

HEWLETT  PACKARD

HP 1000 COMPUTERS ENGINEERING AND REFERENCE DOCUMENTATION

Part No. 92851-90001
Printed in U.S.A. JUNE 1979

IC PART NUMBER NOTICE

Many of the schematic diagrams and parts lists contain the generic part number of the IC packs. These are for your convenience in referring to pack diagrams and general operating conditions in semiconductor manufacturers catalogs. The generic number should not be used to order replacement parts. Many parts used in Hewlett-Packard equipment are purchased with special specifications and tolerances, or may undergo special testing and treatment (such as burn-in). Therefore replacement parts must be ordered using the Hewlett-Packard part number to insure that the replacement part will restore the equipment to its operating condition.

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Library Index Number
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HP1000 COMPUTERS
ENGINEERING AND REFERENCE DOCUMENTATION

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*Used on units with Power Fail Recovery System (PFRS).

**Used on units without Power Fail Recovery System.

FORWARD

GENERAL. The information contained in this package includes documentation for HP1000 M-Series and the E-Series Computers. The following paragraphs of this forward contain information pertinent to board computer customers only.

HP2108MK AND HP2109EK BOARD COMPUTERS. Board computer customers will need to provide voltage, current, and ventilation as specified in the following paragraphs.

POWER SUPPLY SPECIFICATIONS. The K-Series microprogrammable processor requires the voltages and tolerances listed in the following table. If memory is to be sustained during power failure the "M" (memory) voltages must be isolated from the CPU and I/O voltages. If this feature is not desired, the +5M and -12M may be common with the +5v and -12V respectively. The +12M should be derived from a separate source since it requires closer regulation than the +12V.

REQUIRED VOLTAGES AND REGULATION

VOLTAGE	REGULATION*
+5V	5%
-2V	10%
+12V	5%
-12V	5%
+5VM	5%
-12VM	10%
+12.5VM**	3%

*Regulation includes line, load, and ripple
**Labeled +12VM

CURRENT REQUIREMENTS. The current required for your CPU, front panel, memory, and accessories can be calculated using the electrical specifications contained in the HP1000 Computers Hardware Data book. The current edition of the data book can be obtained from your local Hewlett-Packard Sales and Service Office.

Note: The current requirements for planned additions to your computer should be taken into consideration when designing your power supply.

VENTILATION. Air intake may be from either the left or right side of the card cage. Air must flow parallel to the CPU board. Vents are provided in the the deck for this purpose. See the appropriate assembly drawing located at the rear of this forward.

Air flow requirements in cubic feet per minute are derived as follows:

1. $\text{cfm required} = \text{Watts} \times 0.22$
To derive Watts for dc power use $P=EI$

0.22 is a constant to provide the total cfm required so that the temperature rise should not exceed 10 degrees Celsius from ambient. Where ambient = 55 degrees Celsius maximum.

CARD CAGE AND BACKPLANE ASSEMBLY. The procedure for assembling the card cage and backplanes to the deck is provided on the drawings immediately following this forward. There are three assembly and mounting drawings for the 2108MK and three for the 2109EK.

REPAIR INFORMATION. The HP1000 K-Series Board Computer service plan is based on returning defective boards to the Computer Service Division, K-Series Repair Facility in Cupertino, California for cutomers in the United States. Customers located outside the United States should contact local Hewlett-Packard Sales and Service Office for the address of their appropriate repair center.

The original shipping container is the recommended package for returning boards and should have been retained for this purpose. All repairs will be performed in the shortest time possible and a two week maximum turn-around time can usually be expected.

Repaired boards will not be updated to the latest service note change revision unless specific instructions are

included requesting updates.

You can help expedite repairs by:

1. Packaging board in original container.
2. Include details describing the failure.
3. Ship packaged boards prepaid to:

Computer Service Division
K-Series repair
19310 Pruneridge Avenue
Cupertino, Ca. 95014

HP1000 COMPUTERS
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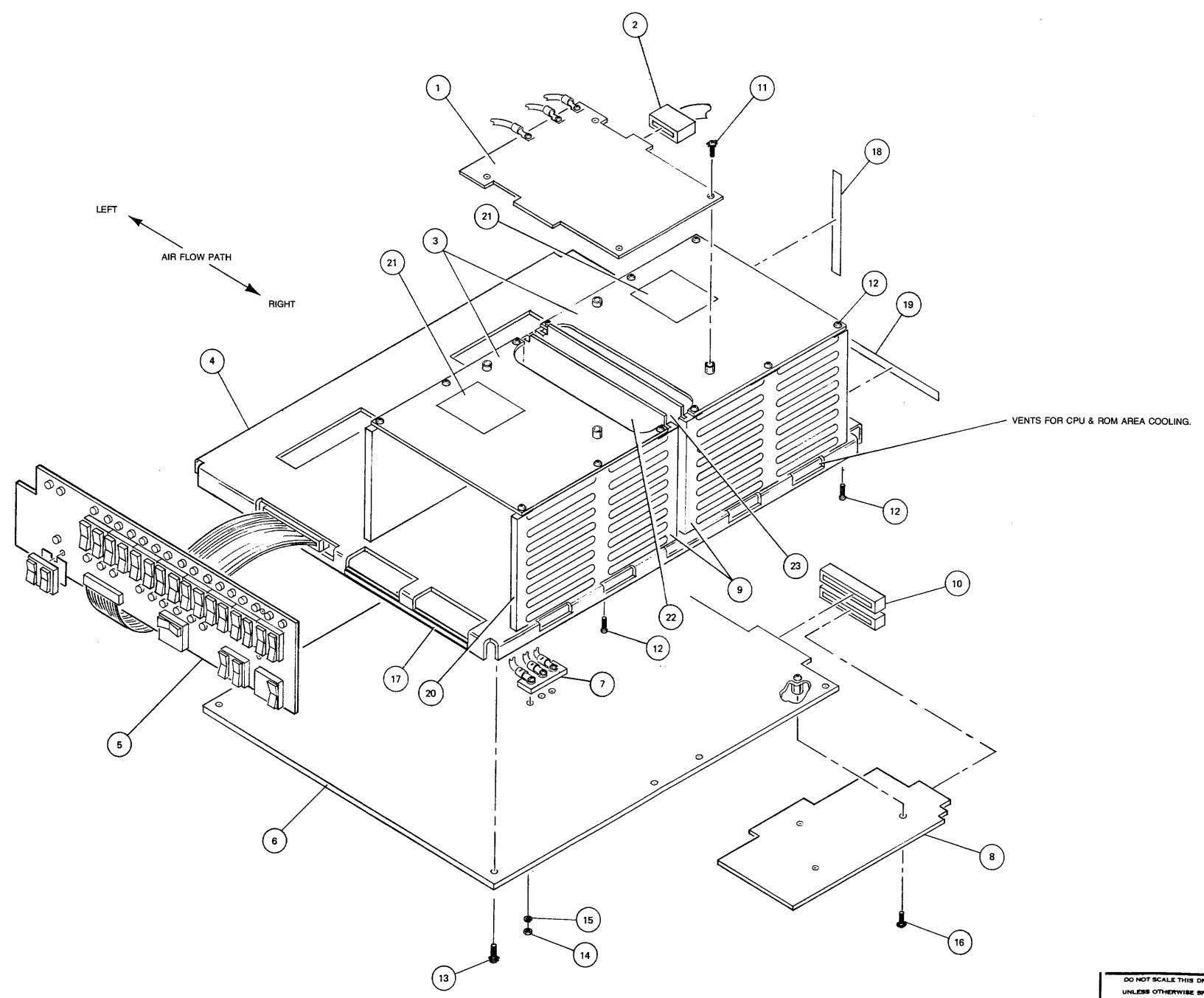
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0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	SYM			

ASSEMBLY PROCEDURE

- ATTACH FRONT AND BACK CARD GUIDES (9) (4 EACH) TO THE DECK (4) USING TWELVE 6-19 X .375 SELF-TAPPING SCREWS (13) TORQUE TO 2 LB/IN. NOTE PROPER LOCATION OF LABELED CARD GUIDES.
- ATTACH CARD CAGE TOP COVERS (3) (2 EACH) USING TWELVE 6-19 X .375 SELF-TAPPING SCREWS (13) TORQUE TO 2 LB/IN.
- ATTACH POWER WIRING ASSEMBLY (7) (02108-60039) TO PROCESSOR BOARD (6) (5060-8352) USING NUTS AND LOCKWASHERS INCLUDED WITH THE ASSEMBLY. BLACK WIRE GOES TO GROUND CONNECTION.
- INSERT POWER WIRING ASSEMBLY THRU HOLE IN DECK AND ATTACH PROCESSOR BOARD TO BOTTOM OF DECK USING TWELVE 6-32 X .375 SCREWS (14).
- INSERT I/O BACKPLANE BOARD (23) (02105-60002 OR 02108-60007) INTO REAR CARD CAGE AND PROCESSOR BOARD. BE SURE TO INSTALL ACCORDING TO LABELS.
- INSERT MEMORY BACKPLANE BOARD (22) (02105-60005 OR 02108-60021) INTO FRONT CARD CAGE AND PROCESSOR BOARD. BE SURE TO INSTALL ACCORDING TO LABELS.
- ATTACH CROSSOVER BOARD (1) (5060-8345) TO I/O AND MEMORY BACKPLANE BOARDS USING FOUR 6-32 X .375 SCREWS (11).
- ATTACH THE THREE WIRES OF THE POWER WIRING ASSEMBLY TO CROSSOVER BOARD. BLACK TO GROUND; WHITE-BLACK-RED TO +5V AND WHITE-VIOLET TO -2V.
- CONNECT CABLE ASSEMBLY (2) (02108-60034) TO CROSSOVER BOARD.
- ATTACH ROM CONTROL STORE BOARD (8) (5061-1367) TO PROCESSOR BOARD USING THREE 6-32 X .250 SCREWS (16) AND CONNECT THE TWO BOARDS TOGETHER WITH CABLE ASSEMBLY (10) (5061-1336).
- ATTACH FLAT RIBBON CABLE OF FRONT PANEL ASSEMBLY (5) (5060-8343) TO PROCESSOR BOARD (NOTE CONNECTOR ORIENTATION).



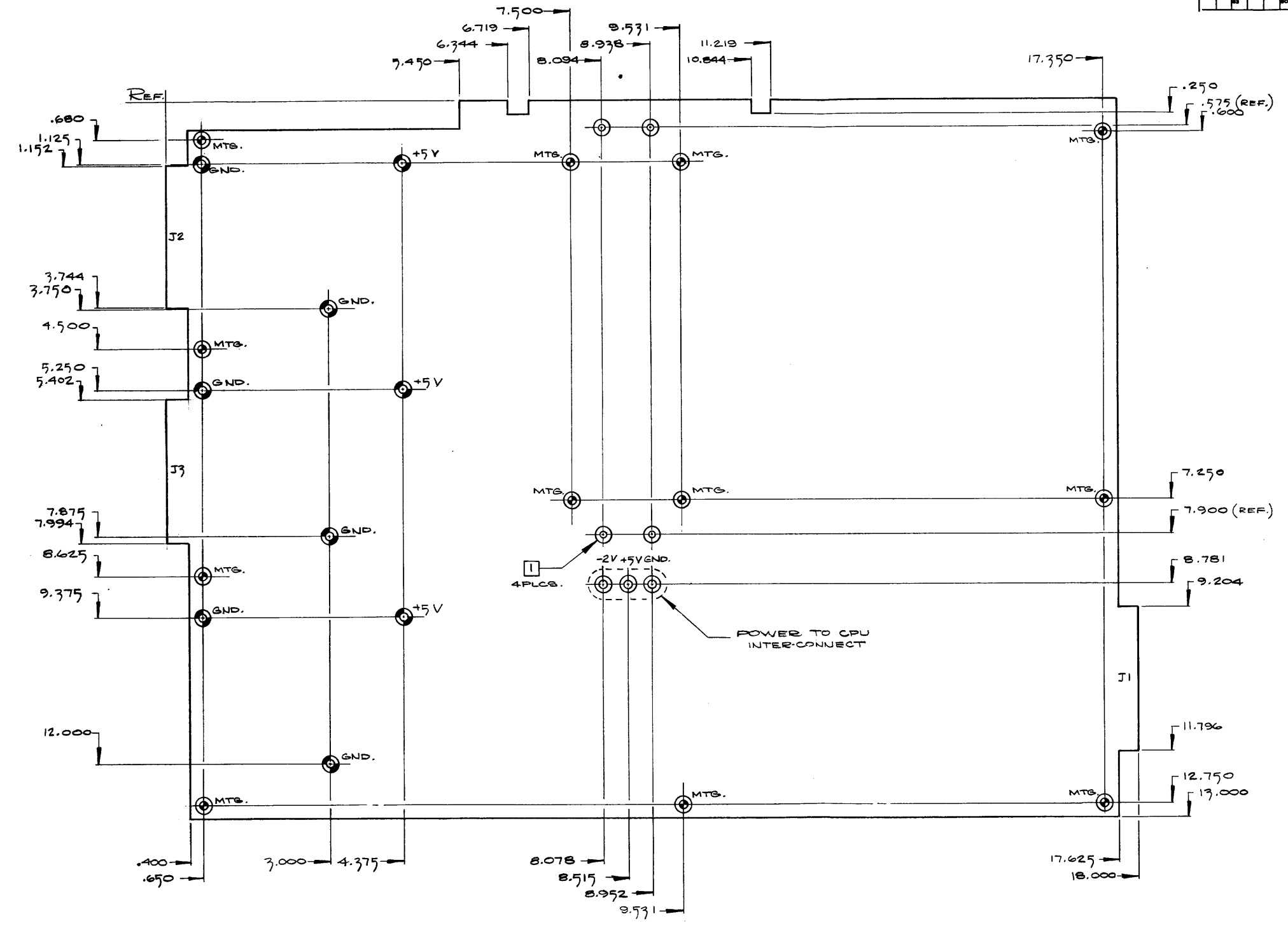
ITEM	QTY.	MATERIAL-DESCRIPTION	MAT'L-PART NO.	MAT'L-DWG. NO.	MAT'L-SPEC.
23	1	ASSY - I/O BACKPLANE			
22	1	ASSY - MEMORY BACKPLANE			
21	2	LABEL - WARNING			
20	1	LABEL - MEMORY (BLACK & WHITE)			
19	1	LABEL - COMPONENT SIDE UP			
18	1	LABEL - I/O			
17	1	LABEL COMPONENT SIDE UP			
16	3	SCREW 6-32 X .250	2380-0113		
15	3	WASHER - LOCK	2190-0006		
14	3	NUT	2420-0002		
13	12	SCREW - 6-32 X .375	2360-0359		
12	24	SCREW - 6-19 X .375 TAPPING	0624-0309		
11	4	SCREW - 6-32 X .375	2360-0359		
10	1	ASSY - CABLE	5061-1336		
9	4	GUIDE - PC 5-SLOT OR 9-SLT			
8	1	ASSY - ROM	5061-1367		
7	1	ASSY - POWER WIRING	02108-60039		
6	1	ASSY - CPU	5060-8352		
5	1	ASSY - FRONT PANEL PCA	5060-8343		
4	1	DECK	02108-00004		
3	2	COVER - CARD CAGE	02108-00012		
2	1	ASSY - P.S. CABLE	02108-60034		
1	1	ASSY - X-OVER	5060-8345		

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE IN INCHES. TOLERANCES .XX ± .02 .XXX ± .008

DRAWN BY <i>L. Lunt</i>	DATE	2108K AND ACCESSORIES ASSEMBLY	HEWLETT-PACKARD
ENGINEER		TITLE	
RELEASE TO PROD.		NEXT ASSEMBLY	PART NUMBER
SUPersedes DWG.		FINISH	SCALE

D - SHEET OF

ENGINEERING RESPONSIBILITY										REPLA										REV. NO.		APPROVED		DATE															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40



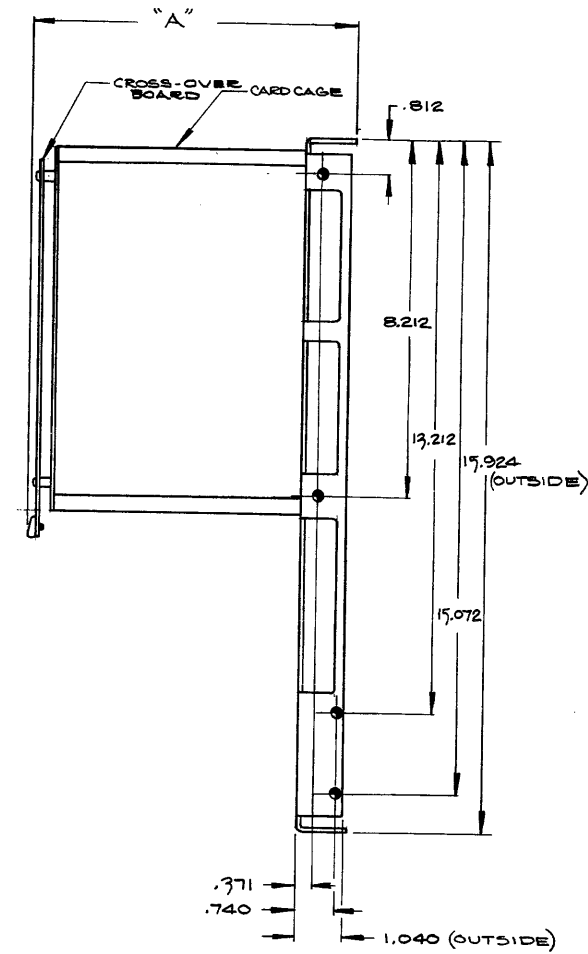
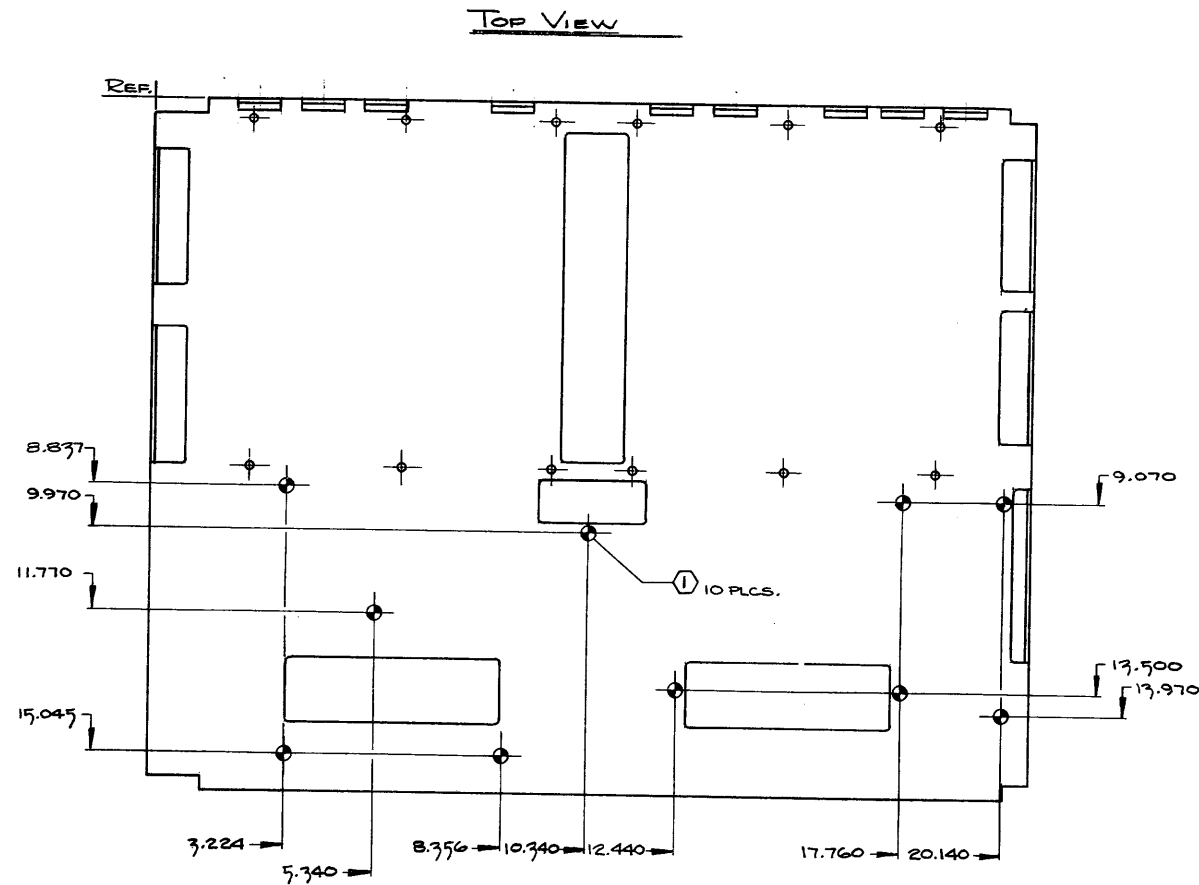
POWER TO CPU INTER-CONNECT

- NOTES:**
1. MTG. HOLES FOR 43/86 CONNECTORS WITH BARS. (NOT USED)
 2. CPU TO DECK MTG. HOLES. (12 PLCS.)
 3. ROM MTG. HOLES (VALUES ABOVE). (9 PLCS.)

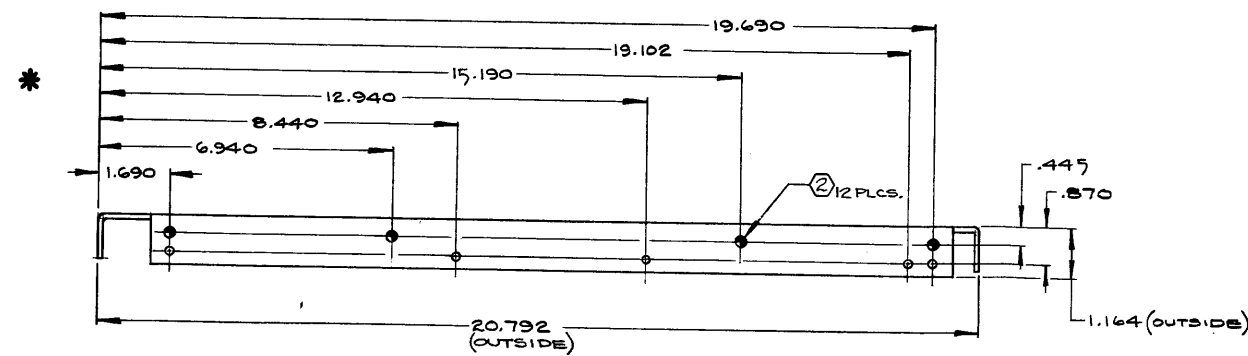
COMPONENT SIDE

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE IN INCHES. TOLERANCES .XX ± .02 XXX ± .005		DRAWN BY G. Koopman ENGINEER RELEASE TO PROD. SUPERSEDES DWG.	DATE NEXT ASSEMBLY FINISH SCALE	MATERIAL DESCRIPTION CPU ASSEMBLY MOUNTING DIM.	MAT'L PART NO. MAT'L DWG. NO. PART NUMBER D-	HEWLETT-PACKARD
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ENGINEERING RESPONSIBILITY												REVISED		APPROVED		DATE	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36



MODEL NO.	DIMENSION "A"
12728A	4.400 ± .062
12728B	7.600 ± .062



* ALL DIMENSIONS ON THIS VIEW ARE THE SAME OPPOSITE SIDE.

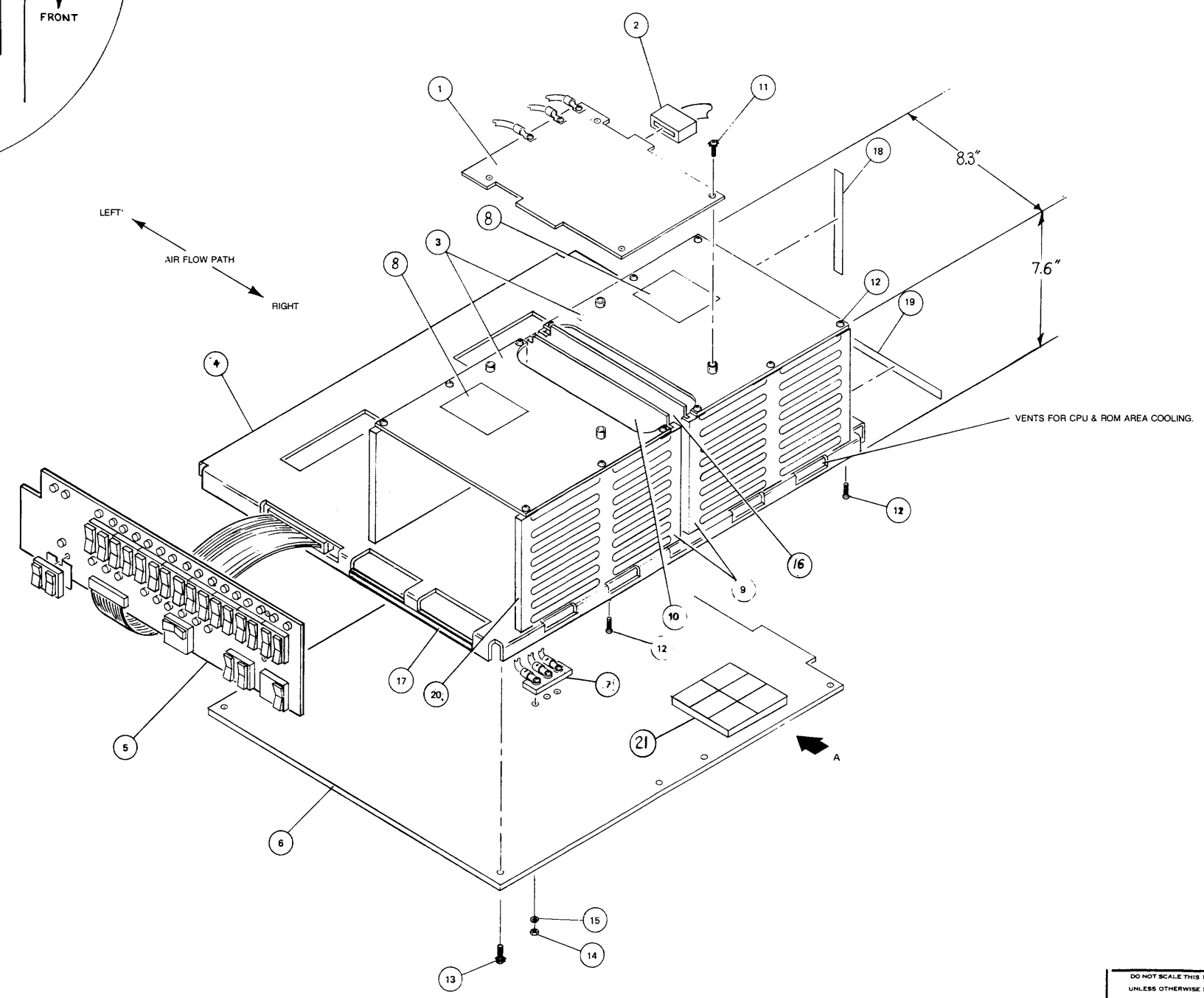
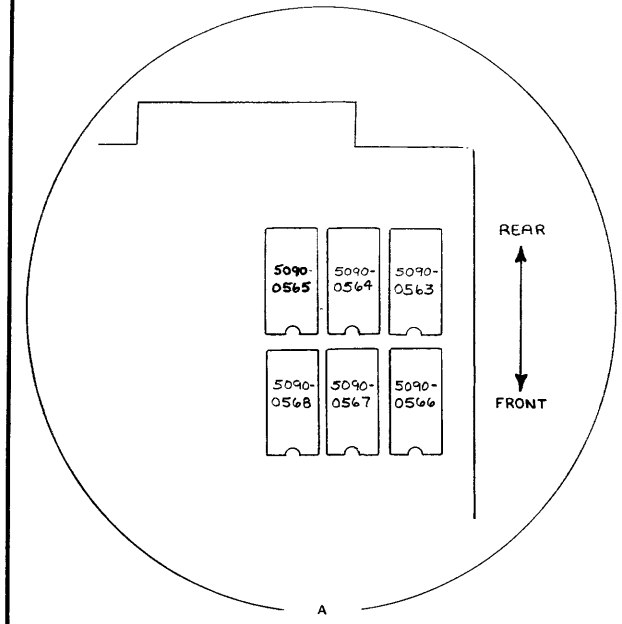
- ① #8-32 x .460 LG. (FROM TOP OF DECK) STANDOFFS, 10 EA.
- ② #6-32 CLINCH NUTS (INSTALLED FAR SIDE), 12 EA.

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE IN INCHES. TOLERANCES .XX ± .02 .XXX ± .005		ITEM	QTY.	MATERIAL DESCRIPTION	MAT'L PART NO.	MAT'L DWG. NO.	MAT'L SPEC.
DRAWN BY G. Koopman		DATE		DECK ASSEMBLY MOUNTING DIM.		HEWLETT PACKARD	
ENGINEER		RELEASE TO PROD.		NEXT ASSEMBLY		PART NUMBER	
SUPERSEDES DWG.		FINISH		SCALE 1/2 x		0-	

ENGINEERING RESPONSIBILITY															SYM		REVISIONS		APPROVED		DATE	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
16	17	18	19	20	21	22		23	24	25	26	27	28	29	30							
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46							
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62							

ASSEMBLY PROCEDURE

- ATTACH FRONT AND BACK CARD GUIDES (9) (4 EACH) TO THE DECK (4) USING TWELVE 6-19 X .375 SELF-TAPPING SCREWS (12). TORQUE TO 2 LB.IN. NOTE PROPER LOCATION OF LABELED CARD GUIDES.
- ATTACH CARD CAGE TOP COVERS (3) (2 EACH) USING TWELVE 6-19 X .375 SELF-TAPPING SCREWS (12). TORQUE TO 2 LB.IN.
- ATTACH POWER WIRING ASSEMBLY (7) (02108-60039) TO PROCESSOR BOARD (6) (5061-1400) USING NUTS AND LOCKWASHERS INCLUDED WITH THE ASSEMBLY. BLACK WIRE GOES TO GROUND CONNECTION.
- INSERT POWER WIRING ASSEMBLY THRU HOLE IN DECK AND ATTACH PROCESSOR BOARD TO BOTTOM OF DECK USING TWELVE 6-32 X .375 SCREWS (14).
- INSERT I/O BACKPLANE BOARD (16) (02108-60007) INTO REAR CARD CAGE AND PROCESSOR BOARD. BE SURE TO INSTALL ACCORDING TO LABELS.
- INSERT MEMORY BACKPLANE BOARD (10) (5061-1382) INTO FRONT CARD CAGE AND PROCESSOR BOARD. BE SURE TO INSTALL ACCORDING TO LABELS.
- ATTACH CROSSOVER BOARD (1) (5061-1388) TO I/O AND MEMORY BACKPLANE BOARDS USING FOUR 6-32 X .375 SCREWS (11).
- ATTACH THE THREE WIRES OF THE POWER WIRING ASSEMBLY TO CROSSOVER BOARD. BLACK TO GROUND; WHITE-BLACK-RED TO +5V AND WHITE-VIOLET TO -2V.
- CONNECT CABLE ASSEMBLY (2) (5061-1364) TO CROSSOVER BOARD.
- INSTALL THE INSTRUCTION ROMS (21) AS ILLUSTRATED.
- ATTACH FLAT RIBBON CABLE OF FRONT PANEL ASSEMBLY (5) (5061-1343) TO PROCESSOR BOARD (NOTE CONNECTOR ORIENTATION).



ITEM	QTY	MATERIAL DESCRIPTION	MAT'L PART NO.	MAT'L DWG. NO.	MAT'L SPEC.
21	1	SET OF INSTRUCTION ROMS	12728H		
20	1	LABEL - MEMORY (BLACK & WHITE)	7120-3861		
19	1	LABEL - COMPONENT SIDE UP			
18	1	LABEL - I/O	7120-3859		
17	1	LABEL COMPONENT SIDE UP			
16	1	ASSY - I/O BACKPLANE	02108-60007		
15	3	WASHER - LOCK	2190-0006		
14	3	NUT	2420-0002		
13	16	SCREW - 6-32 X .375	2360-0359		
12	24	SCREW - 6-19 X .375 TAPPING	0624-0309		
11	4	SCREW - 6-32 X .375	2360-0359		
10	1	ASSY - MEMORY BACKPLANE	5061-1382		
9	4	GUIDE - PC 4-SLOT OR 9-SLOT	02108-40001		
8	2	LABEL - WARNING	7120-2598		
7	1	ASSY - POWER WIRING	02108-60039		
6	1	ASSY - CPU	5061-1400		
5	1	ASSY - FRONT PANEL PCA	5061-1343		
4	1	DECK	5000-8087 4		
3	2	COVER - CARD CAGE	02108-60012		
2	1	ASSY - P.S. CABLE	5061-1364 4		
1	1	ASSY - X-OVER	5061-1388		

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE IN INCHES. TOLERANCES: .XX ± .02, .XXX ± .008.

DRAWN BY: *L. Swartz* DATE: _____

ENGINEER: _____ TITLE: **2100K AND ACCESSORIES ASSEMBLY**

RELEASE TO PROD. _____ NEXT ASSEMBLY _____

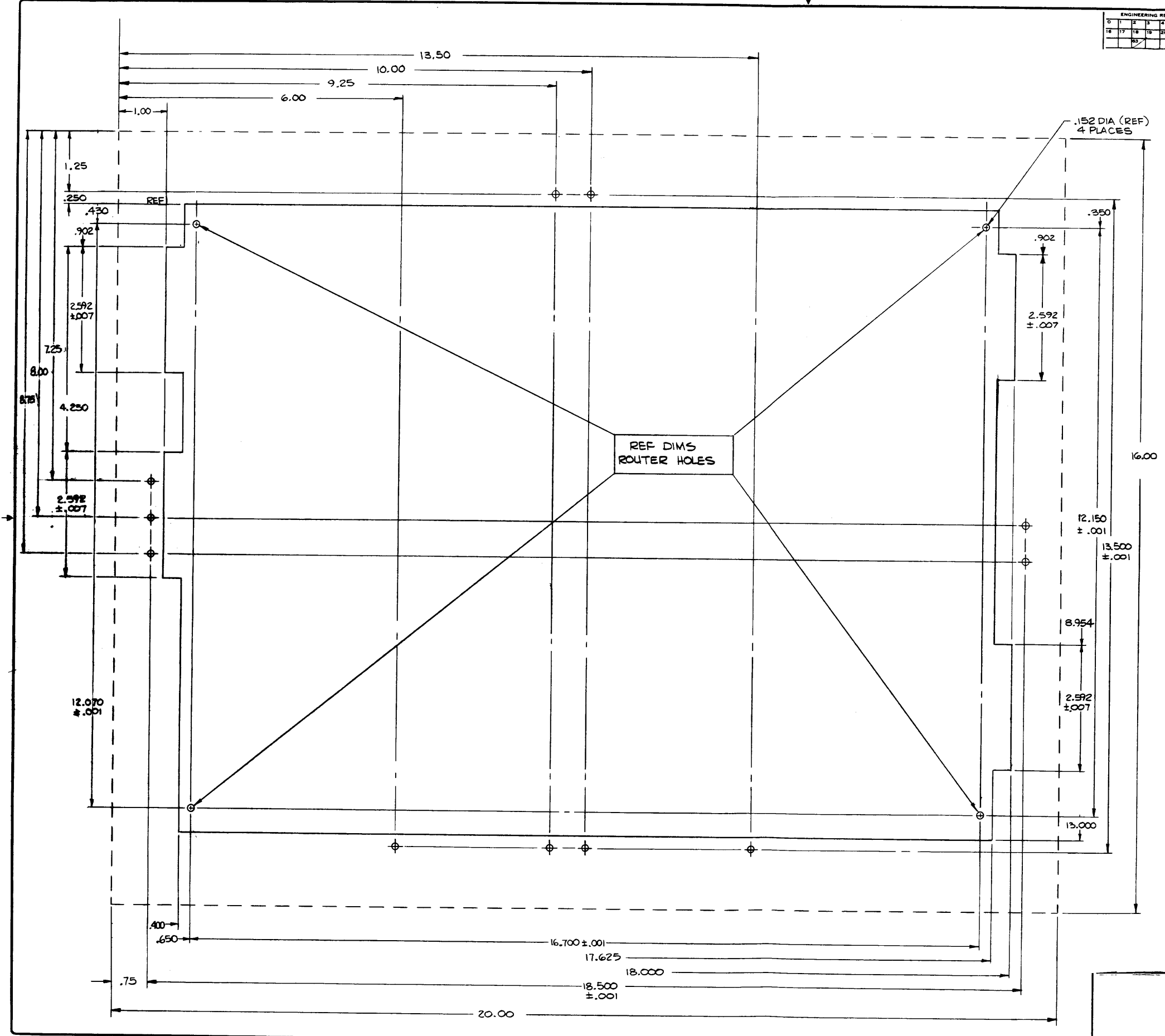
SUPERSEDES DWG. _____ FINISH _____ SCALE: _____

PART NUMBER: **D**

HEWLETT-PACKARD

SHEET OF _____

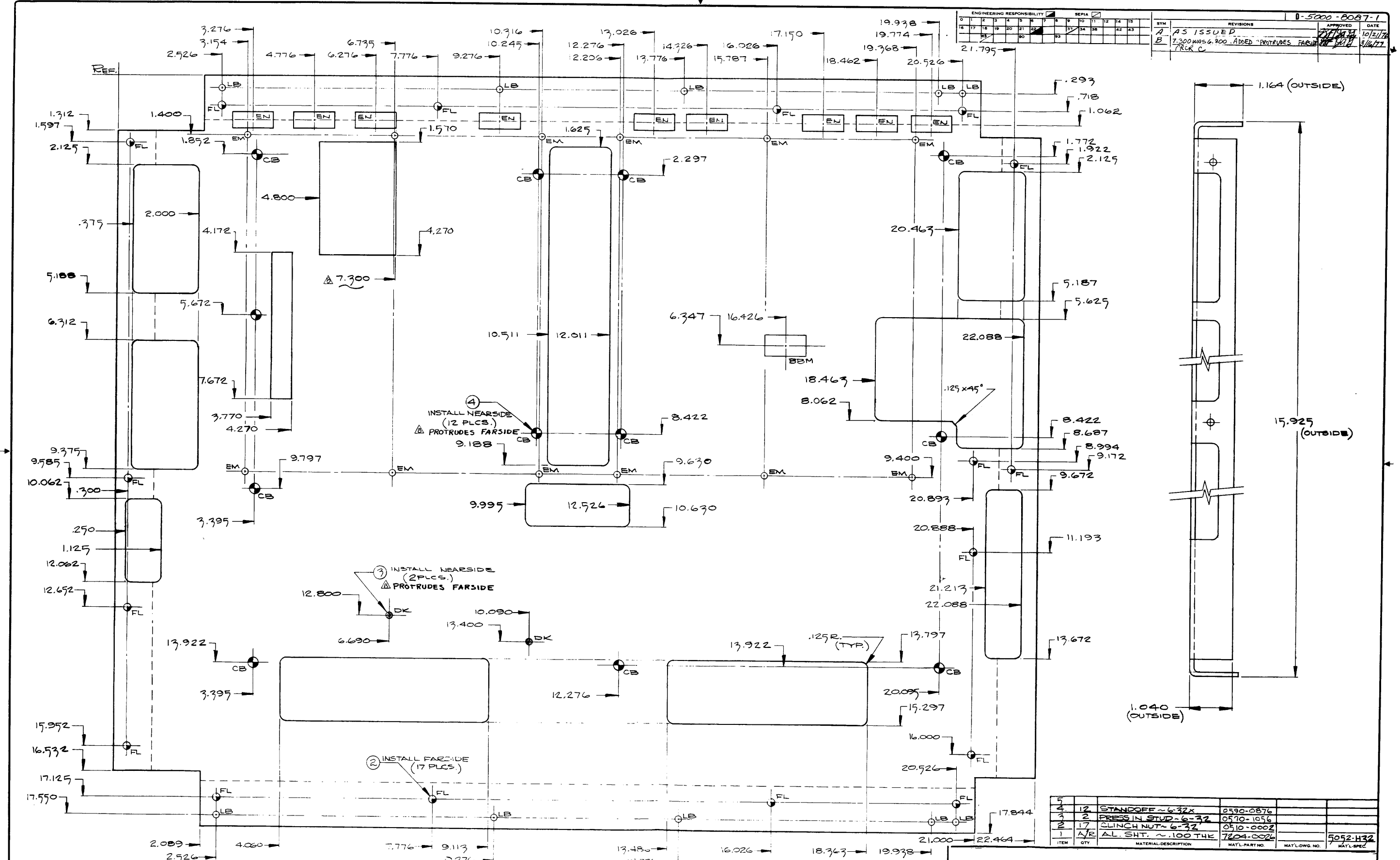
STOCK NO. 9386-0004 PRINTED ON DESKTOP 1050-10 CLEARPRINT FANOUT



1	4	.007 GLASS EPOXY CU CL	4174-0288		
ITEM	QTY	MATERIAL DESCRIPTION	MATL PART NO.	MATL QTY NO.	MATL SPEC.

CPU ASSEMBLY MOUNTING DIMENSIONS

ENGINEERING RESPONSIBILITY													REVISIONS		APPROVED		DATE																												
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	AS ISSUED	10/21/72
													A		B		C																												
													7.300 WAS 6.900. ADDED "PROTRUDES FARSIDE"		3/11/72		3/11/72																												
													TRUCK C																																



ITEM	QTY	MATERIAL DESCRIPTION	MAT'L PART NO.	MAT'L WGT. NO.	MAT'L SPEC.
5	12	STANDOFF ~ 6-32x	0590-0876		
3	2	PRESS IN STUD ~ 6-32	0570-1056		
2	17	CLINCH NUT ~ 6-32	0510-0002		
1	A/R	AL. SHT. ~ .100 THK	7204-0026		5052-H32

DECK ASSEMBLY MOUNTING DIAGRAM

STOCK NO 3280-0004 PRINTED ON DESK NO 1020-10 CLEARPRINT FOLDOUT