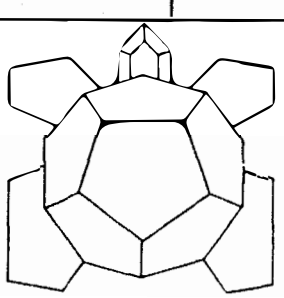
VALIANT DESIGNS

TITLE

DIAGNOSTICS TEST SPECIFICATION FOR MKII TURTLE

DOCUMENT Nº VDL1/150

ISSUE Nº	*PREPARED*	*CHECKED*	*APPROVED*	*COMMENTS*
A	D.A. EWINS			21.5.85



Valiant Designs Ltd Park House 140 Battersea Park Road LONDON SW11 4NB ENGLAND
Tel: 01-720 3947/627 1351/627 0470 Telex: 946461 (Attn Valiant) NIMTEX G

I N D E X

1.0 INTRODUCTION

This document is a diagnostic test guide for fault finding on malfunctioning MKII production Turtle units. It is intentionally brief, wherby the majority of faults will be quickly diagnosed. However, in those circumstances where the fault is rather more elusive, it is recommended that document VDL1/103 (Test Spec. for MKIV Controller Board) is referenced. However, where applicable a reference to the most likely cause of a fault is identified in the text.
It is also recommended that the individual electronics diagnostics reports are referenced in order to provide further information on the nature of faults, diagnoses and remedies.

All tests assume removal of the Turtle lid.

2.0 EQUIPMENT REQUIRED

a) Oscilloscope

b) Variable power supply unit providing up to 1 Amp at 30 Volts DC.

c) Charge socket lead assembly.

d) Board voltage supply cable and connector assembly.

e) Microcomputer system and diagnostics software pack (Sinclair Spectrum and cassette recorder kit), as per document VDL1/147.

f) Communicator Unit.

3.0 CHARGER SYSTEM TESTS

Assuming that the Turtle is wired normally, a properly functioning charger system should perform according to the following:

3.0.1 Set main Turtle switch to the 'CHARGE' position.

3.0.2 Confirm that the yellow PCB LED is illuminated (its level of illumination will be dependent on the current state of battery charge).

3.0.3 Connect the charge lead into the PSU and set to 19 volts.

3.0.4 Connect the charge plug into the socket at the side of the Turtle.
Confirm that the yellow LED remains on and that the current drawn is approximately 0.6Amp.
If the current is above 0.7Amp or lower than 0.45Amp it is possible that there is a battery pod fault. (If the yellow LED fails to illuminate, check that the pod thermistor is in circuit).

3.0.5 Reduce the voltage supply to 10 volts whilst still connected. The yellow LED should remain on.

3.0.6 Set the Turtle switch to 'OFF'.

3.0.7 Increase the voltage of the PSU until the yellow LED is turned off. Confirm that the voltage is approximately 19 volts. (If the LED fails to go out, check that the pod thermistor is not shorted out. Typical room temperature resistance is 70 ohms).

3.0.8 Increase the voltage further to 24 volts.

3.0.9 Set the Turtle switch to 'CHARGE'.

3.0.10 Confirm that the current consumption does not exceed 100 milliamps, and that the yellow LED remains off.

3.0.11 Set the Turtle switch to the 'OFF' position and confirm that the residual current does not exceed 30 milliamps.

4.0 MAIN SYSTEM TEST

The following should be carried out using the Spectrum Computer Kit.
Connect the Spectrum system to the Communicator and load the Diagnostics Test Software, according to the instructions in VDL1/147.

Set the Power Supply Unit to 12 volts and connect the voltage supply cable to its outlets.
Turn the PSU off.
Disconnect the main power connector PL2 from the controller board.
Connect the plug end of the supply cable into the board.
Ensure that the Turtle underside DIL switches are both set to the off position.

4.1 Initial Power Up Test

4.1.1 Manually rotate the pen gearing such that the pen mechanism is in the 'down' position.

4.1.2 Switch on the PSU whilst monitoring the current.

4.1.3 Confirm that the initial current drawn is 0.6Amp (approx.) and then drops back to around 80milliamps following a delay of 1 second (approx.).
Confirm that the initial burst of current is complemented by a pen lift action.

4.1.4 Confirm that the board red LED is illuminated.

4.1.5 Confirm that the eyes are illuminated.

4.1.6 Reduce the PSU voltage to 10volts, and confirm that the eyes are now out.

4.1.7 Set PSU back to 12volts output.

4.2 I.R. Reception Test

4.2.1 With the Communicator initialised according to the instructions in VDL1/147, set up the transmit

coding on the computer as follows:

ØØØØØØØØ

and transmit for one shot.

4.2.2 Confirm that the board red LED has turned off, but that no other change has occurred - i.e. no change in current consumption beyond the 5mA (max.) deflection required to drive the LED.
If the LED does not change state, then refer to VDL1/103, Section 15. Specifically, refer to 15.3 as the measurement yields a very useful indication as to the integrity of the I.R. receiver/amplifier stage.

4.3 Pen Control

4.3.1 Set the transmit coding as ØØØ1ØØØØ and transmit for single shot.

4.3.2 Confirm that the current consumption increases to 0.6Amp approximately for about 1 second, and then drops back to its quiescent level of 80milliamps.
Confirm that the current surge is complemented by a pen drop action.

4.3.3 Set the transmit coding as ØØØØØØØØ and single shot transmit.
The pen system should lift again, with the associated 1 second current surge.

4.4 Port Motor Control

4.4.1 Set transmit coding as Ø11ØØØØ1 and one shot transmit.

4.4.2 Confirm that the current consumption is now approximately 0.4Amps and complemented by a backward step of the port motor.

4.4.3 Repeat 4.4.1 and 4.4.2 at least once to ensure circuit integrity.

4.4.4 Set the transmit coding to ØØØØØØØØ and one shot transmit to turn off motor control circuitry, reducing current to the quiescent level.

4.5 Starboard Motor Control

4.5.1 Set the transmit coding as Ø11Ø1ØØØ and one shot transmit.

4.5.2 Confirm that the current consumption is now approximately 0.4Amps and complemented by a backward step of the starboard motor.

4.5.3 Repeat 4.5.1 and 4.5.2 at least once to ensure circuit integrity.

4.5.4 Set transmit coding to ØØØØØØØØ and one shot transmit to turn off motor control circuitry, reducing current to quiescent level.

5.0 STEPPER MOTOR ADJUSTMENT

Each stepper motor is mounted on the main plastic base by means of two screw fixings. These mountings provide a level of adjustment whereby the degree of gear engagement between the motor shaft gear and wheel gear may be optimally set. The adjustment is such that there should be no residual backlash in the gearing, whilst avoiding over tight gear meshing. Assessment of the existence of backlash is a manual skill, whilst assessment of the degree of gear meshing is related to obtaining smooth rotational movement at a designated drive voltage and step rate.

5.1 Backlash

5.1.1 With the Turtle power turned off, apply finger light pressure to each wheel in turn and attempt to move rapidly in a backward-forward motion. If wheel movement is detected relative to no movement of the stepper motor gear, then backlash is present. Readjust motor setting by loosening screws, rotating motor unit and tightening again.

5.2 Gear Mesh

Once the motor-drive system has been adjusted to remove any backlash, the system requires checking to ensure that the gearing has not been over meshed. (During the manual motor setting process, it is possible to sense for over-tightened drives: however, this skill only develops with experience!)

5.2.1 Set the PSU unit to 8.5volts.

5.2.2 Select the Drive Test 'Forward' option on the computer and ensure that the wheels rotate smoothly without faltering.

5.2.3 Repeat 5.2.2 but with the 'Reverse' option.