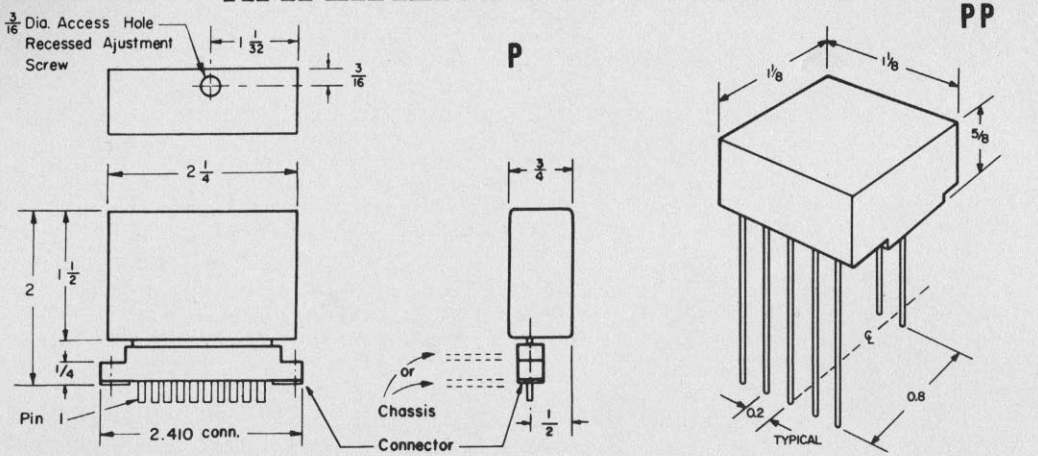
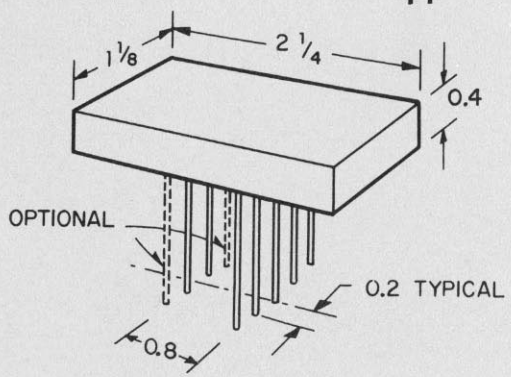
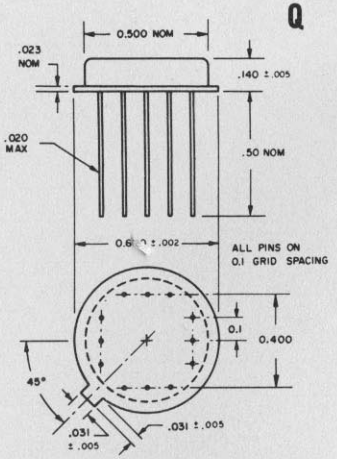
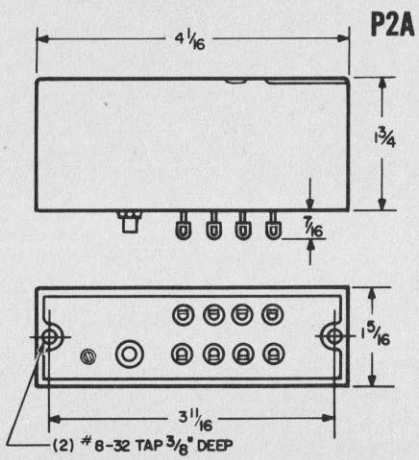
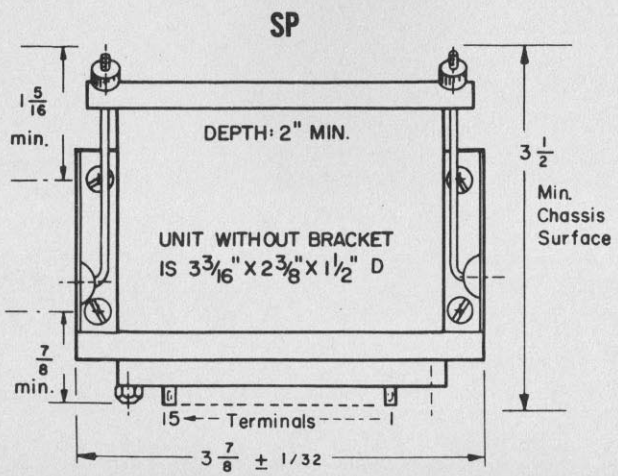
AMPLIFIER DIMENSIONS











Philbrick Utility-Grade Amplifiers, identified by the letter "U" following the family number (e.g. P65AU), are identical to premium-grade prototypes in circuitry, layout, manufacturing techniques, and the exclusive use of silicon transistors and first-grade passive components from leading U. S. manufacturers. The price difference is achieved by the following means:

The use of silicon transistors encapsulated in highly moisture-resistant silicone plastic (Note: not epoxy!) instead of hermetically-sealed amplifiers.

Use of capacitors which are guaranteed from −55 to +85°C, instead of the −65 to +125°C units normally used in premium units.

All room-temperature tests are carried out with the thoroughness that has earned Philbrick an enviable reputation for reliability; **complete** temperature tests are run on representative samples of each production run to confirm compliance with published specifications.

Use of date codes and go-no-go tests instead of serial numbers and recording of data as normally required for all premium units (Government Inspection and/or certified test results are always available, upon request, for **premium** units.)

In performance, the Utility-Grade amplifiers are within their operating temperature range identical to their Premium-Grade counterparts. As low-temperature tests are conducted on samples only, gain tolerances are relaxed by a factor of 2, and the input current vs. temperature tolerances by a factor of 1.5, compared with the corresponding specifications for the premium amplifier.

Philbrick Utility-Grade amplifiers may be substituted in virtually all applications for which Premium-Grade counterparts are recommended.

Philbrick differential operational amplifier families P35 through P85 contain input stages with matched pairs of junction transistors in a common emitter configuration. Emitter current being kept constant, each transistor requires a "housekeeping" current into its base amounting to emitter current divided by β (current gain). By selecting high-β transistors and low emitter currents, these base currents can be made as small as 10^{-8} amperes, but they can never be eliminated, and they increase as temperature decreases. If the base currents of input transistors are not supplied by current sources within the amplifier, an output voltage error will result because this offset current produces a voltage drop across the feed-back impedance (in an inverter) or the signal source impedance (in a voltage follower).

The simplest form of base current supply is a resistor from +B to each base. P45A, P55A, P65A and P85A families have these built in, while the proper resistance values for external installation are marked on their PP equivalents. Although these current trim resistors are inexpensive, they are most effective within narrow temperature limits and where high common-mode voltages do not occur. After all, β, and with it base current do change with temperature, and a resistor is a constant current source only as long as the voltage across it remains constant!

Philbrick Current Compensated Amplifiers, identified by the letter C following the family number, have built-in base current sources which closely track current demand over the entire operating temperature range.

The P35C and P85C series contain a sophisticated compensating circuit which leaves the outstanding common mode voltage rejection ratio, the common mode voltage range, and the input impedances unaffected. An additional feature of this compensating circuit is a provision for nulling either input current completely by applying an adjustable voltage bias (±5 volts maximum) to a terminal provided for the purpose. The P45C and P65C series contain a simpler compensating circuit which provides a fivefold decrease in offset current over the entire temperature range, but also reduces the common mode rejection ratio, the common mode voltage range, and the input impedance.