8 Channel Multiplexer

type 2811

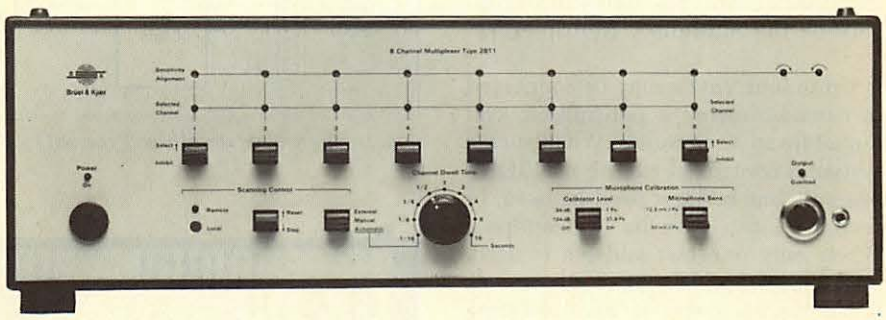
FEATURES:

- Dual 8-channel system (Main and Subsidiary Multiplexers)
- Scanning of Main Multiplexer under manual, automatic or external control
- Both multiplexers controllable from IEC 625–1/ IEEE–488 bus interface
- By-passing or selection of individual channels
- Standard 7-pin B&K microphone socket inputs
- Dual-function input/output sockets
- Choice of 0 V, 28 V or 200 V polarization voltages
- Individual ± 3 dB channel sensitivity adjustment
- Dual LED tuning indicator for calibration with Pistonphone or Microphone Calibrator
- Frequency response 2 Hz to 200 kHz ± 0,5 dB
- Crosstalk less than –80 dB up to 20 kHz, less than –60 dB up to 200 kHz

USES:

- Building acoustics measurements with the Building Acoustics Analyzer Type 4418
- Sound power measurements with the Digital Frequency Analyzer Type 2131
- Reverberation time measurements with the Digital Frequency Analyzer Type 2131
- Multi-channel noise monitoring
- Multi-channel sound, vibration and electrical measurements

The Type 2811 is a dual 8-channel multiplexer intended mainly for acoustics applications. Its microphone inputs are standard B&K 7-pin sockets which provide the power for microphone preamplifiers and a choice of polarizing voltages for condenser microphones. The 2811 provides transient-free electronic switching between channels under automatic, manual or external control, and switches the selected channel to output connectors on both the front and rear panels. A digital interface complying with IEC 625-1 and compatible wih IEEE–488 permits the 2811 to be used in a variety of advanced acoustic, monitoring and automatic test applications.



Description

Scanning Characteristics

Scanning can be controlled manually using the front-panel switches, or automatically using the built-in clock, external clock control or the IEC/ IEEE interface. Each channel is provided with its own three-position "Select – Inhibit" switch. The upper, spring-loaded setting enables the corresponding channel to be selected (for calibration, for example), overriding any scan which may be in progress. The lower setting inhibits the corresponding channel, causing it to be bypassed during a scan.

For manual scanning, a single "Reset – Step" switch is provided. When pressed upwards this switch resets the Multiplexer to the channel with the lowest number which is not inhibited. When pressed downwards, it steps the Multiplexer to the next (higher numbered) channel which is not inhibited.

The built-in clock generator provides 9 scan rates, with channel dwell times from 1/16 s to 16 s in a binary sequence. It may be stopped and reset using the "Reset – Step" switch. When this switch is released again, the generator starts on a whole new dwell period with the channel selected.

An external clock and reset timing generator can be connected to the "External Scanning" Input. When the manual mode is selected, both the external clock generator and the "Reset – Step" switch can control the scanning. If the external mode has been selected, only the external clock generator can control the scanning. Typical external clock generators include the Building Acoustics Analyzer Type 4418 or another 2811 ("External Scanning" Out socket).

The scan may also be controlled through the digital interface of the 2811, which conforms with the re-

quirements of IEC 625–1 and is compatible with the IEEE–488 interface bus. A 5-digit switch on the rear panel enables the device address to be selected by the user. The bus interface may be used to exercise full control of the scanning, i.e., selection of a specified channel, selection of the output of another, cascaded 2811 ("From Extension"), step to next channel or reset to first channel.

To minimise the risk of problems with ground loops, the common line (ground) of the digital circuitry of the 2811 is permanently connected to the chassis. This is separated from the analogue signal common (screen) by a non-linear link, which offers a high resistance to induced noise currents, but a low resistance to fault currents. The two common lines may also be linked by a metal strap on the rear panel.

When the 2811 is connected to the IEC/IEEE bus, a Subsidiary Multiplexer is available in the same cabinet. This Subsidiary Multiplexer operates on the same eight inputs as the Main Multiplexer, with the output selected using IEC bus commands. None of the front panel switches have any influence on the Subsidiary Multiplexer.

Up to four 2811's may be connected in cascade, giving a multiplexer system of up to 32 channels. When such a system is controlled via the IEC/IEEE bus only one address need be used, or each 2811 can have its own address. When only one bus address is used, interface control of scanning functions is limited to stepping and resetting the Main Multiplexers.

Signal Characteristics

Microphone input to the 2811 is by eight B&K standard 7-pin preamplifier sockets, which also carry power supply lines for B&K microphone preamplifiers (Types 2633, 2639 and 2645) and polarizing voltages for condenser microphones. A single switch on the rear panel selects polarizing voltages of 0V, 28V or 200V. Each channel is provided with a BNC Direct Input/Output socket, which may be used either for monitoring or recording individual microphone outputs, or as an input for non-acoustic signals (such as vibration or general instrumentation signals) to the multiplexer.

Each channel input is provided with ± 3dB sensitivity adjustment, for easy calibration with Pistonphone Type 4220 or Sound Level Calibrator Type 4230 when the Multiplexer is being used in sound measurement systems. A two-LED Sensitivity Alignment indicator permits easy adjustment of all eight channels.

The Main Multiplexer has signal output connections on both the front and rear panels. The Subsidiary Multiplexer signal output is present only on the rear panel

The maximum output level in both multiplexers is 5V peak; when this is exceeded, an LED lights to indicate overload. The input limits are from 3,5V to 7V peak, depending on the Sensitivity Alignment setting. The extended frequency response of the

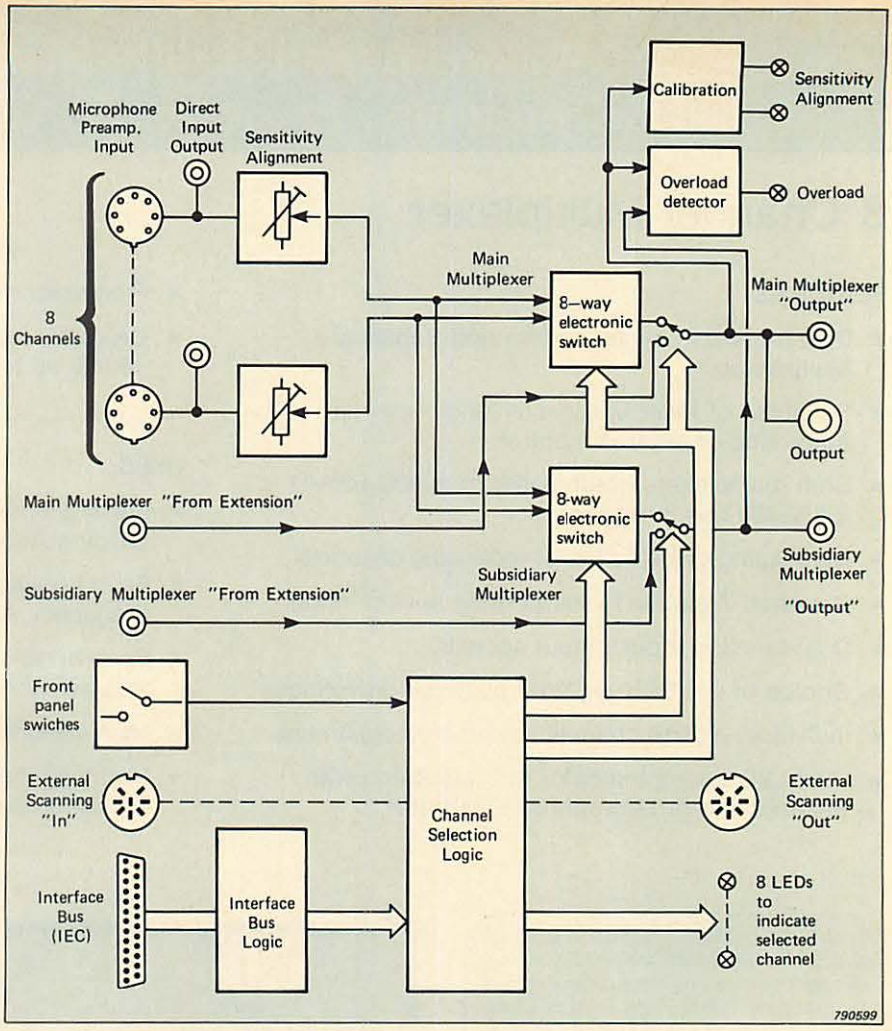


Fig. 1. Block diagram of the Type 2811

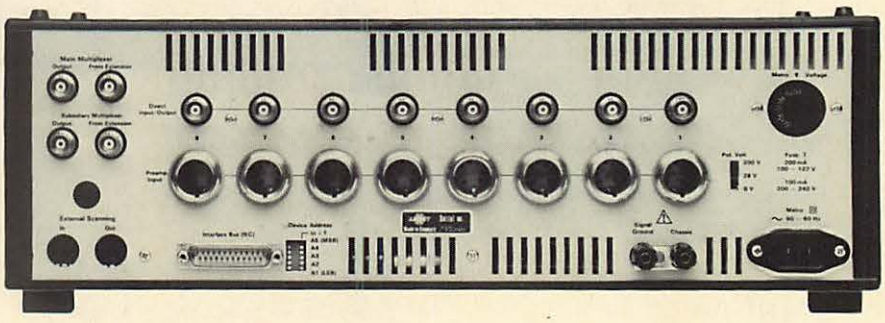


Fig. 2. Rear panel of the Type 2811

Type 2811 — ± 0,5 dB from 2 Hz to 200 kHz — allows its use with a wide variety of transducers. Over the audio frequency range of 20 Hz to 20 kHz, for which it is primarily intended, the response is flat within ± 0,1 dB.

IEC/IEEE Interface

The 2811's interface commands select output of individual channels or the extension input in the main and subsidiary multiplexers; "Reset" and "Step" of the main multiplexer; and a Start/Stop logic signal on the External Scanning Control connector.

The Start/Stop facility can be used to control instruments associated with the 2811 which do not themselves have interface control. For example instruments such as the Type 1405 Noise Generator, the Type 4205 Sound Power Source and the Type 4224 Sound Source may be stopped and started via a control cable connected to the External Scanning Control connector of the 2811.

Applications

Building Insulation Measurements

For investigations into noise transmission paths in large buildings, one or two Type 2811 Multiplexers can be connected directly to the Type 4418 Building Acoustics Analyzer (or the earlier Type 4417) to facilitate measurements of sound pressure levels in different parts of the structure. Up to three more Type 2811's can be cascaded with those connected directly to the 4418 allowing up to 32 microphones to be used for each of the 4418's two input channels.

A typical measurement arrangement is shown in Fig. 3. Multiplexers are used in both source and receiving rooms to obtain spatial averaging of sound pressure level and measure re-

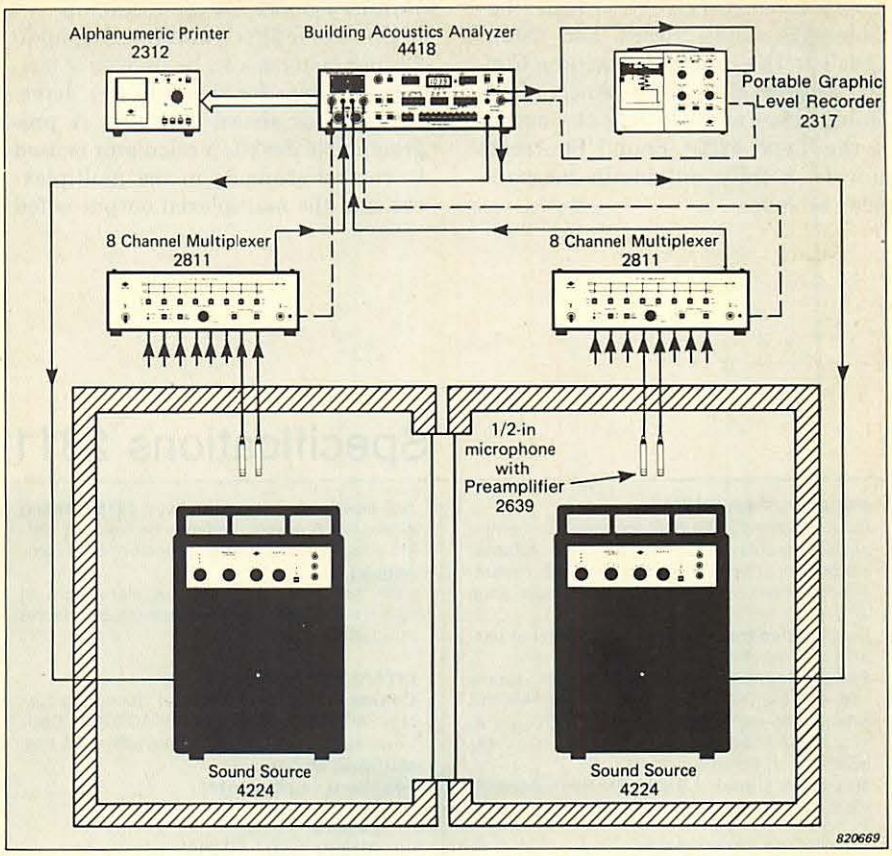


Fig. 3. A typical arrangement for building acoustics analysis, showing two Type 2811's in use with a Type 4418 Building Acoustics Analyzer and two Type 4224 Sound Sources. The Type 4418 provides all the necessary remote control signals to the Multiplexers and to the other instruments in the set-up to make this a fully automatic system for sound power and reverberation time measurement

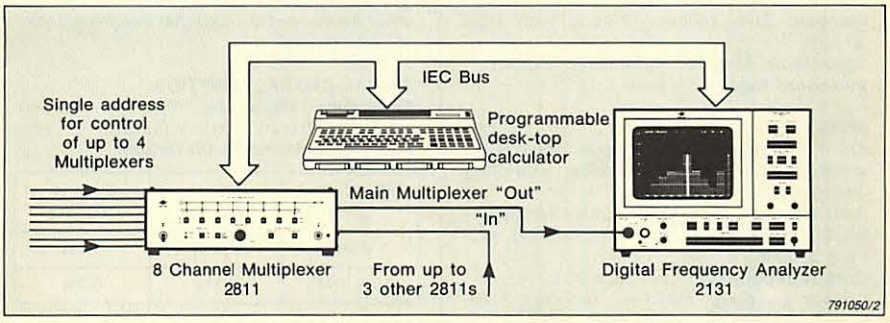


Fig. 4. Use of the Type 2811 in frequency analysis or sound power measurement, showing control of up to four 2811s from a single IEC/IEEE bus address

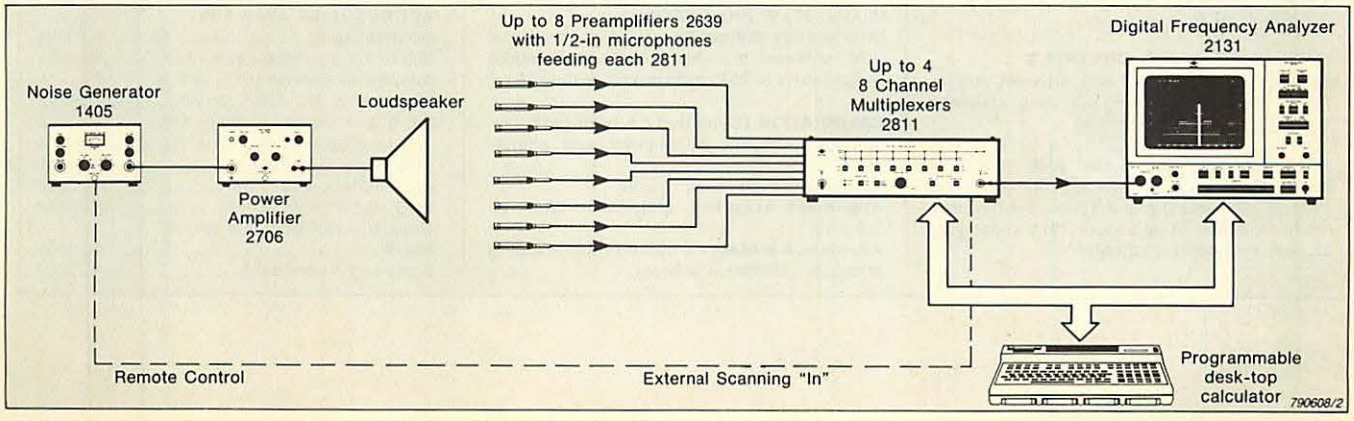


Fig. 5. An automated system for reverberation time measurements

ceiving room reverberation time. The Type 4418 sends "Reset" and "Step" signals to the External Scanning Control sockets on the rear panels of the Multiplexers and controls the output of the Type 42224 Sound Source to provide a fully automatic measurement set-up.

Sound Power Determination

Up to four 2811's multiplexing up to 32 microphones can be used in a bus-based system for sound power determination as shown in Fig. 4. A programmable desk-top calculator is used to control scanning in the multiplexers, and the multiplexed output is fed to a Digital Frequency Analyzer Type 2131.

Reverberation Time Measurements

The 2811 may be combined with a Real Time Analyzer and a calculator for automated reverberation time measurements, as shown in Fig. 5.

Specifications 2811

PREAMPLIFIER INPUTS:
B & K standard 7-pin Microphone Preamplifier socket, mates with Plug JP 0715. Adaptor DB 2609 is supplied to allow use with Preamplifiers fitted with the earlier, longer Plug JP 0701
Input Impedance: (Signal line) 300 kΩ in parallel with 50 pF
Power Supplies: +6,3 V DC heater supply and +12,6 V DC supply (each supply 480 mA total for all eight sockets); +150 V DC (2 mA) supply; and choice of 0, +28 V or +200 V DC polarization voltage
Maximum signal: 3,5 V to 7 V Peak depending on setting of Sensitivity Alignment

DIRECT INPUT/OUTPUTS:
Standard BNC sockets, mating with Plug JP 0035
Input Impedance: 300 kΩ in parallel with 50 pF, as for Preamplifier Inputs (corresponding sockets are wired in parallel)
Output Impedance: Corresponds to the output impedance of the Preamplifier used

"FROM EXTENSION" INPUTS:
Standard BNC sockets, mating with Plug JP 0035
Impedance: Matches Multiplexer "Output"
Maximum Signal: 5 V Peak

MULTIPLEXER OUTPUTS:
Front Panel: (Main Multiplexer only) B & K standard coaxial socket, mating with Plug JP 0101
Rear Panel: (Main and Subsidiary Multiplexer) Standard BNC connectors, mating with Plug JP 0035
Output Impedance: Less than 20 Ω.
Output Loading: Minimum resistive load, 5 kΩ; maximum capacitive load, 1 nF
Maximum signal: 5 V Peak

AUTOMATIC SCANNING CONTROL:
9 switch-selectable dwell times, 1/16 s to 16 s. Accuracy ± 1%

MANUAL SCANNING CONTROLS:
Facilities: Selection of any channel, inhibition of any channel during scanning, stepwise scanning, reset to beginning

EXTERNAL SCANNING "IN" AND "OUT":
Pair of standard 8-pin DIN sockets accepting Plug JP 0802 and Cable AQ 0034, for cascade interconnection of up to four 2811's, carrying all scanning control signals
"In" interfaces fully to the Type 4418 Building Acoustics Analyzer, and may be used for other combinations (open-collector TTL-compatible)
Both "In" and "Out" carry a signal (pin 5) which may be set (low) and reset (high) via the Interface Bus

INTERFACE BUS (IEC):
Connector: 25-pin connector accepting Cables AO 0184, AO 0194 and AO 0264. Conforms to IEC 625-1, compatible with IEEE Std. 488/ANSI MC1.1
Functions Implemented:
Acceptor Handshake — AH 1
Listener — L 2
Remote/Local — RL 1
All other functions — no capability
Main Multiplexer Facilities: Selection of a specified channel, Selection of "From Extension" input. Step to next channel, Reset to first channel
Subsidiary Multiplexer Facilities: Selection of a specified channel (1 to 8), Selection of "From Extension" input
Start/Stop instructions: Commands to another instrument via External Scanning sockets (pin 5)

SIGNAL CHARACTERISTICS:
Frequency Response: 2 Hz to 200 kHz ± 0,5 dB, 20 Hz to 20 kHz ± 0,1 dB
Max. Total Harmonic Distortion:

Sine Output Level	2 Hz to 20 kHz	2 Hz to 200 kHz
1 V RMS	0,03%	0,2%
3,5 V RMS	0,1%	0,3%

T00823GB0

Maximum Crosstalk: –80 dB, 2 Hz to 20 kHz; –60 dB, 2 Hz to 200 kHz (with 50 Ω source impedance at all inputs)
Maximum Broadband Noise: 12 μV, 2 Hz to 20 kHz; 30 μV, 2 Hz to 200 kHz
Interference Rejection: 100 A/m magnetic field increases broadband noise in the audio range (20 Hz to 20 kHz) to not more than 20 μV

CALIBRATION (Sensitivity Alignment):
Individual, channel-by-channel gain adjustment
Range, each channel: ± 3 dB
Alignment Accuracy, channel-to-channel: ± 0,1 dB
Absolute Accuracy: ± 0,25 dB (not including errors in calibration source)

TEMPERATURE RANGE:
Operating: 5°C to 40°C (41°F to 104°F)
Storage: –25°C to 70°C (–13°F to 158°F)

HUMIDITY RANGE:
0 to 90% relative humidity, non-condensing at 30°C

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

WEIGHT:
6,5 kg (14,3 lb)

CABINET:
Supplied as model A (light-weight metal cabinet), B (mahogany cabinet), or C (as A, with flanges for standard 19 in. rack mounting)

POWER SUPPLY:
100, 115, 127, 200, 220, 240 V single phase AC mains 50/60 Hz. Approximate power ratings are 13 VA alone, 21 VA with 8 Microphone Preamplifiers Type 2639, and 28 VA with 8 Microphone Preamplifiers Type 2645
Complies with Safety Class II of IEC Publication 348, and with requirements for U.S. FCC Class B Computing Device in respect of electromagnetic compatibility

ACCESSORIES INCLUDED:
1 mains cable ..... AN 0020
4 BNC plugs ..... JP 0035
1 B & K coaxial plug ..... JP 0101
2 8-pin DIN plug JP0802
2 100 mA fuses ..... VF 0026
3 200 mA fuses ..... VF 0012
2 4 mm banana plugs ..... JB 0002
1 IEC Bus connector kit (25-pin) ..... UA 0793
8 Preamp. Input adaptors (long plug/short socket) ..... DB 2609
1 screwdriver ..... QA 0001

ACCESSORIES AVAILABLE:
Control cable ..... AQ 0034
IEC 625-1 interface cable (2m) ..... AO 0194
Adaptor to convert IEEE–488 instrument to IEC 625-1 (25 pin) ..... AO 0195
IEC 625–1 (25 pin) to IEEE–488 interface cable (2 m) ..... AO 0264
BNC signal cable (0,6 m) ..... AO 0133
BNC signal cable (1,2 m) ..... AO 0087
BNC signal cable (3 m) ..... AO 0142
Coaxial screened cable in free length ..... AC 0002
Screened 7-core cable ..... AC 3029