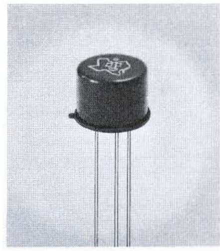
N-P-N DIFFUSED JUNCTION SILICON TRANSISTORS

TYPES 2N497, 2N498, 2N656, 2N657
BULLETIN No. DL-S 945, AUGUST, 1958
REPLACES BULLETIN No. DL-S 840, OCTOBER, 1957



4 watts at 25°C with infinite heat sink

10-Ohm saturation resistance (typical)

− 65°C to + 200°C operating and storage range

Temperature stabilized at 215°C

qualification testing

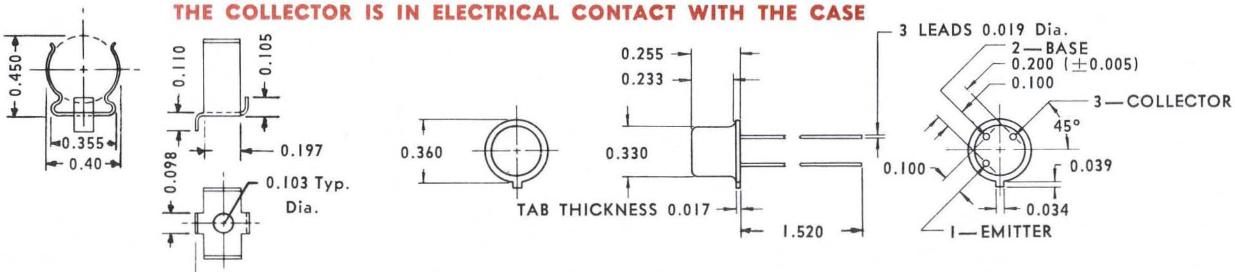
Each unit is heat cycled from — 65°C to + 175°C for ten cycles, and then humidity cycled at temperature from — 65°C to + 75°C in air at 95% relative humidity for four cycles. The hermetic seal is tested by subjecting immersed units to hydraulic pressure. A rigorous tumbling test subjects each unit to a number of random mechanical shocks to ensure maximum mechanical reliability. Each unit is thoroughly tested to determine the electrical design characteristics. Production samples are life tested periodically to determine the effects of storage and dissipation and ensure maximum attainable reliability.

mechanical data

The transistor is contained in a JETEC TO-5 outline welded package with glass-to-metal hermetic seal between case and leads. Approximate weight is 1.0 gram. Case and leads are tinplated, and then case is black enameled.

The noninsulated mounting clip (TI P/N 354001-100) is provided with each transistor. It is suitable for applications where thermal dissipation to a heat sink is desired. Material: beryllium copper, cadmium plated — gold iridited.

THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE CASE



DIMENSIONS ARE MAXIMUM IN INCHES UNLESS OTHERWISE SPECIFIED

maximum ratings

Collector Voltage referred to base or emitter at 25°C . . . (Breakdown voltages are indicated below)
Collector Dissipation at 25°C. (case temperature)* . . . . 4 W
Junction Temperature (maximum range) . . . . −65°C to +200°C

*Derate 22.8 mW/°C increase in case temperature within range of 25°C to 200°C

maximum and minimum design characteristics at $T_j = 25°C$

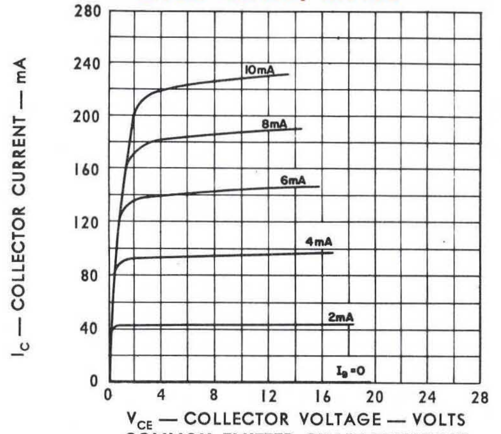
PARAMETER	TEST CONDITIONS		2N497 min.	2N497 max.	2N498 min.	2N498 max.	2N656 min.	2N656 max.	2N657 min.	2N657 max.	unit
BV_{CBO} Breakdown Voltage	$I_C = 100\ \mu A$	$I_E = 0$	60		100		60		100		V
BV_{CEO} Breakdown Voltage	$I_C = 250\ \mu A$	$I_B = 0$	60		100		60		100		V
BV_{EBO} Breakdown Voltage	$I_E = 250\ \mu A$	$I_C = 0$	8		8		8		8		V
I_{CBO} Collector Cutoff Current	$V_{CB} = 30V$	$I_E = 0$		10		10		10		10	μA
h_{FE} Current Transfer Ratio†	$V_{CE} = 10V$	$I_C = 200mA$	12	36	12	36	30	90	30	90	—
h_{IE} Input Impedance†	$V_{CE} = 10V$	$I_B = 8mA$		500		500		500		500	ohm
R_{CS} Saturation Resistance†	$I_C = 200\ mA$	$I_B = 40mA$		25		25		25		25	ohm

† Semiautomatic testing is facilitated by using pulse techniques to measure these parameters. A 300-microsecond pulse (approximately 2% duty cycle) is utilized. Thus, the unit can be tested under maximum current conditions without a significant increase in junction temperature, even though no heat sink is used. The parameter values obtained in this manner are particularly pertinent for switching circuit design and, in general, indicate the true capabilities of the device.

TYPICAL CHARACTERISTICS

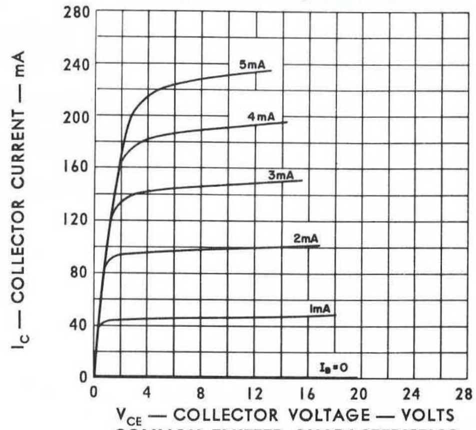
(AS INDICATED)

TYPES 2N497, 2N498



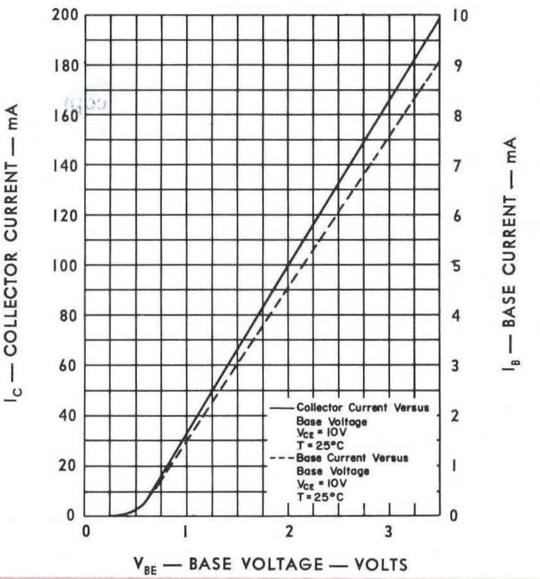
COMMON EMITTER CHARACTERISTICS

TYPES 2N656, 2N657

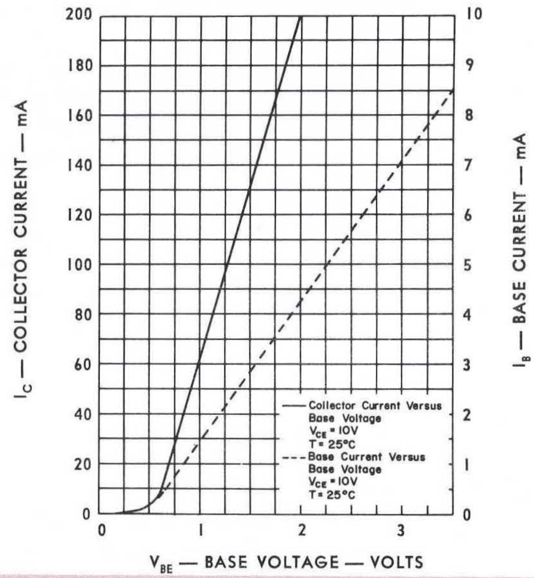


COMMON EMITTER CHARACTERISTICS

TYPES 2N497, 2N498



TYPES 2N656, 2N657



typical design characteristics at $T_j = 25°C$ (except as indicated)

PARAMETER		TEST CONDITIONS		2N497-98	2N656-57	unit
H_{ie}	Input Impedance	$V_C = 30V$	$I_C = 30$ mA	250	350	ohm
H_{fe}	Forward Current Gain	$V_C = 30V$	$I_C = 30$ mA	30	60	—
H_{re}	Reverse Voltage Gain	$V_C = 30V$	$I_C = 30$ mA	200	400	—
H_{oe}	Output Admittance	$V_C = 30V$	$I_C = 30$ mA	70	90	μmho
h_{fe}	Forward Current Gain @ 2 megacycles	$V_C = 30V$	$I_C = 30$ mA	9	6	—
I_{EBO}	Emitter Cutoff Current	$V_{EB} = 5V$	$I_C = 0$	0.1	0.1	μA
I_{CBO}	Collector Cutoff Current @ 150°C	$V_{CB} = 30V$	$I_E = 0$	60	60	μA

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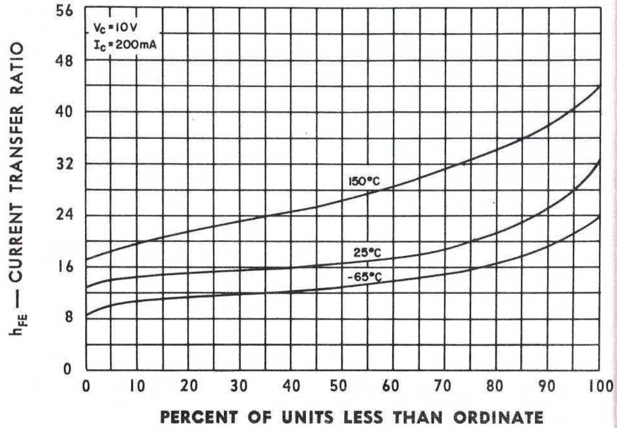
EXPLANATION OF CURVES:

1. The curves shown are based on extensive data. Individual units or small groups of units may not confor
2. All temperatures are ambient except where noted.

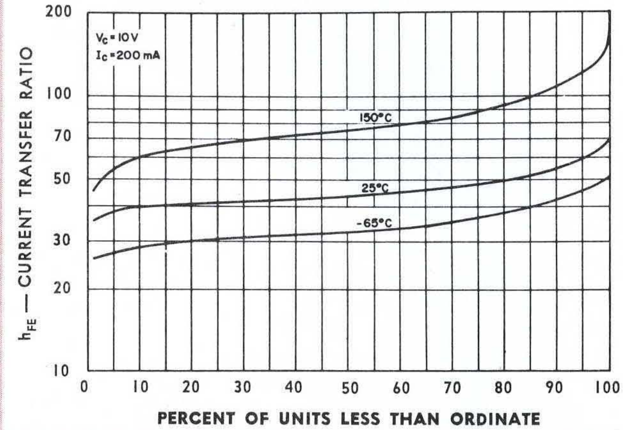
TYPICAL PRODUCTION DISTRIBUTIONS

(AS INDICATED)

TYPES 2N497, 2N498



TYPES 2N656, 2N657



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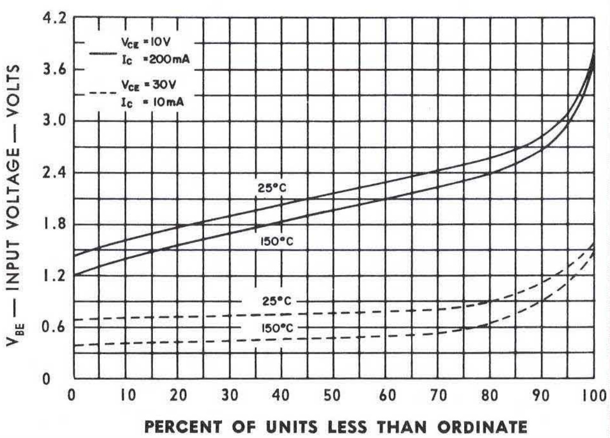
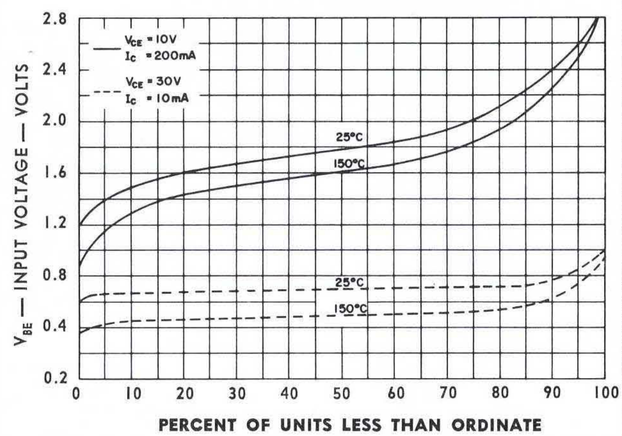


TYPES 2N656, 2N657



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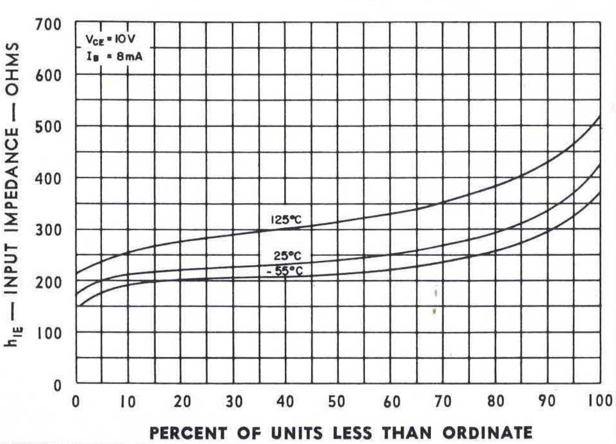
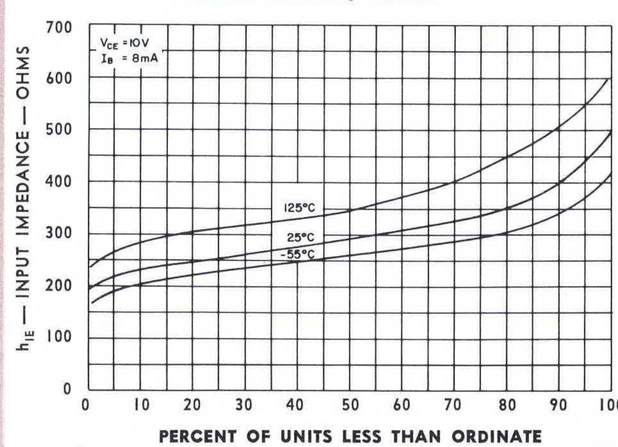


TYPES 2N656, 2N657



m exactly to the curves. Hence, these curves should be considered to be typical.

TYPICAL PRODUCTION DISTRIBUTIONS

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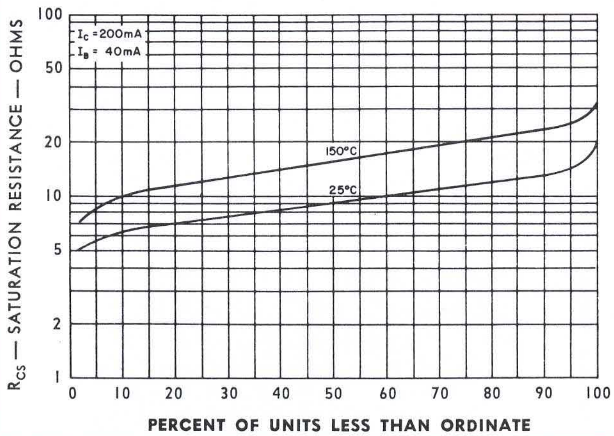

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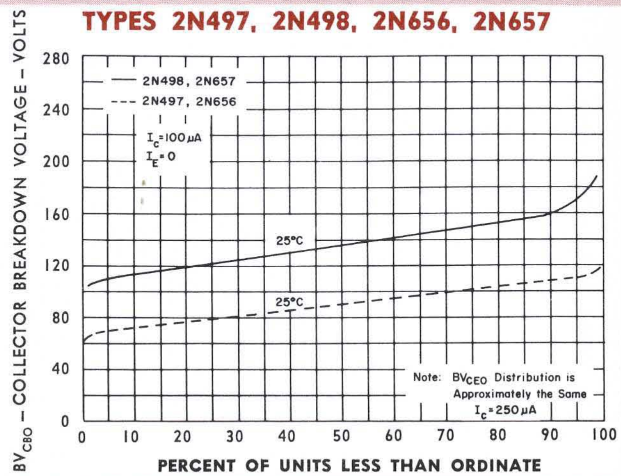

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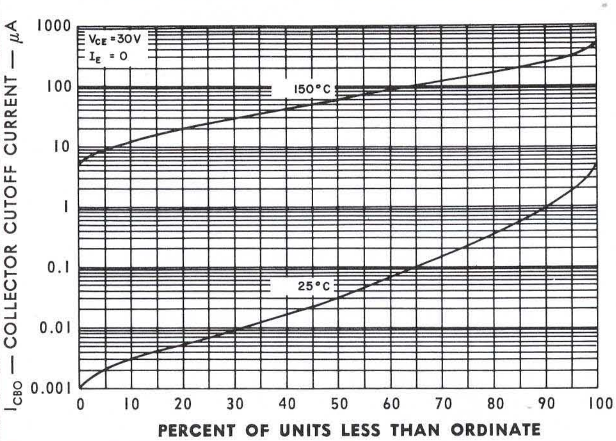

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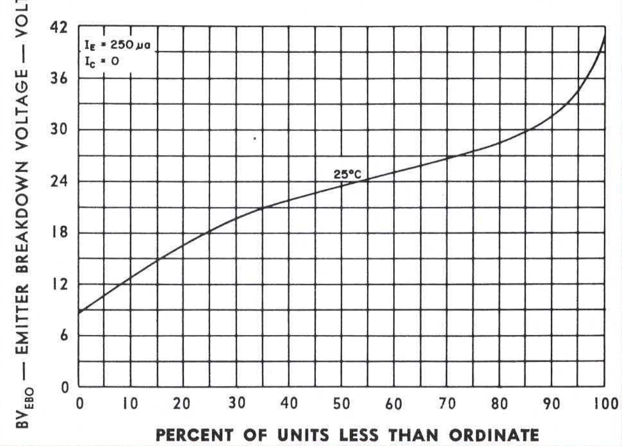

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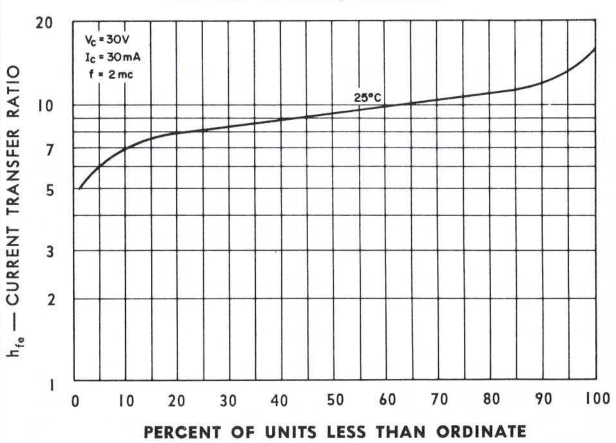
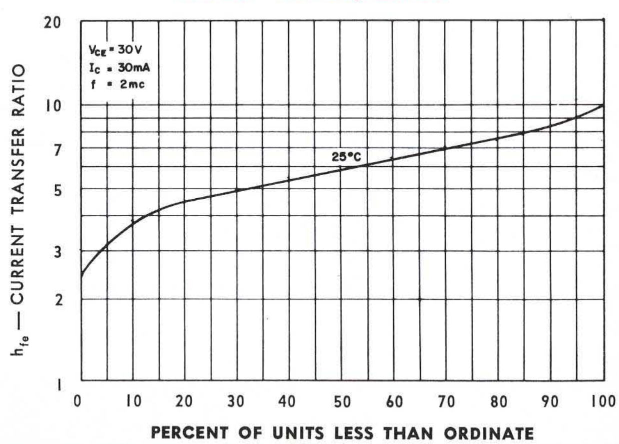


TYPES 2N656, 2N657



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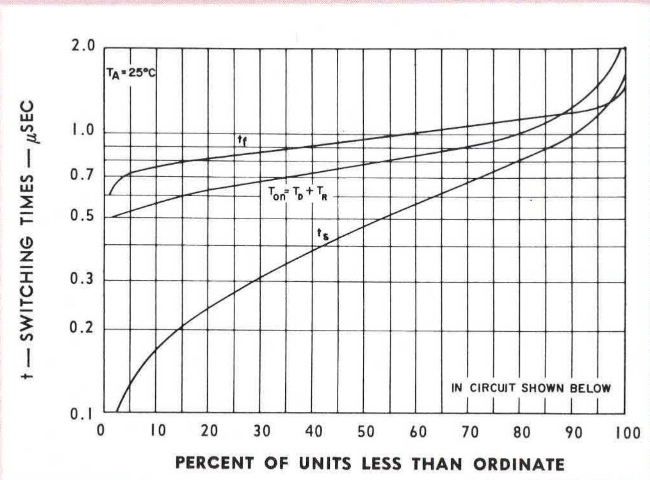

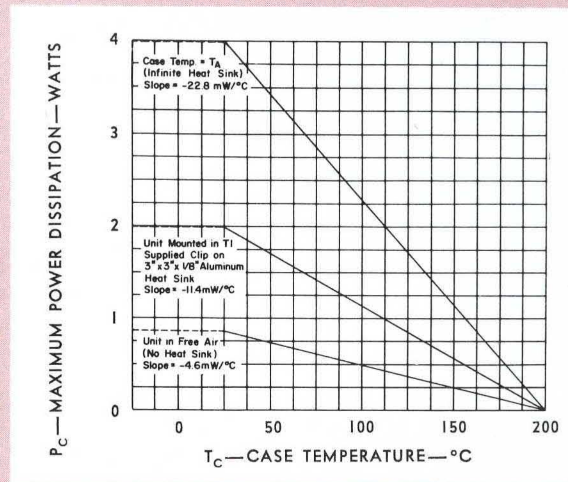

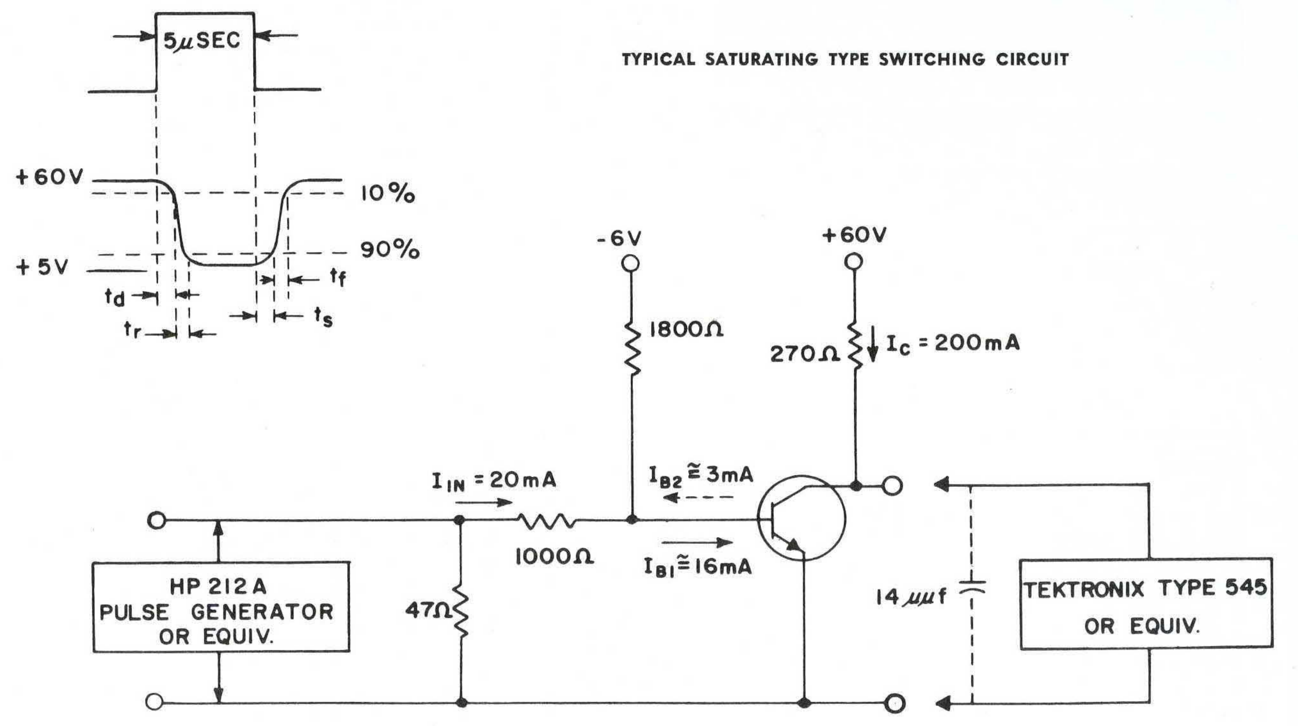

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