

Engineering Note

Hydronix Limited, 70 Smithbrook Kilns, Cranleigh, Surrey GU6 8JJ England
☎ +44 (0)1483 271769 📠 +44 (0)1483 276219

Title:	Hydro-View fault diagnosis
Document reference (DRC):	EN0006 issue 2
Last updated:	01/02/97
Products affected:	Hydro-Views prior to model HV02
Author:	M. Swann
Search keywords:	Hydro-View, fault, failure, diagnosis
Summary:	This note describes some simple self-help procedures which may be performed on Hydro-View units in the event of a fault being suspected

Introduction

It has been discovered that many units have been returned to Hydronix with apparent faults, only to be diagnosed as working perfectly or that the fault is a simple one (e.g. a blown fuse) which may be rectified '*in situ*'. This document details simple test procedures using the on-board test facility (firmware version 2.03 and later).

Also described are some known problems together with brief descriptions of the revisions necessary to overcome them. Some of these are discussed in more detail in other Engineering notes and these are supplied as references.

To carry out the tests given here all that is required is a multi-meter.

Factory Test facility

The latest versions of firmware (versions 2.03 upwards) now have a built-in functional test facility. This is accessed as follows...

- ⇒ Select the *Main menu* by pressing on the Hydro-View front panel.
- ⇒ Highlighting the *Access code* menu option and accept with the key.
- ⇒ Increase this value to 1459 and press or to accept.
- ⇒ Move the highlight down to 'Factory Test' and accept using the key again.

This facility will now allow verification of the unit's inputs and outputs.

Note: To exit the test page the unit must be reset by removing and reapplying power to the Hydro-View.

Analogue Input/Output

It will be observed that some of the test facilities are cyclic. For example, the 'Analogue Output' increases from 0V to 5V to 10V and back to zero again.

A multi-meter set to Vdc may be attached to terminals 6 and 7 thus verifying that the physical output is available.

Where it is believed that there is a problem with the 'Analogue Input', two leads may be attached from terminal 6 to terminal 4, and from terminal 7 to terminal 5. This connects the analogue output back into the analogue input. It may be seen from the display, if functioning correctly, that as the output changes the input follows it.

If both of these tests pass, and you still have problems with either the analogue input or output, then you should check the Hydro-View configuration and your external wiring. If either of these tests fail contact Hydronix Technical Support.

Serial Communications

RS232

The voltage on pin 2 (TxD) measured with respect to pin 3 (0V) of the RJ11-style outlet is normally approximately -12V when the communication line is idle (refer to manual for connection details).

If pin 2 (TxD) is connected to pin 5 (RxD) to form a 'loop-back' arrangement then a continuously scrolling text string may be observed to the right of '232...' in the display. This indicates that the RS232 port is transmitting and receiving correctly.

If problems are still experienced then the type and position of the wiring should be checked, (i.e. is the wire shielded, is it located near to large inductive loads, is it connected to the correct terminals). You should also check that the serial port settings on your external equipment are 9600 baud, 8 data bits, 1 stop bit and no parity.

If this test proves unsuccessful then contact Hydronix Technical Support.

RS485

This facility is not available on Hydro-View units shipped prior to 1st January 1996.

Digital Inputs

The digital inputs may be verified to be working correctly by applying the voltage present on terminal 13 (this should be approximately +24V with respect to terminal 17) to each input, ensuring that terminal 16 is connected to terminal 17 to provide a return path.

When the inputs are 'ON' a corresponding 1 will be set on the *Factory Test* display page under 'In 1' or 'In 2' as appropriate.

If this test fails contact Hydronix Technical Support.

Output Relays

The output relays may be verified to be working correctly by attaching a multi-meter set for continuity to terminal 18 (common) and terminals 19, 20 and 21 in turn.

Watch the Hydro-View display (Out 1, Out 2 and Out 3) and the multi-meter. If the Hydro-View is functioning correctly, continuity should be observed intermittently as the relays open and close in sympathy with the display.

If this test fails, it may be that fuse FS2 has gone open circuit. This is of the plug-in replaceable type. Another possible explanation is that one of the relays have worked loose from their sockets. These are located to the rear of the unit close to terminals 18 through 21.

Note: due to a software error in early versions of the Hydro-View firmware, you may observe the operating sequence on the display to be Out 1, Out 2, Out 3 whilst the operating order of your continuity test will be Out 1, Out 3, Out 2.

Display Blanking Problems

If the display blanks out completely then check the following...

1. Does the keypad still operate i.e. does it 'beep' when a key is pressed. If so, then only the display module has failed. In many cases this has been found to be due to electromagnetic interference affecting the display. See Engineering note EN0001 for details of modifications to overcome these problems.
2. Measure the supply voltage on terminals 1 and 3 with respect to 2. These should read +15V and -15V (approx. open circuit voltage) respectively. If either or both of them are at a much lower voltage (typically between 0V to 5V) then the power supply has shut down. The unit will not continue to operate under these conditions. See below for possible explanations.

Re-settable fuse failure

Quite often the display blanking problem might only be observed with a sensor connected in which case the most likely cause is a re-settable fuse in the power supply. Some of these devices have

been found to 'age' resulting in spurious tripping in the field. If fuse FS1 is the re-settable PTC type (MFR050, yellow coloured bead) then it is very likely that this is the problem. To confirm this, remove power from the unit for a few minutes and then reapply power. If the unit re-starts then you should exchange FS1 for a 1A Anti-Surge (T) TR5 fuse and a two-pin mounting socket. FS1 is indicated in Figure 1.

Capacitor failure

Another probable cause for a 'blank display' symptom is that one or more of the tantalum capacitors C4, C5, C7, C8, C14 and C18 may have failed to a near or total short-circuit condition which causes fuse (FS1) to trip. In this case, the unit will often not operate at all but may give similar symptoms to the *Resettable Fuse* problem above. This particular fault appears to have been associated with a batch of capacitors fitted to units with serial numbers beginning 307504. If your unit is from this batch, the best course of action is to replace all of the tantalum capacitors - which may necessitate a return of the unit to Hydronix.

Analogue to Digital Converter latch-up

Electromagnetic Interference coupled onto the sensor cable has been found to cause the A/D converter to 'latch-up' intermittently. The symptoms of this problem are that the unit appears to function correctly but does not respond to changes in sensor input voltage. In extreme cases, the current taken by the A/D converter can be so high that the power supply will shut-down, giving the appearance of the display blanking problem described earlier.

If the unit begins to operate normally once power has been cycled, then no permanent damage has occurred.

The problem may be fixed by fitting an external EMC filter assembly to the screw terminals at the back of the Hydro-View and another filter assembly to the keypad cable as described in engineering note EN0001. The unit has been tested to very high levels of immunity with these assemblies installed and you should therefore have no further problems. If the problems do continue after installation of the filter assemblies you should look elsewhere for the source of the interference.

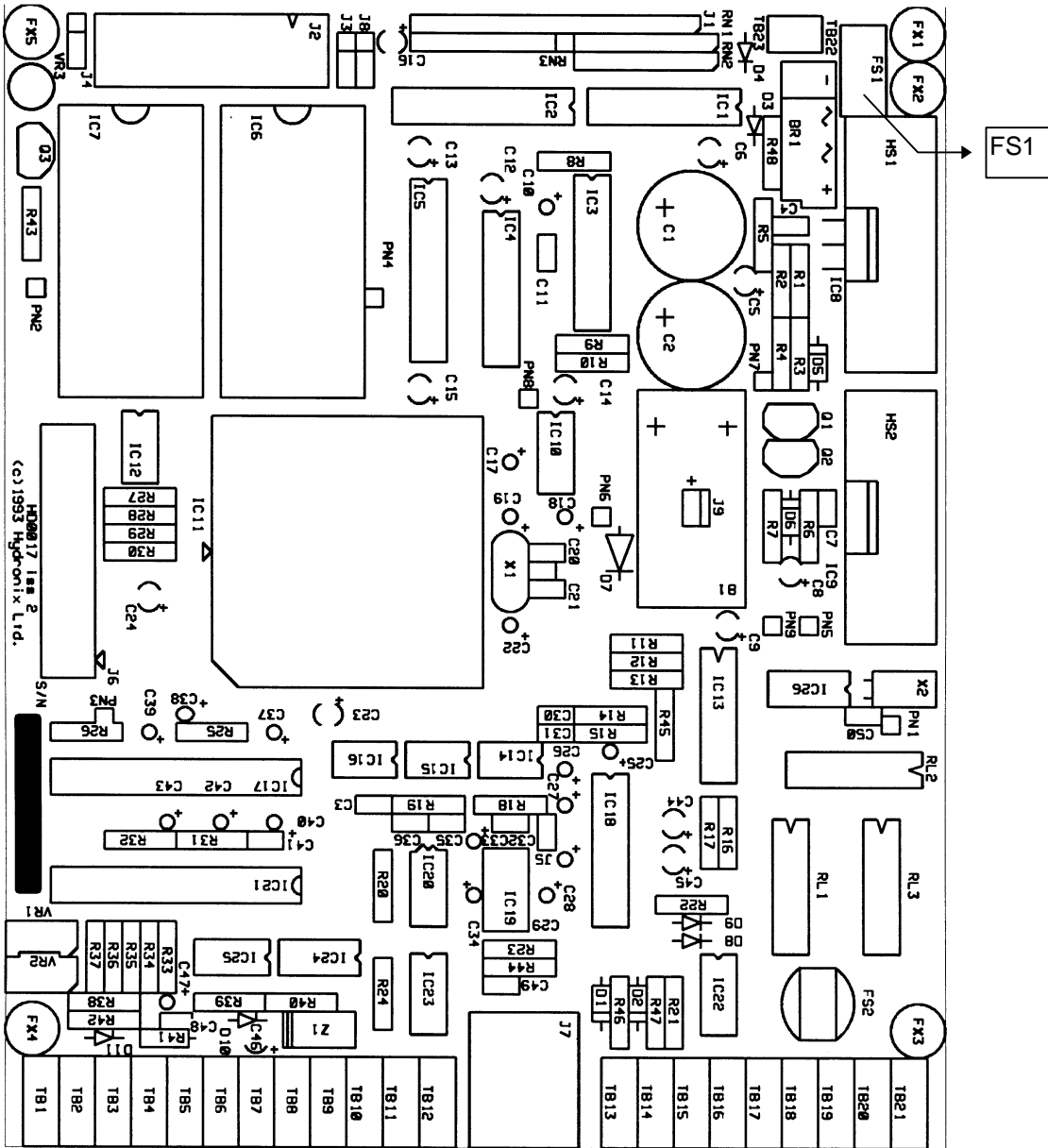


Figure 1 - HD0017 Circuit board