NOTE REGARDING FACTORY CALIBRATION PROCEDURES AND TEST SPECIFICATIONS

Factory Calibration Procedures and Test Specifications are intended for use at the factory as a general guide for calibrators and quality control men. Most of the tolerances listed in these sheets are closer than advertised specifications. This is done purposely in order to insure that the instrument will meet or exceed advertised specifications when it reaches the customer.

These calibration procedures and test specifications should be used, therefore, as a guide only.

Some of the test equipment referred to in the calibration procedures is not available commercially; the Tektronix field engineer will be glad to suggest alternate approaches.

FIELD RECALIBRATION PROCEDURE

CONTENTS:

Introduction	C-555
Circuit specifications	C-557
Recal procedure	C-559
Recal check sheet	C-573

INTRODUCTION:

This recalibration procedure is intended for Tektronix Field Repair Center use.

The specifications listed are factory specs and not guaranteed unless they also appear as catalog or instruction manual specs.

Special equipment has been kept to a minimum, depending on availability and recal time saved vs. production, distribution cost and complexity.

The recalibration steps were designed to make the procedure as simple and as fast as possible, and yet complete enough for a first-time recalibration. To accomplish this, each step was arranged in two parts--Setup and Adjustment; detailed setup procedures were replaced in many cases with general statements. Block diagrams or circuit diagrams were included in certain steps to help locate the adjustment and show what the adjustment does to produce the desired results to aid in trouble shooting. A simplified adjustment procedure was called out next to each adjustment on the block diagram or circuit diagram to help speed up the recal once a person becomes familiar with the instrument, and waveforms were shown where needed.

5T1A

Publication:
061-973
June 1963

For all serial numbers.

The blank column on the right of the page is for notes on trouble shooting hints and general information concerning the recal. It will be filled in as we receive feedback from the Field or further information from the factory.

The "Certification Procedure" shows what part of the instrument may be certified and what is required to perform the certification. Forms may be obtained from Customer Service.

A Recal check sheet has been included for those persons who have become familiar enough with the recal procedure to use it.

Since this procedure is for the Field, we hope all Field personnel will help us improve it. Address your communications to *Field Technical Support.* No suggestions will go unnoticed.

ABBREVIATIONS:

a	amp
ac	alternating current
approx	approximately
b	base
bulb	light, lamp, etc.
c	collector
ccw	counterclockwise or full counterclockwise
cer	ceramic
cm	centimeter
comp	composition (resistor)
cps	cycles per second
crt	cathode ray tube
cw	clockwise or full clockwise
db	decibel
dc	direct current
div	division
e	emitter
emc	electrolytic, metal cased (capacitor)
emt	electrolytic, metal tubular
fil	filament
freq	frequency
gmv	guaranteed minimum value (capacitor)
gnd	chassis ground
h	henry
hv	high voltage
inf	infinity
int	internal
k	kilo (10^3)
k	kilohm
m	milli (10^{-3})
ma	milliamp
max	maximum
mc	megacycle
meg	megohm
mh	millihenry
midr	midrange or centered
min	minimum
mm	millimeter
mpt	metalized, paper tubular (capacitor)
msec	millisecond
mt	mylar, tubular (capacitor)
mv	millivolt
μ	micro (10^{-6})
μf	microfarad
μh	microhenry
μsec	microsecond
n	nano (10^{-9})
nsec	nanosecond
Ω	ohm
p	pico (10^{-12})
pbt	paper, "bathtub" (capacitor)
pcc	paper covered can (capacitor)
pf	picofarad ($\mu\mu$f)
piv	peak inverse voltage
pmc	paper, metal cased (capacitor)
poly	polystyrene
pot	potentiometer
prec	precision (resistor)
pt	paper, tubular (capacitor)
ptm	paper, tubular molded (capacitor)
ptp	peak-to-peak
sec	second
sn	serial number
term	terminal
tub	tubular (capacitor)
unreg	unregulated
v	volt
var	variable
w	watt
WW	wire wound
x-former	transformer

©, 1963, Tektronix, Inc., P. O. Box 500
Beaverton, Oregon. All rights reserved.

CIRCUIT SPECIFICATIONS

Factory circuit specifications are not guaranteed unless they also appear as catalog or instruction manual specs. Factory specs are usually tighter than advertised specs. This helps insure the instrument will meet, or exceed, advertised specifications after shipment and during subsequent Field recalibration over several years use.

The numbers listed beside the specifications are the calibration procedure steps where the check or adjustment is made.

1d LOCKOUT TIME
9.5 - 10 μsec

4b, 4c, 5b, 5c THRESHOLD SENSITIVITY
+and - triggers shall free-run within ±10° of zero and turn off within 2° ccw for - trigger and 2° cw for + trigger.

6d SWEEP LENGTH
Set for 10.5 cm adjustable from 9.5 - 11.5 cm. Staircase 52.5 ±1 v.

6e SWEEP SPEED
100 μsec to 20 nsec ±2%, 1 to 9 cm marks, 3:1 var control capability.

7d TIME EXPANDER
±1.5% all positions.

8g SWEEP DELAY
Greater than 8 nsec.

8g SWEEP REGISTRATION
Sweep delay the same on all ranges less .5% of total sweep time.

9d, 9c, 9e SWEEP TIMING AND RATE ERROR
1, 2, 5, 10 nsec/cm ±2% timing accuracy. ± 4% first 1/10 of 10 nsec/cm sweep compared to last 1/10. ±2% second 1/10 of 10 nsec/cm sweep compared to last 1/10, 1 to 9 cm marks.

9f TIME POSITION

Sweep Speed	Time Exp	Delay Range
10 nsec/cm	X1	greater than 100 nsec
10 nsec/cm	X2	" " 100 nsec
10 nsec/cm	X5	" " 200 nsec
100 nsec/cm	X1	" " 100 nsec
100 nsec/cm	X2	" " 500 nsec
100 nsec/cm	X5	" " 1000 nsec

10c, 10d SAMPLES/CM
Maximum deviation ± .5 mm for 5 dots. Accuracy ±1% from 50 cps to 100 kc rep rate. Samples/cm compared to fast ramp ±.5% overall. (2.5 cycles or 5 cross-overs)

11c TIMED MODE
Sweep must go faster than 5 sec/cm in real time.

12 SINGLE DISPLAY
One sweep shall occur for each operation.

13b TRIGGER AND TIME JITTER
Internal pulse: shall trigger on 40 mv, 2 nsec wide pulse with a rep rate at 1 kc to 100 kc on + and - trigger positions. Should not free-run when signal is removed. Should have less than 200 psec of time jitter. For 400 mv/nsec rise rate less than 30 psec jitter.

13f EXTERNAL PULSES
Shall trigger on 5 mv, 2 nsec wide pulse with less than 200 psec of jitter. May free-run when signal is removed. For 60 mv/nsec rise rate shall have less than 30 psec of time jitter.

INTERNAL SINE WAVES

13j 100 mc 1000 mv p-p less than 30 psec of time jitter; ± trigger.

13k 100 mc 100 mv p-p less than 250 psec of time jitter; ± trigger.

13m 1000 mc 1.2 v p-p. Average jitter less than 100 psec. Random jitter less than 200 psec; ± trigger.

14b EXT TRIGGER KICKOUT
+ and - trigger kickout less than 5 mv.

RECALIBRATION

NOTES

EQUIPMENT REQUIREMENTS

1	Type 661 Indicator	
1	4S1 Sampling Plug-in	
1	Type 530 or 580 Series scope	
1	Vertical Plug-in for test scope (Type L or Type H)	
1	Type 180 Time Mark Generator	
1	Pulse Generator, Type 111	
1	Oscillator, 450-1050 mc GR or equivalent	
1	Power Supply for Oscillator	
1	X10 Probe	
1	X1 Probe	
1	Tek Made Diode Detector (FMS Special)	
1	50 Ω, 2 nsec cable, RG58/AU	(017-505)
2	50 Ω, 5 nsec cable, RG 8/AU	(017-502)
2	50 Ω, 10 nsec cable, RG58/AU	(017-501)
2	UHF to GR Connector Adapter	(017-023)
1	50 Ω Terminator	(017-037)
2	50 Ω X2 Attenuator	(017-003)
2	50 Ω X5 Attenuator	(017-002)
2	50 Ω X10 Attenuator	(017-001)
1	Ext cable, power and signal	(012-064)
2	Ext cables, Gremar (trigger)	(017-070)
1	GR Tee 874T	(017-069)
1	Type 111, Variable Attenuator	(FMS)

BASIC FRONT PANEL SETTINGS

5T1A

SWEEP TIME/CM	--	10 nsec
VARIABLE	--	CAL
SWEEP MODE	--	NORMAL
TIME POSITION	--	cw
TRIGGERING SOURCE	--	+INT
RECOVERY TIME	--	MIN
SAMPLES/CM	--	100

4S1

MODE	--	A only or B only
TRIGGERING	--	A or B
DISPLAY	--	NORMAL
DC OFFSET	--	mid-range
MV/CM	--	200
VERT POS	--	12 o'clock

661

HORIZ DISPLAY	--	X1
AMP/TIME CALIB	--	OFF

NOTES

Basic Front Panel Settings (con'd)

PRELIMINARY PRESET

(Use only in case of major recal; otherwise skip the following preset).

R275 Comparator -- mid-range
R65 OUTPUT TD BIAS --1/4 turn from full cw
R220 DELAY ZERO --1/4 turn from full ccw
R254 RAMP RECOVERY--1/4 turn from full ccw
(Neg)TRIG RECOVERY and RECOGNITION POTS -- fully cw
(Pos) TRIG RECOVERY and RECOGNITION POTS -- fully cw

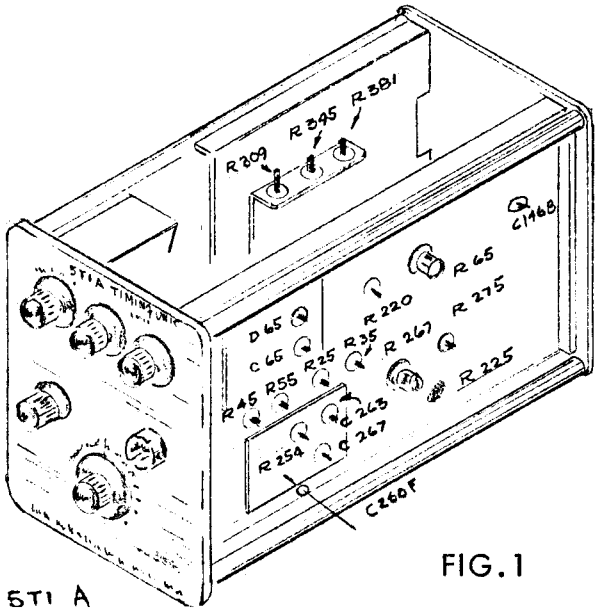

FIG. 1

Also set the center arm of THRESHOLD (Pos and Neg) to ZERO VOLTS (use DC meter). Index knob to zero.

1. OUTPUT TD BIAS, R65; LOCKOUT TIME, C146B

   Setup

   a) 5T1A
      SOURCE -- free run
      RECOVERY TIME -- MIN
      SWEEP TIME -- 10 nsec

   b) Connect X10 probe from test scope (0.05 v and 2 μsec) to junction of C65 and D65 (see Fig. 1).

1. Output TD Bias (con'd)

   Adjustment

   c) Adjust R65 for stable display.

   d) Adjust C146B for 10 µsec between leading edges of pulses.

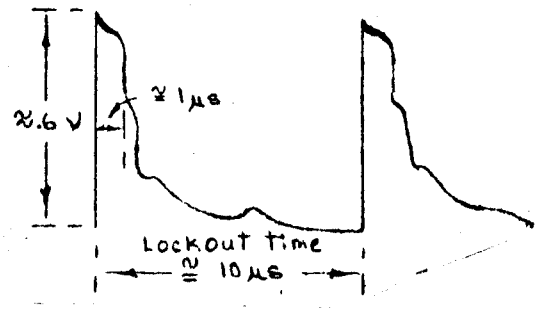

FIG. 2

PRELIMINARY ADJ ONLY FOR MAJOR RECAL, otherwise skip steps 2 and 3.

2. RAMP RECOVERY, R254

   Setup

   a) SWEEP TIME/CM -- 10 nsec
      TRIGGERING -- -INT

   b) Connect X10 probe (0.01 v, .2 µsec) to junction of Q244 collector and D255 cathode.

   Adjustment

   c) Adjust RAMP RECOVERY, R254 until pulse (0.40 v, 50 nsec wide) is stable. Comparator level, R275, may have to be adjusted to obtain a stable display, since these controls affect each other.

3. COMPARATOR LEVEL, R275

   Setup

   a) Connect X10 probe to collector of Q284.

   Adjustment

   b) Adjust COMPARATOR LEVEL, R275, for stable pulse (5.5-6 v pos pulse, 750 nsec wide at top).

4. -TRIG RECOG TD BIAS, R25 and -TRIG RECOVERY TD BIAS, R35 (NEG THRESHOLD SENSITIVITY)

Setup

a) 5T1A

TRIGGERING	--	-INT
SWEEP TIME/CM	--	50 nsec
RECOVERY TIME	--	MIN
THRESHOLD	--	2 o'clock

b) Initially preset R25 and R35 pots fully clockwise. Locate the sweep on the screen. Rotate the THRESHOLD control ccw up to the point where the sweep stops. Back it up to the point where the sweep reappears.

Adjustment

c) Adjust R35 until the sweep stops. Set R35 mid-range between this point and full cw. Adjust TRIG RECOG, R25, by rotating THRESHOLD cw thus making the trace appear at a setting of 0 and disappear when the THRESHOLD is rotated ccw 2° from 0.

Be sure that the DELAY PULSE OUT is not free running. Check this by connecting the DELAY PULSE OUT to 4S1 input with 2 nsec cable (SWEEP TIME - 1 nsec). While observing pulse, slowly pull out the cable until positive and negative spikes separated by about 4 nsec appear on the screen. This indicates the TD is not free running.

If the sweep does not stop when rotating THRESHOLD control ccw, check for tunnel diode trouble in the trigger circuit.

5. +TRIG RECOG TD BIAS, R45 and +TRIG RECOVERY TD BIAS, R55 (POS THRESHOLD SENSITIVITY)

Setup

a) 5T1A

TRIGGERING	--	+INT
SWEEP TIME/CM	--	50 nsec
RECOVERY TIME	--	MIN
SAMPLES/CM	--	100
THRESHOLD	--	10 o'clock

b) Initially preset TRIG RECOG and TRIG RECOVERY pots fully cw. With the sweep on the screen, rotate THRESHOLD cw up to the point where the sweep stops. Back it up to the point where the sweep reappears.

5. +Trig Recog TD Bias, etc. (con'd)

Adjustment

c) Adjust R55, until the sweep stops. Set R55 mid-range between this point and fully cw. Adjust R45, by rotating the THRESHOLD control ccw and making the trace appear at a setting of 0 and disappear when the THRESHOLD is rotated cw 2° from the 0 setting.

6. SWEEP CAL, R267; SWEEP LENGTH, R345

Setup

a) Apply 1 μsec markers from the time mark generator.

b) Obtain a display in 5T1A set at 1 μsec/cm (calibrated).

Adjustment

c) Check or adjust R267 so that the markers coincide with the first and ninth graticule lines, ±2% accuracy.

d) Check or adjust sweep length (R345) for 10.5 cm. Check Staircase on wiper of R211 (VAR TIME/CM) for 52.5 ±1 volt.

e) Check all the ranges of TIME/CM from 100 μsec to 20 nsec/cm for an accuracy of ±2%. Check for at least 3:1 VARIABLE sweep timing range.

7. TIME EXPANDER

Setup

a) 5T1A -- +INT
TIME/CM -- 1 μsec
SWEEP MAG -- X1

b) Set the TIME POSITION control at mid-range.

c) Apply 1 μsec markers from time-mark generator.

Check

d) Check all range of TIME EXPANDER. Accuracy should be ±1.5%, 1 to 9 cm marks.

8. SWEEP REGISTRATION AND SWEEP DELAY SET

Setup

a) 5T1A

SAMPLES/CM	--	100
TRIGGERING	--	+INT
SWEEP TIME/CM	--	2 μsec
TIME EXPANDER	--	X5
TIME POSITION	--	cw

661

AMPL/TIME CALIB -- 1 μsec, 1000 mv

b) Connect the calibrator output to A or B channel (TRIGGER MODE - A or B). Display the sine wave by adusting THRESHOLD control from full cw to the point where it just triggers. Locate start of sine wave to screen center with HORIZ POSITION and Comparator Level controls.

Adjustment

c) Comparator Level, R275
Adjust R275 to obtain a sharp corner on display (see Fig. 3). It may be necessary to turn Delay Zero slightly cw.

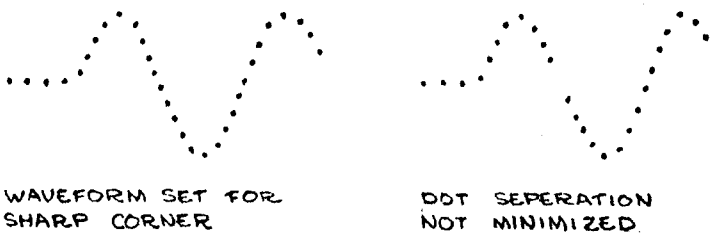

FIG. 3

Also, there should be no visible break anywhere along the display.

d) Inverter Input Zero, R225
Connect X1 probe (1 μsec, 50 mv/cm) to base of Q223 (RAMP INVERTER). Adjust test scope for reference level when AC coupled. With 5T1A Mode switch on Single Display, adjust R225, INVERTER ZERO, to zero volts (same reference level) with test scope set to DC coupled. Return Mode switch to NORMAL

RECALIBRATION	NOTES
8. Sweep Registration, etc. (con'd)	
Adjustment	
e) Staircase DC Level, R381 On 2 μsec/cm sweep speed, disconnect the input signal to 4S1. Turn EXT HORIZ INPUT control on 661 to 0.05 position. Make sure the display is triggered. With HORIZ POSITION control, locate 'dot', display it to same reference point on graticule. Turn HORIZ DISPLAY to X100 MAG. Adjust R381 so that the start of the sweep coincides with the reference point. Return HORIZ DISPLAY to X1, connect the input signal and trigger display.	
f) Delay Zero, R220 Rotate SWEEP TIME/CM between 2, 1 and .5 sec/cm sweep speeds. Adjust DELAY ZERO (R220) so that the start of each sweep range occurs at the same place on the sine wave. This is registration.	
g) Apply pulse from Type 111 Gen (5 nsec charge line, 100 kc) and check delay on 2 nsec/cm range. Return HORIZ DISPLAY to X1. Delay must be greater than 8 nsec. A 20-30 nsec pulse width (charge line length determines pulse width) shall remain on the screen from 2 nsec/cm to 2 μsec/cm speeds (sweep delay same on all ranges less 0.5% of total sweep time). Use time expander to verify pulse location.	If unable to keep pulse on screen for full range of 2 nsec/cm to 2 μsec/cm, check diode D234 on fast ramp board for correct Zener voltage (±10%).
9. FAST TIMING, C260F, C263; and LINEARITY CHECK	
Setup	
a) Apply 50 mc from time mark gen to 4S1.	
b) 5T1A -- 10 nsec/cm TIME EXPANDER -- X1	
Adjustment	
c) Adjust C260F for 1 cycle/2 cm.	C260F is accessible through hole in lower right section of plug-in housing.
d) Check 5 nsec/cm sweep speed for a ±2% accuracy.	

9. Fast Timing, etc. (con'd)

Adjustment

e) Apply 1 k mc to 4S1 input, and with 5T1A at 1 nsec/cm sweep speed, adjust C263 for 1 cycle/cm with X1 TIME EXPANDER setting. Use diode detector and Type 180 at 50 mc to check 1 k mc setting (see Fig. 4).

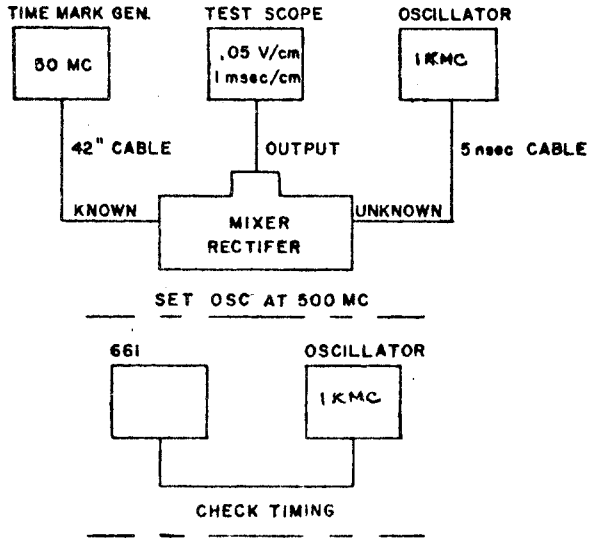

FIG. 4

With the 1 k mc applied to 4S1 input, set 5T1A to 10 nsec/cm sweep range and TIME EXPANDER to X10. Set the TIME POSITION control to maximum cw position. Note timing error in mm. Subtract the ccw position error from this error. This difference shall not be greater than 3.2 mm.

Move TIME POSITION one full screen diameter from max cw position. Note error in mm. Subtract ccw position error from this error. This shall not be greater than 1.6 mm.

Any non-linearity present at the sweep start may be compensated by adjusting R254, RAMP RECOVERY. Because this control interacts with the Comparator and Delay Zero settings, it will be necessary to check and readjust the settings.

9. Fast Timing, etc. (con'd)

Adjustment

f) Apply 10 mc to A or B channel. Set sweep speed to 10 nsec/cm. Set TIME CONTROL to maximum cw, TIME EXPANDER to X1. Move TIME POSITION control to maximum ccw. Measure time as called out in chart below:

Sweep Speed	Freq	Time Exp	Delay Range
10 nsec	10 mc	X1	greater than 100 nsec
10 nsec	10 mc	X2	" " 100 nsec
10 nsec	10 mc	X5	" " 200 nsec
.1 µs	10 mc	X1	" " 100 nsec
.1 µs	10 mc	X2	" " 500 nsec
.1 µs	1 mc	X5	" " 1000 nsec

10. SAMPLES/CM CAL R304, C358D, C358F, C358H, C358K

Setup

a) 5T1A -- +INT
SAMPLES/CM -- 100
SWEEP TIME/CM -- 1 µsec
TIME EXP -- X1
RECOVERY TIME -- MIN

4S1
MV/CM -- 200

661
SWEEP MAG -- X1

b) Apply 50 mc from time mark gen, through X10 attenuator to 4S1 input. Set SAMPLES/CM to 5 and TIME/CM to 20 nsec. Trigger 5T1A for stable sine wave. Return TIME/CM to 1 µsec and TIME POSITION near max ccw.

10. Samples/cm, etc. (con'd)

Adjustment

c) Adjust R304 for a single row of dots. Use chart below for other adjustment of SAMPLES/CM control (see Figs. 5 and 5a).

FIG. 5

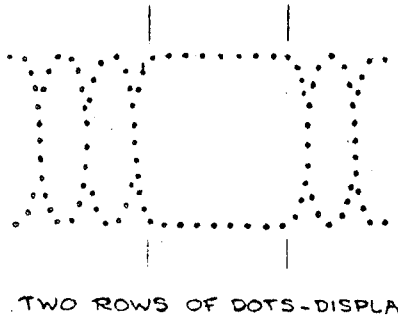

FIG. 5a

SAMPLES/CM	Adj	Row of Dots	Cycles or Crossover
10	C358D	1	2.5 cycles
20	C358F	2	5 crossovers
50	C358H	1	2.5 cycles
100	C358K	2	5 crossovers

d) Obtain approximately 350 mv pulse from Type 111 (5 nsec charge line, 100 kc). Use X25 attenuator. Connect to 4S1 A or B input. Trigger display. Adjust rep rate of 111 for 100 kc with RECOVERY TIME at min. Change 111 to 50 cps. Note that SAMPLES/CM accuracy must not deviate by more than ±1%.

The display as shown in figure indicates total sweep error for one full fast ramp averaged over one screen diameter. 2.5 cycles indicates, at 50 mc, that error is not over 0.5%. This error, in most units, is completely caused by the fast ramp. When Staircase Gen problems occur, the screen picture will give more than the 2.5 cycles. CAUTION: Do not use MAGNIFIER as it will not do the job.

If trace jumps horizontally with rep rate changes, install Mod 6718-5T1. This places a 0.001 µf cap (283-000) across R342 (5.1k) on Staircase chassis.

RECALIBRATION

NOTES

11. TIMED MODE

Setup

a) 5T1A -- free run trigger
SAMPLES/CM -- TIMED MODE

b) Apply 1 sec markers to 4S1 input, A or B channel. Set R357 (front panel) for max cw.

Check

c) Check for less than 5 marks between each cm mark (faster than 5 sec/cm). Rotate R357 to ccw position. This should stop sweep on screen.

If, on the 1000 dot and timed sweep positions, the sweep does not start in same place, install Mod 7132-5T1A. This changes C346 from 0.47 µf to 1.0 µf (285-576), located on Staircase Generator.

12. SINGLE DISPLAY

Check that one sweep occurs for each operation of SINGLE DISPLAY switch.

13. TRIGGER AND TIME JITTER: ±INTERNAL, EXTERNAL

Setup

a) 5T1A -- +INT
SWEEP TIME/CM -- 1 nsec
SAMPLES/CM -- 100
SWEEP EXP -- X1

4S1
MV/CM -- 10

b) Connect 111 pulse generator (no charge line, 100 kc) to input of 4S1 and display approximately 40 mv of signal (use 111 variable and fixed attenuator for X250 attenuation) from 10% to 90% points. Turn HORIZ DISPLAY control to X20. Use 4S1 variable gain control to obtain display at 45° with the graticule lines. Use all 8 cm of screen. Turn SAMPLES/CM to 10.

Be sure 5T1A is triggering and not free running by removing pulse and noting that the trace is gone.

Check

c) Check + and - trigger polarity) for less than 4 cm of vertical deflection on the dots (200 psec of jitter).

13. Trigger and Time, etc. (con'd)

Check

d) 5T1 -- +INT
SAMPLES/CM -- 50

4S1
MV/CM -- 50
HORIZ DISPLAY -- X50 MAG

e) Display approximately 350 mv of signal. Repeat previous step and, for + and - triggering, check for less than 1.5 cm of vertical deflection on the dots (30 psec of jitter).

f) Connect 111 signal through X20, GR 'Tee' and X50 attenuators. Measure output of X50 attenuator for about 5 mv and connect to Ext Trigger input on 5T1A while triggering on other output in other channel. Set HORIZ DISPLAY at X50, SAMPLES/CM at 50 and repeat the previous step.

g) Check for + and - triggering. The jitter should be less than 200 psec.

h) With the same setup, use X10 attenuator 'Tee' and X20 attenuator to obtain 30 mv pulse for EXT TRIGGER INPUT.

i) Check for + and - triggering. The jitter should be less than 30 psec.

k) Apply 100 mc, 1000 mv p-p from calibrator output to 4S1 input. Repeat the previous steps with the HORIZ mag at X50. Check for less than 1.5 cm of vertical deflection on the dots (30 psec of jitter).

m) Apply 100 mc, 100 mv p-p from calibrator output to 4S1 input. Obtain stable display. Repeat previous step with HORIZ DISPLAY at X20. Check for less than 5 cm of vertical deflection on the dots (250 psec of jitter).

To improve EXT TRIGGER sensitivity install Mod 7121-5T1A. This changes R7 from 51Ω to 39Ω (317-390), C8 from 3.3 pf to 0.05 μf (283-010), C21 from 470 pf to 0.001 μf (283-000). Remove R103 (180 Ω) completely. Relocate R5 (2.2 k) to connect R4 and the junction of R6 and R7. Connect C8 to -19 v instead of ground.

13. Trigger and Time, etc. (con'd)

Check

n) Apply 1.2v p-p at 1kmc from GR oscillator to 4S1 input. Repeat previous step with HORIZ DISPLAY at X50. For + and - triggering, check for less than 5 cm of vertical deflection on the dots (100 psec average). Random dots shall display less than 200 psec of jitter.

14. EXT TRIGGER KICKOUT

Setup

a) 5T1A -- free run trig
SWEEP TIME/CM -- 2 nsec
TIME EXP -- X1

b) Connect EXT TRIGGER jack to 4S1 input, channel B at 2 mv/cm sensitivity.

Check

c) For + and - triggering the observed spike shall be less than 5 mv.

When kickout level is excessive, install Mod 6706-5T1A (addendum). This adds an R-C series network of 120Ω and 3.3 pf (316-121 and 281-534). Connected to the junction of the isolation transistor collector and the 1.5k resistor (R8) to ground (cap end of the network to gnd).

RECALIBRATION CHECK SHEET

1 Output TD Bias, R65 ____
Lockout Time, C146B ____

2 Threshold Sensitivity:

	Negative	Positive
Trig Recog TD Bias,	R25____	R45 ____
Trig Recov TD Bias,	R35____	R55 ____

3 Sweep Cal, R267 ____
Sweep Length, R345 ____

4 Time Expander Check ____

5 Sweep Registration and Delay:
Comparator Level, R275 ____
Inverter Input Zero, R225 ____
Staircase DC Level, R381 ____
Delay Zero, R220 ____
Delay Check ____

6 Fast Timing: C260F____ C263 ____
5 nsec - 1 nsec Timing Accuracy Ck ____
20 nsec - 100 μsec Tim'g Accur'y Ck ____

7 Time Expander Delay Range Check ____

8 Samples/cm Adjust:

Samples/cm switch		
5	- - - -	R304 ____
10	- - - -	C358D ____
20	- - - -	C358F ____
50	- - - -	C358H ____
100	- - - -	C358K ____

9 Timed Mode, Check ____

10 Single Display, Check ____

11 Trigger Jitter:

	Pos Pol	Neg Pol
Internal Source		
40 mv pulse, check	____	____
350 mv pulse, check	____	____
100 mc, 1000 mv p-p sine wave check	____	____
1000 mc, 1.2 v p-p sine wave check	____	____
External Source		
5 mv pulse check	____	____
30 mv pulse check	____	____

12 External Trigger Kickout Check ____