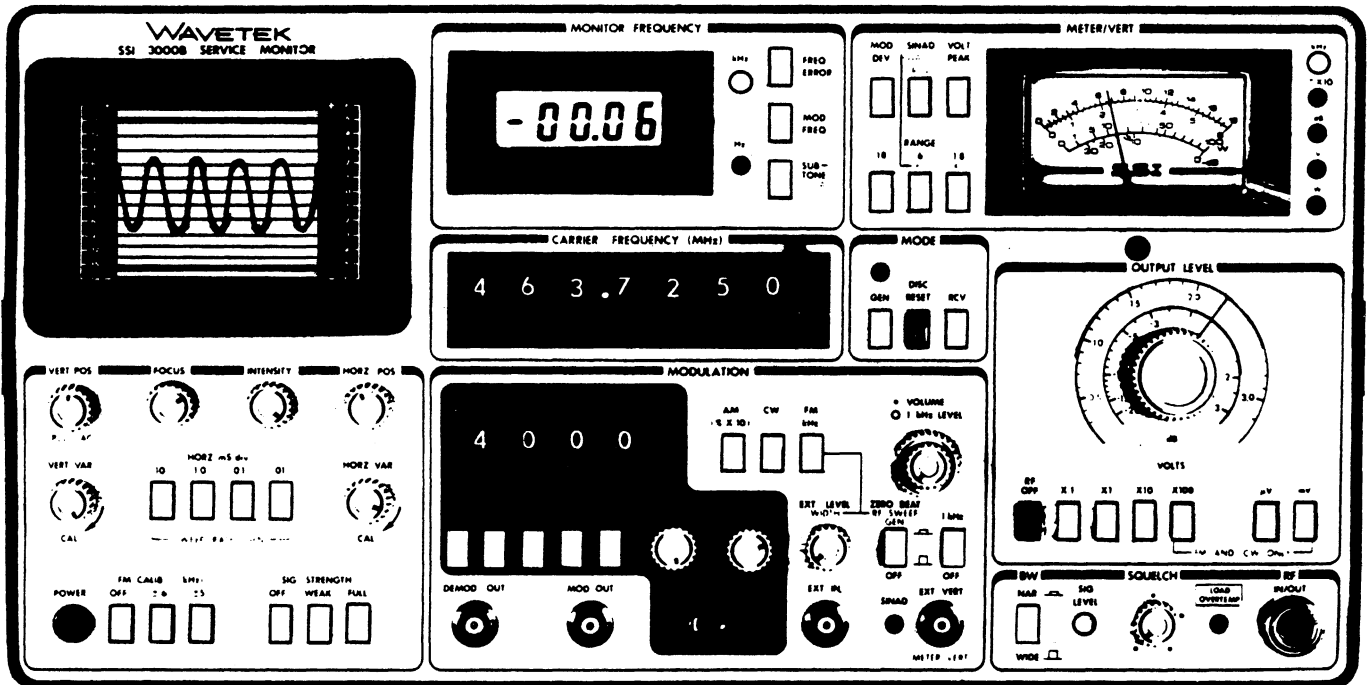


## Model SSI-3000B Service Monitor



# WAVETEK

**INSTRUCTION MANUAL**  
**MODEL SSI-3000B**

**SERVICE MONITOR**

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# WARRANTY

All Wavetek instruments are warranted against defects in material and workmanship for a period of six months on field equipment or one year on laboratory equipment after date of manufacture. Wavetek agrees to repair or replace any assembly or component (except batteries) found to be defective under normal use during this period. Wavetek's obligation under this warranty is limited solely to repairing any such instrument which, in Wavetek's sole opinion, proves to be defective within the scope of the warranty when returned to the factory or to an authorized service center. Transportation to the factory or service center is to be prepaid by purchaser. Shipment should not be made without prior authorization by Wavetek.

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## **Addendum to Warranty for Model SSI-3000B**

Although Model SSI-3000B is a fully capable field instrument, for purposes of this warranty, it is considered a laboratory instrument, and therefore carries a one year warranty. Additional warranty and in-field service information is given in Section 5.2.1.

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# SECTION 1

## GENERAL INFORMATION

### 1.1 INTRODUCTION

The Wavetek Model SSI-3000B is a compact, lightweight Service Monitor for testing FM and AM transceivers. Its low (25 lb) weight and optional inverter permit use in the field, powered by a vehicle battery.

The frequency range is 400 kHz to 1000 MHz in 100 Hz steps. An audio synthesizer permits generation of subaudible tones and timed tone bursts. In receive mode, an internal counter displays frequency error, modulation frequency, or received sub-audible tone frequency. RF voltage level is continuously variable from 0.03  $\mu$ VRMS to 316 mVRMS.

An internal CRT display shows modulation waveform and relative signal strength. A meter reads modulation, SINAD (using the internal 1 kHz tone source), audio input voltage, or RF power from 1 to 100 W. The internal load eliminates the possibility of damage from accidental keying.

The meter and CRT both display the same information, including SINAD, noise and distortion; however, only the meter indicates power, and only the CRT indicates relative signal strength.

## 1.2 SPECIFICATIONS

### 1.2.1 GENERATE MODE

#### 1.2.1.1 FREQUENCY

Range	400 kHz to 999.9999 MHz
Resolution	100 Hz
Display	7 lever/indicator switches
Accuracy	See Time Base

#### 1.2.1.2 RF OUTPUT

Range	0.03 $\mu$ V to 316 mV (-137 to +3 dBm)
Accuracy	0.03 to .3 $\mu$ V $\pm 1$ dB 0.3 to 300 $\mu$ V $\pm 1.5$ dB 0.3 to 316 mV $\pm 4.5$ dB
Attenuator	20 dB/step
Vernier	23 dB overlapping range
Leakage	Virtually unmeasurable at 0.3 $\mu$ V output level

#### REVERSE POWER PROTECTION

Type	Automatically switches to internal load at inputs > 200 mW
Power	Up to 100 W (10 seconds)
Alarm	Excessive energy triggers loud, shrill sound and front-panel indicator

#### SPECTRAL PURITY

Non-Harmonic	< -50 dBc within $\pm 30$ kHz of carrier (all land mobile bands)
Residual FM	< 40 Hz RMS (0.4 to 481 MHz); < 80 Hz RMS (482 to 1000 MHz) (measured in a post-detection bandwidth of 0.1 to 3 kHz)
Residual AM	1% (measured in a post-detection bandwidth of 0.1 to 3 kHz)
Other	2 signals, f1 and f2 For f1=(fc + 17.5 MHz), < 5 mV For f2=(fc + 35 MHz), same level as fc

#### 1.2.1.3 MODULATION

Displayed on METER and CRT DISPLAY

##### FM

Deviation	0 to $\pm 18$ kHz
Ranges	1.8, 6 and 18 kHz
Bandwidth, 3 dB	1 Hz to 10 kHz (METER response limited to > 10 Hz)

Accuracy  
(1 kHz frequency)  $\pm 5\%$  of full scale

External Input  
BURST MODE 100 mVRMS for 5 kHz peak (nominal)

Burst 0.03 to 1.0 seconds continuously variable

Interrupt Switch closure ( $R_{on} < 1 \text{ kohm}$ ) via miniature phone jack to enable internal modulation source

#### AM

Depth 0 to 90%

Bandwidth, 3 dB 10 Hz to 10 kHz

Accuracy at 30%  
(1 kHz frequency)  $\pm 5\%$  of full scale

External Input 100 mVRMS for 100% (nominal)

### 1.2.2 RECEIVE MODE

#### 1.2.2.1 FREQUENCY

Range 400 kHz to 999.9999 MHz

Resolution 100 Hz

Display 7 lever/indicator switches plus frequency error counter

Accuracy See Time Base

Sensitivity  $2 \mu\text{V}$  for 12 dB SINAD (typical)

Bandwidth, 3 dB, nominal

Narrow 7 kHz

Wide 50 kHz

#### 1.2.2.2 MODULATION MEASUREMENT MODE

##### FM MODE

Deviation 0 to  $\pm 18$  kHz

Ranges 1.8, 6 and 18 kHz

Bandwidth, 3 dB 0 to 10 kHz (METER response limited to  $> 10$  Hz)

Accuracy  
(1 kHz frequency)  $\pm 5\%$  of full scale

Display METER and CRT

FM Markers  $\pm 600$  Hz and  $\pm 5$  kHz (accuracy of  $\pm 5$  kHz is  $\pm 2\%$ )



## AM MODE

Depth	0 to 100%
Bandwidth, 3 dB	50 Hz to 10 kHz
Ranges	1.8, 6, and 18% (X10)
Accuracy at 30% (1 kHz frequency)	±5% of full scale
Display	METER and CRT

## 1.2.3 INSTRUMENT FUNCTIONS

### FREQUENCY COUNTER MODES

Display	4 digit LCD, backlighted
Accuracy	Time Base ± 1 count
Gate Period	1.0 second

MODES	RANGE	RESOLUTION
Frequency Error	± (.01 to 20 kHz)	10.0 Hz
Modulation	60 to 9,999 Hz	1.0 Hz
Subtone (RCV)	60 to 250 Hz	0.1 Hz
External Counter	250 to 9,999 Hz	1.0 Hz
Lissajous (RCV)	10 to 9,999 Hz	0.01, 0.1, and 1 Hz

In Lissajous mode, all modulation sources are automatically applied to the CRT DISPLAY horizontal axis. The demodulated audio and external signals are applied to the CRT DISPLAY vertical axis.

**NOTE: In the FM mode, the CRT DISPLAY provides an analog display proportional to the frequency error.**

### 1.2.3.1 RF SWEEP MODE (GEN)

Sweep Width	0 to ±18 kHz
Repetition Time	0.01, 0.1, 1, and 10 msec

1.2.3.2 ZERO BEAT MODE (RCV) Built-in speaker provides audible indication of frequency range.

1.2.3.3 INTERNAL SPEAKER 3-inch speaker with volume control (2 W output).

1.2.3.4 MICROPHONE JACK External microphone "push-to-talk" switch activates generator output. Pre-emphasis and 5 kHz limiter simulates transmitter operation.

### 1.2.3.5 POWER METER MODE

Meter Range	1 to 10 watts (x.1) 1 to 100 watts (x1) (METER selectable from PWR to MOD via SINAD/WATT/MOD switches).
-------------	---

	Accuracy	$\pm$ (7% of reading + 3% of full scale) (to 500 MHz)
1.2.3.6	DISTORTION ANALYZER MODE-SINAD	
	Notch Frequency	1 kHz
	Range	0 to 30 dB
	Accuracy, 12 dB	$\pm$ 1 dB
	Input Impedance	100 kohm (nominal)
	Input Connector	BNC (AUDIO IN)
	Display	METER and CRT
1.2.3.7	INTERNAL MODULATION SOURCES	
	Synthesizer	
	Frequency	
	Range	10 to 9,999 Hz
	Resolution	0.01, 0.1, and 1 Hz
	Accuracy	See Time Base
	Display	4 digit lever/indicator switches
	Output	0 to 1 VRMS
	Impedance	600 ohm (nominal)
	Fixed Source	
	Frequency	1 kHz
	Accuracy	See Time Base
	Output	0 to 1 VRMS
	Impedance	600 ohm (nominal)
1.2.3.8	AC VOLTMETER	
	Ranges	1.8, 6.0, and 18 V peak
	Accuracy	$\pm$ 5% of full scale
	Bandwidth, 3 dB	10 Hz to 100 kHz
	Input Impedance	100 kohm (nominal)
	Input Connector	BNC (AUDIO IN)

**NOTE: Signals measured by the voltmeter can also be viewed on the CRT, measured by the frequency counter, and heard through the speaker.**

**1.2.3.9 RELATIVE SIGNAL STRENGTH INDICATOR**

Frequency	400 kHz to 999.9999 MHz
Dynamic Range	> 90 dB
Weak Signal Range	2 to 30 $\mu$ V (linear) (nominal)
Full Signal Range	2 $\mu$ V to 100 mV (log) (nominal)

**1.2.3.10 OSCILLOSCOPE**

Vertical

Bandwidth, 3 dB	10 Hz to 100 kHz
Ranges	1.8, 6.0 and 18 V peak
Accuracy	$\pm$ 5% of full deflection
Input Impedance	100 kohm (nominal)
Input Connector	BNC (EXT VERT)
Input Coupling	AC/DC selectable from demod circuits

Horizontal

Sweep Range	0.01, 0.1, 1.0, and 10 msec/division
Accuracy	$\pm$ 15%

**1.2.4 TIME BASE CHARACTERISTICS**

Standard TCXO (Refer to Section 1.3.1 for optional OCXO)

Aging Rate	$\pm$ 1 ppm/year
Temperature (0 to 50° C)	$\pm$ 0.5 ppm

**1.2.5 GENERAL**

Operating Temperature	0 to 50° C
Power Requirements	103/117/220/240 VAC; +5%, -10%; approximately 60 VA
Input DC (To Optional Inverter)	10.5 to 15.2 VDC, 6A
Dimensions	41.3 cm (16-1/4 in)(including handles) wide 18.3 cm (7-3/16 in) high 40.6 cm (16 in)(including rear feet & bezel) deep
Weight	11.4 kg (25 lb)

# SECTION 2

## PREPARATION FOR USE

### 2.1 INTRODUCTION

The Model SSI-3000B is a rugged piece of precision test equipment designed for portability. Although it is quite commonly used as a laboratory instrument, it is also well suited for field use.

### 2.2 UNPACKING AND INSPECTION

When unpacking the Service Monitor, inspect the shipping container and instrument for shipping damage. Save the shipping carton and packing material for possible future use.

The instrument was inspected, given final operational and quality control tests, then carefully packaged for shipment, and should operate in accordance with Section 3 of this manual.

If the instrument received has been damaged in transit, notify the carrier and your Wavetek Customer Service representative. The representative will immediately arrange for either replacement or repair of your instrument without waiting for damage claim settlements.

Wavetek  
5808 Churchman  
Beech Grove, IN 46107  
800-428-4424 (Outside Indiana)  
or  
317-787-3332 (In Indiana)

### 2.3 PRE-TURN ON

Before line power is applied, the METER should read zero. If it does not, insert a blade screwdriver into the opening below the METER and mechanically adjust it to zero.

### 2.4 POWER REQUIREMENTS

The instrument operates from selectable 103/117/220/240 VAC, 50/60 Hz primary power source at 60 VA. The

three conductor power cord provides a ground connection when it is connected to the proper outlet.

The instrument can also be operated from DC power by using the optional Inverter. With the Inverter, the instrument requires 10.5 VDC to 15.2 VDC.

For use with other primary power sources, please consult the factory.

### 2.5 ENVIRONMENTAL CONSIDERATIONS

The instrument comes equipped with bottom and rear-panel feet (the rear-panel feet also serve as cord wraps), and a combination carrying handle/instrument stand. These features, along with its small size and light weight, permit easy access to confined working spaces.

The instrument is designed to operate between 0° C and 50° C, and should be used in an area where air flow around the instrument is not restricted. Do not permit the ventilating ports to be blocked or restricted, and **never** operate the unit within its protective cloth cover accessory.

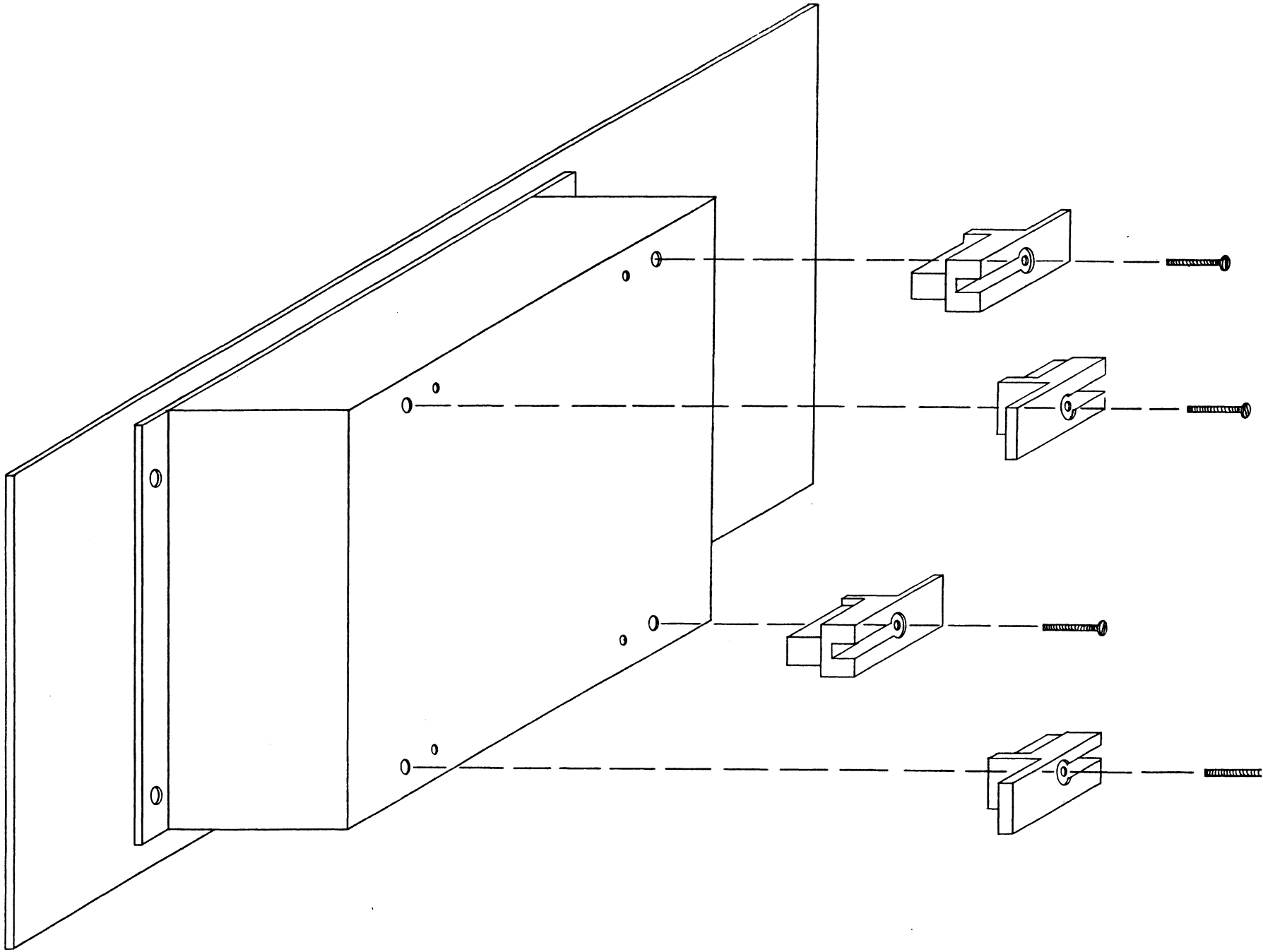
#### NOTE

**Exceeding the upper or lower temperature limits for extended periods may not result in damage to the instrument but may cause degraded performance.**

### 2.6 INSTALLING THE INVERTER

Remove the four rear-panel feet (cord wraps). Position the Inverter over the screw holes with the LOW VOLT-AGE lamp at the top, and secure the Inverter with the four screws supplied. Install the rear-panel feet (cord wraps) on the back of the Inverter. Plug the instrument line cord into the Inverter receptacle and connect the Inverter to a 12 VDC power source.

Figure 2-1. Inverter Installation



# SECTION 3 OPERATION

## 3.1 INTRODUCTION

This section contains operating instructions for the Model SSI-3000B Service Monitor. Included are descriptions of front and rear panels, and notes on use of features.

## 3.2 FRONT PANEL DESCRIPTION

Due to the number of controls, the front panel is divided into sections for description.

### 3.2.1 CRT

Refer to Figure 3-1.

- (1) CRT DISPLAY (with graticule and deviation scales of  $\pm 1.8$ ,  $\pm 6$ , and  $\pm 18$  kHz or V, depending on parameter being measured) displays measurement information.
- (2) VERT POS, FOCUS, INTENSITY, and HORZ POS controls determine CRT DISPLAY trace characteristics. When the VERT POS control is pulled out, the vertical axis from the demodulation circuit is AC coupled. When the VERT POS control is pushed in, the vertical axis is DC coupled.
- (3) VERT VAR control provides continuously variable control of vertical sensitivity. Scale is calibrated when control is fully cw (detent position).
- (4) HORZ/SWEEP RATE pushbutton switches select 10, 1, 0.1, or 0.01 msec/ division horizontal sweep rate. In RF SWEEP mode, the pushbuttons determine the RF sweep rate.
- (5) HORZ VAR control provides vernier control of horizontal sweep rate. Scale is calibrated when control is fully cw (detent position).
- (6) POWER switch applies AC power to the instrument. Non-luminous indicator provides visual on-off information.
- (7) FM CALIB pushbutton switches select a horizontal marker line at  $\pm 5$  kHz deviation level, a marker line at  $\pm 0.6$  kHz deviation level, or no marker lines (OFF).

- (8) SIG STRENGTH pushbutton switches provide an indication of signal strength when active. When the WEAK pushbutton is pressed, a signal of approximately 100 mV will fill the display horizontally. Signals of lesser strength will partially fill the display proportional to the signal strength. (The left edge of the display is the zero signal level.) Minimum to maximum width requires approximately 90 dB change when FULL is pressed.

### 3.2.2 FREQUENCY

Refer to Figure 3-2.

- (1) MONITOR FREQUENCY DISPLAY counts the frequency selected by the FREQ ERROR, MOD, and SUB-TONE pushbutton switches. Either the kHz or Hz lamp will be lit, indicating the unit of measurement.
- (2) FREQ ERROR pushbutton switch causes the MONITOR FREQUENCY DISPLAY to show the difference (in kHz) between the CARRIER FREQUENCY switch setting and the input frequency.

#### NOTE

**A negative reading indicates the input frequency is less than the CARRIER FREQUENCY switch setting.**

- (3) MOD FREQ pushbutton switch causes the MONITOR FREQUENCY DISPLAY to show the input modulation frequency (250 to 9999 Hz).
- (4) SUB-TONE/LISSAJOUS pushbutton switch causes the MONITOR FREQUENCY DISPLAY to show the input modulation frequency (60 to 250 Hz) and a Lissajous pattern on the CRT DISPLAY which indicates the sub-tone frequency compared to the internal audio synthesizer.
- (5) CARRIER FREQUENCY lever/ indicator switches select the output frequency in generate mode, and the input reference frequency in receive mode. (Resolution is 100 Hz.)

### 3.2.3 MODULATION

Refer to Figure 3-3.

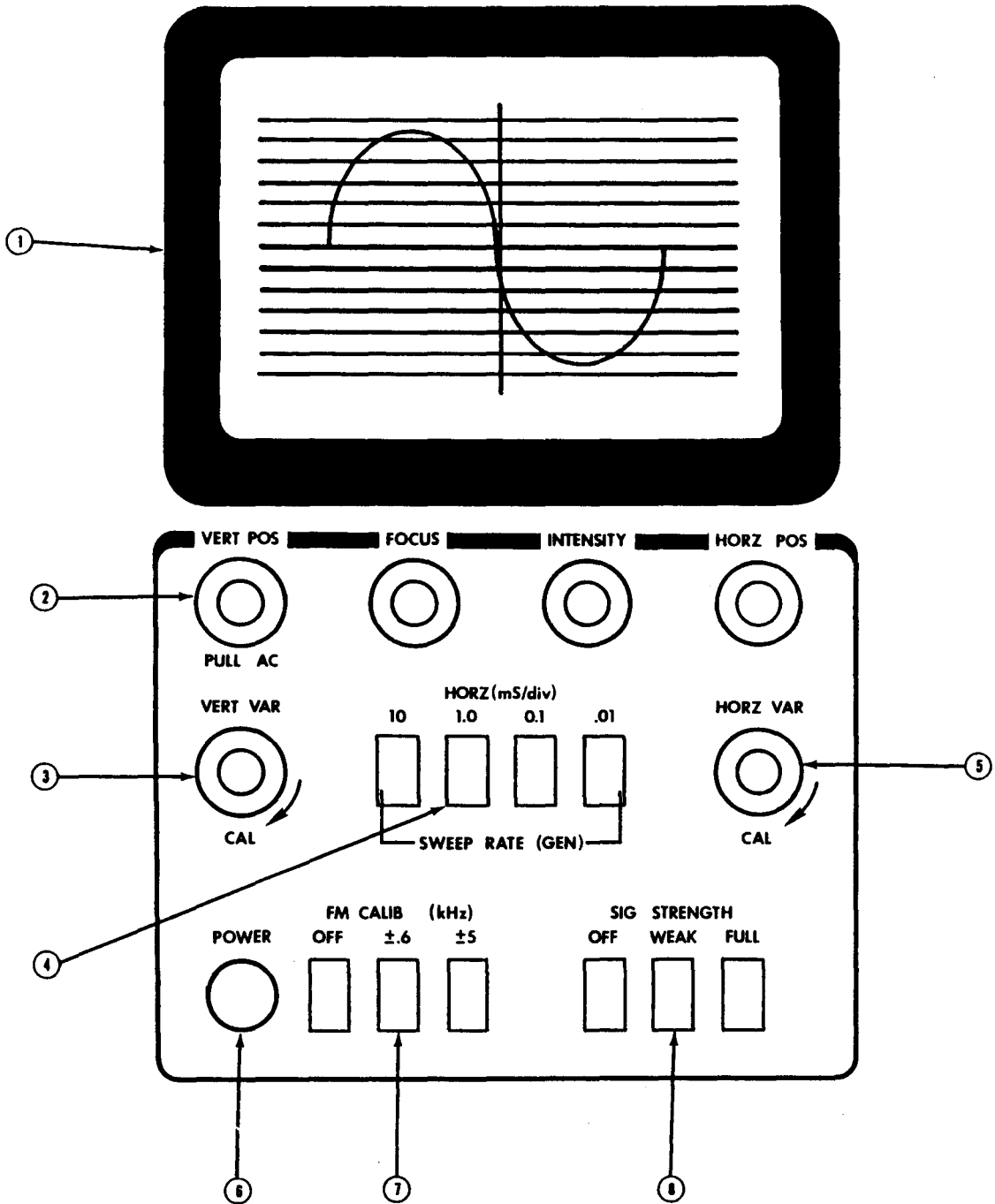


Figure 3-1. Front Panel -- CRT

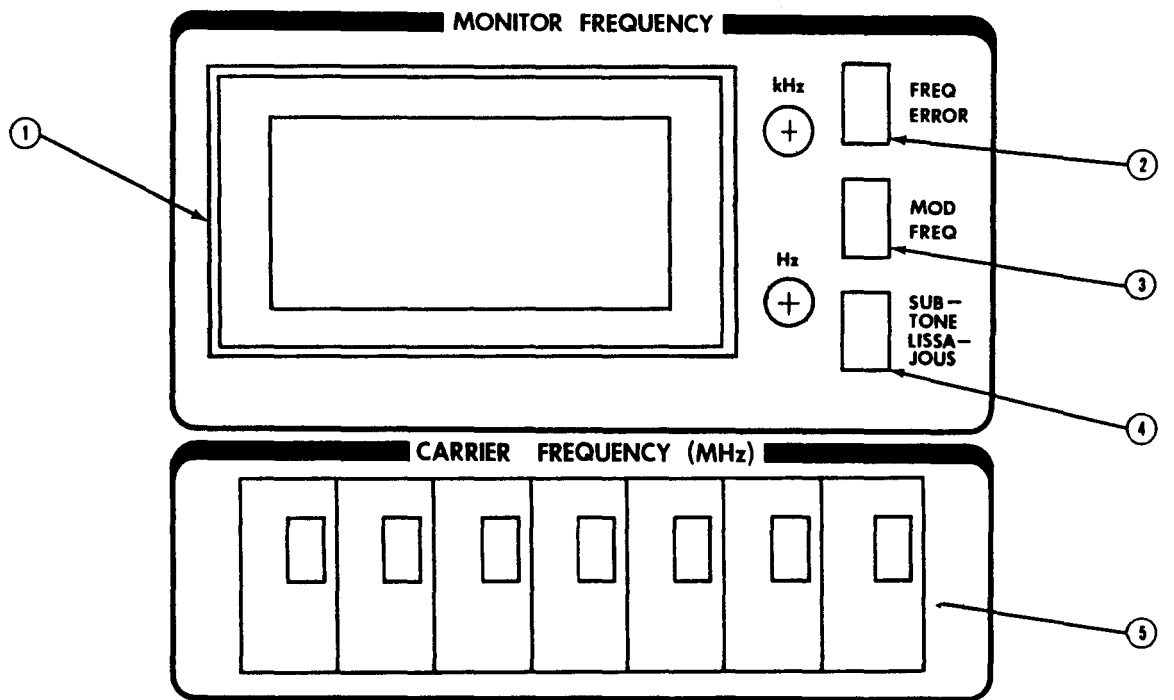


Figure 3-2. Front Panel — Monitor Frequency



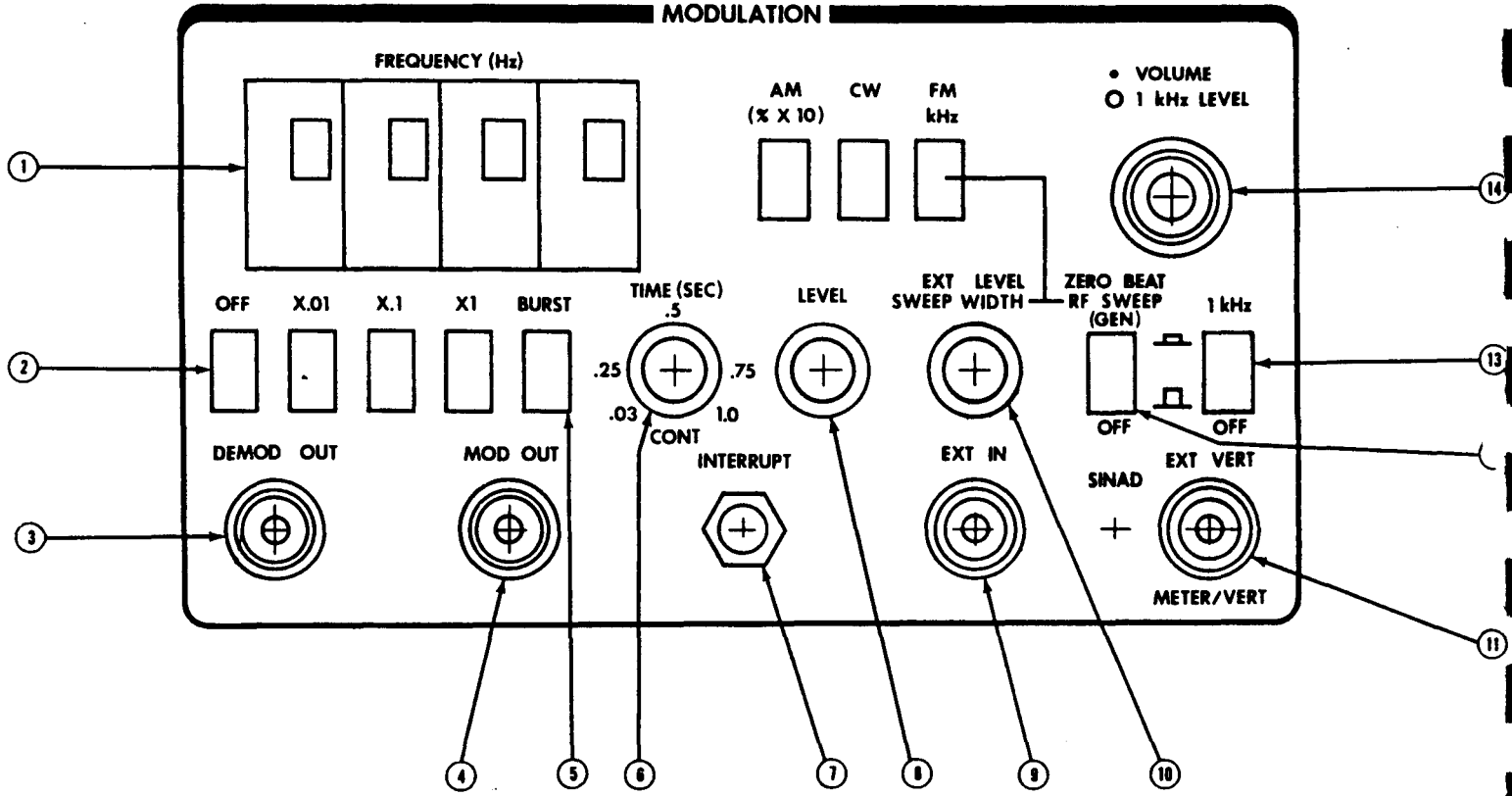


Figure 3-3. Front Panel — Modulation

- (1) MODULATION FREQUENCY lever/indicator switches select the synthesizer modulation frequency.

**NOTE**

Left-most digit can not be zero.

- (2) MODULATION FREQUENCY MULTIPLIER pushbutton switches select the the range of the MODULATION FREQUENCY switches as follows:

OFF -No modulation.

X.01 -Range is 10.00 to 99.99 Hz.

X.1 -Range is 100.0 to 999.9 Hz.

X1 -Range is 1000 to 9999 Hz.

The MODULATION FREQUENCY MULTIPLIER pushbuttons also determine the 0 phase for Lissajous display.

- (3) DEMOD OUT connector (BNC) provides output connection for the demodulated audio signal.
- (4) MOD OUT connector (BNC) provides output connection for all audio modulation (synthesizer, microphone, 1 kHz, and external).
- (5) BURST pushbutton switch activates a burst of synthesizer modulated signal, the frequency of which is set by the MODULATION FREQUENCY and MODULATION FREQUENCY MULTIPLIER switches, and the duration of which is set by the TIME control.
- (6) TIME control selects the length of the modulation burst activated by the BURST control. When the control is fully cw (detent position), modulation is continuous.
- (7) INTERRUPT connector (miniature phone jack) allows the interruption of the synthesizer modulation using external rotary dial equipment, thus providing a means for external modulation burst control.
- (8) LEVEL control sets the level of the synthesizer modulation.
- (9) EXT IN connector (BNC) provides input connection for an external modulating signal.
- (10) EXT LEVEL/SWEEP WIDTH control sets the level of the external modulation, and, in RF sweep mode, controls the sweep width from 0 to  $\pm 18$  kHz.
- (11) EXT VERT/METER/VERT connector (BNC) provides input connection to the audio voltmeter and CRT. The audio signal is displayed on the CRT DISPLAY while the voltage is displayed on both the CRT DISPLAY and METER. The SINAD lamp indicates a sufficient input level for measurement of volts and sinad.

- (12) ZERO BEAT/RF SWEEP pushbutton switch enables the RF sweep at the CRT display sweep rate in generate mode. In receive mode, the pushbutton outputs the beat frequency between the generated and received frequencies via the internal speaker.

- (13) 1 kHz pushbutton switch activates the internal 1 kHz generator.

- (14) VOLUME/1 KHZ LEVEL dual control sets the internal speaker volume (inner knob) and the level of the internal 1 kHz generator signal when the 1 kHz switch is pressed.

- (15) AM, CW, and FM pushbutton switches select the mode of modulation. (FM is selected for RF sweep.)

**NOTE**

In AM mode, the modulation depth is the METER reading X10.

**3.2.4 METER/MODE**

Refer to Figure 3-4.

- (1) METER indicates measurement of modulation, SINAD, voltage, and transmitter power.
- (2) VOLT pushbutton switch causes the METER and CRT DISPLAY to read the peak voltage at the AUDIO IN connector.
- (3) SINAD/WATTS pushbutton causes the METER to read input power (watts) in receive mode. In generate mode, the pushbutton (for 1 kHz modulation) causes the METER to read the ratio (signal + noise + distortion)/ (noise + distortion) in dB.
- (4) MOD pushbutton switch causes the METER to read the modulation level in kHz deviation (FM), or % (AM).

**NOTE**

% AM is read on the scale selected by the METER RANGE switch, and is multiplied by 10 to obtain the correct value.

- (5) METER RANGE pushbutton switches select the METER and CRT DISPLAY scale to be read.
- (6) KHZ, % X10, dB, V, W indicator lamps indicate the unit of measurement for the METER reading.
- (7) GEN pushbutton switch selects the generate mode of operation.
- (8) DISC RESET pushbutton switch centers the discriminator bias in the IF section as an internal calibrator.

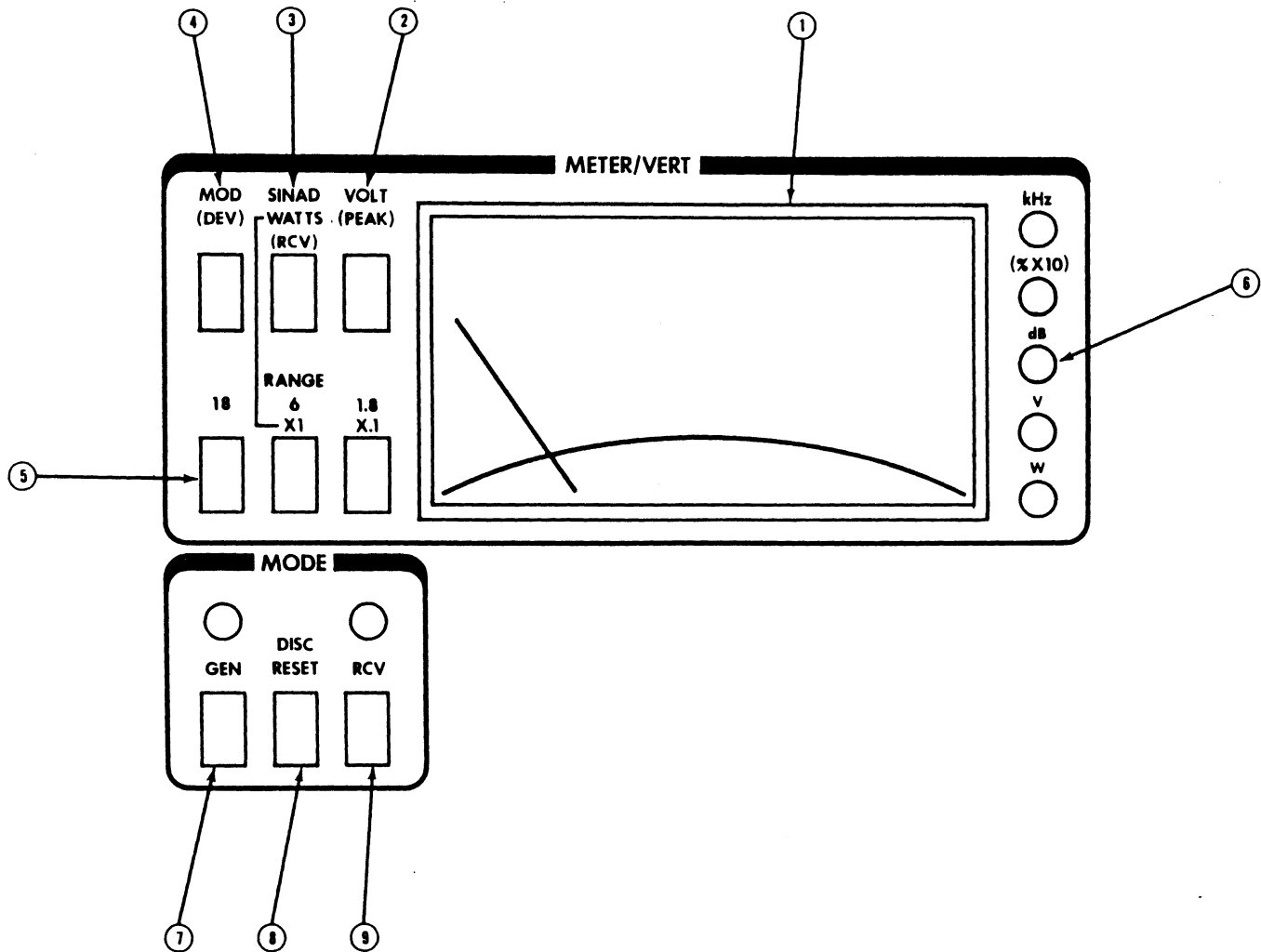


Figure 3-4. Front Panel — Meter/Vert

- (9) RCV pushbutton switch selects the receive mode of operation.

### 3.2.5 OUTPUT LEVEL/SQUELCH

Refer to Figure 3-5.

- (1) OUTPUT LEVEL control sets the instrument output level in generate mode. The dial is calibrated in VRMS and dB.
- (2) RF OFF pushbutton switch selects either continuous output (pushbutton not pressed), or output active only when "push-to-talk" switch of microphone connected to rear-panel MIC connector is activated.
- (3) OUTPUT LEVEL MULTIPLIER pushbutton switches select the multiplication factor for the OUTPUT LEVEL control dial indication.
- (4)  $\mu\text{V}$  and  $\text{mV}$  pushbutton switches select the units of the OUTPUT LEVEL control dial indication.
- (5) BW NAR/WIDE pushbutton switch sets the IF bandwidth to 7 kHz (NAR) or 50 kHz (WIDE) in receive mode.
- (6) SIG LEVEL indicator lamp lights when the RF input signal level is greater than the SQUELCH control level setting.
- (7) SQUELCH control sets the threshold sensitivity in FM receive mode to eliminate unwanted noise. The RF input signal level must be greater than the SQUELCH control level setting for measurement to be made. The SQUELCH control has no function in AM receive mode.
- (8) LOAD OVERTEMP indicator lamp, when lit, indicates that the RF input power has exceeded 100 W for 10 seconds. An audible alarm tone is also output via the speaker.
- (9) RF IN/OUT connector (type N) provides connection for the RF output signal (in generate mode) and the RF input signal (in receive mode). The function of this connector is automatically switched from output to input when RF is applied from an external source.

### 3.3 INITIAL TURN-ON

Connect the rear-panel AC line cord to a suitable power outlet and press the front-panel POWER switch. The POWER switch indicator will change from black to orange, the METER will become illuminated, and lamps corresponding to whichever pushbuttons are pressed will light.

Service Monitors equipped with the standard TCXO time base will generate precision signals accurate to  $\pm 0.5$  ppm within a few seconds.

Service Monitors equipped with the optional OCXO time base will stabilize to  $\pm 0.05$  ppm accuracy within ten minutes in a normal room temperature environment. Instruments in cold environments will require longer stabilization times.

### 3.4 RF GENERATE CW OPERATION

Select CW generate mode by pressing the front-panel GEN and CW pushbuttons.

#### NOTE

The RF OFF pushbutton should be in its released position.

Set the CARRIER FREQUENCY switches for the desired frequency. Set the RF output for the desired level by pressing the appropriate  $\mu\text{V}$  or  $\text{mV}$  pushbutton, the appropriate OUTPUT LEVEL MULTIPLIER pushbutton, and adjusting the OUTPUT LEVEL control.

For example, to generate an RF output of  $0.3 \mu\text{VRMS}$  at 152.0900 MHz, press the  $\mu\text{V}$  and X.1 pushbuttons, set the OUTPUT LEVEL control to 3, and set the CARRIER FREQUENCY switches to 152.0900.

The OUTPUT LEVEL control is calibrated in both VRMS and dB. Refer to Table 3-1 for dial ranges in dBm for all OUTPUT LEVEL MULTIPLIER and  $\mu\text{V}/\text{mV}$  switch settings. The "Low" column gives the minimum dial settings in dBm; the "High" column gives the maximum dial settings in dBm; the "0 dB" column gives the output levels in dBm for 0 dB on the OUTPUT LEVEL control dial.

The RF OFF pushbutton switch disconnects the RF output signal from the RF IN/OUT connector when pressed. A microphone (Shure 405K or equivalent) can then be connected to the rearpanel MIC connector and the microphone "push-to-talk" switch used to "key" the RF output.

Table 3-1. dBm Level Calibration

Mult	Range	Low	0 dB	High
X.1	$\mu\text{V}$	-137	-120	-117
X1	$\mu\text{V}$	-117	-100	-97
X10	$\mu\text{V}$	-97	-80	-77
X100	$\mu\text{V}$	-77	-60	-57
X.1	$\text{mV}$	-77	-60	-57
X1	$\text{mV}$	-57	-40	-37
X10	$\text{mV}$	-37	-20	-17
X100	$\text{mV}$	-17	0	3

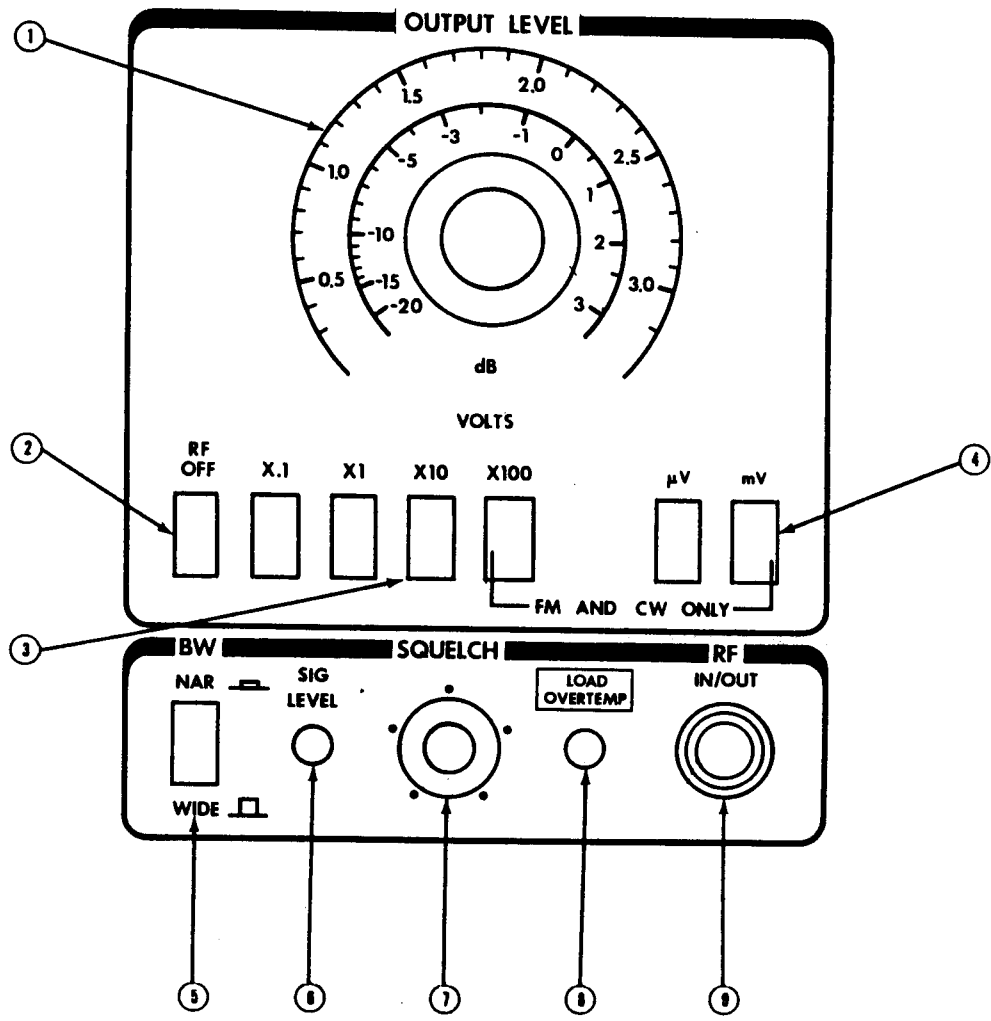


Figure 3-5. Output Level/Squelch

### 3.5 RF GENERATE WITH SINGLE-SOURCE FM

Select FM generate mode by pressing the front-panel GEN, MOD, and FM pushbutton switches. The kHz lamp will be lit.

To modulate using the internal synthesizer, set the desired modulation frequency via the MODULATION FREQUENCY and MODULATION FREQUENCY MULTIPLIER switches (up to 9999 Hz), and adjust the LEVEL control for the desired deviation (up to 18 kHz). For continuous modulation, the TIME control should be in its detented fully cw position. If a tone burst is desired, set the TIME control for the desired duration and press the BURST pushbutton.

For remote tone burst operation, connect a rotary-dial pulser to the INTERRUPT connector. The modulation will be disabled until the pulser enables it.

For example, to continuously modulate with a CTCSS tone of 131.8 Hz at 500 Hz deviation, set the MODULATION FREQUENCY switches to 1318, press the MODULATION FREQUENCY MULTIPLIER X.1 pushbutton, set the TIME control fully cw, press the METER RANGE 1.8 pushbutton, and adjust the LEVEL control for a 0.5 kHz METER reading.

If it is desired to turn off the modulation, but preserve the modulation settings for future use, press the OFF pushbutton.

For external FM, connect the modulating signal to the EXT IN connector and adjust the EXT LEVEL control for the desired deviation (as displayed on the METER). Disconnecting the external source disables the external FM while preserving the EXT LEVEL control setting.

FM with the internal 1 kHz modulation source is accomplished by pressing the 1 kHz pushbutton and adjusting the 1 kHz LEVEL control for the desired deviation (as displayed on the METER). Releasing the 1 kHz pushbutton disables the 1 kHz modulating signal and preserves the 1 kHz LEVEL control setting.

Voice modulation is accomplished by connecting a microphone (Shure 405K or equivalent) to the rear-panel MIC connector and speaking into it. If the RF OFF pushbutton is pressed, the microphone's "push-to-talk" switch will activate the RF output. FM deviation is internally limited to 5 kHz maximum.

### 3.6 RF SWEEP

The output carrier frequency may be swept over a 0 to 36 (0 to  $\pm 18$ ) kHz width at a sweep repetition interval of 0.01, 0.1, 1, or 10 msec.

To sweep the carrier frequency, set the instrument controls for RF generate single-source FM mode as described in Section 3.5. All internal modulation sources

should be inactive. Press the RF SWEEP/ZERO BEAT pushbutton. The sweep width is continuously adjustable via the SWEEP WIDTH/EXT LEVEL control, while the repetition rate is selected via the HORZ/SWEEP RATE pushbuttons.

### 3.7 RF GENERATE WITH MULTIPLE-SOURCE FM

Multiple-source FM is accomplished by setting up the modulation parameters for each modulation source individually, then simultaneously enabling them. Up to four modulation sources (MODULATION FREQUENCY SWITCHES, EXT IN connector, and 1 kHz pushbutton - each with its own LEVEL control - plus voice) can be superimposed on the RF carrier. The BURST and TIME controls, however, affect only the MODULATION FREQUENCY switch source.

### 3.8 RF GENERATE WITH AM

AM operation is accomplished in exactly the same manner as FM with the following exceptions:

Press the AM pushbutton instead of the FM pushbutton (the % X10 lamp will be lit).

In AM mode, the METER ranges are 18, 60, and 180% (specifications apply only to 90%).

The microphone circuitry is intended primarily for FM applications; therefore, AM is limited to approximately 16% peak.

### 3.9 SINAD MEASUREMENTS

Apply an RF carrier (sufficient to quiet the receiver) to the receiver under test. Modulate the RF carrier to 60% of its maximum rated FM deviation or to 30% AM (whichever applies) using the internal 1 kHz source. Connect the receiver's audio output to the AUDIO IN connector. Press the VOLT pushbutton and adjust the receiver's volume control such that the METER reads the receiver's rated audio output level. Press the SINAD pushbutton (the dB lamp will be lit). Vary the CARRIER FREQUENCY switch setting to produce a minimum METER reading (this locates the center of the receiver's IF band), then adjust the OUTPUT LEVEL control such that the METER reads -12 dB (i.e., 12 dB SINAD sensitivity). Align the receiver's IF section for the optimum (minimum) reading.

#### NOTE

**The SINAD reading is the net result of two conflicting requirements on IF alignments: sharp tuning for minimum receiver noise and wide tuning for minimum receiver distortion. Thus, IF alignment with a SINAD meter quickly optimizes these two requirements simultaneously by displaying a reading that results from both noise and distortion. The composite distortion signal may be viewed on the CRT display for analysis of the distortion source.**

### 3.10 AC VOLTMETER

AC signals up to 18 Vpp and between 10 Hz and 100 kHz in frequency can be measured with the METER and CRT DISPLAY. Press the VOLT and appropriate METER RANGE pushbuttons and connect the signal to be measured to the EXT VERT connector. The voltage will be indicated on the METER, the signal will be displayed on the CRT DISPLAY, and may also be monitored aurally on the speaker.

### 3.11 RF WATT METER

RF power up to 100 W can be measured with the METER. Connect the RF source (for example, a transmitter) to the RF IN/OUT connector. When the RF source is enabled ('keyed'), the W lamp will light and the METER will read power on the watts scale.

#### NOTE

The internal 50 ohm load temperature alarm, consisting of the front-panel LOAD OVERTEMP indicator and the internal speaker aural alarm, will activate if the load overheats, typically after 100 W has been applied for longer than 10 seconds. If the warning signals become activated, the power applied at the RF IN/OUT connector must be interrupted (transmitter must be unkeyed) to prevent possible damage to the internal load. RF power applied to the RF IN/OUT connector when the AC power is not on will be absorbed by the internal 50 ohm load, but the alarms will not be operative.

### 3.12 CRT FM/AM MEASUREMENTS

#### NOTE

Before making modulation measurements with the CRT, adjust the VERT POS control such that the trace is on the zero reference line. Adjust the HORZ POS control such that the trace is in the center of the screen. Adjust the INTENSITY and FOCUS controls for a sharp clear trace on the screen.

When the instrument is in receive mode and tuned to a transmitter signal, any modulation (FM or AM) can be observed and measured on the CRT display, depending on the setting of the VERT VAR and HORZ VAR switches.

To measure FM deviation, press the FM pushbutton and set the HORZ switch to 1.0 msec/div. Press the 1.8, 6.0, or 18 kHz RANGE pushbutton, depending on the range of deviation being measured. Deviation can be measured directly on the CRT display graticule.

FM CALIB markers at  $\pm 5$  kHz or  $\pm 0.6$  kHz provide easy reading of peak deviation.

#### NOTE

With FM CALIB markers on, the display is time multiplexed, and therefore some decrease in display intensity and audio volume will be experienced.

To zero the trace while making measurements, press the DISC RESET button and adjust the VERT POS control.

If the received signal carrier is the same frequency as the CARRIER FREQUENCY switch setting, the CRT trace will be on the zero line of the graticule. If the input carrier frequency is above the CARRIER FREQUENCY switch frequency, the trace will be above the zero line. Calibration is set by the METER RANGE pushbuttons. The CRT display provides a convenient indication of frequency error, but the MONITOR FREQUENCY DISPLAY should be used for accurate measurements.

### 3.13 LISSAJOUS

The exact frequency of an external 10 to 9999 Hz CW signal or CW modulating signal on a carrier may be determined using the Lissajous function.

To use the Lissajous function, set the instrument controls for RF generate single-source FM mode (see Section 3.5). All internal modulation sources should be inactive. If the external signal is either an amplitude- or frequency-modulated carrier, connect the external signal to the RF IN/OUT connector. If the external signal is CW, connect the external CW signal to the EXT VERT connector. Press the RCV, MOD, and SUB-TONE/LISSAJOUS pushbuttons, and set the MODULATION FREQUENCY switches to the approximate frequency (if known) of the external CW signal. A rotating trace pattern will appear on the CRT DISPLAY. Adjust the LEVEL control such that the vertical and horizontal trace deflections on the CRT DISPLAY are approximately equal. Vary the MODULATION FREQUENCY switch setting while observing the CRT DISPLAY. As the MODULATION FREQUENCY switch setting approaches the frequency of the external CW signal, the rate of trace rotation will decrease. When the MODULATION FREQUENCY switch setting exactly matches the external CW frequency, the trace rotation will cease and a stable pattern will be displayed.

### 3.14 RELATIVE SIGNAL STRENGTH

When one of the SIG STRENGTH buttons is pressed, the length of the trace, starting at the left edge of the screen, will depend on the signal strength. That is, the stronger the signal, the farther the trace extends to the right. When the OFF button is pressed, the trace is full-width.

When the FULL button is pressed, a full-width trace indicates a signal of approximately 100 mV; when the WEAK button is pressed, a full-width trace indicates a signal of approximately 30  $\mu$ V. Dynamic range in the FULL position is approximately 90 dB.

### **3.15 AUTO CALIBRATION**

When the DISC RESET button is pressed, or when the SIG LEVEL lamp is not lit, the discriminator will be automatically zeroed, removing any longterm drift that

has occurred. The MONITOR FREQUENCY DISPLAY will read zero. The vertical position of the CRT DISPLAY trace may be adjusted to zero using the VERT POS control.





# SECTION 4

## THEORY OF OPERATION

### 4.1 OVERALL

Refer to the block diagram, Figure 4-1. The RF phase-locked loop, on the A3 High-Frequency Synthesizer board, generates a frequency from 18 to 1021 MHz in 1 MHz steps. In generate mode, this is mixed with the output of the low-frequency PLL on board A2 to provide the output frequency. In receive mode, the low-frequency PLL operates from 17.0001 to 18.0000 MHz in 100 Hz steps. The result is an output frequency ranging from 0.4000 to 999.9999 MHz in 100 Hz steps.

In monitor (receive) mode, the output of the A3 high-frequency synthesizer is 22 MHz above the MHz digit of the front-panel frequency. This is mixed with the RF input, the difference being sent to the A4 IF board. The output of the low-frequency PLL now steps by 100 Hz from 16.7001 to 17.7000 MHz. When this is mixed with the 21 - 22 MHz output of the A1 Mixer board, the result is the constant 4.3 MHz second IF.

The second IF is mixed with 3.6 MHz to produce 700 kHz, which drives the FM discriminator, the AM detector, and the AGC. The 700 kHz is divided by 10 to drive the front-panel MONITOR FREQUENCY DISPLAY.

### 4.2 A10 FRONT PANEL BOARD

IC5 is a one-shot timer for the burst frequency. Grounding pin 2 starts the cycle; the length is controlled by the front-panel TIME control. The output pulse is returned via P1 pin 21. IC3 sums all the modulation sources (subtone, 1 kHz, external, and microphone). The output goes to IC6 pin 11, where it is sent on IF RCV ("not receive") is high. This signal will be high (true) in generate mode.

R18, R19, and R24 form the meter range attenuator. IC1A filters out the chopping frequency when the display is in FM calibrate mode. This is the frequency that alternates the trace between the signal and the calibration lines. IC1B amplifies the signal by a factor of 2 in FM calibrate mode to compensate for the losses resulting from the chopping action.

S5A switches the audio signal in AM mode; S5B mutes the audio in CW mode; and S5C selects the proper LED.

The collector of Q2 controls the RF output of the A3 High-Frequency Synthesizer board by controlling the

power supplied to its VCO. When the OFF/MIC switch is set to MIC, the base of Q2 is grounded, turning Q2 and the RF on. When the RF OFF switch is set to OFF, the base is held at +15 V by R46, so the RF is off. Grounding the base via the push-to-talk line turns the RF on. In receive mode, GEN is high, allowing Q3 to turn on. This clamps the base of Q2 low, bypassing the OFF/MIC switch and the push-to-talk line.

### 4.3 A11 FREQUENCY CONTROL BOARD

The Frequency Control board reads the front-panel CARRIER FREQUENCY switches, adds offsets for transmit or receive, and time-multiplexes the frequency digits to the Frequency Synthesizer cards. It also counts the 70 kHz IF divided by 10, subtone, or modulation frequency to drive the front-panel MONITOR FREQUENCY DISPLAY.

The counter circuitry is shown on sheet 1 of the schematic. Sections of IC27, IC23, and IC28 select the input to be counted. R100 and C36 filter RF from the modulation frequency. IC21 and IC22 count the 100 Hz from the A5 board to produce a 1 second gate appearing at IC26 pin 26. IC33 is the four-decade counter. Pins 15 through 18 are the output digit bits. Pins 4 through 7 indicate which digit is enabled.

IC30 is a phase-locked loop which multiplies the subtone frequency by 10, allowing 0.1 Hz resolution with 1 second gate time. IC30 pin 4 is the VCO output. It is divided by 10 in IC31 to drive the phase comparator in IC30.

When the modulation or subtone frequencies are being counted, IC33 counts up. When frequency error is to be counted, a signal on P4 in 7 causes IC19 to set IC33 to count down. The 70 kHz signal from the 700 kHz IF is counted. Each time the counter reaches zero (after 10,000 counts) the divide-by-seven counter consisting of IC19A, IC34, and IC17 is advanced by 1. If the one-second gate expires just as IC33 reaches zero (70,000 counts), the counter will indicate zero error.

Since the IF is generated by high-side injection, a high input frequency with triple conversion will produce a low IF. Thus, if the input is 1 kHz above the switches, the count input will be 69 kHz, and the counter will count only 69,000 counts in one second. The effective starting count is 70,000, so the MONITOR FREQUENCY DISPLAY will indicate 1.00 kHz.

If the input frequency is low, the IF will be high. In this case, the seventh zero will be reached before the end of the gate time. IC27 will clock IC19B, switching the counter to count up. If the input is 1 kHz low, there will be 71,000 IF counts per second, and the counter will count up 1000 counts before the gate closes. IC32 causes the minus sign to be lit.

Sections of IC24 control decimal points and the minus sign. The back-plane drive signal (BP) is applied to both sides of the segment to be turned on. When the data line is low, the output of the exclusive-or gate is in phase with the BP frequency, so the segment is off. When the data line is high, the output is inverted, producing the alternating potential difference needed to drive the LCD segments.

Sheet 2 of the schematic shows the frequency-setting circuitry. IC1 free-runs at approximately 5 Hz. This low frequency, along with CMOS gates, minimizes switching-frequency interference in RF circuits.

The output of IC1 clocks IC2 and IC3, which form a binary counter. IC3 decodes the output of IC2 to produce four time slots, one for each of the three phase-locked loops in the instrument. (The fourth slot is not used.) Outputs of IC4 produce four subintervals, one for each of the four digits a PLL can accept. These signals are gated to produce pulses that select sections of the front-panel CARRIER FREQUENCY switches (S1A through S1G). For example, when the output of IC11 pin 4 is low, the closure of switches in S1G puts the binary-coded decimal (BCD) representation of the 100 Hz digit on the data bus, which is terminated by R40-R43. Diodes prevent interaction between switches.

IC18 is a programmable read-only memory (PROM). The BCD number from the selected switch forms part of the address for the PROM. The count from IC2/IC3 forms another part of the address, as does the REC signal from the Mother board. Each combination of bits addresses one memory location. The contents of that location represent the input digit to the PLL, with offset appropriate for generate or receive.

Outputs 0<sub>0</sub> to 0<sub>9</sub> are the BCD bits of the digit. Output 0<sub>10</sub> tells whether a carry is necessary to the next digit. If it is, IC16B stores the carry flag, which becomes part of the address for the next word.

For example, for a generate frequency of 396 MHz, an offset of 18 MHz is added for programming the A3 PLL. The MHz digit becomes  $6 + 8 = 4$  with a carry. The 100 MHz digit becomes  $3 + 1$  (carry) = 4. So the frequency sent to the synthesizers is 414 MHz.

Switches S2A through S2D for the audio synthesizer are scanned in similar fashion; however, no offsetting is required.

IC13 is a PROM which selects the appropriate frequency band. (Refer to Section 4.4 for band limits.) IC4 and IC15 latch the 100 MHz and 10 MHz digits respectively. IC16A latches the 1000 MHz digit, which can be only 0 or 1. The binary output of IC13 is decoded to decimal by IC17, which causes one of lines B1 through B6 to go low.

#### 4.4 A3 HIGH-FREQUENCY SYNTHESIZER

The A3 High-Frequency Synthesizer board generates a frequency that ranges from 18 MHz to 1021 MHz in 1 MHz steps. The 3.6 MHz reference frequency is also generated on this board.

The heart of the high-frequency synthesizer is a voltage-controlled oscillator (VCO) adjustable between 240 and 505.5 MHz. This frequency is divided or multiplied to obtain the desired output. The VCO consists of Q2 and Q3. Emitter coupling is through the series resonance of voltage-variable capacitors CR1 and CR2, and L3. Q4 is a buffer.

There are two phase-locking paths to complete the loop. The divide-by-N loop locks the VCO to the required frequency. When it is locked, the sampling loop takes over. The sampling loop will lock only on an integral MHz frequency, but is less sensitive to noise than the divide-by-N loop.

The output of Q4 is applied to the input of bridge CR8 through CR11. The opposite corners of the bridge are driven by the output of ECL quad NOR gate IC14. The input to IC14 pin 14 is a 1 MHz square wave from the A6 card. The first two gates of IC14 square up the edges of the wave. The output of IC14 pin 8 is applied to pin 24, driving pin 2 low and pin 3 high, turning the bridge on. The input to pin 1 arrives after one gate delay, restoring the original condition. The result is that the bridge is turned on for a period equal to the gate delay, which is less than 1 nanosecond.

The current flowing through the bridge charges C42. If an integral number of RF cycles have passed since the last sampling pulse (that is, if the RF frequency is a multiple of 1 MHz), the sample will be taken at the same RF phase and the voltage on C42 will be constant; thus, the VCO frequency will be constant. If the frequency varies, the phase at sample time will vary, and so will the VCO control voltage. The design of the circuit is such that the resulting change in frequency will move the phase back toward lock.

IC13 buffers the bridge output and feeds part of the voltage back via R163. This bootstrapping varies the bridge bias as the output voltage changes, preventing the RF from cutting off the diodes and increasing the efficiency of the sampling. IC10 further buffers the control voltage. The feedback circuitry linearizes the frequency/voltage characteristic of the VCO. C37 and C38

limit the voltage swing to protect the voltage-variable capacitors.

The output of Q4 is also applied to the input of ECL divide-by-2 IC1. IC2 and parts of IC3 perform further divisions by 2. The high-frequency synthesizer operates in six bands, as shown in Table 4-1.

**Table 4-1. High-Frequency Synthesizer Bands**

GENERATE MODE		
BAND	CARRIER FREQUENCY (MHz)	SYNTHESIZER OUTPUT (MHz)
1	0 to 11	18-29
2	12 to 41	30-59
3	42 to 101	60-119
4	102 to 231	120-249
5	232 to 481	250-499
6	482 to 999	500-1017

RECEIVE MODE		
BAND	CARRIER FREQUENCY (MHz)	SYNTHESIZER OUTPUT (MHz)
1	0 to 7	22-29
2	8 to 37	30-59
3	38 to 97	60-119
4	98 to 227	120-249
5	228 to 477	250-499
6	478 to 999	500-1021

Band selection is done automatically on the A11 Frequency Control board. If band 5 is selected, the VCO output is sent directly to amplifiers Q8 and Q9, and to J1. On bands 1 through 4, sections of IC4, gated by control lines B1 through B4, select the appropriate subharmonic of the VCO frequency. The selected frequency is fed through PIN diode CR15 to Q8.

When the Frequency Control board selects band 6, PIN diodes CR16 and CR17 are shut off. CR20 and CR25 conduct, sending the VCO output to the doubler, T1 and CR21 through CR24. Q12 and Q13 amplify the doubled frequency.

The selected frequency (undoubled) is applied to the input of IC5, a divide-by-10 prescaler, and IC6, a divide-by-2. The divided-by-20 frequency is then applied to the input of IC9. This phase-locked loop receives its divisor one byte at a time from the Frequency Control board via pins 15 through 18. Each of pins 2 through 5 loads one of the bytes. The phase detector output on pin 12 is amplified by IC10A and IC10B.

When a new divisor is loaded into IC9 the loop is unlocked, and the lock output, pin 13, is low. SPDT

switch IC12 grounds the junction of R47 and R48, disabling the sampling loop. When the divide-by-N loop locks, the LOCK line goes high. IC12 switches so as to ground the junction of R41 and R42, disabling the divide-by-N loop and allowing the sampling loop to control the frequency. As long as frequency is constant, the divide-by-N loop will consider itself locked, even though it is not in control of the frequency.

The 3.6 MHz reference frequency is prescaled by IC9, which divides by 36. The 100 kHz result comes from pin 14 to IC7. This dual-D flip-flop compares the phase of the 100 kHz output of IC9 to the 100 kHz reference from the timebase on the A6 card. The output voltage is differentially amplified by IC11 to control the frequency of the VCO consisting of Q16, CR35, and L18. When band 6 is selected, IC6 divides the 3.6 MHz by 2. This is necessary because the main VCO frequency is doubled, and must change in 0.5 MHz steps.

#### 4.5 A2 LOW FREQUENCY SYNTHESIZER

The low frequency synthesizer consists of two phase-locked loops, going from 6.60 to 7.89 MHz in 10 kHz steps and from 10.1001 to 10.1100 MHz in 100 Hz steps. The outputs are mixed to produce a frequency of from 16.7001 to 18.0000 MHz in 100 Hz steps.

Q1 and Q2 form the VCO for the low PLL. Q3 is a buffer, providing the input to IC3. PIN diodes CR8 and CR9 set the RF output level, which is controlled by the front-panel OUTPUT LEVEL control and by the AM modulating voltage. The combined level control voltage comes in via board pin 2.

Q10 switches in or out of the signal path a 20 dB pad between Q9 and Q11. This is controlled by the front-panel OUTPUT LEVEL range pushbuttons.

The output of the 10.1001 to 10.1100 MHz VCO (Q14 and Q15) is mixed by Q6 and Q18 with the 10 MHz output of the timebase generator on the A6 card. The difference, 100.1 to 110.0 kHz, is the input to IC6. The 3.6 MHz reference is divided by 100 before being divided by 36 and by 10 in IC6, yielding the 100 Hz reference frequency.

The FM modulating voltage comes in via board pin Z. Thermistor RT1 compensates for the temperature sensitivity of the modulator. The loop is designed to have a narrow bandwidth, so that it will not follow audio-frequency variations.

#### 4.6 A1 MIXER BOARD

The Mixer board mixes the 18 to 1017 MHz signal from the A3 High-Frequency Synthesizer board with the 17 to 18 MHz signal from the A2 Low-Frequency Synthesizer board, to produce the generate output, 0.4 to 1000 MHz, or the receive 1st L.O., 22 to 1021 MHz. Most of the

output level control is performed on this board, along with the RF dummy load and its over-temperature circuitry.

The 17 to 18 MHz signal from the low-frequency synthesizer comes in J4. In receive mode (GEN high), Q21 routes the signal to the Mixer board to be the 2nd L.O. injection frequency.

In generate mode, the signal is switched as necessary through a series of 20 dB pads, controlled by the front-panel OUTPUT LEVEL MULTIPLIER pushbuttons. CR21 is turned off, so the signal goes from R103 to the mixer. The 18 to 1021 MHz from the High-Frequency Synthesizer board comes in J3, through IC7, IC8, and C33 to the high-level mixer input. The mixer output is routed along a series of PIN diode switched 20 dB pads to relays K3 and K4. K3 and K4 are normally energized, so the signal goes on to J1, the front-panel RF IN/OUT connector.

In receive mode, the incoming RF is mixed with the 18 to 1021 MHz signal. The difference signal is sent via CR21 and J1 to the A4 IF board, with CR22 biased off.

R78 and R80 form a voltage divider for the incoming RF. CR2 and CR3 detect the voltage, while the DC is buffered by IC4B. If the voltage rises above a threshold value (equivalent to about 200 mW), comparator IC4A turns Q14 off, de-energizing K3. This connects the RF input to dummy load R88, a 50 ohm 150 W resistor. R89 and C50 hold K4 closed momentarily, giving K3 time to transfer the RF to R88. This avoids requiring K4 to interrupt what may be a large current.

CR8, CR9, C10, and CR11 form a power limiter to keep the following attenuators from being damaged by the incoming RF during the brief interval before K3 de-energizes.

Switch IC2 sends to the METER whatever appears on board pin Z or P, as selected by the METER/MODE pushbuttons. When measuring power, the detected power level from IC4B turns off Q14 when the input power is greater than 200 mW, thus closing K3. The power read on the METER is selected by the WATTS X.1 and X1 pushbuttons on the A10 board. Q16 turns on the WATTS annunciator and, if in the generate mode, switches the instrument into the receive mode by grounding the cathode of CR1 on the A12 Mother board.

CR12 is physically close to R88. If R88 overheats, the voltage drop across CR12 decreases enough to raise the output of comparator IC3. This turns on the front-panel LOAD OVERTEMP annunciator, and turns off CR1. CR23 was turned off when Q14 was turned on by the RF input. These diodes had been disabling IC1; it now produces an audio tone through the speaker. When the transmitter is unkeyed, Q14 turns on, shutting off the alarm. The LOAD OVERTEMP annunciator continues to be active until R88 cools.

## 4.7 A4 IF AMPLIFIER

The IF Amplifier board amplifies the 21 to 22 MHz 1st IF, converts it to the 4.3 MHz 2nd IF and 700 kHz 3rd IF, and demodulates both AM and FM signals. It also produces the calibration lines on the CRT DISPLAY.

The 1st IF signal comes from the A1 Mixer board via J1. T1 is a balun which matches the input impedance of Q1. IC1 and IC2 are amplifiers with AGC which drive the mixer. The 16.7 to 17.7 MHz 2nd IF injection signal comes in to pin A to be amplified by Q2. Q3 and Q4 drive double-balanced mixer IC2, mixing the 4.3 MHz 2nd IF with the 3.6 MHz signal from the High-Frequency Synthesizer board to produce 700 kHz. The output of IC2 goes to a four-cascade cascade stage. Transistors Q14 through Q21 control the bandwidth. In the first stage, for example, when the WIDE line (pin Z) is low (narrow bandwidth), Q15 is off. The tank circuit consisting of L9 and C40 is at maximum Q, and so its minimum bandwidth. When WIDE is high, Q15 turns on, shunting the tank via R56, lowering the Q and increasing the bandwidth. This also decreases the gain, so Q14 shunts the emitter resistance to compensate.

The output of Q13 is applied to CR2 and CR3 for AM detection, while the audio is amplified by IC8. C68 filters the DC level for AGC amplifier IC3. The output of IC3 pin 1 controls the gain of IC1, while the output of pin 7 controls the resistance of PIN diode CR21 on the A1 Mixer board. To obtain the best signal/noise ratio, the attenuation by CR21 is delayed until the gain of IC1 has been reduced, thus allowing the maximum possible signal to reach IC1. (In generate mode, the GEN line turns CR21 off.)

The 700 kHz signal is also applied to IC17 via Q22. If the front-panel DISC RESET pushbutton is not pressed, the signal is applied to IC4, a one-shot frequency discriminator.

IC19 divides the output frequency by 10 to drive the MONITOR FREQUENCY DISPLAY.

To reduce temperature effects, the transistors of IC7 provide a precision voltage offset for the output of IC4. IC6 and the first section of IC13 filter out the 700 kHz component.

When the front-panel DISC RESET button is pressed, IC switch IC21 is turned on, biasing IC15 such that IC13 pin 1 is forced to zero by comparison with IC20 pin 3. At the same time, signals of 200 kHz and 500 kHz come from the A6 board timebase into board pins 6 and 7. These frequencies are mixed in IC18, filtered, and amplified by IC17. The resulting 700 kHz signal is fed via IC17 pins 1, 3, 4, and 6 to IC4. Thus, C80 charges to the voltage necessary to hold the discriminator output (IC13 pin 1) at zero with 700 kHz into the discriminator. The charge on C80 leaks off slowly, so that sustained receiver input results in a drift of approximately 20 Hz/minute. The

proper charge on C80 is re-established whenever the discriminator calibrate mode is enabled.

IC8 compares the AGC voltage with the voltage from the front-panel SQUELCH control. When the signal is strong enough, SIG is brought low. When SIG is high, that is when the receiver is squelched, Q24 gates IC12 pin 2 to put the discriminator into the calibrate mode. IC12 pin 1 is gated off when the instrument is in generate mode.

Calibration lines on the CRT DISPLAY are developed by IC9 and IC11. Positive and negative voltages from the A10 Front Panel board, selected by front-panel pushbuttons, come to board pins V and W. When CALIB (pin X) is high, IC5 free-runs to generate a chopping signal. The output of IC15 pin 15 toggles IC11 to switch between the + and - voltages. The output of IC14 pin 11, half the frequency of pin 15, toggles IC9 to switch between the output of IC11 and the FM audio. The result is a three-stage period: V+, V-, and audio. This is repeated across the CRT. When CALIB is low, IC9 selects the FM audio, unchopped.

The output of IC5 pin 1 blanks the CRT while the display is switched to avoid having vertical lines on the screen.

#### 4.8 A5 AUDIO BOARD

The Audio board comprises the distortion analyzer for SINAD measurements, the audio-frequency synthesizer, the meter amplifier, and the circuitry that adjusts output level as frequency changes.

Audio comes in to controlled-gain amplifier IC1. CR1 rectifies the output, developing a DC voltage which is amplified by IC2A to control the resistance of Q1, which, in turn, controls the gain of IC1. This stabilizes the level at the input of IC2B, which, with IC3B, forms a 1 kHz notch filter. With the 1 kHz tone filtered out, what remains is distortion. This is amplified by IC3A to drive the METER. IC3A is quasi-logarithmic to produce a meter range of approximately 35 dB.

The 100 kHz signal from the A6 board timebase comes in via board pin H. It is divided by 100 to generate the 1 kHz tone, by 10 to generate a 100 Hz reference, and by 10 again to generate a 10 Hz reference for the audio phase-locked loop. Digits from the front-panel switches come to board pins V, W, X, and Y and are loaded into latches IC35, IC36, IC16, and IC17. These latches load on positive-going edges rather than negative, so the load pulse is the leading edge of the next pulse. IC31 through IC34 are the divide-by-N counter for the audio phase-locked loop. IC28 stretches the zero-count pulse from the divide chain to drive PLL IC15. The output of IC15 goes to the divide chain, and to IC12, IC13, and IC14. Each IC divides the frequency by 10; the output of one of them being selected in IC18 by the front-panel MODULATION FREQUENCY MULTIPLIER pushbuttons. The selected audio frequency is used as the reference input to phase-

detector IC20; the other input is the output of sinewave VCO IC19.

IC21 through IC27 form the flatness-control circuitry. The AM modulating voltage on board pin 9 is summed with a DC reference voltage in IC21B. IC21A and IC25 buffer this voltage. IC22 acts as an SPDT switch which selects either the voltage from IC21 pin 7 or the voltage at the junction of R77 and R78, thus attenuating the RF output level (via the level output voltage at board pin 4) by either 0 or 0.2 dB, respectively. IC23, IC24, IC26, and IC27 operate in the same manner to attenuate the RF output level by either 0 or 0.4, 0.8, 1.6, and 3.2 dB, respectively. The IC switches are controlled by outputs of PROM IC29. This memory, addressed by the 100 MHz CARRIER FREQUENCY switch, was programmed during factory calibration to produce flat RF output across the frequency range.

#### 4.9 A7 DEFLECTION BOARD

The Deflection board generates the horizontal and vertical deflection signals for the CRT and separates the subtone from the audio for counting.

Vertical information (including FM calibration lines, if selected) is input to IC1 pin 5. The VERTICAL POSITION and GAIN control settings are input to IC1 pin 6. The output voltage is inverted by IC1A and drives push-pull amplifiers Q4 and Q6. Q5 and Q7 reduce the collector dissipation of Q4 and Q7, respectively. The signal also passes through IC9 and IC10, a low-pass filter cutting off at 270 Hz. The subtone output goes to the A11 Frequency Control board where it is multiplied by 10 and counted.

The METER drive comes in to board pin 17. It is amplified by IC6 and squared by Schmitt trigger IC3 to become the horizontal sync signal, triggering IC4.

Q12 is a current source charging a sweep timing capacitor on the A10 Front Panel board. IC8A amplifies the 0 to 10 V ramp to -10 to +10 V. When the ramp voltage reaches the level set by the SIG IN line, IC8 triggers auto-reset one-shot IC5A. The output of IC5A has been holding IC4 at clear, keeping Q2 off, which allows Q12 to charge the sweep timing capacitor. When IC5A is triggered, it unclears IC4. Q1 is turned on and discharges the capacitor. The output of IC8B also triggers hold-off one-shot IC5B. Until this one-shot times out, it holds IC4 and Q2 at clear, allowing the capacitor to discharge fully and return the trace to the left side of the screen.

When the hold-off times out, the next sync pulse sets IC4 and the sweep starts. If there is no input signal, IC4 will not be triggered. In this case, it will be cleared when IC5B times out, and the sweep will start regardless.

Q10 and Q11 form the blanking amplifier. If IC3 pin 3 is low, Q10 is on, Q11 is off, and the BLANK line is pulled high, cutting off the trace. If IC3 pin 3 is high, the

transistors reverse, and BLANK is grounded. The Q output of IC4 or the Z MOD input can activate blanking.

#### 4.10 MISCELLANEOUS BOARDS

This section describes the A6 Low Voltage Power Supply, A8 High Voltage Power Supply, A9 Display, and A12 Mother boards.

The A6 Low Voltage Power Supply provides +5 V (from IC1), +15 V (from IC2), and -15 V (from IC3). Each regulator controls a series-regulating transistor, mounted on the rear panel. Q2 and Q3 are NPN, while Q1 is PNP, to allow the output voltage to be closer to the supply. R1, R6/R7, and R12/R52 are current limiters. When the current is too high, the increased voltage drop across the limiter shuts down the series transistor.

IC5 is a separate regulator for the 10 MHz temperature-compensated crystal oscillator (TCXO) or oven-controlled crystal oscillator (OCXO) timebase which establishes the frequency accuracy of the unit. Q3 buffers the timebase output, while IC6 divides the frequency by 10 to provide a 1 MHz reference. IC7 is connected as a divide-by-five counter followed by a divide-by-two. The output of the first stage provides a 200 kHz reference, while the output of the second stage provides a 100 kHz reference.

When band 6 is selected, IC8 divides the 1 MHz and 100 kHz frequencies by 2. This allows the synthesizer to take half-steps, which will be full steps when the frequency is doubled.

IC4, IC9, and IC10 encode the front-panel OUTPUT LEVEL MULTIPLIER pushbuttons to activate attenuators on the A1 Mixer board.

Q1, Q2, and IC13 limit and filter the microphone input to limit the deviation to 5 kHz.

The A8 High-Voltage Power Supply provides voltages for the CRT. IC1 controls series transistor Q2. The 15 V supply provides a reference to IC1 pin 3. R6 and R8 divide the 200 V at IC1 pin 2. R3 is a current limiter. If the current becomes too great, Q3 conducts, lowering base of Q2 and thus lowering the current. IC1 pin 6 becomes positive, turning off Q1. CR10 clamps the voltage to protect Q1.

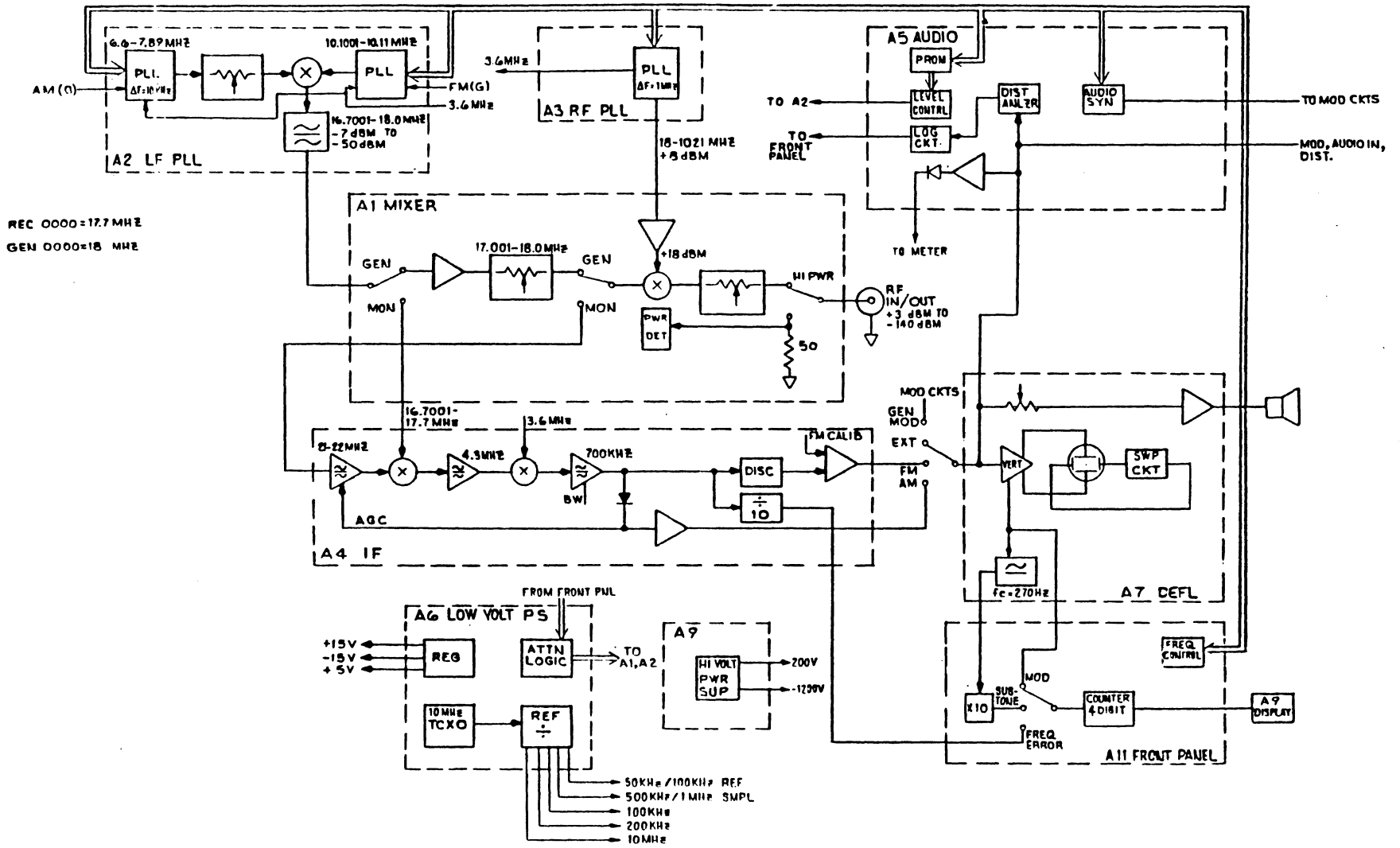
CR5 through CR8 supply cathode and focusing voltages to the CRT. The voltage at the top of resistor string R19/R18/R17 is approximately -1200 V. This is controlled by shunting current through Q4. The +15 V provides a reference. The voltage at the junction of R28 and R30 is held at zero.

The A9 Display board contains display driver IC1, the LCD display, and LEDs indicating Hz or kHz. When P3 pin 8 is low, HZ annunciator CR1 conducts. When pin 8 is high, CR1 is off. Q1 turns on, causing KHZ annunciator CR2 to conduct.

The A12 Mother board provides most of the interconnections between boards. Q1 switches between generate and receive modes. When the instrument is in generate mode, activation of the WATTS line turns Q1 off, switching the instrument into receive mode.

The A13 (early version) or A10 board (later version) provides audio and ramp routing for automatic Lissajous and RF sweep functions.

Figure 4-1. Block Diagram







# SECTION 5

## MAINTENANCE

### 5.1 INTRODUCTION

This section provides information for disassembling, testing, calibrating, and troubleshooting the Model SSI-3000B Service Monitor. Measurements and adjustments will be facilitated by placing the instrument so that the front panel faces the user.

### 5.2 SERVICE AND MAINTENANCE INFORMATION

#### 5.2.1 IN-FIELD SERVICE

The Model SSI-3000B features modular PC board construction for convenient servicing. Should a problem arise, contact the Customer Service office for assistance (see Section 2.2). A replacement board will be shipped immediately. When you are satisfied the problem has been corrected, return the defective board.

#### 5.2.2 DISASSEMBLY INFORMATION

##### WARNING

**High voltages are used within this instrument. Before servicing, remove AC power from the instrument.**

To remove the instrument top cover, remove the six screws (three on each side) securing the top cover and lift the cover off.

To remove the instrument bottom cover, invert the instrument, remove the six screws (three on each side) securing the bottom cover and lift the cover off.

To remove the high voltage shield, remove the top cover and then remove the seven screws securing the shield. Carefully lift the shield straight up.

Removal of the Front Panel assembly provides access to PC boards A9, A10, and A11, mounted on the front panel.

To remove the Front Panel assembly, remove the top and bottom covers. Stand the instrument on its rear feet. Remove the INTENSITY and FOCUS control knobs. Disconnect the three ribbon cable assemblies on the under side of the instrument. Disconnect the POWER switch harness. Disconnect 2 pin connector to Mother board, and 4 pin connector to Mother board (early versions). Disconnect coaxial cable W1 from the A1 board (SMB

connector). Remove the handle by unscrewing the two black knobs securing the handle to the chassis side rail. Remove the four screws (two each side) securing the front-panel brackets to the chassis side rail. Carefully lift the Front Panel assembly straight up from the instrument.

The top cover, bottom cover, high voltage shield, and Front Panel assembly are reinstalled by reversing the removal procedure.

#### 5.2.3 PLUG-IN PC BOARD SERVICING

Refer to Figure 5-1.

To remove boards A1 through A4, remove the instrument top cover. Disconnect the connecting coaxial cable(s), remove the philips head screws securing the board to the card cage and pull (do not turn) the knurled knobs. Lift the board straight up from the instrument.

Before reinstalling a board, check the board's gold "fingers" and the Mother board (A12) edge connector. Carefully replace the board into its Mother board edge connector and reverse the removal procedure.

##### NOTE

**Harness connectors are not keyed. Note the connector orientation before disconnecting.**

### 5.3 PERFORMANCE TESTS/CALIBRATION

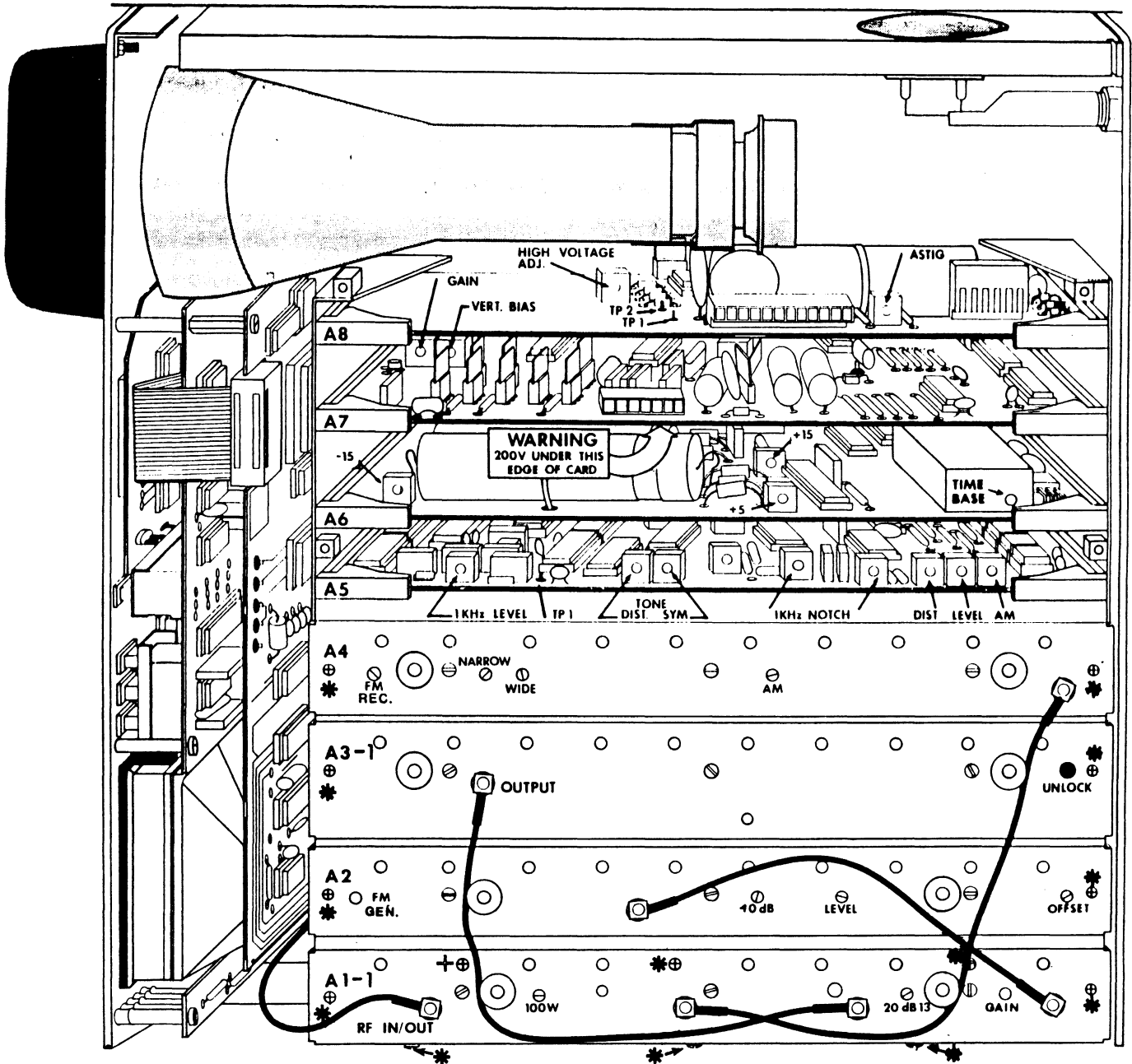
The purpose of the performance tests in this section is to verify that the instrument meets its published specifications (Section 1.2). Recommended test equipment is listed in Table 5-1.

The instrument top cover should be removed to permit access to internal test points and adjustments. Internal test point and adjustment locations are shown in Figure 5-1.

##### WARNING

**High voltages are used within this instrument. Use extreme care when making measurements and/or adjustments to avoid shock.**

Before applying AC power to the instrument, see Section 2 for details of electrical installation. Be sure that the



TO REMOVE A1-A4 BOARDS,  
 REMOVE ONLY SCREWS MARKED  
 AND PULL KNURLED KNOBS.

Figure 5-1. Top View

**TABLE 5-1. RECOMMENDED TEST EQUIPMENT**

<b>EQUIPMENT</b>	<b>CRITICAL REQUIREMENT</b>	<b>RECOMMENDED</b>
(1) Signal Generator	Range: 1 to 1000 MHz; Maximum output > +3 dBm	Wavetek 3010
(2) DVM	3-1/2 digit	Fluke 8010A
(3) Function Generator	Range: 10 Hz to 10 kHz; Maximum output > 1.06 VRMS	Wavetek 180
(4) Frequency Counter	Range to 200 MHz; Resolution better than timebase	HP5383A
(5) SINAD Test Set	-----	Helper S-101
(6) Microphone	Standard Communication Type	Shure 405K
(7) Spectrum Analyzer	Range: 1 to 1000 MHz; Display: 2 dB log, 10 dB log	HP8558B/182T
(8) Modulation Analyzer	Range: 1 to 1000 MHz; Filter: 3 kHz lowpass 300 Hz highpass	HP8901
(9) RF Power Source (Transmitter)	Frequency: In 1 to 1000 MHz band Maximum output: 100 W	Any
(10) Transceiver	Frequency: In 1 to 1000 MHz band Sub-Tone: In 60 to 270 Hz band	Force APU44
(11) Amplifier	Gain: 20 to 40 dB Impedance: 50 ohm	HP8447D
(12) Precision Attenuator Pads	20 and 40 dB	Weinschel 50-20 and 50-40
(13) Power Meter	Input level: -7 to +3 dBm Accuracy: $\pm 1\%$ of FS	HP435A/8481A
(14) Bandpass Filter	450 MHz	Wavetek 5204
(15) Bandpass Filter	850 MHz	Wavetek 5205

instrument is set for operation with the available power source and that the line fuse is the correct value.

A copy of the Performance Test Record (PTR) is included at the end of this section for convenience in recording instrument performance during testing. It can be filled out and used as a permanent record for incoming inspection, or used as a guide for routine performance testing. All tests refer to the PTR.

### 5.3.1 VOLTAGE TEST

Equipment - (2)

Remove the high voltage shield. Set the DVM to measure up to 20 VDC. Connect the negative probe to the instrument chassis. With the positive probe, measure the voltages at the +5, +15, and -15 V test points on the A6 board. The voltages should be the nominal value +0.01 V. If a voltage is not within +0.102 of the nominal value, adjust the appropriate A6 board control to bring the voltage within specification. Record the voltages on the PTR and replace the high voltage shield.

### 5.3.2 AUDIO TEST

#### 5.3.2.1 METER/CRT

Equipment - (2) (3)

Turn the instrument power off and mechanically zero the METER using the screwdriver adjustment below the METER face. Turn the instrument power on and set the instrument controls for RF generate single-source FM mode (see Section 3.5). All internal modulation sources should be inactive. Set the function generator for a 1.06 VRMS output at 1 kHz and connect it to the EXT VERT connector. The METER should indicate  $1.5 \pm 0.05$  V. If it does not, adjust the Meter Sensitivity control on the A5 board until the METER reading is correct. The CRT DISPLAY should indicate  $1.5 \pm 0.05$  Vp. If it does not, adjust the Vertical Gain Adjust control on the A7 board until the CRT DISPLAY reading is correct. Record the voltages on the PTR.

#### NOTE

**If the trace width (left to right) or sine wave pattern (top to bottom) is not uniform, carefully adjust the A7 board Astigmatism or Vertical Bias controls, respectively.**

Disconnect the function generator. Press the RCV pushbutton and set the MODULATION FREQUENCY switches for a 1000 Hz continuous modulation frequency. Press the VOLT pushbutton and adjust the LEVEL control for a 0.2 V METER reading. Connect the MOD OUT connector to the EXT VERT connector and verify that the EXT VERT lamp is lit. If it is, place a check mark on the PTR.

Change the MODULATION FREQUENCY switch settings as follows:

1000  
2123  
3234  
4345  
5456  
6567  
7678  
8789  
9899  
9999

The MONITOR FREQUENCY DISPLAY should read the selected frequencies  $\pm 1$  Hz. If it does, place a check mark on the PTR.

Set the MODULATION FREQUENCY switches for a 100 Hz continuous modulation frequency and connect the MOD OUT connector to the DVM. Adjust the LEVEL control such that the DVM reads 750 mVRMS. Connect the MOD OUT connector to the EXT VERT connector, press the SUB-TONE pushbutton and change the MODULATION FREQUENCY switch settings as follows.

60  
71  
82  
93  
124  
145  
156  
187  
238  
269

#### NOTE

**The MODULATION FREQUENCY MULTIPLIER switch selected will have to be changed to select all required frequencies.**

The MONITOR FREQUENCY DISPLAY should read the selected frequencies  $\pm 0.1$  Hz. If it does, place a check mark on the PTR.

Press the GEN, MOD, 18 METER RANGE, OFF MODULATION FREQUENCY MULTIPLIER, and 1 kHz pushbuttons. Set the 1 kHz LEVEL control fully cw and verify that the METER and CRT DISPLAY both read  $>18$  kHz. If they do, place a check mark on the PTR.

Release the 1 kHz pushbutton and set the MODULATION FREQUENCY switches for a 1000 Hz continuous modulation frequency. Set the LEVEL control fully cw and verify that the METER and CRT DISPLAY both read  $>18$  kHz. If they do, place a check mark on the PTR.

Press the OFF MODULATION and 1 kHz pushbuttons. Adjust the 1 kHz LEVEL control for a 6 kHz METER reading. Adjust the VERT POS control such that the audio sine wave peaks are aligned along the center horizontal graticule lines on the CRT DISPLAY. (The

HORZ VAR control must be in its detented CAL position with the 1.0 HORZ pushbutton pressed.) Adjust the HORZ POS control such that one of the sine wave peaks is aligned with the center vertical graticule line. Verify that each sine wave peak is aligned with each successive vertical graticule line. If the peaks are not aligned with the graticule lines, adjust the A7 board Sweep Rate control to correct the alignment. When the alignment is correct, place a check mark on the PTR.

Connect the MOD OUT connector to the DVM and adjust the 1 kHz LEVEL control for a 1 VRMS reading on the DVM. Set the instrument controls for SINAD measurements (see Section 3.8). Connect the MOD OUT connector to the EXT VERT connector. The METER should read  $<-30$  dB. If it does not, adjust the A5 board Notch control until the METER reading is correct. Record the METER READING on the PTR.

### 5.3.3 FREQUENCY LOCK TEST

Equipment - None

Set the instrument controls for RF generator CW operation (see Section 3.4). Change the setting of the CARRIER FREQUENCY switches as follows:

11 to 101 MHz in 10 MHz steps  
100 to 260 MHz in 20 MHz steps  
260 to 500 MHz in 30 MHz steps  
499 to 999 MHz in 100 MHz steps

Verify that at each step, the Frequency Lock LED indicator on the A3 board goes out within 3 seconds of the frequency change. If it does, place a check mark on the PTR.

Press the RCV pushbutton and repeat the above procedure.

As many frequency settings as desired may be tested.

### 5.3.4 GENERATE MODULATION TESTS

#### 5.3.4.1 RESIDUAL MODULATION

Equipment - (8) (14) (15)

Set the modulation analyzer for FM average mode with its 3 kHz lowpass filter enabled. Set the instrument controls for RF generate CW mode. Press the CW and MOD pushbuttons, and set the OUTPUT LEVEL controls to 100 mVRMS.

Connect the RF IN/OUT connector to the modulation analyzer through the 450 MHz bandpass filter and set the CARRIER FREQUENCY switches to 450.0000 MHz. The residual FM read on the analyzer should be  $<40$  Hz. Record the reading on the PTR.

Connect the RF IN/OUT connector to the modulation analyzer through the 850 MHz bandpass filter and set the CARRIER FREQUENCY switches to 850.0000 MHz. The residual FM read on the analyzer should be  $<80$  Hz. Record the reading on the PTR.

Set the modulation analyzer for AM average mode. Connect the RF IN/OUT connector to the modulation analyzer through the 450 MHz bandpass filter and set the CARRIER FREQUENCY switches to 450.0000 MHz. The residual AM read on the analyzer should be  $<1\%$ . Record the reading on the PTR.

#### 5.3.4.2 FM ACCURACY

Equipment - (8) (14)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). Press the 1 kHz, MOD, and 6 RANGE pushbuttons. Adjust the 1 kHz LEVEL control for a 5 kHz METER and CRT DISPLAY reading. Connect the RF IN/OUT connector to the modulation analyzer through the 450 MHz bandpass filter and set the analyzer for FM average mode. The analyzer should read  $3.54 \pm 0.18$  kHz. If it does not, adjust the A2 board FM Adjust control until the reading is correct. Record the reading on the PTR.

#### 5.3.4.3 FM BANDWIDTH

Equipment - (3) (8) (14)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). All internal modulation sources should be inactive. Connect the function generator to the EXT IN connector. Connect the RF IN/OUT connector to the modulation analyzer through the 450 MHz bandpass filter (3 kHz lowpass filter not active). With the EXT LEVEL control set to midrange, set the function generator for a 1 kHz sine wave and adjust the output level to produce a reading of 3.54 kHz on the modulation analyzer in FM average mode. Switch the modulation analyzer to read dBm and note the reading (should be 0 dB). Change the function generator frequency to 10 Hz and note the analyzer reading. It should be  $0 +3$  dB. Record the reading on the PTR. Change the function generator frequency to 10 kHz and note the analyzer reading. It should be  $0 \pm 3$  dB. Record the reading on the PTR.

#### 5.3.4.4 AM ACCURACY

EQUIPMENT - (8) (11) (14)

Set the modulation analyzer for AM average mode. Set the instrument controls for RF generate single-source AM (see Section 3.7). Press the 1 kHz pushbutton and set the CARRIER FREQUENCY switches to 450.0000 MHz. Set the OUTPUT LEVEL controls to 15 mVRMS RF output level. Connect the RF IN/OUT connector to the modulation analyzer through the 450 MHz bandpass filter

DISPLAY trace is approximately the same for both switch positions. IF it is, place a check mark on the PTR.

Disconnect the signal generator and press the 18 RANGE pushbutton. Adjust the SQUELCH control to its threshold point. Press the DISC RESET pushbutton, center the CRT DISPLAY trace, and press the RCV pushbutton. The trace should not move from its centered position when the RCV pushbutton is pressed. If it does, adjust the A4 board Offset Adjust control such that the trace does not move.

Press the 1.8 and 6 RANGE pushbuttons and repeat the above procedure. When all 3 ranges show no offset, place a check mark on the PTR.

Press the GEN pushbutton and repeat the above procedure for all 3 ranges (allowable offset is  $\pm 1$  division for generate mode). When all 3 ranges show acceptable offset, place a check mark on the PTR.

#### NOTE

The A4 board Offset Adjust control cannot be adjusted without removing the board from the instrument. The potentiometer may be adjusted by removing the board, making an adjustment, plugging the board back in and checking the offset (i.e. trial and error) or by using a board extender and making the adjustment while in operation. A board extender is available at no charge from Wavetek Customer Service (see Section 2.2).

#### 5.3.5.2 FM MARKERS

Equipment - None

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). Press the RCV, BW NAR/WIDE, 6 RANGE, and MOD pushbuttons. Set the SQUELCH control fully cw. Press the 5 kHz FM CALIB pushbutton. Verify that the markers on the CRT DISPLAY indicate  $\pm(5 \pm 1)$  kHz. Record the CRT DISPLAY readings on the PTR.

Press the 1.8 RANGE and 600 Hz FM CALIB pushbuttons. Verify that the markers on the CRT DISPLAY indicate  $\pm(600 \pm 150)$  Hz. Record the CRT DISPLAY readings on the PTR.

#### 5.3.5.3 FM ACCURACY

Equipment - (1) (8)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). Press the RCV, 6 RANGE, and MOD pushbuttons. All internal modulation sources should be inactive.

Adjust the SQUELCH control to its threshold point. Connect the signal generator to the modulation analyzer

(3 kHz lowpass and 300 Hz highpass filters active) and set it for an output of 100 mVRMS at 457.3000 MHz. Adjust the signal generator for a reading of 3.54 kHz FM deviation on the modulation analyzer. Connect the signal generator to the RF IN/OUT connector and set the CARRIER FREQUENCY switches to 457.3000 MHz. Verify that the METER and CRT DISPLAY both read 5 kHz  $\pm 250$  Hz. Record the readings on the PTR.

#### 5.3.5.4 FM/SUB-TONE BANDWIDTH

Equipment - (1) (3)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). Press the RCV, 6 RANGE, and MOD pushbuttons. The BW NAR/WIDE pushbutton must be released. All internal modulation sources should be inactive. Connect the function generator to the signal generator's external FM input and set the signal generator for an output of 1 mVRMS at 457.3000 MHz. Connect the signal generator output to the RF IN/OUT connector and set the CARRIER FREQUENCY switches to 457.3000 MHz. Set the function generator for 1 kHz modulation frequency and adjust the output level such that the METER and CRT DISPLAY read 5 kHz FM deviation. Vary the function generator frequency between 10 Hz and 10 kHz and verify that the METER and CRT DISPLAY readings do not exceed the range of 4.2 to 5.8 kHz (equivalent to  $< 3$  dB change). Record the extreme readings on the PTR.

Press the 1.8 RANGE pushbutton. Set the function generator frequency to 100 Hz and adjust the output level such that the METER and CRT DISPLAY read 600 Hz FM deviation. Press the SUB-TONE pushbutton and vary the function generator frequency between 60 and 270 Hz. Verify that the MONITOR FREQUENCY DISPLAY follows the function generator frequency. If it does, place a check mark on the PTR.

#### 5.3.5.5 AM ACCURACY

Equipment - (1) (8)

Set the instrument controls for RF generate single-source AM mode (see Section 3.7). Press the RCV, 6 RANGE, MOD, and BW NAR/WIDE pushbuttons. All internal modulation sources should be inactive. Connect the signal generator output to the modulation analyzer and adjust it for an output of 100 mVRMS at 457.3000 MHz and a modulation analyzer reading of 34.5% AM. Connect the signal generator output to the RF IN/OUT connector and decrease the signal generator output to 10 mVRMS. Verify that the METER and CRT DISPLAY both read  $50 \pm 5\%$  AM. If they do not, adjust the A4 board AM Adjust control such that the readings are correct. Record the METER reading on the PTR.

### 5.3.5.6 AM BANDWIDTH

#### Equipment - (1) (3)

Set the instrument controls for RF generate single-source AM mode (see Section 3.7). Press the RCV, 6 RANGE, MOD, and BW NAR/WIDE pushbuttons. All internal modulation sources should be inactive. Connect the function generator to the signal generator's external AM input and connect the signal generator output to the RF IN/OUT connector. Set the function generator frequency to 1 kHz and adjust the output level such that the METER and CRT DISPLAY read 50% AM. Vary the function generator frequency between 10 Hz and 10 kHz and verify that the METER and CRT DISPLAY readings do not exceed the range of 42 to 58% AM (equivalent to <3 dB change). Record the extreme readings on the PTR.

### 5.3.5.7 SIGNAL STRENGTH

#### Equipment - (1)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). Press the RCV, 6 RANGE, and MOD pushbuttons. Set the signal generator for a 30  $\mu$ VRMS CW output at 457.3000 MHz. Be sure the OFF SIG STRENGTH pushbutton is pressed. Adjust the HORZ POS control such that the left edge of the CRT DISPLAY trace is aligned with the left vertical graticule line. Press the WEAK SIG STRENGTH pushbutton. Verify that the trace extends the full graticule width  $\pm 2$  divisions. If it does not, adjust the A10 board Weak control such that the trace extension is correct. When the trace extension is correct, place a check mark on the PTR.

Set the signal generator for 100  $\mu$ VRMS output level and press the FULL SIG STRENGTH pushbutton. Verify that the trace extends the full graticule width  $\pm 2$  divisions. If it does not, adjust the A10 board Full control such that the trace extension is correct. When the trace extension is correct, place a check mark on the PTR.

### 5.3.6 TIME BASE

#### Equipment - (1) (4)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). All internal modulation sources should be inactive. Press the RCV, MOD, BW NAR/WIDE, FM, and FREQ ERROR pushbuttons. Connect the rearpanel 10 MHz OUT connector to the frequency counter. The counter should read 10.0000000 MHz. If the instrument is equipped with the standard TCXO, the counter reading accuracy is  $\pm 5$  Hz. If the instrument is equipped with the optional OCXO, the counter reading accuracy is  $\pm 0.5$  Hz. (Use the longest counter gate time possible for maximum accuracy and resolution.) If the counter reading is out of specification, carefully adjust the TCXO or OCXO trimmer until the

reading is within specification. Record the counter reading on the PTR.

Set the signal generator for a CW output of 1 mVRMS at 857.3000 MHz. Connect the signal generator output to the RF IN/OUT connector. Set the CARRIER FREQUENCY switches to 857.3000 MHz and note the MONITOR FREQUENCY DISPLAY reading. For TCXO-equipped instruments, the reading should be <428 Hz. For OCXO-equipped instruments, the reading should be <43 Hz. Record the reading on the PTR.

Set the CARRIER FREQUENCY switches and the signal generator frequency to 57.3000 MHz and note the MONITOR FREQUENCY DISPLAY reading. For TCXO-equipped instruments, the reading should be <28 Hz. For OCXO-equipped instruments, the reading should be <3 Hz. Record the reading on the PTR.

### 5.3.7 WATTMETER/PROTECTION

#### CAUTION

**Do not insert more than 10 W with the WATTS X.1 pushbutton pressed.**

#### Equipment - (9) (10)

Set the instrument controls for RF generate CW mode (see Section 3.4). Connect the transmitter to the RF IN/OUT connector and insert 100 W at a VHF frequency (set the CARRIER FREQUENCY switches to the transmitter frequency) into the instrument. Verify that the audio alarm and front-panel LOAD OVERTEMP indicator are activated in 10  $\pm 2$  seconds. If they are not, adjust A1 board R105 until the activation time is within specification. Record the time on the PTR.

Insert 20 W at a VHF frequency (set the CARRIER FREQUENCY switches to the transmitter frequency) into the instrument and note the METER reading. The reading should read between 18.6 and 21.4 W ( $\pm 7\%$ ). If it is not, adjust the A1 board Watts control such that the METER reading is correct. Record the METER reading on the PTR.

Repeat both above procedures at a UHF frequency.

Set the VOLUME control fully cw. Insert 100 W at a VHF frequency (set the CARRIER FREQUENCY switches to the transmitter frequency) and verify that the CRT DISPLAY and speaker output show only background "white" noise within 800 Hz of the transmitter frequency. If they do, place a check mark on the PTR.

Disconnect the transmitter and connect the accessory antenna to the RF IN/OUT connector. Set the instrument controls for RF generate single-source AM (see Section 3.7), and press the RCV, MOD, and SUB-TONE pushbuttons. Verify that the correct sub-tone (tone squelch) frequency is indicated on the CRT DISPLAY and MONI-



TOR FREQUENCY DISPLAY. If it is, place a check mark on the PTR. Press the FREQ ERROR pushbutton and verify that the CRT DISPLAY and MONITOR FREQUENCY DISPLAY both read frequency error. If they do, place a check mark on the PTR. Press the MONITOR FREQUENCY MOD pushbutton and whistle into the transceiver. Verify that the CRT DISPLAY shows a relatively clean, approximately sinusoidal waveform, and that the MONITOR FREQUENCY DISPLAY reads the frequency of the waveform. If they do, place a check mark on the PTR.

**NOTE**

The above tests using the transceiver are operational tests only, not accuracy tests.

5.3.8 OUTPUT LEVEL TESTS

5.3.8.1 STEP ATTENUATOR ACCURACY

Equipment - (1) (7) (12) (13)

The Step Attenuator error is measured by an RF substitution method. Each setting of the Step Attenuator is measured at 457.3000 MHz. A reference output level is set with a signal generator and a power meter. A reference trace is obtained with a spectrum analyzer and a standard attenuator pad. The standard pad is removed

and the Step Attenuator setting to be measured is substituted. The spectrum analyzer trace is returned to the reference level by resetting the output level. The resulting instrument output level is measured and compared to the original power meter reference level. An RF amplifier is required to boost signal levels below the -60 dBm level.

Connect the signal generator's RF output to the power meter and set the signal generator for a -2 dBm CW RF output at 457.3000 MHz. Disconnect the power meter and connect the signal generator to the spectrum analyzer. Set the analyzer to 457.3000 MHz, the bandwidth to 10 kHz, and the frequency span per division to 2 kHz. Adjust the video filter for optimum trace presentation and set the vertical display to 2 dB per division. Use the analyzer log reference controls to establish a peak reference one division below the top graticule line. Center the trace on the display with fine tuning. Disconnect the signal generator and connect the spectrum analyzer to the RF IN/OUT connector. Set the instrument controls for RF generate CW mode (see Section 3.4). Set the CARRIER FREQUENCY switches to 457.3000 MHz and adjust the OUTPUT LEVEL controls such that the analyzer trace peak is aligned with the reference graticule line. Press the X10 OUTPUT LEVEL MULTIPLIER pushbutton and adjust the analyzer controls to establish a peak reference one division below the top graticule. Insert a

OUTPUT LEVEL MULTIPLIER	mV/ $\mu$ V	STEP ATTENUATOR PADS				
		20 dB 01	20 dB 02	20 dB 11	20 dB 13	40 dB
X100	mV	0	0	0	0	0
X10	mV	0	0	0	1	0
X1	mV	0	1	0	1	0
X.1	mV	1	1	0	1	0
X100	$\mu$ V	1	1	0	1	0
X10	$\mu$ V	1	1	1	1	0
X1	$\mu$ V	1	1	0	1	1
X.1	$\mu$ V	1	1	1	1	1

1 = Pad is active    0 = Pad is not active

Pad activated by low (0 V).

**NOTE:** Measurement at the X.1  $\mu$ V setting may not be possible due to analyzer/amplifier noise floor levels.

Figure 5-2. Step Attenuator Pad Activation

standard 20 dB attenuator pad between the spectrum analyzer and the RF IN/OUT connector. Adjust the analyzer log reference controls to establish a peak reference one division below the reference graticule line. Press the X10 OUTPUT LEVEL MULTIPLIER pushbutton. Disconnect the attenuator pad and reconnect the spectrum analyzer to the RF IN/OUT connector. Adjust the OUTPUT LEVEL controls to realign the trace peak one division below the reference graticule line. Press the X100 OUTPUT LEVEL MULTIPLIER pushbutton and adjust the analyzer log reference control to align the trace peak with a graticule line. Disconnect the spectrum analyzer and connect the signal generator to the power meter. The difference between the power meter reading and the -2 dBm reference is the Step Attenuator error. Record this difference on the PTR.

Repeat the above procedure for all OUTPUT LEVEL MULTIPLIER and  $\mu\text{V}/\text{mV}$  pushbutton settings (refer to Figure 5-2).

#### NOTE

**To test the Step Attenuator below -60 dBm, one or more RF amplifier(s) are required. Insert the amplifier(s) between the standard attenuator pad and the spectrum analyzer.**

#### 5.3.8.2 DIAL ACCURACY

Equipment - (7)

Set the instrument for RF generate CW mode (see Section 3.4). Set the CARRIER FREQUENCY switches to 457.3000 MHz. Connect the spectrum analyzer to the RF IN/OUT connector and set the analyzer to 457.3000 MHz, the bandwidth to 10 kHz, and the frequency span per division to 2 kHz. Adjust the video filter for optimum trace presentation and set the vertical display to 2 dB per division. Set the OUTPUT LEVEL control to 3.0 VOLT and press the X10 OUTPUT LEVEL MULTIPLIER PUSHBUTTON (approximately -18 dBm output level). Use the analyzer log reference controls to establish a peak reference on a graticule line. Set the OUTPUT LEVEL control to 0.3 VOLT and press the X100 OUTPUT LEVEL MULTIPLIER pushbutton. The analyzer trace peak should be within 1/2 division (1 dB) of the reference graticule line. If it is not, adjust the A2 board Offset control such that the readings are within 1 dB of each other. Record the difference on the PTR.

#### 5.3.8.3 LEVEL ACCURACY

Equipment - (1) (7) (13)

Connect the signal generator's RF output to the power meter and set the signal generator for a +2 dBm CW RF output at 457.3000 MHz. Disconnect the power meter and connect the signal generator to the spectrum analyzer. Set the analyzer to 457.3000 MHz, the bandwidth to 10 kHz, the frequency span per division to 2 kHz. Adjust

the video filter for optimum trace presentation and set the vertical display to 2 dB per division. Use the analyzer log reference controls to establish a peak reference on a graticule line. Disconnect the signal generator and connect the spectrum analyzer to the RF IN/OUT connector. Set the instrument controls for RF generate CW mode (see Section 3.4). Set the CARRIER FREQUENCY switches to 457.3000 MHz and the OUTPUT LEVEL controls for a +2 dBm output level. The analyzer trace peak should be within 2-1/4 divisions (4.5 dB) of the reference graticule line. Record the measured level on the PTR.

#### 5.3.9 SINAD TEST

Equipment - (10)

Connect the receiver's antenna input to the RF IN/OUT connector and set the instrument controls for RF generate single-source FM or AM (depending on the transceiver used) mode (see Section 3.5 or 3.7). Set the CARRIER FREQUENCY switches to the transceiver frequency and transmit an RF signal sufficient to quiet the receiver under test. Modulate the carrier to 60% of the transceiver's maximum rated FM deviation or to 30% AM using the internal 1 kHz source. Connect the transceiver's audio output to the EXT VERT connector. Press the VOLT pushbutton and adjust the transceiver's volume control such that the METER indicates the transceiver's rated audio output level. Press the SINAD pushbutton and vary the CARRIER FREQUENCY switch setting for a minimum METER reading. Adjust the OUTPUT LEVEL control such that the METER reads -12 dB. The OUTPUT LEVEL control reading should be within 1 dB of the transceiver's rated SINAD sensitivity. Record both the transceiver's rated SINAD sensitivity and the OUTPUT LEVEL control reading on the PTR.

#### 5.3.10 LISSAJOUS TEST

Equipment - (3) (4)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). Press the RCV, MOD, and SUB-TONE/LISSAJOUS pushbuttons. The CRT DISPLAY should now be in X-Y mode, with a dot appearing on the screen. Center the dot on the screen using the HORZ and VERT POS controls. Press the MOD FREQ pushbutton. The CRT DISPLAY trace should extend off the screen to both the left and the right. If it does, place a check mark on the PTR.

Press the SUB-TONE/LISSAJOUS pushbutton. Connect the function generator output to the EXT VERT connector and the frequency counter using a "Tee" connector. Press the 1.8 RANGE pushbutton. Set the function generator frequency to 100 Hz and adjust the output level such that a  $\pm 800$  Hz vertical line appears on the CRT DISPLAY.

Press the X.1 MODULATION FREQUENCY MULTIPLIER pushbutton and set the MODULATION FREQUENCY

switches for 100.0 Hz. Adjust the LEVEL control such that the horizontal and vertical deflections of the CRT DISPLAY trace are equal. Fine adjust the function generator frequency such that the rotation of the CRT DISPLAY trace (should be a circle) stops. The frequency counter should read  $100 \pm 0.1$  Hz. If it does, place a check mark on the PTR.

#### 5.3.11 RF SWEEP TEST

Equipment - (7)

Set the instrument controls for RF generate single-source FM mode (see Section 3.5). All internal modulation sources should be inactive. Set the CARRIER FREQUENCY switches to 450.0000 MHz and the OUTPUT LEVEL controls for a 70.7 mVRMS output level. Connect the spectrum analyzer to the RF IN/OUT connector and set the analyzer to 450 MHz, the bandwidth to 25 kHz, and the frequency span per division to 5 kHz. Insert 20 dB of attenuation (this establishes the analyzer display top graticule line at 0 dB) and adjust the video filter for optimum trace presentation. Press the ZERO BEAT/RF SWEEP pushbutton, turn the HORZ VAR control fully cw, and press the 1 msec HORZ/SWEEP RATE pushbutton. The sweep width (as read on the analyzer) should be at least 36 kHz ( $\pm 18$  kHz). Record the maximum observed sweep width on the PTR.

Vary the EXT LEVEL/SWEEP WIDTH control and verify that the sweep width is adjustable from 0 to  $\pm 18$  kHz. If it is, place a check mark on the PTR.

Press the 10, 0.1, and 0.01 msec HORZ/SWEEP RATE pushbuttons, and verify that the sweep rate as observed on the analyzer changes accordingly. If it does, place a check mark on the PTR.

Read the level of the sweep center frequency on the analyzer. It should be between -8 and -12 dBm. Record the level on the PTR.

Use the analyzer log control to align the peak of the center frequency with a horizontal graticule line. Read the level of the sweep 18 kHz above the center frequency. It should be less than 4 dB below the center frequency level. Record the difference in level (rolloff) on the PTR.

Read the level of the sweep 18 kHz below the center frequency. It should be less than 4 dB below the center frequency level. Record the difference in level (rolloff) on the PTR.

## 5.4 TROUBLESHOOTING

Effective troubleshooting requires a thorough understanding of the block diagram and circuit description located in Section 4 of this manual; then the Performance Tests in Section 5 will aid in localizing the trouble symptom to a particular PC board. Once this has been accomplished, the board can be replaced, or repaired with aid of the proper schematic and parts layout diagram. In general, it is preferable to replace a defective PC board assembly.

Equipment troubles are frequently due simply to improper control settings; therefore, before engaging in a troubleshooting procedure, be sure front-panel controls are set in proper operating position. Refer to the operating instructions in Section 3 of this manual for a complete explanation of each control's function along with typical operating instructions.

After verifying that the trouble is not improper setting of the controls or test setup, make a thorough visual inspection of the instrument for such obvious defects as loose or missing screws, broken wires, defective sockets, loose RF cables, and burned or broken components.

After localizing the problem, voltage and resistance checks will help locate the defective component.

For troubleshooting purposes, it is permissible to operate the instrument with any of the plug-in PC boards or RF cables removed; however, the instrument should be turned off when removing or installing boards. If substitute boards are available, this provides an easy method of verifying if a suspected board is defective.

RF cables can be disconnected from the PC board connectors, and a power meter or spectrum analyzer connected directly to the connector for power level or frequency measurements. Fabrication of a short coax adapter cable, terminated in a mating SMB connector on the instrument end, will facilitate connection of test equipment.

A problem in a power supply may cause many symptoms pointing to other areas, and should be checked when the symptom does not clearly indicate a specific problem. Performance of the supplies is indicated in the Performance Tests.

Figure 5-3 gives troubleshooting information for the instrument in flowchart form.

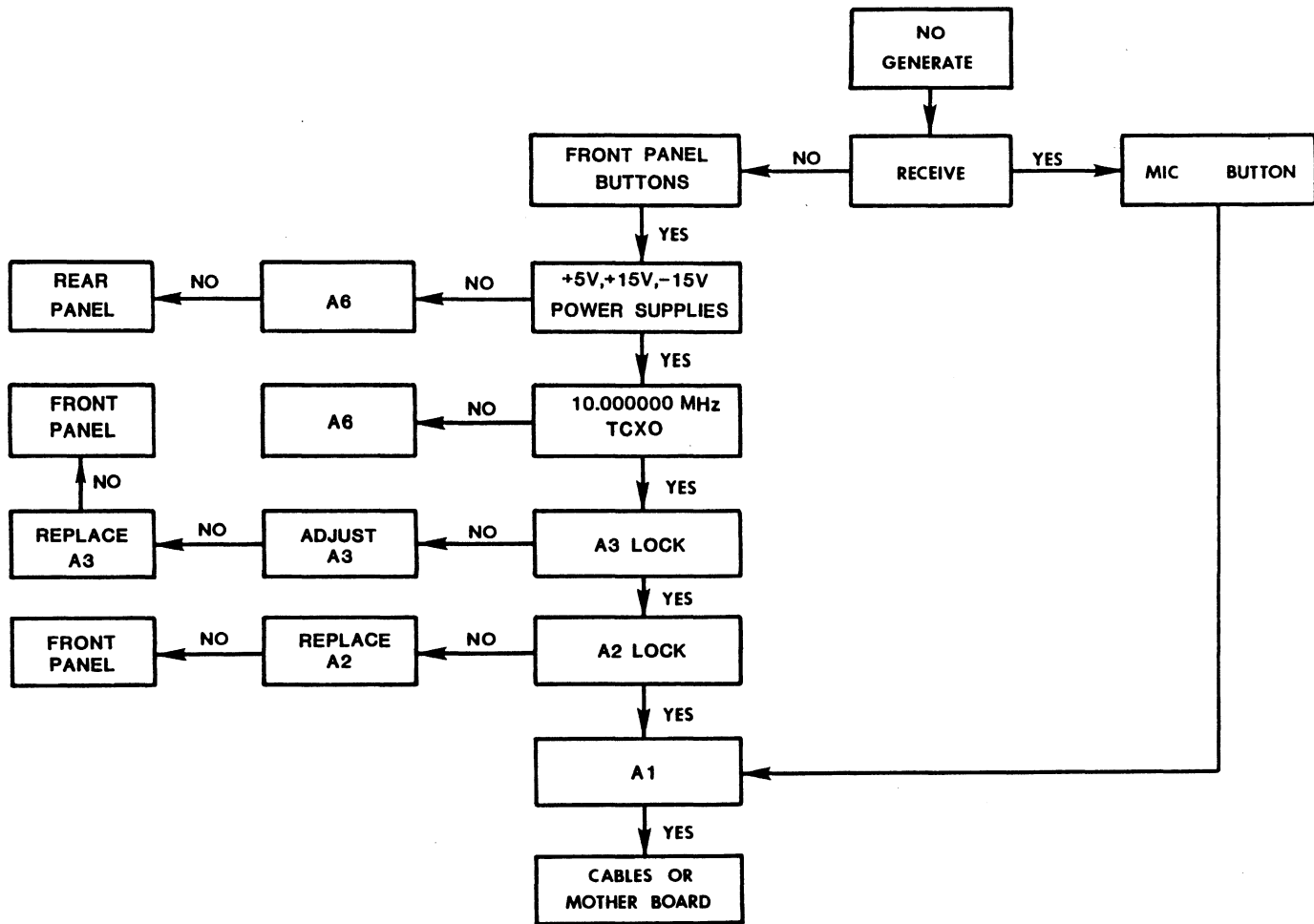


Figure 5-3. Troubleshooting — No Generate

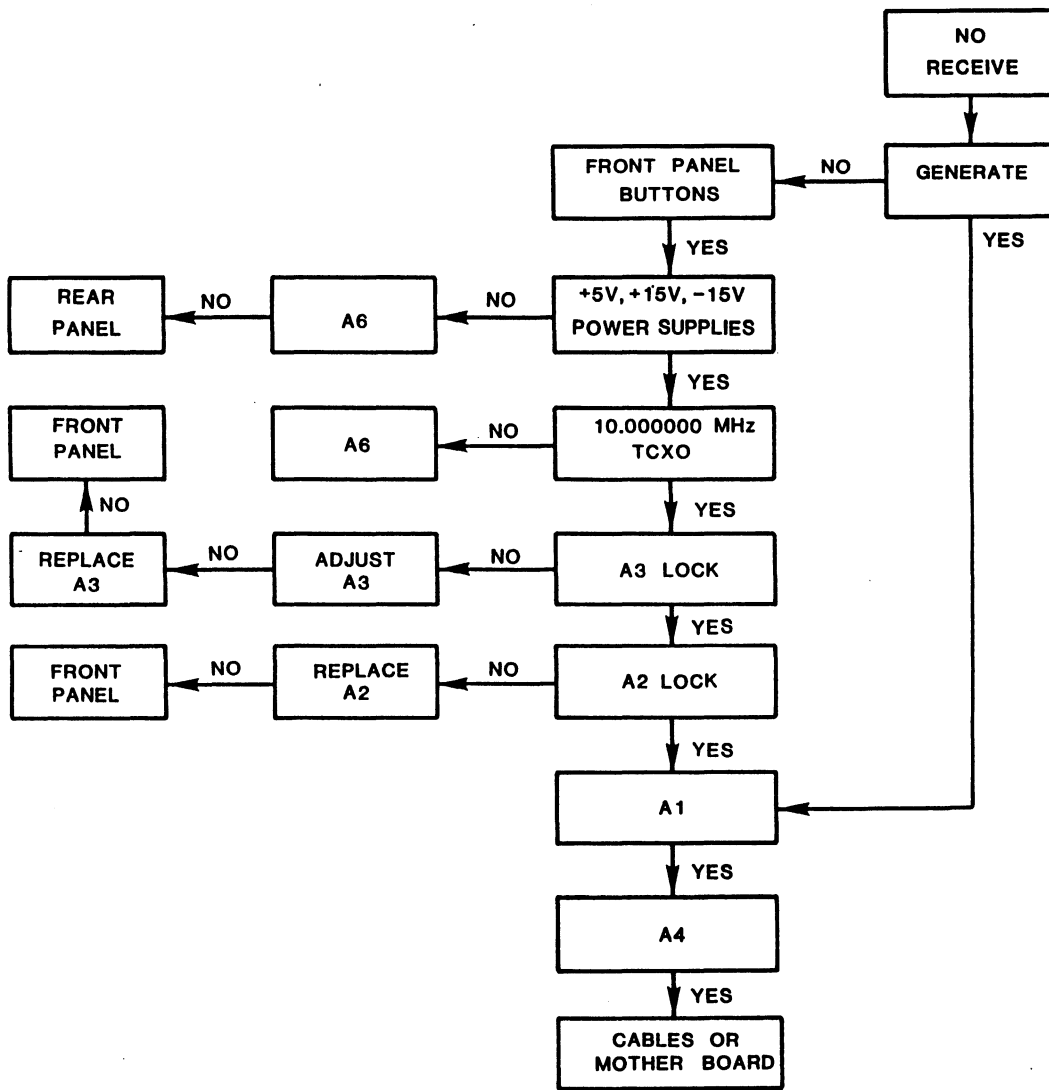


Figure 5-4. Troubleshooting – No Receive

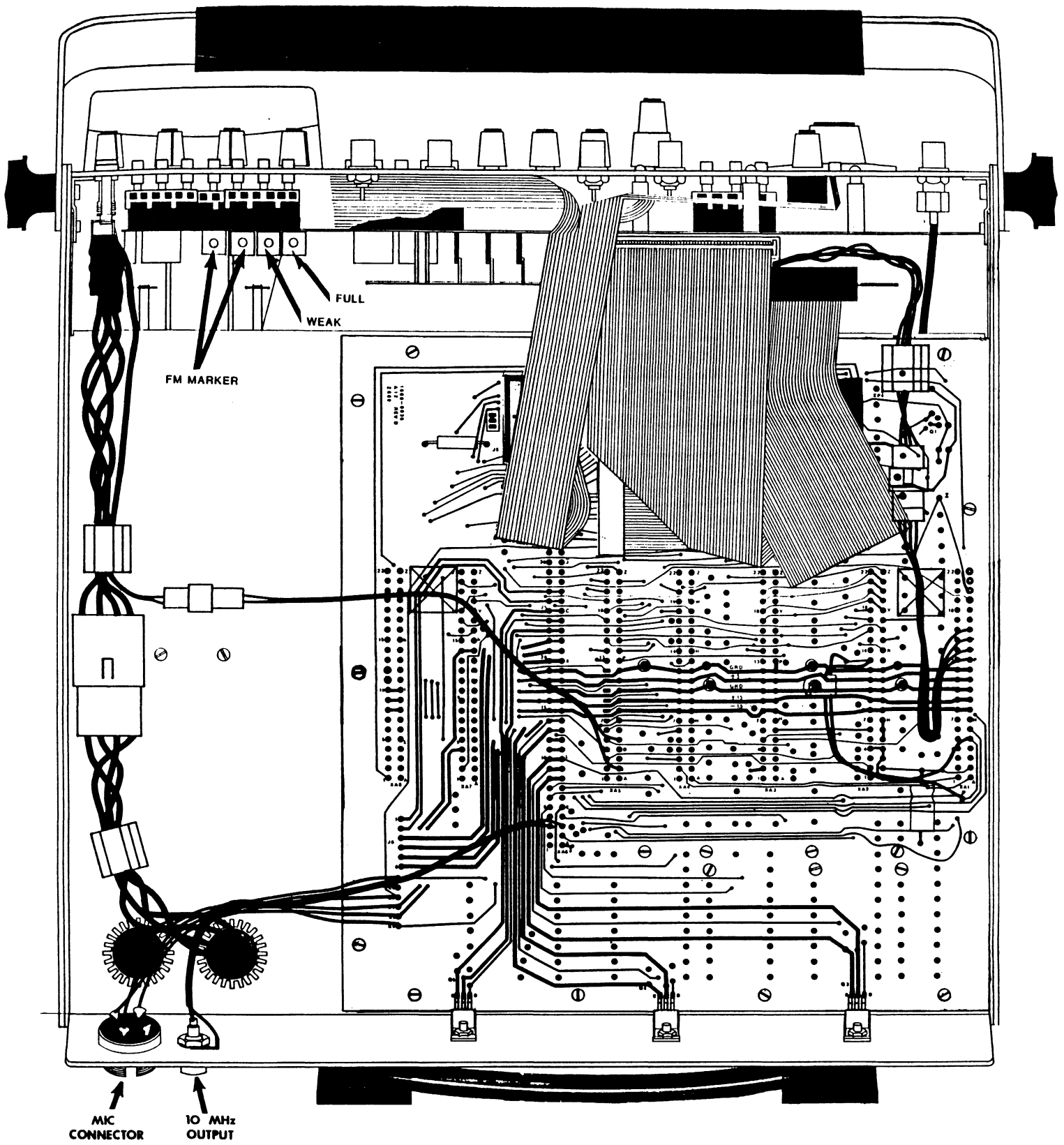


Figure 5-5. Bottom View

SECTION	TEST	MINIMUM SPECIFICATION	MEASUREMENT	MAXIMUM SPECIFICATION	LINE		
5.3.1	VOLTAGE	+ 4.99 V	V	+ 5.01 V	1		
		+ 14.99 V	V	+ 15.01 V	2		
		- 15.01 V	V	- 14.99 V	3		
5.3.2	AUDIO	1.45 V	V	1.55V	4		
		1.45 V	V	1.55 V	5		
			Check		6		
			Check		7		
			Check		8		
			Check		9		
			Check		10		
			Check		11		
			dB	- 30 dB	12		
		5.3.3	FREQ LOCK		Check		13
					Check		14
		5.3.4.1	RESIDUAL MOD		Hz	40 Hz	15
	Hz			80 Hz	16		
	%			1%	17		
5.3.4.2	FM ACCURACY	3.36 kHz	kHz	3.72 kHz	18		
5.3.4.3	FM BANDWIDTH	- 3 dB	dB	+ 3 dB	19		
		- 3 dB	dB	+ 3 dB	20		
5.3.4.4	AM ACCURACY	32.8%	%	36.2%	21		
5.3.4.5	AM BANDWIDTH	- 3 dB	dB	+ 3 dB	22		
		- 3 dB	dB	+ 3 dB	23		
5.3.4.6	MICROPHONE		Check		24		
5.3.5.1	SENS/BW/OFFSET		$\mu$ VRMS		25		
			$\mu$ VRMS		26		
			$\mu$ VRMS		27		
			Check		28		
			kHz		29		
			kHz		30		
			kHz		31		
			Check		32		
			Check		33		
			kHz	Check	34		
		5.3.5.2	FM MARKERS	+ 4.9 kHz	kHz	+ 5.1 kHz	35
- 5.1 kHz	kHz			- 4.9 kHz	36		
+ 450 Hz	Hz			+ 750 Hz	37		
- 750 Hz	Hz			- 450 Hz	38		

# PERFORMANCE TEST RECORD

S/N \_\_\_\_\_  
DATE \_\_\_\_\_

SECTION	TEST	MINIMUM SPECIFICATION	MEASUREMENT	MAXIMUM SPECIFICATION	LINE
5.3.5.3	FM ACCURACY	4.75 kHz	kHz	5.25 kHz	39
		4.75 kHz	kHz	5.25 kHz	40
5.3.5.4	FM/SUB-TONE BW	4.2 kHz	kHz	5.8 kHz	41
		4.2 KHz	kHz	5.8 kHz	42
			Check		43
5.3.5.5	AM ACCURACY	45%	%	55%	44
5.3.5.6	AM BANDWIDTH	42%	%	58%	45
5.3.5.7	SIGNAL STRENGTH		Check		46
			CHECK		47
5.3.6	TIME BASE	See Text	MHz	See Text	48
		See Text	Hz	See Text	49
		See Text	Hz	See Text	50
5.3.7	WATTMETER/PROT	8 sec	sec	12sec	51
		18.6 W	W	21.4 W	52
		8 sec	sec	12 sec	53
		18.6 W	W	21.4 W	54
			Check		55
			Check		56
			Check		57
			Check		58
5.3.8.1	ATTENUATOR		dB	4.5 dB	59
			dB	4.5 dB	60
			dB	4.5 dB	61
			dB	4.5 dB	62
			dB	1.5 dB	63
			dB	1.5 dB	64
			dB	1.5 dB	65
			dB	1.0 dB	66
5.3.8.2	DIAL ACCURACY		dB	1 dB	67
5.3.8.3	LEVEL ACCURACY	-2.5 dBm	dBm	+6.5 dBm	68
5.3.9	SINAD		μVRMS		69
			μVRMS		70
5.3.10	LISSAJOUS		Check		71
			Check		72
5.3.11	RF SWEEP		kHz	±18 kHz	73
			Check		74



# SECTION 6

## REPLACEABLE PARTS

### 6.1 INTRODUCTION

This section contains lists of all replaceable parts for the instrument.

For an assembly containing one or more subassemblies, the assembly list appears first, and is followed by the subassembly lists.

The lists appear in the following order:

<b>PARTS LIST</b>	<b>ASSEMBLY</b>
1010-70-0001	SSI-3000B
1111-70-0003	Cabinet Assy
1111-70-0002	Chassis Assy
1110-00-7012	A12
1118-70-0001	RP Assy
1219-00-0402	XFMR Assy
1219-70-0003	Line Cord Assy
1219-00-0403	Harness Assy - CRT
1118-70-0003	FP Assy
1110-00-7009	A9
1110-70-0074	A10
1110-00-7011	A11
1219-70-0002	Harness - Switch
1110-70-0071	A1-1
1110-00-7002	A2
1110-70-0054	A3-1
1110-00-7004	A4-1
1110-00-7005	A5
1110-00-7006	A6
1110-00-7007	A7
1110-00-7008	A8

### 6.2 MANUFACTURERS CODE

The following code is used on the parts list to identify the manufacturer.

ABBR.	NAME.....	CITY.....	ST	FSCM.	ABBR.	NAME.....	CITY.....	ST	FSCM.
A-B	ALLEN-BRADLEY	MILWAUKEE	WI	01121	BOKER	BOKER'S INC.	MINNEAPOLIS	MN	85446
A-D	ANALOG DEVICES	CAMBRIDGE	MA	24355	BORDN	BORDEN INC.	COLUMBUS	OH	32283
A-H	ARROW HART, INC.	KETTERING	OH	07858	BOU	BOURNS, INC.	RIVERSIDE	CA	90294
A-I	ALAN INDUSTRIES	COLUMBUS	IN	52750	BRAUN	BRAUN MFG CO	CHICAGO	IL	73785
A-M	AMERICAN MAGNETICS	CARTERSVILLE	IL	12715	BREZ	BREEZE CORPORATIONS, INC.	UNION	NJ	08484
A-P	AMERICAN PLASTICRAFT CO.	CHICAGO	IL	53628	BSCAN	B-SCAN, INC.	PHILADELPHIA	PA	32198
ABAC	ABACUS PACKAGING CO.	CHICAGO	IL		BSHP	BISHOP GRAPHICS, INC.	WESTLAKE VILLAGE	CA	34730
ACEIN	ACE INDUSTRIAL HDWR.	CAMDEN	NJ		BUCK	BUCKEYE STAMPING CO.	COLUMBUS	OH	21604
ACI	ADVANCE COMPONENTS, INC.	CENTERBROOK	CT	28102	RUD	RUD RADIO, INC.	WILLOUGHBY	OH	71218
AEG-T	AEG-TELEFUREN CORP.	SOMERVILLE	NJ	24972	BURND	BURNIDY CORP.	NORWALK	CT	09922
AEP	APPLIED ENG PRODUCTS	NEW HAVEN	CT	19505	BUS	BUSSMAN MFG.	ST. LOUIS	MO	71400
AER	AVX CERAMICS	MYRTLE BEACH	SC	96095	BWC	BARON WIRE AND CABLE CORP.	CHICAGO	IL	72622
AERTK	AERTECH INDUSTRIES	SUNNYVALE	CA	21847	C-A	CIRCUIT ASSEMBLY CORP	COSTA MESA	CA	52072
AFE	ACCESSORIES FOR ELECTRONICS	BALDWIN	NY		C-D	CORNELL DUELLIER ELECT DIV	NEWARK	NJ	14655
AHAM	AHAM COMPANY	AZUSA	CA	53894	C-E	CLINTON ELECTRONICS	ROCKFORD	IL	54972
AIN	ALPHA INDUSTRIES, INC.	WOBURN	MA	17540	C-H	CUTLER-HAMMER, INC.	MILWAUKEE	WI	55841
ALC	ALCO ELECTRONICS PRODUCTS	NORTH ANDOVER	ME	95146	C-I	COMPONENTS, INC.	BIDDEFORD	ME	17554
ALLPL	ALL PLASTICS, INC.	INDIANAPOLIS	IN		C-J	TRW/CINCH	ELK GROVE VILLAGE	IL	71785
ALMPT	ALPHA METALS, INC	JERSEY CITY	NJ	96613	C-K	C & K COMPONENTS, INC.	WATERTOWN	MA	09353
AMATH	AMATOM ELEC HDWE CO	NEW HAVEN	CT		C-L	CENTRALAB DIV.	MILWAUKEE	WI	71590
AMD	ADVANCED MICRO DEVICES INC.	SUNNYVALE	CA	34335	C-M	C-M			
AMELC	AMERICAN ELECTRIC CORDSETS	BESENVILLE	IL	0	C-W	C-W INDUSTRIES	WARMINSTER	PA	79727
AMP	AMP, INC.	HARRISBURG	PA	00779	CAE	CAPAR COMPONENTS CORP	MELVILLE	NY	
ANSLY	ANSLEY ELECTRONICS LTD	DOWNSVILLE, ONT., CANADA	**		CAI	CUSTOM ACCESSORIES, INC.	SKOKIE	IL	XXXXX
ANZAC	ADAMS-RUSSELL, ANZAC DIV	BURLINGTON	MA		CAM	CAMBION	CAMBRIDGE	MA	71279
APL	AMPHENDL CONNECTOR SYSTEMS	BROADVIEW	IL	74868	CAR	CARLING ELECTRIC, INC.	WEST HARTFORD	CT	73559
APP	A-P PRODUCTS	PAINESVILLE	OH	0	CBWV	CABLEWAVE SYSTEMS, INC.	NORTH HAVEN	CT	16733
APX	AMPEREX ELECTRONIC CORP.	SLATERSVILLE	RI	25403	CBRDH	CARBORUNDUM INSUL DIV	NIAGARA FALLS	NY	
ARC	ARCO ELECTRIC PRODUCTS	SHELBYVILLE	IN	24652	CCM	CORCON, INC.	LIBERTYVILLE	IL	05245
ARIES	ARIES ELECTRONICS CORP.	FRENCHTOWN	NJ		CCD	COMPONENT DEVELOPMENT CORP.	CARSON	CA	XXXXX
ARN	ARNOLD ENGINEERING CO.	MARENGO	IL	95566	CECO	CENTRAL COIL CO.	BRAZIL	IN	XXXXX
AROMT	AROMAT CORP.	ELK GROVE VILLAGE	IL		CFI	CIRCUIT FUNCTIONS INC.	NEWBURY PK	CA	32499
ARW-M	ARROW-M CORP	CARSON	CA		CGW	CORNING GLASS WORKS	CORNING	NY	24546
ASBAG	ASSOCIATED BAG CO.	MILWAUKEE	WI		CHE	CHERRY ELECTRICAL PRODUCTS	WAUKEGAN	IL	01963
ASC	ASSOCIATED SPRING	BRISTOL	CT	92830	CHEMP	CHEMPLAST, INC.	WAYNE	NJ	0
ASE	AIRCO SPEER ELECTRONICS	ST. MARYS	PA	06560	CHLAR	CHARLES LARSON CO.	STERLING	IL	
ASM	ACCURATE SCREW MACHINE CO	NUTLEY	NJ	51506	CHOM	CHOMERICS INC.	WOBURN	MA	18565
ASTID	ASTRO INDUSTRIES	DAYTON	OH	29365	CHRY	CHRYSLER CORP.	DETROIT	MI	12204
AT/IN	ATLANTIC INDIA RUBBER CO	CHICAGO	IL	70485	CIMCO	CINCO WIRE AND CABLE INC.	ALLENDALE	NJ	XXXXX
ATC	AMERICAN TECHNICAL CERAMICS	HUNTINGTON STATN	NY	29990	CINOX	CINOX CORP	CINCINNATI	OH	58997
ATR	ATR COIL CO.	BLOOMINGTON	IN	XXXXX	CKI	CTS KNIGHTS, INC.	SANDWICH	IL	75378
AUGAT	AUGAT, INC.	ATTLEBORO	MA	91506	CLA	CLAIREX CORP.	MT. VERNON	NY	03911
AULT	AULT INC.	MINNEAPOLIS	MN	14310	CLAR	CLAROSTAT MFG. CO	DOVER	NH	12697
AUTCP	AUTOMATION CORP.	PECKVILLE	PA		CLCFT	COILCRAFT	CARY	IL	
AVDEL	AVDEL FASTENER SYS.	PARSIPPANY	NJ	19738	CLFRM	COILFORM	GENEVA	IL	20254
AVT	AVANTEK, INC.	SANTA CLARA	CA	24539					
AWC	ALPHA WIRE	ELIZABETH	NJ	92194					
B-T	BEK-TEK, INC.	READING	PA	XXXXX					
B-W	BARKER & WILLIAMSON	BRISTOL	PA	05690					

ABBR.	NAME.....	CITY.....	ST	FSCM.	ABBR.	NAME.....	CITY.....	ST	FSCM.
CLFX	COLE-FLEX CORP.	BABYLON	NY	56352	ELC-I	ELECTRA	CUMBERLAND	IN	
CLMRK	CALMARK CORP	SAN GABRIEL	CA	52094	ELCO	ELCO INDUSTRIES	ROCKFORD	IL	83486
CMLC	CAMLOC FASTENER	PARAMUS	NJ		ELDRE	ELDRE COMPONENTS, INC	ROCHESTER	NY	19648
CNCRD	CONCORD ELEX	NEW YORK	NY	18310	ELEXP	ELECT EXPEDITERS	MILWAUKEE	WI	
CNTRN	CENTURION	****	**		ELFX	ELECTRO-FLEX HEAT INC.	BLOOMFIELD	CT	02728
COL	COLLHER SEMICONDUCTORS INC	DALLAS	TX		ELHDW	ELECTRONIC HARD	FARMINGDALE	NY	
COORS	COORS PORCELAIN CO	GOLDEN	CO		ELNA	ELNA	CARSON	CA	
CPKG	CREATIVE PKG DIV	INDIANAPOLIS	IN	46203	EM-CH	EMERSON & CUMING, INC	CANTON	MA	
CPLRD	COMPLETE-READING ELEC.CO.	DALLAS	TX	02358	EMRON			S	0
CRDWL	CARDWELL CONDENSER CORP	LINDENHURST	NY	88356	ENTHN	ENTHON INC.	NEW HAVEN	CT	02258
CRMLY	CERMALLOY	WEST CONSHOHOCKEN	PA		EPITK	EPITEK ELECTRONICS	KANATA,ONT,CANADA	**	37907
CRTR	CORE-TRONICS	ORANGE	NJ	29324	EPOXT	EPOXY TECHNOLOGY, INC.	BILLERICA	MA	33246
CSDC	CONDITIONING SEMICNDR DVS	WAYNE	NJ		ETC	ELECTRONIC TRANSISTOR CORP.	FLUSHING	NY	12045
CTC	COMMUNICATIONS XISTOR CORP	SAN CARLOS	CA		ETP	ERIE TECHNOLOGICAL PRODUCTS	ERIE	PA	72982
CTS	CHICAGO TELEPHONE SYSTEMS	CHICAGO	IL	71450					
CTS-E	CTS OF ELKHART	ELKHART	IN	71450	EVROY	EVEREADY	NEW YORK	NY	
CTS-F	C.T.S. OF FAIRBERRY	FAIRBERRY	IL	71450	EXAR	EXAR INTEGRATED SYSTEMS	SUNNYVALE	CA	52063
CTS-K	CTS OF KEENE	PASO ROBLES	CA	11237	EZLOK	E-Z LOK	GARDENIA	CA	
CTSBR	CTS OF BERNE	BERNE	IN	11236	F-K	THERMELL PRODUCTS, INC.	FRAMINGHAM	MA	XXXXX
CTSBV	CTS OF BROWNSVILLE	BROWNSVILLE	TX	34263	F-S	FEDERAL SCREW	CHICAGO	IL	73734
CW/AL	C.W./ALPHA	SOUTHAMPTON	PA		FAN	FANCOURT & CO.	GREENSBORO	NC	XXXXX
DAL	DALE TECHNOLOGY CORP.	HARTSDALE	NY	XXXXX	FASTX	FASTEX DIV., ILL. TOOL WORKS	DES PLAINES	IL	0
DATEL	DATEL SYSTEMS, INC.	MANSFIELD	MA	50721	FCD	FAIRCHILD	MOUNTAIN VIEW	CA	07263
DAV	HARRY DAVIES MOLDING CO.	CHICAGO	IL	72512	FCI	FILM CAPACITORS, INC.	PAS SALC	NJ	00686
DAYTN	DAYTON ELECTRIC CO.	CHICAGO	IL	16327	FJTSU	FUJITSU AMERICA, INC.	LAKE BLUFF	IL	
DEL	DELEVAN DIV.	EAST AURORA	NY	XXXXX	FRWL	FENWAL	FRAMINGHAM	MA	15801
DEN	DENNISON MFG. CO.	FRAMINGHAM	MA	16956	FRDKS	FREDERICKS CO.	HUNTINGDON VALLEY	PA	
DEW	DEWIRE FABRICATING CORP.	LOWELL	MA	13161	FRK	FRAKO	FRANKFORT, GER.	**	XXXXX
DGTRN	DIGITRAN CO.	PASADENA	CA		FRTE	FAIR RITE PRODUCTS CORP.	WALLKILL	NY	34899
DILEC	DIELECTRON	MONROVIA	CA	0	FRXC	FERROCUBE DIVISION	SAUGERTIES	NY	02114
DIO	DIODES, INC.	CHATSWORTH	CA	12060	FUT	FUTABA			
DIXON	DIXON INDUSTRIES INC.	BRISTOL	RI	04813	G-E	GENERAL ELECTRIC	INDIANAPOLIS	IN	24446
DK-WR	DAKO-WARE	CHICAGO	IL		G-H	GRAYHILL, INC.	LA GRANGE	IL	81073
DLGHT	DIALIGHT	BROOKLYN	NY	72619	G-I	GEN'L INSTRUMENT SEMICNDR	HICKSVILLE	NY	14963
DLI	DIELECTRIC LABORATORIES INC	CAZENUEVA	NY	55153	G-T	GRAND TRANSFORMERS	GRAND HAVEN	MI	02459
DLTEN	DELTA ELECTRONICS MFG CO	BEVERLY	MA	00795	GAL	GALILEO ELECTRO-OPTICS	STURBRIDGE	MD	28719
DM-GY	DMCO-GRAY	CENTERVILLE	OH	90813	GATES	GATES ENERGY PROD.	DENVER	CO	57053
DNTCH	DONTECH, INC.				GBN	GILBERT ENGINEERING CO., INC	PHOENIX	AZ	82316
DRA	DRAKE MANUFACTURING CO.	HARWOOD HEIGHTS	IL	71744	GC	GC ELECTRONICS	ROCKFORD	IL	80112
DRMYR	DORMEYER	ROCKVILLE	IN	73662	GHZ	GHZ DEVICES, INC.	CHELMSFORD	MA	
DUPNT	E.I.DUFONT DENEHOURS & CO	WILMINGTON	DE		GLOBE	GLOBE	MILWAUKEE	WI	
DYNR	DYNEER CORP.	CHATSWORTH	CA		GNATR	GENERAL ATRONICS CORP.	PHILADELPHIA	PA	07407
E-C	ELECTRONIC CRYSTALS	KANSAS CITY	MO	18853	GOUL	GOULD, INC.	ST. PAUL	MN	55857
E-I	ELECTRICAL INDUSTRIES, INC.	MURRAY HILL	NJ	20093	GRIES	GRIES REPRODUCER	NEW ROCHELLE	NY	05673
E-M	ELECTRA/MIDLAND CORP.	MINERAL WELLS	TX	XXXXX	GRIP	GRIPMASTER CO.	MARLBORO	NJ	XXXXX
EATON	EATON CORP.	SUNNYVALE	CA	34657	GRVCO	GROVE COMPANY	DAYTON	OH	
EBY	EBY COMPANY	PHILADELPHIA	PA	72825	GUDL	GUDEBROD BROS. SILK CO.	CHICAGO	IL	XXXXX
ECKDT	ECKARDT LABORATORIES	ORANGE	CA		GWNDA	GOWANDA ELEX CORP	GOWANDA	NY	
ECNC	ELECTRI-CORD MFG. CO. INC.	WESTFIELD	PA	XXXXX	H-P	HEWLETT-PACKARD	INDIANAPOLIS	IN	28480
EDAC	EDAC, INC.	DON HILLS, ONT., CANADA	**	31781	HARTW	HARTWELL CORP.	PLACENTIA	CA	0
EECO	EECO, INC.	SANTA ANA	CA	97525	HDMLD	DAVIES H HOLDING	CHICAGO	IL	
					HEL	HELIFOT	ANAHEIM	CA	XXXXX

ABBR.	NAME.....	CITY.....	ST	FSCM.	ABBR.	NAME.....	CITY.....	ST	FSCM.
HEY	HEYMAN MFG. CO.	WAUKESHA	WI	28520	KIN	KINGS ELECTRONICS	TUCKAHOE	NY	91836
HGHS	HUGHES SOLID-STATE PROD	NEWPORT BEACH	CA		KMYO	KAHAYA OHM	JAPAN	**	
HHS	HERMAN H. SMITH, INC.	BROOKLYN	NY	83330	KRYST	KRYSTINEL	PATERSON	NJ	29251
HI-G	HI-G INC	WINDSOR LOCKS	CT	02289	KSTR	KESTER SOLDER DIV.	CHICAGO	IL	09185
HIT	HITACHI AMERICA, LTD.	SAN FRANCISCO	CA	XXXXX	KSW	KSW ELECTRONICS	BURLINGTON	MA	52673
HMLN	HAMLIN	LAKE HILLS	WI	12617	KUL	KULKA ELECTRIC CORP.	MT. VERNON	NY	75382
HOLGW	HOLLINGSWORTH SLDRLS TERM.	POTTSTOWN	PA	14726	KYCRA	KYOCERA INTERNATIONAL	SAN DIEGO	CA	
HOLUB	HOLUB DISTRIBUTING CO.	NEWPORT	KY	XXXXX	LAMB	LAMB INDUSTRIES, INC.	PORTLAND	OR	
HSD	HARRIS CORP. SEMICDR. DIV.	NELBOURNE	FL	27410	LAURN	LAUREN MFG CO.	NEW PHILADELPHIA	OH	56329
HUD	HUDSON TOOL & DIE CO.	NEWARK	NJ	02875	LEYSE	LEYSE ALUMINUM CO.	KEWANEE	WI	20218
HY/PL	HYDRO PLASTICS INC.	GEORGETOWN	KY	XXXXX	LIT	LITTELFUSE, INC.	DES PLAINES	IL	75915
HYSOL	HYSOL CORP	INDUSTRY	CA	12405	LNHST	LINEMASTER SWITCH CORP.	WOODSTOCK	CT	97918
HYSYS	HYBRID SYSTEMS	BEDFORD	MA	33256	LOCTT	LOCTITE CORP.	NEWINGTON	CT	05972
HYT	HYTRONICS	PINELLAS PARK	FL	29525	LRC	LRC ELECTRONICS, INC.	HORNELL	NY	16157
IBNCO	INDIANA BOLT AND NUT CO.	INDIANAPOLIS	IN		LSI	LUMINESCENT SYSTEMS, INC	LEBANON	NH	16157
ICI	ILLINOIS CAPACITOR INC.	MORTON GROVE	IL	74840	LTRNX	LITRONIX	CUPERTINO	CA	50579
ICO-R	ICO-RALLY	PALO ALTO	CA		M-A	MICROWAVE ASSOCIATES	BURLINGTON	MA	96341
IDC	INTL DIODE CORP.	HARRISON	NJ	16068	M-D	MILLER DIAL & NAMEPLATE CO.	EL MONTE	CA	74072
IEE	INDUSTRIAL ELECTRONIC ENG	NORTH HOLLYWOOD	CA	05464	M-E	MEPCO ELECTRA, INC.	MORRISTOWN	NJ	19701
IERC	INT'L ELEC. RESEARCH CORP.	BURBANK	CA	98978	M-O	ILLUMINATED PRODUCTS INC.	SANTA ANA	CA	XXXXX
INDCP	INDUCTIVE COMPONENTS	HAUPPAUGE	NY	25159	M-P	MICRO PLASTICS INC.	CHATSWORTH	CA	31223
INDEC	INDUSTRIAL ELECTRONIC HDWR.	NEW YORK	NY	97913	MAL	MALLORY CONTROLS CO.	FRANKFORD	IN	90201
INDGL	INDIANA GENERAL	KEASBEY	NJ	72656	MAND	MANDEX	CHICAGO	IL	98278
INLOK	INTERLOK/WM J PURDY CO.	BURLINGAME	CA	55951	MARG	J. & J. MARQUARDT	TUTTILINGEN, GER.	**	XXXXX
INT	INTERSIL, INC.	CUPERTINO	CA	32293	MCMTL	MICROMETALS, INC	ANAHEIM	CA	12856
INTEL	INTEL CORP	SANTA CLARA	CA	34649	MCREL	MICRO ELEX LTD	HONG KONG	**	
INWEB	INTERNATIONAL WEBBING	WHITEHALL	PA	32860	MD-AM	MID AMERICA	CHICAGO	IL	
IRC	INTERNATIONAL RESISTANCE CO	PHILADELPHIA	PA	75042	MDC	MAIDA DEVELOPMENT CO.	HAMPTON	VA	91984
IREC	INT'L RECTIFIER CORP.	LOS ANGELES	CA	81483	MDLRS	MIDLAND ROSS	CINCINNATI	OH	57951
ISTMP	ISOTEMP RESEARCH, INC.	CHARLOTTEVILLE	VA	31785	MODUTEC	MODUTEC	NORWALK	CT	32171
ITRON	ISE ELECTRONICS	ISE, JAPAN	**	0	MFLCO	MAURICE FRANKLIN LOUVER CO.	PROVIDENCE	RI	
ITT	INT'L TELEPHONE & TELEGRAPH	W. PALM BEACH	FL	XXXXX	MILN	MILLEN MFG. CO.	NEW YORK	NY	XXXXX
JAMES	JAMES ELECTRONICS	CHICAGO	IL	12749	MILSP	MILITARY SPECIFICATION	WASHINGTON	DC	81349
JAN	JAN HARDWARE MFG. CO.	LONG ISLAND CITY	NY	99813	MIN-C	MINI-CIRCUITS	BROOKLYN	NY	15542
JEF	JEFFERS	DUBOIS	PA	97469	MINIS	MINI SYSTEMS	NORTH ATTLEBORO	MA	50316
JEFWC	JEFFERSON WIRE AND CABLE	WORCHESTER	MA	07883	MINOR	MINOR RUBBER CO.	BLOOMFIELD	NJ	76385
JEW	JEWELL ELECTRICAL INST	MANCHESTER	NH		MITEK	MITEK	LEXINGTON	MA	0
JFD	JFD ELECTRONICS	BROOKLYN	NY	73899	MJLJW	J.W. MILLER	COMPTON	CA	96804
JFW	JFW INDUSTRIES	BEECH GROVE	IN	56532	MMH	3M COMPANY	ST. PAUL	MN	
JHSM	JOHANSON MFG. CORP.	BOONTON	NJ	91293	MNO	MONSANTO COMM. PROD. DIV.	PALO ALTO	CA	50522
JON	E.F. JOHNSON CO.	WASECA	MN	74970	MOL	MOLEX PRODUCTS	LISLE	IL	27264
JUDD	JUDD WIRE DIV, ECC	TURNERS FALLS	MA	12703	MORAD	MORGAN ADHESIVES	STOW	OH	17452
K-L	KERRIGAN LEWIS MFG.	CHICAGO	IL	73920	MOSTK	MOSTK CORP.	CARROLLTON	TX	50088
K-S	K & S ENGINEERING CO.	CHICAGO	IL	22376	MOT	MOTOROLA SEMI. PROD. DIV.	INDIANAPOLIS	IN	04713
KDI-P	KDI-PYROFILM CORP.	WHIPPANY	NJ	03888	MOUS	MOUSER ELECTRONICS	LAKEVIEW	CA	50811
KEENE	KEENE CORP.	NEWARK	DE	52869	MRM	M. ROSS MASON	INDIANAPOLIS	IN	
KEM	KENTRON ELECTRON PRODUCTS	NEWBURYPORT	MA	92703	MRO	MICRO SWITCH DIV.	FREEMONT	IL	91929
KEY	KEYSTONE ELECTRONIC CORP.	NEW YORK	NY	91833	MRRUB	MARION RUBBER PROD.	INDIANAPOLIS	IN	
KID	KIDCO, INC.	MEDFORD	NJ	12126	MSN	MICROSONICS DIV.	WEYMOUTH	MA	11869
					MSP	MICRO SEMICONDUCTOR CORP.	SANTA ANA	CA	14552

ABBR.	NAME.....	CITY.....	ST	FSCM.	ABBR.	NAME.....	CITY.....	ST	FSCM.
MULSO	MULTICORE SOLDERS LTD.	WESTBURY	NY	03051	PNI	PRECISION MONOLITHICS INC.	SANTA CLARA	CA	06665
MURA	MURA	WESTBURY	NY	32539	PNSNC	PANASONIC			
MURGA	MURATA-GEORGIA	MARIETTA	GA	51406	POLPH	POLYPHASE INSTR.CO	BRIDGEPORT	PA	98330
MWS	MAGNET WIRE SUPPLY CO.	CHATSWORTH	CA	51668	POH	POMONA ELECTRONICS CO.,INC	POMONA	CA	05276
MWS-P	MWS PRECISION WIRE INDUS	WESTLAKE VILLAGE	CA		PREH	PREH VERT,HRH	GERMANY	**	
MYERS	MYERS SPRING CO.	LOGANSPOET	IN	91956	PRND	PYRAMID INDUSTRIES, INC.	PHOENIX	AZ	XXXXX
N-T	NATIONAL TEL-TRONICS	LAREDO	TX	XXXXX	PRRES	PRECISION RESISTIVE PRDTS	MEDIAPOLIS	IA	
NAT	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA	CA	27014	PRSLK	PRESTO-LOCK	GARFIELD	NJ	77386
NCC	NATIONAL CERAMIC CO	TRENTON	NJ	76626	PRSN	PRECISION TUBE CO., INC	NORTH WALES	PA	82413
NCSVC	NATL COM SERV.	WILLOW GROVE	PA		PWN	PENN TRAN CORP.	BELLEFONT	PA	XXXXX
NEC	NIPPON ELECTRIC CO.	TOKYO, JAPAN	**	18324	PWRMT	POWER-MATE CORP.	HACKENSACK	NJ	
NEL	NATIONAL ENGINEERING LABS	INDIANAPOLIS	IN	XXXXX	PYRO	PYROFILM CORP.	WHIPPANY	NY	XXXXX
NEHCO	NEHCO METALS, INC	HANVILLE	RI		PYTT	PYTTRONICS INDUSTRIES, INC.	MONTGOMERYVILLE	PA	31924
NEW	NEWARK ELECTRONICS	INDIANAPOLIS	IN	XXXXX	Q-C	QUALITY COMPONENTS	ST. MARYS	PA	95121
NHWC	NEW HAVEN WIRE & CABLE	NEW HAVEN	IN	XXXXX	R-E	ROBISON ELECTRONICS	SAN LUIS OBISPO	CA	
NICHN	NICHICON (AMERICA) CORP.	SCHAUMBURG	IL	55680	R-H	ROBINSON-NUGENT	NEW ALBANY	IN	0
NMB	NMB CORP.	ARLINGTON HEIGHTS	IL	60005	R-OHM	R-OHM	IRVINE	CA	57668
NMC	MAGNUM MICROWAVE CORP.	SUNNYVALE	CA	59277	RAF	RAF ELECTRONIC HDWE	STRAFFORD	CT	
NPC	NUCLEONIC PRODUCTS CO.	CANOGA PARK	CA	0	RAWST	RAW STOCK	****	**	
NRTLK	NORTHLAKE ENG, INC	ANTIOCH	IL	50638	RAY	RAYTHEDN	INDIANAPOLIS	IN	49956
NYLD	NYLOMATIC	MORRISVILLE	PA	XXXXX	RAYVC	RAY-D-VAC/DV	MADISON	WI	
O-G	OPTI-GAGE INC.	DAYTON	OH	XXXXX	RBRCT	RUBBERCRAFT	****	**	
O-S	OMNI SPECTRA INC.	FARMINGTON	MI	16179	RCA	RCA	CAMDEN	NJ	02735
OAK	OAK INDUSTRIES INC.	CRYSTAL LAKE	IL	76854	RCHLK	RICHLOK CORP	CHICAGO	IL	
OHM	OHITE MFG. CO.	SKOKIE	IL	44655	REL	RELIANCE MICA CO.	BROOKLYN	NY	08530
OMEGA	OMEGA WIRE & CABLE	HARLEYSVILLE	PA	XXXXX	RGNCY	REGENCY ELECTRONICS, INC.	INDIANAPOLIS	IN	
OPTO	OPTO ELECTRONICS INC	FT LAUDERDALE	FL		RGR	ROGERS CORP.	CHANDLER	AZ	31745
OPTRN	OPTRON INC.	CARROLLTON	TX	XXXXX	RICH	RICHCO PLASTIC CO.	CHICAGO	IL	06915
P-B	POTTER AND BRUMFIELD	PRINCETON	IN	77342	RICHM	RICHARDS METAL PRODUCTS	WOLCOTT	CT	19076
P-C	POWER COMPONENTS	WOODLAND HILLS	CA	XXXXX	RMC	RADIO MATERIALS CORP.	CHICAGO	IL	82560
P-K	PARKER KALON CORP.	CLIFTON	NJ	XXXXX	RMF	RMF PRODUCTS INC.	BATAVIA	IL	XXXXX
P-T	PENN TUBE PLASTICS CO.	CLIFTON HEIGHTS	PA	0	ROCKW	ROCKWELL INTL.	ANAHEIM	CA	33085
P-U	PROJECTS UNLIMITED INC.	DAYTON	OH	XXXXX	ROGAN	ROGAN CORP.	NORTHBROOK	IL	86797
POLPH	POLYPHASE INSTR. CO.	BRIDGEPORT	PA	0	ROTRN	ROTRON INC.	WOODSTOCK	NY	82877
PACTC	PACTEC DIV.	PHILADELPHIA	PA		RPBLC	REPUBLIC ELECTRONICS CORP	PATTERSON	NJ	
PAN	PANOTOR DIV.	BURLINGAME	CA	23936	RSSLL	RUSSELL	OCEANSIDE	NY	24324
PAND	PANDUIT CORP.	TINLEY PARK	IL	06383	RTNA	ROSENTHAL TECHNIK,N.A.	PROVIDENCE	RI	
PARA	PARAMETRIC INDUSTRIES	NORTHEFIELD	IL	XXXXX	S-C	SPECIALTY CONNECTOR	INDIANAPOLIS	IN	24931
PCC	PANEL COMPONENTS CORP.	BERKELEY	CA	00000	S-G	STANDARD GRIGSBY	AURORA	IL	82104
PEC	PACIFIC ELECTRICORD CO.	GARDENA	CA	90126	S-I	SWITCHCRAFT, INC.	CHICAGO	IL	82389
PEN	PENN ENGRG & MANUF CO.	DANBORO	PA		S-S	SERVICE SUPPLY	INDIANAPOLIS	IN	XXXXX
PFZR	PFIZER, INC.	NEW YORK	NY	86491	S-T	SARKES TARZIAN	BLOOMINGTON	IN	51589
PHC	PHILADELPHIA HANDLE CO.	CAMDEN	NJ	XXXXX	SAE	STANFORD APPLIED ENG	SANTA CLARA	CA	
PHILP	PHILPOTT RUBBER CO.	CLEVELAND	OH	86510	SAGE	SAGE LABORATORIES, INC.	NATIC	MA	
PIC	PIHER INTERNATIONAL CORP.	ARLINGTON HEIGHTS	IL	54869	SAYRO	SAYROSA ENGINEERS LTD.	ALTON, HANTS, U.K	**	04180
PIEZO	PIEZO TECHNOLOGIES, INC.	ORLANDO	FL		SCBE	SCANBE DIVISION	EL MONTE	CA	18677
PLI	PRECISION LAMP, INC.	MT. VIEW	CA	48451	SCC	STACKPOLE CARBON CO.	ST. MARYS	PA	78488
PLSSY	PLESSEY ENG.	SCHILLER PARK	IL	55112	SCX	SILICONIX INC.	SANTA CLARA	CA	17856
PLSTI	PLASTIC TECHNIQUES, INC	NEW BOSTON	NH		SEAST	SEASTROM MFG. CO.	GLENDALE	CA	86928
PLYCL	POLYCLAD LAMINATES	SOUTHFIELD	MI		SECR	SECOR INC.	WESTWOOD	NJ	0
PNCL	PERMACEL DIV.	NEW BRUNSWICK	NJ	99742					



ABBR.	NAME.....	CITY.....	ST	FSCN.
WNZLR	WINZLER MFG	CHICAGO	IL	09109
WRC	WIRE RESEARCH CORP	SANTA ANA	CA	
WSD	WAVETEK	SAN DIEGO	CA	23338
WSTN	WESTON COMPONENTS	ARCHBALD	PA	94075
ZEN	ZENITH RADIO CORP.	CHICAGO	IL	67177
ZERO	ZERO MANUFACTURING CO.	BURBANK	CA	98376
ZIE	ZIERICK MFG. CORP.	MOUNT KISCO	NY	79963
ZPT	ZIPPERTUBING, CO.	LOS ANGELES	CA	07240

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
W02 W03 W04	CABLE ASSY,8-1/2 IN	WXSSI-3000	W-I	1217-80-0066	3.000
ZA01	MIXER BD,A1-1B	SSI-3000B-A1-1B	W-I	1110-70-0071	1.000
ZA02	IF PLL BD,A2	3000SSI-A2	W-I	1110-00-7002	1.000
ZA03	FREQ SYN BD,A3-1	1110-70-0054	W-I	1110-70-0054	1.000
ZA04	IF AMP BD,A4	3000SSI-A4	W-I	1110-00-7004	1.000
ZA05	AUDIO BD,A5	3000SSI-A5	W-I	1110-00-7005	1.000
ZA06	LV FWR SUPPLY BD,A6	3000SSI-A6	W-I	1110-00-7006	1.000
ZA07	DEFL AMP BD,A7B	3000SSI-A7	W-I	1110-00-7007	1.000
ZA08	HV FW SUPPLY BD,A8	3000SSI-A8	W-I	1110-00-7008	1.000
ZA11	FP ASSY,SSI-3000B	SSI-3000B-FP	W-I	1118-70-0003	1.000
ZA12	CHASSIS,SSI-3000B	SSI-3000B-CHAS	W-I	1111-70-0002	1.000
ZA13	CABINET,SSI-3000B	SSI-3000B-CAB	W-I	1111-70-0003	1.000
<b>WAVETEK</b> PARTS LIST	SVC MNTR, SSI-3000B	1010-70-0001			REV
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFR-PART-NO	MFR	WAVETEK NO.	QTY
HH01	HRNSS,3000SSI-A,CRT	WY3000SSI-A	W-I	1219-00-0403	1.000
HH04	HRNSS,3000SSI-D,MIC	WY3000SSI-D	W-I	1219-70-0001	1.000
LS01	SPEAKER	30A05Z8	QUAM	3010-11-0005	1.000
P01	PLUG	19-09-2042	HOL	2113-26-0001	1.000
Q03	TRANSISTOR,POWER	TIP-32	T-I	4902-00-0320	1.000
Q04 Q05	TRANSISTOR,POWER	TIP31	MOT	4902-00-0311	2.000
R04 R05	POT,5K,LIN	72A1G032R505M	A-B	4610-15-4505	2.000
V01	CRT	3RP1A	RCDSN	5710-00-0017	1.000
ZA01	MOTHER BD,A12	6608-0036	W-I	1110-00-7012	1.000
ZA02	SP ASSY,110/220VAC	1118-70-0001	W-I	1118-70-0001	1.000
ZA03	HANDLE SUBAY,3000SSI	1216-72-0001	W-I	1216-72-0001	1.000
<b>WAVETEK PARTS LIST</b>		CHASSIS,SSI-3000B	1111-70-0002 PAGE: 1		REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
C01 C02 C03 C04 C05 C06	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	6.000
C07	CAP,ELEC,16V,470UF	ECEB1CV471S	PNSNC	1510-25-8471	1.000
CR01	DIODE,SCHOTTKY	1N5820	MOT	4809-01-5820	1.000
J05	HEADER,20 PIN MALE STRAIGHT	609-2027	ANSLY	2112-08-0038	1.000
J06	CONNECTOR,MOLEX	09-66-1061	MOL	2112-08-0032	1.000
Q01	TRANSISTOR	PN4275	NAT	4902-04-2750	1.000
R01	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	1.000
R02	RES,C,1/4W,5%,470	CF1/4-470	ASE	4700-15-4700	1.000
R04 R05	RES,C,1/4W,5%,.9K	CF1/4-19K	ASE	4700-15-1902	2.000
R06 R10	RES,C,1/4W,5%,1.5K	CF1/4-1.5K	ASE	4700-15-1501	2.000
R07	RESISTOR,VARIABLE1K	3306W-1-102	BOU	4610-02-0102	1.000
R09	RES,C,1/4W,5%,1.9K	CF1/4-1.9K	ASE	4700-15-1901	1.000
TP01 TP02 TP03 TP04 TP05 TP06 TP07	TESTPOINTS-	2520B-1	USECO	2112-19-0005	7.000
XA01 XA02 XA03 XA04 XA07 XA08	PC EDGE CONN,GOLD	530666-6	AMP	2112-27-0010	6.000
XA06	PC EDGE CONN,72-CKT	1-530666-0	AMP	2112-27-0011	1.000
XP01	CABLE ASSEMBLYPER B/P	6606-0028	WVTK	6011-60-0024	1.000
XP04	CABLE ASSEMBLYPER 3/P	6606-0029	WVTK	6011-60-0025	1.000

**WAVETEK**  
PARTS LIST

MOTHER BD,A12

1110-00-7012

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
1	FUSE CARRIER, 3AG	031.1666	PCC	2410-05-0009	1.000
2	FUSEHOLDER, BODY, LOW PROFILE	031.1673	PCC	2410-05-0014	1.000
C01 C02	CAP, DISC, 3KV, .01UF	DD30-103	C-L	1510-14-0103	2.000
F01	FUSE, 3/4AMP	313750	LIT	2410-05-0019	1.000
F220V	FUSE, 3/8 AMP	MDL-3/8	BUS	2410-05-0031	1.000
J01	RECEPTACLE, 4 PIN	19-09-1042	MDL	2113-26-0002	1.000
J02	CONN, MIC, 4-PIN	91-FC4F	APL	2112-11-0003	1.000
J03	CONN, BNC-F, 50, PANEL UG-1094/U	31-221	APL	2110-01-1022	1.000
S02 S03	SWITCH, SLIDE, DPDT	4021.0521	MARQ	5105-00-0012	2.000
ZA01	XFMR ASSY	1510-3001	SSI	1219-00-0402	1.000
ZA02	LINE CORD AY, 3000SSI	3000SSI-LINE CORD	W-I	1219-70-0003	1.000
<b>WAVETEK</b> PARTS LIST		SP ASSY, 110/220VAC	1118-70-0001 PAGE: 1		G REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY	
1	FERRITE RING	F303-1-06	INDGL	1813-00-0048	1.000	
2	COIL FORM	TM-401-4	MCMTL	1813-00-0049	1.000	
<b>WAVETEK</b> <b>PARTS LIST</b>		XFMR, BIFILAR		1210-43-0011 PAGE: 1		B REV

REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
1	CONTACT MC000-068	08-50-0107	MOL	2113-07-0001	6.000
2	PIN, TRIFURCATED	08-50-0185	MOL	2113-07-0004	4.000
3	CONTACT, MC000-131	08-50-0106	MOL	2113-07-0002	2.000
P01 P02	CONN, 6-PIN, KONEKTON MC000-076	09-50-3061	MOL	2113-06-0002	2.000
T01	TRANSFORMER	S141-103	MRTLK	5610-00-0050	1.000
<b>WAVETEK</b> PARTS LIST		4FMR ASSY	1219-00-0402		REV
			PAGE: 1		

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
1 P101	TERM, FEMALE CORD SET, 18/3SVT, 6FT BK, NLD. CAP, UL-APPRV	02-09-1118 17237SVT	MOL BEL	2113-09-0003 6011-80-0001	4.000 1.000
<b>WAVETEK</b> PARTS LIST	LINE CORD AY, 3000SSI	1219-70-0003 PAGE: 1		A REV	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY	
1	CONTACT MC000-068	08-50-0107	MOL	2113-07-0001	19.000	
P01	CONNECTOR,MOLEX	09-50-7071	MOL	2113-06-0023	1.000	
P02	CONNECTOR,MOLEX	09-50-7121	MOL	2113-06-0025	1.000	
P03	SOCKET,CRT	3B12	C-J	2112-00-0039	1.000	
<b>WAVETEK</b> <b>PARTS LIST</b>		<b>HRNSS,3000SSI-A,CRT</b>		<b>1219-00-0403</b> <b>PAGE: 1</b>		<b>A</b> <b>REV</b>

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
HH05	HRNSS,3000SSI,SWITCH	WY3000SSI-SWITCH	W-I	1219-70-0002	1.000
HH07	CABLE ASSEMBLYPER B/P	6606-0030	WVTK	6011-60-0026	1.000
HH08	CABLE ASSEMBLYPER B/P	6606-0031	WVTK	6011-60-0027	1.000
J01 J02 J04 J05	CONN,BNC-F,50,PANEL UG-1094/U	31-221	APL	2110-01-1022	4.000
J03	PHONE JACK	42A	S-I	2112-12-0007	1.000
H01	METER W/SCALE PER 5300-0007	WSTN-7521	WSTN	2410-06-0014	1.000
R01	POT/SWITCH,10K	11M141	A-B	4610-31-7103	1.000
R02	POT,LIN,50K	73A1G032R503M	A-B	4610-15-0503	1.000
R03	POT SWITCH, 10K	22M493	A-B	4610-31-6103	1.000
R04	POT/SW, 50K	22M094	A-B	4610-31-6503	1.000
R05	POT,1M,LIN	21M724	A-B	4610-31-5105	1.000
R06	POT,10K,AUD	73A1G032R103R	A-B	4610-15-2103	1.000
R07	POT,100K,AUD	73A1G032R104A	A-B	4610-15-2104	1.000
R08	POT,DUAL 10K,AUD	20M332	A-B	4610-40-7103	1.000
R10	POT,10K,LIN	73A1G032R103M	A-B	4610-15-0103	1.000
R11	POT,5K,LIN	JA1G040S502UA	A-B	4610-15-3502	1.000
S01	POWER SWITCH	1XF17.5NE152UEEFA201B	SHDW	5102-00-0008	1.000
ZA01	DISPLAY BD,A9	6608-0033	W-I	1110-00-7009	1.000
ZA02	FP BD, A10B	SSI-3000B-A10B	W-I	1110-70-0074	1.000
ZA03	FRED CTL RD,A11	3000SSI-A11	W-I	1110-00-7011	1.000

**WAVETEK**  
PARTS LIST

FP ASSY,SSI-3000B

1118-70-0003

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
1	IC SOCKET,40-PIN	530018-2	AMP	2112-00-0021	1.000
C01	CAP,MICA,500V,47PF	CM05ED470J03	SPR	1510-50-0470	1.000
CR01 CR02	LED,YL,T-1-3/4	5082-4550	H-P	4810-02-0011	2.000
DS01	DISPLAY,L.C.,5-DIGIT	3913-365-025	HAM	2410-03-0008	1.000
DS02	LAMP,ELEC-LUMIN.	0431-1232	LSI	2410-03-0007	1.000
IC01	LCD DRIVER STATIC SENSITIVE	ICM72111PL	INT	8000-72-1110	1.000
P03	CABLE ASSEMBLYPER B/P	6606-0027	WVTK	6011-60-0023	1.000
Q01	TRANSISTOR	PN4275	NAT	4902-04-2750	1.000
R01 R02	RES,C,1/4W,5%,180	CF1/4-180	ASE	4700-15-1800	2.000
R03	RES,C,1/4W,5%,3.9K	CF1/43.9K	ASE	4700-15-3901	1.000
<b>WAVETEK</b> PARTS LIST		DISPLAY BD,A9	1110-00-7009 PAGE: 1		REV

REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
2	IC SKT, 16 PIN MC000-074	DILB-16P-108	BURND	2112-00-0012	1.000
C01	CAP, FILM, .82 UF	160/.82.10/100/H	PLSSY	1510-62-2824	1.000
C02 C06 C11 C12 C13 C14 C15 C16 C18 C29 C30	CAP, DISC, .05UF	UK25-503	C-L	1510-14-1503	11.000
C03 C05 C20	CAP, FILM, .22 UF	225P22491XD3	SPR	1510-62-1224	3.000
C04 C22	CAP, FILM, .022 UF	225P2239S1WD3	SPR	1510-61-7223	2.000
C07	CAP, MICA, 500V, 680PF	DM19-681J	ARC	1510-50-0681	1.000
C08	CAP, FILM, .0033 UF	225P33291WD3	SPR	1510-61-7332	1.000
C09	CAP, FILM, .0012 UF	225P12291WD3	SPR	1510-61-7122	1.000
C10	CAP, TANT, 35V, 4.7UF	196D475X9035JA1	SPR	1510-25-3479	1.000
C17	CAP, FILM, .33 UF	225P33491XD3	SPR	1510-62-1334	1.000
C21	CAP, TANT, 35V, .47UF	196D474X9035HA1	SPR	1510-25-3478	1.000
C23	CAP, FILM, .047 UF	225P47391WD3	SPR	1510-61-7473	1.000
C24	CAP, FILM, .0022 UF	225P22291WD3	SPR	1510-61-7222	1.000
C25	CAP, FILM, .0047 UF	225P47291WD3	SPR	1510-61-7472	1.000
C26 C28	CAP, TANT, 35V, 1UF	196D105X9035HA1	SPR	1510-25-3109	2.000
C27	CAP, MON, 50V, 1UF	3420-050-E105M	AER	1510-11-3105	1.000
CR01 CR02 CR06 CR07 CR09 CR10 CR12 CR13	LED, YL, T-1-3/4	5082-4550	H-P	4810-02-0011	8.000
CR03 CR08	LED, RED, T-1-3/4	5082-4650	H-P	4810-02-0012	2.000
CR04 CR11 CR15	DIODE, SIGNAL	1N914	G-E	4807-01-0914	3.000
CR05 CR14 CR16 CR17 CR18 CR19 CR20 CR21	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	8.000
H01	HARNESS, SSI-3000-A10B	WYSSI-3000-A10B	W-I	1219-70-0025	1.000
IC01 IC03 IC10	DUAL OP AMP	TL082CP	T-I	7000-00-8200	3.000
IC02 IC09	OP AMP	LF351N	NAT	7000-00-8100	2.000
IC04 IC07 IC08	SPDT ANALOG SWITCH	TL607CP	T-I	7000-06-0700	3.000
IC05	TIMER	MC1455P1	MOT	7000-14-5500	1.000
IC06	QUAD SPST SWITCH	DG308	SCX	7000-03-0800	1.000
L01 L02	CHOKE	VK20010/3B	FRXC	1810-09-0001	2.000
P01	HEADER, 56PIN MALE	609-5617	ANSLY	2112-08-0037	1.000
Q01 Q02	TRANSISTOR	PN4356-5	NAT	4901-04-3560	2.000
Q03 Q04	TRANSISTOR	PN4275	NAT	4902-04-2750	2.000
<b>WAVETEK</b> PARTS LIST	FP BD, A10B	1110-70-0074			REV
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
Q05	TRANSISTOR	PN4121-18	MAT	4901-04-1210	1.000
R01	RES,MF,1/8W,1Z,30.1K	RN55D-30.1K	MILSP	4701-03-3012	1.000
R02	RES,C,1/4W,5Z,6.8K	CF1/4-6.8K	ASE	4700-15-6801	1.000
R03 R31 R47	RES,C,1/4W,5Z,3.3K	CF1/4-3.3K	ASE	4700-15-3301	3.000
R04 R65	RES,C,1/4W,5Z,5.6K	CF1/4-5.6K	ASE	4700-15-5601	2.000
R05 R23	RES,C,1/4W,5Z,1K	CF1/4-1K	ASE	4700-15-1001	2.000
R06	RES,C,1/4W,5Z,4.7K	CF1/4-4.7K	ASE	4700-15-4701	1.000
R07 R09 R17 R48 R50 R51 R52 R53 R57 R58 R60 R61	RES,C,1/4W,5Z,10K	CF1/4-10K	ASE	4700-15-1002	12.000
R08 R29 R56 R64	RES,C,1/4W,5Z,8.2K	CF1/4-8.2K	ASE	4700-15-8201	4.000
R10 R11	RES,MF,1/8W,1Z,8.25K	RN55D-8.25K	MILSP	4701-03-8251	2.000
R12	RES,MF,1/8W,1Z,9.76K	RN55D-9.76K	MILSP	4701-03-9761	1.000
R13 R16 R20 R22 R32 R33 R42	RES,C,1/4W,5Z,180	CF1/4-180	ASE	4700-15-1800	7.000
R14 R15 R34 R37	RES,1/8W,1Z, 49.9K	RN55D-49.9K	MILSP	4701-03-4992	4.000
R18	RES,MF,1/8W,1Z,698	RN55D-698	MILSP	4701-03-6980	1.000
R19	RES,MF,1/8W,1Z,200	RN55D-200	MILSP	4701-03-2000	1.000
R21 R63	RES,C,1/4W,5Z,560	CF1/4-560	ASE	4700-15-5600	2.000
R24	RES,MF,1/8W,1Z,100	RN55D-100	MILSP	4701-03-1000	1.000
R25	RES,C,1/4W,5Z,1M	CF1/4-1M	ASE	4700-15-1004	1.000
R27	RES,MF,1/8W,1Z,90.9K	RN55D-90.9K	MILSP	4701-03-9092	1.000
R28	RES,MF,1/8W,1Z,10K	RN55D-10K	MILSP	4701-03-1002	1.000
R30	RES,C,1/4W,5Z,820	CF1/4-820	ASE	4700-15-8200	1.000
R35 R38	RES,MF,1/8W,1Z,309	RN55D-309	MILSP	4701-03-3090	2.000
R36 R39	RES,MF,1/8W,1Z,2.32K	RN55D-2.32K	MILSP	4701-03-2321	2.000
R40	RES,C,1/4W,5Z,6.2K	CF1/4-6.2K	ASE	4700-15-6201	1.000
R41 R44	POT,500,25T,VERT MTG	3299X-1-501	BOU	4610-01-7501	2.000
R43 R49	RES,C,1/4W,5Z, 2.4K	CF1/4-2.4K	ASE	4700-15-2401	2.000
R45	RES,C,1/4W,5Z,100	CF1/4-100	ASE	4700-15-1000	1.000
R46	RES,C,1/4W,5Z,1.5K	CF1/4-1.5K	ASE	4700-15-1501	1.000
R54 R55	POT,5K	3386W-1-502	BOU	4610-02-0502	2.000
R59	RES,C,1/4W,5Z,39K	CF1/4-39K	ASE	4700-15-3902	1.000
R62	RES,C,1/4W,5Z,560K	CF1/4-560K	ASE	4700-15-5603	1.000

**WAVETEK**  
PARTS LIST

FP 8D, A10B

1110-70-0074

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REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
S01	SWITCH,3STA PER B/P	1820-0008	W-I	5110-00-0028	1.000
S02 S03 S04 S05 S07 S09	SWITCH,3STA PER B/P	1820-0012	W-I	5110-00-0030	6.000
S06 S08 S12	SWITCH,4STA PER B/P	1820-0011	W-I	5110-00-0029	3.000
S10 S13 S14 S15	SWITCH,1STA PER B/P	1820-0013	W-I	5102-00-0009	4.000
S11	SWITCH,2STA PER B/P	1820-0014	W-I	5110-00-0031	1.000
S16	SWITCH,1STA,MMH. PER B/P	1820-0016	W-I	5110-00-0032	1.000
<b>WAVETEK PARTS LIST</b>		FP RD, A10B	1110-70-0074 PAGE: 3		REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DILB-8P-108	BURND	2112-00-0007	2.000
2	IC SKT,PC,14 PIN MCO00-073	C931402	T-I	2112-00-0011	22.000
3	IC SKT,16 PIN MCO00-074	DILB-16P-108	BURND	2112-00-0012	8.000
4	IC SKT,PC,24 PIN MCO00-126	C932402	T-I	2112-00-0013	1.000
5	IC, SKT,28-PIN	C842802	T-I	2112-00-0023	1.000
C01 C02 C03 C04 C05 C15 C16 C17 C18 C20 C21 C22 C27 C28 C29 C30 C39 C40 C41	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	19.000
C06 C10 C11 C12 C13 C14 C19	CAP,MICA,500V,470PF	DM15-471J	ARC	1510-50-0471	7.000
C07	CAP,MICA,500V,39PF	DM05ED390J03	SPR	1510-50-0390	1.000
C08 C09	CAP,DISC,1KV,.001UF	5GAD10	SPR	1510-10-1102	2.000
C23 C24 C25 C26 C31 C32 C35	CAP,DISC,.05UF	UK25-503	C-L	1510-14-1503	7.000
C33 C34	CAP,FILM,.039 UF	160/.39/10/400/D	PLSSY	1510-61-1393	2.000
C36	CAP,DISC,1KV,.002UF	5GAD20	SPR	1510-10-1202	1.000
C37	CAP,TANT,35V,1UF	196D105X9035HA1	SPR	1510-25-3109	1.000
C38	CAP,MICA,500V,560PF	DM-15-561J	ARC	1510-50-0561	1.000
CR01 CR02 CR03 CR04 CR05 CR06 CR07 CR08 CR09 CR10 CR11 CR12 CR13 CR14 CR15 CR16 CR17 CR18 CR19 CR20 CR21 CR22 CR23 CR24 CR25 CR26 CR27 CR28 CR29 CR30 CR31 CR32 CR33 CR34 CR35 CR36 CR37 CR38 CR39 CR40 CR41 CR42 CR43 CR44	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	44.000
CR45 CR46 CR47 CR48	DIODE,SIGNAL	1N914	G-E	4807-01-0914	4.000
IC01	TIMER	MC1455P1	MOT	7000-14-5506	1.000
IC02 IC03 IC16 IC32	DUAL FLIP-FLOP STAT.SENS.	MM74C74N	NAT	8000-74-7410	4.000
IC04 IC08 IC09	QUAD 2-INP POS NOR STATIC SENSITIVE	DM74C02	NAT	8000-74-0211	3.000
IC05 IC06 IC07	QUAD 2-INP POS AND STATIC SENSITIVE	MM74C08	NAT	8000-74-0811	3.000
IC10 IC11 IC12	HEX INVERTER	SN74LS05N	T-I	8000-74-0510	3.000
IC13	PROM,SSI-3000 FROM:8007-42-8700	1110-2213	SSI	8410-00-0020	1.000

**WAVETEK**  
PARTS LIST

FREQ CTL BD,A11

1110-00-7011

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REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
IC14 IC15	HEX D-FLIP FLOP	SN74LS174N	T-I	8007-41-7410	2.000
IC17	DEMULTIPLEXER	DM74LS156N	NAT	8007-41-5610	1.000
IC18	ROM, SSI 3000 FREQ STATIC SENSITIVE	8000-25-1610(SSI-FR)	W-I	8410-00-0026	1.000
IC19 IC22 IC34	DUAL J-K FLIP-FLOP STATIC SENSITIVE	MM74C76	NAT	8000-74-7611	3.000
IC20 IC21 IC31	DECADE COUNTER STATIC SENSITIVE	MM74C90	NAT	8000-74-9010	3.000
IC23 IC28 IC35	QUAD 2-IN NAND STAT.SENS.	MM74C00N	NAT	8000-74-0011	3.000
IC24 IC25	QUAD EXCL. OR GATE STATIC SENSITIVE	CD4030BE	RCA	8000-40-3010	2.000
IC26 IC27	TRIPLE 3-INP NAND STATIC SENSITIVE	MM74C10	NAT	8000-74-1011	2.000
IC29	DUAL OP AMP	TL082CP	T-I	7000-00-8200	1.000
IC30	PHASE LKD. LOOP STATIC SENSITIVE	CD4046AE	RCA	8000-40-4610	1.000
IC33	UP/DN CTR, 4 DIGIT STATIC SENSITIVE	ICH7217A1PL	INT	8000-72-1710	1.000
L01 L02	CHOKE	VK20010/3B	FRXC	1810-09-0001	2.000
R01	RES,C,1/4W,5%,470	CF1/4-470	ASE	4700-15-4700	1.000
R02 R86 R99	RES,C,1/4W,5%,2.2M	CF1/4-2.2M	ASE	4700-15-2204	3.000
R03 R04 R05 R06 R07 R08 R10 R11 R44 R45 R87 R90	RES,C,1/4W,5%,39K	CF1/4-39K	ASE	4700-15-3902	12.000
R09 R97	RES,C,1/4W,5%,8.2K	CF1/4-8.2K	ASE	4700-15-8201	2.000
R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40 R41 R42 R43 R44 R47 R48 R53 R54 R55 R56 R57 R58 R59 R60 R61 R62 R63 R64 R65 R66 R67 R68 R69 R70 R71 R72 R79 R82 R91	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	58.000
R49 R50 R51 R52	RES,C,1/4W,5%,680	CF1/4-680	ASE	4700-15-6800	4.000
R73 R74 R75 R76	RES,C,1/4W,5%,220	CF1/4-220	ASE	4700-15-2200	4.000
R78 R30	RES,C,1/4W,5%,3.9K	CF1/43.9K	ASE	4700-15-3901	2.000
R81	RES,C,1/4W,5%,33K	CF1/4-33K	ASE	4700-15-3302	1.000
R83	RES,C,1/4W,5%,120K	CF1/4-120K	ASE	4700-15-1203	1.000
R84 R98	RES,C,1/4W,5%,100K	CF1/4-100K	ASE	4700-15-1003	2.000
<b>WAVETEK</b> <b>PARTS LIST</b>	FREQ CTL BD,A11	1110-00-7011 PAGE: 2		H REV	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFR-PART-NO	MFR	WAVETEK NO.	QTY
R85	RES,C,1/4W,5Z,150K	CF1/4-150K	ASE	4700-15-1503	1.000
R88	RES,C,1/4W,5Z,1.8K	CF1/4-1.8K	ASE	4700-15-1801	1.000
R89	RES,C,1/4W,5Z,82K	CF1/4-82K	ASE	4700-15-8202	1.000
R92 R93 R94 R95 R96	RES,C,1/4W,5Z,100	CF1/4-100	ASE	4700-15-1000	5.000
R100	RES,C,1/4W,5Z,12K	CF1/4-12K	ASE	4700-15-1202	1.000
S01	SWITCH	N28-S111	DGTRN	5101-00-0009	1.000
S02	SWITCH	N28-S115	DGTRN	5101-00-0010	1.000
TP01 TP02 TP03 TP04 TP05 TP06 TP07 TP08 TP09 TP10 TP11 TP12 TP13 TP14 TP15	TESTPOINTS-	25208-1	USECD	2112-19-0005	15.000
<b>WAVETEK</b> <b>PARTS LIST</b>	FREQ CTL BD,A11			1110-00-7011 PAGE: 3	H REV

REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY	
1	TERN,FEMALE	02-09-1118	MOL	2113-09-0003	4.000	
2	TERMINAL,MALE	02-09-2118	MOL	2113-09-0004	8.000	
3	PLUG	19-09-2042	MOL	2113-26-0001	1.000	
4	RECEPTACLE,4 PIN	19-09-1042	MOL	2113-26-0002	1.000	
<b>WAVETEK</b> <b>PARTS LIST</b>		HRNSS,3000SSI,SWITCH		1219-70-0002 PAGE: 1		A REV



REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DIL8-BP-108	BURND	2112-00-0007	6.000
C01	CAP,MICA,500V,300PF	DM15-301J	ARC	1510-50-0301	1.000
C02 C03 C04 C06 C07 C08 C09 C10 C11 C12 C13 C14 C17 C19 C20 C21 C22 C23 C24 C25 C26 C27 C38 C39 C40 C41 C42 C43 C47 C48 C49 C51 C52 C57 C61 C62 C65 C72 C73 C74 C75 C78 C86	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	43.000
C28 C30 C31 C33 C37 C54 C58 C68 C69 C80 C81 C82	CAP,MON,50V,.01UF	CW15C103K	C-L	1510-14-4103	12.000
C29 C36	CAP,ELEC,16V,470UF	ECEB1CV471S	PNSNC	1510-25-8471	2.000
C46 C64 C67	CAP,MON,100V,470PF	CW15A471M	C-L	1510-14-5471	3.000
C50	CAP,ELEC,16V,100UF	ECEB1CV101S	PNSNC	1510-25-8102	1.000
C53 C55 C56 C60 C70 C76 C77	CAP,MON,50V,.22UF	8131-050-151-224M	ETP	1510-14-6224	7.000
C63	CAP,TANT,20V,10UF	196D106X9020JA1	SPR	1510-25-2100	1.000
C79	CAP,MICA,500V,22PF	DM05ED220J03	SPR	1510-50-0220	1.000
C83	CAP,MON,50V,1UF	3420-050-E105M	AER	1510-11-3105	1.000
C84	CAP,COMP,500V,2.4PF	3C-2.4PF	Q-C	1510-40-0249	1.000
C85	CAP,MICA,500V,150PF	DM05FD151J03	SPR	1510-50-0151	1.000
C87	CAP,VAR,1-3PF	302504-121	STR	1510-70-8309	1.000
CR01 CR04 CR05 CR13 CR14 CR23	DIODE,SIGNAL	1N914	G-E	4807-01-0914	6.000
CR02 CR03	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	2.000
CR06 CR07 CR17 CR18 CR19 CR20	DIODE,PIN	KS8379	FRQSS	4805-02-0008	6.000
CR08 CR09 CR10 CR11	DIODE, SIGNAL	1N4444	UNIT	4807-01-4444	4.000
CR12	RES/INDIE NET	4789-00-0009	W-I	4789-00-0009	1.000
CR21 CR22	DIODE, VARACTOR	1N5767	HP	4803-02-0018	2.000
IC01	TIMER	MC1455P1	NOT	7000-14-5500	1.000
IC02	SPDT ANALOG SWITCH	TL607CP	T-I	7000-06-0700	1.000
IC03	OP AMP	LF351N	NAT	7000-00-8100	1.000
IC04 IC05 IC06	DUAL OP AMP	TL082CP	T-I	7000-00-8200	3.000
IC07	WB AMP,HYS,PRE-SEL	SWA121	NOT	7000-03-2003	1.000
IC08	WIDE-BAND AMP,HYBRID DC-1000 MHZ,100 MA	MWA330	NOT	7000-03-3000	1.000
<b>WAVETEK PARTS LIST</b>	MIXER BD,A1-1B	1110-70-0071			C REV
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-WEGR-PART-NO	WEGR	WAVETEK NO.	QTY
J01 J02 J03 J04	CONN,RF,STR.JACK	700209	CBLWV	2110-08-0006	4.000
K03	RELAY,RF,N.C.	234-4-1	WBSH	4510-00-0017	1.000
K04	RELAY,RF,N.O.	234-3-1	WBSH	4510-00-0016	1.000
L01 L03 L04 L11	CHOKE	VK20010/3B	FRXC	1810-09-0001	4.000
L02 L10 L15 L20 L21 L27	CHOKE,MOLDED,56 UH	1025-62	DEL	1810-10-0560	6.000
L05 L06 L07 L08 L09 L12 L13 L14 L18	FERRITE CHOKE,5 TURN FROM: 1813-00-0007	LA006-005	W-I	1210-30-0002	9.000
MX01	MIXER,W/INSULATOR	TFM-2H	MIN-C	3010-54-0007	1.000
Q01 Q05 Q13 Q23	TRANSISTOR	PN4121-18	NAT	4901-04-1210	4.000
Q02 Q20 Q21	TRANS QA035-630	2N3563	FCD	4901-03-5630	3.000
Q03 Q04 Q11 Q12 Q14 Q16 Q17	TRANSISTOR	PN2222	NAT	4901-02-2220	7.000
Q15	TRANSISTOR	2N4403	NAT	4901-04-4030	1.000
Q18 Q22	TRANSISTOR	PN4275	NAT	4902-04-2750	2.000
R01	RES,1/4W 5%,39	CF-1/4-39	ASE	4700-15-3909	1.000
R02	RES,C,1/4W,5%,390	CF1/4-390	ASE	4700-15-3900	1.000
R03 R128 R133 R23 R41	RES,C,1/4W,5%,5.6K	CF1/4-5.6K	ASE	4700-15-5601	5.000
R04 R119 R129 R130 R141 R53 R54 R59 R60 R61	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	10.000
R05 R07 R75	RES,C,1/4W,5%,1.2K	CF1/4-1.2K	ASE	4700-15-1201	3.000
R06	RES,C,1/4W,5%,5.1K	CF1/4-5.1K	ASE	4700-15-5101	1.000
R08	RES,C,1/4W,5%,22	CF1/4-22	ASE	4700-15-2209	1.000
R09 R70	RES,C,1/4W,5%,330	CF1/4-330	ASE	4700-15-3300	2.000
R10 R103 R15	RES,C,1/4W,5%,33	CF1/4-33	ASE	4700-15-3309	3.000
R11 R140 R66	RES,C,1/4W,5%,68	CF1/4-68	ASE	4700-15-6809	3.000
R13 R62	RES,C,1/4W,5%,4.7K	CF1/4-4.7K	ASE	4700-15-4701	2.000
R16 R17	RES,MF,1/8W,1%,140	RN55D-140	MILSP	4701-03-1400	2.000
R18	RES,MF,1/8W,1%,95.3	RN55D-95.3	MILSP	4701-03-9539	1.000
R19 R24	RES,MF,1/8W,1%,191	RN55D-191	MILSP	4701-03-1910	2.000
R21 R69	RES,C,1/4W,5%,560	CF1/4-560	ASE	4700-15-5600	2.000
R26	RES,C,1/4W,5%,100	CF1/4-100	ASE	4700-15-1000	1.000
R42	RES,C,1/4W,5%,56K	CF1/4-56K	ASE	4700-15-5602	1.000
R43 R84	RES,C,1/4W,5%,150K	CF1/4-150K	ASE	4700-15-1503	2.000
R47 R48 R49 R50	RES,L-A,1/4W,1%,61.6	SPS-N-347-61.6	IRC	4741-61-6007	4.000

**WAVETEK**  
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
R51 R56	RES,C,1/4W,5Z,1.1K	CF1/4-1.1K	ASE	4700-15-1101	2.000
R55 R58	RES,L-A,1/4W1Z,247.5	SPS-N-347-247.5	IRC	4741-24-7508	2.000
R64	RES,C,1/4W,5Z, 2.4K	CF1/4-2.4K	ASE	4700-15-2401	1.000
R71	RES,C,1/4W,5Z,680	CF1/4-680	ASE	4700-15-6800	1.000
R74	RES,C,1/4W,5Z,2.7K	CF1/4-2.7K	ASE	4700-15-2701	1.000
R76 R77	RES,C,1/4W,5Z,120	CF1/4-120	ASE	4700-15-1200	2.000
R78	RES,CHIP,2W,5Z,1K	2512CPX102K	SOART	4711-45-1001	1.000
R80	RES,C,1/8W,5Z,51	CF1/8-51	ASE	4700-05-5109	1.000
R82	RES,C,1/4W,5Z,3.9K	CF1/43.9K	ASE	4700-15-3901	1.000
R83	RES,C,1/4W,5Z,220K	CF1/4220K	ASE	4700-15-2203	1.000
R85	RES,C,1/4W,5Z,12K	CF1/4-12K	ASE	4700-15-1202	1.000
R87 R97	RES,C,1/4W,5Z,6.8K	CF1/4-6.8K	ASE	4700-15-6801	2.000
R89	RES,C,1/4W,5Z,470	CF1/4-470	ASE	4700-15-4700	1.000
R93	RES,C,1/4W,5Z,470K	CF1/4-470K	ASE	4700-15-4703	1.000
R98 R99	RES,MF,1/8W,1Z,14.7K	RN55D-14.7K	MILSP	4701-03-1472	2.000
R101 R27 R63	RES,C,1/4W,5Z,820	CF1/4-820	ASE	4700-15-8200	3.000
R102 R65	RESISTOR,VARIABLE1K	3386W-1-102	BOU	4610-02-0102	2.000
R104 R116	RES,C,1/4W,5Z,47	CF1/4-47	ASE	4700-15-4709	2.000
R105	RES,C,1/4W,5Z,33K	CF1/4-33K	ASE	4700-15-3302	1.000
R106	RES,C,1/4W,5Z,220	CF1/4-220	ASE	4700-15-2200	1.000
R107 R20 R52 R57 R68 R86	RES,C,1/4W,5Z,1K	CF1/4-1K	ASE	4700-15-1001	6.000
R108	RES,C,1/4W,5Z,1.8K	CF1/4-1.8K	ASE	4700-15-1801	1.000
R111	POT,5K	3386W-1-502	BOU	4610-02-0502	1.000
R112 R25	POT,100	3386W-1-101	BOU	4610-02-0101	2.000
R125	RES,MF,1/8W,1Z,48.7	RN55D-48.7	MILSP	4701-03-4879	1.000
R131 R138	RES,C,1/4W,5Z,51	CF1/451	ASE	4700-15-5109	2.000
R132 R135 R22	RES,C,1/4W,5Z,1.5K	CF1/4-1.5K	ASE	4700-15-1501	3.000
R134	RES,C,1/4W,5Z,3.3K	CF1/4-3.3K	ASE	4700-15-3301	1.000
R136	RES,C,1/4W,5Z,15K	CF1/4-15K	ASE	4700-15-1502	1.000
R137	RES,C,1/4W,5Z,18K	CF1/4-18K	ASE	4700-15-1802	1.000
R139	RES,C,1/4W,5Z,150	CF1/4-150	ASE	4700-15-1500	1.000
R142	RES,C,1/4W,5Z,360	CF1/4-360	ASE	4700-15-3600	1.000

**WAVETEK**  
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
RT01	THRNSTR,500	CA25J1	FWL	5310-00-0005	1.000
T01	XFNR, BIFILAR	1501-0001	SSI	1210-43-0011	1.000
TP01	TESTPOINTS-	2520B-1	USECO	2112-19-0005	1.000
<b>WAVETEK</b> <b>PARTS LIST</b>		MIXER BD,A1-1B	1110-70-0071 PAGE: 4		C REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFR-PART-NO	MFR	WAVETEK NO.	QTY
1	IC SKT, 8 PIN	D1LB-8P-108	BURND	2112-00-0007	3.000
2	IC SKT, PC, 14 PIN HC000-073	C931402	T-I	2112-00-0011	2.000
3	IC SOCKET, 18-PIN	C841802	T-I	2112-00-0022	2.000
C01 C02 C03 C05 C06 C07 C09 C10 C11 C12 C13 C14 C16 C20 C21 C23 C24 C26 C27 C28 C29 C30 C31 C32 C33 C36 C38 C45 C47 C49 C50 C51 C52 C54 C60 C61 C63 C64 C76 C77 C84	CAP, DISC, .05UF	UK25-503	C-L	1510-14-1503	41.000
C04 C37	CAP, ELEC, 16V, 470UF	ECEB1CV471S	PNSNC	1510-25-8471	2.000
C08	CAP, MICA, 500V, 150PF	CM05FD151J03	SPR	1510-50-0151	1.000
C15 C34	CAP, DISC, 1KV, .002UF	5GAD20	SPR	1510-10-1202	2.000
C17	CAP, MICA, 500V, 68PF	DM15-680J	ARC	1510-50-0680	1.000
C18	CAP, MICA, 500V, 18PF	CM05CD180J03	SPR	1510-50-8180	1.000
C19	CAP, MICA, 500V, 39PF	CM05ED390J03	SPR	1510-50-0390	1.000
C22 C53	CAP, MICA, 500V, 330PF	DM15-331J	ARC	1510-50-0331	2.000
C25 C78 C82	CAP, MICA, 500V, 56PF	CM05ED560J03	SPR	1510-50-0560	3.000
C35 C73 C83	CAP, TANT, 35V, 1UF	196D105X9035HA1	SPR	1510-25-3109	3.000
C39	CAP, MICA, 500V, 22PF	CM05ED220J03	SPR	1510-50-0220	1.000
C40	CAP, MICA, 500V, 10PF	CM05CD100D03	SPR	1510-50-8100	1.000
C41	CAP, FILM, 100V, .33UF	160/.33/10/100/E	PLSSY	1510-60-7334	1.000
C42 C71	CAP, FILM, .1 UF	225P010491WD3	SPR	1510-61-7104	2.000
C43 C56	CAP, MICA, 500V, 180PF	DM15-181J	ARC	1510-50-0181	2.000
C44 C46 C55 C62 C70	CAP, TANT, 20V, 10UF	196D106X9020JA1	SPR	1510-25-2100	5.000
C48	CAP, ELEC, 25V, 100UF	TE1211	SPR	1510-20-4101	1.000
C57 C79 C81	CAP, MICA, 500V, 100PF	DM15-101J	C-D	1510-50-0101	3.000
C58	CAP, COMP, 500V, 6.8PF	68PF	Q-C	1510-40-0689	1.000
C59 C74	CAP, DISC, 1KV, .001UF	5GAD10	SPR	1510-10-1102	2.000
C65 C66	CAP, TANT, 35V, 4.7UF	196D475X9035JA1	SPR	1510-25-3479	2.000
C68 C69	CAP, TANT, 20V, 47UF	196D476X9020PE4	SPR	1510-26-4470	2.000
C72	CAP, DISC, 25V, .1UF	UK25-104	C-L	1510-14-1104	1.000
C75	CAP, MICA, 500V, 120PF	DM15-121J	ARC	1510-50-0121	1.000
C80	CAP, MICA, 500V, 15 PF	DM15-150J	ARC	1510-50-0150	1.000
CR01 CR02 CR13 CR14	DIODE, VARACTOR	MV2308	HOT	4803-02-0012	4.000
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
CR03 CR04 CR07 CR12 CR16 CR17 CR18 CR19	DIODE, SIGNAL	1N914	G-E	4807-01-0914	8.000
CR06 CR11	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	2.000
CR08 CR09	DIODE, VARACTOR	1N5767	HP	4803-02-0018	2.000
CR10	DIODE, ZENER, 9.1V	1N5239	MOT	4801-01-5239	1.000
HS U03 HS U06	HEATSINK	6011B	THR	2810-11-0017	2.000
IC01 IC05	DUAL OP AMP	TL082CP	T-I	7000-00-8200	2.000
IC02	OP AMP	LF351N	NAT	7000-00-8100	1.000
IC03 IC06	DIVIDE-BY-N PHASE LOCK LOOP	SABX18N-B	SIG	7000-00-1800	2.000
IC07 IC08	DECADE COUNTER	DM74LS90	NAT	8000-74-9011	2.000
IC09	VOLTAGE REG, 12	LM78L12ACZ	NAT	7000-78-1220	1.000
IC10	VOLT REG, -12	LM79L12ACZ	NAT	7000-79-1210	1.000
J01	CONN, RF, STR. JACK	700209	CBLWU	2110-08-0006	1.000
L01 L03 L06	CHOKE	VK20010/3B	FRXC	1810-09-0001	3.000
L02 L05 L09 L10 L11 L12 L15 L16 L17 L18	CHOKE, MOLDED, 82 UH	1537-72	DEL	1810-10-0820	10.000
L04 L13 L14	COIL, VAR, 1.01/1.18UH	Y3353-N3	MURA	1811-00-0006	3.000
L07 L08	CHOKE, MOLDED, 6.8 UH	1025-40	DEL	1810-10-0689	2.000
L19 L20	COIL, VAR, 0.47 UH, NOMINAL	Y3353-N6	MURA	1811-00-0007	2.000
MX01	MIXER, DBL. BAL.	SBL-1-DBL	MIN-C	3010-54-0004	1.000
Q01 Q02 Q03 Q05 Q11 Q16	TRANS QA035-630	2N3563	FCD	4901-03-5630	6.000
Q04 Q10 Q13 Q20	TRANSISTOR	PN4121-18	NAT	4901-04-1210	4.000
Q06 Q07 Q18 Q19	TRANSISTOR	PN4275	NAT	4902-04-2750	4.000
Q08 Q09 Q14 Q15	TRANSISTOR	PN2222	NAT	4901-02-2220	4.000
Q12	TRANSISTOR	PN4356-5	NAT	4901-04-3560	1.000
R01 R43	RES, C, 1/4W, 5%, 100	CF1/4-100	ASE	4700-15-1000	2.000
R02 R105 R149 R55	RES, C, 1/4W, 5%, 820	CF1/4-820	ASE	4700-15-8200	4.000
R03 R129 R13	RES, C, 1/4W, 5%, 68K	CF1/4-68K	ASE	4700-15-6802	3.000
R04 R11 R12 R92 R97	RES, C, 1/4W, 5%, 22K	CF1/422K	ASE	4700-15-2202	5.000
R05 R121 R145 R58	RES, C, 1/4W, 5%, 5.6K	CF1/4-5.6K	ASE	4700-15-5601	4.000
R06 R19 R95	RES, C, 1/4W, 5%, 470	CF1/4-470	ASE	4700-15-4700	3.000
R07 R107 R108 R94	RES, C, 1/4W, 5%, 270	CF1/4-270	ASE	4700-15-2700	4.000
<b>WAVETEK PARTS LIST</b>	IF PLL BD, A2	1110-00-7002 PAGE: 2		I REV	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
R08 R106	RES,C,1/4W,5%,330	CF1/4-330	ASE	4700-15-3300	2.000
R09 R15 R151 R28 R47	RES,C,1/4W,5%,150	CF1/4-150	ASE	4700-15-1500	5.000
R10 R87	RES,C,1/4W,5%,220K	CF1/4220K	ASE	4700-15-2203	2.000
R21 R29 R81	RES,C,1/4W,5%,3.9K	CF1/43.9K	ASE	4700-15-3901	3.000
R22 R83 R84	RES,C,1/4W,5%,2.7K	CF1/4-2.7K	ASE	4700-15-2701	3.000
R23	RES,C,1/4W,5%,51	CF1/451	ASE	4700-15-5109	1.000
R25	RES,C,1/4W,5%,39K	CF1/4-39K	ASE	4700-15-3902	1.000
R30 R80	RES,C,1/4W,5%,390	CF1/4-390	ASE	4700-15-3900	2.000
R31 R68	RESISTOR,VARIABLE1K	3386W-1-102	BOU	4610-02-0102	2.000
R34	RES,C,1/4W,5%,6.8K	CF1/4-6.8K	ASE	4700-15-6801	1.000
R42 R96	RES,C,1/4W,5%,18K	CF1/4-18K	ASE	4700-15-1802	2.000
R51	RES,MF,1/8W,1%,110	RMS5D-110	MILSP	4701-03-1100	1.000
R52	RES,C,1/4W,5%,9.1K	CF1/4-9.1K	ASE	4700-15-9101	1.000
R53	POT,5K	3386W-1-502	BOU	4610-02-0502	1.000
R54 R78	RES,C,1/4W,5%,120	CF1/4-120	ASE	4700-15-1200	2.000
R60 R79	RES,C,1/4W,5%,1.2K	CF1/4-1.2K	ASE	4700-15-1201	2.000
R61	RES,C,1/4W,5%,33	CF1/4-33	ASE	4700-15-3309	1.000
R63	RES,C,1/4W,5%,27K	CF1/4-27K	ASE	4700-15-2702	1.000
R64	RES,C,1/4W,5%,1.8K	CF1/4-1.8K	ASE	4700-15-1801	1.000
R69 R70	RES,MF,1/8W,1%,39.2K	RMS5D-39.2K	MILSP	4701-03-3922	2.000
R71	RES,C,1/4W,5%,47K	CF1/4-47K	ASE	4700-15-4702	1.000
R73	RES,MF,1/8W,1%,47.5K	RMS5D-47.5K	MILSP	4701-03-4752	1.000
R74	RES,MF,1/8W,1%,169K	RMS5D-169K	MILSP	4701-03-1693	1.000
R75	RES,MF,1/8W,1%,51.1K	RMS5D-51.1K	MILSP	4701-03-5112	1.000
R76	RES,MF,1/8W,1%,18.2K	RMS5D-18.2K	MILSP	4701-03-1822	1.000
R77	RES,MF,1/8W,1%,100K	RMS5D-100K	MILSP	4701-03-1003	1.000
R88	RES,C,1/4W,5%, 2.4K	CF1/4-2.4K	ASE	4700-15-2401	1.000
R99	RES,C,1/4W,5%,82	CF1/4-82	ASE	4700-15-8209	1.000
R100	RES,C,1/4W,5%,1.1K	CF1/4-1.1K	ASE	4700-15-1101	1.000
R102 R103	RES,C,1/4W,5%,15K	CF1/4-15K	ASE	4700-15-1502	2.000
R104	RES,C,1/4W,5%,8.2K	CF1/4-8.2K	ASE	4700-15-8201	1.000
R109	RES,C,1/4W,5%,18	CF 1/4-18	ASE	4700-15-1809	1.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
R110 R116	RES,C,1/4W,5%,220	CF1/4-220	ASE	4700-15-2200	2.000
R111 R113 R115 R24	RES,C,1/4W,5%,12K	CF1/4-12K	ASE	4700-15-1202	4.000
R112 R14 R18	RES,C,1/4W,5%,680	CF1/4-680	ASE	4700-15-6800	3.000
R114 R150 R20 R26 R27 R50	RES,C,1/4W,5%,560	CF1/4-560	ASE	4700-15-5600	6.000
R118 R122 R123 R40 R56 R62 R98	RES,C,1/4W,5%,4.7K	CF1/4-4.7K	ASE	4700-15-4701	7.000
R119	POT,10K	3386W-1-103	BDU	4610-02-0103	1.000
R120 R148 R152 R16 R39 R49 R59 R65	RES,C,1/4W,5%,1K	CF1/4-1K	ASE	4700-15-1001	8.000
R124	RES,C,1/4W,5%,56K	CF1/4-56K	ASE	4700-15-5602	1.000
R125 R66 R85	RES,C,1/4W,5%,51K	CF1/4-51K	ASE	4700-15-5102	3.000
R126 R17 R37 R86	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	4.000
R127	RES,C,1/4W,5%,150K	CF1/4-150K	ASE	4700-15-1503	1.000
R128 R33 R36 R82 R90 R93	RES,C,1/4W,5%,2.2K	CF1/4-2.2K	ASE	4700-15-2201	6.000
R130 R131 R32 R44 R67	RES,C,1/4W,5%,100K	CF1/4-100K	ASE	4700-15-1003	5.000
R132 R153 R57	RES,C,1/4W,5%,1.5K	CF1/4-1.5K	ASE	4700-15-1501	3.000
R147 R72	RES,MF,1/8W,1%,19.6K	RN55D-19.6K	MILSP	4701-03-1962	2.000
RT01	THRMSTR,1K	CA31J1	FWL	5310-00-0006	1.000
TP01 TP02 TP03 TP04 TP05 TP06 TP07 TP08 TP09	TESTPOINTS-	2520B-1	USECO	2112-19-0005	9.000

**WAVETEK**  
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REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DILB-8P-108	BURND	2112-00-0007	4.000
2	IC SKT,PC,14 PIN MC000-073	C931402	T-I	2112-00-0011	2.000
3	IC SKT,16 PIN MC000-074	DILB-16P-108	BURND	2112-00-0012	1.000
4	IC SOCKET,18-PIN	C841802	T-I	2112-00-0022	1.000
C01 C02 C07 C08 C135 C138 C140 C21 C27 C29 C33 C36 C40 C52 C53 C54 C55 C56 C57 C64 C67 C78 C80 C86 C87 C89 C92 C93 C97	CAP,MON,50V,.01UF	CW15C103K	C-L	1510-14-4103	29.000
C03 C04 C06 C10 C108 C11 C112 C113 C114 C115 C116 C119 C12 C126 C131 C139 C14 C16 C19 C20 C24 C26 C31 C32 C34 C43 C44 C45 C46 C47 C59 C60 C61 C63 C65 C68 C69 C70 C77 C83 C90	CAP,MON,100V,470PF	CW15A471M	C-L	1510-14-5471	41.000
C05 C15 C22 C28 C58 C62 C66 C71	CAP,ELEC,16V,470UF	ECER1CV471S	PNSNC	1510-25-8471	8.000
C09 C129	CAP,ELEC,16V,100UF	ECER1CV101S	PNSNC	1510-25-8102	2.000
C35	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	1.000
C39	CAP,FILM,.15 UF	225P15491XD3	SPR	1510-62-1154	1.000
C42	CAP,MICA,500V,10PF	CM05CD100D03	SPR	1510-50-8100	1.000
C50 C51	CAP,MICA,500V,50PF	DM15-500J	ARC	1510-50-0500	2.000
C94	CAP,MICA,500V,330PF	DM15-331J	ARC	1510-50-0331	1.000
C100 C102 C99	CAP,FILM,.022 UF	225P2239S1WD3	SPR	1510-61-7223	3.000
C101 C107 C109 C91 C96 C98	CAP,DISC,.05UF	UK25-503	C-L	1510-14-1503	6.000
C103 C105 C95	CAP,MICA,500V,.001UF	DM15-102J	ARC	1510-50-0102	3.000
C104	CAP,MICA,500V,15 PF	DM15-150J	ARC	1510-50-0150	1.000
C106	CAP,MICA,500V,390PF	DM-15-391J	ARC	1510-50-0391	1.000
C110	CAP,MICA,500V,820PF	DM15-821J	ARC	1510-50-0821	1.000
C111 C120 C121 C122 C124 C48	CAP,MON,50V,6.8PF	C312C689D2G5CA	UNCAR	1510-11-8689	6.000
C123 C125 C142 C30	CAP,MON,50V,15PF	RA50-150JA	MURGA	1510-11-8150	4.000
C127	CAP,MICA,500V,270PF	DM15-271J	ARC	1510-50-0271	1.000
C130 C17	CAP,MON,50V,.22UF	B131-050-151-224M	ETP	1510-14-6224	2.000
C132 C136 C41	CAP,TANT,20V,10UF	196D106X9020JA1	SPR	1510-25-2100	3.000
C134 C37 C38	CAP,TANT,35V,1UF	196D105X9035HA1	SPR	1510-25-3109	3.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
C137	CAP, MICA, 500V, 120PF	DM15-121J	ARC	1510-50-0121	1.000
C143	CAP, MON, 50V, 8.2PF	C312C829D2G5CA	UNCAR	1510-11-8B29	1.000
C144	CAP, MON, 50V, 10PF	RA50-100DA	MURGA	1510-11-8100	1.000
C145	CAP, COMP, 500V, 3PF	QC-3.0PF	D-C	1510-40-0309	1.000
CR01 CR02	DIODE, VARACTOR	BB405B	APX	4803-02-0011	2.000
CR03 CR05 CR06 CR07 CR15 CR18 CR20 CR25	DIODE, PIN	MPN3401	MOT	4805-02-0006	8.000
CR04 CR12 CR13 CR26 CR27 CR28 CR29 CR30 CR31 CR32 CR33 CR34 CR36 CR40	DIODE, SIGNAL	1N914	G-E	4807-01-0914	14.000
CR08	DIODE, QUAD SET	5082-2805	H-P	4899-02-0002	1.000
CR14 CR21 CR22 CR23 CR24	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	5.000
CR16 CR19	DIODE, VARACTOR	1N5767	HF	4803-02-0018	2.000
CR35	DIODE, VARACTOR	MV2308	MOT	4803-02-0012	1.000
CR37 CR38	DIODE, ZENER, 9.1V	1N5239	MOT	4801-01-5239	2.000
CR39	LED, YL, T-1-3/4	5082-4550	H-P	4810-02-0011	1.000
HS U01	HEATSINK	6011B	THR	2810-11-0017	1.000
HS U09	HEAT SINK, DIP	6012B	THR	2810-11-0032	1.000
HS U14	HEATSINK, 24-PIN DIP	6085B	THR	2810-11-0033	1.000
IC01 IC02	FLIP-FLOP, ECL	F11C70	FCD	8000-11-7000	2.000
IC03	DUAL FLIP-FLOP, ECL	10231PCQR	FCD	8001-02-3100	1.000
IC04	QUAD 2-IN NOR, MOT	MC10102P-MOT	MOT	8001-01-0201	1.000
IC05	DIVIDE-BY-10, ECL	11C90DC	FCD	8000-11-9000	1.000
IC06	DUAL J-K FLIP-FLIP	SN74S112N	T-I	8007-41-1200	1.000
IC07	DUAL D-FLIP FLOP	SN74LS74AN	T-I	8000-74-7411	1.000
IC08	QUAD POS NAND	SN74LS00N	T-I	8000-74-0010	1.000
IC09	DIVIDE-BY-N PHASE LOCK LOOP	SA8X19N-B	SIG	7000-00-1800	1.000
IC11	OP AMP	N5741CV	SIG	7000-57-4100	1.000
IC12	SPDT ANALOG SWITCH	TL607CP	T-I	7000-06-0700	1.000
IC13	OP AMP	LF351N	NAT	7000-00-8100	1.000
IC14	QUAD NOR, ECL	100102PCQR	FCD	8010-01-0200	1.000
IC15 IC16 IC17 IC18 IC19 IC20	WB AMP, HYB, PRE-SEL	SMA121	MOT	7000-03-2003	6.000
J01	CONN, RF, STR. JACK	700209	CBLWV	2110-08-0006	1.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
L01 L02 L04 L05 L07 L08 L09 L10 L13 L15 L16 L17 L19	CHOKE	VK20010/3B	FRXC	1810-09-0001	13.000
L03	INDUCTOR,AIR,2TURN PER DWG	1555-0010	SSI	1815-00-0067	1.000
L06 L14 L20 L24	FERRITE CHOKE,5 TURN FROM: 1813-00-0007	LA006-005	W-I	1210-30-0002	4.000
L11 L21 L23	CHOKE,MOLDED,100 UH	1025-68	DEL	1810-10-0101	3.000
L12	COIL,AIR2 TURNPER DWG	1555-0005	SSI	1815-00-0066	1.000
L18	COIL,VAR,2.15/2.9UH	Y3353-N1	MURA	1811-00-0004	1.000
L22	CHOKE,MOLDED,39 UH	1025-58	DEL	1810-10-0390	1.000
Q01 Q11	TRANSISTOR	PN4356-5	NAT	4901-04-3560	2.000
Q02 Q03	TRANSISTOR	A400	APX	4902-00-4000	2.000
Q05 Q06 Q07 Q10 Q15	TRANSISTOR	PN4275	NAT	4902-04-2750	5.000
Q16	TRANSISTOR	PN4121-18	NAT	4901-04-1210	1.000
Q17	TRANSISTOR	2N4403	NAT	4901-04-4030	1.000
R01	RES,C,1/4W,5%,47	CF1/4-47	ASE	4700-15-4709	1.000
R02 R122 R164	RES,C,1/4W,5%,100	CF1/4-100	ASE	4700-15-1000	3.000
R03	RES,C,1/4,5%,27	CF1/4-27	ASE	4700-15-2709	1.000
R04	RES,1/4W 5%,39	CF-1/4-39	ASE	4700-15-3909	1.000
R05 R08 R140	RES,C,1/4W,5%,82	CF1/4-82	ASE	4700-15-8209	3.000
R06 R125 R30	RES,C,1/4W,5%,820	CF1/4-820	ASE	4700-15-8200	3.000
R07 R102 R145 R148 R92 R96	RES,C,1/4W,5%,1.5K	CF1/4-1.5K	ASE	4700-15-1501	6.000
R09 R162	RES,C,1/4W,5%,390	CF1/4-390	ASE	4700-15-3900	2.000
R10 R14 R48	RES,C,1/4W,5%,39K	CF1/4-39K	ASE	4700-15-3902	3.000
R11 R12 R127 R13 R130 R131 R151 R154 R53 R62 R63 R65	RES,C,1/4W,5%,4.7K	CF1/4-4.7K	ASE	4700-15-4701	12.000
R15	RES,C,1/4W,5%,330	CF1/4-330	ASE	4700-15-3300	1.000
R17 R43	RES,C,1/4W,5%,56K	CF1/4-56K	ASE	4700-15-5602	2.000
R18	RES,C,1/4W,5%,47K	CF1/4-47K	ASE	4700-15-4702	1.000
R20	RES,C,1/8W,5%,39	CF1/8-39	ASE	4700-05-3909	1.000
R21 R22	RES,C,1/8W,5%,150	CF1/8-150	ASE	4700-05-1500	2.000
R23 R75	RES,MF,1/8W,1%,48.7	RN55D-48.7	MILSP	4701-03-4879	2.000
R27 R74 R76	RES,MF,1/8W,1%,34.5	RN55D-34.5	MILSP	4701-03-8459	3.000
R28	RES,MF,1/8W,1%,22.1	RN55D-22.1	MILSP	4701-03-2219	1.000
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
R33 R34	RES,C,1/8W,5%,27	CF1/8-27	ASE	4700-05-2709	2.000
R35	RES,C,1/8W,5%,33	CF-1/8-33	ASE	4700-05-3309	1.000
R36 R47	RES,C,1/4W,5%,1K	CF1/4-1K	ASE	4700-15-1001	2.000
R41 R54	RES,C,1/4W,5%,100K	CF1/4-100K	ASE	4700-15-1003	2.000
R42 R46	RES,C,1/4W,5%,82K	CF1/4-82K	ASE	4700-15-8202	2.000
R45	RES,C,1/4W,5%,6.8K	CF1/4-6.8K	ASE	4700-15-6801	1.000
R50 R51 R52 R53 R60 R61 R89	RES,C,1/4W,5%,270	CF1/4-270	ASE	4700-15-2700	7.000
R56	RES,C,1/4W,5%,51	CF1/451	ASE	4700-15-5109	1.000
R95	RES,C,1/4W,5%,220	CF1/4-220	ASE	4700-15-2200	1.000
R98	RES,C,1/4W,5%,12K	CF1/4-12K	ASE	4700-15-1202	1.000
R111 R124 R132 R64 R90	RES,C,1/4W,5%,470	CF1/4-470	ASE	4700-15-4700	5.000
R112 R113 R115 R141 R171 R32 R39 R68	RES,C,1/4W,5%,2.2K	CF1/4-2.2K	ASE	4700-15-2201	8.000
R114 R87	RES,C,1/8W,5%,2.2K	CF1/8-2.2K	ASE	4700-05-2201	2.000
R121 R139 R58 R97	RES,C,1/4W,5%,3.3K	CF1/4-3.3K	ASE	4700-15-3301	4.000
R123 R155 R19 R66 R67	RES,C,1/4W,5%,68	CF1/4-68	ASE	4700-15-6809	5.000
R126 R142 R143 R144 R147 R158 R59 R99	RES,C,1/4W,5%,1.8K	CF1/4-1.8K	ASE	4700-15-1801	8.000
R128 R129 R156 R157 R31	RES,C,1/4W,5%,680	CF1/4-680	ASE	4700-15-6800	5.000
R133 R136 R146 R152 R159 R37 R38 R40 R91 R93	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	10.000
R134	RES,C,1/4W,5%,30K	CF1/4-30K	ASE	4700-15-3002	1.000
R135 R16 R94	RES,C,1/4W,5%,15K	CF1/4-15K	ASE	4700-15-1502	3.000
R137	RES,C,1/4W,5%,330K	CF1/4-330K	ASE	4700-15-3303	1.000
R138 R149 R150 R44 R70 R71	RES,C,1/4W,5%,2.7K	CF1/4-2.7K	ASE	4700-15-2701	6.000
R153	RES,C,1/4W,5%,62	CF1/4-62	ASE	4700-15-6209	1.000
R160 R57	RES,C,1/4W,5%,1.2K	CF1/4-1.2K	ASE	4700-15-1201	2.000
R161	RES,C,1/4W,5%,18K	CF1/4-18K	ASE	4700-15-1802	1.000
R163	POT,500	3386W-1-501	BOU	4610-02-0501	1.000
R165 R49 R69	RES,C,1/4W,5%,560	CF1/4-560	ASE	4700-15-5600	3.000
R168	RES,C,1/4W,5%,220K	CF1/4220K	ASE	4700-15-2203	1.000
R169	RES,C,1/4W,5%,3.9K	CF1/43.9K	ASE	4700-15-3901	1.000
R170	RES,C,1/4W,5%,180	CF1/4-180	ASE	4700-15-1800	1.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
T01	XFMR, BIFILAR	1501-0001	SSI	1210-43-0011	1.000
TP01 TP02 TP03 TP04 TP05 TP06 TP07	TESTPOINTS-	2520B-1	USECO	2112-19-0005	7.000
U10	DUAL OP AMP	TL082CP	T-I	7000-00-8200	1.000
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DILB-8P-108	BURND	2112-00-0007	10.000
2	IC SKT,PC,14 PIN MC000-073	C931402	T-I	2112-00-0011	8.000
3	IC SKT,16 PIN MC000-074	DILB-16P-108	BURND	2112-00-0012	2.000
C01 C02 C03 C04 C07 C08 C09 C10 C101 C104 C106 C110 C12 C13 C14 C15 C16 C19 C20 C21 C22 C25 C38 C78 C79 C81 C86 C88 C94 C95 C96 C97 C98 C99	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	34.000
C05 C11	CAP,MICA,500V,100PF	DM15-101J	C-D	1510-50-0101	2.000
C06	CAP,MICA,500V,15 PF	DM15-150J	ARC	1510-50-0150	1.000
C17 C29	CAP,MICA,500V,82PF	CM05ED820J03	SPR	1510-50-0820	2.000
C18 C64	CAP,MICA,500V,18PF	CM05CD180J03	SPR	1510-50-8180	2.000
C24	CAP,MICA,500V,39PF	CM05ED390J03	SPR	1510-50-0390	1.000
C28 C33 C89	CAP,FILM,.0012 UF	225P12291WD3	SPR	1510-61-7122	3.000
C40 C42 C49 C54	CAP,DISC,1KV,330PF	10TCU-T33	SPR	1510-10-3331	4.000
C62	CAP,FILM,100V,.33UF	160/.33/10/100/E	PLSSY	1510-60-7334	1.000
C63	CAP,FILM,.0056 UF	160-.0056K400C	PLSSY	1510-61-7562	1.000
C65	CAP,MICA,500V,270PF	DM15-271J	ARC	1510-50-0271	1.000
C66 C73 C75 C82 C83 C85 C90	CAP,TANT,20V,10UF	196D106X9020JA1	SPR	1510-25-2100	7.000
C69	CAP,DISC,1KV,.001UF	5GAD10	SPR	1510-10-1102	1.000
C70	CAP,MICA,500V,330PF	DM15-331J	ARC	1510-50-0331	1.000
C71	CAP,MICA,500V,27PF	CM05ED270J03	ARC	1510-50-0270	1.000
C72	CAP,MICA,500V,180PF	DM15-181J	ARC	1510-50-0181	1.000
C80	CAP,FILM,.82 UF	160/.82.10/100/H	PLSSY	1510-62-2824	1.000
C87	CAP,MICA,500V,470PF	DM15-471J	ARC	1510-50-0471	1.000
C91	CAP,FILM,.0018 UF	225P18291WD3	SPR	1510-61-7182	1.000
C92	CAP,MICA,500V,150PF	CM05FD151J03	SPR	1510-50-0151	1.000
C100 C109 C26 C27 C30 C31 C32 C35 C36 C61 C76 C84	CAP,DISC,.05UF	UK25-503	C-L	1510-14-1503	12.000
C102	CAP,ELEC,16V,470UF	ECEB1CV471S	PNSNC	1510-25-8471	1.000
C103	CAP,MON,50V,.22UF	8131-050-151-224M	ETP	1510-14-6224	1.000
C105 C74	CAP,MICA,500V,560PF	DM-15-561J	ARC	1510-50-0561	2.000
C107	CAP,MICA,500V,68PF	DM15-680J	ARC	1510-50-0680	1.000
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
C108 C111 C37 C39 C41 C43 C44 C45 C46 C47 C48 C50 C51 C52 C53 C55 C56 C57 C58 C59 C60 C67 C68 C77 C93	CAP,TANT,35V,1UF	196D105X9035HA1	SPR	1510-25-3109	25.000
C112	CAP,MICA,500V,220PF	DM-15-221J	ARC	1510-50-0221	1.000
C113 C23 C34	CAP,MICA,500V,120PF	DM15-121J	ARC	1510-50-0121	3.000
C114 C115 C116 C117	CAP,MICA,100V,250PF	ADM-10CA251J	ARC	1510-50-5251	4.000
CR01 CR04 CR05 CR07 CR08 CR10	DIODE,SIGNAL	1N914	G-E	4807-01-0914	6.000
CR02 CR03 CR06 CR09	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	4.000
IC01	TRANSISTOR ARRAY	LM3054N	NAT	7000-30-5400	1.000
IC02	BAL MOD/DEM0D	LM1496N	NAT	7000-07-9600	1.000
IC03 IC06 IC08 IC13 IC20	DUAL OP AMP	TL082CP	T-I	7000-00-8200	5.000
IC04	MONOST MVBTR	DM74121N	NAT	8007-41-2100	1.000
IC05	DUAL MONOST/MVBTR	DM74123N	NAT	8007-41-2300	1.000
IC07	TRANSISTOR ARRAY	LM3086N	NAT	7000-30-8600	1.000
IC09 IC11 IC21	SPDT ANALOG SWITCH	TL607CP	T-I	7000-06-0700	3.000
IC10	OP AMP	LF351N	NAT	7000-00-8100	1.000
IC12 IC17	QUAD 2-IN NAND STAT.SENS.	MM74C00N	NAT	8000-74-0011	2.000
IC14	DUAL J-K FLIP-FLOP STATIC SENSITIVE	MM74C76	NAT	8000-74-7611	1.000
IC15	OP AMP, BIMOS	CA3140E	RCA	7000-31-4001	1.000
IC16	VOLT REG,+5V	MA78L05AWC	FCD	7000-78-0501	1.000
IC18	QUAD EXCL. OR GATE STATIC SENSITIVE	CD4030BE	RCA	8000-40-3010	1.000
IC19	DECADE COUNTER STATIC SENSITIVE	MM74C90	NAT	8000-74-9010	1.000
J01	CONN,RF,STR.JACK	700209	CBLWV	2110-08-0006	1.000
L01 L02	CHOKE,MOLDED,39 UH	1025-58	DEL	1810-10-0390	2.000
L03 L04 L05 L06	COIL,VAR,0.47 UH, NOMINAL	Y3353-N6	MURA	1811-00-0007	4.000
L07 L08	COIL,VAR,1.01/1.18UH	Y3353-N3	MURA	1811-00-0006	2.000
L09 L10 L11 L12 L14	COIL,VAR,76/109 UH	Y3353-N2	MURA	1811-00-0005	5.000
L13 L15 L16 L17	CHOKE	VK20010/3B	FRXC	1810-09-0001	4.000
MX01	MIXER,DBL.BAL.	SBL-1-DBL	MIN-C	3010-54-0004	1.000

**WAVETEK**  
PARTS LIST

IF AMP BD,AA

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
Q01	JFET,N-CHANNEL	2N4416	NAT	4901-04-4160	1.000
Q02 Q03 Q04	TRANS QA035-630	2N3563	FCD	4901-03-5630	3.000
Q05 Q06 Q07 Q08 Q09 Q10 Q11 Q12 Q13	TRANSISTOR	2N3565	NAT	4901-03-5650	9.000
Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 Q22	TRANSISTOR	PN4275	NAT	4902-04-2750	9.000
Q24 Q26	TRANSISTOR	PN4121-1B	NAT	4901-04-1210	2.000
R01 R53 R58 R61	RES,C,1/4W,5%,820	CF1/4-820	ASE	4700-15-8200	4.000
R02 R04 R144 R145 R19 R93	RES,C,1/4W,5%,27K	CF1/4-27K	ASE	4700-15-2702	6.000
R03 R05 R147	RES,C,1/4W,5%,270	CF1/4-270	ASE	4700-15-2700	3.000
R06 R08 R106 R108 R13 R14 R17 R18 R45 R47 R49 R51	RES,C,1/4W,5%,3.3K	CF1/4-3.3K	ASE	4700-15-3301	12.000
R07 R115 R118 R130 R131 R14 R20 R21 R33 R36 R38 R40 R42	RES,C,1/4W,5%,1K	CF1/4-1K	ASE	4700-15-1001	13.000
R09 R99	RES,C,1/4W,5%,1.5K	CF1/4-1.5K	ASE	4700-15-1501	2.000
R10 R116 R129 R34 R35 R85 R97	RES,C,1/4W,5%,33K	CF1/4-33K	ASE	4700-15-3302	7.000
R11 R25 R31	RES,C,1/4W,5%,1.2K	CF1/4-1.2K	ASE	4700-15-1201	3.000
R12 R122 R16	RES,C,1/4W,5%,15K	CF1/4-15K	ASE	4700-15-1502	3.000
R22 R39	RES,C,1/4W,5%,51	CF1/451	ASE	4700-15-5109	2.000
R24 R32 R82 R89	RES,C,1/4W,5%,5.6K	CF1/4-5.6K	ASE	4700-15-5601	4.000
R26 R30	RES,C,1/4,5%,27	CF1/4-27	ASE	4700-15-2709	2.000
R29 R69 R70 R71 R72 R73 R74 R75 R76	RES,C,1/4W,5%,3.9K	CF1/43.9K	ASE	4700-15-3901	9.000
R41	RES,C,1/4W,5%,6.8K	CF1/4-6.8K	ASE	4700-15-6801	1.000
R44 R46 R48 R50	RES,C,1/4W,5%,56K	CF1/4-56K	ASE	4700-15-5602	4.000
R65	POT,5K	3386W-1-502	BOU	4610-02-0502	1.000
R68	RES,C,1/4W,5%,680	CF1/4-680	ASE	4700-15-6800	1.000
R77 R80	RES.MF,1/8W,1%,1M	RN55J-1M	MILSP	4701-03-1004	2.000
R78	RES,C,1/4W,5%,68	CF1/4-68	ASE	4700-15-6809	1.000
R86	RES,C,1/4W,5%,18K	CF1/4-18K	ASE	4700-15-1802	1.000
R87	RES,C,1/4W,5%,24K	CF1/4-24K	ASE	4700-15-2402	1.000
R92	POT,100K	3386W-1-104	BOU	4610-02-0104	1.000
R96	RESISTOR,1/4W 5%	CF1/4-300K	ASE	4700-15-3003	1.000

**WAVETEK**  
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
R100 R101 R102 R126 R23 R37 R90	RES,C,1/4W,5%,2.2K	CF1/4-2.2K	ASE	4700-15-2201	7.000
R103	RES,MF,1/8W,1%,69.8K	RN55D-69.8K	MILSP	4701-03-6982	1.000
R104	RES,MF,1/8W,1%,61.9K	RN55D-61.9K	MILSP	4701-03-6192	1.000
R105 R79 R81 R94 R95	RES,MF,1/8W,1%,10K	RN55D-10K	MILSP	4701-03-1002	5.000
R107 R113 R123 R140 R141 R88 R98	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	7.000
R109	RES,C,1/4W,5%,7.5K	CF1/4-7.5K	ASE	4700-15-7501	1.000
R110	RES,MF,1/8W,1%,1.82K	RN55D-1.82K	MILSP	4701-03-1821	1.000
R111	RESISTOR,VARIABLE1K	3386W-1-102	BOU	4610-02-0102	1.000
R112 R117 R136 R56 R59 R63 R66	RES,C,1/4W,5%,2.7K	CF1/4-2.7K	ASE	4700-15-2701	7.000
R114	RES,MF,1/8W,1%,35.7K	RN55D-35.7K	MILSP	4701-03-3572	1.000
R119 R43	RES,C,1/4W,5%,100	CF1/4-100	ASE	4700-15-1000	2.000
R120 R138	RES,C,1/4W,5%,150K	CF1/4-150K	ASE	4700-15-1503	2.000
R121	RES,C,1/4W,5%,470K	CF1/4-470K	ASE	4700-15-4703	1.000
R124 R132	RES,C,1/4W,5%,22K	CF1/422K	ASE	4700-15-2202	2.000
R125 R128 R67 R83	RES,C,1/4W,5%,8.2K	CF1/4-8.2K	ASE	4700-15-8201	4.000
R127 R64	POT,10K	3386W-1-103	BOU	4610-02-0103	2.000
R133 R152 R27 R28 R54 R57 R60 R84	RES,C,1/4W,5%,4.7K	CF1/4-4.7K	ASE	4700-15-4701	8.000
R134	RES,C,1/4W,5%,120	CF1/4-120	ASE	4700-15-1200	1.000
R135 R91	RES,C,1/4W,5%,220K	CF1/4220K	ASE	4700-15-2203	2.000
R137	RES,C,1/4W,5%,4.7M	CB4755	A-B	4700-15-4704	1.000
R139	RES,C,1/4W,5%,12K	CF1/4-12K	ASE	4700-15-1202	1.000
R142	RES,C,1/4W,5%,2.2M	CF1/4-2.2M	ASE	4700-15-2204	1.000
R146 R52 R55 R62	RES,C,1/4W,5%,39K	CF1/4-39K	ASE	4700-15-3902	4.000
R148	RES,C,1/4W,5%,1M	CF1/4-1M	ASE	4700-15-1004	1.000
R149 R15	RES,C,1/4W,5%,100K	CF1/4-100K	ASE	4700-15-1003	2.000
R150	RES,VAL DET IN CALIB	RES,TRIM	W-I	4799-99-9999	1.000
R151	RES,1/4W 5%,39	CF-1/4-39	ASE	4700-15-3909	1.000
T01	XFMR, BIFILAR	1501-0001	SSI	1210-43-0011	1.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DILB-8P-108	BURND	2112-00-0007	14.000
2	IC SKT,PC,14 PIN MC000-073	C931402	T-I	2112-00-0011	12.000
3	IC SKT,16 PIN MC000-074	DILB-16P-108	BURND	2112-00-0012	10.000
C01 C04 C32 C33 C34 C35 C36	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	7.000
C02 C19 C23 C24 C25 C28 C30 C31 C39	CAP,TANT,20V,10UF	196D106X9020JA1	SPR	1510-25-2100	9.000
C03 C12 C13 C18	CAP,ELEC,16V,100UF	ECERICV1015	PNSMC	1510-25-8102	4.000
C05 C06 C38	CAP,FILM,.22 UF	225P22491XD3	SPR	1510-62-1224	3.000
C07 C15 C17 C37	CAP,DISC,.05UF	UK25-503	C-L	1510-14-1503	4.000
C08 C09	CAP,FILM,.015 UF	225P15391WD3	SPR	1510-61-7153	2.000
C10 C14 C26	CAP,TANT,35V,1UF	196D105X9035HA1	SPR	1510-25-3109	3.000
C11 C20 C21 C22	CAP,FILM,400V,.01UF	167/.01/5/400/B	PLSSY	1510-61-2103	4.000
C16	CAP,MICA,500V,470PF	DM15-471J	ARC	1510-50-0471	1.000
C27	CAP,FILM,.0022 UF	225P22291WD3	SPR	1510-61-7222	1.000
C29	CAP,FILM,.1 UF	225P010491WD3	SPR	1510-61-7104	1.000
C40	CAP,FILM,.0012 UF	225P12291WD3	SPR	1510-61-7122	1.000
C41	CAP,CER,25V,.022UF	HY-525	SPR	1510-11-9223	1.000
CR01 CR02 CR03 CR04 CR05 CR06 CR07 CR08 CR09 CR10 CR11 CR12 CR13 CR14 CR16	DIODE,SIGNAL	1N914	G-E	4807-01-0914	15.000
CR15	LED,YL,T-1-3/4	5082-4550	H-P	4810-02-0011	1.000
IC01 IC02 IC03 IC04 IC05 IC06 IC07 IC21 IC25	DUAL OP AMP	TL082CP	T-I	7000-00-8200	9.000
IC08 IC09 IC10 IC11 IC12 IC13 IC14	DECADE COUNTER STATIC SENSITIVE	MM74C90	NAT	8000-74-9010	7.000
IC15	PHASE-LOCKED LOOP STATIC SENSITIVE	CD4046BE	RCA	8000-40-4612	1.000
IC16 IC17 IC35 IC36	HEX FLIP-FLOP STATIC SENSITIVE	MM74C174N	NAT	8007-41-7411	4.000
IC18	QUAD 2-IN NAND STAT.SENS.	MM74C00N	NAT	8000-74-0011	1.000
IC19	WAVEFORM GENERATOR	ICL8038CCJD	INT	7000-80-3800	1.000
IC20	DUAL FLIP-FLOP STAT.SENS.	MM74C74N	NAT	8000-74-7410	1.000
IC22 IC23 IC24 IC26 IC27	SPDT ANALOG SWITCH	TL607CP	T-I	7000-06-0700	5.000
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REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MFG-PART-NO	MFG	WAVETEK NO.	QTY
IC28	MONOST MVBTR	DM74121N	NAT	8007-41-2100	1.000
IC29	PROM	DM74S288N	NAT	8007-42-8800	1.000
IC30	QUAD POS OR	SN74LS32N	T-I	8000-74-3210	1.000
IC31 IC32 IC33 IC34	DUAL BCD UP/DN CTR	DM74LS192N	NAT	8007-41-9210	4.000
Q01	TRANSISTOR	PN4091	NAT	4901-04-0910	1.000
Q02 Q03	TRANSISTOR	PN4275	NAT	4902-04-2750	2.000
R01 R06 R07 R100 R12 R40	RES,C,1/4W,5%,1M	CF1/4-1M	ASE	4700-15-1004	6.000
R02 R15 R16 R17 R27 R29 R30 R42 R49 R55 R56 R57 R58 R59 R68 R70 R94	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	17.000
R03	RES,C,1/4W,5%,3.9K	CF1/43.9K	ASE	4700-15-3901	1.000
R04 R20 R95	RES,C,1/4W,5%,18K	CF1/4-18K	ASE	4700-15-1802	3.000
R05 R48	RES,C,1/4W,5%,2.2K	CF1/4-2.2K	ASE	4700-15-2201	2.000
R08 R11 R67 R87 R88 R89 R96	RES,C,1/4W,5%,100K	CF1/4-100K	ASE	4700-15-1003	7.000
R09	RES,C,1/4W,5%,1.8M	CF1/4-1.8M	ASE	4700-15-1804	1.000
R10	RES,C,1/4W,5%,5.6K	CF1/4-5.6K	ASE	4700-15-5601	1.000
R13	RES,MF,1/8W,1%,35.7K	RN55D-35.7K	MILSP	4701-03-3572	1.000
R14	RES,MF,1/8W,1%,665K	RN55D-665K	MILSP	4701-03-6653	1.000
R18	RES,C,1/4W,5%,47K	CF1/4-47K	ASE	4700-15-4702	1.000
R19	RES,C,1/4W,5%,39K	CF1/4-39K	ASE	4700-15-3902	1.000
R21	RES,1/8W,1%,49.9K	RN55D-49.9K	MILSP	4701-03-4992	1.000
R22 R53 R54	RES,MF,1/8W,1%,100K	RN55D-100K	MILSP	4701-03-1003	3.000
R23 R25	POT,5K	3386W-1-502	BOU	4610-02-0502	2.000
R24 R26 R28 R45 R73	RES,C,1/4W,5%,8.2K	CF1/4-8.2K	ASE	4700-15-8201	5.000
R31 R92	RES,C,1/4W,5%,12K	CF1/4-12K	ASE	4700-15-1202	2.000
R32	RES,C,1/4W,5%,120K	CF1/4-120K	ASE	4700-15-1203	1.000
R33 R43 R60 R61	RES,C,1/4W,5%,4.7K	CF1/4-4.7K	ASE	4700-15-4701	4.000
R34 R47	POT,10K	3386W-1-103	BOU	4610-02-0103	2.000
R35	RES,C,1/4W,5%,820	CF1/4-820	ASE	4700-15-8200	1.000
R36	RES,C,1/4W,5%,390	CF1/4-390	ASE	4700-15-3900	1.000
R37 R69	RESISTOR,VARIABLE1K	3386W-1-102	BOU	4610-02-0102	2.000
R38	RES,C,1/4W,5%,2.4K	CF1/4-2.4K	ASE	4700-15-2401	1.000
R39	RES,C,1/4W,5%,33K	CF1/4-33K	ASE	4700-15-3302	1.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
R41	RES,C,1/4W,5%,330	CF1/4-330	ASE	4700-15-3300	1.000
R44	RES,C,1/4W,5%,22K	CF1/422K	ASE	4700-15-2202	1.000
R46	RES,C,1/4W,5%,5.1K	CF1/4-5.1K	ASE	4700-15-5101	1.000
R50	RES,MF,1/8W,1%,39.2K	RN55D-39.2K	MILSP	4701-03-3922	1.000
R51	RES,MF,1/8W,1%,61.9K	RN55D-61.9K	MILSP	4701-03-6192	1.000
R52	RES,MF,1/8W,1%,2.15K	RN55D-2.15K	MILSP	4701-03-2151	1.000
R62 R64	RES,C,1/4W,5%,390K	CF1/4-390K	ASE	4700-15-3903	2.000
R63 R65	RES,C,1/4W,5%,15K	CF1/4-15K	ASE	4700-15-1502	2.000
R66 R71 R75	POT,100K	3386W-1-104	BOU	4610-02-0104	3.000
R72	POT,50K	3386W-1-503	BOU	4610-02-0503	1.000
R74	RES,C,1/4W,5%,680K	CF1/4-680K	ASE	4700-15-6803	1.000
R76	RES,C,1/4W,5%,91K	CF1/4-91K	ASE	4700-15-9102	1.000
R77	RES,MF,1/8W,1%,226	RN55D-226	MILSP	4701-03-2260	1.000
R78	RES,MF,1/8W,1%,9.76K	RN55D-9.76K	MILSP	4701-03-9761	1.000
R79	RES,MF,1/8W,1%,453	RN55D-453	MILSP	4701-03-4530	1.000
R80	RES,MF,1/8W,1%,11.8K	RN55D-11.8K	MILSP	4701-03-1182	1.000
R81	RES,MF,1/8W,1%,4.42K	RN55D-4.42K	MILSP	4701-03-4421	1.000
R82	RES,MF,1/8W,1%,45.3K	RN55D-45.3K	MILSP	4701-03-4532	1.000
R83	RES,MF,1/8W,1%,1.69K	RN55D-1.69K	MILSP	4701-03-1691	1.000
R84	RES,MF,1/8W,1%,10K	RN55D-10K	MILSP	4701-03-1002	1.000
R85	RES,MF,1/8W,1%,15.4K	RN55D-15.4K	MILSP	4701-03-1542	1.000
R86	RES,MF,1/8W,1%,34.8K	RN55D-34.8K	MILSP	4701-03-3482	1.000
R90	RES,C,1/4W,5%,68K	CF1/4-68K	ASE	4700-15-6802	1.000
R91	RES,C,1/4W,5%,51K	CF1/4-51K	ASE	4700-15-5102	1.000
R93	RES,C,1/4W,5%,220K	CF1/4220K	ASE	4700-15-2203	1.000
R98	RES,C,1/4W,5%,56K	CF1/4-56K	ASE	4700-15-5602	1.000
R99	RES,C,1/4W,5%,2K	CF1/4-2K	ASE	4700-15-2001	1.000
TP01 TP02 TP03 TP04 TP05 TP06 TP07	TESTPOINTS-	2520B-1	USECO	2112-19-0005	7.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MEGR-PART-NO	MEGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	D1LB-8P-108	BURND	2112-00-0007	1.000
2	IC SKT,PC,14 PIN MC000-073	C931402	T-I	2112-00-0011	10.000
3	IC SKT,16 PIN MC000-074	D1LB-16P-108	BURND	2112-00-0012	1.000
C01 C04 C08 C10	CAP,FILM,.1 UF	225P010491WD3	SPR	1510-61-7104	4.000
C02	CAP,ELEC,15V,8000UF	TCG8024015N2L	MAL	1510-25-9802	1.000
C03 C17 C22 C23	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	4.000
C05	CAP,ELEC,25V,4000UF	TCG4024025L3C	MAL	1510-25-8402	1.000
C06 C07	CAP,MICA,500V,470PF	DM15-471J	ARC	1510-50-0471	2.000
C09	CAP,ELEC,25V,2200UF	39D228G025HP4	SPR	1510-25-7222	1.000
C11 C24	CAP,TANT,35V,1UF	196D105X9035HA1	SPR	1510-25-3109	2.000
C12 C16 C20 C21	CAP,MICA,500V,.001UF	DM15-102J	ARC	1510-50-0102	4.000
C13 C14 C15 C18	CAP,DISC,.05UF	UK25-503	C-L	1510-14-1503	4.000
C19	CAP,MICA,500V,100PF	DM15-101J	C-D	1510-50-0101	1.000
C26	CAP,MON,50V,15PF	RA50-150JA	MURGA	1510-11-8150	1.000
C27	CAP,DISC,50V,.47UF	1C20Z5U474Z050B	SPR	1510-11-2478	1.000
C28	CAP,DISC,80/20,.1MF	M-12-.1-80/20	RMC	1510-12-2104	1.000
CR01 CR02 CR03 CR04	DIODE,SCHOTTKY	1N5820	MOT	4809-01-5820	4.000
CR05 CR06 CR07 CR08	DIODE,SCHOTTKY	1N5822	MOT	4809-01-5822	4.000
CR09 CR10 CR11 CR12	DIODE	MR501	MOT	4806-02-0007	4.000
CR13 CR14	DIODE, SIGNAL	HSCH1001	H-P	4807-01-6263	2.000
G01	TCXD,10 MHZ	TCX050-17A	ISTHP	2311-00-0007	1.000
IC01 IC02 IC03	VOLTAGE REGULATOR	LM723CN	NAT	7000-07-2300	3.000
IC04	IC,DIGITAL-TTL	DM74LS12N	NAT	8000-74-1210	1.000
IC05	PD VOLTAGE REG.	UA7805UC	FCD	7000-78-0523	1.000
IC06	DECADE COUNTER	DM74LS90	NAT	8000-74-9011	1.000
IC07	DECADE COUNTER STATIC SENSITIVE	MM74C90	NAT	8000-74-9010	1.000
IC08	DUAL J-K FLIP-FLOP	DM74LS76AN	NAT	8000-74-7610	1.000
IC09 IC10 IC11	QUAD POS. NAND	SN74LS01	T-I	8000-74-0110	3.000
IC12	QUAD POS NAND	SN74LS00N	T-I	8000-74-0010	1.000
IC13	OP AMP	LF351N	NAT	7000-00-8100	1.000
L01	CHOKE,MOLDED,6.8 UH	1025-40	DEL	1810-10-0689	1.000

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
Q01 Q04	TRANSISTOR	PN2222	NAT	4901-02-2220	2.000
Q02	TRANS QAO35-630	2N3563	FCD	4901-03-5630	1.000
Q03	TRANSISTOR	PN4121-18	NAT	4901-04-1210	1.000
R01	RES,WW,1W,5%,.18	BWH.18-5Z	IRC	4702-35-1807	1.000
R02	RES,C,1/4W,5%,150	CF1/4-150	ASE	4700-15-1500	1.000
R03	RES,C,1/4W,5%,750	CF1/4-750	ASE	4700-15-7500	1.000
R04	POT,500	3386W-1-501	BOU	4610-02-0501	1.000
R05	RES,MF,1/8W,1%,2.21K	RN55D-2.21K	MILSP	4701-03-2211	1.000
R06 R07 R12 R52	RES,C,1/2W,5%,1	CF1/2-1	ASE	4700-25-1008	4.000
R08 R16	RES,MF,1/8W,1%,1.96K	RN55D-1.96K	MILSP	4701-03-1961	2.000
R09 R13	RES,MF,1/8W,1%,3.83K	RN55D-3.83K	MILSP	4701-03-3831	2.000
R10 R14	RESISTOR,VARIABLE1K	3386W-1-102	BOU	4610-02-0102	2.000
R11 R15	RES,MF,1/8W,1%,3.48K	RN55D-3.48K	MILSP	4701-03-3481	2.000
R17 R43	RES,C,1/4W,5%,47K	CF1/4-47K	ASE	4700-15-4702	2.000
R18 R19	RES,MF,1/8W,1%,499	RN55D-499	MILSP	4701-03-4990	2.000
R20	RES,MF,1/8W,1%,75K	RN55D-75K	MILSP	4701-03-7502	1.000
R21	RES,C,1/4W,5%,3.9K	CF1/4-3.9K	ASE	4700-15-3901	1.000
R22	RES,C,1/4W,5%,1.8K	CF1/4-1.8K	ASE	4700-15-1801	1.000
R23	RES,C,1/4W,5%,120	CF1/4-120	ASE	4700-15-1200	1.000
R24 R42	RES,C,1/4W,5%,330	CF1/4-330	ASE	4700-15-3300	2.000
R25	RES,C,1/4W,5%,220	CF1/4-220	ASE	4700-15-2200	1.000
R26	RES,C,1/4W,5%,100	CF1/4-100	ASE	4700-15-1000	1.000
R27 R28 R29 R30 R31 R33 R35 R53 R54	RES,C,1/4W,5%,4.7K	CF1/4-4.7K	ASE	4700-15-4701	9.000
R36	RES,C,1/4W,5%,47	CF1/4-47	ASE	4700-15-4709	1.000
R37 R38	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	2.000
R39	RES,C,1/4W,5%,1.5K	CF1/4-1.5K	ASE	4700-15-1501	1.000
R40	RES,C,1/4W,5%,1K	CF1/4-1K	ASE	4700-15-1001	1.000
R41	RES,C,1/4W,5%,560	CF1/4-560	ASE	4700-15-5600	1.000
R44	RES,MF,1/8W,1%,10K	RN55D-10K	MILSP	4701-03-1002	1.000
R45	RES,MF,1/8W,1%,1.1K	RN55D-1.1K	MILSP	4701-03-1101	1.000
R46	RES,MF,1/8W,1%,39.2K	RN55D-39.2K	MILSP	4701-03-3922	1.000
R47	RES,MF,1/8W,1%,133K	RN55D-133K	MILSP	4701-03-1333	1.000

**WAVETEK**  
PARTS LIST

LV PWR SUPPLY BD,A6

1110-00-7006

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
R48	RES,MF,1/8W,1Z,205K	RN55D-205K	MILSP	4701-03-2053	1.000
R49	RES,MF,1/8W,1Z,2.15K	RN55D-2.15K	MILSP	4701-03-2151	1.000
R50 R51	RES,MF,1/8W,1Z,100K	RN55D-100K	MILSP	4701-03-1003	2.000
R55	RES,C,1/4W,5Z,270	CF1/4-270	ASE	4700-15-2700	1.000
R56	RES,C,1/4W,5Z,2.2K	CF1/4-2.2K	ASE	4700-15-2201	1.000
TP01 TP02 TP03	TESTPOINTS-	2520B-1	USECO	2112-19-0005	3.000

<b>WAVETEK</b> PARTS LIST	LV PWR SUPPLY BD,A6	1110-00-7006 PAGE: 3	F REV
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DILB-8P-108	BURND	2112-00-0007	6.000
2	IC SKT,PC,14 PIN MC000-073	C931402	T-I	2112-00-0011	2.000
3	IC SKT,16 PIN MC000-074	DILB-16P-108	BURND	2112-00-0012	2.000
C01 C15 C36 C53	CAP,TANT,35V,1UF	196D105X9035HA1	SPR	1510-25-3109	4.000
C03 C04 C05	CAP,DISC,.22UF	4PS-P22	SPR	1510-14-3224	3.000
C06	CAP,DISC,3KV,.01UF	DD30-103	C-L	1510-14-0103	1.000
C07 C20 C25 C28	CAP,FILM,.0027 UF	225P27291WD3	SPR	1510-61-7272	4.000
C08 C47	CAP,FILM,.1 UF	225P010491WD3	SPR	1510-61-7104	2.000
C09 C17 C38 C50	CAP,ELEC,25V,100UF	TE1211	SPR	1510-20-4101	4.000
C10 C11 C12 C16 C30 C32 C37 C43 C44	CAP,DISC,.01UF	UK25-103	C-L	1510-14-1103	9.000
C13	CAP,MICA,500V,560PF	DM-15-561J	ARC	1510-50-0561	1.000
C14	CAP,FILM,.0082 UF	225P82291WD3	SPR	1510-61-7822	1.000
C18	CAP,FILM,.022 UF	225P223951WD3	SPR	1510-61-7223	1.000
C19 C24	CAP,FILM,.0012 UF	225P12291WD3	SPR	1510-61-7122	2.000
C21	CAP,MICA,500V,150PF	CM05FD151J03	SPR	1510-50-0151	1.000
C22 C29	CAP,FILM,.0047 UF	225P47291WD3	SPR	1510-61-7472	2.000
C23	CAP,FILM,.012 UF	2225P12391WD3	SPR	1510-61-7123	1.000
C26	CAP,MICA,500V,330PF	DM15-331J	ARC	1510-50-0331	1.000
C27	CAP,MICA,500V,390PF	DM-15-391J	ARC	1510-50-0391	1.000
C35 C40 C46 C52	CAP,TANT,20V,10UF	196D106X9020JA1	SPR	1510-25-2100	4.000
C39	CAP,MICA,500V,10PF	CM05CD100D03	SPR	1510-50-8100	1.000
C41	CAP,MICA,500V,220PF	DM-15-221J	ARC	1510-50-0221	1.000
C42	CAP,MICA,500V,120PF	DM15-121J	ARC	1510-50-0121	1.000
C45	CAP,FILM,.047 UF	225P47391WD3	SPR	1510-61-7473	1.000
C48	CAP,ELEC,16V,470UF	ECEB1CV471S	PNSNC	1510-25-8471	1.000
C49 C51	CAP,MICA,500V,12PF	CM05CD120J03	SPR	1510-50-8120	2.000
CR01	DIODE,ZENER,9.1V	1N5239	MOT	4801-01-5239	1.000
CR02	DIODE,ZENER,75V	1N5267	MOT	4801-01-5267	1.000
CR03 CR10	DIODE,RECT,400V	1N4004	P-C	4806-01-4004	2.000
CR04 CR05 CR06 CR07 CR08 CR09	DIODE,SIGNAL	1N914	G-E	4807-01-0914	6.000

**WAVETEK**  
PARTS LIST

DEFL AMP BD,A7B

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REFERENCE DESIGNATORS	PART DESCRIPTION	* ORIG-MFR-PART-NO	MFR	WAVETEK NO.	QTY
IC01 IC08	DUAL OP AMP	TL082CP	T-I	7000-00-8200	2.000
IC02	POWER AMP, AUDIO	LM380M	NAT	7000-03-8001	1.000
IC03	QUAD POS NAND,SCHMT	SN74LS132N	T-I	8007-41-3210	1.000
IC04	DUAL J-K FLIP-FLOP	DM74LS76AN	NAT	8000-74-7610	1.000
IC05	DUAL MONOST/MVBTR	DM74123N	NAT	8007-41-2300	1.000
IC06	OP AMP, BIMOS	CA3140E	RCA	7000-31-4001	1.000
IC07 IC09 IC10	OP AMP	N5741CV	SIG	7000-57-4100	3.000
L01 L02 L03	CHOKE	VK20010/3B	FRXC	1810-09-0001	3.000
P01	CONNECTOR,MOLEX	09-66-1071	MOL	2112-08-0033	1.000
Q02	TRANSISTOR	PN4275	NAT	4902-04-2750	1.000
Q03 Q12	TRANSISTOR	PN4121-1B	NAT	4901-04-1210	2.000
Q04 Q05 Q06 Q07 Q11 Q13 Q14 Q16 Q17	TRANSISTOR	2N6557	MOT	4901-06-5570	9.000
Q10	TRANSISTOR	2N6556	NAT	4901-06-5560	1.000
Q15	TRANSISTOR	2N3565	NAT	4901-03-5650	1.000
R01 R59	RES,C,1/4W,5%,2.7K	CF1/4-2.7K	ASE	4700-15-2701	2.000
R02 R16 R30	RES,C,1/4W,5%,18K	CF1/4-18K	ASE	4700-15-1802	3.000
R03 R09	POT,10K	3386W-1-103	BOU	4610-02-0103	2.000
R04 R05 R66 R70	RES,MF,1/8W,1%,10K	RN55D-10K	MILSP	4701-03-1002	4.000
R06 R10	RES,C,1/4W,5%,3.3K	CF1/4-3.3K	ASE	4700-15-3301	2.000
R07 R08 R11 R12 R21 R22	RES,C,1/4W,5%,68K	CF1/4-68K	ASE	4700-15-6802	6.000
R13	RES,C,1/4W,5%,5.6K	CF1/4-5.6K	ASE	4700-15-5601	1.000
R14	RES,C,1/4W,5%,15K	CF1/4-15K	ASE	4700-15-1502	1.000
R15	RES,C,1/4W,5%,100K	CF1/4-100K	ASE	4700-15-1003	1.000
R17	RES,C,1/4W,5%,390K	CF1/4-390K	ASE	4700-15-3903	1.000
R18	RES,C,1/4W,5%,51	CF1/451	ASE	4700-15-5109	1.000
R19	RES,C,1/4W,5%,180K	CF1/4-180K	ASE	4700-15-1803	1.000
R20 R64	RES,C,1/4W,5%,2.2K	CF1/4-2.2K	ASE	4700-15-2201	2.000
R23 R25	RES,C,1/4W,5%,150K	CF1/4-150K	ASE	4700-15-1503	2.000
R24 R26	RES,C,1/4W,5%,9.1K	CF1/4-9.1K	ASE	4700-15-9101	2.000
R27	RES,MF,1/8W,1%,24.9K	RN55D-24.9K	MILSP	4701-03-2492	1.000
R28 R65	RES,MF,1/8W,1%,6.19K	RN55D-6.19K	MILSP	4701-03-6191	2.000
R29	RES,MF,1/8W,1%,1K	RN55D-1K	MILSP	4701-03-1001	1.000
<b>WAVETEK</b> <b>PARTS LIST</b>	DEFL AMP BD,A7B	1110-00-7007		D	REV
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
R31	RES,C,1/4W,5%,120K	CF1/4-120K	ASE	4700-15-1203	1.000
R32 R80	RES,C,1/4W,5%,56K	CF1/4-56K	ASE	4700-15-5602	2.000
R33	RES,C,1/4W,5%,10K	CF1/4-10K	ASE	4700-15-1002	1.000
R34	RES,C,1/4W,5%,82K	CF1/4-82K	ASE	4700-15-8202	1.000
R35	RES,C,1/4W,5%,470K	CF1/4-470K	ASE	4700-15-4703	1.000
R36	RES,C,1/4W,5%,220	CF1/4-220	ASE	4700-15-2200	1.000
R37 R68 R74	RES,C,1/4W,5%,1K	CF1/4-1K	ASE	4700-15-1001	3.000
R38	RES,C,1/4W,5%,39K	CF1/4-39K	ASE	4700-15-3902	1.000
R39	RES,MF,1/8W,1%,133K	RN55D-133K	MILSP	4701-03-1333	1.000
R40	RES,MF,1/8W,1%,105K	RN55D-105K	MILSP	4701-03-1053	1.000
R41	RES,MF,1/8W,1%,52.3K	RN55D-52.3K	MILSP	4701-03-5232	1.000
R42	RES,MF,1/8W,1%,191K	RN55D-191K	MILSP	4701-03-1913	1.000
R43	RES,MF,1/8W,1%,182K	RN55D-182K	MILSP	4701-03-1823	1.000
R44	RES,MF,1/8W,1%,511K	RN55D-511K	MILSP	4701-03-5113	1.000
R45	RES,MF,1/8W,1%,866K	RN55D-866K	MILSP	4701-03-8663	1.000
R46	RES,MF,1/8W,1%,348K	RN55D-348K	MILSP	4701-03-3483	1.000
R47	RES,MF,1/8W,1%,237K	RN55D-237K	MILSP	4701-03-2373	1.000
R48	RES,MF,1/8W,1%,357K	RN55D-357K	MILSP	4701-03-3573	1.000
R49	RES,MF,1/8W,1%,80.6K	RN55D-80.6K	MILSP	4701-03-8062	1.000
R50	RES,MF,1/8W,1%,140K	RN55D-140K	MILSP	4701-03-1403	1.000
R51	RES,MF,1/8W,1%,69.8K	RN55D-69.8K	MILSP	4701-03-6982	1.000
R60	POT,5K	3386W-1-502	BOU	4610-02-0502	1.000
R61	RES,C,1/4W,5%,3.9K	CF1/4-3.9K	ASE	4700-15-3901	1.000
R63	RES,MF,1/8W,1%,15K	RN55D-15K	MILSP	4701-03-1502	1.000
R67	RES,C,1/4W,5%,12K	CF1/4-12K	ASE	4700-15-1202	1.000
R69	RES,MF,1/8W,1%,30.1K	RN55D-30.1K	MILSP	4701-03-3012	1.000
R71	RES,C,1/4W,5%,270K	CF1/4-270K	ASE	4700-15-2703	1.000
R75	RES,C,1/4W,5%,560K	CF1/4-560K	ASE	4700-15-5603	1.000
R76	RES,C,1/4W,5%,2K	CF1/4-2K	ASE	4700-15-2001	1.000
R78	RES,C,1/4W,5%,47K	CF1/4-47K	ASE	4700-15-4702	1.000
R79 R83	RES,C,1/4W,5%,470	CF1/4-470	ASE	4700-15-4700	2.000
R81 R84	RES,C,1/4W,5%,2.7	CF1/4-2.7	ASE	4700-15-2708	2.000
<b>WAVETEK</b> PARTS LIST		DEFL AMP BD,A7B	1110-00-7007 PAGE: 3		D REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-WGR-PART-NO	WGR	WAVETEK NO.	QTY
R82	RES,C,1/4W,5%,1M	CF1/4-1M	ASE	4700-15-1004	1.000
R85	RES,C,1/4W,5%,27K	CF1/4-27K	ASE	4700-15-2702	1.000
R86	RES,C,1/4W,5%,6.2K	CF1/4-6.2K	ASE	4700-15-6201	1.000
R87	RES,C,1/4W,5%,8.2K	CF1/4-8.2K	ASE	4700-15-8201	1.000
R88	RES,C,1/4W,5%,220K	CF1/4220K	ASE	4700-15-2203	1.000
R89	RES,C,1/4W,5%,820	CF1/4-820	ASE	4700-15-8200	1.000
TP01 TP02 TP03 TP04 TP05 TP06 TP07 TP08 TP09	TESTPOINTS-	2520B-1	USECD	2112-19-0005	9.000
<b>WAVETEK</b> <b>PARTS LIST</b>		DEFL AMP BD,A7B	1110-00-7007		D
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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY
1	IC SKT,8 PIN	DILB-8P-108	BURND	2112-00-0007	2.000
C01	CAP,ELEC,300V,120UF	39D127F300HS4	SPR	1510-25-5121	1.000
C02	CAP,MICA,500V,220PF	DM-15-221J	ARC	1510-50-0221	1.000
C03	CAP,TANT,20V,10UF	196D106X9020JA1	SPR	1510-25-2100	1.000
C04 C06 C08 C09 C10	CAP,DISC,3KV,.01UF	DD30-103	C-L	1510-14-0103	5.000
C05	CAP,DISC,2KV,.25UF	KM9-20-250	FCI	1510-14-2254	1.000
C07	CAP,FILM,.0047 UF	225P47291MD3	SPR	1510-61-7472	1.000
C11	CAP,ELEC,16V,470UF	ECEB1CV4715	PNSNC	1510-25-8471	1.000
CR01 CR02 CR03 CR04 CR11	DIODE,RECT,800V	ED30015	ETP	4806-01-4006	5.000
CR05 CR06 CR07 CR08 CR15	DIODE,RECT,7000V	G7F-7KV-10MA-150NS	GAL	4806-02-0070	5.000
CR09	DIODE,RECT,400V	1N4004	P-C	4806-01-4004	1.000
CR10 CR12 CR13 CR14	DIODE,SIGNAL	1N914	G-E	4807-01-0914	4.000
CR16	DIODE, VARACTOR	NV430D10	NEC	4803-02-0017	1.000
IC01 IC02	OP AMP	N5741CV	SIG	7000-57-4100	2.000
P02	CONNECTOR,MOLEX	09-66-1121	MOL	2112-08-0036	1.000
P07	CONN,6-PIN KONEXTON	09-65-1068	MOL	2112-05-0009	1.000
Q01 Q02 Q03 Q04	TRANSISTOR	2N6559	MOT	4901-06-5590	4.000
R01	RES,C,1/2W,5%,820	CF1/2-820	ASE	4700-25-8200	1.000
R02	RES,C,2W,5%,22K	HB2235	A-B	4700-45-2202	1.000
R03	RES,C,1/4W,5%,18	CF 1/4-18	ASE	4700-15-1809	1.000
R04 R29	RES,C,1/4W,5%,2.2K	CF1/4-2.2K	ASE	4700-15-2201	2.000
R05 R07 R20	RES,MF,1/8W,1%,19.6K	RN55D-19.6K	MILSP	4701-03-1962	3.000
R06	RES,MF,1/8W,1%,255K	RN55D-255K	MILSP	4701-03-2553	1.000
R08	RES,MF,1/8W,1%,10K	RN55D-10K	MILSP	4701-03-1002	1.000
R09 R11	RES,C,1/4W,5%,180K	CF1/4-180K	ASE	4700-15-1803	2.000
R10	POT,100K	3386W-1-104	BOU	4610-02-0104	1.000
R12 R13	RES,C,1/4W,5%,4.7M	CB4755	A-B	4700-15-4704	2.000
R14 R15 R16 R17 R18	RES,C,1/4W,5%,1M	CF1/4-1M	ASE	4700-15-1004	5.000
R19	RES,MF,1/8W,1%,169K	RN55D-169K	MILSP	4701-03-1693	1.000
R21	RES,MF,1/8W,1%,392K	RN55D-392K	MILSP	4701-03-3923	1.000
R22	RES,MF,1/8W,1%,301K	RN55D-301K	MILSP	4701-03-3013	1.000
R23 R24 R25 R26 R27 R28	RES,MF,1/4W,1%,261K	RN60D-261K	MILSP	4701-13-2613	6.000
<b>WAVETEK PARTS LIST</b>	HV PW SUPPLY BU,AB	1110-00-7008		A REV	
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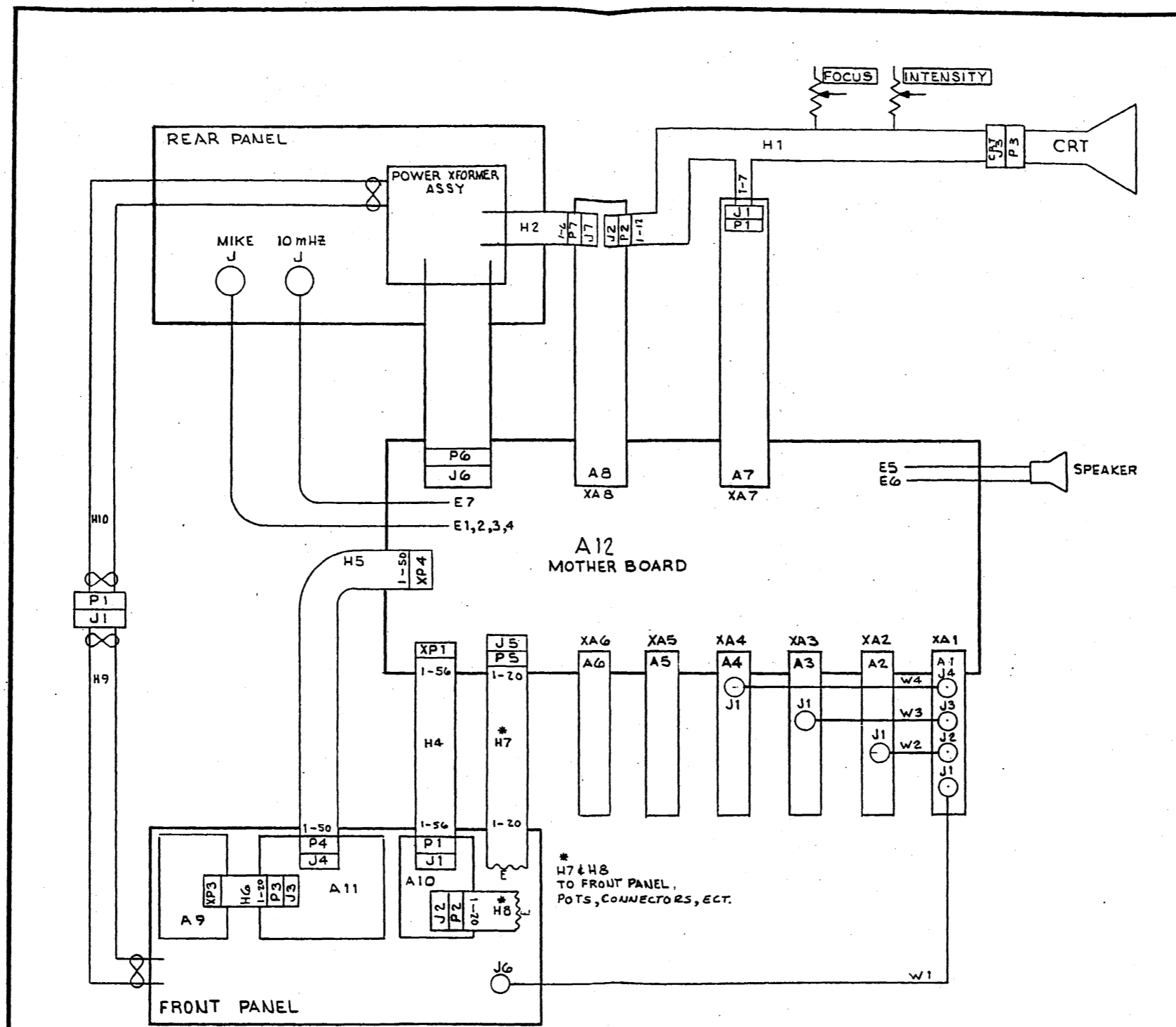
REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-NEGR-PART-NO	MEGR	WAVETEK NO.	QTY
R30	RES,C,1/4W,5Z,24K	CF1/4-24K	ASE	4700-15-2402	1.000
R31	POT,10K	3386W-1-103	BOU	4610-02-0103	1.000
R32	RES,C,1/4W,5Z,10K	CF1/4-10K	ASE	4700-15-1002	1.000
R33	RES,C,1/4W,5Z,33K	CF1/4-33K	ASE	4700-15-3302	1.000
R34	RES,C,1/4W,5Z,120	CF1/4-120	ASE	4700-15-1200	1.000
R35	RESISTOR, 1/4W 5Z	CF-1/4-22M	ASE	4700-15-2205	1.000
R37 R38	RES,C,1/4W,5Z,470K	CF1/4-470K	ASE	4700-15-4703	2.000
TP01 TP02	TESTPOINTS-	2520B-1	USECD	2112-19-0005	2.000
<b>WAVETEK PARTS LIST</b>		HV PW SUPPLY BD,AB	1110-00-7008		A REV
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# SECTION 7

## SCHEMATICS

The schematics appear in the following order:

- Cable Diagram
- Front Panel Wiring
- Rear Panel Wiring
- CRT Interconnect Wiring
- A1-1B Mixer Bd
- A2 Low Frequency PLL
- A3-1 High Freq Synth Bd
- A4 IF Amplifier Bd
- A5 Audio Bd
- A6 Low Voltage PS Bd
- A7B Deflection Bd
- A8 High Voltage PS Bd
- A9 Display Bd
- A10B Front Panel Bd
- A11 Freq Control Bd (1 of 2)
- A11 Freq Control Bd (2 of 2)
- A12B Mother Bd
- A13B Lissajous/Swept RF (Early Versions)
- Inverter



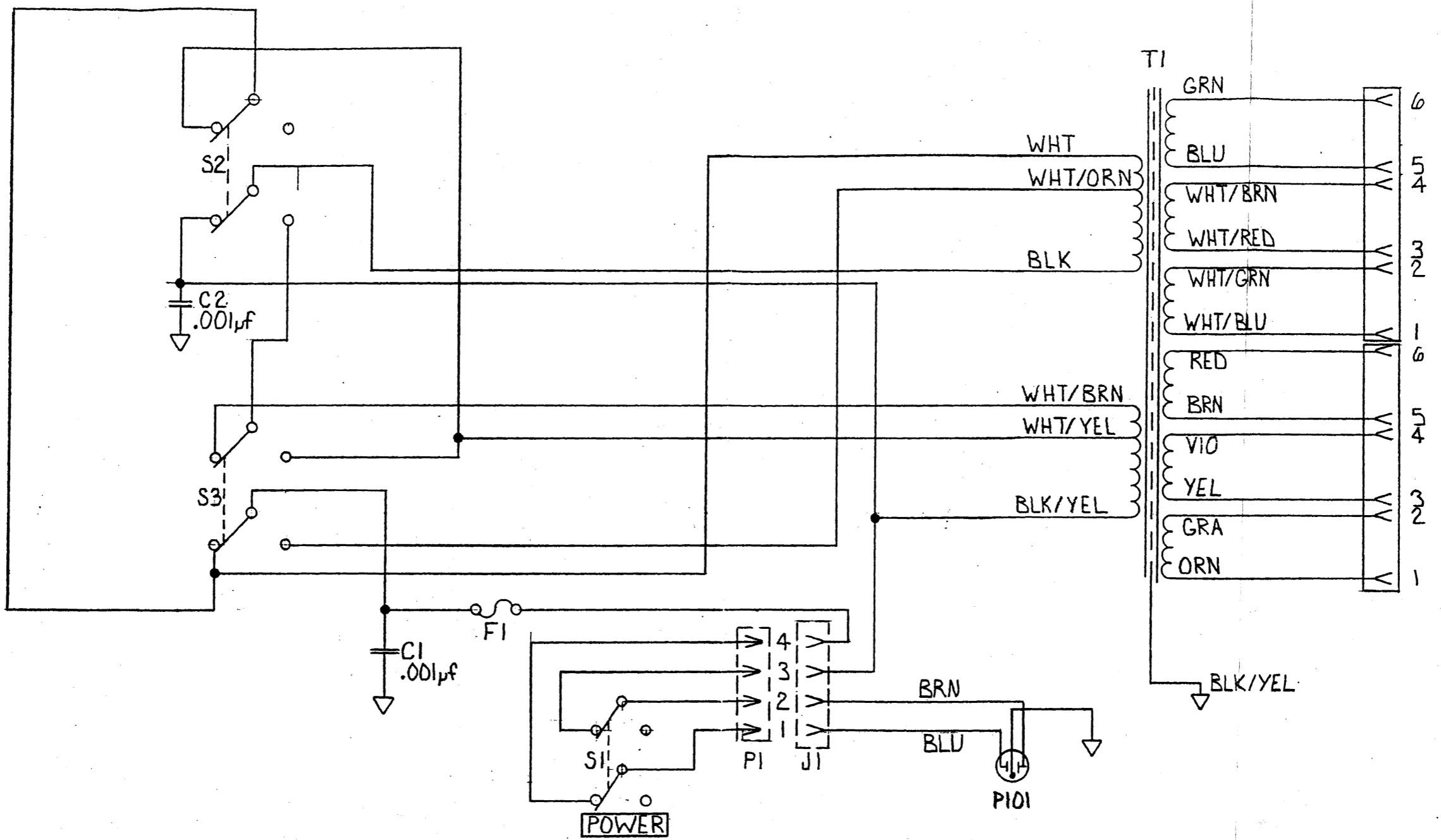
THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO WAVETEK. THE INFORMATION IN THIS DOCUMENT IS NOT TO BE USED OR DUPLICATED IN ANY MANNER WITHOUT THE PRIOR APPROVAL IN WRITING OF WAVETEK.

MATERIAL:		<b>WAVETEK</b> , INDIANA	
		3000 CABLE DIAGRAM	
FINISH:	DRAWN BY L.T.E.	SCALE 1/1	DATE 10-26-92
	CHE' D R.W.	DATE 10-26-92	DRAWING NO. 0714-250001
ARTWORK:	RELEASED BY	DATE	

TOLERANCE:  
DECIMAL DIM. ± .005  
FRACTIONAL DIM. ± 1/64  
ANGLES ± 30°  
UNLESS OTHERWISE SPECIFIED

RELEASED 10-26-92		
NO.	DESCRIPTION	BY
	REVISION	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



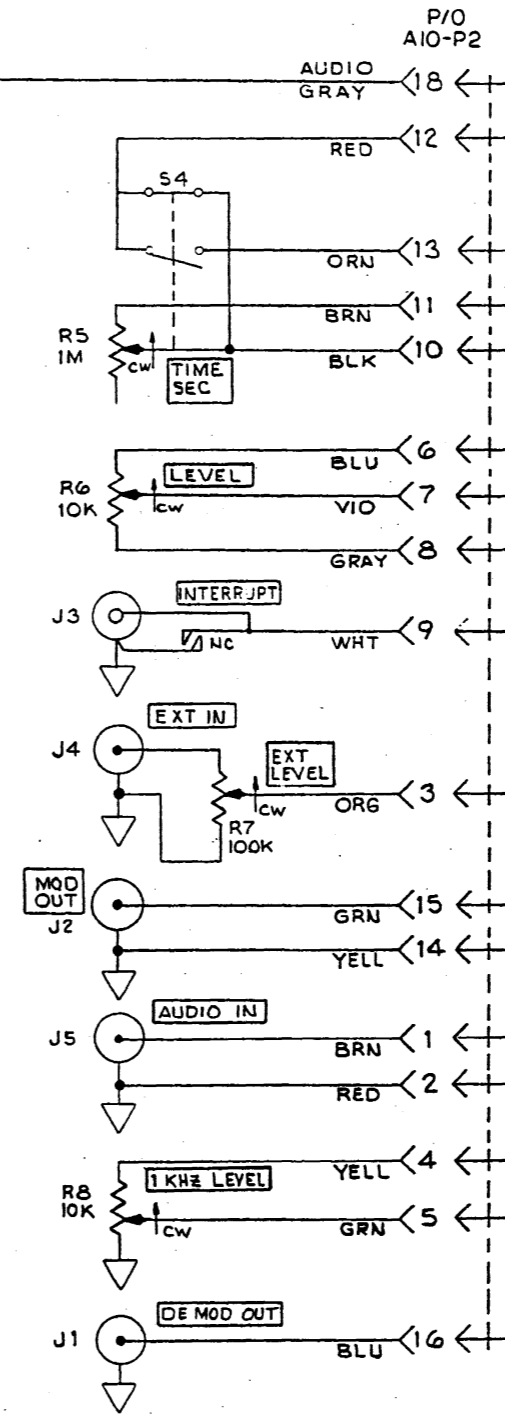
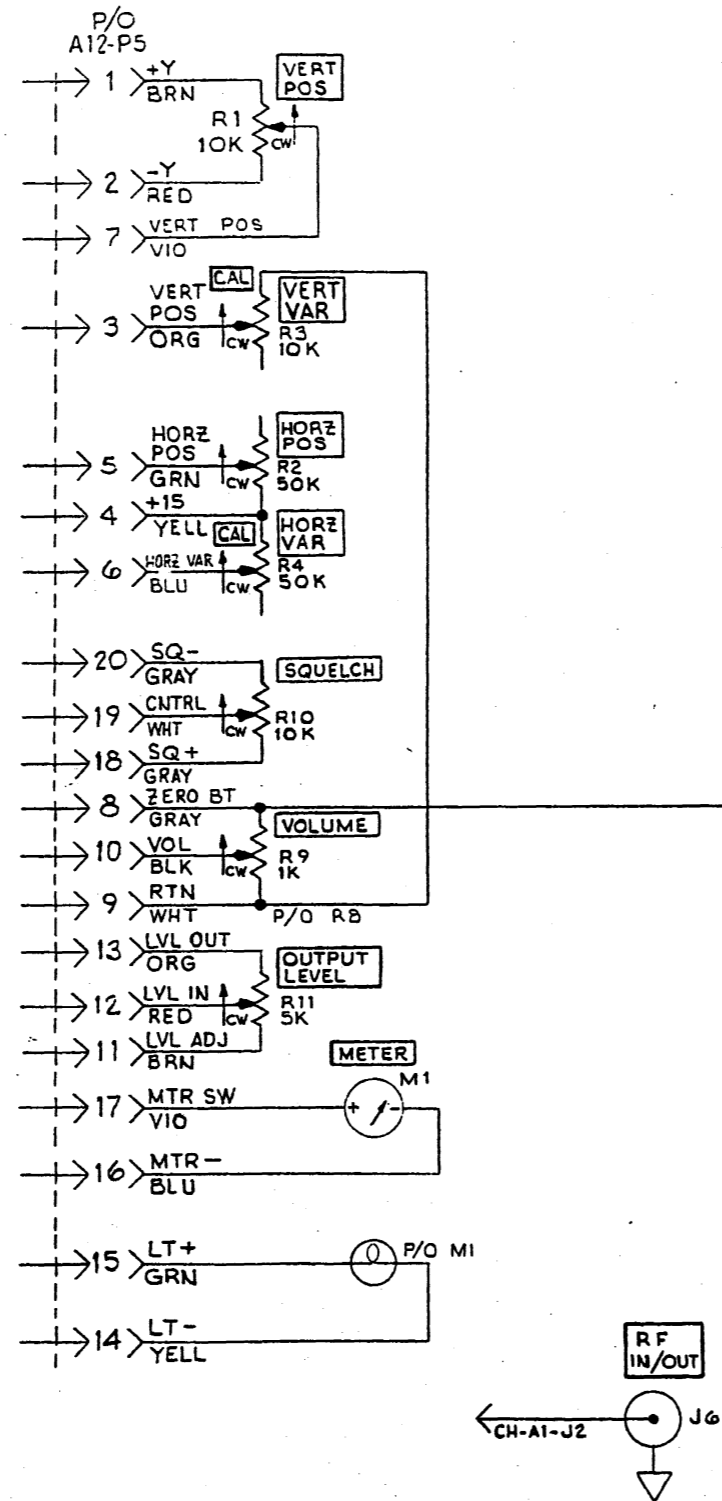
P6

P7

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± XX ± ± .XXX ±		CONTRACT NO.		<b>WAVETEK</b> INDIANA, INC.		
MATERIAL		APPROVALS	DATE			
FINISH		DRAWN Dale Hedgspeth 10/82		MODEL 3000 REAR PANEL SCHEMATIC		
NEXT ASSY		CHECKED				
USED ON				SIZE <b>B</b>	CODE IDENT NO. <b>34280</b>	DRAWING NO. 0714-15-0004
APPLICATION		DO NOT SCALE DRAWING		SCALE	DRAWING	SHEET 1 OF 1





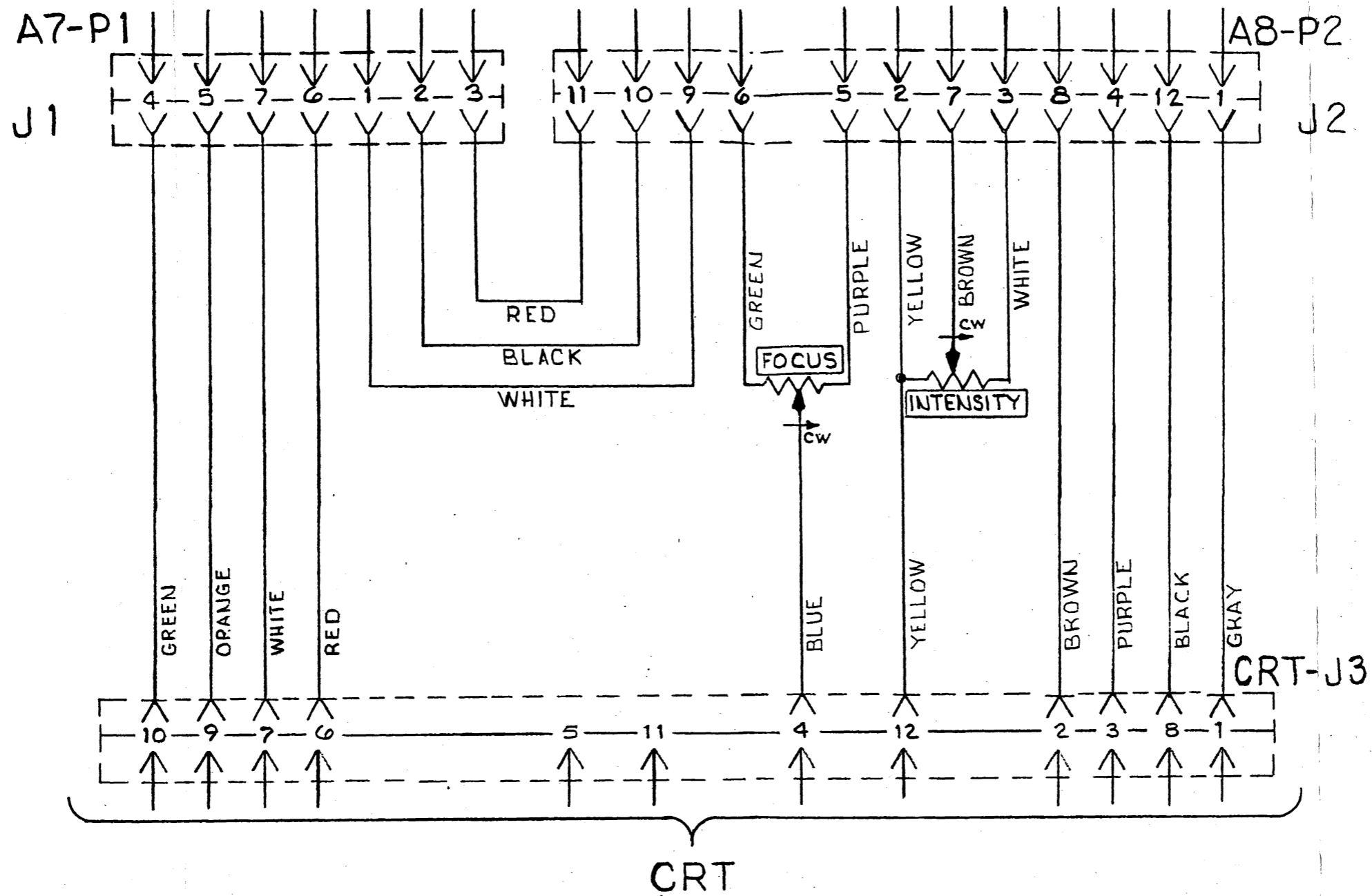
THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO WAVETEK. THE INFORMATION IN THIS DOCUMENT IS NOT TO BE USED OR DUPLICATED IN ANY MANNER WITHOUT THE PRIOR APPROVAL IN WRITING OF WAVETEK.

TOLERANCE:  
 DECIMAL DIM. ± .005  
 FRACTIONAL DIM. ± 1/64  
 ANGLES ± 30°  
 UNLESS OTHERWISE SPECIFIED

2 ECN 12-7-82 DH  
 RELEASED 10-26-82 DH

NO.	DESCRIPTION	BY
	REVISION	

MATERIAL:		WAVETEK <sup>INDIANA</sup>	
FRONT PANEL WIRING			
FINISH:	DRAWN BY LTS	SCALE ~	DATE 1-2-82
	CHK'D R.W.	DATE 1-31-82	DRAWING NO. 0714-25-0003
ARTWORK #	RELEASED BY	DATE	

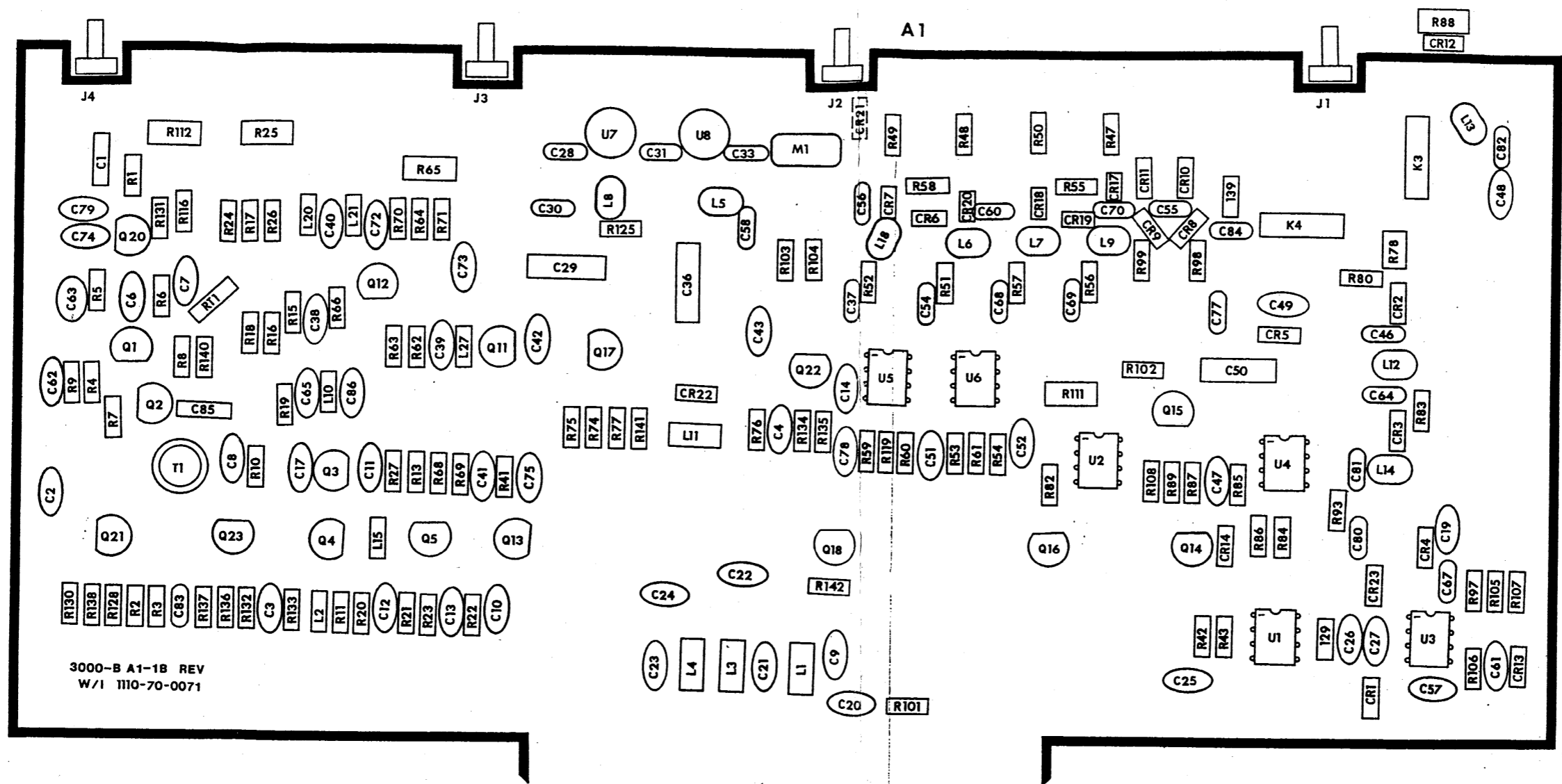


THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO WAVETEK. THE INFORMATION IN THIS DOCUMENT IS NOT TO BE USED OR DUPLICATED IN ANY MANNER WITHOUT THE PRIOR APPROVAL IN WRITING OF WAVETEK.

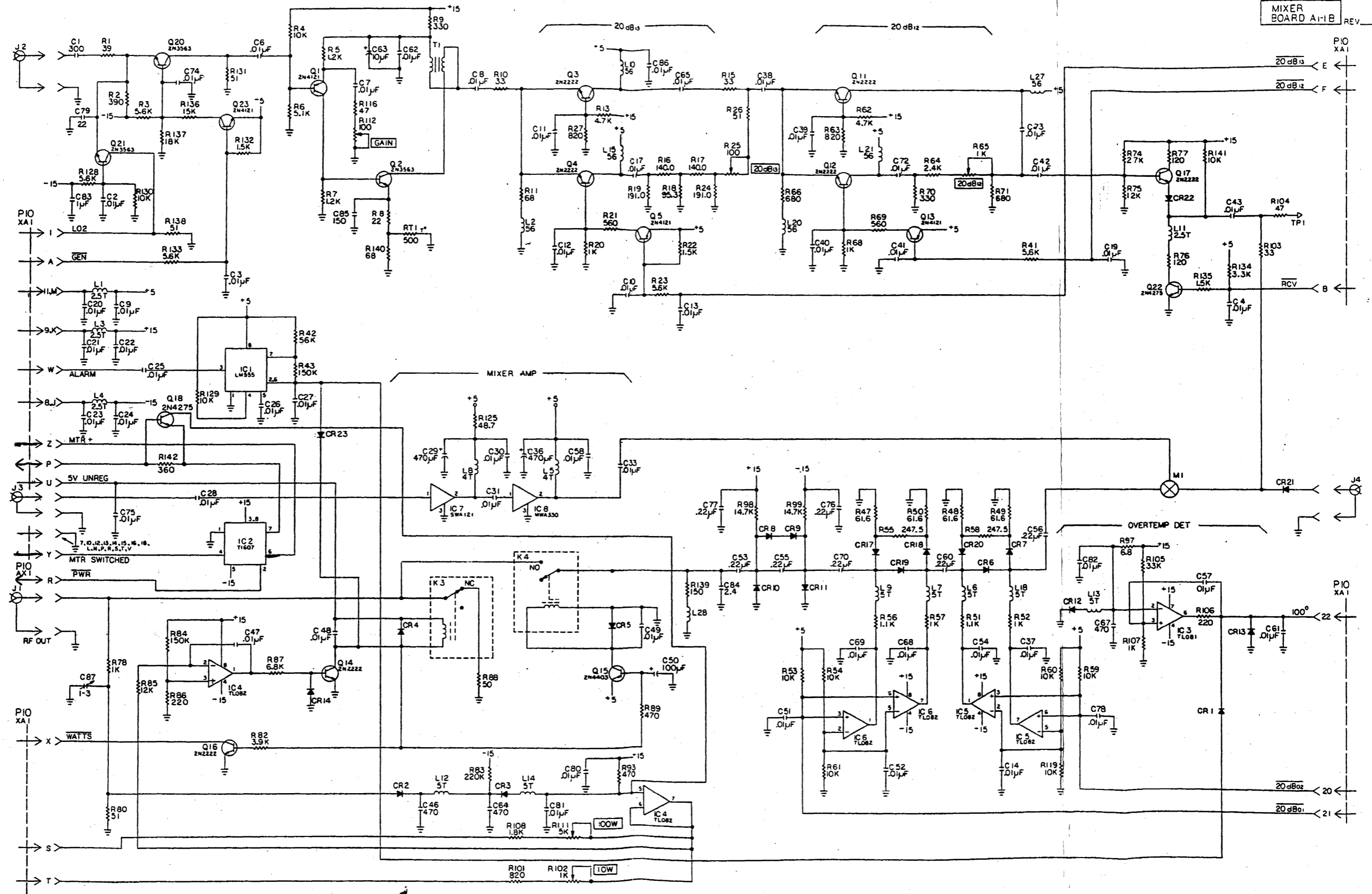
TOLERANCE:  
 DECIMAL DIM.  $\pm .005$   
 FRACTIONAL DIM.  $\pm 1/64$   
 ANGLES  $\pm 30'$   
 UNLESS OTHERWISE SPECIFIED

NO.	DESCRIPTION	BY
	REVISION	

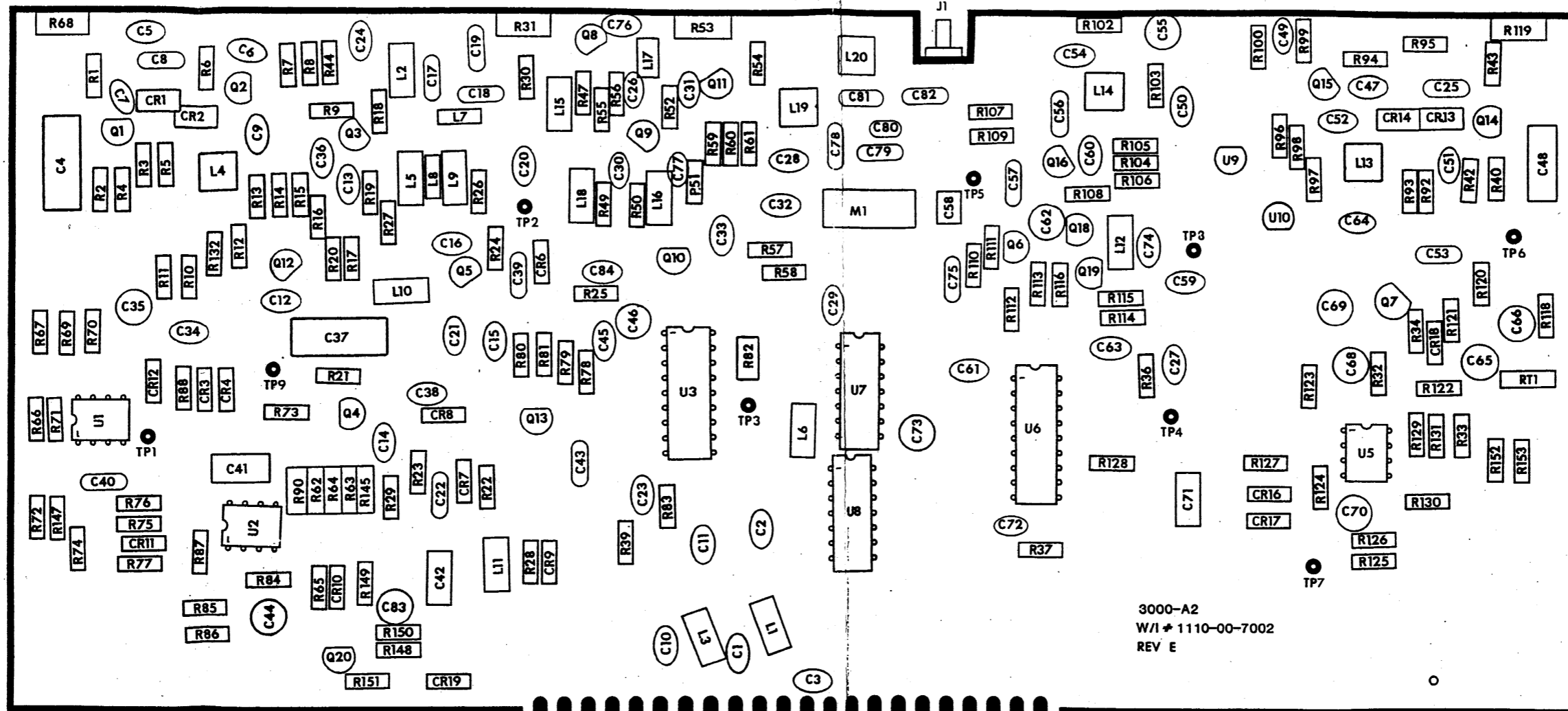
MATERIAL:	<b>WAVETEK</b> <sup>INDIANA</sup>		
	CRT INTERCONNECT WIRING-H1		
FINISH:	DRAWN BY LTS	SCALE N	DATE 1-12-82
	CHK'D RW	DATE 1-31-82	DRAWING NO.
ARTWORK #	RELEASED BY	DATE	



3000-B A1-1B REV  
W/1 1110-70-0071

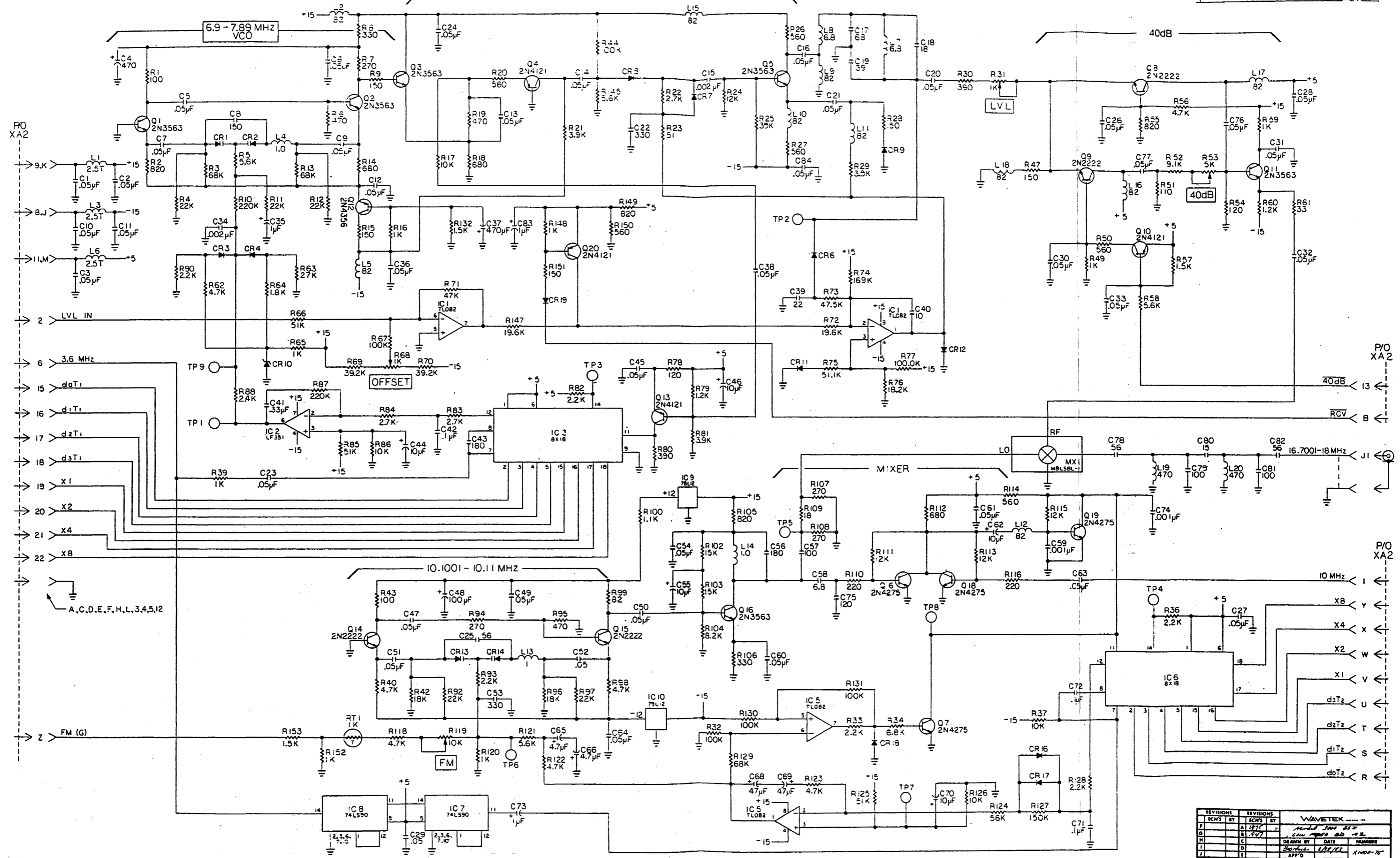


A2



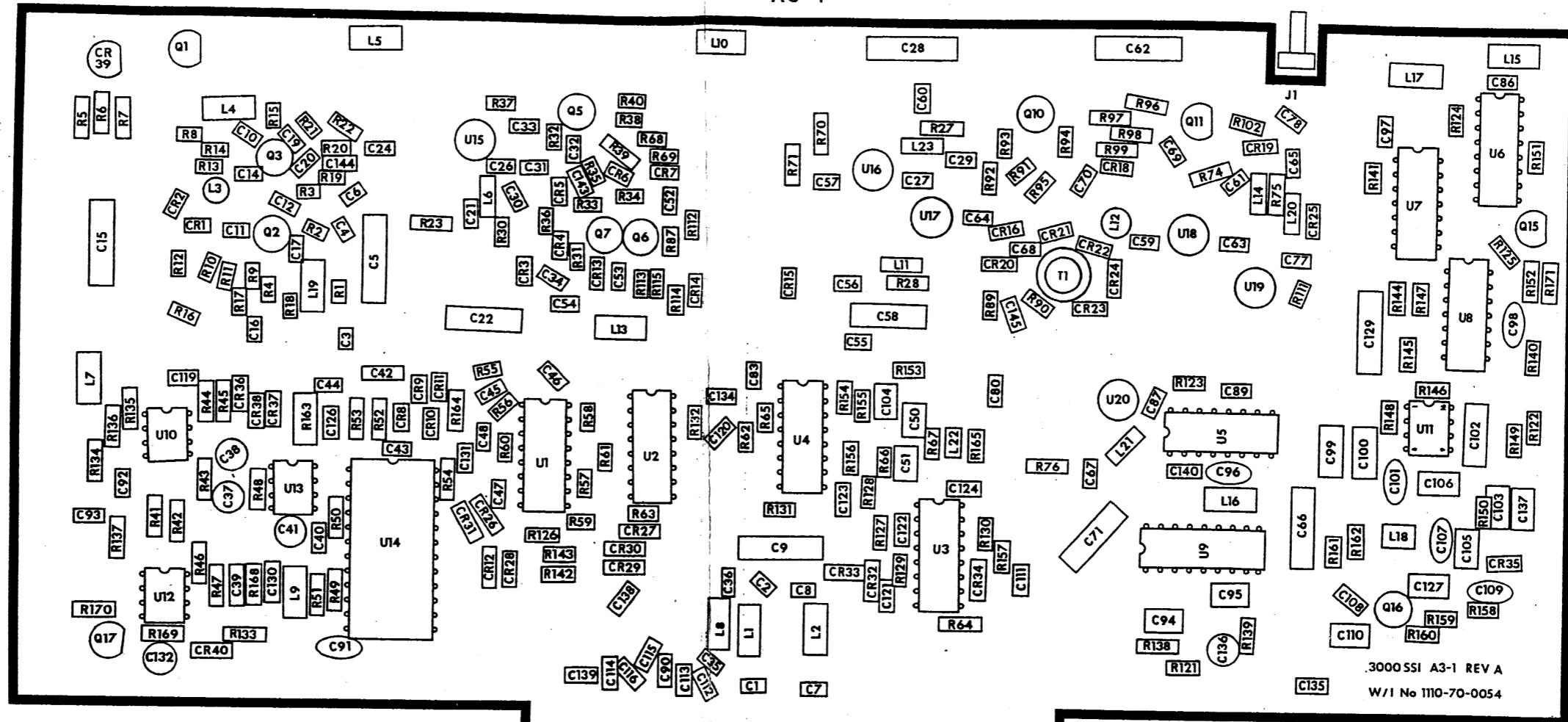
3000-A2  
W/I # 1110-00-7002  
REV E

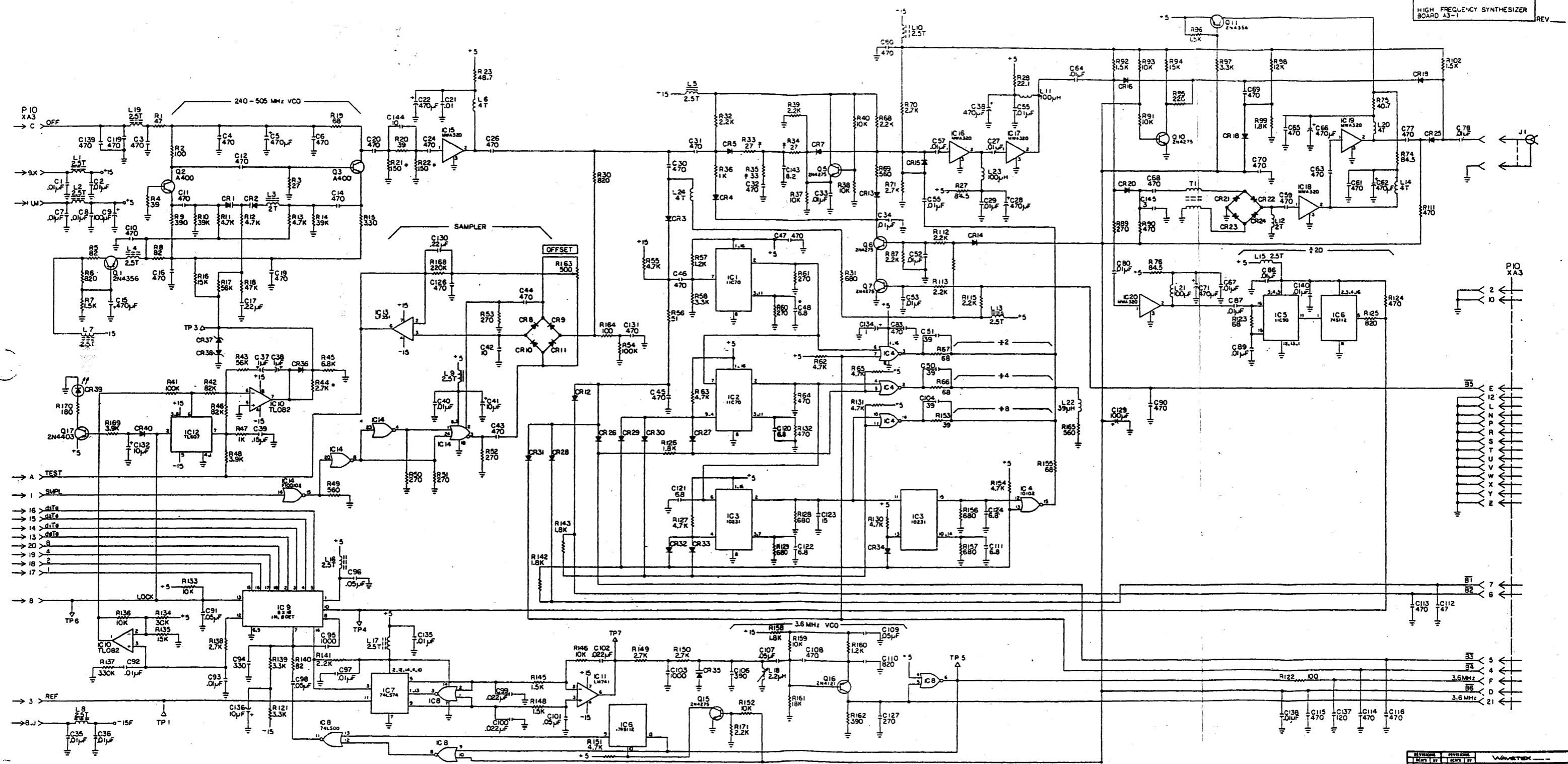
AM CKTS



REV	BY	DATE	DESCRIPTION
A	1/77		REVISED
B	1/77		REVISED
C			
D			
E			

WAVETEK  
 DRAWN BY DATE NUMBER  
 BANKS 5/25/78 1400-75  
 APP'D

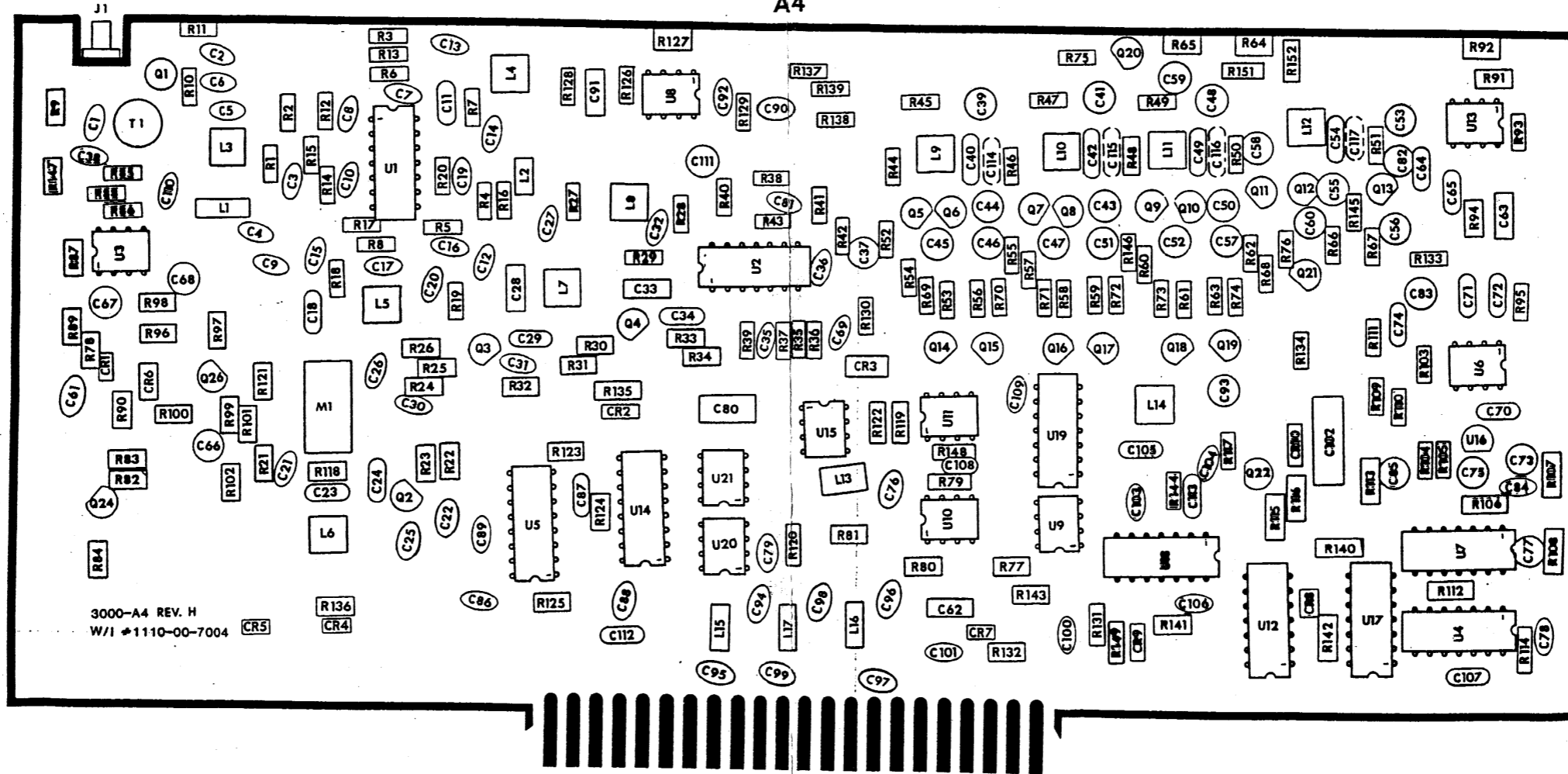




REV	DATE	BY	CHKD	APP'D
1	10/1/74	...	...	...
2	10/1/74	...	...	...
3	10/1/74	...	...	...
4	10/1/74	...	...	...
5	10/1/74	...	...	...
6	10/1/74	...	...	...
7	10/1/74	...	...	...
8	10/1/74	...	...	...
9	10/1/74	...	...	...
10	10/1/74	...	...	...



A4

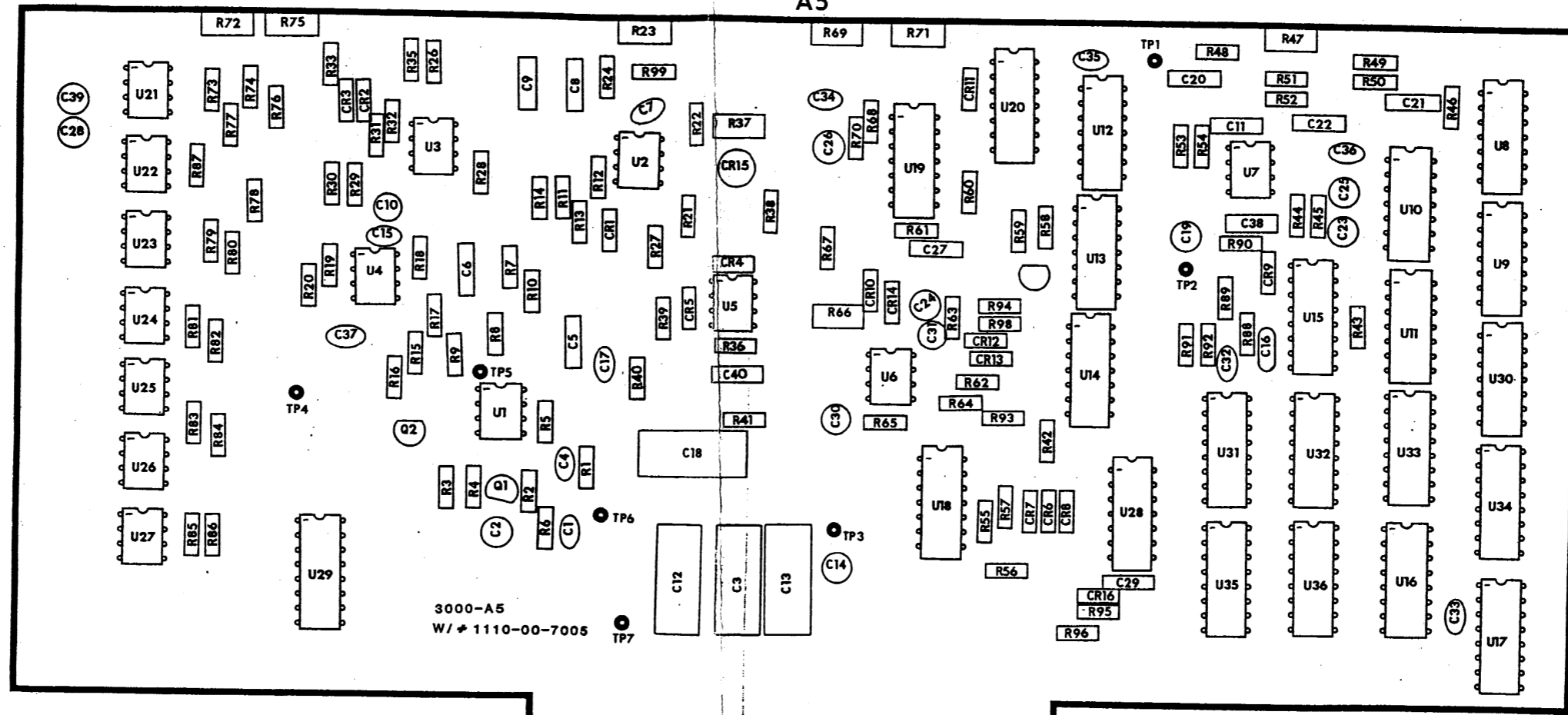


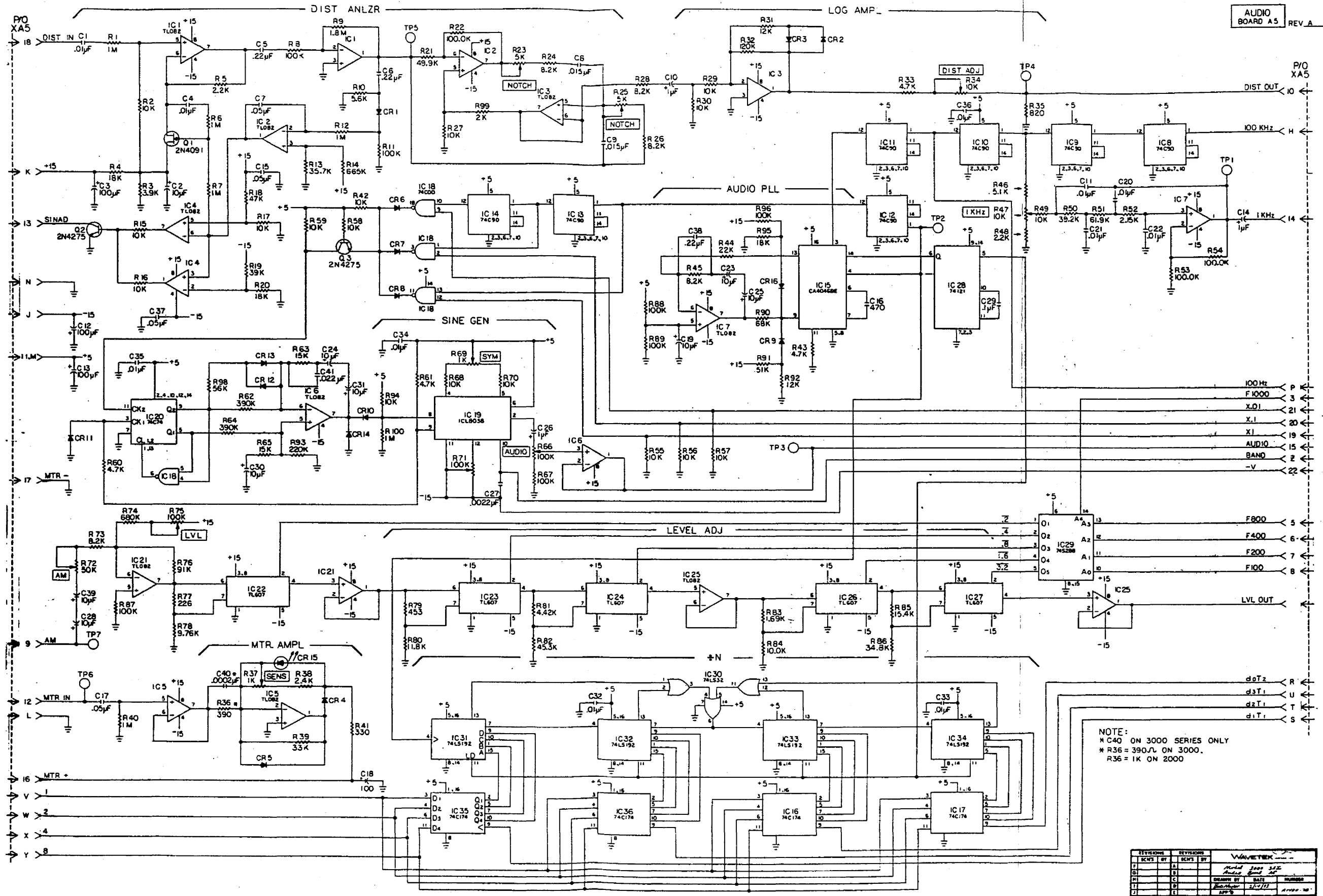
3000-A4 REV. H  
W/1 #1110-00-7004

CR5



A5

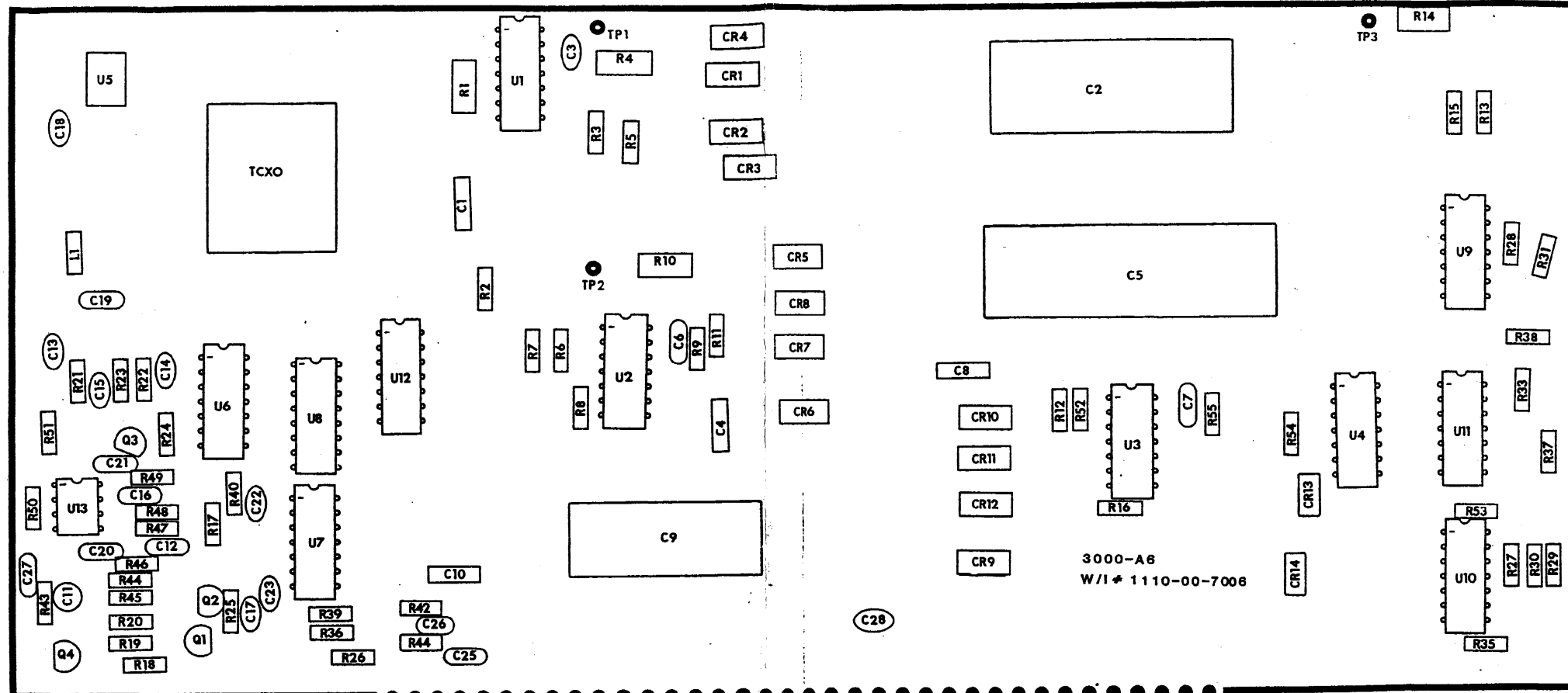


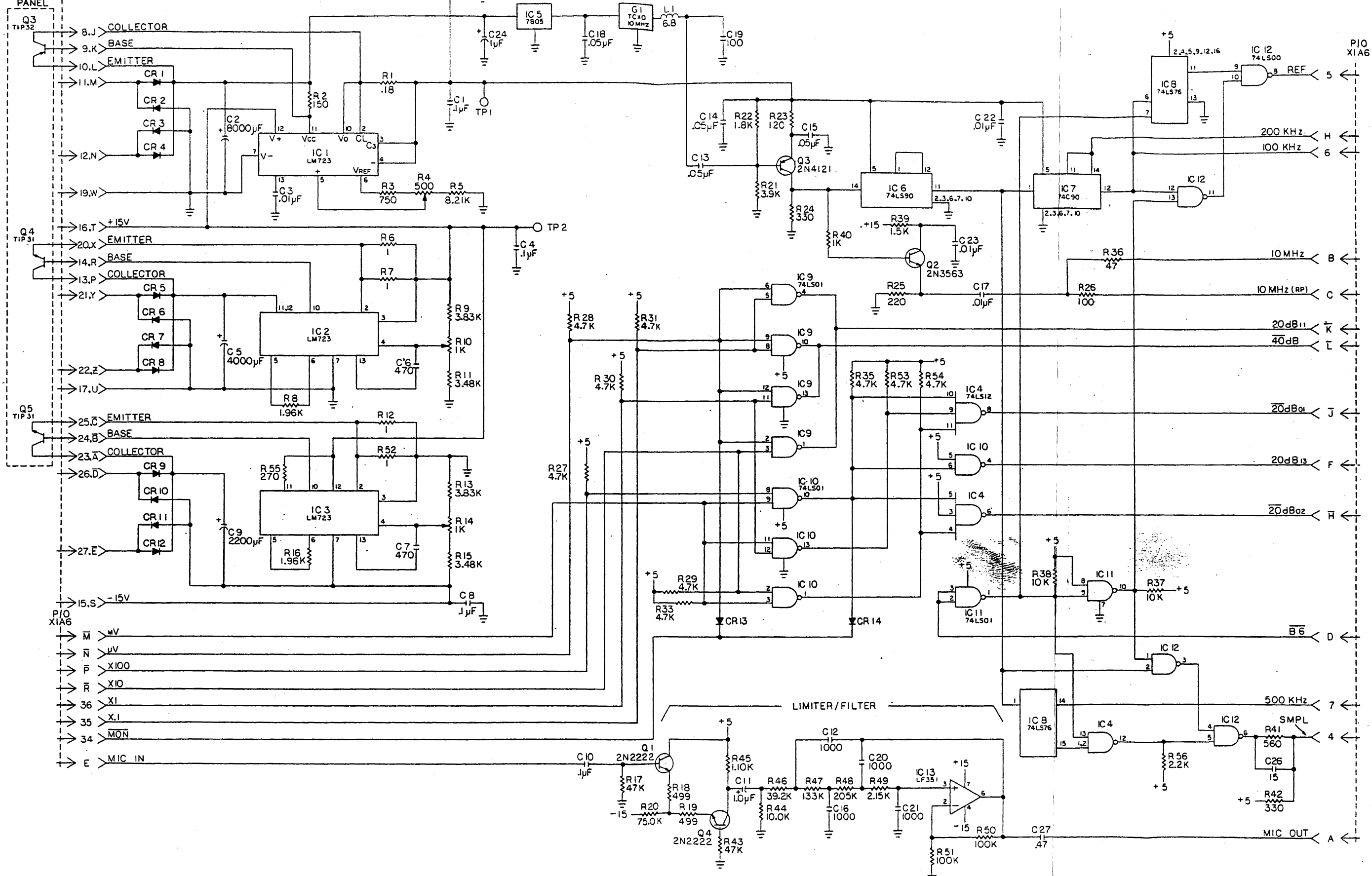


NOTE:  
 \* C40 ON 3000 SERIES ONLY  
 \* R36 = 390Ω ON 3000.  
 R36 = 1K ON 2000

REV	BY	DATE	DESCRIPTION
1	AW	10/1/77	Initial Design
2	AW	10/1/77	Final Design
3	AW	10/1/77	Production
4	AW	10/1/77	Production
5	AW	10/1/77	Production

A6

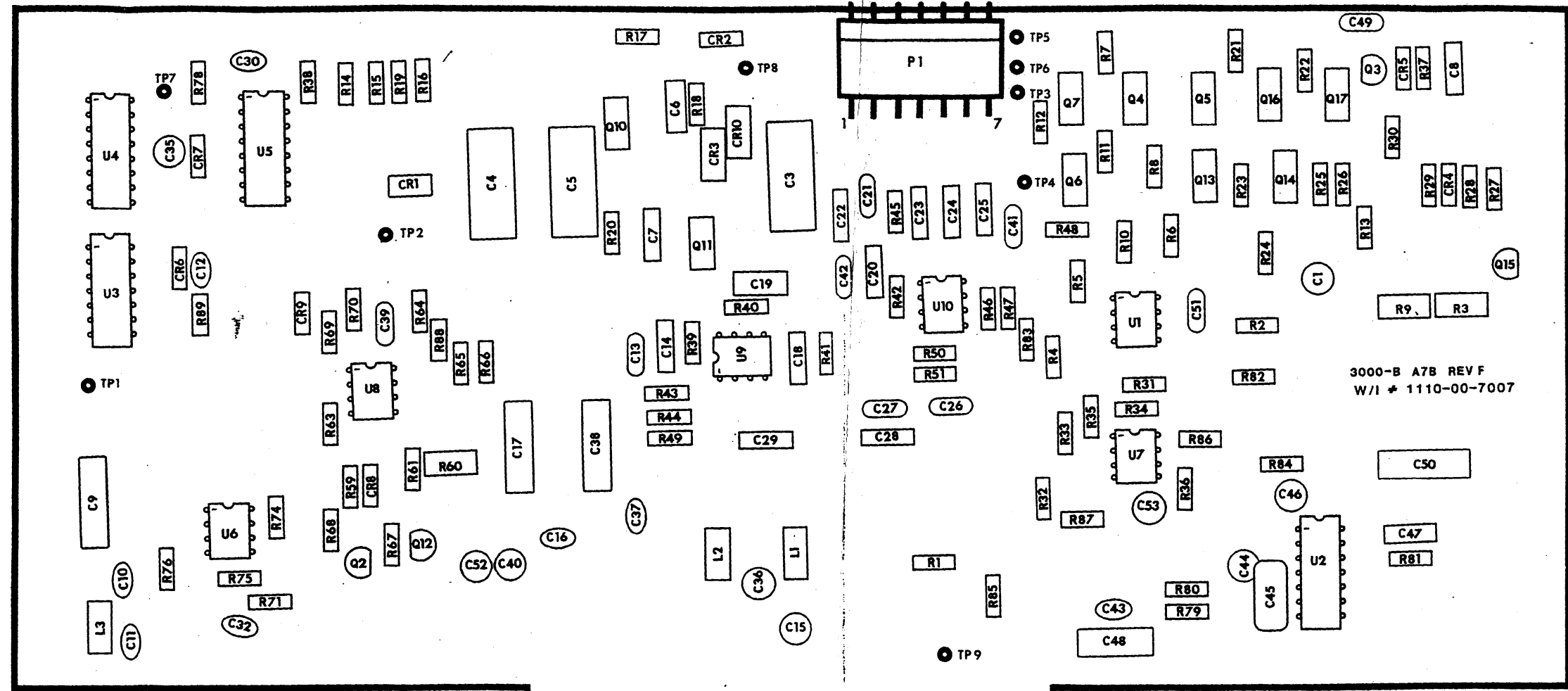




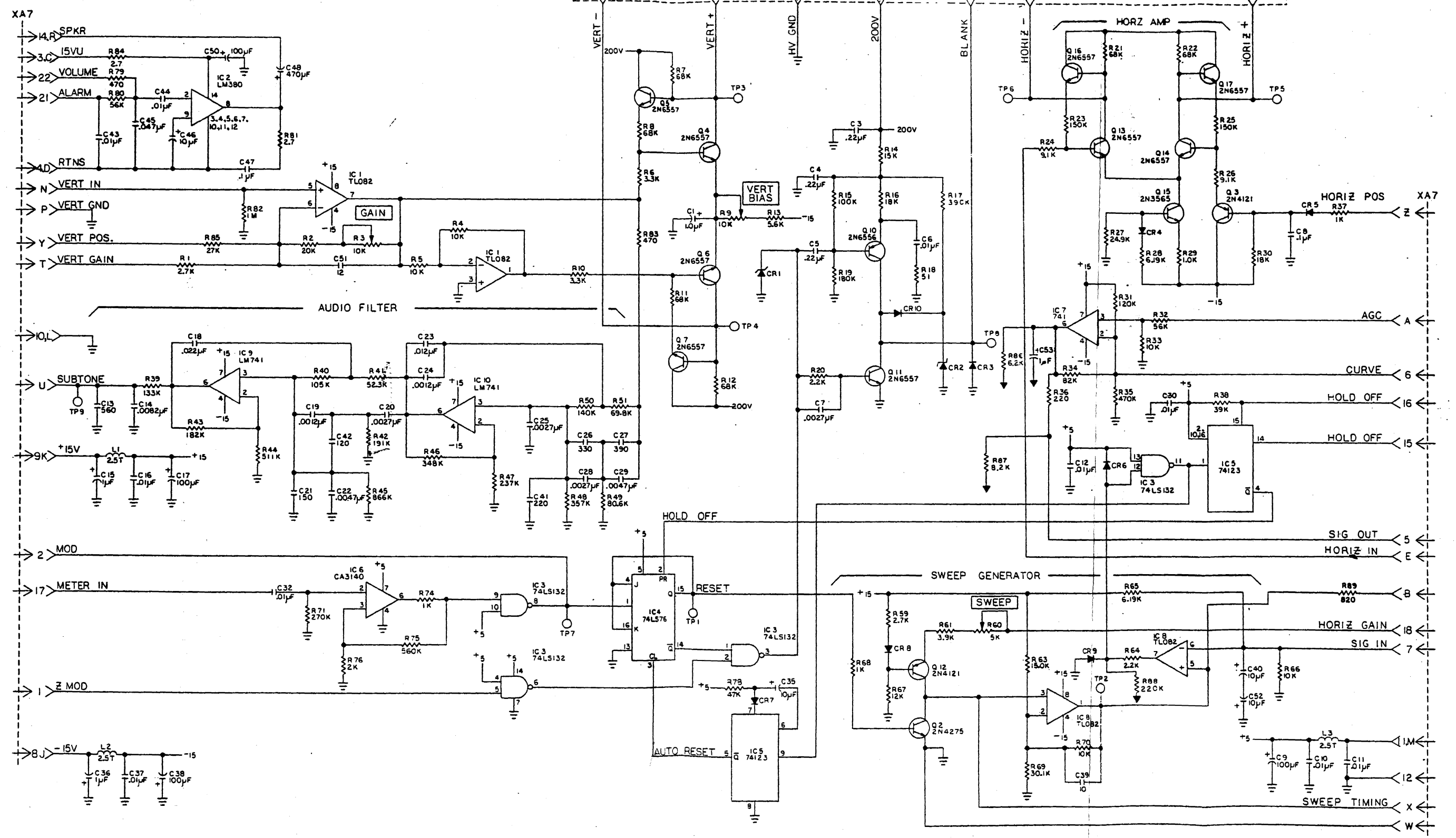
REVISIONS		REVISIONS		WAVETEK		
ICNS	BY	ICNS	BY	MODE	DATE	NUMBER
F		A	1/27/72	3000	53E	
G		B	1/27/72	LOW	10/19/72	BD No
H		C				
I		D				
J		E				

DRAWN BY: [Signature]  
 DATE: 1/27/72  
 NUMBER: A-100-71  
 APP: 6

A7B

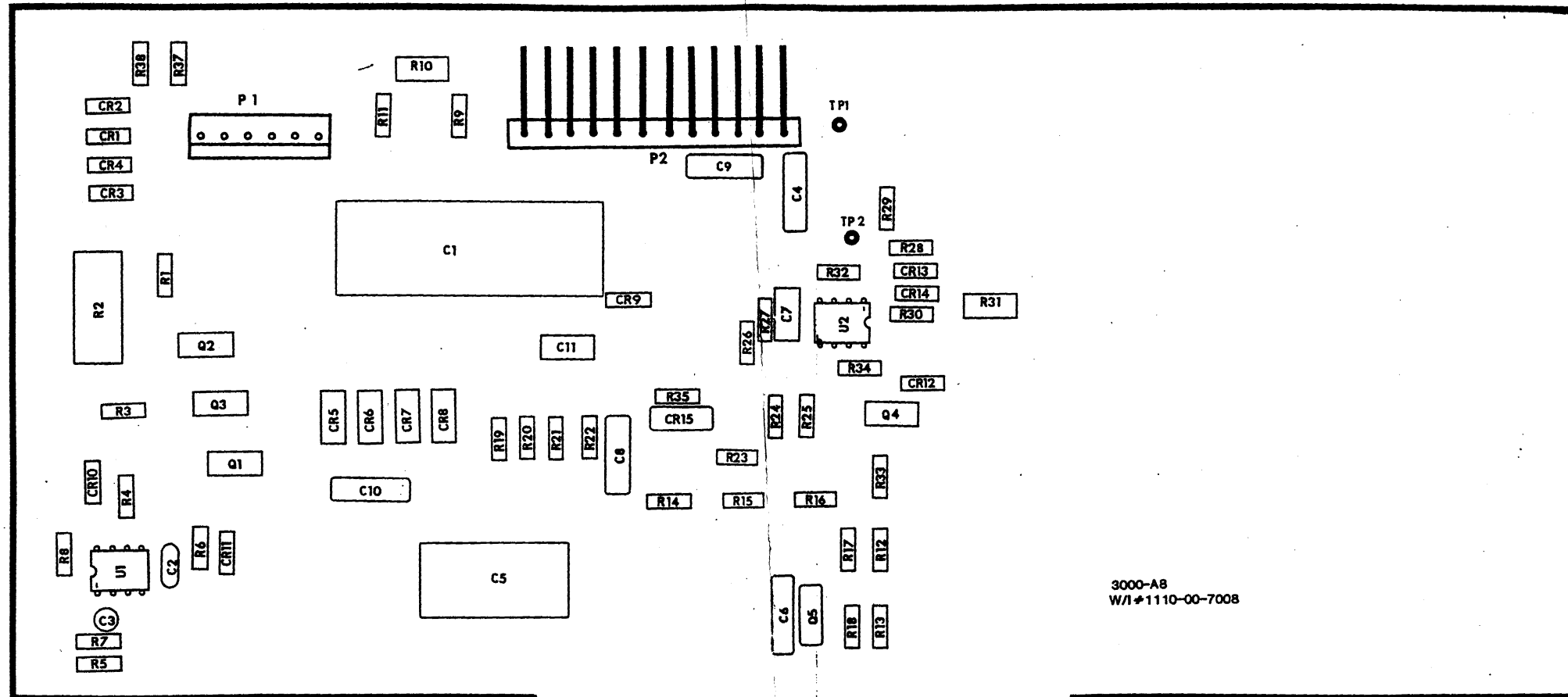


3000-B A7B REV F  
W/I \* 1110-00-7007





A8



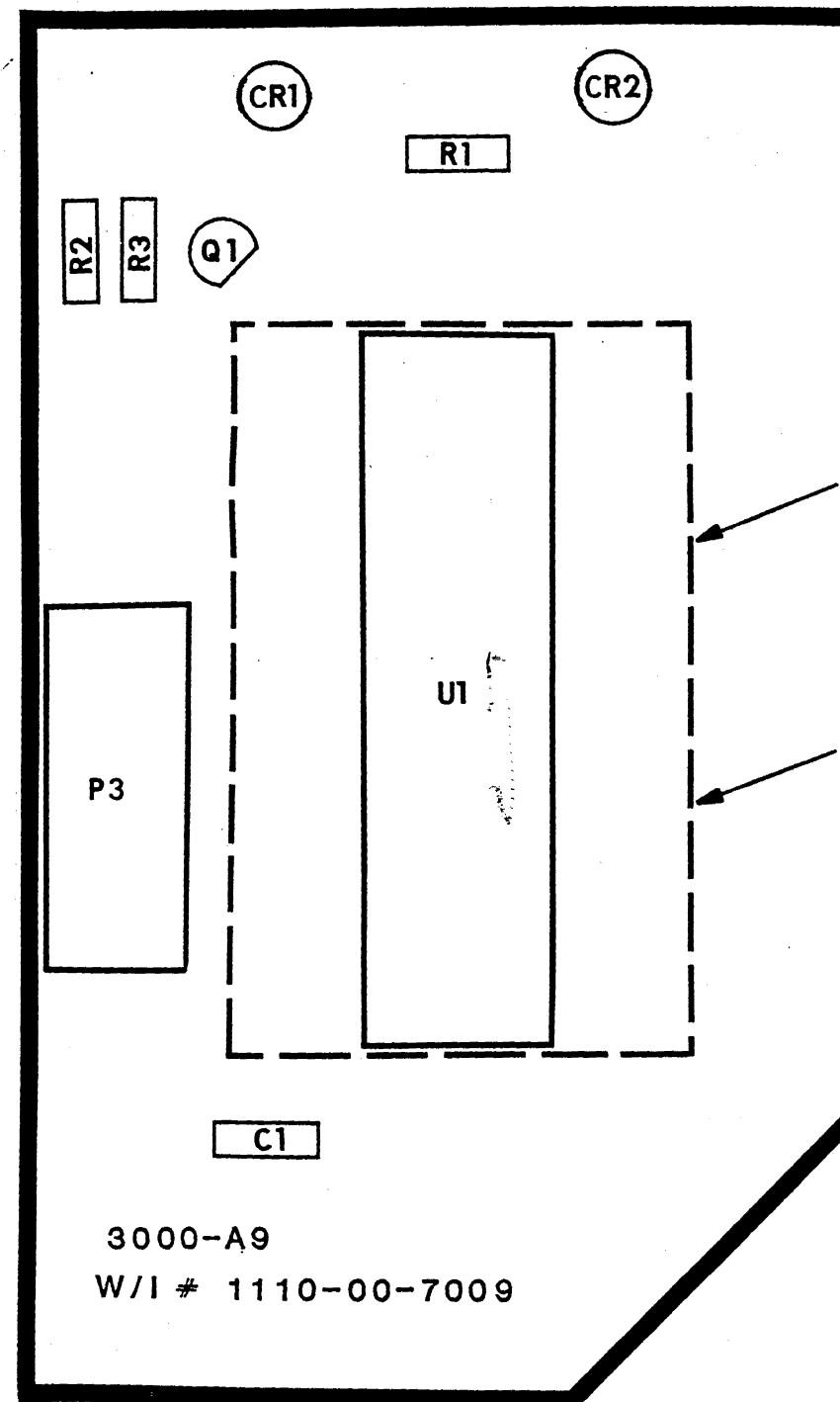
3000-A8  
W/1-1110-00-7008

o

o



A9

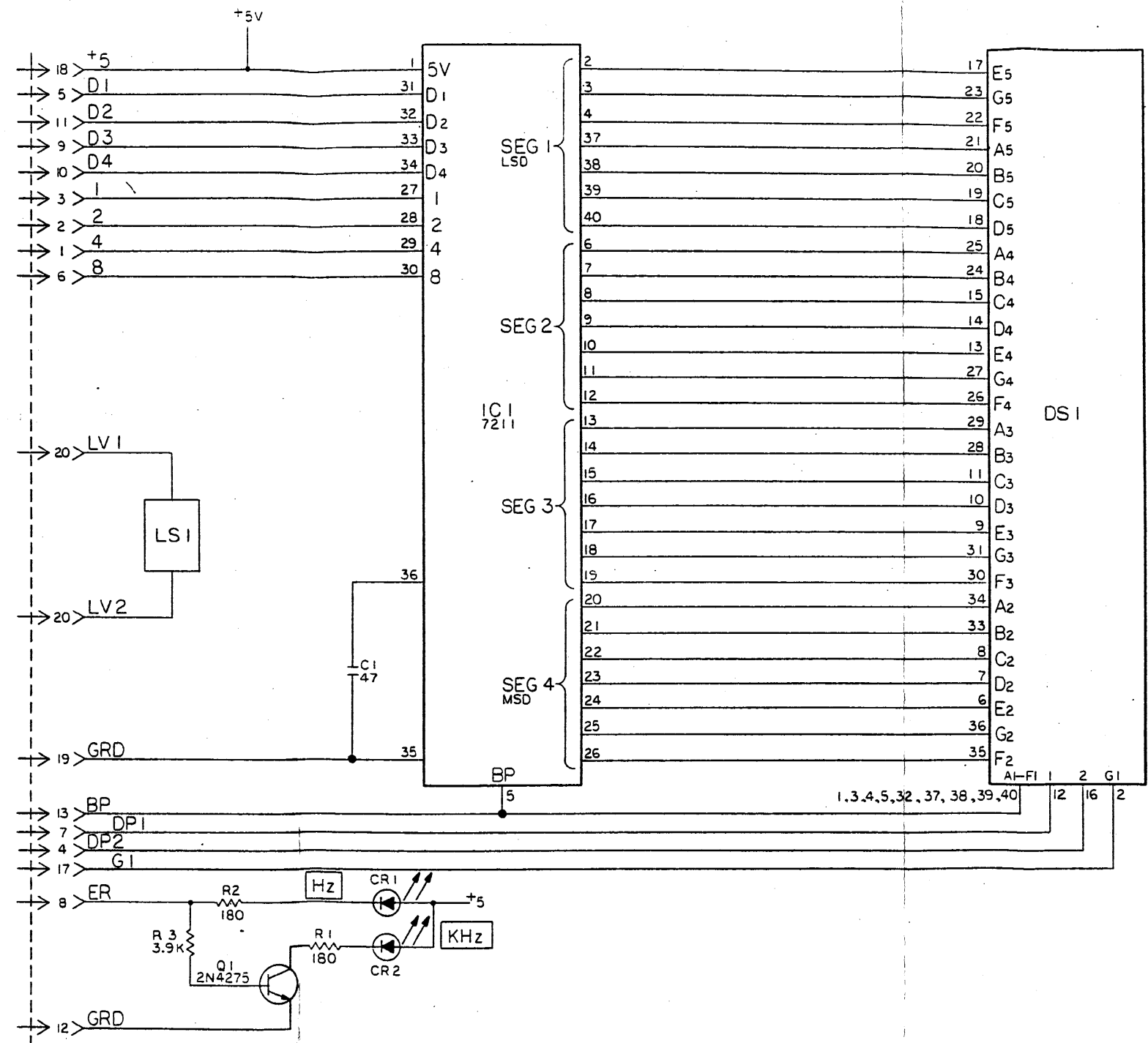


DS1

LS1  
(LS1 IS MOUNTED TO UNDERSIDE  
OF DISPLAY, DS1)

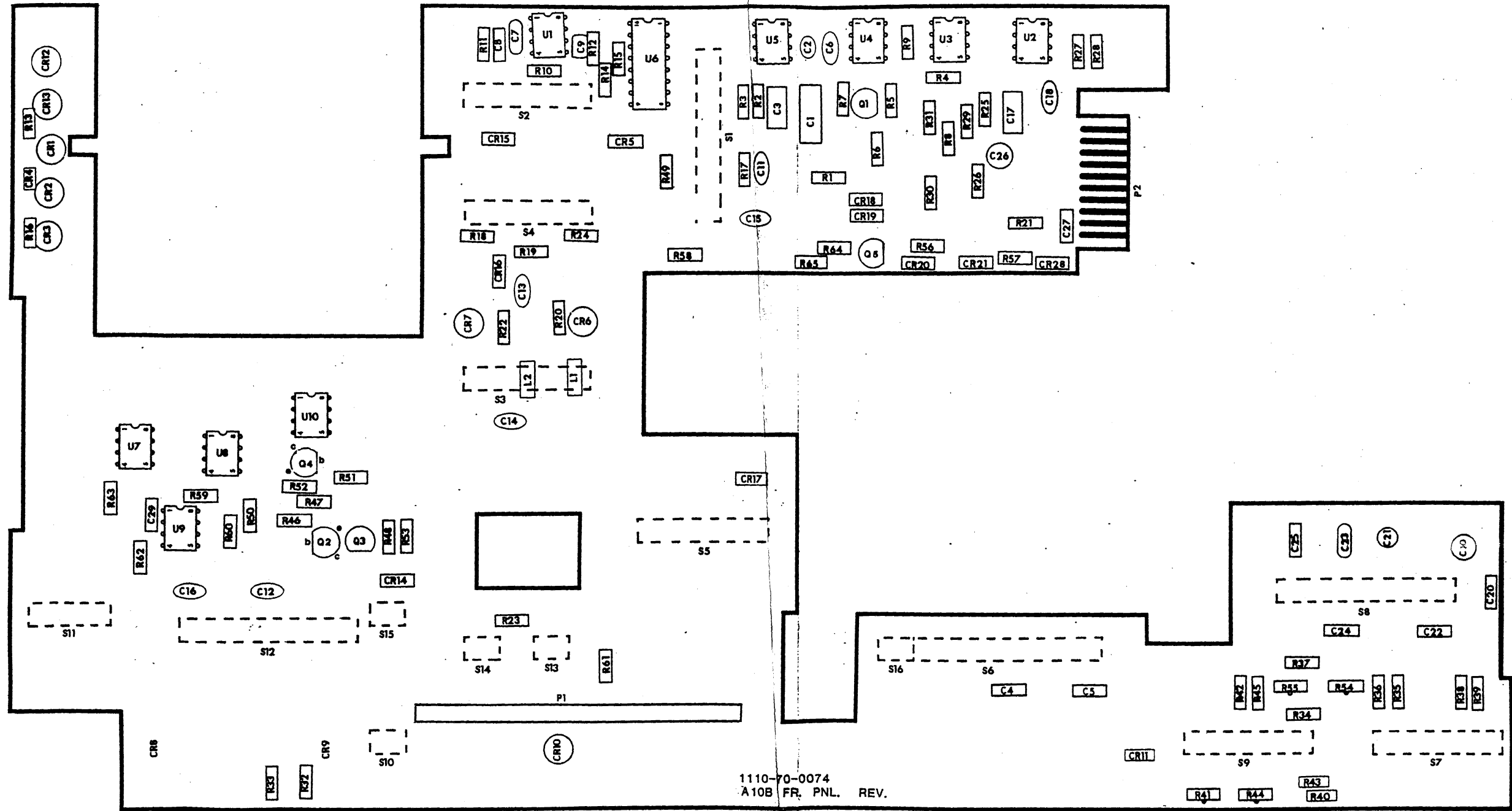
3000-A9  
W/I # 1110-00-7009

DISPLAY BOARD A9

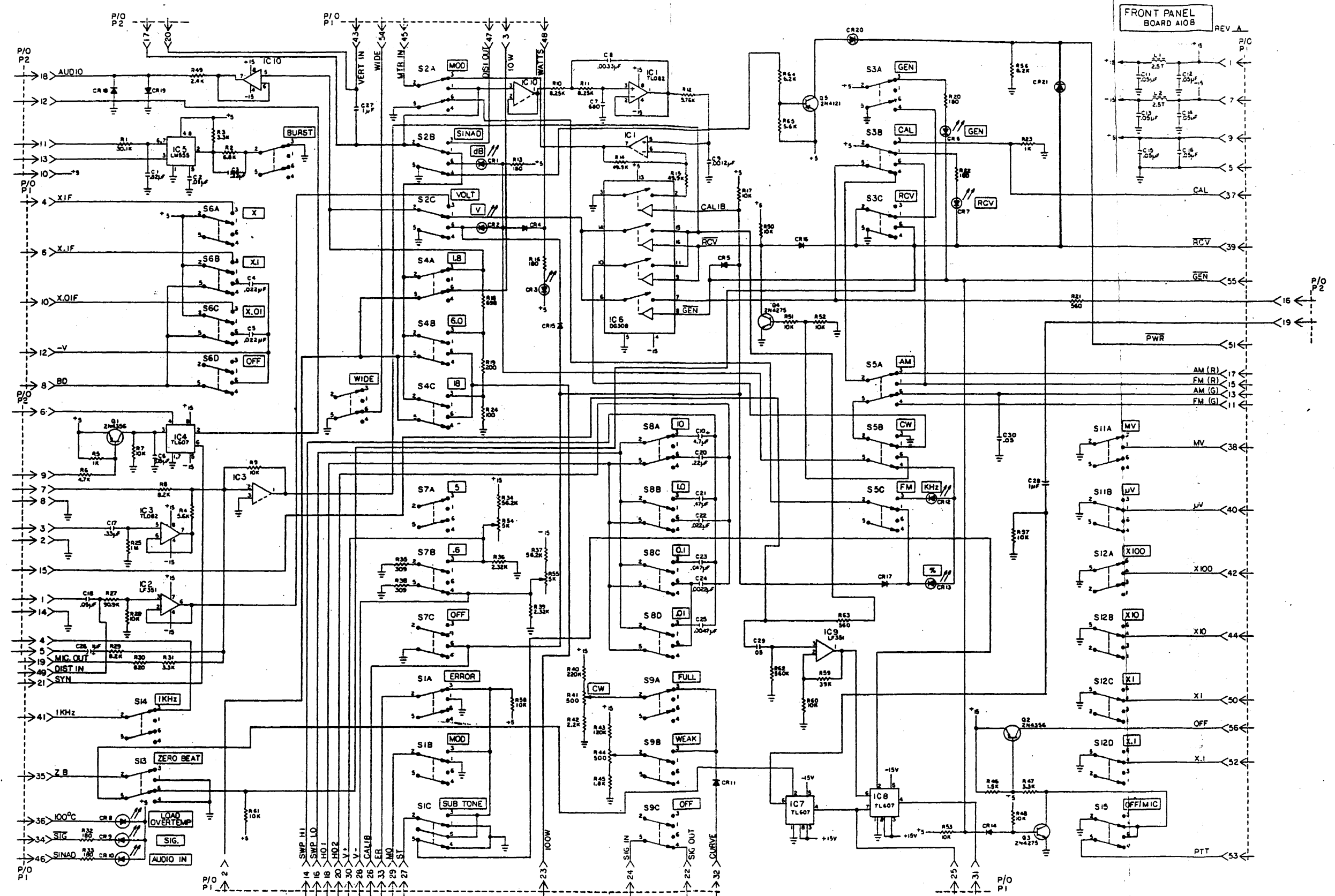


REVISIONS		REVISIONS		WAVETEK		
ECN'S	BY	ECN'S	BY	PART 300552 DISPLAY A9 - 11		
F		A				
G		B				
H		C		DRAWN BY	DATE	NUMBER
I		D		Bob Vojta	1/15/83	C1211-47
J		E		APP'D		

A10B



1110-70-0074  
A10B FR. PNL. REV.

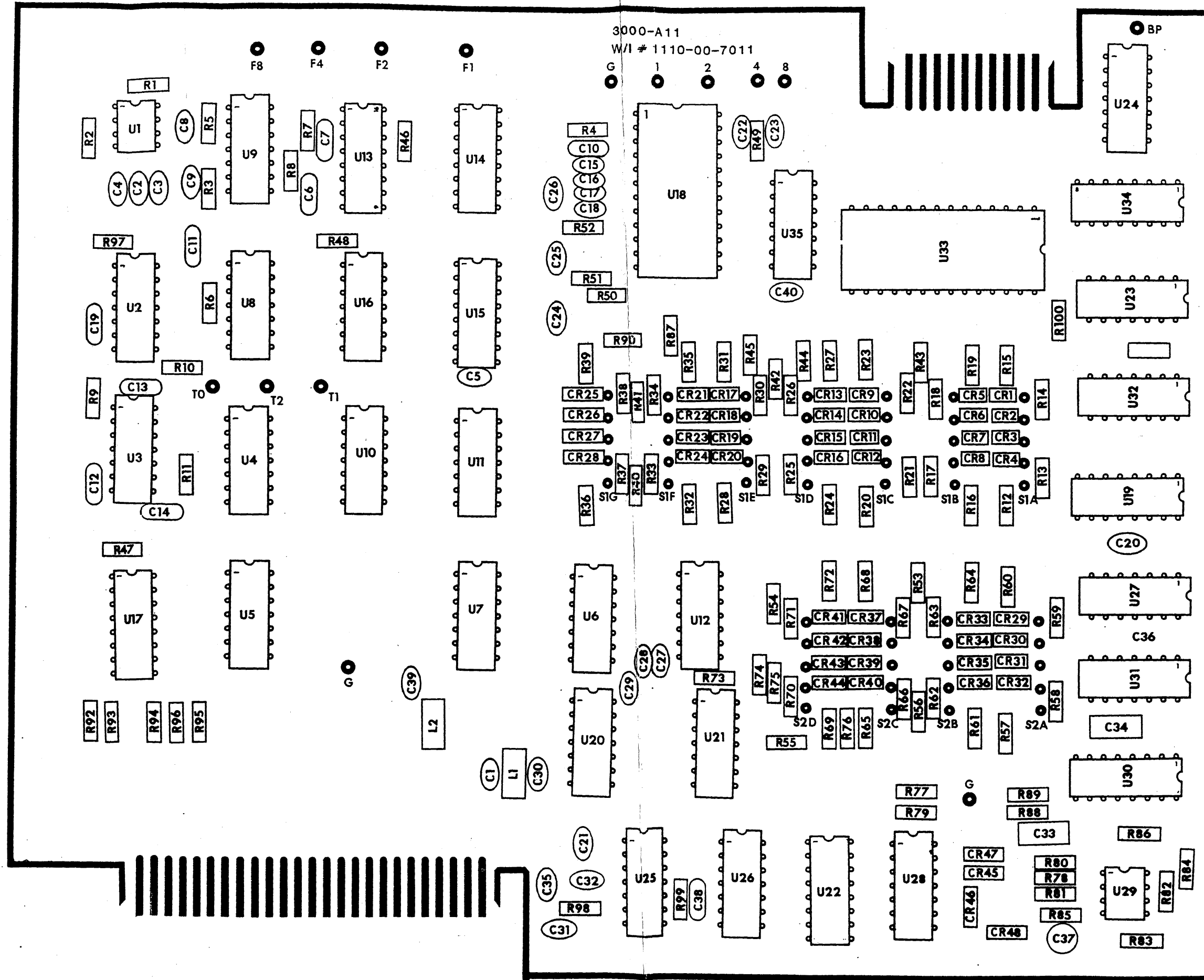


FRONT PANEL BOARD A10B REV. A

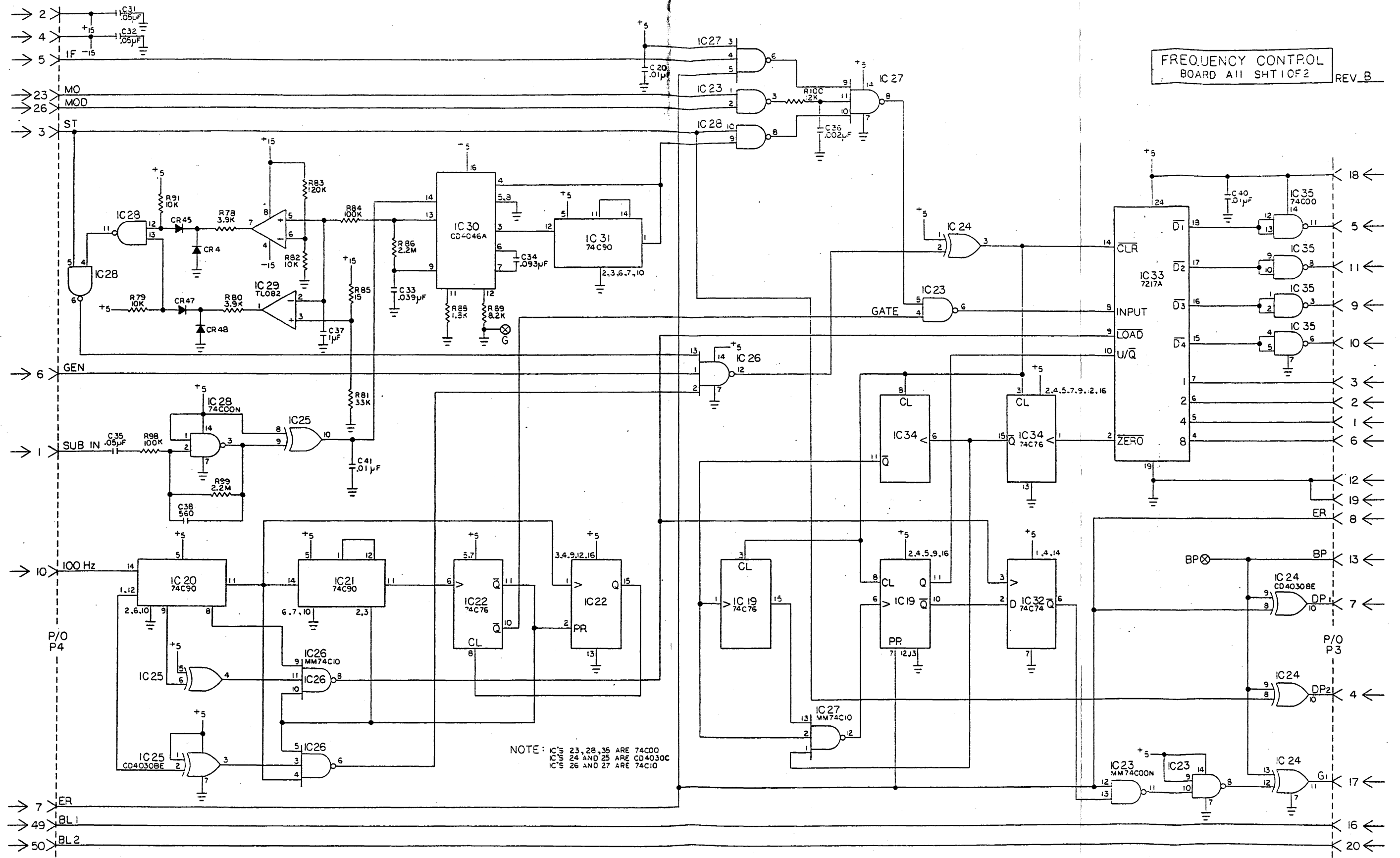
SYMBOLS		WAVEFORM	
A	POS	PP	175
B			
C	DEPTH	DATE	NUMBER
D		11-8-82	
E	APP'S		

A11

3000-A11  
W/I # 1110-00-7011

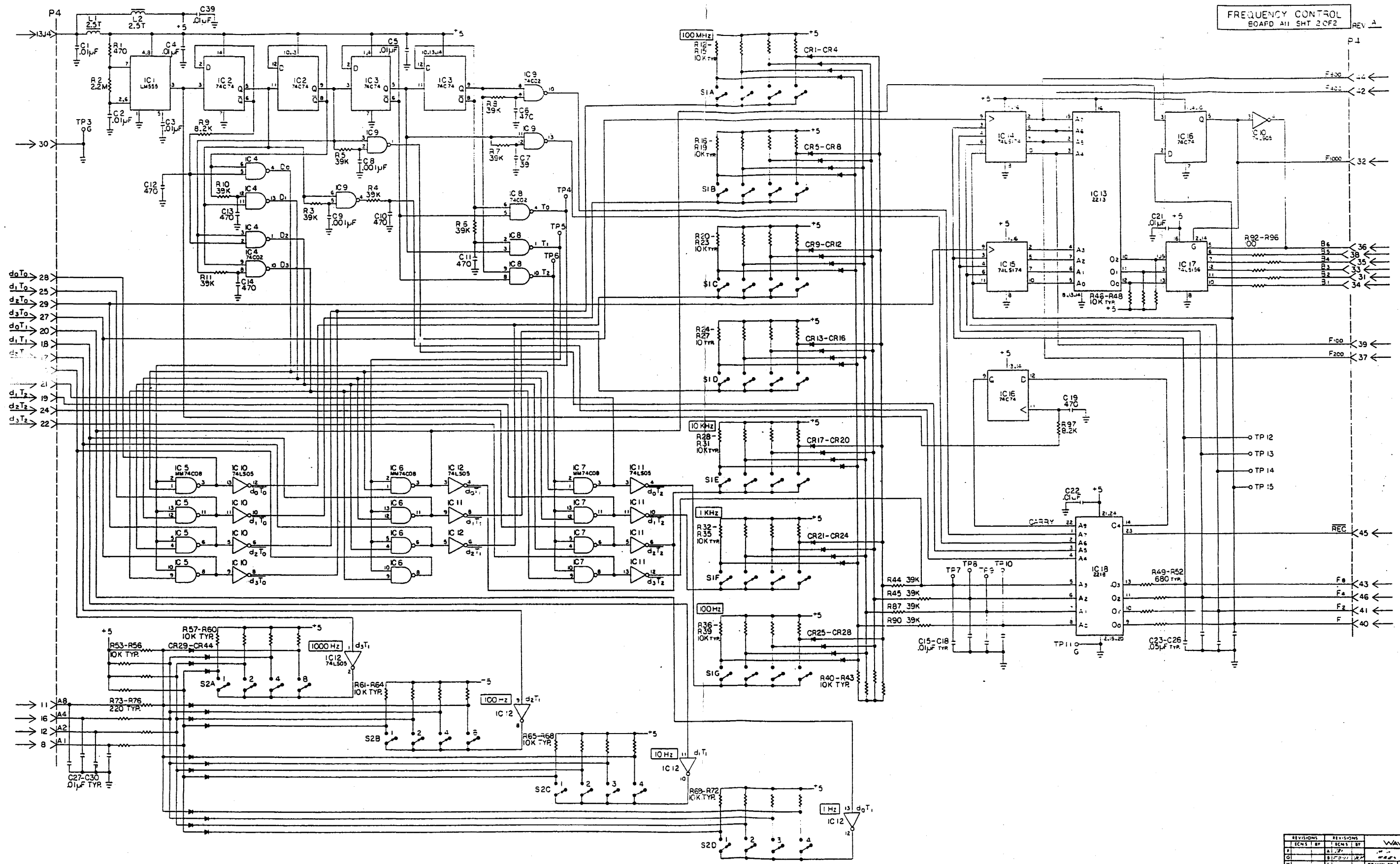


FREQUENCY CONTROL BOARD ALL SHT 1 OF 2 REV. B

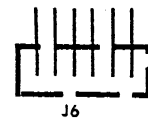


REVISIONS		REVISIONS		WAVETEK		
ECN'S	BY	ECN'S	BY	MODEL	DATE	NUMBER
F		A	7/79	MODEL 3000 S22		
G		B	1/90	BOARD ALL SHT 1 OF 2		
H		C		DRAWN BY	DATE	NUMBER
I		D		APWD	1/13/83	D1302-79
J		E		APWD	2/25/89	67





REVISIONS		REVISIONS		WAVETEK	
NO.	BY	NO.	BY	DATE	NUMBER
1		1			
2		2			
3		3			
4		4			
5		5			
6		6			
7		7			
8		8			
9		9			
10		10			



3000-A12  
W/I # 1110-00-7012

REAR PANEL

C5

C5  
C6

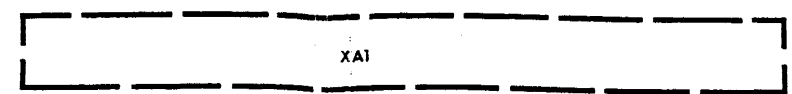
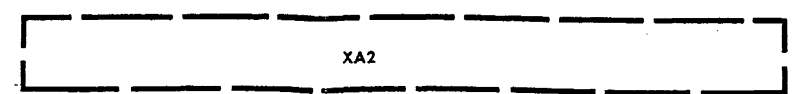
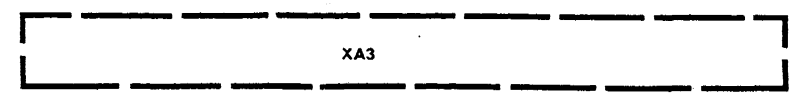
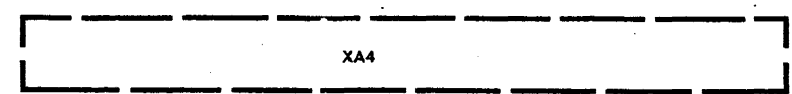
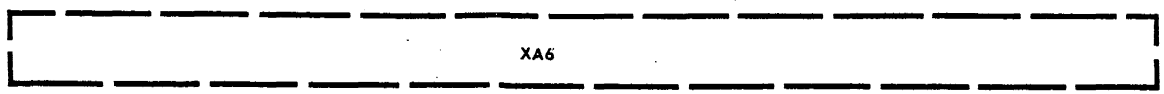
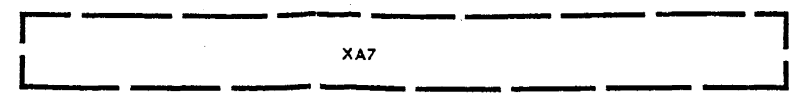
C4

C4  
C3

C3

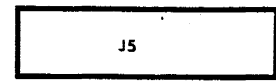
C2  
C1

C7



R8

R7

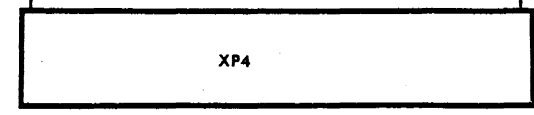
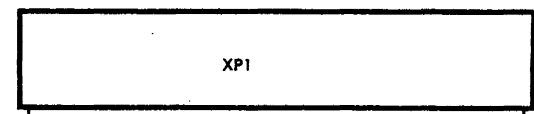


R6

R9

R5

R4



CR1

R10

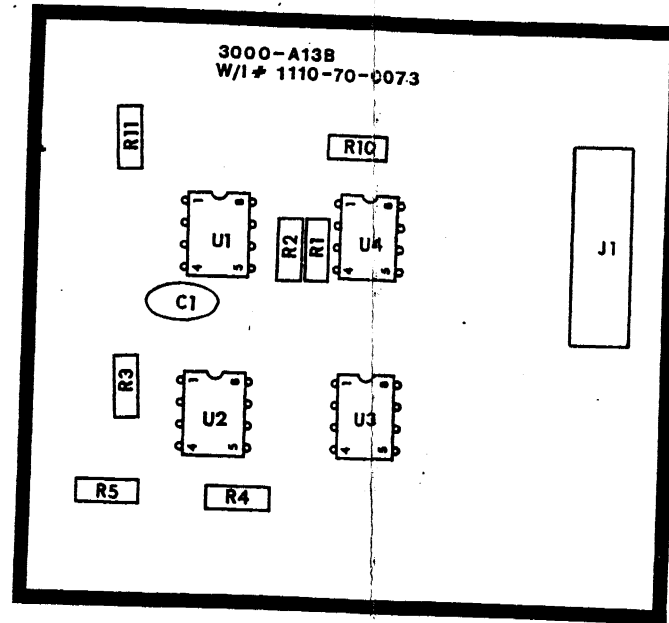
R2

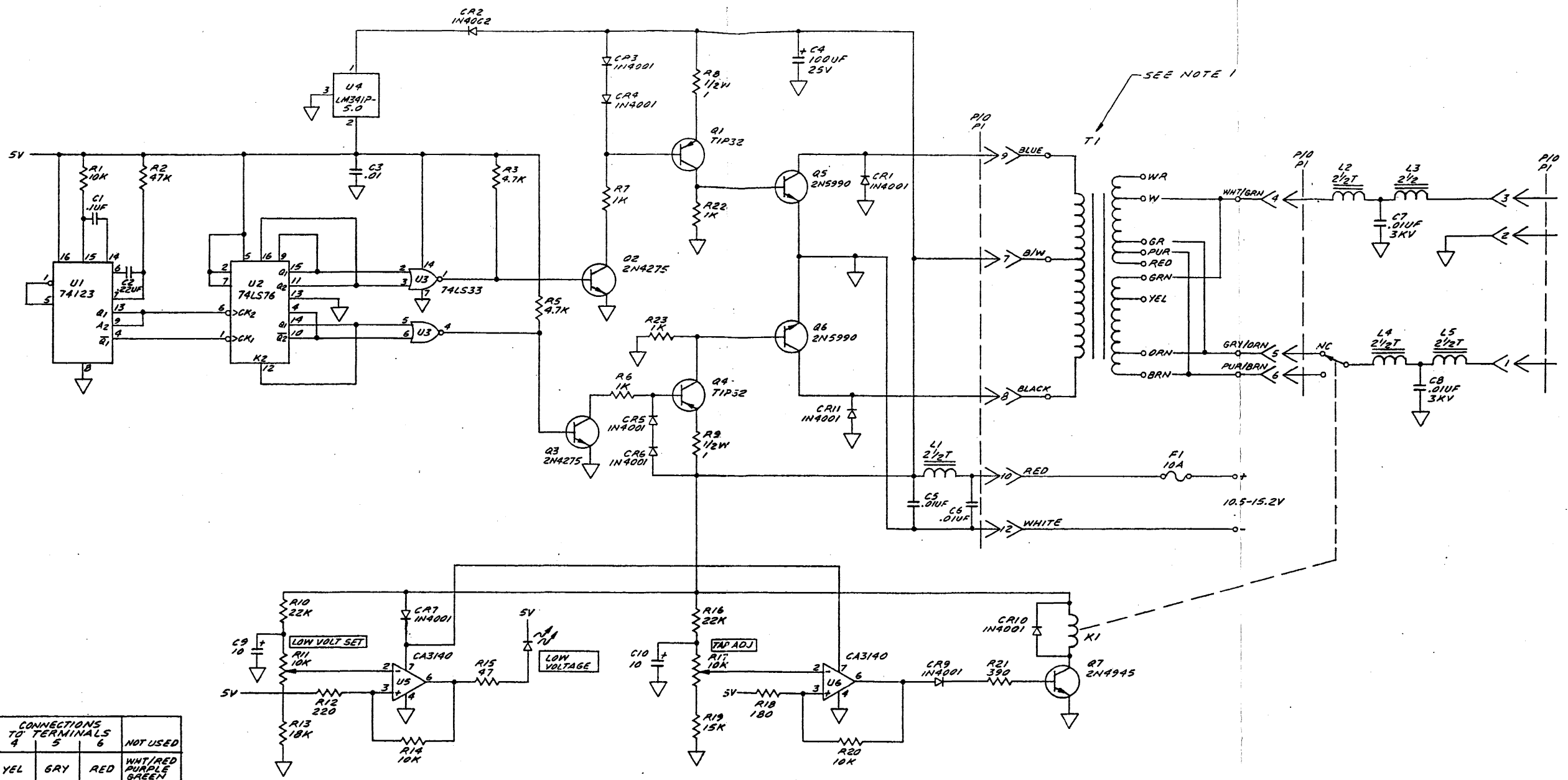
Q1

R1



A13B





SEE NOTE 1

VOLTAGE	SHORT	CONNECTIONS TO TERMINALS			NOT USED
		4	5	6	
220	WHT/DRN	YEL	GRY	RED	WHT/RED PURPLE GREEN BROWN
234	WHT/DRN	GRN	GRY	RED	WHT/RED PURPLE YELLOW BROWN
240	WHT/RED/DRN	GRN	GRY	RED	WHITE PURPLE GREEN BROWN

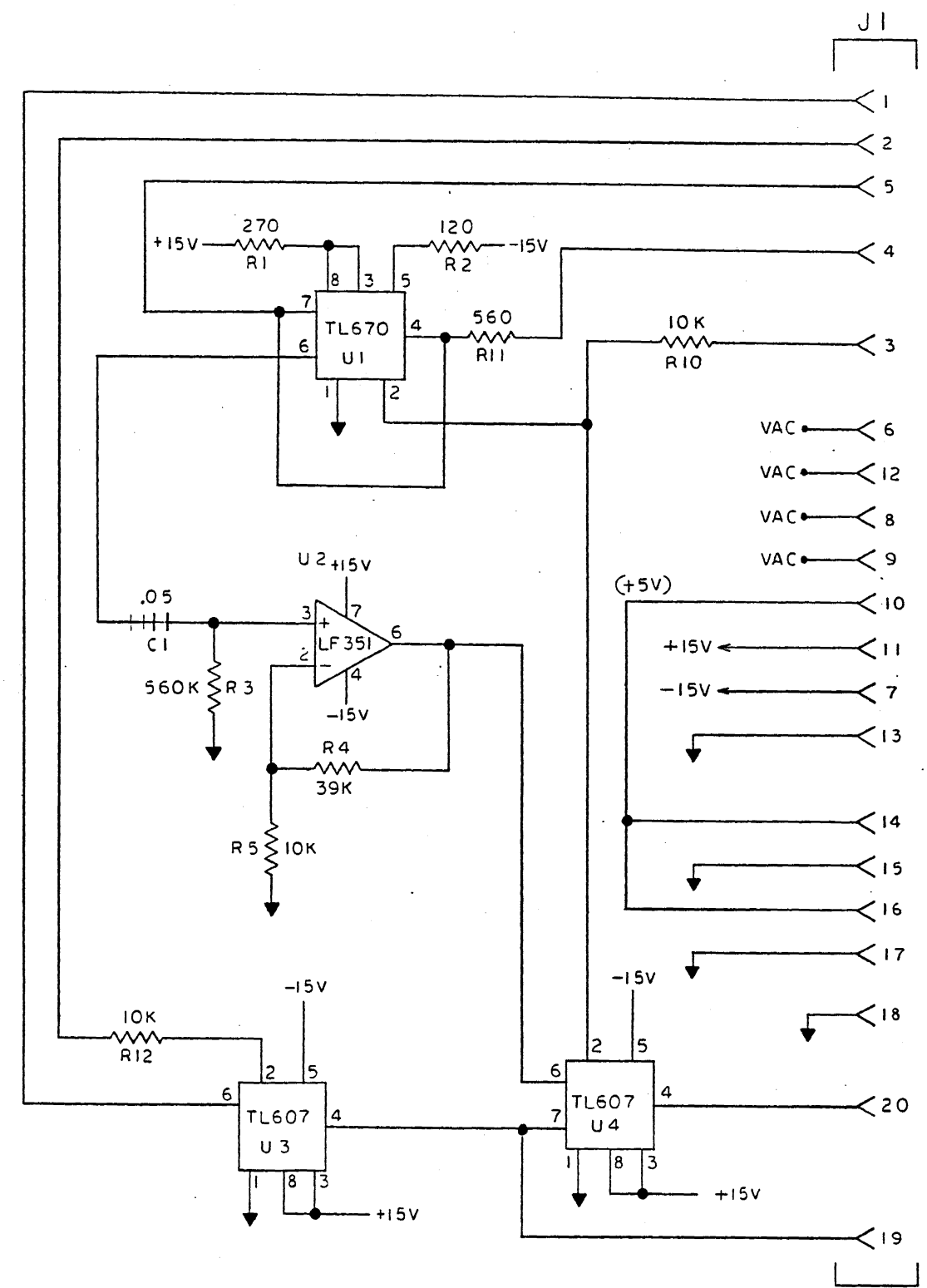
NOTE:

1. TRANSFORMER (T1) AS SHOWN IS WIRED FOR 117V NOMINAL OUTPUT SEE TABULATED TABLE FOR OTHER TRANSFORMER OUTPUTS.
2. LOW VOLTAGE SET ADJUSTMENT IS MADE TO CAUSE LOW VOLTAGE LED TO LIGHT AS INPUT DECREASES TO 10.6 VOLTS.
3. TAP ADJUSTMENT IS MADE TO CAUSE RELAY TO ENERGIZE AS INPUT DECREASES TO 12.8 VOLTS

SPECTRA SPECIALTIES INC  
 SANTA CLARA, CAL (408) 737-7374  
 SCALE: NONE APPROVED BY: DRAWN BY: EK  
 DATE: 2/27/91 REVISED: C  
**INVERTER**  
 DRAWING NUMBER: 6601-0011

LISSAJOUS / SWEPT RF  
BOARD A13B

REV \_\_\_\_\_



REVISIONS		WAVETEK <sup>INDIANA</sup>		
ECN'S	BY			
A		A13B		
B				
C		DRAWN BY	DATE	NUMBER
D		W.F.		1110-70-0073
E		APP'D		