

INDEXED

Amperex[®]

INSTRUMENTATION COMPONENTS

- Temperature Compensated Crystal Oscillators
- Reed Switches
- Trigger Tubes
- Premium Quality Tubes

Amperex[®] Electronic Corporation...

is a pioneer in the development of industrial electronic components and for four decades has been producing high quality devices for industrial, military and commercial equipment manufacturers.

Creative engineering and precision manufacturing have been responsible for a steady growth in the facilities and operations of Amperex. Founded in 1932, the Company originally manufactured special purpose tubes. Today, the Hicksville Division of Amperex manufactures and markets computer components, instrumentation components, microwave devices, scientific products, industrial power components, and communication components.

This catalog is one in a series of six containing condensed technical data on these products. The contents of this catalog as well as the others in the series is listed below:

COMMUNICATION COMPONENTS

RF POWER TRANSISTORS
RF POWER TUBES (LARGE)
RF POWER TUBES (SMALL)
TV TETRODE CAVITIES
TEMPERATURE COMPENSATED—
CRYSTAL OSCILLATORS
VACUUM CAPACITORS
MICROWAVE DIODES AND ASSEMBLIES
RF CIRCULATORS
RECTIFIERS
KLYSTRONS

SCIENTIFIC PRODUCTS

PHOTOMULTIPLIER TUBES
RADIATION COUNTER TUBES
CHANNEL ELECTRON MULTIPLIERS
COAXIAL THERMOCOUPLE AND HEATER WIRE
SEMICONDUCTOR RADIATION DETECTORS
RECTIFIER STACKS
X-RAY COMPONENTS

MICROWAVE DEVICES

MICROWAVE DIODES AND ASSEMBLIES
INDUSTRIAL MAGNETRONS
RADAR TUBES
RECTIFIER STACKS
KLYSTRONS

INDUSTRIAL POWER COMPONENTS

RF POWER TUBES (LARGE)
VACUUM CAPACITORS
RECTIFIER STACKS
INDUSTRIAL MAGNETRONS
MERCURY RECTIFIERS
THYRATRONS
IGNITRONS

INSTRUMENTATION COMPONENTS

TEMPERATURE COMPENSATED—
CRYSTAL OSCILLATORS
REED SWITCHES
TRIGGER TUBES
PREMIUM QUALITY TUBES

COMPUTER COMPONENTS

REED SWITCHES
TEMPERATURE COMPENSATED—
CRYSTAL OSCILLATORS
TRIGGER TUBES

The Hicksville Division...

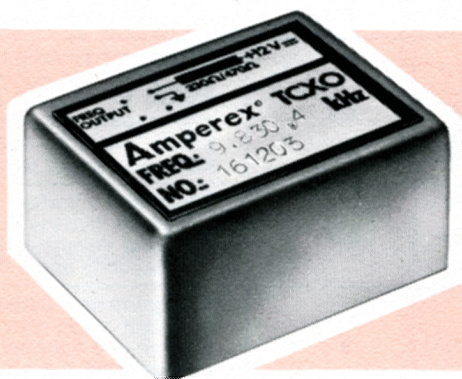


occupies seven acres in Hicksville, Long Island, New York and contains 140,000 square feet of manufacturing space and 17,000 square feet devoted to research and development activities.

Amperex is a wholly owned subsidiary of the North American Philips Corporation, an affiliation that supplements its general capabilities in electronics technology and gives it ready access to the basic product technology and international research facilities of the renowned N.V. Philips of Holland.

Temperature Compensated Crystal Oscillators

TYPE NO.	FREQ. RANGE	FREQ. TOLERANCE	STABILITY		FREQ. ADJ.	DIMENSIONS (IN.)		
			TEMP. RANGE	AGING		LENGTH	WIDTH	HEIGHT
4322-190	4.5-15 MHz	$\pm 2 \times 10^{-6}$	-30°C to +60°C	$\pm 1 \times 10^{-6}$ /year	Int. Capacitor	.984	1.28	.591
4322-191	4.5-15 MHz	$\pm 2 \times 10^{-6}$	-30°C to +60°C	$\pm 1 \times 10^{-6}$ /year	Ext. Capacitor	.984	1.28	.591
4322-195	20-60 MHz	$\pm 2 \times 10^{-6}$	-30°C to +60°C	$\pm 1 \times 10^{-6}$ /year	Int. Capacitor	.984	1.28	.591
4322-196	20-60 MHz	$\pm 2 \times 10^{-6}$	-30°C to +60°C	$\pm 1 \times 10^{-6}$ /year	Ext. Capacitor	.984	1.28	.591



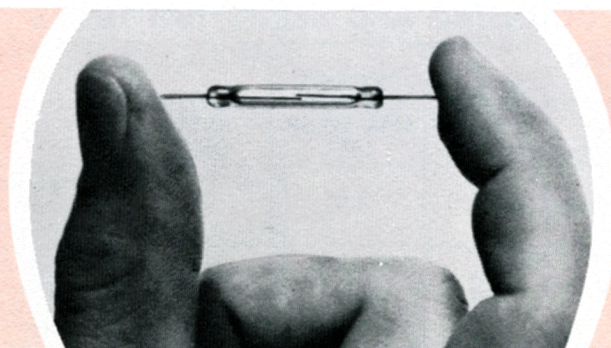
Reed Switches

TYPE	CONTACT MATERIAL	CONTACT RATING VOLT/AMP	SWITCHED		OPERATING A/T	INITIAL CONTACT RESISTANCE MILLIOHMS	MINIMUM OPERATIONS ***	GLASS LENGTH INCHES
			VOLTAGE	CURRENT				
RI-12/01	Gold	5	65	100mA	28-62*	50	5×10^6	1.11
RI-20	Ruthenium	10	100	500mA	17-32**	150	10×10^6	0.56
RI-30.	Ruthenium	10	150DC 115AC	200mA	19-44**	120	10×10^6	0.85

*1" Long Coil

**1/2" Long Coil

***Full Load



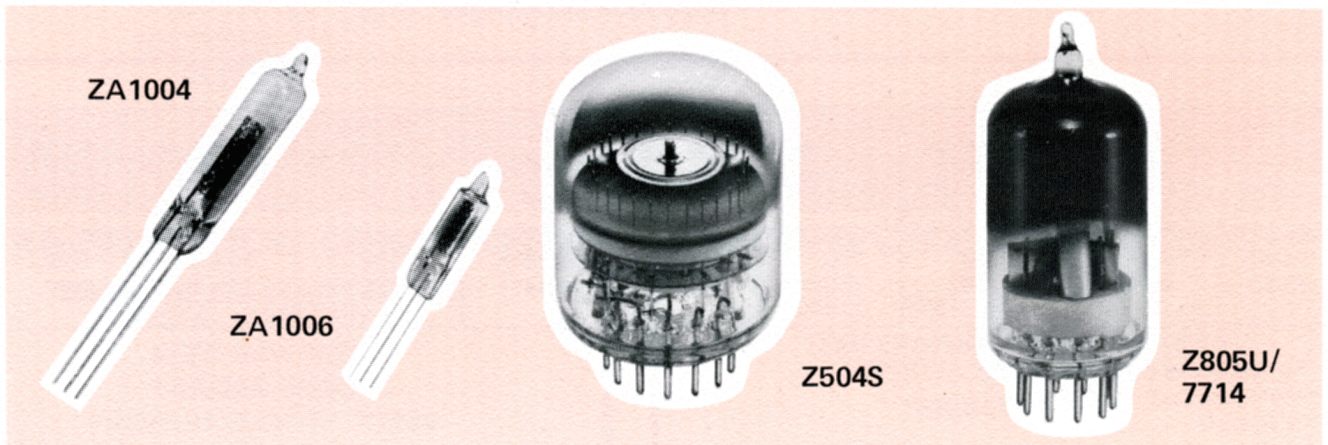
Trigger Tubes

INDICATOR DIODES

TYPE NO.	BREAKDOWN VOLTAGE V_{ign}		MAINTAINING VOLTAGE V_m		CATHODE CURRENT I_k (mA)	DESCRIPTION
	Max (v)	Min (v)	Max (v)	Min (v)		
ZA 1001	135	120	95	91	1.5	Shock and vibration resistant cold cathode, gas filled subminiature diode. Designed for switching and stable saw-tooth generator circuits. Operable thru audio frequency range. May be used in frequency divider chains as in electronic organs.
ZA 1002	175	165	109	103	2.0	Switching and light diode intended for logic functions both in sensing and programming circuits.
ZA 1004	90	88	*	*	1.0	Shock and vibration resistant, close tolerance cold cathode, gas filled subminiature diode with visible glow discharge for readout purposes. Contains two electrodes, a rod-shaped molybdenum cathode and a concentric gauze anode. May be used with signal voltages as low as 3.0 volts depending upon readout circuit mode of operation.
ZA 1005	138	108	86	70	5.0**	Shock and vibration resistant cold cathode, gas filled subminiature diode with pure molybdenum cathode. Designed for firing silicon controlled rectifiers. Has high peak current capacity and a minimum life of 4000 operating hours.
ZA 1006	183	161	111	103	3	A long-life cold-cathode neon-filled subminiature switching and light diode with a large and stable difference between ignition and maintaining voltage intended for touch control applications, e.g. in variable capacitance diode controlled radio or television tuners. The tube is shock and vibration resistant.

*Extinction Voltage V_{ext} (Min) = 83.5 Volts

**Peak Cathode Current = 250 mA



COUNTING AND SELECTING TUBES

TYPE	MAX ANODE SUPPLY VOLTAGE (V)	MAINTAINING VOLTAGE (MAIN CATHODE) (V)	GUIDE VOLTAGE PULSE (V)	CATHODE CURRENT MAX VALUE (μ A)	COUNTING RATE (KC)	DESCRIPTION
Z504S	550	195	100	525	5	All glass decade selector and counting tube. Ten main cathodes with separate connections. Counts in either direction.
Z505S	1000	260	100	1 mA	50	Cold cathode, gas filled bi-directional decade selector and counting tube. Ten separate outputs are provided. All glass construction.

Trigger Tubes (Continued)

TRIGGER TUBES

TYPE NO.	ANODE VOLTAGE RANGE (V)	STARTER-TO-CATHODE BREAKDOWN VOLTAGE (V)	ANODE-TO-CATHODE MAINTAINING VOLTAGE (V _m)	ANODE-TO-CATHODE BREAKDOWN VOLTAGE (V)	RECOMMENDED PRIMING RESISTOR (MEGOHMS)	CATHODE CURRENT RANGE (MA)	PEAK CATHODE CURRENT (MA)	TYPICAL DC STARTER CURRENT (μa)	MAXIMUM NEGATIVE STARTER CURRENT (μa)	MAXIMUM AMBIENT TEMPERATURE (°C)	DESCRIPTION
Z70U/7710	200-310	137-153	111-121	>325	18	2-4	16	20	150	70	Subminiature tube with priming cathode and positive starter voltage, for DC circuits. It may be used as an electronic switching element in counter circuits and in logic units. Other applications are in welding timers, touch controls.
Z70W/7709	200-310	137-153	111-121	>325	18	2-4	16	30	150	70	Subminiature tube with priming cathode and positive starter voltage for DC circuit.
Z803U/6779	170-290	128-137	105	>290	10	25 (max)	100	50	—	70	Stable trigger striking characteristic for position triggering.
Z805U/7714	250-450 dc 180-275 ac (rms)	137-155 dc 98-110 ac (rms)	118-128	>500	—	5-25	150	50	—	70	Miniature relay tube for ac circuits, short ignition delay and excellent high voltage properties.

Amperex®

Premium Quality Tubes

PREMIUM QUALITY 10,000 HOUR TUBES¹

TYPE	HEATER		CAPACITANCES—pF			MAXIMUM RATINGS						TYPICAL CHARACTERISTICS								
	Voltage ^a volts	Current amps	Cold Values	Input	Output	Max. Anode Dissipation watts	Anode Voltage volts	Suppressor Grid Voltage volts	Screen Grid Voltage volts	Cathode Current mA	Screen Grid Voltage volts	Anode Voltage volts	Cathode Resistor ohms	Anode Current mA	Screen Grid Current mA	Transconductance micromhos	Amplification Factor	Plate Resistance megohms	Maximum Seated Hgt. inches	Maximum Diameter inches
E92CC Twin Triode	6.3	0.4	one section	3.1	0.3	2.0 ² (absolute value)	300	—	—	15	—	150	—	8.5	—	6,000	45	0.0083	2 ³ / ₁₆	3/ ₁₆
5842 ⁴ Triode	6.3	0.3	—	9.0	1.8	4.5	400	—	—	38	—	130	360	27	—	27,000	43	0.0016	1 ¹ / ₂	7/ ₁₆
5920/E90CC Twin Triode	6.3	0.4	one section	3.4	0.35	2.0 ² (absolute value)	300	—	—	15	—	100	—	8.5	—	6,000	27	0.0045	2 ¹ / ₃₂	3/ ₁₆
6084/E80F ³ Sharp cut-off amplifier pentode	6.3	0.3	—	5.0	7.3	1.3 (absolute value)	300	0	200	9	100	250	550	3	0.65	1,850	25	1.5	2 ³ / ₁₆	7/ ₁₆
6085/E80CC ³ Twin Triode	Series 12.6 Par. 6.3	0.3 0.6	one section	2.6	3.5	2.02 ² (absolute value)	300	—	—	12	—	250	920	6	—	2,700	27	0.01	2 ¹ / ₁₆	7/ ₁₆
6211 Twin Triode	6.3 12.6	0.3 0.15	one section	2.9	0.35	1.5 ² (absolute value)	200	—	—	14	—	100	470	4.6	—	3,600	27	0.0075	1 ¹ / ₁₆	7/ ₁₆
6211A	6.3 12.6	0.300 0.150	sec. 1 sec. 2	2.9 2.9	0.45 0.35	1.5 ² (absolute value)	600	—	—	14	—	100	470	4.6	—	3,600	27	0.0075	1 ¹ / ₁₆	7/ ₁₆
6227/E80L ³ Power Pentode	6.3	0.75	—	11.0	7.0	8.0 (absolute value)	300	0	300	50	250	250	270	24	3.3	9,000	21.5	0.09	2 ¹ / ₁₆	7/ ₁₆
6463 medium mu twin triode	6.3 12.6	0.6 0.3	one section	3.4	0.5	4.4	330	—	—	31	—	250	620	14.5	—	5,200	20	—	2 ³ / ₁₆	7/ ₁₆
6686/E81L Power Pentode	6.3	0.375	—	11.5	6.5	4.5 (design center value)	210	0	210	30	210	210	120	20	5.3	11,000	36	0.3	2 ³ / ₁₆	7/ ₁₆
6688/E180F ^{3,4} Broad-band amplifier pentode 6688A	6.3	0.3	—	7.5	3.0	3.0 (absolute value)	210	0	175	25	160	190	630 Note 5	13	3.3	16,500	50	0.09	1 ¹ / ₂	7/ ₁₆
6689/E83F wide-band amplifier pentode	6.3	0.3	—	8.0	3.6	2.1 (design center value)	210	0	210	16	120	210	165	10	2.1	9,000	34	0.5	2 ³ / ₁₆	7/ ₁₆
6922/E88CC ^{3,4} Twin Triode	6.3	0.3	one section	3.1	0.5	1.5 ² (design center value)	220	—	—	20	—	100	680 Note 5	15	—	12,500	33	0.00264	1 ¹ / ₁₆	7/ ₁₆

¹These tubes are designed for life of 10,000 hours or more. ²Ratings and operating conditions apply to one section. ³Rugged construction. ⁴Available to military specifications.
⁵Grid Supply Voltage: +9 volts. ⁶Grid Supply Voltage: +12.5 volts. ⁷Grid Supply Voltage: +12.0 volts. ⁸Grid 2 to Grid 1. *k less than 10mA. **k more than 10mA.

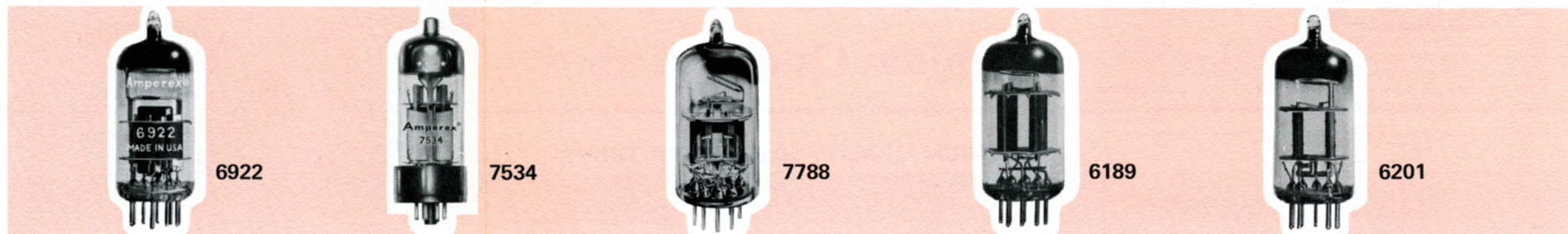
(continued)

Premium Quality Tubes (Continued)

PREMIUM QUALITY 10,000 HOUR TUBES¹ Continued

TYPE	HEATER		CAPACITANCES—pF			MAXIMUM RATINGS						TYPICAL CHARACTERISTICS								
	Voltage volts	Current amps	Cold Values	Input	Output	Max. Anode Dissipation watts	Anode Voltage volts	Suppressor Grid Voltage volts	Screen Grid Voltage volts	Cathode Current mA	Screen Grid Voltage volts	Anode Voltage volts	Cathode Resistor ohms	Anode Current mA	Screen Grid Current mA	Transconductance micromhos	Amplification Factor	Plate Resistance megohms	Maximum Seated Hgt. inches	Maximum Diameter inches
7062/E180CC Twin Triode	6.3 12.6	0.400 0.200	one section	3.5	0.5	2.0 ² (absolute value)	600	—	—	20	—	150	—	8.5	—	6,400	46	0.0072	2 ³ / ₈	7 ₈
7119/E182CC Twin Triode	Series 12.6 Par. 6.3	0.4 0.8	one section	5.3	6.7	4.5 (absolute value)	300	—	—	60	—	120	—	36	—	15,500	24.5	0.0016	2 ³ / ₈	7 ₈
7308/E188CC ^{3,4} Twin Triode	6.3	0.335	one section	3.1	1.75	2.0	250	—	—	22	—	100 (supply)	680 Note 5	15	—	12,500	33	—	1 ¹ / ₈	7 ₈
7534/E13QL Pentode	6.3	1.7	—	35	17	27.5	900	—	250	300	150	250	—	100	4	25,000	6.5	—	4 ¹ / ₃₂	1 ¹ / ₈
7643/E80CF Triode Section Pentode Section	6.3 6.3	0.33 0.33	1.5 0.025	2.5 5.6	1.5 3.4	1.75 2.15	275 275	— 0	— 225 * 200 **	18 18	— (supply) 170	100 (supply) 170	120 155	14 10	— 2.8	5,000 6,200	18 40 ⁸	— 0.4	2 ³ / ₂	7 ₈ —
7737/E186F ^{3,4} Pentode	6.3	0.32	—	7.6	3.3	3	210	—	175	25	—	—	630 ⁵	13	3.3	16,500	53 ⁸	0.1	1 ¹ / ₂	7 ₈
7788/E810 ^{3,4} Pentode	6.3	0.34	—	16.5	3.3	5	250	0	200	50	165	155	360 ⁶	35	5	50,000	57 ⁸	0.042	1 ¹ / ₈	7 ₈
8233/E55L	6.3	0.6	0.110	18	4	10	200	0	175	75	140	140	270 ⁷	50	5.5	45,000	30 ⁸	0.02	2 ³ / ₈	1 ¹ / ₈

¹These tubes are designed for life of 10,000 hours or more. ²Ratings and operating conditions apply to one section. ³Rugged construction. ⁴Available to military specifications.
⁵Grid Supply Voltage: +9 volts. ⁶Grid Supply Voltage: +12.5 volts. ⁷Grid Supply Voltage: +12.0 volts. ⁸Grid 2 to Grid 1. *1k less than 10mA. **1k more than 10mA.



PREMIUM QUALITY TUBES

TYPE NO.	PROTO-TYPE	HEATER		AMPLIFICATION FACTOR	TRANS-CONDUCTANCE (MICRO-MHOS)	TYPICAL OPERATION						POWER OUTPUT WATTS	LOAD RESISTANCE k OHMS	CUT-OFF BIAS VOLTS	CAPACITANCES pF			DESCRIPTION
		Volts	Amps			PLATE			Grid		SCREEN				G-P	Input	Output	
						Volts DC	Current mA-DC	Resistance k Ohms	Grid Volts DC	Volts DC	Current mA-DC							
5654/E95F	6AK5W	6.3	0.175	—	5000	120	7.5	340	R _k = 180	120	2.5	—	—	-8.5 ²	0.02	4.0	2.9	Sharp cut-off pentode particularly suited for use as a wide band, high frequency amplifier. Ruggedized construction makes it suitable for critical applications in which operational dependability is of primary importance.
5847/E182F	404A	6.3	0.30	—	12500	160	13	—	+8.5	160	4.50	—	—	—	0.05	7.0	2.5	High-gain, miniature pentode for use in broad band amplification where its high figure of merit is required for replacement purposes only. For new equipment design, Amperex 6688 is recommended.
6139	12AU7 WA	6.3 12.6	0.30 0.15	17	2200	250	10.5	7.7	-8.5	—	—	—	—	-25	1.5	1.6	0.5	Premium quality twin triode designed for use as AF amplifier shock and vibration resistant.
6201/E81CC	12AT7 WA	6.3 12.6	0.30 0.15	60	5500	250	10	10.9	R _k = 200	—	—	—	—	-12 ²	1.6	2.5	0.45	Premium quality twin triode designed for use as RF amplifier in grounded grid circuits; as a frequency changer below 300 MHz, in mobile and industrial equipment with intermittent operation; and in on-off control applications where operation under cut-off conditions is required.
6218/E80T		6.3	0.15	—	—	100	1.35	—	0	70	—	—	—	—	—	2.2	2.0 max.	Ruggedized beam deflecting tube designed for use as a phase discriminator in impulse governed-oscillators.
7693/E90F		6.3	0.15	48	4600	250	7.4	1.3 meg	R _k = 100Ω	150	2.9	—	—	6.5 ²	0.0035	5.0	4.2	Sharp cut-off, shock and vibration resistant HF pentode for mobile applications. Premium type replacement for 6BH6/6661.
7694/E99F		6.3	0.15	25 ¹	3800	250	9.2	1 meg	-20 ³	100	3.3	—	—	—	0.0035	4.5	5.2	Variable slope HF pentode for mobile and industrial applications. Shock and vibration resistant premium type replacement for 6BJ6/6662.
8608		6.3	0.600	30	45000	125	50	20	-3	125	5.5	—	—	—	0.110	18	3.2	Premium quality power pentode. Constructed in a magnoval envelope with double frame grids. Designed for use as a wideband video amplifier in applications requiring low output capacitance.

¹Grid 2 to Grid 1 ²Plate Current = 10 μA approx. ³For transconductance of 1500 micromhos.

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