

Information

Volume 1





CONTENTS AND PAGE NUMBERING

As you will see from the following list of contents, this manual is laid out in 10 major sections. Within each section we have divided the information into numbered subsections, and then further subdivided each subsection to the extent that each individual item is fully referenced by the contents list. Each page in this manual, with the exception of printed publicity leaflets and bound documents, carries its own number which consists of 4 figures, plus the date of release of the information.

The 4 figures given refer respectively to the section number, subsection number, item number and page number. We trust that this method of numbering will enable you to find the information you require as easily as possible.

We plan to provide new material from time to time and this will be numbered in exactly the same way in order to allow you to insert or replace pages without difficulty. The contents list, which is itself dated, will be revised each time we issue an update.

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Neither the whole or any part of the information contained in, or the products described in, this manual may be adapted or reproduced in any material form except with the prior written approval of Acorn Computers Limited (Acorn Computers).

The products described in this Information Manual and products for use with it, are subject to continuous development and improvement. All information of a technical nature and particulars of the products and their use (including the information and particulars in this manual) are given by Acorn Computers in good faith. However, it is acknowledged that there may be errors or omissions in this manual. A list of details of any revisions or amendments to this manual may be obtained upon request from Acorn Computers, Technical Enquiries. Acorn Computers welcome comments and suggestions relating to the products and this manual.

All correspondence should be addressed to:-

Customer Service Department
Acorn Computers Limited
Units 8 & 9
Cambridge Technopark
645 Newmarket Road
CAMBRIDGE
CB5 8PD

All maintenance and service on the products must be carried out by Acorn Computers' authorised dealers and service agencies. Acorn Computers can accept no liability whatsoever for any loss or damage caused by service or maintenance by unauthorised personnel. This manual is intended only to assist the reader in the use of the products, and therefore Acorn Computers shall not be liable for any loss or damage whatsoever arising from the use of any information or particulars in, or any error or omission in, this manual, or any incorrect use of the products.

This manual is for the use only of Acorn Computers' authorised dealers and service agencies and must only be used by them in connection with the products described within. This manual remains the property of Acorn Computers at all times and must be returned to them immediately upon the termination of the agent's appointment.



2.1 INTRODUCTION

In this first edition of the new Customer Service Information Manual we have included information on both technical and administrative aspects of servicing machines sold by Acorn Computers. On the technical side we include basic information, such as circuit diagrams as well as advice on repairs and details of upgrades and peripherals; on the servicing front we set out repair procedures and list spare parts and prices.

We intend to send you new diagrams, manuals, notes etc., as and when they become available and also to update existing data when necessary; all pages will be numbered and dated so that you may be sure that you have the most up-to-date information.

Our aim is to meet the requirements of our service agencies and to provide a comprehensive and high level of support; to this end we would welcome any comments or suggestions you may have, both as to information which might be provided in updates to the manual and as to ways in which the overall service we give to our customers can be improved.

On the following pages you will find a performance survey sheet and an information exchange sheet, which we would like you to complete and return, but please do not feel that you are limited to these particular forms, we hope to establish a continuing dialogue and will be pleased to receive communications either by letter or telephone at any time.



2.2

CUSTOMER SERVICE PERFORMANCE SURVEY

(Please complete and return to Customer Service Department,
Acorn Computers Limited, Units 8 & 9, Cambridge Techno Park,
645 Newmarket Road, CAMBRIDGE CB5 8PB)

DEALER/ASC NAME

ASC NUMBER
(where appropriate)

ADDRESS

Please indicate

Less than
Satisfactory Adequate Good

(1) How satisfactory do you
consider our service to
be in the following areas

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| a. Ordering spares | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Ordering upgrades | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Obtaining replacement
parts from service
reports | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Forwarding machines
to RCS | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Response to general
queries on servicing
problems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

(2) Any other servicing problems
you wish to bring to our attention.

(3) Any commonly occurring faults.

(4) Any faults that you find
particularly difficult to repair.

2.3 CUSTOMER SERVICE : EXCHANGE OF INFORMATION

(Please complete and return to Customer Service Department, Acorn Computers Limited, Units 8 & 9, Cambridge Techno Park, 645 Newmarket Road, CAMBRIDGE CB5 8PB).

- (1) Please indicate what information, technical or otherwise, you would like to obtain on:
 - a. BBC Micro
 - b. Electron
 - c. Atom
 - d. Test Equipment
 - e. Other

 - (2) Please let us know of any technical information you have which might be of use to the other service engineers or to the engineers at Acorn.
-



THE CUSTOMER SERVICE DEPARTMENT

3.1 Introduction

The Customer Service Department, as the name implies, exists to provide a comprehensive range of pre-sale and support services both to individual customers and to our dealers and service agencies.

The functions of this office fall into four main categories:

1. To respond to enquiries on all general aspects of our machines, such as repair facilities, guarantee policy, general availability of products etc.
2. To answer technical questions on the use and repair of the computers.
3. To provide support for exhibitions and demonstrations arranged by our Art and Promotions Manager.

All enquiries about demonstrations or requests for support should be addressed to Mr John Caswell, Acorn Computers Ltd., Fulbourn Road, Cherry Hinton, Cambridge, CB1 4JN Telephone Cambridge 245200.

4. To progress orders placed for spares, and to process Service Reports. The Department currently employs 25 people, under the direction of the Customer Service Manager, Mr Mike Bicknell. We are situated in the new offices of Acorn Computers Limited at:

Units 8 & 9
Cambridge Technopark
Newmarket Road
CAMBRIDGE
CB5 8PD

There are 9 direct telephone help lines to our office which offers an adviser service to both dealers and members of the public all accessed on the number CAMBRIDGE 210111. In addition to this you may also reach us on the main switchboard number CAMBRIDGE 214411.

On the following pages are found faces and names of the members of the Customer Service Department, together with a brief description of the job each of us does.



3.2 CUSTOMER SERVICE STAFF



Mike Bicknell
Customer Service Manager



Rachel Pullen
Customer Support Advisor
Responsible for: General enquiries



Laurence Hardwick
Customer Service Engineering Section
Leader
Responsible for: Technical support



Martyn Lowry
Educational Advisor



Mike Howieson
Educational Advisor



Paul Lilley
Business Systems Advisor



Martin Grantham
Technical Information Assistant



Abigail Wineberg
Technical Assistant
Responsible for: Technical Enquiries



Richard Boyd
Technical Assistant
Responsible for: Technical Enquiries



Matt Bridger
Technical Assistant
Responsible for: Technical enquiries



Sue Harris
Customer Service Assistant
Responsible for : General Enquiries
Advice for Disabled Customers



Gail Foxcroft
Customer Service Assistant
Responsible for: General Enquiries

Franni Vincent
Technical Information Assistant





Rosemary Walker
Spares Co-ordinator
Responsible for: Service
reports, Spares Orders
enquiries



Brigitte Garner
Administrative Assistant

Grainne Germany
Customer Service Assistant
Responsible for: Goods Inwards





Kamlesh L Davda
Senior Technician
Responsible for: Service Engineering



Ash Bavalia
Support Engineer
Responsible for: Equipment
Installation and Demonstration



Clare Benton
Secretary to Mike Bicknell



Val Jansen
Secretarial Assistant

Chris Seaman
Secretarial Assistant





3.3 ADVICE FOR DISABLED CUSTOMERS

For some time now we have been building a file of information which we hope will be of use to disabled current and 'would-be' computer users. This includes details of 'control aids', which enable people with a wide variety of disabilities to control a microcomputer if standard keyboard format is not suitable. We also hold information on sources of specialist software, adapted keyboards and input aids, speech synthesis systems for the blind and BBC Micro controlled physiotherapy equipment.

Although we are not able to give specific advice on the needs of our disabled customers, we are able to refer them on to professionals within the field, and will always be delighted, on request, to put a customer in touch with manufacturers, specialist user clubs and associations who can provide information and advice suited to the customers particular needs.

Please contact Sue Harris, Customer Services on Cambridge (0223) 210111.



SERVICING PROCEDURES

4.1 Warranty Repairs

Acorn Computers Limited offer a six month guarantee on all products. An example of the guarantee card and of the letter which also accompanies each new computer will be found at the end of this section, together with details of how this should be completed.

Customers are expected to offer some proof of purchase date when they submit their machines for repair, either an invoice or delivery note, or a completed guarantee card. If a customer has any problems in establishing the validity of a warranty claim, then he/she should apply to the Acorn Customer Service Department for clarification.

Having accepted a computer for repair under warranty and completed the work you should then submit a Service Report, in order to claim payment for the work carried out. If you wish to obtain replacement parts for any that may have been used in the repair, this should be clearly indicated in the appropriate space on the Service Report, and the faulty components should be enclosed with the report. (Please note that we only supply parts as indicated on the spare parts list and not such things as capacitors, resistors etc.). All details entered on the Service Report will be checked by Mrs. Walker of the Customer Service Department and if all is correct the report will be passed for payment and replacement parts as soon as possible.

A specimen copy of a Service Report may be found at the end of this section, together with details of how this should be completed.



4.2 Non-Warranty Repairs

We do not require Service Reports for work you may do on computers that are out of warranty except in the following circumstances:-

1) Operating System 0.1 EPROM to 1.2 ROM exchange:

If the original Operating System is in EPROM, then this exchange is chargeable to Acorn and not to the customer, you will be required to submit a fully completed Service Report stating "EPROM to ROM exchange" and enclosing one set of 4 EPROMS per claim. You will receive a credit of £10 per claim; £ 4 for the return of the EPROMS and £ 6 for labour. We will not accept any claims for the exchange of a 0.1 ROM Operating System.

2) Disc Upgrades:

When the computer to be upgraded has a linear power supply, this must be exchanged for a switch-mode P.S.U. You may return the linear P.S.U. to Acorn for replacement on a Service Report, stating that this is required for disc upgrade, whether or not the computer is still under warranty, but you will not be credited for the labour involved in this exchange.

If the machine to be upgraded has an 0.1 Operating System ROM, this must be exchanged for a 1.2 Operating System ROM from your stock, at no extra cost to the customer.

An allowance for the P.S.U. replacement costs and for the 1.2 supply and fitting is included in the sales discount structure.

3) Authorised Repairs:

From time to time Acorn Computers may authorise a repair to be carried out as if under warranty as an action of discretionary customer support. All such authorisations will be set down in writing and a copy of the authorisation letter should accompany the Service Report.

4) Manufacturing Faults:

If, following an upgrade or change of use a fault is discovered, which appears to have been present since manufacture, consideration will be given to a warranty claim in respect of this. All such cases should be discussed with a representative of the Customer Service Department before work is carried out under warranty.

5) Failure of Replacement Parts:

All Acorn spare parts carry a guarantee of three months; therefore if a component that has been replaced in a customer's machine should fail within three months of that repair, we will replace it again on receipt of a Service Report which clearly states these circumstances. Similarly we expect our authorised dealers and service agencies to guarantee their work for a three month period and a customer should not be charged for repair if his/her machine subsequently exhibits the same fault.



4.3 Guarantee Card: Completion Details

On the following pages you will find copies of the front and reverse sides of both the new and old versions of our guarantee card. The new card will be sent out with new equipment from August 1983.

We would like to draw your attention to the following points:

- 1) Wherever possible the dealer should complete the details on the front of the card:

Dealer name, Model, Serial Number and date of purchase; failure to do this will not necessarily invalidate the guarantee card but the customer will then be required to produce additional proof of purchase to substantiate a warranty claim.

- 2) The customer should sign where indicated and send the bottom portion of the card to Acorn within ten days of purchase. The customer must retain the top portion of the guarantee card.



4.4

GUARANTEE CARD
PRE-AUGUST 1983

FRONT OF CARD

Acorn Computers Limited

Guarantee

(Valid in U.K. only)



Customer _____

Address _____

Block capitals please

Fold here

Guarantee Registration Customer's copy

Model/Invoice/Ref. no.	Serial no.	Date of purchase

Date of registration

Dealer _____

Address _____

This guarantee is only valid if it is completed and signed below by the customer and mailed to ACORN COMPUTERS LTD. within ten days of delivery to the original user. ACORN COMPUTERS LTD., will retain this card as confirmation of registration.

This guarantee is valid in U.K. only.

Fold here

Guarantee Registration ACORN COMPUTERS LTD copy

Model/Invoice/Ref. no.	Serial no.	Date of purchase

Dealer _____

Customer _____

Address _____

Address _____

I accept the terms of this guarantee.

Dealer's signature _____

Customer's signature _____

For company use only.

4.4

GUARANTEE CARD
PRE-AUGUST 1983

REVERSE OF CARD

Guarantee

This equipment is guaranteed only against defects in design, materials and workmanship, from the date of purchase for the relevant period and subject to the conditions detailed below.

Registration

This guarantee shall only be effective if the whole Guarantee Card is completed and signed where indicated by an appointed ACORN Dealer and by the customer, and mailed within 7 days of delivery to the original user.

If purchased by mail order please complete the cards (overleaf) also quoting your invoice number or reference number.

Period of guarantee

This Guarantee is effective for six months calculated from the date of purchase

Conditions

- 1 This Guarantee is personal to the original user, is not transferable and shall not be valid unless the equipment was purchased or taken on deferred or hire purchase terms from an appointed ACORN Dealer, to whom the equipment was sold by the Company or direct from the Company.
- 2 This Guarantee will be invalidated if the equipment is misused or modified in any way without the written consent of the Company or if any original component or accessory has been replaced by any component or accessory of a type not recommended or approved by the Company, or if operated other than in accordance with the Instruction Manual.
- 3 Any claims made under this Guarantee must whenever possible be made through the Dealer from whom the equipment was originally purchased, or taken on deferred or hire purchase terms. If this is not possible a claim may be made to any other Appointed Acorn Dealer (a list of whom can be supplied on application). The customer's portion of the certified guarantee must be produced when any claim is made. The cost of carriage to and from the Dealer must be paid by the customer.
- 4 The Company's own transport will collect and return at no charge from an Appointed Acorn Dealer only any equipment which after agreement by the Company is found necessary to be forwarded to them for repair.
- 5 In the event of equipment being returned which on test is found to comply with published specification, the Company reserves the right to charge a reasonable fee for testing the equipment and for return carriage.
- 6 The liability of the Company under this Guarantee shall be limited to the cost of repair or complete replacement (at the discretion of the Company) of the defective equipment.
- 7 The Company does not accept responsibility for any loss or damage during transit to or from the Dealer or the Company, but every effort will be made to investigate complaints of loss or damage if these arise.

This guarantee does not affect the purchaser's statutory rights.

Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN

**ACORN COMPUTERS LTD
Fulbourn Road
Cherry Hinton
CAMBRIDGE
CB1 4JN**



Acorn Computers Limited

Guarantee

(Valid in U.K. only)

4.4

GUARANTEE CARD
POST AUGUST 1983

FRONT OF CARD

WARRANTY PROCEDURE

To claim under warranty, proof of purchase date is required. To simplify this procedure please note the following:

Dealer

1. Please stamp dealer name and address, complete model, serial no. and date of purchase on both sections below at completion of sale.

Customer

1. Complete both sections below with your name, address and signature, returning lower section to Acorn Computers Ltd within 10 days of purchase.
2. Please produce this completed card at all times to support any warranty claims made through a registered Acorn Dealer.

Guarantee Registration THIS SECTION TO BE RETAINED BY THE CUSTOMER

Model-Invoice/Ref. no.:	Serial no.	Date of purchase
-------------------------	------------	------------------

Dealer _____	Customer _____
Address _____	Address _____
_____	_____
_____	_____
_____	Customer's signature _____

This Guarantee is only valid if all sections are completed and signed by the dealer and the customer..This guarantee is valid in U.K. only.

This section must be returned to Acorn Computers Limited within ten days of delivery, by the original user.

Model-Invoice/Ref. no.	Serial no.	Date of purchase
------------------------	------------	------------------

Dealer _____	Customer _____
Address _____	Address _____
_____	_____
_____	I accept the terms of this guarantee
_____	Customer's signature _____

Acorn Computers Ltd will retain this section as confirmation of registration



Guarantee

GUARANTEE CARD
POST AUGUST 1983

REVERSE OF CARD

This equipment is guaranteed only against defects in design, materials and workmanship, from the date of purchase for the relevant period and subject to the conditions detailed below.

Registration

This guarantee shall only be effective if the whole Guarantee Card is completed and signed where indicated by an appointed ACORN Dealer and by the customer, and mailed within 10 days of delivery to the original user.

If purchased by mail order please complete the cards (overleaf) also quoting your invoice number or reference number.

Period of guarantee

This Guarantee is effective for six months calculated from the date of purchase

Conditions

- 1 This Guarantee is personal to the original user, is not transferable and shall not be valid unless the equipment was purchased or taken on deferred or hire purchase terms from an appointed ACORN Dealer, to whom the equipment was sold by the Company or direct from the Company.
- 2 This Guarantee will be invalidated if the equipment is misused or modified in any way without the written consent of the Company or if any original component or accessory has been replaced by any component or accessory of a type not recommended or approved by the Company, or if operated other than in accordance with the Instruction Manual.
- 3 Any claims made under this Guarantee must whenever possible be made through the Dealer from whom the equipment was originally purchased, or taken on deferred or hire purchase terms. If this is not possible a claim may be made to any other Appointed Acorn Dealer (a list of whom can be supplied on application). The customer's portion of the certified guarantee must be produced when any claim is made. The cost of carriage to and from the Dealer must be paid by the customer.
- 4 The Company's own transport will collect and return at no charge from an Appointed Acorn Dealer only any equipment which after agreement by the Company is found necessary to be forwarded to them for repair.
- 5 In the event of equipment being returned which on test is found to comply with published specification, the Company reserves the right to charge a reasonable fee for testing the equipment and for return carriage.
- 6 The liability of the Company under this Guarantee shall be limited to the cost of repair or complete replacement (at the discretion of the Company) of the defective equipment.
- 7 The Company does not accept responsibility for any loss or damage during transit to or from the Dealer or the Company, but every effort will be made to investigate complaints of loss or damage if these arise.

This guarantee does not affect the purchaser's statutory rights.

Acorn Computers Limited
Fulbourn Road
Cherry Hinton
Cambridge CB1 4JN



ACORN COMPUTERS LTD
Fulbourn Road
Cherry Hinton
CAMBRIDGE
CB1 4JN



4.5 – WARRANTY REPAIRS – GENERAL REPAIRS – MAINTENANCE – INSTALLATION –

Acorn Computers warrants your BBC Microcomputer in accordance with the guarantee enclosed.

To support your local dealer Acorn have appointed:

Retail Control Systems Ltd.
Gresham House,
Twickenham Road,
Feltham,
Middlesex. TW13 6HA

As the authorised factory service facility, who are fully equipped to undertake a comprehensive range of services including:

- Warranty/Guarantee work on behalf of Acorn
- Testing, repair and expansion/updating of equipment
- Annual maintenance and repair contracts
- Installation and maintenance on user premises, schools, colleges, etc.
- Seven day service response

TO OBTAIN SERVICE:

- 1) If your computer develops a fault you may send it direct to RCS.
- 2) Alternatively, you may contact the person who sold the unit to you, who will either undertake repair or arrange to forward it to RCS for repair and testing.
- 3) Ensure that the goods return slip is completed to assist in fault diagnosis and updating of customer records.
- 4) In the event of queries regarding equipment returned to RCS only, you may contact the customer liason on 01-898-4761. An answerphone is available outside normal office hours.
- 5) Advise if further information required on any of the other services RCS provide, i.e. factory repairs, maintenance contracts, installations and maintenance.

**RETAIL CONTROL SYSTEMS LTD.
GOODS RETURN ADVICE (BBC MICROCOMPUTER)**

Service required: Warranty Repair Maintenance

Serial No. Date Acquired

Name: Date fault occurred

Address: Date despatched

Description of fault

Further information required:

- General Repairs – Annual Maintenance Contracts – Installation



SERVICE REPORTS: COMPLETION DETAILS

On the following page may be found a specimen Service Report form. We would like to draw your attention to the following points as numbered on it.

(1) "Dealer"

Enter full name and address and, where appropriate, A.S.C. number.

(2) "No."

You may enter any internal number of your own.

(3) "Date"

Enter the date on which you received the computer for repair.

(4) "Serial No."

Please enter the full serial number, including manufacturer's code, and the model type, e.g. 01-ANB03-5000428-BBC, 06-ALA01-0002611-ELECTRON.

(5) "Customer's Name"

Enter company, school or individual name and brief address. If the equipment is from your own stock, please indicate this.

(6) "Machine Type"

Enter type and model, e.g. BBC, Model A, or Atom.

(7) "Description of Fault"

Enter a description of symptoms of fault displayed by machine.

(8) "Repair Carried Out"

Enter details of how the repair was effected (e.g. "IC 9 (DM(/LS95AN) replaced, machine soak tested - O.K." or "Dry joints on IC 7 resoldered, machine tested - working")

We regret we are unable to refund costs on any report where we cannot identify that a repair has been successfully completed.



(9) "Time Taken"

Indicate actual time taken by engineer on inspection and repair.

(10) "Parts Used"

List all parts used with full descriptions:

e.g. 1 x Video ULA 5C094

(11) "Costs"

Fill in only the section marked "Labour".

Please indicate an appropriate amount according to the time taken. Acorn will pay labour charges up to a maximum of £10 + V.A.T.

(12) "Defective Parts to be Returned"

Ensure that faulty parts are enclosed. Acorn Computers will not send out new components as replacements, unless the defective ones are received. Please do not send any parts except those included in the spares parts list.

(13) "Customer's Receipt Reference"

Enter invoice number, despatch note number, or other relevant details to establish validity of warranty. If a guarantee card has been produced, please indicate this fact.

(14) "Customer's Signature"

Please complete as appropriate.

(15) "Maintenance Engineer's Signature"

Please complete as appropriate.



4.7

ACORN COMPUTER

Acorn Computers Limited
Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone 0223 245200 Telex 817875 ACORN G

(1) DEALER: SERVICE REPORT (2) No:
..... (3) Date:
..... (4) Serial Number:
.....

(5) Customer's Name:

(6) Machine Type:

(7) Description of fault:
.....
.....
.....
.....
.....
.....
.....

(8) Repair carried out:
.....
.....
.....
.....
.....

(9) Time taken: Costs

(10) Parts used: (11) Labour:
..... Parts:
..... Total:

(12) DEFECTIVE PARTS TO BE RETURNED WITH THIS FORM. £ _____

(13) Customer's receipt reference:

(14) Customer's signature:

(15) Maintenance Engineer's signature:

Warranty*/Non-Warranty* Repair
* strike out as appropriate.

RETURN TO: ACORN COMPUTERS LTD
ATT: CUSTOMER SERVICE DEPT
As per above address.

5.1 REFERRING FAULTY EQUIPMENT TO OTHER AGENCIES

There will be occasions when you will be unable to mend equipment yourselves and will therefore need to send it elsewhere. This could be either because a particular fault should prove too difficult for you to rectify within a reasonable amount of time or because the machine is not one that we expect you to repair in the first place, for example, disc drives. On the next page is a chart indicating which machines should be sent where in these circumstances. Please note that these instructions only apply to equipment supplied by Acorn Computers Limited.

Acorn Computers does not currently provide spare parts for any equipment other than the Atom Computer, Electron and the BBC Micro.

Provided that the equipment in question is within the warranty period, pre-paid postage labels for the sending of goods to the appropriate agency must be used. These are available from the Customer Service Department, on CAMBRIDGE 210111. When telephoning to request a label you should state the serial number (where applicable) of the equipment and confirm that it is within the six months guarantee period.

REFERRING FAULTY UNITS TO RETAIL CONTROL SYSTEMS

As indicated above, faulty BBC Micro's should be referred to RCS if you are unable to effect a repair yourself. If the machine is within warranty, transportation costs, in the form of the pre-paid label (see above) will be paid by Acorn but you will not be credited for inspection or testing.

REPLACEMENT OF FAULTY EQUIPMENT

Acorn Computers Limited's policy on replacement is as stated on the guarantee card.

"The liability of the Company under this Guarantee shall be limited to the cost of repair or complete replacement (at the discretion of the Company) of the defective equipment".

Where equipment that is to be replaced was purchased from one of our authorised dealers, it must be replaced by that same dealer.



5.2	<u>PRODUCT</u>	<u>LOCATION TO WHICH EQUIPMENT SHOULD BE SENT FOR WARRANTY REPAIRS</u>
	ATOM Computer	Customer Service Department, Acorn Computer Limited, Cambridge Technopark, 645 Newmarket Road, Cambridge, CB5 8BR.
	BBC Computer	Retail Control Systems Limited, Enterprise House, Central Way, North Feltham Trading Estate, Feltham, Middx.
	Electron Computer	Retail Control Systems Limited, (As Above)
	Systems	Customer Service Department (As Above)
	ATOM Disc Drive	Customer Service Department. (As Above)
	BBC Disc Drive	Vector Marketing Limited, London Road, Wellingborough, Northants. NN8 2RL
	Novex Monitor	Retail Control Systems Limited, (As Above)
	Microvitec Monitors	Microvitec Limited, P.O. Box 188, Bollings Road, Bradford. BD4 7TU
	All other monitors	Vector Marketing Limited, (As Above)
	All Printers	Vector Marketing Limited (As Above)
	BBC Data Recorder	Retail Control Systems Limited (As Above)
	All other Cassette Recorders	Retail Control Systems Limited, (As Above)
	Games Paddles	Vector Marketing Limited, (As Above)
	Teletext	A.B. Electronics Prince of Wales Industrial Est., Abercarn, Gwent.



<u>PRODUCT</u>	<u>LOCATION TO WHICH EQUIPMENT SHOULD BE SENT FOR REPAIR</u>
6502 Second Processor	Race Electronics Ltd Race House Lanelay Road Talbot Green Pontyclun Mid Glamorgan CF7 8YY
Z80 Second Processor	To be arranged
IEEE	Intelligent Interfaces 14, Julius Close, Chandlersford Eastleigh Hants
Bitstik	Robocom Ltd c/o Colverns Ltd Spring Gardens Romford Essex RM7 9LP
Prestel Adaptor	To be arranged
PET and FIT Testers	Customer Service Department, Acorn Computers Limited, Cambridge Technopark, 645, Newmarket Road, Cambridge, CB5 8BR.
Electron Test Equipment	Customer Service Department, (as above)
Acornsoft Software	Vector Marketing Limited London Road Wellingborough, Northants. NN8 2RL.

Please contact Customer Services Department if you need advice on non-warranty repair agencies.



6.1

PROCEDURE FOR ORDERING SPARES

If you are a dealer or an A.S.C. and you have an account with our company, you may order spares from us. We are no longer accepting telephone orders, and it would assist us if you could follow the procedure detailed below.

All orders should be sent to Customer Service Department on official order forms, quoting your order number, your name, A.S.C. number (where appropriate) and delivery address. The order should list exactly what is required, giving both part number and the description as outlined on the price list to avoid any possibility of error.

Orders will be processed and despatched as quickly as possible; you will not necessarily be sent an acknowledgement of order, but any enquiries on the progress of orders should be addressed to Rosemary Walker or Ann Wood in the Customer Service Department (Cambridge 214411 ext. 321 or 322).

Please note that there is a minimum recommended order level of £20.00 on spares, and that orders received which are mixed with Vector Products cannot be considered accumulative.

Spares held by Customer Service Department are for servicing purposes only; orders cannot be accepted for individual IC's for upgrade purposes with the exception of BASIC ROM's (B05) and 1.2 O.S. Orders which are in excess of 20 individual IC's may be reduced or scheduled over different despatch dates according to stock level at the time. If this should occur, every effort will be made to advise you of the situation.

All orders are now processed on the computerised ordering system; as a result of this changeover it is no longer possible to quote either serial number or reference number from each individual Service Report. It would greatly assist our ordering department if a six digit reference number could be quoted per batch of Service reports submitted; this reference will then appear on the advice note and invoice relevant to the replacement parts requested from the batch of service reports. The ordering department will prefix your reference with "S.R."; this identifies the order as free of charge in respect of Service Report claims. Any claims that are not considered valid by the company will be returned to the originator with a covering letter of explanation.



6.2

BBC SPARES PRICE LIST

MAY 1984

PLEASE NOTE:

The prices quoted are strictly NETT of discount regardless of volume. VAT will be added at the current rate where applicable. Please quote PART NUMBERS and DESCRIPTIONS as listed. Orders submitted must quote your account number and order number. PRICES QUOTED ARE LIABLE TO CHANGE - please check whether you have received an updated price list before ordering, or contact Customer Services Department (Cambridge 214411 ext 321 or 322) for an up-to-date quotation.

<u>ITEM</u>	<u>PART NUMBER</u>	<u>PRICE</u>
CARDBOARD BOX	201,074	0.60
TV/AERIAL LEAD	201,503	1.05
WELCOME CASSETTE	403,001	10.00
BBC USER GUIDE	403,000	10.00 *
CASE ASSEMBLY SET	(103,002	16.80
	(103,004	
CASE UPPER SPIRE CLIP	882,946	0.10
	(201,096	
STICK ON LABEL SET	(201,098	2.58
	(201,111	
PLASTIC RULER	201,024	1.18
KEYBOARD ASSEMBLIES	103,001	34.92
SWITCH MODE PSU	103,003	39.20
BASEPLATES	201,030	0.75
RIBBON CABLE ASSEMBLIES	870,701	2.58
ASPECT CUSTOM CHIP (replaces 5C ULA)	201,647	10.50
2C199 ULA	201,602	6.30
BASIC ROMS BO5 (incl. free manual)..	201,628	13.50
1.2 O/S ROMS BO4	201,629	4.00
SAA 5050.....	705,050	6.30



7002	707,002	5.67
6502A	706,502	5.16
6845	706,845	6.60
6522	706,522	4.80
6850	706,850	1.59
81LS95	738,095	1.35
4816	704,816	5.60
RELAY RBR 210-5V	810,001	1.14
UM.1233 E-36 MODULATOR	825,000	3.18
SPEAKER	835,003	1.50
17.73 MHZ CRYSTAL	820,177	1.25
16 MHZ CRYSTAL	820,160	1.25
76489	706,489	3.75
LM 555	770,555	0.50
LM 386	770,386	0.68
LM 324	770,324	0.60
7438	740,038	0.65
74LS00	742,000	0.60
74LS02	742,002	0.60
74LS04	742,004	0.66
74LS10	742,010	0.60
74LS20	742,020	0.60
74LS30	742,030	0.60
74LS32	742,032	0.60
74LS51	742,051	0.93
74LS74	742,074	0.80
74LS86	742,086	0.78



74LS138	742,138	0.86	'
74LS139	742,139	0.86	''
74LS163	742,163	0.95	'
74LS244	742,244	1.57	''
74LS245	742,245	2.50	''
74LS259	742,259	1.54	'
74LS273	742,273	1.57	'
74LS283	742,283	1.12	'
74S00	741,000	0.75	'
74S04	741,004	0.95	
74S74	741,074	1.15	''
88LS120	739,120	2.60	
3691	733,691	4.28	
DM 7445	740,045	1.35	
74LS251	742,251	1.32	
POLY CASE MOULD TOP	(201,075	2.04	
POLY CASE MOULD BOTTOM	(201,076		
HEATSINK	201,029	0.66	
RUBBER FEET	890,000	0.20	
FUTUBA KEY SWITCHES	886,004	0.50	
COM. KEYTOPS (SETS)	201,143	12.50	
SPACE BAR SUPPORTS	886,007	0.20	
SPACE BAR	350,172	0.40	
SPACE BAR WIRE	886,005	0.30	
LED RED	799,000	0.50	
FASTON TAB	800,200	0.20	
SOCKET D-TYPE 15 WAY	800,304	3.10	



SOCKET DIN MAB 5WH 5WAY	800,001	0.80
20 WAY PCB HEADER	800,009	2.70
26 WAY PCB HEADER	800,008	2.35
34 WAY PCB HEADER	800,006	2.85
40 WAY PCB HEADER	800,007	3.25
TRANSISTOR 2N3906	783,906	0.65
MINI SHUNT	800,070	0.28
2732 EPROM TO PET SPEC	201,619	7.00
SERVICE MANUAL	999,968	7.15 *
RECOMMENDED SPARES KIT.....	999,875	577.57

Please contact Customer Services Spares Dept (0223 214411 x 321 & 322)
for spares and servicing requirements not listed.

* ITEMS NOT SUBJECT TO VAT



ELECTRON SPARES - PRICE LIST

MAY 1984

PLEASE SEE NOTE AT BEGINNING OF BBC SPARES LIST BEFORE ORDERING.

<u>DESCRIPTION</u>	<u>PART NUMBER</u>	<u>PRICE</u>
7 PIN DIN CASSETTE SKT	800,003	0.60
6 PIN RGB SKT	800,002	0.64
I C SOCKET 68 WAY	800,168	8.97
VIDEO CONNECTOR	800,611	0.60
RUBBER FEET	890,001	0.20
SPEAKER	835,001	1.47
CASE LABEL	201,112	0.44
CASE ASSEMBLY SET	(201,080	7.80
	(201,081	
PUSH ROD	886,002	0.16
WIRE HOLDER	886,001	0.17
SPACE BAR WIRE	886,000	0.15
SPACE BAR	999,599	0.44
KEYBOARD SWITCH	886,003	0.45
KEYBOARD ASSEMBLY	105,002	23.80
RIBBON CABLE ASSEMBLY	201,102	2.91
L.E.D. TIL 211-2	799,001	0.76
PLASTIC BOOT (EDGE CONNECTOR)	201,248	0.20
COIL 33 uH	860,005	0.60
KEYTOPS SETS	201,079	13.20
INTRODUCTORY CASSETTES	105,006	5.00




MAINS ADAPTOR (PSU)	201,113	9.14
PSU P.C.B ASSEMBLY	105,001	13.68
PROGRAMMING BOOKLET	405,002	*. 5.95
ELECTRON USER GUIDE	405,001	*. 5.50
I.C O/S BASIC (IC2)	201,621	13.44
I.C 12C021 ULA	201,620	25.80
I.C 4164	704,864	9.37
I.C 74LS169A	743,169	1.75
TRANSISTOR BC309 .....04..	780,309	0.35
TRANSISTOR BC239 .....04..	780,239	0.35
TRANSISTOR BC213 L	780,213	0.22
TRANSISTOR BC183 L	780,183	0.42
CAPACITOR VARIABLE 5.5-40P VC1	699,004	0.35
CARDBOARD BOXES	210,134	0.44
POLYSTYRENE CASE SET	201,126 201,127	1.95
RECOMMENDED SPARES KIT	999,641	443.59

N.B. FOR PARTS COMMON TO THE BBC COMPUTER PLEASE REFER TO BBC SPARES PRICE LIST MAY 84

* ITEMS NOT SUBJECT TO VAT

Electron Service Manual Part No 405,001 £5.50



6.3 SPARES AND TEST EQUIPMENT

Acorn Computers Limited strongly recommend that all Approved Service centres and Dealers Workshops purchase our custom test equipment:-

PET (Progressive Establishment Tester) - £ 200 excl. V.A.T.

FIT (Final Inspection Tester) - £ 120 excl. V.A.T.

Technical data on this equipment is detailed in Section 2 of this manual.


PIT (Production Inspection Tester - for Electrons) price to be advised.

6502 FT (Functional Tester) - price to be advised.

We also recommend that you purchase sets of spares, at the moment we offer 2 spares kits:-

The Recommended BBC Micro Spares Kit contains the following:

- 5 x UHF TV Leads
- 5 x Welcome Cassettes
- 5 x User Guides
- 1 x Case Upper Half
- 2 x Case Upper Spire clips
- 1 x Case Lower Half
- 1 x Stick on Label Set
- 2 x Plastic Rulers
- 3 x Keyboard Assemblies
- 5 x Power Supply Modules
- 3 x Keyboard Connectors
- 5 x 5C094 ULA (Video)
- 5 x 2C199 Mark 7 (Serial)
- 5 x 82K Resistor
- 1 x Instruction sheet



5 x HM 613128 PBO5 (Basic)
5 x HM 613128 PBO4 (OS)
3 x SAA 5050 (Teletext)
3 x UPD 7002
3 x 6502A
3 X 6845
3 X 6522
3 X 6850
10 x 61 LS 95
20 x HM 4816 AP-11
3 x Cassette Relays
3 x UHF Modulators
3 x 2" Loudspeakers (inc. in Keyboard)
5 x 17.73 MHz crystals
5 x 16 MHz crystals
5 x 76489A
5 x Reset timers 555
5 x IM386
5 x IM324
2 x TTL 74 LS 00
2 x TTL 74 LS 02
2 x TTL 74 LS 04
2 x TTL 74 LS 10
2 x TTL 74 LS 20
2 x TTL 74 LS 30
2 x TTL 74 LS 32



2 x TTL 74 LS 51

2 x TTL 74 LS 74

2 x TTL 74 LS 86

2 x TTL 74 LS 138

2 x TTL 74 LS 139

2 x TTL 74 LS 163

2 x TTL 74 LS 245

2 x TTL 74 LS 259

2 x TTL 74 LS 273

2 x TTL 74 LS 283

2 x TTL 74 S 00

2 x TTL 74 S 04

2 x TTL 74 S 74

2 x TTL 7438

1 x Socket D Type 15 way (Analogue Socket)

1 x Socket DIN MAB 7 SH (Cassette Socket)

1 x Socket DIN MAB 5 WH 5 way (RS 423)

1 x Socket DIN MAB 6 H 6 way (RGB Socket)

16 x Bump on Feet

5 x Baseplates for use with Switch Mode P.S.U.

2 x Space Bar Assemblies

comprising:

2 x Space Bars

2 x Space Bar Supports (Metal)

4 x Space Bar Supports (Plastics)



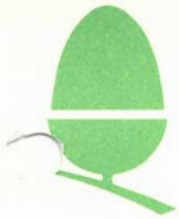
ELECTRON SPARES KIT

<u>QUANTITY PER KIT</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
1	7 PIN DIN SOCKET	800,003
1	6 PIN DIN RGB SOCKET	800,002
1	I.C. SOCKET 68 WAY	800,168
1	VIDEO CONNECTOR	800,611
8	RUBBER FEET	890,001
2	SPEAKER	835,001
1	CASE LABEL	201,112
1	CASE ASSEMBLY SET	(201,080 (201,081
4	PUSH ROD	886,002
4	WIRE HOLDER	886,001
2	SPACE BAR WIRE	886,000
2	SPACE BAR	N/A
10	KEYBOARD SWITCHES	886,003
2	RIBBON CABLE ASSEMBLY	201,102
1	L.E.D. TIL 212-2	799,001
3	KEYBOARD ASSEMBLY	105,002
3	PLASTIC BOOT	201,248
3	CONNECTOR RELAY (CASSETTE)	810,001
5	COIL 33 uH	860,005
3	CRYSTAL 17.7345 MHZ	820,177
3	CRYSTAL 16 MHZ	820,160
3	UHF MODULATOR	825,000
5	INTRODUCTORY CASSETTES	105,006
5	TV/AERIAL LEAD	201,503



3	MAINS ADAPTOR (PSU)	205,115
3	PSU PCB ASSEMBLY	105,001
5	PROGRAMMING BOOKLET	405,002
5	USER GUIDE	405,001
5	I.C. O/S BASIC (IC 2)	201,621
5	I.C. 12C021 ULA (IC I)	201,620
5	I.C. 6502 A	706,502
20	I.C. 4164	704,864
5	I.C. LM 324	770,324
2	I.C. 74LS169A	742,169
2	I.C. 74LS86	742,086
2	I.C. 74LS74	742,074
2	I.C. 74LS00	742,000
5	I.C. 74S74	741,074
2	I.C. 74S04	741,004
2	TRANSISTOR BC309	780,309
2	TRANSISTOR BC239	780,239
2	TRANSISTOR BC213 L	780,213
2	TRANSISTOR BC183 L	780,183
2	CAPACITOR VARIABLE 5-5	699,004

PLEASE CONTACT SPARES AND SERVICE DEPARTMENT FOR CURRENT PRICE OF KITS



6.4 MANUALS

The following manuals may be ordered from the Sales Department using the same procedure as is used for spares ordering.

The information contained in some of the old system manuals is not entirely accurate but we have included them in this list in the interest of providing as comprehensive a list as possible.

	<u>Price</u>
Atom Technical Manual	£ 2.50
Atomic Theory and Practice	8.00
Atom Disc Pack Manual	3.00
Atom Colour Board Manual	2.50
6502 ADE Manual	3.00
System 1 Technical Manual	3.00
System 1 User Manual	5.00
System 2 Manual	3.00
System 3 DOS Manual	3.00
System 5 Manual	10.00
6809 User Manual	5.00
Analogue Interface Manual	2.50
Atom ONLI Basic Manual	2.50
System ONLI Basic Manual	2.50
8k Static RAM Manual	2.50
Laboratory Interface Manual	2.50
Versatile Interface Board Manual	2.50
16k and 32k D'RAM Manual	2.50
40 Character VDU Card	2.50
PROM Programmer	2.50
Atom/System Econet, User Manual I	5.00
Atom/System Econet, Technical Manual I	5.00
Atom/System Econet, User Manual II	5.00
Atom/System Network Software Manual II	5.00



CUSTOMER SERVICE

6502 SECOND PROCESSOR - PRICE LIST

OCTOBER 1984

PLEASE NOTE:

The prices quoted are strictly NETT of discount regardless of volume. VAT will be added at the current rate where applicable. Please quote PART NUMBERS and DESCRIPTIONS as listed. Orders submitted MUST quote your ACCOUNT NUMBER and ORDER NUMBER.

<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>COMMON TO:</u>	<u>PRICE</u>
T.B.A.	6502 SERVICE MANUAL.....	NIL	T.B.A.
T.B.A.	6502 FUNCTIONAL TEST.....	NIL	T.B.A.
04,201103	CASE LABEL UPPER)		
	)SETS ONLY.....	NIL	1.20
04,201106	CASE LABEL REAR)		
04,201109	CASE UPPER MOULDING)		
	)SETS ONLY...Z.80 ,PRES.....		7.68
04,201110	CASE LOWER MOULDING)		
04,201146	RIBBON CABLE ASS.....	NIL	5.85
04,201605	TUBE ULA I.C.....	Z80.....	17.88
04,201606	I.C. 2732.....	NIL	5.40
04,201666	D.N.F.S. ROM I.C.....	Z80.....	13.50
04,704164	I.C. 4164.....	Z80.(REF 8264)...	8.40
04,706501	I.C. 6502C.....	NIL.....	14.25
04,738095	I.C. 81LS95.....	BBC,Z80.....	REF.BBC
04,741004	I.C. 74S04.....	BBC,E,Z80.....	REF.BBC
04,741074	I.C. 74S74.....	BBC,E,Z80.....	REF.BBC
04,742000	I.C. 74LS00.....	BBC,E,E+I,Z80...	REF.BBC
04,742002	I.C. 74LS02.....	BBC.....	REF.BBC
04,742074	I.C. 74LS74.....	BBC,E,Z80.....	REF.BBC
04,742122	I.C. 74LS122.....	NIL.....	0.81
04,742133	I.C. 74LS133.....	Z80.....	0.72
06,742161	I.C. 74LS161.....	NIL.....	0.60
04,742163	I.C. 74LS163.....	BBC.....	REF.BBC
04,742393	I.C. 74LS393.....	BBC.....	1.80
04,800037	S.H.E. CONNECTOR.....	Z80.....	3.45
04,800200	FASTON TAB.....	BBC,Z80 ,PRES.....	REF.BBC
04,805003	MAINS SWITCH.....	Z80 ,PRES.....	0.99
04,815010	FUSE 2AMP 20MM X 5MM.....	NIL.....	0.21
04,815208	FUSE 20MM X 315MM.....	NIL.....	0.30
04,820120	CRYSTAL 12 MHZ.....	Z80.....	1.29
04,831100	P.S.U.....	Z80.....	30.50
04,882946	SPIRE CLIP NO.6.....	BBC,Z80 ,PRES.....	REF.BBC
04,890000	STICK ON FEET.....	BBC,PRES,Z80.....	REF.BBC



CUSTOMER SERVICE

Z80 SECOND PROCESSOR - PRICE LIST

OCTOBER 1984

PLEASE NOTE:

The prices quoted are strictly NETT of discount regardless of volume. VAT will be added at the current rate where applicable. Please quote PART NUMBERS and DESCRIPTIONS as listed. Orders submitted MUST quote your ACCOUNT NUMBER and ORDER NUMBER.

PART NO.	DESCRIPTION	COMMON TO:	PRICE
T.B.A.	Z80 SERVICE MANUAL	NIL.....	T.B.A.
T.B.A.	Z80 FUNCTIONAL TEST.....	NIL.....	T.B.A.
04,201108	CASE LABEL UPPER))SETS ONLY.....	NIL.....	1.32
04,201742	CASE LABEL LOWER)		
04,201109	CASE UPPER MOULDING))SETS ONLY..	6502,PRES.....	REF.6502
04,201110	CASE LOWER MOULDING)		
04,201146	RIBBON CABLE ASS.....	6502.....	REF.6502
04,201605	TUBE ULA.....	6502.....	REF.6502
04,201644	Z80 BOOT ROM.....	NIL.....	9.00
04,201666	D.N.F.S. ROM.....	6502.....	REF.6502
04,700080	I.C. Z80B.....	NIL.....	7.23
04,704164	I.C. 8264 (SEE 4164).....	6502.....	REF.6502
04,738095	I.C. 81LS95.....	BBC,6502.....	REF.BBC
04,741004	I.C. 74S04.....	BBC,E,6502.....	REF.BBC
09,741074	I.C. 74S74.....	BBC,E,6502.....	REF.BBC
04,742000	I.C. 74LS00.....	BBC,E,E+1,6502...	REF.BBC
09,742011	I.C. 74LS04.....	BBC,E+1.....	REF.BBC
04,742011	I.C. 74LS11.....	NIL.....	0.54
04,742032	I.C. 74LS32.....	BBC,E+1.....	REF.BBC
04,742074	I.C. 74LS74.....	BBC,E,6502.....	REF.BBC
04,742123	I.C. 74LS123.....	BBC.....	1.12
04,742132	I.C. 74LS132.....	BBC.....	0.90
04,742133	I.C. 74LS133.....	6502.....	REF.6502
06,742260	I.C. 74LS260.....	E+1.....	1.02
04,783906	TRANSISTOR 2N3906.....	BBC.....	REF.BBC
04,800037	S.H.E. CONNECTOR.....	6502.....	REF.6502
09,815007	FASTON TAB.....	BBC,6502,PRES....	REF.BBC
09,815007	MAINS SWITCH.....	6502,PRES.....	REF.6502
04,815007	FUSE 20MM X 5MM LAMP RATING....	NIL.....	0.30
04,815207	FUSE 20MM X 5MM 250NA.....	NIL.....	0.45
04,820120	CRYSTAL 12 MHZ.....	6502.....	REF.6502
04,831100	P.S.U.....	6502.....	REF.6502
04,860002	INDUCTOR 2uH.....	NIL.....	0.39
04,882946	SPIRE NUT NO.6.....	BBC,6502,PRES....	REF.BBC
04,890000	STICK ON FEET.....	BBC,6502,PRES....	REF.BBC



CUSTOMER SERVICE

PRESTEL RECEIVER - PRICE LIST

OCTOBER 1984

PLEASE NOTE:

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<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>COMMON TO:</u>	<u>PRICE</u>
T.B.A.	PRESTEL SERVICE MANUAL.....	NIL	T.B.A.
T.B.A.	PRESTEL TEST EQUIPMENT.....	NIL	T.B.A.
04,201109	ADAPTOR CASE LOWER))SETS ONLY..6502,Z80.....		REF.6502
04,201110	ADAPTOR CASE UPPER)		
04,201182	LABEL UPPER))SETS ONLY.....	NIL	1.14
04,201184	LABEL REAR)		
04,201186	ADAPTOR PHONE ASS.....	NIL	4.35
04,201187	ADAPTOR CABLE ASS.....	NIL	1.35
04,201643	8K X 8 25ONS (PRESTEL ROM)....	NIL	10.60
04,733691	DS.3691	BBC	REF.BBC
04,754020	I.C. 4020.....	BBC	0.82
04,754049	I.C. 4049B.....	NIL	0.72
06,754071	I.C. 4017B.....	NIL	0.60
04,754081	I.C. 4081B.....	NIL	0.45
04,754520	I.C. 4520B.....	NIL	0.96
04,754556	I.C. 4556B.....	NIL	0.90
04,763101	TCM 3201.....	NIL	18.00
06,770062	TL.062.....	NIL	0.86
04,770386	IM.386.....	BBC	REF.BBC
06,772003	ULN 2003A.....	NIL	0.99
04,778006	IM.341 P5.....	NIL	0.96
04,779001	IM.320 LZ-5.....	NIL	0.72
06,795003	DIODE BZX79C3V3.....	NIL	0.15
04,795005	DIODE BZY 96C5V1.....	NIL	2.31
04,795012	DIODE BZX70C12.....	NIL	0.90
04,798101	1 KABIO BRIDGE RECTIFIER.....	NIL	0.72
04,800050	PIN 2 WAY.....	BBC	0.16
04,800051	PIN 3 WAY.....	BBC	0.18
04,800070	MINI SHUNT.....	BBC	REF.BBC
06,800080	CRIMP TERMINAL.....	NIL	0.10
04,800082	SHELL 2 WAY.....	NIL	0.22
04,800200	FASTON TAB.....	BBC,6502,Z80...	REF.BBC
04,805003	MAINS SWITCH.....	6502	REF.6502



PRESTEL RECORDER SPARES - PRICES LIST (CONT...)

06,810003	RELAY (2-POLE N/O).....NIL	.....3.09
06,810004	RELAY (2-POLE N/O).....NIL	.....2.82
06,810005	RELAY (1-POLE N/O).....NIL	.....2.16
04,815003	FUSE QUICK BLOWN 250 MA.....NIL	.....0.21
04,815016	FUSE QUICK BLOWN 63 MA.....NIL	.....0.45
04,815209	FUSE SLOW BLOW 400MA.....NIL	.....0.30
04,820043	CRYSTAL 4.4361 19 MHZ.....NIL	.....1.44
06,835001	LOUDSPEAKER.....E.	.....REF.ELEC.
04,865001	TRANSFORMER.....NIL	.....4.88
06,865002	ISOLATION TRANSFORMER.....NIL	.....4.60
04,882946	SPIRE CLIP NO.6.....BBC,6502,Z80	...REF.BBC
04,890000	RUBBER FEET.....BBC,6502,Z80	...REF.BBC

CUSTOMER SERVICEELECTRON PLUS 1 SPARES - PRICE LISTOCTOBER 1984PLEASE NOTE:

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<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>COMMON TO:</u>	<u>PRICE</u>
T.B.A.	PLUS 1 SERVICE MANUAL.....	NIL	T.B.A.
T.B.A.	PLUS 1 TEST EQUIPMENT.....	NIL	T.B.A.
06,999608	CASE ASSEMBLY SET.....	NIL	4.90
06,201752	I.C. 32K ROM.....	NIL	5.52
06,700844	I.C. ADC 0844.....	NIL	7.02
04,742000	I.C. 74LS00.....	BBC,E,6502,Z80....	REF.BBC
04,742004	I.C. 74LS04.....	BBC,Z80.....	REF.BBC
04,742010	I.C. 74LS10.....	BBC.....	REF.BBC
04,742020	I.C. 74LS20.....	BBC.....	REF.BBC
06,742027	I.C. 74LS27.....	NIL.....	0.56
04,742030	I.C. 74LS30.....	BBC.....	REF.BBC
04,742032	I.C. 74LS32.....	BBC.....	REF.BBC
06,742125	I.C. 74LS125.....	NIL.....	0.66
04,742139	I.C. 74LS139.....	BBC.....	REF.BBC
06,742175	I.C. 74LS175.....	NIL.....	0.87
06,742195	I.C. 74LS195.....	NIL.....	0.87
06,742260	I.C. 74LS260.....	Z80.....	1.02
04,742273	I.C. 74LS273.....	BBC.....	REF.BBC
04,780239	TRANSISTOR BC.239.....	BBC,E.....	REF.ELEC
06,800038	CONNECTOR 26 WAY HEADER.....	NIL.....	1.20
06,800043	CONNECTOR 22 WAY 1".....	NIL.....	2.31
06,800044	CONNECTOR 25 WAY 1".....	NIL.....	2.67
06,800305	CONNECTOR 15 WAY D-TYPE.....	NIL.....	1.50
06,890001	RUBBER FEET.....	E.....	REF.ELEC



CUSTOMER SERVICE

DATA CASSETTE SPARES - PRICE LIST

OCTOBER 1984

PLEASE NOTE:

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<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>PRICE</u>
05 999500 EAR JACK 3.5mm PCB TYPE	0.20
05 999501 7 PIN DIN SOCKET	0.72
05 999502	..... LEVEL METER	2.79
05 999503	..... LOUD SPEAKER 3.5"	1.14
05 999504	..... SLIDE VOLUME CONTROL	0.44
05 999505	..... A.C. SKT. V.D.E. TYPE	0.45
05 999506	..... POWER TRANSFORMER	1.65
05 999507	..... RECORDING SWITCH	0.52
05 999508	..... BIASING COIL	0.35
05 999509	..... MOTOR CHOKE COIL	0.15
05 999510	..... I.C. TA-7628P	1.26
05 999511	..... TRANSISTOR 2SC536F	0.52
05 999512	..... SILICON DIODE CDG-22	0.10
05 999513	..... GERM. DIODE IN60-5	0.10
05 999514	..... RECTIFIER IN 4001	0.10
05 999515	..... TOP CABINET	1.46
05 999516	..... BOTTOM CABINET	1.46
05 999517	..... CASSETTE KNOB	0.10
05 999518	..... RECORD KNOB	0.10
05 999519	..... CASSETTE DOOR	0.72
05 999520	..... BATTERY DOOR	0.25
05 999521	..... JACK MOUNTING PLATE	0.15
05 999522	..... VOLUME & TONE KNOB	0.10
05 999523	..... CASSETTE DOOR LENS	0.30
05 999524	..... ALUMINIUM HANDLE	0.81
05 999525	..... BATTERY CONTACT (+VE)	0.10
05 999526	..... BATTERY CONTACT (-VE)	0.15
05 999527	..... BATTERY CONTACT (+VE & -VE)	0.15
05 999528	..... VOLUME & TONE BRACKET	0.25
05 999529	..... CASSETTE DOOR SPRING	0.10
05 999530	..... COUNTER BRACKET	0.15
05 999531	..... SPEAKER KTG. CLIP	0.10



DATA CASSETTE SPARES - PRICE LIST (CONT...)

05	999532	.....	VOLUME TONE FELT	0.10
05	999533	.....	RUBBER RING	0.10
05	999534	.....	CASSETTE MIRROR	0.10
05	999535	.....	COUNTER PLATE	0.10
05	999536	.....	JACK PLATE	0.10
05	999537	.....	COUNTER BELT	0.25
05	999538	.....	COUNTER	1.02
05	999539	.....	BATTERY SPONGE	0.10
05	999540	.....	SCREW M.2 6X4 P/H	0.10
05	999541	.....	SCREW M.3 X5 B/H	0.10
05	999542	.....	SCREW M.3 X 6 P/H	0.10
05	999543	.....	SCREW M.2 6X6 K/H	0.10
05	999544	.....	SCREW M.2 X 4 P/H	0.10
05	999484	.....	SCREW S.T 3X6 P/H	0.10
05	999485	.....	SCREW S.T. 3X8 B/H	0.10
05	999486	.....	SCREW S.T. 3X10 B/H	0.10
05	999487	.....	SCREW S.T. 3X20 B/H	0.10
05	999488	.....	SCREW S.T. 3X15 B/H	0.10
05	999489	.....	SCREW TAPE TITE M.2 6X6	0.10
05	999490	.....	POLY BAG 2" X 3"	0.10
05	999491	.....	POLY BAG 10" X 15"	0.10
05	999492	.....	POLY BAG 4" X 15"	0.10
05	999493	.....	POLY FOAM	0.44
05	999494	.....	GIFT BOX	0.52
05	999495	.....	INSTRUCTION BOOKLET	0.25*
05	999496	.....	EARPHONE o 3.5mm	0.15
05	999497	.....	GIFT BOX LABEL	0.15
05	999498	.....	U-SHAPED CARDBOARD	0.45
05	999499	.....	FLAT POLYFOAM 230 x 200 x 13	0.25
04	201521	.....	CASSETTE CABLE 7-7 DIN	1.53

* ITEMS NOT SUBJECT TO V.A.T.



PERIPHERAL MANUALS

Below is a list of Manuals available on request for replacement purposes, to obtain replacements please contact Acorn Customer Services and quote the Serial No. and date of purchase of the equipment supplied with missing or incomplete Manuals.

These Manuals can also be purchased through the Acorn Sales Office.

- 06,419000 PLUS 1 USER GUIDE
- 04,408000 6502 MANUAL
- 04,415000 PRESTEL USER GUIDE

Z80 SECOND PROCESSOR MANUALS

- 04,409002 Z80 BASIC USER GUIDE
- 04,409010 Z80 USER GUIDE
- 04,409004 CIS COBOL LANGUAGE MANUAL
- 04,409000 CIS COBOL WITH ANIMATOR
- 04,409001 CP/M2 WITH CSX GRAPHICS
- 04,409003 BBC BASIC RUNNING CP/N
- 04,409005 MEMO PLAN
- 04,409006 FILE PLAN
- 04,409007 GRAPH PLAN
- 04,409008 ACCOUNTANT
- 04,409009 NUCLEUS SYSTEM GENERATOR
- 04,409011 PREPARING THE BBC FOR Z80
- 04,409012 FUNCTION KEY MANUAL

ECONET MANUALS

- 04,412014 ECONET PRINTER SERVER MANAGERS GUIDE
- 04,412011 ECONET LEVEL 1 FILE SERVICE MANAGERS GUIDE
- 04,412111 ECONET LEVEL 1 FILE SERVER USER GUIDE
- 04,412017 ECONET LEVEL 2 FILE SERVER MANAGERS GUIDE
- 04,412018 ECONET LEVEL 2 FILE SERVER USER GUIDE
- 04,412019 ECONET ADVANCED USER GUIDE

1.1 TEST EQUIPMENT FOR THE BBC AND ELECTRON MICROCOMPUTERS: Introduction

The following hardware/software packages are available to Service Centres for use before, during, and after repairs to the Electron and various models of the BBC microcomputer:-

BBC MICROCOMPUTER

1) Progressive Establishment Tester (P.E.T.)

The Progressive Establishment Tester is a device which is attached to a partly functioning BBC Microcomputer and which performs a series of comprehensive tests on all aspects of the hardware, as well as ensuring that correct copies of firmware are all in place.

Further information on the P.E.T. can be found on the appropriate Engineering Information Sheet in the following pages.

2) Final Inspection Tester (F.I.T.)

The Final Inspection Tester is used in conjunction with a cassette of test programs to complete the soak testing of a repaired or upgraded machine.

3) BBC FIT Test Station

The Test Station is a dedicated computer used to semi automatically test machines of all types, and it includes software and hardware for testing ECONET and Disc interfaces.

4) 6502 FT (Functional Test)

This test equipment will be released in the near future and will be used to prove the functions of the 6502 second processor.

ELECTRON

1) Production Inspection Tester (P.I.T.)

The Production Inspection Tester is a device which is used in conjunction with a BBC micro when attached to a partly functioning Electron, to produce diagnostic information by means of a series of comprehensive tests.

2) Watchdog

The Watchdog is used to carry out soak testing of a repaired Electron. It provides information to indicate that the Electron has continued to operate for the period of the soak test.

1.2 BBC MICROCOMPUTER TEST EQUIPMENT: General Description

Progressive Establishment Tester (P.E.T.)

The requirement that all repaired or upgraded machines must be PET tested is now a recommendation only. It is still very strongly suggested that every dealer should have a PET, as they are also very useful as fault-finding equipment.

The main PCB is at Issue 1 and no changes are outstanding. The buffer PCB is at Issue 2, but all Issue 1 buffers were modified to Issue 2 standard when manufactured.

The PET EPROM code is at Issue 4.0. The only previous Issue was 3.0. The only difference between the two Issues is that 4.0 includes the CRC values for OS 1.2 (as well as 0.1 and 1.0, which were in Issue 3.0) and BASIC II (as well as BASIC I, which was in Issue 3.0). It was originally intended to add tests for the Disc and Econet areas, but as these are fully covered by the FIT tests this is not planned for the near future.

The PET manual is currently at Issue 1. It is not recommended that the instructions within the service manual are used as they are not complete.

All the above is sold under product code ABX03.

N.B. The PET is not fully compatible with the speech option on BBC machines. Unless the TMS5220 is removed (IC99) the PET will fail tests 1.4 to 1.7 and the "silence" and "sound" tests will be corrupted.

Final Inspection Tester (F.I.T.)

This now consists of the following equipment:

i) FIT PCB

The standard PCB as supplied for the last year. It is currently at Issue 1, but will soon be going to Issue 2 to correct a missing track which has been fitted as a link on all previous production units.

ii) FIT Cassette

Currently at Issue 3 (CTESTA3 and CTESTB3). Previous issues are 1 and 2. The changes are only minor and, although it is preferred that the latest version is used, the earlier issues are acceptable.



iii) FIT with Cassette Manual

Currently at Issue 2. Changes from Issue 1 are minor (mainly spelling mistakes!) plus details of the Issue 3 software. The Issue 1 manual covers Issue 2 software and the description in the BBC service manual is for Issue 1 software.

Items (i) to (iii) are currently sold as ABX02.

iv) BBC FIT Test Station

The idea of the test station is to enable full testing of the Econet Interface. It has, however, been extended to cover all Models as it includes the additional advantage of not needing a cassette, eliminating the necessity for re-winding tapes. It also provides extra testing of the cassette interface as both "Load" and "Save" operations are carried out (the FIT cassette only tests "Load"). For Models A and B it is an alternative to the FIT cassette, but is compulsory for Econet models (A+E, B+E, B+D+E).

The test station upgrade comes in three parts:

a) Model A+B Test Station Kit

This contains a slightly modified operating system EPROM (TOS1.2), two further EPROMS containing the test software, two cassette leads and Upgrade and Operating Instructions. It requires a Model B computer (for modification to a test station) plus necessary monitors and TVs. The FIT PCB requires two resistors (also supplied) to be added for the cassette-to-cassette link to operate fully at 1200 baud.

Using the test station the standard Model A and B FIT tests can be transferred to the unit under test via the cassette sockets on the FIT PCB. The test procedure is then identical to the standard FIT cassette tests except for the transmission of the Pass/Fail messages from the unit under test to the test station prior to the sound test.

The software supplied includes tests for Econet and Disc models, but these are not usable without items (b) and (c).

b) FIT Econet Test Kit

This includes the "Econet Test Box" with all leads, plus an Instruction Manual and full details of how to upgrade all Issue PCBs to include Econet (not supplied in the Econet Upgrade Kit).

The test box provides the clock and terminators for a short Econet network (two computers), so that the Test Station and Unit under test can communicate via Econet. It also incorporates a "worst case" network simulator (switched in and out of the line by the Test Station) so that tests can be carried out on "Good" and "Bad" lines.

All the test software is supplied with the Model A+B test kit.

The test station must, of course, have an Econet Interface fitted.



c) FIT Disc Test Kit

A set of 3 discettes (80 track, double sided). Discettes "SCRATCH 0" and "SCRATCH 1" are simply formatted discs with specific titles. Discette "TEST 0" contains 3 programs.

Two of the programs are used within the Test Station routine. The third is an extract of one of the first two which enables the Disc Interface to be tested in isolation from the Test Station.

Full operating instructions are supplied, and a pair of 80 Track BBC drives will be required.

In summary, the following FIT equipment is required for various Models of BBC computer as listed:

Model A

Either FIT Cassette
or Model B + "A+B" test station kit + monitor +
FIT PCB
plus B&W monitor) for unit under test
Colour TV)

Model B

Either FIT Cassette
or Model B + "A+B" test station kit + monitor
plus FIT PCB
B&W monitor)
RGB monitor) for unit under test
Colour TV)

Model A + Econet

Model B + Econet)
"A+B" Test Station Kit)
Econet Test Kit) for test station
FIT PCB)
Monitor)
B&W Monitor) for unit under test
Colour TV)

Model B + Econet

Model B + Econet)
"A+B" Test Station Kit)
Econet Test Kit) for test station
FIT PCB)
Monitor)
B&W Monitor)
RGB Monitor) for unit under test
Colour TV)



Model B + Disc

Either: FIT Cassette + Disc Test Kit
or: Model B + "A+B" Test Station Kit + Disc Test Kit + Monitor

Plus: FIT PCB)
B&W Monitor)
RGB Monitor) for unit under
Colour TV) test
Dual 80 track Disc Drives)

Model B + Disc + Econet

Model B + Econet)
"A+B" Test Station Kit)
Econet Test Kit) for test station
Disc Test Kit)
FIT PCB)
Monitor)
B&W Monitor)
RGB Monitor) for unit under test
Colour TV)
Dual 80 track Disc Drives)

N.B. Speech is now tested in Issue 3 FIT cassettes and all test stations.



1.3 PET MANUAL

THE MANUAL LISTED IN THE CONTENTS SECTION IS NOW SUPPLIED WITH THE TEST EQUIPMENT ITSELF.

IF YOU REQUIRE A COPY FOR HISTORICAL PURPOSES, PLEASE REMOVE THIS PAGE, COMPLETE THE ADDRESS SECTION BELOW, AND FORWARD TO:

Engineering Support Section
Customer Service Department
Acorn Computers Ltd.
Cambridge Technopark
645, Newmarket Rd.
Cambridge.
CB5 8PD

We apologise for any inconvenience this may have caused.

NAME.....

COMPANY.....

ADDRESS.....

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<u>EQUIPMENT</u> BBC MICROCOMPUTER FIT TEST STATION KIT (Models A + B)		<u>HEIGHT</u> (mm) N/A	<u>WIDTH</u> (mm) N/A	<u>FIRM</u> <i>Alan Foster</i> PROJECT LEADER	
<u>ORDER CODE</u> ABX 11	<u>PART NUMBER</u> 003,015	<u>DEPTH</u> (mm) N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> To provide necessary hardware and software and operating instructions to convert a Model B computer to be a FIT test Station for Models A + B. N.B. Also includes software (only) for Econet Tests.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A		
<u>OPERATES WITH</u> (Peripherals) FIT Test PCB (ABX 02) Model B computer (ANB 01) Monitor		<u>CONTROLS</u> (Switches, pots., keyboards) None			
<u>SIMILAR EQUIPMENT</u> FIT Test PCB (ABX 02) FIT Econet Test Kit (ABX 12) Disc Test Kit (ABX 13)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None			
<u>MAJOR COMPONENTS</u> Test Operating System EPROM (105) Test Software EPROMs (FITR1 + FITR2) Upgrade Instructions Operating Instructions Components for modifying FIT PCB		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) Cassette Leads: 7 pin DIN "Free" plugs both ends: wired 1:1 (standard cassette specs.)			
<u>DESCRIPTION OF OPERATION</u> The FIT PCB modifications allow the test station to transmit the programs (from EPROMs FITR1 + FITR2), via the cassette socket and the FIT PCB, to the unit under test. These test programs are the normal FIESTA and FIESTB, as supplied on cassette. The unit under test transmits the Pass/Fail messages back to the test station. The test operating system is a slightly modified version of the normal operating system to improve the efficiency of the tests. FITR1 and FITR2 also include the software for testing disc and Econet interfaces (see 003,016/E and 003,017/E)		<u>POWER IN</u> (V,A,W,HZ,Connector type) None		<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 0-35°C		<u>WEIGHT (KG) UNIT ONLY</u> 0.2	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.25	
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Foam pad Plastic bag Cardboard stiffener Jiffy bag		<u>ACCESSORIES INCLUDED</u> 2 x 7 pin cassette leads	
<u>SPEED</u> (operating frequency) 1200 Baud	<u>INSTALLATION</u> Dealer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 003,015/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>Alan Foster</i> CH. ENG.	
		<u>ISSUE</u>	1 2	© COPYRIGHT 1983 ACORN COMPUTERS LTD.	
		<u>DATE</u>	4.83 6.83		

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1.5 FIT MANUAL

THE MANUAL LISTED IN THE CONTENTS SECTION IS NOW SUPPLIED WITH THE TEST EQUIPMENT ITSELF.

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Customer Service Department
Acorn Computers Ltd.
Cambridge Technopark
645, Newmarket Rd.
Cambridge.
CB5 8PD

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<u>EQUIPMENT</u> FIT ECONET TEST KIT		<u>HEIGHT</u> (mm) Test Box 65	<u>WIDTH</u> (mm) Test Box 180	<u>FROM</u> <i>Alan Fox</i> PROJECT LEADER
<u>ORDER CODE</u> ABX 12	<u>PART NUMBER</u> 003,016	<u>DEPTH</u> (mm) Test Box 120	<u>MATERIAL</u> Plastic/metal panels	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> To provide the necessary hardware (except for the Econet Interface) to expand a Model A + B Test station to also test Models A + E and B + E. For model B + D + E the Disc Test Kit (ABX 13) is also required. Econet upgrade instructions also supplied.		<u>COLOUR</u> Two-tone grey with brushed aluminium front and back panels	<u>CONSTRUCTION</u> Moulded	
<u>OPERATES WITH</u> (Peripherals) Fit Test PCB (ABX 02) Monitor (colour or B/W) or TV Model B + Econet Computer (ANB 02) Fit Test Station Kit (ABX 11)		<u>CONTROLS</u> (Switches, pots., keyboards) None		
<u>SIMILAR EQUIPMENT</u> Fit Test PCB (ABX 02) Fit Test Station Kit (Models A + B) (ABX 11) Disc Test Kit (ABX 13)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None		
<u>MAJOR COMPONENTS</u> Box containing PCB with Econet Clock, two terminators, "Bad Line" network and switching relay.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) 2 off Econet (5 pin 180° DIN) connectors (Standard Econet Interface) on box. 2 off Econet (5 pin 180° DIN "Free") connectors per cable (Standard Econet Interface) 20-way ribbon cable wired 1:1 with IDC connectors with strain relief. TTL Levels. 20-way L/E header for ribbon cable IDC on box (TTL Levels)		
<u>DESCRIPTION OF OPERATION</u> The Econet test box allows interconnection of the test station to the computer under test. Once an initial cassette interface test is completed, all transfer of programs and data between the two machines is via the Econet link. The test routine is the standard Model A or B FIT test preceded by a sequence of Econet tests on both "good" and "bad" lines.		<u>POWER IN</u> (V,A,W,HZ, Connector type) 5 volts DC via connector on front of BBC PSU to test box	<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 0-35°C	<u>WEIGHT (KG) UNIT ONLY</u> 0.5	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.55	
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Two-part polystyrene Cardboard box	<u>ACCESSORIES INCLUDED</u> 2 x Econet Cables 1 x 20-way Ribbon Cable 1 set ECONET upgrade instructions	
<u>SPEED</u> (operating frequency) Econet clock @ 370k	<u>INSTALLATION</u> User	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 003,016/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>Alan Fox</i> CH. ENG.
		<u>ISSUE</u>	1	2
		<u>DATE</u>	4.83	6.83
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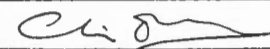
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<u>EQUIPMENT</u> BBC MICROCOMPUTER ECONET UPGRADE KIT		<u>HEIGHT (mm)</u> N/A	<u>WIDTH (mm)</u> N/A	<u>FROM:</u> <i>Geoffrey Vincent</i> PROJECT LEADER
<u>ORDER CODE</u> ANB 12	<u>PART NUMBER</u> 003,960	<u>DEPTH (mm)</u> N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> Allows any BBC Microcomputer to be upgraded to include an Econet Interface.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A	
<u>OPERATES WITH (Peripherals)</u> Econet Network (cabling, clock box and two terminator boxes)		<u>CONTROLS (Switches, pots., keyboards)</u> None		
<u>SIMILAR EQUIPMENT</u> Models: A + E (ANA 02) B + E (ANB 02) B + D + E (ANB 04)		<u>INDICATORS (Meters, lamps, readouts, audible)</u> None		
<u>MAJOR COMPONENTS</u> NFS EPROH (2764) 68B54 ADLC All Other Necessary ICs and Discrete Components 5 pin 180° DIN Socket (PCB Mount)		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 5 pin 180° DIN Socket (PCB Mounting). Standard Econet Specifications.		
<u>DESCRIPTION OF OPERATION</u> Data can be transmitted along the network between machines, which also allows sharing of resources such as disc drives and printers.		<u>POWER IN (V,A,W,Hz,Connector type)</u> None	<u>POWER OUT (V,A,W,Hz, Connector Type)</u> None	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> None	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> 0-35°C	<u>WEIGHT (KG) UNIT ONLY</u> 0.2	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.25	
<u>CAPACITY</u> Dependent on model of computer and other facilities on the Econet	<u>FORMAT</u> N/A	<u>PACKAGING</u> Polystyrene and clingfilm Jiffy Bag	<u>ACCESSORIES INCLUDED</u> Econet User Guide 1m Econet Lead	
<u>SPEED (operating frequency)</u> Network clock rate 76 to 370k	<u>INSTALLATION</u> Dealer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 003,960/E	
			<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>Ch. Eng.</i> CH. ENG.	
		<u>ISSUE</u>	1	2
		<u>DATE</u>	4.83	6.83
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ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> DISC TEST KIT		<u>HEIGHT</u> (mm) N/A	<u>WIDTH</u> (mm) N/A	<u>FROM:</u>  PROJECT LEADER	
<u>ORDER CODE</u> ABX 13	<u>PART NUMBER</u> 003,017	<u>DEPTH</u> (mm) N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> To provide the ability to test the BBC Microcomputer disc interface with or without a FIT test station.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A		
<u>OPERATES WITH</u> (Peripherals) BBC 80 track disc drives (AND 02) Monitor		<u>CONTROLS</u> (Switches, pots., keyboards) None			
<u>SIMILAR EQUIPMENT</u> FIT Test Station Kit (ABX 11) FIT Econet Test Kit (ABX 12) FIT Test PCB (ABX 02)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None			
<u>MAJOR COMPONENTS</u> 3 Discs: Test Ø) Scratch Ø) All 80 track Scratch 1) Instruction Manual		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) None			
<u>DESCRIPTION OF OPERATION</u> The "Test Ø" disc contains 3 programs: 1) DITEST: For use without test stations. This tests drive select, write protect, sector save/read and a comparison of the save/read data. 2&3) FTSTID2&3: The model B FIT Test station program incorporating DITEST. The "Scratch Ø" and "Scratch 1" discs are formatted and specially titled discs containing no programs.		<u>POWER IN</u> (V,A,W,HZ,Connector type) None		<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 0-35°C		<u>WEIGHT (KG) UNIT ONLY</u> 0.25	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.30	
<u>CAPACITY</u> N/A	<u>FORMAT</u> BBC 80 Track	<u>PACKAGING</u> Cardboard Stiffener Jiffy Bag		<u>ACCESSORIES INCLUDED</u> None	
<u>SPEED</u> (operating frequency) N/A	<u>INSTALLATION</u> User	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 003,017/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  ENG.	
			<u>ISSUE</u> 1	© COPYRIGHT 1983 ACORN COMPUTERS LTD.	
			<u>DATE</u> 4.83		

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1.9 ELECTRON PRODUCTION INSPECTION TESTER (P.I.T.)

The Electron PIT is intended for use both as part of the production test procedure and also as a diagnostic for after sale maintenance and servicing.

To carry out the PIT test procedures the following equipment is required:

- 1 One Electron computer to be the Unit Under Test (UUT).
- 2 One Electron P.I.T., complete with 50 way ribbon cable assembly, two 7 pin cassette leads and the latest P.I.T. test software.
- 3 One BBC Microcomputer Model B (ANB01) with the latest issue BBC Electron Test ROM (B.E.R.T.) fitted in position I.C.88.
- 4 One colour TV, one RGB monitor and one monochrome video monitor, each with connecting leads to the Electron.
- 5 One Electron mains adaptor.

The tests consist of a selection of visual, audible and internal checks. The internal checks will only provide FAIL messages, if they are OK then the operator will not be aware of their having happened, as they occur whilst the audio/visual tests are running. If any FAIL messages appear on the screen the operator must note the message and then press the space bar to continue. Unless the failure is of a catastrophic nature, the test must be run to its conclusion in order to provide all the diagnostic information possible.

The tests that are carried out are as follows:

- 1 The tests begin with Mode 6 which consists of a visual test and also a sound test of 5 consecutive notes. After the sequence of notes and graphics has been completed the test move automatically onto the next stage.
- 2 The second stage is a Mode 5 test which follows the same principles as the previous stage. Since this is a graphics mode the range of colours and symbols is more varied but the sound test remains the same.
- 3 The third stage of the test sequence is a RAM test. The only indication of this is that the screens will go black for about four seconds. This test will only give a message if it FAILS.
- 4 The next test is for Mode 4 and the test is exactly the same as the Mode 6 test.
- 5 After the Mode 4 test the cassette motor relay is checked.
- 6 At this stage the remaining Modes are tested:
 - The Mode 3 test : as the Mode 6 test
 - The Mode 2 test : as the Mode 5 test
 - The Mode 1 test : as the Mode 5 test
 - The Mode 0 test : as the Mode 4 test
- 7 Stage 6 completes the Graphics and sound tests and stage 7 moves on to test the keyboard.



8 After the keyboard test is complete the P.I.T. tests the reset function followed by the NMI's.

This completes the tests carried out by the P.I.T., complete instructions for configuring and running the P.I.T. test are found in the manual accompanying the package.



ELECTRON WATCHDOG

The Electron Watchdog is designed as a first line functional test which enables an Electron to be soak tested without constant supervision. The computer to be tested is plugged into the Watchdog by means of a 50-way edge card connector with the power OFF. The unit is then switched on and left for the specified soak test time.

The Watchdog will indicate by means of red or green LEDs whether the machine has passed or failed the soak test. Limited diagnostic information is given in the event of a failure. A typical example would be if the green LED failed to light at the beginning of the test. This would be an indication that the machine must be returned for repair. Various combinations of red LEDs being lit during, or at the end of the test, may indicate probable sources of failures such as the ULA, the 6502, or an intermittent fault.

If the Electron fails the Watchdog soak test, and the cause of the failure is not immediately obvious, the unit under test should be subjected to the P.I.T. for a more complete diagnosis of the failure.

The ATOM manual our introduction to computing

A comprehensive manual is free with every ATOM. It's written in two sections. The first is the beginners section simply describing the operation of keyboard and keyboard functions and taking you step by step through the fundamentals of BASIC so that in minimum time, with no previous experience of computers, you can be writing your own programs. This section also deals with machine code programming at the same level.

The second section describes the same subjects in much greater depth allowing the more experienced programmer to take advantage of the Atom's more advanced features and extended BASIC commands. Both sections are fully illustrated with example programs.

How your ACORN ATOM grows

Internally.

Both screen and program memory can be expanded in 1K blocks up to 12K total, and the fixed memory can be added to in two blocks of 4K. One is the 4K floating point arithmetic package. The printer interface output requires the addition on board of a 6522 and buffers.

The PAL encoder module when fitted allows full colour output to a domestic colour TV although a simple modification allows direct connection to a colour monitor without a PAL encoder.

Externally.

The most exciting addition however is the communication module which fits inside the case and allows high speed communication to other systems which can be anything from an Acorn System One to an IBM 370 and what's more any number of other Atoms. Designed for classroom use where, for example, twenty Atoms may be linked both to each other and to the teacher's system. The teacher can take control of any keyboard and display for instruction purposes, and can link any pupil to a printer or disc storage facility. In the home or laboratory however, this module may be used to control substations such as System I with any of the Acorn interface modules. Existing owners of Acorn systems may use the tape interface as a simple communication line to and from the Atom.

Kit or Built

The cheapest way of buying an Atom is in minimum configuration in kit form, when supplied in this form a construction manual is included which gives a checklist of components, preliminary advice on soldering, a suggested assembly schedule, Pre switch-on tests, operational testing and fault finding hints.

All components are guaranteed and faulty components will be replaced free of charge. Our service department will handle enquiries and repairs, if necessary, will be charged for at minimum cost. Reasonable skill with a soldering iron is required.

The assembled version is priced as shown and is fully tested and guaranteed for six months provided serious misuse has not occurred.

Technical Description

HARDWARE

Memory: From 2K to 12K RAM on board (in steps of 1K) up to 40K including external memory. From 8K to 16K ROM (two 4K additions).

Processor: 6502 with 1 Mc/s clock.

Video Display Generator: 6847 generates video signals for 8 different modes including: high resolution graphics (256 x 192), Red, green, and blue graphics up to resolution of 128 x 192, and mixed ASCII characters and semi-graphics.

PIA: 8255 provides keyboard scan, cassette I/O, audio output, graphics control and user I/O.

VIA: 6522 provide two 8 bit + control I/O ports (one used for printer output) plus a wide range of serial I/O functions and dual timers.

Cassette Interface: CUTS 300 baud, involves minimum hardware (zero crossing detector input and output from timer) to allow user to redefine tape routine to virtually any speed or standard.

Loudspeaker: Driven from 8255 via buffer allowing software tone generation of any frequency.

B/W Video Output: To monitor.

UHF Modulator Output: Channel 36 domestic TV.

Bus Output: Fully buffered address and data bus plus internal connections for one Acorn Eurocard.

Power Requirement: Minimum system: 8 volts @ 800 mA (from ATOM power unit feeding internal regulator). Maximum system: 5V @ 1.8A from external regulator supply.

SOFTWARE

ATOM BASIC: • 32-bit arithmetic ($\pm 2,000,000,000$) • High speed execution • 43 standard and extended BASIC commands • Variable length strings (up to 256 characters) • String manipulation functions • 27 32-bit integer variables • 27 additional arrays • Random number function • PUT and GET bytes, words and strings to and from files • WAIT command for timing • DO-UNTIL construction • Commands may be abbreviated for economy • Multiple statements per line • Logical operators (AND, OR, EX-OR) • LINK to machine code routines • Numbers can be input and printed in hexadecimal • Symbolic labels for fast branches and subroutine calls • Powerful indirection operators (?.!) • Graphics facilities to draw points and lines • 16 PLOT commands, MOVE and DRAW.

ASSEMBLER: • Mnemonic Assembler for machine code programming • Formatted listing • Assembler and BASIC may be combined • Standard 6502 mnemonics • Provides symbols, automatic resolution of forward references • Macro-facilities • Breakpoints may be inserted for debugging.

VDU: • 32 characters x 16 lines • Inverted characters • Automatic scrolling • Paged/Non paged modes • All control codes can be generated • Screen editing.

Operating System: • CUTS cassette routines with checksum • Filenames up to 12 character • LOAD and SAVE BASIC and assembler programs or text files • Search (catalogue) routine • Software hook to optional disc drive and communication loop modules • Printer drive routines.

Optional Maths Software: • Floating point maths functions to 9 digit accuracy including arithmetic, trigonometric and hyperbolic functions.

Optional Communication Software: • Allows high speed bi-directional interface to other ATOMs peripherals • Allows transfer of control or data to other modules in loop.

Optional Utility ROM: • Such as the ONLIBASIC extension for real time control of laboratory experiments.

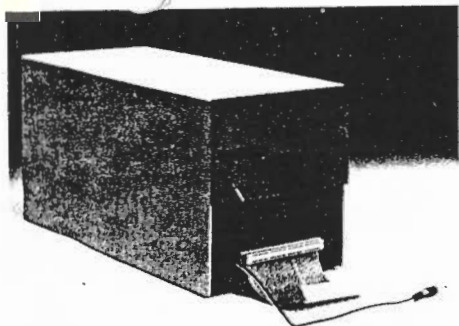
Service/Guarantee Each kit is provided with assembly instructions and all components are guaranteed. Service facilities exist at our Cambridge premises if required.



Acorn Computers Limited, Fulbourn Road,
Cherry Hinton, Cambridge CB1 4JN Tel: (0223) 24

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Optional Accessories



COLOUR BOARD

The board fits inside the Atom and generates colour output suitable for all makes of monitors and domestic receivers.

Two colour palettes can be achieved Red, Yellow, Green, Blue and White, Cyan, Magenta, Orange. In text modes this provides green on blue or orange on black displays. **£45.24** inc VAT and post, packing and insurance.

WORD PROCESSING

Acorn have combined their Atom word pack and their GP-80 printer for really low cost word-processing. Ideal for business or recreational use to produce personalised letters, leaflets, documents and reports. The word pack consists of a text editor and word processor combined in a 4K ROM which plugs into the Acorn's utility ROM socket. The GP-80 is a dot-matrix, 80 column printer with 96 ASCII characters. Word Pack **£30**. Printer **£232**.



**ACORN
COMPUTER**

Acorn Computers Limited, Fulbourn Road,
Cherry Hinton, Cambridge CB1 4JN Tel: (0223) 245200

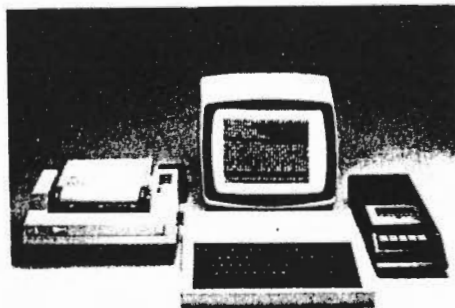
ATOM DISC PACK

- * 40-track single-sided 5¼" disc drive
- * power supply to run both the disc pack and a fully expanded Atom
- * disc controller card with 4K DOS ROM
- * 3K bytes of static RAM
- * 64-way Euro-connector plug and cable
- * full operating instructions and manual

£350 including VAT, post, packing and insurance.

SOFTWARE

Acornsoft, the software division of Acorn have produced an enormous range of cassette and ROM based software. Languages like FORTH, LISP, BBC-type BASIC, over 50 games, household and business applications, interactive teaching are now available. Prices from **£11.50**. Write to Acornsoft, 4A Market Hill, Cambridge CB2 3NJ for complete details.



Acorn Atom

Order Form

Please send me the following items:

QTY	ITEM	PRICE	PRICE INC VAT & P&P	TOTALS
	Atom Kit - 8K Rom + 2K Ram (min)	£120.00	£140.00	
	Atom Assembled - 8K Rom + 2K Ram (min)	£150.00	£174.50	
	Atom Kit - 12K Rom + 12K Ram (max)	£220.00	£255.00	
	Atom Assembled - 12K Rom + 12K Ram (max)	£250.00	£289.50	
	1K Ram Sets	£6.50	£8.50	
	4K Floating Point Rom (inc. in 12K version)	£20.00	£23.30	
	G.P. 80 Printer	£198.26	£232.00	
	Printer Drive (inc. in 12K version)	6522 VIA	£9.00	£10.35
		LS244 Buffer	£2.50	£3.17
	Single 5¼" floppy diskpack	£297.00	£350.00	
	Colour Encoder	£39.00	£45.24	
	Mains Power Supply (1.8 amps)	£8.00	£10.20	
GRAND TOTAL				

Name (please print) _____

Position _____

Address _____

Tel. No. _____

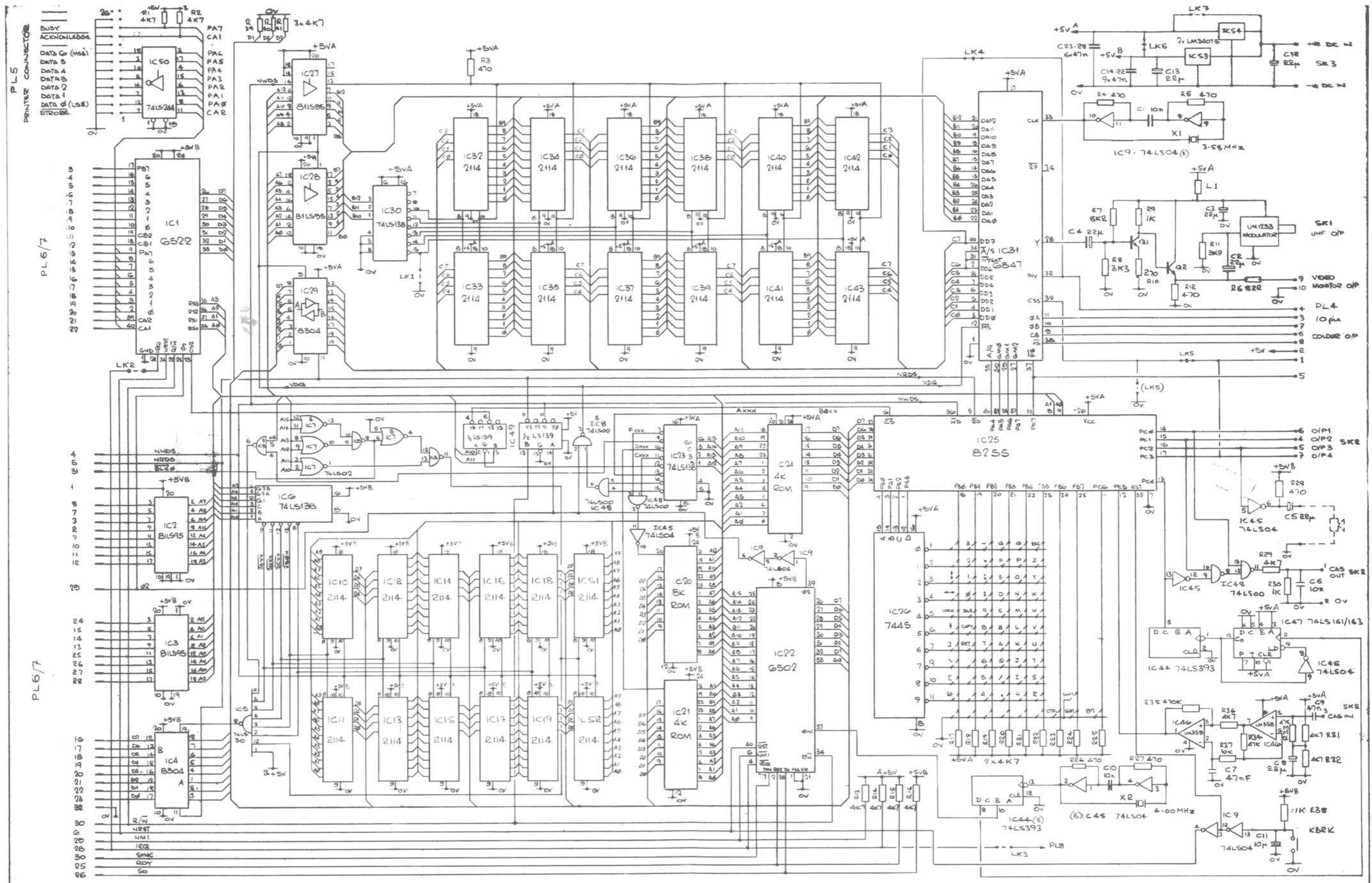
Cheque/PO enclosed for £ _____

Please debit my Access/Barclaycard No. _____

Goods will be despatched in strict order of receipt, delivery within 28 days. For special delivery extra charges will apply. otherwise letter post is used.

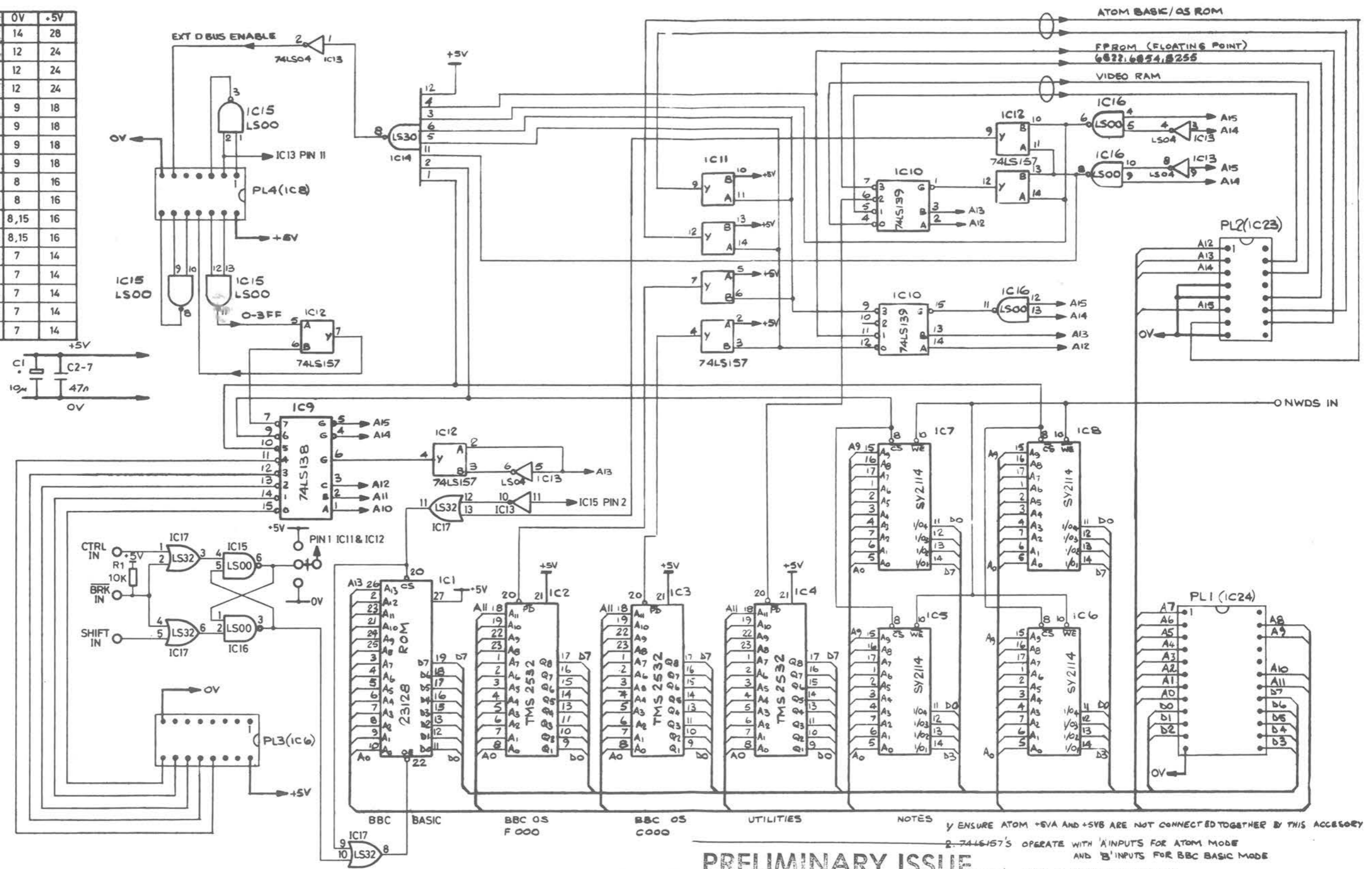


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3
July 83



ISSUE	A	B	C	D	1	2	3	PIN CONNECTION SCHEME FOR PLS IN ATOM TECH MAN.	© COPYRIGHT 1980 ACORN COMPUTERS 4A, MARKET HILL, CAMBRIDGE TEL. 0223 312772	DPN GWS DATE 28.2.80	TITLE CIRCUIT DIAGRAM FOR ATOM MICROCOMPUTER.	PRELIMINARY ISSUE DATE 27 JUN 1980 ACORN COMPUTERS LTD.
DATE	3.3.80	9/4/80	16/4/80	090580	130580	6-8-80	14-01-81					
			CBT	CBT	CBT	CBT	CBT					

REF	OV	+5V
IC1	14	28
IC2	12	24
IC3	12	24
IC4	12	24
IC5	9	18
IC6	9	18
IC7	9	18
IC8	9	18
IC9	8	16
IC10	8	16
IC11	8,15	16
IC12	8,15	16
IC13	7	14
IC14	7	14
IC15	7	14
IC16	7	14
IC17	7	14

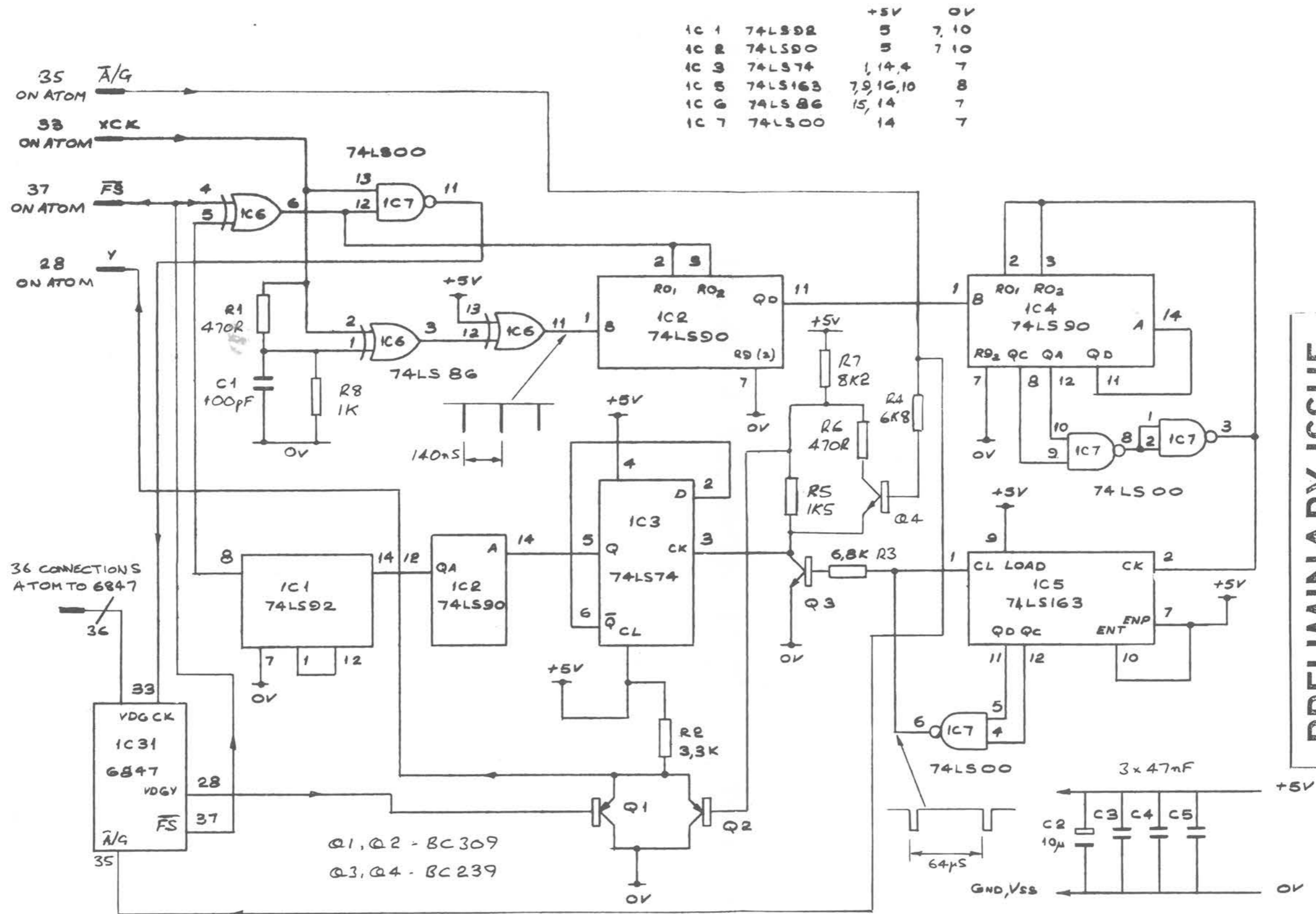


1. ENSURE ATOM +5VA AND +5VB ARE NOT CONNECTED TOGETHER BY THIS ACCESSORY
 2. 74LS157'S OPERATE WITH 'A' INPUTS FOR ATOM MODE AND 'B' INPUTS FOR BBC BASIC MODE
 3. 74LS157'S HAVE 'E' CONNECTED TO 0V
 4. IC NOS. IN BRACKETS REFER TO ATOM PCB

PRELIMINARY ISSUE

27 JUN 1983

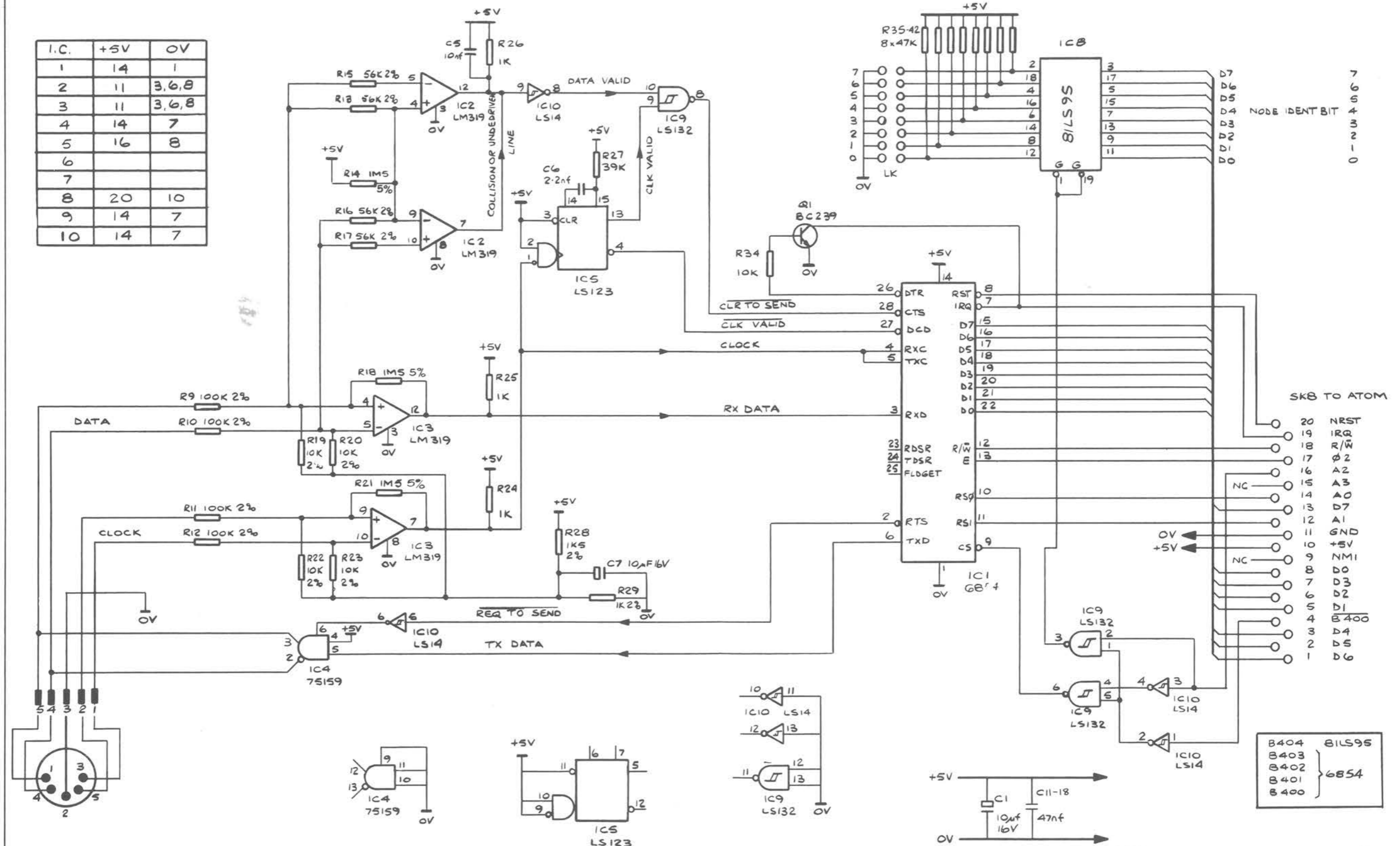
DATE	1-82	1-82	3-82	5-82	6-82	DATE	COPYRIGHT 1982 ACORN COMPUTERS BULLBOURN RD CHERRY HINTON CAMBRIDGE CBI 43N	DRAWN RDA	TITLE ATOM/BBC BASIC CONVERSION CARD	REF 102-007/C ACORN COMPUTERS LTD
ISSUE	A	B	C	D	1			11-1-82		
SIGN					RA					



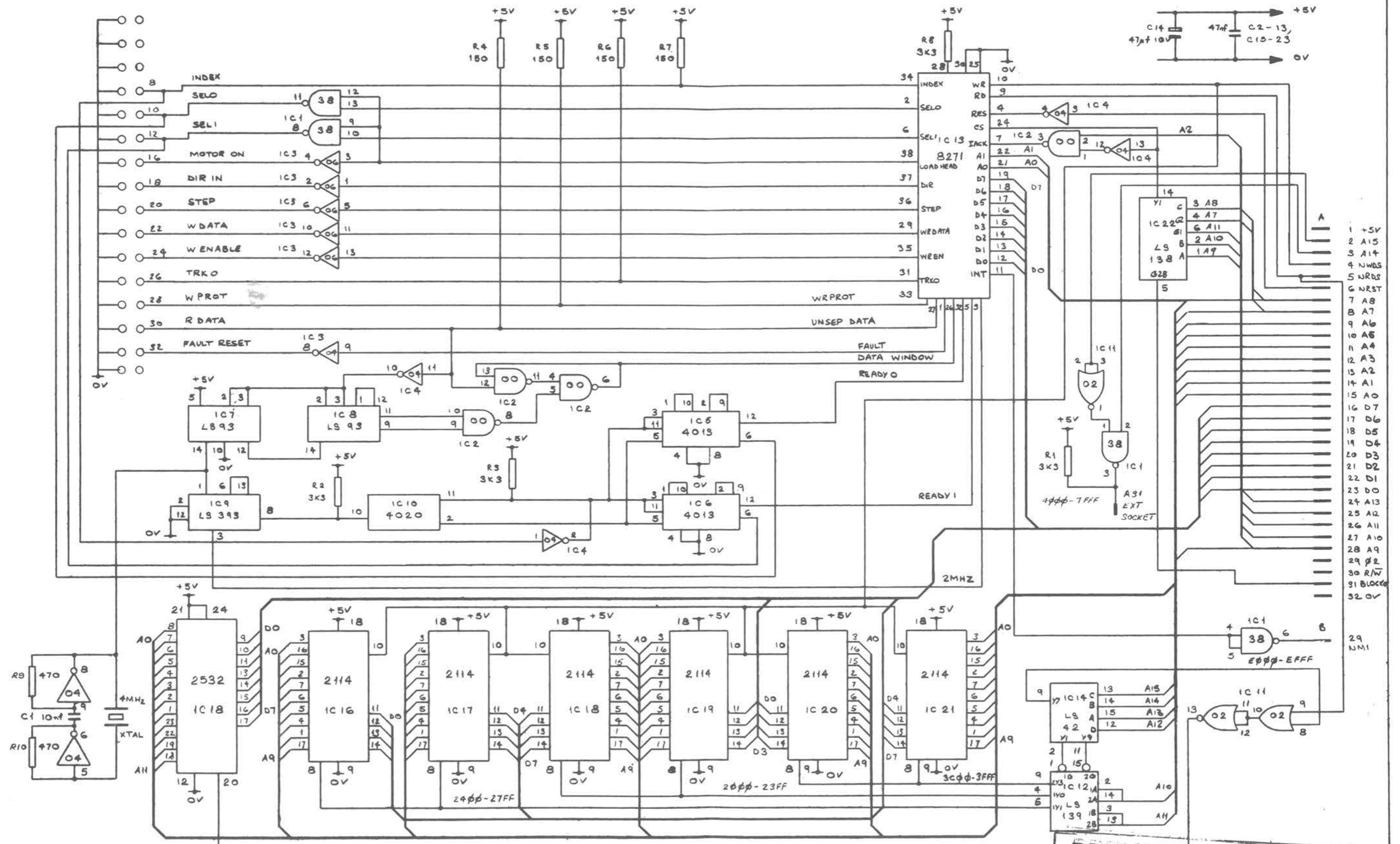
PRELIMINARY ISSUE
 27 JUN 1985
 DATE.....

ISSUE	A	1		© COPYRIGHT 1981	DRN	TITLE	COMPANY
DATE	12-1-81	28-1-81		ACORN COMPUTERS LTD	GWDS	CIRCUIT DIAGRAM FOR	ACORN COMPUTERS LTD
		CBT		4A MARKET HILL	DATE	ATOM 50Hz T.V. CONVERTER	REF
				CAMBRIDGE	12-1-81		102,003/c
				TEL 0223-312772			

I.C.	+5V	0V
1	14	1
2	11	3,6,8
3	11	3,6,8
4	14	7
5	16	8
6		
7		
8	20	10
9	14	7
10	14	7



ISSUE 3	REDRAWN									TOLERANCE	TITLE CIRCUIT DIAGRAM FOR ATOM ECONET PCB	<p>PRELIMINARY ISSUE</p> <p>DATE 27 JUN 83</p> <p>ACORN COMPUTERS LTD FULBURN ROAD CHERRY HINTON CAMBRIDGE CB1 4JN</p>
DATE 6-82										FINISH		
DRAWN R.A.										MATERIAL	DRG. No. 102,002/C	



DATE	21-9-81	13-1-82
ISSUE	1	2

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ACORN COMPUTERS
9 A MARKET HILL
CAMBRIDGE
TEL: 0825

PRELIMINARY ISSUE

DATE _____

TITLE
CIRCUIT DIAGRAMS FOR THE
ACORN DISC PACK

DATE 21-9-81

REF 106,000/c

ACORN COMPUTERS LTD

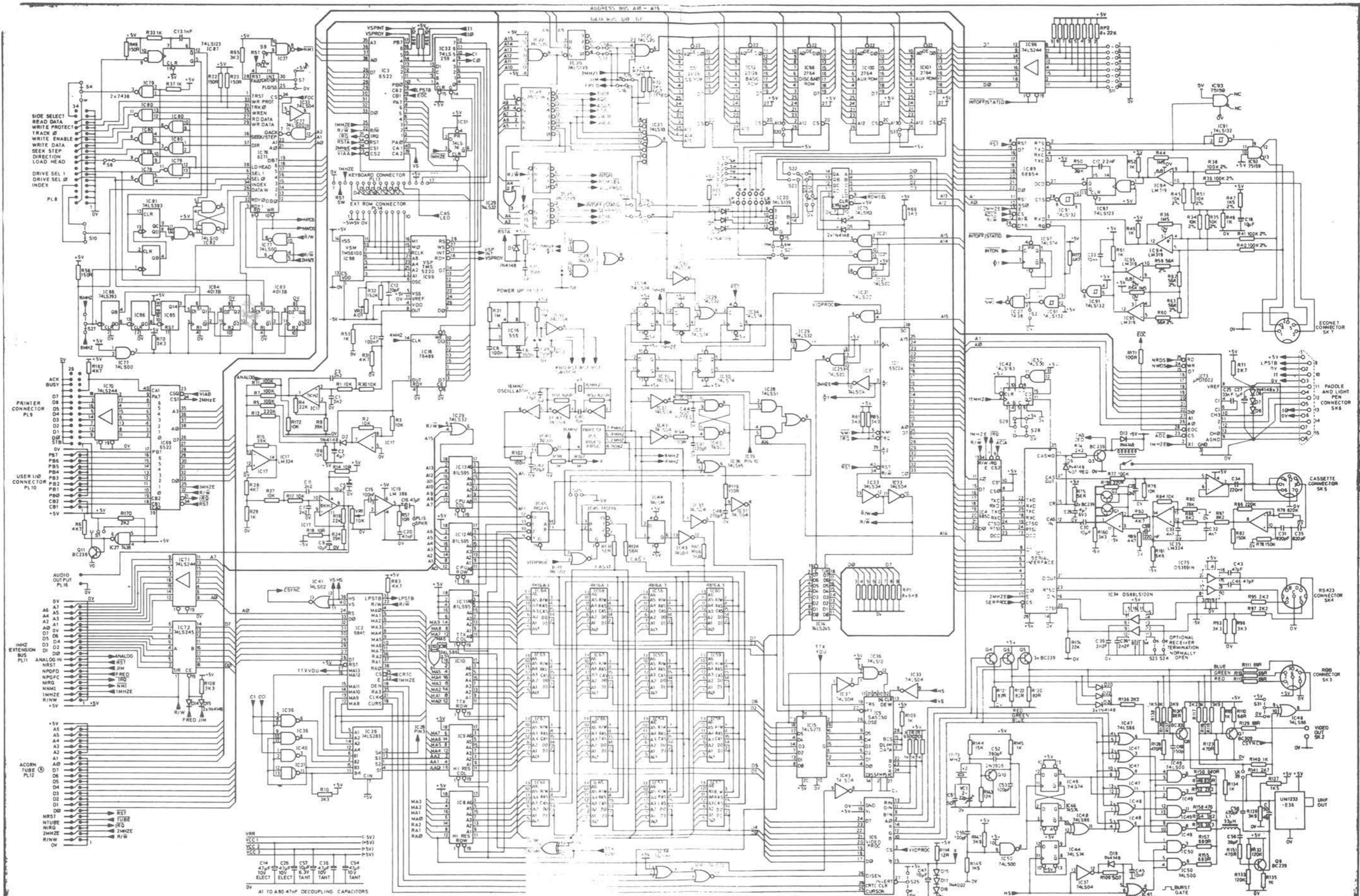


ACORN^{SOFT}

June 1983 Price List

1.7

	CASSETTE		DISC (40 L.L.)			
GENERAL	CODE	PRICE	INC.VAT	CODE	PRICE	INC.VAT
<u>GENERAL</u>						
Magic Garden	SBX04	8.65	9.95			
Creative Graphics	SBX01	8.65	9.95			
Graphs and Charts	SBX02	8.65	9.95			
Desk Diary	SBB01	8.65	9.95			
VIEW ROM (inc. manuals)	SBB03	52.00	59.80			
View Printer Drivers	SBB04	8.65	9.95			
<u>GAMES</u>						
Monsters	SBG03	8.65	9.95	SNG03	10.00	11.50
Snapper	SBG04	8.65	9.95	SNG04	10.00	11.50
Planetoid	SBG15	8.65	9.95	SNG15	10.00	11.50
Arcade Action	SBG06	10.35	11.90			
Rocket Raid	SBG05	8.65	9.95	SNG05	10.00	11.50
Meteors	SBG13	8.65	9.95	SNG13	10.00	11.50
Arcadians	SBG14	8.65	9.95	SNG14	10.00	11.50
Sliding-Block Puzzles	SBG12	8.65	9.95			
Cube Master	SBG08	8.65	9.95			
Chess	SBG10	8.65	9.95			
Super Invaders	SBG16	8.65	9.95	SNG16	10.00	11.50
Missile Base	SBG18	8.65	9.95			
Snooker	SBG21	8.65	9.95			
Starship Command	SBG22	8.65	9.95	SNG22	10.00	11.50
Hopper	SBG23	8.65	9.95	SNG23	10.00	11.50
Draughts and Reversi	SBG20	8.65	9.95			
<u>ADVENTURES</u>						
Sphinx Adventure	SBG07	8.65	9.95	SNG07	10.00	11.50
Philosopher's Quest	SBG01	8.65	9.95	SNG01	10.00	11.50
Castle of Riddles	SBG17	8.65	9.95			
Countdown to Doom	SBG19	8.65	9.95			
<u>EDUCATION</u>						
Algebraic Manipulation	SBE01	8.65	9.95			
Peeko-Computer Pack	SBE02	8.65	9.95			
Business Games	SBE03	8.65	9.95			
Tree of Knowledge	SBE04	8.65	9.95			
Sentence Sequencing	SBE07	10.35	11.90	SNE07	13.35	15.35
Word Sequencing	SBE06	10.35	11.90	SNE06	13.35	15.35
Missing Signs	SBE09	10.35	11.90	SNE09	13.35	15.35
Number Balance	SBE08	10.35	11.90	SNE08	13.35	15.35
Word Hunt	SBE05	10.35	11.90	SNE05	13.35	15.35
Speed and Light	SBE10	10.35	11.90	SNE10	13.35	15.35
Density and Circuit	SBE11	10.35	11.90	SNE11	13.35	15.35
Chemical Analysis	SBE12	12.00	13.80	SNE12	15.00	17.25
Chemical Simulations	SBE13	12.00	13.80	SNE13	15.00	17.25
Chemical Structures	SBE14	12.00	13.80	SNE14	15.00	17.25
Jars	SBE15	10.35	11.90	SNE15	13.35	15.35
<u>LANGUAGES</u>						
LISP	SBL02	14.65	16.85	SNL02	17.30	19.90
FORTH	SBL01	14.65	16.85	SNL01	17.30	19.90
Microtext	SBL04	43.35	49.85	SNL04	52.00	59.80
BCPL (ROM, disc and manual)				SNL03	86.65	99.65
<u>BOOKS</u>						
Creative Graphics	SBD01	7.50	7.50			
Graphs and Charts	SBD02	7.50	7.50			
LISP	SBD04	7.50	7.50			
FORTH	SBD03	7.50	7.50			
View Guide	SBD07	2.50	2.50			
Into View	SBD08	2.50	2.50			
BCPL Manual	SBD10	15.00	15.00			

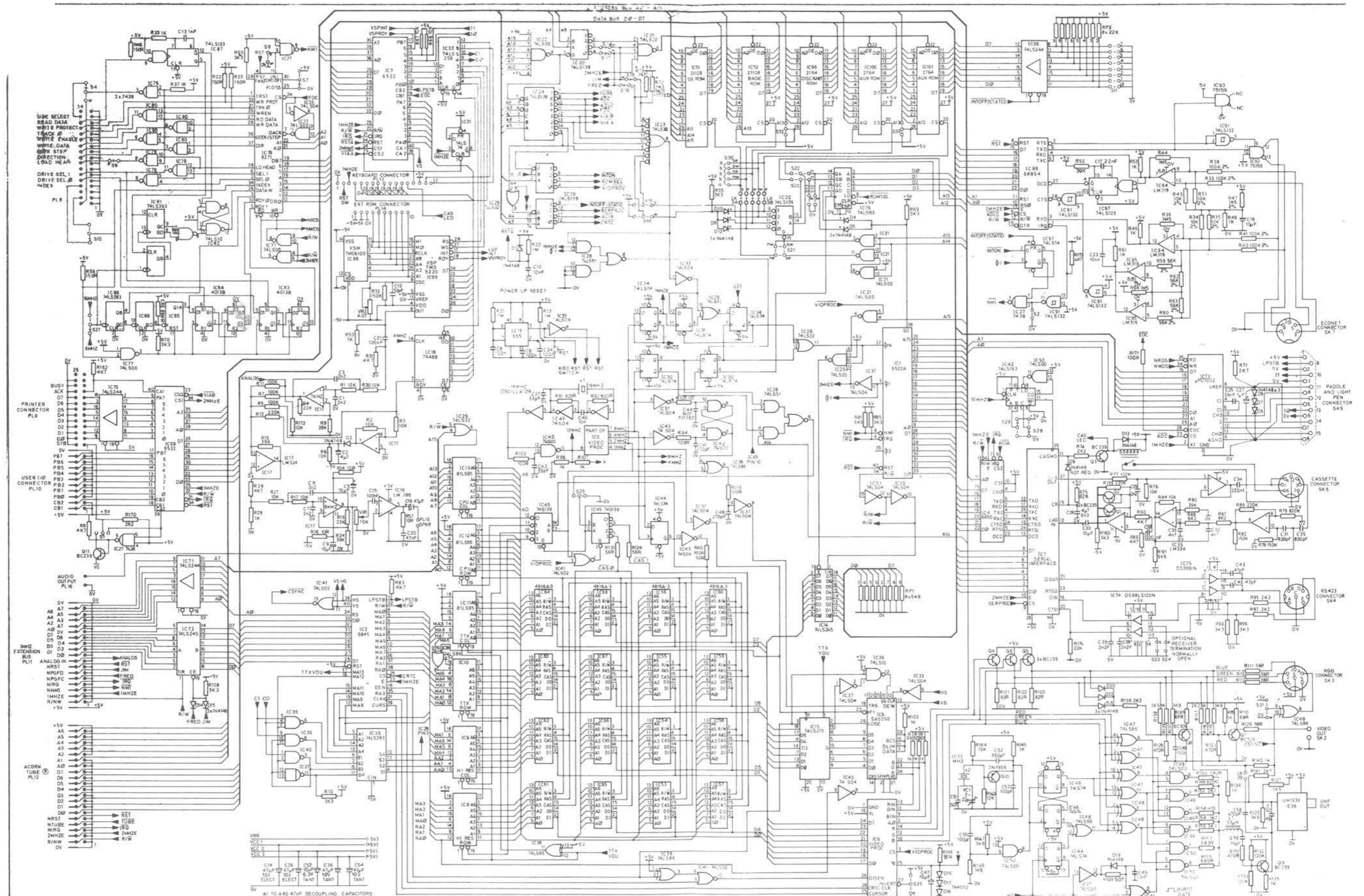


ISSUE	4	REDRAWN	5	MODIFIED TO E.C.N. 31	6	MODIFIED TO E.C.N. 38
DATE	3-83		0-82		5-82	
DRAWN			R.A.		R.J.C.	

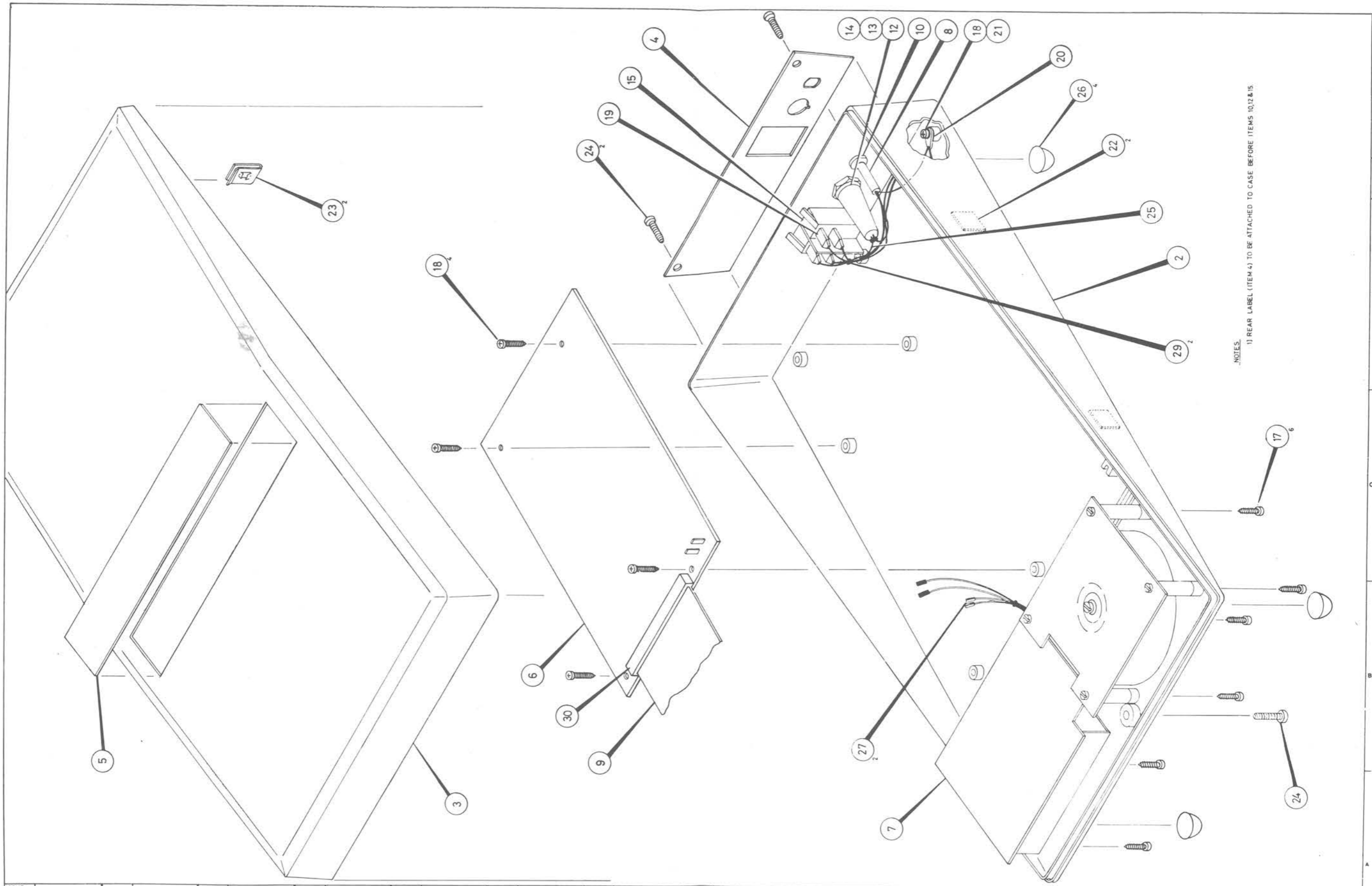
HISTORICAL RECORD - 4 JUL 1983

TITLE: CIRCUIT DIAGRAM for B.B.C. MICROCOMPUTER
 ORG No: 103,000/C
 ACORN CE

NOTES: 1) DV CONNECTORS VIEWED FROM OUTSIDE CASE



REVISION	4	REDRAWN	5	MODIFIED TO	6	MODIFIED TO	7
DATE	3-83		8-82		8-82		1-83
DRAWN			R.A.		R.J.C.		DBDL



NOTES:
 1) REAR LABEL (ITEM 4) TO BE ATTACHED TO CASE BEFORE ITEMS 10, 12 & 15

ISSUE
 2
 DATE
 11-83
 DRAWN
 J.S.C.

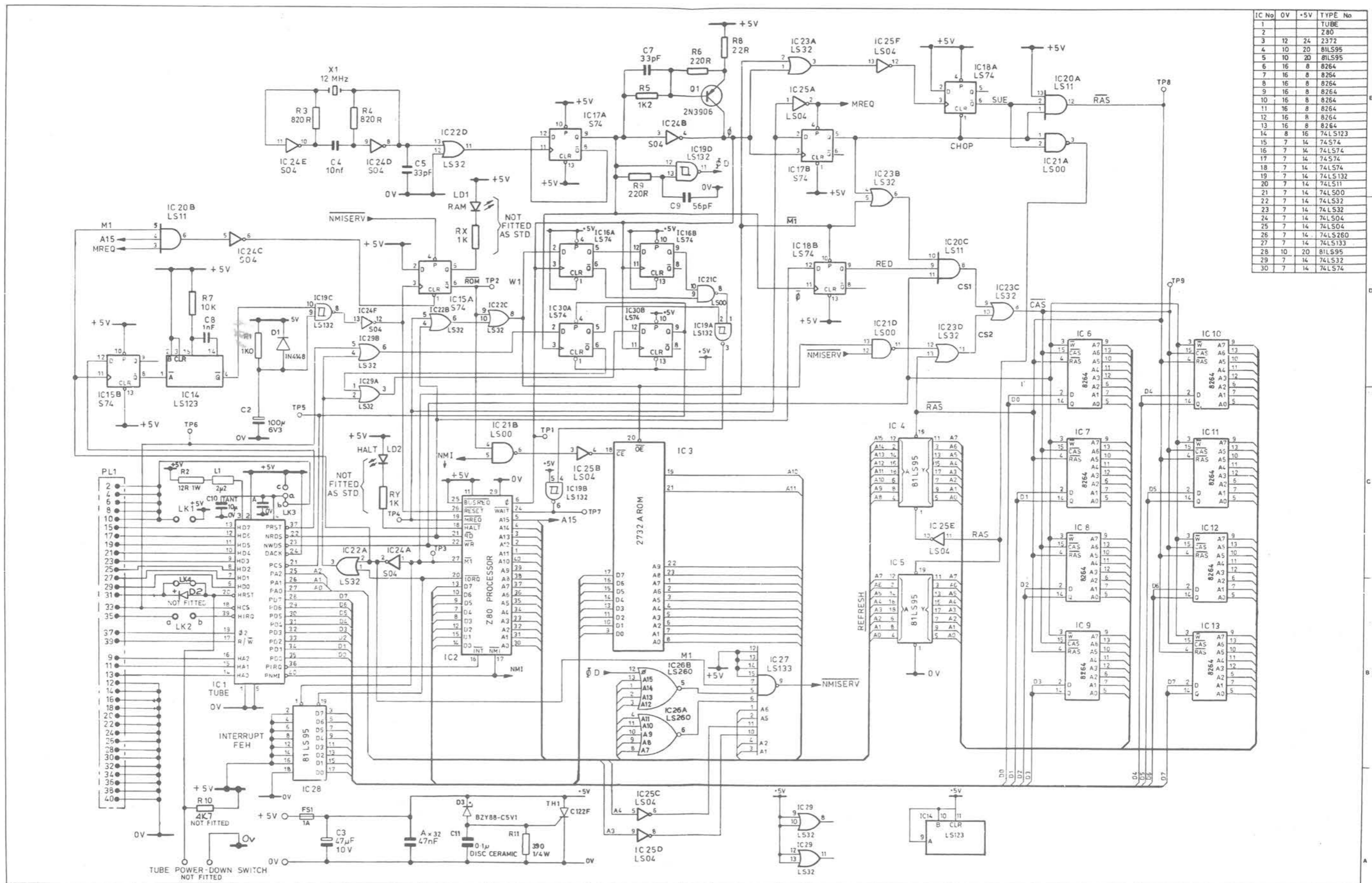
ECO 256																				
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TOLERANCE
 FINISH
 MATERIAL
 SEE PARTS LIST

TITLE
 6502 SECOND PROCESSOR MODULE
 GENERAL ASSEMBLY
 DRG. No.
 A1/008,000/A

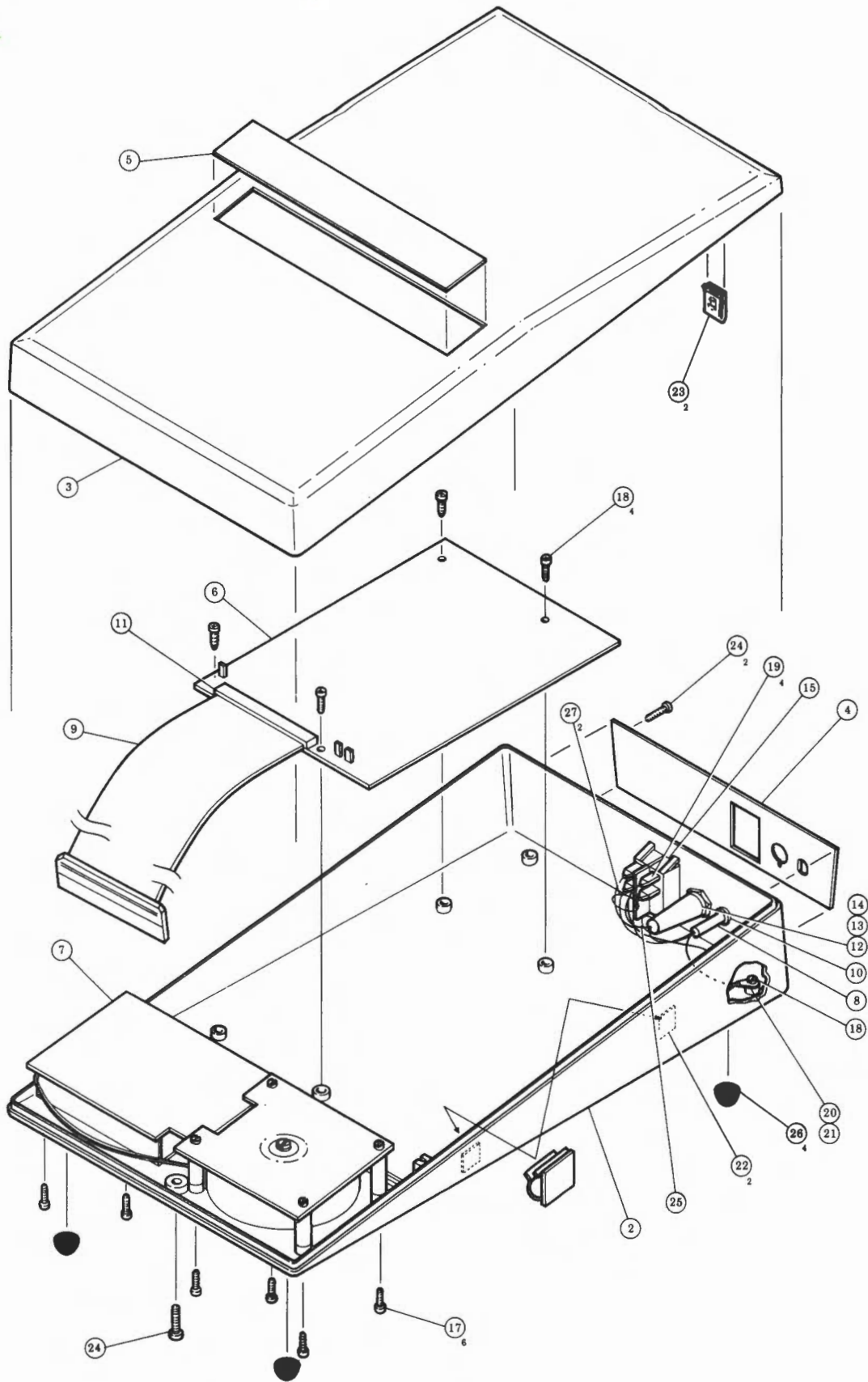
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 ACORN COMPUTERS Ltd
 FULBOURN ROAD
 CHERRY HINTON
 CAMBRIDGE
 CB1 4JN
ACORN COMPUTERS Ltd



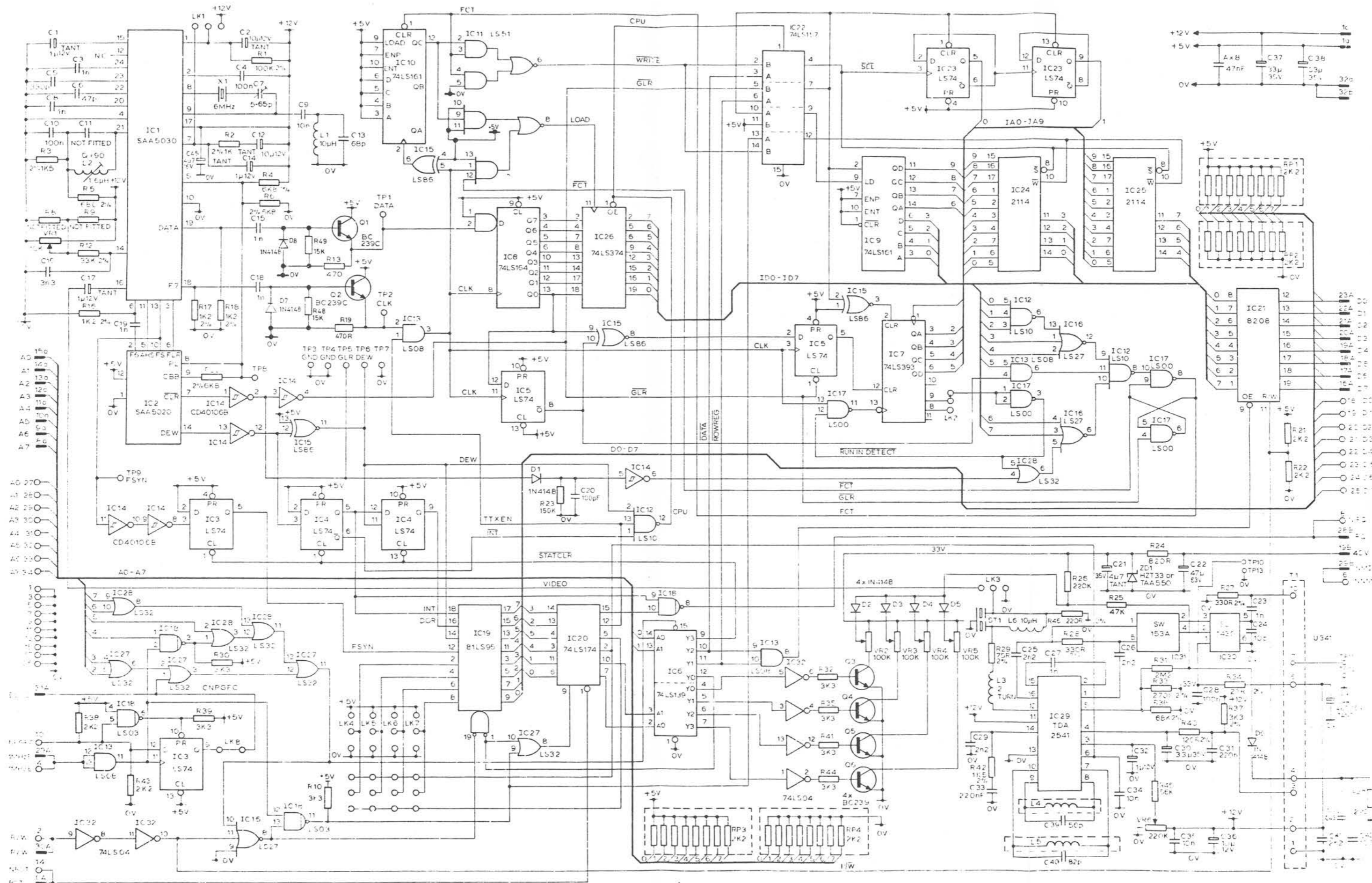


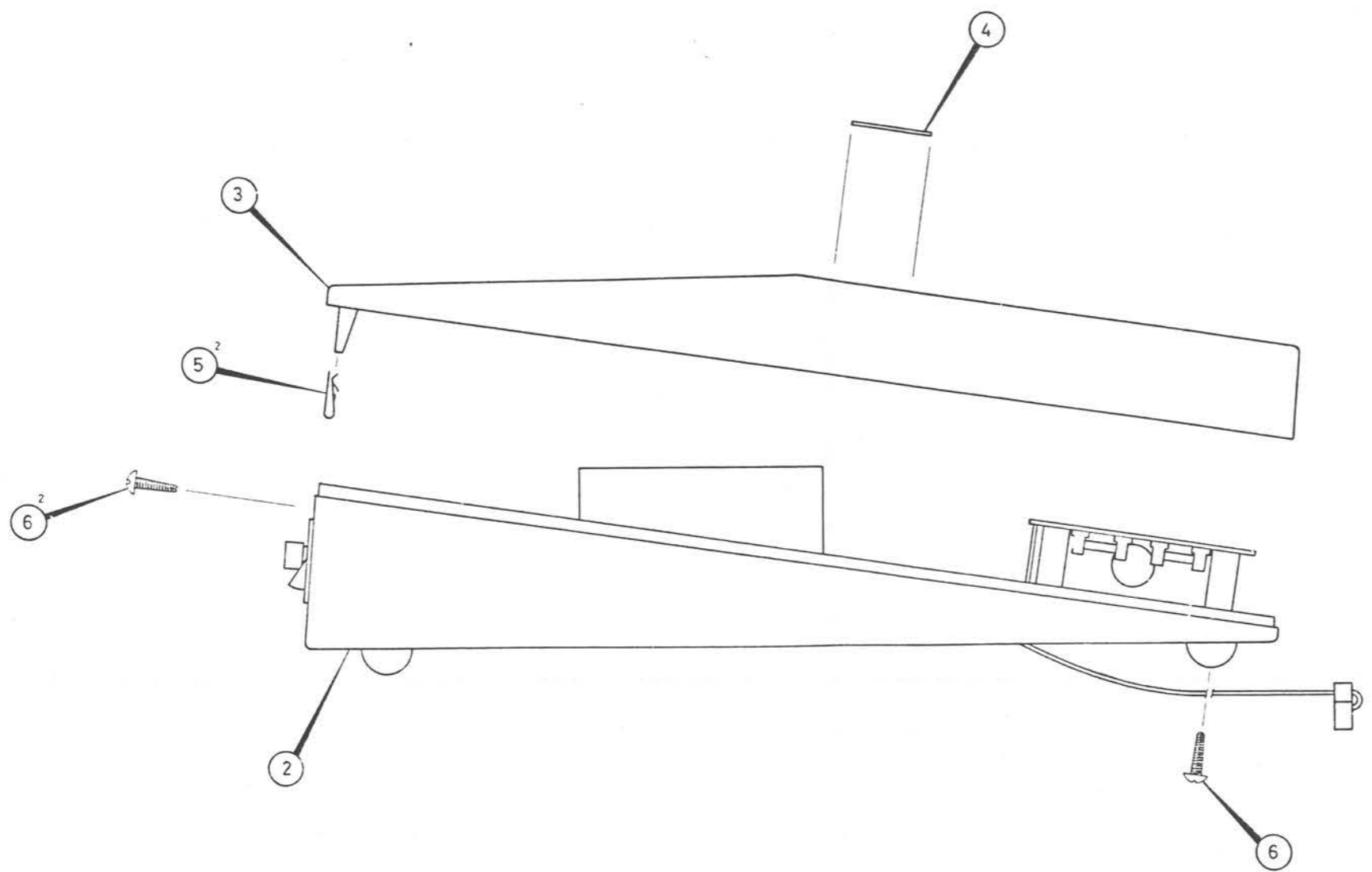
IC No	OV	+5V	TYPE	No
1			TUBE	
2			Z80	
3	12	24	2372	
4	10	20	81LS95	
5	10	20	81LS95	
6	16	8	8264	
7	16	8	8264	
8	16	8	8264	
9	16	8	8264	
10	16	8	8264	
11	16	8	8264	
12	16	8	8264	
13	16	8	8264	
14	8	16	74LS123	
15	7	14	74LS74	
16	7	14	74LS74	
17	7	14	74LS74	
18	7	14	74LS74	
19	7	14	74LS132	
20	7	14	74LS11	
21	7	14	74LS00	
22	7	14	74LS32	
23	7	14	74LS32	
24	7	14	74LS04	
25	7	14	74LS04	
26	7	14	74LS260	
27	7	14	74LS132	
28	10	20	81LS95	
29	7	14	74LS32	
30	7	14	74LS74	

ISSUE A	INITIAL	B	2732A ROM ADDED.	C	PC.B RE-TAPED.	D	LK2 ADDED SRR SIGNAL DELETED.	E	LK3,LK4,R9 & D2 ADDED	1	PPR 90	2	ECO197	3	ECO 403	TOLERANCE	TITLE	© COPYRIGHT 1982 ACORN COMPUTERS Ltd FULBOURN ROAD CHERRY HINTON CAMBRIDGE CB1 4JN
DATE	6.82			12.82		3.83		5.83		7.83		9.83		4.84		FINISH	CIRCUIT DIAGRAM FOR Z80 2nd PROCESSOR	
DRAWN	R.A.		DBDL		M.J.		QCB			M.J.		J.L.T.		IRS		MATERIAL	DRG No. A1/0109,000/C		ACORN COMPUTERS Ltd



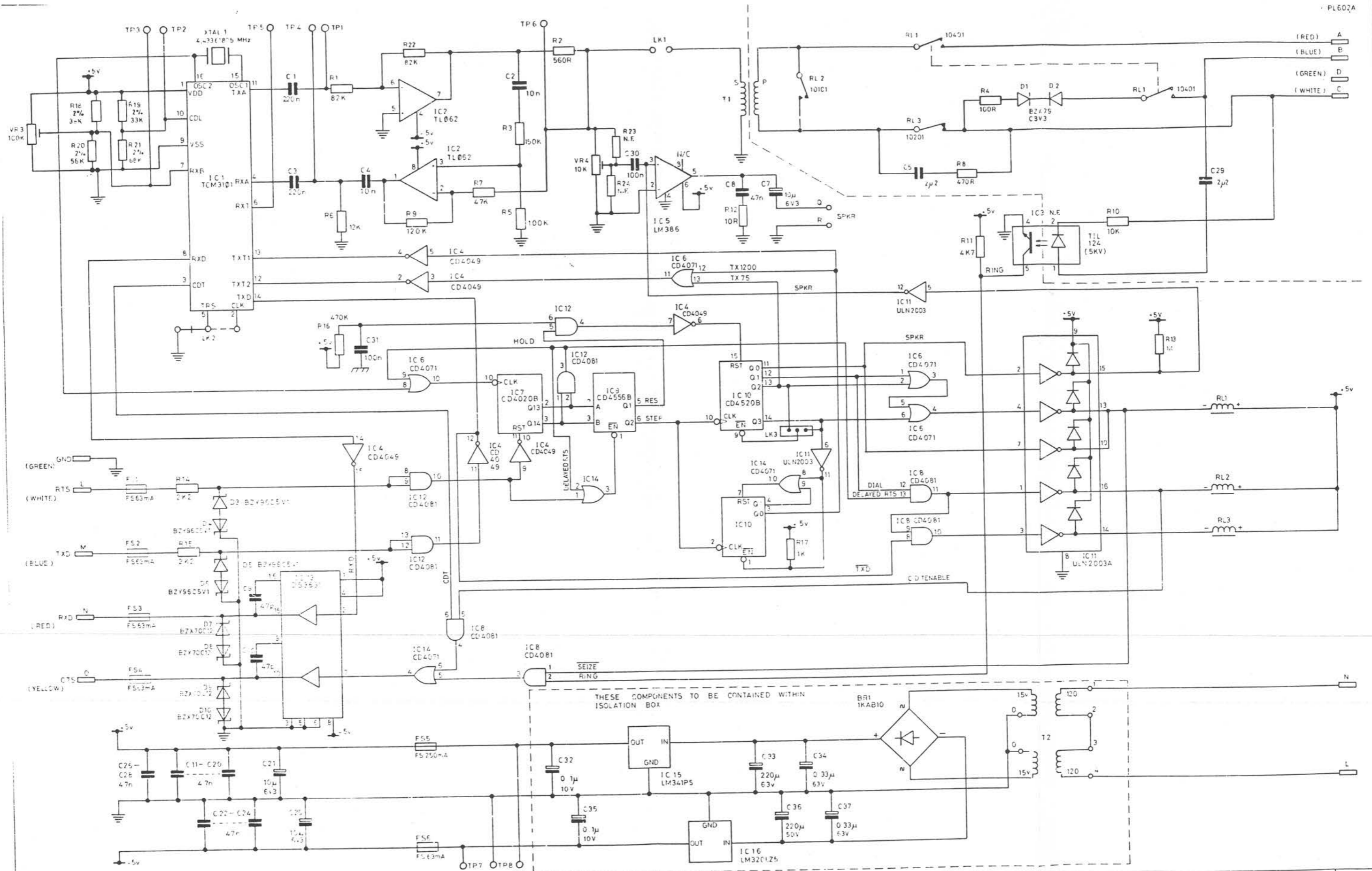
Z80 Second Processor General Assembly





1	2	3	4	5	6	7	8	9	10	11	12
	7	ECO 55, 71	ECO 126								
12 B2			6-B3	7-83	ECO 138	7-83	ECO 153	8-83	ECO 166		
R J C	R J C		DB5	DB5		DB B		DB B			

REFERENCE	11111	TELETEXT ADAPTER UNIT FINAL ASSEMBLY DRAWING	COPYRIGHT © 2 ACORN COMPUTERS LTD FULBURN ROAD CHERRY HORTON CAMBRIDGE CB3 4RN
MATERIAL	SEE PARTS LIST		
QUANTITY	004,000	ACORN COMPUTERS Ltd	



ISSUE A	B	C	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			
DATE 18 4 83	5 83			10 23	PPK 141		3 84	EGU 343																																																
DRAWN D B L	D P 1	D G	U 5	D G			AMCF																																																	

TOLERANCE: FINISH: MATERIAL:

TITLE: PRESTEL ADAPTOR CIRCUIT DIAGRAM

DRG No: 115,000/C

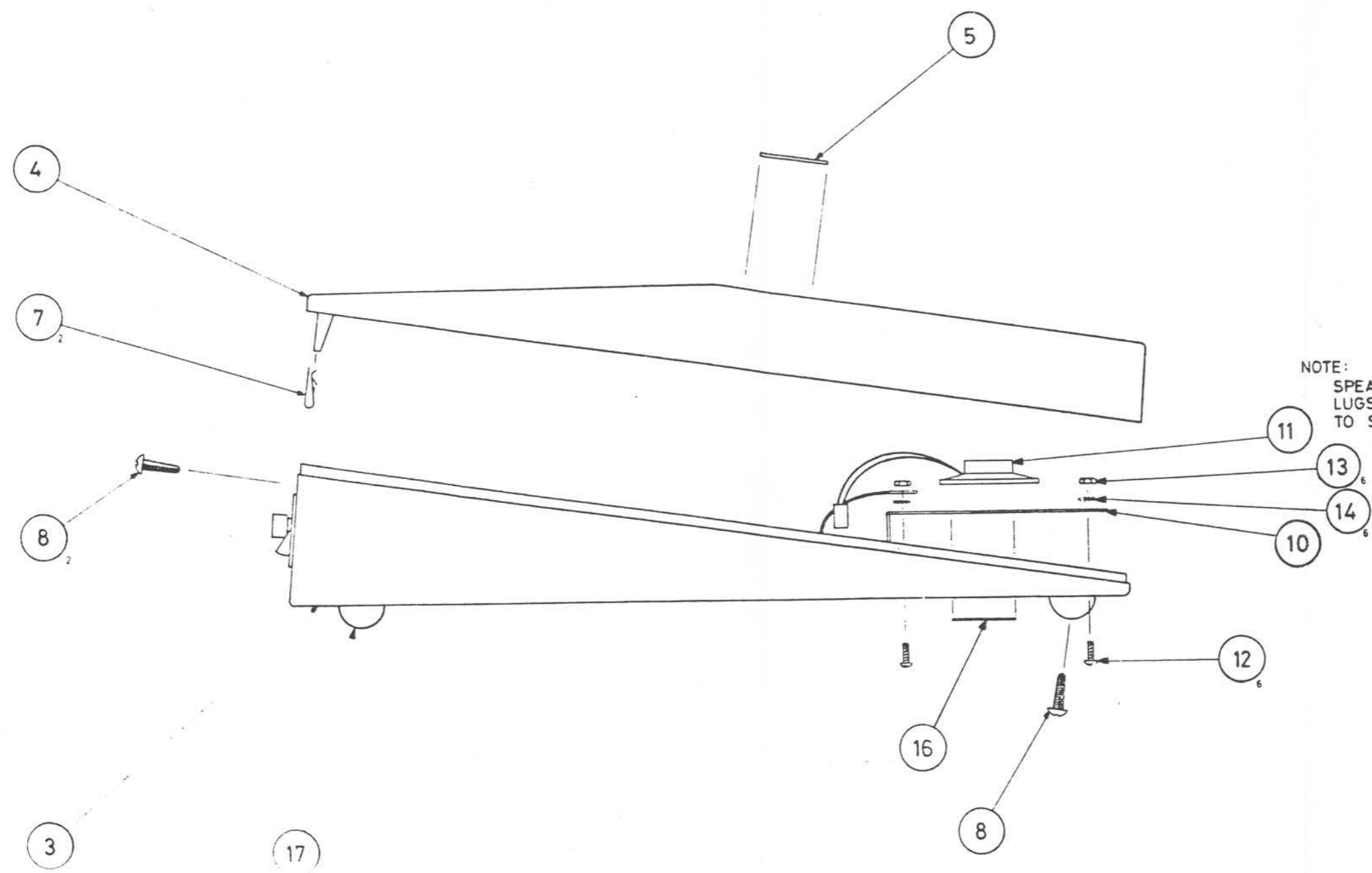
ACORN COMPUTERS Ltd

BR1 1KAB10

IC15 LM341P5

IC16 LM3201Z5

Copyright 1983 Acorn Computers Ltd, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.



NOTE:
 SPEAKER INSERTED UNDER MOUNTING LUGS,
 LUGS BENT DOWN AND ADHESIVE APPLIED
 TO SECURE SPEAKER TO LUGS. (ADHESIVE TO
 ACORN SPEC. 0890,010).

ISSUE A	B	C	D	1	2	3	TOLERANCE	TITLE	© COPYRIGHT 1983 ACORN COMPUTERS LTD FULBURN ROAD CHERRY HINTON CAMBRIDGE CB1 4JN
DATE 7 4 83	DBCTB3	8-83	10 83	10 83	3-84	3 9 84	FINISH	PRESTEL ADAPTER UNIT FINAL ASSEMBLY DRAWING	
DRAWN D B I	D G	LWS	J L T	D G	TMT	IPS	MATERIAL SEE PARTS LIST	DRG No A1/0015,000/A	ACORN COMPUTERS Ltd



1. INTRODUCTION

The BBC Microcomputer has been designed to allow expansion in a number of ways. In addition to the specialised Disc and Printer plugs, there are three "general" expansion facilities. For these facilities, the Model B has IDC headers mounted at the front edge of the main board, accessed from the underside of the case.

The Tube interface and the user port will be discussed in other application notes. This note describes the signals available on the 1 Megahertz Bus, the circuitry required to utilise them, and the way in which they are connected to the Acorn Expansion Box. The expansion memory map is also defined. When interfacing designs to the 1MHz Bus, it is vital to ensure compatibility with Acorn standards, to prevent problems when using several pieces of equipment on the bus simultaneously.

Remember that the standards cover both hardware and software protocols.

It is as important for the software to follow these guidelines as it is for the hardware, otherwise simultaneous operations of several peripherals may not be possible.

The standards described allow up to 64K of paged address space to be accessed as well as 255 bytes of direct access ports.



2. SIGNAL DEFINITIONS

The following lines are available on the 1MHz Expansion Connector:

- A0 - A7 (pins 27-34) The low eight address lines from the 6502, buffered by a 74LS244 (IC 71) permanently enabled.
- D0 - D7 (pins 18-25) A bi-directional data bus connected to the CPU through IC 72, a 74LS245 buffer. The direction of data is determined by the system Read-not-write (R/W) line. The buffer is only enabled if NPGFC or NPGFD is low (see below).
- Analogue In. (pin 16) An input to the BBC Microcomputer audio circuitry. Input impedance is 9K ohms. A signal of +/-3volts RMS will produce a saturated signal at the loudspeaker (full volume), though signals this large will cause distortion if the on-board sound or speech is used at the same time.
- NRST (pin 14) Not Reset. This is an OUTPUT ONLY for the system reset line (active low). It may be used to initialise peripherals on power-up and when the "BREAK" key is pressed.
- NPGFC & NPGFD (pins 10 & 12) "Not page FC" and "Not page FD". Page select signals decoded from the top eight address bits of the system data bus. These signals are active low. Pages FC and FD (i.e. FC00 to FCFF and FD00 to FDFF hex) are the only pages available for general expansion. However, the paging register described in Section 5 allows a much larger address space to be accessed.

NIRQ (pin 8)

Not Interrupt Request (active low). The system IRQ line which is open collector (i.e. "wired-or") and may be asserted by devices attached to the extension bus. The pull-up resistor on this line is 3K3.

IRQ is level triggered and it is absolutely essential for correct operation of the machine that interrupts do not occur until the software is capable of dealing with them. Interrupts on the 1MHz bus should therefore be disabled on power-up and reset conditions. Significant use of interrupt service time may affect other machine functions. In particular, masking interrupts for more than 10ms will affect the real time clock.

NNMI (pin 6)

Not Non-Maskable Interrupt (active low). The system NMI line which is open collector (i.e. "wired-or") and may be asserted by devices attached to the extension bus.

The pull-up resistor on this line is also 3K3.

It should be remembered that NMI is negative edge triggered and that both the disc and net chips on the main board use this line. Caution must be exercised to avoid masking other interrupts by holding the line low. Use of NMI facilities on the BBC machine requires an advanced knowledge of 6502 programming techniques and the Operating System Protocols.

1 MHzE (pin 4)

A system clock timing signal which is a 1MHz 50% duty-cycle square wave. During access to 1MHz peripherals and to the extension bus the processor clock (normally 2MHz) is stretched so that the trailing edges of 1MHzE and processor clock are coincident.

R/W (pin 2)

The system Read-Not-Write signal which is derived from the CPU R/W signal through two 74LS04 inverters.

0V (pins 1,3,5,7,9,11,
13,15,17,26)

System 0V, i.e. GND wires, dispersed so as to interleave with asynchronous groups of signals in a flat ribbon cable.

3. HARDWARE REQUIREMENTS FOR 1 MHz EXPANSION BUS PERIPHERALS

1. No power may be drawn from the BBC Microcomputer. Each peripheral should have its own integral power supply, although a separate power unit may be used.
2. Not more than one low-power Schottky TTL load may be presented to any bus line by each peripheral.
3. A 1MHz Bus feed-through connector should be provided. Connection to the BBC Microcomputer should be via 600mm of 34-way ribbon cable terminated with a 34-way IDC socket, and fitted with strain relief. Please note that copying the Teletext Adapter's layout is not possible, because this has been given the special status of the last box in the chain.
4. Optional bus termination should be provided on all bus lines except NRST, NNMI and NIRQ. The recommended termination is a 2K2 resistor to +5V and a 2K2 resistor to ground for each line.
5. The timing requirements for the 1MHz Bus are detailed in Figure 1.

4. FURTHER REQUIREMENTS FOR EQUIPMENT TO BE APPROVED BY ACORN COMPUTERS

1. Address space within page &FC must be allocated by the Research and Development Department of Acorn Computers Ltd. - see Section 6.
2. The dimensions of any peripheral and its associated integral power supplies should allow it to be fitted into the BBC Microcomputer Expansion Box - see Figure 4.
3. When housed in the Expansion Box, the equipment should meet BS 415 Class 1 specifications for Electrical safety.

Further details of the requirements and procedures for gaining approval should be obtained from Acorn. The information included here is for guidance only and is not intended to be a full specification for approval.



5. DERIVATION OF VALID PAGE SIGNALS

1MHz peripherals are clocked by a 1MHz 50% duty cycle square wave (chosen to allow chips such as the 6522 to use their timing elements reliably). The BBC Microcomputer's c.p.u. normally operates with a 2MHz clock, but with a slow-down circuit which has the effect of stretching the "clock high" period immediately following the detection of a valid 1MHz peripheral address.

There are two problems as a result of this. First, addresses will change and may momentarily become 1MHz addresses while the 2MHz c.p.u. clock is low, but while the 1MHzE signal is high. This could give rise to a spurious pulse on the chip select. Second, if the c.p.u. deliberately addresses a 1MHz peripheral during the time that 1MHzE is high, the device will be addressed immediately, and then again when 1MHzE is next high: this is because the c.p.u. clock will be held "high" by the stretching circuit until the next coincident falling edge of the 1MHz and 2MHz clocks. See Figure 2: the two accesses are marked C and D. This double access is not usually a problem except when reading from or writing to a location twice has some additional effect: an example of this is an interrupt flag which is cleared by reading it.

These effects mean that the 1MHzE Bus cannot be used as a conventional "address valid" signal. However, addresses will always be valid on the rising edge of 1MHzE. If the chip select lines are latched by 1MHzE as shown in Figure 2, the clean signal CNGFC (or CNPGFD) will be generated.



6. ADDRESS SPACE ALLOCATION

PAGE FC

Page FC is reserved for peripherals with small memory requirements. Only one peripheral will be allocated to each group of addresses. Further allocations must be agreed with the R & D department of Acorn Computers Ltd.

Initial allocations are:

FC00 to FC0F	Test Hardware
FC10 to FC13	Teletext
FC14 to FC1F	Prestel
FC20 to FC27	IEEE 488 Interface
FC28 to FC2F	Acorn Expansion: Spare
FC30 to FC3F	Cambridge Ring Interface
FC40 to FC47	Winchester Disc Interface
FC48 to FC7F	Acorn Expansion: spare
FC80 to FC8F	Test Hardware
FC90 to FCBF	Acorn Expansion: spare
FCC0 to FCFE	User Applications
FCFF	Paging Register

PAGE FD

Page FD is used in conjunction with the paging register to provide a 64K address space, accessed one page at a time. Each BBC Expansion Box will have a paging register on the back plane, thus data will be latched simultaneously on every Expansion Box. Data latched into the paging register will provide the top eight address bits to the eurocard back plane. These top address bits are referred to as the 'Extended Page Number'. Any peripheral designed to locate in page FD without using an expansion back plane must latch and decode the paging address information.

To make this facility as easy to use as possible, NPGFD (a hazard-free version of the signal available from PL 12) will be connected to the back plane pin 24b, 'Not Valid Memory Address', and also OR-ed with the top four extended page address lines as a link selectable option to pin 31a 'BLK0'. (the other option on this pin will be NPGFC).

Extended pages &00 to &7F are reserved for Acorn use, pages &80 to &FF may be freely used by special applications. The paging register will be reset to &00 on power-up and BREAK.

Since the paging register is a write-only latch, location &00EE in the zero page of the BBC machine address map has been allocated as a RAM image of the register. Note that this location will remain in the I/O processor's memory map if a second processor is fitted.

The importance of this image is that it allows interrupt routines to change the paging register and restore it again afterwards.

It is vital to change location &00EE BEFORE changing the paging register itself. If you don't, then an interrupt may occur before you change the RAM image and this will restore the paging register to the old value of &EE.

A suitable sequence is

```

LDA # new value
STA &EE
STA &FCFF                MACHINE CODE

OR....

?&EE = new value
?&FCFF = new value      BASIC

```

User routines should save the contents of &EE before changing the paging register and restore both &EE and &FCFF to this value before returning from the interrupt.

A suitable sequence is

```

[save processor registers etc]

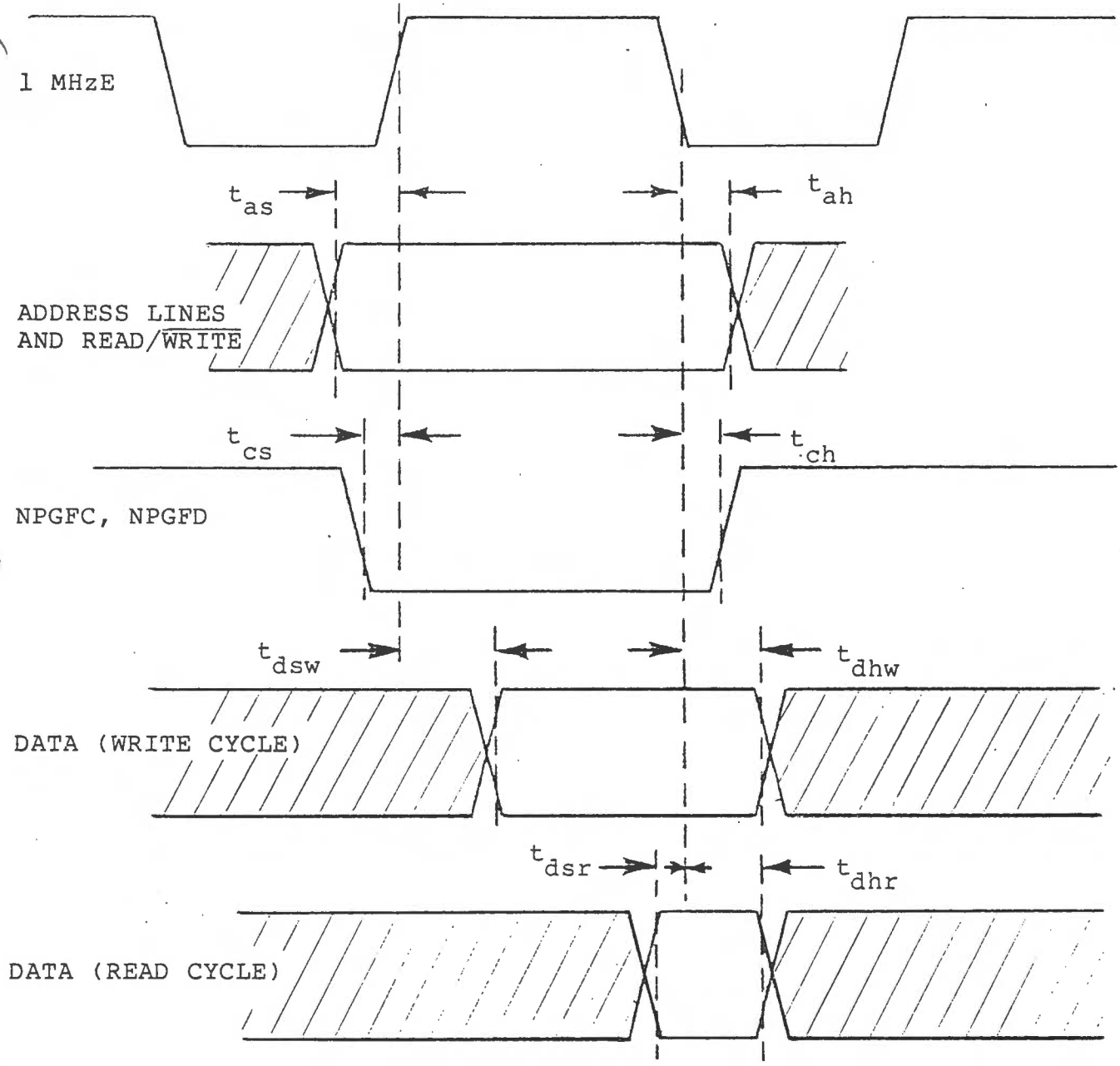
LDA &EE
STA tempstore
LDA # new value
STA &EE
STA &FCFF

[users code here]

STA &EE
STA &FCFF

[restore other data and return]

```



Timing requirements

Parameter	Symbol	Min.	Max.
Address Set-up time (& R/W Set-up time)	t_{as}	300	1000
Address Hold Time (& R/W Hold Time)	t_{ah}	30	-
NPGFC & NPGFD Set-up Time	t_{cs}	250	1000
NPGFC & NPGFD Hold Time	t_{ch}	30	-
Write Data Set-up Time	t_{dsw}	-	150
Write Data Hold Time	t_{dhw}	50	-
Read Data Set-up Time	t_{dsr}	200	-
Read Data Hold Time	t_{dhr}	30	-

Note: The above timings are based on only one peripheral attached to the Expansion Bus. Heavy loading may slow the rise and fall times of 1MHzE with possible adverse effects on timings.

FIGURE 1

1MHZ BUS TIMING DIAGRAM

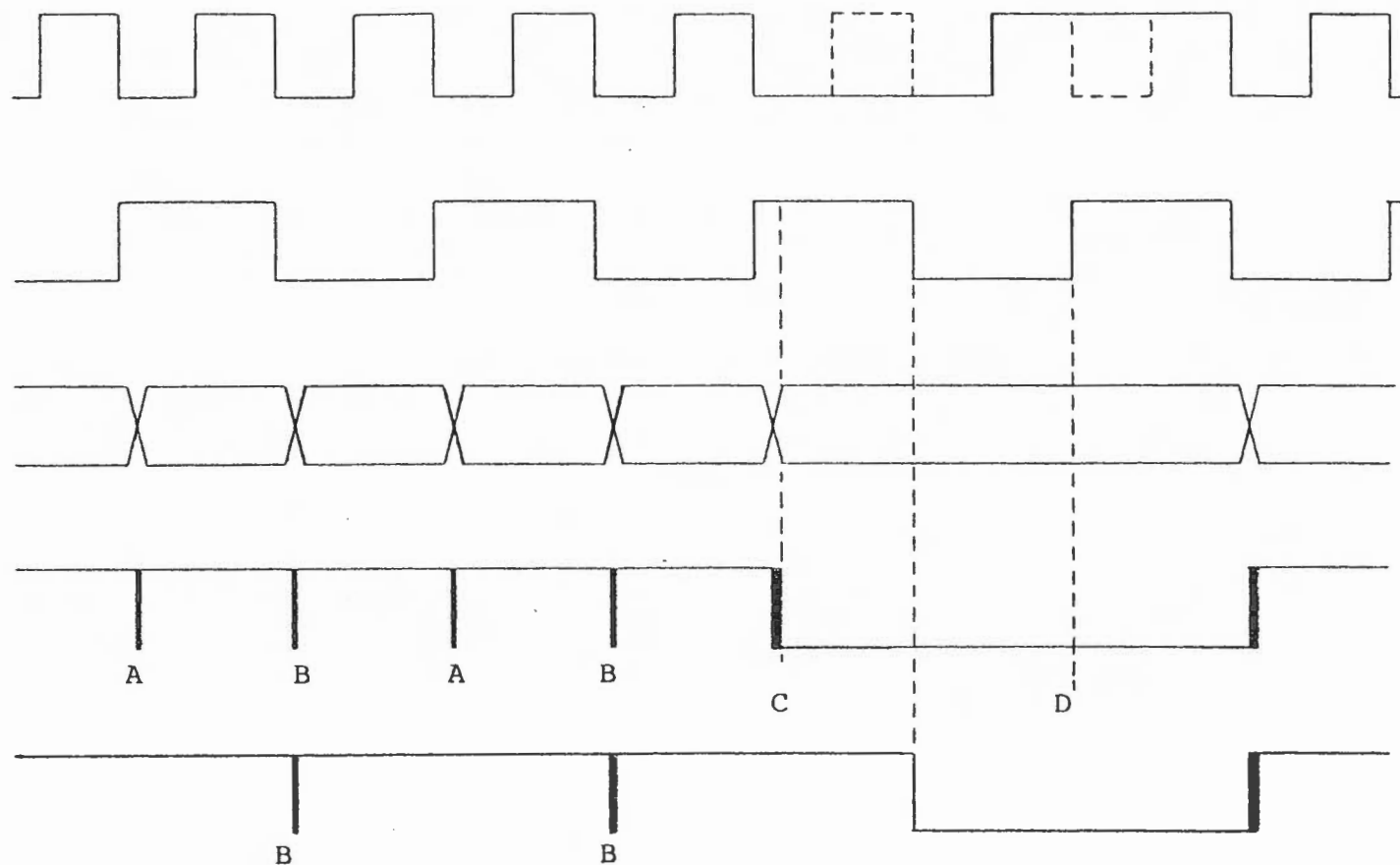
C.P.U. CLOCK
(2MHz clock
shown dotted)

1MHzE

ADDRESS BUS

NPGFC
(or NPGFD)

CNPGFC
(or CNPGFD)

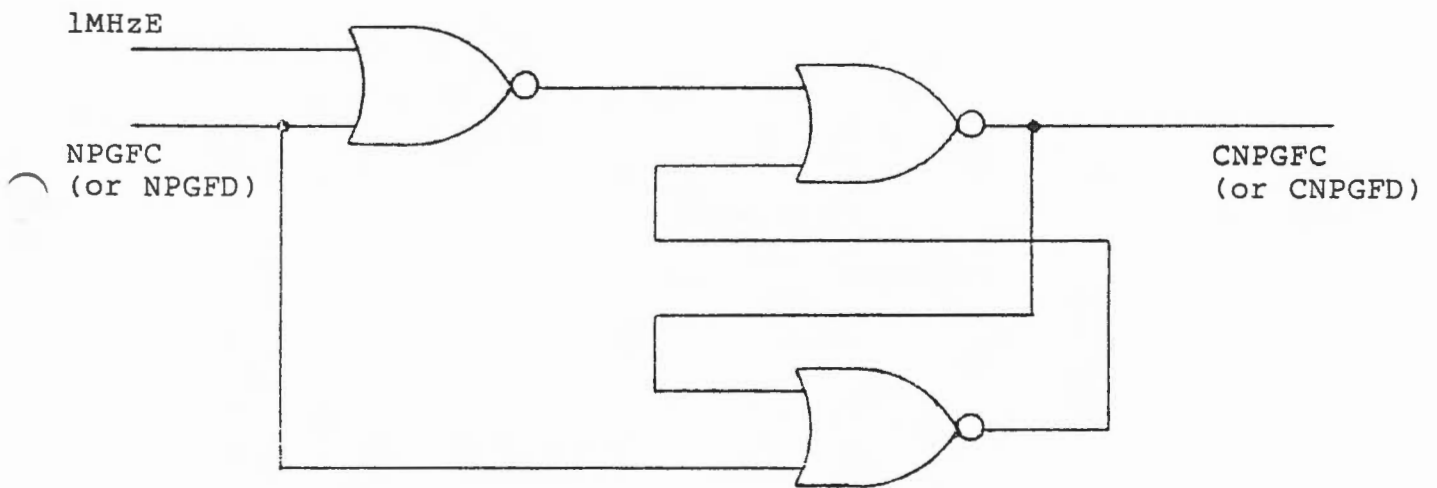


As the address lines settle, a momentary pulse could occur on the NPGFC (or NPGFD) line. The pulses at B are ignored because 1MHzE is low, but those at A could cause a spurious access.

When a valid 1MHz device address appears, NPGFC (or NPGFD) goes low: this can happen as shown whilst 1MHzE goes high, accessing the device. When a 1MHz address is detected, the clock stretching circuit waits if necessary for the next rising edge of the 2MHz clock (point E), and holds the c.p.u. clock (point F). Hence the device is accessed again at point D, when 1MHzE is next high.

The gated signal CNPGFC (or CNPGFD) removes the glitches A and the first of the two accesses at C.

FIGURE 2 DERIVATION OF VALID PAGE SELECT SIGNAL



R-S flip-flop with gated input which allows 'clean select' to be set low only if 1MHzE is low. An alternative circuit using transparent flip-flops is shown on the circuit diagram for the Expansion Box back plane (Drawing 107,000)

FIGURE 3 DERIVATION OF CLEAN SELECT SIGNALS



3.1 1MHZ BUS APPLICATION NOTE

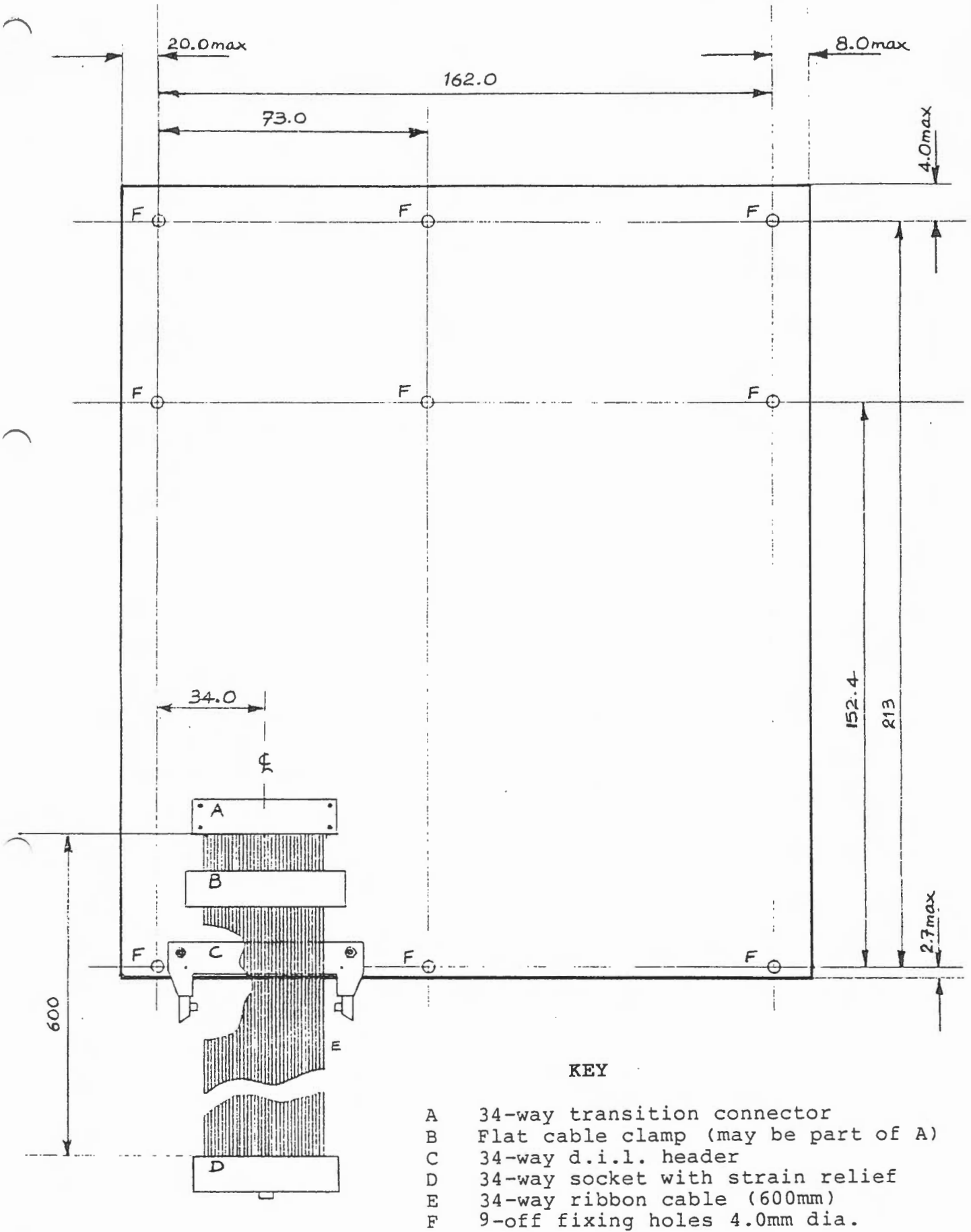
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Circuit Diagram for BBC Machine Expansion Box Backplane	Drg. No. 107,000	4.3.1.13

NOTE: All dimensions in millimetres

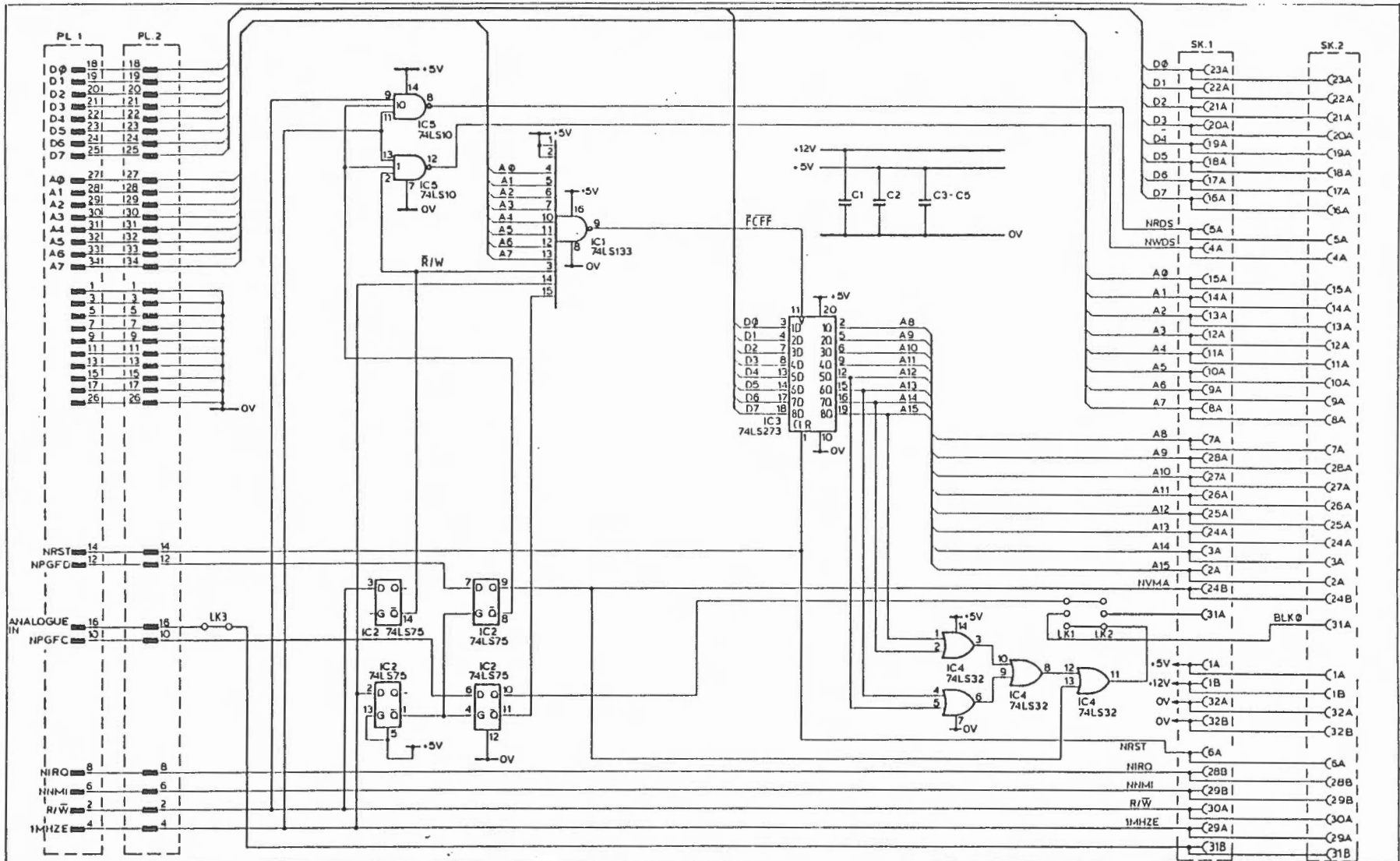


KEY

- A 34-way transition connector
- B Flat cable clamp (may be part of A)
- C 34-way d.i.l. header
- D 34-way socket with strain relief
- E 34-way ribbon cable (600mm)
- F 9-off fixing holes 4.0mm dia.

FIGURE 4

BOARD DIMENSIONS TO FIT
BBC MICROCOMPUTER EXPANSION BOX



ISSUE 1	REDRAWN	2	MODIFIED TO E C O 63						
DATE 8 62		1 83							
DRAWN RJC		DBDL							

TOLERANCE	
FINISH	
MATERIAL	

TITLE
**1MHz BACKPLANE
 CIRCUIT DIAGRAM**

DRG. No. **107,000/C**

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 ACORN COMPUTERS LTD
 FULBOURN ROAD
 CHERRY HINTON
 CAMBRIDGE
 CB1 4JN

ACORN COMPUTERS Ltd





3.2 SIDEWAYS ROMs APPLICATION NOTE

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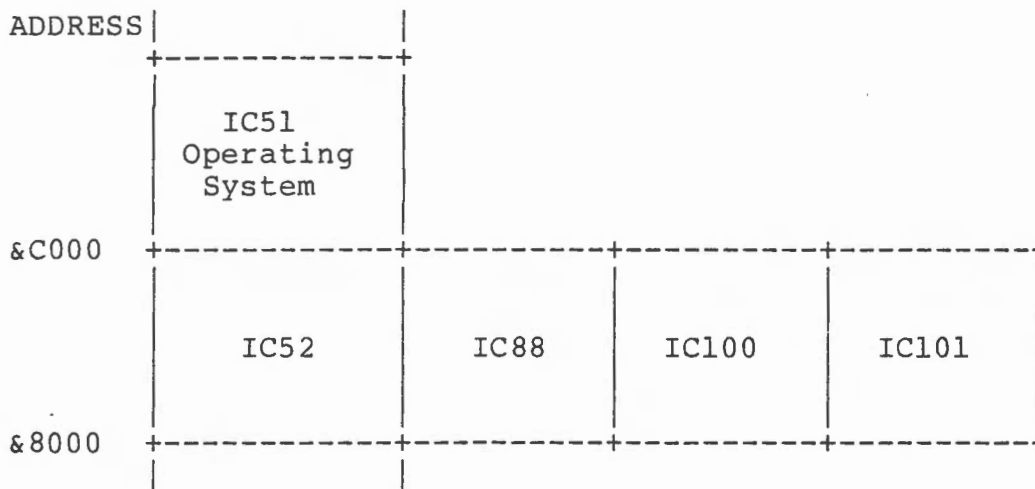
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SIDEWAYS ROMS

1 Introduction

The BBC microcomputer can be configured to have up to 16K of software from &8000 to &BFFF paged in (i.e. present in the address space) under OS control. Up to 16 such 16K pages may be placed side by side in this location but only 4 sockets are available in the machine so extra hardware is required to use to full extent. Paged ROMs reside in ICs 52, 88, 100 and 101 on the main BBC PCB. These sockets can also accept EPROMs (type 2764, or 2732) if the appropriate links have been selected. The memory map in this region would appear as below:



The paged ROMs are ICs 52, 88, 100 and 101.

The first section of a paged ROM must conform to a specific format. ROMs that do not conform are ignored by the OS.

The required format is shown below:

OFFSET		SIZE
0	JMP (language)	3
3	JMP (service)	3
6	ROM type	1
7	Copyright offset pointer	1
8	Version number (binary)	1
9	Title string	[t]
	&00	1
	Version string	[v]
	&00	1
	'('	1
	'C'	1
	')'	1
	Copyright string	
	&00	1
	Rest of ROM . . .	

Note that the copyright offset pointer is relative to the start of the ROM and points to the zero before the '('.

Each field of the ROM format is described in the following sections.

1) JMP (language)

A three byte JMP instruction referring to the language entry point. This field should contain zeros if the ROM is not a language ROM.

2) JMP (service)

A three byte JMP instruction referring to the service entry point. This field should contain zeros if the ROM is not a service ROM.

3) ROM type

A byte identifying the type of code contained in the ROM.

```
-----  
| S | L | 0 | K | 0 | 0 | 1 | 0 |  
-----
```

S=1 => this is a service ROM
L=1 => this is a language ROM

A ROM may be both a language ROM and a service ROM.
All OS ROMs have S=0 and L=0.

K=1 => this language ROM supports soft key expansions on the Electron.

4) Copyright Offset pointer

A pointer relative to the beginning of the ROM pointing to the zeros after the version string.
It is important that this offset points to the four bytes '&00', '(', 'C', and ')' in order. This sequence is used by the OS to determine whether a physical ROM resides in a paged ROM socket.

5) Version number (binary)

A version number (in binary starting from zero) distinct from version numbers appearing in previous generations of ROM software. This byte need not have any correspondance with the version string.

6) Title string

A string identifying the ROM. This string is output by the OS when entering the ROM as a language ROM.

7) Version string

A string identifying the release number of the ROM software. The recommended format is A.BB, where A and B are decimal digits.

8) Copyright string

A string identifying the software house responsible for the ROM product. The recommended format is the year, followed by a space, followed by the name of the company.

When a language is entered the error report pointer is set to point to the zero byte preceding the copyright string. (For example, in BASIC the REPORT command outputs the copyright string).

Rest of ROM

The program code itself.

2 Language sideways ROMs

Note that you may be wanting to write a language ROM even if you are not writing a language (!) - notable language ROMs include Text editors, Dumb terminal emulators, Teletext decoders, games, and other stand-alone application programs not requiring a language. Language ROMs are slurped across the 'TUBE' in a dual processor configuration and hence have access to all that wonderful memory on the other side. The penalty for this is that Languages must not make hardware dependant peeks & pokes. To get the best of both worlds, a ROM may be a hybrid, with a machine-independant 'language' section communicating with the sordid hardware poking code (which has service ROM status) by unallocated OSWORD calls.

The language entered on power up is the language in the paged ROM socket that is closest to the edge of the BBC microcomputer main PCB. The language entered after a BREAK is the language active at the time that BREAK was pressed. After a ctrl. BREAK, the language in the paged ROM closest to the edge of the PCB is entered again.

The language can be changed by typing the appropriate command (e.g. *BASIC or *PASCAL). This is recognised in the standard service ROM manner, and hence the service ROM bit must be set in the ROM header if the language is to be started in this way. Upon recognising the relevant *command from the service entry, OSBYTE should be called with A=&8E, X=<ROM no.> (The ROM no. is in X on entry and also in location &F4). Note that this OSBYTE call never returns, so there is not a lot of point in preserving registers, for example, hoping to restore them afterwards, as there is no afterwards! The rom will now be entered at the language entry point, and will also be re-entered after BREAK has been pressed (it is at this point that the perilous journey into the second processor is undertaken. Note that there is no processor type checking done so an NS16032 may be given the language contents of a standard sideways rom). On entry, A contains an entry code - see below.

On entry, language ROMs must enable IRQ interrupts, or the MOS will not work. For workspace, the language has available 1K from &400 to &800 plus the dynamically allocated memory from the 'OS high-water-mark' to the start of the currently selected screen mode (the screen start should be requested from the MOS by OSBYTE call, because this indicates that on TUBE systems the screen takes up no room at all, and on model As it comes down much further than on model Bs). The language is responsible for intercepting the BRK vector and handling BRKs to produce a sensible error response (this can be left out if the ROM is so simple that no errors can occur, but remember that even calling OSWRCH can cause an error if the spool file is full, for example).

Language Entry Codes

A=0 Entry to Tube code if no language present

A=1 Normal entry to start up language

A=2 Request next byte of soft key expansion (Key no. set by call with A=3, result in Y)

A=3 Request length of soft key expansion (Key No. in Y, result in Y)

Note that codes 2 & 3 are only used for ROMs required to run on the electron and will not be used on the BBC computer. These calls will only occur if bit 4 of the ROM type byte is set.

3 Service sideways ROMs

A service ROM may take several forms:

A filing system

An application package (e.g. CAD graphics)

An application program (e.g. joystick keyboard for the disabled).

Any filing system (e.g. disc) integrates into the OS via a service ROM interface (except the cassette filing system which is resident in the OS ROM). Thus the discussion for service ROMs applies to all filing systems other than the cassette.

When a service is 'offered' to service ROMs in turn, it is offered to ROMs from the edge of the PCB inwards. On offering the service, A will hold a reason code, X a ROM number and Y a parameter if applicable. The reason codes are tabulated below and then explained in more detail:

REASON CODE	DESCRIPTION
00	NOP
01	Absolute space claim
02	Relative space claim
03	Bootstrap
04	Command, unknown to OS
05	Interrupt, unknown to OS
06	BRK
07	OSBYTE call, unknown to OS
08	OSWORD call, unknown to OS
09	*HELP
0A	Claim static work space
0B	NMI being released
0C	NMI request
0D	
0E	
0F	Vectors claimed
10	
11	

The OS offers some of these on power-up, the others at other times depending upon what the OS is called upon to do. After looking at the offer, each sideways ROM must restore the registers to their condition on entry to the ROM. If the ROM accepts the service then after processing, the ROM must return A=&00 so that the call is ignored by all other ROMs (A=&00 corresponds to no-operation, NOP).

REASON CODE=&00

This means the call has been claimed by someone else and therefore should be ignored.

REASON CODE=&01

Absolute space claim.

This service is offered on power-up, and lets the ROMs tell the OS how much work space they would require if called. Pages &E00 and above provide a fixed work area. On power-up, the sideways ROM code is called with A=&01, X = ROM number and Y = top of fixed area. If the top of the fixed area is not sufficient for the requirements of the code, then it should be increased, otherwise Y should be preserved.

REASON CODE=&02

Relative space claim.

This memory space is 'relative' because it follows on from the fixed area which has a variable upper boundary (depending upon the static work space requirements of the ROMs). Each sideways ROM has the opportunity on power-up to claim part of the relative area, which then becomes private to that ROM - hence also called private data area. The area for each ROM should be large enough to store all the data required to keep the context of the code during a dormant phase. At power-up the OS calls the ROM with A=&02, X = ROM number and Y = start page. If private space is required, Y should be incremented, the initial value being the start of the reserved area to be used. The first piece of code in a ROM should store this in the ROMnumbereth location of the 16 bytes from &0DF0 to &0DFF. Subsequent pieces of code should know their base addresses relative to this. Hence all code intended to be placed within a sideways ROM would include a definition for the offset from the start of the data area, and the necessary code to add it to the pointer.

REASON CODE=&03

Auto-boot.

Each service ROM is given the opportunity of auto-booting after the start-up message has been displayed (i.e. after power-up or BREAK). The ROM should test for a condition under which it might (a) be selected and (b) automatically load/execute/EXEC a file with name '!BOOT'. The service ROM should determine whether any key is pressed. If no key is pressed or a key unique to the service ROM

(e.g. 'D' for the DFS) is pressed then the ROM should select itself.

If the service ROM determines that it should not select itself then it should return without claiming.

If the filing system determines that it should select itself then it should auto-boot if it is entered with Y=0.

The exact interpretation of auto-boot is service ROM dependent.

REASON CODE=&04

Offers command line for interpretation.

When the user issues an OS command it is processed by the OS. The OS may recognise it, in which case the corresponding code will be executed. However, if the command is not recognised it is offered to the service ROMs. The unknown command is offered to each of the service ROMs in turn. A service ROM may either ignore the service, or claim the command, in which case the service will not be offered to other service ROMs.

It should be noted that only filing system independent commands should be intercepted or filing system selection commands; thus utilities may intercept here but filing systems may not.

Commands that should be intercepted - DISC,NET,BUILD,....

Commands that should not be intercepted - INFO,DELETE,....

ON ENTRY,

A has the value &04

X contains the ROM number.

Y Contains an offset, which combined with the pointer in zero page located at &00F2 points at the line to be processed (spaces and asterisks have been skipped).

ON EXIT, restore all the registers. Set A=&00 to prevent other service ROMs being offered the service.

If no service ROM claims the unknown command then the command is offered to the currently active filing system.

REASON CODE=&05

Unknown interrupt.

If an interrupt occurs which the OS does not recognise, it will offer it to the service ROMs. In such a case, A=&05, X = ROM number.

If a service ROM recognises the interrupt then it should accept the offer and process the interrupt accordingly. Afterwards it should return with A=&00 to prevent other service ROMs being offered the interrupt. N.B. You should return with an 'RTS' NOT an 'RTI'.

REASON CODE=&06

BREAK

(e.g.'D' for the DFS) is pressed then the ROM should select itself.

If the service ROM determines that it should not select itself then it should return without claiming.

If the filing system determines that it should select itself then it should auto-boot if it is entered with Y=0.

The exact interpretation of auto-boot is service ROM dependent.

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Offers command line for interpretation.

When the user issues an OS command it is processed by the OS. The OS may recognise it, in which case the corresponding code will be executed. However, if the command is not recognised it is offered to the service ROMs. The unknown command is offered to each of the service ROMs in turn. A service ROM may either ignore the service, or claim the command, in which case the service will not be offered to other service ROMs.

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Commands that should not be intercepted - INFO,DELETE,....

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ON EXIT, restore all the registers. Set A=&00 to prevent other service ROMs being offered the service.

If no service ROM claims the unknown command then the command is offered to the currently active filing system.

REASON CODE=&05

Unknown interrupt.

If an interrupt occurs which the OS does not recognise, it will offer it to the service ROMs. In such a case, A=&05, X = ROM number.

If a service ROM recognises the interrupt then it should accept the offer and process the interrupt accordingly. Afterwards it should return with A=&00 to prevent other service ROMs being offered the interrupt. N.B. You should return with an 'RTS' NOT an 'RTI'.

REASON CODE=&06

BREAK

(e.g.'D' for the DFS) is pressed then the ROM should select itself.

If the service ROM determines that it should not select itself then it should return without claiming.

If the filing system determines that it should select itself then it should auto-boot if it is entered with Y=0.

The exact interpretation of auto-boot is service ROM dependent.

REASON CODE=&04

Offers command line for interpretation.

When the user issues an OS command it is processed by the OS. The OS may recognise it, in which case the corresponding code will be executed. However, if the command is not recognised it is offered to the service ROMs. The unknown command is offered to each of the service ROMs in turn. A service ROM may either ignore the service, or claim the command, in which case the service will not be offered to other service ROMs.

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Commands that should be intercepted - DISC,NET,BUILD,....

Commands that should not be intercepted - INFO,DELETE,....

ON ENTRY,

A has the value &04

X contains the ROM number.

Y Contains an offset, which combined with the pointer in zero page located at &00F2 points at the line to be processed (spaces and asterisks have been skipped).

ON EXIT, restore all the registers. Set A=&00 to prevent other service ROMs being offered the service.

If no service ROM claims the unknown command then the command is offered to the currently active filing system.

REASON CODE=&05

Unknown interrupt.

If an interrupt occurs which the OS does not recognise, it will offer it to the service ROMs. In such a case, A=&05, X = ROM number.

If a service ROM recognises the interrupt then it should accept the offer and process the interrupt accordingly. Afterwards it should return with A=&00 to prevent other service ROMs being offered the interrupt. N.B. You should return with an 'RTS' NOT an 'RTI'.

REASON CODE=&06

BREAK

Any BRK instruction causes this call before indirecting through <BRKVEC> at &0202. BRK's are used to signal errors.

REASON CODE=&07

Unknown OSBYTE call.

An OSBYTE call will normally be processed by the OS. If, however, the OS does not recognise the call it will pass it on to the service ROMs.

When an OSBYTE call is offered to the service ROMs, the A,X and Y registers (which initially hold parameters relevant to the OSBYTE call) are stored in locations &00EF thro' &00F1. The ROM should check that the call applies to it be checking location &00EF.

If a service ROM accepts the OSBYTE call, it should, after dealing with it, return A=&00 and the X and Y registers unchanged.

REASON CODE=&08

Unknown OSWORD call.

An OSWORD call is normally dealt with by the OS. However, if the OS does not recognise an OSWORD call then it will be offered to the service ROMs in a manner similar to unknown OSBYTE calls. The contents of A,X and Y (which point to the control block) are stored in locations &00EF thro' &00F1. The ROM should check that the call applies to it be checking location &00EF. Again, on accepting an offer, a service ROM should deal with the call and then return with A=&00 and the X and Y registers restored. It should be noted at OSWORDS > 127 are not really OSWORDS at all but pass through the user vector at &0200.

REASON CODE=&09

*HELP

When a *HELP command is intercepted by the MOS this call is initiated. The rest of the command line is pointed to by (&F2),Y in the standard manner. If the remainder of the line is blank then the name of the ROM followed by version number should be output and on subsequent lines any subheadings to which the ROM will respond. Thus the DFS outputs:

```
DFS n.nn
DFS
UTILS
```

Showing that it will respond to *HELP DFS and *HELP UTILS.

If the rest of the line is not blank then the ROM should compare it against its subheadings and if any of them match then it should output the info from under that subheading. Thus *HELP UTILS will produce:

```
DFS n.nn
BUILD <fsp>
```

DISC
DUMP <fsp>
LIST <fsp>
TYPE <fsp>

If there is more than one item on the line then the ROM should respond to all of them individually.

The following two reason codes may be used by a sideways ROM in conjunction with the OSBYTE call with A=&8F (the reason code being put in X). These calls should be used by a ROM when it is activated, to claim the static work space (reason code &0A) and/or the NMI area (reason code &0C) if these areas are required.

REASON CODE=&0A

Claim static workspace

When a sideways ROM is activated it may call OSBYTE with A=&8F, X=&0A and Y=&FF to claim the static workspace, the previous user will save any valuable contents in its private area. The work area is not returned after use - the next user simply claims it, and will only release it when asked by a new user starting up. When acceptng a call from some other claimant, the variables in the fixed area which are required to maintain context should be written to some variable area. This may be in the private variable space, or in some secret place, such as the 1K of RAM on the teletext unit. At the same time, any scratch data should be marked as lost, or for random file buffers, written back to disc. On claiming this area, the zero page workspace is also available (&20 bytes). Variables in this area are lost in the same way as variables in the main area.

****note**** The claiming of workspace and the selection of filing system are totally independant, so you may have the workspace but not be selected as the filing system (eg if the cassette has been selected, which has its own workspace), or, far worse, be selected as the filing system but not have the workspace. To cope with this, you should have a flag (which must be in your private workspace !) to indicate whether you have the workspace. If you are entered in any way, you should check this flag, and if you find that you do not have the workspace, you should immediately grab it back. This is a pain to implement !!!! An easier (though undesireable) soloution is to give up being the selected Filing system when you are called upon to release the workspace. To do this you must change all the indirection vectors to point to a convenient RTS.

REASON CODE=&0B

Release NMI

This code indicates that the previous NMI claimant has released it and the original owner can have it back. Y contains the ID of the previous user and so should be compared against the ID of the ROM, if it is the same then A should be set to zero on return otherwise all

registers should be preserved. During this call filing system zero page should not be stamped on.

REASON CODE=&0C

Claim NMI.

This area is always reserved from BASIC if there are any sideways ROMs plugged in. To actually use it, OSBYTE should be called with A=&8F, X=&0C and Y=&FF to tell the previous user to relinquish it and stop causing NMIs. On return, Y will hold the previous user's Code ID, or &FF if it was not previously in use. When a piece of code has finished with NMI, OSBYTE should be called with A=&8F, X=&0B and Y=previous Code ID to allow the previous user to continue using it. On claiming NMI, the 8 bytes of NMI zero page become available. The contents of these bytes are lost when NMI is released, and so should be stored in a private allocation. Note: (i) It will be necessary to store the previous Code ID until NMIs are no longer required. (ii) There should be no need to check whether an NMI was caused by your hardware, as all other sources of NMI should have been turned off. However, it is probably better to check for and ignore spurious NMIs when speed is not critical, as this makes the system more robust. During this call filing system zero page should not be stamped on.

REASON CODE=&0F

Vectors claimed.

When a ROM claims the filing system indirections it should call OSBYTE with A=&8F, X=&0F; the reason for this is not entirely clear... see Paul for further details. During this call filing system zero page should not be stamped on.

REASON CODE=&12

Init filing system Y

This call enables a service to find out what filing system is active (with OSARGS A=0,Y=0) switch to something else and restart it by calling this. Therefore if Y equals your filing system number, init yourself and set A=0 to tell the world you've done it - simple isn't it! (n.b. As usual this is a facility that the SFS and CFS do not have and therefore they must be initialised by different means.)

4 Filing system Roms

In addition to the standard sideways ROM interface described above, a filing system has to make use of the filing system interface to obtain file related calls.

Initialisation

Three things can cause a filing system to become selected - a *command (eg. *DISC) detected by sideways call with A=&04, a sideways

call with A=&12 and Y=<your filing system number>, or an Auto-boot at Reset time. Note that the relevant workspace must have been allocated at Reset-time (see sideways call with A=&01 & A=&02).

Auto-boot

On receipt of a sideways call with A=&03, the filing system should auto-boot if appropriate. The filing system should check at this point for things such as the presence of appropriate Hardware - there may be more than one FS in a standard ROM, and the user does not want the wrong one selected. (Actually, the test should have been performed at the workspace claiming stage, since the user of an Econet system does not want space reserved for disc file buffers if he has no disc but both FS's are in the same ROM). If Y=0 also, the FS should do something with a file called !BOOT, according to the possibilities of the FS in question (DFS & NFS offer the option of *RUN, *EXEC or *LOAD). Note that the Language has not yet woken up, so the response to any BRK will be silly unless the FS has temporarily indirected it, or deals with its errors in a different way (not difficult, since all errors usually pass through one routine which copies them out into RAM).

Action on initialisation

On initialisation, the filing system must claim the filing system indirections and the filing system workspace, if required (ie. usually).

To claim the filing system indirections, the previous owner must first be told to get out. This is achieved by a call to OSFSCM with A=&06. Since OSFSCM does not exist as a call in the OS, it is necessary to fabricate a JSR indirect through &021E (JSR to a JMP (&020E),RTS). Beware that zero page may disappear under your nose, so don't leave anything valuable in there. Next the indirections should be indirected to point to your code. This is a two stage process - first the main indirection must be set to point at location (&FF00+3*n) where the vector you are changing is at (&0200+2*n) - eg. the vector at &0212 would be set to &FF1B. Second, the three byte vectors whose address is found by a call to OSBYTE with A=&A8,X=&00,Y=&FF (the answer being in X and Y, X=lo byte) must be set to point to the actual routine. The three bytes go lo-byte,hi-byte,ROM id. The ROM id was in X on entry, but you have probably forgotten it, so it can be obtained from location &F4. Finally, OSBYTE should be called with A=&8F,X=&0F to indicate to any interested ROMs that you have taken over.

The OSFSCM Indirection

This is a vector through which the OS passes various filing system functions which it has decoded, giving a reason code in A.

Reason code &00

A *OPT command has been issued - the two parameters are in X and Y

Reason code &01

EOF check - the OS has received a call to OSBYTE with A=&7F to check for end of file conditions. Beware that the handle is in X rather than the usual Y. On return, X should be set to &FF if there is an end of

file on channel X, otherwise X should be set to &00.

Reason code &02

A */<filename> command has been received by the OS. This should usually be treated in the same way as *RUN, as this is a standard abbreviation.

Reason code &03

*command - this is the last chance : either the command should be recognised, or it should be treated as an unrecognised command. 'Fast' filing systems should attempt to *RUN the appropriate file, but slow systems should give a "Bad command" error, since the user does not want to wait for miles of tape to wind past before he realises that he has mis-spelt the *CAT command, for example. On entry, XY points to the command name. (X is 10 byte as usual)

Reason code &04

*RUN command. Load and execute the command pointed to by XY

Reason code &05

*CAT - print a catalogue. XY points to the rest of the command line in case you need parameters.

Reason code &06

Another filing system is about to take over the filing system vectors, so die gracefully - close the spool & exec files with OSBYTE call &77 and do anything else you think appropriate.

Reason code &07

Return the range of handles used by your filing system - X=<lowest value used>, Y=<highest value>

Reason code &08

This call occurs each time the OS is about to process a *command. This is used by the DFS to implement the *ENABLE mechanism, which is turned off by the next *command of whatever type.

Memory summary

Zero page:

&A0 to &A7 NMI area - may only be used after claiming NMI

&A8 to &AF

Utilities area - may be used by filing systems when processing *commands but at no other time.

&B0 to &BF

Filing system scratch space - use it, but don't expect it to remain the same between calls. Also, don't use it for IRQ routines.

&C0 to &CF

Filing system dedicated space - guaranteed to remain intact between



3.3 RS423 APPLICATION NOTE

It is often useful to be able to transmit and receive characters and data by means of the RS423 port, without affecting the use of the print stream to parallel (or otherwise connected) printers. This task is most easily accomplished from a BASIC program by making use of the OSBYTE calls available in the Series One MOS.

The following BASIC program makes use of these facilities to enable the BBC Micro to act as a 'Dumb' terminal.

NOTE THAT THIS PROGRAM REQUIRES MOS 1.0 OR GREATER.

```

100 REM DUMB TERMINAL
200 REM VERSION I
300 REM ACORN COMPUTERS
400 REM
500 REM ENABLE RS423
600 *FX 2,2
700 REM SET RECEIVE & TRANSMIT BAUD RATES
800 *FX 7,3
900 *FX 8,3
1000 REM MAIN PROGRAM LOOP
1100 REPEAT
1200 A% = INKEY (0) [GET KEY FROM KEYBOARD]
1300 IF A% > 0 : A% = FNTX (A%) [IF KEY PRESSED, SEND IT]
1400 A% = FNRX [CHECK FOR RECEIVED CHARACTER]
1500 IF A% > 0 : PRINT CHR$(A% AND & 7F); [IF VALID, PRINT IT]
1600 UNTIL 0 [REPEAT INDEFINITELY]
1700 REM
1800 REM
1900 REM FUNCTION TO RECEIVE CHARACTERS
2000 DEF FNRX
2100 A% = 145 : X% = 1 [CALL OSBYTE TO CHECK BUFFER]
2200 R% = USR (&FFF4)
2300 E% = R% AND & 10000000 [SET UP E% TO INDICATE IF CHARACTER RECEIVED]
2400 Y% = (R% AND & FF0000) DIV & 10000 [MASK OUT CHARACTER]
2500 IF E% : = -1 : ELSE = Y% [RETURN -1 OR CHARACTER]
2600 REM
2700 REM

```

```

280 REM FUNCTION TO TRANSMIT CHARACTER
290 DEF FNTX (Y%) [CALL OSBYTE TO TRANSMIT]
300 A% = 138 : X% = 2 [THE SUPPLIED CHARACTER]
310 = USR (&FFF4)

```

PROGRAM DESCRIPTION

The above program makes use of two vital operating system calls; the call with A% = 145 (line 210) checks to see if a character is present in the RS423 receive buffer and this call is documented in the User Guide on page 435. The other call with A% = 138 (line 300) puts a character into the RS423 transmit buffer and is described on page 433 of the User Guide. The *FX2,2 command on line 60 enables the RS423 receiver whilst allowing the keyboard to be used. This is described on page 421 of the User Guide. NOTE: There is an error in this section of the User Guide and *FX2,0 actually gets characters from the keyboard and DISABLES the RS423 receiver.

RS423 HARDWARE

The RS423 interface is upwards compatible with the RS232 standard, and whilst some electrical details differ, a number of important features are shared by both standards.

i) Electrical Characteristics

Both standards use negative voltages to represent logic One, and positive voltages to represent logic Zero. The RS423 interface uses -5V and +5V respectively.

The lines idle with continuous ones (i.e. -5V) when no data is being transmitted.

The RS423 standard specifies data transmission up to 4000 ft, but this length is variable subject to the data rate.

ii) Operating System Control

The CTS input to the computer must be logic One (i.e. -5V) for the computer to transmit data.

The RTS output from the computer indicates that the computer is ready to transmit data; this is acknowledged with CTS.

For operation with peripherals which do not support RTS/CTS handshaking, the two pins may be connected together, and a *FX2,2 command will enable operation.

3.4 CHANGING THE RS423 DATA FORMAT

The serial port on the BBC Micro by default transmits and receives data as 8 - bit bytes preceded by one start bit and followed by one stop bit. This format was chosen because of its generality, however, it is often necessary to alter this format in order to communicate with other devices.

The format can be altered to any of those shown below (fig. 1), by means of the FX/OSBYTE call with A = &9C (156) and X = appropriate value.

In order not to alter other parameters of the 6850 ACIA chip, a mask is supplied with the call specifying which bits are to be altered. This mask must be &E3 (227). The following data byte is then supplied to set the format.

<u>VALUE</u>	<u>FORMAT</u>
0	7 Bits + Even Parity + 2 Stop Bits
4	7 Bits + Odd Parity + 2 Stop Bits
8	7 Bits + Even Parity + 1 Stop Bit
12	7 Bits + Odd Parity + 1 Stop Bit
16	8 Bits + 2 Stop Bits
20	8 Bits + 1 Stop Bit
24	8 Bits + Even Parity + 1 Stop Bit
28	8 Bits + Odd Parity + 1 Stop Bit

Fig. 1

The call is made either by:-

*FX 156, VALUE (from above), 227

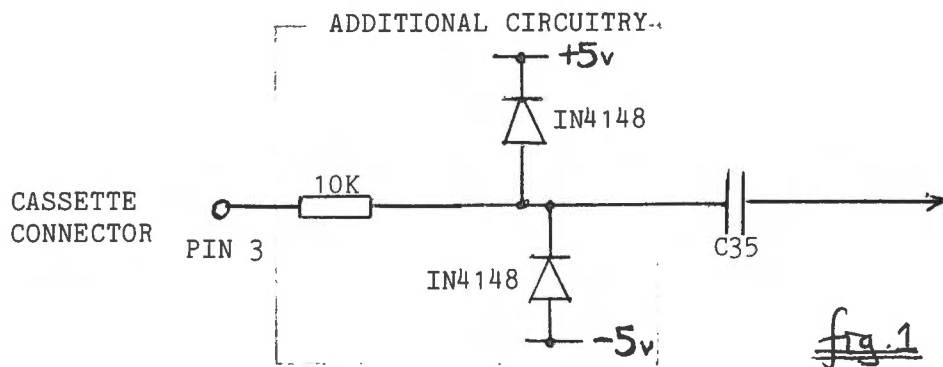
or by calling OSBYTE (JSR &FFF4)
with A = 156, X = VALUE (as above), Y = 227.

3.5 CASSETTE INTERFACE CIRCUITRY PROTECTION.

It has come to our notice that the cassette interface of the BBC Microcomputer can in some cases be damaged by certain tape recorders. The following additional circuitry can be added to any board in order to minimise this problem. (fig. 1)

COMPONENTS REQUIRED:

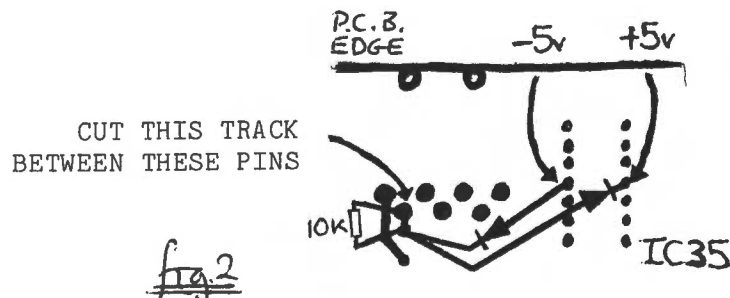
- 2 x 1N4148 Diode
- 1 x 10K $\frac{1}{4}$ Watt 10% Carbon Film Resistor



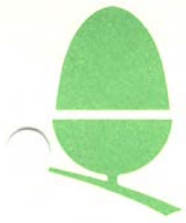
MODIFICATION:

The modification is performed as follows:

- i) Ensure the computer is disconnected from the mains
- ii) Disconnect the 7 power supply connectors from the main PCB, and disconnect or unsolder (as appropriate) the two connectors to the Video Out socket.
- iii) Unscrew the PCB and remove it from the case. Place it upside-down on a flat surface.



- iv) Identify the cassette socket and IC35 as shown in fig 2 above. Cut the track marked, and fit the 10K resistor and the two diodes as shown. Make sure that the leads from the diodes do not touch



any other of the pins of IC35, preferably by insulating them with a short length of heat-shrink sleeving or wire insulation.

- v) Re-install the main PCB by reversing (ii) and (i) above. This completes the modification.



3.6 *FX/OSBYTE features not documented in
the BBC MICROCOMPUTER USER GUIDES
FOR THE SERIES ONE M.O.S.

&ØD (13)

Two undocumented parameters may be supplied in X to disable events:

- X = 7 disable RS423 receive error event
- X = 8 disable service/network error event

&ØE (14)

As above, two undocumented parameters may be supplied in X to enable events:

- X = 7 enable RS423 receive error event
- X = 8 enable service/network error event

Events are explained on p 465 of the User Guide

&76 (117)

This call returns the VDU status byte (which contains various status flags) in the X register.

- BIT 0 - set if VDU2 sent, cleared by VDU3
- BIT 2 - set if PAGED MODE ON, cleared if PAGED MODE OFF
- BIT 3 - set if software scrolling, cleared if hardware scrolling

Software scrolling is used when text windows have been defined whereas hardware scrolls are used when the whole screen scrolls.

- BIT 5 - set when cursors joined by VDU 5
- BIT 7 - set if VDU disabled

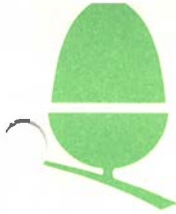
&76 (118)

Returns with the carry bit set if the CTRL key is pressed, and with the Negative bit set if the SHIFT key is pressed. Machine code routines may branch on these conditions. This feature is invalid when called from a Second Processor.

&7B (123)

This call is used by the User Print Routine to indicate to the MOS that it has finished its task. (CF *FX 5.3 command). This feature should not normally be called from a Second Processor.

&8A (138)



This call has been expanded to allow a character to be inserted into any buffer.

X must contain the buffer number, and Y the character to be inserted.

A list of buffer numbers appears with *FX 21 on p 428 of the User Guide.

&8D (141)

This command is exactly equivalent to the *ROM command.

&98 (152)

This call examines a buffer. The buffer number must be in X, and the call returns as follows:-

- Carry bit set if buffer empty
- Carry bit clear indicates character(s) present in buffer.
- Note that no character has been removed from the buffer.

&99 (153)

The call inserts a character into an INPUT buffer handling the interrupt character, and generating an escape condition if necessary.

- Valid only for X = 0 or 1
- Y must contain character to be inserted

&9C (156)

Change 6850 control register.

The 6850 control register is altered to: (Old value AND Y) EOR X.

(See User Guide page 438)

Refer to the 6850 Data sheet for details of the 6850 control register.

&9E (158) /&9F (159)

These calls respectively read and write to the Speech Processor chip. Refer to the Speech System User Guide.

&E9 (233)

As for &E7 (see User Guide page 441) but affects the system 6522. The system 6522 is used extensively in the normal operation of the machine and consequently this call should be used with extreme care.

&EB (235)

Return presence of Speech Processor.

- X = &FF if Speech Processor present
- X = &00 if Speech Processor not present

&FI (241)



Read/Write *FX1 value

&F5 (245)

Read/Write *FX5 value

XF6 (246)

Read/Write *FX6 value

THESE THREE CALLS OPERATE AS DESCRIBED IN THE USER GUIDE ON PAGE 438.

&FC (252)

Reads I.D. of current language, a number from 0 to 15 which indicates which socket the presently selected language ROM is in. The sockets are numbered from right to left starting at 15. On board sockets are 15, 14, 13, 12; and the remainder can be installed offboard. This call may not be meaningful from a Second Processor, since there may not necessarily be a current language in this case.

&FD (253)

Returns a number indicating what sort of reset last occurred:

0 = Soft Break
1 = Power-On Break
2 = CTRL Break

&FE (254)

Read/Write available RAM in BBC Microcomputer (even when called from Second Processor)

128 = 32k
64 = 16k

&FF (255)

Read/Write start up option byte.

This allows the keyboard link value to be read: it may be written to, but the value will be reset to the actual wired value on any reset other than a soft-reset.

The links are configured as follows:

1	2	3	4	5	6	7	8
X	X	D ₂	D ₁	B	M ₃	M ₂	M ₁

D₂, D₁ : Disk configuration bits (see Disk Manual)

B : Auto-boot select (Auto-boot when fitted)

M₃, M₂, M₁ : Screen mode on hard reset (∅ - 7)

X : Unused

3.7 PRODUCING COLOUR ON THE VIDEO OUT SOCKET

The BBC computer usually produces a black and white composite video signal through the Video Out Socket on the back panel, but it may be modified to produce a colour signal. This is achieved as follows:

On Issue 1, 2 and 3 PCB's, a 470 picoFarad capacitor should be fitted between the emitter of Q9 (identified by an "e" next to one leg) and the base of Q7 (the central leg).

On Issue 4 and later, the capacitor is on-board and can be connected simply by fitting link S39 which may be found next to the modulator in the far right corner of the PCB.

With the fitting of this capacitor, the colour burst signal is now fed to the video mixer and a colour monitor may be attached to the output socket. This allows the computer to be recorded on videotape etc.

The video output socket is specified for black and white in order to provide a stable high quality picture for word processing and other eighty character applications. It was decided that gating colour burst onto this output degraded the picture quality sufficiently to warrant the removal of this facility as standard.



3.8 BBC USER GUIDE ERRATA : UK VERSION

This is the current errata for the User Guide as supplied with all UK computers. (4/84)

- p13 The range of cassette leads shown have now been deleted.
- p23 The *FX command takes a second parameter which controls the interlace on Modes 0-6. If the second parameter is a 1 then interlace is turned on, if 0 then it is turned off. Note that the change in interlace operation only takes place after the next MODE command.
- p32 Insert a ':' after the ';' on line 115 of the example.
- p33 Insert a ':' after the ';' on line 160.
- p43 Add a '-' after '+/' on line 230.
- p53 (Second paragraph) Alter 'page 213' to 'page 211'.
- p61 Delete the space between 'RND' and '(4)' in line 100.

- p65 The arithmetic range extends from 170000 (1.7 * 10³⁸) to 0.000 (1.2 * 10⁻³⁹), not as shown.

- p67 In the second example program there should be a '\$' after each 'A' in line 40.

- p72 [BASIC II ONLY] At the top of the page, the maximum number of significant figures is 10, and the initial value of @% is &90A.

- p74 Add a ';' after "H" in line 40.
- p93 Alter line 100 of the example to read
FOR ROW = 1 TO 5.

- p100 (3/4 down the page) All non-zero values are regarded as true EXCEPT non-integers from -1 to +1.

- p143 (Top of page) Note that the "Auto-boot" mechanism does not work on the cassette filing system. (1/2 down the page) Change 'page 424' to 'page 422'.

- p152 (3/4 down the page) The code for 'New Background' is 157 not 137 as shown.
- p179 Line 10120 of the example should read MOVE X%,Y%.
- p204 (Last paragraph) 'page 428' should read 'page 426'.
- p288 Note that pressing <SHIFT> and <CTRL> together holds the listing until they are released, and that <ESCAPE> stops the listing.

- p327 Note that 'PRINT~' followed by a numeric argument prints that argument in hexadecimal.

- p328 (Paragraph concerning Integer Variables) Integers are sent MOST significant byte first, not least significant byte first as shown.

- p416 (First paragraph) The whole LINE after a '*' is passed to the Operating System, rather than just the rest of the statement.
- p421 Alter *FX2,0 to read '..and DISABLES the RS423 receiver.'
Alter *FX2,1 to read '..RS423 port, disables the keyboard.'

- p423 Add : *FX6,0 filters NO characters.
- p427 In paragraph six, 'After a *FX20,1 command...' the line should read 'After a *FX20,6 command...'
- p438 (Paragraph beginning 'If on entry,...') The net effect of X=&00 and Y=&FF is to read the value of V into X (not A as shown).
- p439 The second OSBYTE call shown is A=&E2(226) not &EA(228).
- p453 (Top paragraph) The channel number is returned in A not in Y as shown.
- p459 OSWORD A=0 : 'On exit....Y is set to the length of the line EXcluding the CR if C=0.' (Not INcluding as shown).
- p469- There should be '\ ' characters between the assembler
470 statements and the comments on EVERY line.
- p482 Add three error codes:
251 Bad Key
253 Bad String
254 Bad Command
- p488 The pattern for code 36 should be inverted (ie black:=white and white:=black).
- p489 The pattern for code 228 is upside-down.
- p490 The comments for codes 24 and 27 should be reversed (ie 27=Nothing).
- p497 The codes for the UP and DOWN cursor keys should be reversed.
- p499 The pin numbers on the disc, printer, user input/output, 1MHz bus and Tube have been reversed (e.g. on the Tube, the top right pin is pin1, the bottom left pin is pin34)
- p501 Delete the comment that &D00-&DFF is for user supplied routines. This area is RESERVED for the Operating system.

The remaining errata concern the index (p513++). Only the corrected line will be given.

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3.9 RANDOM KEYBOARD INTERRUPTS

Under certain circumstances, particularly when the user is utilising the various options available from the bank of links on the bottom right of the keyboard, the speed of operation of the BBC Microcomputer can be enhanced by the following modification designed to help reduce spikes on the output lines of the 74LS30 on the keyboard which generates machine interrupts.

This modification may be carried out on all BBC Microcomputers irrespective of the issue of the circuit board.

1. Disconnect the unit from the mains power supply, remove the four fixing screws and remove the lid.
2. Change resistors No. R4 to R11 to be 2K2 1/4W 5% these resistors are located at the bottom right of the main P.C.B. with the exception of R6 and R10 which are found on the centre of the right hand edge of the main P.C.B.
3. Alternatively fitting a 560pF capacitor across pins 7 and 8 of the keyboard 74LS30 will also cure the problem.
4. Reassemble and test the machine.

This completes the modification.



3.10 DIFFERENCES BETWEEN BASIC I AND BASIC II

During 1982, an enhanced version of BBC Basic was created by Acorn in response to requests from users for additional facilities. In particular it was felt that the 6502 Assembler, which is a component part of BBC Basic, could be improved by the addition of an ability to generate code for sideways ROM's and other memory areas not usually mapped to RAM. Some of the BASIC keywords have been extended so they are more powerful and some additional ones have been incorporated. Furthermore some of the arithmetic routines have been recoded for greater precision. In keeping with Acorn's policy of providing a series of enhancements to our software, the BASIC II ROM can be ordered from any Acorn dealer.

ISSUE II BASIC

The new version of BASIC's differences with the old version are as follows:-

- (1) ELSE no longer leaves a byte on the hardware stack in ON.. GOTO/GOSUB.
- (2) INSTR no longer leaves the shorter string of INSTR("AB","ABC") on the Software stack.
- (3) The lexical analyser is now called correctly from EVAL so that EVAL("TIME") works.
- (4) ABS can take the absolute value of integers without bit 31 set without returning a string (i.e. PRINT -ABS 1 works).
- (5) ASC":" can be used in the assembler without confusing it.
- (6) A new statement OSCLI has been introduced, shortest abbreviation OS., token value &FF. It takes a string expression and gives it to the operating system, e.g. OSCLI "KEY "+STR\$Z+". This is key "+STR\$Z. It has no unique errors of its own, just the normal "Type mismatch" error.
- (7) The value of the token for OPENIN has changed to &BE and now just opens files for input only using the &40 open. A new keyboard openup (open for update) has been introduced with the old token value &AD which opens files for update using the &CO open. This results in old programs automatically changing to OPENUP when they are LOADED into the new interpreter.
- (8) The next bit in OPT (OPTs 4 to 7) controls whether code generated by the assembler will be put at the program counter P% or at the code original O%. If it is set code will be put at O% and both O% and P% incremented, if unset only P% will

be used. Current implementation results in all OPTs greater than 3 causing code to be put at 0%.

- (9) The LN and LOG functions are completely recoded to make them more accurate and to avoid the LN(2E-39) bug.
- (10) The fix routine avoids the INTLE38 bug.
- (11) The SIN/COS functions are completely recoded to make them more accurate.
- (12) The binary to decimal string conversion routines, used for PRINT and STR\$, have been changed to allow the use of 10 figures of precision on printing. The initial value of @% is now &0000090A to give the same results on startup. Note that @%=10 now gives the internal default of 10 figures. The changes allow the maximum positive integer 2147483647 to be printed out (and indeed get 2³² right). STR\$ when not controlled by @% uses the new 10 figure default which will result in it giving different answers to before e.g. 7.7 (a recurring binary fraction) will be converted to 7.699999999.
- (13) Four new operations are available in the assembler. These are EQUW, EQUW, EQUW, EQUW. They have no errors of their own apart from the Type mismatch error. They take a single argument and put its value into the assembly code. EQUW put all the characters of a string into the code WITHOUT a carriage return like \$P%; if you need a carriage return just add it to the string. EQUW may be used together with FN to implement macros as shown in this example:-

```

DEF FNOSBYTE (A,X,Y)
  IF A>127 [OPT Z:LDY#Y:]
  [OPT Z:LDX#X:LDA#A:JSR&FFF4:]
  =""

  [OPT Z
  EQUW FNOSBYTE(&99,33,44)
  EQUW FNOSBYTE(2,1,0)
  ]

```

- (14) The startup REPORT is the way to tell the new version of BASIC from the old one, the new one has (c)1982.
- (15) The bug associated with ON ERROR GOTO 9999 has been removed.
- (16) A MODE change now resets COUNT
- (17) BASIC will now only execute if A contains 1 on entry at 8000. There is no entry at 8003 any more.
- (18) BASIC is of type 60; this means that it contains its own tube



relocation address after all the standard sideways RCM items. Of course, with the general release this will be 00008000 (the default for no relocation) but this gives more trouble free production of relocated versions to run at 0000B000.

- (19) The version number is 01.
 - (20) In INPUT ';' is introduced and functions as the ',' does.
 - (21) Fatal errors have been introduced. Errors whose ERR is zero cause an ON ERROR OFF effect while they are being processed.
 - (22) STOP has been redefined as a fatal error, this causes the STOP at line 0 message to be corrected to STOP.
 - (23) The "No room" error is a fatal error.
 - (24) The standard error handling procedures do not use stack any more. The situation of running out of all free space no longer causes error messages to be printed out following by a "No room" message.
 - (25) The allocation of space for strings has been made slightly more efficient, it can cope with REPEAT A\$=A\$+"*": UNTIL LEN A\$ = 255 and only allocate 255 bytes. It still has problems if B\$ is being done alternatively with A\$.
 - (26) A new error 45 "Missing #" arrives if PTR, EOF, BGET, BPUT, EXT have a missing #.
 - (27) DIM P% -2 gives Bad DIM
-

3.11 CASSETTE RECORDER USAGE WITH BBC AND ELECTRON COMPUTERS

Several cassette recorders have been checked for compatability with our computers by the Product Services group. Comments on these various devices appear below. The non-appearance of any recorder on this list does not imply any dissatisfaction - merely that it has not been checked.

BBC DATA RECORDER

Operation very good using DIN input.

BUSH 3150

Operation satisfactory using microphone input.

HITACHI TRQ-240R

Microphone input causes overloading. Use an attenuator or use the DIN input.

SANYO DR101

Best operation is obtained by using the unit in DATA mode, with REVERSE phase.

SANYO SLIM 3A

Operation is just about satisfactory using the microphone input, although performance can be improved by attenuating the input by about 25:1.

W.H.SMITH CCR800

Microphone input causes overloading. Use an attenuator or use the IN input. COMPUTE mode produces much better results than NORMAL mode.

W.H.SMITH CPD8300

SAVE input causes overload. AUX input produces good results in both SPECTRUM and OTHER modes. A meter reading of 2-4 is recommended for both recording and playback.



3.12 USE OF EPROMS IN SIDEWAYS ROM SOCKETS OF THE BBC MICROCOMPUTER

The following Ultra-Violet erasable EPROMs may be used in the sideways ROM sockets:

64K BIT PARTS

INTEL D2764 D2764-2
AMD AM2764DC AM2764-20DC
FUJITSU MBM2764-252

32K BIT PARTS

INTEL D2732, C2732 or B2732
HITACHI HN462732
NEC UPD2732
TEXAS 2532JL-45 or 2532JL-35
HITACHI HN462532G

MITSUBISHI M5L2764K parts are not recommended for use in the BBC Microcomputer.

3.13 BBC MICROCOMPUTER - PARALLEL PRINTER PORT

PRODUCTION MODIFICATION

The following changes must be made to the Issue 2 Board to conform with Issue 3.

CUTS

- 1 S1 centre pad. Side 1. Cut link to south pad.
- 2/3 S1 north pad. Side 1. Cut both tracks.
- 4 PL9 pin23. Side 1. Cut track.

LINKS

- 1 Join together 2 tracks previously connected to S1 north pin.
- 2 Join S1 north pin to IC27 pin 7.
- 3 Join IC27 pins 9 and 7 and leave S9 not linked.
- 4 Join IC87 pin 10 to north pin to R49.
- 5 Join track previously connected to PL9. pin 23 to PL9, pin 19 (Model B only).

COMPONENT CHANGE

- 1 S1 is replaced by a BC239 Transistor, pinned as follows:-
 - e - north pin
 - c - centre pin
 - b - south pin
- 2 RL62 (4K7) should be inserted between existing holes 0.2" west of IC 70 pins 11 & 13.
- 3 Pin 26 of PL9 should be removed or cut too short to make contact.

This completes the modifications.

3.14 THE USER-PRINTER VECTOR

The BBC Microcomputer operating system (MOS) provides support for standard interfaces to serial (RS423) and parallel (Centronics) printers. However the facility also exists for a user to provide a printer driver for a non-standard printer interface, or to replace the standard MOS drivers with a customised handling of the interface.

The printer selection command *FX5 has an option (*FX5,3) to select the user supplied print routine which is called through the User Printer Vector (UPIV) at &222 (as shown at the top of page 512 in the user guide). This Vector should be modified to point to the user's print routine before the *F5,3 command is issued, so that the software will be called to initialise. The MOS communicates with the user print routine by 'reason codes' which are passed in the accumulator. These codes inform the user routine of events which may be of interest to it, and are as follows:

Reason code

- A=0 This call is a timer kick for polled printers. If a print routine is active then this call will be issued every centisecond to allow the routine to collect any characters which have arrived in the printer buffer. If the routine is dormant then this call will not be issued. This call is only available in MOS releases 1.1 and above. (For explanation of when a print routine is active and when it is dormant see reason code 1).
- A=1 This call 'wakes up' a previously dormant print routine to inform it that characters are present in the printer buffer. X contains the buffer number (which will be 3 in this case) and Y contains a number indicating which sort of printer is selected (From *FX5). The user printer is indicated by Y=3. The carry flag on exit from this call is significant: C=0 implies that the print routine remains active, C=1 informs the MOS that the routine is dormant and should be 'woken up' when more characters arrive in the printer buffer.
- A=2 This reason code indicates that a Control-B has been issued. This code is recognised as a command to start the print stream. No characters should be taken from the printer buffer until a Control-B is issued.
- A=3 A Control-C has been issued, which is a command to stop the printer stream.

For all of the above cases X holds the buffer identifier and Y holds the printer destination.

- A=5 A new printer destination has been selected by *FX 5,n. The



old selection is passed in the X register, the new selection is held in the location &F0 in zero page.

All registers should be preserved under all circumstances. All other reason codes are reserved by the MOS and must be ignored and flags should be preserved on unrecognized calls.

Characters should be taken from the printer buffer either by an interrupt driven task or by using the timer kick described above. These options may be implemented as follows:-

Interrupts

If the printer can use interrupts to indicate status, for example when it is ready to take another character, then the user routine may attach to the interrupt chain through the IRQ2 vector (&206). The interrupt service routine pointed to by IRQ2V should ensure that the interrupt was caused by the printer, and if it indicates that the printer is ready then the routine should attempt to take a character from the printer buffer and send it to the printer. If no character is available then the routine should disable the printer interrupt and inform the MOS that the routine is now DORMANT (by OSBYTE 123). A dormant printer task should also detach itself from the interrupt chain to avoid unnecessary overheads in interrupt processing. A printer routine which is dormant will be 'woken up' (by A=1) when more characters arrive in the printer buffer. A print routine which is not DORMANT is assumed to be taking characters from the printer buffer already, so is not called to 'wake up' when more characters arrive.

Timer kick

The timer driven routine should respond thus:

- 1 If the printer is busy then return
- 2 If the printer buffer was not empty then take characters and send them to the printer, then return.
- 3 If the printer buffer is empty then return DORMANT (by OSBYTE 123).

OSBYTE Calls

- A=123 This call informs the MOS that the current printer task needs to be 'woken up' when more characters arrive in the printer buffer. That is, the printer task is now dormant.
- A=145 This call removes characters from a buffer. The buffer number is specified in X. The printer buffer number is 3. if the carry is set then the buffer was empty, otherwise the Y register holds the character returned.

3.15 USE OF *FX3

Output characters destination

As a result of errors and omissions in the BBC User Guide, use of the *FX3 command is difficult, particularly when one destination, which is not the screen, is required.

The error in the User Guide is as follows:

Page 422: The chart of written character destinations shows four ticks in the Printer [Bit 2] column. There should not be ticks for FX 3,2 and 3,3.

There is an undocumented bit of this word (bit 3) which allows other bits to be overridden; this is summarised in the chart below:-

Value of n in decimal	Value of n binary				EFFECT			
	Bit 3	Bit 2	Bit 1	Bit 0	Printer	Screen	RS423	
0	0	0	0	0	✓+	✓	x	+ Printer controlled by VDU 1,2, 3 and *FX5 and *FX6
1	0	0	0	1	✓+	✓	✓	
2	0	0	1	0	x	x	x	
3	0	0	1	1	x	x	✓	
4	0	1	0	0	x	✓	x	
5	0	1	0	1	x	✓	✓	
6	0	1	1	0	x	x	x	
7	0	1	1	1	x	x	✓	* Printer controlled by *FX5 and *FX6 and automatically enabled
8	1	0	0	0	✓*	✓	x	
9	1	0	0	1	✓*	✓	✓	
10	1	0	1	0	✓*	x	x	
11	1	0	1	1	✓*	x	✓	
12	1	1	0	0	x	✓	x	
13	1	1	0	1	x	✓	✓	
14	1	1	1	0	x	x	x	
15	1	1	1	1	x	x	✓	

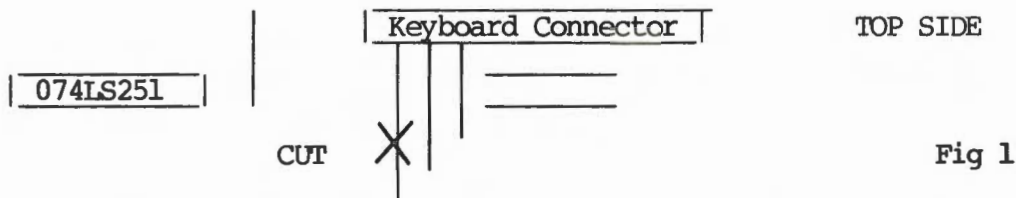
TABLE 1 - the effects of *FX3.n

Note that the appropriate printer must have been selected with *FX5, and that if a serial printer is selected with FX5 and RS423 is selected from the above chart (with FX3) then the output from the RS423 port is undefined.

3.16 CHANGING THE BREAK KEY

To disable the keyboard BREAK key:

The keyboard 'break' key may be disabled by cutting the wire link on the top side as shown in the diagram below.




To fit a separate BREAK key to the rear of the machine:

A separate 'break' key may be fitted to the rear of the BBC Micro as follows:

Open the machine and locate the "reset" aperture on the back of the machine. Clear the hole by removing the perforated disc from the back fascia if necessary.

Fit a switch (Part No 531-25 by Britimpex) to the two empty holes adjacent to the aperture and solder.

Reassemble the case.



3.17 ROM FILING SYSTEMS

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PLEASE NOTE : throughout the listing of the "File Conversion Program" included in this document, all occurrences of the £ symbol should be changed to the # symbol.

*ROM Data Formatting Program

This utility program creates an EPROM image which when blown into a 4, 8 or 16 K byte device allows access to files via the *ROM filing system.

The program transfers data from files present on disc and reformats the data, outputting to an image file.

The *ROM Filing System

The *ROM filing system is selected by typing in *ROM. This filing system behaves in a similar manner to the Tape Filing System except that the source of the data is in ROM or EPROM. The data is formatted in blocks with CRC checking on both block headers and the blocks themselves.

The *ROM data format differs slightly from the *TAPE format in that only the block headers of the first and last blocks contain the full file information (name, load address, execution address etc); the intermediate block headers contain only a marker to indicate their status so that needless duplication of data is avoided thus minimising memory overheads.

Software Protection

The *ROM filing system offers a facility for software protection by allowing a file to be *RUN only. If the protection option is switched on for a *ROM file then that file will only be accessible by using the *RUN command. Attempts to LOAD, *LOAD or *EXEC the file will return the message: FILE LOCKED. Programs may thus be written so that once loaded and running they may not be recovered by the user for the purpose of copying.

Use of the Program

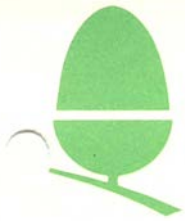
This program is largely self documenting as regards use and once this section has been read it is hoped that reference back to this document will not be necessary when running the program.

When creating a *ROM image access is required simultaneously from the files being transferred and to the file being created; it is envisaged that the image file will normally be formed on the disc containing the source files.

The program may be run by typing CHAIN "MAKEROM".

The first input required is the device memory size for which the *ROM data is intended. The program is set up to accept the numbers 4, 8 or 16 only.

A title for the *ROM image file is then required; only a valid file name will be accepted and a null file name will also be rejected.



*ROM Title

A *ROM title and number are prompted for so that a title may be placed at the head of the *ROM image. The title is a block of zero length incorporating the name and number of the *ROM. The actual title takes the form of the user supplied name followed by the number and preceded and followed by asterisks. The number must be in the range 0 to 15; in the title single digit numbers are padded with a zero.

The program then requires the user to enter a list of files which he wishes to incorporate into the *ROM image. The program tests each file as it is submitted testing for its presence on disc. Invalid filenames or files not present will be rejected and input may be resumed. Each input may consist of upto 4 items, the file name, a load address, an execution address and lock flag for switching in the software protect. The software protect flag is set by typing the letter L as the 4th item in the file input line. If the 4th item is not a letter L or there is no 4th item then the flag is not set.

During this input user specification of the load address, execution address and protect are optional and default values of zero and protect off will be used if only a file name is submitted. BASIC and text files do not require load or execution addresses and are unusable if protect is switched on. A null input (i.e. a carriage return only) terminates this input sequence. An input sequence may look like this:-

(Name) (Load address) (Execution address) (Protect)

The load address, execution address and protect are an optional parameter list. If any one parameter is to be defined all three parameters must be included.

e.g. ?MOIRE
 ?VERIFY 2800 2803
 ?FORM80 2800 2800 L
 ?KEYS
 ?

Where MOIRE is a BASIC program, VERIFY and FORM80 are machine code routines.

FORM80 has software protection set and so can only be used with the *RUN command. KEYS is a text file which may be used to set up some soft key definitions using the *EXEC command.

It is possible to send a line of input to the command line interpreter by entering a line preceded by an asterisk in response to the prompt. This allows the user to ascertain the file parameters from a disc file using the *INFO command. Should the user not know the execution address of a machine code program he wishes to include in the *ROM image he can ascertain this information without leaving the program.



The program prints each *ROM file block title, number and length as it is created, overwriting the previous block details until a new file is being output. When the program is finished the details of the last block of each file is present on the screen. The program finishes up by printing the amount of data contained in the image file.

If the amount of data output to the image file exceeds the length of the device size for which it is intended the program will terminate informing the user of this error condition and printing a '*** bad image' message. This message is incorporated into the error handling routine of the program and indicates that the *ROM image file is not in a legal *ROM data format or state. The '*** bad image' message should not be confused with error 215, 'Bad ROM' which the Operating System error message for a corrupt *ROM file (i.e. that message which would result from the attempt to blow and use a *ROM file which gave a '*** bad image' during its creation).

The Escape Key

Pressing the escape key will prematurely terminate the program at any time during a run sequence. In addition to the usual escape message the '*** bad image' message will be printed indicating that the partially formed image is not in a usable state.

Error states which are likely to be encountered

While it is hoped that this program protects the user from the consequences of most mistakes, he may still possibly provoke the BBC microcomputer into entering an error state which will halt the program. If an error condition is detected the message '*** bad image' will be printed followed by an operating system error message and a line number. The area in which the user is most likely to cause errors is the Disc filing system. If the user attempts to put files in a *ROM image which result in an image size greater than the device size for which the image is intended, the program will halt execution and print the messages 'Image length exceeds device size' and '*** bad image'. Errors encountered when the command line interpreter is used will be reported but the program will not be halted and the input sequence may be resumed.

Notes on file conversion

An important aspect of the use of *ROM files is that the *ROM file has a memory overhead associated with the division of the data into blocks. Thus it must be realised that a file which occupies 16 K bytes of disc file will not fit into a 16 K sideways ROM as a *ROM file. Each *ROM sideways ROM also has an area of data and code at its head which allows the Operating System to recognise it as a *ROM data ROM and which contains a copyright message. In practice the only sure way to test if a given combination of files will fit into a ROM image of a certain size is to try it out.

```

10REM FILE CONVERSION PROGRAM
20REM This program creates a ROM
30REM image in *ROM format from
40REM disc files. The ROM image
50REM is formed in a disc file.
60:
70II$=""
80ON ERROR GOTO1830
90CLOSE#0
100VDU15
110DIM FILES$(30),EXECS$(30),LADRS$(30),PROTS$(30),NU%
100 ,DISCNAME 20,MEM 18,CLI 20
120CCITL%=&10:CCITTH%=8:BLOCKSIZE%=256:DIM CRC% 4,CRCC
NT% 1,WORK% 4,Z% 50
130 DIM MM% 300,PB% 16,INDEX 1
140FORI=0TO2STEP2:PROCASSM(I):PROCASSM2(I):NEXT
150PROCINIT
160PROCtitle
170PRINT""Enter file details..."
180PRINT"File name followed by optional parameter list"
190PRINT"e.g."" TEMP 3000 3010 L"
200PRINT"<name> <load adr> <exec adr> <protect>"
210PRINT"a null entry terminates input"
220NFILES=0
230REPEAT:NFILES=NFILES+1:UNTIL FNaddfile
240NFILES=NFILES-1
250IF NFILES=0 GOTO230
260PRINT""Total length of files to be included is
&" ;~length%;" Bytes."
270IF length>BB% PRINT"" Length of files to be includ
ed exceeds device size.""*** Bad ROM":CLOSE#0:END
280PRINT"in ";BLOX%;" blocks.""
290FORQ%=1TONFILES:PROCWRITEFILE(FILE$(Q%),LADRS%(Q%),
EXECS%(Q%),PROTS%(Q%),Q%):PRINT:NEXTQ%
300PROCTERMINATE
310PRINT""ROM image occupies &" ;~EXT#Y%;" Bytes.""
320IF EXT#Y%>BB% PRINT"ROM image exceeds device size""
*** Bad ROM"
330CLOSE#0:REM CLOSE OUTPUT FILES ETC.
340 END :REM ** END OF MAIN PROG. **
350DEF FNaddfile
360INPUTII$
370Q1$="" :Q2%=0:Q3%=0:Q4%=0
380IFII$="" :=-1
390IF LEFT$(II$,1)="" $CLI=II$:X%=CLI MOD 256:Y%=CLI
DIV 256:CALL&FFF7:Y%=HANDLE%:GOTO360
400I=1
410Q1$=FNstn
420Q2%=EVAL("&0"+FNstn)
430Q3%=EVAL("&0"+FNstn)
440Q4%=ASC(FNstn)
450IF LENQ1$>7 PRINT"NAME TOO LONG : try again":GOTO360
460OO%=OPENUP(Q1$):IF OO%=0 PRINT"FILE NOT FOUND : try

```

```

again":GOTO360:ELSE length%=length%+EXT#00%: BLOX%=BLOX%+
(EXT#00 %+255)DIV 256:CLOSE#00%
  470FILES$(NFILES)=Q1$:LADRS$(NFILES)=Q2%:EXECS$(NFILES)
=Q3 %:IF Q4%=ASC("L") PROTS$(NFILES)=1
  480=0
  490DEF FNstn
  500AA$=""
  510REPEAT
  520TT$=MID$(II$,I,1)
  530I=I+1
  540AA$=AA$+TT$
  550UNTIL I>LENII$ OR MID$(II$,I,1)=" "
  560REPEAT
  570I=I+1
  580UNTILI>=LENII$ OR MID$(II$,I,1)<>" "
  590=AA$
  600DEFPROCWRITEFILE(FILE$,LADDR%,EXEC%,F%,C%)
  610REM FIRST FILE IS TITLE, LENGTH ZERO
  620IF C%>0 THEN SRCHAND%=OPENUP FILE$:LEFT%=EXT#SRCHAND
% ELSE LEFT%=0
  630BLOCKNO%=0
  640REM SET POINTER TO NEXT FILE IN SIRROM
  650BLKPOINT%=offset%+EXT#HANDLE%+FNfilelength(LEFT%,FIL
E$)
  660REPEAT
  670THISBLOCK%=LEFT%-BLOCKSIZE%
  680IF THISBLOCK%>0 THEN PROCBLOCK(BLOCKSIZE%, BLOCKNO%,
F%,BLKPOINT%)ELSE PROCBLOCK(LEFT%,BLOCKNO%,F% OR &80,BLKP
OINT%)
  690LEFT%=LEFT%-BLOCKSIZE%:BLOCKNO%=BLOCKNO%+1
  700UNTILTHISBLOCK%<=0
  710IF C%>1 THEN CLOSE#SRCHAND%
  720ENDPROC
  730DEFPROCBLOCK(BKLEN%,NUMBER%,FLAG%,NXTPTR%)
  740REM
  750REM PUTS OUT BLOCK OF LENGTH%
  760REM
  770PRINTFILE$,NUMBER%,BKLEN%,CHR$l1
  780IF BLOCKNO%=0 OR (FLAG%AND&80)>0 THEN PROCBYTEOUT(AS
C("#"))ELSE PROCBYTEOUT(ASC("#")):GOTO 830
  790REM Note middle blocks are marked with a # char.
only and
  800REM have no other header
  810REM
  820PROCHEADER:REM OUTPUT HEADER
  830!CRC%=0
  840IF EXT#HANDLE%+BKLEN%>=BB% PRINT'"ROM image exceeds
device size"'** Bad ROM':CLOSE#0:END
  850IF BKLEN%=0 THEN ENDPROC
  860FORI%=1TOBKLEN%:A%=BGET#SRCHAND%:CALLsend:CALL
ADDCRC:N EXT
  870RAMPTR%=RAMPTR%+BKLEN%
  880A%=CRC%?1:CALL send

```



```


890A%=?CRC%:CALL send
900ENDPROC
910DEFPROCHEADER
920REM
930REM PUTS OUT HEADER
940REM
950!CRC%=0
960FORI%=1TOLEN(FILE$)
970PROCCRCBYTES(ASC(MID$(FILE$,I%,1)),1)
980NEXT
990PROCCRCBYTES(0,1):REM ZERO TERMIN.
1000PROCCRCBYTES(LADDR%,4)
1010PROCCRCBYTES(EXEC%,4)
1020PROCCRCBYTES(NUMBER%,2)
1030PROCCRCBYTES(BKLEN%,2)
1040PROCCRCBYTES(FLAG%,1)
1050PROCCRCBYTES(NXTPTR%,4)
1060A%=CRC%?1:CALLsend
1070A%=?CRC%:CALLsend
1080ENDPROC
1090DEFPROCCRCBYTES(T%,N%)
1100LOCALI%
1110!WORK%=T%
1120FORI%=0TON%-1
1130A%=WORK%?I%:CALL send:CALL ADDCRC
1140NEXT
1150ENDPROC
1160DEFPROCBYTEOUT(A%)
1170CALLsend
1180ENDPROC
1190DEFPROCASSM(O%)
1200P%=Z%
1210[ OPTO%
1220.ADDCRC SEC:ROR CRCNT%:EOR CRC%+1
1230STA CRC%+1
1240.CRCLP1 LDA CRC%+1:ROLA:BCC CRCLB1
1250RORA:EOR#CCITTH%:STACRC%+1
1260LDACRC%:EOR#CCITTL%:STACRC%:SEC
1270.CRCLB1 ROLCRC%:ROLCRC%+1:LSR CRCNT%:BNE CRCLP1
1280RTS
1290]
1300ENDPROC
1310DEFPROCINIT
1320LOCAL T$
1330VDU12:PRINT''
1340REPEATINPUT"EPROM size in Kbytes : (16,8 or 4) ? "
BB%:UNTILBB%=4 OR BB%=8 OR BB%=16
1350INPUT "New ROM image filename ? "$DISCNAME :IF LEN
$DIS CNAME >7 PRINT"NAME TO LONG : try again":GOTO1350.
1360IF $DISCNAME="" GOTOL350
1370BB%=BB%*400
1380?MEM=DISCNAME MOD256:MEM?1=DISCNAME DIV256:MEM!2=0:
ME M!6=0

```


```

1390MEM!10=0:MEM!14=EB%+128:X%=MEM MOD 256:Y%=MEM DIV
256
1400A%=0:CALL&FFDD
1410Y%=OPENOUT $DISCNAME:HANDLE%=Y%
1420PTR#HANDLE%=EXT#HANDLE%:REM ADD TIMEO END OF FILE
1430PROCstartswram
1440ENDPROC
1450DEFPROCTERMINATE
1460PROCBYTEOUT(ASC("+")):REM ROM TERMINATOR
1470ENDPROC
1480REM
1490REM
1500DEFNfilelength(L%,FILENM$)
1510LOCAL bkohead%,R%,nbks%,smallohead%
1520REM
1530REM Calculate length in bytes of a cassette
1540REM format file.
1550REM
1560bkohead%=LENFILENM$+22+1:REM block overhead for
normal block
1570smallohead%=1+2:REM for short block=header char. +
data
CRC
1580IF L%=0 THEN R%=bkohead%-2:GOTO 1630:REM zero length
file
1590nbks%=(L% DIV BLOCKSIZE%)+SGN (L% MOD BLOCKSIZE%)
1600IF nbks%<=2 GOTO 1620 :REM no small blocks
1610REPEAT:R%=R%+smallohead%:nbks%=nbks%-1:UNTILnbks%<=2
1620REPEAT:R%=R%+bkohead%:nbks%=nbks%-1:UNTILnbks%=0
1630=R%+L%
1640DEFPROCstartswram
1650REM
1660REM reads in preamble for paged rom from data
statements.
1670REM Also sets ?&80 to zero so
1680REM bytes are not reversed.
1690REM Also sets offset% to &8000 since this is start
of S W ram
1700REM
1710offset%=&8000
1720?&80=0:REM Don't reverse data bytes
1730FORI%=1TO &82:READ,Q%:BPUT#HANDLE%,Q%:NEXT
1740ENDPROC
1750DEF PROCASSM2(O%)
1760P%=NU%
1770[OPTO%
1780 .send STA &70
1790.EXIT JSR &FFD4
1800RTS
1810]
1820ENDPROC
1830IF LEFT$(II$,1)="*" AND ERR<>17:REPORT:NFILES=NFILES
-1: PRINT:Y%=HANDLE%:GOTO230


```

```
1840PRINT''' *** Bad ROM":REPORT:PRINT" at line ";ERL'
1850CLOSE#0
1860END
1870DEF PROCtitle
1880PRINT
1890INPUT"ROM Title ?"ROMTITLE$
1900REPEATINPUT"ROM Number ?"ROMNO%:UNTILROMNO%>-1 AND
ROMN O%<16
1910IF ROMNO%<10 THEN T$="0"+STR$ROMNO% ELSE T$=STR$ROMNO%
1920ROMTITLE$="*"+ROMTITLE$+T$+"*"
1930PROCWRITEFILE(ROMTITLE$,0,0,1,0)
1940ENDPROC
1950DATA 0
1960DATA 0
1970DATA 0
1980DATA 76
1990DATA 46
2000DATA 128
2010DATA 130
2020DATA 21
2030DATA 0
2040DATA 83
2050DATA 101
2060DATA 114
2070DATA 105
2080DATA 97
2090DATA 108
2100DATA 32
2110DATA 82
2120DATA 111
2130DATA 109
2140DATA 0
2150DATA 48
2160DATA 0
2170DATA 40
2180DATA 67
2190DATA 41
2200DATA 32
2210DATA 49
2220DATA 57
2230DATA 56
2240DATA 50
2250DATA 32
2260DATA 65
2270DATA 99
2280DATA 111
2290DATA 114
2300DATA 110
2310DATA 32
2320DATA 67
2330DATA 111
2340DATA 109
2350DATA 112
```



2360DATA 117
2370DATA 116
2380DATA 101
2390DATA 114
2400DATA 0
2410DATA 201
2420DATA 13
2430DATA 240
2440DATA 5
2450DATA 201
2460DATA 14
2470DATA 240
2480DATA 30
2490DATA 96
2500DATA 72
2510DATA 32
2520DATA 123
2530DATA 128
2540DATA 197
2550DATA 244
2560DATA 144
2570DATA 19
2580DATA 169
2590DATA 130
2600DATA 133
2610DATA 246
2620DATA 169
2630DATA 128
2640DATA 133
2650DATA 247
2660DATA 165
2670DATA 244
2680DATA 32
2690DATA 125
2700DATA 128
2710DATA 133
2720DATA 245
2730DATA 104
2740DATA 169
2750DATA 0
2760DATA 96
2770DATA 104
2780DATA 96
2790DATA 72
2800DATA 152
2810DATA 48
2820DATA 21
2830DATA 32
2840DATA 123
2850DATA 128
2860DATA 197
2870DATA 244
2880DATA 208



2890DATA 243
2900DATA 160
2910DATA 0
2920DATA 177
2930DATA 246
2940DATA 168
2950DATA 230
2960DATA 246
2970DATA 208
2980DATA 230
2990DATA 230
3000DATA 247
3010DATA 76
3020DATA 78
3030DATA 128
3040DATA 165
3050DATA 245
3060DATA 73
3070DATA 255
3080DATA 41
3090DATA 15
3100DATA 168
3110DATA 32
3120DATA 185
3130DATA 255
3140DATA 168
3150DATA 76
3160DATA 100
3170DATA 128
3180DATA 165
3190DATA 245
3200DATA 73
3210DATA 255
3220DATA 41
3230DATA 15
3240DATA 96

3.18 THE BUFFER INDIRECTIONS

All buffer handling on the BBC Machine is handled by 3 routines, each of which is indirected. The indirections are:-

- 1 &22A Insert into buffer
- 2 &22C Remove from buffer or examine buffer
- 3 &22E Count characters in input buffer, free slots in output buffer or purge buffer.

The interfaces are as follows:-

1 Insert

ENTRY:- A = character
 X = buffer number
 Y,P irrelevant

EXIT:- X preserved
 A,Y corrupt
 C = 1 \Leftrightarrow buffer was full

2 Remove/Examine

ENTRY:- X = buffer number
 A,Y irrelevant
 V = 1 \Leftrightarrow examine option required

EXIT:- X preserved
 Y = character if found
 C = 1 \Leftrightarrow buffer was empty
 A corrupt

3 Count/Purge

ENTRY:- X = buffer number
 A,Y irrelevant
 V - 1 \Leftrightarrow purge



EXIT:- for purge X preserved
A,Y,P corrupt
for count YX = count (Y high X low)
A,P corrupt



3.19 FITTING A V.T.I. VIDEO PROCESSOR TO THE BBC MICROCOMPUTER:

A small modification is required when the first iteration V.T.I. video processor is fitted to the BBC Micro. This iteration can be identified by the numbers VC2023 and 201647 printed on the top.

The second iteration of this chip does not require this modification and can be identified by the numbers VC2069 printed on the top of the chip. The V.T.I. processor is a semi-custom I.C. rather than an uncommitted logic array of the kind used in the past, and one of its features is that the video invert pin needs to be gated by a signal indicating use of Teletext mode to provide a correct picture. All P.C.B.'s using the original U.L.A. chip need the following modification to facilitate this:

- 1) Unscrew the four fixing screws which retain the top of the case and identify the existing Video Processor (IC 6). Remove IC6 and replace it with the V.T.I. chip.
- 2) Remove the Molex jumper from S26 and connect a short length of insulated wire between the central pin of S26 and Pin 1 of IC10.
- 3) Reassemble the case and tighten the fixing screws.

This completes the modification.



3.20 TELETEXT MODE DETERIORATION

Under certain circumstances the Mode 7 screen display of the BBC Microcomputer becomes unstable and breaks up. This is due to "signal race" caused by "fast" TTL to pins 19 and 20 of the SAA5050. This can be distinguished from other display deterioration problems caused by the Video Processor because it will affect only Mode 7 leaving a normal display in Modes 0 - 6. This can be corrected with the simple modification that follows:

1. Disconnect the unit from the mains power supply, remove the four fixing screws and remove the lid.
2. Locate C48 which you will find between IC's 37 and 38 directly to the right of the Video Processor. Change the value of this capacitor from 270pF to 220pF.
3. Replace the lid, secure the four fixing screws and test the machine

This completes the modification.



3.21 SECOND PROCESSOR TIMING INCOMPATIBILITY

The information below outlines the corrective action to be carried out in the instance of a timing incompatibility between the BBC microcomputer and either of the second processor options.

It should be noted that this information is provisional and may be changed without prior notice.

Symptom:

The operation of the micro becomes unreliable when used in conjunction with a second processor. This is caused by central timing failure when the Tube connection is made. In the worst cases the micro may fail to power up.

A standard demonstration of this fault would be the appearance of random characters on the screen along with the recent history of the keyboard buffer.

Modification:

Change IC14 to 74ALS245 (Pt.No. 744245). On side 1 of the PCB cut the track to pin 10 of IC25, then make a wire link from pin 10 of IC25 to pin 8 of IC30.

Test:

Using BBC BASIC in both the micro and the second processor, load and run the following program. Check the display for clean triangles with the second processor both switched on and off.

Test Program:

```
10 MODE 0
20 MOVE 1279,0:PLOT85,1279,1023
30 GCOL 3,135
40 REPEAT CLG:UNTIL 0
```


ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> BBC MICROCOMPUTER MODEL A TO B UPGRADE KIT		<u>HEIGHT (mm)</u> N/A	<u>WIDTH (mm)</u> N/A	<u>FROM:</u> <i>Geoffrey Vincent</i> PROJECT LEADER
<u>ORDER CODE</u> ANA 11	<u>PART NUMBER</u> 003,970	<u>DEPTH (mm)</u> N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> Allows Model A or Model A + E computer to be upgraded to Model B or B + E respectively		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A	
<u>OPERATES WITH (Peripherals)</u> Model B provides circuitry and connectors for RGB video output, RS423, parallel printer (centronics), 1 MHz bus, Tube, User IO port and disc (connector only)		<u>CONTROLS (Switches, pots., keyboards)</u> None		
<u>SIMILAR EQUIPMENT</u> Model B (ANB 01) Model B + E (ANB 02)		<u>INDICATORS (Meters, lamps, readouts, audible)</u> None		
<u>MAJOR COMPONENTS</u> 16k of RAM A/D Convertor and Connector RS423 Interface ICs and Connector 1MHz Bus Buffers and Connector "Tube" Connector Printer and User Port ICs and Connectors Disc Drive Connector RGB Socket		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> A/D: 15-way PCB Mounting "D" Type: Max. 5 volts RS423: 5-way Domino "DIN" PCB Mounting: Max. 5 volts: Max. 19200 Baud 1MHz: 34-way 90° IDC Header with LE Ears: Standard TTL at 1MHz Tube: 40-way 90° IDC Header with LE Ears: Standard TTL at 2MHz Printer: 26-way 90° IDC Header with LE Ears: Standard Centronics Interface User: 20-way 90° IDC Header with LE Ears: Standard 6522 Interface Disc: 34-way 90° IDC Header with LE Ears: Remainder N/A Without Disc Interface Fitted		RGB: 6-way PCB Mounting "DIN". Standard RGB (5v) and Sync.
<u>DESCRIPTION OF OPERATION</u> Full specification upgrade from Model A to B or Model A + E to B + E		<u>POWER IN (V,A,W,HZ, Connector type)</u> None	<u>POWER OUT (V,A,W,HZ, Connector Type)</u> None	
		<u>APPROVALS (BS,FCC,CSA, UL ,VDE,BEAB)</u> None	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> 0-35°C	<u>WEIGHT (KG) UNIT ONLY</u>	0.2
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	0.25
<u>CAPACITY</u> Increases memory size of computer to 32k (from 16k)	<u>FORMAT</u> N/A	<u>PACKAGING</u> Polystyrene and shrinkwrap Jiffy Bag	<u>ACCESSORIES INCLUDED</u> None	
<u>SPEED (operating frequency)</u> 2 MHz CPU Clock	<u>INSTALLATION</u> Dealer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 003,970/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>[Signature]</i> CH. ENG.
		<u>ISSUE</u>	1	© COPYRIGHT 1983 ACORN COMPUTERS LTD.
		<u>DATE</u>	4.83	

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ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> SPEECH UPGRADE KIT (BBC COMPUTER)		<u>HEIGHT</u> (mm) N/A	<u>WIDTH</u> (mm) N/A	<u>FROM:</u> <i>Geoffrey Vint</i> PROJECT LEADER	
<u>ORDER CODE</u> TBA	<u>PART NUMBER</u> 003,950	<u>DEPTH</u> (mm) N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER MANUFACTURING	
<u>FUNCTION</u> To provide the user with the voice synthesis facility on the BBC machine, plus keyboard slots for additional ROM cartridges.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A		
<u>OPERATES WITH</u> (Peripherals) Any BBC Microcomputer		<u>CONTROLS</u> (Switches, pots., keyboards) NONE			
<u>SIMILAR EQUIPMENT</u> None		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None			
<u>MAJOR COMPONENTS</u> Voice Synthesis I.C. (VSP) ROM Slot Cover Phrase ROM "A" (VSM) Keyboard Interconnector Two Edge Card Connectors		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) 7 Data Lines. Direct interconnection within computer. 2 x 15 way Edgecard connectors on keyboard for ROM Cartridges. Protected by slot cover until required.			
<u>DESCRIPTION OF OPERATION</u> Speech data (compressed using pitch-excited LPC) is supplied to the VSP by direct serial access of the VSM. The VSP decodes the data to construct a time-varying digital filter model of the vocal tract. This model is excited with a digital representation of either glottal air impulses or the rush of air. The output of this model is passed through an 8-bit D to A convertor to produce a synthetic speech wave form.		<u>POWER IN</u> (V,A,W,HZ,Connector type) All power available from BBC Microcomputer internal PSU	<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None		
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None	<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE</u> (°C) 0 - 35°C	<u>WEIGHT (KG) UNIT ONLY</u> 0.2	<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.3	
		<u>PACKAGING</u> Polystyrene, shrink wrap and jiffy bag	<u>ACCESSORIES INCLUDED</u> BBC Speech System User Guide		
<u>CAPACITY</u> 128k bit ROM	<u>FORMAT</u> Linear predictive coding				
<u>SPEED</u> (operating frequency) 40 Hz frame rate	<u>INSTALLATION</u> Dealer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 003,950 / E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>C. J. ...</i> CH. ENG.	
		<u>ISSUE</u> 1	<u>DATE</u> 2.83	© COPYRIGHT 1983 ACORN COMPUTERS LTD.	

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4.3 TO ADD A 5 1/4" DISC UPGRADE TO A MODEL 'B' BBC MICROCOMPUTER:

1 Following parts are required:-

1 off I.C.	8271	IC78
2 off I.C.	7438	IC's 79,80
1 off I.C.	74LS10	IC82
2 off I.C.	74LS393	IC's 81,86
2 off I.C.	CD4013B	IC's 83,84
1 off I.C.	CD4020B	IC85
1 off I.C.	74LS123	IC87
1 off I.C.	2764-Eprom D.F.S	IC52
1 off I.C.	OS 1.2 ROM	IC51

2 Insert the IC's listed above into the sockets provided on the main board.

3 On issue 1 and 2 boards, connect the two pads of S8 with an insulated wire link.

4 If an OS 0.1 ROM is fitted in position IC51 then it must be removed. Insert an OS 1.2 ROM in its place.

5 If the existing power supply unit does not have an Auxiliary Power outlet it must be exchanged for one that does (e.g. Astec).

6 On issue 1,2 or 3 boards ONLY, cut the track connected to IC27 Pin 9 on the component side of the PCB between IC27 and IC89. Cut IC27 Pin 9 close to the PCB and bend the remaining part of the leg horizontal; then reconnect the IC leg to the East pad of S9 with a short length of insulated wire.

7 Ensure the links listed below are set as shown:

- S9 - Open
- S18 - North
- S19 - East
- S20 - North
- S21 - Both links facing East/West
- S22 - North
- S32 - West
- S33 - West

8 Ensure that S2 is Closed unless an Econet interface is fitted, in which case it MUST be Open.

9 Test the machine using a FIT test station. The Disc Test Kit may be used to test just the interface.

The upgrade is now completed.



4.4 SPEECH SYSTEM USER GUIDE ERRATA:

The following errata had been detected in the Speech System User Guide at 30/4/84:

p3 Parts 9 and 10 should be 47nF in both cases.

p23[Paragraph numbered (1)]

The bytes &4C and &43 have had their hexadecimal representation reversed. Further down the paragraph, the binary pattern &6BBC3 has its last two nibbles (nibble=4 bits) similarly reversed.

p31 Word number 138 in the list should show the word '-Z'.
Words 170,172,173,174 are missing a leading '1' in the Absolute Address (hex) column.

BRITISH BROADCASTING CORPORATION MICROCOMPUTER

MODEL B+ (64K)

FITTING INSTRUCTIONS 8271 DISC INTERFACE KIT

These instructions explain the installation of a single density disc interface kit, based on the 8271 disc controller IC.

Three ACORN KITS are needed for the upgrade:

ANB21 DNFS ROM kit NOT REQUIRED IF DNFS IS ALREADY FITTED
 ANB23 Disc Hardware Upgrade
 ANB24 B+ hardware conversion kit

DISC INTERFACE PARTS LIST

An 8271 disc interface requires all the parts listed below. Items marked * should already be fitted, see note below.

QTY.	ACORN PART NO.	DESCRIPTION	CIRCUIT REFERENCE
1	0708,271	8271 disc controller	IC15
** 2	0800,181	20 way SIL IC SOCKET	IC15
1	0740,038	7438 (not 74LS38)	IC7
1	0740,016	7416 alternative	IC8
	0740,006	7406 alternative	
1	0742,123	74LS123	IC1
1	0742,000	74LS00	IC9
1	0742,393	74LS393	IC2
1	0754,013	4013B (CMOS)	IC3
1	0754,521	4521B (CMOS)	IC4
1	0201,666	DNFS ROM	see text
* 5	0502,151	150R 5% 1/4W RESISTOR	R1,5,6,7,8
* 1	0502,102	1K0 5% 1/4W RESISTOR	R3
* 3	0502,332	3K3 5% 1/4W RESISTOR	R9,10,14
* 1	0502,103	10K 5% 1/4W RESISTOR	R2
* 1	0630,100	1n0F PLATE CERAMIC CAP.	C1
* 1	0794,148	IN4148 DIODE	D1
* 1	0800,006	34 PCB mounted plug	PL8
* 1	0800,051	PLUG 3 WAY	S7
* 1	0800,070	SHUNT (made WEST)	S7

** IC15 must be installed in a socket.
 Either a 40 pin DIL (0800,140) or 2 off 20 pin SIL (0800,181).

NOTE: The first production batch of model B+ machines were made without the above components (except PL8 which is fitted). Later units should only require fitting of the I.C's listed, so they can be upgraded without removing the PCB from the case.

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Issue 1 March 1985

FITTING THE DISC UPGRADE

Figure 1 shows the location of all the disc components on the B+ Microcomputer. All the components shown (and listed above) must be fitted for reliable operation of the disc interface.

STEP ONE

Check that all the resistors and the capacitor listed above, and shown in figure 1, are fitted. Check that the diode is fitted. Check that the disc drive connector PL8 is fitted. Any missing items should be installed before proceeding with the upgrade.

STEP TWO

Check that the socket for IC15 is fitted. IC15 is normally fitted into a socket made with 2 off 20 way SIL socket rows, if these are not fitted and if there are no obstructions, the socket can be a 40 way DIL type, otherwise SIL socket rows must be used.

STEP THREE

Fit the shunt to S7, made WEST, e.g. the shunt is towards the ROM side of the link. If the plug is not fitted, then either fit a plug (0800,051) or use a piece of tinned copper wire (e.g. a resistor lead offcut) for the link which is soldered directly onto the PCB, between the middle and WEST holes of S7. Check that S8 is NOT MADE (S8 is to right of IC7, near disc plug PL8).

STEP FOUR

Insert IC1,2,3,4,7,8,9. Note pin 1 of all ICS is towards the PCB rear. The ICS are normally fitted into sockets on the PCB. If any sockets are missing then either fit sockets or solder the ICs directly into the PCB.

Handle all Integrated Circuits carefully as they are easily damaged by electrostatic voltages.

STEP FIVE

Plug IC15, the 8271 disc controller, into its socket. Pin 1 is towards the rear of the PCB, the edge with the DIN style sockets.

STEP SIX

Insert the DNFS ROM into one of the vacant ROM sockets. See next sheet for selecting the preferred filing system, when more than one is fitted.

The ROM sockets have the ROM page numbers (ROM ID) listed below:

IC68	10 and 11 (HEXADECIMAL A & B)
IC62	8 and 9
IC57	6 and 7
IC44	4 and 5
IC35	2 and 3

When the Microcomputer is turned on or is reset by the CTRL/BREAK key combination, the default filing system (the one active after reset) will be the one with the highest page number. If the Microcomputer has more than one filing system ROM fitted, then the preferred filing system must be fitted in a socket with a higher page number than any other filing system ROM/EPROM's.

NOTE: filing system ROMs are sorted separately from language ROMs so that language ROMs can be ignored when selecting the filing system ROM socket.

TESTING

If any soldering has been done, the PCB should be visually inspected for solder shorts or debris and all faults made good. The PCB should then be remounted in the lower case half and the power connections refitted. Refit the keyboard.

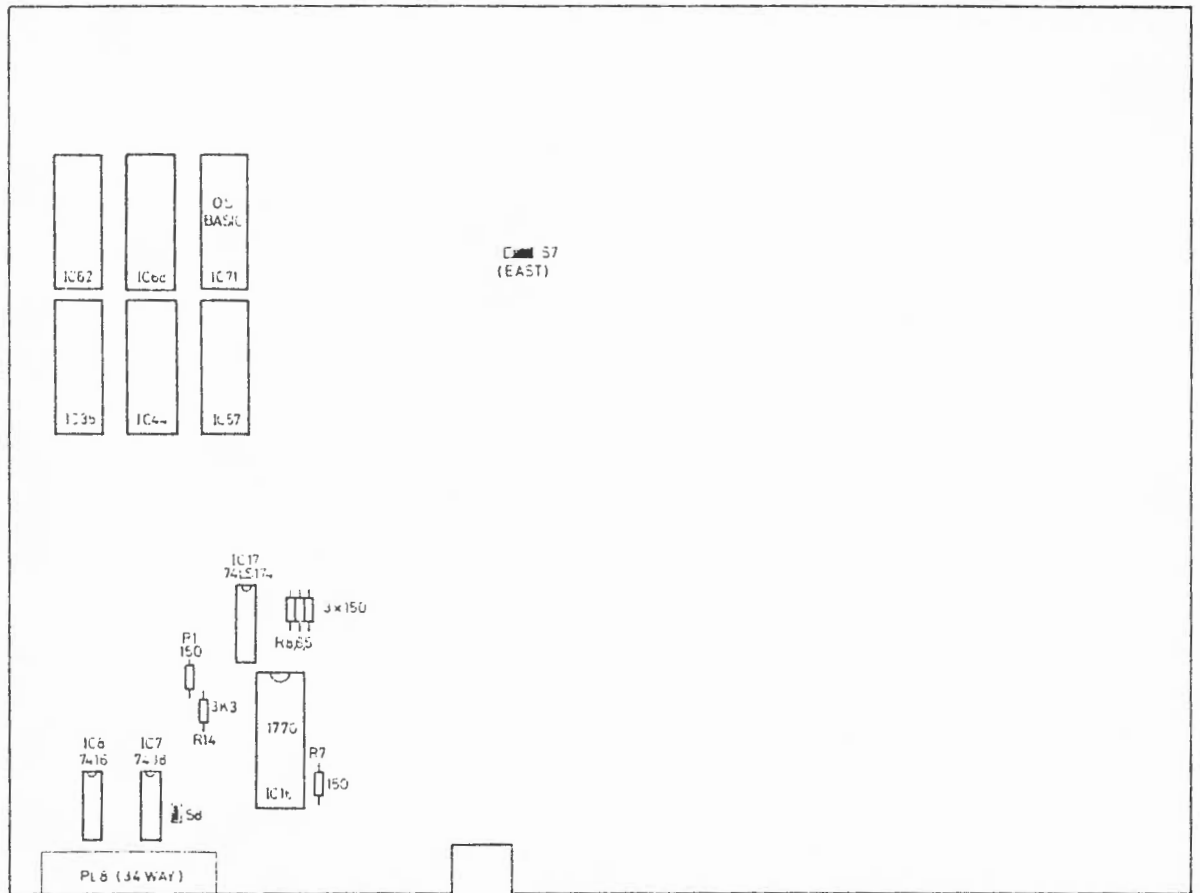
Test the unit with the ACORN PORT TESTER.

If a tester is not available then check the disc interface, with a DUAL 80 track drive, by reading and writing a BASIC program to each of the 4 drive surfaces.

Replace the case upper half.

The upgrade is now complete.

FIG 1. BBC MICROCOMPUTER B + 1770 DPL COMPONENTS



NOTE THIS KIT CONSISTS ONLY OF IC'S SHOWN
ENSURE THAT ALL RESISTORS AND PL6
SHOWN ARE ALREADY FITTED

BRITISH BROADCASTING CORPORATION MICROCOMPUTER

MODEL B+ (64K)

FITTING INSTRUCTIONS 1770 DISC INTERFACE KIT

These instructions explain the installation of a single density disc interface kit, based on the 1770 disc controller IC.

One ACORN KIT is needed for the upgrade:

ANB25 1770 DISC UPGRADE KIT

DISC INTERFACE PARTS LIST

A 1770 disc interface requires all the parts listed below. Items marked * should already be fitted, see note below.

A DFS user guide is also supplied with the kit.

QTY.	ACORN PART NO.	DESCRIPTION	CIRCUIT REFERANCE
1	0701,770	1770 disc controller	IC16
** 2	0800,183	14 way SIL IC SOCKET	IC16
1	0742,174	74LS174	IC17
1	0740,038	7438 (not 74LS38)	IC7
1	0740,016	7416 alternative	IC8
	0740,006	7406 alternative	
1	2201,113	1770 DFS ROM	see text
* 5	0502,151	150R 5% 1/4W RESISTOR	R1,5,6,7,8
* 1	0502,332	3K3 5% 1/4W RESISTOR	R14
* 1	0800,006	34 PCB mounted plug	PL8
* 1	0800,050	PLUG 2 WAY	S8
* 1	0800,051	PLUG 3 WAY	S7
* 2	0800,070	SHUNT	S7,8

** IC16 is usually installed in a socket; either a 28 pin DIL (0800,128) or 2 off 14 pin SIL (0800,183).

NOTE: The first production batch of model B+ machines were made without the components marked *, except PL8 which is fitted. Later units should only require fitting of the ICs listed, so they can be upgraded without removing the PCB from the case.

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Issue 1 March 1985

FITTING THE DISC UPGRADE

Figure 1 shows the location of all the disc components on the B+ Microcomputer. All the components shown (and listed above) must be fitted for reliable operation of the disc interface.

STEP ONE

Check that all the resistors listed above, and shown in figure 1, are fitted. Check that the disc drive connector PL8 is fitted. Any missing items should be installed before proceeding with the upgrade.

STEP TWO

Check that the socket for IC16 is fitted. IC16 is normally fitted into a socket made with 2 off 14 way SIL socket rows. If these are not fitted and if there are no obstructions, the socket can be a 28 way DIL type, otherwise IC16 may be soldered directly into the PCB. See STEP 5.

STEP THREE

Fit the shunt to S7, made EAST, e.g. the shunt is towards the Modulator side of the link. If the plug is not fitted, then either fit a plug (0800,051) or use a piece of tinned copper wire (e.g. a resistor lead offcut) for the link which is soldered directly onto the PCB, between the middle and EAST holes of S7. Check that S8 IS MADE (S8 is to right of IC7, near disc plug PL8).

STEP FOUR

Insert IC7, 8 and 17. Note pin 1 of all ICs is toward the PCB rear. The ICs are normally fitted into sockets on the PCB. If any sockets are missing then either fit sockets or solder the ICs directly into the PCB. Handle all Integrated Circuits carefully as they are easily damaged by electrostatic voltages.

STEP FIVE

Plug IC16, the 1770 disc controller, into its socket. Pin 1 is toward the rear of the PCB, the edge with the DIN style sockets. If no socket is fitted, solder the 1770 directly into the PCB.

STEP SIX

Insert the 1770 DFS ROM into one of the vacant ROM sockets. See next sheet for selecting the preferred filing system, when more than one is fitted.

The ROM sockets have the ROM page numbers (ROM ID) listed below:

IC68	10 and 11 (HEXADECIMAL A & B)
IC62	8 and 9
IC57	6 and 7
IC44	4 and 5
IC35	2 and 3

When the Microcomputer is turned on or is reset by the CTRL/BREAK key combination, the default filing system (the one active after reset) will be the one with the highest page number. If the Microcomputer has more than one filing system ROM fitted, then the preferred filing system must be fitted in a socket with a higher page number than any other filing system ROM/EPROM's.

NOTE: filing system ROMs are sorted separately from language ROMs, so language ROMs can be ignored when selecting the filing system ROM socket.

TESTING

If any soldering has been done, the PCB should be visually inspected for solder shorts or debris and all faults made good. The PCB should then be remounted in the lower case half and the power connections refitted. Refit the keyboard.

Test the unit with the ACORN PORT TESTER.

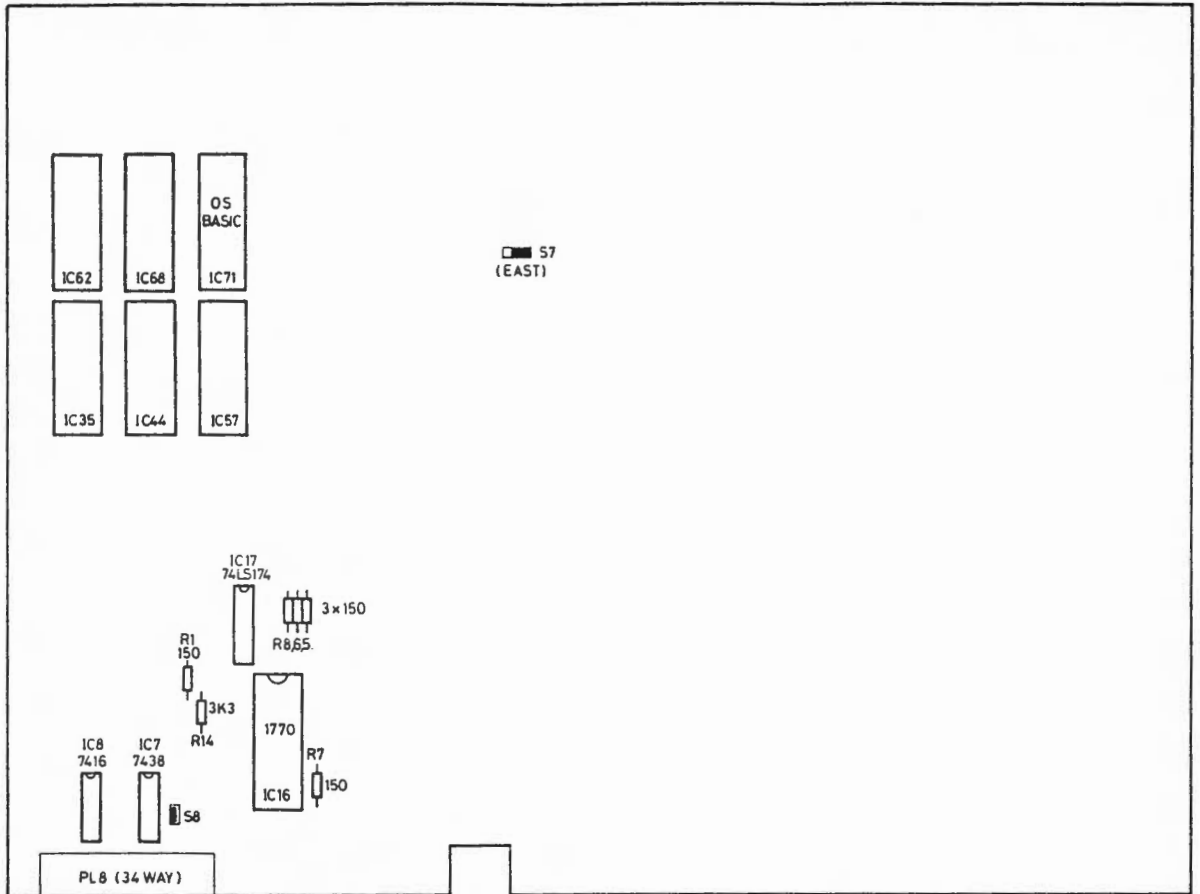
If a tester is not available then check the disc interface, with a DUAL 80 track drive, by reading and writing a BASIC program to each of the 4 drive surfaces.

Replace the upper case half.

The upgrade is now complete.


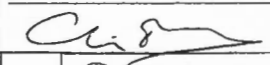


FIG. 1. BBC MICROCOMPUTER B * 1770 DISC COMPONENTS



NOTE THIS KIT CONSISTS ONLY OF IC'S SHOWN
ENSURE THAT ALL RESISTORS AND PL8
SHOWN ARE ALREADY FITTED.



ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> LEVEL 1 FILE SERVER DISC - 40 TRACK		<u>HEIGHT</u> (mm) N/A	<u>WIDTH</u> (mm) N/A	<u>FROM:</u>  PROJECT LEADER
<u>ORDER CODE</u> AES 20	<u>PART NUMBER</u> 012,011	<u>DEPTH</u> (mm) N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> Econet system users share a simple multi-user filing system based on the BBC DFS		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A	
<u>OPERATES WITH</u> (Peripherals) BBC Microcomputer system model B + D + E and 40T disc drive		<u>CONTROLS</u> (Switches, pots., keyboards) None		
<u>SIMILAR EQUIPMENT</u> Level 1 File Server (80 Track) (AES 23)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None		
<u>MAJOR COMPONENTS</u> A serialised 40 track DFS disc containing the following :- \$.FS \$.VERIFY L.VIEW L.DS \$.FSUTIL \$.FORMAT L.REMOTE L.FS \$.NETMON L.NOTIFY.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) None		
<u>DESCRIPTION OF OPERATION</u> Provides a limited number of files per user, identified by DFS directory. One directory is design "public" and is read-only to all users. A subset of the DFS commands are supported.		<u>POWER IN</u> (V,A,W,HZ,Connector type) None	<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 0 - 35°C	<u>WEIGHT (KG) UNIT ONLY</u> 0.1	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.15	
<u>CAPACITY</u> 100k	<u>FORMAT</u> BBC DFS	<u>PACKAGING</u> Shrink-wrap to cardboard stiffener, pack into jiffy bag		<u>ACCESSORIES INCLUDED</u> Introduction Sheet Operators Manual (A5) Station User Leaflet (6 copies)
<u>SPEED</u> (operating frequency) N/A	<u>INSTALLATION</u> User	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 012,011/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  F.N.
		<u>ISSUE</u> 1	<u>DATE</u> 4.83	© COPYRIGHT ACORN COMPUTERS LTD.

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<u>EQUIPMENT</u> LEVEL 1 FILE SERVER DISC - 80 TRACK		<u>HEIGHT (mm)</u> N/A	<u>WIDTH (mm)</u> N/A	<u>FROM:</u>  PROJECT LEADER
<u>ORDER CODE</u> AES 23	<u>PART NUMBER</u> 012,012	<u>DEPTH (mm)</u> N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> Econet system users share a simple multi-user filing system based on the BBC DFS		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A	
<u>OPERATES WITH (Peripherals)</u> BBC Microcomputer system model B + D + E and 80 track disc drive		<u>CONTROLS (Switches, pots., keyboards)</u> None		
<u>SIMILAR EQUIPMENT</u> Level 1 File Server (40 Track) (AES 20)		<u>INDICATORS (Meters, lamps, readouts, audible)</u> None		
<u>MAJOR COMPONENTS</u> A serialised 80 track DFS disc containing the following files:- \$.FS \$.VERIFY L.VIEW L.DS \$.FSUTIL \$.FORMAT L.REMOTE L.FS \$.NETMON L.NOTIFY		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> None		
<u>DESCRIPTION OF OPERATION</u> Provides a limited number of files per user, identified by DFS directory. One directory is designated "public" and is read-only to all users. A subset of the DFS commands are supplied.		<u>POWER IN (V,A,W,HZ,Connector type)</u> None	<u>POWER OUT (V,A,W,HZ, Connector Type)</u> None	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> None	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> 0 - 35°C	<u>WEIGHT (KG) UNIT ONLY</u> 0.1	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.15	
<u>CAPACITY</u> 800k	<u>FORMAT</u> BBC DFS	<u>PACKAGING</u> Shrink-wrap to cardboard stiffener, pack into jiffy bag	<u>ACCESSORIES INCLUDED</u> Introduction Sheet Operators Manual (A5) Station User Leaflet (6 copies)	
<u>SPEED (operating frequency)</u> N/A	<u>INSTALLATION</u> User	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 012,012/1	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  F.M.L.
			<u>ISSUE</u> 1	© COPYRIGHT 1988 ACORN COMPUTERS LTD.
			<u>DATE</u> 4.85	

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<u>EQUIPMENT</u> ECONET CLOCK BOX		<u>HEIGHT</u> (mm) Clock 40 PSU 60	<u>WIDTH</u> (mm) Clock 120 PSU 110	<u>FROM:</u> <i>B. Robertson</i> PROJECT LEADER	
<u>ORDER CODE</u> AEH 14	<u>PART NUMBER</u> 012,001	<u>DEPTH</u> (mm) Clock 65 PSU 75	<u>MATERIAL</u> Plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> To provide a clock (at changeable frequency) for the Econet system		<u>COLOUR</u> Clock: Two-tone grey PSU: Black	<u>CONSTRUCTION</u> Moulded		
<u>OPERATES WITH</u> (Peripherals) Econet Network		<u>CONTROLS</u> (Switches, pots., keyboards) None			
<u>SIMILAR EQUIPMENT</u> Econet Terminator Box (AEH 15)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) "Power On" LED on clock box			
<u>MAJOR COMPONENTS</u> Clock box containing oscillator and divider.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) 5-pin 180° DIN connector on clock box (standard Econet interface)			
<u>DESCRIPTION OF OPERATION</u> The clock, when connected to an Econet network (normally as close to the centre as possible), provides a reference clock signal for the network to synchronise all the machines connected. The clock rate is internally selectable in discrete steps between 4K8 and 460 KHz.		<u>POWER IN</u> (V,A,W,HZ,Connector type) 240v, 50Hz, 4 watts to PSU 8v (DC), 250mA to clock box	<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None		
		<u>APPROVALS</u> (BS,FCC,CSA, UL, VDE, BEAB) To conform to BS415 (79) Double insulated	<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE</u> (°C) 0-35°C	<u>WEIGHT (KG) UNIT ONLY</u> 1.5	<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 1.6	
		<u>PACKAGING</u> Two part polystyrene Cardboard box	<u>ACCESSORIES INCLUDED</u> Econet cable Mains Adaptor		
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>APPENDICES</u> None		<u>DRAWING NUMBER</u> 012,001/E	
<u>SPEED</u> (operating frequency) Variable between 4.8 and 460KHz	<u>INSTALLATION</u> User	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>Ch...</i>		<u>ISSUE</u> 1	
		<u>DATE</u> 4.83	© COPYRIGHT 1983 ACORN COMPUTERS LTD.		

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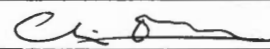
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<u>EQUIPMENT</u> ECONET TERMINATOR BOX		<u>HEIGHT (mm)</u> Terminator: 40 PSU: 60	<u>WIDTH (mm)</u> Terminator: 120 PSU: 110	<u>FROM:</u> <i>B. Robertson</i> PROJECT LEADER
<u>ORDER CODE</u> AEH 15	<u>PART NUMBER</u> 012,002	<u>DEPTH (mm)</u> Terminator: 65 PSU: 75	<u>MATERIAL</u> Plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> To provide termination for each end of an Econet network		<u>COLOUR</u> Terminator: Two-tone grey PSU: Black	<u>CONSTRUCTION</u> Moulded	
<u>OPERATES WITH (Peripherals)</u> Econet Network		<u>CONTROLS (Switches, pots., keyboards)</u> None		
<u>SIMILAR EQUIPMENT</u> Econet clock box (AEH 14)		<u>INDICATORS (Meters, lamps, readouts, audible)</u> "Power On" LED on terminator box		
<u>MAJOR COMPONENTS</u> Terminator Box containing termination and line bias voltage components		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 5-pin 180° DIN connector on terminator box (standard Econet Interface)		
<u>DESCRIPTION OF OPERATION</u> A resistor/capacitor/diode network within the terminator box holds the two "Data" lines at $\pm 0.25v$ around +2v, which drives the data lines at logic "1" when the line is idle. When the lines are in use the terminators prevent reflections.		<u>POWER IN (V,A,W,HZ, Connector type)</u> 240v, 50Hz, 4 watts to PSU 8v(DC), 250mA to terminator box	<u>POWER OUT (V,A,W,HZ, Connector Type)</u> None	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> To conform to BS415 (79) double insulated	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> 0-35°C	<u>WEIGHT (KG) UNIT ONLY</u> 1.5 <u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 1.6	
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Two-part polystyrene Cardboard box	<u>ACCESSORIES INCLUDED</u> Econet Cable Mains adaptor	
<u>SPEED (operating frequency)</u> N/A	<u>INSTALLATION</u> User	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 012,002/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>[Signature]</i> CH. ENG.
		<u>ISSUE</u> 1	<u>DATE</u> 4.83	© COPYRIGHT 1983 ACORN COMPUTERS LTD.

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<u>EQUIPMENT</u> ECONET 10 STATION LEAD KIT		<u>HEIGHT (mm)</u> N/A	<u>WIDTH (mm)</u> N/A	<u>FROM:</u>  PROJECT LEADER	
<u>ORDER CODE</u> AEH 18	<u>PART NUMBER</u> 012.016	<u>DEPTH (mm)</u> N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Provide extra leads and Y pieces for Econet system users		<u>COLOUR</u> Black	<u>CONSTRUCTION</u> N/A		
<u>OPERATES WITH (Peripherals)</u> Any Econet product		<u>CONTROLS (Switches, pots., keyboards)</u> None			
<u>SIMILAR EQUIPMENT</u> 100m lead		<u>INDICATORS (Meters, lamps, readouts, audible)</u> None			
<u>MAJOR COMPONENTS</u> 10 leads (1 metre long) 11 3-way 'y' pieces		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 1 off 5-pin 180° DIN "Free" plug each end of leads 3 off 5-pin 180° DIN sockets per 'y' piece			
<u>DESCRIPTION OF OPERATION</u> N/A		<u>POWER IN (V,A,W,HZ, Connector type)</u> N/A	<u>POWER OUT (V,A,W,HZ, Connector Type)</u> N/A		
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> None	<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE (°C)</u> 0 to 35°C	<u>WEIGHT (KG) UNIT ONLY</u>	0.8	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	0.9	
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Jiffy bag	<u>ACCESSORIES INCLUDED</u> Installation sheet		
<u>SPEED (operating frequency)</u> N/A	<u>INSTALLATION</u> By user	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 012,016/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.	
			<u>ISSUE</u> 1	© COPYRIGHT 1983 ACORN COMPUTERS LTD.	
			<u>DATE</u> 2.83		



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<u>EQUIPMENT</u> ECONET USER KIT		<u>HEIGHT</u> (mm) N/A	<u>WIDTH</u> (mm) N/A	<u>FROM:</u> PROJECT LEADER
<u>ORDER CODE</u> T.B.A	<u>PART NUMBER</u> 012,010	<u>DEPTH</u> (mm) N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER MANUFACTURING
<u>FUNCTION</u> To provide operating details and connection ability to BBC Econet users.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A	
<u>OPERATES WITH</u> (Peripherals) BBC Microcomputer with Econet.		<u>CONTROLS</u> (Switches, pots., keyboards) N/A		
<u>SIMILAR EQUIPMENT</u> None.		<u>INDICATORS</u> (Meters, lamps, readouts, audible) N/A		
<u>MAJOR COMPONENTS</u> Econet lead. Econet User guide. Covering letter.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) N/A		
<u>DESCRIPTION OF OPERATION</u> N/A		<u>POWER IN</u> (V,A,W,HZ, Connector type) N/A	<u>POWER OUT</u> (V,A,W,HZ, Connector Type) N/A	
		<u>APPROVALS</u> (BS,FCC,CSA, UL, VDE, BEAB) N/A	<u>GUARANTEE</u> N/A	
		<u>OPERATING TEMPERATURE</u> (°C) N/A	<u>WEIGHT (KG) UNIT ONLY</u> 0.1	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.15	
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Cardboard stiffener Jiffy bag	<u>ACCESSORIES INCLUDED</u> None	
<u>SPEED</u> (operating frequency) N/A	<u>INSTALLATION</u> N/A	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 012,010/E	
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<u>EQUIPMENT</u> ECONET PRINTER SERVER EXPANSION		<u>HEIGHT</u> (mm) N/A	<u>WIDTH</u> (mm) N/A	<u>FROM:</u>  PROJECT LEADER	
<u>ORDER CODE</u> AES 22	<u>PART NUMBER</u> 012,014	<u>DEPTH</u> (mm) N/A	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Econet system users share printer resource at Printer Server station		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A		
<u>OPERATES WITH</u> (Peripherals) BBC Microcomputer models B + E and B + D + E with series or Parallel (centronics) printer attached		<u>CONTROLS</u> (Switches, pots., keyboards) None			
<u>SIMILAR EQUIPMENT</u> None		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None			
<u>MAJOR COMPONENTS</u> 64k bit ROM or EPROM containing the Printer Server Program		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) All provided by 28-pin sideways ROM socket in BBC computer			
<u>DESCRIPTION OF OPERATION</u> The printer server station receives and services print requests under interrupt using the "System Timer" Event. Printing is strictly on a first-come, first-served basis.		<u>POWER IN</u> (V,A,W,HZ,Connector type) Internal to BBC computer		<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 0 - 35°C		<u>WEIGHT (KG) UNIT ONLY</u> 0.1	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.15	
<u>CAPACITY</u>	<u>FORMAT</u> "Sideways" ROM	<u>PACKAGING</u> Antistatic Foam Jiffy Bag Cardboard Stiffener Shrink Wrap		<u>ACCESSORIES INCLUDED</u> Introduction Sheet Manual (A5)	
<u>SPEED</u> (operating frequency) Max. 2,000 characters per second (dependent on printer)	<u>INSTALLATION</u> By user or authorised dealer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 012,014/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.	
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5.8 THE ECONET SYSTEM USER GUIDE - ERRATA

p76 The transmission returns an 8 bit code on completion, the bottom five bits of which contain an error code.

<u>Returned Code</u>	<u>Error</u>
&40	Line Jammed
&41	Net Error
&42	Not Listening
&43	No Clock
&44	Bad TX Block

p81 The maximum size of parameter block for remote jumps and procedure calls is 128 bytes.

p83 The control flag for the Remote Procedure Call is misprinted and should read &85.

p89 a) 11.2.1 Calling TX

The user copy of the control block will have its control byte zeroed if TX cannot be initialised.


Otherwise the control block is copied to OS workspace and must be polled by the following call.

b) 11.2.2 Polling TX

On exit X contains the TX block control byte

0 = : successful TX 0 = : failed TX (see p76)





5.9 ECONET FAULT FINDING

This document is intended as a first level check list to enable users to detect a fault on a portable network e.g a network assembled for exhibition purposes. All the relevant procedures should be diligently followed before contacting Acorn Computers for advice.

Whilst carrying out the following procedures it would be useful to keep a record of that which you have checked and the faults, if any, that you have found. If, when all the checks have been carried out, you still have not resolved the fault, you should contact Acorn Customer Services on Cambridge (0223) 210111.

INDEX

1. LINE JAMMED
2. NET ERROR
3. NOT LISTENING
4. NO REPLY
5. NO CLOCK
6. MACHINE FAULTS
7. SETTING A STATION NUMBER
8. MINIMUM NETWORK CONFIGURATION
9. CHECK LIST

In the event of a fault occurring with your network, it would be appreciated if you would complete the check list at the back of this document. Please return the completed form to :

Acorn Computers Ltd.
Customer Services Dept.
Cambridge Technopark.
Newmarket Road
Cambridge.

1. LINE JAMMED

This error is returned if there is continuous information on the data lines. This may be due to a fault in another station or in one (or both) of the terminators.

If this fault is reported then do the following, checking at each stage to see if the fault has been rectified.

(1) Check that there are not two stations on the network with the same number. If there are two or more stations with the same number



the numbers must be changed. To do this refer to section 7 of this leaflet.

(2) Reset all stations connected to the network and restart the file server and print server.

(3) Unplug all stations from the network with the exception of one user station and the file server. Restart the file server and reset the user station and try to access the file server, if this is successful then you should replace all the other stations one at a time re-trying at every stage until the faulty machine is located.

(4) If at the beginning of stage (3) you get a line jammed message reported with only the one machine and the file server connected to the network then exchange the user station and re-try. If this is successful then continue as explained in stage (3).

(5) There may be a faulty terminator connected to the network, if you have spare terminators then exchange them one at a time for the terminators already in use. If however you do not have replacements then you should remove one terminator and re-try the system, then reconnect that terminator and remove the other one. If one of the terminators is causing the problem and you do not have a replacement it is possible to run a network of up to ten stations with only one terminator, however a replacement should be obtained as soon as possible.

(6) A line jammed error will be reported if there are crossed wires in the network. At this point you should refer to the section concerning the error message "NET ERROR" and follow stage (4).

2. NET ERROR

This error is returned if an error occurs during transmission. It may be due to an unsuitable clock speed for the network, a fault in the terminators or a fault in the network cable.

(1) If two or more station numbers on the network are the same then it may well produce this error. If this is the case then refer to section 7 of this leaflet.

(2) To determine whether the clock speed is suitable you should refer to section 8.3 in the Econet System User Guide. It should be noted that although the BBC machine is capable of a network speed of 307k the use of a plug together lead set will reduce this in practice to 230k.

(3) Check the terminators to see if they are (a) connected to a power supply and that the power supply is switched on (check the LEDs on the terminators). (b) That the terminators are connected to



the network.

(4) The most common cause of a NET ERROR message is a fault in the cable, either a short circuit, open circuit or crossed wires. To determine whether this is the case it is necessary to check each of the leads and junction pieces. To do this you should shorten the network to the bare minimum of seven leads and three junctions. Connect onto this the clock box to the central junction, the file server and one terminator to one end and a user station and the other terminator to the other end. Restart the file server and reset the user station and try to access the file server. If this is unsuccessful then replace the leads and junctions one at a time re-trying each time until the faulty lead or junction is isolated. When the network functions correctly at the minimum length, rebuild the network connecting one junction piece, two leads and a user station at each stage. Each time you connect another station you must re-try the network to ensure that you do not introduce other faulty leads or junctions. Section 8 contains a diagram of a minimum configuration network.

IT IS MOST IMPORTANT TO ENSURE THAT ALL LEADS AND JUNCTIONS ARE EXCHANGED DURING THIS OPERATION. DO NOT OVERLOOK ANY POSSIBLE LEADS OR JUNCTIONS BY RUSHING THROUGH THE ABOVE CHECKING.

3. NOT LISTENING

This message may occur when any Network Filing System command is executed, and means either that the machine to which the command is directed is not attached to the network, or is not interested. For example, trying to save a file on a network without a file server, or when the file server program is not running, will produce the Not Listening message. Similarly, the message will appear if you try to VIEW a non-existent or protected station.

(1) If upon trying to access either the file server or the print server you get the message Not Listening you should check that the peripheral has been initialised (started up) and that the unit is connected to the Network. If you are in any doubt at all you should always re-start.

(2) When you are sure that the File/Print server has been correctly started you should try to access the unit again. If you are still unsuccessful you should ascertain whether the File/Print server has the correct station number. The default number for the File Server is 254 and the number for the Print Server is 235. If the number differs from these you should change the station number as detailed in the Econet System User Guide page 69.

(3) If all of the above is correct then you should change the lead that connects the peripheral to the network as this may be at fault. If having changed the lead and relevant junction piece you should suspect either the remote station i.e the File Server or the



user station which is being denied access.

(4) It should be noted that the station that you are trying to access should be in the Econet mode. If for example you are trying to access a station that has an acoustic coupler attached, it must have the NFS selected as it's current filing system. If this is not the case then typing *NET will put the machine into the correct mode.

4. NO REPLY

This message is less likely to occur and generally means that some operation has failed in the middle. For example, if a user types LOAD "FILE" and at that moment the disc is removed from the File Server, or the File Server is disabled in some way, it is likely that the NO REPLY message will occur.

(1) You should physically check that the peripheral is still attached to the network and that it is still enabled e.g make sure the printer is still switched on. Ensure that the printer still has paper, ribbon etc. or in the case of a disc that the drive door is shut and the disc correctly inserted.

(2) If all appears to be well then you should re-try and if you are still unsuccessful you will probably receive a different error message at which point you should follow the relevant procedure.

5. NO CLOCK


This message is returned if the Econet interface in the user station cannot detect a valid clock signal. After checking that you are plugged into the network, the problem will probably lie in the clock box or in the clock lines of the cable.

(1) Firstly check that your terminal is in fact plugged into the network.

(2) Check that the clock box is connected to the network and is connected to a power supply (ensuring that the LED indicator on the clock box is lit).

(3) Assuming that it is only one user station that has received the NO CLOCK message you should change the cable connecting the machine to the network and also exchange the junction piece at that point in the network. If this does not solve the problem then it is almost certainly the user station itself which is at fault.

(4) In the instance whereby all the user stations are receiving a NO CLOCK message and you have completed the checks in sections (1)



and (2) you should if possible exchange the clock box. If however this is not possible then you should check that there is an output from the clock box, unfortunately you will need either an oscilloscope or an Acorn Econet test box. If one of these is not available it would be advantageous to try step (5) as it may be a fault in the clock line.

(5) Using a standard test meter you should test the continuity in the clock lines. These should be found on pins 3 and 5. of the network bus (refer to page 67 in the Econet System User Guide. If there is a break in the continuity you should remove each lead and junction piece one at a time until the faulty lead or junction is located.

6. MACHINE FAULTS

If during the preceding checks you have discovered a faulty machine it may be the case that the machine is incorrectly configured. In the event that you are short of equipment and a replacement machine is not available it may be possible to locate the problem with a visual check. Ensure that the machine is unplugged and remove the lid. You should now check the following:

(1) Check that there is in fact an Econet interface in the machine. On the bottom left hand corner of the main printed circuit board you will find a row of five sockets some of which will contain chips. Ensure that one of these chips is labelled NFS 3.34 (the number may vary), Also check that the top left hand corner of the board is populated, in particular that IC 89 is present.

(2) Check that link S2 is cut, you will find this on the left hand edge of the main PCB.

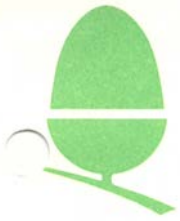
(3) Locate link S9 which is to be found slightly below and to the left of the words ACORN COMPUTERS. This link should be made if IC 78 (located directly below the words ACORN COMPUTERS) is NOT present. The link should be cut if IC 78 IS present.

(4) For the purpose of this section North is taken to mean the back of the machine and South is the front of the machine under the keyboard.

You should now also check the following links, although they should have been set correctly during production. The term OPEN means that NO CONNECTION IS MADE across the link. If a compass bearing is indicated it implies a three pin link running either north to south or east to west. Therefore to set a link NORTH the connector should be placed across the top and middle link of three vertical pins.

The links should be set as follows:

-S5 SOUTH



- S12 OPEN
- S13 OPEN
- S18 NORTH
- S19 EAST
- S20 NORTH
- S21 2 x EAST-WEST
- S22 NORTH
- S32 WEST
- S33 WEST

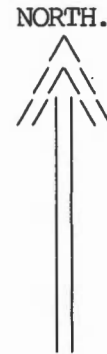
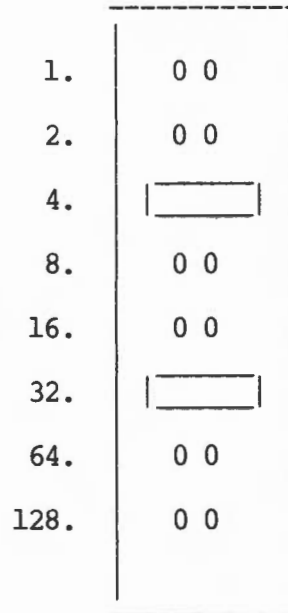
When all the above checks have been completed and assuming no alterations have been made the machine should be reassembled and if the machine still fails to function correctly you should consult an Acorn technician.



7.SETTING A STATION IDENTITY

To set the station number you should locate S11. of which this diagram is an exploded view.

STATION NUMBER 219



When the connector is placed across the pins the number is inoperative. Therefore the station identity shown here is;

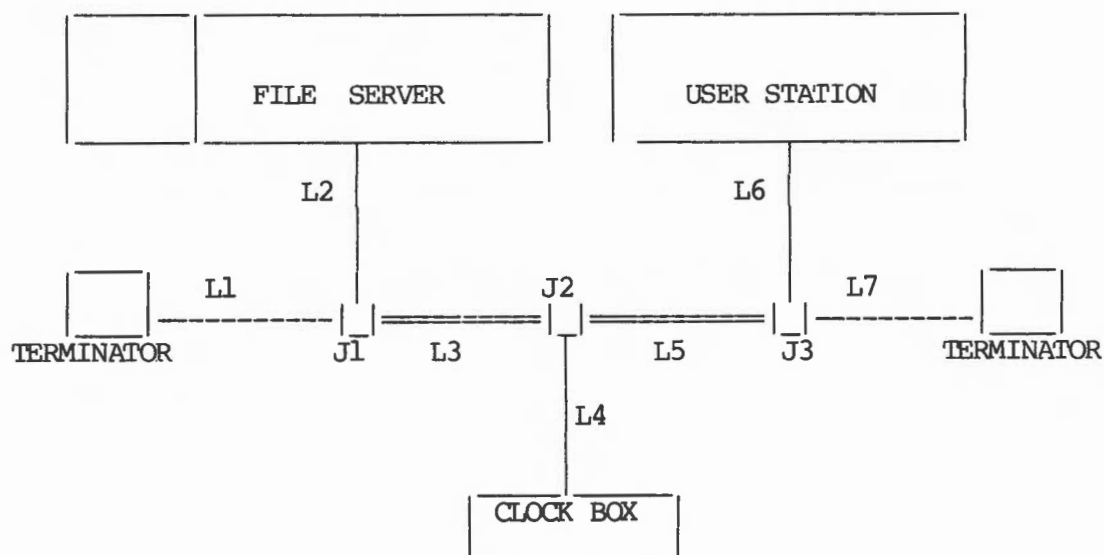
$$1+2+8+16+64+128 = 219$$

If you required station number 1 then all the connectors except the top one should be in place,if 254 is the required number then only the top link would be in place.



8. MINIMUM NETWORK CONFIGURATION

L(n)=Five pin din lead
 J(n)=Junction piece



This is the configuration which you should start with when you commence stage 4 of the section on NET ERROR.



9. CHECK LIST

ERROR REPORTED	EQUIPMENT IN WHICH FAULT WAS FOUND
LINE JAMMED	
NET ERROR	
NOT LISTENING	
NO REPLY	
NO CLOCK	
MACHINE FAULT	
OTHER	
COMMENTS	



5.10 SYSTEM 5 MODIFICATIONS

CONTENTS

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4.5.10.2	INTRODUCTION / REASONS FOR MODIFICATIONS
4.5.10.3	FITTING MAINS FILTER
4.5.10.4	DIAGRAM OF MAINS FILTER INSTALLATION
4.5.10.5	MODIFICATIONS TO CPU CARD (200,005)
4.5.10.6	WIRING OF 74HC244 ON CPU CARD (200,005)
4.5.10.7	MODIFICATIONS TO 32K DRAM CARD (200,010) COMPONENTS LIST
4.5.10.8	DIAGRAM OF 32K DRAM MODIFICATIONS (200,010)



INTRODUCTION

A field change order was raised to inform customer services of a possible problem with a number of system 5 computers. The following pages, for your information, show the letter that was sent to our customers in an attempt to trace the systems that were affected, and details of the necessary modifications.

Letter Sent to Customers

13 February 1984

Dear Sir

Our records indicate that you may have a System 5 supplied by Acorn Computers. It has been brought to our attention that a problem has arisen in certain system 5's delivered between May and August 1983. The system may exhibit the following symptoms:

- * The file server may stop occasionally and will not respond to keyboard input.
- * Stations on the network may receive the message "not listening".

It is possible that these symptoms occur separately under normal operation. If however, the symptoms occur simultaneously and persist, it may be necessary to return the System 5 for a service.

If you are experiencing problems such as these, could you please complete the attached form and return it to the address indicated as soon as possible, and not later than Friday 9 March. We will then contact you to make the necessary arrangements for the servicing of your equipment. Acorn will cover the transportation costs for the equipment to be returned to an appointed service agency, and we will of course make our best efforts to reduce the turn-around time, in order to minimise the disruption to your normal operation.

Yours faithfully
ACORN COMPUTERS LTD

FITTING THE MAINS FILTER

- (1) Turn off the System 5 and disconnect from the mains power supply.
- (2) Remove the top and back panels from the System 5 and remove the power supply.
- (3) Attach the mains filter to the cover of the power supply using two No.6 x 1/4" self tapping screws into the cooling holes (see the diagram on page 4.5.10.4)
- (4) Disconnect the mains connector from the power supply and desolder and remove the earth connection.
- (5) Remove the plastic connector from the mains cable and solder the Live, Neutral and Earth leads to the bottom end of the mains filter.
- (6) Connect an earth lead from the earth on the bottom of the mains filter to the earth connection on the power supply.
- (7) Connect the output of the mains filter to the power supply using the original plastic connector with new inserts.
- (8) Refit the power supply into the System 5 ensuring that it is orientated so that the connectors are on the left when the System is viewed from the front.

IMPORTANT NOTE: ALL MAINS CONNECTIONS AND CABLING MUST BE SLEEVED AND THOROUGHLY INSULATED TO PREVENT DANGER FROM ELECTRIC SHOCK.

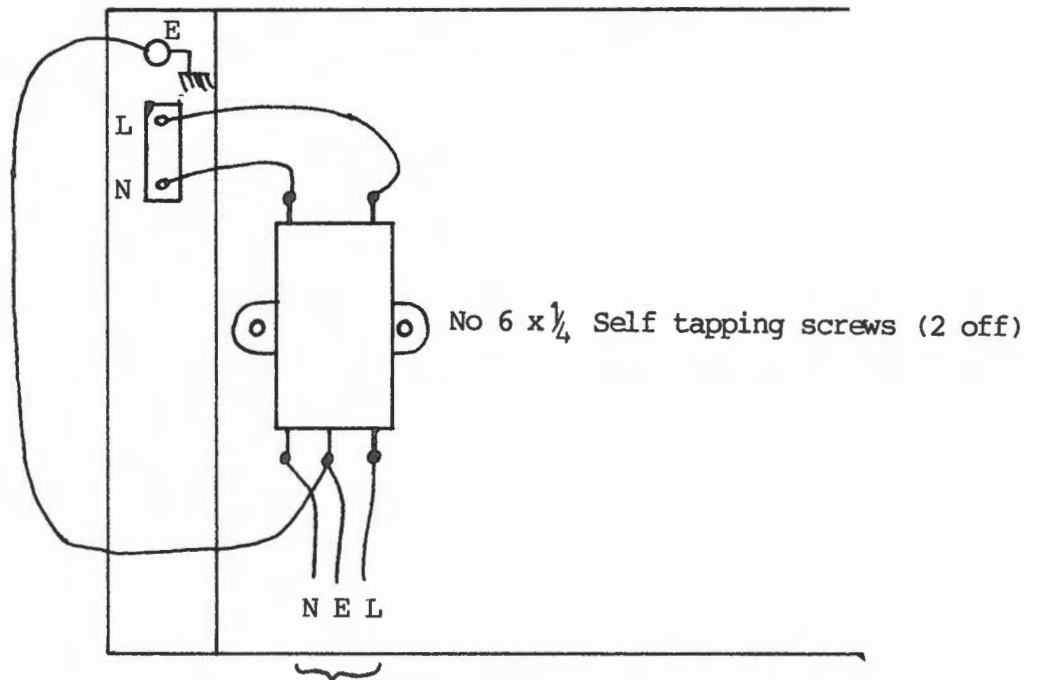
If preferred, for units already in the field or held in stock, a filter of similar characteristics may be supplied. This shall either be of the type built-in to a 3 pin 13 amp socket (requiring the replacement of the System 5 mains plug) or of the type supplied as a unit with a standard 13 amp socket (into which you plug the System 5) and a 3 pin 13 amp plug to connect the mains filter to a standard U.K power source.

A suggested source of the "built-in" type is the MPL Clean Power Plug (6 amp rating). this is available from:

MPL Power Systems Ltd.
Bilton Way,
Hayes,
Middlesex,
UB3 3ND



Mains filter installation



Mains input from
front panel switch

All wires 32/0,2

N Blue

L Brown

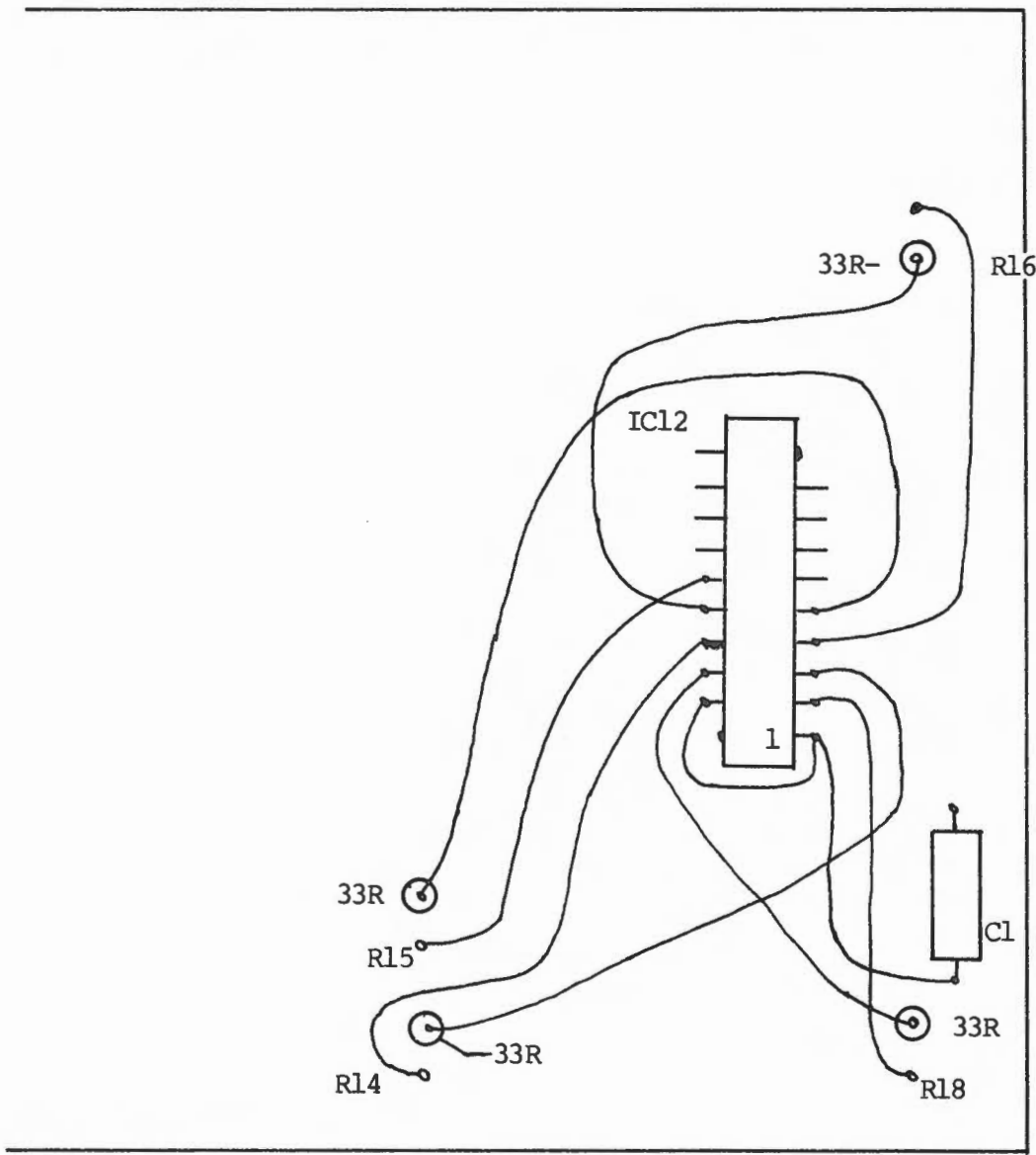
E Green/Yellow

MODIFICATIONS TO CPU CARD (200,005)

- (1) Remove the CPU card from the System 5 (the card with the 20 way socket)
- (2) Locate and remove I.C. 12 (741S245N)
- (3) Take I.C. 74HC244 and bend all the pins except 10 and 20 horizontal.
- (4) Fit I.C 74HC244 into I.C. 12 by soldering pins 10 and 20.
- (5) Locate and remove resistors: R14, R15, R16 and R18.
- (6) Insert one end of each 33R resistor vertically into positions R14, R15, R16 and R18 (as shown in the diagram on page 4.5.10.6) leaving the other end free.
- (7) Wire up the 74HC244 as shown in the diagram on page 4.5.10.6.
- (8) Cut unused legs on the 74HC244 flush with the packaging.
- (9) Turn the board over and solder a 47nF disc ceramic capacitor (12v working or greater) between pins 10 and 20 on I.C. 12. Insulate the leadout wires and lay the component flat against the PCB with the top towards the edge connector.



Wiring of 74HC244 on CPU card (200,005)





MODIFICATIONS TO 32K DRAM CARDS (2000,010)

Please note that there are two of these cards in the System 5 both of which must be modified as follows:

- (1) Replace I.C.27 (74LS74) with I.C. 74HC74
- (2) Cut the track from that runs from I.C.20 pin 1 to I.C.21 pin 3 (see the diagram on next page).
- (3) Fit a wire link from I.C.20 pin 1 to I.C.21 pin 6 on the reverse side of the board.

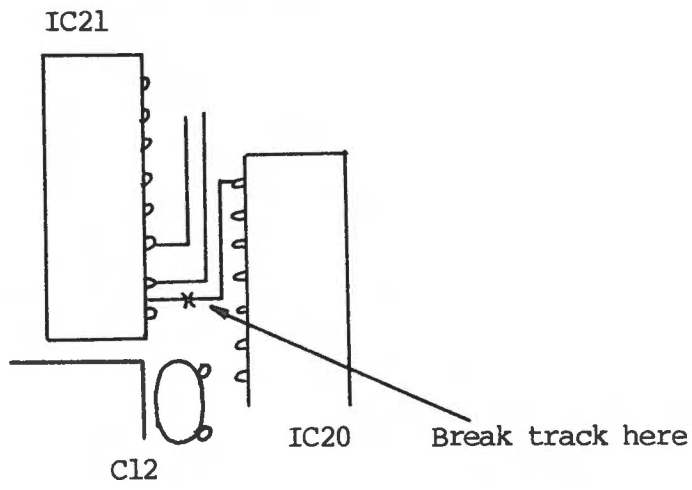
COMPONENTS LIST
QUANTITIES ARE PER SYSTEM

ITEM	ACORN PART No.	DESCRIPTION	No. OFF	COMMENTS
1	831,900	MAINS FILTER	1	
2	747,244	I.C. 74HC244	1	
3	747,074	I.C. 74HC74	2	
4	502,330	RESISTOR 33R 1/4W 5%	4	
5	628,470	CAPACITOR 47nF DISC CERAMIC	1	
6	870,151	WIRE 32/0.2mm BLUE	A/R)
7	870,152	WIRE 32/0.2mm BROWN	A/R	) FOR MAINS RE-WIRING
8	870,153	WIRE 32/0.2mm GREEN/YELLOW	A/R)
9	870,160	WIRE 1/0.6mm BLACK	A/R	FOR P.C.B LINKS
10	800,090	CRIMP CONNECTOR INSERTS	2	
11	880,040	SLEEVING	A/R	FOR ITEMS 5,6,7 AND 8

If item 1 is replaced by the external-type mains filter (831,910) then items 1, 6, 7, 8, 10 and part of 11 are not required.



Diagram of DRAM modifications (200,010)



TESTING THE SYSTEM 5

The System 5, once modified, should be subjected to the following test procedure. The equipment needed to carry out the test is:

- (i) The unit under test
- (ii) Continuity/ short circuit detector (eg Hytrack)
- (iii) "System 5 Test Procedure" Discette (2 off)
- (iv) A formatted blank System 5 discette
- (v) Monitor
- (vi) ASCII keyboard

Test Procedure

PLEASE NOTE: Whenever equipment is connected to or disconnected from the System 5 the power must be turned OFF.

Should the System 5 itself or any of its component parts fail a test at any stage, the test procedure should be started at the beginning following repair of the unit.

1. Rack/ PSU Tests

Take the assembled rack and, using the continuity/ short circuit detector, check continuity between earth pin on mains plug and all exposed metal parts of case.

2. Complete System Test

(a) Put all the cards into the system and turn on. If the system fails to work, test the cards by plugging them one-by-one into a known working System 5.

(b) Insert the disc entitled "System 5F Test Procedure" into left hand drive (drive 0). If the System 5 auto-boots (ie drive light is on and system attempts to read the disc), press <Delete> followed by <Break> to produce the prompt :

Acorn Dos

*

(c) Type CRC <Return>

Enter the following in response to prompts:

Start address? E000 <Return>
End address? 0000 <Return>

The correct result is 7906. Any deviation from this indicates a faulty EPROM on the CPU card.

(d) Type the following:

```
ATBASIC <Return>
LOAD "KYBD" <Return>
RUN <Return>
```

Follow the instructions displayed on the screen to test the keyboard. Any keys which are faulty will fail to erase the corresponding symbol from the screen

(e) Type LOAD "CPURAM" <Return>
RUN <Return>

This tests the CPU page 0 RAM from 0400 to 07FF. If this test indicates failure, check that LK5 is present and LK6 is absent and retest if appropriate.

(f) Type LOAD "RANRAM" <Return>
RUN <Return>

This exhaustive test of blocks 4,6,8 and A of RAM takes approximately 1 minute. Block 2 contains the test program and Block C contains ATBASIC so these areas cannot be written to by a test program. However, the fact that the program runs proves these areas.

(g) Type LOAD "VDURAM" <Return>
RUN <Return>

This tests the VDU RAM.

3. Disc Tests

Insert the formatted blank System 5 disc into drive 1 .

```
Type <Delete> <Break>
E.READ <Return>
```

This test should take in the region of 4 minutes 10 seconds and verifies all four surfaces of the disc drives.

```
Type <Delete> <Break>
E.WRT <Return>
```

This test also takes in the region of 4 minutes 10 seconds, and ensures the four surfaces of the disc drive can be written to; the tests in this and the previous section also exercise the FDC card.

PLEASE NOTE: If the power fails, or the system is turned off during this test, there is a slight possibility that the disc



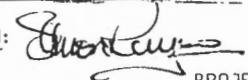
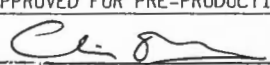
may become corrupted, producing "Disc Errors" when it is next read. If this should happen, revert to a backup copy.

4. Econet

Where the System 5 is to be used as a file server, then it should be tested for operation by starting it as a file server and ensuring it can be accessed by all users on the network. If this, fails, the Econet card may be tested by inserting it into a known working System 5 file server.

This completes the test procedures .

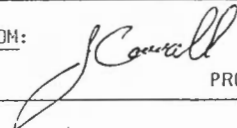
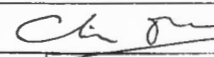
ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> TELETEXT ADAPTOR		<u>HEIGHT</u> (mm) 70	<u>WIDTH</u> (mm) 210	<u>FROM:</u>  PROJECT LEADER
<u>ORDER CODE</u> ANE 01	<u>PART NUMBER</u> 004,000	<u>DEPTH</u> (mm) 350	<u>MATERIAL</u> ABS injection moulded plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> Provides access to teletext and telesoftware services broadcast on U.H.F. channels E21 to E69		<u>COLOUR</u> BBC computer cream	<u>CONSTRUCTION</u> Moulded top and bottom to match BBC computer profile	
<u>OPERATES WITH</u> (Peripherals) Any Model "B" BBC Microcomputer with 1.2 M.O.S. or later issue		<u>CONTROLS</u> (Switches, pots., keyboards) Four tuning potentiometers on rear panel Mains on/off switch on rear panel		
<u>SIMILAR EQUIPMENT</u> None		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None		
<u>MAJOR COMPONENTS</u> PCB carrying TV tuner, teletext acquisition circuitry and digital computer interface. Internal Power Supply.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) 34-way ribbon cable to BBC Microcomputer "1MHz Bus" Standard U.H.F. TV aerial socket		
<u>DESCRIPTION OF OPERATION</u> A 4-channel I.V. tuner demodulates incoming U.H.F. signals from a standard U.H.F. aerial and feeds a composite video signal to a Mullard video processor I.C. Teletext data is stored in on-board Random Access Memory and retrieved by the BBC Microcomputer during picture lines of the incoming video signal. All data processing is performed by a "Telerom" which is supplied and fitted within the BBC Microcomputer.		<u>POWER IN</u> (V,A,W,Hz, Connector type) 240v, 50Hz, 15w Moulded 13A fused plug on 2m cable	<u>POWER OUT</u> (V,A,W,Hz, Connector Type) None	
		<u>APPROVALS</u> (BS,FC,CSA, UL,VDE,BEAB) BS415 Class 1 applied for	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 10 to 35°C	<u>WEIGHT (KG) UNIT ONLY</u> 2.0	<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 2.2
<u>CAPACITY</u> 1 Kbyte on-board R.A.M.	<u>FORMAT</u> See Appendix	<u>PACKAGING</u> Two part moulded polystyrene package contained in cardboard sleeve	<u>ACCESSORIES INCLUDED</u> User Manual "Telerom"	
<u>SPEED</u> (operating frequency) Max. data capture rate approx. 128 kbaud. (8 lines of Teletext per frame)	<u>INSTALLATION</u> Should be installed by a dealer as ROM and possible M.O.S. update required for BBC Micro.	<u>APPENDICES</u> 1. Teletext data format and broadcast specification	<u>DRAWING NUMBER</u> 004,000/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.
		<u>ISSUE</u> 1	<u>DATE</u> 10.82	© COPYRIGHT 1983 ACORN COMPUTERS LTD.

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ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> SECOND PROCESSOR - 6502		<u>HEIGHT (mm)</u> 70	<u>WIDTH (mm)</u> 210	<u>FROM:</u>  PROJECT LEADER	
<u>ORDER CODE</u> ANC 01	<u>PART NUMBER</u> 008,000	<u>DEPTH (mm)</u> 350	<u>MATERIAL</u> ABS injection moulded plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Provide extra processing power, i.e. faster operation of programs and more user memory for the BBC Microcomputer.		<u>COLOUR</u> BBC computer cream	<u>CONSTRUCTION</u> Moulded top and bottom to match BBC computer profile		
<u>OPERATES WITH (Peripherals)</u> BBC Microcomputer Model B with Econet/tube ROM fitted		<u>CONTROLS (Switches, pots., keyboards)</u> None			
<u>SIMILAR EQUIPMENT</u> Second Processor - Z80 ANC 02		<u>INDICATORS (Meters, lamps, readouts, audible)</u> None			
<u>MAJOR COMPONENTS</u> Plastic case, internal power supply. Fitted tube connector cable. PCB carrying: Tube ULA, 6502C, 8 x 64k DRAMs, Bootstrap ROM and other components.		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 40 way flat ribbon cable to BBC Microcomputer tube connector.			
<u>DESCRIPTION OF OPERATION</u> Once installed, the selected language is automatically passed across the tube into the second processor memory space. The second processor then carries out all user program language processing tasks. The original BBC computer processor then serves the language processor via the tube for all operating system functions. The second processors will run without a language ROM in the BBC computer, in which case the language may be loaded over the filing system at the users command.		<u>POWER IN (V,A,W,HZ, Connector type)</u> 240v AC 50Hz	<u>POWER OUT (V,A,W,HZ, Connector Type)</u> None		
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> None To conform BS 1117/79	<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE (°C)</u> 10° - 35°C	<u>WEIGHT (KG) UNIT ONLY</u>	3.1	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	3.4	
<u>CAPACITY</u> 64k total. 2½k for bootstrap ROM and work space. Generally 60k of RAM is available for the user program and the selected language.	<u>FORMAT</u> BBC Microcomputer tube operating system environment	<u>PACKAGING</u> Two part polystyrene in cardboard carton	<u>ACCESSORIES INCLUDED</u> User Manual Econet/Tube ROM		
<u>SPEED (operating frequency)</u> 3MHz Clock 6502. Bus speed 3 Mbytes/second	<u>INSTALLATION</u> By dealer or user plug in. Note: ROM to be fitted in BBC computer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 008,000/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  © ACORN COMPUTERS LTD. 83	
		<u>ISSUE</u>	1		
		<u>DATE</u>	4.83		

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<u>EQUIPMENT</u> SECOND PROCESSOR - Z80		<u>HEIGHT</u> (mm) 70	<u>WIDTH</u> (mm) 210	<u>FROM:</u> <i>J. Carroll</i> PROJECT LEADER	
<u>ORDER CODE</u> ANC 04	<u>PART NUMBER</u> 009,000	<u>DEPTH</u> (mm) 350	<u>MATERIAL</u> ABS injection moulded plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Provide extra processing power, i.e. faster operation of programs and more user memory for the BBC Microcomputer. CP/M* compatibility.		<u>COLOUR</u> BBC computer cream	<u>CONSTRUCTION</u> Moulded top and bottom to match BBC computer profile		
<u>OPERATES WITH</u> (Peripherals) BBC Microcomputer Model B with Econet/tube ROM fitted plus Random Access Filing System (e.g. DFS).		<u>CONTROLS</u> (Switches, pots., keyboards) On/off switch			
<u>SIMILAR EQUIPMENT</u> Second processor 6502 - ANC 01		<u>INDICATORS</u> (Meters, lamps, readouts, audible) None			
<u>MAJOR COMPONENTS</u> Plastic case, internal power supply. Fitted tube connection cable. PCB carrying: Tube ULA, Z80B, 8 x 64k DRAMs, Bootstrap ROM and other components.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) 40 way flat ribbon cable to BBC Microcomputer tube connector			
<u>DESCRIPTION OF OPERATION</u> The CPM operating system is loaded via the BBC computer from the filing system. The Z80 performs all user program processing, while the BBC computer carries out, via the Tube, all input and output functions.		<u>POWER IN</u> (V,A,W,Hz,Connector type) 240v AC, 50Hz	<u>POWER OUT</u> (V,A,W,Hz, Connector Type) None		
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None	<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE</u> (°C) 10° - 35°C	<u>WEIGHT (KG) UNIT ONLY</u> 2.0	<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 2.2	
		<u>PACKAGING</u> Two part polystyrene in cardboard carton	<u>ACCESSORIES INCLUDED</u> User Manual Econet/Tube ROM <i>Bundle of software and manuals.</i>		
<u>CAPACITY</u> 64k RAM plus Bootstrap ROM. ROM appears only when required, leaving all RAM useable.	<u>FORMAT</u> BBC Microcomputer tube operating system environment	<u>APPENDICES</u> *CP/M is a registered trade mark of Digital Research Inc. Second Processor Z80 Appendix		<u>DRAWING NUMBER</u> 009,000/E	
<u>SPEED</u> (operating frequency) Bus speed 2M bytes/second 6MHz clock Z80B	<u>INSTALLATION</u> By dealer or user plug in. Note: ROM to be fitted in BBC computer	<u>ISSUE</u> A	<u>DATE</u> 4.83	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> CH. ENG. © COPYRIGHT 1983 ACORN COMPUTERS LTD.	

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ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> PRESTEL ADAPTOR		<u>HEIGHT</u> (mm) 70	<u>WIDTH</u> (mm) 210	<u>FROM:</u> <i>Montey</i> PROJECT LEADER	
<u>ORDER CODE</u> ANE 02	<u>PART NUMBER</u> 015,000	<u>DEPTH</u> (mm) 350	<u>MATERIAL</u> ABS Injection moulded plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Interfaces a BBC Microcomputer to any British Telecom attached 1200/75 baud dial-up system (e.g. Prestel, Micronet, Telecom Gold).		<u>COLOUR</u> BBC Computer cream Brown label	<u>CONSTRUCTION</u> Moulded top and bottom to match BBC Microcomputer profile		
<u>OPERATES WITH</u> (Peripherals) Any BBC Microcomputer Model "B" with 1.2 MOS or later issue.		<u>CONTROLS</u> (Switches, pots., keyboards) Mains on/off switch on rear panel			
<u>SIMILAR EQUIPMENT</u> Teletext Adaptor (ANE 01)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) Loudspeaker monitor during call set-up			
<u>MAJOR COMPONENTS</u> Two part plastic box containing PCB carrying modem, auto-dialler, RS232 interface, phone line interface and power supply. Metal access prevention plate carrying loudspeaker assembly.		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) Cable to 5-pin domino plug (RS423 interface) Cable to new telephone jack (telephone connection)			
<u>DESCRIPTION OF OPERATION</u> Call set-up and auto-dialler fully computer controlled. A 1200/75 baud modem interfaces to the RS423 serial port on the BBC Microcomputer and to the telephone line via the telephone line barrier. All data processing is performed by software including the downloading of telesoftware files from Micronet 800.		<u>POWER IN</u> (V,A,W,Hz, Connector type) 240v, 50Hz, 10w 13a moulded plug		<u>POWER OUT</u> (V,A,W,Hz, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) British Telecom applied for. Complies with BS415 Class 1		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 10° - 35°c		<u>WEIGHT (KG) UNIT ONLY</u> 1.5	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 1.7	
<u>CAPACITY</u> N/A	<u>FORMAT</u> C.C.I.T.T. V23	<u>PACKAGING</u> Two-part moulded polystyrene contained within cardboard sleeve		<u>ACCESSORIES INCLUDED</u> User Guide Prestel Filing System (PFS) ROM	
<u>SPEED</u> (operating frequency) 1200 baud receive 75 baud transmit	<u>INSTALLATION</u> By dealer as ROM and possible MOS update required within BBC Microcomputer	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 015,000/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> CH. ENG.	
		<u>ISSUE</u> A		© COPYRIGHT 1983 ACORN COMPUTERS LTD.	
		<u>DATE</u> 5.83			

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1 JULY 83

6.4 PRESTEL RELAY PROTECTION

The dial relay (RL3) in the prestel adaptor is prone to damage if the adaptor is not connected to the phone line in conjunction with the methods and regulations followed by British Telecom or any other connecting company.

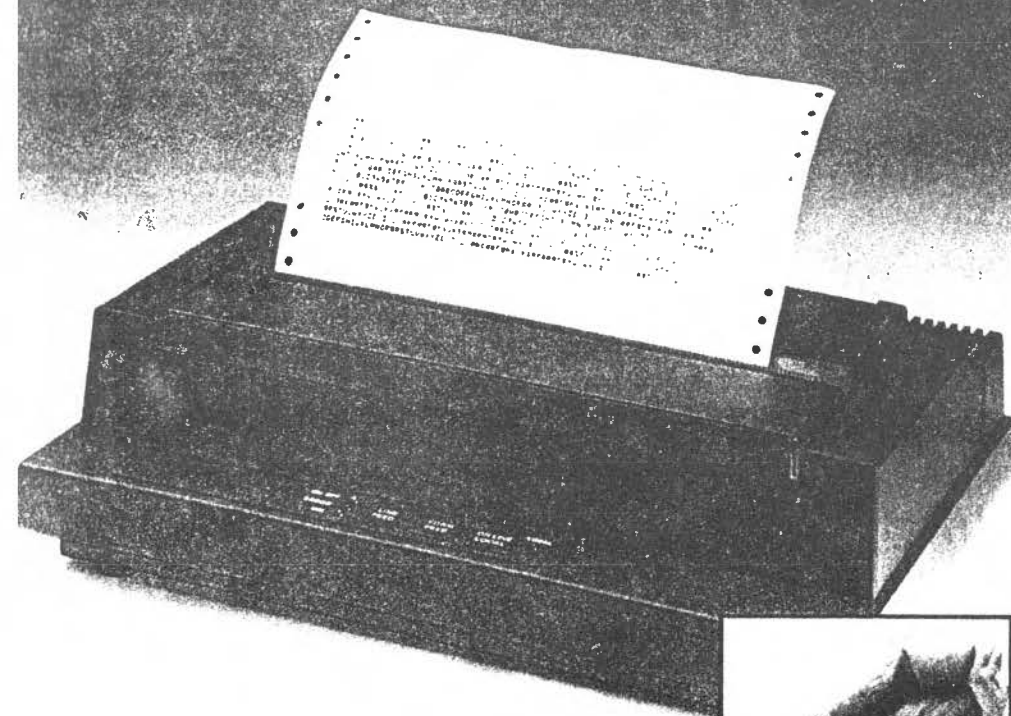
This relay has been known to have been damaged by surges from the phone line. However, if the line has been installed by British Telecom then the adaptor should normally be safe from surges since a suitable arrestor will have been fitted. The surge arrestor is fitted in the line jack unit which is used to terminate the incoming phone line. This type of line jack unit, known as the "master", is needed only by the connecting company and generally is not commercially available.

There is also another type of line jack unit known as a "secondary" unit. This unit can only be used as an extension unit in a circuit where a "master" already exists.

Since all genuine phone installations will have been carried out by British Telecom or another connecting company the user will not under normal use experience problems with line surges.

Acorn will not therefore consider any warranty claims for prestel adaptors which have been damaged through improper connection to the phone line.

The Revolutionary 'Spark-Jet' Printer

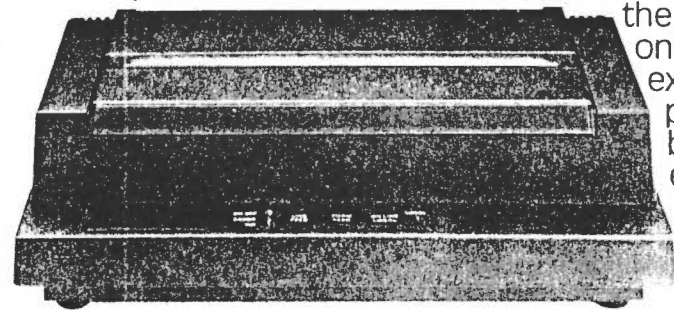


'Spark'Ink Jet

- * Optimum graphics
- * Minimum moving parts
- * Virtually noiseless
- * 50 lines per minute
- * Single dot addressable
- * Bi-directional
- * 800 dot horizontal resolution

**ONLY
£365
VAT**

The JPI is a compact 'spark ink-jet' printer using the latest dry-ink printing technology for fast, clean, virtually noiseless printing. The printer is suitable for both personal and business use and has all the advanced features normally only found in much more expensive machines. All printing is logic-seeking and bi-directional and can be executed in normal, double height, double width and underlined characters. The high resolution graphics are easily available and have



a horizontal resolution of 110 pixels per inch and a vertical resolution of 216 pixels per inch. All printer functions are controlled by the Printer's own microprocessor which can hold a complete screen of information at a time in its memory. This means the user can release the information to the printer instantly and continue using the computer whilst the screen contents are printed.

The 'Spark-jet'

The heart of the JPI printer is an advanced serial-matrix printhead. Electronic impulses fire minute particles of the carbon rod at high speed through a 7 x 7 dot matrix producing very high-quality lettering and graphics. There are no moving parts within the head itself which dramatically reduces noise and improves reliability.

Character Set

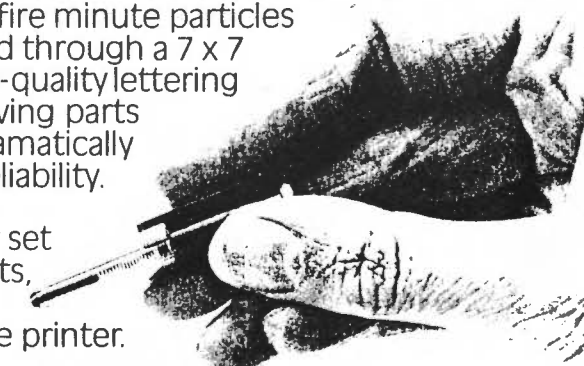
The JPI has a 96 ASCII character set with 8 different national variants, each available by sending the appropriate control code to the printer.

Character Spacing

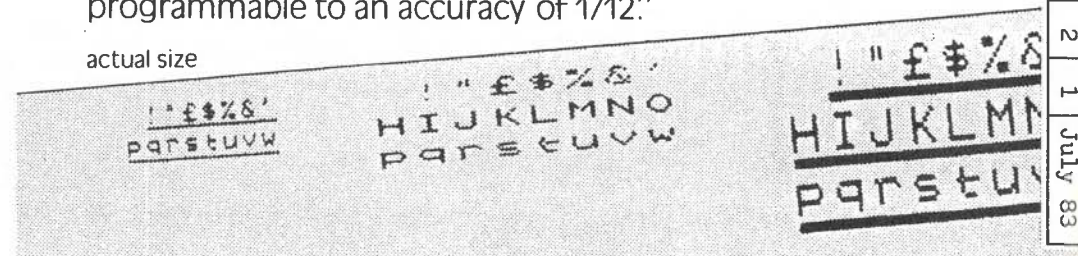
The printer has several modes these include 80 columns (1/10" spacing) 96 columns (1/12" spacing) 132 columns (1/16" spacing) Each character is printed in a 7 x 7 matrix.

Vertical Tabulation

The vertical tabulation can be easily set to either 1/6" or 1/8" or is programmable to an accuracy of 1/12"



actual size



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Print Modes

The JPI has several programmable print modes including Normal, Double width, Double Height and underlined. It also has several print sizes, these are 10 CPI 12 CPI 18 CPI

Graphics Mode

The JPI is capable of high resolution graphics and plotting. It has a horizontal resolution of 110 pixels per inch or 880 per line, the vertical resolution is 216 pixels per inch or integer multiples of this. It also has several graphics modes including normal, reverse and zoom (which magnifies the image by a factor of 2).

Print Speed

The JPI has a fast printing speed of 50 lines per minute or 83 characters per second. It has bi-directional printing. With shortest path seeking capability.

Paper

The JPI can accept either paper rolls or continuous, fan-fold stationary (8" or 9" pin-to-pin).

Printer Buffer

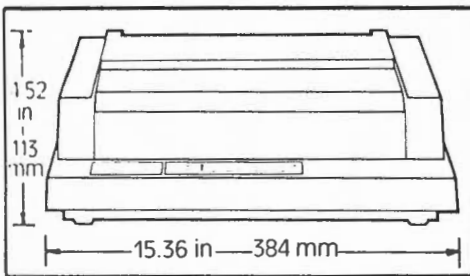
The JPI has a 1K buffer with "buffer nearly full" warning when 75% of the buffer has been filled.

Console and Light Signals

There are three keys on the console for local control of the printer. i.e. line feed, form feed and local mode. There are also several indicators and warning lights. On/off, Error, Local and Ink.

Physical Dimensions

Height: 4.52 in (113 mm) Width: 15.36 in (384 mm)



Depth: 9.92 in (248 mm)

Weight: 11.44 lbs (5.2 Kg)

Electrical Characteristics

Voltage: 100, 115, 120, 220, 240

Frequency: 50 or 60 Hz

Power consumption: 35 watts

Operating Environment

Operating temperatures: 5°C to 40°C.

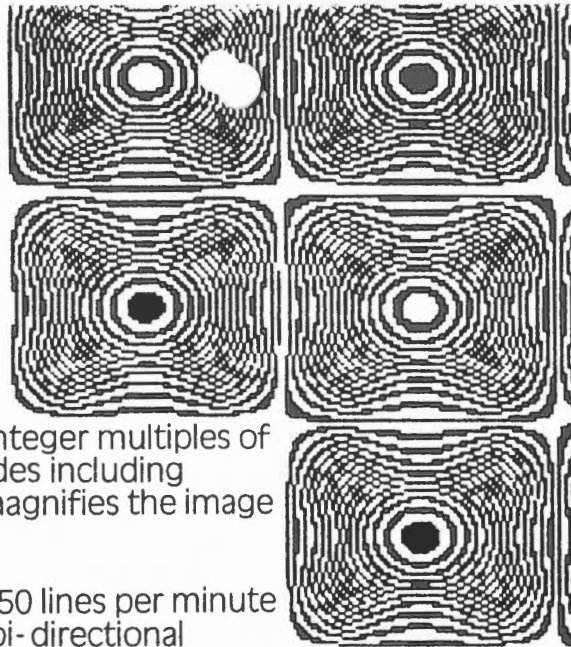
Relative humidity: 10% to 85%

Interfaces

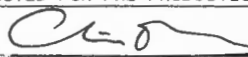
An 8-bit Centronics parallel interface with data strobe, busy and acknowledged handshaking is fitted as standard.

Paper

Maximum Width 12in.



actual size

<u>EQUIPMENT</u> SINGLE DISC DRIVE		<u>HEIGHT</u> (mm) 90	<u>WIDTH</u> (mm) 155	<u>FROM:</u> T.A. Scotcher PROJECT LEADER		
<u>ORDER CODE</u> AND 01	<u>PART NUMBER</u> 003,700	<u>DEPTH</u> (mm) 240	<u>MATERIAL</u> Aluminium	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER		
<u>FUNCTION</u> Provide program and data storage for BBC Microcomputer		<u>COLOUR</u> BBC computer cream painted	<u>CONSTRUCTION</u> 2 piece folded metal assembly, secured by screws, 4 rubber feet			
<u>OPERATES WITH</u> (Peripherals) BBC Microcomputer Models B (ANB 03) with disc interface and Model B (ANB 04) with disc and net interface		<u>CONTROLS</u> (Switches, pots., keyboards) None				
<u>SIMILAR EQUIPMENT</u> Dual disc drive (AND 02)		<u>INDICATORS</u> (Meters, lamps, readouts, audible) Drive active LED on drive front panel				
<u>MAJOR COMPONENTS</u> One full height, single sided, single track density (48 TPI) 5 1/4 inch floppy disc drive; i.e. 1 diskette surface Fitted connection cables		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) 34 way flat ribbon cable with IDC socket to plug on to Model B disc interface connector. Standard mini-floppy interface. See appendix.				
<u>DESCRIPTION OF OPERATION</u> Files are loaded and saved to and from the BBC Microcomputer under control of the Disc Filing System ROM and the 8271 disc controller chip in the Microcomputer. A catalogue for each disc surface is maintained by the DFS on the first two sectors of that surface.		<u>POWER IN</u> (V,A,W,Hz,Connector type) Power cable to connect to Model B disc power socket on SMPS. 5v DC @ 500mA, 12v DC @ 750mA		<u>POWER OUT</u> (V,A,W,Hz, Connector Type) None		
		<u>APPROVALS</u> (BS,FCC,CSA, UL,VDE,BEAB) None		<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE</u> (°C) 10° - 30°C		<u>WEIGHT (KG) UNIT ONLY</u> 2.04		<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 2.2
		<u>PACKAGING</u> Cardboard carton with preformed cardboard to contain the disc unit. Plus any packaging in the drive as delivered from vendor.		<u>ACCESSORIES INCLUDED</u> DFS Manual Utilities diskette, 40 track		
<u>CAPACITY</u> 100 Kbytes formatted	<u>Soft sectored, similar to IBM 3740</u> <u>FORMAT</u> 40 tracks, 10 sectors per track 256 data bytes per sector	<u>APPENDICES</u> 1. Standard mini-floppy interface details		<u>DRAWING NUMBER</u> 003,700/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.	
<u>SPEED</u> (operating frequency) Data rate 125 kbits/second	<u>INSTALLATION</u> Dealer or User. Check drive characteristic links on keyboard are correct and remove any packaging in drive.			<u>ISSUE</u> 1	<u>DATE</u> 10.82	
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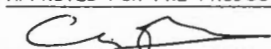
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<u>EQUIPMENT</u> 40 Track Disc Drive Utilities Kit		<u>HEIGHT (mm)</u> 15	<u>WIDTH (mm)</u> 150	<u>FROM:</u> <i>Alan Fournier</i> PROJECT LEADER	
<u>ORDER CODE</u> ANJ 02	<u>PART NUMBER</u> 003,601	<u>DEPTH (mm)</u> 210	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> To supply necessary operating instructions and software utilities to disc drive users.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A		
<u>OPERATES WITH (Peripherals)</u> BBC 40 Track Disc Drive		<u>CONTROLS (Switches, pots., keyboards)</u> N/A			
<u>SIMILAR EQUIPMENT</u> 80 Track Disc Drive Utilities Kit		<u>INDICATORS (Meters, lamps, readouts, audible)</u> N/A			
<u>MAJOR COMPONENTS</u> 40 Track Utilities Disc Disc System User Guide		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> N/A			
<u>DESCRIPTION OF OPERATION</u> <u>N.B.</u> These items are supplied with 40 track BBC Microcomputer system disc drives purchased from Acorn Computers.		<u>POWER IN (V,A,W,HZ,Connector type)</u> N/A		<u>POWER OUT (V,A,W,HZ, Connector Type)</u> N/A	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> N/A		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> N/A		<u>WEIGHT (KG) UNIT ONLY</u> 0.170	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 0.340	
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Cardboard Stiffener Shrink Wrap Jiffy Bag		<u>ACCESSORIES INCLUDED</u> None	
<u>SPEED (operating frequency)</u> N/A	<u>INSTALLATION</u> User	<u>APPENDICES</u> N/A	<u>DRAWING NUMBER</u> 003,601/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>Ch. Eng.</i> CH. ENG.	
			<u>ISSUE</u> 1	© COPYRIGHT 1983 ACORN COMPUTERS LTD.	
			<u>DATE</u> 2.83		

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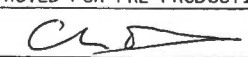
ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> DUAL DISC DRIVE		<u>HEIGHT (mm)</u> 90	<u>WIDTH (mm)</u> 155	<u>FROM:</u> T. C. Scotcher PROJECT LEADER		
<u>ORDER CODE</u> AND 02	<u>PART NUMBER</u> 003,900	<u>DEPTH (mm)</u> 240	<u>MATERIAL</u> Aluminium	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER		
<u>FUNCTION</u> Provide program and data storage for BBC Microcomputer		<u>COLOUR</u> BBC computer cream painted	<u>CONSTRUCTION</u> 2 piece folded metal secured by screws 4 rubber feet			
<u>OPERATES WITH (Peripherals)</u> BBC Microcomputer Models B (ANB 03) with disc interface and Model B (ANB 04) with disc and net interface		<u>CONTROLS (Switches, pots., keyboards)</u> None				
<u>SIMILAR EQUIPMENT</u> Single disc drive (AND 01)		<u>INDICATORS (Meters, lamps, readouts, audible)</u> Drive active LED on each drive front panel				
<u>MAJOR COMPONENTS</u> Two slimline double sided, double track density (96 TPI) 5 1/4 inch floppy disc drives, i.e. 4 diskette surfaces Fitted connection cables		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 34 way flat ribbon cable with IDC socket to plug on to Model B disc interface connector. Standard mini-floppy interface, see appendix				
<u>DESCRIPTION OF OPERATION</u> Files are loaded and saved to and from the BBC Microcomputer under control of the disc filing system ROM and the 8271 disc controller chip in the Microcomputer. A catalogue for each disc surface is maintained by the DFS on the first two sectors of that surface.		<u>POWER IN (V,A,W,HZ,Connector type)</u> Power cable and connector Model B disc power socket on SMPS, 5v DC @ 620mA, 12v DC @ 1200mA		<u>POWER OUT (V,A,W,HZ, Connector Type)</u> None		
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> None		<u>GUARANTEE</u> 6 months		
		<u>OPERATING TEMPERATURE (°C)</u> 10 - 30°C		<u>WEIGHT (KG) UNIT ONLY</u> 2.6		<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 2.9
		<u>PACKAGING</u> Cardboard carton with preformed cardboard to contain the disc unit. Plus any packaging in the drive as delivered from vendor.		<u>ACCESSORIES INCLUDED</u> DFS Manual Utilities diskette, 80 track		
<u>CAPACITY</u> 200 Kbytes formatted per surface i.e. 800k total	<u>Soft sectored similar to IBM 3740</u> <u>FORMAT</u> 80 tracks per surface 10 sectors per track 256 data bytes per sector	<u>APPENDICES</u> 1. Standard mini-floppy interface circuit		<u>DRAWING NUMBER</u> 003,900/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.	
<u>SPEED (operating frequency)</u> Data rate 125 Kbits/second	<u>INSTALLATION</u> Dealer or User. Check drive characteristic links on keyboard are correct. Remove any packaging in drive	<u>ISSUE</u> 1	<u>DATE</u> 10.82	© COPYRIGHT 1983 ACORN COMPUTERS LTD.		

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<u>EQUIPMENT</u> 80 Track Disc Drive Utilities Kit		<u>HEIGHT</u> (mm) 15	<u>WIDTH</u> (mm) 150	<u>FROM:</u> Alan Fournier PROJECT LEADER
<u>ORDER CODE</u> ANJ 03	<u>PART NUMBER</u> 003,602	<u>DEPTH</u> (mm) 210	<u>MATERIAL</u> N/A	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> To supply necessary operating instructions and software utilities to disc drive users.		<u>COLOUR</u> N/A	<u>CONSTRUCTION</u> N/A	
<u>OPERATES WITH</u> (Peripherals) BBC Dual 80 Track Disc Drives		<u>CONTROLS</u> (Switches, pots., keyboards) N/A		
<u>SIMILAR EQUIPMENT</u> 40 Track Disc Drive Utilities Kit		<u>INDICATORS</u> (Meters, lamps, readouts, audible) N/A		
<u>MAJOR COMPONENTS</u> 80 Track Utilities Disc Disc System User Guide		<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) N/A		
<u>DESCRIPTION OF OPERATION</u> N.B. These items are supplied with 80 track BBC Microcomputer system disc drives purchased from Acorn Computers.		<u>POWER IN</u> (V,A,W,HZ,Connector type) N/A	<u>POWER OUT</u> (V,A,W,HZ, Connector Type) N/A	
		<u>APPROVALS</u> (BS,FCC,CSA, UL, VDE, BEAB) N/A	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) N/A	<u>WEIGHT (KG) UNIT ONLY</u>	0.170
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	0.340
<u>CAPACITY</u> N/A	<u>FORMAT</u> N/A	<u>PACKAGING</u> Cardboard Stiffener Shrink Wrap Jiffy Bag	<u>ACCESSORIES INCLUDED</u> None	
<u>SPEED</u> (operating frequency) N/A	<u>INSTALLATION</u> User	<u>APPENDICES</u> N/A	<u>DRAWING NUMBER</u> 003,602 / E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.
			<u>ISSUE</u> 1	© COPYRIGHT 1983 ACORN COMPUTERS LTD.
			<u>DATE</u> 2.83	

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2.5 DISK DRIVES APPROVED BY ACORN:

The following disk drives are approved by Acorn for use in their Disc System products for the BBC Microcomputer and Eurocard Systems:

40 Track, Single sided, full height:

Tandon TMS100-1

Shugart SA405 (When modified as per Shugart Euroregion 1 technical memo 24/1/83)

Olivetti FD501

40 Track, Single sided, half height:

Astec TC/FD55A(1)/S/110 - Astec cased Teac drive

80 Track, Double sided, full height (Eurocard Systems):

YE Data YD280

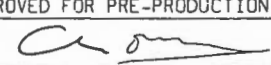
Tandon TMS100-4

Olivetti FD592

80 Track, Double sided, half height (BBC microcomputer):

Mitsubishi M4853

This list is only intended to indicate the drives we have tested and approved and that may appear from time to time in Acorn product. The list should not be considered as recommendation or approval of any product marketed by any third party, nor should any omission be considered to indicate any prejudice to any product.

<u>EQUIPMENT</u> JP101 Printer		<u>HEIGHT (mm)</u> 113	<u>WIDTH (mm)</u> 384	<u>FROM:</u> Alan Fournier. PROJECT LEADER	
<u>ORDER CODE</u> AJP 01	<u>PART NUMBER</u> 003,014	<u>DEPTH (mm)</u> 248	<u>MATERIAL</u> Plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Dry ink, spark ink jet printer. Full ASCII character and graphics capability.		<u>COLOUR</u> Black	<u>CONSTRUCTION</u> -----		
<u>OPERATES WITH (Peripherals)</u> System Versatile Interface Board. Acorn Atom with printer interface. BBC Microcomputer (except model A)		<u>CONTROLS (Switches, pots., keyboards)</u> On line/Local switch Form Feed switch. Line Feed switch. Power on/off switch. Intensity of print pot.			
<u>SIMILAR EQUIPMENT</u> Sekoshia GP100		<u>INDICATORS (Meters, lamps, readouts, audible)</u> LEDs for: On/Off Local Audible startup and error warning Error Ink			
<u>MAJOR COMPONENTS</u> Complete printer		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 36 way Delta Connector to standard Centronics format (8 bit data, data strobe, busy and acknowledge included)			
<u>DESCRIPTION OF OPERATION</u> Dependent upon hardware and software being used in conjunction. For examples see: BBC User Guide View User Guide System 5 Manual Atom User Guide		<u>POWER IN (V,A,W,HZ,Connector type)</u> 240v. 50HZ. 35w. moulded lead		<u>POWER OUT (V,A,W,HZ, Connector Type)</u> None	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> To BS415 1979		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> 5 to 40		<u>WEIGHT (KG) UNIT ONLY</u> 5.2 Kg	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	
<u>CAPACITY</u> 1k printer buffer	<u>FORMAT</u> Plain paper or 8 or 9 inch tractor feed paper	<u>PACKAGING</u> Cardboard box 2 x polystyrene end pieces		<u>ACCESSORIES INCLUDED</u> Manual. Connector cable Dust cover Paper roll holder assy. 10 x ink jets	
<u>SPEED (operating frequency)</u> 50 lines/minute 83 characters/second	<u>INSTALLATION</u> User	<u>APPENDICES</u> -----	<u>DRAWING NUMBER</u> 003,014/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.	
			<u>ISSUE</u> 1	© COPYRIGHT 1983 ACORN COMPUTERS LTD.	
			<u>DATE</u> 11.2.83		

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<u>EQUIPMENT</u> DATA CASSETTE RECORDER		<u>HEIGHT (mm)</u> 62	<u>WIDTH (mm)</u> 270	<u>FROM:</u> <i>S. E. Parsons</i> S. E. PARSONS. PROJECT LEADER	
<u>ORDER CODE</u> ANF-03	<u>PART NUMBER</u> 003,980	<u>DEPTH (mm)</u> 173	<u>MATERIAL</u> Injection moulded plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Program and data storage on up to C60 type audio cassette tape		<u>COLOUR</u> Top - BBC computer cream Bottom - black	<u>CONSTRUCTION</u> Two part plastic case with battery compartment and carrying handle		
<u>OPERATES WITH (Peripherals)</u> BBC Microcomputer - all models Also other Acorn products and audio use		N.B. Type *TAPE on disc and Econet machines			
<u>OPERATES WITH (Peripherals)</u> BBC Microcomputer - all models Also other Acorn products and audio use		<u>CONTROLS (Switches, pots., keyboards)</u> 6 key mechanism for "pause", "play", "stop and eject", "fast forward", "rewind" and "record" Slider controls for volume and tone			
<u>SIMILAR EQUIPMENT</u> None		<u>INDICATORS (Meters, lamps, readouts, audible)</u> Record level/battery level meter, (-20 to +3 dB) Tape position counter with reset button 650 mW loudspeaker for audible monitor			
<u>MAJOR COMPONENTS</u> Casing, cassette mechanism, internal mains power supply, electronics on PCB		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 7 pin DIN for input/output/motor control (motor controlled when plugged in) Input signal range from -20dB to +10dB (0dB = 60mV RMS) Output signal 275mV RMS fixed (nominal) 3.5 mm loudspeaker/earphone jack socket (mutes speaker when inserted)			
<u>DESCRIPTION OF OPERATION</u> Mono cassette recorder with motor control facility Auto stop on play and record Fixed level audible monitor on record Variable level audible monitor on playback does not affect signal to computer Also useable for audio but no microphone facilities		<u>POWER IN (V,A,W,Hz, Connector type)</u> 240v, 50Hz AC, 8 watts OR 4 x HP11 1.5 volt cells		<u>POWER OUT (V,A,W,Hz, Connector Type)</u> None	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> To conform to BS415 double insulated and to meet BEAB requirements		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> -10 to +45°C		<u>WEIGHT (KG) UNIT ONLY</u> 1.6 kg	<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u> 1.8 kg
		<u>PACKAGING</u> Plastic bag Polystyrene end pieces Cardboard carton		<u>ACCESSORIES INCLUDED</u> Earpiece with 3.5 mm jack plug (to mute speaker). 7 pin DIN to DIN lead, Mains lead, 2 core. User Manual	
<u>CAPACITY</u> Approx. 30 Kbytes/side on C15 Approx. 120 Kbytes/side on C60	<u>FORMAT</u> 300 or 1200 baud computer user tape standard 1200 and 2400 Hz tones	<u>APPENDICES</u> None		<u>DRAWING NUMBER</u> 003,980/E	
<u>SPEED (operating frequency)</u> 4.75 cm/second -2% to +3% Fast forward and rewind in 100 seconds for C60	<u>INSTALLATION</u> User plug in	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u> <i>C. E. Parsons</i> CH. ENG.			
		<u>ISSUE</u> 1	<u>DATE</u> 5.83		
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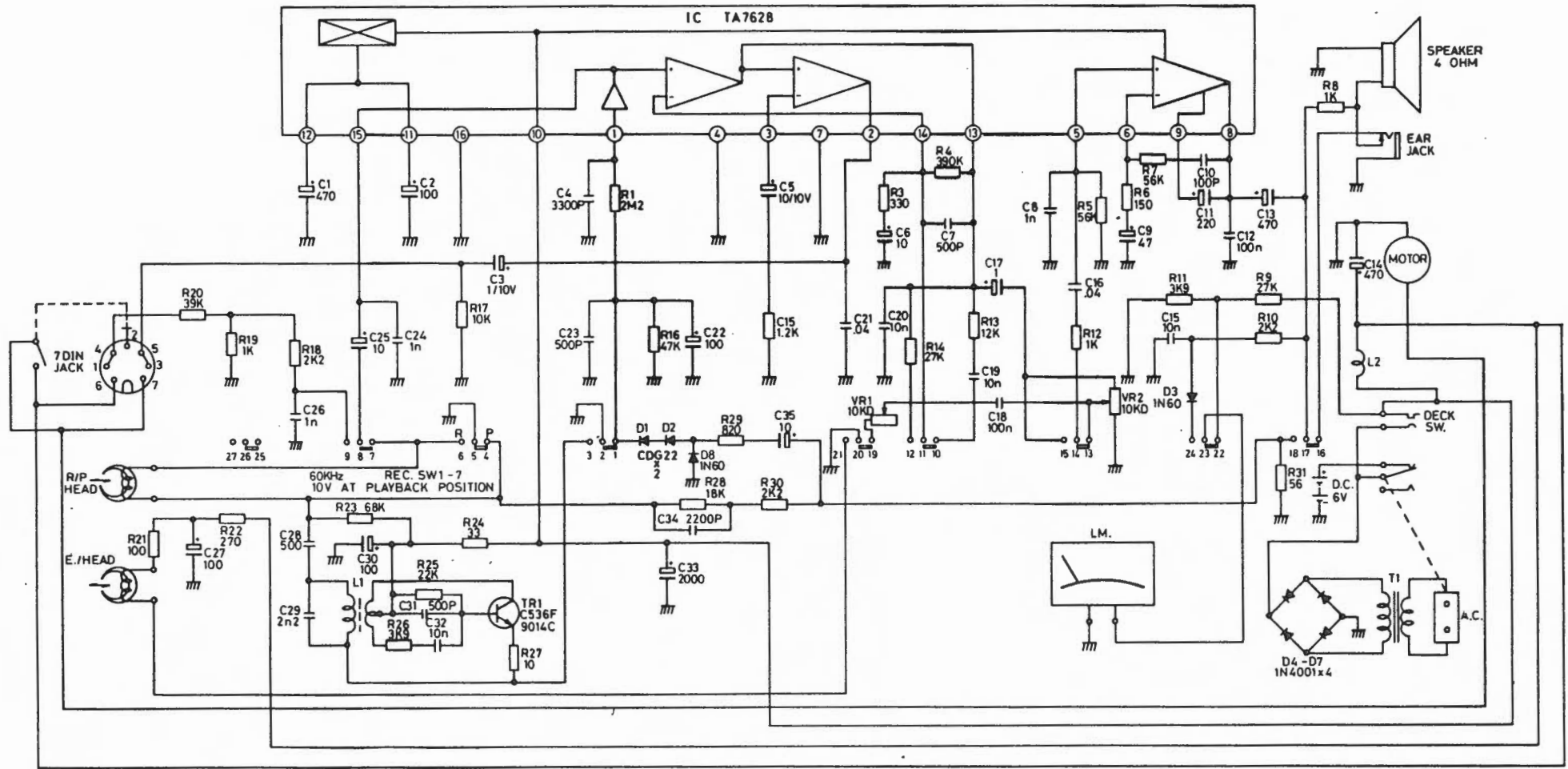
4.2 BBC DATA RECORDER CIRCUIT DIAGRAMS AND SCHEMATA

The following pages contain various diagrams which may be of use to you. (Please note that at present we do not supply any spare parts for this machine).

<u>Page</u>	<u>Diagram</u>
5.4.2.2	Schematic diagram
5.4.2.3	Wiring diagram
5.4.2.4	Component layout

SCHEMATIC DIAGRAM

MODEL : ANF 03



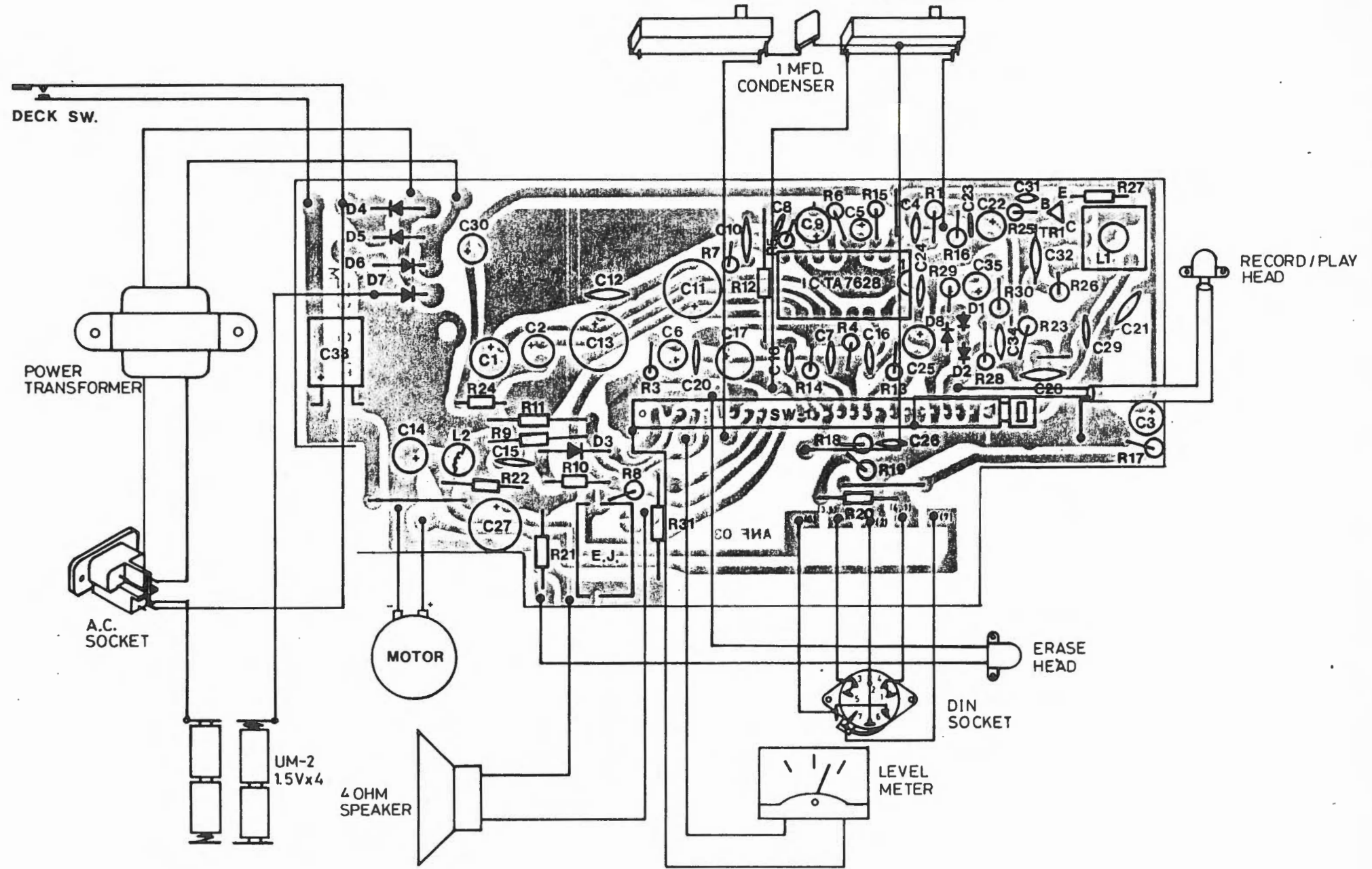
NOTES:

1. ALL RESISTORS UNIT ARE IN OHM. (1K=1,000 ; 1M=1,000K)
2. ALL CAPACITORS UNIT ARE IN MFD. UNLESS OTHERWISE SPECIFIED.

* DO NOT SCALE THIS DRAWING *

ACORN		DESIGN NO	BT1	1. UNLESS OTHERWISE SPECIFIED
TITLE SCHEMATIC DIAGRAM		MODEL ANF 03		2. ALL NOTES AND REVISIONS MUST BE INDICATED BY DATE AND INITIALS
MATERIAL		FINISH		3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
PART NO	SCALE	UNIT	ISSUE	4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
DATE	BATT CHECKED	DATE APPROVAL	DATE USE PROD.	SHEET 01

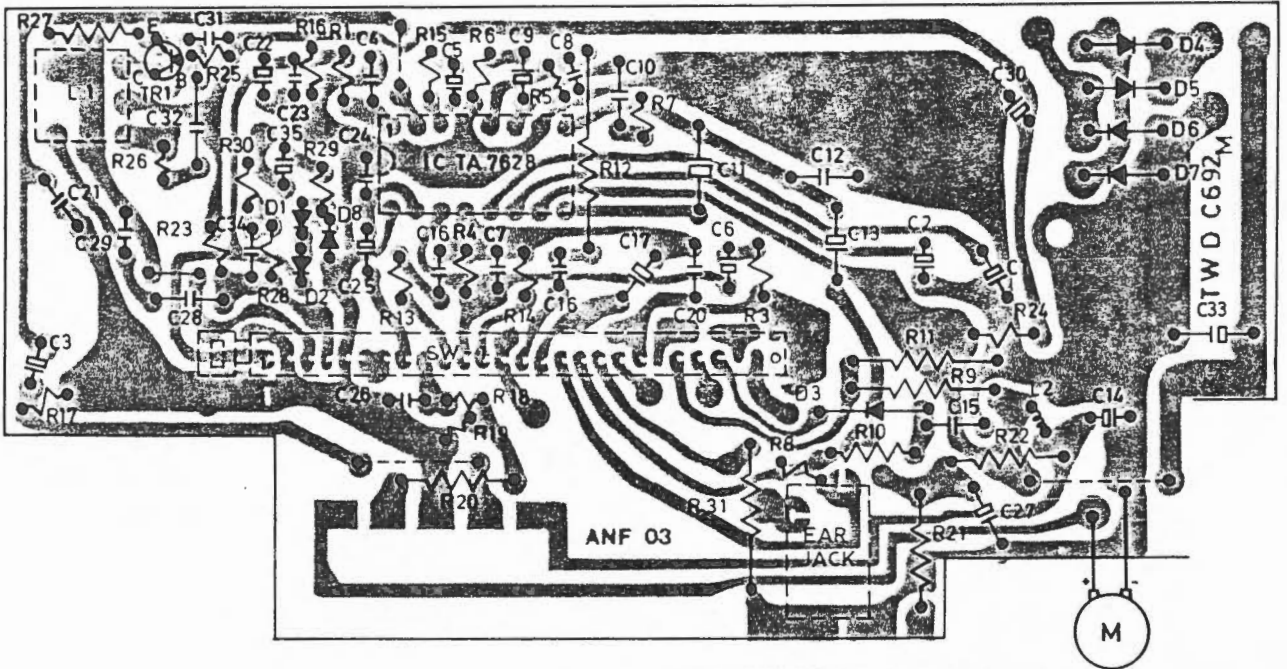
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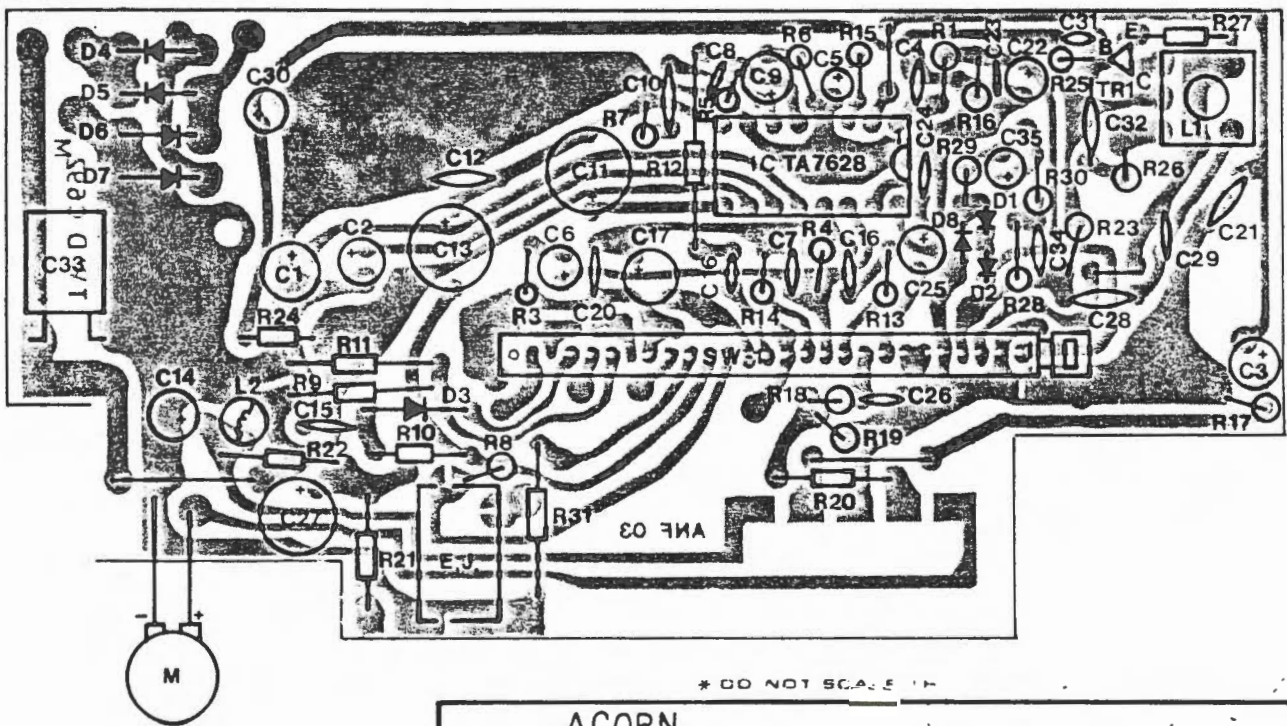
ACORN				USED ON	
TITLE WIRING GRAM				MODIFIED	
MATERIAL				ANF 03	
PART NO				SCALE	
DRAWN				DATE	
CHECKED		DATE		APPROVAL	

REVISION ON 8-5-83



ACORN		USED ON	TOLERANCES
TITLE COMPONENT LAYOUT (bottom view)		MOD 1	0.1%
PART NO		ANF 03	
DATE		ISSUE	
CHECKED		DATE	ISO PROJ
APPROVAL		DATE	SHEET 01

REVISION ON 9-5-83



ACORN		USED ON	TOLERANCES
TITLE COMPONENT LAYOUT TOP VIEW		MOD 1	0.1%
PART NO		ANF 03	
DATE		ISSUE	
CHECKED		DATE	ISO PROJ
APPROVAL		DATE	SHEET 01

REVISION ON 9-5-83



1.1 SYSTEMS

Acorn have now ceased production of most of their range of Eurocard based rack-mounting systems; however in keeping with our policy of continued support, circuitry information for the whole range is included in this manual.

The most recently introduced in this equipment range, the SYSTEM 5, is supported by a comprehensive manual, the SYSTEM 5 HANDBOOK, which is available from Customer Service (Spares) using the documentation ordering procedure described in Section 1. The SYSTEM 5 HANDBOOK has detailed descriptions of the various cards employed, as well as a discussion of 6502 machine-code programming and the organisation of Acorn Operating Systems.

There are short technical manuals for most of the Eurocard range and these are also available from Customer Service; a price list of these may be found in Section 1 of this manual.

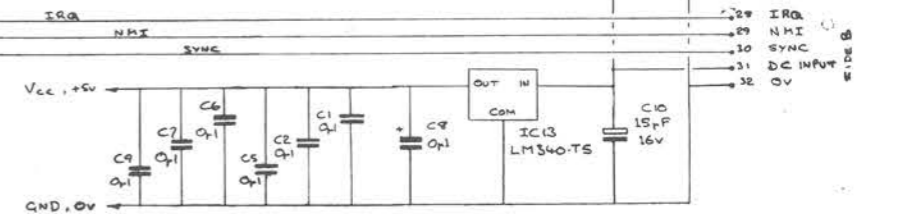
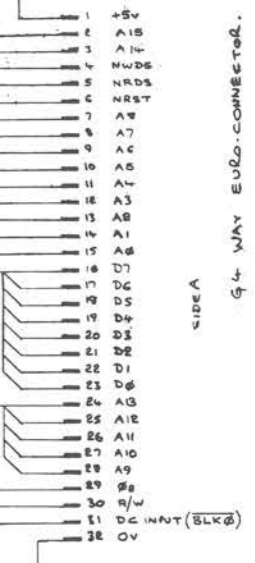
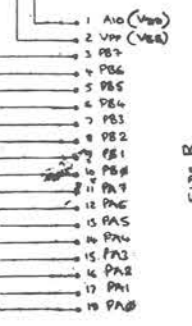
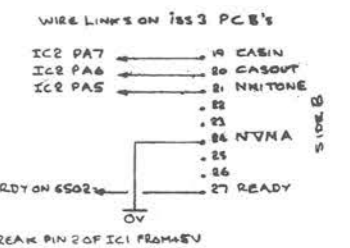
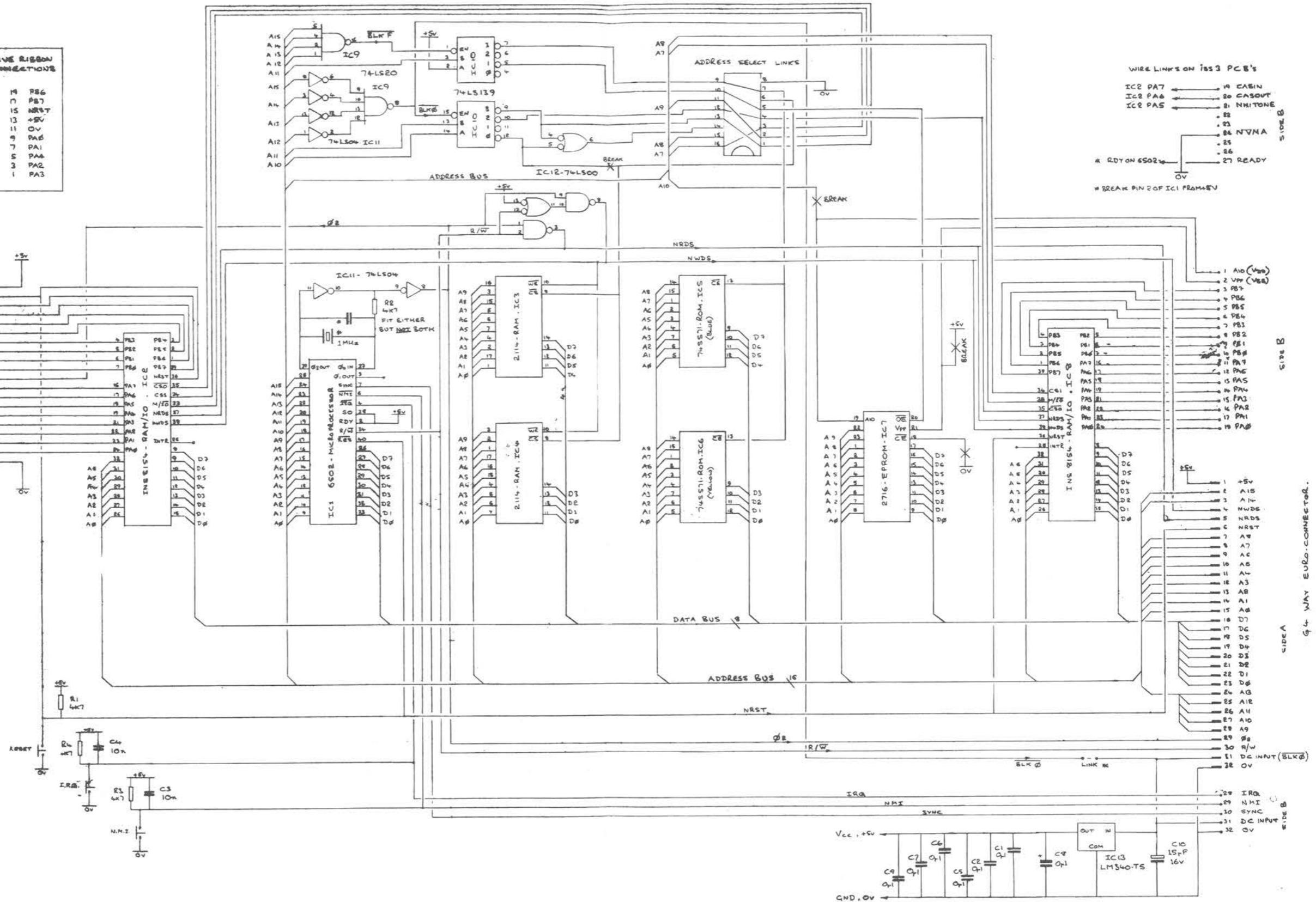
Accompanying this introduction you will find a copy of our original sales leaflet on the systems. The information contained in this leaflet is not entirely accurate but it has been included in the interest of providing you with the most comprehensive information available.

ALTERNATIVE RIBBON HEADER CONNECTIONS

20	PB5	19	PB6
19	PB4	18	PB7
18	PB3	17	NRST
17	PB2	16	+5V
16	PB1	15	OV
15	PB0	14	PA6
14	PA5	13	PA1
13	PA4	12	PA2
12	PA3	11	PA3

CONNECTED TO KEYBOARD, DISPLAY & CASSETTE INTERFACES

- +5V
- NRST
- PB7
- PB6
- PB5
- PB4
- PB3
- PB2
- PB1
- PB0
- PA7
- PA6
- PA5
- PA4
- PA3
- OV



* REMOVE C10 AND IC13 BEFORE ATTACHING

PRELIMINARY ISSUE
27 JULY 1983

ISSUE	6	2	1	1
DATE	23-02-79	11-08-79	23-02-80	

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Acorn Computers Ltd
11, MARKET HILL,
CAMBRIDGE,
ENGLAND CB2 3RQ

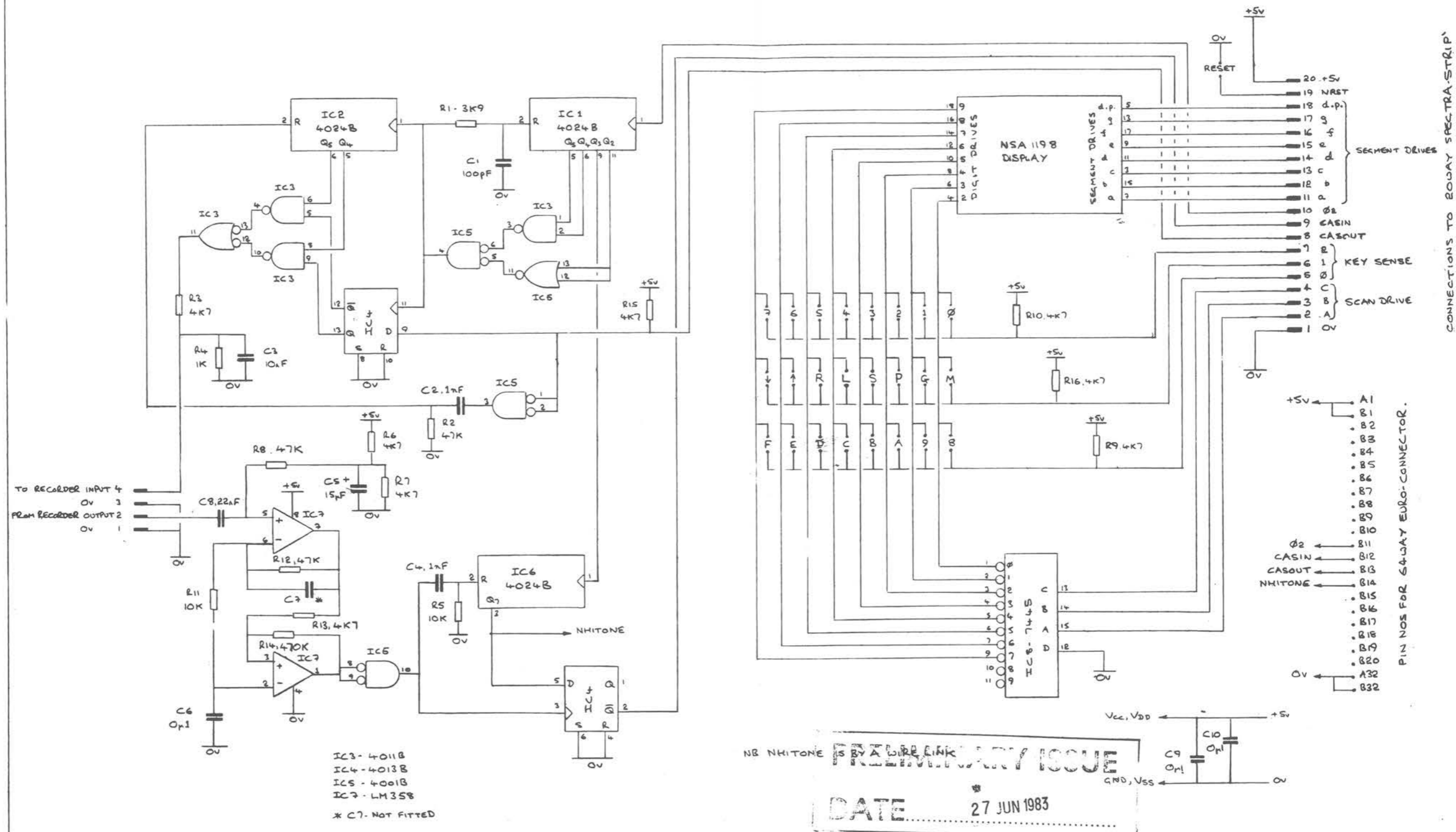
DATE 23-02-79

DESIGNER CBT

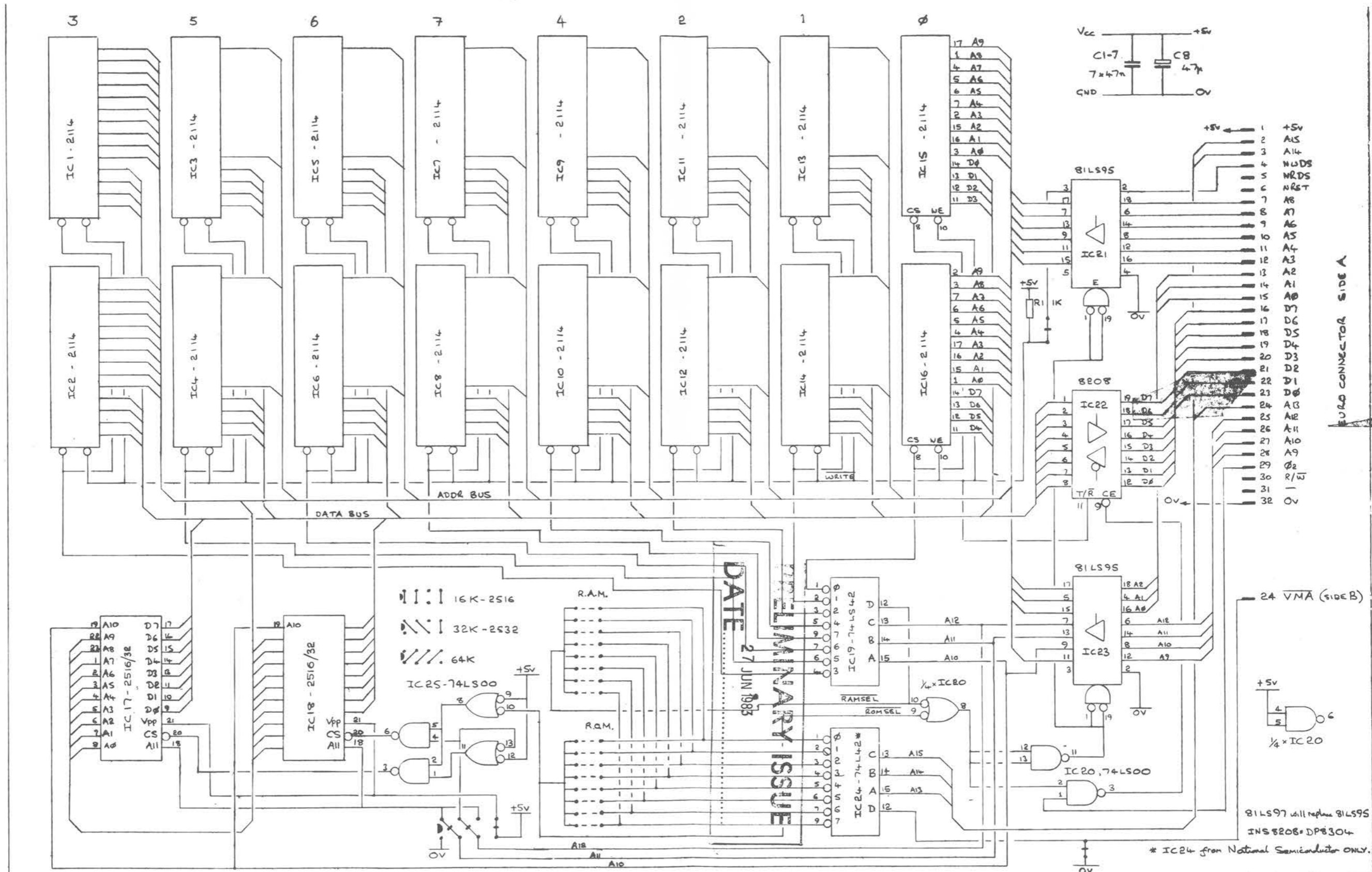
TITLE 6502 MicroComputer P.C.B. Circuit Diagram

100.000/c

Acorn Computers Ltd



ISSUE	1	2	2		©COPYRIGHT 1980 ACORN COMPUTERS LTD. 4A, MARKET HILL, CAMBRIDGE. TEL 0223-312772.	DRAWN CBT	TITLE KEY BOARD, DISPLAY & CASSETTE INTERFACE P.C.B.	REF 100.001/C
DATE	26-02-79	11-07-79	27-03-80			DATED 26-02-79		ACORN COMPUTERS LTD

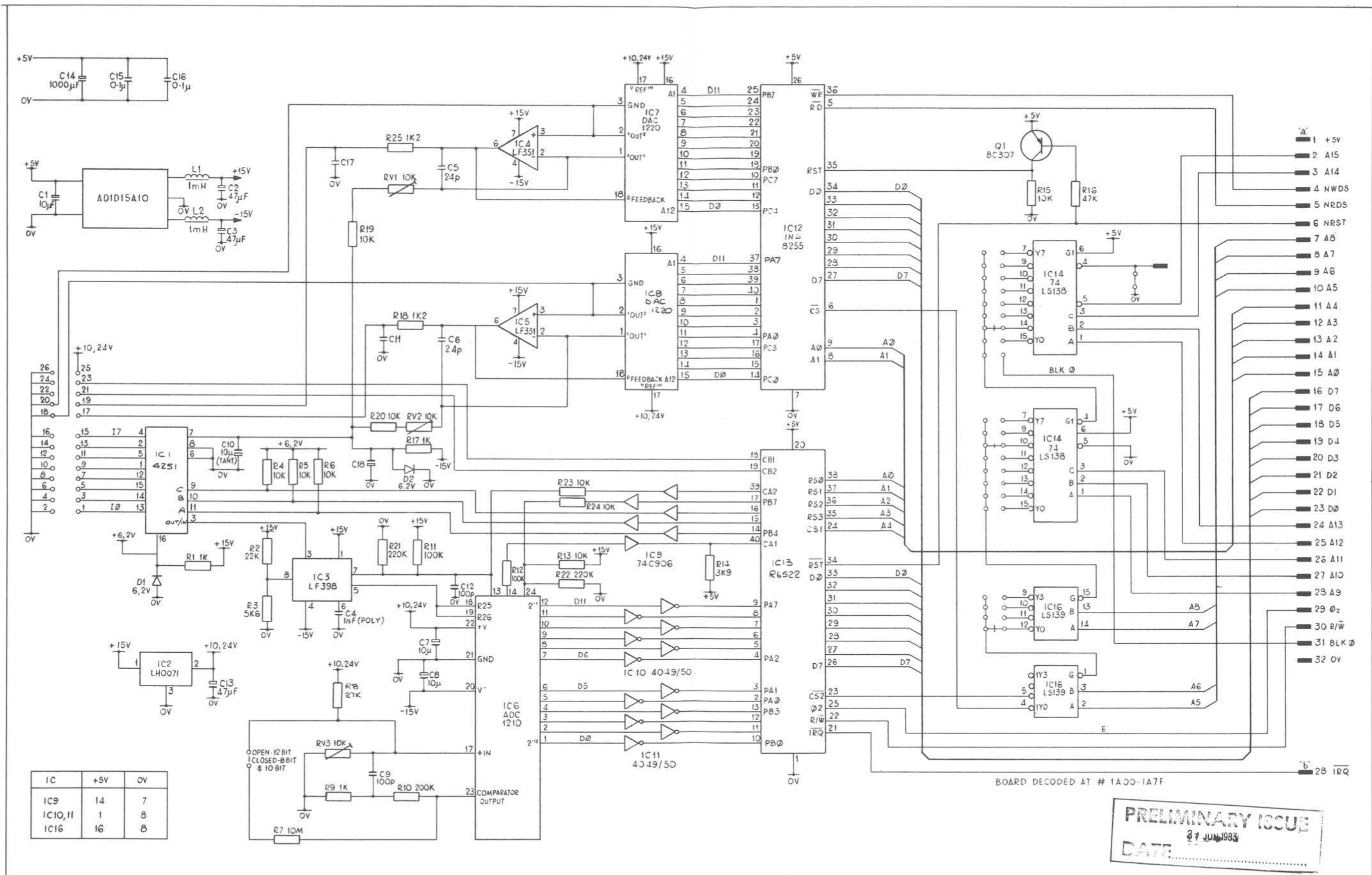


ISSUE	1	2	2	3
DATE	21-05-79	16-11-79	19-12-79	13-2-80
		CBT	CBT	CBT

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ACORN COMPUTERS LTD
4A, MARKET HILL
CAMBRIDGE
0223-212772

CBT
21-05-79
8K RAM + 8K PROM
P.C.B. CIRCUIT DIAGRAM

100.003/C
ACORN COMPUTERS LTD

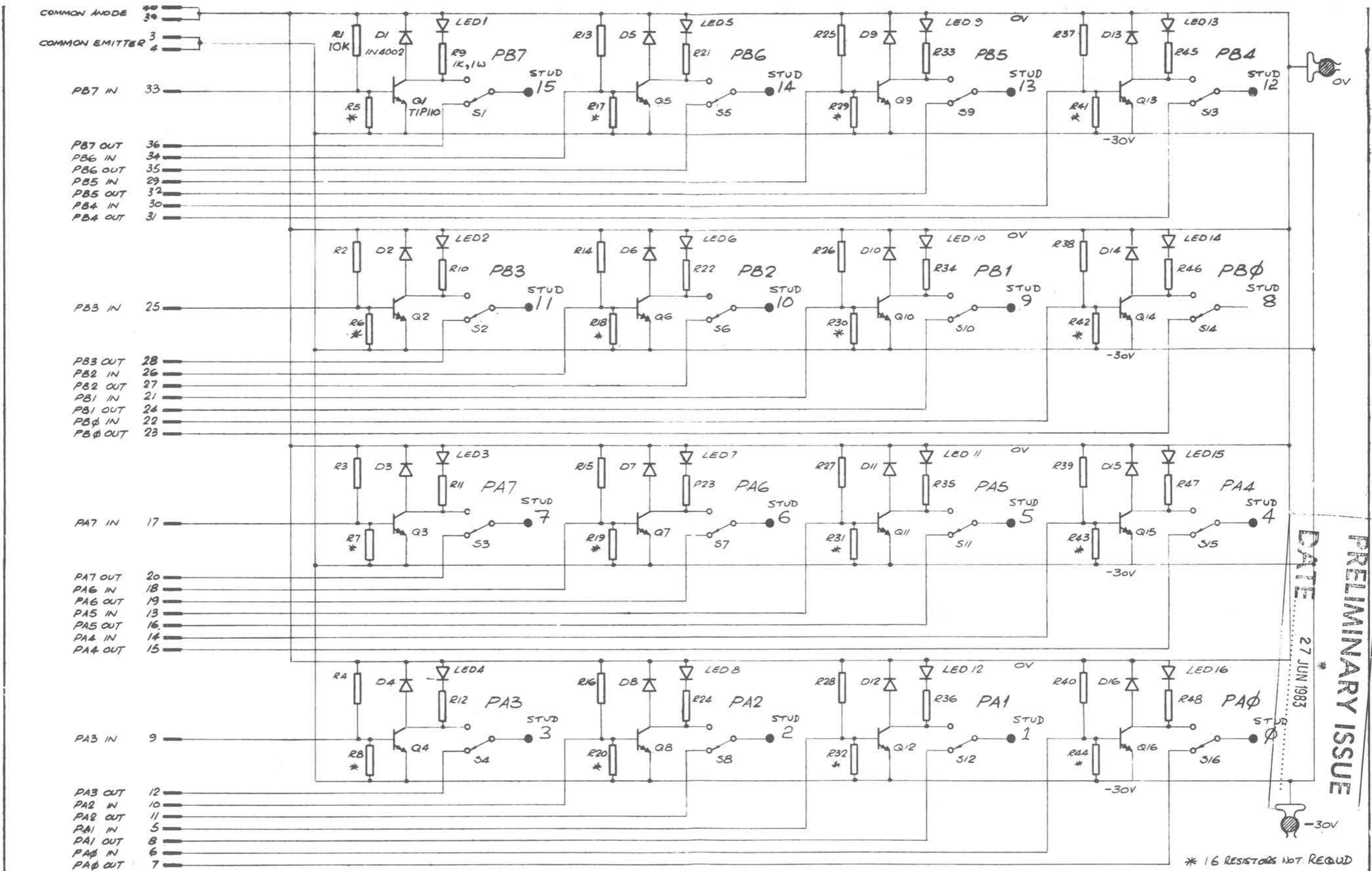


IC	+5V	0V
IC9	14	7
IC10,11	1	8
IC16	16	8

BOARD DECODED AT # 1A00-1A7F

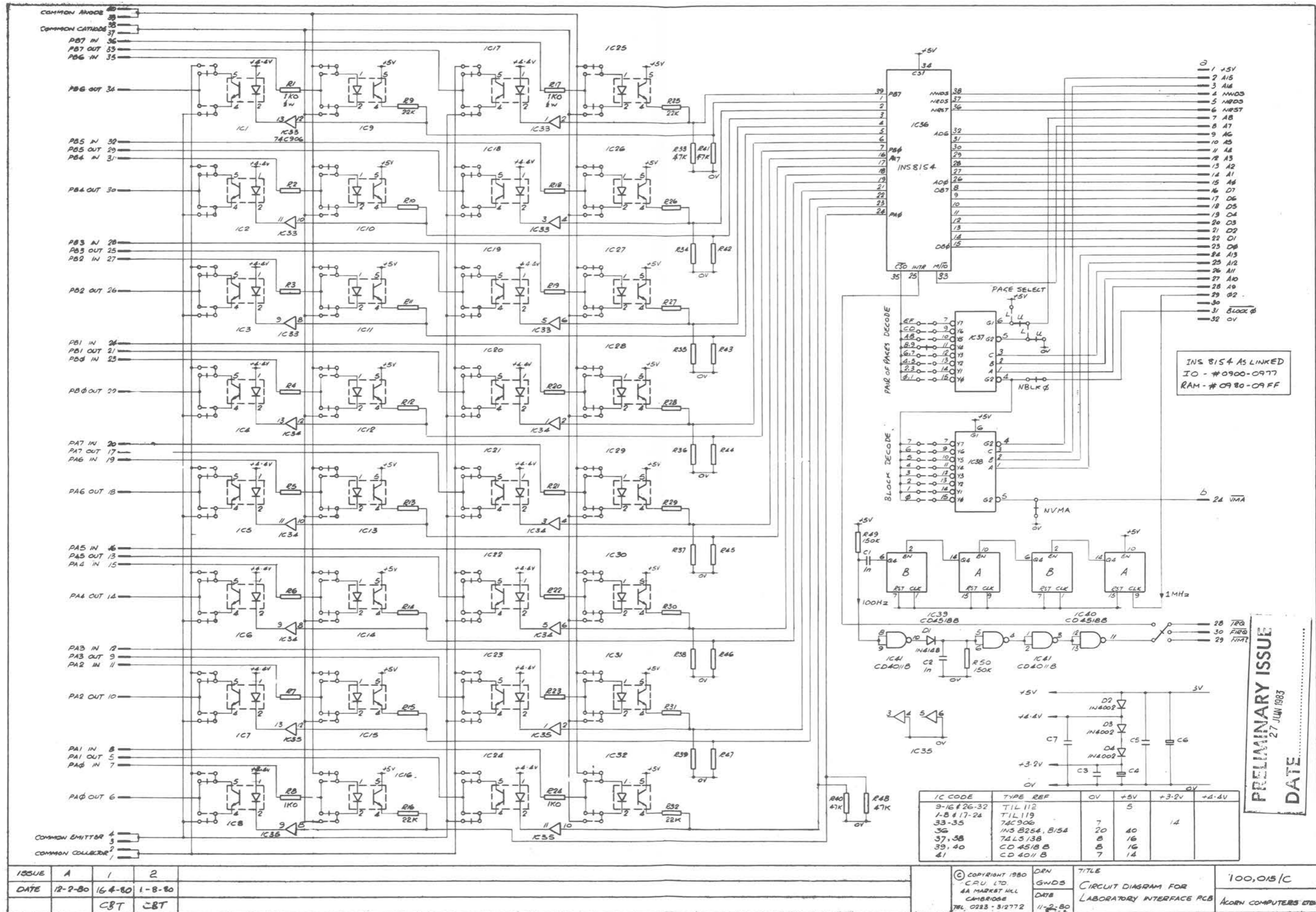
PRELIMINARY ISSUE
DATE 27 JUN 1983

ISSUE 2	REDRAWN (LOST MASTER)											TOLERANCE	TITLE	© COPYRIGHT 1982 ACORN COMPUTERS Ltd FULBURN ROAD CHERRY HINTON CAMBRIDGE CB1 4JN
DATE 5-82												FINISH	CIRCUIT DIAGRAM for ANALOGUE INTERFACE	
DRAWN EA												MATERIAL	DRG. No. 100.014/C		ACORN COMPUTERS Ltd



PRELIMINARY ISSUE
 DATE 27 JUN 1983

ISSUE	A	1	2		© COPYRIGHT 1980 ACORN COMPUTERS LTD. 4A MARKET HILL CAMBRIDGE TEL 0223 312772	DRN GWDS DATE 29-2-80	TITLE CIRCUIT DIAGRAM FOR INTERFACE PANEL PCB	100.017/C ACORN COMPUTERS LTD.
DATE	6-3-80	16-4-80	1-8-80					
		CBT	CRT					



INS 8154 AS LINKED
IO - #0900-0977
RAM - #0980-09FF

IC CODE	TYPE REF	0V	+5V	+3.2V	+4.4V
9-16 & 26-32	TIL 112		5		
1-8 & 17-24	TIL 119				
33-35	74C906				
36	INS 8254, 8154	7	40	14	
37, 38	74LS138	8	16		
39, 40	CD 4518 B	8	16		
41	CD 4011 B	7			

ISSUE	A	1	2
DATE	12-2-80	16-4-80	1-8-80
		C8T	C8T

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CRU LTD.
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TEL 0283-512772

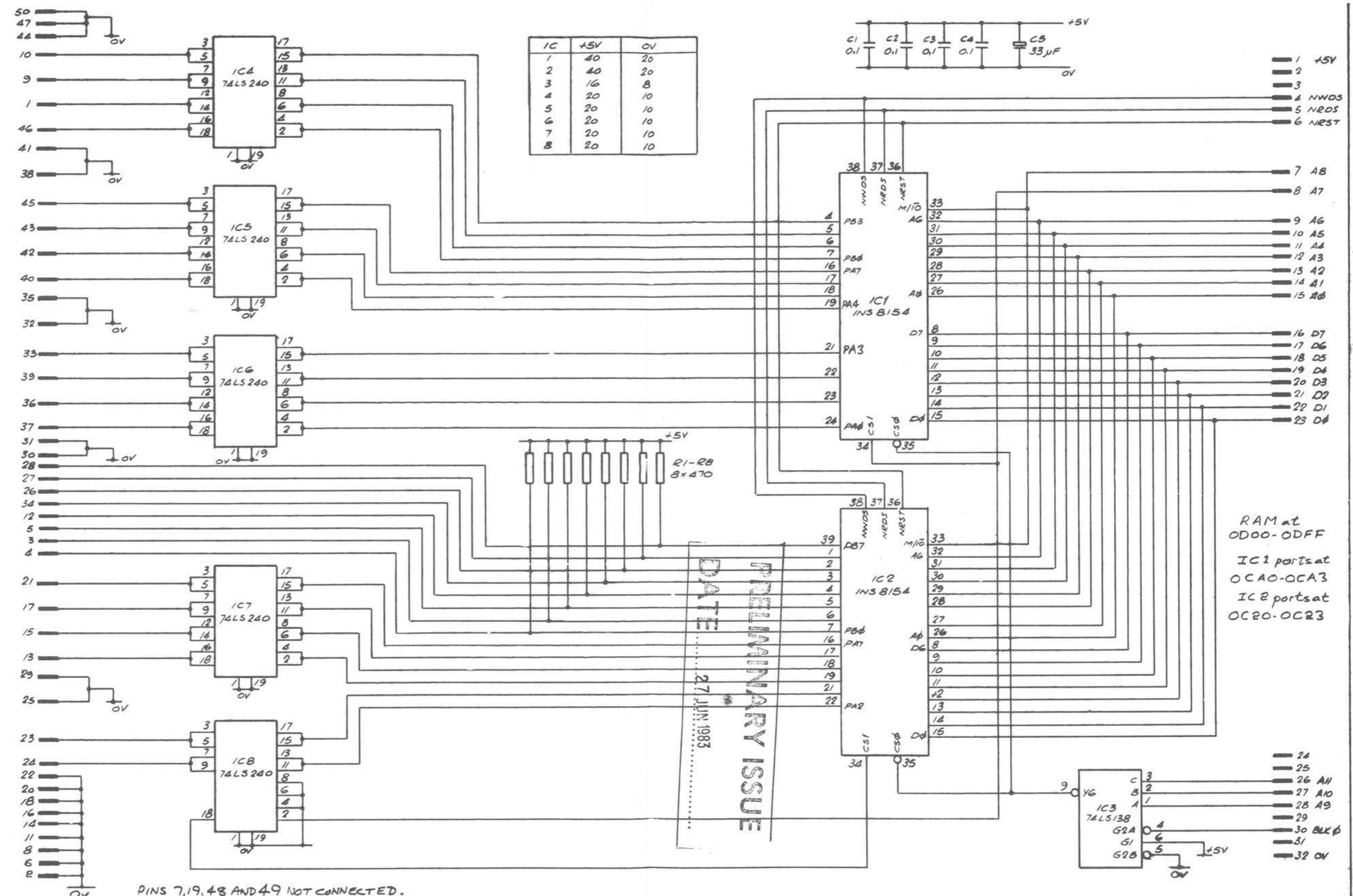
DRN
GWDS
DATE
11-2-80

TITLE
CIRCUIT DIAGRAM FOR
LABORATORY INTERFACE PCB

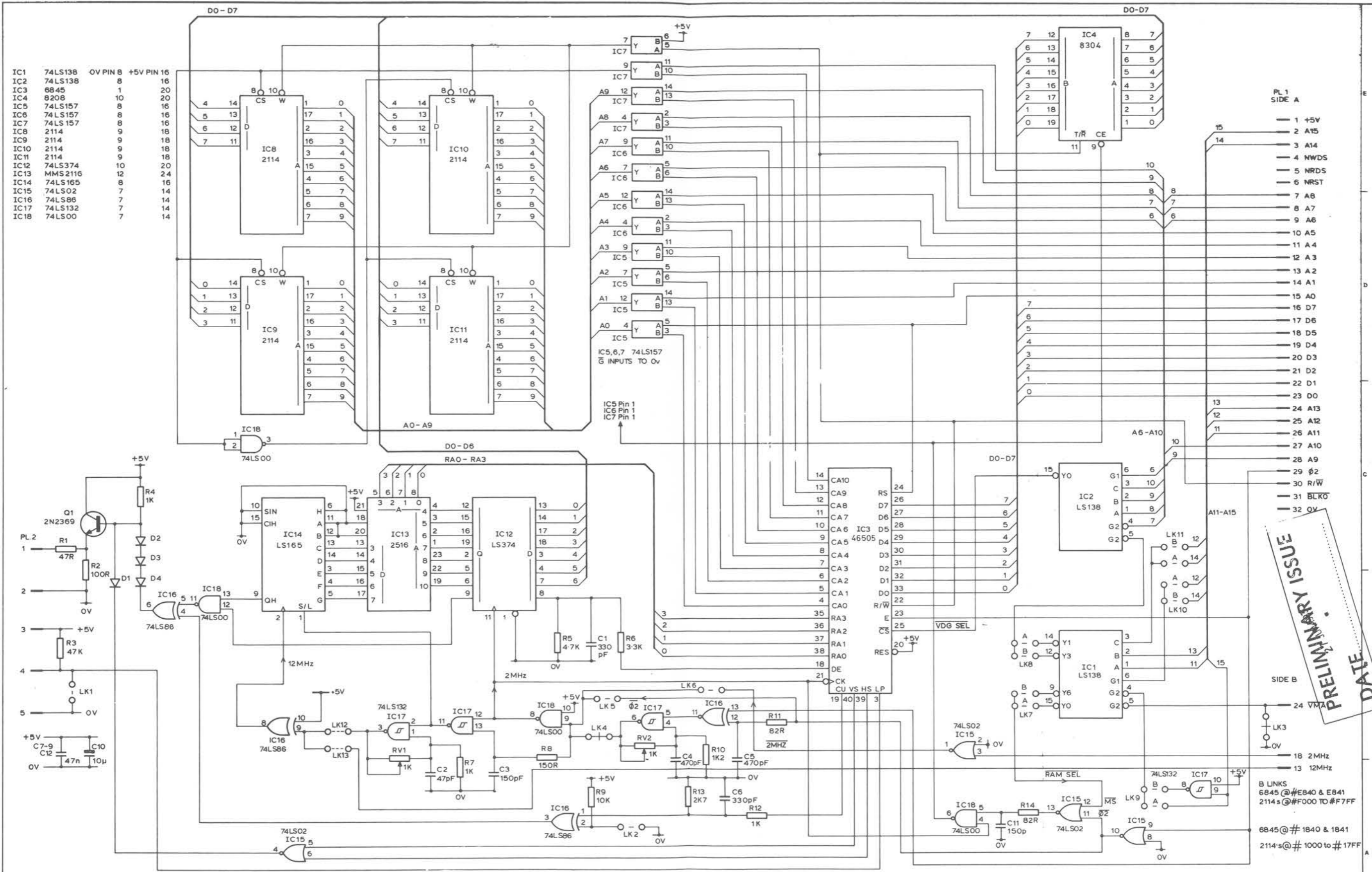
100,015/C
ACORN COMPUTERS LTD

PRELIMINARY ISSUE
27 JUN 1983
DATE

50 WAY PRINTER CONNECTOR.

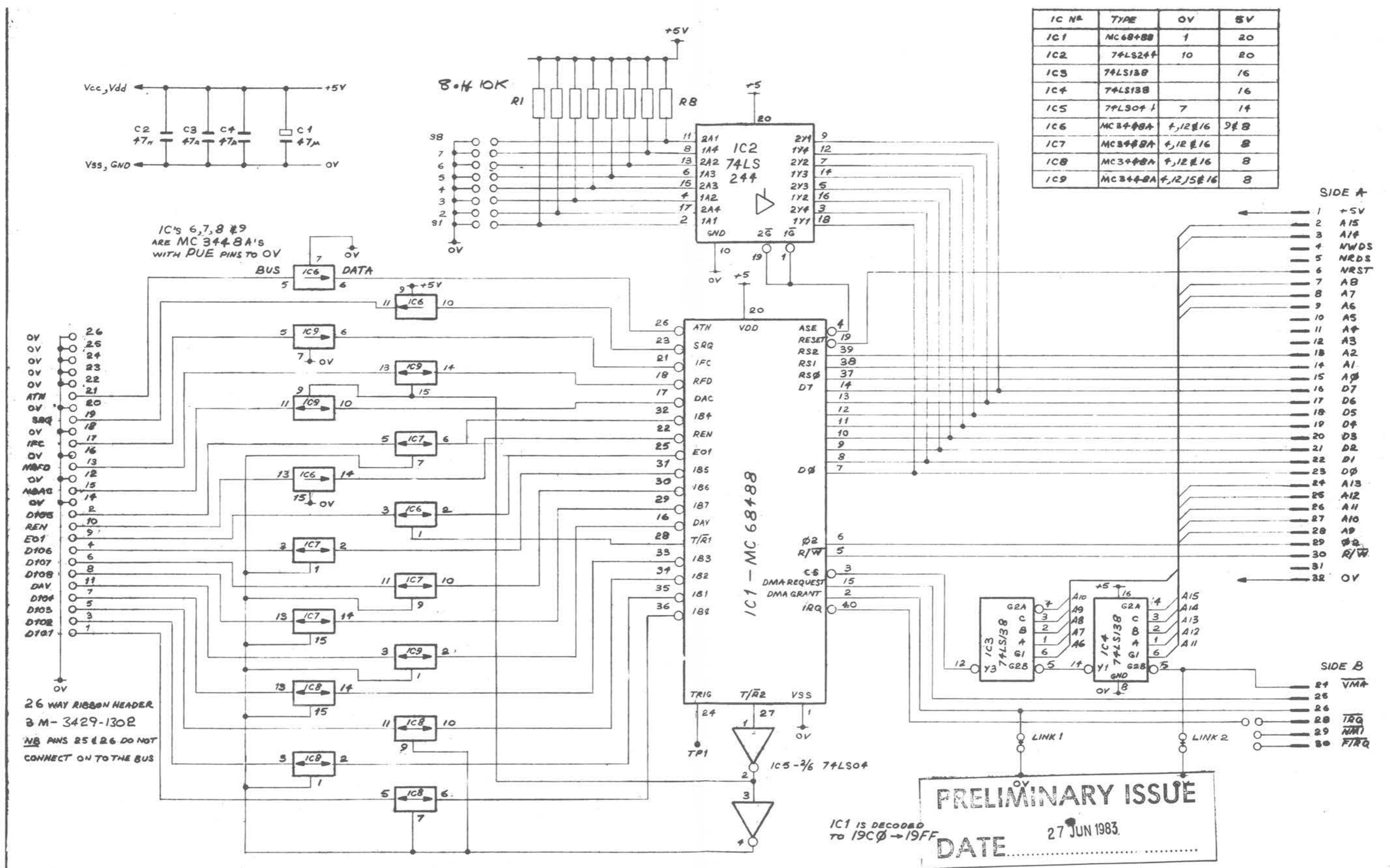


ISSUE	A	1			© COPYRIGHT 1980	DEN	TITLE	REF
DATE	18-4-80	21-5-80			ALORN COMPUTERS LTD 4A MARKET HILL CAMBRIDGE TEL(0223) 312772	GWDS DATE 18-4-80	CIRCUIT DIAGRAM FOR DAISY WHEEL PRINTER INTERFACE	100.018/C
								ALORN COMPUTERS LTD



ISSUE 4	REDRAWN	5	6	ECO 115
DATE 6 82	FOR CLARITY	8-82	6.83	
DRAWN CKL		R.J.C	M.J.	

TOLERANCE	TITLE	© COPYRIGHT 1982 ACORN COMPUTERS Ltd FULBORN ROAD CHERRY HINTON CAMBRIDGE CB1 4JH
FINISH	80 x 25 VDU INTERFACE CIRCUIT DIAGRAM	
MATERIAL	DRG. No. 100,019/C	
ACORN COMPUTERS Ltd		



IC N°	TYPE	OV	5V
IC1	MC68488	1	20
IC2	74LS244	10	20
IC3	74LS138		16
IC4	74LS138		16
IC5	74LS04	7	14
IC6	MC3448A	4, 12, 16	8
IC7	MC3448A	4, 12, 16	8
IC8	MC3448A	4, 12, 16	8
IC9	MC3448A	4, 12, 15, 16	8

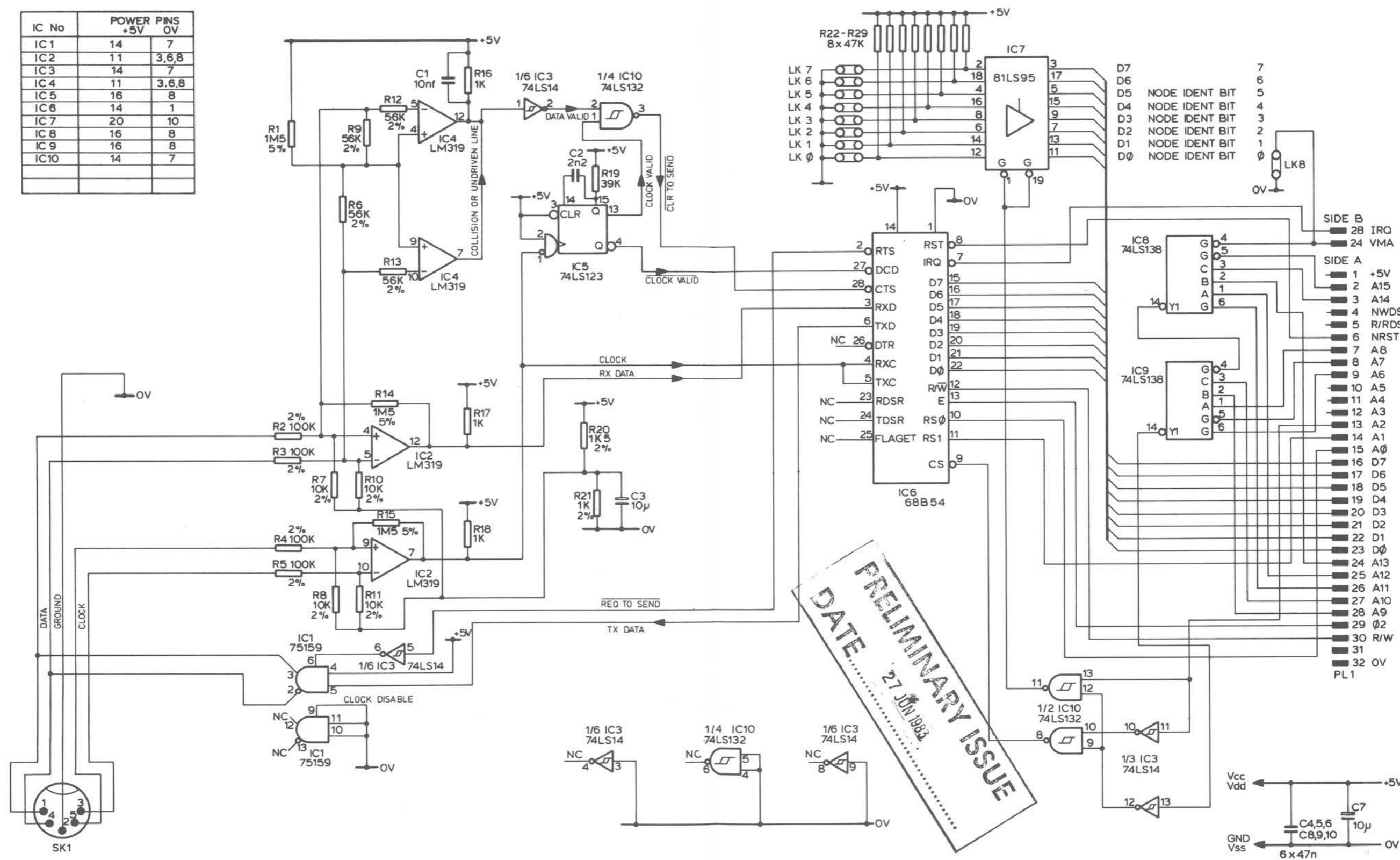
SIDE A

SIDE B

PRELIMINARY ISSUE
 DATE 27 JUN 1983
 IC1 IS DECODED TO 19C0 -> 19FF

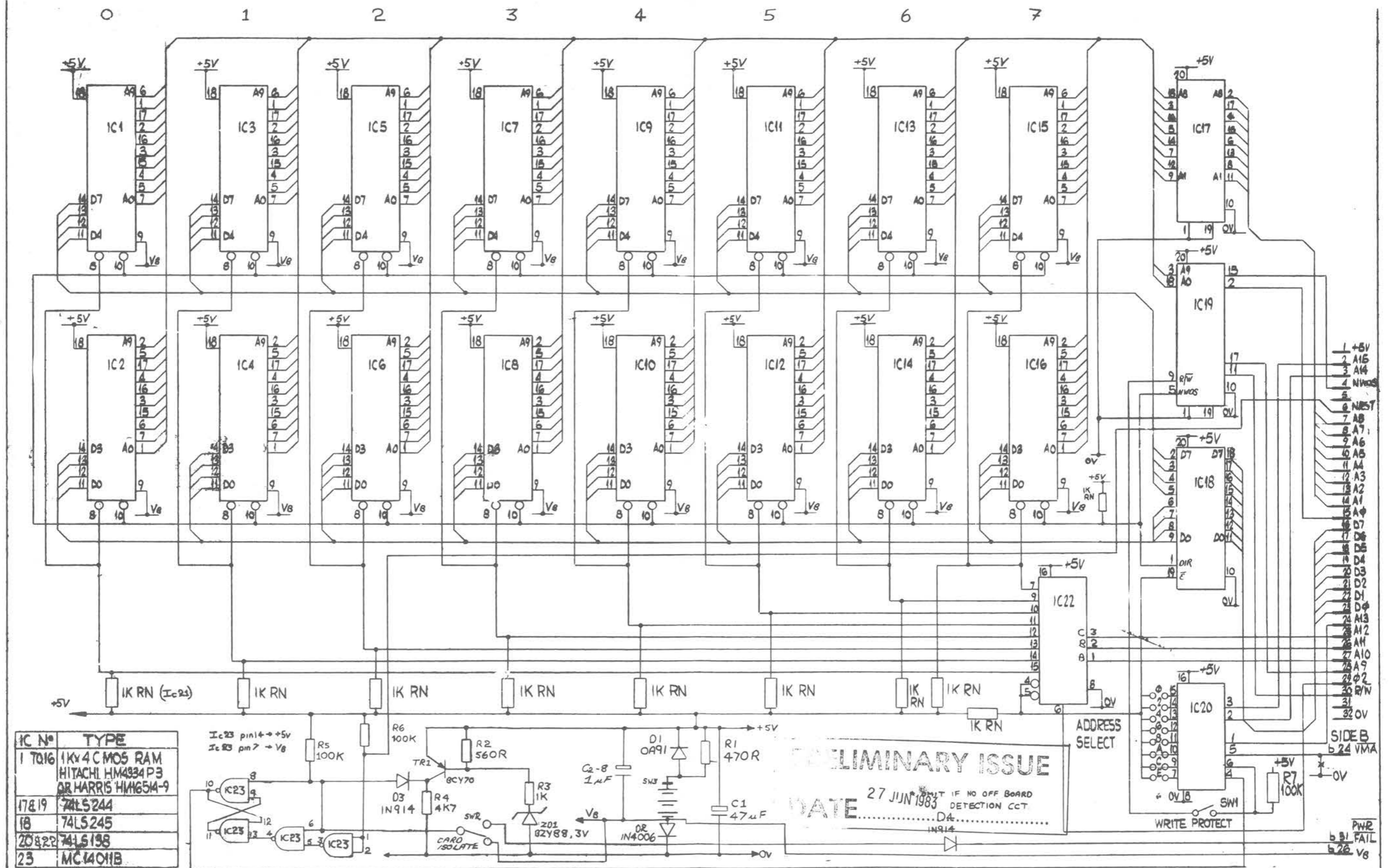
ISSUE	A	SCALE	2-1	© COPYRIGHT 1983 ACORN COMPUTERS 4A MARKET HILL CAMBRIDGE TEL: 0883-34277	DRN	GWDS	TITLE	IEEE 488 BUS INTERFACE	REF	100,021
DATE	23-6-80				DATE	9-7-80				ACORN COMPUTER

IC No	POWER PINS +5V	OV
IC 1	14	7
IC 2	11	3,6,8
IC 3	14	7
IC 4	11	3,6,8
IC 5	16	8
IC 6	14	1
IC 7	20	10
IC 8	16	8
IC 9	16	8
IC 10	14	7

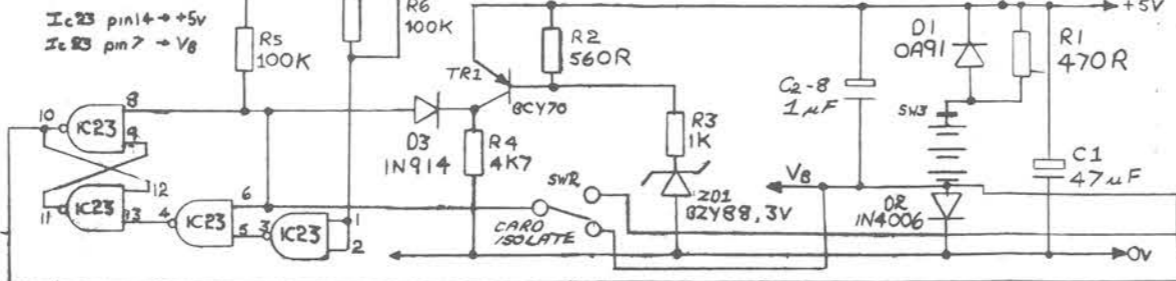


ISSUE - 2	REDRAWN									TOLERANCE	TITLE	©COPYRIGHT 1982 ACORN COMPUTERS Ltd FULBOURN ROAD CHERRY HINTON CAMBRIDGE CB1 4JN
DATE 7 82										FINISH	ECONET NODE CIRCUIT DIAGRAM (EUROCARD VERSION)	
DRAWN R.J.C										MATERIAL	DRG. No. 100,024/C		ACORN COMPUTERS Ltd

ADMEL C/7/398



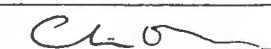
IC No	TYPE
1 7016	1Kx4 CMOS RAM HITACHI HM4934P3 OR HARRIS HM4651A-9
17 & 19	74LS244
18	74LS245
20 & 22	74LS138
23	MC1401B



PRELIMINARY ISSUE
DATE 27 JUN 1983

ISSUE	1	© COPYRIGHT 1981 ACORN COMPUTERS LTD 4 A MARKET HILL CAMBRIDGE TEL 0223-312772	DRN. G.W.D.S DATE 9-2-81	8K C, MOS RAM	REF 100,027
DATE					ACORN COMPUTERS

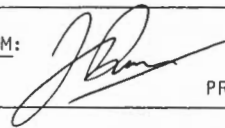
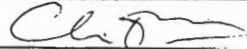
ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> ASCII Keyboard		<u>HEIGHT (mm)</u> 70	<u>WIDTH (mm)</u> 385	<u>FROM:</u> T.G. Sedzher PROJECT LEADER
<u>ORDER CODE</u> ASH 60	<u>PART NUMBER</u> 000,013	<u>DEPTH (mm)</u> 245	<u>MATERIAL</u> Plastic	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER
<u>FUNCTION</u> To provide keyboard facility for users of Acorn "Systems"		<u>COLOUR</u> Grey	<u>CONSTRUCTION</u> Moulded	
<u>OPERATES WITH (Peripherals)</u> Systems 2, 3, 4 and 5		<u>CONTROLS (Switches, pots., keyboards)</u> 62 Non-locking long-life keyswitches (QWERTY format)		
<u>SIMILAR EQUIPMENT</u> None		<u>INDICATORS (Meters, lamps, readouts, audible)</u> LEDs for: Power Caps Lock Shift Lock		
<u>MAJOR COMPONENTS</u> Plastic case 62 key "QWERTY" keyboard		<u>SIGNAL CONNECTIONS (V,A,Z, Baudrates, frequencies, connector type)</u> 8 bit parallel TTL to System CPU card All connections via 700 mm of 20 way ribbon cable terminated in 20 way header.		
<u>DESCRIPTION OF OPERATION</u> The keyboard encoder detects a depressed key and outputs a 10-bit code and a flag signal. This is then reformatted into ASCII 7-bit code plus the flag signal. This 8-bit code is fed down the 20-way ribbon cable to the CPU card in the system.		<u>POWER IN (V,A,W,HZ, Connector type)</u> 5 volts DC at 100 mAmps via 20 way ribbon cable	<u>POWER OUT (V,A,W,HZ, Connector Type)</u> -----	
		<u>APPROVALS (BS,FCC,CSA, UL,VDE,BEAB)</u> None	<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE (°C)</u> 0-35	<u>WEIGHT (KG) UNIT ONLY</u> 3.45	
			<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	
<u>CAPACITY</u> N/A	<u>FORMAT</u> 62 Key "QWERTY" keyboard	<u>PACKAGING</u> Cardboard Box 2 x end pieces (polystyrene)	<u>ACCESSORIES INCLUDED</u> -----	
<u>SPEED (operating frequency)</u> Scan Time 8mSec	<u>INSTALLATION</u> User	<u>APPENDICES</u>	<u>DRAWING NUMBER</u> 000,013/E	<u>APPROVED FOR PRE-PRODUCTION RELEASE</u>  CH. ENG.
		<u>ISSUE</u> 1	<u>DATE</u> 2.83	© COPYRIGHT 1983 ACORN COMPUTERS LTD.

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1
July 83

Alphabetic issues to be regarded as provisional information. Numeric issues are correct but as products are subject to improvement and modification, this specification may change without prior notice and no responsibility is accepted for any errors or omissions.

ACORN COMPUTERS LTD. ENGINEERING INFORMATION SHEET

<u>EQUIPMENT</u> SYSTEM 5F		<u>HEIGHT</u> (mm) 215	<u>WIDTH</u> (mm) 495	<u>FROM:</u>  PROJECT LEADER	
<u>ORDER CODE</u> ASH 56	<u>PART NUMBER</u> 000,056	<u>DEPTH</u> (mm) 318	<u>MATERIAL</u> Steel/Aluminium	<u>TO:</u> CUSTOMER SERVICES SALES ACCOUNTS R & D MANAGER CHIEF ENGINEER PRODUCT SERVICES GROUP LEADER	
<u>FUNCTION</u> Econet File Server		<u>COLOUR</u> Blue	<u>CONSTRUCTION</u> Steel case frame		
<u>OPERATES WITH</u> (Peripherals) BBC Econet Packages Monitor (Video)) Essential ASCII Keyboard)		<u>CONTROLS</u> (Switches, pots., keyboards) Mains on/off switch			
<u>SIMILAR EQUIPMENT</u> Systems 3, 4 and 5A to 5E		<u>INDICATORS</u> (Meters, lamps, readouts, audible) Mains on/off Light			
<u>MAJOR COMPONENTS</u> Frame including PSU and Backplane CPU PCB VDU PCB FDC PCB 32k RAM PCB		16k RAM PCB Econet PCB 2 80 track double-sided disc drives	<u>SIGNAL CONNECTIONS</u> (V,A,Z, Baudrates, frequencies, connector type) BNC to monitor 5-pin DIN to Econet 20 way header to keyboard		
<u>DESCRIPTION OF OPERATION</u> Data storage and retrieval using Econet local networking system.		<u>POWER IN</u> (V,A,W,HZ,Connector type) 115v AC 50/60 Hz 1.0A 230v AC 50/60Hz 0.6A		<u>POWER OUT</u> (V,A,W,HZ, Connector Type) None	
		<u>APPROVALS</u> (BS,FCC,CSA, UL, VDE, BEAB) To BS415		<u>GUARANTEE</u> 6 months	
		<u>OPERATING TEMPERATURE</u> (°C) 0-30		<u>WEIGHT (KG) UNIT ONLY</u>	
				<u>WEIGHT (KG) INC. PACKAGING & ACCESSORIES</u>	
<u>CAPACITY</u> 800 kbytes storage	<u>FORMAT</u> N/A	<u>PACKAGING</u> 2 part foam Cardboard box		<u>ACCESSORIES INCLUDED</u> Econet manual System Utilities Disc System 5F manual Econet Lead File Server Disc	
<u>SPEED</u> (operating frequency) 2 MHz	<u>INSTALLATION</u> User	<u>APPENDICES</u> None	<u>DRAWING NUMBER</u> 000,056/E	<u>APPROVED FOR PRE-PRODUCTION</u> 	
		<u>ISSUE</u> 1	<u>DATE</u> 11.3.	© COPYRIGHT 1987 ACORN COMPUTERS LTD.	

Alphabetic issues to be regarded as provisional information. Numeric issues are correct but as products are subject to improvement and modification, this specification may change without prior notice and no responsibility is

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1
July 83



1.1 ELECTRON - Introduction

All information contained in this section, with the exception of the provisional publicity sheet, is issued in advance of the release of this product and is therefore highly confidential. We ask you to treat this information as privileged and not to reproduce or otherwise disseminate it in any way.



1.2 Provisional price and specification subject to change

A C O R N E L E C T R O N

Specification

1. The Electron has a 56 key full travel QWERTY keyboard with 10 user definable keys. All keys are software redefinable and feature single key entry for keywords.
2. A full 64K bytes of memory is standard - 32K RAM and 32K MOS/BASIC interpreter in ROM.
3. The BASIC language is identical to that of the BBC Micro except for a small number of hardware features. Software is upwards compatible to the BBC Micro and is loaded via a 1200 baud cassette unit with motor control.
4. The CPU is a 2 MHz 6502 microprocessor.
5. The Electron can eventually be upgraded via securely fixed expansion units to include such popular BBC Model B features as printer interfaces (RS 423 and Centronics types), analogue to digital conversion for games paddles, a ROM cartridge slot for VIEW Word Processing etc., as well as Disc Drive and Econet.
6. Even with these expansion units the Electron will not fully match the BBC Micro specification.
7. The Electron has all the BBC Micro graphics and text modes except Mode 7 and gives exceptionally high quality TV output through a PAL UHF connection or RGB colour monitor and has a built-in loud-speaker.
8. The Electron comes complete with an introductory cassette that demonstrates 15 example programs, a comprehensive user guide and free BASIC programming course book.

Price

Probably £199 inc. VAT.

Availability

End of September 1983 direct from Acorn or from W H Smith and all Acorn Dealers.

Provisional price and specification subject to change



3.1 ACORNSOFT GAMES FOR THE ELECTRON

Certain Acornsoft games for the Electron have a software bar to stop them from running on other machines. In some circumstances it may be useful to remove this bar, and this can be accomplished as follows:-

- 1 Attempt to load the program until the message "This program is only designed for the Acorn Electron" appears.
- 2 List the loader program.
- 3 Locate the line starting with an IF statement that includes the test shown above and delete it.
- 4 Type RUN and continue to play the tape until the program starts automatically.

Note that whilst this will allow the game to run, it does not necessarily mean that the game will be playable since most games are likely to run too fast on other machines.

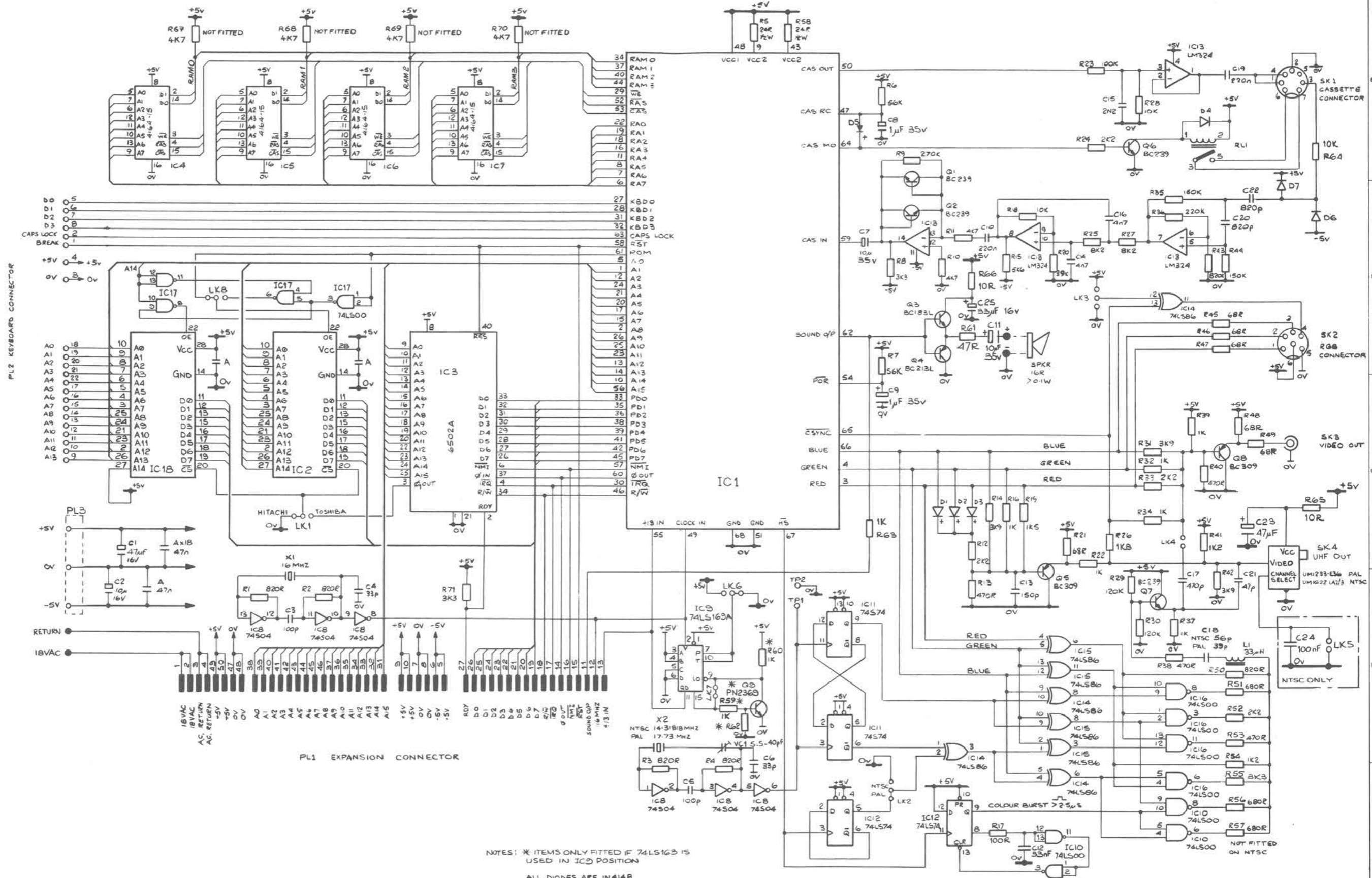
SUITABILITY OF BBC SOFTWARE FOR THE ELECTRON

Several of the Acornsoft packages produced for the BBC Microcomputer can also be used with the Electron.

Only BCPL, Graphs & Charts and Creative Graphics will run in their entirety, in addition to these, the following will run but will have distorted title pages:

WORD SEQUENCING	MISSING SIGNS	FORTH
WORD HUNT	TURTLE GRAPHICS	MICROTEXT
LISP	DESK DIARY	PICTURE MAKER
SLIDING BLOCK PUZZLES	SNOOKER	CUBE MASTER
CHES		

If you require any further information on the above, please contact Acornsoft Limited, on CAMBRIDGE (0223) 316039.



NOTES: * ITEMS ONLY FITTED IF 74LS163 IS USED IN IC9 POSITION
ALL DIODES ARE IN 4148

ISSUE B	REDRAWN	C	D	1	PPR G3	2				TOLERANCE	TITLE	© COPYRIGHT 1982 ACORN COMPUTERS Ltd FULBOURN ROAD CHERRY HINTON CAMBRIDGE CB1 4JN
DATE 10-82	ULA PIN OUT CHANGED R59,60,Q9 Added	2.83	3.83	4.83		6-83	ECO 120			FINISH	CIRCUIT DIAGRAM FOR ELECTRON MICROCOMPUTER MAIN PCB	
DRAWN R.A.		ACB	ACB	LR5		CFD				MATERIAL	DRG. No. 105,000/C	
ADWEL D/G/134											ACORN COMPUTERS Ltd	

PRELIMINARY ISSUE
DATE 20 JUL 1983

3.2 PCB COMPONENT CHANGES FOR DIFFERENT ULA TYPES FOR ELECTRON

On some production sites, Electrons have been fitted with a new type of ULA. These may be found in units serial number 07-ALA01-0100001 onwards, although Electrons are being produced with both types of ULA.

The two types differ in appearance as follows:

1. Ferranti ULA: familiar assembly of chip in carrier as shown in the Electron service manual issue 1, page 11.

2. Aberdeen ULA: the ULA is covered by a drop of insulating material and mounted on a carrier which is directly soldered on to the Electron PCB.

There are certain component changes employed on the PCB which are due to the ULA changes and also because of a general re-work.

The changes concerning the Aberdeen ULA are as follows;

1. The Aberdeen ULA is soldered directly onto the main PCB and therefore does not require the 68 pin IC socket as used with the Ferranti.

2. A 74AS08 (IC 18) chip has been added to buffer the following signals;

- | | | | |
|----|------|--------|----------|
| a) | IC 1 | Pin 49 | CLOCK IN |
| b) | IC 1 | Pin 60 | PHI OUT |
| c) | IC 3 | Pin 6 | NMI |

When a Ferranti ULA is used, these buffers can be by-passed by making links 8, 9 and 10.

3. Finally, a 4K7 resistor (R74) is fitted when using the Aberdeen ULA. This resistor is not required for Electrons fitted with Ferranti ULAs. If the resistor is omitted it should not be replaced with any form of wire link.

4. These changes have required the use of a new PCB which is now at issue 6.

This new ULA is generally expected to be less prone to failure than previous Ferranti ULA. However, should the ULA require replacement, the simplest method is to remove all the solder from the ULA carrier pins where they pass through the PCB. Once this has been done it is possible to remove the ULA on its carrier. We are investigating the availability of a suitable tool or jig to assist with the removal of the new Aberdeen ULA and will publish details here as soon as they are available.

As for all repairs if any workshop does consider that this is beyond their ability the unit may be returned to the appointed central service location as detailed in section 1.5.1.1. of this manual.

	1.6.2.3	July '84
	1.6.2.4	July '84
3 Spares kits and test equipment	1.6.3.1	July '84
	1.6.3.2	July '84
	1.6.3.3	July '84
	1.6.3.4	July '84
	1.6.3.5	July '84
4 Manuals	1.6.4.1	July '83
5 Peripherals spares price lists	1.6.5.1	Oct '84
	1.6.5.2	Oct '84
	1.6.5.3	Oct '84
	1.6.5.4	Oct '84
	1.6.5.5	Oct '84
	1.6.5.6	Oct '84
	1.6.5.7	Oct '84
	1.6.5.8	Oct '84



	4.3.2.8	July '83
	4.3.2.9	July '83
	4.3.2.10	July '83
	4.3.2.11	July '83
	4.3.2.12	July '83
	4.3.2.13	July '83
3	RS423 Application Note	4.3.3.1 July '83
		4.3.3.2 July '83
4	Changing the RS423 Data format	4.3.4.1 July '83
5	Cassette Interface circuitry protection	4.3.5.1 July '83
		4.3.5.2 July '83
6	Undocumented *FX/OSBYTE features for the series one MOS	4.3.6.1 July '83
		4.3.6.2 July '83
		4.3.6.3 July '83
7	Producing colour on the Video Out socket	4.3.7.1 July '83
8	User Guide errata	4.3.8.1 July '84
		4.3.8.2 July '84
9	Random Keyboard Interrupts	4.3.9.1 July '84
10	BASIC II	4.3.10.1 July '84
		4.3.10.2 July '84
		4.3.10.3 July '84
11	Cassette Recorders for BBC/ Electron	4.3.11.1 July '84
12	Use of Eproms in Sideways ROM sockets	4.3.12.1 July '84
13	Issue 2 PCB printer port modifications	4.3.13.1 July '84
14	User Printer Vector	4.3.14.1 July '84
		4.3.14.2 July '84
15	Use of *FX3	4.3.15.1 July '84
16	Changing the Break Key	4.3.16.1 July '84
17	ROM Filing System Application Note	4.3.17.1 July '84
		4.3.17.2 July '84
		4.3.17.3 July '84
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