

TEKTRONIX®

L3

PLUG-IN MODULE

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INSTRUCTION MANUAL

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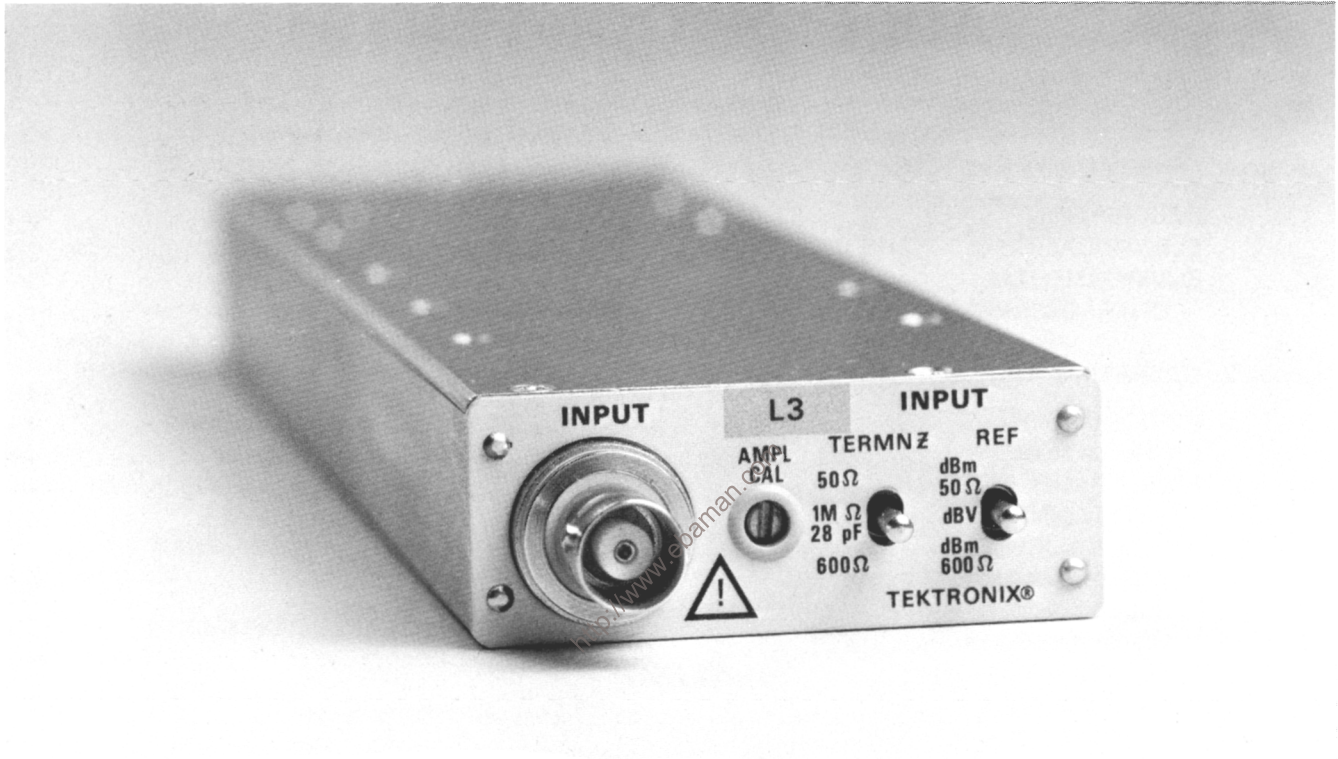
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TABLE OF CONTENTS

	Page		Page
Section 1 GENERAL INFORMATION		Section 3 PERFORMANCE CHECK	
DESCRIPTION	1-1	INTRODUCTION	3-1
ELECTRICAL CHARACTERISTICS	1-1	EQUIPMENT REQUIRED	3-2
ENVIRONMENTAL		PROCEDURE	3-3
CHARACTERISTICS	1-4		
Section 2 OPERATING INSTRUCTIONS		Section 4 SERVICE INFORMATION & DIAGRAM	
INTRODUCTION	2-1	INTRODUCTION	4-1
INSTALLATION	2-1	CALIBRATION PROCEDURE	4-2
FRONT PANEL CONTROLS		CIRCUIT DESCRIPTION	4-6
AND CONNECTOR	2-1	COMPONENT LOCATIONS	4-9
INITIAL CALIBRATION	2-2	SCHEMATIC DIAGRAM	4-13
USING THE ANALYZER	2-3	INPUT IMPEDANCE CHANGE	
Impedance Matching	2-3	PROCEDURE	4-18
Signal Amplitude	2-3		
USING THE L3 OPTION 1		Section 5 REPLACEABLE PARTS LISTS	5-1
WITH BALANCED		Accessories	5-18
CONNECTIONS	2-4		
		Section 6 OPTIONS	
		L3 Option 1	6-1



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Fig. 1-1. L3 Plug-In Module.

L3

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GENERAL INFORMATION

DESCRIPTION

The L3 Plug-In Module is one of a series of modules that are used with the Tektronix 7L5 Spectrum Analyzer to provide it with various front end capabilities. The L3 has a switch-selectable input termination: 50 Ω , 600 Ω , or a high impedance (1 M Ω /28 pF) probe compatible input.

Options for the L3 are described in the Options section.

ELECTRICAL CHARACTERISTICS

The following electrical characteristics apply when the L3 Plug-In Module, in combination with a 7L5 Spectrum Analyzer, is installed in a 7000-Series oscilloscope, and has had a warm-up period of ten minutes or more.

Intermodulation Distortion

With two on-screen signals within any frequency span and of any amplitudes, intermodulation distortion is at least 75 dB down for third-order products and at least 72 dB down for second-order products.

With two on-screen signals and reference levels of -53 dB or less, intermodulation distortion is at least 80 dB down.

With two out-of-band (>5 MHz) signals equal to or less than the reference level, second-order intermodulation products are at least 50 dB down.

With the INPUT BUFFER switch on, second- and third-order intermodulation products for any two on-screen signals within any frequency span are at least 80 dB down.

Sensitivity

The following tabulation of input noise for each resolution bandwidth is measured with: 1) an L3 Plug-In Module installed; 2) the INPUT BUFFER off; 3) the VIDEO PEAK/VIDEO AVERAGE control at maximum clockwise position; 4) the TIME/DIV control set at 10 s; 5) DIGITAL STORAGE DISPLAY A and B on; 6) the input impedance switch at 50 Ω .

Resolution Bandwidth	Equivalent Input Noise (equal to or less than)
10 Hz	-148 dBV
30 Hz	-146 dBV
100 Hz	-143 dBV
300 HZ	-138 dBV
1 kHz	-133 dBV
3 kHz	-128 dBV
10 kHz	-123 dBV
30 kHz	-118 dBV

NOTE

Sensitivity is degraded an additional 8 dB when the INPUT BUFFER is on (illuminated): e.g., at 3 kHz, the equivalent noise would be -120 dBV instead of -128 dBV. Noise level will increase by approximately 10 dB when operation is in the Video Peak mode.

Range

MODE	50Ω	600Ω	High Z
LOG 2 dB/DIV	-128 dBm to +21 dBm	-139 dBm to +10 dBm	-141 dBV to +8 dBV
LOG 10 dB/DIV	-70 dBm to +21 dBm	-81 dBm to +10 dBm	-83 dBV to +8 dBV

Residual Response

Internally generated spurious signals are -143 dBV or less (referred to the input), or -138 dBV or less for calibrator harmonics.

Display Flatness

Maximum peak-to-peak amplitude variation is 0.5 dB from 25 Hz to 5 MHz, or 0.75 dB from 20 Hz to 5 MHz, plus quantization error if digital storage is used (see 7L5 specifications).

Reference Level

In the log mode, reference level refers to the top horizontal graticule line and is calibrated in 1 dB and 10 dB steps.

With operation in LIN mode, reference level calibration range is from 20 nV/div to 200 mV/div, within 5%, in a 1-2-5 sequence. A variable reference level control, VAR, can be used to increase the display amplitude by ≥ 8 dB.

NOTE

A > sign is displayed adjacent to the reference level readout when the reference level is not calibrated due to an incompatible selection of the REFERENCE LEVEL, FREQUENCY SPAN/DIV, and TIME/DIV controls.

Incremental Accuracy

Within 0.2 dB for any 1 dB change of reference level, with cumulative error of 0.25 dB for any change up to 10 dB.

Within 0.25 dB/10 dB for any change of 10 dB or more.

Input Connector

The INPUT connector is a three-conductor bnc connector with the outer ring used to detect the presence of a 10X probe so that the reference level readout is changed by 10X (+20 dB).

NOTE

Readout changes by a factor of only 10X if a 100X probe is connected.

Input Impedance: Switch selectable; 1 M Ω in parallel with 28 pF, 50 Ω termination, or 600 Ω termination.



Maximum Input Levels

1 M Ω /28 pF: 15 V p-p for ac or pulse signals with risetimes of 2 V/ μ s or faster (pulses or ac beyond this specification may open an input fuse).

100 V (dc plus peak ac) for signals with risetimes slower than 2 V/ μ s.

600 Ω (internally terminated): 12 V dc or rms (+24 dBm).

50 Ω (internally terminated): 3.5 V dc or rms (+24 dBm).

ENVIRONMENTAL CHARACTERISTICS

The L3 Plug-In Module will meet the foregoing electrical characteristics when installed in a 7L5 Spectrum Analyzer within the environmental limits of a 7000-Series oscilloscope. Complete details on environmental test procedures including failure criteria etc., can be obtained from your local Tektronix Field Office or representative.

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OPERATING INSTRUCTIONS

INTRODUCTION

This section of the manual contains installation instructions for the L3 plug-in, describes the function of its front panel controls and connectors, and includes general operating information such as initial calibration and signal application.

INSTALLATION

Visually inspect the 7L5 plug-in cavity to verify the absence of any obstruction such as misplaced internal cables or packing materials such as cardboard or styrofoam. Carefully inspect the L3 module to ensure that the cover plate is properly fastened with no protruding screw heads.



Never install the L3 Plug-In Module without its cover plate. The metal grounding fingers within the 7L5 cavity will catch and be severely damaged when the plug-in is removed.

Align the L3 module in front of the 7L5 plug-in aperture with its edge card connector to the rear and the dBV/dBm switch to the right. Carefully slide the L3 into the 7L5 plug-in cavity and apply a steady pressure to the L3 front panel until its rear connector is firmly seated and its front panel is approximately flush with the 7L5 front panel.

FRONT PANEL CONTROLS AND CONNECTOR

AMPL CAL

The AMPL CAL control is a potentiometer that is adjusted during the Operational Check to calibrate the full screen reference level. This control is used to compensate for gain differences in the RF and IF portions of the instrument. The AMPL CAL control should be adjusted or checked for proper setting each time the L3 Plug-In Module is installed in a 7L5. (Refer to Initial Calibration Section, which follows.)

INPUT TERMN Z

This three-position switch selects input termination of 50 Ω , 600 Ω , or the unterminated input of 1 M Ω in parallel with 28 pF.

INPUT REF

This three-position switch selects the reference level scale factor: dBm for 50 Ω , dBm for 600 Ω , or dBV. This switch is independent of the INPUT TERMN Z selection.

INPUT

This three-conductor bnc connector uses the outer ring to detect the presence of a 10X probe, so that the readout changes by a factor of 10X (+20 dB).

NOTE

A 100X probe will change the readout by a factor of only 10X (20 dB) instead of 100X (40 dB).

INITIAL CALIBRATION

The following procedure correlates deflection sensitivity of the L3 Plug-In Module, the 7L5 Spectrum Analyzer, and the oscilloscope mainframe. These steps should be performed each time the L3 is installed in a 7L5, and each time the instruments are turned on.

a. With the L3 installed in a 7L5 and the 7L5 installed in an oscilloscope mainframe, apply ac power and allow a 10-minute warmup period.

b. Select mainframe Vertical Mode, Horizontal Mode, and Trigger Source (Right or Left) settings to correspond with plug-in compartments occupied by the 7L5.

c. Connect the 7L5 CALIBRATOR signal to the INPUT connector on the L3 front panel with a short length of coaxial cable. Set the INPUT TERMN Z switch to 50 Ω , and the INPUT REF switch to dBV.

d. Select the LOG 2 dB/DIV pushbutton and set the FREQUENCY SPAN/DIV to 2 kHz, RESOLUTION to 3 kHz, and TIME/DIV to 0.2 s. Switch the DISPLAY A and DISPLAY B display processing selectors on. Adjust the VERT POSITION to place the display on the bottom horizontal graticule line.

e. Adjust the REFERENCE LEVEL to -40 dBV and set the DOT FREQUENCY to 500.00 kHz. Select the LOG 10 dB/DIV pushbutton and adjust the 7L5 LOG CAL control for a full screen (8-division) display.

f. Select the LOG 2 dB/DIV display and adjust the L3 AMPL CAL control for a full screen display.

g. Repeat steps e and f until the displayed waveform is 8 vertical divisions in both the 10 dB/DIV and 2 dB/DIV modes. Refer to Fig. 2-1.

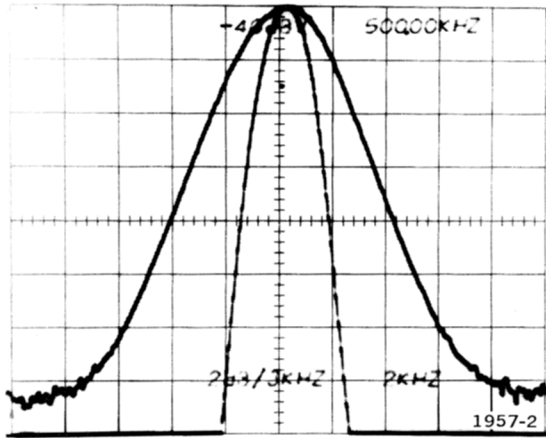


Fig. 2-1. Initial calibration waveform.

USING THE ANALYZER

Impedance Matching

When the L3 module is installed, the input impedance of the 7L5 Spectrum Analyzer is determined by the setting of the INPUT TERMN Z switch. Impedance mismatch between a signal source and the module's input connector causes reflections or standing waves in the interconnecting transmission line. Standing waves at the input

connector may cause amplitude errors in the display and an overall degraded performance of the analyzer. To minimize the probability of an impedance mismatch, all cables and transmission lines fastened to the input connector should have the same impedance as the plug-in module. All cables used should be of minimum length and of good quality with connector center conductors not worn, protruding or recessed. Degraded display caused by impedance mismatch may be improved by selecting the 7L5's INPUT BUFFER control.

Signal Amplitude

High amplitude signals (refer to Electrical Characteristics) should not be applied to the INPUT connector. Signals of unknown amplitude should be routed through a series attenuator. If spurious or multitone intermodulation signals are present in the display, or if saturation of the mixer is suspected, select the 7L5 INPUT BUFFER. This control adds 8 dB of attenuation in series with the input signal, and compensates with 8 dB of amplification in the 7L5. If the displayed signals show little or no amplitude change with the buffer on, the intermodulation is probably being generated prior to the input. If the displayed signals decrease in amplitude, they are being generated within the analyzer as a result of excessive input signal amplitude.

USING THE L3 OPTION 1 WITH BALANCED CONNECTIONS

Baseband telephony systems frequently utilize balanced connections. This is accommodated by a balanced to single-ended transformer, part number 013-0182-00. See Fig. 2-2. Frequency range of the Balanced Transformer is 50 kHz to 3 MHz (useable from 10 kHz to 20 MHz). Flatness is 0.25 dB peak-to-peak, including nominal 0.1 dB insertion loss, and a common mode rejection of 25 dB minimum (within the 50 kHz to 3 MHz range). The transformer has a three-position switch at the output to provide a 124 Ω termination, a 135 Ω termination, and no termination. Thus, an L3 Option 1 in conjunction with the accessory transformer provides all of the common baseband impedance levels (75 Ω , 600 Ω , 124 Ω , 135 Ω , and 1 M Ω for bridging).

Balanced connections at 124 Ω or 135 Ω is accomplished by connecting the Balanced Transformer between the balanced connections and the L3 INPUT. Switch the L3 INPUT TERMN Z to 1 M Ω and the REF to dBV. Switch the Balanced Transformer switch to the desired impedance. The relationship between dBV and dBm is: $\text{dBm} = \text{dBV} - 10 \text{Log}Z + 30$, where Z equals the terminating impedance. For the two impedances provided on the balanced transformer, the theoretical relationship is: $\text{dBm} (124 \Omega) = \text{dBV} + 9.07$, $\text{dBm} (135 \Omega) = \text{dBV} + 8.7$.

Since the transformer has an insertion loss of less than 0.1 dB, the theoretical correction factors offer sufficient accuracy.

Balance connection at other than 124 Ω or 135 Ω uses the transformer in the unterminated position with the termination provided either by the L3 or by a feed-through termination connected between the transformer and 7L5 input. When the termination is outside the 7L5, it is necessary to set the 7L5 in the 1 M Ω bridging position so as not to double terminate the connection. The reference level should be set to dBV.

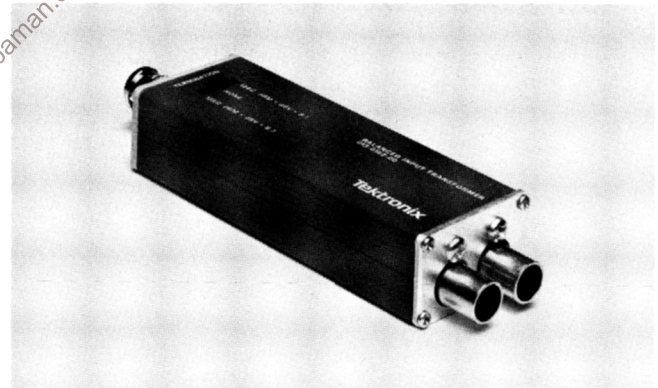


Fig. 2-2. Balance Transformer.

PERFORMANCE CHECK

INTRODUCTION

The following procedure verifies the electrical characteristics of the L3 Plug-In Module and includes checks on intermodulation distortion, residual response, reference level accuracy, and display flatness. Adjustments are not included; they are located in the Calibration Procedure in Section 4.

If the instrument fails to meet a performance requirement, refer to the related adjustment procedure in this manual or in the 7L5 manual.

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EQUIPMENT REQUIRED

Type	Minimum Performance Requirements	Typical Model or Part No.
7L5 Spectrum Analyzer Plug-In installed in a 7000-series mainframe		
Signal Generators	10 kHz to 5 MHz +10 dBm to -89 dBm into 50 Ω	Hewlett-Packard 654 or 651
Signal Generators	10 MHz to 125 MHz +5 dBm to -40 dBm into 50 Ω	Hewlett-Packard 8654
Step Attenuator	1 dB/step	Tektronix 2701
Attenuators, 14 dB 50 Ω (2)		Tektronix 011-0060-02
Coaxial cables, 50 Ω (3)		Tektronix 012-0057-01
BNC T connector		Tektronix 103-0030-00
Cap, BNC non-shorting		Tektronix 200-0678-00 or Tektronix 200-0685-00

PROCEDURE

1. Preliminary Steps

- a. Install the L3 in the 7L5, and install the 7L5 in the oscilloscope mainframe.
- b. Turn the instruments on and allow to warm up for 10 minutes or more.
- c. Perform the Initial Calibration procedure described in Section 2 of this manual.

2. Check Readout

- a. Set REFERENCE LEVEL to +21 dBm 50 Ω .
- b. Switch INPUT REF to dBV and check for a readout of +8 dBV.
- c. Switch INPUT REF to dBm 600 Ω and check for a readout of +10 dBm.
- d. Momentarily connect a 10X probe to the INPUT, or short circuit the INPUT connector ring to the shell, and check that the readout increases by 20 dB.

3. Check Reference Level Accuracy

- a. Set the front panel controls as follows:

DOT FREQUENCY	1 MHz
RESOLUTION	COUPLED
FREQUENCY SPAN/DIV	10 kHz
INPUT REF	dBV
REFERENCE LEVEL	-45 dBV; LOG 2 dB/DIV
TRIGGERING	FREE RUN NORM
TIME/DIV	AUTO
INPUT TERMN Z	50 Ω

- b. Connect a HP 654 signal generator, through a 2701 Step Attenuator, to the L3 INPUT. Set the attenuators for 48 dB attenuation, then adjust the signal generator for a 7-division display at 1 MHz.
- c. Set the REFERENCE LEVEL to -37 dBV, set the step attenuator for 40 dB, and check for a display of 7 divisions ± 0.1 division (0.2 dB).
- d. Repeat the above procedure of adding 8 dB in the 7L5 and taking out 8 dB in the step attenuators, up to +3 dBV reference level. Check that the level at each step is within ± 0.1 division of the level at the previous step.

4. Check Display Flatness

a. Set the front panel controls as follows:

DOT FREQUENCY	10.00 kHz
FREQUENCY SPAN/DIV	20 kHz
INPUT REF	dBm 50 Ω
REFERENCE LEVEL	0 dBm; LOG 2 dB/DIV

Leave all other controls as they were in the previous set-up.

b. Connect a HP 654 signal generator to the input and adjust it for a 7-division display at 10 kHz.

c. Simultaneously tune the signal generator frequency and the DOT FREQUENCY from 10 kHz to 5 MHz, and check that the display flatness is within 0.5 dB peak-to-peak.

5. Check Third-Order Intermodulation Distortion

a. Set the front panel controls as follows:

DOT FREQUENCY	4500.00 kHz
FREQUENCY SPAN/DIV	5 kHz
INPUT REF	dBV
REFERENCE LEVEL	-38 dBV; LOG 10 dB/DIV

Leave all other controls as they were in the previous set-up.

b. Connect two signal generators, such as HP654 or 651, plus the attenuators, as shown in Fig. 3-1. Set the step attenuators for 32 dB of attenuation, and adjust the signal generators for two full-screen signals one division apart (such as 4495 kHz and 4500 kHz).

c. Check that the intermodulation sidebands are at least 75 dB below the signals.

d. Set the REFERENCE LEVEL to -14 dBV, and set the step attenuators for 8 dB attenuation.

e. Check that the intermodulation sidebands are at least 75 dB below the signals.

f. Set the REFERENCE LEVEL to -6 dBV, and set the step attenuators for 0 dB attenuation.

g. Check that the intermodulation sidebands are again at least 75 dB below the signals.

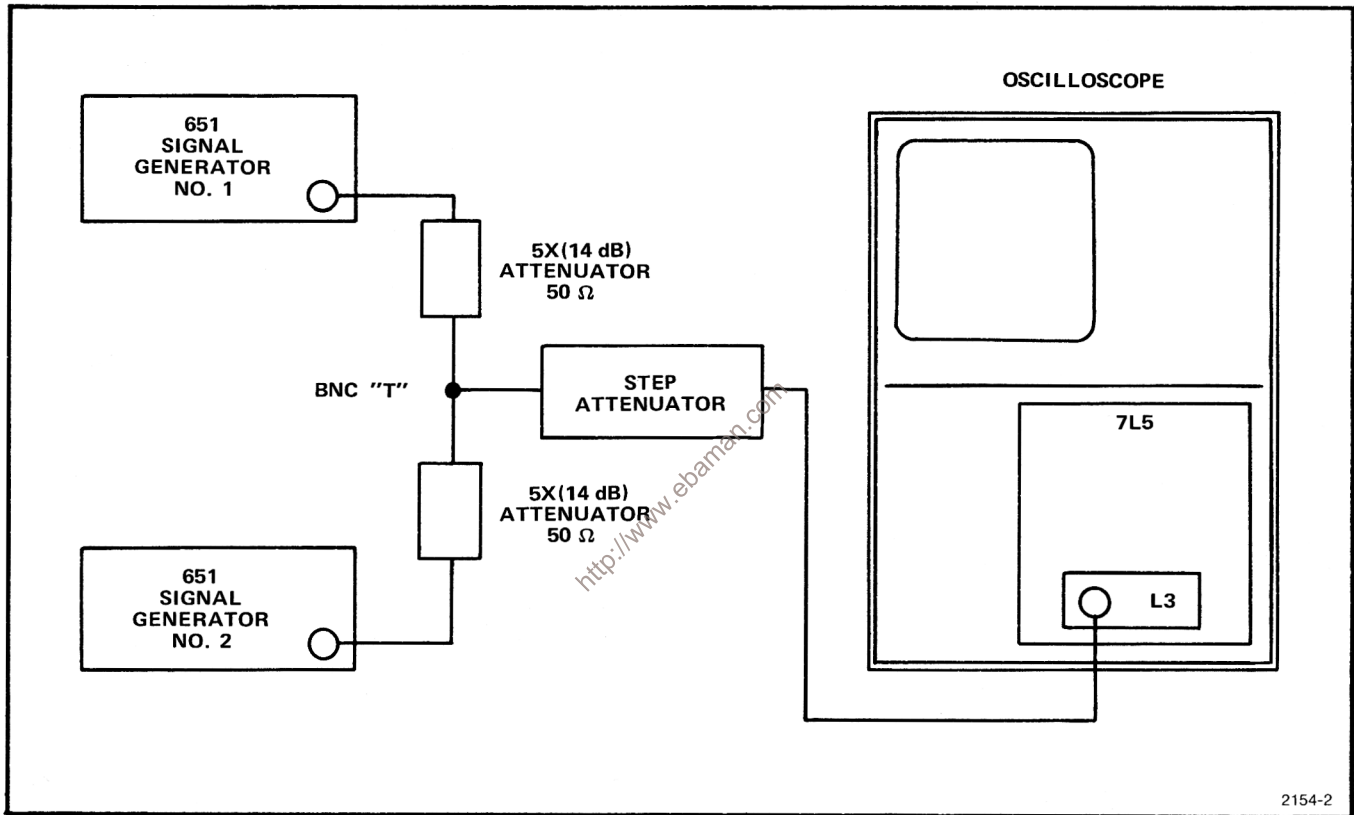


Fig. 3-1. Intermodulation distortion test equipment setup.

6. Check Second-Order Intermodulation Distortion

a. Set one signal generator to 5 kHz, then repeat the set-up and procedure in step 5, checking that the intermodulation sidebands are at least 72 dB below the signals.

7. Check Out-of-Band Intermodulation Distortion

a. Set the front panel control as follows:

DOT FREQUENCY	4500.00 kHz
REFERENCE LEVEL	-14 dBV

Leave all other controls as they were in the previous set-up.

b. Connect two signal generators, such as HP 8654, to the L3 as indicated in Fig. 3-2. Set generator one to 10 MHz and generator two to 14.5 MHz.

c. Adjust the generators so that each signal is 560 mV P-P at the L3 input. To do this: monitor the L3 input with an oscilloscope, disconnect generator two, and terminate the

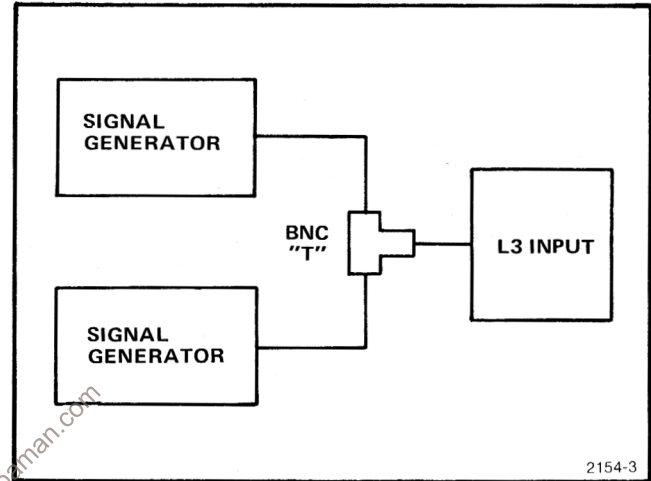


Fig. 3-2. Test set-up for out-of-band intermodulation distortion.

cable into 50 Ω . Adjust generator one, then disconnect it, terminate its cable into 50 Ω , and reconnect and adjust generator two. Remove the termination and reconnect generator one.

d. Check that the display at 4500 kHz is more than 50 dB below the signals.

e. Set the signal generators to the following frequencies and repeat steps c and d:

20 MHz	24.5 MHz
40	44.5
60	64.5
75	79.5
90	94.5
120	124.5

8. Check Residual Response and Sensitivity

Refer to the 7L5 Instruction Manual and perform the residual response and sensitivity checks found there, with a non-shortening bnc cap installed on the INPUT connector. Make the checks with the INPUT TERMN Z switch set to both $1\text{ M}\Omega/28\text{ pF}$ and $50\ \Omega$.

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SERVICE INFORMATION & DIAGRAM

WARNING

The service information in the remainder of this manual is intended for use by qualified personnel only. To avoid electrical hazards, DO NOT perform any servicing unless you are qualified to do so.

INTRODUCTION

This section includes a calibration procedure, a circuit description, and other maintenance information which requires access to the interior of the instrument. Therefore, refer all servicing to qualified personnel.

CALIBRATION PROCEDURE

Equipment Required

Type	Minimum Performance Requirements	Typical Model or Part No.
7L5 Spectrum Analyzer Plug-In installed in a 7000-series mainframe		
Signal generator	10 kHz to 5 MHz +10 dBm to -89 dBm into 50 Ω	Hewlett Packard 654
Signal generator	10 MHz to 125 MHz +5 dBm to -40 dBm into 50 Ω	Hewlett Packard 8654
Step attenuator	1 dB/step	Tektronix 2701
Plug-in extender cables (2)		Tektronix 067-0616-00
Termination, 50 Ω , bnc connectors		Tektronix 011-0049-01
Coaxial cables, 50 Ω (2), bnc connectors		Tektronix 012-0057-01

1. Preliminary

- a. Install the L3 in the 7L5 Spectrum Analyzer Plug-In.
- b. Connect the 7L5 to the oscilloscope mainframe through the two extender cables.
- c. Turn on the power and allow the instruments to warm up for at least 30 minutes.
- d. Refer to the Adjustment Locations drawing on the facing page while performing the following steps. Also included on the drawing are brief notes intended to aid the experienced calibrator; the numbers correspond to the following step numbers.

NOTE

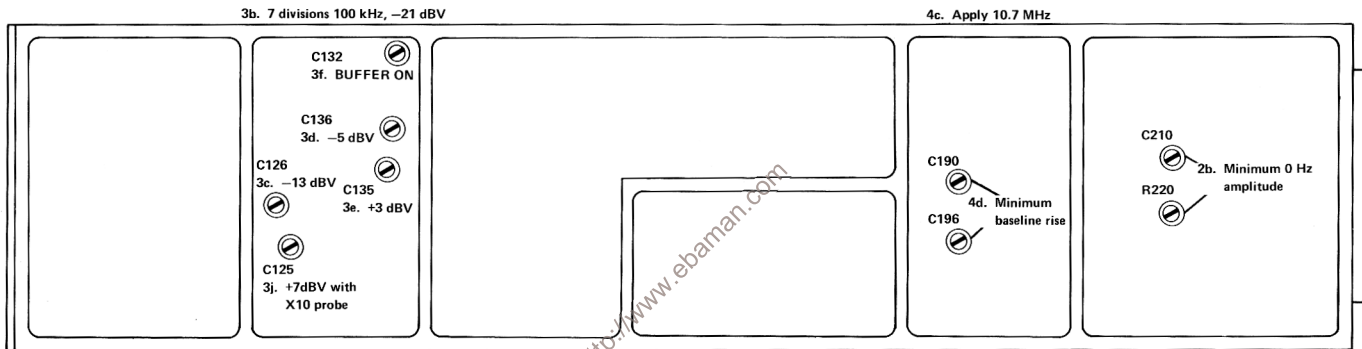
This procedure presumes that the 7L5 plug-in has been calibrated and is working correctly.

2. Adjust 0 Hz Spur Amplitude

- a. Set the L3 and 7L5 front panel controls as follows:

DOT FREQUENCY	0.00 kHz
DIGITAL STORAGE	DISPLAY A and B ON;
BASELINE CLIPPER	midrange
FREQUENCY SPAN/DIV	20 kHz
RESOLUTION	30 kHz
REFERENCE LEVEL	LOG 10 dB/DIV; -30 dBm
TRIGGERING	FREE RUN and NORM
TIME/DIV	AUTO
INPUT TERMN Z	50 Ω
INPUT REF	dBm 50 Ω

- b. Adjust R220 and C210 for minimum 0 Hz response. Repeat several times since the adjustments interact.
- c. Check that the 0 Hz amplitude is below -45 dBm reference level.



L-3 Adjustment locations.

3. Adjust Attenuators

a. Set the front panel controls as follows:

DOT FREQUENCY	1000.00 kHz
INPUT TERMN Z	50 Ω
INPUT REF	dBV
REFERENCE LEVEL	-21 dBV; LOG 2 dB/DIV

Leave all other controls as they were in the previous set-up.

b. Connect a signal generator, such as the HP654, through a step attenuator, such as the Tektronix 2701, to the L3 input. Set the attenuator for 24 dB attenuation, set the generator for 1 MHz, and adjust the generator for a 7-division display.

c. Set the REFERENCE LEVEL to -13 dBV, decrease the step attenuator setting to 16 dB, and adjust C126 for a 7-division display.

d. Set the REFERENCE LEVEL to -5 dBV, decrease the step attenuator setting to 8 dB, and adjust C136 for a 7-division display.

e. Set the REFERENCE LEVEL TO +3 dBV, decrease the attenuator setting to 0 dB, and adjust C135 for a 7-division display.

f. Push the INPUT BUFFER pushbutton to ON, then adjust C132 for a 7-division display. Push the button again to turn off the input buffer.

g. Recheck all parts of step 3, and readjust as necessary.

h. Disconnect the cable between the step attenuator and the L3, and connect a 50 Ω terminator to the attenuator output. Set the REFERENCE LEVEL to -21 dBV, and set the attenuators for 8 dB attenuation.

i. Set the INPUT TERMN Z to 1 M Ω /28 pF, and connect a P6105 probe to the INPUT (check that the readout is changed to -1 dBV). Connect the other end of the probe to the output of the 50 Ω terminator, and adjust the signal generator for a 7-division display.

j. Set the REFERENCE LEVEL to +7 dBV, reduce the attenuator setting to 0 dB, and adjust C125 for a 7-division display. Disconnect the probe from the L3.

4. Adjust Low-Pass Filter

a. Turn off the instruments, remove the L3 from the 7L5, then remove the bottom cover from the L3.

b. Remove the bottom plate that forms the bottom of the L3 Plug-In Module housing. This is accomplished by removing its mounting screws at the rear of the plate, then sliding the plate back toward the rear of the 7L5 enough to clear the front edge. Next, the sides of the module housing are compressed enough at the rear end to allow the bottom cover to pop off.

c. Re-install the L3 in the 7L5, turn the instruments on, and allow to warm up again.

d. Set the front panel controls as follows:

RESOLUTION	30 kHz
FREQUENCY SPAN/DIV	MAX
INPUT REF	dBm 50 Ω
REFERENCE LEVEL	-40 dBm; 10 dB/DIV
INPUT TERMN Z	50 Ω

e. Connect a signal generator, such as a HP8654, to the input, and set its output for 10.7 MHz at 0 dBm. Adjust the frequency slightly for maximum baseline rise.

f. Adjust C190 and C196 for minimum baseline rise.

g. Replace the L3 bottom cover, and the bottom plate on the 7L5.

CIRCUIT DESCRIPTION

NOTE

Refer to the schematic diagram while reading the following paragraphs.

Input Impedance Selection

The input impedance is selected by the INPUT TERMN Z switch, S122. In the center position of the switch, no resistor is connected (both relays K62 and K64 deactivated) and the input impedance is 1 M Ω /28 pF. In the 600 Ω position, relay K62 is energized, terminating the input with R64. In the 50 Ω position, both K62 and K64 are energized, terminating the input with R66.

The other section of the INPUT TERMN Z switch connects P2210-B13 to ground through W58 in the 50 Ω position, or through R56 in the 600 Ω position. This sets the calibrator level in the 7L5 to provide the correct level for the input termination selected. Also, when the switch is in the 600 Ω position, the output of U55E goes high to insert R62 between ground and P2210-B14. This tailors the gain in the 7L5 to compensate for a roll-off due to the 28 pF input capacitance. C62 is for decoupling. These resistors (R56, W58, R62) may be changed if the input impedance is changed; refer to the change procedure later in this section.

Attenuators

Two, 2-element parallel RC attenuators with 1 M Ω impedance are inserted as needed by relays K130 and K140. In addition, Q130 gates in an additional 8 dB of attenuation when both attenuators are in and the input buffer is selected on the 7L5 (gain is added in the 7L5 to compensate). The first attenuator section inserts 8 dB; the second section inserts 16 dB. Thus, with the 4 dB attenuator in the output of the amplifier, the L3 provides attenuator steps of 4 dB up to 36 dB; the 1-dB steps between the 4-dB steps are handled in the 7L5.

Fuse F125 protects input diodes CR146 and CR148 from exceeding their maximum current limits when high voltage transitions at the input charge C127 and C146.

These capacitors block dc primarily for Q130 and Q150. L125, R125, and the plug-in input capacitance form a low-pass filter with cutoff at about 10 MHz.

Amplifier

Refer to Fig. 4-1. The gates of Q150 and Q160 can be thought of as the noninverting and inverting inputs, respectively, of an operational amplifier, the output of which is the collector of Q154. This arrangement reduces second-order intermodulation distortion generated by the nonlinear gate voltage-drain current transfer characteristics of the JFET. The collector of Q154 is connected to the base of Q158; the emitter of Q158 is connected back to the inverting input of the operational amplifier. The output signal is taken from the collector of Q158, and is proportional to the ratio of its collector resistance (R158) to its emitter resistance. The emitter resistance consists primarily of the gain-setting resistors, selected by relays K162 and K164. These resistors change the gain in 8-dB steps. Diodes CR146 and CR148 protect the input by limiting the signal voltage excursion. The 1-M Ω input impedance of the amplifier is composed of R146 and R148 in parallel. This arrangement is for bias considerations, and also provides a discharge path for C146. Q152 is a constant-current source. At the output of the amplifier is a 4-dB attenuator which is switched in and out as necessary (refer to Control Circuits paragraph). Capacitor C160 sets the point of frequency roll-off for the

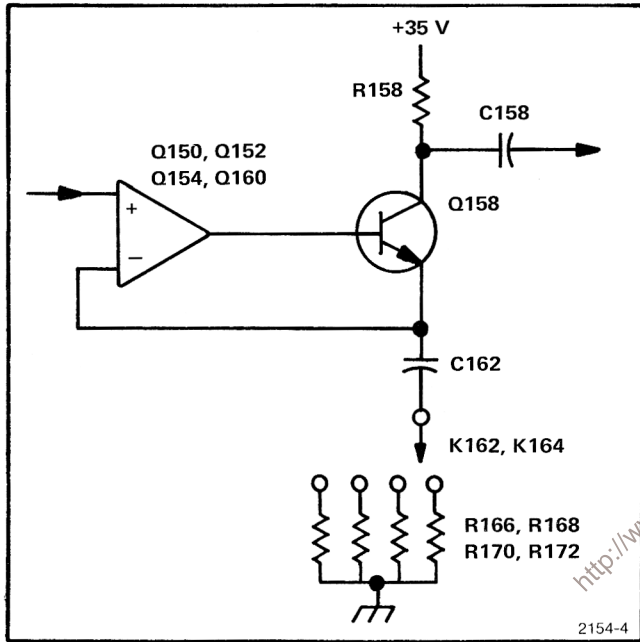


Fig. 4-1. L3 Amplifier (simplified diagram).

amplifier at 2 to 3 MHz (amplifier's 6 dB point); capacitor C162 blocks dc operating bias from the gain-setting resistors.

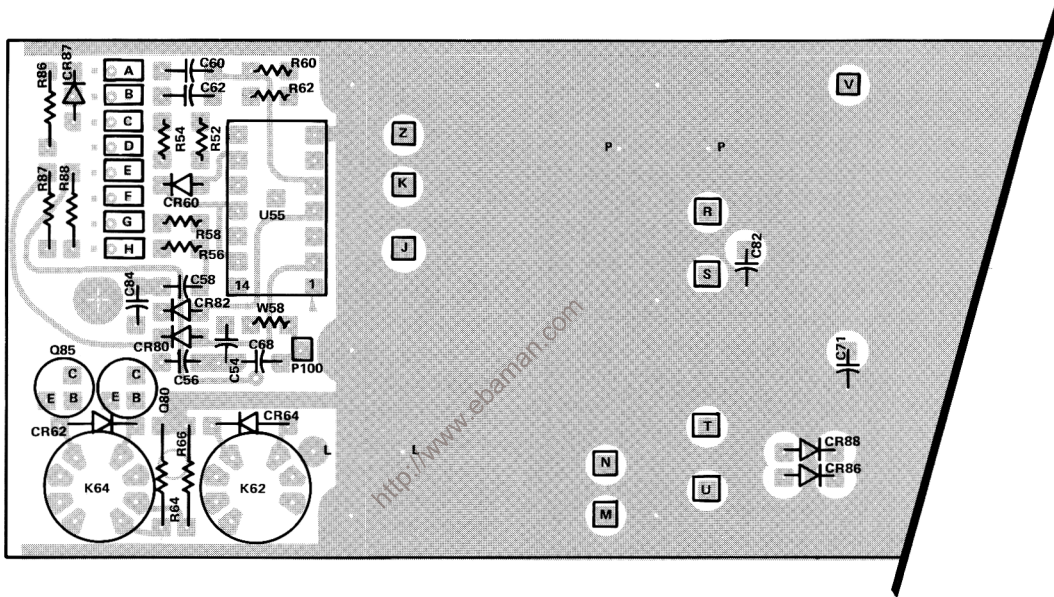
Low-Pass Filter

The low-pass filter is a seven-pole elliptical filter with a bandpass of slightly more than 5 MHz and an impedance of 300 Ω . The first zero point is at 10.7 MHz, giving about 110 dB of rejection at the 7L5 first IF frequency. The minimum out-of-band attenuation is 85 dB, up to 400 MHz. C202 and L200 are not part of the filter, but serve to correct a low-impedance mismatch near the edges of the 10.7 MHz passband of the 7L5.

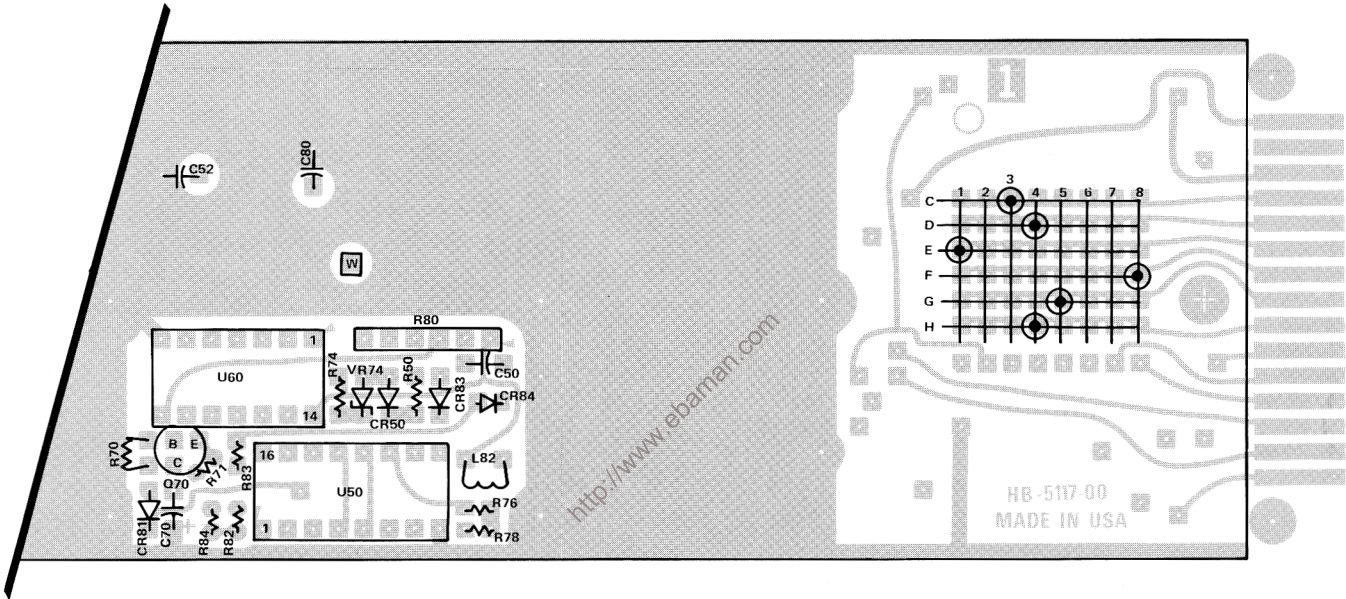
Mixer

The first local oscillator from the 7L5 is coupled through T215 and applied to a balanced bridge mixer. The square waves developed at the end terminals of T215 are of equal amplitude but opposite polarity, so with no input signal applied, and assuming a perfectly balanced bridge, no current flows in the primary of T210. However, when a signal appears, the bridge is unbalanced and a squarewave-modulated input signal is coupled through T210 and T205 to the 10.7 MHz IF output. In the IF output line is a 2-dB attenuator to help improve the impedance match with the 7L5 IF port. Since the diode bridge is not perfectly matched, R220 provides a low frequency balance, and C210 provides a high frequency balance at 10.7 MHz.

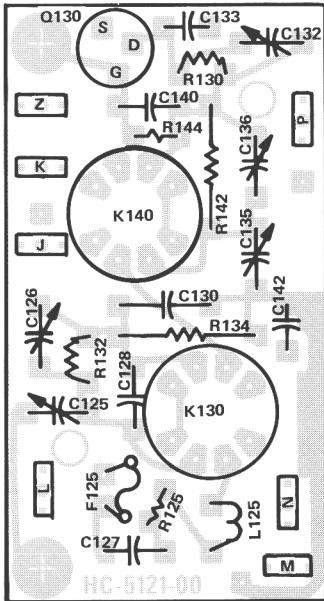
(Circuit description continued on page 4-15.)



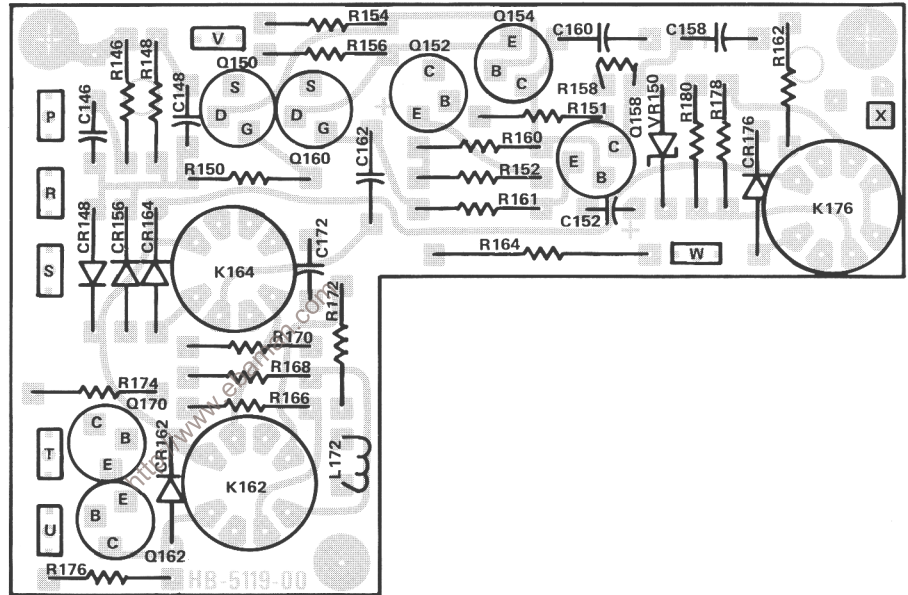
A50 Mother Board component locations (partial-left).



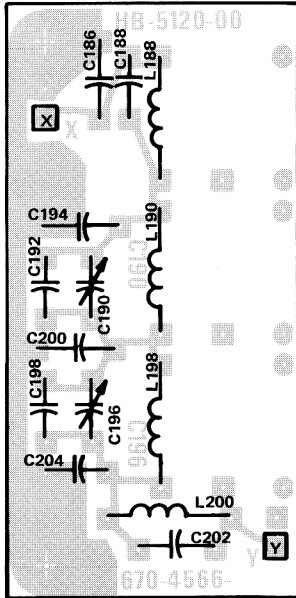
A50 Mother Board component locations (partial-right).



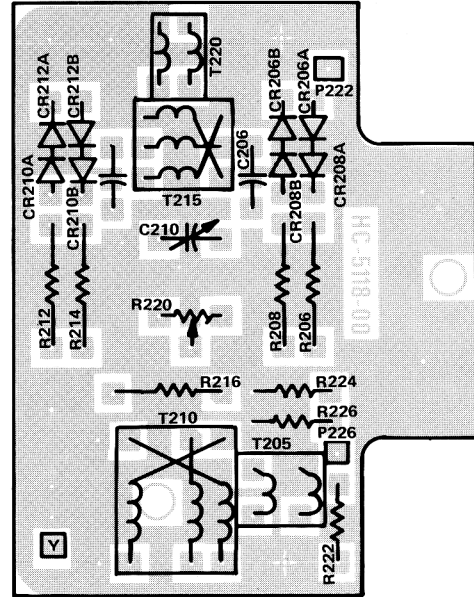
A125 Attenuators component locations.



A145 Amplifier component locations.

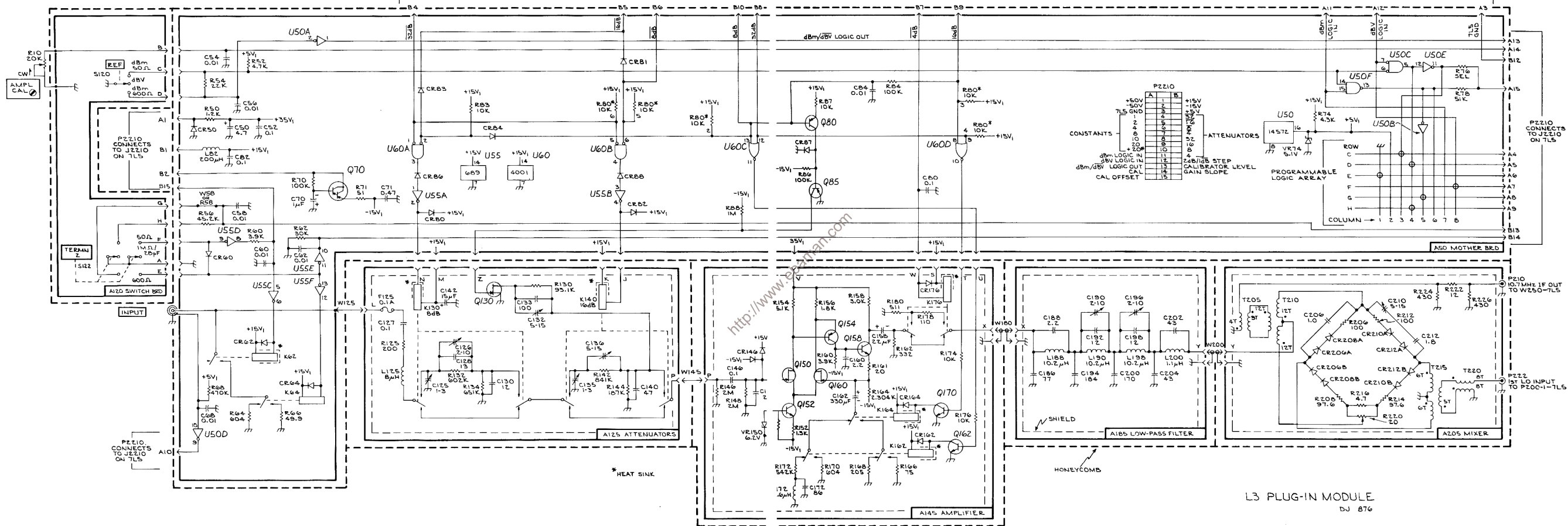


A185 Low-Pass Filter component locations.



A205 Mixer component locations.

@



Control Circuits

The control circuits for the attenuator and amplifier gain settings decode the logic lines from the 7L5. Since the 7L5 logic lines are set up to operate only attenuators, a different decoding arrangement must be used. This is accomplished by diodes CR81, CR83, and CR84, gates

U60A, U60B, U60C, and U60D, and transistors Q80 and Q85. Table 4-1 gives the incoming codes for the various reference levels, and the manner in which they are established. Note that the reference levels given are the lowest in each 4-dB step (i.e., -28 dBm position is used for -28, -27, -26, and -25 dBm reference levels). The intermediate 1-dB steps are accomplished in the 7L5.

Table 4-1
Attenuator and gain switching logic

Lowest ref level		Inputs (conn pin no.)				Interface Pin Designations					
						U	T	N	J	W	Z
50 Ω dbm	dBV	32(B8)	16B(9)	8(B10)	4(B7) ¹	Outputs					
						K162 ²	K164 ²	K130 ¹	K140 ¹	K176 ¹	Q130
-29 to -128	-42 to -141	0	0	0	1	1	1	0	0	1	0
-28	-41	0	0	0	0	1	1	0	0	0	0
-24	-37	0	0	1	1	0	1	0	0	1	0
-20	-33	0	0	1	0	0	1	0	0	0	0
-16	-29	0	1	0	1	1	0	0	0	1	0
-12	-25	0	1	0	0	1	0	0	0	0	0
-8	-21	0	1	1	1	0	0	0	0	1	1 ³

Table 4-1 (cont)

						Interface Pin Designations					
						U	T	N	J	W	Z
Lowest ref level		Inputs (conn pin no.)				Outputs					
50 Ω dbm	dBV	32(B8)	16B(9)	8(B10)	4(B7) ¹	K162 ²	K164 ²	K130 ¹	K140 ¹	K176 ¹	Q130
-4	-17	0	1	1	0	0	0	0	0	0	1 ³
0	-13	1	0	0	1	0	0	1	0	1	0
+4	-9	1	0	0	0	0	0	1	0	0	0
+8	-5	1	0	1	1	0	0	0	1	1	0
+12	-1	1	0	1	0	0	0	0	1	0	0
+16	+3	1	1	0	1	0	0	1	1	1	0
+20	+7	1	1	0	0	0	0	1	1	0	0
+16 with input buffer	+3	1	1	1	1	0	0	1	1	1	1
+20 with input buffer	+7	1	1	1	0	0	0	1	1	0	1

¹0=relay energized

²1=relay energized

³Inconsequential, since the attenuator is not switched in.

Input Impedance Change Provisions

Although the L3 Plug-In Module is normally supplied with input terminations of 50 Ω and 600 Ω , it is possible to change either or both of these to any termination impedance desired from 50 Ω to about 900 Ω . The following is an outline of the changes involved; complete instructions are found in the Input Impedance Change Procedure, found later in this section.

These changes are involved in an input impedance change:

(1) Resistor R64 or R66, or both, are changed to terminate the input.

(2) Resistor R56 or R58 (W58 on schematic), or both, are changed to set the calibrator level in the 7L5 to provide the correct level for the input impedance selected (the calibrator output impedance remains at 50 Ω).

(3) Resistor R62 may be changed for high-frequency roll-off compensation. The value is determined from Fig. 4-2.

(4) Resistor R76 or R78, or both, may be changed to add a small amount of gain (up to 1 dB) in the 7L5 so that the L3 will be calibrated in dBm with respect to the new termination impedance. The resistor value is given in Fig. 4-3.

(5) The programmable logic array is reprogrammed so that the dBm readout(s) will be correct.

Programmable Logic Array

The 7L5 provides 149 reference level steps; the programmable logic array (pla) allows positioning of the range. For instance, with the INPUT REF switch set to dBm 50 Ω , the range is from +21 dBm to -128 dBm; with the switch set to dBV, the range is from +8 dBV to -141 dBV. (A separate line, A13, selects whether the readout is dBm or dBV.) The lines are coded in BCD as indicated in Table 4-4. A logic zero on all lines provides a maximum readout of -1. The Input Impedance Change Procedure describes how to reprogram the pla when the input impedance is changed.

Power Supplies

The supply voltages used in the 7L5 are -15 V, $+5$ V, $+15$ V, and $+35$ V. The -15 V supply is decoupled by Q70 to provide the improved ripple rejection needed by the amplifier. The $+15$ V supply is decoupled by L82-C82 and C142, and provides a source for the $+5$ V supply, R74-VR74. The $+35$ V supply is derived by dropping the 7L5's $+50$ V source through decoupling resistor R50.

INPUT IMPEDANCE CHANGE PROCEDURE

The following describes the procedure necessary to change the input termination of the L3. No provision is made to change the front panel nomenclature, nor is any mention made of possible changes necessary in the calibration procedure.

1. Disassembly of the Unit

- a. Remove the L3 from the 7L5, then remove the screws securing the top and bottom covers.
- b. Disconnect the two wires coming from the INPUT connector to the circuit board. Note their locations for later replacement.
- c. Remove the five screws securing the mother board, then remove the mother board by carefully prying it straight out at the front and rear.

2. Changing Input Terminations (R64 and R66)

Replace input terminating resistors R64 or R66, or both, as desired. R64 should be the larger value of the two unless they are both less than 300Ω . R66 should be less than 600Ω and R64 should be less than 900Ω to ensure that the instrument meets its 0.5 dB flatness specification at 5 MHz. These resistors are located on the mother board, between relays K62 and K64.

3. Change Calibrator Level-Setting Resistors (R56 and R58)

a. R56 sets the calibrator level for the R64 termination; R58 sets it for the R66 termination. Compute R56 or R58 according to the following formulas.

$$R56 = 4100 \left(\frac{R64}{50 \Omega} - 1 \right) \quad R58 = 4100 \left(\frac{R66}{50 \Omega} - 1 \right)$$

b. Replace the resistor(s), located on the mother board directly behind the switch that interconnects pins G and H. To maintain calibrator accuracy, use 1/8 watt, 0.1% T9 metal film resistors.

4. Replace Gain Slope Resistor

a. Select the gain slope resistor R62 value from the graph in Fig. 4-2 and replace.

NOTE

If the termination impedance is less than 200 Ω , R62 is 0 Ω . If the termination impedance is more than 700 Ω , R62 is omitted.

b. R62 is located on the mother board near U55 pin 7.

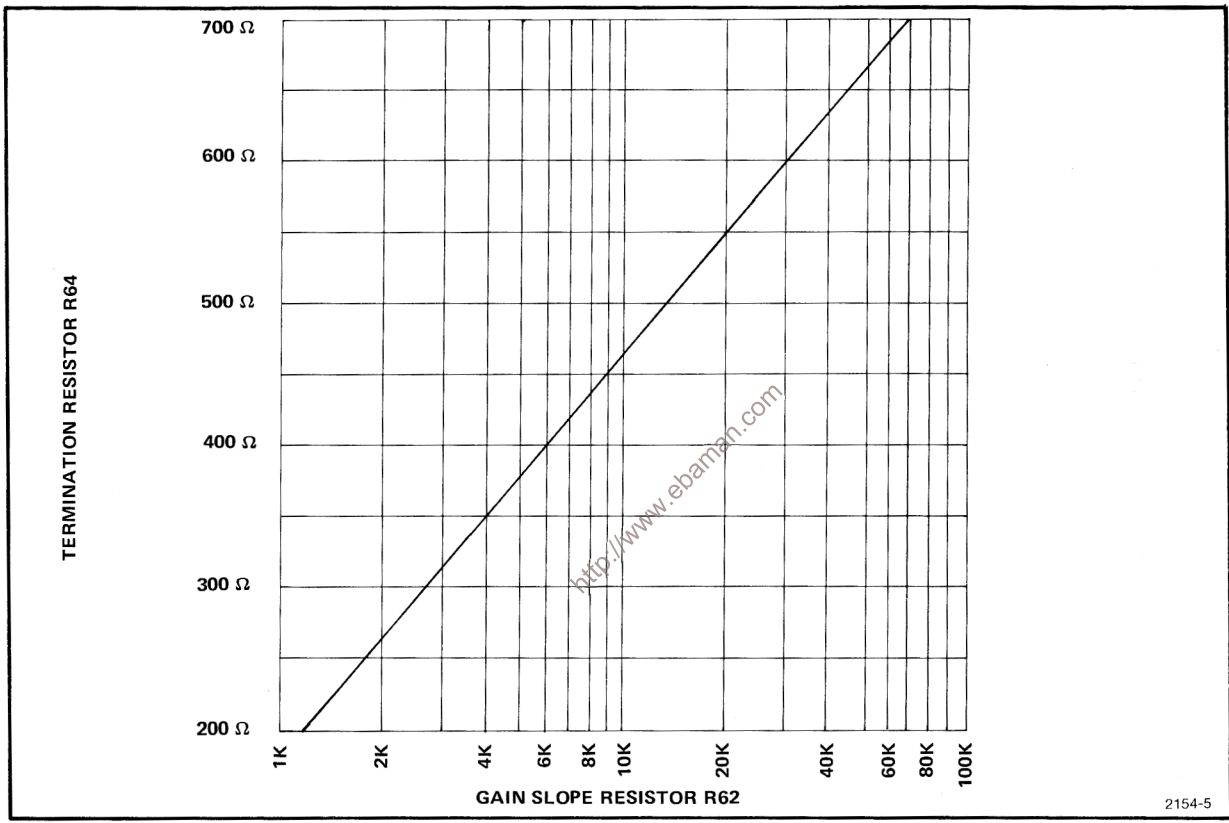


Fig. 4-2. Gain slope resistor R62 vs input impedance.

5. Set dBm Readout Code (reprogram the programmable logic array)

a. Use Table 4-2 and the following procedure to calculate and incorporate the programmable logic array (pla) when the termination resistors R64 and R66 are changed.

b. Calculate the constants x or y as follows:

For R66 termination: $y=10 (3-\log_{10} R66)$

Example: For 50 Ω , $y=10 (3-\log_{10} 50) = 13.01$

For R64 termination: $x=10 (3-\log_{10} R64)$

Example: For 600 Ω , $x=10 (3-\log_{10} 600) = 2.218$

c. Add nine (constant) to the integer part of the x or y value, then insert the BCD equivalent in the appropriate row of Table 4-2 (R66 and R64). Table 4-3 can be used as an example (R66 = 50 Ω).

d. Match the column binary number, generated for each column of Table 4-2, with those in Table 4-4 and enter the appropriate column numbers from Table 4-4 to the Column row of Table 4-2 (e.g., 100 has a column value of 4 and 011 a column value of 3).

Table 4-2

Readout Offset Value	Most Significant BCD Digit		Least Significant BCD Digit				
	20	10	8	4	2	1	
dBm—R66							←Y+9
dBV	0	0	1	0	0	1	←9
dBm—R64							←X+9
Row	H	G	F	E	D	C	
Column							

Table 4-3

Standard Programmable Logic Array (pla) for 50 Ω and 600 Ω

Readout Offset Value	Most Significant BCD Digit		Least Significant BCD Digit				
	20	10	8	4	2	1	
dBm 50 Ω—R66	1	0	0	0	1	0	$-Y+9=22$
dBV	0	0	1	0	0	1	-9
dBm 600 Ω—R64	0	1	0	0	0	1	$-X+9=11$
Row	H	G	F	E	D	C	
Column from Table 4-4	4	5	8	1	4	3	

Table 4-4

Column Binary-to-Decimal Conversion

1	2	3	4	5	6	7	8
0	1	0	1	0	1	1	0
0	1	1	0	0	1	0	1
0	1	1	0	1	0	1	0

e. Compare the row column pairs (e.g., H4, G5, etc.) generated in Table 4-2 to those of Table 4-3. Those that are different indicate the changes necessary in the pla. Change the programmable logic array (pla) as follows:

1) Remove plated-through connections by drilling through the hole with a #55 drill.

2) Install new connections by drilling a hole with #60 drill, then fill the hole with solder. Make sure that the run on both sides of the board connects to the plated hole.

3) Alternately run a short piece of wire through one of the holes in the pla board and solder it to the desired runs on both sides of the board. Use caution and ensure that the connections do not short to the metal housing when the board is installed.

Example:

If the desired termination is $50\ \Omega$ and $350\ \Omega$. In step 2, since $350\ \Omega$ is larger than $300\ \Omega$, R64 should be $350\ \Omega$ and R66 should remain $50\ \Omega$. In step 3, part a, since R66 is not changed, R58 remains $0\ \Omega$. $R56 = 4100 (350 \div 50 - 1) =$

$24.60\ \text{k}\Omega$. In step 4, part 1, the graph in Fig. 4-2 shows that $R62 = 4.0\ \text{k}\Omega$ (a standard value is $3.9\ \text{k}\Omega$, 5% resistor). In step 5, part b, for R66, $y = 10 (3 - \log 50) = 13.01$ and for R64, $x = 10 (3 - \log 350) = 4.56$.

In step 5, parts c and d, adding 9 to the integer of the x value and entering the BCD equivalent in the working Table 4-2, generates Table 4-5. Comparison with Table 4-4 gives the resultant column numbers listed in Table 4-5.

In Step 5, part e, the comparison of row-column pairs of Table 4-5 with those of Table 4-3 shows that the only change required is to connect row D to column 7 instead of column 4. Therefore, the procedure calls for drilling out the plating at matrix point D on the "pla," drill a new hole at D7, and solder the front run to the back run at D7.

In step 6, part a, since R66 was not changed, R76 is not installed. Since the fractional part of x in step 5, part b, is 0.56, the graph of Fig. 4-3 shows $R78 = 18\ \text{k}\Omega$ which is a standard 5% value.

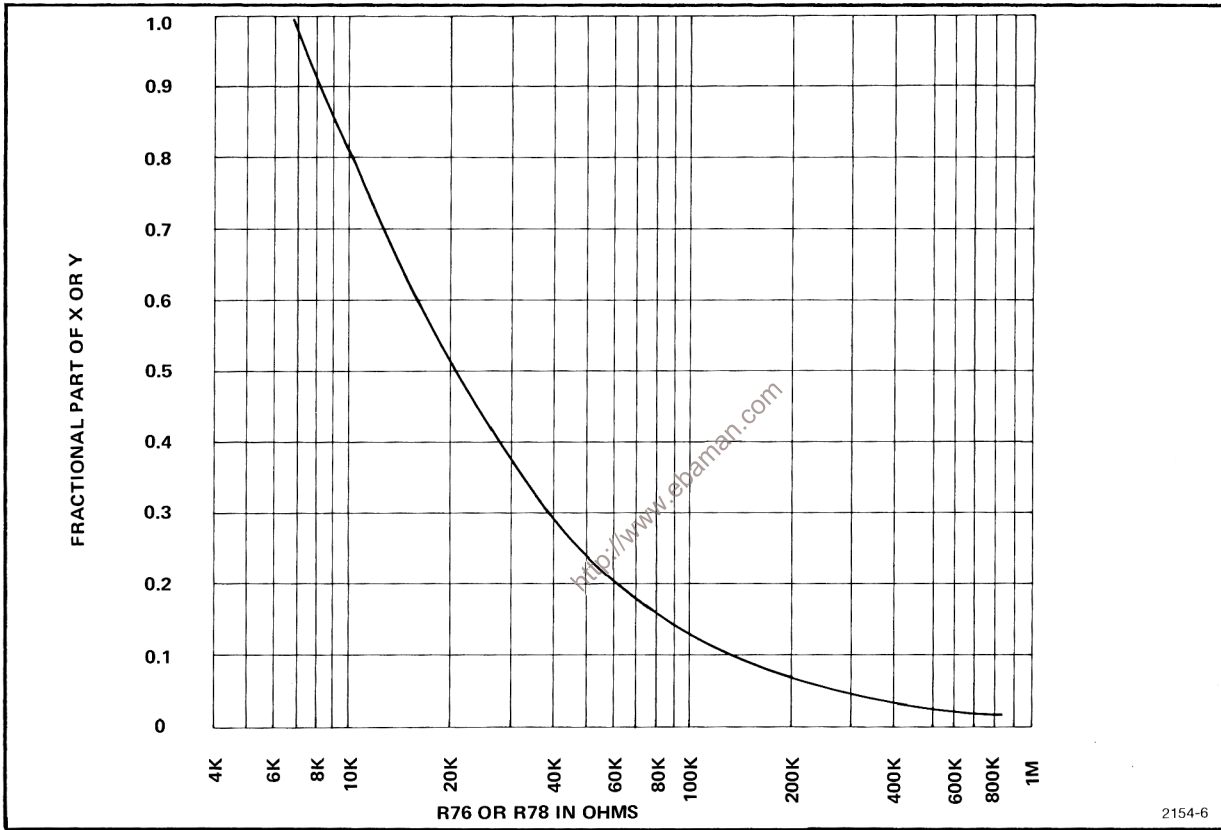


Fig. 4-3. R76 or R78 vs gain offset in dB.

Table 4-5

Impedance Change Example

Readout Offset Value	Most Significant BCD Digit		Least Significant BCD Digit				
	20	10	8	4	2	1	
dBm—R66	1	0	0	0	1	0	-Y+9=22
dBV	0	0	1	0	0	1	-9
dBm—R64	0	1	0	0	1	1	-X+9=13
Row	H	G	F	E	D	C	
Column from Table 4-4	4	5	8	1	7	3	

6. Change the Gain Setting Resistors (R76 and R78)

a. The value of R76 and R78 can be determined from the graph in Fig. 4-3. R76 pairs with R66 termination and R78 goes with R64 termination. The horizontal axis of the graph represents the fractional part of x or y, determined by the computations in step 5, part b (e.g., 0.218 for y value of 2.218 is 51 kΩ for R78).

b. Replace R78 with the nearest standard value 5%, 0.25 W resistor. (R78 is located near U50, pin 8, on the mother board, and R76 is adjacent to R78. See Component Location figure for the mother board.)

REPLACEABLE PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 *Name & Description*

Assembly and/or Component
Attaching parts for Assembly and/or Component
 --- * ---

Detail Part of Assembly and/or Component
Attaching parts for Detail Part
 --- * ---

Parts of Detail Part
Attaching parts for Parts of Detail Part
 --- * ---

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol --- * --- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

"	INCH	ELCTR	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICON	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVEING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OB	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
77250	PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP.	5700 W. ROOSEVELT RD. P. O. BOX 500	CHICAGO, IL 60650 BEAVERTON, OR 97077
80009	TEKTRONIX, INC.	6135 MAGNOLIA AVE.	RIVERSIDE, CA 92506
80294	BOURNS, INC., INSTRUMENT DIV.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
81483	INTERNATIONAL RECTIFIER CORP.	2530 CRESCENT DR.	BROADVIEW, IL 60153
83385	CENTRAL SCREW CO.		
87308	N. L. INDUSTRIES, INC., SOUTHERN SCREW DIV.	P. O. BOX 1360	STATESVILLE, NC 28677
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E WASHINGTON STREET P O BOX 372	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
95146	ALCO ELECTRONICS PRODUCTS, INC.	P. O. BOX 1348	LAWRENCE, MA 01842

<http://www.ebamain.com>

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000AH	STANDARD PRESSED STEEL CO., UNBRAKO DIV.	8535 DICE ROAD	SANTA FE SPRINGS, CA 90670
0000A	LEMO USA	2015 2ND STREET	BERKLEY, CA 94710
0000L	MATSUHITA ELECTRIC	200 PARK AVENUE, 54TH FLOOR	NEW YORK, NY 10017
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
13103	THERMALLOY COMPANY, INC.	2021 W VALLEY VIEW LANE P O BOX 34829	DALLAS, TEXAS 75234
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
24931	SPECIALTY CONNECTOR CO., INC.	3560 MADISON AVE.	INDIANAPOLIS, IN 46227
28480	HEWLETT-PACKARD CO., CORPORATE HQ.	1501 PAGE MILL RD.	PALO ALTO, CA 94304
53894	AHAM, INC.	968 W FOOTHILL BLVD.	AZUSA, CA 91702
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
A50	670-4563-00			CKT CARD ASSY:MOTHER	80009	670-4563-00
A50 ¹	670-4563-01			CKT CARD ASSY:MOTHER	80009	670-4563-01
A120	670-4609-00			CKT CARD ASSY:SWITCH	80009	670-4609-00
A125	670-4567-00			CKT CARD ASSY:ATTENUATOR	80009	670-4567-00
A145	670-4565-00			CKT CARD ASSY:AMPLIFIER	80009	670-4565-00
A185	670-4566-00			CKT CARD ASSY:LOW PASS FILTER	80009	670-4566-00
A205	670-4564-00			CKT CARD ASSY:MIXER	80009	670-4564-00
C50	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
C52	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C54	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C56	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C58	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C60	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C62	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C68	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C70	290-0267-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	162D105X0035CD2
C71	283-0346-00			CAP.,FXD,CER DI:0.47UF,+80-20%,100V	72982	8131-M100E474Z
C80	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C82	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C84	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N075Z5U0103M
C125	281-0151-00			CAP.,VAR,CER DI:1-3UF,100V	72982	518-600A1-3
C126	281-0221-00			CAP.,VAR,CER DI:2-10PF,100V	72982	513-001-A-2.0-10

¹Option 1 only.

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	Mfr Part Number
	Part No.	Eff	Dscont		Code	
C127	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C128	281-0657-00			CAP.,FXD,CER DI:13PF,2%,500V	72982	374-005C0G0130G
C130	281-0505-00			CAP.,FXD,CER DI:12PF,+/-1.2PF,500V	72982	301-012C0G0120K
C132	281-0161-00			CAP.,VAR,CER DI:5-15PF,350V	72982	518-000A5-15
C133	283-0330-00			CAP.,FXD,CER DI:100PF,5%,50V	72982	8111M100C0G0A101
C135	281-0151-00			CAP.,VAR,CER DI:1-3UF,100V	72982	518-600A1-3
C136	281-0161-00			CAP.,VAR,CER DI:5-15PF,350V	72982	518-000A5-15
C140	283-0115-00			CAP.,FXD,CER DI:47PF,5%,200V	72982	805-509C0G470J
C142	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C146	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C148	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	72982	301-000C0J0229C
C152	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C158	290-0718-00			CAP.,FXD,ELCTLT:22UF,20%,35V	56289	196D226X0035PE3
C160	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	72982	301-000C0J0229C
C168	290-0533-00			CAP.,FXD,ELCTLT:330UF,20%,6V	56289	196D337X006MA3
C172	283-0352-00			CAP.,FXD,CER DI:86PF,5%,100V	72982	8121-P3K860J
C186	283-0633-00			CAP.,FXD,MICA D:77PF,1%,100V	00853	D151E770F0
C188	281-0610-00			CAP.,FXD,CER DI:2.2PF,+/-0.1PF,500V	72982	374-001C0J0229B
C190	281-0221-00			CAP.,FXD,CER DI:2-10PF,100V	72982	513-001-A-2.0-10
C192	283-0168-00			CAP.,FXD,CER DI:12PF,5%,100V	72982	8111-100C0G0120J
C194	283-0668-00			CAP.,FXD,MICA D:184PF,1%,500V	00853	D155F1840F0

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	Mfr Part Number
	Part No.	Eff	Dscont		Code	
C196	281-0221-00			CAP.,FXD,CER DI:2-10PF,100V	72982	513-001-A-2.0-10
C198	283-0168-00			CAP.,FXD,CER DI:12PF,5%,100V	72982	8111-100COG0120J
C200	283-0646-00			CAP.,FXD,MICA D:170PF,1%,100V	00853	D151E171F0
C202	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
C204	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
C206	281-0599-00			CAP.,FXD,CER DI:1PF,+/-0.25PF,500V	72982	374001-C0K0-109C
C210	281-0161-00			CAP.,VAR,CER DI:5-15PF,350V	72982	518-000A5-15
C212	281-0670-00			CAP.,FXD,CER DI:1.8PF,+/-0.1PF,500V	72982	374-005C0K0189B
CR50	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR60	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR62	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR64	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR80	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR81	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR82	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR83	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR84	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR86	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR87	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR88	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR146	152-0457-00			SEMICOND DEVICE:SILICON	28480	5082-2671

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Replaceable Electrical Parts List—L3

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
CR148	152-0457-00			SEMICON D DEVICE:SILICON	28480	5082-2671
CR162	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR164	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR176	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR206	153-0025-00			SEMICON D VC SE:SILICON,50UA/10MV & 1MA/10MV	80009	153-0025-00
CR208	153-0037-00			SEMICON D VC SE:SILICON,MTCHD PAIR,15V	80009	153-0037-00
CR210	153-0037-00			SEMICON D VC SE:SILICON,MTCHD PAIR,15V	80009	153-0037-00
CR212	153-0025-00			SEMICON D VC SE:SILICON,50UA/10MV & 1MA/10MV	80009	153-0025-00
F125	159-0056-00			FUSE,CARTRIDGE:0.1A,125V,FAST-BLOW	75915	279-100
K62	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
K64	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
K130	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
K140	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
K162	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
K164	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
K176	148-0107-01			RELAY,ARMATURE:18VDC COIL	80009	148-0107-01
L82	108-0598-00			COIL,RF:200UH	80009	108-0598-00
L125	108-0440-00			COIL,RF:8UH,TOROIDAL INDUCTOR	80009	108-0440-00
L172	108-0724-00			COIL,RF:12.5NH	80009	108-0724-00
L188	108-0833-00			COIL,RF:FIXED,10.2UH	80009	108-0833-00

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	Mfr Part Number
	Part No.	Eff	Dscont		Code	
L190	108-0833-00			COIL, RF :FIXED, 10. 2UH	80009	108-0833-00
L198	108-0833-00			COIL, RF :FIXED, 10. 2UH	80009	108-0833-00
L200	108-0215-00			COIL, RF :1. 1UH	80009	108-0215-00
Q70	151-0435-00			TRANSISTOR:SILICON, PNP	04713	MPS-A65
Q80	151-0188-00			TRANSISTOR:SILICON, PNP	01295	2N3906
Q85	151-0188-00			TRANSISTOR:SILICON, PNP	01295	2N3906
Q130	151-1021-00			TRANSISTOR:SILICON, JFE	80009	151-1021-00
Q150	151-1070-00			TRANSISTOR:SILICON, FET	80009	151-1070-00
Q152	151-0190-00			TRANSISTOR:SILICON, NPN	80009	151-0190-00
Q154	151-0220-00			TRANSISTOR:SILICON, PNP	80009	151-0220-00
Q158	151-0333-00			TRANSISTOR:SILICON, NPN, SEL FROM MPS918	80009	151-0333-00
Q160	151-1070-00			TRANSISTOR:SILICON, FET	80009	151-1070-00
Q162	151-0190-00			TRANSISTOR:SILICON, NPN	80009	151-0190-00
Q170	151-0190-00			TRANSISTOR:SILICON, NPN	80009	151-0190-00
R10	311-1880-00			RES. , VAR, NONWTR: 20K OHM, 1W		
R50	301-0122-00			RES. , FXD, CMPSN: 1. 2K OHM, 5%, 0. 50W	01121	EB1225
R52	315-0472-00			RES. , FXD, CMPSN: 4. 7K OHM, 5%, 0. 25W	01121	CB4725
R54	315-0223-00			RES. , FXD, CMPSN: 22K OHM, 5%, 0. 25W	01121	CB2235
R56	321-1624-06			RES. , FXD, FILM: 45. 2K OHM, 0. 25%, 0. 125W	91637	MMF1816C45201C
R58 ¹	321-0223-00			RES. , FXD, FILM: 2. 05K OHM, 1%, 0. 125W	91637	MMF1816G20500F
R60	315-0392-00			RES. , FXD, CMPSN: 3. 9K OHM, 5%, 0. 25W	01121	CB3925
R66 ¹	321-0085-03			RES. , FXD, FILM: 75 OHM, 0. 25%, 0. 125W	91637	MMF1816D75R00C

¹Option 1 only.

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	Mfr Part Number
	Part No.	Eff	Dscont		Code	
R62	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R64	322-0172-00			RES.,FXD,FILM:604 OHM,1%,0.25W	75042	CEBT0-6040F
R66	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R68	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R70	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R71	317-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
R74	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R76 ¹	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R78	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R80	307-0542-00			RES.,NETWORK:THICK FILM,10K OHM,5%,0.125W		
R82	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R83	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R84	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R86	317-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.125W	01121	BB1045
R87	317-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.125W	01121	BB1035
R88	317-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.125W	01121	BB1055
R125	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R130	321-0831-03			RES.,FXD,FILM:92.5K OHM,0.25%,0.125W	91637	MFF1816D9250C
R132	321-0976-04			RES.,FXD,FILM:602 OHM,0.1%,0.125W	91637	HFF1816D60202B
R134	321-1654-07			RES.,FXD,FILM:651K OHM,0.1%,0.125W	91637	HMF188C65102B
R142	321-1697-01			RES.,FXD,FILM:841K OHM,0.5%,0.125W	91637	MFF1816G84102D
R144	321-0701-00			RES.,FXD,FILM:187K OHM,0.25%,0.125W	91637	MFF1816C18702C

¹Option 1 only.

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	
	Part No.	Eff	Dscont		Code	Mfr Part Number
R146	321-0510-00			RES.,FXD,FILM:2M OHM,1%,0.125W	91637	HFF188G20003F
R148	321-0510-00			RES.,FXD,FILM:2M OHM,1%,0.125W	91637	HFF188G20003F
R150	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R152	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R154	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R156	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R158	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R160	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R161	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R162	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
R164	322-0633-00			RES.,FXD,FILM:2.304K OHM,0.25%,0.25W	91637	MFF1421D23040C
R166	321-0085-03			RES.,FXD,FILM:75 OHM,0.25%,0.125W	91637	MFF1816D75R00C
R168	321-0127-01			RES.,FXD,FILM:205 OHM,0.5%,0.125W	91637	MFF1816G205R0D
R170	321-0172-02			RES.,FXD,FILM:604 OHM,0.5%,0.125W	91637	MFF1816D604R0D
R172	321-0710-01			RES.,FXD,FILM:2.542K OHM,0.5%,0.125W	91637	MFF1816G25420D
R174	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R176	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R178	321-0101-00			RES.,FXD,FILM:110 OHM,1%,0.125W	91637	MFF1816G110R0F
R180	321-0165-00			RES.,FXD,FILM:511 OHM,1%,0.125W	91637	MFF1816G511R0F
R206	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R208	321-0096-00			RES.,FXD,FILM:97.6 OHM,1%,0.125W	91637	MFF1816G97R60F

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Replaceable Electrical Parts List—L3

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R212	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MPF1816G100R0F
R214	321-0096-00			RES.,FXD,FILM:97.6 OHM,1%,0.125W	91637	MPF1816G97R60F
R216	307-0107-00			RES.,FXD,CMPNS:5.6 OHM,5%,0.25W	01121	CB56G5
R220	311-1007-00			RES.,VAR,NONWIR:20 OHM,20%,0.50W	80294	3329HG48-200
R222	317-0120-00			RES.,FXD,CMPNS:12 OHM,5%,0.125W	01121	BB1205
R224	317-0431-00			RES.,FXD,CMPNS:430 OHM,5%,0.125W	01121	BB4315
R226	317-0431-00			RES.,FXD,CMPNS:430 OHM,5%,0.125W	01121	BB4315
S120	260-1841-00			SWITCH,TOGGLE:DPDT,10MA,5V	95146	TT21PG-PC-2
S122	260-1841-00			SWITCH,TOGGLE:DPDT,10MA,5V	95146	TT21PG-PC-2
T205	120-1076-00			XFMR,RF:TOROID,2 WINDINGS	80009	120-1076-00
T210	120-1074-00			XFMR,RF:TOROID,12 TURNS,TRIFILAR	80009	120-1074-00
T215	120-1075-00			XFMR,RF:TOROID,3 WINDINGS	80009	120-1075-00
T220	120-0445-00			XFMR,TOROID:8 TURNS,BIFILAR	80009	120-0445-00
U50	156-0767-00			MICROCIRCUIT,DI:HEX GATE	80009	156-0767-00
U55	156-0790-00			MICROCIRCUIT,DI:HEX INVERTER	04713	MC689P
U60	156-0349-00			MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE	80009	156-0349-00
VR74	152-0279-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	07910	CD332305
VR150	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	81483	69-6585
W58	131-0566-00			LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	0000L	JWW0200E0

FIG. 1 EXPLODED

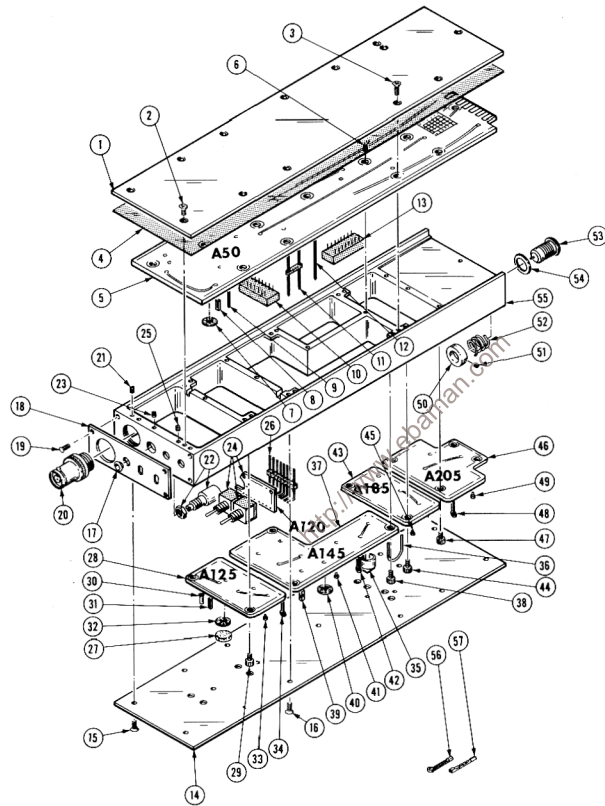


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Dscnt	Qty	Name & Description					Mfr Code	Mfr Part Number
					1	2	3	4	5		
1-1	337-2362-00			1	SHIELD,ELEC:COVER, TOP (ATTACHING PARTS)					80009	337-2362-00
-2	211-0030-00			2	SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL					83385	OBD
-3	211-0112-00			10	SCREW,MACHINE:4-40 X 0.375"100DEG,FLH STL - - - * - - -					83385	OBD
-4	342-0351-00			1	INSULATOR,FILM:5.31 X 1.92 INCH					80009	342-0351-00
-5	-----			1	CKT CARD ASSY:MOTHER(SEE A50 EPL) (ATTACHING PARTS)						
-6	211-0030-00			5	SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL - - - * - - -					83385	OBD
	-----			-	. CKT CARD ASSY INCLUDES:						
-7	342-0356-00			3	. INSULATOR,PLATE:NYLON,W/10 LEADS					13103	7717-231N
-8	136-0263-04			8	. CONTACT,ELEC:FOR 0.025 INCH SQUARE PIN					22526	75377-001
-9	131-0608-00			1	. CONTACT,ELEC:0.365 INCH LONG					22526	47357
-10	136-0269-02			2	. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE					01295	C931402
-11	131-1612-02			2	. TERM,FEEDTHRU:U-SHAPED					80009	131-1612-02
-12	131-0787-00			11	. CONTACT,ELEC:0.64 INCH LONG					22526	47359
-13	136-0260-02			1	. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE					01295	C931602
-14	337-2361-00			1	SHIELD,ELEC:COVER,BOTTOM (ATTACHING PARTS)					80009	337-2361-00
-15	211-0030-00			1	SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL					83385	OBD
-16	211-0030-00			17	SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL - - - * - - -					83385	OBD
-17	342-0301-00			1	INSULATOR,FILM:					80009	342-0301-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Model No. Dscont	Qty	1 2 3 4 5	Name & Description	Mfr	
							Code	Mfr Part Number
1-18	333-2218-00			1		PANEL,FRONT:	80009	333-2218-00
	333-2218-01			1		PANEL,FRONT:	80009	333-2218-01
						(ATTACHING PARTS)		
-19	213-0109-00	B010100	B010140	4		SCREW,DRIVE:00 X 0.125 INCH LONG	77250	OBD
	211-0650-00	B010141		4		SCR,CAP,SOC HD:0.80 X 0.187 INCH,SST	000AH	OBD
						- - - * - - -		
-20	131-0679-02			1		CONNECTOR,RCPT,:BNC W/HARDWARE	24931	28JR270-1
						(ATTACHING PARTS)		
-21	213-0048-00			1		SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
						- - - * - - -		
-22	-----			1		RESISTOR,VAR:(SEE R10 EPL)		
						(ATTACHING PARTS)		
-23	213-0048-00			2		SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
						- - - * - - -		
-24	-----			1		CKT CARD ASSY:SWITCH(SEE A120 EPL)		
						(ATTACHING PARTS)		
-25	213-0048-00			4		SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
						- - - * - - -		
	-----			-		. CKT CARD ASSY INCLUDES:		
-26	131-1956-00			1		. TERM SET,PIN:8 MALE CONT,RIGHT ANGLE	00779	87233-8
-27	348-0515-00			4		PAD,CUSHIONING:0.281 DIA	80009	348-0515-00
-28	-----			1		CKT CARD ASSY:ATTENUATOR(SEE A125 EPL)		
						(ATTACHING PARTS)		
-29	211-0196-00			2		SCREW,MACHINE:4-40 X 0.188,SCH,HEX,STL	000AH	OBD
						- - - * - - -		
	-----			-		. CKT CARD ASSY INCLUDES:		
-30	136-0261-00			2		. CONTACT,ELEC:FOR 0.22 INCH PIN	00779	1-331677-6
-31	136-0263-04			7		. CONTACT,ELEC:FOR 0.025 INCH SQUARE PIN	22526	75377-001

¹Option 1 only.

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty	Name & Description					Mfr Code	Mfr Part Number
					1	2	3	4	5		
1-32	342-0356-00			2	.	INSULATOR,PLATE:NYLON,W/10	LEADS			13103	7717-231N
-33	136-0252-04			3	.	CONTACT,ELEC:0.188	INCH LONG			22526	75060
-34	214-0579-00			3	.	TERM.,TEST PT:0.40	INCH LONG			80009	214-0579-00
-35	214-2496-00			4		HEAT SINK,XSTR:				53894	OBD
-36	195-0167-00			2		LEAD,ELECTRICAL:50 OHM	COAX,SEMI RIGID			80009	195-0167-00
-37	-----			1		CKT CARD ASSY:AMPLIFIER(SEE A145 EPL)					
						(ATTACHING PARTS)					
-38	213-0192-00			3		SCR,TPG,THD FOR:6-32 X 0.50	INCH,PNH STL			87308	OBD
						- - - * - - -					
	-----			-	.	CKT CARD ASSY INCLUDES:					
-39	136-0263-04			7	.	CONTACT,ELEC:FOR 0.025	INCH SQUARE PIN			22526	75377-001
-40	342-0356-00			2	.	INSULATOR,PLATE:NYLON,W/10	LEADS			13103	7717-231N
-41	136-0252-04			23	.	CONTACT,ELEC:0.188	INCH LONG			22526	75060
-42	214-0579-00			2	.	TERM.,TEST PT:0.40	INCH LONG			80009	214-0579-00
-43	-----			1		CKT CARD ASSY:LOW PASS FILTER(SEE A185 EPL)					
						(ATTACHING PARTS)					
-44	211-0196-00			2		SCREW,MACHINE:4-40 X 0.188,SCH,HEX,STL				000AH	OBD
						- - - * - - -					
	-----			-	.	CKT CARD ASSY INCLUDES:					
-45	136-0252-04			2	.	CONTACT,ELEC:0.188	INCH LONG			22526	75060
-46	-----			1		CKT CARD ASSY:MIXER(SEE S205 EPL)					
						(ATTACHING PARTS)					
-47	211-0196-00			4		SCREW,MACHINE:4-40 X 0.188,SCH,HEX,STL				000AH	OBD
						- - - * - - -					

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty						Name & Description	Mfr	
					1	2	3	4	5		Code	Mfr Part Number
1-	-----	-----		-						. CKT CARD ASSY INCLUDES:		
-48	214-0579-00			2						. TERM. ,TEST PT:0.40 INCH LONG	80009	214-0579-00
-49	136-0252-04			3						. CONTACT,ELEC:0.188 INCH LONG	22526	75060
-50	343-0548-00			2						COLLAR,CONN:	80009	343-0548-00
										(ATTACHING PARTS FOR EACH)		
-51	213-0306-00			2						SETSCREW:2-56 X 0.062 INCH,OX STL	74445	OBD
										- - - * - - -		
-52	214-2255-00			2						SPRING,HLCPS:0.035 DIA MUSIC WIRE 0.25" L	80009	214-2255-00
-53	131-1604-00			2						CONNECTOR,RCPT,:FEMALE,50 OHM,SLIDE-ON	0000A	RA 00.100.250
-54	210-1228-00			2						WASHER,FLAT:CONNECTOR MIXER	80009	210-1228-00
-55	337-2363-00			1						SHIELD,ELEC:HONEYCOMB	80009	337-2363-00
	198-3320-00			1						WIRE KIT,ELEC:	80009	198-3320-00
-56	131-0512-02			1						. CONTACT,ELEC:0.315 INCH LONG	00779	61941-1
-57	131-0707-00			1						. CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	47439

<http://www.ebamall.com>

ACCESSORIES

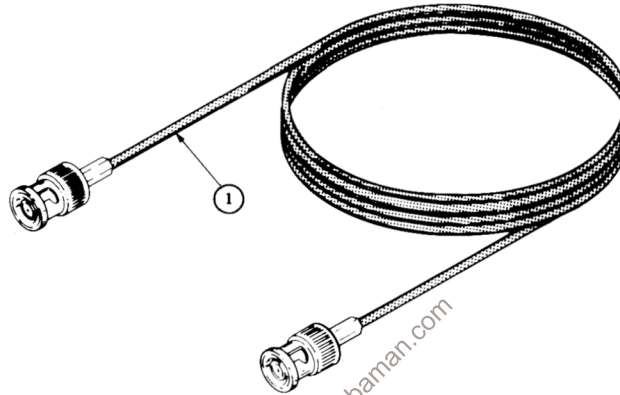


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
STANDARD ACCESSORIES												
-1	012-0113-00			1						CABLE ASSY,RF:50 OHM COAX,72 INCH LONG	80009	012-0113-00
	070-2154-01			1						MANUAL,TECH:INSTRUCTION	80009	070-2154-01
OPTIONAL ACCESSORIES												
	-----	-----		1						2703:ATTENUATOR,STEP,75 OHM		
	-----	-----		1						2701:ATTENUATOR,STEP,50 OHM		
	-----	-----		1						P6053B:10X PROBE		

¹Option 1 only.

OPTIONS

L3 Option 1

The L3 Option 1 provides an input termination of 75 Ω in lieu of 50 Ω . The selectable terminations for the Option 1 are 75 Ω , 600 Ω , and 1 M Ω /28 pF.

The following changes and additions to the L3 manual apply for the L3 Option 1 Plug-In Module.

Section 4, Input Impedance Change Procedure:

Add the following Table:

Standard pla for 75 Ω and 600 Ω

Readout Offset Value	Most Significant BCD Digit		Least Significant BCD Digit				
	20	10	8	4	2	1	
dBm 75 Ω —R66	1	0	0	0	0	0	$\leftarrow Y+9=22$
dBV	0	0	1	0	0	1	$\leftarrow 9$
dBm 600 Ω —R64	0	1	0	0	0	1	$\leftarrow X+9=11$
Row	H	G	F	E	D	C	
Column from Table 4-4	4	5	8	1	1	3	