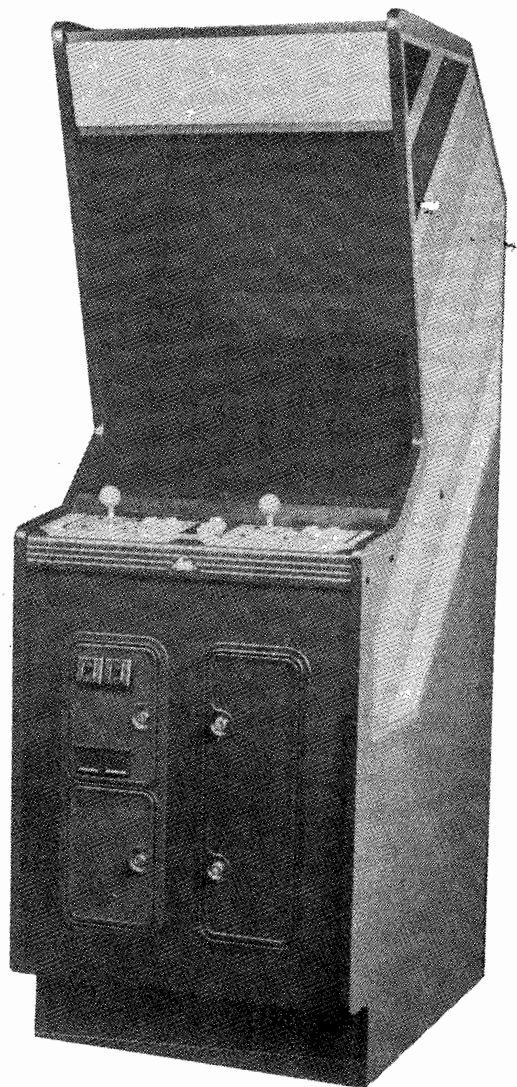


CINEMAT SYSTEM*



Service Manual
Rev. C 1986

W A R N I N G

This equipment generates, uses, and can radiate radio frequency energy and if not installed and 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 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.

OPERATION AND MAINTENANCE
MANUAL FOR
THE CINEMATRONICS CINEMAT SYSTEM
With Illustrated Parts Lists

CINEMATRONICS INCORPORATED
1841 Friendship Drive
El Cajon, California 92020

NOTICE REGARDING THE USE OF NON-CINEMATRONICS
REPLACEMENT PARTS:

Cinematronics recommends the use of only Cinematronics parts when replacing any malfunctioning component or assembly in the Cinemat system. For safety and reliability, Cinematronics does not recommend or authorize any substitute parts or modifications of Cinematronics equipment. Such alterations may adversely affect game play, cause serious injury, and void your warranty. Unauthorized parts, modifications and non-Cinematronics game conversion kits may also void FCC compliance.

WHAT YOU WILL FIND IN THIS MANUAL:

This manual contains information on your Cinemat system, including: Illustrated parts lists of system components, cabinet wiring diagrams, main logic board schematics and video monitor data.

WHAT YOU WON'T FIND IN THIS MANUAL:

Information regarding a specific game or game conversion, detailed instructions for the book-keeping and diagnostic functions and other game specific material. This information will be found in the appropriate Cinemat Game Manual.

TABLE OF CONTENTS

1	SET-UP PROCEDURE	
	A. Shipping Bolt Removal.....	8
	B. Game Inspection.....	9
	C. Game Module Installation.....	9
	D. AC Power Requirements.....	9
2	MAINTENANCE AND SERVICE	
	A. Warranty.....	12
	B. Fuse Replacement.....	13
	C. Service Assistance.....	14
3	ILLUSTRATED PARTS LISTS	
	A. Cinemat Cabinet (Front View).....	16
	B. Cinemat Cabinet (Rear View).....	17
	C. Control Button Detail.....	18
	D. Main Logic Board.....	19
4	TECHNICAL INFORMATION	
	A. Overall Harness Wiring Diagram.....	24
	B. Power Harness Wiring Diagram Detail.....	25
	C. Video, Speaker, Coin/Service Wiring Detail...	26
	D. Main Logic Board Schematics.....	27
	E. Power Supply Schematics.....	45
	F. Conversion Kit Technical Information.....	46
	G. Video Monitor.....	51

blank

SET-UP PROCEDURE

A. SHIPPING BOLT REMOVAL

The component drawer of your Cinemat system is secured during shipment by means of a bolt located at the rear of the component drawer. (See Figure 1)

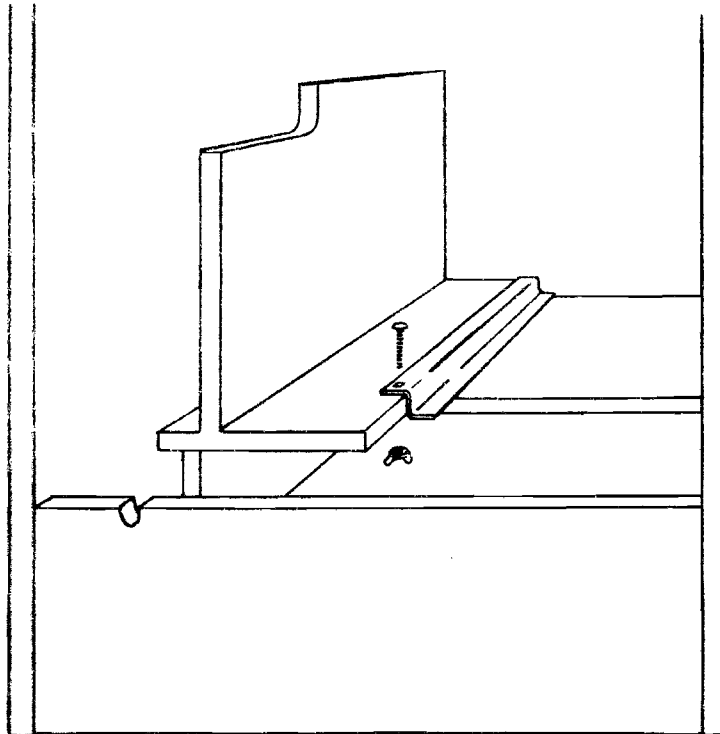


FIGURE 1

B. GAME INSPECTION

1. Examine the exterior of the game cabinet for dents, chips or broken parts.
2. Inspect the interior of the cabinet as follows:
 - a) Check that all plug in connectors are firmly seated. Re-plug any connectors found unplugged.
 - b) Check that all socketed components on the main logic board are firmly seated in their sockets.
3. Note the location of the serial number located on a tag affixed to the back of the cabinet and the main logic board serial number located near the lower right-hand corner of the board. Please make note of these numbers in the front of this manual for easy reference and mention them whenever you call your distributor or Cinematronics for service.

C. GAME MODULE INSTALLATION

Your Cinemat system may come to you with no game installed. A Cinemat game conversion consists of a game module (ROMs and custom chips) and a game enhancement module (control panel and add-on boards). All conversions require a game module, however adding an enhancement module may not necessary when converting to another game with similar control configuration. Instructions for installing game and enhancement modules can be found in the specific game manual for that particular game.

D. AC POWER REQUIREMENTS

Connect this system only to a grounded three wire outlet providing 108-132 volts A.C. If you have only a two wire outlet we recommend you hire a licensed electrician to install a grounded outlet. The possibility exists that players may receive an electric shock if this system is not properly grounded.

blank

MAINTENANCE AND SERVICE

A. WARRANTY

Cinematronics warrants that whenever the video display (television monitor) and/or the power supply and/or the printed circuit boards and/or all parts contained therein are furnished with its product, that such part or parts will be free from defects in materials and workmanship for a period of ninety (90) days from date of shipment. Cinematronics' warranty of above parts is subject to the normal use and service of its products. No other products or parts are warranted except those herein stated.

If Cinematronics' warranted parts fail to perform as stated in this Warranty, then Cinematronics' sole liability shall be, at its option, to replace or repair such products which are returned to Cinematronics during the herein stated warranty period, provided:

A. Cinematronics is notified immediately in writing at the time the parts are determined to be defective.

B. That the defective parts are returned pre-paid to Cinematronics' plant accompanied by an authorized RMA number.

C. That Cinematronics' examination of returned products determines to Cinematronics' satisfaction that the alleged defects existed and were not caused by improper repair, installation, improper testing or by accident.

NOTE: Cinematronics is not responsible for bent pins on integrated circuits NOT installed by Cinematronics' employees.

In no event shall Cinematronics be liable for loss of profits, loss of use, or incidental or consequential damages.

EXCEPT FOR THIS EXPRESS WARRANTY, CINEMATRONICS DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON CINEMATRONICS' BEHALF, AND IT NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR CINEMATRONICS ANY OTHER LIABILITIES IN CONNECTION WITH THE SALE OF PRODUCTS MANUFACTURED BY CINEMATRONICS.

B. FUSE REPLACEMENT

The Cinemat system contains three fuses located on the power supply assembly. See figure 2A for position and type. Replace these fuses only with the type indicated. Use of fuse types other than those shown will void your warranty and may cause system failure or serious personal injury. For monitor fuse information see the video monitor technical section of this manual.

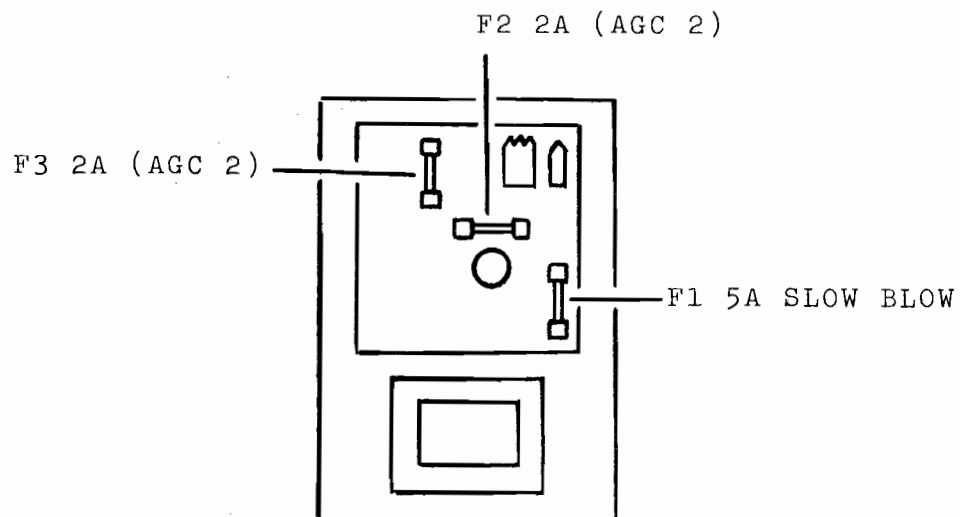


FIGURE 2A

C. SERVICE ASSISTANCE

For parts, service and technical information, first contact your authorized Cinematronics distributor. For additional technical aid contact Cinematronics Customer Service Department at (619) 562-7004 Monday thru Friday from 7:00 A.M. to 6:00 P.M. Pacific Standard time.

To provide you with the quickest possible response to your questions, please have the following information ready when calling the Cinematronics Customer Service Department:

- 1) Your Cinemat system serial and model numbers.
- 2) The game software serial number.
- 3) Any referenced drawings or schematics.

ILLUSTRATED PARTS LISTS

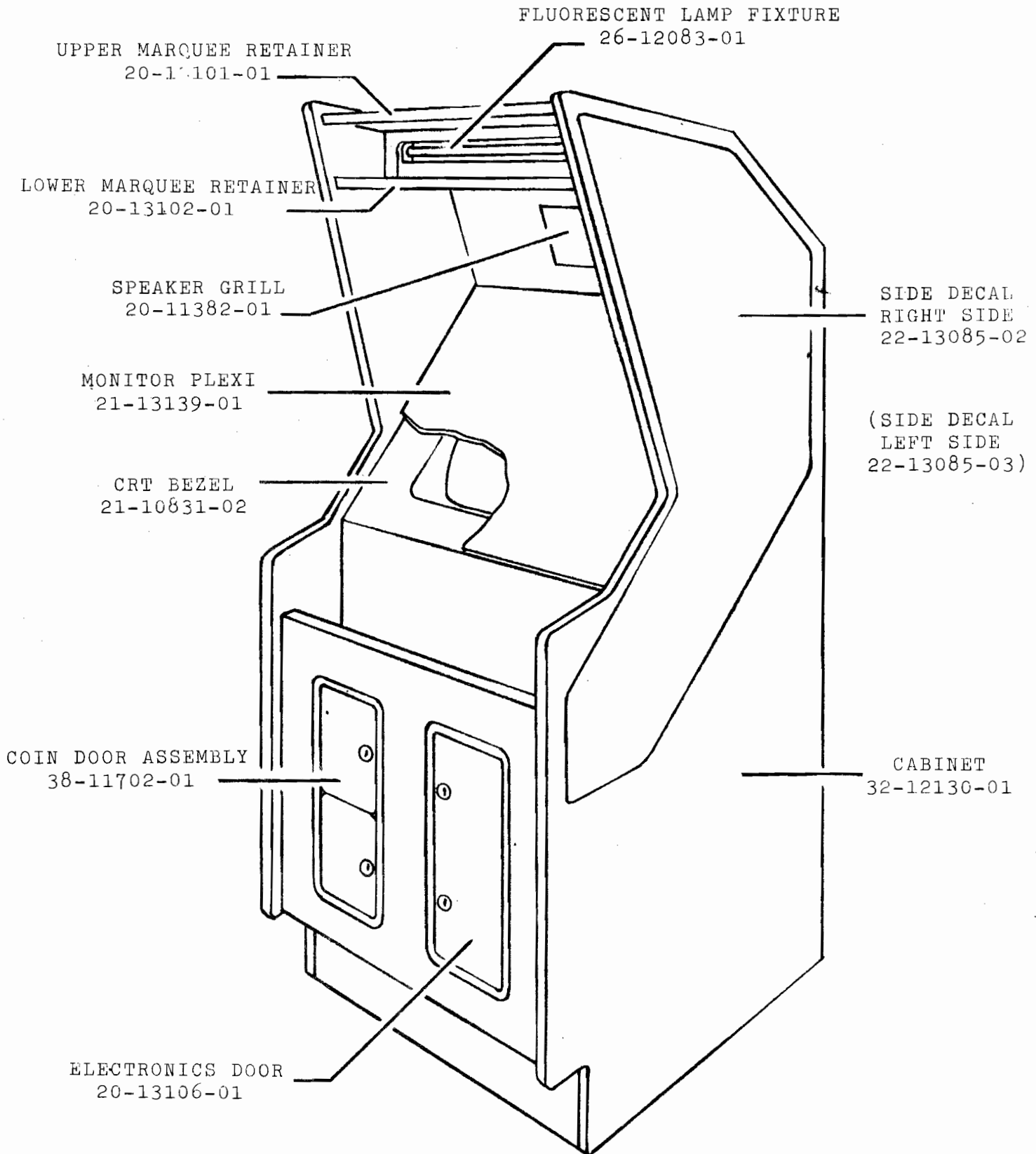


FIGURE 3A: CINEMAT CABINET (FRONT VIEW)

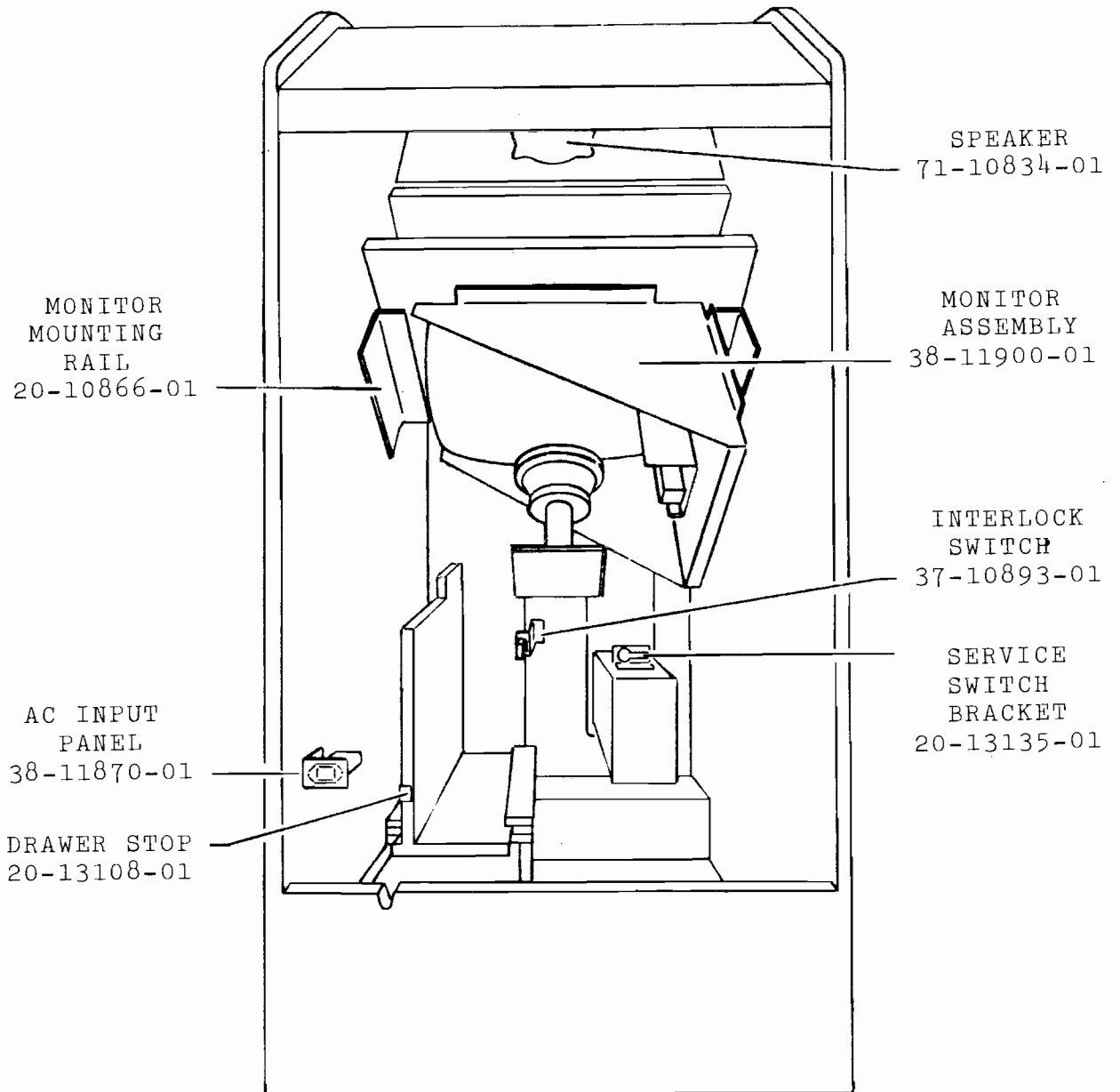


FIGURE 3B: CINEMAT CABINET (REAR VIEW)

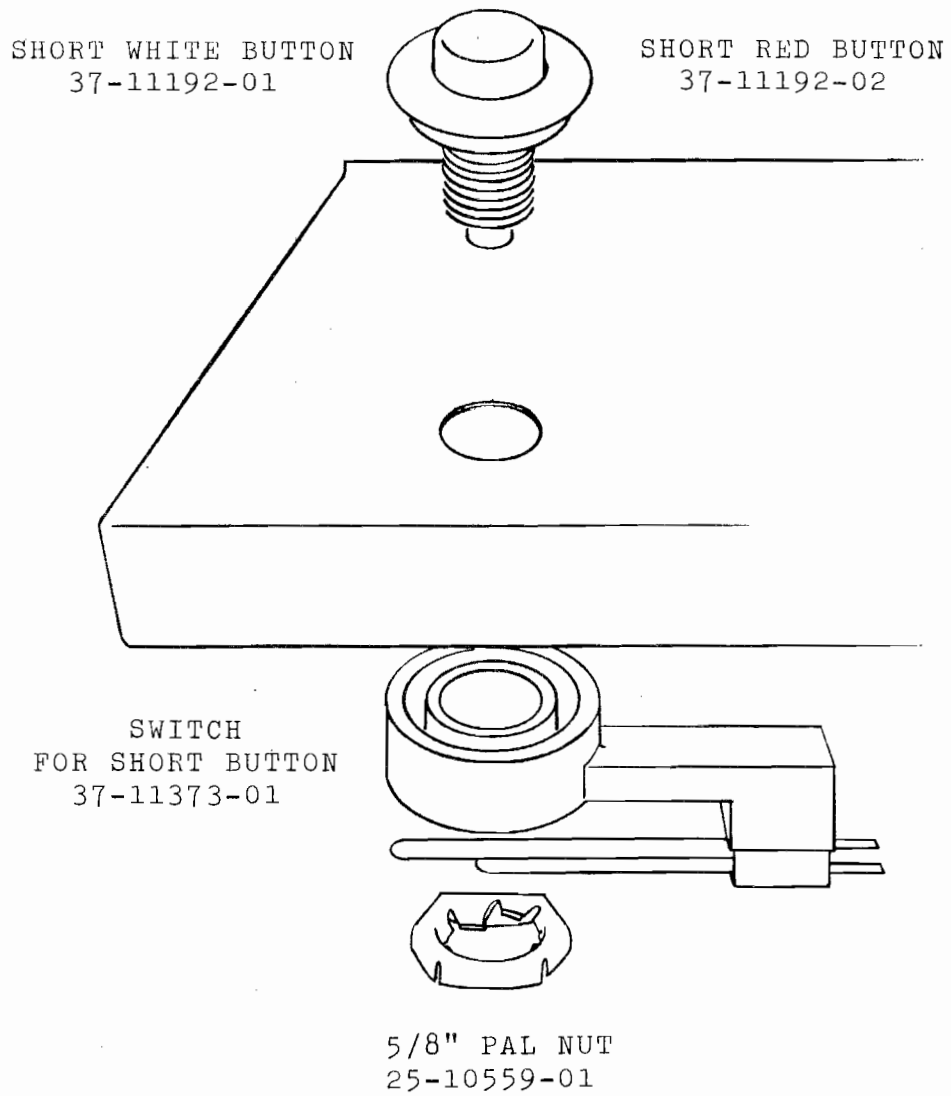


FIGURE 3C: CONTROL BUTTON DETAIL

CINEMAT SYSTEM MAIN LOGIC BOARD PARTS LIST

PART NUMBER	DESCRIPTION	LOCATION	QTY
44-10680-01	IC, 74LS08	U114	1
44-10681-01	IC, 74LS10	U38	1
44-10683-01	IC, 74LS32	U54, U125	2
44-11028-01	IC, 74LS74	U115, 112, 25, 124	4
44-11130-01	IC, 74LS125	U52	1
44-11030-01	IC, 74LS132	U97	1
44-11029-01	IC, 74LS138	U55	1
44-13077-01	IC, 74F138	U15, 113	2
44-11031-01	IC, 74LS154	U116	1
44-11032-01	IC, 74LS157	U84	1
44-11033-01	IC, 74LS166	U81-83	3
44-11034-01	IC, 74LS173	U30, 75-78	5
44-11484-01	IC, 74LS175	U14, 39, 59, 71	4
44-11486-01	IC, 74LS244	U13, 29, 66, 111	4
44-11487-01	IC, 74LS245	U2, 65, 100	3
44-11490-01	IC, 74LS257	U31, 44, 117-119	5
44-11810-01	IC, 74LS283	U72-74	3
44-11492-01	IC, 74LS374	U18, 20, 37, 57, 58, 61-64, 79, 88, 121	12
44-10697-01	IC, 74LS393	U30	1
44-10698-01	IC, 74LS461	U22, 23, 45, 56, 60	5
44-10670-01	IC, 74S02	U41	1
44-10700-01	IC, 74S04	U12, 110	2
44-10774-01	IC, 74S74	U28, 53	2
44-11895-01	IC, 7405	U24	1
44-11834-01	IC, Z80B(6MHZ)	U1, 99	2
44-11835-01	IC, CUSTOM.	U120	1
44-12053-01	IC, AY-3-8910	U86	1
44-11890-01	IC, 4016(200NS)	U10, 11, 108, 109	4
44-11915-01	IC, TDA 2002	U122	1
44-11916-01	REG, LM324N	U98	1
44-12080-01	REG, LM7815	U123	1
44-11896-01	RAM, (TMS4416-15)	U33-36, 46-49	8
44-11533-01	RAM, STATIC (2148-55)	U50, 51	2
44-12101-01	RGS-01 CUSTOM.	U96	1
44-12102-01	RGS-02 CUSTOM.	U85	1
44-12103-01	RGS-03 CUSTOM.	U16	1
44-12104-01	RGS-04 CUSTOM.	U17	1
44-12201-01	RGS-08 CUSTOM.	U42	1
44-12301-01	RGS-07 CUSTOM.	U43	1
44-12302-01	RGS-09 CUSTOM.	U40	1
44-12303-01	RGS-10 CUSTOM.	U26	1
44-12304-01	RGS-11 CUSTOM.	U27	1
44-12304-01	RGS-05 CUSTOM.	U21	1
44-12401-01	RGS-06 CUSTOM.	U19	1
65-10993-01	DIODE, 1N914	CR1, CR2	2
66-10816-01	TRANSISTOR, NPN 2N3904	Q1	1
66-10817-01	TRANSISTER, NPN 2N3906	Q2	1
69-12070-01	CRYSTAL, 12 MHZ	Y2	1
69-12063-01	CRYSTAL, 14.31818MHZ	Y1	1

CINEMAT SYSTEM MAIN LOGIC BOARD PARTS LIST (CONTINUED)

PART NUMBER	DESCRIPTION	LOCATION	QTY
53-11306-01	RES. 1.2K OHM 1/4W 5% C.	R61	1
53-10735-01	RES. 1.5K OHM 1/4W 5% C.	R19, 33	2
53-10734-01	RES. 1K OHM 1/4W 5% C.	R4, 5, 7, 14, 46, 50	6
53-10740-01	RES. 3K OHM 1/4W 5% C.	R24, 34	2
53-12118-01	RES. 6.2K OHM 1/4W 5%	R23, 27	2
53-11369-01	RES. 12K OHM 1/4W 5%	R18, 31, 45, 51	4
53-10751-01	RES. 24K OHM 1/4W 5% C.	R17, 25, 30, 35, 44, 49	6
53-10982-01	RES. 100K OHM 1/4W 5% C.	R37-43, 47, 48	9
53-12120-01	RES. 180 OHM 1/4W 5%	R22, 28	2
53-11684-01	RES. 220 OHM 1/4W 5%	R6, 10, 12, 52, R60	5
53-10731-01	RES. 330 OHM 1/4W 5% C.	R1-3, 53-55	6
53-10914-01	RES. 390 OHM 1/4W 5% C.	R21, 29	2
53-10732-01	RES. 470 OHM 1/4W 5% C.	R8, 9, 11, 13, 15, 16, 26, 36	8
53-11130-01	RES. 750 OHM 1/4W 5% C.	R20, 32	2
53-13101-01	RES. 22 OHM 1/4W 5% C.	R59	
53-12117-01	RES. 2.2K OHM 1/2W 5%	R56, 58	2
53-12137-01	RES. 200 OHM 1/2W 5%	R57	1
53-12220-01	RES. SIP PACK, 4.7K OHM	RP3-5	3
53-13111-01	RES. DIP PACK, 8X100 OHM	RP6, 7, 8	3
53-12221-01	RES. DIP PACK, 33 OHM	RP1	1
53-12223-01	RES. SIP PACK, 330 OHM	RP2	1
51-12222-01	POT. 5K OHM	VRO1	1
63-11785-01	CAP. .01mf MONO 50V	C89-109	21
63-10785-01	CAP. .1mf MONO 50V	(SEE BOARD LAY-OUT)	66
63-12149-01	CAP. 33pf, NPO CER DISC	C7, 12, 115	3
63-12148-01	CAP. 100pf, NPO CER DISC	C3-5, 110-114	8
63-11035-01	CAP. 680pf 50V CER DISC	C1, 2, 6	3
63-12141-01	CAP. 10mf, 25V ELECT	C10, 14, 20-26, 88	10
63-11042-01	CAP. 470mf, 35V ELECT	C11, 17, 19	3
63-12118-01	CAP. 2200mf, 25V ELECT AX	C8	1
36-10501-01	SOCKET, 8 PIN DIP	U120	1
36-11852-01	SOCKET, 20 PIN DIP	U16, 17, 26, 27, 40, 42, 43, 85, 96	9
36-11902-01	SKT. 24 PIN SKINNY DIP	U19, 21	2
36-10621-01	SOCKET, 24 PIN DIP	U10, 11, 108, 109	4
36-11547-01	SOCKET, 28 PIN DIP	U3-9, 67-70, 87, 89, 90-95, 101, 107	26
36-11784-01	SOCKET, 40 PIN DIP	U1, 86, 99	3
37-11535-01	SWITCH, PUSHBUTTON, RED	SW1	1
41-10649-01	CONN. 10 PIN MOLEX	P1, 3, 4, 5, 6	5
41-10640-01	CONN. 2 PIN MOLEX	P2	1
20-10521-01	HEAT SINK, THERM. 6072B		1
41-11521-01	HEADER, 65805-406	JP1-3	3

blank

TECHNICAL INFORMATION

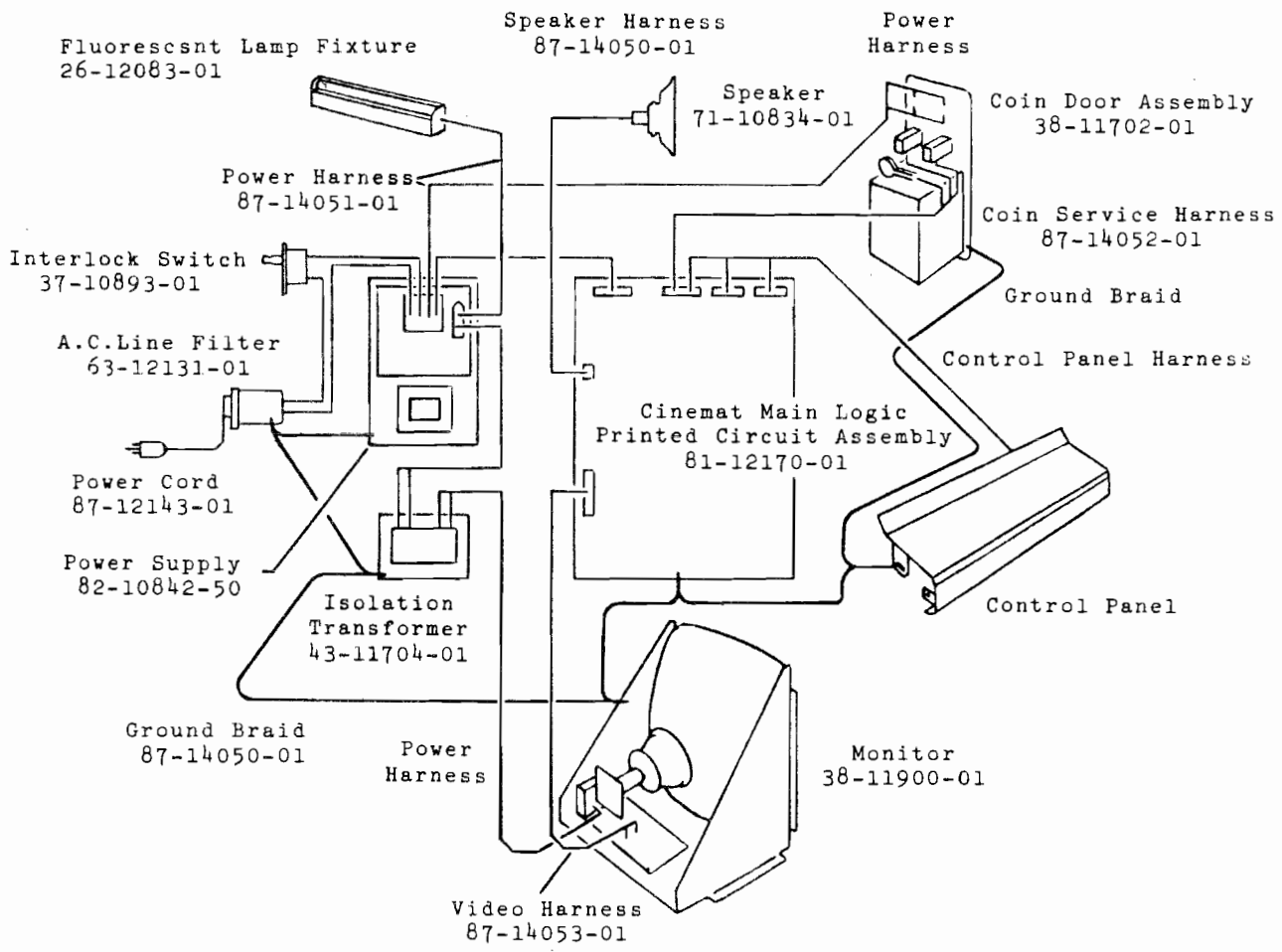
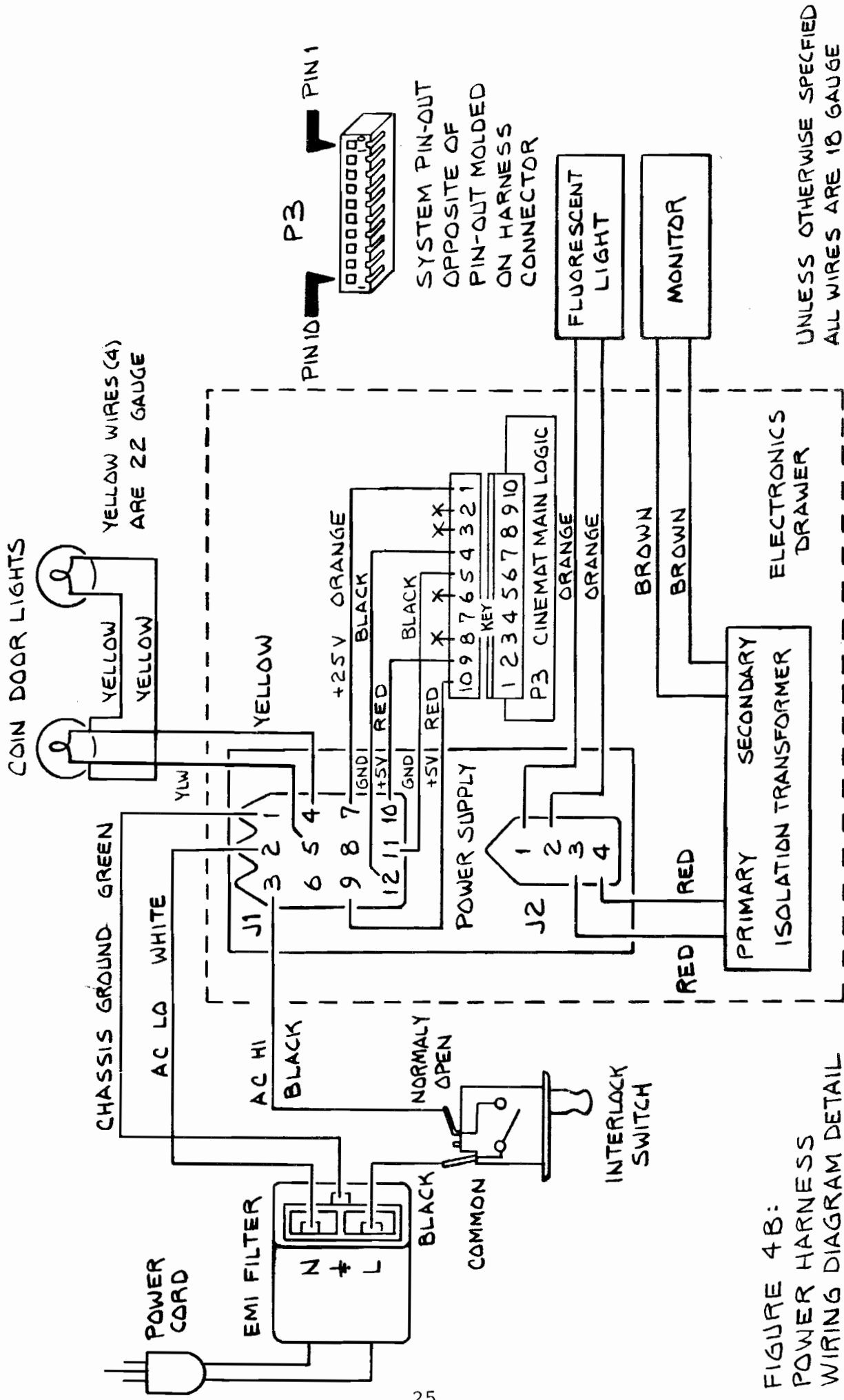


FIGURE 4A: OVERALL HARNESS WIRING DIAGRAM



UNLESS OTHERWISE SPECIFIED
ALL WIRES ARE 18 GAUGE

ELECTRONICS
DRAWER

FIGURE 4B:
POWER HARNESS
WIRING DIAGRAM DETAIL

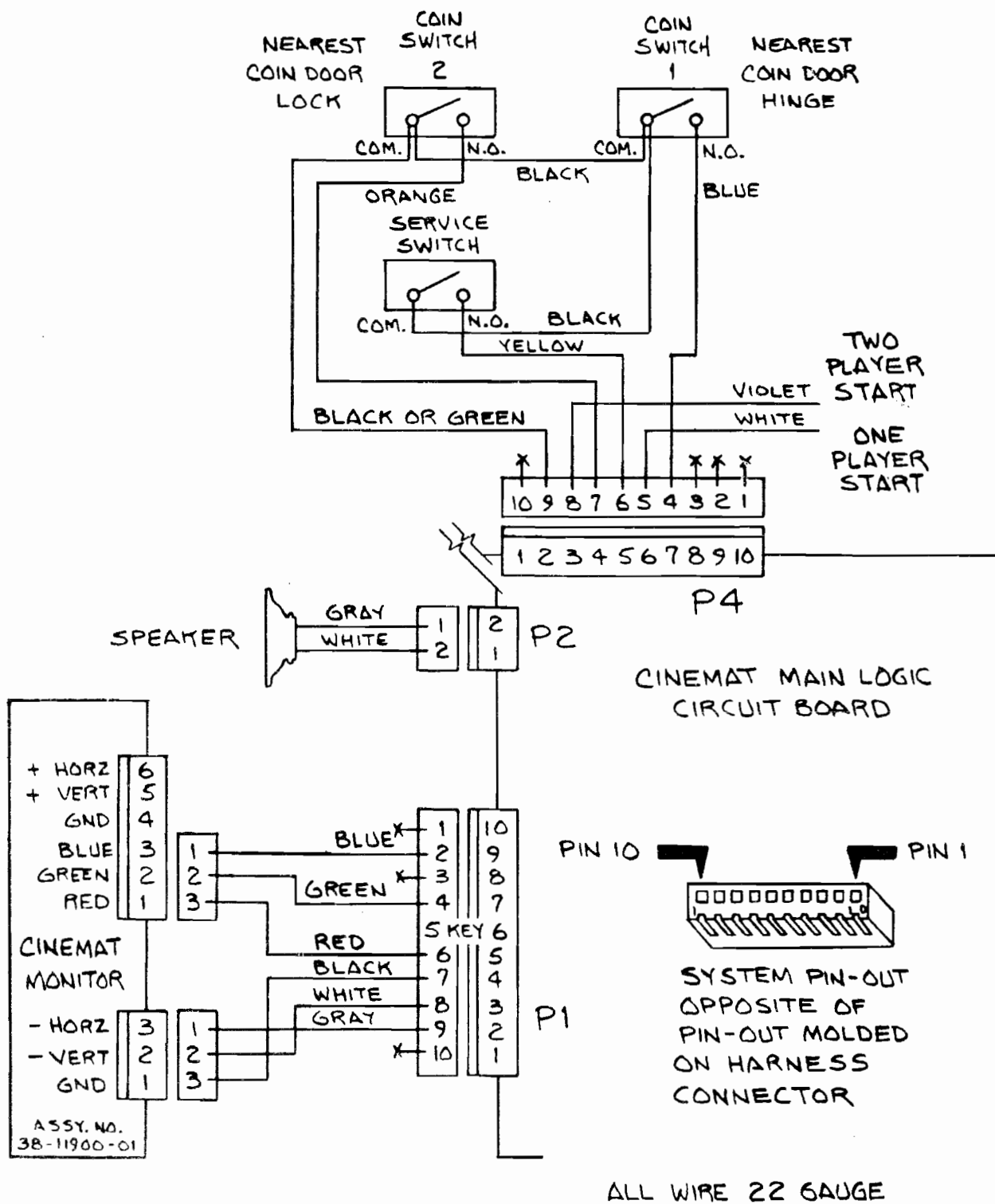
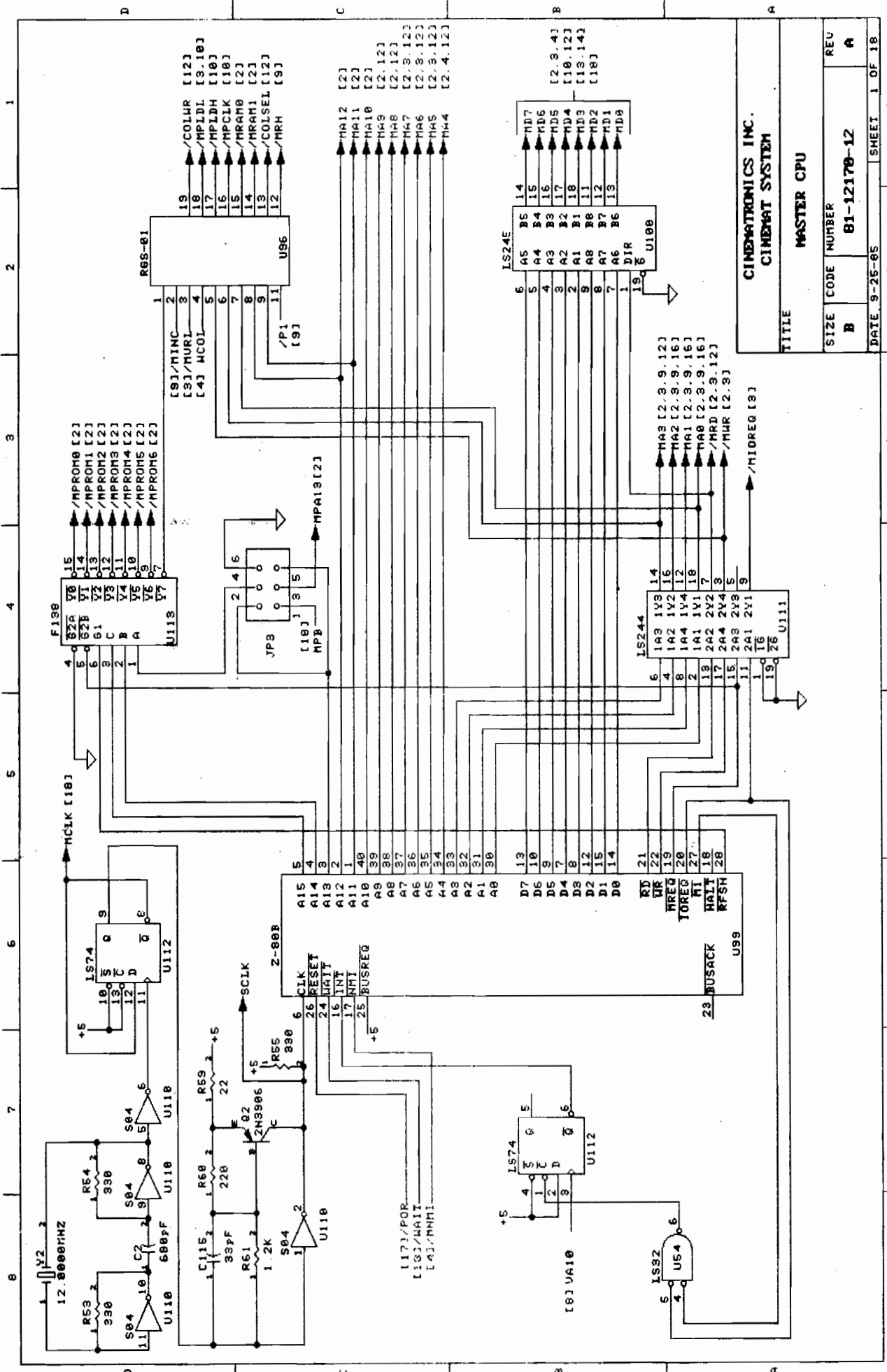
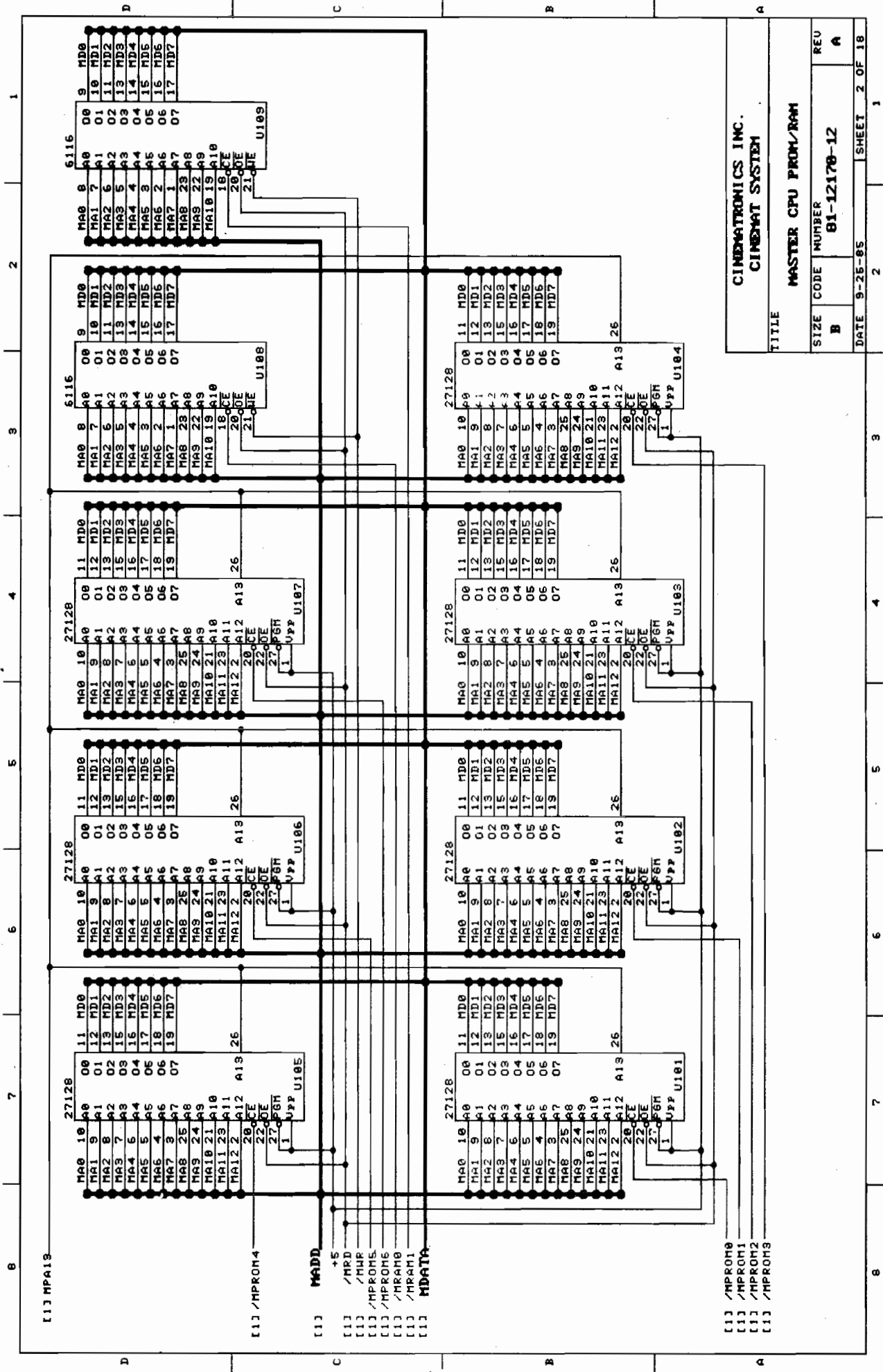


FIGURE 4C:
VIDEO, SPEAKER, COIN SERVICE
WIRING DETAIL

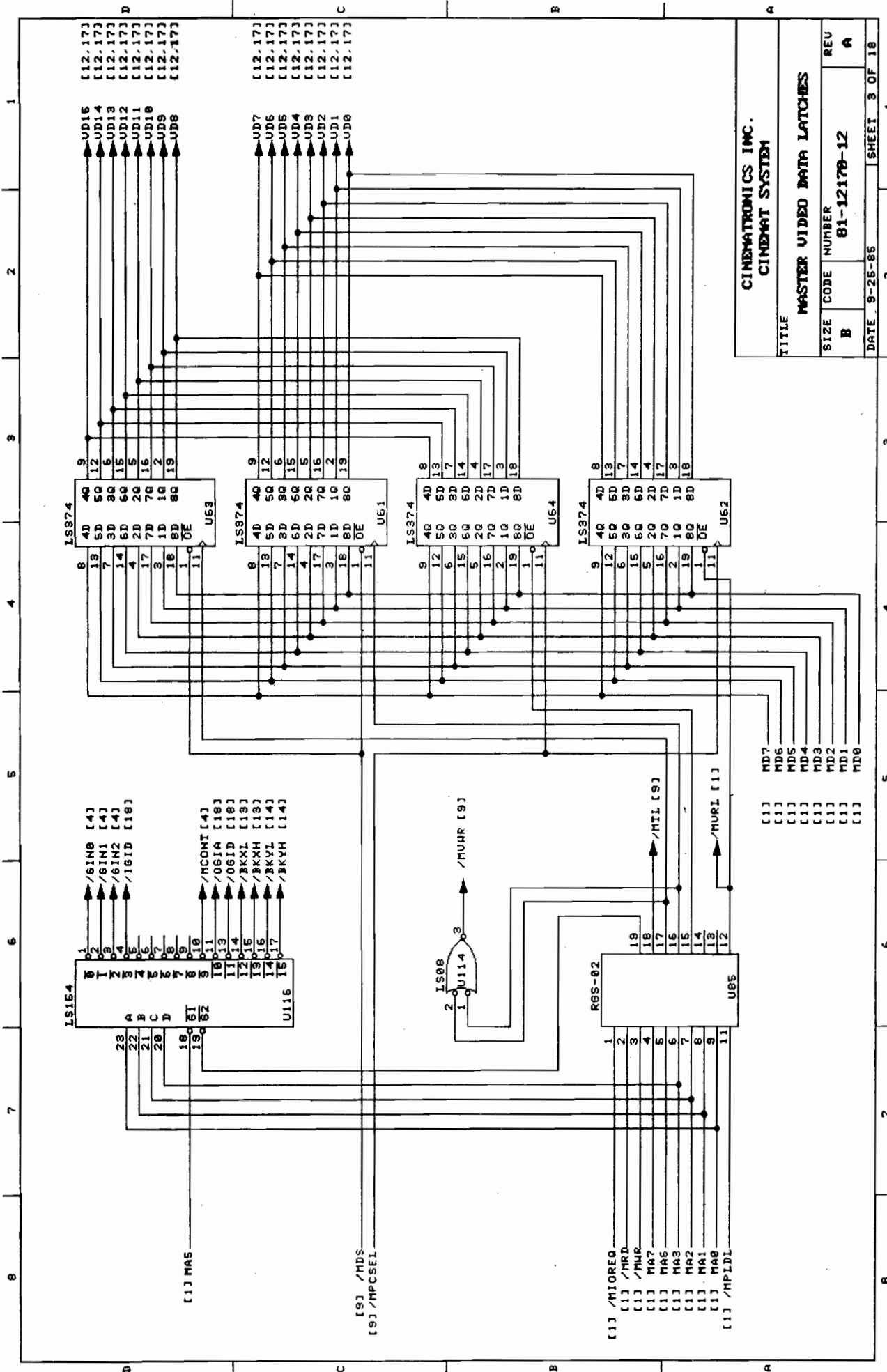


CINEMATRONICS INC.	
CINEMAT SYSTEM	
TITLE	
MASTER CPU	
SIZE	CODE NUMBER
B	81-12178-12
DATE	REV
9-25-85	A
SHEET 1 OF 18	

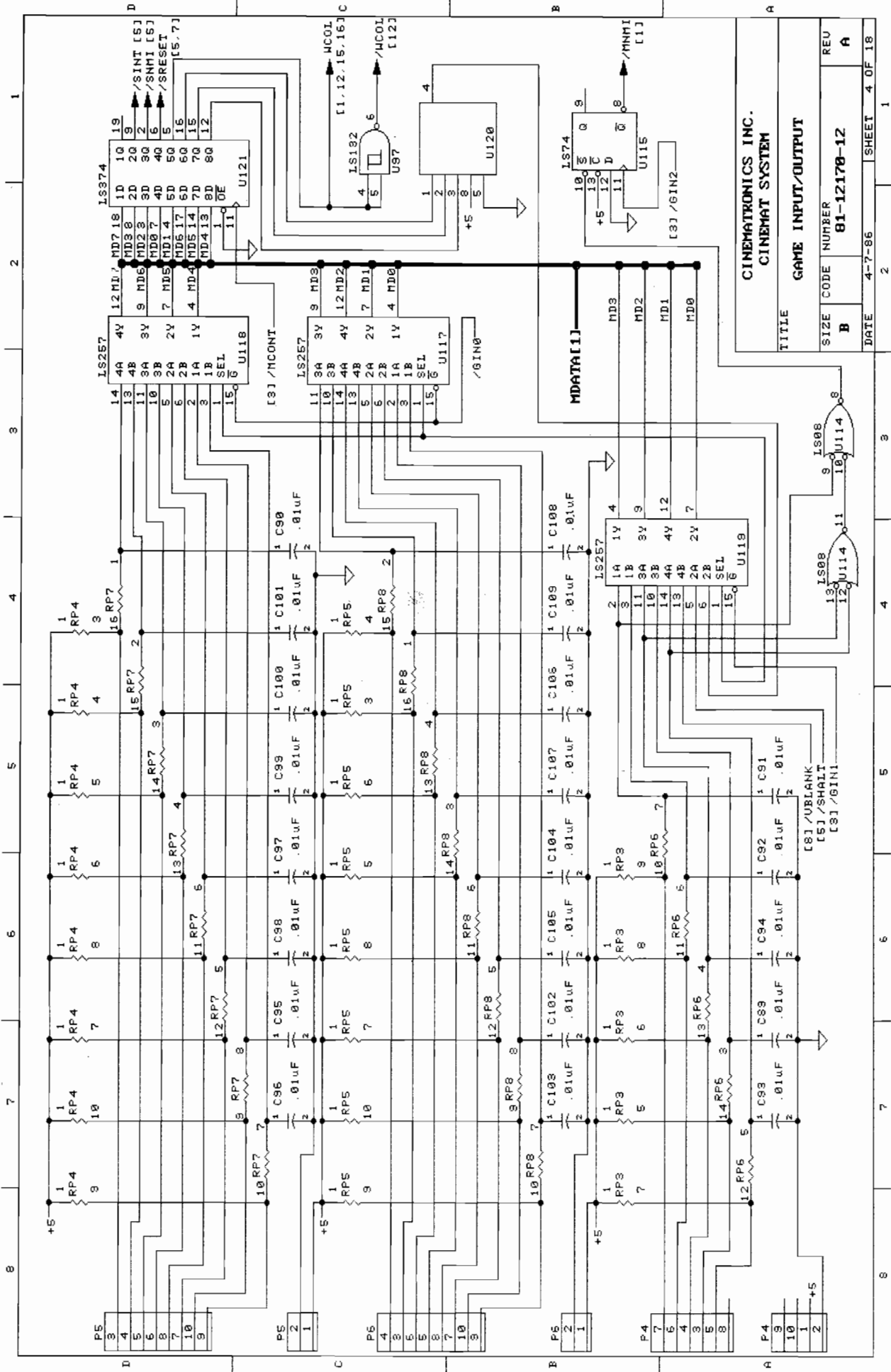


CINEMATRONICS INC.
CINEMAT SYSTEM

TITLE	
MASTER CPU PROM/RAM	REV A
SIZE CODE B	NUMBER 81-12170-12
DATE 9-25-85	SHEET 2 OF 18



CINEMATRONICS INC. CINEMAT SYSTEM	
TITLE MASTER UIDED DATA LATCHES	
SIZE B	CODE NUMBER 81-12170-12
DATE 9-25-85	REV A
SHEET 3 OF 18	



CINEMATRONICS INC.
CINEMAT SYSTEM

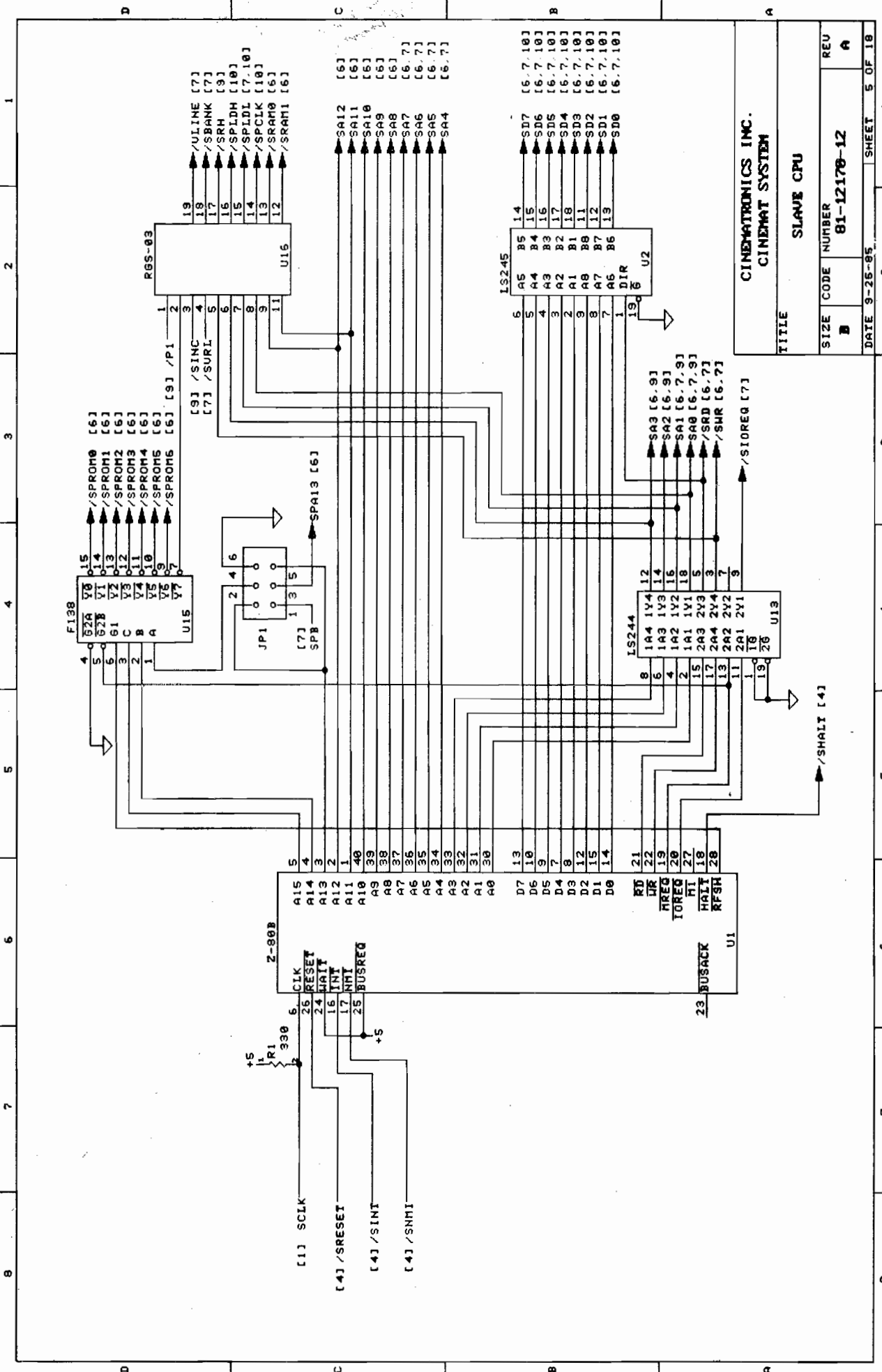
TITLE
GAME INPUT/OUTPUT

SIZE CODE NUMBER
B

REV
A

DATE 4-7-86

SHEET 4 OF 18



CINEMATRONICS INC.
CINEMAT SYSTEM

TITLE
SLAVE CPU

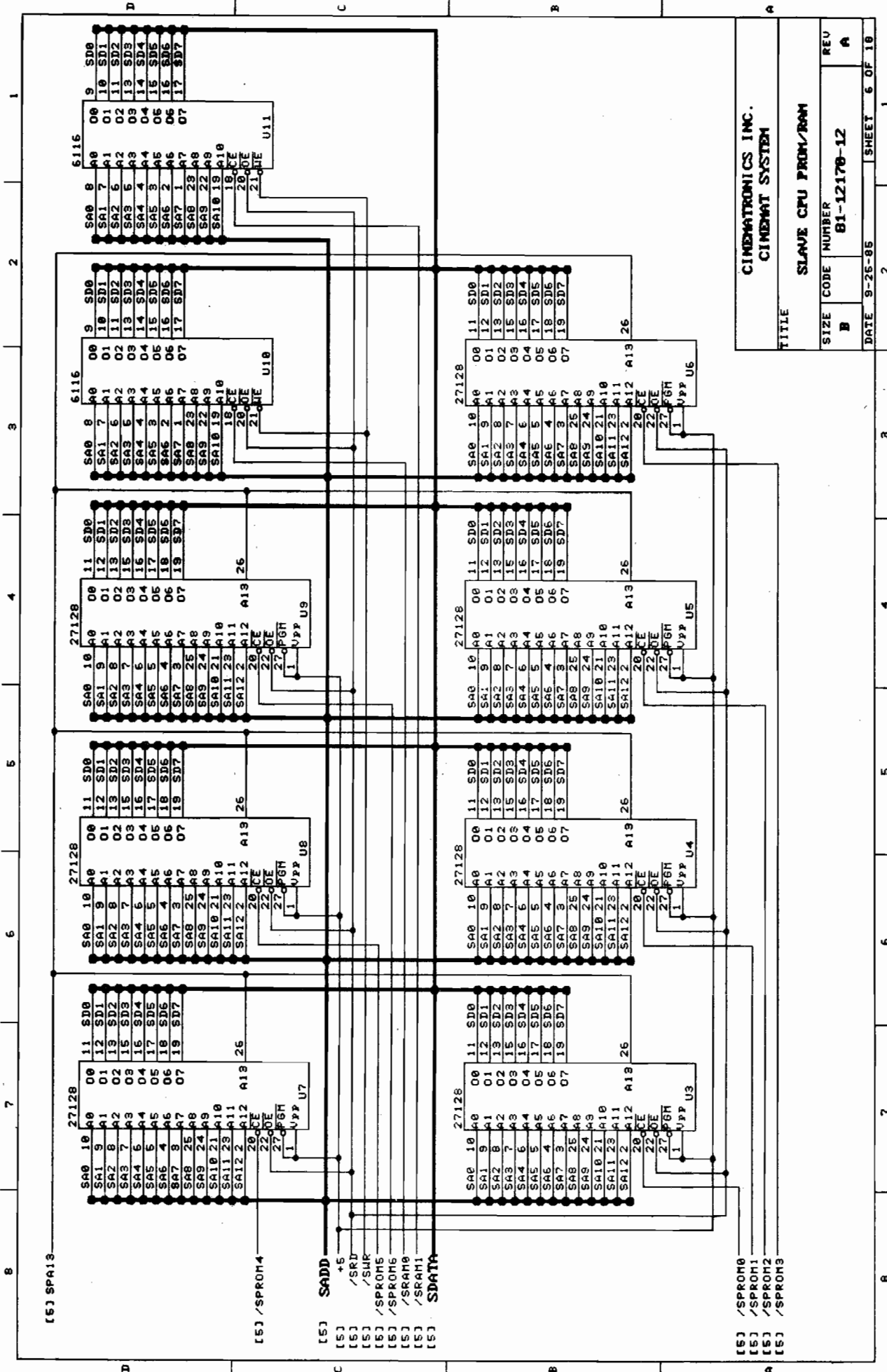
SIZE CODE
B

NUMBER
81-12170-12

REV
A

DATE 9-25-85

SHEET 5 OF 18



[5] SPRA13

[5] /SPROM4

[5] /SADD

[5] +5

[5] /SRD

[5] /SMR

[5] /SPROME

[5] /SPROMG

[5] /SRAMB

[5] /SRAM1

[5] /SDATA

[5] /SPROM0

[5] /SPROM1

[5] /SPROM2

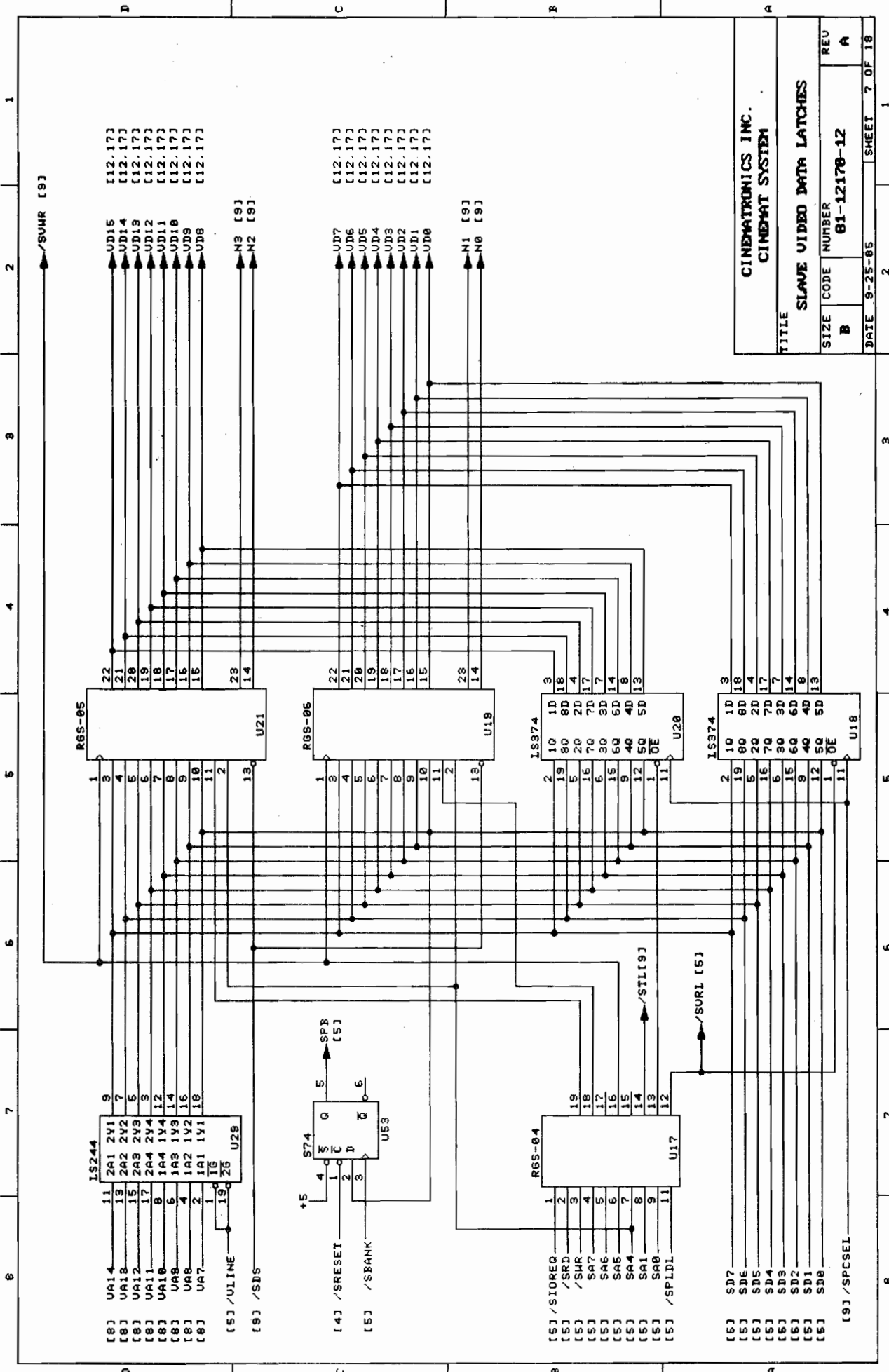
[5] /SPROM3

CINEMATRONICS INC.
CINEMAT SYSTEM

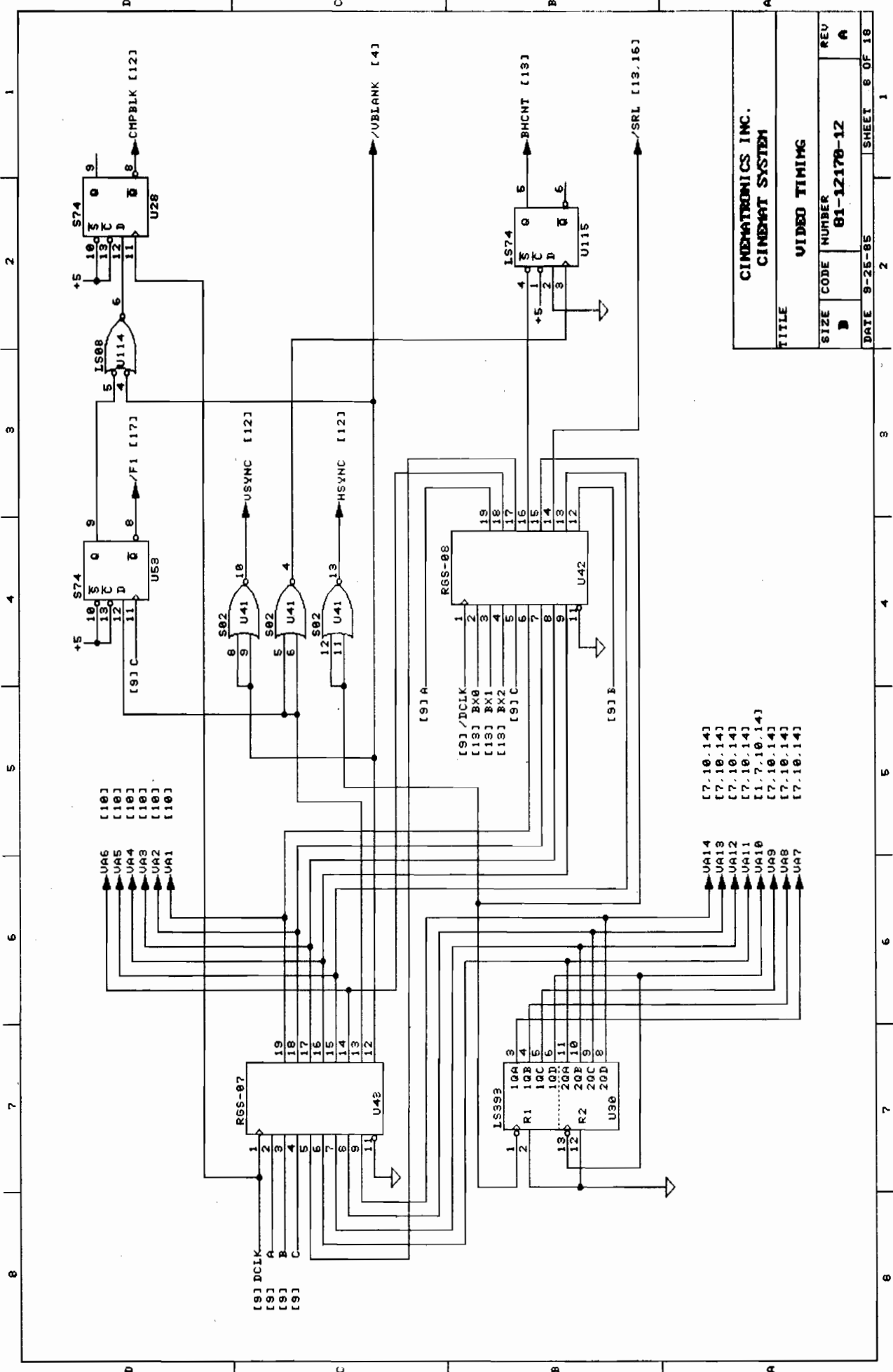
TITLE

SLAVE CPU PROM/RAM

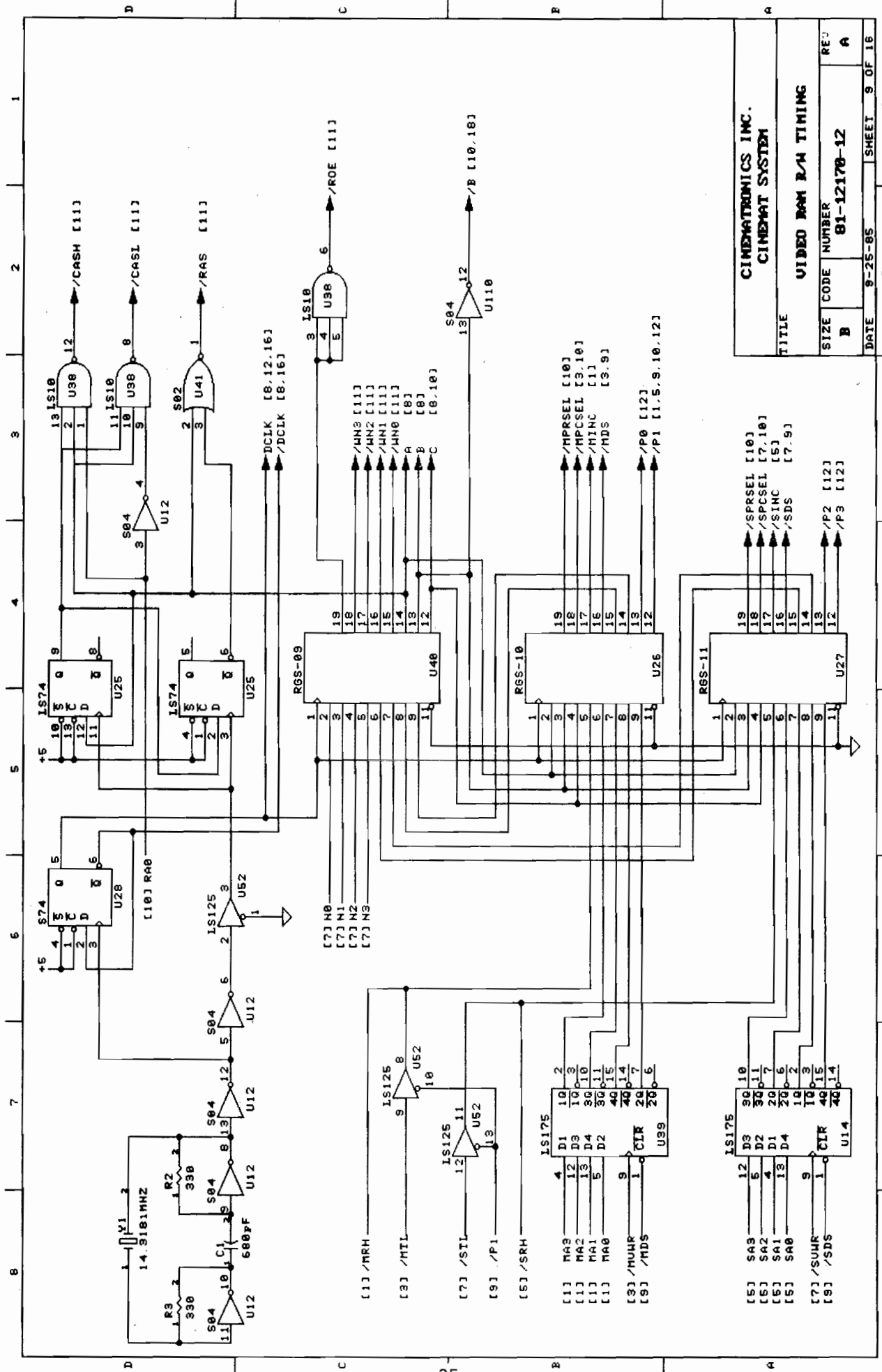
SIZE	REV
B	A
CODE	NUMBER
81-12178-12	
DATE	SHEET
9-26-86	6 OF 18



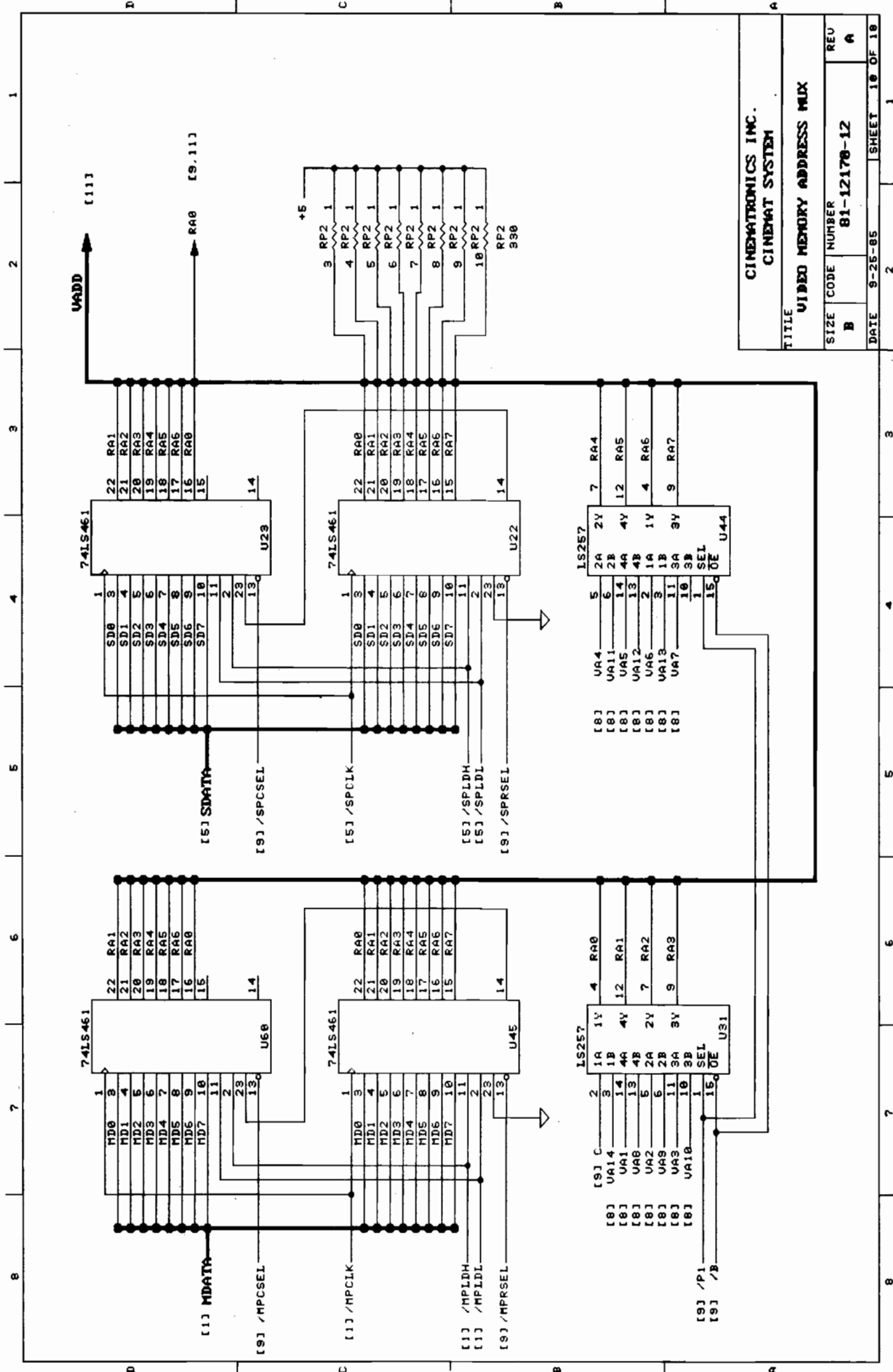
CINEMATRONICS INC. CINEMAT SYSTEM	
TITLE SLAVE VIDEO DATA LATCHES	
SIZE B	CODE NUMBER 61-12170-12
DATE 9-25-85	REV A
SHEET 7 OF 18	



CINEMATRONICS INC. CINEMAT SYSTEM	
TITLE	VIDEO TIMING
SIZE	CODE NUMBER
B	81-12178-12
DATE	REV
9-25-85	A
SHEET 6 OF 18	

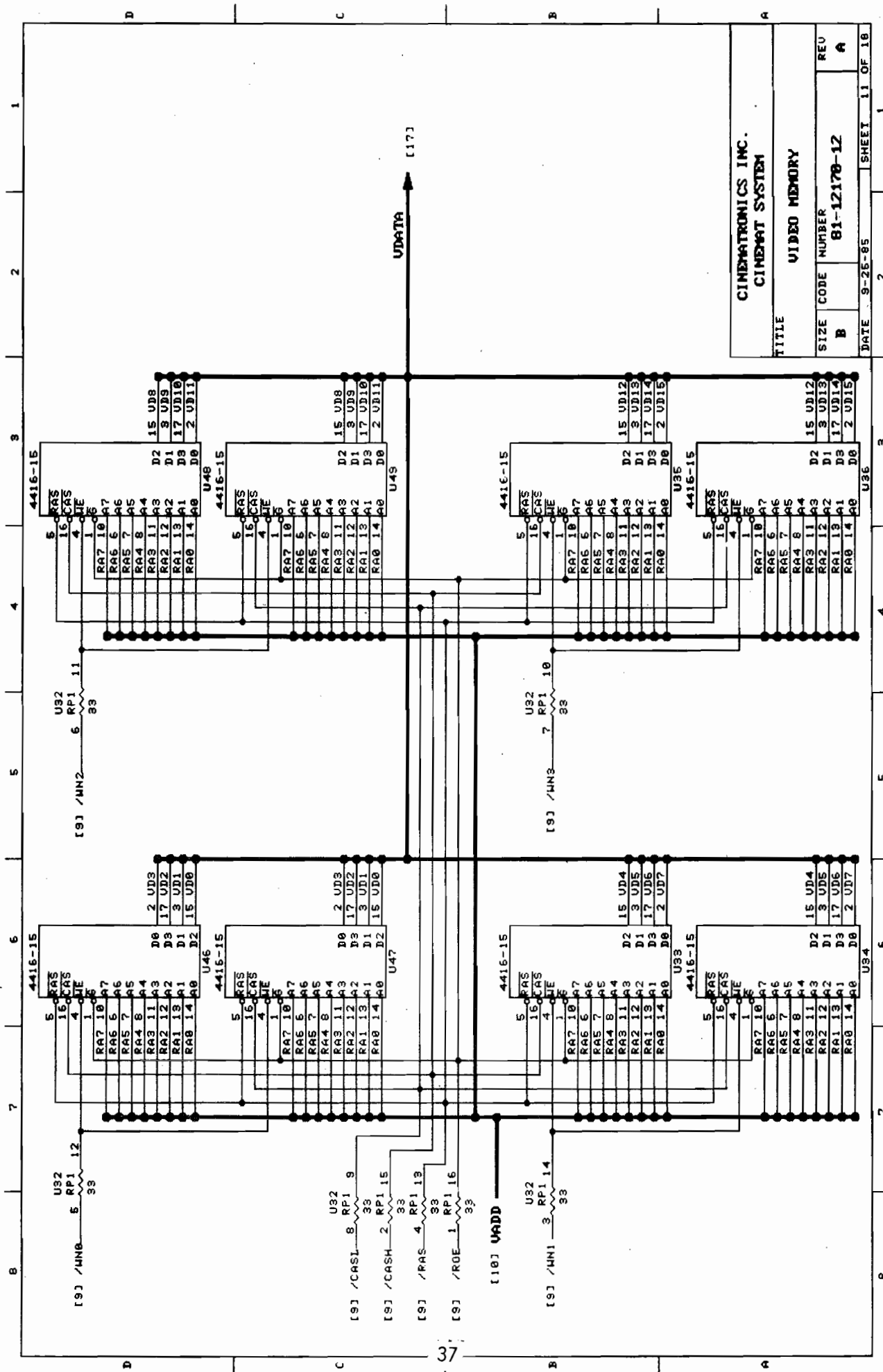


CINEMATRONICS INC.	
CINEMAT SYSTEM	
TITLE	
SIZE	NUMBER
B	81-12178-12
DATE	9-25-85
SHEET	9 OF 16

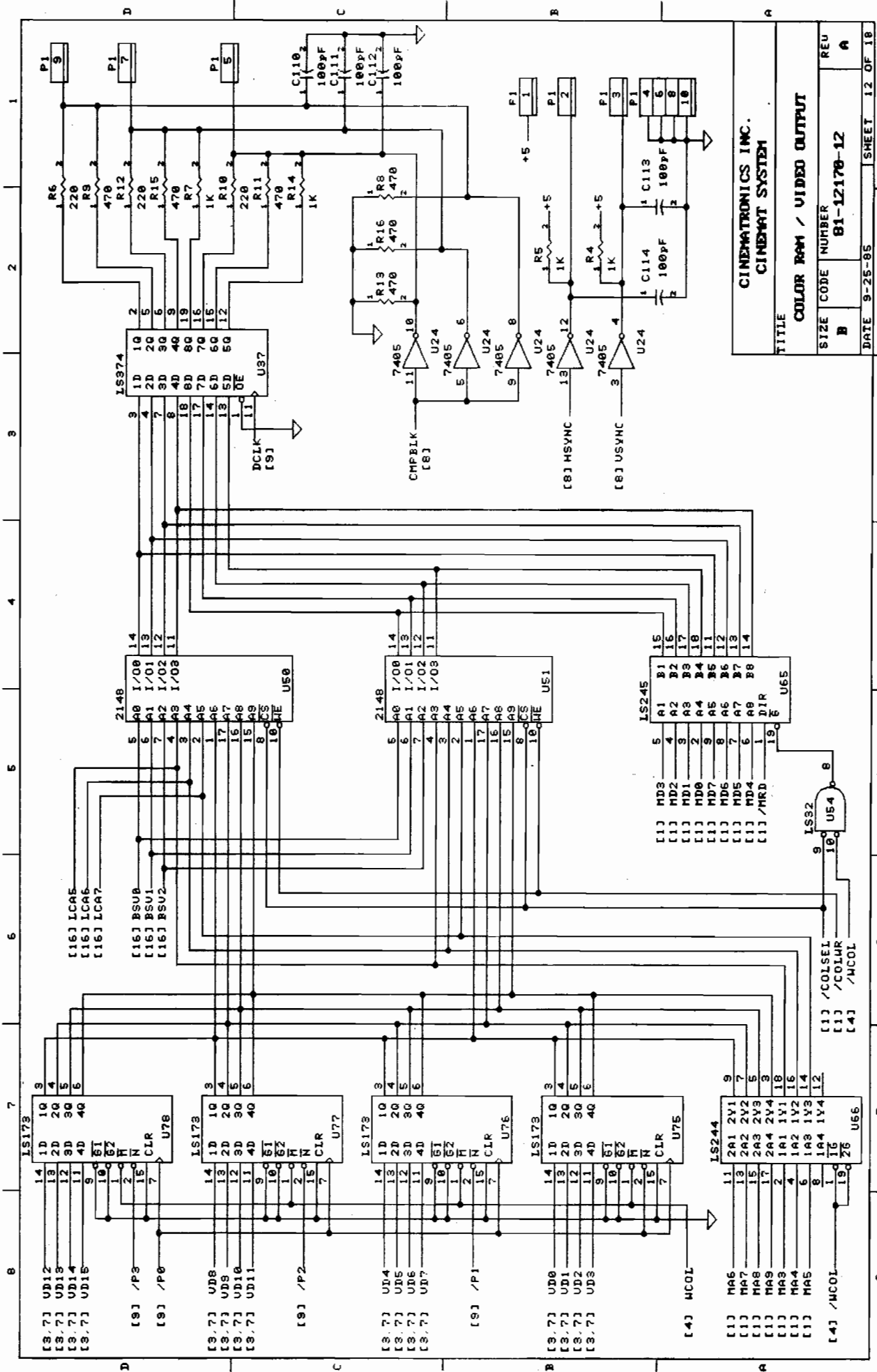


CINEMATRONICS INC.
CINEMAT SYSTEM

TITLE		VIDEO MEMORY ADDRESS MUX	
SIZE	CODE NUMBER	REV	
B	81-12178-12	A	
DATE	9-25-85	SHEET	10 OF 18



CINEMATRONICS INC.	
CINEMAT SYSTEM	
TITLE	
VIDEO MEMORY	
SIZE	B
CODE	
NUMBER	81-12170-12
REV	A
DATE	9-26-85
SHEET	11 OF 18



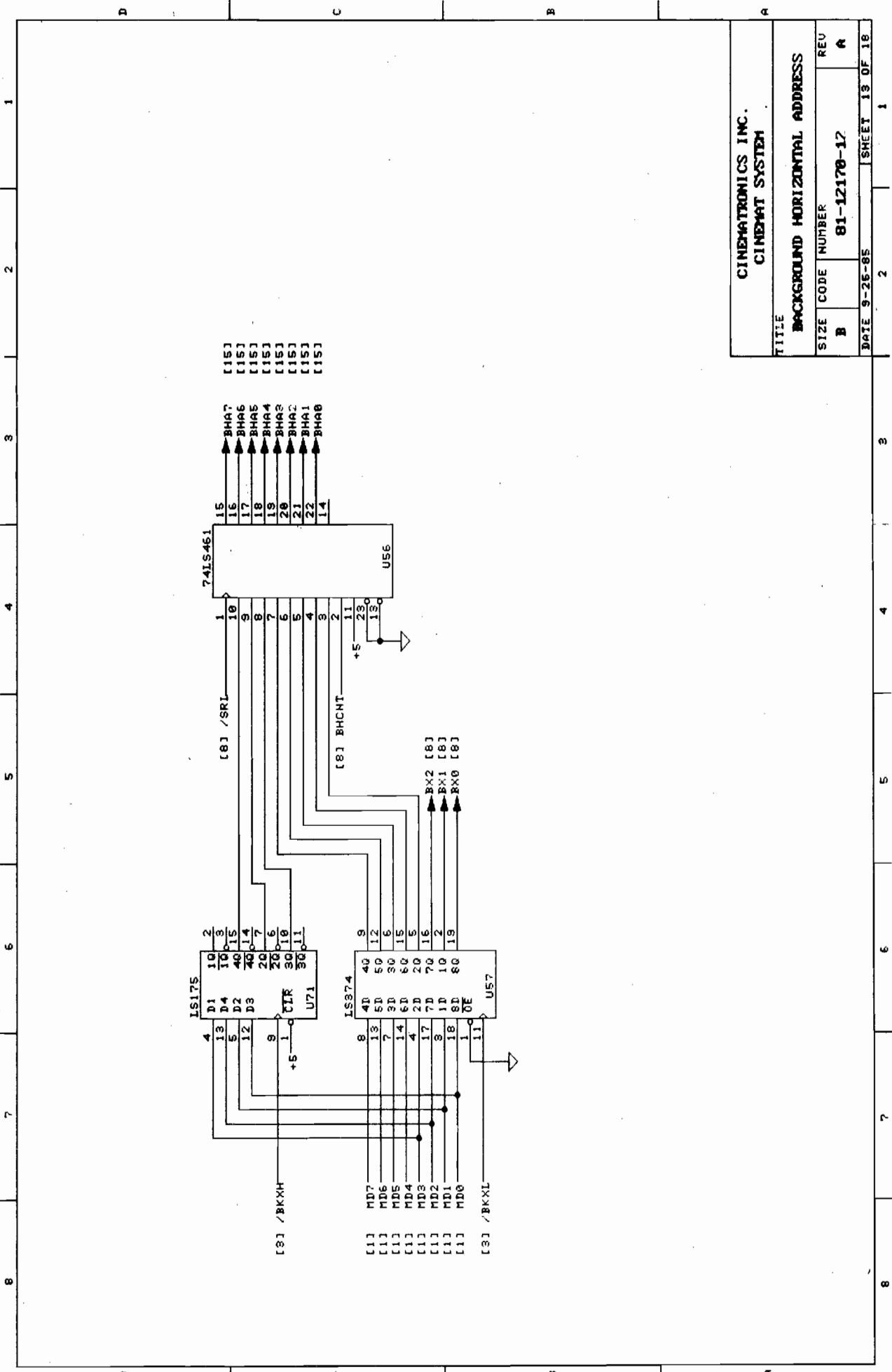
CINEMATRONICS INC.
CINEMAT SYSTEM

TITLE
COLOR RAM / VIDEO OUTPUT

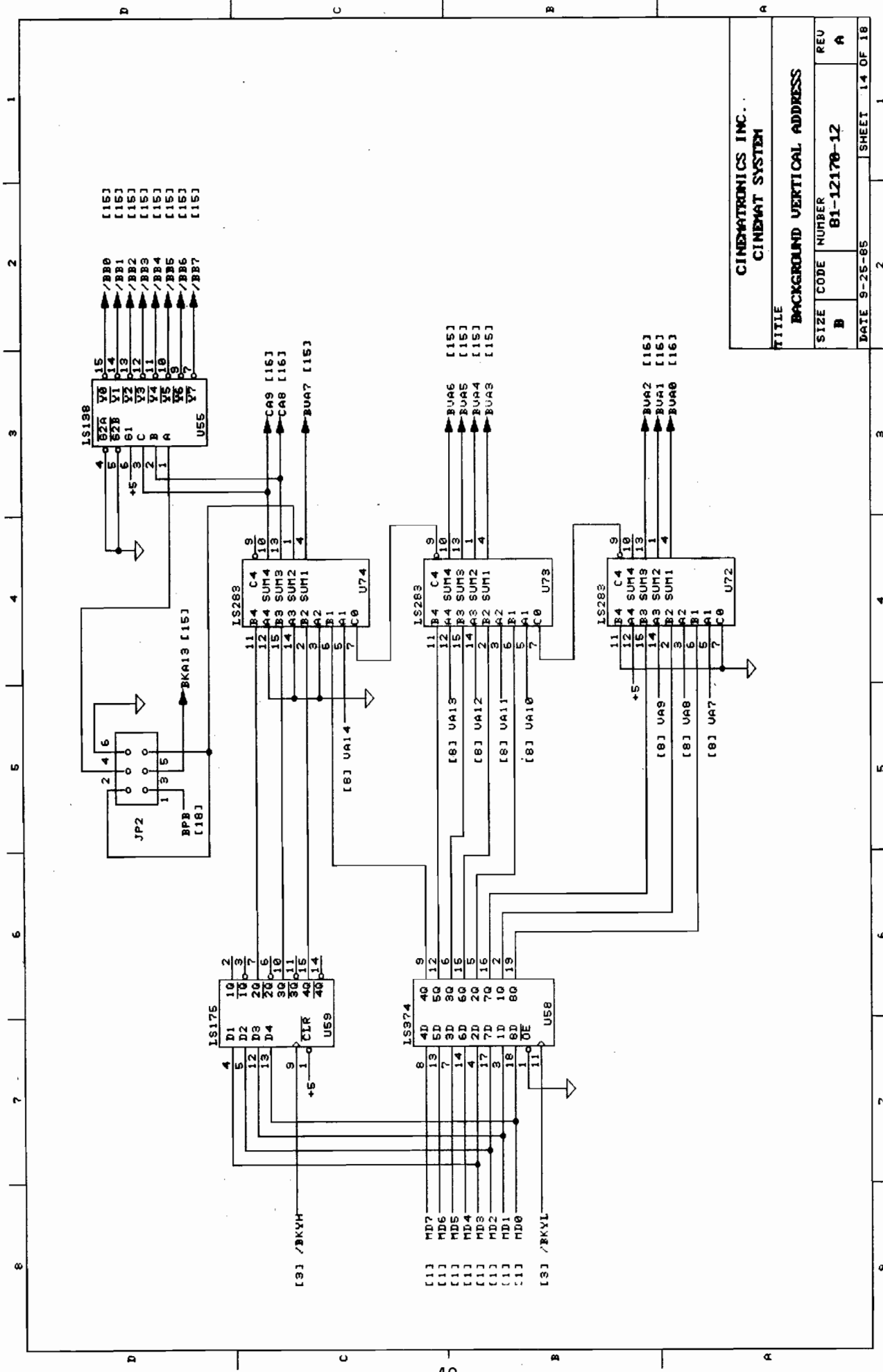
SIZE CODE NUMBER
B B1-12170-12

REU
A

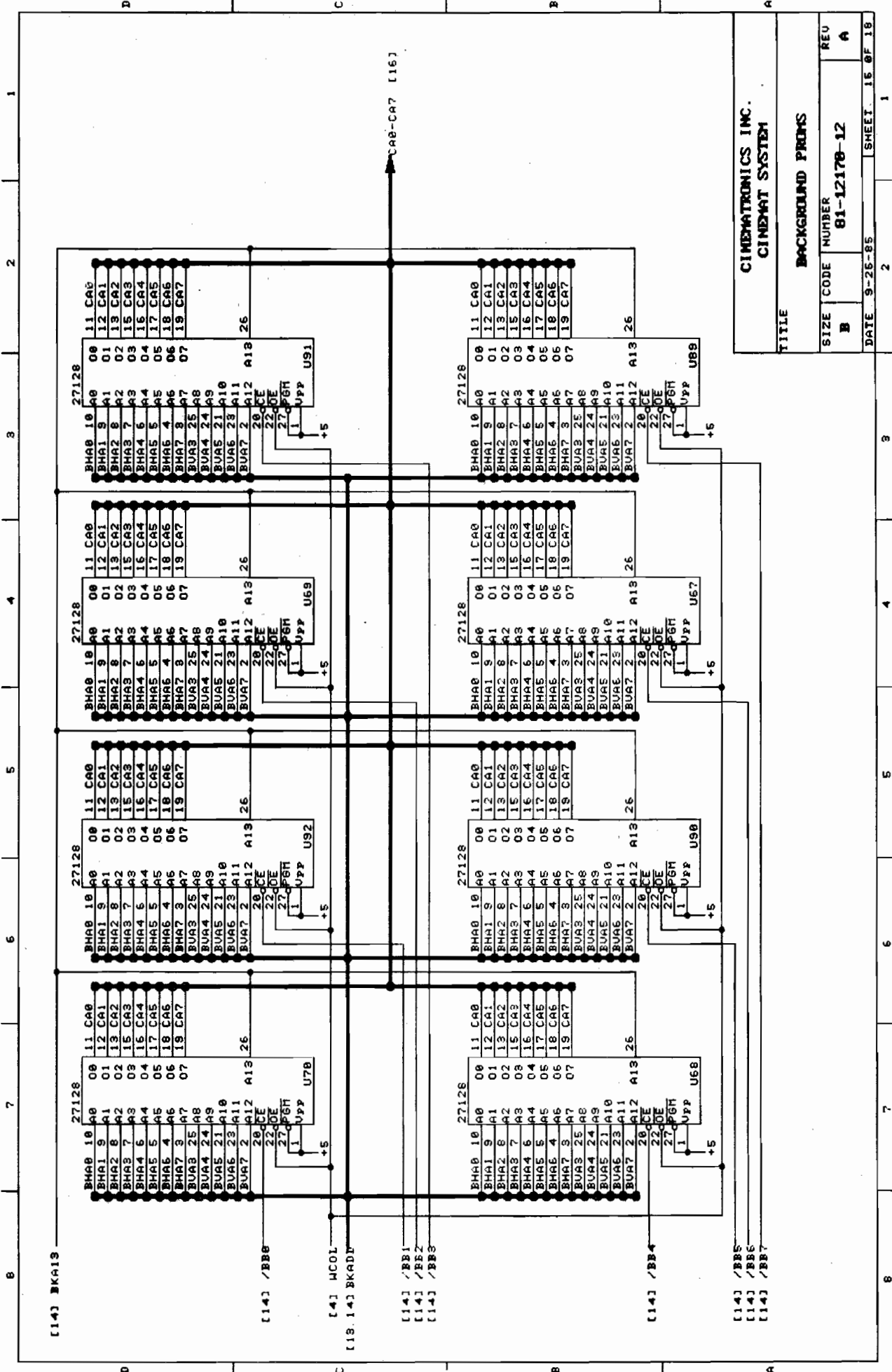
DATE 9-25-85 SHEET 12 OF 18



CINEMATRONICS INC.			
CINEMAT SYSTEM			
TITLE			
BACKGROUND HORIZONTAL ADDRESS			
SIZE	CODE NUMBER	REV	
B	81-12170-17	A	
DATE	9-26-85	SHEET	19 OF 18



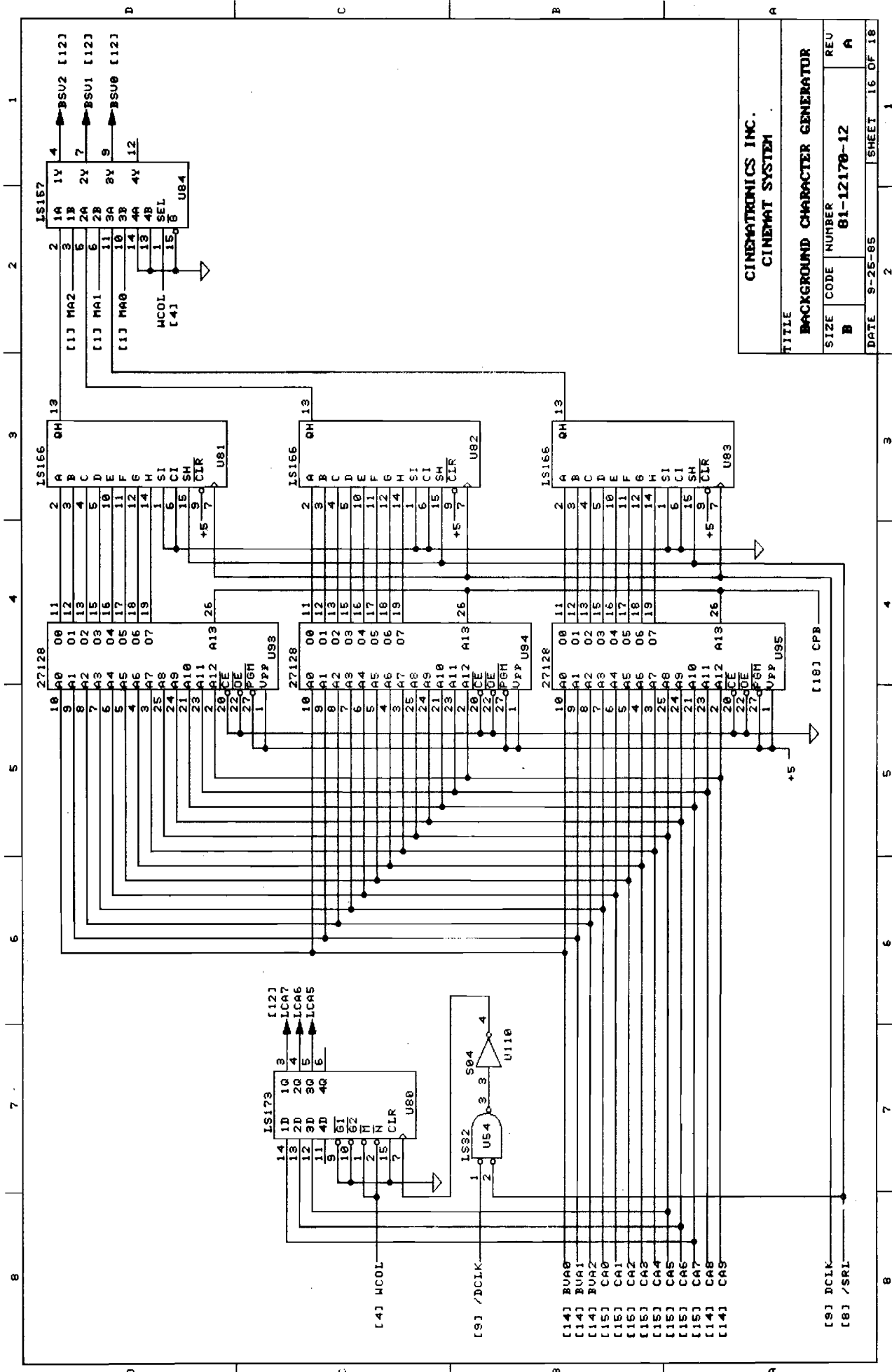
CINEMATRONICS INC.	
CINEMAT SYSTEM	
TITLE BACKGROUND VERTICAL ADDRESS	
SIZE B	CODE NUMBER B1-12170-12
REV A	REU A
DATE 9-25-65	SHEET 14 OF 18



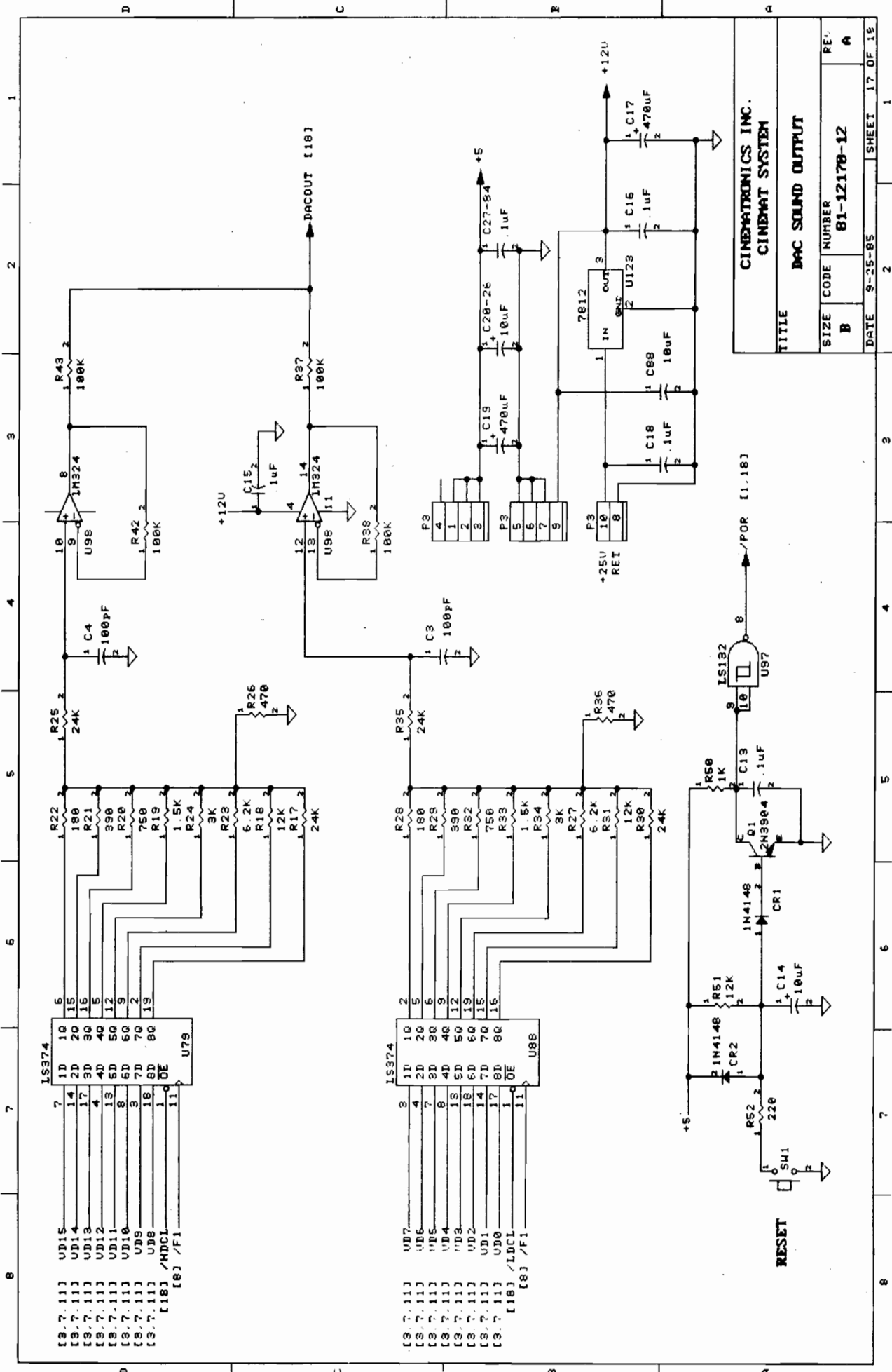
CINEMATRONICS INC.
CINEMAT SYSTEM

BACKGROUND PROMS

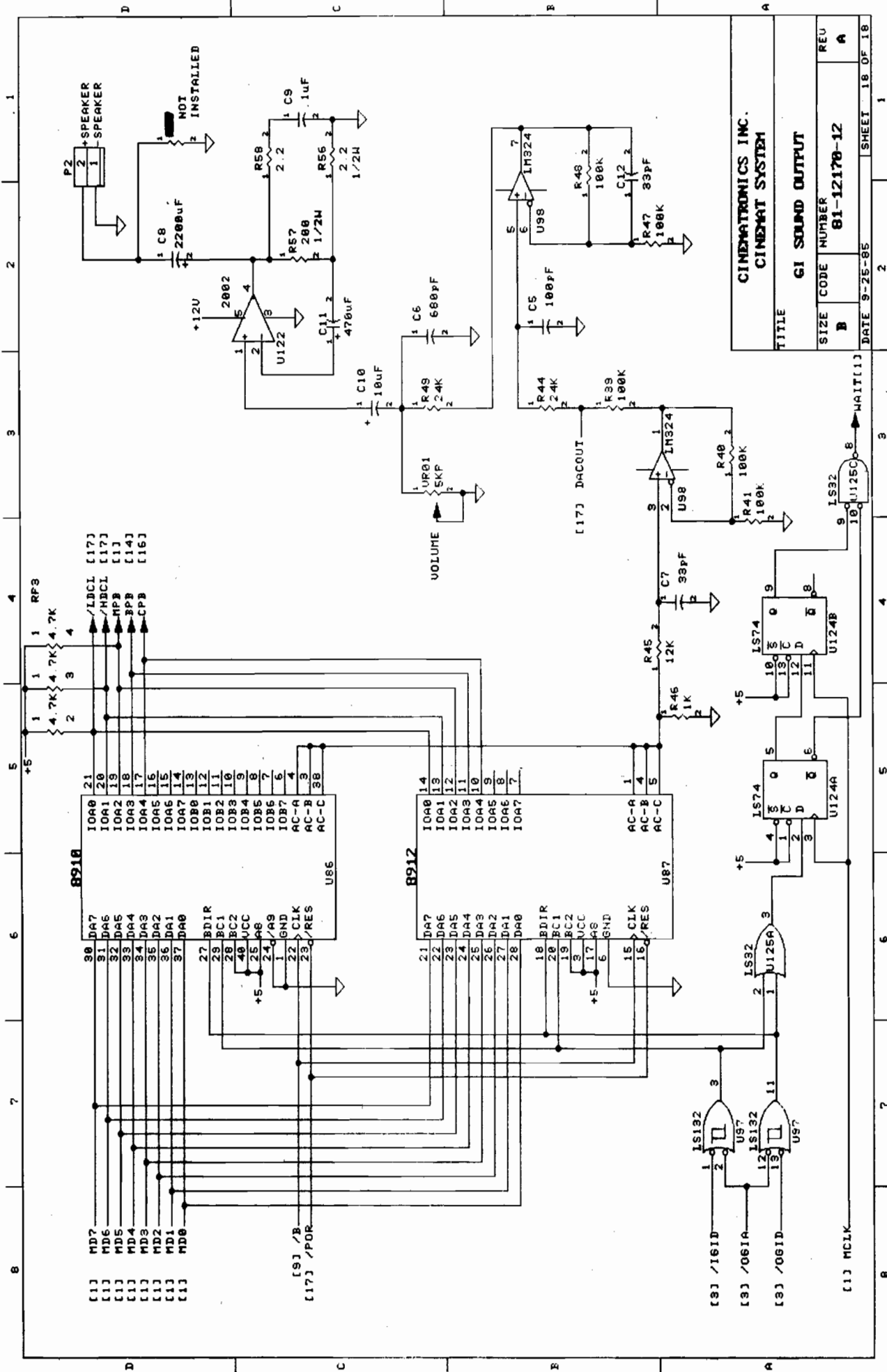
TITLE	SIZE	CODE	NUMBER	REV
	B		81-12178-12	A
DATE	9-26-85		SHEET	16 OF 18



CINEMATRONICS INC. CINEMAT SYSTEM	
TITLE BACKGROUND CHARACTER GENERATOR	
SIZE B	CODE NUMBER 81-12170-12
DATE 9-25-85	SHEET 16 OF 18



CINEMATRONICS INC.	
CINEMAT SYSTEM	
TITLE	DAC SOUND OUTPUT
SIZE	CODE NUMBER
B	81-12178-12
REV.	A
DATE	9-25-85
SHEET	17 OF 18



CINEMATRONICS INC.
CINEMAT SYSTEM

TITLE
61 SOUND OUTPUT

SIZE CODE NUMBER
B 81-12170-12

DATE 9-25-85 SHEET 18 OF 18

1 2 3 4 5 6 7 8

1 2
P2
SPEAKER

NOT INSTALLED

+12V

VOLUME

[17] DACOUT

[13] MCLK

[11] MD7
[11] MD6
[11] MD5
[11] MD4
[11] MD3
[11] MD2
[11] MD1
[11] MD0

30 DA7
31 DA6
32 DA5
33 DA4
34 DA3
35 DA2
36 DA1
37 DA0

27 BDIR
28 BC1
29 BC2
48 UCC
25 A8
24 A9
1 GND
22 CLK
23 RES

U86

14
13
12
11
10
9
8
7

10A0
10A1
10A2
10A3
10A4
10A5
10A6
10A7

U87

18 BDIR
19 BC1
20 BC2
3 UCC
17 A8
6 GND
15 CLK
16 RES

U87

1 LS192
2
3

U97

12 LS192
13

U97

2 LS92
1 U125A

3

4
5

LS74

10
11
12
13

C
D
E

U124A

9
10

LS74

9
10
11
12

C
D
E

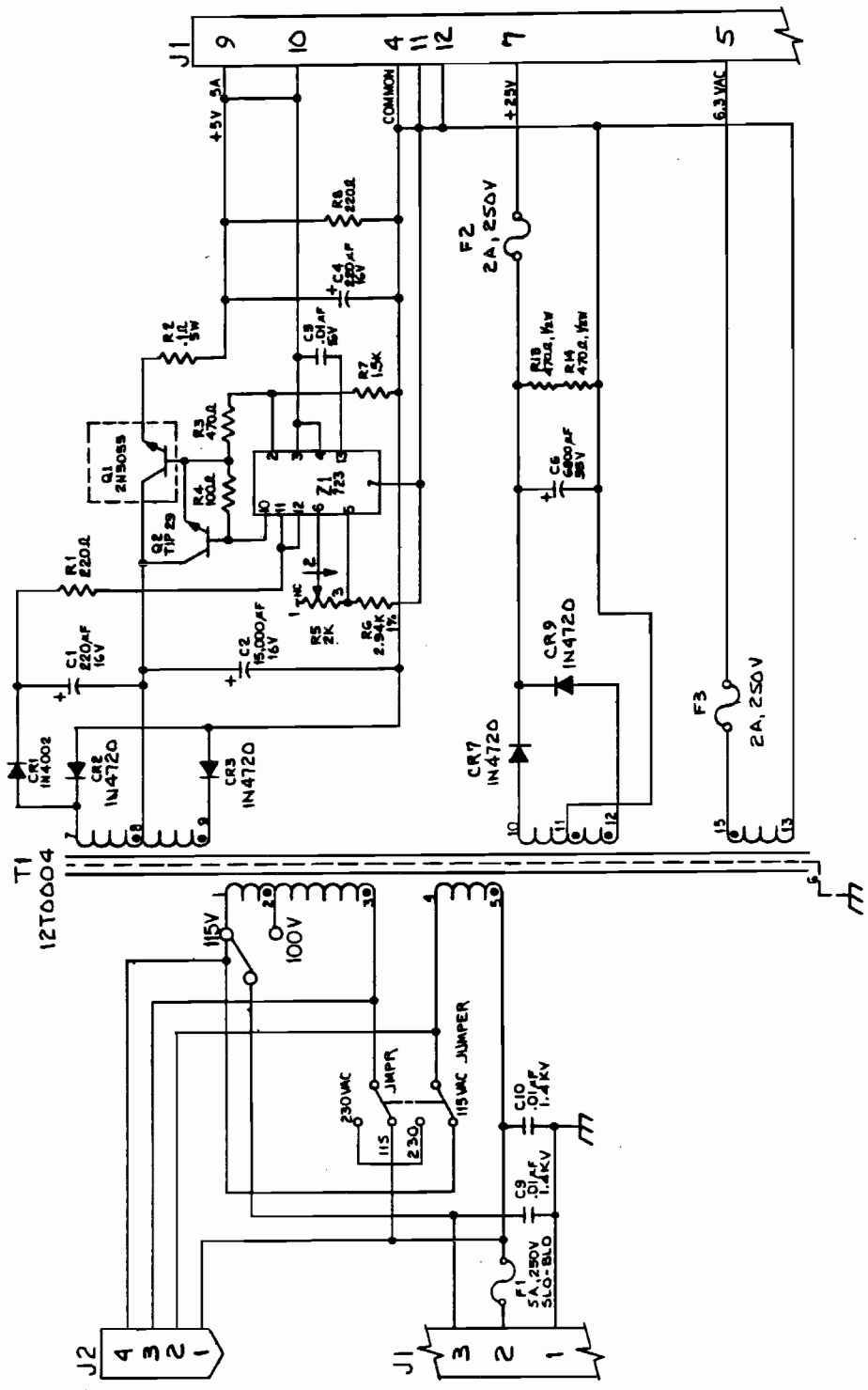
U124B

9 LS92
10 U125C

8

WAIT[1]

REVISIONS		DATE	APPROVED
DESCRIPTION		4 DEC 60	EAC
Q1	PROTOTYPE	15 JAN 61	
A PRODUCTION RELEASE EGO 0597		25 JAN 61	B.M.Y.
- SEE ECO. 0420			
B DWS. NO. FROM 12A0100-00			



PART IDENTIFYING NO.		PARTS LIST		CONTRACT NO.	
QTY	COMP. IDENT	APPROVALS	DATE	CONTRACT NO.	DESCRIPTION
		C. ESCALERA	4 DEC 60		
		CHECKED E. B.	11/1/60		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS .XX. ANGLES .XX. MATERIAL FINISH					
12A0013-00		62A0013-00			
NEXT ASSY USED ON		APPLICATION			
		DO NOT SCALE DRAWING			
SIZE C		DRAWING NO. 72-10842-41		REV B	
SCALE NONE		DRAWING NO.		PAGE 1 OF 1	

NATIONAL POWER TECHNOLOGY
 POWER SUPPLY

CINEMAT SYSTEM KIT TECHNICAL INFORMATION

Video Monitor

MAYHEM 2002 requires a horizontal oriented monitor. The Cinemat System produces separate negative horizontal and vertical sync.

Cinemat System Power Supply Requirements

- 1) +5 Vdc @ 5 amps regulated
- 2) +17-30 Vdc @ 1 amp unregulated (see note below)

Note: If your power supply provides a regulated 12-15 volts, then the on-board regulator must be bypassed. Follow the necessary modification below.

Step 1: Remove retaining hardware from the voltage regulator, U123.

Step 2: Desolder the regulator.

Step 3: With the regulator removed, place an insulated 18-gauge wire from pin 10 of connector P3 to the output pin of previously removed regulator on the underside of Cinemat PC board as shown in Figure 1.

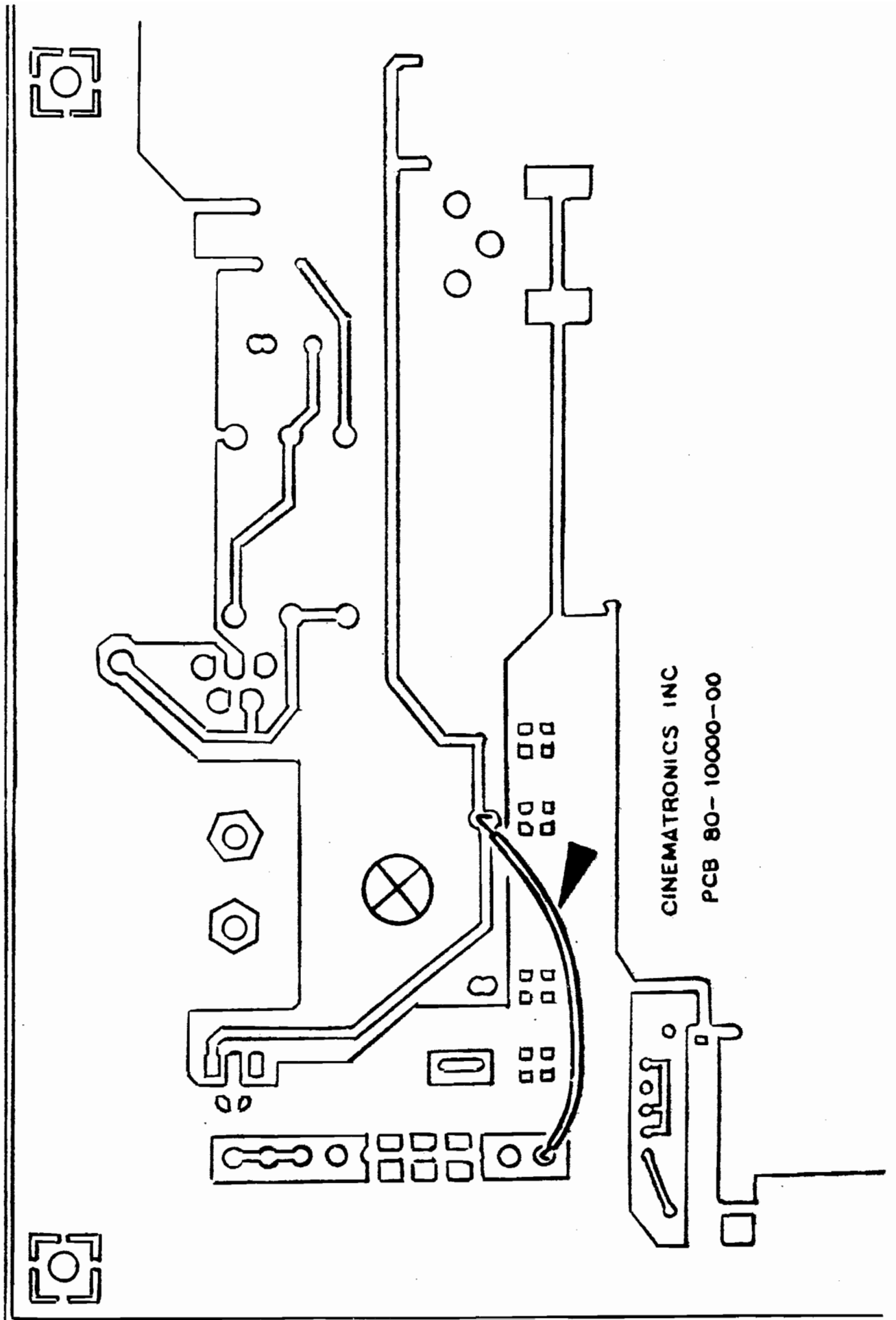


Figure 1

A. WARRANTY

Cinematronics warrants that whenever the video display (television monitor) and/or the power supply and/or the printed circuit boards and/or all parts contained therein are furnished with its product, that such part or parts will be free from defects in materials and workmanship for a period of ninety (90) days from date of shipment. Cinematronics' warranty of above parts is subject to the normal use and service of its products. No other products or parts are warranted except those herein stated.

If Cinematronics' warranted parts fail to perform as stated in this Warranty, then Cinematronics' sole liability shall be, at its option, to replace or repair such products which are returned to Cinematronics during the herein stated warranty period, provided:

A. Cinematronics is notified immediately in writing at the time the parts are determined to be defective.

B. That the defective parts are returned pre-paid to Cinematronics' plant accompanied by an authorized RMA number.

C. That Cinematronics' examination of returned products determines to Cinematronics' satisfaction that the alleged defects existed and were not caused by improper repair, installation, improper testing or by accident.

NOTE: Cinematronics is not responsible for bent pins on integrated circuits NOT installed by Cinematronics' employees.

In no event shall Cinematronics be liable for loss of profits, loss of use, or incidental or consequential damages.

EXCEPT FOR THIS EXPRESS WARRANTY, CINEMATRONICS DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON CINEMATRONICS' BEHALF, AND IT NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR CINEMATRONICS ANY OTHER LIABILITIES IN CONNECTION WITH THE SALE OF PRODUCTS MANUFACTURED BY CINEMATRONICS.



1841 Friendship Drive El Cajon, California 92020 (619) 562-7000

*trademark of Cinematronics, Inc.