OPERATION
AND
SERVICE MANUAL
NO. 490220

MODEL 1019
SWEEP/SIGNAL
GENERATOR

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DS-289

MANUAL DIFFERENCE SHEET

MODEL 1019-014

The Model 1019-014 differs from the basic Model 1019 in that it has a special AM-IF range of 455 KHz - 475 KHz.

MODEL 1019

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General Information

The Model 1019 is a sweep signal generator designed to provide stable, accurate swept signals used for the alignment of AM and FM radio tuners and IF strips. The unit features a unique digitally controlled feedback system which provides a high degree of linearity, precise frequency controllability, and a reference from which highly accurate pulse markers can be derived.

The Model 1019 is rugged, easily serviceable, and exemplifies simplicity of operation. The basic unit is equipped with an attenuator system and one set of ten markers; additional markers and a modulation option are available. Swept and CW operations are provided as an integral portion of the basic 1019.

1.2 Electrical Specifications

The following paragraphs outline the electrical specification of the Model 1019:

1.2.1 RF Ranges

A. Preset Mode (Swept)

Channel No.	Description	Frequency Range
1	Mobile IF (IF 2)	252 - 272 KHz
2	Standard IF (IF1)	445 - 465 KHz
3	AM RF	500 - 1700KHz
4	FM IF	10.2- 11.2MHz
5	FM RF (USA)	86 - 110 MHz
6	FM RF (CCIR)	85 - 105 MHz
7	FM RF (JAPAN)	75 - 115 MHz

B. Manual Mode (Swept)

Channel No.	Sweep Width	Center Frequency
1	10 KHz	
2	10 KHz	Covers the same
3	60 KHz	range as shown in
4	200 KHz	para. 1.2.1.A,
5	1.2 MHz	"Frequency Range"
6	1.0 MHz	
7	2.0 MHz	

C. CW Mode

Sweep ramp and blanking is inhibited; frequency is adjustable over the range as indicated in paragraph 1.2.1A, "Frequency Range".

1.2.2 RF Characteristics

Power Output	0.5 V rms into 50 ohms
Flatness	±0.2 dB
Linearity	±5% of sweep width
Harmonic Content	-30 dB
Spurious Content	-40 dB

Residual FM and Drift

Channel	Residual FM (KHz) Max	Drift (KHz/hr.) Max
1	0.01	0.1
2	0.02	0.2
3	0.24	2.4
4	0.48	4.8
5	4.00	40.0
6	4.00	40.0
7	4.00	40.0

1.2.3 Markers

Type	Pulse markers
Accuracy	±0.1% in manual mode only
Width	Nominally 1% of horizontal
Amplitude	0.1 to 35V at rear panel 10 to 500 mV at marker adder
Polarity	Switchable, + or -

1.2.4 Horizontal Output

Amplitude	± 10 V P-P
Sweep time	24 msec trace
Rate	Sync with half-line rate

1.2.5 Prime Power

Voltage	110/220 VAC ±10%
Frequency	50 - 60 Hz
Input Power	60 watts maximum

NOTE: THIS UNIT CONTAINS THERMAL STABILIZING ELEMENTS. PERMIT AT LEAST 15 MINUTES AFTER TURN-ON BEFORE USE.

2.0 OPERATING INSTRUCTIONS

2.1 General Description

The Model 1019 Sweep/Signal Generator is designed to permit the operator to use the instrument with a minimum of training and orientation. Controls used during the alignment operation are located on the front panel; these controls are clearly labeled for ease of operation.

The intensity marks and modulation outputs (if used) are available at the rear panel. The fuse, a standard commercially available 2A line fuse (Littlefuse 3AG or equivalent), is accessible from the rear panel also.

The switches and adjustments found inside the unit can be divided into two categories - those required for initialization and those which need adjustment only when calibration is required. The former will be included in this section; the latter will be discussed in Section 4.0 (Test and Calibration Instructions).

2.2 Front Panel Description (see Figure 2-1 for location of Front Panel Controls)

2.2.1 Controls

A. POWER SWITCH

Provides ON/OFF control for AC power. The pilot light, located also at A, is illuminated when the POWER switch is in the "ON" position.

B. MODE SWITCH

The MODE switch determines in what mode the unit will be operating. The MODE switch affects the following items:

MODE	Sweep	Blanking	Center Freq.
PRESET	Full	On	Preset
MAN	Narrow	On	Controllable by (D)
CW	None	Off	Controllable by (D)

C. BAND CHANNEL SWITCH

The CHANNEL Switch determines the frequency range of the RF output. The precise ranges are detailed in Section 1.0; the additional FM ranges are selectable by internal switching, as will be discussed infra. The FM RF MOD and AM RF MOD activate the modulation option if installed; if not installed, the action of these switches is identical to the FM and AM RF SWEPT switches.

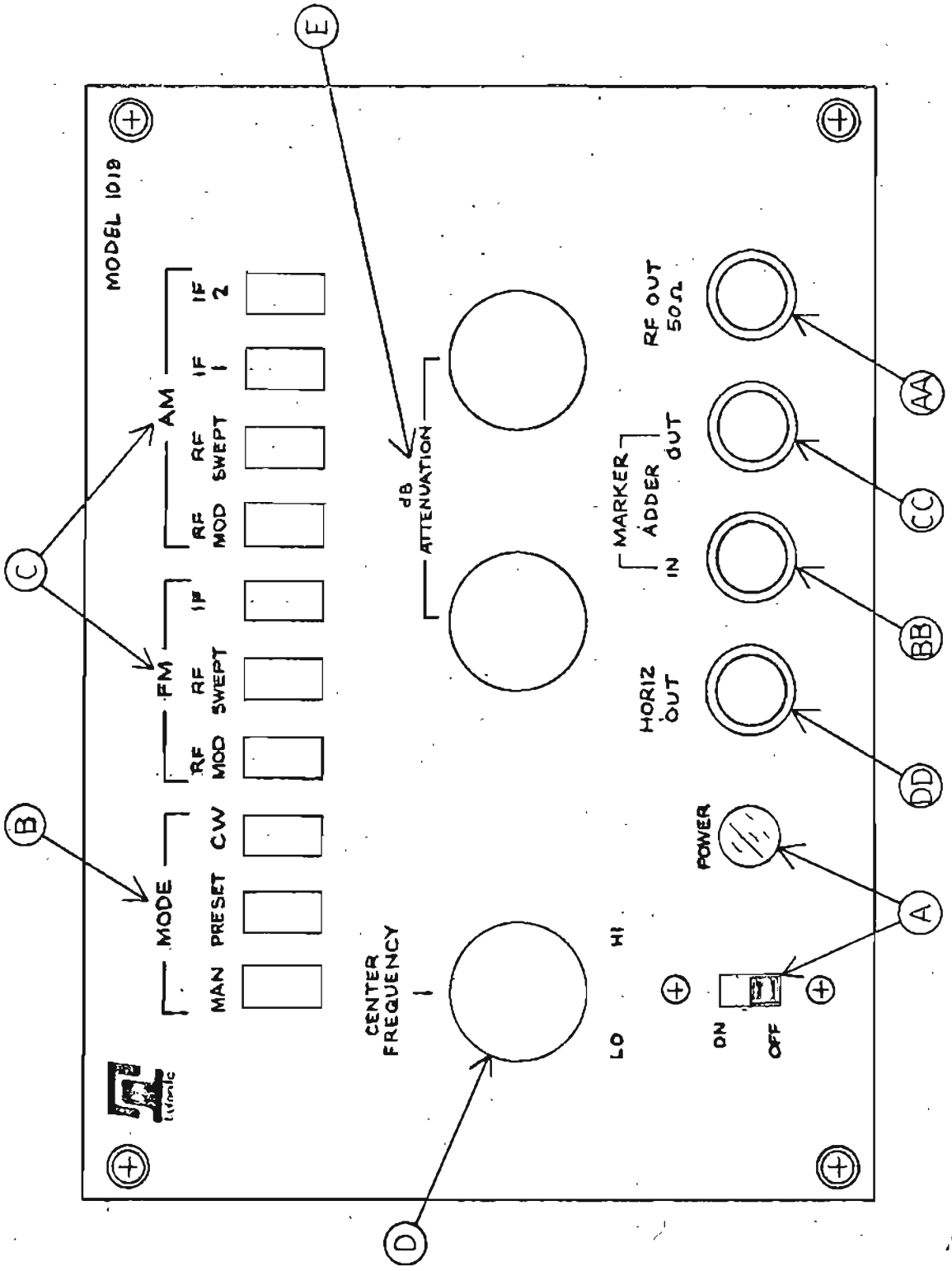


Figure 2-1
Front Panel Diagram

D. CENTER FREQUENCY CONTROL	This control is operative during the MANUAL Swept and the CW Modes of operation. The center frequency of the narrow swept output in the MANUAL mode or the output frequency itself in the CW mode is governed by this control.
E. ATTENUATORS	These attenuators control the amount of attenuation of the RF output. The degree of attenuation is shown by the individual attenuator.

2.2.2 Connectors

AA. RF Output	Type BNC Connector - provides RF output at an impedance of 50 ohms.
BB. MARKER ADDER IN	Type BNC Connector - provides an input for adding the detected RF to the markers.
CC. MARKER ADDER OUT	Type BNC Connector - provides a means of coupling the added marker and detected RF signals to the vertical input of an oscilloscope. Output impedance (DC) is nominally 47k ohms.
DD. HORIZ OUT	Type BNC connector - provides a ramp drive of ±10V P-P at a nominal 10 kΩ impedance to an oscilloscope horizontal input.

2.3 Rear Panel Connectors (see Figure 2-2)

AA. INTENSITY MARKS OUT	Type BNC connector - provides pulses of switchable polarity up to 35V amplitude at the marker frequencies.
BB. 400 Hz out (Modulation Option 618 only)	Provides 400 Hz output when AM MOD is enabled.
CC. 1000 Hz out (Modulation Option 618 only)	Provides 1000 Hz output when FM MOD is enabled.

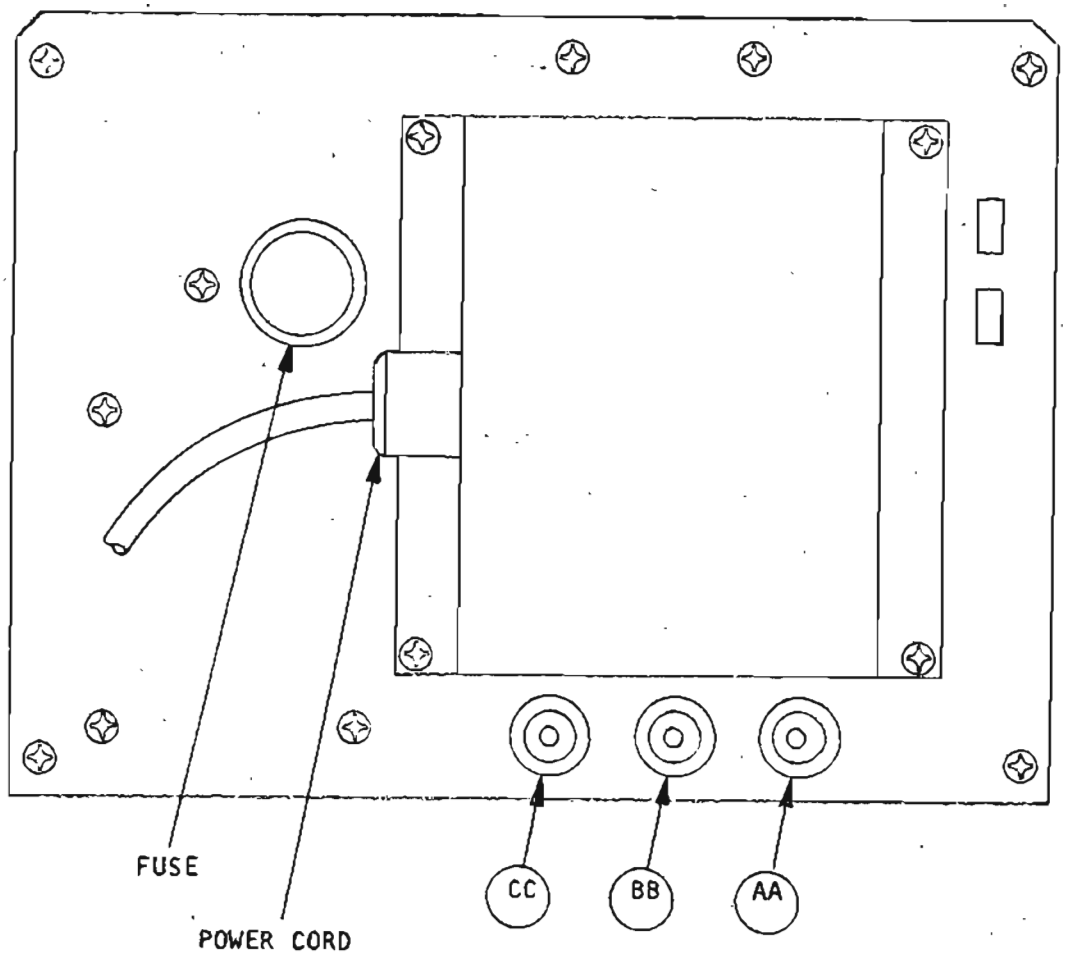


Figure 2-2 - Rear Panel

2.4 Internal Operational Adjustments (see Figure 2-3 for internal adjustment location)

A. FM BAND SWITCHES	These switches determine WHICH band (USA, JAPAN, or CCIR) is engaged in the FM RF Swept and FM RF MOD positions of the bandswitch.
B. MARKER SIZE (F.P.)	This control determines the size of the marker pulses appearing at the marker adder output connector.
C. MARKER SIZE (R.P.)	This control determines the size of the pulses appearing at the rear panel used for intensity modulation of oscilloscope.
D. MARKER POLARITY SWITCH	This switch enables the operator to select the polarity of the marker pulses, both front and rear panel.
E. 115/230V LINE SWITCH	This switch enables the unit to be operated from either 115 or 230 VAC input.

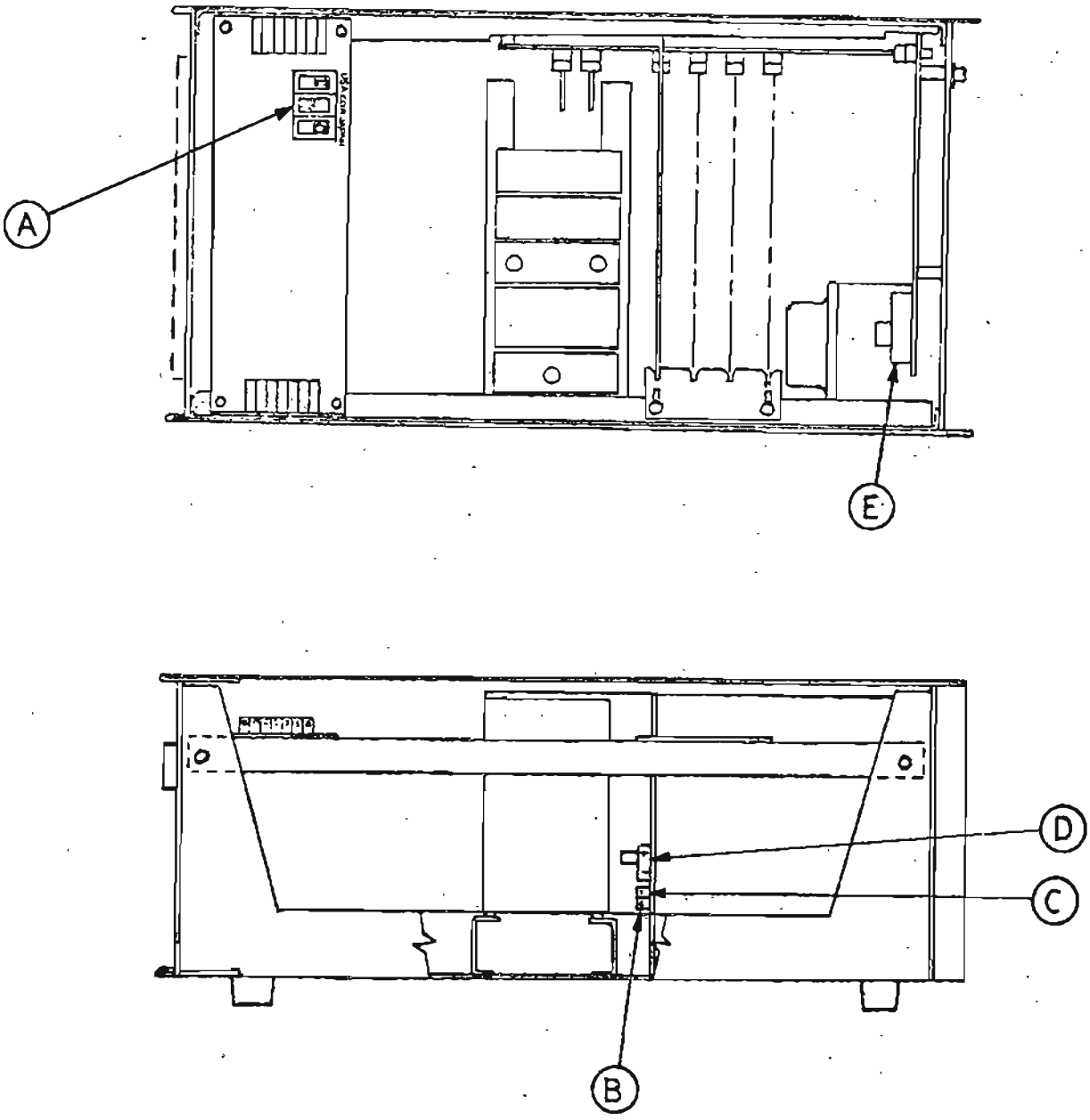


Figure 2-3
Internal Operational Controls

3.0 THEORY OF OPERATION

3.1 General Description (see Figure 3-1)

The Model 1019 is basically a multi-channel sweep/signal generator covering the AM and FM RF and IF ranges. All outputs are derived directly from a single oscillator which covers the 75-115 MHz range. Lower frequency outputs are synthesized digitally from the master oscillator.

The operation of the system is controlled by the Preset and Control Board; this board is the one to which the front panel MODE and BAND switches are mounted. All center frequency and sweep width adjustments are located on this board as well as the enabling circuitry for the bands and markers. The center frequency and sweep width controls are connected to inputs on the Frequency-to-Voltage Converter Module (F/V Converter) and form a reference with which an internally generated voltage is compared. The internally generated voltage is proportional to the frequency of the master oscillator and is formed by integrating the output of a temperature stabilized one-shot integrated circuit.

The F/V Converter has two basic outputs as follows:

A. The direct voltage from the frequency to voltage conversion. This is used to provide a ramp to drive the marker circuitry; the ramp is compared with tightly controlled DC voltages to yield pulse marks at the output.

B. The ramp from (A) above is compared (internally) with the summed sweep width and center frequency voltages from the Preset Control Board and amplified to produce an error signal. This error signal is used to drive the varactor diodes in the 75-115 MHz oscillator and becomes the sweep drive signal.

With the above technique, frequency control is obtained with a closed-loop system; the drift of the output is a function of the control circuitry and not of the individual semiconductor elements within the oscillator module.

The basic ramp is generated by a ramp generator circuit located on the interconnect circuit board. This board contains also the +5 volt regulator and the blanking control circuits.

The individual bands are formed either by filtering a direct quotient of the 75-115 MHz oscillator or by mixing a fixed oscillator with a quotient (in the case of the AM RF band). The outputs of the amplifiers for the various bands are connected to the multiplexer/monitor assembly which consists of basically three filters and a monitor circuit. The three filters include the following:

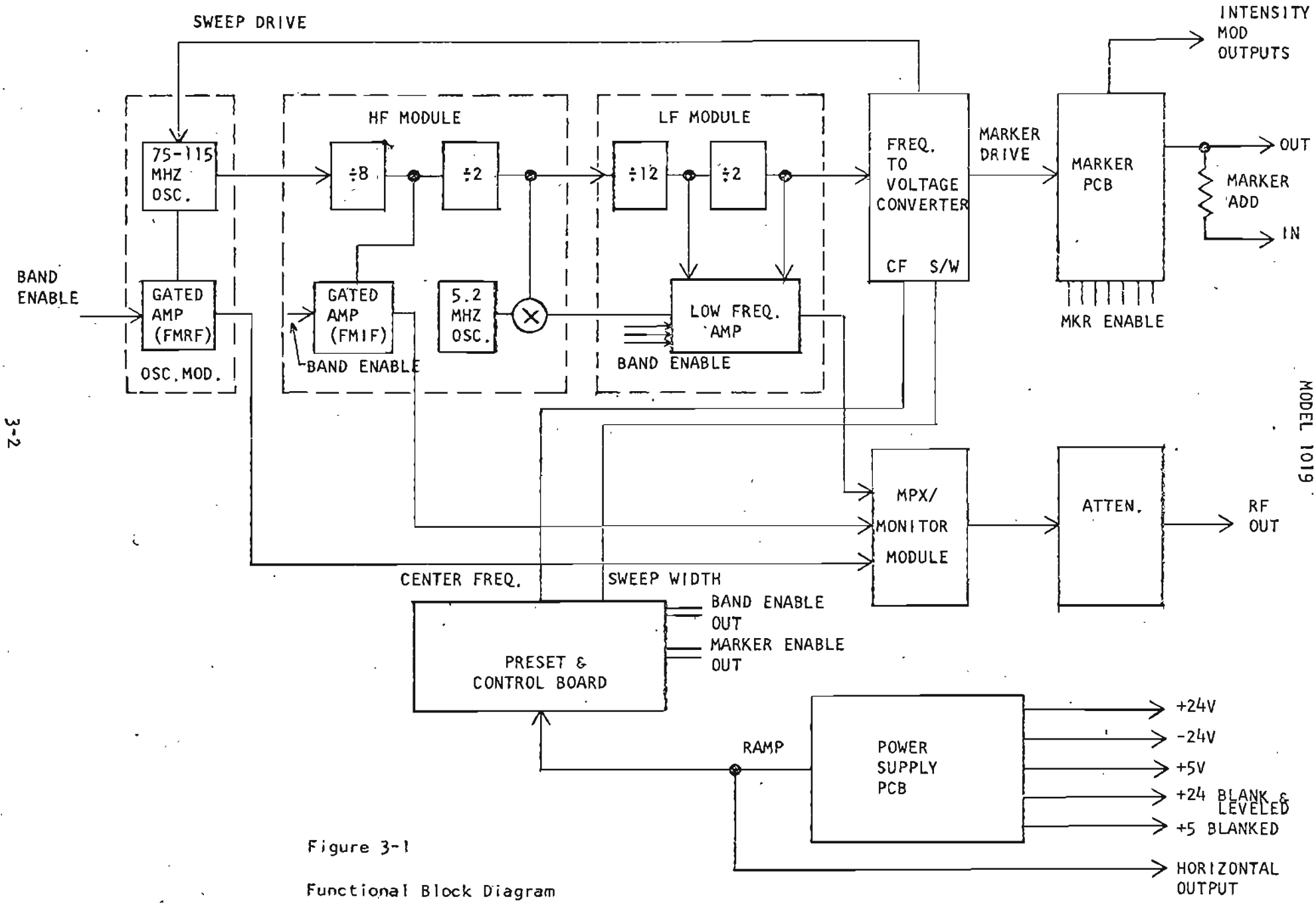


Figure 3-1

Functional Block Diagram

A. A high-pass filter through which the FM RF signals are coupled to the output,

B. A band-pass filter for the FM IF, and

C. A low-pass filter through which the AM IF and AM RF signals pass.

The output of the multiplexer/monitor is coupled to the RF output jack of the front panel through the attenuator.

3.2 Detailed Description (refer to appropriate diagrams, located in Section 6.0 of this manual)

3.2.1 Power Supply (refer to Figure 6-3, Schematic No.54-0273-01)

Basic power supply voltages for the Model 1019 are +24V and -24V. Unregulated DC is derived from rectifiers CR1 - CR4 and filtered by capacitors C1 and C2 (positive voltage) and C* and C9 (negative voltage). Positive regulation is accomplished through the use of a standard regulator circuit - a 723 integrated regulator (E1) and pass transistor (Q2). Transistor Q1 and its associated circuitry are required only to insure that the maximum voltage rating of the 723 is not exceeded. Adjustment of the output voltage is achieved through R4 and its surrounding resistors.

Negative regulation is accomplished by means of operational amplifier (E2) and modified Darlington amplifier (Q7 and Q8). Transistor Q6 is required, as above, to prevent excessive voltage from appearing across E2. The reference for the -24V regulator is ground; the sense voltage is a combination of +24V and -24V taken through R19 and R20. In this manner, adjustment of BOTH supplies is achieved by a single control, R4.

Blanked voltages are achieved through a series of switching transistors deriving an input from the rate generation circuitry. Transistors Q3 and Q4 supply a positive 24V blanked signal to the Blanker/Level amplifier, E3. Transistors Q9 and Q10 supply the negative 24V blanked voltage to the oscillators and other circuitry.

The reference for the -24V leveler circuitry is taken from the reference ALC input, which is applied to pin 2 of E3. This is compared with the monitor input at pin 3 of E3 and results in the desired leveling voltage at the output. Transistor Q5 provides the necessary current handling capability required for this usage.

3.2.2 Lateral (Interconnection) Assembly (refer to Schematic #54-0236-01, Figure 6-5)

The interconnection assembly is basically a distribution assembly for power and signal lines. Contained on the assembly are certain functions including the ramp generator, the +5 volt power source, and miscellaneous controls and functions.

The +5 volt regulated supply is used to power the logic elements of the 1019. The reference for the 5 volts is taken from the +24 volt supply by means of R3 and R4. The regulator consists of a standard differential pair (Q1 and Q2), a buffer (Q3) and a pass transistor (Q4).

The ramp generator is basically a line-triggered integrator, a simplified schematic of which is shown in Figure 3-2.

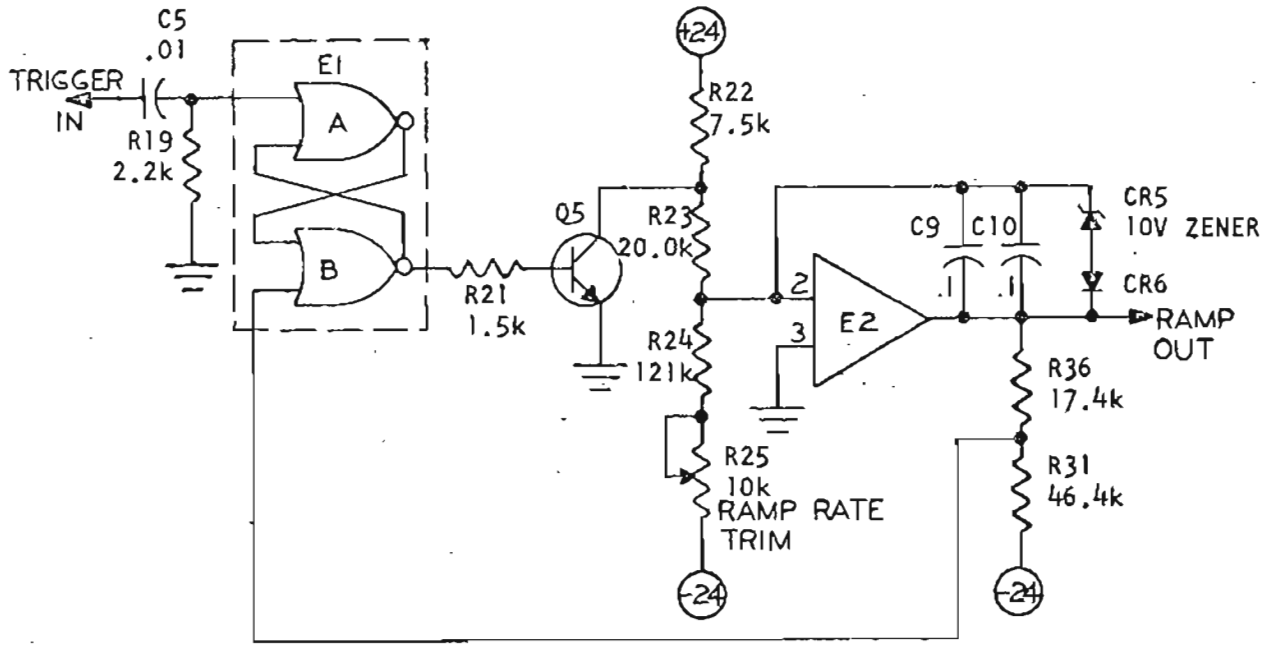


Figure 3-2. Ramp Generator (Reference designations refer to Schematic 54-0236-01)

The operation of the ramp generator is explained as follows:

A trigger pulse is applied at the TRIGGER INPUT which causes the output of E1,A to go to the low state. By the action of the cross-coupled gate circuit, the output of E1,B goes to the high state which causes Q5 to conduct. The equivalent voltage (assuming that R23, R24, and R25 are viewed as a Thevenin equivalent resistance) at the integrator input is negative in this condition; therefore, the integrator output will be a positive going ramp due to the inversion action of E2.

When the ramp reaches +10 volts, the voltage at the junction of R30 and R31 will be enough to trigger the cross-coupled gate circuitry and drive the output of E1,B to the low state. This causes Q5 to become non-conductive, the equivalent voltage at the integrator input to be positive, and the output of the integrator to be a negative going ramp. The ramp continues negative until it reaches an amplitude of -10 volts, at which time CR5 conducts and lowers the amplifier gain to near zero. The output stays, then, at -10 volts until the next trigger pulse occurs.

For the CW mode, the ramp generator must be inhibited - this is done by the action of the remaining two elements of E1 (not shown in the simplified schematic). The sweep disable signal merely prohibits any trigger pulses from activating the ramp generator. The additional circuitry (CR2 and R18 ensure that the blanking switches are all ON during the CW modes.

Other functions of this assembly include providing a 5 volt blanked signal (Q6) for logic control and providing a level control reference (R33) for the ALC circuitry.

3.2.3 Preset Board Assembly (refer to Schematic #54-0235-01, Figure 6-7)

The preset board is located on brackets which mount directly to the front panel. It forms the circuitry into which the front panel push-button switches, both mode and band, are connected. From this board are derived the band and marker enable signals, the sweep width and center frequency information, and all other miscellaneous control functions.

The band and marker enable signals are voltage levels which are dependent on the switches depressed. In all cases, the enable signals are +5 (or +5 through a diode) to enable, ground if not enabled. The marker enable signals for the FM bands are derived through transistors, Q3, Q4, and Q5 - the undesired marker enable signals are held off by gating the transistors in question with the unused center frequency signals, which are positive in all cases.

The center frequency signals are merely a voltage divided signal derived from the +24 volt supply line. The center frequency voltage is switched through the band switch only, and is applied to the F/V converter input at all times.

The sweep width signal is provided by action of the switching circuitry and the ramp amplifier, E1. The ramp, as is seen from the schematic, is completely disconnected from the preset circuitry in the CW mode, connected to the junction of R3, 4, 5, 6 and 8 in the PRESET mode, and to the band switches in the MANUAL mode. In this manner, the sweep width is ZERO in the CW mode, maximum in the PRESET mode, and governed by resistors R3, R4, and R5 in the MANUAL mode. In the MANUAL and CW modes, the CF pot is engaged and its input is added to the sweep width inputs by means of R9. Since the full sweep width in PRESET is adjusted by means of the potentiometers, R16 through R22, the center frequency variation is a function of the full sweep width of EACH PARTICULAR BAND; hence the center frequency resolution as a percentage of bandwidth is the same on all bands.

The individual FM bandswitches are located on the preset board. The operation of these switches is straightforward and easily noted from the schematic diagram.

3.2.4 Oscillator (refer to Figure 6-9)

The oscillator for the Model 1019 is a varactor tuned sweep oscillator with three outputs. These outputs are defined as follows:

RF-1 Leveled output, presented to the RF OUT Connector on the Front Panel during the FM RF modes.

RF-2 A constant output, provided to the first divider of the HF module.

RF-3 A blanked sample output, used during alignment.

The basic oscillator consists of Q1 and the tuned feedback circuitry comprised of the varactor diodes (CR2 and CR3) and the coil assembly. Transistors Q2, Q3 and their associated circuitry form a buffer amplifier which is capable of providing drive to the output stage of RF2 and the preamplifier for RF1. Transistor Q4 provides the output necessary to drive the first JK flip-flop in the frequency control divider chain - the filter (C39, L12, C40, L13, and C41) is included to prevent harmonics of the output from possibly activating the counter and yielding false information.

The main RF output is provided by transistor Q7 and the preamplifier stages, Q5 and Q6. Leveling is accomplished by varying the bias on Q5 and Q7 simultaneously. The output of Q7 is filtered to provide the necessary harmonic rejection. The entire RF 1 amplifier is enabled by Q8 - when the RF1 enable signal is at ground, Q8 is off and the amplifier is inoperative. An RF-1 enable signal (+5 volts) causes Q8 to conduct, which permits current to flow through the amplifier transistors and the RF-1 output is operative.

Transistor Q9 is a single stage amplifier which is gated by the RF-3 enable signal. In practice, this signal is the +5V blanked line; therefore, the output is ON during trace time and OFF during retrace. The output of Q3 is not used during normal operation of the system; rather, it provides a main oscillator sweep sample which is used during the calibration of the bands and markers. This operation will be discussed more in detail in Section 4.0.

3.2.5 HF Module (refer to schematic diagram #54-0226-01, Figure 6-11)

The purpose of the HF module is threefold:

A. Provide a 4.5-7 MHz signal to the LF module
B. Provide a gated 10.7 MHz signal for the FM IF band, and
C. Provide a gated 0.5 - 1.7 MHz signal to the LF module for the AM RF band.

The first of these functions is provided by E1, E2, and the interface circuitry. E1 is an emitter-coupled logic element which takes the "counter drive" output of the 75-115 MHz oscillator module and divides that output by four. The resulting output, nominally 18-28 MHz, is coupled to the interface circuitry, consisting of Q1 and its associated circuitry. The interface circuitry is basically a level shifter which converts ECL levels to TTL levels. The next divider is one section of a dual JK flip-flop (E2 which is gated to the 10.7 MHz amplifier and also connected to the remaining divider section, from which is obtained the 4.5-7 MHz output.

The FM IF output is derived by sweeping the 75-115 MHz oscillator from 81.6 to 89.6 MHz and gating the output of the first flip-flop of E2 into a tuned amplifier, Q3 and associated circuitry. This output is at a frequency of 10.2 to 11.2 MHz, since that output is at a divide-by-eight level. The output amplifier, Q3 is leveled by the action of the blanker/leveler; the gating is accomplished by the three input NAND gate (E3,1) and diode CR5.

The AM RF (0.5-1.7 MHz) output is generated in the HF module by mixing a swept signal of 5.7 - 6.9 MHz (derived from the second flip-flop section of E2) with a fixed 5.2 MHz signal. This represents a sweep of nominally 91-110 MHz from the 75-115 MHz oscillator. The 5.2 MHz oscillator (Q5) is activated by the band 3 enable input; the balanced mixer is activated by the band 3 input and the 5V blanking signal. The gating is done by means of E3,2 and E3,3.

Transistor Q4 is a leveling amplifier for the 5.2 MHz signal; in this manner, the low-level signal to the mixer is kept as low as possible, thus reducing the possibility of harmonic and spurious signals.

Transistor Q2 and associated circuitry is a pre-amplifier for the AM RF signals which drives the output amplifier in the LF module when activated.

3.2.6 LF Module (refer to schematic #54-0228-01, Figure 6-13)

The purpose of the LF moduel is to:

A. Provide outputs for AM RF, AM IF (1) and (2)
B. Provide a 180-300 kHz output for the F/V converter.

The AM RF output is provided by taking the signal from the HF module (which rides on a 5V DC level due to the Band 3 enable input) and connecting that signal to the base of Q3, thus activating Q3. The output of Q3 (developed across R6) is coupled to the Low Frequency Amplifier, consisting of Q4, 5, 6, 7 and 8. The amplifier has a basic gain of 5 (governed by R22 and R18) and is capable of acting as both a source and a sink for current due to the action of Q7 and Q8.

The AM IF inputs are realized by filtering divided outputs of the 4.5-7 MHz signal from the HF module. The IF-1 input (445-465 kHz) is derived from an input signal of 5.34 to 5.58 MHz which is divided by 12 by E1. Again, gating is accomplished by a three input NAND gate, E3, controlled by the 5V blanking signal and the band 2 enable input. The IF 2 input is derived from a 6.05 to 6.51 input which is divided by 24. The division is accomplished by E1 and one section of E2 (dual JK flip-flop).

The 180-300 kHz output to the F/V converter is derived from the divide-by-24 function and taken directly from E2.

3.2.7 F/V converter module (see Figure 6-15)

The F/V converter module is the heart of the feedback frequency control system of the Model 1019. The converter provides two outputs - one which is a filtered voltage corresponding to frequency used to drive the markers, the other an "error" signal used to drive the varactor diodes of the 75-115 MHz oscillator.

The frequency to voltage conversion is accomplished by means of E2, which is a gated one-shot. The integrated circuit provides a nominal 1.5 usec pulse for each input cycle from the 180-300 kHz of the LF module. The width of this pulse is very accurately controlled by means of R6 and the NP0 capacitors, C4 and C18. The pulses are amplified by Q1 and associated circuitry and integrated by the action of E3 and its filtering. The oven is required to hold the one-shot circuit at a constant temperature, thus improving the stability with ambient temperature.

The output of the filtered pulse train, a DC voltage proportional to frequency is coupled out to the markers and also to E4, the summing amplifier. The inputs to the summing amplifier include:

A. The center frequency voltage
B. The sweep width voltage, and
C. Frequency modulation inputs.

These inputs are summed by the action of R26, R27, and R28 and compared with the DC from E3, introduced as a reference. The output of E4, an error voltage, is used as a sweep drive input at the 75-115 MHz oscillator.

Integrated circuit E1 is a local 5 volt regulator used to power the one-shot and amplifier. Local regulation is provided for stability.

3.2.8 Multiplexer/monitor (see Figure 6-17)

The multiplexer/monitor is designed to take the three outputs of interest - the FM RF, FM IF, and the AM RF and AM IF outputs - all emanating from different sources and combine them such that the RF is made available at a single output location. This is accomplished by coupling the low frequency information (from the LF module) in through a low-pass filter, the FM IF information (from the HF module) in through a band-pass filter, and the FM RF information (from the 75-115 MHz oscillator) in through a high-pass filter. The low pass filter is composed of L1, L2 and C2; the band pass filter of L3, L4, C3, and C4,; and the high-pass filter of C5, L5, and C6. The outputs of these filters all terminate at the monitor input.

The monitor of the 1019 is a current-monitor consisting of CR1 and the associated resistors and capacitors. The monitor output is a negative DC proportional to the current in R2. The dynamic impedance of the output is 50 ohms, due to the fact that the monitor is referenced to the junction of R3 and R5, not ground.

The monitor output is used as an input to the blanker/leveler circuitry previously discussed.

3.2.9 Marker Circuitry (see Figure 6-19)

The Model 1019 employs pulse markers, voltage controlled, in order to mark the frequencies during the swept modes of operation. Due to the extreme stability of the feedback controlled

output frequency, these pulse markers are accurate to within 0.1% over wide variations in temperature and aging. The pulse marker circuitry provides switchable polarity pulses at two locations - the rear panel and the front panel marker adder. Marks are provided in the following manner:

The output of the F/V converter is connected to the RAMP input of the marker board; E11 serves as a buffer amplifier with a gain of 2 (inverted). The output of the buffer is connected to the inverting input of each of the ten marker comparators (E1-E10); the reference input to each comparator is governed by a stable potentiometer (R11-R20). The comparator is configured such that the feedback circuitry (R1-10, C1-10) is connected in a positive feedback configuration, thus causing the output to sharply change.

The pulse from the marker comparators is connected to the one-shot driver, Q1, through the coupling circuitry R21-30, C21-30, CR1-10, and R31-40. The action of C21-30 and R31-40 is that of a differentiator; the pulse from the differentiator is enough to activate Q1 ONLY if the Marker Enable line for the particular marker in question is in a positive state (+5 volts).

The output of Q1 activates a one-shot, consisting of Q2, Q3, and associated circuitry. The output of the one-shot, observed at the collector of Q3, is negative; hence, for negative output the gain controls for the outputs (R53 and R52) are connected to that point. For positive output pulses, these gain controls are connected to the collector of the inverter transistor, Q4. The position of the polarity switch determines to which collector the gain controls will be connected.

The output pulses are adjustable from 0.1-35 volts (min) at the rear panel, and are designed for use with display oscilloscopes having intensity modulation (Z axis) inputs. The pulses at the marker adder output are variable from 10 - 500 mV, and are designed to appear on the trace (Y axis) during use.

3.2.10 Attenuators

Two attenuators are provided with the Model 1019; these enable the user to select any attenuation level of the output from 0 to 110 dB in one dB steps. The attenuators are non-repairable items, and are considered as components for repair and spare parts purposes.

4.0 ALIGNMENT INSTRUCTIONS. (Refer to Figure 4-1 for location of the internal controls)

4.1 Control Description

The following is a brief description of the controls of the 1019 used during the alignment process. Other controls - those normally adjusted once during the final testing process - will be discussed in more detail in subsequent sections.

DESIGNATION	FUNCTION
A	+5V Adjust
B	+24V Adjust
C	Level Adjust
D	Trace Time Adjust
E	Intensity Mark Amplitude Adjust
F	Front Panel Marker Size Adjust
G	IF2 Level Adjust
H	IF1 Level Adjust
J	FM IF Tuning Adjust
K	Center Frequency Adjustments (See note 1)
L	Sweep Width Adjustments (See note 1)
M	FM Bandswitch

NOTE 1: The numbers on the Center Frequency and Sweep Width controls designate the following:

1	IF-2
2	IF-1
3	AM-RF
4	FM-IF
5	FM-RF (JAPAN)
6	FM-RF (CCIR)
7	FM-RF (USA)

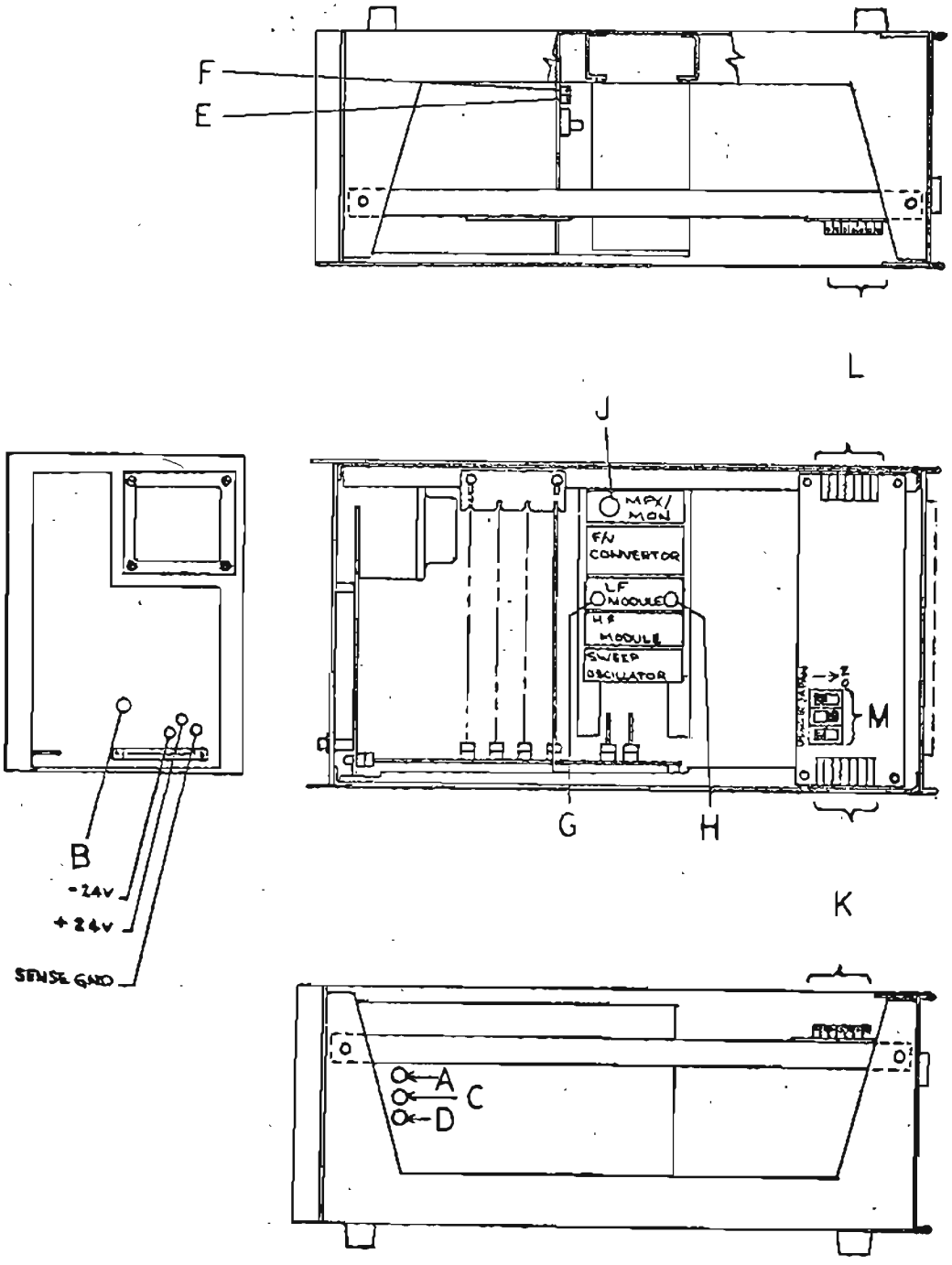


Figure 4-1

Internal Control Location

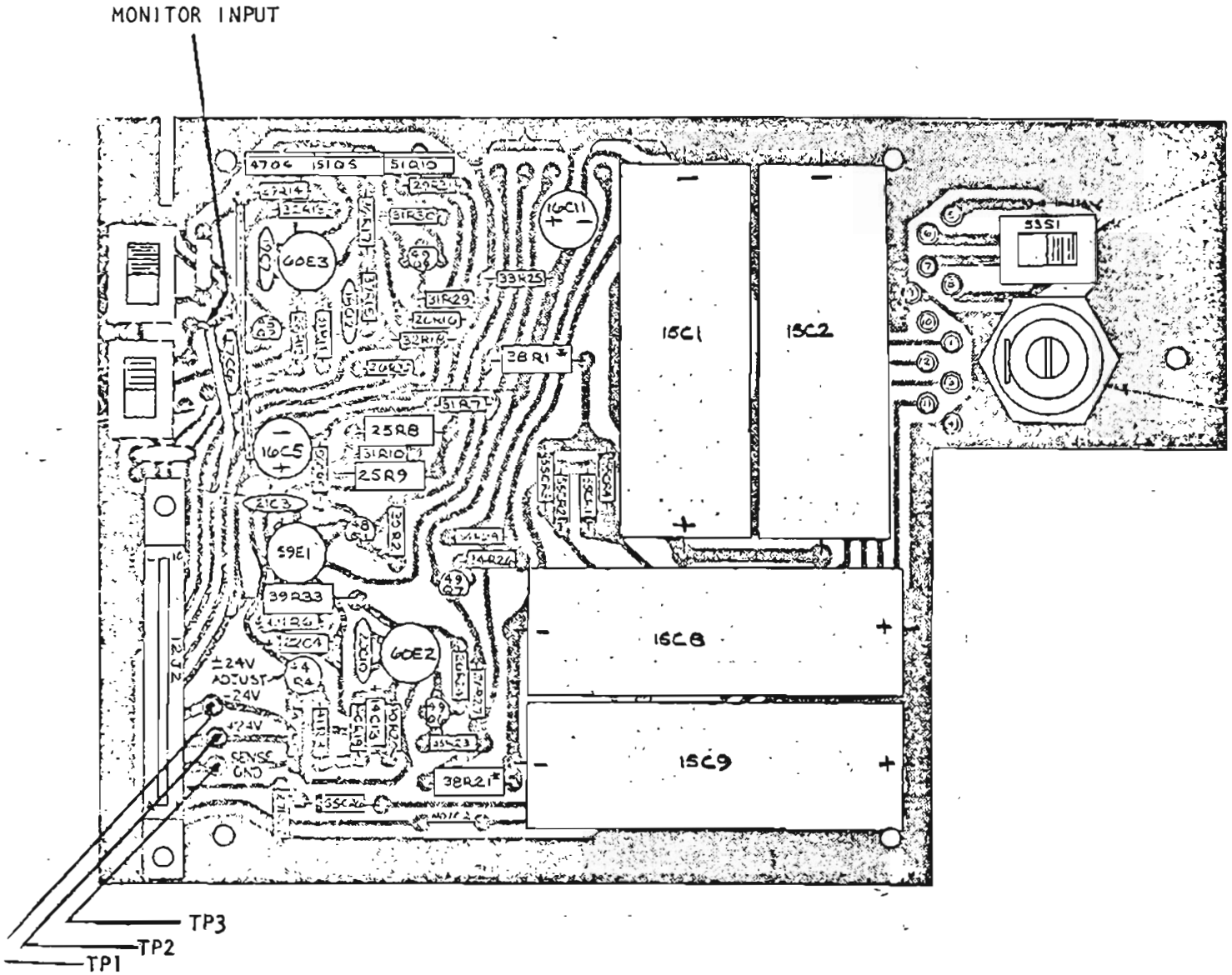


Figure 4-2

Test Point Location (Power Supply)

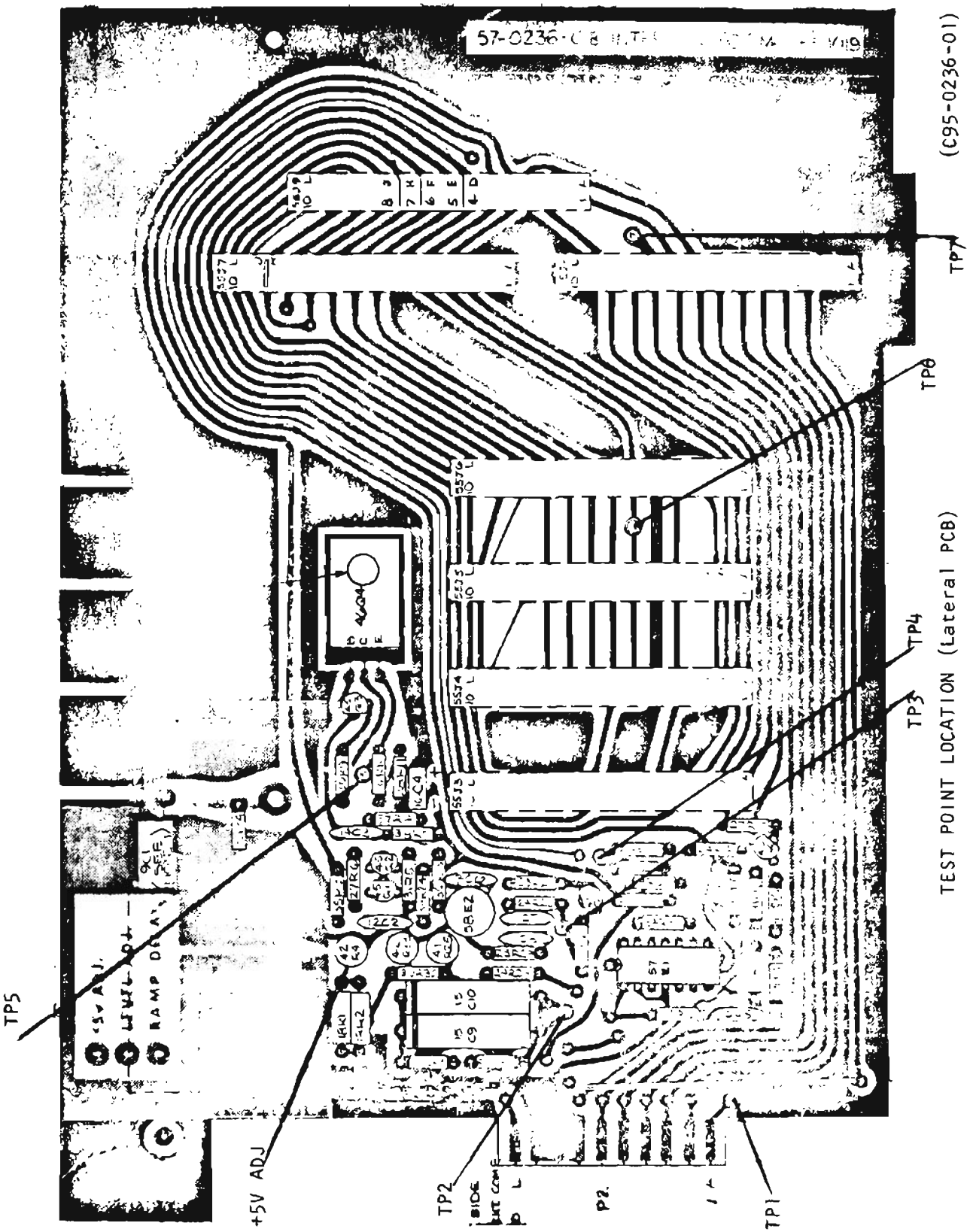


Figure 4-3
Test Point Location (Lateral PCB)

4.2 Equipment Required

A. Digital Voltmeter
B. Calibrated Detector (8029-2 or equivalent)
C. Marker system (TMS-2 or 2003 system with 1, 10 and 50 MHz harmonic markers)
D. Oscilloscope (HP-103 or equivalent)

4.3 Alignment Procedures

4.3.1 Power Supply (See Figure 4-2)

A. With the unit ON measure the +24V output, TP2. This voltage should be within ±0.20V of +24V. Adjust the +24V potentiometer, (Figure 4-1,B) for the proper output.

NOTE: CONSTANTLY MONITOR THE +5V OUTPUT (TP5, FIGURE 4-3) WHILE ADJUSTING THE +24V CONTROL AND INSURE THAT THE +5V OUTPUT NEVER EXCEEDS 5.25V OR DAMAGE TO THE DIGITAL INTEGRATED CIRCUITS MAY RESULT.

B. Measure the -24V output, TP1. This voltage should be within ±0.140V of -24V. If not, a malfunction exists within the -24V supply. The -24V output is controlled by the +24V control and referenced to sense ground.

4.3.2 Interconnect (Lateral) PC Board (See Figure 4-3)

A. Adjust the +5V output control (Figure 4-1,A) for 5 ±0.050V. Measure at TP5.

B. Observe the ramp output, TP2. Be sure the front panel MODE control is NOT in the CW Mode, or the ramp generator will be inhibited. Adjust the ramp trace control (Figure 4-1,D) for a "wait" time (See Figure 4-4,A of nominally 1.5 msec.

NOTE: THE ACTUAL "WAIT" TIME IS NOT CRITICAL. HOWEVER, EXCESSIVE "WAIT" TIME RESULTS IN A HIGH INTENSITY DOT AT THE LEFT EDGE OF THE SCREEN AND INSUFFICIENT "WAIT" TIME CAN PRODUCE ERRATIC OPERATION OF THE UNIT.

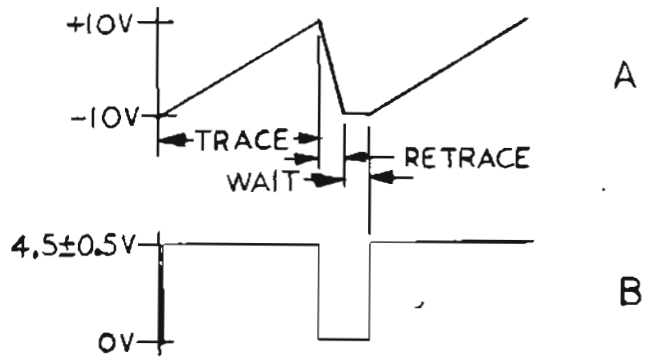


Figure 4-4

C. Observe the +5BL output, TP7, and note that it appears as shown in Figure 4-3,B.

D. All functions of the Lateral PC Assembly are now aligned except for the leveler - this will be discussed in subsequent paragraphs.

4.3.3 Frequency Range Alignment

A. Connect the equipment as shown in Figure 4-5.

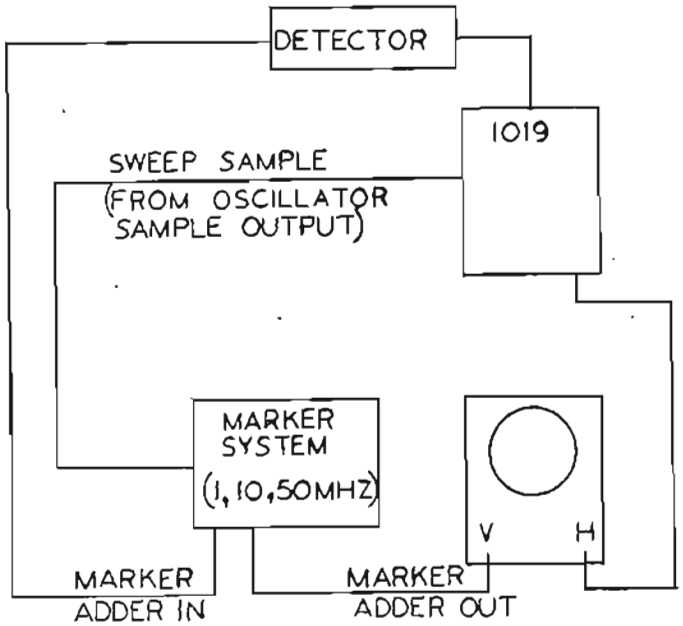


Figure 4-5

B. Set the Front Panel MODE Switch to PRESET, and the band to FM-RF SWEPT. Set the FM Bandswitch on the PRESET Board (Figure 4-1,M) for USA ON. Adjust the center frequency and sweep width controls (Figure 4-1 K7 and L7) for a swept range of 85-111 MHz.

C. Set the FM Bandswitch (Figure 4-1,M) such that CCIR is ON, and all others are off. Adjust controls (Figure 4-1, K6 and L6) for a swept range of 84-106 MHz.

D. Set the FM Bandswitch (Figure 4-1,M) such that the JAPAN range is ON, and all others off. Adjust controls (Figure 4-1, K5 and L5) for a swept range of 72-115 MHz.

E. Depress the Front Panel FM-IF button. Adjust the controls (Figure 4-1,K4 and L4) for a swept range of 81-90 MHz. The output from the front panel will be 1/8 of this swept range; therefore, the FM-IF output is at least 10.2 to 11.2 MHz.

F. Depress the AM RF SWEPT button on the front panel. Adjust the controls (Figure 4-1, K3 and L3) for a swept range of 90-111 MHz. This will correspond to a front panel output of at least 500 - 1700 MHz. The actual front panel output frequency is found from the expression:

$F=(F_s/16 - 5.2)$ where F is the front panel output frequency and F_s is the oscillator frequency.

G. Depress the AM IF 1 button on the front panel. Adjust the controls (Figure 4-1, K2 and L2) for a swept range of 85 to 90 MHz. This corresponds to a front panel output of at least 445 to 465 kHz - the actual front panel frequency (F) is $F_s/192$.

H. Depress the AM-IF 2 button on the front panel. Adjust the controls (Figure 4-1, K1 and L1) for a swept range of 96 - 105 MHz. This will insure a front panel output range of at least 252 to 272 kHz; the actual output frequency (F) is $F_s/384$.

4.3.4 Output Level (reference Figure 4-5 - set all attenuation OUT)

A. Depress the FM RF SWEPT button on the front panel. Adjust the LEVEL control (Figure 4-1,C) for a front panel output level of 5 mW.

NOTE: USE OF A CALIBRATED DETECTOR IS SUGGESTED HERE, AS A POWER METER READING WILL INDICATE AVERAGE POWER (WHICH IS A FUNCTION OF THE TRACE AND BLANKING TIMING) AND USUALLY WILL NOT BE ACCURATE AT LOW FREQUENCIES.

B. Depress the FM IF button and disable the leveling by grounding the MONITOR INPUT terminal on the power supply (Figure 4-2. Adjust the FM IF output tuning capacitor (Figure 4-1,J) for a symmetrical display on the oscilloscope. Remove the grounding and the level should be the same as that set in 4.3.4,A within 1 dB.

C. Depress the AM RF button and verify that the level obtained in the previous paragraph is maintained on this band within 1 dB.

D. Depress the AM IF 1 button and adjust the IF 1 level control (Figure 4-1,H) for 5 mW output power.

E. Depress the AM IF 2 button and adjust the IF 2 level control (Figure 4-1,G) for 5 mW output power.

4.3.5 Marker Adjustments (See Figure 4-6)

The markers are designed so that ten markers (on each card) may be utilized in any combination on each band. Marker adjustments are as shown in the figure; the enable inputs for the ten markers are terminals 1 through 10 respectively, located on the left side of the card. The enable inputs from bands 1 through 7 enter the card and appear at terminals 11 through 17 respectively.

In Figure 4-6, a commonly desired marker configuration is shown for exemplary purposes. The connections are interpreted as follows:

Band 2 enable jumpered to Markers 1, 2, and 3 - three markers enabled on AM IF 2.

Band 3 enable jumpered to Markers 4 and 5 - two markers enabled on band 3 (AM RF).

Band 4 enable jumpered to Markers 6, 7 and 8 - three markers enabled on band 4 (FM IF).

Band 6 enable jumpered to Markers 9 and 10 - two markers enabled on FM RF (CCIR).

The procedure for aligning the markers is quite straightforward and consists basically of adjusting the potentiometer for the desired marker until the mark appears in the desired location. Refer to Figure 4-7 for system configuration.

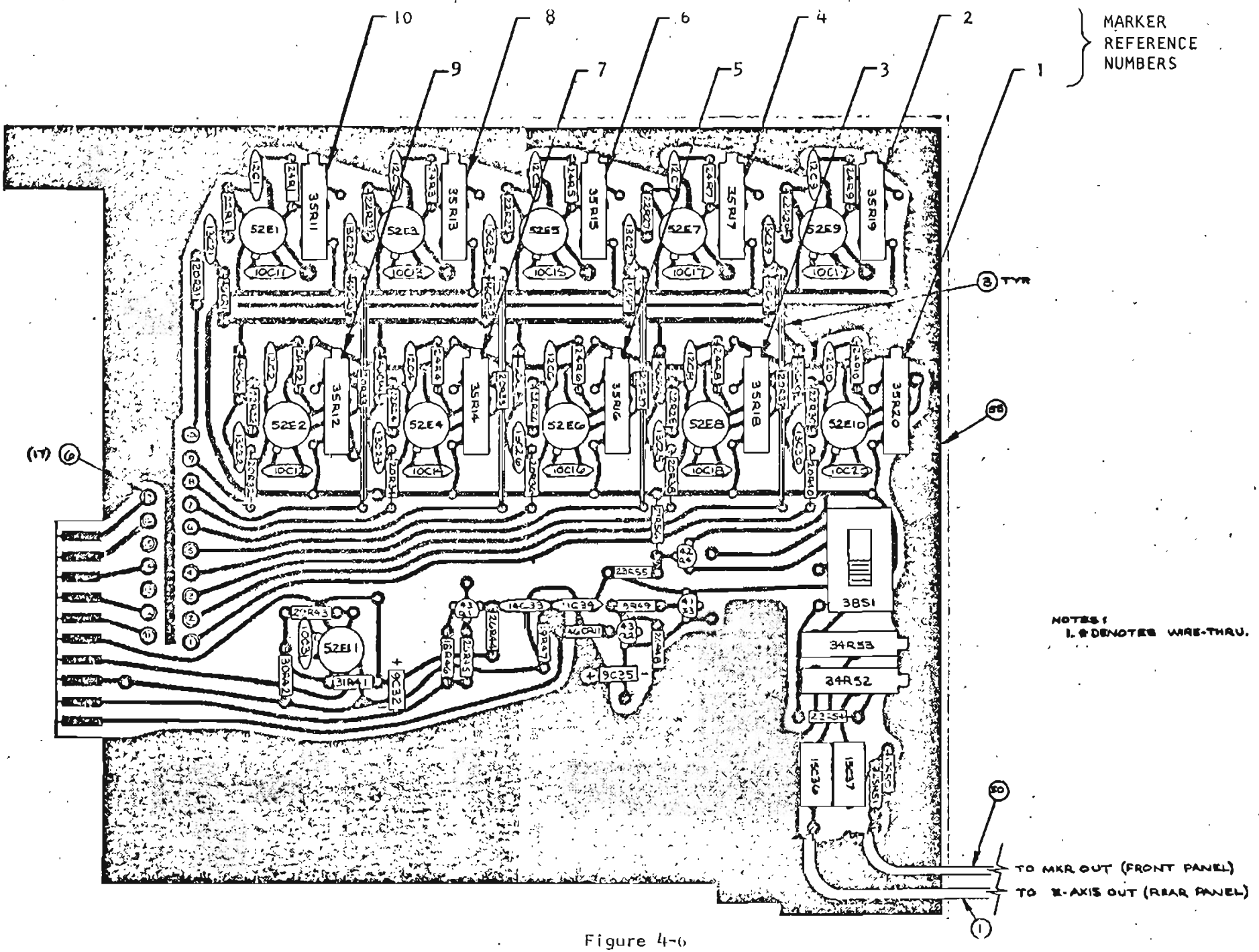


Figure 4-6
Marker Board Configuration

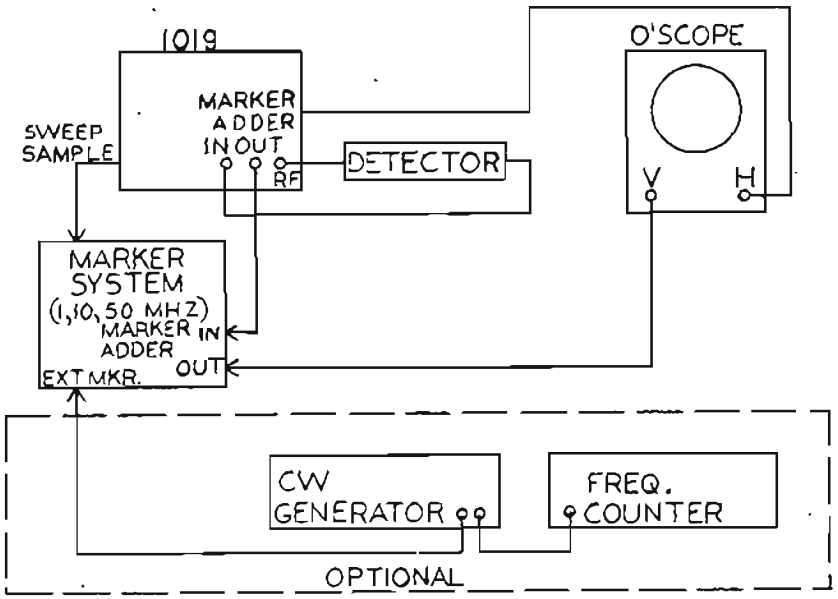


Figure 4-7

A. Depress the AM IF 2 button on the front panel. Determine the equivalent marker frequency desired by multiplying the output marker desired by 384.

EXAMPLE: Assume 260 kHz is desires - the marker should be set such that it appears at (0.26) (384) MHz, or 99.84 MHz.

Place the MODE switch in MAN and locate the equivalent marker frequency with the marker system. Adjust the potentiometer of the marker (or markers) under consideration until the pulse appears at the desired frequency. Adjust the marker

amplitude control (Figure 4-1,F) for a convenient display amplitude. Note that the exact frequency may be difficult to determine (99.84 MHz in the example), but that a 50 kHz error amounts to only 0.05% marker error at the output frequency.

B. Depress the AM IF 1 button on the front panel. Determine the equivalent marker frequency desired by multiplying the output marker desired by 192.

EXAMPLE: Assume 450 kHz is desired - the marker should be adjusted such that the pulse appears at (0.45) (192) MHz, or 86.4 MHz.

Place the MODE switch in MAN, and locate the equivalent marker frequency with the marker system. Adjust the potentiometer of the marker (or markers) under consideration until the pulse appears at the desired frequency.

C. Depress the AM RF SWEPT button on the front panel. Determine the equivalent marker frequency desired by the following equation:

$F_e = (Fm + 5.2)\ (16)$ Where F_e = the equivalent marker frequency, and Fm = the output marker frequency desired.

EXAMPLE: Assume a mark at 800 kHz is desired. The marker should be adjusted to appear at (0.8 + 5.2) (16), or 96.0 MHz.

Place the MODE switch in MAN and locate the equivalent marker frequency with the marker system. Adjust the potentiometer of the marker (or markers) under consideration until the pulse appears at the desired frequency.

D. Depress the FM IF button on the front panel. Determine the equivalent marker frequency desired by multiplying the output marker desired by 8.

EXAMPLE: Assume 10.7 MHz is desired - the marker should be set such that it appears at (10.7) (8), or 85.6 MHz.

Place the MODE switch in MAN and locate the equivalent marker frequency with the marker system. Adjust the potentiometer of marker (or markers) under consideration until the pulse appears at the desired frequency.

E. Depress the FM RF SWEPT button on the front panel. Set the FM Bandswitch (Figure 4-1,M) to the desired band. Adjust the marker potentiometer under consideration until the marker appears at the desired frequency. Note that the instrument output in this position is the same frequency as the sample; therefore, no conversion is required.

4.3.6 Changing Markers Between Bands

The band on which a particular marker will appear is selected by a buss wire jumpering terminals near the connector on the Marker PCB (see Figure 4-6). Each of the terminals 1 through 10 is the enable input of a marker. Terminals 11 through 17 are the enable output for the seven bands:

Band	Terminal
IF 2	11
IF 1	12
AM RF	13
FM IF	14
FM RF (Japan)	15
FM RF (CCIR)	16
FM RF (USA)	17

If it is desired to change a marker from one band to another, the process is a matter of rearranging the jumpers. Referring to the example in Section 4.3.5, suppose that markers 9 and 10 are to be switched to the FM RF (USA) band.

1. Remove the jumper between terminals 9, 10 and 16.

2. Install a new jumper between terminals 9, 10, and 17.

5.0 MAINTENANCE AND TROUBLESHOOTING

The Model 1019 has been designed and tested to insure reliable, trouble-free operation. Occasional malfunctions may occur, however, and it is the purpose of these paragraphs to present the repairman with a starting place for trouble-shooting. Before resorting to these paragraphs, however, it is important to determine the nature of the failure, the areas of interest (if possible) and perform the following:

1. A thorough and complete VISUAL inspection of the areas,
2. A measurement of all voltages in the areas of interest.

It is also advisable to perform the steps outlined in paragraphs 4.3.1 and 4.3.2 (Power Supply and Interconnection Assembly Alignment) in order to determine that the power supply is properly functioning.

5.1 No Operation

A. Check the fuse, the line cord, and the 115/230 volt switch.
B. Check the power supply - especially the following components (refer to Figure 6-3):

R1, R21, E1 and E2.

5.2 No ramp (or horizontal drive)

A. Make sure the MODE switch is NOT in CW, and depress the FM RF SWEPT button. Check to see that a square wave at the line rate is appearing at E1, pin 5 (reference Figure 6-5).

B. Any of the following semiconductors may be suspect:

E1, E2, Q5, CR5 or CR6.

5.3 No RF Output (any band)

A. Check cabling from Multiplexer/Monitor to attenuator and from attenuator to front panel. Check attenuator.

B. Check oscillator (see Figure 6-9) and associated voltages. Suspect oscillator components Q1, Q2, Q3 and associated circuitry.

5.4 No RF (One band or more but not all)

5.4.1 FM RF band

A. Check cabling to multiplexer/monitor from oscillator.
B. Check Preset Board switches (Figure 4-1,M) and the controls in question (Figure 4-1,K and L).
C. Ensure that the Band 5,6,7 enable signal is present at the oscillator.

D. Check oscillator, with particular emphasis on components Q5, Q6, and Q7 (reference Figure 6-5).
E. Check leveler circuitry (E3 of Figure 6-3).

5.4.2 FM IF band

A. Check cabling to multiplexer/monitor from HF module.
B. Check multiplexer/monitor in the area of C3, C4, L3, and L4.
C. Check HF module (Insure that the Band 4 enable signal is present).
D. Check HF module, with particular emphasis on the following components: E2, E3, and Q3 (reference Figure 6-11).
E. Check leveler circuitry (E3 of Figure 6-3).

5.4.3 AM RF band

A. Check cabling from the LF module to multiplexer/monitor.
B. Check the HF module and insure that the band 3 enable signal is present.
C. Remove the 0.5-1.7 MHz coaxial cable between the HF and LF modules and observe the signal coming from the HF module. Be sure the front panel controls are in AM RF SWEPT and PRESET; the output amplitude should be at least 200 mV P-P. If no RF is present, the problem is in the HF module and proceed to step D. If RF is present, the problem is in the LF module, proceed to step E.
D. Examine the HF module - first try adjusting C31, the oscillator adjust capacitor - then proceed to examine E2, E3, Q5, Q4, CR1 - CR4, Q2, and the associated circuitry and cabling. (Reference schematic, Figure 6-11).
E. Examine the LF amplifier - specifically Q3 through Q8. (Reference,Figure 6-13).

5.4.4 AM IF bands (1 or 2)

A. Check cabling from the IF module to the multiplexer/monitor.
B. Check the LF module - if only ONE output is defective, check the LEVEL control for that IF and the transistor it drives (Q1 or Q2) reference, Figure 6-13).
C. If BOTH outputs are defective, check the amplifier comprised of Q4 through Q8 (Figure 6-13).

5.5 Marker Failures

5.5.1 NO Markers

A. Check the marker enable lines to ensure operation.
B. Check the ramp signal at the input (pin 3) of E11 (reference, Figure 6-19). In the JAPAN FM RF SWEPT mode of operation, this signal should be a nominal 8V ramp centered at 10 ± 3 VDC.

C. Check transistors Q1, Q2, Q3 and Q4 (reference, Figure 6-19).

5.5.2 SOME markers inoperative

A. Check the marker enable lines to ensure operation.
B. Check the integrated circuit (E1-E10) for the markers in question (reference, Figure 6-19).
C. Check the marker adjustment control (R11 - R20) for the marker in question (reference, Figure 6-19).

6.0 PARTS LISTS AND SCHEMATIC DIAGRAMS

6.1 General

Parts lists and schematic diagrams contained herein are for the modules and other assemblies comprising the Model 1019.

6.2 Index of Assemblies

The parts lists and schematic diagrams for the Model 1019 are included in the following order in this section:

	Drawing No.	Figure No.
Interconnection Schematic	54-0220-01	6-1
Power Supply Assembly		
Rear Panel Assembly & P/L	95-0273-04	6-2A,B
P.C.B. Assembly & P/L	95-0274-01	6-2C,D
Schematic Diagram	54-0273-01	6-3
Lateral Circuit Board Assembly		
P.C.B. Assembly & P/L	95-0236-01	6-4A,B
Schematic Diagram	54-0236-01	6-5
Preset Board Assembly		
P.C.B. Assembly & P/L	95-0235-01	6-6A,B
Schematic Diagram	54-0235-01	6-7
Oscillator Module Assembly		
P.C.B. Assembly & P/L	95-0225-01	6-8A,B
Schematic Diagram	54-0225-01	6-9
High Frequency Module Assembly		
P.C.B. Assembly & P/L	95-0227-01	6-10A,B
Schematic Diagram	54-0226-01	6-11
Low Frequency Module Assembly		
P.C.B. Assembly & P/L	95-0229-01	6-12A,B
Schematic Diagram	54-0228-01	6-13
Frequency to Voltage Converter Assembly		
P.C.B. Assembly & P/L	95-0231-01	6-14A,B
Schematic Diagram	54-0230-01	6-15
Multiplexer/Monitor Assembly		
P.C.B. Assembly & P/L	95-0233-01	6-16A,B
Schematic Diagram	54-0232-01	6-17
Pulse Marker Assembly		
P.C.B. Assembly & P/L	95-0237-01	6-18A,B
Schematic Diagram	54-0237-01	6-19
Modulation Option 618		
P.C.B. Assembly & P/L	95-0238-01	6-20A,B
Schematic Diagram	54-0238-01	6-21

6.3 Drawing Practice

6.3.1 All components in each assembly are numbered in sequence from "1".

6.3.2 All resistors are shown in ohms unless otherwise specified.

6.3.3 All capacitor values are shown in picofarads (pF) unless otherwise specified.

6.3.4 All inductor values are shown in microhenries (μH) unless otherwise specified.

6.3.5 Table 6-1 specifies the abbreviations used for components in the Model 1019 parts lists.

TELONIC INDUSTRIES, INC.	Title: USE OF ABBREVIATIONS	No. 619	Rev. B
STANDARD PROCEDURE	TABLE 6-1	Page 1 of 1	

Dist: ENGINEERING DEPARTMENT

Rev	Signature	Date
Orig	KERANEN	10-26-70
Appl	R.H. Cornish	10-26-70
A	RHC	1/28/71
B	KERANEN	10-1-71
C		

1.0 SCOPE.

This document describes and defines standard abbreviations to be used in all Telonic Industries drawings and communications.

2.0 PURPOSE.

To establish a uniform list of standard abbreviations.

3.0 LIST OF ABBREVIATIONS.

3.1 Prefixes.

3.1.1 Multiple

Number	Prefix	Abbrev.
10^9	GIGA	G
10^6	MEGA	M
10^3	KILO	K

3.1.2 Submultiple

Number	Prefix	Abbrev.
10^{-3}	MILLI	m
10^{-6}	MICRO	μ
10^{-9}	NANO	n
10^{-12}	PICO	p

3.2 Units.

Unit	Abbrev.
HERTZ	Hz
AMPERE	A
WATT	W
VOLT	V
FARAD	F
HENRY	H
OHM	Ω

3.3 Unless Specified.
Resistors are 1/4 watt in ohms.
Capacitors are in pF.

3.4 Colors.

Color	Abbrev.
BLACK	BLK.
RED	RED
BLUE	BLU.
WHITE	WHT.
GREEN	GRN.
ORANGE	ORN.
VIOLET	VIO.
BROWN	BRN.
YELLOW	YEL.
GRAY	GRA.

3.5 Miscellaneous

DECIBEL	dB
FREQUENCY CONTROLLED VOLTAGE	FCV
FACTORY SELECTED VALUES	FSV
GROUND	GRD.
NOT ASSIGNED	NA
PART OF	PO
PEAK-TO-PEAK	P-P
SAME AS	SA
SUBJECT TO CHANGE	SC

3.6 Component Designations

Component	Part Description	Circuit Reference
Capacitors:		
Fixed Ceramic	CFC	C
Fixed Ceramic Feed-Thru	CFCF	C
Fixed Discap	CFD	C
Fixed Electrolytic	CFE	C
Fixed Metal Film	CFF	C
Fixed Mica	CFM	C
Fixed Mylar	CFMY	C
Fixed Composition	CFN	C
Fixed Oil	CFO	C
Fixed Paper	CFP	C
Fixed Polyester	CFPE	C
Fixed Teflon	CFT	C
Fixed Tantalum	CFTA	C
Trimmer, Ceramic, Disc	CTCD	C
Trimmer, Ceramic, Tubular	CTCT	C
Variable, Air	CVA	C
Variable, Glass-dielectric	CVG	C
Printed		CP
Circuit Breakers	CKT BKR	S
Crystals	XTAL	Y
Diodes:		
Semiconductor	DS	CR
Semiconductor, Tunnel	DST	CR
Semiconductor, Varactor	DSV	CR
Semiconductor, Zener	DSZ	CR
Fuses	--	F
Inductors:		
Fixed	IF	L
Variable	IV	L
Printed		LP
Integrated Circuits:		
Digital	ICD	E
Linear	ICL	E
Lamps, Indicator	LI	DS
Meters	--	M
Plugs, Cable	PC	P
Power Supplies	PWR SUP	PS
Printed Circuit Boards	PCB	PCB
Receptacles, Jack	RJ	J
Resistors:		
Fixed Composition	RFC	R
Fixed Carbon Film	RFCF	R
Fixed Metal Film	RFMF	R
Fixed Wirewound	RFWW	R
Variable, Composition	RVC	R
Variable, Dual Composition	RVDC	R
Variable, Dual, Wirewound/Composition	RVDWW	R
Voltage Variable (Varistor)	RVV	R
Variable, Wirewound	RVWW	R
Switches:		
Rotary	SWR	S
Slide	SWS	S
Toggle	SWT	S
Terminator Cables	TC	--
Test Points	TP	TP
Time Delay	TD	--
Transformers, Power	XFMR	T
Transistors	TR	Q
Field Effect	TRFE	Q
Tubes, Electron	TE	V
Wires	--	W

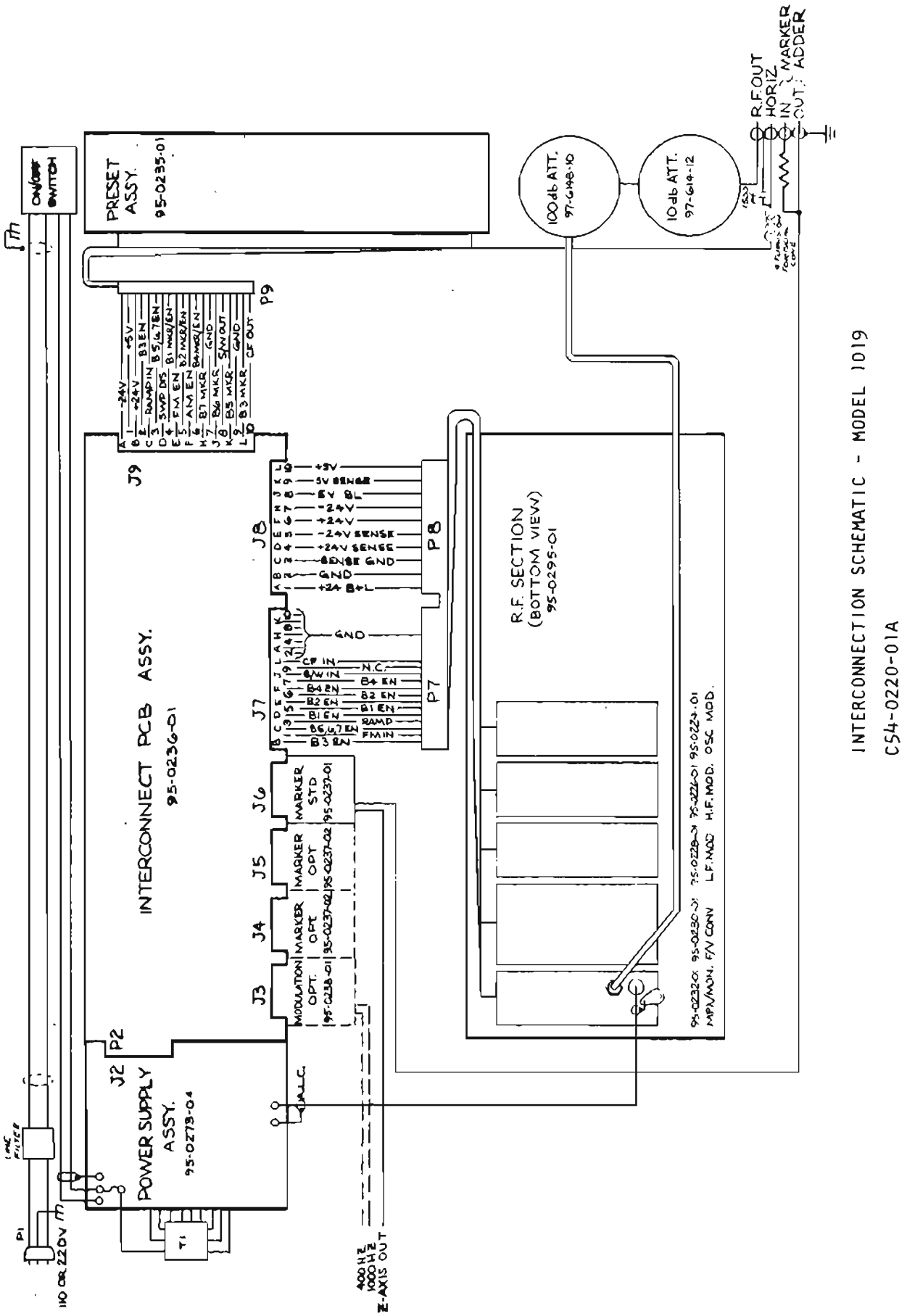
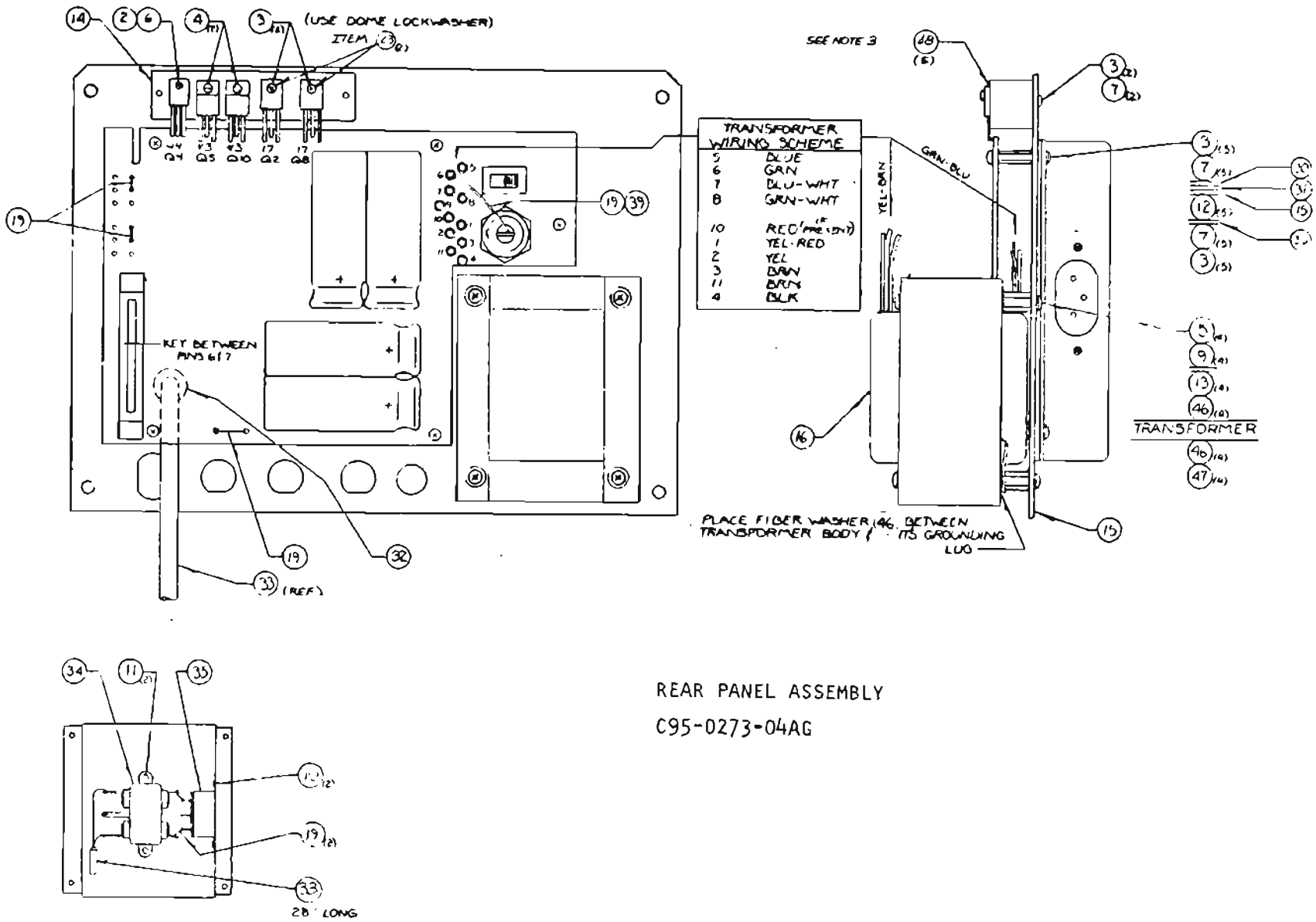

INTERCONNECTION SCHEMATIC - MODEL 1019
C54-0220-01A
PRESET ASSY. 95-0235-01
P9
J9
INTERCONNECT PCB ASSY. 95-0236-01
J8
P8
J7
P7
J6
J5
J4
J3
P2
J2
POWER SUPPLY ASSY. 95-0273-04
P1
T1
R.F. SECTION (BOTTOM VIEW) 95-0295-01
100 db ATT. 97-6148-10
10 db ATT. 97-6149-12
R.F. OUT
HORIZ IN
MARKER ADDER OUT
ON/OFF SWITCH
110 OR 220V
400 HZ 1000 HZ Z-AXIS OUT
MARKER STD 95-0237-01
MARKER OPT 95-0237-02
MODULATION OPT. 95-0238-01
MPX/MON. F/V CONV
L.F. MOD
H.F. MOD. OSC MOD.

Figure 6-1



REAR PANEL ASSEMBLY

C95-0273-04AG

Figure 6-2A

QUANTITY 09	08	07	06 T200 Series	05 Obsolete	04 1019	03 1006, 1011, 1030	02 1011-1F	01 Obsolete	00 Obsolete	ITEM	PART NUMBER	DESCRIPTION
			1			1	1			1	95-0274-01	Ass'y, PCB Power Supply
			1		1	1	1			2	02-7004-04	Screw PH #4-40 x 1/4
			14		14	14	14			3	02-7006-04	Screw PH #6-32 x 1/4
			2		2	2	2			4	02-1009-01	Screw PH #6-32 x 1/4 Nylon
			4		4	4	4			5	02-7008-06	Screw PH #8-32 x 3/8
			1		1	1	1			6	03-1029-01	Lockwasher, Ext. #4
			12		12	12	12			7	03-1038-01	Lockwasher, Int. #6
			AR		AR	AR	AR			8	00-5112-06	Shrink Tubing
			4		4	4	4			9	03-1045-01	Lockwasher, Int. #8
					2					10	03-1565-01	Pop Rivet
					2					11	03-1565-10	Pop Rivet
			5		5	5	5			12	03-1545-01	Spacer, Swage Type
			4		4	4	4			13	03-1546-01	Spacer, Hex #8-32 x 7/8
			1		1	1	1			14	09-0552-01	Spacer, Transistor
			1		1	1	1			15	14-0794-01	Rear Panel
			1		1	1	1			16	34-0075-01	Transformer
			2		2	2	2			17	40-0103-01	TR, MJE3055 02,8
			1		1	1	1			18	11-0299-01	Label, 1 Amp
			AR		AR	AR	AR			19	43-0043-01	Jumper Wire
			2				2			20	37-0170-01	Switch, Blanking & AM
			1			1				21	95-0439-01	Power Switch
			2				2			22	97-9814-03	Cable Assy AM, ALC
			2		2	2	2			23	03-1570-01	Washer, Domed
			1				1			24	26-1507-01	RFC 47K 1/4W 5%
			1				1			25	22-0170-01	CFD, .1uF 10v.
			1			1				26	09-0106-01	Solder Lug
			1			1	1			27	09-0075-01	Grommet, Str. Rel.
			1							28	14-0780-01	Cover, Rear Panel
			1			1	1			29	43-0046-03	Cord, Power
					1					30	13-0633-01	Line Filter Cover
					1					31	14-0780-02	Rear Panel Cover
					1					32	09-0074-01	Grommet
					A/R					33	43-0030-01	Cable
					1					34	15-0261-01	Line Filter
					1					35	44-0174-01	Connector
					1					36	95-0274-02	Assy. PCB Power Supply
										37		
										38		
			AR		AR	AR	AR			39	00-1045-01	Teflon Tubing 196A
										40		
			1							41	11-0311-01	Label
										42		
			2		2	2	2			43	40-0104-01	TR 2N5296 05,10
			1		1	1	1			44	40-0055-01	TR MJE371 Q4
										45		
			8		8	8	8			46	03-1073-01	Fiber Washer #8
			4		4	4	4			47	02-7008-32	Screw PH #8-32 x 2
			5		5	5	5			48	09-4645-01	Insulator, Thermal
										49		
			AR			AR				50	43-0109-01	Wire, Shielded, 2 Conductors
										51		
										52		
										53		Figure 6-2B
										54		
										55		

ENG / CHK / BY — NAME — DATE

PARTS LIST

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road · Box
Laguna Beach, California 92652
Tel. 714 494-9

TITLE: Ass'y, Rear Panel

SH 5 OF 5 — SIZE A — DWG NO [illegible] 027[illegible] — REV

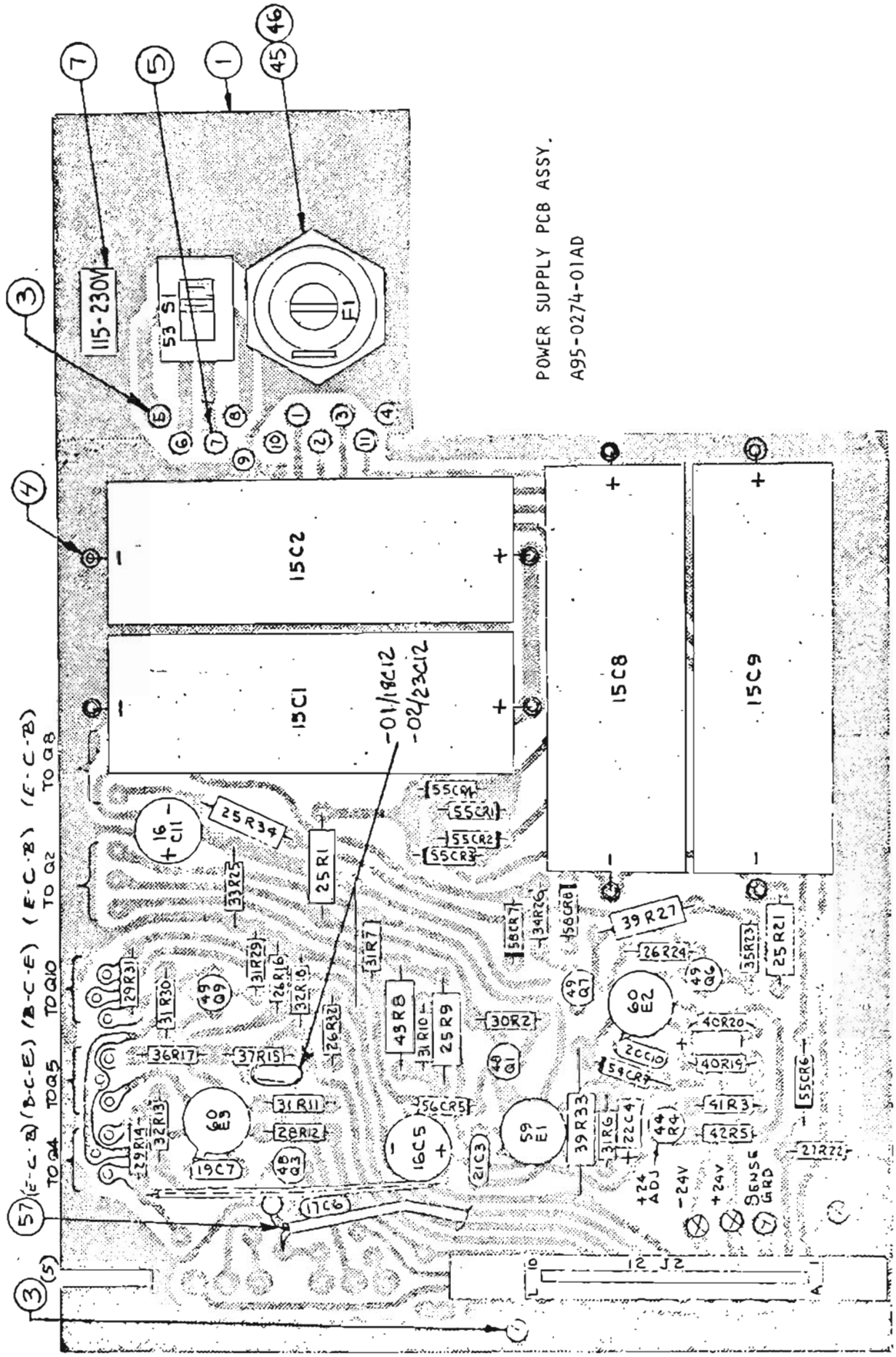

POWER SUPPLY PCB ASSY.
A95-0274-01AD
115-230V
S1
F1
15C2
15C1
15C8
15C9
-01/18C12
-02/23C12
TO Q4
TO Q5
TO Q10
TO Q2
TO Q8
+24 ADJ
-24V
+24V
SENSE GRD
J2

Figure 6-2C

BY	NAME	DATE
	Retyped TPR	7/12/77
CHK		
ENG		
APVD	RJ Hauser	7-18-77

ITEM	PART NUMBER	QTY -01	QTY -02	DESCRIPTION	CKT REF
1	57-0274-01	1	1	P.C. Board	
2					
3	09-1504-01	15	15	Terminal PCB	
4	09-1508-01	8	8	Terminal Hollow	
5	09-4643-01	1	1	Terminal Hollow Double Tier	
6					
7	11-0290-01	1	1	Label 115-230V	
8					
9	00-1045-01	AR	AR	Sleeving Clear	
10	43-0043-01	AR	AR	Wire Buss #22 Ga.	
11					
12	44-0102-01	1	1	Connector	J2
13					
14					
15	20-0055-01	4	4	CFE 500µF/50V	C1,2,8,9
16	20-0076-01	2	2	CFE 50µF/35V	C5,11
17	22-0055-01	1	1	CFD .01µF	C6
18	22-0004-01	1		CFD 470pF	C12
19	22-0002-01	1	1	CFD 33pF	C7
20	22-0001-06	1	1	CFD 10pF	C10
21	22-0168-01	1	1	CFD 150pF	C3
22	22-0193-01	1	1	CFTA 15µF/10V	C4
23	22-0189-13		1	CFD 82pF	C12
24					
25	26-0149-01	4	4	RFC 1Ω ±10% 1/2W	R1,9,21,34
26	26-0159-01	3	3	RFC 1.5kΩ ±10% 1/4W	R16,24,32
27	26-1518-01	1	1	RFC 22kΩ ±10% 1/4W	R22
28	26-1527-01	1	1	RFC 2.2kΩ ±10% 1/4W	R12
29	26-1528-01	2	2	RFC 1kΩ ±10% 1/4W	R14,31
30	26-1568-01	1	1	RFC 1.8kΩ ±10% 1/4W	R2
31	26-1594-01	6	6	RFC 10kΩ ±10% 1/4W	R6,7,10,11,29,30
32	26-1595-01	2	2	RFC 5.6kΩ ±10% 1/4W	R13,18
33	26-1596-01	1	1	RFC 3.3kΩ ±10% 1/4W	R25
34	26-4168-06	1	1	RFC 680Ω ±10% 1/4W	R26
35	26-1623-01	1	1	RFC 390Ω ±10% 1/4W	R23
36	26-4022-06	1	1	RFC 22Ω ±10% 1/4W	R17
37	26-4522-06	1	1	RFC 2.2 MegΩ ±10% 1/4W	R15
38					
39	26-0138-01	2	2	RFC 1.5kΩ ±10% 1/2W	R33,27
40	27-0253-64	2	2	RFMF 10kΩ ±1%	R19,20
41	27-0253-67	1	1	RFMF 5.62kΩ ±1%	R3
42	27-0253-09	1	1	RFMF 2.1kΩ ±1%	R5
43	26-0152-01	1	1	RFC 4.7Ω ±10% 1/2W	R8
44	29-0131-03	1	1	RVC 500Ω	R4
45	36-0016-05	1	1	Fuse 1A 3AG	F1
46	36-0035-01	1	1	Fuse Holder	
47					
48	40-0097-01	2	2	TR MPSA10	Q1,3
49	40-0101-01	3	3	TR 2N5138	Q6,7,9
50					
51					
52					
53	37-0170-01	1	1	Switch DPDT	S1
54	41-0113-04	1	1	DSZ MZ500-15 (9.1V)	CR9
55	41-0048-01	5	5	DS ED 3005/1N 4006/ES	CR1-4,6
56	41-0113-03	1	1	DSZ MZ 500-29 (36V)	CR5
57	43-0049-01	AR	AR	Shielded Audio Cable 26"	
58	41-0022-01	2	2	DS 1N3064	CR7,8
59	45-0018-01	1	1	ICL µA 723C	E1
60	45-0020-01	2	2	ICL µA 748C	E2,3

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel: 714 494-9401 • TWX: 910 596-1320

PARTS LIST

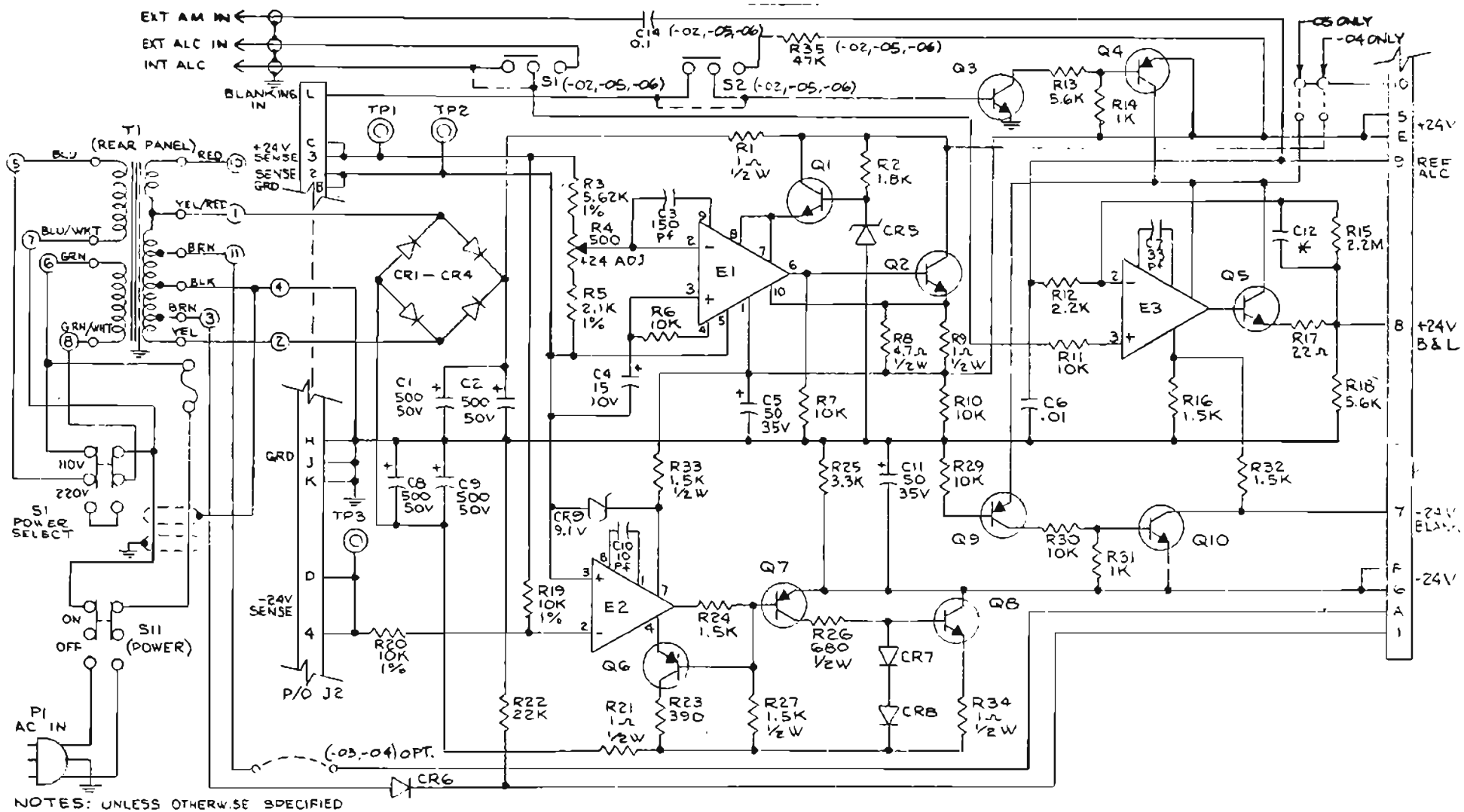
TITLE: ASSEMBLY, POWER SUPPLY, PCB

REL	SH 2 OF 2
SIZE	DWG NO
A	95-0274-( )
REV	AD

95-0274-( )

Figure 6-20

87-6001-01



NOTES: UNLESS OTHERWISE SPECIFIED
1. CAPACITOR VALUES IN MICROFARADS.
2. RESISTOR VALUES IN OHMS, ±10%, ¼ WATT.
3. Q2 & Q8 ARE MJE 3055, TELONIC #40-0103-01
4. T1 IS TELONIC # 34-0075-01.

POWER SUPPLY SCHEMATIC

B54-0273-( )N

Figure 6-3

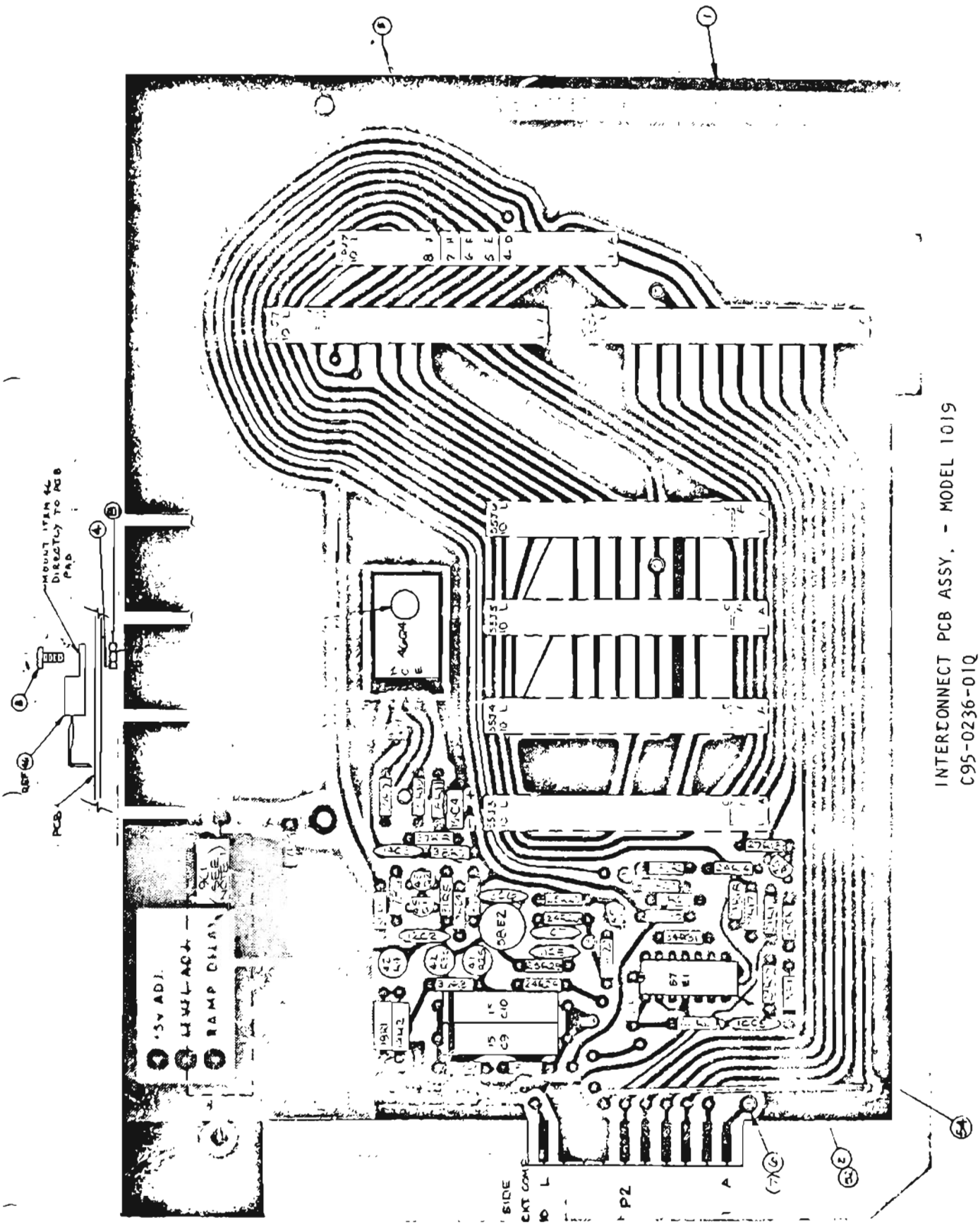

INTERCONNECT PCB ASSY. - MODEL 1019
C95-0236-01Q
MOUNT ITEM 46 DIRECTLY TO PCB PAD
PCB
13V ADJ.
LEVEL ADJ.
RAMP DELAY
P2

Figure 6-4A

ITEM	PART NUMBER		DESCRIPTION	CKT REF
1	57-0236-01	1	PCB	
2	00-1045-01	A/R	Tubing	
3	02-7004-05	1	Screw #4-40 x 5/16 PH	
4	03-1029-01	1	Lockwasher #4	
5	09-0366-01	8	PCB Keys	
6	09-1504-01	7	PCB Terminals	
7				
8	03-1522-01	1	Nut #4	
9	20-0066-01	1	CFE 2000µf/15V	C1
10	22-0055-01	1	CFD .01µf	C5
11	22-0126-01	2	CFD .05µf	C7,8
12	22-0170-01	1	CFD .1 µf	C2
13	22-0002-01	1	CFD 33pf	C6
14	22-0038-01	1	CFD 100pf	C3
15	22-0192-01	2	CFMY .1µf	C9,10
16	22-0193-01	1	CFTA 15µf/10V	C4
17				
18	26-0149-01	2	RFC 1Ω ±10% 1/2W	R1,2
19	26-0159-01	1	RFC 1.5k ±10% 1/4W	R21
20	26-0168-01	1	RFC 7.5k ±5% 1/4W	R22
21	26-1518-01	1	RFC 22k ±10% 1/4W	R12
22	26-1524-01	2	RFC 47k ±10% 1/4W	R15,16
23	26-1527-01	2	RFC 2.2k ±10% 1/4W	R19,20
24	26-1528-01	4	RFC 1k ±10% 1/4W	R18,26,28,14
25	26-1531-01	2	RFC 4.7k ±10% 1/4W	R27,29
26	26-1538-01	1	RFC 68Ω ±10% 1/4W	R10
27	26-1594-01	2	RFC 10k ±10% 1/4W	R6,13
28	26-1597-01	1	RFC 120Ω ±10% 1/4W	R11
29	26-1598-01	1	RFC 560Ω ±10% 1/4W	R17
30	26-1602-01	1	RFC 4.7Ω ±10% 1/4W	R9
31	26-1623-01	1	RFC 390Ω ±10% 1/4W	R5
32	26-4003-95	1	RFC 3.9Ω ±10% 1/4W	R34
33	27-0253-38	1	RFMF 17.4k ±1% 1/4W	R30
34	27-0253-41	1	RFMF 46.4k ±1% 1/4W	R31
35	27-0253-04	1	RFMF 6.81K ±1% 1/4W	R3
36	27-0253-70	2	RFMF 20.0k ±1% 1/4W	R23,32
37	27-0253-76	1	RFMF 3.01k ±1% 1/4W	R8
38	27-0253-78	1	RFMF 2.21k ±1% 1/4W	R7
39	27-0253-93	1	RFMF 121k ±1% 1/4W	R24
40				
41	29-0131-08	1	RVC 100k	R25
42	29-0131-04	2	RVC 1k	R4,33
43				
44				
45	40-0097-01	5	TR, MPS A10	Q1-3,5,6
46	40-0104-01	1	TR, 2N5296	Q4
47				
48	41-0022-01	3	DS, 1N3064	CR2,3,6
49	41-0048-01	1	DS, ED-3005	CR1
50	41-0113-04	1	DSZ MZ-500-15	CR5
51				
52	43-0043-01	1	Buss Wire #22 ga.	
53				
54	44-0300-01	1	Socket IC 14 Pin	
55	44-0102-01	7	PCB Connector	J3-9
56				
57	45-0002-01	1	ICD MC717P	E1
58	45-0020-01	1	ICL µA748	E2
59				
60			Figure 6-4B	

	BY	DATE
APVD		
ENG		
CHK		
NAME	JG	8/21/73

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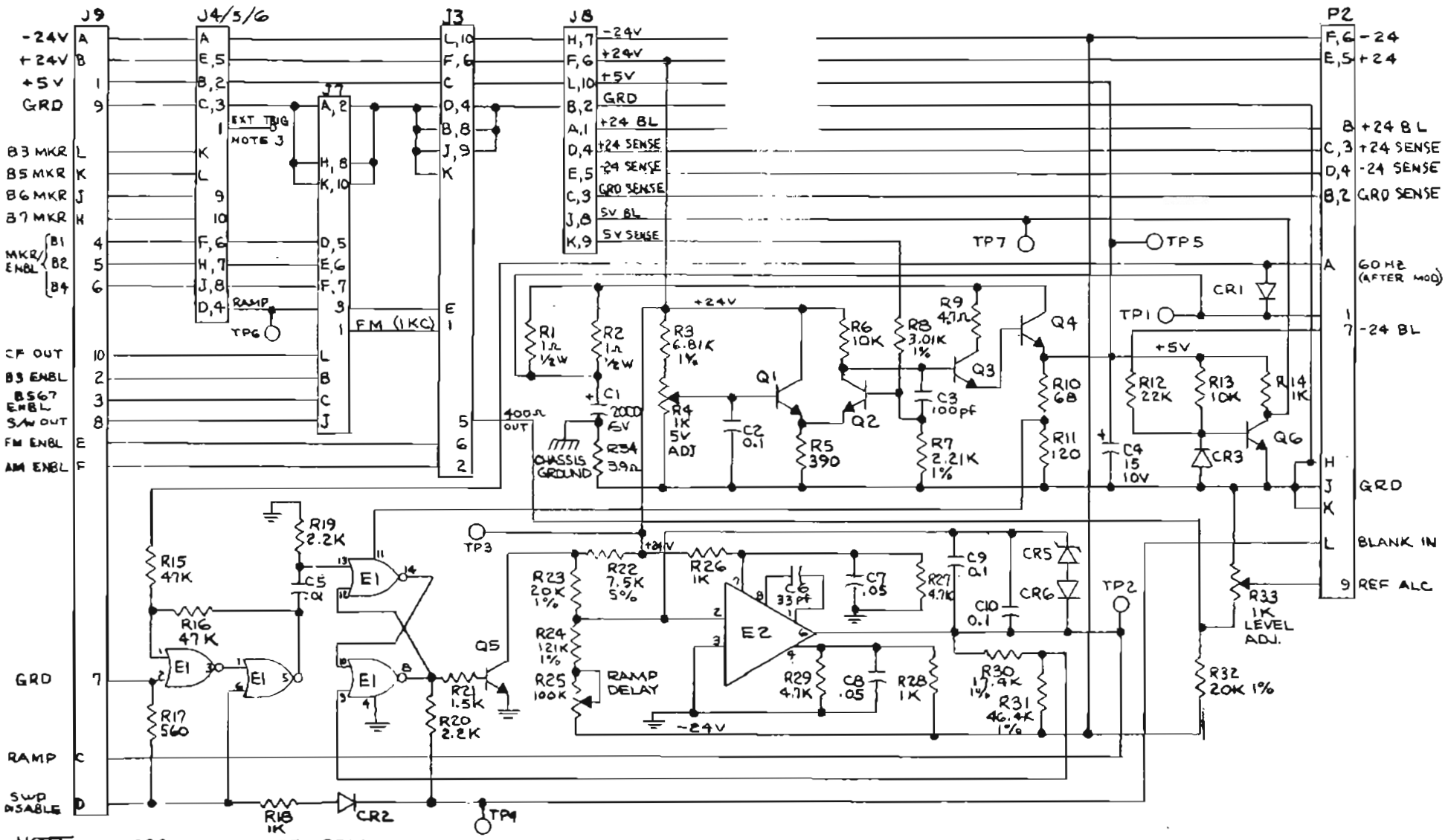
Tel: 714 494-9401 • TWX: 910 596 1320

PARTS LIST

TITLE	SIZE	DWG NO	REV
PCB ASSEMBLY INTERCONNECT BOARD	A	95-0236-01	Q

REF Model 1019 — SH 2 OF 2

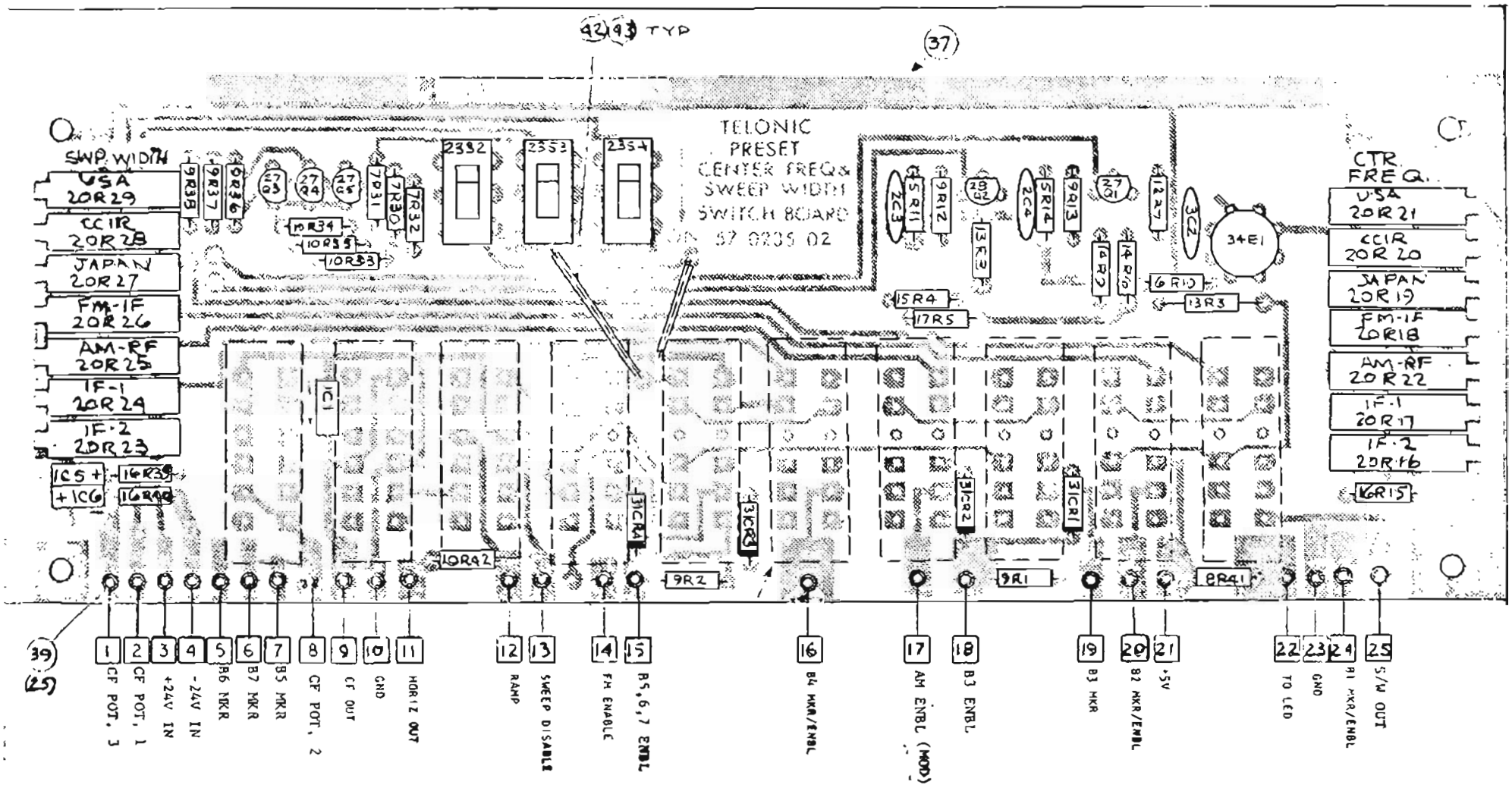


NOTE: UNLESS OTHERWISE SPECIFIED
1. CAPACITORS IN MICROFARADS.
2. RESISTORS IN OHMS, ±10%, 1/4W.
3. ALL CONNECTIONS J4, J5 & J6 IN PARALLEL.

LATERAL PCB SCHEMATIC - MODEL 1019

B54-0236-01E

Figure 6-5



PRESET TUNING ASSY., PCB - MODEL 1019

B95-0235-01E

Figure 6-6A

A - PILOT RUN

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	20-0064-06	3	CFTA, 2.7/35	C1,5,6
2	22-0186-01	2	CFD, .02 μF	C3,4
3	22-0002-01	1	CFD, 33 pF	C2
4				
5	26-0160-01	2	RFC, 8.2k, ±10%, 1/4W	R11,14
6	26-1524-01	1	RFC, 47k, ±10%, 1/4W	R10
7	26-1525-01	3	RFC, 100k, ±10%, 1/4W	R30-32
8	26-1522-01	1	RFC, 100Ω, ±10%, 1/4W	R41
9	26-1528-01	7	RFC, 1k, ±10%, 1/4W	R1,2,12,13,36-38
10	26-1594-01	4	RFC, 10k, ±10%, 1/4W	R33-35,42
11				
12	27-0253-82	1	RFMF, 150k, ±1%	R7
13	27-0095-06	2	RFMF, 4.99k, ±1%	R3,8
14	27-0253-08	2	RFMF, 100k, ±1%	R6,9
15	27-0253-51	1	RFMF, 97.6k, ±1%	R4
16	27-0253-67	3	RFMF, 5.62k, ±1%	R15,39,40
17	27-0253-70	1	RFMF, 20k, ±1%	R5
18				
19				
20	29-0130-07	14	RVC, 10k	R16-29
21				
22				
23	37-0170-01	3	SWS, DPDT	S2-4
24	37-0162-01	1	SW, Push Button, 10 Module	S1
25				
26				
27	40-0097-01	4	TR, MPS A10	Q1,3-5
28	40-0101-01	1	TR, 2N 5138	Q2
29				
30				
31	41-0022-01	4	DS, 1N 3064	CR1-4
32				
33				
34	45-0020-01	1	ICL, 748C	E1
35				
36				
37	57-0235-028	1	P.C. Board	
38				
39	09-1504-01	25	P.C.B. Terminals	TP1-25
40				
41				
42	43-0043-01	AR	Buss Wire, #22 Ga.	
43	00-1045-01	AR	Sleeving, Clear	
44				
45				
46	95-0239-01	1	Harness Assembly	
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60			Figure 6-68	

APVD / ENG / CHK / BY — NAME: KH — DATE: 4/21/71

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Laguna Beach, California 92652
Tel 714 494-9401 • TWX 910 596-

PARTS LIST

TITLE: ASSEMBLY, PRESET BOARD, MODEL 1019

SIZE: A | DWG NO: 95-0235-01 | REV: E

SH 2 OF 2 | REL

950235

07-0005-01

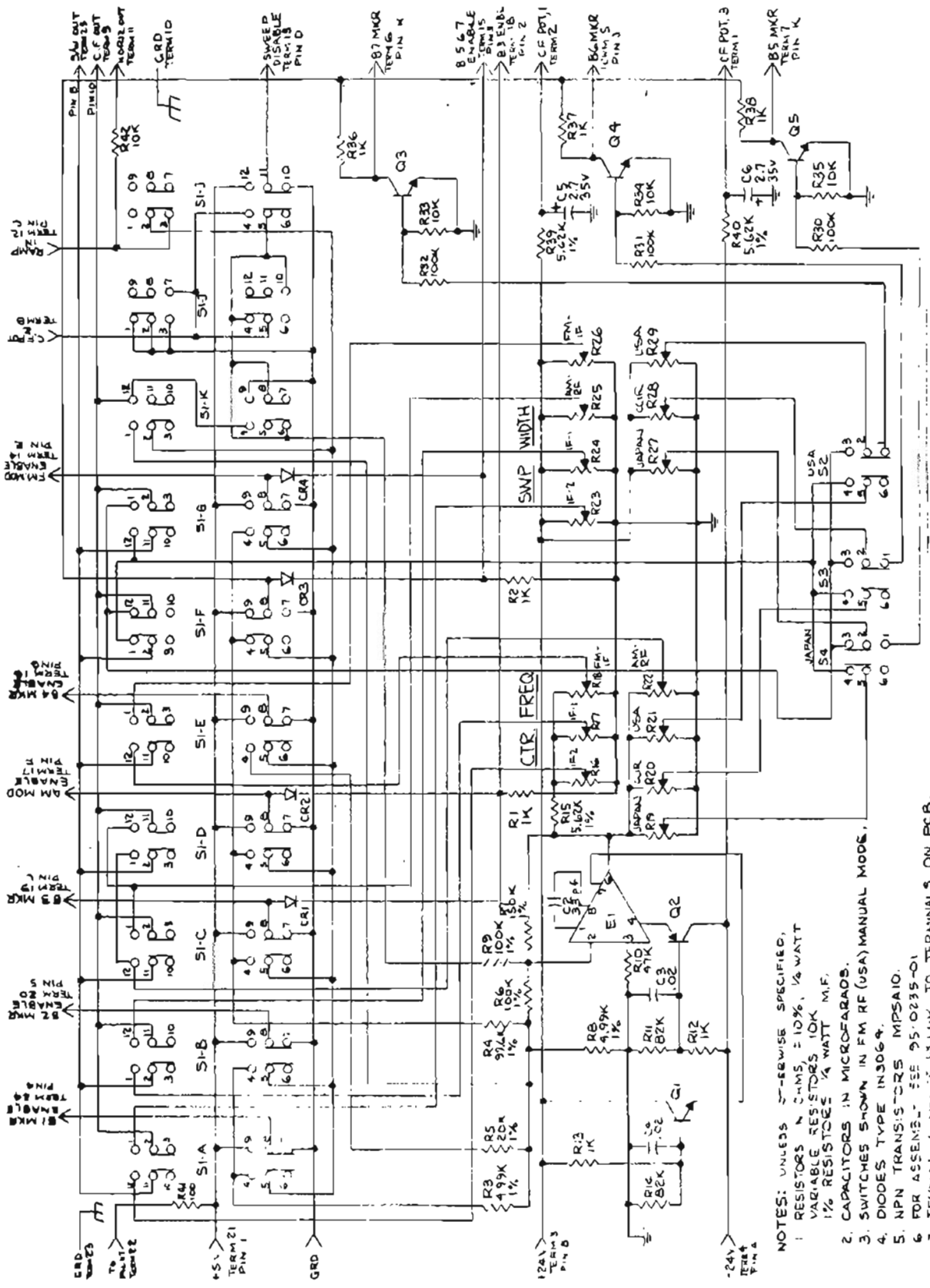
SCHEMATIC - PRESET & SWITCHING
C54-0235-01A
NOTES: UNLESS OTHERWISE SPECIFIED,
1. RESISTORS IN OHMS, ±10%, ¼ WATT
VARIABLE RESISTORS 10K
1% RESISTORS ¼ WATT M.F.
2. CAPACITORS IN MICROFARADS.
3. SWITCHES SHOWN IN FM RF (USA) MANUAL MODE.
4. DIODES TYPE IN3064.
5. NPN TRANSISTORS MPSA10.
6. FOR ASSEMBLY SEE 95-0235-01
7. TERMINAL ½ MEANS PIN ½ TO TERMINALS ON PCB.
PIN NUMBERS REFER TO CONNECTOR
SWP WIDTH
CTR FREQ
+5V
GRD
-24V
+24V

Figure 6-7

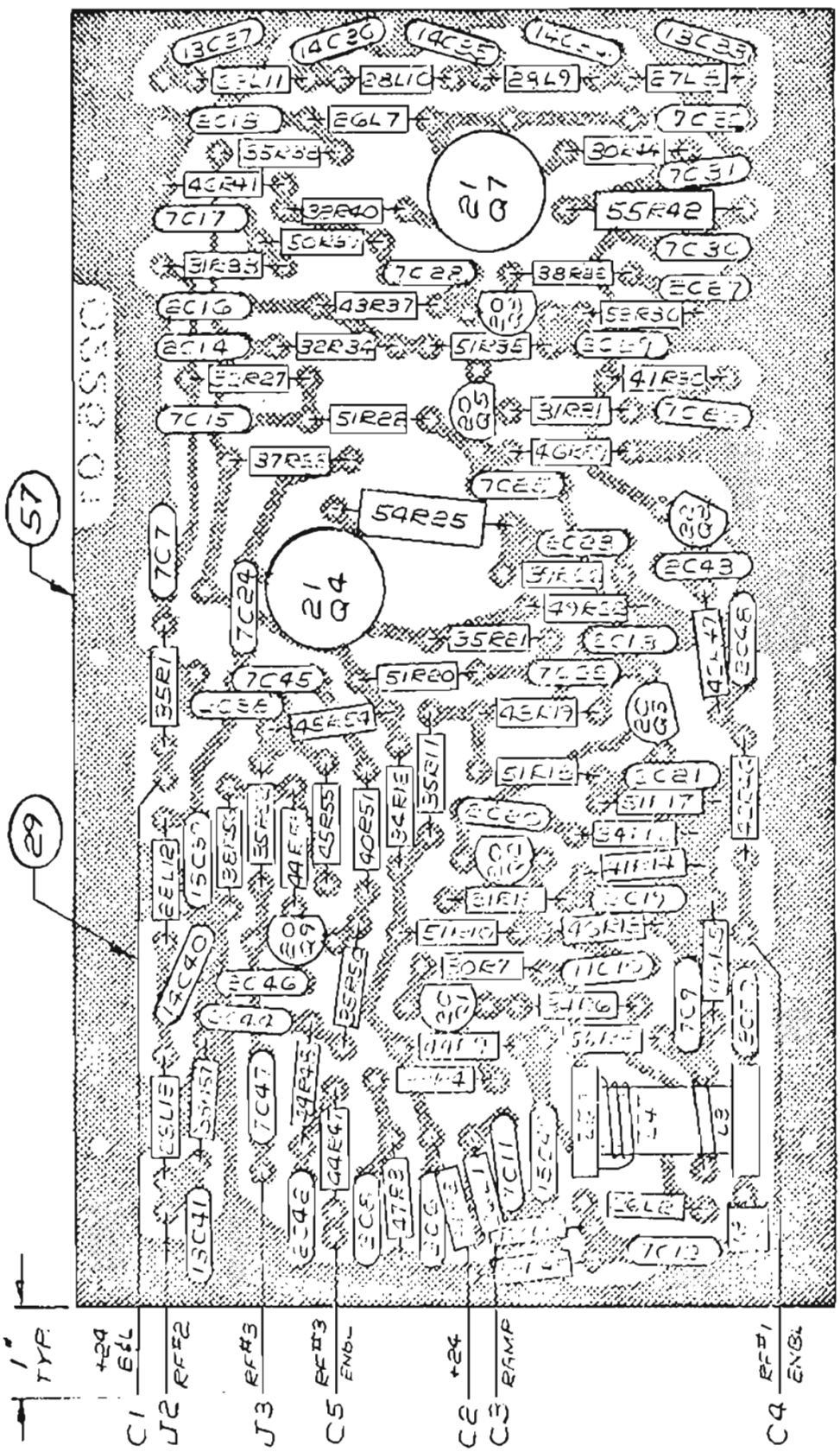
OSCILLATOR PCB ASSY. - MODEL 1019
A95-0225-01F
57
29
1" TYP
C1 +24 EXT
J2 RF#2
J3 RF#3
C5 RF#3 ENBL
C2 +24
C3 RAMP
C4 RF#1 ENBL

Figure 6-8A

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1				
2	22-0005-01	19	CFD, .001	C6,8,13,14,16,18,
3				19,20,21,23,27,29,
4				38,42,43,44,46,48,
5				50
6				
7	22-0123-01	16	CFD, 220pf	C7,9,11,12,15,17,
8				22,24,25,26,28,30,
9				31,45,47,32
10				
11	22-0001-10	1	CFD, 4.7pf	C10
12				
13	22-0001-09	4	CFD, 25pf, 10%	C33,37,39,41
14	22-0002-05	4	CFD, 47pf, 10%	C34,35,36,40
15	22-0055-01	1	CFD, .01μf, 10%	C49
16				
17	41-0022-01	1	DS, 1N3064	CR1
18	41-0112-01	1	DSV, BB-105	CR2
19				
20	40-0106-01	6	TR, MPSH10	Q1,2,3,5,6,9
21	40-0068-01	2	TR, 2N5109	Q4,7
22	40-0041 01	1	TR, 2N3904	Q8
23				
24				
25	97-1080-01	1	Coil Assy.	L3,4,6
26	32-0027-01	3	IF, 1μhy	L1,2,7
27	43-0091-10	AR	Red, #24 Solderease Wire	L8
28	43-0091-11	AR	Green, #24 " "	L9,10,11,12,13
29	43-0043-01	AR	#22 Buss Wire	
30	26-1602-01	2	RFC, 4.7., 1/4W, 10%	R7,44
31	26-1583-01	3	10Ω	R15,31,33
32	26-4022-06	3	22Ω	R34,40,27
33	26-0163-01	1	33Ω	R4
34	26-1530-01	4	47Ω	R2,6,12,16
35	26-1522-01	7	100Ω	R1,11, ,21,38,
36				50,52,57
37	26-1600-01	1	180Ω	R23
38	26-1501-01	2	220Ω	R56,32
39	26-0162-01	1	270Ω	R26
40	26-1517-01	1	330Ω	R51
41	26-1623-01	2	390Ω	R14,30
42	26-1503-01	2	470Ω	R46,49
43	26-1598-01	2	560Ω	R19,37
44	26-1528-01	4	1kΩ	R9,47,48,53
45	26-1527-01	2	2.2k	R54,55
46	26-0161-01	3	2.7k	R13,29,41
47	26-1596-01	1	3.3k	R3
48	26-1531-01	1	4.7k	R5,
49	26-1595-01	1	5.6k	R22
50	26-0160-01	1	8.2k	R39
51	26-1594-01	6	10kΩ	R10,17,18,20,28,35
52	26-1535-01	1	15k	R36
53	26-1524-01	1	47kΩ	R45
54	26-0068-01	1	100, 1/2W, 10%	R25
55	26-0133-01	1	150, 1/2W, 10%	R42
56	26-1578-01	1	680, 1/4W, 5%	R8
57	57-0225-01	1	PCB	
58				
59				
60			Figure 6-8B	

	BY	NAME	DATE
APVD			
ENG			
CHK	JB	6A8	12/29/71
DRN	RMK	8.30.71	9/29/71

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TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road - Box 277
Laguna Beach California 92652
Tel 714 494-9401 - TWX 910 596-1328

PARTS LIST

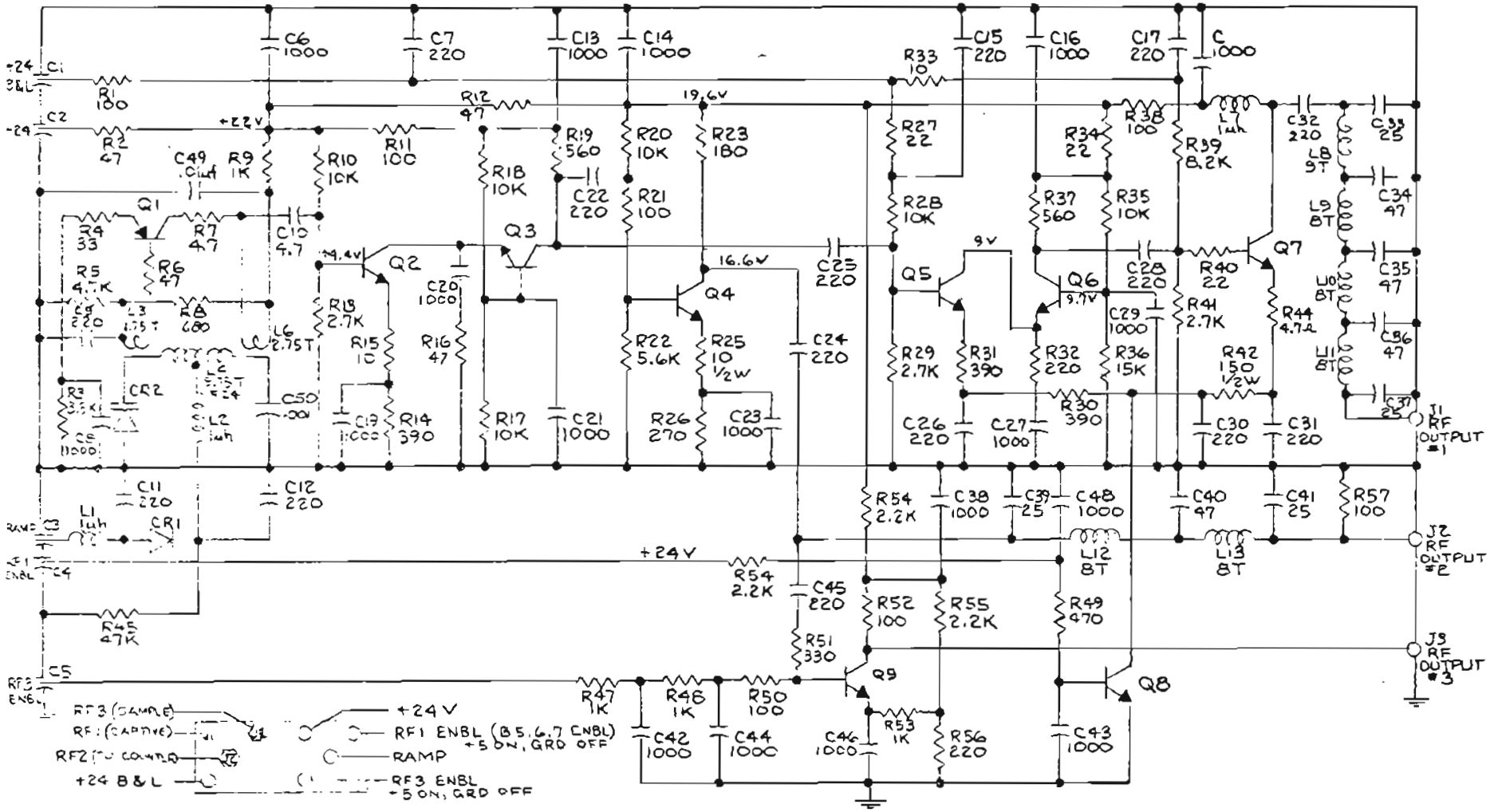
TITLE: 1019 OSC., PCB ASSEMBLY

SIZE: A | DWG NO: 95-0225-01 | REV: F

REL | SH 2 OF 2

95-0225-01

07-0005-01



NOTES. UNLESS OTHERWISE SPECIFIED

1. CAPACITORS IN PICOFARADS.
2. RESISTORS IN OHMS, ±10%, ¼ WATT.
3. FEED THRU CAPACITORS 1000 pf

OSCILLATOR SCHEMATIC - MODEL 1019

B54-0225-01C

Figure 6-9

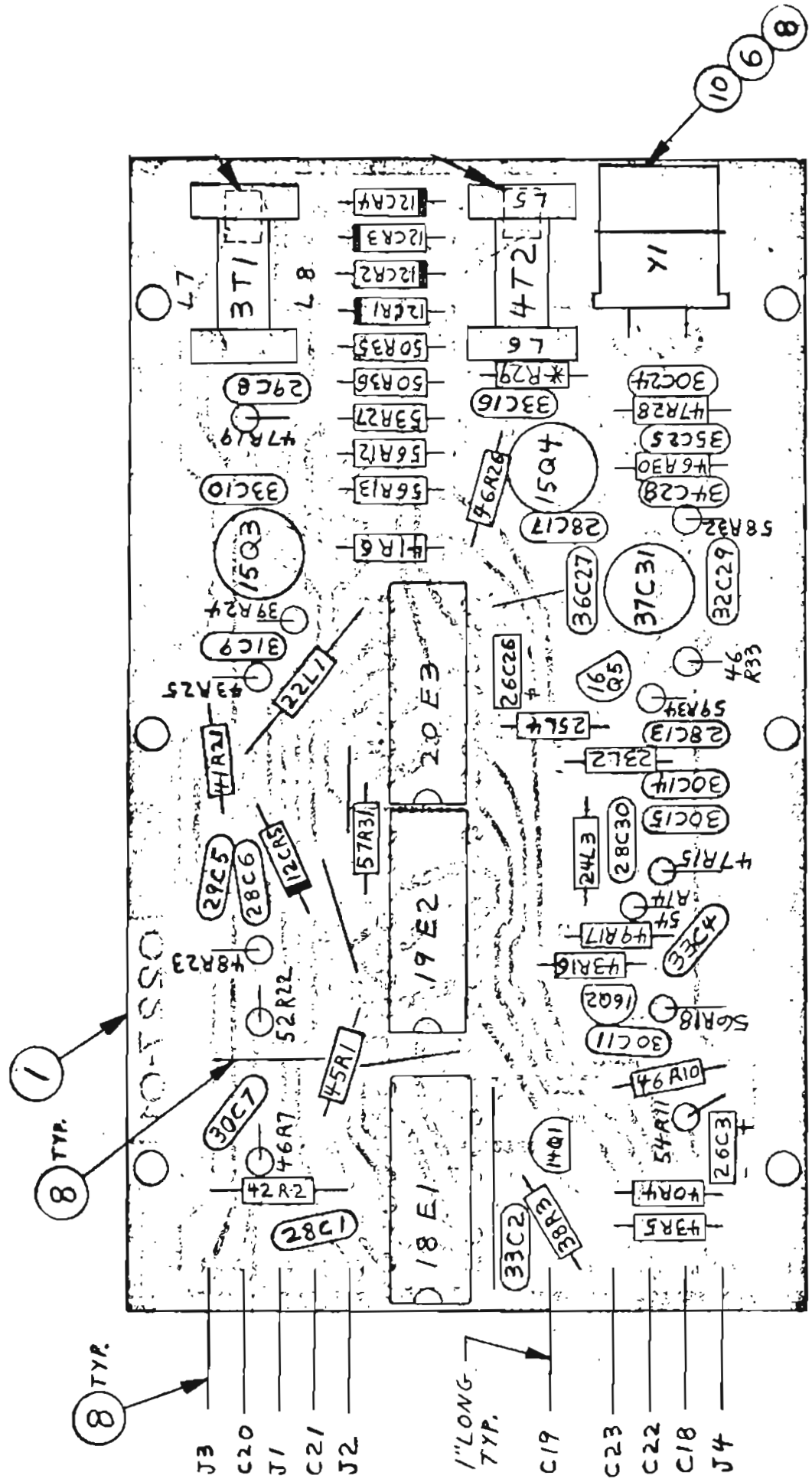

HIGH FREQ. MODULE PCB ASSY.
A95-0227-01C
1" LONG TYP.
8 TYP.
1
8 TYP.
10
6
8
J3
C20
J1
C21
J2
C19
C23
C22
C18
J4
3T1
4T2
Y1
15Q4
15Q3
16Q5
14Q1
18E1
19E2
20E3
37C31
36C27
33C16
33C10
28C17
26C26
25L4
23L2
22L1
12CR5
12CR4
12CR3
12CR2
12CR1
50R35
50R36
53R27
56R12
56R13
47R6
*R29
46R28
47R19
29C8
39R24
31C9
43R25
41R24
29C5
28C6
52R22
48R23
57R31
45R1
30C7
46R7
42R2
28C1
33C2
38R3
54R11
46R10
30C11
50R18
16Q2
33C4
49R17
54R14
49R16
24L3
28C30
47R15
30C15
30C14
28C13
59R34
46R33
32C29
58R32
3C28
46R30
35C25
47R28
30C24

Figure 6-10A

A 9654
B-6827

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	57-0227-01	1	PC Board	
2				
3	97-1078-01	1	Coil Assy.	T1 (L7 & L8)
4	97-1079-01	1	Coil Assy.	T2 (L5 & L6)
5				
6	09-0475-01	1	Crystal Pad	
7				
8	43-0043-01	1	Buss Wire #22	
9				
10	35-0026-01	1	Crystal 5.2000 Mhz	Y1
11				
12	41-0022-01	5	DS IN3064	CR1-5
13				
14	40-0070-01	1	TR2N4258	Q1
15	40-0035-01	2	TR2N3643	Q3, Q4
16	40-0041-01	2	TR2N3904	Q2, Q5
17				
18	45-0022-01	1	ICD 9528	E1
19	45-0023-01	1	ICD 74H103N	E2
20	45-0024-01	1	ICD 7410N	E3
21				
22	32-0032-12	1	IF 1.5 μh	L1
23	32-0032-23	1	IF 22 μh	L2
24	32-0032-26	1	IF 39 μh	L3
25	32-0032-38	1	IF 10μh	L4
26	22-0193-01	2	CFTA 15μF/10v	C3, C26
27				
28	22-0038-01	5	CFD 100 pf	C1,6,13,17,C30
29	22-0168-01	2	CFD 150 pf	C5, C8
30	22-0004-01	5	CFD 470 pf	C7,14,15,24,11
31	22-0060-01	1	CFD .005 μf	C9
32	22-0055-01	1	CFD .01 μf	C29
33	22-0126-01	4	CFD .05 μf	C2,4,10,16
34	22-0005-01	1	CFD 1000 pf	C28,
35	22-0124-01	1	CFD 1500 pf	C25
36	22-0187-21	1	CFM 82 pf	C27
37	23-0032-01	1	CV 7-35 pf	C31
38	26-4022-06	1	RFC 22Ω 1/4W 10%	R3
39	26-0163-01	1	RFC 33Ω " "	R24
40	26-1522-01	1	RFC 100Ω " "	R4
41	26-1501-01	2	RFC 220Ω " "	R6, R21
42	26-1559-01	1	RFC 180Ω " 5%	R2
43	26-1503-01	3	RFC 470Ω " 10%	R5, R16, R25
44				
45	26-0174-01	1	RFC 62Ω " 5%	R1
46	26-1528-01	5	RFC 1K " 10%	R7,10,26,30,33
47	26-0161-01	3	RFC 2.7K " "	R19,28,15
48	26-1607-01	1	RFC 4.3K " 5%	R23
49	26-1531-01	1	RFC 4.7K " 10%	R17
50	26-1575-01	2	RFC 150Ω " 5%	R35, R36
51				
52	26-4312-05	1	RFC 12K " 5%	R22
53	26-1533-01	1	RFC 18K " 10%	R27
54	26-0164-01	2	RFC 39K " "	R11, R14
55				
56	26-1576-01	3	RFC 330Ω " 5%	R12,13,18
57	26-1583-01	1	RFC 10Ω " 10%	R31
58	26-1623-01	1	RFC 390Ω " "	R32
59	26-1584-01	1	RFC 3.9K " "	R34
60				

NAME	BY	DATE
	JB	10/21/71
P.MARX	CHK	10/27/71
	ENG	
	APVD	

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Tel. 714 494 9401 • TWX 910 596 1505

PARTS LIST

TITLE: ASSY., P.C.B. - HF MODULE 1019

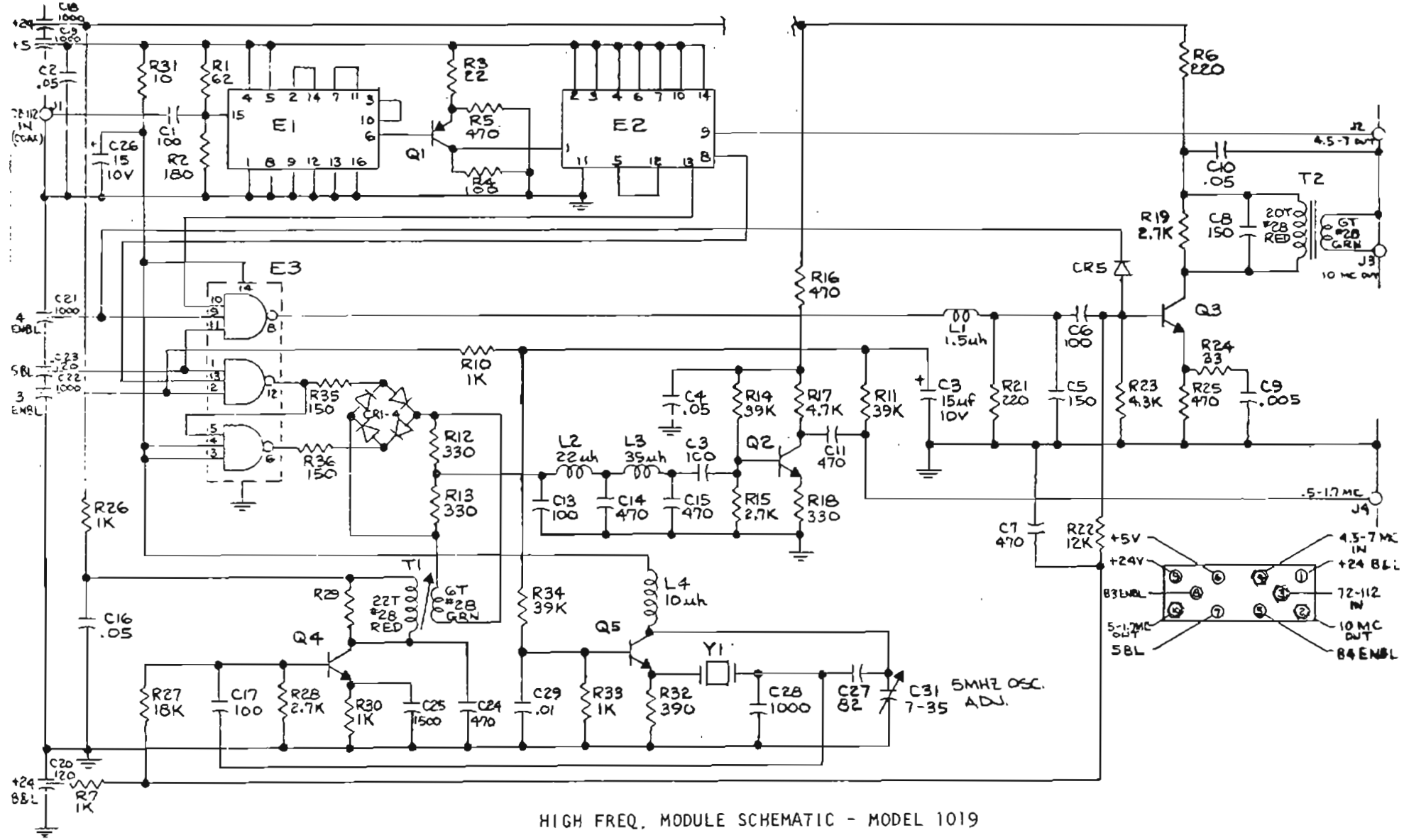
SIZE	DWG NO	REV
A	95-0227-01	C

SH 2 OF 2
REL

95-0227-01

Figure 6-10B

07-0005-01



HIGH FREQ. MODULE SCHEMATIC - MODEL 1019

B54-0226-01A

Figure 6-11

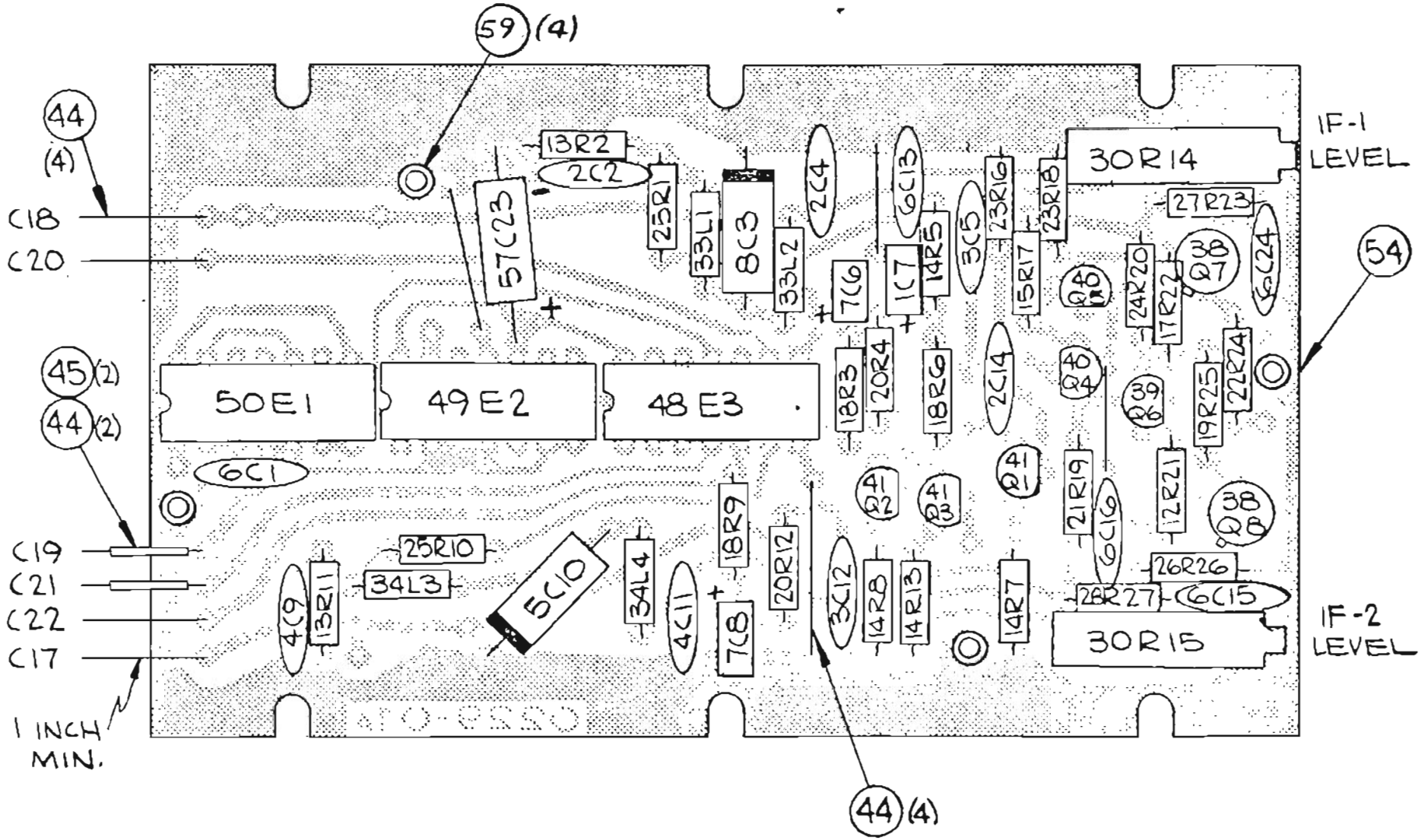


Figure 6-12A

LO FREQ. MODULE PCB ASSY. - MODEL 1019

A95-0229-01E

A-7219

	NAME	DATE
BY	JB	10/26/71
CHK	P. MARX	11/4/71
ENG		11/11/71
APVD		11/11/71

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Laguna Beach, California 92652
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PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	20-0064-06	1	CFTA 2.7/35	C7
2	22-0005-01	3	CFD 1000 pf	C2, C4, C14
3	22-0055-01	2	CFD .01 µf	C5, C12
4	22-0124-01	2	CFD 1500 pf	C9, C11
5	22-0125-01	1	CFMY 4700 pf 10% 100V WMF	C10
6	22-0126-01	5	CFD .05 µf	C1, C13, C15, C16, C24
7	22-0193-01	2	CFTA 15/10	C6, C8
8	22-0198-01	1	CFMY 3300 pf 10% 100V WMF	C3
9				
10				
11				
12	26-0161-01	1	RFC 2.7K 1/4W 10%	R21
13	26-0162-01	2	RFC 270Ω " "	R2, R11
14	26-1503-01	4	RFC 470Ω " "	R5, 7, 8, 13
15	26-1518-01	1	RFC 22K " "	R17
16				
17	26-1524-01	1	" 47K " "	R22
18	26-1528-01	3	" 1K " "	R3, R6, R9
19	26-1530-01	1	" 47Ω " "	R25
20	26-1531-01	2	" 4.7K " "	R4, R12
21	26-1535-01	1	" 15K " "	R19
22	26-1583-01	1	" 10Ω " "	R24
23	26-1594-01	2	" 10K " "	R16, R18
24	26-1595-01	1	" 5.6K " "	R20
25	26-1598-01	2	" 560Ω " "	R1, R10
26	26-4022-06	1	" 22Ω " "	R26
27	26-1604-01	1	" 820 " "	R23
28	26-0172-01	1	" 750 " 5%	R27
29				
30	29-0130-13	2	RVC 200Ω 3/4W	R14, R15
31				
32				
33	32-0032-31	2	IF 100 µh	L1, L2
34	32-0032-33	2	IF 150 µh	L3, L4
35				
36				
37				
38	40-0035-01	2	TR 2N3643	Q7, Q8
39	40-0041-01	1	TR 2N3904	Q6
40	40-0089-01	2	TR 2N4249	Q4, Q5
41	40-0097-01	3	TR MPSA10	Q1, Q2, Q3
42				
43				
44	43-0043-01	AR	Buss Wire, 22 Ga.	
45	00-1070-01	AR	Teflon Sleeve	
46				
47				
48	45-0024-01	1	ICD 7410N	E3
49	45-0025-01	1	ICD 7473N	E2
50	45-0026-01	1	ICD 7492N	E1
51				
52				
53				
54	57-0229-01	1	P C Board	
55				
56				
57	20-0085-01	1	CFTA 56/6V	C23
58				
59	09-1504-01	4	Terminal	
60				

FIGURE 6-128

REL	SH 2 OF 2
SIZE	DWG NO
A	95-0229-01
REV	E

TITLE: ASS'Y. P.C.B. LOW FRQ. MOD. 1019

95-0229-01

07-0003-01

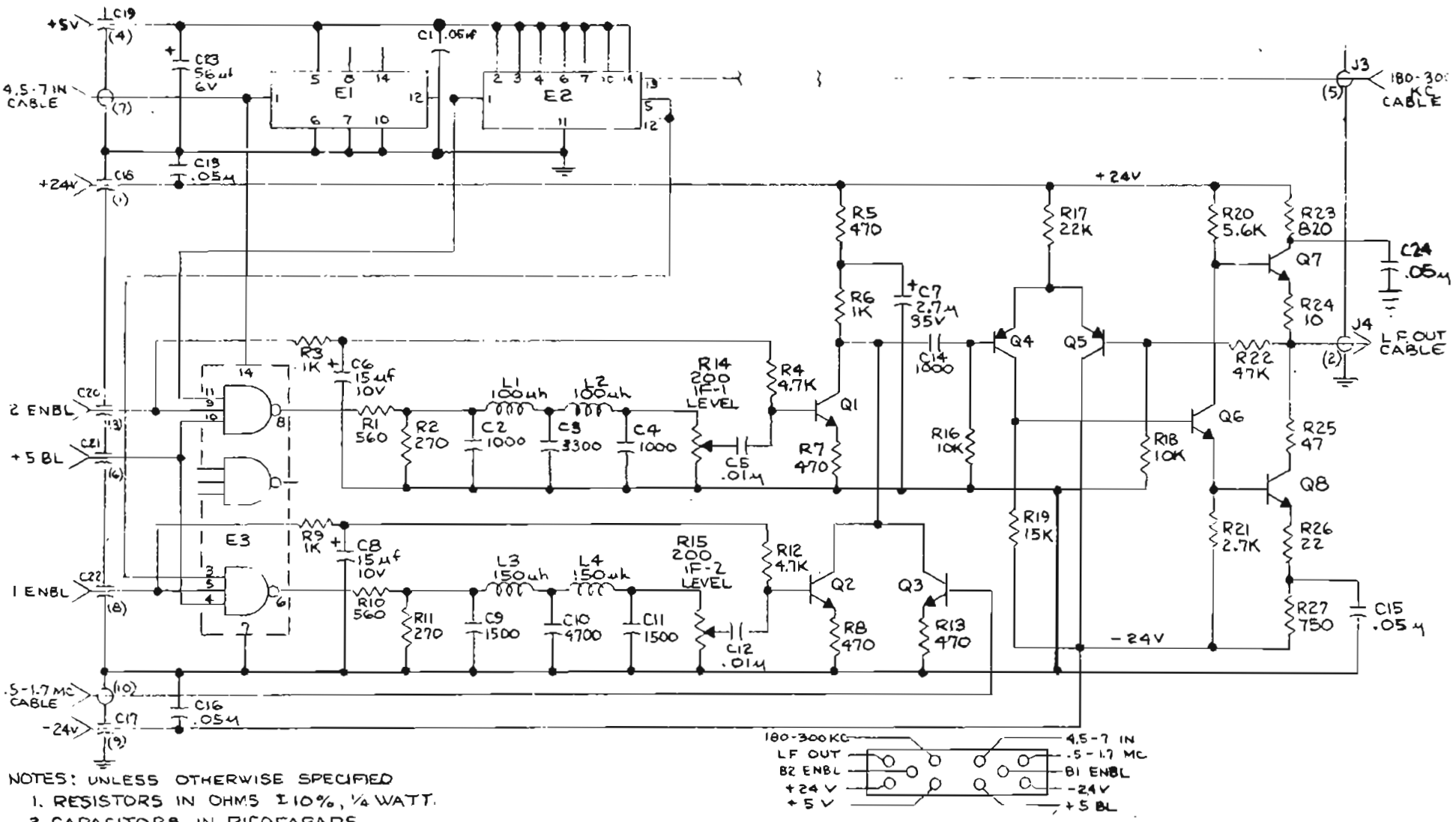


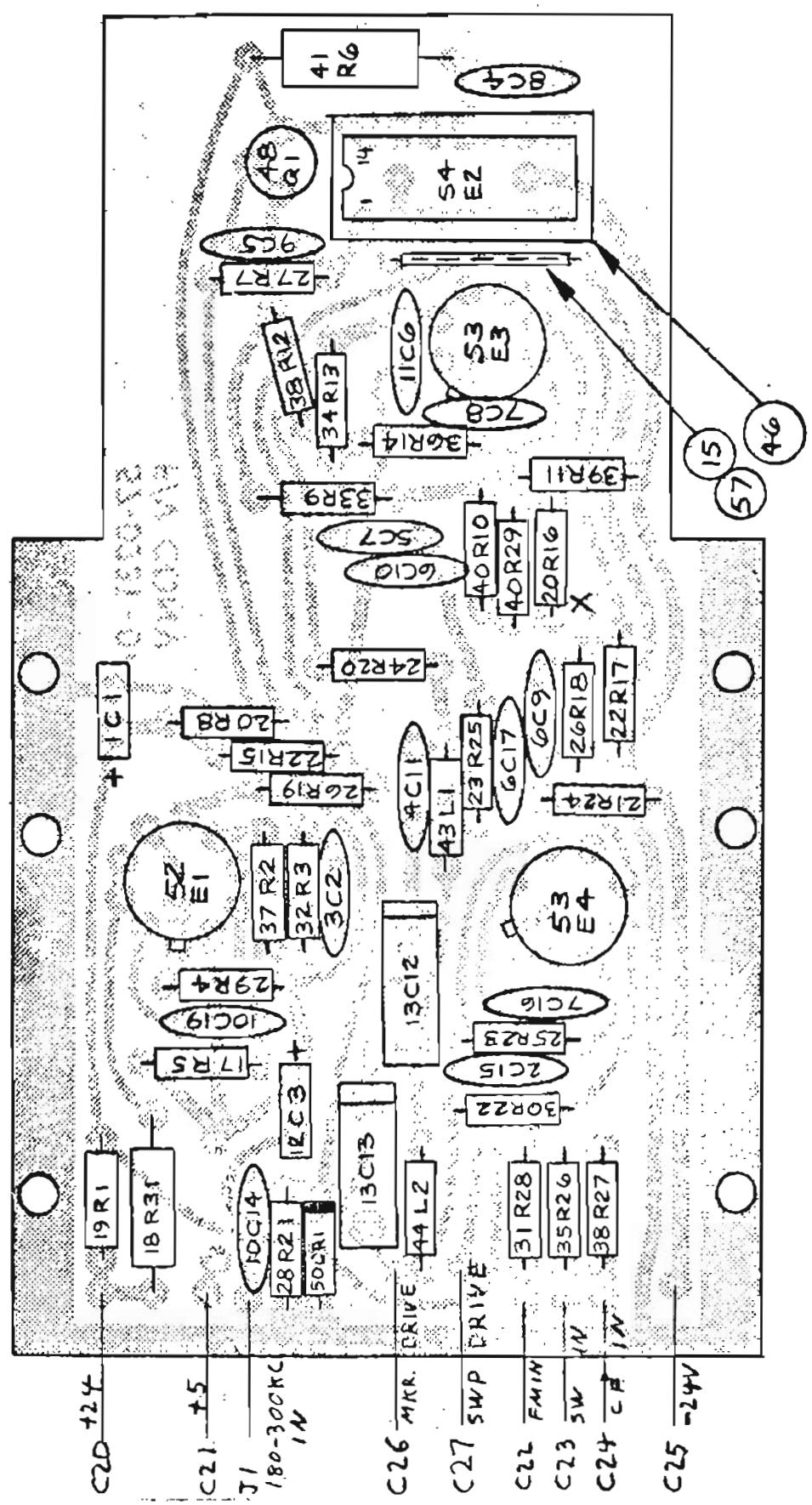
Figure 6-13

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTORS IN OHMS ±10%, ¼ WATT.
2. CAPACITORS IN PICOFARADS
   FEED THRU CAPACITORS 470pf (C17-C22)

LO FREQ. MODULE SCHEMATIC - MODEL 1019

B54-0228-01C



FREQUENCY TO VOLTAGE CONVERTER ASSY. PCB

A95-0231-01H

Figure 6-14A

B-ECN7080
C-ECN7501

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	20-0064-06	1	CFTA, 2.7/35	C1
2	22-0046-01	1	CFD, .002 µF	C15
3	22-0170-01	1	CFD, .1 µF	C2
4	22-0055-01	1	CFD, .01 µF	C11
5	22-0124-01	1	CFD, 1500 pF	C7
6	22-0126-01	3	CFD, .05 µF	C9,10,17
7	22-0002-01	2	CFD, 33 pF	C8,16
8	22-0206-01	1	CFC, 220pF NPO	C4,
9	22-0189-13	1	CFD, 82 pF	C5
10	22-0038-01	2	CFD, 100 pF	C14,19
11	22-0197-01	1	CFD, 680 pF	C6
12	22-0193-01	1	CFTA, 15/10V	C3
13	22-0143-01	2	CFPE, .047/250V	C12,13
14				
15	00-1045-01	A/R	Teflon Sleeving, Clear	
16				
17	26-0159-01	1	RFC, 1.5k, ±10%, 1/4W	R5
18	26-0042-01	1	RFC, 470Ω, ±10%, 1/2W	R31
19	26-1522-01	1	RFC, 100Ω, ±10%, 1/4W	R1
20	26-1524-01	2	RFC, 47k, ±10%, 1/4W	R8,16
21	26-1527-01	1	RFC, 2.2k, ±10%, 1/4W	R24
22	26-1528-01	2	RFC, 1k, ±10%, 1/4W	R15,17
23	26-1531-01	1	RFC, 4.7k, ±10%, 1/4W	R25
24	26-1538-01	1	RFC, 68Ω, ±10%, 1/4W	R20
25	26-1589-01	1	RFC, 3.3MegΩ, ±10%, 1/4W	R23
26	26-1584-01	2	RFC, 3.9k, ±10%, 1/4W	R18,19
27	26-1596-01	1	RFC, 3.3k, ±10%, 1/4W	R7
28	26-1623-01	1	RFC, 390Ω, ±10%, 1/4W	R21
29	26-4005-65	1	RFC, 5.6Ω, ±5%, 1/4W	R4
30	26-4333-06	1	RFC, 33k, ±10%, 1/4W	R22
31	26-1565-01	1	RFMF, 560k, ±5%, 1/4W	R28
32	27-0250-14	1	RFMF, 5.11k, ±1%, 1/4W	R3
33	27-0250-68	1	RFMF, 665Ω, ±1%, 1/4W	R9
34	27-0253-14	1	RFMF, 174k, ±1%, 1/4W	R13
35	27-0253-08	1	RFMF, 100k, ±1%, 1/4W	R26
36	27-0253-64	1	RFMF, 10k, ±1%, 1/4W	R14
37	27-0253-78	1	RFMF, 2.21k, ±1%, 1/4W	R2
38	27-0253-83	2	RFMF, 49.9k, ±1%, 1/4W	R12,27
39	27-0192-01	1	RFMF, 1k, ±1%, 1/2W	R11
40	27-0253-01	2	RFMF, 1K, ±1%, 1/4W	R10,29
41	28-0146-02	1	RFWW, 10K	R6
42				
43	32-0029-01	1	IF, 470 µH	L1
44	32-0038-01	1	IF, 1000 µH	L2
45				
46	36-0069-01	1	IC Oven	R30
47				
48	40-0070-01	1	TR, 2N 4258	Q1
49				
50	41-0022-01	1	DS, 1N 3064	CR1
51				
52	45-0018-01	1	ICL, µA723C	E1
53	45-0020-01	2	ICL, µA748C	E3,4
54	45-0021-01	1	ICD, 5412IN	E2
55				
56	57-0231-01	1	PC Board	
57	43-0043-01	A/R	Buss Wire #22 Ga.	
58	01-0218-01	A/R	Silicone Grease	
59				
60			Figure 6-14B	

APVD | ENG | CHK | BY
KH
NAME
4/28/71
DATE

TELONIC INDUSTRIES, INC.
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Laguna Beach, California 92652
Tel 714 494-9401 • TWX 910 596 1535

PARTS LIST

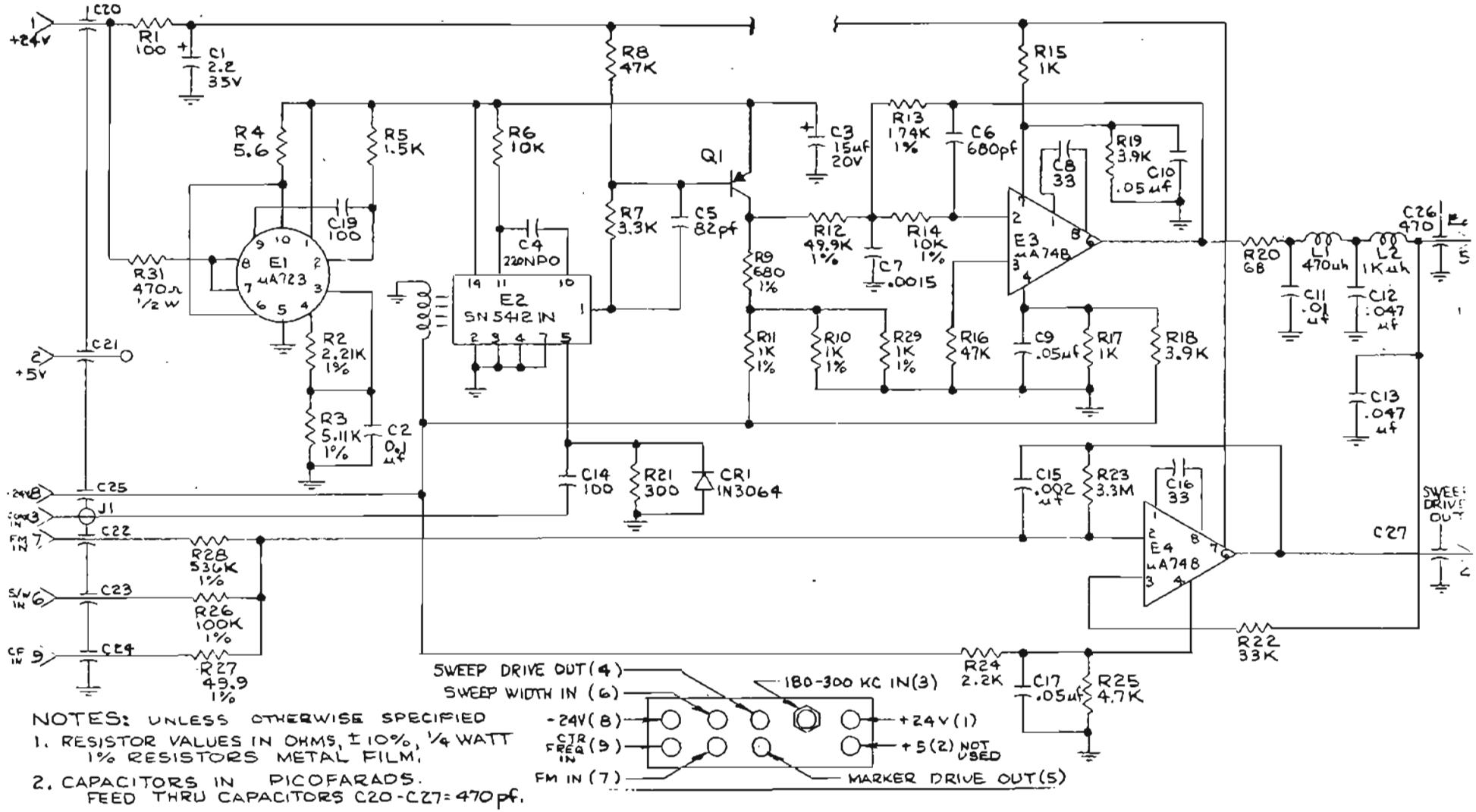
TITLE ASSEMBLY, PCB, FREQUENCY TO VOLTAGE CONVERTER

SIZE A | DWG NO 951 1-9 | REV

SH 2 OF 2

950231

07-0005-01



NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES IN OHMS, ±10%, 1/4 WATT 1% RESISTORS METAL FILM.
2. CAPACITORS IN PICOFARADS. FEED THRU CAPACITORS C20-C27 = 470 pf.

FREQUENCY TO VOLTAGE CONVERTER SCHEMATIC

B54-0230-01B

Figure 6-15

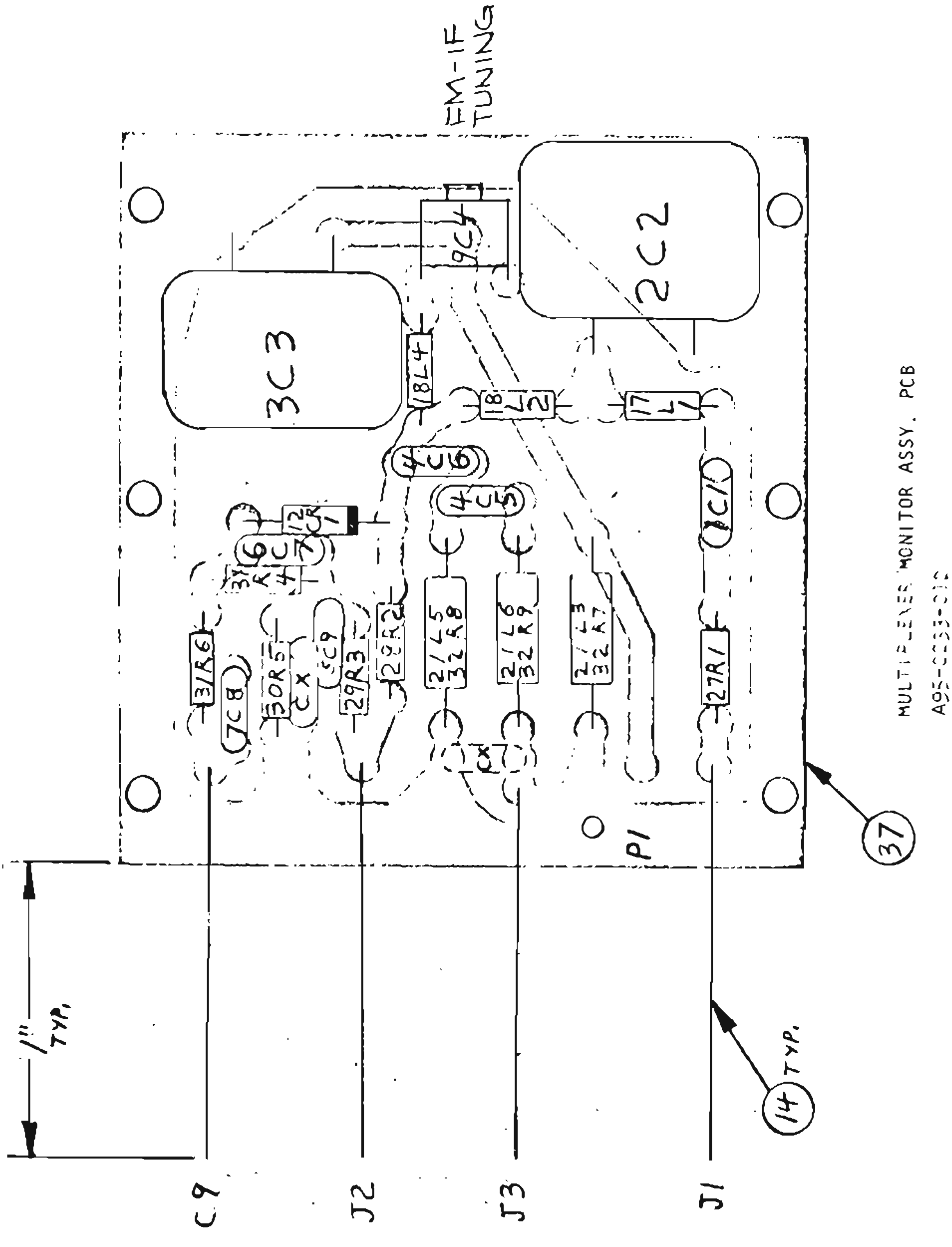

FM-IF TUNING
3C3
2C2
9C4
P1
37
1" TYP.
14 TYP.
C9
J2
J3
J1
MULTIPLEXER MONITOR ASSY. PCB

Figure 6-16A

	NAME	DATE
BY	JB	11/12/7[illegible]
CHK		
ENG	[illegible]	12/3/72
APVD		

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	22-0126-01	1	CFD, .05 uf,	C1
2	22-0008-01	1	CFM 2200pf, ±10% DURMICA	C2 (DM-19)
3	22-0017-01	1	CFM 1200pf, ±5% DURMICA	C3 (CD-19)
4	22-0001-09	2	CFD 25pf ±10%	C5, C6
5	22-0001-06	1	CFD 10pf NPO	C9
6	22-0004-01	1	CFD, 470pf	C7
7	22-0005-01	1	CFD, .001μF	C8
8				
9	23-0037-01	1	CTCD, 10-60pf	C4
10				
11				
12	41-0015-02	1	DS, IN82	CR1
13				
14	43-0043-01	AR	#22 BUSS WIRE	
15				
16				
17	32-0032-18	1	IF, 6.8μH ±10%	L1
18	32-0021-01	2	IF, 4.7μH ±10%	L2, 4
19				
20				
21	43-0091-10	AR	#24 MAGNET WIRE	L3, L5, L6
22				
23				
24				
25				
26				
27	26-0163-01	1	RES, 33Ω, ±10%, 1/4W	R1
28	26-4010-05	1	RES, 10Ω, ±5% "	R2
29	26-1559-01	1	RES, 180Ω, ±5% "	R3
30	26-0172-01	1	RES, 750Ω, ±5% "	R5
31	26-1535-01	2	RES, 15K, ±10% "	R4, R6
32	26-0073-01	3	RES, 470KΩ, 1/2W, 10%	R7, 8, 9
33				
34				
35				
36				
37	57-0233-02	1	PC BOARD	
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57			Figure 6-16B	
58				
59				
60				

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Laguna Beach, California 92652
Tel 714 494 9401 • TWX 910 596 1320

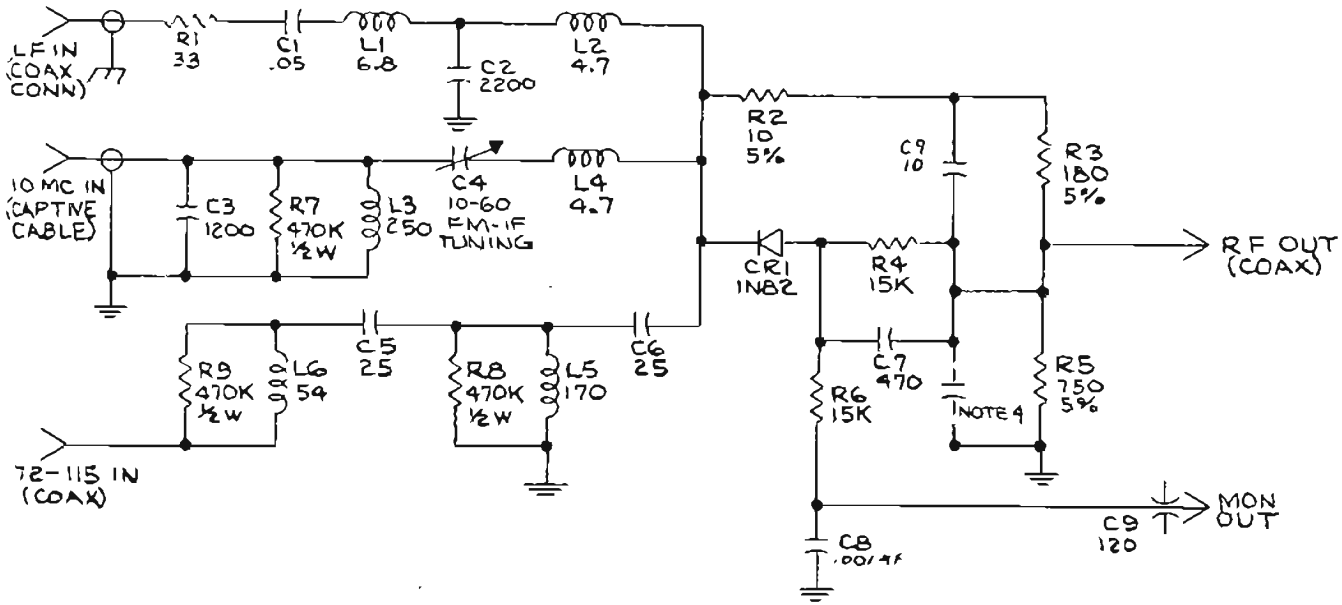
PARTS LIST

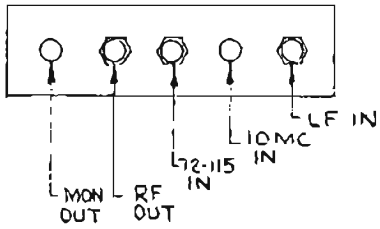
TITLE: ASSY, MULTIPLEXER/MONITOR PC BOARD

REL	SH 2 OF 2
SIZE: A	DWG NO: 95-0233-01
REV: D	

95-0233-01

07-0008-01





NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITORS IN PICOFARADS.
2. RESISTORS IN OHMS ±10% ¼ WATT
3. CHOKES IN MICROHENRIES
4. CAPACITORS MAY BE REQ'D TO ACHIEVE FLATNESS. VALUES SELECTED AT TEST.

MULTIPLEX/MONITOR SCHEMATIC

B54-0232-01C

Figure 6-17

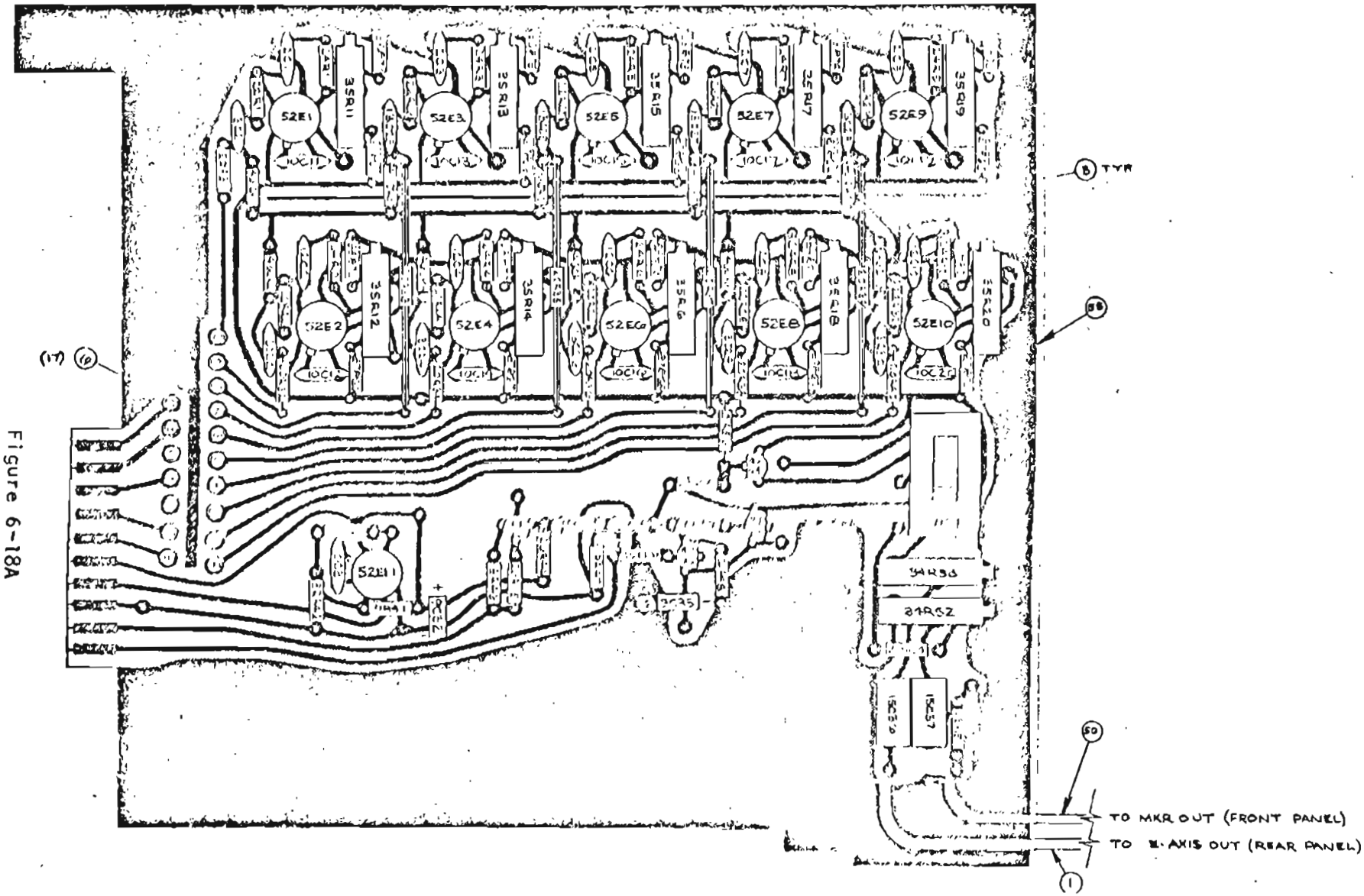


Figure 6-18A

PULSE MARKER OPTION PCB ASSY.

C95-0237-( )F

A-7054
B-7132

ITEM	PART NUMBER	QTY 01	QTY 02	DESCRIPTION	CKT REF
1	9[illegible]-0998-0[illegible]	1	—	Cable Assembly (12")	
2					
3	00-1045-01	A / R		Sleeving	
4					
5					
6	09-1504-01	17	17	Terminals	
7					
8					
9	20-0064-06	2	2	CFE, 2.7µF/35V	C32,35
10	22-0001-10	11	11	CFD, 4.7 pF	C11-20, 31
11	22-0004-01	1	—	CFD, 470 pF	C34
12	22-0038-01	10	10	CFD, 100 pF	C1-10
13	22-0055-01	10	10	CFD, .01µF	C21-30
14	22-0060-01	1	1	CFD, .005µF	C33
15	22-0138-01	2	—	CFPE, .1µF/100V	C36,37
16					
17					
18	26-0161-01	2	[illegible]	RFC, 2.7kΩ, 1/4W, ±10%	(R43,49
19	26-1525-01	2	—	RFC, 100kΩ, 1/4W, ±10%	R47,50
20	26-1527-01	10	10	RFC, 2.2kΩ, 1/4W, ±10%	R31-40
21	26-1528-01	1	—	RFC, 1kΩ, 1/4W, ±10%	R56
22	26-1532-01	10	10	RFC, 12kΩ, 1/4W, ±10%	R21-30
23	26-1518-01	2	—	RFC, 22kΩ, 1/4W, ±10%	R54,55
24	26-1539-01	10	10	RFC, 4.7MΩ, 1/4W, ±10%	R1-10
25	26-1543-01	1	—	RFC, 1.5MΩ, 1/4W, ±10%	R51
26	26-1594-01	3	2	RFC, 10kΩ, 1/4W, ±10%	(R44,45)48
27	27-0095-14	10	10	RFMF 2[illegible] 1/4W 1%	R61-R70
28	27-0253-78	10	10	RFMF 2.21K 1/4W 1%	R71-R80
29	27-0253-64	1	1	RFMF, 10kΩ, 1/4W, ±1%	R43
30					
31	27-0253-84	1	1	RFMF, 40.2kΩ, 1/4W, ±1%	R41
32	27-0253-05	1	1	RFMF 15.0K 1/4W ±1%	R42
33					
34	29-0130-04	2	—	RVC, 25kΩ, 3/4W	R52,53
35	29-0166-09	10	10	RVC, 50kΩ	R11-20
36					
37					
38	37-0170-01	1	—	DPDT Slide Switch	S1
39					
40					
41	40-0032-01	1	—	TR, 2N3568	Q3
42	40-0064-01	1	—	TR, 2N4888	Q4
43	40-0097-01	2	1	TR, MPS A10	(Q1),2
44					
45					
46	41-0022-01	11	10	DS, 1N3064	(CR1-10),11
47					
48					
49	43-0043-01	A / R		22 Ga. Wire	
50	43-0097-01	1	—	Coax 14"	
51					
52	45-0020-01	11	11	IC, µA748	E1-11
53					
54					
55	57-0237-01	1	1	PCB	
56					
57					
58					
59					
60					

APVD / ENG / CHK / BY

NAME: TPR

DATE: 11/3/71

PARTS LIST

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel. 714 494-9401 • TWX 910 596-1320

TITLE: ASSY., P.C.B., PULSE MARKER, 1019

REL

SH 2 OF 2

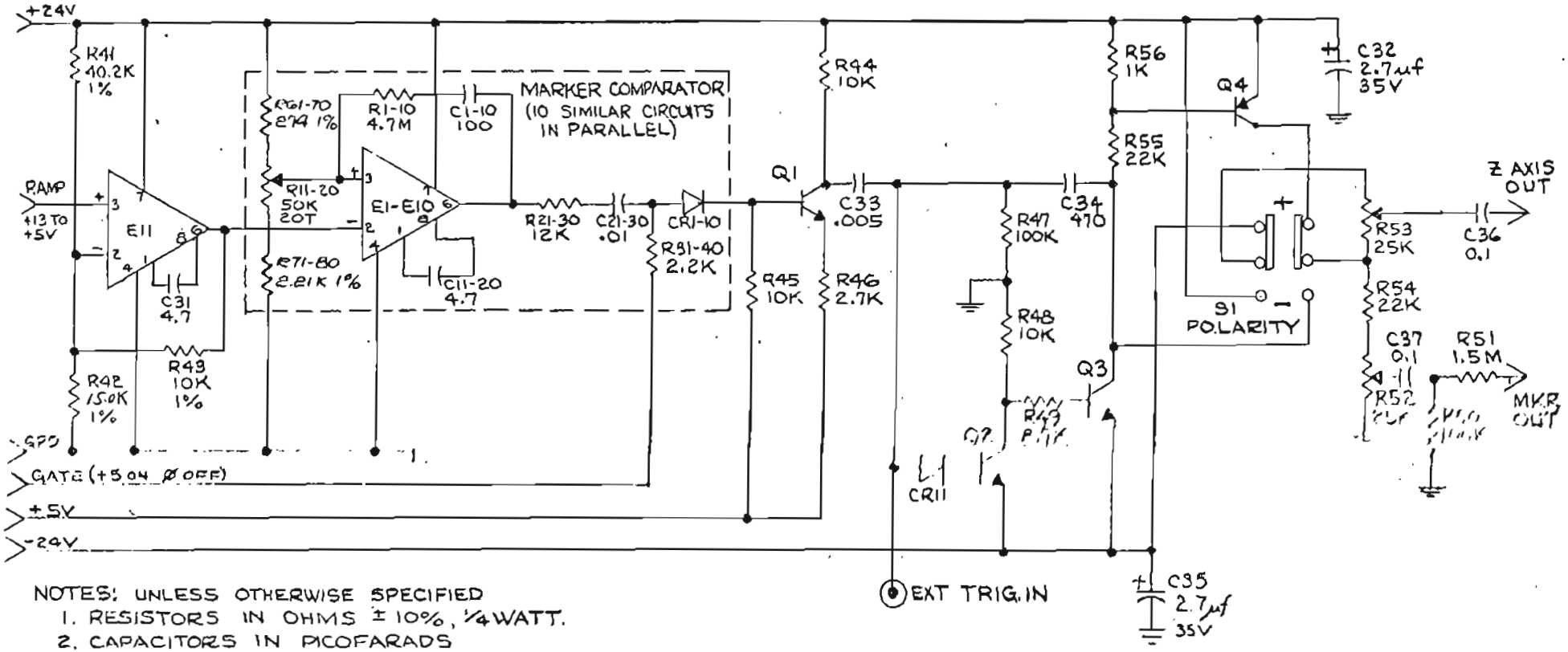
SIZE: A

DWG NO: 95-0237-( )

REV: F

Figure 6-18B

07-0205-01



NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTORS IN OHMS ± 10%, ¼ WATT.
2. CAPACITORS IN PICOFARADS

PULSE MARKER OPTION SCHEMATIC

B54-0237-01C

Figure 6-19

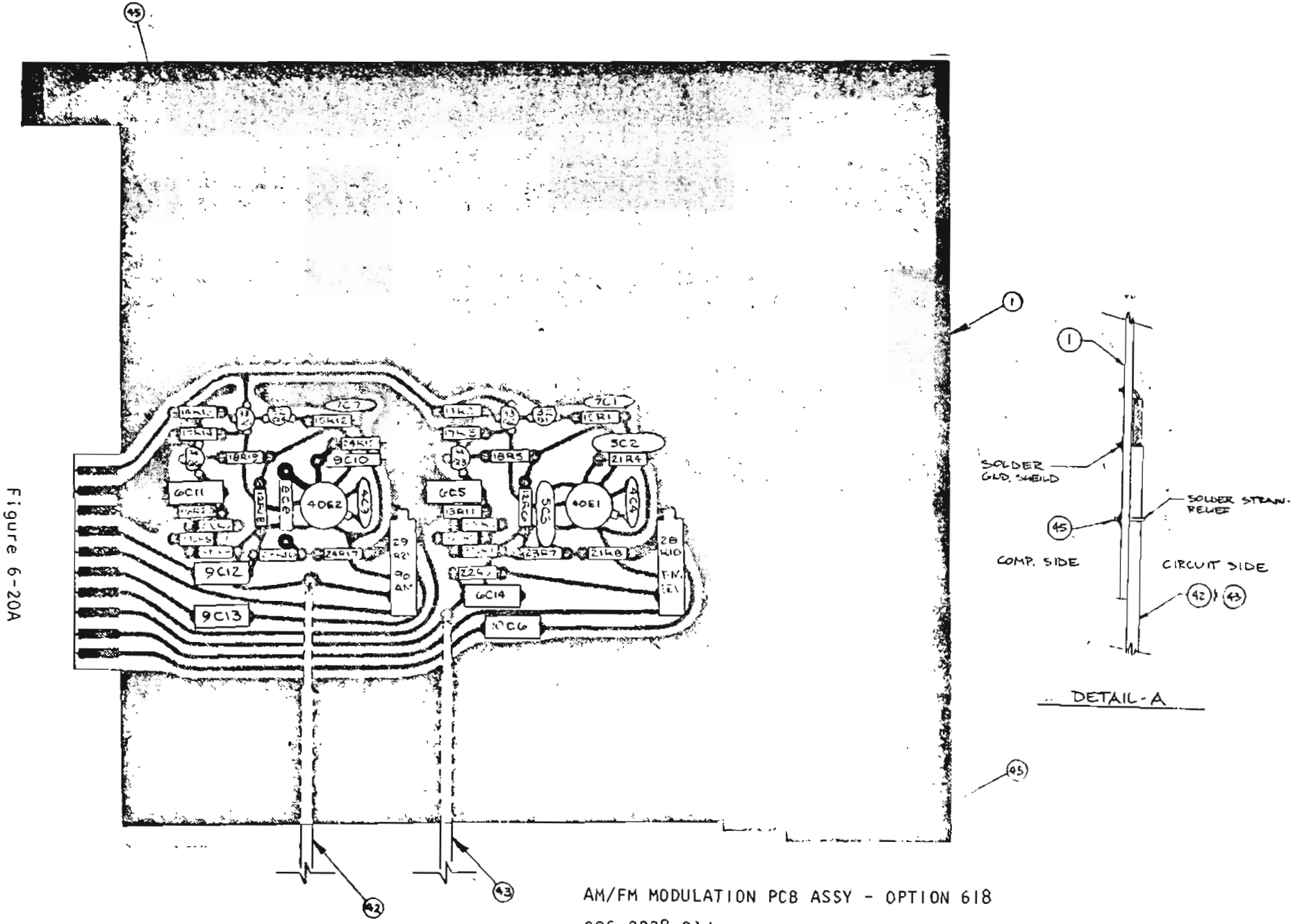


Figure 6-20A

AM/FM MODULATION PCB ASSY - OPTION 618

C95-0238-01J

A-6615
A-6625
C-6699
F 7283

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	57-0238-01	1	PCB	
2				
3				
4	22-0002-01	2	CFD 33pf	C4,9
5	22-0024-01	2	CFM 4300pf	C2,3
6	22-0138-01	3	CFPE .1µf	C5,11,14
7	22-0170-01	2	CFD .1µf	C1,7
8	22-0200-01	2	CFP .01µf	C8,10
9	22-0139-01	2	CFPE .22µf	C12,13
10	22-0005-01	1	CFD 0.001µF	C6
11				
12	26-0153-01	2	RFC, 13K 10% 1/4W	R6,18
13	26-4418-06	1	RFC, 180k 10% 1/4W	R11
14	26-1527-01	2	RFC, 2.2K 10% 1/4W	R2,13
15	26-1528-01	2	RFC, 1K 10% 1/4W	R1,12
16	26-1540-01	1	RFC, 330K 10% 1/4W	R20
17	26-1594-01	2	RFC, 10K 10% 1/4W	R3,14
18	26-1611-01	2	RFC, 510 5% 1/4W	R5,19
19				
20				
21	27-0253-10	2	RFMF, 37.4K 1% 1/4W	R4,8
22	27-0253-39	1	RFMF, 24.9K 1% 1/4W	R9
23	27-0253-53	2	RFMF, 147K 1% 1/4W	R7,16
24	27-0253-84	2	RFMF, 40.2K 1% 1/4W	R17,15
25				
26				
27				
28	29-0130-04	1	RVC, 25K	R10
29	29-0130-08	1	RVC, 50K	R21
30				
31				
32	40-0101-01	2	TR2N5138	Q1,4
33	40-0097-01	2	TRMPSA10	Q2,5
34	40-0118-01	2	TR2N5461	Q3,6
35				
36				
37	41-0022-01	6	D.S. IN3064	CR1-6
38				
39				
40	45-0020-01	2	ICL µA748	E1,2
41				
42	97-0342-04	1	Cable Assy	
43	97-0342-11	1	Cable Assy	
44				
45	43-0043-01	1	Wire, 3 ss	
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58			Figure 6-20B	
59				
60				

	BY	NAME	DATE
APVD			
ENG			
CHK	JB	P.MARX	1/27/72

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PARTS LIST

TITLE: MODEL 1019 MODULATION OPTION 618

REL	SH 2 OF 2
SIZE: A	DWG NO: 95-0238-01
REV: J	

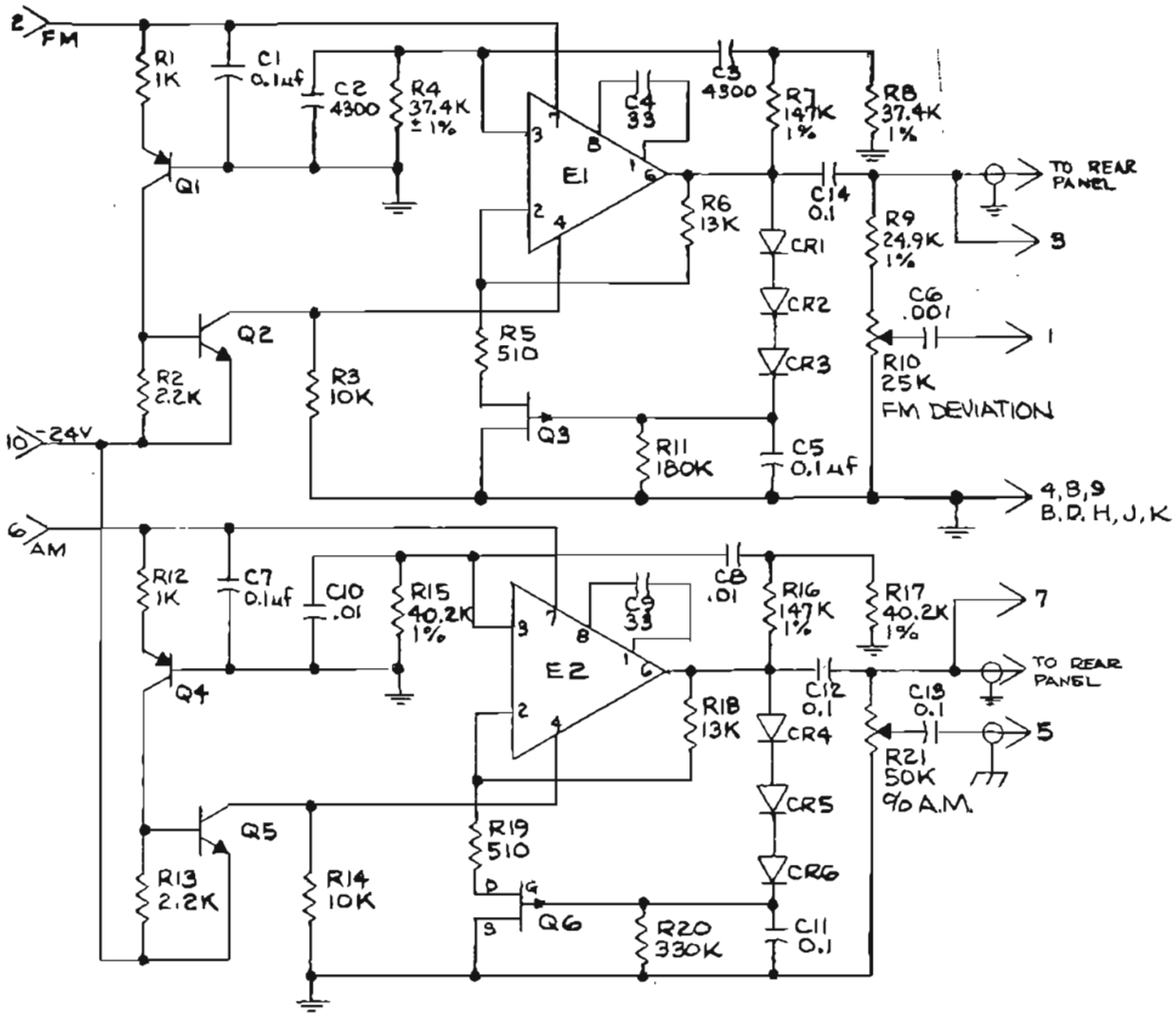

Figure 6-21

NOTES: UNLESS OTHERWISE SPECIFIED
1. CAPACITORS IN PICOFARADS
2. RESISTORS IN OHMS ±10, ¼WATT
3. DIODES TYPE IN3064.

MODULATION OPTION 618 SCHEMATIC

B54-0238-01D

7.0 Option Information

7.1 Option 319 (Additional Markers)

A. General Description

Option 319 provides an additional ten markers which may be presented in any combination on any band in precisely the same manner as the ten markers comprising the basic 1019 marker system. The 1019 chassis is capable of accepting two sets of Option 319, thus providing a capability for a maximum of 30 markers.

B. Theory of Operation

The Option 319 marker system is contained on one card, which is similar in appearance and identical in operation to the basic pulse marker card, P/N 95-0237-01. The only difference is found in the output pulse amplifying circuitry - the Option 319 does NOT have Q2, Q3, Q4 and associated circuitry rather the output of Q1 is coupled to the External Trigger Input of the basic card. The Option is aligned exactly like the basic card: refer to paragraph 4.3.5 for alignment instructions.

C. Documentation Information

Refer to Schematic 54-0237-01 and Assembly 95-0237-01 (Figures 6-18A, 6-18B and 6-19).

7.2 Option 618 (AM/FM Modulation)

A. General Description

The modulation option (618) provides amplitude modulation of the AM RF band at 400 Hz when the AM RF MOD front panel push-button is depressed OR frequency modulation of the FM RF band at 1000 Hz when the FM RF MOD button is depressed. In either case, the modulation level is adjustable with controls located on the option assembly. Audio outputs of both the 400 Hz and the 1000 Hz signals are available at the rear panel.

The modulation function is independent of the MODE selected. In the swept modes (PRESET or MANUAL) the modulation is superimposed over the swept blanked signal. A modulated CW signal is provided in the CW mode.

B. Theory of Operation

The basic modulation oscillators are modified Wien bridge oscillators using a field effect transistor (Q6 for 400 Hz, Q3 for 1000 Hz) as the gain-varying element. The frequency of oscillation is determined by the feedback resistors and capacitors located electrically between the output (pin 6) and the input (pin 3) of each amplifier. The modulation enable signals are switched from the +5 volt supply and serve two functions:

a. Supply positive voltage to the oscillator circuit, and
b. Gate the negative voltage (-24) to the oscillator.

The 1000Hz output is coupled to the rear panel and, through the FM diviation control (R10) to the FM input of the frequency to voltage converter. The 1000 Hz signal, then, is added as an error signal to the F/V converter input causing the closed-loop frequency control system to respond to the modulation frequency. In this manner, the amount of deviation and purity of modulation is independent of the non-linearity of the varactor diodes in the swept oscillator.

The 400 Hz output is coupled also to the rear panel, and through the % AM control (R21) to the reference input of the ALC amplifier. In this manner, the 400 Hz is applied as an ALC error which causes the leveling system to respond accordingly.

C. Alignment Instructions

1) FM alignment

In general, the FM alignment is performed by setting the unit in the CW mode, depressing the FM RF MOD control, and aligning the degree of deviation desired with a deviation meter connected to the front panel RF output connector. In the event no deviation meter is available, the following procedure is applicable:

a) With the unit in FM RF SWEPT and MANUAL mode, determine the actual swept width with a marker system as shown in Figure 4-7. Adjust the appropriate sweep width control (Figure 4-1,L) for a 1 MHz sweep width.

b) Measure the peak-to-peak ramp voltage appearing at the marker output terminal (pin 5) of the F/V converter (see Figure 6-15) and obtain a transfer ratio in volts per MHz.

D. Documentation Information

Refer to Schematic 54-0238-01 and Assembly 95-0238-01 (Figures 6-20A, 6-20B and 6-21).

c) Calculate the anticipated voltage variation resulting from the amount of deviation desired; for example, assuming the measured transfer ratio in step (b) above is 250 mV/MHz, a desired deviation of 50 kHz would provide a voltage variation of (50/1000) X (250 mV) or 12.5 mV.

d) Set the unit in the CW mode, depress the FM RF MOD control, and adjust the FM modulation control (R10) for a measured peak-to-peak voltage as determined in the above step.

e) Finally, reset the sweep width in the FM PRESET SWEPT mode to the requisite amount.

2) AM Alignment

The amount of amplitude modulation is determined by a modulation percentage defined as follows:

$$\text{Percent Modulation} = \frac{\text{Peak Amplitude - Min. Amplitude}}{\text{Peak Amplitude + Min. Amplitude}} \times 100$$

(See Figure 7-1)

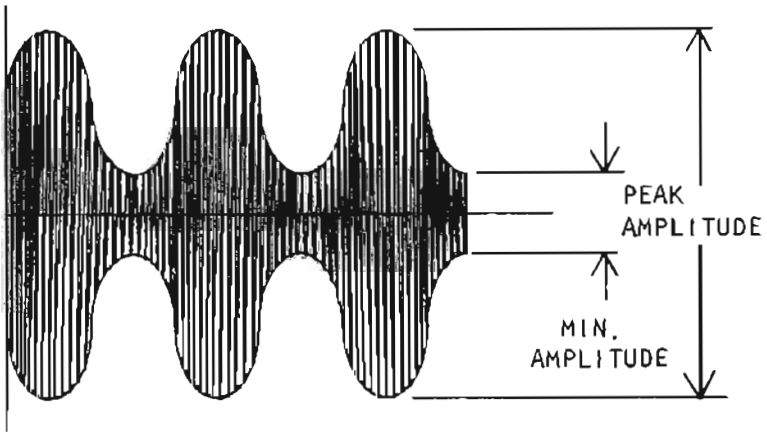

Figure 7-1

The standard modulation percentage for most signal-to-noise and sensitivity tests is 30%. However, other percentages are often desired. For adjusting the modulation percentage, connect the equipment as shown in Figure 7-2.

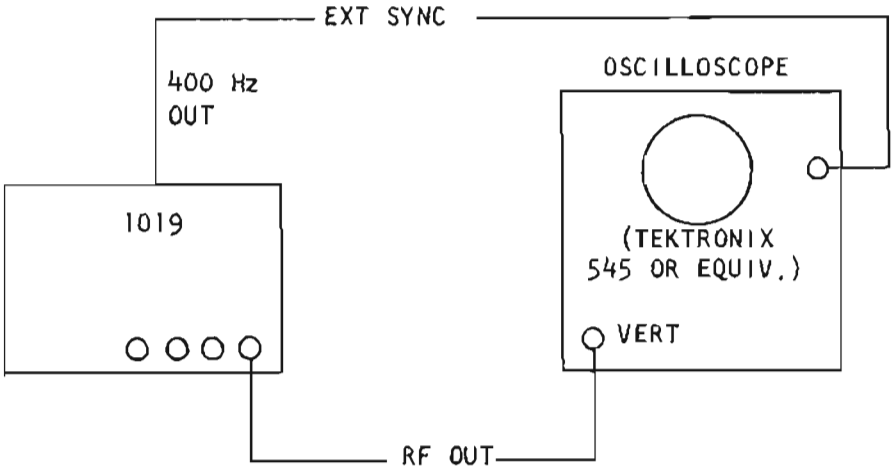

Figure 7-2

Perform the following steps:

a) Set the 1019 in the CW mode, and depress the AM RF MOD control. Adjust the % AM control (R21) for a mid-range setting.

b) Obtain a pattern on the oscilloscope similar to that shown in Figure 7-3.

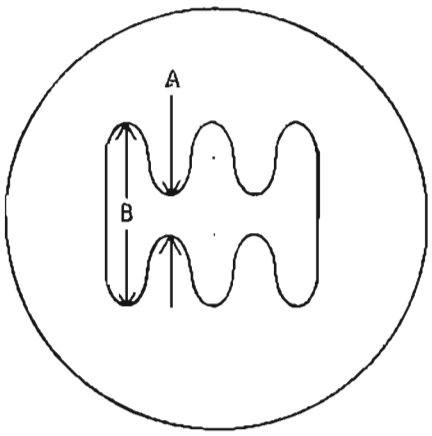

Figure 7-3

c) Adjust the amplitude modulation level control (R21) for the desired percentage of modulation.

NOTE: The ratio between peaks and valleys (B and A on Figure 7-3) is related to the modulation percentage by the following equation:

$$\frac{B}{A} = \frac{1 + \frac{\% \text{ Mod}}{100}}{1 - \frac{\% \text{ Mod}}{100}}$$

D. Documentation Information

The following pages contain documentation information for the Modulation Option 618, Schematic No. 54-0238-01 and Assembly No. 95-0238-01.

WARRANTY

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC/BERKELEY are guaranteed against defective materials and workmanship for a period of one year (Vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

CUSTOMER RETURN OF EQUIPMENT (REPAIR, REPLACEMENT, DUPLICATION, CREDIT, OTHER)

All customer returns require authorization from TELONIC/BERKELEY prior to shipment of equipment. Any equipment returned without authorization for shipment will be at the customer's or distributor's expense.

Instructions for Returning Equipment to Telonic:

1. Contact factory with details of part number, serial number, original purchase order number and reason for return.

2. Telonic will issue instructions on returning the material to the factory or to our regional repair facility. "Please do not return instruments or parts before receiving directions." This will assure you the fastest possible service on Telonic products.

3. Customer is expected to ship all returns prepaid freight. Material will be returned via same shipping method as received unless otherwise instructed.

   Units will be shipped "Prepaid"....In Warranty and
   "Collect"....Out of Warranty.