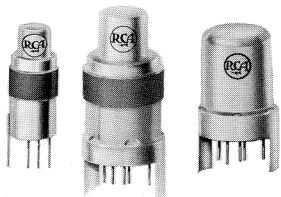


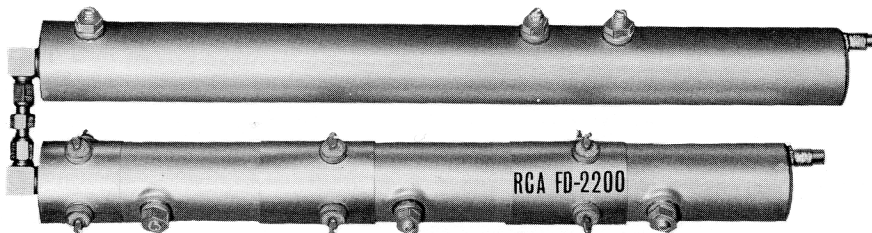
RCA

muvistors

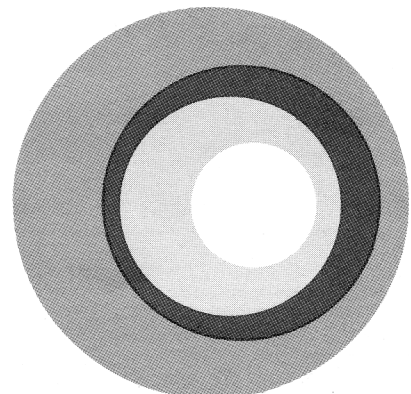
Reference Guide to
Commercial and Developmental Types



Single-and Double-Ended Types



Integral-Cavity Amplifiers



RADIO CORPORATION OF AMERICA
ELECTRONIC COMPONENTS AND DEVICES
HARRISON,
N. J.

Trademark(s) ® Registered
Marcas(s) Registrada(s)

RCA NUVISTOR TUBES

RCA INTEGRAL-CAVITY TRF AMPLIFIERS^a

ITEM	INDUSTRIAL AND MILITARY ^a										ENTERTAINMENT						UNIT	ITEM	Commercial Type	Developmental Types ^b			UNIT															
	Commercial & Military-Specification Types										Developmental Types ^b			Commercial Types																								
	7586 (A15202)	7587 (A2654F)	7895 (A15246)	8056 (A15247A)	8058 (A15211)	8203 (A15250)	8393 (A15342)	8627 (A15294B)	8628 (A15460)	A15274B	A15526 ^d	A15533 ^e	2CW4 ^e (A15217)	6CW4 (A15147N)	13CW4 (A15364)	2DS4 ^e (A15272)				6DS4 (A15251D)	2DV4 ^e (A15316)	6DV4 (A15300)																
RCA TYPE	Former RCA Dev. Type										Former RCA Dev. Type						RCA TYPE	FD-2200 (A15477E)	A15474D	A15515	A15528																	
Description	Medium-Mu Triode										Medium-Mu Extended-Cutoff Triode			High-Mu Triodes						High-Mu Extended-Cutoff Triodes						Medium-Mu Triodes						Description	1030-Mc, 3-Stage Amplifier & 3-Section Filter (Preselector)	1030-Mc, 1-Stage Amplifier	1090-Mc, 3-Stage Amplifier & 3-Section Filter (Preselector)	1030-Mc, 2-Stage Amplifier		
Intended Application	General Purpose										RF Amplifier			RF Amplifier in VHF TV or FM Receivers						RF Amplifier in VHF TV or FM Receivers						Local Oscillator in UHF TV Receivers						Aircraft Transponder Equipment & Other Fixed-Cavity Applications						
Military-Spec. Type	JAN-7586										-			-						-						Meets Specification for Class-2 Electronic Equipment as Covered in Military Specification MIL-E-5400G												
Military Specification ^c	MIL-E-1/1397B										-			-						-						-												
Electrical Characteristics:																																						
E_f	6.3										6.3			6.3						6.3						6.3						volts						
I_f	135										135			135						135						135						135						ma
P_f	0.85										0.85			0.85						0.85						0.85						0.85						watts
E_{bb}	26.5										110			70						70						70						70						ohms
R_k	100										100			100						100						100						100						ohms
R_g	0.5										-			-						-						-						-						megohms
μ	11.5										70			70						70						70						70						
r_p	4400										3200			3200						3200						3200						3200						ohms
g_m	7000										18000			18000						18000						18000						18000						μ hos
I_b	2.8										1.5			1.5						1.5						1.5						1.5						ma
I_{c2}	-										-			-						-						-						-						ma
$E_{c1}(co) @ I_b = 10 \mu a$	-7										-5 @ 100 μa			-5 @ 100 μa						-5 @ 100 μa						-5 @ 100 μa						-5 @ 100 μa						volts
Maximum Ratings:	Class A										Class C			Class A						Class A						Class A						Class A						
E_{bb}	330										400			330						300						300						300						volts
E_b	110										250			110						135						125						125						volts
E_{c1}	-55										-100			-55						-55						-55						-55						volts
e_{c1m}	4										5			4						10						2						2						volts
e_{hkm}	±100										±100			±100						±100						±100						±100						volts
$I_{c1}(av)$	2										5			2						0						5						5						ma
$I_{k(av)}$	15										25			15						15						15						15						ma
P_{g2}	-										-			-						-						-						-						watts
P_b	1										0.45			1						1.5						1						1						watts
P_{g1} (circuit) ^f	0.5/1										0.05			0.05						0.05						0.05						0.05						megohms
Altitude	100,000										100,000			100,000						100,000						100,000						100,000						ft
f (useful):	400										1200			400						1200						1200						1200						Mc
As amplifier	1000										800			1000						800						800						800						Mc
As oscillator	1000										800			1000						800						800						800						Mc
Typical Operation:	NF @ 200 Mc										NF @ 200 Mc			NF @ 200 Mc						NF @ 200 Mc						NF @ 200 Mc						NF @ 200 Mc						
Amplifier	4.3 db										11 db			4.3 db						4.3 db						4.3 db						4.3 db						db
Oscillator	-										-			-						-						-						-						db
Doubler	-										-			-						-						-						-						db
Mechanical:																																						
l_m (overall)	0.800										0.800			0.800						0.800						0.800						0.800						inch
(seated)	0.625										0.625			0.625						0.625						0.625						0.625						inch
d_m	0.440										0.440			0.440						0.440						0.440						0.440						inch
Base	5-Pin										5-Pin			5-Pin						5-Pin						5-Pin						5-Pin						
Top-Cap Diameter	-										0.250			-						-						-						-						inch
Other Developmental Versions: ^b																																						
Long-Lead Types ^g	A15212										A15317			A15317						A15317						A15317						A15317						
13.5-V-Heater Types ^h	See 8393 above										-			-						-						-						-						

^a Subjected to special controls on critical characteristics, environmental tests (shock, fatigue, vibration, altitude), and special life tests.

^b The number identifies a particular laboratory tube design but the number and identifying data are subject to change. No obligations are assumed as to future manufacture unless otherwise arranged.

^c Copies are available from: Specifications Division, Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa. 19120.

^d Developed under Buships, U.S. Navy contract.

^e Bogey heater warm-up time = 8 sec. for series-heater-string applications.

^f For fixed-bias/cathode-bias operation; single values are for either. For industrial and military types, at $T_{shell} = 150^\circ C$; max. T_{shell} with R_{g1} derating = $250^\circ C$. For entertainment types, at $T_{shell} = 135^\circ C$.

^g Intended for applications where it is desired to avoid use of a tube socket (such as printed-circuit-board applications; short-life, no-replacement applications; and applications at frequencies where re-actances caused by use of a socket would result in substantially-lowered tube performance). These types differ primarily from their respective prototypes in that they do not have either indexing lugs or base skirt, and in place of base pins have leads of length 0.750 inch min. RCA will entertain requests for other versions of specific prototypes having any number of long leads up to a maximum of 3 per electrode.

^h Intended for hybrid-equipment applications. RCA will entertain requests for other versions of specific prototypes having a bogey $E_f < 13.5 V$ with a corresponding bogey I_f such that cathode temperature is held constant.

^k For $DF \leq 0.01$; for $DF > 0.01$ and ≤ 0.5 , i_{km} derating is required.

^m For metal-shell-to-ceramic-insulator seal temperatures up to $100^\circ C$. Higher temperatures permissible with P_{g1} derating.

ⁿ For top-cap-to-ceramic-insulator seal temperatures up to $150^\circ C$. Higher temperatures permissible with P_b derating.

^p With series plate-circuit resistance = 5000 ohms min.

^q A mechanically-modified Type 8058 nuvistor tube is utilized in each amplifier stage. The plate and one end of the heater of each tube are connected to a common dc-ground terminal (tab) on the metal shell of the amplifier; the cathode and other end of the heater are brought out to separate terminals through 470-pF feed-thru capacitors; the grid has a separate terminal and is bypassed with a 1000-pF capacitor. Each amplifier or amplifier-filter combination has an input impedance of 50 ohms, and is designed for use with a load having an impedance of 50 ohms. RF terminals on each filter or amplifier are designed to mate with screw-on connectors Sealectro Corp. (225 Hoyt St., Mamaroneck, N.Y. 50944) Part No. 50 007 0000, or equivalent. For rigid filter-to-amplifier interconnection, Sealectro 50 073 000, 50 073 0029, or equivalent, may be used; for flexible interconnection, RG 188/U coaxial cable is recommended. RCA will entertain requests for other TRF Amplifiers having a center frequency within the range of 470 Mc to 1200 Mc.

^r At $T_A = 25^\circ C$ and under same conditions as shown for Electrical Chars.

^s Amplification (voltage gain) at center frequency f_0 .

^t Change in f_0 ; measured as average of Δf_L and Δf_U at -6 db level.

^u Change in A_0 from its value at $T_A = 25^\circ C$.

^v Exclusive of terminals.

NUVISTOR-TUBE SOCKET & CONNECTOR INFORMATION^a

NUVISTOR TYPE		SOCKET			
		Mounting	Body Material ^b	Cinch Mfg. Co. ^c No.	Cinch-Jones Sales-Division ^d Distributor No.
2CW4	7586	Crimp	MFP	133 65 10 001	5NS
2DS4	7587		DIALL [▲]	133 65 92 025	-
6CW4	7895		TEFLON	133 65 91 034	-
6DS4	8056	Flange	MFP	133 65 10 003	5NS-1
13CW4	8393	Printed-Board (Stand-Off)	MFP	133 65 10 009	5NS-2
8058 8203 8627		Crimp	MFP	133 65 10 041	5NS-3
2DV4 6DV4 A15526		Crimp	HALON [□]	133 67 90 040	5NS-4
8628		Crimp	DIALL	133 65 92 025	-
			TEFLON [●]	133 65 91 034	-
A15274B		Swaged	MFP	131 35 10 014	-
A15533		Spring	MFP	131 35 10 014 with Mounting Spring 441 00 23 094	-

NUVISTOR TYPE	TOP-CAP CONNECTOR	
7587 8058 8627	Cinch Mfg. Co. ^c No. 422 03 22 017 or 422 03 22 024, or equivalent "1/4-inch" connector.	
A15274B A15533	International Electronic Research Corp. ^e Part No. TXB2P-019-028G	
A15526	For Distributed-Constant Circuit	International Electronic Research Corp. ^e Therna-Link Retainer Part No. TXBE-032-031G
	For Lumped-Constant Circuit	Wakefield Engineering, Inc. ^f Semiconductor Cooler Type NF207

^a Information on sockets or connectors having different materials or finishes may be obtained from the manufacturers listed. Sockets or connectors having comparable mechanical and electrical characteristics may be available from other manufacturers.

^b MFP = general-purpose, low-loss Mica-Filled Phenolic; DIALL = glass-filled Diallyl Phthalate for missile, satellite, and other high-vacuum applications; TEFLON and HALON are for low-rf and low-leakage loss, high-temperature applications.

[▲] TRADE MARK: Mesa Plastics Co., Los Angeles, Calif.

[□] TRADE MARK: Allied Chemical Corp., Morristown, N.J.

^c 1026 South Homan Ave., Chicago, Illinois 60624. Tel: (312) NE 2-2000.

^d This number appears in many distributors' catalogs.

^e 135 West Magnolia Blvd., Burbank, Calif. 91502. Tel: (213) 849-2481.

^f 139 Foundry St., Wakefield, Mass. 01880. Tel: (617) 245-5900

[●] TRADE MARK: E.I. DuPont de Nemours & Co., Inc., Wilmington, Del.

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FIELD OFFICES

EQUIPMENT SALES

East	<i>Newark</i>	32 Green St., Newark, N.J. 07102	(201) 485-3900
	<i>Syracuse</i>	731 James St., Room 402, Syracuse, N.Y. 13203	(315) 474-5591
	<i>Needham</i>	64 "A" St., Needham Heights, Mass. 02194	(617) 444-7200
Mid-Atlantic	<i>Haddonfield</i>	605 Marlton Pike, Haddonfield, N.J. 08034	(609) 428-4802
	<i>Orlando</i>	200 East Marks St., Orlando, Fla. 32803	(305) 425-5563
Central	<i>Chicago</i>	446 East Howard Ave., Des Plaines, Ill. 60018	(312) 827-0033
	<i>Detroit</i>	714 New Center Bldg., Detroit, Mich. 48202	(313) 875-5600
	<i>Minneapolis</i>	5805 Excelsior Blvd., Minneapolis, Minn. 55416	(612) 929-0676
Mid-Central	<i>Indianapolis</i>	2511 East 46th St., Bldg. Q2, Atkinson Square, Indianapolis, Ind. 46205	(317) 546-4001
West	<i>Hollywood</i>	6363 Sunset Blvd., Hollywood, Calif. 90028	(213) 461-9171
	<i>Los Altos</i>	4546 El Camino Real, Suite P, Los Altos, Calif. 94022	(415) 948-8996
	<i>Seattle</i>	2250 First Ave. South, Seattle, Wash. 98104	(206) MAIN 2-8816

GOVERNMENT SALES

<i>Harrison</i>	415 South Fifth St., Harrison, N.J. 07029	(201) 485-3900
<i>Dayton</i>	224 North Wilkinson St., Dayton, Ohio 45402	(513) 461-5420
<i>Washington</i>	1725 "K" St., N.W., Washington, D.C. 20006	(202) 337-8500

NUVISTOR-TUBE RELIABILITY

Production Tests (At Max.-Rated P_b)

Based on over 1,662,000 tube-hours of regular-production life tests, nuvistor type 7586 has had an observed Failure Rate of 0.54% per 1000 hours during the first 5000 hours of operation at maximum-rated plate-dissipation conditions ($E_f = 6.3$ volts, $E_b = 100$ volts, $E_c = -1.85$ volts, $R_g = 0.5$ megohm, $E_{hk} = 100$ volts, $P_b = 1$ watt and $T_E = 150^\circ\text{C min.}$)

Engineering-Evaluation Tests (At Reduced P_b)

Based on over 1,541,000 tube-hours of engineering-evaluation life tests, nuvistor type 7586 has had an observed Failure Rate of 0.065% per 1000 hours, out to 20,000 hours of operation at reduced plate-dissipation (normal-operation) conditions ($E_f = 6.3$ volts, $E_{bb} = 75$ volts, $R_k = 100$ ohms, $R_g = 0.5$ megohm, $P_b = 0.75$ watt, and $T_E = 150^\circ\text{C min.}$)

UNIFORMITY OF NUVISTOR-TUBE CHARACTERISTICS

The critical characteristics of RCA nuvistor tubes have an extremely high degree of uniformity from tube to tube, both initially and throughout life when compared to conventional electron tubes. This exceptional uniformity results from the unique nuvistor-tube design, the special methods of assembly and processing, and a rigorous Quality-Assurance Program. Industrial and Military types are subjected, on a statistical-lot-sampling basis, to Initial Variables Controls to assure that the spread of critical characteristics is narrow and that the sample average is close to the established bogey value. In addition, Life-Test end-points assure that (1) the Transconductance Change with Operating Time for an individual sample tube and the Sample Average of these individual changes, are small and (2) the Useful Power Output for class C types is above an established minimum value.

NUVISTOR TUBES and NUCLEAR RADIATION

Pulse Nuclear Irradiation

Nuvistor tubes have been operated as af-amplifier tubes and monitored before, during, and after exposure to pulse nuclear radiation having a Peak Fast-Neutron Flux of 10^{15} neutrons per square centimeter per second and a Peak Gamma Intensity of 10^7 roentgens per second.

The transient response of all tubes monitored followed the nuclear-radiation pulse and returned to normal, with no permanent damage to the tubes.

Steady-State Nuclear Irradiation

Type 7586 nuvistor tubes have been operated, for 3 hours, in a nuclear-radiation environment having a constant Fast-Neutron Flux of 10^{13} neutrons per square centimeter per second and a Gamma Intensity of 10^8 roentgens per second.

During the 3-hour exposure to nuclear radiation, the tubes continued to operate with no permanent damage.

ADDITIONAL TECHNICAL INFORMATION

Additional technical information on the RCA Nuvistor Tubes and Integral-Cavity TRF Amplifiers listed in this abbreviated Reference Guide is available, in the following forms, from your nearest RCA Field Office, or from Commercial Engineering, Electronic Components and Devices, RCA, Harrison, New Jersey 07029.

Technical Bulletins

For each commercial type.

Preliminary and Tentative Data Sheets

For each developmental type.

Brochure

1CE-280 RCA Nuvistor Tubes for Industrial and Military Applications.

Application Notes

AN-191 RCA-6CW4 and 2CW4 Nuvistor Triodes as RF Amplifiers in VHF Television Tuners.

AN-193 Use of RCA-7587 Industrial Nuvistor Tetrode in RF and IF Applications.

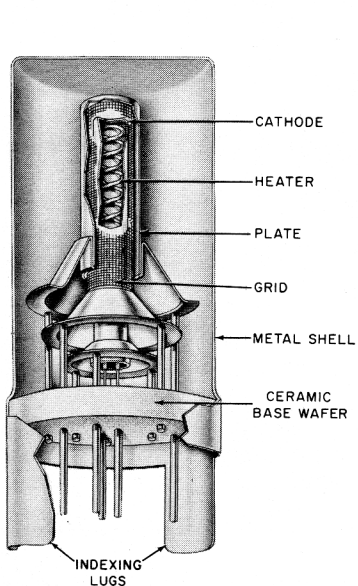
AN-195 Noise and Gain of the RCA-8056 Nuvistor Triode at 200 Mc.

AN-196 Temperature Ratings and Thermal Considerations for Nuvistor Tubes.

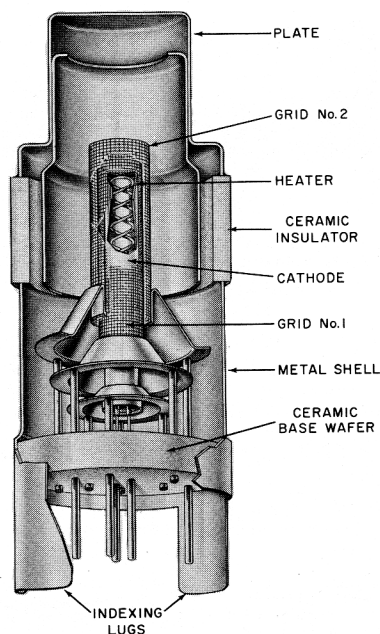
Preliminary and Tentative Application-Information Reports

ST-2296 Nuvistor Nuclear-Radiation Testing.

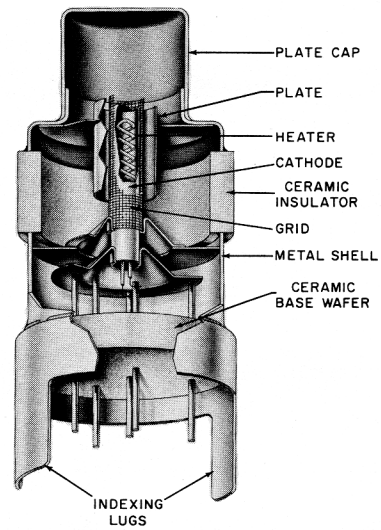
ST-2474 Nuvistor Environmental Performance.



Typical Single-Ended
Nuvistor Triode



Typical Double-Ended
Nuvistor Tetrode



Typical Double-Ended
Nuvistor Triode