

MILITARY SPECIFICATION SHEET
 ELECTRON TUBE, VIDICON
 TYPE 7263A

This specification sheet forms a part of the latest issue of Military Specification MIL-E-1

DESCRIPTION: 1 inch diameter, ruggedized, low power heater, magnetic focus, magnetic deflection for film or live pickup with color or black and white TV cameras.

PIN CONNECTIONS AND DIMENSIONS: See Figure 6

OPERATING POSITION: Any

ABSOLUTE MAXIMUM RATINGS:

Parameter:	Ef	DI _{sJ}	IsJT	Ec3	Ec2	Ec1	Ehk
Unit:	V	μA _{dc}	μA _{dc}	V _{dc}	V _{dc}	V _{dc}	V _{dc}
Maximum:	6.9	0.25	0.55	750	750	300	+10
Minimum:	5.7	----	----	---	---	0	-125

TEST

CONDITIONS:
(Note 2)

Parameter:	FI	T(Faceplate)	tk	I(Focus Coil)
Unit:	fc	°C	s	mA _{dc}
Maximum:	1000	71	--	----
Minimum:	0	0	--	----

TEST

CONDITIONS:
(Note 2)

TEST EQUIPMENT AND COMPONENTS: See Note 1

GENERAL:

Qualification: Not required (See Note 22)

Holding period: t = 48 hours

(B) Complete Revision

TYPE 7263A

FSC 5960

METHOD OR PAR. NO.	TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
						Min	Max	
	General							
	Qualification inspection							
1331	Direct interelectrode capacitance	Target to all	--	--	C	3.5	5.5	pF
---	Environmental 1	Faceplate temperature 0°C to +55°C max. (See Notes 14 & 15)	--	--	--	--	--	--
---	Environmental 2	No voltages (See note 16)	--	--	--	--	--	--
	Quality Conformance inspection, part 1							
---	Target Voltage	Note 3			Esj	20	50	Vdc
---	Dark Current	Note 4			DIsj		.05	μAdc
---	Signal Uniformity	Note 5			Δ Isj		20	%
---	Lag	Note 6			Lag		25	%
---	Alignment Horizontal	Note 7			A _h	-36	+36	mAdc
---	Alignment Vertical	Note 7			A _v	-36	+36	mAdc
---	Spurious Signal (1)	Notes 8, 21			1SS	See	Note 8	--
---	Center Resolution	Note 9			CeRes	650		lines
---	Corner Resolution	Note 9			CoRes	350		lines
---	Raster Cutoff	Note 10			Ecl	-50	-95	Vdc
---	After Image	Note 11			AIm		7	Sec.
---	Spurious Signal (2)	Note 8			2SS	See	Note 8	--
---	Maximum Signal Discharge	Notes 12,21			MSD	.55		μAdc
---	Raster Burn	Notes 13,21			RB	See	Note 13	--
	Quality Conformance inspection Part 2							
1301	Heater Current		6.5	S3	If	85	105	mA
---	Vibration	Faceplate temperature 0°C to +55°C (See Notes 15,17, 18)	6.5	S3	--	--	--	--
---	Shock	No voltages (see Note 19)	6.5	S3	--	---	--	--
	Post environmental tests							
---	Target Voltage		--	--	Esj	20	50	Vdc
---	Dark Current		--	--	DIsj		.05	μAdc
---	Lag		--	--	Lag		25	%
---	Center Resolution		--	--	CeRes	650		lines
---	Raster Cutoff		--	--	Ecl	-50	-95	Vdc
---	Maximum Signal Discharge		--	--	MSD	.55		μAdc

METHOD OR PAR. NO.	TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
						Min	Max	
	Quality Conformance Inspection Part 3							
4.6	Life Test	Group D; t = 500 hours (see Note 20)	--	--	--	--	--	--
4.6.2	Life Test End Point							
---	Maximum Signal Discharge		--	--	MSD	.55		μ Adc

NOTES:

1. TEST EQUIPMENT AND COMPONENTS

Perform tests in a Vidicon Test Set having a monitor with a 10-3/4" x 8-1/8" raster and an oscilloscope to display the video signal (See Figure 9).

Faceplate Illumination will be from wither a calibrated light source of 2854°K or from a back lighted test pattern, as required to perform each test.

Test components: See Figure 8

Deflection, Focus, Alignment Assembly - Cleveland Electronics VYFA 355-1 or equivalent.

Scanning Frequency: 15,750 Hz x 60 Hz Sawtooth.

Scanning Linearity: Within 1% over the entire raster using a grating generator and the EIA (RETMA) Ball linearity chart

2. GENERAL TEST CONDITIONS

The General Test Conditions will apply unless otherwise specified:

Cathode Conditioning Time: 300 seconds minimum.

Reference Voltage: The cathode voltage is the zero reference for the target and other grid voltages.

Faceplate Temperature: 30° + 3°C

Focus Coil Current: 33 mA_{dc}. The polarity for the focus coil shall be such that a north-seeking pole is attracted to the image end of the focus coil.

Heater Voltage (E_f): 6.3V

Grid No. 1 Voltage (E_{c1}): Adjust until the beam current is just sufficient to discharge the photolayer.

Grid No. 2 Voltage (E_{c2}): 300V_{dc}

Grid No. 3 Voltage (E_{c3}): Adjust for best focus (approx. 250 volts). Grids No. 3 and No. 4 are connected internally in the tube. The voltage applied to these two electrodes shall be referred to as E_{c3}. Alternately adjust E_{c3} and Optical focus for best focus.

Target Voltage (E_{sj}): As adjusted per Note 3.

Scan Size: With a mask having a 1/2" x 3/8" opening positioned and centered directly in front of the faceplate, adjust scanning to extend just beyond the masked area. With lens in place, adjust test pattern to Vidicon distance such that the test pattern just fills the 1/2" x 3/8" scan size.

Alignment: The alignment coil currents of the horizontal and vertical coils shall be adjusted until the center of the test pattern remains stationary as E_{c3} is varied in and out of focus.

3. TARGET VOLTAGE (E_{js})

FI = 1fc. With incident light on the masked (1/2" x 3/8") faceplate, adjust the target voltage (E_{sj}) to produce 0.3 μA_{dc} total target current (I_{sJT}).

4. DARK CURRENT (DI_{sj})

FI = 0fc. With the tube capped and the target voltage adjusted as per note 3, read the dark current (DI_{sj}).

5. SIGNAL UNIFORMITY (ΔI_{sj})

FI = 1fc (Calibration light source)

Line select through the center of the monitor display. Using the following procedure, adjust the scope until the signal amplitude at the exact center of the picture equals 100%.

Cap the tube and adjust the scope vertical centering to position the trace at the 0% line. Uncap the tube and adjust the scope gain until the trace is positioned at the 100% line. Adjust the blanking level to approx. -20%. Alternately adjust scope centering, scope gain, and blanking level until all conditions are met.

Measure the signal amplitude (in %) of the remaining eight points located 10% in from each edge (See Figure 1). The signal uniformity is the difference between the highest and the lowest of the nine readings.

6. LAG

FI = 1fc (calibrated light source) (Figure 3)

Connect the signal output of the Vidicon directly to the DC input of the oscilloscope and line select through the center of the monitor display.

Cap the tube and adjust the scope vertical centering to position the trace at the 0% line. Uncap the tube and adjust the scope gain until the trace is positioned at the 100% line. Adjust the blanking level to approx. -20%. Alternately adjust scope centering, scope gain, and blanking level until all conditions are met.

Using a motor driven light chopper, interrupt the light path 4 times per second. The light chopper shall provide light to the Vidicon target for 1/5 second (approx. 12 T.V. fields) and interrupt light for 1/20 second (approx. 3 T.V. fields).

With the chopper running, observe the minimum decay level of the signal (closest to 0% line). Read L_{ag} as the minimum decay level in percent.

7. ALIGNMENT CURRENT (A_{eh}, A_{ev})FI / IsjT = 0.3 μ Adc

Test Pattern: Figure 4

With the tube aligned per the General Test Conditions (Note 2), read the current drawn by the horizontal and the vertical alignment coils.

8. SPURIOUS SIGNALSpurious Signal (ISS)FI / IsjT = 0.3 μ Adc

Test Pattern: See Figure 4

Spurious Signal (2SS)

FI = 0fc

Esj / Disj = 0.2 μ AdcLimits

a. Any white spot of contrast ratio greater than 2 to 1 and greater than

0.030 inch or two raster lines is cause for rejection.

- b. Low contrast white spots having a contrast ratio between 1.5 and 1 and 2 to 1, or white spots having a contrast ratio greater than 2 to 1 but less than 0.030 inch or two raster lines in size, as well as black spots having a contrast ratio greater than 1.5 to 1, are allowed as shown in the following table: The size of these blemishes, spots or smudges and the maximum allowable number in either zone of the spurious test patterns are as follows:

Method I	Method II	Number allowed	
		Zone 1	Zone 2
Measurement in inches using a monitor with 10-3/4 by 8-1/8 inch raster	Number of raster lines		
Over 0.065	Over 4	None	None
0.065 to but not including 0.050	4 to 3	None	1
0.050 to but not including 0.015	3 to 1	2	3
0.015 and under	1	*	*

* Do not count spots of this size unless concentration causes a smudge appearance.

- c. Minimum separation between any two spots counted per Note b is limited to 1/4 inch or 16 raster lines.
- d. Reject for smudge, lines, streaks, mottled background, grainy background, or uneven background having contrast ratio greater than 1.5 to 1.0.

9. RESOLUTION

FI/IsjT = 0.2 μ Adc

Test Pattern: See EIA Resolution Chart 1956 or equivalent.

Adjust video gain control to see all steps of grey scale on resolution pattern.

Adjust Ec3 for balanced horizontal and vertical resolution in the center of the pattern.

Read center resolution (CeRes) on the horizontal wedge in the center of the test pattern. The CeRes reading shall meet the limit.

Read corner resolution (CoRes) on the horizontal wedge in each corner. The worst corner reading shall meet the CoRes limit.

Criterion for reading resolution wedges - Beginning with the widest portion of the wedge, follow the lines to the point where the last individual line pair (one white, one black) becomes indistinguishable. The final resolution reading shall be based on the greatest penetration of any line pair.

10. RASTER CUTOFF (Ecl)

FI/IsjT = 0.2 μ Adc

Test Pattern: See EIA Resolution Chart 1956 or equivalent.

Remove the blanking voltage from Grid No. 1 and adjust Ecl until the test pattern just disappears as observed on the monitor. Read Ecl as the raster cutoff voltage.

11. AFTER IMAGE (AIm)

Target, overscanned

Esj/Disj = 0.2 μ A

FI/IsjT = 0.4 μ A (calibrated light source)

After establishing the proper signal current, position the After Image Test Fixture (See Figure 5) in front of the tube.

Line select through the monitor display of the opening in the Test Fixture. Adjust the scope gain to adequately see the reference pedestal generated by the illumination through the ND2 filter. Open the shutter and expose the area adjacent to the ND2 filter to full illumination for 30 seconds (See Figure 6). Close the shutter, and time the signal decay to the reference pedestal height as observed in the scope display.

12. MAXIMUM SIGNAL DISCHARGE (MSD)

Target overscanned.
 $E_{sj}/D_{Isj} = 0.2 \mu A$
 FI = vary (calibrated light source)

With the Target overscanned, alternately increase illumination and discharge the Target until the specified minimum Target current (I_{sJT}) is obtained on a fully discharged Target. Reject the tube if the available beam current is insufficient to obtain the specified Target current.

13. RASTER BURN (RB)

Target overscanned.
 $E_{sj}/D_{Isj} = 0.2 \mu A$
 FI = Ofc

If a raster or pattern burn is observed in the monitor display, age the target using the following procedure.

Set Target voltage in the range from 150 to 300 volts. Slightly defocus by adjusting the Grid No. 3 voltage. Adjust Grid No. 1 voltage to zero volts. A complete white raster with no distortion or black areas should be seen on the monitor. If black or distorted areas are observed, readjust the target voltage. Age target for a minimum of one minute.

Readjust the tube to the original setup conditions. If a raster or pattern burn is observed on the monitor, repeat the Aging procedure.

Reject the tube for permanent raster or pattern burns. Burns which are momentarily observed when going through discharge are acceptable.

14. TEMPERATURE - ALTITUDE

During and after the time the tube and yoke assemblies are subjected to temperature and altitude tests in accordance with 3.2.20, 3.2.20.1, and 3.2.20.1.1 (except for (a)-(2) and (c) of Specification MIL-E-5400A (ASG), dated 1 January 1956, the tube and yoke assembly shall meet the following requirements:

During the test there shall be no loss of resolution. After the tests the tube shall meet the limits of the specified post-environmental tests.

15. ELECTRICAL TEST CONDITIONS FOR VIBRATION:

The test pattern required for environmental test 1 is RETMA Resolution Pattern 1956.

Voltages applied to the tube are equivalent to the voltages specified in General Test Conditions (Note 2) with following exceptions:

Dark Current (DI_{sj}) is set for .02 μA.

Total Target current is adjusted for the best picture.

16. HUMIDITY:

After the tube is subjected to relative humidity up to 95 percent at temperatures up to +50°C, the tube shall meet the limits of the specified post-environmental tests.

17. VIBRATION EQUIPMENT:

The preamplifier should be placed as close to the tube and yoke, but mechanically isolated from the vibration intake. The monitor, camera controls and associated cabling should be mechanically isolated from the vibration table to minimize accoustical and electromagnetic coupling between the vibration table and the test equipment. Use a ruggedized yoke with a suitable fixture to fasten tube and yoke to the vibration table. The fixture should be so designed that acceleration amplifications are prevented within the critical frequency range of the test.

18. VIBRATION CONDITIONS:

TABLE 1. Vibration Test Schedule

(Times shown refer to one axis of vibration)

Type	Vibration at Room Temp	Vibration at 131°F(55°C)	Vibration at 32°F(0°C)
Resonance Dwell	60 minutes	15 minutes	15 minutes
Cycling	60 minutes	15 minutes	15 minutes

Axes - X, Y, Z (Three mutual perpendicular axes)

Resonance Search

<u>Freq. Hz</u>	<u>Disp "D.A."</u>	<u>Accel g</u>	<u>Swp Rate</u>
5-10	0.08 in		
10-15		0.41	8 min.
15-75	0.036		
75-100		10	

If no Resonances are found, the tube is vibrated at 0.06" DA, 55Hz for twice the normal vibration time.

Resonance Dwell

Dwell will take place at the frequency where the maximum distortion occurs on the video signal. For time schedule see Table 1.

Cycling

<u>Freq. Hz</u>	<u>Disp "D.A"</u>	<u>Accel g</u>	(Table 1) <u>Swp Rate</u>
10-75-10	0.036"		15 min.
75-500-75		10	

Reject Criteria:

1. No loss in resolution during vibration.
2. Failure to meet post-environmental test limits.

19. SHOCK TEST:

The tubes shall be mounted on the table of the shock machine using double-backed tape for the X and Y axis. For the Z axis, tubes shall be held in suitable designed fixture. No voltages are applied to tube for this test.

Shock Conditions

Axis X+, X-, Y+, Y-, Z+, Z-
 3 shocks/axis, a total of 18 shocks.
 Peak acceleration: $15g \pm 10\%$
 One-half sine wave Pulse Duration: $11ms \pm 1ms$

Reject Criteria:

Failure to meet post-environmental test limits.

20. LIFE TEST SET UP:

- a. Adjustment for scan size is made by the use of a specially designed vidicon tube with a phosphor screen and with 300 Vdc applied to the target.
- b. With the scan size adjusted to approximately 1/2 by 3/8 inch (do not allow scanned area to touch target ring), faceplate temperature of $45^{\circ} \pm 5^{\circ}C$, adjust Ecl to obtain 0.5 mA dc of grid No. 2 current. Adjust target voltage to obtain 0.20 uAdc (DISj) with no light incident on the faceplate.
- c. Adjust the incident illumination on the faceplate to obtain 0.40 uAdc target current (ISjT). Light plus dark current).
- d. The target voltage shall be readjusted for specified dark current within 24 hours after the tube has reached the specified operating temperature. The incident illumination shall be readjusted when Esj is readjusted.

21. Test to be performed after the holding period.

22. FIRST ARTICLE TESTING:

The first article sample furnished by the contractor/manufacturer shall consist of preproduction tubes in the quantity indicated by Table 1 of MIL-E-1. In addition, the contractor shall furnish along with the test reports, written assurance that:

- a. The first article sample is representative of the product to be furnished under the contract.
- b. Production articles will be fabricated in the facility that produced the sample tubes.
- c. Production articles will be fabricated from new materials. The contractor shall furnish a test plan to the Contracting Officer for approval

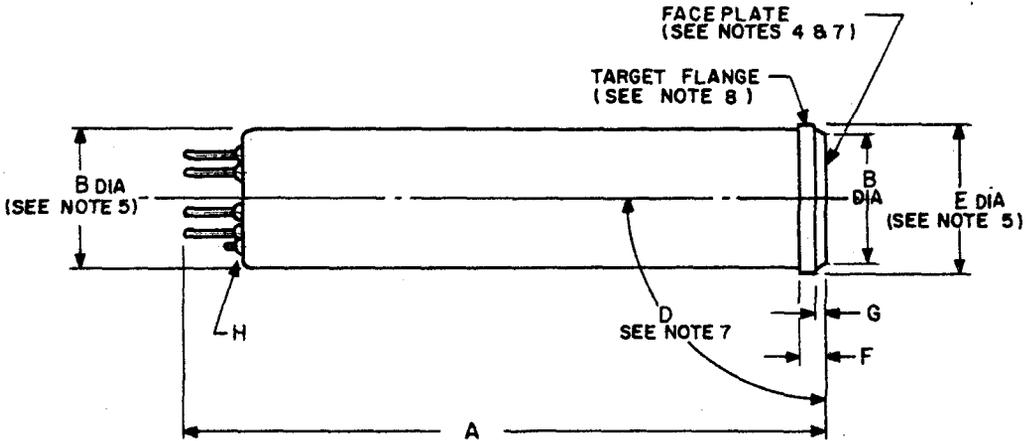
before proceeding with first article testing. The test plan shall list all production test and laboratory test facilities to be utilized in first article testing and production phases of the contract. Upon receipt of test plan approval the Contractor shall proceed with first article testing. First article testing shall include all tests and requirements of this specification and conform to Table 1 of MIL-E-1 where applicable. Upon conclusion of testing, three copies of the test report prepared in accordance with MIL-STD-831 and certified by the Government Representative shall be forwarded along with the test samples, to the contracting officer for approval.

Custodian:
Air Force - 80

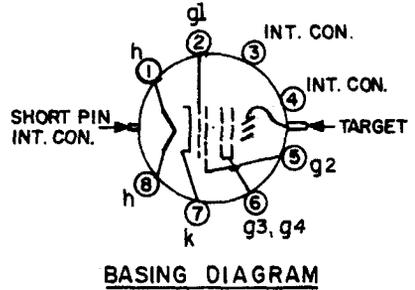
Preparing Activity:
Air Force - 80

Review Activities:
Air Force - 11, 17

DSA-ES



DIM.	AQL (% DEFECTIVE)	INSP. LEVEL	LIMITS	
			MIN	MAX
QUALIFICATION INSPECTION				
H	BASE: E8-II (SEE NOTE 6)			
QUALITY CONFORMANCE INSPECTION, PART I				
A	SEE NOTE 3	I	5.06 (128.52)	5.18 (131.57)
B			.985 (25.02)	1.050 (26.67)
E			1.115 (28.32)	1.135 (28.83)
QUALITY CONFORMANCE INSPECTION, PART 2				
D	6.5	S3	89° 45'	90° 15'
REFERENCE DIMENSIONS				
F	.175 (4.45) (SEE NOTE 2)			
G	.050 (1.27) (SEE NOTE 2)			



BASING DIAGRAM

NOTES:

1. ALL DIMENSIONS ARE IN INCHES. METRIC EQUIVALENTS ARE SHOWN IN PARENTHESIS.
2. THESE DIMENSIONS ARE FOR INFORMATION ONLY AND ARE NOT REQUIRED FOR INSPECTION PURPOSES.
3. THE AQL FOR THE COMBINED MECHANICAL DEFECTIVES IN Q.C.I., (PRODUCTION) SHALL BE 1 PERCENT.
4. DIRECTION OF INCIDENT LIGHT IS INTO FACE END OF TUBE.
5. CONCENTRICITY AND CAMBER OF TUBE SHALL BE DETERMINED BY GAGE SHOWN ON FIGURE 8.
6. JEDEC DESIGNATION. FOR PIN ALIGNMENT USE JEDEC GAGE GE8-2.
7. FACEPLATE TILT SHALL BE GAGED ABOUT ENTIRE CIRCUMFERENCE.
8. TARGET CONTACT FLANGE IN FORM OF METAL RING ENCIRCLING TUBE AND HAVING INDICATED DIAMETER MAY BE LOCATED ALONG TUBE AXIS IN ANY PART OF, OR ALL OF, SPACE BETWEEN DASHED LINES.

FIGURE 1. Outline drawing

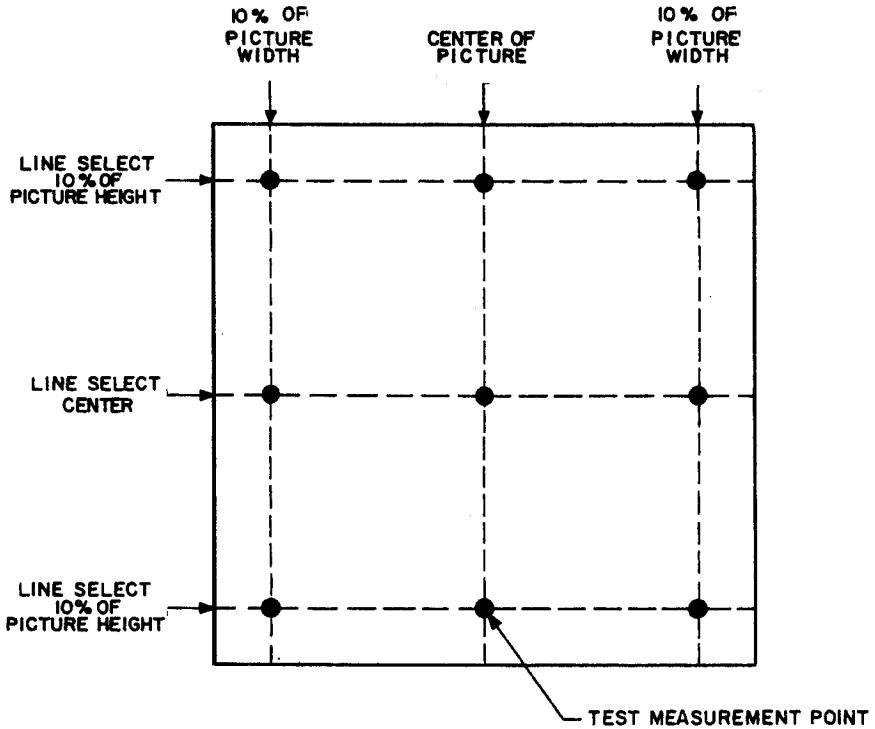
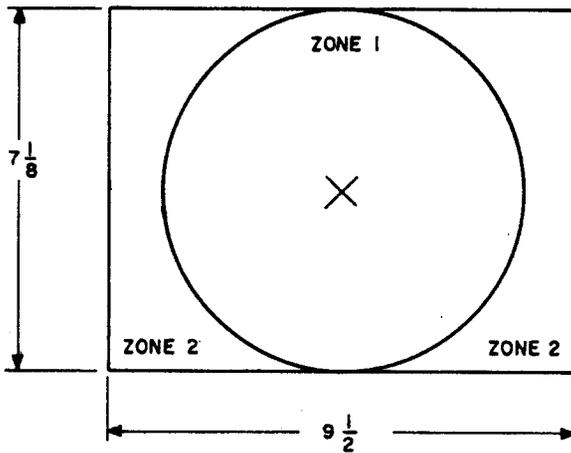


FIGURE 2. Signal uniformity test points



NOTE : DIMENSIONS ARE IN INCHES.

FIGURE 4. Zone locations for test pattern used for all 4:3 Aspect Vicon Testing

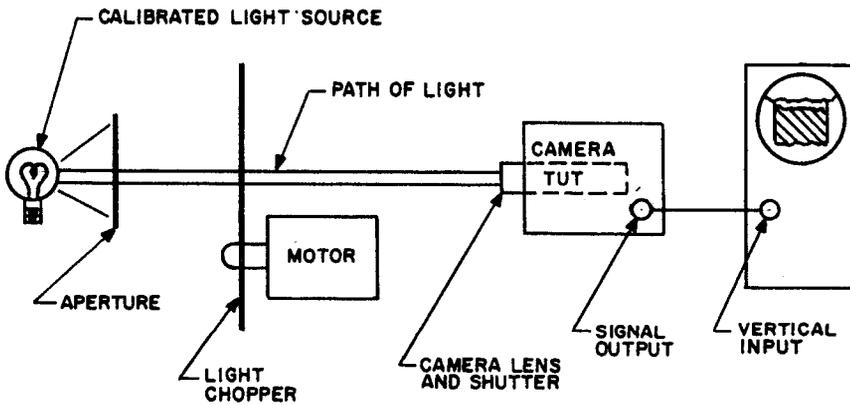


FIGURE 3. Lag test set-up

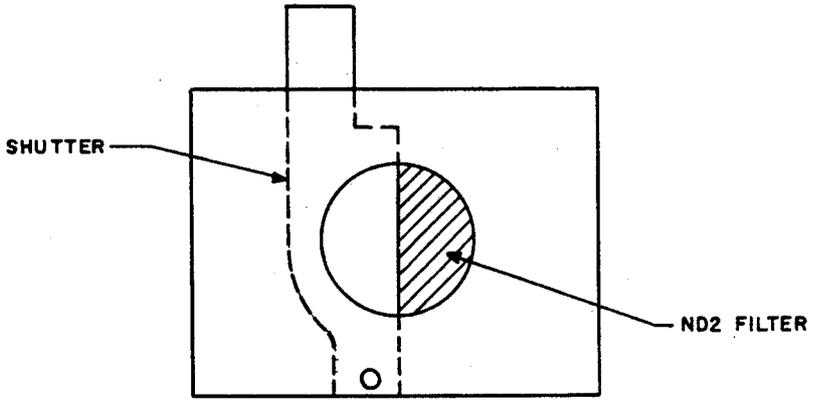


FIGURE 5. After image fixture

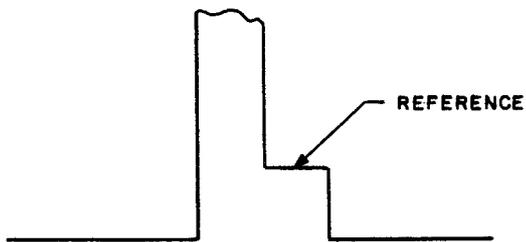
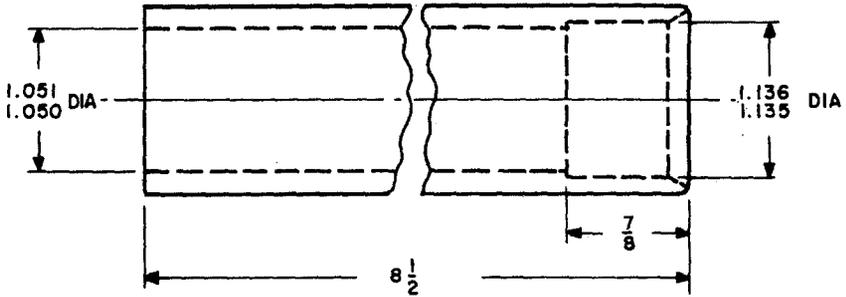


FIGURE 6. Scope display (shutter open)



NOTE: ALL DIMENSIONS ARE IN INCHES

FIGURE 7. Gage, Concentricity and Camber

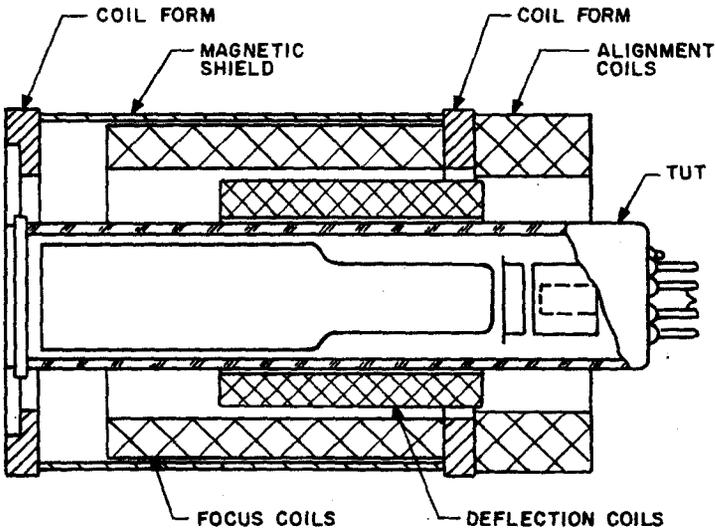


FIGURE 8. Test components

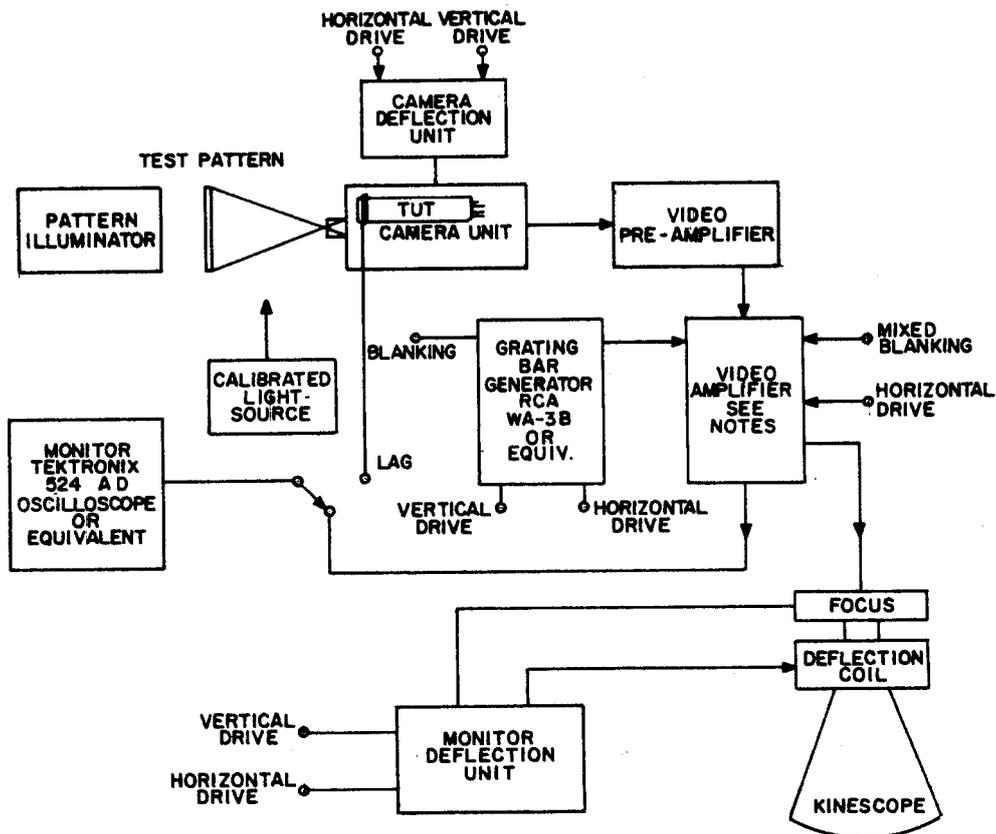


FIGURE 9. Block diagram of test equipment

NOTES :

VIDEO AMPLIFIER REQUIREMENTS :

BANDWIDTH (FREQUENCY RESPONSE) - NOMINAL RESPONSE OF VIDEO CHANNELS SHALL BE FLAT WITHIN ± 3 dB TO 15 MHz.

GAIN - APPROXIMATELY 40 dB (LINEARITY SHALL BE WITHIN 10 PERCENT)

INPUT SIGNAL - 0.5 vpp WHERE BLACK IS NEGATIVE.

FREQUENCY DISTORTION (AMPLITUDE AND PHASE) SHALL NOT EXCEED ± 2 PERCENT TILT AT EITHER VERTICAL OR HORIZONTAL RATE.