

# ELECTRICAL MANUAL

## ZWACKERY U.R.

*Bally*

MIDWAY MFG. CO.

10601 W Belmont Avenue  
Franklin Park, Illinois 60131  
U.S.A.



Phone (312) 451-9200 Cable Address MIDCO Telex No.: 72-1596

**WARNING**

**THIS GAME MUST BE GROUNDED. FAILURE TO DO SO MAY RESULT IN DESTRUCTION TO ELECTRONIC COMPONENTS.**

**WARNING:** This equipment generates, uses, and can radiate radio frequency energy and if not used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a CLASS A computing device pursuant to SUBPART J of PART 15 of FCC RULES, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

**ELECTRICAL BULLETIN:** FOR ALL APPARATUS COVERED BY THE CANADIAN STANDARDS ASSOCIATION (CSA) STANDARD C22.2 NO. 1, WHICH EMPLOYS A SUPPLY CORD TERMINATED WITH A POLARIZED 2-PRONG ATTACHMENT PLUG.

**CAUTION:** TO PREVENT ELECTRIC SHOCK DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

**ATTENTION:** POUR PREVENIR CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

**Bally MIDWAY**

*Invites You To Use*

**OUR TOLL FREE NUMBERS FOR SERVICE INFORMATION CONCERNING THIS GAME, OR ANY OTHER BALLY MIDWAY GAME YOU NOW HAVE ON LOCATION.**

**CALL US FOR PROMPT, COURTEOUS ANSWERS TO YOUR PROBLEMS.**

**VIDEO**

**PINBALL**

**Continental U.S. 1-800-323-7182**

**Bally MIDWAY**

10601 West Belmont Avenue, Franklin Park, Illinois, 60131

phone (312) 451-9200

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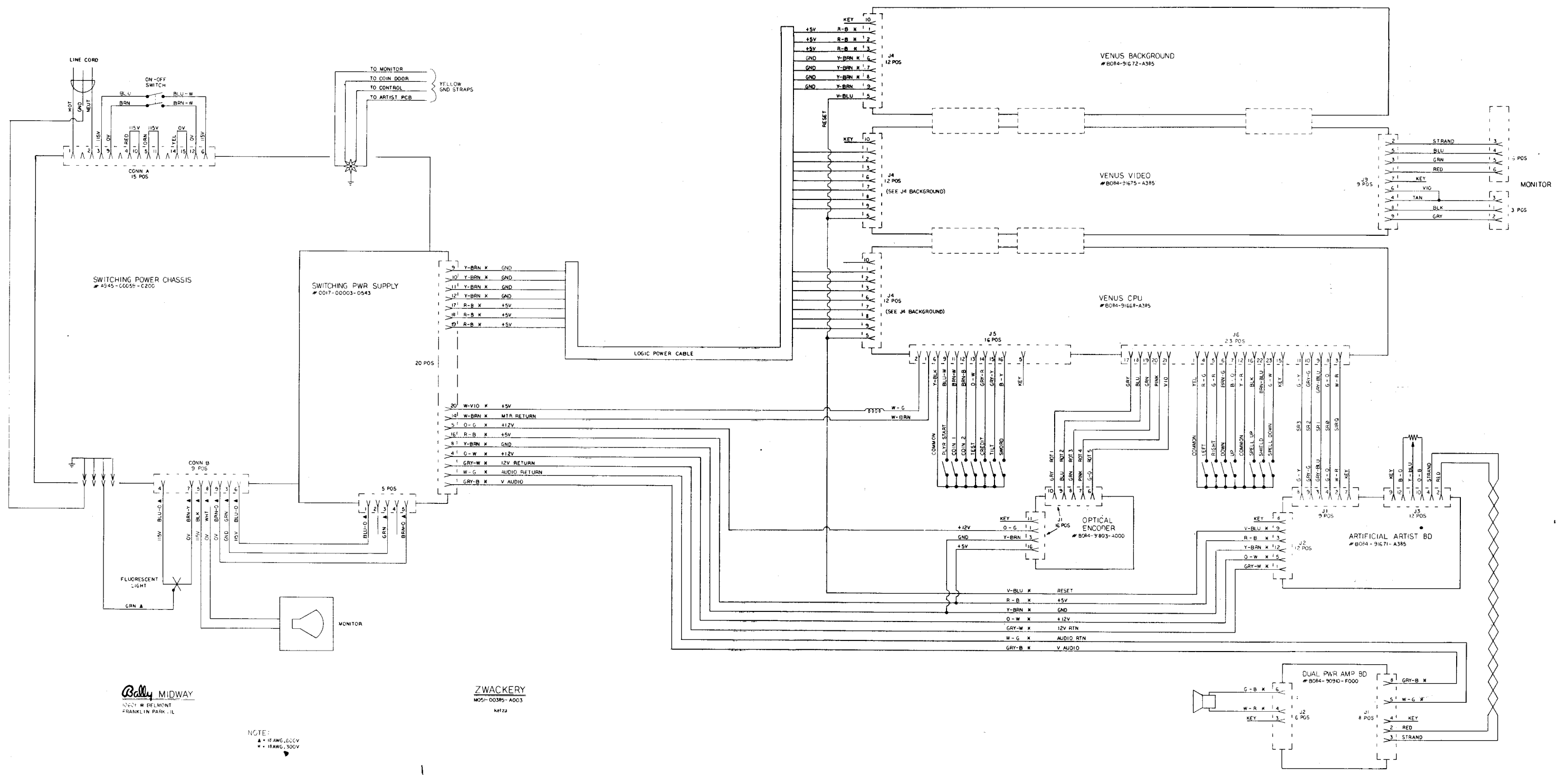
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Printed in U.S.A.

**ZWACKERY U. R.  
ELECTRICAL MANUAL  
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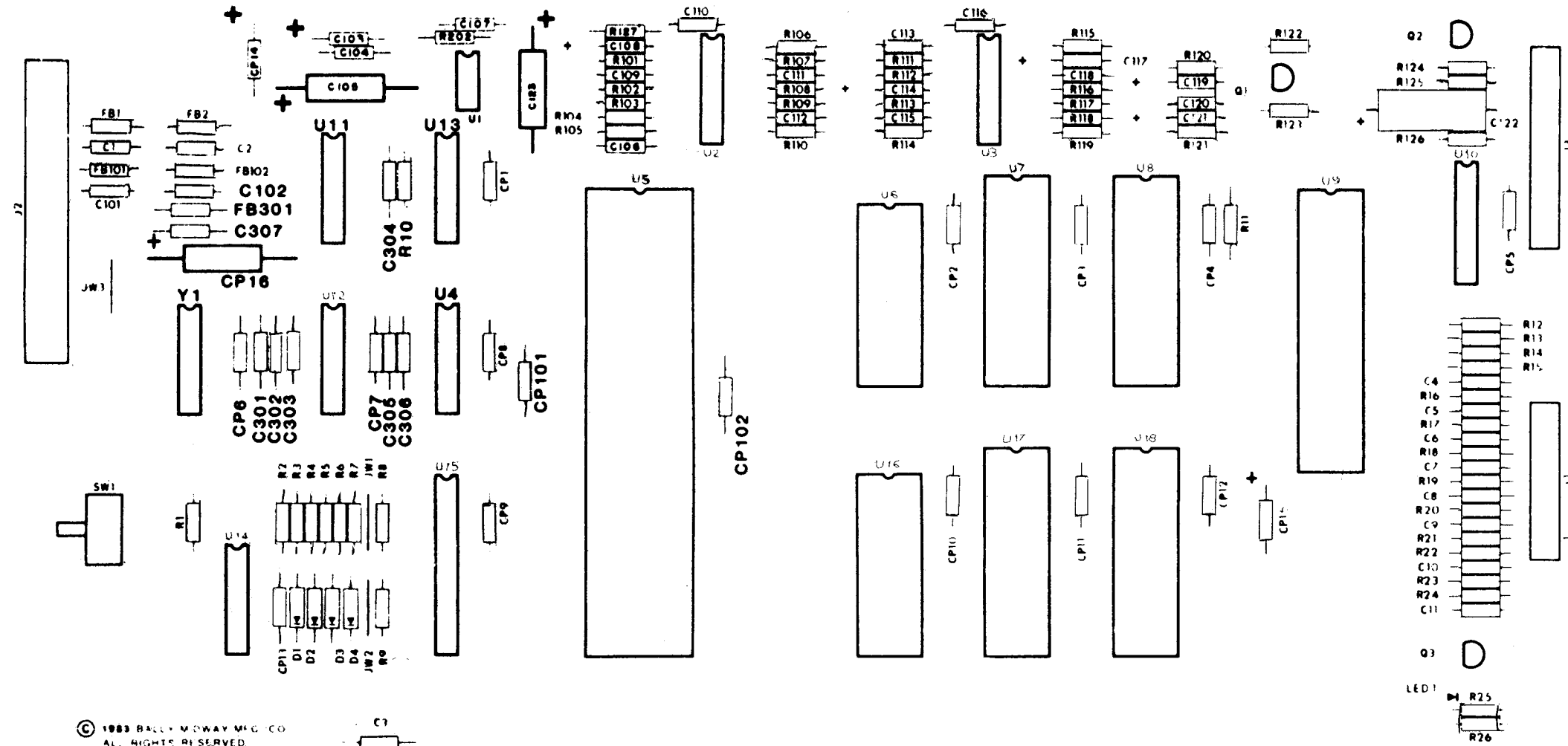
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**Bally MIDWAY**  
 1000 W BELMONT  
 FRANKLIN PARK, IL

**ZWACKERY**  
 #051-00385-A003  
 #4723

NOTE:  
 ▲ = 15WV, 60CV  
 \* = 15WV, 300V



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 PAT. PENDING.

A080-91671-G000 ARTIFICIAL ARTIST

THIS DWG IS CONFIDENTIAL & PROPERTY OF BALLY/MIDWAY MFG. CO.

<b>DIM. TOLERANCES</b> UNLESS OTHERWISE SPEC. CONCENTRICITY T.I.R. .002 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA. +.002-.000 ANGLE ± 1/2° <b>DO NOT SCALE DWG.</b>	FIRST USED ON		<b>Bally/MIDWAY MFG. CO.</b> FRANKLIN PARK, IL 60131	SHEET 1 of 3 (2+3 of 3 = "A")	
	DRN	DATE			SCALE
	MECH CHK	MAT L		<b>ASSY DRAWING</b> <b>ARTIFICIAL ARTIST</b> <b>A084-91671-G000</b>	<b>REVISIONS</b> PART NO. <b>M051-00304-G016</b>
	ELEC CHK	FINISH			

M051-00304-G016 (3/3)  
 ARTIFICIAL ARTIST  
 A084-91671-G000

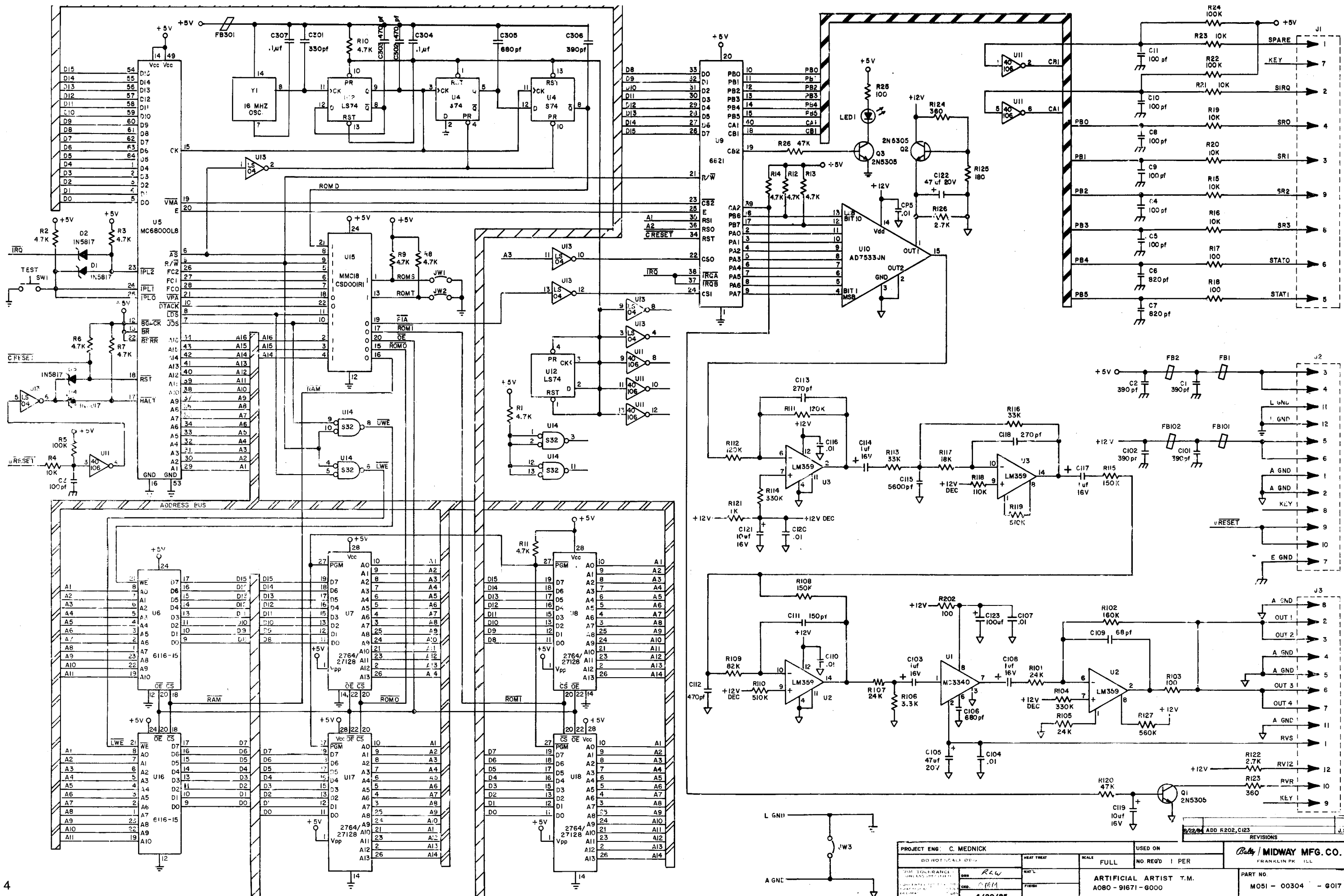
CROSS REFERENCE

<u>DESCRIPTION</u>	<u>QTY.</u>	<u>DESIGNATION</u>	<u>PART NUMBER</u>
74S74	2	U4,U12	0304-00803-0061
14584/40106	1	U11	0304-00803-0056
6821 PIA	1	U9	0304-00803-0054
68010G8 CPU	1	U5	0A15-00803-0082
AD7533JN DAC	1	U10	0304-00803-0055
CSD002R0 PAL	1	U15	0304-00803-0052
LM359	2	U2,U3	0304-00803-0053
MC3340	1	U1	0358-00803-0002
RAM 2KX8	2	U6,U16	0304-00803-0057
ROM/EPROM	1	U7	
ROM/EPROM	1	U8	SEE ROM/EPROM
ROM/EPROM	1	U17	CHART
ROM/EPROM	1	U18	
FERRITE BEAD	5	FB1,FB2,FB101,FB102,FB301	0316-00804-0002
8 PIN IC SOCKET	1	ICS U15	110E-00001-0001
16 PIN IC SOCKET	2	ICS U10,U15A	110E-00001-0003
24 PIN IC SOCKET	2	ICS U6,U16	110E-00001-0007
28 PIN IC SOCKET	4	ICS U7,U8,U17,U18	110E-00001-0010
40 PIN IC SOCKET	1	ICS U9	110E-00001-0011
64 PIN IC SOCKET	1	ICS U5	110E-00001-0016
AUTO INSERT PIN TIN .025 SQ	8	J1	0304-00804-0009
AUTO INSERT PIN TIN .025 SQ	11	J3	0304-00804-0009
AUTO INSERT PIN TIN .045 SQ	11	J2	0304-00804-0010
ZERO OHM RES	3	JW1-JW3	117E-00001-0003
GREEN LED	1	LED 1	0360-00804-0015
SWITCH PC MTG	1	SW1	0986-00804-3100
16 MHZ XSTAL OSC	1	Y1	0304-00804-0008
PC BOARD	1		A080-91671-G000

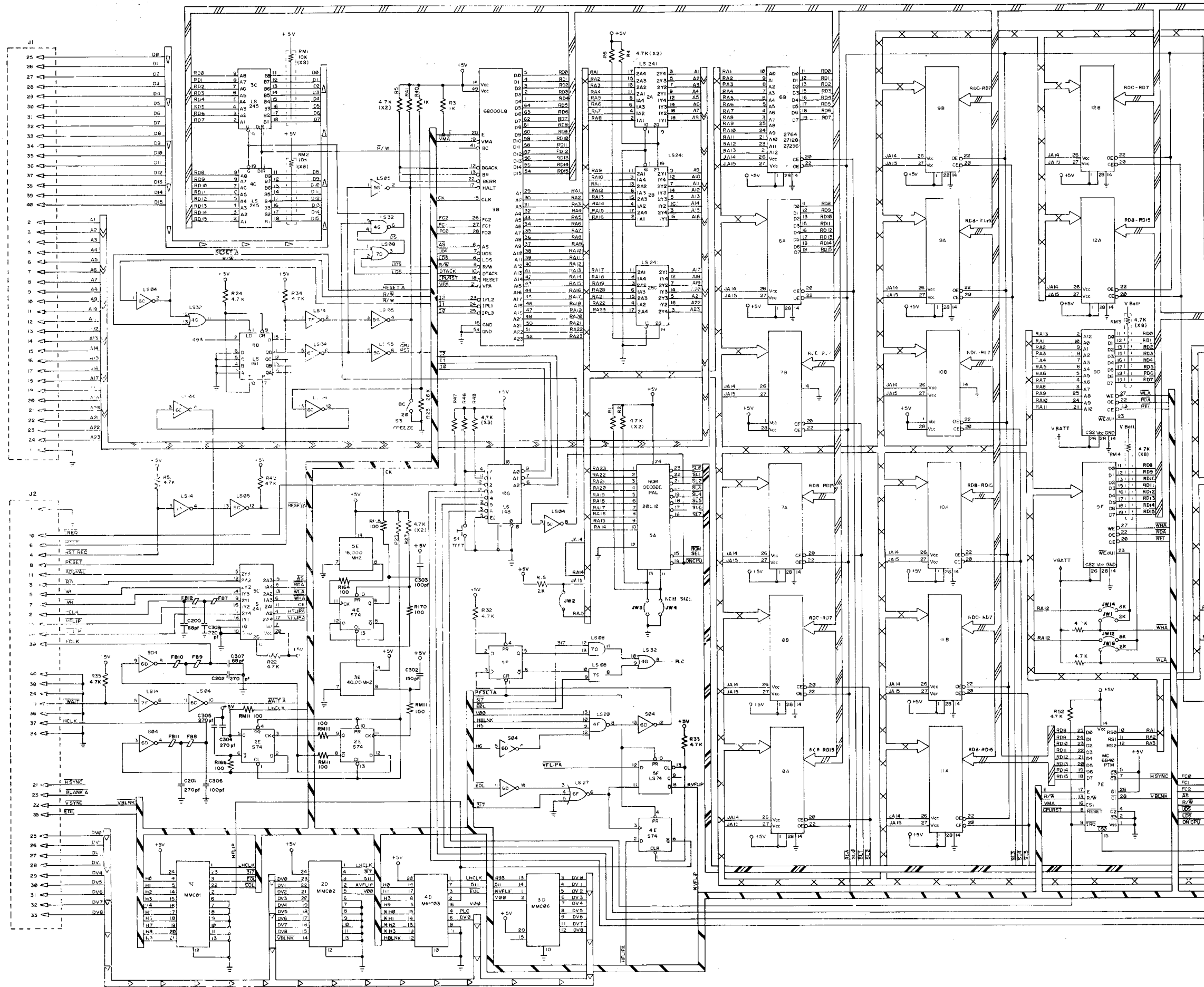
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 ARTIFICIAL ARTIST  
 A084-91671-G000

CROSS REFERENCE

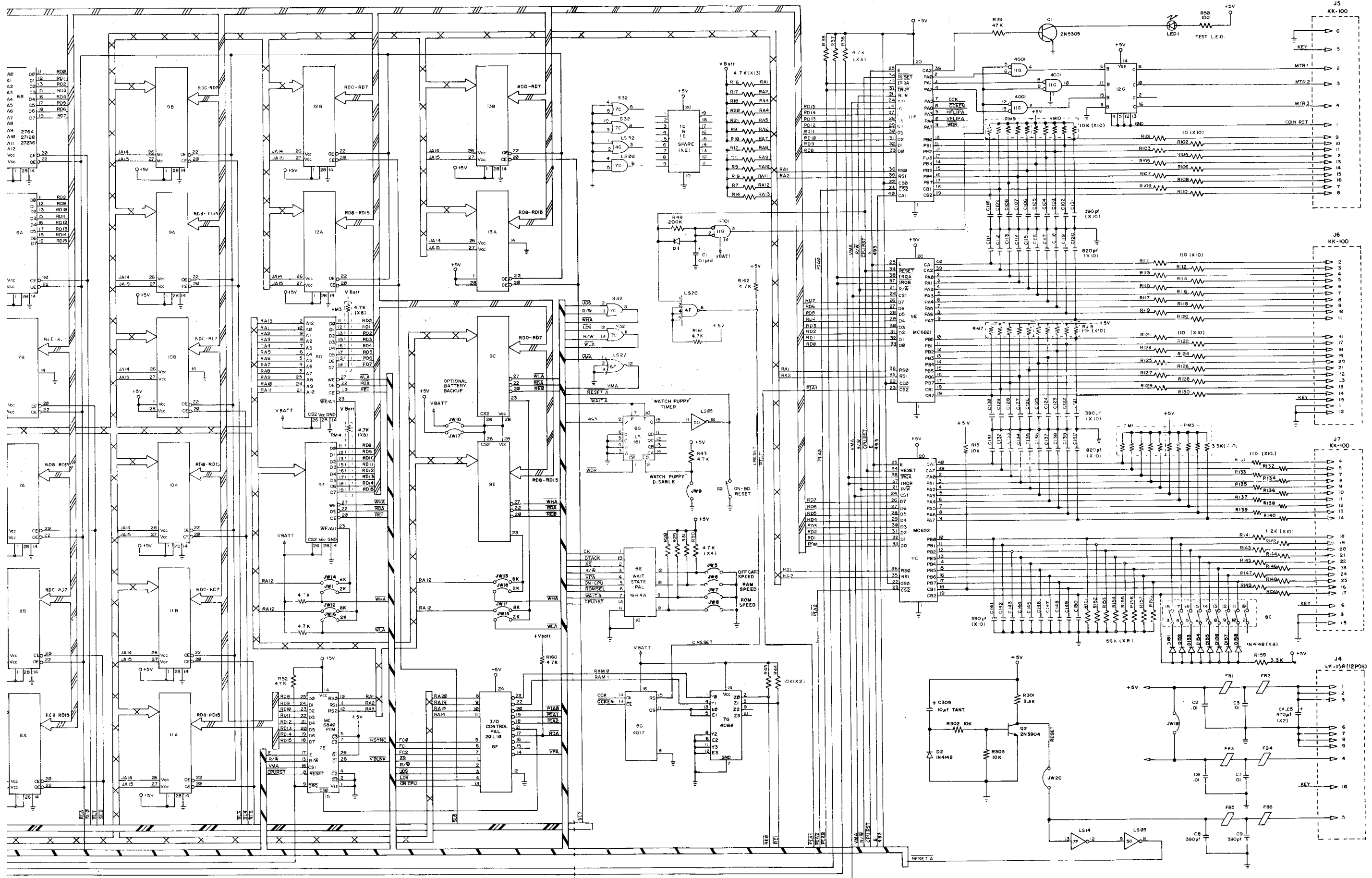
<u>DESCRIPTION</u>	<u>QTY.</u>	<u>DESIGNATION</u>	<u>PART NUMBER</u>
68 PF AX CER 10%	1	C109	0307-00800-0011
100 PF AX CER	7	C3-C5,C8-C11	0304-00800-0001
150 PF AX CER 10%	1	C111	0307-00800-0010
270 PF AX CER 10%	2	C113,C118	0307-00800-0009
330 PF AX CER	1	C301	0300-00800-1402
390 PF AX CER	5	C1,C2,C101,C102,C306	0986-00800-3000
470 PF AX CER 10%	3	C112,C302,C303	0307-00800-0008
680 PF AX CER	2	C106,C305	0358-00800-0002
820 PF AX CER	2	C6,C7	0304-00800-0002
5600 PF AX CER 10%	1	C115	0307-00800-0007
.01 MF AX CER	18	C104,C107,C110	0986-00800-2200
		C116,C120,CP1-CP13	
0.1 UF AX CER	4	C304,C307,CP101,CP102	0986-00800-0200
1 MF RD TANT	4	C103,C108,C114,C117	0307-00800-0004
10 MF AX TANT	2	CP14,CP15	0986-00800-0700
10 MF RD TANT	2	C119,C121	0307-00800-0005
47 MF AX ELECT	2	C105,C122	0307-00800-0003
100 MF AX ELECT	2	CP16,C123	0307-00800-0006
100 OHM 1/4W CRBN	5	R17,R18,R25,R103,R202	100E-00005-0033
		R125	100E-00005-0039
180 OHM 1/4W CRBN	1	R123,R124	100E-00005-0048
360 OHM 1/4W CRBN	2	R10,R121	100E-00005-0061
1K OHM 1/4W CRBN	2	R122,R126	100E-00005-0071
2.7K OHM 1/4W CRBN	2	R106	100E-00005-0074
3.3K OHM 1/4W CRBN	1	R1-R3,R6-R9	100E-00005-0079
4.7K OHM 1/4W CRBN	11	R11-R14	
		R4,R15,R16,R19-R21,R23	100E-00005-0088
		R117	100E-00005-0093
18K OHM 1/4W CRBN	1	R101,R105,R107	100E-00005-0097
24K OHM 1/4W CRBN	3	R113,R116	100E-00005-0100
33K OHM 1/4W CRBN	2	R26,R120	100E-00005-0104
47K OHM 1/4W CRBN	2	R109	100E-00005-0112
82K OHM 1/4W CRBN	1	R5,R22,R24,R118	100E-00005-0115
100K OHM 1/4W CRBN	4	R111,R112	100E-00005-0118
120K OHM 1/4W CRBN	2	R108,R115	100E-00005-0120
150K OHM 1/4W CRBN	2	R102	100E-00005-0121
160K OHM 1/4W CRBN	1	R104,R114	100E-00005-0128
330K OHM 1/4W CRBN	2	R110,R119	100E-00005-0133
510K OHM 1/4W CRBN	2	R127	100E-00005-0134
560K OHM 1/4W CRBN	1		
IN5817	4	D1-D4	103E-00003-0009
2N5305	3	Q1-Q3	0360-00802-0012
74LS04	1	U13	0304-00803-0060
74F32/74S32	1	U14	0304-00803-0059



PROJECT ENG: C. MEDNICK		USED ON		REVISIONS	
DO NOT SCALE DIM.		HEAT TREAT		SCALE FULL	
NO. REQ'D 1 PER		NO. REQ'D 1 PER		NO. REQ'D 1 PER	
ARTIFICIAL ARTIST T.M.		PART NO.		M051 - 00304 - 6017	
A080 - 91671 - 6000		DATE 4/29/85		REVISED	







PROJECT ENG. S. ACKERMAN		USED ON		REVISED	
DATE	4/28/83	NO.	0015	PER	1
VENUS CPU SCHEMATIC DWG		A080-91668-F000		PART NO. MO51-00A15 - F002	
MIDWAY MFG. CO. FRANKLIN, PA. U.S.A.					

## M051-00A15-F001 (2/4)

## VENUS CPU

## A084-91668-F000

<u>DESCRIPTION</u>	<u>QTY</u>	<u>DESIGNATION NO.</u>	<u>PART NUMBER</u>
47 PF AX CR	1	C301	0A15-00800-0016
68 PF AX CR	1	C200, C307	0A15-00800-0017
150 PF AX CR	1	C302	0A15-00800-0018
220 PF AX CR	1	C308	0A15-00800-0014
270 PF AX CR	4	C201, C202, C304, C305	0A15-00800-0013
390 PF AX CR	32	C8, C9, C101-C110, C121-C130, C141- C150	0A15-00800-0001
820 PF AX CR	20	C111-C120, C131- C140	0A15-00800-0002
.01 UF AX CR	51	C2, C3, C6, C7, CP1, CP3, CP5-CP20, CP22, CP24, CP26- CP28, CP33-CP38, CP42-CP46, CP48- CP57, CP58, CP59	0A15-00800-0003
.1 UF RD TANT	1	C1	0A15-00800-0004
10 UF AX TANT	14	CP2, CP4, CP21, CP23, CP25, CP29- CP32, CP39-CP41, CP47, C309	0A15-00800-0006
470 UF AX ELEC	2	C4, C5	0A15-00800-0005
100 OHM 1/4W 5%	5	R50, R164-R166, R170	100E-00005-0033
110 OHM 1/4W 5%	40	R101-R140	100E-00005-0034
1K OHM 1/4W 5%	2	R3, R40	100E-00005-0061
1.2K OHM 1/4W 5%	10	R141-R150	100E-00005-0063
3.3K OHM 1/4W 5%	2	R159, R301	100E-00005-0074
4.7K OHM 1/4W 5%	45	R1, R2, R4-R12, R14-R22, R24, R25, R27-R38, R41-R43, R46-R48, R51, R52, R160-R162	100E-00005-0079
10K OHM 1/4W 5%	5	R13, R44, R45, R302, R303	100E-00005-0088
20K OHM 1/4W 5%	1	R23	100E-00005-0095
47K OHM 1/4W 5%	1	R39	100E-00005-0104
56K OHM 1/4W 5%	8	R151-R158	100E-00005-0106
200K OHM 1/4W 5%	1	R49	100E-00005-0123
100 OHM SERIES	1	RM11	102E-00004-0041
8 PIN SIP			
3.3K OHM 6 PIN SIP	2	RM5, RM6	102E-00004-0043
4.7K OHM 10 PIN SIP	2	RM3, RM4	102E-00004-0026
10K OHM 6 PIN SIP	4	RM7-RM10	102E-00004-0031
10K OHM 10 PIN SIP	2	RM1, RM2	102E-00004-0030
1N4148	9	D151-D158, D2	103E-00002-0005
1N5817	1	D1	103E-00003-0009
2N3904	1	Q2	104E-00001-0006
2N5305	1	Q1	104E-00007-0003
2068	1	G12	0A15-00803-0025
4001	1	G11	0A15-00803-0007
4017	1	G8	0A15-00803-0008
4066	1	G7	0A15-00803-0009
74LS04	1	C6	0A15-00803-0010
74LS05	1	G5	0A15-00803-0011
74LS08	1	D7	0A15-00803-0012

## M051-00A15-F001 (3/4)

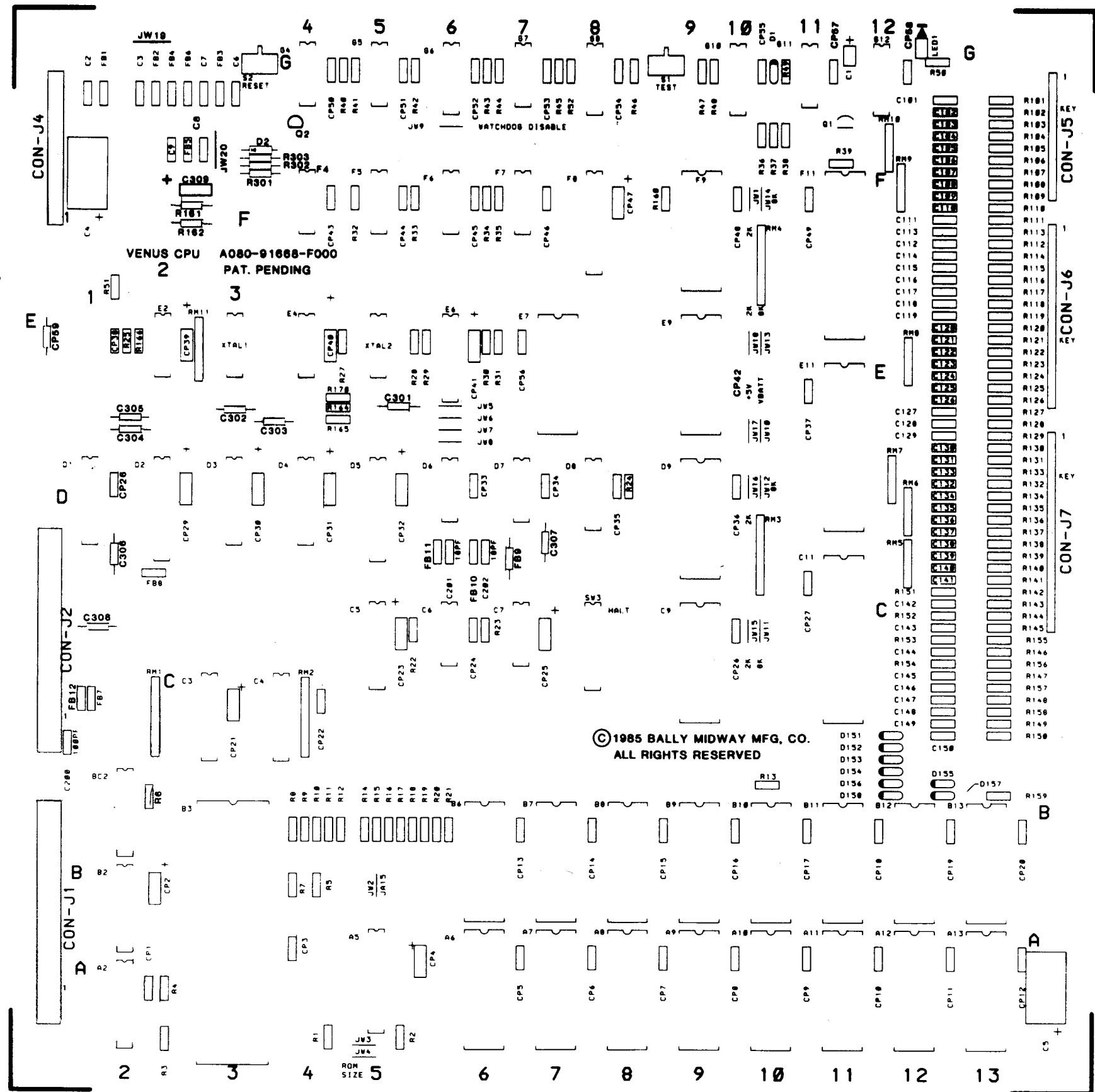
## VENUS CPU

## A084-91668-F000

<u>DESCRIPTION</u>	<u>QTY</u>	<u>DESIGNATION NO.</u>	<u>PART NUMBER</u>
74LS14	1	F7	0A15-00803-0013
74LS20	1	F4	0A15-00803-0014
74LS27	1	F6	0A15-00803-0015
74LS32	1	G4	0A15-00803-0016
74LS74	1	F5	0A15-00803-0017
74LS161	2	D8,G6	0A15-00803-0018
74LS148	1	G10	0A15-00803-0067
74LS241	1	C5	0A15-00803-0019
74LS245	2	C3,C4	0A15-00803-0020
74LS341	3	A2,B2,BC2	0A15-00803-0081
74S04	1	D6	0A15-00803-0021
74S32	1	C7	0A15-00803-0022
74S74	2	E2,E4	0A15-00803-0023
RAM LOW POWER	2	D9,F9	0A15-00803-0026
RAM 2KX8	2	C9,E9	0A15-00803-0038
H-T PAL	1	D5	0A15-00803-0003
V-T PAL	1	D2	0A15-00803-0004
MISC V&H PAL	1	D4	0A15-00803-0005
MISC CUSTOM PAL	1	D3	0A15-00803-0006
CPU WTS PAL	1	E6	0A15-00803-0043
CPU IOC PAL	1	F8	0A15-00803-0044
CPU RMD PAL	1	A5	0A15-00803-0045
6821	3	C11,E11,F11	0A15-00803-0002
6840	1	E7	0A15-00803-0068
68000 CPU	1	B3	0A15-00803-0001
EPROM/ROM 0	1	A6	
EPROM/ROM 1	1	B6	
EPROM/ROM 2	1	A7	
EPROM/ROM 3	1	B7	
EPROM/ROM 4	1	A8	SEE ROM/EPROM CHART
EPROM/ROM 5	1	B8	
EPROM/ROM 6	1	A9	
EPROM/ROM 7	1	B9	
EPROM/ROM 8	1	A10	
EPROM/ROM 9	1	B10	
EPROM/ROM 10	1	A11	
EPROM/ROM 11	1	B11	
EPROM/ROM 12	1	A12	
EPROM/ROM 13	1	B12	
EPROM/ROM 14	1	A13	
EPROM/ROM 15	1	B13	
FERRITE BEAD	12	FB1-FB12	0A15-00804-0004
20 PIN IC SOCKET	3	D3,D4,E6	110E-00001-0005
24 PIN IC SOCKET	4	A5,D2,D5,F8	110E-00001-0009
28 PIN IC SOCKET	21	A6-A13,B6-B13, C9,D9,E7,E9,F9	110E-00001-0010
40 PIN IC SOCKET	3	C11,E11,F11	110E-00001-0011
64 PIN IC SOCKET	1	B3	110E-00001-0016
12 PIN KK156 RT	1	J4	0017-00021-1214
16 PIN KK100 RT	1	J5	0017-00021-1266

M051-00A15-F001 (4/4)  
VENUS CPU  
A084-91668-F000

<u>DESCRIPTION</u>	<u>QTY</u>	<u>DESIGNATION NO.</u>	<u>PART NUMBER</u>
23 PIN KK100 RT	1	J6	0017-00021-1267
25 PIN KK100 RT	1	J7	0017-00021-1268
40 PIN KK100	2	J1,J2	0A15-00804-0005
JUMPER WIRE	20	JW1-JW20	0A15-00804-0002
GREEN LED	1	LED 1	119E-00001-0001
SWITCH PC MTG	2	SW1,SW2	0017-00032-0038
SWITCH 10-POS DIP	1	SW3	113E-00001-0004
16 MHZ CLK OSC	1	XTAL 2	109E-00002-0001
40 MHZ CLK OSC	1	XTAL 1	109E-00002-0007
VENUS CPU	1		A080-91668-F000



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COMPONENT SIDE  
NOMENCLATURE

THIS DWG. IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG. CO.

<b>DIM. TOLERANCES</b> UNLESS OTHERWISE SPEC. FRACTIONAL T.I.R. .002 CONCENTRICITY .002 ± 1/64 DECIMAL .005 HOLE DIA. +.002-.000 ANGLE ± 1/2° DO NOT SCALE DWG.	FIRST USED ON DWN ✓	DATE 4/22/85	SCALE	<b>MIDWAY MFG. CO.</b> FRANKLIN PK., IL. 60131 A BALLY CO.	SHEET 1 of 4 (SEE SHEET 2, 3 & 4)
	MECH. CHK.	MAT'L.	ELEC. CHK.		FINISH

ASSY DRAWING  
VENUS CPU  
A084-91668-F000

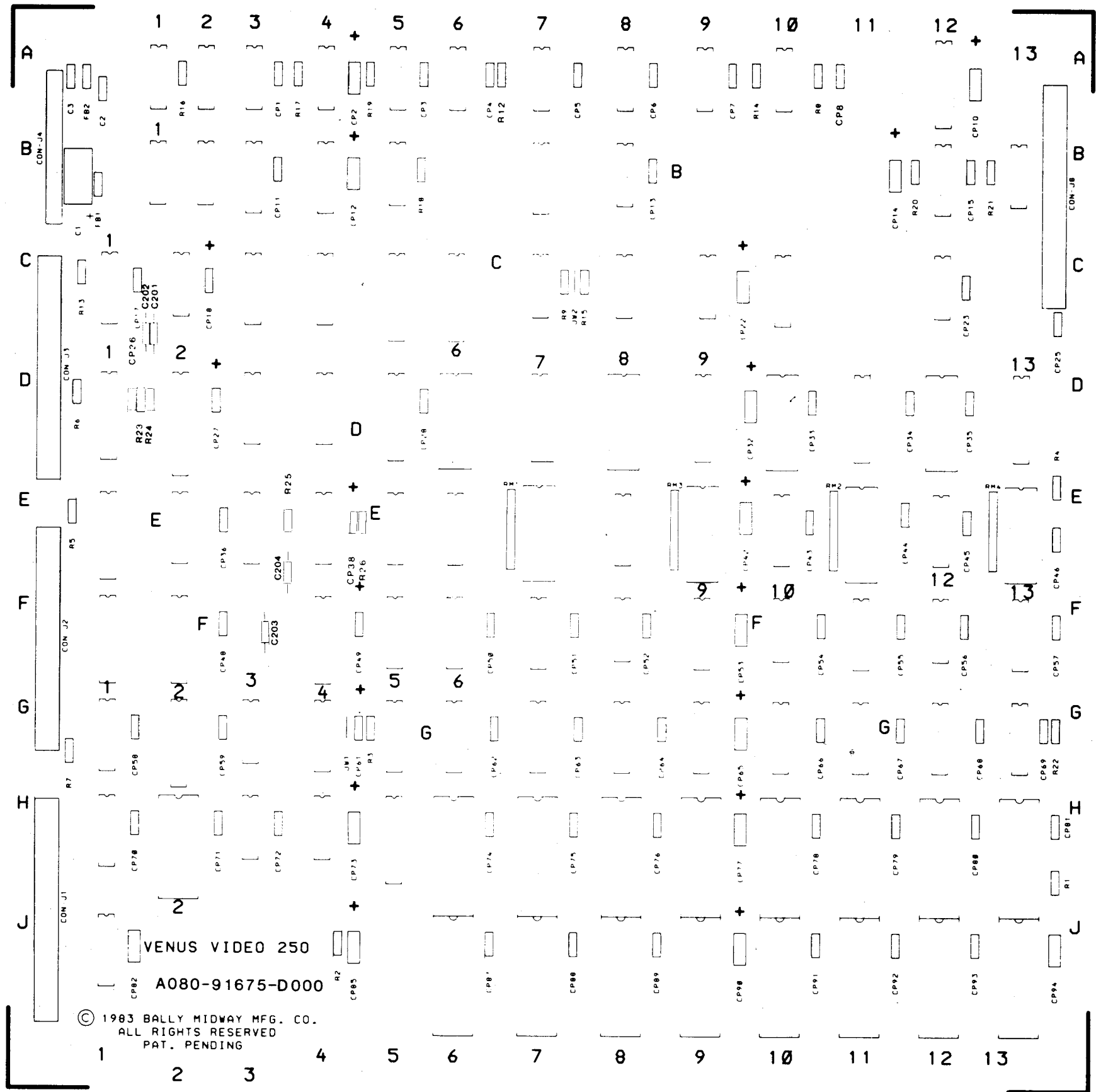
## M051-00A15-D009 (2/3)

VENUS VIDEO 250

A084-91675-D000

CROSS REFERENCE

<u>DESCRIPTION</u>	<u>QTY.</u>	<u>DESIGNATION</u>	<u>PART NUMBER</u>
100PF AX CR.	2	C201,C202	0A15-00800-0012
270PF AX CR.	2	C203,C204	0A15-00800-0013
470 MF AX ELEC	1	C1	0A15-00800-0005
10 MF AX TANT	18	CP2,CP10,CP12, CP14,CP18,CP22, CP27,CP32,CP38, CP42,CP49,CP53, CP61,CP65,CP73, CP77,CP85,CP90	0A15-00800-0006
.01 UF AX CR.	60	C2,C3,CP1,CP3-8, CP11,CP13,CP15, CP17,CP23,CP25, CP26,CP28,CP33- CP36,CP43-46, CP48,CP50-52, CP54-59,CP62- CP64,CP66-72, CP74-76,CP78- CP82,CP87-89, CP91-94	0A15-00800-0003
68 OHM 1/4W	2	R25,R26	100E-00005-0029
100 OHM 1/4W	2	R23,R24	100E-00005-0033
1K OHM 1/4W	20	R1-9,R12-22	100E-00005-0061
1K OHM 10 PIN SIP	4	RM1-RM4	102E-00004-0013
7420	2	IC 10F,12F	0A15-00803-0027
74S00	1	IC 12C	0A15-00803-0033
74S08	1	IC 1A	0A15-00803-0032
74S133	1	IC 5G	0A15-00803-0031
74S283	2	IC 5E,5F	0A15-00803-0030
74S374	1	IC 2F	0A15-00803-0066
74LS00	3	IC 7A,8C,3G	0A15-00803-0046
74LS04	1	IC 2B	0A15-00803-0010
74LS10	1	IC 9A	0A15-00803-0047
74LS20	2	IC 8A,8B	0A15-00803-0014
74LS30	3	IC 2A,2C,5B	0A15-00803-0048
74LS32	2	IC 1B,8F	0A15-00803-0016
7474	4	IC 3A,4A,5A,6A, 10A,7C	0A15-00803-0080
74LS74	2	IC 3H,4H	0A15-00803-0049
74LS86	2	IC 13R,9C	0A15-00803-0050
74LS125	2	IC 6F	0A15-00803-0051
74LS139	1	IC 1C,1G,1H,1J,3D, 4D,7B,10C	0A15-00803-0053
74LS157	8	IC 4G	0A15-00803-0018
74LS161	1	IC 2E	0A15-00803-0054
74LS163	1	IC 6E,8E,10E,12E	0A15-00803-0055
74LS169	4		



THIS DWG IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG. CO

<b>DIM. TOLERANCES</b> UNLESS OTHERWISE SPEC CONCENTRICITY T1R 002 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA + .002 - .000 ANGLE ± 1/2° DO NOT SCALE DWG.	FIRST USED ON		DATE		SCALE	<b>MIDWAY MFG. CO.</b> FRANKLIN PK., IL. 60131 A BALLY CO. SHEET 1 OF 3 (SEE "A-MAIN FILE") REVISIONS PART NO M05-1-00A-15-D00-9
	DWN	CL	4/12/85			
	MECH CK					
	ELEC CK					

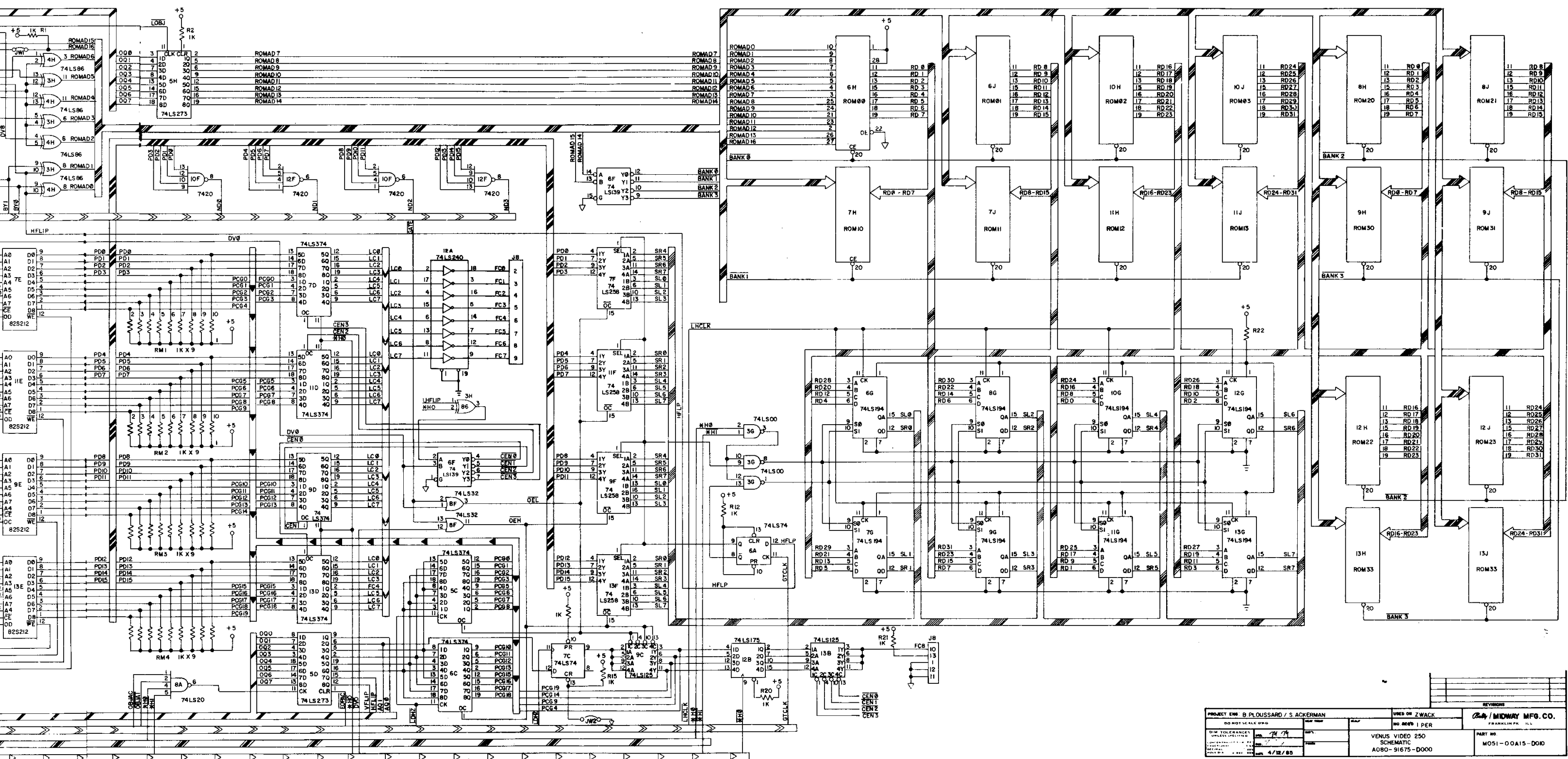
**M051-00A15-D009 (3/3)**  
**VENUS VIDEO 250**  
**A084-91675-D000**

**CROSS REFERENCE**

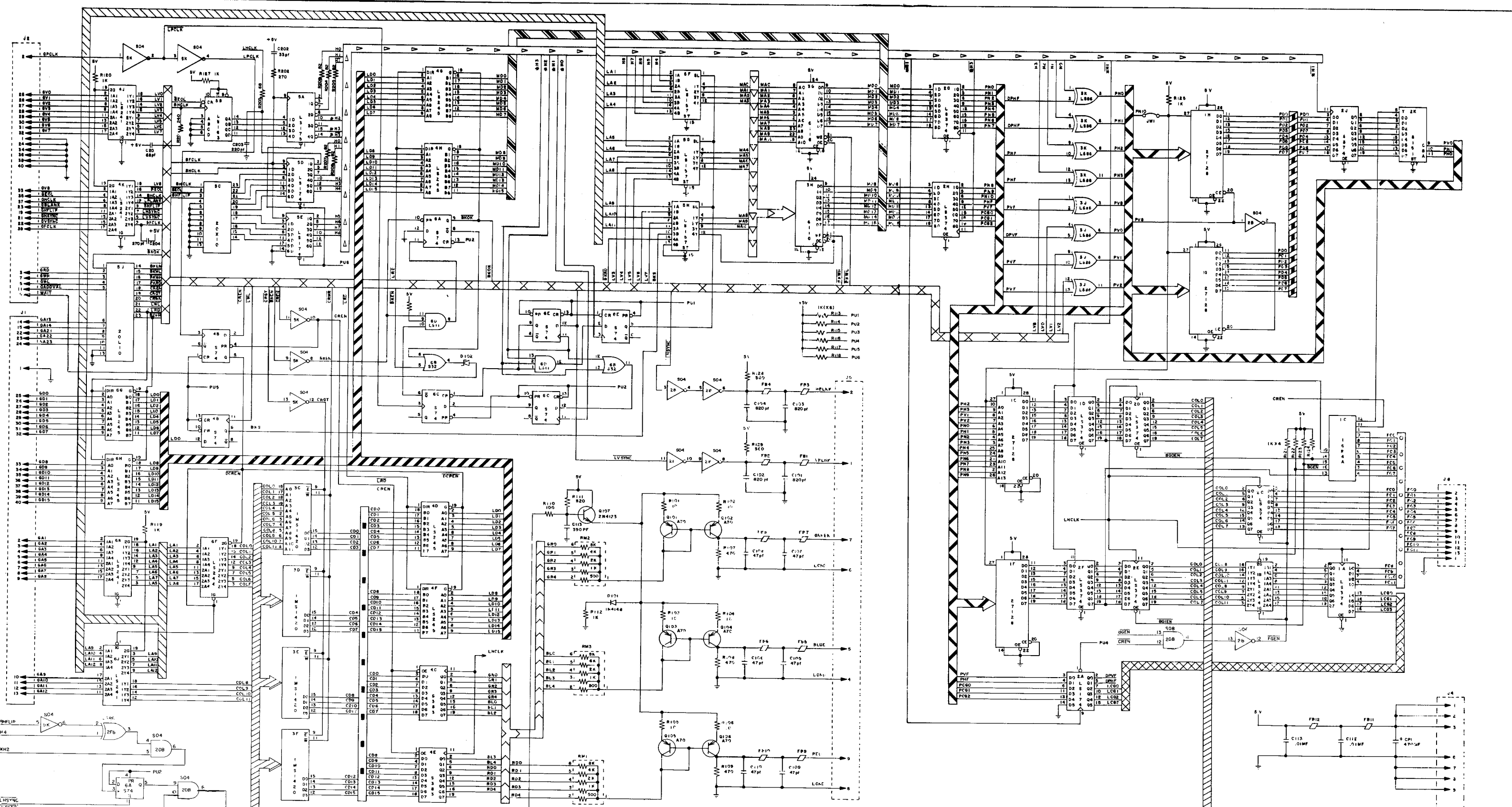
<u>DESCRIPTION</u>	<u>QTY.</u>	<u>DESIGNATION</u>	<u>PART NUMBER</u>
74LS174	2	IC 4B,4E	0A15-00803-0056
74LS175	3	IC 3B,3E,12B	0A15-00803-0057
74LS194	8	IC 6G-13G	0A15-00803-0058
74LS240	1	IC 12A	0A15-00803-0059
74LS245	1	IC 2G	0A15-00803-0020
74LS258	4	IC 7F,9F,11F,13F	0A15-00803-0061
74LS273	3	IC 5D,4F,5H	0A15-00803-0062
74LS283	2	IC 3C,4C	0A15-00803-0063
74LS341	2	IC 1D,1E	0A15-00803-0081
74LS374	6	IC 5C,6C,7D,9D, 11D,13D	0A15-00803-0064
2K X 8 RAM	1	IC 2H	0A15-00803-0065
93422	4	IC 6D,8D,10D,12D	0A15-00803-0029
82S212	4	IC 7E,9E,11E,13E	0A15-00803-0028
PAL FGBDCD	1	IC 1F	0A15-00803-0039
PAL HCT	1	IC 2D	0A15-00803-0040
EPROM KIT	16	IC 6H-13H,6J-13J	SEE EPROM/ROM CHART
20 PIN SOCKET	1	ICS 1F	110E-00001-0005
22 PIN SOCKET	8	ICS 6D,8D,10D, 12D,7E,9E,11E 13E	110E-00001-0006
24 PIN SOCKET SKINNY	1	ICS 2D	110E-00001-0009
24 PIN SOCKET	1	ICS 2H	110E-00001-0007
28 PIN SOCKET	16	ICS 6H-13H,6J-13J	110E-00001-0010
FERRITE BEAD	2	FB1-FB2	0A15-00804-0004
JUMPER WIRE	2	JW1,JW2	0A15-00804-0002
12 PIN RT ANGLE CONN KK156	1	J4	0017-00021-1214
40 PIN RT ANGLE CONN RIBBON	3	J1,J2,J8	0A15-00804-0005
VENUS VIDEO 250	1	PCB	A080-91675-D000



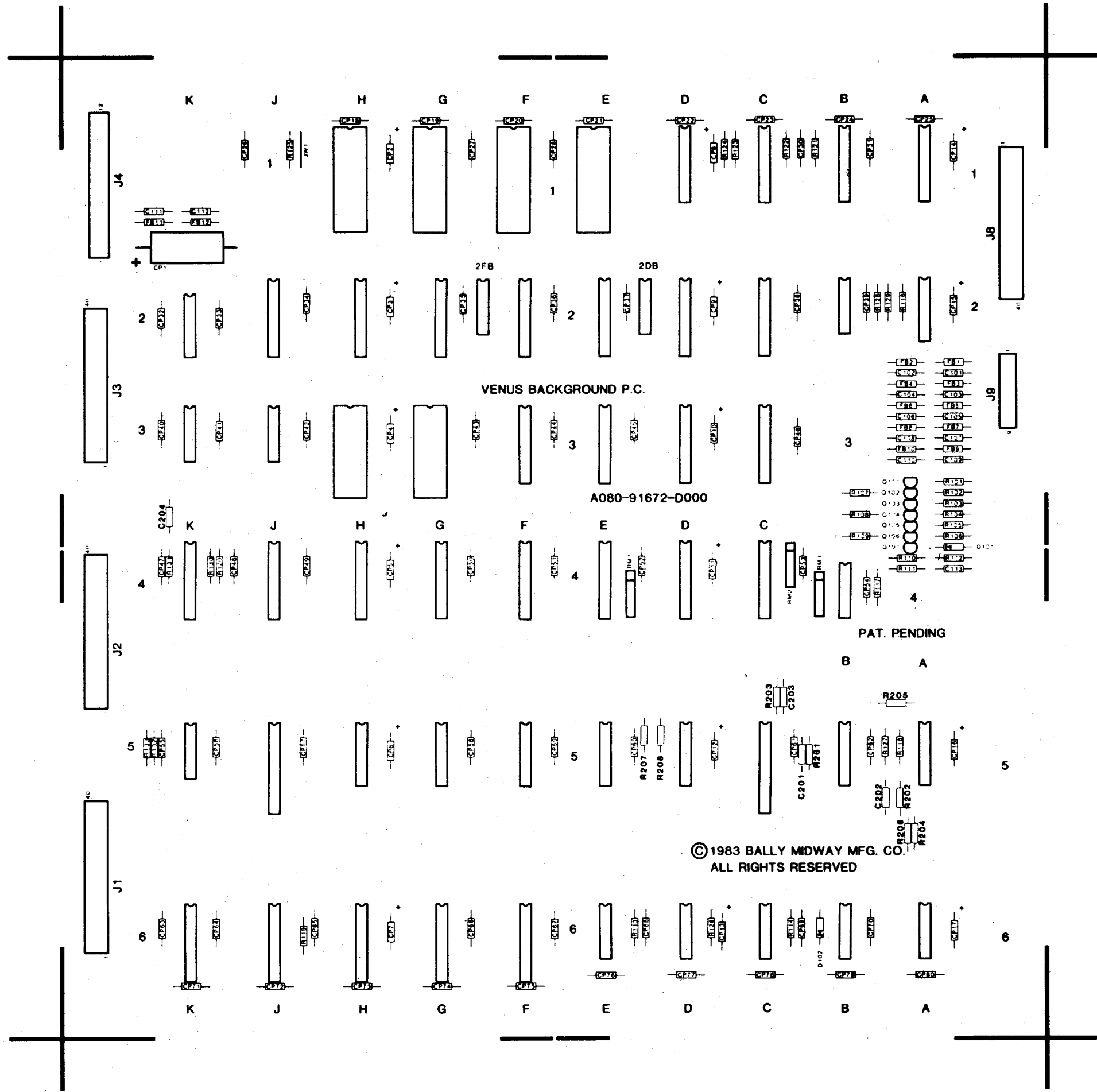




PROJECT ENG: B. PLOUSSARD / S. ACKERMAN		USED ON ZWACK		REVISED	
DO NOT SCALE DIMS		NO. SHEETS: 1 PER		PART NO. M051-00A15-000	
DIM TOLERANCES UNLESS SPECIFIED		DATE: 4/22/83		VENUS VIDEO 250 SCHEMATIC A080-91675-0000	
MFG. BY: MIDWAY MFG. CO. FRANKLIN, PA. U.S.A.		PART NO. M051-00A15-000		M051-00A15-000	



PROJECT ENG. S. ACKERMAN / B. PLOUSSARD	DESIGNER: ZWACK	DATE: 11/72
DESIGNER: BAK	VENUS BACKGROUNDS	NO. REV: PEN
DATE: 4 28 80	ARCH: 5172-00-C	MOBI - 0015 - 000



THIS DWG. IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG. CO.

<b>MIDWAY MFG. CO.</b> FRANKLIN Pk., IL. 60131 A BALLY CO.	DATE	4/22/85	SCALE	
	SHEET 1 of 3 (2 of 3 "A")			
DIM. TOLERANCES UNLESS OTHERWISE SPEC CONCENTRICITY T.I.R. .002 FRACTIONAL ± .164 DECIMAL ± .005 HOLE DIA. +.002 - .000 ANGLE ± 1/2° DO NOT SCALE DWG.		REVISIONS PART NO. MO-5-1-0-0-A-1-5-D-0-0-7		
FIRST USED ON DRN <input checked="" type="checkbox"/> MECH. CHK <input type="checkbox"/> ELEC. CHK <input type="checkbox"/>	ASSY DRAWING VENUS BACKGROUND P.C. A084-91672-D000			

M051-00A15-D007 (2/3)  
 VENUS BACKGROUND  
 A084-91672-D000

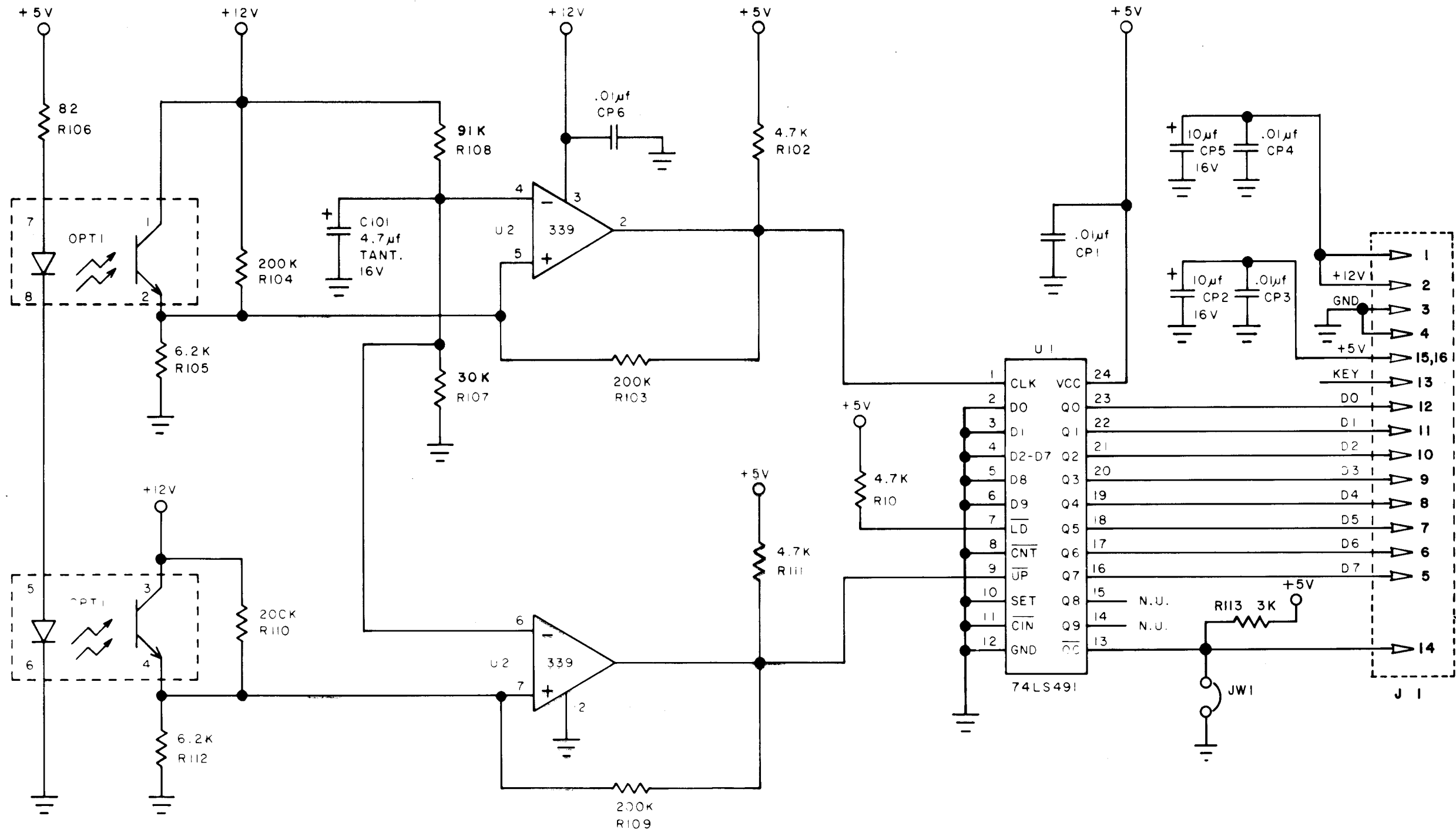
CROSS REFERENCE

<u>DESCRIPTION</u>	<u>QTY</u>	<u>DESIGNATION NO.</u>	<u>PART NUMBER</u>
33 PF AX CR	1	C202	0A15-00800-0015
47 PF AX CR	6	C105-C110	0A15-00800-0007
68 PF AX CR	1	C201	0A15-00800-0017
390 PF AX CR	1	C113	0A15-00800-0001
820 PF AX CR	4	C101-C104	0A15-00800-0002
.01 UF AX CR	64	C111,C112,CP18-CP28,CP30-CP80	0A15-00800-0003
10 UF AX TANT	16	CP2-CP17	0A15-00800-0006
470 UF AX ELEC	1	CP1	0A15-00800-0005
10 OHM 1/4W 5%	6	R101-R106	100E-00005-0011
68 OHM 1/4W 5%	1	R203	100E-00005-0029
82 OHM 1/4W 5%	5	R204-R208	100E-00005-0031
100 OHM 1/4W 5%	5	R110,R130-R133	100E-00005-0033
240 OHM 1/4W 5%	1	R201	100E-00005-0043
270 OHM 1/4W 5%	1	R202	100E-00005-0044
300 OHM 1/4W 5%	3	R107-R109	100E-00005-0046
560 OHM 1/4W 5%	2	R128,R129	100E-00005-0054
820 OHM 1/4W 5%	1	R111	100E-00005-0058
1K OHM 1/4W 5%	15	R112-R114,R116-R127	100E-00005-0061
.5 -8K OHM 6 PIN SIP	3	RM1-RM3	102E-00004-0036
1N4148	1	D101	103E-00002-0005
1N5817	1	D102	103E-00003-0009
MPSA70	6	Q101-Q106	104E-00002-0012
2N4123	1	Q107	104E-00001-0007
7411	1	IC 6D	0A15-00803-0034
74175	1	IC 5A	0A15-00803-0035
74S04	2	IC 2B, 5K	0A15-00803-0021
74S08	1	IC 2DB	0A15-00803-0032
74S32	1	IC 6B	0A15-00803-0022
74S74	4	IC 4B, 6A, 6C, 6E	0A15-00803-0023
74LS86	3	IC 3J, 3K, 2FB	0A15-00803-0049
74LS151	1	IC 2K	0A15-00803-0052
74LS157	3	IC 5F, 5G, 5H	0A15-00803-0053
74LS163	1	IC 5B	0A15-00803-0054
74LS174	3	IC 2A, 5D, 5E	0A15-00803-0056
74LS244	2	IC 1B, 6F	0A15-00803-0060
74LS245	6	IC 4D, 4F, 4G, 4H, 6G, 6H	0A15-00803-0020
74LS341	4	IC 4J, 4K, 6J, 6K	0A15-00803-0081
74LS374	9	IC 1A, 1D, 2C, 2D, 2E, 2F, 2G, 2H, 2J	0A15-00803-0064
74S383	2	IC 4C, 4E	0A15-00803-0036
HCT PAL	1	IC 5C	0A15-00803-0040

M051-00A15-D007 (3/3)  
 VENUS BACKGROUND  
 A084-91672-D000

CROSS REFERENCE

<u>DESCRIPTION</u>	<u>QTY</u>	<u>DESIGNATION NO.</u>	<u>PART NUMBER</u>
BGBCPE PAL	1	IC 1C	0A15-00803-0041
BGBDCD PAL	1	IC 5J	0A15-00803-0042
2Kx8 RAM	2	IC 3G, 3H	0A15-00803-0038
4Kx4 RAM	4	IC 3C, 3D, 3E, 3F	0A15-00803-0037
EPROM/ROM	4	IC 1E, 1F, 1G, 1H	SEE EPROM/ROM CHART
20 PIN IC SOCKET	5	ICS 1C, 3C, 3D, 3E, 3F	110E-00001-0005
24 PIN IC SOCKET	2	ICS 3G, 3H	110E-00001-0007
24 PIN IC SOCKET SKINNY	2	ICS 5C, 5J	110E-00001-0009
28 PIN IC SOCKET	4	ICS 1E, 1F, 1G, 1H	110E-00001-0010
FERRITE BEAD	12	FB1-FB12	0A15-00804-0004
JUMPER WIRE	1	JW1	0A15-00804-0002
9 PIN KK100	1	J9	0017-00021-1269
RT ANGLE			
12 PIN KK156	1	J4	0017-00021-1214
RT ANGLE			
40 PIN KK100	3	J1, J2, J8	0A15-00804-0005
RT ANGLE			
VENUS BACKGROUND	1	PCB	A080-91672-D000



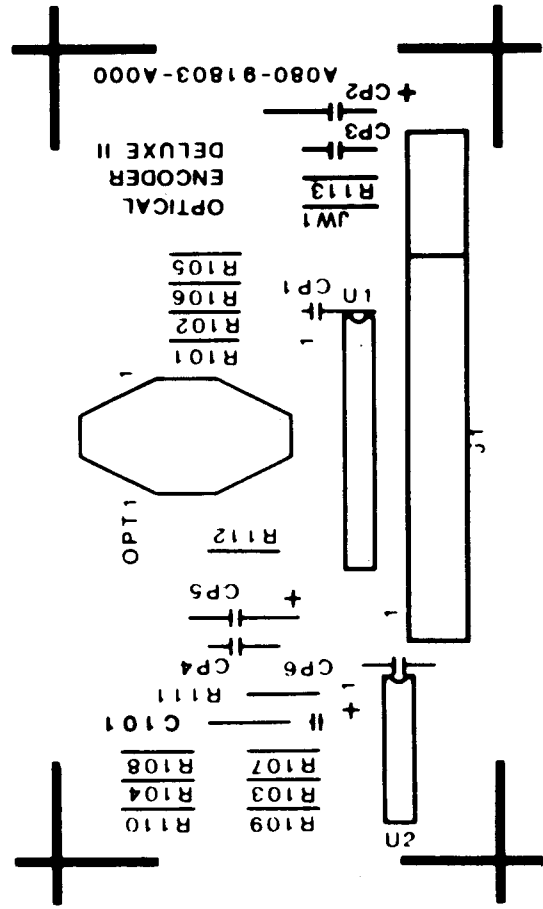
JOHN BOYDSTON

c.v

3/8/85

SCHEMATIC DRAWING  
OPTICAL ENCODER DELUXE II  
A084-91803-A000

M051-00385-A012



THIS DWG IS CONFIDENTIAL & PROPERTY OF BALLY/MIDWAY MFG. CO.

**Bally/MIDWAY MFG. CO.**  
FRANKLIN PARK, IL 60131

**ASSY DRAWING**  
**OPTICAL ENCODER DELUXE II**  
**A084-91803-A000**

FIRST USED ON	DATE	SCALE
DRN	4/16/85	
MECH CHK	MATL	
ELEC CHK	FINISH	

**DIM. TOLERANCES**  
UNLESS OTHERWISE SPEC.  
CONCENTRICITY T.I.R. 002  
FRACTIONAL ± 1/64  
DECIMAL ± 005  
HOLE DIA + 002 - 000  
ANGLE ± 1/2°  
**DO NOT SCALE DWG.**

BRUNING 40-107

REVISIONS

PART NO  
**MO 51-0-0385-A-01-J**  
SHEET 1 of 2

A M-F

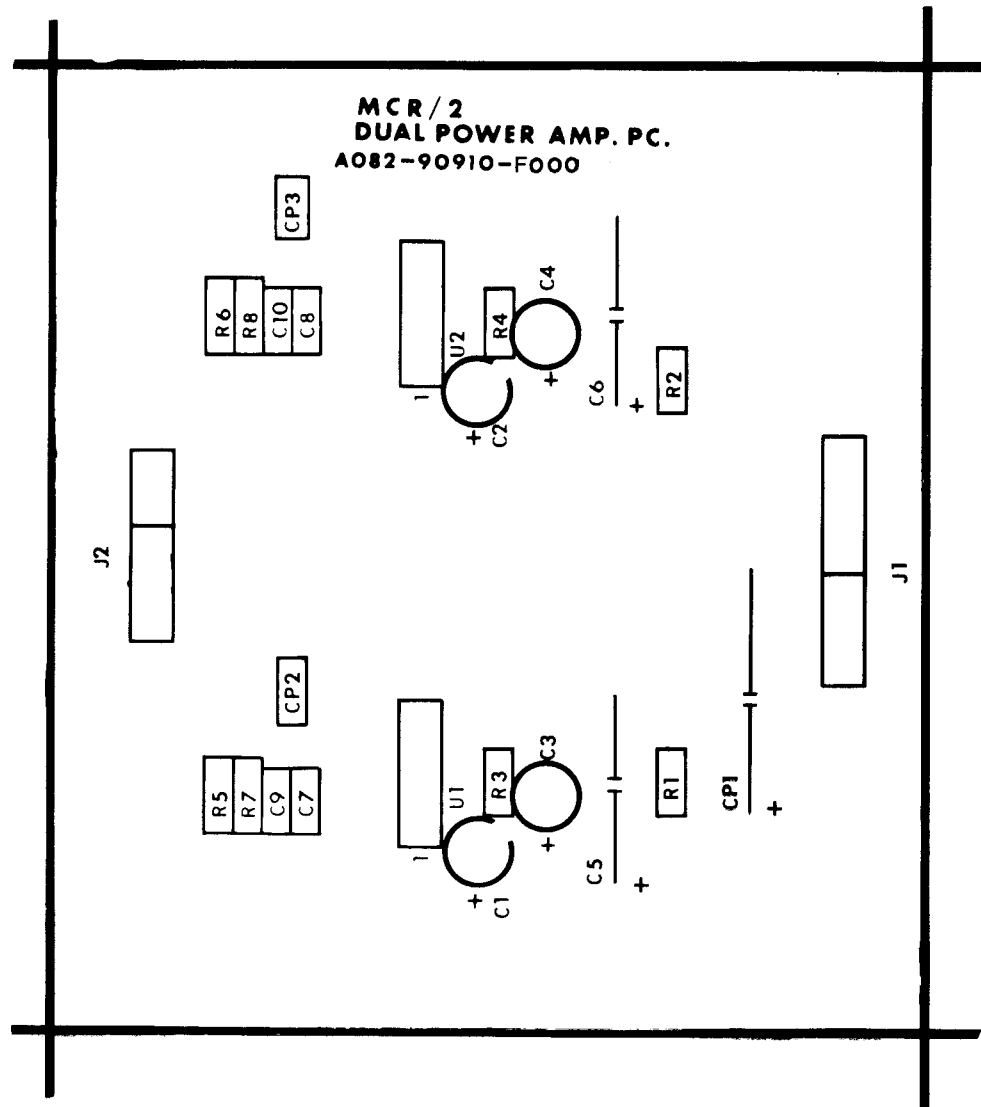
**M051-00385-A011 (2/2)**  
**OPTICAL ENCODER DELUXE II**  
**A084-91803-A000**

**CROSS REFERENCE**

DESCRIPTION	QTY.	DESIGNATION	PART NUMBER
.01UF AX. CR.	4	CP1,CP3-CP4,CP6	0628-00800-0100
4.7UF RAD. TANT	1	C101	0628-00800-0200
10UF AX. ELECT.	2	CP2,CP5	0628-00800-0300
82 OHM 1/4W 5%	1	R106	100E-00005-0031
3K OHM 1/4W 5%	1	R113	100E-00005-0073
4.7K OHM 1/4W 5%	3	R101,R102,R111	100E-00005-0079
6.2K OHM 1/4W 5%	2	R105,R112	100E-00005-0083
30K OHM 1/4W 5%	1	R107	100E-00005-0099
91K OHM 1/4W 5%	1	R108	100E-00005-0113
200K OHM 1/4W 5%	4	R103,R104,R109,R110	100E-00005-0123
74LS491	1	U1	0628-00803-2700
LM339	1	U2	0628-00803-2900
OPTO SWITCH DUAL	1	OPT 1	120E-00001-0010
JUMPER WIRE	1	JW1	117E-00001-0003
16 PIN KK156 RIGHT ANGLE	1	J1	0017-00021-1287
OPTICAL ENCODER DELUXE	1	PCB	A080-91803-A000

**DESIGNATION LIST**

DESIGNATION NO.	DESCRIPTION
C1,C2	4.7 MF 25V RD TANT
C3,C4	22 MF 6V RD TANT
C5,C6	470 MF 6V AX ELEC
C7-C10	.1 MF 50V AX CER
CP1	220 MF 25V AX ELEC
CP2,CP3	.1 MF 50V AX CER
R1,R2	2.7K OHM 1/4W 5% CRBN
R3,R4	27 OHM 1/4W 5% CRBN
R5-R8	1 OHM 1/2W 5% CRBN
U1,U2	MB3730
J1	7 PIN
J2	5 PIN
HSA1,2	HEATSINK ASSY
MH1-MH4	1/4" SPACER



**CROSS REFERENCE LIST**

DESCRIPTION	QTY	DESIGNATION NO.	PART NUMBER
.1 MF 50V AX CER	6	C7-C10,CP2,CP3	0986-00800-1100
4.7 MF 25V RD TANT	2	C1,C2	0986-00800-3100
22 MF 6V RD TANT	2	C3,C4	0986-00800-1600
220 MF 25V AX ELEC	1	CP1	0986-00800-3200
470 MF 6V AX ELEC	2	C5,C6	0986-00800-1700
1 OHM 1/2W 5%	4	R5-R8	0062-02603-1XXX
27 OHM 1/4W 5%	2	R3,R4	0062-06803-1XXX
2.7K OHM 1/4W 5%	2	R1,R2	0062-19903-1XXX
MB3730	2	U1,U2	0066-188XX-XX4X
TIN .045 SQ PINS	12	J1,J2	0017-00033-0480
HEATSINK ASSY	2	HSA1,2	A986-00010-E000
1/4" SPACER	4	MH1-MH4	0017-00042-0320
PC BOARD	1		A080-90910-F000

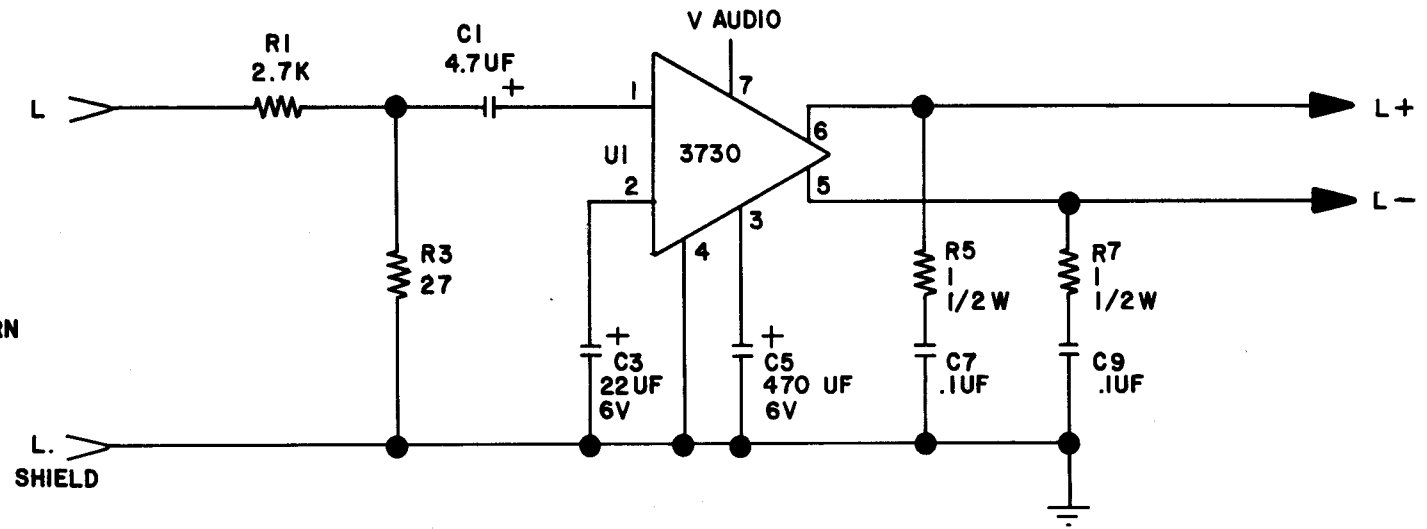
PROJECT ENG: C. MEDNICK

THIS DWG IS CONFIDENTIAL & PROPERTY OF BALLY/MIDWAY MFG CO

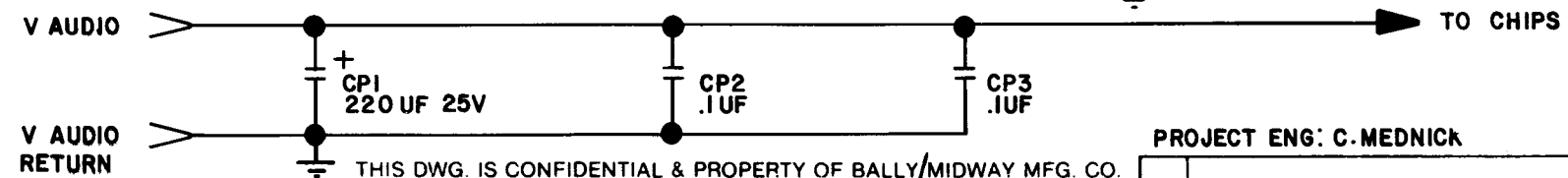
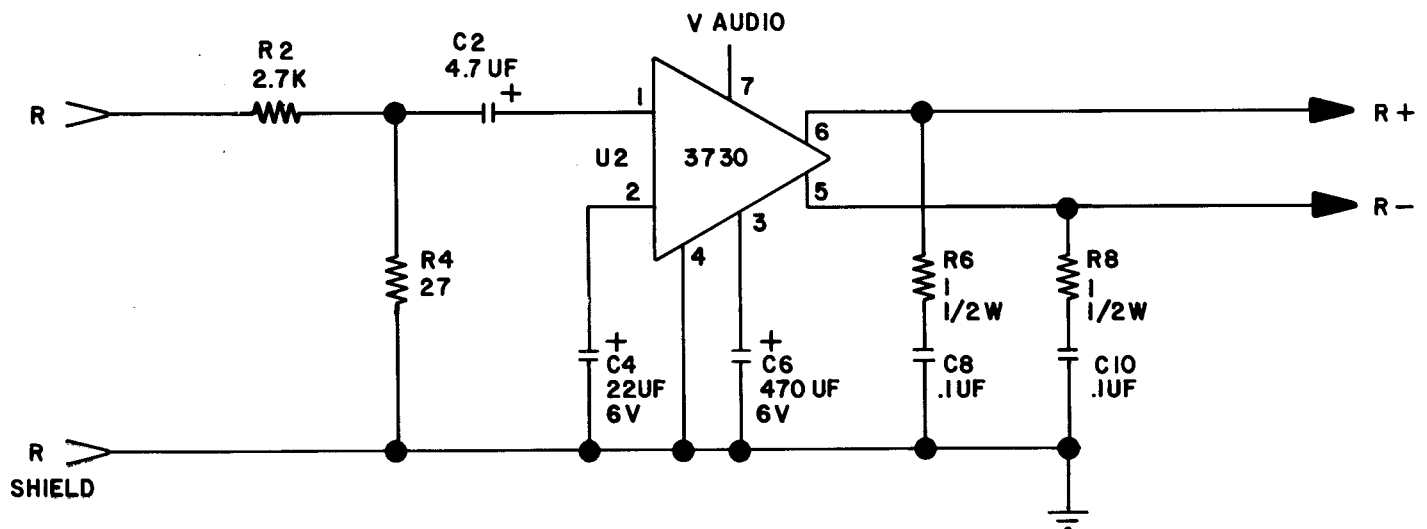
<b>DIM. TOLERANCES</b> UNLESS OTHERWISE SPEC. CONCENTRICITY T.I.R. .002 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA. +.002-.000 ANGLE ± 1/2° <b>DO NOT SCALE DWG.</b>	FIRST USED ON <b>TRON</b>				<b>REVISIONS</b>  PART NO. <b>M051-00986-F010</b>
	DRN <i>m m</i>	DATE <b>6/14/84</b>	SCALE <i>1:1</i>		
	MECH CHK	MAT'L	DUAL PWR AMP ASSEMBLY DRWNG A084-90910-F000		
	ELEC CHR	FINISH			



- J1  
 PIN 1 - N.C.  
 2 - L. AUDIO  
 3 - L. SHIELD  
 4 - KEY  
 5 - VAUDIO RETURN  
 6 - R. AUDIO  
 7 - R. SHIELD  
 8 - VAUDIO



- J2  
 PIN 1 - R+  
 2 - R-  
 3 - KEY  
 4 - L+  
 5 - N.C.  
 6 - L-



THIS DWG. IS CONFIDENTIAL & PROPERTY OF BALLY/MIDWAY MFG. CO.

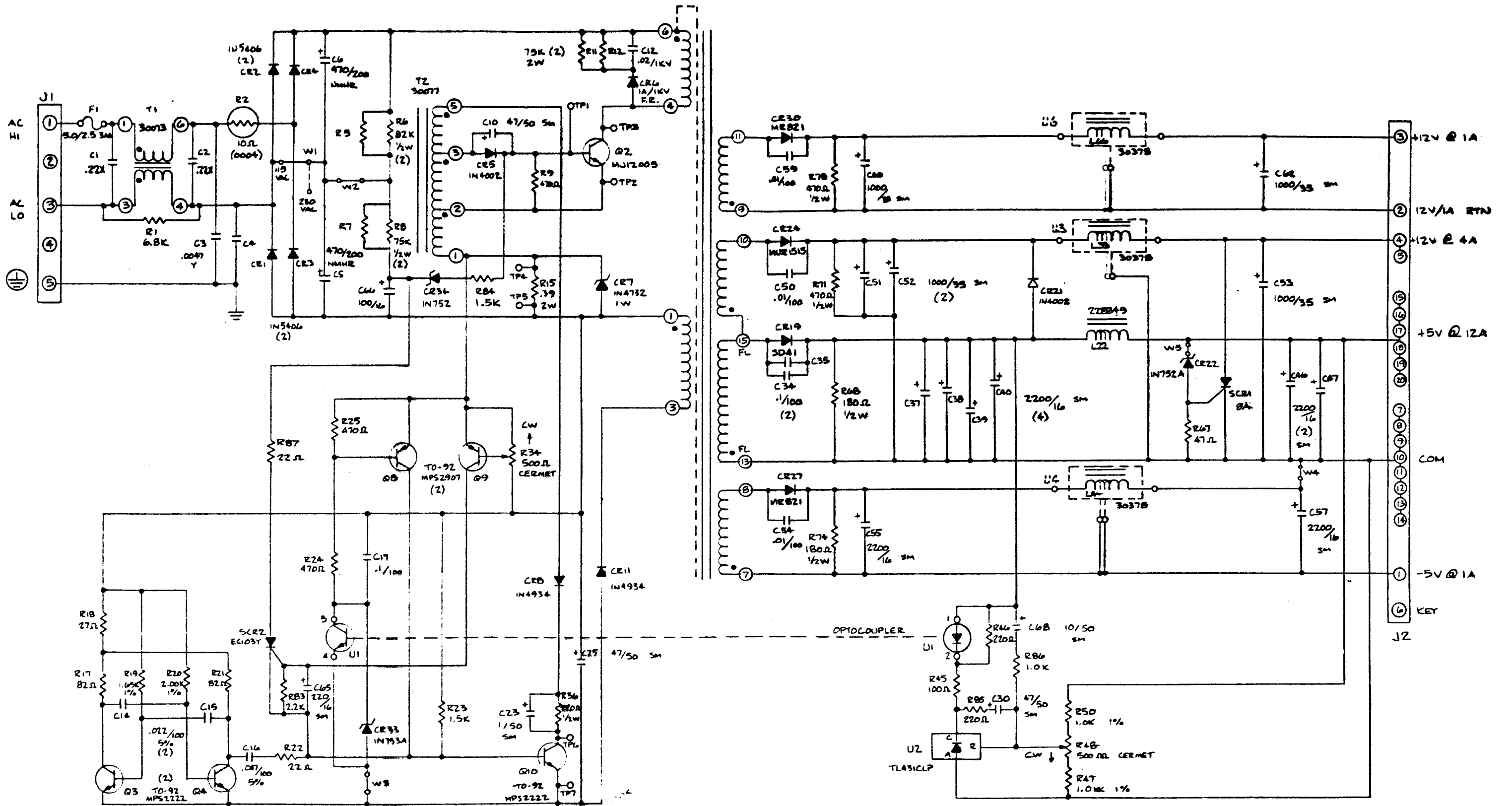
PROJECT ENG: C. MEDNICK

**DIM. TOLERANCES**  
 UNLESS OTHERWISE SPEC.  
 CONCENTRICITY T.I.R. .002  
 FRACTIONAL ±.1/64  
 DECIMAL ±.005  
 HOLE DIA. +.002-.000  
 ANGLE ± 1/2°  
**DO NOT SCALE DWG.**

FIRST USED ON	TRON		
DRN	M. M.	DATE	6/14/84
MECH. CHK	MAT. L.	SCALE	H
ELEC. CHK	FINISH		

**Bally/MIDWAY MFG. CO.**  
 FRANKLIN PARK, IL 60131  
**DUAL POWER AMP**  
 SCHEMATIC  
 A080-90910-F000

<b>REVISIONS</b>	
PART NO.	M051-00986-F011



2. CAPACITOR VALUES IN MICROFARAD/VOLTS.  
 1. RESISTOR VALUES ARE IN OHMS 1/2W, 5%, C.F.

FOR ADDITIONAL ELECTRICAL INFORMATION,  
 REFER TO MECH. DWG. NO. 0017-0003-0543.

18 NOTES: UNLESS OTHERWISE SPECIFIED.

0017-0003-0543 M051-00945-A087

QTY		PART OR IDENTIFYING NO.		NOMENCLATURE OR DESCRIPTION		MATERIAL SPECIFICATION	
PARTS LIST							
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS DECIMALS ANGLES				CONTRACT NO.			
NEXT ASSY				USED ON		APPROVALS DATE	
APPLICATION				DO NOT SCALE DRAWING		DRAWN: S. WINTER 5-10-84	
						CHECKED:	
						REVIEWED:	
						SIZE / PCB NO. DWG. NO. REV	
						D / 31-SPI016 X	

CAMARILLO, CALIF 93010  
 (805) 484-2851

ONDOR INC.  
 SCHEMATIC  
 SPI016

A945-00059-0000/0100/0200

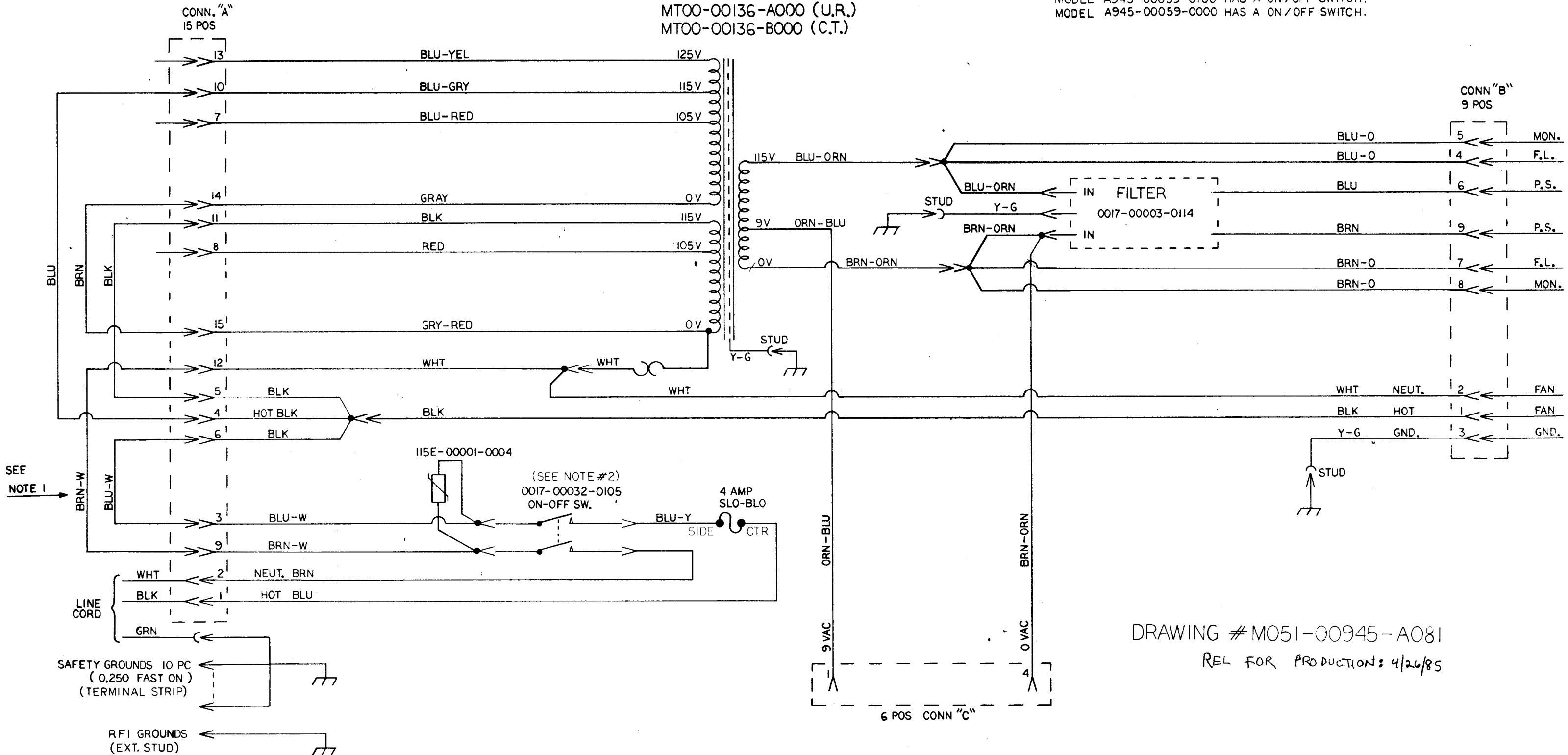
UNI PWR SUPPLY CHASSIS ASS'Y # 125 SWUR + 125 SWCT

	105	115	210	220	230	240
BLK	5-8	5-11	8-14	11-14	11-14	11-14
BRN	14-15	14-15	---	---	---	---
BLU	4-7	4-10	4-7	4-7	4-10	4-13

NOTES: 1. JUMPERS ON CONN "A" 3-6 AND 9-12 CAN BE REPLACED WITH A SAFETY SW. AND/OR AUX. ON OFF SW.

2. MODEL A945-00059-0200 HAS A TERMINAL STRIP.  
 MODEL A945-00059-0100 HAS A ON/OFF SWITCH.  
 MODEL A945-00059-0000 HAS A ON/OFF SWITCH.

TRANSFORMER  
 MTOO-00136-A000 (U.R.)  
 MTOO-00136-B000 (C.T.)



**BALLY/MIDWAY'S ZWACKERY**

**U.R. #0385**

**ROM/EPROM PART NUMBERS**

**UNPROGRAMMED VENUS CPU A084-91668-F000**

**PROGRAMMED VENUS CPU A084-91668-A385**

POS.	MIDWAY PART NUMBER
A6	385A-42AAE-JXRD
B6	385A-42AAE-KXRD
A7	385A-42AAE-LXRD
B7	385A-42AAE-MXRD
A8	385A-42AAE-NXRD
B8	385A-42AAE-PXRD
A9	385A-42AAE-RXRD
B9	385A-42AAE-TXRD
A10	385A-42AAE-UXRD
B10	385A-42AAE-VXRD
A11	385A-42AAE-WXRD
B11	385A-42AAE-YXRD
A12	385A-42AAE-ZXRD
B12	385A-42AAE-1XRD

JUMPERS	IN	OUT
JW1	**	
JW2		**
JW3	**	
JW4		**
JW5	**	
JW6		**
JW7-JW8	**	
JW9-JW14		**
JW15-JW20	**	

**UNPROGRAMMED VENUS BACKGROUND A084-91672-D000**

**PROGRAMMED VENUS BACKGROUND A084-91672-A385**

POS.	MIDWAY PART NUMBER
1H	385A-42AAE-2XRD
1G	385A-42AAE-3XRD
1F	385A-42AAE-5XRD
1E	385A-42AAE-4XRD

JUMPERS	IN	OUT
JW1		**

**UNPROGRAMMED VENUS VIDEO 250 A084-91675-D000**

**PROGRAMMED VENUS VIDEO 250 A084-91675-A385**

POS.	MIDWAY PART NUMBER
6H	385A-42AAE-AXRD
6J	385A-42AAE-BXRD
7H	385A-42AAE-EXRD
7J	385A-42AAE-FXRD
10H	385A-42AAE-CXRD
10J	385A-42AAE-DXRD
11H	385A-42AAE-GXRD
11J	385A-42AAE-HXRD

JUMPERS	IN	OUT
JW1		**
JW2		**

**UNPROGRAMMED ARTIFICIAL ARTIST A084-91671-G000**

**PROGRAMMED ARTIFICIAL ARTIST A084-91671-A385**

POS.	MIDWAY PART NUMBER
U7	385A-22AAE-AAMD
U17	385A-22AAE-BAMD
U8	385A-22AAE-CAMD
U18	385A-22AAE-DAMD

JUMPERS	IN	OUT
JW1	**	
JW2		**
JW3	**	

**NONPROGRAMMED OPTICAL ENCODER DELUXE II A084-91803-A000**

JUMPERS	IN	OUT
JW1	**	