

Industrial and Military

CATHODE RAY TUBES

for use in

OSCILLOSCOPES
RADAR DISPLAYS
FLYING SPOT SCANNERS
VIDEO RECORDERS
INDUSTRIAL MONITORS
TV CHECK TUBES
SPECTRUM ANALYZERS
OSCILLOSCOPE PHOTOGRAPHY
and other applications

Thomas

ELECTRONICS Inc.

118 NINTH ST.
PASSAIC, N. J.

CHART OF INDUSTRIAL-MILITARY CATHODE-RAY TUBE CHARACTERISTICS

MAGNETIC DEFLECTION TYPES

JEDEC TYPE NO.	OVERALL LENGTH (Inches)	FACEPLATE AND SCREEN (See * below)	DEFLECTION ANGLE (Degrees)	OUTSIDE CAPACITANCE (mmf)	FOCUSING METHOD	ION TRAP	JEDEC BASING	JEDEC BASE NO.	ANODE VOLTAGE (KV DC)	ACCELERATOR GRID VOLTAGE (V DC)	NEGATIVE CUT-OFF VOLTAGE (V DC)	FOCUSING VOLTAGE (V DC) or CURRENT (MA DC)
3AKP	6-3/8	CA	36° Offset	None	ES	No	Spec. Coded	Molded	7	300	45-95	-50 to 350 V
3HP	9-13/16	C	55	None	M	No	5AN	88-65	5	150	15-45	—
4BP	13-7/8	C	50	100-500	M	No	8ET	88-65	25	No Grid	75-175	—
4CP	11-1/4	C	50	100-500	M	No	12G	85-57	20	—	70-140	—
5ACP	11-1/8	CA Rd	53	None	ES	No	8EQ	88-65	12	250	27-63	-50 to 350 V
5AEP	11-7/8	C Rd	53	None	ES	No	8EQ	88-65	7	250	25-70	-50 to 350 V
5AHP	11-7/8	C Rd	53	None	ES	No	8EF	88-65	7	300	28-72	-50 to 350 V
5AHP-A	11-7/8	CA Rd	53	None	ES	No	8EF	88-65	7	300	28-72	-50 to 350 V
5AKP	12-9/16	A Rd	50	100-500	M	No	12G	85-57	30	No Grid	80 to 140	250 MA
5ALP	7-1/4	C Rd	53	None	M	No	9DF	—	8	—	50	—
5AUP	12-1/2	CA Rd	40	100-500	ES	No	12C	86-63	25	200	40-100	5200 V AUTO
5AXP	10-5/8	C Rd	53	None	ES	No	12S	85-57	14	300	28-72	—
5BCP	7	C Rd	70	None	M	No	9DF	E9-37	8	—	25-75	56-84 MA
5BNP	10-5/8	CA Rd	53	None	ES	No	12M	86-63	14	300	28-72	-50 to 350 V
5CKP	16-5/8	C Rd	42	None	M	No	12AM	87-51	20	1000	35 to 110	135 MA
5FP-A	11-1/8	C Rd	53	None	M	No	5AN	88-65	6	250	25-70	75-102 MA
5QP-A	11-1/8	CA Rd	53	None	M	No	5AN	88-65	10	300	28 to 72	137 MA
5TP	11-3/4	CA Rd	50	100-500	ES	No	12C	87-51	27	200	40-100	—
5WP	11-7/16	CA Rd	50	100-500	ES	No	12C	87-51	27	200	42-98	6600 V MAX.
5ZP	14-3/8	CA Rd	40	100-500	ES	No	12C	87-51	20	200	42-98	4700 V
7ABP	13-1/4	C Rd	50	None	ES	No	12M	86-63	7	300	33-77	-50 to 350 V
7ABP-A	13-1/4	CA Rd	50	None	ES	No	12M	86-63	7	300	28-72	0 to 250 V
7AJP	19	CA	40	None	M	No	12D	86-63	14	550	75-150	77 MA
7BP	13-1/4	C Rd	53	None	M	No	5AN	88-65	7	250	50	99-135 MA
7BP-B	13-1/4	C Rd	53	None	M	No	5AN	88-65	7	250	25-70	99-135 MA
7CP	13-7/16	C Rd	55	None	ES	No	8BQ	88-65	6	250	25-68	1200 V
7DP	14-1/16	C Rd	50	400-1500	ES	No	12C	87-51	6	250	25-65	—
7HP	13	C Rd	50	500 Max.	M	No	12N	85-57	6	250	28-72	—
7LP	13-1/4	CA Rd	53	None	ES	No	8EQ	88-65	12	250	27-63	0 to 250 V
7MP	12-3/4	C Rd	50	None	M	No	12D	85-57	7	250	27-63	105-140 MA
7QP	12-7/8	C Rd	52	None	M	No	12D	85-57	8	300	28-72	80 MA
7RP	14-1/16	CA Rd	50	None	M	No	12D	85-57	9	250	27-63	80 MA
7SP	14-1/16	C Rd	50	100-500	M	No	12G	85-57	20	—	63-147	195 MA
7TP	13-1/8	CA Rd	50	None	ES	No	12Q	86-63	10	200	23-53	2200 V MAX.
8DP	10-7/16	G Re	90	250-350	ES	No	12AB	86-158	8	200	22-51	-50 to 350 V
8FP	11-7/16	GA Re	90	500-1500	M	No	12D	85-57	16	300	35 to 72	125 MA
9LP	14-31/32	C Rd	55	None	M	No	5AN	88-65	7	250	60-100	—
9MP	17-1/2	C Rd	55	None	M	No	5AN	88-65	6	250	25-75	—
10KP-A	17-5/8	G Rd	50	None	M	No	12D	87-51•85-57	9	250	27-63	105 MA (Approx.)
10NP-A	17-5/8	GA Rd	52	500-1500	M	No	12G	85-57	18	No Grid	62-125	110 MA (Approx.)
10QP	17-9/16	C Rd	50	100-500	M	No	12G	85-57	20	—	63-147	190 MA
10SP	16-5/8	GA Rd	50	None	ES	No	12Q	86-63	14	200	18-48	1900 V
10UP	17-5/8	C Rd	50	None	ES	No	12M	86-63	10	300	38-72	0 to 350 V
10UP-A	17-5/8	CA Rd	50	None	ES	No	12M	86-63	10	300	28-72	0 to 350 V
10VP	17-5/8	CA Rd	50	500-2500	M	No	12N	85-57	11	250	28-72	110 MA (Approx.)
10WP	16-15/16	G Rd	50	None	ES	No	12M	86-63	10	300	28-72	0 to 350 V
10WP-A	16-15/16	GA Rd	50	None	ES	No	12M	86-63	10	300	28-72	0 to 350 V
17ABP	18	G Rd	55	None	ES	No	12M	86-63	10	300	28-72	0 to 350 V

TYPICAL OPERATING CONDITIONS



JEDEC TYPE NO.	OVERALL LENGTH (Inches)	FACEPLATE AND SCREEN (See * below)	JEDEC BASING	JEDEC BASE NO.	NO. OF GUNS	DEFLECTION FACTOR	POST ACCELERATOR VOLTAGE (KV DC)	ACCELERATOR GRID VOLTAGE (V DC)	FOCUSING VOLTAGE (V DC)	NEGATIVE CUT-OFF (V DC)
12ABP_A	18	GA Rd	55	None	ES	12M	10	300	28-72	0 to 350 V
12AFP_A	18-5/16	G Rd	54	None	M	12M	12	500	28-72	110 MA (Approx.)
12AGP_A	18-5/16	GA Rd	54	None	ES	12M	12	500	28-72	0 to 350 V
12BP_A	20-3/4	C Rd	55	None	M	5AN	7	250	22-66	75-102 MA
12DP_A	19-5/8	G Rd	50	None	M	5AN	7	250	22-66	99-135 MA
12DP_C	19-5/8	GA Rd	50	None	M	5AN	7	250	22-66	75-102 MA
12KP_A	17-5/8	GA Rd	54	500-2500	M	12N	11	250	27-63	110 MA (Approx.)
12SP_A	18-3/4	C Rd	55	None	M	12D	9	250	27-63	105 MA (Approx.)
12SP_B	18-3/4	GA Rd	55	None	M	12D	9	250	27-63	105 MA (Approx.)
12SP_D	18-3/4	GA Rd	55	None	M	12D	9	250	27-63	105 MA (Approx.)
14WP	13-3/16	GA Re	90	80-1200	ES	12L	12	300	28-72	0 to 350 V
16AFP	19-5/32	CA Re	70	None	ES	12L	12	250	27-63	0 to 350 V
16AKP	22-1/16	GA Rd	53	None	ES	12M	12	300	32 to 70	100 to 200 V
16LP	22-1/4	C Rd	52	750-2000	M	12N	12	300	38-72	95 MA
16WP	17-3/4	G Rd	70	None	M	12D	12	250	27-63	95 MA
16WP_A	17-3/4	G Rd	70	750-1500	M	12N	12	250	27-63	95 MA
17ADP	19-3/16	GA Re	70	None	M	12D	12	300	27-63	92 MA
17BCP	19-1/4	GA Re	70	None	ES	12M	12	250	27-63	0 to 350 V
17LP	19-3/16	G Cy Re	70	750-1500	ES	12L	14	300	33-77	0 to 350 V
17QP	19-3/16	G Cy Re	70	750-1500	M	12N	14	300	28-72	95 MA (Approx.)
21AMP_A	20	GA Re	90	2000-2500	M	12N	16	300	28-72	105 MA (Approx.)
21EP	23	G Cy Re	70	None	M	12D	16	300	28-72	95 MA (Approx.)
21FP	23	G Cy Re	70	None	ES	12D	16	300	28-72	95 MA (Approx.)
22CP	22-1/16	C Rd M	70	None	M	12D	12	300	33-77	0 to 350 V
22DP	22-1/16	C Rd M	70	None	ES	12N	12	300	33-77	105 MA (Approx.)
27EP	23-1/16	GA Re	90	None	M	12M	16	300	38-72	-50 to 350 V

ELECTROSTATIC DEFLECTION TYPES

JEDEC TYPE NO.		OVERALL LENGTH (Inches)	FACEPLATE AND SCREEN (See * below)	JEDEC BASING	JEDEC BASE NO.	NO. OF GUNS	DEFLECTION FACTOR	POST ACCELERATOR VOLTAGE (KV DC)	ACCELERATOR GRID VOLTAGE (V DC)	FOCUSING VOLTAGE (V DC)	NEGATIVE CUT-OFF (V DC)
1BP		3	C FL	9CU	Min. 9 Pin	1	350	None	600	150	100 Max.
1EP		4-1/16	C FL	11V	E11-22	1	210-310	None	1000	100-300	14-42
2AP		7-7/16	C8	11B	Magnal 11 Pin	1	115	None	500	125	15-45
2AP_A		7-7/16	C8	11L	Sm. Shell Mag.	1	230	None	1000	250	30-90
2BP		7-5/8	C8	12E	B12-43	1	230-310	None	2000	300-560	135 Max.
3AP		11-1/2	C8	7AN	Med. 7 Pin	1	47	None	600	170	14-40
3AP_A		11-1/2	C8	7CE	Med. 7 Pin	1	114	None	1500	430	25-75
3ABP		10-3/4	C FL	14T	B14-38	2	164-198	4	2000	480	45-75
3ACP		10	C FL	14J	B12-37	1	180-220	4	2000	545	45-75
3ADP		10	C FL	12Z	B12-43	1	140-160	4	2000	320-470	52-87
3AHP		9-1/8	C15 Re	12E	B12-43	1	146-198	None	2000	330-620	58-135
3AQP		9-1/8	C8	12E	B12-43	1	146-198	None	2000	330-620	58-135
3BP		10	C8	14A	B12-37	1	168	None	1500	430	22.5-67.5
3BP_A		10	C8	14G	B12-37	1	200	None	2000	575	30-90
3CP		10-3/8	C8	11C	Med. Mag. 11 Pin	1	124	None	2000	575	30-90
3DP		10-7/16	C8	14C	B12-37	1	166	None	1500	430	22.5-67.5
3DP_A		10-7/16	C8	14H	B12-37	1	220	None	2000	575	30-90
3EP		9-15/16	C8	11N	Wafer Mag. 11 Pin	1	221	None	2000	575	30-90
3FP		10	C8	14B	B12-37	1	221	2	2000	575	30-90
3FP_A		10	C8	14J	B12-37	1	250	4	2000	575	30-90
3GP		11-1/2	C8	11N	B11-66	1	64-96	None	1000	163-291	16.5-49.5
3JP		10	C8	14J	B12-37	1	170-230	4	2000	400-690	30-90
3JP_A		10	C8	14J	B12-37	1	180-220	4	2000	400-690	45-75
3KP		11-1/2	C8	11M	B11-66	1	50-68	None	1000	160-300	45 Max.
3MP		8	C8	12F	B12-43	1	286-380	None	2000	400-700	126 Max.
3QP		6-1/8	C8	9D	B12-43	1	214-290	None	1200	240-480	31-74
3RP_A		9-1/8	C8	12E	B12-43	1	146-198	None	2000	330-620	45 to 135
3SP		9-1/8	C15 Re	12E	B12-43	1	73-99	None	1000	165-310	28.5-67.5
3UP		7-1/2	C FL Re	12F	B12-43	1	246-310	None	2000	330-620	126 Max.
3WP		11-1/2	C FL	12T	B12-43	1	83-101	None	2000	330-620	60-100
3XP		8-7/8	C15 Re	Spec. 14Y	08-1	1	68-92	None	2000	370-650	28.5-67.5
4DP		12-1/4	C FL	14Y	B12-37	2	115-140	4	2000	335-615	52-87
5AP		13	C9	11A	Large Magnal	1	93	None	1500	430	21-57
5ABP		16-3/4	C FL	14J	B12-37	1	53-72	4	2000	400-690	52-87
5ADP		16-3/4	C FL	14J	B12-37	1	46-50	3	1500	300-515	34-56

TYPICAL OPERATING CONDITIONS

Part No.	Spec.	Material	Finish	Length	Width	Height	Weight	Notes
5AJP	18-3/4	C FL	Spec.	2	54-66	49-60	2000	400-584
5AMP	9-7/8	C7-1	Spec.	1	230	230	750	400-900
5APF	17-5/8	C FL	14U	1	40-50	20-25	2500	0-300
5APG	16-3/4	C FL	14G	1	40-50	31.5-38.5	2500	0-300
5APH	16-3/4	C FL	14G	1	40-50	31.5-38.5	2500	0-300
5ARP	18-1/2	C FL	Spec.	2	45-55	31.5-38.5	2500	0-300
5ATP	17-5/8	C FL A	14V	1	94-116	34-42	6000	0-700
5AWP	16-3/4	C FL A	14P	1	113-128	113-128	2300	500-730
5BP	16-3/4	C8	11A	1	63	57	1500	310
5BP A	16-3/4	C8	11N	1	84	76	2000	450
5BPB	18-1/4	C FL A	14AB	2	130-160	111-133	2000	400-630
5BFP	18-5/16	C FL A	14B	2	130-160	110-138	2750	600-900
5BGP	17-1/2	C FL A	14AF	1	70-86	28.4-34.8	1670	180-590
5BHP	18-1/4	C FL A	14AF	1	70-86	15-18.3	1670	180-590
5CBP	18-1/4	C FL	14AG	1	48.3-58.5	15.5-19	1900	190-565
5CP	16-3/4	C8	14B	1	92	74	2000	575
5CP A	16-3/4	C8	14J	1	92	78	2000	575
5CP B	16-3/4	C8	14J	1	83-101	70-86	2000	400-690
5CAP	17-1/2	C FL	14AF	1	48.3-61	22.6-28	1850	225-670
5CP	16-3/4	C8	11A	1	36	72	2000	425
5HP	16-3/4	C8	11A	1	63.5	57.8	1500	310
5HP A	16-3/4	C8	11N	1	84	76	2000	450
5HP B	16-3/4	C10	11E	1	96	96	1000	260
5JP	16-3/4	C10	11S	1	77-115	77-115	2000	333-630
5LP	16-3/4	C10	11F	1	103	90	2000	500
5LP A	16-3/4	C10	11T	1	83-124	72-108	2000	376-633
5MP	15-7/8	C10	7AN	1	66	60	1000	250
5NP	16-3/4	C	11A	1	84	76	1500	337
5RP	16-3/4	C FL	14F	1	140-210	131-197	2000	528
5RP A	16-3/4	C FL	14F	1	140-210	131-197	2000	363-695
5SP	18-1/2	C FL	14K	2	74-110	62-94	2000	363-695
5SP A	18-1/4	C FL	14K	2	83-101	70-86	2000	363-695
5SP B	14-3/4	C20	12E	1	56-77	46-62	2000	340-640
5VP	16-3/4	C8	11N	1	70-98	63-89	2000	315-562
5XP	17-5/8	C FL	14P	1	140-210	46-68	2000	362-695
5XP A	17-5/8	C FL	14P	1	130-159	42-52	2000	362-695
5XP B	17-5/8	C FL A	14P	1	130-159	42-52	2000	362-695
5YP	17-5/8	C8	14Q	1	108-162	36-54	3000	541-1040
6DP	20-1/16	FL A	Spec.	3	112-138	105-130	4000	950-1225
7ACP	17-3/4	C30 A Re	Spec.	3	86-130	84-126	3000	595-1020
7AEP	15-1/2	C FL	14J	1	81-101	67-83	2000	380-620
7AGP	18-7/8	G30 A	Spec.	1	175-195	170-186	8000	2000-2950
7GP	14-1/2	C	14G	1	93-123	75-102	3000	810-1200
7JP	14-1/2	C20	14R	1	186-246	150-204	6000	1620-2400
7VP	14-1/2	C20	14R	1	93-123	75-102	3000	800-1200
7XP	18-5/8	C24	Spec.	5	63-105	59-94	2000	440-750
7YP	18-1/2	C40 Sq	Spec.	5	60-90	28-45	2000	450-700
8CP	16-1/2	C20	14J	1	58-81	49-68	2000	540-800
10GP	18-1/2	C	14A	1	125-165	100-135	5000	1250-1850
10HP	19-1/4	C	14G	1	110-150	85-115	5000	1200-1800
12ACP	24-7/8	C40 A	14E	2	140-190	130-180	7500	1750-2500
12FP	24	C	14E	1	110	125	4000	1250
12GP	22	C	14S	1	108	101	4000	1143
12HP	23-1/2	C	11J	1	95	125	5000	1150
14AP	24-1/4	C	12A	1	130	130	4000	1000
20AP	27-7/8	C	12A	1	110	110	4000	1000

* A = Aluminized, C = Clear, Cy = Cylindrical, G = Gray, M = Metal, Rd = Round, Re = Rectangular, FL = Flat, Sq = Square, Digit = Radius of curvature given in inches

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



118 NINTH STREET
ELECTRONICS INC. PASSAIC, N. J.

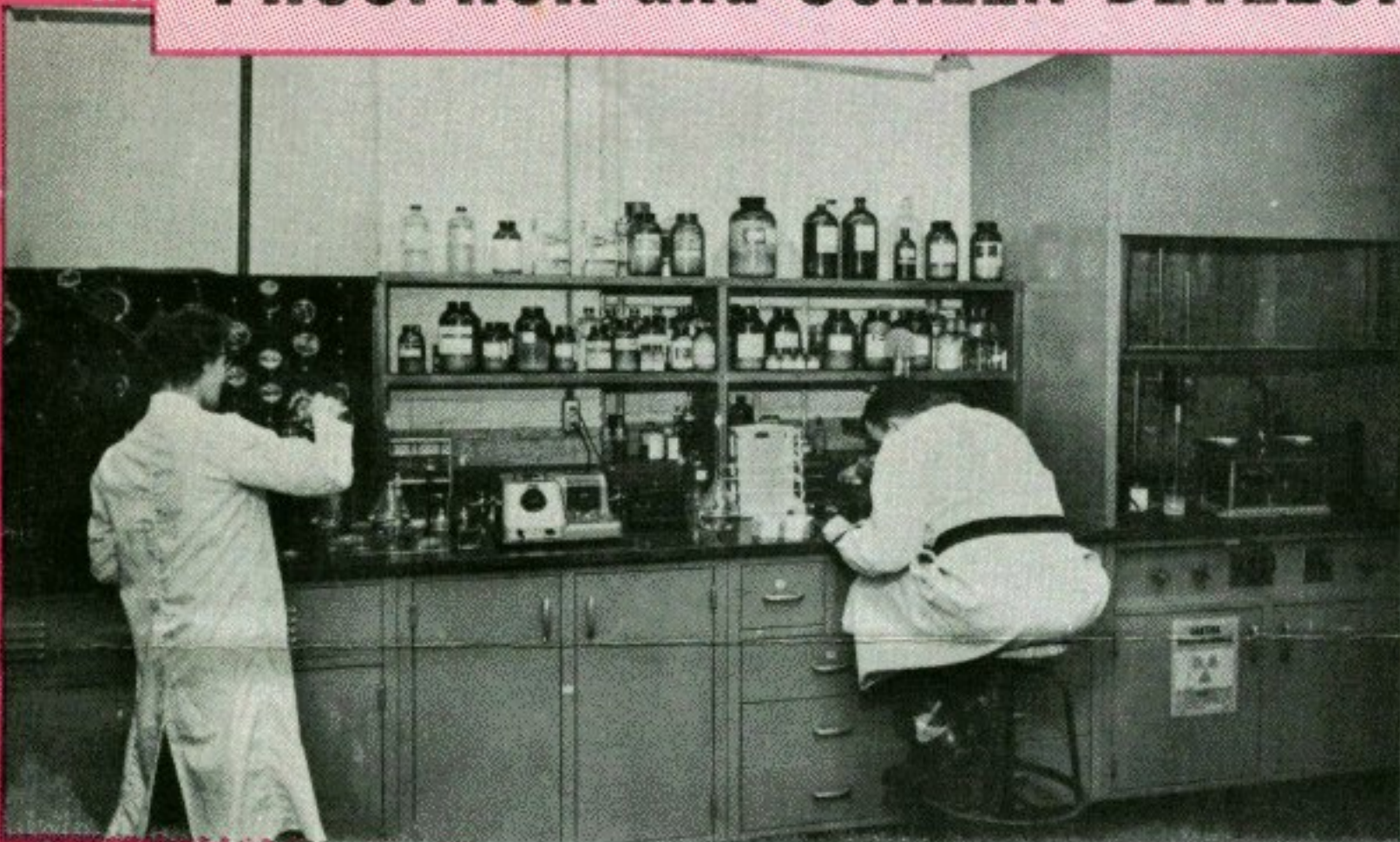
TESTING EQUIPMENT



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.

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 Cathode-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.