

Commands are sent to the counter using the menu-driven supplied control programs. If a command applies to the software for the **directly** connected PC **only** then it is marked **(L)**; if it applies to the **remotely** connected PC **only** then it is marked **(R)**. In the absence of either letter, the command is applicable to both versions of the software

Set baud rates for communication with counter (L)

The user can change the baud rate of the *Control* or *Printer* port to one of 300, 1200, 2400, 4800, 9600 or 19200. If the *Control* port is being changed, then the software will attempt to change the baud rate of the counter and re-establish communications at the new rate.

Set baud rates for communication with counter (R)

The user is prompted for the new baud rate, chosen from 300, 1200, 2400, 4800, 9600 or 19200. This is then used for subsequent communications - usually via a modem.

Interrogate counter and display its status (R)

The counter is interrogated and the current status displayed, including number of events, up and down counts, date and time, version number, etc.

Continuously updated display of counter status (L)

The counter sends updated status information to the PC at regular intervals and on the occurrence of any change in status.

Show or download the information logged in the counter

The events stored in the data log can be displayed on the screen or stored in a file or both. The user is prompted for the number of events required and the destination. Optionally, a status dump of the counter may precede the data.

Insert a dummy fish

This simulates the passage of a fish through a channel, nominally equivalent to a 55 cm salmon. The user is first prompted to enter the channel number (1-4), and then to select **Up** or **Down**, upon which the dummy fish is inserted across the electrodes for the channel and direction selected.

Re-calibrate counter

If this command is chosen, then the counter will perform its calibration procedure, which normally occurs automatically every thirty minutes.

Log on, set or clear password

A simple password facility allows a four-digit code to be used to "lock" the counter. A password of 0000 effectively means no password is set. This command allows the user to *Log-in*, *Log-out* or *Change* the password.

Read the current conductivity

This gives either a one-off or continuous display of conductivity in microsiemens per centimetre.

Send the counter a user defined command

This facility is intended for the advanced user and may be used to send the counter one or more (encoded) commands that may optionally be stored in a file. Details of the exact command formats are available from *Aquantic* on request or on the *Aquantic World Wide Web* page at <http://www.aquantic.com>

Alter the date and/or time in the counter

The user may enter a new date and/or time manually, or the counter may be set to the date and/or time set on the controlling PC. (*System* date and/or time)

Set relay numbers and times

This allows the user to allocate relays to various conditions for individual channels. The user is first prompted to enter the channel number, then the condition (Up, Down or Event). The user is then prompted to enter the numbers of up to two relays that are to be operated if this condition occurs and the time of operation in 0.1s increments. If a second relay is not required, then enter the letter D for the second relay number.

Set new threshold values

The user is prompted to enter the channel number (1-4), upon which the current values for the Up and Down thresholds are displayed followed a request to enter new values. If the user simply wishes to check the values for that channel then pressing *Enter* at this point ends the command.

Enable or disable the printer port on the counter

The counter can print information on each count, as it occurs. This will consist of the date and time, the conductivity at the time of the most recent calibration, channel, whether upstream or downstream and the size (0-99% or 0-127). This command either enables or disables the printed output. In addition, the user can select whether the *pseudo-graph* output is enabled:

Pseudo-graph output

A pseudo graphical output has been made available via the printer port in order to be able to show the fish wave-forms on a PC display. The user may select pseudo-graphical output on a per-channel basis, although if **any** channel has this form of output enabled, **all other channels** have their normal printer output suppressed.

The printer should be replaced with a personal computer (PC) and appropriate logging software that is supplied with the counter. To generate this type of output, the *printer* output must be enabled, an event relay must be set for the required channel for a time greater than or equal to 4 seconds, and *pseudo-graph* output must be enabled.

Enable or disable event logging

It is possible for a signal to be detected which exceeds the pre-set thresholds, but does not pass the internal checks that determine whether or not it is a fish. The signal may, if the user desires, trigger the event relay, and generate a trace on the chart recorder or pseudo-graph output. This command enables or disables this occurrence. In addition, the user may choose to have the event relay operate when an event is detected, rather than after the signal is processed. The user may also choose to log these signals or not, as required.

Make the data log buffer linear, circular or flushed

The buffer holding the logged counts and/or events may be set to either linear or circular mode, or cleared.

Change algorithm (fast or slow)

The fish discrimination algorithm built-in to the counter can take two forms. The *fast* version can count fish passing at a rate of up to one fish every 0.5s but is more susceptible to false counts due to wind and waves. The *slow* version can only count fish passing at a rate of no more than one fish every two seconds, but has better rejection of false counts.

Change maximum size (100/127)

When the counter prints data on logged fish or events, it includes a figure for size. This is usually a percentage of full scale (0-99) but may be changed to utilise the full resolution of the analogue to digital converter, which gives values up to 127.

Clear the counts

The user is asked to confirm that they wish to reset the currently stored values of all channel counts to zero.

Continuous output on or off

The normal chart recorder outputs only produce signals when a fish or event occurs and for a time determined by the event relay time. This command forces continuous, real-time output to take place and therefore the event times are ignored other than for relay operating times.

Status dump on or off

Every 30 minutes, the counter performs its self-calibration routines, including reading the conductivity. The user may choose to have a status dump of the counter sent to the printer after this calibration has been performed.

Enable or disable a channel.

The user is prompted to enter the channel number (1-4), upon which the current status of that channel is displayed, i.e. enabled or disabled. The channel may then be enabled or disabled as required.

Change conductivity profile

A table of conductivity values is displayed on one row, and the corresponding gain compensations (in %) are displayed on the next with a top row giving the entry number. The user may then choose from *N(ew)*, *D(efault)*, *F(lat)* or *Q(uit)*:

A predefined set of values may be used by pressing D or all values may be reset to 100% (the default when shipped) by pressing F. If any of the values needs to be individually changed, then N should be pressed. The appropriate number from the top row should be entered and the value corresponding to that entry will be highlighted and the user allowed to enter a new value. This value can be greater than 100% to increase the gain, or less than 100% to decrease it. To change more values, press N again, or press *Enter* to exit and update the attenuations.

Default conductivity setting or probe calibration

The operation of this command depends on whether the optional conductivity board has been installed. If it is absent,

then a "default conductivity" value may be entered, otherwise the following instructions apply.

The conductivity measurement may be calibrated to take into account the capacitance of the cable connecting the counter to the conductivity probe. The software will prompt the user to confirm that the probe is out of the water and if so, calculates the capacitance of the cable, so that this may be discounted from future readings. If the probe is not out of the water, any key other than C should be pressed then this calibration will be bypassed. Failure to calibrate the probe in this way will result in small errors in conductivity measurements.

Length and Depth of weir

This allows the user to set up the values of water depth and electrode length (in cm) for use by the conductivity compensation algorithm. The user will be asked for the channel number and then for the length and depth in cm. If no change is required then the *Enter* key should be pressed in response to the request(s) for new values.

Length compensation.

The electrode length compensation factor is entered in this section. The user is prompted for a length compensation factor (in % per metre). This value is used, along with the electrode length, to calculate a gain compensation factor for different sizes of weir sections. For example, with a factor of 110% and a weir length of 240cm, the gain would be increased by $(110-100) * 2.4\%$. It is also possible to enter values less than 100%, in which case the gain will be reduced.

Dumb terminal for modem access (R)

This is used in the remote version to gain access to the modem in order to issue dialling commands and monitor call progress.

Hang-up the modem (R)

This instructs the **counter** to toggle the DTR signal on the control port so that the remote modem drops the line and terminates the call.

Toggle talk through mode (R)

In some circumstances it may be necessary to have more than one four-channel counter at a site, for example wide rivers with more than four sections to the weir. It is possible to "daisy chain" two counters by connecting the printer port of the first counter to the control port of the second one. This command permits commands to be transmitted through the first counter to the second and removes the need for a second telephone line and modem for remote access.

NB (a) The counter will wait 10s for completion of a command then will time out. (b) Pressing **F1** when the menu is displayed will show the version number(s) of the counter software supported by the program

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The following guide assumes that the counter has been correctly installed, and connected to a weir, as described in the manual.

- 1 **Attach the controlling PC.** Connect one end of the 9-pin to 9-pin serial cable (supplied) to the front panel of the counter and the other end to a serial port on the controlling PC.
- 2 **Install the controlling software on the PC.** Copy all the files from the floppy disk to a convenient sub-directory on the PC, for example C:\2100C. The controlling program for a locally connected PC will have a filename of the form FCPTxxxx.EXE where the xxxx is the version number. The program reads its configuration data from a text file called FCNTR.CFG, which contains lines enumerating the COM port used and baud rate. As supplied, this defaults to "1", (that is COM1, the first serial port), and 2400 baud. It may be edited with a standard text editor if the counter is connected to a different COM port and/or at a different baud rate. The counter is shipped set to 2400 baud.
- 3 **Attach power supply or batteries and switch on the counter.** Ensure that the power supply connections are made in the correct polarity and that the supply voltage is between 18 and 36 volts. Immediately upon switch-on, the counter will emit a series of "beeps" at one second intervals, for 45 seconds, allowing time for the internal filters to stabilise. At the end of the countdown, the counter will perform an initial self-calibration and test the weir sections. After the calibration, the counter will be ready to accept commands via its front panel serial connector.
- 4 **Run the program on the PC (FCPTxxxx).** From a DOS prompt, in the directory you created for the software, type FCPTxxxx, which will run the controlling program. It will attempt to establish communication with the counter by trying first at the specified baud rate and then at other baud rates, and if successful will display a menu of commands. If it fails to make contact with the counter this is usually because the cable is connected to the wrong serial port on the PC. There are several screens of commands, which can be accessed by pressing "i - More..."
- 5 **Check the status of the counter.** Use *command "b - Continuously updated display of counter status"* to display the values of most of the counter parameters. There will be a short pause while the data is transferred from the counter then the status screen will be displayed. If all is well, this should show the time being updated approximately every three seconds. Exit this screen by pressing the "Esc" key.
- 6 **Set the date and time.** If the date and time are not correct, then use *command "a" on the second screen* to alter them.
- 7 **Set the threshold values.** *Command "b" on the second screen.* By default, the counter will only count fish larger than approximately 55cm. This may be changed by adjusting the **thresholds**. These are values, which may be set independently for upstream and downstream moving fish for each channel, and may range from 15% to 100%. The default value of 50% is the equivalent of a 55cm fish. Choice of threshold values is extremely site specific, and need to be confirmed after experimentation. However, as a starting point, we suggest 45 for the **Up** thresholds and 35 for the **Down** thresholds. (Downstream moving fish tend to swim higher in the water and therefore generate less of a signal)
- 8 **Insert some test (dummy) fish.** *Command "d" on the first screen.* To confirm satisfactory operation, "dummy" fish signals should be inserted on each channel. The command will ask for the **channel number**, followed by **U** (for an upstream fish) or **D** (for downstream). The counter should register the "dummy" fish as up or downstream counts, which should be checked using the status command as in step 5.
- 9 **View the data log.** *Command "c" on screen one.* This asks for the number of values to show, (0 for all) whether to save them to a file (N) and if a status dump is required (N). The data will be shown on the display of the PC and consists of: the date and time the fish was recorded, its direction, channel, the conductivity reading (if probe is fitted) and its size (as a percentage of full scale). The latter value should be near to 50, for dummy fish.
- 10 **Clear the counts.** *Command "a" on screen three.* Once satisfied with the results of steps 8 and 9, it is probably necessary to clear the counts on the display, since they are not real fish. After confirmation of the command, the counts will be reset to zero.
- 11 **Flush the data log.** *Command "f" on screen two* For similar reasons to step 10, the data log should be cleared.

The counter is a sophisticated instrument, and contains many features not mentioned above. These are fully described in the manual, and cover such things as connecting a printer, setting relays for operation of video recorders, etc., etc.

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The counter may be accessed remotely using a pair of modems; one connected to a PC running the `FCPCxxxx` software and the other connected to the 2100C's control port. For successful communication, the following instructions should be used as a checklist.

1 Speed of connection. The counter is capable of communicating at any speed from 300 up to 19200 baud, but the actual speed chosen depends upon the modems available. If large amounts of data are to be downloaded then a minimum of 2400 and preferably 19200 should be used.

2 Initial tests. Before attempting to set up a remote counter and local PC it is advisable to first test the communications with the counter when it is situated close to the PC. This can most easily be done using a "cross-over" cable, as supplied with the counter.

Run the controlling program, `FCPTxxxx`, which will attempt to establish communication with the counter by trying first at the baud rate specified in the `FCNIR.CFG` file and then at other baud rates. If successful, it will display a menu of commands; if it fails to make contact with the counter this is usually because the cable is connected to the wrong serial port on the PC. Use the command to change baud rates, selecting the "Control Port" when prompted, then the speed appropriate for the modems you will be using. The program will first change the counters baud rate, then check the communications with the counter and finally write the changes in the `FCNIR.CFG` file. A more realistic test of the link could then be performed with modems on two telephone lines following the guidelines below.

3 PC ↔ Modem connection. Normally the cable connecting the PC and modem should be of the "straight-through" type, with appropriate 9-pin or 25-pin D-type connectors. This may have been supplied with the modem, but are available from any good computer store.

If necessary, the configuration file `FCNIR.CFG`, which is supplied as part of the counter driver software, should be edited so that the line which reads "port : x" reflects the number of the serial COM port to which the modem is connected (1-4 for COM1 through COM4) and the line "baud : xxxx" matches the desired speed of communication (300-19200).

Run the `FCPCxxxx` software which has as part of the menus, the option "Dumb terminal for modem access". This allows communication with the modem using the port/baud rate specified in the configuration file. A simple check that communication with the modem is successful is to type `AT` which should echo the `AT` and give the response `OK`.

4 Counter ↔ modem connection. The cable required to connect the counter and the remote modem is exactly the

same format as that used to connect the PC to its local modem. The connector on the counter is a male 9-pin D-type which is the style commonly found on most modern PCs. The counter control port baud rate is set using the controlling software (See step 2) and should be the same as that used on the PC.

The modem is not controlled by the counter, i.e. it is not sent any "Hayes" commands to set baud rate, compression etc.. This is because the counter may be connected directly to a PC or Palmtop computer and these commands would be inappropriate under these circumstances. The only special action taken by the counter is that of toggling the DTR line when the remote user has given the "Hang up the modem" command, so that the telephone connection is dropped.

Because of the above, it is necessary to fix the baud rate of the modem connected to the counter at the correct speed and to set the modem to answer on the required number of rings. The easiest method of doing this is to temporarily connect the remote modem to a PC (probably the one being used locally) and use the `FCPCxxxx` program to give the appropriate commands to the modem. (See step 3 above) For example, a US Robotics Sportster Vi uses the `AT&Nx` command to set a fixed baud rate and `ATS0=1` to answer on the first ring. This would then be written into non-volatile storage using `AT&W0`. Each modem will have its own particular commands to do this, although most "Hayes compatible" modems will probably use similar ones.

5 Making a connection. Ensure that the remote modem has its "Auto answer" LED on, or other indication that it will answer incoming calls. From the local PC, run the `FCPCxxxx` software and select "Dumb terminal for modem access". Give the command `AIDnnnnnn`, where `nnnnnn` is the telephone number of the remote modem. When the modem answers, you will usually receive a message of the form `CONNECT 2400`. Press function key `F1` to exit from the "dumb terminal" mode and use the "Interrogate counter and display its status" command to check connectivity. If a message such as "Unrecognised/no response from counter" appears, then one of several things could be wrong: the counter could have been set at the wrong baud rate; the modem connection could be noisy; the counter might have been busy performing a calibration sequence. Try the command at least three times at intervals of greater than 10 seconds, to eliminate the latter two possibilities.