MODEL 763
FM MODULATION MONITOR

TFT

TIME AND FREQUENCY TECHNOLOGY, INC.

Serial No. _____
Revision Level C
December 1980

MODEL 763
FM MODULATION MONITOR

TIME & FREQUENCY TECHNOLOGY, INC.
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TFT OPERATION MANUAL ADDENDUM

MODEL 763 MANUAL REVISION LEVEL _____ EFFECTIVITY S/N _____

IMPORTANT MANUAL CHANGES

This addendum shows the component values needed to change the meter and audio circuits in the model.

763 from 75 usec to 50 usecs deemphasis

Schematic	Assy Dwg.	Reference designator	Values for 50 usec De-emphasis
6601-1570	6608-1050	C78	.047 ufd
6601-1570	6608-1050	C121	.039 ufd

Date 5/18/84

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SECTION 1

GENERAL INFORMATION

1.1 General Description.

The Model 763 FM Modulation Monitor is designed for continuous monitoring of an FM broadcast transmitter operating in the frequency range of 88 to 108 MHz. The monitor is factory-adjusted for the customer's assigned transmitter frequency. Features include:

- Flashers to indicate when a preset modulation percentage is exceeded on either positive or negative peaks.
- Adjustable attenuator for reading residual AM, noise and low percentage modulation on the modulation meter.
- Wide audio bandwidth.
- Internal calibration circuit to check the modulation meter and peak flashers.
- Carrier-fail alarm to indicate loss of RF input to the Monitor.
- Low-level audio output for aural program monitoring.
- Three options, all field installable:

  Carrier Power Alarm
  Modulation Alarm
  Balanced Audio Output

1.2 Specifications.

RF Input

Frequency Range	88 to 108 MHz
RF Input Voltage Range	1 to 7 volts rms
Input Impedance	50 ohms nominal

Modulation Meter

Deviation for 100% indication	±75 kHz
Meter Range	0 to 133%
Attenuator Range	0 to -50dB in 10-dB steps
Accuracy (5-kHz modulation)	±2% at all modulation percentages
Frequency Response	±0.1 dB from 100 Hz to 75 kHz ±0.25 dB from 50 Hz to 100 kHz
Characteristics	Peak-reading circuit. Scale and ballistics conform to FCC requirements
Remote Output	Suitable for driving two Model 704F Remote Readout Panel

1.2 (Continued)

Peak Modulation Indicators

Deviation for 100% Indication	±75 kHz
Peak Level	Set by a front-panel three-digit thumbwheel switch in 1% steps from 50% to 129% on both positive and negative peaks.
Accuracy (5-kHz modulation)	±2% at 100% modulation
Frequency Response	±2% from 400 Hz to 50 kHz, +4% from 50 Hz to 75 kHz
Response Time Accuracy (1 cycle of 50 kHz)	±2%
Remote Output	Suitable for driving two Model 704F Remote Readout Panels.

Modulation Calibrator — Built in, for calibration of modulation meter and peak flashers from the front panel.

Measurement of Residual AM

Range	0 to -70 dB
Accuracy (at -30 dB)	±1 dB

Audio Outputs (at 100% modulation)

Composite Outputs (with or without 75-us deemphasis)	5 volts rms into 5000 ohms
Signal-to-Noise Ratio (400 Hz with deemphasis)	75 dB
Harmonic Distortion	0.1% max.
Intermodulation	0.1% max. per SMPTE standard
Frequency Response (W/O deemphasis)	+0.25 dB from 50 Hz to 75 kHz
Audio Monitor Output	0 dBm into 600 ohms
Stereo Monitor Output	1 volt rms into 600 ohms
SCA Monitor Output	1 volt rms into 600 ohms

Carrier-Fail Alarm - Relay drive output capable of sinking 50 mA at 30V DC when RF carrier drops below 50% of nominal.

Preselector Input - Direct input to discriminator for use with FM preselector

Frequency	700 kHz
Input Level	100 mV rms for full limiting

1.2 (Continued)

Optional Features

Carrier Power Alarm	Two relay drive outputs, one for carrier level changes of +5% and the other for +10%. Each output is capable of sinking 50 mA at 30V DC.
Modulation Alarm	An output capable of sinking 50 mA at 30 V DC when modulation drops below 30% for a period of time between 2 seconds and 1 minute, internally adjustable.
Balanced Audio Output	
Level	0 dBm into 600 ohms
Frequency Response	±1 dB from 50 Hz to 50 kHz
Power Requirements	117/230V AC ±10% 50 to 400 Hz
Operating Temperature	0° C to 50° C
Dimensions	19" W X 5-1/2" H X 14" D Rack Mount

1.3 Accessory Equipment.

1.3.1 Model 704F Remote Readout Panels.

These remote modulation meter and peak flasher panels duplicate the corresponding front-panel indications. They connect to terminals on rear-panel strips J1 and J2 of the Model 763 through 5-conductor cables. Power for operating the two remote panels and drive for the remote meter and peak flashers are supplied by the Model 763.

1.3.2 Model 724A Stereo Monitor.

This instrument is for use by stereo FM stations to meet all FCC stereo monitoring requirements. A composite input is furnished by the Model 763.

1.3.3 Model 730A SCA Monitor.

The Model 730A enables FM stations broadcasting SCA information on the carrier to meet all FCC SCA monitoring requirements. The Model 763 provides a composite input to the Model 730A.

1.3.4 Model 764A/765A FM RF Preselectors.

Either the Model 764A or 765A allows the user to monitor the transmitter at a remote location. Both models are digitally tunable to any channel in the FM band. The Model 764 has a digital frequency error readout, the 765 does not.

1.4 Warranty.

TIME & FREQUENCY TECHNOLOGY, INC., warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship and will repair or replace, at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or poor workmanship.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charges prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if any instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charges prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the BUYER.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. TFT IS NOT LIABLE FOR CONSEQUENTIAL DAMAGES.

1.5 Claim for Damage in Shipment.

Your instrument should be inspected and tested as soon as it is received. The instrument is insured for safe delivery. If the instrument is damaged in any way or fails to operate properly, file a claim with the carrier, or if insured separately, with the insurance company.

WE SINCERELY PLEDGE OUR IMMEDIATE AND FULLEST COOPERATION TO ALL USERS OF OUR PRECISION ELECTRONICS INSTRUMENTS.

PLEASE ADVISE US IF WE CAN ASSIST YOU IN ANY MANNER

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SECTION 2

INSTALLATION

2.1 Unpacking and Inspection.

Upon receiving the instrument, inspect the packing box and instrument for signs of possible shipping damage. After installation, operate the instrument in accordance with the procedures of Section 3 of this manual. If the instrument is damaged or fails to operate properly, file a claim with the transportation company, or with the insurance company if insured separately.

2.2 Power Requirements.

The Model 763 is factory wired to operate from either a 117-volt or a 230-volt source. A marking on the rear panel of the instrument indicates which voltage is to be used. The line frequency must be between 50 and 400 Hz. Maximum power required is 35 watts.

2.3 Installation and Connections.

The Model 763 must be installed at the transmitter site unless a Model 764A or Model 765A FM RF Preselector is used. Connections to the Preselector are described in its instruction manual.

For installation at the transmitter site without a preselector, proceed as follows:

a. Mount the Monitor in the equipment rack.
b. Connect external equipment to the rear-panel 5% CARRIER ALARM and AUDIO MONITOR OUTPUT terminals as desired. Refer to the Model 763 specifications, Section 1.2, for characteristics of these outputs.
c. Plug the line cord into an appropriate power receptable (see Section 2.2 above). There is no power switch --the Monitor is energized whenever it is plugged into an AC outlet.
d. Make sure the rear-panel RF INPUT/PRESELECTOR INPUT switch is in the RF INPUT position.
e. Turn the front-panel RF LEVEL SET control fully counterclockwise.

CAUTION

The RF input to the Monitor must not exceed 7 V rms, and should not be applied to the Monitor unless the RF LEVEL SET control is fully counterclockwise.

2.3 (Continued)

f. Connect a coax cable from rear-panel RF INPUT connector J3 to the modulated RF sampling point on the transmitter. The level of this input must be at least 1 V rms and not more than 7 V rms.
g. Depress the front-panel RF LEVEL button and adjust the RF LEVEL SET control for a reading of 100% on the MODULATION meter. Then release the RF LEVEL button.

The Monitor is now ready for use.

2.3.1 Connection to Model 724A Stereo Monitor.

When a Model 724A is to be used with the Model 763, proceed as follows:

a. Connect a coax cable from rear-panel connector J5 on the Model 763 to the rear-panel COMPOSITE INPUT connector on the Model 724A.
b. If the Model 724A is not mounted on a common rack with the Model 763, connect a ground strap from the chassis of the Model 763 to the chassis of the Model 724A, using No.16 AWG or larger wire.

2.3.2 Connection to Model 730A SCA Monitor.

When a Model 730A is to be used with the Model 763, proceed as follows;

a. Connect a coax cable from rear-panel connector J6 on the Model 763 to the rear-panel COMPOSITE INPUT connector on the Model 730A.
b. If the Model 730A is not mounted on a common rack with the Model 763, connect a ground strap between the two chassis using No.16 AWG or larger wire.

2.4 Model 704F Connections.

A Model 704F Remote Meter and Peak Flasher can be connected to the five REMOTE METER OUTPUTS terminals on strip J1, and an additional Model 704F can be connected to similar terminals on J2, Refer to Figure 6.6, the Model 704F schematic and wiring diagram, for wire color code.

2.5 Composite Output Connections.

Rear-panel banana jacks J7, J8, and J9 provide high-impedance composite outputs for such loads as distortion analyzers and voltmeters. The J9/J8 output is the same as the J7/J8 output, except that the J9 audio has been passed through an internal 75 microsecond deemphasis network.

2.6 Field Installation of Options.

2.6.1 Carrier Power Alarm.

When this option is used, the Carrier-Fail Alarm (Section 2.3.b) is not used.

a. Plug the Carrier Power Alarm board into its socket on the Model 763 chassis (see Figure 2-1).
b. Connect a wire from either the ±5% or the ±10% CARRIER ALARM terminal on rear-panel strip J1 of the Model 763 to the appropriate terminal on the external alarm device. The terminals on the Model 763 can sink a maximum of 50 mA at 30 V DC.
c. Connect a wire from the GND terminal of J1 on the Model 763 to the ground terminal on the external device.

2.6.2 Modulation Alarm.

a. Plug the Modulation Alarm board into its socket on the Model 763 chassis (see Figure 2-1).
b. Connect a wire from the MODULATION ALARM terminal of rear-panel terminal strip J1 on the Model 763 to the appropriate terminal on the external alarm device. The MODULATION ALARM terminal on the Model 763 can sink a maximum of 50 mA at 30 V DC.
c. Connect a wire from the GND terminal of J1 on the Model 763 to the ground terminal on the external device.

2.6.3 Balanced Audio Output.

a. Solder the transformer into the Model 763 motherboard (see Figure 2-1).
b. Wire the BALANCED AUDIO terminals on rear-panel terminal strip J2 to the appropriate connectors on the Mother board.
c. Connect the desired load to the BALANCED AUDIO terminals on rear-panel terminal strip.

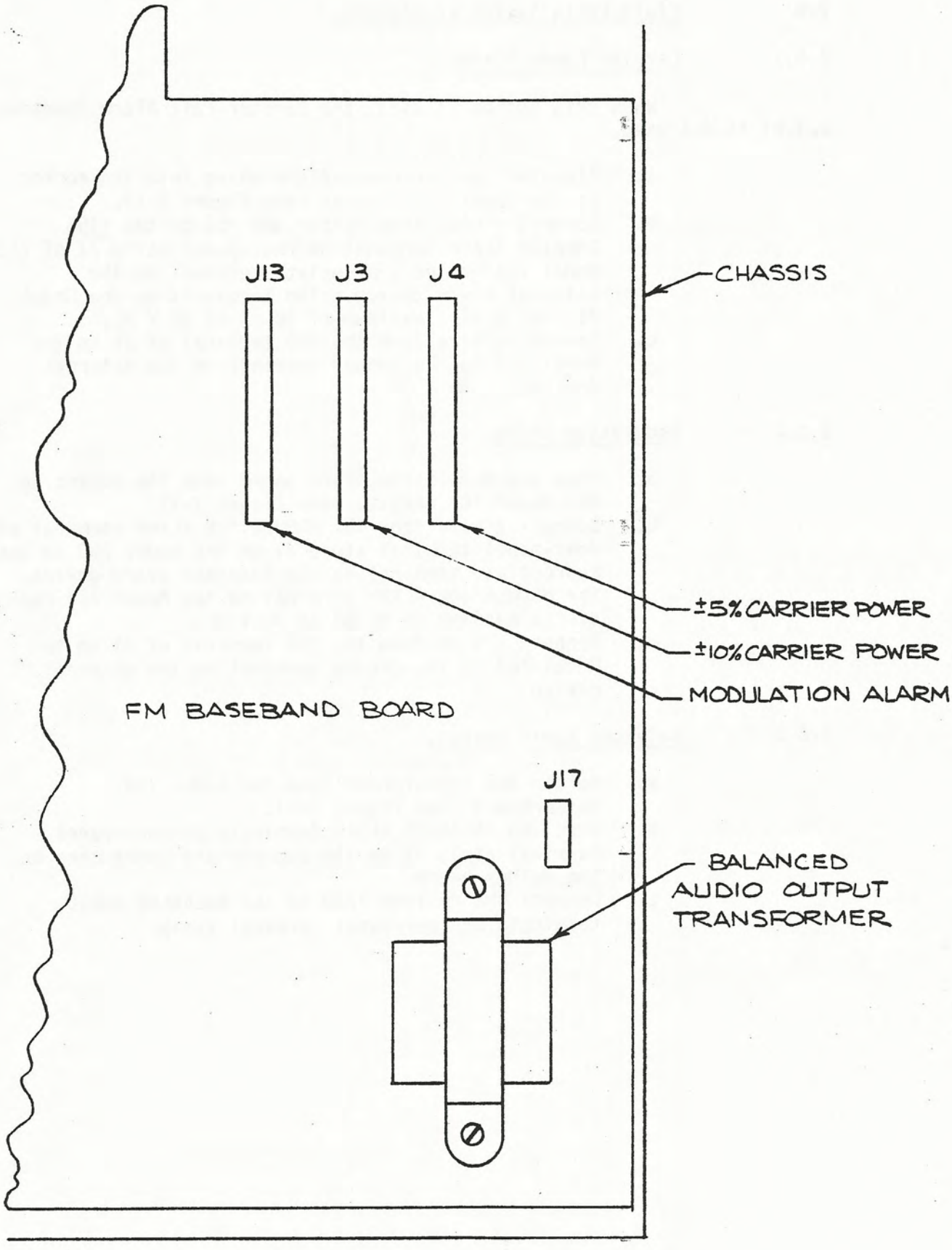

FIGURE: 2-1

NEXT ASSY	USED ON
	763

REVISIONS						
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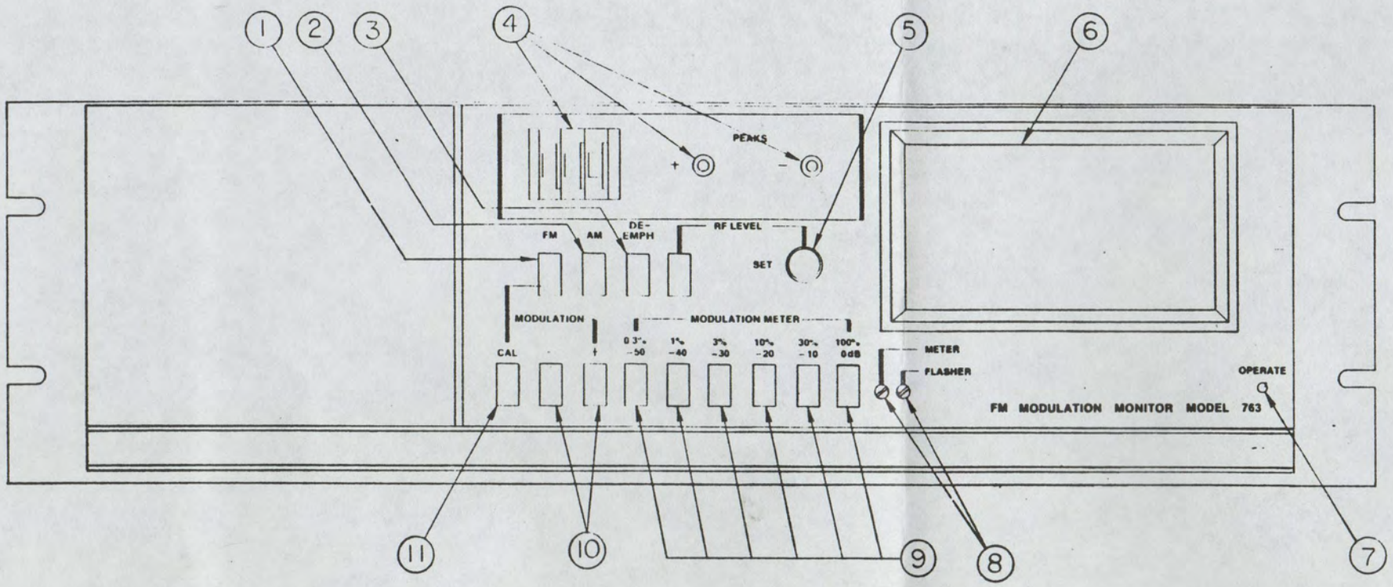
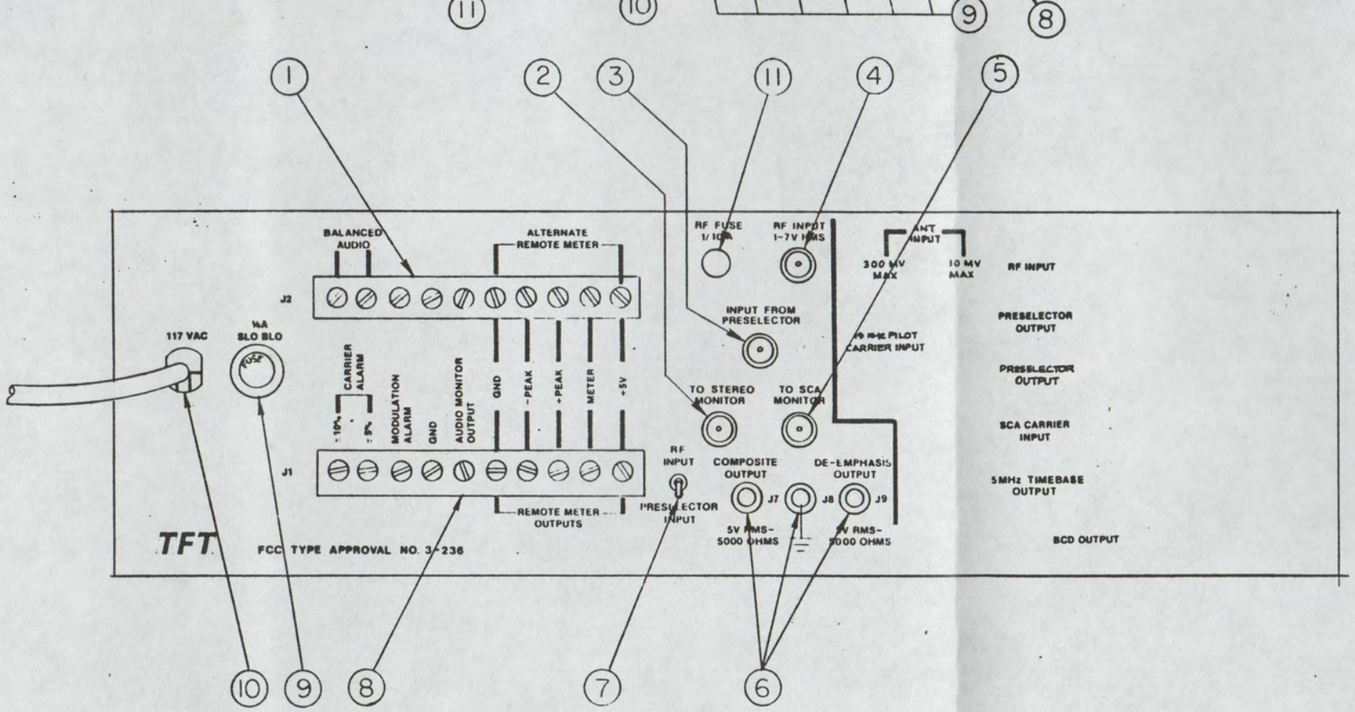
D	REV PER ECO	JT	EW	493	9/15/78	MICRO





ITEM NO	EN NO	PART NO	DESCRIPTION	REF DES
QTY PER ASSY			LIST OF MATERIALS	

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
XX ± ~ ANGULAR
XXX ± ± ~

DO NOT SCALE THIS PRINT

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	CHK BY	9/15/78
	PROJ ENG	
	MFG ENG	
	APPD	
	APPD	
	ECO NO	

TFT TIME & FREQUENCY TECHNOLOGY INC
Santa Clara California 95050

TITLE: FM MONITOR MODEL 763

SIZE D | DRAWING NO 6600-0940 | REV D

SCALE 1-1 | SHT 1 OF 1

SECTION 3

OPERATION

3.1 General.

The Model 763 FM Modulation Monitor enables FM station personnel to monitor FM transmissions to comply with FCC rules. The Monitor provides all the test functions required for modulation proof-of-performance tests. When the Model 763 is used with the Model 724A Stereo Monitor or the Model 730A SCA Monitor, stereo or SCA proof-of-performance tests can also be made.

The Monitor displays the modulation percentage of the carrier being monitored. Either positive or negative modulation can be selected for monitoring on the meter. Two front-panel LED's provide a flashing indication when the modulation percentage exceeds a preset limit on either positive or negative peaks.

The Model 763 displays modulation only. When used with the Model 764A Preselector, carrier frequency error measurements can also be made; and when used with the Model 764A, the Model 724A, the Model 724A Stereo Monitor, and the Model 730A SCA Monitor, stereo pilot frequency and SCA subcarrier frequency can also be measured.

3.2 Turn-On and Warm-Up.

The Monitor contains no on-off switch, and is on whenever it is plugged into an appropriate power source. When the Monitor is on, the front-panel OPERATE light should be lit, regardless of whether an RF input is present or not, to indicate that the power supplies are on. If the OPERATE lamp does not light, check the fuse on the rear panel.

3.3 Controls, Connectors, and Indicators.

Fig. 3-1 Ref. No.	Name	Function
1	FM Switch	Selects the FM mode of operation Depressed for normal FM monitoring.
2	AM Switch	Selects AM mode. Used for making residual AM measurements on the monitored carrier.
3	De-emph Switch	Introduces a 75 us deemphasis network into meter circuit. Can be used in both the FM and AM models.
4	PEAKS lamps and thumbwheel switches	The PEAKS "+" lamp flashes whenever the positive modulation peaks exceed the percentage for which the thumbwheel switches have been set; the PEAKS "-" lamp

3.3 (Continued)

Fig. 3-1 Ref. No.	Name	Function
		does the same thing on negative peaks. Operation of these flashers is independent of all switch settings except the MODULATION CAL switch.
5	RF LEVEL switch and SET control	Used to adjust the carrier input level from the transmitter as described in Section 2.3.
6	MODULATION meter	Indicates modulation percentage of carrier being monitored, as described in Sections 3.5 and 3.6. The scale to be read depends on which MODULATION METER attenuation switch is depressed, as follows:

MODULATION METER Switch	Applicable Meter Scale
100%	Top scale.
30%	Middle scale.
10%	Top scale divided by 10.
3%	Middle scale divided by 10.
1%	Top scale divided by 100.
0.3%	Middle scale divided by 100.

The MODULATION meter is also used to indicate residual noise, as described in Section 3.8. Residual noise in dB referred to 100% modulation is the sum of the reading on the lower meter scale and the dB label on the MODULATION METER switch depressed.

7	OPERATE lamp	When lit, indicates that the AC power is on.
8	FLASHER and METER controls	Used in calibrating the MODULATION meter and PEAKS lamps as described in Sections 3.5 and 3.7.

3.3 (Continued)

Fig. 3-1 Ref. No	Name	Function
9	MODULATION METER attenuation	Used with the MODULATION meter to measure percentage modulation and residual noise as described under reference No.6 on opposite page.
10	MODULATION "-" and "+" switches	Select negative or positive modulation peaks, respectively, to operate the MODULATION meter.
11	MODULATION CAL switch	Switches in the built-in modulation calibrator to calibrate the MODULATION meter and the PEAKS flashers as described in Section 3.5 and 3.7.
Fig. 3-2 Ref. No.		
1	Terminal Strip J2	Provides the following outputs: BALANCED AUDIO -- When this option is installed, a 0 dBm, 600 ohm, balanced audio output is delivered to these two terminals. ALTERNATE REMOTE METER -- These five terminals supply power, peak flasher drive, and modulation meter drive to a Model 704F Remote Meter and Peak Flasher.
2	TO STEREO MONITOR connector J5	Provides a 1 volt rms, 600 ohm composite output to drive a Model 724A Stereo Monitor.
3	RF INPUT connector J3	Accepts the modulated carrier from the transmitter being monitored. Input level must be in the range of 1 to 7 volts rms. Input impedance is 50 ohms.
4	INPUT FROM PRESELECTOR connector J4	Accepts 700 kHz input from a Model 764 or Model 765 Preselector, when used. Input level is 100 mV rms at 50 ohms.

3.3 (Continued)

Fig. 3-2 Ref. No.	Name	Function
5	TO SCA MONITOR connector J4	Provide a 1 volt rms, 600 ohm composite output to drive a Model 730A SCA Monitor.
6	Composite output con-..ectors J7, J8, and J9	J7 provides the same composite output as J5 and J6, but at a level of 5 volts rms into 5000 ohms. J9 provides the same output as J7, but through a 75us deemphasis network. J8 is a ground for use with either J7 or J9. Both the J7 and J9 outputs are for driving high-impedance devices such as distortion meters and oscilloscopes.
7	RF INPUT/PRESELECTOR INPUT switch	Selects either the RF input at J3 or the input from the preselector at J4 as the signal to drive the Monitor. When the Model 763 is used without a preselector, this switch must be in RF INPUT position.
8	Terminal strip J1	Provides the following outputs: 5% CARRIER ALARM -- This terminal sinks a maximum of 50 mA at 30 V DC when the RF input drops below the level necessary to operate the Monitor. It is also used for the Carrier Power Alarm when that option is installed. CARRIER ALARM -- When the Carrier Power Alarm option is installed, one of these two terminals sinks a maximum of 50 mA at 30 V DC when the carrier power level changes by more than 5% of nominal, and the other terminal does the same when the power changes by more than 10%. MODULATION ALARM -- When this option is installed, this terminal sinks a maximum of 50 mA at 30 V DC when the modulation drops below 30% for a period of time between 2 seconds and 1 minute, internally adjustable.

3.3 (Continued)

Fig. 3-2 Ref. No.	Name	Function
		GND -- Provides a ground for the carrier fail output, the carrier power alarm, the modulation alarm, and the audio monitor output. AUDIO MONITOR OUTPUT -- Provides an unbalanced 0 dBm, 600 ohm output for station monitor, etc. REMOTE METER OUTPUTS -- These five terminals supply power, peak flasher drive, and modulation meter drive to a Model 704F Remote Meter and Peak Flasher.
9	1/4A SLO BLO fuse	Fuses the AC power circuit.
10	117VAC line cord	For connecting the Monitor to a power source. If the Monitor is wired for a 230volt input, the line cord will be so marked.
11	0.1A fuse	RF level input protection.

3.4 Setting the Carrier Level Into the Monitor.

The RF input to the measurement circuitry can be adjusted to the required 1 volt for any Monitor input between 1 volt and 7 volts by means of the front-panel RF LEVEL SET control. Depress the RF LEVEL button and adjust the SET control for a meter indication of 100%, which corresponds to a 1 volt rms input.

3.5 FM Measurement Using the Modulation Meter.

With the carrier level set as described in Section 3.4, depress the FM button, the MODULATION METER 100% button, and either the MODULATION "-" or MODULATION "+" button depending on whether negative or positive peaks are to be monitored. The meter will then give a quasi-peak indication of modulation percentage. If deemphasis is desired, press the front-panel DE-EMPH button.

For maximum accuracy, the MODULATION Meter calibration should be checked regularly and adjusted if necessary. The meter is calibrated by depressing the MODULATION CAL and the MODULATION METER 100% buttons; if the meter reading is not exactly 100%, adjust it to 100% by means of the front-panel METER screwdriver control.

3.6 AM Measurement Using the Modulation Meter.

Make sure the carrier level is properly set as described in Section 3.4. Then depress the AM button; the meter will now read the percentage of AM on the carrier. Since this is typically 1% or less, it will be necessary to use a different meter range to obtain a usable reading. The upper meter scale is used for the 1%, 10%, and 100% MODULATION METER switches, and the middle meter scale is used for the 0.3%, 3%, and 30% switches.

The amount of AM on the carrier can also be read in dB below 100% FM by taking the algebraic sum of the reading on the lower meter scale and the dB value of the depressed MODULATION METER switch.

If AM measurements with deemphasis are desired, depress the DE-EMPH switch. To release this switch, depress it again.

3.7 FM Measurement Using the Peak FLashers.

The PEAKS "+" and "-" flashers will catch fast transients and peaks to which the meter cannot respond. They always read FM, even when the AM button is depressed; and they are not affected by the settings of the MODULATION "-", and MODULATION METER switches.

Accuracy of the flashers should be checked regularly, as follows:

a. Depress the MODULATION CAL button.
b. Set the thumbwheel switches for 100%. Both flashers should light.
c. Set the thumbwheel switches for 101%. Both flashers should be off.

If the conditions for b. and c. above are not met, adjust the front-panel FLASHER screwdriver control.

3.8 Measuring Residual Noise.

This measurement is usually made with the DE-EMPH button depressed to provide deemphasis. To measure residual noise, turn off the transmitter modulation. Depress the FM switch. Starting with the 0 dB MODULATION METER switch, depress each switch in turn until a reading is obtained on the MODULATION meter. The residual noise in dB below 100% modulation is the algebraic sum of the lower scale meter reading and the value of the MODULATION METER switch depressed.

3.9 Distortion Measurements.

Connect the distortion meter input to rear-panel connectors J7 and J8 (or, if deemphasis is desired, to J9 and J8). Modulate the transmitter to the desired level and measure the distortion.

3.10 Use of the Model 704F Remote Meter and Peak Flasher.

The Model 704F duplicates the indications of the Model 763 front- panel MODULATION meter and peak flashers. Either one or two of the remote panels can be connected to the Monitor as described in Section 2.4.

To calibrate the remote indicators, make sure the Model 763 meter and flashers are calibrated as described in Sections 3.5 and 3.7, respectively. Then calibrate the external meters by adjusting the potentiometer on the rear of the remote meter.

3.11 Carrier Power Alarm (Optional).

The Carrier Power Alarm board is adjusted at the factory to provide a ground at the rear-panel CARRIER ±5% ALARM terminal when the carrier power level changes by more than that percentage; and a ground at the ±10% terminal when the level changes more than that percentage. If recalibration is required, or if different percentages are to be used, refer to Section 5, Maintenance.

3.12 Modulation Alarm (Optional).

The Modulation Alarm board is factory-set to provide a ground at the rear-panel MODULATION ALARM terminal when the modulation drops below 30% for more than 5 seconds. If a different time period is required, refer to Section 5, Maintenance, for adjustment procedures.

SECTION 4

THEORY OF OPERATION

4.1 Block Diagram (Figure 6-1).

The Model 763 FM Modulation Monitor is basically a superheterodyne receiver capable of accurately measuring the modulation percentage of the frequency modulated RF carrier being monitored. The RF input is adjusted to a level of 1 volt rms by means of the RF LEVEL SET control, and downconverted to a 700 kHz IF by mixing with the output of a highly stable local oscillator. The IF is fed through a 3 MHz low-pass filter to remove residual carrier and other mixer products and through a limiting amplifier to remove any AM on the carrier. The FM signal is then demodulated in a one-shot discriminator, lowpass filtered, and applied to an inverting amplifier. Front-panel switches permit selection of the noninverted positive modulation peaks or the inverted negative modulation peaks for monitoring.

With the front-panel FM switch depressed, the selected modulation is fed through a stepped attenuator, amplified (75 microsecond deemphasis can be inserted at this point by depressing front-panel DE-EMPH switch), and either peakdetected (when high percentage attenuator switches are depressed) or average detected (when low-level signals are being monitored). The output of the selected detector drives the meter through the meter driver, which also supplies outputs for two Model 704F remote meters.

The positive modulation and negative modulation are also used to drive the front-panel PEAKS flashers. Each modulation peak is compared in a peak detector with a voltage obtained from a constant current source by means of thumbwheel selected resistances. The pulse outputs produced by the peak detectors when modulation exceeds the preset voltage are stretched to approximately 3 seconds and applied to the front-panel LED flashers. The outputs are also available for two Model 704F Remote Meter and Peak FLashers.

When the AM switch is depressed, residual AM on the monitored carrier can be measured. The AM is demodulated by the carrier level and AM detector and fed to the stepped attenuator, from where the AM audio is handled in the same way as the FM audio.

The local oscillator frequency is derived by doubling the frequency of a crystal oscillator. The local oscillator is factory set to supply a frequency 700 kHz above the frequency of the transmitter to be monitored. A separate crystal oscillator time base supplies a calibration signal, consisting of a 200 kHz frequency turned on and off at a 5 kHz rate to simulate a 100% modulated FM signal for calibrating the meter and flashers.

When a Model 764 or Model 765 Preselector is used, its 700 kHz output is introduced into the IF limiting amplifier when the rear-panel RF INPUT/ PRESELECTOR INPUT switch is in the PRESELECTOR INPUT position.

All audio outputs, including the optional Balanced Audio Output, are supplied by two audio amplifiers driven by the inverting amplifier.

4.1 (Continued)

The output of the carrier level and AM detector is also used to drive the carrier fail alarm and the optional Carrier Power Alarm. The optional Modulation Alarm is driven by the demodulated FM.

The power supply consists of a transformer that delivers 25 volts AC to a bridge rectifier which feeds three DC regulators supplying outputs of +5 volts, +12 volts, and -12 volts to operate all Monitor circuits.

4.2 AM Detector and Carrier Level Circuits (Figure 6-3)

CR 1 is the AM and carrier level detector. Its output is applied to voltage follower Z36, which acts as a buffer. When the RF LEVEL switch is depressed, the DC output of Z36 is delivered through meter driver Z30 to the meter. This circuit is calibrated so that when the RF LEVEL SET is adjusted for an RF input of 1 volt rms, the MODULATION Meter will deflect to the 100% mark. The DC output of Z36 is also delivered to J3-2 and J4-2 for driving the optional Carrier Power Alarm boards.

The AM output of Z36 is applied to amplifier Z31, whose gain is factory adjusted to produce a 1 volt rms output for 100% amplitude modulation. Thus, when AM monitoring is selected by depressing the AM switch, the rms input to the metering circuit for 100% modulation will be the same as for FM.

4.3 Local Oscillator (Figure 6-3)

The local oscillator frequency is produced by a crystal oscillator whose output is tuned to twice the crystal frequency. Oscillator transistor Q1 is tuned by the resonant circuits L1-C4 and C2-C9. The crystal frequency is selected to produce an output 700 kHz above the monitored carrier frequency. The output of the local oscillator is fed to mixer Z37.

4.4 Mixer (Figure 6-3)

The mixer, Z37, is a double balanced diode ring mixer. The RF input is applied to Pin 5, and the local oscillator is applied to Pin 8. The resulting 700 kHz I.F. at Pins 3 & 7 is passed through the low pass filter consisting of L7, L9 and associated capacitors.

4.5 Limiting Amplifier and Discriminator (Figure 6-3).

The limiting amplifier, Z12, consists of two high-gain differential amplifiers which are driven into saturation to provide limiting.

Z14 is a one-shot multivibrator which acts as a pulse averaging discriminator. It delivers a pulsed output whose frequency is the same as the IF, but with a fixed pulse width. Thus, the duty cycle in the output pulse train varies with the modulation, and the audio is recovered by passing the discriminator output through a low-pass filter. Transistors Q4 through Q7 are clamping circuits.

4.6 Baseband Low-Pass FIlter and Amplifiers (Figure 6-3).

The baseband low-pass filter consists of two low-pass filters separated by amplifier Z17. This provides a flat response to 100 kHz and linear phase, to give good stereo measurements with the Model 724A Stereo Monitor. The frequency response rolls off after 100 kHz to eliminate any 700 kHz present. Baseband amplifier Z18 raises the audio level to 1 volt rms.

4.7 Calibration Signal Generator and Low-Pass Filter (Fig.6-3).

The calibration signal generator consists of buffer Z6-11/Z6-3, divide-by-40 circuit Z7/Z8, and NAND gate Z6-6. The 200 kHz output of the time base is divided down to 5kHz, which is then used to gate the 200 kHz on and off at a 5 kHz rate, thus simulating a 100% modulated input. When the front-panel CAL switch is pressed, this calibration signal is fed into limiting amplifier Z12 and discriminator Z14 in place of the 700 kHz IF. After passing through a 7.5 kHz calibration low-pass filter, it is amplified by Z35 which is adjusted by R47 to give a 100% reading on the meter. The signal can then be used to check meter and flasher calibration. The circuit is very stable, and will calibrate out drifts in the one-shot discriminator and the meter amplifiers.

4.7.1 Peak Flasher Low-Pass Filter (Fig. 6-3)

The output of the one-shot discriminator is also fed to a separate low-pass filter which cuts off at approximately 85 kHz to eliminate any wideband noise spikes from the preselector. The filtered signal is fed to amplifier Z38 which is adjusted by R51 to provide the proper level to drive the peak flashers.

4.8 Inverting Amplifier (Fig. 6-3)

Inverting amplifier Z19 is a unity-gain operational amplifier. In the monitor mode, recovered audio from the discriminator is delivered through the base band low-pass filter and the baseband amplifier to the "+" terminal of switch S9 so that when front-panel MODULATION "+" switch is depressed, positive modulation peaks are monitored. The audio is also inverted by Z19 and fed to the "-" terminal of S9 for monitoring negative peaks when MODULATION "-" switch is depressed.

4.9 Thumbwheel Current Source and Peak Detectors (Figure 6-3).

Operational amplifier Z20 acts as a constant-current generator for the thumbwheel-switch resistors. Zener CR15 furnishes a constant voltage input to Z20, adjustable by R110; this front-panel FLASHER control is adjusted in the calibration mode to trigger the peak detectors with the thumbwheel switches reading 100%, but will not trigger them with the thumbwheel switches at 101%. The gain of Z20 is set by the thumbwheel switch resistors in the feedback circuit. The thumbwheel switches are calibrated so that when they indicate 100%, the selected resistance is of such a value that the DC voltage out of Z20 is exactly equal to the peaks of a 75kHz modulated carrier. Other settings of the thumbwheel switches select appropriate resistance values to produce the required reference voltage out of Z20 for the percentage modulation indicated by the switches.

The reference voltage from Z20 is compared with positive modulation peaks in peak detector Z22. When the modulation amplitude exceeds the reference voltage, Z22 produces an output pulse. The pulse is stretched to approximately 3 seconds in one-shot multivibrator Z23-2/Z23-13 to drive the front-panel PEAKS "+" LED through Q10. Z21 is the negative peak detector; Z23-3/Z23-14 stretches pulses for negative modulation, and Q11 drives the front-panel PEAKS "-" LED. Drivers Q10 and Q11 also provide open-collector outputs for remote flashers.

4.10 Audio Amplifiers (FIgure 6-3).

The audio output of inverting amplifier Z19 drives the two audio amplifiers, Z24 and Z25. Z25 provides 5 volt rms outputs at J6-6 and J6-5; 75 microsecond deemphasis is added to the output at J6-6 by capacitor C121. Amplifier Z24 provides the 0 dBm, 600 Ohm audio monitor output at J1-5, and the two 1 volt rms, 600 ohm outputs at J6-3 and J6-2.

4.11 Meter Amplifiers and Meter Detectors (Figure 6-3).

Meter amplifiers Z26, Z27, and Z28 provide approximately 50 dB of gain to drive the meter detectors. Input to Z26 comes from the FM/AM switch through the stepped attenuator. Variable resistor R92 is the front-panel METER adjustment, which varies the gain of Z26 to provide a meter reading of 100% in the calibration mode with the 100% attenuator switch depressed.

Q9 is a switch which grounds C78 to provide 75 microsecond deemphasis when the front-panel DE-EMPH switch is depressed to furnish a positive DC voltage at J7-7.

Because average meter readings are more significant for low-level signals such as residual AM and noise, and peak meter readings are more significant for the normal FM, two meter detectors are used, both driven by Z28. When the attenuator 0 dB, 10 dB, or 20 dB switch is closed, the output of peak detector CR5 feeds meter driver Z30. When the attenuator 30 dB, 40 dB, or 50 dB switch is closed, the output of half-wave averaging detector Z29 is applied to Z30. This averaging detector is calibrated by R79 to give the same reading as the peak detector on sine waves.

4.12 Power Supplies (Figure 6-3).

A chassis-mounted transformer furnishes 25 volts AC to bridge rectifier CR9 through CR12, which provides +19 volts to regulators Z32 and Z33, and -19 volts to regulator Z34. Z32 delivers a +5 volt output, Z33 a +12 volt output, and Z34 a -12 volt output to operate all circuits in the Monitor, except audio amplifiers Z24 and Z25 which are supplied by 16V Zeners CR14 and CR17. The regulators are not adjustable.

SECTION 5

MAINTENANCE

5.1 General.

Since the Model 763 is a solid-state instrument and its power requirements are low, no maintenance problems due to high temperature should be encountered, provided the instrument is installed well away from vacuum-tube and other heat-generating equipment. Likewise, because the operating voltages are low, excessive dust accumulation associated with high-voltage devices should not occur.

5.2 Access.

To gain access to the top-of-chassis components, remove six screws from the top cover, and then remove the top cover. No access is provided to the bottom of the board.

5.3 Periodic Maintenance.

Once a year, or more often in dusty locations, remove the cover and blow off any dust with compressed air.

On a regular basis, check the meter calibration as described in Section 3.5, and check the calibration of the peak flashers as described in Section 3.7.

NOTE

For all maintenance checks and adjustments, set front-panel controls as follows unless directed otherwise in the procedure.

FM pushbutton depressed
DE-EMPH pushbutton up
RF LEVEL pushbutton up
RF LEVEL SET control as described in Section 2.3.g
MODULATION CAL pushbutton up
MODULATION + pushbutton depressed
MODULATION METER 100% (0 dB) pushbutton depressed
Also verify that the Preselector/RF Input switch is in the RF Input position.

5.4 Modulation Accuracy Check.

The modulation meter can be calibrated against the internal standard as described in Section 3.5. If calibration against a laboratory standard is desired, a Bessel-null measurement must be performed using a spectrum analyzer with a 13.587 kHz modulation frequency (second Bessel null). This should produce a MODULATION meter reading of 100% ±2. When the CAL pushbutton is depressed, the meter should again read 100% ±2%.

5.5 Calibration Circuit Adjustment.

If the measurements of Section 5.4 show that the MODULATION meter is in error by more than ±2%, proceed as follows:

a. Adjust the front-panel METER control for a reading of exactly 100% with the Bessel-null adjustments of Section 5.5.

b. Depress the front-panel CAL pushbutton. If the MODULATION meter does not read 100% within ±2%, adjust CAL LEVEL potentiometer R47 on the Mother Board so that the meter reads 100%.

5.6 Modulation Attenuator Check.

a. Adjust the audio input level to the transmitter modulator to produce a 0 dB reading on the MODULATION meter with the front-panel 0 dB pushbutton depressed.

b. Reduce the audio input level to the transmitter modulator by exactly 10 dB.

c. Depress the -10 dB pushbutton. The MODULATION meter should read 0 dB.

d. Reduce the audio input to the transmitter modulator another 10 dB.

e. Depress the front-panel -20 dB pushbutton. The meter should read 0 dB.

f. Reduce the transmitter audio input another 10 dB, for a total reduction of 30 dB.

g. Depress the -30 dB pushbutton. The meter should read 0 dB.

If the MODULATION meter does not read correctly in steps c and e, first make sure that the transmitter modulation level reductions were accurately made. If they were, then one or more of the precision resistors (R61 through R70) in the attenuator network are probably defective.

If the meter reads correctly in steps c and e, but reads incorrectly in step g, the problem may be a difference in gain between the peak detector used in the 0 dB, -10 dB and -20 dB positions and the averaging detector (used in the -30 dB, -40 dB, and -50 dB positions). To correct this, perform steps f and g above, and adjust R79 (located approximately 2 inches behind the attenuator switches toward the center of the Mother Board) for a meter reading of 0 dB.

5.7 RF level and AM Modulation Circuitry Checks.

a. Connect the output of an RF signal generator to the RF Input on the rear panel and adjust the generator for a 1 v olt RMS output at the Monitor operating frequency.

b. Depress the RF LEVEL Pushbutton the Model 763 front panel. The meter should read 100% ±10%.

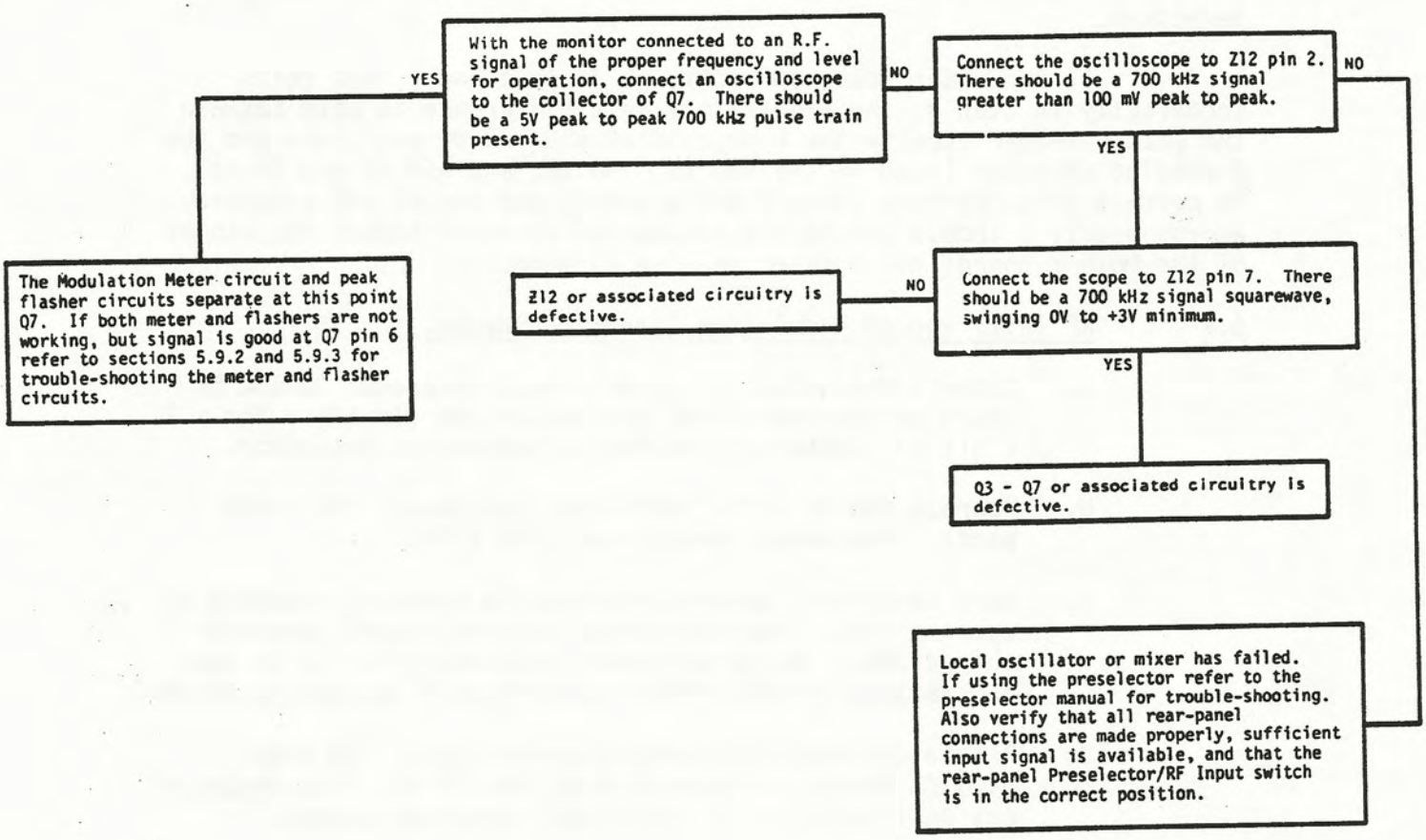
c. Vary the signal generator output to produce a reading of exactly 100%. Amplitude modulate the signal generator output 30%. The meter should read 30% ±5%. If it does not, adjust AM CAL potentiometer R72 on the Mother Board.

d. Reduce the amplitude modulation to zero. The meter reading should be down by more than 70 dB, less whatever residual noise is in the signal generator output.

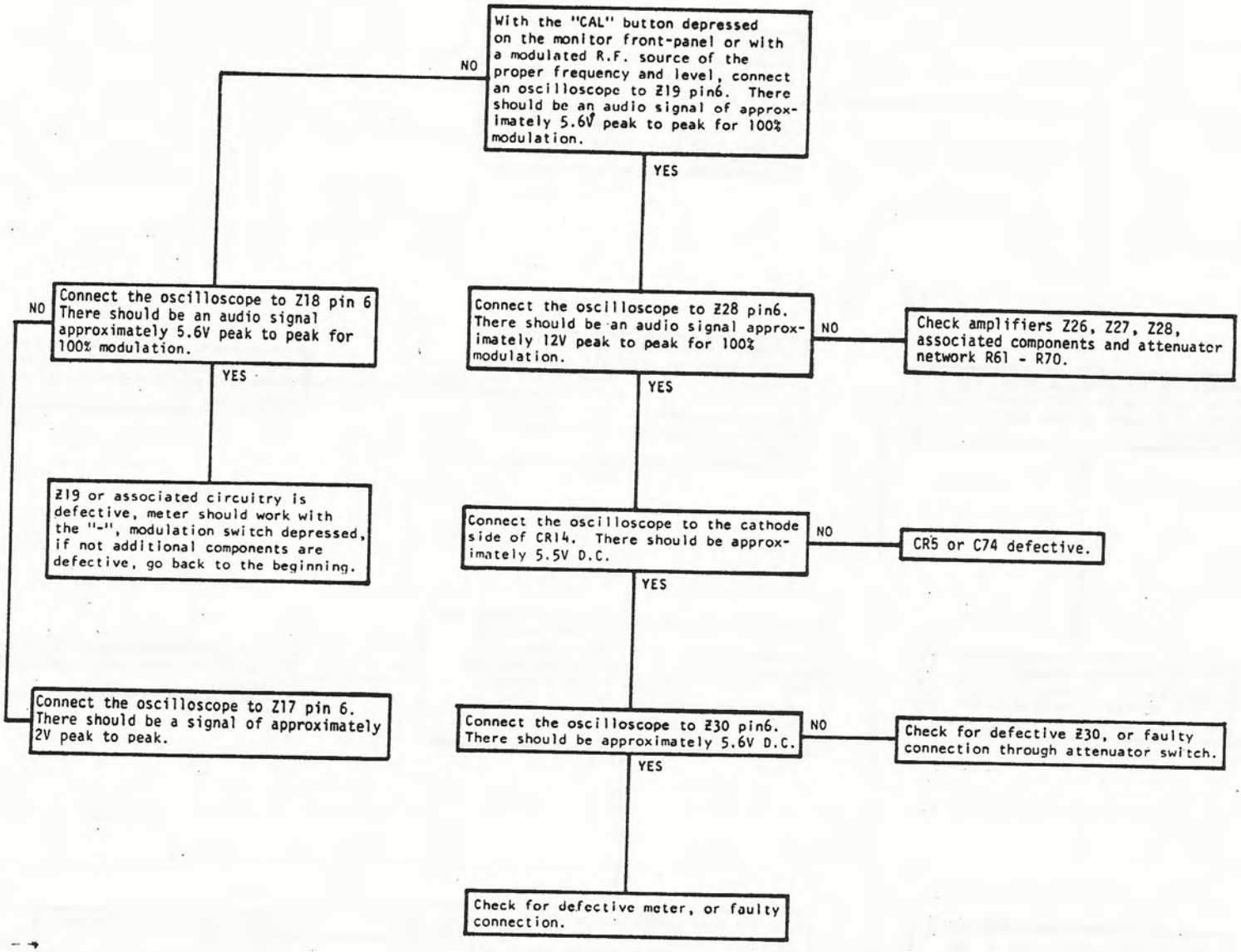
5.8 Troubleshooting Guides.

Four troubleshooting trees are presented in Sections 5.9.1 through 5.9.4 as an aid in isolating the causes of a failure. To use the guides, start at the top and do whatever is required to answer the question in the first box. Then proceed to the next operation along the route determined by the answer to the first question. Continue this sequence until the fault is found.

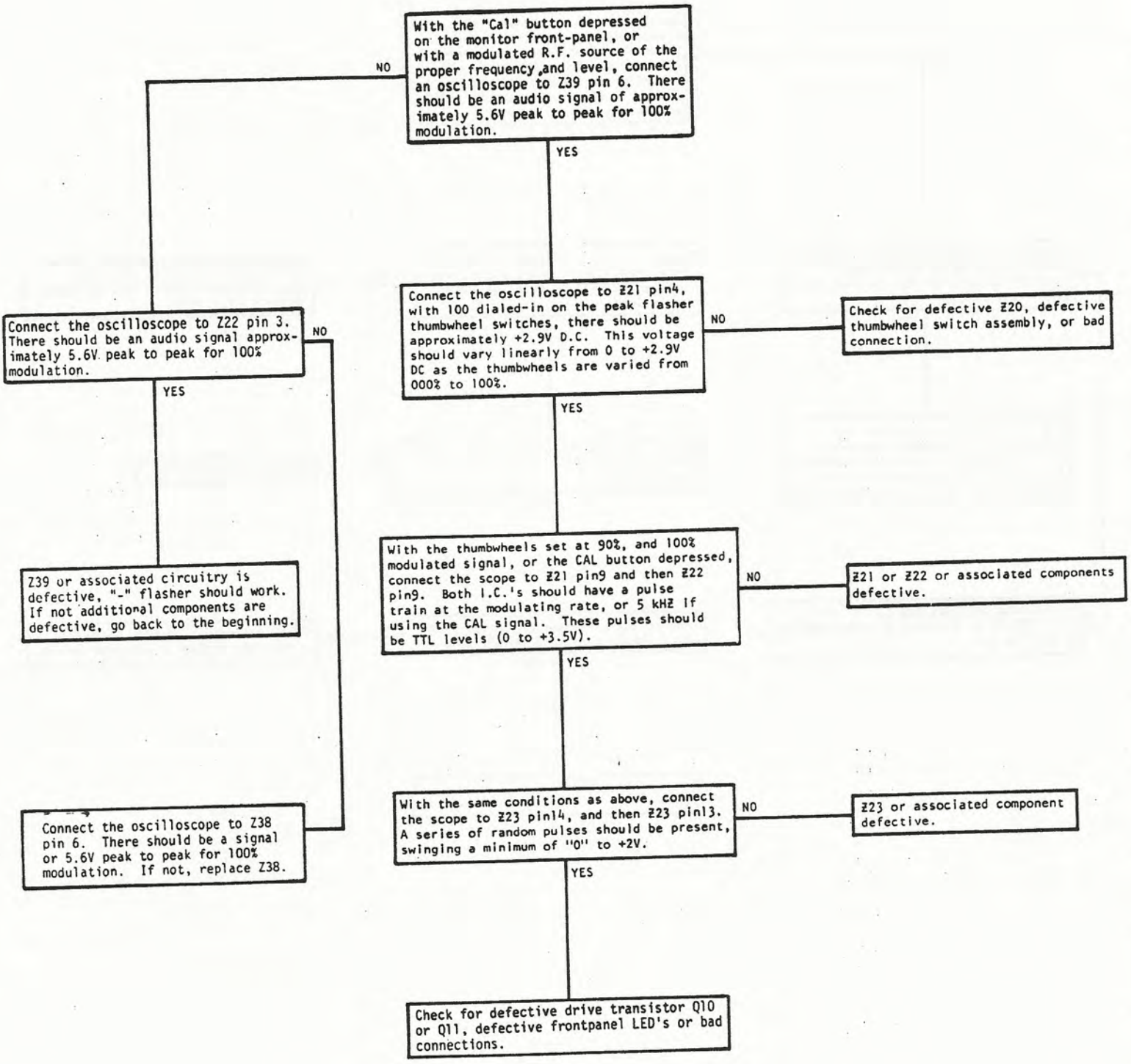
5.9.1 Modulation and Flasher Inoperative



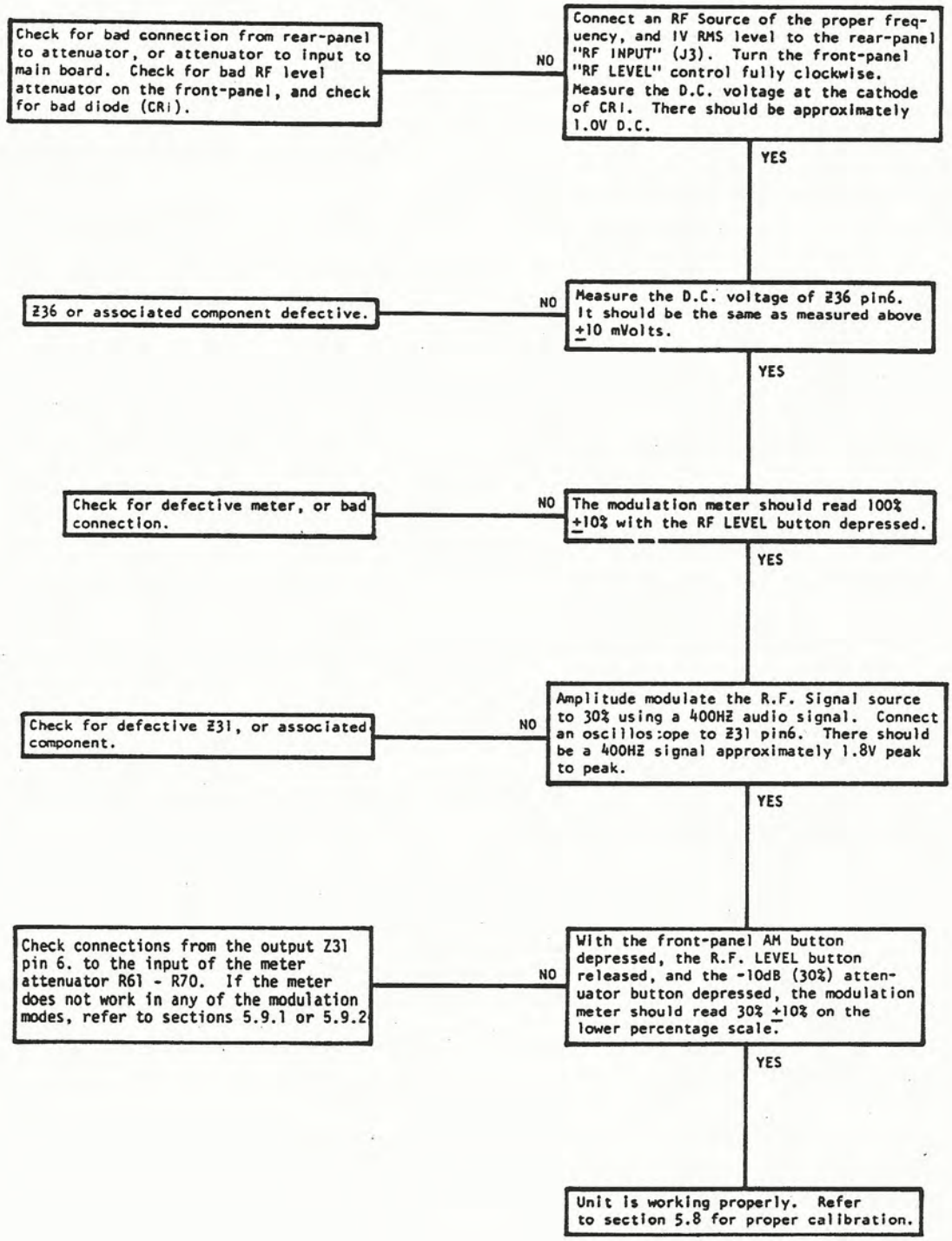
5.9.2 Modulation Meter Inoperative



5.9.3 Peak Flashers Inoperative



5.9.4 RF Level and/or AM Modualtion Circuitry Inoperative



NEXT ASSY	USED ON
	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
B	REV PER ECO 344	TD			7-15-74
C	REV PER ECO 377				9/24/75

R.F. INPUT 88-108 MHz 1-7 VRMS

RF LEVEL SET

CARRIER LEVEL AND AM DETECTOR

L.O. = f_{IN} - 700kHz

CRYSTAL LOCAL OSCILLATOR

700 KHz

3 MHz LOW PASS

INPUT FROM PRESELECTOR

PRESELECTOR

CALIBRATION SIGNAL GENERATOR

CAL

RF

LIMITING AMPLIFIER

ONE SHOT DISCR.

MODULATION ALARM

LOSS OF MODULATION ALARM (OPTION)

BASEBAND LOW PASS fc = 300KHz

CALIBRATION LOW PASS fc = 7.5 KHz

PEAK FLASHER LO-PASS fc = 85KHz

AUDIO AMPLIFIERS

INVERTING AMPLIFIER

INVERTING AMPLIFIER

AM AMPL.

BALANCED AUDIO

724A 1V/600Ω

750 1V/600Ω

AUDIO MONITOR 0dBm/600Ω

AUDIO WITH DE-EMPHASIS 8V/5KΩ

AUDIO WITHOUT DE-EMPHASIS 8V/5KΩ

FM

AM

0-50 dB ATTENUATOR 10dB STEPS

50dB

S/N

DE-EMPHASIS

0.8 -50 1 -40 3 -30 10 -20 20 -10 100% 0dB

PEAK DETECTOR

0-20dB

30-50dB

AVERAGE DETECTOR

REMOTE METER

REMOTE METER

MODULATION

RF LEVEL

METER DRIVER

CARRIER POWER ALARMS (OPTION)

± 10%

± 5%

VCC

I

PEAKS 1 9 9 %

+ PEAK DETECTOR

PULSE STRETCHER & DRIVER

REMOTE + FLASHERS

+6V

- PEAK DETECTOR

PULSE STRETCHER & DRIVER

REMOTE - FLASHERS

117/230 VAC LINE

POWER SUPPLY

+12V

+5V

-12V

ITEM NO.	QTY PER ASSY	PART NO	DESCRIPTION
		LIST OF MATERIALS	

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED .xx ± .xxx ± ANGULAR ±

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ECO NO.

TFT TIME & FREQUENCY TECHNOLOGY INC. 3000 Olcott St. Santa Clara, California 95050 (408) 249-6300

TITLE BLOCK DIAGRAM FM MONITOR FIGURE 6-1

SIZE D DRAWING NO 6600-0980 REV C

SCALE 2 SHT OF

DWG. NO. 6600-0980 REV C

MICRO

NEXT ASSY	USED ON
N/A	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
A	REL TO PROD. ECO 348	TD			
B	REV FOR REVB MANUAL	TD			

REAR PNL.
RF INPUT
Q1A
FRONT PNL.
RF LEVEL
51Ω 2W
51Ω 2W
TO A1-J6

INPUT FROM PRE-SELECTOR
P15A
2
1
A1 - J15

AM MOD J2-2
FM MOD J7-4
FM
J7-1
AM
J7-5 +12V
S/N
J7-7
J7-8 GND
J2-1 RF LEVEL
RF LEVEL
J7-6 MODULATION
MODULATION
J7-8 GND
J11-1
DS1
DS2
J11-2
A1-J9-1
0-1.99K
PEAKS
A1-J9-2

A1-J9-3
CR1
- PEAK
A1-J9-5
CR2
+PEAK
A1-J9-4

A1 J8
TO A1-J8
1
2
3
4
5
RP J2
10 +5V
9 METER
8 +PEAK
7 - PEAK
6 GND
5
4
3
2
1

RPJ6
2
TO SCA MONITOR
RP-J5
3
TO STEREO MONITOR
RP-J7
5
COMPOSITE OUTPUT
RP-J8
7
GND
RP-J9
6
AUDIO OUTPUT WITH DEEMPHASIS

117 V AC
BLK
GRN
WHT
V4A S.B.
1
2
3
TB1
C1 .01 1KV
C2 .01 1KV
BLK
BLK
GRN
GRN/YEL
GRN
1
2
3
P10
A1-J10

1. CAPACATANCE VALUES ARE IN MICRO-FARADS

NOTES, UNLESS OTHERWISE SPECIFIED;

ITEM NO.	EN NO.	PART NO.	DESCRIPTION	REF. DES.

QTY PER ASSY — LIST OF MATERIALS

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TOLERANCES UNLESS OTHERWISE SPECIFIED
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.XXX ± ±

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PROJ. ENG.	Dave	7/27/77
MFG. ENG.		
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ECO NO.		

TFT TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St., Santa Clara, California 95050
(408) 246-6365

TITLE: WIRING DIAGRAM FIGURE 6-2

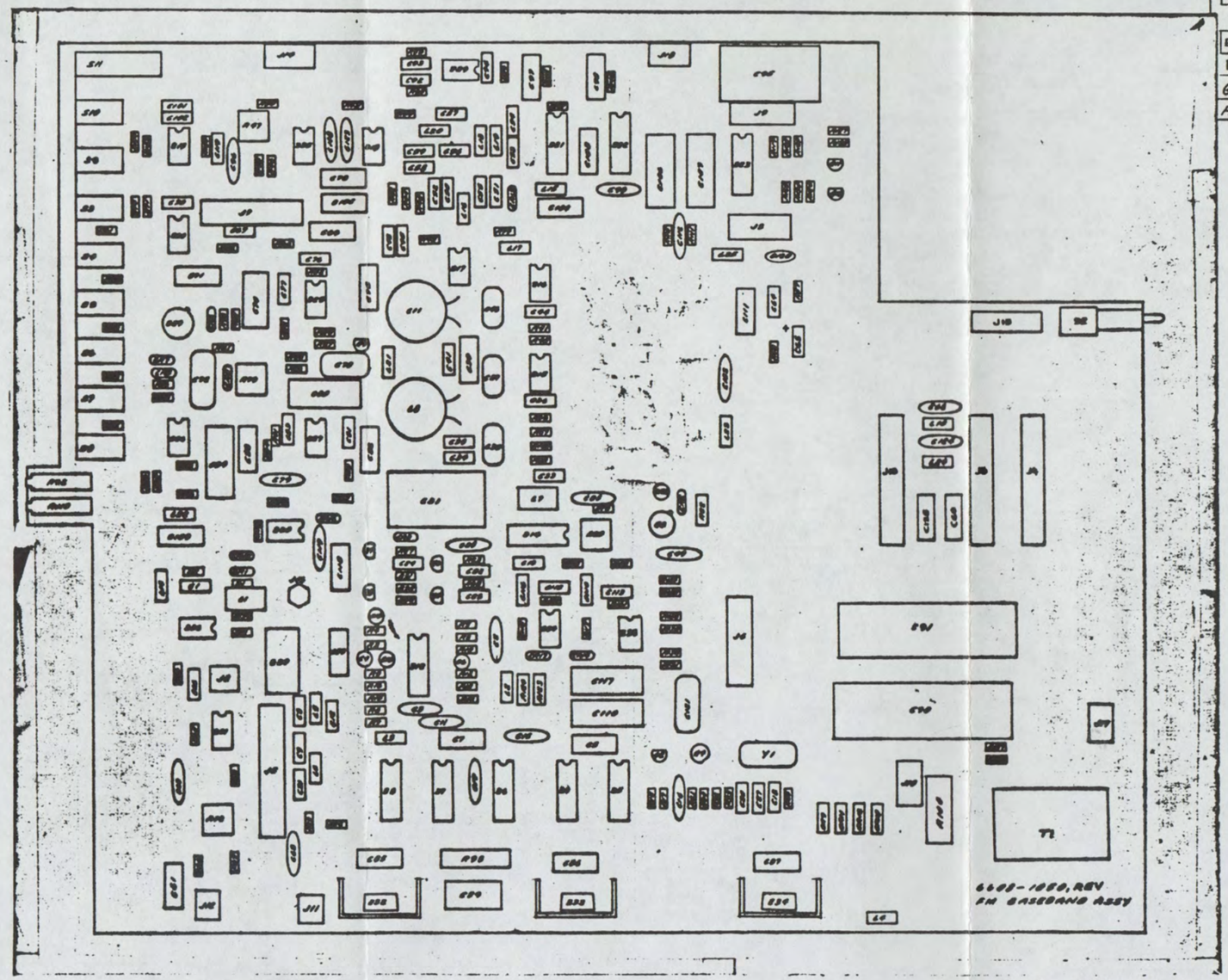
SIZE C | DRAWING NO. 6600-108 | REV B

SCALE N/A | SHT 1 OF 1

DWG. NO.

NEXT ASSY	USED ON
5102-1820	763

SYM	DESCRIPTION	DR	CHK	AUTH	DATE
C	REV PER ECO 377	JD	JT		10/17/78
D	REV/ECO 998. PARTS SUBSTITUTION CHANGE ONLY TO L/M. NO CHANGE TO DWG	MY	JTam	JTam	1/4/80
E	REV PER ECO 1065	MY	EL.	EL.	1/22/80 CP
F	REV PER ECO 1209	JT	JT	JT	7/25/80
G	REV PER ECO 1323	KL			1/26/81
H	REV PER ECO 1395	KL			3/6/81



SCHEMATIC: 6601-1570

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QTY PER ASSY		LIST OF MATERIALS		

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
.XX ±
.XXX ±
ANGULAR ±

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CHK. BY	JTam	12/21/78
PROJ. ENG.		
MFG ENG.		
APPD.		
APPD.		
ECO NO.		

TFT TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St., Santa Clara, California 95051
(408) 246-8385

TITLE: FM BASEBAND ASSY

SIZE C | DRAWING NO 6608-1050 | REV H | SCALE ~ | SHT 1 OF 1

DWG. NO. 6608-1050

Ckt. Ref.	Description	TFT Stock No.
C1	Cap Mica 820 PF	1001-0821
C2	Cap Cer Disc .2MFD	1005-2029
C3	Cap Cer Disc .2MFD	1005-2029
C4	Cap Tan 10MFD 20V 10%	1008-0100
C5	Cap Elect 15MFD 25V	1010-0150
C6	Cap Tan 10MFD 20V 10%	1008-0100
C7	Cap Elect 15MFD 25V	1010-0150
C8	Cap Mica 750 PF	1001-0751
C9	Cap Mica 1000 PF	1001-0102
C10	Cap Tan 10MFD 20V 10%	1008-0100
C11	Cap Cer Disc .2MFD	1005-2029
C12	Cap Mica 270 PF	1001-0271
C13	Cap Tan 10MFD 20V 10%	1008-0100
C14	Cap Mica 68 PF	1001-0680
C15	Cap Cer Disc .2MFD	1005-2029
C16	Cap Cer Disc .2MFD	1005-2029
C17	Not Used	
C18	Cap Mica 470 PF	1001-0471
C19	Cap Cer Disc .2MFD	1005-2029
C20	Cap Mica 1000 PF	1001-0102
C21	Cap Mica 750 PF	1001-0751
C22	Cap Mica 10 PF	1001-0100
C23	Cap Mica 10 PF	1001-0100
C24	Cap Mica 10 PF	1001-0100
C25	Cap Cer Disc .2MFD	1005-2029
C26	Cap Tan 10MFD 20V 10%	1008-0100
C27	Cap Mica 51 PF	1001-0510
C28	Cap Cer Disc .2MFD	1005-2029
C29	Cap Tan 10MFD 20V 10%	1008-0101
C30	Cap Poly .0039MFD 100V	1002-0392
C31	Cap Elect 2200 MFD	1010-0222
C33	Cap Tan 2.2MFD 20V 10%	1008-0022
C34	Cap Mica 1000 PF	1001-0102
C35	Not Used	
C36	Cap Mica 240 PF	1001-0241
C37	Cap Poly .0082MFD 100V	1002-0822
C38	Cap Mica 270 PF	1001-0271
C39	Cap Mica 1700 PF	1001-0172
C40	Not Used	
C41	Cap Mica 200 PF	1001-0201
C42	Not Used	
C43	Cap Mica 1000 PF	1001-0102
C44	Cap Mica 91 PF	1001-0910
C45	Cap Mica 270 PF	1001-0271

Ckt. Ref.	Description	TFT Stock No.
C46	Cap Poly .01MFD 100V	1002-0011
C47	Not Used	
C49	Cap Cer Disc .2MFD	1005-2029
C50	Cap Mica 18 PF	1001-0180
C51	Cap Mica 22 PF	1001-0220
C52	Cap Mica 270 PF	1001-0271
C53	Cap Mica 470 PF	1001-0471
C54	Cap Mica 33 PF	1001-0330
C55	Cap Mica 100 PF	1001-0101
C56	Cap Mica 470 PF	1001-0471
C57	Cap Mica 75 PF	1001-0750
C58	Cap Mica 5.0 PF	1001-0050
C59	Cap Mica 240 PF	1001-0241
C60	Cap Elect 15MFD 25V	1010-0150
C61	Cap Elect 15MFD 25V	1010-0150
C62	Cap Cer Disc .2MFD	1005-2029
C63	Cap Cer Disc .2MFD	1005-2029
C64	Cap Tan 4.7MFD 35V 10%	1008-0047
C65	Cap Tan 4.7MFD 35V 10%	1008-0047
C66	Cap Tan 2.2MFD 20V 10%	1008-0022
C67	Cap Tan 4.7MFD 35V 10%	1008-0047
C68	Cap Cer Disc .2MFD	1005-2029
C69	Cap Elect 15MFD 25V	1010-0150
C70	Cap Mica 150 PF	1001-0151
C71	Cap Elect 25MFD 6V	1010-0250
C72	Cap Poly .22MFD 100V	1002-0220
C73	Cap Elect 15MFD 25V	1010-0150
C74	Cap Elect 250MFD 6V	1010-0251
C75	Cap Elect 15MFD 25V	1010-0150
C76	Cap Tub 2.2 PF	1000-0022
C77	Cap Mica 150 PF	1001-0151
C78	Cap Poly .068MFD 100V	1002-0681
C79	Cap Cer Disc .2MFD	1005-2029
C80	Cap Elect 250MFD 6V	1010-0251
C81	Cap Mica 18 PF	1001-0180
C82	Cap Elect 15MFD 25V	1010-0150
C83	Cap Mica 150 PF	1001-0151
C84	Cap Elect 100MFD 16V	1010-0101
C85	Cap Elect 15MFD 25V	1010-0150
C86	Cap Elect 15MFD 25V	1010-0150
C87	Cap Elect 15MFD 25V	1010-0150
C88	Cap Elect 15MFD 25V	1010-0150
C89	Cap Elect 100MFD 25V	1010-0103

Ckt. Ref.	Description	TFT Stock No.
C90	Cap Elect 1000MFD 25V	1010-1001
C91	Cap Mica 5.0 PF	1001-0050
C93	Cap Mica 150 PF	1001-0151
C94	Cap Tub 2.2 PF	1000-0022
C95	Cap Elect 2200 MFD	1010-0222
C96	Cap Cer Disc .2MFD	1005-2029
C97	Cap Tan 10MFD 20V 10%	1008-0101
C98	Cap Tan 10MFD 20V 10%	1008-0101
C99	Cap Cer Disc .2MFD	1005-2029
C101	Cap Mica 150 PF	1001-0151
C102	Cap Tub 2.2 PF	1000-0022
C103	Cap Elect 15MFD 25V	1010-0150
C104	Cap Elect 15MFD 25V	1010-0150
C105	Cap Elect 15MFD 25V	1010-0150
C106	Cap Elect 150MFD 6V	1010-0251
C107	Cap Elect 250MFD 6V	1010-0251
C108	Cap Cer Disc .2MFD	1005-2029
C109	Cap Elect 15MFD 25V	1010-0150
C110	Cap Elect 100MFD 25V	1010-0103
C111	Cap Elect 15MFD 25V	1010-0150
C112	Cap Cer Disc .2MFD	1005-2029
C113	Cap Mica 12 PF	1001-0120
C114	Cap Mica 150 PF	1001-0151
C115	Cap Mica 15 PF	1001-0150
C116	Cap Mica 150 PF	1001-0151
C117	Cap Elect 100MFD 25V	1010-0103
C118	Cap Elect 15MFD 25V	1010-0150
C119	Cap Cer Disc .2MFD	1005-2029
C120	Cap Cer Disc .05MFD	1005-5039
C121	Cap Poly .056MFD 100V	1002-0561
C122	Not Used	
C123	Cap Cer Disc .2MFD	1005-2029
C124	Cap Cer Disc .2MFD	1005-2029
C125	Cap Elect 15MFD 25V	1010-0150
C126	Not Used	
CR1	DIO, Hot Carrier, HP 5082-2800	1282-2800
CR2	DIO, ZNR IN4734A	1283-4734
CR3	DIO, Hot Carrier, HP 5082-2800	1282-2800
CR4	LED HP 5082-4487 Clear	1285-4487
CR5	DIO, Hot Carrier, HP 5082-2800	1282-2800
CR6	DIO, Hot Carrier, HP 5082-2800	1282-2800
CR7	DIO, IN3064	1281-3064

Ckt. Ref.	Description	TFT Stock No.
CR8	DIO, Hot Carrier, HP 5082-2800	1282-2800
CR9	DIO, MR501	1281-0501
CR10	DIO, MR501	1281-0501
CR11	DIO, MR501	1281-0501
CR12	DIO, MR501	1281-0501
CR13	DIO, ZNR IN4735	1283-4735
CR14	DIO, ANR IN4745	1283-4745
CR15	DIO, ANR IN4734A	1283-4734
CR16	DIO, ANR IN4735	1283-4735
CR17	DIO, ANR IN4745	1283-4745
J1	Term Strip 10 Pos	1700-0010
J2	Plug 2 Pin	2250-6002
J3	Plug 10 Pin	2250-6510
J4	Plug 10 Pin	2250-6510
J5	Plug 10 Pin	2250-6510
J6	Plug 7 Pin	2250-6007
J7	Plug 8 Pin	2250-6008
J8	Plug 5 Pin	2250-6505
J9	Plug 5 Pin	2250-6505
J10	Plug 3 Pin	2250-6003
J11	Plug 2 Pin	2250-6002
J12	Plug 2 Pin	2250-6002
J13	Plug 10 Pin	2250-6510
J15	Plug 2 Pin	2250-6002
J16	Conn RF Sub Mini 50 ohm	2200-0004
J18	Plug 3 Pin	2250-6003
L1	Choke RF 2 1/2 T	1530-0025
L2	Choke RF 15 UH	1530-0150
L3	Choke RF 15 UH	1530-0150
L4	Choke RF 15 UH	1530-0150
L5	Choke 2.2 UH	1530-0020
L6	Choke 2.2 UH	1530-0020
L7	Choke RF 2 1/2 T	1530-0025
L8	IND VAR 76T	1577-0920
L9	IND VAR 76T	1577-0920
L10	Choke RF 15 UH	1530-0025
L11	IND VAR 76T	1577-0920
L12	IND VAR 76T	1577-0920
L13	Choke RF 470 UH	1530-0471
L14	Choke RF 15 UH	1530-0150
L15	Choke RF 15 UH	1530-0150
L16	Choke 560 UH	1530-0561

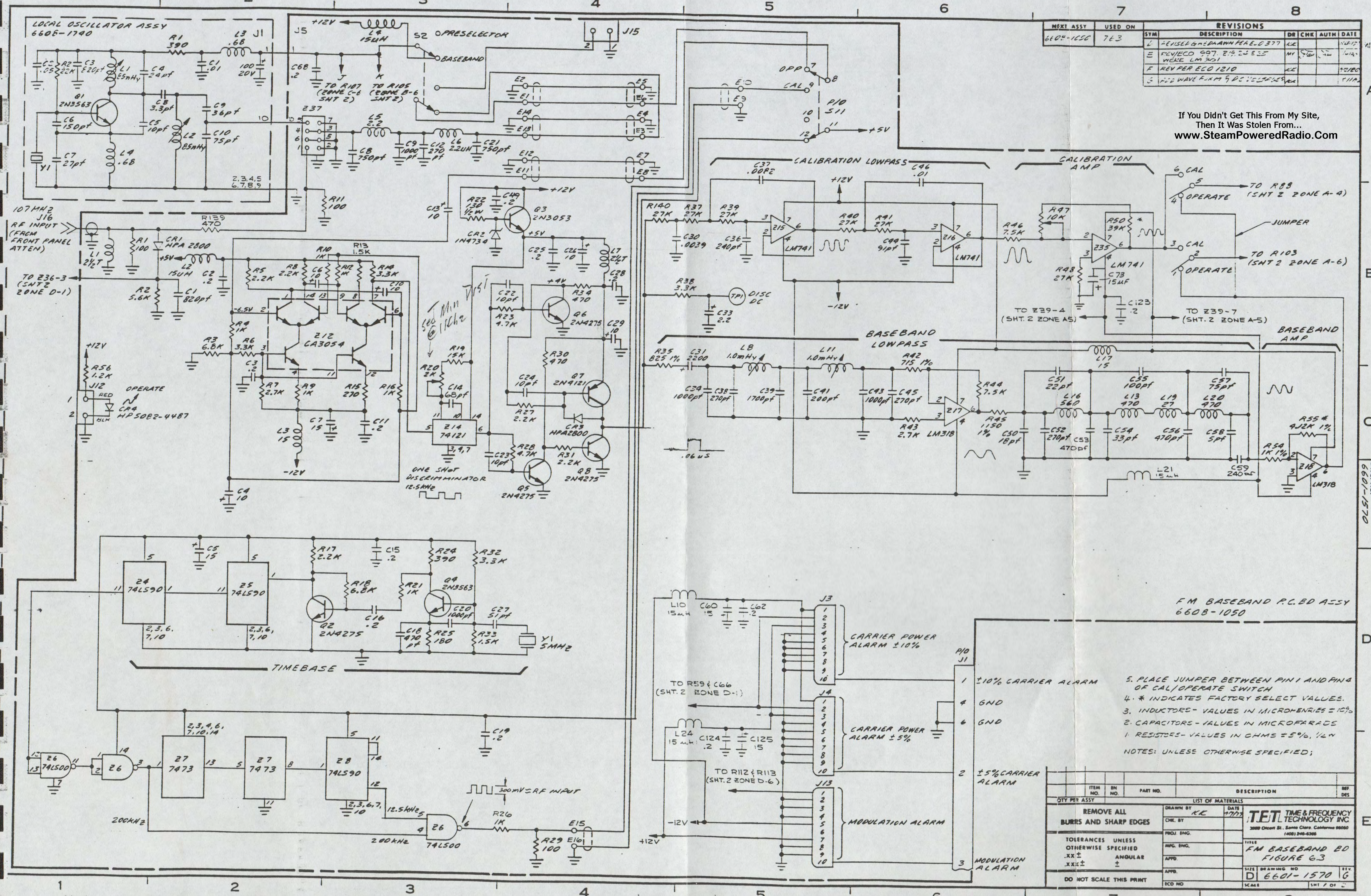
Ckt Ref.	Description	TFT Stock No.
L17	Choke RF 15 UH	1530-0150
L18	Not Used	
L19	Choke RF 27 UH	1530-0270
L20	Choke RF 470 UH	1530-0471
L21	Choke RF 15 UH	1530-0150
L22	Choke RF 15 UH	1530-0150
L23	Not Used	
L24	Choke RF 15 UH	1530-0150
L25	Choke RF 150 UH	1530-0151
Q2	Xistor 2N4275	1271-4275
Q3	Xistor 2N3053	1271-3053
Q4	Xistor 2N3563	1271-3563
Q5	Xistor 2N4275	1271-4275
Q6	Xistor 2N4275	1271-4275
Q7	Xistor 2N4121	1271-4121
Q8	Xistor 2N4275	1271-4275
Q9	Xistor 2N3643	1271-3643
Q10	Xistor 2N3643	1271-3643
Q11	Xistor 2N3643	1271-3643
R1	Res Car Comp 1/4W 5% 100	1065-0100
R2	Res Car Comp 1/4W 5% 5.6K	1065-5601
R3	Res Car Comp 1/4W 5% 6.8K	1065-6801
R4	Res Car Comp 1/4W 5% 1K	1065-1001
R5	Res Car Comp 1/4W 5% 2.2K	1065-2201
R6	Res Car Comp 1/4W 5% 3.3K	1065-3301
R7	Res Car Comp 1/4W 5% 2.7K	1065-2701
R8	Res Car Comp 1/4W 5% 2.2K	1065-2201
R9	Res Car Comp 1/4W 5% 1K	1065-1001
R10	Res Car Comp 1/4W 5% 1K	1065-1001
R11	Res Car Comp 1/4W 5% 100	1065-0100
R12	Res Car Comp 1/4W 5% 1K	1065-1001
R13	Res Car Comp 1/4W 5% 1.5K	1065-1501
R14	Res Car Comp 1/4W 5% 3.3K	1065-3301
R15	Res Car Comp 1/4W 5% 270	1065-0270
R16	Res Car Comp 1/4W 5% 1K	1065-1001
R17	Res Car Comp 1/4W 5% 2.2K	1065-2201
R18	Res Car Comp 1/4W 5% 6.8K	1065-6801
R19	Res Car Comp 1/4W 5% 15K	1065-1502
R20	Pot PC MT 2K 1T	1070=2001
R21	Res Car Comp 1/4W 5% 1K	1065-1001
R22	Res Car Comp 1/2W 10% 130	1067-0130
R23	Res Car Comp 1/4W 5% 4.7K	1065-4701

Ckt. Ref.	Description	IFI Stock No.
R24	Res Car Comp 1/4W 5% 390	1065-0390
R25	Res Car Comp 1/4W 5% 180	1065-0180
R26	Res Car Comp 1/4W 5% 1K	1065-1001
R27	Res Car Comp 1/4W 5% 2.2K	1065-2201
R28	Res Car Comp 1/4W 5% 4.7K	1065-4701
R29	Res Car Comp 1/4W 5% 100	1065-0100
R30	Res Car Comp 1/4W 5% 470	1065-0470
R31	Res Car Comp 1/4W 5% 2.2K	1065-2201
R32	Res Car Comp 1/4W 5% 3.3K	1065-3301
R33	Res Car Comp 1/4W 5% 1.5K	1065-1501
R34	Res Car Comp 1/4W 5% 470	1065-0470
R35	Res MT Flm 1/8W 1% 825	1061-0825
R36	Not Used	
R37	Res Car Comp 1/4W 5% 27K	1065-2702
R38	Res Car Comp 1/4W 5% 3.3K	1065-3301
R39	Res Car Comp 1/4W 5% 27K	1065-2702
R40	Res Car Comp 1/4W 5% 27K	1065-2702
R41	Res Car Comp 1/4W 5% 27K	1065-2702
R42	Res Mt Flm 1/8W 1% 715	1061-0715
R43	Res Car Comp 1/4W 5% 2.7K	1065-2701
R44	Res Car Comp 1/4W 5% 7.5K	1065-7501
R45	Res Mt Flm 1/8W 1% 1150	1061-1150
R46	Res Car Comp 1/4W 5% 7.5K	1065-7501
R47	Pot 10K 1T	1072-1002
R48	Res Car Comp 1/4W 5% 27K	1065-2702
R49	Not Used	
R50	Res Car Comp 1/4W 5% 39K	1065-3902
R51	Not Used	
R53	Not Used	
R54	Res Mt Flm 1/8W 1% 1K	1061-1001
R55	Res Mt Flm 1/8W 1% 4.12K	1061-4101
R56	Res Car Comp 1/4W 5% 1.2K	1065-1201
R57	Res Car Comp 1/4W 5% 5.6K	1065-5601
R58	Res Car Comp 1/4W 5% 5.6K	1065-5601
R59	Res Car Comp 1/4W 5% 22	1065-0022
R60	Res Car Comp 1/4W 5% 15K	1065-1501
R61	Res Mt Flm 1/8W 1% 1.37K	1061-1370
R62	Res Mt Flm 1/8W 1% 432	1061-0432
R63	Res Mt Flm 1/8W 1% 137	1061-0137
R64	Res Mt Flm 1/8W 1% 43.2	1061-0043
R65	Res Mt Flm 1/8W 1% 13.7	1061-0013
R66	Res Car Comp 1/4W 5% 10K	1065-1002

Ckt. Ref.	Description	IFI Stock No.
R67	Res Car Comp 1/4W 5% 15K	1065-1502
R68	Res Car Comp 1/4W 5% 5.6K	1065-5601
R69	Res Mt Flm 1/8W 1% 12.7	1061-0012
R70	Res Mt Flm 1/8W 1% 12.7	1061-0012
R71	Res Car Comp 1/4W 5% 2.2K	1065-2201
R72	Pot 10K 1T	1072-1002
R73	Res Car Comp 1/4W 5% 12K	1065-1202
R74	Res Car Comp 1/4W 5% 1K	1065-1001
R75	Res Car Comp 1/4W 5% 680K	1065-6803
R76	Res Car Comp 1/4W 5% 330K	1065-3303
R77	Res Car Comp 1/4W 5% 5.6K	1065-5601
R78	Res Car Comp 1/4W 5% 2.2K	1065-2201
R79	Pot PC Mt 1K 1T	1072-1001
R80	Res Car Comp 1/4W 5% 12K	1065-1202
R81	Res Car Comp 1/4W 5% 10K	1065-1002
R82	Res Car Comp 1/4W 5% 56K	1065-5602
R83	Res Car Comp 1/4W 5% 4.7K	1065-4701
R84	Res Car Comp 1/4W 5% 10K	1065-1002
R85	Res Car Comp 1/4W 5% 2K	1065-2001
R86	Res Car Comp 1/4W 5% 2.7K	1065-2701
R87	Res Car Comp 1/4W 5% 4.7K	1065-4701
R88	Res Mt Flm 1/8W .1% 10K	1058-1002
R89	Res Car Comp 1/4W 5% 10K	1065-1002
R90	Res Car Comp 1/4W 5% 5.6K	1065-5601
R91	Res Car Comp 1/4W 5% 4.7K	1065-4701
R92	Res Var PC Mt 5K 10T	1069-5001
R93	Res Car Comp 1/4W 5% 8.2K	1065-8201
R94	Res Car Comp 1/4W 5% 750	1065-0750
R95	Res Mt Flm 1/8W .1% 10K	1058-1002
R96	Res Car Comp 1/4W 5% 1.8K	1065-1801
R97	Res Car Comp 1/4W 5% 1K	1065-1001
R98	Res Car Comp 5W 5% 22	1068-0022
R99	Res Car Comp 1/4W 5% 470	1065-0470
R100	Res Car Comp 5W 5% 22	1068-0022
R102	Res Car Comp 1/4W 5% 1K	1065-1001
R103	Res Mt Flm 1/8W 1% 10K	1058-1002
R104	Res Car Comp 1/4W 5% 10K	1065-1002
R108	Res Car Comp 1/4W 5% 1K	1065-1001
R109	Res Mt Flm 1/8W .1% 10K	1058-1002
R110	Res Var PC Mt 500 Ohm 10T	1069-0500
R111	Res Car Comp 1/4W 5% 12K	1065-1202
R112	Res Car Comp 1/4W 5% 2K	1065-2001

Ckt. Ref.	Description	IFI Stock No.
R113	Res Car Comp 1/4W 5% 2K	1065-2001
R114	Res Mt Flm 1/8W 1% 1.82K	1061-1821
R115	Res Car Comp 1/4W 5% 12K	1065-1202
R116	Res Car Comp 1/4W 5% 820	1065-0820
R117	Res Car Comp 1/4W 5% 2K	1065-2001
R118	Res Car Comp 1/4W 5% 2K	1065-2001
R119	Res Car Comp 1/4W 5% 2.2K	1065-2201
R120	Res Car Comp 1/4W 5% 2.2K	1065-2201
R121	Res Car Comp 1/4W 5% 6.8K	1065-6801
R122	Res Car Comp 1/4W 5% 3.3K	1065-3301
R123	Res Car Comp 1/2W 5% 150	1066-0150
R124	Res Car Comp 1/2W 5% 150	1066-0150
R125	Res Car Comp 1/4W 5% 150	1066-0150
R126	Res Car Comp 1/4W 5% 150	1065-0150
R127	Res Car Comp 1/4W 5% 150	1065-0150
R128	Res Car Comp 1/4W 5% 150	1065-0150
R129	Res Car Comp 1/4W 5% 150	1065-0150
R130	Res Car Comp 1/4W 5% 150	1065-0150
R131	Res Mt Flm 1/8W 1% 1.37K	1061-1370
R132	Res Mt Flm 1/8W 1% 1.37K	1061-1370
R133	Res Car Comp 1/4W 5% 1.2K	1065-1201
R134	Res Car Comp 1/4W 5% 1.2K	1065-1201
R135	Res Car Comp 1/4W 5% 910	1065-0910
R136	Res Car Comp 1/4W 5% 910	1065-0910
R137	Res Car Comp 1/4W 5% 1.2K	1065-1201
R138	Res Car Comp 1/4W 5% 1.2K	1065-1201
R139	Res Car Comp 1/4W 5% 470	1065-0470
R140	Res Car Comp 1/4W 5% 27K	1065-2702
R141	Not Used	
S2	Switch Tog Dpdt	1800-7201
S3	Switch Assy Push Buttom	1850-1009
Y1	Crystal 5.0 MHz	2400-0502
Z4	I/C SN74LS90N	1101-7490
Z5	I/C SN74LS90N	1101-7490
Z6	I/C SN74LS00N	1101-7400
Z7	I/C SN7473N	1100-7473
Z8	I/C SN74LS90N	1101-7490
Z12	I/C CA3054	1100-3054
Z14	I/C SN74121	1100-7412
Z15	I/C LM741CN	1100-0741
Z16	I/C LM741CN	1100-0741
Z17	I/C LM318	1100-0318

Ckt. Ref.	Description	TFT Stock No.
Z18	I/C LM318	1100-0318
Z19	I/C LM301	1100-0301
Z20	I/C LM741CN	1100-0741
Z21	I/C LM710CN	1100-0710
Z22	I/C LM710CN	1100-0710
Z23	I/C SP380A	1100-0380
Z24	I/C LM301	1100-0301
Z25	I/C LM301	1100-0301
Z26	I/C LM318	1100-0318
Z27	I/C LM301	1100-0301
Z28	I/C LM301	1100-0301
Z29	I/C CA3140	1100-3140
Z30	I/C LM308N	1100-0308
Z31	I/C LM741CN	1100-0741
Z32	I/C LM340T-05	1100-7805
Z33	I/C Reg 1/2 Amp +12V	1100-4212
Z34	I/C Reg 1/2 Amp 12V	1100-2012
Z35	I/C LM741CN	1100-0741
Z36	I/C LM741CN	1100-0741
Z37	Mixer 2-6 Channel	4500-0001
Z38	I/C LM318	1100-0318
Z39	I/C LM301	1100-0301
	PC BD 763	1600-1050



NEXT ASSY	USED ON
6608-1050	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
	SEE SHT 1				

TO AVG DETECTOR

TO PEAK DETECTOR

R61 1370 1%
R62 432 1%
R63 137 1%
R64 43.2 1%
R65 13.7 1%
R69 12.7 1%
R70 12.7 1%
-50dB -40dB -30dB -20dB -10dB 0dB
S3 S4 S5 S6 S7 S8

TO SII-5 SHT 1 (ZONE A-8)

R88 10K 1%
LM301 Z39
R89 10K
C94 2.2pF
C92 5pF
R95 10K 1%
C93 150pF

TO SII-2 SHT 1 (ZONE A8)

TO Z35-7 SHT. 1 (ZONE B7)

TO Z35-4 (SHT. 1 ZONE B7)

INUERTING AMPLIFIER

R103 10K 1%
NE5534 Z19
R104 10K
C102 2.2pF
C101 150pF
C119 5pF
R109 10K .1%
C105 15
C108 .2

TO ATTENUATOR SWITCHES

TO Z22-9

TO Z21-9

+2V L15 15

C103 15
C99 2

THUMBWHEEL CURRENT SOURCE

L25 150
C112 .2
C120 .05
+5V

LM710 Z21
C97 10
SP380 Z22
R115 12K
C111 15
C106 250
SP380 Z23
R119 2.2K
2N3643 Q11

PEAK DET.

MULTIVIBRATOR 2 SEC

R108 1K
R111 12K

LM710 Z22
C98 10
J18-1
C107 250
SP380 Z23
SP380 Z23
R120 2.2K
2N3643 Q10

C95 2200

CR13 IN4735
R102 1K
P89 470
C104 15
-12V

FLASHER
R114 X 1820 1%
LM741 Z20
C118 5
C119 .2
R110 500
CR15 IN4734
C109 15
R116 820Ω
CR16 IN4735
-12V

P/O J9
FRONT PANEL T.W. SWITCH

R125 150
R126 150
R127 150
R128 150
R129 150
R130 150
+PEAK FRONT PANEL CR2
+PEAK
+PEAK
-PEAK
-PEAK FRONT PANEL CR1
-PEAK

METER AMPLIFIERS

50dB

C79 .2

R82 56K
C76 2.2pF
C77 150pF
R85 2K
PB6 2.7K
C80 250
C78 .068
Q9 2N3643
R83 4.7K
C75 15
Z28 LM301

R84 10K
RR7 4.7K

P/O J7 7 8

CR5 HPA 2800
C74 250
C72 .22 FS. FALL TIME
R79 1K AVG GAIN
R75 680K
R76 330K

PEAK METER DETECTOR

CR8 HPA 2800
R81 10K

AVERAGING METER DETECTOR

R77 5.6K
CA3140 Z29
C71 25

R78 2.2K
R80 12K
CR6 HPA 2800
CR7 IN3064

ALTERNATE REMOTE METER
P/O J8 2
R57 5.6K
C64 4.7

REMOTE METER
P/O J1 9
R58 5.6K
C65 4.7
F.S. RISE TIME

L14 15
+12V
C69 15
METER AMP
LM308 Z30
C70 150pF

P/O J7 6
+12V
C67 4.7
R68 5.6K
R71 2.2K
R74 1K
LM741 Z36
R66 10K
-12V

SHT. 1 TO A (ZONE C-1)

R.F. LEVEL
P/O J2 1
R59 22

SHT. 1 TO J4-2 (J3-2 (ZONE D-5)

L22 15
-12V

+12V
R72 10K
C66 2.2
LM741 Z31
R73 8.2K
R60 15K
R67 15K
C61 15
C63 .2
-12V

CARRIER LEVEL AND AM CIRCUITRY

P/O J2 2

AUDIO AMPLIFIERS

P/O J7 5

TO J13-1 SHT. 1 (ZONE E5)

CR14 IN4745
C110 100
R112 2K
C113 12PF
R121 6.65K
C114 150pF
NE5534 Z25
R117 2K
R131 .37K
C121 .056
R132 1.37K
R133 2K
R134 1.2K
R135 910
R136 910
R137 1.2K
R138 1.2K

R113 2K
C115 15PF
R122 3.3K
C116 150 PF
NE5534 Z24
R118 2K
C117 100
CR17 IN4745 16V

R124 150 ½W
R123 150 ½W

METER
R92 5K
R96 1.8K
R93 8.2K
R97 1K
J11 2 1
TO METER LAMPS

R90 5.6K
C83 150PF
R94 750
C84 100
Z27 LM301
Z26 LM318
R91 4.7K
C82 15
C88 15
R100 22 5W

P/O J1 10
+5V
LM341T Z32 +5V
C85 15
C89 100
R99 22 5W
P/O J6 1
P/O J3 3
-12V
LM342T Z33 +12V
C86 15
C90 1000
LM320MP Z34 -12V
C87 15
C91 1000
-12V -17V

CR9 CR11 CR10 CR12 MR501
J10 1 .2 .3
TI SEC
TI-CT
TI-SEC

P/O J6
AUDIO OUT w/DE-EMPHASIS
GND RP-J8
COMPOSITE OUTPUT
RP-J7
AUDIO MONITOR OUTPUT
STEREO MONITOR
RP-J5
SCA MONITOR
RP-J6
J17 1 2 3

DWG. NO.

ITEM NO.	EN NO.	PART NO.	DESCRIPTION	REF DES
QTY PER ASSY			LIST OF MATERIALS	

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
.XX ± ANGULAR ±
.XXX ± ±

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DSG. ENG.	
APPD.	
APPD.	
ECO NO.	

T.E.T. TIME & FREQUENCY TECHNOLOGY INC.
3000 Oakmead St., Santa Clara, California 95050
(408) 246-8355

TITLE: FM BASEBAND BOARD FIG. 6.3

SIZE D | DRAWING NO 6601-1570 | REV G | SCALE — | SHT 2 OF 2

NEXT ASSY	USED ON
6608-1050	763

REVISIONS

SYM	DESCRIPTION	DR	CHK	AUTH	DATE
	SEE SHT 1				

R61 1370 1% R62 432 1% R63 137 1% R64 43.2 1% R65 137 1% R69 12.7 1% R70 12.7 1%

-50dB -40dB -30dB -20dB -10dB 0dB

S1 S2 S3 S4 S5 S6 S7 S8

OBSOLETE

ALTERNATE REMOTE METER — P/O J8 — R57 5.6K — C64 4.7

REMOTE METER — P/O J1 — R58 5.6K — C65 4.7

P/O J7 — C67 4.7 — R68 5.6K — R71 2.2K — R74 1K — R66 10K

+12V — L14 15 — C69 15 — Z30 LM308 — C70 150PF

SHT. 1 TO A (ZONE C-1) — Z30 LM741 — -12V

R.F. LEVEL — P/O J2 — R59 22 — L22 15 — -12V

SHT. 1 TO J4-2 J3-2 (ZONE D-5) — C66 2.2 — R60 15K — R67 15K — C61 15 — Z31 LM741 — +12V — R72 10K — R73 8.2K — C63 .2 — -12V

CARRIER LEVEL AND AM CIRCUITRY

P/O J2 — 2

R78 2.2K — R80 12K — CR6 HPA 2800 — CR7 IN3064

R77 5.6K — Z29 CA3140 — C71 25

AVERAGING METER DETECTOR — CR8 HPA 2800 — R81 10K

CR5 HPA 2800 — C74 250 — C72 .22 — R79 1K AVG GAIN — R75 680K — R76 330K

PEAK METER DETECTOR

C75 15

Z28 LM301 — R83 4.7K — Q9 2N3643 — C78 .068

R85 2K — R86 2.7K — C80 250

PEAK DET.

C92 5PF — R95 10K 1% — C93 150PF — R88 10K 1% — Z39 LM301 — C94 2.2PF — R89 10K

TO S11-5 SHT 1 (ZONE A-8)

TO S11-2 SHT. 1 (ZONE A-B)

TO Z35-7 SHT. 1 (ZONE B-7)

C96 .2

TO Z35-4 (SHT. 1 ZONE B-7)

INVERTING AMPLIFIER

C119 5PF — R109 10K .1% — C101 150PF — R103 10K 1% — NE 5534 — Z19 — R104 10K — C102 2.2PF — C105 15 — C108 .2

S9

TO Z22-9

TO Z21-9

+12V — L13 15 — C103 15 — C99 .2

THUMBWHEEL CURRENT SOURCE — L25 150 — +5V — C120 .05 — C112 .2

LM710 — Z21 — C97 10 — J18-3 — SP380 — Z23 — R115 12K — C111 15 — C106 250 — SP380 — Z23 — R119 2.2K — 2N3643 Q11

R108 1K

LM710 — Z22 — C98 10 — J18-1 — SP380 — Z23 — C107 250 — SP380 — Z23 — R120 2.2K — 2N3643 Q10

R111 12K

C95 2200

OBSOLETE

CR13 IN4735 — R102 1K — R99 470 — C104 15 — -12V

OBSOLETE

FLASHER — R114 X 1820 1% — LM741 — Z20 — C118 15 — C119 .2 — CR16 IN4735

CR15 IN4734 — R110 500 — C109 15 — R116 820Ω — -12V

P/O J9 — FRONT PANEL T.W. SWITCH

R125 150 — + PEAK FRONT PANEL CR2

R126 150 — + PEAK

R127 150 — - PEAK

R128 150 — R129 150 — - PEAK FRONT PANEL CR1

R130 150 — - PEAK

METER AMPLIFIERS

AUDIO AMPLIFIERS

RB2 56K — C76 2.2PF — C77 150PF — C79 .2

C81 18PF — R90 5.6K — C83 150PF — R94 750 — C84 100 — Z26 LM318 — R97 1K — J11 — TO METER LAMPS

METER — R92 5K — R93 8.2K — R96 1.8K

TO J13-1 SHT. 1 (ZONE E-5)

P/O J7 — 5

+5V — C85 15 — Z32 LM341T +15V +5V — C89 100

+12V — C86 15 — Z33 LM342T +12V — +17V — C90 1000

-12V — C87 15 — Z34 LM320MP -12V — -17V — C91 1000

R84 10K — R87 4.7K

P/O J7 — 7 8

R91 4.7K — Z27 LM301 — C82 15 — C88 15 — R100 22 5W — R98 22 5W

P/O J1 — 10

P/O J8 — 1

P/O J3 — 3

CR9 CR11 CR10 CR12 MR501

J10 — 1 T1 SEC — 2 T1-CT — 3 T1-SEC

CR14 IN4745 — C110 100 — C113 12PF — R121 6.8K — R112 2K — Z25 NE5534 — C114 150PF — R131 1.37K — C121 .056 — R132 1.37K

R117 2K — R113 2K — C115 15PF — R122 33K — C116 15PF — Z24 NE5534 — R118 2K — C117 100 — CR17 IN4745 16V — R124 150 1/2W — R123 150 1/2W

R133 2K — R134 1.2K — R135 910 — R136 910 — R137 1.2K — R138 1.2K — T1

P/O J9 — 6 4 5 — AUDIO OUT w/DE-EMPHASIS — GND RP-J8 — COMPOSITE OUTPUT RP-J7

P/O J1 — 5 — AUDIO MONITOR OUTPUT

P/O J6 — 3 2 — STEREO MONITOR RP-J5 — SCA MONITOR RP-J6

J17 — 1 2 3

P/O J2 — 2

ITEM NO	EN NO	PART NO	DESCRIPTION	DEV DES
QTY PER ASSY			LIST OF MATERIALS	

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED .xx ± .xxx ± ANGULAR ±

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DRAWN BY	T DIAZ
DATE	2-6-71
CHK BY	
PROJ ENG	
MFG ENG	
APPD	
APPD	
ECO NO	

T.F.T. TIME & FREQUENCY TECHNOLOGY INC.
3000 Oakcrest St Santa Clara California 95050
(408) 248-8306

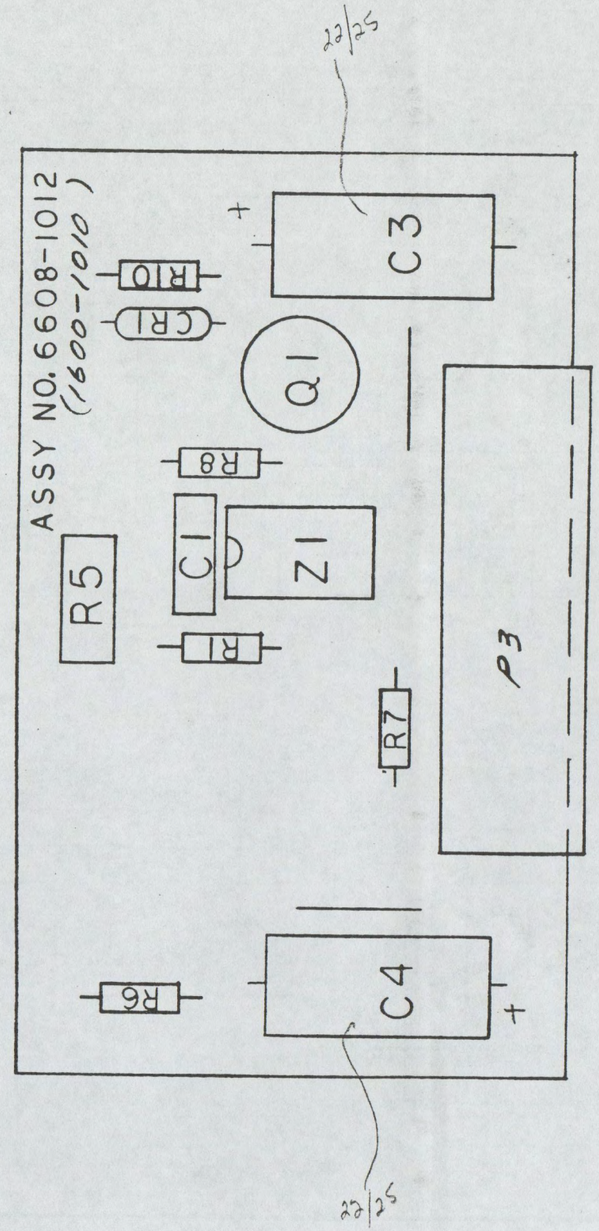
TITLE: FM BASEBAND BOARD FIG. 6.3

SIZE D — DRAWING NO 6601-1570 — REV F — SCALE — — SHT 2 OF 2

Model 763 Standard Carrier Power Alarm Assembly # 6608-1012

Rev A

Ckt. Ref.	Description	TFT Stock No.
C1	Cap 1000Pf +5% Mica	1001-1002
C3	Cap ELect 15MFD 25V	1010-0150
C4	Cap ELect 15MFD 25V	1010-0150
CR1	Diode IN3064	1281-3064
P3	Socket 10pin	2250-5210
Q1	XISTOR 2N3643	1271-3643
R1	Res Car Comp 1/4W 5% 8.2K	1065-8201
R5	Pot PC MT 1K 1T	1072-1001
R6	Res Car Comp 1/4W 5% 10K	1065-1002
R7	Res Car Comp 1/4W 5% 10K	1065-1002
R8	Res Car Comp 1/4W 5% 1K	1065-1001
R10	Res Car COmp 1/4W 5% 1K	1065-1001
Z1	IC LM 741CN	1100-0741
	Socket, I/C 8 PIN	2250-1008
	PC BD 753 Carrier Alarm	1600-1010 REVA



NEXT ASSY	USED ON
6608-1050	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
D	REVISED & REDRAWN PER ECO 377	KK			10/17
E	REV/ECO 997, R19, 24 & 25 WERE LM 301	MT			1/14/80
F	REV PER ECO 1210	KK			12/80

OBSOLETE

OBSOLETE

OBSOLETE

OBSOLETE

FM BASEBAND P.C. BD ASSY
6608-1050

NOTES: UNLESS OTHERWISE SPECIFIED;
1. RESISTORS - VALUES IN OHMS ±5%, ¼W
2. CAPACITORS - VALUES IN MICROFARADS
3. INDUCTORS - VALUES IN MICROHENRIES ± 10%
4. * INDICATES FACTORY SELECT VALUES.
5. PLACE JUMPER BETWEEN PIN 1 AND PIN 4 OF CAL/OPERATE SWITCH

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
XX ± ANGULAR ±
XXX ±

DO NOT SCALE THIS PRINT

DRAWN BY KK
CHK BY
PROJ ENG
MFG ENG
APPD
APPD
ECO NO

TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St. Santa Clara California 95050
(408) 249-8305

TITLE: FM BASEBAND BD FIGURE 6.3

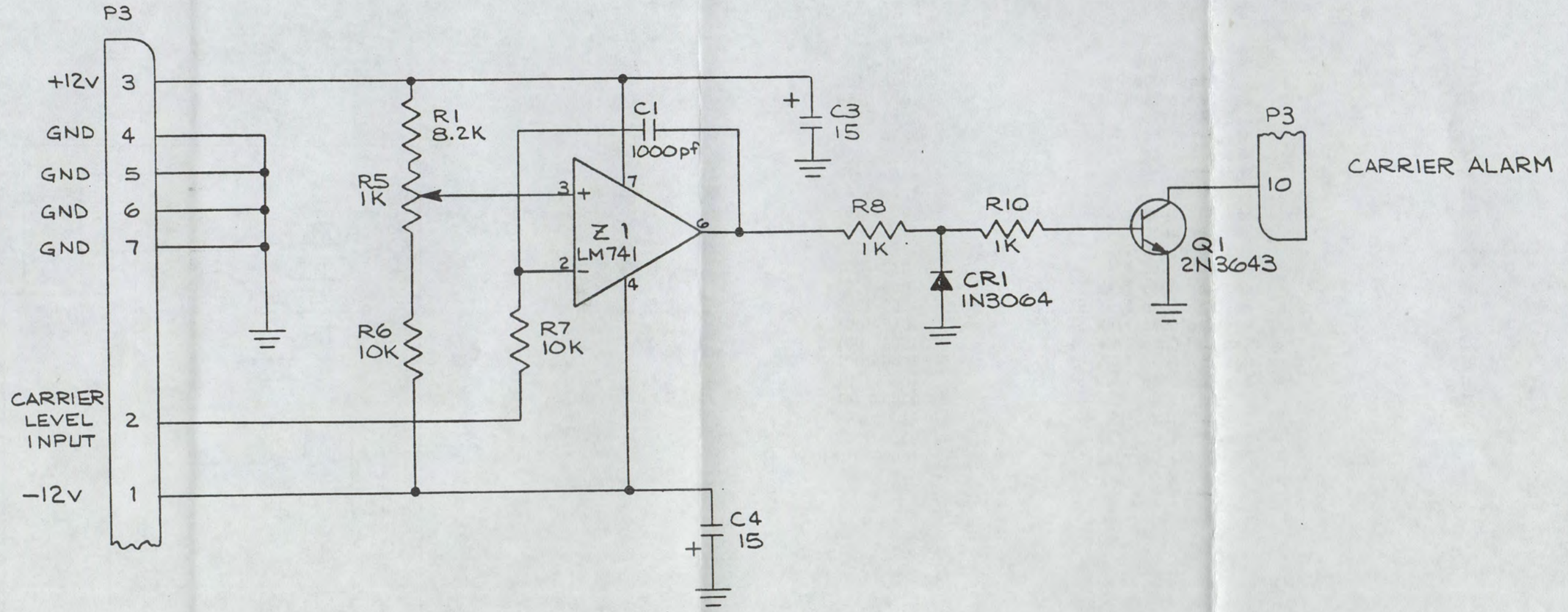
SIZE D | DRAWING NO 6601-1570 | REV F | SCALE | SHT 1 OF 2

DWG NO 6601-1570

DWG. NO. 6601-1710

NEXT ASSY	USED ON
5102-1900	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
A	REL TO PRODUCTION 344	TD			



NOTES; UNLESS OTHERWISE SPECIFIED:
1. RESISTORS - VALUES IN OHMS +5%, 1/4 WATT.
2. CAPACITORS - VALUES IN MICROFARADS.
3. INDUCTORS - VALUES IN MICROHENRYS +10%
4. *FACTORY SELECT VALUE. TYPICAL VALUE SHOWN.
5. VOLTAGES ARE DC CONDITIONS.

ITEM NO.	EN NO.	PART NO.	DESCRIPTION	REF. DES.
QTY PER ASSY	LIST OF MATERIALS			

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
.XX ±
.XXX ±
ANGULAR ±

DO NOT SCALE THIS PRINT

DRAWN BY	Du Bay	DATE 7-28-76
CHK. BY	Stan	11/17/77
PROJ. ENG.	CWE	11/17/77
MFG. ENG.		
APPD.		
APPD.		
ECO NO.		

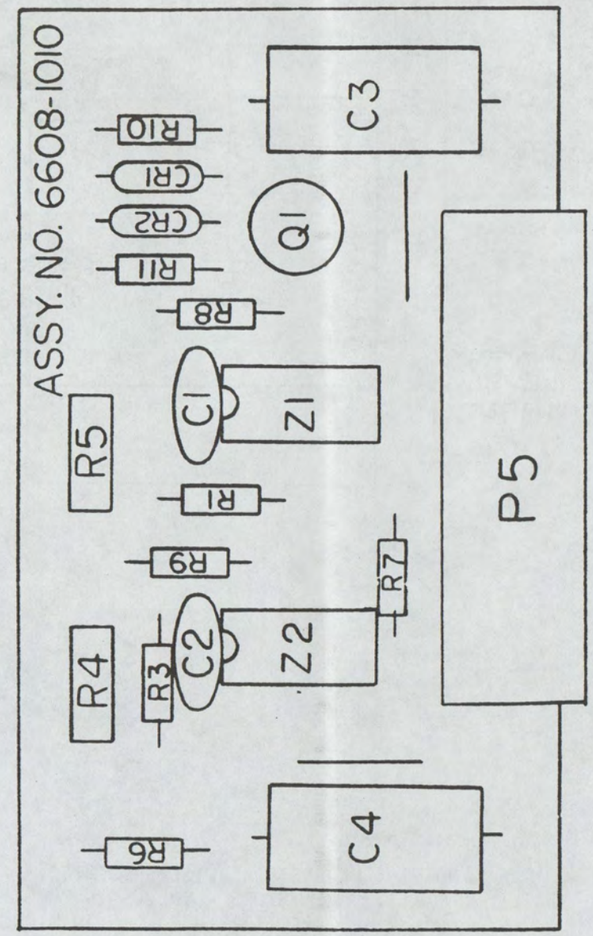
TFT TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St., Santa Clara, California 95050
(408) 246-6365

TITLE SCHEMATIC
CARRIER FAIL ALARM
FIGURE 6.4

SIZE B | DRAWING NO. 6601-1710 | REV A
SCALE N/A | SHT. 1 OF 1

Model 763 Option 02 Carr Alarm Assemby # 6608-1010

Ckt. Ref.	Description	TFT Stock No.
C1	Cap Mica 1000 PF	1001-0102
C2	Cap Mica 1000 Pf	1001-0102
C3	Cap Elect 15MFD 25V	1010-0150
C4	Cap Elect 15MFD 25V	1010-0150
CR1	Diode IN3064	1281-3064
CR2	Diode IN3064	1281-3064
P4	Socket 10pin	2250-5210
Q1	XISTOR 2N3643	1271-3643
R1	Res Car Comp 1/4W 5% 8.2K	1065-8201
R3	Res Car Comp 1/4W 5% 8.2K	1065-8201
R4	Pot PC MT 1K IT	1072-1001
R5	Pot PC MT 1K 1T	1072-1001
R6	Res Car Comp 1/4W 5% 10K	1065-1002
R7	Res Car Comp 1/4W 5% 10K	1065-1002
R8	Res Car Comp 1/4W 5% 1K	1065-1001
R9	Res Car Comp 1/4W 5% 1K	1065-1001
R10	Res Car Comp 1/4W 5% 1K	1065-1001
R11	Res Car Comp 1/4W 5% 1K	1065-1001
Z1	IC LM 741CN	1100-0741
Z2	IC LM 741CN	1100-0741
	Socket, I/C 8 Pin	2250-1008
	PC BD 753 Carrier Alarm	1600-1010 REVA

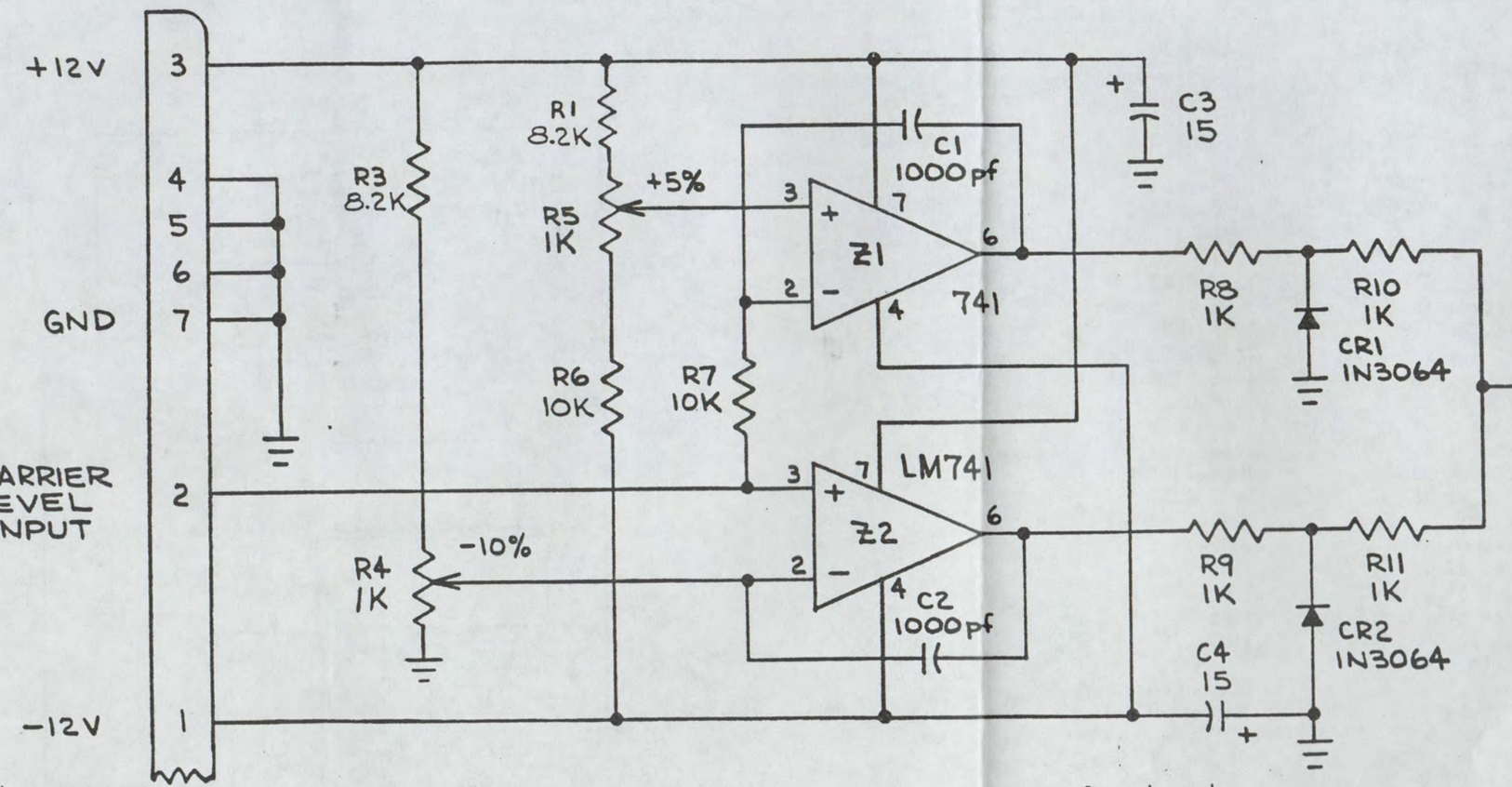


DWG. NO. 6601-1650

NEXT ASSY	USED ON
6608-1010	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
A	RELEASED PER ECO 344	BD			7-15-76

ICRC



NOTES; UNLESS OTHERWISE SPECIFIED:
1. RESISTORS - VALUES IN OHMS ±5%, 1/4 WATT.
2. CAPACITORS - VALUES IN MICROFARADS.
3. INDUCTORS - VALUES IN MICROHENRYS ±10%
4. *FACTORY SELECT VALUE. TYPICAL VALUE SHOWN.
5. VOLTAGES ARE DC CONDITIONS.

ITEM NO.	EN NO.	PART NO.	DESCRIPTION	REF. DES.
QTY PER ASSY	LIST OF MATERIALS			

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
.XX ± ANGULAR ±
.XXX ± ±

DO NOT SCALE THIS PRINT

	DRAWN BY	DATE
	DuBay	7-15-76
CHK. BY	Tom	11/17/77
PROJ. ENG.	Cliff	11/17/77
MFG. ENG.		
APPD.		
APPD.		
ECO NO.		

TFT TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St., Santa Clara, California 95050
(408) 246-6365

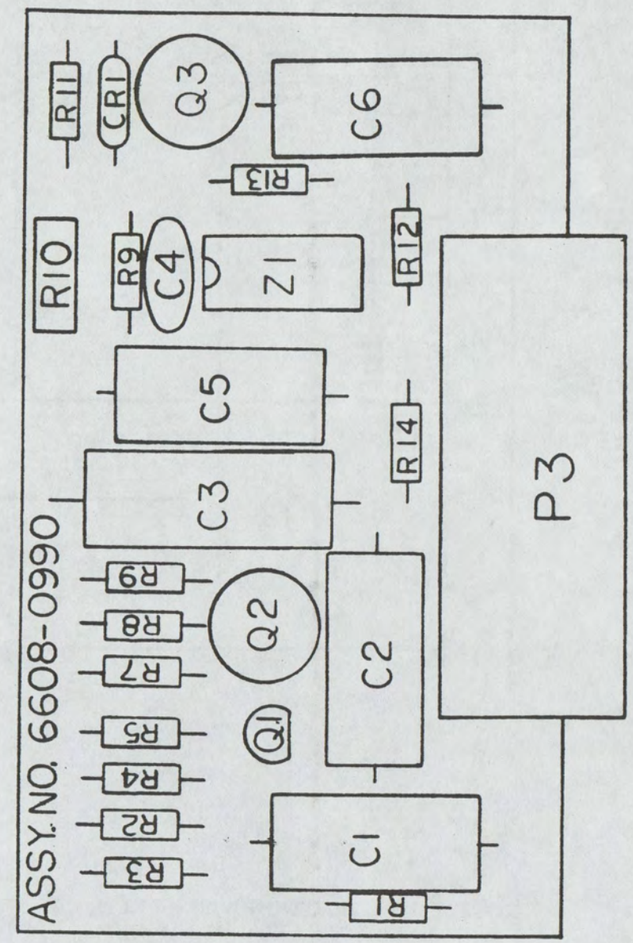
TITLE SCHEMATIC
CARRIER ALARM (OPTION)
FIGURE 6.5

SIZE	DRAWING NO.	REV.
B	6601-1650	A

SCALE — SHT. 1 OF 1

Model 763 OPT 04 Modulation Alarm Assemby # 6608-0990

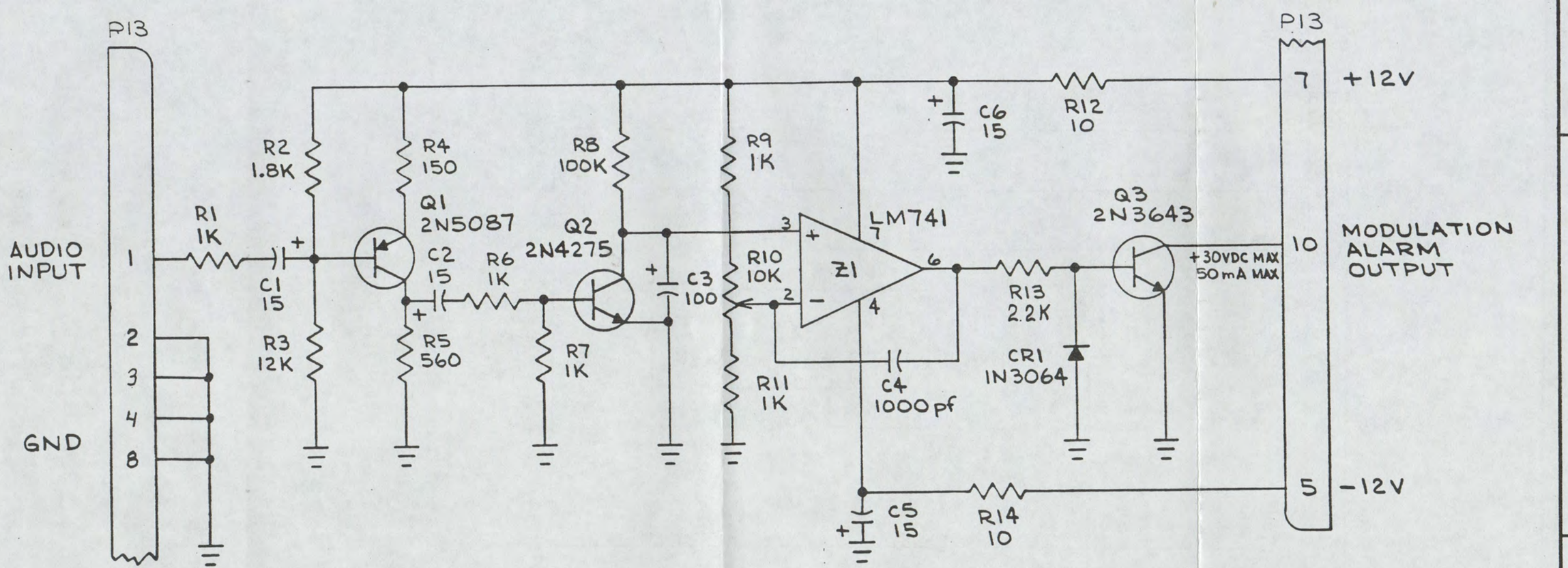
Ckt. Ref.	Description	TFT Stock No.
C1	Cap Elect 15MFD 25V	1010-0150
C2	Cap Elect 15MFD 25V	1010-0150
C3	Cap Elect 100MFD 16V	1010-0101
C4	Cap Mica 1000 PF	1001-0102
C5	Cap ELect 15MFD 25V	1010-0150
C6	Cap ELect 15MFD 25V	1010-0150
CR1	Diode IN3064	1281-3064
P13	Socket 10pin	2250-5210
Q1	XISTOR 2N5087	1271-5087
Q2	XISTER 2N4275	1271-4275
Q3	XISTER 2N3643	1271-3643
R1	Res Car Comp 1/4W 5% 1K	1065-1001
R2	Res Car Comp 1/4W 5% 1.8K	1065-1801
R3	Res Car Comp 1/4W 5% 12K	1065-1202
R4	Res Car Comp 1/4 5% 150	1065-0150
R5	Res Car Comp 1/4W 5% 560	1065-0560
R6	Res Car Comp 1/4W 5% 1K	1065-1001
R7	Res Car Comp 1/4W 5% 1K	1065-1001
R8	Res Car Comp 1/4W 5% 100K	1065-1003
R9	Res Car Comp 1/4W 5% 1K	1065-1001
R10	Pot 10K 1T	1072-1002
R11	Res Car Comp 1/4W 5% 1K	1065-1001
R12	Res Car Comp 1/4W 5% 10.	1065-0010
R13	Res Car Comp 1/4W 5% 2.2K	1065-2201
R14	Res Car Comp 1/4W 5% 10.	1065-0010
Z1	IC LM 741CN	1100-0741
	XISTOR Socket 3Pin	1150-0001
	Socket, I/C 8 Pin	2250-1008
	PC BD 753/763 Modulation Alarm	1600-0990 REVA



DWG. NO. 6601-1690

NEXT ASSY	USED ON
6608-	763

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
A	RELEASED PER ECO 344				



NOTES; UNLESS OTHERWISE SPECIFIED:

1. RESISTORS - VALUES IN OHMS ±5%, 1/4 WATT.
2. CAPACITORS - VALUES IN MICROFARADS.
3. INDUCTORS - VALUES IN MICROHENRYS ±10%
4. *FACTORY SELECT VALUE. TYPICAL VALUE SHOWN.
5. VOLTAGES ARE DC CONDITIONS.

ITEM NO.	EN NO.	PART NO.	DESCRIPTION	REF. DES.
QTY PER ASSY	LIST OF MATERIALS			

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
.XX ±
.XXX ±
ANGULAR ±

DO NOT SCALE THIS PRINT

		DATE
DRAWN BY	Du Bay	1-6-76
CHK. BY		1/7/77
PROJ. ENG.		1/17/77
MFG. ENG.		
APPD.		
APPD.		
ECO NO.		

TFT TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St., Santa Clara, California 95050
(408) 246-6365

TITLE SCHEMATIC MODULATION ALARM FIGURE 6.6

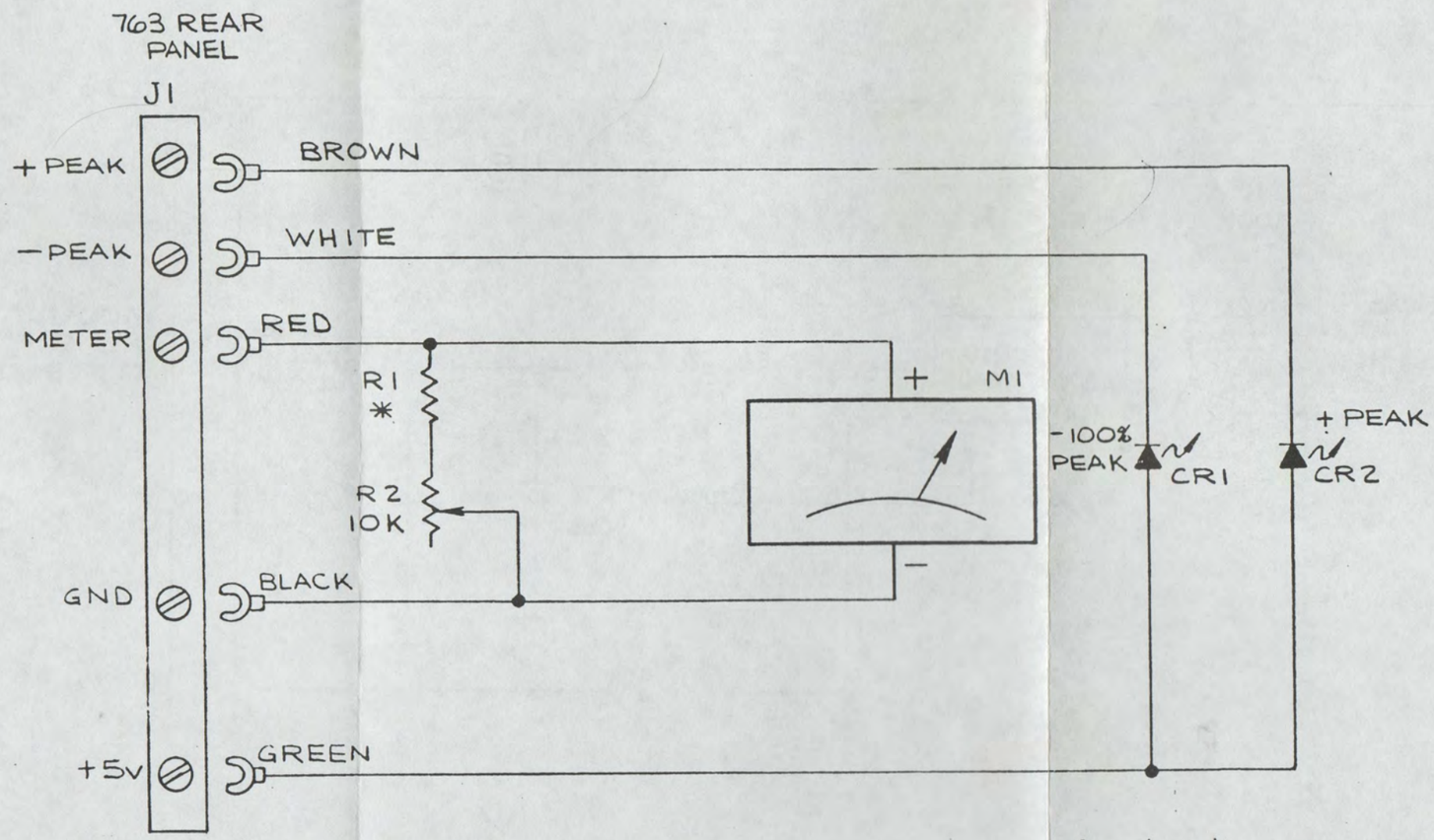
SIZE	DRAWING NO.	REV.
B	6601-1690	A

SCALE — SHT. 1 OF 1

NEXT ASSY	USED ON
5102-1920	704F

REVISIONS					
SYM	DESCRIPTION	DR	CHK	AUTH	DATE
A	REL TO PRODUCTION	TD			7-22-76

MICRO



2. RESISTOR VALUES ARE IN OHMS.

1. * INDICATES FACTORY SELECT VALUE

NOTES, UNLESS OTHERWISE SPECIFIED;

ITEM NO.	EN NO.	PART NO.	DESCRIPTION	REF. DES.
QTY PER ASSY	LIST OF MATERIALS			

REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
.XX ±
.XXX ±
ANGULAR ±

DO NOT SCALE THIS PRINT

	DRAWN BY	DATE
	Lou Barry	
CHK. BY	Lou	11/7/77
PROJ. ENG.		11/7/77
MFG. ENG.		
APPD.		
APPD.		
ECO NO.		

TFT TIME & FREQUENCY TECHNOLOGY INC.
3000 Olcott St., Santa Clara, California 95050
(408) 246-6365

TITLE
REMOTE METER & PEAK FLASHERS
FIGURE 6.7

SIZE	DRAWING NO.	REV.
B	6601-1700	A

SCALE N/A SHT. 1 OF 1

Model 704F	Front PNL Assy Model	Assembly # 5102-1920
Ckt. Ref.	Description	TFT Stock No.
CR1	Led Hp 5082-4403 Red	1285-4403
CR2	Led Hp 5082-4403 Red	1285-4403
R2	Res Var PC Mt 10K 10T	1069-1002
M1	MTR Lighted Weston	1400-4200
	Terminal/Insulator	1700-2014
	Bezel Weston 0271923	2140-0271
	Cable, 5 Con.	4750-8500
	704F Panel	2000-0460 REVA
	PC BD Meter Cal 704	1600-0018 REVB

Model 763	Chassis Materials Model 763	
	Description	TFT Stock No.
	Lamps 14v, 80mA	2300-7382
	Attenuator 50 ohm ±20%	1075-1001
	Res Car Comp 51 ohm 2w	1067-1551
	LED Panel Mount, Red	1285-4403
	Led, Clear	1285-4487
	Meter, Modulation	1400-4200
	Bezel for 1400-4200	2140-3279
	Thumbwheel Switch Assembly	5102-1200
	Cap Cer Disc .0047mfd 1kv	1005-4749
	Transformer 26.8 Volt: 117Vac	1500-8609
	Transformer 26.8 Volt: 230Vac	1500-0340
	Fuse 1/2A Slo-Blo	1900-0005
	Fuse Holder	1910-0001
	Power Cord	1950-7239
	Connector R.F. BNC	2200-7935
	Binding Post 5 way Red	2260-0001
	Binding Post 5 way Black	2260-0002
	Terminal Strip 10 position	1700-1010
	Switch 4 station pushbutton	1850-0615