OK 20/1-'80 Sichman

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REFERENCE DATA

Accelerator voltage	$V_{q2, q4, q5(l)}$	1000 V
Display area	5-73-75-77	60 x 36 mm ²
Deflection coefficient		
horizontal	M×	12,5 V/cm
vertical	Mv	20 V/cm

SCREEN

		colour	persistence			
	D7-220GH	green	medium short			
Useful screen dimensions				\geq	60 x 36	mm
Useful scan horizontal vertical				\mathbb{N}	60 36	mm mm
Spot eccentricity in horizontal and vertical directions				<	5	mm
HEATING						
Indirect by a.c. or d.c.; parallel	supply					
Heater voltage				Vf	6,3	V
Heater current				If	300	mA
MECHANICAL DATA						
Mounting position: any						
The tube should not be suppor allowed to support the tube.	ted by the base a	alone and u	nder no circumstan	ces sho	ould the sc	ocket be

Mullard

Net mass Base approx. 350 g

12-pin all glass; JEDEC B12-246



Dimensions and connections			
See also outline drawing			
Overall length	\leqslant	225 mm	
Face dimensions	\leq	72,5 x 49 mm	
Accessories			
Socket, supplied with tube	type 5	55589	
Mu-metal shield	type 5	55535	
FOCUSING	electr	ostatic	
DEFLECTION	doubl	e electrostatic	
x-plates	symm	netrical	
y-plates	symm	netrical	
Angle between x and y-traces		90 ± 1º	
Angle between x-trace and horizontal axis of the face	≤ 30	*	

If use is made of the full deflection capabilities of the tube the deflection plates will block part of the electron beam, hence a low impedance deflection plate drive is desirable.

--- CAPACITANCES

x_1 to all other elements except x_2	C _{x1(x2)}	4,0 pF
x_2 to all other elements except x_1	$C_{x2(x1)}$	4,1 pF
y_1 to all other elements except y_2	Cy1(y2)	4,2 pF
y2 to all other elements except y1	Cy2(y1)	5,4 pF
x1 to x2	C _{x1x2}	1,6 pF
y1 to y2	Cy1y2	1,8 pF
Control grid to all other elements	Cg1	7,0 pF
Cathode to all other elements	Ck	5,0 pF

* The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has 1000 turns and a maximum resistance of 250 Ω . Under typical operating conditions, a maximum of 10 ampere-turns are required for the maximum rotation of 3^o. This means the required current is 10 mA maximum at a required voltage of 2,5 V maximum.

October 1979

Mullard

Instrument cathode-ray tube







- The bulge at the frit seal does not exceed the maximum dimensions.
- (2) The coil is fixed to the envelope by means of adhesive tape.
- (3) The length of the connecting leads of the rotation coil is min. 350 mm.



+1 H

y1 .

X

g

R≤ 50kΩ g₃4

g2

+50V

-50V

x and y-

plate potential

T

- Y2

X2

7273807



Mullard

October 1979

3

RIVER S

D7-220GH

NOTES

TYPICAL OPERATION						
Conditions (note 1)						
Accelerator voltage	Vg2, g4, g5(l)		1000	V		
Astigmatism control voltage	ΔV_{q2} , q4, q5(ℓ)		±50	V	(note 2)	
 Focusing electrode voltage 	V _{q3}	100	to 180	V		
Control grid voltage for visual extinction of focused spot	V _{g1}	\leqslant	-35	V		
Performance						
Useful scan						
horizontal		>	60	mm		
vertical		>	36	mm		
Deflection coefficient horizontal	M _×		12,5	V/cm		
vertical	N/L	<	13,8	V/cm		
to, tour	wy	<	22	V/cm		
Line width	1.w.		0,28	mm	(note 3)	
Deviation of linearity of deflection		<	2	*%	(note 4)	
Grid drive for 10 μ A screen current		\approx	10	V		
Geometry distortion	see note 5					
LIMITING VALUES (Absolute maximum rating sy	vstem)					
Accelerator voltage	Vg2, g4, g5(l)	max. min.	2200 900	V V		
Focusing electrode voltage	Vg3	max.	2200	V		
Control arid voltage	14	max.	200	V		

 $-V_{q1}$

Vkf

Wo

-Vkf

min.

max.

max.

max.

max.

0 V

125 V

125 V

20 V

3 mW/cm²

1. The mean x-plate potential and the mean y-plate potential should be equal to Y	/g2, g4, g5(l) (with
astigmatism control voltage set to zero).	0,0,0.	

2. When putting the tube into operation the astigmatism control voltage should be adjusted only once for optimum spot size in the centre of the screen. The control voltage will be within the stated range, provided the conditions of note 1 are adhered to.

3. Measured with the shrinking raster method in the centre of the screen under typical operating conditions, adjusted for optimum spot size at a beam current $I_{g} = 10 \ \mu A$.

As the construction of the tube does not permit a direct measurement of the beam current, this current should be determined as follows.

- a) Under typical operating conditions, apply a small raster display (no overscan), adjust V_{a1} for a beam current of approx. 10 μ A and adjust V_{g3} and V_{g2, g4, g5(ℓ) for optimum spot quality at} the centre of the screen.
- b) Under these conditions, but without raster, the deflection plate voltages should be changed to: $V_{x1} = V_{x2} = 1000 V$; $V_{y1} = 300 V$; $V_{y2} = 700 V$, thus directing the total beam current to y_2 . Measure the current on y₂ and adjust V_{a1} for $I_{v2} = 10 \ \mu$ A.
- c) Set again for the conditions under a), without touching the Val control. The screen current of the resulting raster display is now 10 μ A.

d) Focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.

4. The sensitivity at a deflection of less than 75% of the useful scan will not differ from the sensitivity at a deflection of 25% of the useful scan by more than the indicated value.

5. A graticule, consisting of concentric rectangles of 57,0 mm x 33,0 mm and 56 mm x 31,6 mm is aligned with the electrical x-axis of the tube. The edges of a raster will fall between these rectangles.

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Control grid voltage

positive

negative

Grid drive, average

Screen dissipation

Cathode to heater voltage

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REFERENCE DATA

Accelerator voltage	V _g 2, g4, g5 (ℓ) 1000	V
Display area	60 × 36	mm ²
Deflection coefficient horizontal vertical	M _x 12,5 M _y 20	V/cm V/cm

SCREEN

	colour	persistence			
D7-220GH	green	medium short			
			\geq	60 x 36 mm	
			\gg	60 mm 36 mm	
			<	5 mm	
supply					
			Vf	6,3 V	
			١ _f	300 mA	
	D7—220GH supply	colour D7—220GH green	colour persistence D7—220GH green medium short	colour persistence D7—220GH green medium short > > supply ∨f If	colourpersistenceD7-220GHgreenmedium short \geq 60×36 mm \geq 60 mm \geq 60 mm \geq 36 mm $<$ 5 mmsupplyV _f l_f 300 mA

MECHANICAL DATA

Mounting position: any

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The tube should not be supported by the base alone and under no circumstances should the socket be allowed to support the tube.

Net mass		 approx. 350 g
Base		12-pin all glass; JEDEC B12-246

Dimensions and connections				
See also outline drawing				
Overall length		\leq	225	mm
Face dimensions		\leqslant	72,5 x 49	mm
Accessories				
Socket, supplied with tube		type 555	589	
Mu-metal shield		type 555	535	
FOCUSING	•	electrost	atic	
DEFLECTION		double e	electrostatio	2
x-plates		symmet	rical	
y-plates		symmetr	rical	
Angle between x and y-traces			90 ± 1	0
Angle between x-trace and horizontal axis of the face		≼ 30 *		
If use is made of the full deflection canabilities of the tube the defle	ection nl	atos will h	lock part o	of the

If use is made of the full deflection capabilities of the tube the deflection plates will the electron beam, hence a low impedance deflection plate drive is desirable.

CAPACITANCES

.......

2

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x_1 to all other elements except x_2	C _{x1(x2)}	4,0 pF
x2 to all other elements except x1	C _{x2(x1)}	4,1 pF
y_1 to all other elements except y_2	C _{y1(y2)}	4,2 pF
y2 to all other elements except y1	C _{y2(y1)}	5,4 pF
x ₁ to x ₂	C _{x1x2}	1,6 pF
y ₁ to y ₂	Cy1y2	1,8 pF
Control grid to all other elements	C _{g1}	7,0 pF
Cathode to all other elements	C _k	5,0 pF

The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has 1000 turns and a maximum resistance of 250 Ω . Under typical operating conditions, a maximum of 10 ampere-turns are required for the maximum rotation of 3°. This means the required current is 10 mA maximum at a required voltage of 2,5 V maximum.

June 1979











- (1) The bulge at the frit seal does not exceed the maximum dimensions.
- (2) The coil is fixed to the envelope by means of adhesive tape.
- (3) The length of the connecting leads of the rotation coil is min. 350 mm.





May 1979

TYPICAL OPERATION

Conditions (note 1)					
Accelerator voltage	Vg2, g4, g5(l)		1000	V	
Astigmatism control voltage	∆Vg2, g4, g5(ℓ)		±50	V	(note 2)
Focusing electrode voltage	V _{q3}	100 t	o 180	V	
Control grid voltage for visual extinction of focused spot	V _{g1}	\langle	-35	V	
Performance					
Useful scan horizontal vertical		> >	60 36	mm mm	
Deflection coefficient					
horizontal	M _x	/	12,5	V/cm	
vertical	M	<	13,8	V/cm	
Verticul	iviy	<	22	V/cm	
Line width	I.w.		0,28	mm	(note 3)
Deviation of linearity of deflection		<	2	%	(note 4)
Grid drive for 10 μ A screen current		\approx	10	V	
Geometry distortion	see note 5				
LIMITING VALUES (Absolute maximum rating system	n)				
Accelerator voltage	Vg2, g4, g5(l)	max. min.	2200 900	V V	
Focusing electrode voltage	V _{g3}	max.	2200	V	
Control grid voltage	-V _{g1}	max. min.	200 0	V V	
Cathode to heater voltage positive negative	V _{kf} -V _{kf}	max. max.	125 125	V V	
Grid drive, average		max.	20	V	
Screen dissipation	Wl	max.	3	mW/c	m ²

4

NOTES

26 a

- 1. The mean x-plate potential and the mean y-plate potential should be equal to $V_{g2, g4, g5(l)}$ (with astigmatism control voltage set to zero).
- 2. When putting the tube into operation the astigmatism control voltage should be adjusted only once for optimum spot size in the centre of the screen. The control voltage will be within the stated range, provided the conditions of note 1 are adhered to.
- 3. Measured with the shrinking raster method in the centre of the screen under typical operating conditions, adjusted for optimum spot size at a beam current $I_{\chi} = 10 \ \mu$ A.

As the construction of the tube does not permit a direct measurement of the beam current, this current should be determined as follows.

- a) Under typical operating conditions, apply a small raster display (no overscan), adjust V_{g1} for a beam current of approx. 10 μ A and adjust V_{g3} and V_{g2, g4, g5(l)} for optimum spot quality at the centre of the screen.
- b) Under these conditions, but without raster, the deflection plate voltages should be changed to: $V_{x1} = V_{x2} = 1000 \text{ V}; V_{y1} = 300 \text{ V}; V_{y2} = 700 \text{ V}$, thus directing the total beam current to y₂. Measure the current on y₂ and adjust V_{g1} for $I_{y2} = 10 \mu \text{A}$.
- c) Set again for the conditions under a), without touching the V_{g1} control. The screen current of the resulting raster display is now 10 μ A.
- d) Focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.
- 4. The sensitivity at a deflection of less than 75% of the useful scan will not differ from the sensitivity at a deflection of 25% of the useful scan by more than the indicated value.
- 5. A graticule, consisting of concentric rectangles of 57,0 mm x 33,0 mm and 56 mm x 31,6 mm is aligned with the electrical x-axis of the tube. The edges of a raster will fall between these rectangles.

May 1979

D7-221GH

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices. This tube features a low heater power consumption.

QUICK REFERENCE DATA

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Accelerator voltage	V _{g2, g} 4, g5(l)	1000	V
Display area	5,5,5,5	60 x 36	mm²
Deflection coefficient horizontal vertical	M _× M _y	12,5 20	V/cm V/cm
The D7-221GH is equivalent to the type D7-220GH exc	ept for the following.		
HEATING			
Indirect by a.c. or d.c.; parallel supply			
Heater voltage	Vf	6,3	V
Heater current	۱ _f	95	mA
LIMITING VALUES (Absolute maximum rating system)			
Cathode to heater voltage positive negative Control grid circuit resistance	V _{kf} -V _{kf} Bal	max. 100 max. 15 max. 1	V V MΩ
CAPACITANCES	rigi	mux.	NIL D
Cathode to all other elements	C _k	3,7	pF





June 1979

1

DEVELOPMENT SAMPLE DATA

This information is derived from development samples made available for evaluation. It does not form part of our data handbook system and does not necessarily imply that the device will go into production D7-220GH



INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REF	FERENCE DATA			
Accelerator voltage	$V_{g2,g4,g5(\ell)}$		1000	V
Display area			60 x 36	mm ²
Deflection coefficient, horizontal vertical	M _x M _y	4575	12,5 13 20 21 -	V/cm V/cm

SCREEN

		colour	persistence		
	D7-220GH	green	medium short		
Useful screen dime	nsions		≥	60 x 36	mn
Useful scan, horizo	ontal		≥	60	mn
vertic	al		≥	36	mn
Spot eccentricity in and vertical direct	horizontal ctions		<	5	mn
HEATING					
Indirect by a.c. or	d.c.; parallel s	supply			
Heater voltage			Vf	6,3	V
Heater current			If	300	mA

MECHANICAL DATA

Mounting position : any

The tube should not be supported by the base alone and under no circumstances should the socket be allowed to support the tube.

Net mass		×	350	g	
Base	12-pin all	glass;	JEDEC	B12-2	24

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Blue Binder, Tab 4

May 1976

This information is derived from development samples made available for evaluation. It does not form part of our data handbook system and does not necessarily imply that the device will go into production D7-221GH

Dimensions and connections

See also outline drawing

Overall length

Face dimensions

Accessories

Socket (toppter Supplied with take) Mm - metal shireld Socket

FOCUSING

DEFLECTION .	double electrostatic
x-plates	symmetrical
y-plates	symmetrical
Angle between x and y traces	90 ± 1^{0}
Angle between x trace and horizontal axis of the face	see note 1

Angle between x trace and horizontal axis of the face

If use is made of the full deflection capabilities of the tube the deflection plates will block part of the electron beam, hence a low impedance deflection plate drive is desirable.

CAPACITANCES

x_1 to all other elements except x_2	C _{x1(x2)}	3,2 pF V
x_2 to all other elements except x_1	C _{x2(x1)}	3,4 pF 3.6
y_1 to all other elements except y_2	Cy1(y2)	4,9 pF 4,7
y_2 to all other elements except y_1	Cy2(y1)	4,7 pF 4,7
x ₁ to x ₂	C _{x1x2}	1,5 pF 🗸
y_1 to y_2	Cyly2	2,0 pF_1.8
Control grid to all other elements	C _{g1}	6,3 pF 6,6
Cathode to all other elements	Ck	4,7 pF 5

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices. This tube features a low heater power consumption.

QUICK REFERE	ENCE DATA	
Accelerator voltage	$V_{g2, g4, g5(\ell)}$ 1000	V
Display area	60 x 36	mm^2
Deflection coefficient, horizontal vertical	$\begin{array}{ccc} M_{\rm X} & 12.5 \\ M_{\rm y} & 20 \end{array} \begin{array}{c} 13 \\ 21 \end{array}$	V/cm V/cm

The D7-212GH is equivalent to the type D7-221GH except for the following:

Γab	The D7-212GH is equivalent to the type D7-221GH exc	cept for the	e following	g:	
r. '	HEATING				
inde	Indirect by a.c. or d.c.; parallel supply				
le B	Heater voltage	Vf		6,3	V
Bl	Heater current	I_{f}		95	mA
	LIMITING VALUES (Absolute max. rating system)				
	Cathode to heater voltage, positive negative	V _{kf} -V _{kf}	max. max.	100 15	V V

3 pF

1

1) The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has a resistance of 260 Ω , and the maximum current required is 10 mA.

PHILIPS	May 1976	May 1976	PHILIPS
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225 mm

72,5 x 49 mm

2412 500 00002

55535

electrostatic

 \leq



TYPICAL OPERATION				
Conditions ²)				
Accelerator voltage	$V_{g2,g4,g5(l)}$	1000) V	
Astigmatism control voltage	$\Delta V_{g2,g4,g5(\ell)}$	± 50) V ³)	
Focusing electrode voltage	V _{g3}	90 to 170) V	
Control grid voltage for visual extinction of focused spot	V _{g1}	≤ −35	5 V	
Performance				
Useful scan, horizontal vertical		> 60 > 36	mm mm	
Deflection coefficient, horizontal vertical	M _x M _v	≈ 12, √- 13 ≈ 20 21	V/cm <13.8 V/cm <22	
Line width	1. w.	0,20 0,3	mm ⁴)	
Deviation of linearity of deflection		< 2	% ⁵)	
Grid drive for 10 µA screen current		≈ 10) V	
Geometry distortion		see note 6		
LIMITING VALUES (Absolute max. rat	ing system)			
Accelerator voltage	$v_{g2,g4,g5(\ell)}$	max. 2200 min. 900) V) V	
Focusing electrode voltage	Vg3	max. 2200) V	
Control grid voltage	-V _{g1}	max. 200 min. 0) V) V	
Cathode to heater voltage	V _{kf} -V _{kf}	max. 125 max. 125	V V	
Grid drive, average		max. 20	V	
Screen dissipation	Wl	max. 3	mW/cm ²	0
	Rai	max	1MS2	

NOTES

- 3) When putting the tube into operation the astigmatism control voltage should be adjusted only once for optimum spot size in the centre of the screen. The control voltage will be within the stated range, provided the conditions of note 2 are adhered to.
- ⁴) Measured with the shrinking raster method in the centre of the screen under typical operating conditions, adjusted for optimum spot size at a beam current I_q = 10 μ A.

As the construction of the tube does not permit a direct measurement of the beam current, this current should be determined as follows:

- a) under typical operating conditions, apply a small raster display (no overscan), adjust V_{g1} for a beam current of approx. 10 μ A and adjust V_{g3} and $V_{g2,g4,g5(\ell)}$ for optimum spot quality at the centre of the screen.
- b) under these conditions, but without raster, the deflection plate voltages should be changed to: $V_{x1} = V_{x2} = 1000 V$; $V_{y1} = 550 V$; $V_{y2} = 700 V$, thus directing the total beam current to y2. Measure the current on y₂ and adjust $V_{\sigma 1}$ for I_{v2} = 10 μ A.

- ⁵) The sensitivity at a deflection of less than 75% of the useful scan will not differ from the sensitivity at a deflection of 25% of the useful scan by more than the indicated value.
- ⁶) A graticule, consisting of concentric rectangles of 57,0 mm x 33,0 mm and 55,8 mm x 32,0 mm is aligned with the electrical x axis of the tube. The edges of a raster will fall between these rectangles.

Notes see page 5.

4	PHILIPS	May 1976	May 1976	PHILIPS	5
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²⁾ The mean x-plate potential and the mean y-plate potential should be equal to $V_{g2,g4,g5(\ell)}$ (with astigmatism control voltage set to zero).

c) set again for the conditions under a), without touching the $V_{\sigma 1}$ control. The screen current of the resulting raster display is now exactly 10 µA.

d) focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.