

SA200

with SA200 drive

DESCRIPTION

Less than two-thirds the height of standard models, Shugart's single-sided SA200 5.25-inch Minifloppy™ disk drive offers 125 or 250 kilobytes of capacity in a low cost, highly reliable package. Low cost, compact size and high reliability make the SA200 an ideal choice for entry level desktop applications in personal computers, word processors, memory typewriters, portable computers or terminal add-ons.

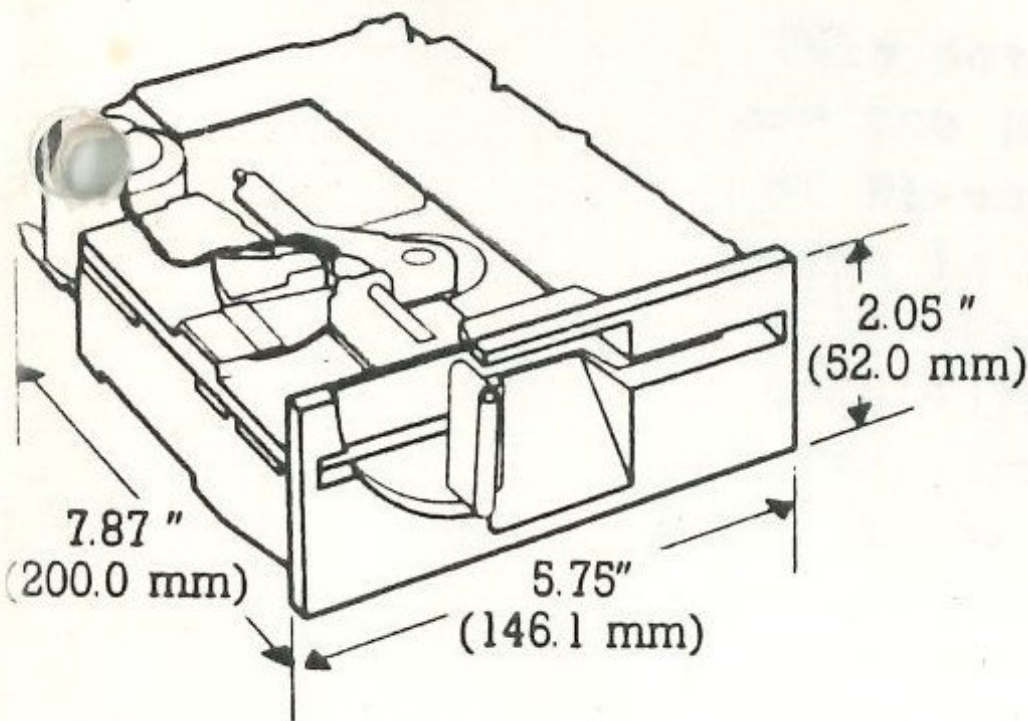
The SA200 is manufactured on highly automated, progressive assembly lines for consistent high quality and reliability. It is designed to fit under the keyboard in desktop systems and features a removable faceplate to further increase the space available to system designers.

Both interface and media compatible with the industry standard SA400/450 Minifloppies, the SA200 features a DC motor, internal write protect circuitry, positive media insertion and low heat dissipation.

The SA200 incorporates more than nine years of disk drive manufacturing experience and is backed by the largest and most experienced engineering, sales and service organizations dedicated to the OEM disk drive industry.

KEY FEATURES

- Compact size—less than two-thirds the height of standard Minifloppies
- SA400/450 compatibility
- Internal write protect circuitry
- Positive media insertion
- Low heat dissipation
- All DC power
- Removable faceplate



PERFORMANCE SPECIFICATIONS

	SA200 SINGLE DENSITY	SA200 DOUBLE DENSITY
CAPACITY		
Unformatted		
Per Disk	125 kbytes	250 kbytes
Per Track	3.1 kbytes	6.2 kbytes
Formatted (16 Records/Track)		
Per Disk	81.9 kbytes	163.8 kbytes
Per Track	2.0 kbytes	4.1 kbytes
Per Sector	128 bytes	256 bytes
Sectors/track	16	16
TRANSFER RATE	125 kbits/sec	250 kbits/sec
LATENCY (avg)	100 msec	100 msec
ACCESS TIME		
Track to Track	26 msec	26 msec
Settling Time	20 msec	20 msec
Motor Start Time	350 msec	350 msec

FUNCTIONAL SPECIFICATIONS

ROTATIONAL SPEED	300 rpm	300 rpm
RECORDING DENSITY (inside track)	2768 bpi	5536 bpi
FLUX DENSITY	5536 fci	5536 fci
TRACK DENSITY	48 tpi	48 tpi
TRACKS	40	40
INDEX	1	1
ENCODING METHOD	FM	MFM
MEDIA REQUIREMENTS	SA104	soft sectored

PHYSICAL SPECIFICATIONS

ENVIRONMENTAL LIMITS	
Ambient Temperature: 50°F to 115°F (10°C to 46.1°C)	
Relative Humidity: 20% to 80%	
Maximum Wet Bulb: 85°F (29.4°C)	
DC VOLTAGE REQUIREMENTS	
+12 V DC ± 5% @ 0.77 A typical (1.05 A max)	
+ 5 V DC ± 5% @ 0.24 A typical (0.415 A max)	
MECHANICAL DIMENSIONS (exclusive of face plate)	
Height: 2.05 in. (52.0 mm)	
Width: 5.75 in. (146.1 mm)	
Depth: 7.87 in. (200.0 mm)	
Weight: 3 lbs. (1.36 kg) nominal	
HEAT DISSIPATION	
35.8 BTU/hr (10.5 watts) continuous (typical)	
21.5 BTU/hr (6.3 watts) power down (typical)	
9.6 BTU/hr (2.8 watts) standby (typical)	

RELIABILITY SPECIFICATIONS

MTBF: 8000 POH at 15% duty cycle
PM: Not required
MTTR: 30 minutes
COMPONENT LIFE: 5 years
ERROR RATES:
Soft Read Errors: 1 per 10 ⁸ bits read
Hard Read Errors: 1 per 10 ¹¹ bits read
Seek Errors: 1 per 10 ⁶ seeks
MEDIA LIFE:
Passes per Track: 3.0 × 10 ⁶
Insertions: 30,000 +

Warburton Franki - Sydney
 433 Parramatta Road,
 Auburn, N.S.W. Aust. 2141 Phone 649 1711

SALES/SERVICE:

West:
 Milpitas, CA
 (408) 263-2600
 Costa Mesa, CA
 (714) 979-1935
 Thousand Oaks, CA

Central:
 Richardson, TX
 (214) 234-3568
 Minneapolis, MN
 (612) 574-9750

East:
 Framingham, MA
 (617) 879-1700
 Saddle Brook, NJ
 (201) 368-8445
 Atlanta, GA

Eastern Canada:
 Markham, Ontario
 (416) 495-2655

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Headquarters:
 475 Oakmead Parkway
 Sunnyvale, CA 94086
 Phone (408) 733-0100
 TWX: 910-339-9355
 SHUGART SUVL

ORIGINAL on Vero

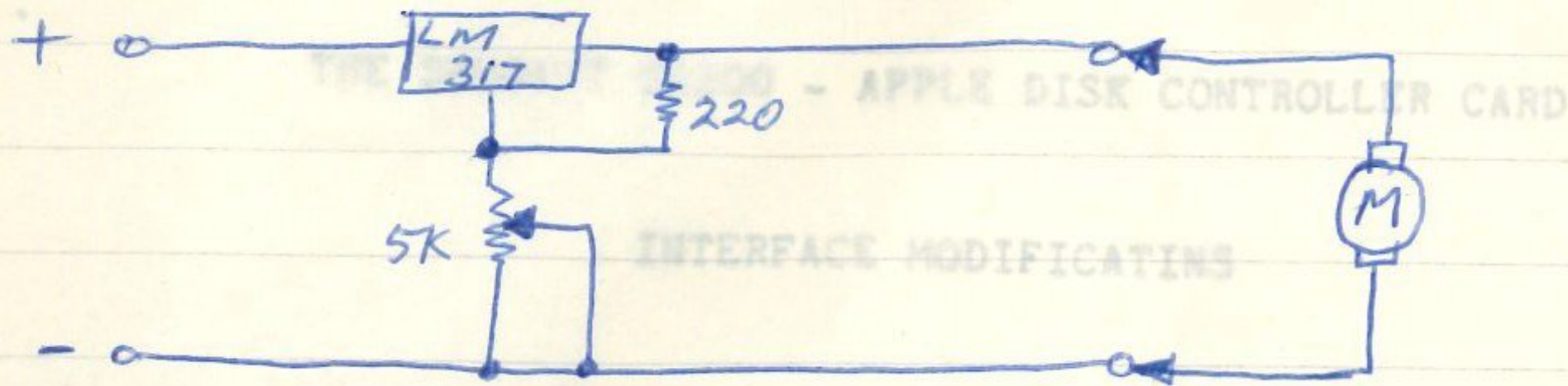
Shugart

Right from the start.

WARBURTON FRANKI

SOUTH MELBOURNE

Speed control modification for SA200



LM317 Adjustable Regulator if too fast

~~or~~ adj governor inside motor

CAUTION

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4 TOR ROAD BELGRAVE HEIGHTS 3160 Phone (03) 754 6502

WARBURTON FRANKI
SOUTH MELBOURNE

THE SHUGART SA200 - APPLE DISK CONTROLLER CARD

INTERFACE MODIFICATINS

•• RIVENDELL SOFTWARE ••

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WARBURTON FRANKI

NOTE: Read these notes carefully before starting construction.

These modifications are in four stages, viz:

1. Interface board construction.
2. Interface board fitting of options (if required)
4. Putting in a box.

1. Interface Board Construction:

Note: X-x means IC labeled "X" on the layout diagram pin number "x"

(a) Using board layout diagram mount IC sockets, molex connector, 34 pin edge connector (after stripping copper off board where even numbered pins poke through) and the 20 pin flat ribbon connector (after drilling copper away from where even numbered pins go through - except pin 12)

(b) Cut tracks on veroboard with 3mm drill where shown by an "X" on the layout diagram.

(c) Solder in links for ground, +5V and +12V viz:

GROUND-

1, 3, 5, 7 on flat ribbon con. as per diagram.

IC's A & B pin 7, IC C pin 8 to ground line under edge con. and along bottom of board.

+5V-

11 & 12 of flat ribb. con. to board +5V line and IC A & B pin 14.

+12V

Pins 13, 15, 17, 19 commoned as per diagram.

SOLDER BRIDGE

A-3 TO A-4.

(d) Solder transistor, diode, resistors and capacitors (except the 220 uF electrolytic) into board.

(e) Wire Wrapping.

Note: E-x - means the 34 pin edge con.

F-x - means the 20 pin flat ribbon con.

Write Protect-

E-28 TO A-13

A-12 TO A-10

A-11 TO B-1

B-3 TO B-5

B-6 TO F-20

Stepper-

F-2 TO C-1

F-4 TO C-2 TO B-2

F-6 TO C-3

F-3 TO C-4

Enable-

F-14 TO B-9

B-10 TO B-7

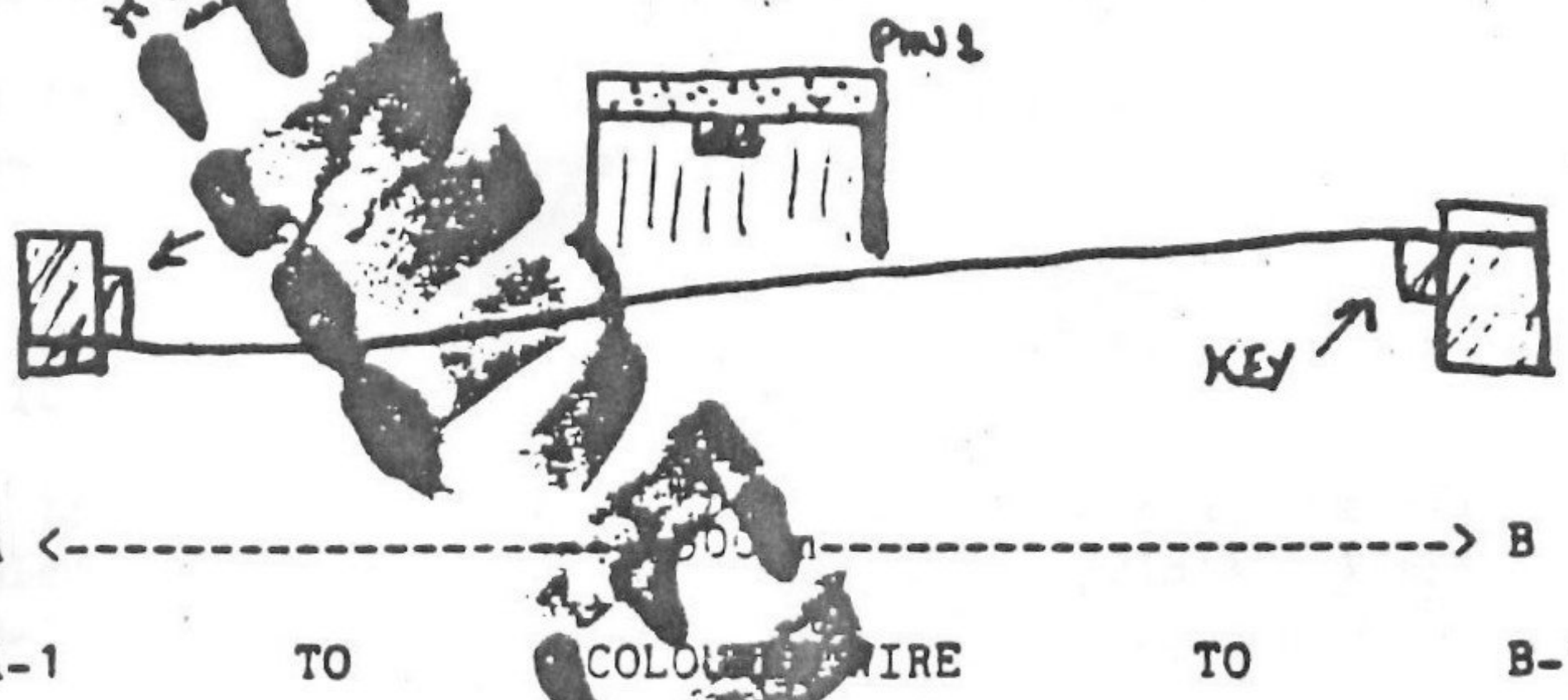
Read-

Write Rec-

ite Data-

- B-8 TO B-4 TO B-13 TO C-5 TO E10 TO E16
- C-12 TO C-6
- F-16 TO B-11
- B-12 TO E-30
- F-10 TO E-24
- F-18 TO A-1
- A-2 TO A-7
- A-6 TO A-9
- A-8 TO E-22

(f) Make wire flat ribbon lead viz:



(g) Solder 220 uF electrolytic between +12V on emitter of transistor and ground. Solder heavy gauge wire to +5V on con. F (about 70mm long) do the same with the +12v from con. F and also run a heavy wire to +12V on the emitter of the transistor.

(h) Remove stepper wires from plug on drive (see drive diagram for location) by poking a scribe into holes in the side of con. Place heatshrink over bare clips on wires and plug into molex con. on interface board viz:

- Remove from pin 2 RED wire and plug on to molex pin 6
- 4 RED 5
- 7 BLK 4
- 3 YEL
- 5 BRN
- 1 ORG

(i) Remove resistor pack from socket on drive main. Solder +5V wire to pin 1 on drive power socket and +12 to 1

(j) Have a good visual check. If your not sure check the notes or your workmanship compare your board with the circuit diagrams.

2. Interface Board debugging:

Connect the flat ribbon cable between your interface and the disc controller card and place the drive on a clean flat surface.

Power up your Apple and check for smoke. The drive motor should whirr and the stepper motor should shudder, and if you have a disk in it should boot.

However if this does not happen -

whirr

•• DON'T PANIC ••

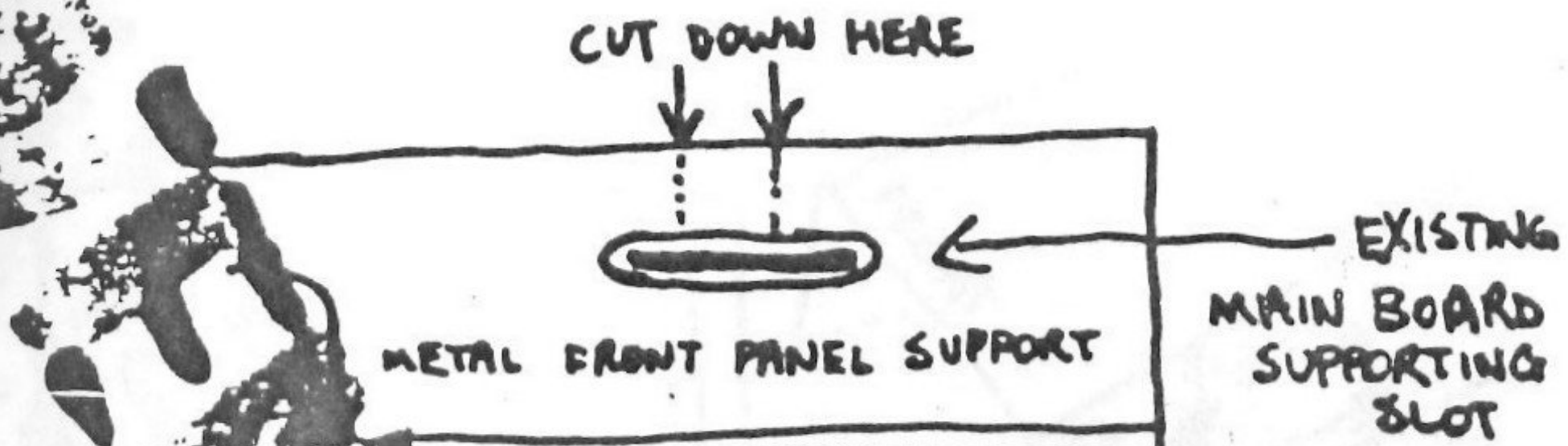
That +5V

- (a) Check *That +5V* is on pin 1 of drive power socket. 4 and power and ground on each IC on the interface board.
- (b) If the *motor doesn't* go check the enable line (pins 10 & 16 on the E con.) *power on.*
- (c) If it doesn't *start* for +12V on molex con. pins 5 & 6 and IC C-9. If OK check for stepping pulses (5 - 15 mS) each side of IC C after power *is low after* on.
- (d) If it won't boot *or read a disk* check that the read data is enabled (B-13 low) and data *going pulses* (1 mS) is on B-12 & B-13.
- (e) If it won't write (with *no protect tab on disc!*) Check write protect cct.; check write req. line *E-24* goes low; check write data doubling cct. around IC A is *functioning.*
- (f) If your dead certain of everything it *may* need aligning. The charge for aligning a drive is \$10.00 but if I have to fix any faults to do the aligning it's \$25.00 *an hour* so think about the problem a little (the cct. is relatively *simple*) while you save up your pennies.

3. Fitting of options:

(a) Activity Led

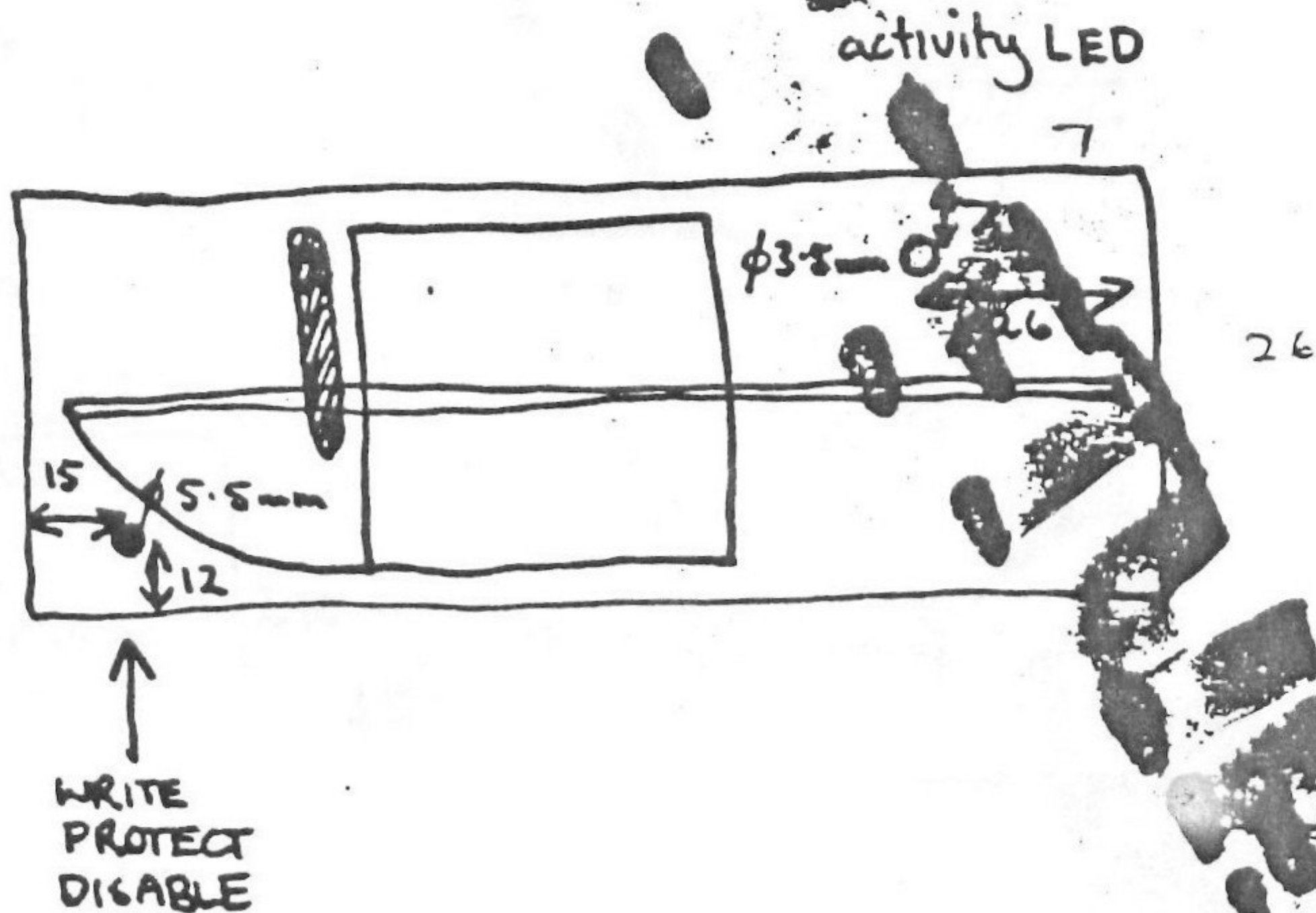
Remove front panel and drill a 3.5 mm hole as indicated on drive diagram. Remove metal from front panel support with tin



Solder a 330 Ω resistor in position R13 on main drive PCB and a 3 mm Led (pin 1 (cathode) and pin 2 (anode) at edge of main PCB so that it pokes through the front panel.

(b) Write Protect Disable

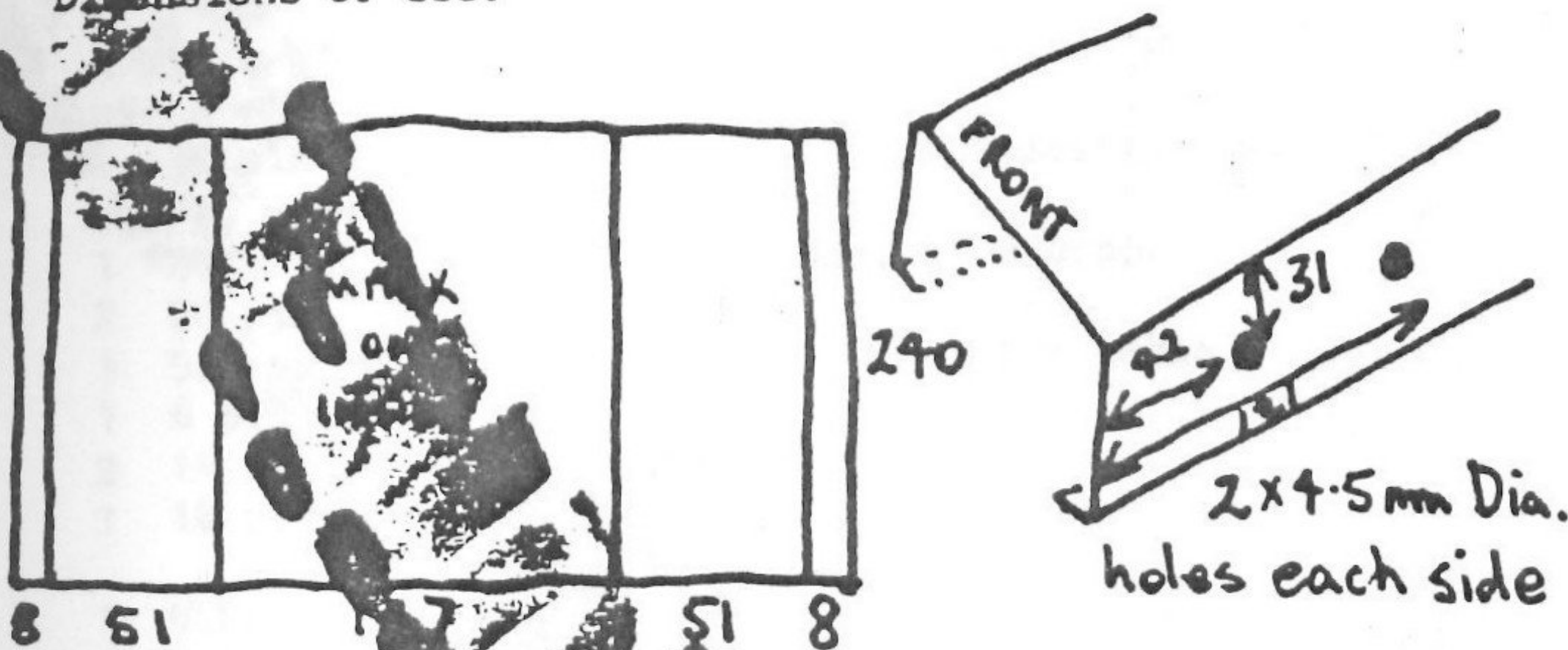
Drill 5.5 mm hole in front panel as shown on drive diagram and file out so that a C & K pushbutton switch threads into the plastic. Extend nearby brown wire from write protect switch through pushbutton contacts "common" & "normally closed", trim white plunger so that red cap just clears panel when pressed.



4. Putting it in a box:

Note: This is the recommended box for ease of servicing. If you wish Rivendell Software to align your drive we expect it to be in a serviceable case!

Dimensions of lid:

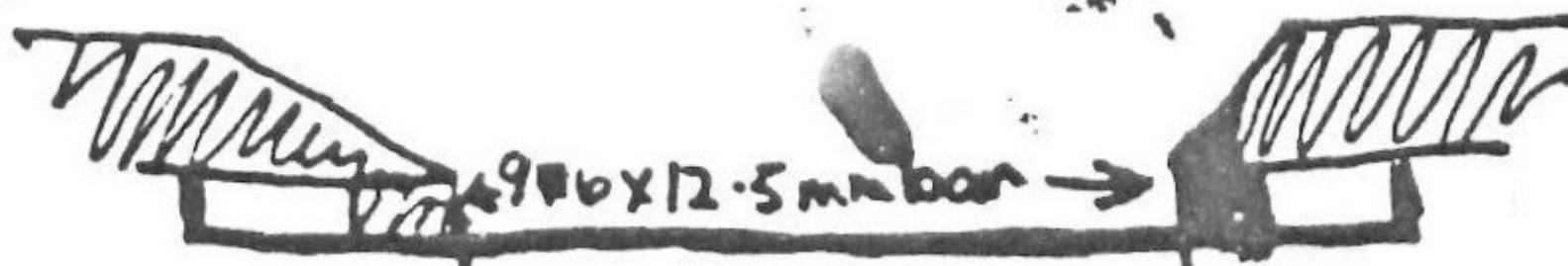


How to bend lid

First bends-

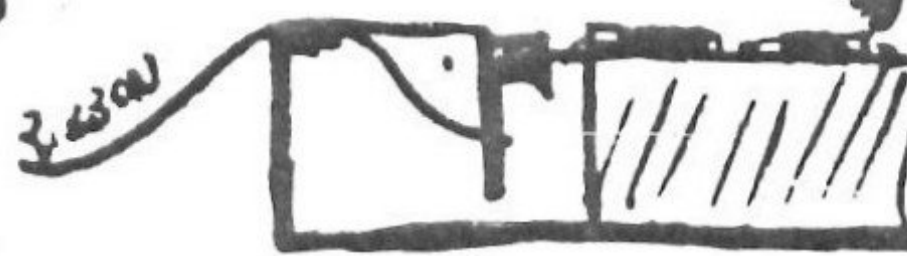
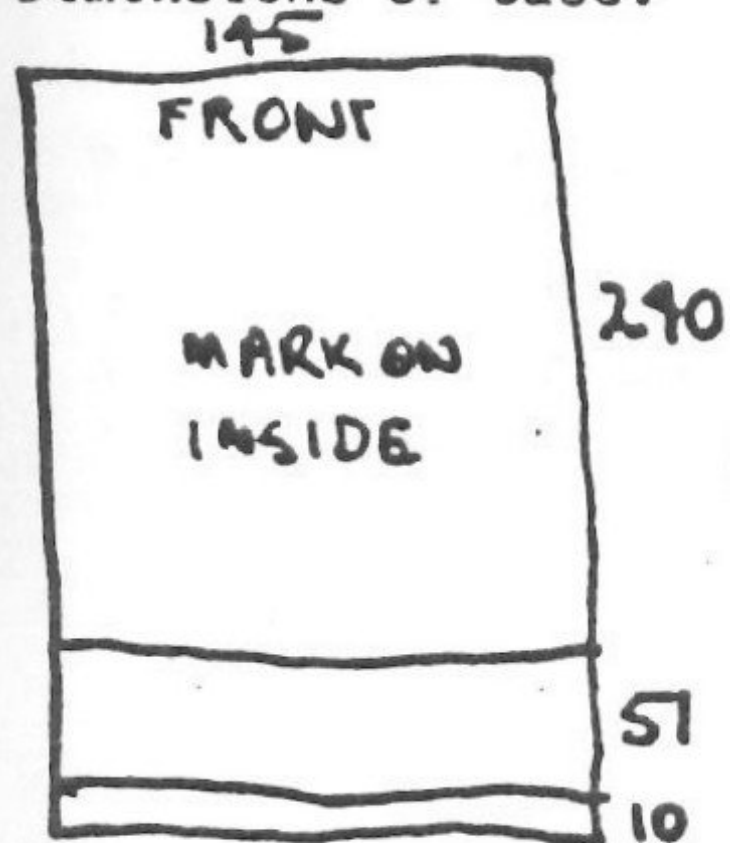


Second bends-



(when doing second bend adjust bender to clamp at low height)

Dimensions of base:



Base is attached to lid with 4 short self tappers. Fit rubber feet.

Assembly - Slide cover over unit and fix with 3 mm screws at sides. Ensure that interface card is in position with cable taped to lid, then screw base on to lid.

PARTS LIST

A piece of veroboard 37 holes x 18 holes (which is half width of sheet)

1 35 pin D-sub connector, 0.1" pin spacing, rows 0.2" apart, wire wrap. - flat

1 20 pin flat ribbon connector, wire wrap.

2 20 pin flat ribbon plugs.

1 500 mm length of 20 wire flat ribbon cable.

1 6 pin molex connector.

2 14 pin D-sub sockets.

1 16 pin D-sub socket.

1 ULN2003 driver (or similar) driver

1 74LS125 driver

1 74LS86 XOR gate

1 MJE172 transistor (or similar)

1 1N4148 diode (or similar)

1 220 uF electrolytic capacitor

1 4.7 uF tantalum capacitor

4 0.1 uF (or thereabouts) bypasses

1 .0022 (222K) capacitor

1 56 ohm 1/2W resistor

1 120 ohm 1/2W

1 120 ohm 1/4W

2 150 ohm 1/4W

10 1K0 ohm 1/4W

150 mm of 3 mm heatshrink the colour of your choice.

Parts required for options-

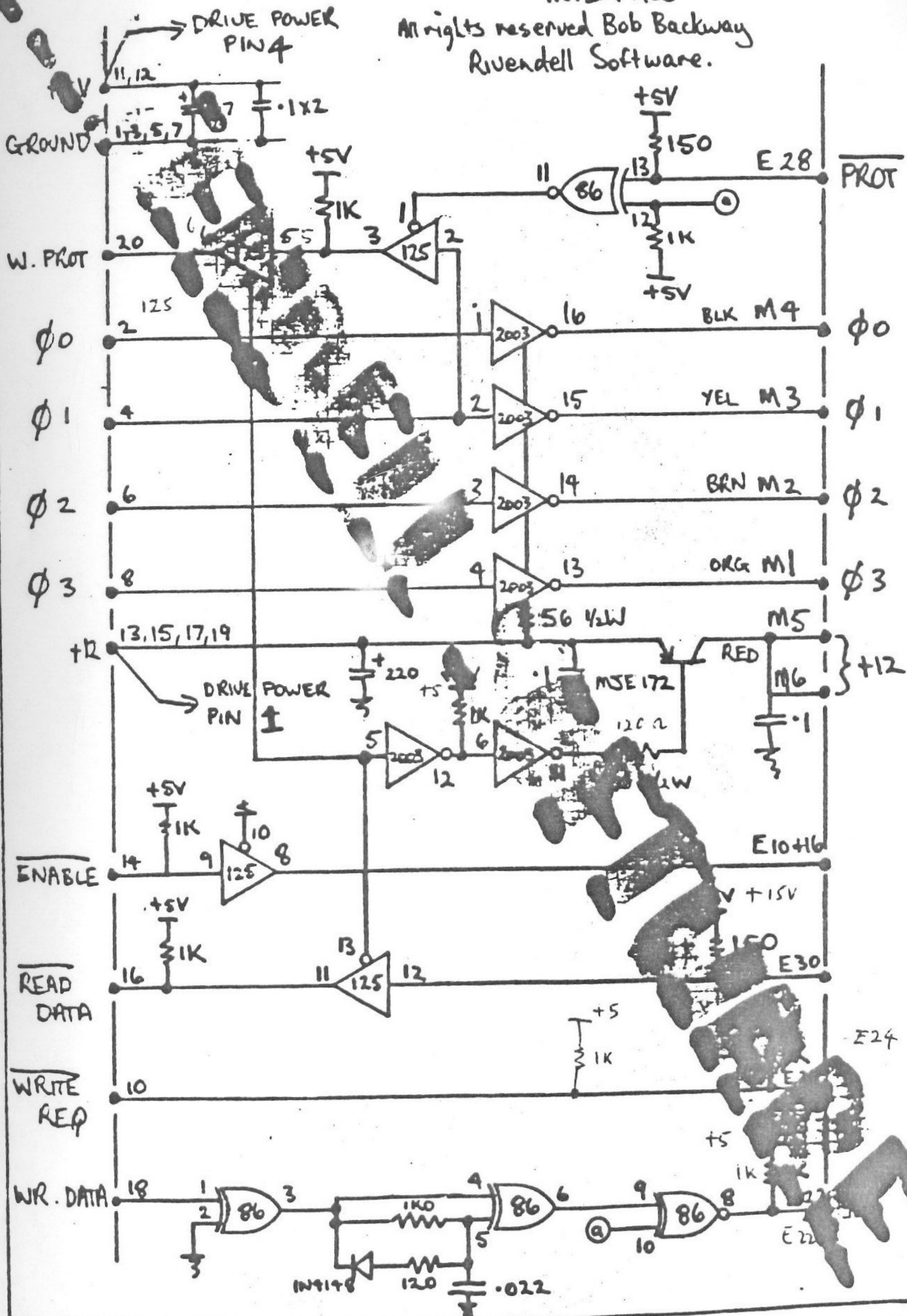
1 330 ohm 1/4W resistor

1 3 mm D. red Led

1 Push-button C & K switch with red cap

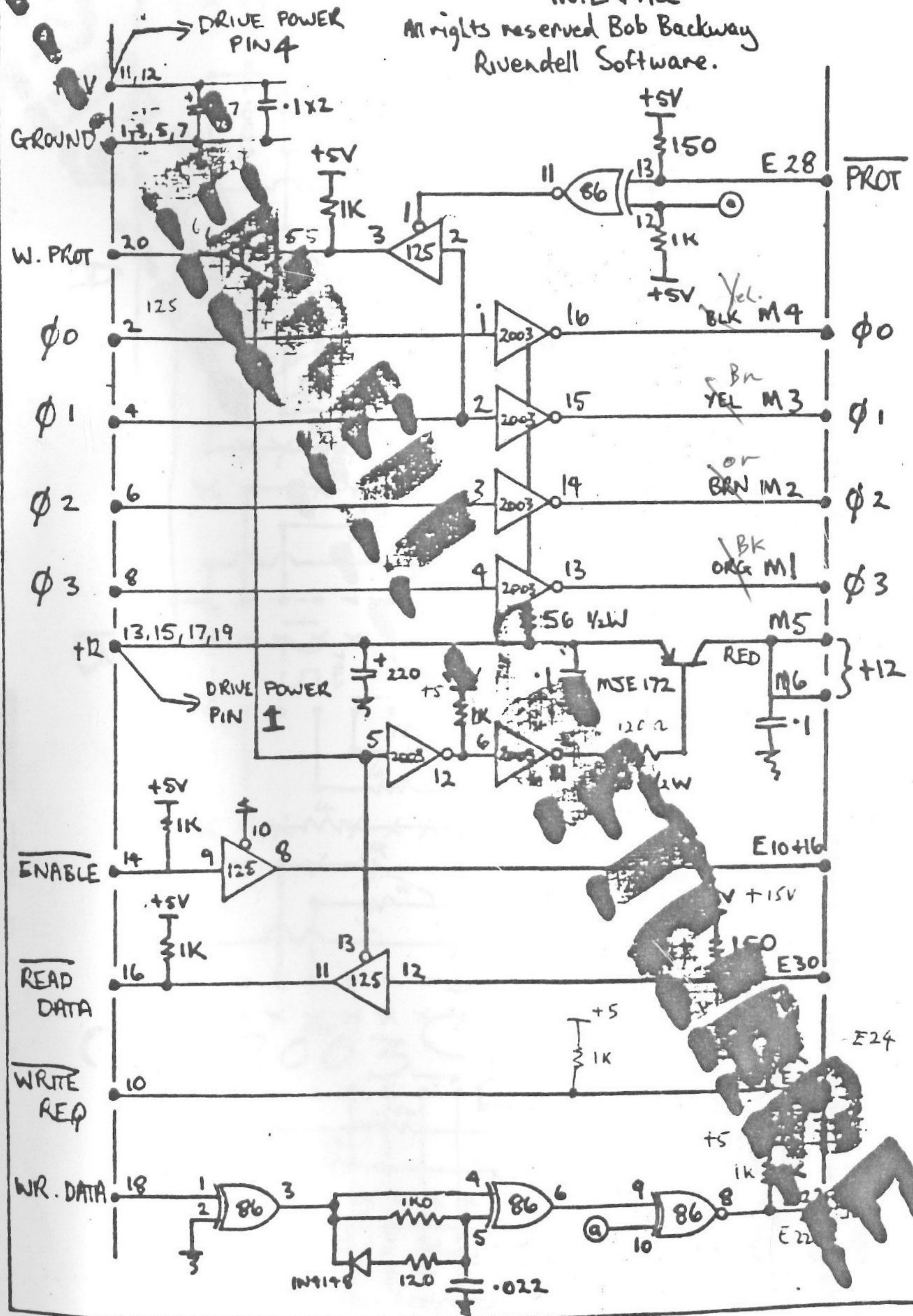
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X MARK OUT COPPER HERE (USE 3MM DRILL)

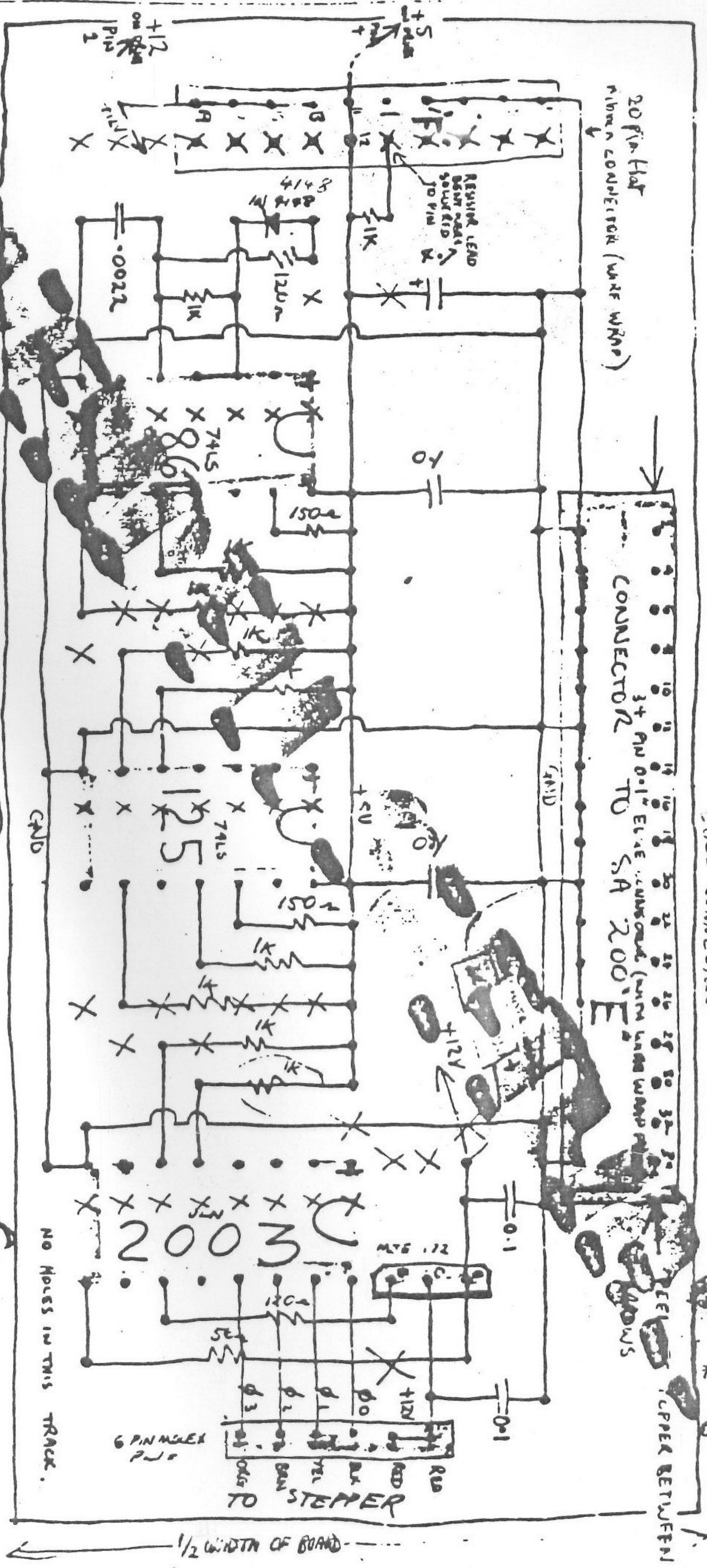
EDGE CONNECTOR

VERPCARD TRACKS RUN

20 pin Hat
NIMH CONNECTION (WAF WRAP)

CONNECTOR TO SA 200E
3+ PIN 0.1" ELAS SUBSTRATE (WITH LAMIN WAFER PAD)

COPPER BETWEEN



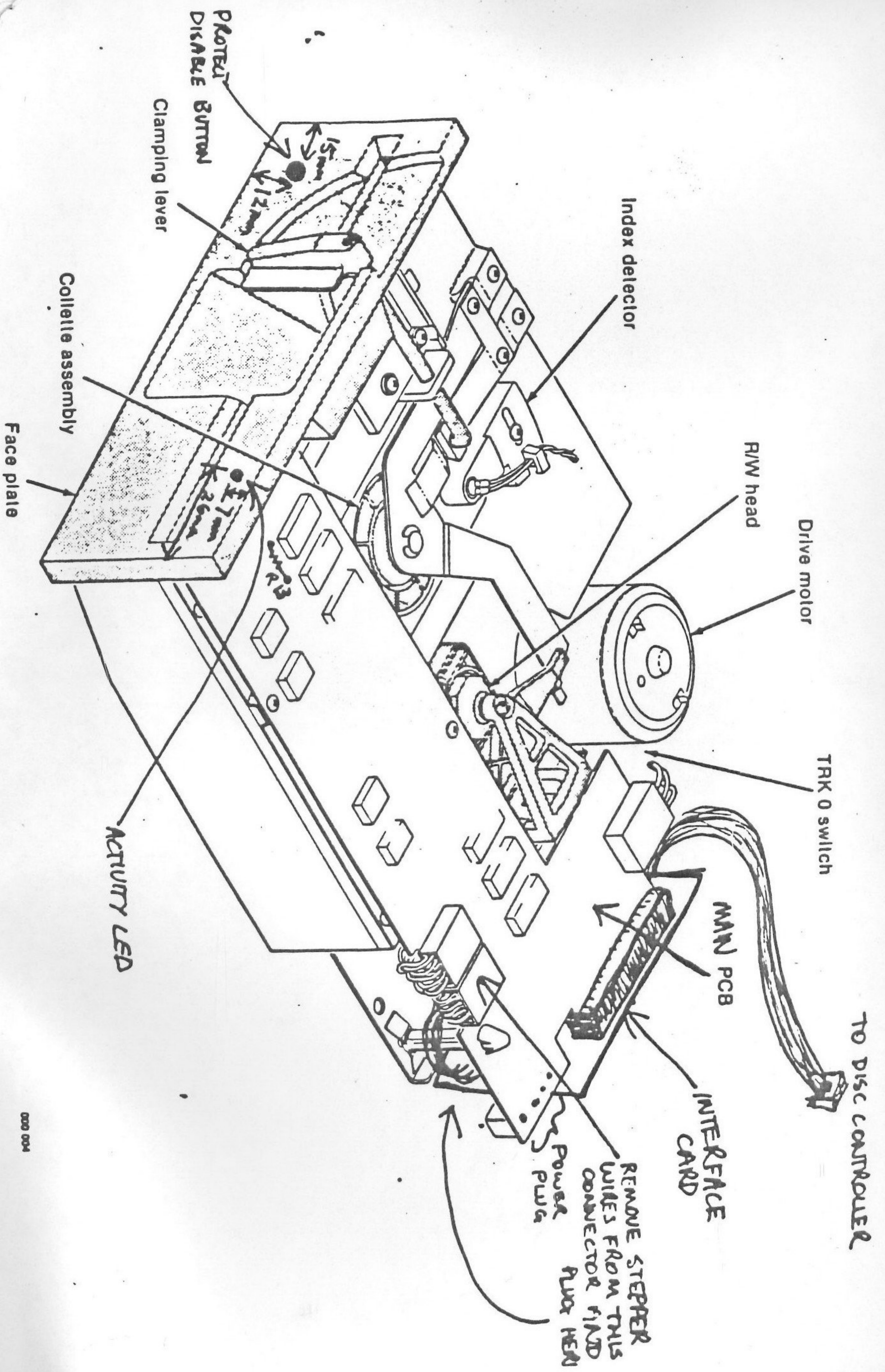
A

B

C

1/2 WIDTH OF BOARD

NO HOLES IN THIS TRACK.



Shurt Associates SA 200

0000 004