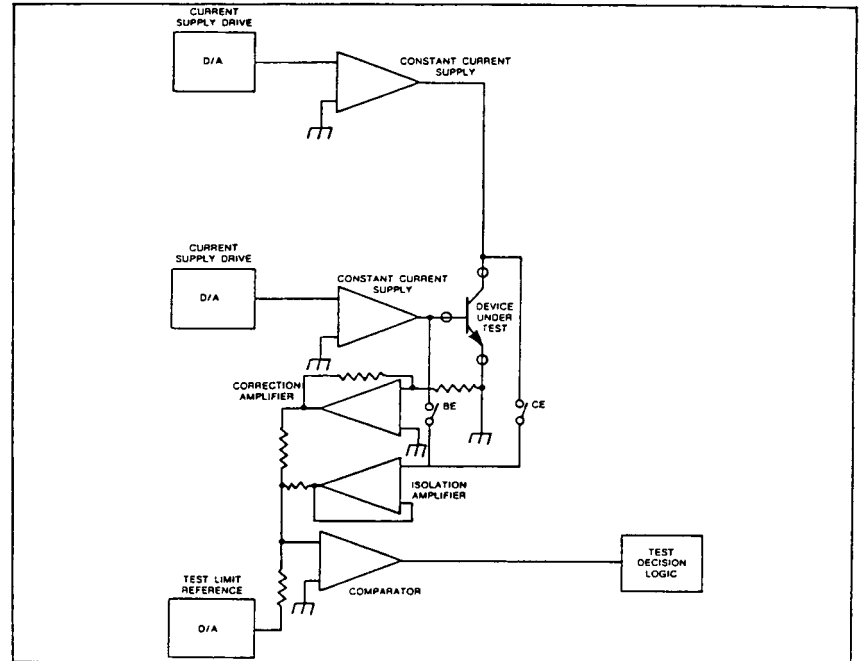




HOW TO MEASURE COMMON-EMITTER CURRENT GAIN (HFE) and SATURATION VOLTAGES ON SEMICONDUCTOR DEVICES

The Lorlin tests available are: VCE(SAT), VBE(SAT, Base-to-Emitter, Linear Operating Voltage (VBE ON), and Inverted Current Gain (INV. HFE).

The simplified circuit diagram for the Common-Emitter three-terminal measurements of transistors is shown. The two digital-to-analog converters supply the drive voltages for two identical constant-current supplies, which provide the programmed collector and base currents. To further simplify the diagram, the constant-current supplies are less detailed than in the previous pictures. When performing HFE or VCE(SAT) measurements, the unity-gain isolation amplifier has its input connected to the collector of the device under test, and its output of the summing junction of the comparator. Another digital-to-analog converter is programmed for the test limit reference voltage, and it is also connected to the comparator summing junction. The collector voltage is sensed and compared to the programmed test limit to determine if the test has been passed or failed. The voltage drop, because of high currents in the emitter wiring, is sensed and compensated for by the correction amplifier which provides a proportional input to the comparator summing junction.



For VBE(SAT) measurements, the input of the isolation amplifier is switched from the collector to the base of the device under test, and the measurement is performed in a similar manner. For VBE(ON) measurements, the base current is measured at the desired collector current and voltage bias conditions, and then a VBE saturation measurement is performed using this value of base current. The collector and emitter terminals are interchanged to perform an inverted test.

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