



CHARACTERISTICS

# MAGNETIC DEFI FCTION TYPES

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									-	TYPICAL OPE	OPERATING CON	CONDITIONS
JEDEC	OVERALL	FACEPLATE	DEFLECTION	OUTSIDE	FOCUSING	NO	JEDEC	JEDEC	ANONE	ACCEI FRATOR	NEGATIVE CIIT.	EDCIISING VOLTAGE
TYPE NO.	LENGTH (Inches)	(See * below)	(Degrees)	(mmf)	METHOD	TRAP	BASING	NO.	VOLTAGE (KV DC)	GRID VOLTAGE (V DC)	OFF VOLTAGE (V DC)	(V DC) or CUR- RENT (MA DC)
3AKP 3HP 4BP 4CP	6-3/8 9-13/16 13-1/8 11-1/4	స్టలలల	36° Offset 55 50 50	None None 100-500 100-500	ZZZZ	2222	Spec. Coded 5AN 8ET 12G	Molded B8-65 B8-65 B5-57	7 5 25 20	300 150 No Grid	45-95 15-45 75-175 70-140	-50 to 350 V 
SACP— SAEP— SAHP— SAHP—A	11-1/8	S C C C R R R R R R R R R R R R R R R R	22222	None None None	8888	NN	8EQ 8EQ 8EF	B8-65 B8-65 B8-65 B8-65	12 7 7	250 250 300 300	27-63 25-70 28-72 28-72	-50 to 350 V -50 to 350 V -50 to 350 V -50 to 350 V
SAKP— SALP— SAUP— SAXP	12-9/16 7-1/4 12-1/2 10-5/8	C Rd C Rd C Rd C Rd Rd C Rd	53 53 53	100-500 None 100-500 None	ESSE	% % % % % % % % % % % % % % % % % % %	126 90F 12C 12S	B5-57 B6-63 B5-57	30 8 25 14	No Grid 200 300	80 to 140 50 40-100 28-72	250 MA 5200 V AUTO
58CP 58NP 5CKP 5FP A	10-5/8 16-5/8 11-1/8	C C & & & & & & & & & & & & & & & & & &	70 53 53	None None None	MESM	8888 8888	9DF 12M 12AM 5AN	E9-37 B6-63 B7-51 B8-65	8 14 20 6	300 1000 250	25-75 28-72 35 to 110 25-70	56-84 MA -50 to 350 V 135 MA 75-102 MA
50P_A 5TP_ 5WP_	11-1/8 11-3/4 11-7/16 14-3/8	SSSSS	53 50 40	None 100-500 100-500 100-500	ESSSE	0000 0000	5AN 12C 12C 12C	88-65 87-51 87-51 87-51	10 27 27 20	300 200 200 200	28 to 72 40-100 42-98 42-98	137 MA 6600 V MAX. 4700 V
7ABP 7ABP 7AIP 7BP	13-1/4 13-1/4 19 13-1/4	C Rd CA Rd C Rd C Rd	50 50 53	None None None	ESS	NN NN N	12M 12M 12D 5AN	B6-63 B6-63 B6-63 B8-65	7 7 14 7	300 300 550 250	33-77 28-72 75-150 50	-50 to 350 V 0 to 250 V 77 MA 99-135 MA
8 - 1 de E	13-1/4 13-7/16 14-1/16 13	2222	52 20 20 20	None None 400-1500 500 Max.	AESA	No No Double No	5AN 8BQ 12C 12C	88-65 88-65 87-51 85-57	7 6 6	250 250 250 250	25-70 25-68 25-65 28-72	99-135 MA 1200 V
71.P.— 74.P.— 74.P.—	13-1/4 12-3/4 12-7/8 14-1/16	CA Rd CA Rd CA Rd	53 50 52 50	None None None	ZZZZ	No No Single No	8EQ 12D 12D 12D	88-65 85-57 85-57 85-57	12 7 8 9	250 250 300 250	27-63 27-63 28-72 27-63	0 to 250 V 105-140 MA 80 MA 80 MA
45 T T B 8 8 P P P P P P P P P P P P P P P P P	14-1/16 13-1/8 10-7/16 11-7/16	C Rd CA Rd G Re GA Re	90 90 90 90	100-500 None 250-350	MESS	No No Single Single	12G 12Q 12AB 12D	B5-57 B6-63 B6-158 B5-57	20 10 8 16	200 200 300	63-147 23-53 22-51 35 to 72	195 MA 2200 V MAX. -50 to 350 V 125 MA
9LP _ 9MP _ 10KP _ A _ 10NP _ A _	14-31/32 17-1/2 17-5/8 17-5/8	G R Rd G R Rd Rd Rd Rd	55 55 50 52	None None None 500-1500	SSSS	No on o	5AN 5AN 12D 12G	B8-65 B8-65 B7-51• B5-57 B5-57	7 6 9 18	250 250 250 No Grid	60-100 25-75 27-63 62-125	 105 MA (Approx.) 110 MA (Approx.)
109P 10SP 100P A quot	17-9/16 16-5/8 17-5/8 17-5/8	C Rd CA Rd CA Rd CA Rd	2022	100-500 None None	ESSS™	0000 0000	12G 12Q 12M 12M	B5-57 B6-63 B6-63 B6-63	20 14 10 10	300	63-147 18-48 38-72 28-72	190 MA 1900 V 0 to 350 V 0 to 350 V
10VP 10WP 10WP A 12ABP	17-5/8 16-15/16 16-15/16 18	CA Rd G Rd GA Rd G Rd	50 50 55 55	500-2500 None None None	ESES	0 0 0 0 N0 0 0	12N 12M 12M 12M	B5-57 B6-63 B6-63 B6-63	11 10 10 10	250 300 300 300	28-72 28-72 28-72 28-72	110 MA (Approx.) 0 to 350 V 0 to 350 V 0 to 350 V

NEGATIVE CUT-OFF	FOCUSING VOLTAGE	ACCELERATOR GRID VOLTAGE	POST ACCEL- Erator volt-	D3 D4	D1 D2	2	5	BASE	JEDEC BASING	AND SCREEN	LENGTH	TYPE
CONDITIONS		TYPICAL OPERATING	(L	FACTOR	DEFLECTION FACTOR	DE	S	IFNEC		CANCOLATE		IEDEC
ES	TYP	NO		LE	L U		0	TA	1051	CTR		Ш
95 MA (Approx.) 0 to 350 V 105 MA (Approx.) -50 to 350 V 105 MA	28-72 28-72 33-77 38-72	000 000 000 000 000 000 000	16 12 12 16	85-57 86-63 85-57 86-63 85-57	120 120 120 12N 12M	Single Single No No Single	ZSZSZ	None None None None	70 70 70 90	G C C Re Re G R M M R R M M M M M M M M M M M M M M	23 23 22-1/16 22-1/16 23-1/16	216P— 216P— 226P— 220P— 276P—
92 MA 0 to 350 V 0 to 350 V 95 MA (Approx.)	27-63 27-63 33-77 28-72	300 250 300 300	12 14 14	85-57 86-63 86-63 85-57		No No Single Single	MRSM	None None 750-1500 750-1500	70 70 70 70 70	GA Re GA Re G Cy Re G Cy Re	19-3/16 19-1/4 19-3/16 19-3/16	1740P178CP171P170P
100 to 200 V 95 MA 95 MA 95 MA	32 to 70 38-72 27-63 27-63	300 300 250 250	12 12 12	86-63 85-57 85-57 85-57	12M 12N 12D 12N	No Double Double Double	MMM	None 750-2000 None 750-1500	53 70 70		22-1/16 22-1/4 17-3/4 17-3/4	164KP16WP16WP
105 MA (Approx.) 105 MA (Approx.) 0 to 350 V 0 to 350 V	27-63 27-63 28-72 27-63	250 250 300 250	9 9 2 2 2 1 2 9	85-57 85-57 86-63 86-63	120 120 121 121	2222	SESS	None None 80-1200 None	55 55 70	SA RG SA RG	18-3/4 18-3/4 13-3/16 19-5/32	12SP_B 12SP_D 14WP_ 16AFP_
99-135 MA 75-102 MA 110 MA (Approx.) 105 MA (Approx.)	22-66 22-66 27-63 27-63	250 250 250 250	7 7 111 9	B8-65 B8-65 B5-57 B5-57	5AN 5AN 12N 12D	2000	2222	None None 500-2500 None	50 54 55		19-5/8 19-5/8 17-5/8 18-3/4	120P_A 120P_A 12KP_A
0 to 350 V 110 MA (Approx.) 0 to 350 V 75-102 MA	28-72 28-72 28-72 22-66	300 500 500 250	10 12 12 7	86-63 85-57 86-63 88-65	12M 12D 12M 5AN	0 0 0 0 0 0 0 0	ES WES	None None None None	55 55 55	GA Rd G Rd GA Rd C Rd	18-5/16 18-5/16 18-5/16 20-3/4	12ABP_A 12AFP_A 12AGP_A

	ITIONS	NEGATIVE CUT-OFF (V DC)
	ATING CONDITIONS	FOCUSING VOLTAGE (V DC)
	YPICAL OPERATING	ACCELERATOR GRID VOLTAGE (V DC)
	TY	POST ACCEL- ERATOR VOLT- AGE (KV DC)
「「「「「」	IN FACTOR	D3 D4 (V DC/Inch)
	DEFLECTION	01 D2 (V DC/Inch)
2	ON	OF
1	IENEC	BASE NO.
THE RESERVE OF THE PERSON NAMED IN		

JEDEC BASING

LENGTH (Inches)

2000 2000

300 240-350 198 198 148-200 445 148-181 148-181 148-181 148-199 148-181 148-181 148-189 148-189 123-70 123-181 189-189 180-368 180-369 133-183

B12-43 Med. 7 Pin Med. 7 Pin B14-38 B12-43 B12-43 B12-37 B12-43 B

3 4-1/16 7-5/8 11-1/2 11-1/2 10-3/4 10-3

45.75	30-60 34-56 34-56 34-56	34-56 34-56 33-55 20-60	20-60 45-75 35-65 50-80	50-80 82-85 30-90 30-90	45.75 60-85 24-56 15-45	20-60 22.2-51.8 45-105 30-90	30-90 16.5-49.5 15-45 30-90	30-90 30-90 45-75 90 Max.	20-60 30-90 45-75 45-75	45-135 75-124 87-112 45-75	105-175 36-84 72-168 84 Max.	22.5-67.5 50-90 24-56 60-140	60-140 150-225 30-90 65-195	45-135 40-120 40-120
400-684	400-900 0-300 0-300 0-300	0-300 0-700 500-730 310	450 400-630 600-900 180-590	180-590 190-565 575 575	400-690 225-670 425 310	450 260 333-630 500	376-633 250 337 528	363-695 363-695 363-695 340-640	315-562 362-695 362-695 362-695	541-1040 950-1225 595-1020 380-620	2000-2950 810-1200 1620-2400 800-1200	440-750 450-700 540-800 1250-1850	1200-1800 1750-2500 1250 1143	1150 1000 1000
2000	750 2500 2500 2500	2500 6000 2300 1500	2000 2000 2750 1670	1670 1900 2000 2000	2000 1850 2000 1500	2000 1000 2000 2000	2000 1000 1500 2000	2000 2000 2000 2000 2000	2000 2000 2000 2000	3000 4000 3000 2000	8000 3000 3000 3000	2000 2000 2000 5000	5000 7500 4000 4000	5000 4000 4000
4	6 None None	None 10.3 None	None 14 13.25 10	10 4 4 4	4 6 None None	None 2 4 4	4 None None 20	20 4 4 None	None 20 12 12	12 9 4	None None None	4 4 4 None	None 8 8 6	None 8 8
49-60	230 20-25 31.5-38.5 31.5-38.5	31.5-38.5 34.42 113-128 57	76 111-133 110-138 28.4-34.8	15.18.3 15.5-19 74 78	70-86 22.6-28 72 57.8	76 96 77-115 90	72-108 60 76 131-197	131-197 62-94 70-86 46-62	63-89 46-68 42-52 42-52	36-54 105-130 84-126 67-83	170-186 75-102 150-204 75-102	59-94 28-45 49-68 100-135	85-115 130-180 125 101	125 130 110
54-66	230 40-50 40-50 40-50	45-55 94-116 113-128 63	84 130-160 130-160 70-86	70-86 48.3-58.5 92 92	83-101 48.3-61 36 63.5	84 96 77-115 103	83-124 66 84 140-210	140-210 74-110 83-101 56-77	70-98 140-210 130-159 130-159	108-162 112-138 86-130 81-101	175-195 93-123 186-246 93-123	63-105 60-90 58-81 125-165	110-150 140-190 110 108	95 130 110
2		11112	1 1					12221		T.C.C.T	пппп	പപവവ	111111111111111111111111111111111111111	
612-37	812-37 812-37 812-37	B12-37 B12-37 B12-37 Wafer Mag.	Med. Mag. 11 Pin B12-37 B12-37 B12-37	812-37 812-37 812-37 812-37	812-37 812-37 11 Pin Sleeve 11 Pin Sleeve	Med. Mag. 11 Pin Mag. Med. Mag. Med. Mag.	Med. Mag. Large 7 Pin 11 Pin Sleeve B12-37	812-37 812-37 812-37 812-37 812-43	Med. Mag. B12-37 B12-37 B12-37	825-139 825-139 825-139 812-37	22 Pin Collar B12-37 B12-37 B12-37	22 Pin Collar B25-139 B12-37 B12-37	812-37 812-37 812-37 812-37	11 Pin Sleeve 12 Pin Per. 12 Pin Per.
Spec.	Spec. 14U 14G 14G	Spec. 14V 14P 11A	11N 14AB 14AF	14AF 14AG 14B 14J	14J 14AF 11A 11A	IIIS IIIS	11T 7AN 11A 14F	14F 14K 14K 12E	11N 14P 14P	140 Spec. Spec. 14J	Spec. 14G 14R 14R	Spec. Spec. 14J 14A	146 14E 14S	111 12A 12A
H 9	1-20 1-20 /	CFL CFLA CFLA C8	000 FFF8 AAA	C.F. A C.F. A SS SS	<u>ಜ</u> ್ವಜಜ	80000 010 010 010	010 010 0.5 F.	44400 0000	08 C.F. P. P. P.	C8 FL A C30 A Re C FL	G30 A C20 C20 C20	C20 C20 C20 C	040 000	ပပပ
18-1/4	9-7/8 17-5/8 16-3/4 16-3/4	18-1/2 17-5/8 16-3/4 16-3/4	16-3/4 18-1/4 18-5/16 17-1/2	181/4 181/4 163/4 163/4	163/4 17-1/2 16-3/4 16-3/4	16-3/4 16-3/4 16-3/4 16-3/4	16-3/4 15-7/8 16-3/4 16-3/4	16.3/4 18-1/2 18-1/4 14-3/4	16-3/4 17-5/8 17-5/8 17-5/8	17-5/8 20-1/16 17-3/4 15-1/2	18-7/8 14-1/2 14-1/2 14-1/2	18-5/8 18-1/2 16-1/2 18-1/2	19-1/4 24-7/8 24 22	23-1/2 24-1/4 27-7/8
SAFP.	SAMP SAGE SAGE	SARP— SATP— SAWP— SBP—	58P_A 580P_ 58FP_	Segue S Segue Segue Segue Segue Segue Segue Segue Segue Segue Segue Segu	SCAP_B SGAP	ا ۱۱ ۱۲ الله الله الله الله الله الله الله الله	SE S		1	5YP 60P 7ACP 7AEP	7AGP	7XP 7YP 86P 106P	12ACP 12RP 12GP	12HP— 14AP— 20AP

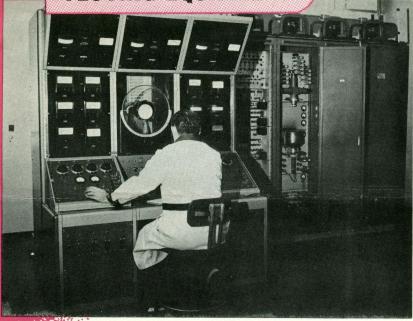




Address inquiries to Manager of Sales, Industrial and Military Tube Division

STREE PASSAIC, 118 NINTH

**TESTING EQUIPMENT** 



Depicted at the left is a section of the Industrial-Military cathode-ray tube Test Department showing one of Thomas' test sets and a composite video signal generator. The test set was designed and built by Thomas Electronics for evaluating the electrical characteristics of electrostatic deflection cathode-ray tubes over a very wide range of operating conditions. Close-tolerance precision components, well-regulated power supplies and large-scale meters (accurate to within 0.5%) ensure precise measurements. The test set is capable of testing tubes according to MIL-E specifications. Similar test sets, employing advanced circuit design, are used by Thomas Electronics for testing magnetic deflection tubes. Test sets like the one shown on the left, and supplementary test equipment, are checked by Thomas' calibration laboratory in accordance with rigorous quality control schedules.

Cathode-Ray Tube Test Set

# PHOSPHOR and SCREEN DEVELOPMENT



This is a section of Thomas' chemical laboratory showing a chemist and technician engaged in a phosphor screen development project. The lab is well equipped with up-to-date apparatus for complete analysis of tube and tube process materials, the formulation of materials and the preparation and evaluation of phosphors, phosphor screens and other tube coatings. While the main function of the laboratory is research as well as material and process development, it also works closely with production departments by chemically testing raw materials, issuing specifications for developmental tube type processes and troubleshooting shop problems.

Corner Section of One of Thomas' Laboratories

This brief summary of the THOMAS ELECTRONICS organization will acquaint you with our personnel, plant facilities and operation.

We welcome the opportunity to discuss your prototype and production requirements in greater detail.

Address all inquiries to: Jess E. Dines, Manager of Sales, Industrial and Military Tube Division of THOMAS ELECTRONICS, Inc., 118 NINTH STREET, PASSAIC, N. J., U.S.A.

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# **ABOUT THOMAS ELECTRONICS**

Thomas Electronics, Inc., founded in 1949, was engaged initially in the design and manufacture of television picture tubes. In subsequent years, other product lines were added including cathode-ray tube component parts, industrial-military cathode-ray tubes and electronic equipment and cable assemblies. Advancements in automated production techniques (together with effective management, engineering, research and quality control facilities) have enabled Thomas Electronics to become one of the leading manufacturers of television cathode-ray tubes in the nation. Production capacity is presently in excess of 6,000 tubes a day. Headquarters in Passaic, New Jersey comprise a quarter-million-square-foot plant as well as manufacturing and warehouse facilities in St. Charles, Illinois; Cedartown, Georgia and Fort Worth, Texas. Overseas operations include manufacturing facilities in Australia and Italy.

In the laboratories, research and development groups are engaged in advanced product development and the study of new material and design concepts. A substantial portion of the laboratory and industrial-military area is air-conditioned and humidity-controlled for critical processing operations. The necessary facilities for fabrication and testing of experimental electron guns and tubes are available, as well as equipment for development work on metal and phosphor film evaporation techniques. Research groups are supplemented by efficient production engineers, equipment design specialists and industrial and application engineers to bring new developments into full scale production with minimum delays. At the present time, particular emphasis is being placed on the enhancement of light output of cathode-ray tubes when operating on low voltages and high precision, high resolution, tube and electron gun designs.

# **KEY PERSONNEL**

### KENNETH A. HOAGLAND Director of Engineering

Mr. Hoagland holds the degrees of B.S. and M.S. in electrical engineering from Newark College of Engineering and has done graduate work in physics and mathematics at the Polytechnic Institute of Brooklyn and Stevens Institute of Technology. He is a Senior Member of the I.R.E., a member of the American Physical Society, A.I.E.E. and Tau Beta Pi. From 1941 to 1959 Mr. Hoagland was associated with the Allen B. DuMont Laboratories in various engineering capacities including Chief Engineer, Cathode-Ray Tube Division; Director of Color Tube Research and Development; and Director of Engineering, Tube Operations. He is responsible for a number of innovations in cathode-ray tube design, such as high sensitivity tubes for wide-band oscillography, precision mono-accelerator instrument tubes and an electron beam focusing lens presently in general use for television picture tubes. Mr. Hoagland is a former Chairman of the JEDEC Committee on Cathod-Ray Tubes, Electronic Industries Association.

### **PETER SEATS** Manager, Research and Development

Mr. Seats was educated in Europe and Australia, joining Thomas Electronics in 1954 after serving six years as Chief Chemist in the Cathode-Ray Tube Division of E.M.I. Ltd., England. In the past ten years, he has been responsible for a number of significant improvements in cathode-ray tube efficiencies, particularly in the areas of screen applications and aluminizing. Mr. Seats' experience and original approach to design and development problems concerning cathode-ray tubes are exemplified by a recently concluded project involving the use of radioactive tracers. He holds 18 patents in the cathode-ray tube field.

## EDWARD LISOVICZ Manager, Industrial and Military Tube Division

Mr. Lisovicz has a B.S. degree in electrical engineering from the Newark College of Engineering and is a member of Tau Beta Pi. He has been associated with Thomas Electronics since its inception in 1949 and has made a number of significant contributions to the company's growth in the areas of production and processing engineering. His diversified experience includes plant production supervision, cathode-ray tube manufacturing processes; development of electron gun production techniques, gun design, and control of plant shrinkage, using statistical inspection and quality control procedures. He holds several electron gun design patents.

### NICHOLAS E. BRODERICK Director of Quality Control and Field Engineering

Mr. Broderick holds a B.S. degree in physics from Fordham University. He has done graduate work at both Fordham and Syracuse Universities in the fields of electronics, mathematics and nuclear physics. He is a Senior Member of the I.R.E., a former chairman of the engineering section of the Cathode-Ray Tube Manufacturers' Association, a member of the Joint Electron Devices Engineering Council and the American Physical Society. Before joining Thomas Electronics, Mr. Broderick was connected with Sylvania Electronics Products where his duties included the design and development of optical systems and electron guns. He holds several cathode-ray tube patents.

