15. Mixing action is accomplished in the emitter base junction of Q5. Q5 emitter is series resonated at 455 KHz by filter Y2. Q5 is highly degenerative at frequencies other than 455 KHz. The collector output is developed across a 455 KHz resonant circuit consisting of L5, C18, and C23. TP4 permits connection of test equipment for alignment. The narrow bandwidth of Y2 and the narrow overall bandwidth of the 455 KHz amplifier permits the 3 db resolution of the SDU to be approximately 10 KHz. C18 and C23 form a step down voltage divider to match the low impedance of the 455 KHz amplifier Q7 which follows.

D. Push-Pull Detector:

 provides an output voltage which varies according to the input signal envelope. This voltage is applied directly to the vertical deflection plates of the CRT. The circuit includes two series diode detectors, CR1 and CR2, with their outputs filtered through two identical resistance-capacitance networks. The diodes are connected into their respective circuits in opposite directions to provide the positive and negative polarities necessary for push-pull deflection. The functional operation of each detector circuit is identical. Diode CR1 is the rectifying device, and R63 is the load. CR1 conducts on only one-half of the input cycle and therefore, rectifies the output IF signal. CR10 is a voltage clamping diode that prevents the vertical deflection plate from dropping below 75 volts since the anode of CR10 is connected to the junction of R22 and R24. The detector output is the modulation envelope.

E. Sweep Oscillator and Linearity Network:

Sweep oscillator Q8 is connected in a Colpitts circuit configuration with regenerative feedback obtained from the emitter-base tank circuit. Bias is provided by R35. The tuned circuit consists of capacitors C39 and C40 in parallel with L7. L7 permits alignment of the 25.7 MHz oscillator center frequency.

The 25.7 MHz output from Q8 is swept across a range of 3 MHz by varicap CR7. CR7 is in series with the oscillator tank circuit and controls the oscillator frequency by varying the series capacitance. Control voltages which vary the capacitance are derived from two sources. One is tapped from the arm of CENTERING control R3, through terminal 10 on module A1. R3 is part of a voltage divider circuit across Zener diode CR8. By varying R3, the fixed bias applied to the varicap is adjusted to vary the sweep ± 250 KHz from its center frequency. The other is a sawtooth waveform developed in the horizontal sweep circuits. This voltage varies the sweep oscillator frequency in synchronization with the horizontal sweep of the cathode-ray beam. The amplitude of the sawtooth applied to the varicap, and hence the sweep width of local oscillator Q8 is controlled by OSC control R59 and SWEEP WIDTH control R2. R59 is adjusted so that when the SWEEP WIDTH control is at maximum the local oscillator sweeps plus and minus 1.5 MHz around the 25.7 MHz center frequency.

Diodes CR3 through CR6 and load resistors R26 through R31 comprise the linearity network. This network compensates for the non-linear voltage versus capacitance characteristics of variable capacitance diode CR7 to provide a linear frequency versus time characteristics at the output of the sweep oscillator. Diode action approximates that of four parallel voltage controlled, electronic switches, each switch with an associated load. As the input sawtooth voltage (negative going) is applied to the network, each switch opens at a different time in the sawtooth cycle and its associated parallel load is removed from the input.

F. Sawtooth Generator:

Transistors Q9 and Q11 and unijunction transistor Q10 develope the sawtooth voltage which is applied to the sweep oscillator and to the horizontal deflection plates of the CRT. Q9 is a common emitter dc amplifier. Its collector output is simultaneously applied to the emitter of Q10, the base of emitter follower Q11, and a capacitance network containing C42, C43, C44, and C45. As Q9 conducts, capacitors C42, C43, C44, and C45 charge very slowly. The charge rate of the capacitors, and therefore the rate of conduction of Q9, is determined by the value of potentiometer R40, RATE control. As the capacitors charge, the positive dc voltage across them rises. When the voltage across the capacitors is sufficient to cause Q10 to conduct its emitter circuit discharges the capacitors very rapidly. Slow charging and rapid discharging of the capacitors produces a sawtooth waveform at the output. The rate of charging and discharging is set for 20 Hz by RATE potentiometer R40. The sawtooth output of Q9 is applied to the base of Q11. Q11 reproduces the sawtooth waveform and provides circuit isolation to Q9. A portion of the emitter circuit is fed back to capacitors C44 and C45 through LINEARITY control R42 permitting greater linearity in the sawtooth waveshape. Additional linearity is provided by the negative feedback loop from Q10 to the base of Q9.

G. Horizontal Deflection Amplifier:

The horizontal deflection amplifier is used to amplify the output of the sawtooth generator for application to the CRT. A portion of the sawtooth is also applied to the sweep oscillator through potentiometers R59, OSC; and R2, SWEEP WIDTH to synchronize the local oscillator with the horizontal sweep on the CRT screen. The output from the sawtooth generator is fed through GAIN control, R46 directly to the base of phase splitter Q12 resulting in a 180° phase shift between emitter and collector. The emitter and collector outputs of Q12 are resistance-capacitance coupled to push-pull amplifiers Q13 and Q14, respectively. The resulting outputs to the horizontal deflection plates are equal in amplitude but opposite in phase.

6. High Voltage Rectifier, HVR-201.

Power transformer T1, secondary windings, terminals 5, 6, 7, and 8 are inputs to the high voltage rectifier module. Terminals 5 and 6 are inputs for a full wave voltage doubler circuit containing CR2, CR3, and R3 producing a -1200 vdc output. VR1 is a corona regulator diode used to regulate the output voltage at -1200 vdc. Terminals 7 and 8 are connected to a full wave bridge rectifier CR1. From CR1 the rectified voltage passes through a conventional filter before being applied to the +150 vdc Zener diode voltage regulator CR4. Fixed astigmatism is derived by connection of the CRT second anode to the junction of R4 and R5.

7. Control Potentiometer, CP-202.

The -1200 vdc from the high voltage rectifier module is applied across a voltage divider comprised of potentiometers R10 and R8 and resistors R9, R11, and R12 of control potentiometer CP-202. R8 functions as the INT control by varying the voltage to the control grid of the CRT. R10 functions as the focus control by varying the voltage to the first anode. VERT potentiometer R2 and HORIZ potentiometer R5 permit positioning of the CRT trace.

SECTION V

MAINTENANCE

1. General

The signal display unit will require little, if any, maintenance and repair. In the event of a malfunction however, this section contains information concerning the normal distribution of dc potentials on the various transistors and an alignment procedure.

> **WARNING**
>
> This equipment, though basically composed of transistor circuitry, employs AC line voltage and extremely high CRT supply voltages, up to 1200 volts. Exercise extreme caution when working inside this chassis, especially in the area around the power supply.

Before attempting to disassemble and repair a unit, standard troubleshooting techniques should be utilized to aid in the isolation of the difficulty to a particular module or component. Such techniques involve the use of the various front panel controls and indicating instruments including the oscilloscope. In addition, maintenance personnel are urged to become thoroughly familiar with the Theory of Operation section of this manual before attempting to perform maintenance or troubleshooting operations. Maintenance personnel should also familiarize themselves with the circuits of the unit in which the signal display unit is installed since, in some cases, irregular operation may not be caused by the plug-in unit alone.

2. Test Equipment

The test equipment listed in Table 5-1 or their equivalents should be utilized in performing the alignment operations.

Table 5-1. Test Equipment.

EQUIPMENT	MODEL	MFG	REQUIRED CHARACTERISTICS
Sweep Generator	SM-2000	Telonic	Sweep Rate: 0.01 to 100 Hz RF Attenuation: 0 to 60 db in 1 db steps Mkr System: Birdy-by-pass, Ext. marker in, plug-in crystal markers, rectified markers

Table 5-1. Test Equipment (Cont).

EQUIPMENT	MODEL	MFG	REQUIRED CHARACTERISTICS
			Output Impedance: 50 ohms
			Scope Horizontal Output: 15 volts p-to-p
Signal Generator	606A	Hewlett-Packard	Freq Range: 50 KHz to 65 MHz in six bands
			RF Output: 0.1 uv to 3 volts
			Modulation: AM, 0 to 100%, 400 and 1000 Hz; external 0 to 100%, dc to 20 KHz
			Output Impedance: 50 ohms
Oscilloscope	503	Tek-tronix	Freq Range: DC to 450 KHz
			Vertical Sensitivity: 1 mv/cm to 20 volt/cm
			Sweep Range: 1 microsecond/cm to 5 sec/cm
			Input Impedance: 1 meg ohm shunted by 47 pf
VTVM	WV-98C	RCA	Range: 0 to 1500 volts, ac and dc, 0 to 1000 meg ohms
			Input Resistance: 11 meg ohms dc
			Frequency Range: 30 Hz to 3 MHz
			Accuracy: ± 3%
Detector	XD-4A	Telonic	Freq Range: 0.1 to 300 MHz
			Input Impedance: 50 ohms
			Type of Detection: Half-wave

3. Input Amplifier, IA-103, and IA-103-1.

A. Input Amplifier Alignment:

(1) With the signal display unit installed in an associated receiver main chassis or signal display unit panel adapter, turn the equipment on its side and remove chassis bottom dust cover.

(2) Remove P3 from J1 and P9 from J4 on input amplifier circuit board and connect test equipment as shown in Figure 5-1.

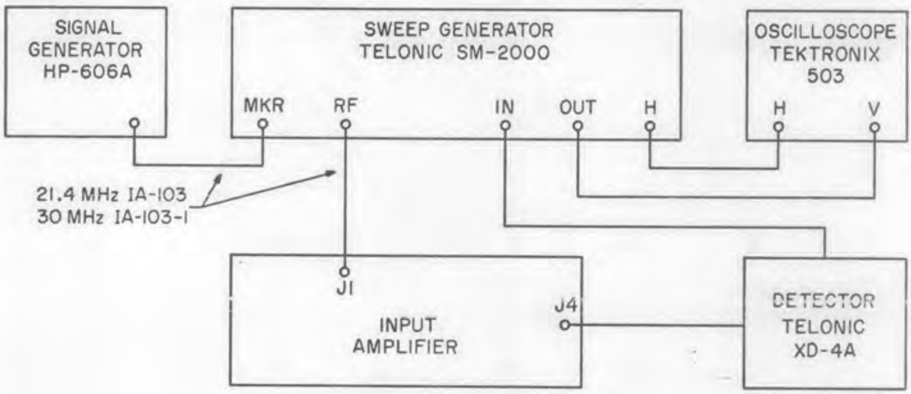

Figure 5-1. Input Amplifier Alignment Test Setup.

(3) Energize the circuits of the signal display unit and adjust oscilloscope horizontal sensitivity for full scale deflection and vertical sensitivity for 2 mv/cm.

(4) Adjust GAIN control for maximum gain and place the MKR-ON switch in the MKR (off) position.

(5) Adjust output level of signal generator and the marker gain control on sweep generator for a small marker pattern on oscilloscope. Adjust sweep generator to 21.4 MHz or 30 MHz as indicated by the presence of the marker in the center of the trace.

(6) Adjust L1 through L6 for maximum symmetrical response centered around the input marker. Reduce sweep generator output level as required to maintain a peak-to-peak response of approximately 6 mv or less. The response should have a peak-to-peak bandwidth of approximately 3 MHz.

B. Normal Operating Voltages:

Table 5-2 is a tabulation of the dc voltages normally encountered. Measurements are referenced to chassis ground using an RCA Senior Voltohmyst Model WV-98C.

Table 5-2. Input Amplifier Transistor Voltages.

Transistor Symbol Number	Emitter	Base	Collector
Q1	-0.8	0	6.4
Q2	-0.7	GRD	8.0
Q3	-1.0	-0.4	7.0
Q4	-0.4	GRD	7.0

4. IF Amplifier and Sweep Circuit, IFS-101-2.

A. 4.3 MHz and 455 KHz IF Alignment.

(1) Set front panel controls as follows:

SWITCH	POSITION
SWEEP WIDTH	Fully CW
GAIN	Fully CW
MKR	OFF
CENTERING	Midrange

(2) Disconnect cable W1 from INPUT jack J2. Disconnect jumper, A1W1 from between J5 and J6. The sweep oscillator circuits should not be connected to the base of transistor Q1 during the IF alignment.

(3) Energize receiver by placing the POWER switch in the ON position.

(4) Connect a signal generator through a 0.01 uf capacitor to TP4. Adjust the frequency to 455 KHz and the output level for a half-scale presentation of the 455 KHz input signal on the signal display unit.

(5) Adjust T1 for a maximum amplitude indication on the display unit.

(6) Remove signal generator from TP4 and connect it to TP3. Adjust the output level for a half-scale presentation of the 455 KHz signal on the signal display unit.

(7) Adjust L5 for maximum amplitude of the display signal.

(8) Remove signal generator from TP3 and connect it to TP2. Adjust the frequency to 4.3 MHz. Adjust the output signal level for a half-scale presentation of the 4.3 MHz input signal on the signal display unit.

(9) Adjust L3 and L4 for maximum amplitude on the display unit.

(10) Remove signal generator from TP2 and connect it to J2 input. Adjust the output level for a half-scale presentation of the 4.3 MHz input signal on the signal display unit.

(11) Adjust L1 and L2 for maximum amplitude of the display signal. Remove signal generator from J2 input.

B. Sweep Circuit Adjustment.

(1) Reconnect jumper cable, A1W1 between J5 and J6.

(2) Observe base line on CRT screen. Adjust GAIN potentiometer R46 until base line just breaks around the corner of the CRT screen.

(3) Adjust CENTERING control to the middle of its range and the SWEEP WIDTH control one quarter turn clockwise from its maximum counter clockwise position.

(4) Set MKR switch to ON to display an expanded center frequency marker pulse on the CRT.

(5) Adjust L7 to center this display around the center frequency scribe mark on the CRT screen.

(6) Turn SWEEP WIDTH control fully clockwise and adjust HORIZ potentiometer R5 until the center frequency marker is behind the center scribe mark on the CRT screen.

(7) Observe markers on CRT screen* There should be a center frequency marker and three 500 KHz sideband marker pips on each side of the center frequency marker.

(8) Adjust OSC potentiometer R59 until the sideband marker pips are behind the 500, 1000, and 1500 KHz scribe mark on the CRT screen.

(9) Place MKR switch to down (off) position and connect oscilloscope between terminal J4 on the IFS-101-2 module and ground.

*500 KHz Crystal in Y2.

(10) Adjust oscilloscope horizontal sensitivity to 10 msec and vertical sensitivity to 10 volts per centimeter.

(11) Adjust RATE potentiometer R40 until sawtooth waveform on oscilloscope screen is 50 msec wide, minimum to maximum amplitude. (The sweep rate is now 20 Hz since the rate in Hz is equal to the reciprocal of the duration in seconds).

(12) Adjust LIN potentiometer R42 for maximum linearity of the displayed sawtooth.

(13) This completes the sweep circuit adjustments.

C. Final Check.

(1) Connect a signal generator to J2 input. Adjust the signal generator frequency to 21.4 MHz and its output level as required to achieve full-scale deflection of the trace. Reduce the SWEEP WIDTH control as required to present the complete response.

(2) The signal displayed upon the scope should be symmetrical and show no evidence of bumps or other irregularities. If such irregularities are noted, it will be necessary to touch up the tuning of the 455 KHz and the 4.3 MHz inductances. Perform this adjustment while looking at the expanded signal on the trace. Adjust for both maximum gain and narrowest pulse width.

(3) This completes the alignment and test of the IFS-101-2 circuit board and all test equipment should be removed.

D. Normal Operating Voltages.

Table 5-3 lists the dc voltages normally encountered. Measurements were made with an RCA Senior Voltohmyst, Model WV-98C referenced to chassis ground.

Table 5-3. IFS-101-2 Transistor Voltages.

Transistor Symbol Number	Emitter	Base	Collector
Q1	-1.2	-0.44	-0.69
Q2	-0.69	GRD	6.0
Q3	-1.8	-1.3	6.3
Q4	-0.67	GRD	8.9

Table 5-3. IFS-101-2 Transistor Voltages (Cont).

Transistor Symbol Number	Emitter	Base	Collector
Q5	-8.3	-7.6	-0.02
Q6	7.5	5.2	10.5
Q7	-0.73	GRD	11.7
Q8	5.2	5.7	11.8
Q9	4.9	10.9	11.4
Q10	4.9	B1=GRD	B2=10.8
Q11	4.2	4.9	11.8
Q12	3.0	3.7	9.1
Q13	2.0	2.7	68.0
Q14	2.0	2.7	68.0

5. Marker Oscillator, MO-101.

A. Marker Adjustment.

(1) Turn front panel SWEEP WIDTH control maximum clockwise and MKR switch to ON. A center frequency marker at 21.4 MHz and three sideband marker pips at 500 MHz* intervals on each side of the center frequency marker but lower in amplitude will be displayed on the CRT screen.

(2) Adjust the amplitude of the sideband markers with R7. The amplitude should be lower than the center frequency marker.

(3) Adjust the ratio of center frequency to sideband marker amplitude with R8. The overall amplitude of both the center frequency and sideband marker amplitude is adjusted by C9.

B. Normal Operating Voltages.

Table 5-4 lists the dc voltages normally encountered. Measurements were made with an RCA Senior Voltohmyst, Model WV-98C referenced to chassis ground. Turn MKR switch to ON.

Table 5-4. MO-101 Transistor Voltages

Transistor Symbol Number	Emitter	Base	Collector
Q1	-6.7	-5.7	GRD
Q2	-7.4	-6.6	GRD
Q3	-9.6	-9.0	-2.4

* 500 KHz Crystal in Y2

6. Cathode Ray Tube (CRT), V1.

A. Operational Settings.

The following adjustments set the CRT operating voltages to control intensity, focus and vertical positions.

(1) Set the receiver POWER switch to ON.

(2) Set MKR switch to ON.

(3) Adjust intensity potentiometer, R8, for desired viewing intensity.

(4) Adjust focus potentiometer, R10, for sharpest display.

(5) Adjust vertical potentiometer, R2, to place horizontal sweep directly under horizontal line on the SDU face plate.

B. CRT Voltages.

Table 5-5 lists the dc voltages normally encountered on the CRT. Meaurements were made with an RCA Senior Voltohmyst, Model WV-98C referenced to chassis ground. Actual voltage reading may vary slightly due to operational setting in step (A) above. Set following controls to positions indicated, apply no IF input signal.

SWITCH	POSITION
POWER	ON
MKR	down
GAIN	Fully clockwise
SWEEP WIDTH	Fully clockwise

Table 5-5. CRT Voltages.

WARNING - HIGH VOLTAGE

Exercise extreme caution when making following voltage measurements.

Pin Number	Voltage
1	+70
2	+69
3	-1160
4	-1180
5	-700
6	+66
[illegible]	[illegible]
8	-1120

C. Removal.

> **WARNING**
>
> Handle the CRT very carefully. To prevent personal injury, gloves and goggles or a face-mask should be worn when handling the CRT.

(1) Remove display unit from main chassis.

(2) Remove dust cover from display unit. Short the filter capacitors to ground.

(3) Remove the four screws holding CRT bezel to front panel.

(4) Disconnect high voltage lead from CRT.

(5) Remove CRT base socket.

(6) Loosen the two screws holding CRT base support bracket and slide bracket toward the rear of the display unit.

(7) Carefully push CRT forward and out of CRT shield.

D. Replacement.

(1) Carefully slide CRT into shield.

(2) Replace CRT bezel, gasket and face plate.

(3) Slide CRT support bracket forward and tighten screws.

(4) Replace high voltage lead.

(5) Replace CRT base socket.

(6) Perform CRT voltage adjustemnts as outlined in para. A.

(7) Replace display unit cover.

SECTION VI

PARTS AND MANUFACTURERS LISTS

1. Parts Lists

> **NOTE**
>
> Any changes in the Parts Lists will be listed on the Addendum sheets at the front of this manual.
>
> When ordering replacement parts from the manufacturer, always include the following information:
>
> 1. Instrument model number
> 2. Instrument serial number
> 3. Module number
> 4. Module serial number
> 5. Component circuit symbol number (Q1, C13, etc.)
> 6. Component description
> 7. Component part number
> 8. Component manufacturer's name
> 9. Quantity desired

21.4 MC, INPUT AMPLIFIER IA-103

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C1	Capacitor, Fxd, Mica Die. 30 pf ±5% 500vdc	Arco	DM10-300J	1
C2	Capacitor, Fxd, Ceramic Die. 8.2 pf ±.25 pf NPO ±60ppm	Erie	301-COH829C	4
C3	Capacitor, Fxd, Composition 2.7 pf ±10% 500vdc	QC	MC-2.7	1
C4	Same as C2			
C5	Capacitor, Fxd, Mica Die. 50 pf ±5% 500vdc	Arco	DM10-500J	2
C6	Capacitor Fxd, Mica Die. .001 µf ±20% 1000vdc	MIL	CK60AW102M	13
C7	Same as C6			
C8	Same as C6			
C9	Same as C6			
C10	Same as C6			
C11	Same as C6			
C12	Capacitor, Fxd, Composition 2.4 pf ±10% 500vdc	QC	MC-2.4	2
C13	Same as C2			
C14	Same as C5			
C15	Same as C6			
C16	Same as C6			
C17	Same as C6			
C18	Same as C6			
C19	Same as C6			
C20	Same as C6			
C21	Capacitor, Fxd Ceramic Die. 4.7 pf ±.25 pf NPO ±60ppm	Erie	301-COH-479C	1
C22	Same as C12			
C23	Same as C2			
C24	Capacitor, Fxd, Ceramic Die. 36 pf ±5% 500vdc	Arco	DM10-360J	1

21.4 MC INPUT AMPLIFIER IA-103

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
C25	Same as C6				
J1	Connector, Plug Electrical		FXR	5116-054900	1
J2	Connector, Plug Electrical		CTC	3230-1	5
J3	Same as J2				
J4	Same as J2				
J5	Same as J2				
J6	Same as J2				
L1	Inductance Standard Variable		ACL	AC-257-4	6
L2	Same as L1				
L3	Same as L1				
L4	Same as L1				
L5	Same as L1				
L6	Same as L1				
Q1	Transistor		Fairchild	2N3337	2
Q2	Transistor		ACL	SA395	2
Q3	Same as Q1				
Q4	Same as Q2				

21.4MC, INPUT AMPLIFIER IA-103

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R1	Resistor, Fxd, Composition 150 ohms ±5% 1/4 w	AB	CB1515	3
R2	Resistor Fxd, Composition 36 ohms ±5% 1/4 w	AB	CB3605	1
R3	Same as R1			
R4	Resistor, Fxd, Composition *1.8 K ohms ± 5% 1/4W	AB	CB1825	1
R5	Resistor, Fxd, Composition 10 K ohms ±5% 1/4 w	AB	CB1035	2
R6	Resistor, Fxd, Compsotion *20 ohms ±5% 1/4 w	AB	CB2005	2
R7	Resistor, Fxd, Composition 3.3 K ohms ±5% 1/4 w	AB	CB3325	2
R8	Resistor, Fxd, Composition 1.5 K ohms ±5% 1/4 w	AB	CB1525	2
R9	Resistor, Fxd, Composition 6.2 K ohms, ± 5%, 1/4 w	AB	CB6225	2
R10	Resistor, Fxd, Composition 2.7 K ohms ±5% 1/4 w	AB	CB2725	2
R11	Resistor, Fxd, Composition 1 K ohms ±5% 1/4 w	AB	CB1025	2
R12	Resistor, Fxd, Composition 100 ohms ±5% 1/4 w	AB	CB1015	3
R13	Same as R12			
R14	Same as R12			
R15	Same as R1			
R16	Same as R5			
R17	Same as R6			
R18	Same as R7			
R19	Same as R8			
R20	Same as R9			
R21	Same as R11			
R22	Same as R10			
R23	Resistor, Fxd, Composition 91 ohms ±5% 1/4 w	AB	CB9105	2
R24	Resistor, Fxd, Composition 68 ohms ±5% 1/4 w	AB	CB6805	1

21.4 MC, INPUT AMPLIFIER IA-103

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R25	Same as R23			
	* Value to be determined by test			

30. 0 MC, INPUT AMPLFIER, IA-103-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C1	Capacitor, Fxd, Mica Die. 30 pf ±5% 500 vdc	Arco	DM10-300J	1
C2	Capacitor, Fxd, Ceramic Die. 8. 2 pf ±. 25 pf NPO ±60ppm	Erie	301-COH-829C	4
C3	Capacitor, Fxd, Composition 2. 4 pf ±10% 500 vdc	QC	MC-2. 4	2
C4	Same as C2			
C5	Capacitor, Fxd, Mica Die. 50 pf ±5% 500 vdc	Arco	DM10-500J	2
C6	Capacitor, Fxd, Mica Die. .001 µf ±20% 1000 vdc	Sprague	40C214A	13
C7	Same as C6			
C8	Same as C6			
C9	Same as C6			
C10	Same as C6			
C11	Same as C6			
C12	Capacitor, Fxd, Composition 2. 0 pf ±10% 500 vdc	QC	MC-2. 0	1
C13	Same as C2			
C14	Same as C5			
C15	Same as C6			
C16	Same as C6			
C17	Same as C6			
C18	Same as C6			
C19	Same as C6			
C20	Same as C6			
C21	Capacitor, Fxd, Ceramic Die. 4. 7 pf ±. 25 pf NPO ±60ppm	Erie	301-COH-479C	1
C22	Same as C3			1
C23	Same as C2			
C24	Capacitor, Fxd, Ceramic Die. 36 pf ±5% 500 vdc	Arco	DM10-360J	1

30.0 MC, INPUT AMPLIFIER, IA-103-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C25	Same as C6			
J1	Connector, Plug, Electrical	FXR	5116-054900	1
J2	Connector, Plug, Electrical	CTC	3230-1	5
J3	Same as J2			
J4	Same as J2			
J5	Same as J2			
J6	Same as J2			
L1	Inductance Standard Variable	ACL	AC-257-3	6
L2	Same as L1			
L3	Same as L1			
L4	Same as L1			
L5	Same as L1			
L6	Same as L1			
Q1	Transistor	Fairchild	2N3337	2
Q2	Transistor	ACL	SA-395	2
Q3	Same as Q1			
Q4	Same as Q2			

30.0 MC, INPUT AMPLIFIER, IA-103-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R1	Resistor, Fxd, Composition 150 ohms ±5% 1/4 w	AB	CB1515	2
R2	Resistor, Fxd, Composition 36 ohms ±5% 1/4 w	AB	CB3605	1
R3	Same as R1			
R4	Resistor, Fxd, Composition 390 ohms ±5% 1/4 w	AB	CB3915	1
R5	Resistor, Fxd, Composition 10 K ohms ±5% 1/4 w	AB	CB1035	2
R6	Resistor, Fxd, Composition 10 ohms ±5% 1/4 w	AB	CB1005	2
R7	Resistor, Fxd, Composition 3.3 K ohms ±5% 1/4 w	AB	CB3325	2
R8	Resistor, Fxd, Composition 1.5 K ohms ±5% 1/4 w	AB	CB1525	2
R9	Resistor, Fxd, Composition 6.2 K ohms ± 5% 1/4 w	AB	CB6225	2
R10	Resistor, Fxd, Composition 3.0 K ohms ±5% 1/4 w	AB	CB3025	1
R11	Resistor, Fxd, Composition 1 K ohms ±5% 1/4 w	AB	CB1025	2
R12	Resistor, Fxd, Composition 100 ohms ±5% 1/4 w	AB	CB1015	3
R13	Same as R12			
R14	Same as R12			
R15	Resistor, Fxd, Composition 470 ohms ±5% 1/4 w	AB	CB4715	1
R16	Same as R5			
R17	Same as R6			
R18	Same as R7			
R19	Same as R8			
R20	Same as R9			
R21	Same as R11			
R22	Resistor, Fxd, Composition 2.7 K ohms ±5% 1/4 w	AB	CB2725	1
R23	Resistor, Fxd, Composition 91 ohms ±5% 1/4 w	AB	CB9105	2
R24	Resistor, Fxd, Composition 68 ohms ±5% 1/4 w	AB	CB6805	1

30. 0 MC, INPUT AMPLIFIER, IA-103-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R25	Same as R23			

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MARKER-OSCILLATOR MO-101

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C1	Capacitor, Fxd, Ceramic Die. 3.0 pf ±.25 pf ±120ppm	Erie	301-COJ-309C	1
C2	Capacitor, Fxd, Mica Die. 68 pf ±5% 500vdc	Arco	DM10-680J	4
C3	Capacitor, Fxd, Mica Die. 43 pf ±5% 500vdc	Arco	DM10-430J	1
C4	Same as C2			
C5	Same as C2			
C6	Same as C2			
C7	Capacitor, Fxd, Mica Die. 10 pf ±5% 500vdc	Arco	DM10-100J	1
C8	Capacitor, Variable Ceramic Die. 2-8 pf NPO	Erie	538-002-89R	1
C9	Capacitor, Fxd, Ceramic Die. 1000 pf ±20% 1000vdc	MIL	CK60AW102M	2
C10	Same as C9			
J1	Connector Plug, Electrical	CTC	3230-1	2
J2	Same as J1			
L1	Inductance, Standard Fxd, 1.5μh	CTC	2960-30-2	1
Q1	Transistor	[illegible]	2N918	3
Q2	Same as Q1			
Q3	Same as Q1			

MARKER OSCILLATOR, MO-101

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
R1	Resistor, Fixed, Composition 200 K ±5% 1/4 w		AB	CB2045	2
R2	Same as R1				
R3	Resistor, Fixed, Composition 20 K ±5% 1/4 w		AB	CB2035	1
R4	Resistor, Fixed, Composition 1 M ±5% 1/4 w		AB	CB1055	2
R5	Same as R4				
R6	Resistor, Fixed, Composition 100 K ±5% 1/4 w		AB	CB1045	1
R7	Resistor, Variable 1 M		IRC	CT-150-1M	2
R8	Same as R7				
R9	Resistor, Fixed, Composition 10 K ±5% 1/4 w		AB	CB1035	2
R10	Same as R9				
R11	Resistor, Fixed, Composition 1 K ±5% 1/4 w		AB	CB1025	2
R12	Same as R11				
Y1	Crystal		ACL	C594-7	1
Y2*	Crystal, 100 KHz		ACL	SC-596-1	1
Y2*	Crystal, 500 KHz		ACL	SC-595-12	1

NOTE: * Optional, to be selected by customer P.O.

SDU IF & SWEEP CIRCUIT , IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C1	Capacitor, Fxd, Ceramic Die. (Disc) 1000 pf. ±20% 1000vdc	Sprague	[illegible]40C214A	6
C2	Capacitor, Fxd, Ceramic Die. 0.01 µf +80-20% 50vdc	Sprague	19C214	9
C3	Capacitor, Fxd, Mica Die. 51 pf ±5% 500vdc	Arco	DM10-510J	2
C4	Same as C2			
C5	Capacitor, Fxd, Composition .47 pf ±10% 500vdc	QC	MC-0.47	2
C6	Capacitor, Fxd, Mica Die. 39 pf ±5% 500vdc	Arco	DM10-390J	2
C7	Capacitor, Fxd, Mica Die. 390 pf ±5% 500vdc	Arco	DM10-391J	2
C8	Same as C2			
C9	Same as C1			
C10	Same as C3			
C11	Same as C2			
C12	Same as C5			
C13	Same as C6			
C14	Same as C2			
C15	Same as C7			
C16	Capacitor, Fxd, Composition 3.9 pf ±10% 500vdc	QC	MC-3.9	1
C17	Capacitor, Fxd, Mica Die. 30 pf ±5% 500vdc	Arco	DM10-300J	1
C18	Capacitor, Fxd, Mica Die. 160 pf ±5% 500vdc	Arco	DM10-161J	1
C19	Same as C2			
C20	Capacitor, Fxd, Mica Die. 300 pf ±5% 500 vdc	Arco	DM10-301J	1
C21	Same as C2			
C22	Capacitor, Fxd, Mica Die. 100 pf ±5% [illegible]	[illegible]	DM10-101J	2
C23	Capacitor, Fxd, Mica Die. 1500 pf ±5% 500vdc	Arco	DM19-152J	1

SDU IF & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C24	Capacitor, Fxd, Electrolytic (Tantalum) 0.1 µf ±20% 35 vdc	Sprague	150D104X0035A2	1
C25	Capacitor, Fxd, Electrolytic (Tantalum) 0.47 µf ±20% 35 vdc	Sprague	CS13AFR47M	2
C26	Same as C25			
C27	Capacitor, Fxd, Ceramic Die. .01 µf GMV 500v	Sprague	19C241	2
C28	Capacitor, Dipped Mica Die. 130 pf ±5% 500v	Arco	DM10-131J	1
C29	Same as C27			
C30	Capacitor, Fxd, Electrolytic (Tantalum) 0.1 µf 100 vdc ±20%	Sprague	CS13BJ104M	2
C31	Not Used			
C32	Not Used			
C33	Same as C30			
C34	Capacitor, Fxd, Ceramic Die. 6.8 pf ±0.25 pf NPOA ±60ppm	Erie	301-COH-689C	1
C35	Same as C1			
C36	Same as C2			
C37	Same as C1			
C38	Same as C1			
C39	Same as C22			
C40	Capacitor, Fxd, Mica Die. 200 pf ±5% 500vdc	Arco	DM10-201J	1
C41	Same as C2			
C42	Capacitor, Fxd, Ceramic Die. 2.2 µf ±20% 25vdc	Sprague	5C15	6
C43	Same as C42			
C44	Same as C42			
C45	Same as C42			
C46	Capacitor, Fxd, Electrolytic 47 µf ±20% 20vdc	Sprague	CS13AE470M	2

SDU IF & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C47	Same as C46			
C48	Same as C42			
C49	Same as C42			
C50	Capacitor, Fxd, Electrolytic 1.0 µf 150 vdc	Sprague	112D105C3150D1	1
C51	Same as C1			
CR1	Semiconductor Device, Diode	Fairchild	1N916	4
CR2	Same as CR1			
CR3	Semiconductor Device, Diode	Sylvania	1N462A	4
CR4	Same as CR3			
CR5	Same as CR3			
CR6	Same as CR3			
CR7	Semiconductor Device, Diode	PSI/TRW	V15	1
CR8	Semiconductor Device, Diode	PSI/TRW	1N717A	1
CR9	Same as CR1			
CR10	Same as CR1			
J1	Connector, Receptacle, Elec	CTC	3230-1	10
J2	Same as J1			
J3	Same as J1			

SDU IF & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
J4	Same as J1			
J5	Same as J1			
J6	Same as J1			
L1	Inductance Standard, Variable	ACL	AC-030-6	2
L2	Inductance Standard, Variable	ACL	AC-030-7	2
L3	Same as L1			
L4	Same as L2			
L5	Inductance Standard, Variable	ACL	AC-030-10	1
L6	Inductance Standard, Fxd	Nytronics	WEE-1000	2
L7	Inductance Standard, Variable	ACL	AC-030-3	1
L8	Same as L6			
P1	Connector, Plug, Electrical	CTC	3102-1-0312	2
P2	Same as P1			
Q1	Transistor	ACL	SA395	7
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q1			

SDU IF & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
Q7	Transistor	TI	2N335	3
Q8	Same as Q1			
Q9	Transistor	TI	2N1131	1
Q10	Transistor	TI	2N490	1
Q11	Same as Q7			
Q12	Same as Q7			
Q13	Transistor	Fairchild	2N3114	2
Q14	Same as Q13			

SDU IFU & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R1	Resistor, Fxd, Composition 10 K ohms ±5% 1/4 w	AB	CB1035	5
R2	Same as R1			
R3	Resistor, Fxd, Compsotion 1.8 K ohms ±5% 1/4 w	AB	CB1825	3
R4	Resistor, Fxd, Composition 1.0 K Ohms ±5% 1/4 w	AB	CB1025	8
R5	Resistor, Fxd, Composition 4.7 K ohms ±5% 1/4 w	AB	CB4725	3
R6	Same as R4			
R7	Resistor, Thermistor 50 ohm Disc ± 10%	GE	2D504	1
R8	Same as R3			
R9	Resistor, Variable 5K ohms	Beckman	72PR5K	1
R10	Resistor, Fxd, Composition 3.9 K ohms ±5% 1/4 w	AB	CB3925	1
R11	Same as R4			
R12	Same as R1			
R13	Resistor, Fxd, Composition 6.2 K ohms ±5% 1/4 w	AB	CB6225	1
R14	Resistor, Fxd, Composition 2.2 K ohms ±5% 1/4 w	AB	CB2225	3
R15	Resistor, Fxd, Composition 56 K ohms ±5% 1/4 w	AB	CB5635	2
R16	Same as R15			
R17	Same as R4			
R18	Resistor, Fxd, Composition 5.6 K ohms ±5% 1/4 w	AB	CB5625	1
R19	Same as R5			
R20	Resistor, Fxd, Compos tion 5.1 K ohms ±5% 1/4 w	AB	CB5125	3
R21	Same as R4			
R22	Res stor Fxd, Compos tion 1 M ohms ±5% 1/4w	AB	CB1055	10
R23	Same as R22			
R24	Same as R22			

SDU IF & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R25	Same as R22			
R26	Resistor Fxd, Composition 430 K ohms ±5% 1/4w	AB	CB4345	1
R27	Resistor, Fxd, Composition 3.0 K ohms ±5% 1/4 w	AB	CB3025	1
R28	Resisto , Fxd, Composition 300 K ohms ±5% 1/4 w	AB	CB3045	1
R29	Same as R3			
R30	Res stor, Fxd, Composition 91 K ohms ±% 1/4 w	AB	CB9135	1
R31	Same as R1			
R32	Same as R22			
R33	Same as R22			
R34	Res stor, Fxd, Composit on 100 K ohms ±5% 1/4 w	AB	CB1045	1
R35	Same as R20			
R36	Same as R5			
R37	Same as R4			
R38	Resistor, Fxd, Compos tion 12 K ohms ±5% 1w	AB	GB1235	2
R39	Same as R14			
R40	Resistor, Variable 1K ±10%	IRC	CT 150-1K	1
R41	Same as R14			
R42	Resistor Variable 50 K ohms ±10%	IR C	CT150-50K	1
R43	Resistor Fxd, Compos tion 220 ohms ±5% 1/4 w	AB	CB2215	1
R44	Sam as R1			
R45	Same as R20			
R46	Resistor, Var able 100 K ohms ±10%	IRC	CT150-100K	1
R47	Same as R4			
R48	Same as R4			

SDU IFJ & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R49	Resistor, Fxd, Compsotion 11 K ohms ±5% 1/4 w	AB	CB1135	2
R50	Resistor, Fxd, Composition 470 K ohms ±5% 1/4 w	AB	CB4745	2
R51	Same as R50			
R52	Same as R49			
R53	Resistor, Fxd, Composition 1.2 K ohms ±5% 1/4 w	AB	CB1225	2
R54	Resistor, Fxd, Compsoition 47 K ohms ±5% 1/4 w	AB	CB4735	1
R55	Resistor, Fxd, Composition 51 K ohms ±5% 1/4 w	AB	CB5135	1
R56	Same as R53			
R57	Same as R22			
R58	Same as R22			
R59	Resistor, Variable 1 M ohms ±10%	IRC	CT150-1M	1
R60	Resistor, Fxd, Composition 220 K ohms ±5% 1/4 w	AB	CB2245	1
R61	Same as R38			
R62	Same as R22			
R63	Same as R22			
R64	Resistor, Fxd, Composition 27 ohms ±5% 1/4 w	AB	CB2705	1
T1	Transformer	ACL	AC-030-18	1
TP1	Same as J1			
TP2	Same as J1			
TP3	Same as J1			
TP4	Same as J1			

SDU IFJ & SWEEP CIRCUIT, IFS-101-2

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
W1	Cable Assy	ACL	AC-076-32	1
Y1	Crystal Unit Quartz HC-18/U Case Parallel Res 30 pf	PE:L	4.755MC CR-64/U	1
Y2	Crystal Unit Quartz (Filter)	Clevite	TF01A	1

HIGH VOLTAGE RECTIFIER, HVR-201

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
CR1	Semiconductor Device, Rectifier	Motorola	MDA-920-5	1
CR2	Semiconductor Device, Diode	EDI/PSI	1N1731	2
CR3	Same as CR2			
CR4	Semiconductor Device, Diode	Motorola	1N1799	1
R1	Resistor, Fxd, Composition 2.4 K ohms ±5% 1 W	AB	GB2425	2
R2	Same as R1			
R3	Resistor, Fxd, Composition * 390 K ±5% 1/2W	AB	EB3945	1
R3	Resistor, Fxd, Composition * 330 K ±5% 1/2 W	AB	EB3345	1
R3	Resistor, Fxd, Composition * 470 K ±5% 1/2W	AB	EB4745	1
R3	Resistor, Fxd, Composition * 560 K ±5% 1/2 W	AB	EB5645	1
R4	Resistor, Fxd, Composition 510 K ohms ±5% 1/4W	AB	CB5145	1
R5	Resistor, Fxd, Composition 1.5 Meg ohms ±5% 1/4W	AB	CB1555	1
VR1	Regulator, Voltage	VIC	GV3A-1200	1
*	Value to be determined by test nominal value 390 K			

CONTROL, POTENTIOMETER CP-202

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
R1	Resistor, Fixed, Composition 510 K ohms ± 5% 1/4 w		AB	CB5145	5
R2	Resistor, Variable 1 Meg ohms		Bourns	3068P-1-105	2
R3	Same as R1				
R4	Same as R1				
R5	Same as R2				
R6	Same as R1				
R7	Same as R1				
R8	Resistor, Variable 100 K ohms		Bourns	3068P-1-104	1
R9	Resistor, Fixed, Composition 680 K ± 5% 1/4 w		AB	CB6845	1
R10	Resistor, Variable 500 K ohms		Bourns	3068P-1-504	1
R11	Resistor, Fixed, Composition 1 Meg ± 5% 1/4 w		AB	CB1055	2
R12	Same as R11				

SIGNAL DISPLAY UNIT, SDU-102AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
A1	IF Amplifier & Sweep	ACL	IFS-101-2	1
A2	Input Amplifier	ACL	IA-103	1
A3	Marker-Oscillator	ACL	MO-101	1
A4	High Voltage Rectifier	ACL	HVR-201	1
A5	Control Potentiometer	ACL	CP-202	1
C1	Capacitor, Fxd Ceramic Die. 1000 pf GMV	AB	SB3A-102W	4
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	Capacitor, Fxd, Electrolytic 2.2 µf ±20% 20 vdc	Sprague	150D225X0020A2	1
C6	Capacitor, Fxd, Electrolytic 0.5 µf -0.5µf 1000v	Sprague	CP54B4EG504V1	1
C7	Capacitor, Fxd, Electrolytic 80 µf -80 µf 250 v	Sprague	D38893	1
C8	Capacitor, Fxd, Ceramic Die. .005 µf ±20% 3000vdc	Centralab	DD30-502	2
C9	Same as C8			
C10	Capacitor, Fxd, Electrolytic 2 µf 50 vdc	CD	NLW2-50	1
C11	Capacitor, Fxd, Mica Die 200 pf ± 5% 500 wvdc	Elmenco	DM10-201J	1
CR1	NOT USED			
CR2	NOT USED			
CR3	NOT USED			
CR4	NOT USED			

SIGNAL DISPLAY UNIT, SDU-102AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
DS1	Indicator Assy	Dialco	507-4537-1431-670	1
L1	Inductance Standard, Fxd, 12µh	CTC	2960-41-2	2
L2	Same as L1			
P1	Connector, Plug Electrical 22pin	Cannon	DCM25W3P	1
P2	Connector, Plug, Electrical P/O W1	Cannon	DM53741-5000	1
P3	Connector, Plug, Electrical P/O W1	FXR	5116-037475	1
P4	Connector, Plug, Electrical P/O W2	CTC	3102-1-0312	11
P5	Same as P4 P/O W2			
P6	Same as P4			
P7	Same as P4 P/O W3			
P8	Same as P4 P/O W3			
P9	Same as P4 P/O W4			
P10	Same as P4 P/O W4			
P11	Same as P4 P/O W5			
P12	Same as P4 P/O W5			
P13	Same as P4 P/O W6			
P14	Same as P4 P/O W6			
P15	Connector, Crt Anode	ACL	B1100	1

SIGNAL DISPLAY UNIT, SDU-102AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R1	Resistor, Variable 10 K ohms	Clarostat	57M10K	1
R2	Resistor, Variable 250 K ohms	AB	RV6NAYSD254A	1
R3	Resistor, Variable 1 K ohms	Clarostat	57M1K	1
R4	Resistor, Fxd, Composition 10 K ohms ±5% 1/4 w	AB	CB1035	1
R5	Resistor, Fxd, Composition 100 K ohms ±5% 1/4 w	AB	CB1045	3
R6	Same as R5			
R7	Same as R5			

SIGNAL DISPLAY UNIT SDU-102AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
S1	Switch, Toggle SPST	Allied control	TS-3	1
T1	Transformer, Power, Stepddown & Stepup	ACL	SB-191	1
TB1	NOT USED Board	ACL	AC-521	1
TB2	NOT USED Board	ACL	AC-522	1
V1	Tube, Cathode Ray	Waterman	3ASP1	1
VR 1	NOT USED Voltage	VIC	[illegible]	[illegible]
W1	Cable Assy, Special Purpose, Elec.	ACL	AC-801-6-	1
W2	Cable Assy, Special Purpose, Elec	ACL	AC-076-101	1
W3	Cable Assembly, Sp Purpose Elec	ACL	AC-076-91	4
W4	Same as W3			
W5	Same as W3			
W6	Same as W3			
XA1	Connector, Receptacle, Elec	Elco	00-5009-016-146-001	1

SIGNAL DISPLAY UNIT, SDU-103AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
A1	IF Amplifier & Sweep	ACL	IFS-101-2	1
A2	Input Amplifier	ACL	IA-103-1	1
A3	Marker-Oscillator	ACL	MO-101	1
A4	High Voltage Rectifier	ACL	HVR -201	1
A5	Control Potentiometer	ACL	CP-202	1
C1	Capacitor, Fixed, Ceramic Die. 1000 pf GMV	AB	SB3A-102W	4
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	Capacitor, Fixed, Electrolytic 2.2 uf ±20% 20 vdc	Sprague	150D225X0020A2	1
C6	Capacitor, Fixed, Electrolytic 0.5 uf -0.5 uf 1000 v	MIL	CP54B4EG504V1	1
C7	Capacitor Fixed, Electrolytic 80 uf -80 uf 250 v	Sprague	D38893	1
C8	Capacitor, Fixed, Ceramic Die. 0.005 uf ±20% 3000 vdc	Centralab	DD30-502	2
C9	Same as C8			
C10	Capacitor, Fixed, Electrolytic 2 uf 50 vdc	CD	NLW2-50	1
DS1	Indicator Assy	Dialco	507-4537-1431-670	1

SIGNAL DISPLAY UNIT, SDU-103AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
L1	Inductance Standard, Fxd, 12 μh	CTC	2960-41-2	2
L2	Same as L1			
P1	Connector, Plug Electrical 22 pin	Cannon	DCM25W3P	1
P2	Connecotr, Plug, Electrical P/O W1	Cannon	DM53741-5000	1
P3	Connector, Plug, Electrical P/O W1	FXR	5116-037475	1
P4	Connector, Plug, Electrical P/O W2	CTC	3102-1-0312	11
P5	Same as P4 P/O W2			
P6	Same as P4			
P7	Same as P4 P/O W3			
P8	Same as P4 P/O W3			
P9	Same as P4 P/O W4			
P10	Same as P4 P/O W4			
P11	Same as P4 P/O W5			
P12	Same as P4 P/O W5			
P13	Same as P4 P/O W6			
P14	Same as P4 P/O W6			
P15	Connector, Crt Anode	ACL	B1100	1

2

SIGNAL DISPLAY UNIT, SDU-103AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R1	Resistor, Variable 10 k ohms	Clarostat	57M10K	1
R2	Resistor, Variable 250 k ohms	AB	RV6NAYSD254A	1
R3	Resistor, Variable 1 k ohms	Clarostat	57M1K	1
R4	Resistor, Fixed, Composition 10 k ohms ±5% 1/4 w	AB	CB1035	1
R5	Resistor, Fixed, Composition 100 k ohms ±5% 1/4 w	AB	CB1045	2
R6	Same as R5			
S1	Switch, Toggle SPST	Allied Control	TS-3	1
T1	Transformer, Power, Stepdown & Step-up	ACL	B-191	1
V1	Tube, Cathode Ray	Waterman	3ASP1	1
W1	Cable Assy, Special Purpose, Elec.	ACL	AC801-6	1
W2	Cable Assy, Special Purpose, Elec.	ACL	AC-076-101	1
W3	Cable Assy, Special Purpose Elec.	ACL	AC-076-91	4
W4	Same as W3			
W5	Same as W3			
W6	Same as W3			
XA1	Connector, Receptacle, Elec.	Elco	00-5009-016-146-001	1
XDS1	Light Socket	Dialco	508-7358-912	1
XV1	Case, Socket CRT	ACL	SB965	1

SIGNAL DISPLAY UNIT SDU-102AP

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
XDS1	Light Socket	Dialco	508-7538-912	1
XV1	Case, Socket Crt	ACL	SB965	1

2. Manufacturer's List

Abbreviation	Name and Adress
AB	Allen Bradley Company 1201 South 2nd Street Milwaukee, Wisconsin 53212
Amperex	Amperex Electronic Corporation 230 Duffy Avenue Hicksville, New York 11801
Amphenol	The Amphenol R. F. Division Bunker-Ramo Corporation 33 E. Franklin Street Danbury, Connecticut 06813
API	Angstrohm Presision, Inc. 7811 Lemona Avenue Van Nuys, California 91405
ARC	Applied Research Corporation 76 S. Bayles Avenue Port Washington, New York 11050
Arco	Arco Electronics, Inc. Community Drive Great Neck, New York 11022
ACL	Astro Communication Laboratory 9125 Gaither Road Gaithersburg, Maryland 20760
Augat	Augat, Inc. 33 Perry Avenue Attleboro, Massachusetts 02703
Beckman	Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, California 92634
Belden	Belden Corporation P. O. Box 341 Richmond, Indiana 47374
Bourns	Bourns, Inc., Trimpot Division 1200 Columbia Avenue Riverside, California 92507

Fairchild	Fairchild Semiconductor Corp. Division of Fairchild Camera and Instrument Corp. 464 Ellis Street Mountain View, California 94040
FXR	FXR Amphenol R.F. Division 33 E. Franklin Street Danbury, Connecticut 06813
GE	General Electric Company Miniature Lamp Department Nela Park Cleveland, Ohio 44112
GI	General Instrument Company 65 Gouverneur Street Newark, New Jersey 07104
GRFF	General R.F. Fittings, Inc. P.O. Box 278 Cove Road Port Salerno, Flordia 33492
Gulton	Gulton Industries Alkaline Battery Division 212 Durham Avenue Metuchen, New Jersey 08840
HHS	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
Honeywell	Honeywell Incorporate Micro Switch Division Chicago & Spring Streets Freeport, Illinois 61032
Hopkins	Hopkins Engineering Company Sub Maxon Electronics Corp. 12900 Foothill Boulevard San Fernando, California 91342
HPA	Hewlett-Packard Company H.P. Associates 1501 Page Mill Road Palo Alto, California 94304

Microwave	Microwave Associates, Inc. South Avenue Burlington, Massachusetts 01801
MIL (81349)	Military Specification
Motorola	Motorola Semiconductor Products 5005 E. McDowell Road Phoenix, Arizona 85008
MS (96906)	Military Standards
Nytronics	Nytronics, Inc. 10 Pelham Parkway Pelham Manor, New York 10803
Oak	Oak Manufacturing Company Division of Oak Electro/Netics Corp S. Main Street Crystal Lake, Illinois 60014
OSM	Omni Spectra Inc. 24600 Hallwood Court Farmington, Michigan
Perrott	Perrott Engineering Labs, Inc. 1020 N. Fillmore Street Arlington, Virginia 22201
Piezo	Piezo Crystal Company 100 K Street Carlisle, Pennsylvania 17013
QC	Quality Components Inc. P.O. Box 113 St. Mary's, Pennsylvania 15857
Quam	Quam Nichols Company 218 Marquette Road Chicago, Illinois 60637
Raytheon	Raytheon Company 141 Spring Street Lexington, Massachuetts 02173
RCA	Radio Corporation Solid State Division Route 202 Somerville, New Jersey 08876

SECTION VII

ILLUSTRATIONS AND SCHEMATICS

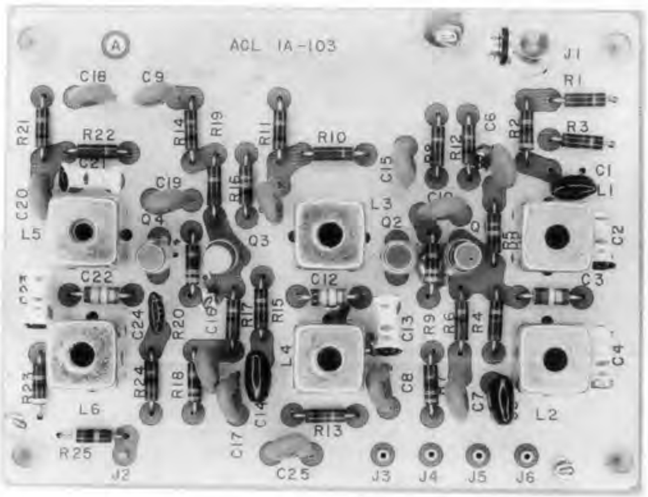


Figure 7-1A. IA-103 Input Amplifier

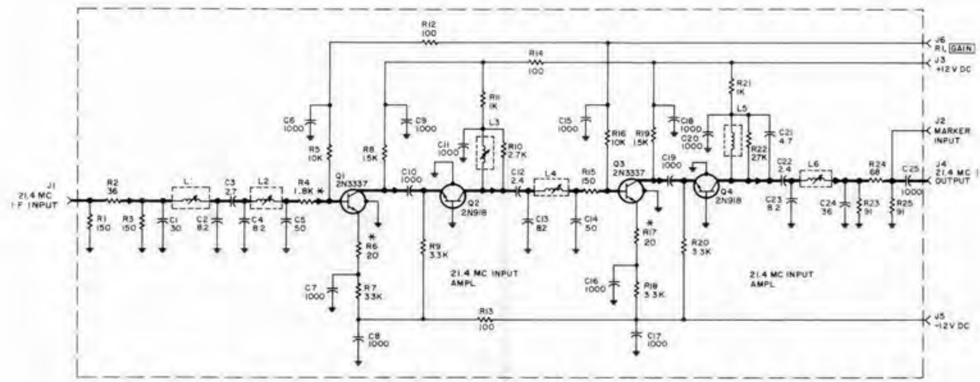


Figure 7-1B. IA-103 Input Amplifier Schematic

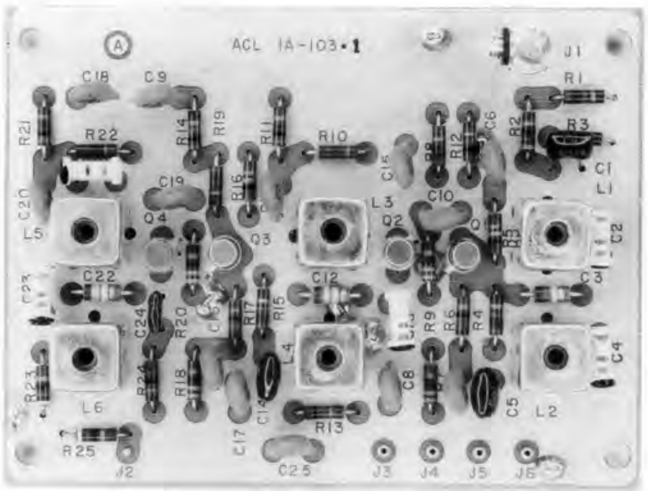


Figure 7-1C. IA-103-1, Input Amplifier

UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS, 1/4 W, 5%.
ALL CAPACITOR VALUES ARE IN pf

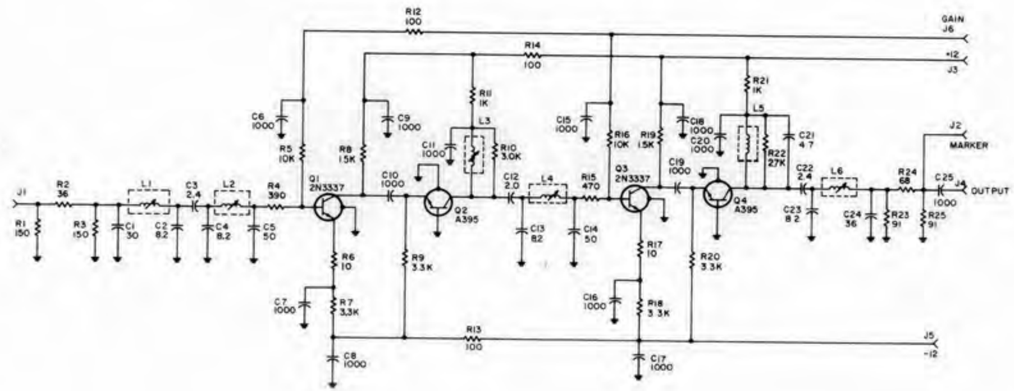


Figure 7-1D. IA-103-1, Input Amplifier Schematic

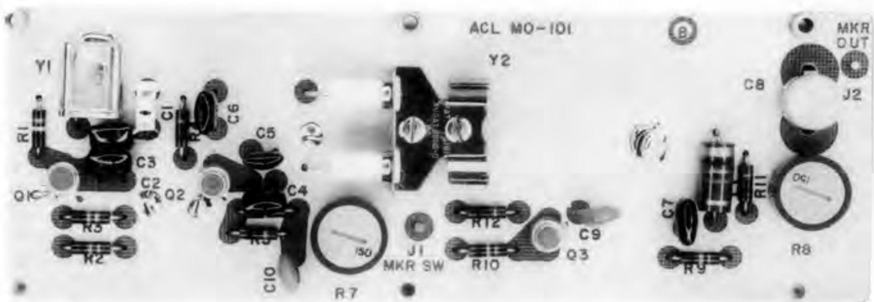


Figure 7-2A. MO-101, Marker Oscillator

UNLESS OTHERWISE SPECIFIED
ALL RESISTOR VALUES ARE IN OHMS,
1/4 W, 5 %.
ALL CAPACITOR VALUES ARE IN pf.

* CRYSTAL SUPPLIED TO CUSTOMER
UPON REQUEST

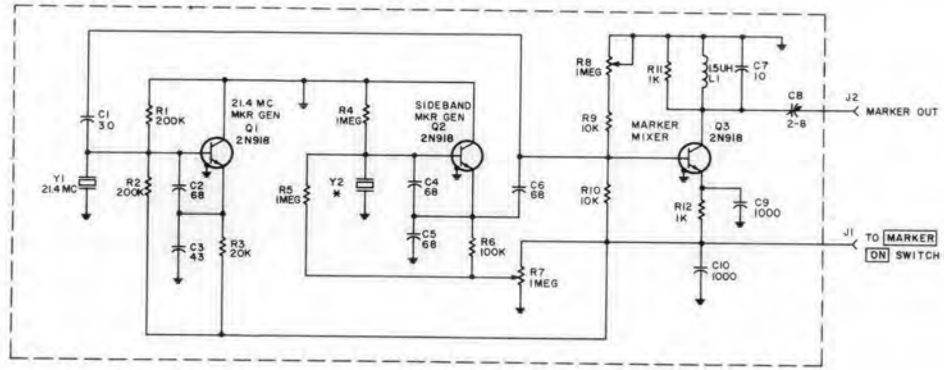


Figure 7-2B. MO-101, Marker Oscillator Schematic

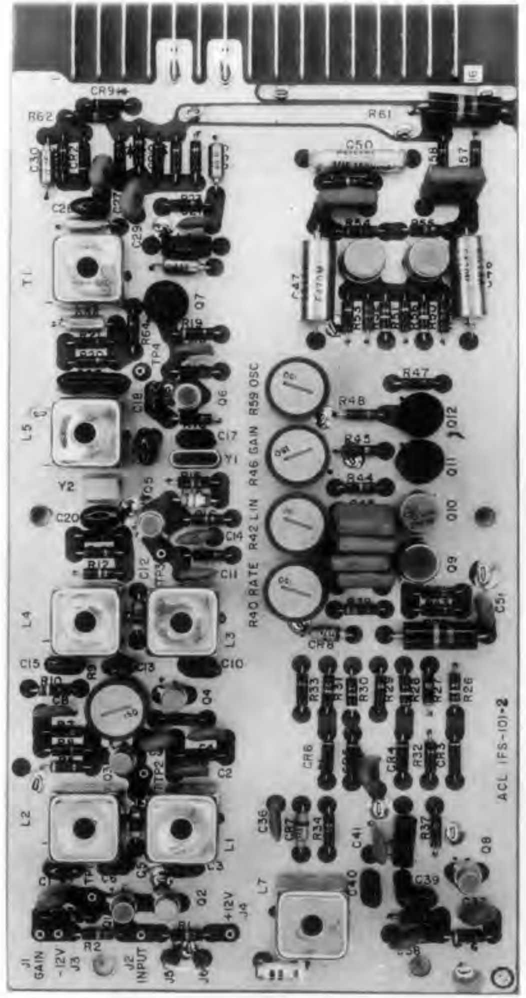


Figure 7-3A. IFS-101-2, IF Amplifier and Sweep Circuit

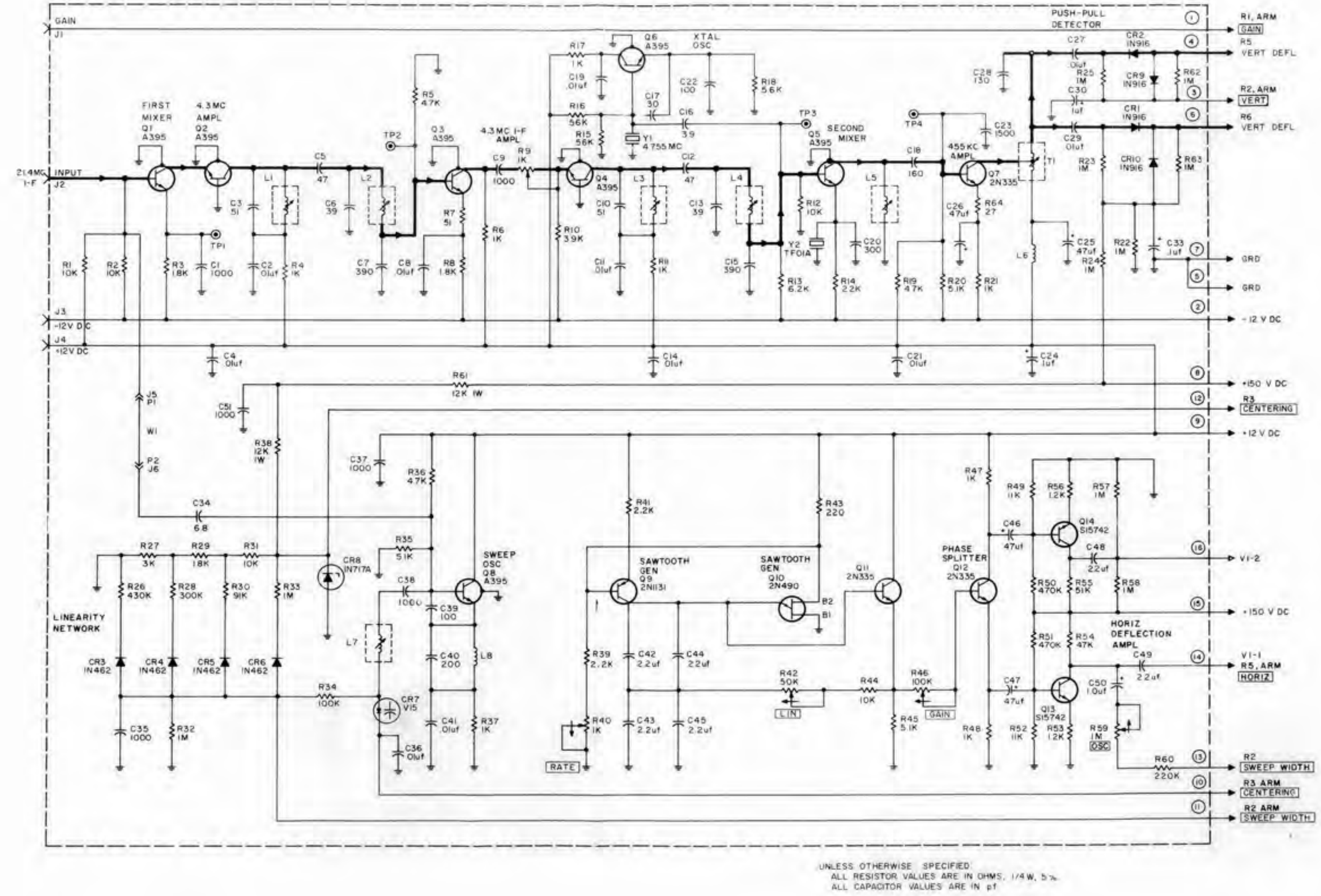


Figure 7-3B. IFS-101-2 IF Amplifier and Sweep Circuit Schematic

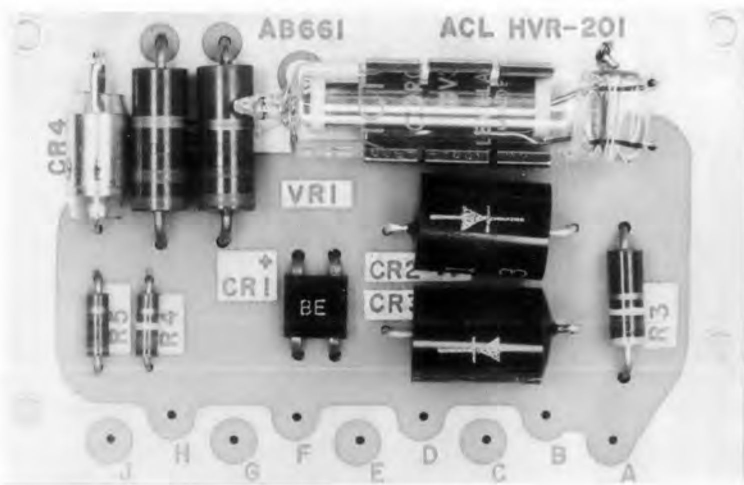
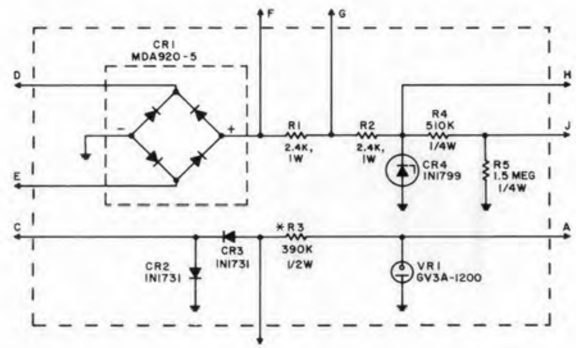


Figure 7-4A. HVR-201, High Voltage Rectifier



NOTE:
1. ALL RESISTOR VALUES ARE IN OHMS, ±5%
* VALUE TO BE DETERMINED BY TEST. NOMINAL VALUE 390K RANGE 330K TO 560K.

Figure 7-4B. HVR-201 High Voltage Rectifier Schematic

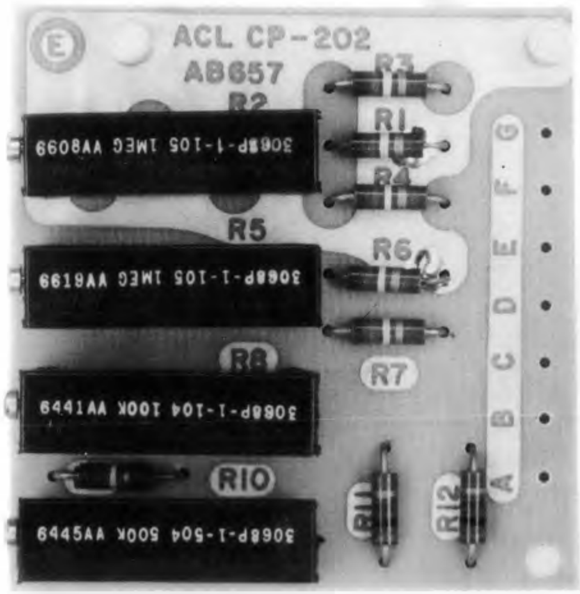
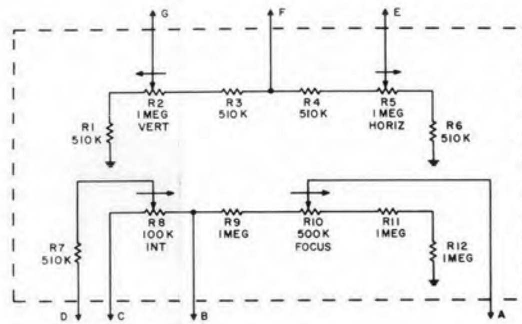
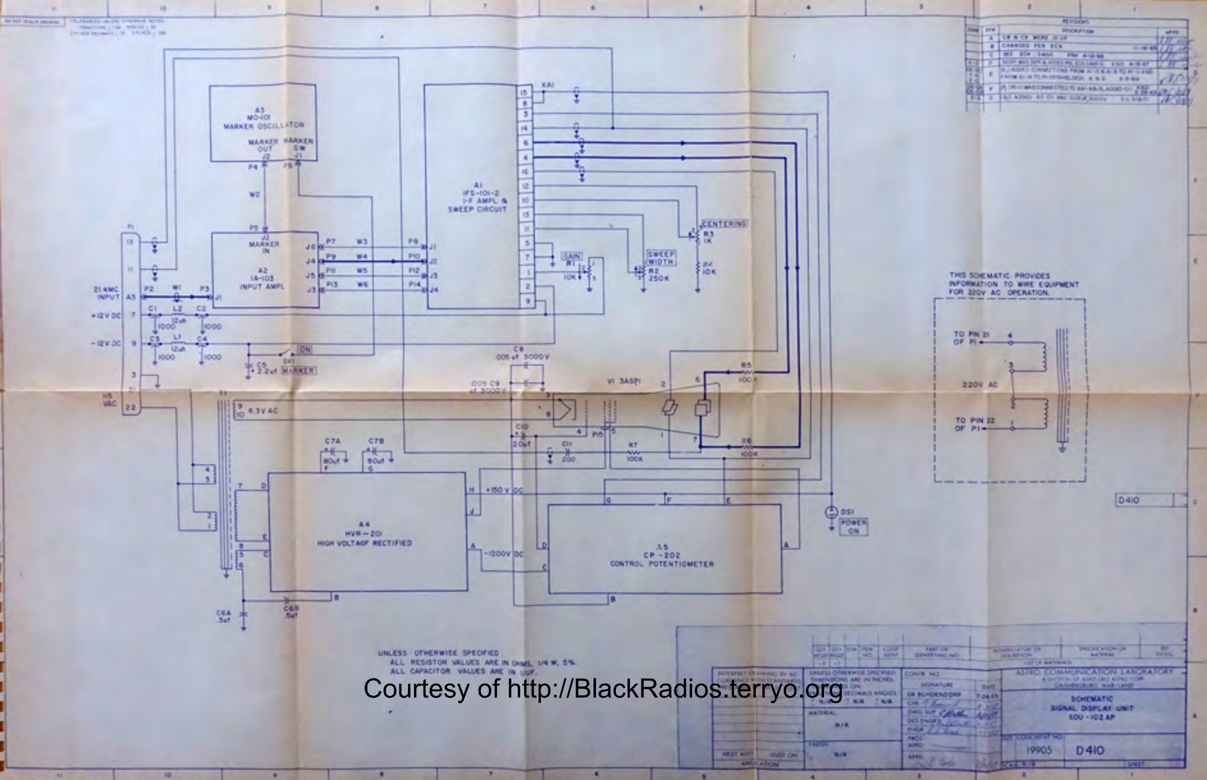


Figure 7-5A. CP-202, Control Potentiometer

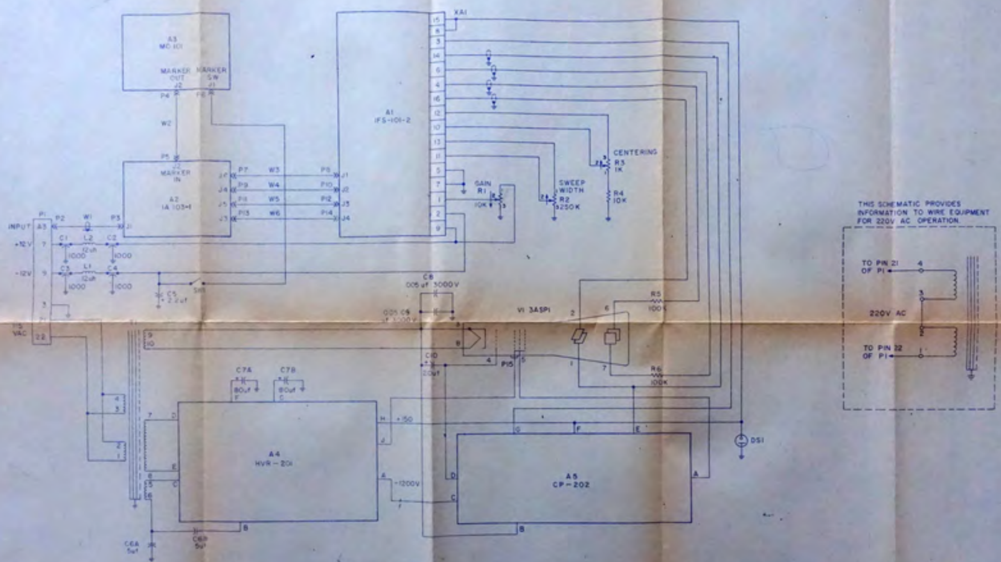


NOTE:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTOR VALUES ARE IN OHMS, 1/4 W, ±5%.

Figure 7-5B. CP-202 Control Potentiometer Schematic


A3
MO-101
MARKER OSCILLATOR
MARKER OUT
MARKER SW
A1
IFS-101-2
I-F AMPL &
SWEEP CIRCUIT
XA1
A2
1A-103
INPUT AMPL
MARKER IN
21.4MC INPUT
+12V DC
-12V DC
115 VAC
CENTERING
R3 1K
R4 10K
GAIN
R1 10K
SWEEP WIDTH
R2 250K
THIS SCHEMATIC PROVIDES INFORMATION TO WIRE EQUIPMENT FOR 220V AC OPERATION.
TO PIN 21 OF P1
220V AC
TO PIN 22 OF P1
C8 .005 uf 3000V
.005 C9 uf 3000V
V1 3ASP1
R5 100K
R6 100K
R7 100K
6.3V AC
C7A 80uf
C7B 80uf
C10 20uf
C11 200
+150 V DC
-1200V DC
A4
HVR-201
HIGH VOLTAGE RECTIFIED
A5
CP-202
CONTROL POTENTIOMETER
DS1
POWER ON
C6A .5uf
C6B .5uf
C5 2.2uf
SW1
ON
MARKER
D410
UNLESS OTHERWISE SPECIFIED
ALL RESISTOR VALUES ARE IN OHMS, 1/4 W, 5%.
ALL CAPACITOR VALUES ARE IN UUF.
LIST OF MATERIALS
ASTRO COMMUNICATION LABORATORY
GAITHERSBURG, MARYLAND
SCHEMATIC
SIGNAL DISPLAY UNIT
SDU-102 AP
19905
D410

ZONE	LTR	DESCRIPTION	DATE	APPD
	A	SEE ECN FRN 5-11-66		
6-9	B	3ASP1 WAS 5ASP1 & ADDED P15, ECN 0520-B K.R.D. 4-19-67		



UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS, 1/4 W, 5%
ALL CAPACITOR VALUES ARE IN pf

ASTRO COMMUNICATION LABORATORY

GAITHERSBURG, MARYLAND

SCHEMATIC
SIGNAL DISPLAY UNIT
SDU-103 AP

MATERIAL	N/A
FINISH	N/A
DR	SCHOENDORF
CODE IDENT NO.	19905
DWG NO.	D-520
SCALE	N/A