

ABRIDGED VALVE DATA


1965

0 CARCINOTRON



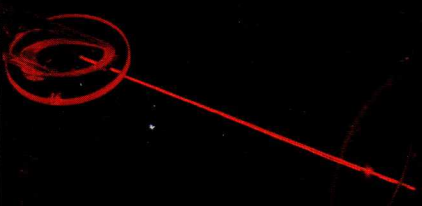
F4074 - CO. 10

**ANALYSER AND IMAGE
MEMORY TUBE**



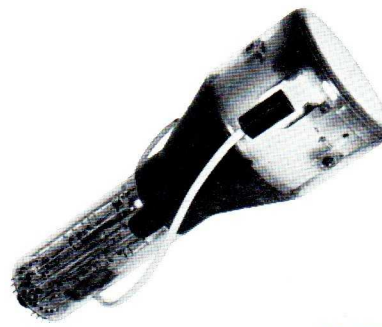
TIAM-ABX

GAS LASER



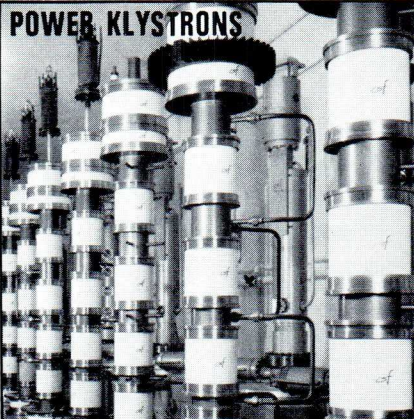
F9104

DIRECT VIEW STORAGE TUBE



F8055

POWER KLYSTRONS



T W T



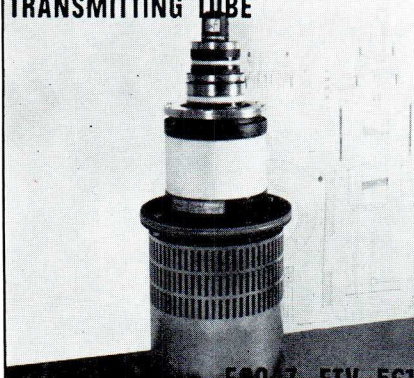
F4059

MAGNETRON




F1005 - 4 J 50 T0

TRANSMITTING TUBE



F4047 - ETV. 561



KLYSTRONS

TYPE		Heater		Frequency range	TYPICAL OPERATION						
		Vf	If		Cavity voltage	Cavity current	Frequency	Reflector voltage	Grid voltage	Output power	Electron tuning range
« F »	« CSF »	V	A	Gc	V	mA	Gc	V	V	W	Mc

EXTERNAL CAVITY

6 BL6	—	6.3	0.68	1.6-6.5	325	28	2.0	-140	0	0.200	6
					325	25	4.0	-300	0	0.150	6
5836*	—	6.3	0.68	1.6-6.5	325	25	2.0	-140	+10	0.200	6
					325	25	4.0	-300	+10	0.120	6
6 BM6	—	6.3	0.68	0.55-3.0	300	18	1.15	-40	0	0.020	6
					325	22	2.2	-500	0	0.100	4
5837*	—	6.3	0.68	0.55-3.0	325	22	0.8	-50	+10	0.100	6

INTERNAL CAVITY

F2013	KR.117	6.3	1	2.75-3.65	450	28	2.94	-150	450	0.160	25
					450	28	3.20	-210	450	0.380	17
					450	28	3.58	-130	450	0.250	16
F2021	KR.740 **	6.3	1	2.90-3.50	1000	85	2.90	-230	—	1.3	25
					1000	85	3.20	-375	—	2.8	22
					1000	85	3.50	-570	—	3.0	17
					500	30	2.90	-375	—	0.4	10
					500	30	3.20	-520	—	0.45	8
F2022	KR.741***	6.3	1	3.45-3.75	850	67	3.50	-250	—	1.5	28
					850	67	3.70	-325	—	1.7	22
					850	67	3.90	-435	—	1.6	15
F2023	KR.742***	6.3	1	3.75-4.0	850	67	3.70	-250	—	1.5	25
					850	67	3.90	-330	—	1.7	21
					850	67	4.10	-450	—	1.5	16
F2024	KR.743***	6.3	1	4.0-4.25	850	67	3.90	-230	—	1.5	26
					850	67	4.10	-310	—	1.65	23
					850	67	4.30	-400	—	1.3	17
F2025	KR.740 SC	Same characteristics as F2021, F2022, F2023 and F2024 but with output on coaxial line Impedance 75 Ω and frequency adjustable by worm wheel and screw.									
F2026	KR.741 SC										
F2027	KR.742 SC										
F2028	KR.743 SC										
F2030	KR.760	Same as F2021 but with output on RG.48/U waveguide.									
F2031	KR.761	Same characteristics as F2022, F2023 and F2024 but with output on WR 229 waveguide.									
F2032	KR.762										
F2033	KR.763										

* Pulse operation or CW

** Output on CNET λ 7 waveguide

*** Output on CNET λ 6 waveguide.

POWER KLYSTRONS

TYPICAL OPERATIONS

TYPE		Operat. frequency	Peak power	Mean power	High voltage	Beam current	Gain	Pulse duration	Focusing
« F »	« CSF »	Gc	MW	kW	kV	A	dB	μs	
CW operation									
F2047	—	1.428		10	13	2.8	40		electromagnetic
F2008	—	0.47-0.65		30	18	4.8	30		electromagnetic
F2009	—	0.59-0.83		30	17	3.8	40		electromagnetic
Pulse operation									
F2011 *	—	3.0	0.05	0.05	40	15 pk		10	electromagnetic
F2015	KA435	3.0	5	5	125	105 pk	39	2.2	electromagnetic
F2043	KA436	3.0	20	2.5	250	230 pk	43	2.5	electromagnetic
F2040	KA438	3.0	25	12	260	265 pk	50	6	electromagnetic
F2042	KA437	3.0	30	25	300	280 pk	50	6	electromagnetic
F2049	—	2.856	30	25	300	280 pk	50	6	electromagnetic

* Pilot klystron.

“ O ” CARCINOTRON TUBES

TYPE		Frequency range	Useful power	Anode 1 voltage Va1	Max. Anode 2 voltage Va2	Anode 2 current Ia2	Modulation sensitivity	Weight with permanent magnet	Remarks
« F »	« CSF »	Gc	mW	V	kV	mA	Mc/V	kg	
F4028A	CO.515A	0.98- 2.1	10 - 1 500	200	1.5	70	2.7 to 0.5	9	coax. output
F4028E**	CO.515E	0.98- 2.1	10 - 1 500	200	1.5	70	2.7 to 0.5	6	coax. output
F4005A	CO.210A	1.6 - 3.2	10 - 2 000	200	1.7	70	5.0 to 0.5	6.5	coax. output
F4005C**	CO.210C	1.6 - 3.2	10 - 2 000	200	1.7	70	5.0 to 0.5	4.6	coax. output
F4029C*	CO.127C	2.0 - 4.0	40 - 1 500	200	1.7	55	5.0 to 0.6	8	coax. output
F4029D**	CO.127D	2.0 - 4.0	40 - 1 500	200	1.7	55	5.0 to 0.6	4.6	coax. output
F4003A	CO.119A	2.4 - 4.7	50 - 600	200	1.5	40	7.0 to 0.7	8	coax. output
F4006A	CO.94A	3.6 - 7.2	10 - 300	200	1.5	40	8.0 to 1.0	6.5	coax. output
F4084*	—	4.0 - 8.0	10 - 300	200	1.5	40	8.0 to 1.0	3.5	coax. output
F4007A	CO.63A	4.8 - 9.6	10 - 1 000	200	1.5	40	12.0 to 1.2	6.5	coax. output
F4007C**	CO.63C	4.8 - 9.6	10 - 1 000	200	1.5	40	12.0 to 1.2	3.5	coax. output
F4053*	—	7.0 - 12.4	15 - 300	250	1.5	25	13.0 to 1.0	2.5	coax. output
F4032A	CO.521A	8.0 - 16.0	10 - 150	200	1.9	20	16.0 to 2.0	2.5	coax. output
F4032B**	CO.521B	8.0 - 16.0	10 - 150	200	1.9	20	16.0 to 2.0	2.5	coax. output
F4033B	CO.2012B	15.5 - 24.0	10 - 400	400	2.7	40	12.0 to 2.0	7.5	waveguide output RG53/U
F4034B	CO.1308B	23.5 - 37.5	10 - 500	400	3.5	45	12.5 to 2.5	7	waveguide output RG96/U
F4143	CO.80	39 - 41	10 W - 20 W	2 000	6.0	85	1.5 to 0.7	16	waveguide output RG97/U
F4110	CO.70	37 - 50	20 - 100	800	3.0	35	12.0 to 4.0	12	waveguide output RG97/U
F4076	CO.40B	68 - 72	2 W - 10 W	1 800	6.0	70	2.0 to 1.2	16	waveguide output RG98/U
F4150	CO.40A	73 - 77	2 W - 10 W	1 800	6.0	70	2.0 to 1.2	16	waveguide output RG99/U
F4109	CO.35	80 - 90	100 - 1 000	1 500	4.0	35	13.0 to 3.0	16	waveguide output RG99/U
F4108	CO.30	90 -100	100 - 1 000	1 500	4.0	35	13.0 to 3.0	16	waveguide output RG138/U
F4075	CO.20B	130 -140	100 - 1 000	2 000	6.0	60	12.0 to 10.0	16	waveguide output RG138/U
F4146	CO.20A	142 -158	100 - 1 000	2 000	6.0	60	12.0 to 10.0	16	waveguide output RG138/U
F4074	CO.10	290 -320	5 - 50	1 600	6.0	50	20.0 to 8.0	16	waveguide output RG138/U
F4114	CO.09	310 -350	1 - 15	1 600	6.0	50	20.0 to 10.0	16	waveguide output RG138/U
F4112	CO.06	480 -520	1 - 10	1 100	6.0	40	30.0 to 20.0	16	waveguide output RG138/U
F4151	CO.05	570 -630	1 - 5	1 400	10.0	50	35.0 to 25.0	▲	waveguide output RG138/U

* The UHF coaxial connector and anode 2 are internally connected together and insulated from the focusing magnet.

▲ Provided with electromagnet.

** Types in development

INTEGRAL CAVITY OSCILLATORS

Type	Frequency	Vf	If	Typical operation			
	Gc	V	A	Va V	Ia mA	Rg Ω	Ps W
F6068	1.5	6.3	0.135	250	15	6 800	0.5
F6072	1.2 - 2.0	6.3	0.5	250	10	—	1

TRAVELLING-WAVE TUBES

TYPE		Frequency range Gc	Useful power		Gain dB	Noise factor dB	High voltage V	Current mA	Weight kg	Remarks
« F »	« CSF »		mW	W						

LOW NOISE T.W.T.

F4064	TPO.251	1.2 - 1.4	0.15		>25	<4.5	300	1.0	8.5	permanent magnet
F4129	—	2.7 - 3.3	1.5		>25	<5.6	450	0.5	7.3	permanent magnet
F4065	TPO.301	8.5 - 9.6	5		30	<8	660	0.6	6.5	permanent magnet

WIDE-BAND, MEDIUM NOISE T.W.T.

F4123	—	1.0 - 2.0	10		>35	<12	250	<1	1	periodic magnets
F4100	—	2.0 - 4.0	10		>35	<12	600	<2	1	periodic magnets
F4024	—	2.15- 4.3	30		>35	<11*	600	<2	1	periodic magnets
F4025	—	4.0 - 7.0	30		>35	<12	850	<1	1	periodic magnets
F4101A	—	4.0 - 8.0	10		>35	<13	850	<1	1	periodic magnets
F4026	—	6.9 -11.0	30		>35	<14	1 000	<1	1	periodic magnets
F4102A	—	8.0 -12.0	10		>35	<14	1 000	<1	1	periodic magnets

* 13 dB in the lower part of the band.

MEDIUM POWER T.W.T.

F4087	—	1.0 - 2.0		>1	32	—	1 200	30	0.72	periodic magnets
F4134	—	1.0 - 2.0		10	30	—	1 200	90	1	periodic magnets
F4017B	TPO.153B	1.7 - 2.7		>7	32	—	1 900	40	1	periodic magnets
F4130	—	1.7 - 2.7		20	32	—	2 000	75		periodic magnets
F4088	—	2.0 - 4.0		>1	32	—	1 500	30	0.72	periodic magnets
F4135	—	2.0 - 4.0		10	32	—			1	periodic magnets
F4066	TPO.430	3.8 - 4.2		6	25	—	2 000	40	0.3 + foc. 25	permanent magnet
F4059	—	5.9 - 6.4		20	30	—	3 000	45	0.5 + foc. 5.0	periodic magnets
F4056	TPO.410	5.9 - 8.4		10	24	—	2 400	40	0.5 + foc. 11.0	permanent magnet

PULSE OPERATION T.W.T.

F4061	TPO.025	1.2 - 1.4		6.5 - 5*	25	—	850	80	2.6	permanent magnet
F4063	TPO.125	1.2 - 1.4		>4 kW	27	—	12 kV pk	4.5 A pk	5	periodic magnets
F4147	TPO.703	4.2 - 4.6		10*	27	—	1 400	70		permanent magnet
F4148	TPO.704	4.2 - 4.6		2 kW	23	—	12 kV pk	2 A pk		periodic magnets
F4149	TPO.705	4.2 - 4.6		500 kW	23	—	70 kV pk	40 A pk		electro-magnet

* CW operation possible.

DUPLEXER TUBES

TYPE		Specification	Frequency range Gc	Max. useful power		Max. ins. loss dB	max. Deioniz. time attenuation 3 dB μS
« F »	« CSF »			MW pk	kW mean		
F3024	AR434C	Spark gap	1.2-1.4	0.06	0.06	0.3	75
F3025	AR434E	Spark gap	1.2-1.4	0.06	0.06	0.3	75
F3027	AP433	Pre-TR window	1.2-1.4	3	3	0.6	50
F3023	AP623	Pre-TR window	1.2-1.4	8	6	0.6	75
F3004	AR414	Wide-band TR	2.9-3.23	0.03	0.03	0.9	40
F3003	AP413	Double Pre-TR	2.9-3.23	1.2	1.2	0.4	90
F3022	AP427	Pre-TR	2.9-3.26	4.5	4.5	0.4	60

NOISE TUBES

TYPE

« F »	« CSF »	NOISE SOURCE FOR TEST EQUIPMENT
F9015	BG52-9	Noise measuring within 10 cm range
F9014	BG22-9	» » » » 9 cm »
F9016	BG65-9	» » » » 9 cm »
F9013	BG22-3	» » » » 3 cm »
F9093	—	» » » » 3 mm »

NOISE GENERATORS

TYPE	Frequency	Power	Max. voltage	Current
	Mc	W	V	A
F9076	200 - 400	40	1 500	0.2
F9091	1 250 - 1 350	60	1 700	0.4

MAGNETRONS

TYPE		Cooling*	Frequency range	Heating voltage	Heating current	Anode-cathode capacity	TYPICAL OPERATION				
							Anode peak voltage	Anode peak current	Filling percent	Pulse duration	Rated useful peak power
« F »	« CSF »		Mc	V	A	pF	V	A		μs	kW

X BAND

a) Fixed frequency

4J52A	—	2	of 9,345 to 9,405	12.6	2.2	13	15,000	15	0.001	1	75
4J50A	—	2	of 9,345 to 9,405	13.75	3.3	16	21,500	27.5	0.001	0.5	240

b) Tunable frequency

F1002	4J52T	2	of 8,500 to 9,600	12.6	2.2	12	15,000	15	0.001	1	70
F1097	MCV602	3	of 8,500 to 9,600	12.6	2.2	12	15,000	15	0.001	1	70
F1005	4J50TO	1	of 8,500 to 9,600	9	2.6	15	22,000	27.5	0.001	1	220
F1103	4J50TR	2	of 8,500 to 9,600	9	2.6	15	22,000	27.5	0.001	1	220
F1103A**	7006 (std-MIL)	2	of 8,500 to 9,600	9	2.6	15	22,000	27.5	0.001	1	220
F1110	7008 (std-MIL)	2	of 8,500 to 9,600	9	2.6	15	22,000	27.5	0.001	1	220

* Different from F1103 by the mechanical arrangement of the frequency tuning device

S BAND

a) Fixed frequency

F1057 to F1077□	MC83 to MC103	2	of 2,925 to 3,525	5.3	2.6	—	28,000	40	0.0005	1	400
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b) Tunable frequency

F1054	MCV1055E	2	of 2,900 to 3,015	14	5.2	—	30,000	65	0.001	4	1.1 MW
F1055	MCV1055F	2	of 2,985 to 3,115	14	5.2	—	30,000	65	0.001	4	1.1 MW
F1056	MCV1055G	2	of 3,085 to 3,200	14	5.2	—	30,000	65	0.001	4	1.1 MW

L BAND

F1088 to F1096	MC567A to J	1	of 1,270 to 1,370	20	13	—	42,000	150	0.0015	5	2.500
F1113	—	—	of 1,200 to 1,400	8	15	—	30,000	30	0.002	8	500

MAGNETRONS FOR INDUSTRIAL PURPOSES-CW.

F1112	—	1	of 2,425 to 2,475	12	3	—	3,500	0.8	—	—	1.5
F1117	—	1	of 2,425 to 2,475	15	5	—	4,600	1	—	—	2.5

* 1 Water-cooled. — 2 Air cooled. — 3 Cooled by inertia

□ 21 Sub-ranges of 30 Mc/s

SPARK-GAPS

Type	Frequency range	Power supply				Max incident peak power	Total leakage power	Deioniz. time at 3 dB	Max. ins. loss
		Voltage	Current	Resistance transmitter side	Resistance receiver side				
	Gc	kV	mA	MΩ	MΩ	W	W	μs	dB
F3018 *F3028	2 - 4.6	- 1.5	0.3	20	8.7	15	1	155	2.44
F3016 *F3029	4- 7.3	- 1.5	0.3	20	9.2	15	0.3	85	1
F3017 *F3030	6.7-10.7	- 1.5	0.3	20	6	15	0.2	85	1.2

* RF connectors : type N

DIODES AND RECTIFIERS

TYPE		FILLING	Limit amb. temp.	Max. inv. volt.		Max. peak current		Max. mean rect. cur.		Heating	
« F »	« CSF »			a	b	a	b	a	b	Vf	If
				°C	kV	kV	A	A	A	A	V

a) Hot cathode

F5004	V30*	vacuum	—	15	30	0.3	5	0.05	0.018	6.3	1.1
F5005	V35B*	vacuum	—	17	40	0.5	10	0.1	0.015	6.3	2
F5011A	VH8600A	merc.	25 to 55	20	—	10	—	5	—	5	18
F5020	—	vacuum	—	25	25	10	—	2	—	7.5	58
8020*	—	vacuum	—	40	40	0.75	2.5	0.1	—	5	6

b) Cold cathode

F5019	AR64	merc.	5-45	16	—	33.6	—	5.6	—	liquid cathode	
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a = rectifier operation (with 0.1 μ F filter input capacitance for tubes marked *).
b = pulse operation.

NEON TUBES

TYPE		
« F »	« CSF »	
F9017	IN10	400 to 1 500 kW — S Band
F9018	IN524	5 to 20 kW — X Band
F9019	IN663	2.5 MW — L Band

CERAMIC TUBES

TRIODES

Limit operating conditions

	Frequency	Va	Ia	Pa	s	k
	Gc	V	mA	W	mA/V	
F6024	6.0	350	17.5	5	8	60
F6067*	2.0	250	15	3	15	
7077	1.2	250	10	1	10	90

* Transmitting tube exclusively.

TETRODE

Limit operating conditions

	Frequency	Va	Vg2	Ia	Pa	k
	Gc	kV	kV	mA	W	
7650	1.215	2.5	1.2	500	700	13

THYRATRONS

Limit operating conditions

	Va pk (kV)	Va inv. pk (kV)	Ia pk (A)	Ia mean (mA)	Vgr pk min. (V)
F5008A	16	16	150	450	200
F5023	8	8	90	100	175

COLD-CATHODE VOLTAGE REGULATOR TUBE

F5016	Va = 120 V ; Voltage drop 82 \pm 3 V ; T max = 500 °C
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TRIODES

TYPE		Heater		Maximum ratings				Mean values		COOLING			
« F »	« CSF »	Vf	If	Freq	Va	Ik	Pa	s	k	NATURAL	FORCED AIR	WATER	VAPOR
		V	A	Mc	kV	A	kW	mA/V					

TELECOMMUNICATIONS

F6059	E1200	12	9.5	60	3.5	0.7	0.5	8	35	o			
F6005	E1300	7.5	36	60	5	1.2	1.5	12	18	o			
F6073	—	7.5	100	30	4	3.2	5	26	30		•		
F6052	E1566R	7.5	95	30	10	3.2	6	33	44		o		
F6043	ETR533	11	275	30	15	10	25	44	42		•		
F6044	ETV533	11	275	30	15	10	50	44	42				•
F6051	E1966R	11	275	30	15	10	25	44	42		•		
F6045	ETO561	12	480	30	18	30	150	135	50			•	
F6047	ETV561	12	480	30	18	30	150	135	50				•

Hard tubes

F6077	—	8	290	—	35	80	15	30	24		•		
F6046	—	12	480	—	50	400	60 150	135	50		•	••	••

VOLTAGE REGULATION

6080WA*	—	6.3	2.5	—	0.25	0.15	0.013	7	2	•			
6336A*	—	6.3	4.75	—	0.4	0.4	0.03	11	3	•			
F6025	—	10	10	—	4	0.6	0.5	6.5	6.5	•			
F6075	—	7.5	36	—	5	1.2	1.5	12	18	•			

* Double triode values per section.

TETRODES AND PENTODES

TYPE		HEATER		Maximum ratings				Mean values		COOLING			
« F »	« CSF »	Vf	If	Freq.	Va	Vg2	Ia	Pa	s	k'	NATURAL	FORCED AIR	VAPOR
		V	A	Mc	kV	V	mA	W	mA/V				

TÉTRODES

5933S	—	6.3	0.9	125	0.6	300	120	25	5.5	7.5	•			
829B	—	6.3 12.6	2.25 1.125	200	0.75	225	240	40	7	11	•			
F6022	P2.40B	6.3 12.6	2.25 1.125	200	0.75	225	240	40	7	11	•			
F6071	Wu = 2 kW			1,000	(under development)								•	
F6074	—	7.5	100	120	4	800	3,000	4,000	18	4		•		
F6053	EG1566R	7.5	100	100	8	1,000	3,000	5,000	20	4		•		
F6065	EGV1566	7.5	100	100	8	1,000	3,000	10,000	20	4			•	
F6054	EGR664	7.5	105	100	10	1,000	3,500	5,000	20	4		•		
F6076	Wu = 5 kW			600	(under development)								•	

PENTODES

F6003	P600A	10	10	60	3	800	600	400	6.5	6.5	•		
F6010	P1300	10	20	30	4	950	1,000	1,000	15	6.5	•		

ELECTROSTATIC RELAYS

(CEA LICENCE) RE 689

To measure small electric charges (10^{-9} Coulomb) or very low currents (10^{-11} Amp) which are restored by the relay to the terminals of a high load impedance in the form of a voltage of a few volts.

Electrical properties

Insulation resistance at 20 °C	> 10^{15} Ω
Minimum active capacitance	approx. 2 pF
Sensitivity for optimum set up, better than	10^{-9} Coulomb
Circuit-making voltage	approx. 100 V
Repeatability at constant temperature	< 1%
Temperature coefficient between - 10 and + 50 °C.	< 1%
Limit operating temperature	70 °C

THERMAL RELAYS

TYPE	Heater		Delay time			Characteristics
	Voltage	Current	Opening of contact 1	Closing of contact 2	Return to contact 1	
« F »	« CSF »	V	A	S	S	S
F9029A	XT20A	6.3	0.33	10	20	80
F9030A	XT30A	6.3	0.33	13	30	85
F9031A	XT45A	6.3	0.33	20	45	120
F9032A	XT60A	6.3	0.33	25	60	130
F9033A	XT75A	6.3	0.33	33	75	180
F9034A	XT90A	6.3	0.33	38	90	190
F9036A	YT15A	26.5	0.075	7	15	70
F9037A	YT20A	26.5	0.075	10	20	80
F9038A	YT30A	26.5	0.075	13	30	85
F9039A	YT45A	26.5	0.075	20	45	120
F9040A	YT60A	26.5	0.075	25	60	130
F9041A	YT75A	26.5	0.075	33	75	180
F9042A	YT90A	26.5	0.075	38	90	190

Contact rating : DC 115 V ; 0.5 A, AC 250 V ; 1 A
 Max. contact resist. : 0.05 Ω
 Pin test voltage : 1 000 V rms across contacts
 Inter-pin insulation : 100 MΩ
 Max. dimens. : 0.19 mm - h. 67 mm

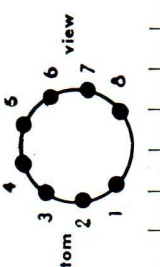
“MINIATRON” TUBES

TYPE	SPECIFICATION	HEATER		CAPACITANCES between electrodes			CHARACTERIST. absol. limit. values			TYPICAL OPERATION					Shock g	Max. dimens.		PIN CONNECTIONS										
		V	A	Cg1-a pF max.	Input pF	Output pF	Va V	Pa W	Pg2 W	Va V	Vg2 V	Ia mA	Ig2 mA	Rk Ω		s mA/V	ρ kΩ	g	mm	Dia. mm	bottom view			view				
DIODES																												
1Z2	Half-wave rectifier	1.25	0.265	Anode maxim. peak inv. volt.: 15.000 V Anode minimum resistance: 300 kΩ			Anode max. peak current : 8.5 mA Max. mean rectif. cur. : 1.5 mA					450	68.6	19.0	-f	+f	-f	-f	+f	-f	+f	Cap-ended anode						
5726/6AL5W	RF twin-diode	6.3	0.3	Anode maxim. peak inv. volt.: 360 V Anode minimum resistance: 11 kΩ			Max. peak current per anode : 60 mA Max. rectified current per anode 9 mA					450	45.3	19.0	k'	a''	f	f	k''	é	a'							
TRIODES																												
6J4S	UHF triode, grounded grid operation	6.3	0.4	Max. val. Cg - a = 3.3 Cgf - k = 9.5 Ca - k = 0.2			165	2.2	-	100	10	-	100	11	5	450	54.8	19.0	g	k	f	f	g	g	a			
6J4WA	UHF triode, grounded grid operation	6.3	0.4				150	2.25	-	150	13.5	-	100	11	5	450	54.8	19.0	g	k	f	f	g	g	a			
6J6WA	Twin-triode	6.3	0.45	1.3	2°	0.4	300	1.1	-	100	9	-	50	6	6.3	450	54.8	19.0	a''	a'	f	f	g'	g''	k			
5687WA	Twin-triode	12.6 6.3	0.45 0.9	4	4°	0.6	300	4.2	-	250	12.5	-	1 000	5.5	3	450	56.3	22.2	a''	g''	k''	f	f	k'	g'	f mil.	a'	
F7004/5842	Low-noise triode	6.3	0.3	0.55	7.75°	2.0	180	4.5	-	150	22	-	60	25	2	450	45.0	22.2	a		f	g	g	k	g	g	f	
12AT7WA	Twin-triode	6.3 12.6	0.3 0.15	1.6	2.5°	0.5	330	2.8	-	250	10	-	200	5.5	10.9	450	56.3	22.2	a''	g''	k''	f	f	a'	g'	k'	fm	
12AX7S	Twin-triode	6.3 12.6	0.3 0.15	1.7	1.6°	0.5	300	1.0	-	250	1.25	-		1.6	6	450	56.3	22.2	a''	g''	k''	f	f	a'	g'	k'	fm	
6189/12AU7WA	Twin-triode	6.3 12.6	0.3 0.15	1.8	1.6°	0.5	300	2.7	-	250	10.5	-	1 000	2.2	7.7	450	56.3	22.2	a''	g''	k''	f	f	a'	g'	k'	fm	
TETRODES AND PENTODES																												
6AH6WA	Sharp cut-off RF pentode	6.3	0.45	0.02	10°	3.6	330	3.2	0.45	300	150	10	2.5	160	9	500	450	54.8	19.0	g1	g3	f	f	a	g2	k		
6AM6S/6064	Sharp cut-off RF pentode	6.3	0.3	0.01	7.6°	3.2	550	3.0	0.9	250	250	9.8	2.6	160	7.6	1,000	450	54.8	19.0	g1	k	f	f	a	g3-é	g2		
6AN5WA	Video power pentode	6.3	0.45	0.075	9°	5.5	135	4.6	1.5	120	120	34	11	125	8.5	-	450	54.8	19.0	g1	k-g3	f	f	a	g2	k-g3		
6AU6WA	Sharp cut-off RF pentode	6.3	0.3	0.0035	6°	4.9	330	3.3	0.7	250	150	10.6	4.3	68	5.2	1,000	450	54.8	19.0	g1	g3-é	f	f	a	g2	k		
6AU6WB	Sharp cut-off RF pentode	6.3	0.3	0.0035	6°	4.9	330	3.3	0.7	250	150	10.6	4.3	68	5.2	1,000	450	54.8	19.0	g1	g3-é	f	f	a	g2	k		
6CL6S	Video power pentode	6.3	0.65	0.12	11°	5.5	330	8.2	1.9	250	150	30	7	Vg1 = -3V	11	150	450	67.5	22.2	k	g1	g2	f	f	a	g3-é	g2	g1
6CQ6S	Remote cut-off RF pentode	6.3	0.2	0.01	4.5°	7.0	300	3.0	0.7	200	200	8	2.1	240	2.5	400	450	54.8	19.0	g1	k	f	f	a	g3-é	g2		
5654/6AK5W	Sharp cut-off RF pentode	6.3	0.175	0.02	4°	2.8	200	1.65	0.55	120	120	7.5	2.5	180	5	300	450	45.3	19.0	g1	k-g3	f	f	a	g2	k-g3		
5656	Power twin-tetrode	6.3	0.4	0.06	3.6°	1.5	250	3.5	1.8	220	120	45	-	-	6	Wu = 4.5W	450	54.8	22.2	g2	g'1	g''1	f	f	k	a''	a'	k
5686	Beam tetrode RF ampl., frequency multiplier	6.3	0.35	0.08	6.5°	8.5	275	8.25	3.3	250	250	27	3.1	Vg1 = -12.5V	3.1	45	450	56.3	22.2	k-g3	g1	k-g3	f	f	g2	a	k-g3	g2
5725/6AS6W	Twin control grid RF pentode	6.3	0.175	0.02	4.0°	3.0	200	1.65	0.55	120	120	5.2	3.5	Vg1 Vg3 -2 0 -3 -3	Sg1 = 3.2 Sg1 = 1.8	Sg3 = 0.5 Sg3 = 0.8	450	45.3	19.0	g1	k-é	f	f	a	g2	g3		
5749/6BA6W	Variable-mu RF pentode	6.3	0.3	0.0035	5.5°	5°	330	3.3	0.7	100	100	10.8	4.4	68	4.3	250	450	54.8	19.0	g1	g3-é	f	f	a	g2	k		
6005/6AQ5W	AF power beam tetrode	6.3	0.45	0.8	8°	8.5	275	11	2.2	180	180	29	3	Vg1 - 8.5 Vg1 - 12.5	3.7	Wu 2W Wu 4.5W	450	67.5	19.0	g1	k-g3	f	f	a	g2	g1		
VOLTAGE STABILISERS																												
OA2WA	Voltage stabiliser	Cold cathode		Min. supply volt. 185 V			Operating voltage : approx. 150V Regul. between 5 and 30 mA : approx. 4 V					Cont. duty. curr. min. 5 mA max. 30 mA		450	67.5	19	a	k	ci	k	a	ci	k					
OB2WA	Voltage stabiliser	Cold cathode		Min. supply volt. 130 V			Operating voltage : approx. 108 V Regul. between 5 and 30 mA : approx. 3 V					Cont. duty. curr. min. 5 mA max. 30 mA		450	67.5	19	a	k	ci	k	a	ci	k					

• With external shield ° Without external shield.

"SUBNITRON" TUBES

TYPE	HEATER		CAPACITANCES between electrodes		CHARACTERIST. absol. limit. values		TYPICAL OPERATION					Stock	Max. dimens. length Dia. mm mm	PIN CONNECTIONS											
	V	A	Cg1-a pF	Input pF	Output pF	Va V	Pa W	Va V	Vg2 V	Ia mA	Ig2 mA or k			Rk Ω	S mAV	ρ kΩ	1	2	3	4	5	6	7	8	
5896	6.3	0.3				Anode max. peak current : voltage :	460 V	6.3	0.3						450	34.9	10.1	a''	k''	f	bl.	a'	f	k'	nc



DIODE

5896	RF twin diode	6.3	0.3	Anode max. peak current : voltage :	460 V	6.3	0.3							450	34.9	10.1	a''	k''	f	bl.	a'	f	k'	nc
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TRIODES

		6.3	0.2	1.6	2.6	0.85	200	1.35	—	120	—	9.4	k=25.5	220	5	5.1	450	38.1	10.1	a	—	f	g	k		
5703WB	UHF triode	6.3	0.15	1.4	2.2	0.7	165	0.9	—	100	—	8.5	k=27	150	5.8	4.6	450	34.9	10.1	g1	nc	f	nc	k	a	
5718	UHF triode	6.3	0.15	0.8	1.7	0.6	165	0.55	—	100	—	0.73	k=70	1500	1.7	41	450	34.9	10.1	g1	nc	f	nc	k	a	
5719	AF triode	6.3	0.2	0.8	2.7	2.3	275	1.3	—	250	—	4.2	k=70	500	4	17.5	450	38.1	10.1	a	f	f	g	k		
5744WB	UHF triode	6.3	0.3	1.5	2.4	0.28	165	1.1	—	100	—	6.5	k=35	150	5.4	6.5	450	34.9	10.1	a''	g''	f	k'	f	g' a'	
6021*	RF twin triode	6.3	0.3	1.5	1.9	0.32	165	1.1	—	100	—	8.5	k=20	220	5	4	450	34.9	10.1	a''	g''	f	k'	f	g' a'	
6111*	RF twin triode	6.3	0.3	1.6	1.75	0.6	150	0.5	—	120	—	0.92	k=54	1500	1.75	30	450	34.9	10.1	a	g	g	a	k	f	a
6533	Antimicrophonic AF triode	6.3	0.2	1.6	1.75	0.6	150	0.5	—	120	—	0.92	k=54	1500	1.75	30	450	34.9	10.1	a	g	g	a	k	f	a

TETRODES AND PENTODES

		6.3	0.15	0.015	4	3.4	165	1.1	0.7	100	100	5.6	4	150	3.2	110	450	34.9	10.1	g1	k	f	g3	a	f	g2	k
5636	Twin-grid RF pentode mixer	6.3	0.45	0.13	9	8	165	3.5	1	150	100	2.0	4	100	9.0	50	450	44.4	10.1	g1	kg3	f	kg3	a	f	g2	kg3
5639	Video pentode	6.3	0.15	0.015	4.2	3.4	165	0.9	0.35	100	100	7.5	2.4	150	5.0	260	450	34.9	10.1	g1	kg3	f	kg3	a	f	g2	kg3
5840	Sharp cut-off RF pentode	6.3	0.15	0.015	4.3	3.4	165	1.1	0.35	100	100	7.2	2	120	4.5	260	450	34.9	10.1	g1	kg3	f	kg3	a	f	g2	kg3
5899	RF variable-μ pentode	6.3	0.15	0.015	4.3	3.4	165	3.7	0.4	110	110	30	2.2	270	4.2	15	450	44.4	10.1	g1	kg3	f	kg3	a	f	g2	kg3
5902	AF Beam power tetrode	6.3	0.45	0.20	6.5	7.5	165	3.7	0.4	110	110	30	2.2	270	4.2	15	450	44.4	10.1	g1	kg3	f	kg3	a	f	g2	kg3

VOLTAGE STABILISER

5783WA	Cold cathode Voltage stabiliser	Max. break down voltage : 120 V		Operating voltage : 86 V approx.		Minimum current : 1.5 mA		Input voltage : 140 V min.		Regulation between 1.5 and 3.5 mA :		3 V approx.		450	38.1	10.1	k										
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THYRATRON

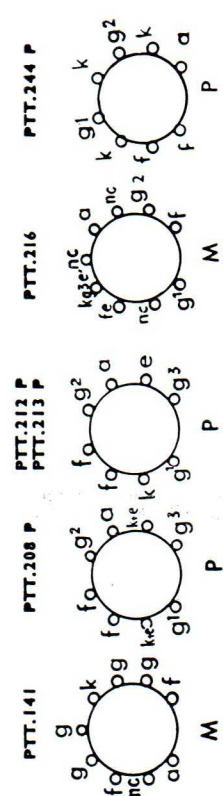
5843	Gas-filled tetrode thyatron	6.3	0.15	Anode max. peak voltage : 500 V	Mean cathode current : 16 mA max.	450	34.9	10.1	a	g2	f	g2	k	f	g1	g2
				Anode max. inver. voltage: 500 V	Cathode max. peak current : 100 mA											
				Limit temp. — 55to125° C												

Length of leads : 38 mm min. — * With external shield. — ° Without external shield.

* Ratings per section.

REPEATER TUBES

TYPES	HEATER		CAPACITANCE between electrodes			CHARACTER. Limit. abs. values		TYPICAL OPERATION						Max. dim.	CHARACTERISTIC FEATURES			NON-LINEAR DISTORTION									
	V	A	C _{g1-a} pF max.	Input pF	Output pF	V _a V	P _a W	V _a V	P _{g2} W	V _g V	I _a mA	I _{g2} mA	R _k Ω		S mA/V	ρ kΩ	V _g V	Length mm	Dia. mm	Noise Resist. at 1 Mc Ω	μA/V/p	Life h	V _{max} V	β% max.	Anode load kΩ	P in anode load (mW)	
PTT.141	6.3	0.3	0.65	7	1.95	3.5	180	4.5	—	150	—	23	—	60	25	2	—	1.4	45	22.2	150	—	8,000	—	—	—	—
TRIODE																											
PTT.208 P	18	0.140	0.060	9	7.1	225	3.6	0.7	200	200	18	3.6	200	6	140	—	4.3	65	26.5	—	—	20,000	—	5	15	666	
PTT.212 P	18	0.11	0.03	7.5	3.7	225	2.4	0.6	200	200	10.5	2	125	8.5	500	—	1.6	60	26.5	675	0.76	16,000	0.2	5	1	—	
PTT.213 P	6.3	0.31	0.03	7.5	3.7	225	2.4	0.6	200	200	10.5	2	125	8.5	500	—	1.6	60	26.5	675	0.76	16,000	0.2	5	1	—	
PTT.216	6.3	0.3	0.12	7.8	3.5	180	2.25	0.75	150	150	12.3	3.7	110	13.5	200	—	1.75	45	22.2	185	1.2	16,000	0.3	7	7.5	—	
PTT.244 P	18	0.14	0.07	11	3.7	4	180	5.2	1.3	150	150	24	5	45	27	30	—	1.5	60	26.5	300	1.7	8,000	—	5	1.5	100
TETRODES AND PENTODES																											



M = 9C12 nine-pin miniature base ; P = UTE standard ; C 95 = PTT 49 8-pin base.

GAUGES

TYPE		VACUUM GAUGES					
« F »	« CSF »	Heater		Collector voltage V	Grid voltage V	Grid current mA	Limit vacuum mm of Hg
		Voltage V	Current A				
F9028	BA10	22.7	4.5	- 50	+ 150	10	10 ⁻¹⁰
F9012	—	Same as BA 10 but with metal connecting flange.					

GAUGE POWER SUPPLY UNITS

TYPE	Pressure measuring range
ALJ2004B	10 ⁻¹ to 10 ⁻⁹ Pa
ALJ2009C	10 ⁻¹ to 10 ⁻⁵ Pa
ALBAG10	3 × 10 ⁵ to 10 ⁻¹⁰ Pa

T. W. T. AMPLIFIERS

TYPE	SPECIFICATION	Frequency Gc	Power W	Gain dB	Noise dB	Remarks
AMP. 2023	Low noise amplifier	1.2- 1.4	0.2 mW	> 25	< 5.5	External amplitude modulation, or manual (or self-acting) gain control.
AMP. 2024	» »	2.5- 3.5	0.002	> 25	< 8	
AMP. 2025	» »	8.0-10.0	0.005	> 25	< 10	
AMP. 2026	Low power amplifier	1.0- 2.0	1	> 30	—	
AMP. 2042	» »	2.0- 4.0	1	> 30	—	
AMP. 2048	Medium Power amplifier	2.0- 4.0	> 10	> 27	—	
AMP. 2039	» »	6.5- 7.5	> 8	> 23	—	

DISPLAY TUBES

TYPE		Figures	Height of figures mm	Voltage V	Current mA
« F »	« CSF »				
F9020	TA543	Figures (0 to 9)	58	250 to 300	10 to 14
F9090	—	Figures (0 to 9)	45	250 to 300	5.8 to 8,2
F9004	TA542	Figures (0 to 9)	20.5	250 to 300	2 to 3
F9057	—	Figures (0 to 9)	15.5	250 to 300	1,5 to 3
F9059	—	Monetary figures	15.5	250 to 300	1,5 to 3
F9060	—	Electrics figures	15.5	250 to 300	1,5 to 3
F9061	—	Mathematics figures	15.5	250 to 300	1,5 to 3
F9082	—	Composite figures	15.5	250 to 300	1,5 to 3
F9080	—	Figures (0 to 9)	13	250 to 300	1,5 to 2,5
F9092	—	Composite figures	13	250 to 300	1,5 to 2,5

Remarks : These tubes are direct-view digital display tubes. They consist of 10 cathodes appearing as superimposed figures and one anode. Figure display is obtained by applying a suitable voltage to the corresponding cathode.

“ LUMIPLAQUES ”

The « Lumiplaques » operation is based upon the electroluminescence principle.

Innumerable problems of display operation are easily and cheaply solved by the use of « Lumiplaques » : Signal operation, visual indicator, luminescent test-meter dials, control panel, markerlight, night-light, advertising, staircase switch, etc.

Recommended operating conditions = 400 c/s; 200 RMSV
Power consumption 35 to 50 mW per cm².

CATHODE-RAY TUBES

TYPE*		Overall bulb diam.	Useful screen diameter	Overall length	Radius of screen curvature	Heater		Plate sensitivity		Typical operation			
« F »	« CSF »					Voltage	Current	X1 X2	Y1 Y2	Voltage A3	Voltage A2	Voltage A1	Grid cut-off voltage

ELECTROSTATIC FOCUSING AND DEFLECTION

F8008A (P1 - P7 - P11)	OE407 (AV - AR - AB)	70	dia 60	285	250	6.3	0.6	4.9	3.7	—	1,500	175	—50
F8009A (P1 - P7 - P11)	OE407AP (AV - AR - AB)	70	dia 60	285	250	6.3	0.6	4.35 to 5.8	3.3 to 4.5	3,000	1,500	135 to 205	—28 to —84
F8045 (P1 - P2 - P7 - P11 - P31)	—	76	64 × 38	346	∞	6.3	0.3	1.2	0.9	4,000	680	0 to 270	—15 to —25
F8013A (P1 - P7 - P11)	OE411 (AV - AR - AB)	110	dia 95	360	350	6.3	0.6	3.6	2.95	—	1,500	180	—50
F8014A (P1 - P7 - P11)	OE411AP (AV - AR - AB)	110	dia. 95	360	350	6.3	0.6	2.9 to 3.95	2.5 to 3.35	3,000	1,500	280 to 420	—25 to —84
5AD (P1 - P2 - P7 - P11)	—	133.3	dia.108	425.4	∞	6.3	0.6	1.57 to 1.96	1.2 to 1.47	3,000	1,500	345 to 515	—34 to —56
5BG (P1 - P2 - P11 - P31)	—	133.3	100 × 60	444.5	∞	6.3	0.6	2.75 to 3.38	1.12 to 1.37	10,000	1,670	180 to 590	—50 to —80
5BH (P1 - P2 - P11 - P31)	—	133.3	100 × 40	463.5	∞	6.3	0.6	2.75 to 3.35	0.59 to 0.72	10,000	1,670	180 to 590	—50 to —80
F8030 (P1 - P2 - P7 - P11)	—	133.3	dia 108	425.4	∞	6.3	0.6	1.57 to 1.96	1.2 to 1.47	3,000	1,500	345 to 515	—34 to —56
F8058 (P2 - P7 - P11 - P31)	—	133.3	100 × 40	463.5	∞	6.3	0.6	2.75 to 3.35	0.59 to 0.72	10,000	1,670	180 to 590	—50 to —80
F8059 (P2 - P7 - P11 - P31)	—	133.3	100 × 60	444.5	∞	6.3	0.6	2.75 to 3.38	1.12 to 1.37	10,000	1,670	180 to 590	—50 to —80
F8072 (P2 - P7 - P11 - P31)	—	133.3	100 × 60	444.5	∞	6.3	0.6	2.75 to 3.38	1.12 to 1.37	10,000	1,670	180 to 590	—50 to —80
F8073 □ (P2 - P31)	—	133.3	100 × 40	497	∞	6.3	0.6	2.0	0.55	10,000	1,670	200 to 600	—40 to —70
F8074 □□ (P2 - P31)	—	133.3	100 × 60	470	∞	6.3	1.2	3.0	0.65	10,000	1,660	180 to 570	—50 to —80
F8018A (P1 - P7 - P11)	OE418 (AV - AR - AB)	180	dia 150	475	400	6.3	0.6	3.0	2.65	—	2,000	480	—56
F8021A (P1 - P7 - P11)	OE418AP (AV - AR - AB)	180	dia 150	475	400	6.3	0.6	2.5 to 3.35	2.4 to 3.1	4,000	2,000	380 to 570	—30 to —80
F8042 (P1 - P7 - P11)	OE1218P (AV - AR - AB)	180	dia 150	500	∞	6.3	0.6	1.85	1.6	4,000	2,000	460 to 690	—45 to —75

□ f: 100 Mc

□□ 2 writing guns

TYPE*		Overall bulb diam.	Useful screen diameter	Overall length	Radius of screen curvature	Heater		Typical operation		
« F »	« CSF »					Voltage	Current	Anode Voltage	Grid 2 voltage	Grid cut-off voltage

ELECTROMAGNETIC FOCUSING AND DEFLECTION

10FP4-A	—	267	dia 230	447.5	1.070	6.3	0.6	10,000	250	—27 to —63
F8048 (P7A - P19A)	OM726 (P7A - RO)	267	dia 230	447.5	1.070	6.3	0.6	10,000	250	—27 to —63

* In each of the two columns « Type », the second line referring to any model of tube, specifies the fluorescent screen powders which can be used.

The complete appellation of a tube necessarily includes the selected type of powder.

Ex.: « F » Type: F 8014AP11 or « CSF » Type: OE411APAB.

CATHODE-RAY TUBES (following)

TYPE		Overall bulb diam.	Useful screen diameter	Overall length	Radius of screen curvature	Heater		Typical operation			
						Voltage	Current	Voltage A2	Voltage A1	Grid 2 voltage	Grid 1 cut-off voltage
« F »	« CSF »	mm	mm	mm	mm	V	A	V	V	V	V

ELECTROSTATIC FOCUSING AND ELECTROMAGNETIC DEFLECTION

F8064P4	—	Rect.	125 × 95		∞	6.3	0.6	9,000	0 to 300	500	—100
5AH (P4A - P7A - P19A)	—	125	dia108	285		6.3	0.6	5,000	0 to 250	300	— 55
7AB (P7A - P19A)	—	182.5	dia152.5	336.5	609	6.3	0.6	7,000	0 to 250	300	—28 to —72
10W (P7A - P19A)	—	267	dia230	430	1,070	6.3	0.6	10,000	0 to 600	300	—33 to —77
12AB (P7A - P11A - P19A)	—	316	dia279.5	457	1,016	6.3	0.6	10,000	0 to 300	300	—28 to —71
F8031A (P2A - P4A - P19A)	OM1138A (P2 - AT - ARO)	381	dia330	635	1,050	6.3	0.6	15,000	0 to 600	300	—38 to —72
F8038 (P2A - P4A - P7A - P19A)	—	403.5	dia365	546	1,016	6.3	0.6	12,000	135 to 400	300	—35 to —75

BARRIER-GRID STORAGE TUBE

TYPE		Characteristics
« F »	« CSF »	
F8026	TCM13	Simultaneous writing and reading. Definition : 400 TV lines. Elimination rate : 20 dB.

SCAN CONVERSION TUBES

TYPE		Writing gun	Reading gun	Min. definition at 50 % mod.	Fast erasing	Remarks
« F »	« CSF »					
F8024	TMA403	Stat. Focusing-Magn. Defl.	Stat. Focusing-Stat. Defl.	140 circles	no	
F8041	TMA404	Stat. Focusing-Magn. Defl.	Stat. Focusing-Stat. Defl.	160 circles	yes	
F8080	TMA406	Stat. Focusing-Magn. Defl.	Stat. Focusing-Magn. Defl.	180 circles	yes	
F8060	TMA408	Stat. Focusing-Magn. Defl.	Magn. Focusing-Magn. Defl.	140 circles	yes	Very light, and low overall dimensions.

DIRECT VIEW STORAGE TUBES

TYPE		Useful dia	Writing guns	Min. writing speed	Screen	Remarks
« F »	« CSF »					
F8029	—	92 mm	1 gun. Static focusing and deflection	5 mm/ μ s	P20	Designed for airborne equipments
F8036	—	92 mm	2 guns. Static focusing and deflection	5 mm/ μ s	P20	Designed for airborne equipments
F8050	TEI.603	92 mm	1 gun. Static focusing and deflection	100 mm/ μ s	P2	Designed for oscilloscopy of transients. Allow to see traces at writing speed up to 500 mm/ μ s
F8055	—	100 mm	1 gun. Static focusing Magnetic deflection	10 mm/ μ s	P20	Low weight and dimensions (l = 200 mm) Designed for airborne equipments.

TELEVISION PICK-UP TUBES

TYPE		Characteristics
« F »	« CSF »	
F8061	TIAM	Television pick-up tube of low dimensions — Useful diameter 25 mm Resolution : 400 TV lines at 70 % modulation. Induced conductivity target.
F8077	TIAM-AB	Supersensitive Television pick-up tube (Saturation illumination : 10^{-3} lx) Photocathode S20. Useful picture dia. : 150 mm. Induced conductivity target.
F8078	TIAM-ABX	Supersensitive Television pick-up tube designed for radiosopic pictures. (Saturation X rays flow : $1,25 \times 10^{-2}$ R/mn) Photocathode S20. Video output. Useful picture diameter : 150 mm. Induced conductivity target.

INFRA-RED TUBES

TYPE		Characteristics
« F »	« CSF »	
F9049	D.16	Designed for infra-red/visible image conversion ; monovoltage type.
F9096	DA-24-75	High-current, fast photoelectric cell — Coaxial Structure $0,35\mu < \lambda < 1,2\mu$ — designed for analysis of light intensities supplied by high — power lasers — Typical impedance: 75 Ω .

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CSF - COMPAGNIE GÉNÉRALE DE TÉLÉGRAPHIE SANS FIL



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