VALIANT DESIGNS

TITLE

DIAGNOSTICS TEST SPECIFICATION FOR MKII COMMUNICATOR

DOCUMENT Nº VDL1/149

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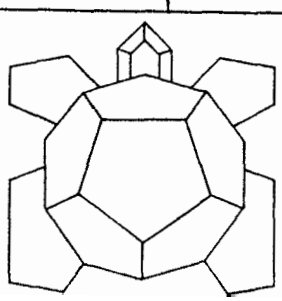

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I N D E X

1.0 INTRODUCTION

This document is a diagnostics test guide for fault finding malfunctioning MKII production Communicator Units.
It is intentionally brief, as detailed functional descriptions and tests are contained in VDL1/102 (Test Specification for MKIV Prototype Communicator Board).
It is recommended that the individual electronics diagnostics reports be referenced to provide further information on the nature of faults, diagnosis and remedy.

2.0 EQUIPMENT REQUIRED

a) Oscilloscope

b) Test kit comprising Sinclair Spectrum, Interface One, cassette recorder and Valiant Parallel Interface, as per document VDL1/147 Section 3.0.

3.0 FUNCTIONAL TESTS

3.1 Parallel Initialisation

3.1.1 Set up Spectrum kit with Communicator parallel lead connected to kit via Parallel Interface. Load up test software.

3.1.2 Set DIL switches on side of Communicator as follows: SW1 = OFF SW2 to 4 incl. to ON

3.1.3 Connect up parallel lead to Communicator and turn on unit.

3.1.4 Ensure that the red LED at the front end of the Communicator is illuminated.

3.1.5 Select the Parallel Initialisation option on the Computer and activate.

3.1.6 The red LED should now be out, indicating that the unit has initialised.
(If the unit has not initialised, first check the 5V supply and processor ALE clock. Select a continuous run option on the Computer and check that the processor is responding to the data input strobe by toggling of the NRFD and NDAC outputs, according to VDL1/102.
If the unit is not responding, check that the DAV input strobe is being received by the processor in its pulse stretched form (15us typically).
If this signal is being received, carry out a bit by bit check using the single shot software test facility).

3.2 Transmission Test

It is assumed that the system is set up, including an initialised Communicator, resulting from Section 3.1. Individual bit tests are necessary for a parallel system, as it is possible for a Communicator to initialise and transmit, but to corrupt certain

command bits.
In the absence of reception and decoding equipment, the most appropriate method of I.R. output and individual bit test is by monitoring the mechanical movement and current consumption of a Turtle powered externally by a DC power supply unit.
(Refer to sections 4.2 to 4.5 inclusive in document VDL1/150.)

(As the output stage is serial, only bit failures will be located in either the parallel input stage or the processor itself).

3.3 Serial Test

3.3.1 Disconnect the power supply and parallel cable from the Communicator.
Set DIL switches 1 and 2 to the ON position.
(Switch positions 3 and 4 are not relevant to this configuration).
Connect the serial cable between the Test kit and the Communicator.

3.3.2 Power up the Communicator and confirm that the red LED is on.

3.3.3 Select the 'Serial Initialise' option on the Computer and activate.
Confirm that the red LED is now OFF.
If the LED is not off, disconnect and reconnect the Communicator supply and retry the initialisation.
(If the unit does not initialise, select the continuous output option on the computer and activate - the data word format is irrelevant.
Check that the RTS line is operating, indicating that the processor is responding to data received at its serial input. If not, check that the data is being received at the processor pin.)

3.3.4 As a final check, following successful initialisation, transmit the bit pattern Ø11ØØ11Ø continuously and confirm that the 'monitor' Turtle moves forward.

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Nature of Failure

Communicator fails to transmit I.R. commands, although it may initialise correctly.
When the unit is opened, the fault distinguishes itself by the thermistor at R26 becoming hot.

Description of Circuit

IC5 (SN75188 RS232 driver IC) performs a dual role within the Communicator unit.
Three of the four individual driver circuits are used as standard RS232 driver outputs, the fourth is used as a level shifter circuit to drive the I.R. output stage.
The device supply is sourced directly from the power jack 24 volt input.

Reason for Failure

Scope testing reveals no logic inversion between IC5 pins 5 and 6.
No specific reason for the failure can be determined.
The incidence of failures is low, yet significant on the basis that it is the predominant failure type.
However, investigation of the failed devices shows damage between the 0 volt and negative terminals of the device: all devices are damaged, indicating that the failure is power supply related.
In this instance, during power up the negative rail limits are exceeded for a short duration (approx. 7 milliseconds), and it is considered that this is responsible for the failures.

Conclusion

There is no certain cause of failure, although the signs indicate a supply orientated problem.
To date, four out of five failures have been of this type - in percentage terms, the failure rate is approx. 0.5%.

Recommendation

It is recommended that a circuit change be implemented in order to prevent the negative power rail exceeding the device supply limits.
If this is indeed the problem, then the incidence of this type of failure will drop. The change is defined in the change request dated 19.3.85.