



TEST PROCEDURE - T7411 AND T7411-402 CATHODE RAY TUBE

R 1.0 FRONT PANEL CONTROLS

- Turn intensity CCW
- Grid bias CCW
- Gun to normal
- Select Non-Store Mode
- Connect line raster generator
- Turn on P-690 Test Unit

*ECO,  
Just Pos - GND  
TIME BASE - AUTO-AC-INT  
CONV.  
TIME B @ 100µs  
INTENS - CCW  
E<sub>CO</sub> for cut off*

SPECIFICATION LIMIT

R 2.0 CUTOFF, CATHODE CURRENT, BEAM CURRENT, FOCUS UNIFORMITY, GEOMETRY, ALIGNMENT & SENSITIVITIES:

- 2.1 Depress E<sub>CO</sub> button. Increase intensity so a spot is just visible.
- 2.2 Adjust spot for best focus and astigmatism at the tube center.
- 2.3 Switch to halftone and increase/decrease operating level until some background is observed.
- 2.4 Turn intensity CCW and increase grid bias until a spot begins to store. Reduce grid bias so that the spot will no longer store. Record as cutoff voltage on test form. (May need to erase to determine if spot is storing.)
- X 2.5 Check electrical center; (Reference to graticule line.)
- X 2.6 Switch gun to gearshift. Check that tube is cutoff. If not, readjust bias so that it will no longer store.
- 2.7 Return to conventional mode and gun to normal.
- 2.8 Set intensity for 50V drive. Center vertically and and measure beam current. Record on test form.
- 2.9 Switch gun to gearshift and note that current is greater than normal mode current. If not, notify LEAD OPERATOR. Switch gun back to normal mode.

*Select to HT -  
adj. for some background  
Watch write through + set  
CO use position knob  
sine wave - focus  
I<sub>IS</sub> - AUTO-AC-INT.  
amp. for set  
V-Position AC*

75 - 105 VDC

±2.5 Minor Div.

25µA Min.

REVISIONS	01							
Mod. No.	4640							
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Pages Changed	1-11, 14-16.							

Total-16.

R 2.0 CUTOFF, CATHODE CURRENT, BEAM CURRENT, FOCUS UNIFORMITY, GEOMETRY, ALIGNMENT & SENSITIVITIES: (Cont.)

2.10 Measure cathode current as set-up in Sec.2.8 and record as  $I_k$  @ 50V drive on test form.

SPECIFICATION LIMIT

$V_{co}$	$I_k$
75 - 79	.48 mA Min.
80 - 84	.44 mA Min.
85 - 89	.40 mA Min.
90 - 94	.38 mA Min.
95 - 99	.34 mA Min.
100 -105	.32 mA Min.

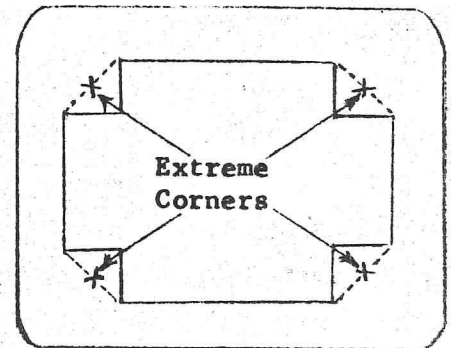
2.11 Set intensity for a  $I_k$  reading of .4ma and measure beam current. Record as  $I_b$  @  $I_k = .4ma$ .

26 $\mu$ A Min.

2.12 Switch gun to gearshift. Note if beam current is greater than recorded value. If not, notify LEAD OPERATOR. Switch gun back to normal.

2.13 Reduce intensity and position spot to center of graticule. Measure the major axis of the smallest focused spot and compare with the major axis when the spot is positioned to corner extremes (See Fig.)

$\leq 2.6.:1$



2.14 Select horizontal lines. Set time base to 10 $\mu$ S/Div. Slowly increase intensity until lines are visible. Check rotational alignment, using center graticule line.

$\pm 2.5$  Minor Div.  
 $(\pm 0.5$  Major Div.)

2.15 Set geometry for straight horizontal lines. Switch to vertical lines. NOTE straightness of vertical lines. If not within specifications, adjust vertical lines until within specification. Check horizontal lines for straightness.

0.5 Minor Div. Total

2.16 Select vertical lines. Using center graticule line, check orthogonality of trace (horizontal lines should be aligned).

$\pm 0.7$  Minor Div. ( $\pm 1^\circ$ )

*for raster  
 Volt - DC  
 time @ AMP. - DC - EXT*

*Focus Ratio*

2.0 CUTOFF, CATHODE CURRENT, BEAM CURRENT, FOCUS UNIFORMITY, GEOMETRY, ALIGNMENT & SENSITIVITIES: (Cont.)

SPECIFICATION LIMIT

2.17 Ground vertical input. Switch horizontal to Amplifier with external trigger source (should have spot).

2.18 Depress Horizontal Button on P.T.U. meter and position horizontally to graticule extremes, noting meter readings. Add absolute value of two readings.

2.19 Depress vertical button and P.T.U. meter and position vertically to graticule extremes, noting meter readings. Add absolute value of two readings.

99 - 117V Total  
 (10.8 ±.9 V/Div.)

28 - 32.8V Total  
 (3.8 ±.3V/Div)

R 3.0 HALFTONE SETUP

*NORM-EXT-10 X1 AC*

3.1 Select halftone mode and erase. Measure flood gun cathode current.

.22 mA Min.

3.2 Set operating level to <sup>2.5</sup>0 volts and prep voltage fully CCW.

*DC for sawtooth  
 X output to ext. on 7916  
 Y " " output " "*

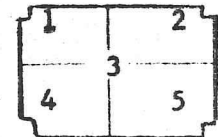
3.3 Erase target and adjust operating level until target just starts to drop from saturation after erasure. Increase this operating level by three (3) volts and record on data form as halftone operating point.

*Target mode*

*just get rid of dash area*

3.4 Measure luminance at the five (5) points shown; record the average reading as saturation luminance.

≥ 100 fL.



3.5 Erase and vary Prep Voltage until a small area of the target just drops from saturation. Record. Lower operating level and erase; continue to do so until first area just dark (1 Div. Sq.). Record as first dark O.L.

*PREP OL Vp*

*let a last dark*

3.6 Vary operating level until the full 8 x 10 quality area is dark after erasure. Record this O.L. as last dark.

*look for a dark area  
 set Prep on 5-625-0  
 scale on 665*

*Horizontal - left  
 Vertical - right*

R 4.0 HALFTONE WRITING SPEED & TARGET DEFECTS

SPECIFICATION LIMIT

- 4.1 Set Drive for 50 volts. *set gun mode to Erase*
- 4.2 Connect low-frequency sine wave generator to vertical, set for 100KHz, and adjust gain for 6.4 Div.
- 4.3 Adjust horizontal for a minimum display of seven (7) complete cycles.
- 4.4 Store the sine wave in different locations of the 6 x 8 Div. quality area to determine the limiting areas for writing speed and view time.

*NORM. CRT  
10  
adj. speed  
location  
target  
Must be triggered*

**NOTE:** Writing speed may be limited by some area other than the area which is darkest.

- 4.5 Position the midpoint of the sine wave on the slowest area.
- 4.6 A. WRITING SPEED:

*op level control*

Vary the frequency and operating level until the trace just stores or until trace breaks .040". Measure time for the display to fade-up (signal no longer visible above background). If the view time (fade-up time) is different from 15 seconds, readjust the operating level and frequency until the view time is just 15 seconds. Record as 15 sec. writing speed.

0.5 Div/ $\mu$ s Min.

- 4.7 A. TARGET DEFECTS: (Bright Spots)

Erase the target. Measure questionable bright spot defects. If defects out of specification, set frequency to 25 KHz. Erase and write target, varying O.P. level until written trace is just visible. Erase and measure defects. If above limits, reject.

See P.S.8-2011, Table I

- 4.8 Switch gun to gearshift. Repeat Sec.4.6.A for gearshift writing speed with 3.2 Div. Sine wave on center 4 x 5 Div. area. Use about 1MHz initially. Switch gun to normal mode.

1.5 Div/ $\mu$ s Min.  
Record

- 4.9 Repeat Sec.4.6.A, using a view time of one (1) minute.

Record Data - Q.A. Only

- 4.10 TARGET DEFECTS: (Dark Spots)

See P.S.8-2011, Table I

Increase the operating level until the screen is saturated. Measure questionable dark defects.

Emission

1. Set 40 Ma IB - HT
2. 7B70 (TIME BASE) 10KS = Be sure red knob is pushed in Calibrated
3. CONNECT Mega H sine w. gen to Vert SET to 100MHz
4. Push top 3 Buttons = P-P, AC, Int  
 NO. Conv - X1  
 Check to see that it doesn't over-scan  
 HORIZ, - if it does - shorten up screw  
 drives adjust - (on side) behind Ith switch X1  
 - blue screw - (PCET)

MOND. SCOPE  
 S.S. AC LINC  
 1 or 2 sec.  
 VT has to heat  
 5MU + Cal.  
 V/DIV

XFR S.  
 HTXFR  
 NORM  
 AC  
 EXT +  
 HT  
 erase

just to see if it all works

6. S. SWEEP - Int - triggered - (blue lit: on) about 9 o'clock  
 + XFR
7. Erase
8. Integrate
9. S.M - (HS in HTXFR Em.)
10. on mon. scope - S.S. - to start trace  
 across
11. single - shot on 7B70 -
12. should have a spike
13. Measure amp. of spike
- HT plug in on scope must be on 5md.

HTXFR EMISSION  
 RETURN VT TO VT  
 Round for W.S.



return to normal + off

5.0 TARGET SENSITIVITY & SECONDARY EMISSION FOR STORAGE MESH

SPECIFICATION LIMIT

- 5.1 Set  $I_b = 40\mu A$  with gun in normal mode. Focus trace.
- 5.2 Select 50KHz sinewave and set for 6.4 Div. Select halftone mode and set operating level to value recorded as last dark (Sec.3.6).
- 5.3 Erase. Confirm that <sup>this is</sup> at last dark condition. / if not adjust  
Decrease operating level one (1) volt below the last dark.
- 5.4 Erase. Single sweep sinewave over last dark area (midpoint of sinewave over area). Vary frequency and erase until trace is just visible. Record, 20X as target sensitivity for storage mesh.
- 5.5 Set timebase to  $10\mu s/Div$ , and 1X. Select 100MHZ sinewave. Set for 5 Div. amplitude. Switch to single sweep and external trigger. <sub>INT.</sub> & TRIG.
- 5.6 Erase. Select storage mesh position on secondary emission selector. Depress internal trigger noting amplitude at spike on output signal. Record value in millivolts.

Sample Data & Engineering Test only

Sample Data & Engineering Test Only

also return op to last dark V!  
~~If HORT is over edge of grid~~

Sens



5-AC-INT

R 6.0 HALFTONE RESOLUTION

- 6.1 Adjust intensity for  $1\mu A$  beam current. *if the won't blank - increase it a bit, focus*
- 6.2 Select vertical lines and non-store mode. Focus trace. (Switch between vertical and horizontal line looking for best trace in both directions.)
- 6.3 Adjust vertical gain for 8 Div. Select Halftone Mode. Erase target for target condition corresponding to just dark.
- 6.4 Adjust line speed <sup>on MONO</sup> so that every line is written above just visible condition. Shrink spacing <sup>with T. Base</sup> between lines increasing number of lines until lines are just discernible over 8 x 10 Div. area.
- 6.5 Count the number of vertical lines stored over two (2) divisions. Record 1/2 of this number as resolution.

Res -  
1  $\mu A$   
CONNECT Res. Lead to vert.  
AC, INT, P.P, NON-ST.  
ON MON. scope  
Auto. Ext. Ac.  
2 msec sweep  
other time base 2 msec  
should have some vt.  
Lines - 6-8-  
Focus -

10 line/Div Min.

lower per div -> 1  
4/10

up MON. scope T. Base control -  
store & erase vary T. Base  
until lines are just visible in 8x10  
then vary T.B. on P. supply unit until  
lines are so close your lines are just discernible  
over 8x10

7.0 VARIABLE PERSISTENCE UNIFORMITY

- Photo call  
114 pulses generated  
into control in house*
- 7.1 Set persistence duty factor to 3%.
- 7.2 Inhibit persistence pulses. Erase for just dark and write total 8 x 10 divisions to saturation (increase drive and single sweep).
- 7.3 Initiate pulsing and note first and last areas to decay.
- 7.4 Repeat Sec.7.2. Place luminance probe at first area to decay away as noted in Sec.7.3. Initiate pulsing. Record decay time as first decay.
- 7.5 Repeat Sec.7.4 for last area to decay. Record.
- 7.6 Divide decay time of Sec.7.5 by Sec.7.4.

SPECIFICATION LIMIT

≤ 3:1

R 8.0 RESIDUAL IMAGE - STORAGE MESH

- 8.1 Set beam current for 40 $\mu$ A in gearshift. Focus trace. Select single sweep.
- 8.2 Select halftone. Erase. Set operating level for just dark condition.
- 8.3 Select non-store mode. Set timebase at 10 $\mu$ s/Div. and ground vertical input signal.
- 8.4 Switch timebase to Auto and Ext. Trigger. Let horizontal line run for one (1) minute, then switch to single sweep. Turn intensity full CCW.
- 8.5 Erase twice. Record difference in operating levels needed to make the area written and the adjacent area dark. If area written blacker than background, then record as negative.

*Ib off  
NORM, AC, EYE  
10  
HTXFR  
Erase twice*

R 9.0 HALFTONE TRANSFER WRITING SPEED

- 9.1 Select halftone fast mode. Set operating level for near all dark condition (i.e., some visible background. Turn intensity full CCW. Preset  $V_p$  for five (5V) volts and  $V_t$  for two (2V) volts.
- 9.2 Set timebase to single sweep and internal triggering. Erase. Note condition of display.

9.0 HALFTONE TRANSFER WRITING SPEED (Cont.)

- 9.3 Erase and wait for fifteen (15 Sec.) seconds. Trigger sweep. NOTE condition of background. If different than that of Sec.9.2 or immediate transfer, then need to change stability setting. If background higher after fifteen (15 sec.) seconds, then increase stability voltage (i.e., stability knob CW). If background lower, then decrease stability voltage.
- 9.4 Repeat Sec.9.3 until display appears nearly the same. Now check for 60 Sec. by erase and waiting 60 Sec. Adjust stability until display after 60 Sec. wait is same as initial transfer.
- 9.5 Set drive to fifty (50V.) volts. Connect 7.5MHz sinewave to input. Adjust for 6.4 Div. amplitude. Focus trace in Non-Store.
- 9.6 Choose halftone fast mode. Erase and note condition of written signal. Adjust  $V_t$  after each transfer until background begins to change. *(4 TXFR)* *XFR up, like a chest X-ray)*
- 9.7 Erase and wait fifteen (15 Sec.) seconds. Trigger sweep and note condition of transferred signal and background. If background or signal is transferred better after 15 second wait, then decrease  $V_p$ . If background or signal is transferred worse after 15 seconds waiting, then increase  $V_p$ . Readjust  $V_t$ . *in hold*
- 9.8 Repeat Sec.9.7 until condition at initial transfer and fifteen (15 Sec.) second stability check are nearly the same.
- 9.9 Repeat Sec.9.7 through Sec.9.8 for stability check time of sixty (60 Sec.) seconds.
- 9.10 Recheck front mesh stability per Sec.9.3 through Sec.9.4.
- 9.11 Erase. Record  $V_p$ ,  $V_t$ , and stability level as hi-speed prep, XFR voltage and hold level-storage mesh, respectively.
- 9.12 Erase. Measure viewtime of display with 7.5MHz 6.4 Div sinewave positioned over slowest area and written to just visible or .040 break in transferred trace. Record viewtime as viewtime at 150 Div/ $\mu$ s.

## SPECIFICATION LIMIT

 $\geq 15$  Sec.*Hi speed prep**EX 8*



## HTRFR / SENSITIVITY

- 1/  $I_b = 40 \mu a$
- 2, Focused
- 3, LEAVE MHZ sine at w.s. setting used to get HTRFR w.s.
- 4, Vary O.L. UNTIL ONE SMALL AREA HAS just a little Bkgd. (trim off screen)
- 5, Position TR. over that area.
- 6, Lower VT UNTIL TRACE just stores.  
(WATCH VT ON DVM)
- 7, Then Lower VT 1 (one) volt. (eg. negative INITIAL = 0.4 go to -1.4)  
Below where it just stores -
- 8, NOW VARY FREQ - (it will need to be a lot lower)  
(usually to 0.75 - 1.6 range or 1.6 - 3.6 range) also reduce T.M. base control 1 or 2 clicks
- 9, STORE IN the same area TO ABOUT the same w.s. as before (initially in step 6 above, record)
- 10, Return VT to WS VT used in later sheet
- 11, Do Emission same way as done in HT -

R 9.0 HALFTONE TRANSFER WRITING SPEED (Cont.)

9.13 Varying frequency determine transferred writing speed yielding fifteen (15 Sec.) seconds of viewtime. Record 20X frequency as writing speed at fifteen (15 Sec.) seconds without gearshift.

9.14 Switch gun to gearshift. Select 100MHz and set at 3.2 Div. Position over center 4 x 5 Div. looking for slowest writing area.

9.15 Adjust operating level until trace transfers to just visible and/or breaks in trace is less than .040". Measure viewtime. Record as viewtime for 1000 Div/ $\mu$ s.

## SPECIFICATION LIMIT

$\geq$  15 Sec.

R 10.0 TARGET SENSITIVITY & SECONDARY EMISSION FOR HI-SPEED MESH

10.1 Set  $I_b = 40\mu A$  with gun in normal mode. Focus the trace.

10.2 *at H.TXFR WS*  
Select ~~1MHz~~ 6.4 Div. sinewave. Select halftone fast mode. Set operating level for condition of barely visible background in a 1 Div. area on target. Decrease  $V_t$  until trace is just transferring in that area.

10.3 Note  $V_t$  reading. Decrease by one (1) volt.

10.4 Erase. Vary frequency until trace transferred to condition same as that of Sec. 10.2. Record 20X as sensitivity-hi-speed.

10.5 Set timebase to 10  $\mu$ s/Div and 1X. Select 100MHz sinewave set for five (5) Div. amplitude. Switch to single sweep external trigger.

10.6 Erase. Select hi-speed mesh position on secondary emission selector. Depress internal trigger noting amplitude of spike on output signal. Record value in millivolts as Emission: hi-speed.

Sample Data &  
Engineering Test Only

Sample Data &  
Engineering Test Only

R 11.0 RESIDUAL IMAGE -HI-SPEED MESH

- 11.1 Set beam current for 40 $\mu$ A in gearshift. Focus the trace. Select single sweep. *sine wave*
- 11.2 Select halftone fast. Erase. Set operating level for same background. Set  $V_p$  and  $V_t$  at values recorded in Sec.9.11.
- 11.3 Select non-store mode. Set timebase at 10 $\mu$ s/Div and ground vertical input. *X 1 mag*
- 11.4 Switch timebase to auto and set trigger. Allow horizontal line to run for one (1) minute. Switch to single sweep. Turn intensity full CCW. Set trigger at internal.
- 11.5 Erase and transfer twice. *LOWER FAST LEVEL CONTROL* Record difference in  $V_t$  needed to suppress the transfer of the background and the residual.

SPECIFICATION LIMIT

*If you get VT leg unplugging sig. - because it reconnected so it will TRG*

Sample Data & Engineering Test Only

R 12.0 BISTABLE OPERATING POINT

- 12.1 Set beam current to 15 $\mu$ A. *AMPL. EXT.* *I<sub>b</sub> SWITCH UP / NON-STORE*
- 12.2 Set focus and astigmatism on a 45° line from triangle.
- 12.3 Switch to bistable and erase.
- 12.4 Single sweep a raster of lines and vary operating level erasing and rewriting until lines begin to break up. Raster must remain one (1) minute with no more than two (2) breaks .025" in a single line. Record as writing threshold. *8 X 10 dio*
- 12.5 Increase the operating level, erasing and rewriting until the trace begins to fade up. Trace should store one (1) minute without fading up over .025". Record as upper writing limit.
- 12.6 Set operation level midway between writing threshold and upper writing limit. Record as bistable operating point.
- 12.7 BISTABLE TARGET DEFECTS
  - a. Erase the target and measure any questionable defects.
  - b. Fully write the bistable target and measure any questionable defects.

*2 on HORIZ sweep plug in. POS. TRACE off face VERTICALLY - BS - erase. run trace over tgt  $\approx$  1 line per div wait 1 min. OP usually around 65V W/around 50-55 UWL " 70-90*

O.R. 10V Min.  
O.P. 125V. Max.

See P.S.8-2011, Table I

# BSXFR

AFTER ALL  $V$ 's are set: Connect to MHz sine wave gen.  
Set at 50V Focus sine wave set 6.4 div ampl.

## Target Stability

$$V_p \approx 15V$$

$$V_T \approx -1.5$$

Set MHz sine wave gen. at 5 on 3.6 to 8

Store this speed to see if it writes -

vary  $V_T$  for  $\approx 5\%$  transfer of 1 div (looks like butter milk)

If it doesn't write in most of 8x10 -

raise  $V_p$  - & vary  $V_T$  to maintain 5% xfr.

may have to vary W.S. (slower or faster) to where it stores.

S.S. AC INT

ERASE

wait  $\approx 15$  sec, HIT S.S. to store TRACE -

If it looks about as it did initially -  
go back to S.S. AC INT, erase  
time for 60 sec.

Target has to look the same after 60 sec. as it did initially.

If it loses W.S. (breaks in trace) or less background  
is xfr'd up lower  $V_p$  (go back to NORM AC,  $\frac{EAT}{10}$ )  
go thru a complete erase & vary  $V_T$  if needed

If it feeds up - raise  $V_p$

$V_T$  - curdles it

$V_p$  - stability (writes better)

13.0 BISTABLE WRITING SPEED

- 13.1 Set Drive to 50 volts.
- 13.2 Connect a 5 KHz sinewave to vertical and adjust gain for a 6.4 Div. display.
- 13.3 Set focus and astigmatism on a 45° centered line.
- 13.4 Store a series of sinewaves to determine the slowest area of the 6 x 8 Div. quality area. (Adjust horizontal sweep for a minimum of one (1) cycle per Div.)
- 13.5 Position the center of the sinewave over the slowest writing area.
- 13.6 Erase and single sweep, varying the sinewave frequency until the slowest area just stores the trace with no breaks >.040", or is just visible above the background.
- 13.7 Record twenty (20) times the sinewave frequency as bistable writing speed.
- 13.8 Switch gun to gearshift. Repeat Sec.13.4 through 13.6 on center 4 x 5 Div. (.9cm/Div graticule) area using a 3.2 Div. amplitude sinewave.
- 13.9 Record ten (10) times the sinewave frequency as gearshift bistable writing speed.

SPECIFICATION LIMIT

*HORIZ 7870*  
*same base*  
*single sup AC. INT.*  
*Trig. late on*      *x1*

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NOTE:  
WS has to be hand-stored - use SS, AC INT. S.S. Sinewave to determine WS.

30 Div/ms Min.

100 Div/ms Min.

*3.6-8*  
*start @ 4 MHz scale*  
*trace*  
*write @ EXT + norm-AC*  
*10*  
*6 x 8 div*  
*To any VT norm-AC - EXT*  
*10*  
*Vp - SS - INT & Trig*

R 14.0 BISTABLE TRANSFER WRITING SPEED

- 14.1 Connect 5MHz sinewave to vertical input. Switch gun to normal. Preset  $V_p$  for fifteen (15V) volts. Signal height to 6.4 Div.
- 14.2 Adjust  $V_t$  for 5% fade-up of any single division.
- 14.3 Evaluate stability for fifteen (15) seconds by using timer and/or single sweep with external trigger. If there is a loss in writing speed and/or less background transferred, then decrease  $V_p$ . If more background transfer, then increase  $V_p$ .

R 14.0 BISTABLE TRANSFER WRITING SPEED (Cont.)

- 14.4 Continue repeating Sec.14.3 until no detectable change in % background transferred or loss in writing speed.
- 14.5 Repeat Sec.14.3 and 14.4 for sixty (60 Sec.) seconds waiting period.
- 14.6 Record  $V_p$  and  $V_t$  as bistable hi-speed prep and XFR voltage, respectively.
- 14.7 Store sinewave in different areas of 6 x 8 Div. to determine writing speed by setting midpoint of sinewave at slowest writing area. Writing speed limit when there are no breaks in signal greater than .040 or trace is just visible above background.
- 14.8 Record 20X frequency as bistable transfer writing speed w/o gearshift.
- 14.9 Switch gun to gearshift. Repeat Sec.14.7 for center 4 x 5 Div. area using a 3.2 Div. amplitude sinewave. (May vary  $V_t$  to increase writing speed.)
- 14.10 Record 10X frequency as bistable transfer writing speed gearshifted.
- 14.11 Switch gun to normal.

## SPECIFICATION LIMIT

 $\geq 30 \text{ Div}/\mu\text{s}$  $\geq 200 \text{ Div}/\mu\text{s}$

SEC. II - CONTROL PROCEDURECONTROL PROCEDURE FOR T7411 TESTINGA. INTRODUCTION

T7411 testing is under control if electrode voltages, and erase, prep, and transfer waveforms are within specifications. Monitoring of these voltage and waveforms must be done with calibrated equipment at various prescribed intervals. Test control evaluation is provided by periodic testing of "standard" tubes.

B. PARAMETERS TO BE MONITORED

Parameter	Sample Rate	Specification Limit		Control Limit
		W/O Gearshift	Gearshift	
1. Test set monitoring calibration.	twice/period			
a. DVM				
Current		<1%		<1%
Voltage		<1%		<1%
2. Operating Voltages: (DC) (Respect to Gnd.)				
WG-Htr	twice/period	6.3V $\pm$ 10% across heaters	-3000	Same as Spec.
WG-K	twice/period	-1475 $\pm$ 15V	-3000 $\pm$ 30V	Same as Spec.
WG-Grid	twice/period	-1580 to -1500V	-3105 to -3025V	Same as Spec.
Tetrode Wafer	twice/period	+25 $\pm$ 1V	-1500 $\pm$ 15V	Same as Spec.
WG-Anode, D3D4 Shield	twice/period	25 $\pm$ 1V	25 $\pm$ 1V	Same as Spec.
WG-Focus	twice/period	-825 to -1235V	-2150 to -2450V	Same as Spec.
D3D4 Plate Ave.	twice/period	25 $\pm$ 2V	25 $\pm$ 2V	Same as Spec.
D1D2 Plate Ave.	twice/period	42 $\pm$ 2V	42 $\pm$ 2V	Same as Spec.
Isolation Shield	twice/period	-40 $\pm$ 1V	-130 $\pm$ 25V	Same as Spec.
Astigmatism (2nd Anode)	twice/period	-15 to 100V	45 to 130V	Same as Spec.
Geometry (D1D2 Shield)	twice/period	-15 to 95V	-15 to 95V	Same as Spec.
FG-Htr	twice/period	12.6V across heaters	12.6V across heaters	Same as Spec.
FGK	daily	0 $\pm$ .1V (store) 50V $\pm$ 2V (modes) (Non-store)	0 $\pm$ .1V (store) 50V $\pm$ 2V (modes) (Non-store)	0V Same as Spec.

SEC. II - CONTROL PROCEDURES (Cont.)CONTROL PROCEDURE FOR T7411 TESTING (Cont.)B. PARAMETERS TO BE MONITORED (Cont.)

Parameter	Sample Rate	Specification Limit		Control Limit
		W/O Gearshift	Gearshift	
2. <u>Operating Voltages:</u> (DC) (Respect to Gnd.)				
Screen	twice/period	7000 $\pm$ 70V (Non-store)	7000 $\pm$ 70V (Non-store)	Same as Spec.
3. <u>Waveforms</u>				
		<u>Specification Limit</u>		
I. Bistable Mode	Weekly	$\pm$ 2%		$\pm$ 1%
II. Transfer Mode	Weekly	$\pm$ 2%		$\pm$ 1%
III Halftone Mode	Weekly	$\pm$ 2%		$\pm$ 1%
IV. Non-Store Mode	Weekly	$\pm$ 2%		$\pm$ 1%
4. <u>Standard Tubes</u>	1 tube/wk/shift	Ea. perform. parameter within control limits on tube card.		Same as Spec. Limit

C. SAMPLING PLAN

During the first and third week of each period, the test set should be calibrated for current and voltage monitoring. At the same time, the electrode voltages, except storage, should be checked and reset. First tube to be tested each day should be used in checking Storage and High-Speed electrode voltages. Erase and prep waveforms, and non-store waveforms need to be evaluated once each week (at the beginning of the week).

Standard tubes should be checked at a rate of one (1) per week/shift (at the beginning of the week). Standard tube test results should be within the control limits on the tube card. If not, check test set before testing tubes.

All control criteria need evaluation after a major test-set breakdown and repair.



R

T7411 STORAGE WAVEFORMS

ELEMENT	MODE	NON-STORE	BISTABLE	BISTABLE TRANSFER	HALFTONE	HALFTONE TRANSFER
FLOOD GUN CATHODE		0V, 38V	0V	0V	0V	0V
FLOOD GUN ANODE		16V	90V, 36V	90V, 20V	74V, 20	74V, 20
CE1		70V	85V, 45V	85V, 30V	70V, 30	70V, 30
CE2		45V	85V	85V, 4.5V	45V	65V, 4.5
CE3		65V	85V	85V, 65V	65V	72.5V, 65
COLLECTOR MESH		150V	115V, 150V	115V, 128V	132.5V, 100	132.5V, 100
HI-SPEED MESH		125V	125V	125V, 10ms period, 2ms width	125V, 100	125V, 10ms period, 2ms width
STORAGE MESH		600V, -15V	600V, 105, 35, 100	600V, 1000+	600V, 100, 250, 600	600V, 100, 250, 600, 1000+
TIME (ms)		0, 100	0, 100, 475, 600	0, 100, 475, 600, 1000+	0, 100, 250, 600	0, 100, 250, 600, 1000+

D. CORRECTIVE ACTION

<u>PARAMETER</u>	<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
<u>BISTABLE MODE</u>			
1. Storage	No storage	Open leads or improper connections	Re-solder all leads and check connections.
		Open internal leads.	Reject tube.
		Storage circuitry failure	Check test set; repair if necessary.
2. Erase	No erase	Same as no storage	Same as no storage
	Poor erase	Waveforms out of calibration	Calibrate; repair if necessary.
<u>TRANSFER MODE</u>			
1. Storage	No storage	Same as Bistable Mode	Same as Bistable Mode.
2. Prep	No prep	No prep pulse; storage circuitry malfunction.	Check test set; repair if necessary.
3. Waiting	Hangs up in prep	Equipment malfunction Timebase not triggered.	Check test set; repair if necessary. Rotate trigger knob.
R R 4. Transfer	No transfer or 100% transfer	$V_t$ and $V_p$ not correct Sweep too fast or too slow.	Re-adjust and try again. Re-adjust and try again.
		Equipment malfunction	Check test set; repair.
5. Erase	No erase	Same as Bistable Mode	Same as Bistable Mode
	Poor erase	Same as Bistable Mode	Same as Bistable Mode
R 6. Stability	Target not stable	$V_p$ not correct. Equipment malfunction	Adjust and try again. Check test set; repair if necessary.