

**RCA**

# **Microwave Devices**

**TWT's and Subsystems**

**MWD-101 10-69**

RCA | Electronic Components | Harrison, NJ 07029

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## RCA Traveling-Wave Tubes

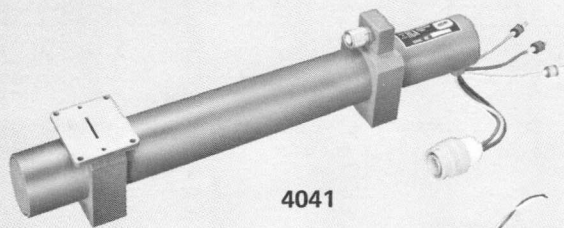
RCA Traveling-Wave Tube capability represents experience acquired during 19 years of TWT tube development and manufacture. Whether providing a standard product or one customized for your application, the RCA trademark assures high quality and reliability. Our application and system engineering groups are available to help define requirements for your system. In addition, the RCA approach includes engineering follow-up that continues beyond the test set until customer satisfaction is assured through in-system tube performance.

### Major Application Areas for RCA TWT's

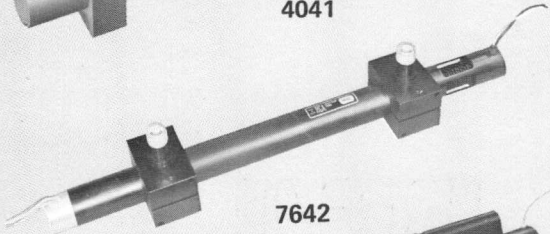
**ECM Systems:** RCA has specialized in providing traveling-wave tubes for the low-level input amplifier stage, recirculating rf memory (loop) stage, and the driver stage of electronic counter measure systems. RCA has designed medium-noise traveling-wave tubes to meet the diverse and opposing requirements of low noise and wide dynamic range for the input amplifier stage of ECM systems. These tubes cover the L-Ku frequency band and have noise figures from approximately 12 to 20 dB. Where desirable, tubes can be prepackaged with delay lines, power dividers and integral power supplies as complete subsystems.

**Communication Systems:** RCA has had years of experience in providing traveling-wave tubes for ground-based and space-orbiting communications systems. These two types of communication systems have certain basic differences, thus, RCA has tailored the electrical characteristics of each type for the specific application. The environment is specified for each tube type in this catalog. Long life and good reliability are of importance for both types of applications. Therefore, RCA has paid particular attention to design features that result in long life.

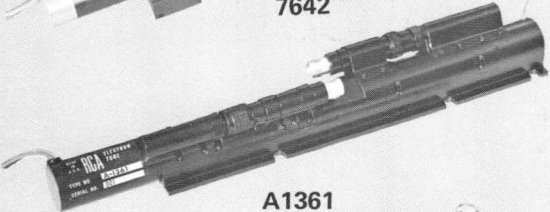
**Subsystems:** RCA can provide solid-state power supplies (designed to MIL-E-5400) integral with traveling-wave tubes or as separate units. The power supplies can be either of the field or depot repairable form depending on the application. Controlling the interface between the traveling-wave tube and the power supply can reduce the total cost for the system and/or result in improved tube performance. Power alarm and monitoring circuits can be customized to your specific needs with quick reaction capability.



4041



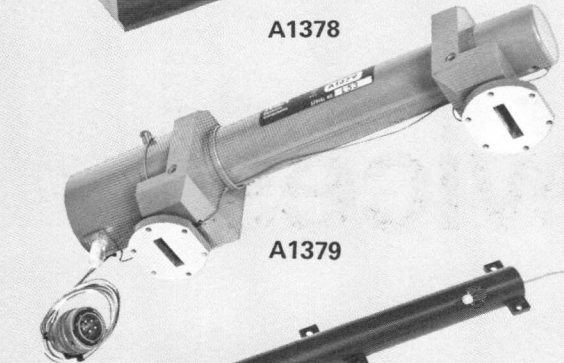
7642



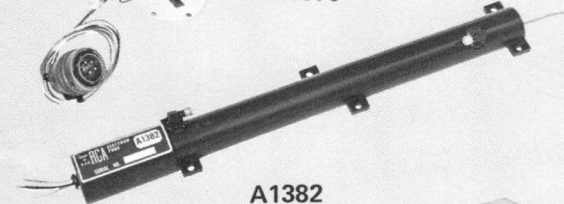
A1361



A1378



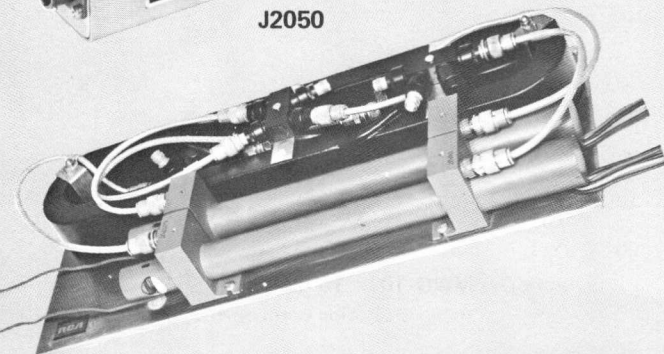
A1379



A1382



J2050



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### Low-Noise TWT's - Focusing : Solenoid

Frequency Range <sup>c</sup> GHz	RF Output Min. mW	Gain (Small Signal) Min. dB	Noise Fig. Max. dB	RCA Type <sup>a</sup>	Environment <sup>b</sup>	Heater		Collector		Control Grid	Dimensions <sup>d</sup>		Weight Approx. lb
						Volt-age Typ. V	Cur-rent Typ. A	Volt-age Typ. V	Cur-rent Typ. mA		Clearance (Includes Conn.) Max. in L	Capsule Nominal in Dia.	
1.25-1.35	0.25	20	4.5	A1056V2	Ground	5	0.70	600	0.27	Yes	19.4	1.38	1.5
1.7-1.94	0.5	25	5	A1217V4	Ground	5	0.65	600	0.15	Yes	19.6	1.39	1.5
2.19-2.31	1.0	20	5	A1207V26	Ground	5	0.65	800	0.15	Yes	19.6	1.39	1.5
2.32-2.68	1.0	28	5	8379	Ground	5	0.65	600	0.15	Yes	19.5	1.39	1.5
2.7-3.5	0.25	20	7	6861	Ground	5	0.65	400	0.15	Yes	19.6	1.39	1.5
2.7-3.5	1.0	20	5	A1207V17	Ground	5	0.65	800	0.15	Yes	19.6	1.39	1.5

### Medium-Noise TWT's - Focusing: Periodic - Permanent - Magnet

Frequency Range <sup>c</sup> GHz	RF Output Min. mW	Gain (Small Signal) Min. dB	Noise Fig. Max. dB	RCA Type <sup>a</sup>	Environment <sup>b</sup>	Heater		Collector		Control Grid	Dimensions <sup>d</sup>				Weight Approx. lb
						Volt-age Typ. V	Cur-rent Typ. A	Volt-age Typ. V	Cur-rent Typ. mA		Clearance (Includes Conn.) Max. in			Capsule Nominal in Dia.	
											L	W	H		
0.8-1.6	10	30	13	A1350V1	Airborne	6.3	0.2	500	1.5	Yes	18	2.5	2.94	1.25	4
1-2	10	35	12	A1294	Airborne	6.3	0.2	500	1.5	Yes	17	2	2	1.25	4
1-2.6	10	30	12	A1350	Airborne	6.3	0.2	500	1.5	Yes	18	2.5	2.94	1.25	4
2-4	10	36	17	A1327	Airborne	6.3	0.2	450	3.0	No	12.3	1.58	1.56	1.50	2
2-4	10	30	16	4017	Airborne	6.3	0.6	500	1.0	Yes	16	1.62	2.94	1.06	3
2-4	10	31	16	A1200V3	Ground	6.3	3.0	500	1.0	Yes	16	1.62	3.5	1.06	3.5
2-4	10	35	13	A1295	Airborne	6.3	0.6	500	1.0	Yes	15	2	2	1.25	3
2-6 <sup>9</sup>	10	38	17	A1375	Airborne	6.3	0.19	800	4.0	Yes	12.9	1.57	1.72	1.06	3
4-7	10	28	18	4020	Airborne	6.3	0.6	900	0.8	Yes	16	1.62	2.94	1.06	3
4-8	10	30	17	A1360 <sup>e</sup>	Airborne	6.3	0.22	900	2.5	No	12	1.5	1.5	1.03	1.8
7.5-12	5	30	20	A1383 <sup>e</sup>	Airborne	6.3	0.2	1050	0.5	Yes	12	1.5	1.5	1.03	1.6
8-12	10	30	10	A1422	Airborne	6.3	0.2	1100	0.5	Yes	12	1.5	1.5	1.50	3

### Low - Power TWT's - Focusing: Periodic - Permanent - Magnet

Frequency Range <sup>c</sup> GHz	RF Output Min. W	Gain (Small Signal) Min. dB	RCA Type <sup>a</sup>	Environment <sup>b</sup>	Heater		Collector		Control Grid	Dimensions <sup>d</sup>				Weight Approx. lb
					Volt-age Typ. V	Cur-rent Typ. A	Volt-age Typ. V	Cur-rent Typ. mA		Clearance (Includes Conn.) Max. in			Capsule Nominal in Dia.	
										L	W	H		
1-2	0.1	25	A1268	Ground	6.3	1.35	600	6	No	14.5	1.75	1.5	1.5	1.75
1.5-4.5	0.01	33	A1308	Airborne	6.3	0.7	500	4	No	12	1.75	1.5	1.06	1.75
2-4	0.006	14	A1374 <sup>e</sup>	Airborne	6.3	0.7	500	4	Yes	6.75	2.12	1.25	1.06	
2-4	{ 0.01 0.005	30 15	A1313 <sup>f</sup>	Airborne	6.3	0.7	500	3.5	No	12	1.75	1.5	1.06	1.75
2-4	0.01	32	A1372 <sup>e</sup>	Airborne	6.3	1.3	700	4	Yes	14	2.04	1.69	1.25	2.8
2-6 <sup>9</sup>	0.01	35	A1322	Airborne	6.3	0.7	780	4.5	No	12.9	1.57	1.72	1.06	1.8
2.5-3.5	0.005	14	A1297 <sup>e</sup>	Airborne	6.3	0.7	500	4	No	6.5	2.125	1.5	1.06	0.9
2.7-3.5	0.1	30	A1113V8	Airborne	6.3	1.3	700	8	Yes	15.6	1.75	2.5	1	2.5
4-7.5	0.003	30	A1382 <sup>e</sup>	Airborne	6.3	0.2	650	0.3	Yes	12	1.5	1.5	1.03	1.6
4-7.5	0.1	41	A1385 <sup>e</sup>	Airborne	6.3	0.2	1050	8	No	13	1.25	1.25	0.95	1.6
4-8	0.01	30	A1361	Airborne	6.3	0.8	900	2.5	Yes	12	1.51	1.55	1.07	1.8
7-11	{ 0.01 0.005	40 20	A1351 <sup>e,f</sup>	Airborne	6.3	0.25	1380	0.8	Yes	15.3	2.25	2.25	1.78	3
7-11	0.03	30	A1379	Shipboard	6.3	0.2	1350	3	Yes	13	4.0	2.5	1.5	5
7.5-12	0.005	30	A1383 <sup>e</sup>	Airborne	6.3	0.2	1050	0.5	Yes	12	1.5	1.5	1.03	1.6
7.5-12	0.2	40	A1386 <sup>e</sup>	Airborne	6.3	0.2	1950	12	No	13.1	1.25	1.25	0.95	1.6
12-18	0.01	35	A1398	Airborne	6.3	0.2	2200	3	No	12.0	1.5	1.5	1.00	1.8
12-18	0.01	35	A1421	Shipboard	6.3	0.2	2200	3	Yes	13.0	4.0	2.5	1.5	5

## Medium - Power TWT's - Focusing: Periodic - Permanent Magnet

Frequency Range <sup>c</sup> GHz	RF Output Min. W	Gain (Small Signal) Min. dB	RCA Type <sup>a</sup>	Environment <sup>b</sup>	Heater		Collector		Control Grid	Dimensions <sup>d</sup>				Weight Approx. lb
					Voltage Typ. V	Current Typ. A	Voltage Typ. V	Current Typ. mA		Clearance (Includes Conn.) Max. in			Capsule Nominal in	
										L	W	H		
0.75-1	20	30	A1317	Ground	6.3	0.95	1650	55	No	20	2.19	2.12	1.62	5
1-2	1	27	4021	Airborne	6.3	1.85	900	25	Yes	15.6	1.52	2.5	1.52	4.5
1-2	10	25	4053	Ground	6.3	1.75	2200	70	Yes	20.5	3.12	3.88	1.62	6.5
1.7-2.3	18	28	7642	Ground	6.3	1.75	2000	70	No	20.5	3.12	3.88	1.62	6.5
1.7-2.7	17	29	4054	Ground	6.3	1.75	2200	70	Yes	19	2.12	3.88	1.62	6.5
1.9-4.1	1	35	A1309	Airborne	6.3	1.4	1100	30	No	13	1.76	1.75	1.25	2.5
1.9-4.1	1	35	A1311	Airborne	6.3	1.3	1100	35	Yes	15.5	1.94	1.84	1.25	2.5
2-4	1	30	A1201V1	Airborne	6.3	1.3	1145	20	Yes	15.4	2.03	3.34	1.06	3
2-4	2	38	A1138V1	Airborne	6.3	1.3	1250	20	Yes	15.5	2.03	1.62	1.06	3
2-4	2	33	A1314	Airborne	6.3	1.5	1150	35	No	13	1.76	1.75	1.25	2.5
2-4	5	30	A1312 <sup>e</sup>	Airborne	5.0	0.5	800	30	No	13	2.72	1.30	1.25	1.5
2-4	20	30	A1320 <sup>e</sup>	Space	5.0	0.5	1000	38	No	9.5	2.72	1.30	1.25	1.6
2-69	2	33	A1323	Airborne	6.3	1.35	1600	30	No	15.8	1.86	2.45	1.25	3.3
2-69	3	35	A1310	Airborne	6.3	1.35	1100	30	No	15.4	1.94	2.00	1.25	3.25
2.2-3	13	35 sat.	4056 <sup>e</sup>	Space	5.0	0.5	1000	38	No	13	2.72	1.30	1.25	1.6
2.5-4.5	5-45 <sup>h</sup>	40 sat.	A1318 <sup>e</sup>	Space	5.0	0.5	800-1400 <sup>h</sup>	20-70	No	12	2.72	1.30	1.25	1.5
4.4-5	1	37	A1205	Airborne	6.3	1.35	1600	27	No	15.6	1.88	2.42	1.12	3.25
4.4-5	15	30	A1359 <sup>e</sup>	Airborne	5.0	0.52	1050	40	No	13	1.5	1.8	0.76	7
5-10	4	40	A1397 <sup>e</sup>	Airborne	6.3	0.70	2300	40	No	11	2.0	1.75	1.50	3
5.8-6.4	3	35	A1358	Airborne	6.3	1.35	1500	27	No	15.2	1.94	2.0	1.25	3.3
7.5-11	1	32	A1203	Airborne	6.3	0.85	2950	12	No	15.2	3.81	2.69	1.75	6
7.9-8.4	20	46	A1378	Airborne	6.3	0.7	3300	50	No	11	2.0	1.75	1.50	3
8-12	1	32	4041	Airborne	6.3	0.85	3000	12	Yes	15	2.2	3.25	1.75	6
12-18	1	35	A1399	Airborne	6.3	0.3	3000	20	No	11	1.5	1.5	1.5	3

### Power Supplies

RCA can provide integral or separate solid-state power supplies for many of the traveling-wave tubes listed in this catalog. Maintaining better control of the interface between the power supply and the traveling-wave tube often results in improved tube performance. Furthermore, trade-offs

can usually be made in the specifications to provide maximum performance at minimum cost. Some examples of power supplies we have sold are: J2022 for the A1308; J2028 for the 4053, 4054, and 7642; J2043 for the A1310; J2044 for the A1358; J2045 for the A1301 and the J2050 for the A1379.

### Footnotes:

- <sup>a</sup> Type numbers with prefix A and J are developmental types. These developmental-type devices are suitable for engineering evaluation. The type designations and data are subject to change. Unless otherwise arranged, no obligations are assumed for notice of change or future manufacture of these devices. Type numbers with suffix V are variants of the prototype. Inquiries are invited about new types or variants of prototypes for specific equipment designs. Application assistance is readily available.
- <sup>b</sup> Details on applicable environmental specifications are available on request. Inquiries are invited on types to meet specific environmental requirements.
- <sup>c</sup> When ordering traveling-wave tubes, specify the frequency range in which operation is intended.
- <sup>d</sup> Capsule nominal diameter is the diameter of the longest cylinder. For the "U" shaped capsule, capsule nominal diameter is the width of the "U" (flange dimension excluded).
- <sup>e</sup> Ceramic-Metal Construction.
- <sup>f</sup> This tube has two output couplers.
- <sup>g</sup> Can be supplied to cover any octave band within this range.
- <sup>h</sup> Power output varies with collector current; efficiency remains constant.