OPERATIONAL NOTES
For Diagnostic Instruments DI-2200 Series FFT Analysers

Key to terms used in this note.

- Bold text (e.g. **ON/OFF)** indicates hard key.
- Bold numbers (e.g. **10)** indicates numeric pad.
- Bold Italic text (e.g. ***INPUT*)** indicates top six soft keys for menu selection.
- Normal italics (e.g. *10v)* indicates selection from screen using arrow keys.

*Use the **ENTER key** to confirm selection.*
*Use the **SHIFT** key to switch between standard entries (white labels) and alphabetic entries (small red label)*

The following notes are extracted from the DI-2200 User's Guide and the ADTWIN User's Guide. The latter is a DI-supplied analyser-to-PC data transfer program. Please consult the full guides as appropriate.

1. GENERAL CONSIDERATIONS

1) Store all FRF measurements into the analyser's *live* memory (Use different sub directories if necessary).

2) Pay particular attention to file naming since the book-keeping of the excitation and response nodes, as well as directions, relies on correct file naming.

3) Once the measurements are completed, transfer all FRFs to the PC and create the corresponding .CRD file using ICATS utility program **LISTFRFW**.

4) Use program **ADTWIN** for DI-2200 to PC data transfer.

2. MEASUREMENTS

Force gauge signal goes to CH1 and the accelerometer signal should be connected to CH2, both at rear of DI-2200.

2.1 Setting up the analyser

Most of these operations need to be performed once only, to set the analyser to the required defaults for structural measurements.

1) Switch on the analyser by pressing **ON/OFF**.
   Press ***SETUP***.

2) Press ***INPUT*.**
   INPUT 1 select suitable range (1 V),
   Set *COUP 1* to *AC*.
   INPUT 2 select suitable range (1 V),
   Set *COUP 2* to *AC*.

If you use IPC transducers directly (ie no charge amplifiers) then set *COUP1 and COUP2* to *ACCEL* in both cases.

3) Press ***TRIGGER***.
   MODE: select *NORMAL*,
   TRIG SET: set *LEVEL* to **10** , and + *slope*,.
   SOURCE: *CH1*,
   DELAY: CH1 **-12** *, CH2*, **-12**. Note the - **value.**

4) Press ***FREQ***.
   Select *BANDWIDTH* as required.
   SAMP/LINE typical 512/200 or 1024/400,
   ZOOM off ,
   X-AXIS : linear freq.

Note that the display tells you how long each data capture period will be, the lower the frequency range the longer the time for each measurement.

5) Press ***PROC***.
   DATA A set *FREQ RESP*,
   YAXIS A set *LOG*,
   DATA B set *FREQ RESP*,

YAXIS B set *PHASE*.
WINDOW: set *FORCE/EXP*,
FORCE/EXP set *FORCE* **10**%,
EXP TC try **4**.
AVERAGE: *TIME AVERAGE* **1**,
PROC AV try **3**,
AVG TYPE: RMS.
PROC OPTS,

Initially *TURBO OFF*, *FAST AVG OFF*, *PREVIEW ON*.

6) Press ***MEM***.
OPERATION set *SAVE*,
DIRECTORY enter directory name for the measurement set. Press **ENTER** when completed.
FILENAME: set in following format Letter, space, 3 numbers AXX, 3 numbers BYY. Use SHIFT key for all alphabetic entry.

SP (space) marked by "**.**" in number pad gives space or underscore.
Press **ENTER** when completed. **See Section 3 for file naming.**

Set YY to 00, as the DI-2200 will automatically increment this by 1 before each measurement. A typical set-up would be :

T_109100

where
T_ : indicates test series T (arbitrary naming),
1 09: fixed transducer in direction 1 (usually X), at location 09 ,
1 00: moving transducer in X direction, ready to store at location 01.

From this setup, the advantage of measuring FRFs sequentially and incrementing the node number by 1 is obvious. See SECTION 3 for a more detailed description.

7) Press **DISP**.
FORMAT: A ONLY ,
SCALE CH1 set to *MAN EU* and give numerical value,
SCALE CH2 set to *MAN EU* and give numerical value.

Have one plot (one trace) on the analyser screen when saving files. This prevents the file being transferred twice.

8) Press ***PROC*** to check out the system, or to set voltage levels.
Select *DATA A* to *TIME CH 1*,
DATA B to *TIME CH 2*.
Press ***DISP***.
Set *FORMAT : A ABOVE B*.

You now need to do auto-ranging to prepare the analyser for measurements.

Press **START** and wait until the screen changes to show two frames for time records and the letter **W** appears in the top right hand part of the screen. Now hit the structure with the hammer (***Beware of double hits***). The screen should rapidly show the time records of both channels, you can test for overloads, dynamic range and proper triggering and delay. You may have a force signal which is -ve on compression, in which case change the trigger level to -10 (=-10% of full scale). If overload warning appear on screen, adjust relevant channel INPUT until satisfactory. If no trigger occurs, reduce voltage at INPUT. If still no trigger examine signal from hammer on oscilloscope to check instrumentation.

If you are attempting low frequency measurements, the measurement time may be considerable. In this case check the instrumentation, say with 1 kHz. However the anti-aliasing filters will cut out the high frequency, and so at low frequency measurements you may need to reduce the INPUT level to achieve triggering.

9) When triggers and input levels are set, press **SETUP.**
Return ***PROC*** to settings in (5) and ***DISP*** to settings in (7).
Set the **FREQ** range to the required value.

You are now ready to make measurements.

2.2 FRF Measurements

Press **START**.

The measurement frame should appear on the screen and the letter W appear in the top right hand corner. Hit the structure at the first point and check that the frequency response function (FRF) looks reasonable for the structure under study. If satisfied then press **STORE**, otherwise repeat the measurement or take several averages. When the measurement is stored, press **START** and hit the structure at the next location point.

***Hints on making measurements*:**
QSET - If measurements are showing OVER/UNDER, the sensitivities can be quickly changed by using the ***QSET*** option.
PREVIEW ON (***PROC*** menu) - Switch the *PREVIEW* 'on' to view the time records of the force input and/or response before deciding whether to accept or reject the measurement. If the signals are over or under loading, reject the measurement by pressing **0** and change the sensitivities by pressing ***QSET***. Make another measurement. If signals are of the required level, accept the measurement by pressing **1**, the FRF will now be displayed.

3. NAMING FRF FILES

The file naming is of paramount importance since the correct transfer of node topology relies on correct file naming. The general format is

N_XAAYBB

where N is a root letter used for identification purposes,
X fixed transducer direction,
AA fixed transducer node,
Y moving transducer direction,
BB moving transducer node.

Notes:

(i) AA and BB must be two characters long, so use 01, 02 etc.

(ii) X and Y can take the following values

1 = + X translation	7 = - X translation
2 = + Y translation	8 = - Y translation
3 = + Z translation	9 = - Z translation
4 = + X rotation	A = - X rotation
5 = + Y rotation	B = - Y rotation
6 = + Z rotation	C= - Z rotation

(iii) The underscore is obtained by pressing SPACE on the analyser. Switch between alpha and numeric characters using the SHIFT key.

(iv) Because there is a limitation of 8 characters per filename, only node numbers under 99 can be accommodated under this scheme. For larger node numbers, use the alternative format **XAAAYBBB** which can deal with node numbers up to 999.

(v) The extension .FRF is automatically appended at the data transfer stage.

4. DATA TRANSFER

1) The data transfer from DI-2200 analyser to the PC is done via the DI-supplied utility program **ADTWIN**. Although **ADTWIN** can transfer the data in many other formats (Lotus 1-2-3, Excel, DADisp, etc.), this document deals with the Universal File Format (UFF) only.

2) Connect the analyser to the PC using the supplied CA-10 cable. The default analyser setting is 9600 baud, 8 bits, 1 stop bit and no parity. Use serial port 1. You may want to change the baud rate if you get the OVERRUN error. Disk caching programs (eg Smartdrive) may interfere with data transfer. In this case, they should be disabled.

3) Go to ***MEM*** menu. Select the required sub directory from the analyser.
Press ***DUMP***. Press **ENTER**.
Select *ALL* (or *ONE*). DO NOT PRESS **ENTER**.

4) Run **ADTWIN** on your computer.

5) Confirm the baud rate on the PC and press **ENTER** on the analyser. Progress on data transfer will be displayed on the PC.

Avoid having two different plots on the analysers screen (eg modulus and phase) as both plots will be transferred, causing unnecessary delay.

For trouble-free data transfer, the analyser must be fully-charged or run from the mains supply. Failure to comply with this may result in erratic transfer errors, especially with fast PCs.