

FACTORY CALIBRATION PROCEDURE

CONTENTS:

This is the guide for calibrating new instruments in Product Manufacturing. The procedure consists of 4 sections:

Equipment Required

Factory Test Limits - Factory Test Limits are limits an instrument must meet before leaving Manufacturing. These limits are often more stringent than advertised performance requirements. This is to insure that the instrument will meet advertised requirements after shipment, allows for individual differences in test equipment used, and (or) allows for changes in environmental conditions.

Short Form Procedure - The Short Form Procedure has the same sequence of steps and the same limits on checks or adjustments as the Main Procedure.

Main Procedure - The Main Procedure gives more detailed instructions for the calibration of the instrument. This procedure may require that some checks and adjustments be made so that performance is better than that required by the Factory Test Limits. This insures the Factory Test Limits will be met when side panels are added, permits some normal variation in test equipment and plug-in scopes, etc.

Abbreviations in this procedure will be found listed in TEKTRONIX STANDARD A-100. Definitions of terms used in this procedure may be found in TEKTRONIX STANDARD A-101.

In this procedure, all front panel control labels and Tektronix instrument names are in capital letters (VOLT/DIV, etc). Internal adjustment labels are capitalized only (Gain Adj, etc).

CHANGE INFORMATION:

This procedure has been prepared by Product Manufacturing Staff Engineering. For information on changes made to this procedure, to make suggestions for changing this procedure, or to order additional copies: please contact PMSE, 39-307. (HD)

*This procedure is
company confidential*

3L10

September 1968
For all serial
numbers.



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EQUIPMENT REQUIRED:

- A needed to calibrate Converter Filter Chassis (610-0147-00)
- B needed to calibrate Wide Band Amplifier Chassis (610-0146-00)
- C needed to calibrate Oscillator-Filter Chassis (610-0148-00)
- D needed to calibrate Oscillator Chassis (610-0165-00)
- E needed to calibrate Assembled TYPE 3L10 SPECTRUM ANALYZER

The following equipment is necessary to complete this procedure:

a. *TEKTRONIX Instruments*

- ABCDE 1 TYPE 564 OSCILLOSCOPE with
- ABCDE 1 TYPE 2B67 TIME BASE UNIT (Plug-in Scope)
- ABCD 1 TYPE 3L10 (Modified according to dwg #1780-C)
- CE 1 TYPE 546 OSCILLOSCOPE with
- CE 1 TYPE 1A1 PLUG-IN UNIT and
- CE 1 TYPE P6006 X10 PROBE and
- CE 1 TYPE P6011 X1 PROBE (Test Scope)
- D 1 TYPE 191 CONSTANT AMPLITUDE GENERATOR
- DE * 1 TYPE 184 TIME MARK GENERATOR
- E 1 TYPE 106 SQUARE WAVE GENERATOR

b. *Test Fixtures and Accessories*

- DE 1 Harmonic Modulator (067-0518-00)
- C 1 Calibration Fixture (067-0543-99)
- AC 2 Selectro to BNC female cables (175-0314-00)
- ABCDE 1 Plug-in extension cable for 560 series (012-0064-00)
- ABCDE 4 50 Ω BNC cables
- ABCDE 1 50 Ω BNC Terminator
- ABCDE 1 BNC "T" connector
- E 1 50 Ω BNC X10 Attenuator (011-0059-00)
- E 1 600 Ω terminated cable for the TO RECORDER jack (PMPE Dwg #1459A)
- C 1 Selectro cable (175-0423-00) terminated with a 330 Ω resistor (301-331-00)
- A 1 Converter Filter chassis cover

c. *Other Equipment*

- E 1 20,000 Ω /V Multimeter (Simpson 262 or equivalent)
- ABE * 1 Hewlett-Packard 608D UHF signal Generator
- E * 1 Hewlett-Packard 355C UHF Attenuator
- E * 1 Hewlett-Packard 355D UHF Attenuator
- E 1 Hewlett-Packard 241A Oscillator
- E 1 Kronhite 440A Oscillator

*The equipment must be traceable to NBS for certification of measurement characteristics.

Substitute test equipment may be used. The Plant Staff Engineer must approve any substitutions. All equipment listed must perform within its manufacturer's specifications, unless otherwise stated.

FACTORY TEST LIMITS

Factory Test Limits are qualified by the conditions specified in the main body of the Factory Calibration Procedure. The numbers and letters to the left of the limits correspond to the procedure steps where the check or adjustment is made. Setups without Factory Test Limits (setups, presets, etc.) are not listed. Instruments may not meet Factory Test Limits if calibration or checkout methods and test equipment differ substantially from those in this procedure.

THE FACTORY TEST LIMITS REFER TO SECTION E ONLY.

- | | |
|---|---|
| <p>4. VIDEO AMPLIFIER</p> <ul style="list-style-type: none">a. Range: 0.6 to 1.6div with 0.1V inb. Compression-expansion: $\leq .05$div with 2divc. Triggering: $\leq .1$divd. Trigger pickoff DC level: 0 ± 15V <p>8. VERTICAL POSITION</p> <ul style="list-style-type: none">a. Range: must position an 8div display off scan area at both top and bottom <p>*10. DISPERSION</p> <ul style="list-style-type: none">c. DISPERSION CAL range: Must be adjustable through 2divd. Accuracy, 1 to .01: $\pm 3\%$ with 2kHz/div on IF incidental FM: resolves 10Hz <p>*11. RF CENTER FREQ</p> <ul style="list-style-type: none">a. Frequency scale accuracy: $\pm(100\text{kHz} + 1\%)$ <p>12. SEARCH</p> <ul style="list-style-type: none">a. Dispersion at 1MHz: ≥ 20kHz totalb. Dispersion at 36MHz: ≥ 56kHz total <p>13. BALANCED MIXER</p> <ul style="list-style-type: none">a. Spurious responses: ≤ 2X noise | <p>*14. DISPERSION CALIBRATOR</p> <ul style="list-style-type: none">a. Frequency: 4kHz $\pm 0.1\%$c. 10.7MHz OSC drift: stable after 15 secondsd. Marker amplitude: all markers discernable <p>*15. IF CENTER FREQ</p> <ul style="list-style-type: none">a. Range: 8kHz $\pm 5\%$b. Dispersion linearity at 0: $\pm 5\%$
Dispersion at extremes: $\pm 5\%$ + error at 0c. Dispersion accuracy at extremes: $\pm 5\%$ plus error at 0 <p>16. GAIN</p> <ul style="list-style-type: none">b. Display flatness: ± 1dBc. GAIN range: ≥ 60dB <p>*17. RF ATTENUATOR dB</p> <p>accuracy: ± 1dB/dB</p> <p>*18. SENSITIVITY</p> <ul style="list-style-type: none">a. 50Ω input: -100dBm for sig + noise = 2X noiseb. 600Ω input: -78dBm for sig + noise = 2X noise <p>19. INCIDENTAL FM</p> <ul style="list-style-type: none">a. At 1MHz: resolves 26Hzb. At 36MHz: resolves 60Hz |
|---|---|

*Indicates measurement characteristics; test equipment must be traceable to NBS for instrument certification.

20. DISPLAY FUNCTIONS

- b. LIN linearity: $\pm 0.8\text{div}$
- c. LIN dynamic range: $\geq 20\text{dB}$
- d. LOG dynamic range: $\geq 50\text{dB}$

21. RECORDER OUTPUT

- b. Amplitude into 600Ω : $\geq 15\text{mV/div}$
Linearity: $\pm 10\%$ of 8div level
- c. Amplitude into open circuit:
 $\geq 30\text{mV/div}$

22. VIDEO BANDWIDTH

- b. Bandwidth: $\geq 50\text{kHz}$

THE END

SHORT FORM PROCEDURE

Factory Test Limits are limits an instrument must meet before it leaves Manufacturing; therefore, it must be possible to inspect to these limits. Because of normal variations in test equipment and plug-in scopes, addition of side panels, etc, it is necessary to set up some circuits so their performance is better than required by Factory Test Limits. Therefore, the instructions given in the Factory Calibration Procedure may call for checks or adjustments which result in less error than that allowed by the Factory Test Limits.

A. CONVERTER FILTER CHASSIS (610-0147-00)

- | | |
|--|--|
| <ul style="list-style-type: none">1. PRESET CONTROLS
608D for -49 DBM @60MHz2. SETUP<ul style="list-style-type: none">a. Calibrate TYPE 3L10 (Modified)
for 8div signal with RF ATTEN-
UATOR at 36dB.b. Connect Converter Filter Chassis | <ul style="list-style-type: none">3. 60MHz FILTER

608D DBM to -40
Remove 36dB RF ATTENUATOR
Adjust C89, C92, C95 and C98
adding 36dB with TYPE RF ATTEN-
UATOR
≈8div signal on TYPE 564 |
|--|--|

B. WIDE BAND AMPLIFIER CHASSIS (610-0146-00)

- | | |
|--|---|
| <ul style="list-style-type: none">1. SETUP2. OSCILLATOR

Adj L154 for Oscillations3. AMPLIFIER<ul style="list-style-type: none">a. Setup: -90dBm on HP608Db. Adjust Amplifier | <ul style="list-style-type: none">4. GAIN

Check for control5. SENSITIVITY

Check for at least -100dBm |
|--|---|
-
- | | |
|---------------|--------------------|
| <u>Adjust</u> | <u>564 display</u> |
| L154 | max |
| C114 | max |
| C124 | max |
| T204 | max |
| T214 | max |
| T224 | max |

C. OSCILLATOR-FILTER CHASSIS
(610-0148-00)

1. PRESETS

2. 800kHz FILTER

- a. Setup: 800kHz
- b. Adjust L405, L415 max
Adjust L410 ccw until output
begins to decrease

3. 900kHz Oscillator

- a. Setup
- b. Adjust L454 $1\frac{1}{2}$ turns ccw from
max
- c. Check oscillator start

D. TYPE 3L10 OSCILLATOR
(610-0165-00)

1. SETUP

2. PRESETS

- a. 3L10 Modified Test Fixture

L.O.	ON
W.B.	INT
900 OSC PLUS	OFF
RF ATTENUATOR	OFF
Gain	Midrange
VERTICAL DISPLAY	LIN
DISPERSION KC/DIV	2.0
IF CENTER FREQ	Midrange

b. TYPE 2B67

TIME/DIV	20mSEC
TRIGGERING	AUTO
MODE	NORM

c. TYPE 191

FREQUENCY RANGE	3.6-8
AMPLITUDE RANGE	5-50mV
AMPLITUDE	10
FREQUENCY	4.0MHz

d. Oscillator

T50	3 turns cw from flush
C49	$\frac{1}{2}$ slug showing at index
TAPE	mark with RF CENTER FREQ fully ccw

3. SET FREQUENCY

- a. Adjust T50 for 4MHz
- b. Adjust C49 for 20MHz
- c. Adjust C49 for 36MHz
- d. Slip tape for 30MHz
Adjust T50 for 3.95MHz at 4MHz
Adjust C49 for 36MHz

4. DIAL TAPE ACCURACY

Check for max error according
to the following table:

RF CENTER FREQ	TYPE 184	Max Error (dial div)
20	50nS	±1.5
10	.1μS	+1, -2
30	.1μS	±2.0
32	.5μS	±2.1
34	.5μS	±2.2
36	.5μS	±2.3
24	.5μS	±1.7
14	.5μS	±1.2
12	.5μS	±1.1
8	.5μS	±1.8
6	.5μS	±1.6
4	.5μS	±1.4
2	.5μS	±1.2
1	1μS	±1.0

5. SEARCH

- a. Setup
- b. Check SEARCH at 1MHz: 20kHz
- c. Check SEARCH at 36MHz: 56kHz

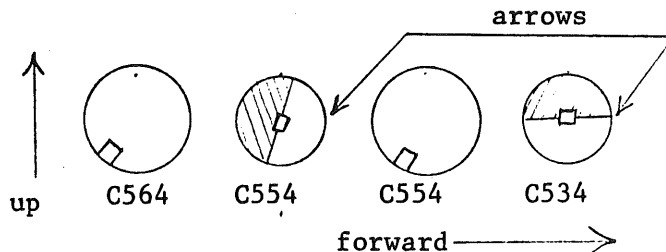
E. Assembled TYPE 3L10 SPECTRUM ANALYZER

1. PRESETS

a. TYPE 3L10

Internal Controls

L364, L374 full cw then 1 turn ccw
L557, L537 flush then 3 turns cw
L624 flush then 5 turns cw
C564, C554, C544, C534



Disconnect J70

2. RESISTANCE

CONNECTOR PIN	APPROXIMATE RESISTANCE	USE OF PIN
1	inf	6.3 Vac
2	inf	6.3 Vac
3	inf	none
4	inf	none
5	inf	-12.2V gnd
6	inf	none
7	inf	none
8	inf	none
9	0	gnd
10	35k	+300V
11	inf	trigger output
12	inf	none
13	4.1k	+125V
14	4.1k	+125V
15	4.1k	+125V
16	inf	-12.2V
17	80k	vert output
18	3.5k	sweep in
19	0	gnd
20	inf	none
21	80k	vert output
22	1.2k	-100V shunt
23	3.6k	-100V
24	inf	none
EXT OSC INPUT	inf	EXT OSC

3. POWER SUPPLIES

- Setup
- Power Supply voltages

-11V	-9.9V to -12.1V
+10V	+9V to 11V
Max hash	300mV

4. VIDEO AMPLIFIER

- Check .1V/DIV SET range: .6div to 1.6div with .1V in set .1V/DIV
- Check compression-expansion: <.05div with 2div sig
- Check triggering: <.1div
- Check trigger pickoff DC level: 0 ±15V at C679, R679

5. 11.5MHz OSCILLATOR

Adjust L364 for sawtooth at junction of C351, Q350 base

6. PEAK SIGNAL

- Setup Harmonic Modulator, 3L10 GAIN max
- Check 900kHz OSC start
- Peak 60MHz signal

adjust	
L624	peak
C89	"
C92	"
C95	"
C98	"
L154	"
C114	"
C124	just cw of peak
T204	"
T214	peak
T224	just ccw of peak
L405	peak
L415	peak
L410	peak

Detune T224 and T204 for 2div noise

7. RESOLUTION

- Setup: DISPERSION to .5 and RESOLUTION to 2
- Adjust C554, C534, L537 and L557 for resolution readjust L624
- Check resolution for discernable 1000Hz sidebands valleys >.5div above baseline
- Adjust C544 and C564: .01 amplitude same as at 2

8. VERTICAL POSITION

Check range: must position 8div display off scan area at both top and bottom.

9. TIMING

Adjust TYPE 2B67 timing

10. DISPERSION

- Setup: DISPERSION to 2, DISPERSION CAL midr
- Adjust L364, R321 and L374: 4 sidebands obtainable, then for correct dispersion
- Check DISPERSION CAL range: 6.8div to 9.4div
- Check dispersion accuracy: $\pm .24$ div

2B67 TIME/CM	3L10kHz/DIV MODULATION	
	DISPERSION	FREQUENCY
20mSEC	1	4kHz
50mSEC	.5	2kHz
.2SEC	.2	800Hz
.2SEC	.1	400Hz
.5SEC	.05	200Hz
.5SEC	.02	80Hz
1SEC	.01	40Hz

Check for discernable sidebands with 10Hz modulation.

11. RF CENTER FREQUENCY

Connect J50 to J70

Check frequency scale: $\pm(100\text{kHz} + 1\%)$

3L10 RF CENTER FREQ	TYPE 184	MAX 3L10 DIV DIAL ERROR
20	50nS	± 1.5
10	.1 μ S	+1, -2
30	.1 μ S	± 2
32	.5 μ S	± 2.1
34	"	± 2.2
36	"	± 2.3
24	"	± 1.7
14	"	± 1.2
12	"	± 1.1
8	"	± 1.8
6	"	± 1.6
4	"	± 1.4
2	"	± 1.2
1	1 μ S	± 1

12. SEARCH

- Check SEARCH at 1MHz: $\geq 20\text{kHz}$
- Check SEARCH at 36MHz: $\geq 56\text{kHz}$

13. BALANCED MIXER

- Check for Spuri: $\leq 2X$ noise
- Adjust C71 and C73 for spurious $\leq 2X$ noise

14. DISPERSION CALIBRATOR

- Adjust T710: 4kHz $\pm 0.1\%$
- Adjust R715 for most discernable markers
- Adjust L728 to center tallest marker check for no marker drift after 15 s
- Select R230 for tallest marker 6 to 8div amplitude

15. IF CENTER FREQ

- Adjust Center Freq Range, R352: 8kHz
- Check dispersion linearity at 0: $\pm .4$ div
- Check dispersion error at extremes: $8 \pm .4$ div + any linearity error

16. GAIN

- a. Setup 10MHz
- b. Check display flatness: $\pm 1\text{dB}$
- c. Adjust Gain Range, R107: 63dB

17. RF ATTENUATOR dB: $\pm 1\text{dB/dB}$

<u>dB</u>	<u>ERROR</u>
1	$\pm 0.1\text{div}$
2	$\pm 0.2\text{div}$
4	$\pm 0.4\text{div}$
8	$\pm 0.7\text{div}$
16	$\pm 1.3\text{div}$
20	$\pm 1.7\text{div}$

18. SENSITIVITY

- a. Check 50 Ω sensitivity:
10MHz to 36MHz -100dBm or greater
- b. Check 600 Ω sensitivity: 1MHz
- 80dBm or greater

19. INCIDENTAL FM

- a. Setup
- b. Check resolution at 1MHz:
resolves $\leq 26\text{Hz}$
- c. Check resolution at 36MHz:
resolves $\leq 60\text{Hz}$

20. DISPLAY FUNCTIONS

- a. Setup.
- b. Check LIN linearity: $\pm 0.8\text{div}$
- c. Check LIN dynamic range: $> 20\text{dB}$
- d. Adjust Log Adj, R646: $\geq 50\text{dB}$
dynamic range

21. RECORDER OUTPUT

- a. Setup
- b. Check 600 output and linearity:
amplitude $\geq 15\text{mV/div}$
linearity $\pm 10\%$ of 8div level
- c. Check open circuit amplitude:
 $\geq 30\text{mV/div}$

22. VIDEO BANDWIDTH

- a. Setup: 8div at 1kHz
- b. Check bandwidth: $\geq 5.6\text{div}$ at 50kHz

THE END

A. CONVERTER FILTER CHASSIS
(610-0147-00)1. PRESET CONTROLS*a. Test Scope*

TYPE 564

DISPLAY NORMAL

TYPE 2B67

TIME/DIV 20mSEC

TRIGGER LEVEL FREE RUN

TYPE 3L10 (Modified)

VERTICAL DISPLAY LIN

DISPERSION kHz/DIV 2

IF CENTER FREQ 0

RF ATTENUATOR 36dB

WIDE BAND (W.B.) INT

b. HP 608D

MEGACYCLES 60

FREQUENCY RANGE C

MOD SELECTOR cw

AMP TRIMMER peak

OUTPUT LEVEL SET

DBM -49

2. SETUP*a. Calibrate TYPE 3L10 (Modified)*

Connect 608D RF SIGNAL OUT to TYPE
3L10 50 Ω RF INPUT via 50 Ω BNC cable.
Adjust TYPE 3L10 GAIN for 8div display
on Test Scope.

b. Connect Converter Filter Chassis

Connect HP608D RF SIGNAL OUT to
Converter Filter Chassis J80 via
50 Ω BNC cable and BNC to selectro
adapter. Connect J98 to TYPE 3L10
via 50 Ω BNC cable and BNC to selectro adapter
Set converter Filter Chassis shield
in place.

3. 60MHz FILTER

Set HP608D DBM to -40. Remove
36dB attenuation with TYPE 3L10
RF ATTENUATOR.

≈9dB loss in filter

Adjust C89, C92, C95 and C98 for
maximum indication on the Test
Scope. Add 36dB with RF ATTENUATOR
to keep peak on CRT. The signal
indication should be ≈8div when
all the capacitors are adjusted for
peak.

THE END

B. WIDE BAND AMPLIFIER CHASSIS
(610-0146-00)

1. SETUP

Remove the jumper plug from right side of TYPE 3L10 (Modified). Connect the plug with cable to the TYPE 3L10 (Modified). Set W.B. to EXT.

Connect W.B. IN to J100 on the wideband amplifier. Connect the coax with clip lead to rear Selectro jack on the TYPE 3L10 (Modified) right side to the terminal next to T224.

Use the internal wideband amplifier as a guide and connect the cable wires to their proper terminals.

Connect a X1 probe from the test scope to C15 (10pf) in the wideband amplifier. Set Test Scope for .005 V/CM and free run trace. Connect the TYPE 3L10 (Modified) to the TYPE 564 with a flexible extension cable.

Turn TYPE 564 POWER to ON.

2. OSCILLATOR

Adjust L154 until oscillations appear on the Test Scope.

Disconnect the X1 probe. Place a cover on the wideband amplifier.

2. C156 may require dressing to keep oscillator running with cover in place.

3. AMPLIFIER

a. Setup

Connect an HP608D to the TYPE 3L10 (Modified) RF INPUT 50Ω. Adjust the HP608D for -90dBm of 60MHz.

Set the TYPE 3L10 (Modified) GAIN fully cw and all RF ATTENUATORS to OUT.

3. (cont'd)

b. Adjust amplifier

Adjust the amplifier according to the following table:

b. 3L10 GAIN must be fully cw

<u>Adjust</u>	<u>564 Display</u>
L154	max
C114	max
C124	max
T204	max
T214	max
T224	max

4. GAIN

Turn TYPE 3L10 (Modified) GAIN and check that the display amplitude can be varied.

5. SENSITIVITY

Turn TYPE 3L10 (Modified) gain fully cw, VERTICAL DISPLAY to LIN, DISPERSION and RESOLUTION to 2. Set the TYPE 2B67 TIME/DIV to .1 SEC. Turn the TYPE 3L10 (Modified) L.O. to ON.

Set the HP608D for 25MHz out. Set TYPE 3L10 (Modified) Oscillator for 25MHz. Adjust HP608D DBM for a signal twice the noise amplitude.

Check that the HP608D DBM reads at least -100dBm.

C. OSCILLATOR-FILTER CHASSIS
(610-0148-00)

1. PRESETS

a. *Sine Wave Generator*
(067-0542-99)

FREQUENCY	8.0
MULTIPLIER	100kHz
FREQUENCY VARIABLE	CAL
AMPLITUDE VOLTS P-P	as convenient
AMPLITUDE MULTIPLIER	" "

b. *Bench Scope*

1A1

VOLTS/CM CH 1	
MODE	CH 1
INPUT SELECTOR CH 1	AC
VOLTS/CM CH 2	
INPUT SELECTOR CH 2	AC

546

HORIZONTAL DISPLAY	A
TIME BASE A	
TRIGGERING MODE	AUTO
" SLOPE	+
" COUPLING	AC
" SOURCE	INT
TIME/CM	

2. 800kHz FILTER

a. *Setup*

Connect the SINEWAVE GENERATOR OUTPUT to J401 via a BNC to Selectro cable and a BNC 50 Ω cable. Connect J418 to the TYPE 1A1 CH 1 INPUT via a 50 Ω BNC cable and a BNC to Selectro cable.

Place cover on chassis. Change the TYPE 1A1 CH 1 VOLTS/CM for convenient display.

b. *Adjust L405, L410 and L415*

Adjust L405 and L415 for maximum display amplitude on the TYPE 546.

Adjust L410, starting fully cw, until display amplitude begins to decrease.

3. 900kHz OSCILLATOR*a. Setup*

Connect the TYPE 3L10 (Modified) W.B. in lead to J401 (for ground connection). Connect 900 OSC PLUS to C456 feed through capacitor (next to L454) via a meter lead.

Connect the TYPE 3L10 (Modified) to the TYPE 564 via a plug-in extension. Turn on the TYPE 564.

Connect J458 to the TYPE 1A1 CH 1 INPUT via a 1X Probe and the 330Ω load cable. Switch 900 ON-OFF to ON.

b. Adjust L454

Adjust L454 for maximum output. Then adjust L454 1½ turns ccw.

c. Check oscillator start

Turn 900 ON-OFF to OFF, then ON several times. Check that the oscillator starts each time the switch is returned to ON.

c .

If oscillator does not start: select Q450.

THE END

D. TYPE 3L10 OSCILLATOR
(610-0165-00)1. SETUP

Connect the TYPE 3L10 (Modified)
plug-in unit to the TYPE 564
vertical with a flexible extension
cable.

Place a cover on the oscillator.
Clamp the oscillator into the
Tracking jig on the top of the
TYPE 3L10 (Modified). Connect
the cable from J70 to J50.

2. PRESETS*a. 3L10 Modified Test Fixture*

L.O.	ON
W.B.	INT
900 OSC PLUS	OFF
RF ATTENUATOR	OFF
Gain	Midrange
VERTICAL DISPLAY	LIN
DISPERSION KC/DIV	2.0
IF CENTER FREQ	Midrange

b. TYPE 2B67

TIME/DIV	20mSEC
TRIGGERING	AUTO
MODE	NORM

c. TYPE 191

FREQUENCY RANGE	3.6-8
AMPLITUDE RANGE	5-50mV
AMPLITUDE	10
FREQUENCY	4.0MHz

d. Oscillator

T50	3 turns cw from flush
C49	$\frac{1}{2}$ slug showing
TAPE	at index mark with
	RF CENTER FREQ fully
	ccw

3. SET DIAL TAPE

a. Adjust T50 for 4MHz

Turn TYPE 564 on. Adjust T50 for a signal on TYPE 564 with the tape at 4MHz.

b. Adjust C49 for 20MHz

Set TYPE 191 for 20MHz. Adjust C49 for signal on the TYPE 564 with tape at 20MHz. Repeat steps 3a and 3b until no further adjustment is necessary.

c. Adjust C49 for 36MHz

Set TYPE 191 for 36MHz out. Re-adjust C49 for signal on TYPE 564 when tape reads 36MHz. Disconnect the TYPE 191 from the RF INPUT.

d. Final adjust

Connect the TYPE 184 MARKER OUTPUT to the TYPE 3L10 (Modified) RF INPUT 50Ω. Switch in 40dB with RF ATTENUATOR.

Push the TYPE 184 .1μS button. Locate the 30MHz signal on TYPE 184. Slip tape on cogwheel to get 30MHz mark behind hairline.

Push .5μS button on TYPE 184. Count (2MHz/pip) down to 4MHz. Readjust T50 to read 3.95MHz on tape with 4MHz signal on TYPE 564.

3. This is a method of roughly setting the dial tape, then setting the tape for more exact readings all adjustments interact.

3.95MHz is an average setting for 4MHz and is used as a guide only.

3d. (cont'd)

Count back to 36MHz (2MHz/pip).
Adjust C49 to read 36MHz with
signal display on TYPE 564.

Slipping cogwheel or turning
cogwheel on shaft (fine adjust)
affects error between 15 and 25MHz
most. L50 affects lower frequency
errors. C49 affects upper frequency
errors.

4. DIAL TAPE ACCURACY

Check for max RF CENTER FREQUENCY
error with signal indicated at grati-
cule center according to the following
table:

RF CENTER FREQ	TYPE 184	Max Error (dial div)
20	50nS	±1.5
10	.1μS	+1, -2
30	.1μS	±2.0
32	.5μS	±2.1
34	.5μS	±2.2
36	.5μS	±2.3
24	.5μS	±1.7
14	.5μS	±1.2
12	.5μS	±1.1
8	.5μS	±1.8
6	.5μS	±1.6
4	.5μS	±1.4
2	.5μS	±1.2
1	1μS	±1.0

E. ASSEMBLED TYPE 3L10 SPECTRUM ANALYZER

1. PRESETS*a. TYPE 3L10*

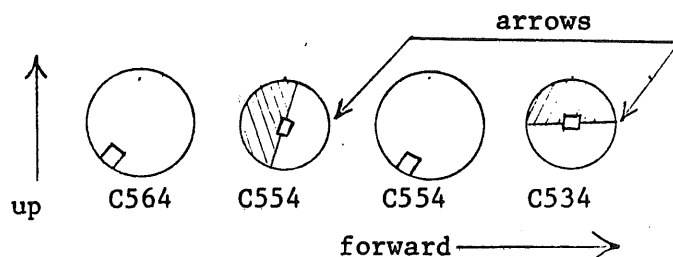
External Controls

DISPERSION kHz/DIV	2
VERTICAL DISPLAY	VIDEO
RF ATTENUATOR	OFF
IF CENTER FREQ	0000
.1V/DIV SET	midr

Internal Controls

Gain Range R107	midr
L364, L374	fully cw then 1 turn ccw
L557, L537	flush then 3 turns cw
L624	flush then 5 turns cw
C564, C554, C544, C534	see notes
disconnect OSC at J70	

It is helpful to: match Q340 and Q350 for B; match Q341 and Q351 for B; Use lower B pair in Q340, Q350

*b. TYPE 2B67*

TIME/DIV	20mSEC
TRIGGERING LEVEL	AUTO
SOURCE	INT
MODE	NORM
COUPLING	AC SLOW

This procedure assumes that the subassemblies have been preadjusted. In cases of difficulty, refer to the proper subassembly section of this procedure.

2. RESISTANCE

Check resistance to ground with the common (-) meter lead grounded. Use the 1k range.

CONNECTOR PIN	APPROXIMATE RESISTANCE	USE OF PIN
1	inf	6.3 Vac
2	inf	6.3 Vac
3	inf	none
4	inf	none
5	inf	-12.2V gnd
6	inf	none
7	inf	none
8	inf	none
9	0	gnd
10	35k	+300V

2. (cont'd)

CONNECTOR PIN	APPROXIMATE RESISTANCE	USE OF PIN
11	inf	trigger output
12	inf	none
13	4.1k	+125V
14	4.1k	+125V
15	4.1k	+125V
16	inf	-12.2V
17	80k	vert output
18	3.5k	sweep in
19	0	gnd
20	inf	none
21	80k	vert output
22	1.2k	-100 shunt
23	3.6k	-100V
24	inf	none
EXT OSC INPUT	inf	EXT OSC

-11V 13k use the X1 scale

Pin 1 to pin 2 $.5\Omega$

pin 5 to pin 16 12Ω

EXT OSC INPUT to J-61 0Ω

3. POWER SUPPLIES

a. Setup

Connect the TYPE 3L10 to the TYPE 564 amphenol, connector.

Turn on and allow a 5 minute warm-up. Adjust CRT controls and POSITION control for a usable display.

b. Power supply voltages:

Supply	Voltage limits	max hash + ripple
-11V	-9.9V to -12.1V	300mV
+10V	9V to 11V	300mV

Check -11V and +10V power supplies for voltage and oscillator hash.

4. VIDEO AMPLIFIER

- a. *Check .1V/DIV SET range:*
0.6div to 1.6div with .1V in

Set TYPE 564 CALIBRATOR to .5 VOLTS.
Connect a coax from CAL OUT to TYPE
3L10 VIDEO INPUT. Set TYPE 3L10
GAIN fully cw.

Turn the .1V/DIV SET fully cw.
Check for at least 1.65div of
square wave on TYPE 564.

Turn the .1V/DIV SET fully ccw.
Check for 0.55div or less of
square wave.

Adjust .1V/DIV SET for exactly 1
div of square wave display.

- b. *Check compression/expansion:*
 $\leq .05\text{div}$ with 2div signal

Set TYPE 564 CALIBRATOR to 10
VOLTS. Adjust TYPE 3L10 GAIN for
2div of display at graticule center.

Position top of display to the top
graticule line. Check for $2 \pm .05$
div of display.

Position bottom of display to
bottom graticule line. Check for
 $2 \pm .05\text{div}$ of display.

- c. *Check triggering: $\leq 0.1\text{div}$*

Set TYPE 564 CALIBRATOR to .1 VOLTS.
Turn TYPE 3L10 Gain fully cw. Check
that the TYPE 2B67 LEVEL can be ad-
justed for a stable display.

- d. *Check trigger pickoff DC LEVEL:*
 $0 \pm 15V$

Set TYPE 2B67 LEVEL to FREE RUN.
Adjust TYPE 3L10 VERTICAL POSITION
to center trace.

Check voltage at junction of C679
and R679 for $0 \pm 15V$.

5. SEARCH

a. Setup

Connect the TYPE 184 MARKER OUTPUT to the HARMONIC MODULATOR RF INPUT. CONNECT the SINE WAVE GENERATOR to the MODU FREQ 2. Connect the HARMONIC MODULATOR MODU FREQ OUT to the TYPE 3L10 (Modified) RF INPUT 50Ω.

Set the SINE WAVE GENERATOR for 2V of 20MHz output. Push the TYPE 184 1μS button. Switch the TYPE 3L10 (Modified) DISPERSION to SEARCH.

b. Check SEARCH at 1MHz

Adjust the HARMONIC MODULATOR for best display at 1MHz (60MC TRAP to IN) and check that the fundamental and one sideband can be displayed on the TYPE 564 at the same time.

c. Check SEARCH at 36MHz

Push the .5μS MARKER SELECTOR ON TYPE. Set Oscillator to 36MHz. Set the SINEWAVE GENERATOR for 56kHz out. Check that the Fundamental and one sideband can be displayed on the TYPE 564 at the same time.

c. The 608D modulated by the SINEWAVE GENERATOR may be substituted.

5. 11.5MHz OSCILLATOR

L374 may need to be adjusted to get sawtooth (see presets).

Set TYPE 1A1 CH 2 VOLTS/CM to .05, INPUT SELECTOR to AC.
Connect X10 probe to INPUT 2.

Connect probe to junction of C351 and Q350 base. Adjust L364 for a sawtooth display on TYPE 546.

6. PEAK SIGNAL

a. Setup

Connect MARKER OUTPUT of TYPE 184 to RF input of Harmonic Modulator with a 50 Ω BNC cable. Connect Harmonic Modulator MODU HARM OUT to TYPE 3L10 50 Ω RF INPUT with a 50 Ω BNC cable. Set Harmonic Modulator RF VARIABLE fully cw.

Press .5 μ S MARKER SELECTOR on TYPE 184. SET TYPE 3L10 GAIN RF ATTENUATORS to provide vertical display of less than 8cm. The display will normally be seen to the right of graticule center.

b. Check 900kHz Oscillator

Turn TYPE 564 POWER to OFF then to ON two or three times. Check that the 60MHz display returns each time.

c. Peak 60MHz signal

Adjust in the following order:

L624	max
C89	max
C92	max
C95	max
C98	max
L154	max
C114	max
C124	just cw of max
T204	just cw of max
T214	max
T224	just ccw of max
L405	max
L415	max
L410	max

6c. (cont'd)

These adjustments interact slightly. Repeat.

T224 and T204 should be detuned an equal amount for about 2div of noise, max.

7. RESOLUTION*a. Setup*

Set TYPE 3L10 DISPERSION to .5. Decouple RESOLUTION to 2. Place a metal shield over the left side of the plug-in to the rear of C564.

Connect an HP608D to the TYPE 3L10. 50 Ω RF INPUT. Set HP608D MEGACYCLES to 60, FREQUENCY RANGE to C and MOD SELECTOR to CW. Peak AMP TRIMMER and adjust DBM for 8div of display.

b. Adjust resolution

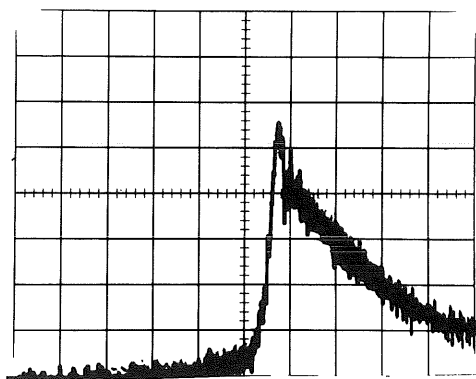
Adjust C554 for a smooth curve into the base line on the left side of display. Adjust C534 for the same curve on the right side. C554 and C534 interact.

Adjust L537 and L557 for minimum deflection of a rounded display. L537 and L557 interact.

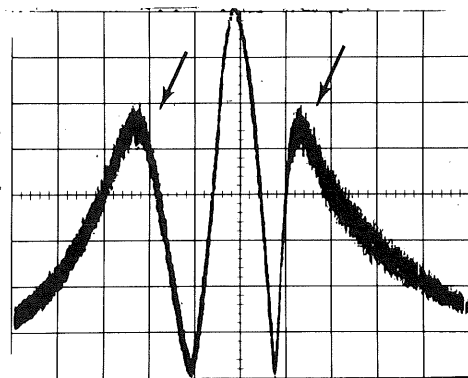
Readjust C554 and C534. Adjust L624 for maximum amplitude.

c. Check resolution

Switch HP608D MOD SELECTOR to 1000 \sim and adjust MOD LEVEL to 100 PERCENT MODULATION. Set HP608D DBM for 8div of display.



L357 and L557 misadjusted

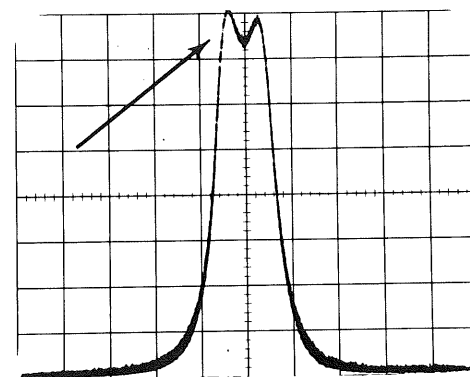


C534 and C554 misadjusted

C534 and C554 are adjusted for symmetrical curves with no reversal.

L537 and L557 are adjusted for a smooth rounded top. The display will appear to roll through minimum amplitude as L537 and L557 are adjusted.

L537, L557, C534, C554 and L624 adjustments interact.



L537 and L557 misadjusted

It may be helpful to preadjust 2kHz DISPERSION.

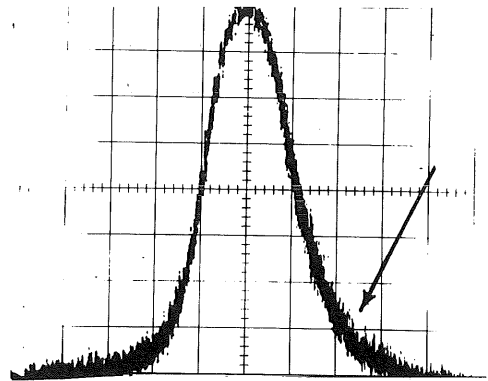
7c. (cont'd)

Check for two 4div sidebands. The valleys between the sidebands and the carrier must be more than 0.5div above the baseline.

d. *Adjust C544 and C564*

Change TYPE 2B67 TIME/DIV to 1SEC. Change TYPE 3L10 DISPERSION coupled RESOLUTION to .01. Switch HP608D MOD SELECTOR to cw. Adjust C544 and C564 for 8div display.

7.



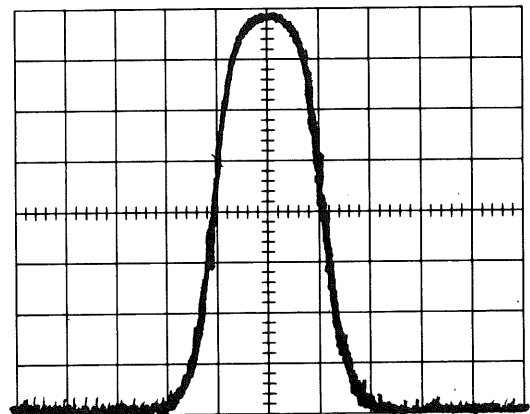
C534 misadjusted

8. VERTICAL POSITION

Check VERTICAL POSITION range: must position 8div display off scan area at both top and bottom

Turn VERTICAL POSITION control fully cw and ccw. The signal must position off the scan area at both top and bottom.

7.



Resolution properly set

9. TIMING

Adjust TYPE 2B67 timing

Connect the TYPE 184 MARKER OUTPUT to the TYPE 3L10 VIDEO INPUT. Push the TYPE 184 lms button. Set the TYPE 3L10 VERTICAL DISPLAY to VIDEO. Change the TYPE 2B67 TIME/DIV to 1m SEC.

Adjust the TYPE 2B67 CALIBRATION for 1 marker per div.

10. DISPERSION

a. Setup

Connect the Harmonic Modulator MODU HARM OUT to the TYPE 3L10 50 Ω RF INPUT. Connect the Kronhite 440A OUTPUT to the Harmonic Modulator MODU FREQ 2. Connect the TYPE 184 MARKER OUTPUT to the Harmonic Modulator RF via a 50 Ω termination. Connect the TYPE 106 OUTPUT to the Harmonic Modulator FREQ 1 via a 50 Ω Termination.

Press the TYPE 184 1 μ S MARKER SELECTOR. Turn the 106 AMPLITUDE fully ccw. Set the 440A for 2kHz out. Set TYPE 3L10 VERTICAL DISPLAY to LIN. Set TYPE 2B67 TIME/DIV to 20mSEC. Adjust Harmonic Modulator RF VARIABLE and MODULATION 2 VARIABLE for the greatest amplitude sidebands on both sides of the carrier of sidebands displayed.

Set 440A for 10kHz out.

b. *Adjust L364, R321 and L374: sidebands can be obtained*

Set TYPE 3L10 DISPERSION and coupled RESOLUTION to 2. Set DISPERSION CAL to midrange.

Adjust R321 for the right side of the display and L374 for the left side of the display. Check that 2 sidebands can be obtained on each side of the carrier. Adjust L364 for linearity.

Set the 440A for 2kHz. Adjust L374 and R321 for 1 sideband pip per div.

10. A stable HP608D may be used for step 10.

Timing must be set before adjusting dispersion.

10. (cont'd)

- c. Check DISPERSION CAL range:
6.8div to 9.4div

Set the 440A for 8kHz. Turn DISPERSION CAL fully cw. Check for at least 9.4div between the two sidebands.

Turn DISPERSION CAL fully ccw. Check 6.8div or less between the two sidebands.

Set the 440A for 2kHz. Readjust DISPERSION CAL for 1 pip per div.

- d. Check dispersion accuracy:
±3% linearity: ±3%

Check dispersion according to the following table for 8 ±.24div between sidebands.

2B67 TIME/DIV	3L10kHz/DIV DISPERSION	MODULATION FREQUENCY	106 OFFSET
20mSEC	1	4kHz	no
50mSEC	.5	2kHz	yes
.2 SEC	.2	800Hz	yes
.2 SEC	.1	400Hz	yes
.5 SEC	.05	200Hz	yes
.5 SEC	.02	80Hz	yes
1 SEC	.01	40Hz	yes

Use IF CENTER FREQ to keep pips at graticule lines. Use the TYPE 106 for additional offset. Vary TYPE 106 amplitude and repetition rate as necessary.

- e. Check IF incidental FM

Change 440A to 10Hz and check that sidebands are discernable.

11. RF CENTER FREQ

Check frequency scale accuracy:
±(100kHz +1%)

Set Harmonic Modulator MODU FREQ 2 to OFF and 60MC TRAP to IN. Push the TYPE 184 50nS button in. Set TYPE 2B67 TIME/DIV to 20mSEC. Connect oscillator to J70 in TYPE 3L10. Set TYPE 3L10 DISPERSION to 2 and IF CENTER FREQ to 0.

Plug TYPE 3L10 into plug-in scope. Allow time for Warm-up.

Some adjustments will require removing TYPE 3L10 from plug-in scope. Checks must be made with TYPE 3L10 installed in plug-in scope.

11. (cont'd)

Check RF CENTER FREQ dial accuracy per the following table:

3L10 RF CENTER FREQ	TYPE 184	max 3L10 dial div error
20	50nS	± 1.5
10	.1 μ S	+1, -2
30	.1 μ S	± 2.0
32	.5 μ S	± 2.1
34	.5 μ S	± 2.2
36	.5 μ S	± 2.3
24	.5 μ S	± 1.7
14	.5 μ S	± 1.2
12	.5 μ S	± 1.1
8	.5 μ S	± 1.8
6	.5 μ S	± 1.6
4	.5 μ S	± 1.4
2	.5 μ S	± 1.2
1	1 μ S	± 1.0

12. SEARCH

a. Check SEARCH at 1MHz: $\geq 20\text{kHz}$

Set Harmonic Modulator MODU FREQ 2 to ON. Set 440A for 10kHz. Set TYPE 3L10 RF CENTER FREQ to 1.0, then center display. Check that the first sidebands are 5div or less from the carrier.

b. Check SEARCH at 36MHz: $\geq 56\text{kHz}$

Push TYPE 184 .5 μ S button. Set 440A for 23kHz. Set RF CENTER FREQ to 36MHz and center display. Check that the first sidebands are no more than 5div from the carrier.

13. BALANCED MIXER

a. Check spuri: ≤ 2 times noise

Remove the cable from TYPE 3L10 RF INPUTS. Turn GAIN fully cw and set VERTICAL DISPLAY to LIN..

13a. (cont'd)

Turn RF CENTER FREQ slowly from 36MHz to 1MHz and note the frequency of any spurious. The largest apparent signal (spurious) will normally appear at 1.6MHz.

b. *Adjust C71 and C73*

Display the largest spurious.

Adjust C71 and C73 for the lowest amplitude spurious. Slight adjustment of C89 may be necessary. Check that no spurious exceed 2 times noise.

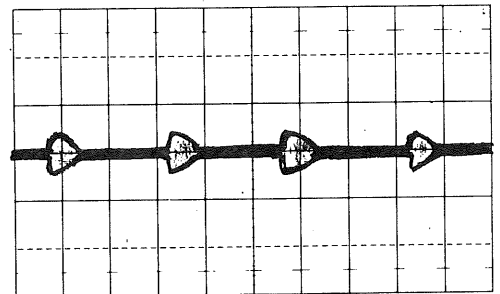
14. DISPERSION CALIBRATOR*a. Adjust T710: 4kHz $\pm 0.1\%$*

Connect the TYPE 184 MARKER OUTPUT to the TYPE 546 TIME BASE TRIGGER INPUT. Connect the TYPE 1A1 CH 2 input to the Dispersion Calibrator output (shielded cable) via a 10X probe. Push the TYPE 184 10mS and 1S buttons in.

Set the TYPE 1A1 CH 2 VOLTS/CM to .1, AC INPUT. Set the TYPE 546 TIME/CM to .1mSEC, TRIGGERING MODE to TRIG, SLOPE to +, COUPLING to AC, and SOURCE to EXT. Adjust TRIGGERING LEVEL for a triggered sweep.

Set TYPE 3L10 R715 fully cw. Set DISPERSION to 2 and RESOLUTION to 1. Set TYPE 2B67 TIME/DIV to 50mS. Adjust T710 until pips are displayed on the TYPE 546. Adjust T710 for max amplitude of these pips.

Turn R715 fully ccw then fully cw. Check that the maximum drift does not exceed 10div per second. (Display will flash once each second.)



display step 14a

14. (cont'd)

b. Adjust R715

Push the TYPE 3L10 4MHz MARKER button. Adjust R175 for a maximum signal to min signal amplitude ratio of about 3 to 1. Remove Probe.

Press the 4kHz MARKER button. Preset L728 for display on the TYPE 564.

Adjust R715 for most discernable markers with IF CENTER FREQ at 0. Check that all markers are discernable with IF CENTER FREQ dial at extremes (1 marker every 2 divisions)

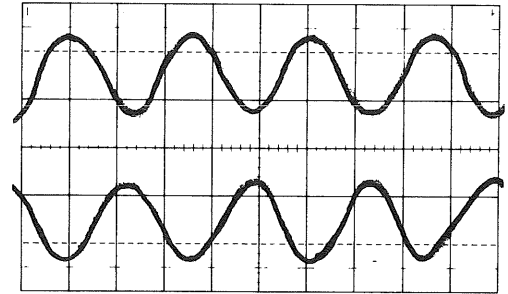
c. Adjust L728: No drift after 15 seconds

Set IF CENTER FREQ to 0. Press 4 kHz MARKER. Wait 15 seconds. Adjust L728 to center tallest marker.

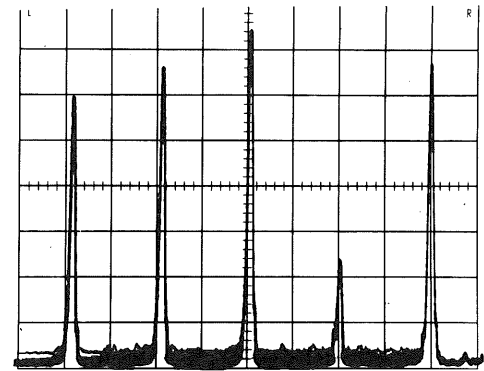
Check that markers do not drift after 4kHz MARKER button has been depressed for 15 seconds.

d. Select R230

Select R230 to adjust tallest marker for 6 to 8div of amplitude.



3 to 1 ratio



4MHz Markers

15. IF CENTER FREQ

a. Adjust Center Freq Range, R352: 8kHz \pm 5%

Push the TYPE 3L10 4kHz MARKER button and position the tallest marker at the center graticule line with the TYPE 2B67 POSITION control.

15a. (cont'd)

Turn the TYPE 3L10 IF CENTER FREQ control fully cw. Adjust Center Freq Range, R352, to position the tallest marker 2div to the right of the graticule centerline.

Turn the TYPE 3L10 IF CENTER FREQ control fully ccw. Position the tallest marker 2div to left of the graticule centerline with POSITION control.

Continue adjustment of the Center Freq Range, R352, until the IF CENTER FREQ range is 4div.

b. Check dispersion linearity at 0: $\pm 5\%$

Set IF CENTER FREQ to 0. Position a marker to the first graticule line with 2B67 POSITION. Check for all markers within .4div of proper graticule line (DISPERSION CAL adjusted.)

c. Check dispersion error at extremes:

Turn IF CENTER FREQ fully cw. Position a marker at the first graticule line. Check for five markers in 8div $\pm(0.4$ div plus error at 0).

Turn IF CENTER FREQ fully ccw. Check for five markers in 8div $\pm(0.4$ div plus error at 0).

16. GAIN

a. Setup

Set HP608D MEGACYCLES to 10, FREQUENCY RANGE to A, and MOD SELECTOR to CW. Peak AMP TRIMMER and set DBM to -90.

Connect the HP608D OUTPUT to the TYPE 3L10 50 Ω RF INPUT. Set TYPE 3L10 RF CENTER FREQ to 10MHz. Adjust TYPE 3L10 GAIN for 8div display. Set Dispersion Resolution to 2. Adjust RF CENTER FREQ for max amplitude display.

Connect the TYPE 3L10 to the plug-in scope with an extension cable.

16. (cont'd)

b. Check display flatness: $\pm 1\text{dB}$

Use the 2dB RF ATTENUATOR to find the display -2dB level. Move the signal across graticule with the RF CENTER FREQ. Check for 8div +0, -2dB across graticule at each IF CENTER FREQ extreme.

Correct flatness error with T204, T214 and T224 readjustment.

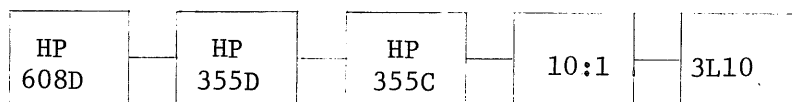
c. Adjust Gain Range, R107: 63dB

Turn TYPE 3L10 GAIN fully cw. Center display. Set HP608D DBM to -93. Adjust TYPE 3L10 RF ATTENUATOR for 6div of display.

Turn TYPE 3L10 GAIN fully ccw. Set HP608D DBM to -30. Adjust Gain Range, R107, for exactly 6div of display.

17. RF ATTENUATOR dB $\pm 0.1\text{dB/dB}$

Connect as follows:



Switch off all TYPE 3L10 RF ATTENUATORS. Set HP608D DBM to -20. Set HP355C to 1. Set TYPE 3L10 GAIN for exactly 8div of display.

Switch HP355C to 0 and switch TYPE 3L10 RF ATTENUATOR in. Check for 8 $\pm 0.1\text{div}$ of display.

17. (cont'd)

Check each of the TYPE 3L10 RF ATTENUATOR positions in the same manner using the following table:

HP355C	HP355D	TYPE 3L10	ERROR
2	0	2	$\pm 0.2\text{div}$
4	0	4	$\pm 0.4\text{div}$
8	0	8	$\pm 0.7\text{div}$
6	10	16	$\pm 1.3\text{div}$
0	20	20	$\pm 1.7\text{div}$

Remove the HP355C, X10 atten, HP 355D and reconnect HP608D to TYPE 3L10 50 Ω RF INPUT. Set DBM to -90.

18. SENSITIVITY

- a. *Check sensitivity from 10MHz to 36MHz: -100dBm or greater*

Turn TYPE 3L10 GAIN fully cw, VERTICAL DISPLAY to LIN, DISPERSION and RESOLUTION to 2. Set TYPE 2B67 TIME/DIV to .1SEC. Set HP608D DBM for a signal twice the noise amplitude. Check that the HP608 DBM reads at least -100dBm.

Repeat sensitivity check at 20, 30 and 36MHz. Remove the HP608 from the TYPE 3L10 RF INPUT.

- b. *Check 600 Ω sensitivity at 1MHz: -80dBm or greater*

Connect an HP350D to the TYPE 3L10 600 Ω RF INPUT. Connect an HP241A to the HP350D via a "T" connector. Connect the "T" connector to the TYPE 1A1 CH 1.

- a. T224 and T204 should be detuned an equal amount for about 2div of noise, max.

18b. (cont'd)

Set the TYPE 546 TRIGGERING MODE to AUTO. Set the TYPE 1A1 MODE to CH 1, VOLTS/CM to .2 and INPUT SELECTOR to DC. Set HP350D to 50. Set HP241A frequency for 99.9kHz.

Adjust the HP241A AMPLITUDE for 3.8cm on the TYPE 546. Adjust TYPE 3L10 RF CENTER FREQ to 1MHz.

Increase the HP350D attenuation to -80dBm. Check for a 1MHz signal of at least twice the noise amplitude on the TYPE 564.

19. INCIDENTAL FM*a. Setup*

Connect the Harmonic Modulator to the TYPE 184 and 440A as in step 10. Connect the Harmonic Modulator MODU HARM OUT to the TYPE 3L10 50 Ω RF INPUT.

Set the Harmonic Modulator 60MC TRAP to IN and MODU FREQ 2 to ON.

*b. Check FM at 1MHz: resolves
 <26Hz*

Set the TYPE 184 for 1 μ S and the 440A for 26Hz. Set TYPE 2B67 TIME/CM to .5SEC.

Locate signal and adjust TYPE 3L10 GAIN for a convenient display.

With DISPERSION at .02 and RESOLUTION at .01. Check for discernable sidebands.

*c. Check FM at 36MHz: resolves
 <60Hz*

Push the .5 μ S button on the TYPE 184 and set the 440A for 60Hz.

Turn the TYPE 3L10 RF CENTER FREQ to 36MHz and locate signal. Adjust GAIN for convenient display.

With DISPERSION at .05 and RESOLUTION to .02 check for discernable sidebands.

19c. (cont'd)

Remove the Harmonic Modulator from the TYPE 3L10 RF INPUT.

20. DISPLAY FUNCTIONS*a. Setup*

Connect the HP608D OUTPUT to the TYPE 3L10 50 Ω RF INPUT. Adjust DBM to -50. Set for 10MHz out.

Set TYPE 3L10 VERTICAL DISPLAY to LIN. DISPERSION and RESOLUTION to 2. Obtain a 10MHz display with RF CENTER FREQ. Adjust GAIN for exactly 8div display.

b. Check LIN linearity: ± 0.8 div

Set HP608 DBM to -53. Check for 4.8 to 6.4div display.

Set HP608 DBM to -56. Check for 3.2 to 4.8div display.

Set DBM to -62. Check for 1.2 to 2.8div display.

*c. Check LIN dynamic range:
>20dB*

Set HP608D DBM to -70. Check for a discernable display.

*d. Adjust Log Adj, R646: >50dB
range*

Set HP608D DBM to -100. Set TYPE 3L10 VERTICAL DISPLAY to LOG, uncouple RESOLUTION to .5 and adjust gain for a 0.2div signal.

Turn HP608 DBM to -48 and adjust Log Adj, R646, for an 8div signal.

21. RECORDER OUTPUT

a. Setup

Connect a 1X probe to the Test Scope TYPE 1A1 CH 1 input. Connect the TYPE 546 + GATE A to the TYPE 2B67 EXT TRIG.

Set the TYPE 546 TIME BASE A TIME/CM to 50mSEC and TRIGGERING MODE to AUTO. Set TYPE 2B67 TIME/DIV to 50mSEC and TRIGGERING SOURCE to EXT. Adjust TYPE 2B67 LEVEL for a display on TYPE 564.

Set the TYPE 3L10 VERTICAL DISPLAY to LIN. Adjust GAIN for 8div of signal.

Set the TYPE 1A1 CH 1 VOLTS/CM to .02. Connect the 1X probe to the red and white lead on the TYPE 3L10 TO RECORDER jack. Insert the 600 Ω Special Plug into the TO RECORDER jack.

b. Check RECORDER output and linearity: *amplitude 15mV/div* *linearity $\pm 10\%$ of 8div level*

Check Test Scope for at least 6cm of display.

Adjust TYPE 1A1 CH 1 VARIABLE VOLTS/CM for exactly 6cm of display on the Test Scope.

Adjust TYPE 3L10 GAIN for 4div display on the Plug-in Scope. Check for 2.4 to 3.6cm display on the Test Scope.

Adjust TYPE 3L10 GAIN for 2div display on the Plug-in Scope. Check for 0.9 to 2.1cm display on the Test Scope.

21. (cont'd)

c. *Check open circuit amplitude:*
 $>30\text{mV/div}$

Remove the 600 Ω Special Plug from the TYPE 3L10 TO RECORDER jack. Adjust TYPE 3L10 GAIN for 8div display on the Plug-in Scope.

Set the TYPE 1A1 CH 1 VOLTS/CM to .05. Check for at least 4.8cm display on the Test Scope.

Remove TYPE 3L10 RF INPUT connections.

22. VIDEO BANDWIDTH

a. *Setup*

Remove the plug-in extension cable and plug the TYPE 3L10 directly into the TYPE 564.

Connect the 440A OUTPUT to the TYPE 3L10 VIDEO INPUT and the TYPE 1A1 CH 1 input.

Set the 440A for 1kHz out. Set the TYPE 3L10 GAIN fully cw. Adjust the 440A output amplitude for 8div on the Plug-in Scope.

Adjust the Test Scope for 4cm of signal display.

b. *Check bandwidth:* $>50\text{kHz}$

Set the 440A for 50kHz out. Adjust 440 output amplitude for 4cm display on the Test Scope.

Check for at least 5.6div display on the Plug-in Scope.

THE END