

2-1974

# Macromodular Computer Design, Part 2, Volume 06, Printed Circuit Board Outlines and Electronic Package Mechanical Drawings

Computer Systems Laboratory, Washington University

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MACROMODULAR  
COMPUTER DESIGN  
PART 2  
MANUFACTURING DESCRIPTION

VOLUME VI

PRINTED CIRCUIT BOARD OUTLINES AND  
ELECTRONIC PACKAGE MECHANICAL DRAWINGS

*Technical Report No. 35*

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. 35**

PART 2 - MANUFACTURING DESCRIPTION  
VOL. VI-PRINTED CIRCUIT BOARD OUTLINES AND ELECTRONIC  
PACKAGE MECHANICAL DRAWINGS

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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

Complete mechanical drawings regarding the manufacture of components and assembly specifications for the macromodular electronic cases and printed circuit board routing dimensions for macromodular electronic assemblies are given.

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FOUR CELL ELECTRONICS CASE

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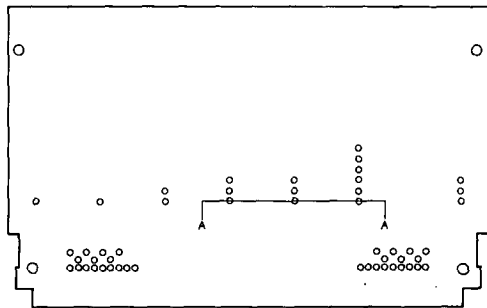
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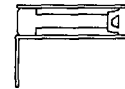
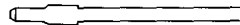
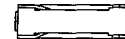
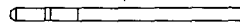
MOTHERBOARD MALE PIN ALIGNMENT



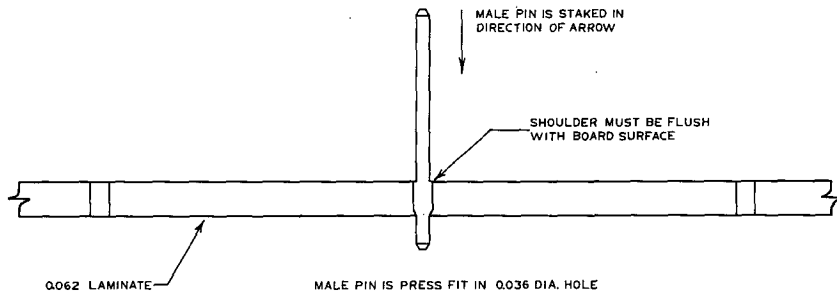
GENERAL ALIGNMENT—  
MALE HAS TWO SMOOTH SURFACES AND MUST MATE  
WITH FEMALE AS SHOWN

MALE 85931-5

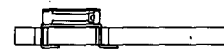
FEMALE 85863-4



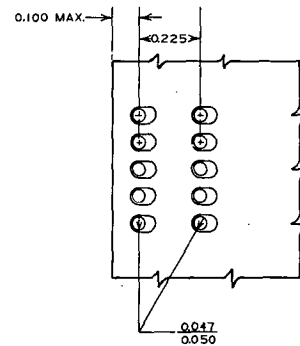
SECTION "A-A"



VERTICAL BOARD FEMALE INSTALLATION

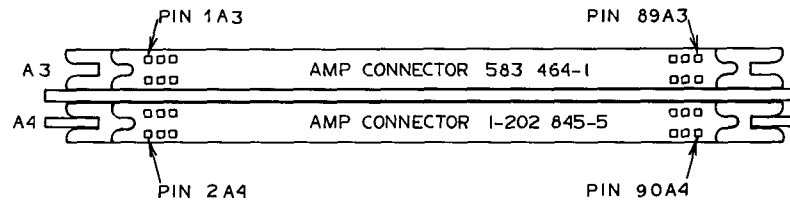
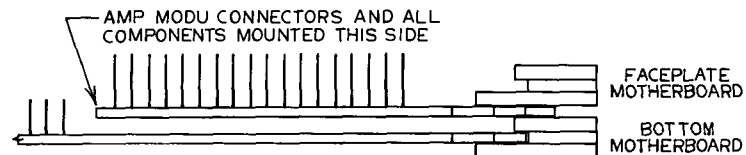
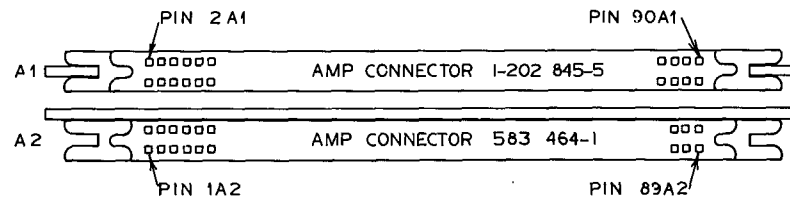
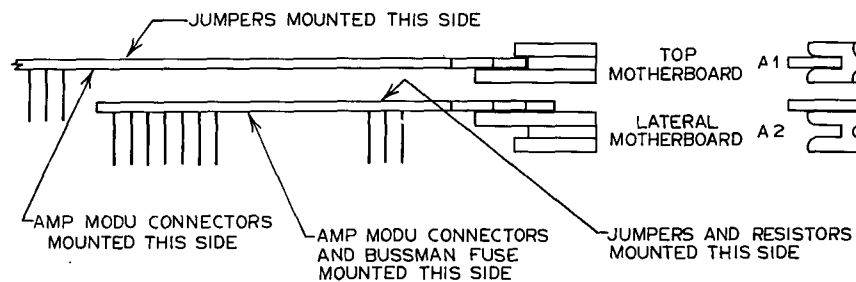


NOTE UNIDIRECTIONAL CRIMPING OF FEMALE

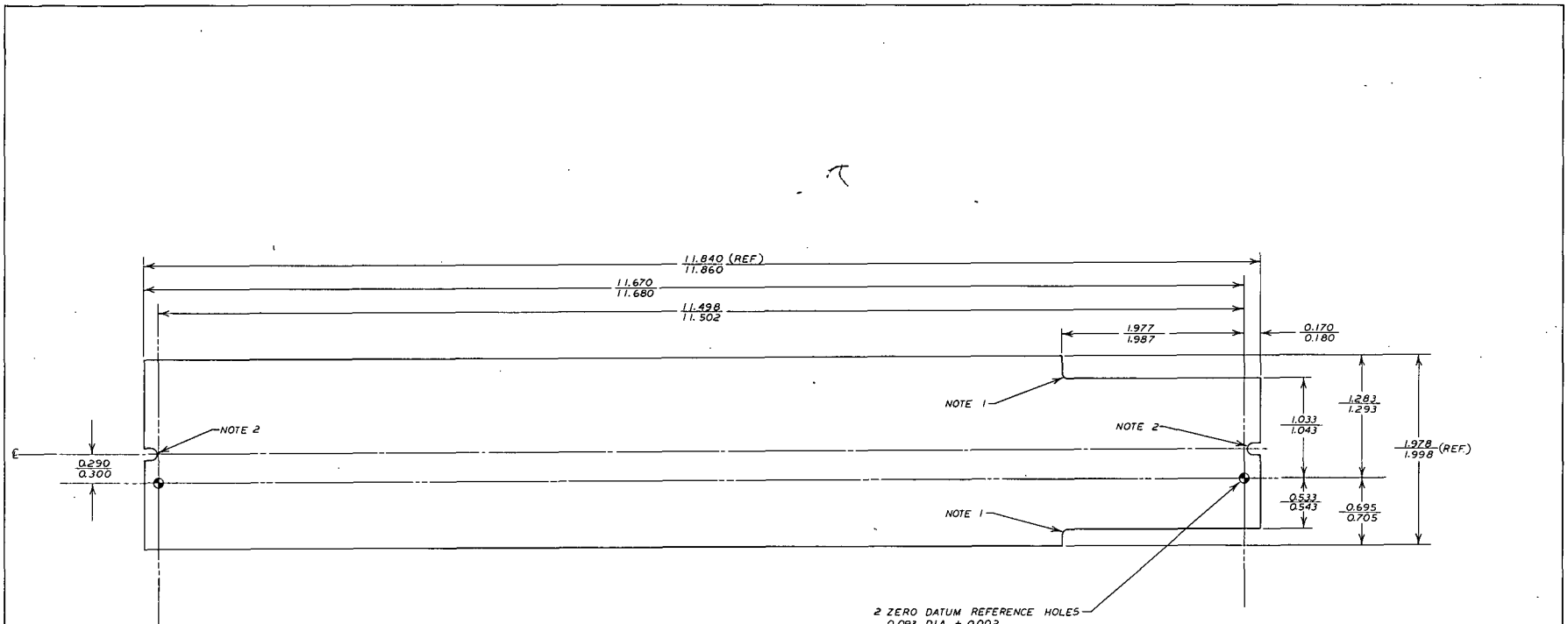


TYPICAL PAD LAYOUT FOR FEMALE

2	3-27-70	NEW DWG. NO.
1	1-19-70	REDRAWN - ADDED TOP VIEWS & LABELING
CHANGE NO.	DATE	DESCRIPTION
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
THIS AMP-MODU CONNECTOR MOUNTING INFORMATION		
APPROVED	DATE	DRAWING NO.
GCJ	GCJ	200.5002
DESIGNED BY	DATE	
PLL	GCJ	6-18-69
CHECKED BY	DATE	
GCJ		



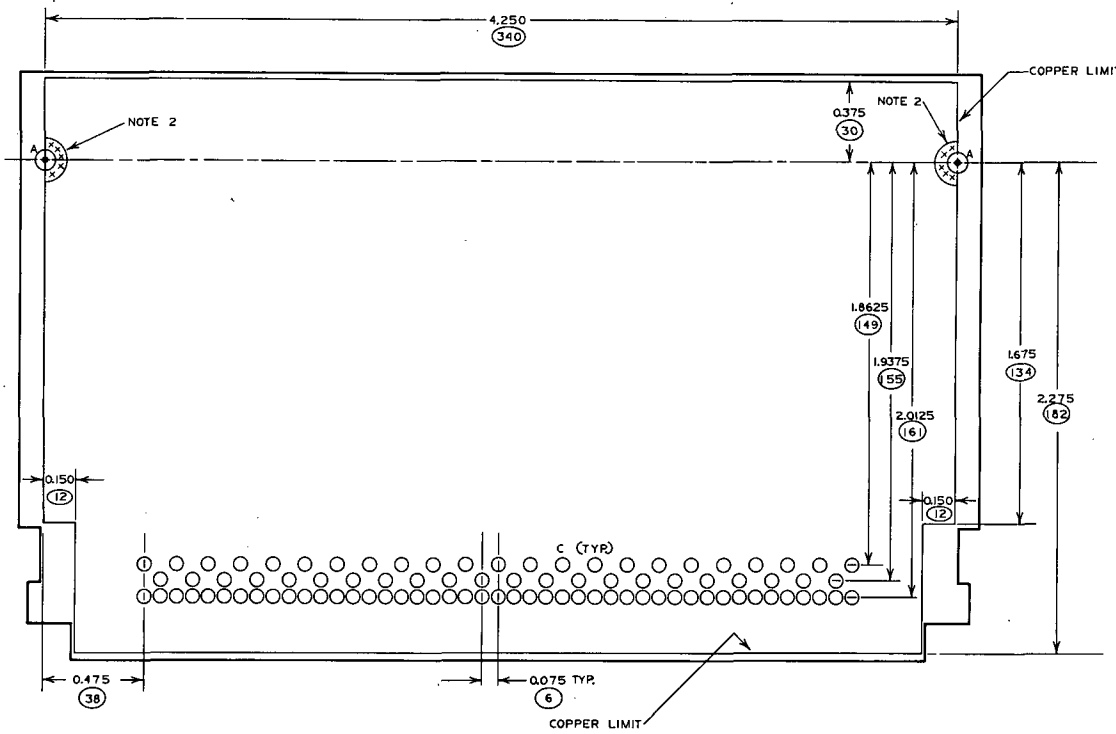
2	8-4-70	NEW TITLE	ADDED MILLI IN - E.C. 3, B3
1	4-7-70	ADDED LABELS	NEW DWG. NO.
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE MOTHERBOARD CONNECTOR ORIENTATION, NUMBERING AND COMPONENT MOUNTING INFORMATION			
APPROVED		ENG	DRAWING NO.
BY	FOR	DATE	G C J
		4/9	200.50D3
DRAWN BY		CHECKED	DATE
P L L		S C J	1-21-70



- NOTES:
1. ROUNDED FILLETS CUT WITH 0.125 DIA. ROUTING CUTTER.
  2. CUT TWO NOTCHES 0.150 ± 0.010 DEEP WITH 0.125 DIA. ROUTING CUTTER.

2	6-16-70	REDRAWN - TITLE CHNG ADD NOTE 2 - CTR LINE
CHANGE NO.	DATE	DESCRIPTION
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE SINGLE HEIGHT VERTICAL BOARD OUTLINE FOR ROUTING		
BY	APPROVED	DATE
CEM	PLL	8/1/70
200.5005	DATE	1-29-70

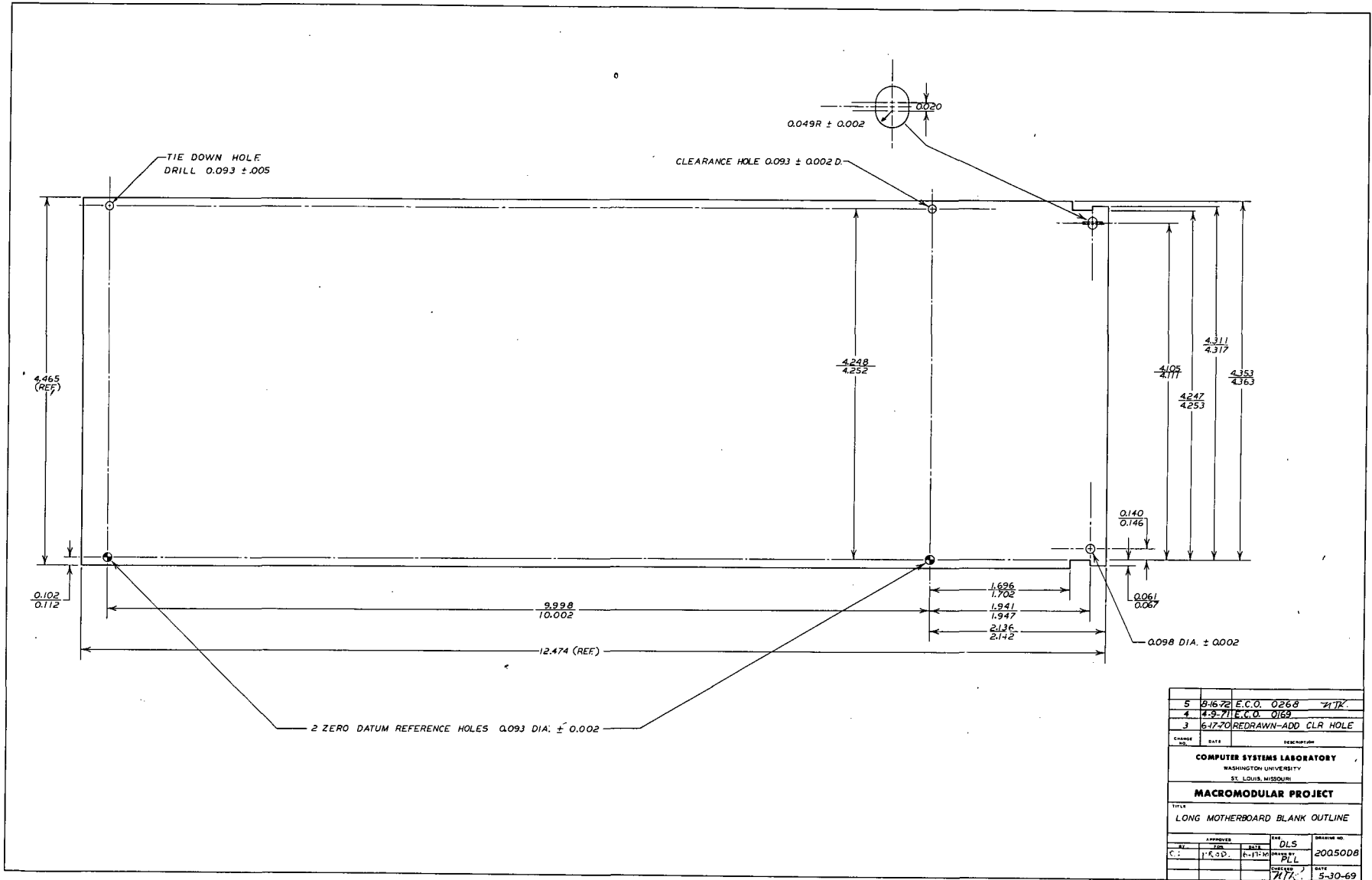




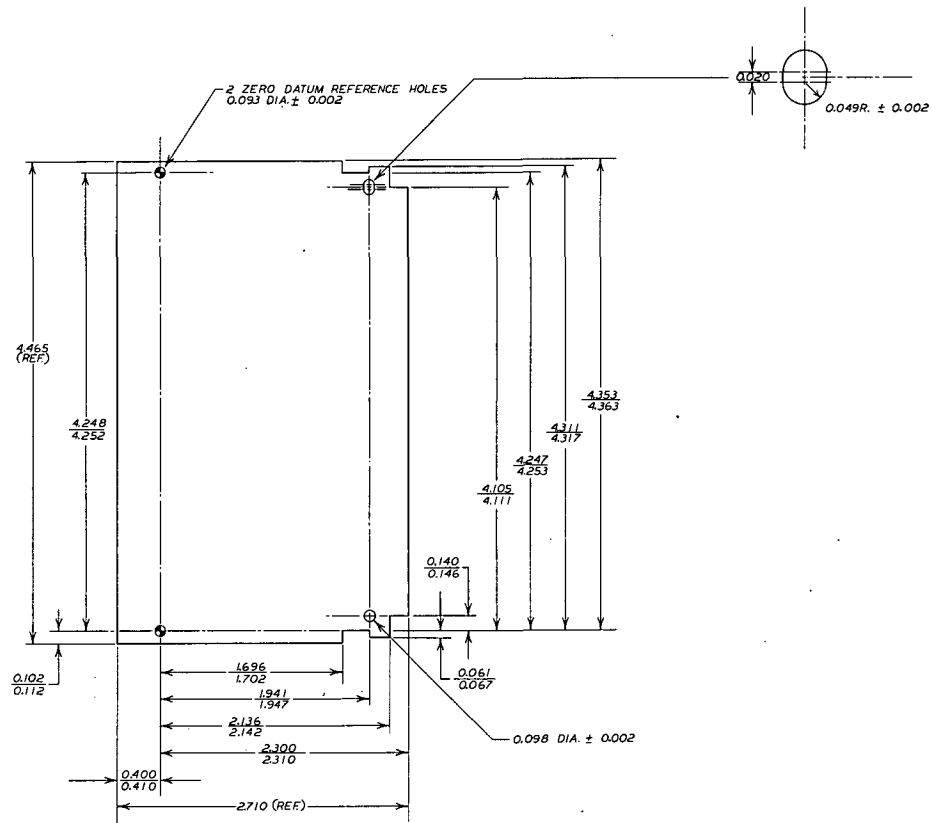
PAD SIZES FOR 4:1 ARTWORK  
 A. TARGET  
 C. 0.250 D.

NOTE:  
 1. CIRCLED NUMBERS ((82)) REFER TO NUMBER OF SPACES ON 0.050 GRID FOR 4:1 LAYOUT MASTERS.  
 2. NO SIGNAL OR POWER PATHS WITHIN 0.100 OF TARGET CENTERS. ((8))

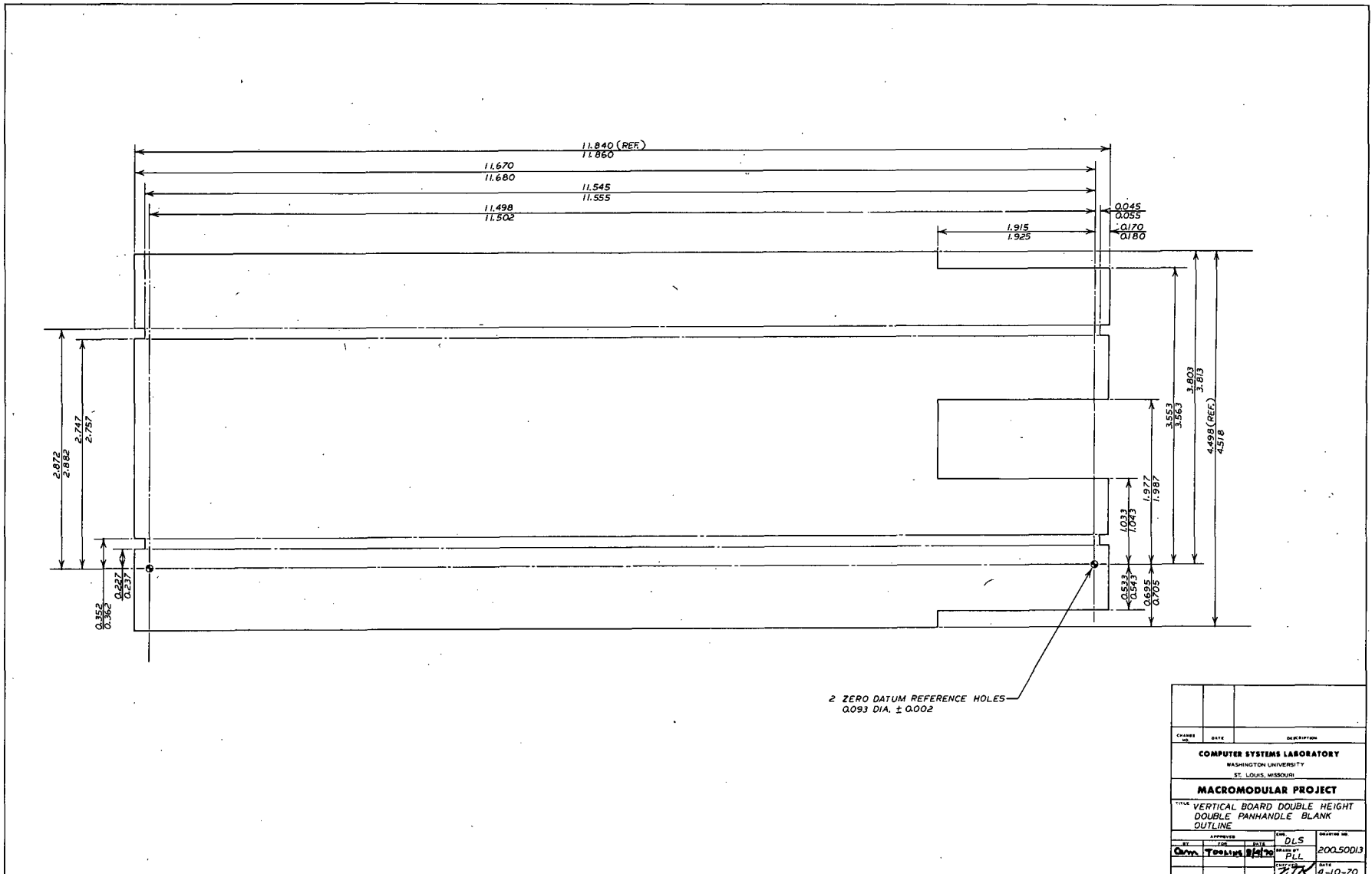
4		6-16-70		ADDED DIMS-MINOR CHNGS.	
CHANGE NO.	DATE	DESCRIPTION			
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI					
MACROMODULAR PROJECT					
PAD LAYOUT-SHORT MOTHERBOARD					
BY	DESIGNED BY	DATE	APPROVED BY	REVISION NO.	
GCJ	GCJ	6-16-70	GCJ	200.5006	
PLD	PLD		PLD		
CHKD	CHKD		CHKD		
				DATE	6-16-69



5	8-16-72	E.C.O.	0268	ZLK
4	4-9-71	E.C.O.	0169	
3	6-17-70	REDRAWN-ADD CLR HOLE		
CHANGE NO.	DATE	DESCRIPTION		
<b>COMPUTER SYSTEMS LABORATORY</b>				
WASHINGTON UNIVERSITY				
ST. LOUIS, MISSOURI				
<b>MACROMODULAR PROJECT</b>				
TITLE				
LONG MOTHERBOARD BLANK OUTLINE				
APPROVED	DATE	BY	DESIGN NO.	
		DLS	2005008	
CHECKED	DATE	BY		
		PLL		
		ZLK		
	DATE			
	5-30-69			

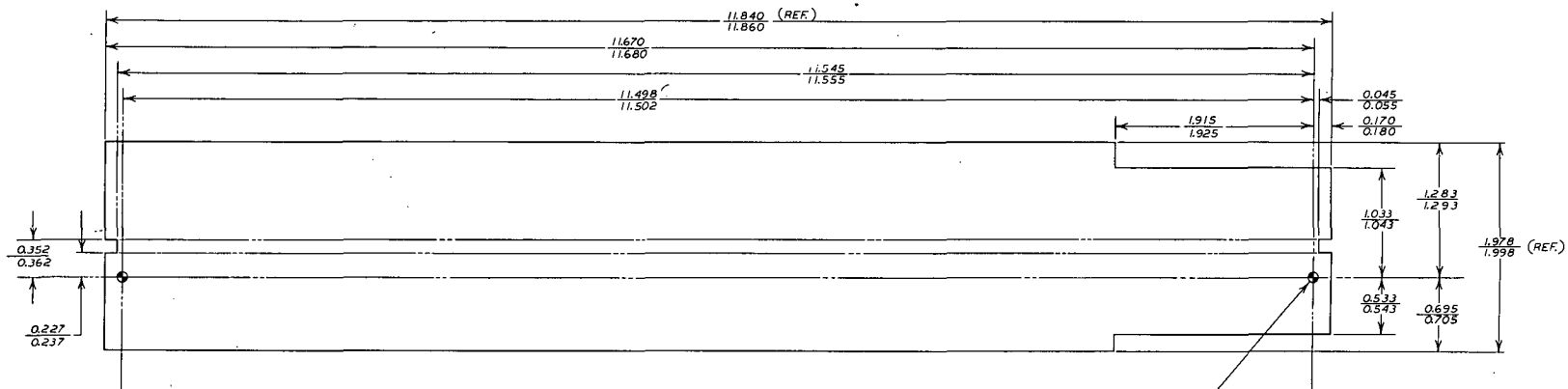


4	4-9-71	E. C. O.	0170
3	6-17-70	REDRAWN	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b>			
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
SHORT MOTHERBOARD BLANK OUTLINE			
APPROVED	DATE	BY	DRAWING NO.
MANF.	6/17/70	DLS	200.5009
CHECKED		PLL	
		CHECKED	DATE
			5-28-69



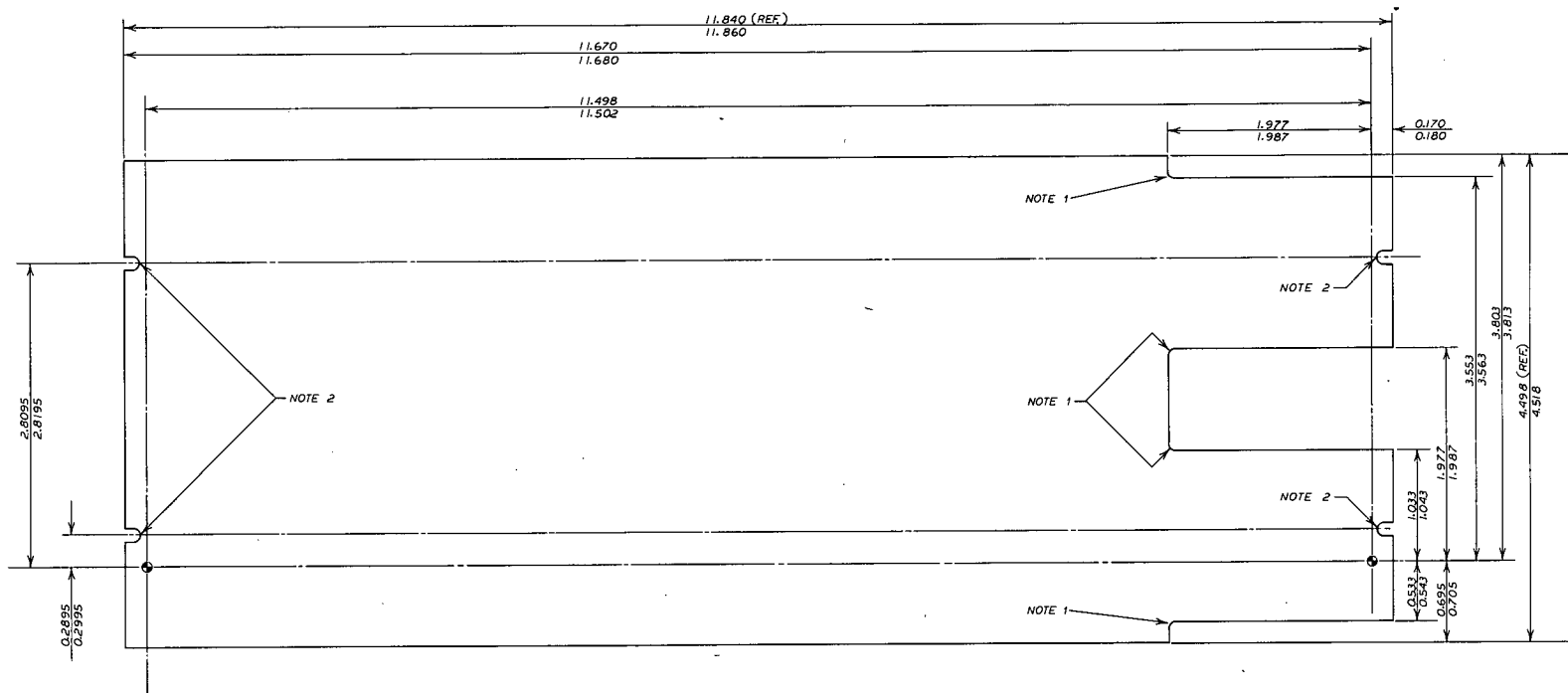
2 ZERO DATUM REFERENCE HOLES  
0.093 DIA. ± 0.002

CHANGES	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE: VERTICAL BOARD DOUBLE HEIGHT DOUBLE PANHANDLE BLANK OUTLINE		
APPROVED	DATE	DESIGNER NO.
BY: <b>Tom</b>	DATE: <b>4/10/70</b>	<b>DLS</b>
BY: <b>Tom</b>	DATE: <b>4/10/70</b>	<b>PLL</b>
BY: <b>Tom</b>	DATE: <b>4/10/70</b>	<b>200.50013</b>
BY: <b>Tom</b>	DATE: <b>4/10/70</b>	<b>200.50013</b>



2 ZERO DATUM REFERENCE HOLES  
0.093 DIA. ± 0.002

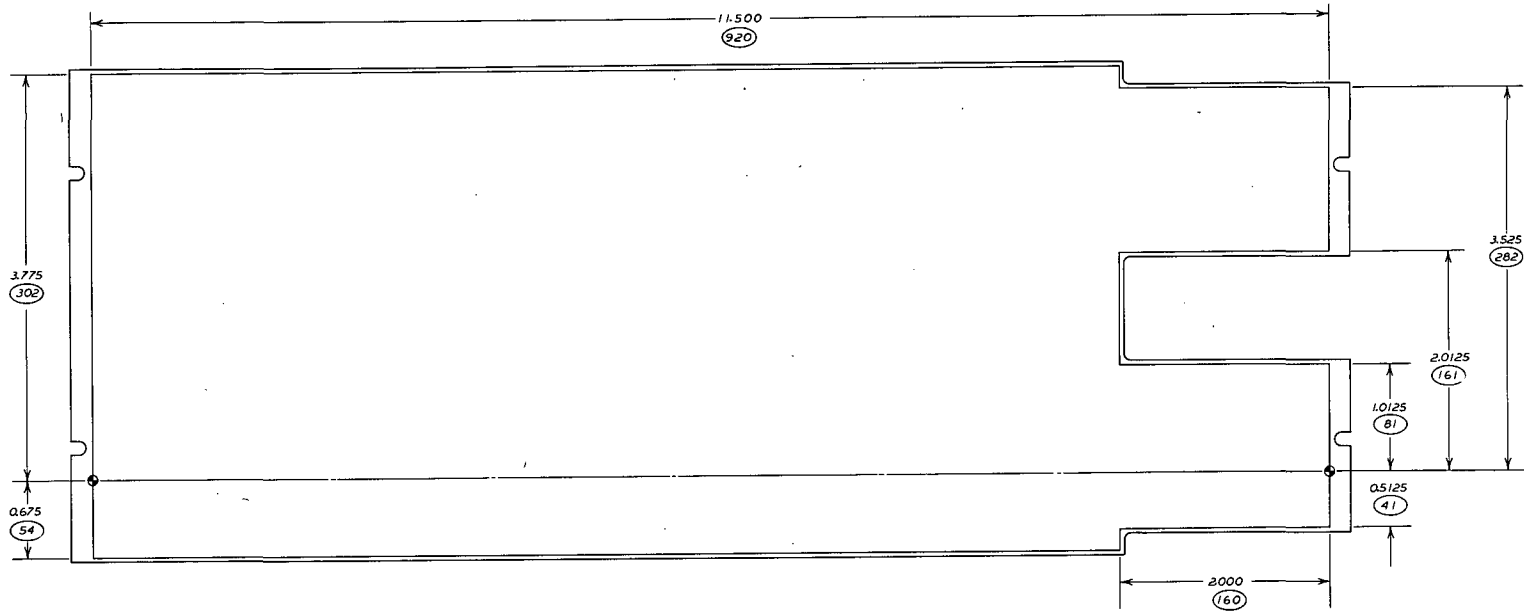
6	6-16-70	REDRAWN
DATE	DATE	DESCRIPTION
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
MACROMODULAR PROJECT		
TITLE SINGLE HEIGHT VERTICAL BOARD OUTLINE FOR BLANKING		
APPROVED	DATE	REFERENCE NO.
BY Cec	DATE 8/1/70	200.50DIS
BY WIA	DATE 8-17-68	



2 ZERO DATUM REFERENCE HOLES  
0.093 DIA. ± 0.002

- NOTES:
1. ROUNDED FILLETS CUT WITH 0.125 DIA. ROUTING CUTTER.
  2. CUT FOUR NOTCHES 0.150 ± 0.010 DEEP WITH 0.125 DIA. ROUTING CUTTER.

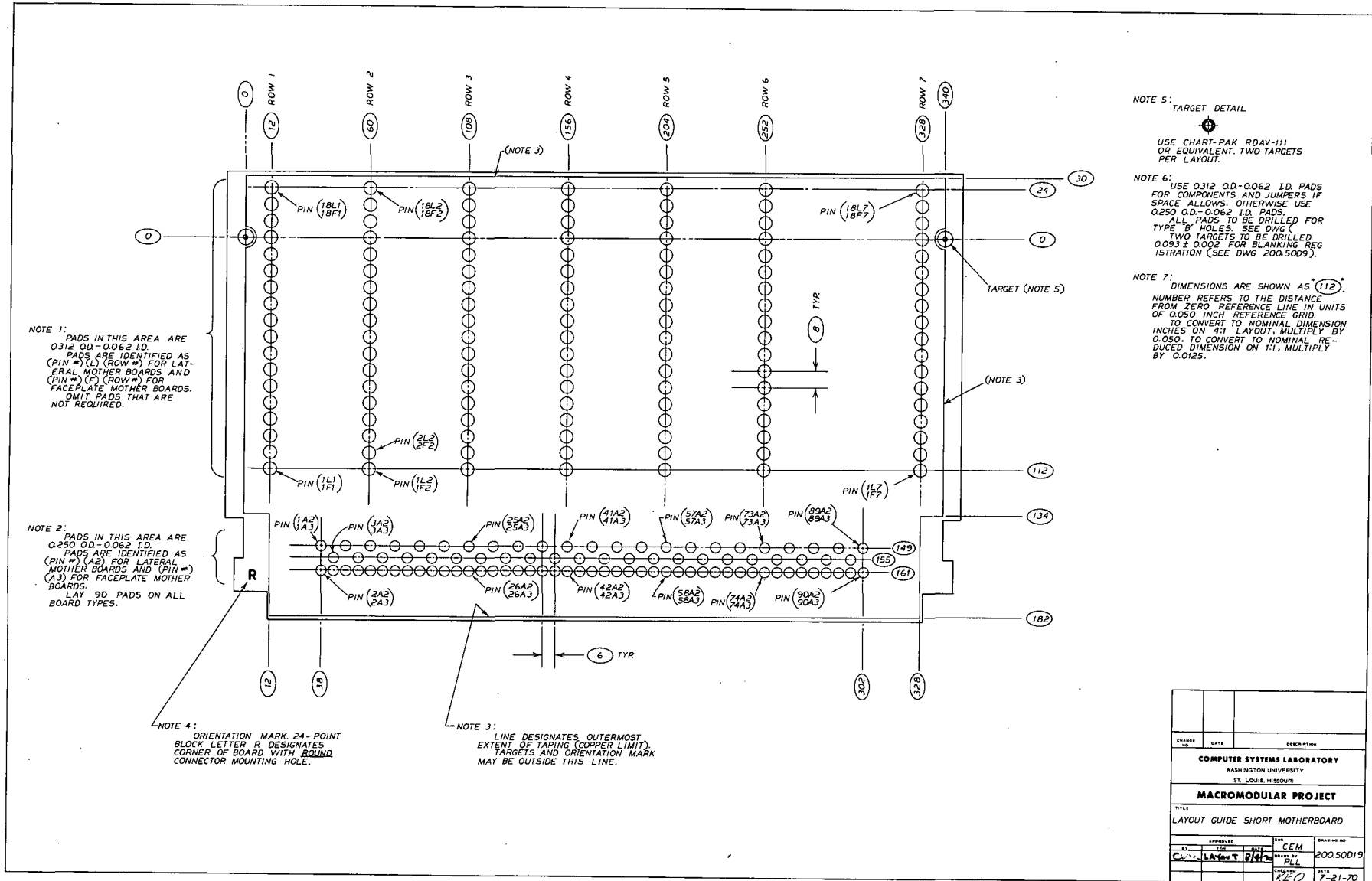
CHANGED BY	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b>		
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE VERTICAL BOARD DOUBLE HEIGHT DOUBLE PANHANDLE OUTLINE FOR ROUTING		
APPROVED	DATE	DRAWING NO.
BY C. M. WILSON	DATE 7/6/70	200.50017
DESIGNED BY PLL	CHECKED BY K. W.	DATE 7-1-70



NOTES:

1. CIRCLED NUMBERS ((160)) REFER TO NUMBER OF SPACES ON 0.050 GRID FOR 4:1 LAYOUT MASTERS.
2. COPPER LIMITS APPLY TO BOTH BLANKED AND ROUTED BOARDS.
3. TARGETS ARE REGISTRATION MARKS DEFINED BY DRAWINGS 200.50D15 OR 200.50D5.

FORM	DATE	DESCRIPTION
2		COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI
MACROMODULAR PROJECT		
TITLE VERTICAL BOARD DOUBLE HEIGHT DOUBLE PANHANDLE COPPER LIMITS		
BY	APPROVED	DATE
CEM	TOPOLUS	7/16/70
		DATE
		7-2-70



NOTE 1: PADS IN THIS AREA ARE 0.312 O.D.-0.062 I.D. PADS ARE IDENTIFIED AS (PIN #)(L) (ROW #) FOR LATERAL MOTHER BOARDS AND (PIN #)(F) (ROW #) FOR FACEPLATE MOTHER BOARDS. OMIT PADS THAT ARE NOT REQUIRED.

NOTE 2: PADS IN THIS AREA ARE 0.250 O.D.-0.062 I.D. PADS ARE IDENTIFIED AS (PIN #)(A2) FOR LATERAL MOTHER BOARDS AND (PIN #)(A3) FOR FACEPLATE MOTHER BOARDS. LAY 90 PADS ON ALL BOARD TYPES.

NOTE 4: ORIENTATION MARK 24-POINT BLOCK LETTER R DESIGNATES CORNER OF BOARD WITH ROUND CONNECTOR MOUNTING HOLE.

NOTE 3: LINE DESIGNATES OUTERMOST EXTENT OF TAPING (COPPER LIMIT). TARGETS AND ORIENTATION MARK MAY BE OUTSIDE THIS LINE.

NOTE 5: TARGET DETAIL

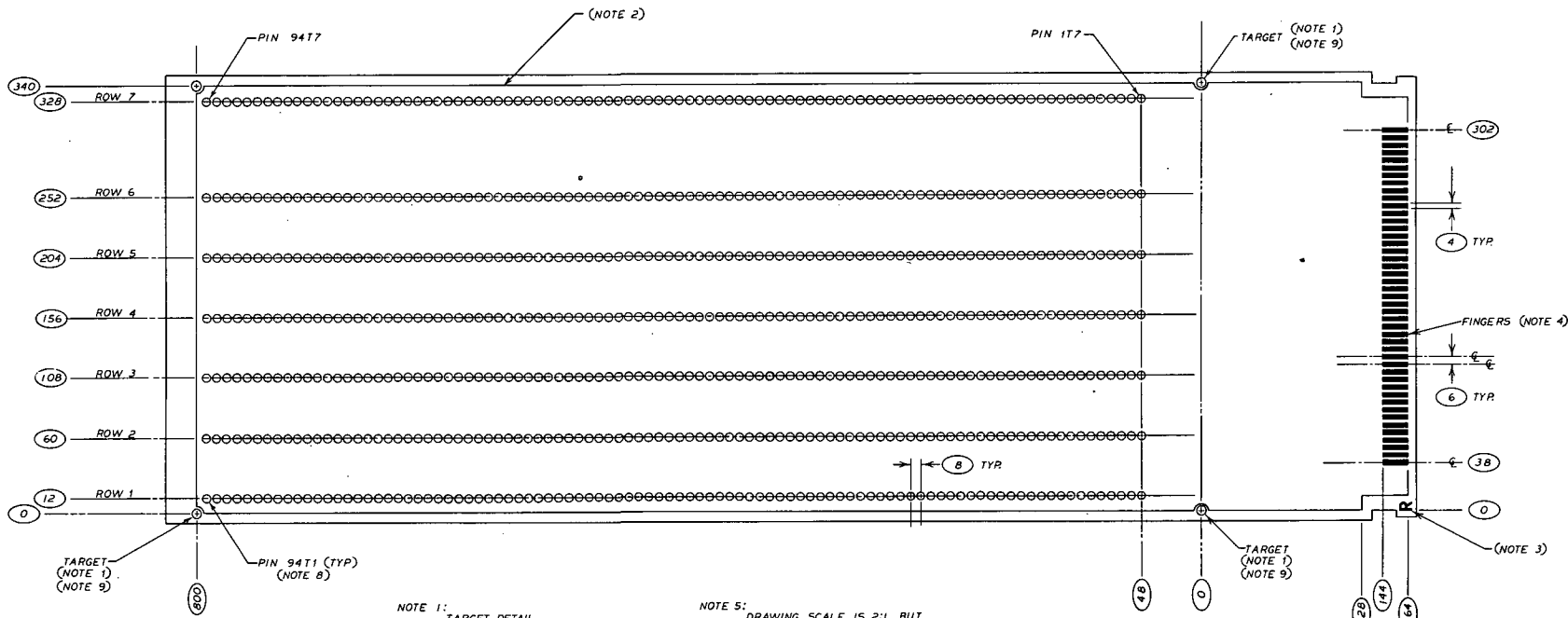
USE CHART-PAK RDAY-111 OR EQUIVALENT. TWO TARGETS PER LAYOUT.

NOTE 6: USE 0.312 O.D.-0.062 I.D. PADS FOR COMPONENTS AND JUMPERS IF SPACE ALLOWS. OTHERWISE USE 0.250 O.D.-0.062 I.D. PADS. ALL PADS TO BE DRILLED FOR TYPE 'B' HOLES. SEE DWG. TWO TARGETS TO BE DRILLED 0.093 ± 0.002 FOR BLANKING REGISTRATION (SEE DWG 200-5009).

NOTE 7: DIMENSIONS ARE SHOWN AS (112). NUMBER REFERS TO THE DISTANCE FROM ZERO REFERENCE LINE IN UNITS OF 0.050 INCH REFERENCE GRID. TO CONVERT TO NOMINAL DIMENSION INCHES ON 4:1 LAYOUT, MULTIPLY BY 0.050. TO CONVERT TO NOMINAL REDUCED DIMENSION ON 1:1, MULTIPLY BY 0.0125.

CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b>		
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE LAYOUT GUIDE SHORT MOTHERBOARD		
APPROVED	DATE	DRAWING NO.
C. L. LAYMAN	8/10/70	200.50019
DESIGNED BY	DATE	SCALE
P. L. LAYMAN	7-21-70	1:1





NOTE 1:  
TARGET DETAIL

USE CHART-PAK RDAV-111  
OR EQUIVALENT. THREE TARGETS  
PER LAYOUT.

NOTE 2:  
LINE DESIGNATES OUTERMOST  
EXTENT OF TAPING (COPPER LIMITS).  
TARGETS AND ORIENTATION MARK  
MAY BE OUTSIDE THIS LINE.

NOTE 3:  
ORIENTATION MARK, 24-POINT  
BLOCK LETTER R DESIGNATES  
CORNER OF BOARD WITH ROUND  
CONNECTOR MOUNTING HOLE.

NOTE 4:  
45 FINGERS  
USE 0.200 TAPE 1.000 LONG.

NOTE 5:  
DRAWING SCALE IS 2:1 BUT  
ALL NUMBERS ARE FOR 4:1 LAYOUT.

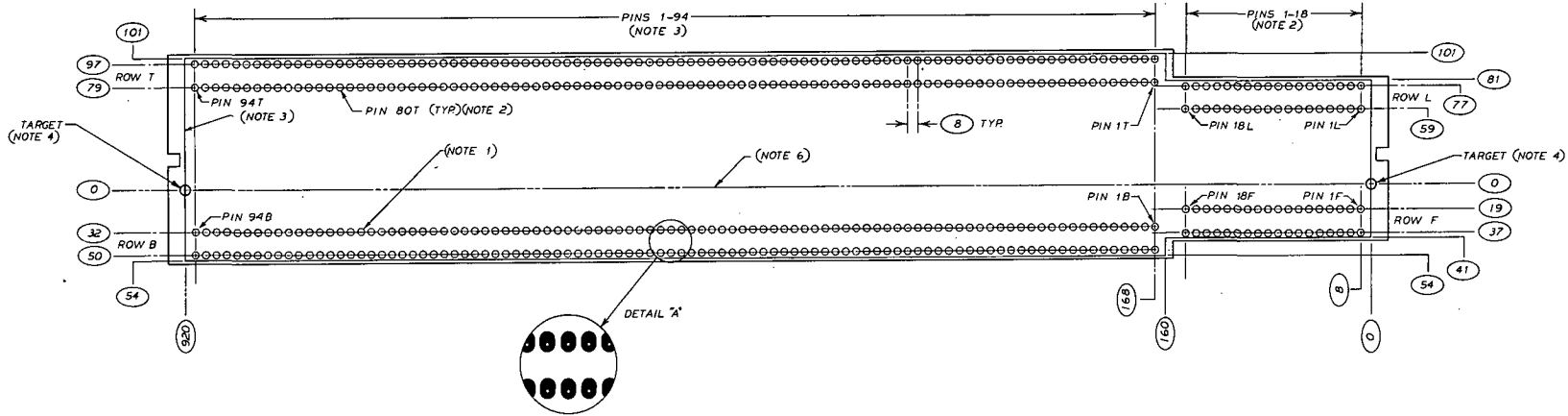
NOTE 6:  
PADS USED ON THIS BOARD ARE  
0.312 OD - 0.062 I.D. OMIT PADS THAT  
ARE NOT REQUIRED.  
ALL PADS TO BE DRILLED FOR  
TYPE B HOLES (SEE DWG.)

NOTE 7:  
DIMENSIONS ARE SHOWN AS **(48)**  
NUMBER REFERS TO DISTANCE FROM  
ZERO REFERENCE LINE IN UNITS OF  
0.050 INCH REFERENCE GRID.  
TO CONVERT TO NOMINAL DIMEN-  
SION ON 4:1 LAYOUT MULTIPLY BY  
0.050. TO CONVERT TO NOMINAL RE-  
DUCED DIMENSION ON 1:1 MULTIPLY  
BY 0.0125.

NOTE 8:  
TERM FOR PIN LOCATION IS PAD  
NUMBER (94) MOTHERBOARD DESIG-  
NATION LETTER (L, B) AND VERTICAL  
ROW NUMBERS (+, -).  
E.G. 117 IS PIN ONE ON TOP  
MOTHERBOARD IN ROW SEVEN.

NOTE 9:  
THREE TARGETS TO BE DRILLED  
0.093 ± 0.002.

1	8-16-72	E.C.G. 026B	TKW
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
MACROMODULAR PROJECT			
TITLE LAYOUT GUIDE - LONG MOTHERBOARD			
APPROVED	DATE	BY	DESIGNED BY
BY C.M.M.	DATE 8/4/72	BY N.T.K.	DESIGNED BY P.L.L.
DRAWN BY R.C.O.			DATE 7-23-70



NOTE 1:  
 OVAL PADS USED FOR EDGE CONNECTOR PINS  
 ARE BY-BUK NO. 72B-1 OR EQUIVALENT.

PAD SIZE: 0.300 O.D. x 0.062 I.D. x 0.000 L.  
 PADS PLACED AS SHOWN WITH LONG END  
 TOWARD CENTER OF BOARD. OMIT PADS  
 NOT REQUIRED. DRILL FOR TYPE "A" HOLES.

NOTE 2:  
 PAIRS OF PADS FOR EDGE CONNECTOR PINS  
 ARE DESIGNATED BY (PIN NUMBER) (LETTER)  
 WHERE THE PIN NUMBER SPECIFIES LOCATION  
 FROM RIGHT TO LEFT AND THE LETTER (L, F OR B)  
 SPECIFIES THE ROW. E.G. PIN BOT IS IN THE BOT.  
 POSITION FROM THE RIGHT IN ROW T.

NOTE 3:  
 LINE DESIGNATES OUTERMOST EXTENT OF  
 TAPING (COPPER LIMITS).  
 TARGETS MAY BE OUTSIDE THIS LINE.

NOTE 4:  
 TARGET DETAIL

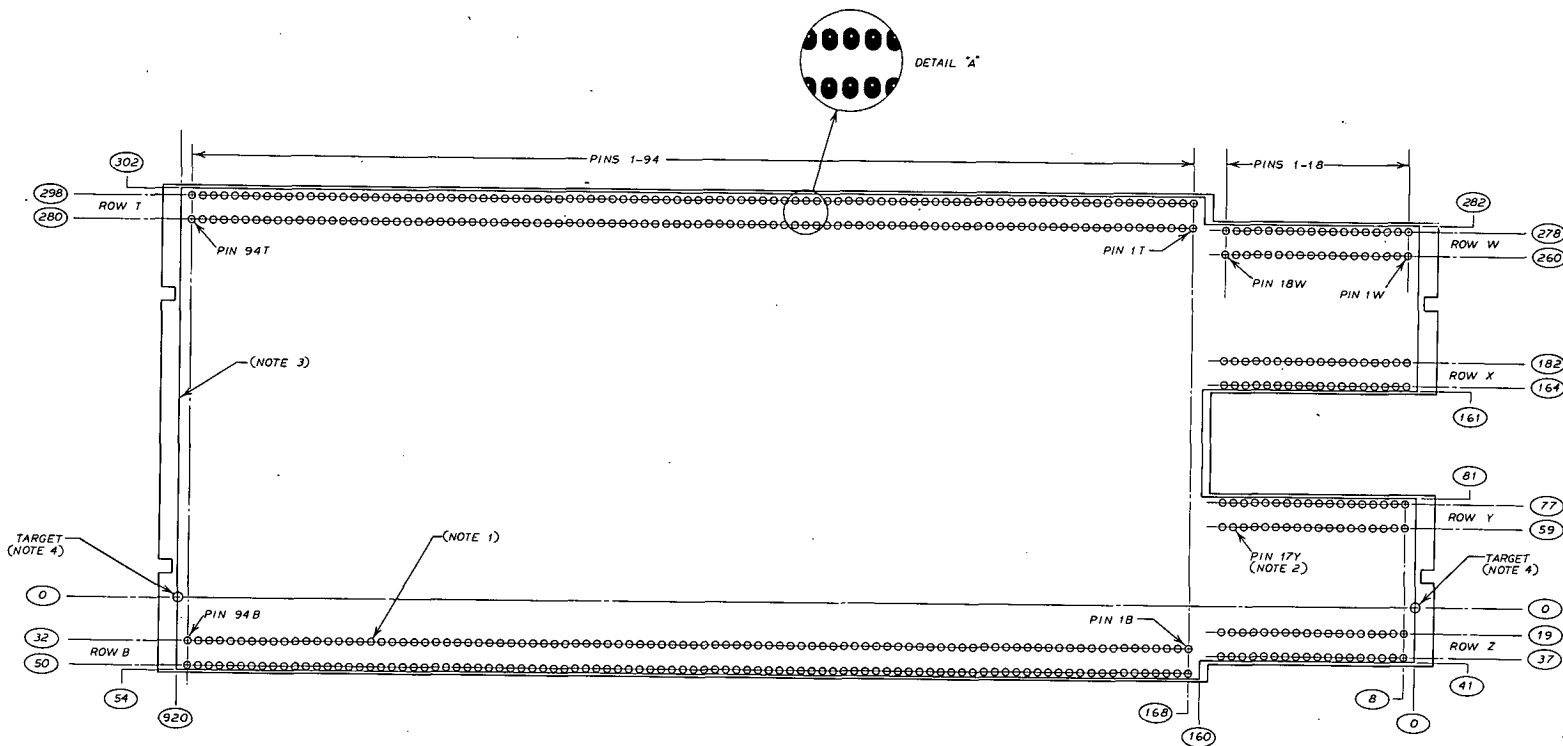
USE CHART PAK RDAY-111 OR EQUIV-  
 ALENT. TWO TARGETS PER LAYOUT.  
 TWO TARGETS TO BE DRILLED 0.093 ± 0.002  
 FOR BLANKING REGISTRATION (SEE DWG. 200.50D9)

NOTE 5:  
 DIMENSIONS ARE SHOWN AS (54). NUMBER  
 REFERS TO THE DISTANCE FROM ZERO REFERENCE  
 LINE IN UNITS OF 0.050 INCH REFERENCE GRID.  
 TO CONVERT TO NOMINAL DIMENSION INCHES ON  
 4:1 LAYOUT, MULTIPLY BY 0.050. TO CONVERT TO  
 NOMINAL REDUCED DIMENSION ON 1:1, MULTIPLY  
 BY 0.0125.

NOTE 6:  
 PADS FOR DUAL IN-LINE PACKAGES GENERALLY  
 PLACED WITH PINS 7 & 8 ON ZERO DATUM LINE.

NOTE 7:  
 ROUND PADS USED FOR DUAL IN-LINE PACKAGES  
 AND OTHER COMPONENTS ARE 0.250 O.D. - 0.062 I.D.  
 ALL ROUND PADS TO BE DRILLED FOR TYPE  
 "B" HOLES. (SEE DWG.)

CHARGE NO.	DATE	DESCRIPTION
		COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI
		MACROMODULAR PROJECT
TITLE LAYOUT GUIDE - VERTICAL BOARD		
APPROVED	DATE	DRAWING NO.
WTK		200.50.02
PL	9/4/68	
DATE		
RED	7-24-70	



NOTE 1: OVAL PADS USED FOR EDGE CONNECTOR PINS ARE BY-BUK NO. 72B-1 OR EQUIVALENT.

PAD SIZE: 0.300 O.D. X 0.062 I.D. X 0.004 L.  
PADS PLACED AS SHOWN WITH LONG END AWAY FROM EDGE OF BOARD. OMIT PADS NOT REQUIRED. DRILL FOR TYPE 'A' HOLES.

NOTE 2: PAIRS OF PADS FOR EDGE CONNECTOR PINS ARE DESIGNED BY (PIN NUMBER) (LETTER), WHERE THE PIN NUMBER SPECIFIES LOCATION FROM RIGHT TO LEFT AND THE LETTER (T, W, X, Y, Z, B) SPECIFIES THE ROW.  
EG: PIN 17Y IS IN THE 17th POSITION FROM THE RIGHT IN ROW Y.

NOTE 3: LINE DESIGNATES OUTERMOST EXTENT OF TAPING.  
TARGETS MAY BE OUTSIDE THIS LINE.

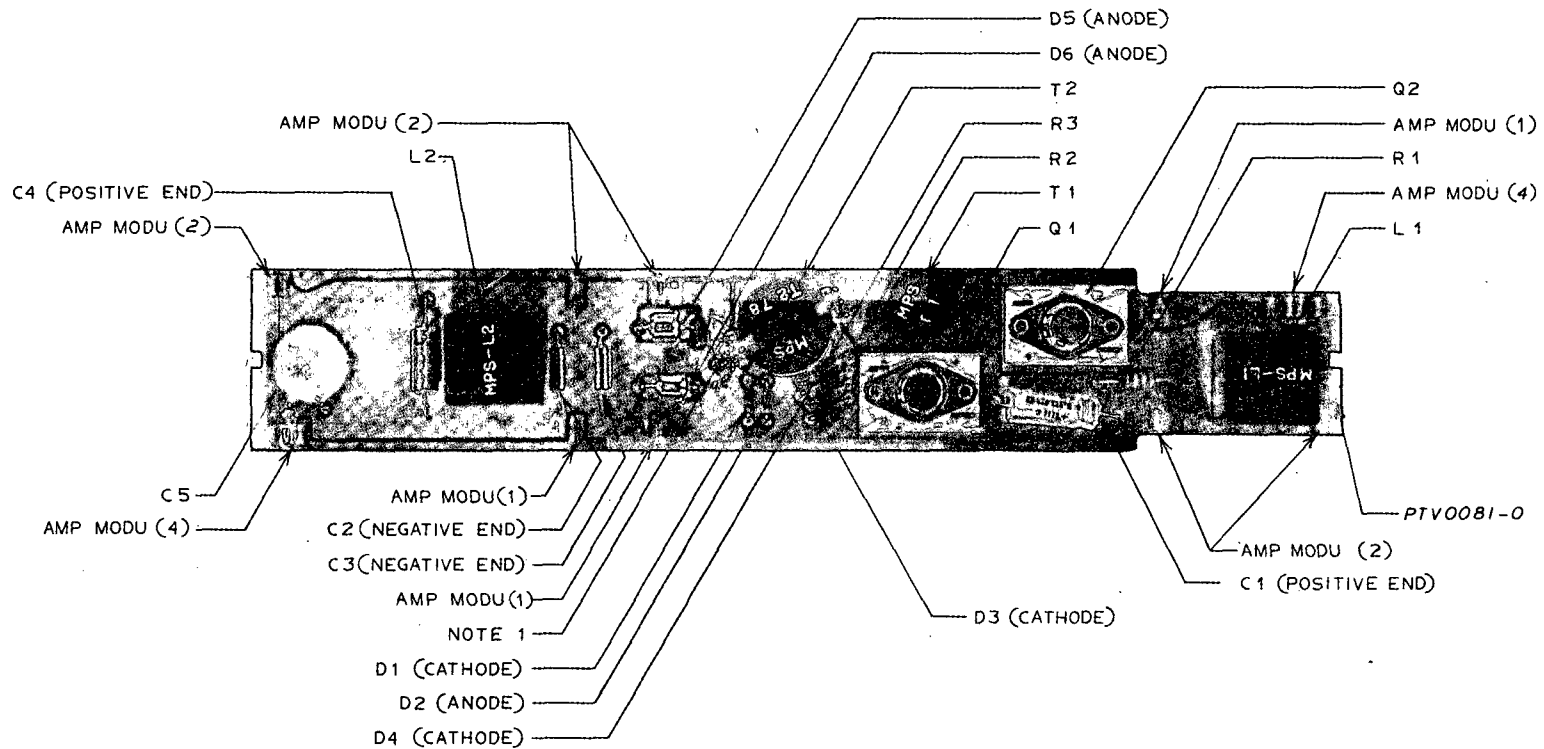
NOTE 4: TARGET DETAIL

USE CHART-PAK RDAY-111 OR EQUIVALENT.  
TWO TARGETS PER LAYOUT.  
TWO TARGETS TO BE DRILLED  $0.093 \pm 0.002$  FOR BLANKING REGISTRATION. (SEE DWG. 200.5009)

NOTE 5: DIMENSIONS ARE SHOWN AS (160). NUMBER REFERS TO THE DISTANCE FROM ZERO REFERENCE LINE IN UNITS OF 0.050 INCH REFERENCE GRID.  
TO CONVERT TO NOMINAL DIMENSION INCHES ON 4:1 LAYOUT, MULTIPLY BY 0.050. TO CONVERT TO NOMINAL REDUCED DIMENSION ON 1:1, MULTIPLY BY 0.0125.

NOTE 6: ROUND PADS USED FOR DUAL IN-LINE PACKAGES AND OTHER COMPONENTS ARE 0.250 O.D. - 0.062 I.D.  
ALL ROUND HOLES TO BE DRILLED FOR TYPE 'B' HOLES. (SEE DWG.)

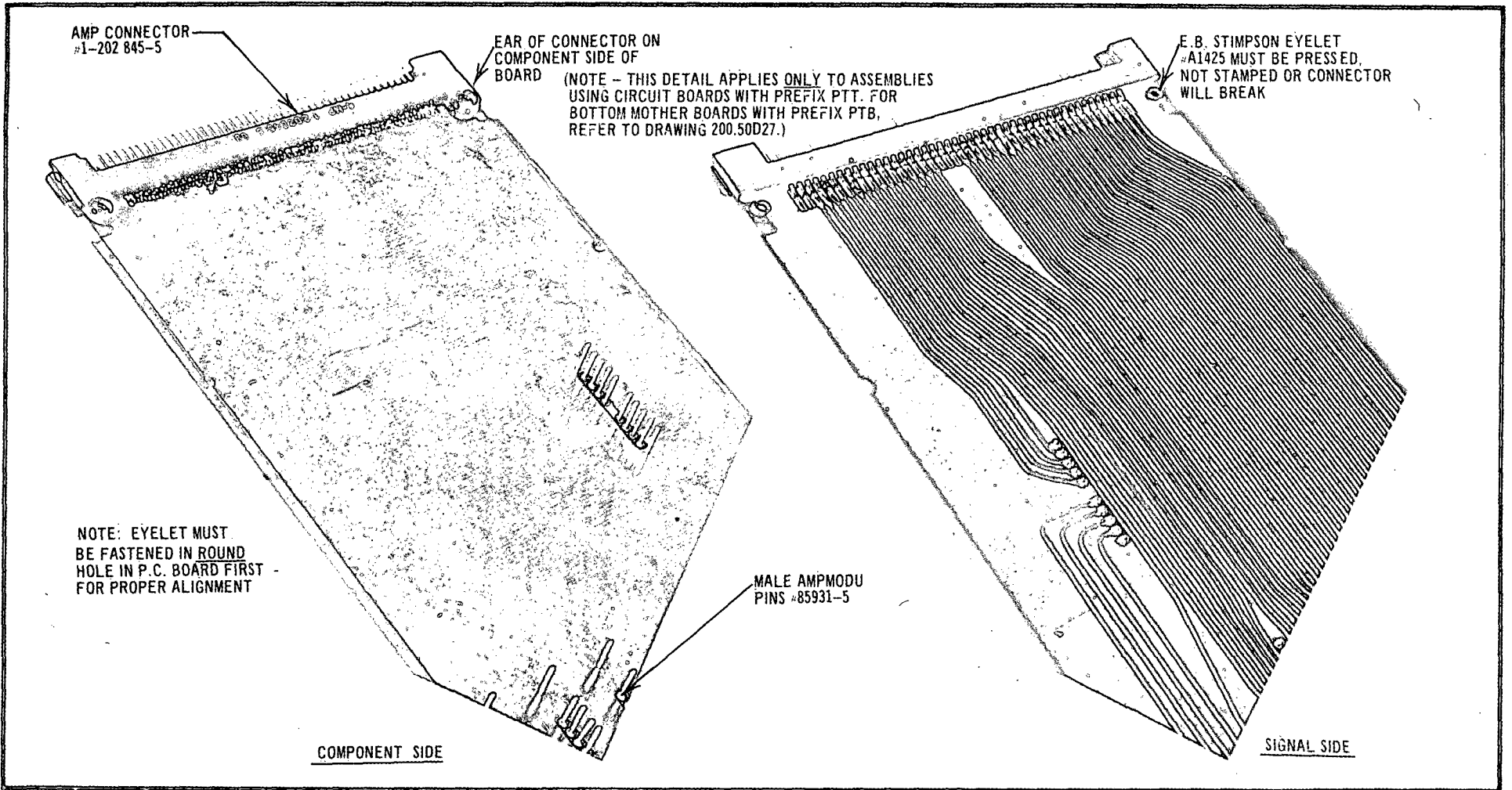
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b>		
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE LAYOUT GUIDE - VERTICAL BOARD DOUBLE HEIGHT-DOUBLE PANHANDLE		
APPROVED	DATE	DESIGNER
BY: [Signature]	DATE: NTK	200.5002
BY: [Signature]	DATE: PCL	
BY: [Signature]	DATE: REQ	7-29-70



NOTES:

1. TWO OF THE WIRES COMING OUT OF T2 WILL BE TWISTED TOGETHER. THESE TWO WIRES ARE INSERTED INTO THE TWO HOLES MARKED "8". THE OTHER TWO WIRES ARE INSERTED INTO THE HOLES MARKED "7" AND "9" IN ANY ORDER.
2. L1, L2, AND T2 ARE MOUNTED WITH RTV SILICONE RUBBER BETWEEN THE PACKAGE AND THE PRINTED CIRCUIT BOARD.
3. L2 IS MOUNTED TO PROVIDE MAXIMUM SPACING BETWEEN L2 AND C2.

CHANGE NO.	DATE	DESCRIPTION
1	2-11-70	REDRAWN, ADDED NOTES 2 & 3
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE 15 WATT DC-DC CONVERTER FINAL ASSEMBLY		
APPROVED	DATE	DRIVING NO.
BY	FOR	ENG. IJC
		DRAWN BY PLL
		CHECKED TJC
		DATE 9-24-70



		<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		TITLE <b>TOP MOTHERBOARD CONNECTOR ORIENTATION</b>	
		<b>MACROMODULAR PROJECT</b>		DRAWING NO. <b>200.50D26</b>	
				DATE <b>8/9/70</b>	
CHANGE NO.	DATE	DESCRIPTION		APPROVED BY	DATE

E. B. STIMPSON EYELET  
#A 1425 MUST BE PRESSED,  
NOT STAMPED OR CONNECTOR  
WILL BREAK

AMP CONNECTOR  
1-202 845-5

EAR OF CONNECTOR ON  
SIGNAL SIDE OF BOARD ON  
BOTTOM MOTHERBOARD ONLY.  
(NOTE - THIS DETAIL APPLIES  
ONLY TO ASSEMBLIES USING  
CIRCUIT BOARDS WITH PREFIX  
PTB. FOR TOP MOTHER BOARDS  
USING PREFIX PTT, REFER TO  
DRAWING 200.50D26)

NOTE: EYELET MUST BE  
FASTENED IN ROUND HOLE  
IN P.C. BOARD FIRST FOR  
PROPER ALIGNMENT

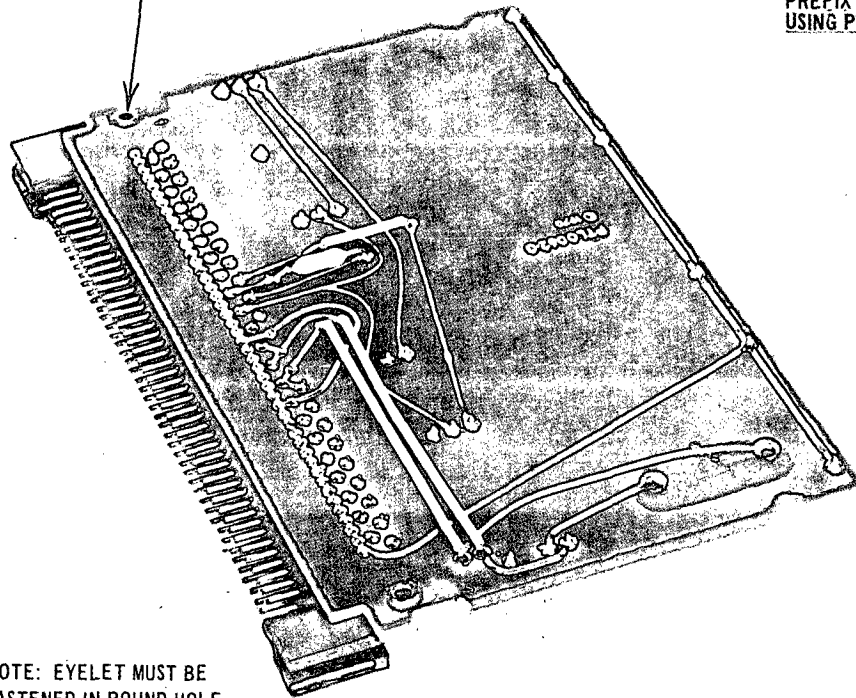
MALE AMPMODU  
PINS #85931-5

COMPONENT SIDE

SIGNAL SIDE

			<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		TITLE <b>BOTTOM MOTHERBOARD          CONNECTOR ORIENTATION</b>																					
			<b>MACROMODULAR PROJECT</b>		<table border="1" style="width: 100%;"> <tr> <td colspan="3" style="text-align: center;">APPROVED</td> <td>ENG.</td> <td>DRAWING NO.</td> </tr> <tr> <td>BY</td> <td>FOR</td> <td>DATE</td> <td>DRAWN BY</td> <td>200.50D27</td> </tr> <tr> <td></td> <td></td> <td></td> <td>CHECKED</td> <td>DATE</td> </tr> <tr> <td></td> <td></td> <td></td> <td><i>NTR.</i></td> <td>8/9/70</td> </tr> </table>		APPROVED			ENG.	DRAWING NO.	BY	FOR	DATE	DRAWN BY	200.50D27				CHECKED	DATE				<i>NTR.</i>	8/9/70
APPROVED			ENG.	DRAWING NO.																						
BY	FOR	DATE	DRAWN BY	200.50D27																						
			CHECKED	DATE																						
			<i>NTR.</i>	8/9/70																						
CHANGE NO.	DATE	DESCRIPTION																								

E.B. STIMPSON EYELET #1425  
MUST BE PRESSED AND NOT STAMPED  
OR CONNECTOR WILL BREAK.



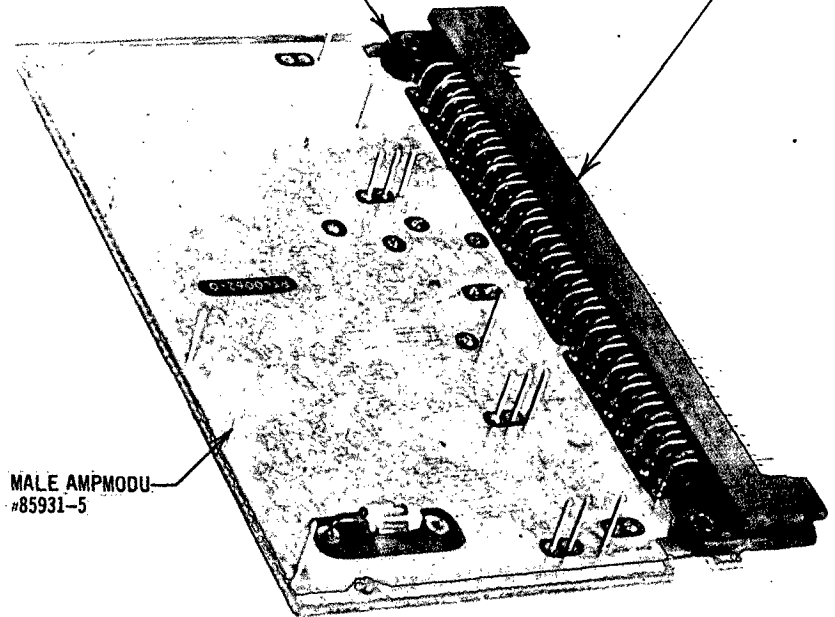
NOTE: EYELET MUST BE  
FASTENED IN ROUND HOLE  
IN P.C. BOARD FIRST FOR  
PROPER ALIGNMENT

SIGNAL SIDE

EAR OF CONNECTOR ON  
COMPONENT SIDE OF BOARD.

(NOTE: THIS DETAIL APPLIES ONLY TO  
ASSEMBLIES USING CIRCUIT BOARDS WITH  
PREFIX PTL. FOR MOTHER BOARDS/  
USING PTF, REFER TO DRAWING 200.50D29)

AMP CONNECTOR  
#583464-1



MALE AMPMODU  
#85931-5

COMPONENT SIDE

**COMPUTER SYSTEMS LABORATORY**

WASHINGTON UNIVERSITY  
ST. LOUIS, MISSOURI

**MACROMODULAR PROJECT**

TITLE

LATERAL MOTHERBOARD  
CONNECTOR ORIENTATION

APPROVED

ENG.

DRAWING NO.

BY FOR DATE

DRAWN BY

200.50D28

CHECKED

DATE

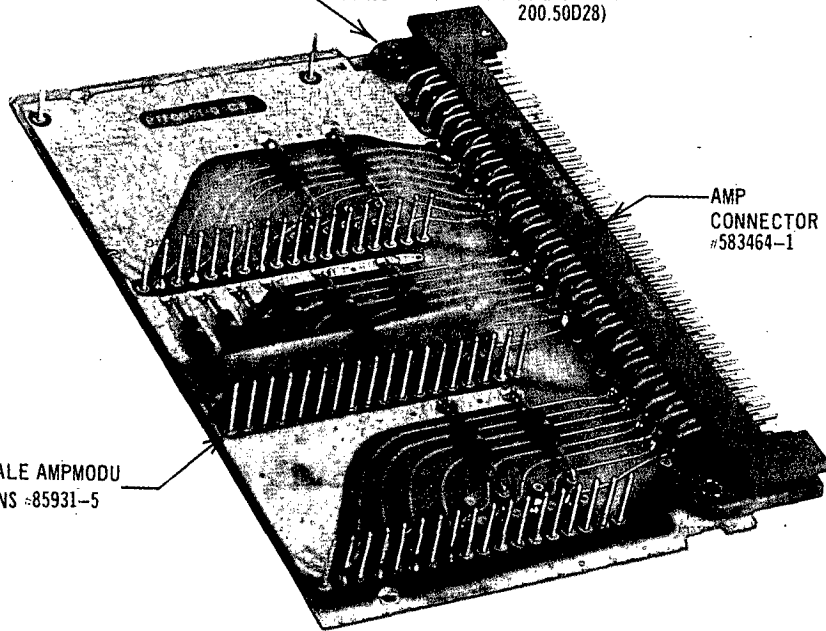
*ETK*

8-9-70

CHANGE NO.	DATE	DESCRIPTION

EAR OF CONNECTOR ON  
COMPONENT SIDE OF BOARD

(NOTE - THIS DETAIL APPLIES ONLY TO  
ASSEMBLIES USING CIRCUIT BOARDS WITH  
PREFIX PTF. FOR MOTHER BOARDS  
USING PTL, REFER TO DRAWING  
200.50D28)

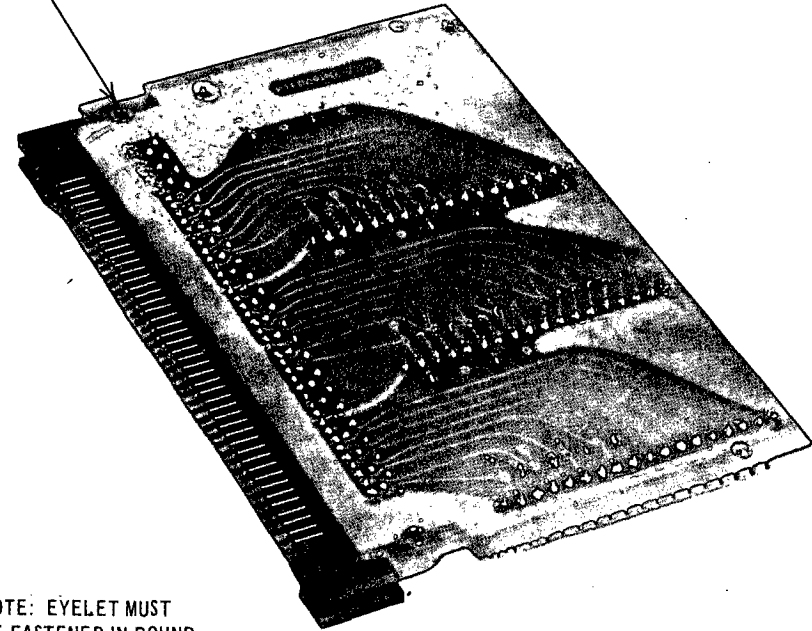


MALE AMPMODU  
PINS #85931-5

AMP  
CONNECTOR  
#583464-1

COMPONENT SIDE

E.B. STIMPSON EYELET -A 1425  
MUST BE PRESSED AND NOT STAMPED  
OR CONNECTOR WILL BREAK.



NOTE: EYELET MUST  
BE FASTENED IN ROUND  
HOLE IN P.C. BOARD  
FIRST FOR PROPER  
ALIGNMENT.

SIGNAL SIDE

**COMPUTER SYSTEMS LABORATORY**  
WASHINGTON UNIVERSITY  
ST. LOUIS, MISSOURI

**MACROMODULAR PROJECT**

TITLE

FACEPLATE MOTHERBOARD  
CONNECTOR ORIENTATION

APPROVED

ENG.

DRAWING NO.

BY FOR DATE

DRAWN BY

200.50D29

CHECKED

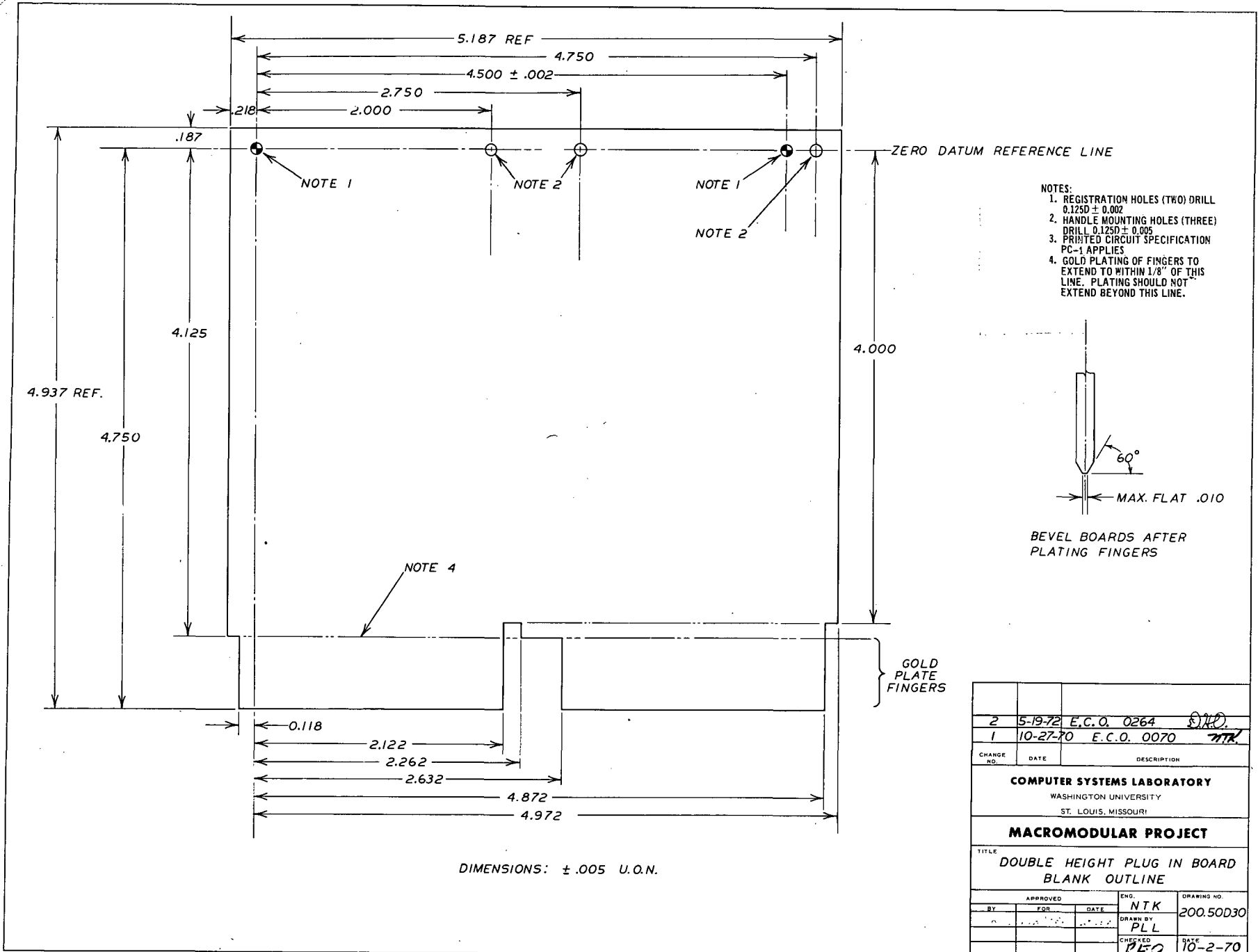
DATE

ATR

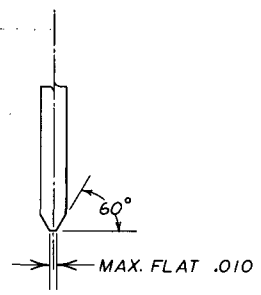
8-9-70

CHANGE NO.	DATE	DESCRIPTION





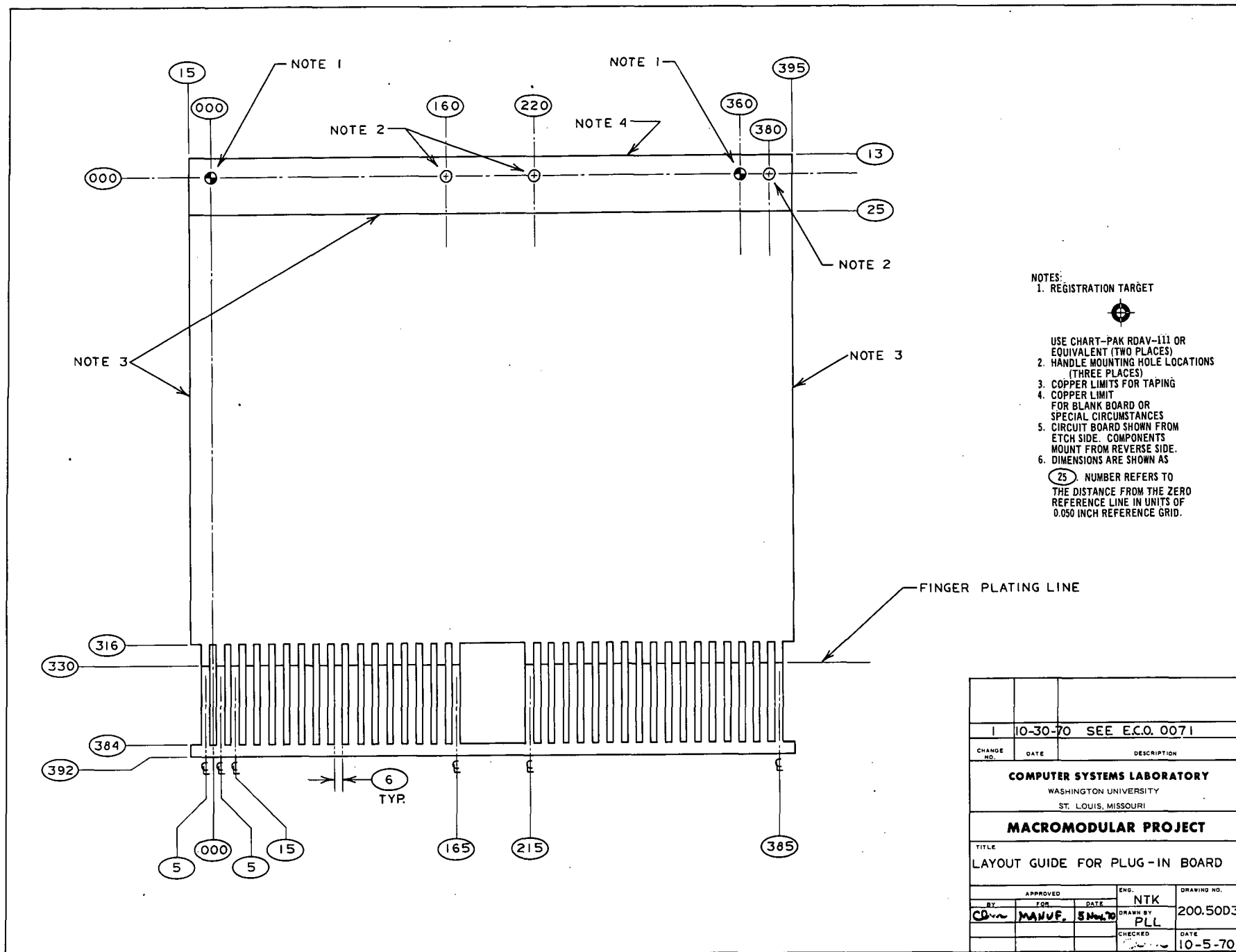
- NOTES:
1. REGISTRATION HOLES (TWO) DRILL  $0.125D \pm 0.002$
  2. HANDLE MOUNTING HOLES (THREE) DRILL  $0.125D \pm 0.005$
  3. PRINTED CIRCUIT SPECIFICATION PC-1 APPLIES
  4. GOLD PLATING OF FINGERS TO EXTEND TO WITHIN  $1/8"$  OF THIS LINE. PLATING SHOULD NOT EXTEND BEYOND THIS LINE.




BEVEL BOARDS AFTER PLATING FINGERS

DIMENSIONS:  $\pm .005$  U.O.N.

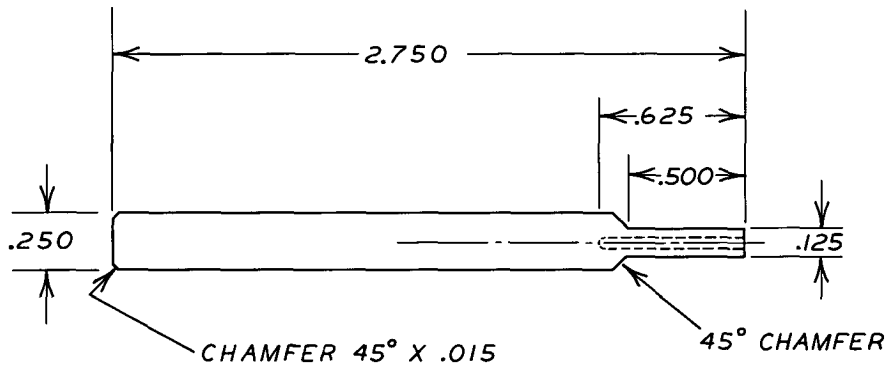
2	5-19-72	E.C.O. 0264	NTK
1	10-27-70	E.C.O. 0070	NTK
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b>			
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
DOUBLE HEIGHT PLUG IN BOARD BLANK OUTLINE			
APPROVED		ENG.	DRAWING NO.
BY	FOR	DATE	NTK 200.50D30
		DRAWN BY	PLL
		CHECKED	REO 10-2-70



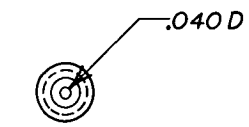
NOTES:

1. REGISTRATION TARGET
- 
2. HANDLE MOUNTING HOLE LOCATIONS (THREE PLACES)
  3. COPPER LIMITS FOR TAPING
  4. COPPER LIMIT FOR BLANK BOARD OR SPECIAL CIRCUMSTANCES
  5. CIRCUIT BOARD SHOWN FROM ETCH SIDE. COMPONENTS MOUNT FROM REVERSE SIDE.
  6. DIMENSIONS ARE SHOWN AS
- (25) NUMBER REFERS TO THE DISTANCE FROM THE ZERO REFERENCE LINE IN UNITS OF 0.050 INCH REFERENCE GRID.

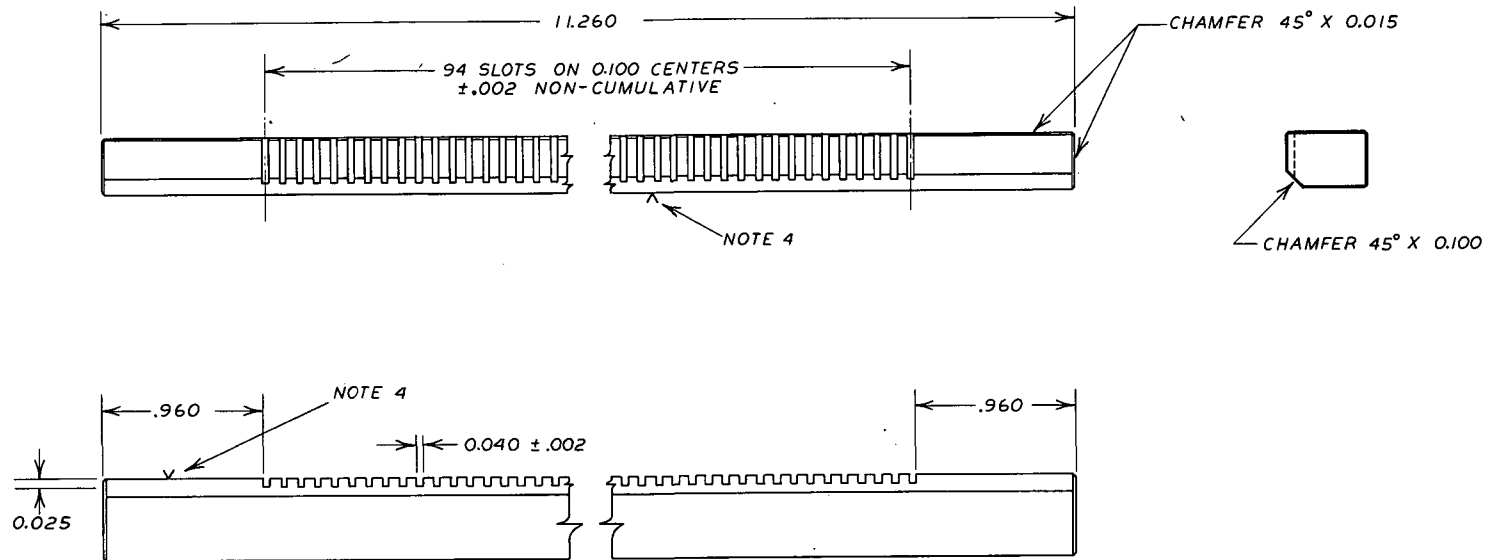
1	10-30-70	SEE E.C.O. 0071	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
LAYOUT GUIDE FOR PLUG-IN BOARD			
APPROVED		ENG.	DRAWING NO.
BY	FOR	DATE	
CD	MANUF.	5 Nov 70	200.50D31
CHECKED		DATE	
		10-5-70	



MATERIAL: .250 DELRIN  
 DIMENSIONS: ±.005



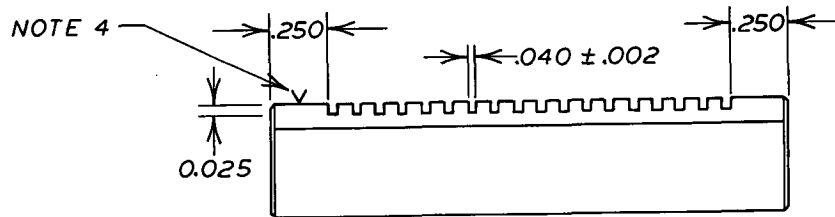
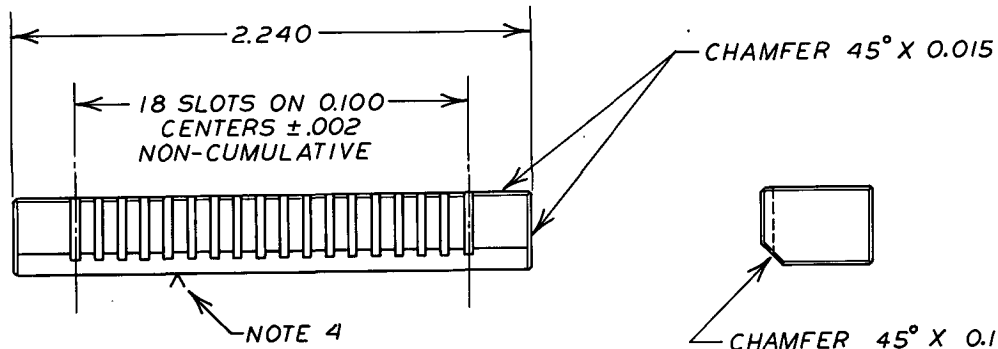
CHANGE NO.		DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI				
<b>MACROMODULAR PROJECT</b>				
TITLE				
MALE PIN STRAIGHTENER TOOL #002				
APPROVED			ENG.	DRAWING NO.
BY	FOR	DATE	GM	200.50D32
Cam	USE	10-9-70	PLL	
			CHECKED	DATE
			NTK	10-9-70



NOTES:

1. DO NOT SCALE FROM PRINT.
2. MATERIAL IS T2024-T3 ALUM
3. TOLERANCES ±.005 U.O.N.
4. MARKED SURFACES TO BE MILLED FLAT.
5. EDGES ARE TO BE FREE OF BURRS.

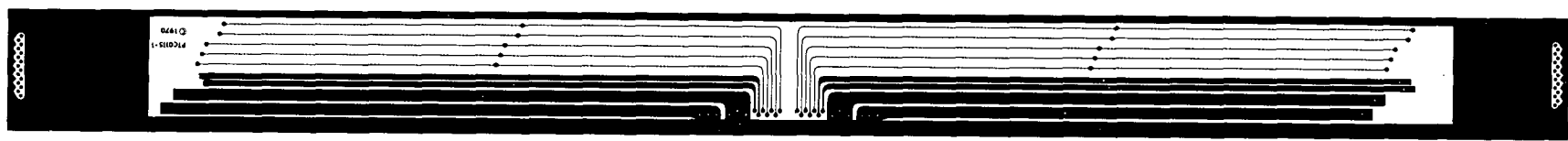
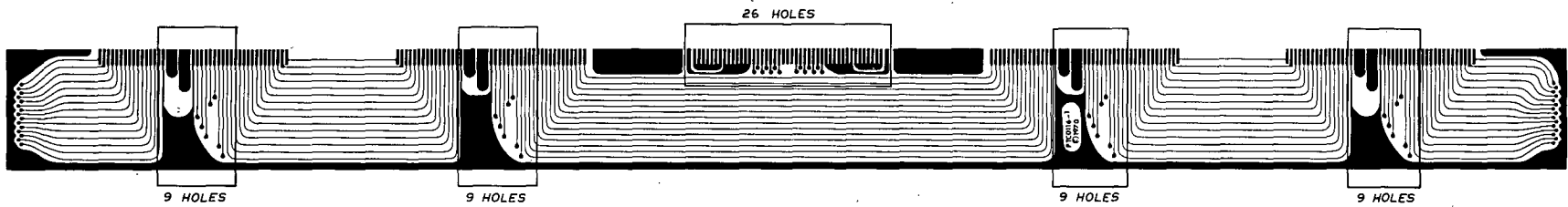
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE		
PIN ALIGNMENT TOOL #001		
BY	APPROVED	ENG.
USE	DATE	GM
USE	10/13/70	DRASH BY
		PLL
		CHECKED
		DATE
		10-9-70
		DRAWING NO.
		200.50D33



**NOTES**

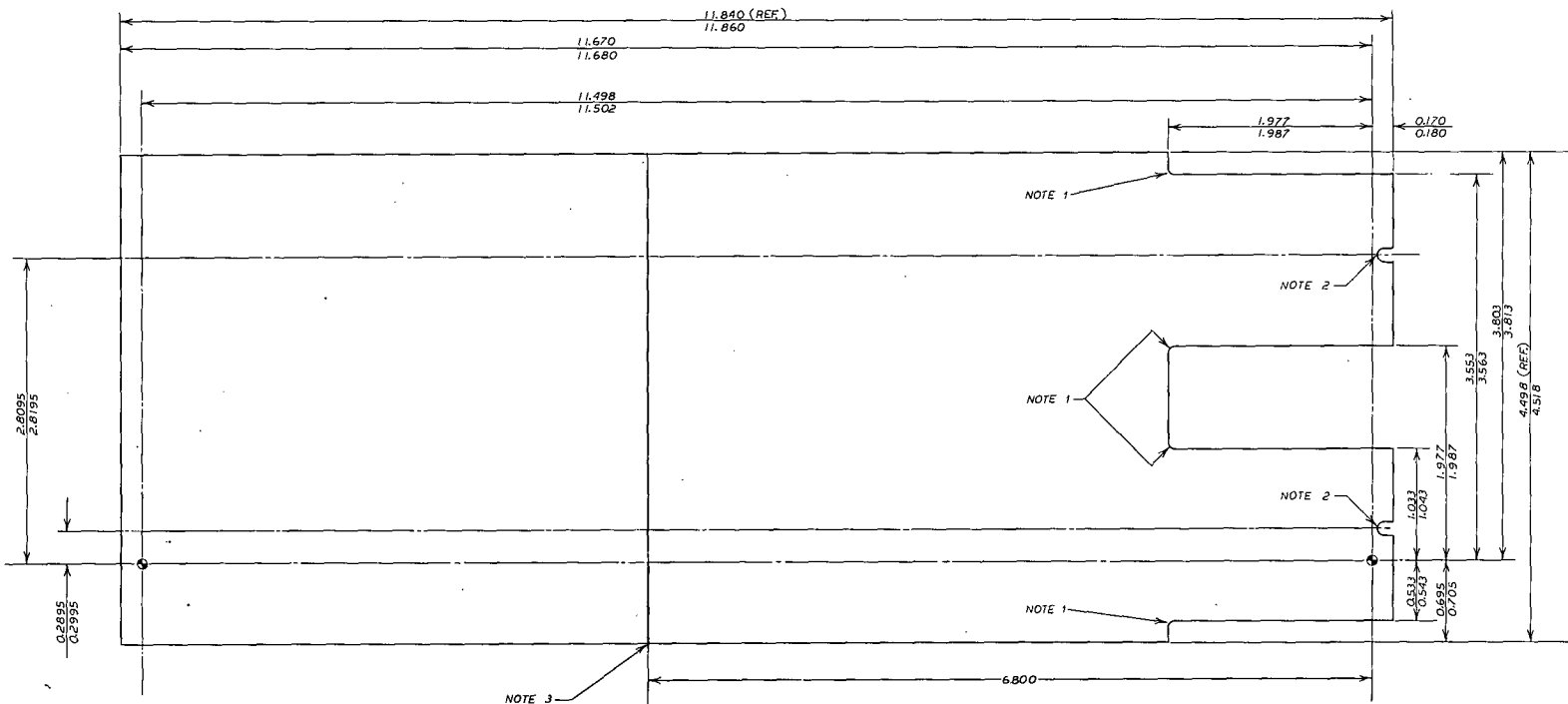
1. DO NOT SCALE FROM PRINT.
2. MATERIAL IS T2024-T3 ALUM.
3. TOLERANCES  $\pm .005$  U.O.N.
4. MARKED SURFACES TO BE MILLED FLAT.
5. EDGES ARE TO BE FREE OF BURRS.

CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE <b>PIN ALIGNMENT TOOL #003</b>		
APPROVED		ENG.
BY	FOR	DATE
Cem	USE	10/13/70
DRAWN BY		DRAWING NO.
PLL		200.50D34
CHECKED		DATE
		10-13-70



NOTE:  
DRILL 62 HOLES 0.033" Ø, IN LOCATIONS  
MARKED AFTER BONDING. BONDING  
MATERIAL SHALL NOT EXTEND MORE  
THAN 1/32" BEYOND EDGE OF PTC015-1  
BOARD OR ABOVE THE ETCHED SURFACE  
OF PTC015-1.

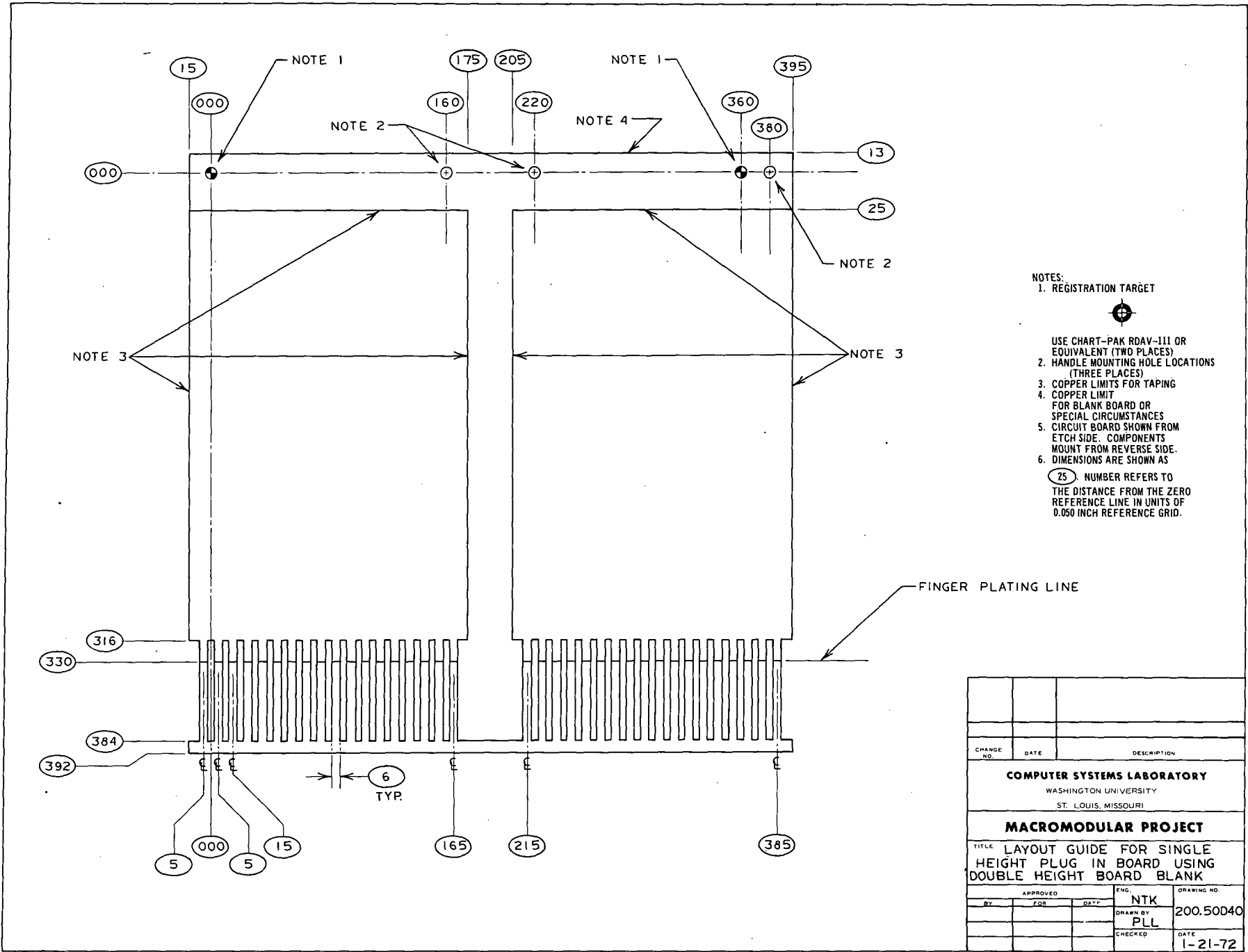
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE <b>CHANNEL INTERCONNECTION          CIRCUIT BOARD ASSEMBLY</b>		
APPROVED		DESIGN NO.
BY	DATE	200.50037
		DATE
		11-21-70



2 ZERO DATUM REFERENCE HOLES  
0.093 DIA. ± 0.002

- NOTES:
1. ROUNDED FILLETS CUT WITH 0.125 DIA. ROUTING CUTTER.
  2. CUT TWO NOTCHES 0.150 ± 0.010 DEEP WITH 0.125 DIA. ROUTING CUTTER.
  3. CUT OFF MEMORY DATA REGISTER & SENSE AMP BOARD PART NO. 211.5 6.300 INCHES FROM RIGHT HAND TARGET AFTER ROUTING.

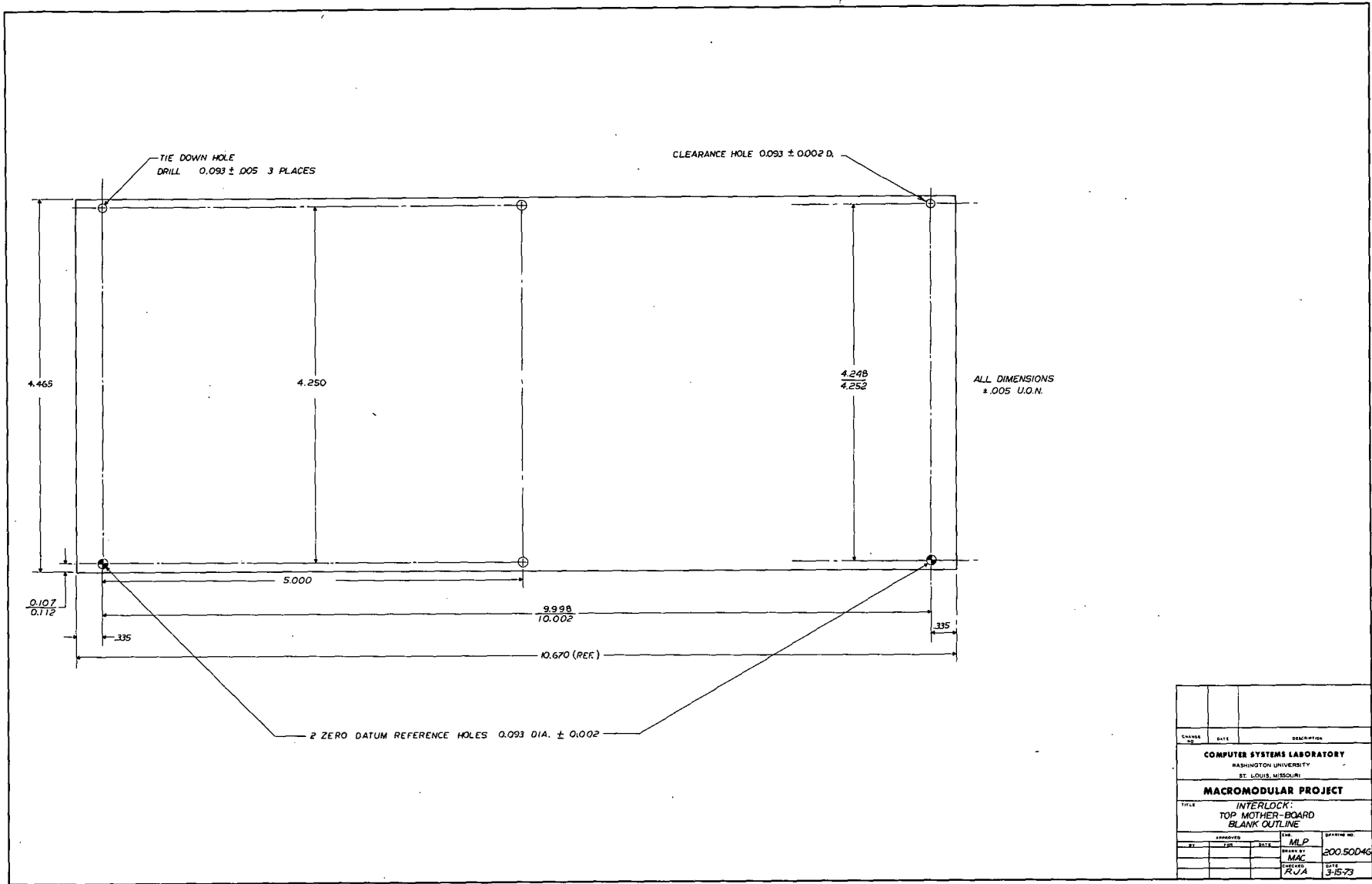
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b>		
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE VERTICAL BOARD DOUBLE HEIGHT DOUBLE PANHANDLE OUTLINE FOR ROUTING (MODIFIED)		
APPROVED	DATE	EXTENSION NO.
BY CEM		
BY P.L.L.		200.50038
BY MK	DATE	
	2-16-71	



- NOTES:
1. REGISTRATION TARGET
  2. HANDLE MOUNTING HOLE LOCATIONS (THREE PLACES)
  3. COPPER LIMITS FOR TAPING FOR BLANK BOARD OR SPECIAL CIRCUMSTANCES
  4. COPPER LIMIT FOR BLANK BOARD OR SPECIAL CIRCUMSTANCES
  5. CIRCUIT BOARD SHOWN FROM ETCH SIDE. COMPONENTS MOUNT FROM REVERSE SIDE. DIMENSIONS ARE SHOWN AS
  6. NUMBER REFERS TO THE DISTANCE FROM THE ZERO REFERENCE LINE IN UNITS OF 0.050 INCH REFERENCE GRID.

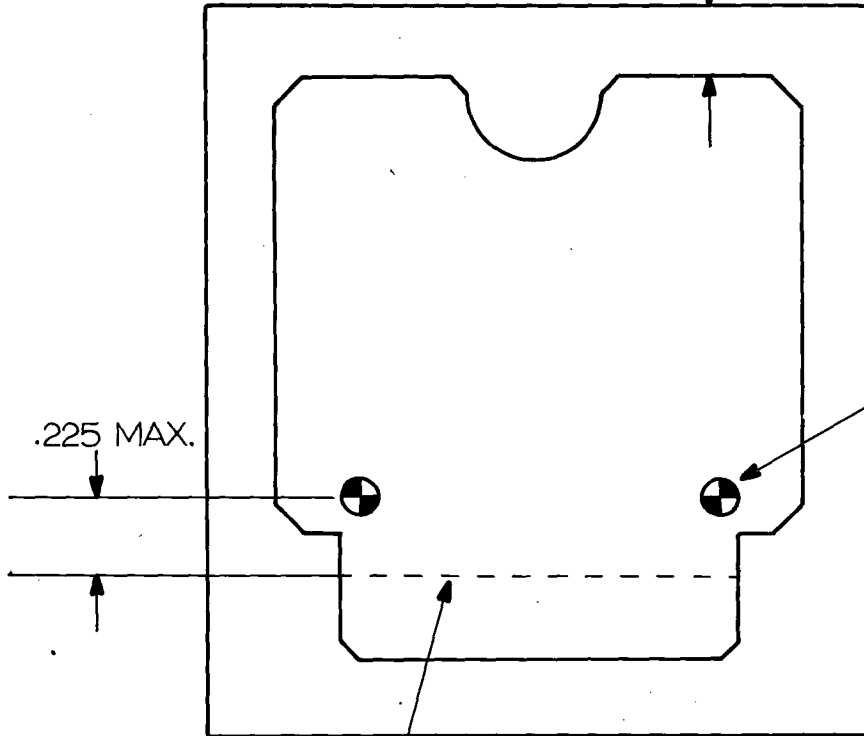
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE LAYOUT GUIDE FOR SINGLE HEIGHT PLUG IN BOARD USING DOUBLE HEIGHT BOARD BLANK		
APPROVED	ENG.	DRAWING NO.
BY FOR DATE	NTK	200.50D40
	P.L.L.	
CHECKED	DATE	
	1-21-72	





CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b>		
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE INTERLOCK; TOP MOTHER-BOARD BLANK OUTLINE		
DESIGNED BY	DATE	DRAWING NO.
DRAWN BY	DATE	200.5004G
CHECKED BY	DATE	
APPROVED BY	DATE	DATE
		3-15-73

MINIMUM BORDER .200  
4 SIDES



.225 MAX.

DRILL NO. 42  
2 HOLES  
ALL OTHER HOLES  
TYPE "B"

GOLD PLATE BELOW LINE -  
SEE SPECIFICATION PC-1

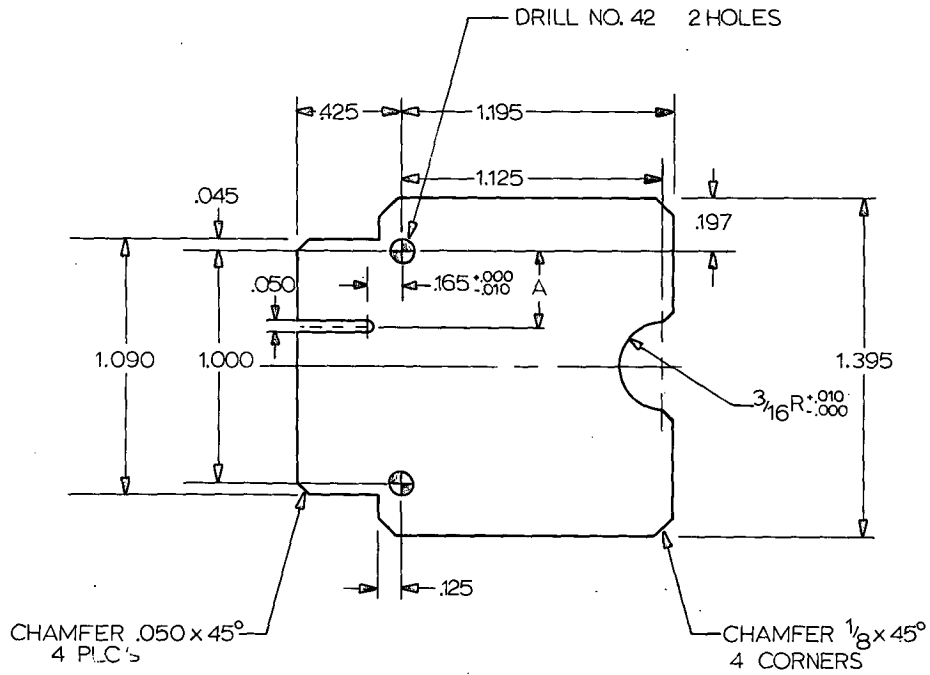
COMPUTER SYSTEMS LABORATORY  
WASHINGTON UNIVERSITY  
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE  
FUNCTION CALLER CABLE  
PC BOARD PRODUCTION GUIDE

			APPROVED		ENG MLP	DRAWING NO.
			BY	FOR	DATE	200.50D47
			RJA	PROD	7-3-73	
					DRAWN BY MAC	
CHANGE NO.	DATE	DESCRIPTION			CHECKED RJA	DATE 7-3-73

RJA



MATERIAL: 1/16 DOUBLE SIDED P.C. STOCK  
 ALL DIMENSIONS ± .005 U.O.N.

DIMENSION A	BOARD NUMBER
.200	WCL0211
.400	WCL0213

		<i>RJA</i>	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE <b>FUNCTION CALLER CABLE</b> <b>P.C. BOARD - ROUTING DIMENSIONS</b>			
APPROVED		ENG.	DRAWING NO.
BY	FOR	<i>RJA</i>	<i>200.50D48</i>
<i>RJA</i>	<i>PROD</i>	DATE	
		<i>7-3-73</i>	DRAWN BY
			<i>MAC</i>
			CHECKED
			<i>MLP</i>
			DATE
			<i>7-3-73</i>

SINGLE CELL ELECTRONICS CASE

PAGE	TITLE	CHANGE
200.1-1	TITLE PAGE	A
200.1-2	PARTS LIST	
200.1-3	SINGLE CELL CASE - DESCRIPTION	A
200.1-4	SINGLE CELL COVER SUB ASSEMBLY	
200.1-5	SINGLE CELL CASE ASSEMBLY	

CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	RJA								
A	0181	5-19-71	DHO								

## SINGLE CELL ELECTRONICS CASE PARTS LIST

QTY.	C.S.L. DOC.	PART
2	200.12-4	COVER PLATE
1	200.12-5	GUIDE PLATE PAIR
1	200.12-6	PLUG BRACKET PAIR
1	200.10	GRILL SUB ASSEMBLY
1	200.11	SHROUD SUB ASSEMBLY
12	-	1/8 x .086 DIA SHALLOW OVAL HEAD NICKEL PLATED STEEL RIVETS
2	-	#2-56 x 3/16 FLATHEAD SOCKET CAP SCREWS
4	-	#5-40 x 1/4 FLATHEAD SOCKET CAP SCREWS

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	<i>RJA</i>								

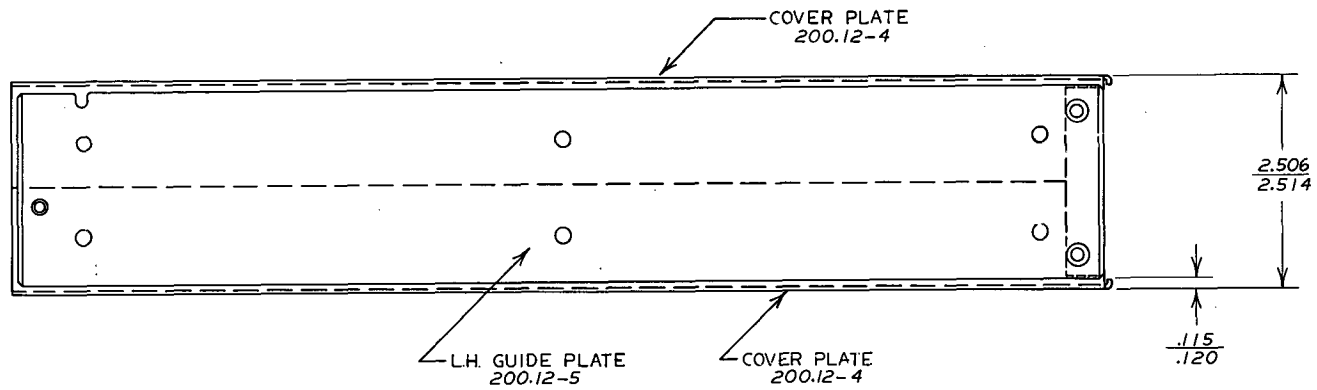
## SINGLE CELL ELECTRONICS CASE - DESCRIPTION

The single cell electronics case is a protective metal shell that houses printed circuit boards and associated components and provides mechanical alignment for engagement of electrical connectors. In addition, the geometry of the case serves as ducting to allow air flow over electronic components housed therein.

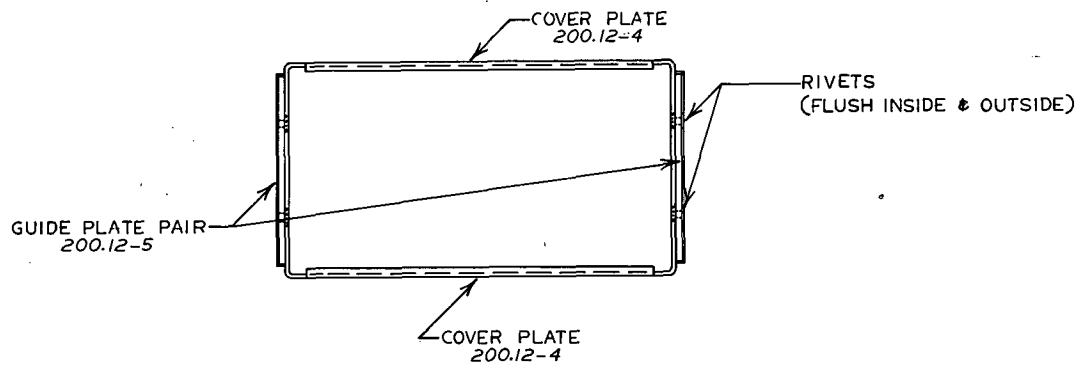
The single cell case is made from four sub-assemblies - the cover, grill, shroud, and bracket pair. The cover and grill are assembled together prior to insertion of printed circuit boards while the shroud and bracket pair are assembled with the boards being loaded into the case.

Page no's. 200.1-4 and 200.1-5 are a set of mechanical drawings and illustrations describing components and assembly of the single cell electronics case. All tolerances and specifications relating to the case 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.

CHG	E C O	DATE	APPR
ISSUE	—	4-6-71	RJA
A	0181	5-19-71	SDH

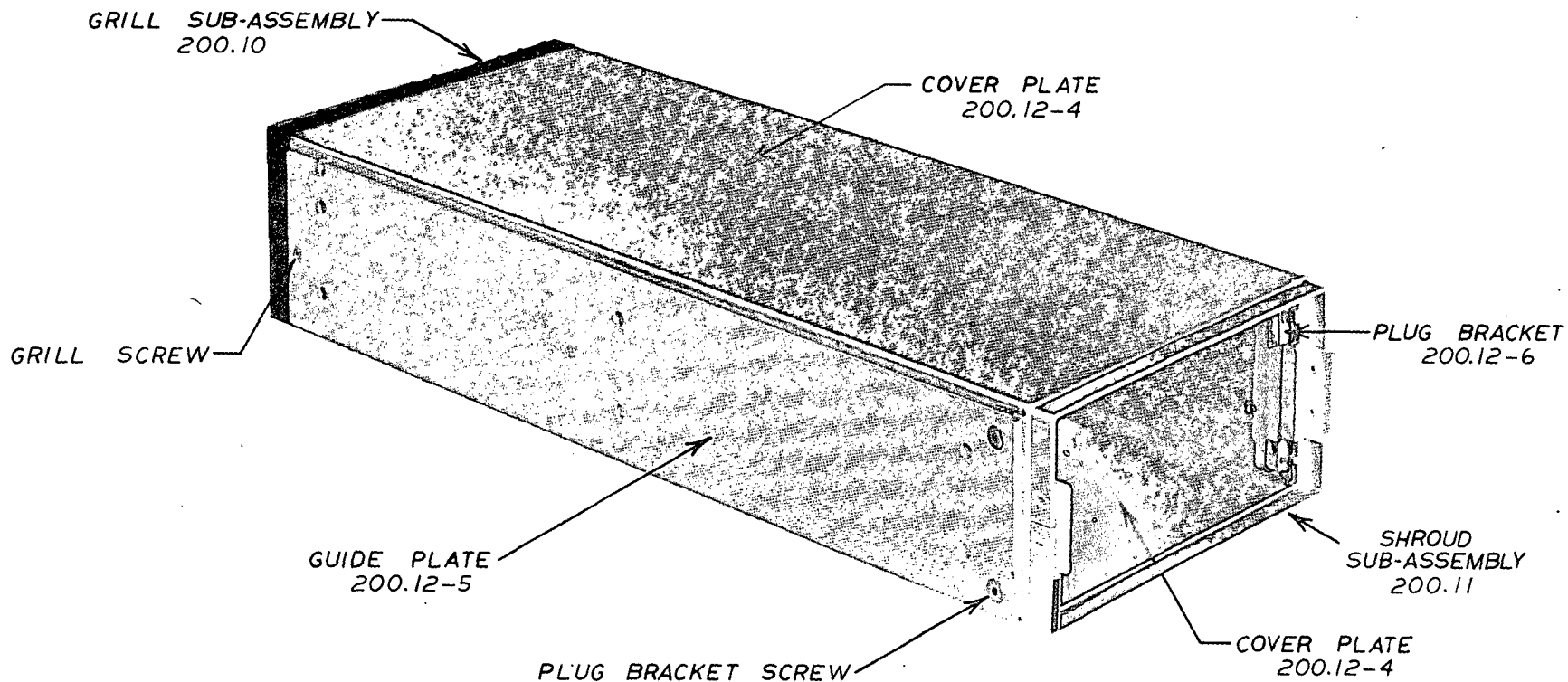


SIDE VIEW



FRONT END VIEW

ISSUE		3-31-71	RJA
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
SINGLE-CELL CASE SUB-ASSEMBLY			
APPROVED	FOR	DATE	ENG
BY	FOR	DATE	WAC
WAC	PROD.	4-7-71	DRAWN BY
			PLL
CHECKED	DATE	DRAWING NO.	
RJA	9-11-69	200.1-4	



		<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		TITLE <b>SINGLE CELL CASE ASSEMBLY</b>	
		<b>MACROMODULAR PROJECT</b>		APPROVED	
				BY <i>WRB</i> FOR PROD. DATE 4-7-71	
ISSUE 3-31-71 RJA				ENG. <b>RJA</b>	
				DRAWN BY <b>DHO</b>	
CHANGE NO.		DATE		CHECKED <b>RJA</b>	
		DESCRIPTION		DATE <b>3-31-71</b>	
				DRAWING NO. <b>200.1-5</b>	



DOUBLE CELL ELECTRONICS CASE

PAGE	TITLE	CHANGE
200.2-1	TITLE PAGE	A
200.2-2	PARTS LIST	
200.2-3	DOUBLE CELL CASE - DESCRIPTION	A
200.2-4	DOUBLE CELL COVER SUB ASSEMBLY	
200.2-5	DOUBLE CELL CASE ASSEMBLY	

CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	RJA								—
A	0182	5-19-71	DND								

## DOUBLE CELL ELECTRONICS CASE PARTS LIST

QTY.	C.S.L. DOC.	PART
2	200.12-4	COVER PLATE
2	200.12-5	GUIDE PLATE PAIR
1	200.12-7	DOUBLE CELL FILLER STRIP PAIR
2	200.12-6	PLUG BRACKET PAIR
2	200.10	GRILL SUB ASSEMBLY
2	200.11	SHROUD SUB ASSEMBLY
24	-	1/8 x .086 DIA SHALLOW OVAL HEAD NICKEL PLATED STEEL RIVETS
4	-	#2-56 x 3/16 FLATHEAD SOCKET CAP SCREWS
8	-	#5-40 x 1/4 FLATHEAD SOCKET CAP SCREWS

CHG	E.C.O.	DATE	APPR.	CHG	E.C.O.	DATE	APPR.	CHG	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	<i>RJA</i>								

MACROMODULAR SYSTEMS PROJECT

200.2-2

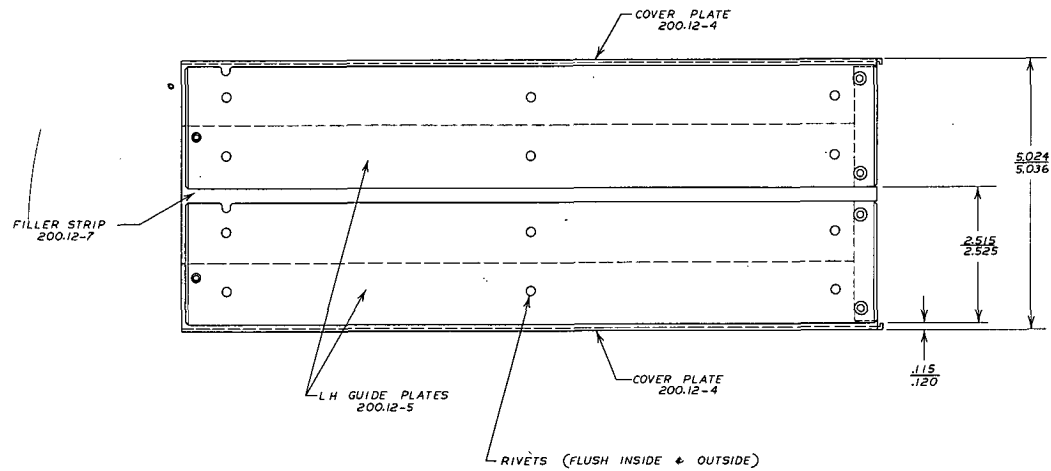
## DOUBLE CELL ELECTRONICS CASE - DESCRIPTION

The double cell electronics case is a protective metal shell that houses printed circuit boards and associated components and provides mechanical alignment for engagement of electrical connectors. In addition, the geometry of the case serves as ducting to allow air flow over electronic components housed therein.

The double cell case is made from four sub-assemblies - the cover, grill, shroud, and bracket pair. The cover and grill are assembled together prior to insertion of printed circuit boards while the shroud and bracket pair are assembled with the boards being loaded into the case.

Page no's. 200.2-4 and 200.2-5 are a set of mechanical drawings and illustrations describing components and assembly of the double cell electronics case. All tolerances and specifications relating to the case 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.

ISSUE	DATE	BY
—	4-6-71	RJA
A 0182	5-19-71	DND



ISSUE 3-21-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
DOUBLE-CELL CASE SUB-ASSEMBLY			
APPROVED		BY	DESIGN NO.
BY	DATE	BY	200.2-4
4/26	PROD 4-7-71	PLL	
DRAWN		DATE	
RJA		3-29-71	

GRILL SUB-ASSEMBLY  
200.10

COVER PLATE  
200.12-4

PLUG BRACKET  
200.12-6

GRILL SCREW

FILLER STRIP  
DOUBLE CELL CASE  
200.12-7

GUIDE PLATE  
200.12-5

SHROUD SUB-ASSEMBLY  
200.11

PLUG BRACKET SCREW

COVER PLATE  
200.12-4

			<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		TITLE <b>DOUBLE-CELL CASE ASSEMBLY</b>			
			<b>MACROMODULAR PROJECT</b>		APPROVED BY <i>Wab</i> FOR <b>PROD.</b> DATE <b>4-7-71</b>		ENG. <b>RJA</b> DRAWN BY <b>DHO</b>	DRAWING NO. <b>200.2-5</b>
ISSUE <b>3-31-71</b> <b>RJA</b>					CHECKED <b>RJA</b>		DATE <b>3-31-71</b>	
CHANGE NO.	DATE	DESCRIPTION						



## TRIPLE CELL ELECTRONICS CASE PARTS LIST

QTY.	C.S.L. DOC.	PART
2	200.12-4	COVER PLATE
3	200.12-5	GUIDE PLATE PAIR
1	200.12-8	TRIPLE CELL FILLER STRIP PAIR
3	200.12-6	PLUG BRACKET PAIR
3	200.10	GRILL SUB ASSEMBLY
3	200.11	SHROUD SUB ASSEMBLY
36	-	1/8 x .086 DIA SHALLOW OVAL HEAD NICKEL PLATED STEEL RIVETS
6	-	#2-56 x 3/16 FLATHEAD SOCKET CAP SCREWS
12	-	#5-40 x 1.4 FLATHEAD SOCKET CAP SCREWS

CHG	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	<i>RJA</i>								

## TRIPLE CELL ELECTRONICS CASE - DESCRIPTION

The triple cell electronics case is a protective metal shell that houses printed circuit boards and associated components and provides mechanical alignment for engagement of electrical connectors. In addition, the geometry of the case serves as ducting to allow air flow over electronic components housed therein.

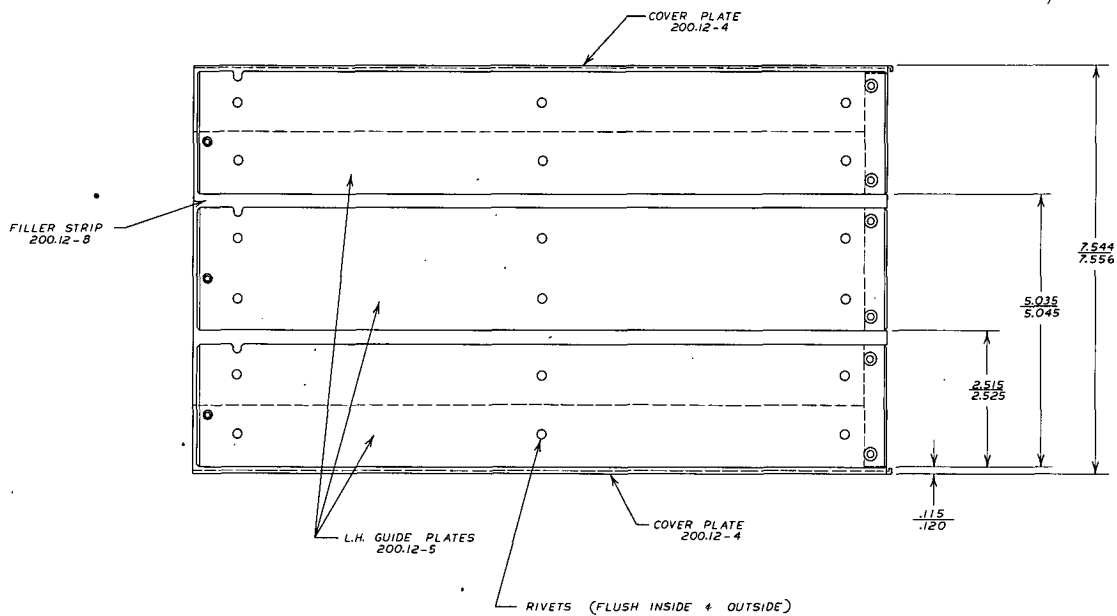
The triple cell case is made from four sub-assemblies - the cover, grill, shroud, and bracket pair. The cover and grill are assembled together prior to insertion of printed circuit boards while the shroud and bracket pair are assembled with the boards being loaded into the case.

Page no's. 200.3-4 and 200.3-5 are a set of mechanical drawings and illustrations describing components and assembly of the triple cell electronics case. All tolerances and specifications relating to the case 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.

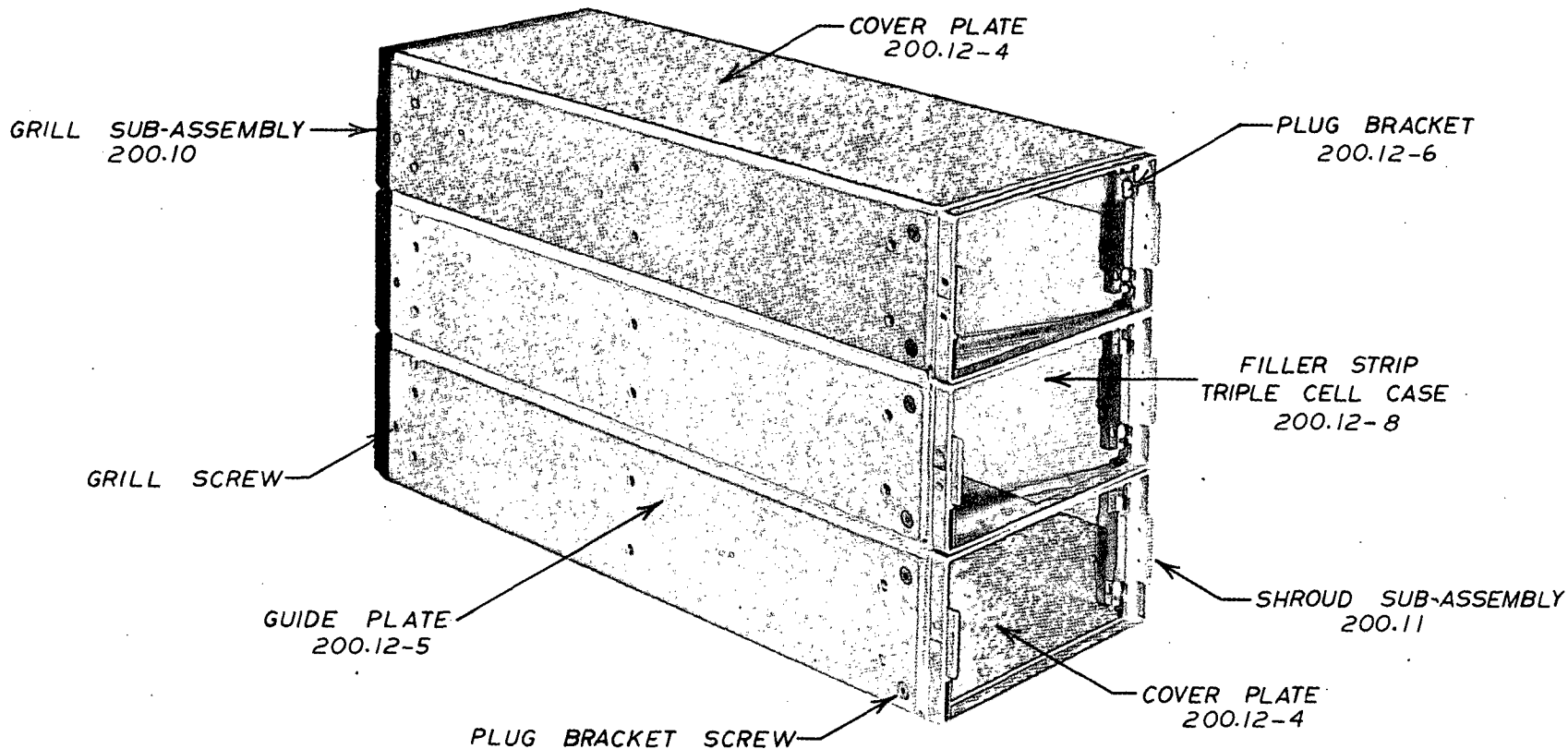
REV	ECO	DATE	BY
ISSUE	—	4-6-71	RJA
A	0183	5-19-71	DJO

200.3-3





ISSUE 3-31-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE TRIPLE-CELL CASE SUB-ASSEMBLY			
APPROVED	DATE	BY	DESIGNED BY
AWG	PROD. 4-7-71	RJA	200.3-4
		PLI	
		RJA	3-29-71



			<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		TITLE <b>TRIPLE CELL CASE ASSEMBLY</b>			
			<b>MACROMODULAR PROJECT</b>		APPROVED		ENG. <b>RJA</b>	DRAWING NO.
ISSUE 3-31-71 <b>RJA</b>					BY <i>Wab</i>	FOR PROD.	DATE 4-7-71	DRAWN BY <b>DHO</b>
CHANGE NO.	DATE	DESCRIPTION			CHECKED <b>RJA</b>	DATE 3-31-71		

FOUR CELL ELECTRONICS CASE

PAGE	TITLE	CHANGE
200.4-1	TITLE PAGE	A
200.4-2	PARTS LIST	
200.4-3	FOUR CELL CASE - DESCRIPTION	A
200.4-4	FOUR CELL COVER SUB ASSEMBLY	
200.4-5	FOUR CELL CASE ASSEMBLY	

CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	RJA								
A	0184	5-19-71	DJO								

## FOUR CELL ELECTRONICS CASE PARTS LIST

QTY.	C.S.L. DOC.	PART
2	200.12-4	COVER PLATE
4	200.12-5	GUIDE PLATE PAIR
1	200.12-9	FOUR CELL FILLER STRIP PAIR
4	200.12-6	PLUG BRACKET PAIR
4	200.10	GRILL SUBASSEMBLY
4	200.11	SHROUD SUB ASSEMBLY
48	-	1/8 x .085 DIA. SHALLOW OVAL HEAD NICKEL PLATED STEEL RIVETS
8	-	#2-56 x 3/16 FLATHEAD SOCKET CAP SCREWS
16	-	#5-40 x 1/4 FLATHEAD SOCKET CAP SCREWS

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	4-1-71	<i>RJA</i>								

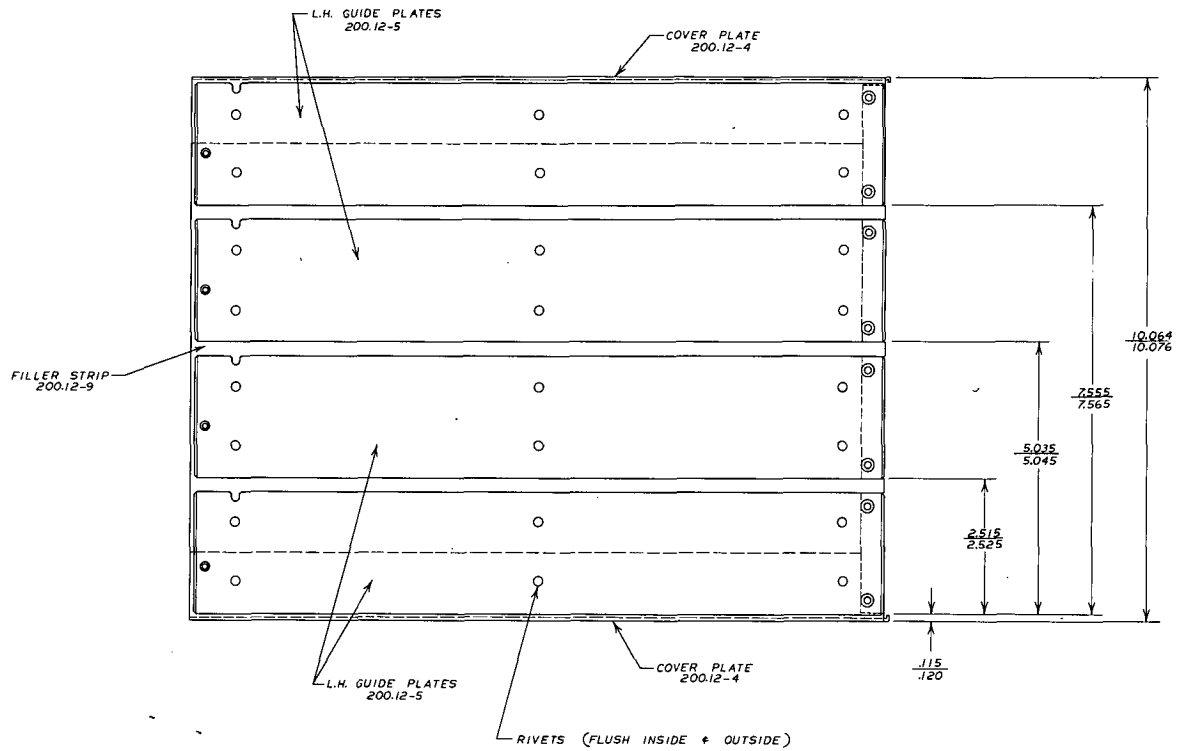
## FOUR CELL ELECTRONICS CASE - DESCRIPTION

The four cell electronics case is a protective metal shell that houses printed circuit boards and associated components and provides mechanical alignment for engagement of electrical connectors. In addition, the geometry of the case serves as ducting to allow for air flow over electronic components housed therein.

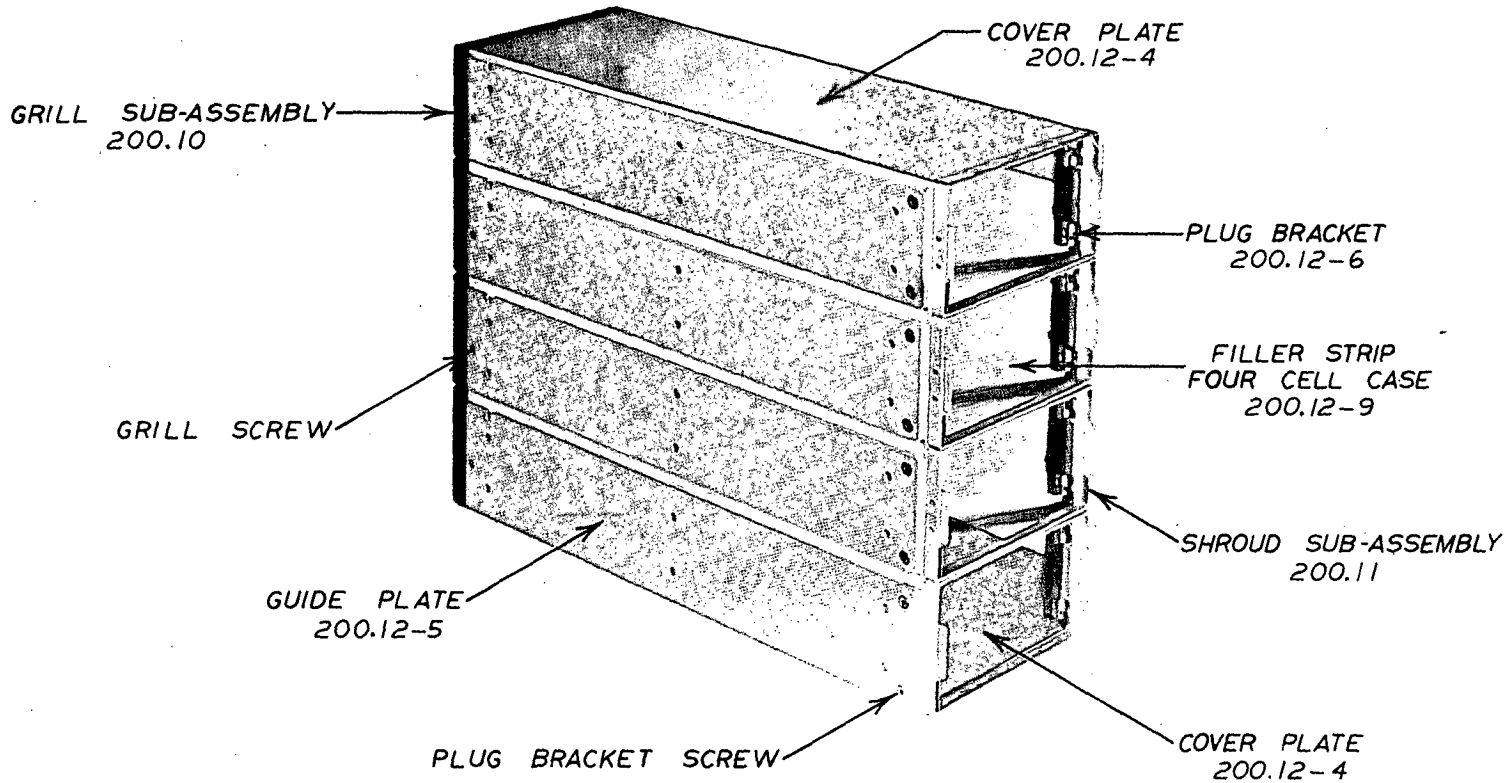
The four cell case is made from four sub-assemblies - the cover, grill, shroud, and bracket pair. The cover and grill are assembled together prior to insertion of printed circuit boards while the shroud and bracket pair are assembled with the boards being loaded into the case.

Page no's. 200.4-4 and 200.4-5 are a set of mechanical drawings and illustrations describing components and assembly of the four cell electronics case. All tolerances and specifications relating to the case 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.

ISSUE	—	4-6-71	RJA
A	0184	5-19-71	DNO



ISSUE 3-31-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE FOUR-CELL CASE SUB-ASSEMBLY			
APPROVED	DATE	BY	OFFICE NO.
PL	PROD. 4-7-71	RJA	200.4-4
PL		PLL	
PL		RJA	DATE 3-29-71



			<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		TITLE <b>FOUR-CELL CASE ASSEMBLY</b>			
			<b>MACROMODULAR PROJECT</b>		APPROVED		ENG. <b>RJA</b>	DRAWING NO. <b>200.4-5</b>
ISSUE <b>3-31-71</b> <b>RJA</b>					BY <b>WAB</b>		FOR <b>PROD.</b>	DATE <b>4-7-71</b>
CHANGE NO.	DATE	DESCRIPTION					CHECKED <b>RJA</b>	DATE <b>3-31-71</b>

GRILL SUBASSEMBLY

PAGE	TITLE	CHANGE
200.10-1	TITLE PAGE	<b>B</b>
200.10-2	PARTS LIST	B
200.10-3	GRILL SUB ASSEMBLY - DESCRIPTION	
200.10-4	GRILL SUB ASSEMBLY	
200.10-5	VERTICAL FIN	
200.10-6	END FIN	A
200.10-7	HORIZONTAL FIN	
200.10-8	TIE BRACKET	
200.10-9	TRIM STRIP	
200.10-10	LOCK STRIP	

CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	→	3-31-71	<i>RJA</i>								
A	0248	1-24-72	<i>RJA</i>								
B	0251	2-1-72	<i>RJA</i>								



**GRILL SUBASSEMBLY  
PARTS LIST**

QTY.	C.S.L. DOC.	PART
11	200.10-5	VERTICAL FIN
2	200.10-6	END FIN
7	200.10-7	HORIZONTAL FIN
2	200.10-8	TIE BRACKET
2	200.10-9	TRIM STRIP
2	200.10-10	LOCK STRIP
4	-	3/32 DIA. x 9/32 FLATHEAD BLACK ANODIZED ALUMINUM RIVETS
4	-	3/32 DIA. x 5/32 FLATHEAD BLACK ANODIZED ALUMINUM RIVETS

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	3-31-71	<i>RJA</i>								
B	0251	2-1-72	<i>RJA</i>								

## GRILL SUB-ASSEMBLY - DESCRIPTION

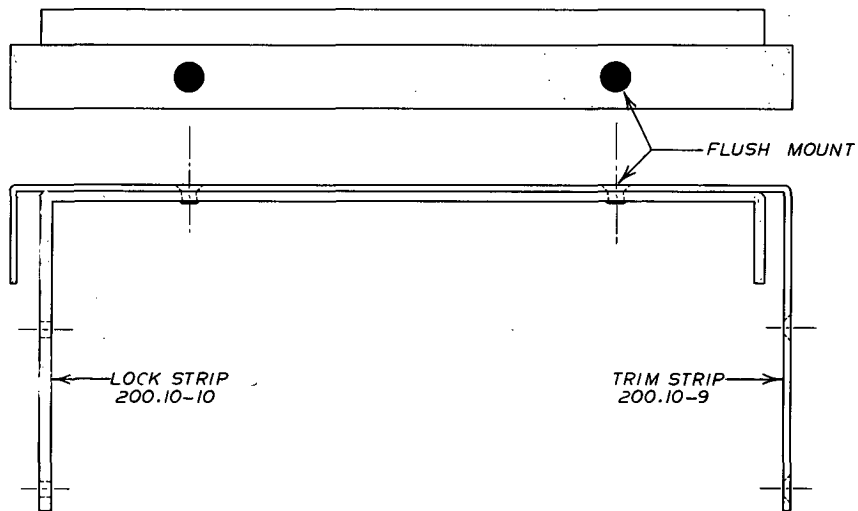
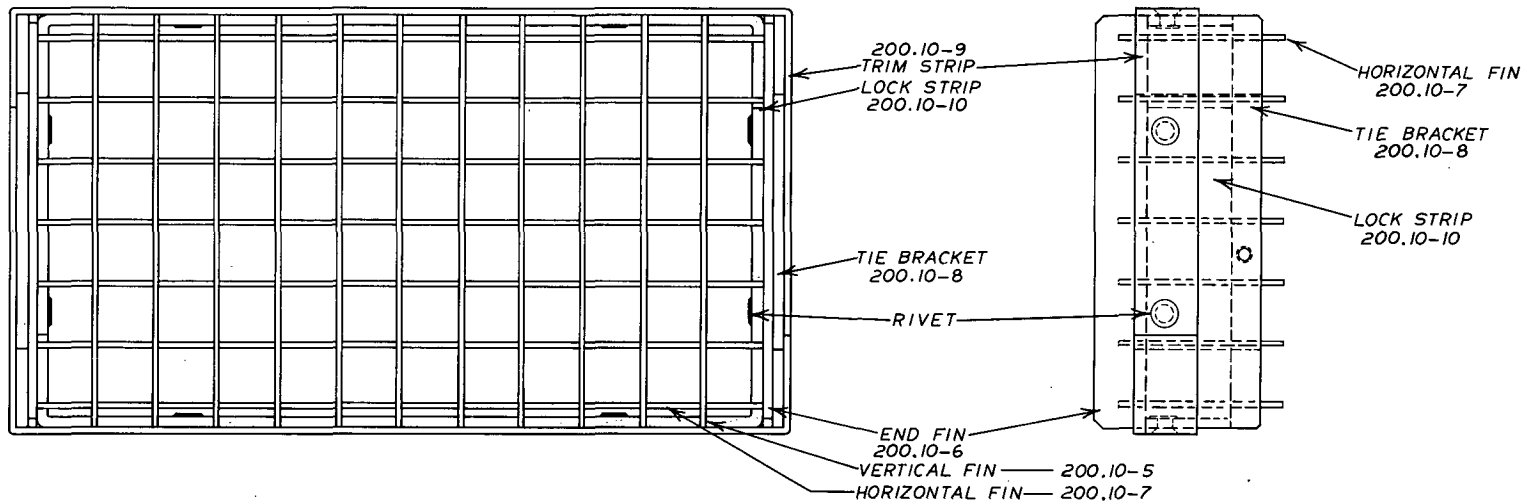
The grill sub-assembly described in this document is used in various numbers, in the assembly of the four types of electronics cases. The number of grills required for a particular case is equal to the name of the case type i.e. a single cell case would require one grill sub-assembly while a four cell case would require four grills.

The grill serves three main functions - it provides mechanical protection and support for circuit boards housed within an electronics case and allows air flow through the case to convectively cool electronic components.

Page no's. 200.10-4 through 200.10-10 are a complete set of mechanical drawings and illustrations fully describing components and assembly of the grill. Each drawing contains tolerance specifications relating to the various parts. 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 components and assembly documentation, his tooling and characteristics of his production processes.

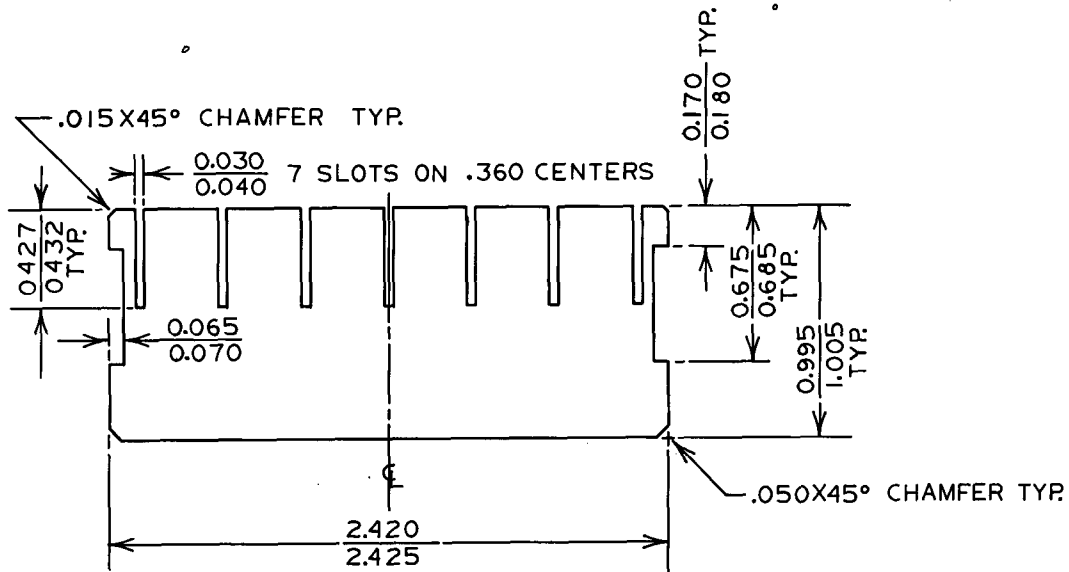
ISSUE	—	4-6-71	RJA

200.10-3



FINISH: CSL SPEC. MF 3

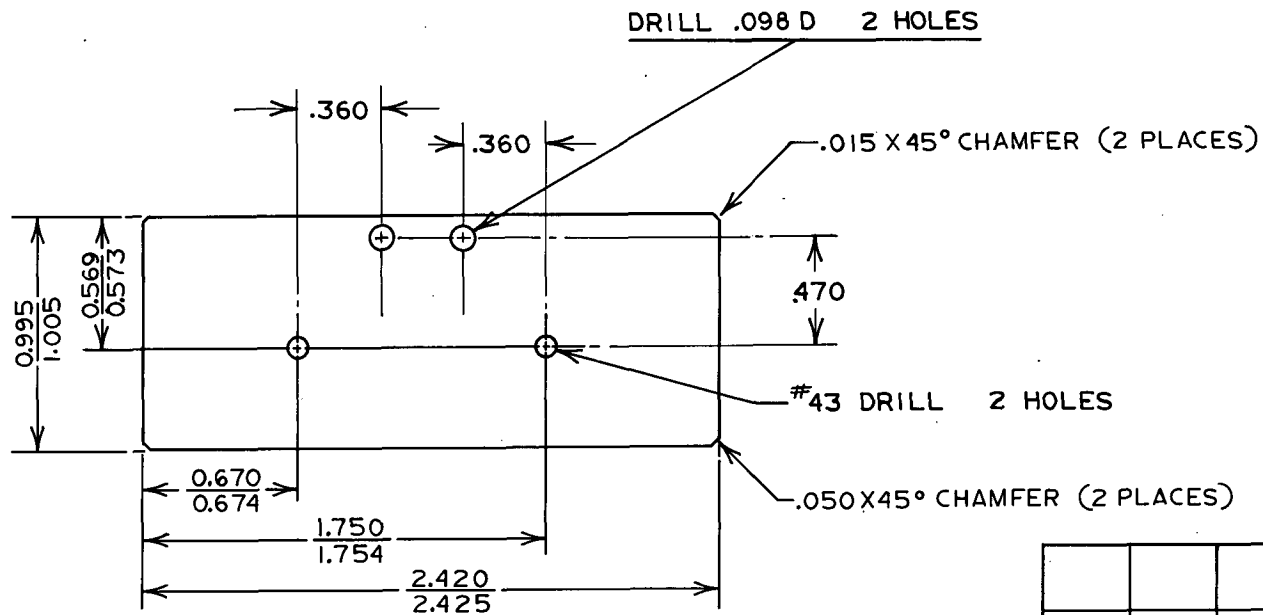
ISSUE 3-31-71		R J A	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE <b>GRILL SUB-ASSEMBLY</b>			
APPROVED	DATE	ENG.	DRAWING NO.
BY	FOR	WAC	200.10-4
WAC	PROD.	4-7-71	DRAWN BY
			PLL
		CHECKED	DATE
		R J A	9-28-68



VERTICAL FIN  
 MAT'L: .030 ALUM.-6061  
 FINISH: CSL SPEC MF 2

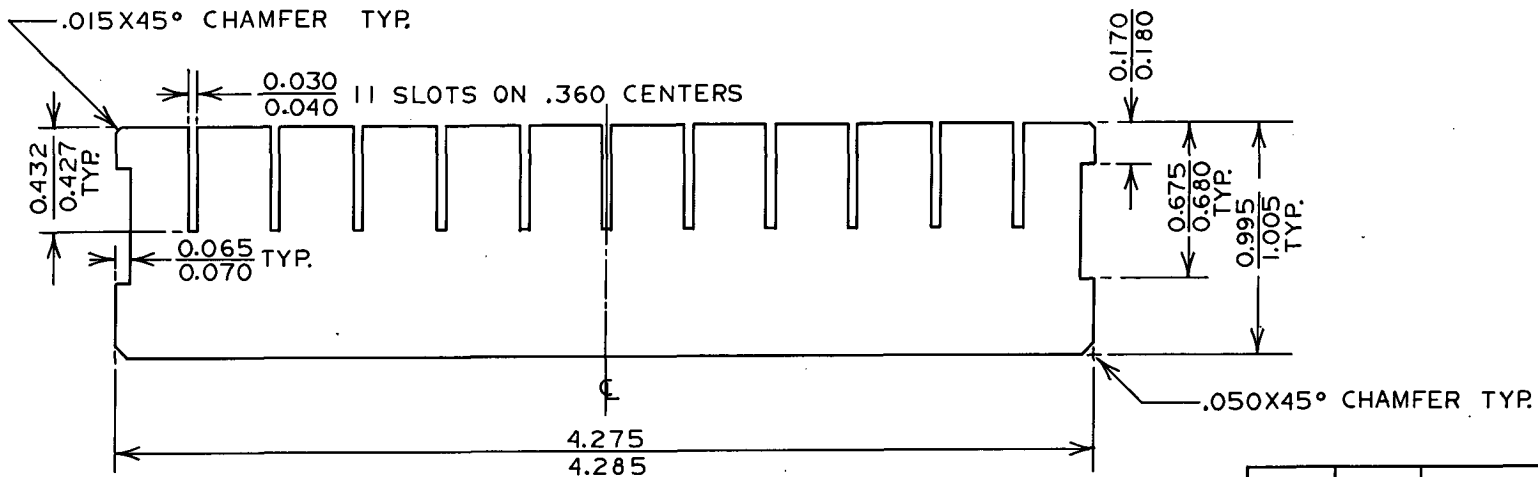
SCALE 2:1

ISSUE	3-31-71	RJA
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE		
VERTICAL FIN		
APPROVED		ENG.
BY	FOR	DATE
WLB	PROD.	4-7-71
		DRAWN BY
		PLL
		CHECKED
		RJA
		DATE
		8-31-68
		DRAWING NO.
		200.10-5



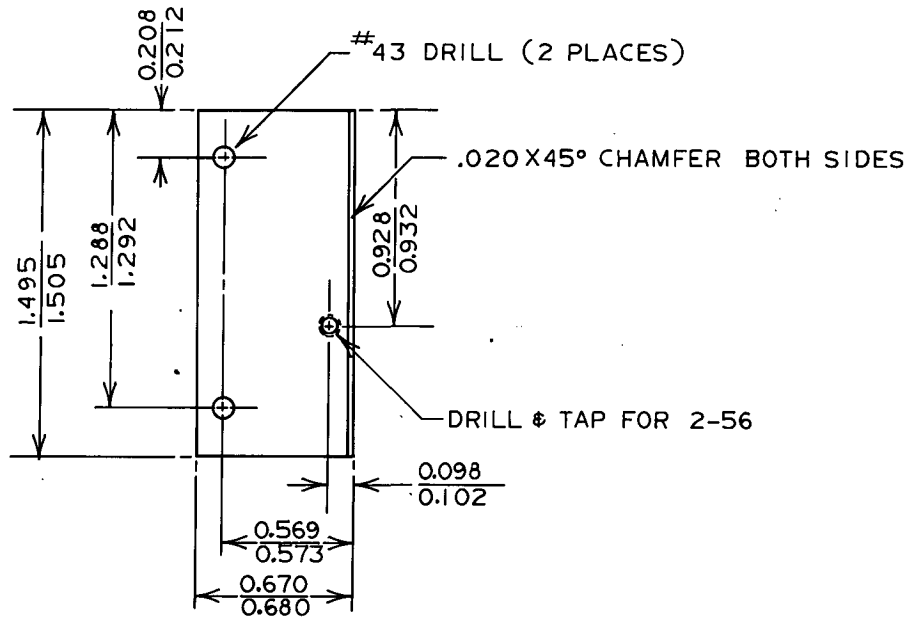
END FIN  
 .062 ALUM.-6061  
 FINISH: CSL SPEC. MF 2  
 SCALE 2:1

A	1-18-72	E.C.O. 0248 RJA	
ISSUE	3-31-71	RJA	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
END FIN			
APPROVED			ENG. WAC
BY	FOR	DATE	DRAWING NO.
WAB	PROD.	4-7-71	200.10-6
DRAWN BY			CHECKED
PLL			RJA
CHECKED			DATE
RJA			9-7-68



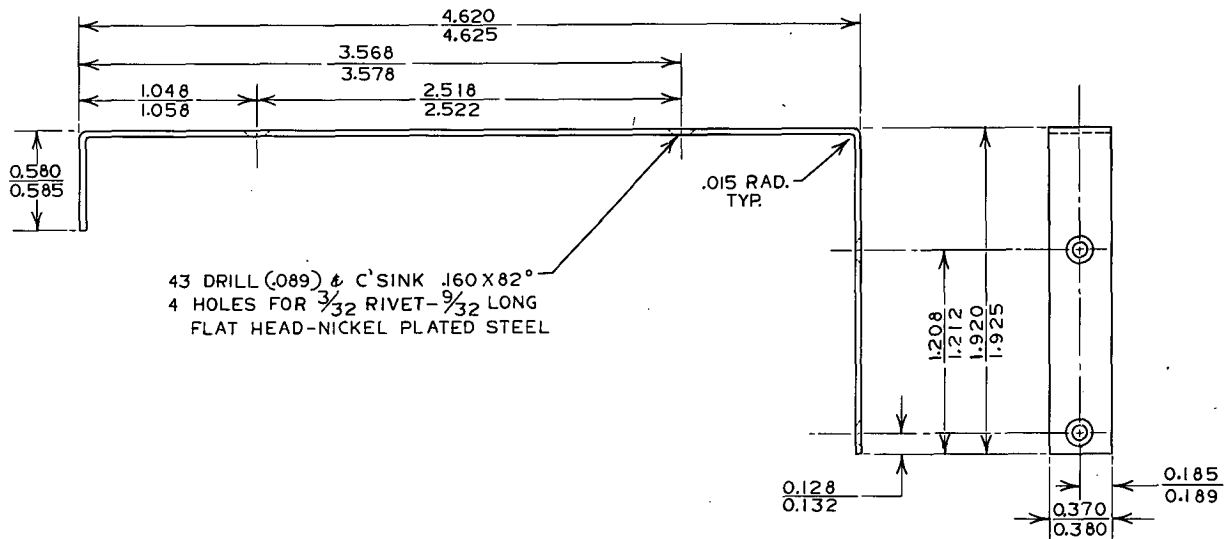
HORIZONTAL FIN  
 MAT'L: .030 ALUM.- 6064  
 FINISH: CSL SPEC. MF 2  
 SCALE 2:1

ISSUE		3-31-71	RJA
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
HORIZONTAL FIN			
APPROVED			ENG.
BY	FOR	DATE	WAC
WAC	PROD.	4-7-71	DRAWN BY
			PLL
CHECKED			DATE
RJA			8-31-68
			DRAWING NO.
			200 10-7



TIE BRACKET -  
 .062 ALUM.-6061  
 FINISH CSL SPEC MF 2  
 SCALE 2:1

CHANGE NO.		DATE	DESCRIPTION
ISSUE		3-31-71	RJA
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE TIE BRACKET			
APPROVED			ENG.
BY	FOR	DATE	WAC
WAB	PROD.	4-7-71	200.10-8
DRAWN BY			DATE
PLL			9-7-68
CHECKED			
RJA			

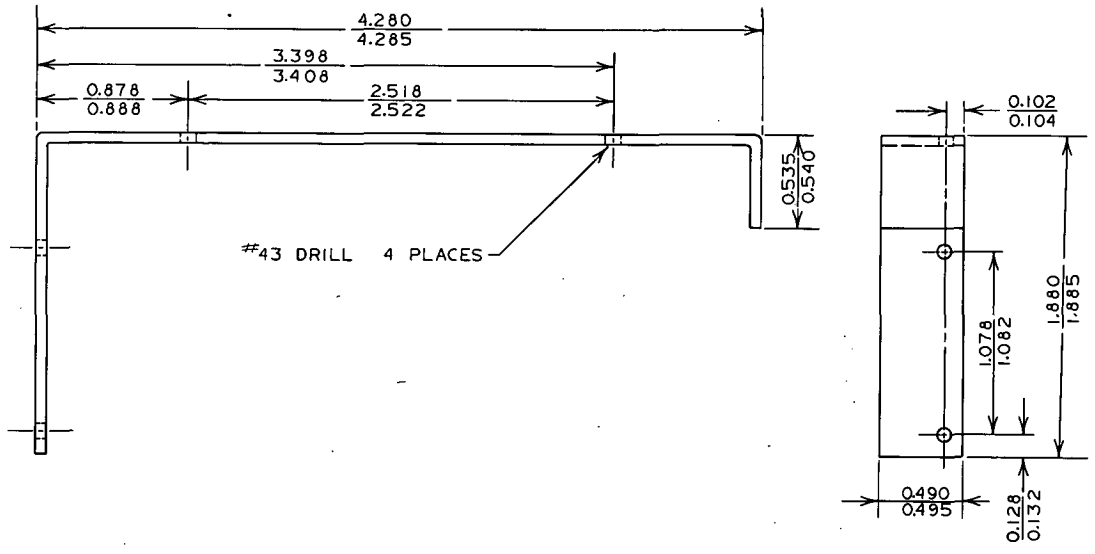


43 DRILL (.089) & C'SINK .160 X 82°  
 4 HOLES FOR 3/32 RIVET - 9/32 LONG  
 FLAT HEAD-NICKEL PLATED STEEL

TRIM STRIP  
 .040 - 6061 ALUM.  
 FINISH: CSL SPEC. MF 2  
 SCALE 2:1

ISSUE 3-31-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
TRIM STRIP			
APPROVED		ENG.	DRAWING NO.
BY	FOR	DATE	
WRE	PROD.	4-7-71	200.10-9
		DRAWN BY	
		PLL	
		CHECKED	DATE
		RJA	9-7-68





LOCK STRIP  
 MAT'L: .062 ALUM.-6061  
 FINISH: CSL SPEC. MF 2

SCALE 2:1

ISSUE		3-31-71	RJA
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
LOCK STRIP			
APPROVED		ENG.	DRAWING NO.
BY	FOR	DATE	
WAC	PROD.	4-7-71	200.10-10
CHECKED		DATE	
RJA		9-14-68	

SHROUD SUBASSEMBLY

PAGE	TITLE	CHANGE
200.11-1	TITLE PAGE	ISSUE
200.11-2	PARTS LIST	
200.11-3	SHROUD SUB ASSEMBLY - DESCRIPTION	
200.11-4	SHROUD SUB ASSEMBLY	
200.11-5	SHROUD COLLAR	
200.11-6	SLIDE PAIR	
200.11-7	KEY STOP	
200.11-8	LEFT AND RIGHT HANDED SHROUD SUB ASSEMBLY	

CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR	CHG.	E.C.O.	DATE	APPR.
ISSUE	0167	3-31-71	RJA								

## SHROUD SUBASSEMBLY PARTS LIST

QTY.	C.S.L. DOC.	PART
2	200.11-5	SHROUD COLLAR
1	200.11-6	SLIDE PAIR
1	200.11-7	KEY STOP
2	-	.086 DIA. x .125 GRIP SHALLOW OVAL HEAD ALUMINUM RIVETS
2	-	.086 DIA. x .165 GRIP SHALLOW OVAL HEAD ALUMINUM RIVETS

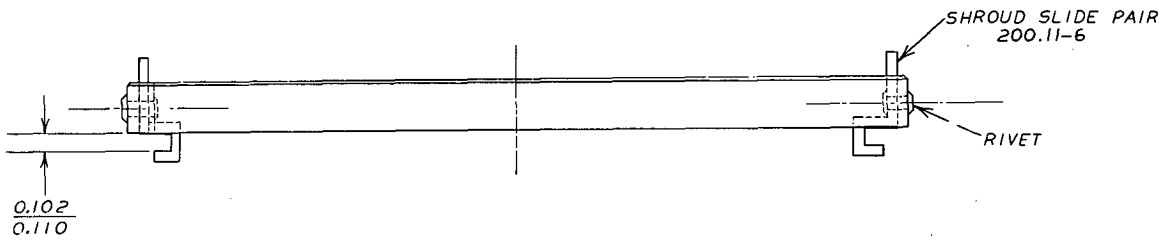
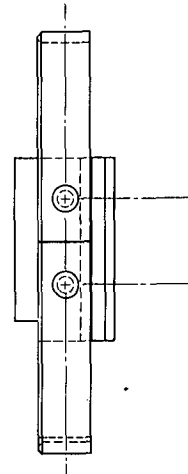
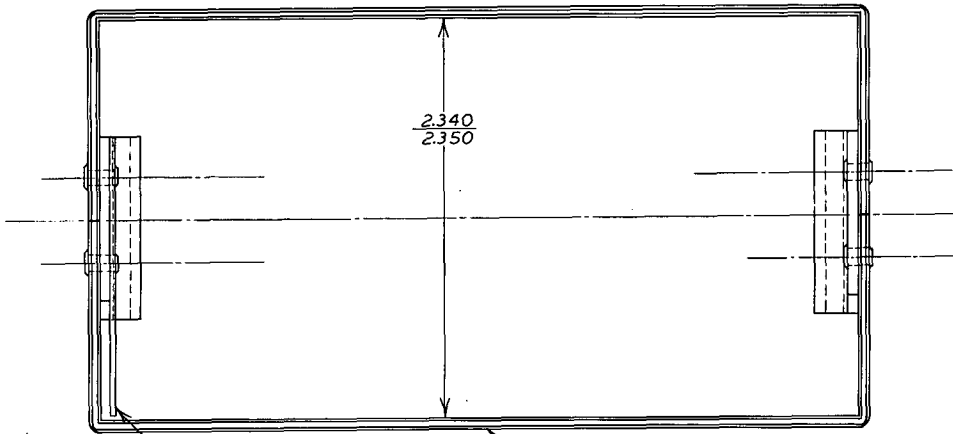
CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	0167	3-31-71	<i>RJA</i>								

## SHROUD SUB-ASSEMBLY - DESCRIPTION

The shroud sub-assembly described in this document is used in conjunction with the four basic types of electronic cases and serves two primary functions - it provides mechanical protection for connector pins and acts as a keying mechanism to prevent insertion of connector pins into incompatible electrical mating with other macromodular elements. Shroud sub-assemblies may be either left handed or right handed, depending upon the position of the key. (See photo's illustrating these two types on page 200.11-8).

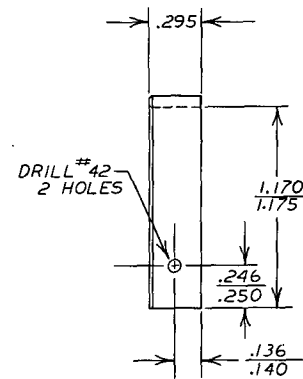
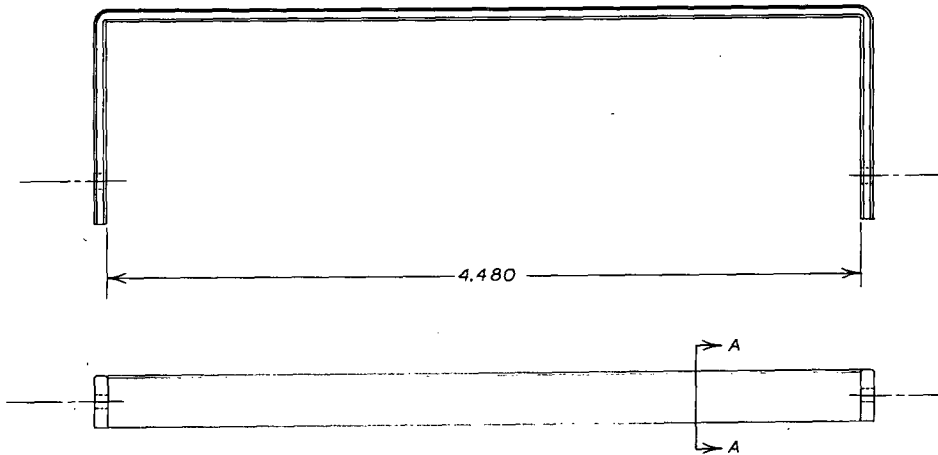
Page no's. 200.11-4 through 200.11-7 are a complete set of mechanical drawings and illustrations fully describing components and assembly of the shroud. Each drawing contains tolerance specifications relating to the various parts. All tolerances and specifications contained herein must be adhered to 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.

ISSUE 0167 4-6-71 RJA



LEFT HAND ASSEMBLY SHOWN

ISSUE		3-31-71		E.C.O. 0167 RJA	
CHANGE NO.	DATE	DESCRIPTION			
<b>COMPUTER SYSTEMS LABORATORY</b>					
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI					
<b>MACROMODULAR PROJECT</b>					
TITLE					
SHROUD SUB-ASSEMBLY					
APPROVED		ENG.		DRAWING NO.	
BY	FOR	DATE	WAC	200.11-4	
WQB	Prod.	10/1/70	PLL		
CHECKED			DATE		
RJA			9-9-69		



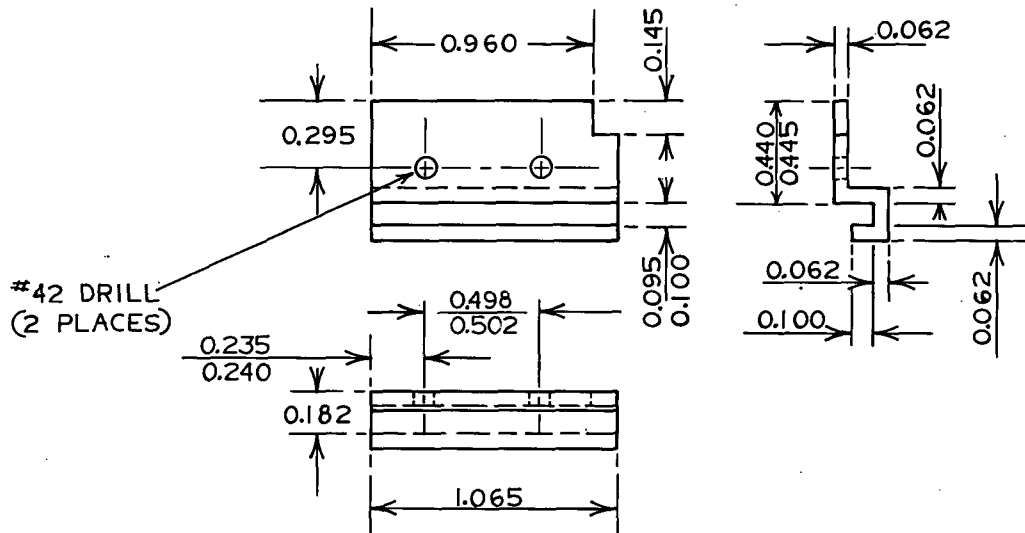
CHAMFER .020 2 EDGES  
(OR ROUND .030 R)



SECTION A-A

MAT'L: 3003-H14 ALUM .062 STOCK  
FINISH: CSL SPEC MFI  
DIMENSIONS: ±.005 U.O.N.

ISSUE 3-31-71		E.C.O. 0167		RJA	
CHANGE NO.	DATE	DESCRIPTION			
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI					
<b>MACROMODULAR PROJECT</b>					
TITLE					
SHROUD COLLAR					
APPROVED		ENG.	DRAWING NO.		
BY	FOR	DATE	DRAWN BY		200.11-5
WAB	Prod.	10/8/70	PLL		
CHECKED		DATE			
RJA		6-16-70			



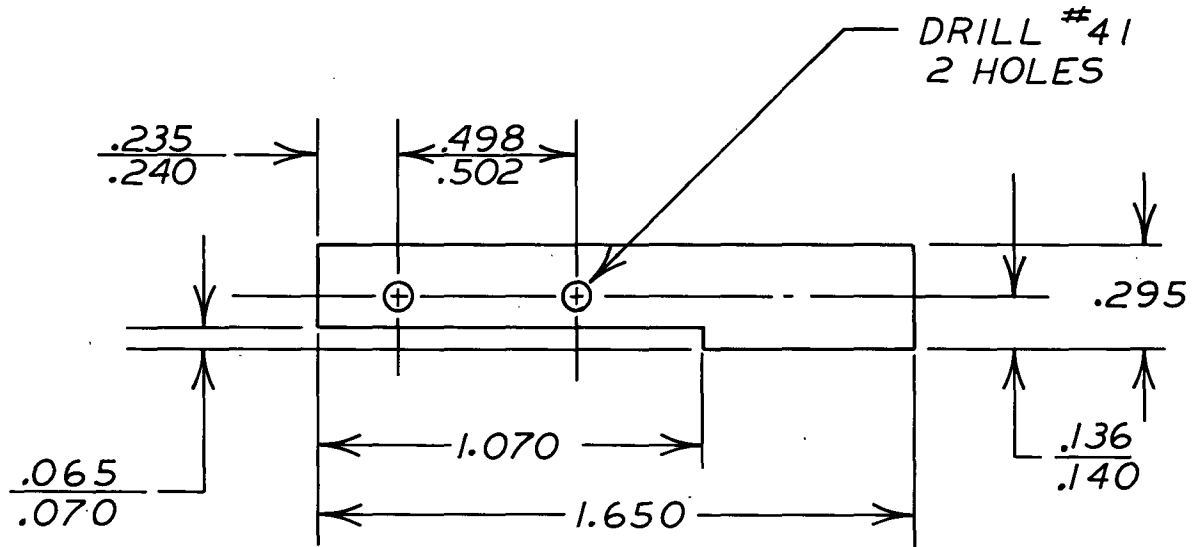
MAT'L. 6061-T 6 ALUMINUM  
TWO REQ'D.—

ONE RIGHT HAND  
ONE LEFT HAND

TOLERANCES  $\pm 0.005$  UNLESS  
OTHERWISE SPECIFIED

FINISH-CSL SPEC. MF I

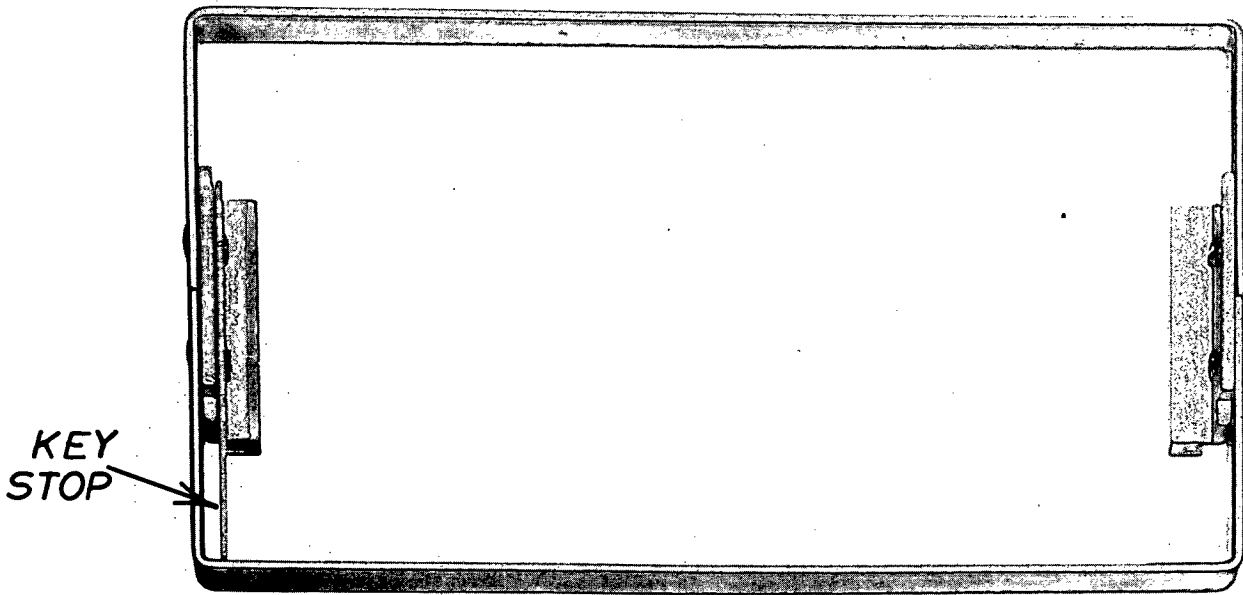
CHANGE NO.		DATE	DESCRIPTION
ISSUE 3-31-71		E.C.O.	0167 RJA
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
SHROUD SLIDE PAIR			
APPROVED			ENG
BY	FOR	DATE	WAC
WAG	Prod	10/18/70	DRAWN BY
			PLL
			CHECKED
			RJA
			DRAWING NO.
			200.11-6
			DATE
			9-12-69



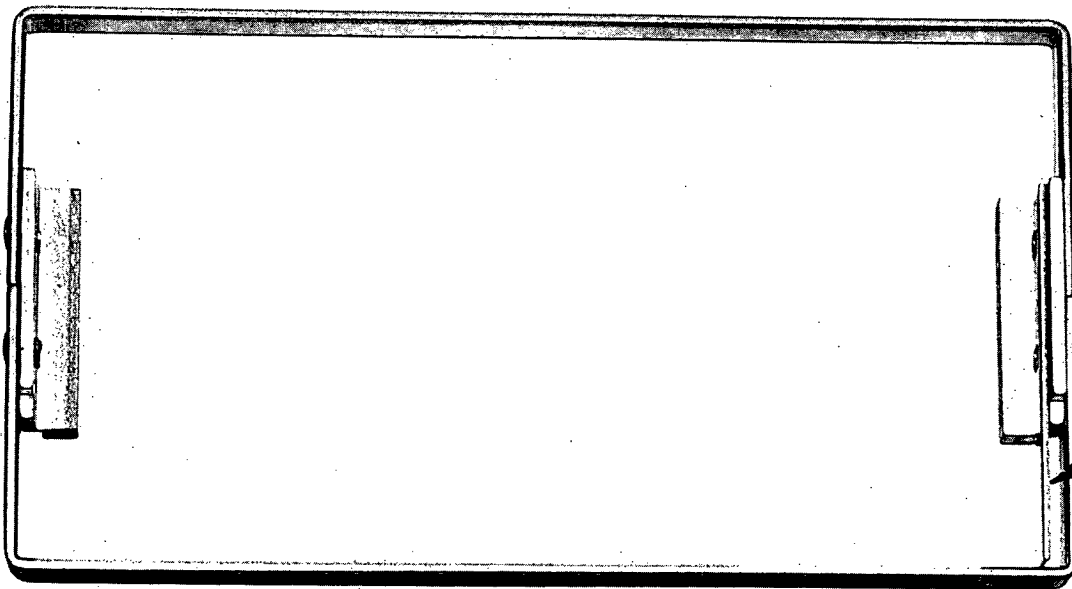
MAT'L: .040 SS  
 DIMENSIONS: ±.005 U.O.N.

COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			<b>MACROMODULAR PROJECT</b>				
			TITLE <b>KEY STOP</b>				
			APPROVED			ENG <b>WAC</b>	DRAWING NO. <b>200.11-7</b>
			BY <b>WAG</b>	FOR <b>Prod</b>	DATE <b>10/8/70</b>	DRAWN BY <b>PLL</b>	
<b>ISSUE 331-71 E.C.O. 0167 RJA</b>						CHECKED <b>RJA</b>	DATE <b>6-16-70</b>
CHANGE NO.	DATE	DESCRIPTION					





LEFT HAND SHROUD SUB-ASSEMBLY



RIGHT HAND SHROUD SUB-ASSEMBLY

COMPUTER SYSTEMS LABORATORY  
WASHINGTON UNIVERSITY  
ST. LOUIS, MISSOURI

**MACROMODULAR PROJECT**

TITLE: **LEFT AND RIGHT HANDED  
SHROUD SUB-ASSEMBLY**

ISSUE	4-5-71	RJA
CHANGE NO.	DATE	DESCRIPTION

APPROVED			ENG	DRAWING NO.
BY	FOR	DATE	RJA	200.11-8
WJR	PROD.	4-7-71	DRAWN BY DHO	
			CHECKED RJA	DATE 4-5-71



ELECTRONIC CASE  
METAL PARTS  
PARTS LIST

QTY.	C.S.L. DOC.	PART
	200.12-4	COVER PLATE
	200.12-5	GUIDE PLATE PAIR
	200.12-6	PLUG BRACKET PAIR
	200.12-7	DOUBLE CELL FILLER STRIP PAIR
	200.12-8	TRIPLE CELL FILLER STRIP PAIR
	200.12-9	FOUR CELL FILLER STRIP PAIR

CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.	CHG.	E.C.O.	DATE	APPR.
ISSUE	—	3-31-71	RJA								

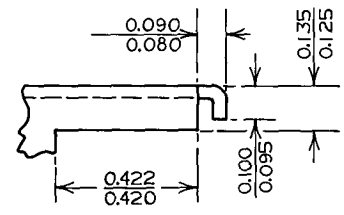
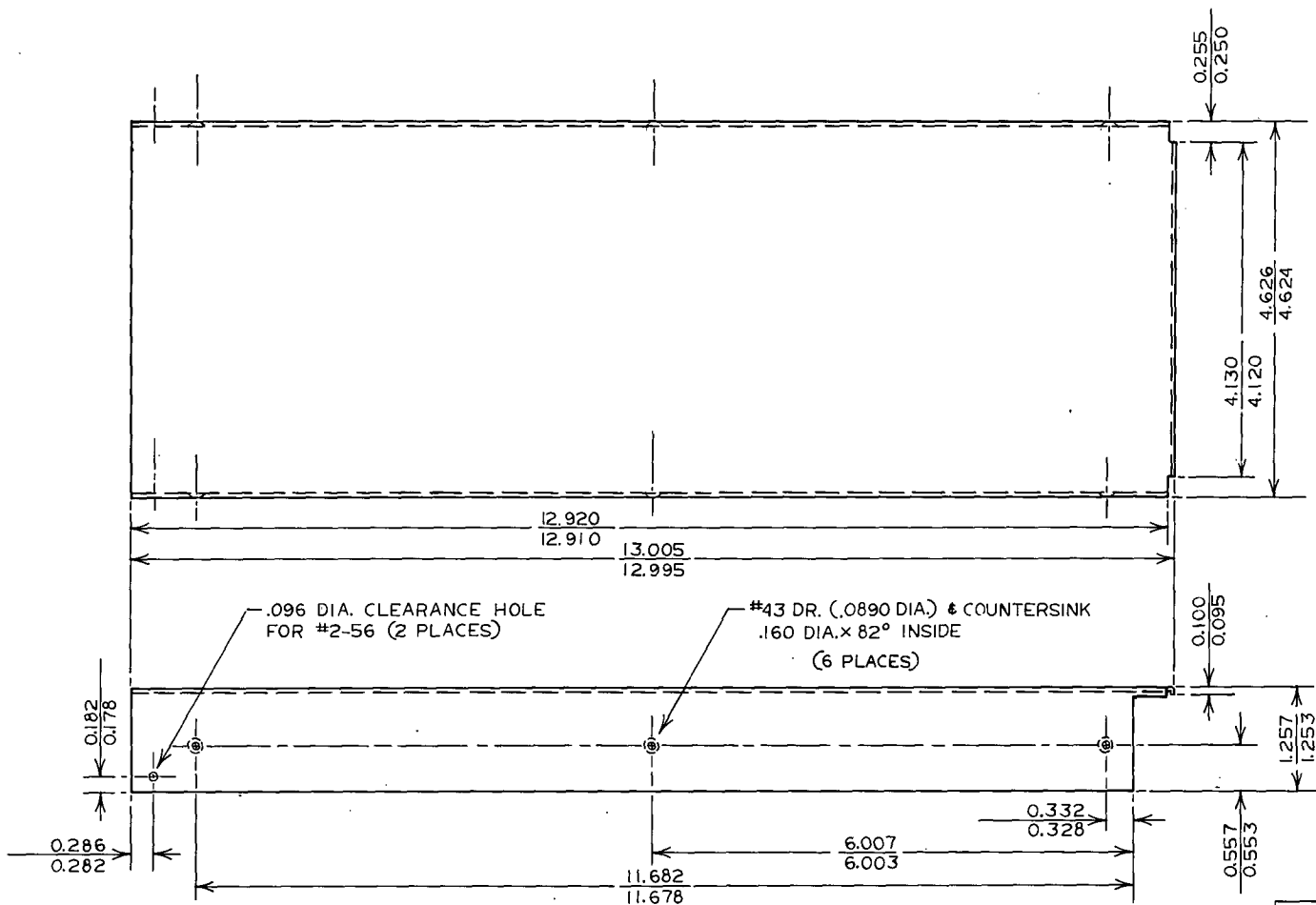
## ELECTRONICS CASE METAL PARTS - DESCRIPTION

The metal parts described in this document relate to the electronics cases. These parts are common to all the case types but may differ in quantity between the types. In the assembly of any case two cover plates and one filler strip pair are required. These parts form the top, bottom and sides of a case. The guide plate and plug bracket pair, on the otherhand, are required in numbers equal to the name of the case type i.e. a single cell unit would require one guide plate and plug bracket while a four cell case would require four pair of each.

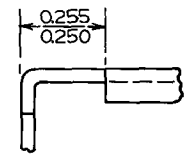
The function of the guide plate, as its name would imply, is to provide alignment for engagement of electrical connectors contained in the plug bracket pair when the case and associated electronics is brought into mating with compatible macro-modular elements.

Page no's. 200.12-4 through 200.12-9 are a complete set of mechanical drawings and illustrations fully describing the electronics case metal parts. Each drawing contains tolerance specifications relating to the various parts. 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 of documentation, his tooling and characteristics of his production processes.

REV.	DESCRIPTION	DATE	APP.
ISSUE	—	4-6-71	RJA



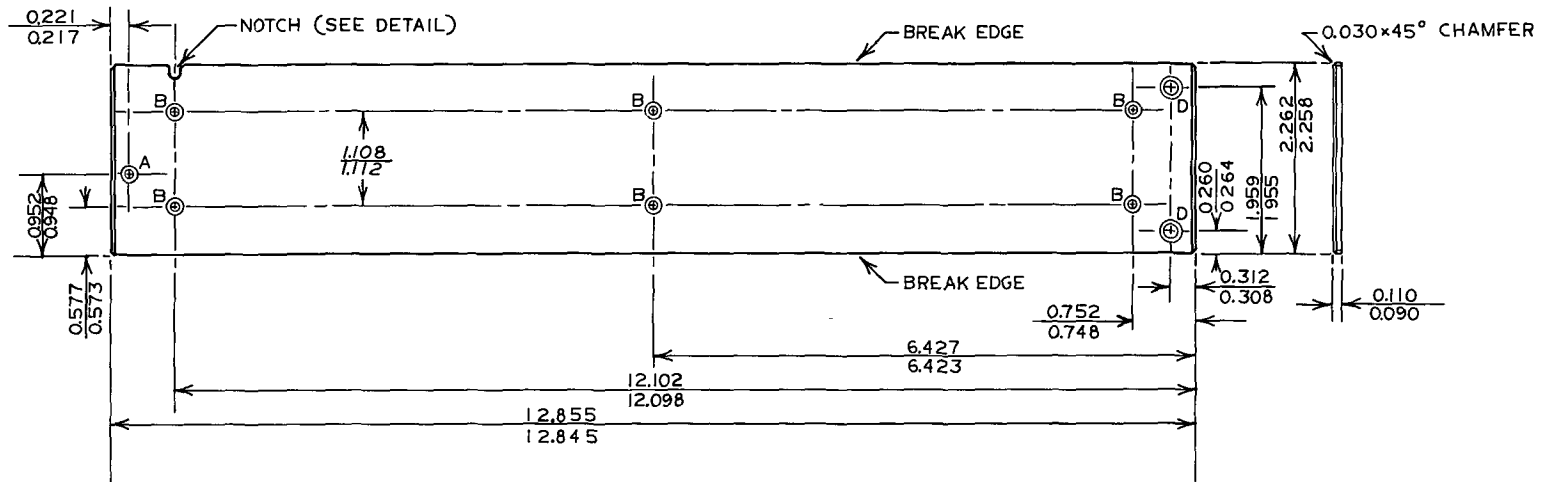
SIDE VIEW: CORNER DETAIL



END VIEW: CORNER DETAIL

MAT'L: .040 ALUM.-6061  
 FINISH: CSL SPEC. MF1

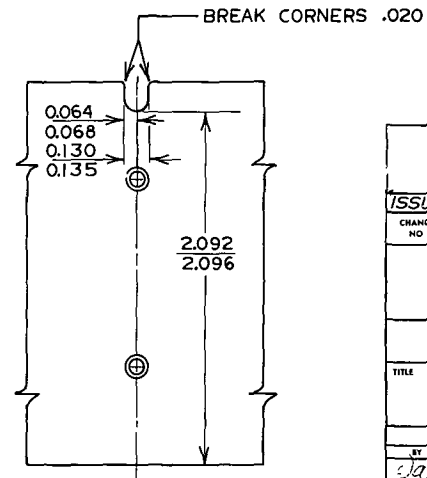
ISSUE 3-31-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
COVER PLATE			
BY	APPROVED	ENG	DRAWING NO.
WAC	FOR	WAC	200 12-4
DATE	DATE		
4-7-71	4-7-71		
PROD.	PROD.	DRAWN BY	
		PLL	
CHECKED	DATE		
RJA	8-30-68		



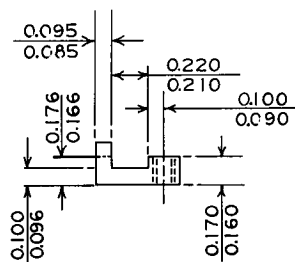
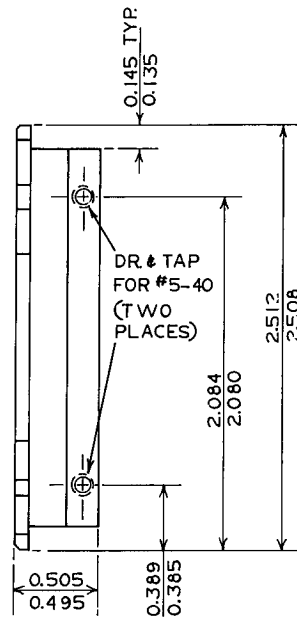
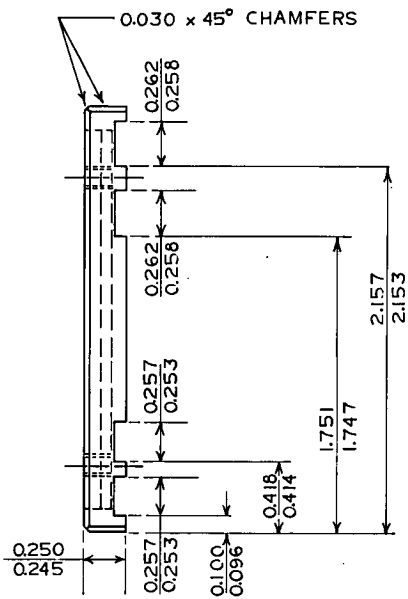
GUIDE PLATE  
 ONE RIGHT HAND &  
 ONE LEFT HAND REQ'D.  
 MAT'L. 0.100 #6061-T6 ALUM.  
 FINISH: CSL SPEC. MF1

HOLE SCHEDULE

- "A" DRILL & COUNTERSINK FOR #2-56
- "B" #42 DRILL & COUNTERBORE 0.166 DIA. x 0.040 DEEP
- "D" DRILL & COUNTERSINK FOR #5-40



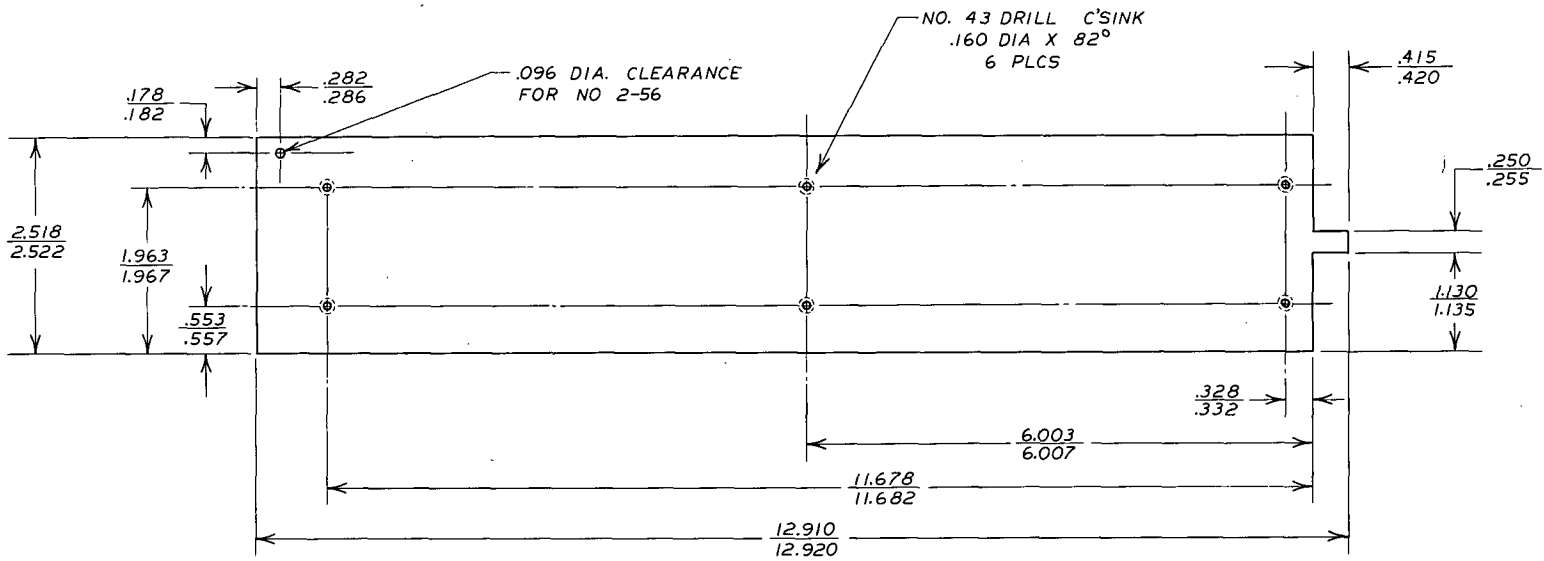
CHANGE NO.		DATE		DESCRIPTION	
ISSUE 3-31-71		RJA			
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST LOUIS, MISSOURI					
<b>MACROMODULAR PROJECT</b>					
TITLE GUIDE PLATE PAIR					
APPROVED			ENG		DRAWING NO
BY	FOR	DATE	WAC		200.12-5
JAE	PROD.	4-7-71	PL		
CHECKED			DATE		
RJA			8-31-68		



PLUG SUPPORT BRACKET

TWO REQ'D. - ONE RIGHT HAND  
 - ONE LEFT HAND  
 MAT'L: 0.250 x 0.500 STOCK  
 6061-T6 ALUMINUM  
 FINISH: CSL SPEC. MF 1

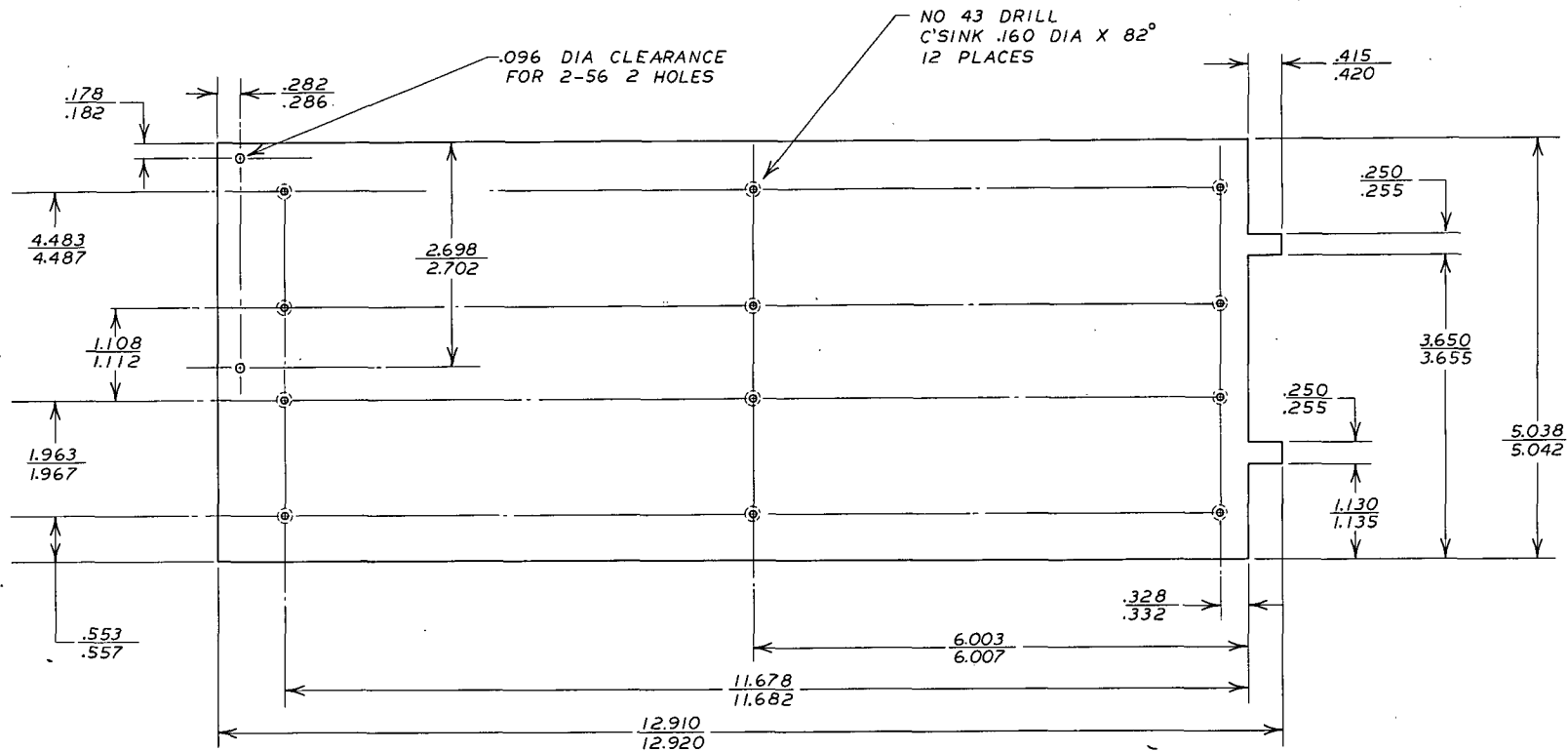
ISSUE 3-31-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
COMPUTER SYSTEMS LABORATORY WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE PLUG BRACKET PAIR			
BY	APPROVED FOR	END WAC	DRAWING NO.
WAG	PROD.	DATE 4-7-71	200.12-6
		DRAWN BY PLL	
		CHECKED RJA	DATE 6-5-69



MAT'L: .040 ALUM 6061-T6  
 FINISH: CSL SPEC MFI  
 1 L.H. \* 1 R.H. REQ'D. PER CASE

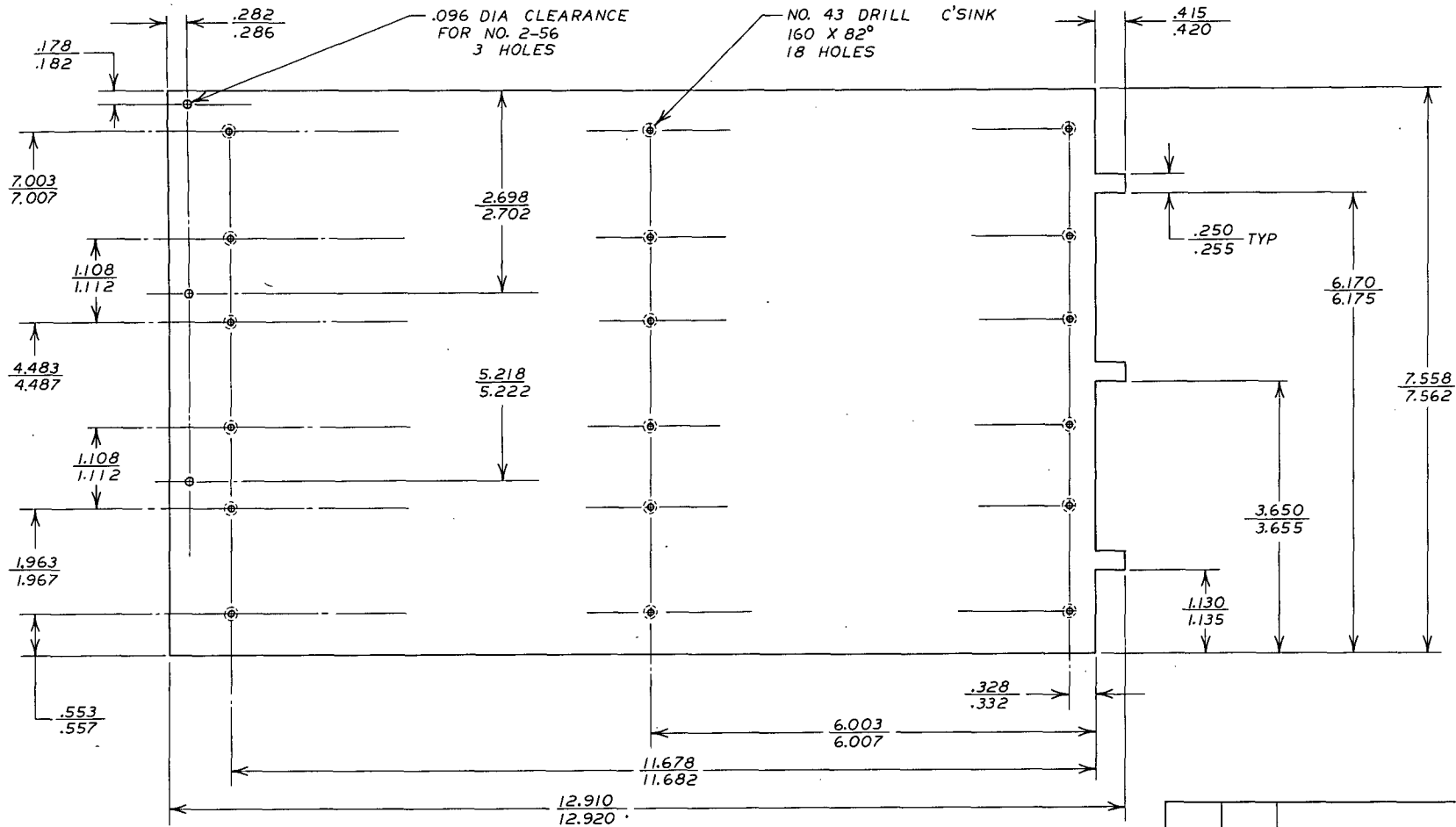
ISSUE 3-31-71		RJA	
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE <b>FILLER STRIP PAIR          DOUBLE CELL CASE</b>			
APPROVED	ENG.	DRAWING NO.	
FOR	DATE	RJA	200.12-7
WAB	PROD. 4-7-71	DRAWN BY PLL	
	CHECKED	RJA	DATE 3-23-71





MAT'L: .040 ALUM 6061-T6  
 FINISH: CSL SPEC MFI  
 1 L.H. & 1 R.H. REQ'D. PER CASE

ISSUE 3-31-71 RJA		
CHANGE NO.	DATE	DESCRIPTION
<b>COMPUTER SYSTEMS LABORATORY</b> WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI		
<b>MACROMODULAR PROJECT</b>		
TITLE FILLER STRIP PAIR THREE CELL CASE		
APPROVED	ENG.	DRAWING NO.
BY WLP	FOR PROD.	DATE 4-7-71
	DATE 4-7-71	DRAWN BY PLL
	CHECKED RJA	DATE 3-23-71



MAT'L: .040 ALUM 6061-T6  
FINISH: CSL SPEC MF1  
1 L.H. & R.H. REQ'D. PER CASE

ISSUE 3-31-71 RJA			
CHANGE NO.	DATE	DESCRIPTION	
<b>COMPUTER SYSTEMS LABORATORY</b>			
WASHINGTON UNIVERSITY ST. LOUIS, MISSOURI			
<b>MACROMODULAR PROJECT</b>			
TITLE			
FILLER STRIP PAIR FOUR CELL CASE			
BY	APPROVED FOR	ENG. DATE	DRAWING NO.
WAB	PROD.	4-7-71	200.12-9
CHECKED		DATE	
RJA		3-23-71	

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

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		2b. GROUP
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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report 4/1/65 through 12/31/73		
5. AUTHOR(S) (First name, middle initial, last name)  Robert J. Arnzen, Editor		
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d.		
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13. ABSTRACT  Complete mechanical drawings regarding the manufacture of components and assembly specifications for the macromodular electronic cases and printed circuit board routing dimensions for macromodular electronic assemblies are given.		

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Macromodule Printed Circuit Boards						
Macromodule Electronics Case						
Macromodule Circuit Board Outline						

