DRAGON DATA LIMITED

SERVICE INFORMATION

CASSETTE FAULTS

Using a cassette recorder and lead known to work successfully with the Dragon 32, save and load a small program. If successful, then the problem is likely to be cassette-computer mismatch.

1. Check lead from computer to cassette internally for short or open circuit.

2. If MOTOR ON/OFF function is at fault, try pulling 2.5mm jack out slightly.

3. Check cassette output signal level is at least 1V positive and 0.5V negative with respect to ground.

4. To limit signal from cassette to computer, fit resistor (270-470K) in series with cassette input. This can be done by cutting the track to Pin 4 of the tape socket and bridging with the resistor.

5. Check that recorder does not distort waveform (i.e. worn or dirty lead).

6. Remove Mic lead when loading and Ear lead when saving.

7. Do not have TV too close to computer.

If the problem appears to be with the computer:-

1. Check relay operation and diode D1.
2. Change IC20.
3. Change IC25.
4. Change IC34.

Problems can also be experienced using cassette recorders fitted with ALC (Automatic Level Control) due to the response time of the circuit. This can usually be overcome by using the following program to save programs in memory. The cassette recorder should be set up to record and the following entered as one line:-

```
MOTOR ON: SOUND 12Ø;5Ø : FOR N = 1 TO 1ØØ : NEXT:
CSAVE "Program Name"
```

This has the effect of allowing the ALC to settle down prior to the output of data from the computer.

RWEW/KA/0080a
18.4.83

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SERVICE INFORMATION

JOYSTICK FAULTS

Using a known good joystick, check operation with diagnostic cartridge. Ensure both joysticks are used.

1. Change IC2Ø.
2. Change IC25.
3 Check R1, R57, R58, R59, R60, R61, R62.

CARTRIDGE FAULTS

1. Check for blockage of cartridge port.
2. Check cartridge guides in correct sides and secure.
3. Check address lines from port to IC15, IC19 and IC26/35.
4. Change IC 15.

PRINTER FAULTS

1. Check connection lead correctly wired and that printer has automatic line feed.
2. Check keyboard operation.
3. Change IC24.

FAULTS DURING PROGRAM OPERATION

1. Check program is valid - test with other program.
2. Change IC15.
3. Change IC17.
4. Change IC18.
5. Change IC19.
6. Check RAM lines.

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18.4.83

DRAGON DATA LIMITED

SERVICE INFORMATION

SOUND AND COLOUR FAULTS

A. No Picture or Sound

1. Check transformer.
2. Check power supply circuit board.
   (a) Check PL10
   (b) Test voltages
   (c) Check diodes.
3. Check RESET button operation.
4. Check IC15 properly seated.
5. Replace IC15.

B. No Sound

1. Check TV channel timing.
2. Retune modulator.
3. Change IC20.

C. Faulty Colour

1. Adjust RV1 (and RV2 if fitted).
2. Alter value of C7.
3. To obtain full green screen or to cure 'rainbow effect', fit a 2-22 pf capacitor trimmer instead of C7.
4. If colour fault on 22" or 27" SONY sets, then fit 15K resistor across Pin 4 of IC9 to Pin 4 of IC1Ø.
5. Change IC9.
6. Change IC16.
7. Change IC12.

D. Garbage on Screen

1. If RESET switch cures fault, then change IC17.
2. Change IC15.
3. Change IC17.
4. Change IC18.

RWEW/KA/0082a
18.4.83

DRAGON 64K MEMORY MAP

<table>
<tr><th>HEX
ADDRESS</th><th>32K MODE</th><th>64K MODE</th></tr>
<tr><td>$FFFF
$FF24</td><td colspan="2">SEE OTHER SHEET</td></tr>
<tr><td>$FF23
$FF20</td><td colspan="2">MC6821 PIA 1</td></tr>
<tr><td>$FF1F
$FF08</td><td colspan="2">EMPTY</td></tr>
<tr><td>$FF07
$FF04</td><td colspan="2">SY6551 ACIA (RS232 CONTROLLER)</td></tr>
<tr><td>$FF03
$FF00</td><td colspan="2">MC 6821 PIA 0</td></tr>
<tr><td>$FDFF
$C000</td><td>OPTIONAL
CARTRIDGE ROMS</td><td>RAM BASED BASIC</td></tr>
<tr><td>$BFFF
$8000</td><td>BASIC ROMS</td><td rowspan="2">↓ STACK +
STRING
STORAGE

BASIC PROG.
↑</td></tr>
<tr><td>$7FFF

$1E00</td><td>↓ STACK +
STRING
STORAGE

BASIC PROG
↑</td></tr>
<tr><td>$0600</td><td colspan="2">4 GRAPHICS PAGES</td></tr>
<tr><td>$0400</td><td colspan="2">TEXT</td></tr>
<tr><td>$0100</td><td colspan="2">EXTENDED DIRECT PAGE</td></tr>
<tr><td>$0000</td><td colspan="2">DIRECT PAGE RAM</td></tr>
</table>

Cont'd.....

DRAGON 64K MEMORY MAP

HEX ADDRESS	32K MODE 64K MODE
$FFFF $FFF2	PROCESSOR VECTORS (See Note 2)
$FFF1 $FFFØ	UNUSED
$FFDF $FFCØ	SAM VECTORS (See Note 1)
$FFBF $FFS2	UNUSED
$FF51 $FF40	OPTIONAL DISC CONTROLLER CHIP (Western Digital 2797)
$FF3F $FF24	UNUSED

1. For further details, see SAM (6883) Data Sheet.

2. See 6809e Data Sheet.

Dragon Data Ltd.,
Kenfig Industrial Estate,
Margam,
Port Talbot,
West Glam. SA13 2PE

SECTION 2

C.P.U. AND P.S.U. MODIFICATIONS AND COMPATABILITY

Since the introduction of the Dragon 32 there have been several versions produced of both the Central Processing Unit (C.P.U.) and the Power Supply Unit (P.S.U.)

Now all versions of C.P.U. will work with MK3 P.S.U.; this service sheet identifies which modifications are necessary to implement this.

C.P.U. TYPES	P.S.U. TYPES
16 x 16	MK1 1286 Modulator
OKI	MK2 1233 Modulator
PIGGY BACK	MK3 1287 Modulator
SIEMENS.	

P.S.U. COMPATABILITY

MK1 P.S.U's now no longer need to be used.
MK2 P.S.U's are obsolete and when encountered, should always be replaced with MK 3 boards.
MK 3 now used for all above mentioned C.P.U's.

NOTE:

For PAL B computers use a normal 16 x 16 C.P.U. with a MK3 P.S.U., the P.S.U. only needs the sound altered from PAL A reception. This is done when P.S.U. is checked & set up at P.S.U. work station.

MK 3 PSU and Piggy Back or OKI CPU

CPU: 150R resistor short circuit over R9
Cut resistor R6 (C49 side) and solder single cone wire to cut end, then solder other end of wire to Pin 14 IC11.

Drill back of board to open circuit track, i.e. between IC11 Pin 13 and cut end of R6.
* Sony Mod.

PSU: Remove R1. This will be either a 1.2K or 68R resistor. For the 68R resistor, this was a modification and may be found on back of board and linked to R7; Replace 330R resistor in original R1 position.

Remove existing 120K resistor at position R6 and replace it with a 22K resistor. Retune modulator sound core.

MK 1 PSU and 16 x 16 CPU

CPU: 1K resistor across PL6 Pin 9 and OV. If background lines are prominent fit 0.22uf capacitor in C58 position.
*Sony Mod.

PSU: 10R resistor in series with +5v supply to modulator.

MK 3 PSU and 16 x 16 CPU

NOTE: With the 16 x 16 CPU, all mods (except possible add on capacitor to C58 ... e completed at time of manufacture. However, s boards may still be present without mods. Mods as listed below:-

CPU: 6.8K resistor from solder pad near C6 to bottom of R6 (C49 side). 220R resistor short circuited across R9 (R9 being 270R). Alternatively replace R9 with 120R.

If background lines are prominent, fit 220N capacitor in C58 position.
*Sony Mod.

PSU: Remove existing 1.2K resistor in position R1 and replace with 330R resistor. Remove existing 120K resistor in position R6 and replace with 22K resistor. Retune modulator sound core.

MK1 PSU and Siemens CPU

CPU: Change C7 to a 2.2 -22pf trimmer. Place a 1K resistor between Ov and PL6 Pin 9.

PSU: 10R resistor in series with +5v supply to modulator.
*Sony Mod.

MK 3 PSU and Siemens CPU

CPU: 6.8K resistor from bottom of R6 to solder plate near positive side of C28, 220R resistor short circuited over R9.
C7 change to 2.2 -22pf trimmer.
1K resistor between Ov and PL6 pin 9.
*Sony Mod.

MK 3 PSU and Siemens CPU (continued)

PSU: Remove existing 1.2K resistor in position R 1 and replace with 330R resistor.
Remove existing 120K resistor in position R6 and replace with 22K resistor. Retune modulator sound core.

* SONY MOD.

This modification was originally introduced to overcome loss of colour band problems encountered when the computer was used with Sony 22" televisions. It has been found however, that it also cures other colour problems and for that reason it is now standard on all CPU's.

The modification is carried out by fitting a 15K resistor across IC10 Pin 4 and IC12 Pin 10, or for neatness on the 16 x 16 and Siemens board the resistor may be fitted from C28 negative side to solder plate on IC12 pin 10 line.

REPLACEMENT OF POWER SUPPLY AND CENTRAL PROCESSING UNITS IN THE DRAGON 32

Since the introduction of the Dragon 32 there have been several versions produced of both the Central Processing Unit (CPU) and the Power Supply Unit (PSU).

Most versions of CPU and PSU will work together and this service sheet identifies which combinations will, and the modifications necessary to implement each of them.

Identification of Boards

The first step when replacing either unit with one of a different version is to identify the version of each of the boards you wish to use.

PSU's can be identified by the type of Modulator used. The model number being clearly marked on top as follows:

PSU	Modulator Model No
MK 1	1286
MK 2	1233
MK 3	1287

CPU's can be identified by comparing the RAM area with the alternatives shown in Fig 1.

Next from the table below check that the combination you have chosen is a usable one.

PSU \ CPU	PIGGY BACK	OKI	SIEMENS	16x16
MK 1	yes	yes	yes	yes
*MK 2	no	no	no	no
MK 3	yes	yes	yes	yes

*NOTE: MK 2 PSU's are obsolete and when encountered should always be replaced with MK 1 or 3 boards.

MODIFICATIONS

Having selected a usable combination carry out the appropriate modifications from the following:-

MK 1 PSU and Piggy Back or OKI CPU

CPU: 27ØR resistor in series with cassette input, i.e. the connection to Pin 4 of PL4.
*Sony Mod.
PSU: 1ØR resistor in series with +5v feed to modulator.

16 x 16

MK3 P.S.U. - 16 x 16 C.P.U.

With the 16 x 16 C.P.U. all mods (except possible add on capacitor to position C58) are completed at time of manufacture. Mods as listed below:-

C.P.U. Mods.

I 15K Resistor (brown, green and orange) to plate through hole which leads to IC12 PIN 10 (Sony mod.), or for neatness resistor may be fitted from C28 negative side to solder plate on IC 12 pin 10 line.

II 6.8 K Resistor (Blue, Grey and Red) from solder pad near C6 to bottom of R6.

III If backbround lines are prominent, fit 220N capacitor in C58 position (Not done at time of manufacture).

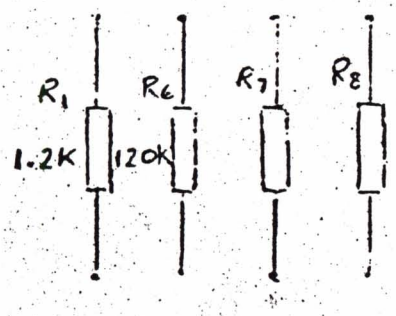
220R resistor short circuited across R9 (R9 bein[illegible]ernatively replace R9 with 120R.

P.S.U. Mods:-

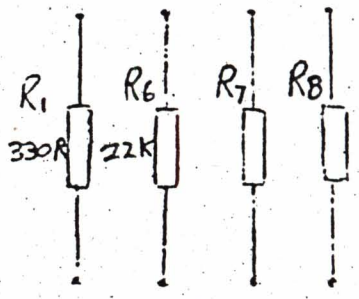
I. Remove existing 1.2K resistor in position R1 and replace with 330R resistor.

II. Remove existing 120K resistor in position R6 and replace with 22K resistor.

Before mod



After mod



III. Retune modulator sound core.

OKI.

MK 3 P.S.U. - OKI C.P.U.

C.P.U. MODS:-

I. 15 K resistor (Brown, Green and Orange) from Pin 4 IC10 to Pin 10 IC12 (Sony mod).

II 220 N capacitor in position C21.

III Cut resistor R6 and solder single cone wire to cut end then solder other end of wire to pin 14 IC11.

resistor (Brown, Green and Brown) short circui'

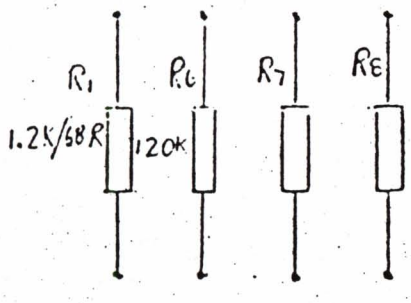
V Drill back of board to open circuit track.

P.S.U. MODS:-

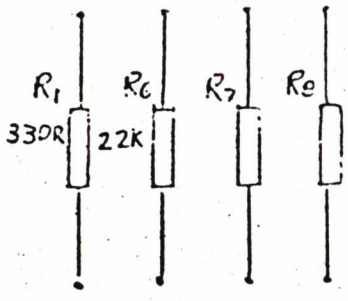
I. Remove existing 1.2K or 68R resistor in position R1 and replace with 330R resistor.

II. Remove existing 120K resistor in position R6 and replace with 22K resistor.

Before mod



After mod



III. Retune modulator sound core.

SIEMENS

MK.3 P.S.U. - SIEMENS C.P.U.

C.P.U. MODS

I. 15K (Brown, Green and Orange) resistor from Pin 4 IC10 to Pin 10 IC12 (Sony mod.) as for neatness resistor may be fitted from C28 negative side to solder plate on IC12 pin 10 line.

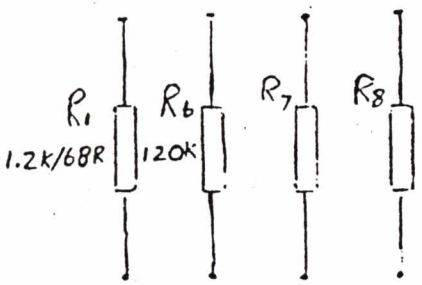
II 220 Ohm resistor, short-circuited over R9

III 6.8Kresistor (Blue, Grey and Red) from bottom of R6 to solder plate near positi[illegible] of C28. This resistor needs to be sleeved.

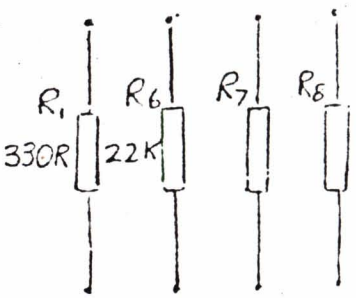
P.S.U. MODS

I Remove existing 1.2K or 68R resistor in position R1 and replace with 330R resistor.

II Remove existing 120K resistor in position R6 and replace with 22K resistor.



Before mod



After mod

III. Retune modulator sound core.

D W Thomas

PIGGY BACK RAM

MK3 P.S.U. - PIGGY BACK RAM

C.P.U. Mods:-

I 15K resistor (Brown, Green and Orange) from Pin 4. IC10 to Pin 10 IC12 (Sony mod).

II 220 N Capacitor in position C3.

III Cut R6 and solder single core wire to cut end, then solder other end of wire to Pin 14 IC11.

IV 150 Ohm resistor (Brown, Green and Brown) short circuited over R9.

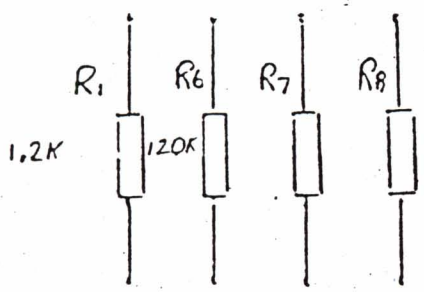
V Drill back of board to o/c

P.S.U. MODS:-

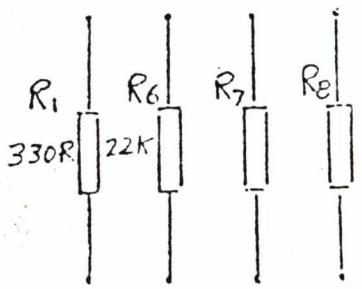
I Remove existing 1.2K resistor in position R1 and replace with 330R resistor

II Remove existing 120K resistor in position R6 and replace with 22K resistor.

Before mod



After mod



III. Retune modulator sound core.

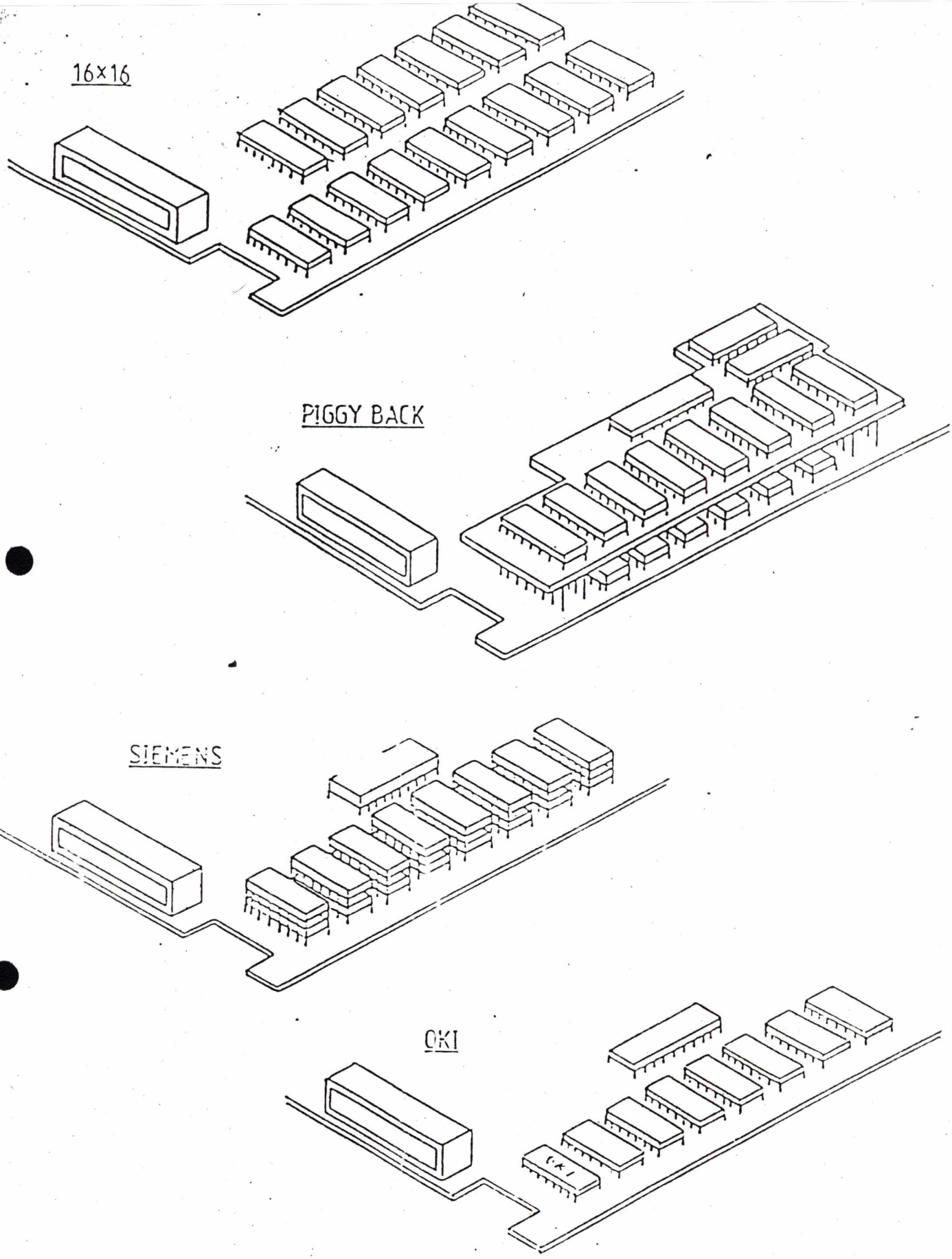
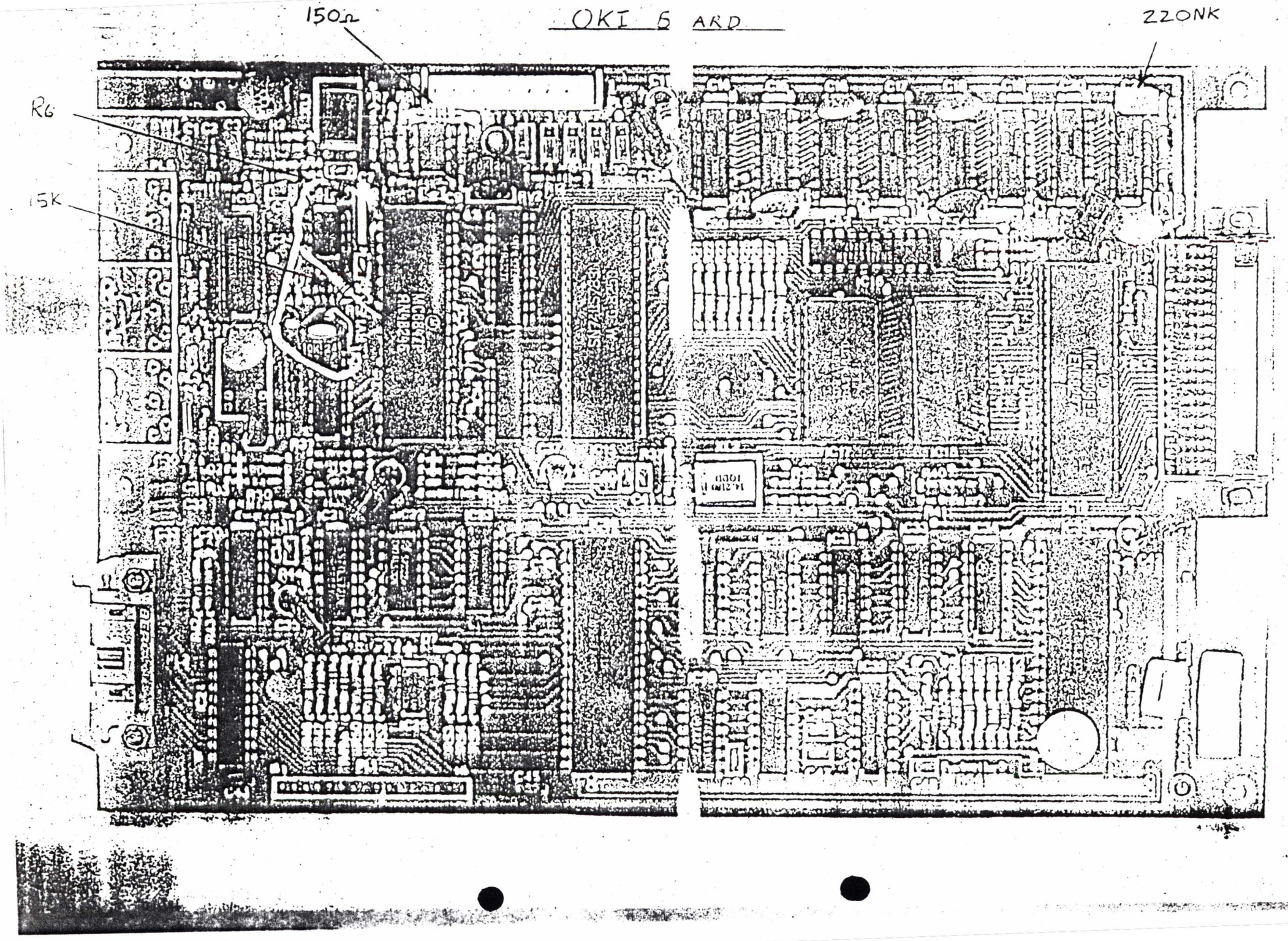


Fig1 Ram Area of CPU's

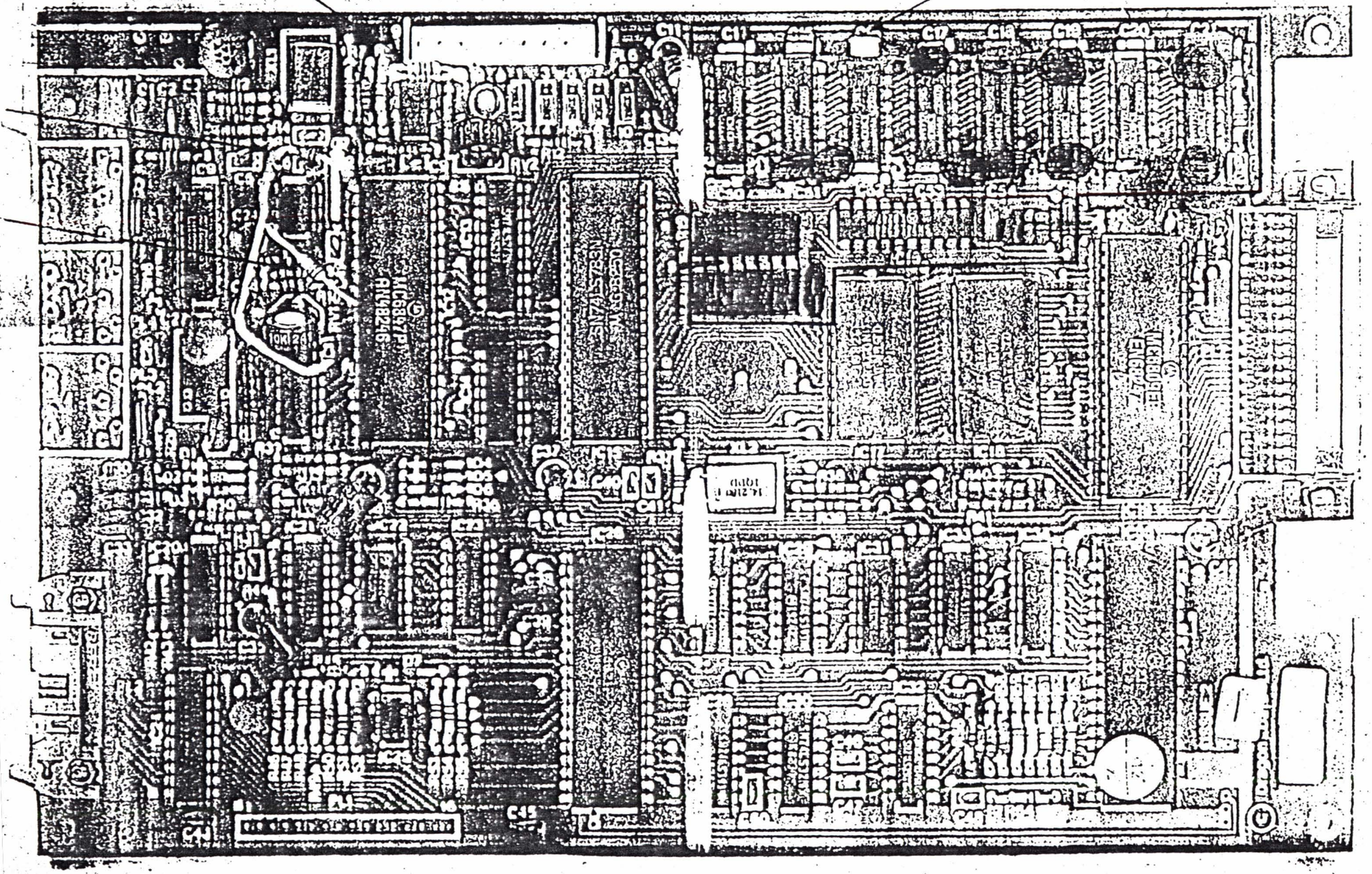
OKI 5 ARD



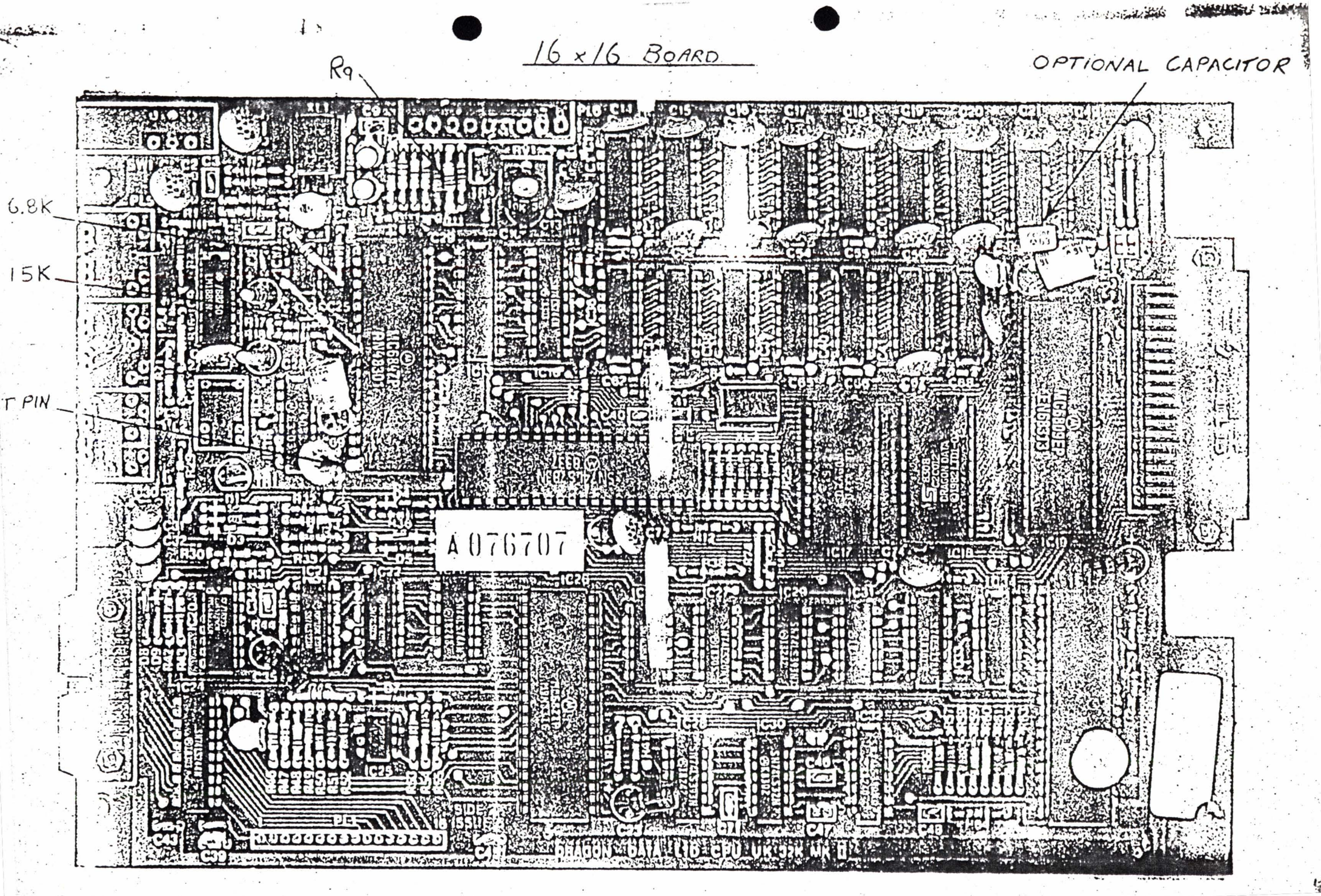
PIGGY BACK BOARD.

150Ω

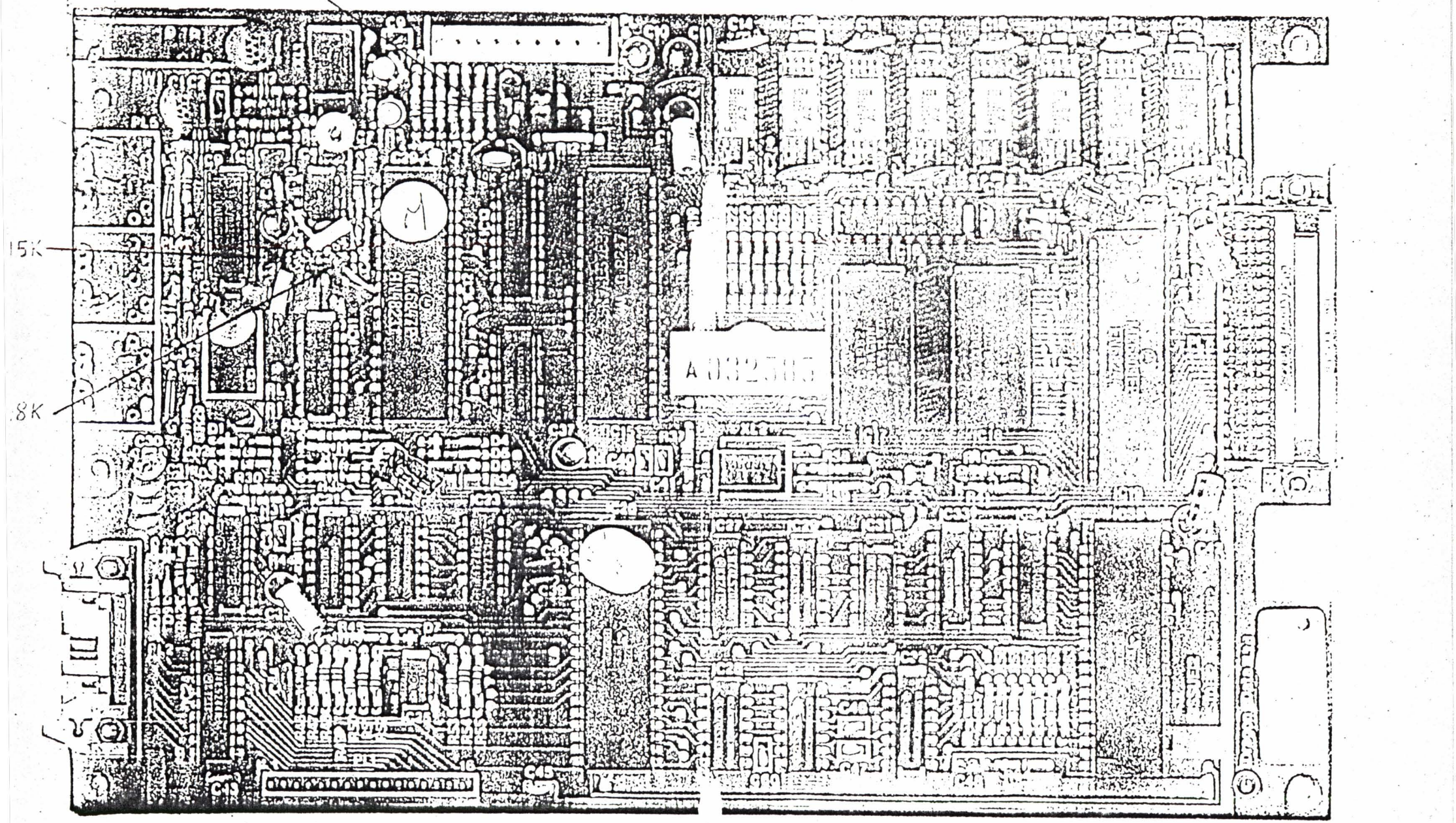
220NK

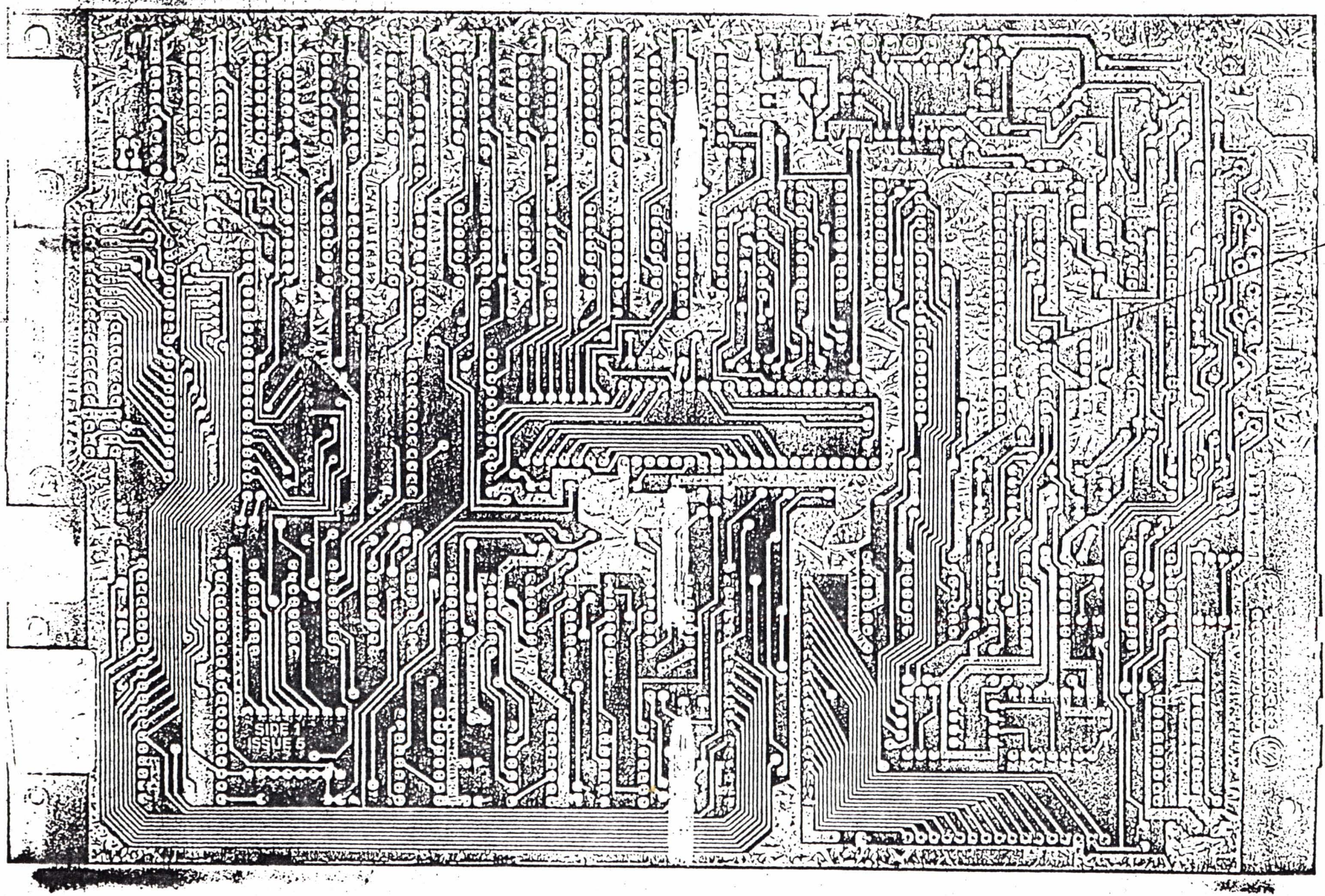


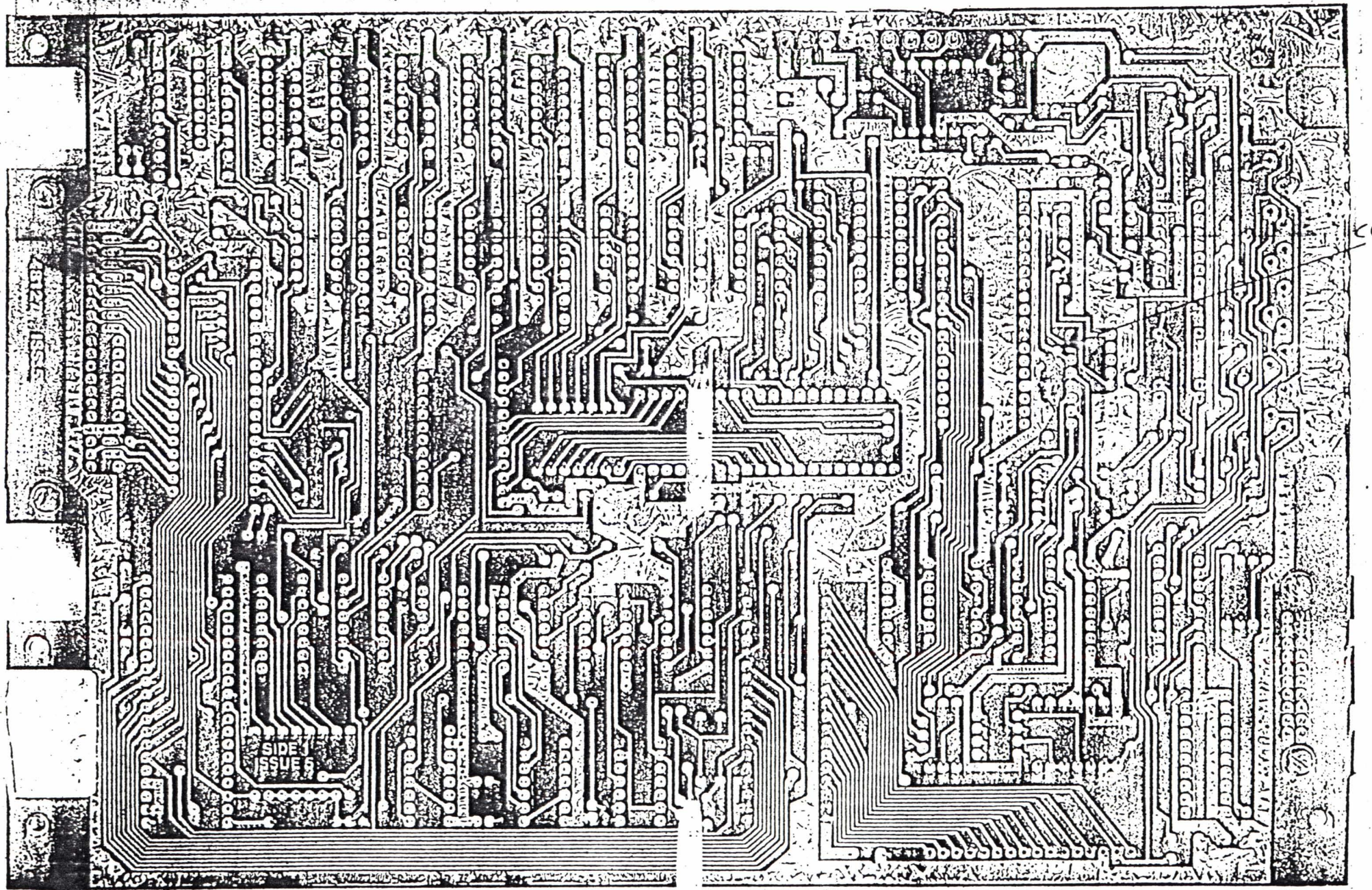
16 x 16 BOARD



SIEMENS BOARD.




CUT
TRACK.
SIDE 1
ISSUE 5


CUT TRACK
SIDE 1
ISSUE 5