VALIANT DESIGNS

TITLE

QUALITY AND TEST

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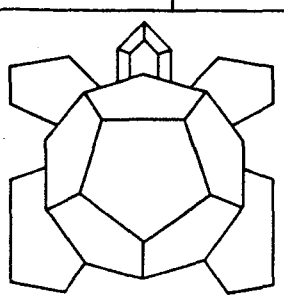

Valiant Designs Ltd Park House 140 Battersea Park Road LONDON SW11 4NB ENGLAND
Tel: 01-720 3947/627 1351/627 0470 Telex: 946461 (Attn Valiant) NIMTEX G
Directors: Prof T Stonier, AB, MS, PhD, FRSA (President) R R Fawcett, ACMA, MBCS (Chairman) D Catlin, B Tech (Managing) G M Manvell (Marketing) T M Airey, BSc, FCA (Finance) (Secretary)
Reg in England No 1626393 Reg Office: 56-60 St Mary Axe, London EC3A 8BJ VAT No 237 711955

QUALITY AND TEST

1.0 GENERAL

At the manufacturing stage, all units are subjected to rigorous quality check procedures - during each sub-part assembly to the fully assembled unit.
Every circuit board produced is automatically tested on GEN RAD equipment under software control.
As a final check, every unit is subjected to Functional Testing procedures, when it is tested for mechanical and electrical integrity.
In particular, the complex nature of the Turtle unit dictates a prolonged functional test phase involving T1 and T2 test procedures: the full functional test program for a single Turtle takes approximately four hours - two hours for a full charge, and two hours of T1 and T2 testing.

Regular failure reports are produced by the manufacturers and assembly plants in order that an ongoing assessment of product reliability may be maintained. This enables rapid identification of areas needing improvement, both in the design and assembly techniques.
In addition, an ongoing field failure record is kept, whereby any trends or problems may be identified, allowing remedial action to be implemented as appropriate.
To maintain this assessment, we require that all authorised test and repair centres record failure details and supply a copy of their findings to Valiant Designs each month.

Every failure is analysed for its possible significance as either an indication of a new or undetected problem,

a random or batch failure, or as a trend indicating a more subtle failure mode.
To date, this monitoring procedure has resulted in the definition of a number of design changes, or assembly procedures, to further reduce the current MKII early return failures of 1% and 5% for Communicator and Turtle repsectively.

Where specific faults rise to prominence, through any of the reasons above, diagnostics reports are produced and, as appropriate, a related change request.

As previously mentioned, all failures require logging; in order to keep paperwork to a minimum, each failure is recorded as a single line entry on the Diagnostics Summary Sheet and it is a copy of these sheets that is required at the beginning of each month.

Testing falls into two categories: the T1 and T2 functional tests (mentioned briefly above) and Diagnostics Tests.
Whereas the T1 and T2 tests run under LOGO and are unmodifiable, the Diagnostics Test facility allows individual bit patterns to be set up, with single shot or continuous transmission modes, in order to facilitate fault detection.

2.0 FUNCTIONAL T1,T2 TESTS

2.1 General

The T1 and T2 test plan is primarily designed for Turtle Unit functional testing at the production stage; however, these procedures may equally well be taken, in whole or part, as a final unit check following repair centre servicing.

Various tests are software based and as such require the provision of a host machine. A standard test kit has been selected and is based on the Sinclair Spectrum.

The T1,T2 test routines require to run in conjunction with the Sinclair LOGO and may be used to test Communicators. However, because of the excessive time taken to load the cassette based software, using T1 procedures for Communicator test becomes impracitcal.

2.2 Equipment

The Sinclair Spectrum based T1,T2 test kit comprises:

- 1 off Sinclair Spectrum
- 1 off Sinclair Interface 1
- 1 off Sinclair LOGO cassette
- 1 off Cassette Recorder
- 1 off Test Tape including T1,T2 'Test' Program
- 1 off Communicator and Power Pack and Spectrum to Communicator Lead
- 1 off Valiant Interface Tape

It is assumed that a Power Supply unit is also available by consequence of kitting out for the diagnostics tests.

2.3 Software Loading Procedure

Load Sinclair LOGO cassette:
enter single key LOAD "" and then start tape running.

When loaded, connect up the Communicator to the Interface 1 via the serial lead, ensure that the side switches SW1 and SW2 are both set to ON and then power up the Communicator.
Ensure that the red led at the front of the Communicator is on.
With the Valiant Interface tape in the cassette recorder (serial side), load the program by typing STARTROBOT and press the play button on the recorder.
On completion of the load, confirm that the Communicator has initialised by checking that the red led has gone out.
With the T1,T2 'test' tape now in the recorder type load"test and press play.
Your software has loaded when ? is displayed.
To run, type TEST and a menu is displayed.

2.4 Running the Test Software

It is assumed that the tests are run in conjunction with the T1,T2 documentation in which an explanation of each option is given.
The menu displayed is as follows:

```
1   T1 PEN
2   T2 PEN
3   T1 DRIVE
4   MOTION TEST
5   SQUARE TEST
6   360° TEST
7  INITIALISE COMMUNICATOR
8   EXIT
SELECT AN OPTION (1-8)?
```

Each option outputs operator instructions in order to perform the test.

The INITIALISE COMMUNICATOR option does provide for running Communicator tests, but the interface type (either serial or parallel) is determined during the software loading procedure detailed above. Accordingly, to run a parallel interface Communicator, the parallel side of the Valiant Interface cassette must be loaded and, unfortunately, the nature of the Sinclair LOGO dictates a time consuming entire software reload.

3.0 DIAGNOSTICS TEST FACILITY

3.1 General

This software facility is primarily intended as a necessary tool to aid the diagnosis of faulty Communicator units. However, by nature of the system, it can also be used to help diagnose faulty Turtle units, when used in conjunction with a working Communicator. Accordingly, the diagnostic procedures contained in documents VDL1/149 and VDL1/150 assume the utilisation of this facility. Finally, because of the nature of the loading requirements for the T1,T2 tests, it is recommended that the Diagnostics Test facility be used for Communicator Functional Tests.

3.2 Equipment

The Diagnostic Software is written to run on a Sinclair Spectrum based test kit; the total equipment requirement is as follows:

Sinclair Spectrum or Spectrum Plus

Sinclair Interface 1

Cassette Recorder

Test Tape including Diagnostics Program 'd test'

Valiant Parallel Interface Board with integral Parallel Cable

Monitor TV

Serial Interface Cable

3.3 Software Loading Procedure

3.3.1 Set up Sinclair based test system with Valiant Parallel Interface Board connected into the PCB edge connector outlet from the Interface 1.

3.3.2 With equipment turned on, load the Diagnostics Tape into the Cassette Recorder.

3.3.3 Enter LOAD "dtest" and press the PLAY button on the recorder. The software should now load.

3.3.4 On completion of the load, the monitor will display a test option menu.

3.4 Running the Test Software

3.4.1 Following a successful software load, a primary option test menu is displayed on the monitor as follows:

1 INITIALISE COMMUNICATOR
2 SEND BIT PATTERN
3 EXIT

On the first run, 1 will normally be selected.

3.4.2 On selection of the INITIALISE COMMUNICATOR option, the next display provides the option for Serial or Parallel Interface?

SERIAL (S) OR PARALLEL (P)

Connect up the Communicator to the desired interface type:
If Serial, connect the Communicator directly to the 9 pin D Type connector at the back of the Interface 1 using the Serial Cable, and set the side mounted DIL switches as follows:
SW1 = ON, SW2 = ON, SW3 = DON'T CARE, SW4 = DON'T CARE
Now depress S on the keyboard.

If Parallel, then connect the Communicator to the Parallel Interface Board, using the integral cable, and set the side mounted DIL switch as follows:
SW1 = OFF, SW2 = ON, SW3 = ON, SW4 = ON
Now depress P on the keyboard.

NOTE: On no account should both the parallel and serial

cables be connected from the Communicator to the Test Kit at the same time as this will cause the Communicator voltage biassing to become unbalanced.

3.4.3 The next display instruction informs the operator to power up the Communicator.
On powering up, confirm that the red LED at the forward end of the Communicator is illuminated. If it is not, then the Communicator has failed to reset itself correctly.
Refer to the Diagnostics and Test Manuals for guidance.
On successful power up, depress the SPACE key as instructed, and confirm that the LED is now out. If not, then the Communicator has failed to initialise, possibly because the correct coding has not been received.

3.4.4 The menu now reverts to the original form of 3.4.1 above.
Typically, option 2, SEND BIT PATTERN, should now be selected. On depression of key 2, the following menu is displayed:

```
CURRENT BIT PATTERN
A M M P L L R R
Ø Ø Ø Ø Ø Ø Ø Ø
1   CHANGE BIT PATTERN
2   SEND BIT PATTERN - CONTINUOUS
3   SEND BIT PATTERN - ONE SHOT
4   EXIT
```

a) Option 1 allows redefinition of the transmitted bit pattern (defaulted to all 0s for first run) and following depression of key 1, the display is as follows:

CURRENT BIT PATTERN

A M M P L L R R

Ø Ø Ø Ø Ø Ø Ø Ø

ENTER NEW PATTERN

Enter Øs and 1s only as appropriate to test. Following entry of the eighth bit, the display reverts automatically to the menu of 3.4.4

b) Selection of option 2 causes a continuous transmission of the selected bit pattern to the Communicator.
For each transmission (8 bit command) the red LED should change state.

c) Selection of option 3 will cause the chosen bit pattern to be transmitted once to the Communicator.

4.0 DIAGNOSTICS SUMMARY SHEET

The Diagnostics Summary Sheet is required to be filled in for each item that is diagnosed as faulty.
The sheet is specifically designed to keep paperwork to a minimum; however, a number of rules must be followed:

4.1 Monthly Returns

A new sheet should be started for each month, commencing on the first. The sheet should be marked with the relevant month and year and a copy of the previous month's entries forwarded to Valiant Designs.

4.2 Entry Date

The Entry Date is the date the item was diagnosed.

4.3 Unit Serial No.

The serial number of the unit diagnosed as faulty should be entered in this column. Where specific serial numbers are not appropriate (e.g. for cables or software), then details of the failed item should be recorded.

4.4 Failure Symptoms

This should record the overall message as conveyed by the customer and should reflect the comparable entry made on the Customer Fault Report and Enquiry Summary Sheet. (Refer to Customer Service Document VDL

4.5 Exact Cause of Fault

This entry should record the details of the failure - the part number of the failed device(s), the nature of the failure and the cause, if known.
In certain circumstances, as in the case of a partly functioning item, that part of the device that has failed (e.g. particular input or gate) should be detailed,

if known. For instance, for early MKI and MKII units, the current limiting resistors in the pen system (R39,R40) may burn out: the direct cause of the unit being returned is the obvious burn out, but the real cause may be a battery pod problem.

4.6 Failure Classification

This column should contain a single entry as to the nature or cause of the fault.

A number of classifications are defined:

a) PCB : This classification relates to a PCB tracking problem.

b) SOLDER : This classification refers to a soldering related fault - e.g. dry joint, solder bridge between two pins etc.

c) ASSEM : This classification refers to an assembly related problem - i.e. where the unit has been incorrectly assembled at the manufacturing stage.

d) WIRING : This classification refers to a wiring related problem - e.g. broken wire, dodgy crimp, etc.
This classification may include interface cables and battery contacts.

e) COMP : This relates to an electrical component failure, and may be any electronic or electrical part, excluding wiring but including batteries.

f) HAND : This classification relates the prime cause of the fault to misuse or otherwise bad handling.

g) SW : This classification refers to a failure that is software related.

4.6 Enquiry Ref.

This should correspond to the reference entered on the Customer Enquiry and Fault Report Sheet.

DIAGNOSTICS SUMMARY SHEET MONTH: YEAR:

ENQUIRY REF.	ENTRY DATE	UNIT SER. NO.	UNIT TYPE	FAILURE SYMPTOMS	EXACT CAUSE OF FAULT	FAILURE CLASSIFICATION*

*PCB: PCB TRACKING FAULT /SOLDER: SOLDER FAULT /ASSEM: FAULTY ASSEMBLY /WIRING: WIRING FAULT
COMP: ELECTRONIC COMPONENT FAILURE /HAND: HANDLING /SW: SOFTWARE