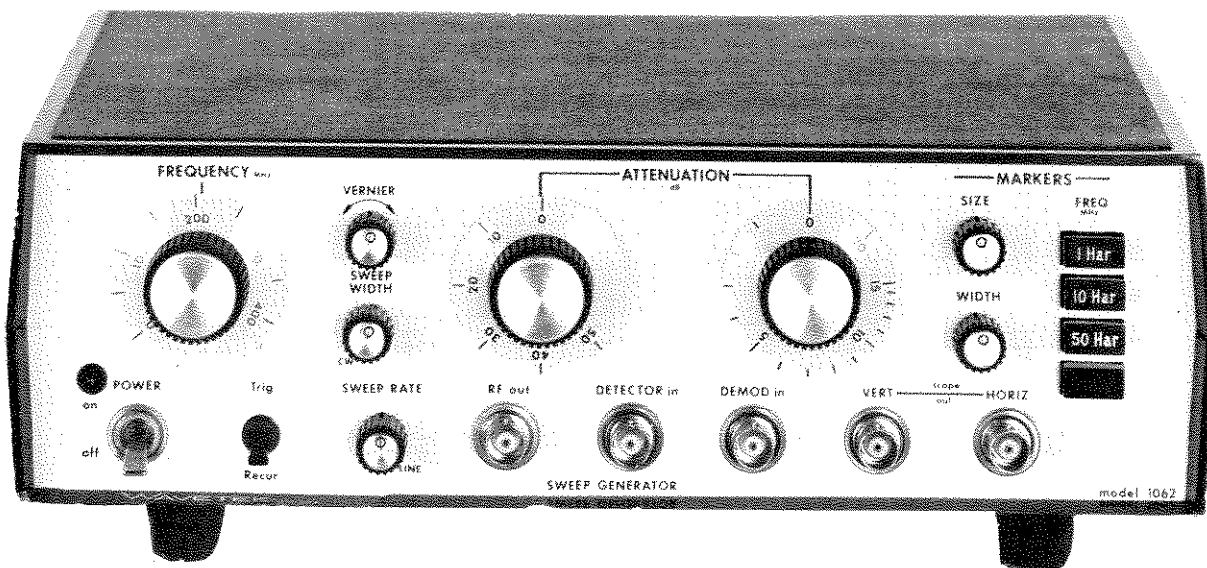


INSTRUCTION MANUAL
1060 SERIES
SWEEP/SIGNAL
GENERATOR



WAVETEK INDIANA INC.

66 N. 1ST. AVENUE, P.O. BOX 190
BEECH GROVE, INDIANA 46107
317-783-3221

WARRANTY

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

This warranty does not apply to any products repaired or altered by persons not authorized by Wavetek, or not in accordance with instructions furnished by Wavetek. If the instrument is defective as a result of misuse, improper repair, or abnormal conditions or operations, repairs will be billed at cost.

Wavetek assumes no responsibility for its product being used in a hazardous or dangerous manner either alone or in conjunction with other equipment. High voltage used in some instruments may be dangerous if misused. Special disclaimers apply to these instruments. Wavetek assumes no liability for secondary charges or consequential damages and, in any event, Wavetek's liability for breach of warranty under any contract or otherwise, shall not exceed the purchase price of the specific instrument shipped and against which a claim is made.

Any recommendations made by Wavetek for use of its products are based upon tests believed to be reliable, but Wavetek makes no warranty of the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for Wavetek any liability in connection with the sale of our products other than set forth herein.

SCOPE OF THIS MANUAL

This manual provides descriptive material and instructions for the installation, operation, maintenance, and repair of the Wavetek 1060 Series Sweep/Signal Generator.

This document contains information proprietary to Wavetek. The information in this document is not to be used or duplicated in any manner without the prior approval in writing of Wavetek.

1060 SERIES

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LOCATED AT THE REAR OF THIS MANUAL.

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

The Wavetek 1060 Series is a family of rugged, low cost, solid state sweep generators covering the frequency range of 1 to 400 MHz. The Models 1061 and 1062 are general purpose sweep generators designed for a variety of applications, while the Models 1066 and 1067 are designed primarily for CATV use. Each unit features 20 dB PIN diode leveling and remote programming of center frequency, sweep width, and output level. Up to five crystal controlled marker modules may be plugged into the unit. These modules are controlled by convenient front panel ON/OFF switches. Marker amplitude and width controls enable optimum adjustment

of the marker display. Additionally, an external marker option can provide a marker by combining an external CW source with a sample of the sweep oscillator signal. Other optional features include an adjustable Pilot Carrier Notch control, and a sweep display Tilt control for use in CATV applications.

The 1060 Series features modular plug-in construction, which allows optional features to be factory installed at the time of purchase, or customer installed at a later date. This concept offers protection against obsolescence since updated and additional features can be easily and economically added as new requirements dictate.

1.2 SPECIFICATIONS

1.2.1 RF SPECIFICATIONS

| | |
|-----------------------------|--|
| Frequency Range | 1 to 400 MHz |
| Operating Modes | Sweep and CW |
| Frequency Dial | |
| calibration | 50 MHz intervals |
| accuracy | 20 MHz |
| Sweep Width | 200 kHz to 400 MHz |
| Display Linearity | 2% |
| Spurious Signals | (Fundamental - 10 to 400 MHz) |
| harmonic | 30 dB below the output |
| non-harmonic | 30 dB below the output |
| Residual FM | less than 20 kHz |
| Drift | 100 kHz/5 minutes - 2 MHz/8 hours (after ½ hour warmup at constant temperature, and allowing a 5 minute stabilizing period after a frequency change.) |
| Blanking | Retrace blanking of the RF output pro- vided for sweep operation. Removed for CW operation. |

| | |
|--------------------------------|---|
| RF Output Amplitude | |
| Models 1061 and 1062 | Continuously adjustable from +10 to -60 dBm. |
| level calibration | 50 dB in 10 dB steps; 20 dB vernier with 0 to -15 dB calibrated in 1 dB increments |
| accuracy | Vernier: ± 1 dB Step Attenuator: ± 0.2 dB/10 dB step |
| RF Output Amplitude | |
| Models 1066 and 1067 | Continuously adjustable from +57 to -13 dBmV. |
| level calibration | 50 dB in 10 dB steps; 20 dB vernier with +7 to -7 dBmV calibrated in 1 dB increments. |
| accuracy | Vernier: ± 1 dB Step Attenuator: ± 0.2 dB/10 dB step |
| RF Output Impedance | |
| Models 1061 and 1062 | 50 Ω standard (75 Ω optional) |
| Models 1066 and 1067 | 75 Ω only |
| RF Output Flatness | ± 0.25 dB (measured with Wavetek detector) |
| DC Blocking | Models 1066 and 1067 include a DC block (100 V max.) in the RF output line. |
| Internal RF Detector | |
| Models 1061 and 1062 | 50 Ω standard (75 Ω optional) |
| Models 1066 and 1067 | 75 Ω only (Each contains a DC block) |

1.2.2 SWEEP

| | |
|--------------------------------|--|
| Models 1062 and 1067 | Modes: Repetitive sweep, single sweep, externally triggered sweep, line locked sweep Rates: continuously variable from less than 0.5 Hz to more than 60 Hz. |
| Models 1061 and 1066 | Line locked, 50 or 60 Hz. |

1.2.3 SCOPE HORIZONTAL

10 Vpp triangular waveform (symmetrical about ground).

1.2.4 RF MARKERS

Pulse and birdy type markers are provided by plug-in "A" options. Six sockets are provided for these options. Birdy marker modules use one socket; pulse markers use two.

Marker Modules

Birdy Markers

| | |
|---------------------|--|
| A1 Option | <u>Single frequency markers</u> at any frequency within the instrument frequency range (Module M6S-). |
|---------------------|--|

A2 Option Harmonic or comb type markers at 1, 10, 50 MHz and a double marker which contains markers at .1 and 1 MHz. Other frequencies available on special order (Module M6H-).

A3 Option External marker provides a marker by combining a CW source supplied by an external source and a sample of the sweep oscillator signal. A connector mounted on the instrument rear panel requires a signal of .1 V into 50 ohms from an external source to produce a marker. (Module M6C).

Pulse markers

A4 Option Single frequency markers between 35 and 52 MHz. Up to 5 pulses per module selected by plug-in crystals (Module M13J).

Marker switching

Four front-panel switches control the 6 Marker sockets in the following manner.

Marker socket a This socket is always "on" and is normally used for option A3.

Marker socket b, c, d These three sockets are individually turned on by the top three front-panel buttons.

Marker sockets e and f These two sockets are turned on together by the bottom front-panel button and are normally used for option A4.

Marker size

Adjustable approximately from 2 mVpp to 2 Vpp.

Marker Width

Pulse ≈80 μs

Birdy adjustable, ≈100 to 400 kHz

Marker Accuracy

Pulse 0.02% (at leading edge)

Birdy 0.005% (at center)

1.2.5 Programming

The rear-panel REMOTE jack provides for remote control of center frequency, sweep width, and 20 dB of the output level. The connections can also be used to provide external AM or FM as specified in Table 1-1.

Also provided is access to ± 18 V (30 mA), blanking and SCOPE HORIZONTAL signals, plus an input for triggering the sweep rate generator (requires +10 V pulse).

Table 1-1. External Modulation

| | |
|---|---|
| AM - | |
| Percent | 90% max |
| Modulating Frequency | DC to 25 kHz |
| Sensitivity | 9% AM per volt |
| Input Impedance | 10 k Ω |
| Note: The output level must be reduced by at least 6 dB by the VERNIER control to allow 90% modulation. | |
| FM - | |
| Input Impedance | 10 k Ω |
| Sensitivity | 50 MHz per volt |
| Deviation | entire range of instrument |
| Modulating Frequency | DC - 4 kHz at above deviation, up to 100 kHz with reduced deviation and linearity |

1.2.6 POWER REQUIREMENTS 115 or 230 VAC $\pm 10\%$, 50 or 60 Hz, 25 VA max.

1.2.7 MECHANICAL

Coaxial Connectors

- Models 1061 and 1062 Type BNC
- Models 1066 and 1067 Type F

- Width 11 $\frac{1}{4}$ " (28.6 cm)
- Height 4" (10.2 cm)
- Depth 10 $\frac{1}{2}$ " (26.7 cm)
- Weight 8 $\frac{1}{4}$ lb. (3.7 kg.)

1.2.8 ENVIRONMENTAL Specifications apply at 25 $^{\circ}$ C $\pm 5^{\circ}$ C. The instrument will operate over the range of 0 $^{\circ}$ C to 50 $^{\circ}$ C.

1.3 OPTIONS

1.3.1 "A" Options For specifications of frequency markers see section 1.2.4.

1.3.2 "B" Options The instrument has provisions for including one of the following "B" options. The options are mounted inside the rear panel through which any required controls are accessible.

- B2 - Pilot Carrier Notches
and Tilt control This option applies to instruments used in CATV applications. The output is blanked at two adjustable frequencies. A single ON/OFF switch is located on the rear panel. Two external controls determine the notch frequency. An internal adjustment determines the notch width between 3 and 10 MHz (this option includes Option B3, Tilt control).
- B3 - Tilt Control This option can be used to simulate or compensate for cable losses. Depending on the output VERNIER setting, the highest frequency of the sweep display can be increased by 6 dB or decreased by 20 dB, referenced to the lowest frequency of the sweep display. Rear panel controls include an ON/OFF switch and a variable TILT control.

1.4 ACCESSORIES

1.4.2 Accessories Available:

- Wide Band RF Detectors Model D151 for 50 ohm impedance and Model D171 for 75 ohm impedance (both have BNC connectors)
- Rack Mount Kit K015 enables unit to be mounted in a 19" wide rack.



OPERATING INSTRUCTIONS

2.1 INTRODUCTION

This section covers electrical and mechanical installation, description of front and rear panels, instructions for operation and external programming.

2.2 INSTALLATION

2.2.1 Mechanical Installation

INITIAL INSPECTION

After being unpacked, the instrument should be inspected for physical damage. A procedure for checking the electrical performance is given in Section 4. The shipping container and packing material should be saved in case it becomes necessary to reship the unit.

If the unit is damaged or does not meet its electrical performance specifications, notify the nearest Wavetek area representative or the factory in Indiana. If the shipping container shows damage, notify the carrier. Retain the shipping container and packing material for the carrier's inspection. In either case, the factory or area representative will arrange for immediate repair or replacement of the instrument without waiting for damage claim settlements.

RACK MOUNTING

The K015 rack mount kit makes it possible to mount the unit in a standard 19" wide instrument rack. The kit includes the parts listed in Table 2-1.

To rack mount unit, first fasten both sides (items B,D) to bottom tray (item C) using screws provided with kit (item E) as shown in Figure 2-1. Position instrument on the tray so that the feet

TABLE 2-1. K015 Parts List

| Item | Description | Wavetek P/N | TQ |
|------|-------------------|-------------|----|
| A | Top Tray | C001-384-2 | 1 |
| B,D | Side | C001-383 | 2 |
| C | Bottom Tray | C001-384-1 | 1 |
| E | Screw, 6-32x3/8" | HS101-606 | 12 |
| F | Handle | HH101-000 | 2 |
| G | Screw, 10-32x1/2" | HS103-908 | 4 |

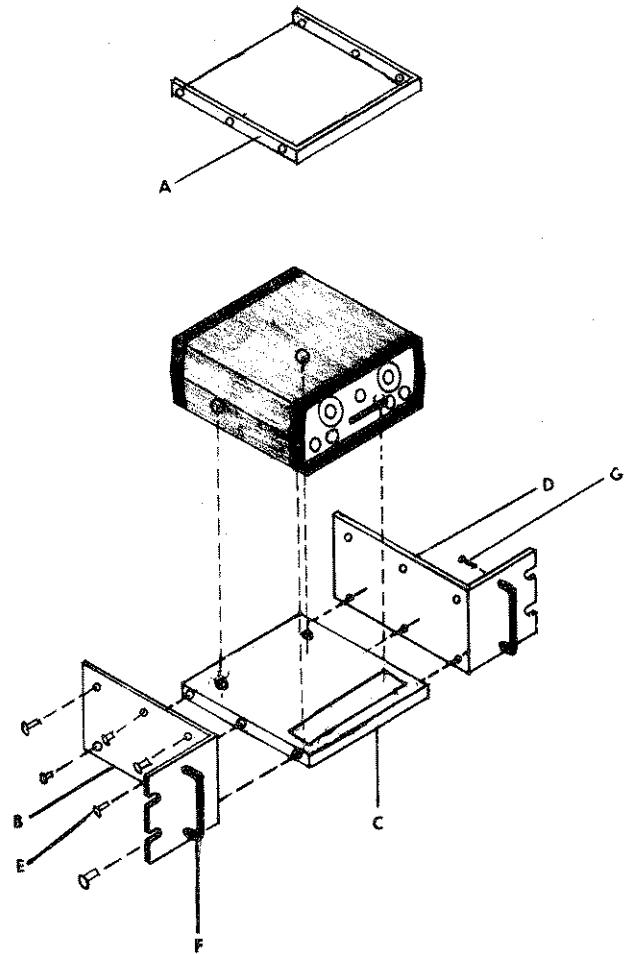


Figure 2-1. Rack Mounting

fit into the provided holes. Fasten top tray with remaining screws.

2.2.2 Electrical Installation

This instrument operates from either 115 volt AC or 230 volt AC supply mains as selected by a slide switch located on the rear panel. Before operating the instrument, check that the fuse mounted in the rear-panel fuse holder corresponds to the correct value for the selected voltage; i.e., $\frac{1}{2}$ amp for a 115 volt AC, and $\frac{1}{4}$ amp for 230 volt AC.

The power supply has been designed to operate from either 50 or 60 Hz supply mains.

Instruments are shipped from the factory for operation at 115 volt AC, 60 Hz unless specified for 230 volt AC, 50 Hz operation.

The electrical performance of this instrument should be verified. Performance checks for incoming inspection are given in Section 4, Maintenance.

2.3 DESCRIPTION OF FRONT PANEL

Refer to Figure 2-2.

- ① POWER ON/OFF switch applies AC line voltage to instrument power supply. Red LED light indicates power is on.
- ② FREQUENCY control adjusts center frequency of output.
- ③ VERNIER control provides fine adjustment of output center frequency.
- ④ SWEEP WIDTH control adjusts the range of frequency over which the instrument is sweeping. Full counter-clockwise rotation of this control will switch the instrument onto continuous wave operation.
- ⑤ OUTPUT STEP ATTENUATOR adjusts output in 10 dB steps.

- ⑥ OUTPUT VERNIER ATTENUATOR - adjusts output continuously over a 20 dB range (first 14 dB calibrated).
- ⑦ MARKER SIZE control adjusts size of marker display.
- ⑧ MARKER WIDTH control adjusts width of marker display.
- ⑨ MARKER switches turn indicated markers on or off.
- ⑩ SCOPE HORIZ OUT provides the horizontal signal for an oscilloscope display.
- ⑪ SCOPE VERT OUT provides the detected signal (with markers) for an oscilloscope display.
- ⑫ DEMOD IN accepts detected RF signal from external detector.
- ⑬ DETECTOR IN accepts RF signal and feeds it to the instrument's internal detector.
- ⑭ RF OUT provides the instrument RF sweep output.
- ⑮ SWEEP RATE control adjusts the repetition rate of the instrument sweep (Models 1062 and 1067 only).
- ⑯ TRIG / RECUR switch provides either continuous recurring sweep or single sweep operation (Models 1062 and 1067 only).

2.4 DESCRIPTION OF REAR PANEL

Refer to Figure 2-3.

- ① NOTCH FILTER controls provide adjustment of notch frequency (B2 option).
- ② TILT control adjusts degree of tilt of output (B3 option).
- ③ OPTION ON/OFF switch turns the installed options on or off (B2, B3 option).

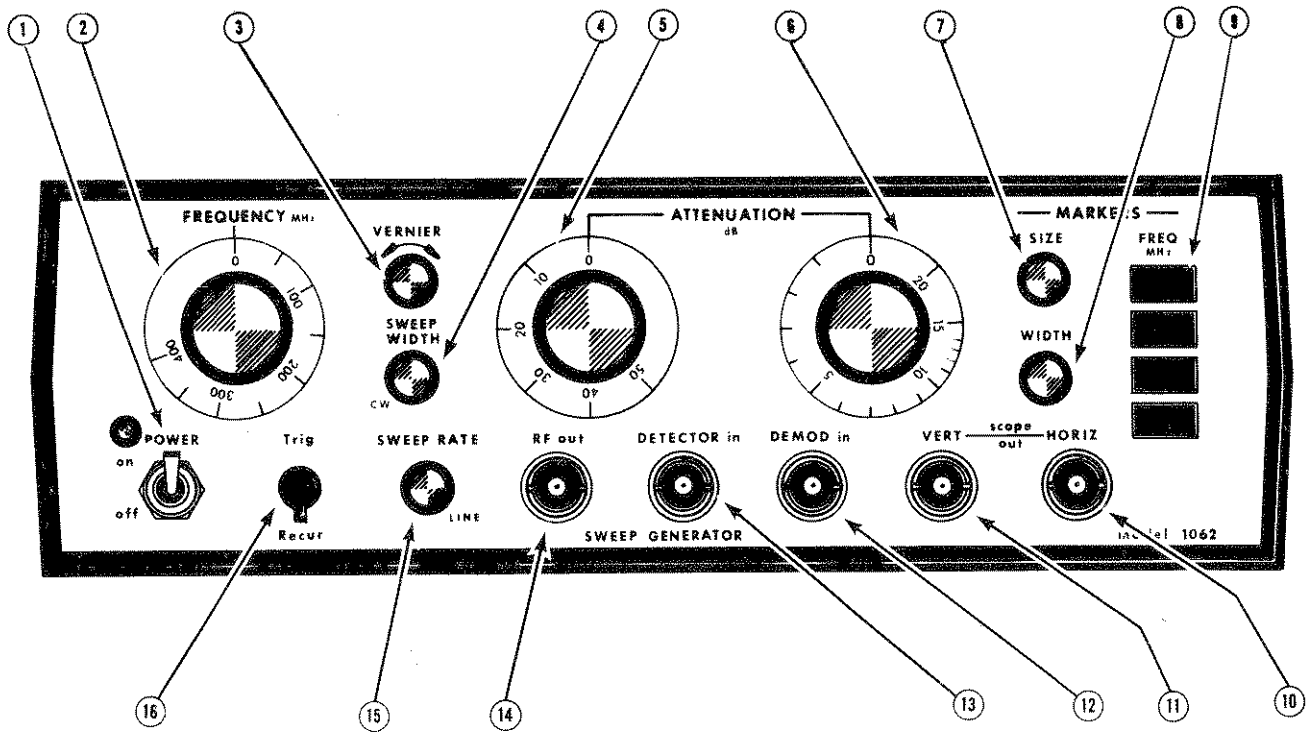


Figure 2-2. Front Panel

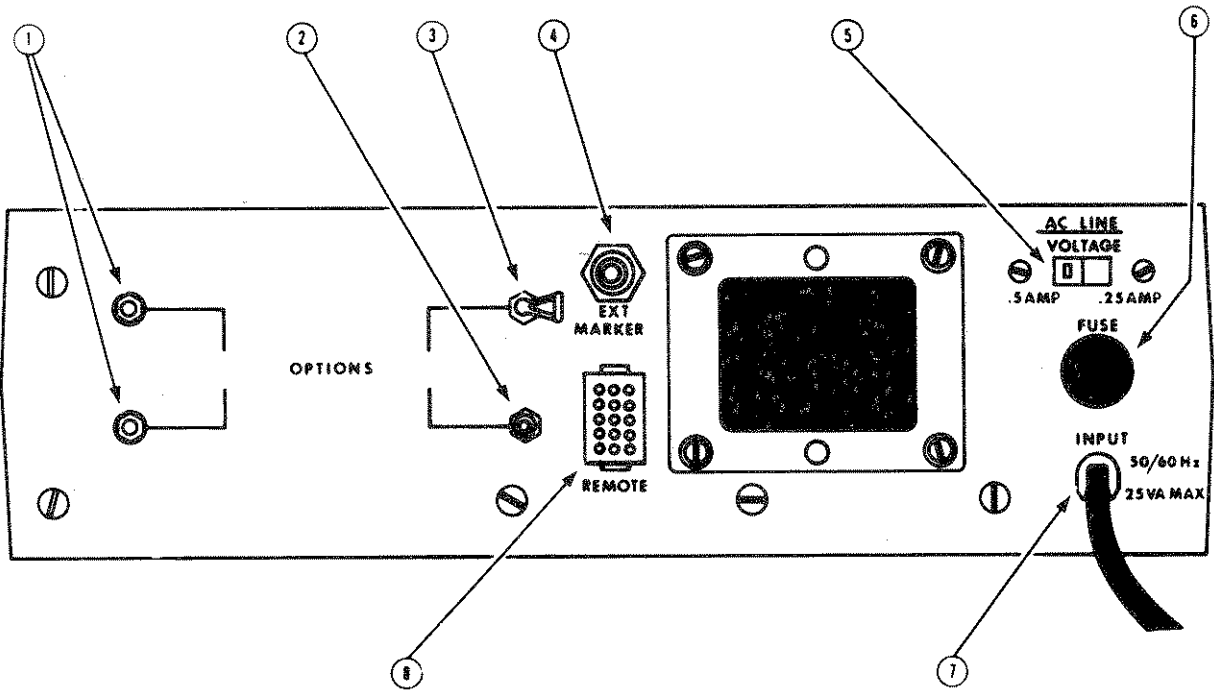


Figure 2-3. Rear Panel

- 4 EXT MARKER input accepts an external CW signal used to generate a marker at an externally determined frequency.
- 5 AC LINE switch selects 115 V or 230 V line operation.
- 6 AC LINE FUSE is $\frac{1}{2}$ amp for 115 V operation, $\frac{1}{4}$ amp for 230 V operation.
- 7 AC LINE INPUT connects instrument to AC mains via 3 prong plug.
- 8 REMOTE jack provides connections for remote control of center frequency, sweep width, and 0 to 20 dB of attenuation.

2.5 TYPICAL OPERATING SETUP

When initially setting up instrument, first check rear-panel AC LINE voltage selector switch and fuse to insure that the instrument is set for operation with the available AC mains.

Make connections between the Sweep Generator, the device under test and the oscilloscope as shown in Figure 2-4. Since hum, RF leakage and spurious signal pickup must be kept to a minimum, it is essential that good connections and grounds be maintained throughout the entire setup. Use coaxial cables with appropriate RF connectors wherever possible. The RF output cable is especially critical. It should match the output impedance of the sweep generator and should be kept as short as practical (under 3 feet). If the input impedance of the device under test is not the same as the sweep generator output impedance, a matching network (Figure 2-4) should be used to insure that a constant amplitude input signal is sent to the device under test.

After the RF signal passes through the RF circuit of the device under test, it must be demodulated before being displayed on the scope. If a detector is not part of the device under test, the RF signal can be detected by an external detector or the internal detector provided as part of the sweep generator.

External detectors are available from Wavetek for both 50 and 75 ohm applications (BNC connectors only).

When using the internal detector, the DEMOD IN connector should have no input connected.

If the detector being used is a high impedance detector or has a DC component, the internal detector must be disconnected from the DEMOD IN connector.

Switch POWER on. The red pilot light should light, indicating an operating condition.

(NOTE: This instrument does not require a warmup period unless it is to be used at the extreme limits of its specifications.)

After completing the setup, adjust the sweep generator controls for the required center frequency, sweep width and output amplitude. Turn the desired markers on, and adjust their size and width.

2.6 SPECIAL OPERATING NOTES

ERRORS FROM SWEEP RATE EFFECTS

When RF circuits having rapid amplitude changes are swept, errors may occur due to detector delays. Decreasing the detector output time constant will minimize this effect.

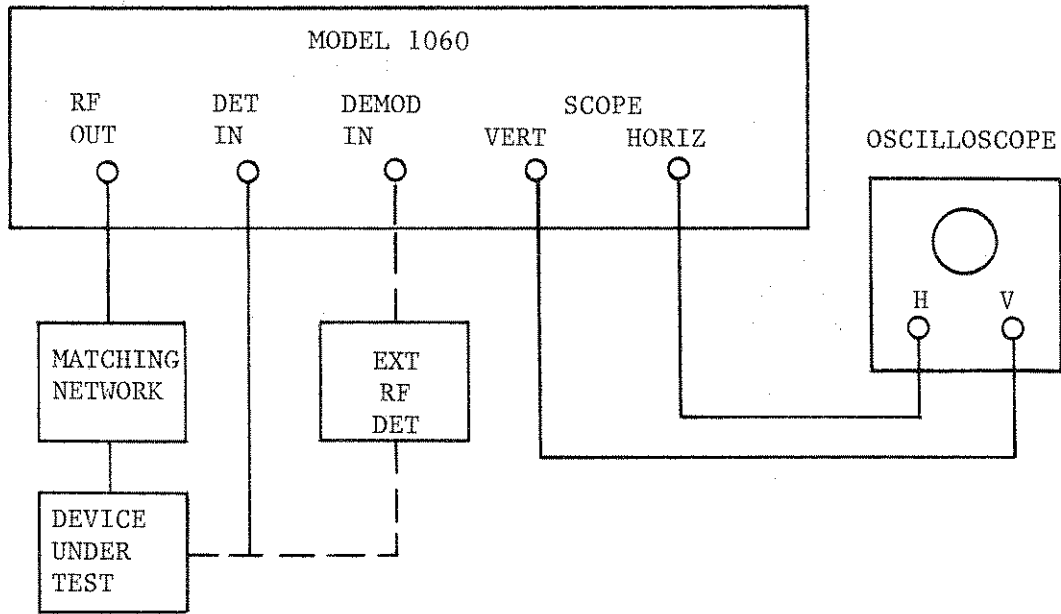


Figure 2-4. Typical Operating Setup

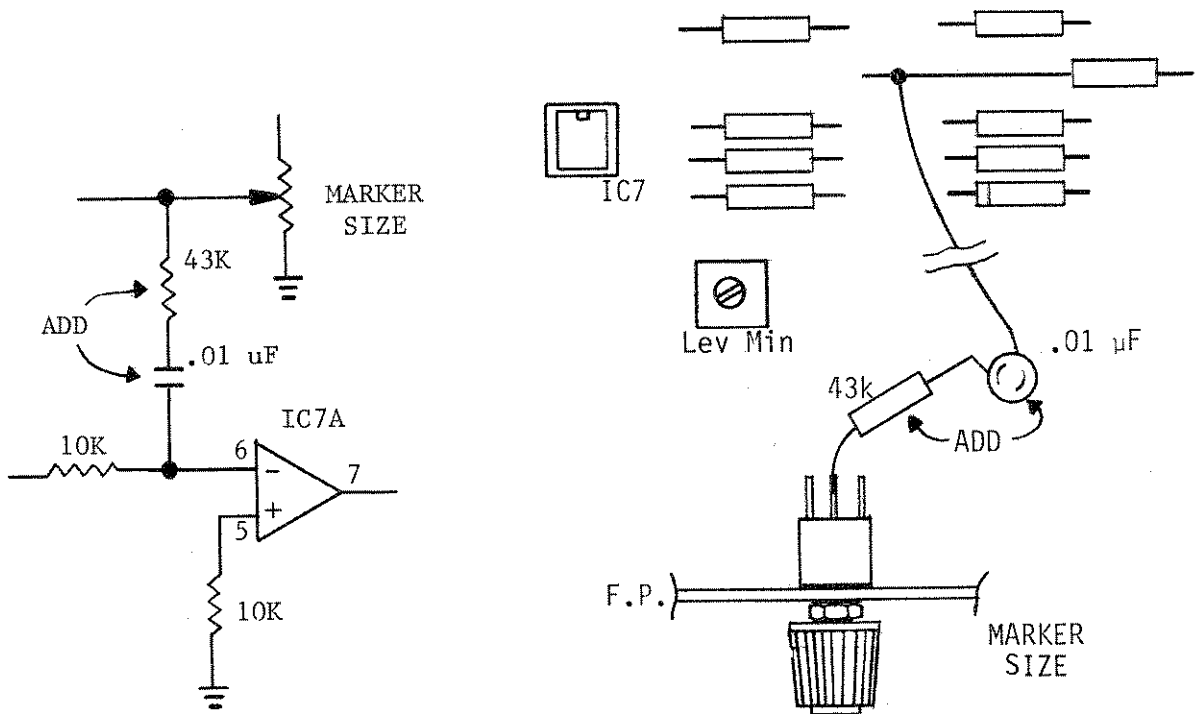


Figure 2-5. Marker Level Modulation Modification

EFFECT FROM OVERLOADING

The use of excessive input signals to the device under test can cause overloading, which yields a distorted response. To prevent this, first turn the attenuation controls to minimum output amplitude. Gradually increase the output amplitude until a response is obtained. Further increase of the output amplitude should not change the shape of the response envelope except in amplitude. If the response envelope does change (e.g., flatten at the top) decrease the signal just far enough to restore the proper shape.

MAKING MEASUREMENTS AT LOW LEVELS

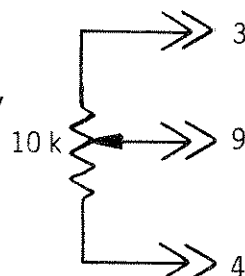
When making measurements at low levels, radiation and ground loops are problems. Using double shielded cables for RF signals helps minimize the radiation problem. Ground loops causing hum pickup can sometimes be eliminated by completing only one ground connection between each instrument. This applies particularly to the oscilloscope. If the ground connection is made at the vertical input terminal, an additional ground at the horizontal input terminal will often result in hum pickup.

MARKER GENERATION BY LEVEL MODULATION

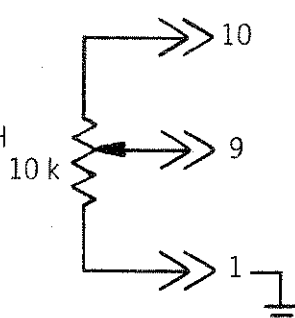
Birdy markers may be used to modulate the RF output signal. This permits viewing frequency markers on the detected response without having to return the detected signal to the marker adder in the sweep generator. This is useful when the detector and scope display are remote to the sweep generator.

In order to accomplish this, the instrument should be modified by adding a 43 kΩ resistor and a .01 uF capacitor in series between the wiper of the MARKER SIZE pot (front panel) and the inverting input (pin 6) of the Leveler IC on the PC Board. Refer to Figure 2-5 for suggested hookup.

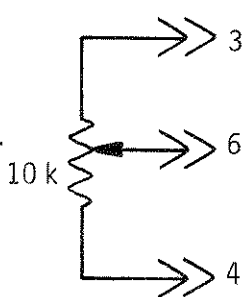
Center Frequency
(F.P. FREQUENCY control set at 200 MHz)



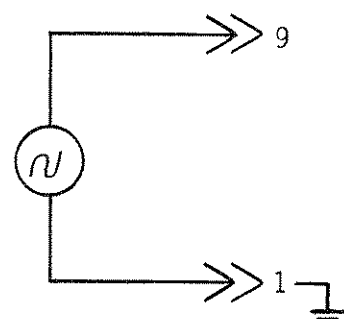
Sweep Width
(F.P. SWEEP WIDTH control set at 10 k min)



Output Amplitude
(F.P. OUTPUT VERNIER ATTENUATOR set at max)



External FM



External AM

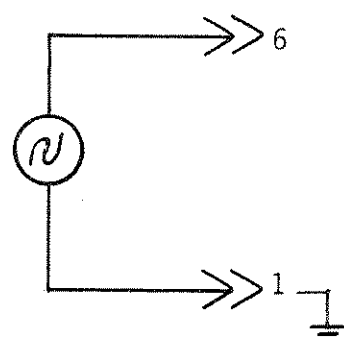


Figure 2-6. External Programming

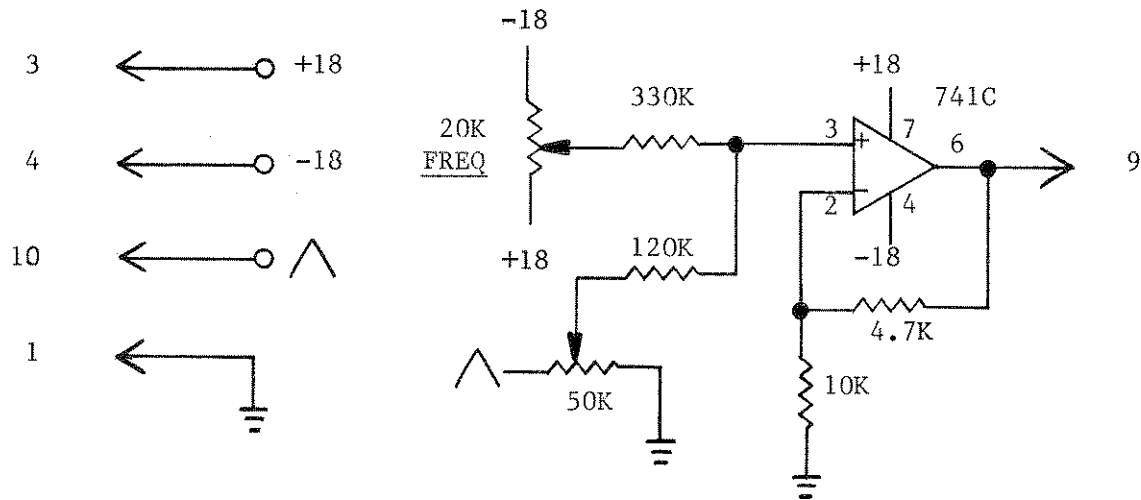


Figure 2-7. Suggested Active External Programming Circuit

2.7 EXTERNAL PROGRAMMING

The rear-panel REMOTE jack is provided for remote control of center frequency, sweep width, and output amplitude. A 10 kilohm pot should be wired as shown in Figure 2-6 in order to control the desired function. Front-panel controls must be set as indicated to allow proper operation of the remote controls.

If both center frequency and sweep width are to be remotely controlled, an active circuit, such as is shown in Figure 2-7, will be necessary.

NOTE

For external AM, the modulating signal is fed into the Level control, pin 6 (pin 1 is ground). For external FM, the modulating signal is fed into the Center Frequency control, pin 9. Refer to Section 1.2.5, Table 1-1 for External Modulation specifications.

2.8 OPTION B2 - PILOT CARRIER NOTCHES AND TILT CONTROL

This option generates pulses which blank the RF output at two frequencies within the instrument range. These pulses (notches) may be positioned at the pilot carriers for systems with fast AGC, or may be used as frequency markers at channel or band edges.

The option is put into operation by means of the rear-panel ON/OFF switch. The pulse (notch) frequency is set using NOTCH POSITION controls 1 and 2 on the rear panel. Notch Width can be adjusted from 3 to 10 MHz using internal adjustment R8.

This option also includes Option B3, Tilt Control, described in Section 2.9.

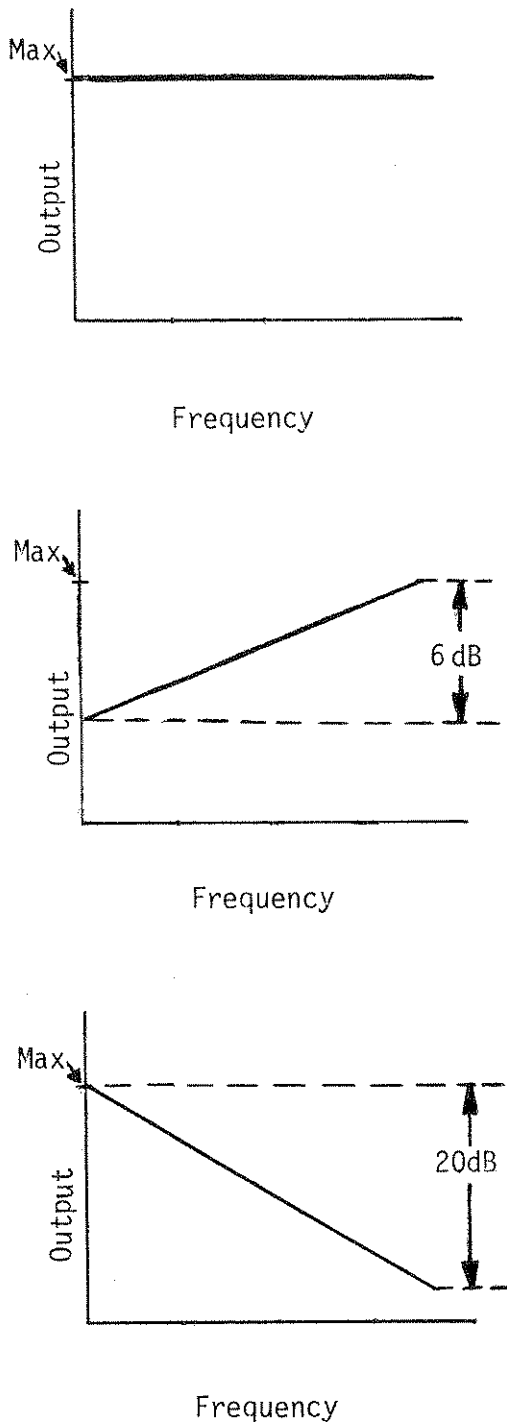


Figure 2-8. Instrument Output Using Tilt Control

2.9 OPTION B3 - TILT CONTROL

This option enables the RF output to be tilted in order to compensate for system tilt or to simulate cable losses.

The option is turned on with the rear-panel ON/OFF switch. The amount of tilt is determined by the rear-panel TILT control. The highest frequency of the sweep display may be increased by up to 6 dB or decreased by up to 20 dB, referenced to the lowest frequency of the display (See Figure 2-8).

The front-panel OUTPUT VERNIER ATTENUATOR must be adjusted such that the 20 dB OUTPUT VERNIER ATTENUATOR range is not exceeded at the high frequency end of the display.

EXAMPLES:

For a 6 dB increase of output at the high frequency end, the OUTPUT VERNIER ATTENUATOR must be set at +1 or less (Models 1066, 1067), or between 6 and 20 (Models 1061, 1062). For a 20 dB decrease, the OUTPUT VERNIER ATTENUATOR must be set at +7 (Models 1066, 1067), or at 0 (Models 1061, 1062).

NOTE

If a Model 1075 RF Comparator is being used in conjunction with a 1060 Series Sweep Generator, Option B3 is disabled.

SECTION 3

THEORY OF OPERATION

3.1 INTRODUCTION

This section includes a brief description of the main blocks of circuitry. This is followed by a more detailed description of each circuit. The physical location of modules and circuits is covered in Section 4 (Figures 4-5 and 4-9).

3.2 SIMPLIFIED BLOCK DIAGRAM

The main blocks of circuitry are shown in the Instrument Wiring Diagram in Section 5 of this manual, which also includes the schematic of the Main PC Board.

The swept RF output of the instrument originates in the Sweep Oscillator. The ramp voltage necessary to drive the Sweep Oscillator comes from the Sweep Drive circuit. The triangle wave for the SCOPE HORIZONTAL output and for the Sweep Drive circuit comes from the Sweep Rate circuit. The optional M6 marker modules generate birdy markers which are ultimately added to the demodulated RF signal and sent to the SCOPE VERTICAL OUTPUT. During the discussion of each circuit it may be helpful to refer to the appropriate schematic in Section 5.

3.3 POWER SUPPLY

T201 has two secondary windings to provide AC power to the two full wave rectifiers which supply approximately 30 VDC to the 18 V regulators. IC2 is a 3 terminal voltage regulator, and, with error amplifier IC1A, provides the regulated +18 V. This supply is protected against reverse voltage by CR7.

IC3 and IC1B supply the regulated -18 V. Reverse voltage protection is furnished by CR8. The +10 V supply is provided by regulator IC4, while -10 V is supplied by IC5, a unity gain inverting amplifier having a +10 V input.

The transformer secondary for the -18 V supply provides the line rate input for the Sweep Rate circuit.

3.4 SWEEP RATE

In Models 1061 and 1066, a Line Rate Card is provided. This circuit provides a line rate triangle wave and a synchronized square wave.

In Models 1062 and 1067, a Rate Generator Card is furnished. This circuit generates variable rate square and triangle waveforms. Front-panel switching provides recurring sweep or triggered mode operation.

3.4.1 LINE RATE CARD

The voltage from the transformer is clipped by CR1 and 2 and fed into comparator IC1A. A square wave is produced by the op amp alternately saturating at its positive and negative output levels ($\approx \pm 16$ V) as the input crosses zero volts. This signal provides blanking for the Oscillator Leveler and Sweep Oscillator circuits.

The blanking signal is integrated by IC1B which provides a +5 V to -5 V triangle wave. This signal is applied to the SWEEP WIDTH control as well as the SCOPE HORIZONTAL Output of the instrument.

3.4.2 RATE GENERATOR CARD

a). Line Rate

With the SWEEP RATE control in the LINE (detent) position, a trigger pulse (developed from the 27 VAC secondary of T201) initiates the comparator/integrator on one cycle of operation. At the end of the cycle there is a delay until the next trigger pulse arrives. Clamp control R18 determines this wait time.

b). Variable Rate

With the TRIG/RECUR control on RECUR, Sweep Rate control R101 controls the integrator charging time, thus determining the 2 to 60 Hz variable rate. R31 provides for calibration of the sweep rate.

c). Trigger

When the TRIG/RECUR switch is in the center position, and the SWEEP RATE control is not detented to LINE, the sweep is held off until a trigger pulse occurs. A pulse occurs when +10 V is momentarily applied to pin 7 of the rear-panel REMOTE jack or the TRIG/RECUR switch is manually pushed to the uppermost (momentary) position. One sweep cycle occurs for each trigger.

The output of comparator IC2A is a square wave that is used for blanking. The square wave is integrated by IC1 and its associated circuitry, thus providing the triangle wave for the SCOPE HORIZONTAL output and the Sweep Drive.

3.5 SWEEP DRIVE

The function of the Sweep Drive circuit is to convert the SWEEP WIDTH and CENTER FREQUENCY programs into the appropriate signal for driving the Sweep Oscillator module.

The CENTER FREQUENCY program and the triangle wave SWEEP WIDTH program are summed at the input of IC6A. The output signal (24 Vpp maximum) is applied to a shaping network which includes Q10 and CR10, 11, 12 and 13. Q10 is a constant

current source which ultimately determines the level at which the shaping diodes conduct. The potentiometers connected to the diodes are controls for "bending" the otherwise linear Sweep Drive ramp. This compensates for non-linearity of the varactor diodes in the Sweep Oscillator.

IC6B is a buffer which allows for calibration of the maximum amplitude of the Sweep Drive signal.

3.6 OSCILLATOR LEVELER

This circuit is an error amplifier for the Sweep Oscillator which keeps the RF amplitude constant over the frequency range. It also includes a VERNIER level control.

The inputs to the Leveler are a negative detected RF signal from the monitor diode in the Oscillator module and a DC level from the OUTPUT VERNIER ATTENUATOR. R82 determines the maximum voltage that can be applied from the OUTPUT VERNIER ATTENUATOR to the op amp. The setting of R85 becomes more relevant as the voltage from the OUTPUT VERNIER ATTENUATOR becomes less negative. IC7B compares its two inputs and amplifies any deviation of the monitor signal from a constant level. This provides current for the PIN diode attenuator in the oscillator. Q11, driven by the blanking signal, closes the feedback loop around the Leveler causing essentially zero gain. This prevents the Leveler from overdriving the PIN diode attenuator during instrument retrace when the monitor signal should be zero volts.

3.7 SWEEP OSCILLATOR (MODULE M9Y-1/M9YA-1)

The sweep signal on the 1060 series is generated by heterodyning the output of a UHF Sweep Oscillator circuit with the output of a 1 GHz fixed frequency (CW) oscillator in a diode mixer. The difference frequency in the 1 to 400 MHz range is amplified by 3 wide-band amp-

lifier stages. An electronic PIN diode attenuator, providing vernier RF level adjustment, is controlled by the Oscillator Leveler (Section 3.6) which is regulated by a voltage from the monitor diode.

The output of oscillator Q1, (approximately 1000 MHz) is coupled through inductor L2 to L3 which is tied to opposite terminals of the double-balanced mixer consisting of diodes CR1, 2, 3, and 4. Q11 sweeps a frequency of approximately 1000 MHz to 1400 MHz. The sweep drive voltage from pin 9 of the module is applied to the varactor diodes, decreasing their junction capacitance, thereby causing the oscillator frequency to vary from low to high. The Sweep Oscillator output is coupled to the other terminals of the double balanced mixer through inductor L11. The resultant difference frequency is then amplified in the 1 to 400 MHz range by the wide band preamplifier stage consisting of transistor amplifier Q2 and emitter followers Q3 and Q6. Transistor switches Q4 and Q5 provide RF blanking by turning off the wide-band preamplifier during sweep retrace time.

Two RF outputs are provided from the wide-band preamplifier. One output from Q6 (designated Sweep Sample) is coupled via R17 and C10 to a wide-band amplifier consisting of Q7, 8, 9, and Q16. Q16 is used as an emitter follower, and the output is provided at J2 as a source for the marker generating circuits. Another module output (Aux. RF) comes through the same wide-band amplifier, but Q16 is used in the common emitter configuration. This output is thus further amplified and is provided at J4 as a source for Option A4. IC1 and its associated circuitry make up a leveler for both the Sweep Sample and Aux. RF outputs. This circuit works in a manner similar to the Oscillator Leveler.

The other RF output signal from Q6 (designated RF Z50 for Models 1061, 1062, or RF Z75 for Models 1066, 1067)

is coupled through R18 and C8 to the electronic attenuator consisting of PIN diodes CR12 and CR13 which provide variable RF conduction proportional to the positive current supplied from the Leveler circuit. The monitor diode, CR14, near the RF output jack, provides to the non-inverting input of the Leveler, a negative DC voltage proportional to the RF output level. Three wide-band amplifier stages, Q12, Q13 and Q14 amplify the signal from the electronic attenuator by about 40 dB, with reduced frequency response below 1 MHz and above 400 MHz. Since the closed loop leveling system establishes zero impedance at the monitor point, R66 determines the output impedance.

3.8 LEVEL MODULATOR

The output signal level of the instrument may be externally modulated. The modulation signal is applied to pin 6 of the rear-panel REMOTE jack. This signal is then internally applied to the OUTPUT VERNIER ATTENUATOR control through Level Modulator IC7A, thus accomplishing level modulation of the RF output signal.

3.9 BIRDY AMPLIFIER

This circuit amplifies the small birdy signals from the M6 marker modules to a useable level for superimposing on the demodulated RF signal. Q1 and Q3 amplify the small (10 mV) signals from the M6 marker modules by about 7. The two inputs are added and fed to Op Amp Q4, 6, and 7 for further gain. The push-pull output stage then amplifies the signals to produce saturated birdies. R45 and 46 drop the signals to about 2 Vpp at the MARKER SIZE pot. Counterclockwise rotation of the MARKER WIDTH control tends to turn on Q5 and Q7, which respectively shunt and feed back the higher frequencies thus causing the birdies to be narrower.

3.10 INTERNAL MARKERS (OPTIONS A1 AND A2)

Single frequency markers (M6S) produce

single birdy markers at any desired frequencies of the sweep generator. Harmonic markers (M6H) produce birdy markers at the fundamental and every multiple of the fundamental frequency.

The M6 receives a sample of the swept RF signal from the sweep oscillator. When power is applied to the module, the birdy marker is generated and sent to the Birdy Amplifier circuit.

Each marker module contains a crystal oscillator, a mixer and a birdy preamp. The M6H also has a harmonic generating stage. The different crystal oscillators used can generate from 1 to 55 MHz CW. The M6S can generate a higher frequency birdy by taking a harmonic of the crystal frequency.

The output from the crystal oscillator (or harmonic generator) is combined with the sweep sample in the mixer stage. In the case of single frequency markers, the mixer includes a tuned circuit which selects the frequency from which the birdy will be generated. In the case of harmonic markers, the mixer is untuned. The mixer circuit is generally a diode mixer, although transistor mixers are sometimes used. A zero beat occurs when the swept signal frequency is the same as that of the CW signal. The difference frequency on either side of the zero beat is a swept low frequency signal. This signal is amplified in a stage having a bandwidth no greater than 800 kHz.

3.11 EXTERNAL MARKER (OPTION A3)

This module (M6C) generates a single birdy marker at the frequency of a CW signal which is provided externally.

The external CW signal is mixed with a sample of the swept RF signal from the sweep oscillator module. The resulting signal sweeps from high to low and a zero beat occurs at the point in time when the sweep sample frequency is the same as that of the CW. This signal then sweeps high in frequency. The lower frequency around the zero beat is

amplified by Q1 with a bandwidth of less than 800 kHz. This birdy marker is then sent to other circuitry for further amplification.

3.12 PULSE MARKERS (OPTION A4)

This module (M13J) generates up to 5 pulses between 35 and 52 MHz. These are generated by sweeping a set of crystal filters with the Aux. RF output from the M9Y-1/M9YA-1, detecting the response, and triggering a comparator to develop pulses. The pulse output is added to the detected RF response by means of the marker adder system.

3.13 PILOT CARRIER NOTCHES AND TILT CONTROL (OPTION B2)

The RF output is blanked at two adjustable frequencies. The limit comparators determine the width and location of the notch. The horizontal ramp causes the comparators to switch as they pass through preset limits - one limit being 0 V, the other determined by the Notch Width control. Notch position is determined by the rear-panel controls. The positive pulse output is added to the blanking signal through diodes CR1 and CR2, thus effectively blanking the output signal at the preset notch positions.

3.14 TILT CONTROL (OPTION B3)

The tilt circuit provides a ramp to the Level Programming input (pin 6 of the rear-panel REMOTE jack) causing a linear increase or decrease in output amplitude with respect to frequency. The amount of tilt (i.e. the actual change of the RF output at the highest frequency of the sweep display) does not change with sweep width.

The horizontal ramp is inverted and attenuated by IC1A, and is inverted again by IC1B. The outputs of IC1A and IC1B are summed across the rear-panel TILT control (R6) to determine the tilt circuit ramp.

The pivot point of the horizontal ramp is determined by Offset control R2.

SECTION 4

MAINTENANCE

4.1 INTRODUCTION

This section provides information for testing, calibrating and troubleshooting the sweep generator. The performance test is designed for incoming inspection and periodic evaluation. If performance is not to specifications, refer to the calibration information in *italics* which immediately follows a performance check. If no such information is given, the unit must be recalibrated at the factory.

4.2 SERVICE INFORMATION

4.2.1 Removal of Cabinet

Turn the unit upside down and remove the four screws in the bottom of the unit. Turn the unit right side up and lift off the top.

4.2.2 Module Servicing

Module Mounting - Modules are mounted on a side panel which can be lifted out when the two rear-panel screws are removed. This facilitates module check-out and maintenance under operating conditions. (See Figure 4-9).

Removal of Module - A module may be removed by removing any cables attached to the top of the module and removing the single hold-down screw from the bottom.

Removal of Module Cover - Remove all nuts and washers from the top of the module and slide the cover off.

Reinstalling Module - Before reinstalling the module, check the module pins for proper alignment, then carefully seat the module pins into the chassis socket and replace the hold-down screw to ensure a good ground connection between module and chassis.

Module Pin Number System - The module pins are numbered as shown in Figure 4-1. The module base mounting screws are located off center and are used as a reference for locating pin No. 1.

4.2.3 Component Lead Configurations

Transistor and I.C. lead configurations are shown in Figure 4-2.

4.2.4 Recommended Test Equipment

The test equipment recommended for servicing, troubleshooting and calibrating this instrument is shown in Table 4-1.

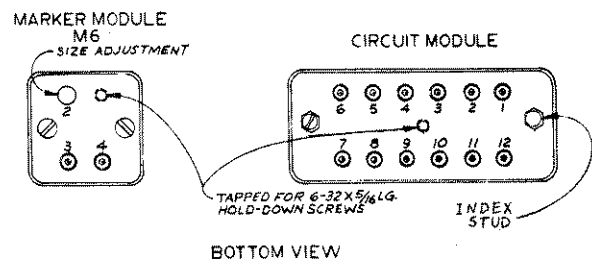


Figure 4-1. Module Pin Numbering

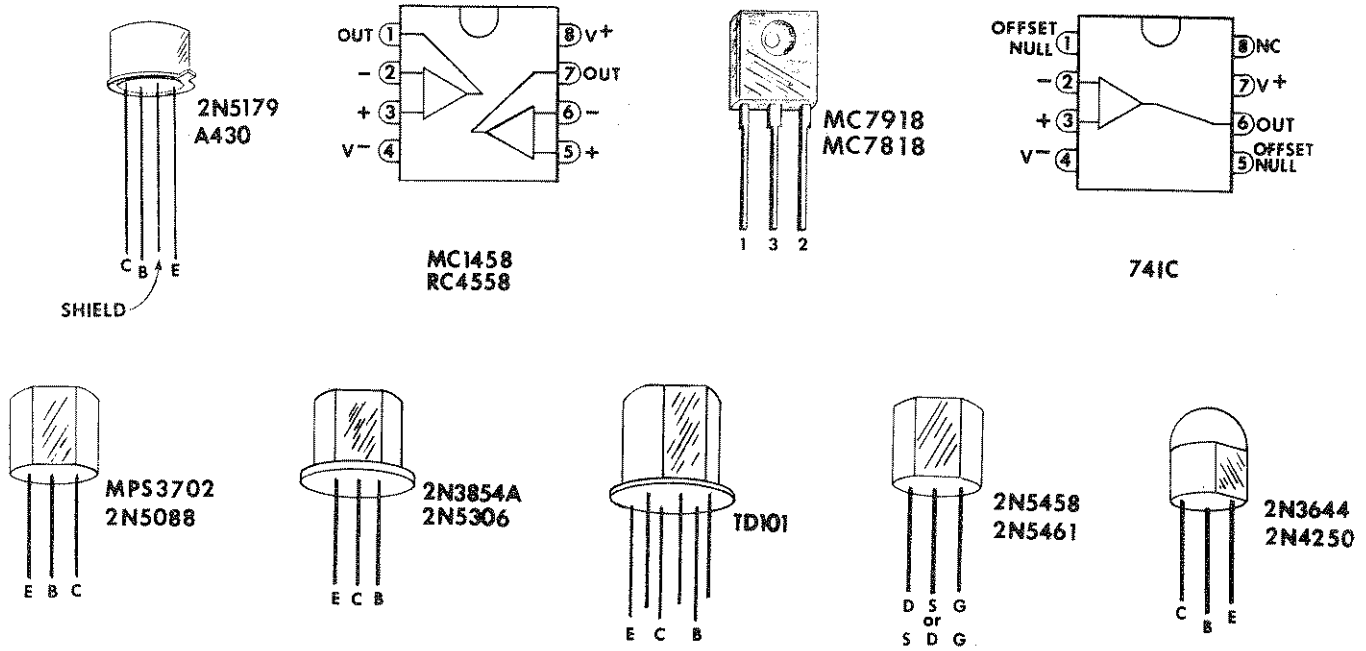


Figure 4-2. Transistor & IC Lead Configuration

TABLE 4-1. RECOMMENDED TEST EQUIPMENT

| INSTRUMENT | CRITICAL REQUIREMENT | RECOMMENDED |
|-------------------------------------|------------------------------------|---|
| Oscilloscope | DC coupled | Tektronix Series 5100 |
| Digital Voltmeter | 0.1% accuracy | Weston 1240 |
| Power Meter | Frequency Range 10 to 1500 MHz | HP432A/478A |
| Spectrum Analyzer | Frequency Range 10 MHz to 3 GHz | HP8555A/8552A |
| Precision Attenuator Pads | 10 dB 20 dB 40 dB | Weinschel 50-10 Weinschel 50-20 Weinschel 50-40 |
| Matching Pad (75 ohm units only) | Minimum Loss 75 to 50 ohms | Wavetek M175 |

TABLE 4-1. Continued

| | | |
|---------------------|--|----------------|
| Harmonic | 1 MHz | Wavetek M6H-1 |
| Marker | 10 MHz | Wavetek M6H-10 |
| Generators | 50 MHz | Wavetek M6H-50 |
| CW Signal Generator | Tunable to any frequency within the frequency range of the sweep generator. Accuracy ± 5 MHz Output 0.1 V | |

4.3 PERFORMANCE CHECKS AND CALIBRATION

4.3.1 Introduction

The following procedure is intended to ensure that the instrument meets its published specifications. If it does not, it can be calibrated according to the instructions in *italics*. The checks specified assume that the instrument is equipped with A-2 options for markers at 1, 10, and 50 MHz. While it is possible to check the instrument's performance without the use of harmonic markers by using suitable external CW sources, a complete check by this method is impractical. The required performance is shown in Section 1.2, Specifications.

If calibration becomes necessary, remove the cabinet as instructed in Section 4.2.1. With the unit cover removed, all adjustments are accessible. Refer to Figure 4-5 for adjustments and test points.

In general, calibration must be performed in the sequence given.

4.3.2 Power Supplies

The +18 and -18 volt supplies are fixed voltage supplies, no adjustment is required. Check each to ensure that it measures between 17.8 and 18.2 volts. The +10 volt supply is adjustable, with the -10 volt supply following within 30 mV.

4.3.3 Horizontal Output Check

Adjust oscilloscope controls for an internally generated, automatic line triggered sweep of approximately 2ms/div and a vertical sensitivity of 2 V/div. Connect scope vertical input to instrument HORIZ output. Triangle wave should be symmetrical about zero with an amplitude of 10 Vpp (See Figure 4-3).

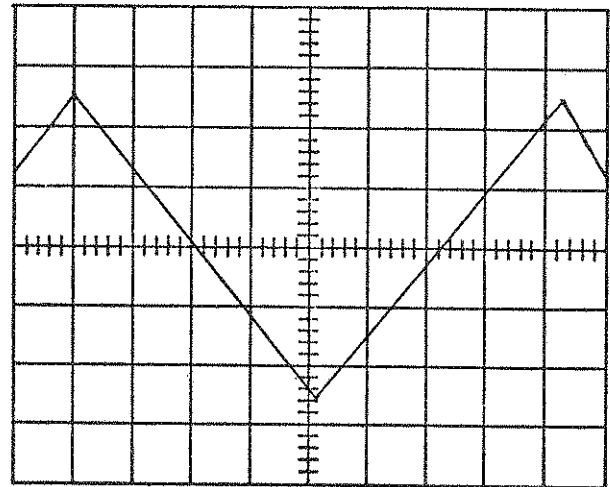


Figure 4-3. Horizontal Output

4.3.4 Frequency Program (Sweep Drive)

TYPICAL SETUP

Connect the sweep generator and scope as shown in Figure 4-4. Set the output frequency to 200 MHz. Set RF level to

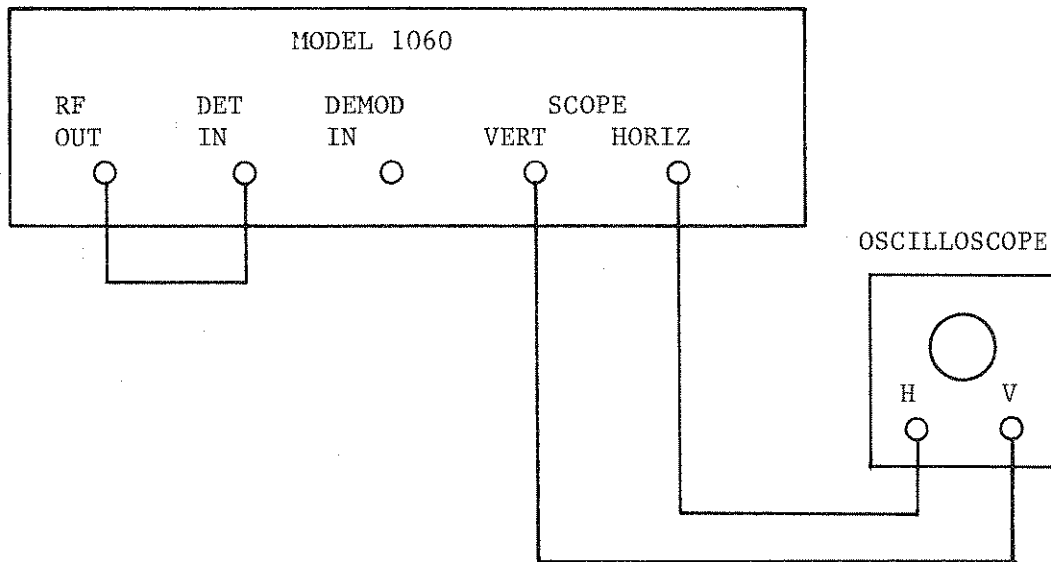


Figure 4-4. Typical Test Setup

maximum output (both STEP ATTENUATOR and OUTPUT VERNIER ATTENUATOR). Set the SWEEP WIDTH fully clockwise.

Adjust the scope to operate in an X-Y mode. Set the vertical sensitivity to 0.2 volt/div. Adjust the vertical position, horizontal position and horizontal sensitivity to obtain a scope pattern as shown in Figure 4-6.

Adjust the sweep generator marker controls as follows:

Turn on 50 MHz harmonic marker. Adjust MARKER WIDTH clockwise and MARKER SIZE to produce a marker amplitude similar to that shown in Figure 4-6.

DISPLAY LINEARITY

Display linearity is read directly from the display shown in Figure 4-6. Each marker must fall within 0.16 div of

a vertical line on the scope graticule. This is equivalent to a display linearity of 2%.

MAXIMUM SWEEP WIDTH

Maximum sweep width is also read directly from the display of Figure 4-6 and equals $((N-1)$ times the marker frequency) where N = number of markers present on the display (incl. Zero Beat).

FREQUENCY RANGE

To identify the frequencies shown on the display of Figure 4-6, one frequency marker must be positively identified. The Zero Beat in the swept RF output looks distinctly different than a marker, is present when other markers are off, and can be used as a frequency reference. The first 50 MHz birdy to the right of zero marks a frequency of 50 MHz, the second indicates 100 MHz, and so on. The frequency of each marker shown on the display can be identified by referring to the Zero Beat.

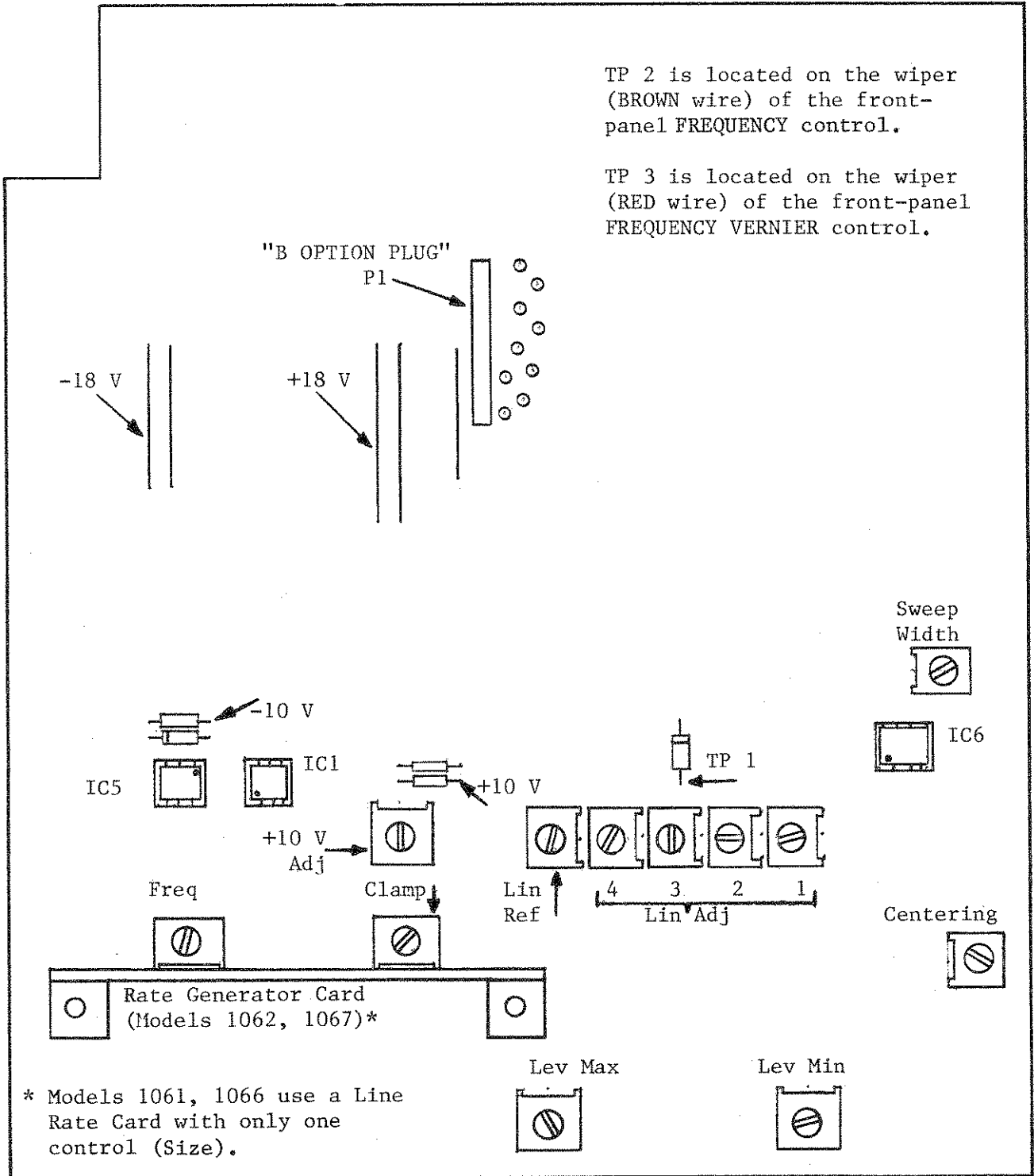


Figure 4-5. 1060 Series Control And Test Point Locations

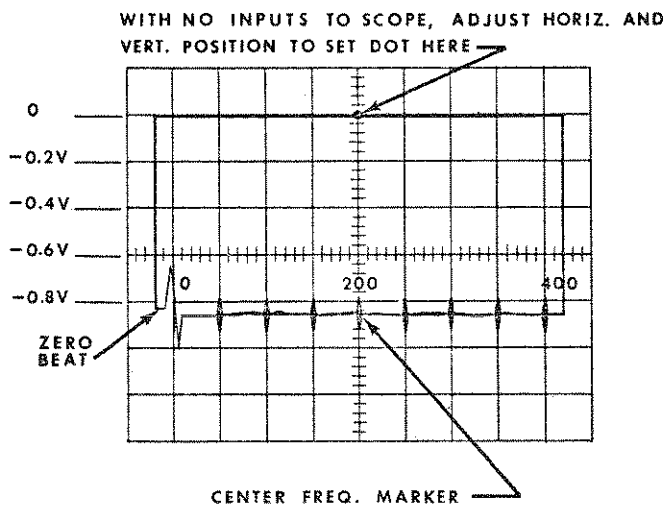


Figure 4-6. Detected RF With Markers

The center frequency range of the instrument can be checked by simply turning the FREQUENCY control to its extremes and noting the range of frequencies indicated at the exact center of the display. The low and high limit markers should move past the display center line by approximately $\frac{1}{2}$ div before the pot stops. This represents approximately 5% overrange capacity.

FREQUENCY DIAL ACCURACY

Set the calibrated FREQUENCY dial for zero MHz. Reduce the sweep width to approximately 50 MHz. With the 10 and 50 MHz harmonic markers on, check each of the lines on the dial against the actual center frequency of the output (as determined by the birdy marker display). The dial error is the difference between the actual frequency at the centerline of the scope and the frequency indicated on the dial. The dial accuracy is 5% of full scale or within 20 MHz of the dial setting.

MINIMUM SWEEP WIDTH CHECK

Turn the 1 MHz harmonic marker on. Adjust the FREQUENCY and SWEEP WIDTH controls to exactly center a 1 MHz harmonic marker on the extreme left scope graticule line and the next higher 1 MHz harmonic marker on the extreme right scope graticule line. See Figure 4-7.

The scope horizontal is now calibrated for 1 MHz full scale or 100 kHz per division. Adjust the FREQUENCY VERNIER to center a 1 MHz harmonic marker on the scope display. Adjust the MARKER WIDTH control to produce a Marker Width approximately equal to the minimum Sweep Width specification (200 kHz). Now decrease the Sweep Width to minimum and ensure that the points of the marker set for 200 kHz cover the entire scope display.

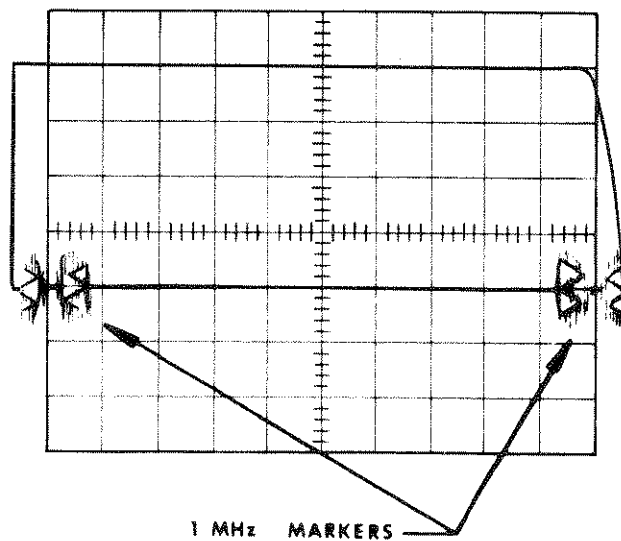


Figure 4-7. 1 MHz Sweep Width

CW MODE CHECK

Adjust the sweep width control fully counterclockwise until a "click" is heard. In this position the retrace blanking and the ramp component of the Sweep Drive signal are removed from the oscillator. The output frequency is determined by the FREQUENCY control and the accuracy is the same as in the above dial accuracy check. The output amplitude is the same as in the sweep mode of operation with the absence of the zero volt retrace reference.

If the instrument does not meet specifications according to above checks, the following calibration should be performed. Refer to Figure 4-5 for control and test point locations mentioned in the following procedure.

POWER SUPPLY

Connect a DVM to the +10 V TP. With the +10 V Adj control, set the voltage to 10.000 V. Measure also the -10 V, +18 V, and -18 V Test Points. The -10 V supply should read within 30 mV of the +10 V supply. The ± 18 V supplies should read within 0.2 V of the specified voltage.

SWEEP RATE

Connect the SCOPE HORIZONTAL output to the vertical input of the oscilloscope (scope set at 2 V/div vertical, 2 ms/div horizontal).

Models 1061, 1066 - Adjust the Size control on the Line Rate Card for a 10 Vpp signal.

Models 1062, 1067 - Set the SWEEP RATE control to a non-line rate. Positive and negative peak levels should be +5 V and -5 V respectively. Set the SWEEP RATE control to LINE. Set the Glamp control for -5 V. Set the scope for 1 ms/div. Adjust the Freq control such that the wait time between sweeps is 1 ms. The minimum non-line rate sweep time should be <16 ms. The maximum non-line rate sweep time should be ≥ 2 sec.

Set the instrument and scope up as described in the Typical Setup at the beginning of this section (4.3.4).

SWEEP DRIVE

Before starting, align the FREQUENCY control dial such that the marks on the dial beyond the 0 to 400 scale coincide with the dial's mechanical stops. Connect a digital voltmeter to TP2 and set the FREQUENCY control for electrical zero. Connect the DVM to TP 3 and set the FREQUENCY VERNIER for zero volts.

FREQUENCY PROGRAM AND LINEARITY

Connect the sweep generator and scope as shown in Figure 4-4. Set the vertical sensitivity of the scope for .2 V/div. Turn on a 50 MHz harmonic mar-

ker and electrically center the scope trace. Using a medium sweep width, adjust the Centering control to center the 200 MHz birdy on the screen. Set the FREQUENCY control to 0 MHz and center the Zero Beat on the screen using the Sweep Width control on the Main PC Board. Set the front-panel SWEEP WIDTH control to maximum. Reset the FREQUENCY control for electrical zero. Set the oscilloscope horizontal sensitivity such that the Zero Beat and the 200 MHz birdy are exactly 4 divisions apart. Connect the oscilloscope vertical to TP 1. Adjust the Lin Ref control on the Main PC Board such that the trace "knee" bends exactly 3 divisions beyond the 200 MHz birdy (Figure 4-8). Reconnect the oscilloscope vertical to the SCOPE VERT OUT connector and align the Zero Beat with the second vertical graticule line. Adjust Lin Adj controls 1, 2, 3, 4, in order, so that the 250, 300, 350, 400 MHz birdies, respectively, fall on graticule lines as shown in Figure 4-6.

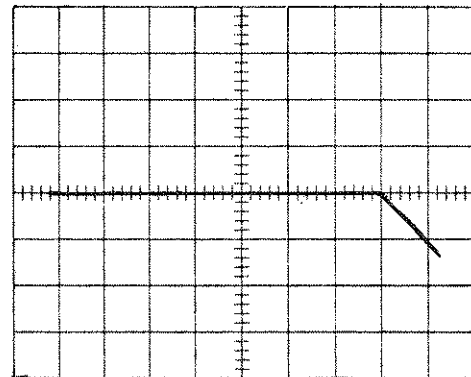


Figure 4-8. Linearity Reference Adj.

4.3.5 RF Amplitude

OUTPUT LEVEL

Set FREQUENCY control to 200 MHz. Set SWEEP WIDTH control to CW mode. Set OUTPUT STEP and VERNIER ATTENUATORS for maximum output. Connect power meter to the RF OUT connector. NOTE: Before connection to power meter, Models 1066, 1067 require an "F to BNC" adapter (less than 3" cable) and a 75 to 50 Ω matching pad.

OUTPUT LEVEL ADJUSTMENTS

Set the front-panel controls for maximum output (+57 dBmV for Models 1066, 1067, +10 dBm for Models 1061, 1062). Set the SWEEP WIDTH control to CW. Adjust the Lev Max control on the Main PC Board for exactly +57 dBmV or +10 dBm output on the power meter (with the 75Ω to 50Ω matching pad, +57 dBmV registers as 2.5 dBm on the power meter). Set the OUTPUT VERNIER ATTENUATOR to -7 on Models 1066, 1067, to +15 on Models 1061, 1062. Adjust the Lev Min control for +43 dBmV on Models 1066, 1067, for -5 dBm on Models 1061, 1062 (with the matching pad, +43 dBmV registers as -11.5 dBm on the power meter).

NOTE

The Lev Max and Lev Min adjustments interact, therefore, the above procedure should be repeated until both levels are correct without adjustment.

Using the power meter, verify the OUTPUT VERNIER ATTENUATOR calibration at every 1 dB marking for the top 14 dB of its range.

For power calibration in the field, the internal detector in the instrument may be substituted for a power meter. The proper detector outputs are:

*OUTPUT VERNIER ATTEN. at max.....-0.8 V
OUTPUT VERNIER ATTEN. at min.....-40 mV*

FLATNESS CHECK

The sweep generator should be set up as outlined in Section 4.3.4.

The RF flatness of ±.25 dB is checked by comparing the minimum amplitude point to the maximum amplitude point.

STEP ATTENUATOR CHECK

The accuracy of the STEP ATTENUATOR can be measured by using a suitable Attenuation Test Set or by directly substituting

precision RF attenuator pads for each 10 dB step of the ATTENUATOR. The output through the precision pad is compared to the output through the instrument's corresponding ATTENUATOR pad. An RF detector can be used to recover the signal at levels down to approximately -40 dBm. Below this level an RF amplifier or sensitive receiver (spectrum analyzer) must be used. The difference between the two outputs represents the attenuator error. Maximum allowable error is two percent of the indicated attenuation. The error is that produced by the step attenuator alone and does not include the basic flatness or the OUTPUT VERNIER ATTENUATOR error.

4.3.6 Frequency Performance

FREQUENCY DRIFT CHECK

Return to typical setup of paragraph 4.3.4 and again calibrate the display's sweep width to 1 MHz as in the minimum sweep width check in Section 4.3.4. Position the marker to the exact center of the oscilloscope display and read frequency drift directly from the scope display by noting the change in the marker's position with time. Each division represents 100 kHz. When reading drift over long periods of time, calibrate the display sweep width to 5 MHz, using the 1 MHz harmonic markers. Next, turn off the 1 MHz marker and turn on the 50 or 10 MHz harmonic markers. Center a marker on the scope display. Read drift as before, except each division now represents 500 kHz.

After one-half hour warmup at a constant ambient and allowing a five minute stabilizing period after a frequency change, the maximum allowable drift is 100 kHz per 5 minutes or 2 MHz per 8 hours.

RESIDUAL FM CHECK

Adjust the horizontal gain of the oscilloscope for a full width (10 div) display. Adjust the SWEEP WIDTH and FREQUENCY VERNIER controls to position a 1 MHz birdy marker at each edge of

the display (1 MHz sweep width). Use the FREQUENCY VERNIER to center a birdy on the screen. Set the SWEEP RATE to maximum (Models 1062, 1067). The birdy "wobble" should be less than 0.2 div (20 kHz at 100 kHz/div).

SPURIOUS SIGNAL CHECK

Checking for spurious signal content is not normally required for periodic calibration, only for incoming inspection. The only practical way to measure spurious signal content is with a high quality spectrum analyzer useable from 10 MHz to at least 800 MHz. The spurious check is made in accordance with the instructions furnished with the particular spectrum analyzer being used.

Spurious signals should be more than 30 dB below the amplitude of the fundamental frequency (10 to 400 MHz.)

The heterodyning method of generating the output signal will give non-harmonically related spurious signals in addition to the harmonically related signals. These signals are typically 40 to 50 dB below the output signal and should increase to no more than -30 dB near the high end of the frequency range.

4.3.7 Marker System

Specifications, with the exception of spurious markers, are the same for either single frequency or harmonic type markers. The procedure for verification of performance is the same for each type.

Single frequency markers should have no spurious markers throughout the swept range. Harmonic type markers may or may not have small spurious markers at one half or one third the specified marker interval.

SWEEP SAMPLE

Connect the RF detector (D151) to the sweep sample output jacks of the M9Y-1/M9YA-1 using 50 ohm coax and appropriate connectors. The detected value should be 30 millivolts and 130 mV at J2 and J4 respectively.

Sweep sample can be adjusted by removing the cover from the M9Y-1/M9YA-1 and turning the level control (R30) which is located at the top of the module on the front.

MARKER SIZE

Observe the markers and insure they are of equal amplitude throughout the range.

Set the oscilloscope vertical gain to 2 V/div and adjust the MARKER SIZE control fully clockwise. The markers should be approximately 2 V peak-to-peak in amplitude. Adjust the MARKER SIZE control fully counterclockwise and set the oscilloscope vertical gain to 5 mV/div. The markers should be less than 2 mV peak-to-peak in amplitude.

MARKER SIZE ADJUSTMENT - MODULE M6

Each marker module has a Size Adjustment control which is accessible from the side of the unit next to the marker module hold-down screw (refer to Figure 4-1). The control is adjusted until a saturated marker is obtained on the scope display when operating the unit as shown in the Typical Setup, Figure 4-6. A saturated marker is obtained when a further increase in the marker module Size Adjustment does not increase the marker amplitude on the scope display. Increasing the Size Adjustment beyond this point may result in spurious markers on the display.

MARKER WIDTH

While observing a birdy at a narrow sweep width, rotate the MARKER WIDTH control. There should be 3 distinct positions of the control and 3 distinguishable corresponding marker widths.

MARKER ACCURACY

Marker accuracy may be verified by one of several methods. The first method requires a signal generator, a frequency counter covering the desired marker frequency and an M6C, External Marker module. First adjust the sweep generator's center frequency to the marker's

frequency and the sweep width to approximately 2 MHz. Connect the output from the signal generator to the EXTERNAL MARKER connector located on the rear panel and carefully adjust the signal generator for a zero beat with the internally generated birdy marker. Next, connect the signal generator's output to the counter and read the signal generator frequency which is now identical to the marker frequency. Allowable error is 0.005% of the marker frequency.

The second method uses the counter only but requires the removal of the instrument cover and marker module cover.

Probe the marker box with the input lead from the counter until sufficient signal is picked up to provide a counter reading.

The highest crystal frequency used is approximately 50 MHz. Markers above this frequency use harmonics of the crystal frequency. Again the allowable error is 0.005% of the marker frequency. Test equipment for the marker accuracy check is not listed in the recommended test equipment chart since the requirements vary with the method and the specific markers installed in the unit. Also, the inherent stability of the quartz crystal makes a marker accuracy check unnecessary in all but the most critical applications.

4.4 TROUBLESHOOTING

INTRODUCTION

Troubleshooting is, in general, a systematic process of elimination. A thorough understanding of the circuit description located in Section 3 of this manual will enable the trouble symptom to be associated with a particular circuit function. Once this has been accomplished, the problem can be troubleshooted with the aid of the schematic. A problem in a power supply often causes many symptoms, and should be checked when the symptom does not clearly indicate a specific problem.

TROUBLESHOOTING HINTS

The following is a list of several typical symptoms followed by the probable cause or a troubleshooting procedure.

INTERMITTENT OPERATION OF ANY TYPE - Defective module pin sockets or loose RF cables.

NO RF OUTPUT - Defective ATTENUATOR or RF cables connecting to the input or output of the ATTENUATOR.

RF OUTPUT NOT FLAT - Most common cause is the RF detector being defective. The components in the internal detector circuit are easily accessible for repair. Another is the monitor diode located in the M9Y-1/M9YA-1. This is a point contact diode and can be damaged if the RF output is momentarily connected to a B+ voltage. (This is prevented in Models 1066, 1067 by the DC block in the RF output line.) A good monitor diode will produce a negative detected voltage approximately twice that of the external detector. For example, at maximum RF output an RF detector will read approximately 0.8 V. The internal monitor will read approximately -1.6 V.

FREQUENCY UNSTABLE (JITTER) - Check the M9Y-1/M9YA-1 module for a loose hold-down screw. Check the +10 V and +18 V supplies for excessive ripple. Operating the unit in a strong magnetic field, such as that adjacent to another instrument containing a large power transformer, can produce 60 Hz hum modulation.

NO RF SWEEP - First check the SCOPE HORIZONTAL connector for the presence of a 10 Vpp ramp. This ramp indicates proper operation of the sweep rate section. Next, check for the ramp at IC6, pin 1. Finally, check the Sweep Drive output of the PC Board at the input of the M9Y-1/M9YA-1 (pin 9). It should be similar to the SCOPE HORIZONTAL connector except it will be lower in amplitude, approximately 8 V

peak-to-peak. If the Sweep Drive output is correct, the trouble is probably in the M9Y-1/M9YA-1 sweep oscillator module.

MARKER PROBLEMS - A common marker problem is that caused by one of the interconnecting cables between the M6 modules being loose. This causes a notch in the sweep sample input to the module causing uneven harmonics or weak output from the M6.

To isolate the cause of a marker problem when the symptom does not clearly indicate a specific circuit or component, first check the sweep sample output at the M9Y-1/M9YA-1 sweep sample output connector (J2) using an RF detector. The detected signal should be approximately 40 mV. If the proper sweep sample signal is not present, it indicates that the trouble is in the Sweep Oscillator module. If signal is correct, connect the detector in place of the terminating plug, P301. A similar signal at this point indicates all jumper cables and RF jacks on the M6 modules are intact. Then check for the birdy output at pin 3 of the marker module (this is a Low Frequency signal). A 10 to 15 mV peak-to-peak birdy is sufficient to drive the birdy amplifier and indicates the M6 module is operating properly. With the 15 mV birdy present at the input of the birdy amplifier, a 5.5 V peak-to-peak signal should be produced at the output. This indicates proper operation of the birdy amplifier. The width of the output signal is controllable by the front-panel **MARKER WIDTH** control. The signal is now routed through the front-panel **MARKER SIZE** control and to the front-panel **SCOPE VERTICAL** connector.

4.5 MARKER INSTALLATION

Installing marker option involves plugging module into chassis, installing hold-down screw, connecting RF sweep sample, and installing the marker switch button.

Refer to Figure 4-9 for locations of marker positions b-f. M6S and M6H can be plugged in any of these 5 positions. Markers should be installed starting with position b and continuing in alphabetical order. The M6C should be plugged only in position a.

After plugging in modules, install hold-down screws as indicated in Figure 4-1.

Next, connect the sweep sample cable. This cable connects to the marker (usually an M6C) in position a (if there is no marker in position a, the sweep sample cable connects to the marker in position b).

The cable from the rear-panel **EXT MARKER** connector (if used) goes to the center connector of the M6C in position a.

Install 50 ohm termination on the unused connector of the last marker module.

Marker switch buttons are engraved to show the frequencies of the installed markers. Buttons can be replaced by pulling blank buttons off and pushing engraved buttons on the switches which turn on the corresponding marker frequencies.

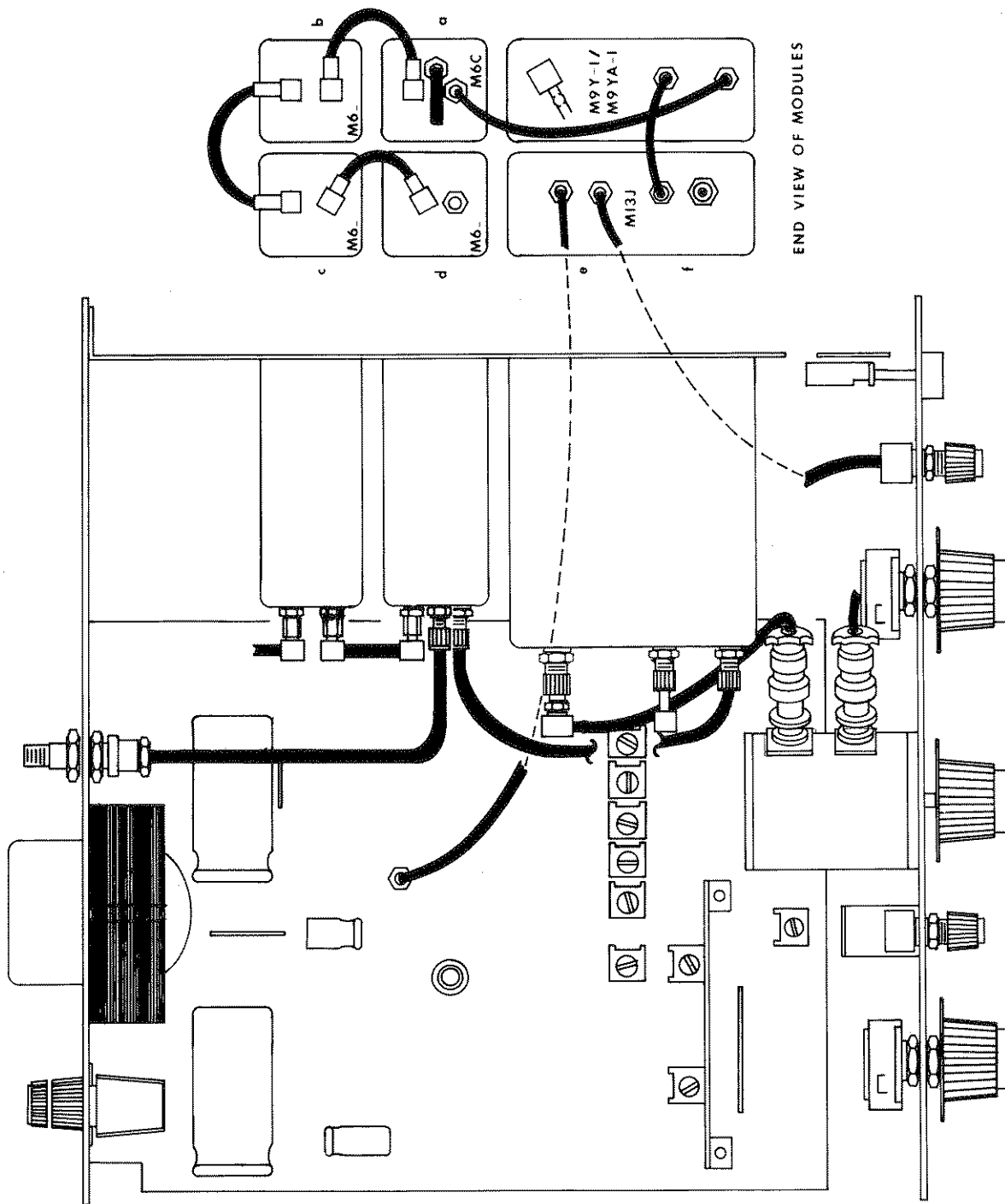


Figure 4-9. Top View

SECTION 5

REPLACEABLE PARTS

5.1 INTRODUCTION

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

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

The lists appear in the following order.

| <u>PARTS LIST</u> | <u>ASSEMBLY</u> |
|-------------------|-------------------------|
| 1010-00-0075 | 1061 |
| 1010-00-0076 | 1062 |
| 1010-00-0077 | 1066 |
| 1010-00-0029 | 1067 |
| ----- | MISC. PARTS |
| 1111-00-0019 | MAIN FRAME |
| 1111-00-0020 | F.P. - 1061, 1062 |
| 1111-00-0022 | F.P. - 1066, 1067 |
| 1219-00-0038 | INT. DET. - 50 Ω |
| 1219-00-0072 | INT. DET. - 75 Ω |
| 1110-00-0890 | MAIN PC BOARD |
| 1110-00-0900 | C001 RATE CARD |
| 1110-00-0970 | C004 RATE CARD |
| 1114-00-0070 | M9Y-1 / M9YA-1 |
| 1114-00-0151 | M13J |
| 1110-00-1050 | TILT |
| 1110-00-1060 | NOTCH / TILT |
| 1114-00-0050 | M6H-1 |
| 1114-00-0099 | M6H-10 |
| 1114-00-0100 | M6H-50 |
| 1114-00-0045 | M6S-3 |
| 1114-00-0046 | M6S-4 |
| 1114-00-0124 | M6C |

5.2 MANUFACTURERS CODE

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

MANUFACTURER ABBREVIATIONS

| ABBRV | NAME | CITY | ST |
|-------|-------------------------------|--------------------|----|
| A-B | ALLEN-BRADLEY | MILWAUKEE | WI |
| A-D | ANALOG DEVICES | CAMBRIDGE | MA |
| A-H | ARROW HART, INC. | KETTERING | OH |
| A-I | ALAN INDUSTRIES | COLUMBUS | IN |
| A-M | AMERICAN MAGNETICS | CARTERVILLE | IL |
| A-P | AMERICAN PLASTICRAFT CO. | CHICAGO | IL |
| ABAC | ABACUS PACKAGING CO. | CHICAGO | IL |
| ACI | ADVANCE COMPONENTS, INC. | CENTERBROOK | CT |
| AER | AVX CERAMICS | MYRTLE BEACH | SC |
| AERTK | AERTECH INDUSTRIES | SUNNYVALE | CA |
| AHAM | AHAM COMPANY | AZUSA | CA |
| AIN | ALPHA INDUSTRIES, INC. | WOBURN | MA |
| ALC | ALCO ELECTRONICS PRODUCTS | NORTH ANDOVER | ME |
| ALLPL | ALL PLASTICS, INC. | INDIANAPOLIS | IN |
| AMP | AMP, INC. | HARRISBURG | PA |
| APL | AMPHENOL CONNECTOR SYSTEMS | BROADVIEW | IL |
| APX | AMPEREX ELECTRONIC CORP. | SLATERSVILLE | RI |
| ARC | ARCO ELECTRIC PRODUCTS | SHELBYVILLE | IN |
| ASC | ASSOCIATED SPRING | BRISTOL | CT |
| ASE | AIRCO SPEER ELECTRONICS | ST. MARYS | PA |
| AT/IN | ATLANTIC INDIA RUBBER COMPANY | CHICAGO | IL |
| ATC | AMERICAN TECHNICAL CERAMICS | HUNTINGTON STATION | NY |
| ATR | ATR COIL CO. | BLOOMINGTON | IN |
| AUGAT | AUGAT, INC. | ATTLEBORO | MA |
| AVT | AVANTEK, INC. | SANTA CLARA | CA |
| AWC | ALPHA WIRE | ELIZABETH | NJ |
| B-T | BEK-TEK, INC. | READING | PA |
| BEK | BECKMAN INSTRUMENTS, INC. | FULLERTON | CA |
| BEL | BELDEN CORP. | GENEVA | IL |
| BER | BERG ELECTRONICS | NEW CUMBERLAND | PA |
| BGH | BEECH GROVE HARDWARE | BEECH GROVE | IN |
| BOU | BOURNS, INC. | RIVERSIDE | CA |
| BREZ | BREEZE CORPORATIONS, INC. | UNION | NJ |
| BUCK | BUCKEYE STAMPING CO. | COLUMBUS | OH |
| BUD | BUD RADIO, INC. | WILLOUGHBY | OH |
| BURND | BURNDY CORP. | NORWALK | CT |
| BUS | BUSSMAN MFG. | ST. LOUIS | MO |
| C-D | CORNELL DUBILIER ELECT. DIV. | NEWARK | NJ |
| C-E | CLINTON ELECTRONICS | ROCKFORD | IL |
| C-H | CUTLER-HAMMER, INC. | MILWAUKEE | WI |
| C-I | COMPONENTS, INC. | BIDDEFORD | ME |
| C-J | TRW/CINCH | ELK GROVE VILLAGE | IL |
| C-K | C & K COMPONENTS, INC. | WATERTOWN | MA |
| C-L | CENTRALAB DIV. | MILWAUKEE | WI |
| C-W | C-W INDUSTRIES | WARMINSTER | PA |
| CAM | CAMBION | CAMBRIDGE | MA |
| CAR | CARLING ELECTRIC, INC. | WEST HARTFORD | CT |
| CDC | COMPONENT DEVELOPMENT CORP. | CARSON | CA |
| CECO | CENTRAL COIL CO. | BRAZIL | IN |
| CGW | CORNING GLASS WORKS | CORNING | NY |
| CHE | CHERRY ELECTRICAL PRODUCTS | WAUKEGAN | IL |
| CIMCO | CIMCO WIRE AND CABLE INC. | ALLENDALE | NJ |
| CKI | CTS KNIGHTS, INC. | SANDWICH | IL |

MANUFACTURER ABBREVIATIONS

| ABBRV | NAME | CITY | ST |
|-------|--------------------------------|------------------|----|
| CLA | CLAIREX CORP. | MT. VERNON | NY |
| CLAR | CLAROSTAT MFG. CO | DOVER | NH |
| CLFX | COLE-FLEX CORP. | BABYLON | NY |
| CTS | CHICAGO TELEPHONE SYSTEMS | CHICAGO | IL |
| CTS-E | CTS OF ELKHART | ELKHART | IN |
| CTSBR | CTS OF BERNE | BERNE | IN |
| CTSBV | CTS OF BROWNSVILLE | BROWNSVILLE | TX |
| DAL | DALE TECHNOLOGY CORP. | HARTSDALE | NY |
| DAV | HARRY DAVIES MOLDING CO. | CHICAGO | IL |
| DEL | DELEVAN DIV. | EAST AURORA | NY |
| DEW | DEWIRE FABRICATING CORP. | LOWELL | MA |
| DIO | DIODES, INC. | CHATSWORTH | CA |
| DRA | DRAKE MANUFACTURING CO. | HARWOOD HEIGHTS | IL |
| E-C | ELECTRONIC CRYSTALS | KANSAS CITY | MO |
| E-M | ELECTRA/MIDLAND CORP. | MINERAL WELLS | TX |
| ELCO | ELCO INDUSTRIES | ROCKFORD | IL |
| ETP | ERIE TECHNOLOGICAL PRODUCTS | ERIE | PA |
| F-K | FROST-KING | **** | ** |
| F-S | FEDERAL SCREW | CHICAGO | IL |
| FAN | FANCOURT & CO. | GREENSBORO | NC |
| FCD | FAIRCHILD | MOUNTAIN VIEW | CA |
| FRTE | FAIR RITE PRODUCTS CORP. | WALLKILL | NY |
| G-E | GENERAL ELECTRIC | INDIANAPOLIS | IN |
| G-H | GRAYHILL, INC. | LA GRANGE | IL |
| G-I | GEN'L INSTRUMENT SEMICONDUCTOR | HICKSVILLE | NY |
| GAL | GALILEO ELECTRO-OPTICS | CARMEL | IN |
| GRIES | GRIES REPRODUCER | NEW ROCHELLE | NY |
| GRIP | GRIPMASTER CO. | MARLBORO | NJ |
| GUDL | GUDEBROD BROS. SILK CO. | CHICAGO | IL |
| H-P | HEWLETT-PACKARD | INDIANAPOLIS | IN |
| HEL | HELIPOT | ANAHEIM | CA |
| HEY | HEYMAN MFG. CO. | WAUKESHA | WI |
| HHS | HERMAN H. SMITH, INC. | BROOKLYN | NY |
| HIT | HITACHI AMERICA, LTD. | SAN FRANCISCO | CA |
| HOLUB | HOLUB DISTRIBUTING CO. | NEWPORT | KY |
| HUD | HUDSON TOOL & DIE CO. | NEWARK | NJ |
| HY/PL | HYDRO PLASTICS INC. | GEORGETOWN | KY |
| HYT | HYTRONICS | PINELLAS PARK | FL |
| INT | INTERSIL, INC. | CUPERTINO | CA |
| IRC | INTERNATIONAL RESISTANCE CO. | PHILADELPHIA | PA |
| ITT | INT'L TELEPHONE & TELEGRAPH | W. PALM BEACH | FL |
| JAN | JAN HARDWARE MFG. CO. | LONG ISLAND CITY | NY |
| JEF | JEFFERS | DUBOIS | PA |
| JEFWC | JEFFERSON WIRE AND CABLE | WORCHESTER | MA |
| JEW | JEWELL ELECTRICAL INSTRUMENTS | MANCHESTER | NH |
| JON | E.F. JOHNSON CO. | WASECA | MN |
| K-L | KERRIGAN LEWIS MFG. | CHICAGO | IL |
| K-S | K & S ENGINEERING CO. | CHICAGO | IL |
| KEENE | KEENE CORP. | NEWARK | DE |
| KEM | KEMTRON ELECTRON PRODUCTS | NEWBURYPORT | MA |
| KEY | KEYSTONE ELECTRONIC CORP. | NEW YORK | NY |
| KID | KIDCO, INC. | MEDFORD | NJ |
| KIN | KINGS ELECTRONICS | TUCKAHOE | NY |

MANUFACTURER ABBREVIATIONS

| ABBRV | NAME..... | CITY..... | ST |
|-------|------------------------------|-----------------|----|
| KSTR | KESTER SOLDER DIV. | CHICAGO | IL |
| KSW | KSW ELECTRONICS | INDIANAPOLIS | IN |
| LEYSE | LEYSE ALUMINUM CO. | KEWANEE | WI |
| LIT | LITTELFUSE, INC. | DES PLAINES | IL |
| LRC | LRC ELECTRONICS, INC. | HORNELL | NY |
| M-A | MICROWAVE ASSOCIATES | BURLINGTON | MA |
| M-D | MILLER DIAL & NAMEPLATE CO. | EL MONTE | CA |
| M-E | MEPCO ELECTRA, INC. | MORRISTOWN | NJ |
| M-O | ILLUMINATED PRODUCTS INC. | SANTA ANA | CA |
| MAL | MALLORY CONTROLS CO. | FRANKFORT | IN |
| MAND | MANDIX | CHICAGO | IL |
| MDC | MAIDA DEVELOPMENT CO. | HAMPTON | VA |
| MILN | MILLEN MFG. CO. | NEW YORK | NY |
| MMM | 3M COMPANY | ST. PAUL | MN |
| MOL | MOLEX PRODUCTS | LISLE | IL |
| MOT | MOTOROLA SEMI. PROD. DIV. | INDIANAPOLIS | IN |
| MSP | MICRO SEMICONDUCTOR CORP. | SANTA ANA | CA |
| MYERS | MYERS SPRING CO. | LOGANSPORT | IN |
| N-T | NATIONAL TEL-TRONICS | LAREDO | TX |
| NAT | NATIONAL SEMICONDUCTOR CORP. | SANTA CLARA | CA |
| NEC | NIPPON ELECTRIC CO. | TOKYO, JAPAN | ** |
| NEW | NEWARK ELECTRONICS | INDIANAPOLIS | IN |
| NYLO | NYLOMATIC | MORRISVILLE | PA |
| O-G | OPTI-GAGE INC. | DAYTON | OH |
| O-S | OMNI SPECTRA INC. | FARMINGTON | MI |
| OHM | OHMITE MFG. CO. | SKOKIE | IL |
| OMEGA | OMEGA WIRE & CABLE | HARLEYSVILLE | PA |
| P-B | POTTER AND BRUMFIELD | PRINCETON | IN |
| P-C | POWER COMPONENTS | WOODLAND HILLS | CA |
| P-K | PARKER KALON CORP. | CLIFTON | NJ |
| P-T | PENN TUBE PLASTICS CO. | CLIFTON HEIGHTS | PA |
| PAND | PANDUIT CORP. | TINLEY PARK | IL |
| PARA | PARAMETRIC INDUSTRIES | NORTHFIELD | IL |
| PEC | PACIFIC ELECTRICORD CO. | GARDENA | CA |
| PEC | PACIFIC ELECTRICORD CO. | GARDENA | CA |
| PHC | PHILADELPHIA HANDLE CO. | CAMDEN | NJ |
| PLSSY | PLESSEY ENG. | SCHILLER PARK | IL |
| POM | POMONA ELECTRONICS CO., INC. | POMONA | CA |
| PRMD | PYRAMID INDUSTRIES, INC. | PHOENIX | AZ |
| PRSN | PRECISION TUBE CO., INC | NORTH WALES | PA |
| PTN | PENN TRAN CORP. | BELLEFONT | PA |
| PYRO | PYROFILM CORP. | WHIPPANY | NY |
| PYTT | PYTTRONICS INDUSTRIES, INC. | MONTGOMERYVILLE | PA |
| Q-C | QUALITY COMPONENTS | ST. MARYS | PA |
| RAY | RAYTHEON | INDIANAPOLIS | IN |
| RCA | RCA | CAMDEN | NJ |
| REL | RELIANCE MICA CO. | BROOKLYN | NY |
| RICH | RICHCO PLASTIC CO. | CHICAGO | IL |
| RMC | RADIO MATERIALS CORP. | CHICAGO | IL |
| ROGAN | ROGAN CORP. | NORTHBROOK | IL |
| S-C | SPECIALTY CONNECTOR | INDIANAPOLIS | IN |
| S-G | STANDARD GRIGSBY | AURORA | IL |
| S-I | SWITCHCRAFT, INC. | CHICAGO | IL |

MANUFACTURER ABBREVIATIONS

| ABBRV | NAME | CITY | ST |
|-------|--------------------------------|-------------------|----|
| S-S | SERVICE SUPPLY | INDIANAPOLIS | IN |
| S-T | SARKES TARZIAN | BLOOMINGTON | IN |
| SCC | STACKPOLE CARBON CO. | ST. MARYS | PA |
| SEAST | SEASTROM MFG. CO. | GLENDALE | CA |
| SEL | SEAELECTRO CORP. | MAMARONECK | NY |
| SEM | SEMTECH | NEWBURY PARK | CA |
| SGM | SIGMA INSTRUMENTS | BRAINTREE | MA |
| SHAM | SHAMROCK PLASTICS & RUBBER CO. | INDIANAPOLIS | IN |
| SIEM | SIEMENS | ISELIN | NJ |
| SIG | SIGNETICS CORPORATION | SUNNYVALE | CA |
| SOUTH | SOUTHCO FASTENERS | LESTER | PA |
| SPE | SPECTROL | DAYTON | OH |
| SPEC | SPECTRUM CONTROL. INC. | FAIRVIEW | PA |
| SPR | SPRAGUE ELECTRIC CO. | INDIANAPOLIS | IN |
| SSS | SOLID STATE SCIENTIFIC | MONTGOMERYVILLE | PA |
| STR | STETTNER TRUSH CO. | CAZENOVIA | NY |
| STSA | STEEL SALES | INDIANAPOLIS | IN |
| SYL | GTE SYLVANIA | WALTHAM | MA |
| SYS | SYSCON INTERNATIONAL, INC. | SOUTH BEND | IN |
| T-F | THERMA-FILM | **** | ** |
| T-I | TEXAS INSTRUMENTS | DALLAS | TX |
| TCPL | TACONIC PLASTIC | PETERSBURG | NY |
| TEK | TEKTRONIX | INDIANAPOLIS | IN |
| TELE | TELETYPE CORP. | ELK GROVE VILLAGE | IL |
| THR | THERMALLOY CO. | DALLAS | TX |
| TIMES | TIMES WIRE AND CABLE | CINCINNAI | OH |
| TIN | TINNERMAN PRODUCTS, INC. | CLEVELAND | OH |
| TKN | TECHNICAL WIRE | CRAWFORD | NJ |
| TLNC | TELONIC ALTAIR | LAGUNA BEACH | CA |
| TORCO | TOR CORP. | VAN NUYS | CA |
| TRU | WALDES TRUARC | LONG ISLAND CITY | NY |
| TRW | TRW CAPACITOR DIV. | OGALLALA | NB |
| U-C | UNIVERSAL COMPONENTS | LOS ANGELES | CA |
| UNIC | UNICORP | ORANGE | NJ |
| UNIT | UNITRODE CORP. | WATERTOWN | MA |
| USECO | USECO DIV. | VAN NUYS | CA |
| VAC | VACTEC INC. | MARYLAND HEIGHTS | MO |
| VAR | VARADYNE CAPACITOR DIV. | SANTA MONICA | CA |
| VARIL | VARI-L CO. | DENVER | CO |
| VLIER | VLIER ENGINEERING CORP. | BURBANK | CA |
| W-E | WELLS ELECTRONICS | SOUTH BEND | IN |
| W-I | WAVETEK INDIANA, INC. | BEECH GROVE | IN |
| WAG | WAGNER ELECTRIC CORP. | ST. LOUIS | MO |
| WECK | WECKESSER CO., INC. | CHICAGO | IL |
| WSD | WAVETEK | SAN DIEGO | CA |
| WSR | WAVETEK | SANTA ROSA | CA |
| ZEN | ZENITH RADIO CORP. | CHICAGO | IL |
| ZERO | ZERO MANUFACTURING CO. | BURBANK | CA |
| ZPT | ZIPPERTUBING, CO. | LOS ANGELES | CA |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|--------------------------|-----------------------|---|--------------|--------|
| 3 | MAIN FRAME ASSY | A500-396 | W-I | 1111-00-0019 | 1 |
| 1 | FRONT-PANEL ASSY 1061 | A500-397 | W-I | 1111-00-0018 | 1 |
| 2 | INT DET ASSY | A500-358-1 | W-I | 1219-00-0038 | 1 |
| 6 | ATTEN, 5050-01 | 5050-01 | W-I | 1113-30-0021 | 1 |
| 7 | MAIN BD ASSY | A530-002 | W-I | 1110-00-0890 | 1 |
| 8 | RATE CARD,C004 | AL540-004 | W-I | 1110-00-0970 | 1 |
| 5 | SWP OSC,M9Y-1 | M9Y-1 | W-I | 1114-00-0070 | 1 |
| W1 | CABLE ASSY,5 IN | WX2000-A3 | W-I | 1217-80-0001 | 1 |
| W2 | CABLE ASSY,7-1/2 IN | WX2000-A4 | W-I | 1217-80-0002 | 1 |
| W3 | CABLE ASSY, 6-3/4 IN | WX1067-W3 | W-I | 1217-01-0066 | 1 |
| W4 | CABLE ASSY,10 IN | WX1067-W4 | W-I | 1217-80-0014 | 1 |
| 9 | SMC TERM,50 A500-267 | A500-267 | W-I | 1118-00-0007 | 1 |
| 4 | HARNESS ASSY | WY1061 | W-I | 1219-00-0045 | 1 |
| WAVETEK PARTS LIST | | TITLE SWP GEN,1061 | ASSEMBLY NO. 1010-00-0075 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|--------------------------|-----------------------|---|--------------|--------|
| 4 | MAIN FRAME ASSY | A500-396 | W-I | 1111-00-0019 | 1 |
| 1 | FRONT PANEL ASSY 1062 | A500-398 | W-I | 1111-00-0020 | 1 |
| 2 | INT DET ASSY | A500-358-1 | W-I | 1219-00-0038 | 1 |
| 8 | ATTEN, 5050-01 | 5050-01 | W-I | 1113-30-0021 | 1 |
| 6 | MAIN BD ASSY | A530-002 | W-I | 1110-00-0890 | 1 |
| 7 | RATE CARD,C001 | AL540-001 | W-I | 1110-00-0900 | 1 |
| 5 | SWP OSC,M9Y-1 | M9Y-1 | W-I | 1114-00-0070 | 1 |
| W1 | CABLE ASSY,5 IN | WX2000-A3 | W-I | 1217-80-0001 | 1 |
| W2 | CABLE ASSY,7-1/2 IN | WX2000-A4 | W-I | 1217-80-0002 | 1 |
| W3 | CABLE ASSY, 6-3/4 IN | WX1067-W3 | W-I | 1217-01-0066 | 1 |
| W4 | CABLE ASSY,10 IN | WX1067-W4 | W-I | 1217-80-0014 | 1 |
| 9 | SMC TERM,50 A500-267 | A500-267 | W-I | 1118-00-0007 | 1 |
| 3 | HARNESS ASSY | WY1062 | W-I | 1219-00-0047 | 1 |
| WAVETEK PARTS LIST | | TITLE SWP GEN,1062 | ASSEMBLY NO. 1010-00-0076 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-----------------------|--------------------------|-------------------|------|--------------|--------|
| 3 | MAIN FRAME ASSY | A500-396 | W-I | 1111-00-0019 | 1 |
| 1 | FRONT-PANEL ASSY 1066 | A500-399 | W-I | 1111-00-0021 | 1 |
| 2 | INT DET ASSY | 1219-00-0072 | W-I | 1219-00-0072 | 1 |
| 8 | ATTEN, 7550-01 | 7550-01 | W-I | 1113-20-0029 | 1 |
| 6 | MAIN BD ASSY | A530-002 | W-I | 1110-00-0890 | 1 |
| 7 | RATE CARD,C004 | ALS40-004 | W-I | 1110-00-0970 | 1 |
| 5 | SWP OSC,M9YA-1 | M9YA-1 | W-I | 1114-00-0071 | 1 |
| W1 | CABLE ASSY, 6 IN | WX1067-W1 | W-I | 1217-70-0010 | 1 |
| W2 | DC BLOCK, B173 | B173 | W-I | 1113-80-0007 | 1 |
| W3 | CABLE ASSY, 6-3/4 IN | WX1067-W3 | W-I | 1217-01-0066 | 1 |
| W4 | CABLE ASSY,10 IN | WX1067-W4 | W-I | 1217-80-0014 | 1 |
| 9 | SMC TERM,50 A500-267 | A500-267 | W-I | 1118-00-0007 | 1 |
| 4 | HARNESS ASSY | WY1061 | W-I | 1219-00-0045 | 1 |

| | | | |
|-------------------------------|-----------------------|------------------------------|-----|
| WAVETEK PARTS LIST | TITLE SWP GEN,1066 | ASSEMBLY NO. 1010-00-0077 | REV |
| PAGE: 1 | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-----------------------|--------------------------|-------------------|------|--------------|--------|
| 3 | MAIN FRAME ASSY | A500-396 | W-I | 1111-00-0019 | 1 |
| 1 | FRONT-PANEL ASSY 1067 | A500-400 | W-I | 1111-00-0022 | 1 |
| 2 | INT DET ASSY | 1219-00-0072 | W-I | 1219-00-0072 | 1 |
| 8 | ATTEN, 7550-01 | 7550-01 | W-I | 1113-20-0029 | 1 |
| 6 | MAIN BD ASSY | A530-002 | W-I | 1110-00-0890 | 1 |
| 7 | RATE CARD,C001 | ALS40-001 | W-I | 1110-00-0900 | 1 |
| 5 | SWP OSC,M9YA-1 | M9YA-1 | W-I | 1114-00-0071 | 1 |
| W1 | CABLE ASSY, 6 IN | WX1067-W1 | W-I | 1217-70-0010 | 1 |
| W2 | DC BLOCK, B173 | B173 | W-I | 1113-80-0007 | 1 |
| W3 | CABLE ASSY, 6-3/4 IN | WX1067-W3 | W-I | 1217-01-0066 | 1 |
| W4 | CABLE ASSY,10 IN | WX1067-W4 | W-I | 1217-80-0014 | 1 |
| 9 | SMC TERM,50 A500-267 | A500-267 | W-I | 1118-00-0007 | 1 |
| 4 | HARNESS ASSY | WY1062 | W-I | 1219-00-0047 | 1 |

| | | | |
|-------------------------------|-----------------------|------------------------------|----------|
| WAVETEK PARTS LIST | TITLE SWP GEN,1067 | ASSEMBLY NO. 1010-00-0029 | REV A |
| PAGE: 1 | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-------------------------------------|------------------------------|----------------------------------|--------------|--------|
| J102 | HSG, MINI-LATCH, 7-PIN MC000-113 | 65039-030 | BER | 2113-10-0003 | 1 |
| J103 | HSG, MINI-LATCH, 16PIN MC000-115 | 65039-021 | BER | 2113-10-0005 | 1 |
| J201 | RECEPTACLE, MC000-016 | 03-06-1151 | MOL | 2113-03-0001 | 1 |
| J202 P202 | HSG, MINI-LATCH, 5-PIN MC000-111 | 65039-032 | BER | 2113-10-0001 | 2 |
| J203 | HSG, MINI-LATCH, 4-PIN MC000-120 | 65039-033 | BER | 2113-10-0006 | 1 |
| J204 | HSG, MINI-LATCH, 9-PIN MC000-121 | 65039-028 | BER | 2113-10-0007 | 1 |
| RPLUG | PLUG, MC000-017 | 03-06-2151 | MOL | 2113-04-0001 | 1 |
| NONE | TERMINAL, FEMALE MC000-018 | 1855 | MOL | 2113-05-0001 | 1 |
| NONE | TERMINAL, MALE MC000-019 | 1854 | MOL | 2113-05-0002 | 1 |
| NONE | TERM, MINI-PV MC000-092 | 47439 | BER | 2113-20-0001 | 1 |
| NONE | TERM, MALE, MC000-116 | 48116 | BER | 2113-22-0001 | 1 |
| NONE | PLUG, POLARIZING MC000-117 | 65307-001 | BER | 2113-23-0001 | 1 |
| WAVETEK PARTS LIST | | TITLE MISCELLANEOUS PARTS | ASSEMBLY NO. ----- PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|------------------------------------|--------------------------|---|--------------|----------|
| F201 | FUSE, S.B., .5 AMP MF000-007 | MDL 1/2 | BUS | 2410-05-0004 | 1 |
| P205 | POWER CORD, WL002-088 | 17237SVT | BEL | 6011-80-0001 | 1 |
| S201 | SWITCH, DPDT, LOCKING SS000-003 | 46256LFE | S-I | 5105-00-0003 | 1 |
| S202 | SWITCH, TOGGLE ST001-007 | 110-85 | CAR | 5106-00-0010 | 1 |
| T201 | XFMR, PWR, TT000-035 | T1000-035 | W-I | 5610-00-0017 | 1 |
| WAVETEK PARTS LIST | | TITLE MAIN FRAME ASSY | ASSEMBLY NO. 1111-00-0019 PAGE: 1 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|---------------------------|--------------------------------|---|---|--------------|--------|
| C101 | CAP,CER,120PF,1KV CD102-112 | 60U121M | MDC | 1510-10-1121 | 1 |
| CR101 | LED DL000-001 | NSL5046 | NAT | 4810-02-0001 | 1 |
| J105 J106 J107 | CONN,UG911A/U JB109-111 | KC79-146 | KIN | 2110-01-1013 | 3 |
| R101 (1062 ONLY) | POT/SWITCH RP152-310 | 70K1G040R103M | A-B | 4610-30-4103 | 1 |
| R102 R105 R107 | POT,10K RP124-310 | WA2G032S103MA | A-B | 4610-10-7103 | 3 |
| R103 | POT/SWITCH RP151-310 | 70K1G04R103R | A-B | 4610-30-3103 | 1 |
| R104 R106 | POT,10K RP118-310 | JAIN056S103MA | A-B | 4610-10-5103 | 2 |
| R108 | RES,C,1/4W,5%,33K RC103-333 | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| S101 (1062 ONLY) | SWITCH,TOGGLE ST002-006 | 7107PN-BLK | C-K | 5106-00-0011 | 1 |
| S104 | SWITCH,PB,SZ000-020 | PR10-304B | CTL | 5110-00-0009 | 1 |
| 7 | BUTTON,SW,SZ000-007 | J52304-B | CTL | 5110-04-0001 | 4 |
| WAVETEK PARTS LIST | | TITLE FRONT-PANEL ASSY 1061, 1062 | ASSEMBLY NO. 1111-00-0020 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|---------------------------|--------------------------------|---|---|--------------|----------|
| C101 | CAP,CER,120PF,1KV CD102-112 | 60U121M | MDC | 1510-10-1121 | 1 |
| CR101 | LED DL000-001 | NSL5046 | NAT | 4810-02-0001 | 1 |
| J105A J106A J107A | HOUSING, A001-503 | A001-503 | W-I | 2111-06-0002 | 3 |
| J105B J106B J107B | INSERT | 1085-3 | PRMD | 2111-07-0001 | 3 |
| R101 (1067 ONLY) | POT/SWITCH RP152-310 | 70K1G040R103M | A-B | 4610-30-4103 | 1 |
| R102 R105 R107 | POT,10K RP124-310 | WA2G032S103MA | A-B | 4610-10-7103 | 3 |
| R103 | POT/SWITCH RP151-310 | 70K1G04R103R | A-B | 4610-30-3103 | 1 |
| R104 R106 | POT,10K RP118-310 | JAIN056S103MA | A-B | 4610-10-5103 | 2 |
| R108 | RES,C,1/4W,5%,33K RC103-333 | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| S101 (1067 ONLY) | SWITCH,TOGGLE ST002-006 | 7107PN-BLK | C-K | 5106-00-0011 | 1 |
| S104 | SWITCH,PB,SZ000-020 | PR10-304B | CTL | 5110-00-0009 | 1 |
| 8 | BUTTON,SW,SZ000-007 | J52304-B | CTL | 5110-04-0001 | 4 |
| WAVETEK PARTS LIST | | TITLE FRONT-PANEL ASSY 1066, 1067 | ASSEMBLY NO. 1111-00-0022 PAGE: 1 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------------|---------------------------------|---|--------------|--------|
| C102 | CAP, FT, 500PF, 20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C103 | CAP, CER, .01MF, 100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| CR102 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 1 |
| J108 | RECEPTACLE, BNC FROM: 2110-01-1013 | A001-228 | W-I | 1410-00-3579 | 1 |
| R110 | RES, C, 1/4W, 5%, 51 RC103-051 | CF1/4-51 | ASE | 4700-15-5109 | 1 |
| R109 | RES, C, 1/4W, 5%, 33K | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| WAVETEK PARTS LIST | | TITLE INT DET ASSY 50 OHM | ASSEMBLY NO. 1219-00-0038 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|--------------------------------------|---------------------------------|---|--------------|--------|
| C102 | CAP, FT, 500PF, 20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C103 | CAP, CER, .01MF, 100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| CR102 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 1 |
| J108A | HOUSING, A001-503 | A001-503 | W-I | 2111-06-0002 | 1 |
| J108B | INSERT | 1085-3 | PRMD | 2111-07-0001 | 1 |
| R110 | RES, C, 1/4W, 5%, 75 RC103-075 | CF1/4-75 | ASE | 4700-15-7509 | 1 |
| R109 | RES, C, 1/4W, 5%, 33K | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| WAVETEK PARTS LIST | | TITLE INT DET ASSY 75 OHM | ASSEMBLY NO. 1219-00-0072 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|------------------------------------|-----------------------------------|-----------------------|---|--------------|----------|
| C01 C10 | CAP,ELECT,1500MF,50V CE102-215 | D76374 | SPR | 1510-20-1152 | 2 |
| C02 C04 C07 C11 C14 | CAP,CER,.005MF,1KV CD103-250 | TG-050 | SPR | 1510-10-2502 | 5 |
| C03 C09 C13 C15 C16 C18 C19 C22 | CAP,TANT,10MF,25V CE120-010 | 162D106X00250D2 | SPR | 1510-21-7100 | 8 |
| C05 | CAP,ELECT,100MF,12V CE119-110 | 500D107G012CC7 | SPR | 1510-21-2101 | 1 |
| C06 | CAP,CER,100PF,1KV CD104-110 | 10TCU-T10 | SPR | 1510-10-3101 | 1 |
| C08 C17 | CAP,ELECT,100MF,25V CE105-110 | TE1211 | SPR | 1510-20-4101 | 2 |
| C20 | CAP,CER,200PF,1KV CD102-120 | 5GA-T20 | SPR | 1510-10-1201 | 1 |
| C21 | CAP,CER,.001MFD,1KV CD102-210 | 5G4D10 | SPR | 1510-10-1102 | 1 |
| C23 | CAP,CER,.05MF,100V CD103-350 | TG-S50 | SPR | 1510-10-2503 | 1 |
| C24 | CAP,CER,10PF,1KV CD101-010 | 10TCC-Q10 | SPR | 1510-10-0100 | 1 |
| C27 | CAP,CER,360PF,1KV CD102-136 | 60U361M | MDC | 1510-10-1361 | 1 |
| C28 | CAP,CER,120PF,1KV CD102-112 | 60U121M | MDC | 1510-10-1121 | 1 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 1 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|--|--|-----------------------|---|--------------|----------|
| C29 | CAP,MON,1MF,50V,20% | 3420-050-E105M | AER | 1510-11-3105 | 1 |
| C30 | CAP,TANT,.47MF,50V CE113-447 | 935 | TRW | 1510-21-9470 | 1 |
| CR01 CR02 CR03 CR04 | DIODE DR000-008 | 1N5059 | G-E | 4806-01-5059 | 4 |
| CR05 CR06 CR07 CR08 CR09 CR10 CR11 CR12 CR13 CR14 CR15 | DIODE DR000-001 | 1N4004 | P-C | 4806-01-4004 | 11 |
| IC1 IC6 IC7 | IC,IC000-005 | RC4558DN | RAY | 7000-14-5800 | 3 |
| IC2 | IC,IC000-026 | MC7818CD | MOT | 7000-78-1800 | 1 |
| IC3 | IC,IL002-001 | MC7918CP | MOT | 7000-79-1800 | 1 |
| IC4 | IC,IC000-001 | LM723CH | NAT | 7000-17-2300 | 1 |
| J104 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 1 |
| P001 P101 | HEADER,10-PIN STRT REF:2112-07-0000 | MC000-123 | W-I | 2112-07-0003 | 2 |
| P103 | HEADER,16-PIN STRT REF:2112-07-0000 | MC000-124 | W-I | 2112-07-0004 | 1 |
| P203 | HEADER,4-PIN STRT REF:2112-07-0000 | MC000-097 | W-I | 2112-07-0015 | 1 |
| P204 | HEADER,9-PIN STRT REF:2112-07-0000 | MC000-122 | W-I | 2112-07-0002 | 1 |
| L1 L2 | CHOKE, 10.0MH,10% LA005-010 | 08N100K | ASE | 1810-03-0100 | 2 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 2 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|-----------------------|---|--------------|----------|
| L3 | CHOKE,10MILH,10% LA004-310 | 1S5103K | ASE | 1810-02-1001 | 1 |
| Q01 Q03 | TRANS QA050-880 | 2N5088 | MOT | 4901-05-0880 | 2 |
| Q02 Q05 | TRANS QA054-610 | 2N5461 | MOT | 4901-05-4610 | 2 |
| Q04 | TRANS QB000-010 | T0101 | SPR | 4902-00-1010 | 1 |
| Q06 Q07 Q09 | TRANS QB000-009 | MPS3702 | MOT | 4902-03-7020 | 3 |
| Q08 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| Q10 | TRANS-QA042-500 | 2N4250 | FCD | 4901-04-2500 | 1 |
| Q11 | TRANS QA054-580 | 2N5458 | MOT | 4901-05-4580 | 1 |
| R01 R10 | RES,MF,1/8W,1%,8.06K RF212-806 | MF55K-8.06K | ASE | 4701-03-8061 | 2 |
| R02 R11 | RES,MF,1/8W,1%,10K RF213-100 | MF55K10K | ASE | 4701-03-1002 | 2 |
| R03 R12 R32 R55 R98 | RES,C,1/4W,5%,4.7K RC103-247 | CF1/4-4.7K | ASE | 4700-15-4701 | 5 |
| R04 R13 R42 R43 | RES,C,1/4W,5%,680 RC103-168 | CF1/4-680 | ASE | 4700-15-6800 | 4 |
| R05 R14 | RES,C,1/4W,5%,330 RC103-133 | CF1/4-330 | ASE | 4700-15-3300 | 2 |
| R06 | RES,MF,1/8W,1%,2.49K RF212-249 | MF55K-2.49K | ASE | 4701-03-2491 | 1 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 3 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|--|--|-----------------------|---|--------------|----------|
| R07 | RES,MF,1/8W,1%,5.11K RF212-511 | MF55K-5.11K | ASE | 4701-03-5111 | 1 |
| R08 | POT,2K,RP131-220 | 360T202B | CTS | 4610-00-3202 | 1 |
| R09 | RES,MF,1/8W,1%,13.0K RF213-130 | MF55K-13.0K | ASE | 4701-03-1302 | 1 |
| R15 R16 | RES,SET,2-10K,1/8W QTY:2:4701-03-1002 | RX000-003 | W-I | 4789-00-0004 | 1 |
| R18 | RES,C,1/4W,5%,3.9M RC103-539 | CB3955 | A-B | 4700-15-3904 | 1 |
| R20 R39 | RES,C,1/4W,5%,3.3K RC103-233 | CF1/4-3.3K | ASE | 4700-15-3301 | 2 |
| R21 R27 | RES,C,1/4W,5%,5.6K RC103-256 | CF1/4-5.6K | ASE | 4700-15-5601 | 2 |
| R23 R28 | RES,C,1/4W,5%,22K RC103-322 | CF1/422K | ASE | 4700-15-2202 | 2 |
| R24 R29 | RES,C,1/4W,5%,270 RC103-127 | CF1/4-270 | ASE | 4700-15-2700 | 2 |
| R25 | RES,C,1/4W,5%,1.5M RC103-515 | CF1/4-1.5M | ASE | 4700-15-1504 | 1 |
| R30 R31 R34 R38 R41 R44 R47 R54 R73 R74 R76 R83 R87 R93 R95 R96 R80 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 17 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 4 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|---------------------------|----------------------------------|-----------------------|---|--------------|----------|
| R33 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R35 | RES,C,1/4W,5%,1.8M RC103-518 | CF1/4-1.8M | ASE | 4700-15-1804 | 1 |
| R36 R91 | RES,C,1/4W,5%,2.2M RC103-522 | CF1/4-2.2M | ASE | 4700-15-2204 | 2 |
| R37 R90 | RES,C,1/4W,5%,1M RC103-510 | CF1/4-1M | ASE | 4700-15-1004 | 2 |
| R40 | RES,C,1/4W,5%,2.2K RC103-222 | CF1/4-2.2K | ASE | 4700-15-2201 | 1 |
| R45 R46 | RES,C,1/4W,5%,24K RC103-324 | CF1/4-24K | ASE | 4700-15-2402 | 2 |
| R48 R49 R50 R51 | RES,MF,1/8W,1%,178K RF214-178 | MF55K-178K | ASE | 4701-03-1783 | 4 |
| R52 | RES,C,1/4W,5%,15M RC103-615 | CB1565 | A-B | 4700-15-1505 | 1 |
| R53 R84 | RES,C,1/4W,5%,470K RC103-447 | CF1/4-470K | ASE | 4700-15-4703 | 2 |
| R56 R71 R82 R85 | POT,20K,RP131-320 | 360T203B | CTS | 4610-00-3203 | 4 |
| R57 R78 | RES,C,1/4W,5%,2.7K RC103-227 | CF1/4-2.7K | ASE | 4700-15-2701 | 2 |
| R58 R59 R60 R92 R94 | RES,C,1/4W,5%,1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 5 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 5 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|---------------------------|-----------------------------------|-----------------------|---|--------------|----------|
| R61 R62 R63 R64 | POT,CONT,100K RP131-410 | 360T104B | CTS | 4610-00-3104 | 4 |
| R65 | RES,C,1/4W,5%,120K RC103-412 | CF1/4-120K | ASE | 4700-15-1203 | 1 |
| R66 R67 | RES,C,1/4W,5%,220K RC103-422 | CF1/4220K | ASE | 4700-15-2203 | 2 |
| R68 R86 | RES,C,1/4W,5%,330K RC103-433 | CF1/4-330K | ASE | 4700-15-3303 | 2 |
| R69 | RES,C,1/4W,5%,100K RC103-410 | CF1/4-100K | ASE | 4700-15-1003 | 1 |
| R70 | RES,C,1/4W,5%,75K RC103-375 | CF1/4-75K | ASE | 4700-15-7502 | 1 |
| R72 | RES,MF,1/8W,1%,36.5K RF213-365 | MF55K-36.5K | ASE | 4701-03-3652 | 1 |
| R75 | RES,C,1/4W,5%,33K RC103-333 | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| R77 | RES,C,1/4W,5%,20K RC103-320 | CF1/4-20K | ASE | 4700-15-2002 | 1 |
| R79 | POT,10K,RP131-310 | 360T103B | CTS | 4610-00-3103 | 1 |
| R81 | RES,C,1/4W,5%,100 RC103-110 | CF1/4-100 | ASE | 4700-15-1000 | 1 |
| R89 | RES,C,1/4W,5%,680K RC103-468 | CF1/4-680K | ASE | 4700-15-6803 | 1 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 6 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|-----------------------|---|--------------|----------|
| R97 | RES,C,1/2W,5%,1.2K RC105-212 | CF1/2-1.2K | ASE | 4700-25-1201 | 1 |
| WAVETEK PARTS LIST | | TITLE MAIN BD ASSY | ASSEMBLY NO. 1110-00-0890 PAGE: 7 | | REV B |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------------|-------------------------|---|--------------|----------|
| C1 | CAP,MYLAR,.15MF,100V CP103-415 | WMF1P15 | C-D | 1510-60-2154 | 1 |
| C2 C3 | CAP,CER,.02UF,50V | TG-820 | SPR | 1510-10-2203 | 2 |
| C4 | CAP,CER,470PF,1KV CD102-147 | 60U471M | MDC | 1510-10-1471 | 1 |
| C5 | CAP,CER,.001MFD,1KV CD102-210 | 5GAD10 | SPR | 1510-10-1102 | 1 |
| CR1 CR2 CR3 CR4 CR5 | DIODE DG109-140 | 1N4148 | FCD | 4807-01-0914 | 5 |
| IC1 | OP AMPL T0-5 IL003-004 | LF355H | NAT | 7000-03-5501 | 1 |
| IC2 | IC,IC000-005 | RC4558DN | RAY | 7000-14-5800 | 1 |
| J101 | CONN,PV CARD MC000-119 | 65001-006 | BER | 2112-10-0001 | 1 |
| P102 | HEADER,7-PIN STRT REF:2112-07-0000 | MC000-125 | W-I | 2112-07-0005 | 1 |
| Q1 Q3 Q6 | TRANS QA054-580 | 2N5458 | MOT | 4901-05-4580 | 3 |
| Q2 Q8 | TRANS QB000-009 | MPS3702 | MOT | 4902-03-7020 | 2 |
| Q4 Q5 Q7 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 3 |
| Q9 | TRANS QA054-610 | 2N5461 | MOT | 4901-05-4610 | 1 |
| R01 R02 R05 R23 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 4 |
| WAVETEK PARTS LIST | | TITLE RATE CARD,C001 | ASSEMBLY NO. 1110-00-0900 PAGE: 1 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|-------------------------|------------------------------|--------------|----------|
| R03 R22 | RES,C,1/4W,5%,4.7K RC103-247 | CF1/4-4.7K | ASE | 4700-15-4701 | 2 |
| R04 R07 R13 R26 | RES,C,1/4W,5%,10M RC103-610 | CB1065 | A-B | 4700-15-1005 | 4 |
| R06 R09 R10 R16 R20 R21 | RES,C,1/4W,5%,100K RC103-410 | CF1/4-100K | ASE | 4700-15-1003 | 6 |
| R08 | RES,MF,1/8W,1%,36.5K RF213-365 | MF55K-36.5K | ASE | 4701-03-3652 | 1 |
| R11 R12 | RES,C,1/4W,5%,22K RC103-322 | CF1/422K | ASE | 4700-15-2202 | 2 |
| R14 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R15 R29 | RES,C,1/4W,5%,27K RC103-327 | CF1/4-27K | ASE | 4700-15-2702 | 2 |
| R17 | RES,C,1/4W,5%,20K RC103-320 | CF1/4-20K | ASE | 4700-15-2002 | 1 |
| R18 | POT,50K,RP129-350 | 360S03B | CTS | 4610-00-1503 | 1 |
| R19 | RES,C,1/4W,5%,68K RC103-368 | CF1/4-68K | ASE | 4700-15-6802 | 1 |
| R24 | RES,MF,1/8W,1%,13.0K RF213-130 | MF55K-13.0K | ASE | 4701-03-1302 | 1 |
| R25 | RES,C,1/4W,5%,2.2M RC103-522 | CF1/4-2.2M | ASE | 4700-15-2204 | 1 |
| WAVETEK PARTS LIST | | TITLE RATE CARD,C001 | ASSEMBLY NO. 1110-00-0900 | | REV C |
| PAGE: 2 | | | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|-------------------------|------------------------------|--------------|----------|
| R27 | RES,MF,1/8W,1%,44.2K RF213-442 | MF55K-44.2K | ASE | 4701-03-4422 | 1 |
| R28 | RES,C,1/4W,5%,180K RC103-418 | CF1/4-180K | ASE | 4700-15-1803 | 1 |
| R30 R34 | RES,C,1/4W,5%,1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 2 |
| R31 | POT,20K,RP129-320 | 360S203B | CTS | 4610-00-1203 | 1 |
| R32 | RES,C,1/4W,5%,12K RC103-312 | CF1/4-12K | ASE | 4700-15-1202 | 1 |
| R33 | RES,C,1/4W,5%,75 RC103-075 | CR1/4-75 | ASE | 4700-15-7509 | 1 |
| WAVETEK PARTS LIST | | TITLE RATE CARD,C001 | ASSEMBLY NO. 1110-00-0900 | | REV C |
| PAGE: 3 | | | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|-------------------------|---|--------------|--------|
| C1 C3 | CAP,TANT,10MF,25V CE120-010 | 162D106X0025D02 | SPR | 1510-21-7100 | 2 |
| C2 | CAP,MYLAR,.15MF,100V CP103-415 | WMF1P15 | C-D | 1510-60-2154 | 1 |
| CR1 CR2 CR3 | DIODE DG109-140 | 1N4148 | FCD | 4807-01-0914 | 3 |
| IC1 | IC,IC000-005 | RC45580N | RAY | 7000-14-5800 | 1 |
| J101 | CONN,PV CARD MC000-119 | 65001-006 | BER | 2112-10-0001 | 1 |
| Q1 | TRANS QA036-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| R01 R11 R12 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 3 |
| R02 | RES,C,1/4W,5%,20K RC103-320 | CF1/4-20K | ASE | 4700-15-2002 | 1 |
| R03 | RES,C,1/4W,5%,100K RC103-410 | CF1/4-100K | ASE | 4700-15-1003 | 1 |
| R04 R09 | RES,C,1/4W,5%,27K RC103-327 | CF1/4-27K | ASE | 4700-15-2702 | 2 |
| R05 R07 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 2 |
| R06 | POT,20K,RP129-320 | 360S203B | CTS | 4610-00-1203 | 1 |
| R08 | RES,C,1/4W,5%,220K RC103-422 | CF1/4220K | ASE | 4700-15-2203 | 1 |
| WAVETEK PARTS LIST | | TITLE RATE CARD,C004 | ASSEMBLY NO. 1110-00-0970 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-------------------------------|-------------------------|---|--------------|--------|
| R10 | RES,C,1/4W,5%,47 RC103-047 | CF1/4-47 | ASE | 4700-15-4709 | 1 |
| WAVETEK PARTS LIST | | TITLE RATE CARD,C004 | ASSEMBLY NO. 1110-00-0970 PAGE: 2 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|---|---------------------------------------|------------------------------------|---|--------------|----------|
| C01 C05 C07 C09 C13 C14 C16 C18 C20 C35 C39 C42 C49 | CAP, FT, 500PF, 20X250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 13 |
| C02 C58 | CAP, Q.C., .47PF CG101-147 | QC-.47PF | Q-C | 1510-40-0478 | 2 |
| C03 C06 C08 C28 C31 C36 C38 C41 C43 C45 C46 | CAP, TANT, .47MF, 50V CE113-447 | 935 | TRW | 1510-21-9470 | 11 |
| C04 C32 C59 | CAP, M.C., 3.9PF CG102-239 | MC-3.9PF | Q-C | 1510-40-1399 | 3 |
| C10 C11 C15 C55 | CAP, CER, .01MF, 100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 4 |
| C12 | CAP, CER, 120PF, 1KV CD102-112 | 60U121M | MDC | 1510-10-1121 | 1 |
| C17 C24 C26 C27 C47 C51 C52 | CAP, F.T., 470PF CF101-147 | FASC-4712 | A-B | 1510-30-0471 | 7 |
| C19 | CAP, CER, 100PF, 1KV CD108-110 | CN1500 | RMC | 1510-10-5101 | 1 |
| C21 C22 | CAP, FT, CER, 100PF, 20% CF104-110 | 4420-100PF | AER | 1510-30-3101 | 2 |
| C23 C29 C57 | CAP, TANT, 10MF, 25V CE120-010 | 162D106X0025002 | SPR | 1510-21-7100 | 3 |
| C25 | CAP, F.T., 6.8PF CF102-R68 | FASC-6892 | A-B | 1510-30-1689 | 1 |
| WAVETEK PARTS LIST | | TITLE SWEEP OSC MODULE M9Y-1 | ASSEMBLY NO. 1114-00-0070 PAGE: 1 | | REV H |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-------------------------------------|------------------------------------|---|--------------|----------|
| C30 | CAP, M-C, 4.7PF, 10% CG102-247 | QC-4.7PF | Q-C | 1510-40-1479 | 1 |
| C33 | CAP, CER, .025MF, 50V CD103-325 | TG-S25 | SPR | 1510-10-2253 | 1 |
| C37 | CAP, CER, 10PF, 1KV CD101-010 | 10TCC-010 | SPR | 1510-10-0100 | 1 |
| C40 C50 C56 | CAP, ELECT, 1MF, 25V CE120-001 | 162D105X90250C2 | SPR | 1510-21-7010 | 3 |
| C44 | CAP, CER, 15PF, 1KV CD101-015 | 10TCC-015 | SPR | 1510-10-0150 | 1 |
| C48 C53 | CAP, CER, .001MFD, 1KV CD102-210 | 5GA010 | SPR | 1510-10-1102 | 2 |
| C54 | CAP, CER, 6.8PF, 1KV CD101-R68 | 60C0H6R8D | MDC | 1510-10-0689 | 1 |
| CR01 CR02 CR03 CR04 | DIODE DG100-822 | 1N82A-K102 | KEM | 4807-03-0001 | 4 |
| CR05 CR07 | DIODE DB000-001 | HW6.8B | C-L | 4801-02-0001 | 2 |
| CR06 CR12 CR13 | DIODE DP000-050 | 5082-3080 | H-P | 4805-02-0002 | 3 |
| CR08 CR14 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 2 |
| CR09 CR10 CR11 | DIODE DC000-005 | 8B141A | ITT | 4889-00-0001 | 3 |
| CR15 | DIODE DR000-001 | 1N4004 | P-C | 4806-01-4004 | 1 |
| IC1 | IC, IC000-004 | N5741T | SIG | 7000-57-4101 | 1 |
| WAVETEK PARTS LIST | | TITLE SWEEP OSC MODULE M9Y-1 | ASSEMBLY NO. 1114-00-0070 PAGE: 2 | | REV H |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|--|--------------------------------|------------------------------------|---|--------------|----------|
| J1 J2 J3 J4 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 4 |
| L01 L02 L03 L04 L08 L11 L16 L18 L21 | RF CHOKE | CHOKE | W-I | 1819-99-9999 | 9 |
| L05 L07 | FERRITE CHOKE LA009-004 | T1255-1 | HYT | 1810-05-0001 | 2 |
| L06 L12 L14 L15 L17 L19 L20 L23 L24 | FERRITE CHOKE LA009-010 | T1255-2 | HYT | 1810-05-0002 | 9 |
| L09 L10 L13 | CHOKE .22MH 10% LA005-R02 | 08NR22K | ASE | 1810-03-0228 | 3 |
| L22 L25 | CHOKE,4.7MH,10% LA005-R47 | 08N4R7K | ASE | 1810-03-0479 | 2 |
| Q01 Q07 Q08 Q09 Q11 | TRANS QA051-790 | 2N5179 | RCA | 4901-05-1790 | 5 |
| Q02 Q03 Q06 Q16 | TRANS QA050-530 | 2N5053 | APX | 4901-05-0530 | 4 |
| Q04 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| Q05 | TRANS QB000-009 | MPS3702 | MDT | 4902-03-7020 | 1 |
| Q10 Q15 | TRANS QA054-580 | 2N5458 | MDT | 4901-05-4580 | 2 |
| Q12 Q13 | TRANS QB000-018 | SD1006 | SSS | 4902-01-0060 | 2 |
| Q14 | TRANS QB000-019 | SD1005 | SSS | 4902-01-0050 | 1 |
| R01 R40 R49 R55 R74 | RES,C,1/4W,5%,680 RC103-168 | CF1/4-680 | ASE | 4700-15-6800 | 5 |
| WAVETEK PARTS LIST | | TITLE SWEEP OSC MODULE M9Y-1 | ASSEMBLY NO. 1114-00-0070 PAGE: 3 | | REV H |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|------------------------------------|---------------------------------|------------------------------------|---|--------------|----------|
| R02 R03 R15 R34 R41 R42 R70 | RES,C,1/4W,5%,4.7K RC103-247 | CF1/4-4.7K | ASE | 4700-15-4701 | 7 |
| R04 R19 R35 R36 R38 | RES,C,1/4W,5%,47 RC103-047 | CF1/4-47 | ASE | 4700-15-4709 | 5 |
| R05 R07 | RES,C,1/4W,5%,120 RC103-112 | CF1/4-120 | ASE | 4700-15-1200 | 2 |
| R06 | POT,1K,RP129-210 | 360S102B | CTS | 4610-00-1102 | 1 |
| R08 R18 R75 | RES,C,1/4W,5%,33 RC103-033 | CF1/4-33 | ASE | 4700-15-3309 | 3 |
| R09 R16 R20 R22 R28 R33 R47 R64 | RES,C,1/4W,5%,100 RC103-110 | CF1/4-100 | ASE | 4700-15-1000 | 8 |
| R10* | RES,C,1/4W,5%,390 RC103-139 | CF1/4-390 | ASE | 4700-15-3900 | 1 |
| R11 R23 R45 R48 R59 | RES,C,1/4W,5%,470 RC103-147 | CF1/4-470 | ASE | 4700-15-4700 | 5 |
| R12 R27 R29 R67 R72 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 5 |
| R13 R73 | RES,C,1/4W,5%,1.5K RC103-215 | CF1/4-1.5K | ASE | 4700-15-1501 | 2 |
| R14 | RES,C,1/4W,5%,27K RC103-327 | CF1/4-27K | ASE | 4700-15-2702 | 1 |
| R17* | RES,C,1/4W,5%,75 RC103-075 | CR1/4-75 | ASE | 4700-15-7509 | 1 |
| WAVETEK PARTS LIST | | TITLE SWEEP OSC MODULE M9Y-1 | ASSEMBLY NO. 1114-00-0070 PAGE: 4 | | REV H |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|---------------------------|---------------------------------|------------------------------------|---|--------------|----------|
| R21 R46 | RES,C,1/4W,5%,2.2K RC103-222 | CF1/4-2.2K | ASE | 4700-15-2201 | 2 |
| R24 | RES,C,1/4W,5%,330 RC103-133 | CF1/4-330 | ASE | 4700-15-3300 | 1 |
| R25 | RES,C,1/4W,5%,1M RC103-510 | CF1/4-1M | ASE | 4700-15-1004 | 1 |
| R26 R63 | RES,C,1/4W,5%,1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 2 |
| R30 | POT,20K,RP144-320 | 91AR20K | BEK | 4610-00-4203 | 1 |
| R31 | RES,C,1/4W,5%,470K RC103-447 | CF1/4-470K | ASE | 4700-15-4703 | 1 |
| R32 | RES,C,1/4W,5%,2.2M RC103-522 | CF1/4-2.2M | ASE | 4700-15-2204 | 1 |
| R39 | RES,C,1/4W,5%,10 RC103-010 | CF1/4-10 | ASE | 4700-15-1009 | 1 |
| R43 | RES,C,1/4W,10%,10M RC104-610 | CB1061 | A-B | 4700-16-1005 | 1 |
| R44 | RES,C,1/4W,5%,15M RC103-615 | CB1565 | A-B | 4700-15-1505 | 1 |
| R50 R52 R56 R60 | RES,C,1/4W,5%,1.8K RC103-216 | CF1/4-1.8K | ASE | 4700-15-1801 | 4 |
| R51 | RES,C,1/4W,5%,180 RC103-118 | CF1/4-180 | ASE | 4700-15-1800 | 1 |
| WAVETEK PARTS LIST | | TITLE SWEEP OSC MODULE M9Y-1 | ASSEMBLY NO. 1114-00-0070 PAGE: 5 | | REV H |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|------------------------------|-----------------------------------|------------------------------------|---|--------------|----------|
| R53 | RES,C,1/2W,5%,150 RC105-115 | CF1/2-150 | ASE | 4700-25-1500 | 1 |
| R54 R5A | RES,C,1/4W,5%,4.7 RC103-R47 | CF1/4-4.7 | ASE | 4700-15-4708 | 2 |
| R61 | RES,C,1/2W,5%,68 RC105-068 | CF1/2-68 | ASE | 4700-25-6809 | 1 |
| R65 | RES,C,1/4W,5%,82 RC103-082 | CF1/4-82 | ASE | 4700-15-8209 | 1 |
| R66 | RES,L-A,1/4W,1%,49.9 RF404-990 | SPS-N-347-49.9 | IRC | 4741-49-9007 | 1 |
| R71 | RES,C,1/4W,5%,7.5K RC103-275 | CF1/4-7.5K | ASE | 4700-15-7501 | 1 |
| R62* | RES,C,1/4W,5%,22 | CF1/4-22 | ASE | 4700-15-2209 | 1 |
| PARTS SUBSTITUTED FOR M9YA-1 | | | | | |
| J3 | CONN JF000-004 | 27-21 | APL | 2110-03-0001 | 1 |
| R66 | RES,L-A,1/4W,1%,75.0 RF407-500 | SPS-N-347-75 | IRC | 4741-75-0007 | 1 |
| WAVETEK PARTS LIST | | TITLE SWEEP OSC MODULE M9Y-1 | ASSEMBLY NO. 1114-00-0070 PAGE: 6 | | REV H |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY |
|--|--------------------------------------|-----------------------|---|--------------|----------|
| C01 C20 C21 | CAP, CER, F. T. 1000PF CF112-210 | 54-794-010-102P | SPEC | 1510-30-8102 | 3 |
| C02 | CAP, FT, 500PF, 20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C03 C04 C05 C06 C07 | CAP, VAR, 3.5-13PF250V CV101-013 | 7S-TRIKO-02-3.5-13PF | STR | 1510-70-0130 | 5 |
| C08 C09 C10 C11 C12 | CAP, CER, .001MFD, 1KV CD102-210 | 5GAD10 | SPR | 1510-10-1102 | 5 |
| C13 | CAP, F. T., 6.8PF CF102-R6B | FA5C-6B92 | A-B | 1510-30-1689 | 1 |
| C14 C15 C16 C17 C18 | CAP, CER, 200PF, 1KV CD102-120 | 5GA-T20 | SPR | 1510-10-1201 | 5 |
| C19 C22 | CAP, CER, .05MF, 100V CD103-350 | TG-S50 | SPR | 1510-10-2503 | 2 |
| C23 | CAP, CER, 120PF, 1KV CD102-112 | 60U121M | MDC | 1510-10-1121 | 1 |
| CR01 CR02 CR03 CR04 CR05 | DIODE D9000-009 | 5082-2835 | H-P | 4809-02-0002 | 5 |
| CR06 CR07 CR08 CR09 CR10 CR11 CR12 CR13 | DIODE DG109-140 | 1N4148 | FCD | 4807-01-0914 | 8 |
| CR14 | DIODE DR000-001 | 1N4004 | P-C | 4806-01-4004 | 1 |
| IC01 IC02 IC03 | IC, IC000-005 | RC455BDN | RAY | 7000-14-5800 | 3 |
| WAVETEK PARTS LIST | | TITLE RF MKR, M13J | ASSEMBLY NO. 1114-00-0151 PAGE: 1 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY |
|-------------------------------|-------------------------------------|-----------------------|---|--------------|----------|
| J01 J02 J03 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 3 |
| Q01 Q09 | TRANS QA050-530 | 2N5053 | APX | 4901-05-0530 | 2 |
| Q02 Q03 Q04 Q05 Q06 | TRANS QB000-009 | MPS3702 | MDT | 4902-03-7020 | 5 |
| Q07 | TRANS QA039-040 | 2N3904 | T-I | 4901-03-9040 | 1 |
| Q08 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| R01 | POT, 1K RF124-210 | WA260325-102MA | A-B | 4610-10-7102 | 1 |
| R02 | RES, C, 1/4W, 5%, 47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R03 R05 R06 R07 R08 R09 | RES, C, 1/4W, 5%, 1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 6 |
| R04 | RES, C, 1/4W, 5%, 56 RC103-056 | CF1/4-56 | ASE | 4700-15-5609 | 1 |
| R10 R11 R12 R13 R14 | RES, C, 1/4W, 5%, 270 RC103-127 | CF1/4-270 | ASE | 4700-15-2700 | 5 |
| R15 R33 R34 | RES, C, 1/4W, 5%, 10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 3 |
| R16 | RES, C, 1/4W, 5%, 1.5M RC103-515 | CF1/4-1.5M | ASE | 4700-15-1504 | 1 |
| R17 R18 R19 R20 R21 | RES, C, 1/4W, 5%, 360K RC103-436 | CF1/4-360K | ASE | 4700-15-3603 | 5 |
| WAVETEK PARTS LIST | | TITLE RF MKR, M13J | ASSEMBLY NO. 1114-00-0151 PAGE: 2 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY |
|-------------------------------|-------------------------------------|-----------------------|---|--------------|----------|
| R22 R23 R24 R25 R26 | RES, C, 1/4W, 5%, 51K RC103-351 | CF1/4-51K | ASE | 4700-15-5102 | 5 |
| R27 | RES, C, 1/4W, 5%, 24K RC103-324 | CF1/4-24K | ASE | 4700-15-2402 | 1 |
| R28 R29 R30 R31 R32 R36 | RES, C, 1/4W, 5%, 22K RC103-322 | CF1/422K | ASE | 4700-15-2202 | 6 |
| R35 | RES, C, 1/4W, 5%, 56K RC103-356 | CF1/4-56K | ASE | 4700-15-5602 | 1 |
| R37 | RES, C, 1/4W, 5%, 1M RC103-510 | CF1/4-1M | ASE | 4700-15-1004 | 1 |
| R38 R39 R40 R41 R42 | RES, C, 1/4W, 5%, 5.6K RC103-256 | CF1/4-5.6K | ASE | 4700-15-5601 | 5 |
| R43 | RES, C, 1/4W, 5%, 3.3K RC103-233 | CF1/4-3.3K | ASE | 4700-15-3301 | 1 |
| R44 | RES, C, 1/4W, 5%, 2.7K RC103-227 | CF1/4-2.7K | ASE | 4700-15-2701 | 1 |
| R45 | RES, C, 1/4W, 5%, 820 RC103-182 | CF1/4-820 | ASE | 4700-15-8200 | 1 |
| R46 | RES, C, 1/4W, 5%, 10 RC103-010 | CF1/4-10 | ASE | 4700-15-1009 | 1 |
| T01 | RF XFMR FROM: 1813-00-0007 | 1210-40-0017 | W-I | 1210-40-0017 | 1 |
| WAVETEK PARTS LIST | | TITLE RF MKR, M13J | ASSEMBLY NO. 1114-00-0151 PAGE: 3 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-------------------------------------|--------------------|---|--------------|--------|
| IC01 | IC, IC000-005 | RC4558DN | RAY | 7000-14-5800 | 1 |
| R01 R03 R06 R08 | RES, C, 1/4W, 5%, 10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 4 |
| R02 | POT, 20K, RP129-320 | 36082038 | CTS | 4610-00-1203 | 1 |
| R04 | RES, C, 1/4W, 5%, 6.8K RC103-268 | CF1/4-6.8K | ASE | 4700-15-6801 | 1 |
| R07 | POT, 20K RP154-320 | WAIN032S203MA | A-B | 4610-11-9203 | 1 |
| R09 | RES, C, 1/4W, 5%, 4.7K RC103-247 | CF1/4-4.7K | ASE | 4700-15-4701 | 1 |
| S01 | SWITCH, TOGGLE ST005-006 | 7101P3Y1ZQEN | C-K | 5106-00-0014 | 1 |
| WAVETEK PARTS LIST | | TITLE TILT ASSY | ASSEMBLY NO. 1110-00-1050 PAGE: 1 | | REV |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|------------------------------------|---------------------------------|--------------------------|------------------------------|--------------|--------|
| C1 C2 | CAP,CER,.005MF,1KV CD103-250 | TG-050 | SPR | 1510-10-2502 | 2 |
| C3 C4 | CAP,TANT,10MF,25V CE120-010 | 162D106X00250D2 | SPR | 1510-21-7100 | 2 |
| CR1 CR2 | DIODE DG109-140 | 1N4148 | FCD | 4807-01-0914 | 2 |
| IC1 | IC,IC000-005 | RC4558DN | RAY | 7000-14-5800 | 1 |
| IC2 | IC,IL004-001 | LM339N | NAT | 7000-03-3900 | 1 |
| L1 L2 | CHOKE, 10.0MH,10% LA005-010 | 08N100K | ASE | 1810-03-0100 | 2 |
| R01 R03 R15 R16 R17 R18 R20 R23 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 8 |
| R02 | POT,20K,RP129-320 | 360S2038 | CTS | 4610-00-1203 | 1 |
| R04 R12 | POT,20K RP156-320 | 43P203T601 | SPE | 4610-00-5203 | 2 |
| R05 R06 R10 R11 R22 | RES,C,1/4W,5%,4.7K RC103-247 | CF1/4-4.7K | ASE | 4700-15-4701 | 5 |
| R07 | RES,C,1/4W,5%,100K RC103-410 | CF1/4-100K | ASE | 4700-15-1003 | 1 |
| R08 | POT,2K,RP129-220 | 360S202B | CTS | 4610-00-1202 | 1 |
| R09 | RES,C,1/4W,5%,330 RC103-133 | CF1/4-330 | ASE | 4700-15-3300 | 1 |
| WAVETEK PARTS LIST | | TITLE NOTCH/TILT ASSY | ASSEMBLY NO. 1110-00-1060 | | REV |
| PAGE: 1 | | | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--------------------------|------------------------------|--------------|--------|
| R13 | RES,C,1/4W,5%,9.1K RC103-291 | CF1/4-9.1K | ASE | 4700-15-9101 | 1 |
| R14 R19 | RES,C,1/4W,5%,6.8K RC103-268 | CF1/4-6.8K | ASE | 4700-15-6801 | 2 |
| R21 | POT,20K RP154-320 | WAIN032S203MA | A-B | 4610-11-9203 | 1 |
| R24 | RES,C,1/4W,5%,3.3K RC103-233 | CF1/4-3.3K | ASE | 4700-15-3301 | 1 |
| S1 | SWITCH,TOGGLE ST003-006 | 7201PN-BLK | C-K | 5106-00-0012 | 1 |
| 2 | HARNESS ASSY | WY1060-B2 | W-I | 1219-00-0104 | 1 |
| WAVETEK PARTS LIST | | TITLE NOTCH/TILT ASSY | ASSEMBLY NO. 1110-00-1060 | | REV |
| PAGE: 2 | | | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---|--|---|--------------|----------|
| C01 | CAP, VALUE DETERMINED IN CALIBRATION | CAP, TRIM | W-I | 1519-99-9999 | 1 |
| C02 | CAP, CER, 33PF, 1KV CD104-033 | 10TU-Q33 | SPR | 1510-10-3330 | 1 |
| C03 C14 | CAP, CER, .01MF, 100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 2 |
| C04 | CAP, CER, .025MF, 50V CD103-325 | TG-S25 | SPR | 1510-10-2253 | 1 |
| C05 | CAP, CER, 68PF, 1KV CD104-068 | 68U2J680J | MDC | 1510-10-3680 | 1 |
| C06 | CAP, CER, 100PF, 1KV CD104-110 | 10TCU-T10 | SPR | 1510-10-3101 | 1 |
| C07 | CAP, VAR, 3.5-13PF, 250V CV101-013 | 7S-TR1K0-02-3.5-13PF | STR | 1510-70-0130 | 1 |
| C08 | CAP, CER, 15PF, 1KV CD101-015 | 10TCC-015 | SPR | 1510-10-0150 | 1 |
| C09 | CAP, CER, 47PF, 1KV CD104-047 | 60U2J470J | MDC | 1510-10-3470 | 1 |
| C10 C13 | CAP, CER, .001MFD, 1KV CD102-210 | 5GAD10 | SPR | 1510-10-1102 | 2 |
| C11 | CAP, TANT, .47MF, 50V CE113-447 | 935 | TRW | 1510-21-9470 | 1 |
| C12 | CAP, CER, 470PF, 1KV CD102-147 | 60U471M | MDC | 1510-10-1471 | 1 |
| WAVETEK PARTS LIST | | TITLE 1 MHZ HARMONIC MARKER, M6H-1 | ASSEMBLY NO. 1114-00-0050 PAGE: 1 | | REV E |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------------|--|---|--------------|----------|
| C15 | CAP, FT, 500PF, 20% 250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C16 | CAP, F.T., 6.8PF CF102-R68 | FA5C-6892 | A-B | 1510-30-1689 | 1 |
| C17 | CAP, F.T., 470PF CF101-147 | FA5C-4712 | A-B | 1510-30-0471 | 1 |
| C18 | CAP, TANT, 10MF, 25V CE120-010 | 1620106X0025DD2 | SPR | 1510-21-7100 | 1 |
| CR1 CR2 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 2 |
| J1 J2 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 2 |
| L1 L2 L3 | RF CHOKE | CHOKE | W-I | 1819-99-9999 | 3 |
| L4 | FERRITE CHOKE LA009-004 | T1255-1 | HYT | 1810-05-0001 | 1 |
| Q1 Q3 | TRANS QB000-009 | MPS3702 | MOT | 4902-03-7020 | 2 |
| Q2 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| Q4 | TRANS QA051-790 | 2N5179 | RCA | 4901-05-1790 | 1 |
| Q5 | TRANS QB000-013 | A430 | APX | 4902-00-4300 | 1 |
| Q6 | TRANS QA054-580 | 2N5458 | MOT | 4901-05-4580 | 1 |
| Q7 | TRANS QA050-880 | 2N5088 | MOT | 4901-05-0880 | 1 |
| R01 R16 | RES, C, 1/4W, 5%, 1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 2 |
| WAVETEK PARTS LIST | | TITLE 1 MHZ HARMONIC MARKER, M6H-1 | ASSEMBLY NO. 1114-00-0050 PAGE: 2 | | REV E |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--|---|--------------|----------|
| R02 R05 R12 | RES,C,1/4W,5%,3.9K RC103-239 | CF1/43.9K | ASE | 4700-15-3901 | 3 |
| R03 R04 | RES,C,1/4W,5%,2.2K RC103-222 | CF1/4-2.2K | ASE | 4700-15-2201 | 2 |
| R06 | RES,C,1/4W,5%,27K RC103-327 | CF1/4-27K | ASE | 4700-15-2702 | 1 |
| R07 R09 R13 | RES,C,1/4W,5%,470 RC103-147 | CF1/4-470 | ASE | 4700-15-4700 | 3 |
| R08 R20 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 2 |
| R10 R24 | RES,C,1/4W,5%,100 RC103-110 | CF1/4-100 | ASE | 4700-15-1000 | 2 |
| R11 | RES,C,1/4W,5%,75 RC103-075 | CR1/4-75 | ASE | 4700-15-7509 | 1 |
| R14 | RES,C,1/4W,5%,33K RC103-333 | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| R15 | RES,C,1/4W,5%,1M RC103-510 | CF1/4-1M | ASE | 4700-15-1004 | 1 |
| R17 | RES,C,1/4W,5%,8.2K RC103-282 | CF1/4-8.2K | ASE | 4700-15-8201 | 1 |
| R18 | RES,C,1/4W,5%,15K RC103-315 | CF1/4-15K | ASE | 4700-15-1502 | 1 |
| R19 | RES,C,1/4W,5%,1.5M RC103-515 | CF1/4-1.5M | ASE | 4700-15-1504 | 1 |
| WAVETEK PARTS LIST | | TITLE 1 MHZ HARMONIC MARKER, M6H-1 | ASSEMBLY NO. 1114-00-0050 PAGE: 3 | | REV E |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--|---|--------------|----------|
| R21 | POT,20K RP124-320 | WA2G032S-203MA | A-B | 4610-10-7203 | 1 |
| R22 R23 | RES,C,1/4W,5%,4.7K RC103-247 | CF1/4-4.7K | ASE | 4700-15-4701 | 2 |
| X1 | CRYSTAL X25W XX000-251 | X25W-00.00000 | W-I | 2310-00-0251 | 1 |
| WAVETEK PARTS LIST | | TITLE 1 MHZ HARMONIC MARKER, M6H-1 | ASSEMBLY NO. 1114-00-0050 PAGE: 4 | | REV E |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|--|---|--------------|----------|
| C01 C07 | CAP,CER,47PF,1KV CD104-047 | 60U2J470J | MDC | 1510-10-3470 | 2 |
| C02 | CAP,CER,330PF,1KV CD104-133 | 10TCU-T33 | SPR | 1510-10-3331 | 1 |
| C03 | CAP,CER,120PF,1KV CD104-112 | 10TCU-T12 | SPR | 1510-10-3121 | 1 |
| C04 | CAP,FT,500PF,20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C05 | CAP,VAR,3.5-13PF250V CV101-013 | 7S-TRIKO-02-3.5-13PF | STR | 1510-70-0130 | 1 |
| C06 | CAP,CER,15PF,1KV CD101-015 | 10TCC-Q15 | SPR | 1510-10-0150 | 1 |
| C08 C09 | CAP,CER,.001MFD,1KV CD102-210 | 5GAD10 | SPR | 1510-10-1102 | 2 |
| C10 | CAP,CER,.01MF,100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| C11 | CAP,F.T.,6.8PF CF102-R68 | FA5C-6892 | A-B | 1510-30-1689 | 1 |
| C12 | CAP,F.T.,470PF CF101-147 | FA5C-4712 | A-B | 1510-30-0471 | 1 |
| C13 | CAP,TANT,10MF,25V CE120-010 | 162D106X0025002 | SPR | 1510-21-7100 | 1 |
| CR1 | DIODE DG100-821 | 1N824G | G-I | 4807-01-0082 | 1 |
| WAVETEK PARTS LIST | | TITLE 10 MHZ HARMONIC MARKER, M6H-10 | ASSEMBLY NO. 1114-00-0099 PAGE: 1 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--|---|--------------|----------|
| J1 J2 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 2 |
| L1 L3 | RF CHOKE | CHOKE | W-I | 1819-99-9999 | 2 |
| L2 | FERRITE CHOKE LA009-010 | T1255-2 | HYT | 1810-05-0002 | 1 |
| L4 | FERRITE CHOKE LA009-004 | T1255-1 | HYT | 1810-05-0001 | 1 |
| Q1 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| Q2 | TRANS QB000-013 | A430 | APX | 4902-00-4300 | 1 |
| Q3 | TRANS QA054-580 | 2N5458 | MOT | 4901-05-4580 | 1 |
| Q4 | TRANS QA050-880 | 2N5088 | MOT | 4901-05-0880 | 1 |
| R01 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R02 | RES,C,1/4W,5%,56 RC103-056 | CF1/4-56 | ASE | 4700-15-5609 | 1 |
| R03 | RES,C,1/4W,5%,1.5K RC103-215 | CF1/4-1.5K | ASE | 4700-15-1501 | 1 |
| R04 R17 | RES,C,1/4W,5%,100 RC103-110 | CF1/4-100 | ASE | 4700-15-1000 | 2 |
| R05 | RES,C,1/4W,5%,75 RC103-075 | CR1/4-75 | ASE | 4700-15-7509 | 1 |
| R06 | RES,C,1/4W,5%,3.9K RC103-239 | CF1/43.9K | ASE | 4700-15-3901 | 1 |
| WAVETEK PARTS LIST | | TITLE 10 MHZ HARMONIC MARKER, M6H-10 | ASSEMBLY NO. 1114-00-0099 PAGE: 2 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--|---|--------------|----------|
| R07 | RES,C,1/4W,5%,470 RC103-147 | CF1/4-470 | ASE | 4700-15-4700 | 1 |
| R08 | RES,C,1/4W,5%,33K RC103-333 | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| R09 | RES,C,1/4W,5%,1M RC103-510 | CF1/4-1M | ASE | 4700-15-1004 | 1 |
| R10 | RES,C,1/4W,5%,1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 1 |
| R11 | RES,C,1/4W,5%,8.2K RC103-282 | CF1/4-8.2K | ASE | 4700-15-8201 | 1 |
| R12 | RES,C,1/4W,5%,15K RC103-315 | CF1/4-15K | ASE | 4700-15-1502 | 1 |
| R13 | RES,C,1/4W,5%,1.5M RC103-515 | CF1/4-1.5M | ASE | 4700-15-1504 | 1 |
| R14 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 1 |
| R15 | POT,20K RP124-320 | WA260329-203MA | A-B | 4610-10-7203 | 1 |
| R16 | RES,C,1/4W,5%,100K RC103-410 | CF1/4-100K | ASE | 4700-15-1003 | 1 |
| X1 | CRYSTAL,XX000-321 | X32W-00.00000 | W-I | 2310-00-0321 | 1 |
| WAVETEK PARTS LIST | | TITLE 10 MHZ HARMONIC MARKER, M6H-10 | ASSEMBLY NO. 1114-00-0099 PAGE: 3 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|--|---|--------------|----------|
| C01 | CAP,CER,20PF,1KV CD101-020 | 60C06200J | MDC | 1510-10-0200 | 1 |
| C02 | CAP,CER,120PF,1KV CD104-112 | 10TCU-T12 | SPR | 1510-10-3121 | 1 |
| C03 C07 | CAP,CER,47PF,1KV CD104-047 | 60U2J470J | MDC | 1510-10-3470 | 2 |
| C04 | CAP,FT,500PF,20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C05 | CAP,VAR,3.5-13PF250V CV101-013 | 7S-TRIKU-02-3.5-13PF | STR | 1510-70-0130 | 1 |
| C06 | CAP,CER,15PF,1KV CD101-015 | 10TCC-Q15 | SPR | 1510-10-0150 | 1 |
| C08 C09 | CAP,CER,.001MFD,1KV CD102-210 | 56A010 | SPR | 1510-10-1102 | 2 |
| C10 | CAP,CER,.01MF,100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| C11 | CAP,F.T.,.6.8PF CF102-R68 | FA5C-6892 | A-B | 1510-30-1689 | 1 |
| C12 | CAP,F.T.,.470PF CF101-147 | FA5C-4712 | A-B | 1510-30-0471 | 1 |
| C13 | CAP,TANT,10MF,25V CE120-010 | 1620106X0025DD2 | SPR | 1510-21-7100 | 1 |
| CR1 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 1 |
| WAVETEK PARTS LIST | | TITLE 50 MHZ HARMONIC MARKER, M6H-50 | ASSEMBLY NO. 1114-00-0100 PAGE: 1 | | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--|------|---|----------|
| J1 J2 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 2 |
| L1 L3 | RF CHOKE | CHOKE | W-I | 1819-99-9999 | 2 |
| L2 | FERRITE CHOKE LA009-010 | T1255-2 | HYT | 1810-05-0002 | 1 |
| L4 | FERRITE CHOKE LA009-004 | T1255-1 | HYT | 1810-05-0001 | 1 |
| R01 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R02 | RES,C,1/4W,5%,56 RC103-056 | CF1/4-56 | ASE | 4700-15-5609 | 1 |
| R03 | RES,C,1/4W,5%,1.5K RC103-215 | CF1/4-1.5K | ASE | 4700-15-1501 | 1 |
| R04 R17 | RES,C,1/4W,5%,100 RC103-110 | CF1/4-100 | ASE | 4700-15-1000 | 2 |
| R05 | RES,C,1/4W,5%,75 RC103-075 | CR1/4-75 | ASE | 4700-15-7509 | 1 |
| R06 | RES,C,1/4W,5%,3.9K RC103-239 | CF1/4-3.9K | ASE | 4700-15-3901 | 1 |
| R07 | RES,C,1/4W,5%,470 RC103-147 | CF1/4-470 | ASE | 4700-15-4700 | 1 |
| R08 | RES,C,1/4W,5%,33K RC103-333 | CF1/4-33K | ASE | 4700-15-3302 | 1 |
| WAVETEK PARTS LIST | | TITLE 50 MHZ HARMONIC MARKER, M6H-50 | | ASSEMBLY NO. 1114-00-0100 PAGE: 2 | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|--|------|---|----------|
| R09 | RES,C,1/4W,5%,1M RC103-510 | CF1/4-1M | ASE | 4700-15-1004 | 1 |
| R10 | RES,C,1/4W,5%,1K RC103-210 | CF1/4-1K | ASE | 4700-15-1001 | 1 |
| R11 | RES,C,1/4W,5%,8.2K RC103-282 | CF1/4-8.2K | ASE | 4700-15-8201 | 1 |
| R12 | RES,C,1/4W,5%,15K RC103-315 | CF1/4-15K | ASE | 4700-15-1502 | 1 |
| R13 | RES,C,1/4W,5%,1.5M RC103-515 | CF1/4-1.5M | ASE | 4700-15-1504 | 1 |
| R14 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 1 |
| R15 | POT,20K RP124-320 | WA2G0328-203MA | A-B | 4610-10-7203 | 1 |
| R16 | RES,C,1/4W,5%,100K RC103-410 | CF1/4-100K | ASE | 4700-15-1003 | 1 |
| X1 | CRYSTAL,XX000-331 | X33W-00.00000 | W-I | 2310-00-0331 | 1 |
| WAVETEK PARTS LIST | | TITLE 50 MHZ HARMONIC MARKER, M6H-50 | | ASSEMBLY NO. 1114-00-0100 PAGE: 3 | REV C |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|--|------------------------------|---|--------------|----------|
| C01 | CAP,CER,47PF,1KV CD104-047 | 60U2J470J | MDC | 1510-10-3470 | 1 |
| C02 | CAP,CER,20PF,1KV CD101-020 | 60CUG200J | MDC | 1510-10-0200 | 1 |
| C03 | CAP,CER,120PF,1KV CD104-112 | 10TCU-T12 | SPR | 1510-10-3121 | 1 |
| C04 C09 | CAP,FT,500PF,20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 2 |
| C05 | CAP,F.T.,470PF CF101-147 | FA5C-4712 | A-B | 1510-30-0471 | 1 |
| C08 | CAP,VALUE DETERMINED IN CALIBRATION | CAP,TRIM | W-I | 1519-99-9999 | 1 |
| C10 | CAP,CER,.01MF,100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| C11 | CAP,CER,.05MF,100V CD103-350 | TG-350 | SPR | 1510-10-2503 | 1 |
| C12 | CAP,F.T.,6.8PF CF102-R68 | FA5C-6892 | A-B | 1510-30-1689 | 1 |
| CR14 | DIODE DG000-007 | 5082-2800 | H-P | 4809-02-0001 | 1 |
| CR2 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 1 |
| J1 J2 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 2 |
| L2 | CHOKE,2.2MH,10% LA005-R22 | 08N2R2K | ASE | 1810-03-0229 | 1 |
| WAVETEK PARTS LIST | | TITLE SING FREQ MKR M6S-3 | ASSEMBLY NO. 1114-00-0045 PAGE: 1 | | REV A |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|------------------------------|---|--------------|----------|
| Q1 Q2 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 2 |
| R1 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R2 | RES,C,1/4W,5%,56 RC103-056 | CF1/4-56 | ASE | 4700-15-5609 | 1 |
| R3 R4 | RES,C,1/4W,5%,1.5K RC103-215 | CF1/4-1.5K | ASE | 4700-15-1501 | 2 |
| R5 | RES,C,1/4W,5%,180K RC103-418 | CF1/4-180K | ASE | 4700-15-1803 | 1 |
| R6 | RES,C,1/4W,5%,470K RC103-447 | CF1/4-470K | ASE | 4700-15-4703 | 1 |
| R7 R9 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 2 |
| R8 | POT,20K RP124-320 | WA26032S-203MA | A-B | 4610-10-7203 | 1 |
| X1 | CRYSTAL,XX000-331 | X33W-00.00000 | W-I | 2310-00-0331 | 1 |
| WAVETEK PARTS LIST | | TITLE SING FREQ MKR M6S-3 | ASSEMBLY NO. 1114-00-0045 PAGE: 2 | | REV A |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|------------------------------|------------------------------|--------------|----------|
| C01 | CAP,CER,47PF,1KV CD104-047 | 60U2J470J | MDC | 1510-10-3470 | 1 |
| C02 | CAP,CER,20PF,1KV CD101-020 | 60C0G200J | MDC | 1510-10-0200 | 1 |
| C03 | CAP,CER,120PF,1KV CD104-112 | 10TCU-T12 | SPR | 1510-10-3121 | 1 |
| C04 C06 C09 | CAP,FT,500PF,20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 3 |
| C05 | CAP,F.T.,470PF CF101-147 | FA5C-4712 | A-B | 1510-30-0471 | 1 |
| C07 | CAP,VAR,4-20PF,250V CV105-020 | 10S-TRIKO-05-4-20PF | STR | 1510-70-4200 | 1 |
| C08 | CAP,VAR,CER,1/6PF CV106-R60 | 2222-802-96072 | M-E | 1510-70-5060 | 1 |
| C10 | CAP,CER,.01MF,100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| C11 | CAP,CER,.05MF,100V CD103-350 | TG-350 | SPR | 1510-10-2503 | 1 |
| C12 | CAP,F.T.,6.8PF CF102-R68 | FA5C-6892 | A-B | 1510-30-1689 | 1 |
| CR1 CR2 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 2 |
| J1 J2 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 2 |
| WAVETEK PARTS LIST | | TITLE SING FREQ MKR M6S-4 | ASSEMBLY NO. 1114-00-0046 | | REV A |
| PAGE: 1 | | | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|------------------------------|------------------------------|--------------|----------|
| L2 | CHOKE,2.2MH,10% LA005-R22 | 08N2R2K | ASE | 1810-03-0229 | 1 |
| Q1 Q2 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 2 |
| R1 | RES,C,1/4W,5%,47K RC103-347 | CF1/4-47K | ASE | 4700-15-4702 | 1 |
| R2 | RES,C,1/4W,5%,56 RC103-056 | CF1/4-56 | ASE | 4700-15-5609 | 1 |
| R3 | RES,C,1/4W,5%,1.5K RC103-215 | CF1/4-1.5K | ASE | 4700-15-1501 | 1 |
| R5 | RES,C,1/4W,5%,180K RC103-418 | CF1/4-180K | ASE | 4700-15-1803 | 1 |
| R6 | RES,C,1/4W,5%,470K RC103-447 | CF1/4-470K | ASE | 4700-15-4703 | 1 |
| R7 R9 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 2 |
| R8 | POT,20K RP124-320 | WA2G032S-203MA | A-B | 4610-10-7203 | 1 |
| X1 | CRYSTAL,XX000-331 | X33W-00.00000 | W-I | 2310-00-0331 | 1 |
| WAVETEK PARTS LIST | | TITLE SING FREQ MKR M6S-4 | ASSEMBLY NO. 1114-00-0046 | | REV A |
| PAGE: 2 | | | | | |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|-----------------------------------|-----------------------------|---|--------------|----------|
| C1 | CAP,F.T.,470PF CF101-147 | FASC-4712 | A-B | 1510-30-0471 | 1 |
| C2 | CAP,FT,500PF,20%250V CF104-150 | 4420-500PF | AER | 1510-30-3501 | 1 |
| C3 | CAP,CER,,01MF,100V CD103-310 | 68U103M | MDC | 1510-10-2103 | 1 |
| C4 | CAP,CER,,05MF,100V CD103-350 | TG-S50 | SPR | 1510-10-2503 | 1 |
| C5 | CAP,F.T.,6.8PF CF102-R68 | FASC-6892 | A-B | 1510-30-1689 | 1 |
| CR1 | DIODE DG100-821 | 1N82AG | G-I | 4807-01-0082 | 1 |
| J1 J2 J3 | CONN JF000-005 | 37JR116-1 | S-C | 2110-03-0002 | 3 |
| L1 | FERRITE CHOKE LA009-004 | T1255-1 | HYT | 1810-05-0001 | 1 |
| Q1 | TRANS QA038-541 | 2N3854A | G-E | 4901-03-8541 | 1 |
| R01 | RES,C,1/4W,5%,47 RC103-047 | CF1/4-47 | ASE | 4700-15-4709 | 1 |
| R02 | RES,C,1/4W,5%,51 RC103-051 | CF1/451 | ASE | 4700-15-5109 | 1 |
| R03 R05 | RES,C,1/4W,5%,470 RC103-147 | CF1/4-470 | ASE | 4700-15-4700 | 2 |
| R04 | RES,C,1/4W,5%,150 RC103-115 | CF1/4-150 | ASE | 4700-15-1500 | 1 |
| WAVETEK PARTS LIST | | TITLE EXT,MKR MODULE,M6C | ASSEMBLY NO. 1114-00-0124 PAGE: 1 | | REV A |

| REFERENCE DESIGNATORS | PART DESCRIPTION | ORIG-MFGR-PART-NO | MFGR | WAVETEK NO. | QTY/PT |
|-------------------------------|---------------------------------|-----------------------------|---|--------------|----------|
| R06 | RES,C,1/4W,5%,180K RC103-418 | CF1/4-180K | ASE | 4700-15-1803 | 1 |
| R07 | RES,C,1/4W,5%,470K RC103-447 | CF1/4-470K | ASE | 4700-15-4703 | 1 |
| R08 R10 | RES,C,1/4W,5%,10K RC103-310 | CF1/4-10K | ASE | 4700-15-1002 | 2 |
| R09 | POT,20K RP124-320 | WA2G032S-203MA | A-B | 4610-10-7203 | 1 |
| WAVETEK PARTS LIST | | TITLE EXT,MKR MODULE,M6C | ASSEMBLY NO. 1114-00-0124 PAGE: 2 | | REV A |

SECTION 6

SCHEMATICS

6.1 INTRODUCTION

This section contains all schematics for the instrument. A schematic index is given in Section 6.4.

6.2 SCHEMATIC NOTES

The following notes and abbreviations pertain to all schematics. Additional notes pertaining to specific schematics

are included on each schematic if required.

All values are shown in the following units unless otherwise specified.

| Components | Units |
|------------|--------------|
| Resistor | ohms |
| Capacitor | picofarads |
| Inductor | microhenries |



Denotes DC voltage reading in volts unless otherwise specified.



Denotes high impedance crystal detector reading in volts unless otherwise specified.



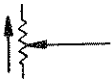
Denotes 50 ohm crystal detector reading in volts unless otherwise specified.



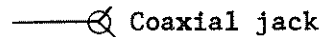
Signal or voltage source.



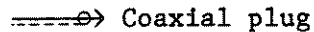
Connects to indicated signal or voltage source.



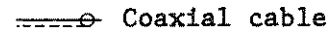
Arrow indicates clockwise rotation of wiper.



Coaxial jack

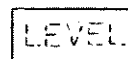


Coaxial plug



Coaxial cable

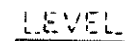
* Factory adjusted part.



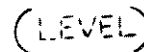
Denotes a front-panel device.



Denotes a rear-panel device.



Denotes a PC board adjustment or accessible module adjustment.



Denotes an internal module adjustment not accessible without removing module cover.

SCHEMATICS

6.3 ABBREVIATION CODE

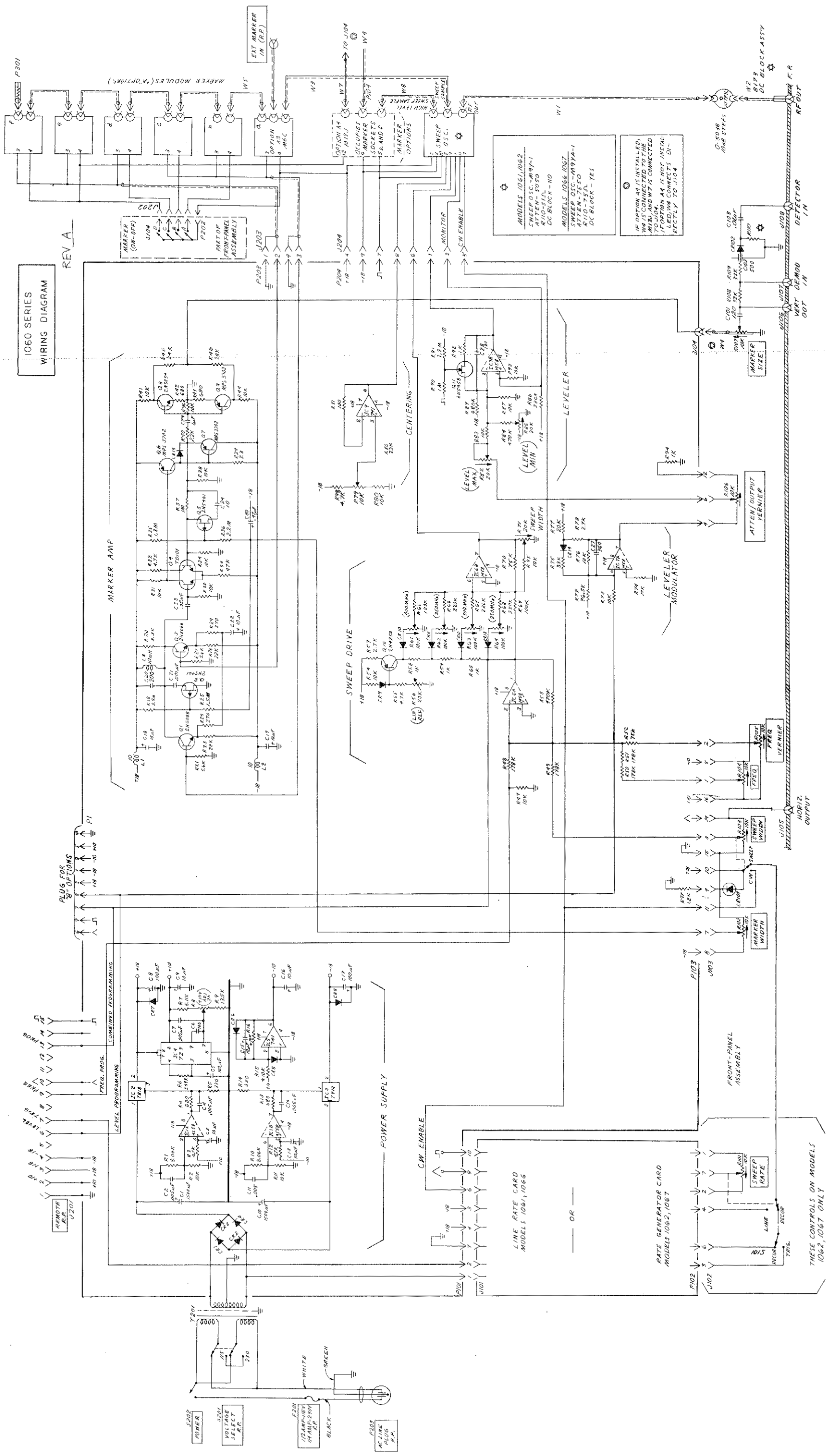
| | | | | | |
|------|--------------------------|------------|------------------------|----------|------------------|
| A | Assembly | IF | intermediate frequency | Ω | ohm |
| A | ampere | J | jack | OC | opto-coupler |
| AC | alternating current | K | relay | P | plug |
| C | capacitor | kHz | kilohertz | pp | peak-to-peak |
| CR | diode | k Ω | kilohm | pF | picofarad |
| CW | continuous wave | kV | kilovolt | Q | transistor |
| cw | clockwise | kW | kilowatt | R | resistor |
| dB | decibel | L | inductor | RF | radio frequency |
| dBm | decibel referred to 1 mW | MHz | megahertz | RMS | root-mean-square |
| dBmV | decibel referred to 1 mV | M Ω | megohm | R.P. | rear panel |
| DC | direct current | μ F | microfarad | S | switch |
| DS | indicating device, lamp | μ A | microampere | T | transformer |
| F | farad | μ H | microhenry | T.P. | test point |
| F.P. | front panel | M | meter | V | volt |
| H | henry | mA | milliampere | VA | voltampere |
| Har | harmonic | mH | millihenry | W | watt |
| Hz | hertz | mV | millivolt | X | crystal |
| IC | integrated circuit | mW | milliwatt | | |

6.4 SCHEMATIC INDEX

| <u>SCH. NO.</u> | <u>ASSY.</u> | <u>NAME</u> |
|-----------------|--------------|----------------------------|
| 1 | 1060 | WIRING DIAGRAM |
| 2 | C001 | RATE GENERATOR CARD |
| 3 | C004 | LINE RATE CARD |
| 4 | M9Y(A)-1 | SWEEP OSCILLATOR |
| 5 | M13J | PULSE MARKERS |
| 6 | B012 | TILT |
| 7 | B014 | NOTCH / TILT |
| 8 | M6H-1 | HARMONIC MARKER (1 MHz) |
| 9 | M6H-5-50 | HARMONIC MARKER (5-50 MHz) |
| 10 | M6S | SINGLE FREQ. MARKER |
| 11 | M6C | EXTERNAL MARKER |

**1060 SERIES
WIRING DIAGRAM**

REV A



THESE CONTROLS ON MODELS
1062, 1067 ONLY

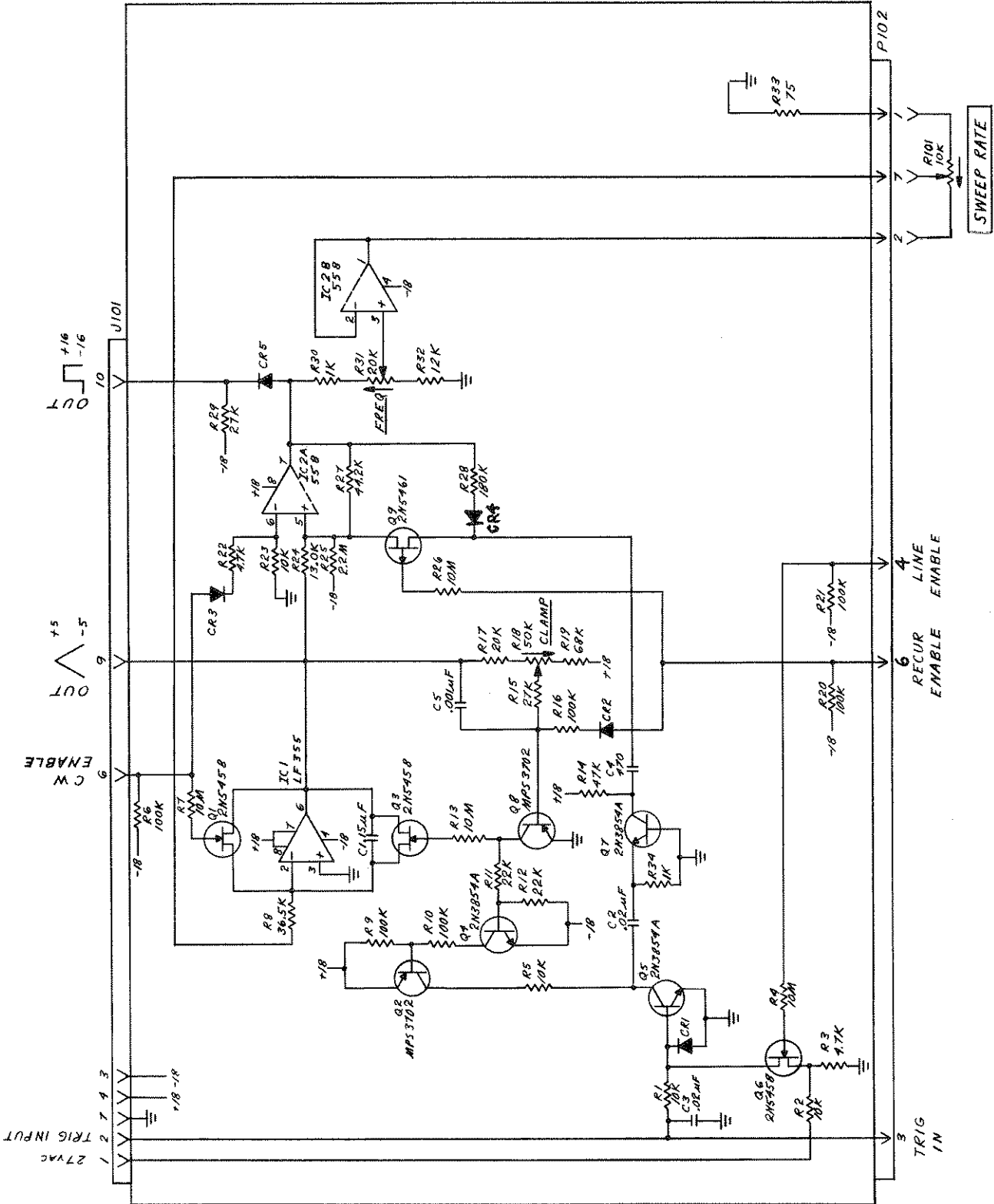
MODELS 1061, 1062
SWEEP OSC. - M91Y-1
ATTEN. - 5050
V110-751L
DC BLOCK - NO

MODELS 1066, 1067
SWEEP OSC. - M91YA-1
ATTEN. - 7550
V110-751L
DC BLOCK - YES

IF OPTION A4 IS INSTALLED,
MARKER SIZE CONTROL IS
M131 AND MUST BE CONNECTED
TO J104.
IF OPTION A4 IS NOT INSTALLED,
MARKER SIZE CONTROL IS
M131 AND MUST BE CONNECTED
TO J104.

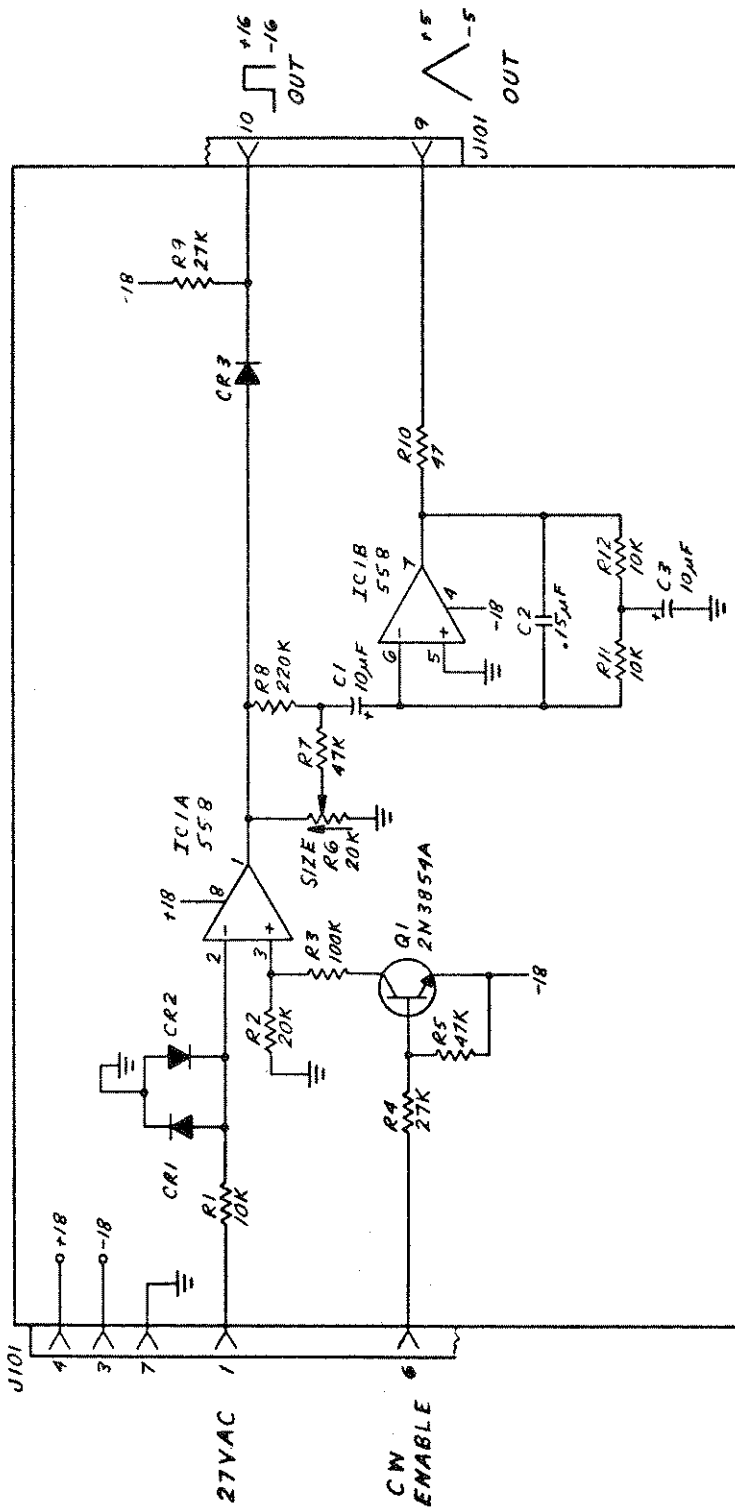
SCHEMATIC 2 - C001
RATE GENERATOR CARD

REV. B



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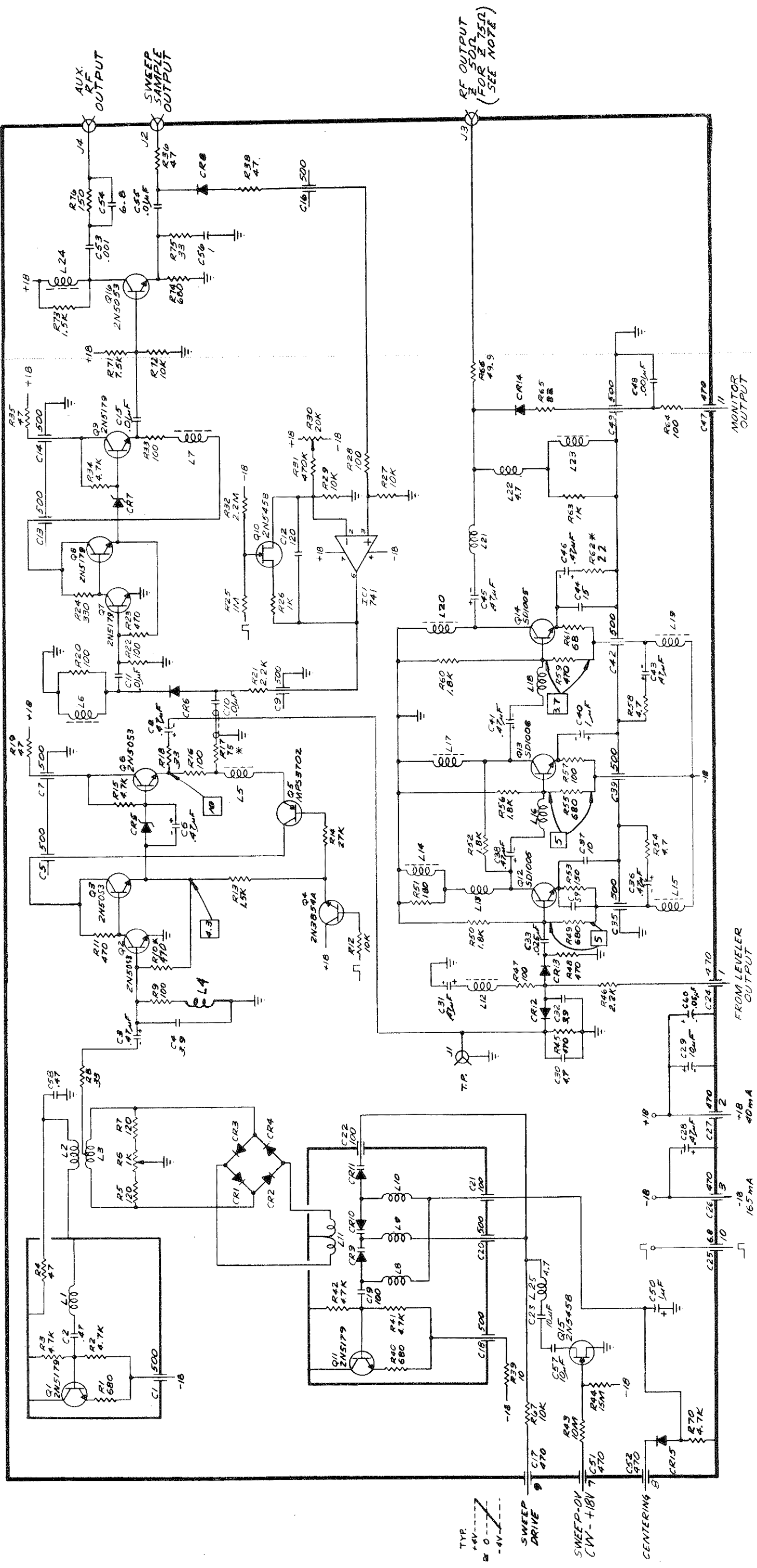
**SCHEMATIC 3 - C004
LINE RATE CARD**



SCHEMATIC 4 - M9Y(A)-1
SWEEP OSCILLATOR

REV. H

NOTE 1: FOR 2 OF 1512, R66 IS CHANGED TO R5 AND THE "A" SUFFIX IS ADDED TO THE MODULE NUMBER



TYR
+4V
0
-4V

SWEEP DRIVE 9

SWEEP-DV CW +18V 7

CENTERING 8

16.5 mA

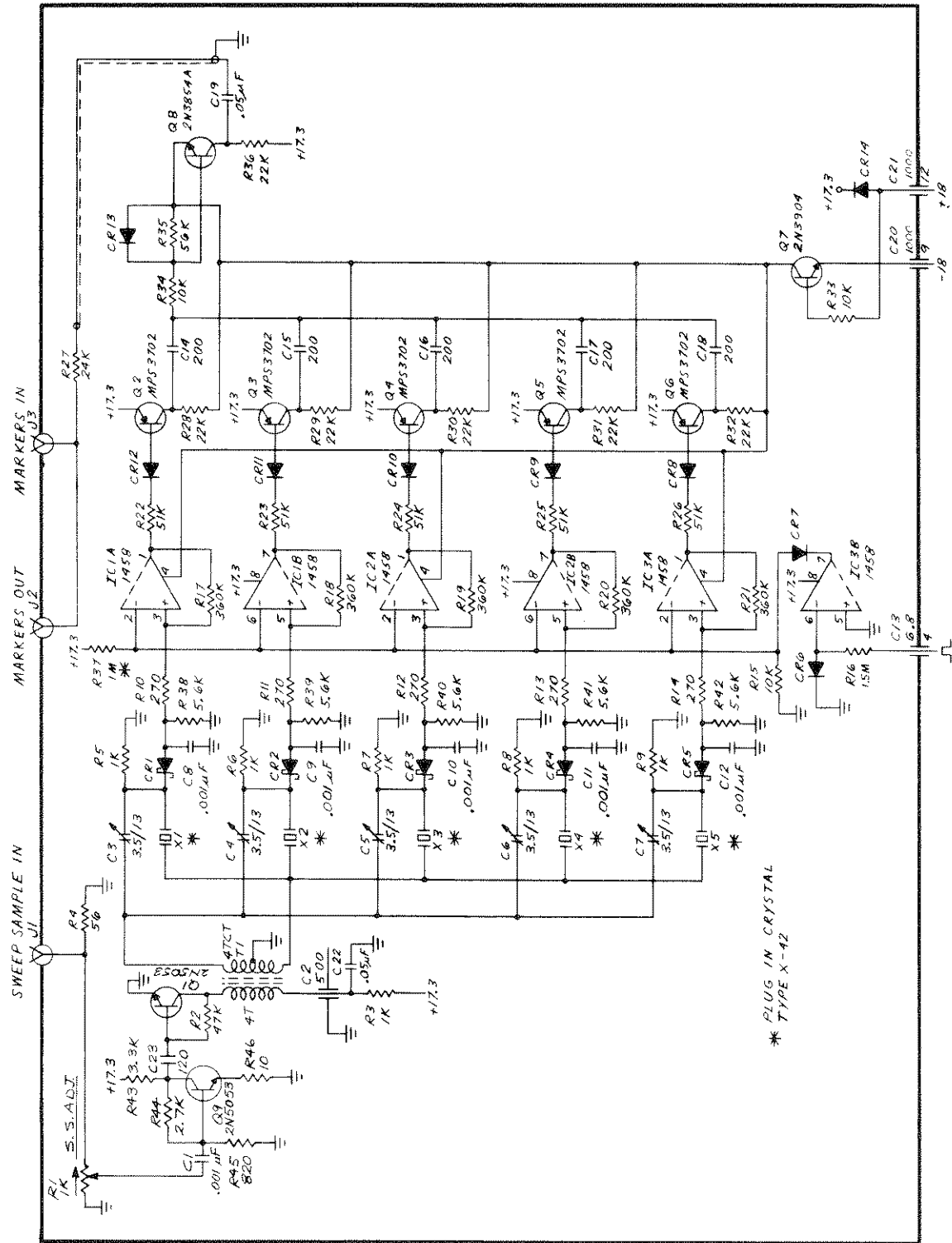
40 mA

FROM LEVELER OUTPUT

MONITOR OUTPUT

SCHEMATIC 5 - M13J
PULSE MARKERS

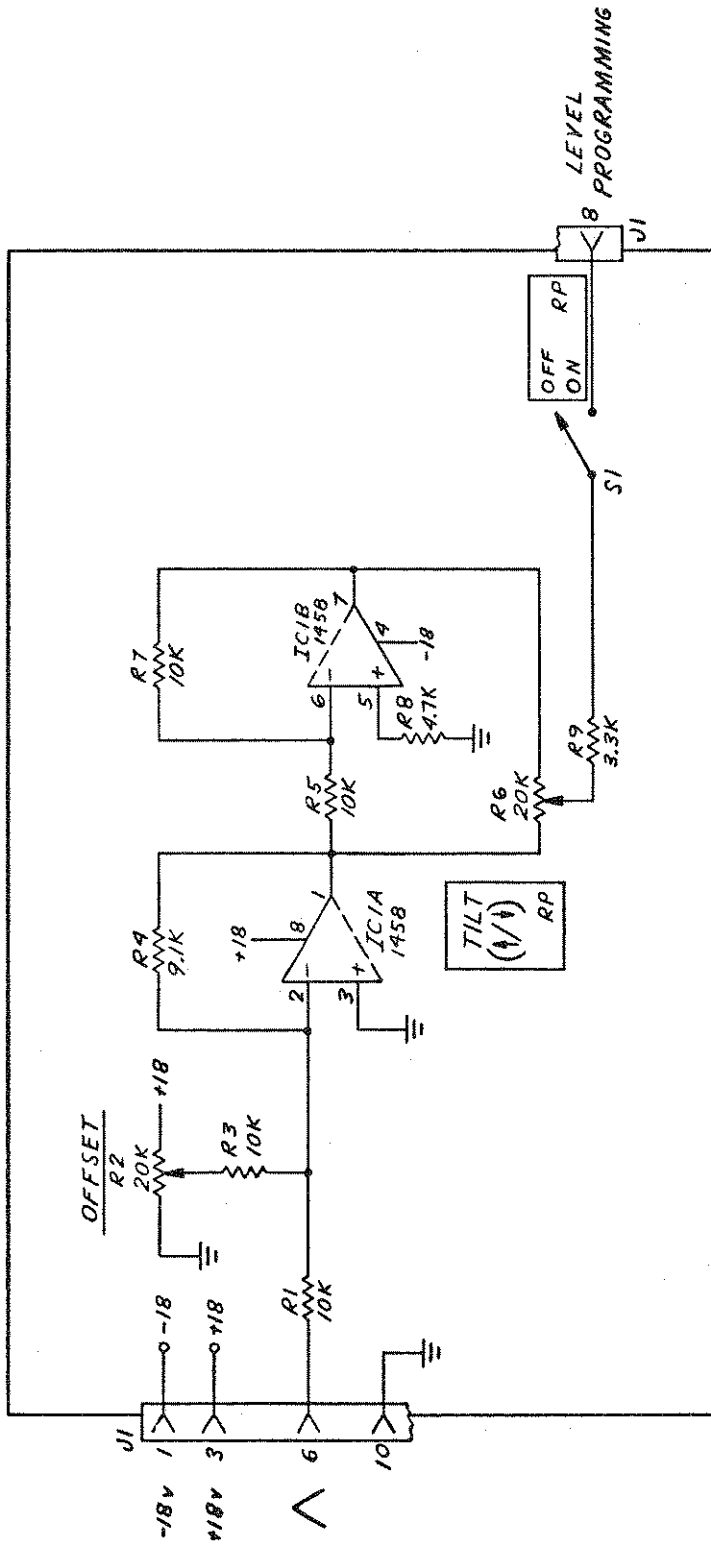
REV B



* PLUG IN CRYSTAL
* TYPE X-42

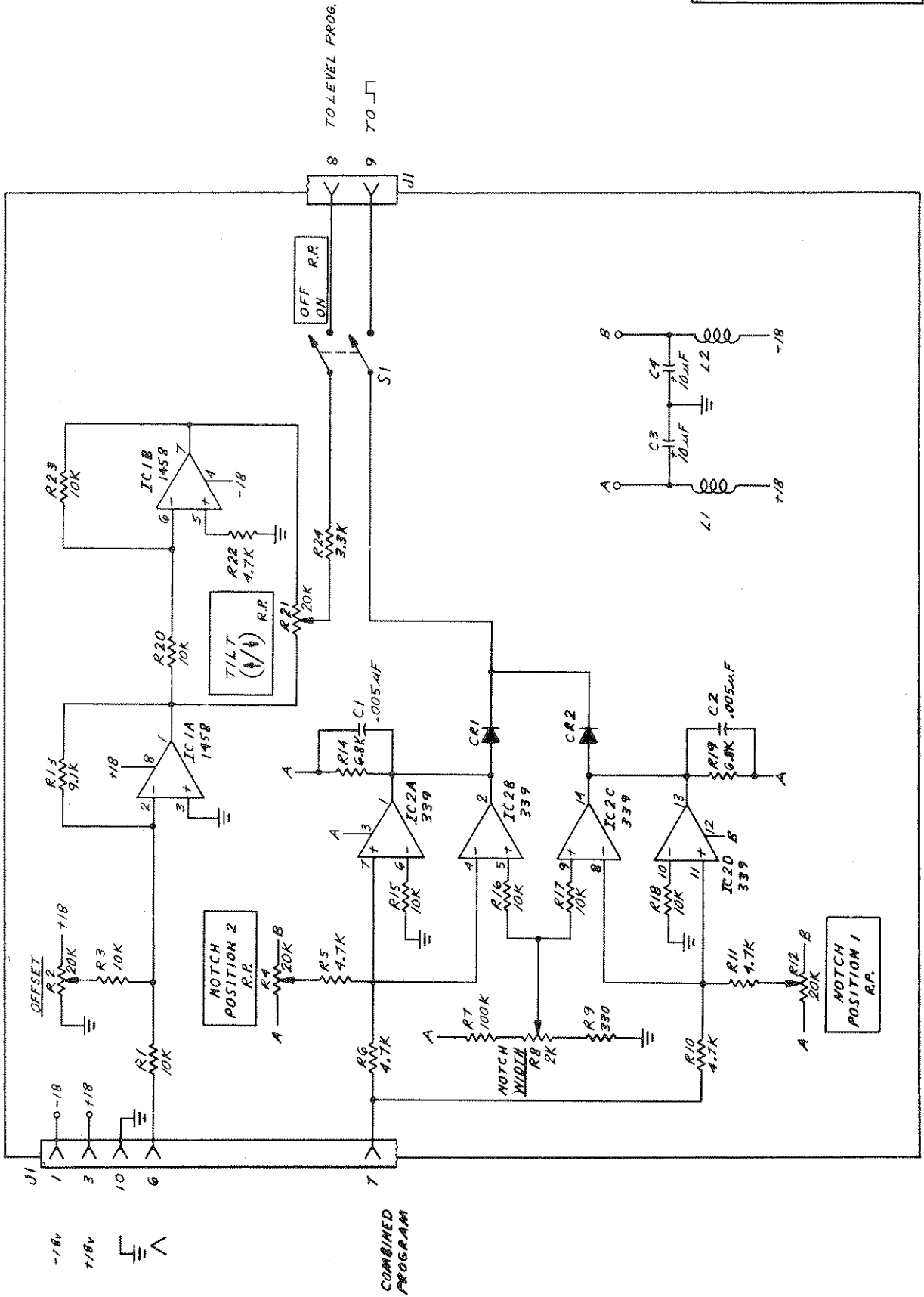
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SCHEMATIC 6 - B012
TILT



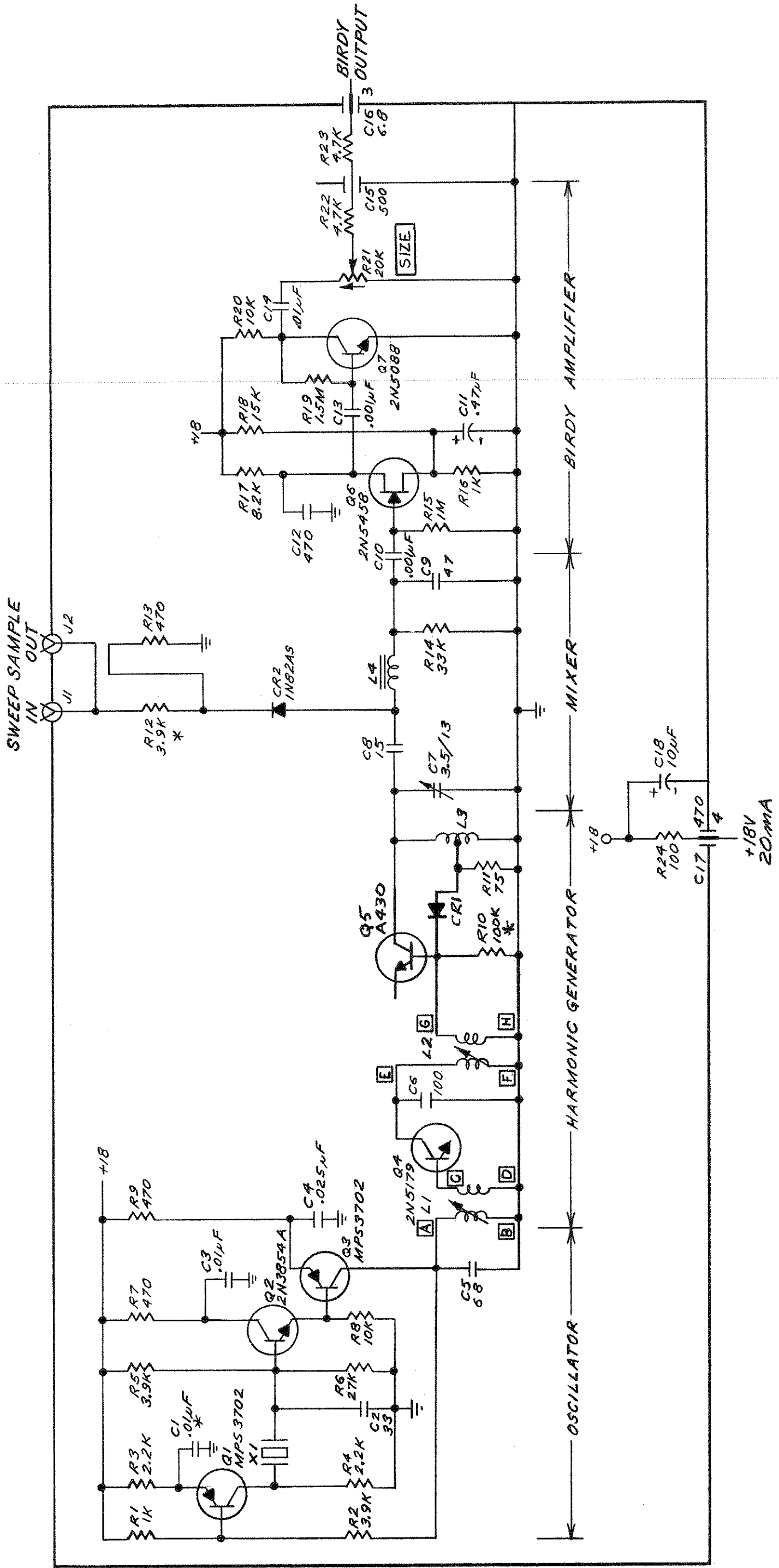
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

SCHEMATIC 7 - B014
NOTCH / TILT

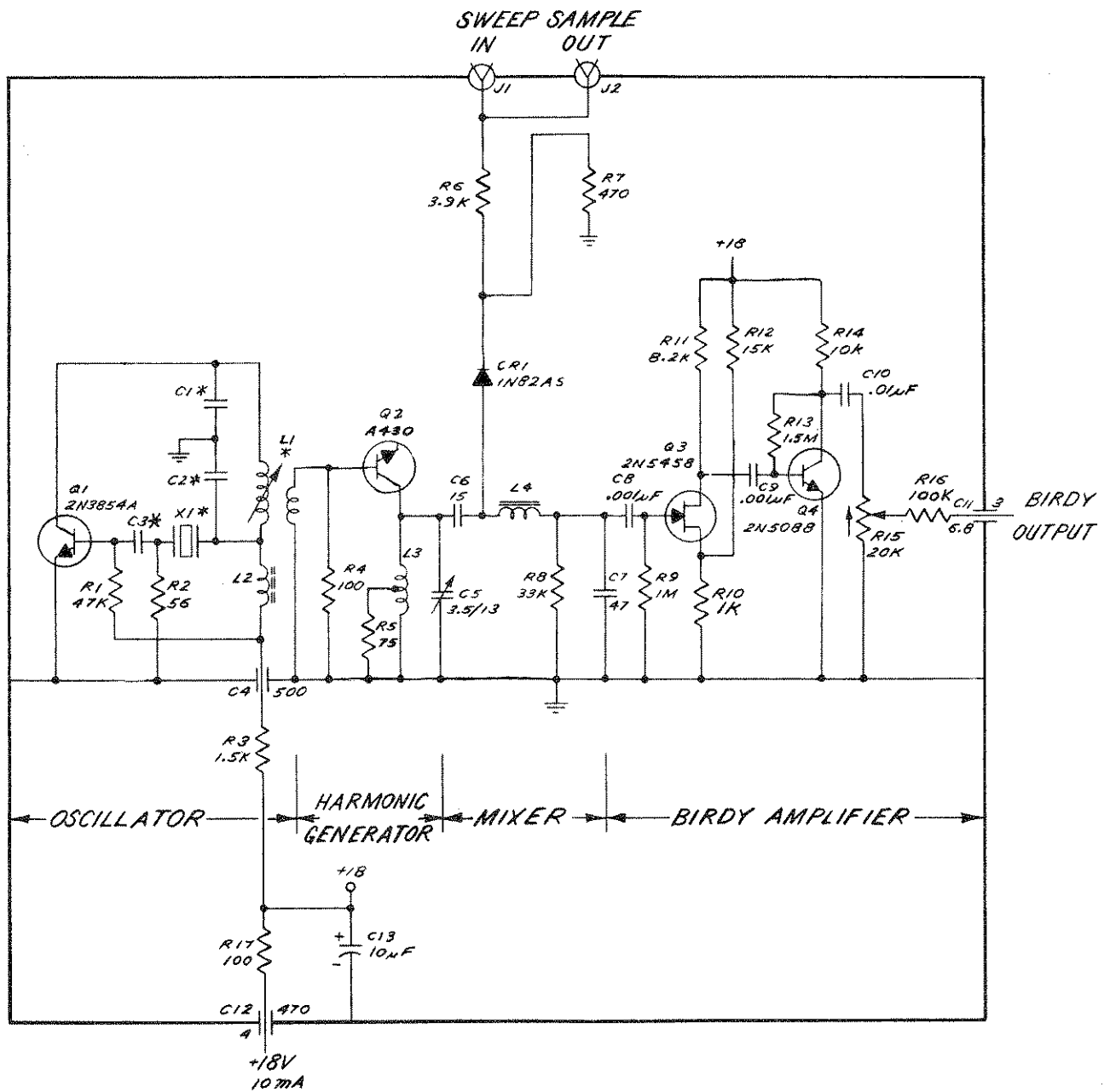


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SCHEMATIC 8 - M6H-1
HARMONIC MARKER (1 MHZ)

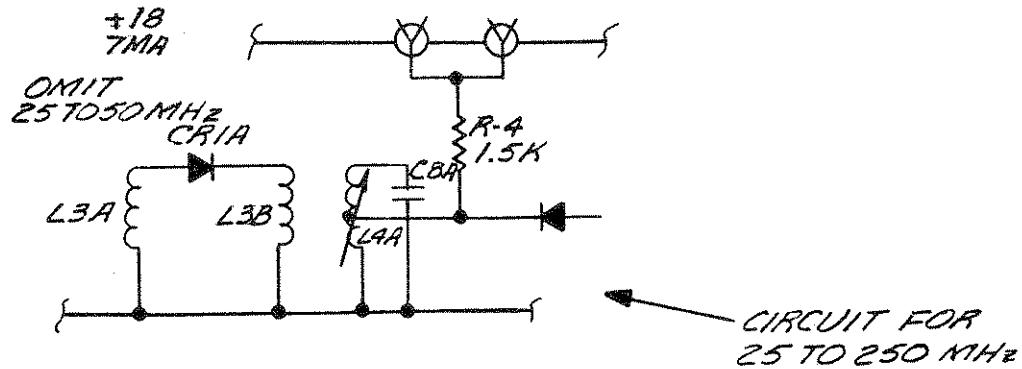
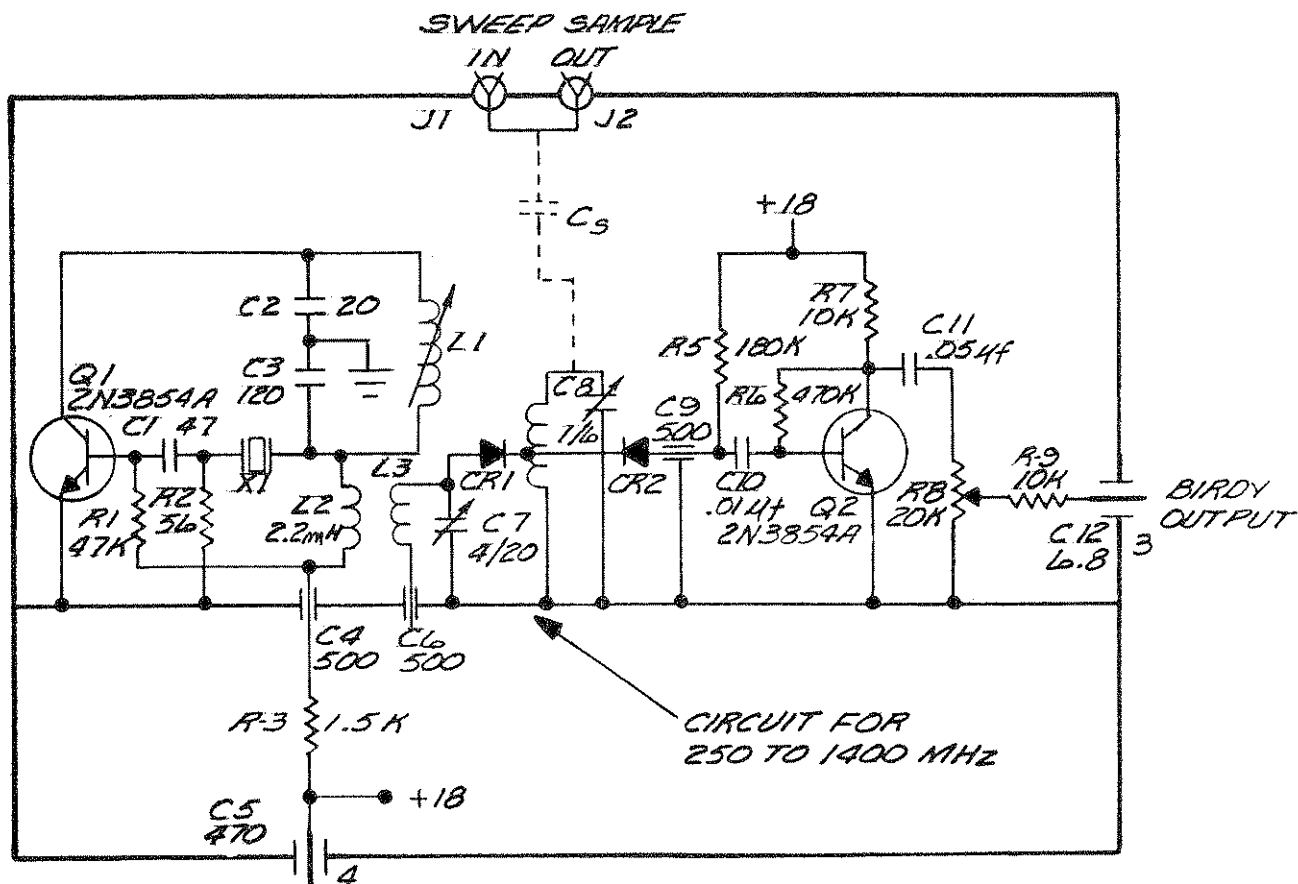


SCHEMATIC 9 - M6H-5-50
HARMONIC MARKER (5-50 MHZ)



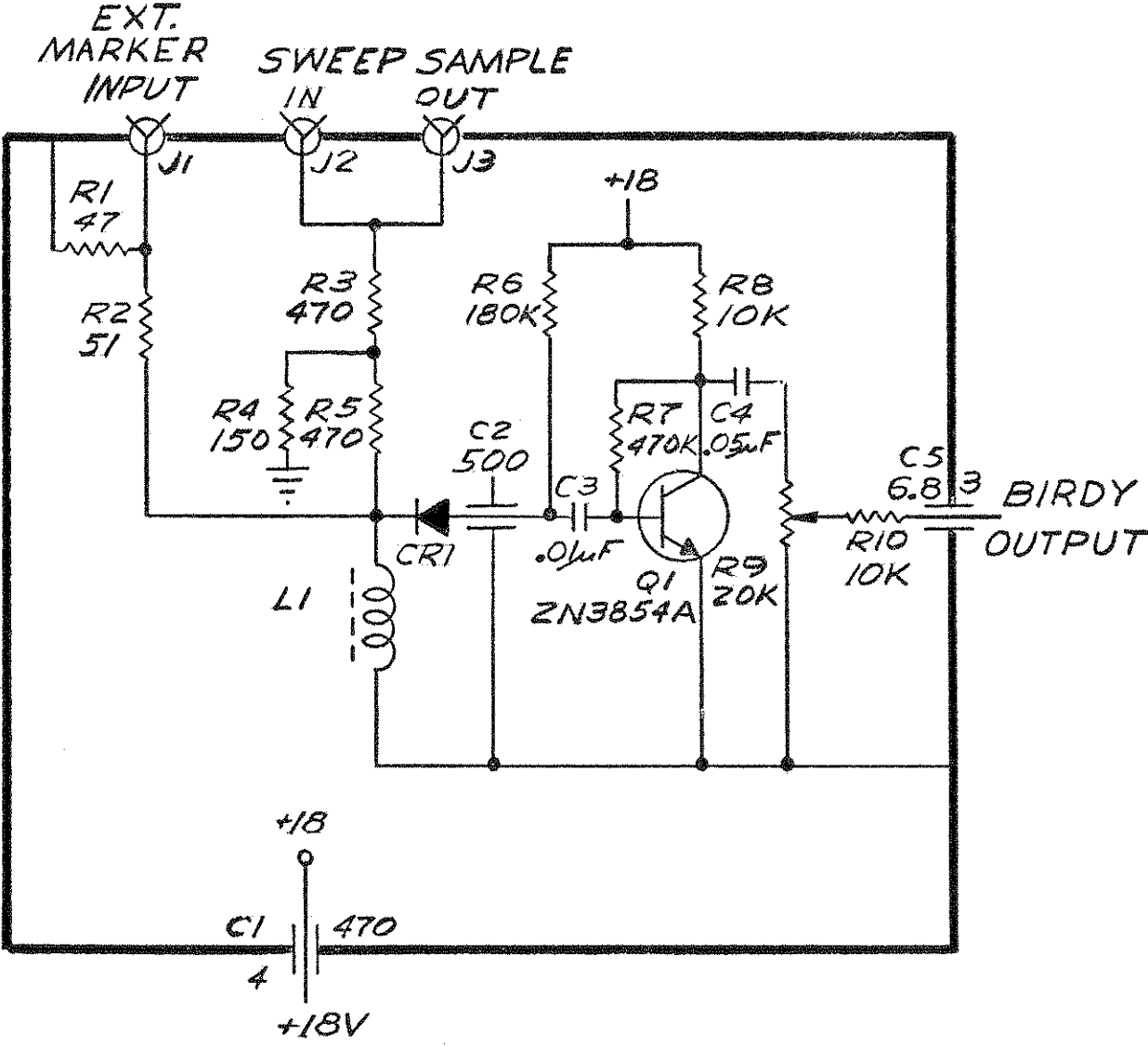
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SCHEMATIC 10 - M6S
SINGLE FREQ. MARKER



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SCHEMATIC 11 - M6C
EXTERNAL MARKER



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