



## Engineering Note

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Title:	Temperature-related display contrast problems on Hydro-Control IV
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Products affected:	Hydro-Control IV operator terminal revision letters below 'C'
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Summary:	This document describes how to correct temperature related display contrast problems on the Hydro-Control IV operator terminal

### Symptoms

- (1) The Hydro-Control IV display is very faint shortly after power has been applied but is OK after extended use.
- (2) The Hydro-Control IV display is OK shortly after power has been applied but fades to almost white after extended use.

### Cause

The contrast of the liquid crystal display is affected by temperature changes. When operated at temperatures other than normal room temperature (20°C) it may be found necessary to adjust the display contrast to improve legibility. The display back-light lamp generates sufficient heat to affect the contrast when the unit has been operated for an extended period.

Early Hydro-Control IV production units were factory set at room temperature. When subsequently operated for extended periods the display fades.

Later units were factory set after establishing a normal operating temperature, but this results in the display appearing faint for a while after power has been applied.

### Remedial action

#### ***Contrast adjustment***

The display contrast may be adjusted by turning the pre-set potentiometer VR3 located on the main circuit board. The location of VR3 is shown in the diagram overleaf.

The contrast should only be adjusted at normal working temperatures and after the unit has been in operation for a few hours. Adjusting the contrast immediately after switch on will mean further adjustment later.

If the display is very faint immediately after power up, leave for a while as the contrast will increase when the unit warms up.

#### ***Temperature compensation***

In order to compensate for temperature changes during operation, temperature compensation thermistors may be fitted in place of some of the fixed resistors on the pcb. This will give a much improved contrast performance over the working temperature range and is the preferred method for addressing this problem. This modification has been factory installed at operator terminal revision letter C.

Proceed as follows...

1. Locate the fixed resistor R43 which is immediately below the EPROM and next to the test point labelled PN2.
2. Remove this resistor and replace with a series combination of the following parts...

33K, NTC bead  
100K, NTC bead

Philips 2322-640-63333  
Philips 2322-640-63104

- When fitted, reapply power and adjust the display contrast using VR3 when the unit has reached normal operating temperature. The compensation offered by the thermistors should then allow the display to work with good visibility over a wide temperature range. However, you should note that operation at ambient temperatures above 50°C is not permitted.

