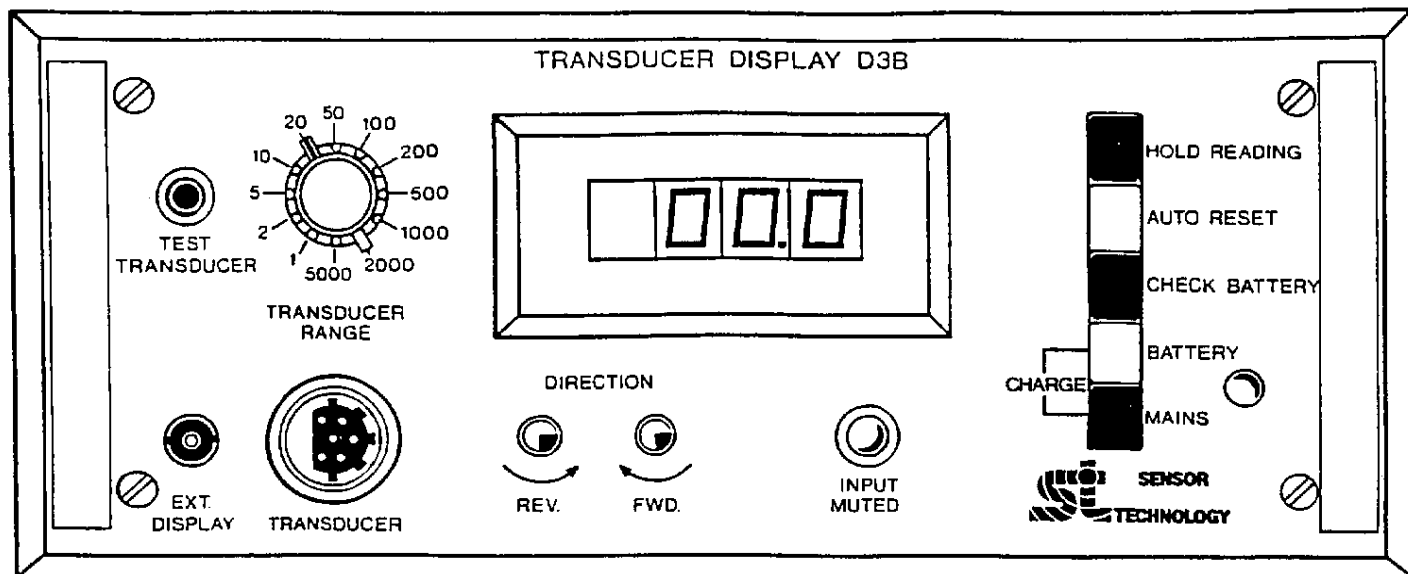


D3B Digital transducer display/power supply



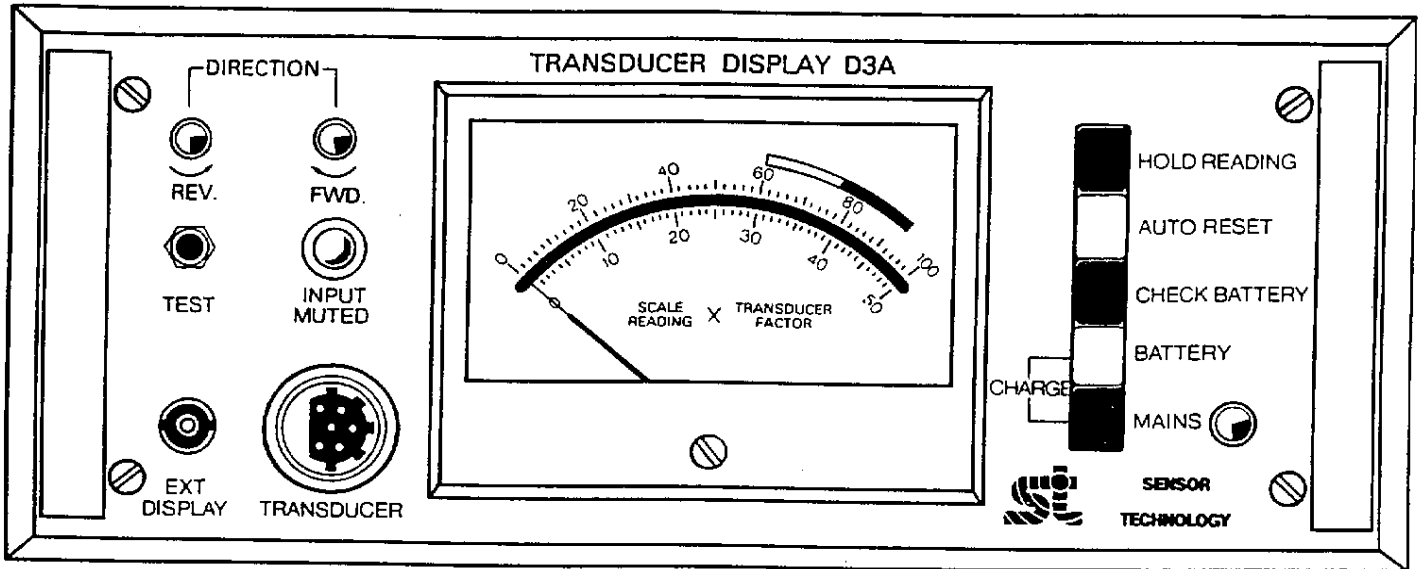
HANDBOOK

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D3A Analogue transducer display/power supply

D3B Digital transducer display/power supply

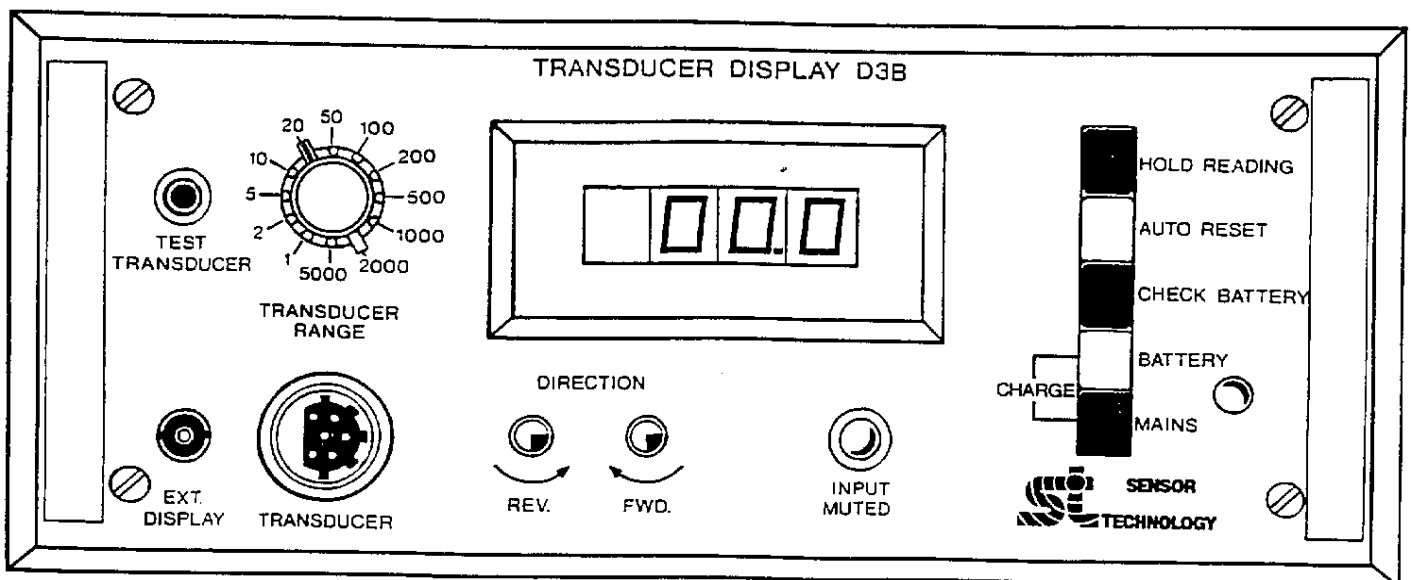


The D3A Analogue and D3B Digital Electronic Transducer Display Module are a proven concept in the precision measurement of dynamic and static torques. It enables the user to measure both clockwise and anti-clockwise torques without changing transducers. The unit is portable, either operating

from its optional internal rechargeable batteries, or from the mains supply. A charging unit and regulator are built in. Any transducer is interchangeable and compatible with the Display Module, which has the dual function of providing a precision power supply for the transducer, and an analogue or digital readout.

The D3A display is a 3.5" mirror scale Analogue meter having simple calibration compatible with the whole range of Transducers.

The D3B display is a .5in LED 3.5 Digital panel meter, with a range switch to select the appropriate transducer range.



Features

Torque Direction. The direction of the torque applied is sensed automatically by the instrument and displayed by indicator lamps on the front panel.

Hold Reading. By push button selection on the front panel the memory circuit holds on display the highest peak of any torque cycle, until manually reset.

Automatic Reset. By selecting the "Holding Reading" and "Auto Reset" together, the memory circuit will retain on display the direction and peak value

of torque for 3-4 seconds then automatically reset to zero. When the instrument is used in this way only the initial torque peak in the cycle is registered, any subsequent input being muted, until the system has reset automatically to zero. Other modes for the calibration of air tools are available to special order.

External Display. A socket on the front panel gives a precise output of 0 to +1 volt d.c. for full scale deflection of any transducer. This has sufficiently low output impedance for direct coupling of pen recorders, oscilloscopes, digital voltmeters, printers,

etc. A similar socket on the rear panel provides a ± 1 volt output for full scale deflection, direct from the transducer, the polarity being dependant upon the direction of the applied torque. The output from this socket is most suitable for monitoring transients or torsional vibrations, with appropriate ancillary equipment, or, for example, tensile and compressive forces.

Options:

Sealed Battery Pack
RS232 output
4-20 milliamp output
Centronics output
Hand Terminal for data entry

Specification

Readout	D3A - Mirror scale analogue meter, 3.5" scale length. D3B - .5in 3.5 LED Digital Display selected with 12 position switch. Automatic decimal point correction.
Accuracy	$\pm 1\%$ standard. $\pm 0.5\%$ to order.
External Display Output	0 to +1 volt d.c. for full scale. Min. load resistance 500 ohms. Accuracy $\pm 0.5\%$
Range	Determined by transducer.
Mains Voltage	230 or 115V $\pm 15\%$. 50-60 Hz.
Power Consumption	Varies with instrument modules and transducers in use - Max 50w.
Batteries (optional).	Two 6V 6amp hour sealed type.
Battery Operating Time.	Dependant on instrument modules and transducers in use. Strain gauge transducers - 15 hours. Optical Transducers - 6 hours.
Finish.	RAF Blue grey case, scratch resistant finish. Front and rear panels anodised al. alloy. Modular case to fit additional instruments.
Case Dimensions	Width 305mm. Height including feet 143mm. Depth 203mm. Allow 50mm at rear for plug access.
Panel Dimensions.	Width 279mm. Height 102mm.
Weight.	With batteries 7.25kg. Less batteries 5.20kg.

The D3A/D3B interfaces with the wide range of D Range instruments and transducers, providing the power for both transducers and auxiliary instruments such as D4A Limit Detector, D5A/B Power Indicator and D6A/B Wide Range RPM Indicator.

1. Introduction.

The transducer display module D3B is an advanced and versatile general purpose instrument intended to supply power to and display the output signal from a wide variety of electromechanical transducers used in the measurement of static and dynamic parameters of mechanical systems. The instrument derives its power either from the A.C. mains supply, or, where portability is required, from optional internal re-chargeable batteries which give a working life of up to hours before re-charging is necessary (Battery charging facilities are fitted as standard on all instruments).

The instrument is equipped with an analogue memory which may be engaged to display, for example, a rapid peak of input signal which would be otherwise difficult to interpret on the digital meter, or for recording and displaying. The memory may be disengaged manually, or by means of the "auto reset" function (which is explained at greater length - section 2.6). The sensitivity may be further extended by the addition of other D-range instruments, such as chart recorders, limit detectors, etc. with which the D3B is compatible.

The instrument has a twelve position range selection switch which gives direct readout in mechanical units of the standard transducer ranges; the full-scale sensitivity and decimal point position of the digital display is controlled by this switch.

The instrument incorporates plug-in module design for ease of maintenance and fault analysis, and is backed by a 12 months warranty and factory calibration service.

2. General Specification.

Power Requirements: 230c AC or 115v AC 50 to 60 Hz.
Power Consumption: 10w or 25w when charging flat batteries.
Weight: 4.8 kgms 11½ lbs without batteries.
7.1 kgms 16 lbs with batteries.
Accuracy: ± 1% of FSD Meter Display.
1.00v. all ranges.
± 0.05% on ranges 2,20,200,2000.
± 0.1% on ranges 1,10,100,1000.
± 0.2% on ranges 5,50,500,5000.
± ½% of FSD - External Display Socket.

Dimensions. Length 11.5 ins. 29.5 cms.
Height 4.6 ins. 11.7 cms.
Width 9.5 ins 24 cms.

3. Description of Controls.

3.1. Transducer Socket.

Static transducers are connected to this socket and through it receive power from the D3B and return signal voltage for display. The transducer "test" facility (see below) is connected to the D3B via this socket. When plugging in a transducer it is necessary to turn the locking ring of the transducer plug onto the socket to ensure a good connection to the D3B. (For Dynamic Transducers refer also to instructions on the D7 Optical Transducer Coupler.)

3.2. Mains Push-Button.

With the mains supply connected to the instrument (see section 4.1) this button is pressed in to switch the instrument on, when the adjacent red indicator lamp and one of the direction indicator lamps, either amber or green, will light up. Pressing the button again switches the instrument off.

3.3. Battery Push-Button.

When this button is pressed in the two 6v batteries (if fitted) are connected, via the rear-mounted fuses, to the power supply of the D3B. If the "mains" push-button is in the "off" position the batteries feed the precision regulator which supply power to the instrument, its transducer and any auxiliary instruments which are connected to it, enabling the apparatus to be used where there is no mains supply. If the "mains" and "battery" push buttons are in the "on" position and the mains supply is connected the D3B power supply charges the batteries, and the supply to the transducer and other instruments is disconnected.

3.4. Check Battery Push-Button.

When the instrument is used on battery operation (i.e. mains switch "off", battery switch "on") the condition of the batteries can be displayed on the front panel meter by pressing the "battery state" button with the range switch set to 20.

At full charge the digital panel meter will display a figure greater than 13.0v. Any figure lower than 10.0v displayed indicates that recharging as described above in 3.3 is required.

The instrument is fitted with a battery voltage detector circuit which will automatically disconnect the batteries from the instrument if the voltage falls below a pre-set level. This is to protect the batteries from being damaged by over discharge.

If the instrument switches itself off while on battery operation the instrument should be fully charged as above until, with the "mains" switch in the Off position, a minimum of 13.0v is displayed when the "Check Battery" switch is pressed.

3.5. Hold Reading Push Button.

When the instrument is switched on and connected to a transducer, the maximum value of the input signal from that transducer may be stored in the internal analogue memory and simultaneously displayed on the meter after engaging the hold reading button. In this state the displayed reading can only change if the signal level from the transducer exceeds the previous stored value. Pressing the button again clears and disengages the memory.

3.6. Auto Reset push button and Input Muted Lamps.

This control is used in conjunction with the "hold-reading" push button (see 3.5) to automatically clear the analogue memory and enable it to receive new data after a pre-set time interval. When the Hold Reading and Auto Reset push button are pressed in, any increasing signal level from the transducer will be displayed on the meter. If this signal level reaches a maximum value (which is stored in the analogue memory, section 3.5) and then begins to drop, the auto reset control board senses the difference between the stored signal and the transducer input signal, and when these vary by 10% the auto reset control inhibits further data from being entered from the transducer into the memory or display meter and lights the "input muted" lamp on the front panel of the instrument. The maximum value of the input signal is displayed on the meter at this time. After a period of about four seconds the auto reset control board releases the "input muted" lamp and clears the analogue memory, and the cycle is completed. This function is particularly useful where a repetitive measurement is being made, such as the determination of the break-point of a batch of torque wrenches or the yield point of material samples under stress. Under these conditions the transducer signal varies very rapidly at the yield-point and it is necessary for the operator to engage the analogue memory to obtain an accurate measurement of the transducer signal level at the break point. The auto reset function precludes the necessity of his re-setting the memory by hand each time the measurement is repeated.

3.7. Direction Indicator Lamps.

These lamps indicate the polarity of the input signal from the transducer.

3.8. "Test" Button.

This button is used for checking the electrical integrity of the instrument and any transducer to which it is attached. Provided that the transducer has no load applied to it when the instrument is switched on, pressing the "test" button will give a reading of the F.S.D. of the transducer provided the correct range has been selected.

3.9. "External Display" Socket.

The bipolar transducer input signal is rectified in the autopolarity board section of the D3 and connected to the "External display" socket for connection to auxiliary instruments which can process only positive polarity signals.

3.10. Transducer Range Selector.

This control sets the F.S.D. of the panel meter by dividing the input voltage by 1, 2 or 5 and setting the decimal point to the appropriate position, enabling the standard transducer ranges to be read directly on the meter. The displayed readings for a +1.00v input level on the various ranges are as follows.

<u>Range</u>	<u>Reading.</u>
1	1.000
2	2.000
5	5.00
10	10.00
20	20.00
50	50.0
100	100.0
200	200.0
500	500.
1000	1000.
2000	2000.
5000	500

This concludes the explanation of the front-panel controls. The following refers to the rear panel of the instrument.

3.11. Mains Input Socket.

This socket is for connection to the external A.C. mains supply by means of the 3 pin plug and lead, which is supplied with the instrument.

3.12. Mains Selector Switch.

This switch selects the appropriate mains voltage and must be set to the correct value before the instrument is connected to the mains.

3.13. Mains Fuse.

This fuse protects the instrument in the event of internal faults and is rated $\frac{1}{2}$ amp slow-blow for 240v A.C. operation or 2 amp slow-blow for 115v A.C. operation.

3.14. Battery Fuses.

These fuses protect the batteries in the event of an internal failure and are rated 1 amp quick-blow.

3.15. Transducer Signal Output Socket.

This socket is connected to the transducer signal input, and is used for connection of the D3B to auxiliary instruments.

3.14 Auxiliary services socket.

This socket carries the internal supply voltages from the D3B regulators and the rectified and unrectified transducer signals (as in 3.14. Transducer Output socket and 3.9. External Display socket) and comprises a universal connection for supplying power and signals to auxiliary D-range instruments.

4. Operating Instructions.

Before attempting to connect the instrument to the mains supply check that the mains selector switch (item 3.11.) is set to the correct position. Check that the mains fuse is of the correct value as described in 3.12. Connect the mains lead to the socket 3.8. and press the mains button on the front panel 3.2. The adjacent red mains indicator lamp and one of the amber and green direction lamps will light up.

Note: (The following procedure refers to the connection and use of a single strain-gauge type transducer. Where more than one of these transducers is required it is necessary to use a D2A or D10A dual or multiple transducer connection module, and the appropriate documentation should be referred to. Where an optical type rotary transducer is employed, the section of the D7 optical transducer coupler should be referred to for connection and operation information).

Connect the transducer plug to the transducer input socket of the D3B and screw the connector locking ring fully home. Allow five minutes for the instrumentation to stabilise and bring the reading on the D3B meter to zero using the appropriate transducer-zero control (see section on transducers), Press the "Test" Button on the front panel of the D3 and check that the meter reads 100 ($\pm 1\%$). The equipment is now ready for use. After several hours of continuous use, the transducer should be taken off load and the D3 meter checked for zero shift. If necessary re-zero the transducer output as desired above. The D3B is designed for use with both strain-gauge type torque and load transducers, which are connected at the front panel "Transducer" socket of the D3A and with optical transducers in conjunction with the D7 optical transducer coupler, which is connected to the D3A by means of the rear-mounted "Aux Services" socket. When both types of transducer are in use with one D3B unit, always ensure that the D7 is switched off or disconnected from the D3B when the strain-gauge transducers are in use. Conversely, when using the optical transducer, always disconnect any strain-gauge transducer from the D3B.