INSTRUCTION MANUAL

MODELS 5100 AND 5110
0.001 Hz—2 MHz
PROGRAMMABLE FREQUENCY SYNTHESIZERS

WAVETEK®

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DRAWINGS

SAFETY FIRST

Protect yourself. Follow these precautions:

- Don't touch the outputs of the instrument or any exposed test wiring carrying the output signals. This instrument can generate hazardous voltages and currents.
- Don't bypass the power cord's ground lead with two-wire extension cords or plug adaptors.
- Don't disconnect the green and yellow safety-earth-ground wire that connects the ground lug of the power receptacle to the chassis ground terminal (marked with ⏚ or ⚠).
- Don't hold your eyes extremely close to an rf output for a long time. The normally nonhazardous low-power rf energy generated by the instrument could possibly cause eye injury.
- Don't plug in the power cord until directed to by the installation instructions.
- Don't repair the instrument unless you are a qualified electronics technician and know how to work with hazardous voltages.
- Pay attention to the **WARNING** statements. They point out situations that can cause injury or death.
- Pay attention to the CAUTION statements. They point out situations that can cause equipment damage.

SECTION 1
GENERAL DESCRIPTION

1.1 MODELS 5100 AND 5110

Models 5100 and 5110 Programmable Frequency Synthesizers provide spectrally pure output frequencies in 0.001 Hz steps from DC to 2 MHz. Model 5100 may be programmed locally and remotely. Model 5110 may only be programmed remotely.

A patented* direct digital synthesis technique is used to generate the output frequency directly from an internal crystal reference, which may be phase locked to an external 1 MHz standard, if desired.

In addition to excellent short term stability, digital synthesis also provides other improvements in performance. Digital operation means inherent programmability and very fast switching. In binary word format, these models maintain *amplitude and phase continuity in switching between any two frequencies* (i.e., no switching transient) with a programming delay of only 1.5 μs before switching. Thus, linear frequency sweeping or frequency hopping (including FSK signaling) are easily programmed.

Excellent spectral purity is also possible with digital synthesis since output distortion is determined entirely by the number of bits per sample and the linearity of the D/A converter. Another feature of digital synthesis is the ability to precisely control the phase of the output frequency. The phase may be asynchronously reset to zero at any time for as long as desired (or as little as 125 ns). Hence, for example, sinusoidal bursts are easily produced with each burst beginning at exactly zero phase.

1.2 SPECIFICATIONS

1.2.1 Frequency

Range 0.001 Hz to 2,000,000.000 Hz.
0.001 Hz to 3,000,000.000 Hz (Option 013).
Resolution 0.001 Hz throughout entire range.
Control
Local (Model 5100 Only): Ten 10-position rotary switches.
Remote: 31 bits in binary or 37 bits in BCD format.

*U.S. Patent 3,735,269

1.2.2 Frequency References

Model 5100
Internal (8 MHz Crystal):
Standard: TCXO (Same as Option 006 for Model 5110).
Option 001: High Stability (Oven Controlled).
External, Rear Panel REF IN (TTL Level, Schmitt-Trigger Conditioned Input, 1 TTL Load):
1 MHz Reference: Phase locks to standard or optional internal reference.
8 MHz Reference: Replaces internal 8 MHz crystal reference.

Model 5110
Internal (8 MHz Crystal):
Option 001: High Stability (Oven Controlled).
Option 006: TCXO.
External, Rear Panel REF IN (TTL Level, Schmitt-Trigger Conditioned Input, 1 TTL Load):
1 MHz Reference: Phase locks to optional internal reference.
8 MHz Reference: Replaces internal 8 MHz crystal reference. Required for units without an internal reference.

1.2.3 Output Amplitudes

Model 5100
Fixed Output: 1 Vp-p no load, 0.5 Vp-p into 50Ω. Front panel (1 VOLT P-P), rear panel (FXD OUT).
Variable Output: 10 Vp-p no load (max), 5 Vp-p into 50Ω (max). Front panel (OUTPUT), rear panel (VAR OUT).

Model 5110
Fixed Output: 1 Vrms no load, 0.5 Vrms into 50Ω. Front panel (OUTPUT 50Ω), rear panel (FXD OUT).
Option 004: Replaces 1 Vrms (no load) signal at fixed output with 10 Vp-p signal.

Models 5100 and 5110
Frequency Response (Full Output):
No Load: dc to 500 kHz, ± 0.25 dB; 500 kHz to 2 MHz (3 MHz with Option 013), ± 0.5 dB.
50Ω Load: dc to 500 kHz, ± 0.25 dB; 500 kHz to 2 MHz (3 MHz with Option 013), + 0.5 to − 2.5 dB.
Reference Output: 1 MHz square wave or 8 MHz pulse at TTL levels. Capable of driving 30 TTL loads. Rear panel (REF OUT).

1.2.4 Output Level Control

Model 5100 only

0 to 85 dB attenuation in 1 dB steps (front panel pushbutton) plus 0 to 10 dB front panel continuous control.

Option 002 (Models 5100 and 5110)

Remote program control (7 bits) of 85 dB attenuation in 1 dB steps from 0 to 85 dB.

Attenuator Response to 60 dB (Includes Option 002)

To 500 kHz: ±0.5 dB.

>500 kHz: See figure 3-2.

1.2.5 Spectral Purity

Spurious Components

Standard: −70 dB to 100 kHz; −60 dB to 500 kHz; −50 dB to 2 MHz.

Option 013: −45 dB, 500 kHz to 2 MHz; −40 dB to 3 MHz.

Harmonic Components (at 1 Vrms)

Standard: −55 dB to 100 kHz; −50 dB to 500 kHz; −45 dB to 2 MHz.

Option 013: −40 dB, 500 kHz to 3MHz.

Phase Noise

30 kHz band excluding 1 Hz centered on carrier.

Standard: −50 dB to 2 MHz.

Options 004 or 013: −40 dB, 2 MHz to 3 MHz.

RMS Fractional Deviation

10 msec averaging: 5×10^{-7}, dc to 2 MHz (3 MHz with Option 013).

1 sec averaging: 5×10^{-9}, dc to 2 MHz (3 MHz with Option 013).

1.2.6 Remote Mode Selection (Model 5100)

Via front panel pushbutton or one control bit. Front panel lamp indicates remote mode.

1.2.7 Switching Characteristics

Programming Delay

1.5μs for BINARY-WORD mode with phase and amplitude continuity maintained.

20 μs for BCD-WORD mode with output reset to zero phase during delay.

20 μs minimum for four BCD or BINARY bytes with output reset to zero phase during programming.

Update Rate

625 ns for BINARY-WORD mode. 18 μs for BCD-WORD and BYTE modes.

Zero Phase Reset

Output signal may be asynchronously reset to zero phase via one control bit. There is a delay of approximately 800 nsec to the output. This line may also be used as a load acknowledge output.

1.2.8 GPIB

Model 1488A-12 provides the following IEEE 488-1978 functions: AH1, L1 (listen only), DT1. Programs frequency (phase continuous) and amplitude (with option 002) as well as all ZERO PHASE modes.

1.2.9 General

Environment

Operating Temperature: 0° to +50°C.

Storage Temperature: −20° to +70°C.

Dimensions

43.2 cm (17 in.) wide; 8.9 cm (3½ in.) high; 33 cm (13 in.) deep.

Weight

9.6 kg (21 lb) net; 11.4 kg (25 lb) shipping.

Power

115/230V ±10%, 50 to 60 Hz, 65 watts.

1.2.10 Options

001: 8 MHz, High Stability Crystal Reference

(Oven Controlled)**.

Temperature Stability: $\pm 1 \times 10^{-8}$, 0° to +55°C.

Aging Rate: $\pm 2 \times 10^{-9}$/day.

002: Remote Programmable Attenuator

Range: 0 to 85 dB in steps of 1 dB.

Programming Delay: Typically less than 5ms.

004: 10 Vp-p Output

Model 5110 only. Not available with Option 013.

006: 8 MHz, Temperature Compensated Crystal Reference

(Standard on Model 5100.)

Temperature Stability: $\pm 1 \times 10^{-6}$, 0° to +55°C.

Aging Rate: $\pm 5 \times 10^{-6}$/year.

013: Frequency Range Extension

Original order only. Not available with Option 004.

Frequency Range: 0.001 Hz to 3 MHz.

Frequency resolution: 0.001 Hz (Remote and Model 5100 Local).

Variable Output (Model 5100 Only): 1 Vrms maximum no load, 0.5 Vrms maximum into 50Ω load. 50Ω source impedance.

Variable Output Signal (Model 5100 Only): See table A-1.

020: Rear Panel TTL Output

Provides a TTL compatable square wave. Replaces VAR OUT BNC on Model 5100. See paragraph 1.2.1 for range and resolution specifications.

GPIB

Use Model 1488A-12 adapter.

1.2.11 Accessories

Rack Adapters

Programming Connector

**Specifications apply after a 72 hour warm-up period.

SECTION 2
INSTALLATION

2.1 INSPECTION

This instrument was carefully inspected and tested prior to shipment. It was operated for at least 100 hours to reduce the probability of early failure. The instrument should be inspected for physical damage incurred in transit. When receiving a shipment from a carrier, inspect the shipping carton in the presence of the carrier. If rough handling is evident take exception on the delivery receipt before accepting the shipment.

If no carton damage is obvious, but physical damage is discovered when the carton is opened, preserve the carton and packing materials, notify the carrier immediately and have them perform a written inspection of the carton and the contents.

It is recommended that the initial conformance test procedure be performed on receipt as described in paragraph 2.4.

2.2 POWER REQUIREMENTS

This instrument will operate on 115 Vac (±10%) 50-60 Hz or 230 Vac (±10%) 50-60 Hz, selectable via a rear panel switch. The instrument is equipped with a three-wire power cable which connects the chassis to earth ground when plugged into a three-contact outlet. If a two-contact outlet is used in conjunction with a three-prong and two-prong adaptor, the pigtail of the adapter should be connected to earth ground.

2.3 INSTALLATION

WARNING

Rack mount brackets are to prevent the instrument from sliding when mounted in a rack. They are not intended to support the weight of the instrument and should never be used for lifting or carrying.

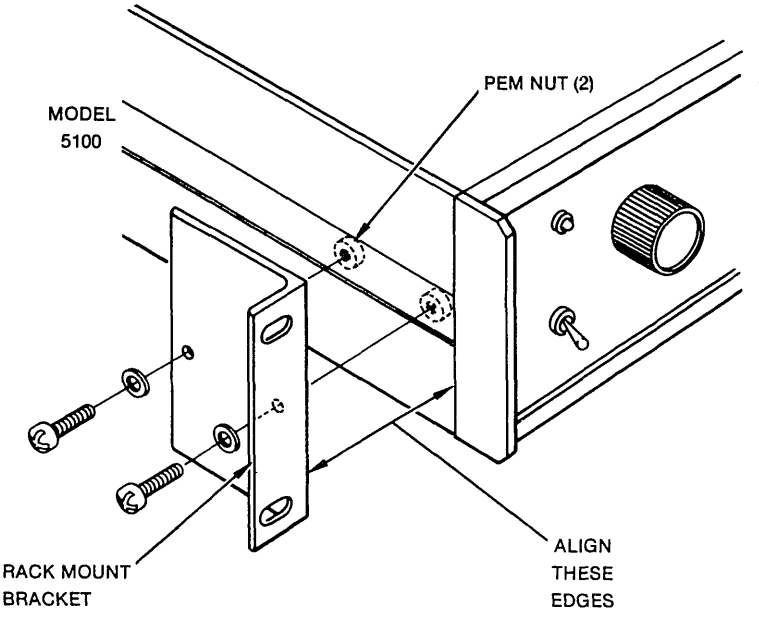


Figure 2-1. Installing Rack Mount Bracket on Model 5100

2.3.1 Model 5100

Model 5100 Frequency Synthesizer was factory assembled for bench use. To convert the instrument for mounting into a standard 19 inch wide rack, the following procedure should be followed. (Refer to figure 2-1.)

1. Unplug instrument from ac power source.
2. Stand instrument on one side.
3. Align rack mount bracket with raised edge of instrument as shown.
4. Holes on rack mount bracket should correspond to pem nut holes just underneath black trim strip. Use a pointed object to pierce the black trim strip at the pem nut holes.
5. Use lock washers and metal screws provided to secure rack mount bracket.
6. Repeat for other side bracket.

Instrument is now ready for rack installation.

2.3.2 Model 5110

Model 5110 Frequency Synthesizer is ready for installation into a standard 19 inch wide rack.

2.4 INITIAL CONFORMANCE TEST PROCEDURE

To verify that the instrument is operational, the following procedure is recommended. If trouble is suspected, then refer to the troubleshooting section in this manual.

Phase lock the unit and a frequency counter to a common frequency reference. A 1 MHz output signal from the REF OUT connector may be used as a reference input to the counter, or a 1 MHz output from the counter may be used to phase lock the unit. For details, refer to paragraph 3.3.3.

Connect the OUTPUT jack of the unit to the counter and verify that the counter is triggered. Program a frequency of 1,111,111.000 Hz and verify on the counter. (A count of ± 1 from the true value is acceptable.) Repeat this procedure for 1,222,222.000 Hz, etc.

SECTION 3
OPERATION

3.1 INTRODUCTION

Figure 3-1 shows the front and rear panels of the instrument with controls and connectors identified. Model 5100 may be controlled locally with the front panel switches or remotely via the rear panel programming connector. Model 5110 is controlled only via the rear panel programming connector. Frequency is programmable on all units, while attenuation is programmable on Option 002 equipped units only.

3.2 POWER SWITCH AND INDICATOR

The front panel POWER switch controls ac line power to the unit. The green POWER indicator verifies the presence of the 5 V supply for the digital logic circuitry.

NOTE

For units equipped with the high-stability proportional-oven crystal (Option 001), power must be maintained (POWER indicator on) at least 72 hours prior to use if full accuracy and drift performance of the crystal are to be realized.

3.3 SYSTEM CLOCKS

For the instrument to function, it must have a system clock derived from either an internal or external reference. In addition, the internal reference may be phase-locked to an external 1 MHz input signal, and two or more instruments may be phase-locked together.

3.3.1 Internal Reference (8 MHz Crystal Oscillator)

The Model 5100 contains either the standard or optional (Option 001) internal 8 MHz crystal reference oscillator. The standard Model 5110 is not supplied with an internal reference oscillator, but may contain either Option 001 or 006, 8 MHz reference oscillators.

To enable any internal crystal reference oscillator, the Input Reference Selector Jumper, located inside the unit on the main board (figure 5-1) must be in the INT position. If no external signal is connected to the REF IN jack, the internal crystal frequency may be adjusted as described in paragraph 6.7 of the Conformance Test Procedure.

3.3.2 External Reference (REF IN Signal)

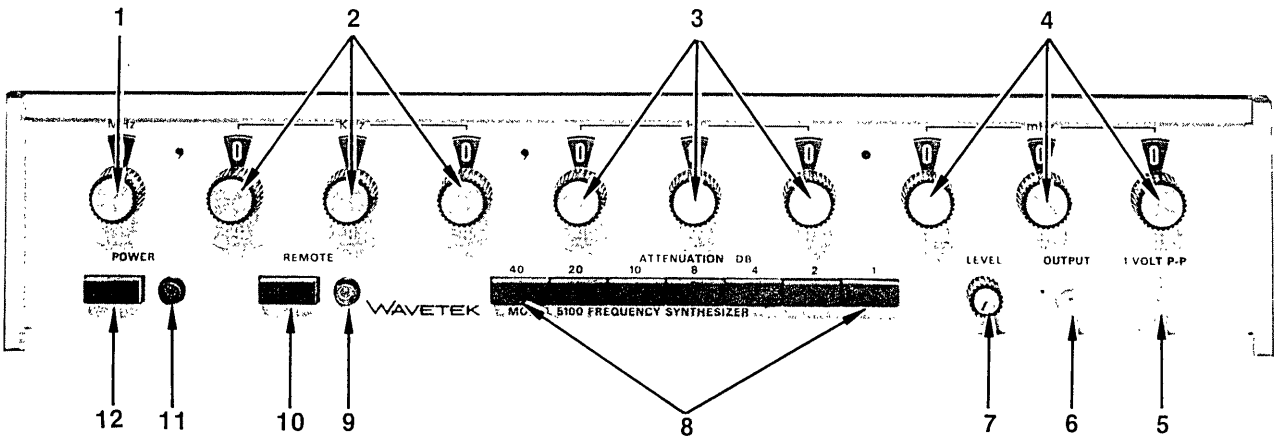
Any internal 8 MHz crystal reference installed in the unit may be either phase-locked to an external 1 MHz reference signal, or completely replaced by an external 8 MHz signal, which becomes the system clock. An external 8 MHz reference signal is required for Model 5110 units without an optional internal reference oscillator. For external 8 MHz reference input operation, the INPUT REFERENCE SELECTOR JUMPER located inside the unit on the main board (drawing 002-004-3100) must be in the EXT position. The rear panel BNC jack labeled REF IN accepts either the 1 or 8 MHz external reference input signals.

The absolute maximum voltage limits of the external reference input signal are ±5.5 V peak for the Model 5100, and ±5.0 V peak for the Model 5110. Burden on the signal source is one standard TTL load. A TTL Schmitt-trigger circuit conditions the input signal to be a hysteresis output signal with a positive-going threshold of +2 V maximum and a negative-going threshold of −0.6 V minimum. The input signal waveform must cross both thresholds for 50 ns, minimum, once per cycle.

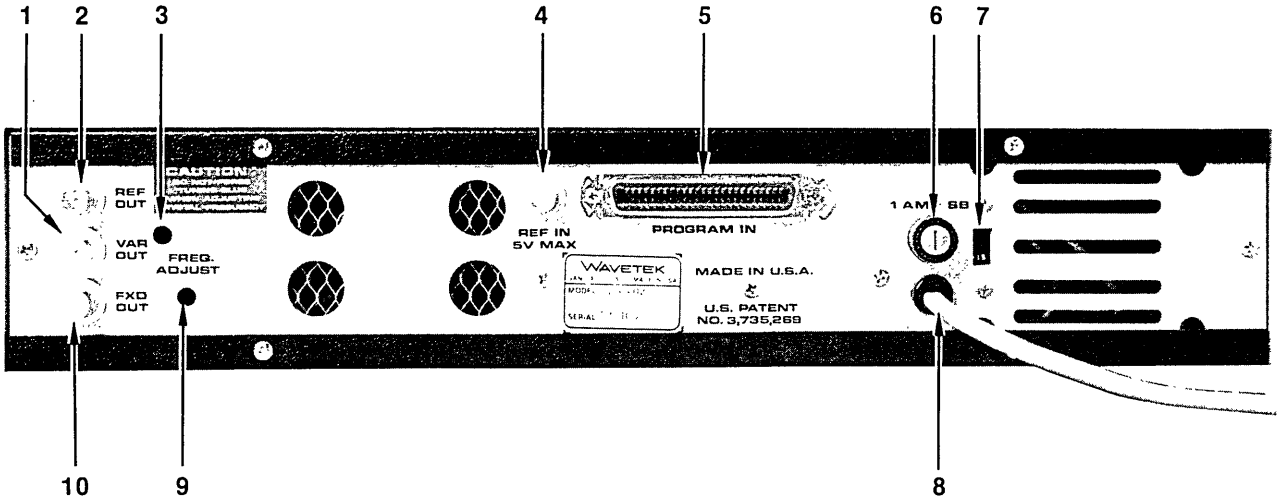
If the REF IN signal is to be the system clock, the input frequency must be between dc and 8.1 MHz. The deviation of the output signal frequency is directly proportional to the deviation of the system clock from 8 MHz. Operation at frequencies below 8 MHz implies a lower sampling rate; the internal low pass filter which removes sampling components from the output signal is designed for an 8 MHz sampling rate and becomes ineffective as the sampling rate is lowered. To maintain full harmonic and spurious distortion specifications, an external low pass filter is required to eliminate these components.

3.3.3 Phase-Locking to an External 1 MHz Standard

For phase-locking to an external standard, the instrument must be equipped with an internal crystal reference. The Input Reference Selector Jumper shown on main board assembly drawing 02-004-3100 in section 8 must be in the INT position, enabling the internal crystal reference as the system clock. If a 1 MHz signal is connected to the rear panel REF IN jack, the internal reference will phase-lock to this signal. The pull-in range



1. MHz Frequency Switch
2. KHz Frequency Switches
3. Hz Frequency Switches
4. mHz Frequency Switches
5. 1 VOLT P-P Signal Jack
6. OUTPUT Signal Jack*
7. LEVEL Control
8. Attenuator Switches
9. REMOTE Mode Indicator
10. REMOTE Switch
11. POWER Indicator*
12. POWER Switch*



1. Output Signal Jack
2. REFerence OUTput*
3. High Stability Crystal FREQ. ADJUST*
4. Ext REFerence INput*
5. PROGRAMming INput Jack*
6. Fuse Holder*
7. Line Selector Switch*
8. Line Cord*
9. Standard Crystal FREQ. ADJUST*
10. FiXeD Amplitude OUTput Signal Jack*

NOTE

1. All items included on Model 5100.
2. *Denotes Items included on the Model 5110.

Figure 3-1. Instrument Front and Rear Panels

of the phase-locked loop is ±2 Hz. The input signal waveform must enter the limits of logical "0" and logical "1" (each for a duration of at least 50 ns) once per cycle.

As a check of proper phase-lock operation, follow paragraph 6.8 of the Conformance Test Procedure. Failure to lock could be due to an excessive difference between the internal and external reference frequencies.

3.3.4 Phase-Locking Two or More Instruments (5100 and 5110)

To phase-lock two or more instruments, use the 8 MHz reference output from a master instrument as an external 8 MHz clock input to the slave instrument(s). All slave instrument phase-locked loops are bypassed because they are driven directly by the single crystal reference of the master instrument, which itself may be phase-locked to an external 1 MHz signal, or driven by an 8 MHz input signal.

The Input Reference Selector Jumper located inside the unit on the main board (assembly drawing 02-004-3100) must be in the INT position for the master unit, and EXT for the slave unit(s).

3.4 OUTPUT SIGNALS

Main output and reference signals are available from Models 5100 and 5110. The main outputs are fixed and variable (Model 5100 only) amplitude sine waves, at the programmed frequency. Reference frequency outputs are 1 MHz square or 8 MHz pulse signals derived from the system clock.

3.4.1 Model 5100 Main Outputs

Main output signals available from the Model 5100 are fixed amplitude (1 Vp-p) and variable amplitude (10 Vp-p maximum) sine waves, at the programmed frequency.

3.4.1.1 Model 5100 Fixed Amplitude Outputs

The Model 5100 front and rear panel jacks labeled 1 VOLT P-P and FXD OUT, respectively, provide sine wave signals (at the programmed frequency) which may be used for scope synchronization or frequency monitoring. The source impedance is 50Ω and the amplitude is nominally 1 Vp-p with no load, or 0.5 Vp-p into 50Ω. The LEVEL and ATTENUATION settings have no control of the output amplitude.

3.4.1.2 Model 5100 Variable Amplitude Outputs

The Model 5100 front and rear panel jacks labeled OUTPUT and VAR OUT, respectively, provide the main sine wave output signal (at the programmed frequency) from the instrument. The source impedance is 50Ω and the maximum amplitude is 10 Vp-p with no load, or 5 Vp-p into 50Ω, as determined by the LEVEL and ATTENUATION control settings.

3.4.2 Model 5110 Main Outputs

Main output signals available from the Model 5110 are fixed amplitude 1 Vrms, (10 Vp-p for units equipped with Option 004) sine waves, at the programmed frequency.

3.4.2.1 Model 5110 Fixed Amplitude Outputs

The Model 5110 output signal (at the programmed frequency) is available from the front panel BNC jack labeled OUTPUT 50Ω and from the rear panel jack labeled FXD OUT. The source impedance is 50Ω and the amplitude is nominally 1 Vrms with no load, or 0.5 Vrms into 50Ω.

For units equipped with Option 004, the OUTPUT 50Ω and FXD OUT signal amplitudes are increased to 10 Vp-p (3.6 Vrms) with no load, or 5 Vp-p into 50Ω (nominally). Option 004 also increases harmonic components (see paragraph 1.2.5).

3.4.3 Models 5100 and 5110 Reference Output Signals

The rear panel REF OUT signal can be either a 1 MHz square-wave or an 8 MHz pulse waveform, as determined by the Output Reference Selector Jumper shown in drawing 02-004-3100, Mainboard Assembly. For the Model 5100, the source can be an 8 MHz signal from either the internal 8 MHz reference (Input Reference Selector Jumper set to INT), or an external 8 MHz signal (jumper set to EXT). The Model 5110 works identically to the 5100, except that no 8 MHz REF OUT signal is generated if the 8 MHz reference signal is from an external source. The instrument is shipped with the Output Reference Selector Jumper in the 1 MHz position. The output is a buffered TTL signal capable of driving 30 standard loads.

3.5 REMOTE SWITCH AND INDICATOR (MODEL 5100 ONLY)

The Model 5100 is always operating in either the local or remote mode, as indicated by the amber REMOTE lamp on the front panel. The REMOTE switch must be in the OUT position for local mode operation. Remote mode operation may be effected in two ways:

1. By setting the REMOTE switch to the IN position.
2. By setting the programming line REMOTE to the proper state. Thus, the unit may be called into the remote mode by either front- or rear-panel control.

Local mode operation requires that neither (1) or (2) above be present.

3.6 LOCAL MODE OPERATION (MODEL 5100 ONLY)

All local frequency and attenuation control is derived from the front panel switches.

3.6.1 Local Frequency Control

The Model 5100 output signal frequency is set directly by the ten front panel rotary switches. Any frequency from 0.001 Hz to 2,000,000.000 Hz is available in increments of 0.001 Hz. All switches (except the MHz switch) have 12 positions with no stops to limit rotation. The two unmarked positions on the knobs which correspond to "10" and "11" are actually valid positions with the following restriction: the combined settings of the three switches in each range of 1000 (mHz, Hz, and kHz) may not exceed 999. For example, if the three "Hz" switches are set left to right as "8", "10", "11", the output frequency is given by: "8" × 100 + "10" × 10 + "11" × 1 = 911 Hz. An example of an invalid setting for the same three switches is "9", "10", "11" which totals 1011 Hz, exceeding the limit of 999.

The MHz switch has two positions. To set a frequency of 2,000,000.000 Hz, the MHz switch is set to 1 and the 100 kHz switch is set to "10". This is the only frequency which requires the use of an unmarked switch position.

When any frequency switch is changed on the Model 5100, the output signal will momentarily drop to zero volts dc before the new frequency appears. The duration of this so-called "zero phase" portion depends primarily on the bounce time of the switch contacts but will be 13.5 μs minimum. The new frequency waveform will always start at zero phase.

3.6.2 Local Attenuation and Level Control

The ATTENUATION switches on the Model 5100 front panel may be used to attenuate the OUTPUT signal from 0 to 85 dB in steps of 1 dB. Any combination of switch settings is valid; the total attenuation is equal to the total of the weights of the switches set to the IN position. There is some degree of rolloff of attenuation at the higher frequencies. Figure 3-2 shows the actual attenuation as a function of frequency.

The LEVEL control on the Model 5100 provides continuous amplitude control of the OUTPUT signal from 0 dB (fully clockwise) to 10 dB (fully counter-clockwise) attenuation relative to the attenuator setting. An output impedance of 50Ω is maintained over all ATTENUATION and LEVEL control settings. The maximum amplitude of the Model 5100 front panel OUTPUT and rear panel VAR OUT jacks is 10 Vp-p.

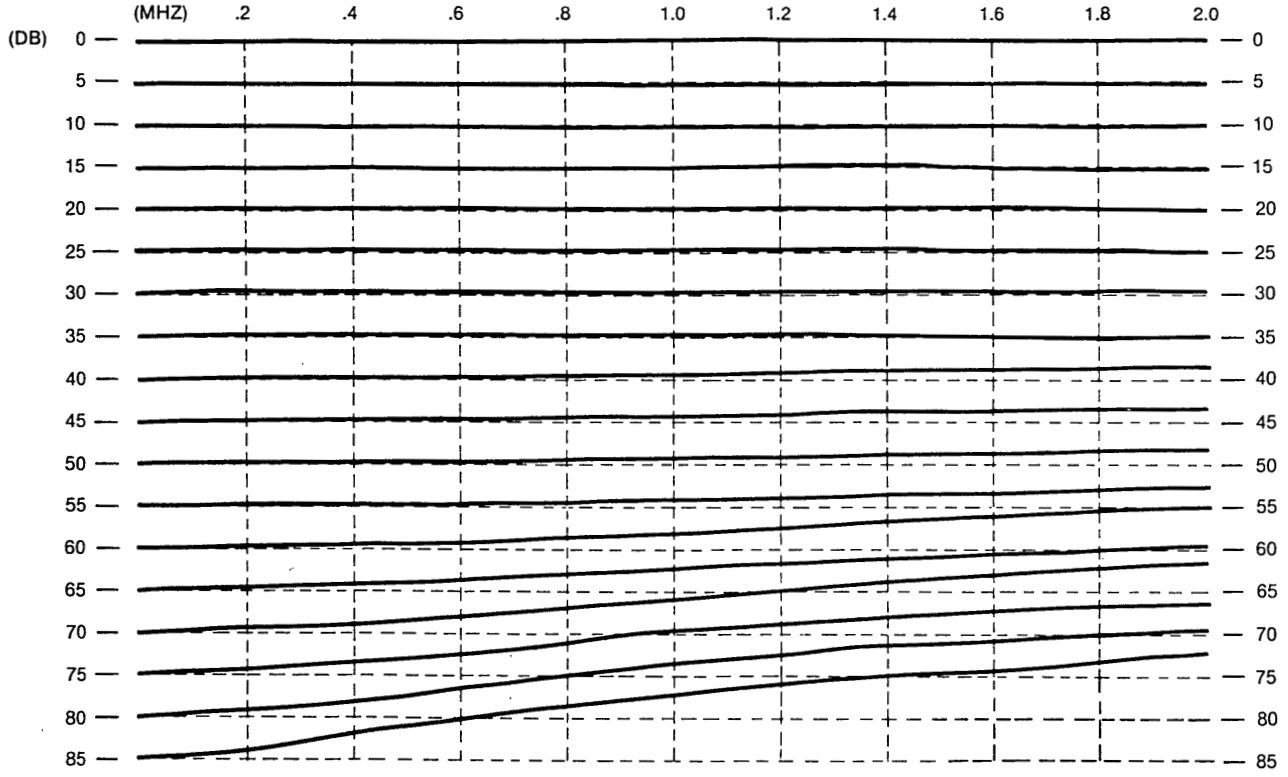


Figure 3-2. Attenuator Response Curves

3.7 REMOTE MODE OPERATION (MODELS 5100 AND 5110)

The programmable functions of these instruments are frequency, zero-phase point, and with Option 002, (see paragraph 5.3) attenuation. Programming data is latched internally at the time of the LOAD pulse and need not be held valid except at that time. The precise switching characteristics of the instruments allow accurate amplitude gating, frequency sweeping, and frequency hopping (FSK).

3.7.1 Programming Lines

All remote programming lines enter the 50-pin connector on the rear panel, and, except for the zero phase line, have the input circuitry shown in figure 3-3. Each programming line must sink a maximum of 4.8 mA when connected to ground potential. If a line is left unconnected, it will be internally pulled to + 5 V (logical "1") by the 3.3 KΩ pull up resistor and therefore may be programmed via contact closure to ground for logical "0" and open for logical "1".

The programming lines can be divided into two categories: control lines and data lines. Control lines are used to set data format, initiate loading, etc. The data lines set the value of the frequency or attenuation.

The pin numbers shown on the connector and its mating plug (supplied) are identified in figure 3-4. Lines A1 through A7 determine the attenuation (Option 002 only); N1 and N2, the loading format; and P_0 through Y_3 and Z_0, the frequency. REMOTE, LOAD, and ZERO PHASE lines are control lines.

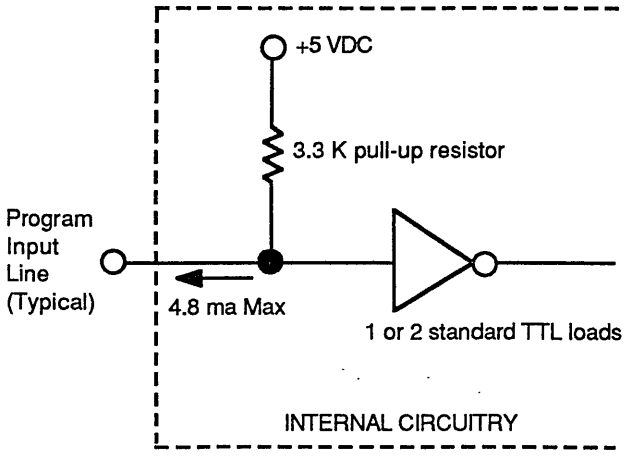


Figure 3-3. Standard Program Line Circuitry

All lines require positive logic with standard TTL levels: logical "0" is from 0.0 V to 0.8 V and logical "1" is from 2.0 V to 5.5 V, all referenced to the GND line.

3.7.1.1 REMOTE Line

The REMOTE Line is used as a device select or a load enable ine. As described in paragraph 3.5, the instrument may be called into the remote mode either by the REMOTE switch on the front panel (Model 5100 only) or via the programming line REMOTE.

With this line in the logical "1" state, Model 5100 remote/local mode selection is determined by the REMOTE switch; in the logical "0" state, the instrument is in the remote mode, regardless of the position of the REMOTE switch.

For the Model 5110, if the REMOTE line is in the logical "0" state, it will respond to data sent over the bus. With the REMOTE line at logical "1", all programming is defeated, and the unit operates as previously loaded. If this line is not to be used on the Model 5110, then it should be hardwired to logical "0" or common ground.

NOTE

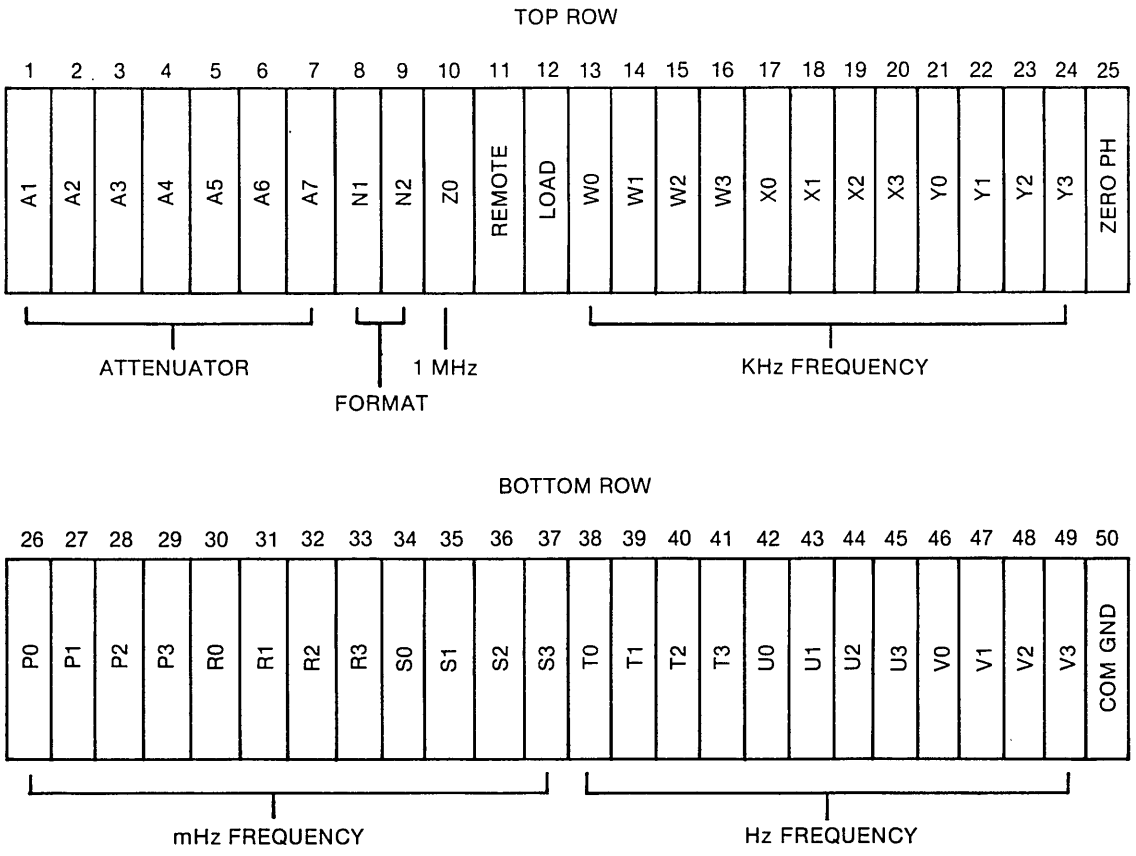
The ZERO PHASE line will operate regardless of the state of the REMOTE Line.

3.7.1.2 ZERO PHASE Line

The ZERO PHASE line circuitry is shown in figure 3-5. It may be used both as an input and as an output. As an input, the line is normally at logical "1". By setting a logical "0" on this line, the internal sample generator is reset to the zero-phase state, causing the output signal to go to 0 Vdc. When this line is set back to logical "1", the output waveform resumes at the zero-phase point. The minimum duration of the logical "0" interval is 125 ns, and there is approximately 1.5 μs delay to the OUTPUT jack.

The instrument may be used to generate an amplitude gate waveform by driving the ZERO PHASE line with a pulse generator; each gated interval is identical in phase content. All transients are spectrally limited to a 2.5 MHz bandwidth by the lowpass smoothing filter.

Every time the instrument changes frequency (except with phase-continuous programming), the internal circuitry causes the ZERO PHASE line to go to logical "0" during the processing time of the newly-loaded data. Thus, as an output, this line may be used to monitor the internal status of the data processing circuitry.



Notes:

1. All signals are referenced to pin 50 COM GND.
2. All lines are internally pulled to +5V by 3.3 kΩ resistors and assume logical "1" level if connected.
3. See figures 3-6 for programming chart.

Figure 3-4. Rear Panel Programming Connector (Rear View of Instrument)

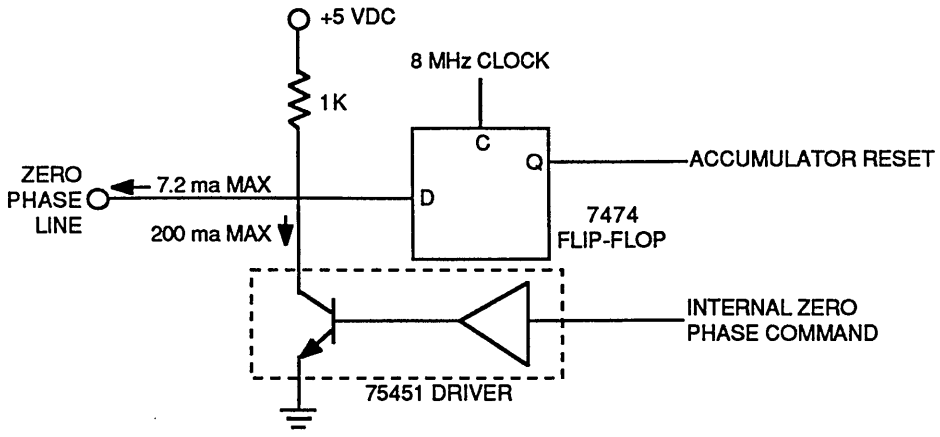


Figure 3-5. Zero Phase Line Circuitry

The ZERO PHASE line is electrically similar to a DTL "wired-or" bus. Internally, it is pulled to + 5V through 1 kΩ resistor and to ground through a saturated NPN transistor capable of sinking 200 mA. Externally, it may be pulled to logical "0" through a low impedance path to ground (switch, diode, transistor, etc.) and may be set to logical "1" by opening this path. Ideally, an external driver should only sink current from the line to ground. However, it must never source more than 200 mA to the line.

Phase Control

The zero phase line is sampled every 125 ns by the D flip-flop shown in figure 3-5. The output of this flip-flop controls the accumulator reset line. When this line is at logical "0", the phase value of the phase accumulator is set to zero degrees. When the line returns to logical "1", the phase accumulator begins advancing in value from the zero degree point.

There is a time uncertainty of up to 125 ns between the zero phase signal and the accumulator reset signal. The duration of the accumulator reset signal will be an integral number of 125-ns periods. Typically, there is a delay of 1.5 μs between the zero phase line signal and the synthesizer output response.

Load Acknowledge

As an output line, the zero phase line will acknowledge the loading of program data as described in paragraph 3.7.2.2. The internal NPN transistor will pull this line to logical "0" during the processing cycle, causing a zero phase interval in the output signal.

3.7.1.3 Control Lines

The control lines are: ZERO PHASE, REMOTE, LOAD, N1 and N2. The ZERO PHASE line is discussed in paragraph 3.7.1.2.

LOAD Line

The LOAD line is used to transfer programming data from the programming lines into the internal data register. This line is normally at logical "1" and the falling edge of a negative-going pulse causes a load. The positive-going edge is ignored with the restriction that the pulse width is 50 ns minimum.

Data Formats

There are four basic formats for loading data: BINARY-WORD, BCD-WORD, BINARY-BYTE, and BCD-BYTE. The format is programmable via bits N1 and N2 which are entered along with other data at the time of the LOAD pulse. The word mode permits loading of all data with a single load pulse, while byte mode allows the user with a limited number of programming lines to load four 12-bit bytes sequentially. The weights of the lines may be either BCD or binary. *Positive logic is used: a logical "1" on any of the lines will cause a contribution to the frequency equal to the weight of that line.* Each of the four modes is described below and summarized in figure 3-6.

3.7.1.4 Data Lines

The frequency range of the unit is from dc to 2 MHz, with 1 mHz resolution throughout. Frequency data is divided into four ranges:

Range	Minimum	Maximum	Resolution
mHz	0 mHz	999 mHz	1 mHz
Hz	0 Hz	999 Hz	1 Hz
kHz	0 kHz	999 kHz	1 kHz
MHz	0 MHz	1 MHz	1 MHz

The programming chart in figure 3-6 shows how data is formatted and weighed in each mode.

Binary Word

In this mode, N1 = N2 = logical "0" as shown in the MODE SELECT column in figure 3-6. All lines are loaded with a single load pulse. The weight of each program line is shown beneath each line designation. Any binary number less than or equal to $999_{10} = 1111100111_2$ is valid for each of the three frequency ranges (kHz, Hz, and mHz). The lines Y_2, Y_3, V_2, S_2 and S_3 are unused in this mode and may be left unconnected. Any lines which are always to be logical "0" are simply hardwired to GND.

The binary-word mode is the only programming mode which maintains phase and amplitude continuity between frequencies. Frequency sweeping is easily accomplished by causing repetitive loads of successively higher (or lower) frequencies. Although the frequency changes are in discrete steps, each step can be as small as 0.001 Hz allowing a close approximation to a linear sweep in most applications.

The delay from the negative edge of the LOAD pulse to the change in frequency at the OUTPUT jack is approximately 1.5 μs. LOAD pulses may be accepted at a maximum rate of one per 0.625 μs. Data must be held valid until at least 0.625 μs after the negative edge of the LOAD pulse. The ZERO PHASE line is logical "1" during all binary-word loads. These conditions are indicated on the timing diagram in figure 3-7.

MODE	MODE SELECT		ATTENUATOR							FREQUENCY																																		LOAD
	N2	N1	A7	A6	A5	A4	A3	A2	A1	Z_0	Y_3	Y_2	Y_1	Y_0	X_3	X_2	X_1	X_0	W_3	W_2	W_1	W_0	V_3	V_2	V_1	V_0	U_3	U_2	U_1	U_0	T_3	T_2	T_1	T_0	S_3	S_2	S_1	S_0	R_3	R_2	R_1	R_0	P_3	P_2	P_1	P_0	
PIN NUMBER →	9	8	7	6	5	4	3	2	1	10	24	23	22	21	20	19	18	17	16	15	14	13	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	
BINARY WORD	0	0	40	20	10	8	4	2	1	1	★	★	512	256	128	64	32	16	8	4	2	1	★	★	512	256	128	64	32	16	8	4	2	1	★	★	512	256	128	64	32	16	8	4	2	1	SINGLE
			DB							MHz	KHz												Hz												mHz											
BCD WORD	1	0	40	20	10	8	4	2	1	1	800	400	200	100	80	40	20	10	8	4	2	1	800	400	200	100	80	40	20	10	8	4	2	1	800	400	200	100	80	40	20	10	8	4	2	1	SINGLE
			DB							MHz	KHz												Hz												mHz											
BINARY BYTE	0	1	40	20	10	8	4	2	1	1																																					LOAD 1
			DB							MHz																																					
																																			★	★	512	256	128	64	32	16	8	4	2	1	LOAD 2
																																			mHz												
																																			★	★	512	256	128	64	32	16	8	4	2	1	LOAD 3
																																			Hz												
																																			★	★	512	256	128	64	32	16	8	4	2	1	LOAD 4
																																			KHz												
BCD BYTE	1	1	40	20	10	8	4	2	1	1																																					LOAD 1
			DB							MHz																																					
																																			800	400	200	100	80	40	20	10	8	4	2	1	LOAD 2
																																			mHz												
																																			800	400	200	100	80	40	20	10	8	4	2	1	LOAD 3
																																			Hz												
																																			800	400	200	100	80	40	20	10	8	4	2	1	LOAD 4
																																			KHz												

★ NOT USED

Figure 3-6. Remote Programming Chart

BCD-Word

In this mode, N1 = logical "0" and N2 = logical "1". Programming lines are weighted in BCD code and are analogous in format to the front panel frequency switches on the Model 5100. The total of the weights in any of the three ranges (kHz, Hz, and mHz) cannot exceed 999; otherwise, any combination of weights is valid. For example, the frequency 150 Hz could be programmed with several different sets of data: (1) 100 Hz + 40 Hz + 10 Hz, (2) 100 Hz + 40 Hz + 8 Hz + 2 Hz, (3) 80 Hz + 40 Hz + 20 Hz + 10 Hz, etc. By properly choosing data lines, the number of active programming lines may be minimized in certain applications.

Data must remain valid for at least 4.5 μs after the negative-going edge of each LOAD pulse. The internal data processing circuitry requires a maximum of 18.0 μs to process the BCD data after a load. During the last 13.5 μs of this interval, the ZERO PHASE line will go to zero volts. The instrument is ready to receive a new load after this time, as shown in figure 3-7.

BCD-Byte and Binary-Byte

The byte loading mode is provided expressly for the user who has a limited number of data lines. Four 12-bit bytes are required, each byte being loaded in 12-bit parallel form. The first byte loads the mode select bits (N1 and N2), the attenuator bits (A1 through A7, Option 002 only) and the 1 MHz bit (Z_0) on the lines shown in figure 3-6. A LOAD pulse causes loading of this data and initiates a wait cycle holding the ZERO PHASE line (and OUTPUT signal) at zero until the next three bytes have been loaded and processed. Data must be held valid for at least 4.5 μs after the first LOAD pulse.

The remaining three bytes program the mHz, Hz and kHz in that order, as shown in figure 3-6. Each range (mHz, Hz, and kHz) is constrained exactly as in the word modes. The fourth LOAD pulse initiates processing of all loaded data after which the new signal appears at the output jacks. Data must be held valid for at least 375 ns after each of the last three LOAD pulses.

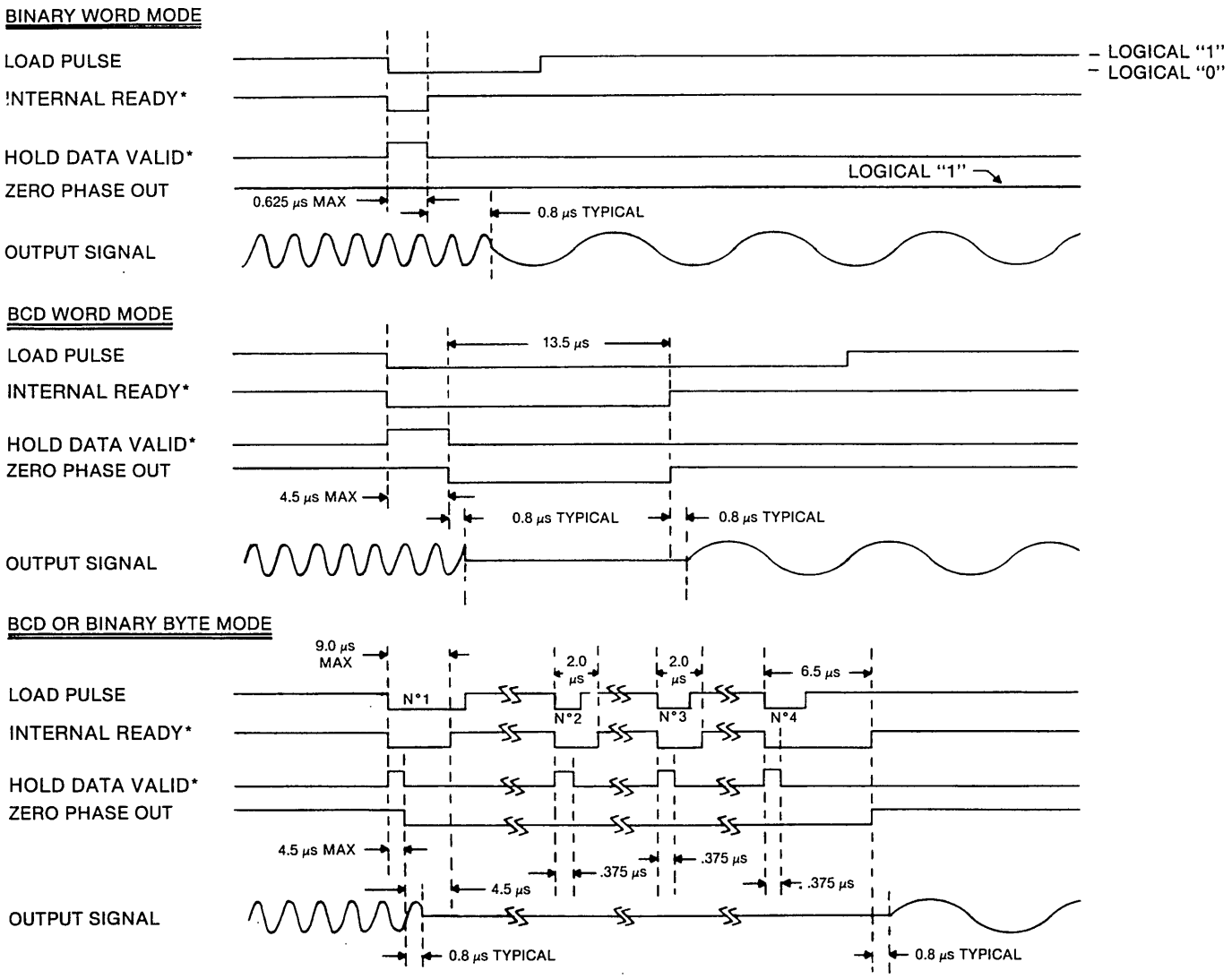
Since the first byte and the remaining three bytes are loaded on two separate sets of lines, the user may tie these two sets in parallel, allowing a single set of 10 or 12 lines to serve for all byte inputs. These sets of lines are arranged adjacent to each other on the rear panel connector (see figure 3-3) so that pins #1 through #10 may be easily connected to pins #26 through #35, respectively. Pins #36 and #37 are then included with the above ten lines to form a total of twelve for BCD bytes. Note that if binary format is used, these latter two lines may be omitted, thus requiring a total of only ten lines for data input.

3.7.2 Remote-Local Mode Transitions (Model 5100 Only)

The characteristics of switching between local and remote modes on the Model 5100 may be useful in some applications. When switching from local to remote modes, no change occurs in frequency (or attenuation) until the first LOAD pulse is received. If, however, at the time of entering the remote mode the LOAD line is at logical "0", the instrument will thereupon load the program data. In order to load new data, either the LOAD line must go to logical "1" and then back to logical "0", or the instrument must go to local mode and back to remote mode. Whenever local mode is entered, the instrument immediately returns to the current front panel setting. Therefore, if the user wishes to switch between two frequencies, he could set the first on the front panel and the second on the program lines. With the LOAD line at logical "0", switching between local and remote modes would then alternate the frequencies. The transition into local mode is identical in character to a BCD-word load and the timing diagram of figure 3-7 applies, substituting the remote condition for the LOAD signal.

Another application may require transitions from one frequency to another without the relatively complex amplitude and frequency transients encountered in rotating the front panel switches to change frequency. This may be done on the front panel without resorting to remote programming. To change frequency, enter the remote mode with the REMOTE button and set the frequency switches to the new frequency. Changing the switches will have no effect. Push the REMOTE button, again bringing the instrument back to local mode. The frequency will change to the new setting. This routine is equivalent to remote programming in the BCD-word mode.

With Option 002, the attenuator may be controlled in the same manner as the frequency setting described above.



*Not available for customer observation. Shown only to illustrate timing.

NOTES:

1. All waveforms except output signal are shown with standard TTL levels.
2. When internal ready is at logical "1" a new load pulse will be accepted.
3. Data must be held valid during the logical "1" portion of hold data valid.
4. Positive-going edge of load pulse is ignored except logical "0" interval is 50 nsec min.

Figure 3-7. Loading Timing Diagram

SECTION 4
CIRCUIT DESCRIPTION

4.1 SINUSOID GENERATION

Models 5100 and 5110 utilize direct digital synthesis techniques to generate the output sinusoid. Samples of the sinusoid are digitally generated at an 8 MHz rate and are then converted to analog form by a Digital-to-Analog Converter (DAC) and a smoothing Low Pass Filter (LPF) cutting off at approximately 2.5 MHz. The amplitude of the digital samples is represented with 11 bits (including sign), and the phase accuracy of each sample is ±0.09°.

4.2 FUNCTIONAL BLOCK THEORY

Figure 4-1 is a composite block diagram of the units. The 8 MHz system clock is derived from either an external signal or a temperature-compensated Crystal-Oscillator Reference (proportional oven control with Option 001). The frequency stability of the output sinusoid is related directly to that of the system clock. Mechanical adjustment of the internal crystal frequency is provided to compensate for long-term aging effects, and the crystal oscillator may also be phase locked to an external 1 MHz reference (which is within ± 2 Hz of the internally derived 1 MHz). Since excellent short-term stability is provided by the internal crystal reference, the function of the external-reference phase-lock loop is only to provide proper bias to the crystal, and hence, the loop bandwidth is fairly broad (approximately 10 Hz).

The frequency value of the output sinusoid is stored in the Frequency Register in binary form with each 3-decade group (kHz, Hz, and mHz) represented by a separate 10-bit binary number (see figure 4-2). A separate flip-flop stores the MHz bit. If the unit is remotely programmed in this binary form, then no numerical conversion is required, and the output frequency changes with no discontinuity in phase or amplitude. The delay from the programming inputs to the analog output in this mode is approximately 1.5 μs.

4.3 PROGRAMMING

If the unit is programmed in BCD either locally (via the Model 5100 front panel) or remotely, then BCD-to-binary conversion is required, and the output is reset to zero phase (and thus zero volts) during the conversion period. Remote programming in either BCD or binary can also be accomplished in four 12-bit bytes, (10 bits for binary) if the number of input lines is more important than programming speed.

Instrument schematics are in section 8.

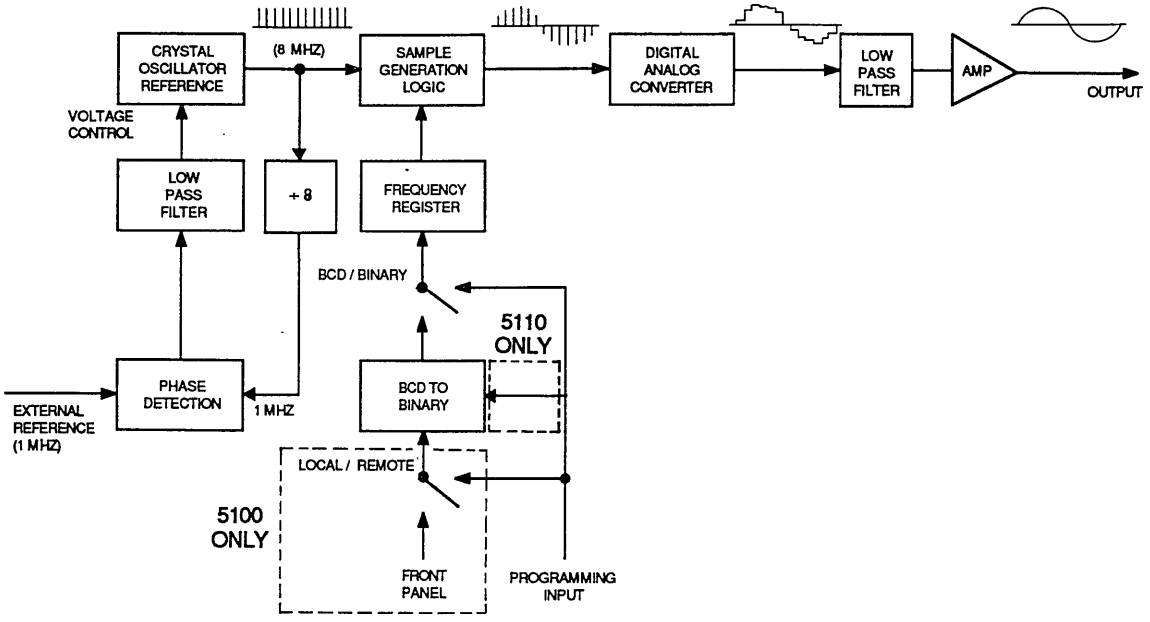
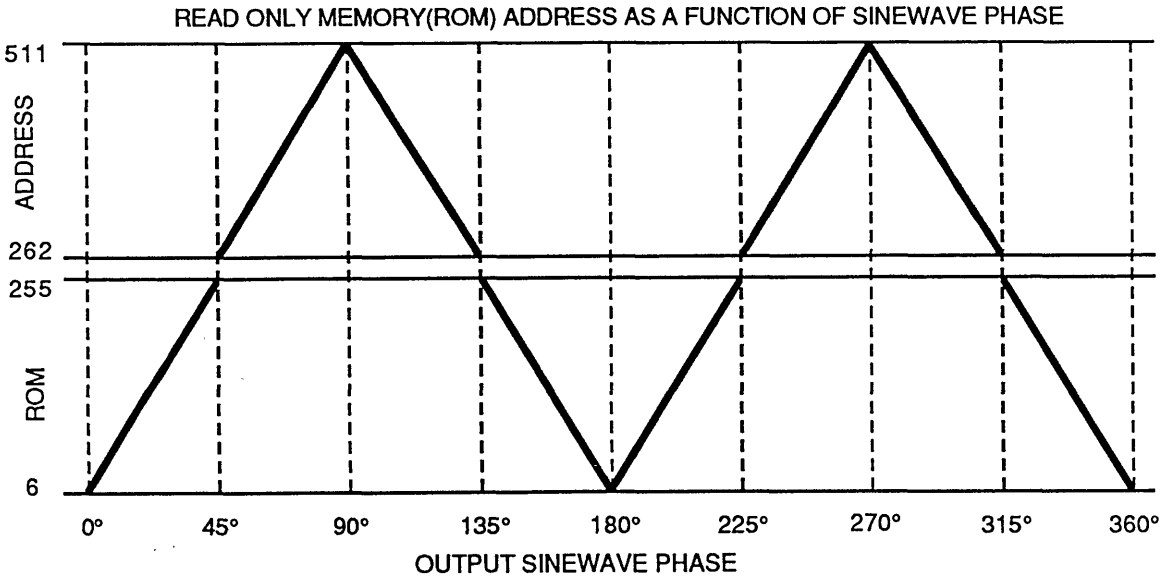


Figure 4-1. Direct Digital Synthesis



NOTE

1. ROM is arranged in 512 × 8 structure. 500 words are used to store relative magnitude of sine function from 0° to 90°. Addresses 6 through 255 store 0° to 45° and addresses 262 through 511 store 45° through 90°.

2. Above graph shows how ROM is addressed to produce 360° sinewave. Inversion after ROM provides negative operation for 180° to 360°.

3. With front panel setting of 4 kHz address is incremented one step per 125 nsec = sampling rate. Each address step corresponds to a phase step of 0.18°. During one sine cycle there are 2,000 samples (2,000 × 0.18° = 360°)

4. Each of the nine address bits may be monitored and verified by displaying DAC-1 on scope. See paragraph 6.4 and figure 6.4. DAC-1 has positive edge at 0° phase of the output sinewave and negative edge at 180°.

5. Non-conforming address bits may be due to defective U69, U78, U85. Otherwise check accumulator malfunction.

6. Signals DAC-4 through DAC-11 are generated directly from the eight output bits of the ROM. DAC-2 and DAC-3 are synthesized from DAC-4 and ADR 8 through ADR 5. DAC-1 is derived directly from the accumulator.

			Address Examples		
Address Bits	**Location**	**Weight**	**38**	**144**	**265**
ADR 0 (MSB)	U94-6	256	0	0	1
ADR 1	U94-5	128	0	1	0
ADR 2	U94-4	64	0	0	0
ADR 3	U94-3	32	1	0	0
ADR 4	U94-2	16	0	1	0
ADR 5	U94-1	8	0	0	1
ADR 6	U94-23	4	1	0	0
ADR 7	U94-22	2	1	0	0
ADR 8 (LSB)	U94-21	1	0	0	1

Logical "1" = 2.0 to 5.0 Volts.
Logical "0" = 0.0 to 0.8 Volts.

Figure 4-2. Sine Wave Generation

SECTION 5
OPTIONS

5.1 GENERAL

This section contains information pertaining to options available for Models 5100 and 5110.

5.2 OPTION 001, HIGH STABILITY REFERENCE OSCILLATOR

Option 001 is the most stable of the oscillators available for Models 5100 and 5110. It uses a crystal with proportional oven control to obtain its excellent stability. See paragraph 1.2.10 for temperature stability and aging rate specifications and assembly drawing 02-002-3031 in this section.

5.3 OPTION 002, REMOTE ATTENUATION

With Option 002 installed, attenuation of the OUTPUT signal as described in paragraph 3.6.2 is fully programable. The format is shown in figure 3-6, and loading of the attenuation bits occurs at the same time as the frequency bits. Positive logic, as described in paragraph 3.7.1.3 (Data Formats), is used. Internal registers store the data and drive miniature relays to switch the appropriate resistor networks. The settling time of the relay contacts is typically less than 5 ms.

Protective circuitry insures that when switching between two levels of attenuation, the settling of the relays will never cause attenuation less than either of the two valid levels. Remote attenuator drawings (suffix -3077) are located in section 8.

5.4 OPTION 004, 10 VOLT P-P OUTPUT (Model 5110 Only)

Option 004 increases the Model 5110 fixed output amplitude from 1 Vrms to 10 Vp-p. Compatable with Option 002, but not available with Option 013.

5.5 OPTION 006, TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR

Though not as stable as Option 001, Option 006 is sufficient for most applications and is standard on the Model 5100. See paragraph 1.2.10 for temperature stability and aging rate specifications.

5.6 OPTION 013, UPPER FREQUENCY RANGE EXTENSION

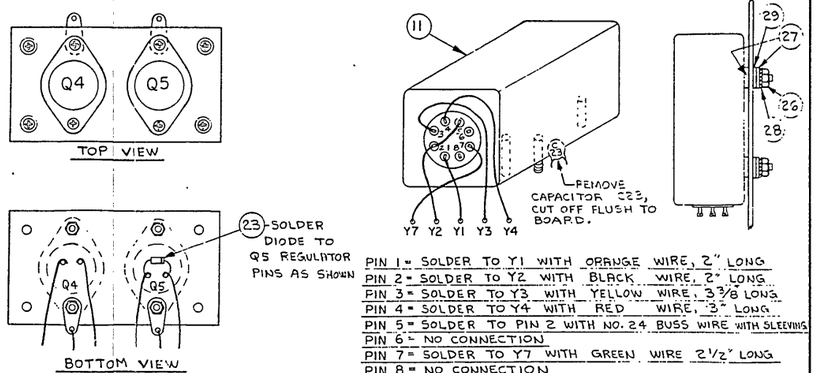
Option 013 extends the frequency range upper limit from 2 MHz to 3 MHz. See Appendix A for additional information and drawings.

5.7 OPTION 020, TTL OUTPUT

Option 020 provides a TTL compatable square wave signal at BNC labeled TTL OUTPUT. The TTL output maintains the same frequency range and resolution as the standard Model 5100 and 5110 outputs. The TTL OUTPUT BNC replaces the VAR OUT BNC on the Model 5100. See Appendix B for additional information and drawings.

REV	ECN	BY	DATE	APP

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASED			
B				



PIN 1 = SOLDER TO Y1 WITH ORANGE WIRE, 2" LONG
PIN 2 = SOLDER TO Y2 WITH BLACK WIRE, 2" LONG
PIN 3 = SOLDER TO Y3 WITH YELLOW WIRE, 3 3/8 LONG
PIN 4 = SOLDER TO Y4 WITH RED WIRE, 3" LONG
PIN 5 = SOLDER TO PIN 2 WITH NO. 24 BUSS WIRE WITH SLEEVING
PIN 6 = NO CONNECTION
PIN 7 = SOLDER TO Y7 WITH GREEN WIRE 2 1/2" LONG
PIN 8 = NO CONNECTION

DRAWN BY: Paul	DATE 2/24/78
CHECKED BY:	
ENG. APPVL.	
MFG. APPVL.	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE: .XXX ± .XX ± F/X ± 1/64 ∠° ± 1°

WAVETEK

TITLE: OPTION -01 HIGH STABILITY OSCILLATOR ASSY FOR 5100 SERIES III

SIZE A | DRAWING NO. 02 002-3031 | REV B | SCALE ~

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SL ZR 15V 5% 1W (1N4744A)			131.0150	1
NONE	OSC: VOLT CONTR 8MHZ H/S (A/P)	173.6001	WVTK	173.6101	1
NONE	WIRE: BUSS TINNED #24 AWG	9024	WEICO	378.0701	1
NONE	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	2
NONE	WIRE: #24 AWG STR RED	1124	WEICO	378.1724	3
NONE	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	2
NONE	WIRE: #24 AWG STR YELLOW	1124	WEICO	378.1744	3.75
NONE	WIRE: #24 AWG STR GREEN	1124	WEICO	378.1754	2.5
NONE	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	.75
NONE	NUT: HX ST ZN 6-32X1/4 AF			387.6080	3
NONE	WASHER: FLAT STL #6 .147ID .312OD .028THK			388.0060	3
NONE	WASHER: EXT LK STL ZN			388.1061	3

WAVETEK PARTS LIST | TITLE: OPT-01, HIGH STAB XTAL 5100 | ASSEMBLY NO. 002.3031 | REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	#6 WASHER: FLT NYL #6 5/16D 1/16T			388.3060	6

WAVETEK PARTS LIST | TITLE: OPT-01, HIGH STAB XTAL 5100 | ASSEMBLY NO. 002.3031 | REV B

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: ASSEMBLY & PARTS LIST OPTION 001
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 5100/5110	DWG NO. 02-002-3031 REV B
	SCALE	CODE IDENT 23338	SHEET 1 OF 1

NOTE: UNLESS OTHERWISE SPECIFIED

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
JAN 73	A	ECO 179			
JAN 75	B	ECO 227			
MAY 77	C	ECO 1822			
9/1/78	D	ECO 9923	M.C.		

OLD No 510356

18 REMOTE
U8A U8B U8C U8D U6A U6B U6C U6D U4A U4B U4C U4D U2A U2B U2C U2D
U1SIH-3
S1SIF-3
F1SIE-3
M1SID-3
K1SIC-3
H1SIB-3
E1SIA-3

VCC
R31 R30 R29 R28 R27 R26 R25 R24
6 A1
7 A2
8 A3
13 A4
14 A5
15 A6
16 A7
U7A U7B U5A U5B U3A U3B U1A
4 LOAD
U9B

U12A U12B U11A U11B U10A U10B U9A

C7 C6 C5 C4 C3 C2 C1
K7 K6 K5 K4 K3 K2 K1

Z1SIGOUT
Y1GNDOUT

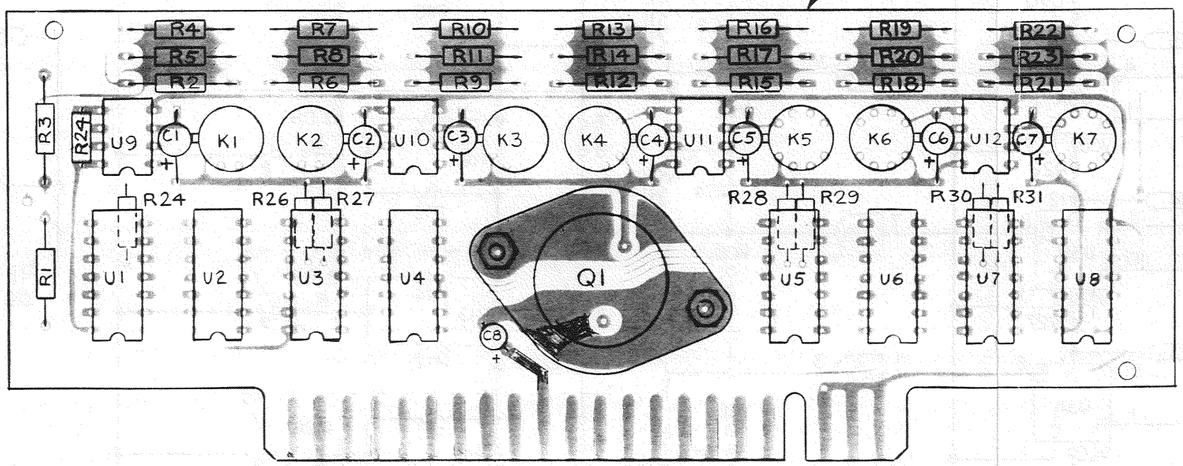
R23 R22 R21 40 DB
R20 R19 R18 20 DB
R17 R16 R15 10 DB
R14 R13 R12 8 DB
R11 R10 R9 4 DB
R8 R7 R6 2 DB
R5 R4 R3 R2 1 DB

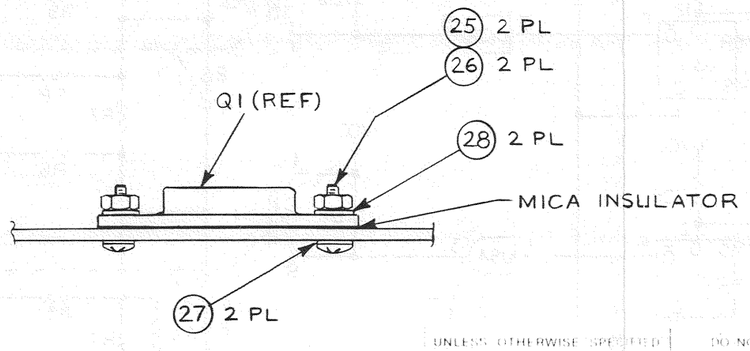
A1SIG IN
R1
B1GND

10 VOLT IN
Q1 LM309K
C8

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE	DRAWN BY AST
			APPROVED BY
FRACTIONAL ± 1/64	TITLE ATTENUATOR ASSEMBLY: REMOTE		
ANGULAR ±	DATE 11-16-72	DRAWING NUMBER 03-004-3077	REV D

ZONE	LTR	ECO NO	CHANGED BY	APPR'D. BY	DATE
	A	52			
	B	178		R.H.	
	C	226		R.H.	
	D	471		R.H	
	E	1512	NP 11/11/82		





UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

.XX	.XXX	.XX
± 1/64	± .005	± .01

MATERIAL

FINISH

DO NOT SCALE DWG.
REMOVE ALL BURRS
BREAK SHARP EDGES

		DATE
DRAWN	R. Peters	11/11/82
CHKD		11/12/82
ENG APPR	SR	"
MFG APPR		
ISSUED		

WAVETEK

TITLE: P.C. ASSEMBLY REMOTE ATTENUATOR

SIZE	MODEL NO	DRAWING NO	REV
C	5100	02-004-3077	E

SCALE 2:1 CODE IDENT 23338

R.S. KNAPP

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C8	CAP, TANT, .10UF 20% 35V	T368A104M035A*	KEMET	109.4100	1
C1 C2 C3 C4 C5 C6 C7	CAP, TANT, 10UF 20% 20V	T368B106M025A*	KEMET	109.6100	7
R12 R14	RES, MFLM 115 OHM 1% 1/8W T0	RN55C1150F	UNCEM	110.1150	2
R11 R9	RES, MFLM 221 OHM 1% 1/8W T0	RN55C2210F	UNCEM	110.2210	2
R19	RES, MFLM 249 OHM 1% 1/8W T0	RN55C2490F	UNCEM	110.2490	1
R6 R8	RES, MFLM 432 OHM 1% 1/10W T2	RN55C4320F	UNCEM	110.4321	2
R2 R5	RES, MFLM 887 OHM 1% 1/8W T0	RN55C8870F	UMCEM	110.8870	2
R22	RES, MFLM 2.6K 1% 1/8W T0	RN55C2611F	JMAR	111.2610	1
R24	RES, CFLM, 1.0K OHM 5% 1/4W	CF-071K-5%	DALE	116.2101	1
R25 R26 R27 R28 R29 R30 R31	RES, CFLM 2.2K OHM 5% 1/8W			116.2220	7
R3 R4 R7	RES, MFLM 11.3 OHM 1% 1/8W T0	RN55C11R3F	JMAR	119.1130	3

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	ASSY, PRE WAVE LOAD 5100-3077	1208-00-2580	

PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R10	RES, MFLM 23.7 OHM 1% 1/8W T0	RN55C23R7F	UMCEM	119.2370	1
R1	RES, MFLM 49.9 OHM 1% 1/8W T0	RN55C49R9F	UMCEM	119.4990	1
R13 R21 R23	RES, MFLM 51.1 OHM 1% 1/8W T0	RN55C51R1F	UMCEM	119.5110	3
R18 R20	RES, MFLM 61.9 OHM 1% 1/8W T0	RN55C61R9F	UMCEM	119.6190	2
R16	RES, MFLM 71.5 OHM 1% 1/8W T0	RN55C71R5F	UMCEM	119.7150	1
R15 R17	RES, MFLM 97.6 OHM 1% 1/8W T0	RN55C97R6F	UMCEM	119.9760	2
U10 U11 U12 U9	U: DUAL PRPHL DRIVER (75451)	SN75451N-3	TI	120.4451	4
NONE	ASSY, PC BD PREPPED 5100-3077	5100-2581	WVTK	1208-00-2581	1
U2 U4 U6 U8	U: QUAD 2 IN NAND GATE	SN7400N-3	TI	122.7400	4
U1 U3 U5 U7	U: DUAL D TYPE FLIP FLOP	SN7474N-3	TI	122.7474	4
K1 K2 K3 K4 K5 K6 K7	RELAY: XTAL DPDT 5V 160MW	712-6	TELED	175.1502	7

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	ASSY, PRE WAVE LOAD 5100-3077	1208-00-2580	

PAGE 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q1	Q: P.V. REG 5V 5% 1A TO-3	LM309K-STEEL	NSC	120.0051	1
NONE	ASSY, PRE WAVE LOAD 5100-3077	5100-2580	WVTK	1208-00-2580	1
NONE	INSULATOR: MICA TO-3	4662	KEYST	368.5003	1
NONE	M XCR: ST ZN SL 4-40X3/8 PH			380.4062	2
NONE	NUT: HX ST ZN 4-40X1/4 AF			387.4080	2
NONE	WASHER: FLAT STL ZN #4			388.0040	2
NONE	WASHER: EXT LK STL ZN #4			388.1041	2

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	ATTENUATOR ASSY REMOTE	004.3077	D

PAGE 1

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST REMOTE ATTENUATOR ASSEMBLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG	MODEL NO 5100/5110	DWG NO 004.3077 REV D
	SCALE	CODE IDENT 23338	SHEET 1 OF 1

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES, MFLM 221 OHM 1% 1/8W TO	RN55C2210F	UNCEM	110.2210	1
NONE	RES, MFLM 432 OHM 1% 1/10W T2	RN55C4320F	UNCEM	110.4321	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	OPTION 004 10 VP-P OUTPUT FOR MODEL 5110	002.3034 PAGE 1	A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	OSC: VOLT CONTR 8MHZ (A/P	251-1457	VECT	173.6100	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	OPTION 006 TCXO FREQUENCY STD. FOR MODEL 5110	002.3036 PAGE 1	B

NOTE: UNLESS OTHERWISE SPECIFIED

WAVETEK SAN DIEGO • CALIFORNIA

TITLE	MODEL NO.	DWG NO.	REV
PARTS LIST OPTIONS 004 & 006	5110	002.3034	A
	MODEL NO. 5110	DWG NO. 002.3036	REV B
	CODE IDENT 23338	SHEET 1 OF 1	

SECTION 6
CONFORMANCE TESTS

6.1 INTRODUCTION

This section describes procedures for verifying correct operation of the instrument and for making the necessary adjustments for optimum performance. If faulty operation is suspected, the steps in this section should be followed to determine the origin of the problem. Section 7 of this manual contains a troubleshooting routine which is keyed to the steps in this section. After each of these conformance tests, there is a reference in parenthesis (TS-#) to table 7-1 in section 7.

NOTE

The completion of the conformance test procedure returns the instrument to correct alignment.

CALIBRATION LIMITS AND TOLERANCES ARE NOT INSTRUMENT SPECIFICATIONS

Instrument specifications are given in Section 1 of this manual.

Equipment required in the procedure:

Item	Minimum Use Specification
Variac (variable autotransformer)	Voltage Range: 0 to line, Current: 1 A.
Oscilloscope	Wideband (25 MHz), Two Channels, Vertical Sensitivity: 20mV/cm, Triggered Sweep.
VOM	AC and DC Voltage Scales, 20,000Ω/V on DC.
RMS Voltmeter	Calibrated in dB, Reads from +20 dBm to −80 dBm.
Frequency Counter	Range 1 Hz to 2 MHz with 1 sec Gating interval. Must Accept 10 Vp-p sine wave.
Programming Unit (PGM)	Capable of setting all data lines individually to TTL "0" or "1" and generating bounceless LOAD pulse (see paragraph 3.7.2.1, LOAD Line).
Frequency Source	1 MHz signal with TTL "0" and "1".

See paragraph 7.3 for description of part designations and IC socket numbering.

6.2 POWER SUPPLY

Equipment required for this test: VOM, variac, and oscilloscope. Refer to section 7, power supply drawings for component locations and schematic. Test points are shown in figure 6-1.

1. Variac initial conditions: Dial set at 0V.
2. Instrument initial conditions: Line cord connected to variac, power ON, local mode, frequency setting 0 Hz, PGM disconnected.
3. Connect negative probe of meter to ground bus at point A, figure 6-1. Connect positive probe to point B and increase setting of variac until a reading of +2.0 Vdc is reached. (TS-1)
4. Move positive probe to point C and verify +5V DC. (TS-1)
5. Move negative probe to point D, positive probe to point E and verify +5Vdc. (TS-1)
6. Move negative probe to point A and positive probe to point B. Increase setting of variac gradually, watching the meter climb to approximately +9Vdc at full line voltage. (TS-1)
7. Scope initial conditions: Vertical sensitivity 1V/cm, dc coupled, free running sweep. Connect ground lead to scope probe to point A.
8. Connect tip of scope probe to points F, G, and H, reading 5.0Vdc at each point. The trace must be "clean" with a maximum noise component of 200mVp-p. (TS-2)

9. Set vertical sensitivity to 5 V/cm on scope. Connect tip of probe to point J and verify +15 Vdc with 200 mV maximum noise. (TS-2)
10. Connect tip of probe to point K and measure −15 Vdc with 200 mV maximum noise. (TS-2)

6.3 CLOCK GENERATOR

Equipment required for this test: oscilloscope. Refer to section 8, main board drawings for component locations and schematic. Test point DC is shown in figure 6-1.

1. Instrument initial conditions: power ON, PGM disconnected, 8 MHz clock (internal or external, paragraph 3.3) connected.
2. Scope initial conditions: 5 V/div. vertical sensitivity, dc coupling, 0.5 μs/cm sweep.
3. Connect channel A probe to test point DC and verify a negative pulse waveform with a width of 40 ns and a period of 4.5 μs. (TS-3)

6.4 FRONT PANEL DATA (MODEL 5100 ONLY)

Equipment required: Oscilloscope. Refer to figures 3-1 and 6-1 for part locations. S1 thru S10 are front panel frequency switches right to left.

1. 5100 initial conditions: Power ON, local mode, frequency setting 0 Hz.
2. Scope initial conditions: Vertical Sensitivity 5 V/div, dc coupled, sweep 0.5 μs/cm, sync triggered on negative slope of channel A.
3. Connect Ch A probe to point DC and verify a negative pulse waveform with a width of 40 ns and a period of 4.5 μs. (TS-3)
4. Adjust position and sweep controls on scope so that the positive-going edges of two consecutive pulses are aligned with the first and the ninth vertical division lines. See figure 6-2.
5. Connect Ch B probe on FPD (Front Panel Data). Signal should be logical "1". (TS-6)
6. The FPD waveform on Ch B represents the setting of the front panel switches S1 through S9 in BCD code, serial form. Negative logic is used so that the logical "1" condition in step 5 reflects the 0 Hz setting. With the scope adjusted as per step 4, the first division of FPD represents S1, the second division S2, etc. Within each of the nine divisions there are four subdivisions corresponding to the 1-2-4-8 code for each switch, left to right.
7. Rotate S1 through its 12 positions verifying the negative-logic BCD code in the first division of FPD as described in step 6. See figure 6-3, waveforms "a" through "l". (TS-7)
8. Repeat step 7 for switches S2 through S9. See figure 6-3 waveforms "m" through "o", etc. (TS-7)

6.5 SAMPLE GENERATOR

Equipment required: Oscilloscope. Refer to main board Assembly in section 8 and figure 6-1 for D/A converter location and test points.

1. 5100 initial conditions: Power ON, local mode, frequency set to 4 kHz.
2. 5110 initial conditions: power ON, PGM connected, all programming lines at logical "0" except 4 kHz and ZERO PHASE. Enter LOAD pulse.
3. Scope initial conditions: Vertical sensitivity 5 V/cm, dc coupled, sync triggered on positive slope of Ch A.
4. Connect Ch A probe to DAC-1 and verify a square-wave with a period of 250 μs. (TS-8)
5. Adjust sweep of scope to set one full cycle of the square wave in step 3 to fill 10 horizontal divisions. See figure 6-3, waveform "a".
6. Connect Ch B probe to DAC-2 and verify waveform "b" in figure 6-3. (TS-9)
7. If more than two channels are provided on the scope, connect them to consecutive DAC pins allowing easier comparison between signals. If only two channels are available, Ch B will have to be checked against CH A only.
8. Display the signal on DAC-3 and compare with figure 6-3, waveform "c". (TS-9).
9. Display the signals on DAC-4 through DAC-11 and compare with figure 6-3, waveforms "d" through "k". (TS-10)

6.6 DC OFFSET

Equipment required: Oscilloscope, PGM. Refer to Main board Assembly, section 8, for location of parts.

1. 5100 initial conditions: Power ON, local mode, frequency setting 0 Hz, LEVEL control fully ccw, connect a jumper across R54, shorting it.
2. 5110 initial conditions: power ON, PGM connected, ZERO PHASE line set to logical "0", connect a jumper between LPF IN and LPF GND.
3. Scope initial conditions: DC coupled, vertical sensitivity −20 mV/cm, free-running sweep.
4. Connect instrument OUTPUT signal to scope. Adjust R29 for minimum dc voltage. (TS-18)
5. Remove jumper.
6. Set LEVEL control fully cw (Model 5100). Adjust R55 for minimum dc voltage. (TS-18)

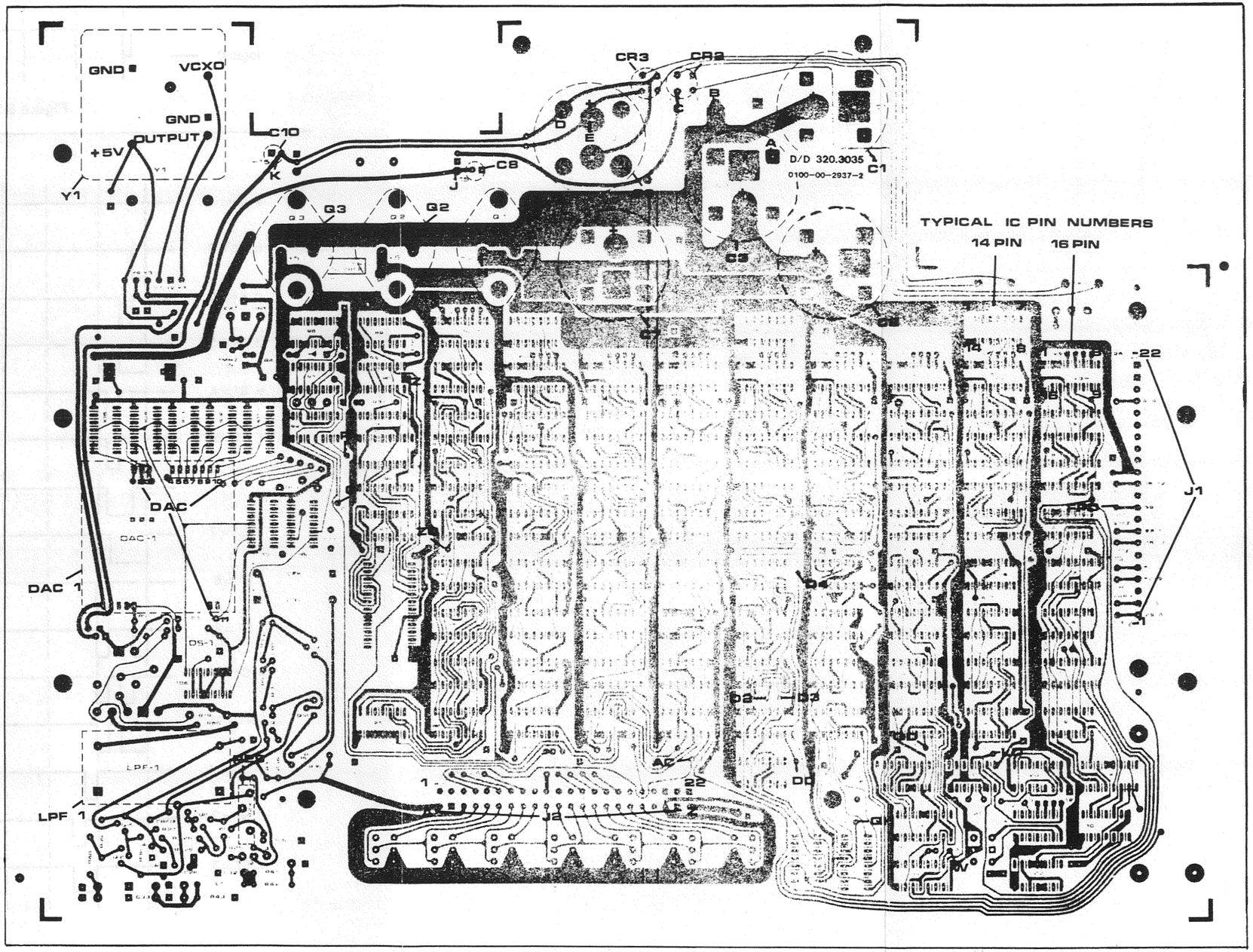


Figure 6-1. Motherboard Assembly A1 — Bottom Side

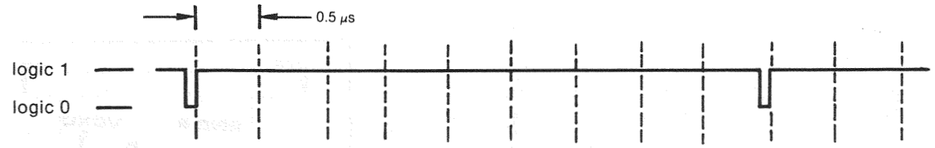


Figure 6-2. Waveform at Point DC ($\overline{DCLK}$)

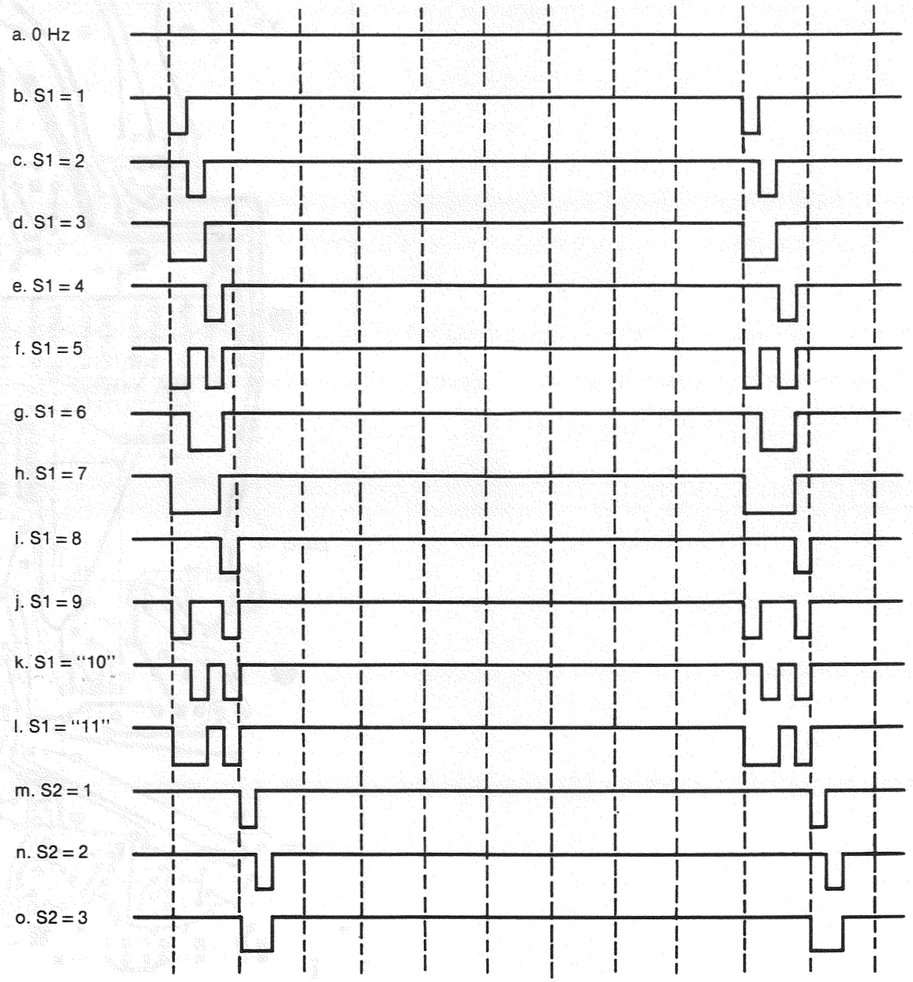


Figure 6-3. Waveform for FPD

6.7 FRONT PANEL FREQUENCY (MODEL 5100 ONLY)

Equipment Required: Frequency counter. Refer to figure 6-1 for component locations. S1 through S10 are the ten front panel frequency switches numbered right to left.

1. Initial Conditions: Power ON, local mode, 0 Hz frequency setting.
2. Connect frequency counter to OUTPUT in order to monitor frequency, 1 second gate interval.
3. Rotate S4 from position 0 through position 9, verifying the correct frequency on the counter. (TS-7)
4. Repeat step 3 with switches S5 through S9. (TS-7)
5. Remove the Hz CARRY jumper shown on main board assembly drawing. Connect the blue mHz CARRY jumper supplied in the plastic bag from point MT to point MC.
6. Repeat step 3 with S1, S2, and S3 reading the frequency on the counter in Hz for a setting of mHz on the 5100. (TS-7)
7. Remove the blue mHz CARRY jumper and replace the small, black Hz CARRY jumper.
8. Set S10 to 1 MHz and S1 through S9 to 0 Hz. Read 1 MHz on the counter. (TS-16)

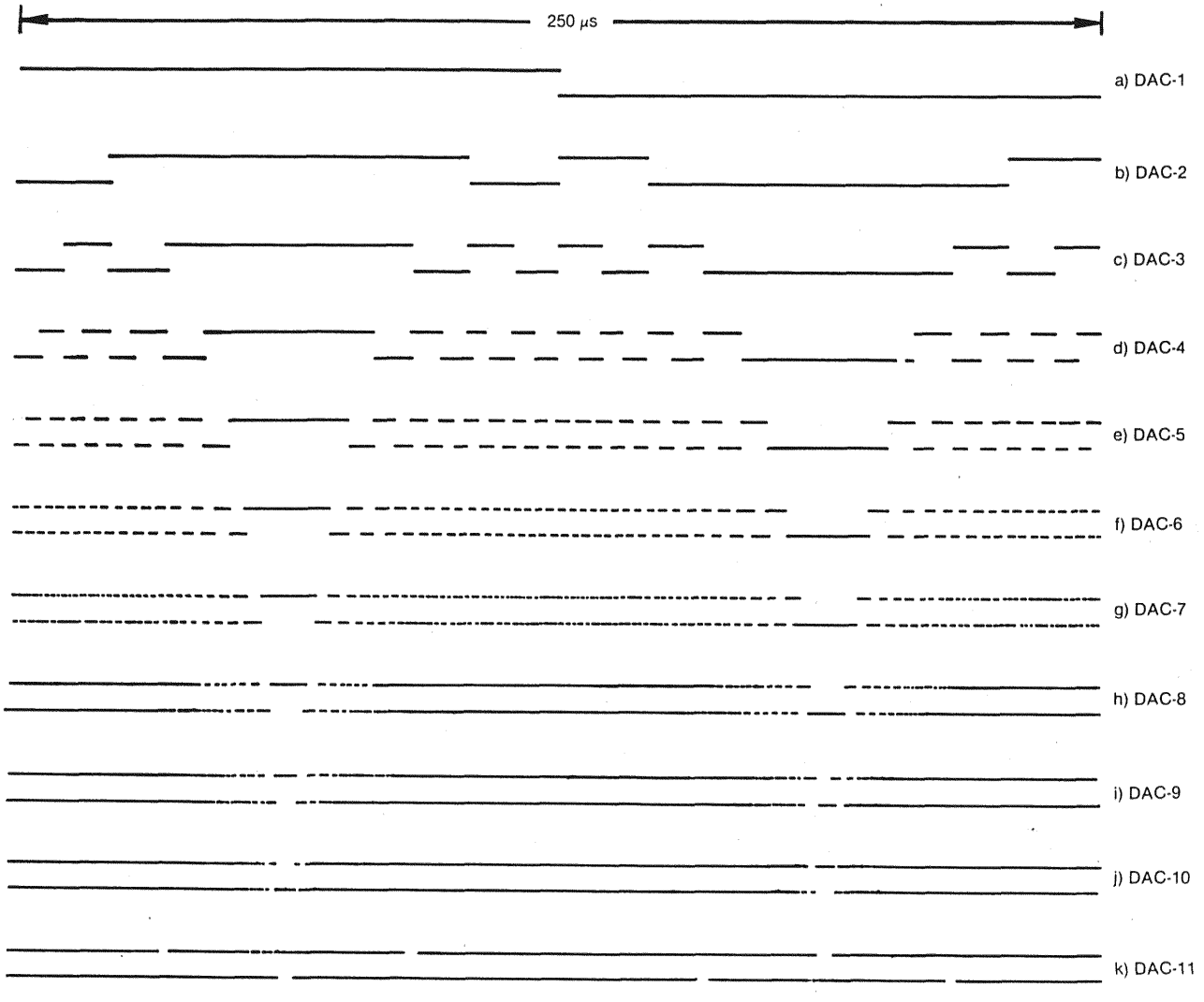


Figure 6-4. Sample Waveform Generator

6.8 REMOTE MODE

Equipment required: Frequency counter, oscilloscope, and programming unit. A bounceless LOAD pulse is required. In the procedure below, this programming unit is referred to as PGM. Refer to section 3 for detailed remote loading instructions. All lines are assumed to be logical "0" unless specified. Refer to figure 6-1 for component locations.

1. Instrument initial conditions: Power ON, local mode (Model 5100 only).
2. Connect PGM to rear panel connector.
3. Set PGM to remote. Verify REMOTE lamp (Model 5100) on front panel is lit. (TS-4b)
4. Connect instrument OUTPUT signal to frequency counter with 1 second gate interval.
5. Set PGM to binary-word, ZERO PHASE line to logical "1", and REMOTE line to logical "0". Load logical "1" 's for frequency bits corresponding to 1 Hz through 512 kHz and 1 MHz one at a time. Check the frequency on the counter after each load. (TS-5)
6. Set PGM to BCD-word and repeat step 5 with lines corresponding to 1 Hz through 800 kHz. (TS-5)
7. Remove the Hz CARRY jumper shown on Main board assembly drawing, section 8. Connect the blue mHz CARRY jumper supplied in the plastic bag from point MT to point MC.
8. Set PGM to binary-word and load logical "1" 's for frequency lines corresponding to 1 mHz through 512 mHz, one at at time. The frequency counter should indicate readings of 1 Hz through 512 Hz. (TS-5)
9. Set PGM to BCD-word and repeat step 8 with lines corresponding to 1 mHz through 800 mHz. (TS-5)
10. Set PGM to binary-byte. Set PGM mHz lines to (512 + 128 + 32 + 8 + 2) and enter three LOAD pulses. Set mHz switches to (256 + 64 + 16 + 4 + 1) and enter one LOAD pulse. Counter should read 341,682 Hz. (TS-5)
11. Set PGM on BCD-byte. Set mHz lines to (400 + 100 + 40 + 10 + 4 + 1) and MHz line to 1. Enter three load pulses. Set mHz lines to (400 + 200 + 100 + 80 + 8 + 1) and enter one LOAD pulse. Counter should read 1,789,555 Hz. (TS-5)
12. Remove the blue jumper and replace the black jumper.

NOTE

Steps 13, 14 and 15 pertain only to Model 5100. For Model 5110, skip to step 16.

13. Set PGM to binary-word, local, 2 kHz.
    Set 5100 to local, 1 kHz.
    Connect OUTPUT to both frequency counter and oscilloscope.
    OUTPUT should be 1 kHz sinewave. Set PGM to remote mode.
    OUTPUT should not change. (TS-5)
14. Enter LOAD pulse. Verify OUTPUT frequency changes to 2 kHz. (TS-5)
15. Set PGM to local mode. Verify OUTPUT frequency changes to 1 kHz. (TS-5)

NOTE

Steps 16 and 17 pertain only to Model 5110. For Model 5100, skip to paragraph 6.9.

16. Set PGM to Binary-word, set and LOAD a frequency of 1 KHz. Connect OUTPUT to both frequency counter and oscilloscope. Output should be 1 KHz sinewave.
17. Set REMOTE line to logical "1", set and LOAD a frequency of 2 KHz. Verify output signal does not change.

6.9 INTERNAL OSCILLATOR

Equipment required: Oscilloscope, and an external 1 MHz frequency standard. The waveform of this signal is arbitrary but for each cycle it must enter the limits of logical "0" and logical "1" voltage levels. The absolute maximum limits are ± 5 V.

1. Instrument conditions: Power ON, ZERO PHASE line to logical "0" (Model 5110 only), local mode (Model 5100 only), frequency setting 0 Hz, input reference selector in INT position, output reference selector in 1 MHz position. See Mainboard Assembly drawing, section 8.
2. Scope initial conditions: Vertical sensitivity 5 V/cm, sweep 100 ns/cm, sync triggered on Ch A.
3. Connect external 1 MHz standard to Ch A of scope and adjust trigger to lock the waveform.
4. Connect the REF OUT signal from the instrument rear panel to Ch B. Verify a 1 MHz square wave. (TS-17)
5. Locate the proper FREQ ADJ hole on the rear panel. With a small, non-metallic flat-bladed screwdriver, adjust the slug so that the waveform of Ch B is stationary with respect to Ch A. (TS-17)
6. Connect the 1 MHz standard to the REF IN jack on the rear panel of the instrument and verify that the leading edges of the waveforms of Ch A and Ch B are phase-locked at 180°. (TS-17)

6.10 STANDARD ATTENUATOR (MODEL 5100 ONLY)

Equipment required: RMS voltmeter.

1. 5100 initial conditions: Power ON, local mode, frequency 1 kHz, attenuation 0 dB, LEVEL fully clockwise.

2. Connect the meter to the OUTPUT jack and verify a reading of greater than +13 dBm. Note this reading as the 0 dB reference point.

3. Add attenuation in steps of 1 dB from 0 dB to 85 dB and verify the attenuation relative to the reference point. Attenuation error must lie within the limits of ±0.5 dB up to 60 dB and −2.0, +0.5 dB up to 85 dB.

6.11 PROGRAMMABLE ATTENUATOR (OPTION 002 EQUIPPED UNITS ONLY)

Equipment required: RMS voltmeter, and a programming unit capable of setting the attenuator data lines to logical "0" or logical "1" as directed.

1. Verify local mode operation (Model 5100 only) by performing paragraph 6.10, standard attenuator test. (TS-19)
2. Connect PGM to Model 5100 or 5110 rear panel connector, verify Power ON and meter connected to output jack.
3. Set to REMOTE mode (Model 5100 only). Set PGM to binary-word and remaining PGM lines to logical "0" except 1 kHz and ZERO PHASE. Enter load pulse.
4. Enter and LOAD logical 1's on lines A1 through A7 one at a time, verifying the correct attenuation on the meter within the limits specified in paragraph 6.10, step 3. (TS-19)

SECTION 7
TROUBLESHOOTING

7.1 INTRODUCTION

In the event of a malfunction, a mechanical inspection is advised before proceeding with troubleshooting procedures. Inspect all IC's for proper seating in each socket; check proper insertion of the two plug-in PC cards in the connector sockets.

7.2 TROUBLESHOOTING CHART INSTRUCTIONS

If trouble develops, start with the Conformance Test Procedure (CTP) in section 6, following it until a discrepancy is found. Refer to the TS (TroubleShooting) procedure which appears in parenthesis after the nonconforming item and start troubleshooting at that portion of the troubleshooting chart, table 7-1.

Set up the Test Conditions, connect the appropriate equipment to the Test Point (shown in figure 6-1) and verify results in each Observation row. If the Observation description is verified, continue downward to the next Observation, changing Test Conditions and Test Point as necessary.

If the Observation is not verified, refer to the Remedy column in that row. Perform each part of the Remedy instructions in the order shown one at a time and recheck the results with the Observation column until Observation checks.

When the results are corrected, return to the section 6 procedure and recheck the test which failed previously. If the test still fails, return to the troubleshooting chart and resume testing with the last step performed above.

If the trouble is not found after exhausting the steps within one procedure, do not continue into the next procedure. Rather, return to the section 6 procedure and repeat all tests made to that point, hopefully uncovering some earlier discrepancy not noticed before.

If the cause of the problem cannot be found, the factory should be consulted. A complete and accurate description of the problem should be made in order to help locate the cause. If the unit is to be returned to the factory, a written and pictorial report should be enclosed to aid in duplicating the operating conditions under which the unit failed. Send all correspondence to:

Customer Service
Wavetek San Diego, Inc.
9045 Balboa Ave.
San Diego, CA 92123
Telephone (619) 279-2200
TWX: (910) 335-2007

7.3 PART DESIGNATION AND IC SOCKET NUMBERING

Part designations may be found on the assembly drawings in section 8. The assemblies are numbered as follows:

A1 — Mainboard Assembly
A2 — Front Panel Scanner Board Assembly
A3 — Attenuator Board Assembly
A4 — Front Panel Assembly
A5 — Rear Panel Assembly

Designations for pins on IC sockets are in the form UXX-YY where XX is the IC socket number and YY is the pin number. Pin numbers for top views of the three sizes of IC package used are shown in figure 7-1.

IC socket numbers on Assemblies A1 and A2 are etched into the bottom side of the PC board.

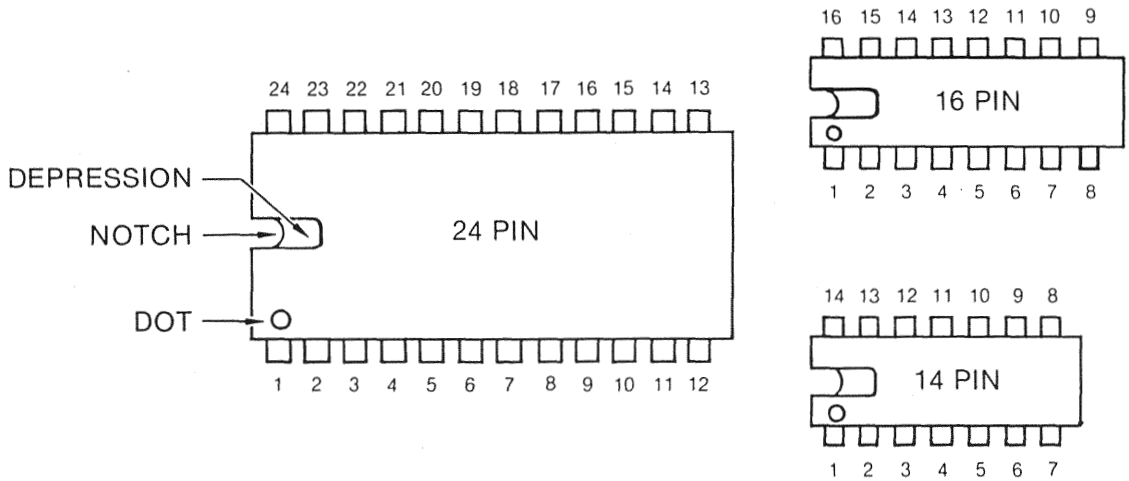


Figure 7-1. DIP Pin Numbering (Top View)

Table 7-1. Troubleshooting Chart

TS-1. Low or Unregulated Digital Supply Voltage

Test Conditions	Test Point	Correct Observation	Remedy
1. Power off		Check fuse	Replace if necessary.
1. Power on	A5T1 PRI #1 0-115	Measure 5Vac	Check continuity of line cord, fuse holder, and power switch S2B. Replace if defective.
2. Apply 5Vac across line cord (10Vac for for units that are switched to 230Vac line power by the power selection switch on the back panel)	A5T1 PRI #2 0-115	Measure 5Vac	
	A5T1 SEC #1 0-8	Measure 0.4Vac	1. If voltages are all zero, replace transformer A5T1. 2. If one or more voltages are low, check for shorts or opens in wiring to bridge rectifiers. 3. Check bridge rectifiers A5CR1, CR2, CR3.
	A5CR1- AC Input		
	A5T1 SEC #2 0-16.5	Measure 0.75Vac	
	CR2 AC Input		

Table 7-1. Troubleshooting Chart (Continued)

TS-1. Low or Unregulated Digital Supply Voltage (Cont.)

Test Conditions	Test Point	Correct Observation	Remedy
1. Power on 2. Apply 5Vac across line cord (10Vac for units that are switched to 230Vac line power by the power selection switch on the back panel)	A5T1 SEC #3 0-16.5	Measure 0.75Vac	1. If voltages are all zero, replace transformer A5T1. 2. If one or more voltages are low, check for shorts or opens in wiring to bridge rectifiers. 3. Check bridge rectifiers A5CR1, CR2, CR3
	CR3 AC Input		
	Across C1	Measure 0.8Vdc	1. Check for shorted C1, C2, C3, Q1, Q2, Q3 and replace.
	Across C6		1. Check for shorted C6, Q4, and replace
	Across C7		1. Check for shorted C7, Q5, and replace.

TS-2. Low or Zero Regulator Voltage

Test Conditions	Test Point	Correct Observation	Remedy
1. Power on 2. Normal line voltage	F	As per CTP 6.2-8*	Replace Q3.
	G	As per CTP 6.2-8	Replace Q2.
	H	As per CTP 6.2-8	Replace Q1.
	J	As per CTP 6.2-9	Replace Q4.
	K	As per CTP 6.2-10	Replace Q5.

*Conformance Test Procedure, paragraph 6.2, step 8.

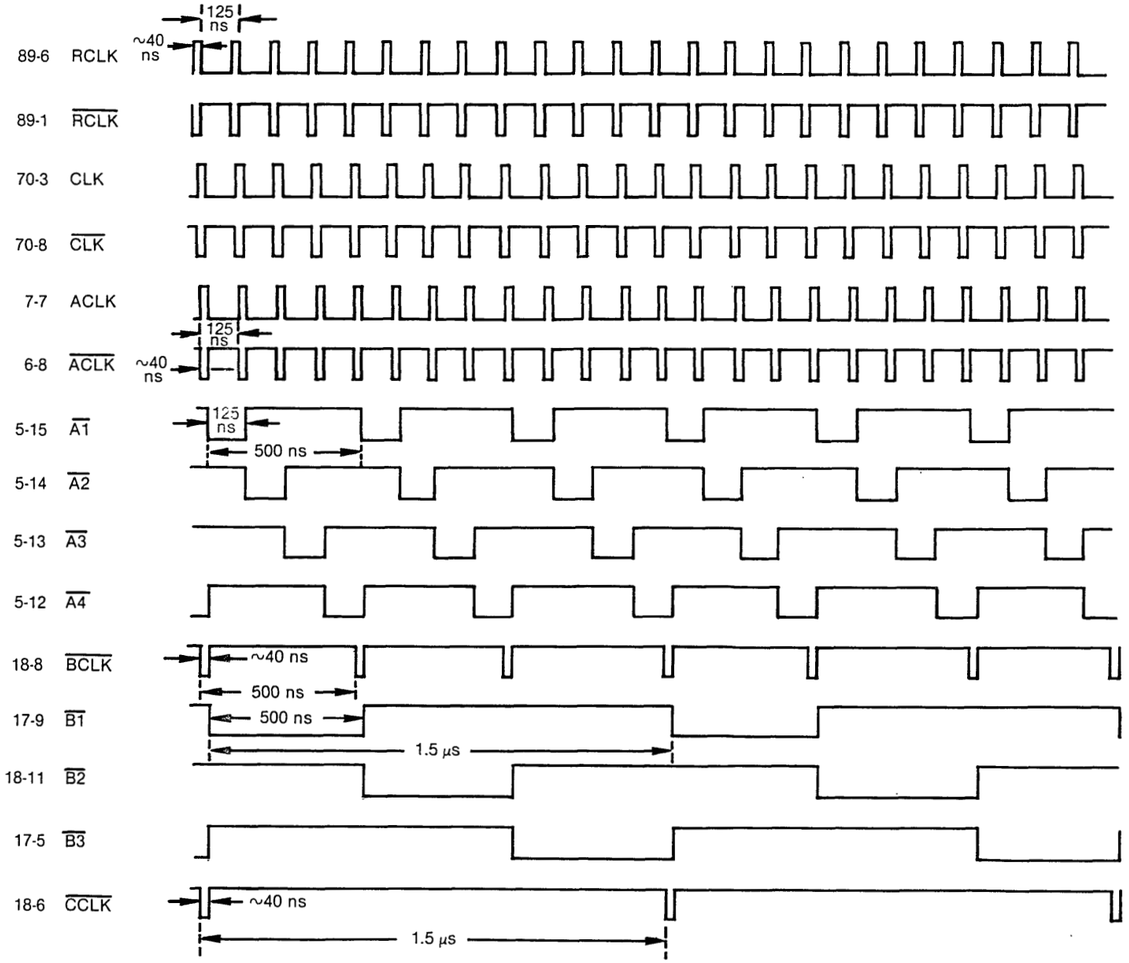
Table 7-1. Troubleshooting Chart (Continued)

TS-3. No $\overline{\text{DCLK}}$ at test Point DC (See figure 7.2 for timing signals)

Test Conditions	Test Point	Correct Observation	Remedy
1. **(Model 5100):** Local mode **(Model 5110):** PGM Disconnected	U96-1	8 MHz pulse waveform	Check power supply voltages. Replace xtal oscillator Y1.
2. Power on	U7-6	Negative pulse waveform. $\overline{\text{CLK}}$. Width 40 ns; period 125 ns	Replace U95, U89, U70, U81, U96.
3. Clock jumper to INT position or inject 8 MHz reference signal	U6-8	Negative pulse waveform. $\overline{\text{ACLK}}$. Width 40 ns; period 125 ns	Replace U6, U7, U8, U9, U22.
	U18-8	Negative pulse waveform. $\overline{\text{BCLK}}$. Width 40 ns; period 500 ns	Replace U5, U4, U18, U70.
	U18-6	Negative pulse waveform. $\overline{\text{CCLK}}$. Width 40 ns; period 1.5 μs	Replace U17, U18, U19.
	U19-6	Negative pulse waveform. $\overline{\text{DCLK}}$. Width 40 ns; period 4.5 μs	Replace U29, U18, U19, U53.
	U19-8	Negative pulse waveform. $\overline{\text{ECLK}}$. Width 40 ns; period 4.5 μs	Replace U19, U10.

TS-4a. REMOTE Lamp Always On (Model 5100)

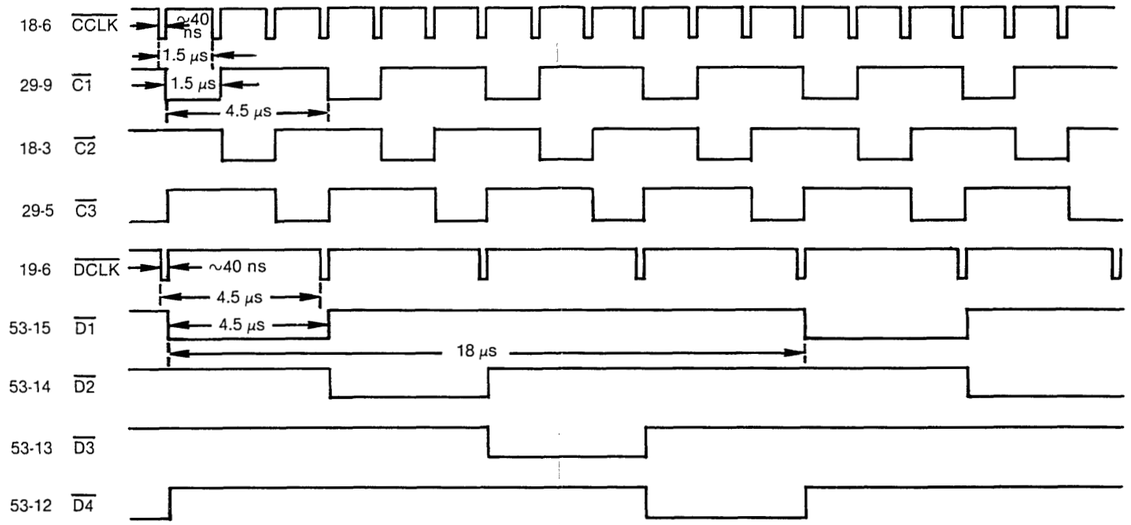
Test Conditions	Test Point	Correct Observation	Remedy
1. REMOTE button in out position	U22-1	Logical "1"	Programmer is causing remote mode. Check programming.
	U22-2	Logical "1"	1. Replace U22, U10. 2. Test and replace S-2A if necessary.
	U10-9	Logical "0"	Replace U10, U19, U70.



NOTES:

D1, D2, D3, D4 are active pulse waveforms as drawn only during a change of frequency. Normally, D1 is at logical "0" and D2, D3, D4 are at logical "1".

To create a continuous change of frequency condition to observe active D1, D2, D3, D4 remove assembly A2-scanner board from its connector.



DESCRIPTION OF IC'S			
IC NO	PART NO.	PINS TO VCC	PINS TO GND
4	122-7410	14	7
5	122-0106	16, 1	8
6	122-7404	14	7
7	122-9015	16	8
8	122-7474	14	7
9	122-9015	16	8
10	122-7474	14	7
16	122-7400	14	7
17	122-7474	14	7
18	122-7400	14	7
19	122-7440	14	7
20	122-7474	14	7
21	128-2330	14	
22	122-7400	14	7
27	122-7474	14	7
28	122-7400	14	7
29	122-7474	14	7
30	122-7400	14	7
31	122-0100	14	7

DESCRIPTION OF IC'S			
IC NO	PART NO.	PINS TO VCC	PINS TO GND
32	122-9015	16	1, 8, 15
33	122-9015	16	1, 8, 15
34	122-0106	16	8, 9
39	122-7451	14	7
40	122-7400	14	7
41	122-7474	14	7
42	122-7474	14	7
43	122-8283	5	7, 8, 12
44	122-7474	14	7
50	122-7404	14	7
51	122-7410	14	7
52	122-7410	14	7
53	122-0106	16	7, 8
54	122-7474	14	7
60	122-7440	14	7
61	122-7400	14	7
62	122-7410	14	7
70	122-7437	14	7

Figure 7-2. Basic Timing Signals

Table 7-1. Troubleshooting Chart (Continued)

TS-4b. REMOTE Lamp Always Off (Model 5100)

Test Conditions	Test Point	Correct Observation	Remedy
REMOTE button pressed	U22-3	Logical "1"	1. Replace U22, U10. 2. Test and replace S-2A if necessary.
	U70-11	Logical "0"	Replace U19, U10, U70.
			Replace L1.

TS-5. Remote Operation Incorrect

Test Conditions	Test Point	Correct Observation	Remedy
1. Disconnect Programmer 2. Connect jumper from U31-4 or LD to U53-10 or DC	U10-5	Positive pulse waveform. Width 125 ns; period 4.5μs.	Replace U31, U20, U10.
3. Remote mode 4. Jumper from U34-7 or W to GND			Replace U22, U9, U8, U7, U34, U4, U41.

TS-6. Incorrect Static Front Panel Data Stream (Model 5100)

Test Conditions	Test Point	Correct Observation	Remedy
1. Local mode	J1-19	Negative pulse waveform. ACLK Width 40 ns; period 125 ns	Replace U95, A2U1 thru A2U8, A2U10; go to TS-3.
2. 0 Hz front panel setting	J1-12	Logical "1"	Replace U10, A2U3. Go to TS-4a.
3. Scope sync as per CTP 6.4-4*	A2U9-8	Negative pulse waveform A4•B3•C3 Width 125 ns; period 4.5 μs	Replace A2U9. Verify C3 on J1-1 and A4B3 on J1-2.
	J1-10	Logical "1"	Replace A2U4 through A2U8 until J1-10 is logical "1".

*Conformance Test Procedure, paragraph 6.4, step 4.

Table 7-1. Troubleshooting Chart (Continued)

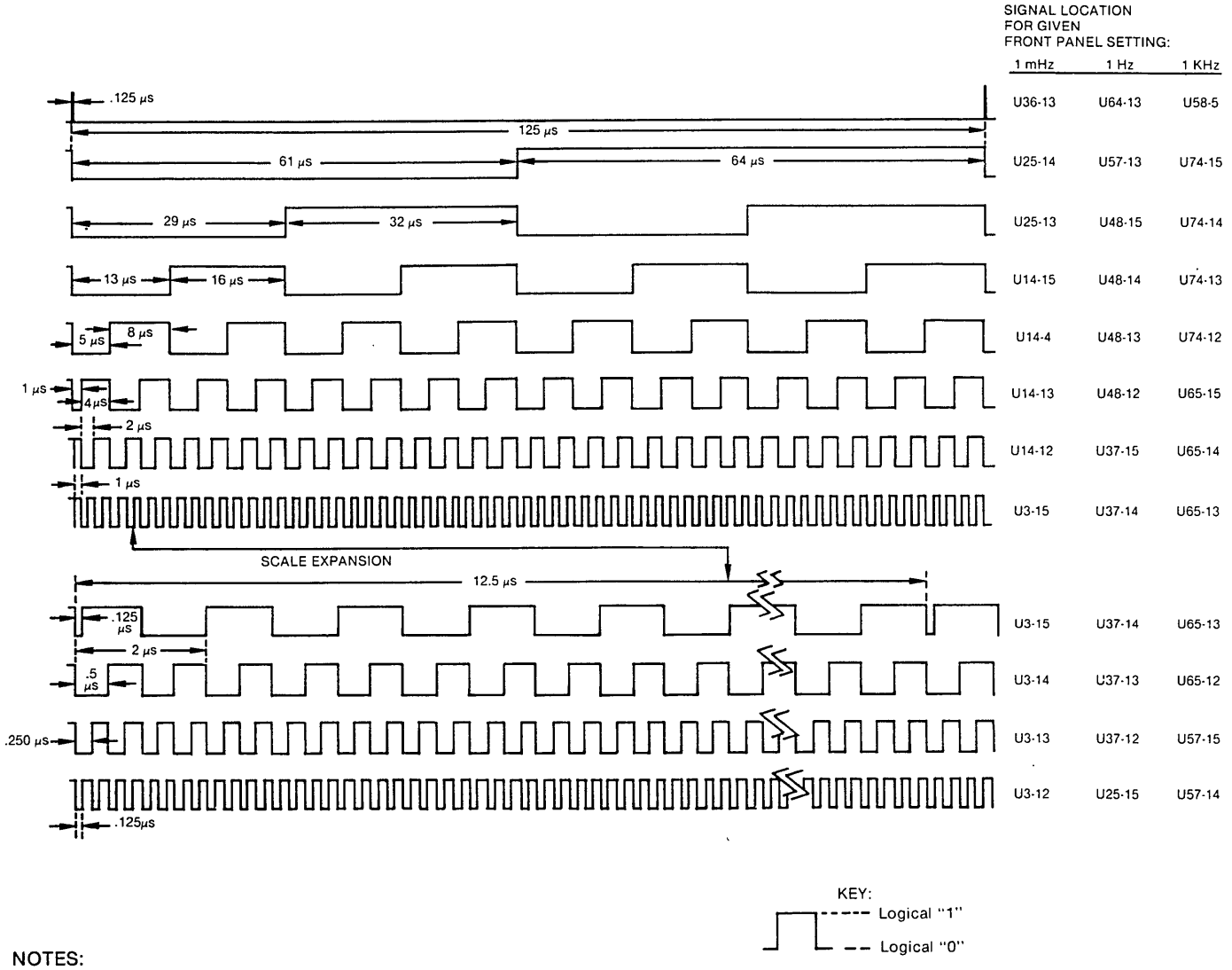
TS-7. Incorrect Front Panel Stream (Model 5100)

Test Conditions	Test Point	Correct Observation	Remedy
1. Local mode 2. Scope sync as CTP 6.4-4*	J1-10	As per CTP 6.4-7 or -8	Go through TS-6. Replace A2U1 through A2U8 until data is correct.

*Conformance Test Procedure, paragraph 6.4, step 4.

TS-8. Sample Generator Malfunction

Test Conditions	Test Point	Correct Observation	Remedy
Model 5100: 1. Local mode **Model 5110:** 1. PGM connected. 2. ZERO PHASE at logical "1". **Models 5100 and 5110:** 1. 8 MHz clock (internal or external) connected. 2. 4 kHz frequency setting.	U98-11	Negative pulse waveform. Width 40 ns; period 125ns	Replace U95, U89, U96, to to TS-3.
	U25-10		Replace U95.
	U98-9	Logical "1"	1. Verify A5J1-25 (ZERO PHASE) is logical "1". If not, correct it. 2. Replace U79, U98, U50.
Model 5100: 1. .001 Hz front panel setting **Model 5100:** 1. Set PGM to Binary-word. 2. Set 1 mHz frequency. 3. Enter LOAD pulse.	Pins #12 to 15 on U12, U23, U35, U46, U55, U63, U72, U80. Pins #13 to 15 on U1	Logical "0"	Go to TS-11.
	U1-12	Logical "1"	
	U36-13	Positive pulse waveform. Width 125 ns; period 125 μs. See figure 7-3.	Replace U2, U13, U24, U15, U26, U25, U3, U14.



NOTES:

1. For each column, set frequency shown and sync on top waveform. Verify each signal from bottom to top.
2. If top waveform is missing or incorrect, start with bottom signal and work upwards until incorrect signal is found. Start troubleshooting at this point.

Figure 7-3. Accumulator Signals

Table 7-1. Troubleshooting Chart (Continued)

TS-8. Sample Generator Malfunction (Cont.)

Test Conditions	Test Point	Correct Observation	Remedy
Model 5100: 1. 1 Hz front panel setting **Model 5110:** 1. Set 1 Hz frequency. 2. Enter LOAD pulse.	Pins #12 15 on U1, U12, U23, U46, U55, U63, U72, U80. Pins #13 to 15 on U35	Logical "0"	Go to TS-11.
	U35-12	Logical "1"	
	U64-13	Positive pulse waveform. Width 125 ns; period 125 μs. See figure 7-3.	Replace U36, U47, U56, U38, U49, U25, U37, U48, U57.
Model 5100: 1. 1 kHz front panel setting **Model 5110:** 1. Set 1 KHz frequency. 2. Enter LOAD pulse.	Pins #12 to 15 on U1, U12, U23, U35, U46, U55, U72, U80. Pins #13 to 15 on U63	Logical "0"	Go to TS-11.
	U63-12	Logical "1"	
	U58-5	Positive pulse waveform. Width 125 ns; period 125 μs. See figure 7-3.	Replace U64, U73, U82, U66, U65, U74, U58, U84.
	U83-9	1 kHz square wave	Replace U83, U95, U82.

TS-9. DAC-1, 2, or 3 Incorrect

Test Conditions	Test Point	Correct Observation	Remedy
			Replace U85, U78, U86, U87, U88, U95, U90, U91, U92, U77, U68, U59, U67, U76, U84, U104, U105, U94.

Table 7-1. Troubleshooting Chart (Continued)

TS-10. DAC-4 through DAC-11 Incorrect

Test Conditions	Test Point	Correct Observation	Remedy
			Replace U90, U92, U93, U100, U101, U102, U103, U94.

TS-11. Incorrect Frequency Register Contents (Model 5100)

Test Conditions	Test Point	Correct Observation	Remedy
1. Remove A2U10 (scanner assy) 2. Local mode	U53-12 or $\overline{D4}$	Negative pulse waveform. $\overline{D4}$ width 4.5 μs; period 18 μs	Replace U52, U44, U53, U19.
1. Sync on negative edge of U53-12 or $\overline{D4}$	U60-8 U51-12 U51-6	Negative pulse waveform. Width 40 ns; spacing 125 ns. Pulses blanked to logical "1" during logical "0" portion of U53-12. There are 108 pulses within a period of U53-12.	Replace U60, U51, U52, U61, U41, U40, U4.
	U70-6	Same as U53-12.	Replace U70, U62.
1. Sync on negative edge of U53-14 or $\overline{D2}$ 2. Set front panel switches to 555,555.555 Hz	U1-12 or QH	Alternating "1010..." pattern during logical "0" portion of U53-14. One alternation per 125 ns. There are eighteen 1's, and eighteen 0's	Replace U39; U80, U72, U63, U55, U46, U35, U23, U12, U1. Check CTP 6.4.
1. Sync on negative edge of U53-13 or $\overline{D3}$ 2. Set front panel switches to 819,819.819 Hz	U80-2 or K	Alternating "1010..." pattern during logical "0" portion of U53-13. One alternation per 250 ns. There are nine 1's and nine 0's	Replace U32, U30, U43, U54, U44, U42, U33, U40.

Table 7-1. Troubleshooting Chart (Continued)

TS-12. Incorrect Frequency Register Contents — Binary-Word Mode

Test Conditions	Test Point	Correct Observation	Remedy
1. PGM Disconnected. 2. Connect U34-6, U34-7, and U34-8 together.	U10-9	Logical "1".	Replace U22, U10, go to TS-3.
	U10-5	Positive pulse waveform. Width = 125ns; Period = 4.5μs.	Replace U31, U20, U10.
3. Connect U19-4 to U31-4. 4. Connect U22-1 to U22-7.	U70-6	Logical "0"	Replace U70, U62, U53.
	U60-8 U51-12 U51-6 U51-8	Negative pulse waveform. Width = 40ns; Period = 4.5μs.	Replace U34, U7, U4, U41, U40, U61, U52, U60, U51.
Remove All Jumpers			

TS-13. Incorrect Frequency Register Contents — BCD-Word Mode

Test Conditions	Test Point	Correct Observation	Remedy
1. PGM Disconnected. 2. Connect jumper between U52-12 and U52-7. 3. Sync on negative edge of D4 or U53-12.	U60-8 U51-12 U51-6	Negative pulse waveform. Width = 40ns; spacing = 125ns. Pulses blanked to logical "0" portion of U53-12. There are 108 pulses within a period of U53-12.	Replace U60, U51, U52, U61, U41, U40, U4.
	U70-6	Same as U53-12.	Replace U70, U62.
1. Sync on negative edge of U53-14 or $\overline{D2}$.	U1-12 or QH	Pattern of "000000000001" repeated three times during logical "0" portion of $\overline{D2}$. Bit spacing is 125ns. 36 bits during $\overline{D2}$.	Replace U1, U12, U23, U35, U46, U55, U63, U72, U80, U39.

Table 7-1. Troubleshooting Chart (Continued)

TS-13. Incorrect Frequency Register Contents — BCD-Word Mode (Cont.)

Test Conditions	Test Point	Correct Observation	Remedy
1. Sync on negative edge of U53-13 or $\overline{D3}$.	U80-2 or K	Pattern of "100001101100" repeated three times during logical "0" portion of $\overline{D3}$. Bit spacing is 125ns. 36 bits during $\overline{D3}$.	Replace U32, U30, U43, U54, U44, U42, U33, U40, U39.
Remove All Jumpers			
Follow procedure in paragraph 6.8.			Replace U7, U40, U62, U70, U52, U51, U60.

TS-14. Incorrect Frequency Register Contents — Byte Modes

Test Conditions	Test Point	Correct Observation	Remedy
Follow procedure in paragraphs 6.8-10 and 6.8-11			Replace U9, U8, U7, U60.

TS-15. No 1 MHz Output

Test Conditions	Test Point	Correct Observation	Remedy
			Replace U81, U97.

TS-16. 1 MHz Operation Incorrect

Test Conditions	Test Point	Correct Observation	Remedy
1. 0 Hz setting	U27-9	Logical "0"	Replace U27, U16, U28.
1. 1 MHz setting		Logical "1"	
			Replace U82, U84, U83.

TS-17. Crystal Cannot Be Adjusted Into Proper Range

Test Conditions	Test Point	Correct Observation	Remedy
			Replace U96, U98, U91, C13.
			Replace XTAL Y1.

TS-18. Output Amplifier Defective

Test Conditions	Test Point	Correct Observation	Remedy
		Refer to the Mainboard schematic 03-004-3100, sheet 4 in section 8 for dc voltage test points, and verify these voltages.	Replace defective components.

TS-19. Programmable Attenuator (Model 5100 with Option 002 Only)

Test Conditions	Test Point	Correct Observation	Remedy
1. Local mode (Model 5100 Only)	J2-4 or AC	Logical "1"	See TS-4.
	A3U8-14	+ 5 VDC	Replace A3Q1.
	A3U8-3 A3U8-6	Logical "0"	Replace A2U8.
1. Disconnect Programmer 2. Connect jumper from U31-4 or LD to U53-10 or DC 3. Remote mode 4. Jumper from U34-7 or W to GND	A3U9-5	Negative pulse waveform. Width 125 ns; period 4.5 μs.	Replace A2U9.

Table 7-1. Troubleshooting Chart (Continued)

TS-19. Programmable Attenuator (Model 5100 with Option 002 Only, Cont.)

Test Conditions	Test Point	Correct Observation	Remedy
Remove jumpers above. Test each attenuator bit in local and remote modes as per CTP 6.11		For errors in attenuation settings of:	Replace following parts on assembly A3:
		1 dB	A3-U2, -U1, -U9, -K1.
		2 dB	A3-U2, -U3, -U10, -K2.
		4 dB	A3-U3, -U4, -U10, -K3.
		8 dB	A3-U4, -U5, -U11, -K4.
		10 dB	A3-U6, -U5, -U11, -K5.
		20 dB	A3-U6, -U7, -U12, -K6.
		40 dB	A3-U8, -U7, -U12, -K7.

TS-20. Programmable Attenuator (Model 5110 with Option 002 Only)

Test Conditions	Test Point	Correct Observation	Remedy
1. Power On	A3U8-14	+ 5VDC	Replace A3Q1.
1. Disconnect Programmer 2. Connect jumper from U31-4 or LD to U53-10 or DC 3. Jumper from U22-1 to U22-7. 4. Jumper from U34-7 or W to U34-8.	A3U9-5	Negative pulse waveform. Width 125 ns; period 4.5 μs.	Replace A2U9.

SECTION 8
STANDARD CIRCUITRY PARTS AND SCHEMATICS

8.1 DRAWINGS

The following assembly drawings (with parts lists) and schematics are in the arrangement shown in the "CONTENTS" section under "DRAWINGS."

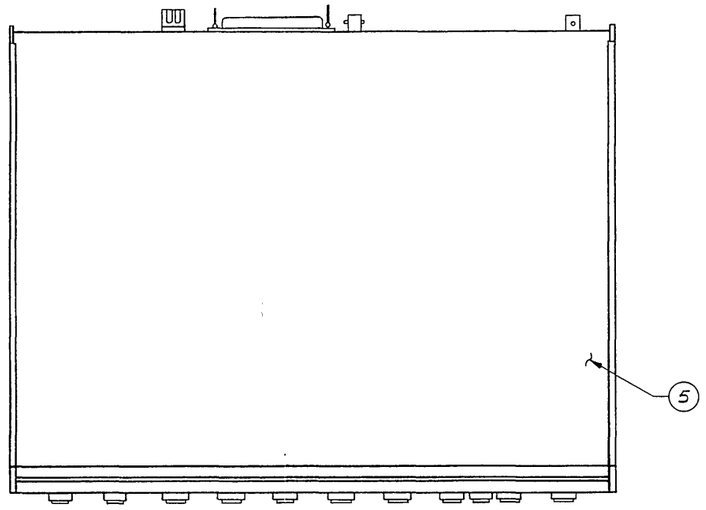
8.2 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference board, serial number of unit and, if applicable, the function performed.

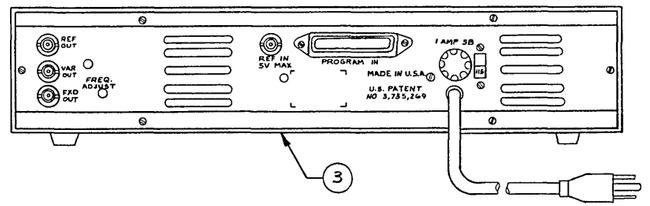
8.3 ERRATA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, errata pages are prepared to summarize the changes made and are inserted inside the shipping carton with this manual. If no such pages exist, the manual is correct as printed.

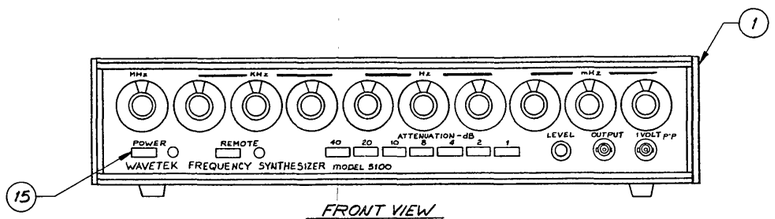
REV	ECO	BY	DATE	APP
A	RELEASE		9/11/78	JV
E	908			
F	9496	W.C. 2-2-88	3/3/88	DMD



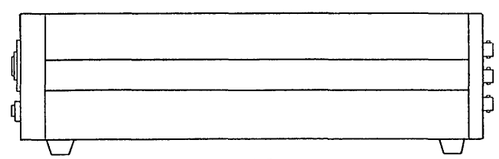
TOP VIEW



REAR VIEW



FRONT VIEW



SIDE VIEW

SEE SEPARATE PARTS LIST

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN Ted Gilbert	DATE 2-2-88	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED R.H.	9/11/78	TITLE: FINAL ASSEMBLY FREQUENCY SYNTHESIZER
	PROJ. ENGR. R. H. H.	9/11/78	
FINISH WAVETEK PROCESS	RELEASE APPROV. JV	9/11/78	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± 1/64, DECIMALS XX ± .02 XXX ± .010, ANGLES ± 1°		SIZE D · FSCM NO. 23338 · DWG. NO. 02-000-3100 · REV F · SCALE 1/2 · MODEL 5100 · SHEET 1 OF 1

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
3	BOTTOM COVER ASSY: BLACK			002.3092	1
7	RACK MOUNT STYLE 11			002.3097	1
1	ASSY: SYNTHESIZER 5100			002.3100	1
5	COVER: TOP, BLACK	MPV-40464-14	BUKEY	303.0101	1
9	CONN: RIB PLUG W/HD 50 CNT	57-30500	CINCH	351.5001	1
11	PATCH CORD: 6" BLUE	445-3306-03-03-16	CAMBN	352.0101	1
15	KNOB: PUSH BUTTON BLK 20MM	B301	CRL	370.0713	9
NONE	INST MANUAL: 5100 5TH ED 12/75			800.0305	1.5
NONE	INST MANUAL: 5100 6TH ED 1/77			800.0306	1.5

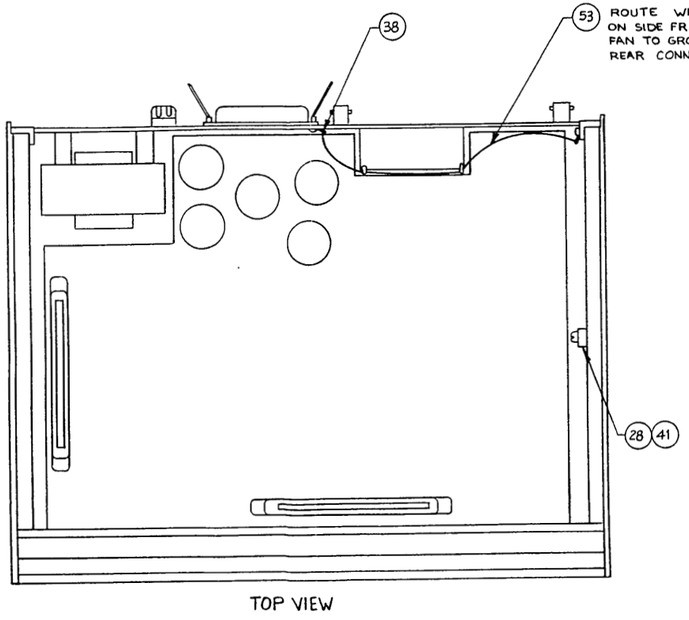
WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MODEL 5100 DC TO 2MHZ REMOTE/LOCAL PROGRAMMING	000.3100	F
		PAGE 1	

NOTE. UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST FINAL ASSEMBLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG		MODEL NO 5100 / DWG NO 000.3100 / REV F
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

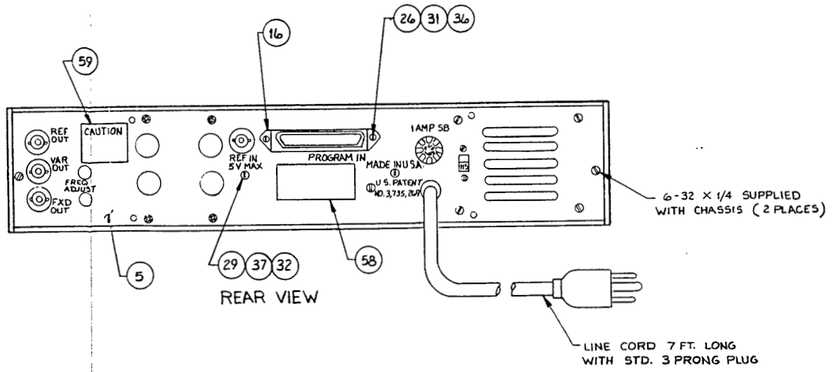
BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3894

REV	ECN	BY	DATE	APP
A	RELEASE			
B	908		9/11/78	
C	990	M.M^c	12/29/78	
D	1242	DC	11/22/81	
E	7843	SD	1/8/87	
F	7857	SD	〃	
G	7891	SD	1/8/87	RBG
H	7899	T.L.	2/9/87	RBG
J	8080	T.C. 4-10-87	7/14/87	RBG
K	8226	T.C. 5/1/87		
L	8255	T.C. 6-18-87	7/1/87	RBG



ROUTE WIRE FROM GROUND LUG ON SIDE FRAME THRU CABLE TIES ON FAN TO GROUND LUG MOUNTED WITH REAR CONNECTOR HARDWARE

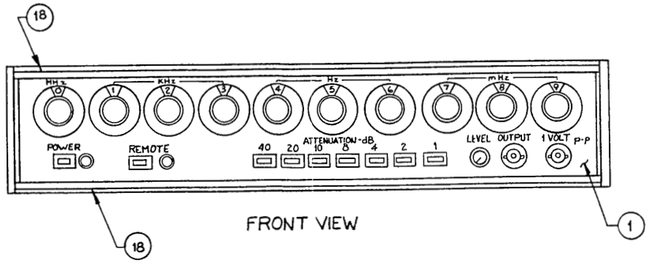
TOP VIEW



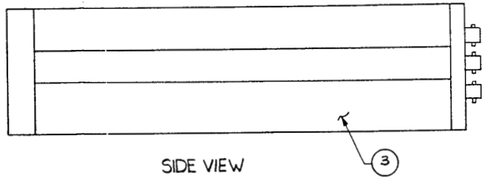
REAR VIEW

6-32 X 1/4 SUPPLIED WITH CHASSIS (2 PLACES)

LINE CORD 7 FT. LONG WITH STD. 3 PRONG PLUG



FRONT VIEW



SIDE VIEW

SEE SEPARATE PARTS LIST

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN M.H. Abbott DATE 9/9/87	WAVETEK SAN DIEGO • CALIFORNIA	
MATERIAL N/A	PROJ ENGR	TITLE FREQUENCY SYNTHESIZER 5100 SERIES III	
	RELEASE APPROV R.B. Brown		
FINISH WAVETEK PROCESS N/A	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ± 1 XX ± .030	MODEL NO 5100	DWG NO 02-002-3100 REV L
	DO NOT SCALE DWG		
	SCALE 1/2 X	CODE IDENT 23338	

NOTE UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS REORDER NO A2706

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
A4	PANEL ASSEMBLY FRONT 5100			001.3100	1
NONE	LOCAL ATTENUATOR 5100			002.3066	1
3	SIDE FRAME ASSY SET			002.3067	1
A5	PANEL ASSY REAR 5100			002.3086	1
A1	MAINBOARD ASSY 5100			004.3100	1
A5-J2	SPK CABLE ASSY: SHLD RGD FMD 5100			009.0591	1
NONE	LABEL, SERIAL NUMBER/FILTERS & SYNTHESIZERS	FSS-8660	WVTK	1400-01-8660	1
NONE	OSC: VOLT CONTR 8MHZ (A/P	251-1457	VECT	173.6100	1
21	CARD GUIDE	VG2-25	BIVAR	2100-06-0024	4
NONE	SUPER KIT	2500-5100-03	WVTK	2500-5100-03	1
NONE	TY-WRAP	TY-523M	TB	2800-00-0006	2
18	TRIM: FRONT TOP SUPR/SNUB 312	MP40318-4	BUKEY	307.0914	2
43	SPACER: SWITCH NYLON 1/16"	FW4-062	MICRO	349.2010	2

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100 | ASSEMBLY NO. 002.3100 | REV L | PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
14	CONN, PLUG, SHORTING	4612871-01-03-10	CTC	352.0201	3
38	LUG: SOLDER ANGLED #6	1416-6	SMITH	359.0006	1
20	BUMPER: MLD-PLAS .320X.635 GRY	SJ5027B1K	3M	361.9000	5
22 NONE	KEY: POLARIZD PC CONN IN-CONT	50-PK-1	CINCH	370.0301	2
59	LABEL: CAUTION FREQ. ADJ.			371.1001	1
41	TIE: CABLE NY NAT (CLAMP)	PLC1M-S4-M	PANDT	377.4002	1
45	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	.6
50	WIRE: #18 AWG STR BLACK	1118/19	WEICO	378.1404	.2
53	WIRE: #22 AWG STR BLACK	1122	WEICO	378.1604	.10
49	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	.2
52	WIRE: #24 AWG STR BROWN	1124	WEICO	378.1714	.6
46	WIRE: #24 AWG BON BROWN	1524	WEICO	378.1715	1

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100 | ASSEMBLY NO. 002.3100 | REV L | PAGE 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
47	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	1.8
51	WIRE: #24 AWG STR YELLOW	1124	WEICO	378.1744	.8
48	WIRE: #24 AWG STR GREEN	1124	WEICO	378.1754	.8
57	SLVNG: PLASTIC FBRGLS #18AWG			378.5181	.4
NONE	M SCR: ST ZN PH 2-56 X 5/16 PH			381.2052	2
26	M SCR: ST ZN 4-40 X 3/8 PH			381.4062	4
NONE	M SCR: ST ZN PHP 4-40X7/8 PH			381.4142	4
29	M SCR: ST ZN PH 8-32X1/2 PH			381.8082	2
28	M SCR: ST ZN SL 6-32X3/8FPH TYPE F			386.6061	6
NONE	NUT: HEX SS 2-56X5/32 AF			387.2051	2
31	NUT: HX ST ZN 4-40X1/4 AF			387.4080	6

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100 | ASSEMBLY NO. 002.3100 | REV L | PAGE 3

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
32	NUT: HX ST ZN 8-32X1/4 AF			387.8080	2
34	WASHER: FLAT STL ZN #4			388.0040	6
35	WASHER: FLAT STL #6 .147ID .312OD .028THK			388.0060	5
NONE	WASHER: SPLT LK STNLS #2			388.1022	2
36	WASHER: EXT LK STL ZN #4			388.1041	8
37	WASHER: EXT LK STL ZN #8			388.1081	2
NONE	WASHER: FLT NYL #4 1/4D X 1/8T			388.3040	2
33	NUT: CLINCH STL ZN 4-40 .031 THK			389.1002	2
NONE	SHRINK TUBING, 1/8 IN	FIT-221-1/8	ALPHA	6001-20-2000	3

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100 | ASSEMBLY NO. 002.3100 | REV L | PAGE 4

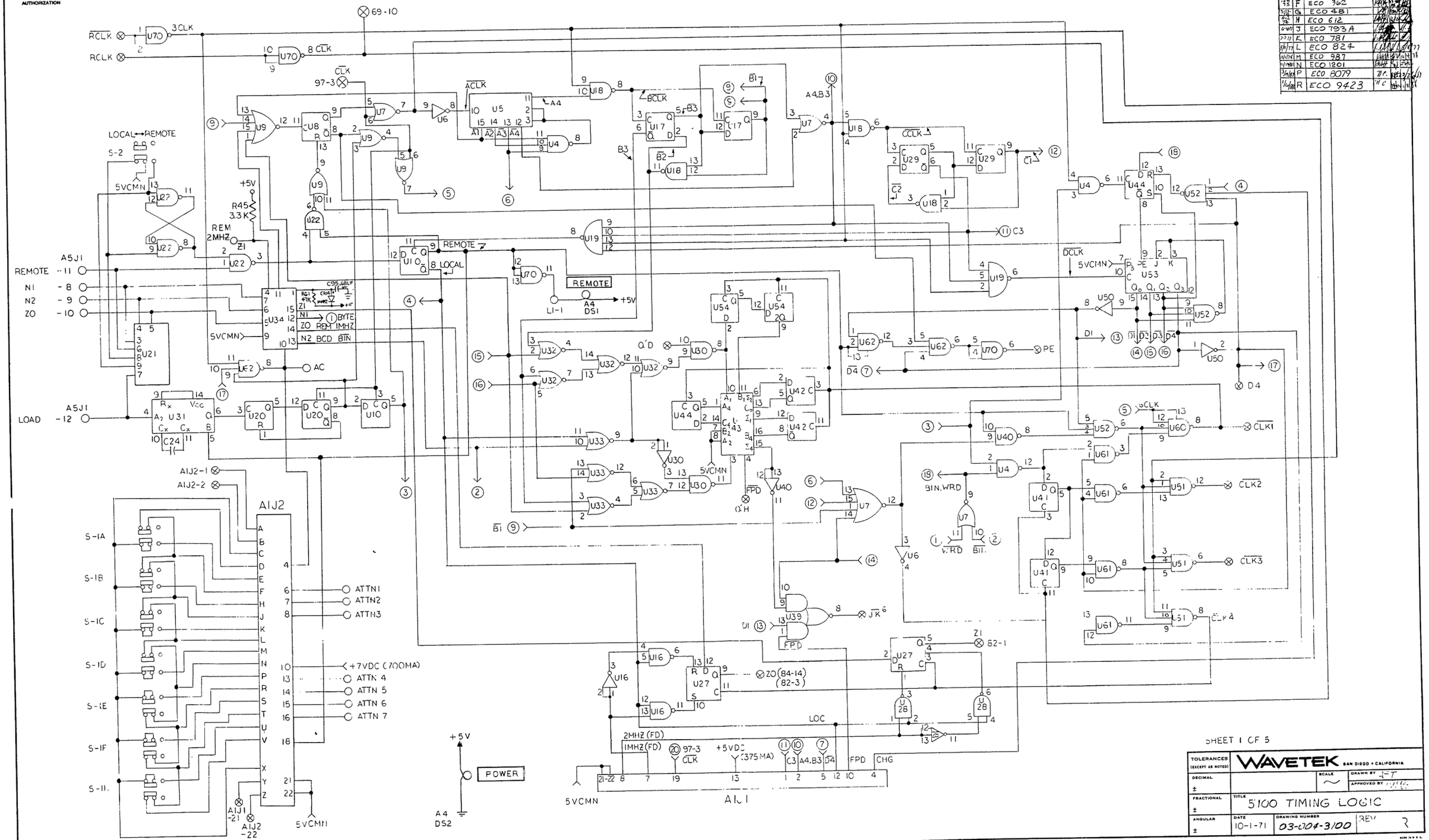
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO 5100 / DWG NO 002.3100 / REV L
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 1
	SCALE		

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3894

OLD NO. 510331-1

DATE	BYM	REVISION RECORD	AUTH	OR.	CK
10/11	A	ECO 462			
	B				
3/74	C	ECO 221, 173			
12/74	D	ECO 224			
7/75	E	ECO 274			
3/76	F	ECO 362			
5/76	G	ECO 481			
8/76	H	ECO 612			
6-1977	J	ECO 793A			
7-77	K	ECO 781			
8/77	L	ECO 824			
12/78	M	ECO 987			
11/1980	N	ECO 1201			
3/1987	P	ECO 8079			
11/1988	R	ECO 9423			



DATE	SYM	REVISION RECORD	AUTH	DR	CK

SEC A.S. 510 355-1

Z1 27-5
Z0 27-9
JK 6
2 MHZ
1 MHZ
CLK3 51-6
CLK2 51-12
CLK1 60-8
PE 70-6
A5J1
512 KHZ
256 KHZ
128 KHZ
64 KHZ
32 KHZ
16 KHZ
8 KHZ
4 KHZ
2 KHZ
1 KHZ
CARRY JUMPER
TEST
NORMAL
QD
QH
HZ CARRY
KHZ CARRY
MHZ CARRY
QUAD
MSB
SGN
SGN 90-2
CLK 7-6
RCLK 89-6
VCC
R44 1K
A5J1-25
D4
M8 85-12
M7 85-2
M6 78-7
M5 69-7
M4 78-5
M3 78-6
M2 69-4
M1 69-5
M0 69-6
5VCMN

DESCRIPTION OF IC'S			
IC NO.	PART NO.	PINS TO VCC	PINS TO GND
1	122 - 0106	16	8
2	122 - 7483	5	12, 13
3	122 - 0106	16	8, 9
11	128 - 2330	14	
12	122 - 0106	16	8
13	122 - 7483	5	12
14	122 - 0106	16	8, 9
15	122 - 7483	5	4,11,12,16
23	122 - 0106	16	8
24	122 - 7483	5	3, 12, 16
25	122 - 0106	16	8, 9
26	122 - 7483	5	1, 8, 11, 12
35	122 - 0106	16	8
36	122 - 7483	5	12
37	122 - 0106	16	8, 9
38	122 - 7483	5	4,11,12,16
45	128 - 2330	14	
46	122 - 0106	16	8
47	122 - 7483	5	12
48	122 - 0106	16	8, 9
49	122 - 7483	5	1, 8, 11, 12
55	122 - 0106	16	8
56	122 - 7483	5	3, 12, 16
57	122 - 0106	16	8, 9

DESCRIPTION OF IC'S			
IC NO.	PART NO.	PINS TO VCC	PINS TO GND
58	123 - 7474	14	7
59	122 - 9014	16	8
60	122 - 7440	14	7
63	122 - 0106	16	8
64	122 - 7483	5	12
65	122 - 0106	16	8, 9
66	122 - 7483	5	4, 11, 8, 16
67	122 - 9014	16	8
68	122 - 7483	5	1, 11, 12, 13
71	128 - 2330	14	
72	122 - 0106	16	8
73	122 - 7483	5	12
74	122 - 0106	16	8, 9
75	122 - 7483	5	1, 8, 11, 12
76	122 - 9014	16	8
77	122 - 7483	5	1, 4, 8, 11, 12
79	.20 - 4451	14	4
80	122 - 0106	16	8
82	122 - 7483	5	12
83	123 - 7474	14	7
84	122 - 9014	16	8
95	122 - 7440	14	7
98	122 - 7474	14	7

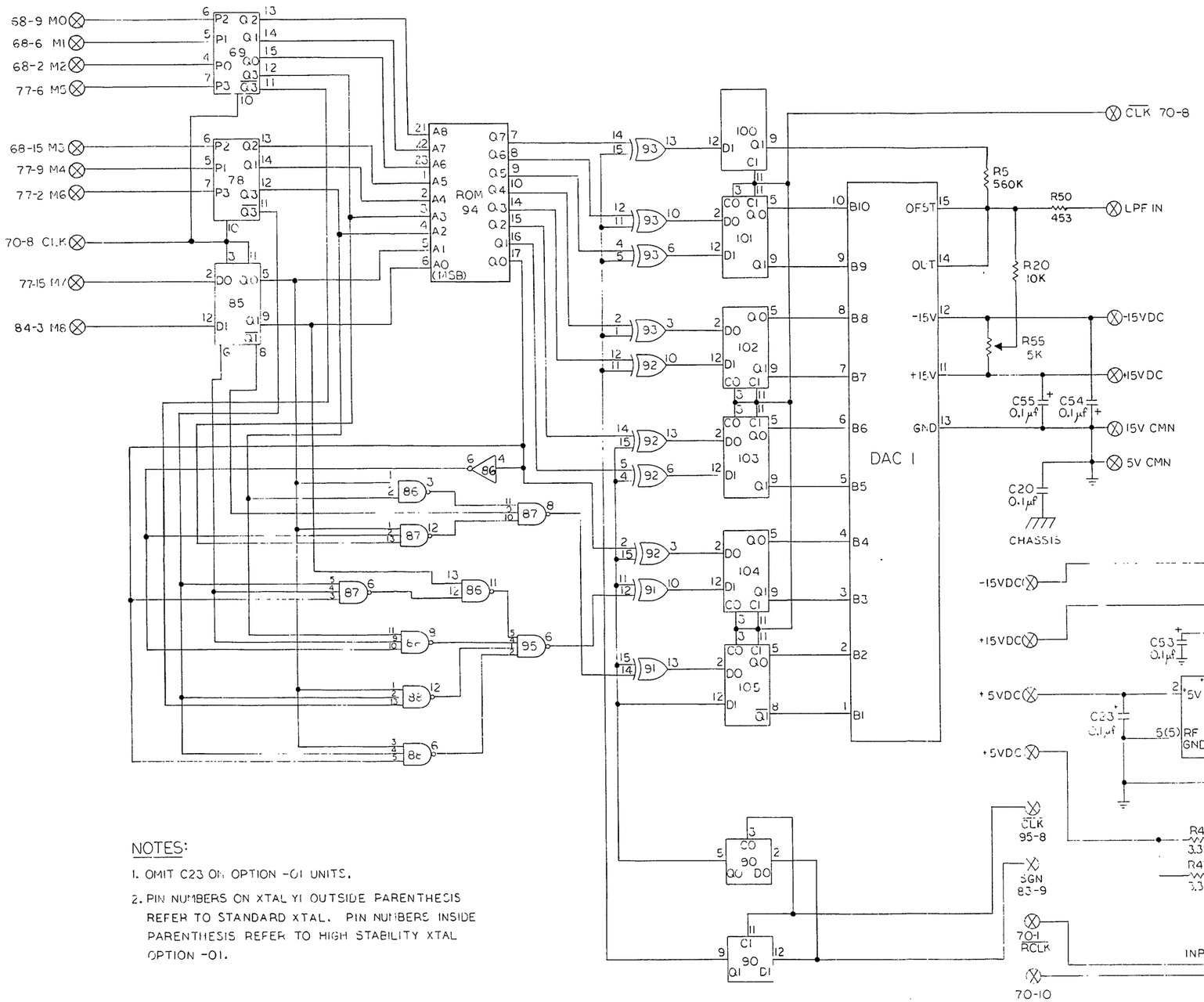
○ REAR PANEL CONNECTOR
⊗ INTERNAL SIGNAL CONNECTION

SHEET 4 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA		
DECIMAL XXX .010 XX .02		SCALE	DRAWN BY
			APPROVED BY
FRACTIONAL ± 1/64	TITLE SIOC FREQUENCY FILTER & SAMPLE GENERATOR (LOGIC)		
ANGULAR ±	DATE 8-1-73	DRAWING NUMBER 03-206-1	REV R

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

OLD No 5104466-3



DESCRIPTION OF IC'S			
IC NO	PART NO	PINSTOVCC	PINS TO GND
69	122-0106	16	8, 9
78	122-0106	16	8, 9
81	122-7493	5	2, 3, 10
85	122-7474	14	7
86	122-7400	14	7
87	122-7410	14	7
88	122-7410	14	7
89	122-0100	14	7
90	122-7474	14	7
91	122-9014	16	8
92	122-9014	16	8
93	122-9014	16	8
94	129-3000	24	12, 20
95	122-7440	14	7
96	122-7413	14	7
97	122-7437	14	7
98	122-7474	14	7
100	124-7474	14	7
101	124-7474	14	7
102	124-7474	14	7
103	124-7474	14	7
104	124-7474	14	7
105	124-7474	14	7
79	120-4451	14	4

NOTES:

1. OMIT C23 ON OPTION -01 UNITS.
2. PIN NUMBERS ON XTAL Y1 OUTSIDE PARENTHESIS REFER TO STANDARD XTAL. PIN NUMBERS INSIDE PARENTHESIS REFER TO HIGH STABILITY XTAL OPTION -01.

SHEET 3 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02	STANDARD	SCALE	DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE 5100 DAC & FREQUENCY REFERENCE		
ANGULAR ±	DATE 6-13-73	DRAWING NUMBER 03-0004-3100	REV R

DATE	SYM	REVISION RECORD	AUTH.	DR	CK
		- - -			

SEC A.S. 5/0 #55-1

Z1 27-5
Z0 27-9
2 MHZ
1 MHZ
JR 6
A5J1 -24 -23 -22 -21
512 KHZ
256 KHZ
CLK3 51-6
A5J1 -20 -19 -18 -17
128 KHZ
64 KHZ
32 KHZ
16 KHZ
A5J1 -16 -15 -14 -13
8 KHZ
4 KHZ
2 KHZ
1 KHZ
PE 70-6
A5J1 -49 -48 -47 -46
CARRY JUMPER
TEST
NORMAL
CLK2 51-12
A5J1 -45 -44 -43 -42
A5J1 -41 -40 -39 -38
A5J1 -37 -36 -35 -34
CLK1 60-8
A5J1 -33 -32 -31 -30
A5J1 -29 -28 -27 -26
QD
QH
5VCMN
QUAD
MSB
SGN
SGN 90-2
KHZ CARRY
HZ CARRY
MHZ CARRY
M8 85-12
M7 85-2
M6 78-7
M5 69-7
M4 78-5
M3 78-6
M2 69-4
M1 69-5
M0 69-6
CLK 7-6
RCLK 89-6
VCC
R44 1K
A5J1-25
D4

DESCRIPTION OF IC'S			
IC NO.	PART NO.	PINS TO VCC	PINS TO GND
1	122 - 0106	16	8
2	122 - 7483	5	12, 13
3	122 - 0106	16	8, 9
11	128 - 2330	14	
12	122 - 0106	16	8
13	122 - 7483	5	12
14	122 - 0106	16	8, 9
15	122 - 7483	5	4, 11, 12, 16
23	122 - 0106	16	8
24	122 - 7483	5	3, 12, 16
25	122 - 0106	16	8, 9
26	122 - 7483	5	1, 8, 11, 12
35	122 - 0106	16	8
36	122 - 7483	5	12
37	122 - 0106	16	8, 9
38	122 - 7483	5	4, 11, 12, 16
45	128 - 2330	14	
46	122 - 0106	16	8
47	122 - 7483	5	12
48	122 - 0106	16	8, 9
49	122 - 7483	5	1, 8, 11, 12
55	122 - 0106	16	8
56	122 - 7483	5	3, 12, 16
57	122 - 0106	16	8, 9

DESCRIPTION OF IC'S			
IC NO.	PART NO.	PINS TO VCC	PINS TO GND
58	123 - 7474	14	7
59	122 - 9014	16	8
60	122 - 7440	14	7
53	122 - 0106	16	8
64	122 - 7483	5	12
65	122 - 0106	16	8, 9
66	122 - 7483	5	4, 11, 8, 16
67	122 - 9014	16	8
68	122 - 7483	5	1, 11, 12, 13
71	128 - 2330	14	
72	122 - 0106	16	8
73	122 - 7483	5	12
74	122 - 0106	16	8, 9
75	122 - 7483	5	1, 8, 11, 12
76	122 - 9014	16	8
77	122 - 7483	5	1, 4, 8, 11, 12
79	120 - 4451	14	4
80	122 - 0106	16	8
82	122 - 7483	5	12
83	123 - 7474	14	7
84	122 - 9014	16	8
95	122 - 7440	14	7
98	122 - 7474	14	7

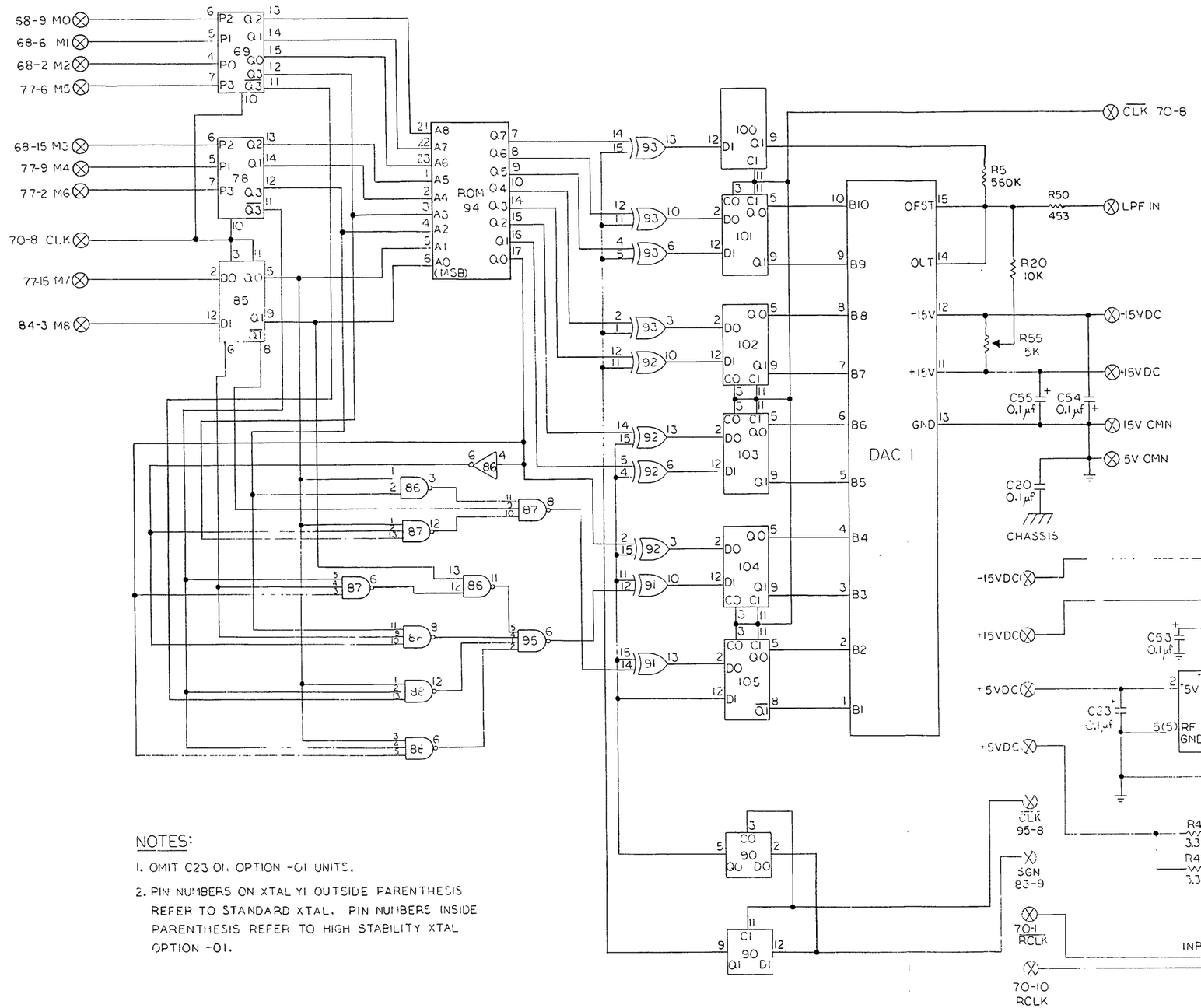
○ REAR PANEL CONNECTOR
⊗ INTERNAL SIGNAL CONNECTION

SHEET 1 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA		
DECIMAL XXX .010 XX .02		SCALE	DRAWN BY Jamison
			APPROVED BY
FRACTIONAL ± 1/64	TITLE SIDC FREQUENCY FINDER & SIMPLE GENERATION LOGIC		
ANGULAR ±	DATE 8-1-73	DRAWING NUMBER 03-2[illegible]-00	REV

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK
		SHT 1			

OLD No 510466-3



DESCRIPTION OF IC'S

IC NO	PART NO	PINSTOVCC	PINS TO GND
69	122-0106	16	8, 9
78	122-0106	16	8, 9
81	122-7493	5	2, 3, 10
85	122-7474	14	7
86	122-7400	14	7
87	122-7410	14	7
88	122-7410	14	7
89	122-0100	14	7
90	122-7474	14	7
91	122-9014	16	8
92	122-9014	16	8
93	122-9014	16	8
94	129-3000	24	12, 20
95	122-7440	14	7
96	122-7413	14	7
97	122-7437	14	7
98	122-7474	14	7
100	124-7474	14	7
101	124-7474	14	7
102	124-7474	14	7
103	124-7474	14	7
104	124-7474	14	7
105	124-7474	14	7
79	120-4451	14	4

NOTES:

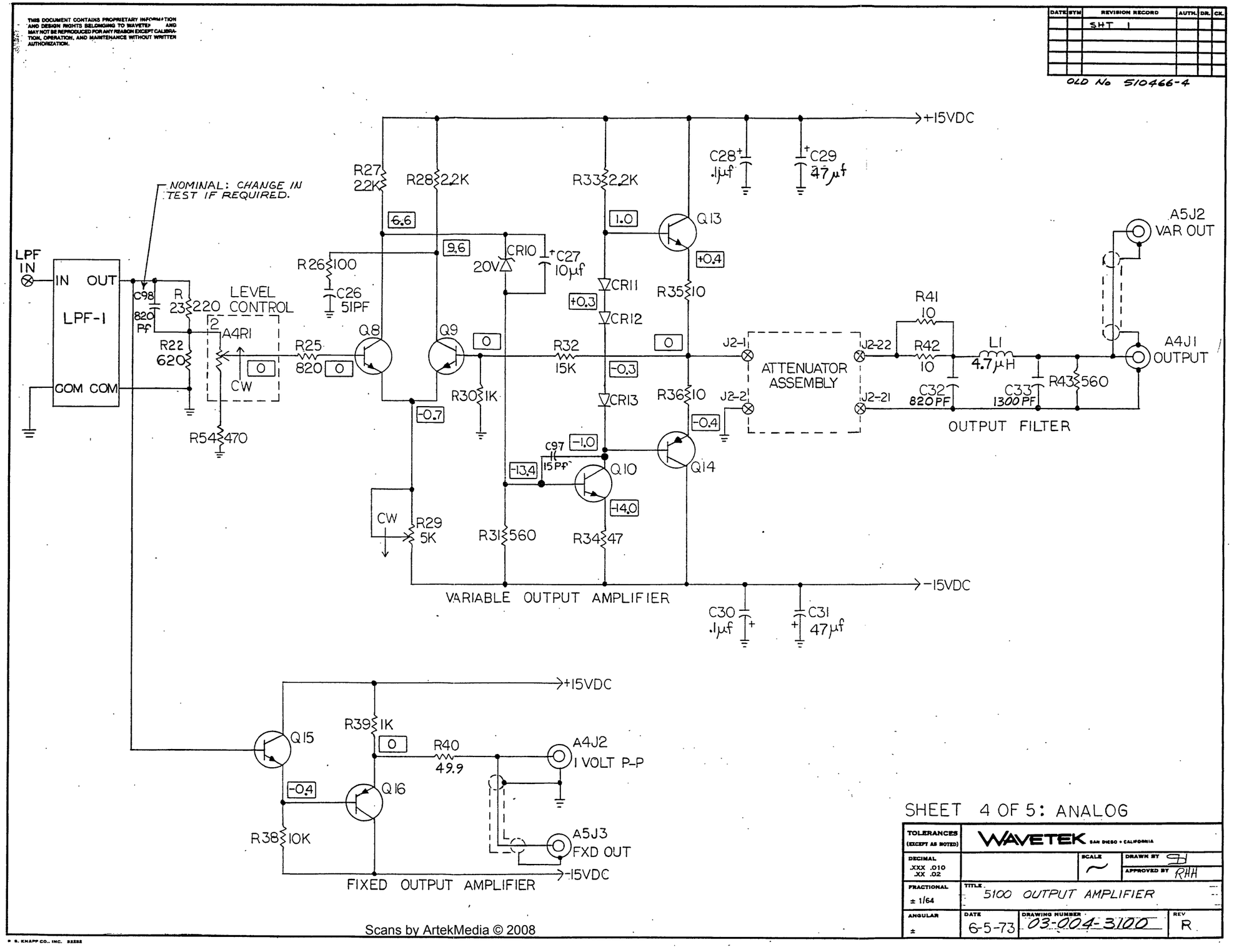
1. OMIT C23 ON OPTION -01 UNITS.
2. PIN NUMBERS ON XTAL Y1 OUTSIDE PARENTHESIS REFER TO STANDARD XTAL. PIN NUMBERS INSIDE PARENTHESIS REFER TO HIGH STABILITY XTAL OPTION -01.

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02	STANDARD	SCALE	DRAWN BY [illegible]
FRACTIONAL ± 1/64	TITLE 5100 DAC & FREQUENCY REFERENCE		APPROVED BY RHH
ANGULAR ±	DATE 6-13-73	DRAWING NUMBER 03-004-3100	REV A

SHEET 3 OF 5

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

OLD No 510466-4

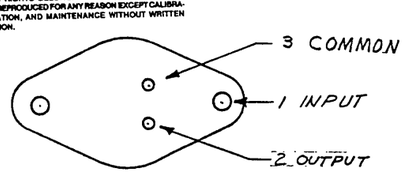


SHEET 4 OF 5: ANALOG

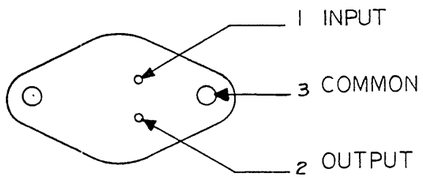
TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE ~	DRAWN BY DJ / APPROVED BY RHH
FRACTIONAL ± 1/64	TITLE 5100 OUTPUT AMPLIFIER		
ANGULAR ±	DATE 6-5-73	DRAWING NUMBER 03-004-3100	REV R

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

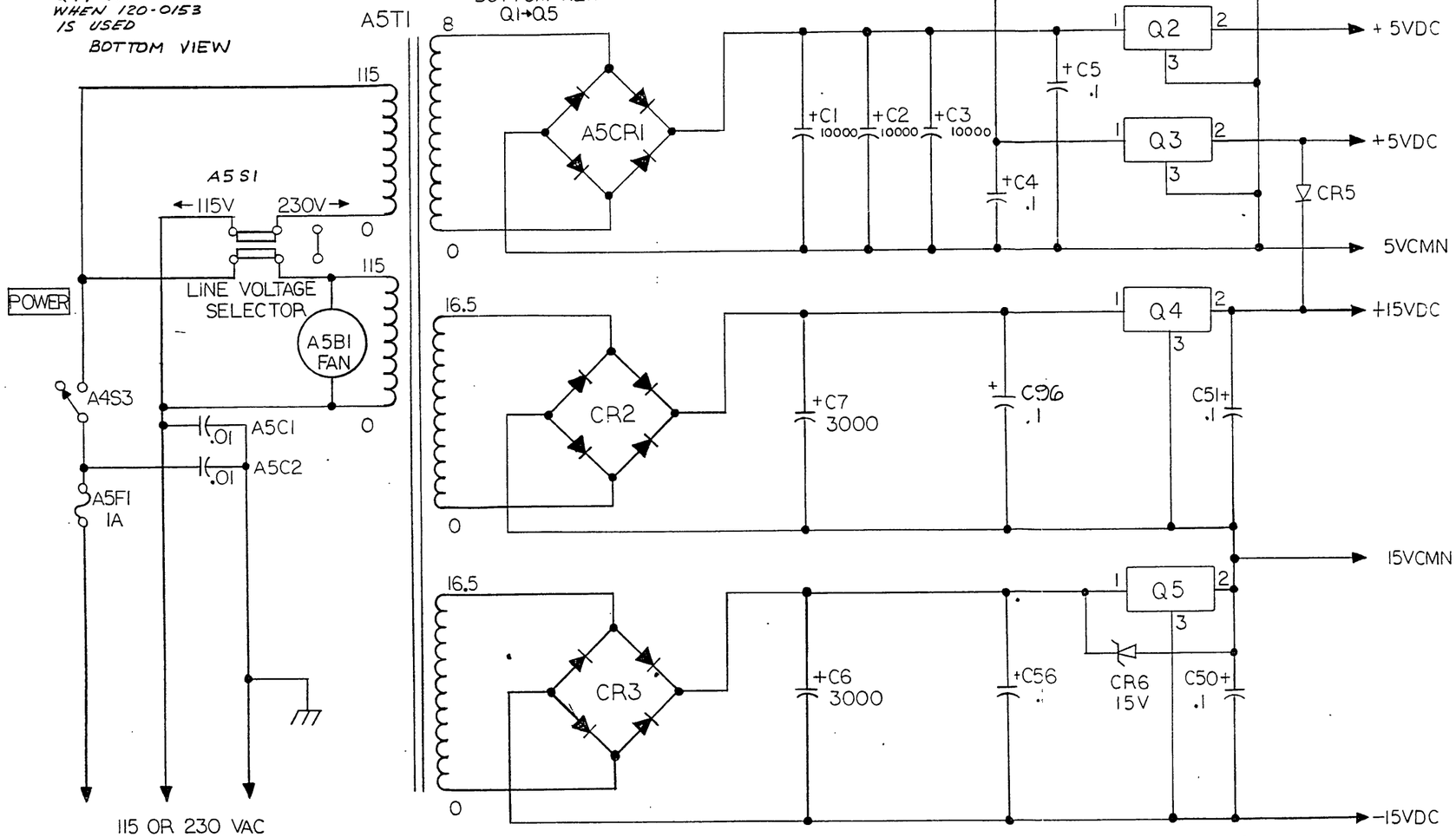
OLD No. 510466-5



Q4 & Q5 WHEN 120-0153 IS USED
BOTTOM VIEW



BOTTOM VIEW Q1→Q5



NOTES:

1. REFERENCE DESIGNATION ARE ABREVIATED FOR ASSY A1
2. ALL CAPACITATOR VALUES ARE IN MICROFARADS
3. CR6 PRESENT ON OPTION -01 UNITS ONLY

SHEET 5 OF 5: POWER

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE ~	DRAWN BY APPROVED BY RHH
FRACTIONAL ± 1/64	TITLE 5100 POWER SUPPLY		
ANGULAR ±	DATE 6-5-73	DRAWING NUMBER 03-004-3100	REV R

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
2	SPK REGULATOR ASSY 5100			004.3030	1
DAC-1	CONVERTER D/A 10 BIT			004.3056	1
3	SPK CABLE ASSY: SHLD RGD FMD 5100			009.0590	1
NONE	SCHEMATIC, MAINBOARD 5100			03.004.3100	1
C98	CAP MICA FX VAL DIP 820PF 5% 0 TO+70PPM/C 300V	CD15FC821J03	CDE	101.1820	1
Q1 Q2 Q3	Q: P.V. REG 5V 5% 1A TO-3	LM309K-STEEL	NSC	120.0051	3
1	ASSY, PRE WAVE LOAD 5100-3100	5100-2557	WVTK	1208-00-2557	1
U94	U: ROM 512X8 CST SINE (SIG)	N82S115N	SIG	129.3000	1
L1	L: FXD 4.7 UHY +/-10% SHLD	1641-472	DELVN	150.9470	1
LPF-1	FILTER: LOW PASS 0-2 MHZ	00.165.3000	WVTK	165.3000	1
6	HEATSINK, TO 3, BASE, BLK ANDZ	6104B	THERM	2800-11-0032	3

WAVETEK PARTS LIST | TITLE: MAINBOARD ASSY 5100 | ASSEMBLY NO. 004.3100 | REV Y

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
10	M SCR: ST ZN SL 4-40X1/2 BH			380.4081	6
11	NUT: HX ST ZN 4-40X1/4 AF			387.4080	2
13	WASHER: FLAT STL ZN #4			388.0040	10
14	WASHER: INT LK STL ZN #4			388.1040	16
15	WASHER: FLAT NYL #2X.250X.032			388.3020	4
12	SPR: THD 3/16HX 4-40X3/4	1656A	KEYST	389.2005	4

WAVETEK PARTS LIST | TITLE: MAINBOARD ASSY 5100 | ASSEMBLY NO. 004.3100 | REV Y

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
21	HEATSINK, TO 3, TOP, GLD CHR	6104C	THERM	2800-11-0033	3
S1	S: PSH/PSH DPDT 7 STA	2KDB070000-585	CRL	341.2200	1
S2	S: PSH/PSH DPDT	PB-1	CRL	341.2201	1
19	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	3
4	SOCKET: JUMPER	450-3704-01-03-00	CAMBN	353.0103	9
5	CONN: TERM PIN .025 WW (NAIL)	W98-025-360-GH-GOLD	A/S	354.0003	16
7	HEAT SINK: TO-8 ROUND	207CB	WAKE	367.0400	2
18	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	1.6
16	WIRE: BUSS HD DWN TND #20 AWG	W2020	WEICO	378.0500	.6
8	WIRE: #30 AWG SLD KYN BLUE			378.1961	15
NA	SLVNG: TEFLON #20AWG			378.5202	.45
20	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	.3
9	M XCR: ST ZN SL 4-40X3/8 PH			380.4062	4

WAVETEK PARTS LIST | TITLE: MAINBOARD ASSY 5100 | ASSEMBLY NO. 004.3100 | REV Y

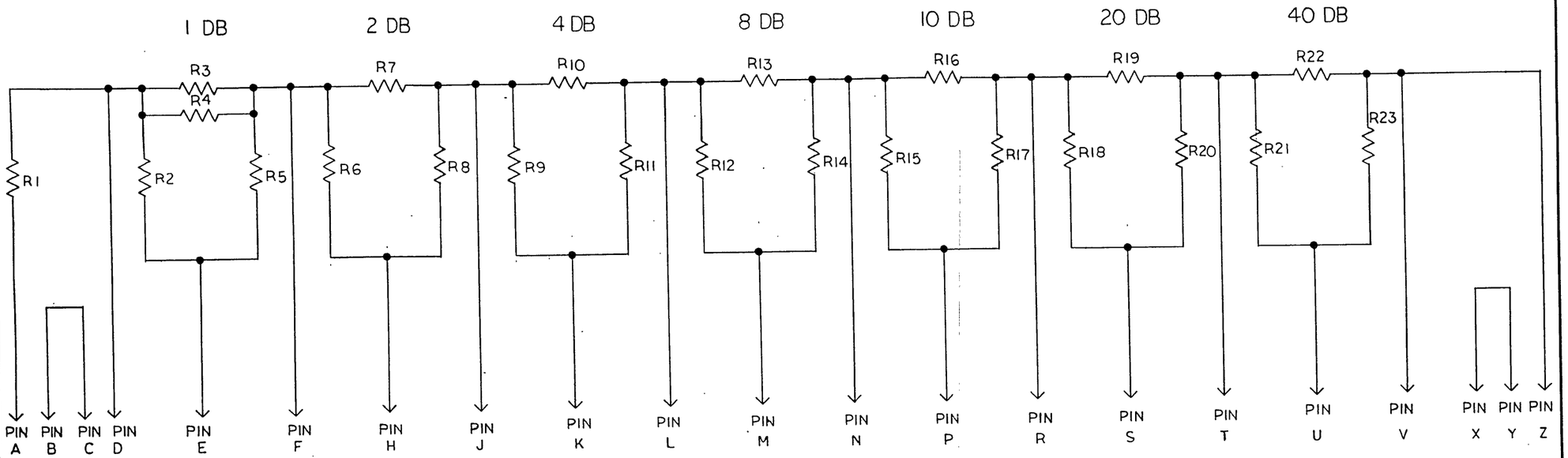
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST MAINBOARD ASSEMBLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 .XX ±.030		
	DO NOT SCALE DWG		MODEL NO 5100 / DWG NO 004.3100 / REV Y
	SCALE		CODE IDENT 23338 / SHEET 2 OF 2

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3894

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
6/87	A	ERO# 8415			

OLD No. 510341

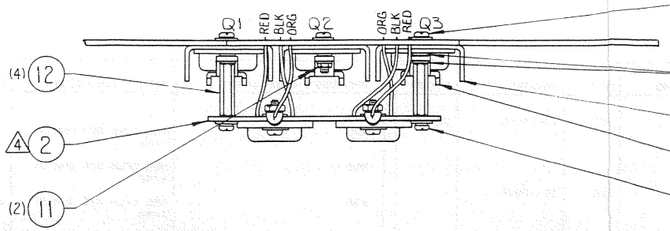


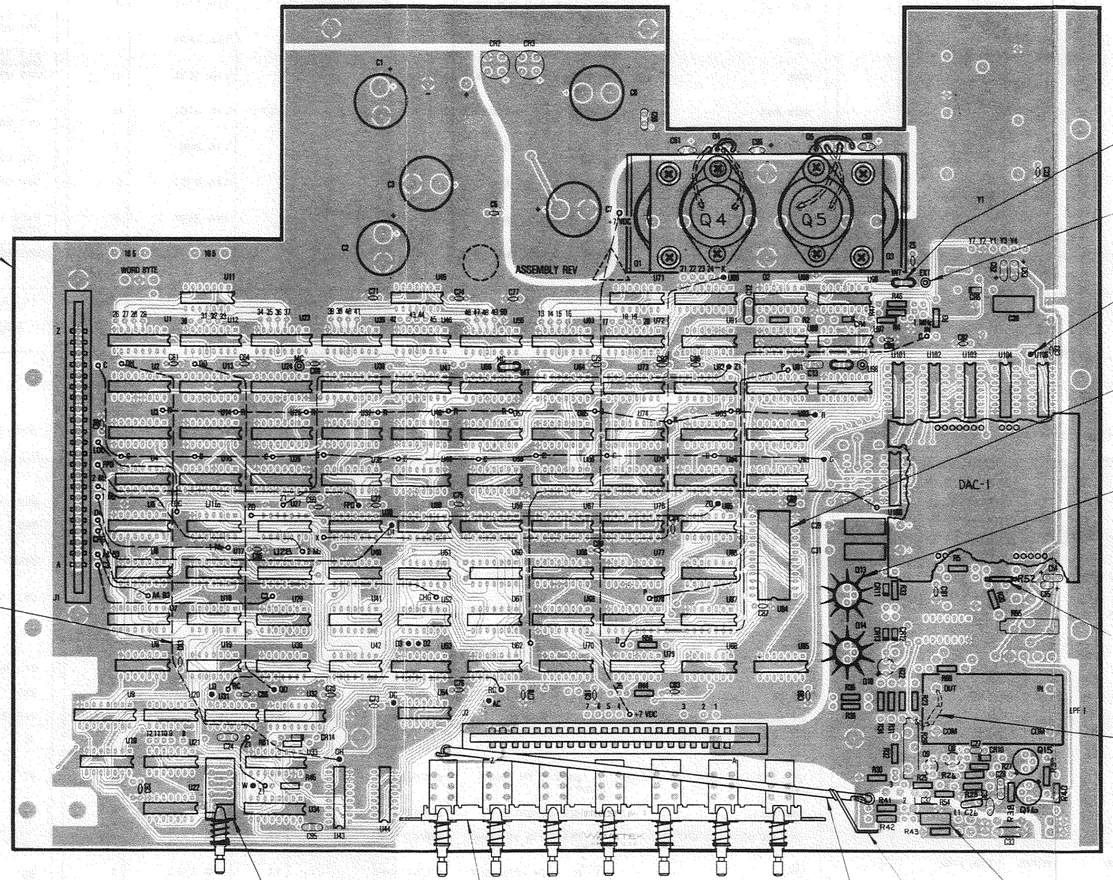
WAS 03-004-3066

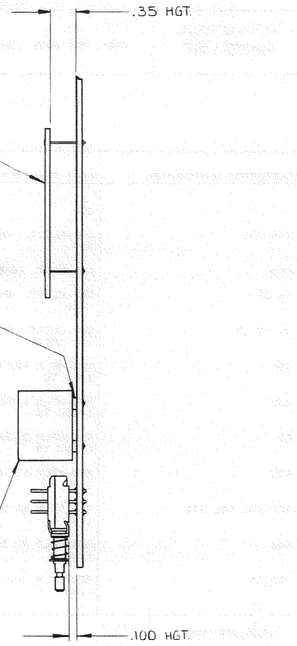
TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL ±		SCALE	DRAWN BY AST. 6/24/87
FRACTIONAL ±	TITLE ATTENUATOR ASSEMBLY LOCAL		
ANGULAR ±	DATE 6-23-87	DRAWING NUMBER 03-002-3066	REV. A

REV	ECO	REV	ECO	BY	DATE	APP
P	989	Y	9173 REDRAWN	CC	9/18/87	9-18-87
R	1201					
T	7857					
U	8080					
V	8255					
W	9046					

△6







(6) 10
(10) 13
(16) 14
(3) 6
(3) 21
(4) 9
REF 14
REF 13
(3) 19
REF 4
(9) 4
REF SEE SHT 2 5
194
DAC-1
(2) 7
(4) 15
16
17
C98 REF FARSIDE SEE SHT 2
LPF-1
(4) 12
△4 2
(2) 11
1
△3 8
S2
S1
△3 △1
18 △2
L1

△6 FOR OLDER REVISIONS SEE OBSOLETED PRINT REV. W.

5. SOLDER ALL ELECTRICAL COMPONENTS INSERTED INTO BOARD.

△4 SOLDER COLORED WIRES FROM ITEM 2 TO BOARD AS DESIGNATED.

△3 ROUTE WIRE (ITEM 8) TO ALL DIFFERENT DESIGNATED PINS & ATTACH.

△2 SUPPORT CABLE ASSY, BY SOLDERING 18 AWG BUSS WIRE (ITEM 18) TO CABLE ASSY & BOARD AS SHOWN.

△1 INSERT CABLE ASSY WIRE INTO BOARD FLUSH TO SLEEVING & INSERT ATTACHED GROUND WIRE INTO BOARD, BOTH ENDS AS SHOWN & SOLDER.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN CARLOS CONTRERAS	DATE 9/18/87	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL —	CHECKED D. BUZZELL	1/1/1	TITLE MAINBOARD ASSEMBLY
	PROJ. ENGR.		
FINISH WAVETEK PROCESS —	RELEASE APPROV. R. BIG	10/1/87	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX ± .XXX ± ±		SIZE D · FSCM NO. 23338 · DWG. NO. 02-004-3100 · REV Y · SCALE 1:1 · MODEL 5100

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C23 C4 C5 C60 C61 C62 C63 C64 C65 C66 C68 C69 C70 C71 C72 C73 C74 C75 C76 C77 C78 C79 C80 C81 C82 C83 C84 C85 C87 C88 C89 C90 C91 C92 C93	CAP, MOND, 0.1UF 50V Z5U	SR215E104ZAT	AVX	100.4102	35
C12	CAP MICA FX VAL DIP 22PF 5% -20+100PPM/C 500V	CM05ED220J03	CDE	101.0220	1
C26	CAP FX VAL, DP MICA 51PF 5% -20+100PPM/C 500V	CM05ED510J03	CDE	101.0510	1
C24	CAP FX VAL, DP MICA 150PF 5% 0 TO +70PPM/C 300V	CM05FD151J03	CDE	101.1150	1
C32	CAP MICA FX VAL DIP 820PF 1% 0 TO+70PPM/C 300V	CD19FD821F03	CDE	101.1821	1
C33	CAP MICA FX VAL DIP 1300PF 1% 0 TO+70PPM/C500V	CM06FD132F03	CDE	101.2131	1
C20	CAP, PLSTR, .10UF 10% 600V	DMT6P1	C-D	105.4100	1
C28 C30 C50 C51 C52 C53 C54 C55 C56 C96	CAP, TANT, .10UF 20% 35V	T368A104M035A$	KEMET	109.4100	10
C13 C27	CAP, TANT, 10UF 20%	T368B106M025A$	KEMET	109.6100	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5100-3100 | ASSEMBLY NO. 1208-00-2557 | REV A | PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R23	RES, CFLM 220 OHM 5% 1/4W			116.1221	1
R59	RES, CFLM 390 OHM 5% 1/4W			116.1391	1
R54	RES, CFLM 470 OHM 5% 1/4W	CF1/4-470OHM, 5%	STKPL	116.1471	1
R31 R43	RES, CFLM 560 OHM 5% 1/4W			116.1561	2
R22	RES, CFLM 620 OHM 5% 1/4W			116.1621	1
R25	RES, CFLM 820 OHM 5% 1/4W			116.1821	1
R39 R44	RES, CFLM, 1.0K OHM 5% 1/4W	CF-071K-5%	DALE	116.2101	2
R27 R28 R33	RES, CFLM 2.2K OHM 5% 1/4W			116.2221	3
R45 R46 R47	RES, CFLM 3.3K OHM 5% 1/4W			116.2331	3
R20 R3 R38	RES, CFLM 10K OHM 5% 1/4W			116.3101	3
R61	RES, CFLM 47K OHM 5% 1/4W			116.3471	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5100-3100 | ASSEMBLY NO. 1208-00-2557 | REV A | PAGE 3

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	TQR				
U70 U97	U: QUAD 2 IN NAND BUFFER	SN7437N-3	TI	122.7437	2
U19 U60 U95	U: DUAL 4 IN NAND BUFFER	DM7440N/A+	NSC	122.7440	3
U39	U: DUAL 2 IN 2W AOI GATE	SN7451N-3	TI	122.7451	1
U10 U17 U20 U27 U29 U41 U42 U44 U54 U8 U85 U90 U98	U: DUAL D TYPE FLIP FLOP	SN7474N-3	TI	122.7474	13
U13 U15 U2 U24 U26 U36 U38 U43 U47 U49 U56 U64 U66 U68 U73 U75 U77 U82	U: 4 BIT FULL ADDER	N7483N-B	SIG	122.7483	18
U81	U: 4 BIT COUNTER	N7493N-B	SIG	122.7493	1
U59 U67 U76 U84 U91 U92 U93	U: QD XOR GATE INVERT OUTPUT	9014DCQB	FAIR	122.9014	7
U32 U33 U7 U9	U: QUAD NOR GATE			122.9015	4
U58 U83	U: DUAL D TYPE FLIP FLOP	DM74H74N/AT	NSC	123.7474	2
U100 U101 U102 U103 U104 U105	U: DL D TYPE FLIP FLOP (SHTKY)	N74S74N-B	SIG	124.7474	6
U11 U21 U45 U71	U: PULL UP NET 3.3K 2% X13	4114R-002-332	BOURN	128.2330	4

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5100-3100 | ASSEMBLY NO. 1208-00-2557 | REV A | PAGE 5

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	20V				
C29 C31	CAP, ELECT, 47UF 20% 63V	47/63-B1009	SIEM	109.6470	2
C95	CAP, TANT, 68UF 20% 6V	T368B686M006AS	KEMET	109.6680	1
C6 C7	CAP, ELECT, 3000UF 50V (PC)	3487AE332M050KM	MEPCO	109.8300	2
C1 C2 C3	CAP, ELECT, 10000UF 15V (PC)	3487BD103M016KM	MEPCO	109.9100	3
R50	RES, MFLM 453 OHM 1% 1/8W TO	RN55C4530F	UNCEM	110.4530	1
R30	RES, MFLM 1.00K 1% 1/10W T2	RN55C1001F	UMCEM	111.1001	1
R2	RES, MFLM 2.00K 1% 1/10W T2	RN55C2001F	UMCEM	111.2001	1
R32	RES, MFLM 15.0K 1% 1/8W TO	RN55C1502F	UMCEM	112.1500	1
R35 R36 R41 R42	RES, CFLM 10 OHM 5% 1/4W			116.0101	4
R34	RES, CFLM 47 OHM 5% 1/4W			116.0471	1
R26 R4	RES, CFLM 100 OHM 5% 1/4W	CF1/4-100OHM, 5%	STKPL	116.1101	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5100-3100 | ASSEMBLY NO. 1208-00-2557 | REV A | PAGE 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R5	RES, CFLM 560K OHM 5% 1/4W			116.4561	1
R29 R55	RES, VAR CMT 5.0K 3/4" RECT	3006P1-502	BOURN	118.2500	2
R40	RES, MFLM 49.9 OHM 1% 1/8W TO	RN55C49R9F	UMCEM	119.4990	1
U79	U: DUAL PRPHL DRIVER (75451)	SN75451N-3	TI	120.4451	1
NONE	ASSY, PC BD PREPPED 5100-3100	5100-2558	WVTK	1208-00-2558	1
U31 U89	U: MNSTBL MVBRTR (74121)	N74121N-B	SIG	122.0100	2
U1 U12 U14 U23 U25 U3 U34 U35 U37 U46 U48 U5 U53 U55 U57 U63 U65 U69 U72 U74 U78 U80	U: 4 BT SHIFT REGISTER (74195)	SN74195N-3	TI	122.0106	22
U16 U18 U22 U28 U30 U40 U61 U86	U: QUAD 2 IN NAND GATE	SN7400N-3	TI	122.7400	8
U50 U6	U: HEX INVERTER	DM7404N/A+	NSC	122.7404	2
U4 U51 U52 U62 U87 U88	U: TRIPLE 3 IN NAND GATE	SN7410N-3	TI	122.7410	6
U96	U: DL 4 IN NAND SMT	SN7413N/F3	TI	122.7413	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5100-3100 | ASSEMBLY NO. 1208-00-2557 | REV A | PAGE 4

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
CR2 CR3	SIL FWB 50PIV 1.5A	PF-05	EDI	130.0140	2
CR5	SIL RCT 200PIV 1A (1N4003)			130.2110	1
CR10	SL ZR 20V 5% 400MW (1N968B)			131.0200	1
CR11 CR12 CR13 CR14 CR4	SL LW LK 70PIV 200MW (1N457)			132.0457	5
Q8,9	Q: SIL NPN MATCHED PAIR			134.0065	1
Q13 Q15	Q: SIL NPN (2N2219)	2N2219	MOT	134.2219	2
Q10	Q: SIL NPN (2N2222)	2N2222A	MOT	134.2222	1
Q14 Q16	Q: SIL PNP (2N2905A)	2N2905	MOT	136.2905	2
J1	CONN, 22 POS EDGE, PC MT, SGL READOUT	009-00179-6	TRW	2100-02-0245	1
J2	CONN, 44 POS EDGE, PC MT, DBL READOUT	009-00341-1	TRW	2100-02-0246	1
U94	SOCKET: IC 24PIN DIP ST	ICNZ46-54Q	ROBNU	353.2402	1
65	CONN: TERM PIN .025 WW (2END)	W239-025-500Q	A/S	354.0007	30
58	SPACER: TXSTR LEAD, NYL, LOW	10414	MILRO	376.2108	4

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5100-3100 | ASSEMBLY NO. 1208-00-2557 | REV A | PAGE 6

NOTE: UNLESS OTHERWISE SPECIFIED

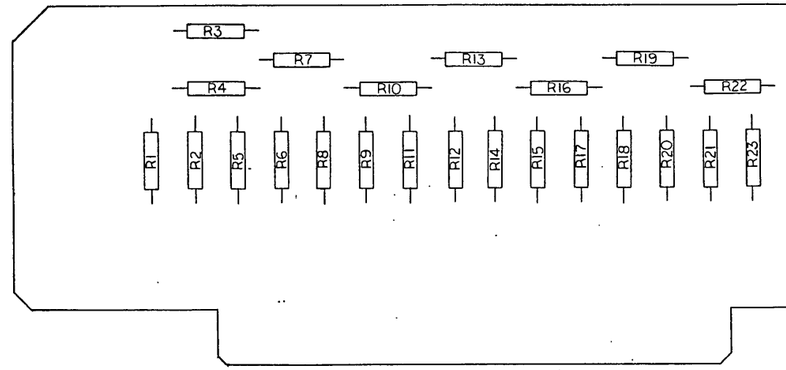
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST MAIN BOARD
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO 5100 / DWG NO 004.3100 / REV Y
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 2
	SCALE		

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3984

REV	ECN	BY	DATE	APP

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
7/23	A	ERO# 8415			

OLD No. 510340



WAS 02-004.3066

SEPARATE PARTS LIST

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA			
DECIMAL ±		SCALE	DRAWN BY AST	
FRACTIONAL ±	TITLE ATTENUATOR ASSEMBLY LOCAL		APPROVED BY	12/87
ANGULAR ±	DATE 6-23-87	DRAWING NUMBER 02-002-3066	REV A	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SCHEMATIC, ATTENUATOR ASSY, LOCAL, FOR 5100'S	03.002.3066	WVTK	03.002.3066	1
R12 R14	RES, MFLM 115 OHM 1% 1/8W TO	RN55C1150F	UNCEM	110.1150	2
R11 R9	RES, MFLM 221 OHM 1% 1/8W TO	RN55C2210F	UNCEM	110.2210	2
R19	RES, MFLM 249 OHM 1% 1/8W TO	RN55C2490F	UNCEM	110.2490	1
R6 R8	RES, MFLM 432 OHM 1% 1/10W T2	RN55C4320F	UNCEM	110.4321	2
R2 R5	RES, MFLM 887 OHM 1% 1/8W TO	RN55C8870F	UMCEM	110.8870	2
R22	RES, MFLM 2.6K 1% 1/8W TO	RN55C2611F	JMAR	111.2610	1
R3 R4 R7	RES, MFLM 11.3 OHM 1% 1/8W TO	RN55C11R3F	JMAR	119.1130	3
R10	RES, MFLM 23.7 OHM 1% 1/8W TO	RN55C23R7F	UMCEM	119.2370	1
R1	RES, MFLM 49.9 OHM 1% 1/8W TO	RN55C49R9F	UMCEM	119.4990	1
R13 R21 R23	RES, MFLM 51.1 OHM 1% 1/8W TO	RN55C51R1F	UMCEM	119.5110	3

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	LOCAL ATTENUATOR 5100	002.3066	B
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R18 R20	RES, MFLM 61.9 OHM 1% 1/8W TO	RN55C61R9F	UMCEM	119.6190	2
R16	RES, MFLM 71.5 OHM 1% 1/8W TO	RN55C71R5F	UMCEM	119.7150	1
R15 R17	RES, MFLM 97.6 OHM 1% 1/8W TO	RN55C97R6F	UMCEM	119.9760	2
NONE	ASSY PC BD PREPPED 5100-3066	5100-2579	WVTK	1208-00-2579	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	LOCAL ATTENUATOR 5100	002.3066	B
		PAGE 2	

NOTE: UNLESS OTHERWISE SPECIFIED

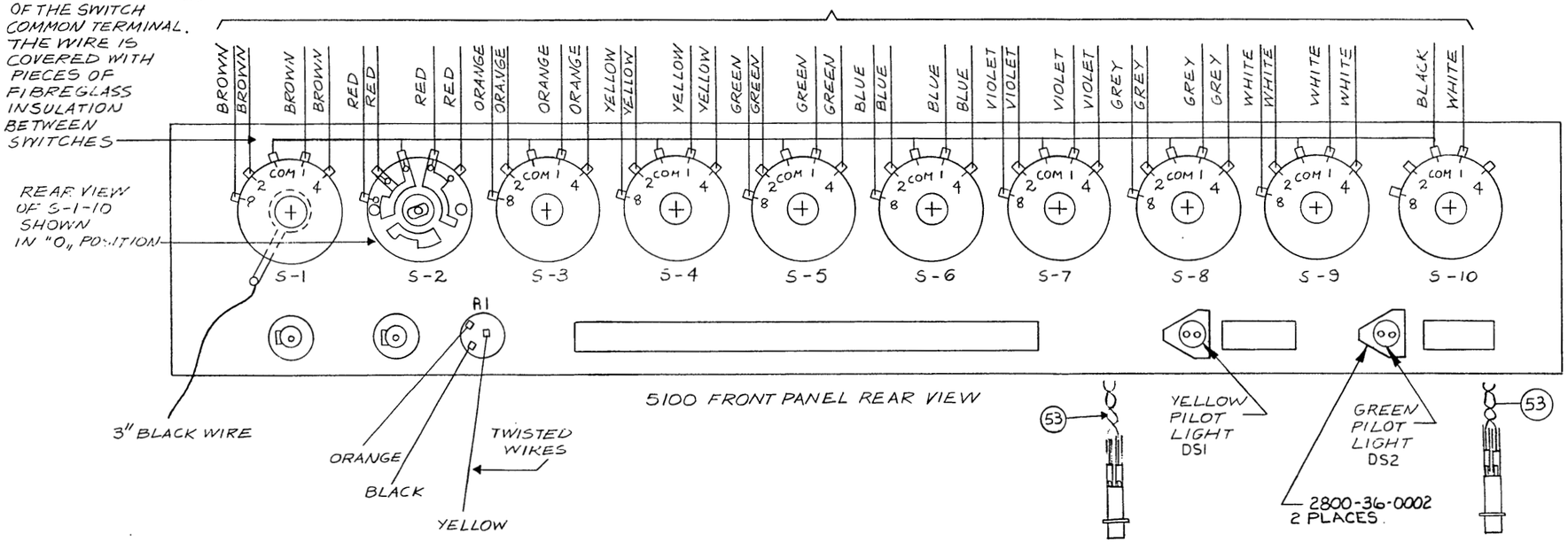
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY & PARTS LIST ATTENUATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		MODEL NO 5100 / DWG NO. 02-002-3066 / REV B
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 1
	SCALE		

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
6/76	A	ECO 217			
7/76	B	ECO 467			
8/76	C	ECO 513			
1/9/87	D	ECO 7912 T.C.			
7/6/87	E	ECO# 8900	T.C.		
7/9/87	F	ECO# 8091	T.C.		

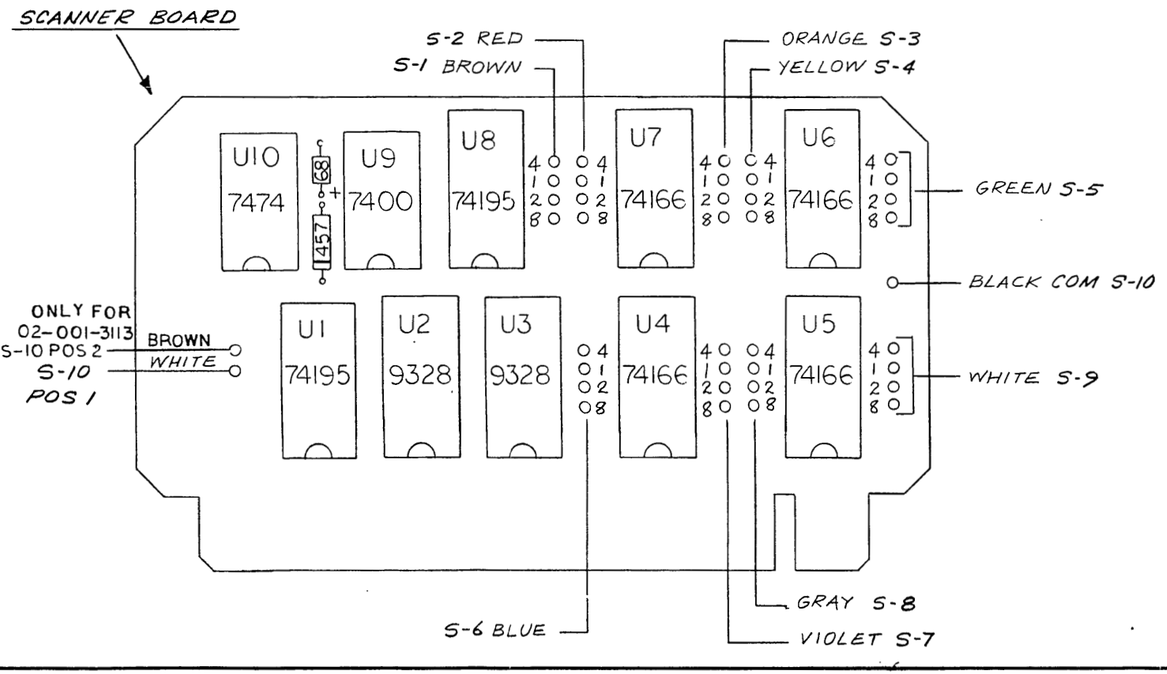
THIS JUMPER WIRE IS A CONTINUOUS PIECE OF Nº 22 SOLID BUSS WIRE RUNNING BETWEEN THE DOUBLE CONTACTS OF THE SWITCH COMMON TERMINAL. THE WIRE IS COVERED WITH PIECES OF FIBREGLASS INSULATION BETWEEN SWITCHES

REAR VIEW OF S-1-10 SHOWN IN "0" POSITION

TO SCANNER BOARD



SCANNER BOARD



NOTE:
TYP. FOR S-1 THRU S-9

4 O TO S-1 POS 4 BROWN
1 O TO S-1 POS 1 BROWN
2 O TO S-1 POS 2 BROWN
8 O TO S-1 POS 8 BROWN

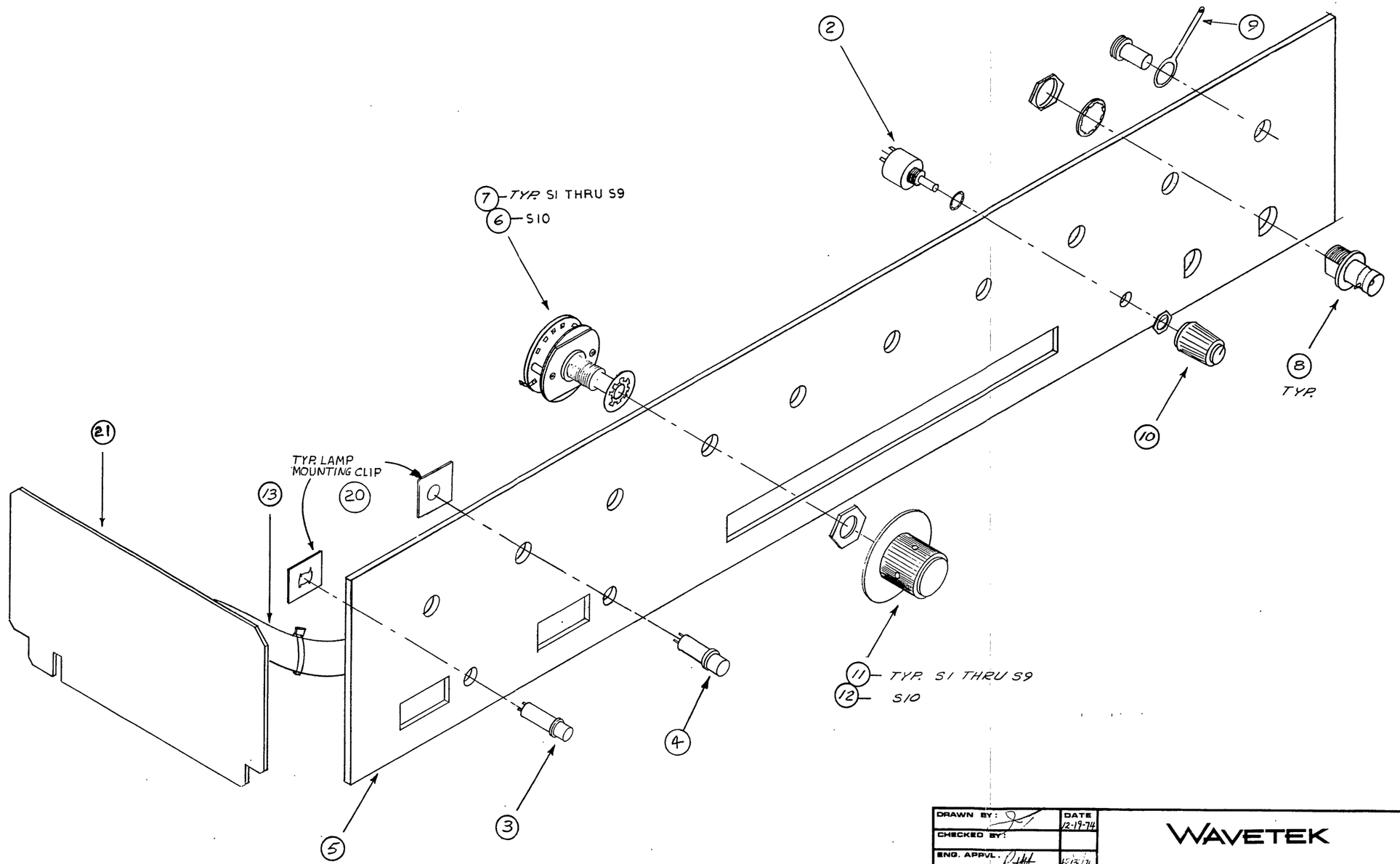
SEE SEPERATE PARTS LIST

TOLERANCES (EXCEPT AS NOTED)	WAVETEK		
DECIMAL .XXX .010 .XX .02		SCALE ~	DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE PANEL ASSEMBLY: FRONT 5100 SERIES III		
ANGULAR ±	DATE 12-18-74	DRAWING NUMBER 02-001-3100	REV F

SIZE	DWG NO	REV
C	02-001-3100	A

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASED	JOE LEWIS		12-31-74

SEE SHEET 1 FOR REVISIONS



DRAWN BY:	DATE	12-19-74
CHECKED BY:		
ENG. APPVL.		12/19/74
MFG. APPVL.		12-19-74

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:
.XXX ±
.XX ±
X/x ± 1/64
∠° ± 1°

WAVETEK

TITLE: PANEL ASSEMBLY: FRONT 5100 SERIES III

SIZE	DRAWING NO.	REV
C	02-001-3100	D

SCALE ~

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
21	SPK SCANNER ASSY 5100			004.3150	1
NONE	SPK ASSY, RIBBON CABLE 5100-SERIES	5100-SERIES-2554	WVTK	1207-00-2554	1
53	WIRE ASSY-AMBER LAMP	1207-00-2944	WVTK	1207-00-2944	2
53	WIRE ASSY-GREEN LAMP	1207-00-2945	WVTK	1207-00-2945	2
DS2	LAMP: INCAND 6.3V 40MA GREEN	BP63-GCB-2180	ELDEM	171.1502	1
DS1	LAMP: INCAND 6.3V 40MA AMBER	BP63-ACB-2180	ELDEM	171.1503	1
NONE	TY-WRAP	TY-523M	TB	2800-00-0006	2
22	RETAINING RING	515-0051	DILCO	2800-36-0002	2
5	FRONT PANEL: 5100			300.3001	1
S-10	S: ROT 1P 2 POS (5100 BCD)	752421001	LEDEX	345.1020	1
S1 S2 S3 S4 S5 S6 S7 S8 S9	S: ROT 1P 12 POS (5100 BCD)	752188001	LEDEX	345.1120	9
J1 J2	CONN: BNC BLKHD RECPT ISOL.	28JR10G-1	SCC	351.0003	2
9	LUG: SOLDER FLAT 3/8"	761-375	ZIER	359.0005	1
10	KNOB: BLACK .5" LINE	PS50-LL-1	BUKEY	370.0701	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	PANEL ASSEMBLY FRONT 5100	001.3100	F

PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
11	KNOB: BLACK .7 TS 0-9	.7 TS 0-9	BUKEY	370.0706	9
12	KNOB: BLACK .7 TS 0-1	.7 TS 0-1	BUKEY	370.0707	1
15	WIRE: BUSS TINNED #24 AWG	9024	WEICO	378.0701	1.6
16	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	.6
17	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	2
18	WIRE: #24 AWG STR YELLOW	1124	WEICO	378.1744	1.10
19	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	1.4
2	POT, MODIFIED, 1K (M/F 118.2107)	4609-71-0200	WVTK	4609-71-0200	1

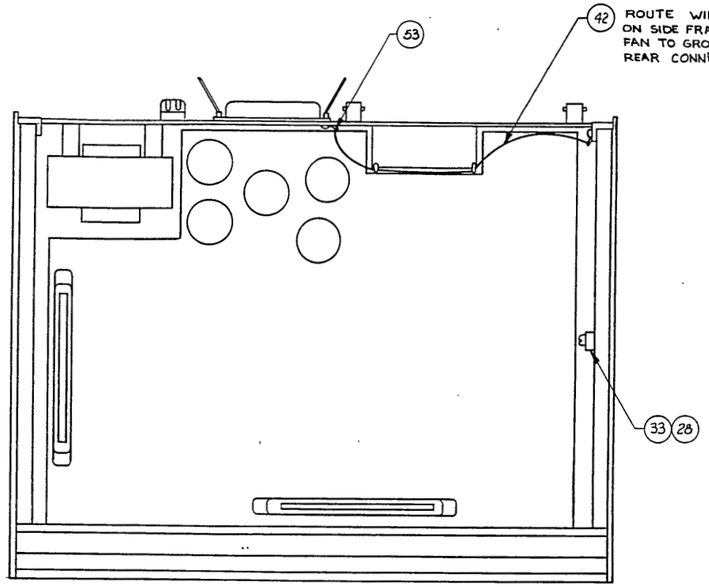
WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	PANEL ASSEMBLY FRONT 5100	001.3100	F

PAGE 2

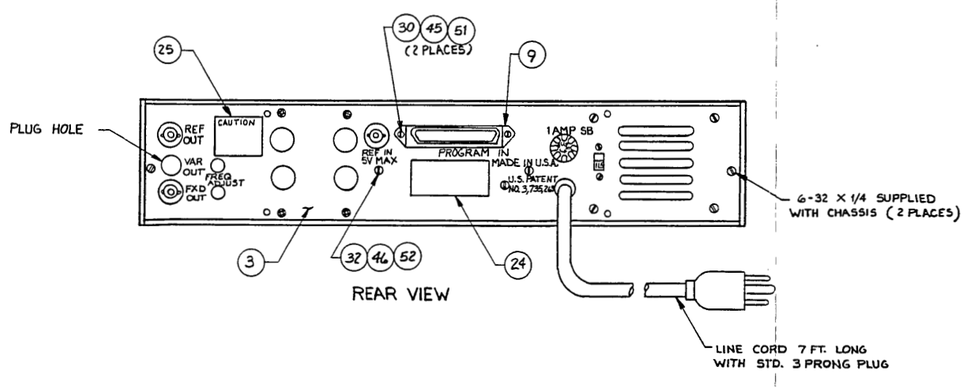
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST FRONT PANEL
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO: 5100
	DO NOT SCALE DWG		DWG NO: 001.3100
	SCALE		REV: F
			CODE IDENT: 23338
			SHEET 1 OF 1

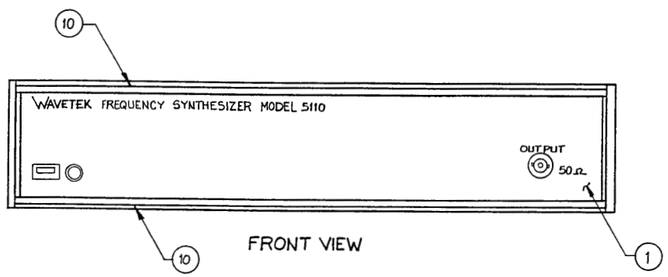
REV	ECN	BY	DATE	APP
A	RELEASE		5/21/78	
B	990	M.M.C.	11/21/78	
C	1248	DE	11/21/81	
D	7843	SD	1/8/87	
E	7857	SD		
F	7891	SD	1/8/87	RBG
G	7899	T.L.C.	3/4/87	RBG
H	8107	T.L.C. 5-18-87	5/25/87	RBG
J	8080	T.L.C. 9-10-87	9/11/87	RBG
K	8255	T.L.C. 6-17-87	7/2/87	RBG



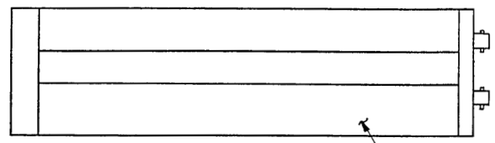
TOP VIEW



REAR VIEW



FRONT VIEW



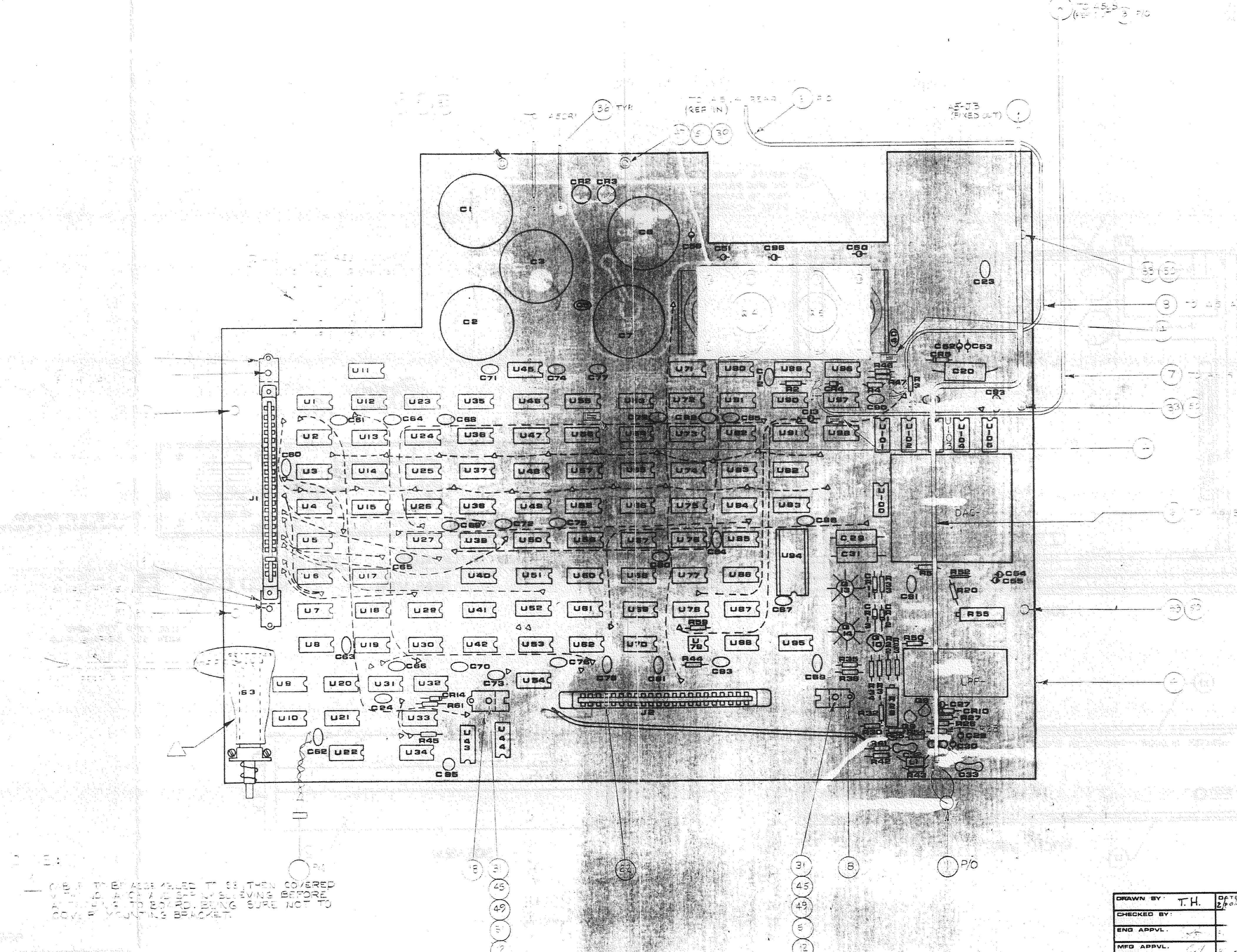
SIDE VIEW

SEE SEPARATE PARTS LIST

NOTE: UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A27086

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN T.L. Caldwell	DATE 2/6/87	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL N/A	PROJ ENGR		TITLE FREQUENCY SYNTHESIZER 5110 SERIES III
FINISH WAVETEK PROCESS N/A	RELEASE APPROV R.B. Garrard	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030	
	DO NOT SCALE DWG	SCALE 1/2 X	MODEL NO. 5110 / DWG NO. 02-002-3110 / REV K
			CODE IDENT 23338 / SHEET 1 OF 2



LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASE			

DRAWN BY: T.H.

CHECKED BY:

ENG APPVL.

MFG APPVL.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:

.XXX ± .005

.XX ± .01

X/X ± 1/64

∠° ± 1°

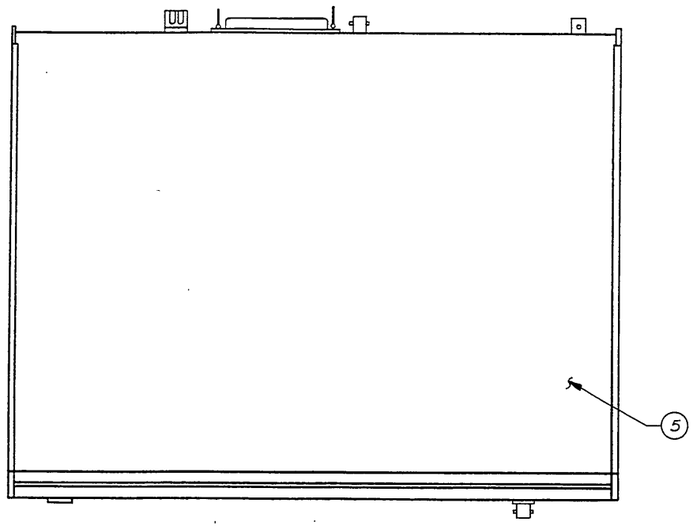
WAVETEK

TITLE: FREQUENCY SYNTHESIZER

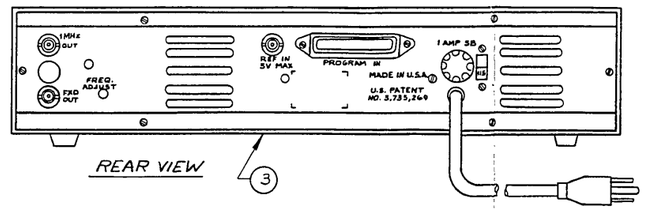
SIZE: D

SCALE: FULL

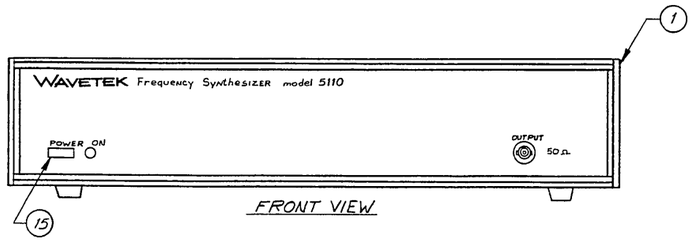
REV	ECO	BY	DATE	APP
A	RELEASE		3/30/78	GV
B	9496	M. C. 12-3-88	5/5/88	DMD



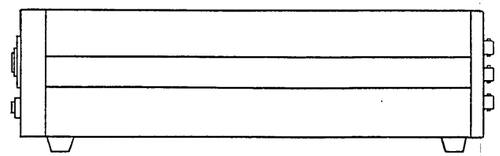
TOP VIEW



REAR VIEW



FRONT VIEW



SIDE VIEW

SEE SEPARATE PARTS LIST

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED R.H.H.	3/30/78	TITLE: FINAL ASSEMBLY FREQUENCY SYNTHESIZER
	PROJ. ENGR. R.H.H.	3/30/78	
FINISH WAVETEK PROCESS	RELEASE APPROV.	4/11/78	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/64 .XX ± .XXX ±		SIZE D · FSCM NO. 23338 · DWG. NO. 02-000-3110 · REV B · SCALE 1/2 · MODEL 5110 · SHEET 1 OF 1

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RACK MOUNT STYLE 11			002.3097	1
NONE	ASSY: SYNTHESIZER 5110			002.3110	1
NONE	COVER: TOP, BLACK	MPV-40464-14	BUKEY	303.0101	1
NONE	COVER: BOTTOM, BLACK	MPV-40465-14	BUKEY	303.0201	1
NONE	CONN: RIB PLUG W/HD 50 CNT	57-30500	CINCH	351.5001	1
NONE	PATCH CORD: 6" BLUE	445-3306-03-03-16	CAMBN	352.0101	1
NONE	KNOB: PUSH BUTTON BLK 20MM	B301	CRL	370.0713	1
NONE	INST MANUAL: 5110 1ST ED			800.0311	1.5

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MODEL 5110 DC TO 2MHZ, REMOTE ONLY.	000.3110	B
		PAGE 1	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE
	PROJ. ENGR.		PARTS LIST FINAL ASSEMBLY
	RELEASE APPROV.		
FINISH WAVETEK PROCESS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± XX ± XXX ± ±		SIZE D · FSCM NO. 23338 · DWG. NO. 000.3110 · REV B
DO NOT SCALE DRAWING			SCALE · MODEL 5110 · SHEET 1 OF 1

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
1	PANEL ASSEMBLY FRONT 5110			001.3110	1
2	SIDE FRAME ASSY SET			002.3067	1
3	PANEL ASSY REAR 5100			002.3086	1
NONE	LOCAL ATTENUATOR 5110			002.3166	1
4	MAINBOARD ASSY 5110			004.3110	1
A5-J3	SPK CABLE ASSY: SHLD RCD FMD 5100			009.0591	1
NONE	LABEL, SERIAL NUMBER/FILTERS & SYNTHESIZERS	FSS-8660	WVTK	1400-01-8660	1
NONE	SUPER KIT	2500-5110-02	WVTK	2500-5110-02	1
NONE	TY-WRAP	TY-523M	TB	2800-00-0006	3
10	TRIM: FRONT TOP SUPR/SNUB 512	MP40318-4	BUKEY	307.0914	2
12	SPACER: SWITCH NYLON 1/16"	FW4-062	MICRO	349.2010	2
14	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	3
53	LUG: SOLDER ANGLED #6	1416-6	SMITH	359.0006	1
NONE	BUMPER: MLD-PLAS	SJ5027B1K	3M	361.9000	5

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110 | ASSEMBLY NO. 002.3110 | REV K

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	.320X.635 GRY				
22 NONE	KEY: POLARIZ PC CONN IN-CONT	50-PK-1	CINCH	370.0301	2
25	LABEL: CAUTION FREQ. ADJ.			371.1001	1
28	TIE: CABLE NY NAT (CLAMP)	PLC1M-S4-M	PANDT	377.4002	1
34	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	6
35	WIRE: #18 AWG STR BLACK	1118/19	WEICO	378.1404	2.5000
42	WIRE: #22 AWG STR BLACK	1122	WEICO	378.1604	10
36	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	2
37	WIRE: #24 AWG STR BROWN	1124	WEICO	378.1714	6
38	WIRE: #24 AWG BON BROWN	1524	WEICO	378.1715	12
39	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	20
40	WIRE: #24 AWG STR	1124	WEICO	378.1744	8

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110 | ASSEMBLY NO. 002.3110 | REV K

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	YELLOW				
41	WIRE: #24 AWG STR GREEN	1124	WEICO	378.1754	8
43	SLVNG: PLASTIC FBRGLS #18AWG			378.5181	4
NONE	M SCR: ST ZN PH 2-56 X 5/16 PH			381.2052	2
30	M SCR: ST ZN 4-40 X 3/8 PH			381.4062	4
NONE NONE NONE NONE	M SCR: ST ZN PHP 4-40X7/8 PH			381.4142	4
32	M SCR: ST ZN PH 8-32X1/2 PH			381.8082	2
33	M SCR: ST ZN SL 6-32X3/8FPH TYPE F			386.6061	6
NONE	NUT: HEX SS 2-56X5/32 AF			387.2051	2
45	NUT: HX ST ZN 4-40X1/4 AF			387.4080	6
46	NUT: HX ST ZN 8-32X1/4 AF			387.8080	2
49	WASHER: FLAT STL ZN			388.0040	6

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110 | ASSEMBLY NO. 002.3110 | REV K

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	#4				
50	WASHER: FLAT STL #6 .147ID .312OD .028THK			388.0060	5
NONE	WASHER: SPLT LK STNLS #2			388.1022	2
51	WASHER: EXT LK STL ZN #4			388.1041	8
52	WASHER: EXT LK STL ZN #8			388.1081	8
NONE	WASHER: FLT NYL #4 1/4D X 1/8T			388.3040	2
47	NUT: CLINCH STL ZN 4-40 .031 THK			389.1002	2
NONE	BKT: ANG BR ZN 3/8 X3/8	723	ZIER	389.3001	3
NONE	SHRINK TUBING, 1/8 IN	FIT-221-1/8	ALPHA	6001-20-2000	3

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110 | ASSEMBLY NO. 002.3110 | REV K

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST CHASSIS
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±		SIZE D · FSCM NO. 23338 · DWG. NO. 002.3110 · REV K · SCALE · MODEL 5110 · SHEET 1 OF 1

DATE	SYM	REVISION RECORD	AUTH.	CHK.
11/19/73	A	RELEASE		
11/18/75	B	ECO# 9423	TLH	

SHEET 1 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA		
DECIMAL .XXX ±.010 .XX ±.02		SCALE	DRAWN BY TLH. APPROVED BY
FRACTIONAL ± 1/64	TITLE 5110 TIMING LOGIC.		
ANGULAR ±	DATE 11-13-75	DRAWING NUMBER 03-004-3110	REV B

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

OLD No. 510466-2

Z1 27-5
Z0 27-9
J K 6
2 MHZ
1 MHZ
A5J1 -24 -23 -22 -21
80 512 KHZ 256 KHZ
CLK3 51-6
A5J1 -20 -19 -18 -17
71 72 128 KHZ 64 KHZ 32 KHZ 16 KHZ
A5J1 -16 -15 -14 -13
63 8 KHZ 4 KHZ 2 KHZ 1 KHZ
PE 70-6
A5J1 -49 -48 -47 -46
55 512 Hz 256 Hz
CLK2 51-12
A5J1 -45 -44 -43 -42
45 46 128 Hz 64 Hz 32 Hz 16 Hz
A5J1 -41 -40 -39 -38
35 8 Hz 4 Hz 2 Hz 1 Hz
A5J1 -37 -36 -35 -34
23 512 mHz 256 mHz
CLK1 60-8
A5J1 -33 -32 -31 -30
11 12 128 mHz 64 mHz 32 mHz 16 mHz
A5J1 -29 -28 -27 -26
1 8 mHz 4 mHz 2 mHz 1 mHz
Q.D
Q.H
CARRY JUMPER
TEST
NORMAL
82 73 75 66 64 56 47 49 38 36 24 26 13 15 2
QUAD
58
84
MSB
83
SGN
SGN 90-2
60
KHZ CARRY
74 65 57 48 37 25 14 3
MHZ CARRY
HZ CARRY
5VCMN
77 68
M8 85-12
M7 85-2
M6 78-7
M5 69-7
M4 78-5
M3 78-6
M2 69-4
MI 69-5
M0 69-6
CLK 7-6
RCLK 89-6
95
98
VCC
R44 1K
A5JI-25
79
D4

DESCRIPTION OF IC'S

IC NO.	PART NO.	PINS TO VCC	PINS TO GND
1	122 - 0106	16	8
2	122 - 7483	5	12, 13
3	122 - 0106	16	8, 9
11	128 - 2330	14	
12	122 - 0106	16	8
13	122 - 7483	5	12
14	122 - 0106	16	8, 9
15	122 - 7483	5	4, 11, 12, 16
23	122 - 0106	16	8
24	122 - 7483	5	3, 12, 16
25	122 - 0106	16	8, 9
26	122 - 7483	5	1, 8, 11, 12
35	122 - 0106	16	8
36	122 - 7483	5	12
37	122 - 0106	16	8, 9
38	122 - 7483	5	4, 11, 12, 16
45	128 - 2330	14	
46	122 - 0106	16	8
47	122 - 7483	5	12
48	122 - 0106	16	8, 9
49	122 - 7483	5	1, 8, 11, 12
55	122 - 0106	16	8
56	122 - 7483	5	3, 12, 16
57	122 - 0106	16	8, 9

DESCRIPTION OF IC'S

IC NO.	PART NO.	PINS TO VCC	PINS TO GND
58	123 - 7474	14	7
59	122 - 9014	16	8
60	122 - 7440	14	7
63	122 - 0106	16	8
64	122 - 7483	5	12
65	122 - 0106	16	8, 9
66	122 - 7483	5	4, 11, 8, 16
67	122 - 9014	16	8
68	122 - 7483	5	1, 11, 12, 13
71	128 - 2330	14	
72	122 - 0106	16	8
73	122 - 7483	5	12
74	122 - 0106	16	8, 9
75	122 - 7483	5	1, 8, 11, 12
76	122 - 9014	16	8
77	122 - 7483	5	1, 4, 8, 11, 12
79	120 - 4451	14	4
80	122 - 0106	16	8
82	122 - 7483	5	12
83	123 - 7474	14	7
84	122 - 9014	16	8
95	122 - 7440	14	7
98	122 - 7474	14	7

O REAR PANEL CONNECTOR

⊗ INTERNAL SIGNAL CONNECTION

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA
DECIMAL .XXX .010 .XX .02	SCALE / DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE FREQUENCY REGISTER & SAMPLE GENERATION LOGIC 5110
ANGULAR ±	DATE / DRAWING NUMBER 03-004-3110 / REV B

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

OLD No 510466-3

DESCRIPTION OF IC'S			
IC NO	PART NO	PINSTOVCC	PINS TO GND
69	122-0106	16	8, 9
78	122-0106	16	8, 9
81	122-7493	5	2, 3, 10
85	122-7474	14	7
86	122-7400	14	7
87	122-7410	14	7
88	122-7410	14	7
89	122-0100	14	7
90	122-7474	14	7
91	122-9014	16	8
92	122-9014	16	8
93	122-9014	16	8
94	129-3000	24	12, 20
95	122-7440	14	7
96	122-7413	14	7
97	122-7437	14	7
98	122-7474	14	7
100	124-7474	14	7
101	124-7474	14	7
102	124-7474	14	7
103	124-7474	14	7
104	124-7474	14	7
105	124-7474	14	7
79	120-4451	14	4

NOTES:

1. OMIT C23 ON OPTION -01 UNITS.
2. PIN NUMBERS ON XTAL Y1 OUTSIDE PARENTHESIS REFER TO STANDARD XTAL. PIN NUMBERS INSIDE PARENTHESIS REFER TO HIGH STABILITY XTAL OPTION -01.

DAC I

INPUT REFERENCE SELECTOR

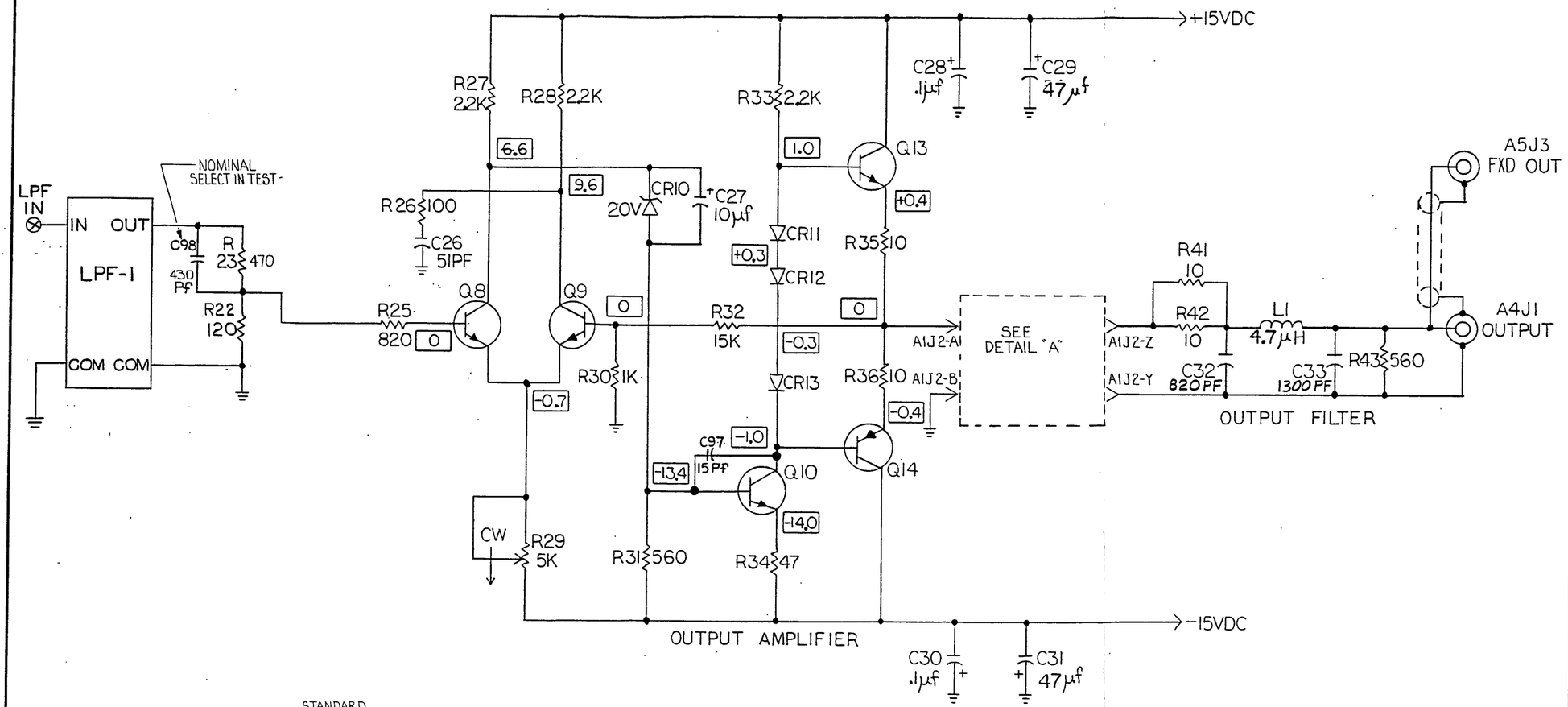
OUTPUT REFERENCE SELECTOR

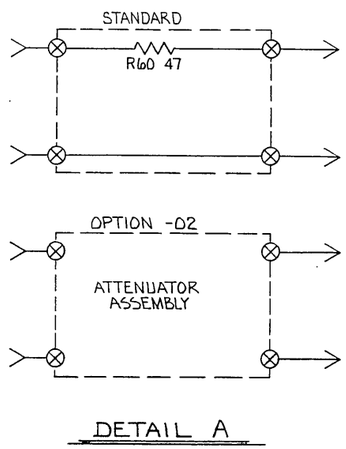
SHEET 3 OF 5:

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE	DRAWN BY
FRACTIONAL ± 1/64	TITLE DAC & FREQUENCY REF 5110		APPROVED BY
ANGULAR ±	DATE	DRAWING NUMBER 03-004-3110	REV B

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

OLD No 510466-4



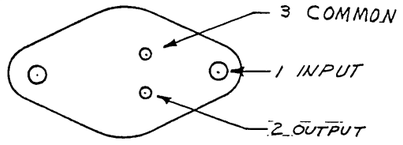


DETAIL A

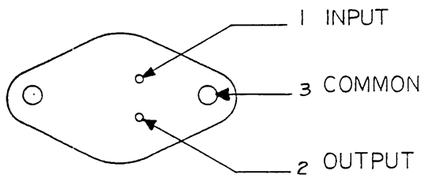
TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02	SHEET 4 OF 5	SCALE —	DRAWN BY ARLOS CONTRERAS; APPROVED BY
FRACTIONAL ± 1/64	TITLE: OUTPUT AMPLIFIER 5110		
ANGULAR ±	DATE 12-2-87	DRAWING NUMBER 03-004-3110	REV B

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

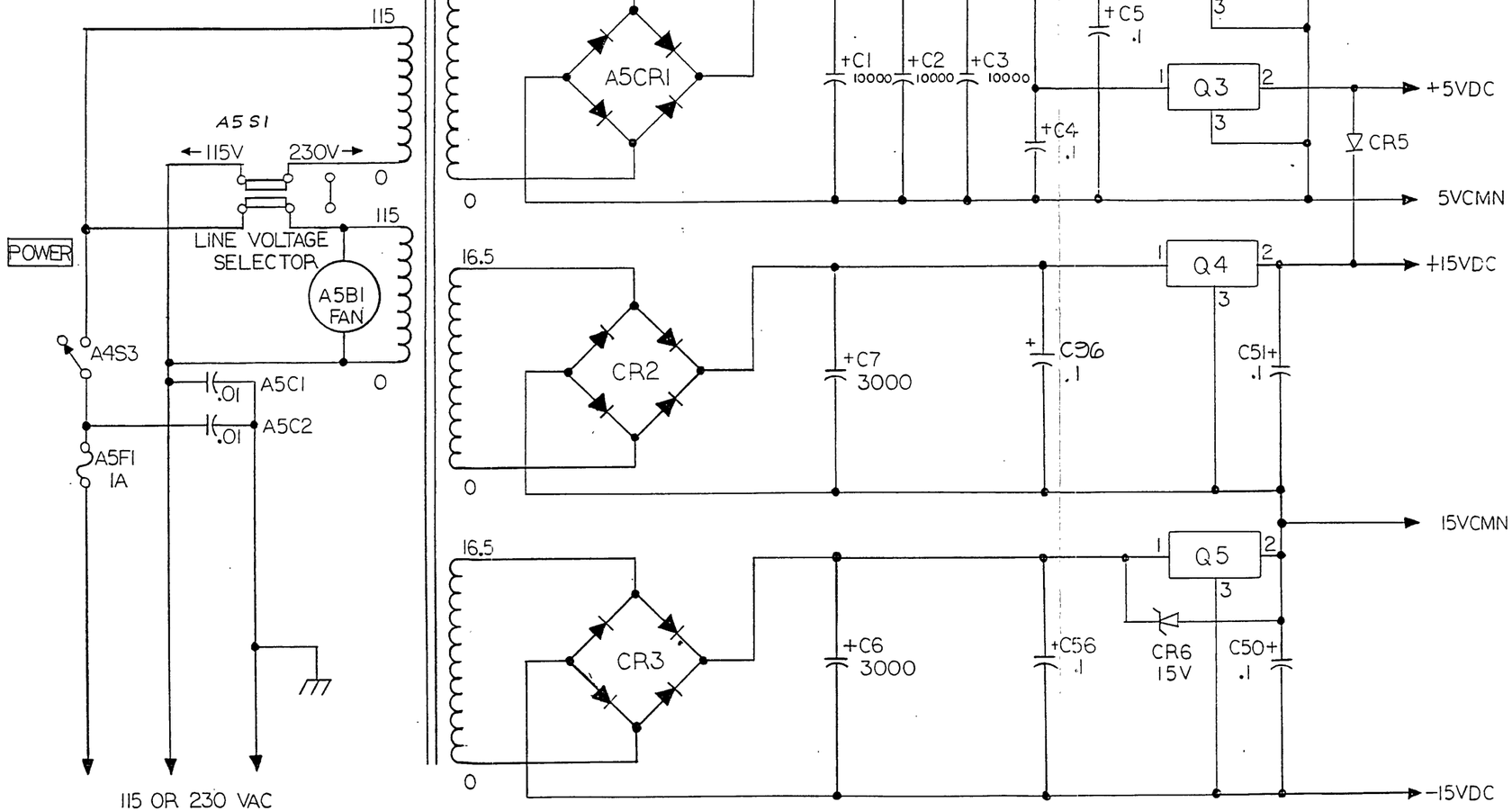
OLD No. 510466-5



Q4 & Q5
WHEN 120-0153
IS USED
BOTTOM VIEW



BOTTOM VIEW
Q1→Q5



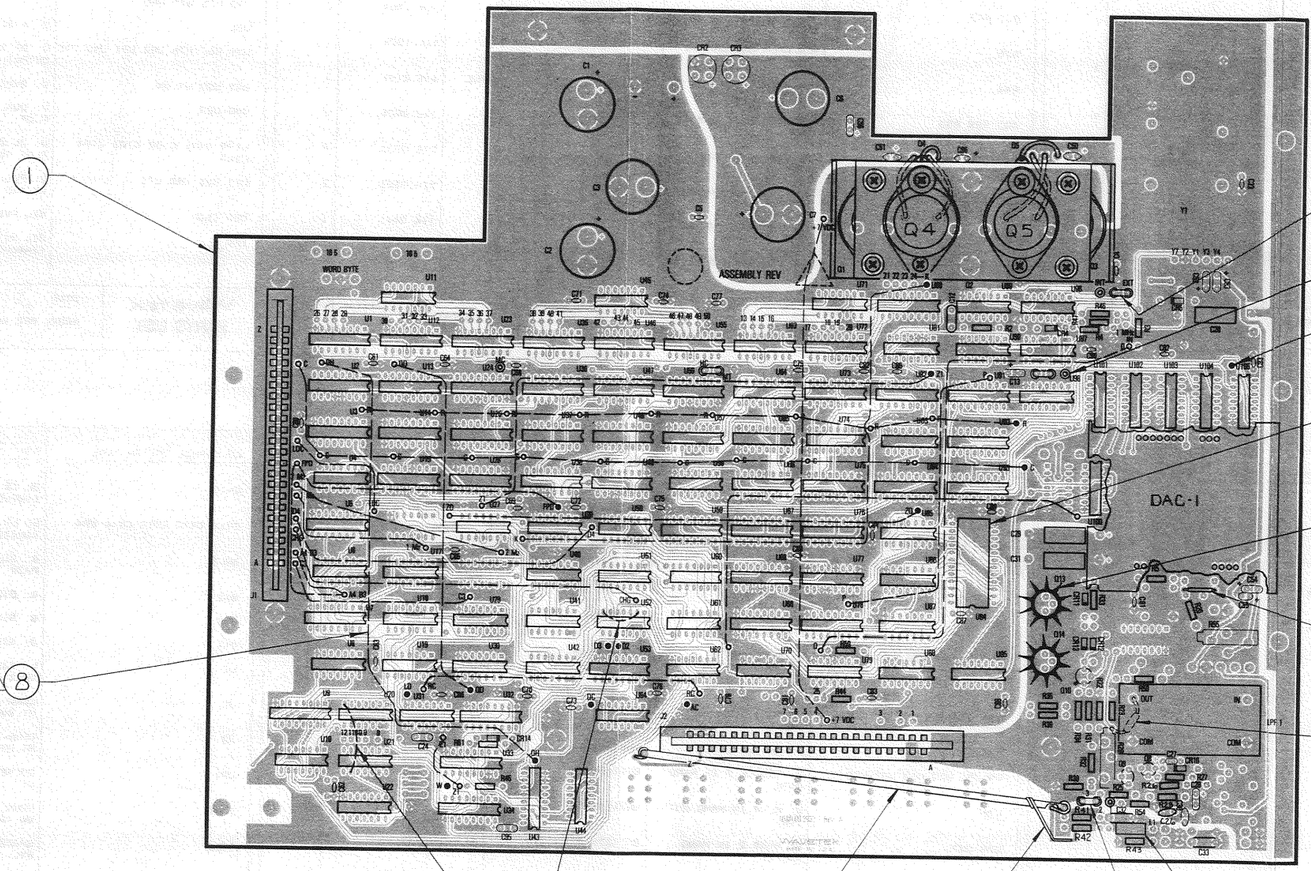
NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED FOR ASSY A1
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
3. CR6 PRESENT ON OPTION -01 UNITS ONLY

SHEET 5 OF 5: POWER

TOLERANCES (EXCEPT AS NOTED) DECIMAL .XXX .010 .XX .02 FRACTIONAL ± 1/64 ANGULAR ±	WAVETEK SAN DIEGO • CALIFORNIA	SCALE	DRAWN BY / APPROVED BY
	TITLE: POWER SUPPLY - 5110		
	DATE	DRAWING NUMBER: 03-004-3110	REV: B

REV	ECO	REV	ECO	BY	DATE	APP
A	RELEASE	K	9173 REDRAWN	CC	11/12	
B	7934					
C	9016					
D	12.00					
E	7857					
F	8079					
G	8080					
H	8255					
J	9046					



(10) (6)
(13) (10)
(14) (16)
(6) (3)
(22)
(9) (4)
(14) REF
(13) REF
(20) (3)
(4) REF
(4) (12)
(5) REF SEE SHT 2
(U94)
(DAC1)
(7) (2)
(15) (4)
(16)
(17)
(C98) REF FARSIDE SEE SHT 2
(LPF-1)

(4) (12)
(4) (2)
(2) (11)
(1)
(3) (8)
(8) REF FARSIDE SEE SHT 2
(3) (1)
(18) (2)
(21)
(4) REF
(L1)

5. SOLDER ALL ELECTRICAL COMPONENTS INSERTED INTO BOARD.

(4) SOLDER COLORED WIRES FROM ITEM 2 TO BOARD AS DESIGNATED.

(3) ROUTE WIRE (ITEM 8) TO ALL DIFFERENT DESIGNATED PINS & ATTACH.

(2) SUPPORT CABLE ASSY. BY SOLDERING 18 AWG BUSS WIRE (ITEM 18) TO CABLE ASSY & BOARD AS SHOWN.

(1) INSERT CABLE ASSY. WIRE INTO BOARD FLUSH TO SLEEVING & INSERT ATTACHED GROUND WIRE INTO BOARD, BOTH ENDS AS SHOWN.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ARLOS CONTRERAS	DATE 9/22/87	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: MAINBOARD ASSEMBLY
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.	11/17/87	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX ± .XXX ±	SIZE D	FSCM NO. 23338 DWG. NO. 02-004-3110 REV K
		SCALE 1:1	MODEL 5110

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C23 C4 C5 C60 C61 C62 C63 C64 C65 C66 C68 C69 C70 C71 C72 C73 C74 C75 C76 C77 C78 C79 C80 C81 C82 C83 C84 C85 C87 C88 C89 C90 C91 C92 C93	CAP,MOND, 0.1UF 50V Z5U	SR215E104ZAT	AVX	100.4102	35
C12	CAP MICA FX VAL DIP 22PF 5% -20+100PPM/C 500V	CM05ED220J03	CDE	101.0220	1
C26	CAP FX VAL,DP MICA 51PF 5% -20+100PPM/C 500V	CM05ED510J03	CDE	101.0510	1
C24	CAP FX VAL,DP MICA 150PF 5% 0 TO +70PPM/C 300V	CM05FD151J03	CDE	101.1150	1
C32	CAP MICA FX VAL DIP 820PF 1% 0 TO+70PPM/C 300V	CD19FD821F03	CDE	101.1821	1
C33	CAP MICA FX VAL DIP 1300PF 1% 0 TO+70PPM/C500V	CM06FD132F03	CDE	101.2131	1
C20	CAP,PLSTR, .10UF 10% 600V	DMT6P1	C-D	105.4100	1
C28 C30 C50 C51 C52 C53 C54 C55 C56 C96	CAP,TANT, .10UF 20% 35V	T368A104M035A$	KEMET	109.4100	10
C13 C27	CAP,TANT, 10UF 20%	T368B106M025A$	KEMET	109.6100	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3110 | ASSEMBLY NO. 1208-00-2568 | REV B | PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	20V				
C29 C31	CAP,ELECT, 47UF 20% 63V	47/63-81009	SIEM	109.6470	2
C95	CAP,TANT, 6BUF 20% 6V	T368B686M006AS	KEMET	109.6680	1
C6 C7	CAP,ELECT, 3000UF 50V (PC)	3487AE332M050KM	MEPCO	109.8300	2
C1 C2 C3	CAP,ELECT, 10000UF 15V (PC)	3487BD103M016KM	MEPCO	109.9100	3
R50	RES,MFLM 453 OHM 1% 1/8W T0	RN55C4530F	UNCEM	110.4530	1
R30	RES,MFLM 1.00K 1% 1/10W T2	RN55C1001F	UMCEM	111.1001	1
R2	RES,MFLM 2.00K 1% 1/10W T2	RN55C2001F	UMCEM	111.2001	1
R32	RES,MFLM 15.0K 1% 1/8W T0	RN55C1502F	UMCEM	112.1500	1
R35 R36 R41 R42	RES,CFLM 10 OHM 5% 1/4W			116.0101	4
R34	RES,CFLM 47 OHM 5% 1/4W			116.0471	1
R26 R4	RES,CFLM 100 OHM 5% 1/4W	CF1/4-100OHM,5%	STKPL	116.1101	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3110 | ASSEMBLY NO. 1208-00-2568 | REV B | PAGE 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R22	RES,CFLM 120 OHM 5% 1/4W			116.1121	1
R59	RES,CFLM 390 OHM 5% 1/4W			116.1391	1
R23 R54	RES,CFLM 470 OHM 5% 1/4W	CF1/4-470OHM,5%	STKPL	116.1471	2
R31 R43	RES,CFLM 560 OHM 5% 1/4W			116.1561	2
R25	RES,CFLM 820 OHM 5% 1/4W			116.1821	1
R44	RES,CFLM, 1.0K OHM 5% 1/4W	CF-071K-5%	DALE	116.2101	1
R27 R28 R33	RES,CFLM 2.2K OHM 5% 1/4W			116.2221	3
R45 R46 R47	RES,CFLM 3.3K OHM 5% 1/4W			116.2331	3
R20 R3	RES,CFLM 10K OHM 5% 1/4W			116.3101	2
R61	RES,CFLM 47K OHM 5% 1/4W			116.3471	1
R5	RES,CFLM 560K OHM 5% 1/4W			116.4561	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3110 | ASSEMBLY NO. 1208-00-2568 | REV B | PAGE 3

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R29 R55	RES, VAR CMT 5.0K 3/4" RECT	3006P1-502	BOURN	118.2500	2
U79	U: DUAL PRPHL DRIVER (75451)	SN75451N-3	TI	120.4431	1
NONE	ASSY, PC BD PREPPED 5110-3110	5110-2569	WVTK	1208-00-2569	1
U31 U89	U: MNSTBL MVBRTR (74121)	N74121N-B	SIG	122.0100	2
U1 U12 U14 U23 U25 U3 U34 U35 U37 U46 U48 U5 U53 U55 U57 U63 U65 U69 U72 U74 U78 U80	U: 4 BT SHIFT REGISTER (74195)	SN74195N-3	TI	122.0106	22
U18 U22 U30 U40 U61 U86	U: QUAD 2 IN NAND GATE	SN7400N-3	TI	122.7400	6
U50 U6	U: HEX INVERTER	DM7404N/A+	NSC	122.7404	2
U4 U51 U52 U62 U87 U88	U: TRIPLE 3 IN NAND GATE	SN7410N-3	TI	122.7410	6
U96	U: DL 4 IN NAND SMT TGR	SN7413N/P3	TI	122.7413	1
U70 U97	U: QUAD 2 IN NAND BUFFER	SN7437N-3	TI	122.7437	2
U19 U60 U95	U: DUAL 4 IN NAND	DM7440N/A+	NSC	122.7440	3

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3110 | ASSEMBLY NO. 1208-00-2568 | REV B | PAGE 4

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	BUFFER				
U39	U: DUAL 2 IN 2W AOI GATE	SN7451N-3	TI	122.7451	1
U10 U17 U20 U27 U29 U41 U42 U44 U54 U8 U85 U90 U98	U: DUAL D TYPE FLIP FLOP	SN7474N-3	TI	122.7474	13
U13 U15 U2 U24 U26 U36 U38 U43 U47 U49 U56 U64 U66 U68 U73 U75 U77 U82	U: 4 BIT FULL ADDER	N7483N-B	SIG	122.7483	18
U81	U: 4 BIT COUNTER	N7493N-B	SIG	122.7493	1
U59 U67 U76 U84 U91 U92 U93	U: QD XOR GATE INVERT OUTPUT	9014DCQB	FAIR	122.9014	7
U32 U33 U7 U9	U: QUAD NOR GATE			122.9015	4
U58 U83	U: DUAL D TYPE FLIP FLOP	DM74H74N/AT	NSC	123.7474	2
U100 U101 U102 U103 U104 U105	U: DL D TYPE FLIP FLOP (SHTKY)	N74S74N-B	SIG	124.7474	6
U11 U21 U45 U71	U: PULL UP NET 3.3K 2% X13	4114R-002-332	BOURN	128.2330	4
CR2 CR3	SIL FWB 50PIV 1.5A	PF-05	EDI	130.0140	2
CR5	SIL RCT 200PIV 1A (1N4003)			130.2110	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3110 | ASSEMBLY NO. 1208-00-2568 | REV B | PAGE 5

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
CR10	SL ZR 20V 5% 400MW (1N968B)			131.0200	1
CR11 CR12 CR13 CR14 CR4	SL LW LK 70PIV 200MW (1N457)			132.0457	5
Q8,9	Q: SIL NPN MATCHED PAIR			134.0065	1
Q13	Q: SIL NPN (2N2219)	2N2219	MOT	134.2219	1
Q10	Q: SIL NPN (2N2222)	2N2222A	MOT	134.2222	1
Q14	Q: SIL PNP (2N2905A)	2N2905	MOT	136.2905	1
L1	L: FXD 4.7 UHY +/-10% SHLD	1641-472	DELVN	150.9470	1
J1	CONN,22 POS EDGE,PC MT,SGL READOUT	009-00179-6	TRW	2100-02-0245	1
J2	CONN,44 POS EDGE,PC MT,DBL READOUT	009-00341-1	TRW	2100-02-0246	1
U94	SOCKET: IC 24PIN DIP ST	ICNZ46-54G	ROBNU	353.2402	1
NONE	CONN: TERM PIN .025 WW (2END)	W239-025-300Q	A/S	354.0007	50
NONE	SPACER: TXSTR LEAD, NYL, LOW	10414	MILRO	376.2108	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3110 | ASSEMBLY NO. 1208-00-2568 | REV B | PAGE 6

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST MAINBOARD
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± XX ± XXX ± ±		SIZE D · FSCM NO. 23338 · DWG. NO. 004.3110 · REV K · SCALE · MODEL 5110 · SHEET 1 OF 2

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
2	SPK REGULATOR ASSY 5100			004.3030	1
DAC-1	CONVERTER D/A 10 BIT			004.3056	1
3	SPK CABLE ASSY: SHLD RGD FMD 5100			009.0590	1
NONE	SCHEMATIC OUTPUT AMP			03.004.3100	1
C98	CAP MICA FX VAL DIP 430PF 5% TO+70PPM/C 500V	CD15FD431J03	CDE	101.1430	1
Q1 Q2 Q3	Q: P.V. REG 5V 5% 1A TO-3	LM309K-STEEL	NSC	120.0051	3
1	ASSY, PRE WAVE LOAD 5110-3110	5110-2568	WVTK	1208-00-2568	1
U94	U: ROM 512X8 CST SINE (SIG)	N82S115N	SIG	129.3000	1
L1	L: FXD 4.7 UHY +/-10% SHLD	1641-472	DELVN	150.9470	1
LPF-1	FILTER: LOW PASS 0-2 MHZ	00.165.3000	WVTK	165.3000	1
6	HEATSINK, TO 3, BASE, BLK ANDZ	6104B	THERM	2800-11-0032	3
22	HEATSINK, TO 3, TOP,	6104C	THERM	2800-11-0033	3

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY 5110	004.3110	K
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	GLD CHR				
20	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	3
21	CONN, PLUG: SHORTING (LOW PROF)	4612872-01-03-10	CTC	352.0202	1
4	SOCKET: JUMPER	450-3704-01-03-00	CAMBN	353.0103	9
5	CONN: TERM PIN .025 WW (NAIL)	W98-025-560-GH-GOLD	A/S	354.0003	16
7	HEAT SINK: TO-8 ROUND	207CB	WAKE	367.0400	2
18	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	1.6
16	WIRE: BUSS HD DWN TND #20 AWG	W2020	WEICO	378.0500	.6
8	WIRE: #30 AWG SLD KYN BLUE			378.1961	15
17	SLVNG: TEFLON #20AWG			378.5202	.45
19	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	.3
9	M XCR: ST ZN SL 4-40X3/8 PH			380.4062	4
10	M SCR: ST ZN SL 4-40X1/2 BH			380.4081	6

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY 5110	004.3110	K
		PAGE 2	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
11	NUT: HX ST ZN 4-40X1/4 AF			387.4080	2
13	WASHER: FLAT STL ZN #4			388.0040	10
14	WASHER: INT LK STL ZN #4			388.1040	16
15	WASHER: FLAT NYL #2X.250X.032			388.3020	4
12	SPR: THD 3/16HX 4-40X3/4	1656A	KEYST	389.2005	4

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY 5110	004.3110	K
		PAGE 3	

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST MAINBOARD
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±		SIZE D · FSCM NO. 23338 · DWG. NO. 004.3110 · REV K · SCALE · MODEL 5110 · SHEET 2 OF 2

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
53	WIRE ASSY-GREEN LAMP	1207-00-2945	WVTK	1207-00-2945	2
NONE	LAMP: INCAND 6.3V 40MA GREEN	BP63-GCB-2180	ELDEM	171.1502	1
22	RETAINING RING	515-0051	DILCO	2800-36-0002	1
NONE	FRONT PANEL: 5110			300.3010	1
NONE	CONN: BNC BLKHD RECPT ISOL.	28JR109-1	SCC	351.0003	1

WAVETEK PARTS LIST	TITLE: PANEL ASSEMBLY FRONT 5110	ASSEMBLY NO.: 001.3110	REV: C

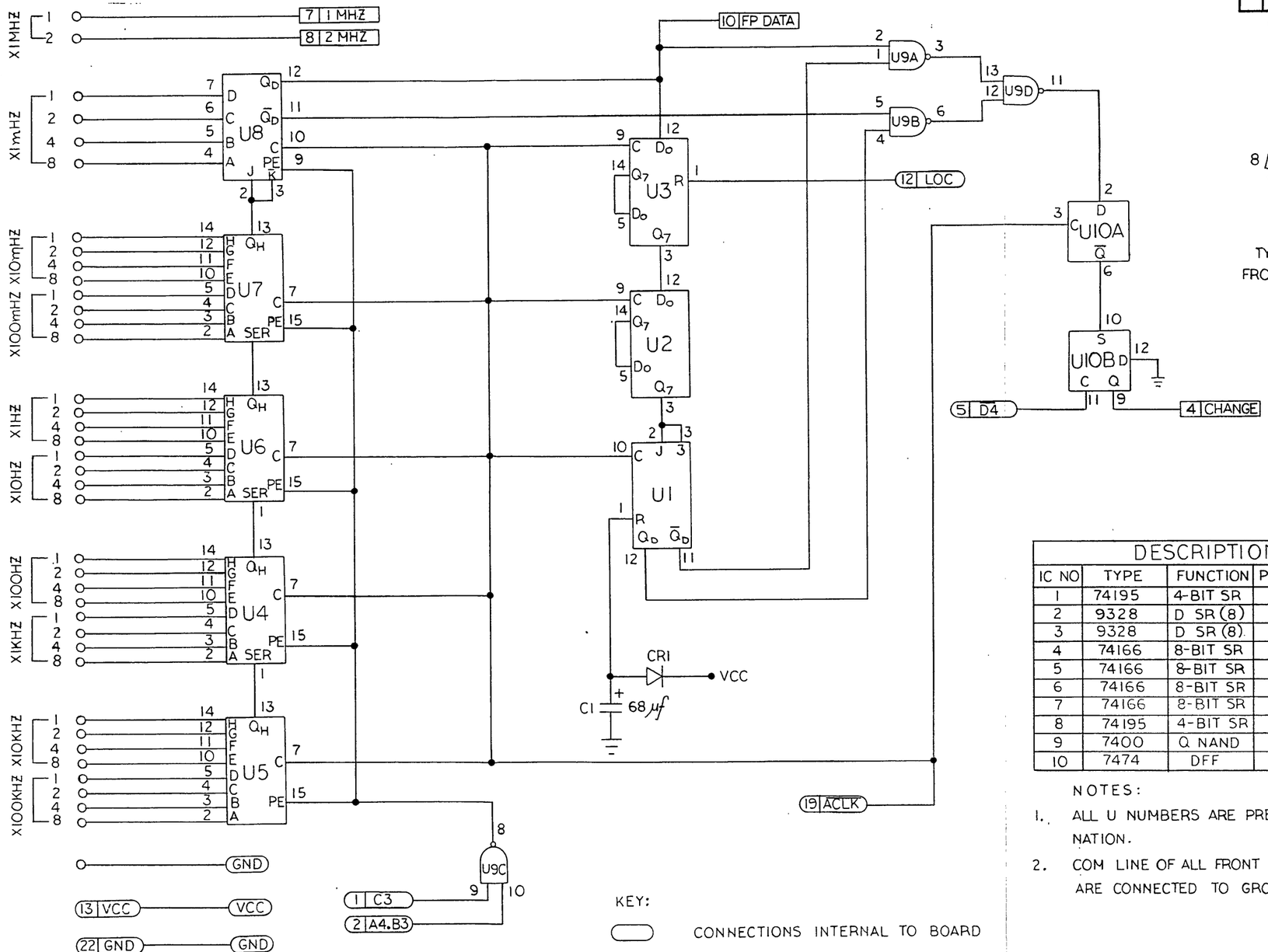
PAGE 1

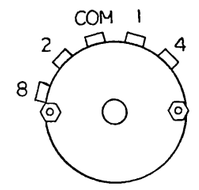
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST FRONT PANEL
	PROJ. ENGR.		
	RELEASE APPROV.		
FINISH WAVETEK PROCESS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± XX ± XXX ± ±		SIZE D | FSCM NO. 23338 | DWG. NO. 001.3110 | REV C
DO NOT SCALE DRAWING			SCALE | MODEL 5110 | SHEET 1 OF 1

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
12/72	A	ECO 213			

OLD No 510436





TYPICAL REAR VIEW
FRONT PANEL SWITCH

DESCRIPTION OF IC'S

IC NO	TYPE	FUNCTION	PINS TO VCC	PINS TO GND
1	74195	4-BIT SR	16	8
2	9328	D SR (8)	16	8, 7, 10
3	9328	D SR (8)	16	8, 7, 10
4	74166	8-BIT SR	16	8, 6
5	74166	8-BIT SR	16	8, 6
6	74166	8-BIT SR	16	8, 6
7	74166	8-BIT SR	16	8, 6
8	74195	4-BIT SR	16, 1	8
9	7400	Q NAND	14	7
10	7474	DFF	14	7, 12

NOTES:

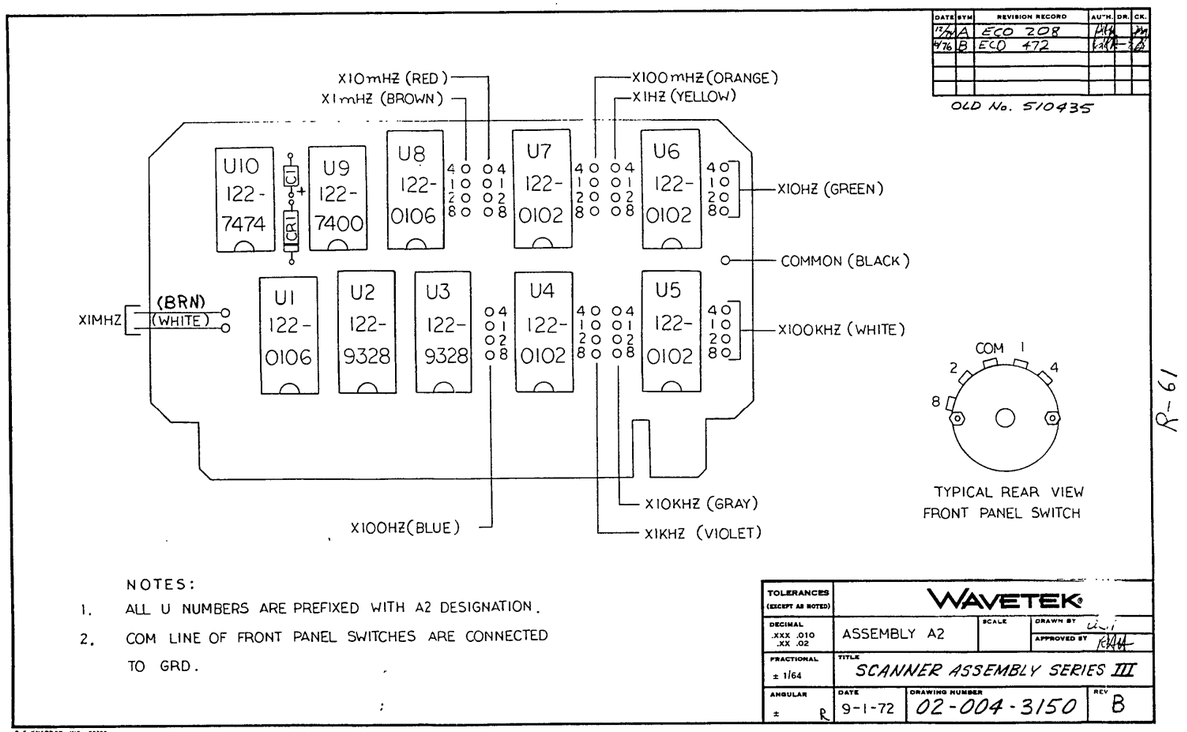
1. ALL U NUMBERS ARE PREFIXED WITH A2 DESIGNATION.
2. COM LINE OF ALL FRONT PANEL SWITCHES ARE CONNECTED TO GROUND.

TOLERANCES (EXCEPT AS NOTED)	WAVETEK		
DECIMAL .XXX ±.010 .XX ±.02	ASSEMBLY A2	SCALE	DRAWN BY J.T.
FRACTIONAL ± 1/64	TITLE SCANNER ASSEMBLY SERIES III		APPROVED BY
ANGULAR ±	DATE 8-7-72	DRAWING NUMBER 03-004-3150	REV A

REV	ECN	BY	DATE	APP

DATE	SYM	REVISION RECORD	AU'H.	DR.	CK.
11/20	A	ECO 208			
4/76	B	ECO 472			

OLD No. 510435



R-61

NOTES:
1. ALL U NUMBERS ARE PREFIXED WITH A2 DESIGNATION.
2. COM LINE OF FRONT PANEL SWITCHES ARE CONNECTED TO GRD.

TOLERANCES (EXCEPT AS NOTED)	WAVETEK		
DECIMAL .XXX .010 .XX .02	ASSEMBLY A2	SCALE	DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE: SCANNER ASSEMBLY SERIES III		
ANGULAR ± R	DATE 9-1-72	DRAWING NUMBER 02-004-3150	REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C1	CAP, TANT, 6BUF 20% 6V	T368B686M006AS	KEMET	109.6680	1
NONE	SPK ASSY, PC BD PREPPED 5100-3150	5100-2553	WVTK	1208-00-2553	1
U4 U5 U6 U7	U: 8BT SHFT REG P-SIPO (74166)	N74166N-8	SIG	122.0102	4
U1 U8	U: 4 BT SHIFT REGISTER (74195)	SN74195N-3	TI	122.0106	2
U9	U: QUAD 2 IN NAND GATE	SN7400N-3	TI	122.7400	1
U10	U: DUAL D TYPE FLIP FLOP	SN7474N-3	TI	122.7474	1
U2 U3	U: DUAL 8 BIT SHIFT REGISTER	FSC-9328DC	FAIR	122.9328	2
CR1	SL LW LK 70PIV 200MW (1N457)			132.0457	1

WAVETEK PARTS LIST	TITLE: SPK SCANNER ASSY 5100	ASSEMBLY NO. 004.3150	REV B
		PAGE 1	

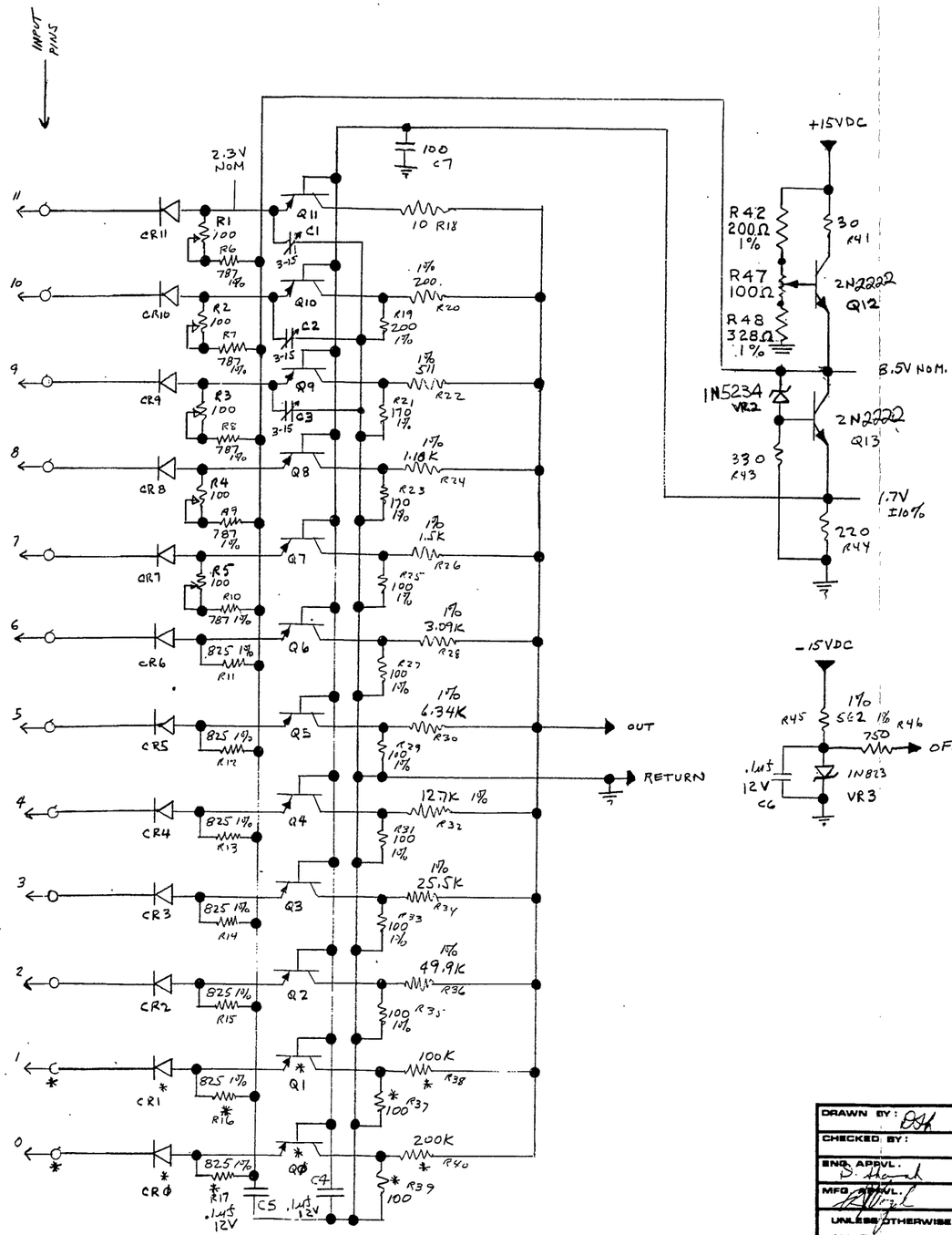
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: ASSEMBLY/PARTS LIST SCANNER
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO 5100 / DWG NO 02-004-3150 / REV B
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

NOTE: UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3864

SIZE	DWG NO	REV
C		

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
C	517	RD		5/14/76
D	547	RD		8/11/76
E	818	T.H. 8-1-77		8/11/77
F	1638	DC 5/26/83		6/3/83
G	1639	KW 12/21/83		2/2/84
H	1949	GD 2/12/85		11/22/85



3) ASTERISKED PARTS ARE TO BE ADDED WHEN 12 BITS ARE DESIRED.

NOTES

1) C1, C2, C3 SELECTABLE IN TEST
2) 74174 PIN 16 IS +5V
   PIN 8 IS GND.

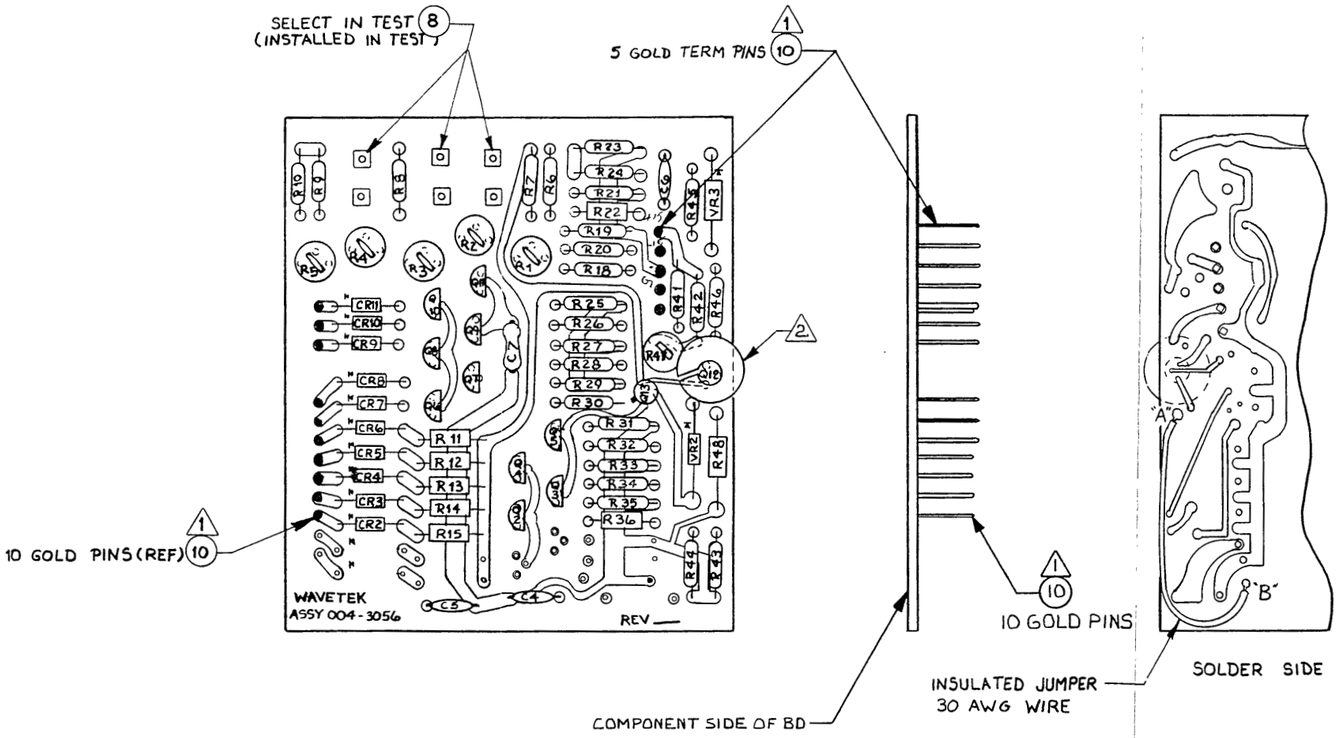
DRAWN BY: DSH	DATE 1/18/75	WAVETEK
CHECKED BY:		Confidential property of WAVETEK SAN DIEGO, INC. not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above.
ENG. APPVL. D. Hedrick	1/27/75	
MFG. APPVL. [illegible]	1/29/75	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:
.XXX ±
.XX ±
X/x ± 1/64
∠° ± 1°

TITLE: SCHEMATIC
10-BIT D/A CONVERTER

SIZE C | DRAWING NO. 03 004-3056 | REV H | SCALE | SHEET 1 OF 1

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASED			2-24-75
B				6-1-76
C	517			6-1-76
D	547			6-1-76
E	1132	SM 5-21-80		5-22-80
F	1191	TC 3-6-81		3-6-81
G	1622	NP 4/22/83		4-29-83
H	1638	DC 5/26/83	R	5-31-83
J	1639	KW 8/1/84		11-22-85
K	1949	GD 2/12/85		11-22-85
L	7844	SD 12-11-86	RBG	12-12-86



2. ASSEMBLE Q13, Q12 AND THE HEATSINK AROUND Q12, MAKING SURE THEY ARE UP OFF OF BOARD NOT TOUCHING EACH OTHER OR ANY OTHER COMPONENT'S.

1. ALL (15) CONN. TERM PINS (NAILS) TO BE INSERTED FROM COMPONENT SIDE AND SOLDER FLUSH WITH COMPONENT SIDE OF THE BOARD.

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN H.H. McHenry	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL N/A	PROJ ENGR R.B. Harper	12-12-86	TITLE P.C. ASSEMBLY 10 BIT D/A CONVERTER
FINISH WAVETEK PROCESS N/A	RELEASE APPROV R.B. Harper		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 5100 / DWG NO. 02-004-3056 / REV L
	SCALE 2:1		CODE IDENT 23338

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-4831

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C4 C5 C6	CAP, MOND, 0.1UF 50V Z5U	SR215E104ZAT	AVX	100.4102	3
C7	CAP FX VAL, DP MICA 100PF 5% 0 TO +70PPM/C 500V	CM05FD101J03	CDE	101.1100	1
C1 C2 C3	CAP, VAR, CER, 3.5-18PF 250V	9373	JACO	108.0180	3
R25 R27 R29 R31 R33 R35	RES, MFLM 100 OHM 1% 1/10W T2	RN55C1000F	ENOX	110.1001	6
R21 R23	RES, MFLM 169 OHM 1% 1/10W T2	RN55C1690F	UNCEM	110.1691	2
R19 R20 R42	RES, MFLM 200 OHM 1% 1/10W T2	RN55C2000F	UNCEM	110.2001	3
R48	RES, MFLM 328 OHM .5% 1/10W T2	RN55C3280D	ENOX	110.3281	1
R22	RES, MFLM 511 OHM 1% 1/10W T2	RN55C5111F	UNCEM	110.5111	1
R45	RES, MFLM 562 OHM 1% 1/10W T2	RN55C5620F	JMAR	110.5621	1
R46	RES, MFLM 750 OHM 1% 1/10W T2	RN55C7500F	UMCEM	110.7501	1
R10 R6 R7 R8 R9	RES, MFLM 787 OHM 1% 1/10W T2	RN55C7870F	UMCEM	110.7871	5

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-3056	1208-00-2555	
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R43	RES, CFLM 330 OHM 5% 1/4W	CF1/4-330OHM, 5%	STKPL	116.1331	1
R1 R2 R3 R4 R47 R5	RES, VAR CMT 100 OHM 1/4" RND	62PR100	BECK	118.1100	6
NONE	ASSY, PC BD PREPPED 5100-3056	5100-2556	WVTK	1208-00-2556	1
VR3	SL ZR 6.2V 5% 400MW (N823)	IN823	SIEM	131.9621	1
VR2	SL ZR 6.2V 2% 400MW (1N5234)	.5M 6.2AZ2	MOT	131.9622	1
CR10 CR11 CR2 CR3 CR4 CR5 CR6 CR7 CR8 CR9	DIODE, HOT CARRIER	5082-2800	HP	133.2800	10
Q10 Q11 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9	Q: SIL PNP (2N4122)	2N4122	NSC	136.4122	10

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-3056	1208-00-2555	
		PAGE 3	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R11 R12 R13 R14 R15	RES, MFLM 825 OHM 1% 1/10W T2	RN55C8250F	ENOX	110.8251	5
R24	RES, MFLM 1.18K 1% 1/10W T2	RN55C1181F	UMCEM	111.1181	1
R26	RES, MFLM 1.50K 1% 1/10W T2	5063JD1K500F	MEPCO	111.1501	1
R28	RES, MFLM 3.09K 1% 1/10W T2	RN55C3091F	JMAR	111.3091	1
R30	RES, MFLM 6.34K 1% 1/10W T2	RN55C6341F	UMCEM	111.6341	1
R32	RES, MFLM 12.7K 1% 1/10W T2	RN55C1272F	UMCEM	112.1271	1
R34	RES, MFLM 25.5K 1% 1/10W T2	RN55C2552F	UMCEM	112.2551	1
R36	RES, MFLM 49.9K 1% 1/10W T2	RN55C4992F	UMCEM	112.4991	1
R18	RES, CFLM 10 OHM 5% 1/4W			116.0101	1
R41	RES, CFLM 30 OHM 5% 1/4W			116.0301	1
R44	RES, CFLM 220 OHM 5% 1/4W			116.1221	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-3056	1208-00-2555	
		PAGE 2	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SPK ASSY, PRE WAVE LOAD 5100-3056	5100-2555	WVTK	1208-00-2555	1
Q12 Q13	Q: SIL NPN (2N2222)	2N2222A	MOT	134.2222	2
NONE	CONN: TERM PIN .025 WW (NAIL)	W98-025-360-GH-GOLD	A/S	354.0003	15
NONE	HEAT SINK: TO-18	2224B	THERM	367.0413	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	CONVERTER D/A 10 BIT	004.3056	L
		PAGE 1	

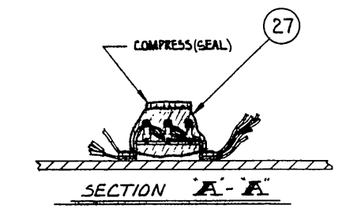
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST D/A CONVERTER
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG		MODEL NO 5100/5110 · DWG NO. 004.3056 · REV L
	SCALE -		CODE IDENT 23338 · SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO A27086

REV	ECO
A	RELEASE
B	470
C	6666
D	7071
E	7890
F	7899
G	8255

REV	ECO	BY	DATE	APP
H	9296	CC	11/24/87	RBH



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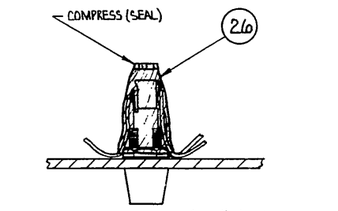

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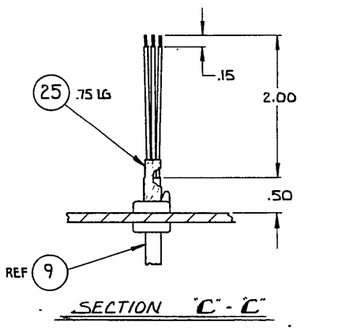

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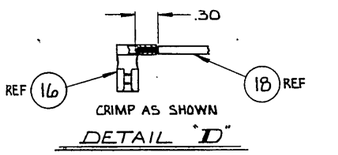

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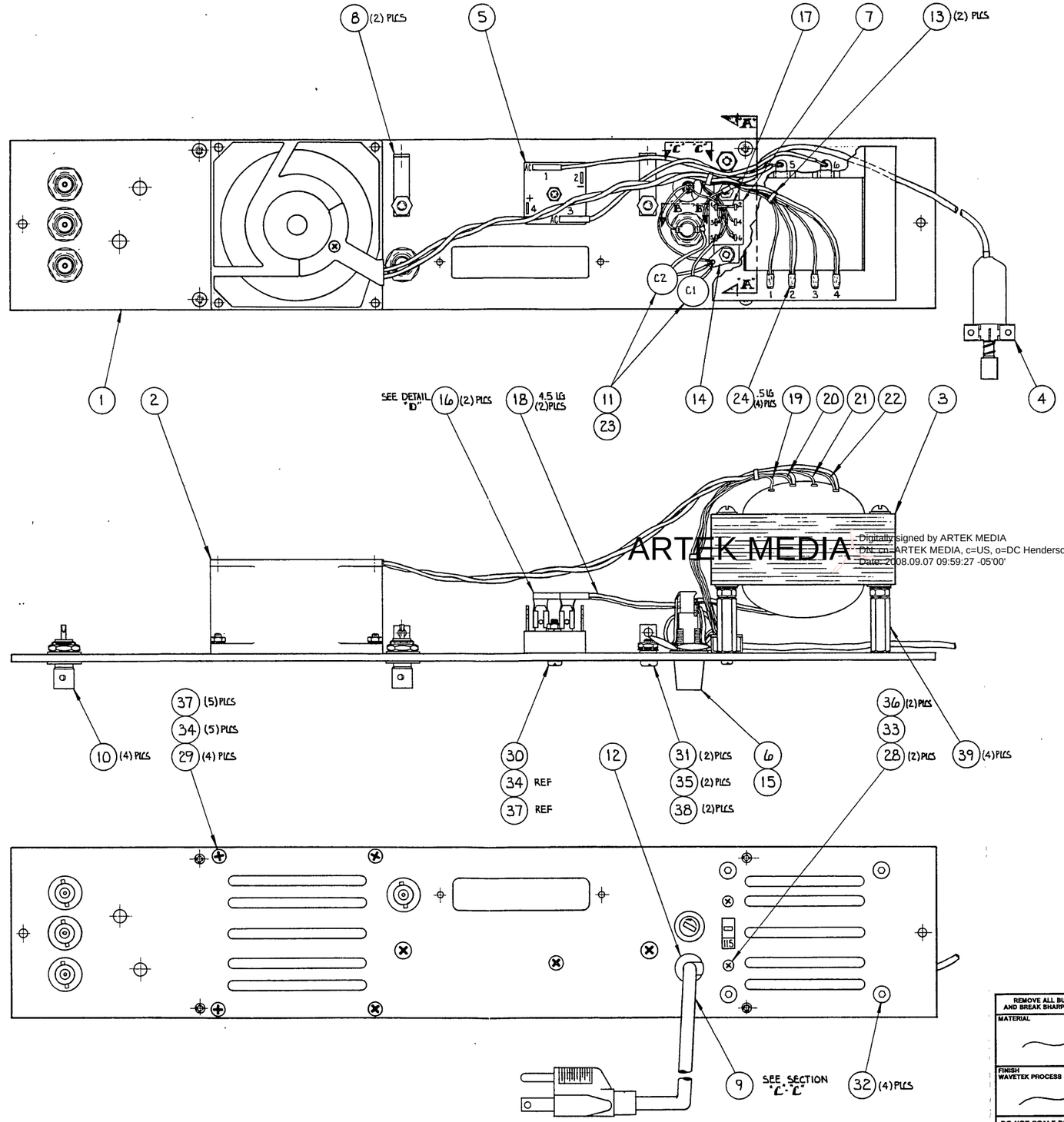


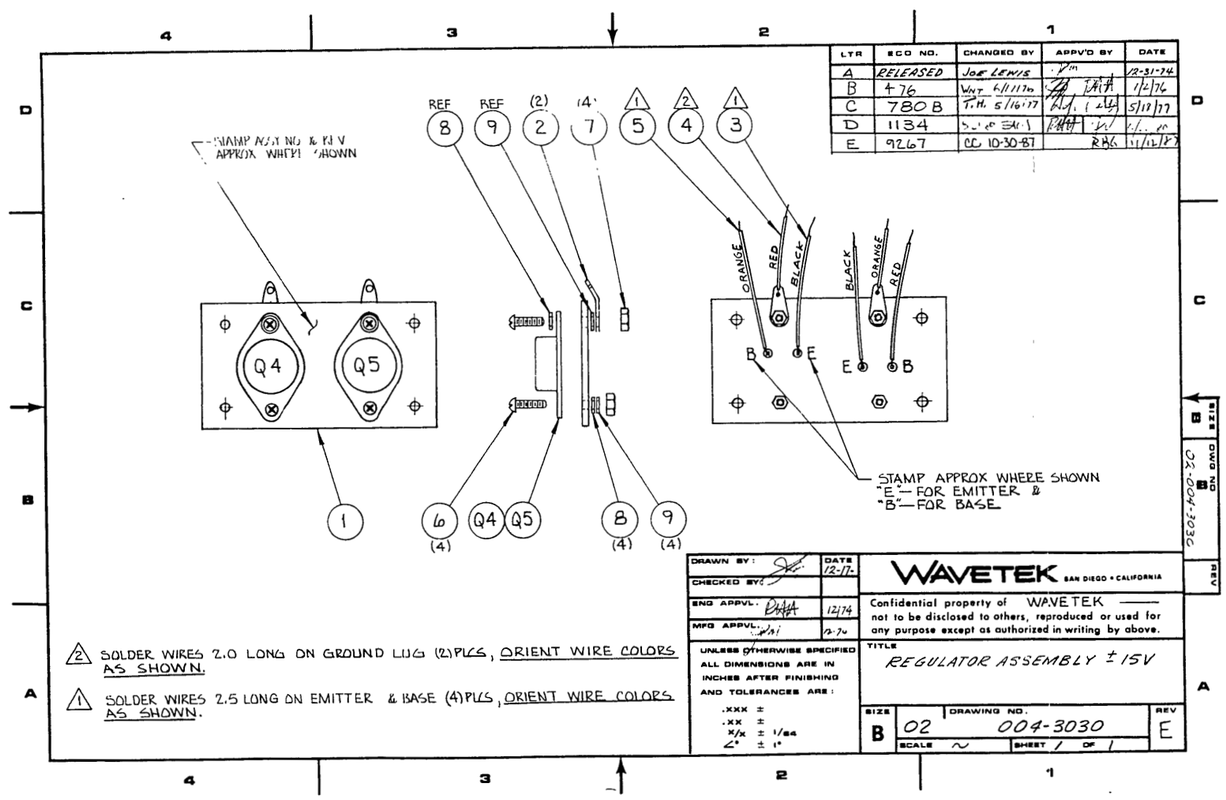
WIRE CONNECTION CHART					
REF DES.	COLOR / WIRE	FROM		TO	
		REF DES.	REF NO.	REF DES.	REF NO.
2	BLK	2	–	3	2
2	BLK	2	–	3	4
4	WHT	4	–	6	1
4	BLK	4	–	7	6
9	YEL/GRN	9	–	14	–
9	WHT	9	–	7	5
9	BLK	9	–	6	2
11	C1	14	–	7	5
11	C2	14	–	6	1
17	BUSS	7	1	7	2
18	WHT	5	1	3	6
18	WHT	5	3	3	5
19	BLK	3	1	7	6
20	RED	3	2	7	4
21	GRN	3	3	7	3
22	WHT	3	4	7	5

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ARLOS CONTRERAS	DATE 9/11/87	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL ~	CHECKED D. BUZZELL	10/2/87	TITLE REAR PANEL ASSEMBLY
	PROJ. ENGR.		
FINISH WAVETEK PROCESS ~	RELEASE APPROV. R.B Hamond	10/26/87	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± XX ± .03 XXX ± ±		SIZE D | FSCM NO. 23338 | DWG. NO. 02-002-3086 | REV H; SCALE 1:1 | MODEL 5100 | SHEET 1 OF 1

REV	ECN	BY	DATE	APP

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASED	JOE LEWIS		12-31-74
B	476	WHT 6/11/76	DATA	1/2/76
C	780B	T.H. 5/16/77		5/18/77
D	1134			
E	9267	CC 10-30-87	RBG	11/12/87



⚠2 SOLDER WIRES 2.0 LONG ON GROUND LUG (2)PLCS, ORIENT WIRE COLORS AS SHOWN.

⚠1 SOLDER WIRES 2.5 LONG ON EMITTER & BASE (4)PLCS, ORIENT WIRE COLORS AS SHOWN.

DRAWN BY:	DATE 12-17-	WAVETEK SAN DIEGO • CALIFORNIA
CHECKED BY:		
ENG APPVL:	12/74	Confidential property of WAVETEK not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above.
MFG APPVL:	12-74	
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE: .XXX ± .XX ± X/x ± 1/64 ∠° ± 1°		TITLE: REGULATOR ASSEMBLY ± 15V
SIZE B	DRAWING NO. 02 004-3030	REV E
	SCALE ~	SHEET 1 OF 1

SIZE B DWG NO 02-004-3030 REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q4 Q5	Q: P.V. REG 15V	LM340K-15	NSC	120.0150	2
1	SPK ASSY, PC BD PREPPED 5100-3030	5100-2559	WVTK	1208-00-2559	1
9	LOCKWASHER, #4 INT TOOTH	#4ITLW	CMRCL	2800-24-4000	4
2	LUG: SOLDER ANGLED #6	1416-6	SMITH	359.0006	2
3	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	5.5000
4	WIRE: #24 AWG STR RED	1124	WEICO	378.1724	4.7500
5	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	4.7500
6	M SCR: ST ZN 4-40 X 3/8 PH			381.4062	4
7	NUT: HX ST ZN 4-40X1/4 AF			387.4080	4
8	WASHER: FLAT STL ZN #4			388.0040	6

WAVETEK PARTS LIST	TITLE: SPK REGULATOR ASSY 5100	ASSEMBLY NO. 004.3030	REV E
		PAGE 1	

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: ASSEMBLY & PARTS LIST REGULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ± 1 .XX ± .030		MODEL NO 5100/5110
	DO NOT SCALE DWG		DWG NO 02-004-3030 REV E
	SCALE		CODE IDENT 23338 SHEET 1 OF 1

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
4	SPK CABLE SHLD 2 COND 1PT 15.5"			009.0206	1
11	CAP,CER, .01UF CMV 1KV	DD-103	CRL	100.3100	2
5	SIL FWB 50PIV 12A			130.0541	1
2	FAN: AXL 3 1/8 115V SLV A/P	SU2A1	ROTRN	165.1701	1
15	FUSE: 3AG 1A SB 250V	313001	LITFU	165.4002	1
3	XFMR: PWR DUAL PRI	177.3005	WVTK	177.3005	1
13	TY-WRAP	TY-523M	TB	2800-00-0006	2
1	PANEL: REAR 5100			303.0602	1
7	SLIDE SW 115-230 SEL, DPDT, SHORT. BAR INSTALLED	46256-LFR	SWCFT	342.2201	1
10	CONN: BNC BLKHD RECPT ISOL.	28JR100-1	SCC	351.0003	4
6	FUSE HOLDER: MINI 3 AG	031.1633/031.1666	SCHUR	351.9951	1
16	LUG: CRIMP FEM SNAP DISCON	B14-250A	T&B	359.0003	2
14	LUG: SOLDER ANGLED #6	1416-6	SMITH	359.0006	1

WAVETEK PARTS LIST | TITLE: PANEL ASSY REAR 5100 | ASSEMBLY NO. 002.3086 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
28	M XCR: ST ZN SL 4-40X3/8 PH			380.4062	2
31	M SCR: ST ZN SL 8-32X3/8 PH			380.8062	2
29	M SCR: ST ZN PH 6-32X3/8 PH			381.6063	4
30	M SCR: ST ZN 6-32X3/4 PH			381.6122	1
32	SKT CSCR: BLK 8-32X1/2 82FH			386.8081	4
36	NUT: HX ST ZN 4-40X1/4 AF			387.4080	2
37	NUT: HX ST ZN 6-32X1/4 AF			387.6080	5
38	NUT: HX ST ZN 8-32X1/4 AF			387.8080	2
33	WASHER: INT LK STL ZN #4			388.1040	1
34	WASHER: EXT LK STL ZN #6			388.1061	5
35	WASHER: EXT LK STL ZN #8			388.1081	2

WAVETEK PARTS LIST | TITLE: PANEL ASSY REAR 5100 | ASSEMBLY NO. 002.3086 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
12	STRAIN REL: SVT-3 .156 PANEL	SR-5L-1BLK	HEYCO	367.1101	1
NONE	WIRE: BUSS HD DWN TND #20 AWG	W2020	WEICO	378.0500	.5
18	WIRE: #14 AWG STR WHITE	3214/19	WEICO	378.1294	9
19	WIRE: #24 AWG BON BLACK	1524	WEICO	378.1705	7.5
20	WIRE: #24 AWG BON RED	1524	WEICO	378.1725	7.5
21	WIRE: #24 AWG BON GREEN	1524	WEICO	378.1755	7.5
22	WIRE: #24 AWG BON WHITE	1524	WEICO	378.1795	7.6
9	POWER CORD: 3 COND GRY	17239B	BELDN	378.4003	1
23	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	1.5
24	SHRINK TBG PLYFIN BLACK 3/16"			378.5530	2
25	SHRINK TBG PLYFIN BLACK 1/4"			378.5540	.75

WAVETEK PARTS LIST | TITLE: PANEL ASSY REAR 5100 | ASSEMBLY NO. 002.3086 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
39	SPR: THD 3/8HX 8-32X1	1452E	KEYST	389.2003	4
8	BKT: ANG ST ZN 1 9/64 X 1/2	1445	SMITH	389.3003	2
26	SHRINK, CLEAR, 3/4	FP-301-3/4	ELCHC	6001-21-2000	1.5
27	SHRINK, CLEAR 1	FP-301-1	ELCHC	6001-21-6000	1.5

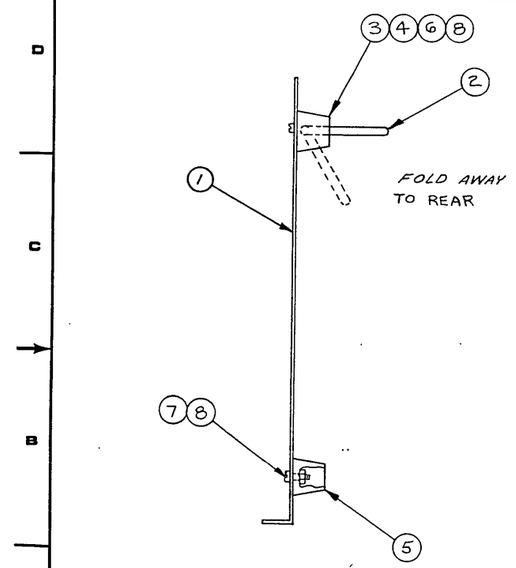
WAVETEK PARTS LIST | TITLE: PANEL ASSY REAR 5100 | ASSEMBLY NO. 002.3086 | REV H

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST REAR PANEL
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO 5100/5110 · DWG NO. 002.3086 · REV H
	SCALE		CODE IDENT 23338 · SHEET 1 OF 1

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	ECO 2082			2/3/66
B	# 7887	Will Caldwell	RDG	1/14/67



SEE SEPARATE PARTS LIST

DRAWN BY:	DATE 2/3/66	WAVETEK
CHECKED BY:	"	Confidential property of WAVETEK SAN DIEGO, INC. not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above.
ENG. APPVL.		
MFG APPVL.		
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE: .XXX ± .XX ± X/x ± 1/64 ∠° ± 1°		TITLE: COVER ASSEMBLY : BOTTOM (5100)
		SIZE B · DRAWING NO. 02 002-3092 · REV B · SCALE · SHEET 1 OF 1

SIZE B · DWG NO 02-002-3092 · REV B

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
1	COVER: BOTTOM, BLACK	MPV-40465-14	BUKEY	303. 0201	1
2	BAIL: 14"	MP-4000B10	BUKEY	365. 5010	1
4	BAIL FOOT: RH	PP-40012. 2	BUKEY	365. 5011	1
3	BAIL FOOT: LH	PP-40012-1	BUKEY	365. 5012	1
5	BAIL FOOT: REAR RUBBER	BH-2096-W	BUKEY	365. 5014	2
8	M SCR: ST ZN PHP 6-32X1/2 BH			381. 6081	6
7	NUT: HX ST ZN 6-32X1/4 AF			387. 6080	2
6	SPRG FSTNR: ST 6-32 (FEET)	C7494-632-4	TINN	389. 0003	4

WAVETEK PARTS LIST · TITLE: BOTTOM COVER ASSY: BLACK · ASSEMBLY NO. 002. 3092 · REV B · PAGE 1

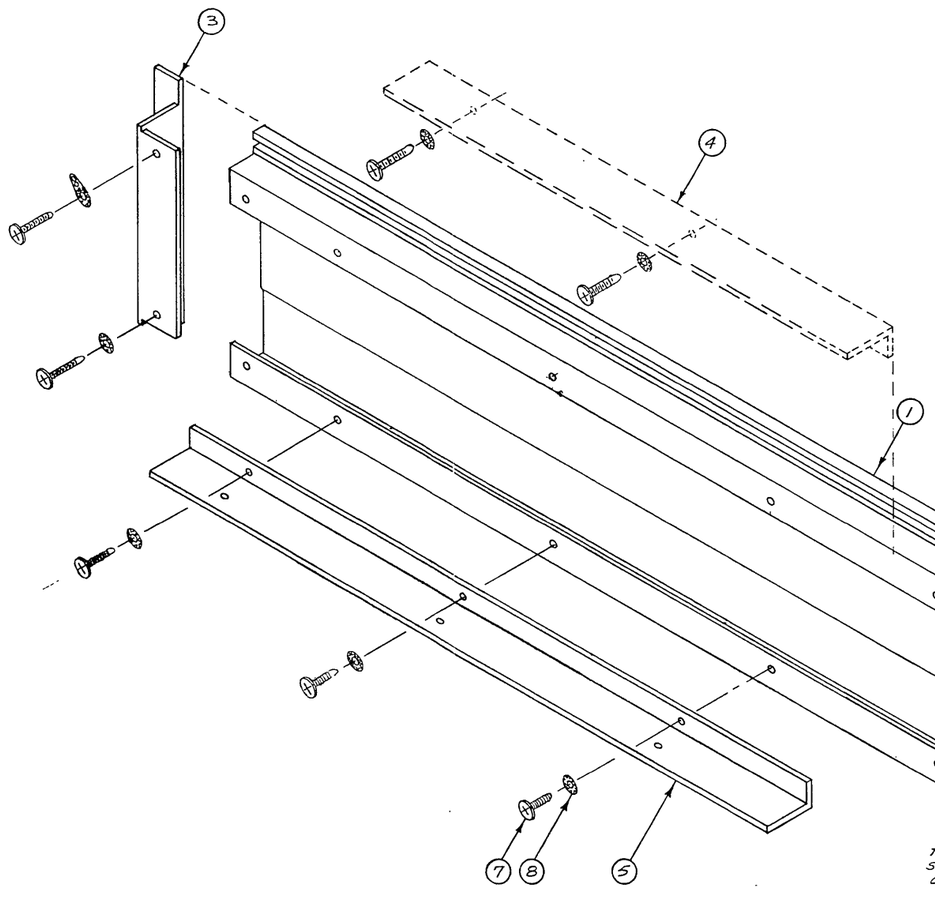
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: ASSEMBLY & PARTS LIST BOTTOM COVER
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 .XX ± .030		
	DO NOT SCALE DWG		MODEL NO 5100/5110 · DWG NO 02-002-3092 · REV B
	SCALE		CODE IDENT 23338 · SHEET 1 OF 1

REV	ECN	BY	DATE	APP

SIZE	DWG NO.	REV
C	02-002-3067	C

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASED	Joe Lewis	JHL	12-31-75
B	468	VNT 6/76	[illegible]	7-2-76
C	627	[illegible] 8/5/76	[illegible]	8-9-76
D	1248	SD 11/20/81	[illegible]	2/5/82
E	7928	SD 2-9-87	RBG	7/13/87



NOTE:

RIGHT SIDE OF UNIT. FOR LEFT SIDE ASSEMBLY TURN ITEMS 1, 2, AND 3 180° AND REPLACE ITEM 5 WITH ITEM 4 ALSO REPLACE ITEM 6 WITH ITEM 8, OMIT SOLDER LUG ON REAR TRIM

SEE SEPARATE PARTS LIST

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
1	SIDE FRAME	MP40375	BUKEY	303. 0500	2
2	TRIM: FRONT SHORT	MP40282-1	BUKEY	303. 0901	2
3	TRIM: REAR	MP40281-1	BUKEY	303. 0902	2
4	SUPPORT: MAINBOARD SHORT			303. 0903	1
5	SUPPORT: MAINBOARD LONG			303. 0904	1
6	LUG: SOLDER ANGLED #6	1416-6	SMITH	359. 0006	2
7	M SCR: ST ZN PH 6-32X3/8 PH			381. 6062	5
8	WASHER: EXT LK STL ZN #6			388. 1061	12

WAVETEK PARTS LIST	TITLE: SIDE FRAME ASSY SET	ASSEMBLY NO. 002. 3067	REV E
		PAGE 1	

DRAWN BY:		DATE 12-30-75
CHECKED BY:		
ENG. APPVL:		12/31/75
MFG. APPVL:		1-30-76

WAVETEK

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:
.XXX ±
.XX ±
X/x ± 1/64
∠° ± 1°

TITLE: SIDE FRAME ASSEMBLY: SET (5100)

SIZE	DRAWING NO.	REV
C	02 002-3067	E
SCALE ~	SHEET 1 OF 1	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE
MATERIAL	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± 010 ANGLES ±1° .XX ± 030	
	DO NOT SCALE DWG	
	SCALE	

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: ASSEMBLY & PARTS LIST SIDE FRAME

MODEL NO	DWG NO.	REV
5100/5110	02-002-3067	E
CODE IDENT 23338	SHEET 1 OF 1	

NOTE: UNLESS OTHERWISE SPECIFIED

APPENDIX A

OPTION 013, 3 MHz FREQUENCY RANGE

A.1 GENERAL

Option 013 extends the frequency range upper limit from 2 MHz to 3 MHz. Front panel (Model 5100 local) and programmed (remote) frequency resolution is 0.001 Hz throughout the range. This option is not available with Option 004.

A.2 OPERATION

With Option 013 installed, the front panel MHz knob has a 2 MHz marking, extending the range by 1 MHz. To obtain 3.0 MHz, set the MHz switch to "2", the 100 KHz switch to "10" and all other switches to "0".

For remote programming, the Word/Byte Line (N1 or pin #8) on the rear panel programming connector becomes the 2 MHz line. The Word/Byte Mode Select capability is retained. This is accomplished by programming N1, the Word/Byte bit, via an internal jumper instead of via pin 8 on the programming connector.

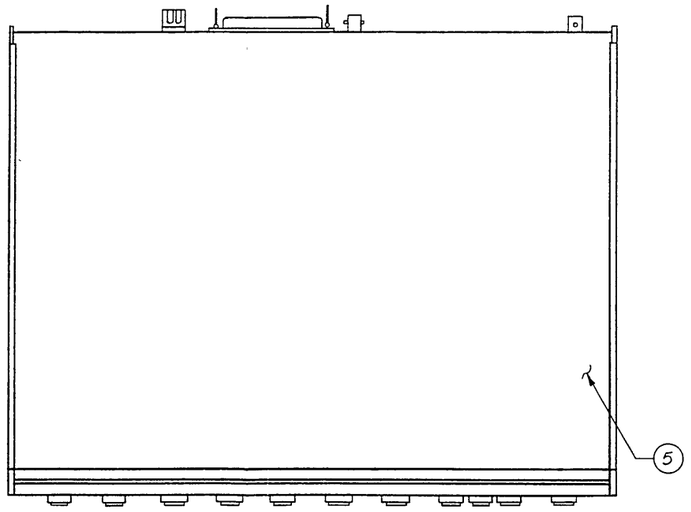
The BCD or Binary modes are selected via the N2 programming line. The Byte or Word mode is selected via an internal jumper (refer to assembly drawing 02-004-3100).

See table A-1 for new Output signal characteristics.

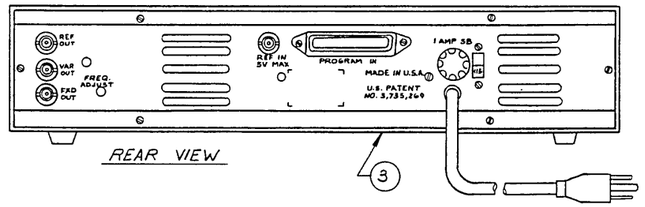
Table A-1. Output Signal Characteristics for Option 013

	DC	100 KHz	500 KHz	2 MHz	3 MHz
RMS FRACTIONAL DEVIATION 10 msec averaging 1 sec averaging			5×10^{-7} 5×10^{-9}		
PHASE NOISE 30 KHz band centered on carrier excluding 1 Hz centered on carrier	– 50 dB	– 50 dB	– 50 dB	– 40 dB	
SPURIOUS COMPONENTS 50 ohm load	– 70 dB	– 60 dB	– 45 dB	– 40 dB	
HARMONIC COMPONENTS 50 ohm load	– 55 dB	– 50 dB	– 40 dB	– 40 dB	
FREQUENCY RESPONSE 50 ohm load	± .25 dB	± .25 dB	+ .5, – 2.5 dB	+ .5, – 2.5 dB	
ATTENUATOR RESPONSE (to 60 dB)	± .5 dB	± .5 dB	Not Specified	Not Specified	

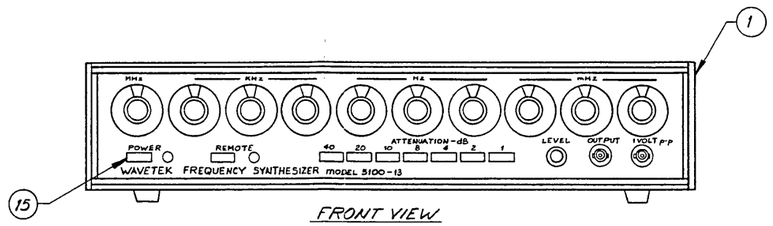
REV	ECO	BY	DATE	APP
A	RELEASE		3/29/78	RHH
B	9996	T.C. 2-4-88	2/5/88	DMB



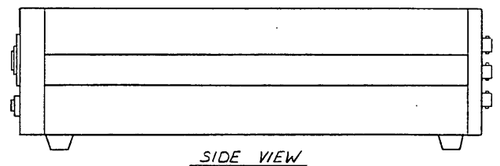
TOP VIEW



REAR VIEW



FRONT VIEW



SIDE VIEW

SEE SEPARATE PARTS LIST

NOTE. UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN T. Caldwell	DATE 2/1/88	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED RHH	3/25/88	TITLE FINAL ASSEMBLY FREQUENCY SYNTHESIZER
	PROJ. ENGR. RHH	3/29/88	
FINISH WAVETEK PROCESS	RELEASE APPROV. JV	4/11/88	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± 1/64 DECIMALS .XX ± .XXX ± ANGLES ± 1°		SIZE D · FSCM NO. 23338 · DWG. NO. 02-000-3113 · REV B · SCALE 1/2 · MODEL 5100-13 · SHEET 1 OF 1

REV	ECN	BY	DATE	APP

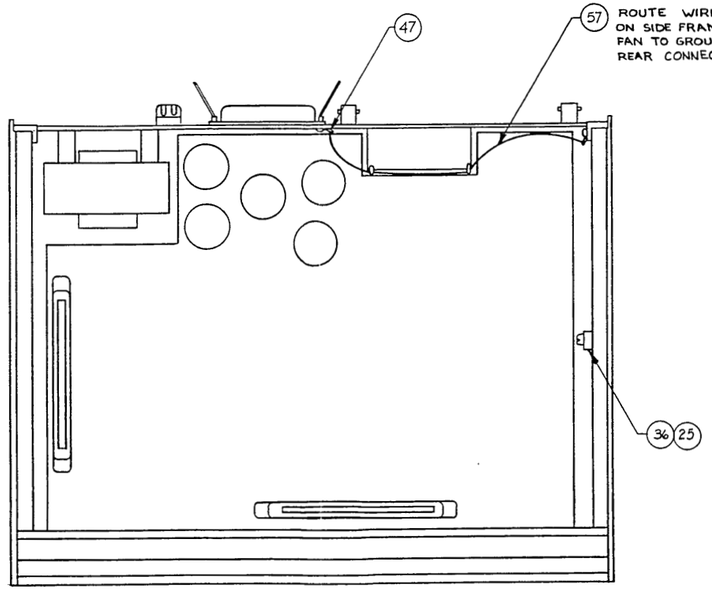
REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
3	BOTTOM COVER ASSY: BLACK			002.3092	1
7	RACK MOUNT STYLE 11			002.3097	1
1	ASSY: SYNTHESIZER 5100-13			002.3113	1
5	COVER: TOP, BLACK	MPV-40464-14	BUKEY	303.0101	1
9	CONN: RIB PLUG W/HD 50 CNT	57-30500	CINCH	351.5001	1
11	PATCH CORD: 6" BLUE	445-3306-03-03-16	CAMBN	352.0101	1
15	KNOB: PUSH BUTTON BLK 20MM	B301	CRL	370.0713	9
NONE	INST MANUAL: 5100 6TH ED 1/77			800.0306	1.5
NONE	INST MANUAL: 5113 SYST 1ST ED			800.5113	1.5

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	TOP OPTION 5100-013, EXTENDS RANGE TO 3MHZ	000.3113	B
		PAGE 1	

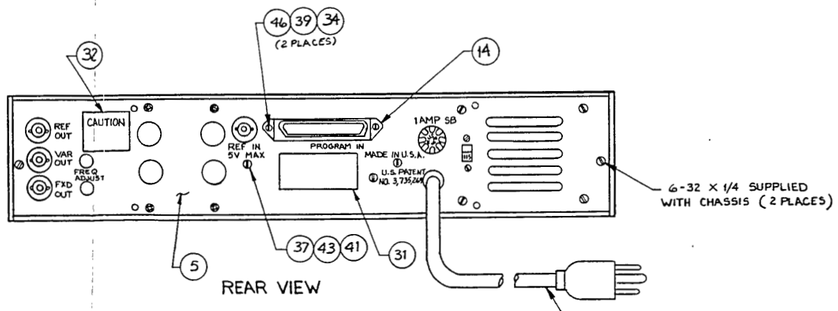
NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST OPTION 013 FINAL ASSEMBLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG		MODEL NO 5100-013 / DWG NO 000.3113 / REV B
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

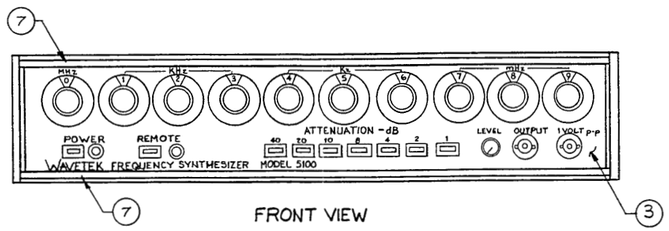
REV	ECN	BY	DATE	APP
A	RELEASE			
B	838			
C	909			
D	990	M.M.	12/01/78	
E	1248	DE	11/12/81	
F	7843	SD	7/8/87	
G	7857	SD		
H	7891	SD	7/8/87	
J	7899	M.C.	3/4/87	RBG
K	8080	M.C. 4.10.87	4/14/87	RBG
L	8226	M.C. 5/1/87		
M	8255	M.C. 6.12.87	7/2/87	RBG



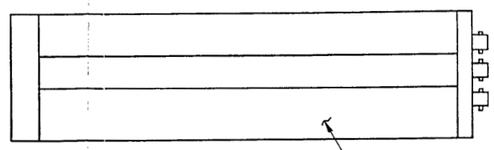
TOP VIEW



REAR VIEW



FRONT VIEW



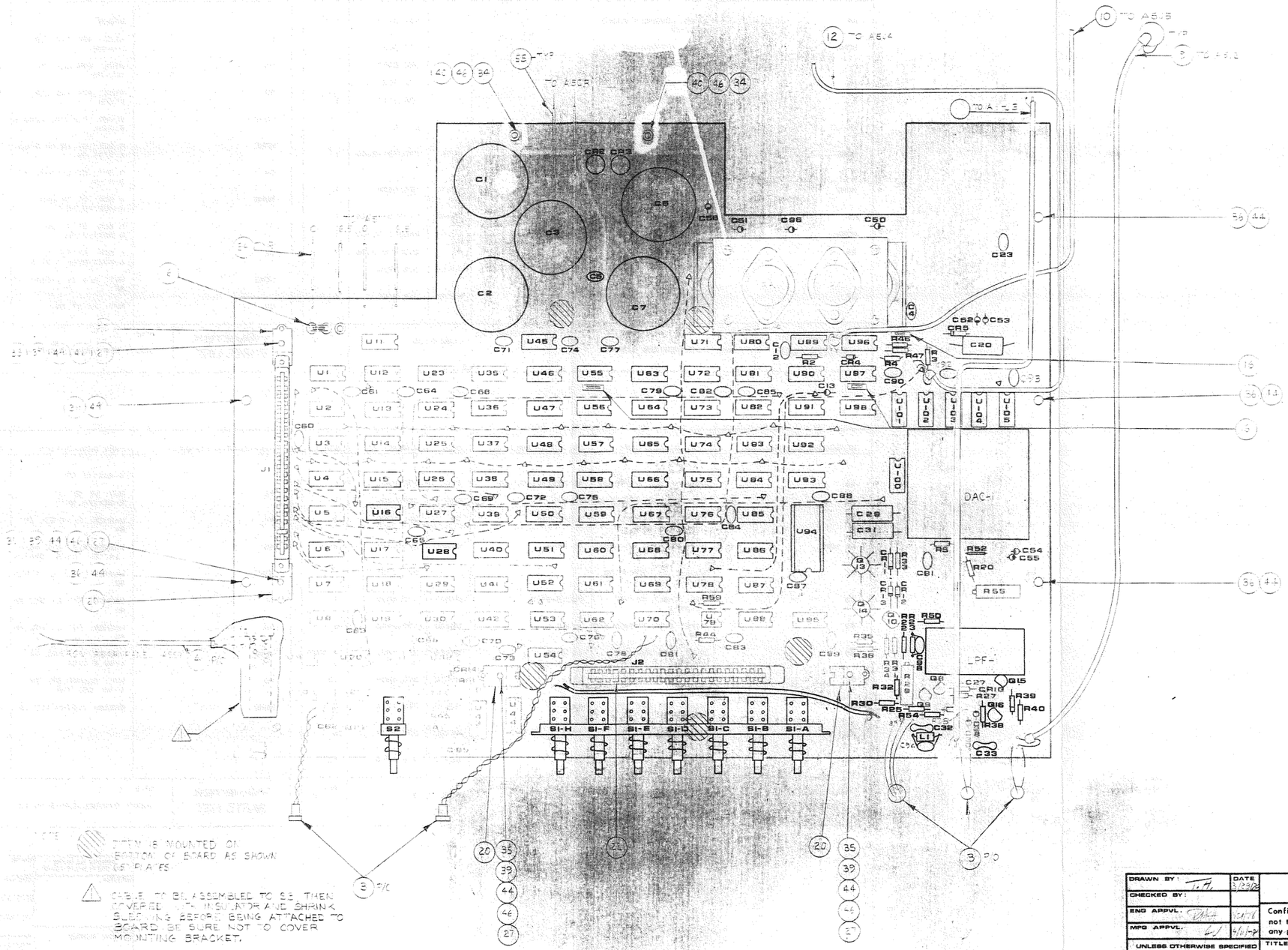
SIDE VIEW

NOTE: UNLESS OTHERWISE SPECIFIED

SEE SEPARATE PARTS LIST

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN M.M. Caldwell 6/10/87	WAVETEK SAN DIEGO, CALIFORNIA	
MATERIAL N/A	PROJ ENGR	TITLE FREQUENCY SYNTHESIZER 5100-13 SERIES III	
	RELEASE APPROV R.B. Bragg		
FINISH WAVETEK PROCESS N/A	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 XX ± .030	MODEL NO. 5100-13	DWG NO 02-002-3113 REV M
	DO NOT SCALE DWG	CODE IDENT 23338	SHEET 1 OF 2
	SCALE 1/2 X		

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
SEE SHEET ONE				



DRAWN BY:	DATE 3/23/72	WAVETEK
CHECKED BY:		Confidential property of WAVETEK SAN DIEGO, INC. not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above.
ENG APPVL.	3/24/72	
MFG APPVL.	4/11/72	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:
.XXX ± .005
.XX ± .01
X/x ± 1/64
∠ ± 1°

TITLE: FREQUENCY SYNTHESIZER 5100-13, SERIES II

SIZE D | DRAWING NO 22002-3113 | REV M

SCALE ~ | SHEET 2 OF 2

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
A4	PANEL ASSEMBLY FRONT 5100-13			001.3113	1
NONE	LOCAL ATTENUATOR 5100			002.3066	1
4	SIDE FRAME ASSY SET			002.3067	1
A5	PANEL ASSY REAR 5100			002.3086	1
6	MAINBOARD ASSY: 5100-13			004.3113	1
A5-J3	SPK CABLE ASSY: SHLD RGD FMD 5100			009.0591	1
NONE	LABEL,SERIAL NUMBER/FILTERS & SYNTHESIZERS	FSS-8660	WVTK	1400-01-8660	1
NONE	OSC: VOLT CONTR 8MHZ (A/P	251-1457	VECT	173.6100	1
21	CARD GUIDE	VG2-25	BIVAR	2100-06-0024	4
NONE	SUPER KIT	2500-5100-03	WVTK	2500-5100-03	1
24	TY-WRAP	TY-523M	TB	2800-00-0006	3
7	TRIM: FRONT TOP SUPR/SNUB 512	MP4031B-4	BUKEY	307.0914	2
27	SPACER: SWITCH NYLON 1/16"	FW4-062	MICRO	349.2010	4

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100-13 | ASSEMBLY NO. 002.3113 | REV M | PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
16	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	4
47	LUG: SOLDER ANGLED #6	1416-5	SMITH	359.0006	1
18	BUMPER: MLD-PLAS .320X.635 GRY	SJ5027B1K	3M	361.9000	5
22 NONE	KEY: POLARZD PC CONN IN-CONT	50-PK-1	CINCH	370.0301	2
32	LABEL: CAUTION FREQ. ADJ.			371.1001	1
25	TIE: CABLE NY NAT (CLAMP)	PLC1M-S4-M	PANDT	377.4002	1
49	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	6
55	WIRE: #18 AWG STR BLACK	1118/19	WEICO	378.1404	2.5000
57	WIRE: #22 AWG STR BLACK	1122	WEICO	378.1604	10
53	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	2
56	WIRE: #24 AWG STR BROWN	1124	WEICO	378.1714	6
50	WIRE: #24 AWG BON	1524	WEICO	378.1715	12

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100-13 | ASSEMBLY NO. 002.3113 | REV M | PAGE 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	BROWN				
51	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	20
54	WIRE: #24 AWG STR YELLOW	1124	WEICO	378.1744	8
52	WIRE: #24 AWG STR GREEN	1124	WEICO	378.1754	8
NONE	SLVNG: PLASTIC FBRGLS #18AWG			378.5181	4
NONE	M SCR: ST ZN PH 2-56 X 5/16 PH			381.2052	2
34	M SCR: ST ZN 4-40 X 3/8 PH			381.4062	4
NONE	M SCR: ST ZN PHP 4-40X7/8 PH			381.4142	4
37	M SCR: ST ZN PH 8-32X1/2 PH			381.8082	2
36	M SCR: ST ZN SL 6-32X3/8FPH TYPE F			386.6061	6
NONE	NUT: HEX SS 2-56X5/32 AF			387.2051	2
39	NUT: HX ST ZN			387.4080	6

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100-13 | ASSEMBLY NO. 002.3113 | REV M | PAGE 3

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	4-40X1/4 AF				
41	NUT: HX ST ZN 8-32X1/4 AF			387.8080	2
44	WASHER: FLAT STL ZN #4			388.0040	6
45	WASHER: FLAT STL #6 .147ID .312OD .028THK			388.0060	5
NONE	WASHER: SPLT LK STNLS #2			388.1022	2
46	WASHER: EXT LK STL ZN #4			388.1041	8
43	WASHER: EXT LK STL ZN #8			388.1081	2
NONE	WASHER: FLT NYL #4 1/4D X 1/8T			388.3040	2
40	NUT: CLINCH STL ZN 4-40 .031 THK			389.1002	2
NONE	SHRINK TUBING,1/8 IN	FIT-221-1/8	ALPHA	6001-20-2000	3

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5100-13 | ASSEMBLY NO. 002.3113 | REV M | PAGE 4

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST OPTION 013 CHASSIS
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS XX ± XXX ± ANGLES ±		SIZE D | F&CM NO. 23338 | DWG. NO. 002.3113 | REV M; SCALE | MODEL 5100-013 SHEET 1 OF 1

OLD NO. 510331-1

DATE	SYM	REVISION RECORD	AUTH	DR	CK
	A	RELEASE			
4/88	B	ECO 9423	T.C.		

SHEET 1 OF 5: TIMING

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA		
DECIMAL ±		SCALE ~	DRAWN BY
			APPROVED BY
FRACTIONAL ±	TITLE TIMING LOGIC 5100 13		
ANGULAR ±	DATE	DRAWING NUMBER 03-004-3113	REV B

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

OLD No. 510466-2

Z1 27-5
Z0 27-9
JK 6
2 MHZ
1 MHZ
A5J1 -24 -23 -22 -21
80 512 KHZ 256 KHZ
CLK3 51-6
A5J1 -20 -19 -18 -17
71 72 128 KHZ 64 KHZ 32 KHZ 16 KHZ
A5J1 -16 -15 -14 -13
63 8 KHZ 4 KHZ 2 KHZ 1 KHZ
PE 70-6
A5J1 -49 -48 -47 -46
55 512 Hz 256 Hz
CLK2 51-12
A5J1 -45 -44 -43 -42
45 46 128Hz 64 Hz 32 Hz 16 Hz
A5J1 -41 -40 -39 -38
35 8 Hz 4 Hz 2 Hz 1 Hz
A5J1 -37 -36 -35 -34
23 512 mHz 256 mHz
CLK1 60-8
A5J1 -33 -32 -31 -30
11 12 128 mHz 64 mHz 32 mHz 16 mHz
A5J1 -29 -28 -27 -26
1 2 8 mHz 4 mHz 2 mHz 1 mHz
CARRY JUMPER TEST NORMAL
QD
QH
82 73 64 56 47 36 24 13 2
75 66 49 38 26 15
QUAD
58
MSB
SGN
83
SGN 90-2
60
KHZ CARRY
74 65 57 48 37 25 14 3
MHZ CARRY
95
CLK 7-6
RCLK 89-6
98
VCC
R44 1K
A5J1-25
79
D4
84 76 67 59
77 68
M8 85-12
M7 85-2
M6 78-7
M5 69-7
M4 78-5
M3 78-6
M2 69-4
M1 69-5
M0 69-6
5VCMN

DESCRIPTION OF IC'S

IC NO.	PART NO.	PINS TO VCC	PINS TO GND
1	122 - 0106	16	8
2	122 - 7483	5	12, 13
3	122 - 0106	16	8, 9
11	128 - 2330	14	
12	122 - 0106	16	8
13	122 - 7483	5	12
14	122 - 0106	16	8, 9
15	122 - 7483	5	4, 11, 12, 16
23	122 - 0106	16	8
24	122 - 7483	5	3, 12, 16
25	122 - 0106	16	8, 9
26	122 - 7483	5	1, 8, 11, 12
35	122 - 0106	16	8
36	122 - 7483	5	12
37	122 - 0106	16	8, 9
38	122 - 7483	5	4, 11, 12, 16
45	128 - 2330	14	
46	122 - 0106	16	8
47	122 - 7483	5	12
48	122 - 0106	16	8, 9
49	122 - 7483	5	1, 8, 11, 12
55	122 - 0106	16	8
56	122 - 7483	5	3, 12, 16
57	122 - 0106	16	8, 9

DESCRIPTION OF IC'S

IC NO.	PART NO.	PINS TO VCC	PINS TO GND
58	123 - 7474	14	7
59	122 - 9014	16	8
60	122 - 7440	14	7
63	122 - 0106	16	8
64	122 - 7483	5	12
65	122 - 0106	16	8, 9
66	122 - 7483	5	4, 11, 8, 16
67	122 - 9014	16	8
68	122 - 7483	5	1, 11, 12, 13
71	128 - 2330	14	
72	122 - 0106	16	8
73	122 - 7483	5	12
74	122 - 0106	16	8, 9
75	122 - 7483	5	1, 8, 11, 12
76	122 - 9014	16	8
77	122 - 7483	5	1, 4, 8, 11, 12
79	120 - 4451	14	4
80	122 - 0106	16	8
82	122 - 7483	5	12
83	123 - 7474	14	7
84	122 - 9014	16	8
95	122 - 7440	14	7
98	122 - 7474	14	7

○ REAR PANEL CONNECTOR
⊗ INTERNAL SIGNAL CONNECTION

SHEET 2 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE	DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE FREQUENCY REGISTER & SAMPLE GENERATION LOGIC 5100-13		
ANGULAR ±	DATE	DRAWING NUMBER 03-004-3113	REV. B

DATE/ITR	REVISION RECORD	AUTH	ENG. APP.
	SHT 1		

OLD No. 510466-3

68-9 M0
68-6 M1
68-2 M2
77-6 M5
68-15 M3
77-9 M4
77-2 M6
70-8 CLK
77-15 M7
84-3 M8

69 78 85

ROM 94 (MSB)

100 101 102 103 104 105

DAC I

CLK 70-8
R5 560K
R50 453
LPF IN
R20 10K
-15V
R55 5K
+15V
-15VDC
+15VDC
C55 0.1μf
C54 0.1μf
15V CMN
5V CMN
GND
C20 0.1μf
CHASSIS

+5V
R59 390
C53 0.1μf
C52 0.1μf
R3 10K
C23 0.1μf
C13 10μf
VCXO XTAL IN PUT
VCXO GND 8MHZ OUT
+5VDC
CLK 95-8
SGN 83-9
70-1 RCLK
70-10 RCLK
R46 3.3K
R47 3.3K
R2 2K
C12 22PF
EXT INT
INPUT REFERENCE SELECTOR
R4 100
CR4 1N457
A5J4 REF IN
A5J5 REF OUT
8MHZ 1MHZ
OUTPUT REFERENCE SELECTOR

DESCRIPTION OF IC'S

IC NO	PART NO	PINSTOVCC	PINS TO GND
69	122-0106	16	8, 9
78	122-0106	16	8, 9
81	122-7493	5	2, 3, 10
85	122-7474	14	7
86	122-7400	14	7
87	122-7410	14	7
88	122-7410	14	7
89	122-0100	14	7
90	122-7474	14	7
91	122-9014	16	8
92	122-9014	16	8
93	122-9014	16	8
94	129-3000	24	12, 20
95	122-7440	14	7
96	122-7413	14	7
97	122-7437	14	7
98	122-7474	14	7
100	124-7474	14	7
101	124-7474	14	7
102	124-7474	14	7
103	124-7474	14	7
104	124-7474	14	7
105	124-7474	14	7
79	120-4451	14	4

NOTES:

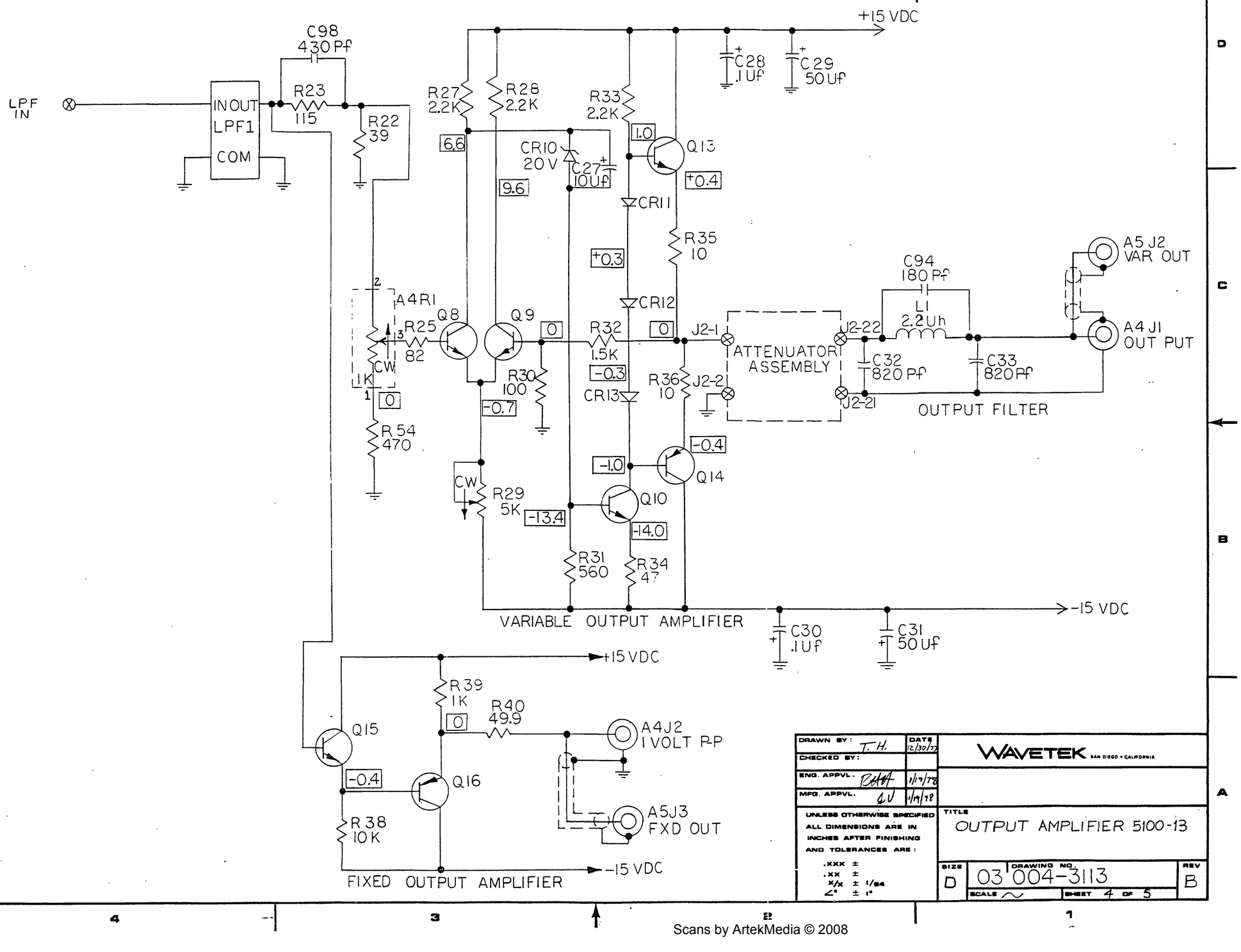
1. OMIT C23 ON OPTION -01 UNITS.
2. PIN NUMBERS ON XTAL YI OUTSIDE PARENTHESIS REFER TO STANDARD XTAL. PIN NUMBERS INSIDE PARENTHESIS REFER TO HIGH STABILITY XTAL OPTION -01.

SHEET 3 OF 5:

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE	DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE DAC & FREQUENCY REF 5100-13		
ANGULAR ±	DATE	DRAWING NUMBER 03-004-3113	REV B

SIZE	DWG NO	REV
D		

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE



DRAWN BY: T. H.	DATE 12/30/77	WAVETEK SAN DIEGO, CALIFORNIA
CHECKED BY:		
ENG. APPVL.	1/9/78	
MFG. APPVL.	1/9/78	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:
.XXX ±
.XX ±
X/x ± 1/64
∠° ± 1°

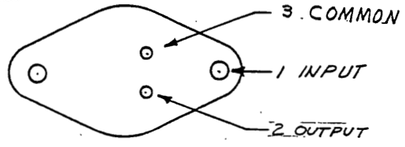
TITLE: OUTPUT AMPLIFIER 5100-13

SIZE	DRAWING NO.	REV
D	03 004-3113	B

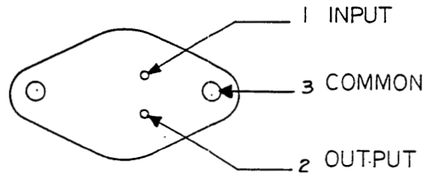
SCALE ~ SHEET 4 OF 5

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

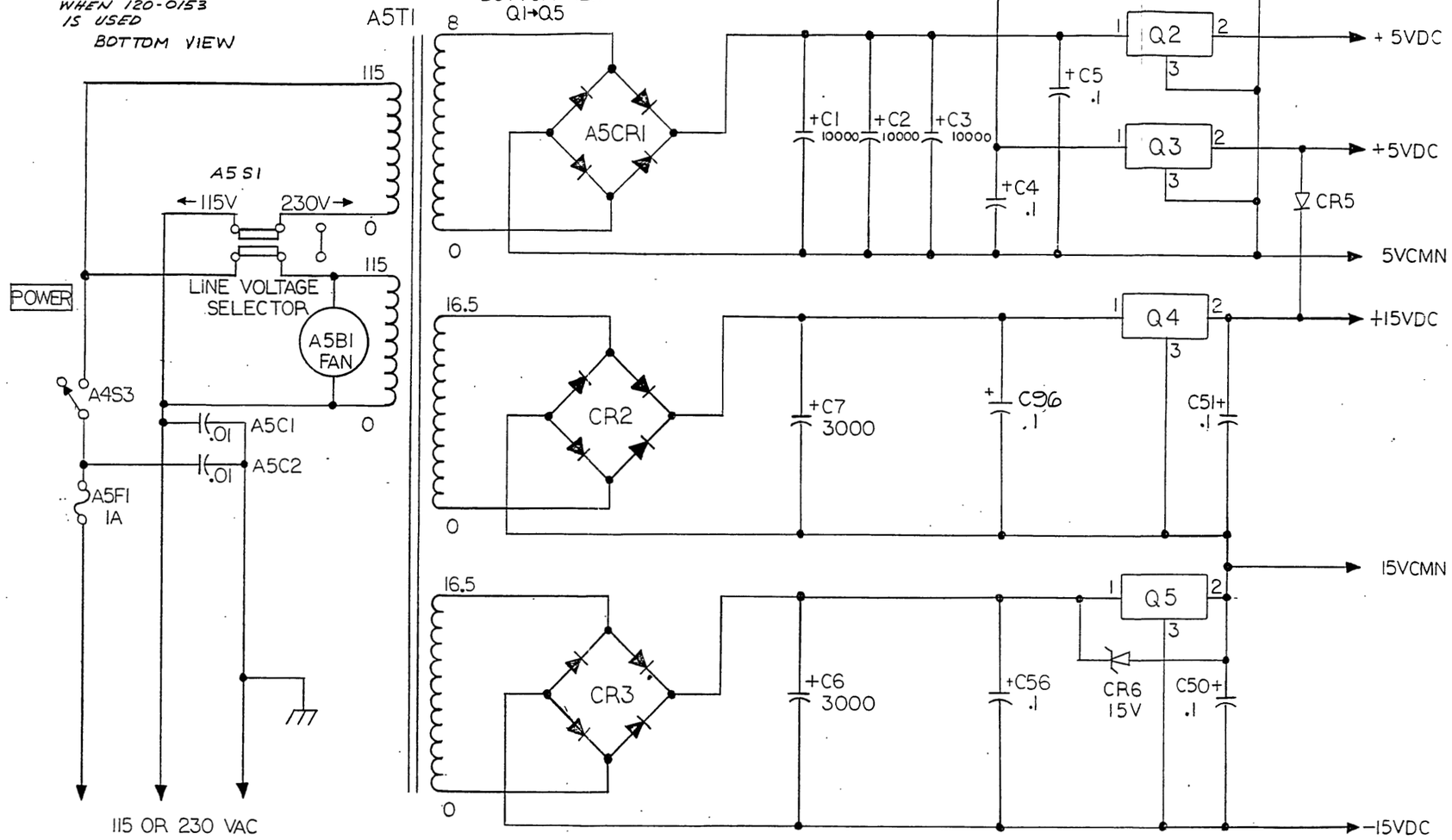
OLD No. 510466-5



Q4 & Q5 WHEN 120-0153 IS USED
BOTTOM VIEW



BOTTOM VIEW Q1→Q5



NOTES:

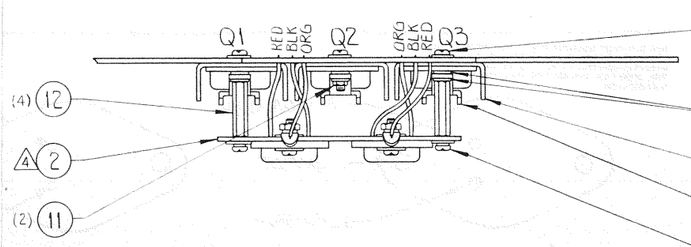
1. REFERENCE DESIGNATIONS ARE ABBREVIATED FOR ASSY A1
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
3. CR6 PRESENT ON OPTION -01 UNITS ONLY

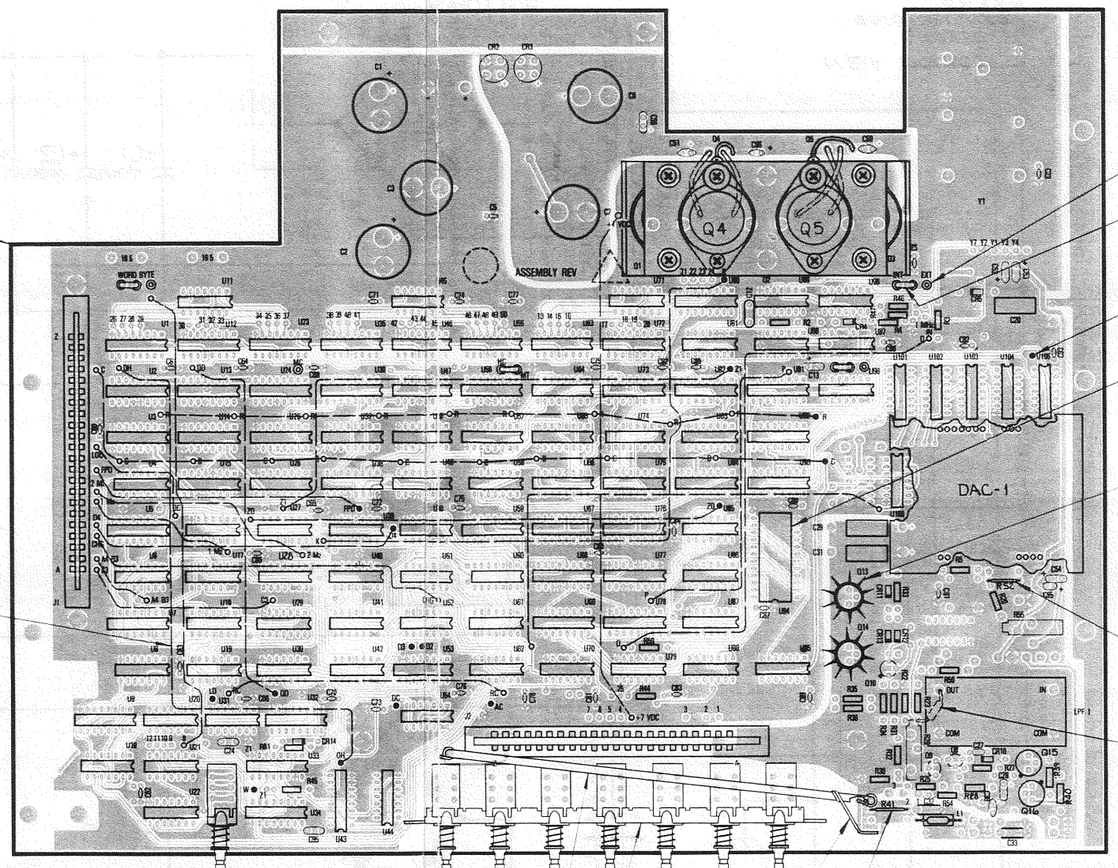
SHEET 5 OF 5: POWER

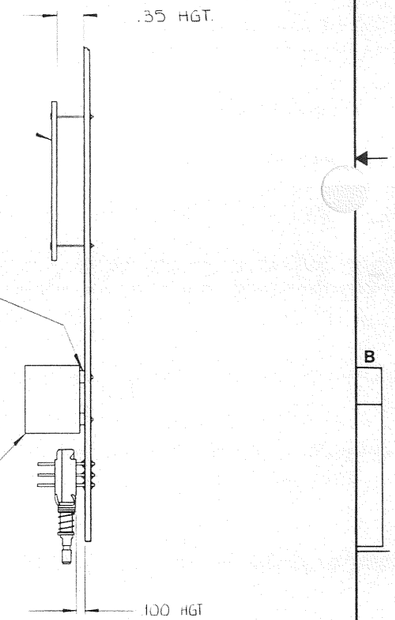
TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE	DRAWN BY / APPROVED BY
FRACTIONAL ± 1/64	TITLE: POWER SUPPLY 5100-13		
ANGULAR ±	DATE	DRAWING NUMBER: 03-004-3113	REV: B

REV	ECO
A	RELEASE
B	683
C	838
D	892
E	909
F	7857
G	8080
H	8255
J	9046

REV	ECO	BY	DATE	APP
K	9173 REDRAWN	CC	11/4/87	RB







(10) (6)
(13) (10)
(14) (16)
(6) (3)
(21) (3)
(9) (4)
(14) REF
(13) REF
(4) (12)
(20) (4)
(4) REF
(5) REF FARSIDE SEE SHT 2
U94
DAC-1
(7) (2)
(4) (15)
(16) (2)
(17) (2)
(C98) REF FARSIDE SEE SHT 2
LPF-1
(C94) (6)
L1

(4) (12)
(2) (11)
(1)
(8)
(S2)
(3)
(S1)
(18) (2)
(16) REF
(17) REF

(6) SOLDER C94 ONTOP TO L1 AS SHOWN.

5 SOLDER ALL ELECTRICAL COMPONENTS INSERTED INTO BOARD.

(4) SOLDER COLORED WIRES FROM ITEM 2 TO BOARD AS DESIGNATED.

(3) ROUTE WIRE (ITEM 8) TO ALL DIFFERENT DESIGNATED PINS & ATTACH.

(2) SUPPORT CABLE ASSY, BY SOLDERING 18 AWG BUSS WIRE (ITEM 18) TO CABLE ASSY & BOARD AS SHOWN.

(1) INSERT CABLE ASSY WIRE INTO BOARD FLUSH TO SLEEVING & INSERT ATTACHED GROUND WIRE INTO BOARD, BOTH ENDS AS SHOWN & SOLDER.

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ARLOS CONTRERAS	DATE 10-5-87	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED D. BULLELL	11/4/87	TITLE: MAINBOARD ASSEMBLY
FINISH WAVETEK PROCESS	PROJ. ENGR.		
DO NOT SCALE DRAWING	RELEASE APPROV.		SIZE D · FSCM NO. 23338 · DWG. NO. 02-004-3113 · K
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± · DECIMALS .XX ± .XXX ± · ANGLES ±		SCALE 1:1 · MODEL 5113

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C23 C4 C5 C60 C61 C62 C63 C64 C65 C66 C68 C69 C70 C71 C72 C73 C74 C75 C76 C77 C78 C79 C80 C81 C82 C83 C84 C85 C87 C88 C89 C90 C91 C92 C93	CAP,MOND, 0.1UF 50V Z5U	SR215E104ZAT	AVX	100.4102	35
C12	CAP MICA FX VAL DIP 22PF 5% -20+100PPM/C 500V	CM05ED220J03	CDE	101.0220	1
C24	CAP FX VAL,DP MICA 150PF 5% 0 TO +70PPM/C 500V	CM05FD151J03	CDE	101.1150	1
C32 C33	CAP MICA FX VAL DIP 820PF 1% 0 TO+70PPM/C 300V	CD19FD821F03	CDE	101.1821	2
C20	CAP,PLSTR, .10UF 10% 600V	DMT6P1	C-D	105.4100	1
C28 C30 C50 C51 C52 C53 C54 C55 C56 C96	CAP,TANT, .10UF 20% 35V	T368A104M035A$	KEMET	109.4100	10
C13 C27	CAP,TANT, 10UF 20% 20V	T368B106M025A$	KEMET	109.6100	2
C29 C31	CAP,ELECT, 47UF 20% 63V	47/63-81009	SIEM	109.6470	2
C95	CAP,TANT, 68UF 20% 6V	T368B686M006AS	KEMET	109.6680	1
C6 C7	CAP,ELECT, 3000UF 50V	3487AE332M050KM	MEPCO	109.8300	2

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-13-3113	1208-00-2566	A
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	(PC)				
C1 C2 C3	CAP,ELECT, 10000UF 15V (PC)	3487BD103M016KM	MEPCO	109.9100	3
R30	RES,MFLM 100 OHM 1% 1/10W T2	RN55C1000F	ENOX	110.1001	1
R23	RES,MFLM 115 OHM 1% 1/8W TO	RN55C1150F	UNCEM	110.1150	1
R32	RES,MFLM 1.50K 1% 1/10W T2	5063JD1K500F	MEPCO	111.1501	1
R2	RES,MFLM 2.00K 1% 1/10W T2	RN55C2001F	UMCEM	111.2001	1
R35 R36	RES,CFLM 10 OHM 5% 1/4W			116.0101	2
R50	RES,CFLM 30 OHM 5% 1/4W			116.0301	1
R22	RES,CFLM 39 OHM 5% 1/4W			116.0391	1
R34	RES,CFLM 47 OHM 5% 1/4W			116.0471	1
R25	RES,CFLM 82 OHM 5% 1/4W			116.0821	1
R4	RES,CFLM 100 OHM 5%	CF1/4-100OHM,5%	STKPL	116.1101	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-13-3113	1208-00-2566	A
		PAGE 2	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	1/4W				
R59	RES,CFLM 390 OHM 5% 1/4W			116.1391	1
R54	RES,CFLM 470 OHM 5% 1/4W	CF1/4-470OHM,5%	STKPL	116.1471	1
R31	RES,CFLM 560 OHM 5% 1/4W			116.1561	1
R39 R44	RES,CFLM, 1.0K OHM 5% 1/4W	CF-071K-5%	DALE	116.2101	2
R27 R28 R33	RES,CFLM 2.2K OHM 5% 1/4W			116.2221	3
R45 R46 R47	RES,CFLM 3.3K OHM 5% 1/4W			116.2331	3
R20 R3 R31	RES,CFLM 10K OHM 5% 1/4W			116.3101	3
R61	RES,CFLM 47K OHM 5% 1/4W			116.3471	1
R5	RES,CFLM 560K OHM 5% 1/4W			116.4561	1
R29 R55	RES, VAR CMT 5.0K 3/4" RECT	3006P1-502	BOURN	118.2500	2
R40	RES,MFLM 49.9 OHM 1%	RN55C49R9F	UMCEM	119.4990	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-13-3113	1208-00-2566	A
		PAGE 3	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	1/8W TO				
U79	U: DUAL PRPHL DRIVER (75451)	SN75451N-3	TI	120.4451	1
NONE	SPK ASSY, PC BD PREPPED 5100-13-3000	5100-13-2567	WVTK	1208-00-2567	1
U31 U89	U: MNSTBL MVBRTR (74121)	N74121N-B	SIG	122.0100	2
U1 U12 U14 U23 U25 U3 U34 U35 U37 U46 U48 U5 U53 U55 U57 U63 U65 U69 U72 U74 U78 U80	U: 4 BT SHIFT REGISTER (74195)	SN74195N-3	TI	122.0106	22
U16 U18 U22 U28 U30 U40 U61 U86	U: QUAD 2 IN NAND GATE	SN7400N-3	TI	122.7400	8
U50 U6	U: HEX INVERTER	DM7404N/A+	NSC	122.7404	2
U4 U51 U52 U62 U87 U88	U: TRIPLE 3 IN NAND GATE	SN7410N-3	TI	122.7410	6
U96	U: DL 4 IN NAND SMT TGR	SN7413N/P3	TI	122.7413	1
U70 U97	U: QUAD 2 IN NAND BUFFER	SN7437N-3	TI	122.7437	2
U19 U60 U95	U: DUAL 4 IN NAND BUFFER	DM7440N/A+	NSC	122.7440	3

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-13-3113	1208-00-2566	A
		PAGE 4	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
U39	U: DUAL 2 IN 2W AOI GATE	SN7451N-3	TI	122.7451	1
U10 U17 U20 U27 U29 U41 U42 U44 U54 U8 U85 U90 U98	U: DUAL D TYPE FLIP FLOP	SN7474N-3	TI	122.7474	13
U13 U15 U2 U24 U26 U36 U38 U43 U47 U49 U56 U64 U66 U68 U73 U75 U77 U82	U: 4 BIT FULL ADDER	N7483N-B	SIG	122.7483	18
U81	U: 4 BIT COUNTER	N7493N-B	SIG	122.7493	1
U59 U67 U76 U84 U91 U92 U93	U: QD XOR GATE INVERT OUTPUT	9014DCQB	FAIR	122.9014	7
U32 U33 U7 U9	U: QUAD NOR GATE			122.9015	4
U58 U83	U: DUAL D TYPE FLIP FLOP	DM74H74N/AT	NSC	123.7474	2
U100 U101 U102 U103 U104 U105	U: DL D TYPE FLIP FLOP (SHTKY)	N74S74N-B	SIG	124.7474	6
U11 U21 U45 U71	U: PULL UP NET 3.3K 2% X13	4114R-002-332	BOURN	128.2330	4
CR2 CR3	SIL FWB 50PIV 1.5A	PF-05	EDI	130.0140	2
CR5	SIL RCT 200PIV 1A (1N4003)			130.2110	1
CR10	SL ZR 20V 5% 400MW (1N968B)			131.0200	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-13-3113	1208-00-2566	A
		PAGE 5	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
CR11 CR12 CR13 CR14 CR4	SL LW LK 70PIV 200MW (1N457)			132.0457	5
Q8,9	Q: SIL NPN MATCHED PAIR			134.0065	1
Q13 Q15	Q: SIL NPN (2N2219)	2N2219	MOT	134.2219	2
Q10	Q: SIL NPN (2N2222)	2N2222A	MOT	134.2222	1
Q14 Q16	Q: SIL PNP (2N2905A)	2N2905	MOT	136.2905	2
J1	CONN,22 POS EDGE,PC MT,SGL READOUT	009-00179-6	TRW	2100-02-0245	1
J2	CONN,44 POS EDGE,PC MT,DBL READOUT	009-00341-1	TRW	2100-02-0246	1
U94	SOCKET: IC 24PIN DIP ST	ICNZ46-S4Q	ROBNU	353.2402	1
NONE	CONN: TERM PIN .025 WW (2END)	W239-025-300G	A/S	354.0007	30
NONE	SPACER: TXSTR LEAD, NYL, LOW	10414	MILRO	376.2108	4

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	SPK ASSY, PRE WAVE LOAD 5100-13-3113	1208-00-2566	A
		PAGE 6	

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST OPTION 013 MAINBOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 5100-013	DWG NO. 004.3113 REV K
	SCALE	CODE IDENT 23338	SHEET 1 OF 2

BISHOP GRAPHICS/ACCUPRESS REORDER NO A27099

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
2	SPK REGULATOR ASSY 5100			004.3030	1
DAC-1	CONVERTER D/A 10 BIT			004.3056	1
3	SPK CABLE ASSY: SHLD RGD FMD 5100			009.0590	1
NONE	SCHEMATIC OUTPUT AMP			03.004.3100	1
C94	CAP FX VAL,DP MICA 180PF 5% 0 TO +70PPM/C 500V	CM05FD181J03	CDE	101.1180	1
C98	CAP MICA FX VAL DIP 430PF 5% TO+70PPM/C 500V	CD15FD431J03	CDE	101.1430	1
G1 G2 G3	Q: P.V. REG 5V 5% 1A TO-3	LM309K-STEEL	NSC	120.0051	3
1	SPK ASSY, PRE WAVE LOAD 5100-13-3113	5100-13-2566	WVTK	1208-00-2566	1
U94	U: ROM 512X8 CST SINE (SIG)	N82S115N	SIG	129.3000	1
L1	L: FXD 2.2 UHY +/-10% SHLD	1641-222	DELVN	150.9220	1
LPF-1	FILTER: LOW PASS 0-3 MHZ	00.165.3002	WVTK	165.3002	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY: 5100-13	004.3113	K
		PAGE 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
9	M XCR: ST ZN SL 4-40X3/8 PH			380.4062	4
10	M SCR: ST ZN SL 4-40X1/2 BH			380.4081	6
11	NUT: HX ST ZN 4-40X1/4 AF			387.4080	2
13	WASHER: FLAT STL ZN #4			388.0040	10
14	WASHER: INT LK STL ZN #4			388.1040	16
15	WASHER: FLAT NYL #2X.250X.032			388.3020	4
12	SPR: THD 3/16HX 4-40X3/4	1656A	KEYST	389.2005	4

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY: 5100-13	004.3113	K
		PAGE 3	

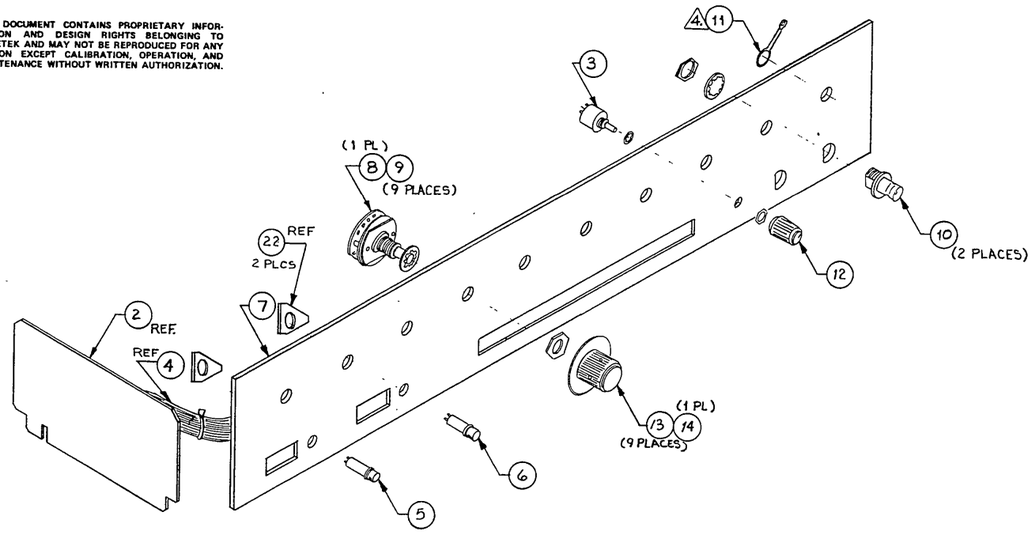
REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
6	HEATSINK, TO 3, BASE, BLK ANDZ	6104B	THERM	2800-11-0032	3
21	HEATSINK, TO 3, TOP, GLD CHR	6104C	THERM	2800-11-0033	3
S1	S: PSH/PSH DPDT 7 STA	2KDB070C00-585	CRL	341.2200	1
S2	S: PSH/PSH DPDT	PB-1	CRL	341.2201	1
20	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	4
4	SOCKET: JUMPER	450-3704-01-03-00	CAMBN	353.0103	12
5	CONN: TERM PIN .025 WW (NAIL)	W98-025-560-GH-GOLD	A/S	354.0003	16
7	HEAT SINK: TO-8 ROUND	207CB	WAKE	367.0400	2
18	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	1.6
16	WIRE: BUSS HD DWN TND #20 AWG	W2020	WEICO	378.0500	1.3
8	WIRE: #30 AWG SLD KYN BLUE			378.1961	15
17	SLVNG: TEFLON #20AWG			378.5202	.95
19	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	.3

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY: 5100-13	004.3113	K
		PAGE 2	

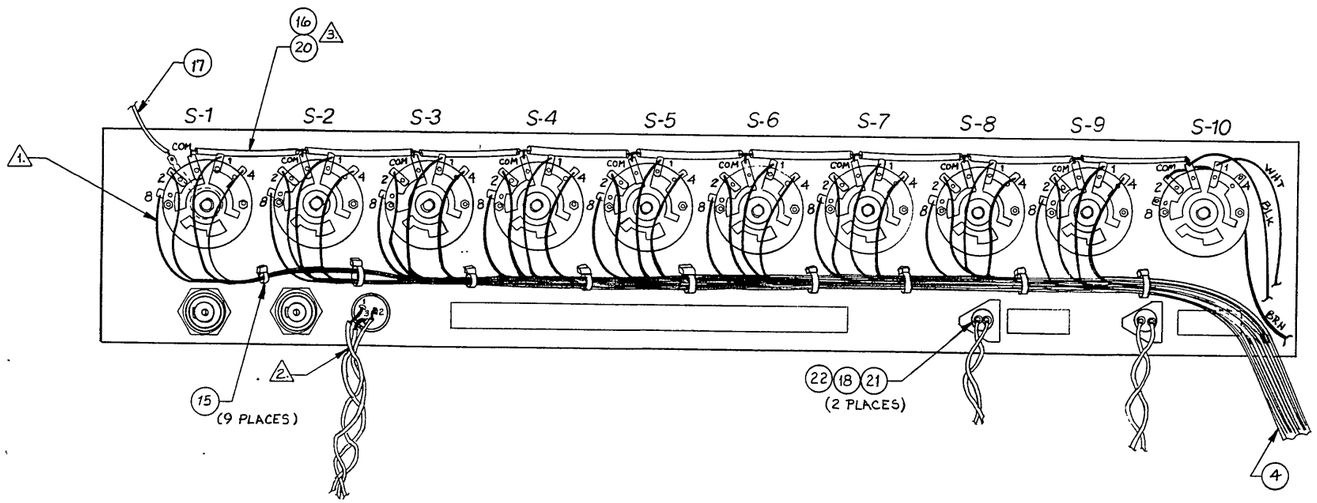
NOTE: UNLESS OTHERWISE SPECIFIED

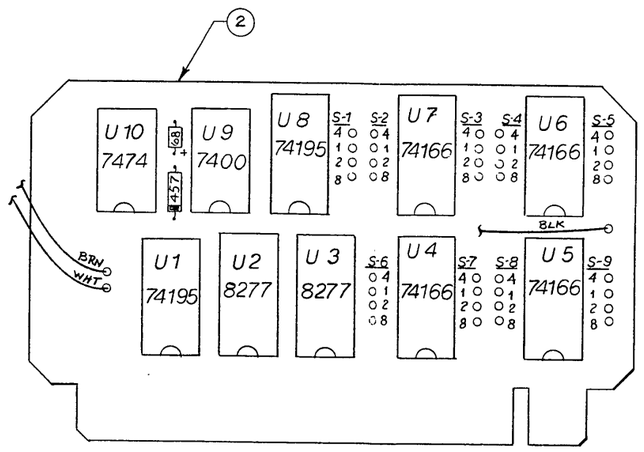
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE
	RELEASE APPROV		PARTS LIST OPTION 013 MAINBOARD
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 5100-013	DWG NO. 004.3113 REV K
	SCALE	CODE IDENT 23338	SHEET 2 OF 2

REV	ECN	BY	DATE	APP'D
B	838		9/30/87	
C	ECO # 7912		11/23/87	
D	ECO # 8400		6/14/88	
E	ECO # 8091		7-7-87	



WIRING CHART FOR SWITCHES 1 THRU 9					
SWITCH	WIRE COLOR	PIN No.S	FROM	TO	PIN No.S
S-1	BROWN	8 2 1 4	SCANNER BD ASSY	S-1 FRONT PANEL	8 2 1 4
S-2	RED	8 2 1 4		S-2 FRONT PANEL	8 2 1 4
S-3	ORN	8 2 1 4		S-3 FRONT PANEL	8 2 1 4
S-4	YEL	8 2 1 4		S-4 FRONT PANEL	8 2 1 4
S-5	GRN	8 2 1 4		S-5 FRONT PANEL	8 2 1 4
S-6	BLUE	8 2 1 4		S-6 FRONT PANEL	8 2 1 4
S-7	VIO	8 2 1 4		S-7 FRONT PANEL	8 2 1 4
S-8	GRAY	8 2 1 4		S-8 FRONT PANEL	8 2 1 4
S-9	WHT	8 2 1 4	SCANNER BD ASSY	S-9 FRONT PANEL	8 2 1 4
S-10 CONNECTS AS SHOWN BELOW					





4. SOLDER LUG IS TO BE ASSEMBLED WITH S-1, NEXT TO FRONT PANEL.

3. THIS JUMPER WIRE IS A CONTINUOUS PIECE OF 24 AWG BUSS WIRE TINNED, RUNNING BETWEEN THE DOUBLE CONTACTS OF THE SWITCH COMMON TERMINAL. THE BUSS WIRE IS COVERED WITH PIECES OF FIBERGLASS SLEEVING BETWEEN SWITCHES.

2. WIRE HOOK-UP FOR ITEM 3 TO BE AS FOLLOWS:

POST 1 ORANGE
POST 2 YELLOW } WIRE TO BE TWISTED TOGETHER.
POST 3 BLACK

1. ALL WIRES TO POST 8 ON S-1 THRU S 9 TO COME FROM BOTTOM RIBBON CABLE ASSEMBLY # 1207-00-2554, WITH WIRES TO POSTS 2,1, & 4 TO COME FROM CABLES IN ASCENDING ORDER.

NOTE. UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN T. Caldwell	DATE 1/19/87	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL N/A	PROJ ENGR		TITLE PANEL ASSY: FRONT
FINISH WAVETEK PROCESS N/A	RELEASE APPROV K.D. Bowman		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 5100-13	DWG NO 02-001-3113 REV E
	SCALE NONE	CODE IDENT 23338	

02-001-3113

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
A2	SPK SCANNER ASSY 5100			004.3150	1
NONE	SPK ASSY, RIBBON CABLE 5100-SERIES	5100-SERIES-2554	WVTK	1207-00-2554	1
53	WIRE ASSY-AMBER LAMP	1207-00-2944	WVTK	1207-00-2944	2
53	WIRE ASSY-GREEN LAMP	1207-00-2945	WVTK	1207-00-2945	2
DS2	LAMP: INCAND 6.3V 40MA GREEN	BP63-GCB-2180	ELDEM	171.1502	1
DS1	LAMP: INCAND 6.3V 40MA AMBER	BP63-ACB-2180	ELDEM	171.1503	1
NONE	TY-WRAP	TY-523M	TB	2800-00-0006	2
22	RETAINING RING	515-0051	DILCO	2800-36-0002	2
7	FRONT PANEL: 5100			300.3001	1
S10	S: ROT 1P 3 POS (5123 BCD)			345.1031	1
S1 S2 S3 S4 S5 S6 S7 S8 S9	S: ROT 1P 12 POS (5100 BCD)	752188001	LEDEX	345.1120	9
J1 J2	CONN: BNC BLKHD RECPT ISOL.	28JR100-1	SCC	351.0003	2
11	LUG: SOLDER FLAT 3/8"	761-375	ZIER	359.0005	1
16	KNOB: BLACK .5" LINE	PS50-LL-1	BUKEY	370.0701	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	PANEL ASSEMBLY FRONT 5100-13	001.3113	E

PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
13	KNOB: BLACK .7 TS 0-9	.7 TS 0-9	BUKEY	370.0706	9
14	KNOB: BLACK .7TS 0-2	PS70TS2	BUKEY	370.0735	1
12	WIRE: BUSS TINNED #24 AWG	9024	WEICO	378.0701	18
17	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	6
18	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	23
19	WIRE: #24 AWG STR YELLOW	1124	WEICO	378.1744	22.5000
20	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	16
2	POT, MODIFIED, 1K (M/F 118.2107)	4609-71-0200	WVTK	4609-71-0200	1

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	PANEL ASSEMBLY FRONT 5100-13	001.3113	E

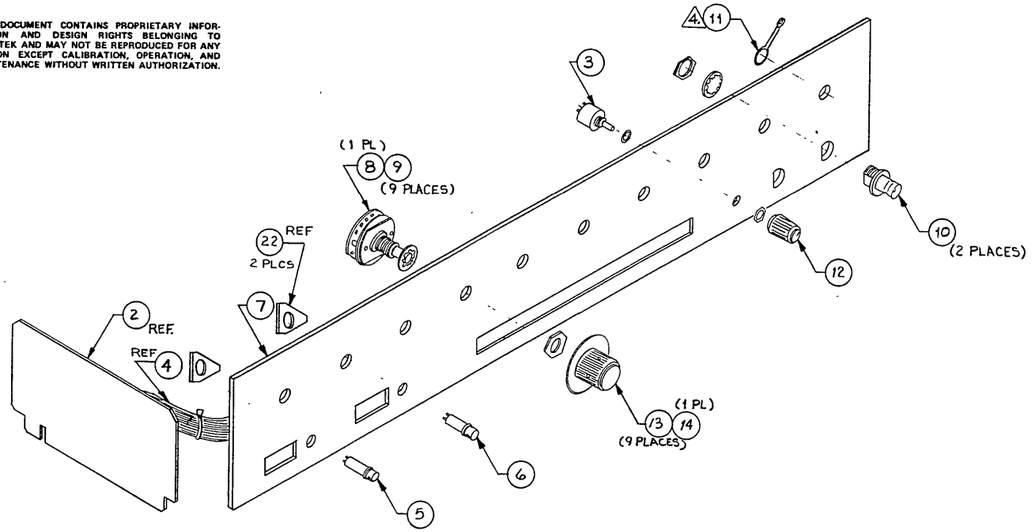
PAGE 2

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST FRONT PANEL
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO: 5100-013
	DO NOT SCALE DWG		DWG NO: 001.3113
	SCALE		REV: E
			CODE IDENT: 23338
			SHEET 1 OF 1

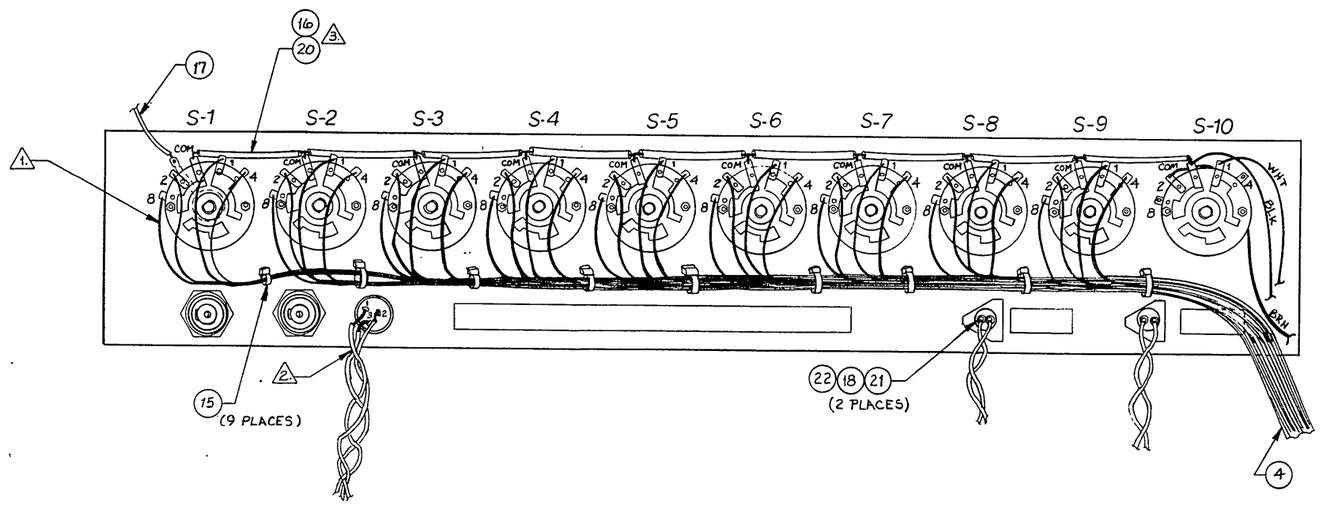
NOTE: UNLESS OTHERWISE SPECIFIED

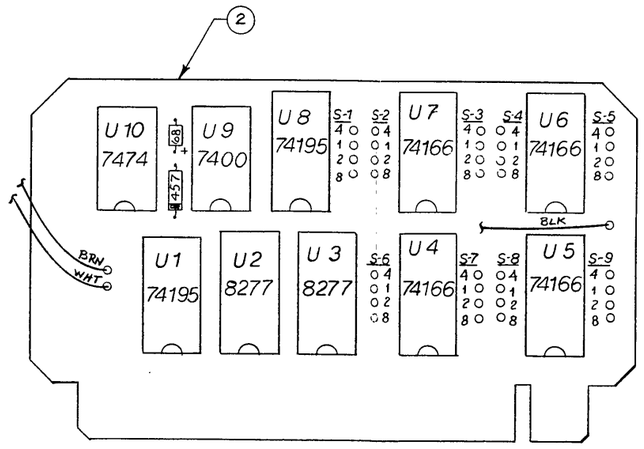
BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3964

REV	ECN	BY	DATE	APP
B	838		9-30-82	
C	ECO # 7912		11-28-83	
D	ECO # 8400		12-6-85	
E	ECO # 8091		7-9-87	



WIRING CHART FOR SWITCHES 1 THRU 9					
SWITCH	WIRE COLOR	PIN No.S	FROM	TO	PIN No.S
S-1	BROWN	8 2 1 4	SCANNER BD ASSY	S-1 FRONT PANEL	8 2 1 4
S-2	RED	8 2 1 4		S-2 FRONT PANEL	8 2 1 4
S-3	ORN	8 2 1 4		S-3 FRONT PANEL	8 2 1 4
S-4	YEL	8 2 1 4		S-4 FRONT PANEL	8 2 1 4
S-5	GRN	8 2 1 4		S-5 FRONT PANEL	8 2 1 4
S-6	BLUE	8 2 1 4		S-6 FRONT PANEL	8 2 1 4
S-7	VIO	8 2 1 4		S-7 FRONT PANEL	8 2 1 4
S-8	GRAY	8 2 1 4		S-8 FRONT PANEL	8 2 1 4
S-9	WHT	8 2 1 4	SCANNER BD ASSY	S-9 FRONT PANEL	8 2 1 4
S-10 CONNECTS AS SHOWN BELOW					





4. SOLDER LUG IS TO BE ASSEMBLED WITH S-1, NEXT TO FRONT PANEL.

3. THIS JUMPER WIRE IS A CONTINUOUS PIECE OF 24 AWG BUSS WIRE TINNED, RUNNING BETWEEN THE DOUBLE CONTACTS OF THE SWITCH COMMON TERMINAL. THE BUSS WIRE IS COVERED WITH PIECES OF FIBERGLASS SLEEVING BETWEEN SWITCHES.

2. WIRE HOOK-UP FOR ITEM 3 TO BE AS FOLLOWS:

POST 1 ORANGE
POST 2 YELLOW
POST 3 BLACK
} WIRE TO BE TWISTED TOGETHER.

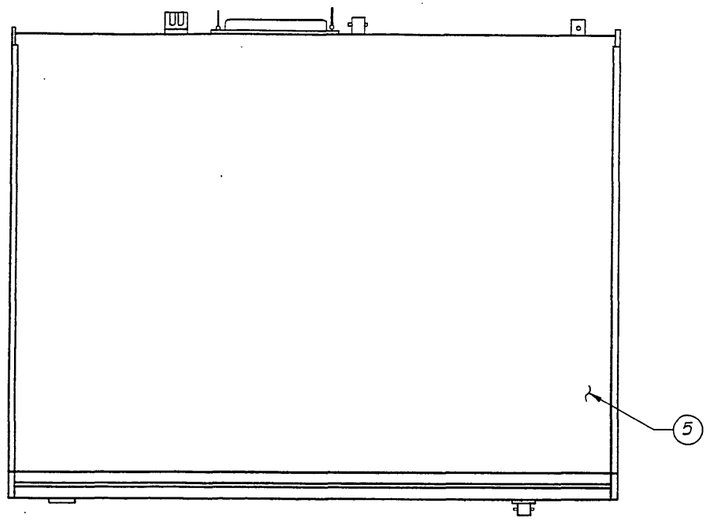
1. ALL WIRES TO POST 8 ON S-1 THRU S 9 TO COME FROM BOTTOM RIBBON CABLE ASSEMBLY # 1207-00-2554, WITH WIRES TO POSTS 2,1, # 4 TO COME FROM CABLES IN ASCENDING ORDER.

NOTE UNLESS OTHERWISE SPECIFIED

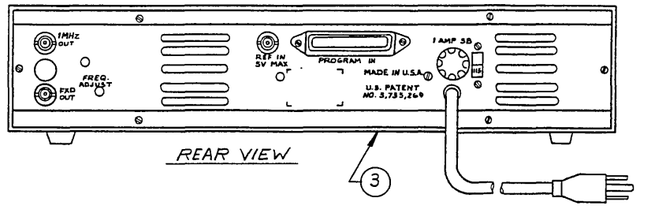
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN Mike Caldwell	DATE 1/19/87	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL N/A	PROJ ENGR		TITLE PANEL ASSY: FRONT
FINISH WAVETEK PROCESS N/A	RELEASE APPROV R.B. Brandt		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 5100-13	DWG NO 02-001-3113 REV E
	SCALE NONE	CODE IDENT 23338	

C 02-001-3113

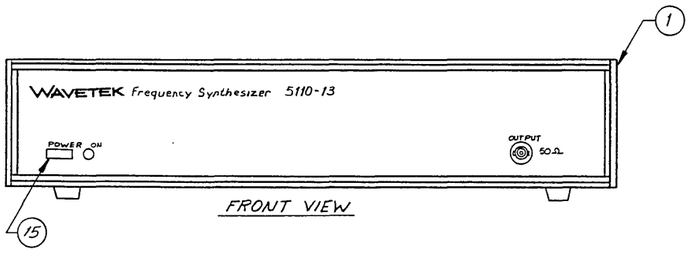
REV	ECO	BY	DATE	APP
A	RELEASE		3/21/88	DMD
B	9496	J.C. 7-4-88	7/5/88	DMD



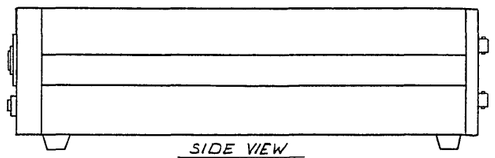
TOP VIEW



REAR VIEW



FRONT VIEW



SIDE VIEW

SEE SEPARATE PARTS LIST

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN Floyd Caldwell	DATE 2/4/88	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED R.H.-H.	3/29/88	TITLE FINAL ASSEMBLY FREQUENCY SYNTHESIZER
	PROJ. ENGR. R.Hoff	3/29/88	
FINISH WAVETEK PROCESS	RELEASE APPRDV. [illegible]	9/11/88	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/64 .XX ± .XXX ± ±1°		SIZE D | FSCM NO. 23338 | DWG. NO. 02-000-3123 | REV B; SCALE 1/2 | MODEL 5110-13 | SHEET 1 OF 1

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RACK MOUNT STYLE 11			002.3097	1
NONE	ASSY: SYNTHESIZER 5110-13			002.3123	1
NONE	COVER: TOP, BLACK	MPV-40464-14	BUKEY	303.0101	1
NONE	COVER: BOTTOM, BLACK	MPV-40465-14	BUKEY	303.0201	1
NONE	CONN: RIB PLUG W/HD 50 CNT	57-30500	CINCH	351.5001	1
NONE	PATCH CORD: 6" BLUE	445-3306-03-03-16	CAMBN	352.0101	1
NONE	KNOB: PUSH BUTTON BLK 20MM	B301	CRL	370.0713	1
NONE	INST MANUAL: 5110 1ST ED			800.0311	1

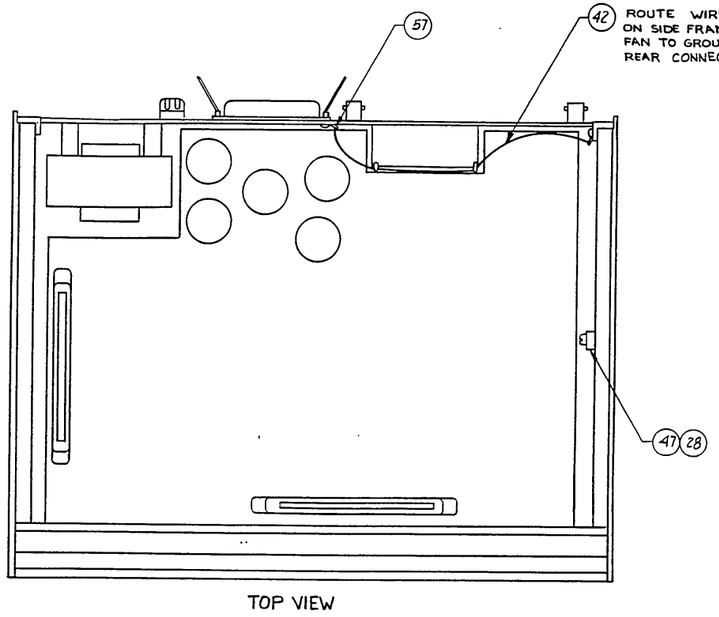
WAVETEK PARTS LIST	TITLE: TOP OPTION 5110-013, EXTENDS RANGE TO 3MHZ	ASSEMBLY NO. 000.3123	REV B

PAGE 1

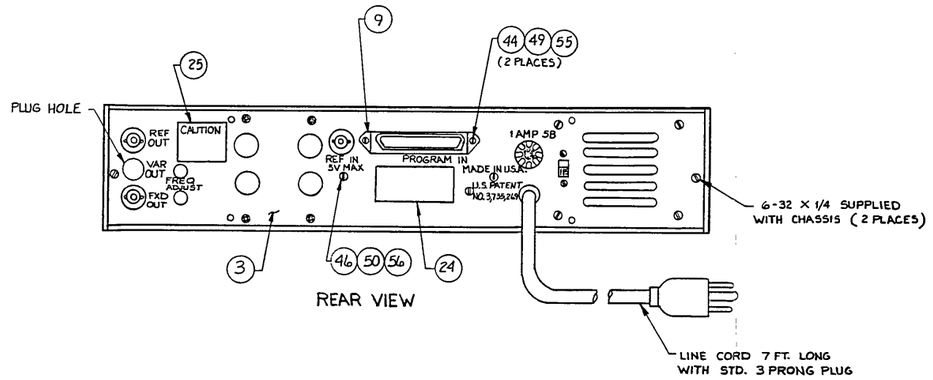
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST OPTION 013 FINAL ASSEMBLY
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		SIZE D · FSCM NO. 23338 · DWG. NO. 000.3123 · REV B
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±		SCALE · MODEL 5110-013 SHEET 1 OF 1

NOTE: UNLESS OTHERWISE SPECIFIED

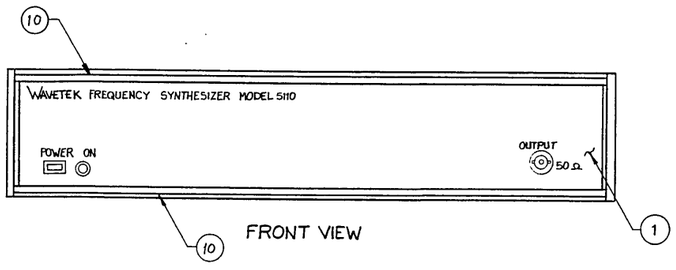
REV	ECN	BY	DATE	APP
A	RELEASE			
B	990	M.M.	11/20/78	BV
C	1248	BP	11/23/81	BV
D	7843	SD	1/8/87	
E	7857	SD		
F	7891	SD	1/8/87	RBG
G	7899	M.C.	3/10/87	RBG
H	8107	M.C. 3-18-87	3/20/87	RBG
J	8080	M.C. 4-28-87	7/14/87	RBG
K	8255	M.C. 6-12-87	7/27/87	RBG



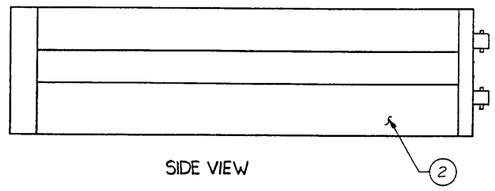
TOP VIEW



REAR VIEW



FRONT VIEW



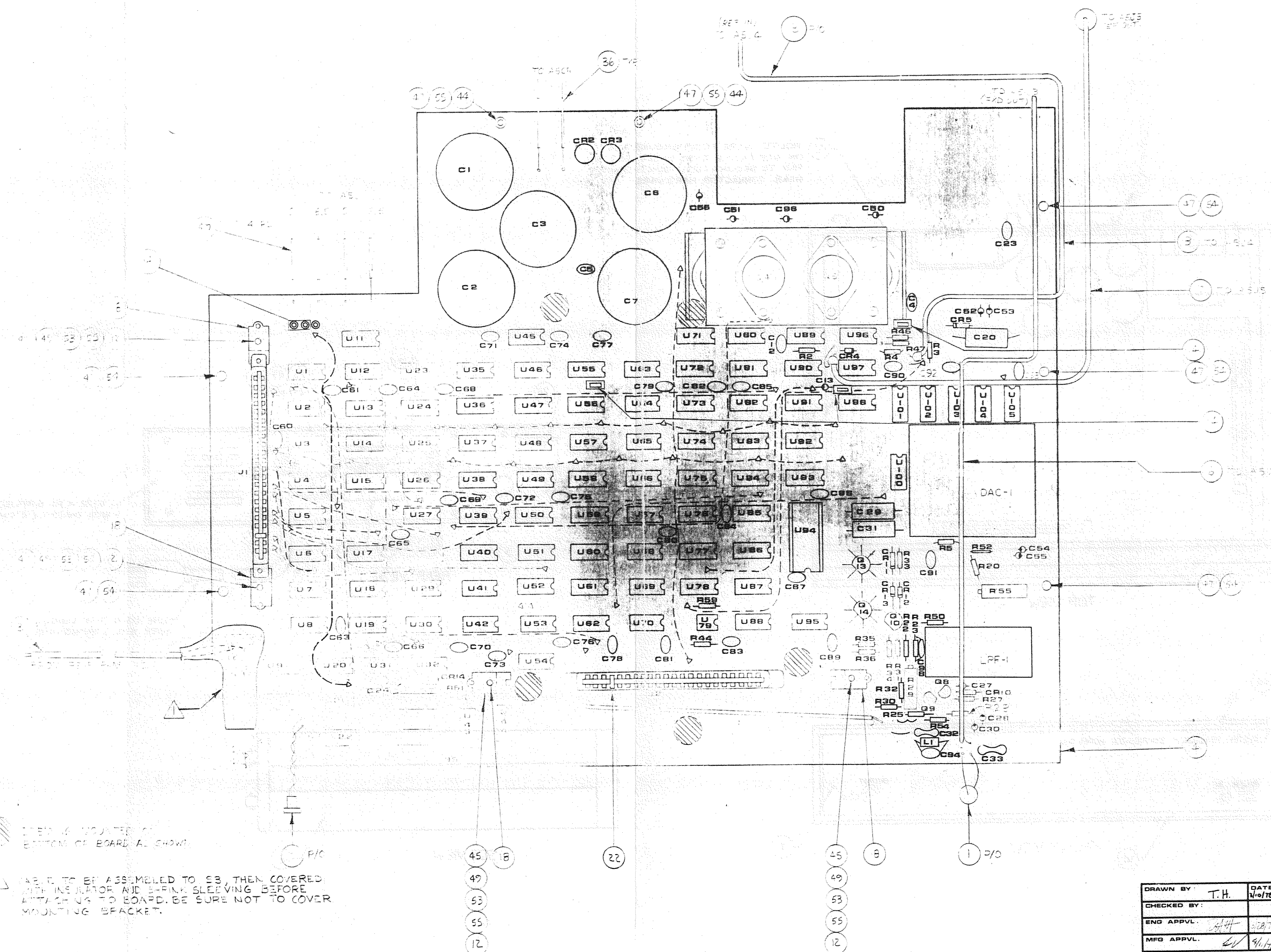
SIDE VIEW

SEE SEPARATE PARTS LIST

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN M.M. Abbott 2/6/87	WAVETEK SAN DIEGO • CALIFORNIA	
MATERIAL N/A	PROJ ENGR	TITLE FREQUENCY SYNTHESIZER 5110-13 SERIES III	
FINISH WAVETEK PROCESS N/A	RELEASE APPROV R. B. Brand	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030	
	DO NOT SCALE DWG	MODEL NO 5110-13	DWG NO 02-002-3123 REV K
	SCALE 1/2 X	CODE IDENT 23338	SHEET 1 OF 2

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASE			



[illegible] MOUNTED ON BOTTOM OF BOARD AS SHOWN

△ [illegible] TO BE ASSEMBLED TO S3, THEN COVERED WITH INSULATOR AND SHRINK SLEEVING BEFORE ATTACHING TO BOARD. BE SURE NOT TO COVER MOUNTING BRACKET.

DRAWN BY: T.H.	DATE 3/10/78	WAVETEK	
CHECKED BY:		Confidential property of WAVETEK SAN DIEGO INC not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above.	
ENG APPVL.	4/28/78		
MFG APPVL.	4/1/78		
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE: .XXX ± .005, .XX ± .01, X/X ± 1/64, ∠° ± 1°		TITLE: FREQUENCY SYNTHESIZER 5110-13 SERIES III	
		SIZE: D / DRAWING NO: 02 002-3123 / SCALE: FULL / SHEET 2 OF 2	REV: K

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
1	PANEL ASSEMBLY FRONT 5110			001.3110	1
2	SIDE FRAME ASSY SET			002.3067	1
3	PANEL ASSY REAR 5100			002.3086	1
NONE	LOCAL ATTENUATOR 5110			002.3166	1
4	MAINBOARD ASSY 5110-13			004.3123	1
6	SPK CABLE ASSY: SHLD RCD FMD 5100			009.0591	1
25	LABEL,SERIAL NUMBER/FILTERS & SYNTHESIZERS	FSS-8660	WVTK	1400-01-8660	1
NONE	SUPER KIT	2500-5110-02	WVTK	2500-5110-02	1
27	TY-WRAP	TY-523M	TB	2800-00-0006	3
10	TRIM: FRONT TOP SUPR/SNUB 512	MP4031B-4	BUKEY	307.0914	2
12	SPACER: SWITCH NYLON 1/16"	FW4-062	MICRO	349.2010	4
14	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	4
57	LUG: SOLDER ANGLED #6	1416-6	SMITH	359.0006	1

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110-13 | ASSEMBLY NO. 002.3123 | REV K | PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
16	BUMPER: MLD-PLAS .320X.635 GRY	SJ5027B1K	3M	361.9000	5
22	KEY: POLARIZ PC CONN IN-CONT	50-PK-1	CINCH	370.0301	2
25	LABEL: CAUTION FREQ. ADJ.			371.1001	1
28	TIE: CABLE NY NAT (CLAMP)	PLC1M-S4-M	PANDT	377.4002	1
34	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	6
35	WIRE: #18 AWG STR BLACK	1118/19	WEICO	378.1404	2.5000
42	WIRE: #22 AWG STR BLACK	1122	WEICO	378.1604	10
36	WIRE: #24 AWG STR BLACK	1124	WEICO	378.1704	2
37	WIRE: #24 AWG STR BROWN	1124	WEICO	378.1714	6
38	WIRE: #24 AWG BON BROWN	1524	WEICO	378.1715	12
39	WIRE: #24 AWG STR ORANGE	1124	WEICO	378.1734	20

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110-13 | ASSEMBLY NO. 002.3123 | REV K | PAGE 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
40	WIRE: #24 AWG STR YELLOW	1124	WEICO	378.1744	8
41	WIRE: #24 AWG STR GREEN	1124	WEICO	378.1754	8
30	SLVNG: PLASTIC FBRGLS #18AWG			378.5181	4
NONE	M SCR: ST ZN PH 2-56 X 5/16 PH			381.2052	2
44	M SCR: ST ZN 4-40 X 3/8 PH			381.4062	4
45	M SCR: ST ZN PHP 4-40X1 PH			381.4162	4
46	M SCR: ST ZN PH 8-32X1/2 PH			381.8082	2
47	M SCR: ST ZN SL 6-32X3/8FPH TYPE F			386.6061	6
NONE	NUT: HEX SS 2-56X5/32 AF			387.2051	2
49	NUT: HX ST ZN 4-40X1/4 AF			387.4080	6
50	NUT: HX ST ZN 8-32X1/4 AF			387.8080	2

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110-13 | ASSEMBLY NO. 002.3123 | REV K | PAGE 3

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
53	WASHER: FLAT STL ZN #4			388.0040	6
54	WASHER: FLAT STL #6 .147ID .312OD .028THK			388.0060	5
NONE	WASHER: SPLT LK STNLS #2			388.1022	2
55	WASHER: EXT LK STL ZN #4			388.1041	8
56	WASHER: EXT LK STL ZN #8			388.1081	2
NONE	WASHER: FLT NYL #4 1/4D X 1/8T			388.3040	2
51	NUT: CLINCH STL ZN 4-40 .031 THK			389.1002	2
NONE	BKT: ANG BR ZN 3/8 X3/8	723	ZIER	389.3001	3
61 NONE	SHRINK TUBING, 1/8 IN	FIT-221-1/8	ALPHA	6001-20-2000	3

WAVETEK PARTS LIST | TITLE: ASSY: SYNTHESIZER 5110-13 | ASSEMBLY NO. 002.3123 | REV K | PAGE 4

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST OPTION 013 CHASSIS
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX ± .XXX ± ±		SIZE D | FSCM NO. 23338 | DWG. NO. 002.3123 | REV K; SCALE | MODEL 5110-013 | SHEET 1 OF 1

DATE	SYM	REVISION RECORD	AUTH.	GR.	CK.
1/14/87	A	ERO 9398	C.C.		

SHEET 1 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO, CALIFORNIA		
DECIMAL .XXX ±.010 .XX ±.02		SCALE	DRAWN BY C. CONTRERAS
FRACTIONAL ± 1/64	TITLE TIMING LOGIC 5110-13		
ANGULAR ±	DATE 1/14/87	DRAWING NUMBER 03-004-3123	REV A

DATE/MTH	REVISION RECORD	AUTH.	DR.	CK.
	SHT 1			

OLD No. 510466-2

Z1 27-5
Z0 27-9
JK 6
2 MHZ
1 MHZ
A5J1 -24 -23 -22 -21
512 KHZ
256 KHZ
CLK3 51-6
A5J1 -20 -19 -18 -17
128 KHZ
64 KHZ
32 KHZ
16 KHZ
A5J1 -16 -15 -14 -13
8 KHZ
4 KHZ
2 KHZ
1 KHZ
PE 70-6
A5J1 -49 -48 -47 -46
512 Hz
256 Hz
CARRY JUMPER
TEST
NORMAL
CLK2 51-12
A5J1 -45 -44 -43 -42
128Hz
64 Hz
32 Hz
16 Hz
A5J1 -41 -40 -39 -38
8 Hz
4 Hz
2 Hz
1 Hz
A5J1 -37 -36 -35 -34
512 mHz
256 mHz
CLK1 60-8
A5J1 -33 -32 -31 -30
128 mHz
64 mHz
32 mHz
16 mHz
A5J1 -29 -28 -27 -26
8 mHz
4 mHz
2 mHz
1 mHz
QD
QH
QUAD
MSB
SGN
KHZ CARRY
HZ CARRY
mHZ CARRY
SGN 90-2
CLK 7-6
RCLK 89-6
VCC
R44 1K
A5J1-25
D4
M8 85-12
M7 85-2
M6 78-7
M5 69-7
M4 78-5
M3 78-6
M2 69-4
MI 69-5
M0 69-6
5VCMN

DESCRIPTION OF IC'S			
IC NO.	PART NO.	PINS TO VCC	PINS TO GND
1	122 – 0106	16	8
2	122 – 7483	5	12, 13
3	122 – 0106	16	8, 9
11	128 – 2330	14	
12	122 – 0106	16	8
13	122 – 7483	5	12
14	122 – 0106	16	8, 9
15	122 – 7483	5	4, 11, 12, 16
23	122 – 0106	16	8
24	122 – 7483	5	3, 12, 16
25	122 – 0106	16	8, 9
26	122 – 7483	5	1, 8, 11, 12
35	122 – 0106	16	8
36	122 – 7483	5	12
37	122 – 0106	16	8, 9
38	122 – 7483	5	4, 11, 12, 16
45	128 – 2330	14	
46	122 – 0106	16	8
47	122 – 7483	5	12
48	122 – 0106	16	8, 9
49	122 – 7483	5	1, 8, 11, 12
55	122 – 0106	16	8
56	122 – 7483	5	3, 12, 16
57	122 – 0106	16	8, 9

DESCRIPTION OF IC'S			
IC NO.	PART NO.	PINS TO VCC	PINS TO GND
58	123 – 7474	14	7
59	122 – 9014	16	8
60	122 – 7440	14	7
63	122 – 0106	16	8
64	122 – 7483	5	12
65	122 – 0106	16	8, 9
66	122 – 7483	5	4, 11, 8, 16
67	122 – 9014	16	8
68	122 – 7483	5	1, 11, 12, 13
71	128 – 2330	14	
72	122 – 0106	16	8
73	122 – 7483	5	12
74	122 – 0106	16	8, 9
75	122 – 7483	5	1, 8, 11, 12
76	122 – 9014	16	8
77	122 – 7483	5	1, 4, 8, 11, 12
79	120 – 4451	14	4
80	122 – 0106	16	8
82	122 – 7483	5	12
83	123 – 7474	14	7
84	122 – 9014	16	8
95	122 – 7440	14	7
98	122 – 7474	14	7

○ REAR PANEL CONNECTOR
⊗ INTERNAL SIGNAL CONNECTION

SHEET 2 OF 5

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE	DRAWN BY APPROVED BY
FRACTIONAL ± 1/64	TITLE FREQUENCY REGISTER & SAMPLE GENERATION LOGIC 5110-13		
ANGULAR ±	DATE	DRAWING NUMBER 03-004-3123	REV A

DATE	SYM	REVISION RECORD	AUTH	DR.	CK.
		SHT 1			

OLD No 510466-3

DESCRIPTION OF IC'S			
IC NO	PART NO	PINSTOVCC	PINS TO GND
69	122-0106	16	8, 9
78	122-0106	16	8, 9
81	122-7493	5	2, 3, 10
85	122-7474	14	7
86	122-7400	14	7
87	122-7410	14	7
88	122-7410	14	7
89	122-0100	14	7
90	122-7474	14	7
91	122-9014	16	8
92	122-9014	16	8
93	122-9014	16	8
94	129-3000	24	12, 20
95	122-7440	14	7
96	122-7413	14	7
97	122-7437	14	7
98	122-7474	14	7
100	124-7474	14	7
101	124-7474	14	7
102	124-7474	14	7
103	124-7474	14	7
104	124-7474	14	7
105	124-7474	14	7
79	120-4451	14	4

NOTES:

1. OMIT C23 ON OPTION -01 UNITS.
2. PIN NUMBERS ON XTAL Y1 OUTSIDE PARENTHESIS REFER TO STANDARD XTAL. PIN NUMBERS INSIDE PARENTHESIS REFER TO HIGH STABILITY XTAL OPTION -01.

DAC 1

INPUT REFERENCE SELECTOR

OUTPUT REFERENCE SELECTOR

SHEET 3 OF 5:

TOLERANCES (EXCEPT AS NOTED) DECIMAL .XXX .010 .XX .02 FRACTIONAL ± 1/64 ANGULAR ±	WAVETEK SAN DIEGO, CALIFORNIA	SCALE DRAWN BY CC APPROVED BY
	TITLE DAC & FREQUENCY REF. 5110-13	
	DATE DRAWING NUMBER 03-004-3123	REV A

SIZE	DWG NO	REV
D		

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
SEE SHT 1				

SELECT IN TEST.

C98 430 Pf NOMINAL

IN OUT LPF1 COM

R23 115

R22 30

+15 VDC

C28 .1 Uf

C29 50 Uf

R27 2.2K

R28 2.2K

R33 2.2K

6.6

9.6

CR10 20 V

C27 10 Uf

1.0

Q13

+0.4

CR11

R35 10

+0.3

CR12

R50 30

R5 560K

A4R1

Q8

Q9

R25 82

0

R32 1.5K

0

J2-1

ATTENUATOR ASSEMBLY

J2-22

J2-21

C94 180 Pf

L1 2.2Uh

C32 820 Pf

C33 820Pf

A5 J2 FIXED OUT

A4 J1 OUT PUT

OUTPUT FILTER

R30 100

-0.7

-0.3

CR13

R36 10

J2-2

-0.4

Q14

-1.0

Q10

-14.0

R54 1.5 K

CW

R29 5K

-13.4

R31 560

R34 47

OUTPUT AMPLIFIER

-15 VDC

C30 .1 Uf

C31 50 Uf

OFST 15

OUT 14

-15V 12

+15V 11

GND 13

R20 10 K

R55 5K

-15VDC

+15VDC

C55 0.1Uf

C54 0.1Uf

15V CMN

5V CMN

PART OF DAC 1

C20 .1 Uf

CHASSIS

DRAWN BY: Abro Contreras	DATE	
CHECKED BY:		
ENG APPVL.		
MFG. APPVL.		

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:

.XXX ±

.XX ±

X/x ± 1/64

∠° ± 1°

WAVETEK SAN DIEGO • CALIFORNIA

TITLE

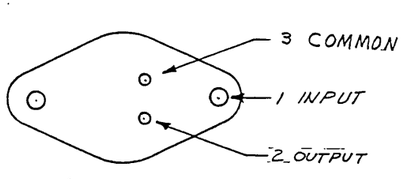
OUTPUT AMPLIFIER 5110-13

SIZE	DRAWING NO.	REV
D	03 004-3123	A

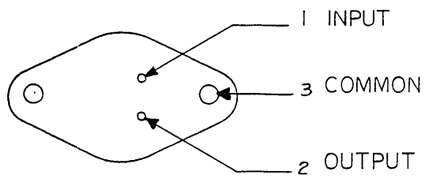
SCALE ~ SHEET 4 OF 5

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
		SHT 1			

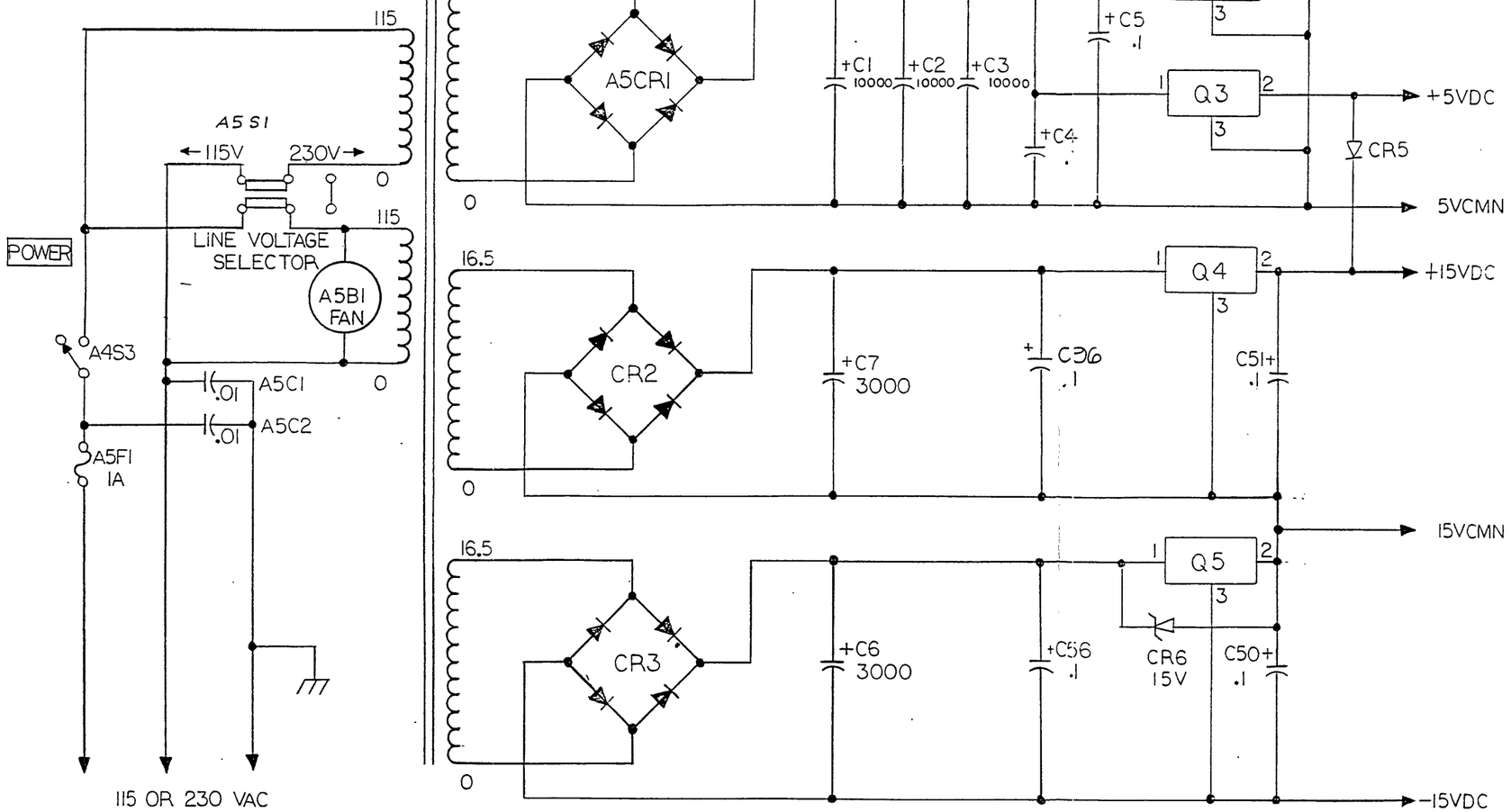
OLD No. 510466-5



Q4 & Q5
WHEN 120-0153
IS USED
BOTTOM VIEW



BOTTOM VIEW
Q1→Q5



NOTES:

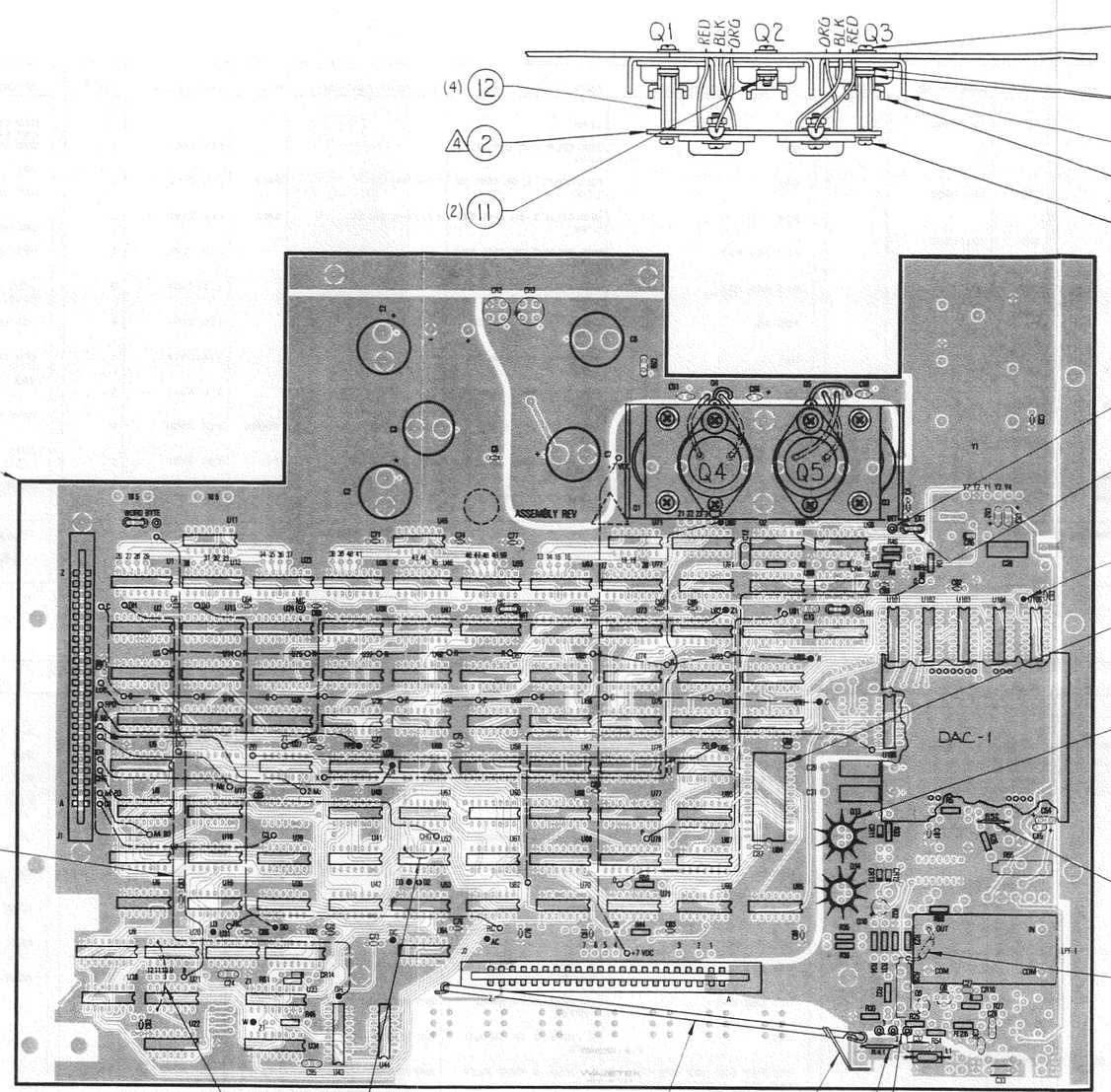
1. REFERENCE DESIGNATIONS ARE ABBREVIATED FOR ASSY A1
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
3. CR6 PRESENT ON OPTION -01 UNITS ONLY

SHEET 5 OF 5: POWER

TOLERANCES (EXCEPT AS NOTED)	WAVETEK SAN DIEGO • CALIFORNIA		
DECIMAL .XXX .010 .XX .02		SCALE —	DRAWN BY AC / APPROVED BY
FRACTIONAL ± 1/64	TITLE: POWER SUPPLY 5110-13		
ANGULAR ±	DATE	DRAWING NUMBER 03-004-3123	REV A

REV	ECO
A	RELEASE
B	7857
C	8080
D	8255
E	9046

REV	ECO	BY	DATE	APP
F	9173 REDRAWN	CC	9/11/90	RJM
G	9496	CC	2-28-91	DMD



(4) 12
△4 2
(2) 11
10 (6)
13 (10)
14 (16)
6 (3)
21 (3)
9 (4)
14 REF
13 REF
4 (15)
20 (4)
4 REF
5 REF FARSIDE SEE SHT. 2
U94
DAC-1
7 (2)
(4) 15
16 (2)
17 (2)
C78 REF FARSIDE SEE SHT. 2
LPF-1
C94 △6
L1
.35 HGT.
1
△3 8
8 REF FARSIDE SEE SHT. 2
△1 3
△2 18
REF 16
REF 17
8 REF FARSIDE SEE SHT 2
4 REF

△6 SOLDER C94 ONTOP TO L1 AS SHOWN.

5. SOLDER ALL ELECTRICAL COMPONENTS INSERTED INTO BOARD.

△4 SOLDER COLORED WIRES FROM ITEM 2 TO BOARD AS DESIGNATED.

△3 ROUTE WIRE (ITEM 8) TO ALL DIFFERENT DESIGNATED PINS & ATTACH.

△2 SUPPORT CABLE ASSY BY SOLDERING 18 AWG BUSS WIRE (ITEM 18) TO CABLE ASSY & BOARD AS SHOWN.

△1 INSERT CABLE ASSY WIRE INTO BOARD FLUSH TO SLEEVING & INSERT ATTACHED GROUND WIRE INTO BOARD BOTH ENDS AS SHOWN & SOLDER.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN MALOS CONTRERAS	DATE 9/30/87	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED D BUSSELL	9/30/87	TITLE: MAINBOARD ASSEMBLY
FINISH WAVETEK PROCESS	PROJ. ENGR K.B.	10/87	
	RELEASE APPROV. R.B.G.	10/16/87	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES XX ± XXX ±		SIZE D · FSCM NO. 23338 · DWG. NO. 02-004-3123 · REV G · SCALE 1:1 · MODEL 5123

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C23 C4 C5 C60 C61 C62 C63 C64 C65 C66 C68 C69 C70 C71 C72 C73 C74 C75 C76 C77 C78 C79 C80 C81 C82 C83 C84 C85 C87 C88 C89 C90 C91 C92 C93	CAP,MOND, 0.1UF 50V Z5U	SR215E104ZAT	AVX	100.4102	35
C12	CAP MICA FX VAL DIP 22PF 5% -20+100PPM/C 500V	CM05ED220J03	CDE	101.0220	1
C24	CAP FX VAL,DP MICA 150PF 5% 0 TO +70PPM/C 500V	CM05FD151J03	CDE	101.1150	1
C32 C33	CAP MICA FX VAL DIP 820PF 1% 0 TO+70PPM/C 300V	CD19FD821F03	CDE	101.1821	2
C20	CAP,PLSTR, .10UF 10% 600V	DMT6P1	C-D	105.4100	1
C28 C30 C50 C51 C52 C53 C54 C55 C56 C96	CAP,TANT, .10UF 20% 35V	T368A104M035A$	KEMET	109.4100	10
C13 C27	CAP,TANT, 10UF 20% 20V	T368B106M025A$	KEMET	109.6100	2
C29 C31	CAP,ELECT, 47UF 20% 63V	47/63-81009	SIEM	109.6470	2
C95	CAP,TANT, 68UF 20% 6V	T368B686M006AS	KEMET	109.6680	1
C6 C7	CAP,ELECT, 3000UF 50V	3487AE332M050KM	MEPCO	109.8300	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3123 | ASSEMBLY NO. 1208-00-2571 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	(PC)				
C1 C2 C3	CAP,ELECT, 10000UF 15V (PC)	3487BD103M016KM	MEPCO	109.9100	3
R30	RES,MFLM 100 OHM 1% 1/10W T2	RN55C1000F	ENOX	110.1001	1
R23	RES,MFLM 115 OHM 1% 1/8W T0	RN55C1150F	UNCEM	110.1150	1
R32	RES,MFLM 1.50K 1% 1/10W T2	5063JD1K500F	MEPCO	111.1501	1
R2	RES,MFLM 2.00K 1% 1/10W T2	RN55C2001F	UMCEM	111.2001	1
R35 R36	RES,CFLM 10 OHM 5% 1/4W			116.0101	2
R22 R50	RES,CFLM 30 OHM 5% 1/4W			116.0301	2
R34	RES,CFLM 47 OHM 5% 1/4W			116.0471	1
R25	RES,CFLM 82 OHM 5% 1/4W			116.0821	1
R4	RES,CFLM 100 OHM 5% 1/4W	CF1/4-100OHM,5%	STKPL	116.1101	1
R59	RES,CFLM 390 OHM 5%			116.1391	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3123 | ASSEMBLY NO. 1208-00-2571 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	1/4W				
R31	RES,CFLM 560 OHM 5% 1/4W			116.1561	1
R44	RES,CFLM, 1.0K OHM 5% 1/4W	CF-071K-5%	DALE	116.2101	1
R54	RES,CFLM 1.5K OHM 5% 1/4W	CF1/4-1.5K.5%	DALE	116.2151	1
R27 R28 R33	RES,CFLM 2.2K OHM 5% 1/4W			116.2221	3
R45 R46 R47	RES,CFLM 3.3K OHM 5% 1/4W			116.2331	3
R20 R3	RES,CFLM 10K OHM 5% 1/4W			116.3101	2
R61	RES,CFLM 47K OHM 5% 1/4W			116.3471	1
R5	RES,CFLM 560K OHM 5% 1/4W			116.4561	1
R29 R55	RES, VAR CMT 5.0K 3/4" RECT	3006P1-502	BOURN	118.2500	2
U79	U: DUAL PRPHL DRIVER (75451)	SN75451N-3	TI	120.4451	1
NONE	ASSY PC BD PREPPED	5110-2572	WVTK	1208-00-2572	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3123 | ASSEMBLY NO. 1208-00-2571 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	5110-3123				
U31 U89	U: MNSTBL MVBRTR (74121)	N74121N-B	SIG	122.0100	2
U1 U12 U14 U23 U25 U3 U34 U35 U37 U46 U48 U5 U53 U55 U57 U63 U65 U69 U72 U74 U78 U80	U: 4 BT SHIFT REGISTER (74195)	SN74195N-3	TI	122.0106	22
U18 U22 U30 U40 U61 U86	U: QUAD 2 IN NAND GATE	SN7400N-3	TI	122.7400	6
U50 U6	U: HEX INVERTER	DM7404N/A+	NSC	122.7404	2
U4 U51 U52 U62 U87 U88	U: TRIPLE 3 IN NAND GATE	SN7410N-3	TI	122.7410	6
U96	U: DL 4 IN NAND SMT TOR	SN7413N/P3	TI	122.7413	1
U70 U97	U: QUAD 2 IN NAND BUFFER	SN7437N-3	TI	122.7437	2
U19 U60 U95	U: DUAL 4 IN NAND BUFFER	DM7440N/A+	NSC	122.7440	3
U39	U: DUAL 2 IN 2W AOI GATE	SN7451N-3	TI	122.7451	1
U10 U17 U20 U27 U29 U41 U42 U44 U54 U8 U85 U90 U98	U: DUAL D TYPE FLIP FLOP	SN7474N-3	TI	122.7474	13

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3123 | ASSEMBLY NO. 1208-00-2571 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
U13 U15 U2 U24 U26 U36 U38 U43 U47 U49 U56 U64 U66 U68 U73 U75 U77 U82	U: 4 BIT FULL ADDER	N7483N-B	SIG	122.7483	18
U81	U: 4 BIT COUNTER	N7493N-B	SIG	122.7493	1
U59 U67 U76 U84 U91 U92 U93	U: QD XOR GATE INVERT OUTPUT	9014DCQB	FAIR	122.9014	7
U32 U33 U7 U9	U: QUAD NOR GATE			122.9015	4
U58 U83	U: DUAL D TYPE FLIP FLOP	DM74H74N/AT	NSC	123.7474	2
U100 U101 U102 U103 U104 U105	U: DL D TYPE FLIP FLOP (SHTKY)	N74S74N-B	SIG	124.7474	6
U11 U21 U45 U71	U: PULL UP NET 3.3K 2% X13	4114R-002-332	BOURN	128.2330	4
CR2 CR3	SIL FWB 50PIV 1.5A	PF-05	EDI	130.0140	2
CR5	SIL RCT 200PIV 1A (1N4003)			130.2110	1
CR10	SL ZR 20V 5% 400MW (1N968B)			131.0200	1
CR11 CR12 CR13 CR14 CR4	SL LW LK 70PIV 200MW (1N457)			132.0457	5
Q8,9	Q: SIL NPN MATCHED PAIR			134.0065	1

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3123 | ASSEMBLY NO. 1208-00-2571 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q13	Q: SIL NPN (2N2219)	2N2219	MOT	134.2219	1
Q10	Q: SIL NPN (2N2222)	2N2222A	MOT	134.2222	1
Q14	Q: SIL PNP (2N2905A)	2N2905	MOT	136.2905	1
L1	L: FXD 2.2 UHY +/-10% SHLD	1641-222	DELVN	150.9220	1
J1	CONN,22 POS EDGE,PC MT,SGL READOUT	009-00179-6	TRW	2100-02-0245	1
J2	CONN,44 POS EDGE,PC MT,DBL READOUT	009-00341-1	TRW	2100-02-0246	1
NONE	SOCKET: IC 24PIN DIP ST	ICNZ46-540	ROBNU	353.2402	1
NONE	CONN: TERM PIN .025 WW (2END)	W239-025-500Q	A/S	354.0007	50
NONE	SPACER: TXSTR LEAD, NYL, LOW	10414	MILRO	376.2108	2

WAVETEK PARTS LIST | TITLE: ASSY, PRE WAVE LOAD 5110-3123 | ASSEMBLY NO. 1208-00-2571 | REV A

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE
MATERIAL	CHECKED	
	PROJ. ENGR.	
FINISH WAVETEK PROCESS	RELEASE APPROV.	
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± .XXX ± ±	

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: PARTS LIST OPTION 013 MAINBOARD

SIZE	FSCM NO.	DWG. NO.	REV
D	23338	004.3123	G

SCALE | MODEL 5110-013 SHEET 1 OF 2

REV	ECO	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
2	SPK REGULATOR ASSY 5100			004.3030	1
DAC-1	CONVERTER D/A 10 BIT			004.3056	1
3	SPK CABLE ASSY: SHLD RGD FMD 5100			009.0590	1
NONE	SCHEMATIC, TIMING LOGIC PCB	03.004.3123	WVTK	03.004.3123	1
C94	CAP FX VAL,DP MICA 180PF 5% 0 TO +70PPM/C 500V	CM05FD181J03	CDE	101.1180	1
C98	CAP MICA FX VAL DIP 430PF 5% TO+70PPM/C 500V	CD15FD431J03	CDE	101.1430	1
Q1 Q2 Q3	Q: P.V. REG 5V 5% 1A TO-3	LM309K-STEEL	NSC	120.0051	3
1	ASSY, PRE WAVE LOAD 5110-3123	5110-2571	WVTK	1208-00-2571	1
U94	U: ROM 512X8 CST SINE (SIG)	N82S115N	SIG	129.3000	1
LPF-1	FILTER: LOW PASS 0-3 MHZ	00.165.3002	WVTK	165.3002	1
6	HEATSINK, TO 3, BASE, BLK ANDZ	6104B	THERM	2800-11-0032	3

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY 5110-13	004.3123	G

PAGE 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
11	NUT: HX ST ZN 4-40X1/4 AF			387.4080	5
13	WASHER: FLAT STL ZN #4			388.0040	10
14	WASHER: INT LK STL ZN #4			388.1040	16
15	WASHER: FLAT NYL #2X.250X.032			388.3020	4
12	SPR: THD 3/16HX 4-40X3/4	1636A	KEYST	389.2005	4

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY 5110-13	004.3123	G

PAGE 3

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
21	HEATSINK, TO 3, TOP, GLD CHR	6104C	THERM	2800-11-0033	3
20	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352.0201	4
4	SOCKET: JUMPER	450-3704-01-03-00	CAMBN	353.0103	15
5	CONN: TERM PIN .025 WW (NAIL)	W98-025-560-GH-GOLD	A/S	354.0003	16
7	HEAT SINK: TO-8 ROUND	207CB	WAKE	367.0400	2
18	WIRE: BUSS TINNED #18 AWG	W1818	WEICO	378.0400	1.6
16	WIRE: BUSS HD DWN TND #20 AWG	W2020	WEICO	378.0500	1.3
8	WIRE: #30 AWG SLD KYN BLUE			378.1961	15
17	SLVNG: TEFLON #20AWG			378.5202	.95
19	SLVNG: PLASTIC FBRGLS #22AWG			378.5221	.3
9	M XCR: ST ZN SL 4-40X3/8 PH			380.4062	4
10	M SCR: ST ZN SL 4-40X1/2 BH			380.4081	6

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	MAINBOARD ASSY 5110-13	004.3123	G

PAGE 2

NOTE. UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	CHECKED		TITLE: PARTS LIST OPTION 013 MAINBOARD
	PROJ. ENGR.		
FINISH WAVETEK PROCESS	RELEASE APPROV.		
DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±		SIZE D · FSCM NO. 23338 · DWG. NO. 004.3123 · REV G · SCALE · MODEL 5110-013 · SHEET 2 OF 2

APPENDIX B

OPTION 020, TTL OUTPUT

B.1 GENERAL

Option 020 provides a TTL compatable square wave signal at BNC labeled TTL OUTPUT. The TTL output maintains the same frequency range and resolution as the standard Model 5100 and 5110 outputs. The TTL OUTPUT BNC replaces the auxiliary VAR OUT BNC on the Model 5100.

B.2 OPERATION AND CIRCUIT DESCRIPTION

The option 020 circuit board assembly (P/N 004-3098) is attached to the inside, center portion of the instrument left side panel.

Refer to the following documents for additional information:

- Modification of the instrument for Option 20 TTL output. P/N 02-002-3050
- Schematic, Option 20 TTL Output. P/N 03-004-3098.
- Assembly, Option 20 TTL Output. P/N 02-004-3098.

The TTL output circuitry consists of an LM361 (high speed differential comparator) and a DM8830 (line driver, single-ended configuration), used with a shorting plug to select either the NON-INVERT or the INVERT output.

If required, use the following steps to obtain the complement of the main output at the TTL output.

1. Remove screws securing the top cover to the rear panel.
2. Slide the top cover toward the rear panel until the Option 020 board assembly is fully exposed.
3. Set the shorting plug to the required position.

Note

The shorting plug must be set between Output and NON-INV or Output and INV to provide a TTL output at the rear panel TTL OUTPUT BNC.

4. Replace the top cover and secure to the rear panel with screws removed in step 1.

The following is a partial list of the DM8830 electrical characteristics applicable to the Option 020:

Parameter	Conditions	Min	Typ	Max
Logical "1" output voltage	I out = − 0.8 mA	2.4V		
Logical "1" output voltage	I out = 40 mA	1.8V	3.3V	
Logical "0" output voltage	I out = + 32 mA		0.2V	0.4V
Logical "0" output voltage	I out = + 40 mA		0.22V	0.5V

5100 Manual Changes:

Page 1-1 Output Signals. Change second sentence of Variable Output description to read front panel BNC jack.

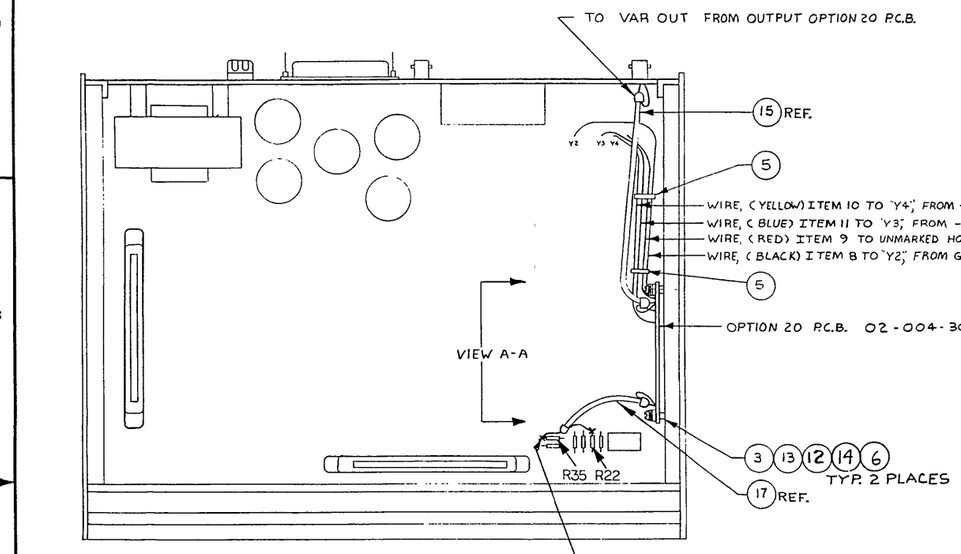
Documentation: Delete all reference to the rear panel VAR Output jack.

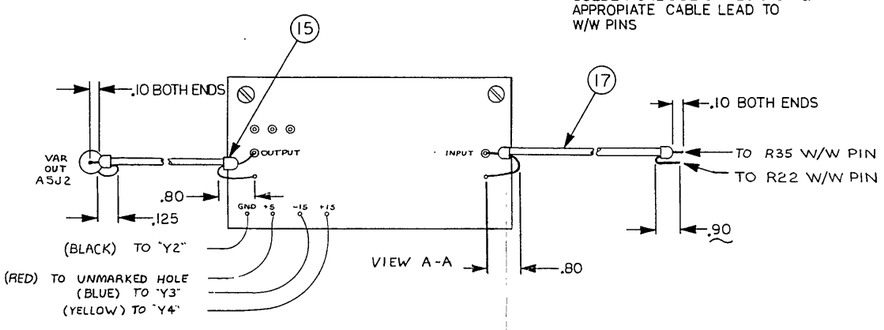
REV	ECN	BY	DATE	APP

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

SIZE	DWG NO	REV
C		

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASE		GV / [illegible]	4/11/79
B	926	Paul 5/16/78	GV / [illegible]	5/22/78
C	1016	M. McMinn	GV / [illegible]	3/22/79
D	1095	SAM 4-8-80	GV / [illegible]	4/18/80
E	1515	J.P. 3-7-83	R. DA / [illegible]	5/29/83





* ALL DIMENSIONS ARE MAX.

NOTE:
1) DELETE CABLE: COAXIAL 02-009-0591 BETWEEN MOTHERBOARD AND A5J2 FOR 5100 AND 5100-13.
2) MARK REAR PANEL VAR OUT BNC "TTL OUTPUT"
3) FOR 5110 AND 5110-13, INSTALL BNC JACK IN VAR OUT IN REAR PANEL (AFTER REMOVING PLUG)

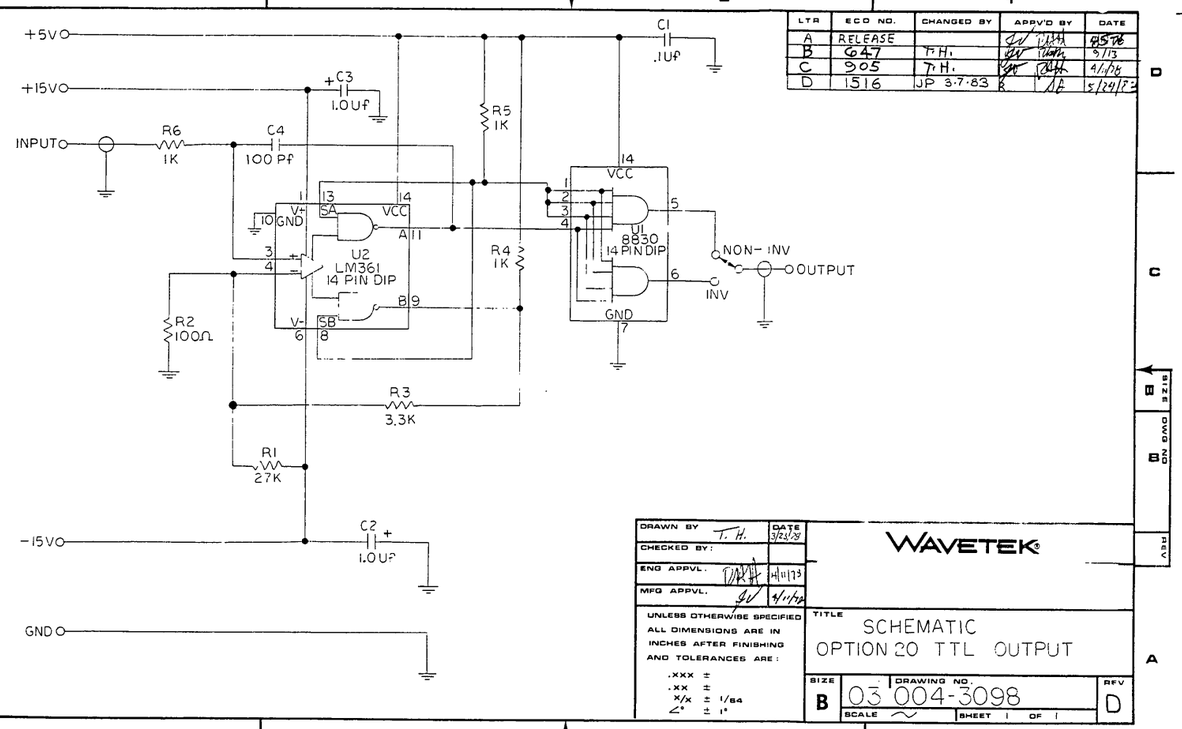
REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TTL ASSY: 5100-20			004.3098	1
NONE	TY-WRAP	TY-523M	TB	2800-00-0006	2
NONE	CONN: TERM PIN .025 WW (NAIL)	W98-025-560-GH-GOLD	A/S	354.0003	2
NONE	TIE: CABLE NY NAT (CLAMP)	PLC1M-S4-M	PANDT	377.4002	2
NONE	WIRE: #24 AWG BON BLACK	1524	WEICO	378.1705	6
NONE	WIRE: #24 AWG BON RED	1524	WEICO	378.1725	6
NONE	WIRE: #24 AWG BON YELLOW	1524	WEICO	378.1745	6
NONE	WIRE: #24 AWG BON BLUE	1524	WEICO	378.1765	6
NONE	M SCR: ST ZN PHP 6-32X1/2 BH			381.6081	2
NONE	WASHER: FLAT STL #6 .147ID .312OD .028THK			388.0060	2
NONE	WASHER: SPLT LK SS #6			388.1062	2
NONE	WASHER: FLT NYL #6 5/16D 1/16T			388.3060	2

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	OPT-20 5100	002.3050	E
		PAGE 1	

DRAWN BY: T.H.	DATE 4/3/78	WAVETEK
CHECKED BY:		
ENG. APPVL. [illegible]	4/11/79	
MFG APPVL. GV	4/11/79	
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE: .XXX ± .XX ± X/x ± 1/64 ∠° ± 1°	TITLE MODIFICATION OF 5IXX FOR OPTION-20 TTL OUTPUT	
	SIZE C / DRAWING NO 02-002-3050 / REV E	SCALE 1/2

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY & PARTS LIST OPTION 020 CHASSIS
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ±1° XX ± .030		
	DO NOT SCALE DWG		MODEL NO 5100/5110-020 / DWG NO 02-002-3050 / REV E
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

NOTE UNLESS OTHERWISE SPECIFIED



LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASE			4/5/78
B	647	T. H.		5/13
C	905	T. H.		4/1/82
D	1516	JP 3-7-83		5/24/83

DRAWN BY	T. H.	DATE 3/22/78
CHECKED BY:		
ENG APPVL.		4/11/78
MFG APPVL.		4/11/78

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:
.XXX ±
.XX ±
X/x ± 1/64
∠° ± 1°

WAVETEK

TITLE: SCHEMATIC OPTION 20 TTL OUTPUT

SIZE B | DRAWING NO. 03 004-3098 | REV D | SCALE ~ | SHEET 1 OF 1

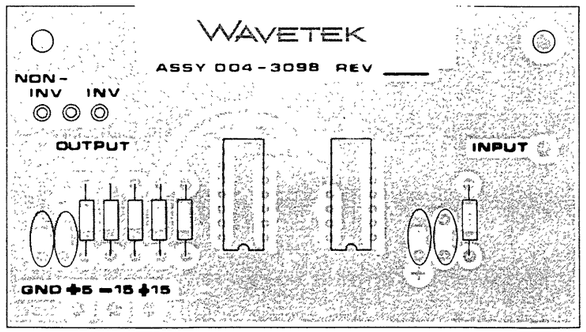
SIZE B DWG NO REV

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C1	CAP, CER, .1UF +80 -20% 16V	UK16-104	CRL	100. 4101	1
C4	CAP FX VAL, DP MICA 100PF 5% 0 TO +70PPM/C 500V	CM05FD101J03	CDE	101. 1100	1
C2 C3	CAP, TANT, 1. 0UF 20% 35V	T368A105M035AS	KEMET	109. 5100	2
R2	RES, CFLM 100 OHM 5% 1/4W	CF1/4-1000HM, 5%	STKPL	116. 1101	1
R4 R5 R6	RES, CFLM, 1. 0K OHM 5% 1/4W	CF-071K-5%	DALE	116. 2101	3
R3	RES, CFLM 3. 3K OHM 5% 1/4W			116. 2331	1
R1	RES, CFLM 27K OHM 5% 1/4W			116 3271	1
U2	U: ANALOG VOLT COMP (LM361)	LM361N	NSC	120. 3529	1
U1	U: DL DIF LINE DRIVER (8830)	DS8830N	NSC	120. 4830	1
NONE	ASSY, PC BD PREPPED 5100-3098	5100-2585	WVTK	1208-00-2585	1
NONE	SUPER KIT	2500-5100-05	WVTK	2500-5100-05	1

WAVETEK PARTS LIST | TITLE: TTL ASSY: 5100-20 | ASSEMBLY NO. 004. 3098 | REV D | PAGE 1

LTR	ECO NO.	CHANGED BY	APPV'D BY	DATE
A	RELEASE			
B	648			
C				



DRAWN BY	T. H.	DATE 3/22/78
CHECKED BY		
ENG APPVL.		
MFG APPVL.		

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE:

WAVETEK

TITLE: ASSEMBLY, OPTION 20 TTL OUTPUT (5100)

SIZE B | DRAWING NO. 02 004-3098 | REV | SCALE 2/1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CONN, PLUG: SHORTING	4612871-01-03-10	CTC	352. 0201	1
	SOCKET: JUMPER	450-3704-01-03-00	CAMBN	353. 0103	3

WAVETEK PARTS LIST | TITLE: TTL ASSY: 5100-20 | ASSEMBLY NO. 004. 3098 | REV D | PAGE 2

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK ... CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: SCHEMATIC, ASSEMBLY & PARTS LIST OPTION 020
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 5100/ 5110-020 | DWG NO 03/02-004-3098 | REV D
	SCALE		CODE IDENT 23338 | SHEET 1 OF 1