



ENGINEERING DATA

RAYONIC
2FP1
2FP2
2FP4
2FP7
2FP11

RAYONIC® 2FP1 CATHODE RAY TUBE

GENERAL DATA

Focusing Method	Electrostatic
Deflecting Method	Electrostatic
Phosphor	P1
Fluorescent Color	Green
Phosphorescent Color	None
Persistence	Medium
Mounting position	Any
Shield	Magnetic and mounting shield over the neck

ELECTRICAL DATA

Heater Voltage	6.3 Volts
Heater Current	0.6 ± 10% Amperes
Direct Interelectrode Capacitances (approx)*	
Grid #1 to all other electrodes	4.5 μμf
D1 to D2	2.0 μμf
D3 to D4	2.5 μμf
D1 to all other electrodes	6.5 μμf
D2 to all other electrodes	6.0 μμf
D3 to all other electrodes	5.5 μμf
D4 to all other electrodes	5.5 μμf

*Magnetic Shield grounded

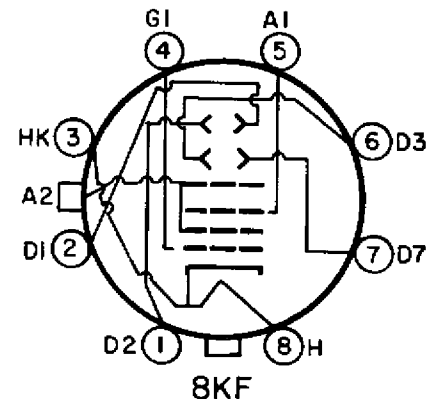
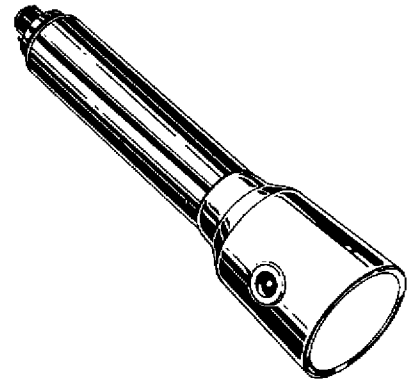
MECHANICAL DATA

Overall Length		7 $\frac{3}{8}$ $\pm$ $\frac{3}{16}$
Greatest Bulb Diameter		2 $\frac{1}{16}$
Minimum Useful Screen Diameter		1 $\frac{3}{4}$ "
Bulb Number	WPC	APZ180
Base Neo-eightar	JEDEC	B8-218
Basing	JEDEC	8 KF
Base Alignment		
D1 D2 trace aligns with Pin #3 and tube axis; 0 $\pm$ 10 deg.		
Positive voltage on D1 deflects beam approx. toward pin #3		
Positive voltage on D3 deflects beam approx. toward pin #5		
Trace Alignment		
Angle between D3 D4 and D1 D2 traces; 90 $\pm$ 1 degree		
Anode Contact	JEDEC	J1-21
Anode Contact is on same side as Pin #3		
Deflection Plates		
D1-D2 are nearest to the screen		
D3-D4 are nearest to the base		

MAXIMUM RATINGS (Design Center Value)

Anode Voltage (A2)	3000 Volts DC
Anode (A2) Input	6 watts
Anode #1 (Focusing Electrode) Voltage	1200 Volts
Grid #1 (G1) Voltage	
Negative bias value	140 Volts DC
Positive bias value	0 Volts DC
Positive peak value	2 Volts
Peak Voltage between Anode #2 and any deflecting plate	550 Volts
Altitude	35,000 feet

QUICK REFERENCE DATA
OSCILLOSCOPE AND MONITOR TUBE
FLAT FACE—2" ROUND
SHIELD—INTEGRAL MAGNETIC &
MOUNTING
LENGTH—SHORT
DEFLECTION SENSITIVITY—EXCELLENT
MONOACCELERATOR
DEFLECTION—ELECTROSTATIC
FOCUSING—ELECTROSTATIC



2FP1 □

TUBE RATINGS

Focusing Electrode (A1) Current for any operating condition	-15 to $\pm 10 \mu$ Amp
Spot Position, undeflected (note 1)	10 Max. mm
A1 Voltage 20% to 35% of A2 Voltage	
G1 Voltage 3.5 max % of A2 Voltage	
Deflection factors	
D1 D2	51 to 69 Volts DC/inch/A2 Kilovolts
D3 D4	29 to 39 Volts DC/inch/A2 Kilovolts

OPERATING CONDITIONS

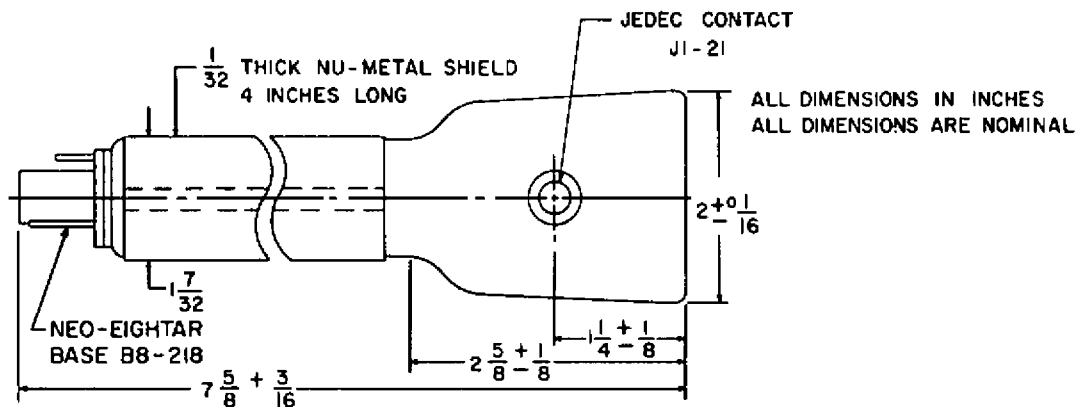
	Minimum	Typical	Typical	
Anode Voltage (A2)	1000	1500	2000	Volts
Focusing Elec. Volt. (A1)	200 to 350	300 to 525	400 to 700	Volts
G1 Voltage (Note 2)	-20 to -35	-30 to -52	-40 to -70	Volts
Deflection Factor D1-D2	51 to 69	76 to 103	102 to 118	Volts DC/in
Deflection Factor D3-D4	29 to 39	44 to 59	58 to 78	Volts DC/in

MAXIMUM CIRCUIT VALUES

Grid #1 Circuit resistance	1.5 Megohms
Resistance in any Deflecting Electrode Circuit (Note 3)	1.0 Megohms

NOTES

1. With tube shielded and deflecting electrodes connected to Anode (A2).
2. For visual extinction of undeflected focused spot.
3. The resistance in each deflecting electrode circuit should be approximately equal.



2FP2

The Rayonic Type 2FP2 is identical to the type 2FP1, except that it has a green fluorescent, green phosphorescent, long persistence phosphor.

2FP4

The Rayonic type 2FP4 is identical to the type 2FP1, except that it has a white fluorescent, medium persistence phosphor.

2FP7

The Rayonic type 2FP7 is identical to the type 2FP1, except that it has a blue fluorescent, yellow phosphorescent, long persistence phosphor.

2FP11

The Rayonic type 2FP11 is identical to the type 2FP1, except that it has a blue fluorescent short persistence phosphor.

WATERMAN PRODUCTS CO., INC.

Phone: GARfield 6-8600 Philadelphia 25, Penna., USA Cable Address, Poketscope, Phila.

Manufacturers of **POCKETSCOPE®**, **CRAFTSCOPE®**, **PULSESCOPE®**, **PANELSCOPE®**,
PANELPACK®, **RAKSCOPE®**, **SYSTEMAT®**, **RAYONIC® TUBES**



WATERMAN PRODUCTS COMPANY

INCORPORATED

2445-63 EMERALD STREET
PHILADELPHIA 25, PA., U. S. A.



3AHPI,2,7,11

CATHODE RAY TUBE-RECTANGULAR

ELECTRICAL DATA

Focusing Method	electrostatic
Deflection Method	electrostatic
Direct Interelectrode Capacitances	
Cathode to all other electrodes	4.0 uuf
Grid #1 to all other electrodes	11.0 uuf
D1 to D2	4.0 uuf
D3 to D4	4.0 uuf
D1 to all other electrodes except D2	15.0 uuf
D2 to all other electrodes except D1	11.0 uuf
D3 to all other electrodes except D4	10.0 uuf
D4 to all other electrodes except D3	11.0 uuf

OPTICAL DATA

Phosphor Number	P ₁	P ₂	P ₇	P ₁₁
Fluorescent Color	Green	Green	Blue	Blue
Phosphorescent Color		Green	Yellow	
Persistence	Medium	Long	Long	Short

MECHANICAL DATA

Overall Length	9.12	±.25	inches
Greatest Dimensions of Bulb			
Diagonal	3.34	±.0312	inches
Width	3	±.047	inches
Height	1.469	± 047	inches
Minimum Useful Screen Diameter			
Diagonal	3.15		inches
Width	2.75		inches
Height	1.125		inches
Base	BI2-43		
Basing	12E		
Base Alignment			
Vertical trace aligns with pin #1 and tube axis.	0±10	degrees	
Positive voltage on D1 deflects beam approximately towards pin #4.			
Positive voltage on D3 deflects beam approximately towards pin #1.			
Angle between D3D4 and D1D2 traces	90±1	degrees	

from JETEC release #1924, May 13, 1957

WATERMAN PRODUCTS CO., INC.

RATINGS (Design Center Value)

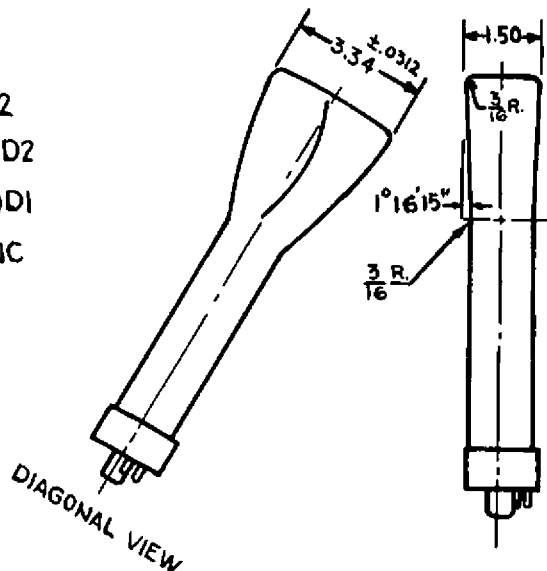
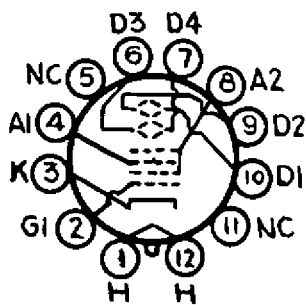
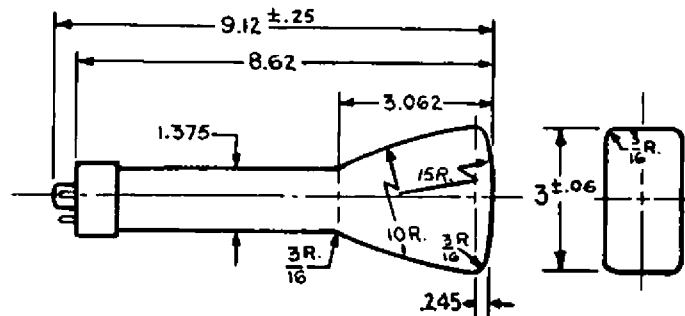
Heater Voltage	6.3	volts
Heater Current at 6.3 volts	$.6 \pm 10\%$	amperes
Anode Voltage	2750	max volts DC
Anode Input	6	max watts
Anode #1 (Focusing Electrode Voltage)...	1100	max volts DC
Grid #1 Voltage		
Negative-bias value	200	max volts DC
Positive-bias value	0	max volts DC
Positive-peak value	2	max volts
Peak-Heater-Cathode Voltage		
Heater negative with respect to cathode		
During warmup period not to		
exceed 15 seconds	410	max volts
After equipment warmup period	125	max volts
Heater positive with respect to		
cathode	125	max volts
Peak Voltage between Anode and		
any Deflection Electrode	550	max volts

TYPICAL OPERATING CONDITIONS

Anode #2 Voltage	1000	2000	volts
Anode #1 Voltage	165 to 310	330 to 620	volts
Grid #1 Voltage (Note 1)	-29 to -67.5	-58 to -135	volts
Deflection Factors			
D1 and D2	73 to 99	146 to 198	volts DC/in
D3 and D4	26 to 35	52 to 70	volts DC/in
Focusing Electrode Current			
for any operating condition	-15 to ± 10		microamp
Spot Position (undeflected) (note 2)		12	millimeters

NOTES

- 1- Visual extinction of undeflected focused spot.
- 2- Connect free deflecting electrodes to anode.



ALL DIMENSIONS ARE NOMINAL



ENGINEERING DATA

RAYONIC
3MP1
3MP2
3MP7
3MP11

RAYONIC® 3MP1 CATHODE RAY TUBE

GENERAL DATA

Focusing Method	Electrostatic
Deflecting Method	Electrostatic
Phosphor Number	P1
Fluorescent Color	Green
Phosphorescent Color	None
Persistence	Medium
Mounting Position	Any

ELECTRICAL DATA

Heater Voltage	6.3 Volts
Heater Current	$0.6 \pm 10\%$ Amperes
Direct Interelectrode Capacitances (approx.)	
Cathode to all other electrodes	$7.5 \mu\text{f}$
Grid #1 to all other electrodes	$8.0 \mu\text{f}$
D1 to D2	$4.6 \mu\text{f}$
D3 to D4	$5.6 \mu\text{f}$
D1 to all other electrodes	$6.4 \mu\text{f}$
D2 to all other electrodes	$6.0 \mu\text{f}$
D3 to all other electrodes	$8.0 \mu\text{f}$
D4 to all other electrodes	$7.4 \mu\text{f}$

MECHANICAL DATA

Overall Length	$8 \pm \frac{1}{4}$ Inches
Greatest Diameter of Bulb	$3 \pm \frac{1}{16}$ Inches
Minimum Useful Screen Diameter	$2\frac{3}{4}$ Inches
Bulb Number	ASA J24P
Base-Small Shell Duodecal	JETEC B12-43
Basing	JETEC 12F
Base Alignment	
D1D2 trace aligns with pin #4 and tube axis 0 ± 10 Degrees	
Positive voltage on D1 deflects beam approximately toward pin #4	
Positive voltage on D3 deflects beam approximately toward pin #1	
Angle between D3D4 and D1D2 traces; 90 ± 1 Degrees	

Deflection Plates

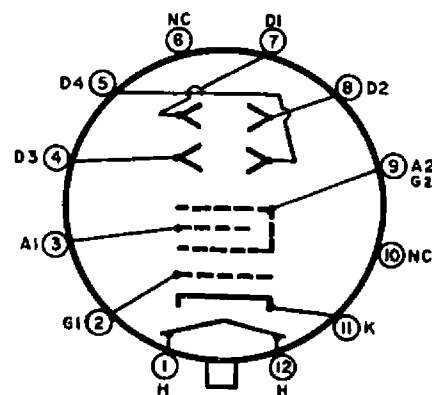
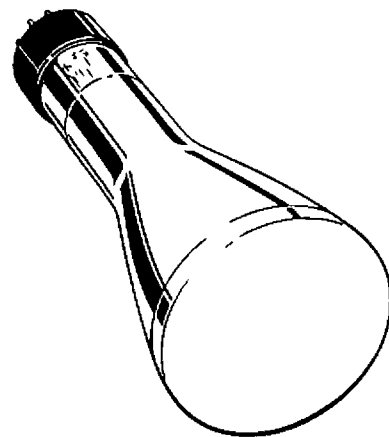
- D1-D2 are nearest to the screen
- D3-D4 are nearest to the base

MAXIMUM RATINGS (Design Center Values)

Anode Voltage (A2)	2750 Volts DC
Anode (A2) Input	6 Watts
Anode #1 (Focusing Electrode) Voltage	1000 Volts
Grid #1 (G1) Voltage	
Negative-Bias Value	200 Volts DC
Positive-Bias Value	0 Volts DC
Positive-Peak Value	2 Volts
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode	
during warm-up (max. 15 seconds)	410 Volts
after equipment warm-up	125 Volts
Heater positive with respect to cathode	125 Volts
Peak Voltage between Anode #2 and any deflecting plate	500 Volts

QUICK REFERENCE DATA

OSCILLOSCOPE TUBE
FACE—3" ROUND
DEFLECTION SENSITIVITY—MODERATE
LENGTH—SHORT
MONOACCELERATOR
FACE PLATE—CLEAR, SPHERICAL
DEFLECTION—ELECTROSTATIC
FOCUSING—ELECTROSTATIC



12F

3MP1

TUBE RATINGS

Focusing Electrode (A1) Current for any operating condition -15 to +10 μ Amps
 Spot Position (Undelected) (Note 1) 15 Max. mm
 A1 Voltage 12% to 30% of A2 Voltage
 G1 Voltage 2.7% to 6.3% of A2 Voltage (Note 2)
 Deflection Factors
 D1 and D2 115 to 145 Volts DC/inch/A2 Kilovolt
 D3 and D4 110 to 140 Volts DC/inch/A2 Kilovolt

OPERATING CONDITIONS

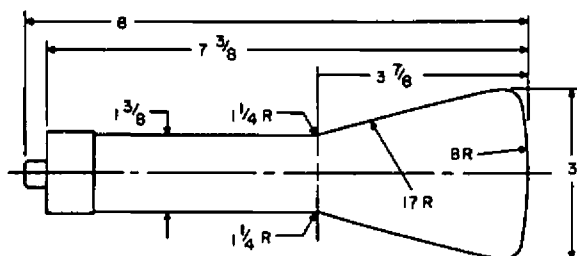
	Minimum	Typical	Typical	
Anode Voltage (A2)	500	1000	2000	Volts
Focusing Electrode Voltage (A1)	60 to 150	120 to 300	240 to 600	Volts
Grid #1 Voltage (Note 2)	-13.5 to -31.5	-27 to -63	-54 to -126	Volts
Deflection Factor D1-D2	57.5 to 72.5	115 to 145	230 to 290	Volts DC/Inch
Deflection Factor D3-D4	55 to 70	110 to 140	220 to 280	Volts DC/Inch

MAXIMUM CIRCUIT VALUES

Grid #1 Circuit Resistance 1.5 Megohms
 Resistance in any Deflecting Electrode Circuit (Note 3) 1.0 Megohms

NOTES

1. With deflecting electrodes connected to Anode (A2).
2. For visual extinction of undeflected focused spot.
3. The resistance in each deflecting electrode circuit should be approximately equal.



ALL DIMENSIONS IN INCHES
 ALL DIMENSIONS ARE NOMINAL

3MP2

The Waterman Rayonic Type 3MP2 is identical to the Type 3MP1 except that it has a green fluorescent, green phosphorescent, long persistence phosphor.

3MP7

The Waterman Rayonic Type 3MP7 is identical to the Type 3MP1 except that it has a blue fluorescent, yellow phosphorescent, long persistence phosphor. Use of 3MP7 at anode voltages below 1000 volts is not recommended.

3MP11

The Waterman Rayonic Type 3MP11 is identical to the Type 3MP1 except that it has a blue fluorescent, short persistence phosphor.



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PANELPACK®, RAKSCOPE®, SYSTEMAT®, RAYONIC® TUBES



ENGINEERING DATA

RAYONIC
3SP1
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RAYONIC® 3SP1 CATHODE RAY TUBE

GENERAL DATA

Focusing Method Electrostatic
Deflecting Method Electrostatic
Phosphor Number P1
Fluorescent Color Green
Phosphorescent Color None
Persistence Medium
Mounting Position Any

ELECTRICAL DATA

Heater Voltage 6.3 Volts
Heater Current $0.6 \pm 10\%$ Amperes
Direct Interelectrode Capacitances (approx.)
Cathode to all other electrodes $5.6 \mu\text{pf}$
Grid #1 to all other electrodes $8.3 \mu\text{pf}$
D1 to D2 $7.2 \mu\text{pf}$
D3 to D4 $5.7 \mu\text{pf}$
D1 to all other electrodes $9.3 \mu\text{pf}$
D2 to all other electrodes $8.2 \mu\text{pf}$
D3 to all other electrodes $7.3 \mu\text{pf}$
D4 to all other electrodes $7.8 \mu\text{pf}$

MECHANICAL DATA

Overall Length $9\frac{1}{8} \pm \frac{1}{4}$ Inches

Bulb Dimensions	Greatest Dim.	Min. Useful Screen	
Diagonal	$3\frac{1}{32} \pm \frac{1}{32}$	3	Inches
Width	$3 \pm \frac{3}{64}$	$2\frac{3}{4}$	Inches
Height	$1\frac{15}{32} \pm \frac{3}{64}$	$1\frac{1}{8}$	Inches

Bulb Number ASA J25 $\frac{3}{4}$ G12

Base-Small Shell Duodecal JETEC B12-43

Basing JETEC 12E

Base Alignment

D1D2 trace aligns with keyway and tube axis 0 ± 10 Degrees
Positive voltage on D1 deflects beam approximately toward keyway
Positive voltage on D3 deflects beam approximately toward pin #4
Angle between D3D4 and D1D2 traces; 90 ± 1 Degrees

Trace Alignment

Angle between trace and bulb wall $\pm 1\frac{1}{2}$ Degrees

Deflection Plates

D1-D2 are nearest to the screen ($3''$ Dimension)
D3-D4 are nearest to the base ($1\frac{15}{32}''$ Dimension)

MAXIMUM RATINGS (Design Center Values)

Anode Voltage (A2) 2750 Volts DC

Anode (A2) Input 6 Watts

Anode #1 (Focusing Electrode) Voltage 1100 Volts

Grid #1 (G1) Voltage

Negative-Bias Value 200 Volts DC

Positive-Bias Value 0 Volts DC

Positive-Peak Value 2 Volts

Peak Heater-Cathode Voltage

Heater negative with respect to cathode
during warm-up (max. 15 seconds) 410 Volts

after equipment warm-up 125 Volts

Heater positive with respect to cathode 125 Volts

Peak Voltage between Anode #2 and any deflecting plate 550 Volts

QUICK REFERENCE DATA

OSCILLOSCOPE TUBE

FACE— $1\frac{1}{2}'' \times 3''$

DEFLECTION SENSITIVITY—GOOD

LENGTH—SHORT

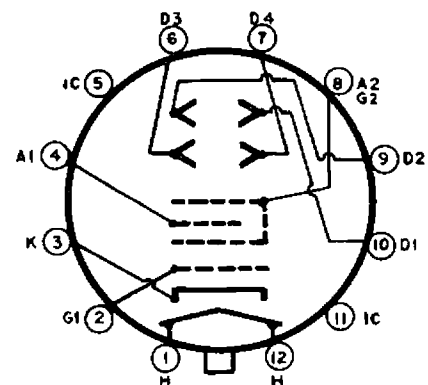
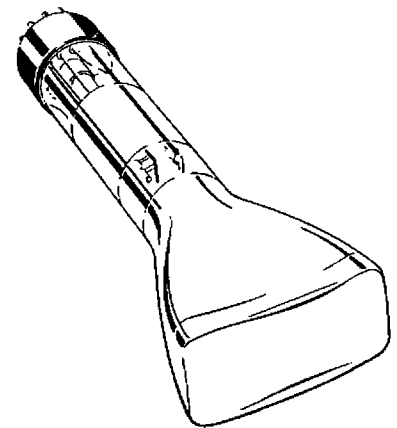
MONOACCELERATOR

FACE PLATE—CLEAR, CYLINDRICAL

FOCUSING—ELECTROSTATIC

DEFLECTION—ELECTROSTATIC

JAN APPROVED



12E

3SP1

TUBE RATINGS

Focusing Electrode (A1) Current for any operating condition -15 to +10 μ Amps
 Spot Position (undeflected) (NOTE 1) 12 Max. mm
 Useful Scan
 D1D2 2 $\frac{3}{4}$ Inches
 D3D4 1 $\frac{1}{8}$ Inches
 A1 Voltage 16.5% to 31% of A2 Voltage
 G1 Voltage 2.8% to 6.7% of A2 Voltage (NOTE 2)
 Deflection Factors
 D1 and D2 (3" Dimension) 73 to 99 Volts DC/inch/A2 Kilovolt
 D3 and D4 (1 $\frac{1}{32}$ " Dimension) 52 to 70 Volts DC/inch/A2 Kilovolt

OPERATING CONDITIONS

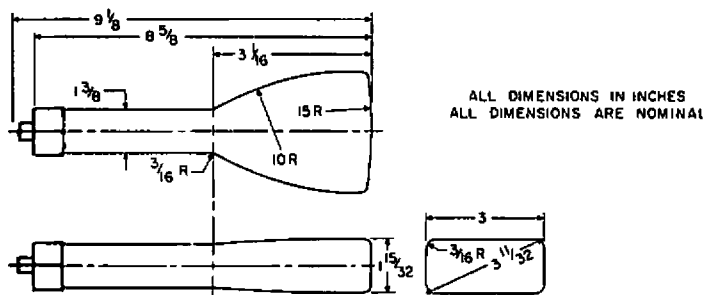
	Minimum	Typical	Typical	
Anode Voltage (A2)	500	1000	2000	Volts
Focusing Electrode Voltage (A1)	82.5 to 155	165 to 310	330 to 620	Volts
Grid #1 Voltage (Note 2)	-14.5 to -33.75	-29 to -67.5	-58 to -135	Volts
Deflection Factor D1-D2	36.5 to 49.5	73 to 99	146 to 198	Volts DC/Inch
Deflection Factor D3-D4	26 to 35	52 to 70	104 to 140	Volts DC/Inch

MAXIMUM CIRCUIT VALUES

Grid #1 Circuit Resistance 1.5 Megohms
 Resistance in any Deflecting Electrode Circuit (Note 3) 1.0 Megohms

NOTES

1. With deflecting electrodes connected to Anode (A2).
2. For visual extinction of undeflected focused spot.
3. The resistance in each deflecting electrode circuit should be approximately equal.



3SP2

The Waterman Rayonic Type 3SP2 is identical to the Type 3SP1 except that it has a green fluorescent, green phosphorescent, long persistence phosphor.

3SP7

The Waterman Rayonic Type 3SP7 is identical to the Type 3SP1 except that it has a blue fluorescent, yellow phosphorescent, long persistence phosphor. Use of 3SP7 at anode voltage below 1000 volts is not recommended.

3SP11

The Waterman Rayonic Type 3SP11 is identical to the Type 3SP1 except that it has a blue fluorescent, short persistence phosphor.

WATERMAN PRODUCTS CO., INC.

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PANELPACK®, RAKSCOPE®, SYSTEMAT®, RAYONIC® TUBES





ENGINEERING DATA

RAYONIC
3XP1
3XP2
3XP7
3XP11

RAYONIC® 3XP1 CATHODE RAY TUBE

GENERAL DATA

Focusing Method Electrostatic
Deflecting Method Electrostatic
Phosphor Number P1
Fluorescent Color Green
Phosphorescent Color None
Persistence Medium
Mounting Position Any

ELECTRICAL DATA

Heater Voltage 6.3 Volts
Heater Current $0.6 \pm 10\%$ Amperes
Direct Interelectrode Capacitances (approx.)
Cathode to all other electrodes $5.2 \mu\mu\text{f}$
Grid #1 to all other electrodes $5.7 \mu\mu\text{f}$
D1 to D2 $6.9 \mu\mu\text{f}$
D3 to D4 $5.4 \mu\mu\text{f}$
D1 to all other electrodes $7.0 \mu\mu\text{f}$
D2 to all other electrodes $7.4 \mu\mu\text{f}$
D3 to all other electrodes $8.0 \mu\mu\text{f}$
D4 to all other electrodes $7.3 \mu\mu\text{f}$

MECHANICAL DATA

Overall Length $8\frac{3}{8} \pm \frac{1}{8}$ Inches

Bulb Dimensions	Greatest Dim.	Min. Useful Screen	
Diagonal	$3\frac{1}{32} \pm \frac{1}{32}$	3	Inches
Width	$3 \pm \frac{3}{64}$	$2\frac{3}{4}$	Inches
Height	$1\frac{1}{32} \pm \frac{3}{64}$	$1\frac{1}{8}$	Inches

Base-Loctal JETEC D8-1

Basing See basing diagram

Base Alignment

- D1D2 trace aligns with pin #3 and tube axis 0 ± 10 Degrees
- Positive voltage on D1 deflects beam approximately toward pin #3
- Positive voltage on D3 deflects beam approximately toward pin #5
- Angle between D3D4 and D1D2 traces; 90 ± 1 Degrees

Trace Alignment

- Angle between trace and bulb wall $\pm 1\frac{1}{2}$ Degrees

Deflection Plates

- D1-D2 are nearest to the screen ($3''$ Dimension)
- D3-D4 are nearest to the base ($1\frac{1}{32}''$ Dimension)

MAXIMUM RATINGS (Design Center Values)

Anode Voltage (A2) 2750 Volts DC
Anode (A2) Input 6 Watts
Anode #1 (Focusing Electrode) Voltage 1100 Volts
Grid #1 (G1) Voltage
Negative-Bias Value 125 Volts DC
Positive-Bias Value 0 Volts DC
Positive-Peak Value 2 Volts
Peak voltage between Anode #2 and any deflecting plate 550 Volts

QUICK REFERENCE DATA

OSCILLOSCOPE TUBE

FACE— $1\frac{1}{2}'' \times 3''$

DEFLECTION SENSITIVITY—HIGH

LENGTH—SHORT

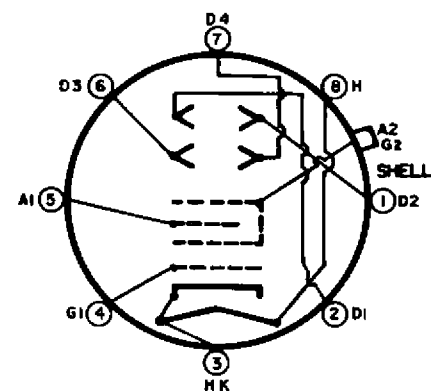
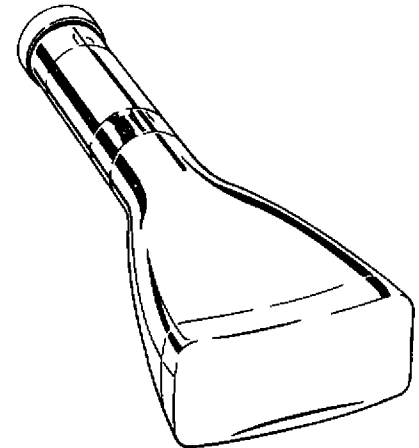
MONOACCELERATOR

FACE PLATE—CLEAR, CYLINDRICAL

DEFLECTION—ELECTROSTATIC

FOCUSING—ELECTROSTATIC

JAN APPROVED



TUBE RATINGS

Focusing Electrode (A1) current for any operating condition - 15 to +10 μ Amps
 Spot Position, Undelected (Note 1) 7.0 Max. mm
 Useful Scan
 D1D2 2 $\frac{3}{4}$ Inches
 D3D4 1 $\frac{1}{8}$ Inches
 A1 Voltage 20% to 35% of A2 Voltage
 G1 Voltage 3.375 max% of A2 Voltage (Note 2)
 Deflection factors
 D1 and D2 (3" Dimension) 34 to 46 Volts DC/inch/A2 Kilovolts
 D3 and D4 (1 $\frac{1}{32}$ " Dimension) 14 to 19 Volts DC/inch/A2 Kilovolts

OPERATING CONDITIONS

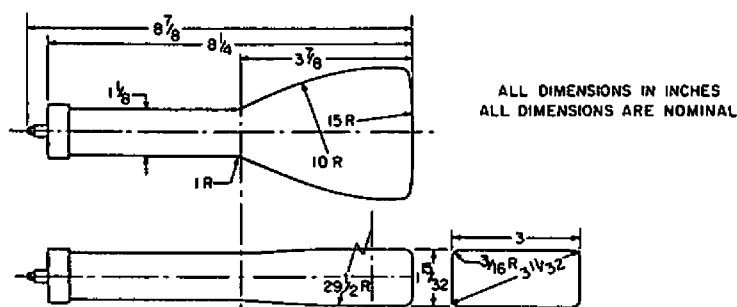
	Minimum	Typical	Typical	
Anode Voltage (A2)	1000	1500	2000	Volts
Focusing Electrode Voltage (A1)	200 to 350	300 to 525	400 to 700	Volts
Grid #1 Voltage (Note 2)	- 34 max.	- 51 max.	- 67.5 max.	Volts
Deflection Factor D1-D2	34 to 46	51 to 69	68 to 92	Volts DC/Inch
Deflection Factor D3-D4	14 to 19	21 to 28.5	28 to 38	Volts DC/Inch

MAXIMUM CIRCUIT VALUES

Grid #1 Circuit Resistance 1.5 Megohms
 Resistance in any Deflecting Electrode Circuit (Note 3) 1.0 Megohms

NOTES

1. With deflecting electrodes connected to Anode (A2).
2. For visual extinction of undeflected focused spot.
3. The resistance in each deflecting electrode circuit should be approximately equal.



3XP2

The Waterman Rayonic Type 3XP2 is identical to the type 3XP1 except that it has a green fluorescent, green phosphorescent, long persistence phosphor.

3XP7

The Waterman Rayonic Type 3XP7 is identical to the Type 3XP1 except that it has a blue fluorescent, yellow phosphorescent, long persistence phosphor.

3XP11

The Waterman Rayonic Type 3XP11 is identical to the Type 3XP1 except that it has a blue fluorescent, short persistence phosphor.

WATERMAN PRODUCTS CO., INC.

Phone: GARfield 6-8600 Philadelphia 25, Penna., USA Cable Address, Poketscope, Phila.

Manufacturers of POCKETSCOPE®, CRAFTSCOPE®, PULSESCOPE®, PANELSCOPE®,
PANELPACK®, RAKSCOPE®, SYSTEMAT®, RAYONIC® TUBES





TENTATIVE
ENGINEERING DATA

RAYONIC

3YP1
3YP2
3YP7
3YP11

RAYONIC 3YP1 CATHODE RAY TUBE

GENERAL DATA

Focusing Method Electrostatic
Deflecting Method Electrostatic
Phosphor Number P1
Fluorescent Color Green
Phosphorescent Color None
Persistence Medium
Mounting Position Any

ELECTRICAL DATA

Heater Voltage 6.3 Volts
Heater Current $0.6 \pm 10\%$ Amperes
Direct Interelectrode Capacitances (approx.)
Cathode to all other electrodes 5.2 uuf
Grid #1 to all other electrodes 5.9 uuf
D1 to D2 4.6 uuf
D3 to D4 5.0 uuf
D1 to all other electrodes 7.0 uuf
D2 to all other electrodes 6.4 uuf
D3 to all other electrodes 6.8 uuf
D4 to all other electrodes 6.4 uuf

MECHANICAL DATA

Overall Length $7.0 \pm 1/8$ Inches

Bulb Dimensions	Greatest Dim.	Min. Useful Screen	
Diagonal	$3\frac{11}{32} \pm \frac{1}{32}$	3	Inches
Width	$3 \pm \frac{3}{64}$	$2\frac{3}{4}$	Inches
Height	$1\frac{15}{32} \pm \frac{3}{64}$	$1\frac{1}{8}$	Inches

Base-Loctal JETEC D8-1
Basing See basing diagram
Base Alignment

D1D2 trace aligns with pin #1 and tube axis 0 ± 10 Degrees
Positive volts on D1 deflects beam approx. toward pin #5
Positive volts on D3 deflects beam approx. toward pin #3
Angle between D3D4 and D1D2 traces 90 ± 1 Degrees

Trace Alignment

Angle between trace and bulb wall $\pm 1\frac{1}{2}$ Degrees

Deflection Plates

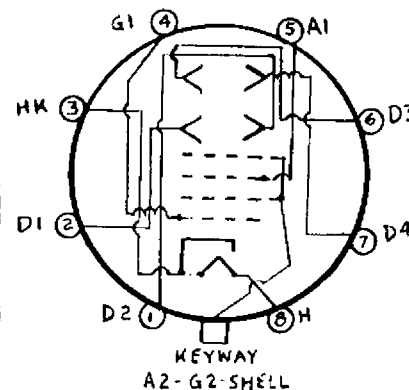
D1-D2 are nearest to the base
D3-D4 are nearest to the screen

MAXIMUM RATINGS (Design Center Values)

Anode Voltage (A2) 2750 Volts DC
Anode (A2) Input 6 Watts
Anode #1 (Focusing Electrode) Voltage 1100 Volts
Grid #1 (G1) Voltage
Negative-Bias Value 125 Volts DC
Positive-Bias Value 0 Volts DC
Positive-Peak Value 2 Volts DC
Peak volts between Anode #2 and any deflecting plate 550 Volts

QUICK REFERENCE DATA

OSCILLOSCOPE TUBE
FACE— $1\frac{1}{2}'' \times 3''$
DEFLECTION SENSITIVITY—GOOD
LENGTH—SHORT
MONOACCELERATOR
FACE PLATE—CLEAR, CYLINDRICAL
FOCUSING—ELECTROSTATIC
DEFLECTION—ELECTROSTATIC



3YP

TUBE RATINGS

Focusing Electrode (A1) current for any

operating condition -50 to +10 uAmps
 Spot Position, Undelected 10.0 Max. mm
 Useful Scan

D1D2 2 3/4 Inches

D3D4 1 1/8 Inches

A1 Voltage 18.5% to 34% of A2 Voltage

G1 Voltage 2.8% to 6.7% of A2 Voltage (NOTE 2)

Deflection factors

D1 and D2 (3" Dimension) 68 to 92 Volts DC/inch/A2 Kilovolts

D3 and D4 (1 15/32" Dimension) 44 to 60 Volts DC/inch/A2 Kilovolts

OPERATING CONDITIONS

	Minimum	Typical	Typical	
Anode Voltage (A2)	500	1000	2000	Volts
Focusing Electrode Voltage (A1)	92.5 to 170	185 to 340	370 to 680	Volts
Grid #1 Voltage (Note 2)	-14 to -33.5	-28 to -67	-56 to -134	Volts
Deflection Factor D1-D2	34 to 46	68 to 92	136 to 184	Volts DC/Inch
Deflection Factor D3-D4	22 to 30	44 to 60	88 to 120	Volts DC/Inch

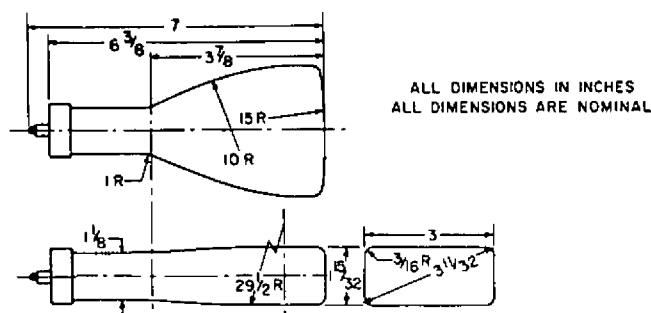
MAXIMUM CIRCUIT VALUES

Grid #1 Circuit Resistance 1.5 Megohms

Resistance in any Deflecting Electrode Circuit (Note 3) 1.0 Megohms

NOTES

1. With deflecting electrodes connected to Anode (A2).
2. For visual extinction of undeflected focused spot.
3. The resistance in each deflecting electrode circuit should be approximately equal.



3YP2

The Waterman Rayonic Type 3YP2 is identical to the Type 3YP1 except that it has a green fluorescent, green phosphorescent, long persistence phosphor.

3YP7

The Waterman Rayonic Type 3YP7 is identical to the Type 3YP1 except that it has a blue fluorescent, yellow phosphorescent, long persistence phosphor. Use of 3YP7 at anode voltages below 1000 volts is not recommended.

3YP11

The Waterman Rayonic Type 3YP11 is identical to the Type 3YP1 except that it has a blue fluorescent, short persistence phosphor.

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ENGINEERING DATA

RAYONIC
5DEP1
5DEP2
5DEP7
5DEP11

RAYONIC® 5DEP1 CATHODE RAY TUBE

GENERAL DATA

Focusing Method	Electrostatic
Deflecting Method	Electrostatic
Phosphor	P1
Fluorescent Color	Green
Phosphorescent Color	None
Persistence	Medium
Mounting Position	Any

ELECTRICAL DATA

Heater Voltage	6.3 Volts
Heater Current	$0.6 \pm 10\%$ Amperes
Direct Interelectrode Capacitances (approx.)	
Grid #1 to all other electrodes	7.5 μf
D1 to D2	5.2 μf
D3 to D4	7.0 μf
D1 to all other electrodes	10.1 μf
D2 to all other electrodes	7.5 μf
D3 to all other electrodes	8.1 μf
D4 to all other electrodes	9.2 μf

MECHANICAL DATA

Overall Length	$14\frac{3}{4} \pm \frac{3}{8}$
Greatest Bulb Diameter	$5\frac{1}{4} \pm \frac{3}{32}$
Minimum Useful Screen Diameter	$4\frac{1}{2}$
Bulb Number	ASA J42J1
Base-Small Shell Duodecal	JEDEC B12-43
Basing	JEDEC 12E
Base Alignment	
D1 D2 trace aligns with Pin #4 and tube axis; 10 Degrees	
Positive voltage on D1 deflects beam approx. toward Pin #4	
Positive voltage on D3 deflects beam approx. toward Pin #1	
Angle between D3 D4 and D1 D2 traces; 90 ± 1 Degrees	
Deflection Plates	
D2 D2 are nearer to the screen	
D3 D4 are nearer to the base	

MAXIMUM RATINGS (Design Center Value)

Anode Voltage (A2)	2750 Volts DC
Anode (A2) Input	6 Watts
Anode #1 (Focusing Electrode) Voltage	1100 Volts
Grid #1 (G1) Voltage	
Negative Bias Value	220 Volts DC
Positive Bias Value	0 Volts DC
Positive Peak Value	2 Volts
Peak Heater—Cathode Voltage	
Heater negative with respect to cathode	
during warm-up (max. 15 seconds)	410 Volts
after equipment warm-up	140 Volts
Heater positive with respect to cathode	
.....	
Peak Voltage between Anode #2 and any deflecting plate	550 Volts

QUICK REFERENCE DATA

OSCILLOSCOPE TUBE

FACE—5" ROUND

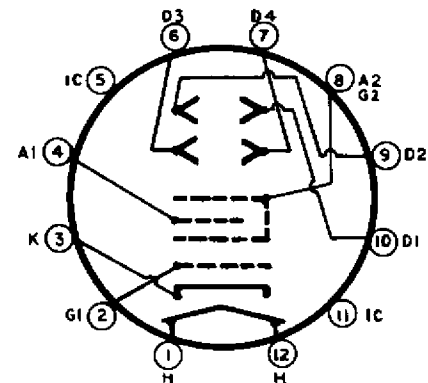
DEFLECTION SENSITIVITY—HIGH

FACE PLATE—CLEAR, CYLINDRICAL

MONOACCELERATOR

DEFLECTION—ELECTROSTATIC

FOCUSING—ELECTROSTATIC



12 E

TUBE RATINGS

Focusing Electrode (A1) Current for any operating condition	-15 to $\pm 10 \mu$ Amps
Spot position, undeflected (Note 1)	10 Max. mm
A1 Voltage	17% to 32% of A2 Voltage
G1 Voltage	4.5% of A2 Voltage (Note 2)
Deflection Factors	
D1 and D2	24 to 32 Volts DC/inch/A2 Kilovolts
D3 and D4	13.5 to 18.5 Volts DC/inch/A2 Kilovolts

OPERATING CONDITIONS

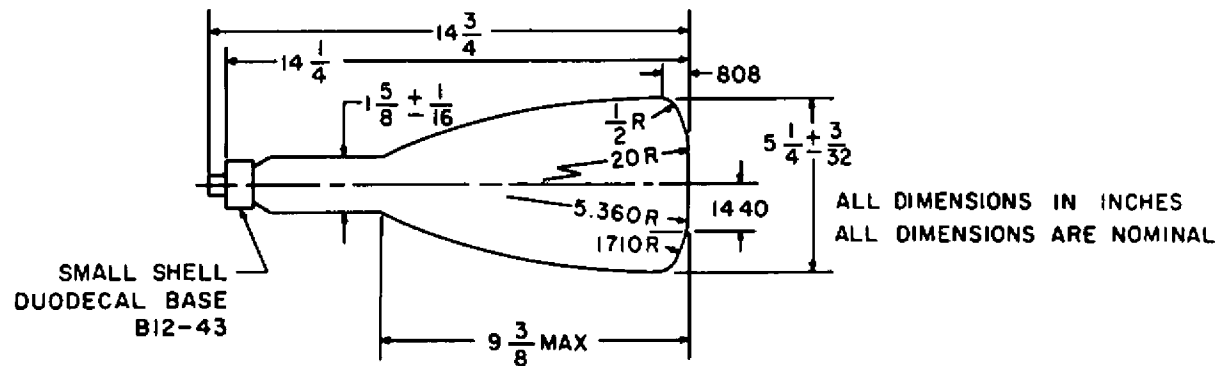
	Minimum	Typical	Typical	
Anode Voltage (A2)	1000	1500	2000	Volts
Focusing Electrode Voltage (A1)	170-320	260-480	340-640	Volts
Grid #1 Voltage (Note 2)	-45	-67.5	-90	Volts
Deflection Factor D1-D2	24-32	36-48	48-64	Volts DC/in
Deflection Factor D3-D4	13.5-18.5	21-28	27-37	Volts DC/in

MAXIMUM CIRCUIT VALUES

Grid #1 Circuit Resistance	1.5 Megohms
Resistance in any Deflecting Electrode Circuit (Note 3)	5 Megohms

NOTES

1. With Deflecting Electrodes connected to Anode (A2).
2. For visual extinction of undeflected focused spot.
3. The resistance in each deflecting electrode circuit should be approximately equal.



5DEP2

The Waterman Rayonic Type 5DEP2 is identical to the Type 5DEP1 except that it has a green fluorescent, green phosphorescent, long persistence phosphor.

5DEP7

The Waterman Rayonic Type 5DEP7 is identical to the Type 5DEP1 except that it has a blue fluorescent, yellow phosphorescent, long persistence phosphor.

5DEP11

The Waterman Rayonic Type 5DEP11 is identical to the Type 5DEP1 except that it has a blue fluorescent, short persistence phosphor.

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