

# TRANSDUCER AMPLIFIER

## KH-102

- No External Circuitry Required
- Internal Frequency Compensation
- Utilizes Advanced Monolithic Circuitry
- Low Noise
- High Common Mode Rejection

- Differential Input
- Short Circuit Protection
- TO-5 Package, 10 Pin
- Flight Qualified



T-65.13

The new Kulite KH-102 hybrid microcircuit amplifier has been designed for high performance and ease of application. It is ideally suited for transducer, strain gage bridge or thermocouple amplification where stability, reliability, ruggedness, as well as small size, are prime requisites to high performance. The most advanced silicon monolithic circuitry, combined with a thick film hybrid circuit has been used.

The amplifier requires no external components for frequency compensation and has a flat response when used with any transducer on the market. Full protection against short circuits occurring at either the input or the output is incorporated within the amplifier.

The device offers a unique feature of either a gain of 50, which allows direct coupling to a bridge cir-

cuit with no external circuitry, or a variable gain for applications where a gain of 50 is not adequate. Two coupling resistors are required to set the gain to the desired value. The ability of this amplifier to accept a high common mode input level allows the use of either one or both of the amplifier power supplies to be used to power the transducer.

Gain	50 (Or Externally Adjustable)
Frequency Response	25KHz (3db Band Width At Gain of 50)
Input Impedance	20K Ohms
Output Impedance	75 Ohms (Max.)
Common Mode Rejection Ratio	90 db (Typ.)
Supply Voltage Rejection Ratio	30 $\mu$ V/V (Typ.)
Operating Temperature Range	0°F to 180°F (-20°C to 80°C) or -65°F to +260°F (-55°C to +125°C)
Input Drift	10 $\mu$ V/°C (Typ.)
Linearity	0.1% (Max.)
Input Offset Voltage	1.0 mV (Typ.)
Transient Response Rise Time	0.3 Microsec.
Supply Voltage	$\pm 5$ V to $\pm 22$ V (See Fig. 1)
External Balance	Connect 10K Ohms Potentiometer Across Pins 5 and 9, Center Tap to Pin 3
Physical Configuration	Standard TO-5, .250" High

FIG. 1 AMPLIFIER PIN CONNECTIONS

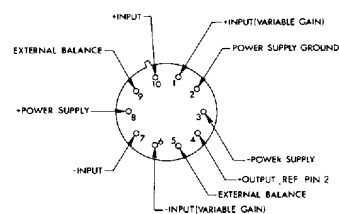


FIG. 2 KH-102 OUTLINE

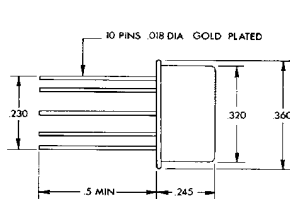


FIG. 3 WHEN OPERATING WITH A WHEATSTONE BRIDGE, FIXED GAIN OF 50, USING INTERNAL FEEDBACK RESISTORS.

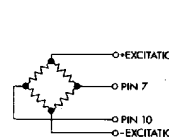


FIG. 4 WHEN OPERATING WITH A WHEATSTONE BRIDGE, VARIABLE GAIN, USING EXTERNAL FEEDBACK RESISTORS.

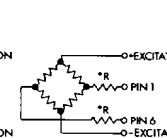
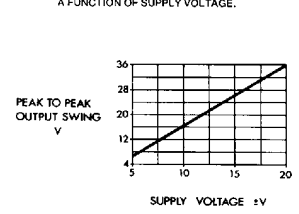


FIG. 5 OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE.



## HIGH OUTPUT TEMPERATURE TRANSDUCERS

### STQ-STH SERIES

The Kulite ST series temperature transducers represent a new generation of high output solid state temperature sensors. Manufactured by advanced integrated circuit and hybrid circuit techniques, these devices incorporate on a single ceramic substrate a complete Wheatstone Bridge. Use of silicon positive temperature coefficient resistors provide an extremely high output together with good linearity. These devices combine all of the advantages of microcircuit technology, substantial size reduction, excellent repeatability and reliability, high output, low power dissipation, simplification of the design and application, etc.

The miniature size of the ST series makes it possible to make discrete temperature measurements at

several points of extremely small surfaces. The encapsulation provides a rugged housing for bonding to surfaces without danger or damage to the Sensor Bridge.

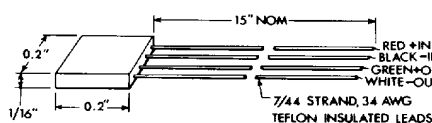
The temperature transducers are offered in two (2) basic series: The STQ and the STH. In the first case, a single active arm bridge is used together with hybrid circuit bridge completion resistors. This technique gives excellent linearity of output with temperature over an extremely wide temperature range -50°F to 350°F. In the second case, two active positive temperature sensors are used in opposite legs of the bridge. This series gives the highest output with some sacrifice in linearity.

The high sensitivity and low power dissipation of the

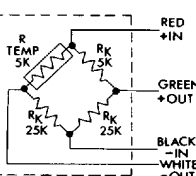
bridge makes it possible to operate at extremely high signal levels. For instance, with a 20 volt input on the STH temperature transducer, an output voltage of approximately 6 volts will result from a 200°F temperature excursion. With the STQ series under similar conditions, a signal of 2 volts will result, with excellent linearity.

The unique ability of the Kulite temperature transducers to provide high output and rapid response over a broad temperature range, together with their extremely small size, make them a valuable new tool in such varied fields as aerospace and missile telemetry, guidance and control and biomedical instrumentation.

Temperature Range	-50°F to +350°F (-45°C to +175°C)
Bridge Resistance @ 5V	15K (STQ) 5-20V 5K (STH)
Excitation	
Sensitivity (mV/V/°F)	.5 mV/V/°F (STQ) 1.5 mV/V/°F (STH)
Linearity	$\pm 0.75\%$ FS (STQ) $\pm 0.25\%$ FS (STH)
Repeatability	$\pm 0.25\%$ FS
Response	0.5 Sec.
Insulation Resistance	100 Megohms @ 50V
Environmental	Vibration 80G's Peak 50-2000 cps With Sensor And Leads Properly Cemented to a Mounting Surface



STQ-5000-200



STH-5000-200

