APPLICATIONS NOTES

SILICON RECTIFIER TEST METHODS

Transitron silicon rectifiers are 100% tested for the following three characteristics:

I. Forward voltage at specified current at 25°C.

II. Inverse voltage at specified current at 25°C.

III. Inverse current at full load at rated temperature.

These three tests are performed by the following methods.

I. FORWARD VOLTAGE

This test can be performed on *lead-mounted* rectifiers by applying a DC current and measuring the resulting DC voltage.

When testing *stud-mounted* rectifiers (particularly units rated 3 amperes and higher), the test should be performed by applying a half sine wave of current to avoid excessive heating of the rectifier junction. The peak current is set equal to the specified current. The peak forward voltage is measured with a peak reading voltmeter or DC calibrated oscilloscope. Figure 1 shows a suitable test circuit.

The forward voltage and current specification limits will be found on each data sheet.

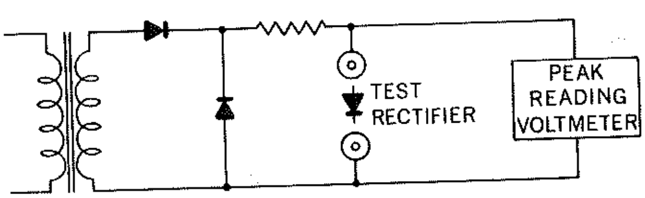

Figure 1

II. INVERSE VOLTAGE

The inverse voltage test at 25°C can be performed by applying the DC current indicated below and observing the DC voltage.

Type	Inverse Test Current
All lead-mounted types	See data sheets
All 7/16 Hex stud-mounted types	Same as inverse current limit for full load test
All 11/16 Hex stud-mounted types	10 milliamperes
All 50 ampere types	30 milliamperes

The rated peak inverse voltage should be less than the DC voltage.

III. INVERSE CURRENT AT FULL LOAD

The full load test for inverse current is significant because it indicates the capability and stability of the rectifier under combined maximums of current, voltage, and temperature.

This test can be performed with the circuit shown in Figure 2.

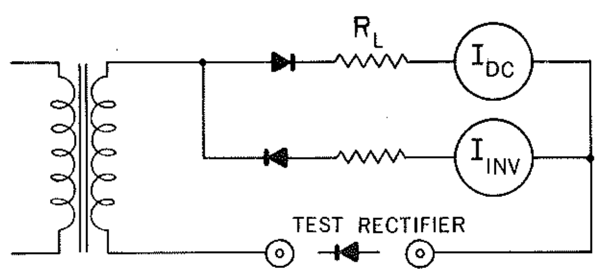

Figure 2

Tests I and II are recommended for normal incoming inspection. The simple circuit requirements and 25°C ambient temperature minimize the effort required to verify product quality.

Test III involves the use of temperature controlled heat sinks or ovens, and additional test equipment. When it is necessary to obtain maximum assurance of product quality for critical applications, all three tests should be performed.

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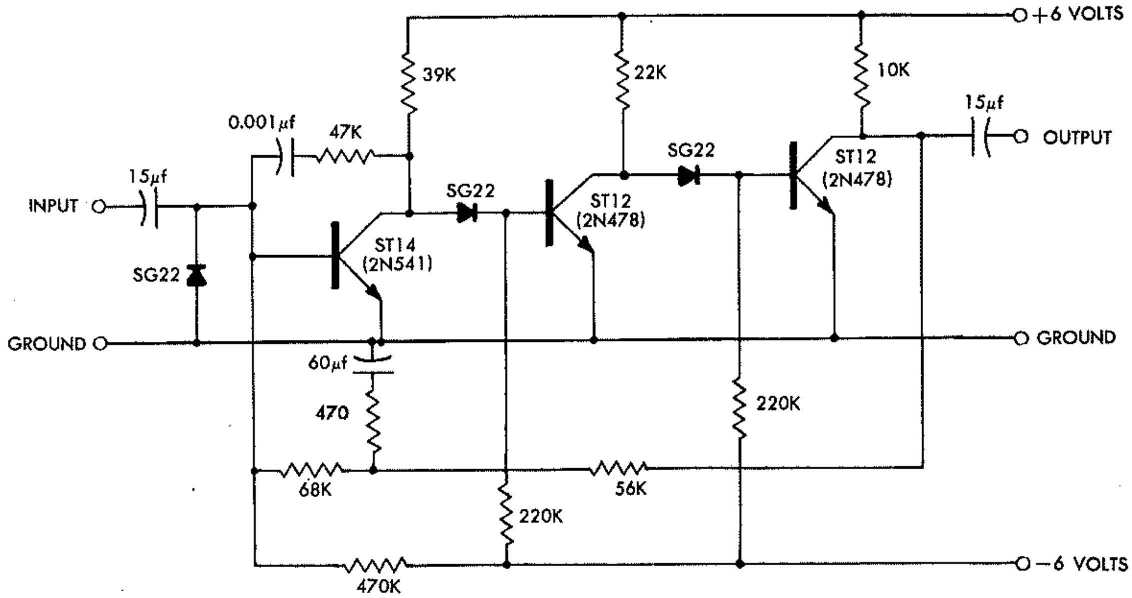
COMPENSATED TRANSISTOR PREAMPLIFIER



CHARACTERISTICS
(400 c/s, 50K load)

Gain	1 volt per 0.125µa, or 44 db with a 50 kilohm source and load.
Feedback factor	50
Undistorted output voltage, max.	1.0 V rms
Output resistance	200 ohms
Input resistance	250 ohms
Frequency response (3 db)	4 c/s to 100 kc/s
Power drain	5 mw
D.C. Stabilization (E_o/I_{co})	0.125 volts/µa
Ambient temperature range	-55° to $+150^\circ$C

This transistor preamplifier is designed for maximum conservation of components, with stable performance over a wide temperature range. It is primarily intended for a current input and a voltage output, for example the current driving, through a moderately high resistance, of a higher level amplifier.

Stabistor d.c. coupling eliminates the need for large bypass capacitors or excessive bleeder current, and the high ratio of d.c. to a.c. impedance in the stabistors prevents any appreciable loss of gain. This method of coupling also fixes the collector to emitter voltages in the first two transistors at a low value (about 1 volt) thereby alleviating the I_{CO} problem, and improving reliability.

The increase in collector capacitance due to these low voltages would somewhat reduce the amplifier bandwidth were it not for the considerable amount of negative feedback used.

D.C. stabilization is provided by an overall feedback loop which makes only the first stage I_{CO} significant, while eliminating excessive coupling circuitry. The a.c. gain is stabilized by partially bypassing this feedback loop, which also serves to reduce the input and output impedances. The one large capacitor in the bypassing circuit determines the low frequency response, preventing more than a 90° phase shift, and providing complete freedom from low frequency instability.

Due to the high a.c. feedback factor, high frequency oscillations would occur in the amplifier, unless prevented by some means such as an RC network between the collector and base of the first transistor.

A stabistor across the input to the first stage prevents damage of the base to emitter junction by any excessive negative signal.

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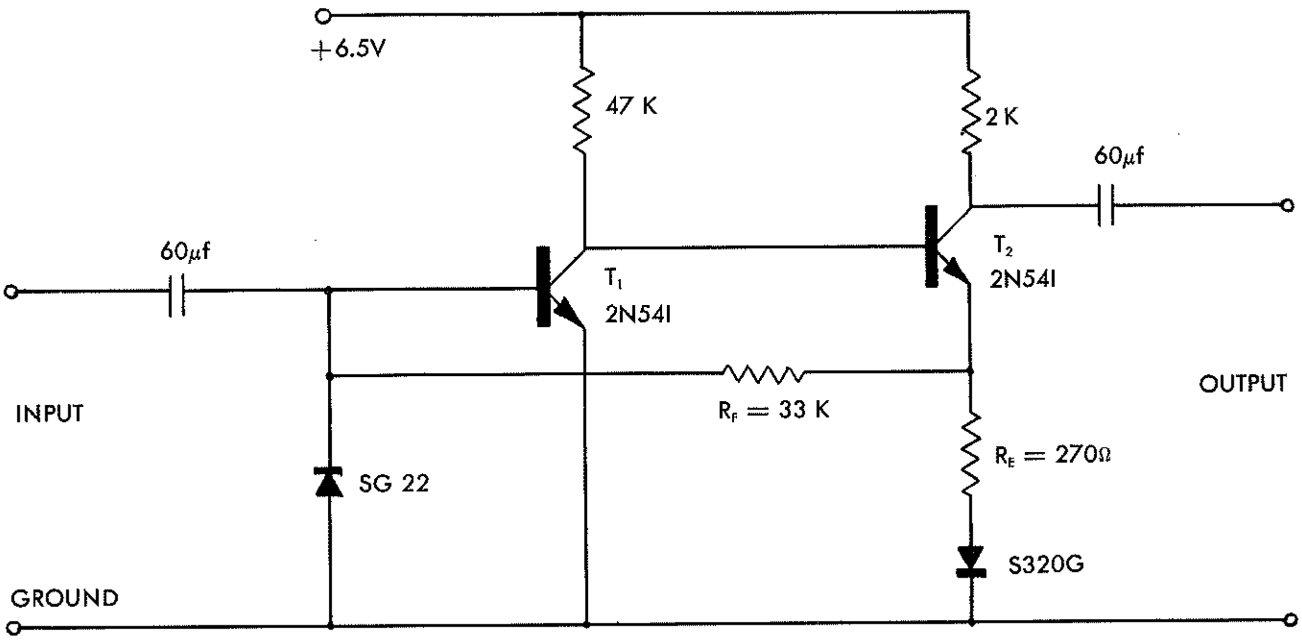
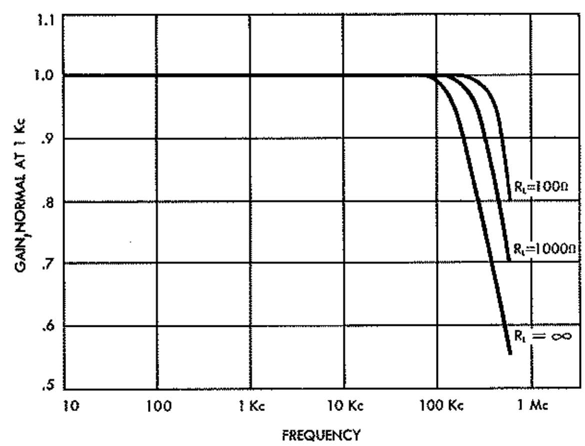
APPLICATIONS NOTES

2 STAGE COMPENSATED TRANSISTOR PREAMPLIFIER



CHARACTERISTICS

Current Gain ($R_L = 0$, f = 1 Kc)	100 ± 5
Input resistance (10 cps to 10 Kc)	500 Ω typical
Output resistance	2000 Ω
frequency response	See curve
Maximum voltage output ($R_L = \infty$)	1.2 V rms
Maximum Current output ($R_L = 0$)	0.6 mAac
DC Stabilization (E_o/I_{co})	0.2 V/µa
Maximum undistorted power output	0.5 mw
Power drain	8 mw
Output Noise voltage ($R_L = \infty$, $R_g = \infty$, f = 5cps to 400Kc)	200 µV
Equivalent input noise current ($R_L = \infty$, $R_g = \infty$, f = 5cps to 400 Kc)	1 mµA
Ambient temperature range	−65°C to +100°C
Temperature Stabilization (Eo/T)	2 mV/°C



This transistor amplifier is designed for use in circuits requiring a relatively constant circuit current gain, B , with considerable variation of individual transistor parameters. It is designed to be driven from a high impedance source ($R_g \geq 20$K).

The circuit is very stable and shows no tendency toward oscillations. The frequency response linearity at low frequencies is determined only by the coupling capacitors since the basic amplifier is flat down to D.C.

Since the current gain of the amplifier without the degeneration is much higher than the gain with feedback, the current gain is independent of the transistors and is equal to the ratio of R_F divided by the total dynamic resistance in the emitter lead of T_2. (In this case, 270 + 40 = 310 ohms.) Therefore the circuit current gain may be varied by changing either R_F or R_E.

In the circuit above, the circuit beta will be 100 ± 5 with transistors having individual betas of 30 or more.

The stabistor S320G is used to compensate for the variation of V_{BE} of T_1 with temperature. The stabistor SG22 is to protect transistor T_1 from an excess negative voltage applied to the input.

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