type 2650

Precision Conditioning Amplifier

FEATURES:

- Charge and voltage input modes
- 4 digit conditioning to transducer sensitivity
- Unified output ratings for simplified system calibration
- Sensitivity up to 100 mV/pC or mV/mV
- Switchable low and high frequency limits
- Built-in test oscillator

USES:

- Comparison calibration of piezoelectric transducers
- General purpose vibration measurements
- Underwater sound measurements with hydrophones

The Transducer Calibration Amplifier Type 2650 is mainly intended for the calibration of piezoelectric vibration transducers. The Amplifier is equipped with a 4 digit conditioning network which directly shows the sensitivity of the transducer under calibration when used together with a reference transducer, amplifier channel (2626), and the comparator Type 2970. Furthermore, Type 2650 is ideal for use with Hydrophones, especially the Standard Hydrophone Type 8100. For this purpose it is equipped with a standard B & K coaxial socket on the rear panel, and a special filter position to reject LF noise which is sometimes troublesome when calibrating in water tanks. It is able to work as a charge amplifier as well as a voltage amplifier and it features unified output ratings in both modes. It is equipped with overload and signal level indicator lamps and has a very short recovery time.

Description

As can be seen from the block diagram in Fig.1 the 2650 consists of an input amplifier, a 1000 Hz oscillator, a filter section, a conditioning section and an output amplifier.

Input Stage

The 2650 is equipped with a high-gain, low-noise operational FET amplifier in the input stage. In the voltage mode it provides a high input impedance giving minimum loading of the accelerometer and thereby securing a high accuracy. In the charge mode it eliminates the influence of capacitance from long cables as it is only sensitive to changes in charge. The sensitivity of the stage is variable, giving a

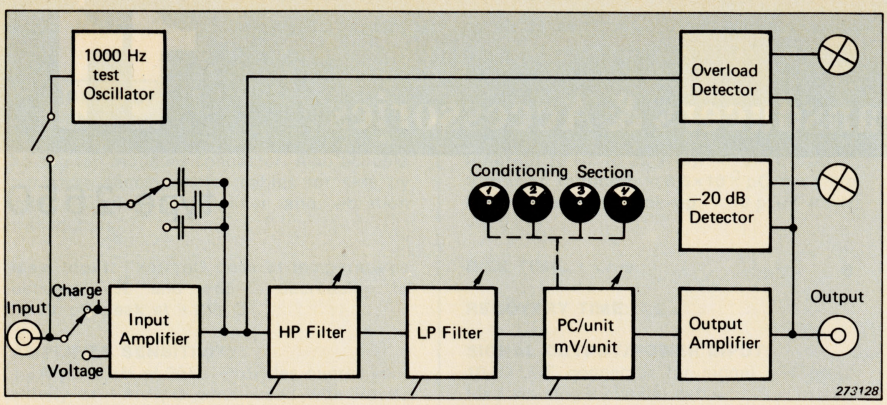

Fig.1. Block diagram of the 2650

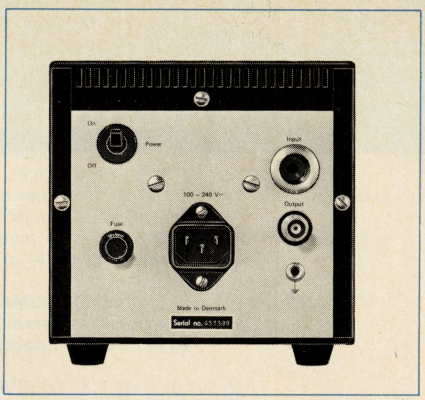

Fig.2. Rear panel of the 2650

rated output in the range 1 mV to 100 V/measurement unit. The obtainable output voltage depends on the sensitivity of the transducer. For calibration purposes, a 1000 Hz oscillator can be connected to the input of the stage.

Filter Section

From the input amplifier the signal is passed to the active high-pass and low-pass filters. Both filters have a cut-off slope of 40 dB/decade and selectable cut-off frequencies.

Conditioning Network

A four-digit transducer conditioning network enables the amplifier sensitivity to be matched exactly to the sensitivity of the transducer, thus providing a directly calibrated output in volts/measurement unit. When the 2650 is combined with a reference transducer, an amplifier channel (for instance the Conditioning Amplifier Type 2626) and the Comparator Type 2970 the four digits provide a direct read-out of the sensitivity of the unknown transducer.

Output Stage

Finally, the signal enters the output stage which secures a low output impedance. Two level indicators are provided. One indicates overload at the input or output stages, while the other indicates when the signal level is within 20 dB of full output. These help in selecting a suitable sensitivity setting for maximum output signal with minimum output noise.

Specifications 2650

CHARGE AND VOLTAGE INPUTS:
Via 10-32 UNF and standard B & K coaxial sockets
Max. Input: $\sim 10^5$ pC and 10 V peak respectively
Input Impedance: 5 GΩ//10 pF (voltage input only)

SENSITIVITY CONDITIONING:
4 digit dial-in of transducer sensitivity from 1,0 to 1099 pC/unit

AMPLIFIER SENSITIVITY:
0,1 to 100 mV/pC or mV/mV corresponding to –20 to +40 dB with transducer capacitance of 1 nF

CALIBRATED OUTPUT RATINGS:
1 mV to 100 V/unit selectable in 20 dB steps

ACCURACY:
For low and intermediate V/UNIT OUT settings of each transducer range: ±0,25% from 20 Hz to 10 kHz for input loads less than 10 nF
For high V/UNIT OUT setting of each transducer range: ±0,5% from 100 Hz to 10 kHz for input loads less than 10 nF

SIGNAL OUTPUT:
Via 10-32 UNF and BNC coaxial socket
Max. Output: 10 V (10 mA) peak
DC Offset: ±10 mV
Output Impedance: < 1 Ω

FREQUENCY RANGE:
0,3 Hz to 100 kHz

LOW-PASS FILTER:
Switchable –3 dB upper frequency limits of 1 kHz, 3 kHz, 10 kHz, 30 kHz and Lin ~200 kHz with attenuation slope of 40 dB/decade except for Lin mode

HIGH-PASS FILTER:
Switchable –3 dB lower frequency limits of 0,3 Hz, 3 Hz and 2 kHz with attenuation slope of 40 dB/decade

DISTORTION: <2%

INHERENT NOISE (2 Hz to 22 kHz)
5 10^{-3} pC or 5 μV RMS referred to input with maximum sensitivity and 1 nF transducer capacitance

TEST OSCILLATOR:
1 kHz sinusoid factory preset for test level of 1 V

LEVEL INDICATORS:
"Overload" LED lights when input or output level exceeds 10 V peak
"20 dB from Overload" LED lights when output level is between 1 and 10 V peak

RISE TIME: ~3 V/μs

RECOVERY TIME: ~200 μs

ENVIRONMENTAL CONDITIONS:
Temperature Range: –10 to +55°C (+14 to 131°F)
Humidity: 0 to 90° C (non-condensing at 30°C)
STORAGE TEMPERATURE: 70° C Max.

POWER REQUIREMENTS:
100 to 240 V (50 to 400 Hz) ±10% AC. 5 VA. Complies with Safety Class I of IEC 348

DIMENSIONS:
Height: 132,6 mm (5,22 in)
Width: 139,5 mm (5,53 in)
Depth: 200 mm (7,87 in)
B & K module cassette KK 0024, 4/12 of 19 in rack module

WEIGHT: 1,5 kg (3,3 lb)

ACCESSORIES INCLUDED:
1 × Power Cable ..... AN 0010
1 × BNC to B & K Input Adaptor ..... JP 0144
1 × 50 mA Fuse ..... VF 0016