VALIANT DESIGNS

TITLE

CUSTOMER ENQUIRY AND FAULT REPORT SHEET

DOCUMENT Nº VDL1/146

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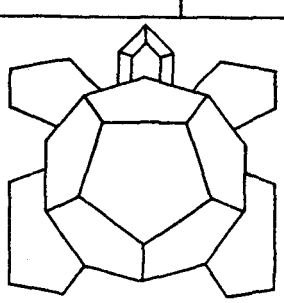
A	D.A. EWINS			21.5.85



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CUSTOMER ENQUIRY AND FAULT REPORT SHEET

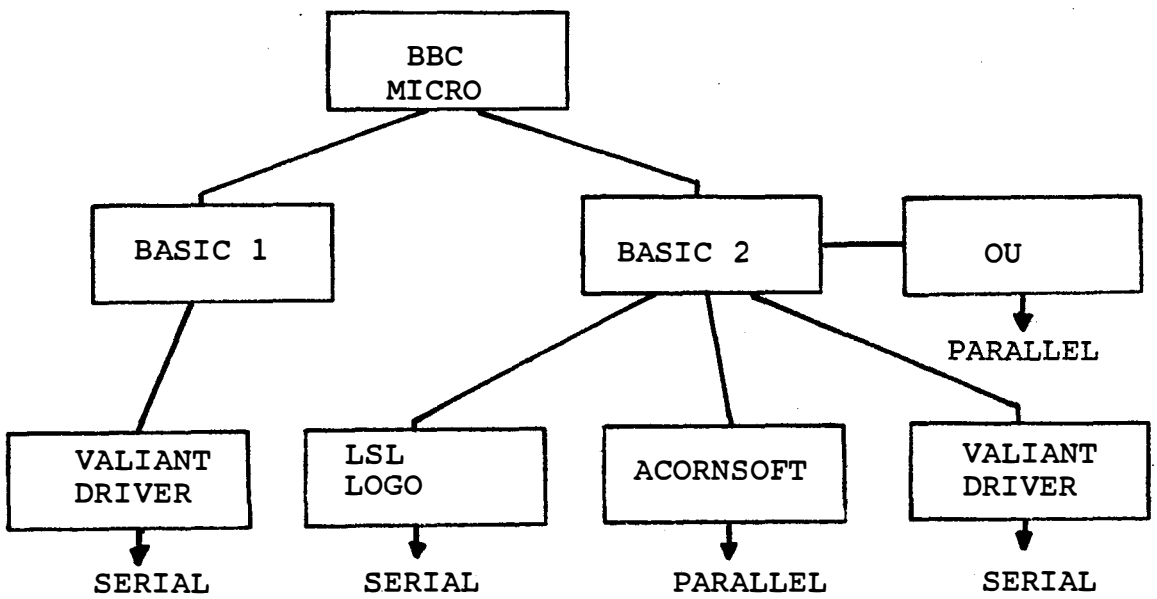
1.0 CUSTOMER SERVICE

For a service department to run efficiently, a Customer Support service is required, both from the point of view of helping the user to clarify misunderstandings with the equipment and, as far as possible, to prevent the return of otherwise correctly functioning units.

It is important to understand the nature of the Turtle product. Firstly, it is obviously necessary to understand the workings of the product itself as a stand alone item, and an in-depth account of this is given in the System Operation Description Document - VDL1/145.

However, the Turtle is NOT a stand alone item. Its operation is dependent on the provision of a host computer and of software (LOGO) to run it: this is where difficulties may occur.

Figure 1 indicates an example of the complexity of the task facing Cusomer Support. It shows the number of variants to which the Turtle interfaces for the BBC Microcomputer.



Five differently configured systems may be indentified immediately, and the situation is being repeated for most of the other microcomputers at one level or another. As another example, the Apple 2e may be fitted with any one of a number of different interface boards and then there are LOGO options available, again rapidly increasing the number of configurations.

At a deeper level of involvement, various computers have evolved with changes in resident firmware, as for the BBC, or changes in the amount of memory, or options on mass memory storage, disc drive or cassette, and so on. And then there are inevitable problems in the host computers or LOGO softwares themselves - batches may be released which have inherent, but otherwise unnoticed, faults which only identify themselves when the customer attempts to run his Turtle for the first time.

It becomes an obvious pre-requisite that a system is required to keep on top of this potentially mountainous problem. Information sheets have been produced detailing the H/W ans S/W Interfacing requirements to each computer; for each issue of software, a sheet is produced detailing the contents of that software, and any problems that have been found with it. The sheets also contain any specific host computer requirements - e.g. memory size, etc.
In addition, any problems found to be specific to that host computer may be mentioned. However, it may not always be possible or appropriate to include certain 'problems' on these sheets and accordingly a User Problem Advice Sheet is also produced.
Finally, the system will not function efficiently without feedback between the Customer Service Departments and Valiant. A CUSTOMER ENQUIRY AND FAULT REPORT SHEET is therefore provided to each Customer Support Service

installation and each enquiry must be logged in this document in order that the pertinent information be recorded for eventual appraisal. Particularly when a new software interface is placed on the market, or even more so, when a new host computer is involved, the initial problems arising require careful attention in order to detect the presence of unforeseen problems at the earliest opportunity.
Normally, only small quantity 'field trials' batches will be issued initially in order to allow market assimilation, but this may not always be possible if the new software is added on to an existing product. In this instance it is expected that the Customer Support Service will detect any abnormal increases in problems and convey the information to Valiant without delay.

2.0 RECORD SHEET

The Customer Enquiry and Fault Report Sheet is detailed as follows:

2.1 Enquiry Ref.

This shall be an unique number that can be referenced by the Diagnostics Summary Sheet.

2.2 Name, Address and Tel. No.

Name, address and telephone number of enquirer.

2.3 Date

Date of enquiry.

2.4 Nature of Problem

This shall record the nature of the problem as conveyed by the enquirer.

2.5 System Details

This shall record details of the host system and interfacing software.

2.6 Description of Faulty Equipment and Serial Numbers

This shall record the details, including serial numbers, of items being returned as possibly faulty.

2.7 Special Notes

This section shall record any special notes relating to this enquiry.

2.8 Action Notes

This section records details of actions to be undertaken as appropriate. The sub-classifications are as follows:

a) Awaiting Reply (AR). Waiting on enquirer to come back.
b) No Action - enquiry closed (EC).
c) Immediate Replacement (IR) according to equipment details recorded under 2.6.
d) Return and Repair (RR).
e) Equipment Received (ER).
f) Equipment Damaged on Receipt (DAM).
g) Replacement Equipment Despatched (ED).

CUSTOMER ENQUIRY AND FAULT REPORT SHEET

ENQUIRY REF.	NAME, ADDRESS & TEL. NO.	DATE	NATURE OF PROBLEM	DESCRIPTION OF FAULTY EQUIPMENT & SER. NOS.	SYSTEM DETAILS	SPECIAL NOTE	ACTION*	
							AR	
							EC	
							IR	
							RR	
							ER	
							DAM	
							ED	
							AR	
							EC	
							IR	
							RR	
							ER	
							DAM	
							ED	
							AR	
							EC	
							IR	
							RR	
							ER	
							DAM	
							ED	

* AR - Awaiting Reply EC - No action: Enquiry closed IR - Immediate Replacement
RR - Return and Repair ER - Equipment Received DAM - Equipment Damaged ED - Replacement Despatched

USER PROBLEM NOTES

These notes are intended to be supplementary to the user notes and instructions supplied with the Turtle kit. These notes are confidential to Valiant Designs and are not to be supplied without authorisation to any person not employed by Valiant Designs Ltd.

These notes are intended as a backup to user problems and indicate the action required to alleviate the problem.

PROBLEM	ASCERTAIN THE FOLLOWING	ACTION
1. Communicator will not initialise on RML480 system	Ensure that RML480 is not CJ serial numbered. If so, then possible problem with SI02 being incorrectly wired.	Inform user to check this and contact RML as appropriate for modification.
2. Cannot load Turtle Driver S/W on BBC Serial System	Inquire as to the display of Syntax error 7620	If syntax error 7620, BBC system fitted with Basic 1 Inform user that Turtle Driver will only run on Basic 2
3. Interface software for Apple 2e or 2 plus will not load.	Almost certainly fault with Apple LOGO disc. A large number of discs have been issued with COPYDEF fault.	Inform user to contact Apple dealer for replacement disc.
4. Turtle set to Ident 3 will not function correctly when operating under multi-Turtle operating systems.	Noise problems within the MKII Turtle Electronics have reduced the effective I.R. range, with the possibility of spasmodic control for far range systems. This problem relates to MKII Turtles Ser. Nos. 1000 to 1999.	Suggest that enquirer uses problem Turtle on idents Ø, 1 or 2

/contd.

5. Communicator may not function on IBM Parallel System	System problem: overcome by cable fix. Only applies to about 25 off systems max.	Get user to check cable at 25pin D end for link between pins 1 and 11, or supply Issue B IBM S/W.

ELECTRONICS DIAGNOSTICS REPORT 001

Nature of Failure

Pen resistor (R39 and R40) burn out on Turtle Controller Board.

Description of Circuit

The pen circuitry is a high current bi-directional d.c. motor driver. The pen mechanism is such that the bi-directional drive need only be applied for a short duration in order to achieve a lift or drop action. This duration is approximately one second. During this period, the current is approximately 0.5 amps through either of the current limiting resistors R39 and R40, with a consequential surge dissipation of 5 to 6 watts.
The resistors are of metal glaze construction and can adequately cope with this surge provided the pen mechanism is cycled up-down at a rate not faster than once per 12 seconds.
Instructions in the User Guide do point out that the pen system should not be continuously activated, and in normal use this will not happen.

Reason for Failure

The pen system is driven via power driver circuits directly from the board processor. Loss of processor control may cause overdriving and consequential pen system burn-out.

Prime Cause of Failure

Under normal circumstances, the processor should always retain control of the pen drive system such that resistor burn out should never occur.
However, fault diagnoses of returned units have revealed a number of modes of failure by which the processor can lose control.
These failure modes are detailed below:

A Faulty battery pod contacts caused by contact corrosion.
B Unit vibration.
C Faulty on-off switch.
D Faulty processor.
E Faulty electronic components other than processor.
F Misuse.

Contact Corrosion

The contact corrosion problem is caused by battery alkaline leakage occuring when the batteries are fully discharged.
A change is in hand to nickel plate all contacts to avoid this problem in future.

Unit Vibration

The unit vibration problem is very dependent on battery pod spring strength and level of vibration. It may be assumed that all units will suffer from this problem, although the level of vibration will depend on spring strength.
Under normal circumstance units should not be immobilised by this problem, but a number of units have been found to have weaker than normal springs, and this is being investigated.

Faulty On-Off Switch

This failure mode relates to switches which do not make reliably during turn-on.

These first three failure types result in the on-board processor reset requirements being contravened and consequential loss of control over the pen-drive circuitry: a similar problem was encountered with the Communicator during power up, which was nullified by incorporation of a protective thermistor in the I.R. output stage.

Faulty Processor

A number of units (three to date) have burnt out due to faulty 8048 processors.
Each of these failures was identical and they have been termed "leaky ram" failures.
Essentially, the firmware is structured into modules, with routines being "called" at the appropriate point.
When the Turtle unit has been left in a "waiting for I.R. input" condition for some minutes, the sub-routine return address has become corrupted causing loss of program control and burn out.
However, limited program control is re-attained enabling the unit to move as normal while the pen system continues to burn out.
The nature of the failure indicates an internal device failure, requiring device replacement.

Faulty Electronics Components

This failure mode relates to any of the conponents in the pen system electronics, the processor reset capacitor, oscillator circuits and five volt regulator. Specifically, a number of burn outs have occurred immediately following unit turn on, which cannot be related to any of the above failure modes, but may be pinpointed to incorrect processor 'time constant' reset conditions. This has been due to a faulty timing capacitor on the processor reset pin.

Misuse

This is possibly the most obscure problem and, for a returned unit, not easily diagnosed.
A number of methods of misuse may be identified:
1) Software overdriving of pen system.
2) Incorrect battery pod re-assembly.
3) Dropping of unit.
The first mode has been discussed earlier.
The second mode may relate to incorrectly tightened lid screws, wrong batteries, and so on.
The third mode is an extreme level of vibration, which has been discussed earlier.
Each of these misuse conditions may result in a unit being returned.

Conclusions

A number of failure modes by which the pen-system may burn out have been identified.
Obviously, those units with definite faults will be returned regardless, but other units may experience a burn out condition only on a very infrequent basis.
Under these latter circumstances, provided the unit is modified to withstand a full pen-system turn-on situation, simply turning the unit off and then on again will remove the fault. In circumstances where the condition occurs more frequently, a recommended cleaning of battery contacts will be necessary.

Recommendation

It is recommended that the pen drive limiting resistors R39 and R40 be replaced with thermistors in order that board damage is avoided when a potential burn-out condition is experienced by the unit due to misuse.
Refer to change request dated 16.3.85.

ELECTRONICS DIAGNOSTICS REPORT 002

Nature of Failure

The fast charge circuit condition is not reliably invoked when setting the power switch on the turtle to the 'CHARGE' position.

Description of Circuit

The charger system consists primarily of a comparator based single flip latch circuit which is thrown on detection of a charged battery stack, when operating in the 'FAST' charge mode only.
By appropriate sequencing of 'CHARGE' switch selection and application of external power, the 'SLOW' charge mode may be selected in preference to the 'FAST' condition.
When illuminated, the PCB mounted yellow Led indicates that the charger circuit is operating in the FAST charge mode.
In this mode, approximately 0.5 Amps is drawn as the charge current and bypasses the slow charge resistive limiter.
A battery thermal detection circuit causes the latch circuit to flip to the 'SLOW' charge condition, reducing the charge current to approximately 60 milliamps via the limiter resistor.

Reason for Failure

Switching into the fast charge mode is reliant on a clean power switching action by the ON-OFF-CHARGE switch.
A capacitor, C17, is incorporated to slug the comparator circuit in the event of incomplete switch contact and was found to be adeqaute initially. However, a number of units have proved unreliable and this is due to an elongated power application phase, whereby the supply makes and breaks over a period exceeding 1 millisecond.

Prime Causes of Failure

The prime cause is attributed to the variation in quality of the three position switch on the Turtle - a fact which was not apparent during the first manufacturing batches.
An alternative cause may be a change in switch wiring practice, but this has not yet been determined.
In addition, it is not known how well these switches will age: with the likelihood of increasing charge mode selection difficulties.

Conclusion

The failure to switch into fast charge mode is not a permanent feature - normally the mode can be invoked after one or two repeated tries. However, this characteristic is likely to prove bothersome to the user.

Recommendation

It is recommended that the slugging capacitor C17 be increased to reduce the effect of the faulty charge mode switching.
This will not entirely eliminate the problem, but will greatly reduce the occurence.
The modification is as detailed in change 2 of the Change Request dated 16.3.85.

ELECTRONICS DIAGNOSTICS REPORT 003

Nature of Failure

Variable responsiveness of Turtle Mk II Unit to infra-red commands when set to ident (address) 3.
The unit, when set to this address, will operate correctly over a much reduced range.

Description of Circuit

Refer to document VDL1/103.

Reason for Failure

Noise pick-up in the I.R. receiver-amplifier from the detector latch control signals causing signal garbling at low input intensities and consequent lack of response.

Prime Cause of Failure

The addition of the remote D.I.L. switch for ident selection and minor PCB layout changes from the MK I production variant have caused the I.R. receiver to become more prone to noise pick-up.
Although difficult to confirm, the changes in the PCB layout and the incorporation of a remote D.I.L. switch appear to have changed the board decoupling requirements.
Accordingly, the performance of the default turtle (ident Ø) remains at the same level as the MK I units, with each switch closure causing a progressive increase in noise pick-up. (This pick-up only signifies itself for units set to ident 3).

Conclusion

The noise problem will not identify itself unless the Turtle is being used in a Multi-Turtle mode.

Recommendation

1. A change in the decoupling capacitor C3 reduces noise levels for all idents onto a parallel with the MK I Turtle.
   Accordingly, the change recommended is detailed in the change note dated 16.3.85 (clause 3).
2. In the event of field problems, recommend that the unmodified Turtle is used with an ident setting of Ø. These susceptible units should be identifiable from serial numbers.

ELECTRONICS DIAGNOSTICS REPORT 005

Nature of Failure

Turtle intermittent movement (juddering) in response to infra-red commands.

Description of Circuit

Refer to VDL1/103

Reason for Failure

Noisy infra-red receiver diode (or diodes) D22-D27 Type BPW41D. Scope testing at IC8 Pin 2 with respect to board ground plane reveals high amplitude spikey noise far in excess of 100mV pk-pk typical noise signal attributed to a 'healthy' board.
This noise may be very intermittent, but may be induced by mechanically flexing the components in turn on the board.

Prime Cause of Failure

The prime cause is essentially an internal BPW41D mechanical bonding failure between the receiver chip and lead.
The manufacturer has modified manufacture procedures to eliminate the supply of faulty batches of components such that this fault should no longer occur.

Conclusion

The juddering fault attributable to faulty manufactured BPW41D diodes should no longer occur, as the manufacturer has incorporated additional procedures to eliminate this type of fault.
However, all Turtle units numbered VDL1/01/01000 through to VDL1/01/01999 may be considered at risk, although these units were subjected to extensive screen testing prior to delivery, so the majority should not suffer from this problem.

Recommendation

Although it is often possible to identify the faulty component, it is possibly more cost effective to replace all 6 diodes.

DAE 9.4.85.