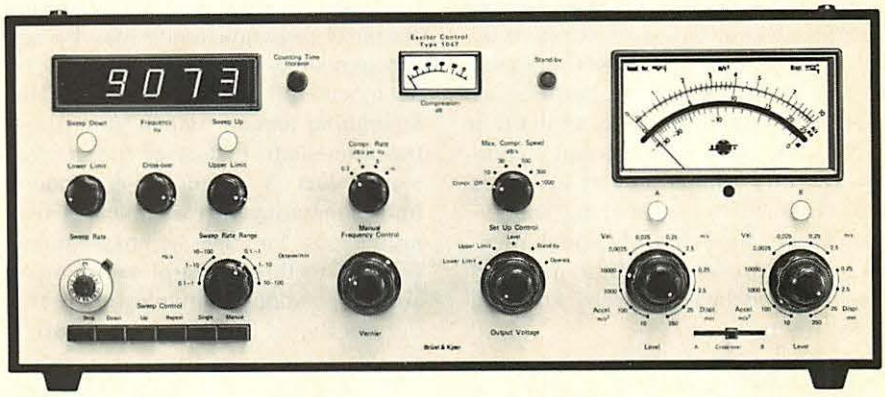
types 5596, 5685, 5686, 5716/WH 0255, 5748, 5812, 1047/WH 0468

Peripherals for use with Type 1047 Exciter Control

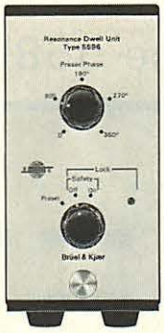


A number of instruments are available for extending the facilities of vibration test installations using the Exciter Control Type 1047 (which is described in a separate data sheet). These instruments, which are described below, may be obtained to special order from B & K's Systems Engineering Group.

Resonance Dwell Unit Type 5596

Resonance Dwell Unit Type 5596 enables the frequency of a vibration test to be locked to the chosen part of a specimen resonance (defined by the phase shift between excitation and response) and maintain lock even if the resonance frequency shifts as a result of material ageing, fatigue etc. The 5596 is intended for use with the Type 2971 Phase Meter, from which it also draws its power, and the Type 1047 Exciter Control, whose frequency it controls.

Operation of the resonance test is very simple. The excitation and response are measured by piezoelectric accelerometers and force transducers, and the conditioned signals fed to the two channels of the Phase Meter. With the 5596 set to "Preset", the frequency of the Exciter Control is adjusted manually until the Phase Meter displays the desired phase relation between excitation and response. The Preset Phase Difference control on the 5596 is then adjusted to find the position at which the LED indicator just lights or is just extinguished,



and the 5596 is then set to "Lock". The Exciter Control will stay locked to the frequency which produces that phase difference, which may be checked visually from the display on the Phase Meter.

The 5596 can be set so that if for any reason the phase shift ceases to keep to the preset value, owing for example to catastrophic failure of the specimen, the Exciter Control is returned automatically to "Stand by".

Further information about the 5596 is contained in a separate data sheet.

Specifications 5596:

Phase Input:

Range: 0° to 360°, continuously adjustable

Limits: ± 5° for interlock activation, with LED indication

Voltage: + 10 mV per degree, compatible with DC OUTPUT of Type 2971 Phase Meter

Connector: Standard BNC type, accepts plug JP 0035

Control Connections:

Frequency Control: 7-pin DIN socket accepting plug JP 0703 for connection to REMOTE SWEEP CONTROL on Type 1047 Exciter Control

Interlock Control: 7-pin DIN socket accepting plug JP 0703 for connection to CROSSOVER OUTPUT on Type 1047 Exciter Control

Power Connections:

7-pin DIN socket accepting plug JP 0703 for taking power from TO EXT. EQUIPMENT on Type 2971 Phase Meter

Dimensions:

Height: 132,6 mm (5,22 in)
Width: 69,5 mm (2,74 in)
Depth: 200,0 mm (7,87 in)

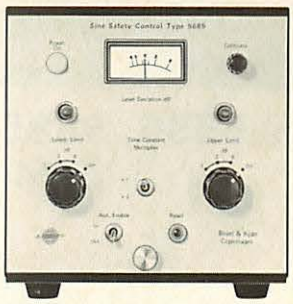
Weight: 1,75 kg (3,9 lb)

Accessories Included:

3 control cables 1,5 m	AQ 0035
1 signal cable 1,2 m	AO 0087

Sine Safety Control Type 5685

Sine Safety Control Type 5685 when coupled with Exciter Control Type 1047 protects specimens undergoing sinewave vibration testing against destructive overtesting caused by system malfunction. Control system faults such as broken accelerometer cables generally result in loss or diminution of the control signal.



If this occurs during a test the compressor circuit of the Exciter Control will increase the vibration level in an effort to restore the specified level at the control position or positions. The 5685 is essentially a fast-acting smoothing-circuit, comparator and trigger which switches the 1047 to the "Stand by" condition when the control signal deviates by a preselected amount from the specified level, thereby shutting down the test.

The 5685 requires only three signal connections, all made to the 1047 directly (one being via any Vibration Programmers ZH 0100 in use). The positive and negative acceptable deviation limits may be set independently to 1, 3 or 6 dB, or switched off independently. The smoothing circuit which integrates the immediate history of the control signal has a frequency-dependent time constant, with a choice of two multipliers for use in installations with up to three control signal measuring positions multiplexed in the Control Signal Selector Type 5686.

The 5685 is automatically disabled temporarily during cross-overs (from one test programme to the next) to ensure that it does not interpret the resulting step changes in control signal level as the result of a malfunction. A moving-coil meter displays the control signal deviation in dB.

Further information about the 5685 is contained in a separate data sheet.

Specifications 5685:

Temperature Range:
5° to 40°C (41° to 104°F)

Warm-up Time:
5 minutes

Dimensions:
Height: 132,6 mm (5,22 in)
Width: 139,5 mm (5,49 in)
Depth: 200,0 mm (7,87 in)

Weight: 2,5 kg (5,5 lb)

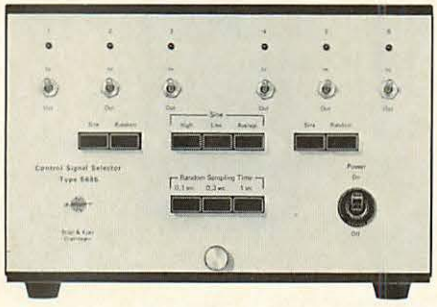
Power Requirements:
100, 115, 127, 220 or 240 V single phase 50/60 Hz AC mains, 8 VA approx.

Accessories Available:
DIN-plug Box WA 0103 for connections between 5685 and ZH 0100

Control Signal Selector Type 5686

Control Signal Selector Type 5686 enables vibration testing installations incorporating level control loops (compressor loops) to accommodate control signals from up to six measuring positions. For sinewave testing, the level controlled may be the highest, lowest or average at up to six positions. For random vibration testing it may be the average of up to six positions, sampled at one of three preselected rates 0,1, 0,3 and 3 seconds per position). The sampling time per position for sine testing is equal to one cycle of the vibration frequency. For mixed sine/random testing, the 5686 can accept up to three inputs of each kind.

The sine and random control outputs are on separate sockets, and a separate recorder output at a level 10 dB above the corresponding control output is available for each of the two signal types. The overall gain between inputs and control outputs is unity, but buffering is provided. For the average modes, averaging is performed in the compressor circuit of the Exciter Control or Sine Random Generator.



Further information about the 5686 is contained in a separate data sheet.

Specifications 5686:

Inputs:
Number: 6, grouped 3 + 3
Input Impedance: 0,5 MΩ // 100 pF
Voltage Range: 3 mV to 1 V RMS
Frequency Range: 1 Hz to 10 kHz
Type: Standard BNC socket, accepts plug JP 0035

Control Outputs:
Number: 1 sine, 1 random
Minimum Load Impedance: 10 kΩ
Gain: 0 dB (referred to inputs)
Type: Standard BNC socket, accepts plug JP 0035

Recorder Outputs:
Number: 1 sine, 1 random
Gain: + 10 dB (referred to inputs)
Type: Standard BNC socket, accepts plug JP 0035

Sampling Time:
Random: 0,1, 0,3, 1 s (selectable)
Sine: 1 cycle of vibration test frequency

Comparator Accuracy:
High/Low: 1,5 dB

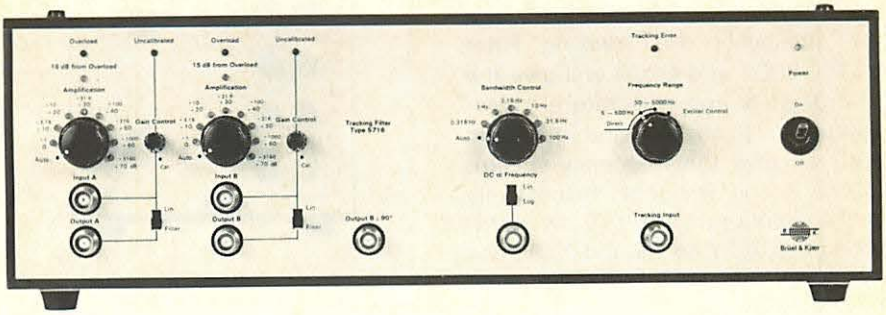
Dynamic Range:
0,03 to 1000 ms^{-2} (normalized to 1,0 mV per ms^{-2})

Dimensions:
Height: 132,6 mm (5,22 in)
Width: 209,5 mm (8,25 in)
Depth: 200,0 mm (7,87 in)

Weight: 2,5 kg (5,5 lb)

Power Requirements:
100, 115, 127, 220 or 240 V single phase 50 to 400 Hz AC mains, 12 VA

Two Channel Tracking Filter Type 5716/WH 0255



Two Channel Tracking Filter Type 5716/WH 0255 is a very versatile dual band-pass filter whose centre frequency may be tuned by a variety of different methods for tracking audio frequency signals in the range 5 Hz to 10 kHz. In a vibration testing installation it can be used for frequency-selective level measurements and spectrum and cross-spectrum analysis. Six constant bandwidths 0,316 to 100 Hz may be automatically selected by frequency band for near constant-percentage bandwidth applications.

The 5716 depends on the action of a voltage-controlled local oscillator, which may be tuned directly by a linear voltage ramp (+ 0,11 to + 11 V) or indirectly by a phase-locked loop. This loop may be locked either to an external trigger signal, which may also be the input signal to one of the filter channels, or to the beat frequency derived by a mixer built into the 5716 between the two high-frequency tuning signals available from the 1047 Exciter Control. The latter facility enables the 5716 to be accurately frequency-synchronized with the 1047. For synchronization of a graphic level or X-Y recorder, a positive direct voltage output is available proportional to either frequency or the logarithm of frequency (switch-selectable). A Ramp Generator WB 0210 is available to sweep the 5716 frequency automatically.

One of the channels provides both coincident and quadrature outputs for use in cross-spectrum analysis with the Type 5748. Other facilities include up to 70 dB gain selectable manually or automatically in 10 dB steps (independently for each channel) and 15 dB continuous attenuators in each channel.

Further information about the 5716 is contained in a separate data sheet.

Specifications 5716:

Center Frequeny Range:

External Trigger or Voltage Control: Two switch-selectable ranges 5 to 500 Hz and 50 to 5 kHz

Control by 1047: 5 Hz to 10 kHz in one continuous range

Band Pass Filters:

Bandwidths: Two-pole Butterworth characteristic, 0,316 1, 3,16, 10, 31,6 or 100 Hz bandwidths

Bandwidth Programme: Cross-over frequencies 15,8, 50, 158, 500, 1580 Hz for near constant bandwidth applications. Can be selected internally

Phase accuracy:

Between input and output:
0° ± 1° when using tracking input
0° ± 1° (5 Hz to 2 kHz), ± 5° (2 kHz to 10 kHz), when using 1047

Between two outputs:
0° ± 1° however tuned

Channel Gain at Centre Frequency
70 dB maximum, adjustable in 10 dB steps, with 0 to −15 dB continuous gain control. Autoranging

Dynamic Range: Bettter than 40 dB

Inputs:

Channels A and B: Impedance 1,0 MΩ, maximum voltage ± 10 V PEAK

Tracking (Trigger): Impedance 100 kΩ, voltage 100 mV to 50 V

Frequency Control: Impedance > 3 kΩ, voltage range + 0,11 to + 11 V approx. for selectable frequency range 5 Hz to 500 Hz or 50 Hz to 5 kHz

Outputs:

Channels A, B and B∠90°: Impedance 100 Ω, minimum load impedance 10 kΩ, maximum output voltage ± 10 V PEAK. Selectable 20 dB rear panel attenuator in each channel, output impedance 1 kΩ

Voltage Proportional to Frequency: Selectable, linear + 0,01 to + 10 V (2 V/kHz), or logarithmic 0 to + 6 V (2 V/decade)

Indicators:
Overload (each channel),
15 dB from overload (each channel),
Tracking error (for tracking input)

Connectors:
All signal connections are made from standard BNC sockets accepting plug JP 0035

Warm-up Time: 5 minutes

Dimensions:

Height: 132,6 mm (5,22 in)
Width: 430 mm (16,9in)
Depth: 200 mm (7,87in)

Weight: 6 kg (13,2 lb) approx.

Power Requirements:
100, 115, 127, 220 or 240 V single phase 50/60 Hz AC mains, 15 VA approx.

Accessories Included:
0,5 A Fuse

Accessories Available:
Ramp Generator WB 0210 for manual tuning of the filters

Cross Spectrum Unit Type 5748

Cross Spectrum Unit Type 5748 enables the Two-Channel Tracking Filter Type 5716 to be used for cross-correlation measurements, which can be useful for identifying the origins of unwanted noises and vibration. It takes three input signals from the 5716 — X, Y and Y∠90° — derived from transducers sited at two positions for which the cross correlation is to be measured. It generates four positive direct voltages proportional to the functions C(XY), Q(XY), g(X) and g(Y), defined as follows:

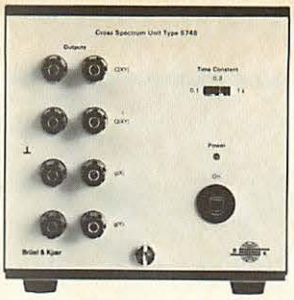
$$g(X) = \frac{1}{2T}\int_{-T/2}^{T/2} X^2 \cdot dt,$$

$$g(Y) = \frac{1}{2T}\int_{-T/2}^{T/2} Y^2 \cdot dt.$$

$$C(XY) = \frac{1}{10T}\int_{-T/2}^{T/2} X.Y.dt.,$$

$$Q(XY) = \frac{1}{10T}\int_{-T/2}^{T/2} X.Y\underline{/90^\circ}.dt.,$$

If these output voltages are used to deflect the pen of a level or X-Y recorder which is synchronized with the sweep of the Tracking Filter 5716, C(XY) and Q(XY) will give the co-ordinated and quadrature cross-spectra respectively, and g(X) and g(Y) will give the frequency spectra of the A and B signals respectively at the inputs to the 5716. (X corresponds to A, Y to B, and Y∠90° to B∠90° on the 5716.) The averaging time T for all four outputs may be selected on a switch giving a choice of 0,1, 0,3 and 1 second. The averaging characterized by the integration functions is performed with exponential weighting.



Specifications 5748:

Frequency Range: 5 Hz to 10 kHz

Input Voltage Range:
± 0,1 to ± 10 V PEAK

Input Impedance: 10 kΩ

Averaging Time: 0,1, 0,3, 1 s, selectable

Output Impedance: less than 100 Ω
(minimum load 10 kΩ)

Output Voltages:
C(XY) and Q(XY): —5 to + 5 V
g(X) and g(Y): 0 to + 5 V

Warm-up Time: 5 minutes

Dimensions:
Height: 132,6 mm (5,22 in)
Width: 139,5 mm (5,49 in)
Depth: 200,0 mm (7,87 in)

Weight: 2 kg approx.

Power Requirements: 100, 115, 127, 220 or 240 V single phase 50/60 Hz AC, 30 VA approx.

Narrow Band Controller Type 5812

Narrow Band Controller Type 5812 is for narrow-band random vibration testing. When connected to the 1047 Exciter Control it provides a narrow-band noise signal in place of the usual sinewave, centred at the frequency to which the 1047 is set. All the existing facilities of the 1047, including programmed sweeping, are retained, but the 1047 should be modified using modification **WH 0570**. This has the effect of increasing by a factor of ten the maximum compressor speed selected on the 1047. The noise-bandwidth selector includes a

position for normal sinewave operation.

Specifications 5812:

Noise Bandwidths: 3,16, 10, 31,6, 100, 316 Hz

Warm-up: For up to 20 s after switch-on, the generated signal will be sinewave. For a further 30 s the narrow-band noise will not be true random

Distribution: Symmetrical Gaussian in amplitude up to 4,5 σ

Maximum Compressor Speeds: 1, 3, 10, 30, 100 dB/s

Dimensions:
Height: 132,6 mm (5,22 in)
Width: 104,5 mm (4,12 in)
Depth: 200,0 mm (7,87 in)

Weight: 2,5 kg (5,5 lb)

Power Requirements: 100, 115, 127, 220 or 240 V single phase 50/60 Hz AC mains, 25 VA approx.

1047 Modification WH 0468

1047 Modification WH 0468 enables the 1047 Exciter Control to operate over a frequency range of 1 Hz to 2 kHz. Existing 1047s may be returned to B & K or their representative for this modification.

These Systems are a development of the Brüel & Kjær Systems Engineering Group and are not standard production items. Specifications can be modified, on a contract basis, to meet individual requirements. For prices and delivery times, please contact your local representative.