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Macromodular Computer Design, Part 2, Volume 14, Pedestal Controller, Fan Module, Channel Coupler and Jigs

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MACROMODULAR COMPUTER DESIGN PART 2 MANUFACTURING DESCRIPTION

VOLUME XIV

PEDESTAL CONTROLLER, FAN MODULE, CHANNEL COUPLER AND JIGS

Technical Report No. 43

FINAL REPORT - FEBRUARY, 1974
CONTRACT SD-302 (ARPA)

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR COMPUTER DESIGN

FINAL REPORT - CONTRACT SD-302

FEBRUARY, 1974

Technical Report No. 43

PART 2 - MANUFACTURING DESCRIPTION

VOL. XIV-PEDESTAL CONTROLLER, FAN MODULE, CHANNEL COUPLER AND JIGS

This work has been supported by the Advanced Research Projects Agency of the Department of Defense under Contract SD-302 and by the Division of Research Facilities and Resources of the National Institutes of Health under Grant RR-00396.
The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Advanced Research Projects Agency or the U.S. Government.

Computer Systems Laboratory
Washington University
St. Louis, Missouri

ABSTRACT

A complete description of electrical and mechanical components, assembly jigs and procedures for manufacture of the macromodular base-pedestal controller, fan module and channel coupler is given.

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PAGES 426-1 thru 426-38

FAN MODULE
PAGES 441-1 thru 441-54

CHANNEL COUPLER
PAGES 500-1 thru 500-13

JIGS
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426-2	Title Page
426-3	Printed Circuit Board Assembly General Specifications
426-4	Parts List - P.C. Card No. 2
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426-6	Component Identification - P.C. Card No. 2
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426-22	Weight
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426-25	System Condition Light Note
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CHG.	E.C.O.	DATE	APPR
ISS		12-10-73	T.g.e.

Macromodular Systems Project

Page	Title
426-27	Controller Assembly General Instructions
426-28	Controller Assembly Parts List
426-29	Controller Assembly Parts List
426-30	Controller Assembly Outline
426-31 thru 426-36	Controller Wiring and Assembly
426-37	Power Wiring Diagram
426-38	P.C. Card Arrangement and Connector Pin No. Diagram

PRINTED CIRCUIT BOARD ASSEMBLY GENERAL SPECIFICATION

1. Printed Circuit Board Manufacture:

The printed circuit boards shall conform to pages 010-12 through 010-16 of the CSL General Standards, and outline drawings 200.50D30 and 200.50D41. Exception: the boards may be manufactured without plated-through holes.

2. Printed Circuit Board Assembly:

The 3 printed circuit boards are assembled per pages 426-4 thru 426-18. If plated-through hole boards are used, pages 426-7, 426-12, and 426-17 may be ignored. Pages 010-24 through 010-35 of the CSL General Standards apply with the additions noted on each assembly drawing. The Printed Circuit board handles are mounted such that the Pull tabs are above the Components.

CHG.	E.C.O.	DATE	APPR
155		1/21/74	J.F.C.

Parts List - P.C. Card #2

Integrated Circuit Requirements

2 MC1015L (Motorola)
3 MC1004L (Motorola)

Resistor Requirements

±5% 1/4W Carbon Comp.

9 4.7 ohms
8 2.2K ohms
1 750 ohms
1 0 ohms jumper

±5% 2W Carbon Comp.

2 68 ohms

±1% 100 PPM/TC, Metal Film

20 57.6 ohms
20 1500 ohms

Potentiometer

1 200 ohm, CTS 190PC201A1

Transistor Requirements

1 2N4918

Diode Requirements

1 MMD-694 (CSL Diode)
1 1N4733 (Motorola)

Capacitor Requirements

1 15µfd, 20V Tant. (Kemet K15J20KS or Mallory TAS156M020P1C)
1 4.7µfd, 50V Tant. (Mallory TAS475M050P1C)

Printed Circuit Board

1 WCL0141-1

Handles

2 DEC Standard for flip chip boards with rivets.

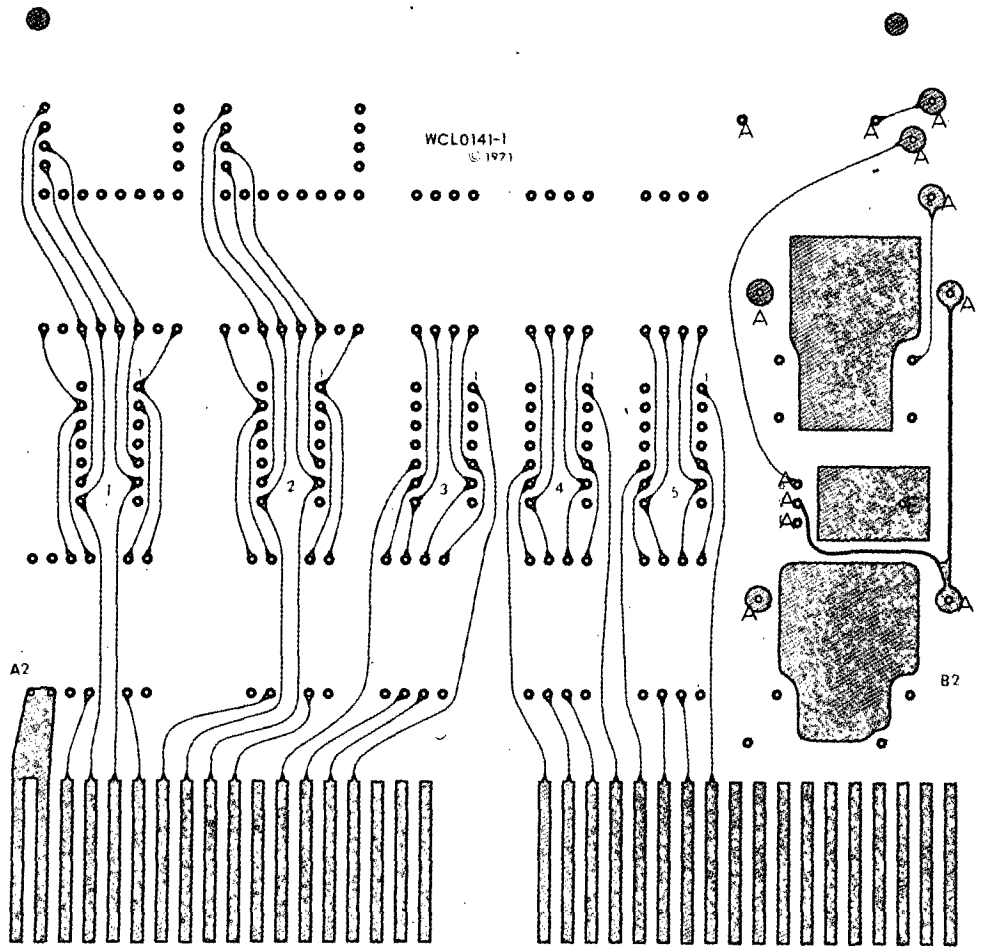
Hardware

1 6-32 nut
1 6-32 x 3/8 screw

CHG.	E.C.O.	DATE	APPR.
155		1/21/74	J.G.L.

TYPE "A" HOLES (12)
TYPE "E" HOLES (1)
TYPE "B" HOLES (all others)

SEE CSL DOCUMENT 010 (GENERAL STANDARDS) FOR HOLE SIZES.



CHANGE NO.	DATE	DESCRIPTION

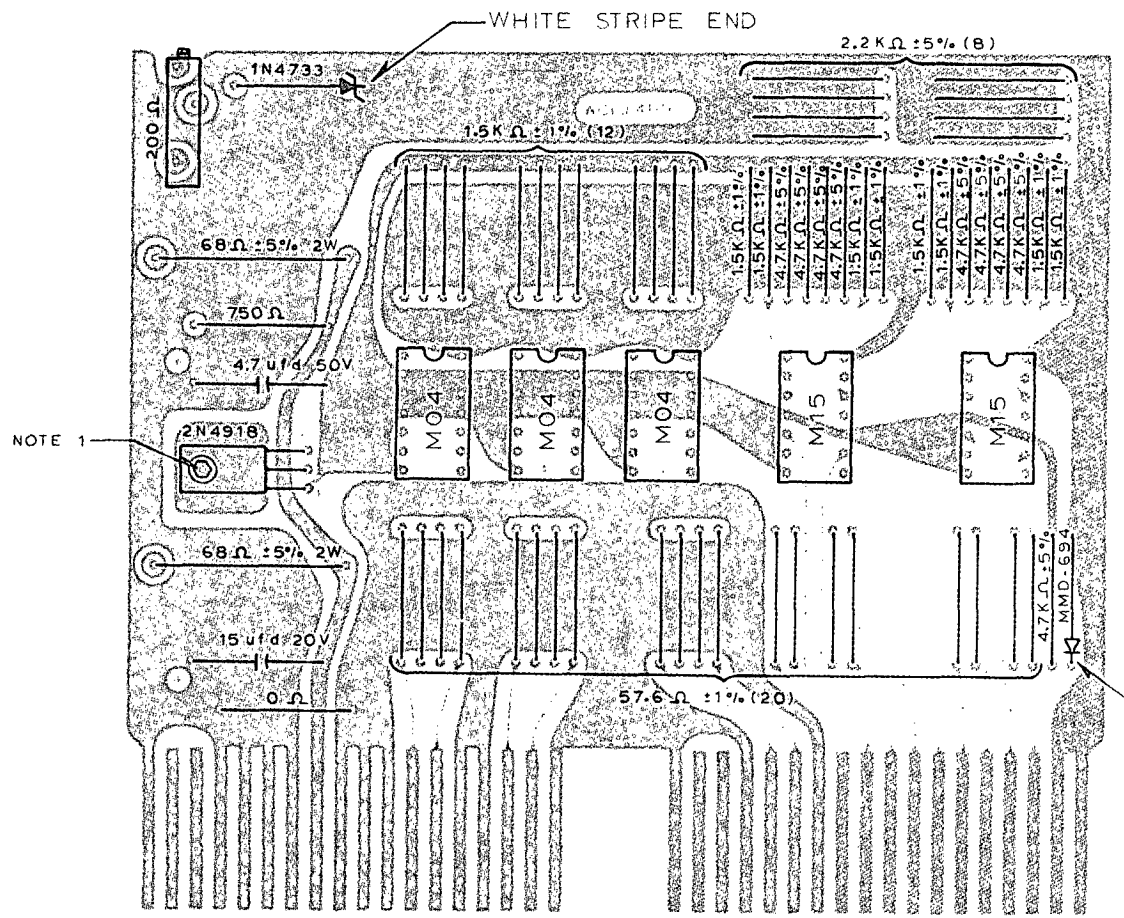
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: HOLE SIZE AND LOCATION
P.C. CARD #2

APPROVED BY	FOR	DATE
T.J.C.	PROD	1/21/74

ENG. TJC
DRAWN BY PLL
CHECKED T.J.C.
DRAWING NO. 426-5
DATE 1-4-74



NOTES:

1. MOUNT TRANSISTOR PLASTIC SIDE UP USING THE SPRING WASHER SUPPLIED WITH THE TRANSISTOR, A 6-32 x 3/8 SCREW AND NUT.
2. M04 AND M15 ARE RESPECTIVELY MC1x04 AND MC1x15 MOTOROLA ECL SERIES LOGIC.
3. 15 μfd AND 4.7 μfd CAPACITORS ARE TANT.
4. THE 68Ω RESISTORS ARE 2W CARBON COMP.
5. ALL OTHER ±5% RESISTORS ARE ¼W CARBON COMP.
6. ALL ±1% RESISTORS ARE METAL FILM, 100 PPM T.C.
7. 200 OHM POT. IS C.T.S. 190PC201A OR EQUIV.
8. COMPONENT ORIENTATION IS INDICATED BY NOTCHES ON DUAL INLINE PACKAGES, NOT IDENTIFICATION NUMBERS.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

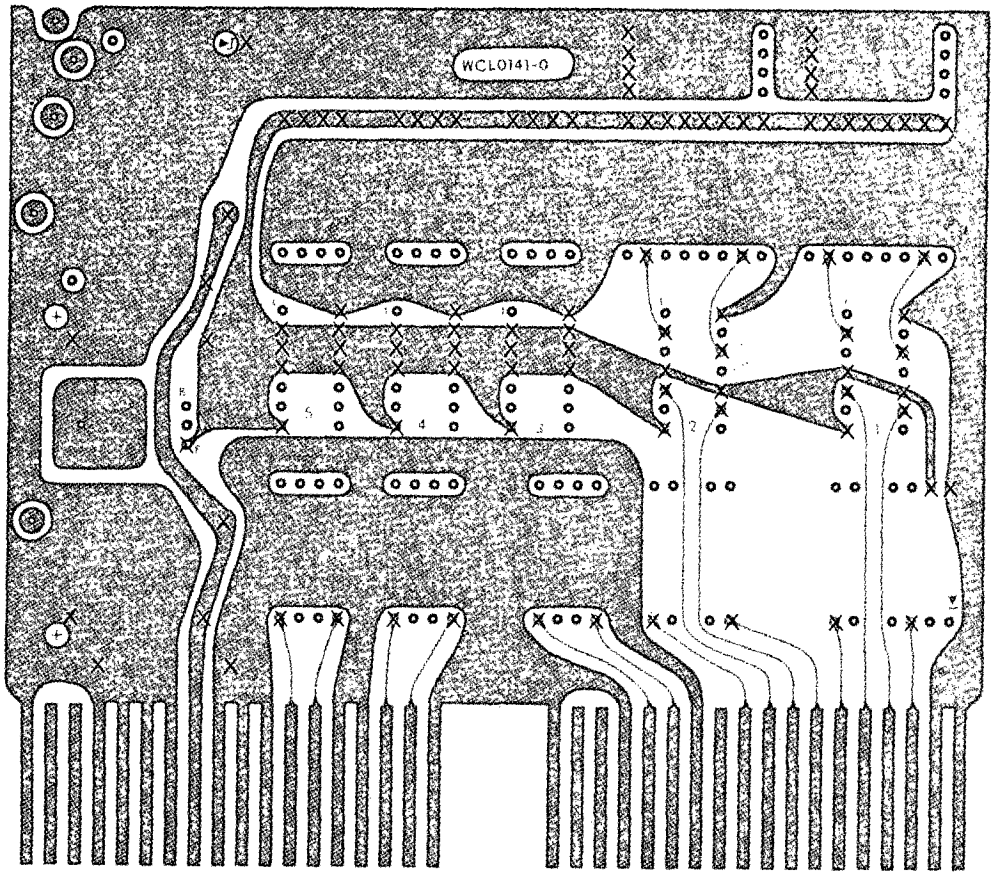
MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
P.C. CARD NO. 2

APPROVED BY	FOR	DATE
	PROD	1/21/73

ENG. TJC
DRAWN BY PLL
CHECKED
DRAWING NO. 426-6
DATE 12-26-72

HOLES MARKED WITH AN "X" MUST BE SOLDERED ON THE COMPONENT (THIS) SIDE. ALL PADS MUST BE SOLDERED ON THE SIGNAL SIDE.



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
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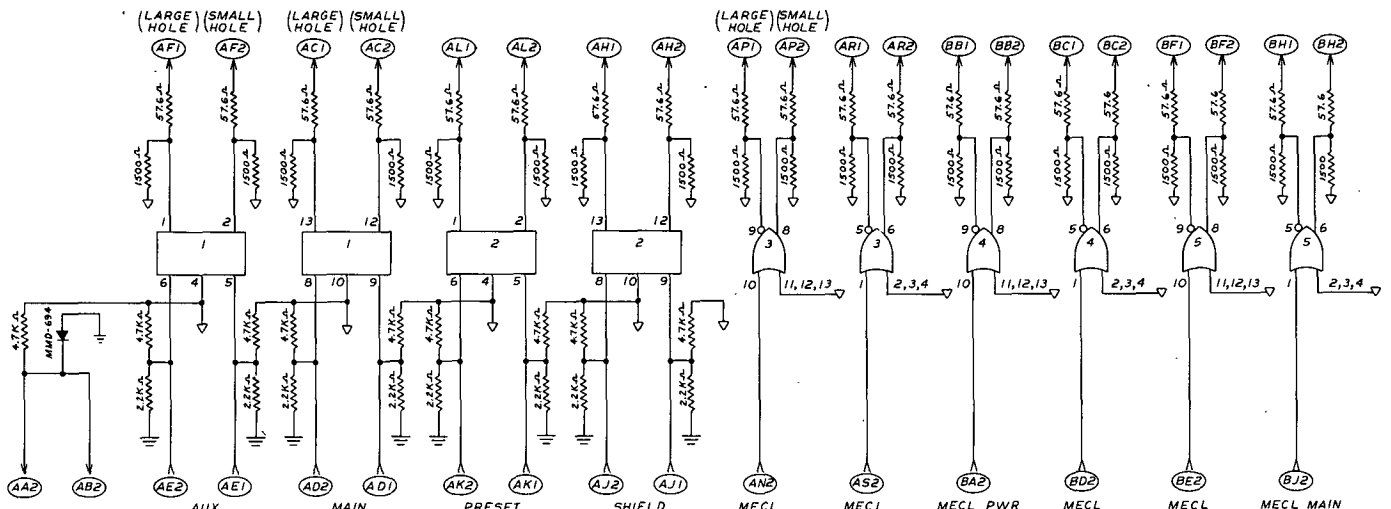
ST. LOUIS, MISSOURI

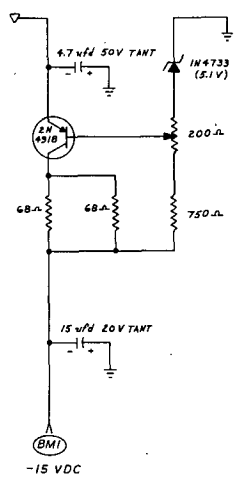
MACROMODULAR PROJECT

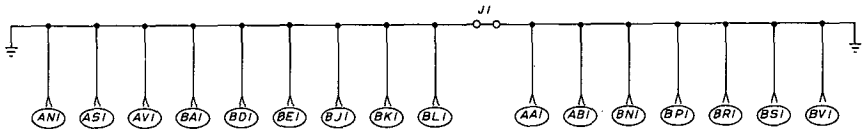
TITLE
COMPONENT SIDE SOLDERING DIAGRAM
P.C. CARD NO. 2

APPROVED BY	FOR	DATE
T.J.C.	PROD	1/4/73

ENG. TJC
DRAWN BY PLL
CHECKED
DRAWING NO. 426-7
DATE 12-26-72







RESISTORS

57.6 Ω = ±1% 100 ppm Metal Film
1500 Ω = ±1% 100 ppm Metal Film
4.7K Ω = ±5% 1/4 W
2.2K Ω = ±5% 1/4 W
68 Ω = ±5% 2 W
750 Ω = ±5% 1/4 W
200 Ω = CTS 190PC201A Variable

PACKAGE	TYPE
1	MC1015
2	MC1015
3	MC1004
4	MC1004
5	MC1004

▽ = -5.2V

CHANGE NO. | DATE | DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
LOGIC DIAGRAM
P.C. CARD NO 2

APPROVED BY	FOR	DATE
T.F.C.		12/7/72

ENG. TJC
DRAWN BY PLL
CHECKED T.F.C.
DRAWING NO 426-8
DATE 12-6-72

Parts List - P.C. Card #3

Integrated Circuit Requirements

1 MC660L (Motorola)
2 MC664L (Motorola)
2 MC671L (Motorola)
2 MC672L (Motorola)
2 MC675L (Motorola)
2 MC680L (Motorola)

Resistor Requirements

±5% 1/4W Carbon Comp.

1 15,000 ohms
1 24 ohms
3 1000 ohms
7 1500 ohms
2 51,000 ohms
1 75,000 ohms
5 0 ohm jumpers
1 3000 ohms

Diode Requirements

3 MMD-694 (CSL Diode)
1 IN5242B (Motorola)

Capacitor Requirements

1 0.01µfd, 16V Cerm. (Sprague HY-420 or C069B160E103Z)
2 15µfd, 20V Tant. (Kemet K15J20KS or Mallory TAS156M020P1C)
4 100µfd, 20V Tant. (Mallory TAS107K020P1C)

Transistor Requirements

2 2N3903 (Motorola)

Printed Circuit Board

1 WCL0174-2

Handles

2 DEC Standard for Flip Chip Boards with Rivets

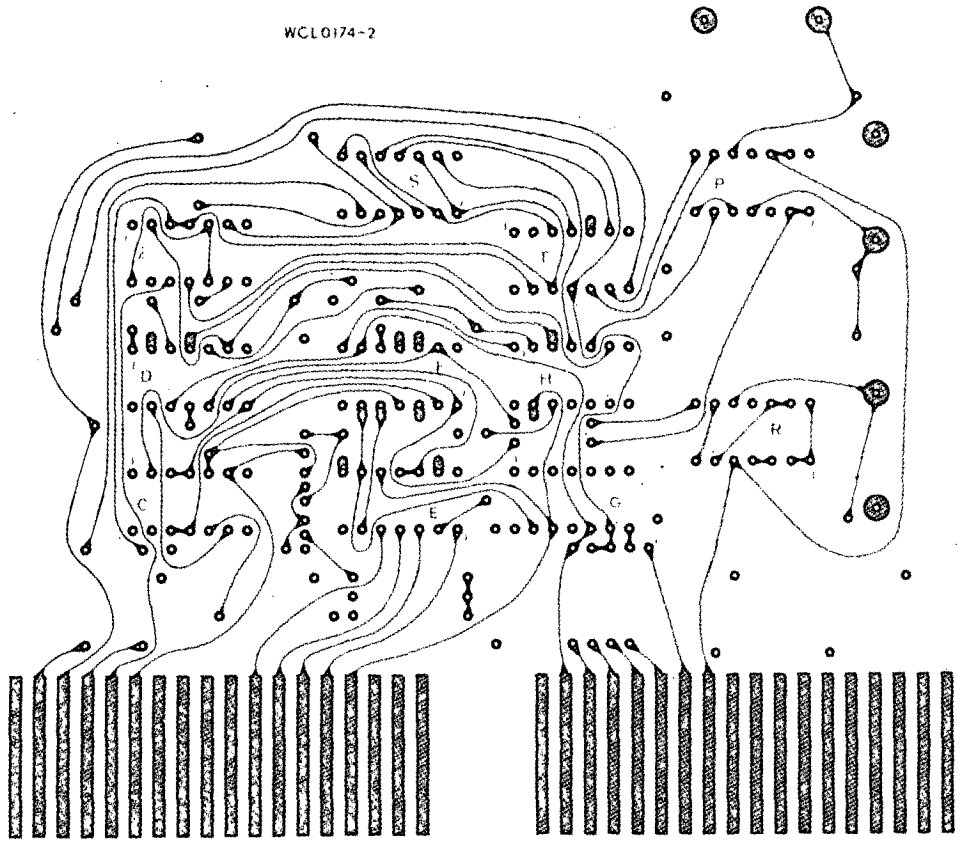
CHG	E.C.O.	DATE	APPR
155	-	1/21/74	T.J.C.

WCL0174-2

NOTE:

ALL HOLES ARE TYPE "B"

SEE CSL DOCUMENT 010 (GENERAL STANDARDS) FOR HOLE SIZE.



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

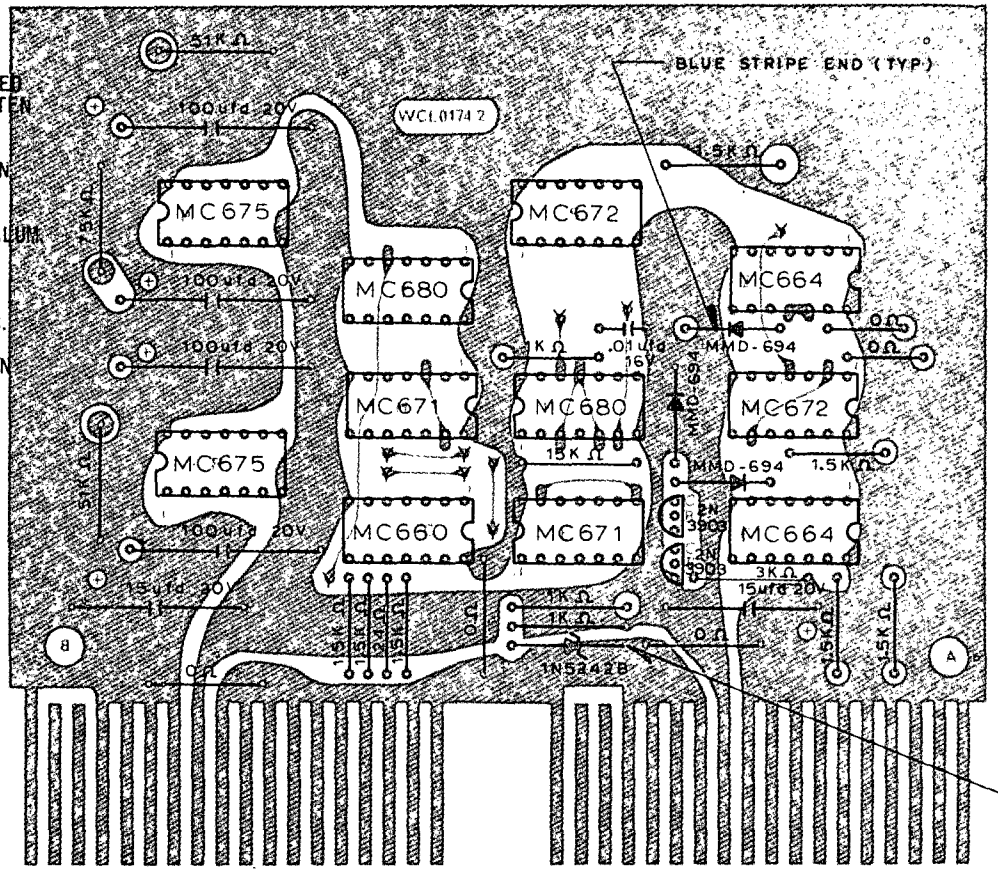
TITLE
HOLE SIZE AND LOCATION
P.C. CARD #3

APPROVED BY	FOR	DATE
T.J.C.	PROD	1/21/74

ENG. TJC
DRAWN BY PLL
CHECKED T.J.C.

DRAWING NO. 426-10
DATE 1-4-74

1. HOLES MARKED WITH A "Y" MUST HAVE A PIECE OF BUS WIRE (24AWG – 28AWG) PLACED THROUGH THE HOLE AND SOLDERED IN PLACE ON BOTH SIDES OF THE BOARD (TEN PLACES).
2. ALL RESISTORS ARE ±5%, 1/4 WATT CARBON COMP.
3. 15ufd AND 100ufd CAPACITORS ARE TANTALUM.
4. 0.01 ufd CAPACITOR IS CERM.
5. MC6XX ARE MOTOROLA HTL SERIES LOGIC.
6. NO COMPONENT SHALL EXTEND MORE THAN 0.375" ABOVE THE P.C. BOARD.
7. COMPONENT ORIENTATION IS INDICATED BY NOTCHES ON DUAL INLINE PACKAGES AND FLAT FACE ON 2N3903's. IDENTIFICATION NUMBERS MAY BE ANY ORIENTATION.



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

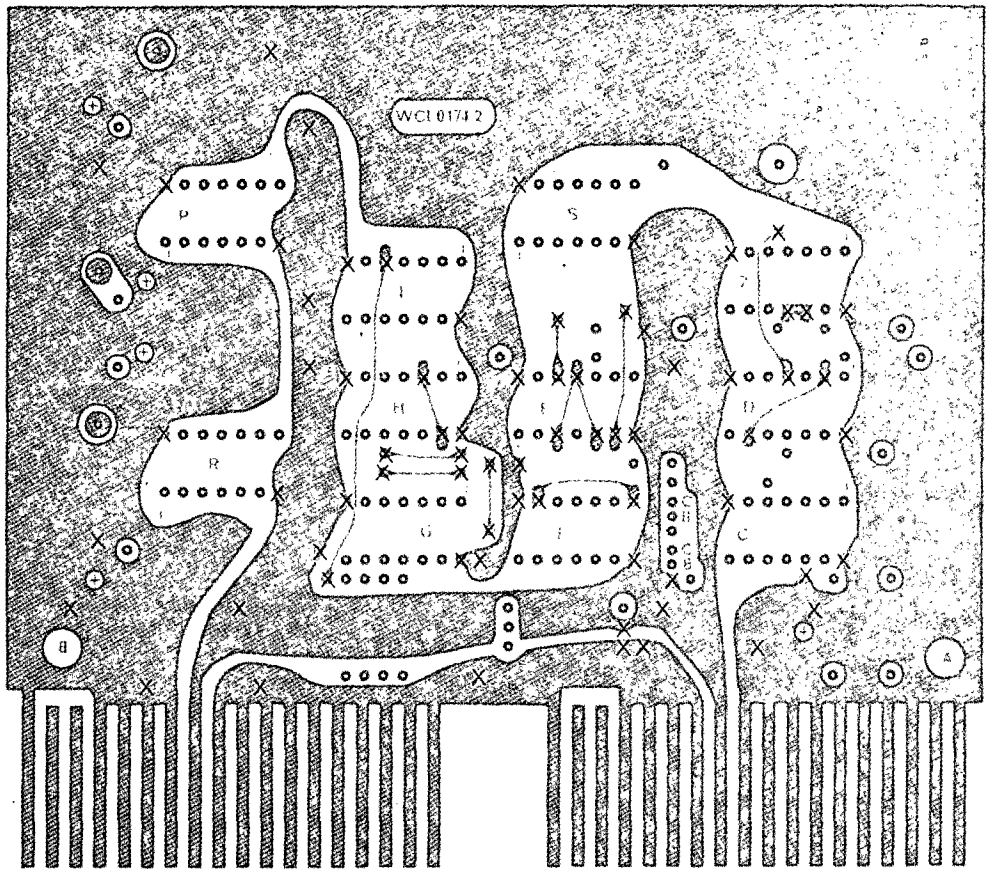
MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION P. C. CARD NO. 3

APPROVED BY	FOR	DATE
T.J.C.	PROD.	1/9/73

ENG. TJC
DRAWN BY PLL
CHECKED
DRAWING NO. 426-11
DATE 12-21-72

HOLES MARKED WITH AN "X" MUST BE SOLDERED ON THE COMPONENT (THIS) SIDE. ALL PADS MUST BE SOLDERED ON THE SIGNAL SIDE.



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

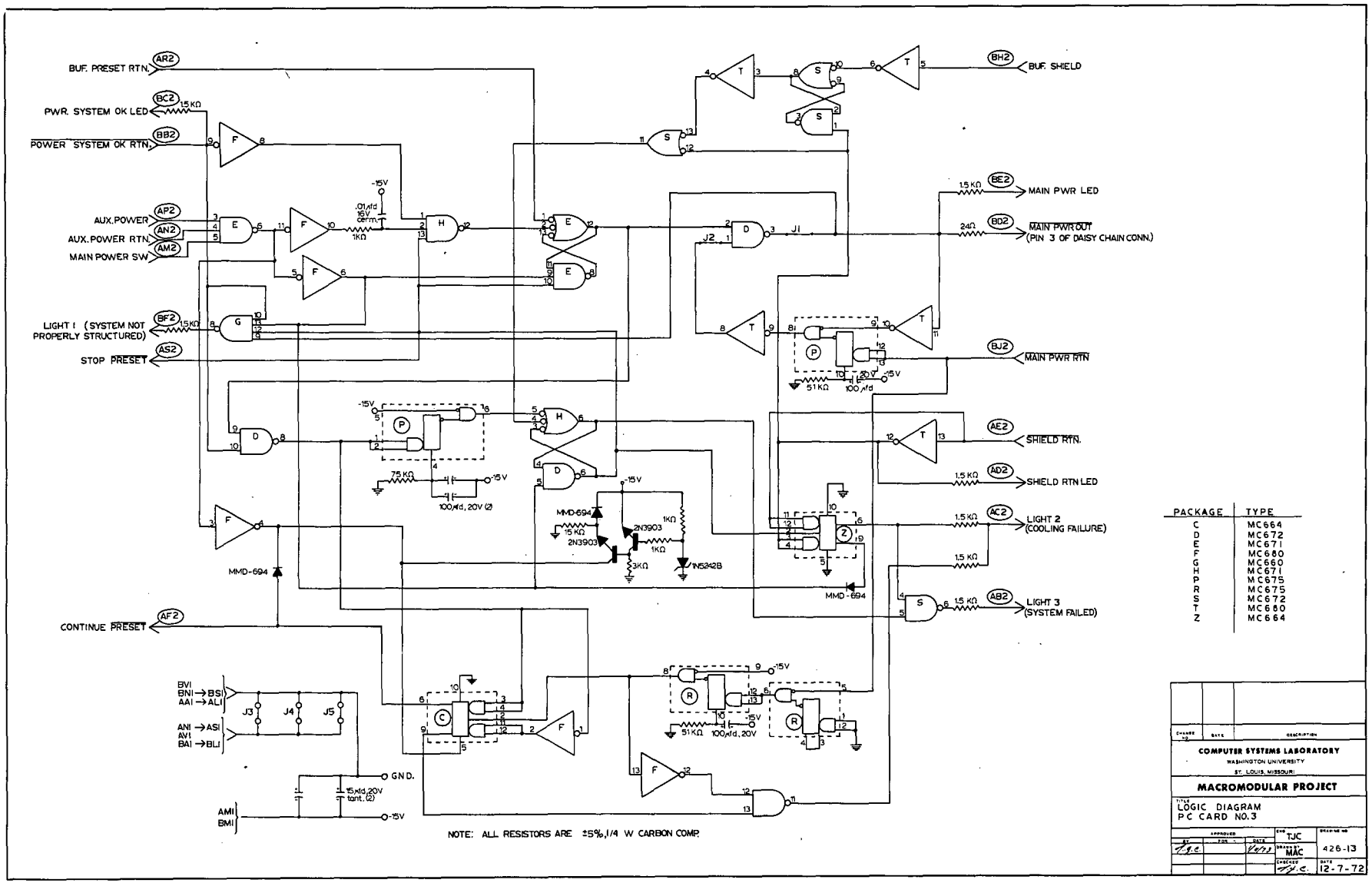
MACROMODULAR PROJECT

TITLE
COMPONENT SIDE SOLDERING DIAGRAM
P.C. CARD NO. 3

APPROVED BY	FOR	DATE
T.J.C.	PROD.	1/4/73

ENG. TJC
DRAWN BY PLL
CHECKED

DRAWING NO. 426-12
DATE 12-21-72



PACKAGE	TYPE
C	MC664
D	MC672
E	MC671
F	MC680
G	MC660
H	MC671
P	MC675
R	MC675
S	MC672
T	MC660
Z	MC664

NOTE: ALL RESISTORS ARE ±5%, 1/4 W CARBON COMP.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
LOGIC DIAGRAM
PC CARD NO. 3

APPROVED BY	FOR	DATE	ENG TJC	DRAWING NO
T.J.C.		12/7/72	DRAWN MAC	426-13
			CHECKED T.J.C.	DATE 12-7-72

Integrated Circuit Requirements

4 LM311H (National)
2 MC660L (Motorola)
1 MC671L (Motorola)
1 MC672L (Motorola)
2 MC675L (Motorola)
3 MC680L (Motorola)

Resistor Requirements

±5%, 1/4W, Carbon Comp.

3 24 ohm
5 360 ohm
2 1000 ohm
8 1500 ohm
1 2000 ohm
6 2700 ohm
4 4700 ohm
3 20,000 ohm
8 47,000 ohm
1 0 ohm jumper

±1%, 100 PPmTC, Metal Film

6 681 ohm
6 13,300 ohm

Diode Requirements

1 MMD-694 (CSL diode)
1 IN4733 (Motorola)

Capacitor Requirements

2 0.01µfd, 16V CERM. (Sprague HY-420 or C069B160E103Z)
4 1.0µfd, 35V TANT. (Sprague CS13BF105M)
2 15µfd, 20V TANT. (Kemet K15J20KS or Mallory TAS156M020P1C)

Printed Circuit Board

1 WCL0142-3

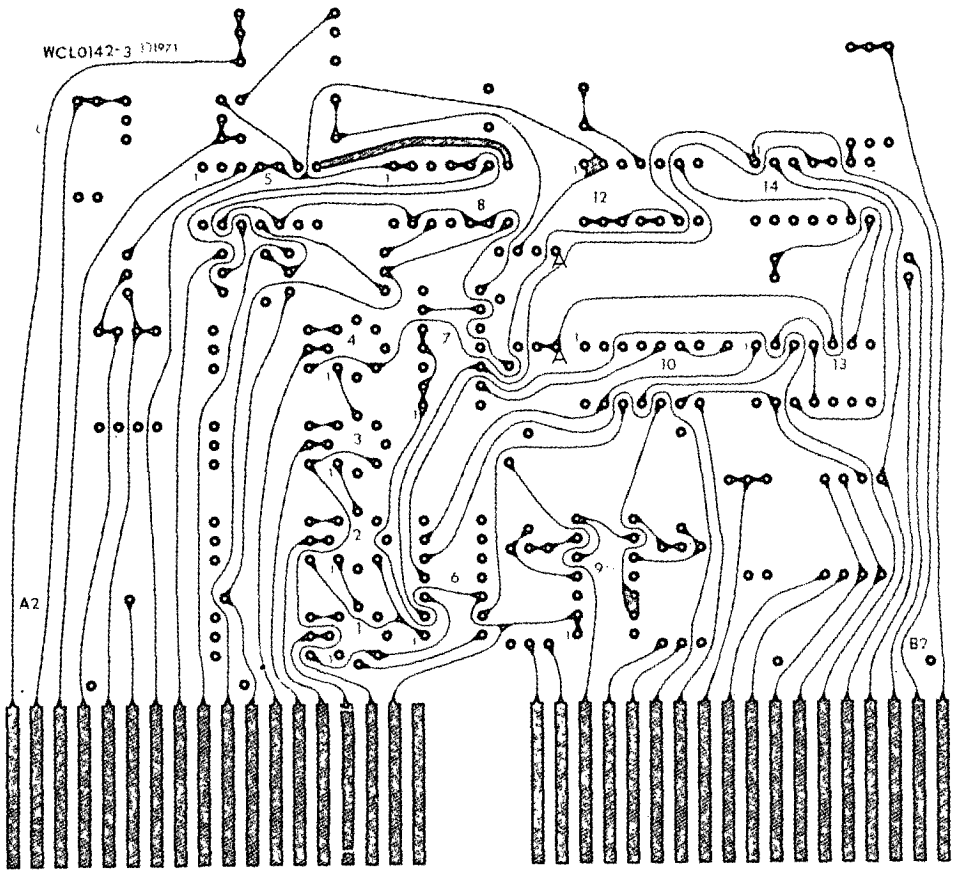
Handles

2 DEC Standard for Flip Chip Boards with Rivets

CHG.	E.C.O.	DATE	APPR.
155		1/21/74	[illegible]

TYPE "A" HOLES (2 PLACES).
ALL OTHER HOLES TYPE "B"

SEE CSL DOCUMENT 010
(GENERAL STANDARDS)
FOR HOLE SIZES.



CHANGE NO.	DATE	DESCRIPTION

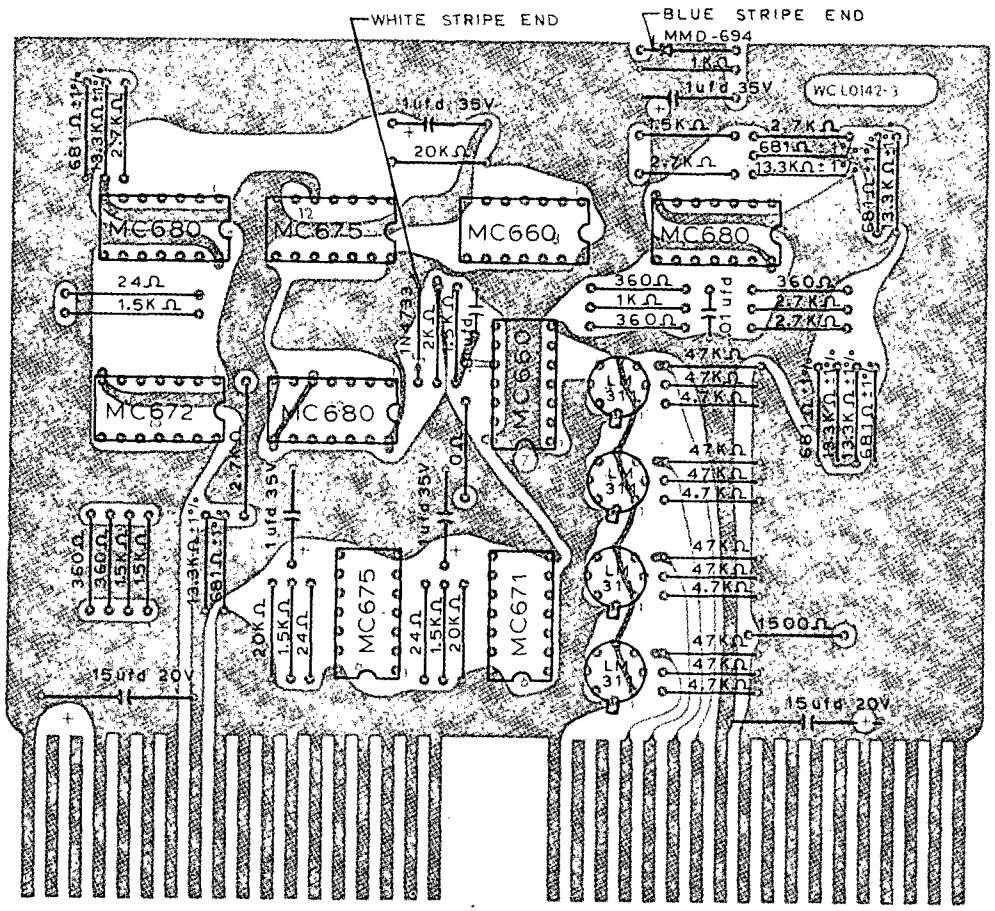
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: HOLE SIZE AND LOCATION
P.C. CARD #4

APPROVED BY	FOR	DATE
T.J.C.	PROD	1/21/74

ENG. TJC
DRAWN BY PLL
CHECKED T.J.C.
DRAWING NO. 426-15
DATE 1-4-74



NOTES:

(a) RESISTORS ±5% CARBON COMP. UNLESS NOTED OTHERWISE.

(b) ±1% RESISTORS ARE METAL FILM, 100 PPM T.C.

(c) 1ufd AND 15ufd CAPACITORS ARE TANTALUM.

(d) 0.01ufd CAPACITORS ARE CERAMIC.

(e) 4 EA. LM311 (NATIONAL)

(f) MC6XX (9) ARE MOTOROLA HTL SERIES LOGIC.

(g) NO COMPONENT SHALL EXTEND MORE THAN 0.375" ABOVE THE P.C. BOARD.

(h) COMPONENT ORIENTATION IS INDICATED BY NOTCHES ON DUAL INLINE PACKAGES AND THE TABS ON LM311's. IDENTIFICATION NUMBERS MAY BE ANY ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION
1	3-29-74	E.C.O. 0308 TJC. 4/1/74

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

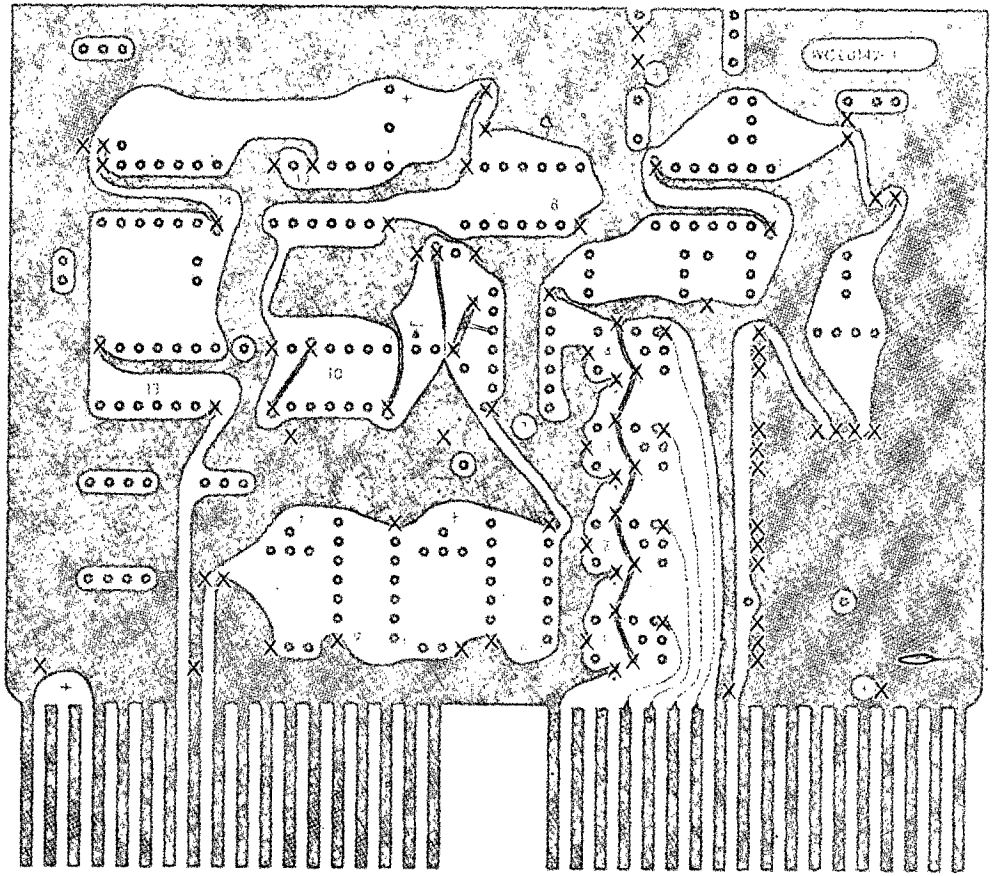
MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
P.C. CARD NO. 4

APPROVED BY	FOR	DATE
TJC	PROD.	4/1/74

ENG. TJC
DRAWN BY PLL
CHECKED
DRAWING NO. 426-16
DATE 12-21-72

HOLES MARKED WITH AN "X" MUST BE SOLDERED ON THE COMPONENT (THIS) SIDE. ALL PADS MUST BE SOLDERED ON THE SIGNAL SIDE.



CHANGE NO.	DATE	DESCRIPTION

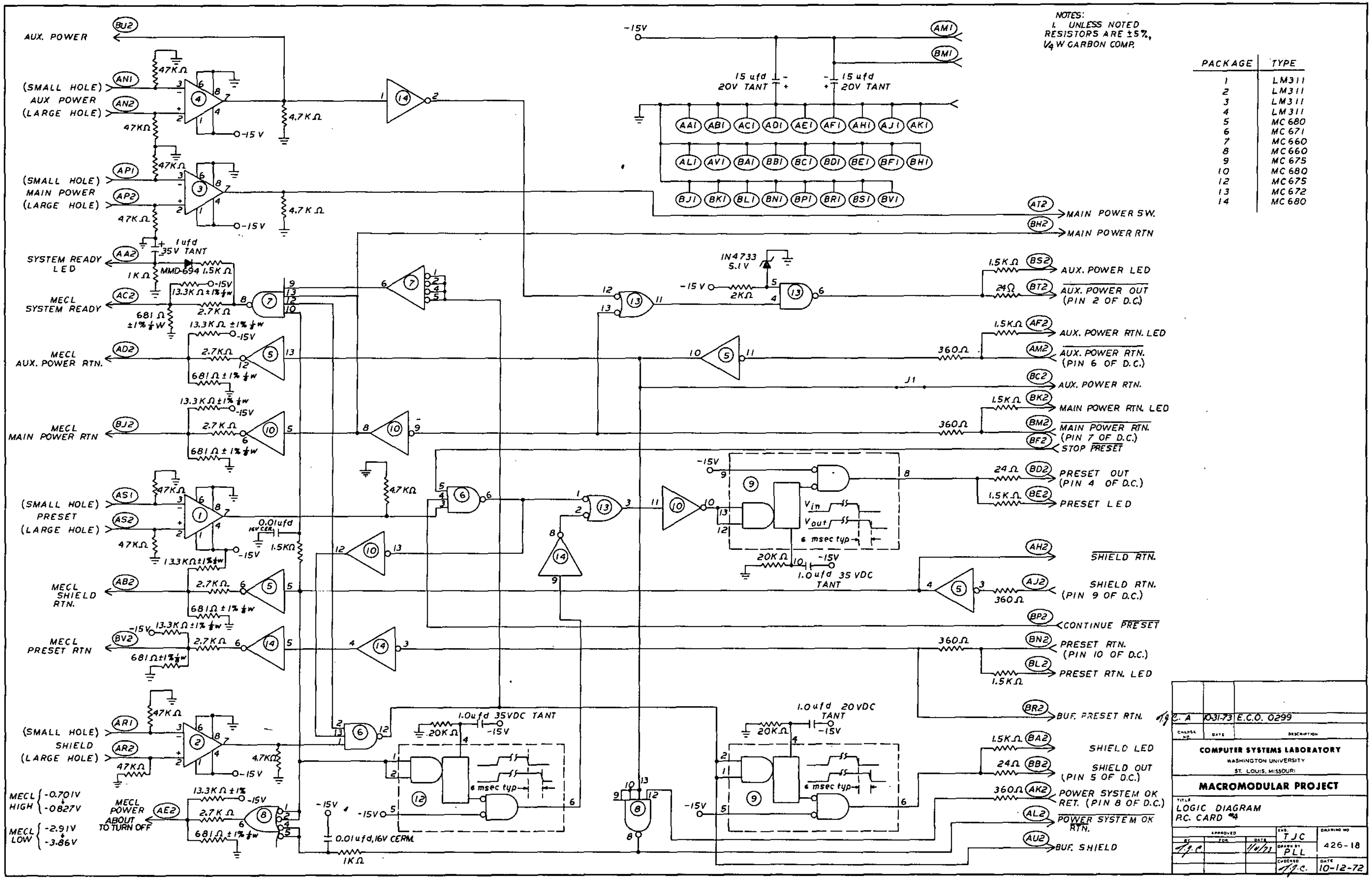
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

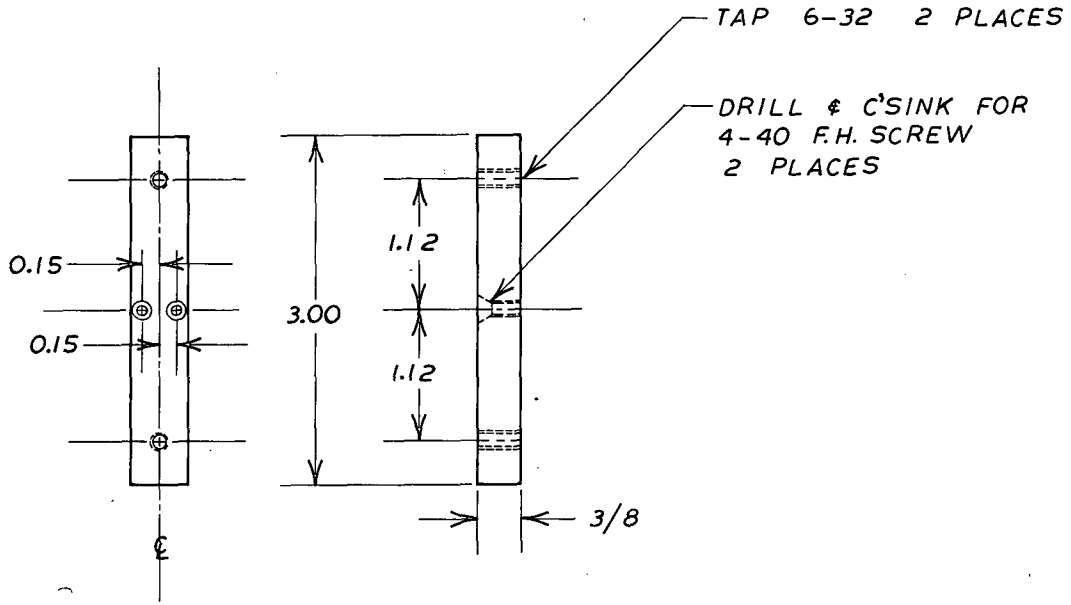
TITLE: COMPONENT SIDE SOLDERING DIAGRAM
P.C. CARD NO. 4

APPROVED BY	FOR	DATE
T.J.C.	PROD	1/4/73

ENG. TJC
DRAWN BY PLL
CHECKED RB
DRAWING NO. 426-17
DATE 12-21-72



NOTES:
1. UNLESS NOTED RESISTORS ARE ±5%, 1/4 W CARBON COMP.
PACKAGE | TYPE
1 LM311
2 LM311
3 LM311
4 LM311
5 MC680
6 MC671
7 MC660
8 MC660
9 MC675
10 MC680
12 MC675
13 MC672
14 MC680
AUX. POWER
(SMALL HOLE)
AUX POWER
(LARGE HOLE)
(SMALL HOLE)
MAIN POWER
(LARGE HOLE)
SYSTEM READY LED
MECL SYSTEM READY
MECL AUX. POWER RTN.
MECL MAIN POWER RTN
(SMALL HOLE)
PRESET
(LARGE HOLE)
MECL SHIELD RTN.
MECL PRESET RTN
(SMALL HOLE)
SHIELD
(LARGE HOLE)
MECL HIGH -0.701V -0.827V
MECL LOW -2.91V -3.86V
MECL POWER ABOUT TO TURN OFF
-15V
15 ufd 20V TANT
1N4733 5.1V
MMD-694
1 ufd 35V TANT
0.01ufd
1.0ufd 35VDC TANT
1.0ufd 20VDC TANT
1.0ufd 35 VDC TANT
0.01ufd,16V CERM.
6 msec typ
Vin
Vout
MAIN POWER SW.
MAIN POWER RTN
AUX. POWER LED
AUX. POWER OUT (PIN 2 OF D.C.)
AUX. POWER RTN. LED
AUX. POWER RTN. (PIN 6 OF D.C.)
AUX. POWER RTN.
MAIN POWER RTN. LED
MAIN POWER RTN. (PIN 7 OF D.C.)
STOP PRESET
PRESET OUT (PIN 4 OF D.C.)
PRESET LED
SHIELD RTN.
SHIELD RTN. (PIN 9 OF D.C.)
CONTINUE PRESET
PRESET RTN. (PIN 10 OF D.C.)
PRESET RTN. LED
BUF. PRESET RTN.
SHIELD LED
SHIELD OUT (PIN 5 OF D.C.)
POWER SYSTEM OK RET. (PIN 8 OF D.C.)
POWER SYSTEM OK RTN.
BUF. SHIELD
A 10-31-73 E.C.O. 0299
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI
MACROMODULAR PROJECT
LOGIC DIAGRAM P.C. CARD #4
TJC
PLL
426-18
10-12-72



MAT'L: 1/2 x 3/8 2024-T6 ALUM

TOLERANCE: ±.005 U.O.N.

FINISH: ALODINE

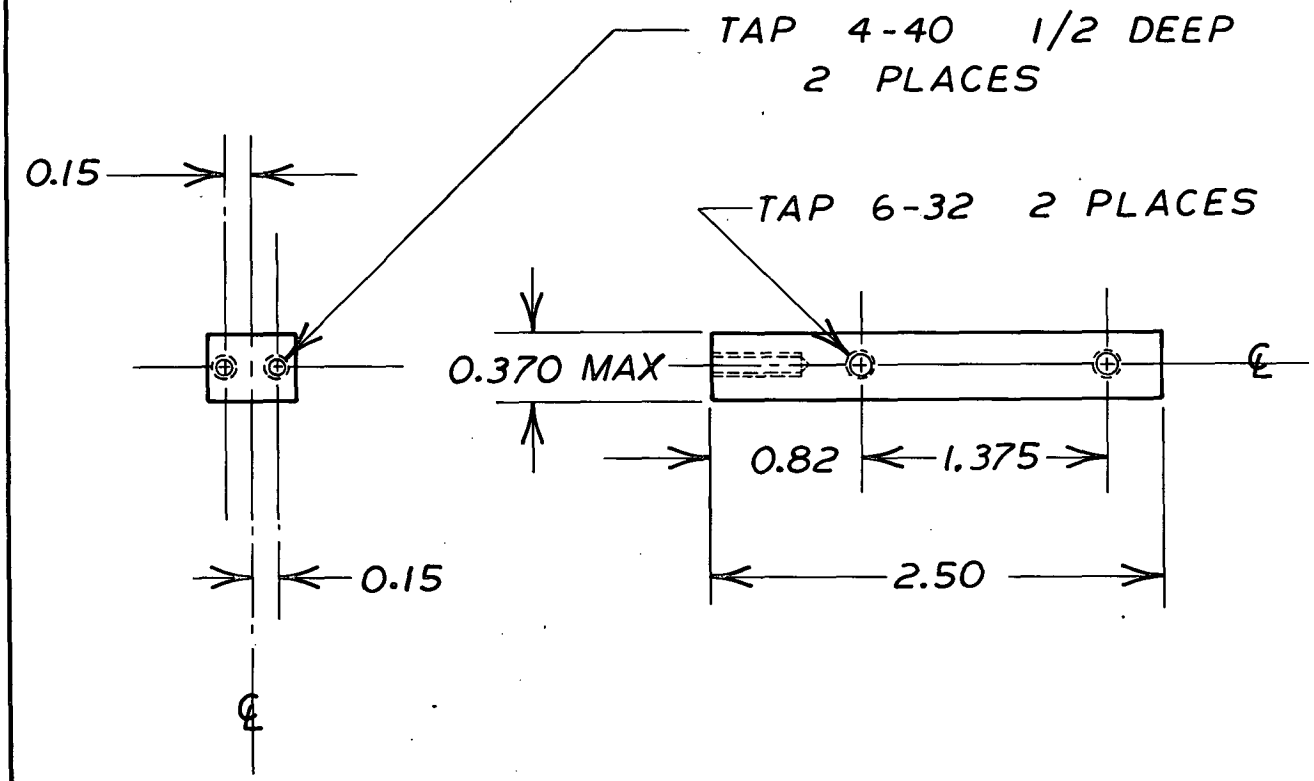
CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
CONNECTOR HOLDER BAR

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
T.J.C.	PROD	1/21/74	TJC	426-19
			DRAWN BY PLL	
			CHECKED PLL	DATE 12-11-73



MAT'L: 1/2 x 3/8 2024-T6 ALUM

TOLERANCE: ±.005 U.O.N.

FINISH: ALODINE

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

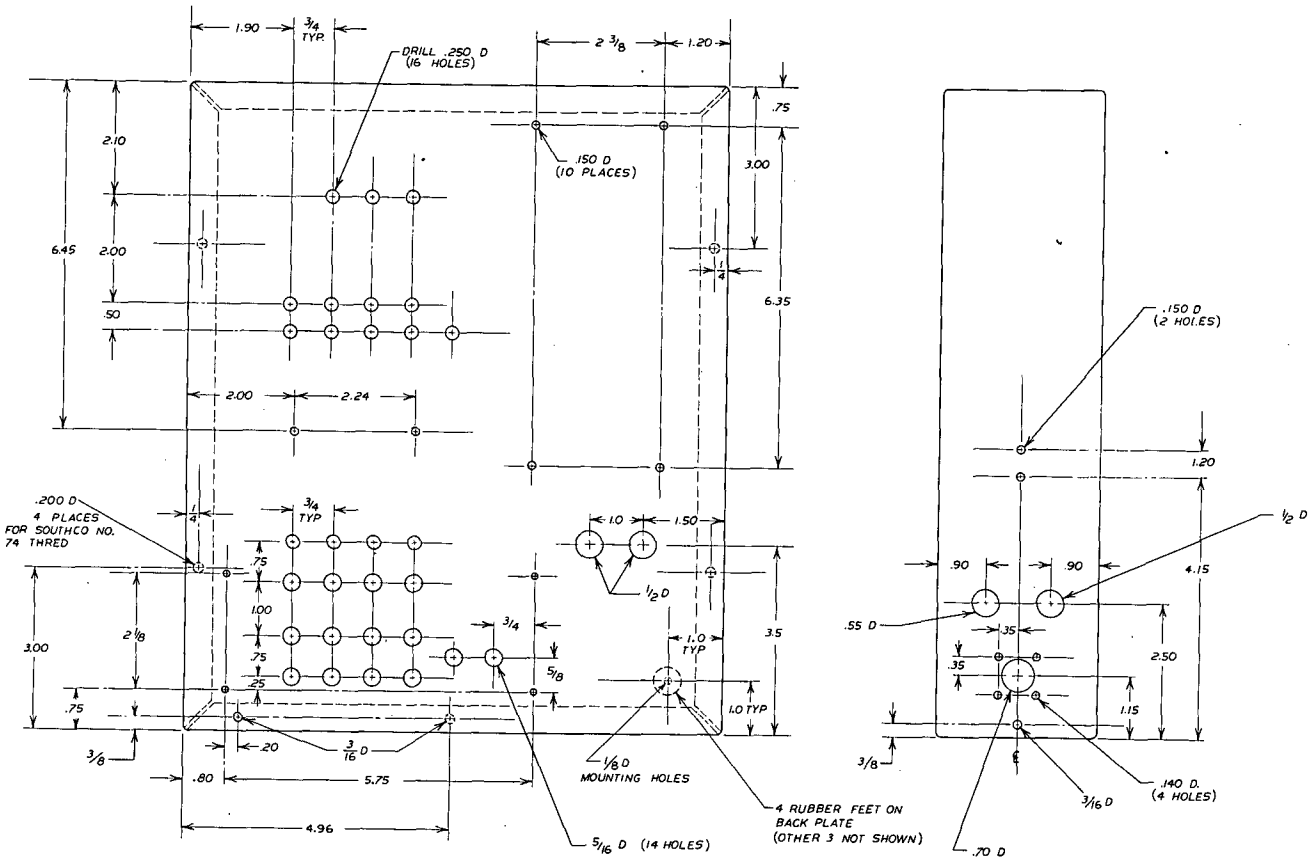
TITLE: CONNECTOR HOLDER LEG

CHANGE NO.	DATE	DESCRIPTION

APPROVED BY	FOR	DATE
T.J.C.	PROD	1/21/74

ENG TJC
DRAWN BY PLL
CHECKED PLL

DRAWING NO. 426-20
DATE 12-10-73



MAT'L: BUD CHASSIS NO. AC-413
WITH BOTTOM PLATE NO. BPA 1523

TOLERANCES: ±.005 U.O.N.

FINISH: RED OXIDE PRIMER
BEIGE OVERCOAT

CHANGE NO	DATE	DESCRIPTION

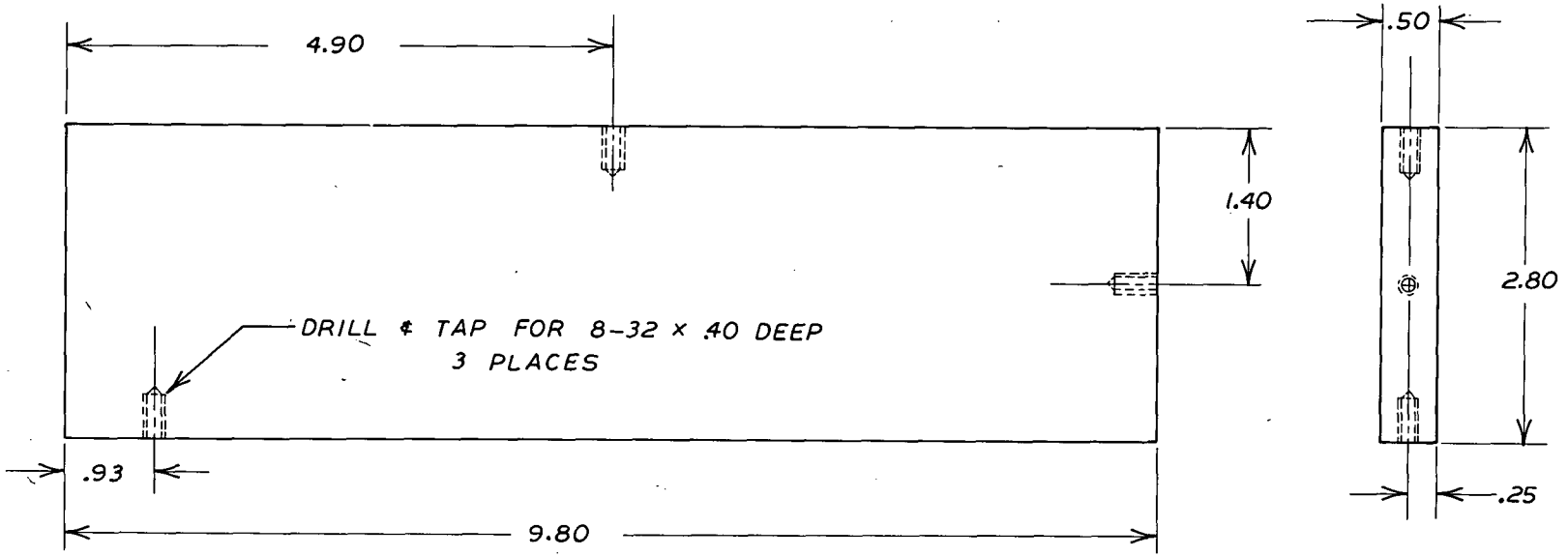
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: CHASSIS HOLE PATTERN

APPROVED BY	FOR	DATE
T.J.C.	PROD	11/1/71

ENG: TJC
DRAWN BY: PLL
TRACED BY: PAL
DRAWING NO.: 426-21
DATE: 12-10-73



MAT'L: COLD ROLL STEEL

TOLERANCES: ± .010 U.O.N.

FINISH: RED OXIDE PRIMER
BEIGE OVERCOAT

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
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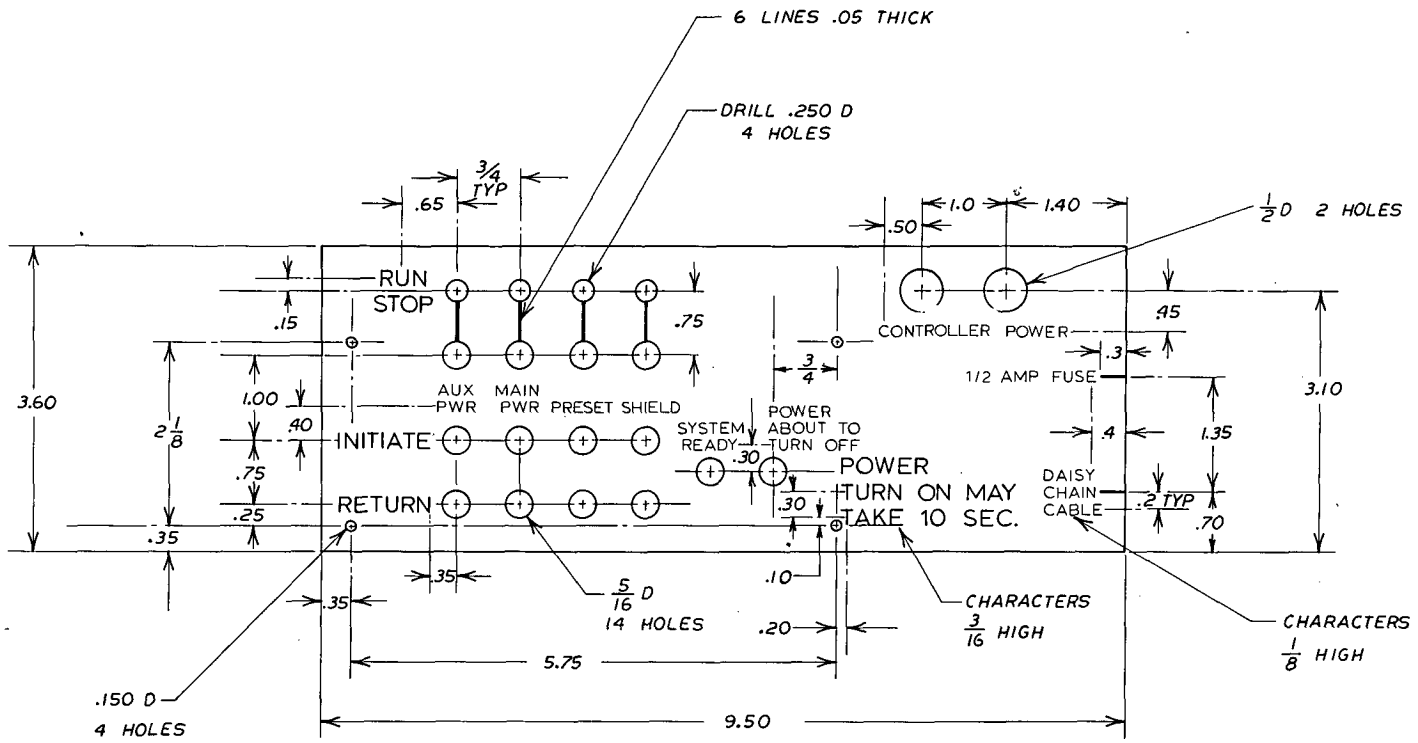
MACROMODULAR PROJECT

TITLE: WEIGHT

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
T.J.C.	PROD	1/21/74	TJC	426-22
			DRAWN BY PLL	
			CHECKED PKR	DATE 12-10-73



MAT'L: 1/32 GRAVOPLY ENGRAVING STOCK

TOLERANCE: ±.005 U.O.N.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

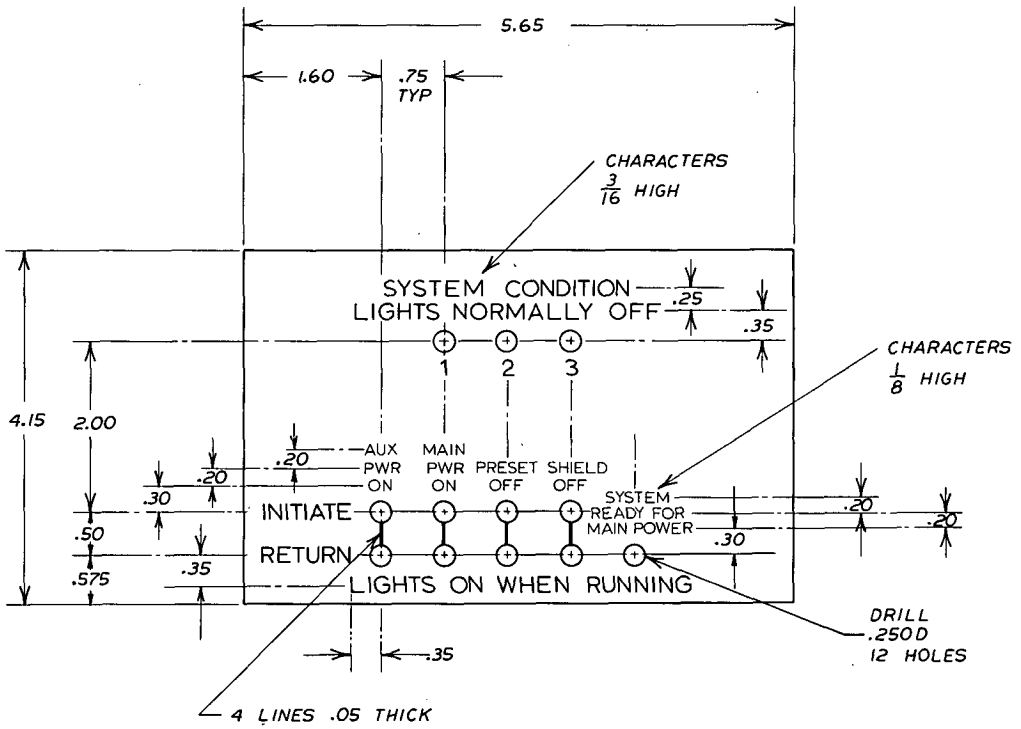
MACROMODULAR PROJECT

TITLE: OVERLAY NO. 1

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
T.J.C.	PROD	1/21/74	TJC	426-23
			DRAWN BY PLL	
			CHECKED PXK	DATE 12-10-73

MAT'L: $\frac{1}{32}$ GRAVOPLY ENGRAVING STOCK

TOLERANCE: ±.005 U.O.N.



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: OVERLAY NO. 2

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
T.J.C.	PROD	1/31/74	TJC	426-24
			DRAWN BY PLL	
			CHECKED PKR	DATE 12-10-73

SYSTEM CONDITION LIGHTS NOTE

SYSTEM CONDITION LIGHTS

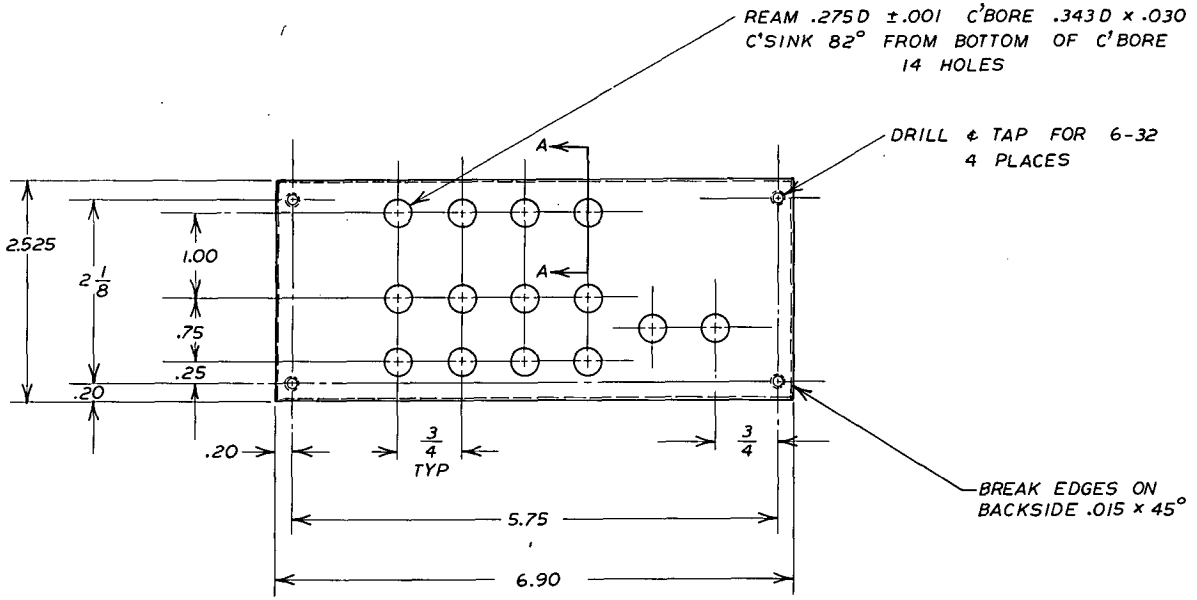
1. Turned on main power when system was not properly structured.
2. Cooling failure - if used "POWER ABOUT TO TURN OFF" control signal, data okay.
3. Pedestal power system failure while running may have lost some data.

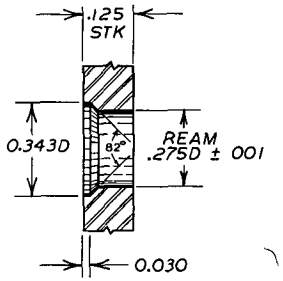
"POWER ABOUT TO TURN OFF" CONTROL

This control port will change state approximately 2 seconds before the system power will be turned off for those kinds of failures which do not cause instant damage.

Note is typed on Paste Up Paper, an opaque white finish Vellum paper with a pressure sensitive adhesive backing. After typing cut to 2.8" x 5" size. Remove adhesive backing and apply to front of chassis as shown on dwg. #426-30.

CHG.	E.C.O.	DATE	APPR
155		1/21/74	TPC





SECTION AA

MAT'L: .125 ALUM 2024-T6

TOLERANCES: ±.005 U.O.N.

FINISH: ALODINE

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
CONTROL SIGNAL CONNECTOR PLATE

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
T.J.C.	PROD	1/21/74	TJC	426-26
			DRAWN BY PLL	
			CHECKED PLL	DATE 12-10-73

CONTROLLER ASSEMBLY GENERAL INSTRUCTIONS

The DEC Connector wiring is done, in part, by mechanical wrapping. An acceptable wrap has five full wraps of bare wire; and insulation wrapped over 2 post corners. Open spiral and over wraps are not acceptable. Care must also be exercised to assure the wire is not stretched so tight between pins that the insulation is pierced.

The assembly outline (426-29) should be used as an aid during assembly.

The A.C. Power Cord leads should be tinned before they are connected and soldered in place.

The spade ground lug (AMP 34161) should be crimped to the AWG 16 Green wire using a AMP 47387 16-14 PlDG crimp tool.

CHG.	E.C.O.	DATE	APPR.
155		1/21/74	T.J.C.

CONTROLLER ASSEMBLY PARTS LIST

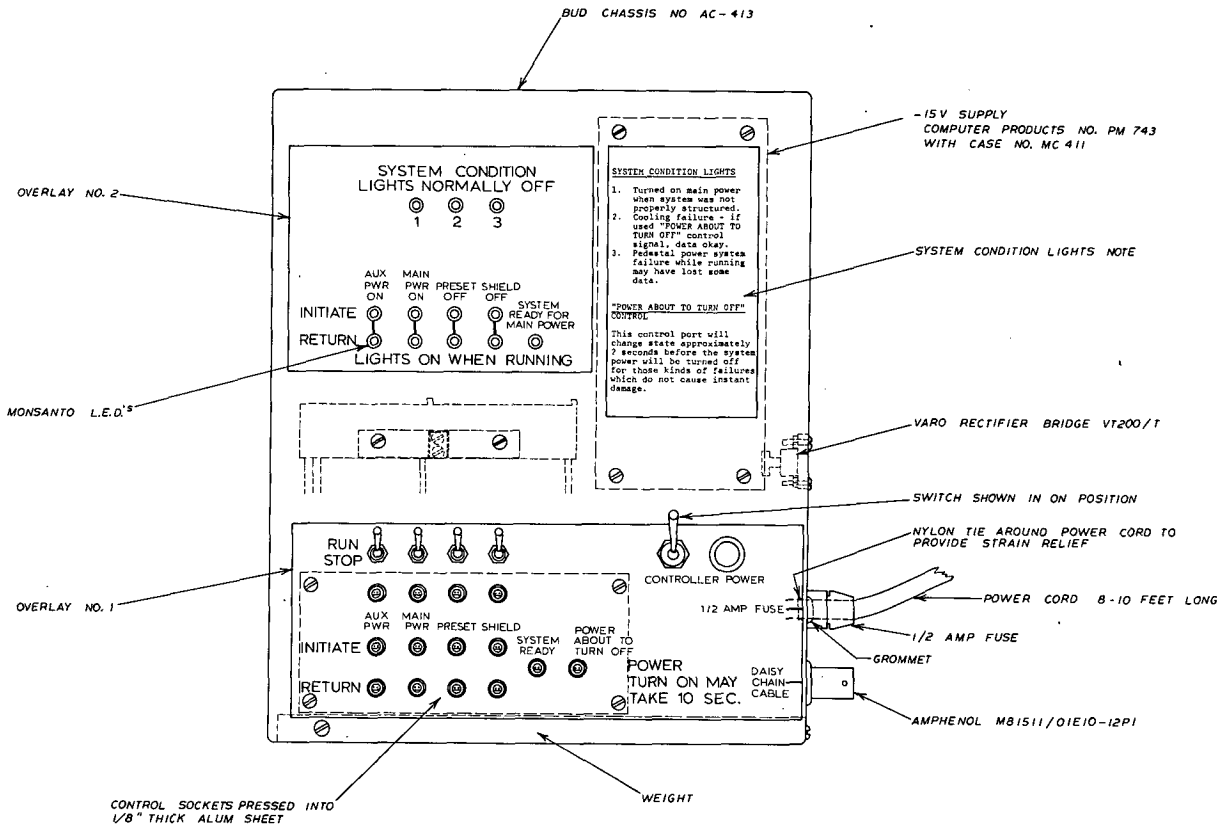
QTY	PART
1	12 ft. Power Cord, Belden 17412S
1	Bud Chassis #AC-413 (as modified per 426-21)
1	Bud Bottom Plate #BPA-1523 (as modified per 426-21)
1	1/2 A Fuse, Buss AGS type or Equiv.
1	Toggle Sw., H.H. Smith 1730 or Equiv.
4	Toggle Sw., C & K #7101
1	Neon Pilot Light, Industrial Devices #1050A1
4	Rubber Feet, G.C. Electronics #1075-CC
12	LEDs, Monsanto MV5023
1	-15V Power Supply, Computer Products #PM743
1	-15V Supply Case, Computer Products #MC411
1	Power Supply Card Edge Connector, AMP 582773-1
1	Daisy Chain Connector, Amphenol M81511/01E10-12P1
14	Coax Con Connector, AMP No. 329055 & 329056 (Includes Ferrule)
1	Rectifier Bridge, VARO VT200/T
1	Dec Connector, H803
1	Space Lug AMP (34161)
1	Assembled WCL 0142-3 P.C. Board (P.C. Card No. 4)
1	Assembled WCL 0174-2 P.C. Board (P.C. Card No. 3)
1	Assembled WCL 0141-1 P.C. Board (P.C. Card No. 2)
1	Grommet, Rubber 3/8", I.D. G.C. Electronics 1043-C or Equiv.
4	4-40 x 1/2 screws, Fillister head
4	4-40 x Lockwashers
2	4-40 x 3/4 screws, flat head
18	6-32 x 1/2 screws, fillister head
2	6-32 x 1 screws, fillister head
6	6-32 nuts
3	8-32 x 1/2 screws, fillister head
4	Southco #74 Thred, Free Running, Part No. 74-11-106-24
1	Fuse Holder, Bus #HRP Panel Mount
4	4-40 nuts

CHG.	E.C.O.	DATE	APPR
155		1/21/74	J.J.C.

PARTS LIST

QTY.	CSL DOC.	PART
1	426-19	Connector Holder Bar
1	426-20	Connector Holder Leg
1	426-22	Weight
1	426-23	Overlay No. 1
1	426-24	Overlay No. 2
1	426-25	System Condition Light Note
1	426-26	Control Signal Connector Plate
As Reqd.		24 Awg, Kovar Solid Red
As Reqd.		24 Awg, Kovar Solid White
As Reqd.		24 Awg, Kovar Solid Blue
As Reqd.		24 Awg, Kovar Solid Yellow
As Reqd.		24 Awg, Kovar Solid Black
As Reqd.		24 Awg, Kovar Solid Green
As Reqd.		24 Awg, Kovar Solid Brown
As Reqd.		24 Awg, Kovar Solid Slate
As Reqd.		16 (26 x 30) Awg, Green Stranded PVC
As Reqd.		Shrink Tubing, 5/16 I.D.
As Reqd.		Wire Ties, Nylon
As Reqd.		Bus Strip, D.E.C. 933
As Reqd.		24 Awg, Tinned Bus Wire

CHG	E.C.O.	DATE	APPR
155		1/21/74	T.J.C.



CHANGE NO	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PEDESTAL CONTROLLER OUTLINE

APPROVED BY	APPROVED FOR	DATE	ENG. TJC	DRAWING NO.
TJC	PROD	12/12/73	DRAWN BY PLL	426-30
			CHECKED PLL	DATE 12-11-73

Wire a DEC Connector #H803
Using a Gardener Denver Bit No. 505415 and Sleave No. 502129.
Refer to page 426-38 for connector pin locations.

POWER GND:

Using Bus Strip: Go from (first pin listed) to (second pin listed):

4AA1 - 1AA1
4AV1 - 1AV1
4BR1 - 1BR1
4BS1 - 1BS1

_____ solder above at square holes, do not solder at round holes

3AA1 - 3AU1
3BA1 - 3BU1

_____ solder above at square holes, do not solder at round holes

Using bare 24 guage bus wire; Jumper:

3AU1 - 3AV1
3BU1 - 3BS1
3AU1 - 3BA1

-15V Distribution:

Jumper: (use red 24 guage insulated wire)

2AM1 - 3AM1
3AM1 - 4AM1
4AM1 - 4BM1
4BM1 - 3BM1
3BM1 - 2BM1

Connector inter pin wiring, use white 24 guage wire

4AD2 - 2AN2
4BJ2 - 2BJ2
4AB2 - 2AS2
4BV2 - 2BE2
4AE2 - 2BA2
4AC2 - 2BD2
4BR2 - 3AR2
4AL2 - 3BB2
4BU2 - 3AP2
4BC2 - 3AN2
4AT2 - 3AM2
4BF2 - 3AS2
4BP2 - 3AF2
4AU2 - 3BH2
4AH2 - 3AE2
4BH2 - 3BJ2

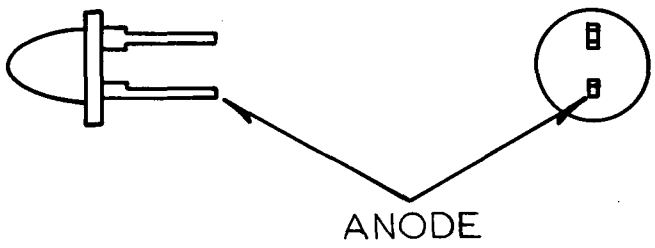
Mount a DEC connector and a mounting bar assembly (426-19 and 426-20) in a modified chasis (426-21) using the top screw hole on mounting bar and bottom screw hole on DEC connector. Also mount the weight (426-22).
Daisy Chain connections: (See contact crimping note next page.)

Amphenol M81511/01E10-12P1 Pin No.	DEC connector pin No.	Wire Used
1	4BK1	Blue Wire (24 guage wire
2	4BT2	
3	3BD2	
4	4BD2	
5	4BB2	
6	4AM2	Yellow Wire (24 guage)
7	4BM2	
8	4AK2	
9	4AJ2	
10	4BN2	
11	----	(Not used, but fill hole in Ampheonol connector with a contact.)
12	4AV1	Blue Wire (24 guage wire)

Note: Crimp Daisy Chain Connector contacts using an amphenol No. 294-268 crimp tool with a contact locator (amphenol No. 294-1551) and a settling of 4. The wires must be stripped back 0.19 to 0.22 inches using a 0.025 NO-NIK stripping tool.

LED Connections:

Bond an overlay No. 2 (426-24) to the outside of the modified chassis and install the 12 Light Emitting Diodes. Jumper all the Anodes of the LEDs together and connect to 1AA1 of the DEC connector with a blue 24 guage wire. The LED pins may be wire wrapped.



Connect the cathodes of the LEDs to the DEC connector as follows, using black 24 guage wire.

1----------3BF2
2----------3AC2
3----------3AB2
AUX PWR ON INIT.----------4BS2
AUX PWR ON RTN.----------4AF2
MAIN PWR ON INIT.----------3BE2
MAIN PWR ON RTN.----------4BK2
PRESET OFF INIT----------4BE2
PRESET OFF RTN ----------4BL2
SHIELD OFF INIT.----------4BA2
SHIELD OFF RTN.----------3AD2
SYSTEM READY FOR MAIN POWER --------3BC2

Connect Macromodular Control Signal Connectors as Follows:

Crimp 3 wires in each of 10 connectors (AMP Coaxicon No. 329055 and Ferrule No. 329056) using an Amp Crimp die 69231-2 in hand tool 45707-2 and 14" lengths of 24 Guage wire of the following colors: (wire strip length is 0.250 $\pm$0.031 inches)

Big Hole - Brown
Small Hole - Slate
Connector Body (Gnd.) - Blue

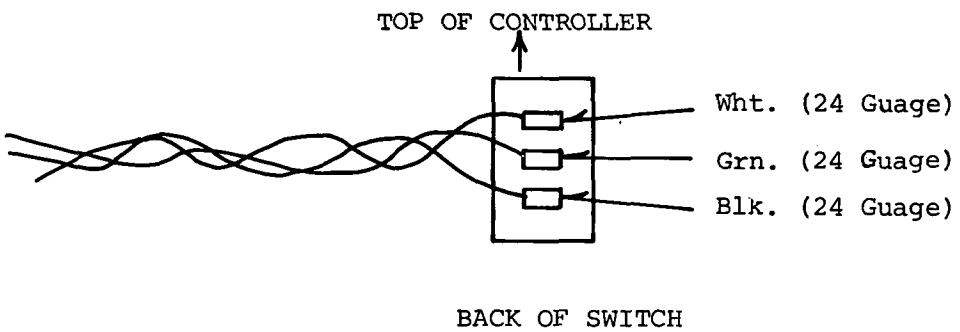
Press the connectors into the plate (426-26) observing the orientation shown on page 426-30. Bond overlay No. 1 (426-23) to the chassis and mount the connector plate. Run the wires from the AMP connectors to the DEC connector as twisted triplets and connect as follows:

Connector Name on Overlay #1	Wire Color	DEC Connector Pin No.
AUX PWR	Brown	2AF1
	Slate	2AF2
	Blue	2AA1
MAIN PWR	Brown	2AC1
	Slate	2AC2
	Blue	2AA1
PRESET	Brown	2AL1
	Slate	2AL2
	Blue	2AV1
SHIELD	Brown	2AH1
	Slate	2AH2
	Blue	1AV1
AUX PWR INITIATE	Brown	4AN2
	Slate	4AN1
	Blue	3AK1
AUX PWR RETURN	Brown	2AP1
	Slate	2AP2
	Blue	3AP1

Connector Name on Overlay #1	Wire Color	DEC Connector Pin No.
MAIN PWR INITIATE	Brown	4AP2
	Slate	4AP1
	Blue	3AP1
MAIN PWR. RTN.	Brown	2BH1
	Slate	2BH2
	Blue	2BK1
PRESET INITIATE	Brown	4AS2
	Slate	4AS1
	Blue	3AV1
PRESET RTN.	Brown	2BF1
	Slate	2BF2
	Blue	3BE1
SHIELD INITIATE	Brown	4AR2
	Slate	4AR1
	Blue	4AV1
SHIELD RTN.	Brown	2AR1
	Slate	2AR2
	Blue	2AV1
SYSTEM READY	Brown	2BC1
	Slate	2BC2
	Blue	3BE1
POWER ABOUT TO TURN OFF	Brown	2BB1
	Slate	2BB2
	Blue	3BA1

Mount the Logic Control Switch as shown on page 426-30 and wire as follows:

Each Switch should be connected to the DEC connector using a twisted triplet:



Wire each of 4 switches as shown

3 wires from AUX PWR SW (Name on overlay)
WHT.-2AE2
GRN.-2AA2
BLK.-2AE1

3 wires from MAIN PWR. SW (Name on overlay)
WHT.-2AD2
GRN.-2AA2
BLK.-2AD1

3 wires from PRESET SW (Name on overlay)
WHT.-2AK2
GRN.-2AB2
BLK.-2AK1

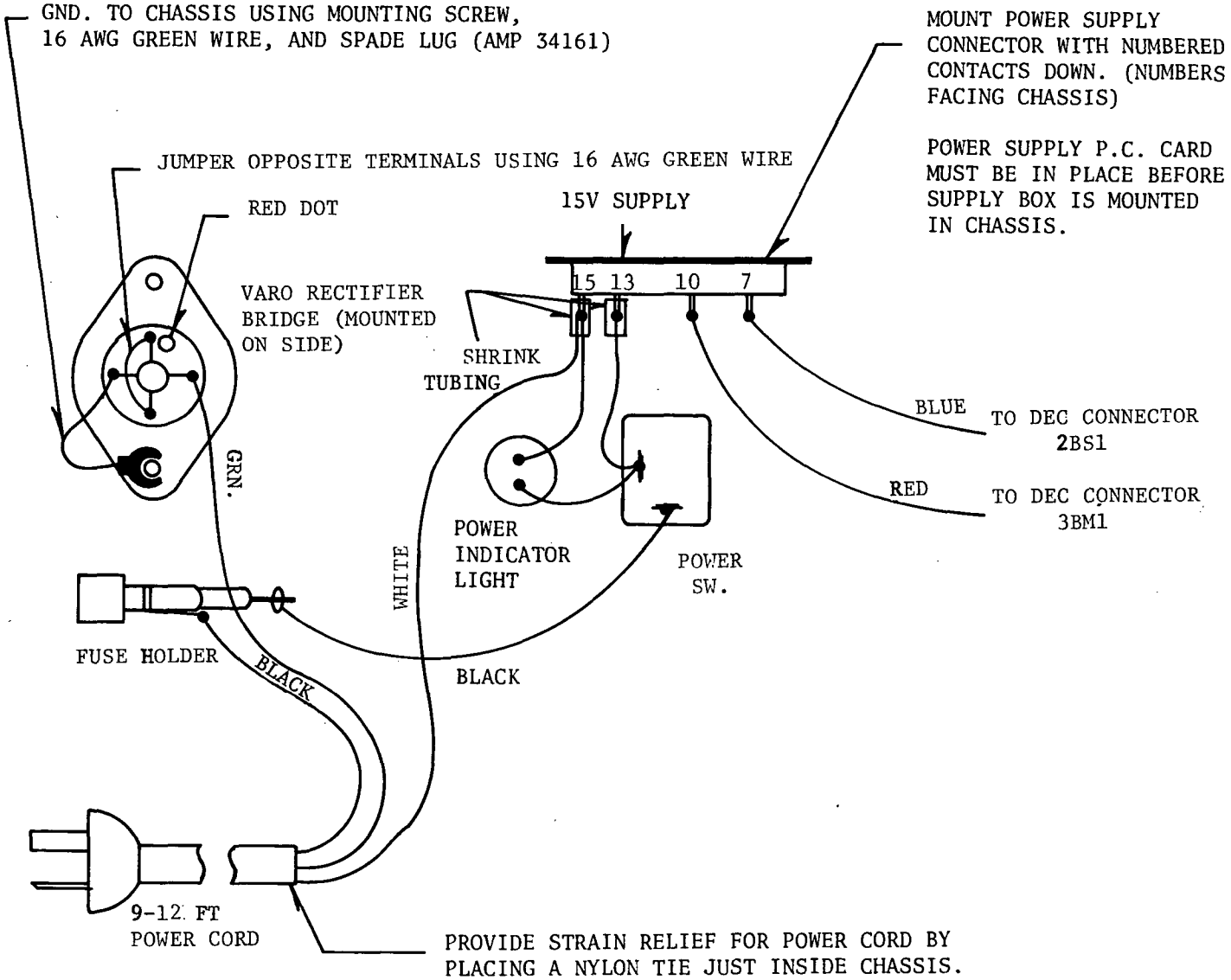
3 wires from SHIELD SW (Name on overlay)
WHT.-2AJ2
GRN.-2AB2
BLK.-2AJ1

Power Wiring:

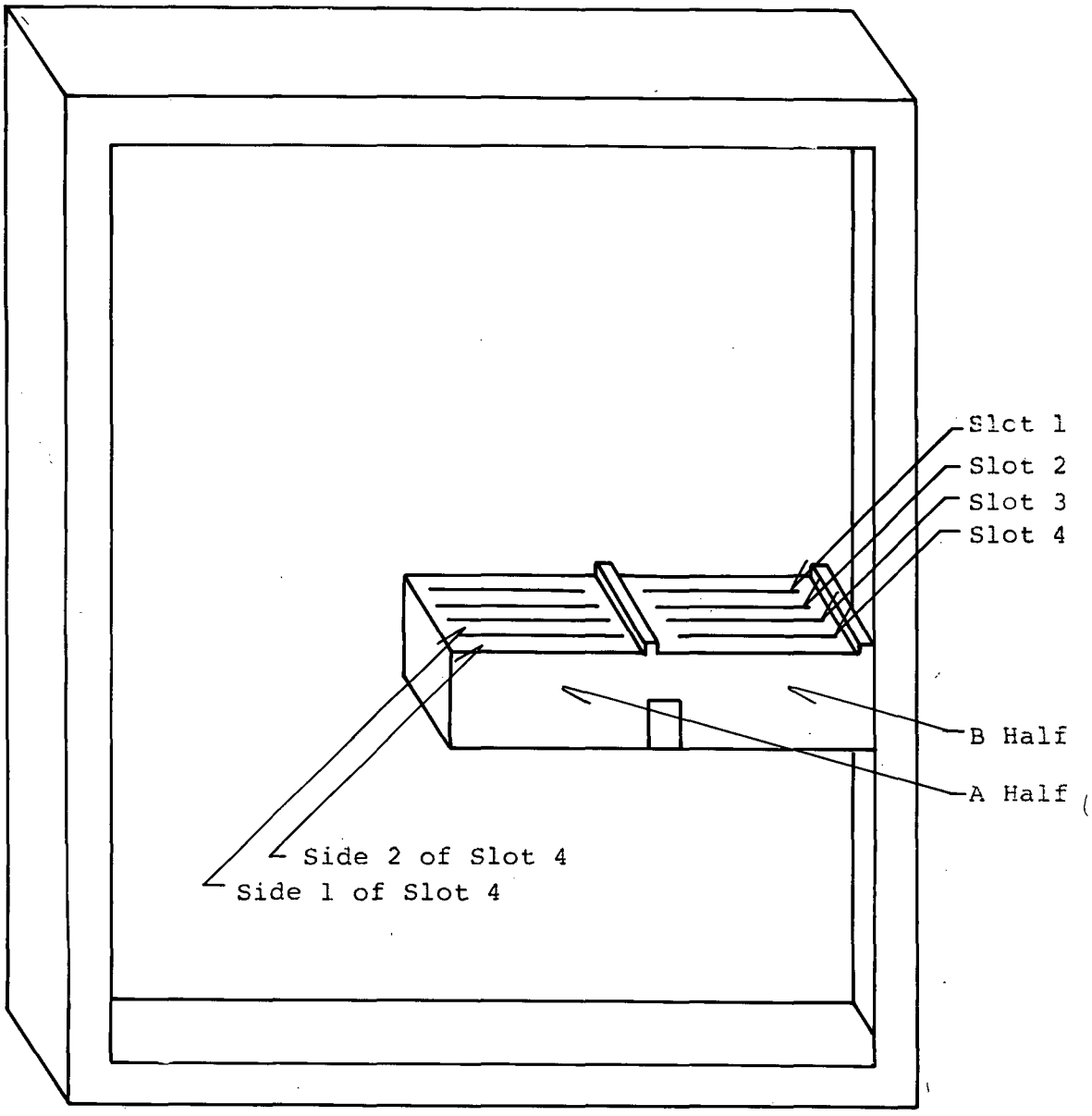
Connect the AC power cord and the DC power supply as shown on pages 426-30 and 426-37.

Finish:

Mount the 3 P.C. cards per 426-38, mount back cover with feet, install fuse, and bond light condition light note (423-25) to chassis.

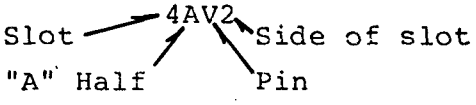


CHG	E.C.O.	DATE	APPR
155		1/21/79	AJC.



DEC Connector Pin No.

Example:



P.C. Boards Mount:

WCL0141 - Slot 2

WCL0174 - Slot 3

WCL0142 - Slot 4

COMPUTER SYSTEMS LABORATORY
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ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: DEC Connector Position

CHANGE NO.	DATE	DESCRIPTION

APPROVED BY	APPROVED FOR	APPROVED DATE
T.J.C	Prod	1/21/74

ENG: TJC
DRAWN BY:
CHECKED: T.J.C.

DRAWING NO.: 426-38
DATE: Nov. 9,73

FAN MODULE
MECHANICAL AND ELECTRICAL
MANUFACTURING SPECIFICATIONS

PAGE	TITLE	CHANGE
441-1&2	TITLE PAGES	M
441-3&4	MECHANICAL PARTS LIST	G, K
441-5&6	ELECTRICAL PARTS LIST	F, H, J, K
441-7 thru 441-14	MECHANICAL AND ELECTRICAL ASSEMBLY	C, H, J, K
441-15	ASSEMBLY AND REFERENCE DIMENSIONS	
441-16	CASE	G,
441-17	PARTITION	K
441-18	FRAME ANGLES	
441-19	PARTITION ANGLES	
441-20	OVERLAY	B, D,
441-21	SHAFT ASSEMBLY	
441-22	BEARING BRACKET	
441-23	MOTOR MOUNTS	
441-24	STRAP AND BRACKET ASSEMBLY	
441-25	WIRE PREPARATION	
441-26&27	WIRE PREPARATION TABLE	F, K
441-28	TOOLING CHART	A, H, J
441-29	COOLING ALARM BOARD PICTORIAL	F, J, K
441-30	COOLING DETECTOR CIRCUIT CONNECTION IDENTIFICATION	F, J, K
441-31	PAD IDENTIFICATION COOLING ALARM BOARD	F, J K
441-32	ALARM INDICATOR CIRCUIT	F, J, K
441-33	PAD IDENTIFICATION - HORIZONTAL DISTRIBUTOR BOARD	F, J, K
441-34	VERTICAL DISTRIBUTOR BOARD (PICTORIAL)	

TITLE PAGE CONTINUED NEXT PAGE

CHG.	E.C.O.	DATE	APPR	CHG	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	-	4-23-71	DCJ	E	0196	6-17-71	DCJ	J	0242	1-7-72	DCJ
A	0176	5-6-71	DCJ	F	097	7-1-71	DCJ	K	0250	1-27-72	RJA
B	0177	5-10-71	RJA	G	0218	7-28-71	RJA	L	0263	5-3-72	
C	0185	5-19-71	DNO	H	0227	10-11-71	DCJ	M	0271	10-6-72	DCJ
D	0195	6-8-71	RJA	I	0240	1-3-72					

FAN MODULE
(Cont)

PAGE	TITLE	CHANGE
441-35	BLANK OUTLINE, HORIZONTAL DISTRIBUTOR BOARD	
441-36	ARTWORK, HORIZONTAL DISTRIBUTOR BOARD	
441-37	BLANK OUTLINE, VERTICAL DISTRIBUTOR BOARD	
441-38	ARTWORK, VERTICAL DISTRIBUTOR BOARD	
441-39	MOTOR SUBASSEMBLY	
441-40	DUCT PLATES, SPACERS BOARDS AND WIRING HARNESS	
441-41	DUCT PLATE AND SPACER	
441-42	FINAL WIRING (PICTORIAL)	K
441-43	POWER AND SIGNAL WIRING	E, J, K, L
441-44&45	CONTINUITY CHART	K
441-46	MALE AMPMODU JIG	
441-47	URETHANE BAFFLES	
441-48	SIDE PANEL AND RAILS	
441-49	RETAINER CLIP	
441-50	OVERALL VIEW - COMPLETED ASSEMBLY	J
441-51	STAND OFF	K
441-52	VANE	K
441-53	VANE ASSEMBLY	K
441-54	THE ORANGE CONNECTOR	M

CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
E	0196	6-17-71	RCJ								
J	0242	1-7-72	RCJ								
K	0250	4-6-72	RJA								
L	0263	5-3-72	[illegible]								
M	0271	10-6-72	RCJ								

FAN MODULE
MECHANICAL PARTS LIST

ITEM	QTY.	C.S.L. DOC.	PART
1	1	441-16	CASE
2	1	441-17	PARTITION
3	2	441-18	SHORT FRAME ANGLE
4	2RH 2LH	441-18	LONG FRAME ANGLE
5	1	441-19	SHORT PARTITION ANGLE
6	1	441-19	LONG PARTITION ANGLE
7	1	441-20	OVERLAY
8	2	441-21	THRUST WASHER
9	2	441-21	PULLEY
10	1	441-21	SHAFT
11	1	441-21	BEARING ASSEMBLY
12	1	441-22	BEARING BRACKET
13	4	441-23	MOTOR MOUNTS
14	1	441-24	CAPACITOR STRAP
15	1	441-24	CAPACITOR MOUNTING BRACKET
16	2	441-41	SPACER
17	3	441-41	DUCT PLATE
18	9	441-47	URETHANE BAFFLES
19	1LH 1RH	441-48	SIDE PANEL AND RAIL ASSEMBLY
20	2	441-49	RETAINER CLIP
21	4	—	RUBBER GROMMET H.H. SMITH 2177

CHG	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	-	4-23-71	JOC/								
G	0218	7-28-71	RJA								

FAN MODULE
MECHANICAL PARTS LIST (Cont)

ITEM	QTY.	C.S.L. DOC.	PART
22	1	—	0-RING BRUENING NO. 01-248, 1/8 x 4-1/2 O.D.
23	1	—	BLOWER WHEEL ROTRON E-4
24	2	—	OIL IMPREGNATED BEARINGS, BOST BRONZE B58-4
25	6	—	10-32 ROUND HEAD MACH. SCREWS 1/4 LONG
26	10	—	8-32 BINDER HEAD MACH. SCREWS 1/4 LONG
27	2	—	8-32 SOCKET HEAD SET SCREW CUP POINT 5/16 LONG
28	54	—	6-32 FLAT HEAD MACH. SCREW 1/4 LONG
29	4		6-32 BINDER HEAD MACH. SCREW 3/8 LONG
30	4		6-32 BINDER HEAD MACH. SCREW 5/16 LONG
31	10		4-40 BINDER HEAD MACHINE SCREWS 1/4 LONG
32	8		4-40 FLAT HEAD MACH. SCREW 1/4 LONG
33	6		2-56 BINDER HEAD MACH. SCREW 1/4 LONG
34	6		NO. 10 LOCK WASHER
35	2		NO. 8 LOCK WASHER
36	2		NO. 6 LOCK WASHER
37	10	—	NO. 4 LOCK WASHER
38	2	—	6-32 HEX NUT
39	8	—	4-40 NEX NUT
40	2		2-56 BINDER HEAD MACH. SCREWS 3/8 LONG
41	1		RUBBER GROMMET H.H. SMITH 2185
42	1	441-52	VANE
43	1	441-53	VANE ASSEMBLY
44	2	441-51	STAND OFFS
45	2		NO. 2 LOCKWASHER
46	2		.086 DIA. x 1/8 LONG EYE LETS

CHG.	E.C.O.	DATE	APPR.
K	0250	1-27-72	RJA

FAN MODULE
ELECTRICAL PARTS LIST

ITEM	QTY.	SYMBOLS	PART
1	1	R1	22,000 OHM 1/4 WATT 5% CARBON COMP. RESISTORS
2	1	R2	22,000 OHM 1/4 WATT 5% CARBON COMP. RESISTOR
3	1	R3	68,000 OHM 1/4 WATT 5% CARBON COMP. RESISTOR
4	1	C1	22 ufd 20% 60 WVDC TANTALUM CAPACITOR
5	1	R5	10,000 OHM 1/4 WATT 5% CARBON COMP. RESISTOR
6	1	R6	820 OHM 1 WATT 5% CARBON COMP. RESISTOR
7	1	R7	16,500 OHM 1/8 WATT 1% 100 PPM METAL FILM RESISTOR
8	1	Q1	MOTOROLA MPS-H05 TRANSISTOR
9	1	Q3	MOTOROLA MPS-A55 TRANSISTOR
10	1	D1	MMD-694 DIODE
11	4	—	PTJ-0121-0 HORIZONTAL DISTRIBUTOR BOARD
12	1	—	PTJ-0122-0 VERTICAL DISTRIBUTOR BOARD
13	1	—	AIRPAX APG-1-4-5-0-021 CIRCUIT BREAKER
14	1	OR EQUIV.	GENERAL ELECTRIC 45F270 2MFD. 370 VAC CAPACITOR
15	1	—	ROTRON 268-AS MOTOR WITH 5/8 INCH SHAFT EXTENSION
16	1	OR EQUIV.	DRAKE 1-29 6075-001-634 1/3 W. 250V PILOT LIGHT
17	64	—	AMPMODU MALE AMP-85931-5
18	64	—	AMPMODU FEMALE AMP-85863-4
19	4	—	AMP 1-202845-5 750 SERIES BOX CONTACT CONNECTOR
20	1	UPPER SERVICE COLUMN	AMP 200474-1 TYPE W CONNECTOR
21	1	LOWER SERVICE COLUMN	AMP 200486-1 TYPE W CONNECTOR

CHG	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	–	4-26-71	[illegible]								
F	0197	7-1-71	[illegible]								
H	0227	10-11-71	[illegible]								
J	0242	1-7-72	[illegible]								
K	0250	4-7-72	[illegible]								

FAN MODULE
ELECTRICAL PARTS LIST
(Cont)

ITEM	QTY.	SYMBOLS	PART
22	29		AMP 201645-1 No. 14 Male Type II Contact
23	29		AMP 201568-1 No. 14 Female Type II Contact
24	11		AMP 200679-1 No. 22 Male Type II Contact
25	11		AMP 201328-1 No. 22 Female Type II Contact
26	2		AMP 34323 Butt Splice No. 4
27	1		AMP 34322 Butt Splice No. 6
28	2		AMP 320570 Window Splice PIDG
29	3		AMP 34161 Ring Tongue Lug Plasti-Grip
30	8		AMP 42599-2 Receptacle Faston
31	2	3 inch	AMP 603101 Heavy Wall Shrink Tubing
32		or Equiv.	BELDEN 8524 No. 22 AWG Stranded Wire with PVC Jacket in
			black,brown,red,orange,yellow,green,blue,violet,slate,
			white and white/red.
33		or Equiv.	BELDEN 8522 No. 18 AWG Stranded Wire with PVC Jacket in
			red, blue and green.
34		or Equiv.	BELDEN 8521 No. 16 AWG Stranded wire with PVC Jacket in
			red, blue and green.
35		or Equiv.	BELDEN 8520 No. 14 AWG Stranded Wire with PVC Jacket in
			orange, yellow, green, violet and white.
36	8		E.B. Stimpson No. A 1425 Eyelets
37			Nylon Lacing Tape
38	3		Electrovert AP5 Cable Clamp
39	1		Electrovert AP7 Cable Clamp
40	1		Microswitch 311SM703-T

MACROMODULAR SYSTEMS PROJECT

CHG.	E.C.O.	DATE	APPR.
I	0240	1-3-72	TTR
K	0250	4-7-72	DCJ

FAN MODULE

MECHANICAL AND ELECTRICAL ASSEMBLY

Introduction

The FAN MODULE contains a motor and fan impeller which serves to move air through the four channels of a Macromodular Frame Block. In addition, this module contains the SERVICE COLUMN which is a large wire harness serving to convey power and control signals to the channels and to the other frame blocks. This SERVICE COLUMN originates in the PEDESTAL and carries two 120 VAC busses, the main 55 VDC power bus, and a variety of system sequence and alarm signals. Page 441-42 is a picture of a wired Fan Module, prior to the addition of the Side Panel and Rail assemblies.

This document consists of three major sections; I. Initial mechanical Assembly, II. Electrical Assembly, and III. Final Assembly and Testing.

I. Initial Mechanical Assembly

Items 1 through 20 and 42 through 44 of the Mechanical Parts List (441-3 & 4) are custom machined metal and plastic parts. The remaining items are available through the catalogs of established suppliers.

Items 1 through 20 and 42 through 44 are completely described by the drawings referenced on the parts list. All tolerances and specifications contained herein must be adhered to in order to produce acceptable assemblies. The manufacturer must assure himself that these requirements can be met by analyzing component and assembly documentation, his tooling, and characteristics of his production processes.

All aluminum parts visible on the exterior of the module shall be lightly glass ball-peened to remove all tool marks, scratches and manufacturers' labels; and all aluminum parts shall be given a clear

CHG	E C O	DATE	APP'D
ISSUE	—	4-26-71	DCJ
C	0185	5-19-71	DNO
H	0227	10-11-71	DCJ
K	0250	4-12-72	DCJ

anodize (see CSL-MF1).

EXTERIOR PARTS

Mechanical Parts List:
Items - 1, 16, 17, 19

1. Drawing 441-15 shows the assembly of the metal parts. Take the following items and assemble.

Mechanical Parts List	Electrical Parts List
Item 1, 2, 3, 4, 5, 6	Item 20, 21

Refer to Page 441-42 for the required orientation of the Service Column Connectors (Items 20,21). The 45 degree chamfers face the fan belt side of the partition -- do not rely on the position of the date code or part number. These are mounted using the screws Item 31, nuts Item 39, and lockwashers Item 37, of the Mechanical Parts List. The frame and partition angles mount to the case with screws, Item 28, and the partition is affixed to the angles with screws, Item 26.

2. Take the following items and assemble.

Mechanical Parts List	Electrical Parts List
Item 7	Item 13, 16

Mount the Circuit Breaker with screws, Item 30, and secure the lower part of the overlay with screw, Item 29, and nut, Item 38. Mount the Pilot Light with firm pressure. See Page 441-39 for completed assembly.

3. Take the following parts and assemble.

Mechanical Parts List

Items 8, 9, 10, 11, 12, 23, 24

Press the bearings, Item 24, into the aluminum housing. Test the bearings with a shaft, and ream with a straight reamer if the shaft

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does not move properly. Affix the bearing assembly to the bearing support bracket with screws, Item 29, and lockwashers, Item 36. Mount the bracket and bearing assembly to the partition with screws, Item 31, and lockwashers, Item 37.

Mount the Blower Wheel to the shaft, add a thrust washer and insert into the bearing assembly. Add the remaining thrust washer, and mount the fan pulley with set screw, Item 27. Oil with SAE 5 motor oil.

4. Take the following items and assemble.

Mechanical Parts List	Electrical Parts List
Items 13, 14, 15, 21, 41, 43, 44	Items 14, 15, 40

Mount the capacitor and strap to the bracket using screws, Item 30, and lockwashers, Item 36. Mount the bracket to the motor using screws, Item 25, and lockwashers, Item 34. Affix the motor ground wire at this time (Wire Ref. 11 in Section II of this document.) Page 441-39 shows the proper orientation of the components.

Press the rubber grommets into the holes in the CASE, and partition. Insert the motor mounts, and secure the motor assembly with screws, Item 25, and lockwashers, Item 34.

Assemble standoff, item 44, to partition with 2-56 screws, item 33, and lockwashers, item 45, followed by mounting of microswitch vane assembly, item 43, onto standoff with 2-56 screws, item 40.

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II. Electrical Assembly

The electrical assembly operations involve wire preparation, contact crimping, circuit board loading, and some harness lacing. The final authority for all connections shall be Page 441-43 which shows the grand total interconnection and schematic routing. Page 441-42 is a pictorial of the completed wiring assembly.

1. Wires, Contacts, and Crimping

The assembly sequence may start with the preparation of the wires. Refer to the WIRE PREPARATION TABLE and cut, strip and crimp the wires as described. Page 441-25 shows the wiring in various stages of preparation.

The WIRE PREPARATION TABLE has a reference number which describes a wire or group of wires. The text of this document will use (Ref. 2) to mean the four #18 AWG red wires of lengths 20, 17.5, 15, and 12.5 inches with the stripping lengths shown. The numbers in the TERMINATION column are AMP part numbers. The terminations are described in the parts list, and appropriate tooling is listed on the TOOLING CHART.

The connections marked "SOLDER" will be soldered to a printed circuit board. The TYPE II contacts, the lugs and the FASTON terminals use straightforward AMP hand tooling.

The 34323 and 34322 BUTT SPLICES require some explanation. The wires of (Ref. 2) are inserted all the way through the splice 34323. Then the ten wires of (Ref. 1) are inserted into one end of the splice--and a crimp operation is performed. Then the ten wires of (Ref. 3) are inserted into the opposite end of the splice and crimped. A three inch length of Heavy Wall Shrink Tubing is centered over the splice and shrunk with a heat gun. Care must be exercised in the use of the heat gun as the PVC insulation may melt. The wires of (Refs. 1, 2, and 3) with one 34323 and shrink tubing comprise the 54.62 VDC bus shown on Page 441-43.

The wires of (Refs. 4, 5, and 6) combine with the second 34323 to

form the ZERO VDC bus. The wires of (Refs. 7, 8, 9 and 10) with the 34322 form the GROUND bus.

The 320570 WINDOW SPLICES used by (Refs. 15, 16, 17, and the MOTOR LEADS) are similar to the BUTT SPLICES described above. The wires with the .700 strip length are fed through the splice and then the wires with the .350 strip are inserted and crimped. The motor leads are stripped as follows:

LEAD	STRIP LENGTH
BLUE	0.200
GREEN	0.200
RED	0.700
YELLOW	0.700

As always--refer to Page 441-43 for the pattern of interconnection.

In general, all strip lengths are ± 0.015 inches, and stripping shall be done with a tool which does not nick or break any strands of the wire. When bundles of stranded wires are inserted into splices, care must be exercised to prevent any of the strands from unraveling and bunching outside the area of the crimp.

2. Circuit Boards

Certain operations are common to the four Horizontal Distributor Boards. Mount the Amp 1-202845-5 connector using the eyelets of Item 36 on the parts list. Mount the 16 Female AMP-MODU contacts and flatten the tails in one direction away from the board edge. Solder all 90 pins of the Amp 1-202845-5 and solder each of the AMP-MODU receptacles on the tail side only. The four horizontal boards are identical.

From the four boards just prepared, select two for the top and bottom positions within the fan module, the remaining two boards require additional components.

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K	0250	4-7-72	

441-29 shows the component layout of the COOLING ALARM BOARD. The layout conforms to the electrical schematics of Pages 441-30 & 31 which give a step-by-step pictorial recipe for assembly. Simply correct each component to the pad with the proper label, and solder all pads when finished. The wires to pads T, U, and V will be connected later.

Page 441-32 shows the ALARM INDICATOR CIRCUIT and Page 441-33 gives the pad locations for component layout. Connect the wires to pads B and H at this time.

Page 441-34 shows the completed VERTICAL DISTRIBUTOR BOARD. Mount the AMP-MODU male posts with the orientation shown using the jig defined by Page 441-46. Insert and solder the wires of (Refs. 19 and 20). Insert and solder the resistor R7.

3. Motor Works

Push on the various FASTON receptacles per Page 441-43 and insert the TYPE II contacts of wires (Refs. 15 and 16) into the service column connectors. Insert the contacts for the wires of (Refs. 12, 13, and 14) at this time.

4. Boards, Duct Plates, and Harness

Arrange the components as shown on Page 441-40. First mate the four Horizontal Distributor Boards to the VERTICAL Distributor Board with the two ALARM boards in the proper order (Pages 441-40 & 43).

Pick out the three longest #18 wires and solder them to the top Horizontal Board. These 20 inch Blue, Red, and Green wires are soldered to pads T, U, and V, respectively (Pages 441-31 & 33). Do the same operation for the other three Horizontal Boards in sequence--ending with the 12.5 inch wires on the bottom board.

Lace these wires, along with the (Ref. 18 and 24) wires from the Alarm Indicator Board, close to the edge of the VERTICAL DISTRIBUTOR BOARD as shown (Page 441-40).

Assemble the three DUCT PLATES and two spacers to the board stack as shown. The .090 break on the DUCT PLATES curls down, see Page 441-42.

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K	0250	4/11/72	

5. Insertion

Carefully insert the entire Assembly of Page 441-40 into the CASE Retain with screws, Item 32. The orientation is shown in Page 441-42.

Solder connect the blue wires (Ref. 24 & 18) to the microswitch vane assembly by passing the wires through the grommet previously assembled in the partition.

Insert all the Type II contacts using Page 441-43 for pin numbering. Lace the top and bottom groups of #22 wires to hold them against the outer wall. Install the four cable clamps using screws, Item 26. Install the two ground wires with lugs using screw, Item 26, and lockwasher, Item 35. The lockwasher is placed next to the aluminum partition. TIGHTEN SECURELY!!

Push the FASTON receptacles of the red and blue wires (Ref. 18) onto the Relay Coil terminals of the Circuit Breaker.

Push the FASTON receptacles of the red wires (Ref. 22 & 23) onto the contact receptacles of the Circuit Breaker.

III. FINAL ASSEMBLY AND TESTING

1. Button-Up

Install the motor pulley with setscrew, Item 27. Install belt and align motor pulley to the same plane as the fan pulley. Mate a connector to the Upper Service Column connector and apply 120VAC to the motor leads. Observe that the Blower Wheel rotates in the proper direction and test the belt for alignment and tension while under power.

Examine wiring for any evidence of looseness or interference with the fan belt. The wiring bundle SHALL NOT TOUCH THE MOTOR or capacitor bracket. If necessary, extra lacing tape shall be applied to achieve this end.

Insert the urethane baffles--taking care not to damage the exposed connector pins. Drawing 441-15 shows the baffles in place.

Assemble the Rails to the Side Plates per drawing 441-48.

Mount Side Plates on case using screws, Item 28.

Mount Retainer Clips to the Side Plates using screws, Item 33. The orientation is shown on the overall view, Page 441-50.

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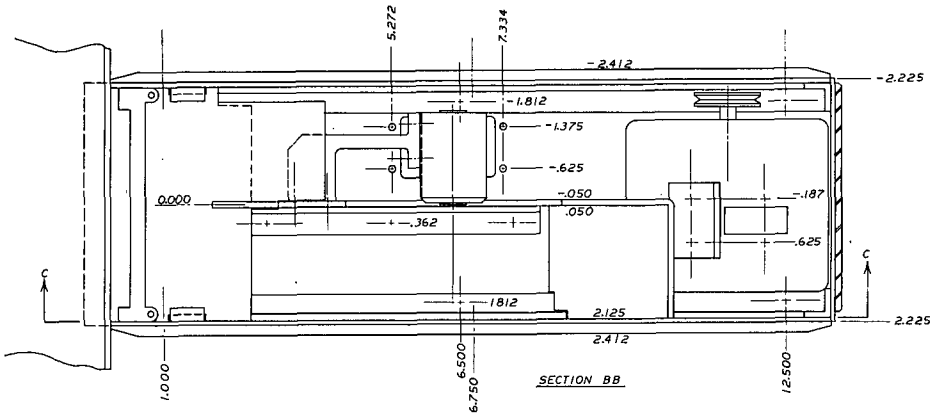
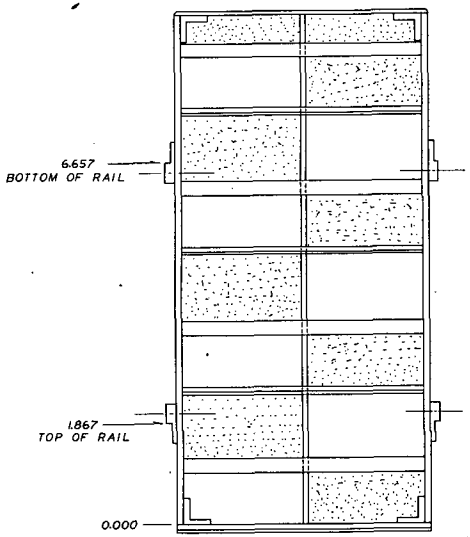
2. Electrical Testing

Each pin of the Lower Service Coumn connector shall be connected to the same pin of the Upper Service Column connector with a resistance of less than one ohm. Each wire, or group of wires as defined by Page 441-43. shall be separate from all other wires by not less than one megohm.

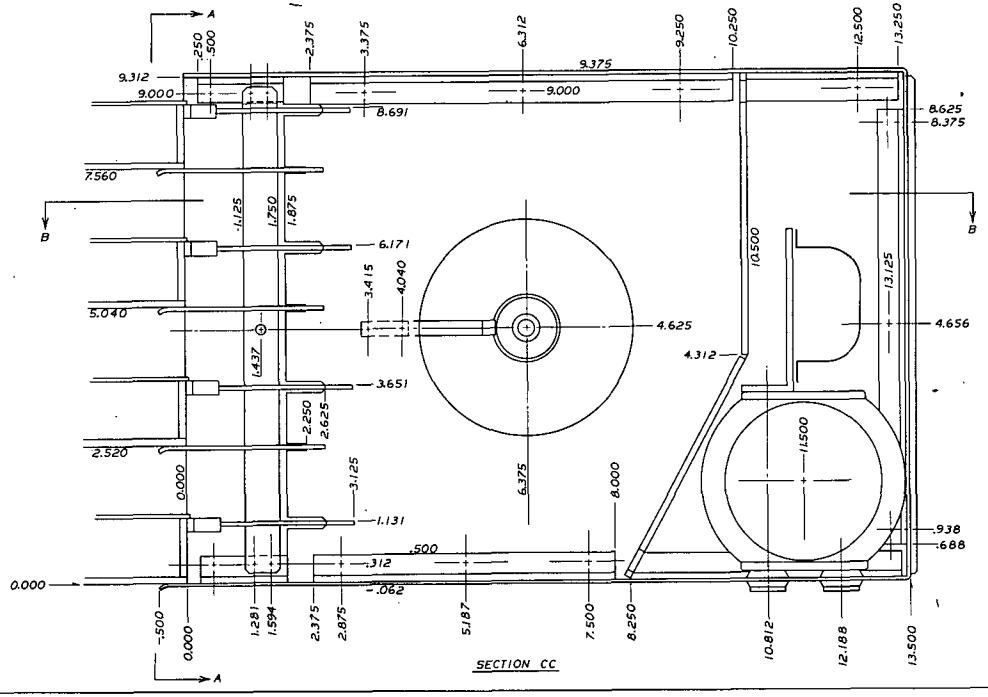
In addition, the above tests shall apply between certain pins of the Service Column connectors and pins of each of the four AMP 1-202845-5 connectors. The connections are given on the CONTINUITY CHART.



SECTION BB



VIEW AA



SECTION CC

NOTE:
IMPELLER & SHAFT; CONNECTORS, IMPELLER PULLEY, AND O-RING BELT ARE NOT SHOWN IN THESE VIEWS

CHANGE NO.	DATE	DESCRIPTION
ISSUE 4.26.71		

COMPUTER SYSTEMS LABORATORY
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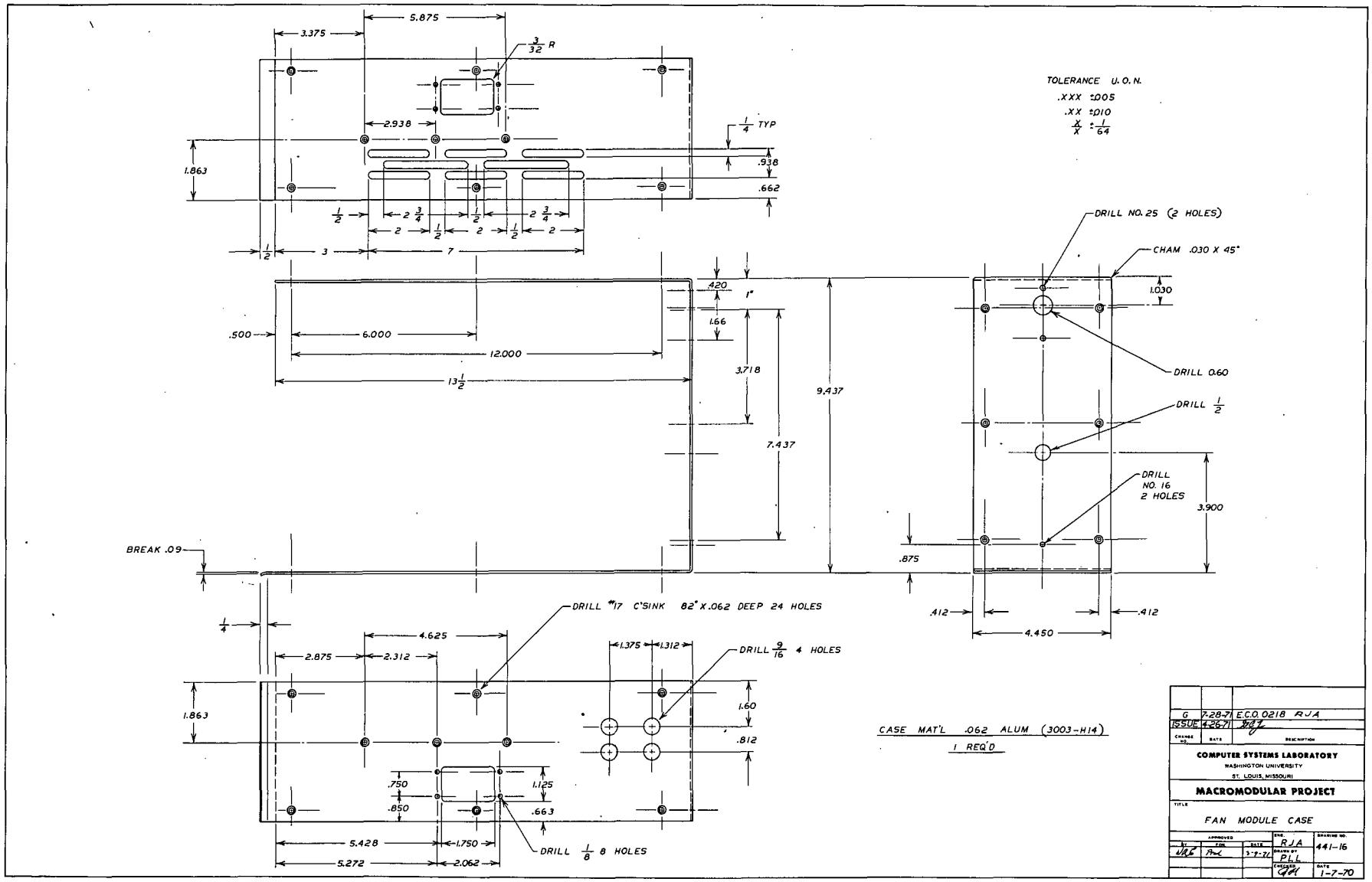
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE ASSEMBLY AND REFERENCE DIMENSIONS

APPROVED BY	FOR	DATE
WRK	PLL	5-5-71

DRAWN BY: RJA
CHECKED BY: PLL
DRAWING NO. 441-15
DATE 1-8-71



TOLERANCE U. O. N.
.XXX ±.005
.XX ±.010
X/X ± 1/64

CASE MAT'L .062 ALUM (3003-H14)
1 REQ'D

CHANGE NO.	DATE	DESCRIPTION
G	7-28-71	E.C.O. 0218 RJA
ISSUE 4	4-26-71	

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MACROMODULAR PROJECT

TITLE: FAN MODULE CASE

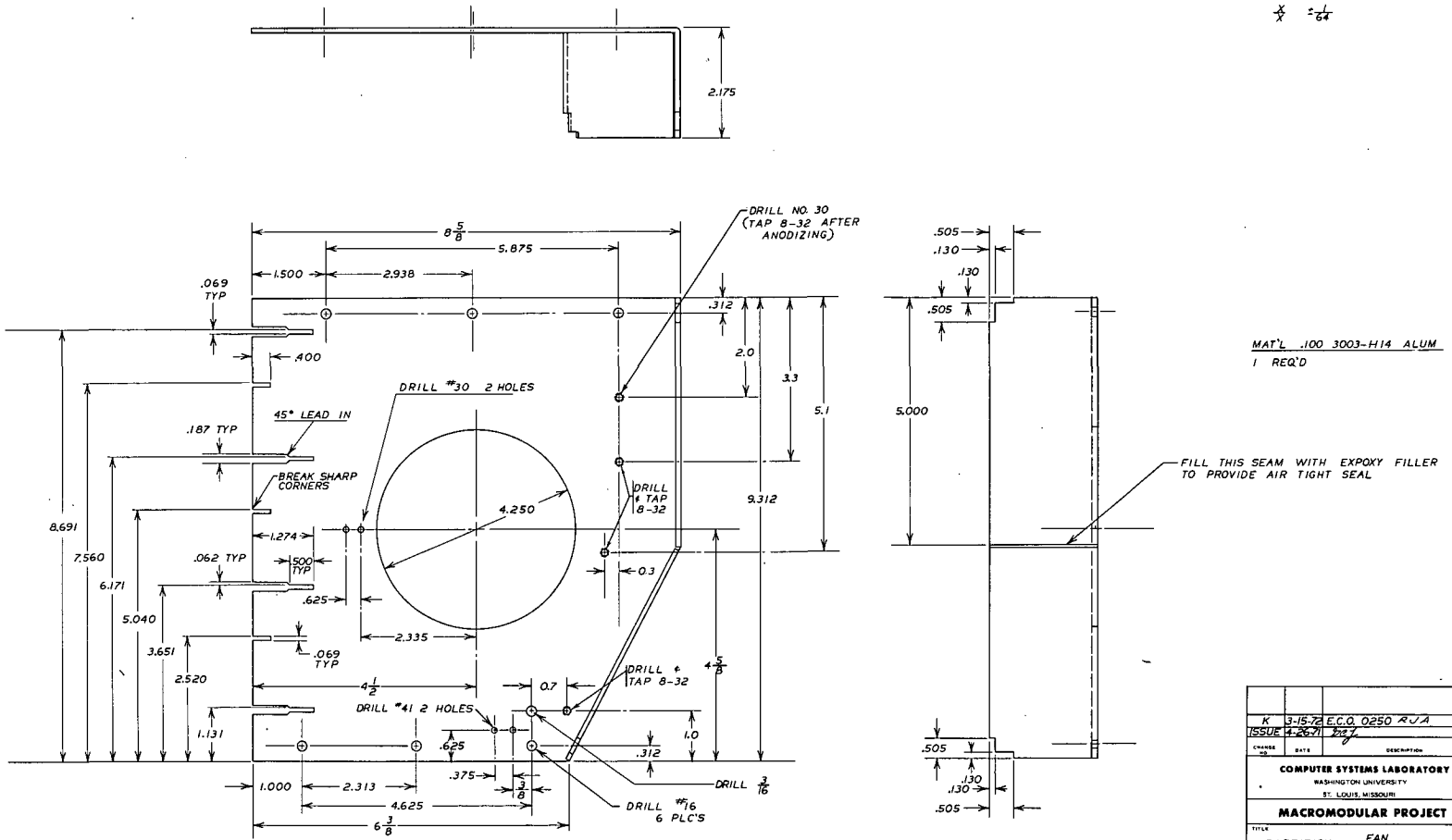
APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
WRK	[illegible]	3-9-71	RJA	441-16
			DRAWN BY PLL	
			CHECKED GH	DATE 1-7-70

TOLERANCE U.O.N.

.XXX ±.005

.XX ±.010

$\frac{X}{X}$ = $\frac{1}{64}$



MAT'L .100 3003-H14 ALUM

1 REQ'D

CHANGE NO.	DATE	DESCRIPTION
K	3-15-72	E.C.O. 0250 RJA
ISSUE 4	26-71	

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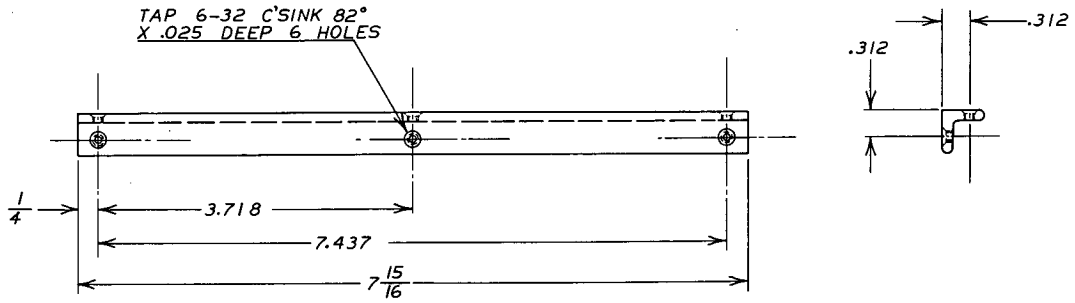
MACROMODULAR PROJECT

TITLE: PARTITION FAN MODULE

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
UAS	Prod	2-7-71	RJA	441-17
			DRAWN BY PLL	
			CHECKED	DATE 1-5-71



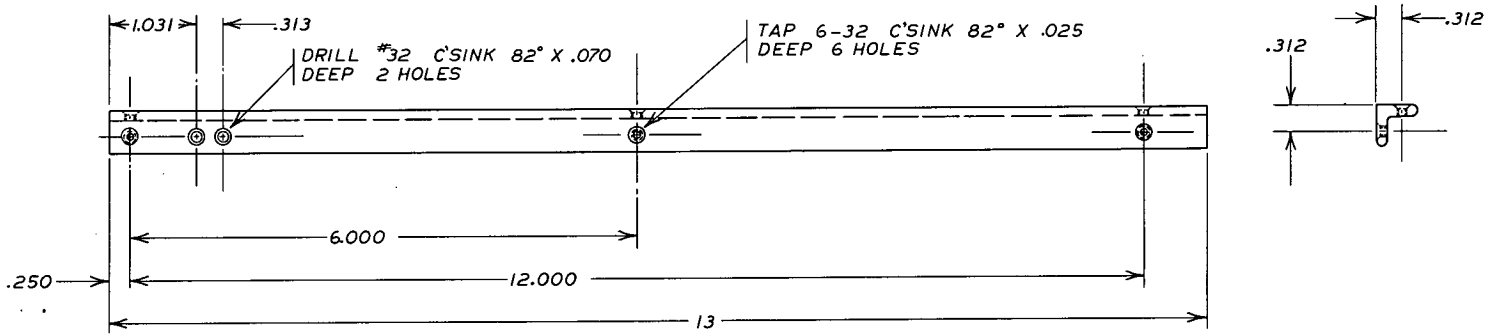
TOLERANCE U.O.N.

.XXX ± .005

.XX ± .010

X/X ± 1/64

SHORT FRAME ANGLE MAT'L - EXTRUDED ALUM L 1/2 X 1/2 X 1/8 2 REQ'D



LONG FRAME ANGLE MAT'L - EXTRUDED ALUM L 1/2 X 1/2 X 1/8 2 L.H. & 2 R.H. REQ'D

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	RCJ

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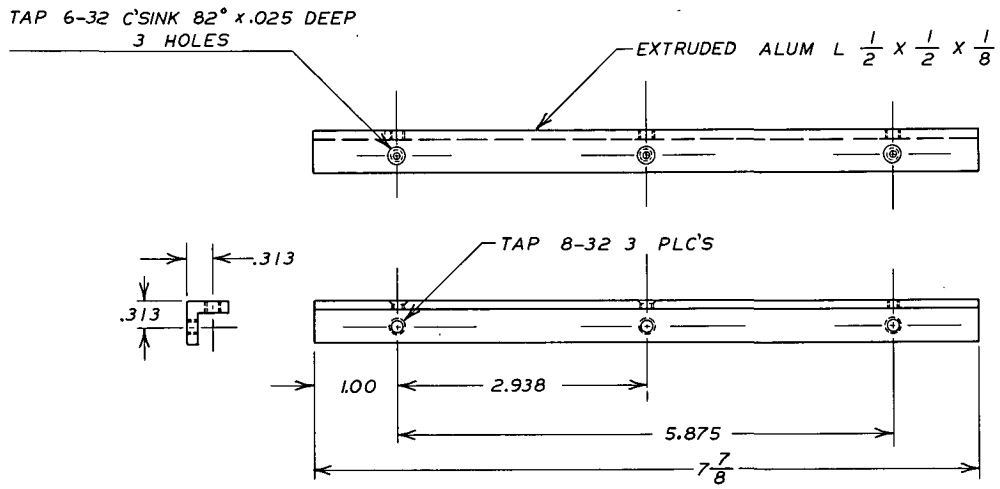
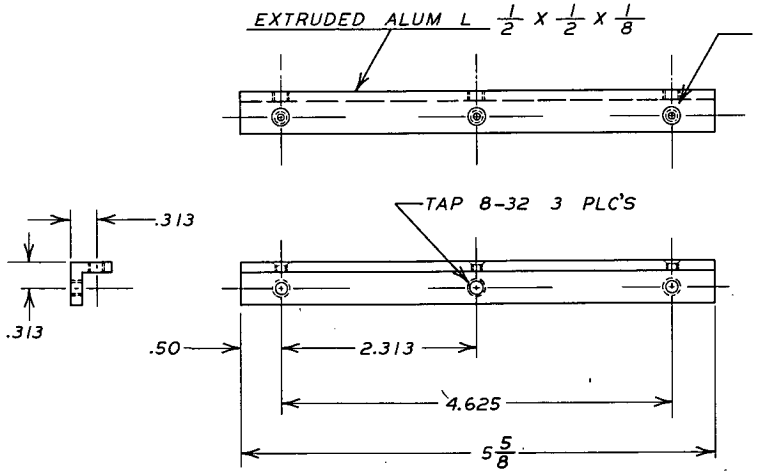
MACROMODULAR PROJECT

TITLE: FAN MODULE FRAME ANGLES

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
WGB	Prod	3-9-71	RJA	441-18
			DRAWN BY PLL	
			CHECKED GLL	DATE 1-5-71



1 REQ'D
LONG PARTITION ANGLE



1 REQ'D
SHORT PARTITION ANGLE

TOLERANCE U. O. N.

.XXX	±.005
.XX	±.010
X/X	± 1/64

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	RJ

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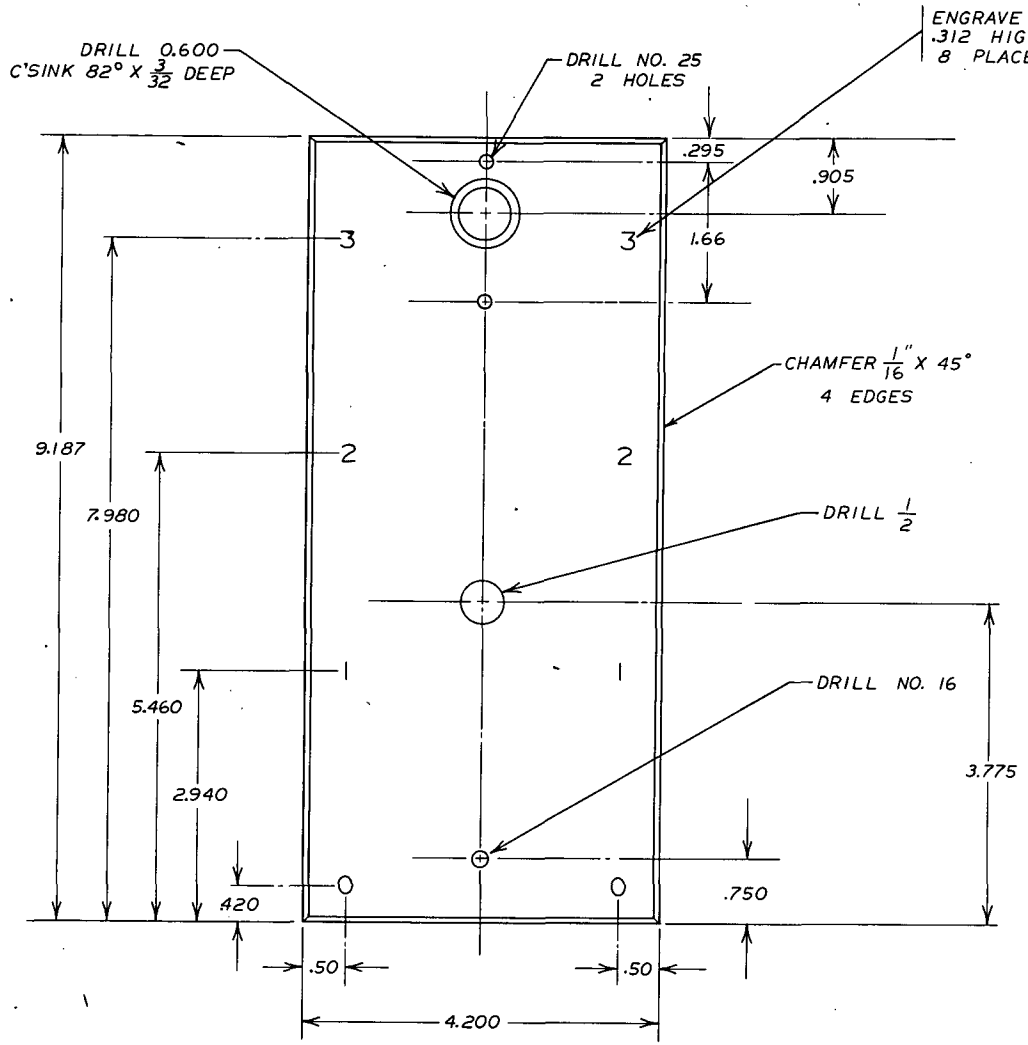
MACROMODULAR PROJECT

TITLE
FAN MODULE
PARTITION ANGLES

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
WAB	Prod	3-9-71	RJA	441-19
			DRAWN BY PLL	
			CHECKED Gd	DATE 1-5-71



TOLERANCE ± .010 U.O.N.

FAN MODULE OVERLAY 1 REQ'D.
MAT'L. 1/8 ENGRAVING STOCK.
MATT BLACK SURFACE WITH WHITE SUBSTRATE. (FORMICA NO. DI-PI)

CHANGE NO.	DATE	DESCRIPTION
D	6-8-71	E.C.O. 0195 RJA
B	5-10-71	E.C.O. 0177 RJA
ISSUE	4-26-71	

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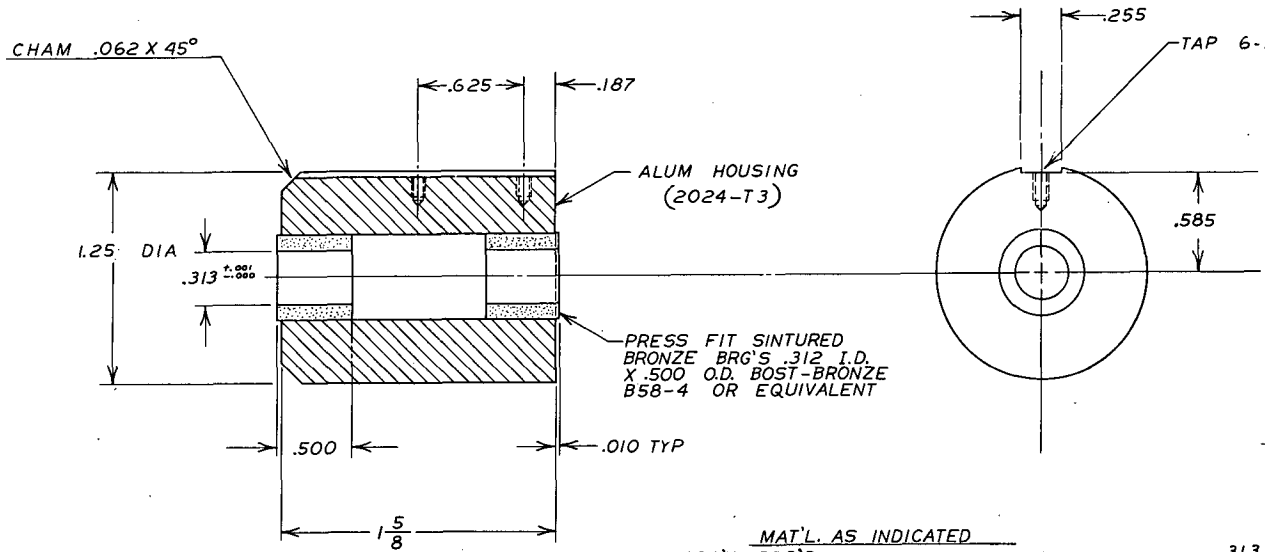
MACROMODULAR PROJECT

TITLE: FAN MODULE OVERLAY

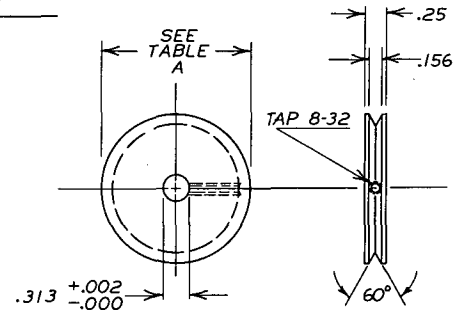
APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
WAT	Prod	3-9-71	RJA	441-20
			DRAWN BY PLL	
			CHECKED	DATE 3-8-70

TOLERANCE U. O. N.
.XXX ±.005
.XX ±.010
X ± 1/64

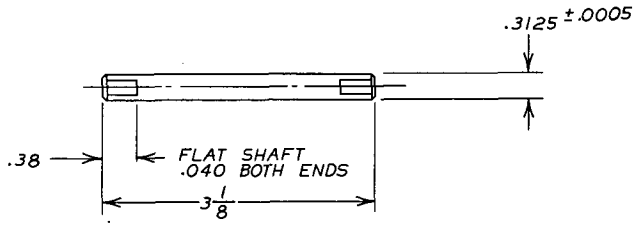


MAT'L. AS INDICATED
1 ASS'Y REQ'D

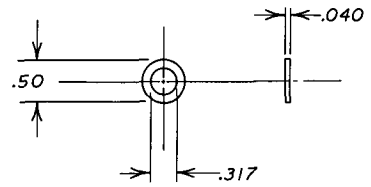
TABLE A
1 REQ'D. 1.500 DIA.-MOTOR
1 REQ'D 1.625 DIA.-FAN



PULLEY MAT'L. 2024-T3 ALUM 2 REQ'D. AS INDICATED



SHAFT MAT'L -DRILL BLANK



THRUST WASHER
MAT'L NYLON OR EQUIV.
2 REQD

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	RCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
SHAFT ASSEMBLY
FAN MODULE

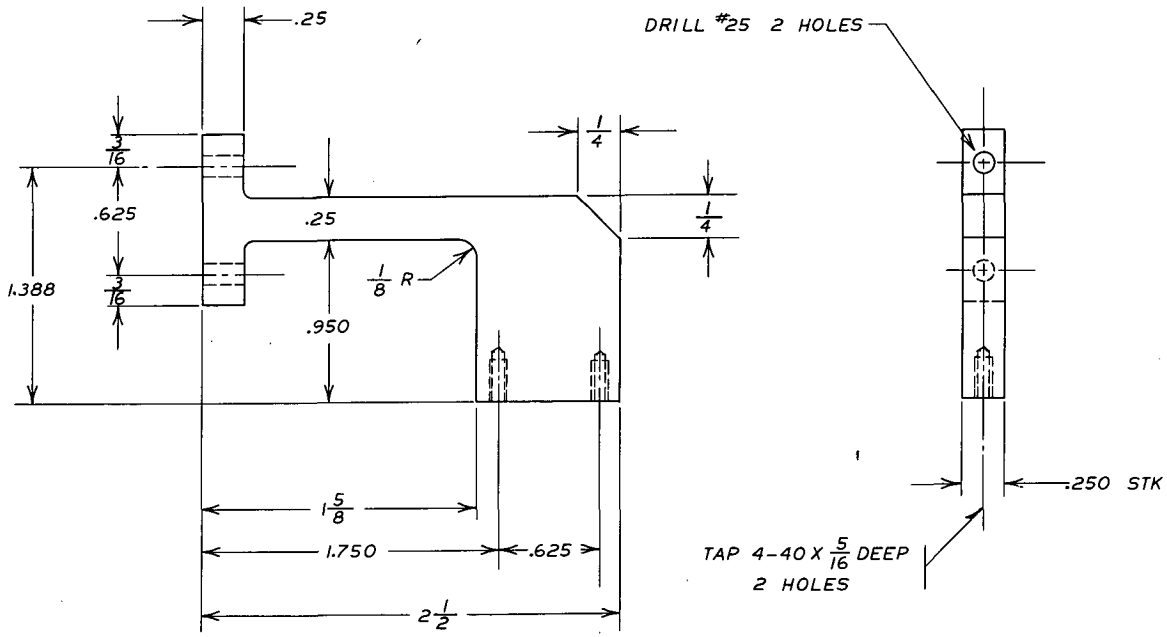
APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
WAB	Prod	3-9-71	RJA	441-21
			DRAWN BY PLL	
			CHECKED GM	DATE 1-4-70

TOLERANCE U. O. N.

.XXX ±.005

.XX ±.010

$\frac{X}{X}$ $\pm\frac{1}{64}$



BRG SUPPORT BRACKET MAT'L 1/4 ALUM 2024-T3

1 REQ'D

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	See F

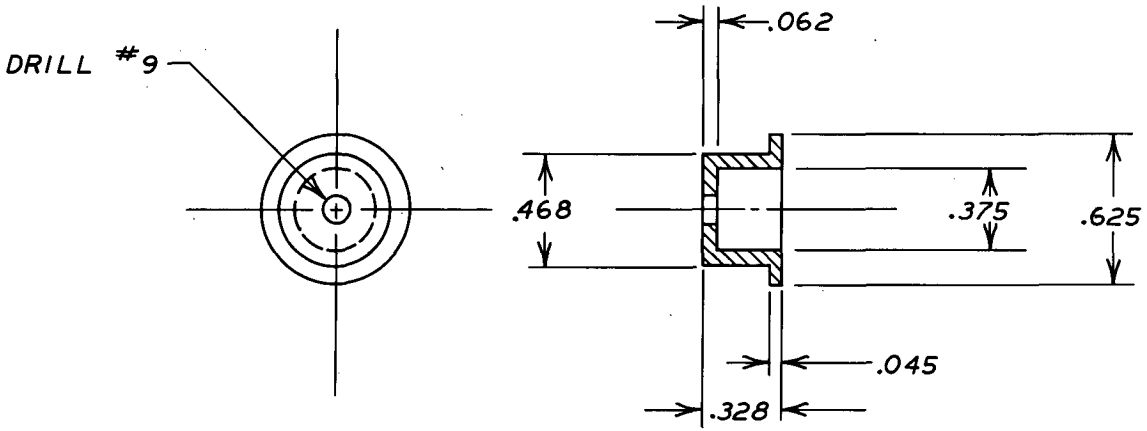
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE BEARING BRACKET

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
GAB	Prod	2-9-71	RJA	441-22
			DRAWN BY PLL	
			CHECKED GAB	DATE 1-4-71

TOLERANCE ±.005 U. O. N.



MOTOR MOUNTS 4 REQ'D
MAT'L ALUM 2024 T3

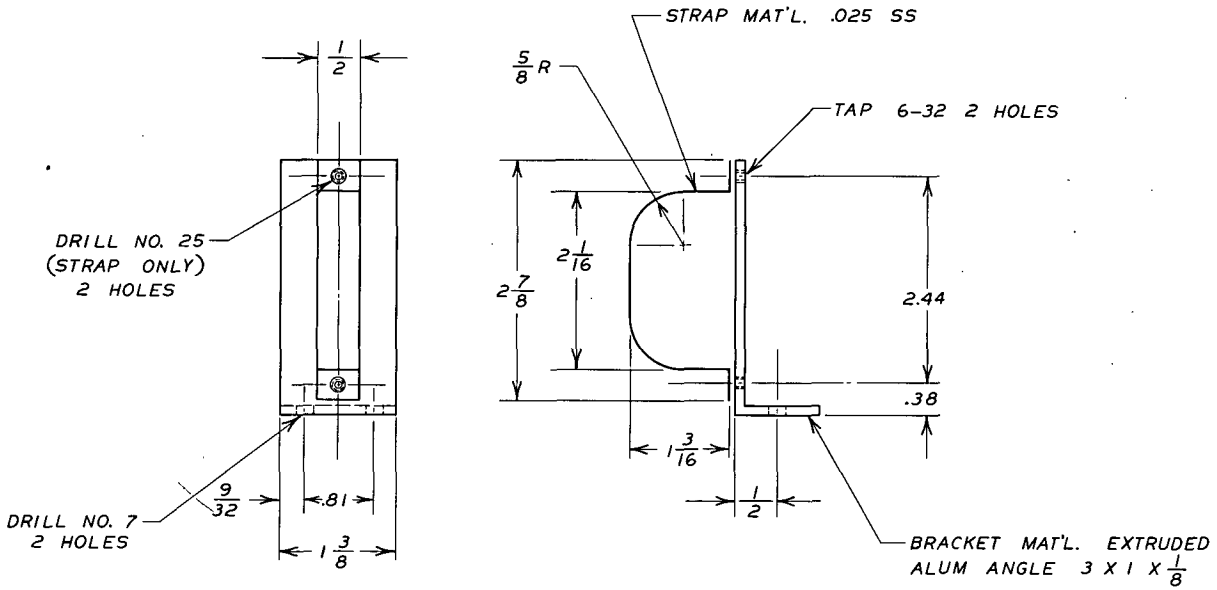
CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	JCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
FAN MODULE
MOTOR MOUNTS

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
Wat	Prod	3-9-71	RJA	441-23
			DRAWN BY PLL	
			CHECKED GH	DATE 1-5-71



TOLERANCE U.O.N.

.XXX	±.005
.XX	±.010
X/X	± 1/64

STRAP & BRACKET ASSEMBLY
1 REQ'D. MAT'L. AS INDICATED

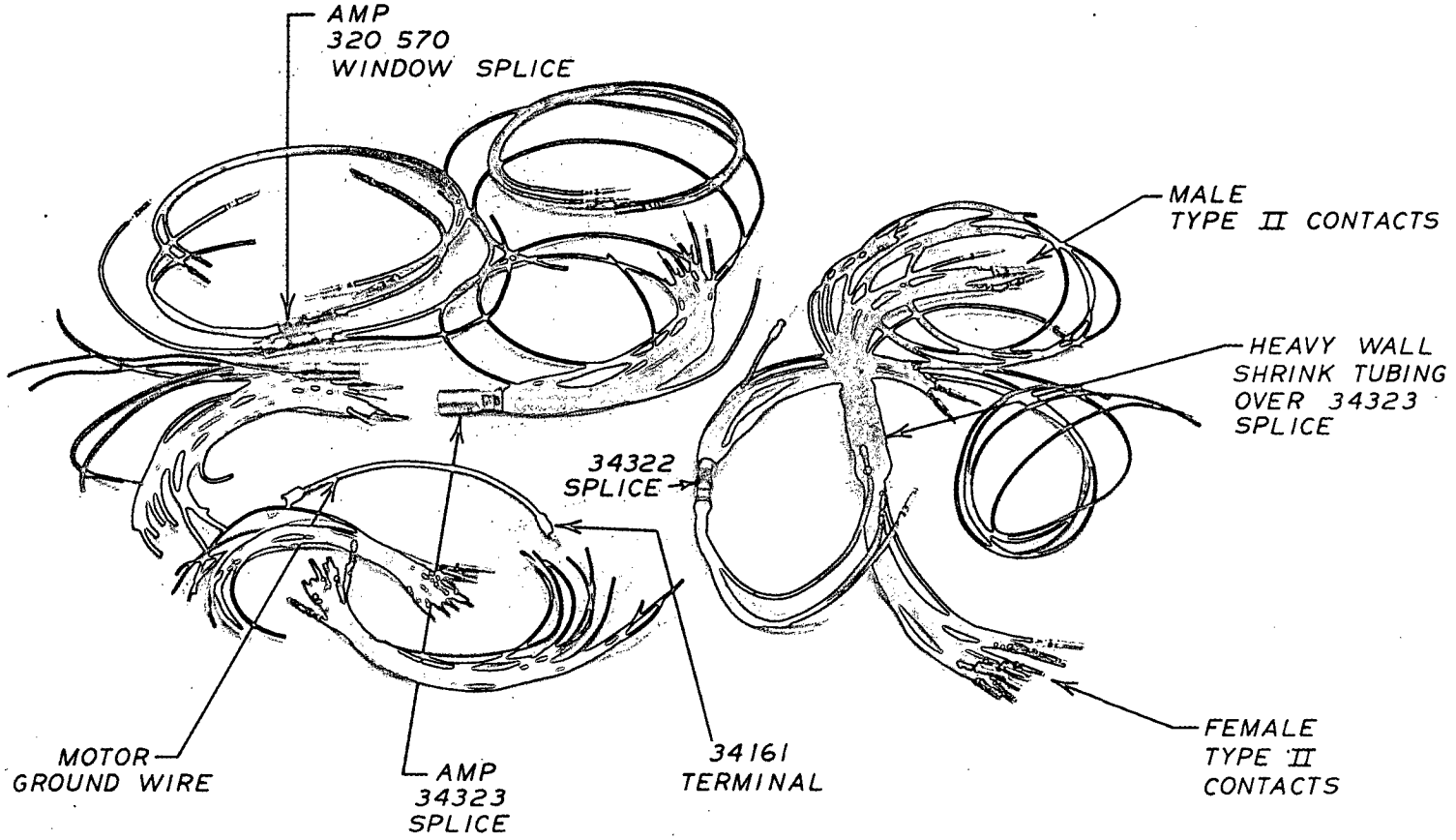
CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GcJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
FAN MODULE
STRAP & BRACKET ASSEMBLY

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
GcJ	PROD	4-21-71	RJA	441-24
			DRAWN BY PLL	
			CHECKED GcJ	DATE 3-9-71



CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: WIRE PREPARATION

APPROVED BY	FOR	DATE
GCJ	PROD	4-23-71

ENG. GCJ
DRAWN BY GWP
CHECKED GCJ

DRAWING NO. 441-25
DATE 4-19-71

FAN MODULE
WIRE PREPARATION TABLE

REFERENCE	QUANTITY	WIRE SIZE	COLOR	LENGTH	STRIP LENGTH END 1	STRIP LENGTH END 2	TERMINATION END 1	TERMINATION END 2	
1	10	16	RED	7	.250	.600	201645-1	34323	54.62 VDC BUS
2	4	18	RED	20 17.5 15 12.5	.100	1.20	SOLDER	34323	
3	10	16	RED	7	.250	.600	201568-1	34323	
4	10	16	BLUE	7	.250	.600	201645-1	34323	ZERO VDC BUS
5	4	18	BLUE	20 17.5 15 12.5	.100	1.20	SOLDER	34323	
6	10	16	BLUE	7	.250	.600	201568-1	34323	
7	3	14	GREEN	7	.250	.500	201645-1	34322	GROUND BUS
8	4	16	GREEN	20 17.5 15 12.5	.100	1.00	SOLDER	34322	
9	3	14	GREEN	7	.250	.500	201568-1	34322	
10	1	14	GREEN	4	.200	1.00	34161	34322	
11	1	14	GREEN	6	.200	.200	34161	34161	
12	2	14	WHITE	16	.250	.250	201645-1	201568-1	
13	1	14	ORANGE	16	.250	.250	201645-1	201568-1	
14	1	14	YELLOW	16	.250	.250	201645-1	201568-1	
15	2	14	VIOLET	7	.250	.350	201645-1	320570	
16	2	14	VIOLET	7	.250	.350	201568-1	320570	

FAN,2 LN=72

REFERENCE	QUANTITY	WIRE SIZE	COLOR	LENGTH	STRIP LENGTH END 1	STRIP LENGTH END 2	TERMINATION END 1	TERMINATION END 2
17	1	22	GREEN	4	.200	.700	42599-2	320570
18	2	22	RED	20	.100	.200	SOLDER	42599-2
			BLUE	12	.100	.200	SOLDER	42599-2
19	11	22	BLACK BROWN RED ORANGE YELLOW GREEN BLUE VIOLET SLATE WHITE WH|RED	6	.200	.100	200679-1	SOLDER
20	10	22	BLACK BROWN ORANGE YELLOW GREEN BLUE VIOLET SLATE WHITE WH|RED	7	.200	.100	201328-1	SOLDER
21	1	22	ORANGE	8	.100	.100	SOLDER	SOLDER
22	1	22	RED	7	.200	.200	201328-1	42599-2
23	1	22	RED	11	.200	.100	42599-2	SOLDER
24	1	22	BLUE	8	.100	.100	SOLDER	SOLDER

[FAN
[20 APRIL 1971
[REVISED 6 JAN 1972
[REVISED 29 MARCH 1972
[GC JOHNS

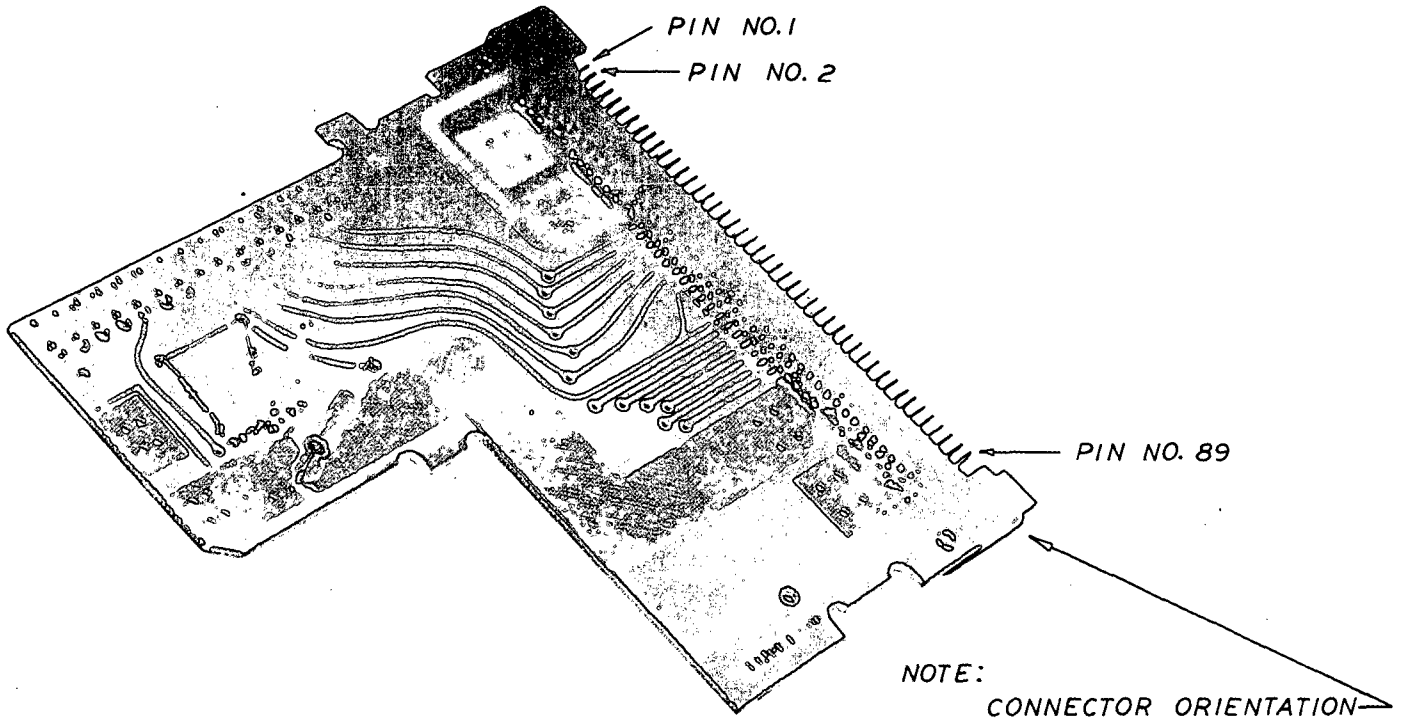
CHG.	E.C.O.	DATE	APPR.
J	0242	1/7/72	
K	0250	4/10/72	

FAN MODULE

TOOLING CHART

CONTACT OR TERMINAL	CRIMP TOOL
AMP 34322	BANTAM ROTO-CRIMP 601075 SETTING #6 OR ROTO-CRIMP 600850 SETTING #6
AMP 34323	SAME TOOLS AS ABOVE, SETTING #4
AMP 320570	AMP 59239-4 12-10 PIDG
AMP 34161	AMP 47387 16-14 PIDG
AMP 201645-1 AMP 201568-1	AMP 45098 TOOL IS COLOR CODED TO COLOR STRIPES ON CONTACTS; BLUE, VIOLET, GREEN
AMP 200679-1 AMP 201328-1	AMP 45099 SAME AS ABOVE, BUT WHITE, RED, YELLOW
	EXTRACTION TOOL FOR ALL TYPE II CONTACTS AMP 305183
AMP 42599-2	AMP 90035-1 FASTON
AMP 85931-5	SPECIAL JIG - SEE PAGE 441-46. -USE IN ARBOR PRESS-

CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-26-71	RCJ
A	0176	5-6-71	RCJ
H	0227	10-11-71	RCJ



NOTE:
CONNECTOR ORIENTATION

NOTE ALSO:
BOARD IS UPSIDE DOWN IN THIS VIEW.

CHANGE NO.	DATE	DESCRIPTION
K	4-10-72	E.C.O. 0250 RJA

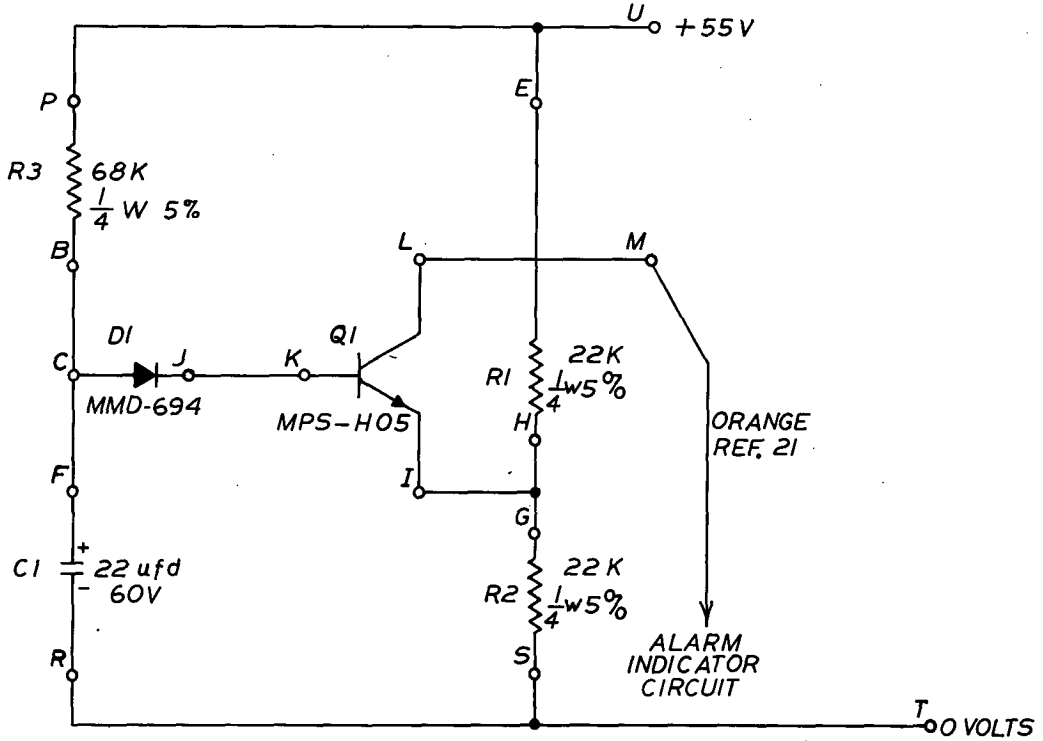
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COOLING ALARM BOARD PICTORIAL

APPROVED BY	FOR	DATE
GCJ	PROD.	4-19-72

ENG. GCJ
DRAWN BY PLL
CHECKED RJA
DRAWING NO. 441-29
DATE 4-10-72



ONE PER FAN MODULE
(COOLING ALARM BOARD)

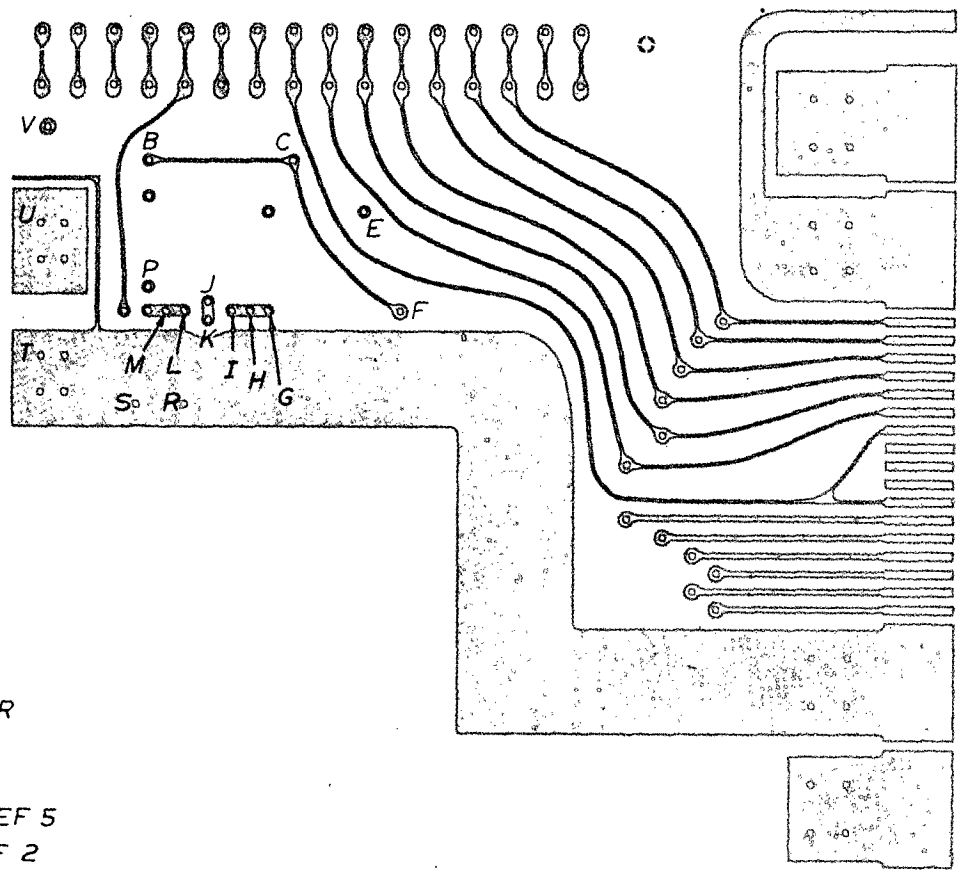
CHANGE NO.	DATE	DESCRIPTION
K	3-20-72	E.C.O. 0250 GCJ
F	7-6-71	E.C.O. 0197 GCJ
ISSUE	4-26-71	GCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COOLING DETECTOR CIRCUIT
CONNECTION IDENTIFICATION

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
GCJ	PROD.	4-23-71	GCJ	441-30
			DRAWN BY DHO	
			CHECKED GCJ	DATE 4-9-71



CONNECTION		COMPONENT
FROM	TO	
B	P	R3
F	R	C1
C	J	D1
	K	Q1 BASE
	I	Q1 EMITTER
	L	Q1 COLLECTOR
E	H	R1
G	S	R2
	T	BLUE WIRE REF 5
	U	RED WIRE REF 2
	V	GREEN WIRE REF 8
	M	ORANGE WIRE REF 21

PTJ0121-2 ©1970

CHANGE NO.	DATE	DESCRIPTION
K	3-30-72	E.C.O. 0250 RJA

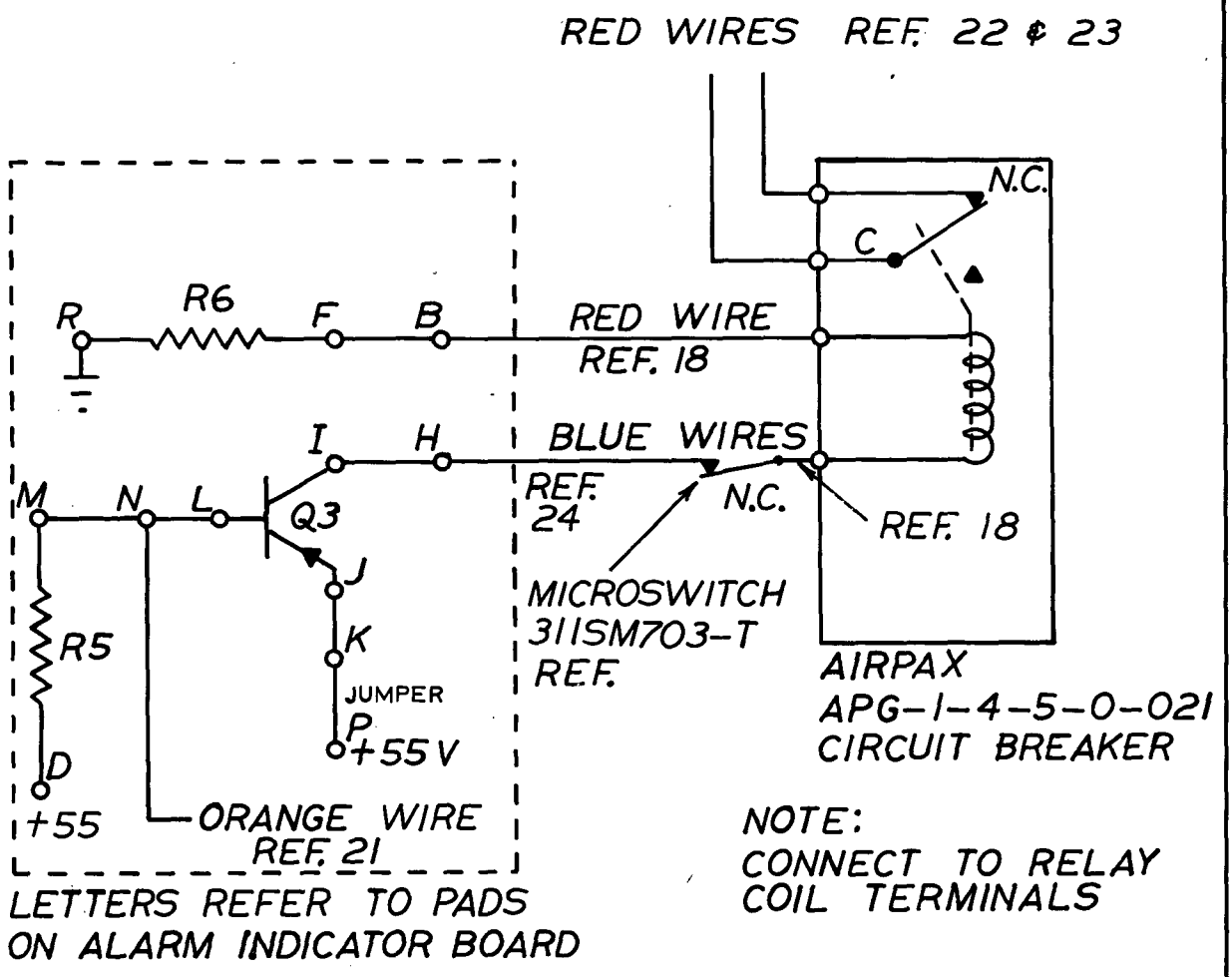
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: PAD IDENTIFICATION
COOLING ALARM BOARD

APPROVED BY	FOR	DATE
JCJ	PROD	4-18-72

ENG. GCJ
DRAWN BY PLL
CHECKED RJA
DRAWING NO. 441-31
DATE 4-14-71



R5=10K OHM 5% $\frac{1}{4}$ WATT

R6=820 OHM 5% 1 WATT

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

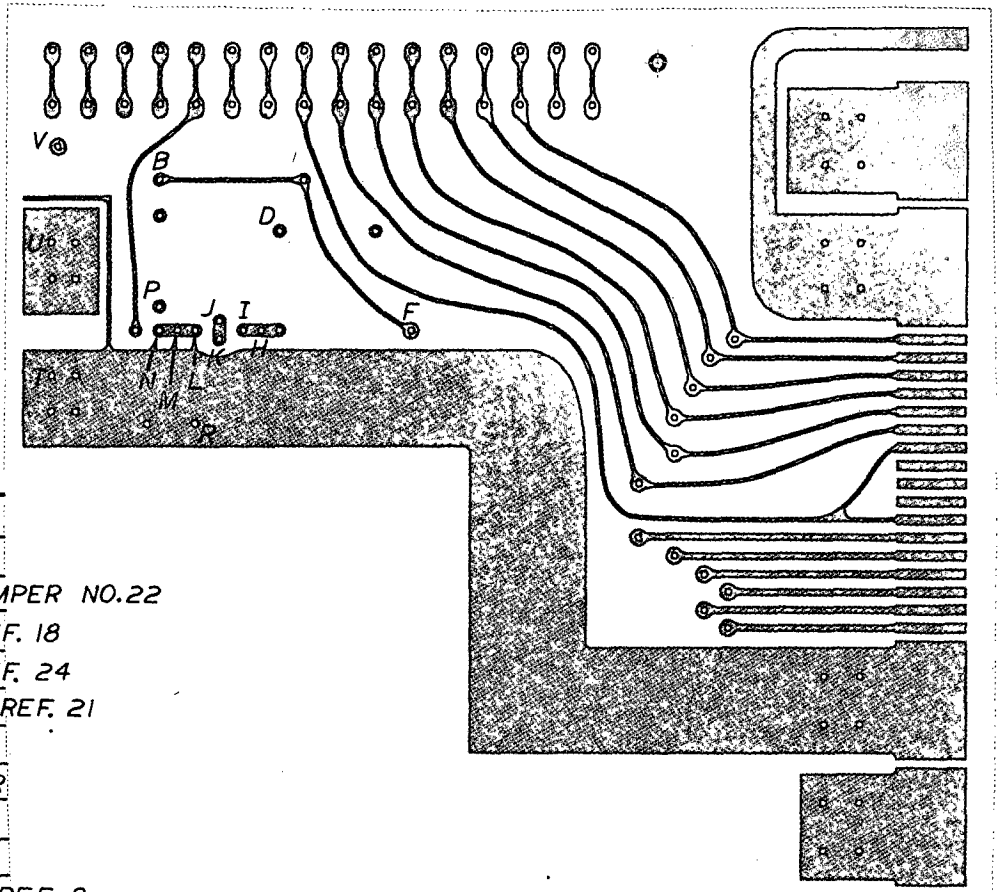
MACROMODULAR PROJECT

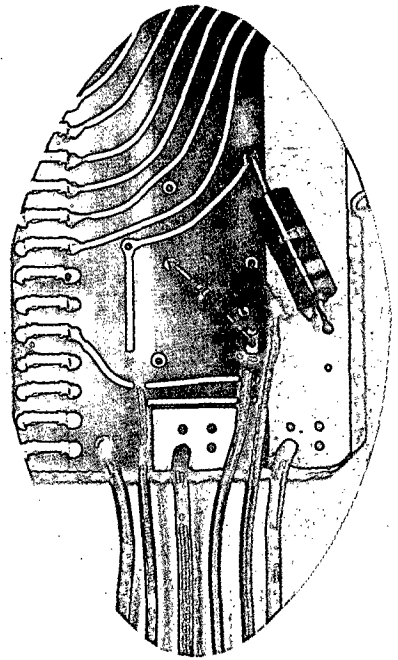
TITLE: ALARM INDICATOR CIRCUIT

CHANGE NO.	DATE	DESCRIPTION
K	3-20-72	E.C.O. 0250 GCJ
F	7-6-71	E.C.O. 0197 GCJ
ISSUE	4-26-71	GCJ

APPROVED BY	FOR	DATE
GCJ	PROD.	4-23-71

ENG GCJ
DRAWN BY DHO
CHECKED GCJ
DRAWING NO. 441-32
DATE 4-13-71





CONNECTION		COMPONENT
FROM	TO	
F	R	R6
P	K	INSULATED JUMPER NO.22
	B	RED WIRE REF. 18
	H	BLUE WIRE REF. 24
	N	ORANGE WIRE REF. 21
D	M	R5
	I	Q3 COLLECTOR
	J	Q3 EMITTER
	L	Q3 BASE
	V	GREEN WIRE REF. 8
	U	RED WIRE REF. 2
	T	BLUE WIRE REF. 5

PTJ0121-2 ©1970

CHANGE NO.	DATE	DESCRIPTION
K	4-10-72	E.C.O. 0250 RJA

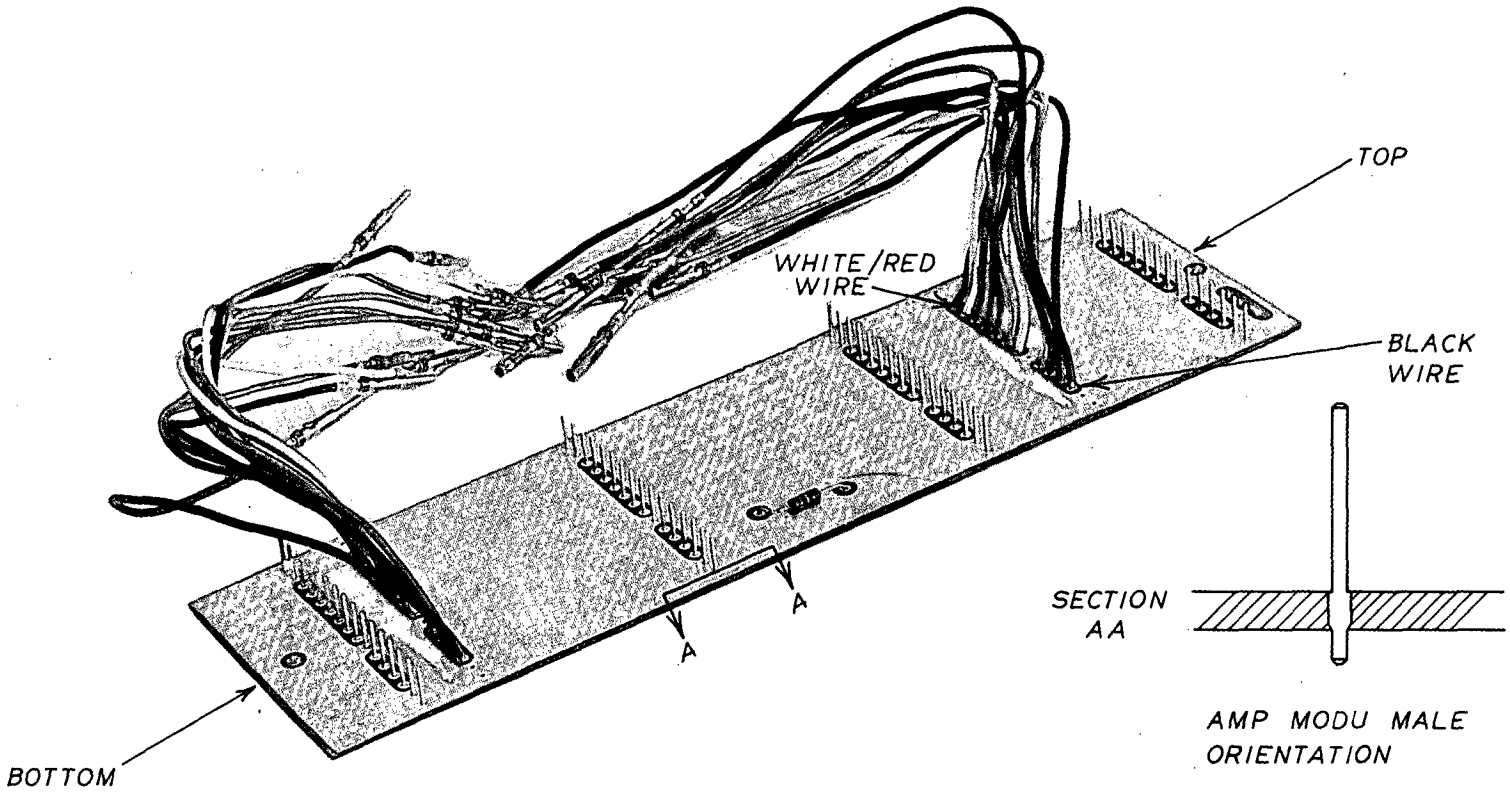
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PAD IDENTIFICATION AND PICTORIAL
COOLING INDICATOR BOARD

APPROVED BY	FOR	DATE
rej	PROD	4-18-72

ENG. GCJ
DRAWN BY PLL
CHECKED RJA
DRAWING NO. 441-33
DATE 4-10-72



CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

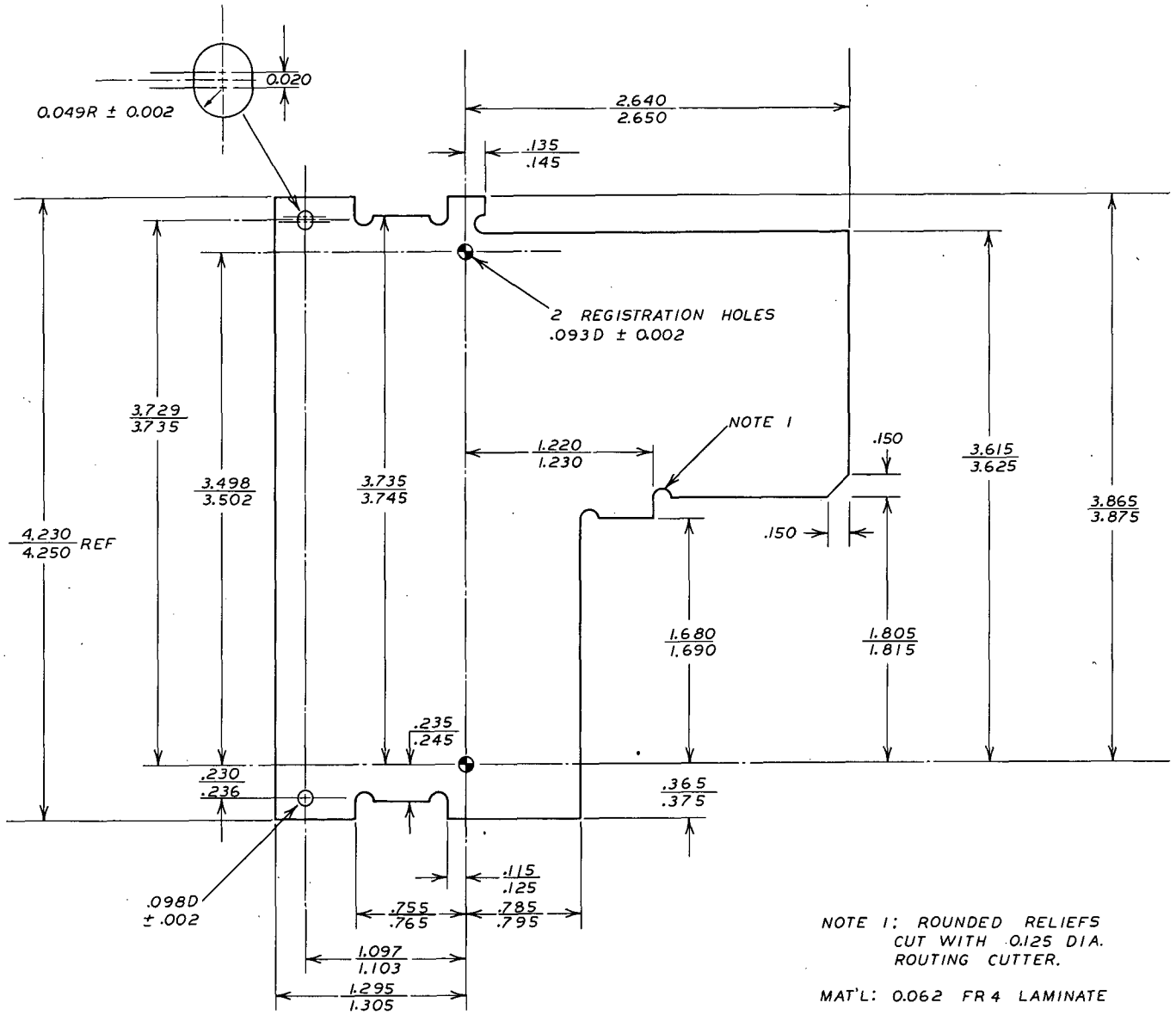
MACROMODULAR PROJECT

TITLE: VERTICAL DISTRIBUTOR BOARD

APPROVED BY	FOR	DATE
GCJ	PROD.	4-23-71

ENG. GCJ
DRAWN BY GWP
CHECKED GCJ

DRAWING NO. 441-34
DATE 4-19-71



NOTE 1: ROUNDED RELIEFS CUT WITH 0.125 DIA. ROUTING CUTTER.

MAT'L: 0.062 FR 4 LAMINATE

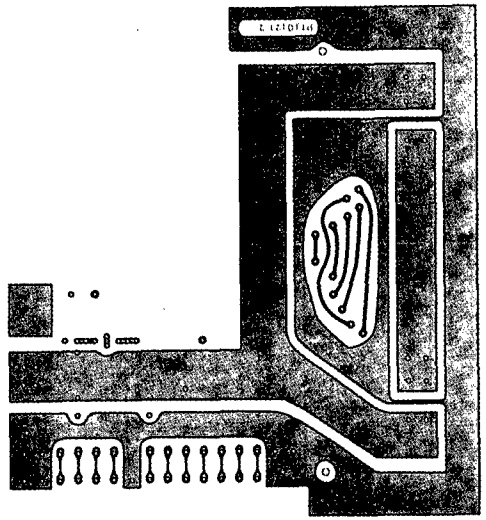
CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

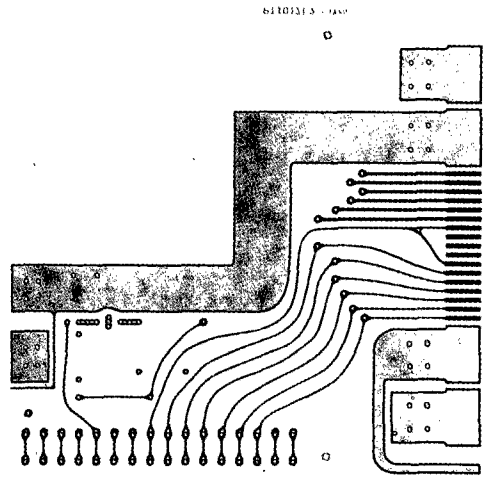
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE
HORIZONTAL DISTRIBUTOR BOARD
BLANK OUTLINE

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
Jae	Prod	3-9-71	RJA-GCJ	441-35
			DRAWN BY: PLL	
			CHECKED: GCJ	DATE: 12-29-70





ARTWORK SUPPLIED AS
4:1 CRONOFLEX PRINT

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	JCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

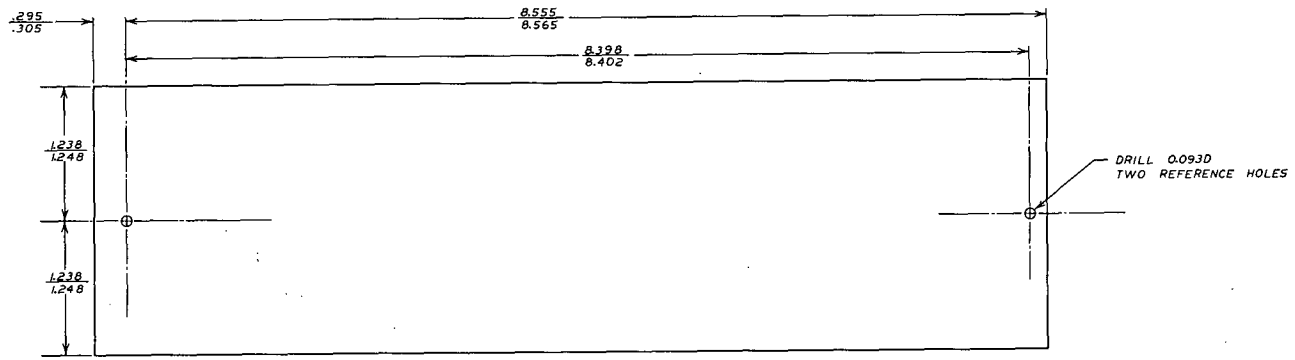
MACROMODULAR PROJECT

TITLE: HORIZONTAL DISTRIBUTOR BOARD. ARTWORK

APPROVED BY	FOR	DATE
JCJ	PROD.	4-23-71

ENG. GCJ
DRAWN BY GWP
CHECKED JCJ

DRAWING NO. 441-36
DATE 4-23-71



0.062 FR-4 LAMINATE

BLANK OUTLINE

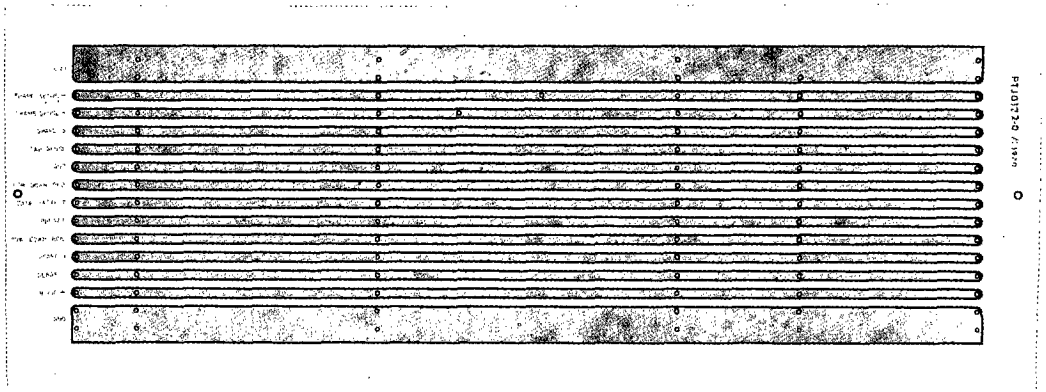
CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

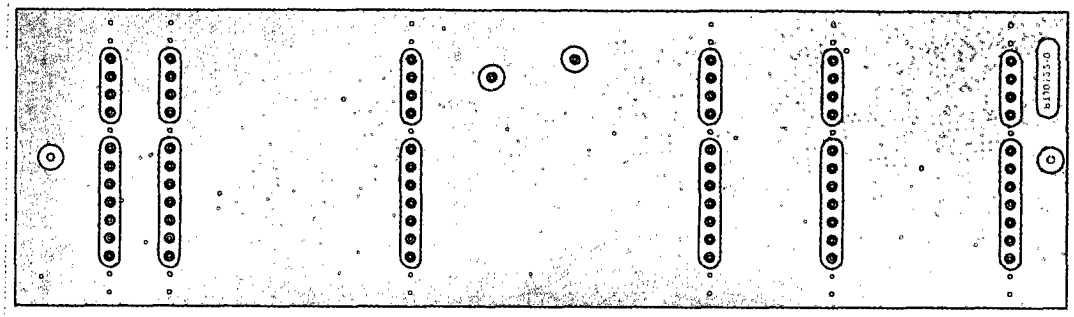
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE
VERTICAL DISTRIBUTOR BOARD

APPROVED BY	FOR	DATE	ENG	DRAWING NO
GCJ	PROD	3-10-71	GCJ	441-37
			DRAWN BY PLL	
			CHECKED GCJ	DATE 1-22-71





ARTWORK SUPPLIED AS
4:1 CRONOFLEX PRINT

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

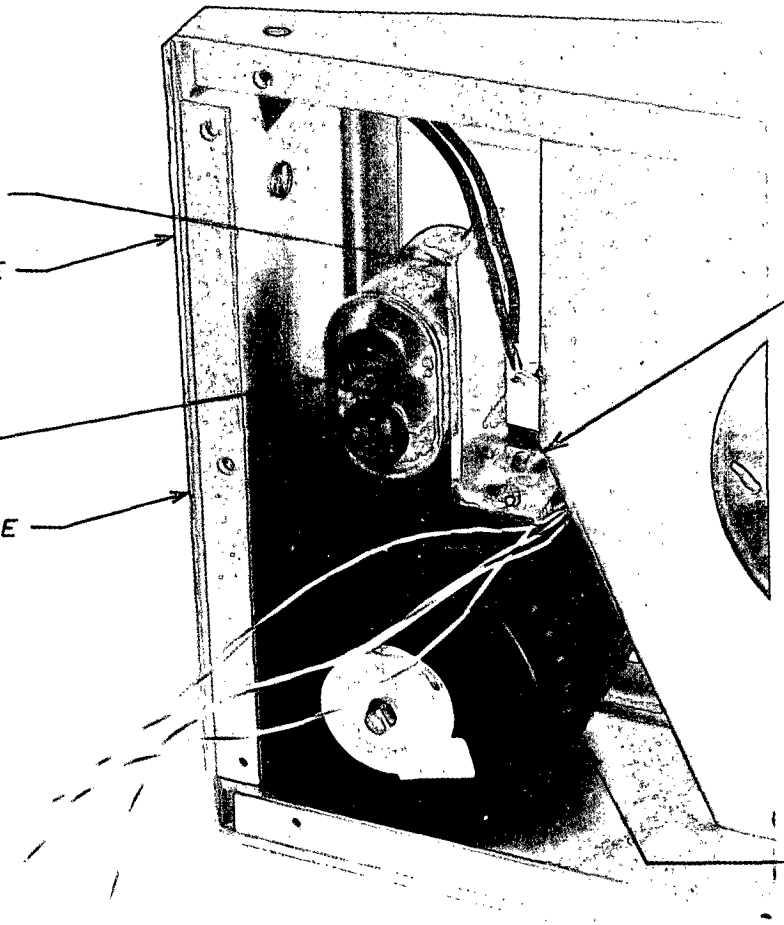
MACROMODULAR PROJECT

TITLE: VERTICAL DISTRIBUTOR BOARD ARTWORK

APPROVED BY	FOR	DATE
GCJ	PROD.	4-23-71

ENG. GCJ
DRAWN BY GWP
CHECKED GCJ

DRAWING NO. 441-38
DATE 4-22-71



CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

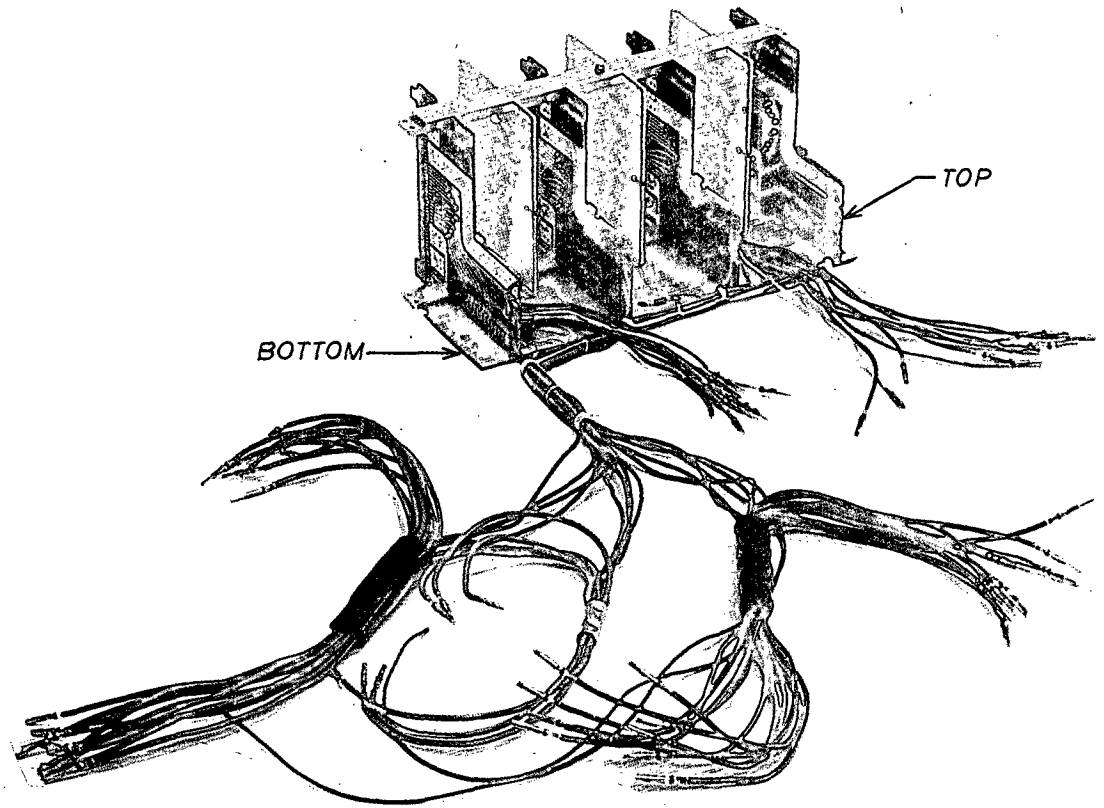
MACROMODULAR PROJECT

TITLE: MOTOR SUBASSEMBLY

APPROVED BY	FOR	DATE
GCJ	PROD.	4-23-71
"		

ENG. GCJ
DRAWN BY GWP
CHECKED GCJ

DRAWING NO. 441-39
DATE 4-19-71



CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	GCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

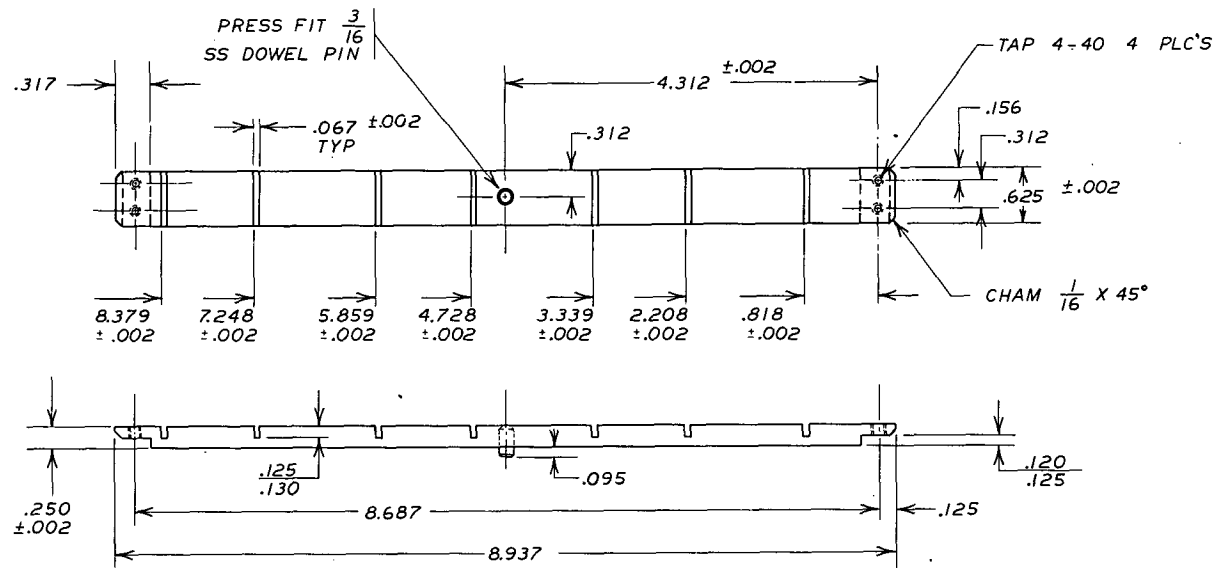
MACROMODULAR PROJECT

TITLE: DUCK PLATE, SPACERS, BOARDS, AND WIRING HARNESS

APPROVED BY	FOR	DATE
GCJ	PROD.	4-23-71

ENG. GCJ
DRAWN BY GWP
CHECKED GCJ

DRAWING NO. 441-40
DATE 4-19-71

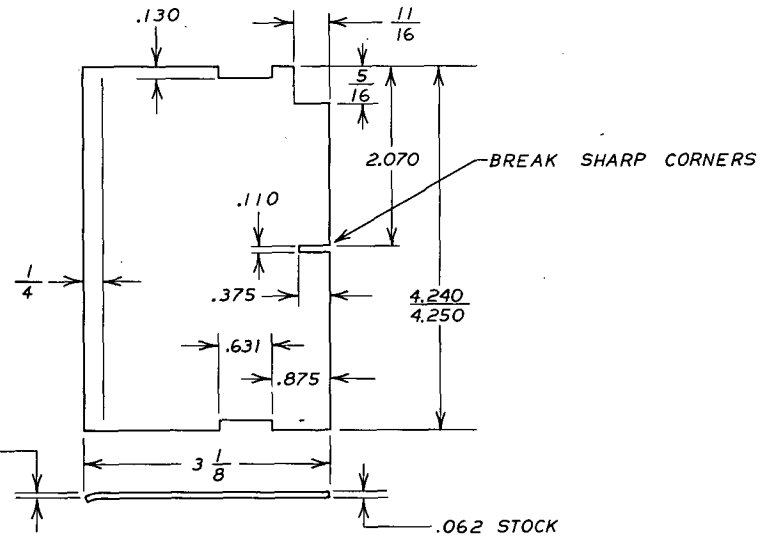


SPACER MAT'L 2024-T3 ALUM
2 REQ'D

TOLERANCE U.O.N.

.XXX	±.005
.XX	±.010
X/X	±1/64

DUCT PLATE MAT'L
3003-H14 ALUM
3 REQ'D



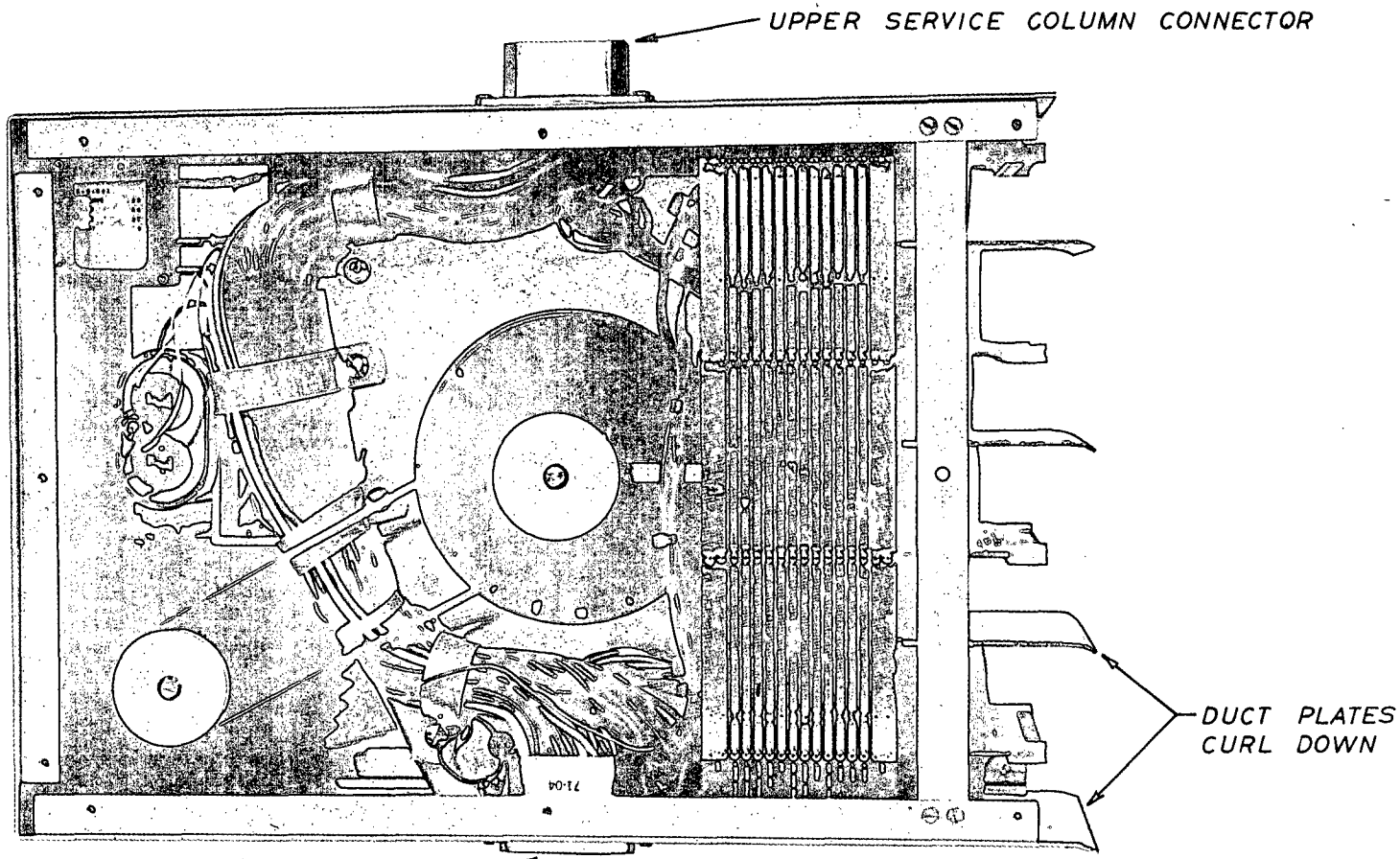
ISSUE	4-26-71	RJA
CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
FAN MODULE
DUCT PLATE & SPACER

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
RCJ	PROD.	4-21-71	RJA	441-41
			DRAWN BY PLL	
			CHECKED GW	DATE 1-5-71



CHANGE NO.	DATE	DESCRIPTION
K	4-10-72	E.C.O. 0250 RJA

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

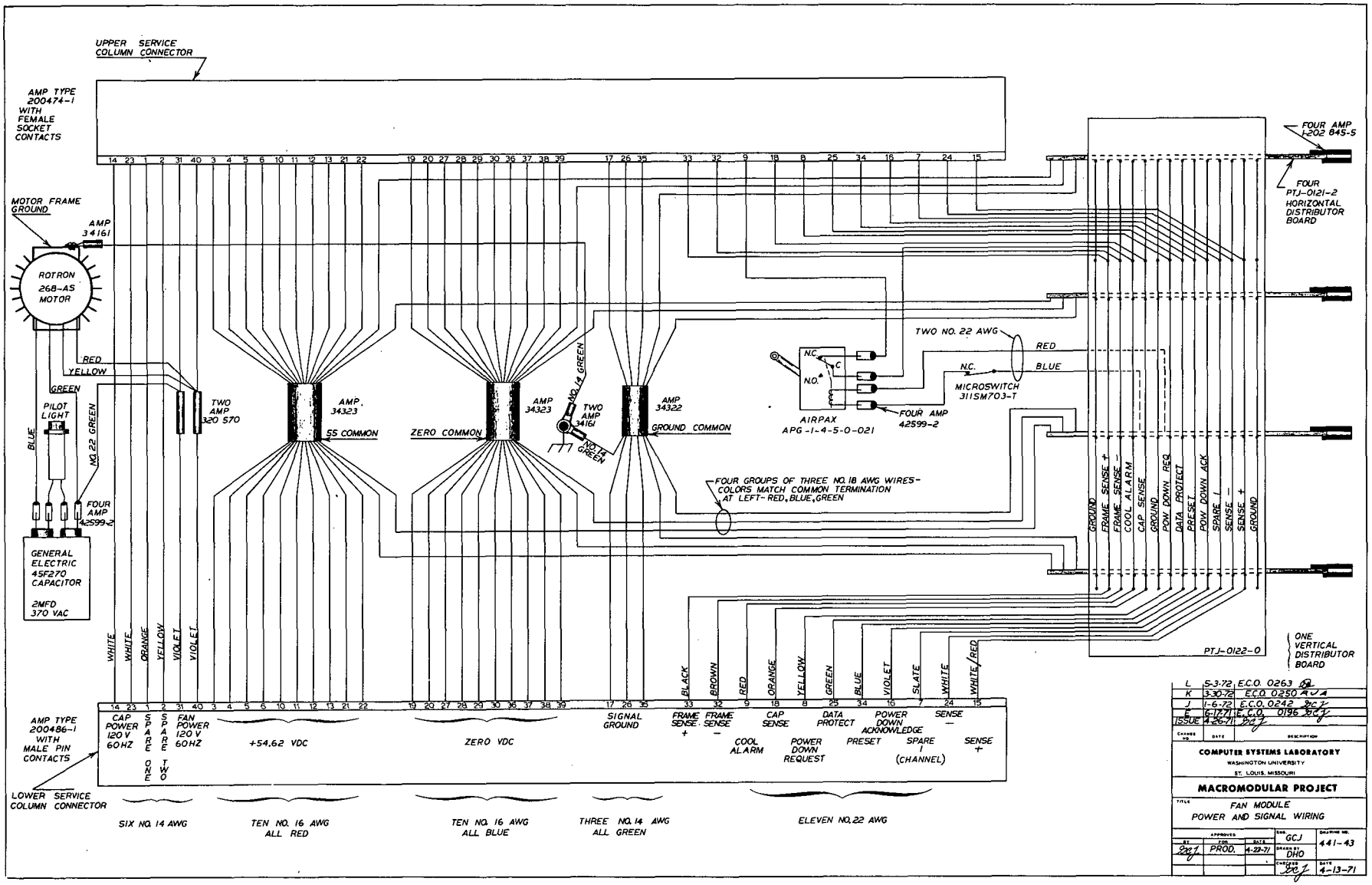
MACROMODULAR PROJECT

TITLE
FAN MODULE – FINAL WIRING

APPROVED BY	FOR	DATE
GCJ	PROD	4-19-72

ENG. GCJ
DRAWN BY PLL
CHECKED RJA

DRAWING NO. 441-42
DATE 4-10-72



ISSUE	CHANGE NO.	DATE	DESCRIPTION
L		5-3-72	E.C.O. 0263
K		3-30-72	E.C.O. 0250
J		1-6-72	E.C.O. 0242
H		6-17-71	E.C.O. 0196
G		4-26-71	

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE
POWER AND SIGNAL WIRING

APPROVES			
BY	FOR	DATE	
	PROD.	4-29-71	

DRAWN BY	GCJ
CHECKED	DHO
DATE	4-13-71
DRAWING NO.	441-43

CONTCH,1 LN=1

CHG.	E.C.O.	DATE	APPR.
K	0250	4/10/72	Rej

FAN MODULE
CONTINUITY CHART

ALL PINS NOTED BETWEEN LINES OF THE SOMBOL -------- ARE CONNECTED IN COMMON

CIRCUIT BREAKER CONTACTS ARE IN CLOSED POSITION

SERVICE COLUMN CONNECTORS	AMP 1-202845-5 CONNECTORS	LOGIC NAME
3,4,5,6, 10,11,12,13, 21,22	1,3,5,7, 9,11,13,77,79, 81,83,85,87,89	55 VOLTS
19,20,27,28, 29,30,36,37 38,39	15,17,19,21, 23,25,27,63, 65,67,69,71,73,75	ZERO VOLTS
17,26,35	ALL EVEN NUMBERED PINS	GROUND
PIN 33 IS CONNECTED TO PIN 32 BY A 16,500 OHM RESISTOR		FRAME SENSE
9	NO CONNECTION	COOL ALARM
18	NO CONNECTION	CAP SENSE
8	41,49	P D REQ
25	39,51	DATA PROTECT
34	37,53	PRESET
16	35,55	P D ACK
7	33,57	SPARE 1
24	31,59	SENSE -
15	29,61	SENSE +
14	NO CONNECTION	CAP POWER
23	NO CONNECTION	CAP POWER
1	NO CONNECTION	SPARE ONE
2	NO CONNECTION	SPARE TWO

CONTCH,2 LN=71

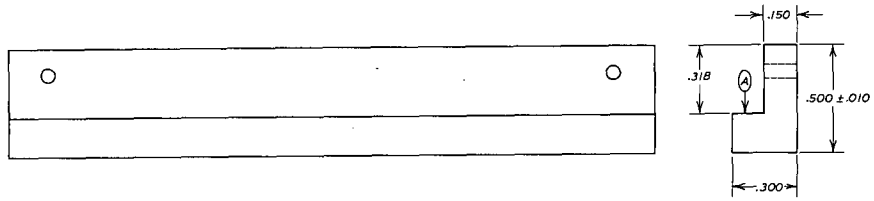
FAN MODULE
CONTINUITY CHART

SERVICE COLUMN CONNECTORS	AMP 1-202845-5 CONNECTORS	LOGIC NAME
31	NO CONNECTION	FAN POWER
40	NO CONNECTION	FAN POWER
NO CONNECTION	43	
NO CONNECTION	45	
NO CONNECTION	47	

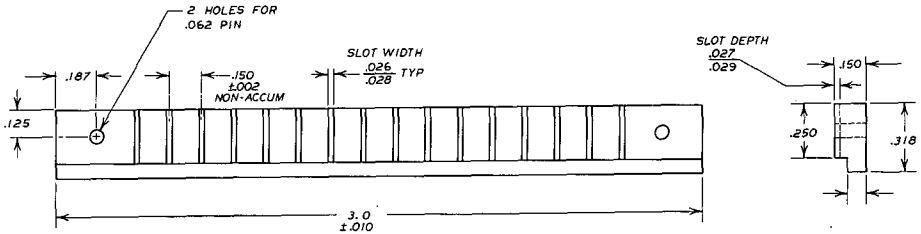
[CONTCH
[GC JOHNS
[21 APRIL 1971
 [REVISED 29 MARCH 1972

CHG.	E.C.O.	DATE	APPR.
K	0250	4/10/72	Dej

Ⓐ HARDEN THIS SURFACE

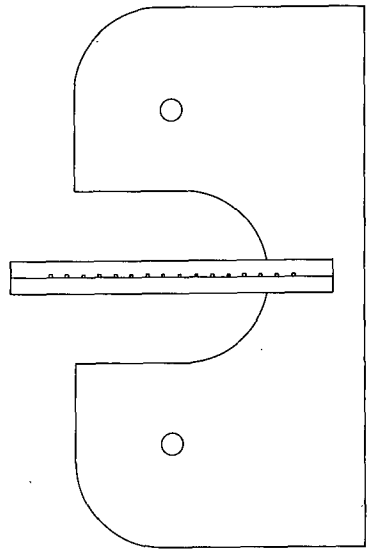


STOP BAR
SCALE 4:1



GUIDE BAR
SCALE 4:1

ORIENTATION OF JIG IN PRESS
(DUE TO BOARD LENGTH)



FOOT OF ARBOR PRESS
SCALE 2:1

ALL DIMENSIONS ±.002 EXCEPT AS NOTED

MATERIAL: HARDENED STEEL

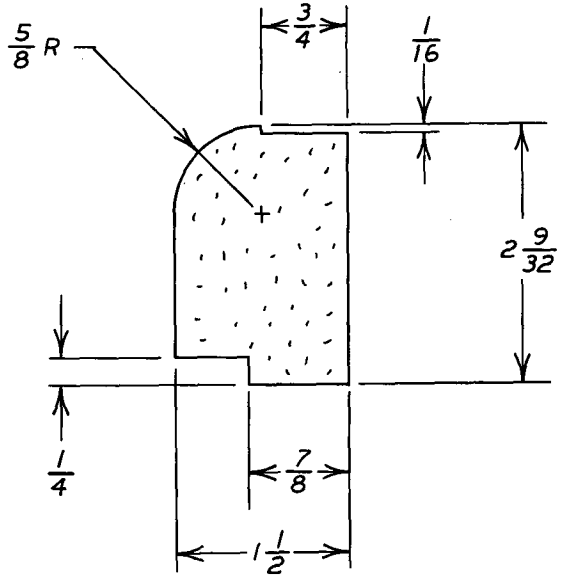
CHANGE NO.	DATE	DESCRIPTION
	ISSUE 4-26-71	DCJ

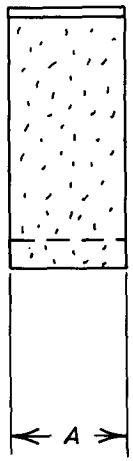
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE
MALE AMP-MODU JIG

APPROVED BY	TITLE	DATE	ENG.	DRAWING NO.
DCJ	PROD	4-23-71	GCJ	441-46
			DRAWN BY PLL	
			CHECKED DCJ	DATE 4-23-71





DIMENSION "A"

4	REQ'D	$1\frac{7}{32}$"
3	REQ'D	$1\frac{15}{32}$"
2	REQ'D	$\frac{3}{4}$"

BAFFLES MAT'L POLYURETHANE FOAM
5 lb/FT³ DENSITY

TOLERANCE $\pm\frac{1}{32}$"

CHANGE NO.	DATE	DESCRIPTION
ISSUE	4-26-71	RCJ

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
FAN MODULE
URETHANE BAFFLES

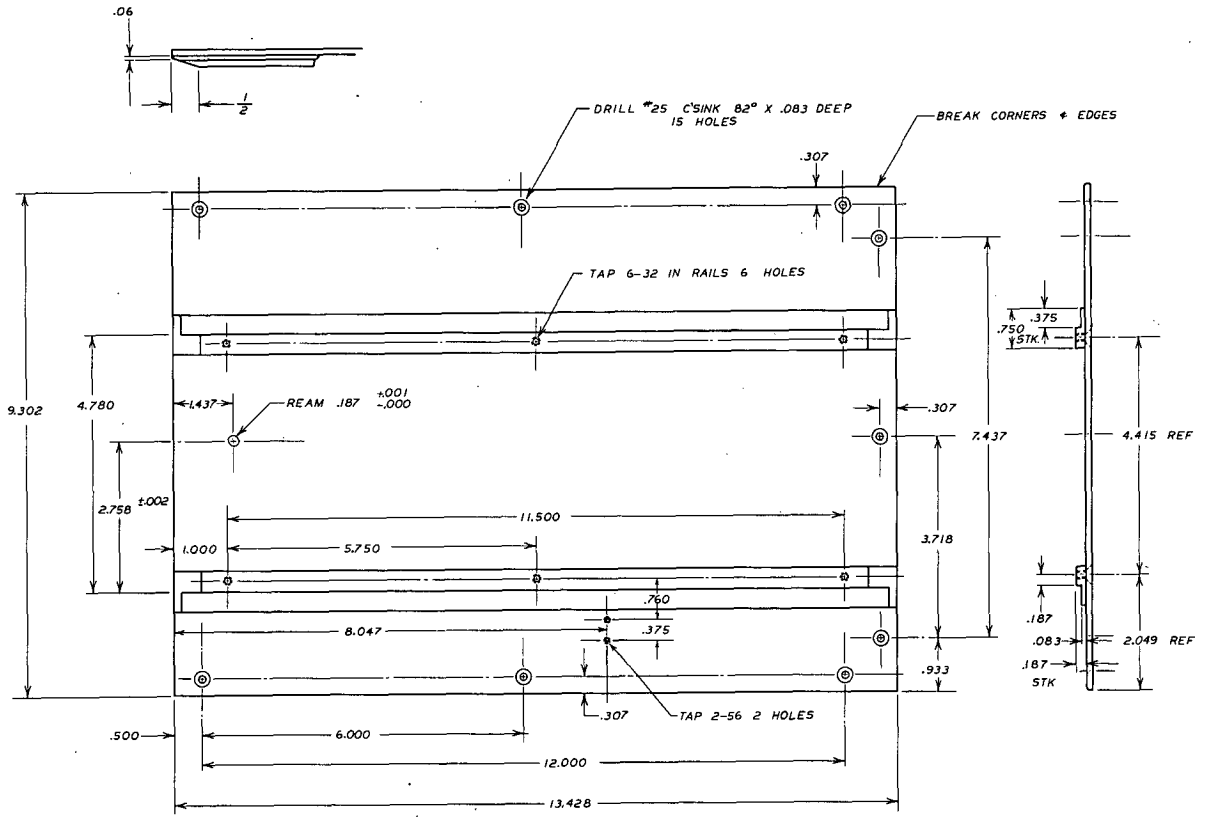
APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
Jab	Prod	3-9-71	RJA	441-47
			DRAWN BY DHO	
			CHECKED	DATE 1-13-71

TOLERANCE U. O. N.

.XXX ±.005

.XX ±.010

X/X ± 1/64



SIDE PANEL MAT'L .100 ALUM (2024-T3)

RAILS 3/4 X 3/16 ALUM (2024-T3)

1 R.H. & 1 L.H. ASSEMBLY REQ'D

CHANGE NO.	DATE	DESCRIPTION
	ISSUE 4-26-71	

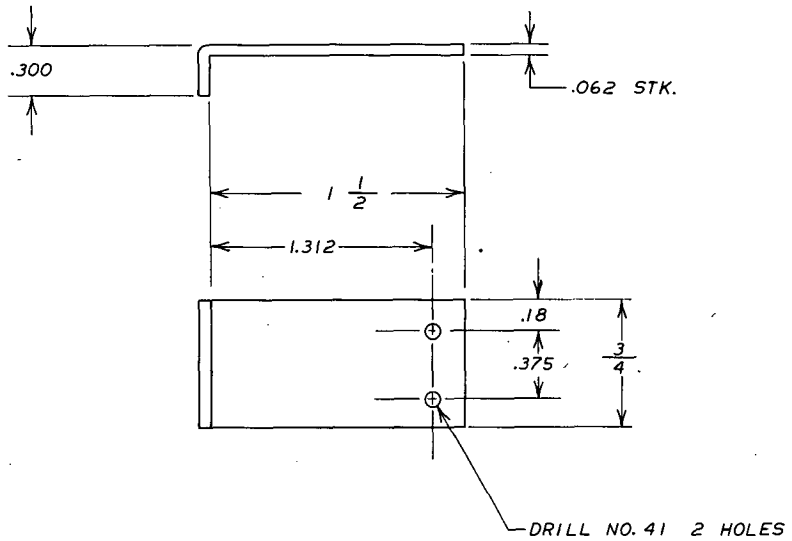
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FAN MODULE
SIDE PANEL & RAILS

APPROVED BY	FOR	DATE
WC	Proj	3-7-71

ENG. R J A
DRAWN BY PLL
CHECKED
DRAWING NO. 441-48
DATE 1-6-71



TOLERANCE U.O.N.

XXX ± .005
XX ± .010
X/X ± 1/64

RETAINER CLIP 2 REQ'D.

MAT'L. 304 SS

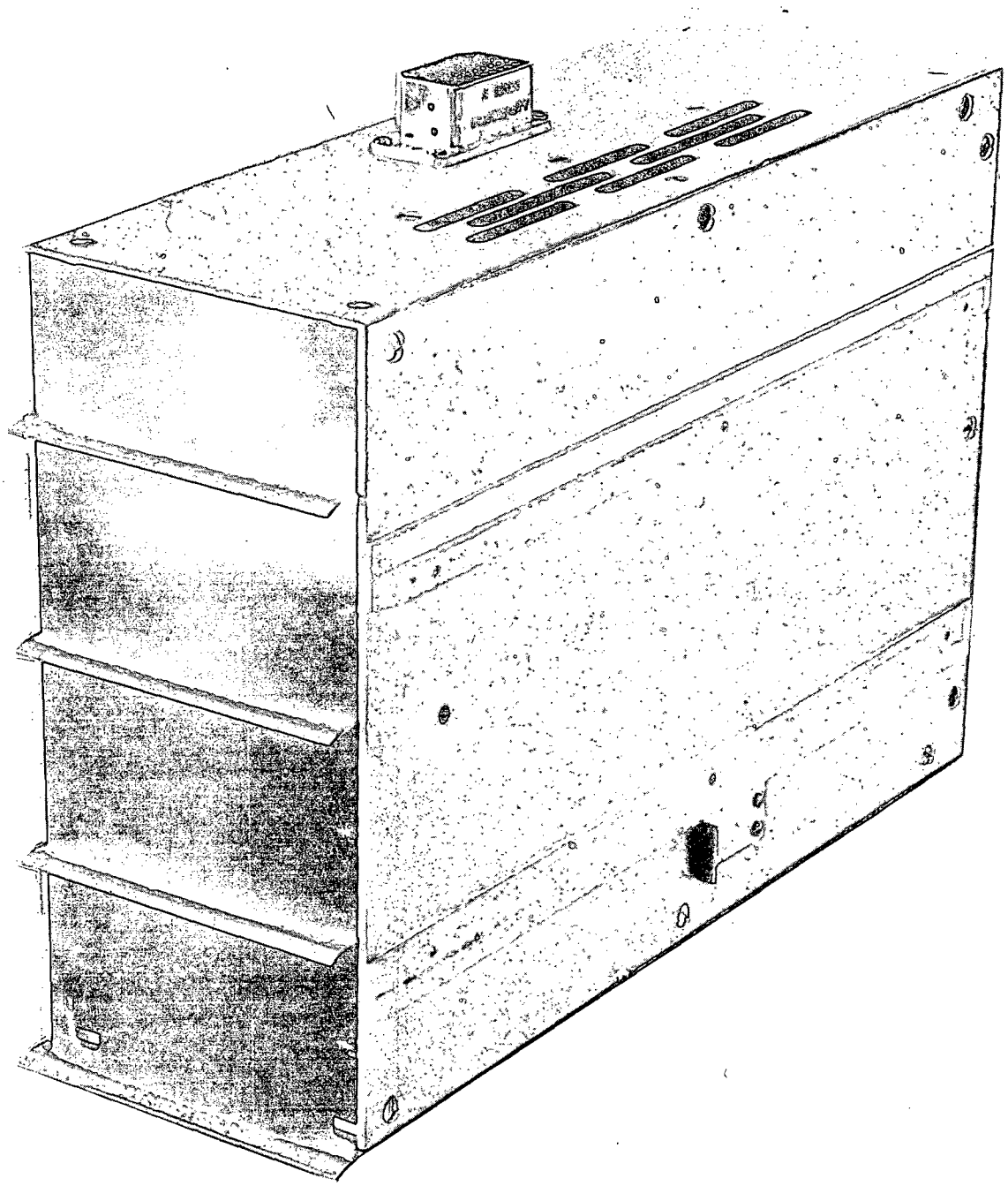
CHANGE NO.	DATE	DESCRIPTION
	ISSUE 4-26-71	JRC

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
FAN MODULE RETAINER CLIP

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
WAB	Prod	3-9-71	RJA	441-49
			DRAWN BY PLL	
			CHECKED GM	DATE 3-8-71



COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

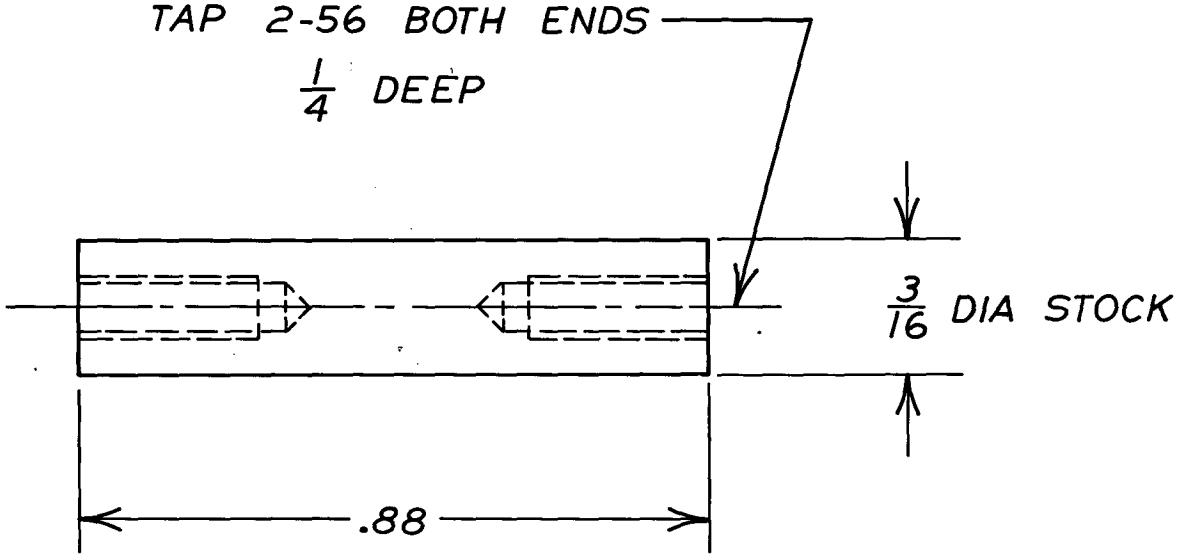
MACROMODULAR PROJECT

TITLE: FAN MODULE
OVERALL VIEW
COMPLETED ASSEMBLY

CHANGE NO.	DATE	DESCRIPTION
J	1-17-72	E.C.O. 0242

APPROVED BY	APPROVED FOR	APPROVED DATE
	PROD	1/19/72

ENG: GCJ
DRAWN BY: DLS
CHECKED:
DRAWING NO.: 441-50
DATE: 1-17-72



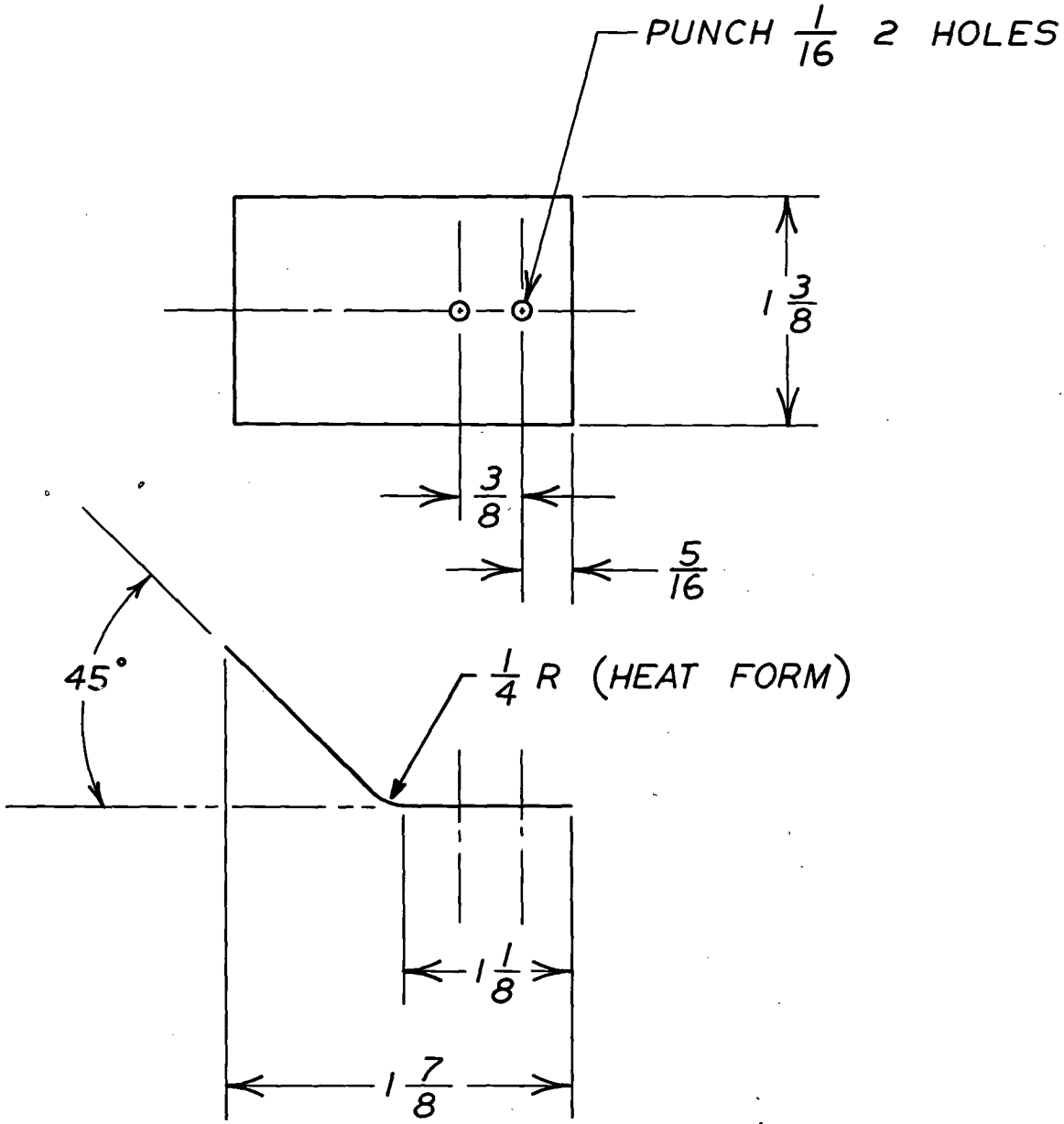
MATERIAL: 3/16 ALUM ROD 2024

FINISH: AS MACHINED

TOLERANCE: ± .010

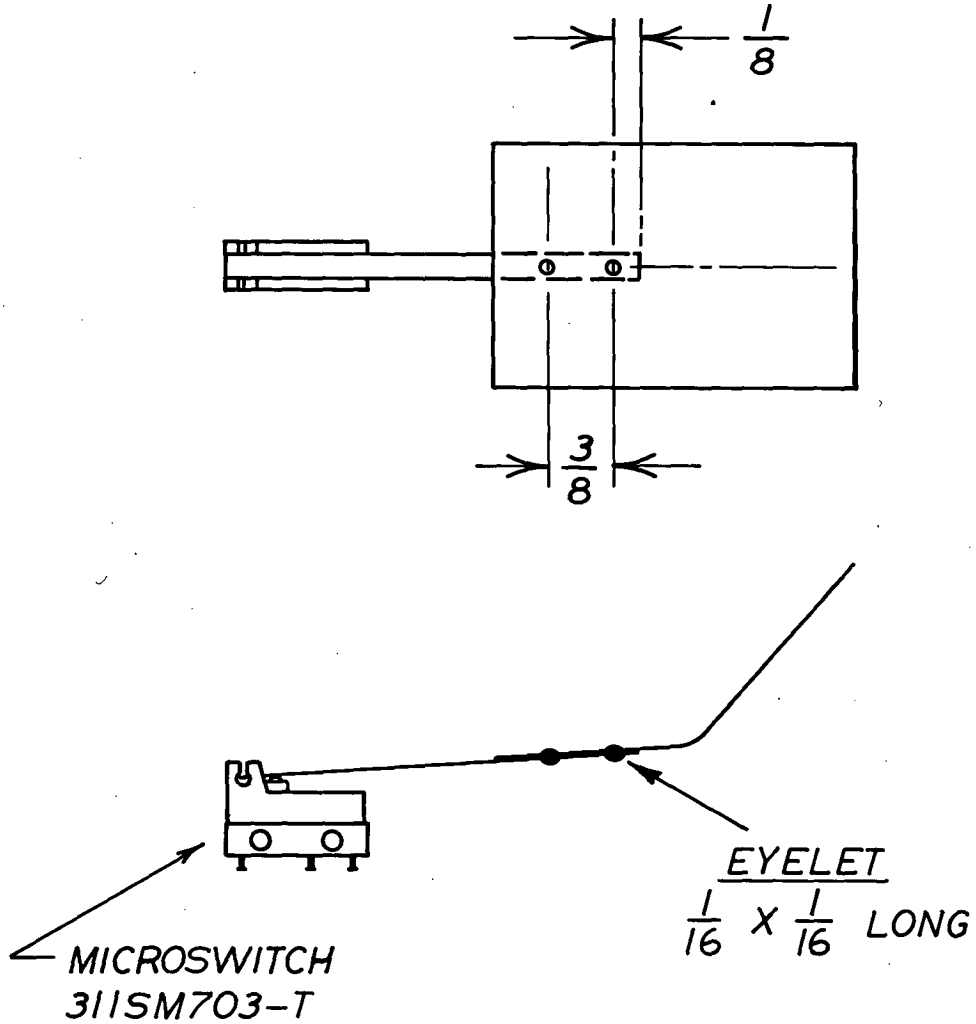
2 REQUIRED

COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			MACROMODULAR PROJECT				
			TITLE: FAN MODULE MICROSWITCH STAND OFF				
			APPROVED			ENG: RJA	DRAWING NO.: 441-51
			BY	FOR	DATE		
K	3-16-72	E.C.O. 0250 RCJ	RJA	PROD	1-19-72	DRAWN BY: PLL	
CHANGE NO.	DATE	DESCRIPTION				CHECKED: RCJ	DATE: 3-16-72



MAT'L: .010 MYLAR (CLEAR)
1 REQ'D.

COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			MACROMODULAR PROJECT				
			TITLE: FAN MODULE MICROSWITCH VANE				
			APPROVED			ENG: RJA	DRAWING NO.: 441-52
			BY	FOR	DATE		
K	3-16-72	E.C.O. 0250 pcj	RJA	PROD	1-19-72	DRAWN BY: PLL	
						CHECKED: pcj	DATE: 3-16-72
CHANGE NO.	DATE	DESCRIPTION					



COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: FLOW SWITCH VANE ASSEMBLY

CHANGE NO.	DATE	DESCRIPTION
K	3-15-72	E.C.O. 0250 DCJ

APPROVED BY	APPROVED FOR	APPROVED DATE
RJA	PROD	4-19-72

ENG: RJA
DRAWN BY: PLL
CHECKED: DCJ
DRAWING NO.: 441-53
DATE: 3-15-72

"The Orange Connector"

Seventeen fan modules in the Macro Module System have been produced with a lower service connector(AMP -200486-1 type w), whose pin number indication have been reversed. These lower connectors have been coated with orange dykem and a typed notation refering to this page, which contains the conversion table necessary for proper pin location.

These fans <u>are</u> compatible with macro module set ups in all other applications except the ability to read correct numbers from the lower service column connector.

NORMAL FAN MODULE	"THE ORANGE CONNECTOR"
1	6
2	5
3	4
4	3
5	2
6	1
7	14
8	13
9	12
10	11
11	10
12	9
13	8
14	7
15	23
16	22
17	21
18	20
19	19
20	18
21	17
22	16
23	15
24	31
25	30
26	29
27	28
28	27
29	26
30	25
31	24
32	40
33	39
34	38
35	37
36	36
37	35
38	34
39	33
40	32

CHG.	E.C.O.	DATE	APPR.
M	0271	10-6-72	DCJ

CHANNEL COUPLER

PAGE	TITLE	CHANGE
500-1	TITLE PAGE	B
500-2	PARTS LIST	A
500-3 500-4	SPECIFICATIONS FOR MANUFACTURER OF MACROMODULAR CHANNEL COUPLER	B
500-5	P.C. BOARD WIRING AND CONNECTOR PLACEMENT	
500-6	P.C. BOARD LAYOUT AND WIRING	
500-7	CHANNEL COUPLER ASSEMBLY	A
500-8	CHANNEL COUPLER P.C. BOARD ARTWORK AND BLANKING DIMENSIONS	A
500-9	CHANNEL COUPLER GUIDES, BRG. & P.C. PIN	A
500-10	CHANNEL COUPLER HANDLES AND WIRING GUARD	A
500-11	CHANNEL COUPLER WIRING GUIDE	A
500-12	CHANNEL COUPLER CARRIER PAIR	A
500-13	ASSEMBLED CHANNEL COUPLER	

CHG.	E.C.O.	DATE	APPR	CHG	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	0133	12-16-70	RJA								
A	0134	12-22-70	RJA								
B	0143	1-7-71	RJA								

PARTS LIST CHANNEL COUPLER

QTY.	C.S.L. DOC.	PART
6	–	2-56 FLATHEAD SCREWS 3/8 LG. SS
4	–	2-56 FLATHEAD SCREWS 5/16 LG. SS
2	–	2-56 ROUND HEAD SCREWS 3/16 LG. SS
2	–	4-40 FLATHEAD SCREWS 1/8 SS
4	–	CONNECTOR EYELETS SE 35 UNITED SHOE MACHINE
4	–	WIRING GUARD RIVETS .086 X 1/8 SHALLOW HEAD SEMITUBULAR
2	–	SPRING WASHERS 3502-10-03 (SHAKEPROOF)
1	500-4	DIP MOLDED HANDLE (WHITE)
2	–	CONNECTORS AMP NO. 202845-9
2	500-9	GUIDE NO. 2
1	500-9	RH GUIDE NO.1
1	500-9	LH GUIDE NO.1
2	500-9	HANDLE BRGS.
2	500-9	PC PIN
1	500-10	LH HANDLE
1	500-10	RH HANDLE
2	500-8	PC BOARDS
1	500-12	RH CARRIER
1	500-12	LH CARRIER
1	500-10	RH WIRING GUARD
1	500-11	LH WIRING GUARD

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	0133	12-17-70	RJA								
A	0134	12-22-70	RJA								

SPECIFICATIONS FOR MANUFACTURE OF MACROMODULAR CHANNEL COUPLER.

I. Introduction.

The Macromodular Channel Coupler is a connector and wire assembly encased in a mechanically functional carrier to provide a quick-connect-disconnect unit. The carrier serves three main functions - 1. mechanical support and protection for connectors and wiring 2. registration and engagement of coupler connectors with their mates and 3. compliance between pairs of engaged connectors. Wiring serves to complete lateral electrical communication between modular elements.

This document has been divided into two parts. The first part deals with electrical specifications and wiring while the second treats manufacture and specifications relating to mechanical components.

Part 1. Printed Circuit Boards and Wiring

Assembly and wiring of connections, and P.C. boards is shown on page no. 500-6. Wiring of the P.C. boards is accomplished by butting together two of these boards with connectors assembled and soldering to them 15 twisted pair of no.30 teflon coated stranded wires. A typical pair is illustrated on page 500-6. One wire of the pair connects adjacent pads on the butted boards while the other ties together both ground planes.

Soldering technique must be carefully supervised. All connections will be made with a temperature controlled iron (600°F) such as the Weller W-TCP. The solder used shall have a nominal composition of 60% tin and 40% lead. All flux residues from chlorinated hydrocarbon cleaners must be removed to prevent corrosion.

For further information concerning P.C. specifications the manufacturer is referred to CSL document PC-1.

Part 2. Manufacture of Mechanical Components

Page no's. 500-7 through 500-12 are a set of mechanical drawings fully describing components and assembly of the channel coupler. The following specifications will apply to these drawings unless specifically stated otherwise.

All three digit decimals will have a tolerance of $\pm$ .005 in. associated with them.

All aluminum parts will be machined from 6061-T6 alloy.

All stainless steel parts will be fabricated from type 304 alloy.

CHG.	E.C.O.	DATE	APPR.
ISSUE	0133	12-16-70	RJA

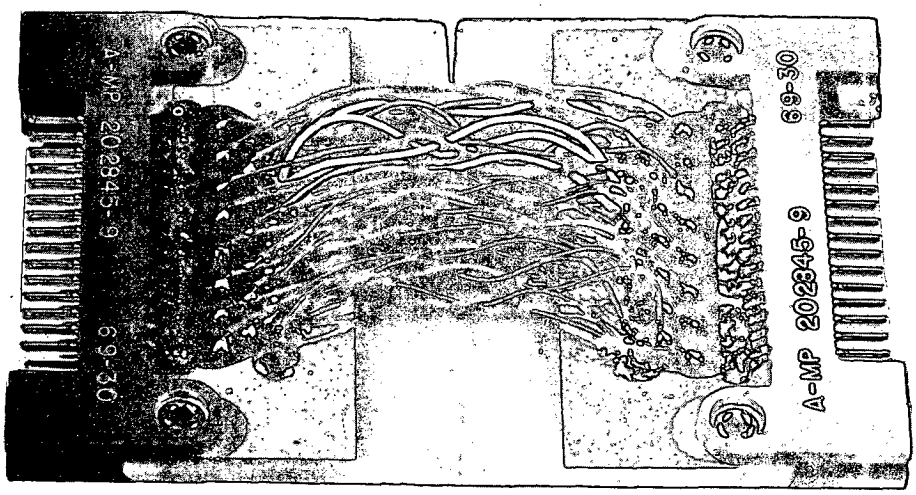
Finish

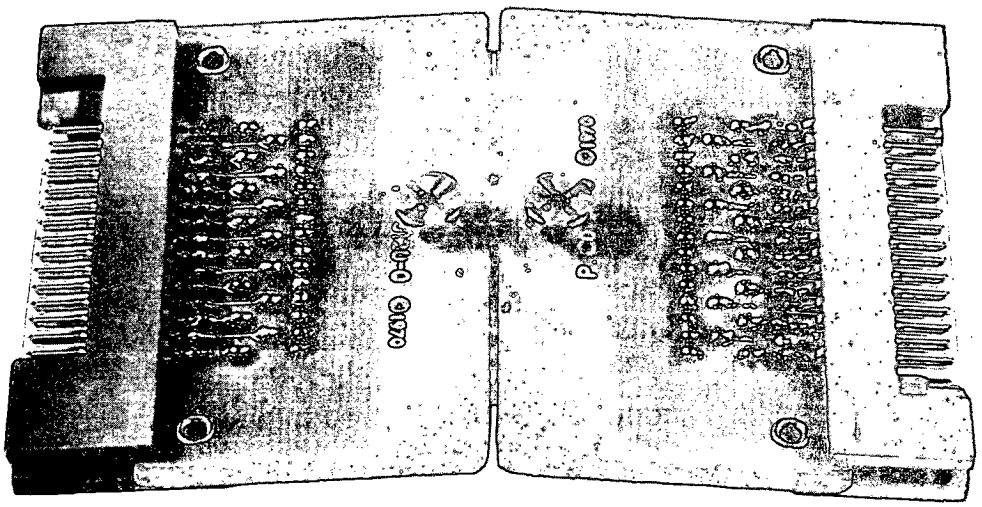
Aluminum parts will be lightly shot peened to remove all tool marks and scratches followed by a clear anodize. All stainless steel parts visible after assembly will have a bright finish free from scratches or other blemishes. Internal parts that cannot be seen in assembly need not be finished.

Plastisol Handle Grip

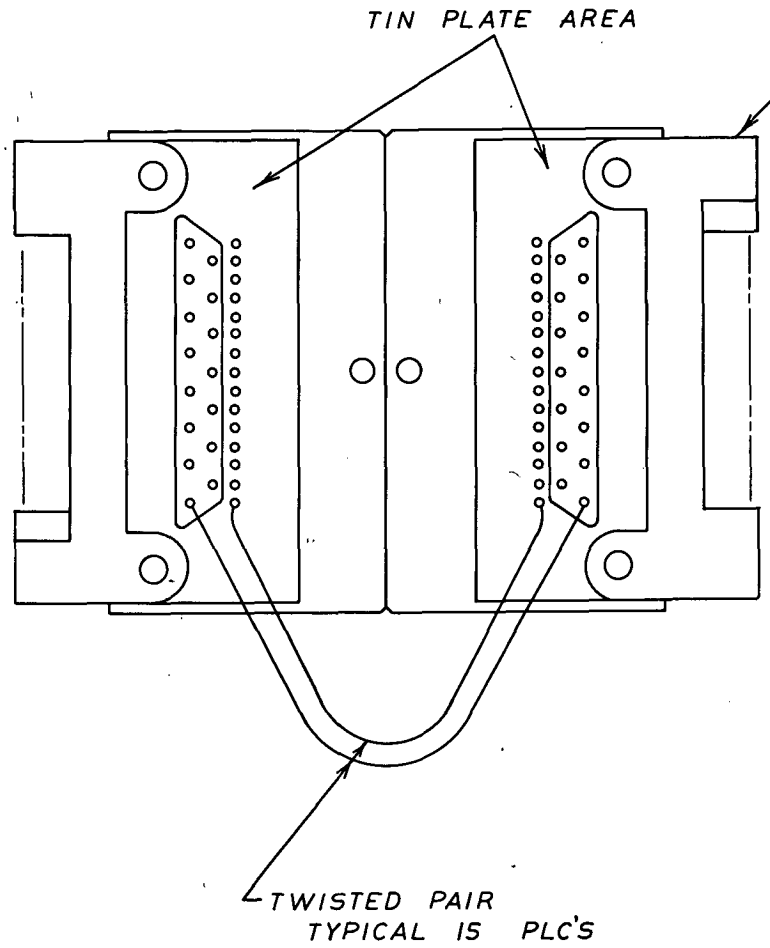
The handle grip for the Channel Coupler shall be made by the dip molding process. A mandrel 3/8 x .080 will be used to manufacture a flat ended grip with an overall inside length of 15/16 in. The color of this grip will be white.

CHG	ECN	DATE	APPR
ISSUE	0133	12-17-70	RJA
A	0134	12-22-70	RJA
B	0143	1-7-71	RJA





COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			MACROMODULAR PROJECT				
			TITLE PC BOARD WIRING AND CONNECTOR PLACEMENT				
			APPROVED			ENG RJA	DRAWING NO. 500-5
			BY	FOR	DATE		
ISSUE	12-21-70	E.C.O. 0133 RJA	WJ	PROD	12-21-70	DRAWN BY DLS	
						CHECKED RJA	DATE 12-21-70
CHANGE NO.	DATE	DESCRIPTION					



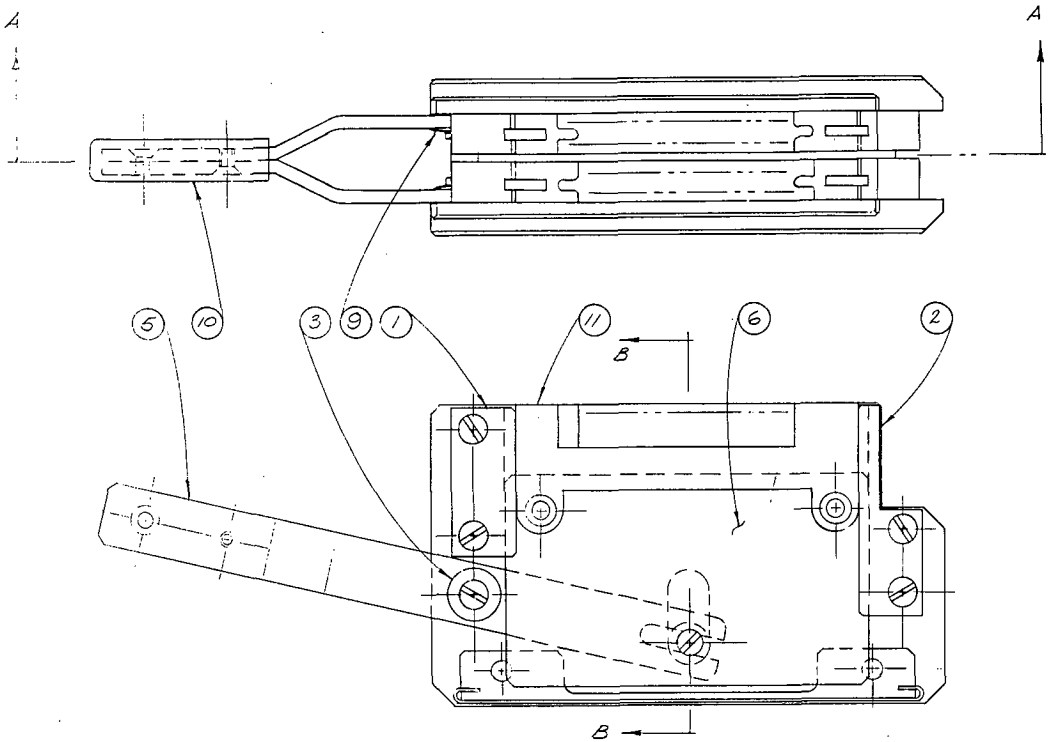
CHANGE NO.	DATE	DESCRIPTION
ISSUE	12-21-70	E.C.O. 0133 RJA

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

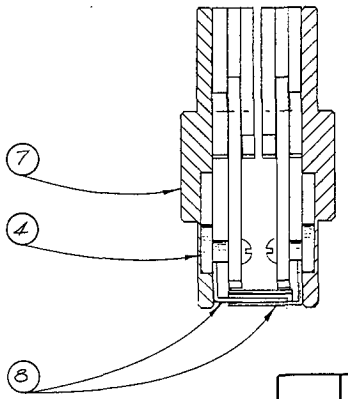
MACROMODULAR PROJECT

TITLE
P.C. BOARD
LAYOUT & WIRING

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
JAC	PROD	12-17-70	RJA	500-6
			DRAWN BY PLL	
			CHECKED RJA	DATE 12-17-70



SECTION AA



SECTION BB

NOTE P.C. BOARD & CONNECTOR ARE NOT SHOWN SECTIONED

① GUIDE #2
② GUIDE #1 (RH OR LH)
③ HANDLE BEARING
④ PC PIN
⑤ HANDLES (LH OR RH)
⑥ PC BOARD
⑦ CARRIER (RH OR LH)
⑧ WIRING GUARD (RH OR LH)
⑨ SPRING WASHER
⑩ HANDLE GRIP
⑪ CONNECTOR

CHANGE NO.	DATE	DESCRIPTION
A	12-23-70	E.C.O. 0134 RJA
ISSUE	12-15-70	E.C.O. 0133 RJA

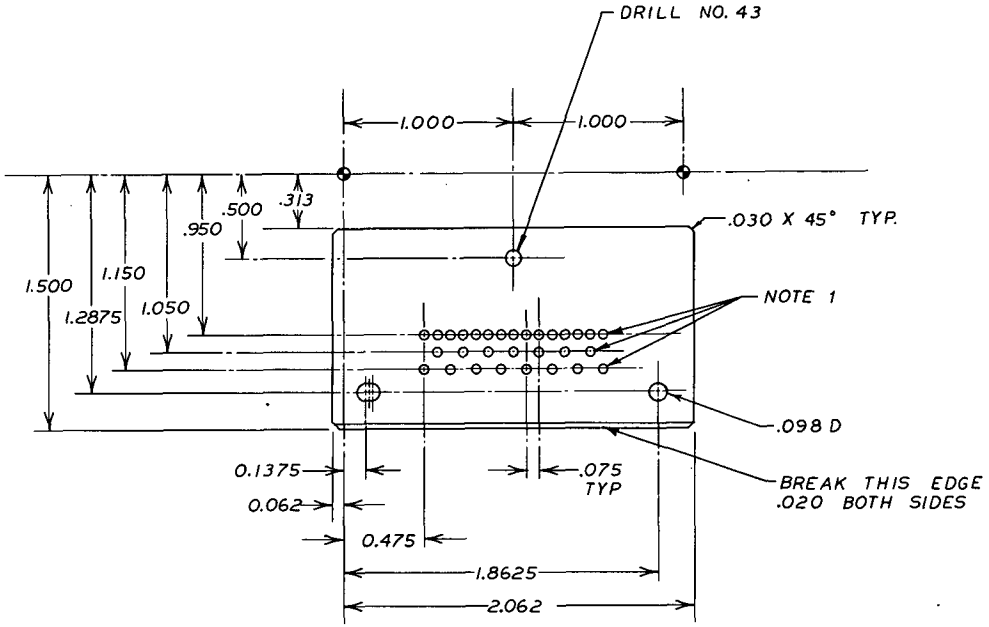
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

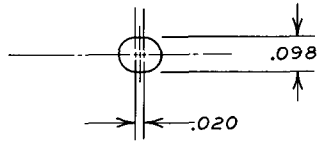
TITLE CHANNEL COUPLER ASSEMBLY

APPROVED BY	FOR	DATE
[illegible]	PROD.	12-18-70

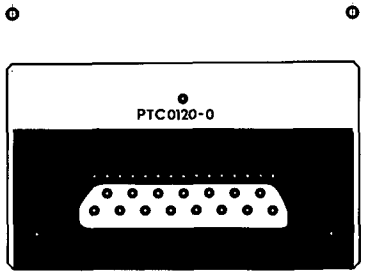
ENG RJA
DRAWN BY RJA
CHECKED [illegible]
DRAWING NO. 500-7
DATE 12-5-70

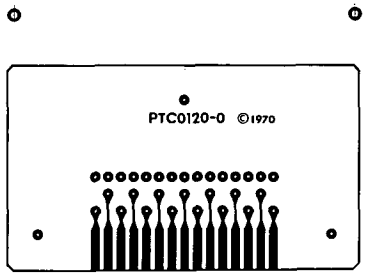


MATERIAL: $\frac{1}{16}$" P.C. BOARD 2 REQ'D.



SLOT DETAIL





NOTE: ARTWORK SUPPLIED AS 4:1 CRONAFLEX PRINT.

NOTE 1: 30 PLATED THROUGH HOLES TYPE "B"

NOTE 2: REFER TO CSL SPECIFICATION PC-1

CHANGE NO.	DATE	DESCRIPTION
A	12-22-70	E.C.O. 0134 RJA MTK.

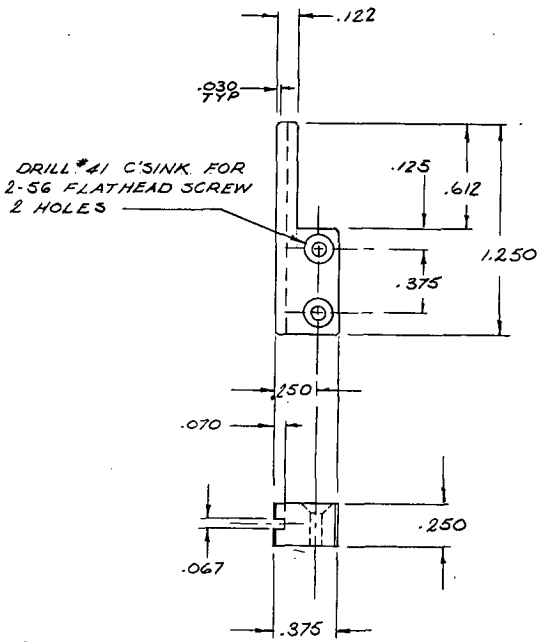
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

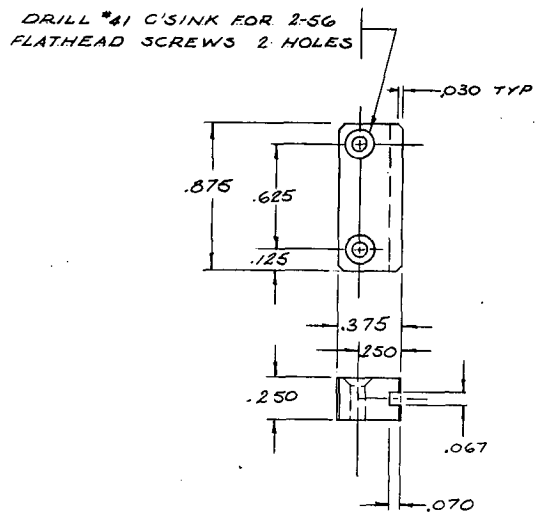
TITLE: CHANNEL COUPLER PC BOARD ARTWORK AND BLANKING DIMENSIONS

APPROVED BY	FOR	DATE
MTK	PROD	12-22-70

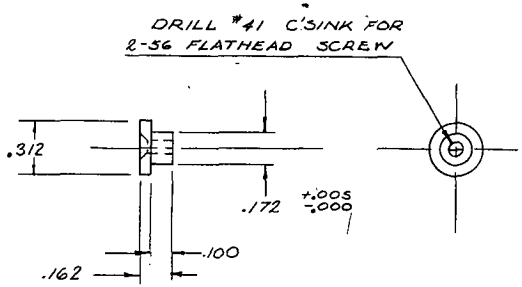
ENG. REO
DRAWN BY PLL
CHECKED MTK.
DRAWING NO. 500-8
DATE 12-22-70



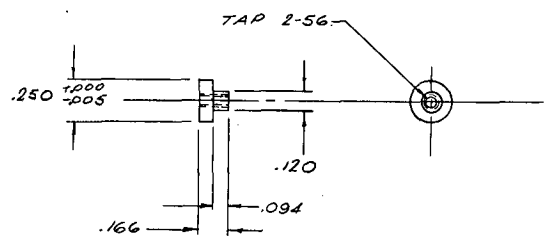
GUIDE #1 - MAT'L NYLON OR EQUIV
1 RH & 1 LH REQ'D



GUIDE #2 - MAT'L NYLON OR EQUIV
2 REQ'D



HANDLE BRG MAT'L SS
2 REQ'D



PC PIN MAT'L SS 2 REQ'D

CHANGE NO.	DATE	DESCRIPTION
A	12-23-70	E.C.O. 0134 RJA
ISSUE	12-15-70	E.C.O. 0133 RJA

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MACROMODULAR PROJECT

TITLE: CHANNEL COUPLER GUIDES, BRG, & PC PIN

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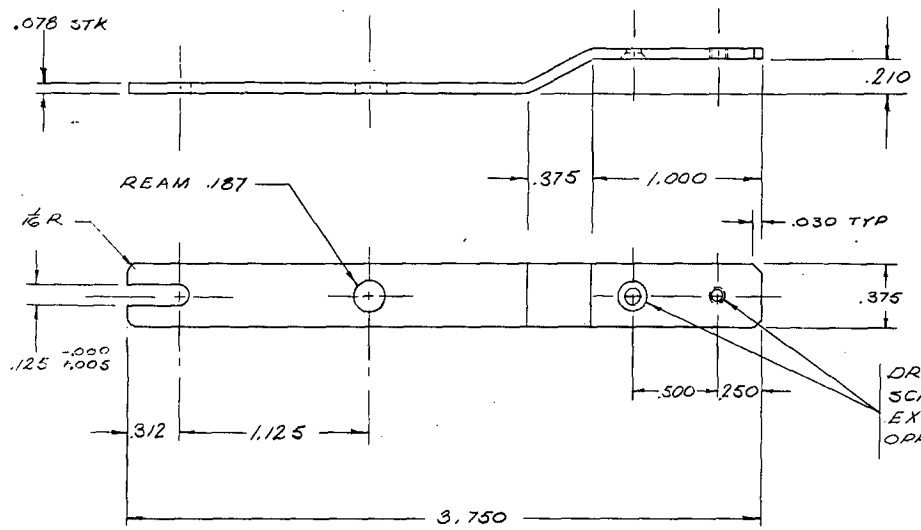
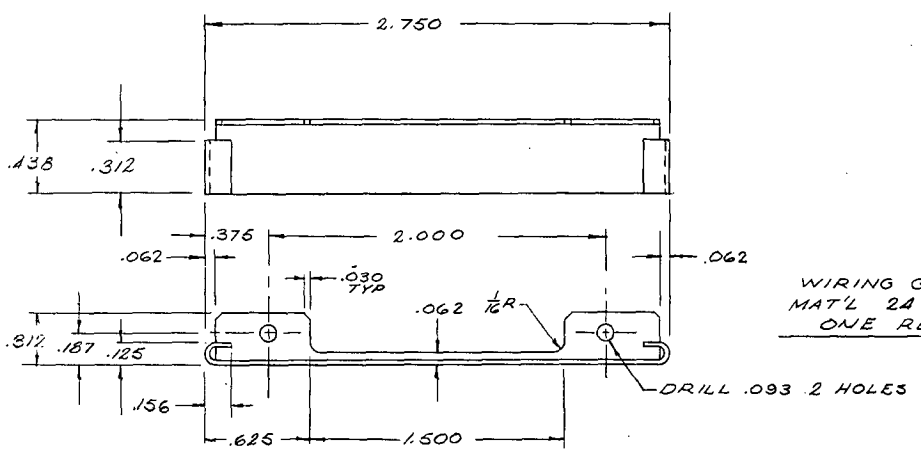
	PROD.	12-14-70	RJA	500-9
			DRAWN BY RJA	
			CHECKED	DATE 11-23-70



HANDLE - MAT'L S.S. 1 LH & 1 RH REQ'D



WIRING GUARD (RH)
MAT'L 24 GA (.025) SS
ONE REQ'D

A	12-22-70	E.C.O. 0134 RJA
ISSUE	12-15-70	E.C.O. 0133 RJA
CHANGE NO.	DATE	DESCRIPTION

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TITLE CHANNEL COUPLER HANDLES & WIRING GUARD

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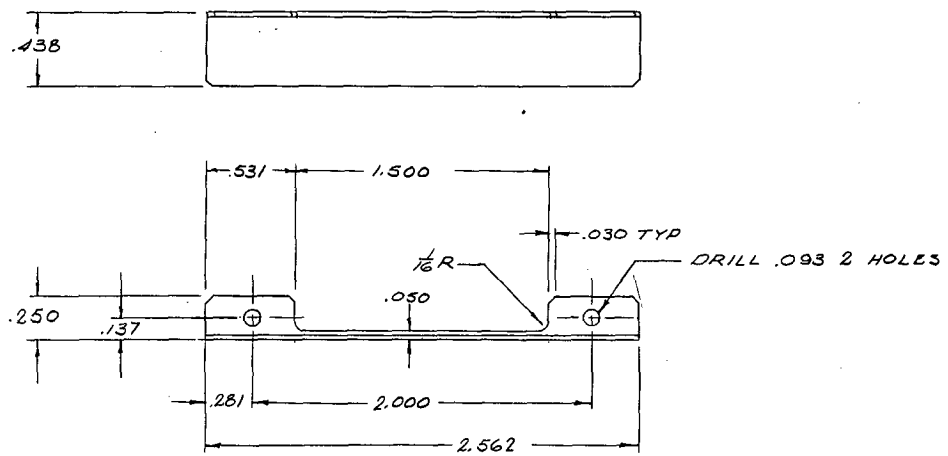
			RJA	500-10
EJ	PROD.	12-14-70	DRAWN BY RJA	
			CHECKED CM	DATE 12-3-70



WIRING GUARD (LH) MAT'L 24GA (.025) SS
ONE REQ'D

CHANGE NO.	DATE	DESCRIPTION
A	12-23-70	E.C.O. 0134 RJA
ISSUE	12-15-70	E.C.O. 0133 RJA

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TITLE CHANNEL COUPLER
WIRING GUARD

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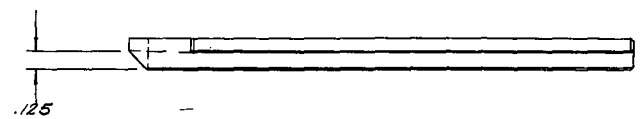
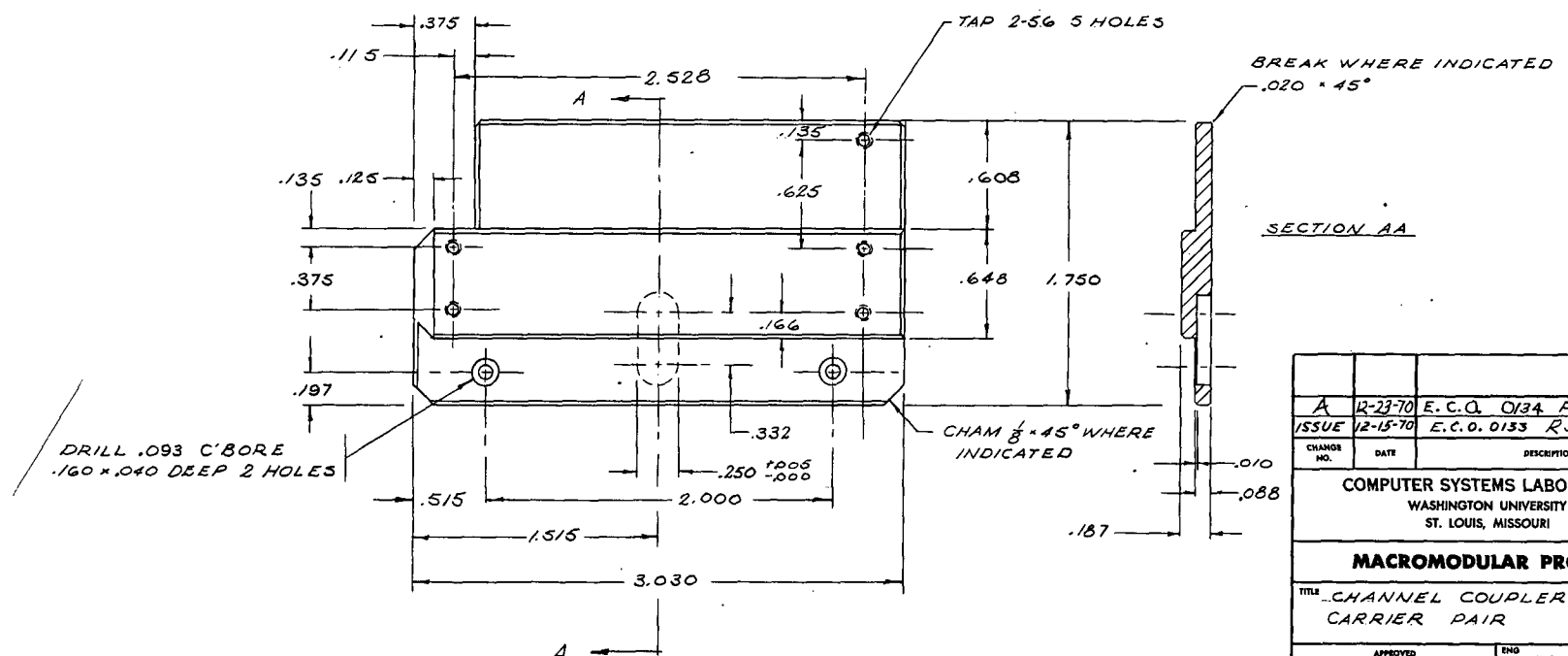
	PROD.	12-14-70	DRAWN BY RJA	
			CHECKED	DATE 12-3-70

MAT'L $\frac{3}{16}$ ALUM 1 RH & 1 LH REQ'D





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TITLE CHANNEL COUPLER CARRIER PAIR

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RJ	PROD.	12-14-70

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DRAWN BY RJA
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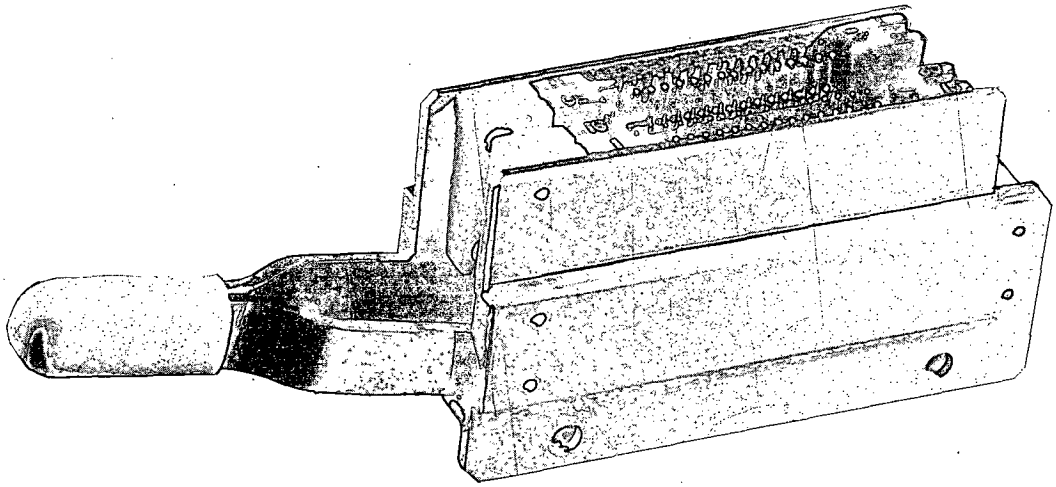
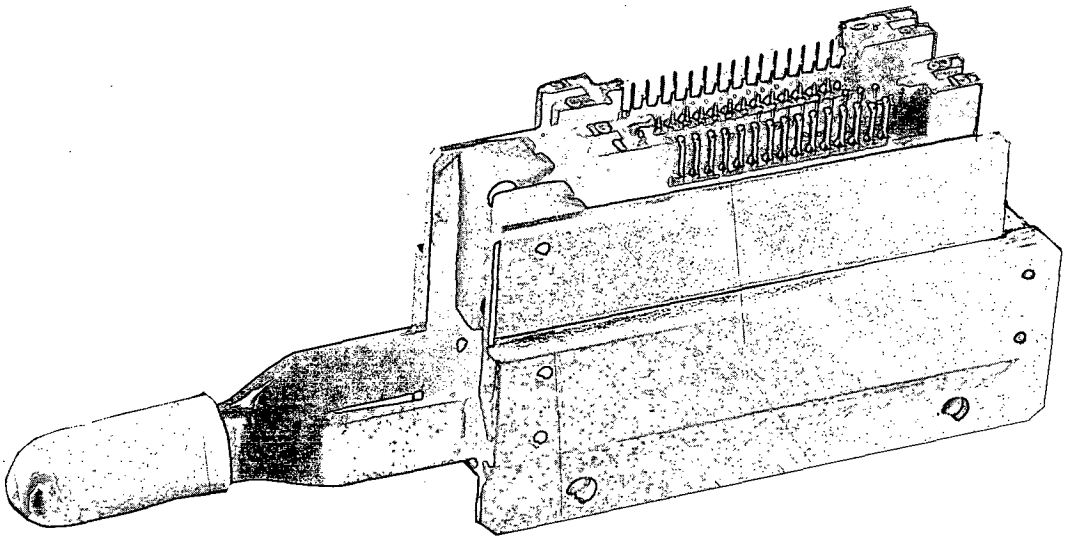
DATE 11-23-70





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TITLE
ASSEMBLED CHANNEL COUPLER

CHANGE NO.	DATE	DESCRIPTION
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[signature]	PROD	12-21-70

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DATE: 12-21-70

COMPUTER SYSTEMS LABORATORY
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903

TYPE 9 FPB P.C. BOARD
ASSEMBLY JIG

PAGE	TITLE	CHANGE
903-1	Title Page	Issue
903-2	Parts List	
903-3	Introduction, Use & Assembly	
903-4	Assembly Template	
903-5	Bar Spacer	

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
Iss	—	6-19-73	RJA								

TYPE 9 FPB P.C. BOARD ASSEMBLY JIG

PARTS LIST

QTY	C.S.L. DOC.	PART
1	903-4	Assembly Template
2	903-5	Bar Spacer
4		4-40X 7/16 Binder Head Machine Screws

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
Iss.	—	6-19-73	RJA								

MACROMODULAR SYSTEMS PROJECT

TYPE 9 FPB PC BOARD ASSEMBLY JIG

INTRODUCTION

This document (903) describes the use and assembly of the Type 9 FPB PC Board Assembly Jig. A list of all required parts is given on page 903-2.

USE

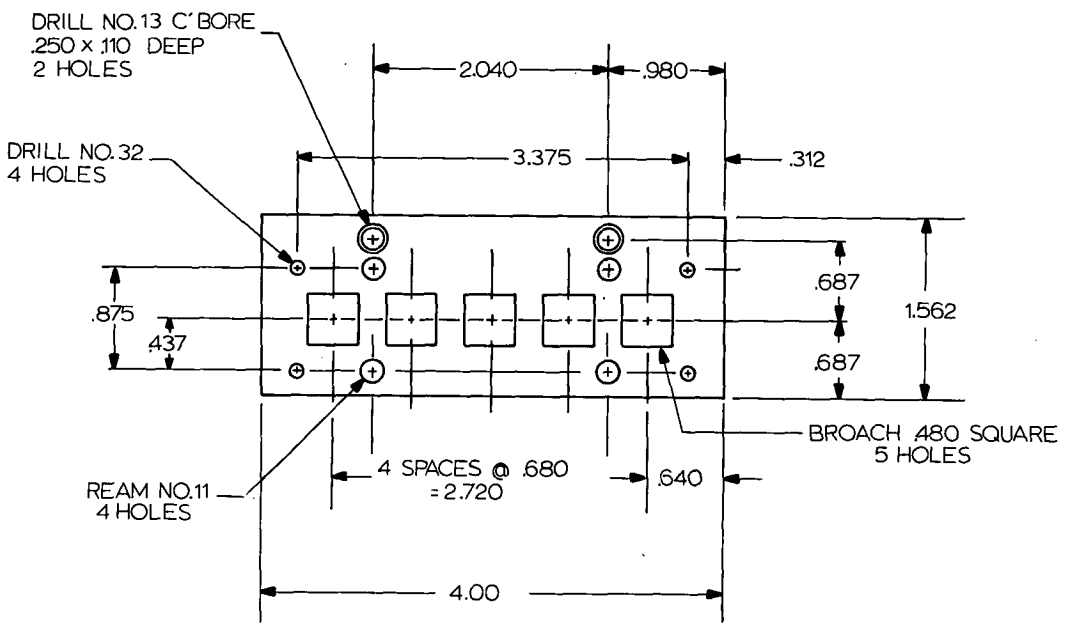
The Assembly Jig is used to facilitate the assembly of the Type 9 Faceplate Box PC Board (refer to CSL Document 309). Details as to its use are given in the Type 9 Faceplate Box Assembly Procedure (page 309-3 and 309-4). The Assembly Jig is pictured on page 309-9.

ASSEMBLY

Align the tapped holes on the two Bar Spacers (part No. 903-5) with the No. 32 holes on the Assembly Template (part No. 903-4). One edge of each Bar Spacer should be in line with the .480 Square Hole Pattern. The No. 13 Counterbore on the Assembly Template should be on the opposite side from the Bar Spacers. Fasten the Bar Spacers to the Assembly Template with the four 4-40 x 7/16 screws.

CHG.	E.C.O.	DATE	APPR
Issue	---	6-19-73	RJA

MATERIAL: .187 ALUMINUM 6061-T6
FINISH: AS MACHINED
TOLERANCE U.O.N.: .XXX ±.005
.XX ±.010
X/X ± 1/64



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TITLE
TYPE 9 FPB P.C. BOARD
ASSEMBLY TEMPLATE

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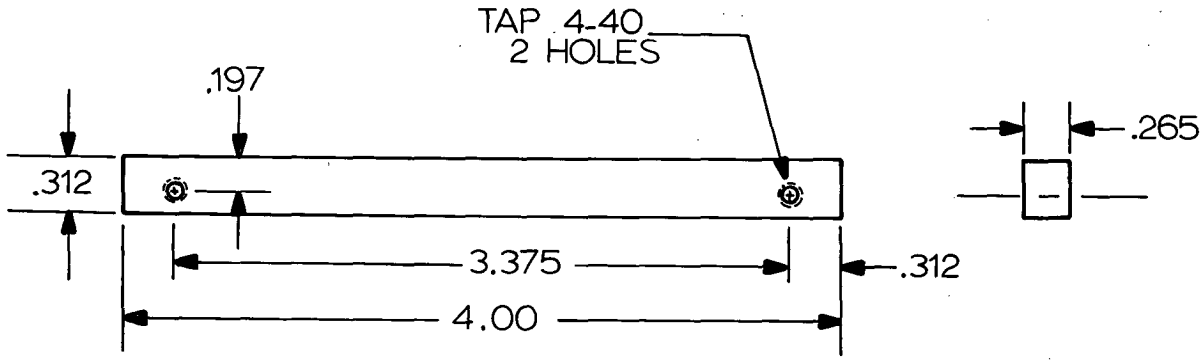
			GM	
			DRAWN BY MAC	903-4
			CHECKED GM	DATE 6-19-73

MATERIAL: ALUMINUM 6061-T6

FINISH: AS MACHINED

TOLERANCE U.O.N.: .XXX ±.005
.XX ±.010
X/X ± 1/64

BREAK CORNERS .010 min.



COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			**MACROMODULAR PROJECT**					
			TITLE TYPE 9 FPB P.C. BOARD BAR SPACER					
			APPROVED			ENG GM	DRAWING NO.	
			BY	FOR	DATE			
ISSUE 6-19-73		RJA				DRAWN BY MAC	903-5	
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4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Final Report 4/1/65 through 12/31/73

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
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13. ABSTRACT

A complete description of electrical and mechanical components, assembly jigs and procedures for manufacture of the macromodular base-pedestal controller, fan module and channel coupler is given.

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Macromodule Base-Pedestal						
Macromodule Fan Module						
Macromodule Channel Coupler						
Macromodule Lateral Extension						
Macromodule Cooling						
Macromodule Service Bus						


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