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2.5 FINAL OFFSET ALIGNMENT

F A C T O R Y D I G I T A L - C A L I B R A T I O N
P R O C E D U R E

* INSTRUMENT TYPE *

7854

THIS PROCEDURE IS A GUIDE FOR DIGITAL PRE-CALIBRATING INSTRUMENTS
PRIOR TO CYCLE AND DIGITAL CALIBRATION.

OTHER PROCEDURES AVAILABLE FOR THIS INSTRUMENT:

FACTORY ANALOG CALIBRATION PROCEDURE

QUALITY CONTROL PROCEDURE

PRESHIP PROCEDURE

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UPDATED: 7-30-82 SLOW

TEKTRONIX, INC.
P O BOX 500
BEAVERTON, OREGON, 97077

TEST EQUIPMENT REQUIRED

ALL TEST EQUIPMENT MUST BE CALIBRATED TO WITHIN FACTORY TEST LIMITS USING METHODS SPECIFIED IN THE APPLICABLE FACTORY CALIBRATION PROCEDURE. EQUIVALENT TEST EQUIPMENT MAY BE USED WITH STAFF ENGINEER APPROVAL.

DM 501	DIGITAL MULTIMETER
TG 501	TIME MARK GENERATOR
SG 503	MID FREQUENCY SIGNAL GENERATOR
SG 504	HIGH FREQUENCY SIGNAL GENERATOR
	7854 CALCULATOR KEY BD
7A26	
7B10	
7B15	
4051	
010-6106-01	TWO X10 PROBES
010-6101-01	X1 PROBE
011-0049-01	50 OHM TERMINATER (2EA)
011-0069-02	2X, 50 OHM, 2W ATTENUATOR
012-0057-00	42" BNC CABLE (2 EA)
012-0630-00	GPIB CABLE
067-0587-02	PULSER
067-0589-00	PLUG-IN EXTENDER
067-0605-00	READOUT EXERCISER
067-0892-00	MICRO LAB
067-0911-00	PERSONALITY CARD
067-0961-01	DIAGNOSTIC PROM
TEST SCOPE	7904
	7A26 DUAL VERTICAL INPUT
	7B10 TIME BASE

1.1 WAVEFORM ADJUSTMENTS

DOT OFFSET AND GAIN

SET: 7854
POWER OFF

INSTALL: DIAGNOSTIC PROMS
SMARTS BDS (IF PRE CAL)

SET: 7854
POWER ON
MID TEST PATTERN
MEAN DOT MODE
STORED INTENSITY FOR USABLE DISPLAY

ADJUST: HORIZ OFFSET R1205(A29) TO HORIZONTAL CENTER
BRIGHTEST DOT.

HORIZ GAIN R1300(A29) TO LINE UP THE DOTS
HORIZONTALY WITH THE GRAT LINES.

VERTICAL RO-WFM CTR R65(A18) TO CENTER BRIGHTEST
DOT.

VERTICAL RO-WFM GAIN R81(A18) TO LINE UP THE DISPLAY
WITH THE GRAT LINES.

CHECK: DOTS ARE WITHIN .05 DIV OF GRATICULE INTERSECTIONS,
WITHIN CENTER 6 BY 8 DIVIONS.

VECTOR OFFSET AND GAIN

PRESS: 7854

RMS

BOTH MODE

ADJUST: VERTICAL VECTOR OFFSET R1625(A29), BACK OF BOARD 2ND
POT FROM REAR, TO VERTICALLY ALIGN CENTER HORIZONTAL
VECTORS TO DOTS.VERTICAL VECTOR GAIN R1720(A29), BACK OF BOARD REAR
POT, TO ALIGN THE VECTORS WITH THE DOTS.HORIZONTAL VECTORS OFFSET R1620(A29), BACK OF BOARD
FRONT POT, TO HORIZONTALLY ALIGN CENTER VERTICAL
VECTORS WITH THE DOTS.HORIZONTAL VECTORS GAIN R1621(A29), BACK OF BOARD
2ND POT FROM FRONT, TO ALIGN THE VECTORS WITH THE
DOTS.

CHECK: VECTORS ARE WITHIN .05 DIV OF GRAT LINES.

VECTOR TIMING

PRESS: 7854

ENERGY

VECTOR TIMING DISPLAY

ADJUST: VECTOR TIMING R1700(A29), LONE POT TOP EDGE, FOR
VERTICAL AND HORIZONTAL LINES WITH NO BRIGHT SPOTS
OR GAP ALSO THE DIAGONAL LINES MUST BE AT LEAST 90
PERCENT OF THE CORNER TO CORNER DISTANCE.

1.2 READOUT ADJUSTMENTS

READOUT POSITIONING

PRESS: 7854
(CURSERS) OFF CHARACTER DISPLAY

SET: 7854
READOUT INTENSITY USABLE DISPLAY

ADJUST: CHAR HORIZ GAIN R1200(A29), TOP OF BOARD 3RD POT
BACK, SO READOUT IS CENTERED ON SCREEN WITH A .1 TO
.3 DIV MARGIN.

CHAR VERT OFFSET R1106(A29), TOP OF BOARD 2ND POT
BACK, SO READOUT IS CENTERED ON SCREEN.

CHAR VERT GAIN R1100(A29), TOP OF BOARD 1ST POT, SO
UPPER AND LOWER 2 ROWS OF READOUT ARE CENTERED IN
THE RESPECTIVE GRATICULE LINES. WITHIN .1 DIV(.5
MINOR).

CHECK: CHARACTERS FOR READABILITY (NO GAPS SHOULD SHOW IN
CHARACTERS).

CHECK: VERTICAL CHARACTER HEIGHT.3 DIV MAX
VERT SPACING BETWEEN CHAR.2 DIV MIN
HORIZONTAL CHARACTER WIDTH
.15 DIV MAX

READOUT ACQUIRE

INSTALL: READOUT EXERCISER 067-0605-99 IN LEFT VERTICAL.

CONNECT: BNC CABLE FROM CAL OUT JACK TO 067-0605-99.

PRESS: 7854
ID FOR SCOPE DISPLAY

SET: 7854
VERT MODE LEFT
CALIBRATOR .4V

067-0605-99
CH 1 CH 2 CH 1
888.00. UP

ADJUST: ROW MATCH R2200(A29), REAR OF BOARD IN FRONT OF TEST
PINS, AND COLUMN MATCH R2600(A29), REAR OF BOARD
BEHIND TEST PINS, FOR A STABLE DISPLAY.

SET: 067-0605-99

888.QQ. SW DOWN
JUMP SW UP

CHECK: FOR JUMP DISPLAY.

CHECK: EACH OF THE FOLLOWING SWITCH POSITIONS FOR CORRECT
READOUT THE SWITCH INDICATED SHOULD BE THE ONLY ONE UP
ALL OTHERS SHOULD BE DOWN.

CHARACTER SET	DISPLAY
NUMERALS	0123456789
SYMBOLS	<I/+--+C >
PREFIX	MUNPXKMGTR
LETTERS 1	SVAWHDBC E
LETTERS 2	UNLZYPFJQD
TEST	TEST 12.34
PERT	888.QQ.

ZEROS LOGIC	DISPLAY
5MV	5MV
50MV	50MV
500MV	500MV
5V	5V
50V	50V
JUMP	JUMP

DECIMAL POINT	DISPLAY
THIRD	.10000
FOURTH	2.0000
FIFTH	30.000
SIXTH	400.00
SEVENTH	5000.0
IDENTIFY	IDENTIFY

SET: 067-0605-99
 CHANNEL SW GH 2

CHECK: READOUT IN LOWER LEFT CORNER OF SCREEN.

CHECK: EACH SETTING OF READOUT EXERCISER.

SET: 7854
 VERT MODE RIGHT

PRESS: FORCE ON READOUT EXERCISER.

CHECK: CHARACTERS ARE DISPLAYED.

CHECK: FORCE AND PRESENTATION IN EACH PLUG-IN COMPARTMENT.

REMOVE: BNC CABLE
 067-0605-99

1.3 FRONT PANEL CODES

PRESS: 7854
POWER OFF

CONNECT: MICRO LAB TO P130 (A29)

PRESS: 7854
POWER ON

ENTER: AT TERMINAL
EX E010 <CR> READS FRONT PANEL
TO TERMINAL CRT

REPEAT: READING OF FRONT PANEL CODE BY PRESSING LF KEY ON
TERMINAL.

CHECK: ALL COMBINATIONS BY TABLE, USE 7A26 OR 7B15 FOR
PLUG-IN WHEN REQUIRED.

	PLUG-IN PLACEMENT	PLUG-IN MODE	BUTTON PRESSED	PROPER CODE
	NO PLUGS		NONE	7800
	NO PLUGS	HORIZ	B	6800
	NO PLUGS	HORIZ	CHOP	7000
	NO PLUGS	HORIZ	ALT	3000
	NO PLUGS	VERT	A	1800
	NO PLUGS	VERT	RIGHT	1000
	NO PLUGS	VERT	CHOP	3800
	NO PLUGS	HORIZ	ADD	5800
	NO PLUGS	VERT	ALT	5000
7A26	NO PLUGS	VERT	LEFT	6000
	B HORIZ	ALT	NONE	7810
	B HORIZ	CHOP	NONE	7818
	A HORIZ	CHOP	NONE	7860
	A HORIZ	ALT	NONE	7840
	RIGHT VERT	ALT	NONE	7900
	RIGHT VERT	CHOP	NONE	7980
	LEFT VERT	CHOP	NONE	7E00
	LEFT VERT	ALT	NONE	7C00
7B15	B HORIZ	DELAYED	"	7B02
	A HORIZ	"	"	7B04

1.4 BATTERY BACKUP

SET: DM 501
 RANGE 20VDC
 BATTERY SUPPLY
 VOLTAGE 5.6V

CONNECT: CABLE FROM BATTERY SUPPLY JACKS TO 7854 REARPANEL
BATTERY BACKUP CONNECTOR.

CHECK: LED ON REARPANEL IS LIT.

ENTER: ON TERMINAL
 BB CR LOADS RAM

SET: 7854
 POWER OFF

CONNECT: DM 501 POSITIVE LEAD TO +5VB, REAR TP ON RAM BD,
NEGATIVE LEAD TO GND.

CHECK: FOR A READING OF 3.9 TO 4.2 VOLTS ON DM 501

PRESS: 7854
 POWER ON

ENTER: ON TERMINAL
 BB CR CHECKS RAM

CHECK: ON TERMINAL FOR PASS STATEMENT.

SET: THE TOP VERNIER DIAL ON BATTERY SUPPLY TO 3.4 (6.8
VOLTS).

ENTER: ON TERMINAL
 BB CR LOADS RAM

PRESS: 7854
 POWER OFF
 POWER ON

ENTER: ON TERMINAL
 BB CR CHECKS RAM

CHECK: ON TERMINAL FOR PASS STATEMENT.

PRESS: 7854
 POWER OFF

TURN: TOP VERNIER ON BATTERY SUPPLY UP SLOWLY OBSERVING
THE DM 501 DISPLAY DOES NOT GO ABOVE 6.5 VOLTS
BEFORE DROPIING CLOSE TO 0 VOLTS.

MOVE: DM 501 POSITIVE LEAD TO THE BATTERY SUPPLYS POSITIVE
OUTPUT.

TURN: TOP VERNIER ON BATTERY SUPPLY UP SLOWLY OBSERVING

THE DM 501 DISPLAY GOES TO 17.5 VOLTS + OR - 2.5
VOLTS BEFORE DROPPING.

RETURN: BATTERY SUPPLY TO 2.75 (5.5VOLTS).

PRESS: 7854
POWER OFF

REMOVE: MICRO LAB FROM 7854 P130(A29).
BATTERY SUPPLY FROM REAR PANEL

2.1 DIGITIZER

INSTALL:

7A26 IN LEFT VERTICAL
 7B10 IN A HORIZONTAL
 7B87 IN B HORIZONTAL
 ROM IN J106(A8)
 TEST SWITCH IN PLACE OF P1303(A27)
 10 TURN POT ON P509(A25)

PUSH: POWER ON

SET: TEST SWITCH POSITION OPEN

7854 SWEEP SW A(SIGNAL OUT BD)
 HORIZ MODE B
 VERT MODE LEFT

DM 501 RANGE 20V DC

7A26 VOLTS PER DIV .1V
 MODE CH1
 COUPLING DC

7B10 TIME PER DIV 2MS
 TRIGGERING AUTO-AC-EXT
 MAG X1

7B87 TIME PER DIV 1MS
 TRIGGERING NORM-AC-EXT
 MAG X1
 AQS CLOCK INT

TEST SCOPE TIME PER DIV .2US
 MAG X10
 TRIGGERING AUTO-AC-EXT
 VOLTS PER DIV .1V

TIMING

PRESS: 7854 STORED FOR STORED DISPLAY
 1024 F P:W 1024 POINT WAVEFORM
 F AQS EXT ACQUIRE

NOTE: THE 7854 CRT SHOULD BE BLANK AND THE BUSY LIGHT ON.

CONNECT: X10 PROBE FROM TEST SCOPE EXT TRIGGER IN TO TP1610-12(A26).

CONNECT: DM 501 POSITIVE LEAD TO LEFT TP ON 10 TURN POT
NEGATIVE LEAD TO GND..

ADJUST: 10 TURN POT TO APPROX. 0V.

CONNECT: SECOND X10 PROBE FROM TEST SCOPE VERTICAL TO U554 PIN 10.

ADJUST: TEST SCOPE HORIZONTAL POSITION SO FALLING EDGE OF LAST CLOCK IS AT GRAT CENTER. **NOTE** MAKE TIMING MEASUREMENTS AT 1.5V LEVEL ON WAVEFORMS.

MOVE: X10 PROBE ON TEST SCOPE VERTICAL TO TP 519(A25) DSAR

ADJUST: 10 TURN POT FOR RISING EDGE ON CRT.

SELECT: C553(A25) FOR RISING EDGE 20 TO 30NS (1 TO 1.5 DIVS) PRIOR TO GRAT CENTER. **NOTE** REPOSITION FALLING EDGE OF LAST CLOCK ON U554-10 TO GRAT CENTER TO MAKE TIMING MEASUREMENT AFTER SELECTING C553.

CONNECT: X10 PROBE ON TEST SCOPE VERTICAL TO U554 PIN 8 ESAR

ADJUST: TEST SCOPE HORIZONTAL POSITION SO RISING EDGE IS AT GRAT CENTER. USE 1.5 VOLTS ON WAVEFORM FOR TIMING REFERENCE.

MOVE: X10 PROBE ON TEST SCOPE VERTICAL TO TP 520(A25).

ADJUST: 10 TURN POT FOR RISING OR FALLING EDGE ON CRT.

SELECT: C599(A25) FOR RISING EDGE 5 TO 15NS OR FALLING EDGE 0 TO 10NS PRIOR TO GRAT CENTER. **NOTE** REPOSITION RISING EDGE ON U554-8 TO GRAT CENTER TO MAKE TIMING MEASUREMENT AFTER SELECTING C599.

PRESS: EXTERNAL WAVEFORM ACQUIRE STOP ON 7854 REAR PANEL.

REMOVE: X10 PROBE FROM TEST SCOPE EXT TRIGGER IN TO TP1610-12(A26).

DIGITIZER WINDOW

MOVE: X10 PROBE FROM TEST SCOPE VERTICAL TO TP 519(A25)

SET: TEST SCOPE
TRIGGERING AUTO-AC-INT

CHECK: FOR A CONTINUOUS LOW TTL LEVEL AT NEGATIVE 512 CODE 5.0 TO 5.3 VOLTS.
THE SAME APPLIES TO +511 CODE WITH A CONTINUOUS HIGH

TTL LEVEL.

SET: 7854
HORIZ MODE A

REMOVE: X10 PROBE

PRESS: 7854
AQR ACQUIRES WAVEFORM

SET: 7854
STORED INTENSITY TO USABLE LEVEL

ROTATE: 10 TURN POT THROUGH RANGE OBSERVING STRAIGHT
DIAGONAL LINE FROM LOWER LEFT TO UPPER RIGHT ON
7854.

BIT SYMETRY

PRESS: 7854
STOP SCOPE STOPS ACQUIRE FOR REALTIME DISPLAY

CONNECT: X1 PROBE FROM 7854 SAWTOOTH OUT TO RIGHT TP ON 10
TURN POT.
X10 PROBE FROM 7A26 CH1 TO TP 523(A25).

ADJUST: R515(A25) LOCATED BELOW 10 TURN POT, FOR THE MOST
SYMETRICAL SQUAREWAVE ON 7854.

SELECT: C561(A25) IF R515(A25) DOES NOT HAVE ENOUGH RANGE TO
ATTAIN 1 TO 1 SYMETRY ON 7854.

ADJUST: 10 TURN POT FOR A READING OF 310 MV (31 CODE) ON DM
501.

ADJUST: LSB MATCH R623(A25) LOCATED AT TOP OF 80 FORWARD OF
10 TURN POT, FOR A SYMETRICAL SQUAREWAVE ON 7854.
NOTE IF NO EFFECT IS OBSERVED ADJUST 10 TURN POT
SLIGHTLY UNTIL THE CORRECT POINT IS FOUND TO DISPLAY
LSB MATCHING.

ADJUST: 10 TURN POT FROM +511 CODE TO -512 CODE ON DM 501
OBSERVING 7854 FOR A SQUAREWAVE DISPLAY WITH ALL
CODES 1 BIT WIDE + OR - .5 BITS (4 CODES CAN BE
OUTSIDE THIS SPEC)

UNPLUG: X1 PROBE AND DM 501 PROBE FROM 10 TURN POT.

REMOVE: 10 TURN POT FROM P509(A25)

REPLACE: JUMPER ON P509(A25) IN TEST POSITION.

CONNECT: X1 PR(CE TO TP 502(A25)

CHECK: 7854 CRT FOR A BIT SYMETRY DISPLAY THAT INCLUDES A
BIT THE LSB MATCH R623(A25) AFFECTS.

REMOVE: X1 PROBE
X10 PROBE
7B87
7A26

REPLACE: JUMPER P509(A25) TO THE NORMAL OPERATION POSITION.

2.2 VERTICAL COMPENSATION

VERTICAL PICKOFF OFFSET

INSTALL: PULSER IN LEFT VERTICAL

SET: 7810

TIME PER DIV .5MS
TRIGGERING AUTO-AC-INT

PULSER

TEST COM MODE
REP RATE 10KHZ

7854

MODE SCOPE
HORIZ MODE A
VERT MODE RIGHT

TEST SCOPE

VOLTS PER DIV 20MV
COUPLING GND
TIME PER DIV .1MS
TRIGGERS AUTO-AC-EXT

ADJUST: TEST SCOPE TRACE TO GRAT CENTER.

SET:

TEST SCOPE
COUPLING DC

CONNECT: X10 PROBE TO BOTTOM LEAD ON R105(A25) LOCATED BEHIND SHIELD.

ADJUST: CENTER R80(A25) LOCATED AT REAR OF BD, TO BRING TEST SCOPE TRACE TO GRAT CENTER.

SAMPLE PULSE WIDTHS

SET:

TEST SCOPE
VOLTS PER DIV 50MV
TIME PER DIV 20NS
MAG X10
TRIGGERING INTERNAL
BW FULL

7854

VERT MODE LEFT

MOVE:

X10 PROBE (P6106 ONLY) TO R241(A25) FREE END, LEFT SIDE OF VERTICAL BRIDGE. (BE EXTREMELY CAREFULL THE BRIDGE DIODES ARE VERY EASILY DESTROYED)

ADJUST: R228(A25) FOR 10NS + OR - .5NS PULSE WIDTH MEASURED
AT GRAT CENTER.

MOVE: X10 PROBE TO R341(A25) FREE END, LEFT SIDE OF
HORIZONTAL BRIDGE.

PULL: 7B10 PART WAY OUT.

ADJUST: R328(A25) FOR 10NS + OR - .5NS PULSE WIDTH MEASURED
AT GRAT CENTER.

PUSH: 7B10 INTO HORIZONTAL COMPARTMENT.

SET: TEST SCOPE
MAG X1

REMOVE: X10 PROBE

SAMPLER VERTICAL OFFSET

SET: TEST SWITCH
POSITION OPEN

7854
VERT MODE LEFT

PRESS: 7854
F BOTH FOR BOTH DISPLAY
AQR FOR WAVEFORM ACQUIRE

ADJUST: OFFSET R280(A25) TO OVERLAY TRACES AT GRAT CENTER.
NOTE: RT MUST BE WITHIN .1 DIVISIONS OF GRAT CENTER.

PRESS: 7854
STOP STOPS ACQUIRE
STORED FOR STORED DISPLAY
AQR FOR WAVEFORM ACQUIRE

THERMALS

SET: PULSER
TEST VERT HORIZ + STEP
AMPLITUDE 6 DIV SQR WAVE
POSITION CENTERED

NOTE: REALTIME MUST BE OFF TO PERFORM THESE ADJUSTMENTS.

ADJUST: FOR MINIMUM OVERSHOOT AND ROLLOFF, BY TABLE.

PULSER	7B10	ADJUSTMENT ON (A25)
1KHZ	.5MS	R13
10KHZ	50US	R12
10KHZ	20US	C262
100KHZ	5US	R11
1MHZ	.5US	R58
1MHZ	20NS	R40,C40
1MHZ	5NS	R60,C62,C61,C245
		ADJUSTMENT ON (A19)
1MHZ	5NS	C195,R195

STEP (UNITY DOT RESPONSE)

POSITION: TOP OF SQUAREWAVE TO GRAT CENTER.

SET: PULSER
REP RATE 10KHZ
7B10
TIME PER DIV 1US
TEST SWITCH
POSITION CLOSED

PRESS: ON CALCULATOR KEY BD PROGRAM ENTRY

ENTER: PROGRAM
AQR .1 SMOOTH 20 VXPB PAUSE 00 GOTO

PRESS: 7854
EXECUTE RETURNS TO STORED
F START STARTS PROGRAM

ADJUST: C262(A25) FOR MINIMUM VERTICAL STEP, 3.5 DIVS FROM
FRONT CORNER.

PRESS: STOP

GAIN

SET: TEST SWITCH
POSITION OPEN

PRESS: 7854
SCOPE MODE FOR SCOPE MODE

SET: 7B10
 TIME PER DIV .5MS
 TRIGGERING AUTO-AC-INT

 PULSER
 TEST VERT HORIZ GAIN
 REP RATE 10KHZ

 ADJUST: 7B10 TRIGGERING AND VARIABLE HOLDOFF FOR STABLE
 STAIRCASE DISPLAY.

 PRESS: 7854
 STORED STORED DISPLAY
 AQR WAVEFORM ACQUIRE

 ADJUST: GAIN R290(A25) FOR ONE STEP PER DIVISION WITHIN
 CENTER 6 DIVISIONS.

 CHECK: FOR ONE STEP PER DIVISION + OR - .06 DIVISIONS.

 PRESS: 7854
 STOP STOPS ACQUIRE
 CRS2-1 2 CURSERS ON

 POSITION: CURSERS 6 VERTICAL DIVISIONS APART.

 CHECK: DELTA VCRD DISPLAYED ON CRT FOR READING BETWEEN 6.06
 AND 5.94

 POSITION: CURSERS 2 VERTICAL STEPS APART BY USING CRS POSITION

 CHECK: DELTA VCRD DISPLAYED ON CRT FOR A READING BETWEEN
 2.1 AND 1.9

 REPEAT: FOR ALL VERTICAL STEPS ON CRT.

 SET: PULSER
 TEST COM MODE

 PRESS: 7854
 AQR WAVEFORM ACQUIRE

 WAIT: 3 TO 5 SEC

 PRESS: 7854
 STOP STOPS ACQUIRE

 ENTER: 7854 KEYBOARD
 MEAN MEASURES MEAN VALUE OF WFM
 VZR COPIES VZR READOUT
 + ADDS MEAN AND VZR VALUES

 CHECK: X REGISTER READS LESS THAN + OR - 80M

 PRESS: 7854
 OFF(CRS) TURNS OFF CURSERS

BANDPASS AND RT MATCH

SET: PULSER
TEST AMPLITUDE VERT-HORIZ FREQ RESP
MAX(CW)

7810
TIME PER DIV .1MS
TRIGGERING AUTO-AC-EXT

SG 504
RANGE REF(6MHZ)

CONNECT: SG 504 TO PULSER CW IN.

PRESS: 7854
SCOPE FOR REALTIME DISPLAY

ADJUST: SG504 AMPLITUDE FOR 8 DIVISION SIGNAL.

SET: PULSER
AMP 6 DIV SIGNAL(CW LIGHT ON)

PRESS: 7854
F BOTH FOR BOTH DISPLAY
AQR STARTS ACQUIRE

SET: SG 504
RANGE LOW(245-550MHZ)

CHECK: BANDPASS AND RT MATCH BY TABLE.

SG 504 FREQUENCY	MINIMUM DIVISIONS	PERCENTAGE OF DIFFERENCE
250	5.40	7.25
300	5.25	8.50
350	5.00	9.75
400	4.70	11.0

PRESS: 7854
STOP STORED STOPS ACQUIRE
FOR STORED DISPLAY

2.3 HORIZONTAL COMPENSATION

PICKOFF CENTERING

EXCHANGE: PULSER AND 7B10 (PULSERS LEFT SIDE COVER REMOVED)

SET:	TEST SCOPE	
	TIME PER DIV	.1MS
	VOLTS PER DIV	10MV
	VERT COUPLING	GND
	PULSER	
	TEST	COM MODE
	TEST SCOPE	
	POSITION	GRAT CENTER
	VERT COUPLING	DC

CONNECT: X10 PROBE FROM TEST SCOPE TO HORIZ SIG IN
P64-2(A25).ADJUST: CENTER R45(A9), RIGHT EDGE BD, TO BRING TEST SCOPE
TRACE TO GRAT CENTER

REMOVE: X10 PROBE

STEP (UNITY DOT RESPONSE)

SET:	PULSER	
	TEST	HORIZ +STEP
	REP RATE	10KHZ
	7B10	
	TIME PER DIV	20US
	TRIGGERS	AUTO-AC-EXT
	MAG	X10
PRESS:	7854	
	SCOPE MODE	REAL TIME DISPLAY

CONNECT: BNC CABLE FROM PULSER PRE TRIGGER OUT TO 7B10 EXT
TRIGGER IN.

SET:	7B80	
	SLOPE	+
	LEVEL	STABLE DISPLAY

PULSER	
GAIN	6 DIV SIGNAL
POSITION	CENTER TRACE

MOVE: JUMPER P630(A25) TO PINS 2 AND 3.

PRESS: 7854
 STORED STORED DISPLAY
 AQR FOR WFM ACQUIRE

SET: PULSER TOP OF SQUAREWAVE
 POSITION GRAT CONTROL

PRESS: 7854
 STOP STOP ACQUIRE
 PROGRAM ENTRY TO INPUT PROG

ENTER: PROGRAM
 AQR .3 SMOOTH 20 VXP0 .1 SMOOTH
 STOP 00 GOTO

PRESS: 7854
 PROGRAM ENTRY RETURNS TO STORED

START: PROGRAM BY PRESSING F START WAIT 3 TO 5 SECONDS,
 PRESS STOP THEN RUN .

ADJUST: C362, LOCATED ABOVE HORIZ BRIDGE, SLIGHTLY REPEAT
 RUN-STOP-RUN AND ADJ UNTIL STEP IS MINIMUMIZED.

PICKOFF COMPENSATION

INSTALL: 7B10 IN B HORIZONTAL

SET: PULSER
 REP RATE 1MHZ
 POSITION CENTERED

7B10
 TIME PER DIV 50NS
 MAG X10

7B10
 TIME PER DIV 1MS
 POSITION CENTERED
 MAG X1

PRESS: 7854
 AQR WAVEFORM ACQUIRE

ADJUST: 7B10 POSITION CONTROL TO DISPLAY LEADING EDGE OF
 SQUAREWAVE.

PRESET: HORIZONTAL PICKOFF (A9)

 R65(TOP RT) MID RANGE
 C65(TOP RT) MAX OVERSHOOT
 C41(GTR) MAX OVERSHOOT
 R41(BOTTOM) CGW

ADJUST: R41(A9) CW UNTIL 2ND DIP, APPROXIMATELY 15NS. FROM THE FRONT CORNER IS GONE.

ADJUST: C65(A9) SO OVERSHOOT AND UNDERSHOOT ARE EQUAL.

ADJUST: R65(A9) CW FOR OPTIMUM ABERRATION WITH EQUAL OVERSHOOT AND UNDERSHOOT.

ADJUST: C41(A9) AND R65(A9) UNTIL OPTIMUM ABERRATION IS REACHED.

PRESS: 7854 STOP STOPS PROGRAM
 SCOPE REALTIME

GAIN AND OVERLAY

EXCHANGE: PULSER AND 7B10

MOVE: JUMPER P630(A25) TO PINS 1 AND 2

SET: 7854 VERT MODE LEFT
 HORIZ MODE B

PULSER TEST AUX IN

TG 501 MARKERS 1MS

CONNECT: BNC CABLE FROM TG 501 MARKER OUT TO PULSER AUX IN.
BNC CABLE FROM TG501 TRIGGER OUT TO 7B10 TRIGGER IN.

ADJUST: 7B10 SWEEP CAL FOR ONE MARK PER DIVISION OVER CENTER 8 DIVS.

PRESS: 7854 F STORED FOR BOTH DISPLAY
 AQR STARTS ACQUIRE

SET: TG 501 MARKERS 5MS

ADJUST: OFFSET R380(A25) AND GAIN R42(A9) TO POSITION DIGITIZED DISPLAY HORIZONTALLY OVER REALTIME.

PRESS: 7854 STOP STOPS ACQUIRE

SET: 7854
HORIZ MODE A

PULSER
TEST VERT HORIZ +STEP
REP RATE 1MHZ
AMPLITUDE 6 DIV SQ WAVE

7810
TRIGGERING AUTO-AC-INT
POSITION FRONT CORNER DISPLAYED
TIME PER DIV 10NS
MAG X10

PRESS: 7854
AQR STARTS ACQUIRE

ADJUST: IF DIGITIZER WAVEFORM IS TO THE RIGHT OF REALTIME.
ADJUST R328(A25) HORIZONTAL STROBE WIDTH
CLOCKWISE TO OVERLAY WAVEFORMS.

IF DIGITIZER WAVEFORM IS TO THE LEFT OF REALTIME.
ADJUST R228(A25) VERTICAL STROBE WIDTH
CLOCKWISE TO OVERLAY WAVEFORMS.

IF ADJUSTMENT OF EITHER R328 OR R228 WILL NOT
OVERLAY WAVEFORMS
ADJUST THE REMAINING R328 OR R228 CLOCKWISE TO
HORIZONTALLY OVERLAY WAVEFORMS.

PRESS: 7854
STOP STOPS ACQUIRE

TIMING

REMOVE: 7810

MOVE: 7810 TO A HORIZONTAL

SET: 7854
HORIZ MODE A

PULSER
TEST AUX IN

PRESS: 7854
AQR STARTS ACQUIRE

CHECK: 1MS TIMING IS WITHIN .08 DIVS OVER CENTER 8 DIVS.

NOTE: ADJUSTMENT OF HORIZONTAL PICKOFF TIMING WILL
INTERACT WITH REALTIME HIGH FREQUENCY TIMING.

SET: TEST SWITCH
POSITION CLOSED

PRESS: 7854
SCOPE MODE FOR REALTIME DISPLAY

CHECK: REALTIME HORIZONTAL TIMING 5NS TO .5NS USING THE
TABLE BELOW.

7810		TG501		
TIME PER DIV	MAG (7810 ONLY)	MARKER TIME	TIMING ERROR, PERCENT	LINEARITY ERROR,
50NS	X10	5NS	1.0	100M
20NS	X10	2NS	1.5	100M
10NS	X10	1NS	2.0	100M
5NS	X10	.5NS	2.5	100M

2.4 SYSTEM VERIFICATION

TTL OUT

PRESS # 7854 PROGRAM FOR PROGRAM ENTRY

ENTER: PROGRAM
SWH SML 00 GOTO

PRESS: 7854 EXECUTE RETURNS TO STORED
F START RUNS PROGRAM

SET: TEST SCOPE
VOLTS PER DIV 2V
TIME PER DIV 2MS
TRIGGERING AUTO-AC-INT

CONNECT: BNC CABLE FROM 7854 REARPANEL CONNECTOR TO TEST
SCOPE VERTICAL.

CHECK: FOR APPROX. 4V PULSE ON TEST SCOPE.

PRESS: 7854 STOP STOPS PROGRAM

REMOVE: BNC CABLE

GPIB ADDRESS SWITCH

SET: 7854 GPIB SW (REAR PANEL)
ON-OFF 1-ON LINE
MODE 00-TALK LISTEN-EOI
ADDRESS 00000

PRESS: 7854 PROGRAM FOR PROGRAM ENTRY

ENTER: PROGRAM
ID PAUSE START

PRESS: 7854 CALCULATOR RETURNS TO STORED
EXECUTE RUNS PROGRAM
F START

CHECK: AS YOU TOGGLE ONE SWITCH AT A TIME, THE ADDRESS
DISPLAYED ON CRT IS THE SAME ONE ENCODED IN BINARY
ON BACK OF 7854.

PRESS: 7854
STOP STOPS PROGRAM

CONNECT: GPIB CABLE FROM 7854 REAR PANEL TO 4051.

NOTE: IF 4051 IS IN USE SKIP NEXT TWO STEPS.

INSTALL: CAL TAPE IN 4051.

PRESS: 4051
AUTO LOAD

LOG ON: 4051, 7854 GPIB ADDRESS DISPLAYED IN SECOND LINE OF
I D MESSAGE. BY PRESSING USER DEFINABLE KEY 1.
ALSO, ANYBODY PRESENTLY LOGGED ON MAY LOG YOU ON BY
ADDING 900 TO YOUR ADDRESS, THEN ENTERING RESULT ON
THEIR 7854 AND PRESSING RQS.

DIGITIZER NOISE TEST

PRESS: 7854
4 RQS LOADS NOISE TEST

REMOVE: PLUG-INS

INSTALL: 7887 IN B HORIZONTAL

SET: 7854
HORIZ MODE B

TEST SWITCH
POSITION CLOSED

7887
TIME PER DIV 1MS
AQS CLOCK INTERNAL
TRIGGERING AUTO-AC-EXT
HOLD OFF MIN(CCW)
MAG X1
ACQ-STOP DELAY CW

PRESS: 7854 CALCULATOR
STORED FOR STORED DISPLAY
100 RUN RUNS PROGRAM

CHECK: WHEN PROGRAM STOPS THE X AND Y REGISTERS ARE LESS
THAN INDICATED BELOW.

Y REGISTER X REGISTER
8.0 MILLI 10.0 MILLI

REMOVE: 7887

MODIFY: RIDGED PLUG-IN EXTENDER 067-0589-00
 BY UNPLUGGING A 11 AND B 11 BNC CABLES AND
 CONNECTING 50 OHM TERMINATORS TO PLUG-IN END OF
 CABLES.

INSTALL: 067-0589-00 IN B HORIZONTAL
 7B87 ON EXTENDER
 7B10 IN LEFT VERTICAL

SET: 7854
 VERT MODE LEFT

7B10
 TIME PER DIV .1MS
 TRIGGERING AUTO-AC-EXT
 MAG X1

MOVE: JUMPER P630(A25) TO PINS 2 AND 3

PRESS: 7854 CALCULATOR
 100 RUN RUNS PROGRAM

CHECK: WHEN PROGRAM STOPS THE X AND Y REGISTERS ARE LESS
 THAN INDICATED BELOW.

Y REGISTERS	X REGISTERS
10.0 MILLI	12.0 MILLI

REPLACE: JUMPER P630(A25) TO PINS 1 AND 2.

REMOVE: PLUG-INS

TIMING AND LINEARITY

PRESS: 7854
 2 ROS LOADS DIG CAL

INSTALL: PULSER IN LEFT VERTICAL
 7B10 IN A HORIZONTAL

SET: 7854
 HORIZ MODE A

PULSER
 TEST AUX IN

CONNECT: CABLES FROM TG 501 TO PULSER AND 7B10.

RUN: PROGRAM 1 SETTING 7B10 AND TG 501 PER FOLLOWING TABLE.

CHECK: TIMING, USING PROGRAM WITH TABLE

7B10		TG501		
TIME PER DIV	MAG (7B10 ONLY)	MARKER TIME	TIMING ERROR, PERCENT	LINEARITY ERROR,
1MS	X1	1MS	500M	50M
1US	X1	1US	750M	50M
.5US	X10	50NS	1.0	50M
.2US	X10	20NS	1.0	50M
.1US	X10	10NS	1.0	50M
50NS	X10	5NS	1.0	100M
20NS	X10	2NS	1.5	100M
10NS	X10	1NS	2.0	100M
5NS	X10	.5NS	2.5	100M

MOVE: 7B10 TO B HORIZONTAL.

SET: 7854
HORIZ MODE B

REPEAT: ABOVE TABLE CHECKING B HORIZONTAL. (UNLESS OPTION 02-XY COMP)

REMOVE: 7B10
CABLES

UNBLANKING MATCHING

PRESS: 7854 CALCULATOR F BOTH FOR BOTH DISPLAY

INSTALL: 7B10 IN B HORIZONTAL.

SET: 7B10
TIME PER DIV 50NS
TRIGGERING AUTO-AC-INT
MAG X10

PULSER
TEST + STEP
REP RATE 1MHZ
AMPITUDE 6 DIV STEP

TEST SWITCH POSITION OPEN

PRESS: 7854 AQR STARTS ACQUIRE

MOVE: JUMPER P211(A25) TO THE POSITION THAT WILL MATCH THE LEFT ENDS OF THE REALTIME AND DIGITIZED WAVEFORMS TO WITH IN 1 DIV (5NS). NOTE ADJUST PULSER POSITION CONTROL AFTER MOVING JUMPER TO SEE END OF WAVEFORMS.

SET: TEST SWITCH
POSITION CLOSED

+RISETIME AND ABERRATIONS

PRESS: 7854 CALCULATOR
2 RUN RUNS PROG 2

SET: 7B10
TIME PER DIV 10NS
MAG X10
POSITION STEP 2 DIV FROM LEFT GRAT
EDGE

PRESS: 7854 CALCULATOR
RUN TO RUN PROGRAM

CHECK: THE X AND Y
REGISTERS ARE LESS THAN INDICATED BELOW.

Y RESISTER	X REGISTER
5 PERCENT	750 P SECONDS

PRESS: 7854 CACULATOR
9 RUN RUNS PROG 9

POSITION: TRACE AS DIRECTED ON 7854 CRT

PRESS: 7854 CACULATOR
RUN RUNS PROGRAM

CHECK: RESULTS IN X AND Y REGISTERS, BOTH SHOULD BE LESS THAN 150M.

-RISETIME AND ABERRATIONS

PRESS: 7854 CACULATOR
RUN RETURNS TO PROG 2

SET: PULSER
TEST -STEP

REPEAT: RISETIME AND ABERRATION AND POSITION EFFECT FOR -
STEP.

STORED REALTIME ABERRATION MATCH

PRESS: 7854 CALCULATOR
3 RUN RUNS PROG 3

SET: 7810
TIME PER DIV 50NS
MAG X10
POSITION STEP 2 DIV FROM LEFT GRAT
EDGE

PRESS: 7854 CALCULATOR
RUN RUNS PROGRAM

POSITION: REALTIME TRACE TO PASS THROUGH CURSERS ON STORED
WAVEFORM.

CHECK: STARTING ONE MINOR DIVISION AFTER FRONT CORNER TRACE
DOES NOT GO OUTSIDE OF LIMIT LINES.

PRESS: 7854 CALCULATOR
RUN RETURNS TO PROG 3

SET: PULSER
TEST + STEP
POSITION TRACE CENTERED

REPEAT: MATCH TEST FOR + STEP.

BANDPASS MATCHING

SET: 7810
TIME PER DIV 1US
MAG X1
TRIGGERING AUTO-AC-INT

PULSER
TEST VERT-HORIZ FREQ RESP
AMPLITUDE MAX(CW)

SG 504
RANGE REF(6MHZ)

CONNECT: SG 504 TO PULSER CW IN.

PRESS: 7854 CALCULATOR
4 RUN RUNS PROG 4

ADJUST: SG 504 AMPLITUDE FOR 8 DIVISION SIGNAL

ADJUST: PULSER AMPLITUDE FOR 6 DIVISION SIGNAL (CW LIGHT
ON).

SET: SG 504
RANGE LOW(245-550MHZ).

7B10
TIME PER DIV 10NS
MAG X10

PRESS: 7854 CALCULATOR
RUN RUNS PROG 4

CHECK: BANDPASS MATCHING IN 25MHZ STEPS FROM 250MHZ TO
400MHZ.

REMOVE: PULSER

DUAL TRACE ACQUIRE

INSTALL: TWO 7A26 S IN LEFT AND RIGHT VERTICALS.

SET: BOTH 7A26 S
DISPLAY MODE ALT

7B10
TIME PER DIV 10US
MAG X1

PRESS: 7854 CALCULATOR
5 RUN RUNS PROG 5

POSITION: TRACES AS INSTRUCTED ON 7854 CRT.

PRESS: 7854 CALCULATOR
RUN RUNS PROGRAM

CHECK: DUAL TRACE FOLLOWING INSTRUCTIONS ON CRT.

REMOVE: 7B10

EXTERNAL ACQUIRE STOP (GPIB)

INSTALL: 7B87 IN B HORIZONTAL

SET: 7854
HORIZ MODE B

7B87
ACQUIRE CLOCK EXT INPUT
TIME PER DIV 1MS
TRIGGERING AUTO-AC-INT

PRESS: 7854 CALCULATOR
6 RUN RUNS PROG 6

CHECK:
EXT ACQUIRE STOP FOLLOWING INSTRUCTIONS ON 7854 CRT.

LOG OFF: 4051, BY PRESSING USER DEFINABLE KEY 6, OR BY
ENTERING 0 RQS.

PRESS: 7854
POWER OFF

REMOVE: PLUG-INS
TEST SWITCH FROM P1303(A27)
GPIB CABLE FROM 7854 REARPANEL

REPLACE: JUMPER ON P1303(A27)

SHAKE: INSTRUMENT, ON SHAKE TABLE, FOR 2 MINUTES IF IT HAS
NOT BEEN THROUGH CYCLE.

STOP: HERE IF INSTRUMENT HAS NOT BEEN THROUGH CYCLE.

DUAL TRACE SINGLE SHOT ACQUIRE

SET: 7887
ACQUIRE CLOCK INT
7A26'S
DISPLAY MODE CH 1
7854
VERT MODE ALT

PRESS: 7854
CALC AQS

CHECK: TWO WAVEFORMS ARE ACQUIRED PROPERLY.

2.5 FINAL OFFSET ALIGNMENT

PRESS: 7854
POWER OFF

INSTALL: SHIELDS AT THESE LOCATIONS.
PLUG-IN HOUSING -3EA-
DIGITIZER
SIDE PANELS (MODIFIED)
BOTTOM PANEL

PRESS: 7854
POWER ON

CONNECT: 4051 TO 7854 WITH GPIB CABLE.

NOTE: IF 4051 WAS IN USE SKIP NEXT 3 STEPS.

INSTALL: TEST TAPE IN 4051

PRESS: 4051
AUTO LOAD LOADS DIG CAL

LOG ON: 4051, 7854 GPIB ADDRESS DISPLAYED IN SECOND LINE OF
I D MESSAGE. BY PRESSING USER DEFINABLE KEY 1.
ALSO, ANYBODY PRESENTLY LOGGED ON MAY LOG YOU ON BY
ADDING 900 TO YOUR ADDRESS, THEN ENTERING RESULT ON
THEIR 7854 AND PRESSING RQS.

PRESS: 7854
3 RQS LOADS OFFSET ALIGN

LOG OFF: 4051, BY PRESSING USER DEFINABLE KEY 6 OR BY
ENTERING 0 RQS.

REMOVE: GPIB CABLE FROM 7854

INSTALL: PULSER IN B HORIZONTAL
7B10 IN LEFT VERTICAL

SET: PULSER
TEST COMMON MODE
REP RATE 10 KHZ

7B10
TIME PER DIV .1MS
MAG X1
TRIGGERING AUTO-AC-INT

WAIT: 15 MINUTES FROM POWER UP FOR THE TEMPERATURE TO
STABILIZE IN THE MAINFRAME.

ADJUST: HORIZONTAL CENTER R15(A17) TO BRING VERTICAL LINE TO
GRAT CENTER.

EXCHANGE: PULSER AND 7B10

ADJUST: VERTICAL CENTER R105(A18) TO POSITION TRACE TO GRAT CENTER.

PRESS: 7854
STORED DISPLAYS TEST PATTERN

ADJUST: HORIZ OFFSET R1205(A29) TO HORIZONTALY CENTER TEST PATTERN.

ADJUST: VERTICAL RO-WFM CTR R65(A18) TO VERTICALLY CENTER TEST PATTERN.

PRESS: 7854 CALCULATOR TIME FOR YT DISPLAY
F BOTH FOR BOTH DISPLAY
PROGRAM ENTRY FOR PROGRAMING MODE
F CLP NEXT CLEARS PROGRAM

ENTER: PROGRAM
AQR 00 GOTO

PRESS: 7854 CALCULATOR EXECUTE FOR EXECUTE MODE
F START RUNS PROGRAM

SET: PULSER TEST VERT-HORIZ +STEP
AMPLITUDE 6 DIV SQUAREWAVE

ADJUST: VERTICAL PICKOFF CENTER R80(A25), LOCATED AT REAR OF BD, TO OVERLAY TRACES.

ADJUST: HORIZONTAL PICKOFF CENTER R45(A9) TO HORIZONTALY OVERLAY TRACES.

REMOVE: SIDE PANELS
ALL PLUG-INS
CALCULATOR KEY BD

PRESS: 7854 POWER OFF

CROSS: FINGERS PLACE SCOPE ON SHELF FOR OC.