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*The Leland*  
CORPORATION



**QUARTERBACK**™  
**SERVICE MANUAL**

# **“QUARTERBACK”™**

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# GAME CONCEPT

“QUARTERBACK” is a one-player or two-player interactive football game with all of the exciting sounds and hard-hitting action of the real thing.

On offense, the player must choose his strategy by selecting a play and maneuvering his quarterback through the right hole or leading his intended receiver with the passing target to complete that perfect pass.

On defense, the object is to outwit your opponent by choosing an alignment that will stop the offense while positioning your linebacker to fill the gap, sack the quarterback, or pick off that pass.

When kicking or punting, the wind is always a factor and the game clock comes into play near the end of each half.

Another interesting feature of “QUARTERBACK” is the ability to keep track of over 15 categories of game play statistics and the fact that each player’s salary reflects his/her overall performance in these areas. Players compete for the top salary.

# GET THAT GAME OUT!

As with any new piece of equipment, the anticipation and excitement of seeing and playing the game is hard to control, but control you must. For one thing, you may have noticed that the control panel is mounted inside the cabinet and thought “well isn’t that a novel idea”. Actually, the control panel is supposed to be mounted on the outside of the cabinet just like all the others, and it is shipped inside the game for protection.

## DON'T TOUCH THAT CONTROL PANEL

Before you remove the control panel from its shipping position, step back and inspect the cabinet for dings and gouges. Check the monitor (especially the neck of the picture tube). Take a look at the board and power supply and make sure they are securely mounted in place. If everything is *not* to your liking STOP RIGHT THERE! Call your distributor and get the shipping company back to inspect the damage. Don't try to fix it yourself. You paid for a complete undamaged game.

## REMEMBER - CONTROL

OK, you're almost ready. To remove the panel you must first remove the two shipping braces that are holding the monitor plex, bezel, and bezel-mounting assembly (the piece of wood that holds the bezel and plex away from the monitor). Gently slip these items out of the cabinet and set them aside.

## NOW - REMOVE THE CONTROL PANEL

Unfasten the panel and carefully remove it through the front of the cabinet (upside down). Inspect your prize and mount it, hinge toward the inside of the panel, to the front of the cabinet. Missing two bolts? No, you will find the other two control panel mounting bolts in the cash box. By the way, the **Keys** are tie-wrapped inside the coin door. Dust off the monitor, clean the plex and button her up.

## BEFORE YOU REACH FOR THAT PLUG

Take just a couple more minutes to read through this manual and the DIAGNOSTICS MANUAL located inside the front door of the cabinet.

## NOW

Apply power. Check for smoke. Got a picture? Good, we planned it that way. Play the game-It's your job. Be sure that everything works and the game is clean. Go through the diagnostics tests, make sure the picture is perfect, the game settings are correct and *get that game out!*

# THE LELAND CORPORATION WARRANTY

The Leland Corporation warrants that whenever the video display (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 sixty (60) days from date of shipment. The Leland Corporation's warranty of above parts is subject to the normal use and service of its product. No other products or parts thereof are warranted. If the products described in this manual fail to conform to this warranty, the Leland Corporation's sole liability shall be, as mutually agreed, to replace or repair such products which are returned to the Leland Corp. during stated warranty period, provided:

- a. The Leland Corp. is notified in writing upon discovery by buyer that said products are defective.
- b. The defective product or part is returned *pre-paid* to The Leland Corp. plant with a Leland Corp. *Returned Merchandise Authorization (RMA)* number clearly visible on the outside of the package.
- c. An Operator Service Card is on file at The Leland Corp. plant or is included in the package for all returned printed circuit boards.
- d. The Leland Corporation's examination of returned products determines to our satisfaction that the alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or testing.

The Leland Corp. is not responsible for bent pins on ICs not installed by our employees. In no event shall The Leland Corp. be liable for loss of profits, loss of use, incidental or consequential damages.

EXCEPT FOR THIS WARRANTY, THE LELAND CORP. 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 THE LELAND CORPORATION'S BEHALF, AND IT NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR THE LELAND CORP. ANY OTHER LIABILITIES IN CONNECTION WITH THE SALE OF PRODUCTS MANUFACTURED BY THE LELAND CORP.

**TO: THE TECH**

**FROM: THE GUY THAT WROTE THIS MANUAL**

First of all, that little card that fell out when you opened this manual is your operator service card and we would appreciate it if you would take a couple of minutes to fill it out and send it to us with your comments. It is also a good idea to record the serial number information in the space provided at the front of this manual for future reference.

Next, this manual is not written for the “bench” technician except for the fact that we do include board layouts and schematic diagrams. As you are well aware, most of the problems incurred in the field are *not* board related. If you have double checked all the wiring, the power supply, the monitor, and where possible, “swapped” boards and have narrowed a problem down to the board, give us a call and our crack customer service department will get you going.

Because of solid state electronic circuitry, this game should require very little maintenance and only occasional adjustments. The majority of the problems encountered by field service technicians are of a type easily remedied, provided said technicians have at least a working knowledge of coin operated amusement devices, the proper tools, and last but not least, a good attitude and a neat appearance.

**FIRST:** Approach the proprietor or attendant with a friendly greeting - “Good morning! And how are you on this fine and cheery morning?”

**SECOND:** List your credentials and purpose - “I’m \_\_\_\_\_ from \_\_\_\_\_ and I understand that one of our/your amusement machines is not functioning properly.”

**THIRD:** Find out as much as possible about the problem before you approach the game - “I know that you are a busy man (or young lady) but if you would please explain exactly what the machine is doing or not doing that prompted your concern I would be very grateful.”

**REMEMBER, YOU ARE A PROFESSIONAL!**

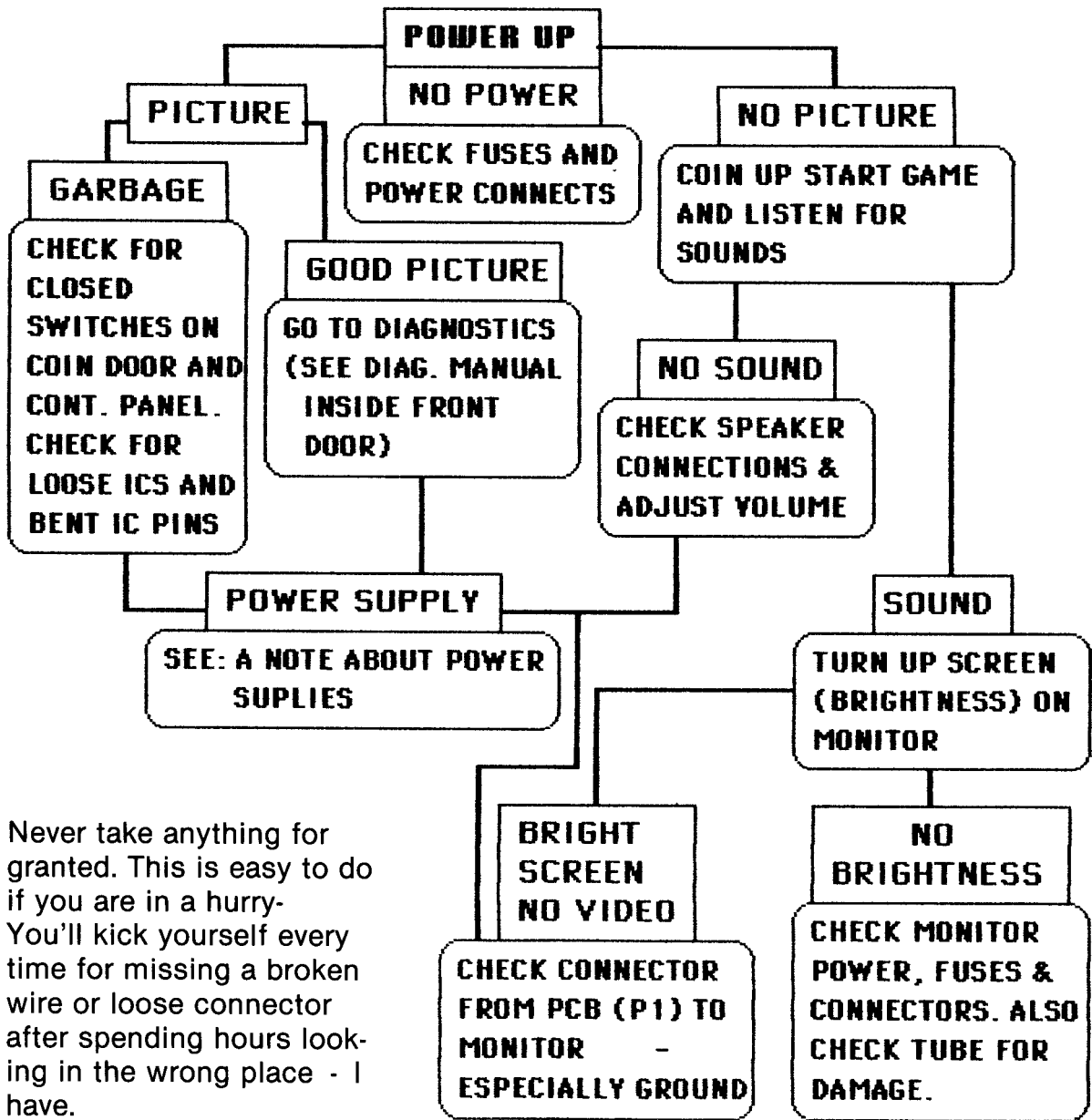
Now that you’ve made a favorable impression and obtained a few facts we can get down to brass tacks. (Which reminds me, be sure to check for foreign objects on the board.) When examining an ailing machine, you may want to use the following flow chart as a foundation on which to build your troubleshooting approach.

# TROUBLESHOOTING FLOW CHART

**DON'T TOUCH THAT SWITCH !!!**

Before you reach for the power switch take a good look at the game. Open it up and check for loose wires, bad connections, or burned spots. Look for spilled drinks and signs of vandalism. These quick checks will save you a lot of time.

After you've eliminated the obvious, start digging.



Never take anything for granted. This is easy to do if you are in a hurry- You'll kick yourself every time for missing a broken wire or loose connector after spending hours looking in the wrong place - I have.



## A NOTE ABOUT POWER

The computer board in this machine operates most efficiently when the power supply is provided a steady + 5.1VDC ( ±0.05VDC). When checking DC power always put your leads across the test points TP1 (GND) and TP3 (+ 5VDC) on the main board and be sure that the + 5 volt supply is between + 5.05VDC and + 5.15VDC. Also be sure that there is less than .005 volts AC riding on the + 5 volt line. If you do find AC on the DC line, suspect the filter capacitor or the rectifier on the power supply. Low voltage or AC on the DC lines is the main cause of the following problems:

- \*“Garbage” on the screen.
- \*Computer “Freeze”.
- \*Coin or Coin Meter malfunction.
- \*A variety of seemingly unrelated problems.

NOTE: Power supply must be allowed to stabilize with power on for approx. 10 minutes before adjustments are made.

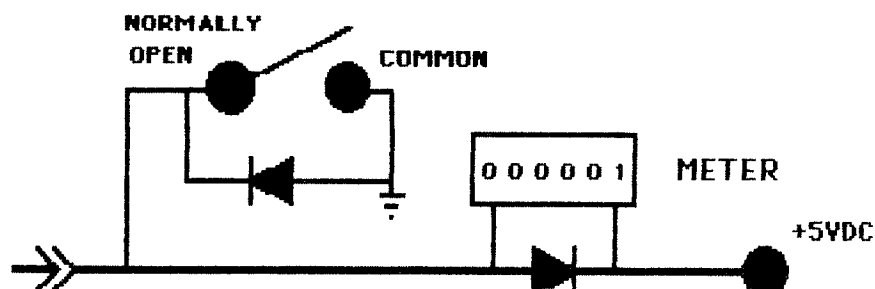
## ABOUT MECHANICAL COIN COUNTERS

We have *not* installed a mechanical coin counter on this game for two reasons:

1. The bookkeeping program on QUARTERBACK™ is very accurate and includes not only number of coins dropped and dollars earned but also the number of tests and coins in a given period. (See BOOKKEEPING in the DIAGNOSTICS MANUAL.)
2. These mechanical counters produce an inductive “kick” that *will* damage components on the circuit board. Checkerboard video is the most common. To see if this is in fact your problem — take a look at the “NMI not” signal on the master Z80 (pin 17). If a low output is observed, try replacing U114 (74LS08) and/or U119 (74LS157).

NOTE: *If you must install a coin counter, please use the following diagram. (Diodes may be IN4001 to IN4004)*

HOOK BOTH COIN SWITCHES TO EITHER P4 PIN 5 OR P4 PIN 8.



# INS AND OUTS

## AC POWER

Connect this game only to a grounded three-wire outlet which provides between 108 and 132 volts AC. If you have only a two-wire outlet we recommend that you hire a licensed electrician to install a grounded outlet. The possibility exists that players may receive an electrical shock if this system is not properly grounded.

## DC POWER

The switching power supply in your game provides +5VDC at 11 amps maximum, +12VDC at 2 amps maximum, and -5VDC at 1 amp maximum. Proper operation of this game depends on these voltages being accurate and free of AC interference.

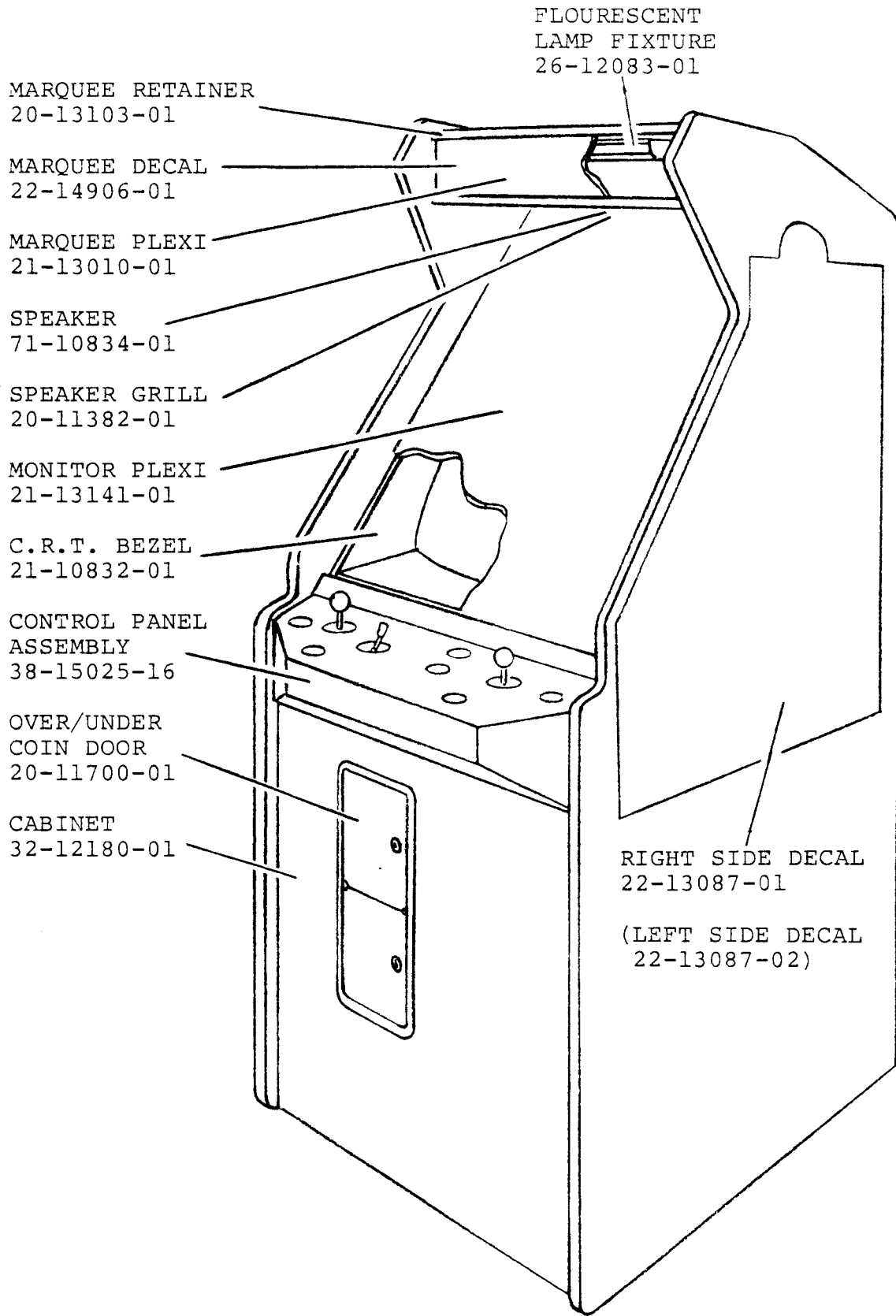
## THE MONITOR

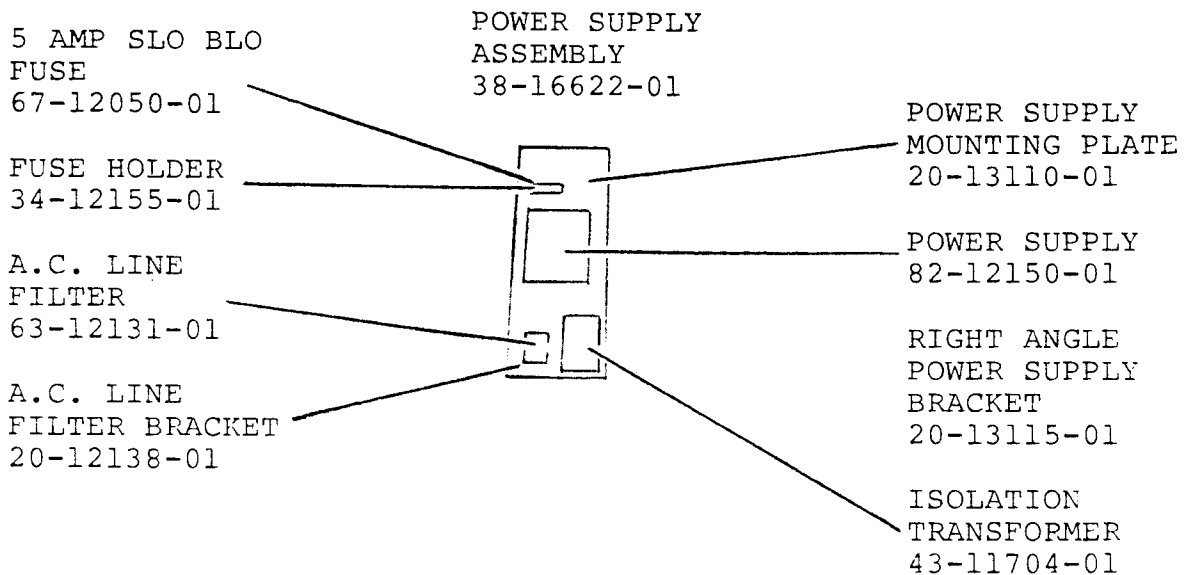
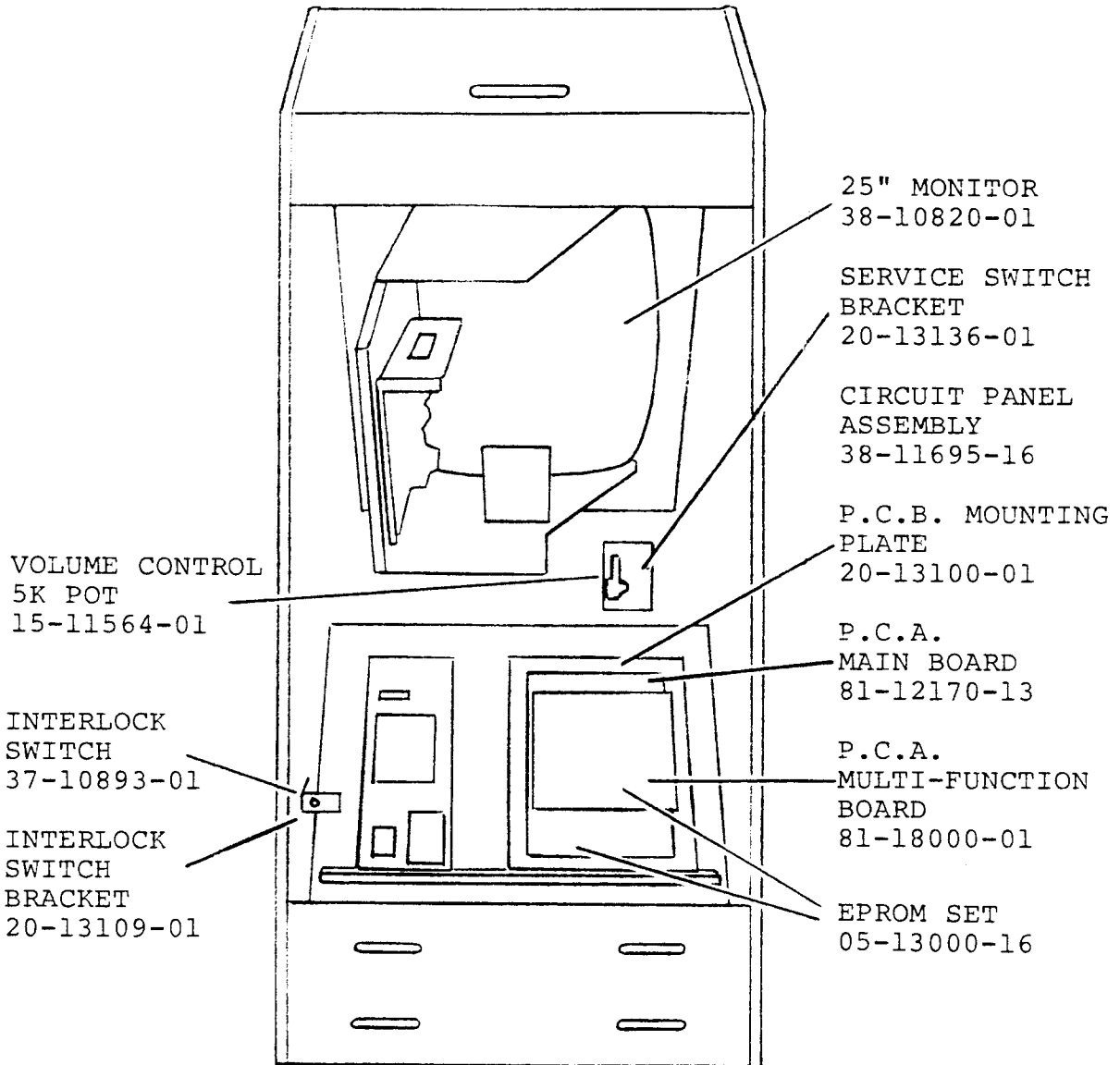
The 25" WELLS-GARDNER monitor in your game was chosen for its dependability and ease of maintenance. The *sync* inputs are both *negative*.

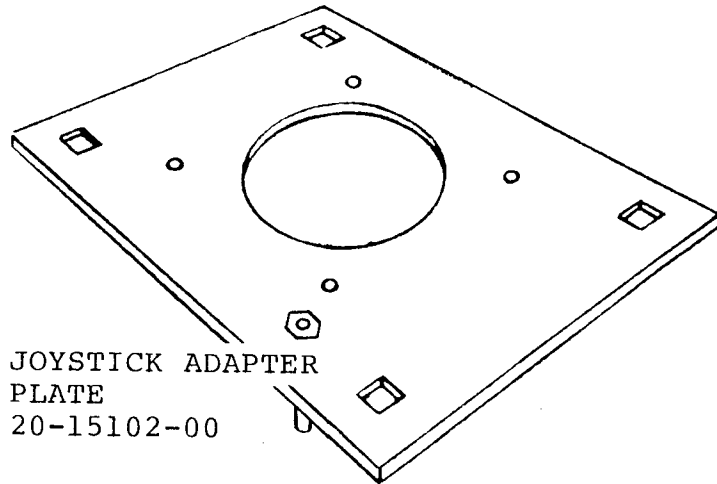
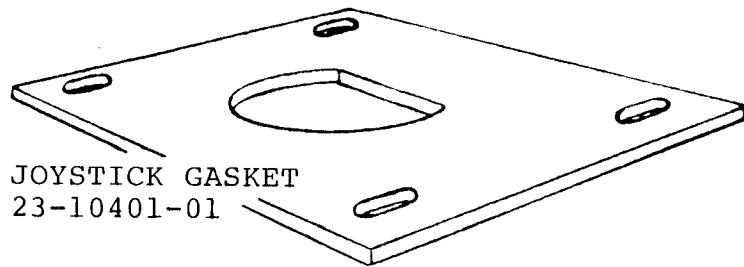
## OUR SERVICE DEPARTMENT

For parts, service, and technical information first contact your authorized Leland Corporation distributor. For additional technical aid feel free to contact the Leland Corp. Customer Service Department at (619)562-7000 Monday through Friday from 8:00 AM to 6:00 PM Pacific Standard Time. To provide you with the quickest possible response to your questions, please have the following information ready when you call:

1. Your QUARTERBACK™ serial number and board numbers.
2. The game software serial number.(Found on the bottom of the MAIN MENU screen and hopefully written on the bottom of the inside front cover of this manual.)
3. Any reference drawings or schematics.

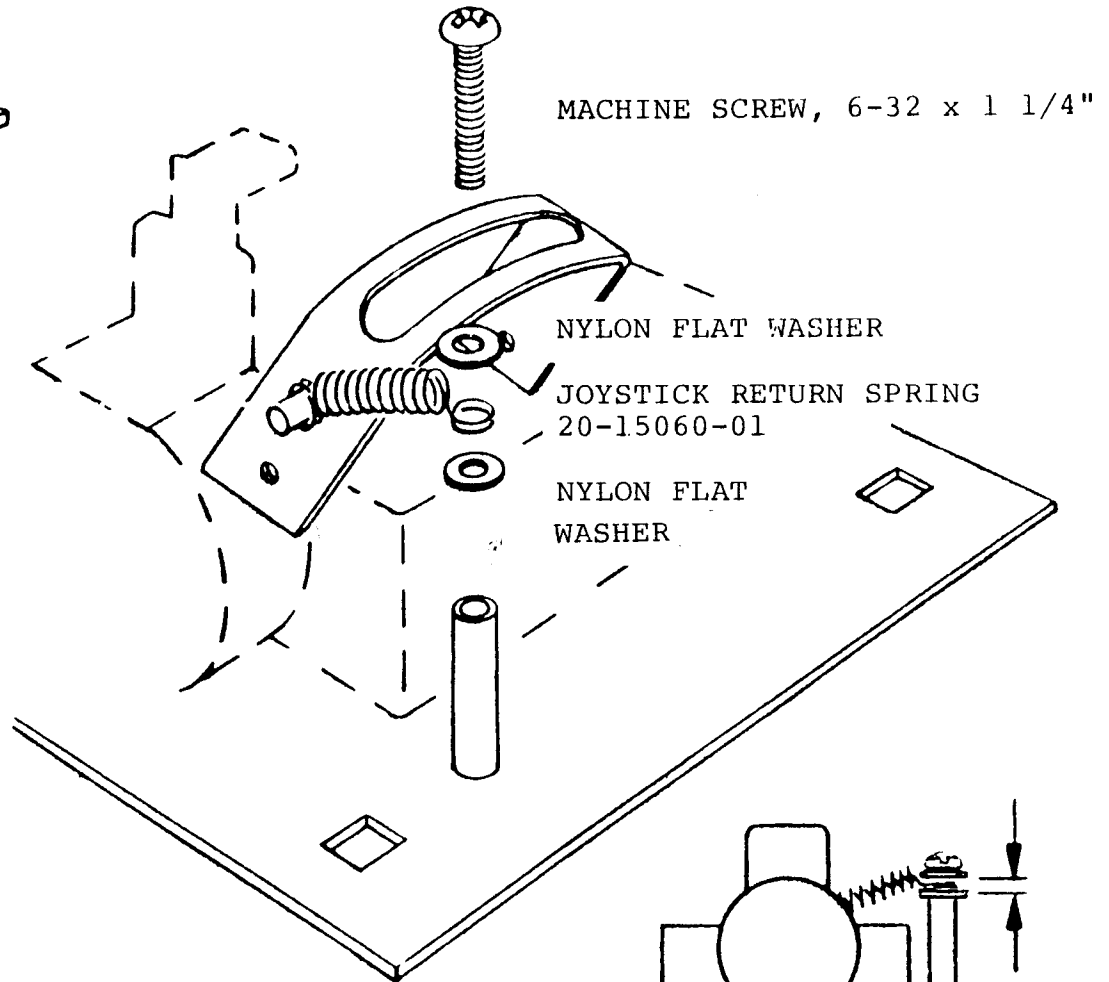
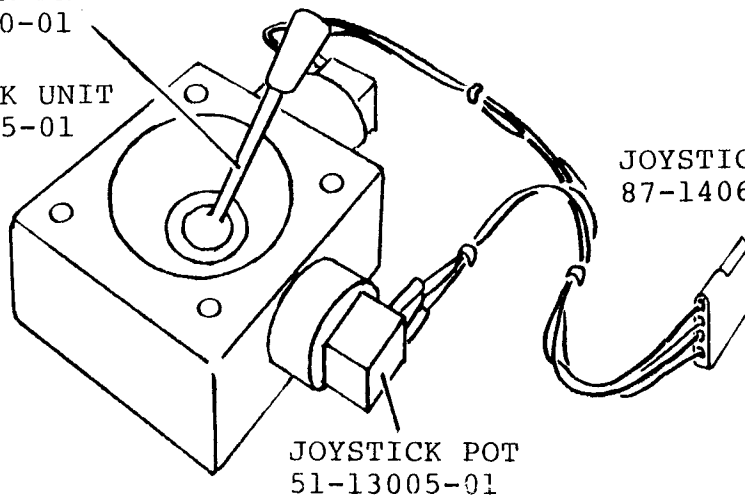




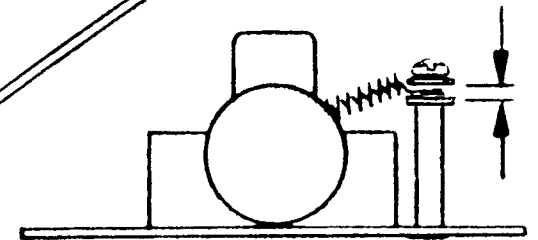


JOYSTICK SHAFT  
22-16600-01

JOYSTICK UNIT  
37-13055-01



JOYSTICK HARNESS  
87-14060-02



SHORT RED BUTTON  
WITH RED RING  
37-11192-02

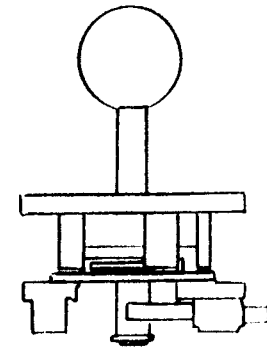
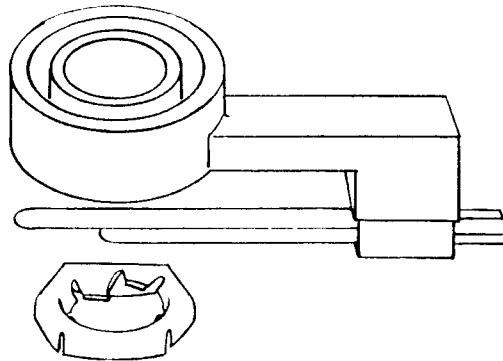
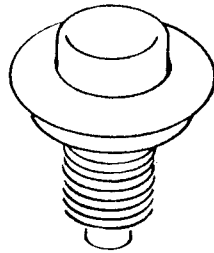
SHORT BLACK BUTTON  
WITH BLACK RING  
37-11192-03

SHORT RED BUTTON  
WITH YELLOW RING  
37-11192-04

SHORT BLUE BUTTON  
WITH YELLOW RING  
37-11192-05

BRACKET WITH SWITCH  
FOR SHORT BUTTON  
37-11373-01

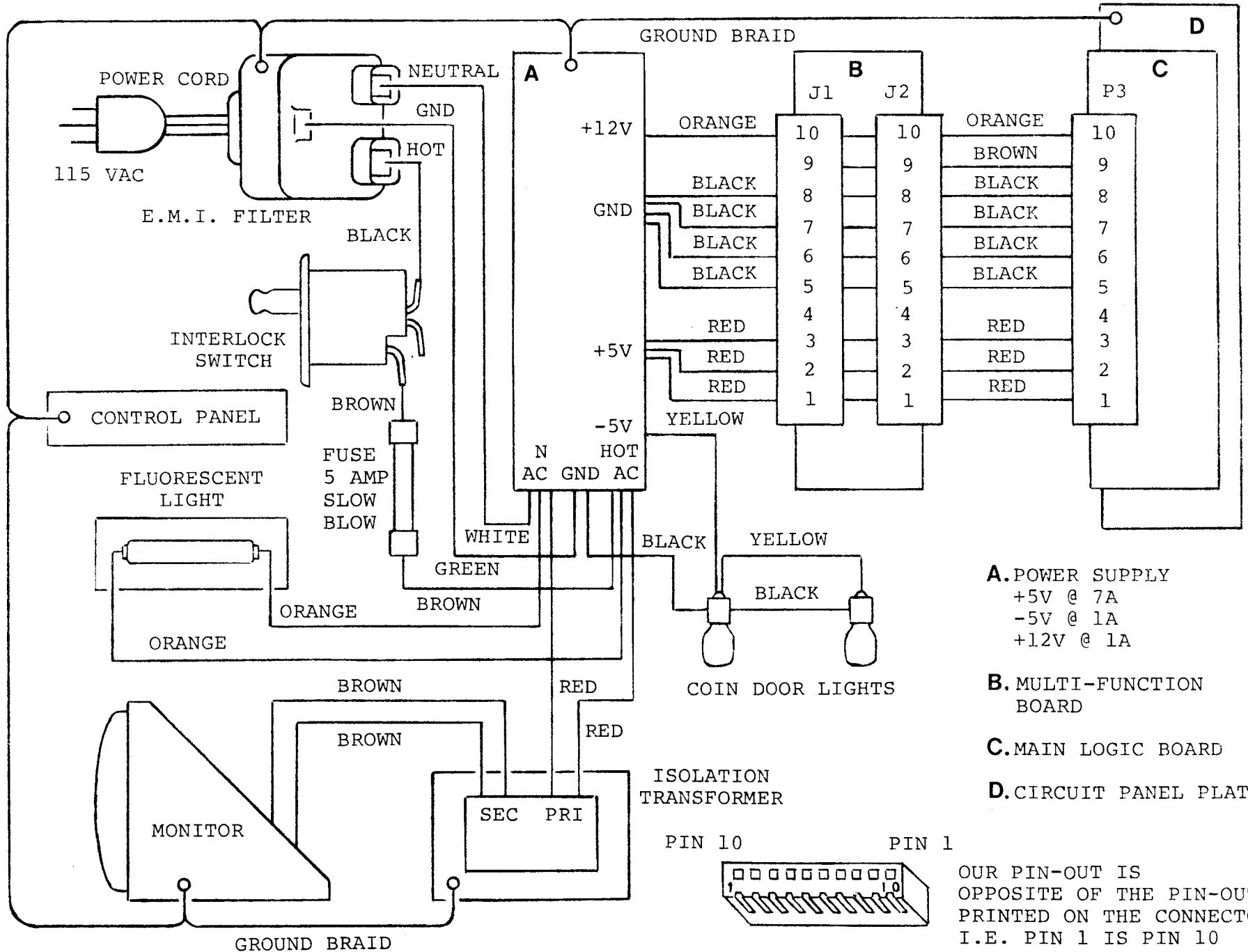
5/8" PAL NUT  
25-10559-01



8-WAY JOYSTICK  
WITH RED  
BALL HANDLE  
38-11396-01

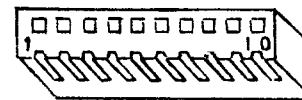
8-WAY JOYSTICK  
WITH BLUE  
BALL HANDLE  
38-11396-02

AC/DC POWER CONNECTION



- A.** POWER SUPPLY  
+5V @ 7A  
-5V @ 1A  
+12V @ 1A
- B.** MULTI-FUNCTION BOARD
- C.** MAIN LOGIC BOARD
- D.** CIRCUIT PANEL PLATE

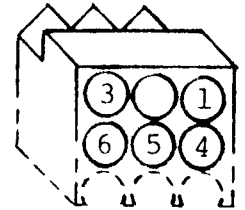
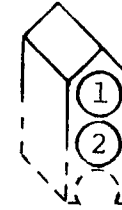
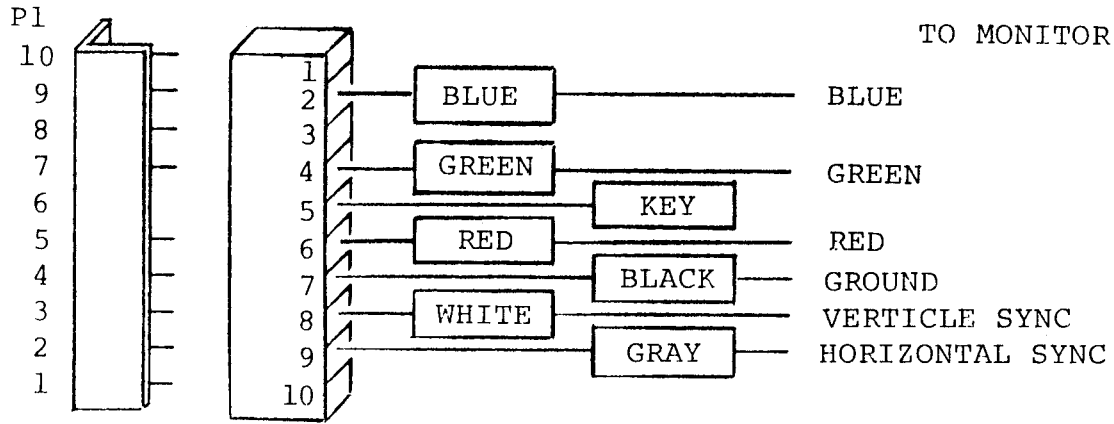
PIN 10                      PIN 1



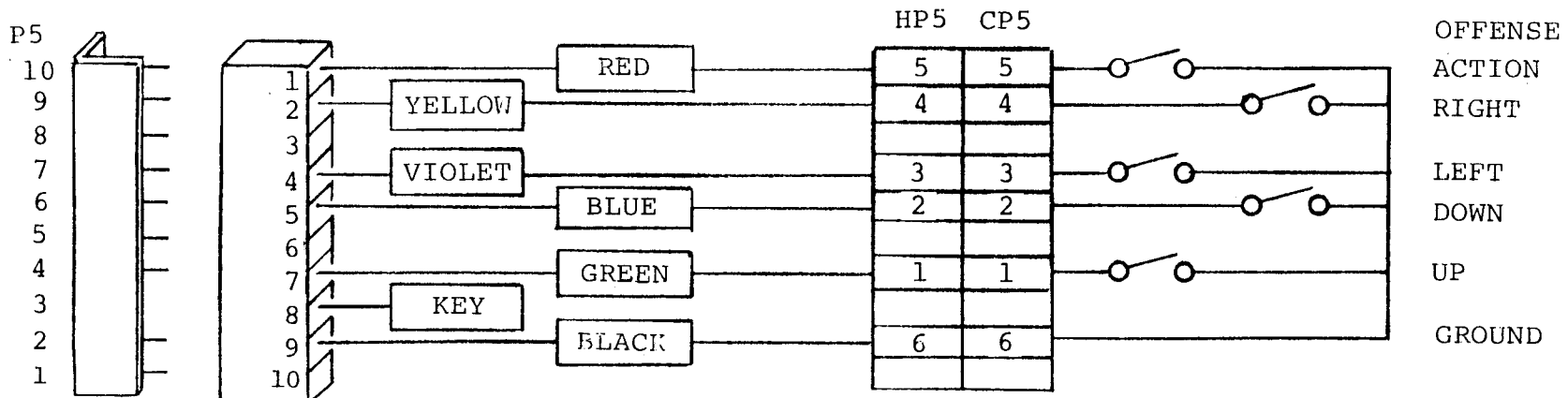
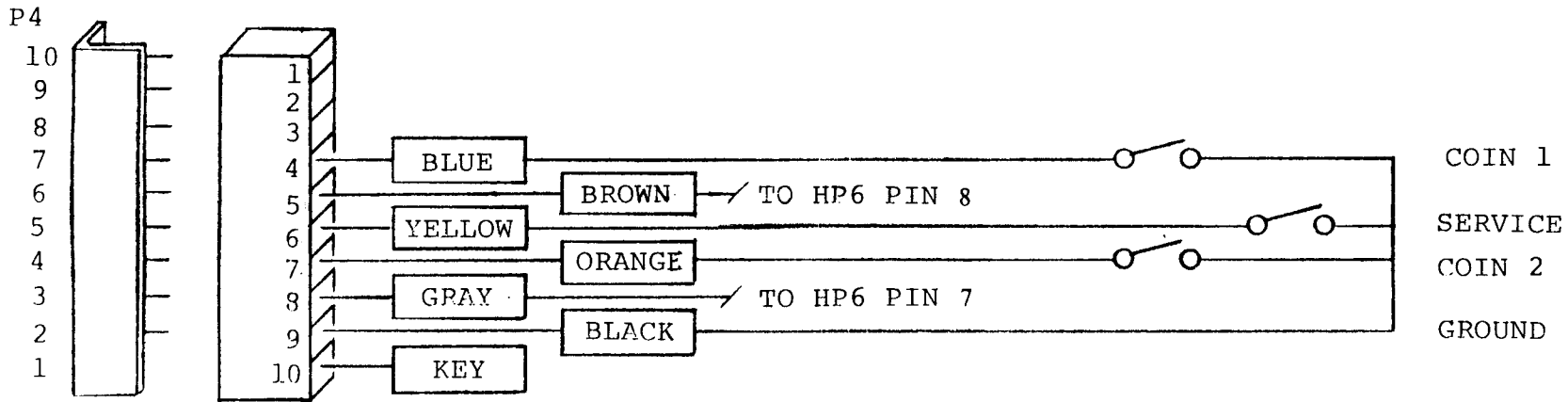
OUR PIN-OUT IS OPPOSITE OF THE PIN-OUT PRINTED ON THE CONNECTOR I.E. PIN 1 IS PIN 10 FOR A 10 PIN CONNECTOR



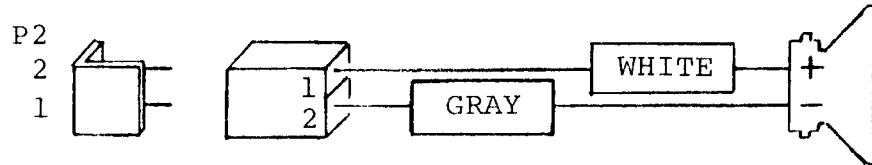
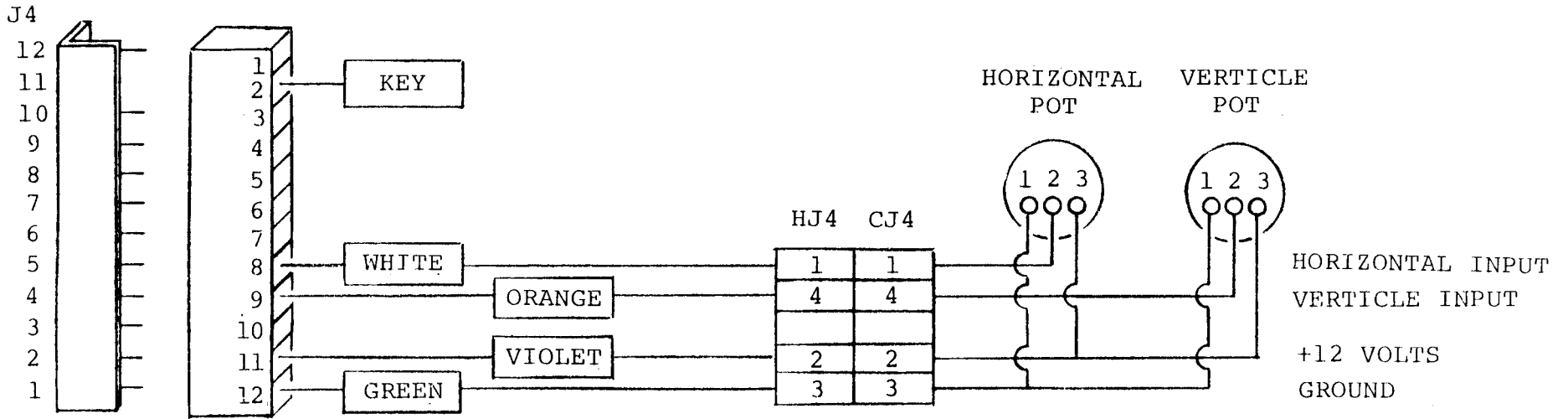
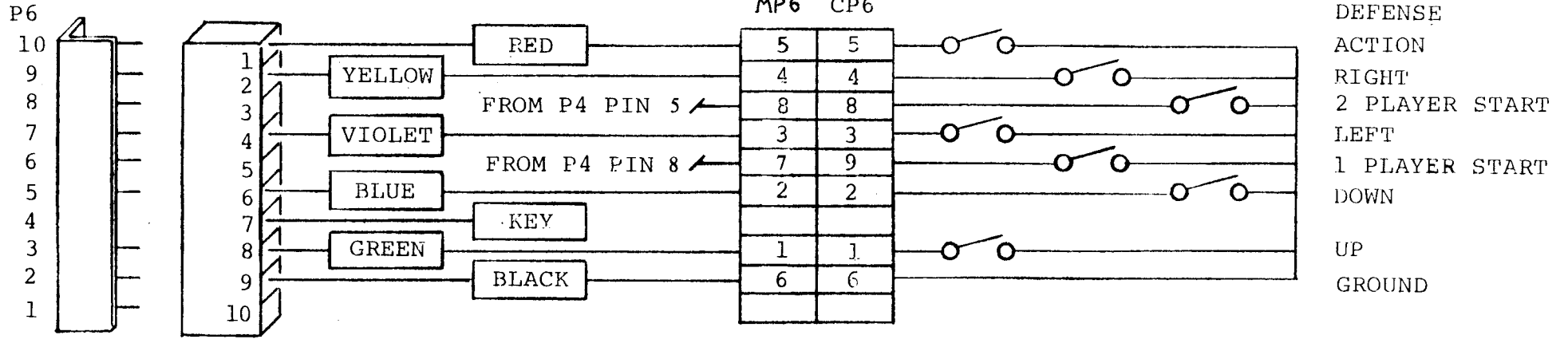
OPPOSITE OF PIN-OUT  
MOLDED ON  
HARNESS CONNECTORS



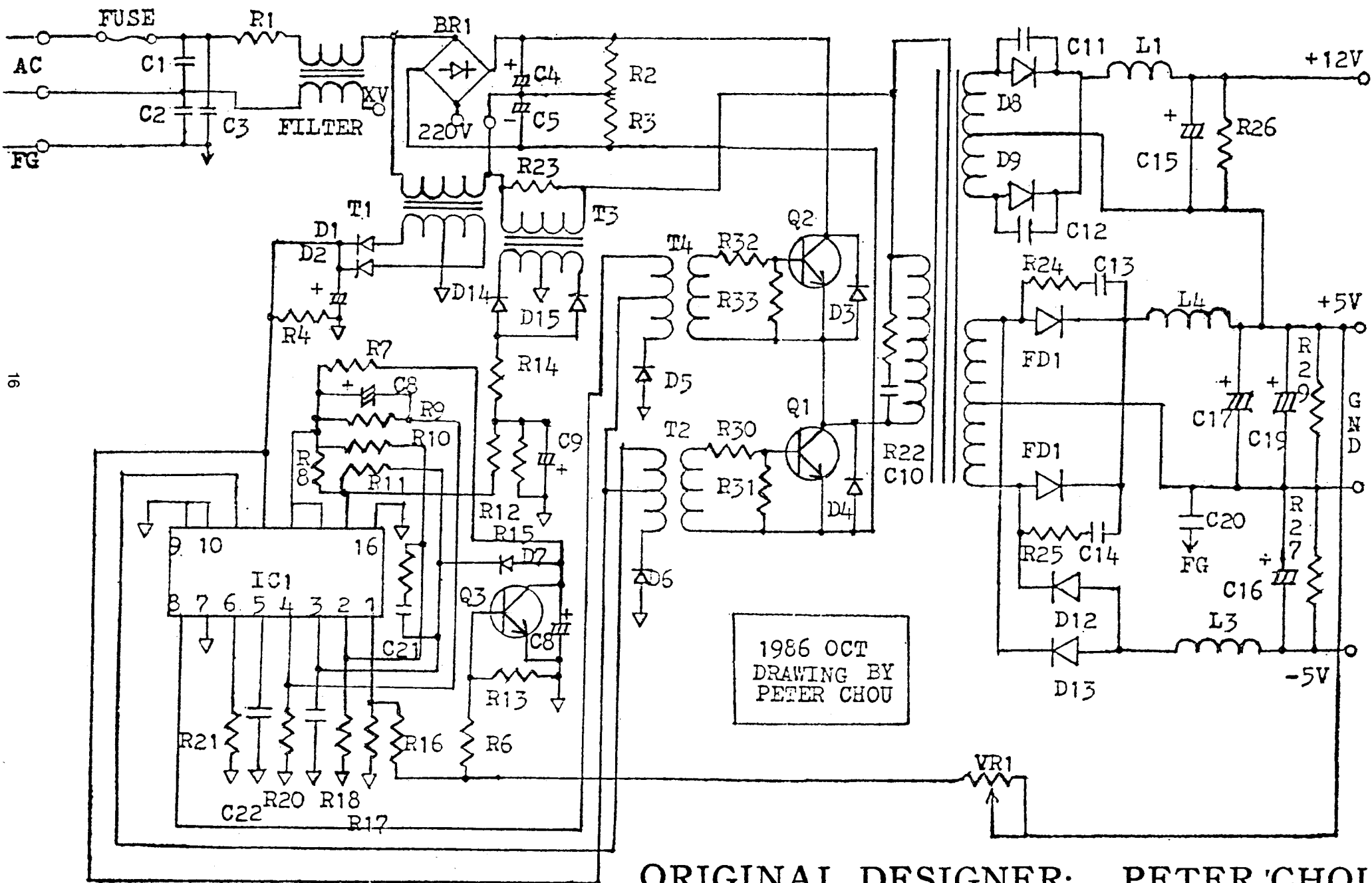
MALE MOLEX CONNECTORS TYPICAL





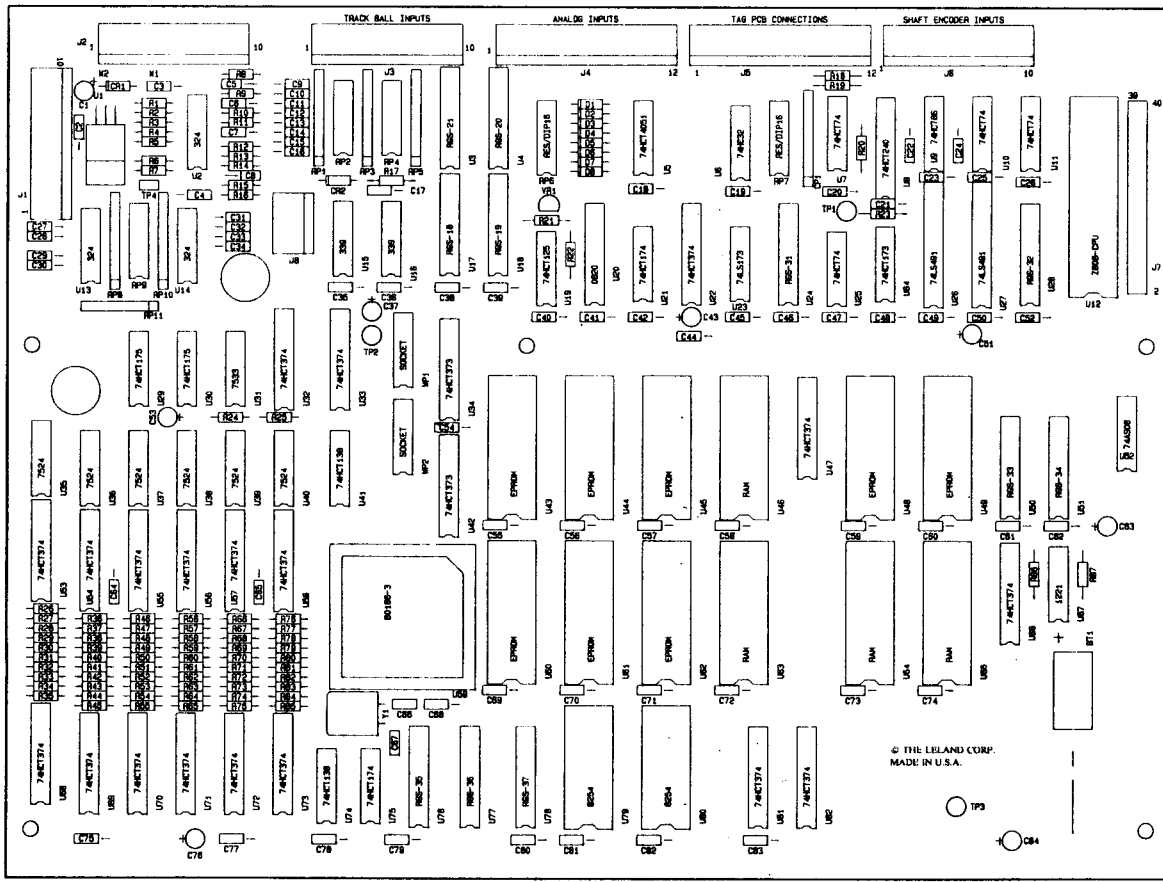


# SWITCHING POWER SUPPLY

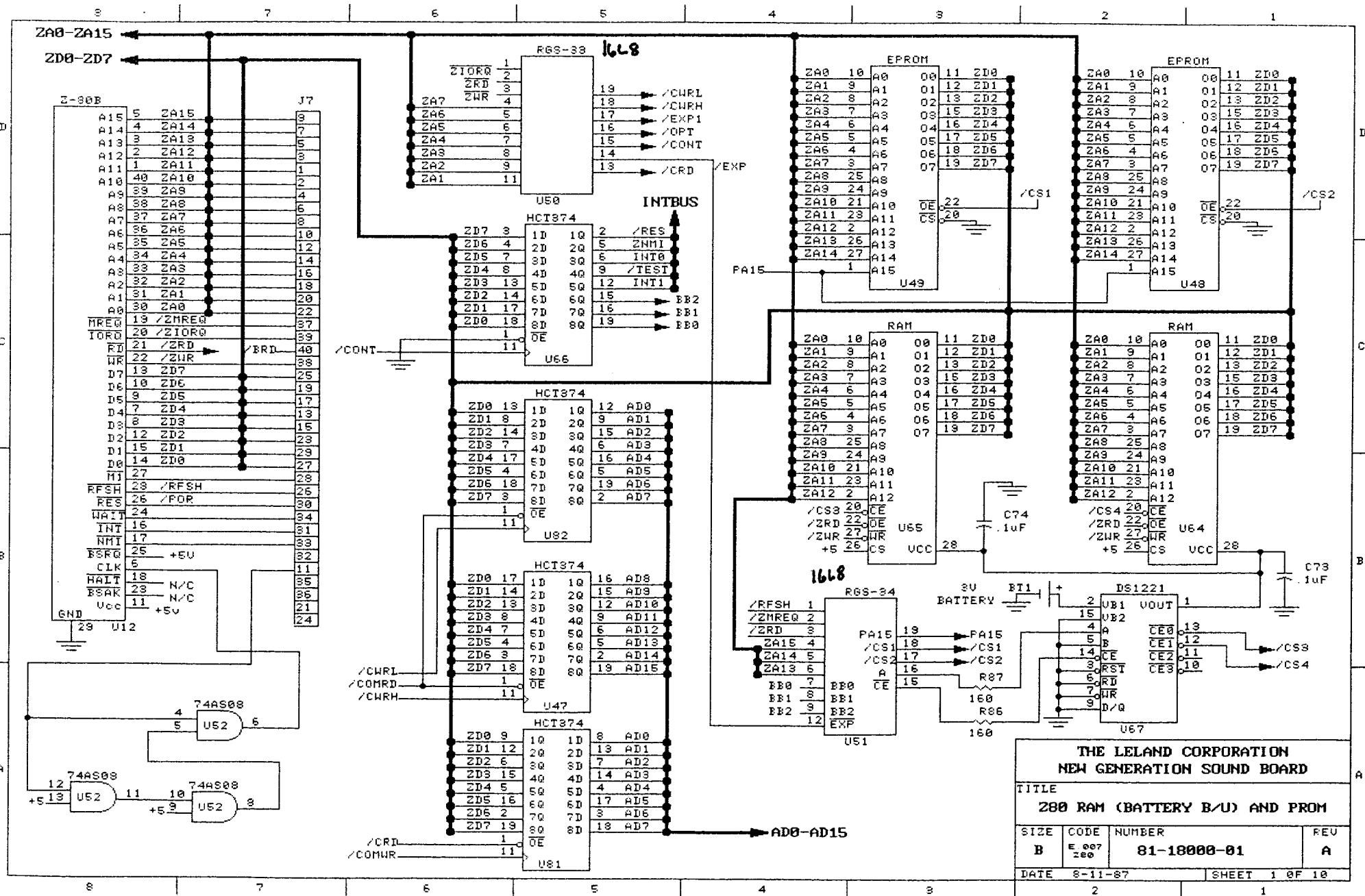


**ORIGINAL DESIGNER: PETER CHOU**

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS      DECIMALS      ANGLES			CONTRACT NO. APPROVALS      DATE DRAWN      10-9-87 CHECKED      [Signature]
MATERIAL			
FINISH			THE LELAND CORP. MULTI FUNCTION BOARD SIZE      CODE IDENT NO      DRAWING NO.      REV D      81-18000-01      B
NEXT ASSY      USED ON			
APPLICATION      DO NOT SCALE DRAWING			SCALE FULL      SHEET 1 OF 1



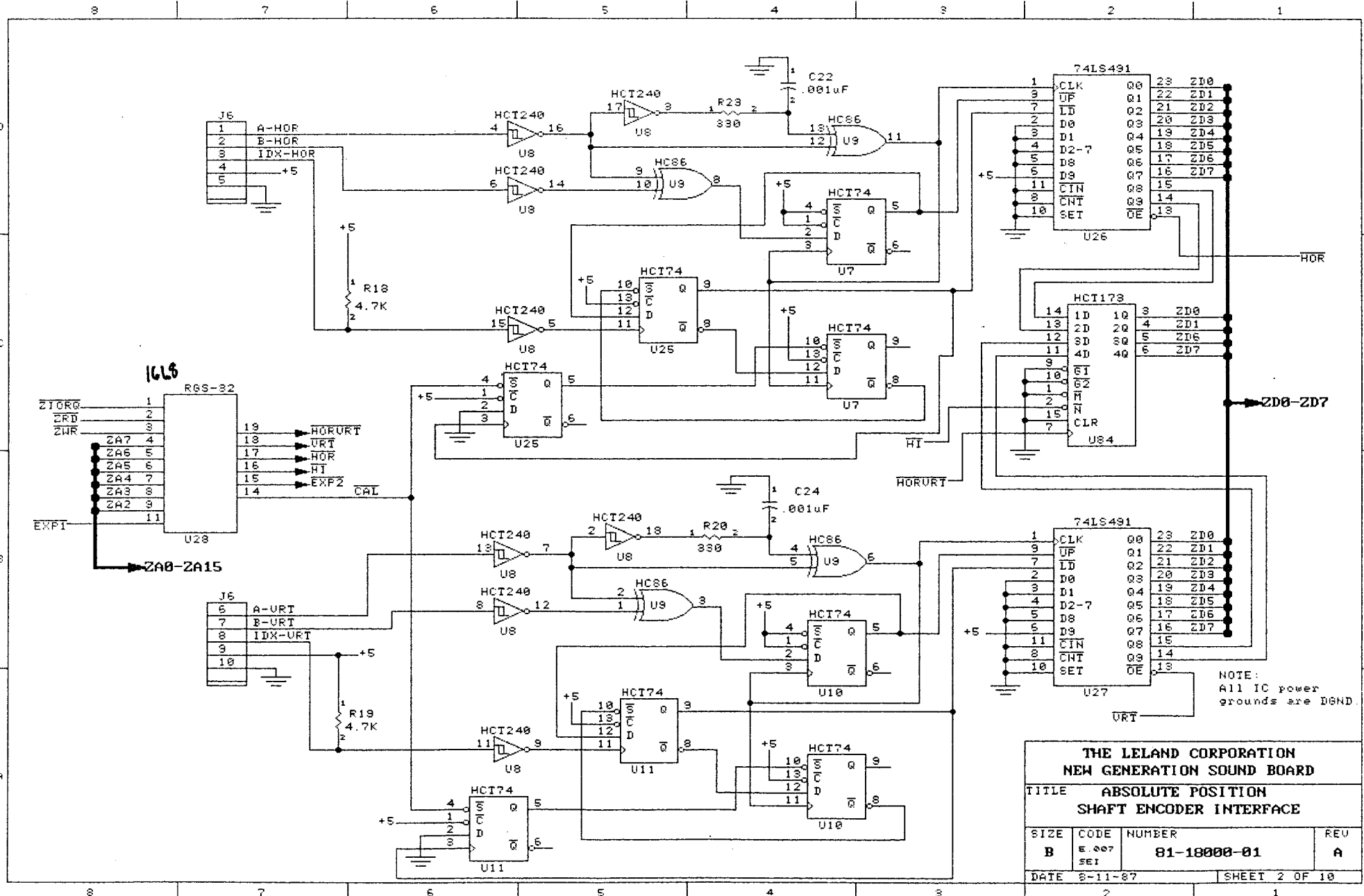
**THE LELAND CORPORATION  
NEW GENERATION SOUND BOARD**

TITLE  
**280 RAM (BATTERY B/U) AND PROM**

SIZE	CODE	NUMBER	REV
B	E 007 280	81-18000-01	A

DATE 8-11-87 SHEET 1 OF 10

19  
D  
C  
B  
A

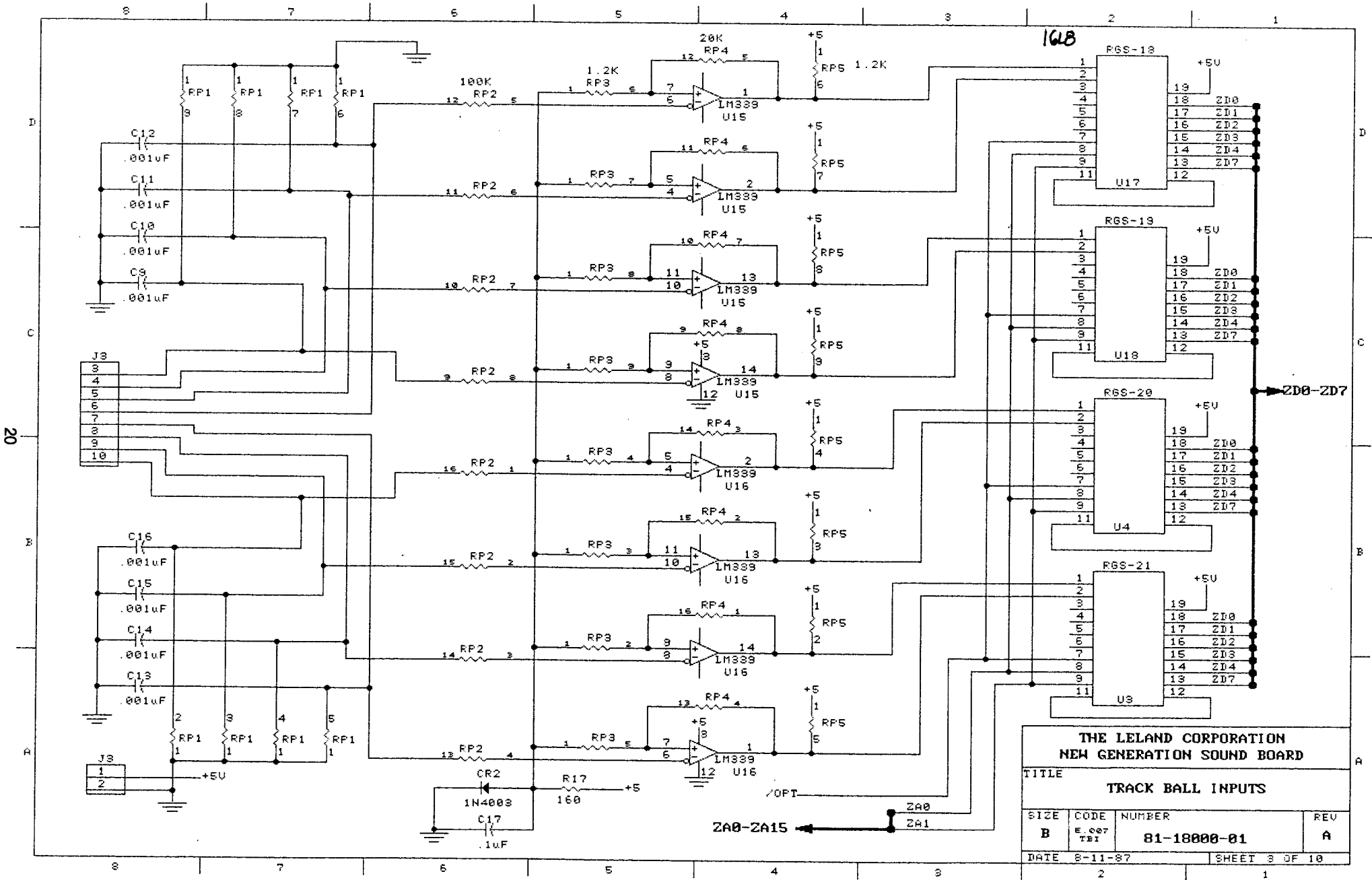


NOTE:  
All IC power  
grounds are DGND.

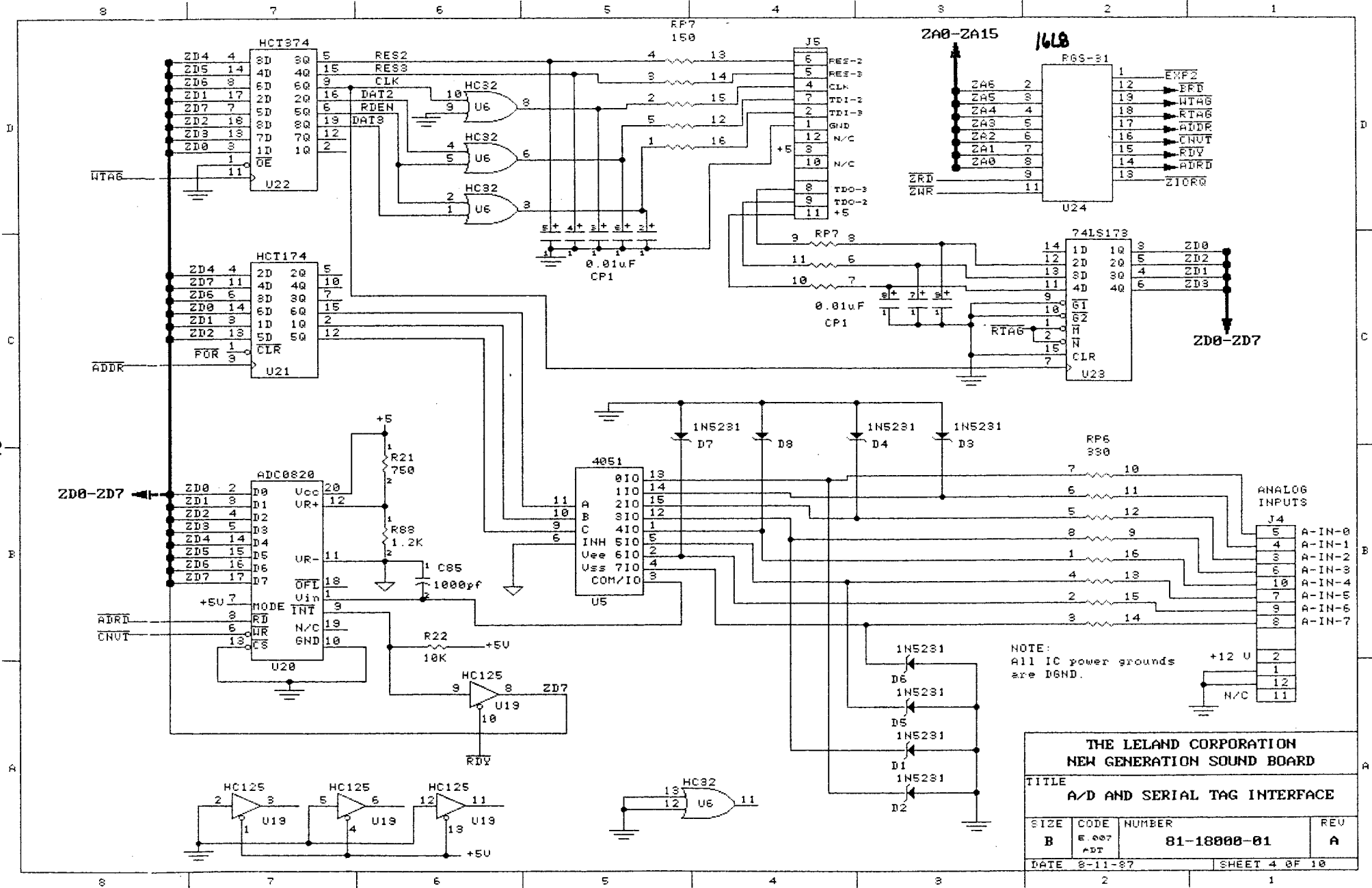
<b>THE LELAND CORPORATION</b>			
<b>NEW GENERATION SOUND BOARD</b>			
TITLE <b>ABSOLUTE POSITION</b>			
SHAFT ENCODER INTERFACE			
SIZE	CODE	NUMBER	REV
B	E.007 SET	81-18000-01	A
DATE 8-11-87		SHEET 2 OF 10	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

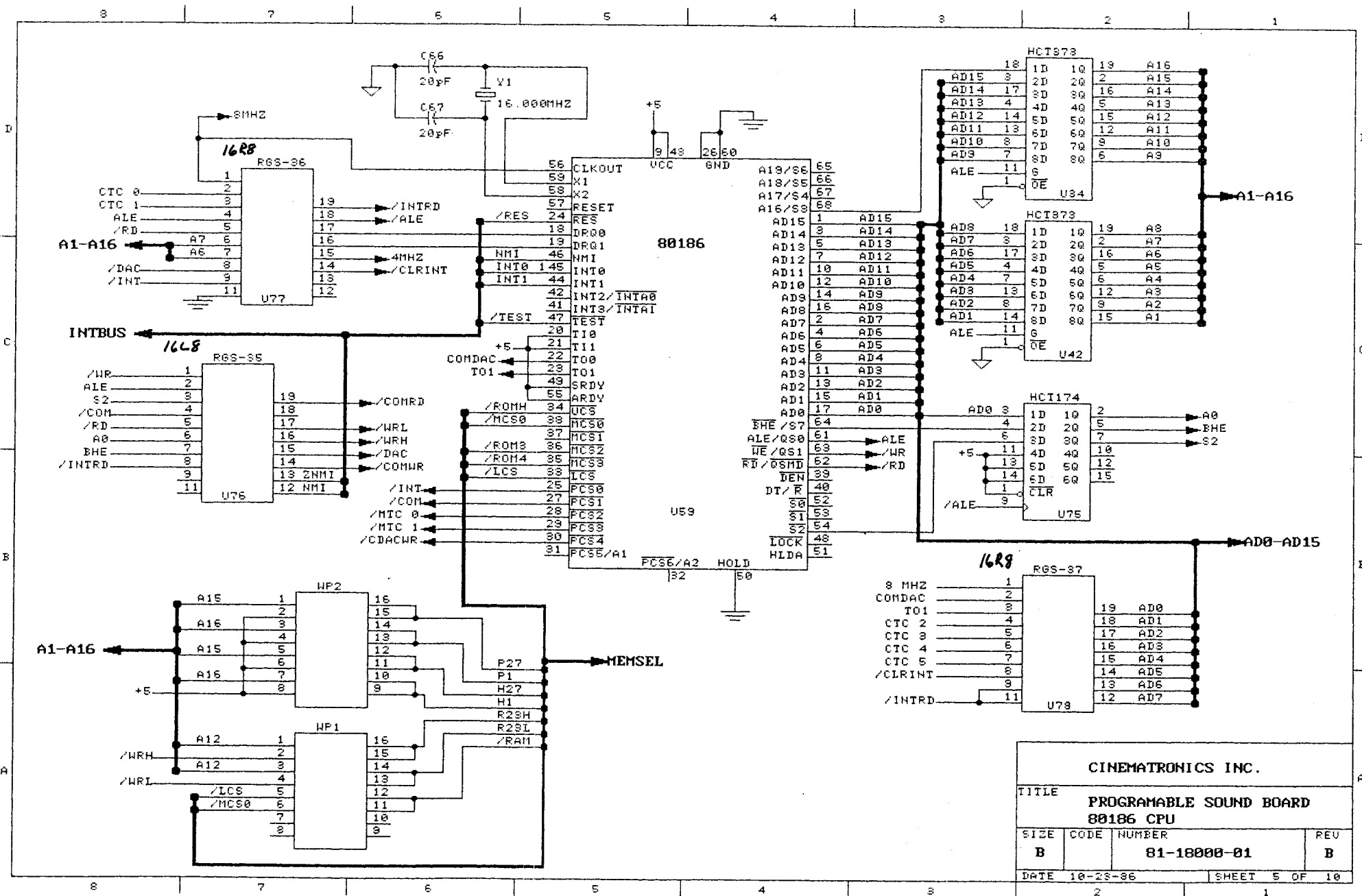


<b>THE LELAND CORPORATION</b>			
<b>NEW GENERATION SOUND BOARD</b>			
TITLE			
<b>TRACK BALL INPUTS</b>			
SIZE	CODE	NUMBER	REV
<b>B</b>	E.007 TBI	<b>81-18000-01</b>	<b>A</b>
DATE 8-11-87		SHEET 3 OF 10	



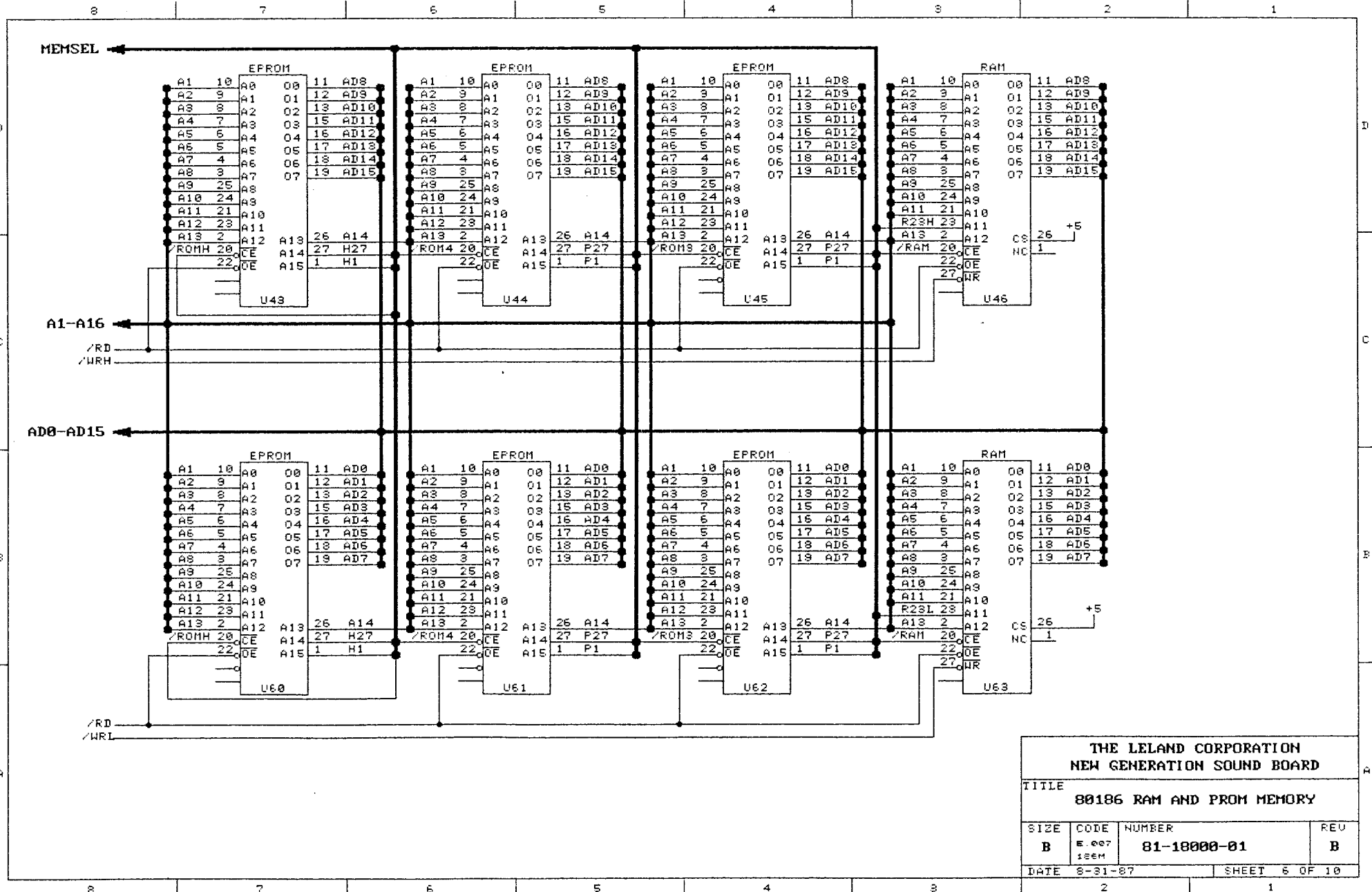
NOTE:  
All IC power grounds  
are D6ND.

<b>THE LELAND CORPORATION</b>			
<b>NEW GENERATION SOUND BOARD</b>			
TITLE			
<b>A/D AND SERIAL TAG INTERFACE</b>			
SIZE	CODE	NUMBER	REV
B	E.007 ADT	81-10000-01	A
DATE	8-11-87		SHEET 4 OF 10



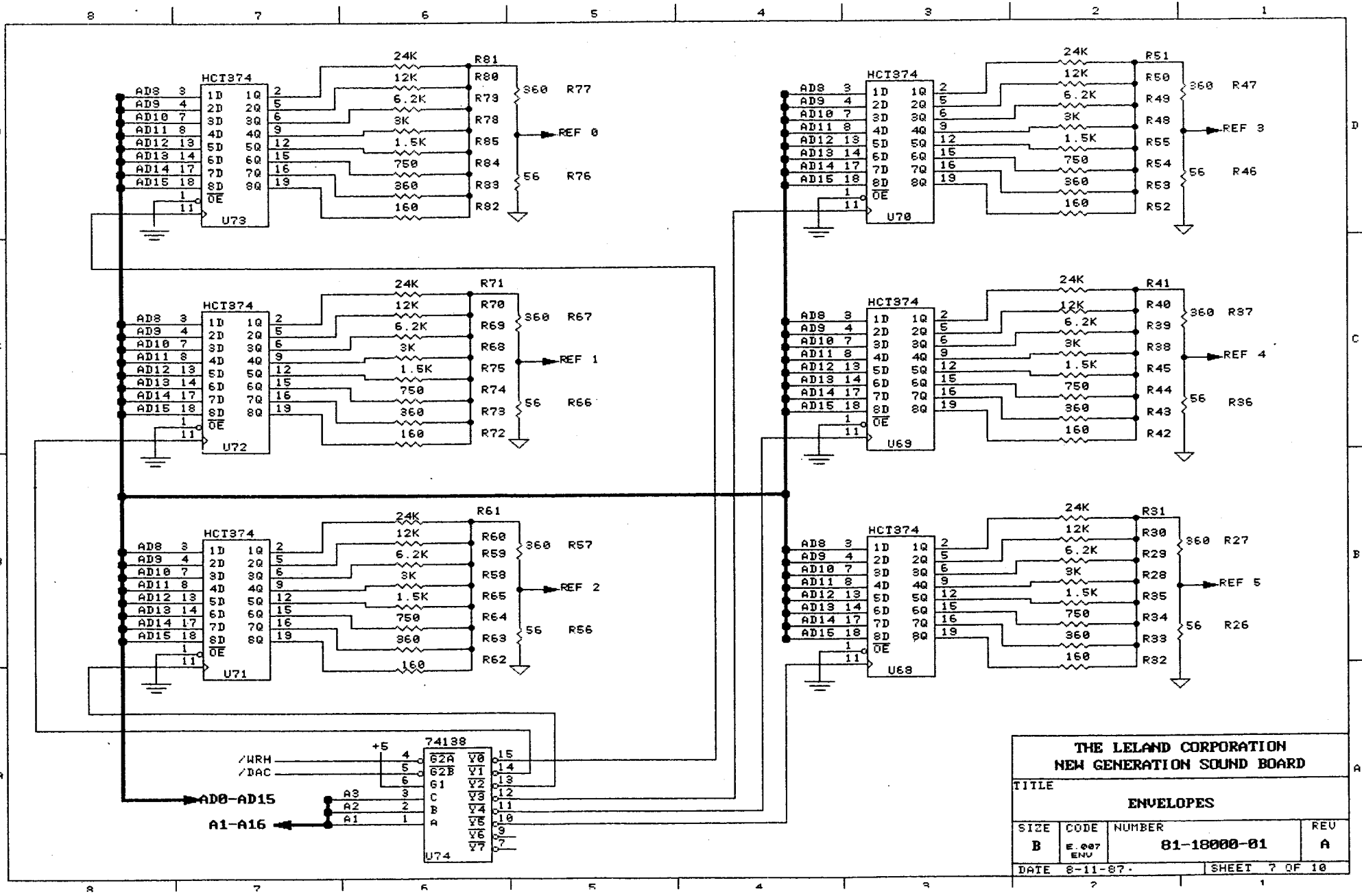
CINEMATRONICS INC.			
TITLE			
PROGRAMMABLE SOUND BOARD			
80186 CPU			
SIZE	CODE	NUMBER	REV
B		81-18000-01	B
DATE 10-23-86		SHEET 5 OF 10	





<b>THE LELAND CORPORATION</b>			
<b>NEW GENERATION SOUND BOARD</b>			
TITLE			
<b>80186 RAM AND PROM MEMORY</b>			
SIZE	CODE	NUMBER	REV
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DATE 8-31-87		SHEET 5 OF 10	

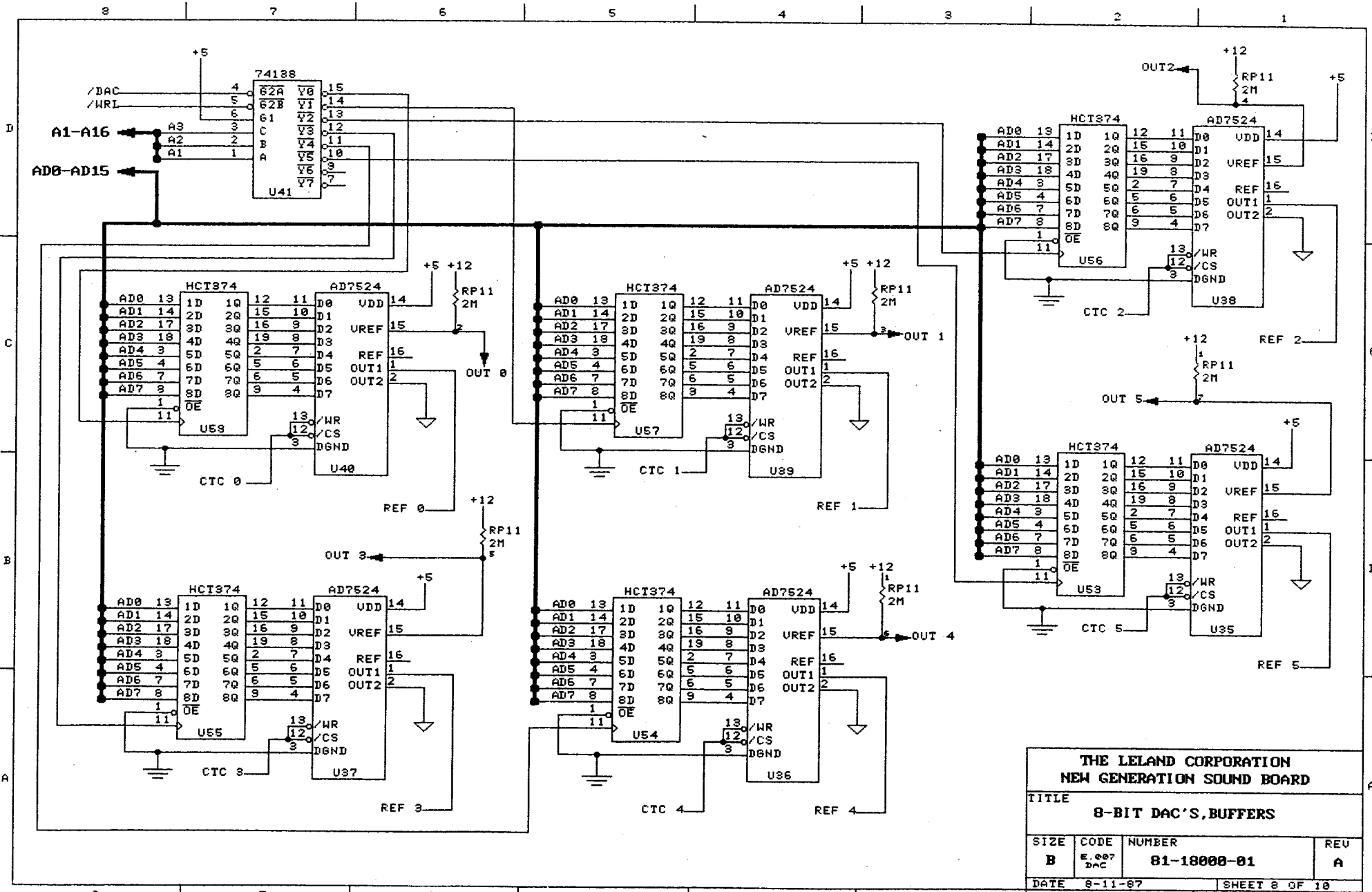
26



**THE LELAND CORPORATION**  
**NEW GENERATION SOUND BOARD**

TITLE  
**ENVELOPES**

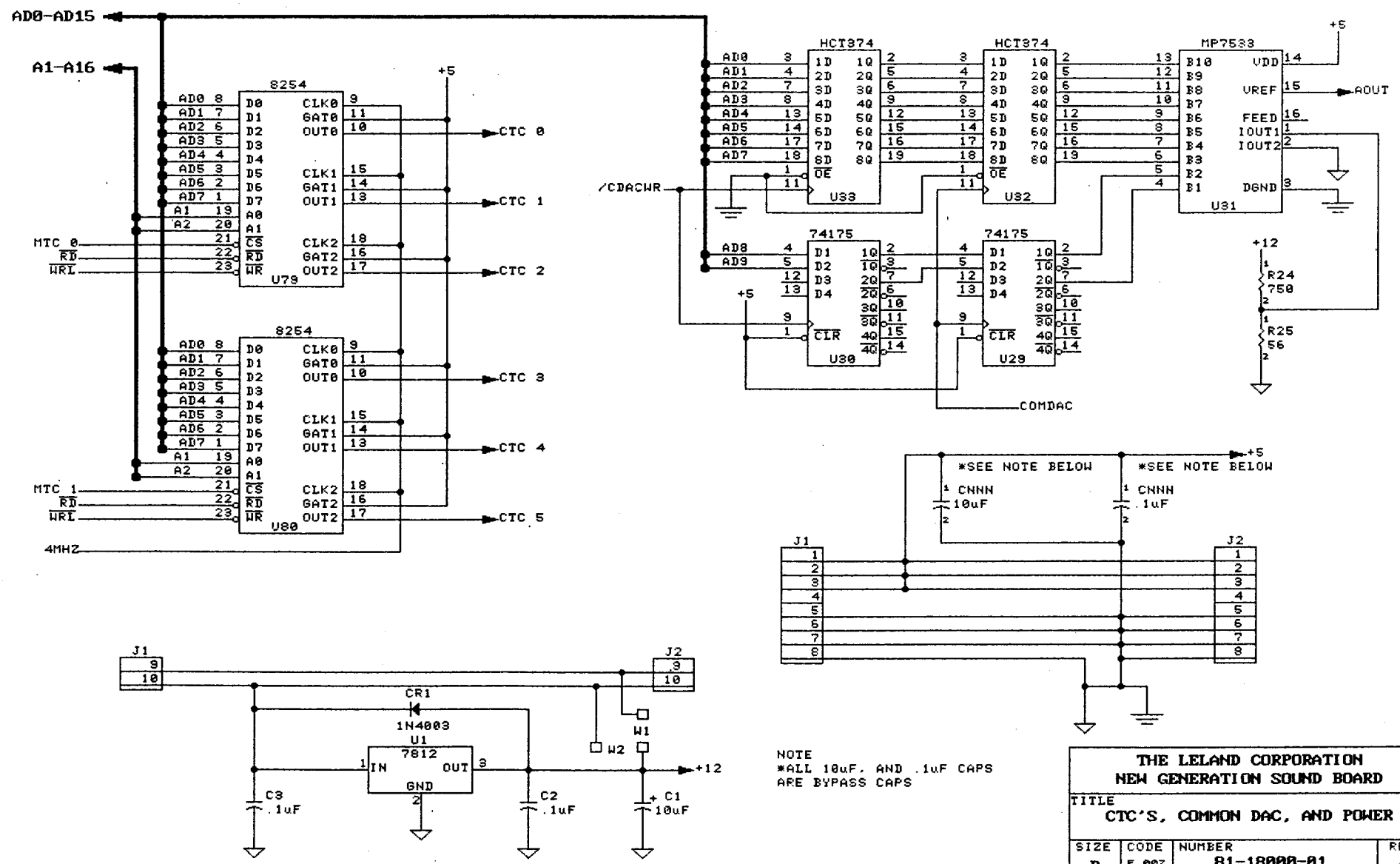
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DATE 8-11-87.		SHEET 7 OF 10	



<b>THE LELAND CORPORATION</b>			
<b>NEW GENERATION SOUND BOARD</b>			
TITLE			
<b>8-BIT DAC'S, BUFFERS</b>			
SIZE	CODE	NUMBER	REV
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DATE	8-11-87		SHEET 8 OF 10

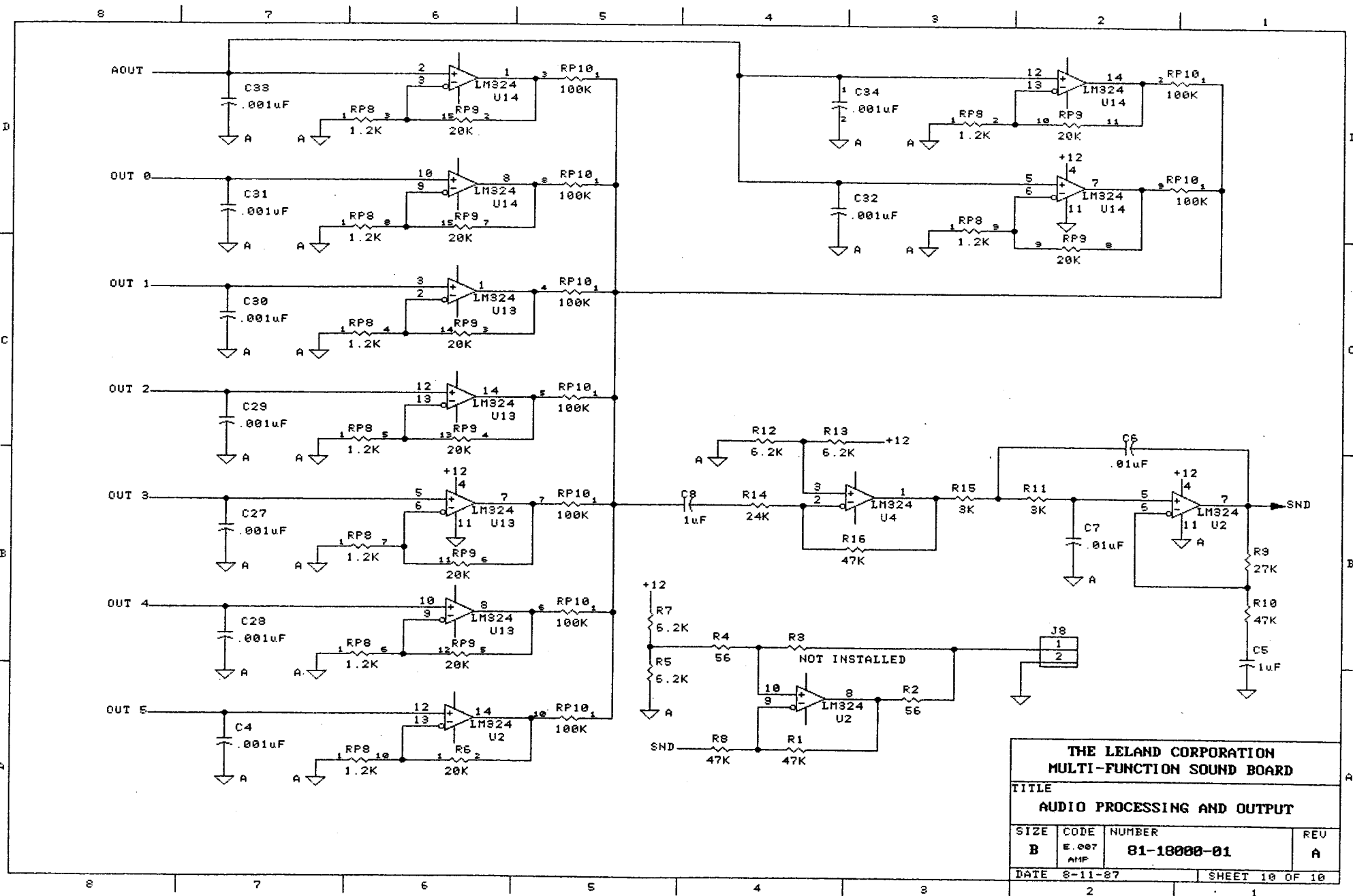
27

28



NOTE  
 \*ALL 10uF. AND .1uF CAPS  
 ARE BYPASS CAPS

<b>THE LELAND CORPORATION NEW GENERATION SOUND BOARD</b>			
TITLE			
<b>CTC'S, COMMON DAC, AND POWER</b>			
SIZE	CODE	NUMBER	REV
<b>B</b>	E.007 CTC	<b>81-18000-01</b>	<b>A</b>
DATE		8-14-87	SHEET 3 OF 10



<b>THE LELAND CORPORATION</b>			
<b>MULTI-FUNCTION SOUND BOARD</b>			
TITLE			
<b>AUDIO PROCESSING AND OUTPUT</b>			
SIZE	CODE	NUMBER	REV
<b>B</b>	E. 007 AMF	<b>81-18000-01</b>	<b>A</b>
DATE		SHEET	
8-11-87		10 OF 10	

8

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4

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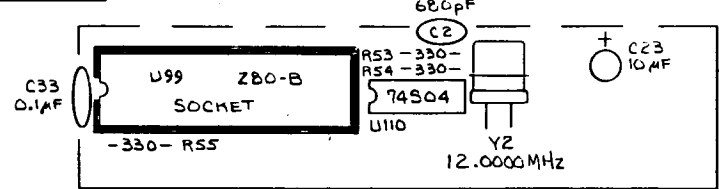
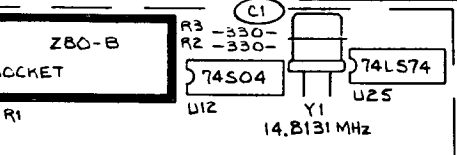
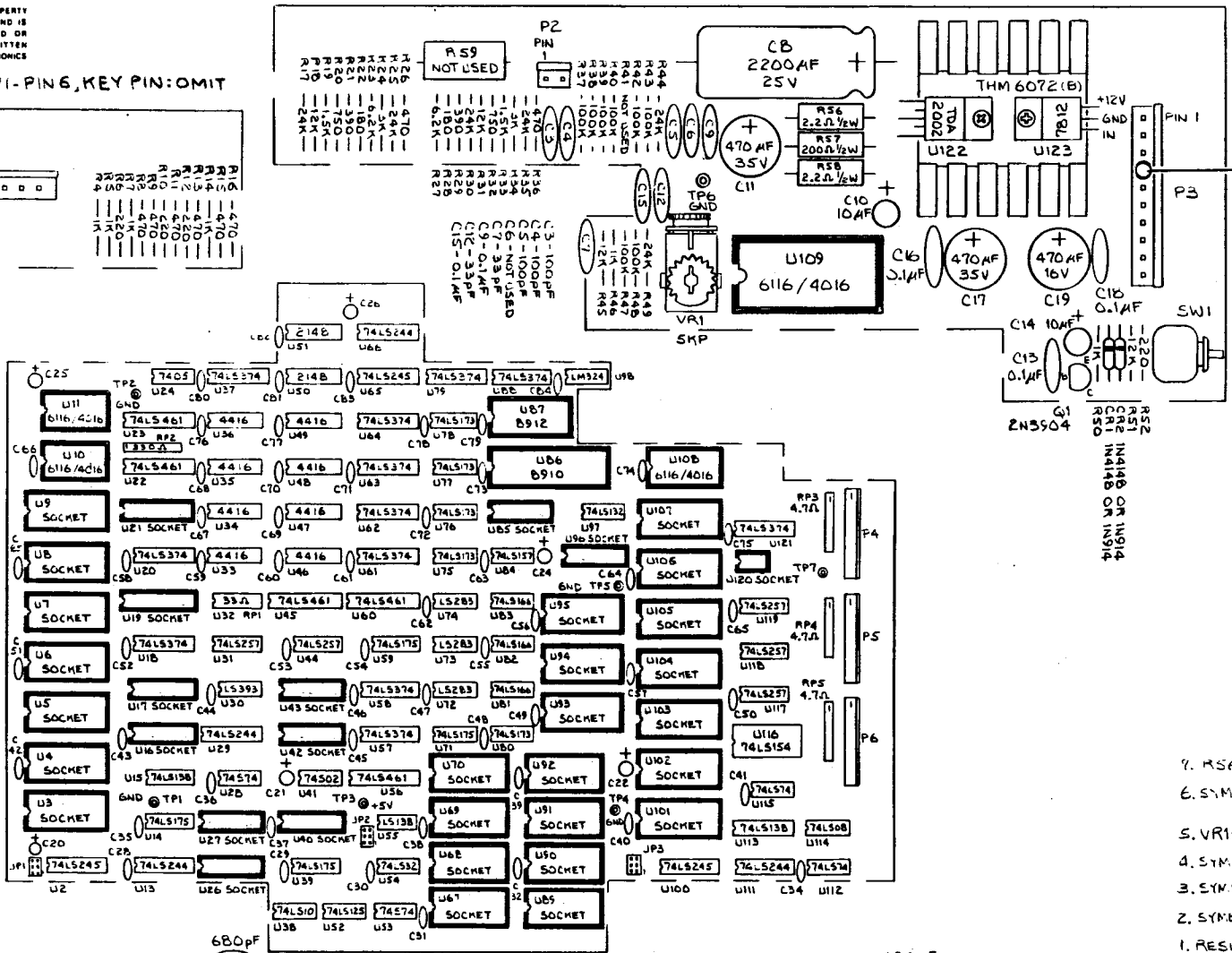
1

PROPRIETARY  
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DISTRIBUTED WITHOUT WRITTEN  
AUTHORIZATION OF CINEMATRONICS  
INC

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

P1-PIN 6, KEY PIN: OMIT

P3-PIN 4, KEY PIN: OMIT



- 7. R56 AND R58 MAY BE 1/4 W
  - 6. SYMBOL [Symbol] IS JUMPER PACK, TYP. HNCUT (P1-3) [Symbol]
  - 5. VR1-VOLUME PCT, INSTALL EITHER STAND-UP OR LAY-DOWN (BOTH SHOWN)
  - 4. SYMBOL @ IS TESTPOINT (TP1-TP7)
  - 3. SYMBOL ( ) IS 0.1uF 50V UISC CAPACITOR (C27-C85)
  - 2. SYMBOL + IS 10uF 16V ELECTROLYTIC RAD. CAP (C20-26)
  - 1. RESISTOR VALUES ARE OHMS, RESISTORS ARE 1/4W, 5% C
- NOTES: UNLESS OTHERWISE SPECIFIED

10/26/87

MATERIAL	DRAWN BY	DATE	THE LELAND CORP.	REV
	PROJECT ENGR	DATE		81-10000-00
FINISH	RELEASE APPROV	DATE	DWG TITLE	
	DO NOT SCALE DWG	DATE	CINEMAT MAIN LOGIC	
TOLERANCE UNLESS OTHERWISE SPECIFIED		MODEL NO	DWG NO	REV
PROJECTION FULL		SCALE	81-10000-00	A
SCALE		CODE IDENT	SHEET 1 OF 1	

NOTES UNLESS OTHERWISE SPECIFIED

8

7

6

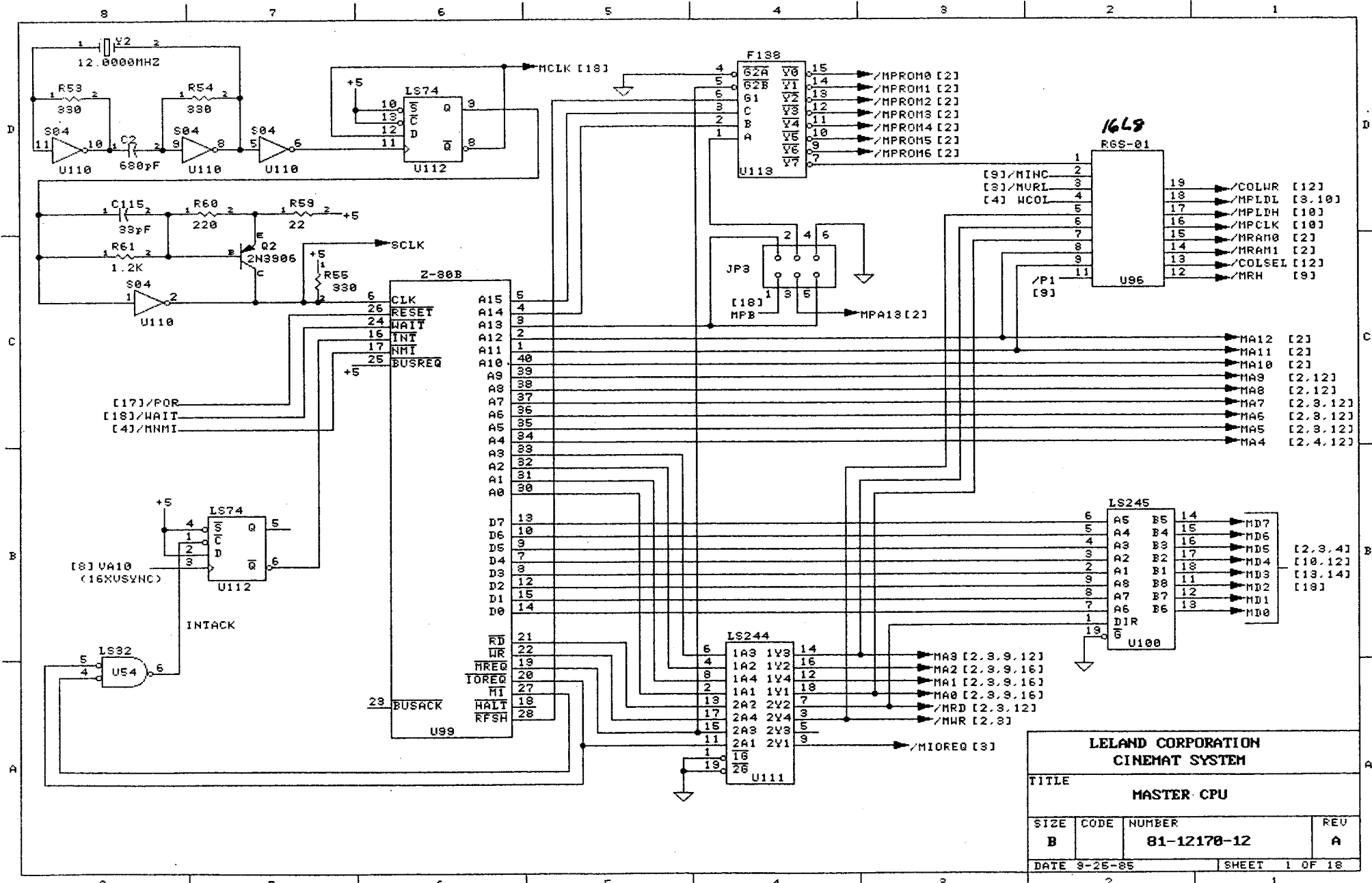
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4

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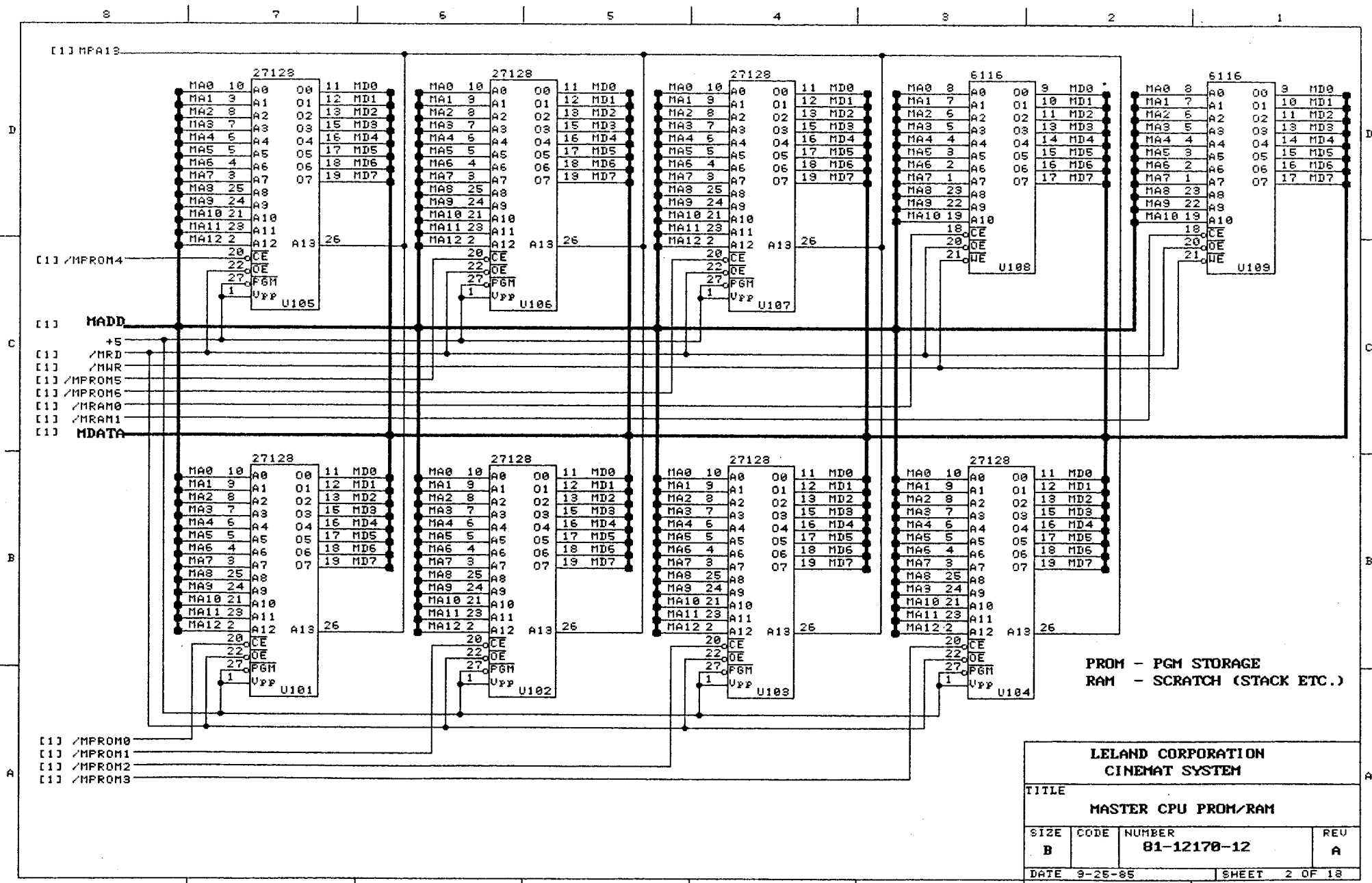
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1



<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE <b>MASTER CPU</b>			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 8-25-85		SHEET 1 OF 18	

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PROM - PGM STORAGE  
RAM - SCRATCH (STACK ETC.)

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

32

D

C

B

A

D

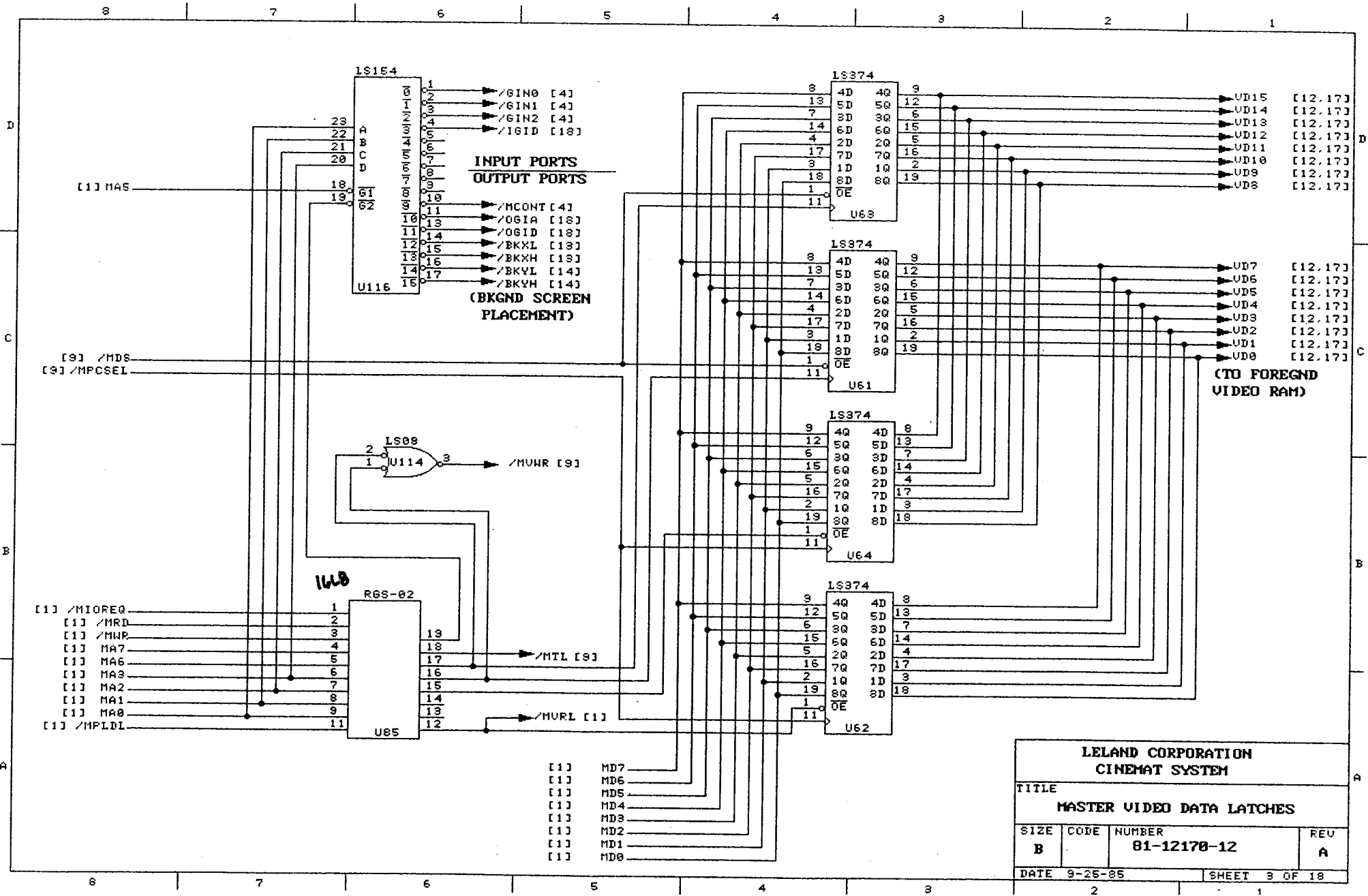
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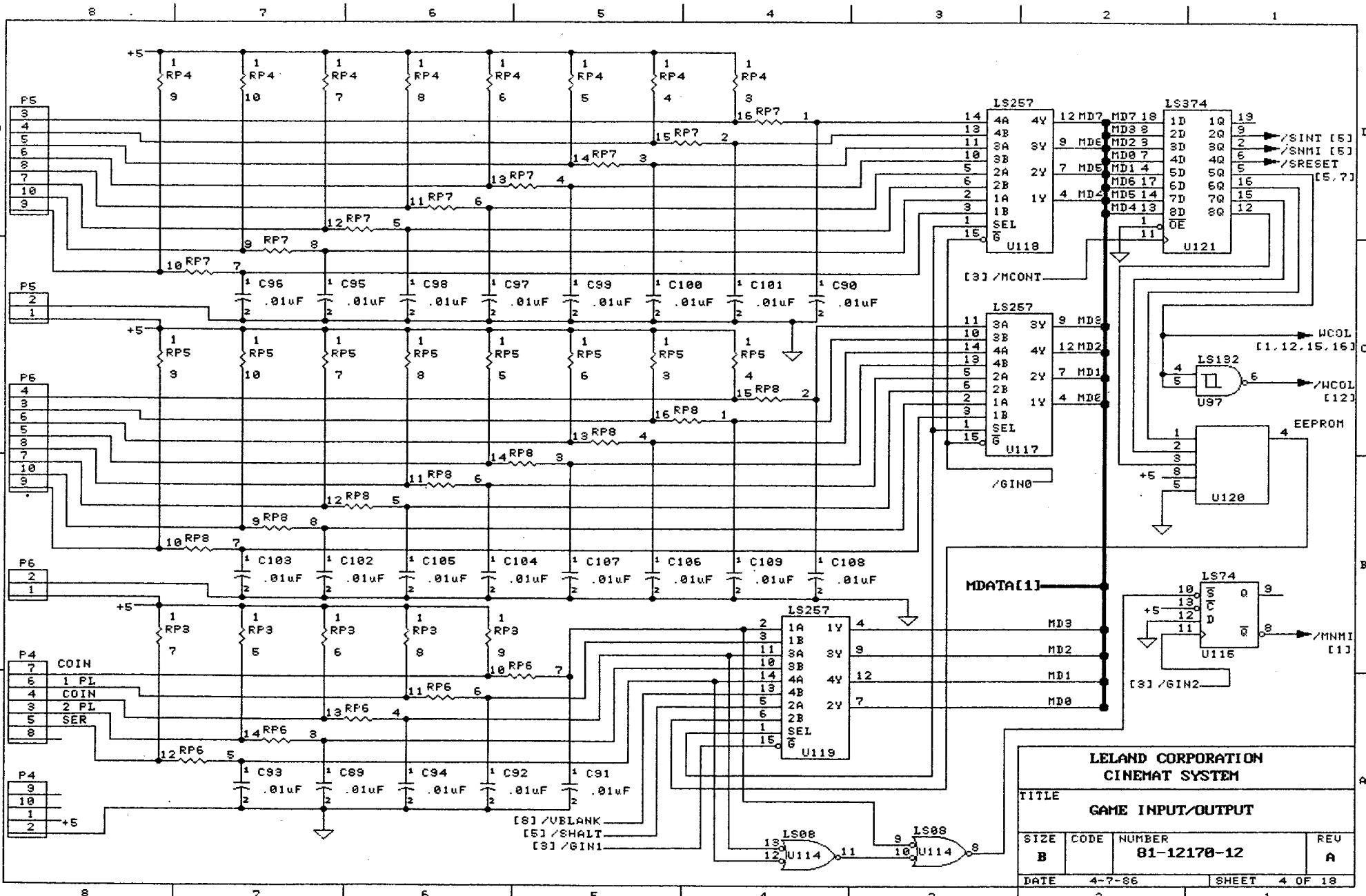
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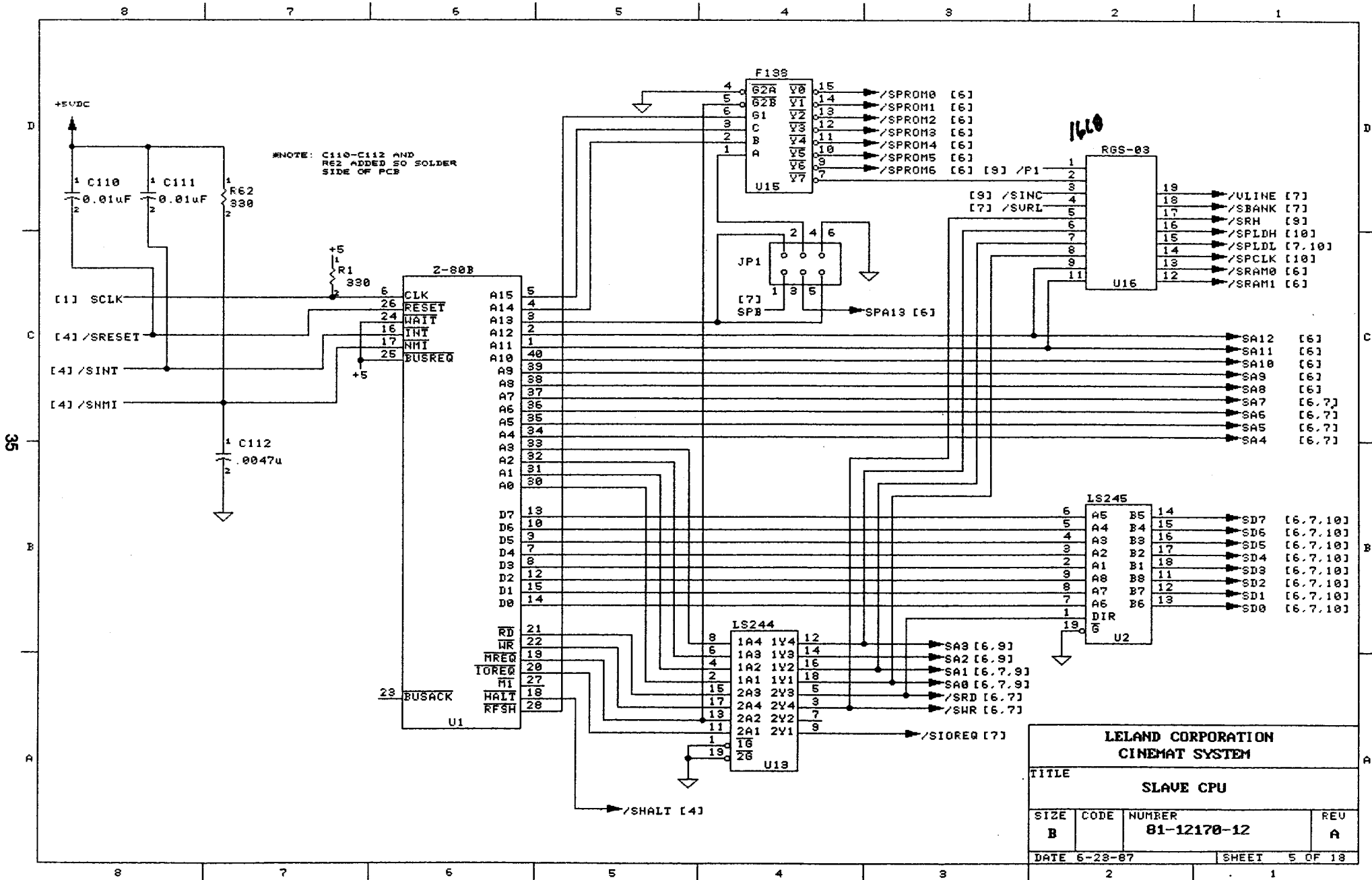
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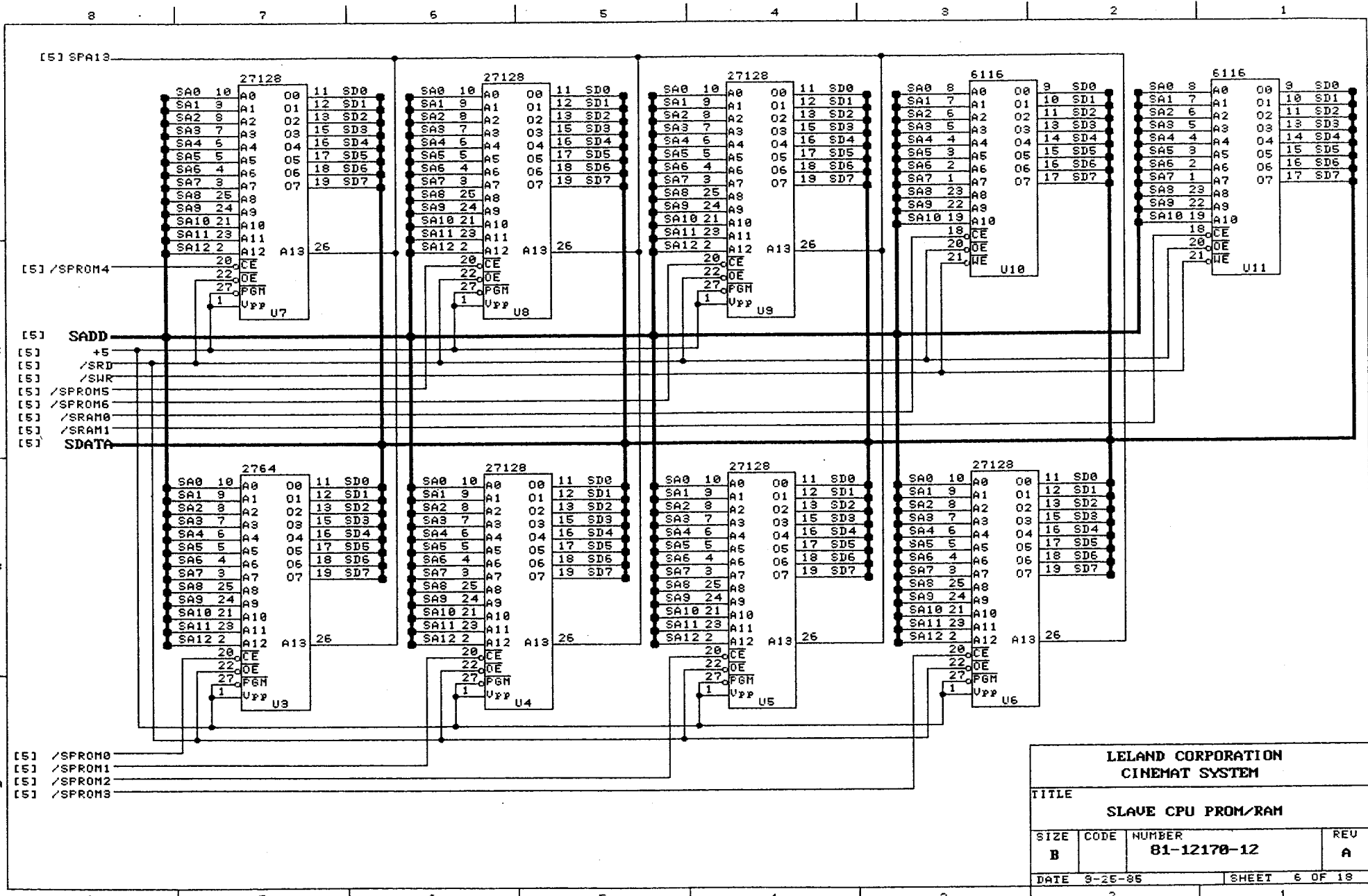
<b>LELAND CORPORATION</b>			
<b>CINEMAT SYSTEM</b>			
TITLE			
<b>MASTER VIDEO DATA LATCHES</b>			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-25-85		SHEET 3 OF 18	



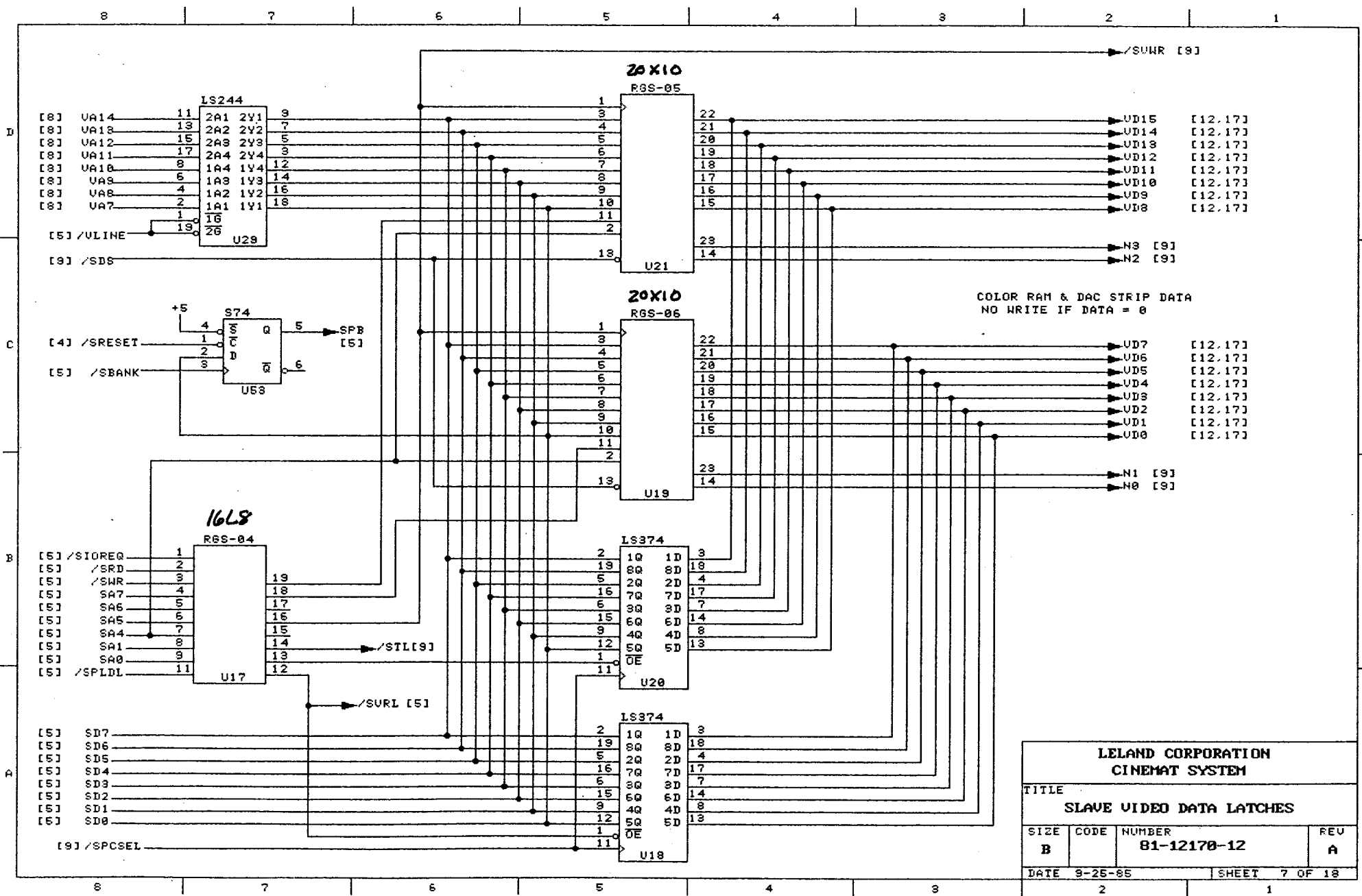
<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
<b>TITLE GAME INPUT/OUTPUT</b>			
SIZE <b>B</b>	CODE	NUMBER <b>81-12170-12</b>	REV <b>A</b>
DATE 4-7-86	SHEET 4 OF 18		



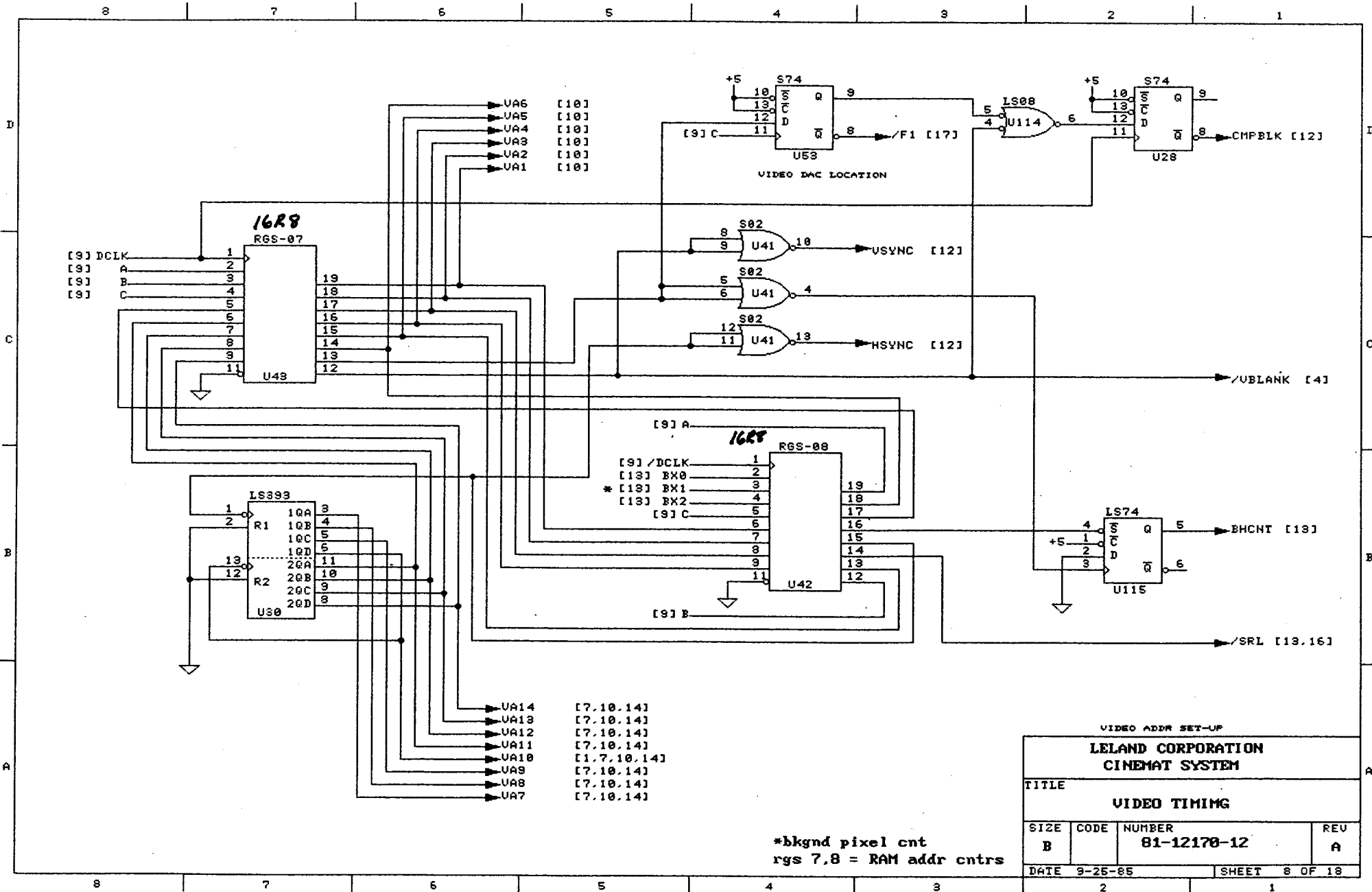
<b>LELAND CORPORATION</b>			
<b>CINEMAT SYSTEM</b>			
<b>TITLE</b>			
<b>SLAVE CPU</b>			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 6-23-87		SHEET 5 OF 18	

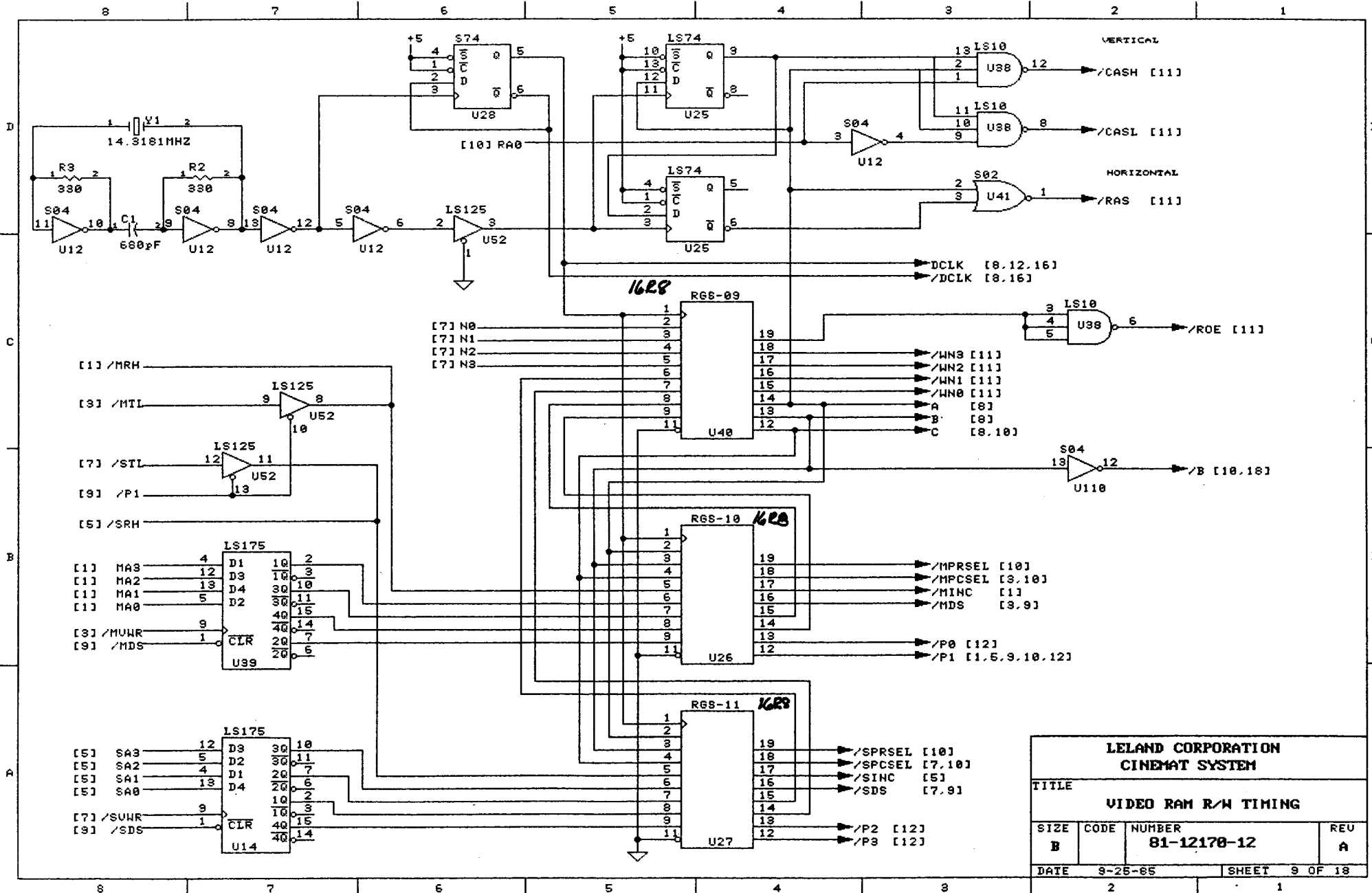


<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE <b>SLAVE CPU PROM/RAM</b>			
SIZE <b>B</b>	CODE	NUMBER <b>81-12170-12</b>	REV <b>A</b>
DATE <b>3-25-85</b>		SHEET <b>6 OF 19</b>	



LELAND CORPORATION CINEMAT SYSTEM			
TITLE SLAVE VIDEO DATA LATCHES			
SIZE B	CODE	NUMBER 81-12170-12	REV A
DATE 9-25-85		SHEET 7 OF 18	





LELAND CORPORATION CINEMAT SYSTEM			
TITLE			
VIDEO RAM R/W TIMING			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE	9-26-85	SHEET	9 OF 18

39

D

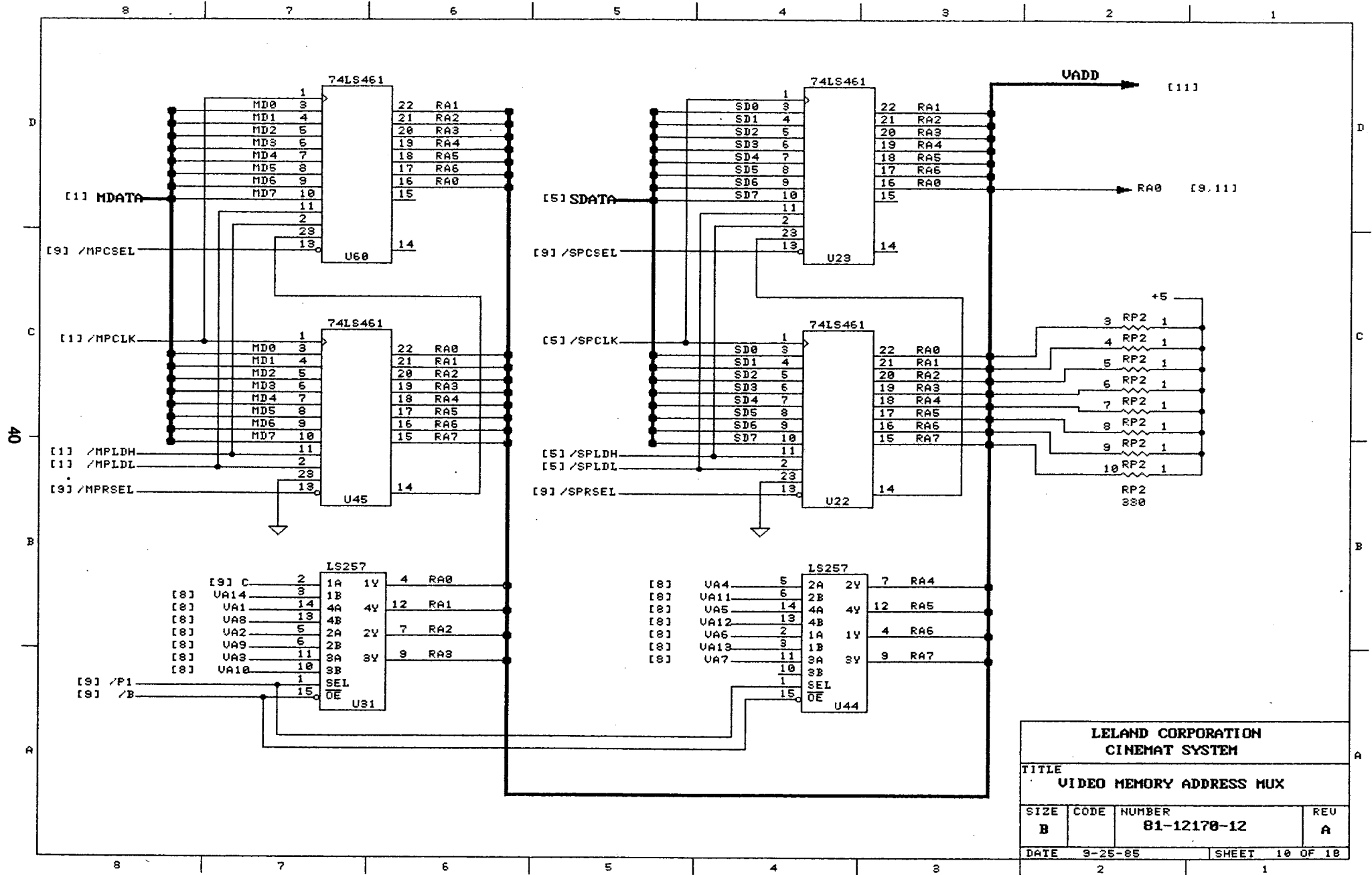
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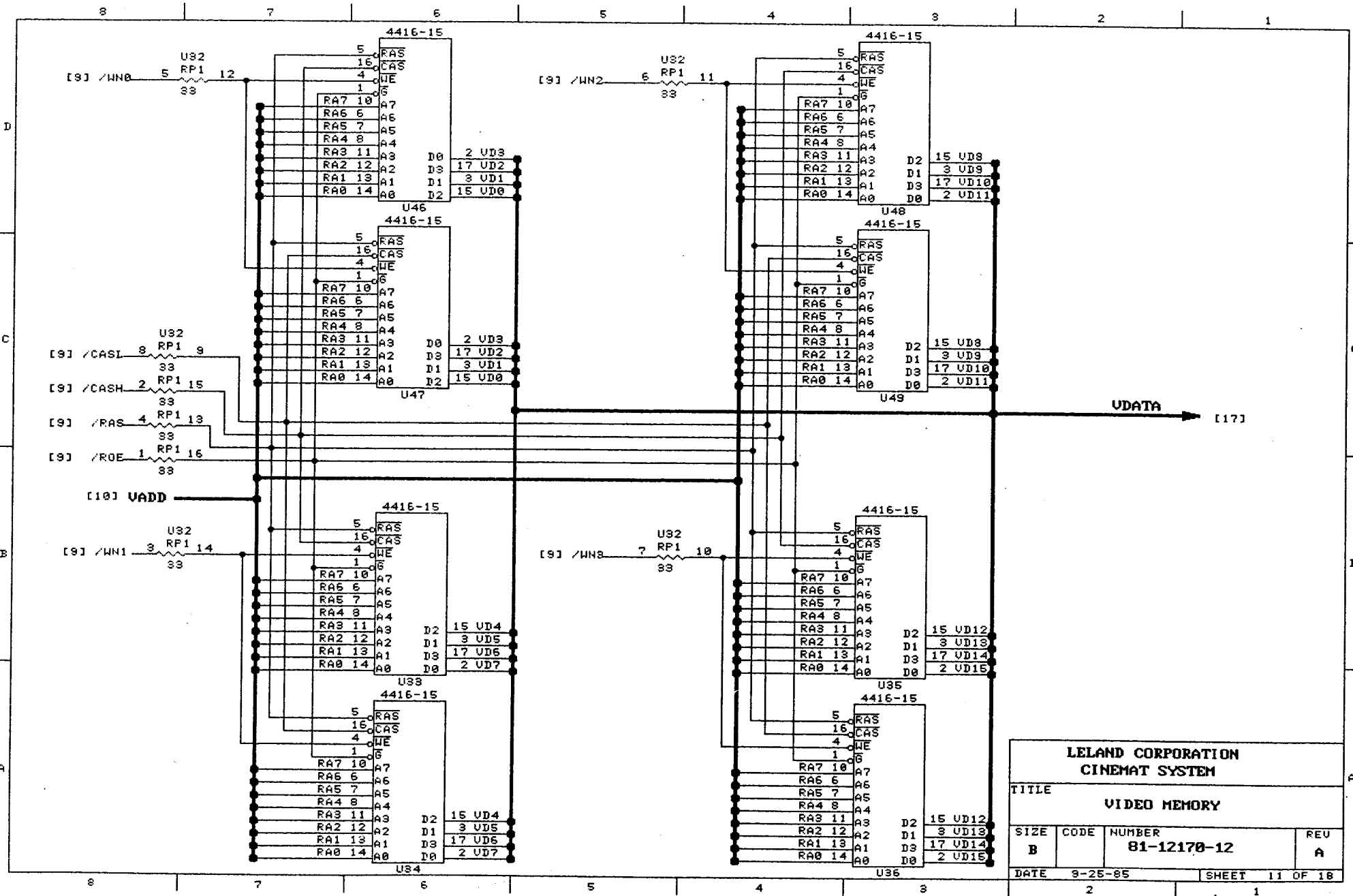
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8 7 6 5 4 3 2 1

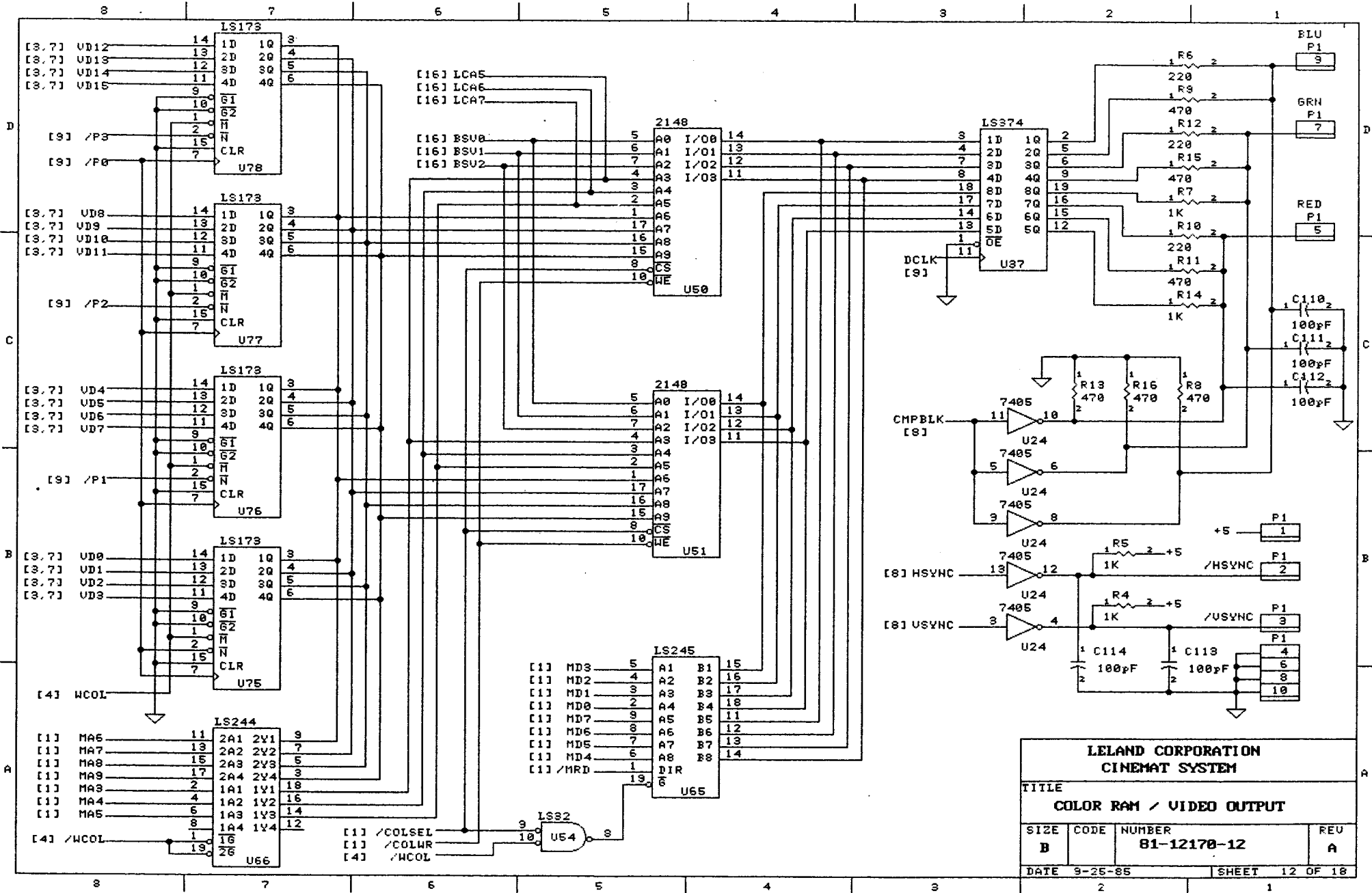


<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE			
<b>VIDEO MEMORY ADDRESS MUX</b>			
SIZE	CODE	NUMBER	REV
<b>B</b>		<b>81-12170-12</b>	<b>A</b>
DATE	9-25-85		SHEET 10 OF 10



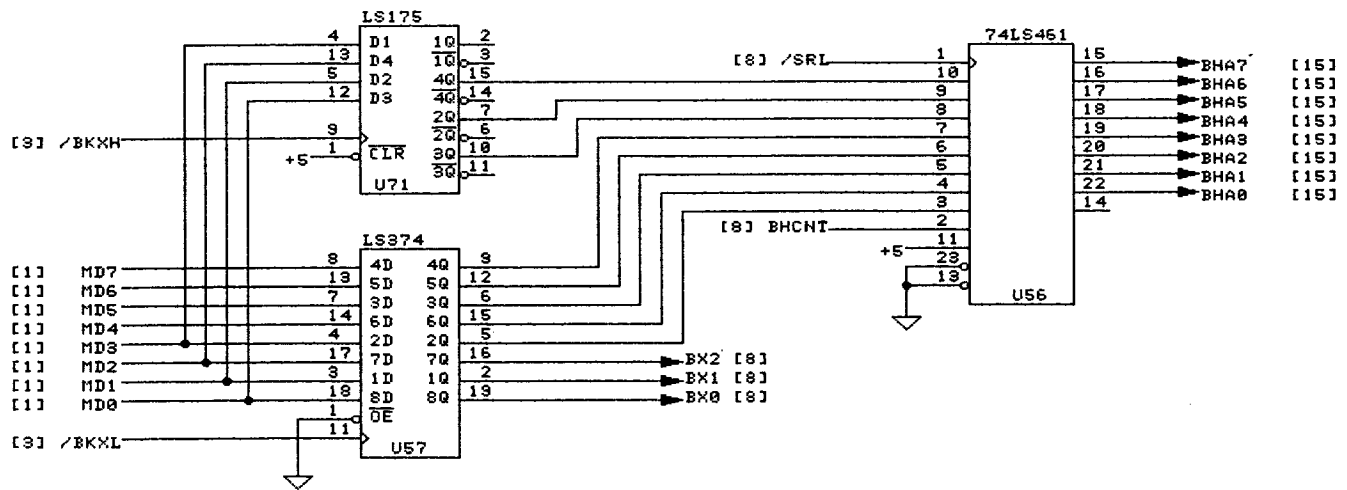


<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE <b>VIDEO MEMORY</b>			
SIZE <b>B</b>	CODE	NUMBER <b>81-12170-12</b>	REV <b>A</b>
DATE 9-25-85		SHEET 11 OF 18	

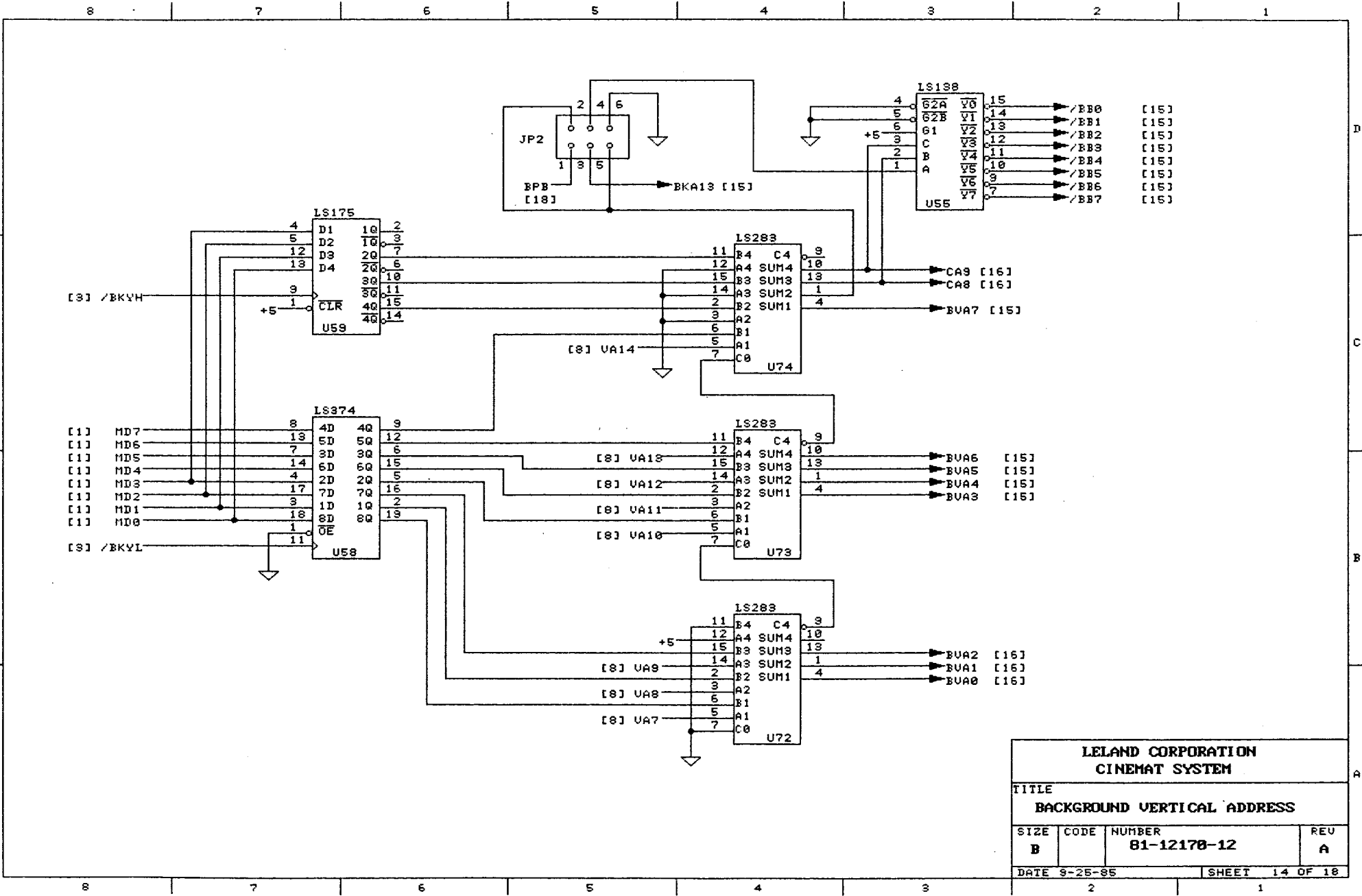


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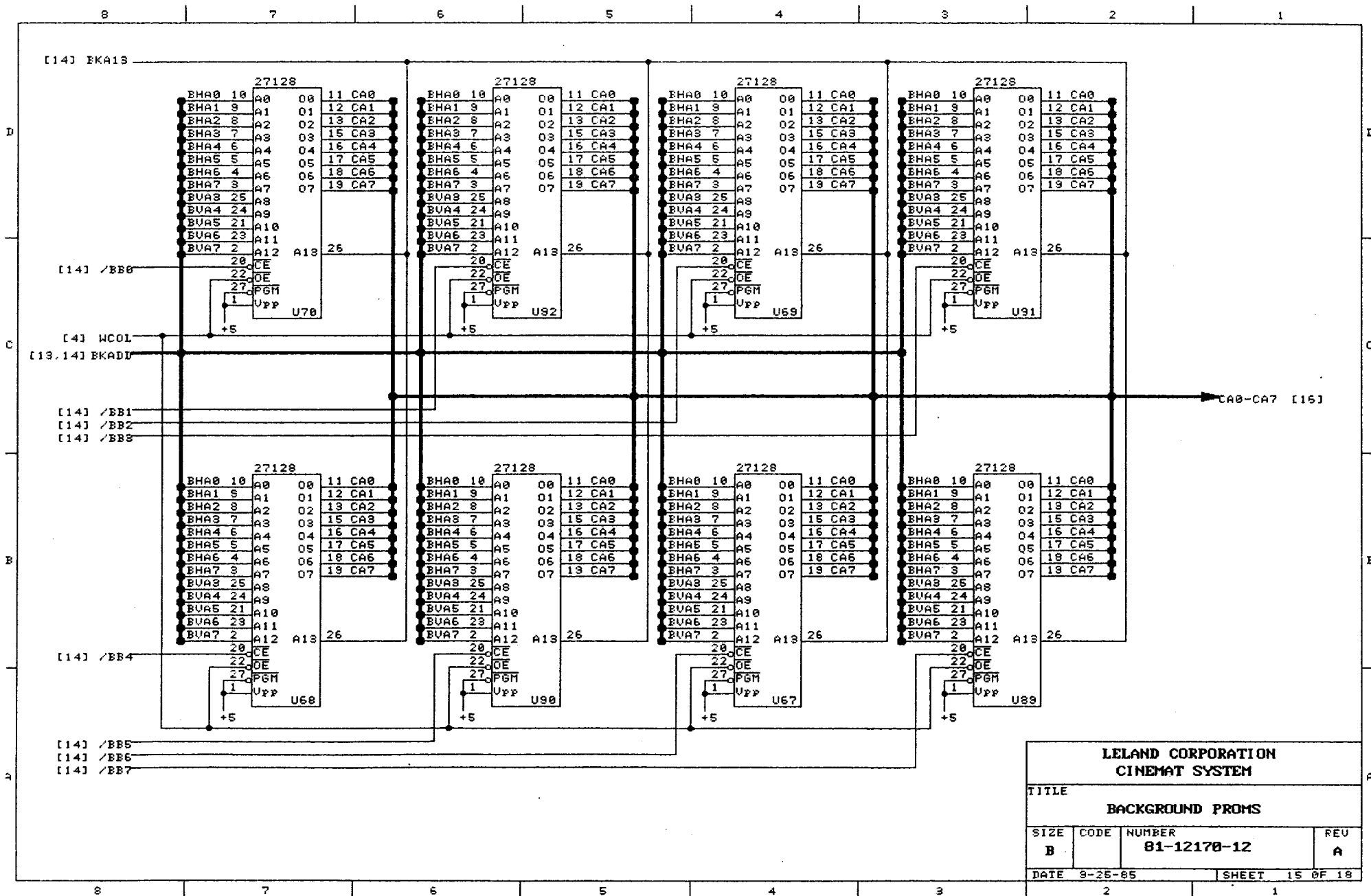
<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE			
<b>COLOR RAM / VIDEO OUTPUT</b>			
SIZE	CODE	NUMBER	REV
B		<b>81-12170-12</b>	A
DATE 9-25-85		SHEET 12 OF 18	



<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE <b>BACKGROUND HORIZONTAL ADDRESS</b>			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-25-85		SHEET 13 OF 18	

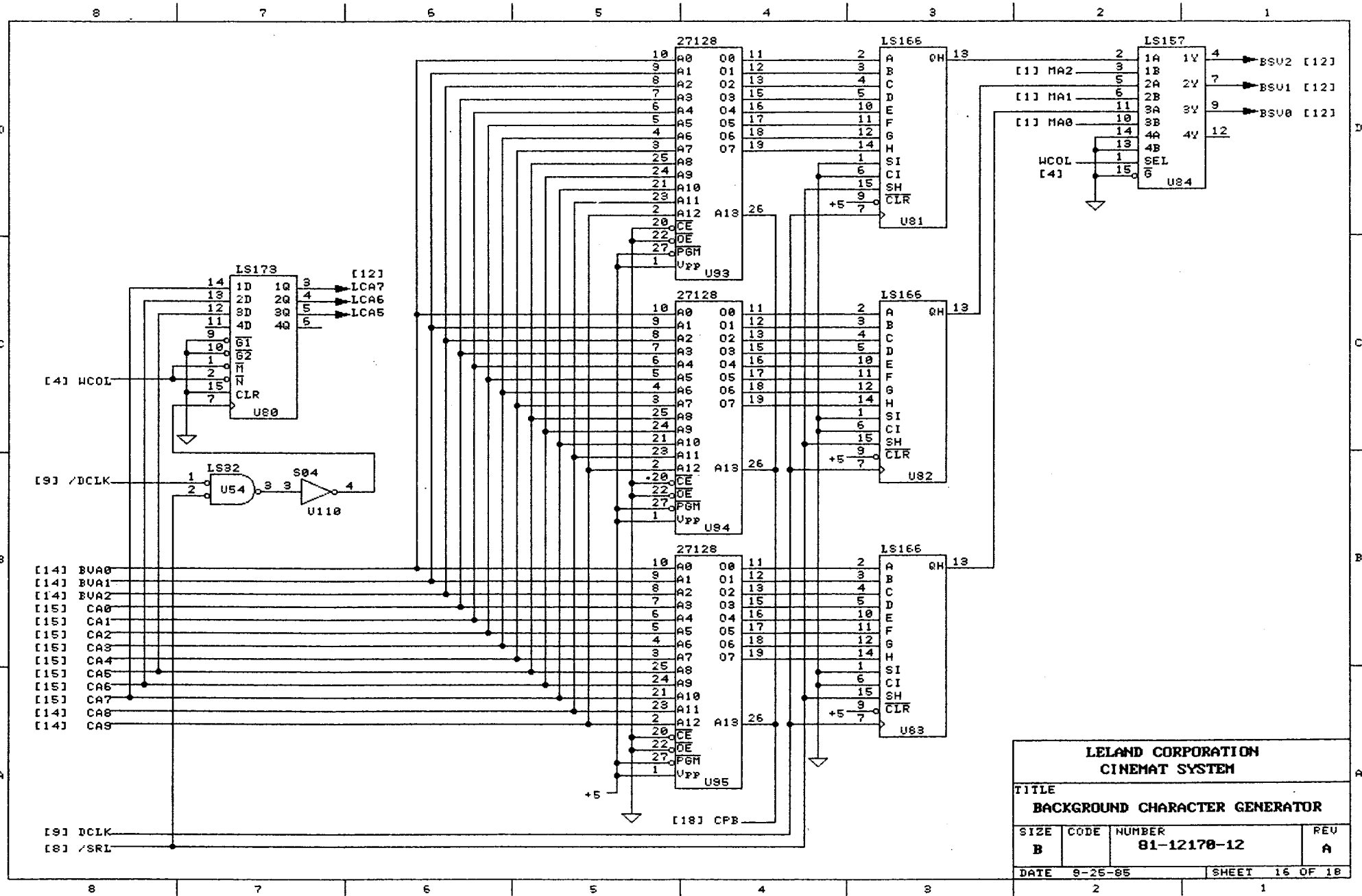


<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE <b>BACKGROUND VERTICAL ADDRESS</b>			
SIZE <b>B</b>	CODE <b>81-12170-12</b>	NUMBER <b>81-12170-12</b>	REV <b>A</b>
DATE <b>9-25-85</b>		SHEET <b>14 OF 18</b>	

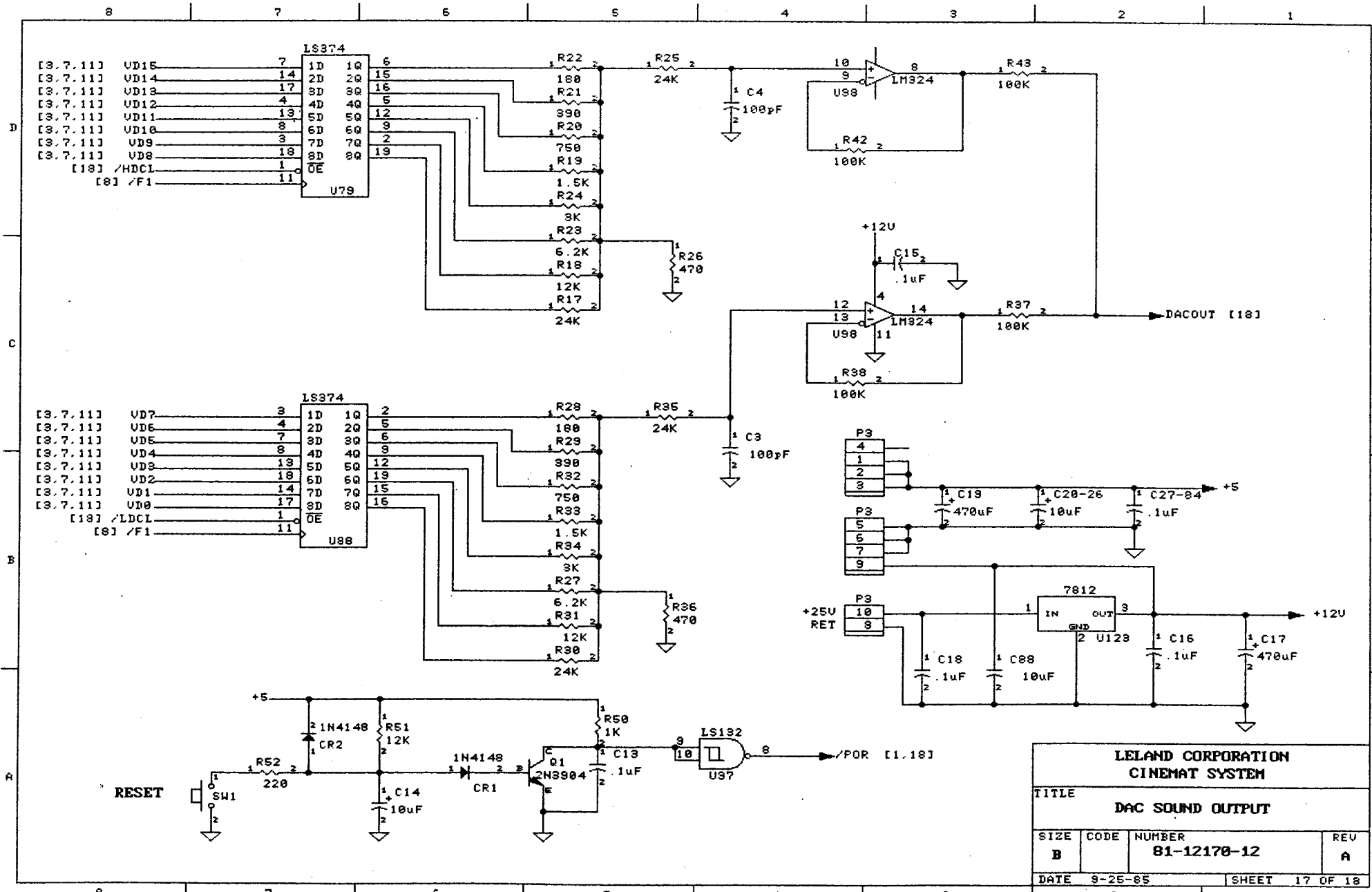


<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE			
<b>BACKGROUND PROMS</b>			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-25-85		SHEET 15 OF 18	

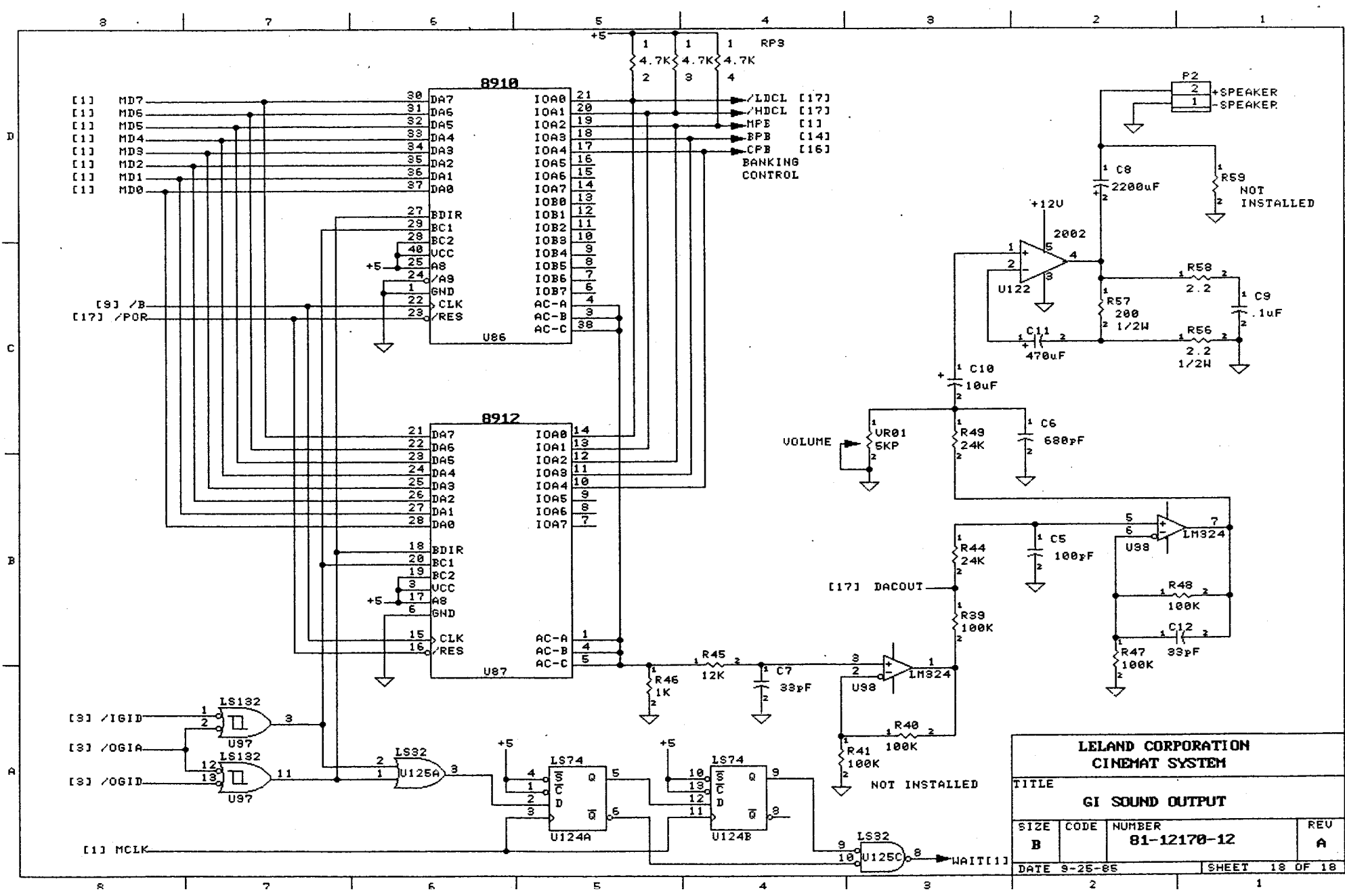
46



<b>LELAND CORPORATION CINEMAT SYSTEM</b>			
TITLE			
<b>BACKGROUND CHARACTER GENERATOR</b>			
SIZE	CODE	NUMBER	REV
B		<b>81-12170-12</b>	A
DATE		9-25-85	SHEET 16 OF 18
	2		1



LELAND CORPORATION CINEMAT SYSTEM			
TITLE DAC SOUND OUTPUT			
SIZE B	CODE	NUMBER 81-12170-12	REV A
DATE 9-25-65		SHEET 17 OF 18	



LELAND CORPORATION			
CINEMAT SYSTEM			
TITLE			
GI SOUND OUTPUT			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-26-85		SHEET 18 OF 18	

48

D

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8 7 6 5 4 3 2 1

R 7 6 5 4 3 2 1