Ztest: a tool for setting up the Merlin CCD system Fibre Comms hardware

D. Carter May 2016

As of 9 May 2016 the Ztest utility has been properly installed on Imag40 - the STE3/4 Instrument control computer in the 40" Telescope. It was unusable for some time as the software had not been correctly set up on the PC.

Instructions for use:

1. On the Imag40 computer log in as diag, usual password. (If you're already logged in as ccd, type the following:)
   `Su –l diag` (lower case L....) - enter the password.
2. To overcome a missing library problem, you have to run a script which sorts out the library issue and auto-starts Ztest. Type:
   `Sudo runz.sh` - enter the diag password again
3. Perform the checks and adjustments described in section 4.2 of the document "Merlin CCD System: temperature/Shutter/Fibre Comms Card". File name <MSHUTEMP.doc>. Insert appended below.....
4. Use ctrl-c to exit the program.
5. Type `exit` to return to the çcd user login

Note that the source code of ztest is now in the ../diag/ZZtest directory

Excerpt from document "Merlin CCD System: temperature/Shutter/Fibre Comms Card".

4. **Set up and Testing**.

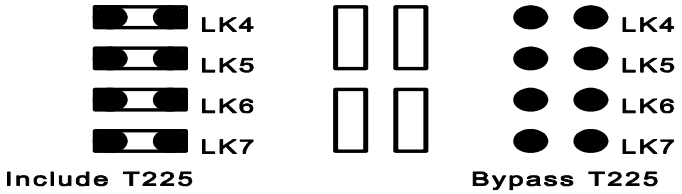
4.1. **Initial setup**

Pots VR2, VR3, VR6 & VR7 are adjusted when the board is populated in accordance with instructions given on the circuit diagram. The pots are then locked with sealing wax. The 1N4148 temperature sensing diodes are selected to give the correct reading at both liquid nitrogen and room temperatures.

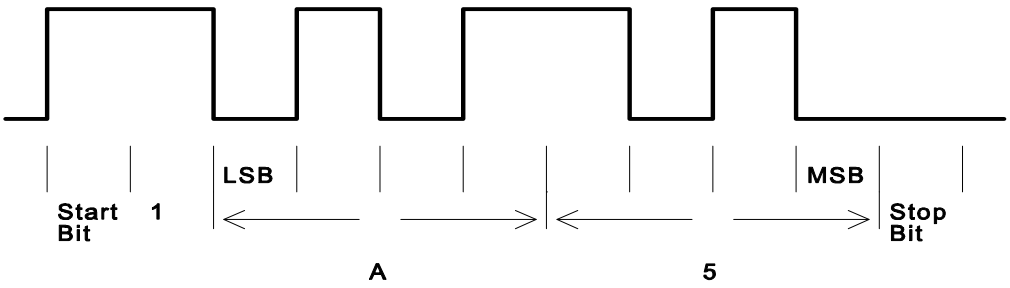
- Link 1 OUT & IN should be jumpered to select transputer link 1.
- LK3 should be jumpered to protect the ADC in the event of analogue and digital grounds not being commoned elsewhere.
- VR5 (Bias Light adjust) is on the front panel. Adjust for required bias light illumination on CCD, as explained in section 3.3(i).

4.2. **Set up of fibre optic link**

N.B. If the interface card in the pc has a buffer transputer, it should be bypassed whilst setting up the fibre optic link. The sketch below shows how the links should be configured.



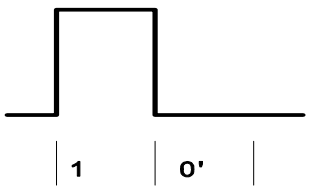
a. Connect dual fibre optic cable between temp/shutter/fibre board and the PC I/F card.
b. Switch on both Merlin crate & pc and allow 10 mins warmup.
c. Run the program ZTEST in the pc.
d. With a 100MHz scope, monitor TP3 (TX) on the fibre optic interface in the pc. You should see the transputer link sending a 'Z ' (hex 5a).



Note that the transputer transmits LSB first.

You may see an acknowledge superimposed on the trace or just an acknowledge on its own. Some adjustment of the scope trigger may be required.

The acknowledge looks like this :



Monitor TP9 on the temp/shutter/fibre interface in Merlin crate and a similar 'Z' should be observed. Adjust VR8 (THRESH.) to give pulses >=100ns wide. We measure at the 2V. level

despite the fact that Inmos specify 1.5V. on their timing diagrams. We have found it more reliable to have the pulses slightly too wide rather than too narrow.

Monitor TP8 on the temp/shutter/fibre interface in Merlin crate and check that a 'Z' is being transmitted. If not : press ctrl-c on the pc to stop ZTEST, reset the Merlin transputer and type `Sudo runz.sh` restart ZTEST.

Monitor TP2 (RX) on the fibre optic interface in the pc. You should see the 'Z ' pulses. Adjust VR1 to give pulses >=100nS wide.

4.3. **Fibre Transmitter/Receiver Waveforms**.

The following waveforms are for reference showing good and bad received signals. The test set is as follows :

1. TTL signal generator signal fed into the 74AC04 driving the transmitter
2. 3m 62.5micron cable feeding back into the same cards receiver.
3. Two different cards used - one “good” and one “bad”, so it is not a directly comparable test as different receivers were used. Nevertheless the test demonstrates the difference in received signal amplitude between a good & bad transmitter quite well.

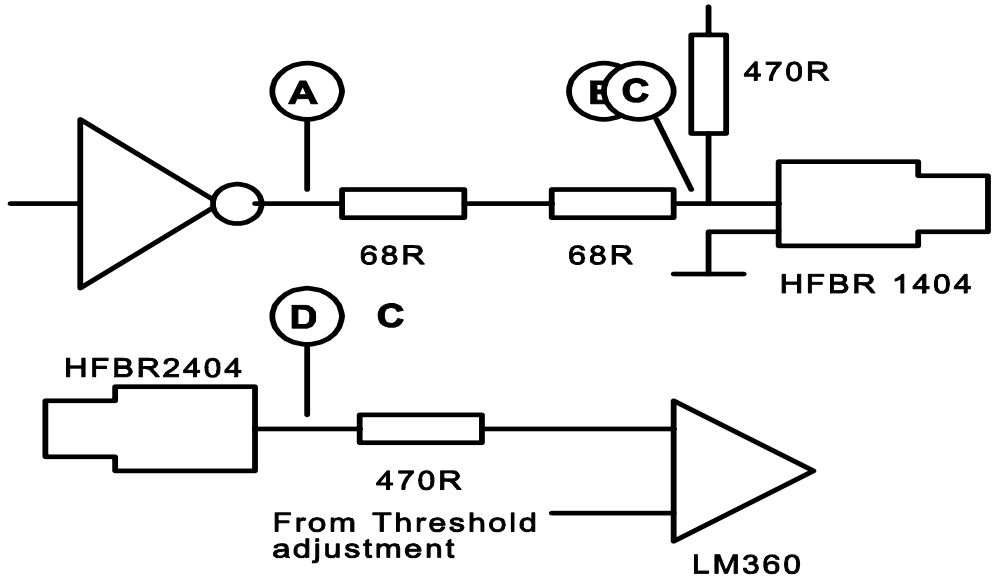


Figure 1 shows the essential parts of the transmitter and receiver circuits, showing where the ‘scope probes were connected.

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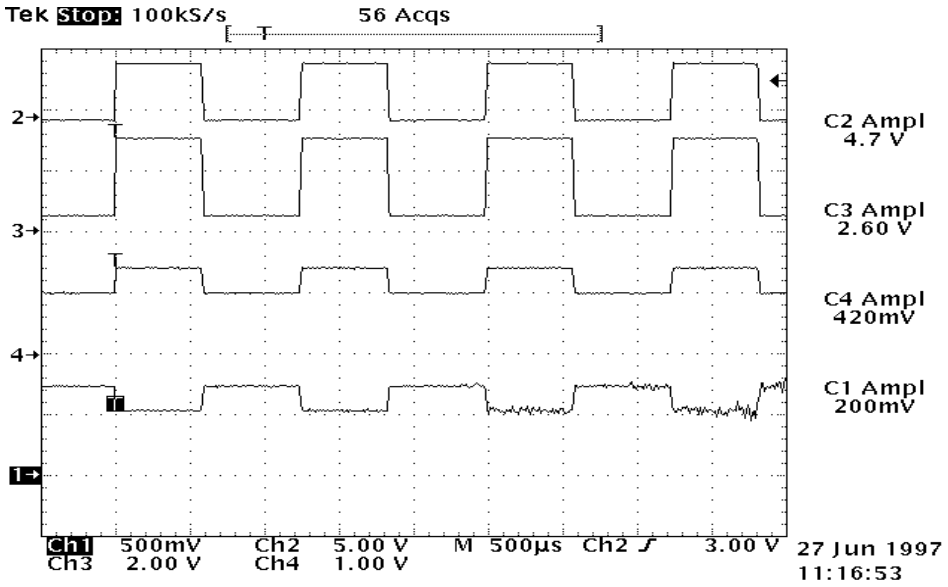
A
B
C
D



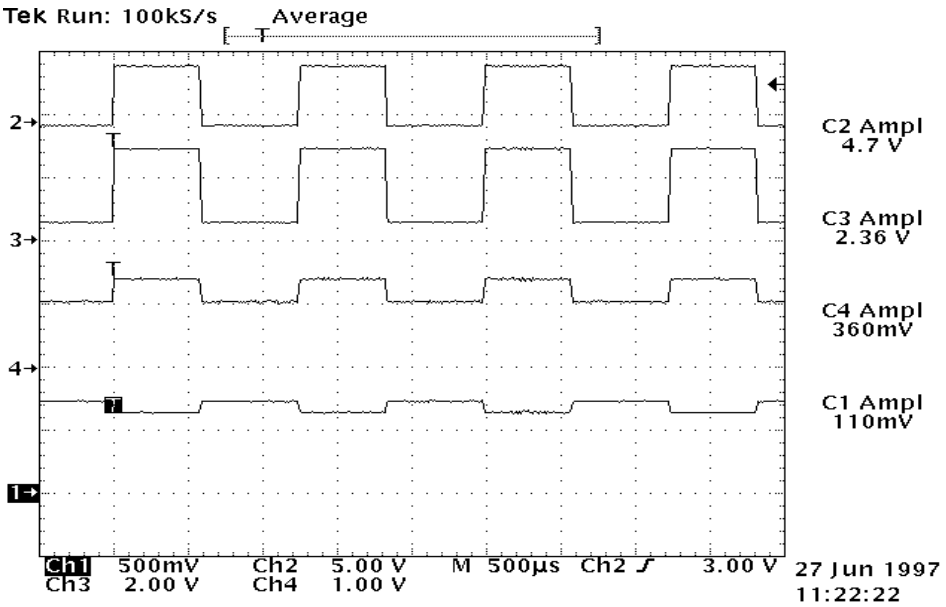
Note the difference in amplitude of the receiver waveform. It seems that an amplitude of around 200mV or more should be expected.

A

B

C

D


Tek Run: 100kS/s Average
2→
3→
4→
1→
C2 Ampl
4.7 V
C3 Ampl
2.36 V
C4 Ampl
360mV
C1 Ampl
110mV
Ch1 500mV Ch2 5.00 V M 500µs Ch2 ƒ 3.00 V
Ch3 2.00 V Ch4 1.00 V
27 Jun 1997
11:22:22