

35^A GDS Helpsheet



*World Leaders in Computer Controlled Testing
Systems for Geotechnical Engineers and Geologists*

Hardware

Digital Transducer Interface (DTI)

SN: 1146 Onwards User Maintenance Procedures

1. Overview

This document describes the construction of the GDS DTI and the user procedures for setting gain, zero and transducer excitation for each analogue channel.

2. Access

The DTI box is constructed using three major components. These are shown in the attached document "BOX 2".

The top plate is attached by means of six cap-headed Allen screws. If these are removed the top-plate can be removed from the top. Care should be taken however because there are three cables which run from the top plate to the base.

The top and the base are attached by six screws around the edge of the back panel which go into the top and six screws through the base which go into the top. If these twelve screw are removed the top can be slid off the base.

To separate the three components you should follow the following procedure:

- remove six cap-headed Allen screws retaining the top-plate.
- remove the twelve screws connecting the base to the top.
- slide the top forwards about 100mm along the base. By lifting the top-plate slightly you can disconnect the green and yellow earth connection from the top-plate and separate the two halves of the clear ribbon cable which connects to the key-pad. Please note that the blue connector joining the two halves of this cable is re-connected so that the gold contacts which can be seen after connection are on the same side of both halves of the cable. The grey ribbon cable attached to the display can be removed from the MUX PCB (see diagram "CARD LAYOUT"). Please note the orientation of this cable before you remove it.

The three major components can now be separated.

3. Base

The base unit is constructed to contain all of the electronics for the DTI, with the exception of the keypad and display which are mounted on the top-plate.

The main components are :-

- fan
- power supply
- Lemo transducer connectors
- IEEE connector
- RS232 connector
- Digital Indicator connector panel
- Combined power receptacle/switch/fuse/filter/voltage selector
- Aluminium card cage supporting the following cards:- MUX, HSDAC, GDSPC8, MUX/HSDAC Interconnection board

The Power supply is connected to the base unit by four screws through the base.

The Aluminium card cage is connected to the base unit by four screws through the base.

Outline Description of Cards.

4. MUX

The MUX card is the external interface processor. It controls the keypad, display, IEEE interface, RS232 interface, HSDAC interface, it also acquires data from up to four digital indicators. There are no user procedures associated with the MUX.

5. HSDAC

The HSDAC card is the analogue to digital conversion card. It accepts analogue data from the GDSPC8 card and converts this into digital format and passes the data as requested to the MUX card. There are no user procedures associated with HSDAC.

6. GDSPC8

The GDSPC8 card provides signal conditioning and power supplies to the transducers. This card is configured by GDS according to the schedule shown on diagram "DTI BACK PANEL 2"

The overall layout of GDSPC8 is shown in diagram "GDSPC8 LAYOUT". The user can make the following hardware adjustments to the GDSPC8 card.

- Null out amplifier zero offsets.
- Set required gain
- Adjust the transducer 10v power supplies

These procedures are described below.

Hardware setting to remove amplifier zero offsets

Remove the transducer connection by removing the Lemo connector for the channel to be zeroed. With zero volts applied between +Vin and -Vin on the relevant channel adjust VR4 to give a zero output for that channel. Alternatively if you have a high accuracy calibrated voltmeter connect it

between 0v on CON11 and DIRECT on L7, you can then use the output of the voltmeter for this setting. Full range analogue output at this point is +/- 10v, so a zero better than 1mV gives a zero setting accuracy better than 0.01% of full range.

Setting Required Gain

The gain for a particular channel must be set to either 1,10,100 or 500 depending on the link positions of LG. These four choices are selected on LG as follows:

Links present	gain	Input voltage range
No links	1	±10v
G1	10	±1v
G2	100	±100mv
G3	333.33	±20mv

These links should not be altered because the DTI is configured to work with the GDSTTS software which assumes that the links are set as follows:

DTI Channel	GDSPC8 Channel	Links Present
8 = Load Cell	CH 7	G3
9 = Hall Ax 1	CH 6	G1
10 = Hall Ax 2	CH 5	G1
11 = Hall Rad 1	CH 4	G1
12 = Pore 1	CH 3	G2
13 = Pore 2	CH 2	G2
14 = Ext Disp	CH 1	No links
15 = Ext Disp	CH 0	No links

There is a different gain potentiometer used for each gain range as follows

Potentiometer	Gain	Links Present
none	1	none
VR1	10	G1
VR2	100	G2
VR3	333.33	G3

To set the gain first zero any amplifier offsets as described above. Then apply a known voltage in the correct range between +Vin and -Vin. The known voltage can be generated by a transducer with a fixed output (you could then measure the voltage between +Vin and -Vin) or preferably using a calibrated voltage generator. Once you know the input voltage accurately you can then measure the output voltage and adjust the relevant potentiometer to give the exact gain required.

Please note that because the Hall Effect device channels operate with a gain of unity (1) there are no gain adjustments possible.

7. Setting 10V Transducer Power Supply

The transducer power supply is available at +VO and -VO. Measure the voltage at this point and adjust potentiometer VR5 to set the value to exactly 10.000V. It is best to carry this setting out with the transducer connected because you then have the operating load on the transducer.

8. Transducer Connections to DTI

The DTI has six connector sockets in the back for the connection of transducers. These sockets are LEMO five pin size 1B. The mating plugs are LEMO FGG1B305CNAD422 as described in the attached diagram entitled "LEMO CONNECTIONS". The description of the GDSPC8 card indicates how the gains of the various channels are set. The GDS software (GDSTTSV7) assumes that the DTI gains are set to the default values described.

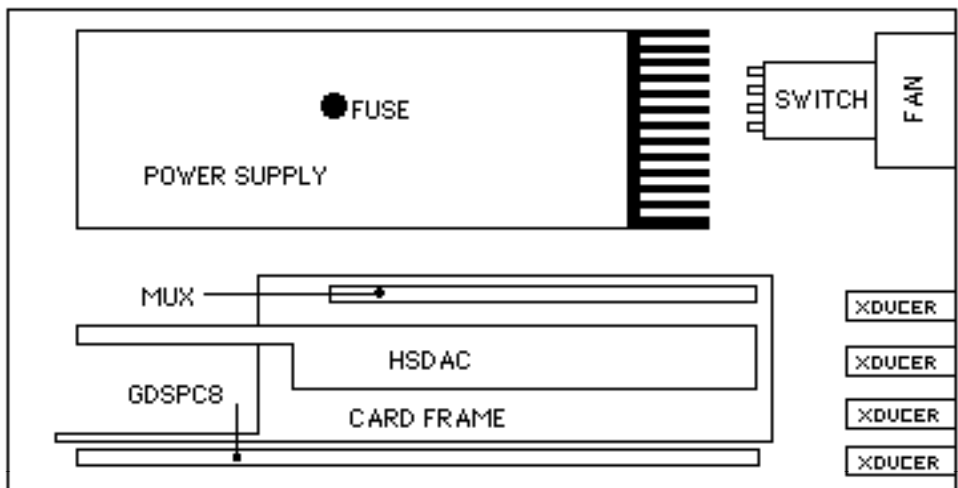
Normally users will only use transducers that have been supplied by GDS. Occasionally a user may wish to connect one of their own transducers into the DTI. This is allowable under the following conditions:

- The DTI supplies 10v DC excitation only.
- The DTI will accept only DC voltage signals from the transducer in one of the ranges specified in the table "setting required gain"
- The transducer voltage range must match the DTI channel gain selected.
- The transducer output must be floating or swing about the system ground potential.
- The GDS software will interpret the output of that channel as if it had the default values.

If you have a load cell with a 40mV output at 10 kN which requires 10v excitation you could connect this directly to channel 8 = LOAD CELL. However, the default gain of channel 8 is 500 and therefore the maximum value that could be read is 20mV. The load cell would therefore have to be used as a 5kN load cell.

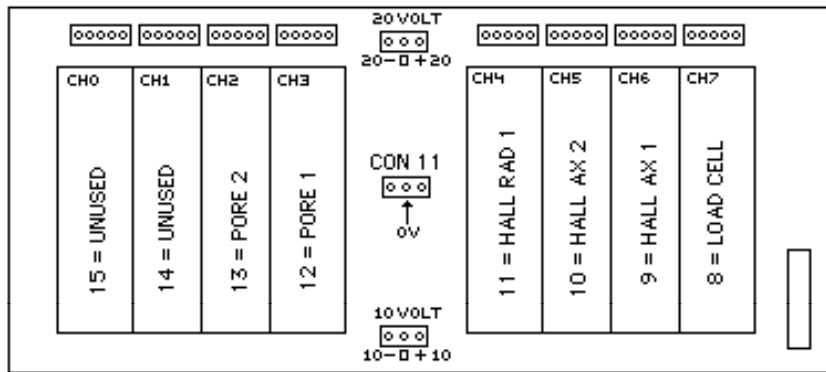
If you have an LVDT which provides a DC output of +/-10v and has its own excitation and signal conditioning you could connect this to channel 9=HALL AX 1 by using only PIN 3 (transducer output +ve), PIN 4 (transducer output negative) and Pin 5 (cable screen). However in this case you may have difficulty with electrical noise because the output of the LVDT is not directly referenced to the DTI excitation voltage zero. If the transducer output is floating the transducer output negative can be commoned to system zero as close as possible to the DTI. If the transducer output is already referred to system ground then you should ensure a very low impedance connection between the DTI ground and the system ground.

We at GDS have spent a lot of time designing the DTI so that it works properly with the GDS supplied transducers with minimum electrical noise. If you decide to use some other transducer we cannot guarantee trouble free operation. The DTI is designed as an addition to the GDS triaxial testing system not as a general purpose data acquisition system. We therefore cannot guarantee satisfactory operation with non-GDS transducers and user supplied transducer.

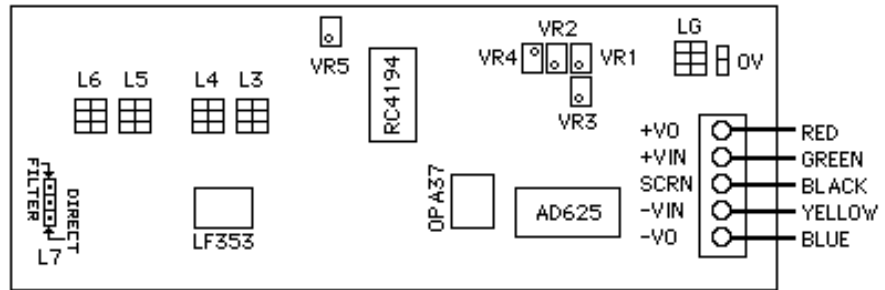


DTI INTERNAL COMPONENTS - PLAN VIEW

CARD LAYOUT
PH 01/02/93



LAYOUT OF GDSPC8 CARD



LAYOUT OF EACH CHANNEL ON GDSPC8

GDSPC8 LAYOUT
PH 01 /02/93

LAYOUT OF DIGITAL TRANSDUCER INTERFACE BACK PANEL

8 9 10 11

12 13 14 15

IEEE

FUSE 1.6A

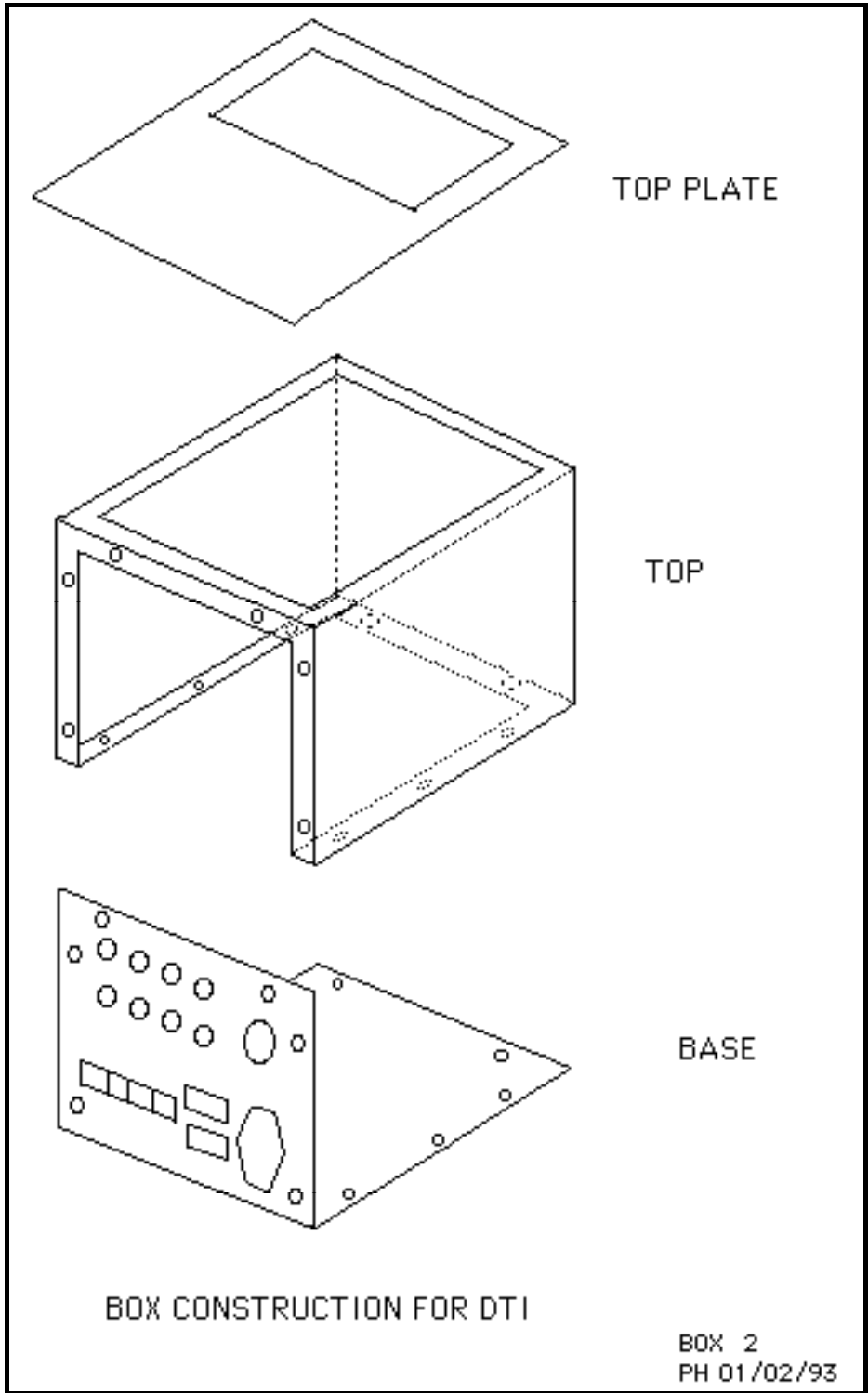
RS232

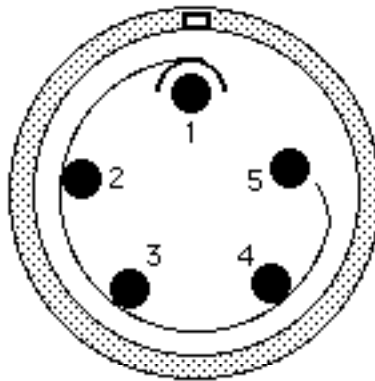
ALLOCATION OF CHANNELS FOR GDSTTS V6 AND ABOVE.

8 =	LOAD CELL	GAIN =	333.33
9 =	HALL AX. 1	GAIN =	10
10 =	HALL AX. 2	GAIN =	10
11 =	HALL RAD. 1	GAIN =	10
12 =	PORE 1	GAIN =	100
13 =	PORE 2	GAIN =	100
14 =	EX. DISP. 1	GAIN =	1
15 =	EX. DISP. 2	GAIN =	1

PANEL 2

DTI BACK





LEMO CONNECTOR VIEWED FROM BACK

LEMO CONNECTOR SPECIFICATION

TYPE: FGG1B305CNAD422 (CONNECTOR), GMA1B035DM (SLEEVE).
DESCRIPTION: 5 PIN TYPE 1B, SOLDER BUCKET

CONNECTIONS:

PIN 1 EXCITATION POSITIVE [RED]
PIN 2 EXCITATION NEGATIVE [BLUE]
PIN 3 TRANSDUCER OUTPUT POSITIVE [GREEN]
PIN 4 TRANSDUCER OUTPUT NEGATIVE [YELLOW]
PIN 5 CABLE SCREEN (DO NOT CONNECT TO TRANSDUCER) [BLACK]

THE DTI PROVIDES 10V TRANSDUCER EXCITATION ON PINS 1 AND 2. PIN 1 IS +5V, PIN 2 IS -5V. THE TRANSDUCER OUTPUT MUST MATCH THE GAIN RANGE SELECTED BY THE SIGNAL CONDITIONING.

LEMO CONNECTIONS
PH 28/2/94