Weighing Instrument USB Flash Drive Interface

USB-FDI

Version 1.2

Introduction

Congratulations on your purchase of the **USB-FDI** a USB **F**lash **D**rive **I**nterface unit. This unit can be attached to most scales, indicators and balances to allow transfer of all data to a standard USB flash drive.

The USB-FDI has two modes of operation:

1. The USB-FDI is permanently connected to the weighing equipment and powered by the supplied mains adapter, continuously recording all data to the USB flash drive.

2. The weighing equipment stores the information, and every so often the user connects the USB-FDI and transfers all the data to the USB flash drive. In this case the USB-FDI would be powered from its internal batteries.

Once the USB-FDI is setup all data is saved to a file on the USB drive in CSV format for direct viewing with Microsoft Excel.

The USB-FDI has its own clock allowing automatic time / date stamping of all data as standard.

A background tally log is also automatically generated which include a checksum for every weighing. This ensures good data integrity in the event of a dispute.

Initial setup

After power up the green transfer light should go off. When a USB flash drive is inserted its light will flash for a few seconds while registering.

There are now four possible tasks which can be performed:

1. Setup / Display the real time clock
2. Sample the serial stream of the attached weighing device
3. Reset the sequential number
4. CRC check

Each of these tasks will be discussed in detail later, but the most important one to get the USB-FDI connected to the weighing instrument is number 2 and will be discussed first.

Connecting the USB-FDI to the Weighing equipment

The only thing required to be known initially is the weighing equipments serial communication parameters options are:

Baud rate: 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, 19200

Parity: NONE – 8 bits, ODD – 7 bits, EVEN – 7 bits

Once you determine this you can proceed to the next step.

You now need to create a file called **SETUP.txt** on the supplied flash drive, by doing the following:

Insert your USB flash drive to your PC and allow your PC to find the drive.

Open up a new file using Windows NOTEPAD, do NOT use any other program such as Word etc.

Create a file exactly as below (***With your serial format!***)

```
BAUD 9600
PARITY NONE
SEQUENTIAL YES
TIME YES
DATE YES
IDENT 0,
T1
T2
T3
T4
T5
T6
T7
T8
SIZE
END
```

These first two lines MUST be set up correctly. as per your weighing equipment's serial format. It is VERY important that only ONE space is between BAUD and 9600 etc otherwise the file may not be read correctly

This file should now be saved to the flash drive as follows:

File name:	**SETUP**
Save as type:	**Text Documents (*.txt)**
Encoding:	**ANSI**

The flash drive may now be inserted into the interface and the serial interface may be connected to the weighing instrument as below:

Weighing Instrument		**USB-FDI**
Transmit OUT	→	Receive IN (Blue wire)
GND	---	GND (Green wire)
Receive IN	←	Transmit OUT (Red wire)
(This wire not normally required)		

Typically the weighing equipment should be set up to send out a serial string at the desired baud rate and parity each time the PRINT key is pressed.

We now want to use the USB-FDI to **SAMPLE** a typical output to allow us to configure the rest of the **SETUP.txt** file.

There is a small button on the circuit board which is accessible by lifting out the battery (Leave the battery connected!)

When you hold this button down the green lamp will give 1 flash then 2 flashes then 3 flashes then 4 flashes, with a time delay between each set of flashes.

The trick here is:

If you wish to **Setup / Display the real time clock**   - Release the button after ONE flash
If you wish to **Sample the serial stream**   **-** Release the button afre TWO flashes

(See table above or front of USB-FDI for all four possibilities)

In our case to sample the serial stream you want to release the button after 2 flashes.

The USB-FDI is now waiting on a sample of the serial data, don't delay as you have 10 seconds to press the PRINT button on the weighing instrument..

You should see the green data transfer lamp start to flash, and the activity light should also flash on the flash drive.

The USB-FDI will now require to be powered off and on again.

The flash drive should be inserted into the PC and this time the file called **SAMPLE.TXT** should be opened with NOTEPAD (Nothing else!)

You should now see the serial data stream listed and each output byte has been numbered.

Ensure notepad is set to a FIXED FONT – Courier or Courier New size 10 is best, and that word wrap is off (In the format menu).

A typical SAMPLE output would look as follows:

*********************IMPORTANT NOTE ************************
The three lines above the string are the string position and should be read vertically

```
0000000000000000000000000000000000000000..
0000000000111111111122222222223333333334..
1234567890123456789012345678901234567890..
**XYZ*  12.45kg  43.50kg**    24131PCS**
```

This would typically be an output from a counting scale, with 12.45kg being the tare 43.50kg being the net weight and 24131 being the number of pieces. XYZW just happens to be a bit of unique data which is with every weighing and the asterisks (**) are bytes which cannot be displayed, such as line feeds and carriage returns.

This is all the information we need to configure the **SETUP.txt** file.

The XYZ which appears in each data string is very useful to allow the CL-FDI to validate the data so the IDENT line could in this case be set up

```
                    IDENT 3,XYZ
```

Where 3 is the start position of the string and XYZ is the unique characters.

It is desirable but not compulsory to have an IDENT so it can be left unused by setting to:
```
                    IDENT 0,
```
The TARE in the example above starts on position 7 and if we include the kg units finishes on position 15, so T1 would be set to:

```
                    T1 7,15
```

In the same way the net weight would be set to:

```
                    T2 16,24
```

and the count would be set to:

```
                    T3 27,38
```

Up to eight different parameters may be set up for recording.

The SIZE parameter is the total sample length (In this case 40)

The word **END** must be the last line.

As mentioned previously there is an internal clock with TIME and DATE, these may be recorded with every weighing or may not be required if there is a clock output already in the data stream from the weighing instrument, so the DATE and TIME may be set as desired.

A sequential number is also generated internally and may be switched ON or OFF as desired.

The **SETUP.txt** file should now be edited using ONLY notepad as before and would be as follows if the string above was captured:

```
BAUD 9600
PARITY NONE
SEQUENTIAL YES
TIME YES
DATE YES
IDENT 3,XYZ
T1 7,15
T2 16,24
T3 27,38
T4
T5
T6
T7
T8
SIZE 40
END
```

Once the **SETUP.txt** file is correct is should be saved back to the flash drive.

Setup / Display the real time clock (2 flashes)

As discussed above when the button is held down and the green lamp flashes once, release the button and you are now in clock setup mode.

You now have up to 4 seconds to start pushing the button for the number of hours required.

Four seconds after you stop pushing the button the green lamp will flash twice to indicate ok and you now should enter the minutes required.

Note for the time if you wish to enter 00 for hours or minutes do not push the button during the appropriate period.

The table below shows the complete sequence after you have entered clock set mode:

Press button for number of hours
                     Green lamp flashes twice
Press button for number of minutes
                     Green lamp flashes twice
Press button for number of days
                     Green lamp flashes twice
Press button for number of months
                     Green lamp flashes twice
Press button for number of years (2 digits)
                     Green lamp flashes 3 times for PASS or 6 times for a FAIL

You are now automatically in clock display mode. The green lamp will flash for the hours, minutes, days, month, year in turn and it is possible to count the flashes to determine the time and date.

Note in display mode if displaying 00 there will be one LONG flash

At the end of clock display the CL-FDI automatically enters normal run mode.

Note it is possible to go into clock mode and then by not pressing any buttons wait until the clock setup has failed and then read the clock. The sequence of green lamp flashes would be:
         2 flashes   (Hours input as 0)
         2 flashes   (Minutes input as 0)
         2 flashes   (Days input as 0 – ERROR)
         2 flashes   (Month input as 0 – ERROR)
         6 flashes   (Year input as 0 – Fail to setup clock

         Flash the hours
         Flash the minutes
         Flash the day
         Flash the month
         Flash the year

Return to normal running mode

Resetting the sequential number (3 flashes)

If as described above you release the button after 3 flashes you are now in a mode to reset the sequential number.

To reset the number you must now hold the button down again for 4 seconds, and the green lamp will give one flash when the sequential number has been reset to 00001

You have up to 10 seconds to reset the number or the system will automatically return to normal run mode.

CRC check – (4 flashes)

The system automatically keeps two tally files for secure authentic backup of the data coming out of the weighing instrument. These files are called **TALLY_A.TXT** and **TALLY_B.TXT** If specified in the SETUP.TXT file then the sequential number, time, and date will be recorded and then the exact string as output from the weighing instrument except the characters which can not be displayed are replaced by asterisks (*)

A checksum and the text **OIML- - - -** is appended to each weighing.

When this checksum is run both these files are scanned and the text is replaced by :

	OIMLPASS	-	(Data agrees with checksum)
Or	**OIMLFAIL**	-	(Data disagrees with checksum)

Any tampering with the data in these files will cause the checksum computation to fail.

To perform the CRC check simply release the button after 4 flashes and wait until the activity lamp on the pen drive has stopped flashing.

The TALLY.TXT files may be viewed using NOTEPAD but should not be modified or saved back out to the flash drive.

Normal Operation

If the SETUP.TXT file is correct and the clock has been set then the system is ready for operation.

It may be permanently left beside the weighing instrument and powered by the supplied adapter. Each PRINT key push will cause the green light to flash and the data will be stored automatically to the pen drive.

When it is desired to view the data on the PC simply plug into an unused USB port and use Microsoft Excel to view the file WEIGHTS.CSV

HUGE amounts of data – (Record up to 60 Million weighings on one flash drive !!!!)

A limitation of Excel is that it will only allow up to 65,000 weighings to be displayed. This may be more than enough for most applications, but the USB-FDI automatically determines the number of weighings in the WEIGHTS.CSV file and when the number of weighings exceed 60,000 it will copy these weighings to a file called WTS000.CSV and start a new WEIGHTS.CSV file. If the WEIGHTS.CSV file fills up again it will copy these weighings to WTS001.CSV

The user can copy off these WTSnnn.CSV files as desired, if the files are removed the system will start back at WTS000.CSV

Up to 1000 WTS files can be created with 60,000 weighings in each!

The most current weighings will always be in WEIGHTS.CSV

Battery operation

The internal battery should only be used when the weighing instrument has stored the data and it is only necessary to switch on the USB-FDI for a few minutes to offload the data.

A RED lamp on the unit will light when the battery has dropped to a low level and requires changing.

This RED LAMP also lights to indicate power on when the unit is run from the external mains adaptor

Specifications :

Power Options	-	Internal PP3 battery or external 9V DC 500mA mains adapter.
Serial Interface	-	Optoisolated RS232 with speeds from 900 baud to 19.2kbaud, 8 bits NO parity and 7 bits ODD or EVEN parity.
USB Interface	-	USB 1.1 or USB 2.0 compatible
Pen drive	-	Up to 4 Gbytes
Indicators	-	Data transfer light (Green) Power / Battery condition (Red)
Power switch	-	Min toggle type
User pushbutton	-	In battery compartment, for occasional use
PC compatibility	-	Windows 98SE (with drivers) and all later O.S
Tally file size (A/B)	-	1 Mbytes each (Approx 30,000 weighings)
Weight files	-	Up to 1000 files each with 60,000 weighings