MIDWAY

STRIKE
FORCE ™

```
╔══════════════════════════════════╗
║                                  ║
║       OPERATIONS MANUAL          ║
║           including:             ║
║                                  ║
║   Game Operation & Adjustment    ║
║  Game Testing & Problem Diagnosis║
║        Parts Information         ║
║  Reference Diagrams & Schematics ║
║                                  ║
╚══════════════════════════════════╝
```

MIDWAY MANUFACTURING
3401 N. California Avenue
Chicago, IL 60618

The Saga of STRIKE FORCE

In the year 2020 the first alien contact is made. From the farthest reaches of the galaxy comes a distress call. The Saurians, an evil reptilian race bent on conquering the universe, are currently invading the human colonized Beta System. The Saurians mutate all life forms they encounter into slaves for their evil empire. The only hope for the colonists and, perhaps, all of mankind is an elite team of fighters able to respond to the initial invasion.

Each player controls a Strike Force composed of a rocket fighter and a team of space marines in their powered battle armor. They must travel throughout the planets of the Beta System, battling the Saurians and their vicious minions. Unfortunately, defeating the Saurians on the planets surface is not enough. . The Saurian megastar, which brought the alien invaders, is circling the solar system launching dreadnaughts. These large dangerous motherships travel to the planets delivering a never- ending supply of invading Saurians. The players need to destroy the dreadnaughts to prevent the retaking of their hard won planets. Ultimately though, they must attempt the destruction of the Saurian Megastar "Apocalypse" to end the invasion and win on the Saurian Front.

STRIKE FORCE
Game Play

STRIKE FORCE is a one, or two-player game in which two players play simultaneously. Unlimited buy-ins are allowed at any time for either player. STRIKE FORCE is unique because it has unlimited open ended game play and an ultimate goal, which allows the players to win. Most games provide the player with a fixed series of encounters that do not change from game to game, STRIKE FORCE puts the player in charge of battling his/her way through a realistic environment. The player not only chooses where to go across a 3D- looking planetary surface, but also which weapon to use from an arsenal that accumulates as the game progresses. Once the Saurians are conquered on a planet, the player pilots his/her interplantary shuttle to one of 22 different planets.

The Megastar is 40 screens long. The ultimate challange of STRIKE FORCE is to chase down, enter, and get to the core of the enemy Megastar.

STRIKE
FORCE

TABLE OF CONTENTS

Section 1 Operation and Troubleshooting

Section 2 Parts Information

Section 3 Diagrams and Schematics

Operation and Troubleshooting

Safety Notices

The following safety hints apply to all game operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply. We recommend that you read this page, and also all of Section 1, before preparing your game for play.

WARNINGS

AC POWER CONNECTION. Before connecting the game to the AC power source, verify that the "line voltage selection chart" jumper wires are installed correctly for the line voltage in your area. For details, refer to Section 3.

PROPERLY GROUND THE GAME. To avoid electrical shocks, do not plug in the game until it has been inspected and properly grounded. MIDWAY games should only be plugged into a grounded 3-wire outlet. Shocks will also result, if the control panel is not properly grounded. After servicing any parts on the panel, assure that the ground wires are secure. Only then should you lock up the game.

DISCONNECT POWER DURING REPAIRS. To avoid electrical shock, disconnect the game from the AC power source before removing or repairing any part of the game. When removing or repairing the monitor, extra precautions must be taken to avoid electrical shock because high voltages may exist within the monitor circuitry and cathode ray tube (CRT) even after power has been disconnected. Do not touch internal parts of the display with your hands or metal objects! Always discharge the CRT. Attach one end of a large, well-insulated, 20-kV jumper to ground. Momentarily touch the free end of the grounded jumper to the anode by sliding it under the anode cap. Wait two minutes and discharge the anode again.

USE THE PROPER FUSE. To avoid equipment damage, use the replacement fuse which is specified in the parts list for this game. The replacement fuse must match the original fuse in fuse type, voltage rating, and current rating.

HANDLE FLUORESCENT TUBE AND CRT WITH CARE. If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion.

(CAUTION)

PROPERLY ATTACH ALL CONNECTORS. Make sure that the connectors on each printed circuit board are properly connected. If they do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty. All connectors are keyed to fit specific pins on each board.

Setup Procedure

Installation and Inspection

1. Remove the game from its shipping carton, and inspect the exterior of the cabinet for any signs of damage. Remove the shipping cleats from the bottom of the cabinet.

2. Remove keys from the taped coin return slot (or attached to joystick). Unlock and open the coin and cash box doors. (Leg levelers and spare parts are stored in the cash box.)

3. Locate the four threaded holes on the bottom of the cabinet (one in each corner), and install one leg leveler (with its hex nut) in each hole.

4. Stand the cabinet upright and make certain that it is in a stable position. Level the cabinet.

5. Unscrew (or unlock) and remove the rear doors/panels of the cabinet. Inspect the interior for any signs of damage. Check all major assemblies to assure that they are mounted securely.

6. Refer to the game's cabinet wiring diagram (Section 3), and check to see that all cable connectors are correctly secured and firmly seated. DO NOT FORCE CONNECTORS. Watch for damaged connectors and avoid making reversed connections.

7. Line Voltage Selection. Your game is designed to work on the line voltage where you are located. Determine the value of your line voltage with a meter. Then, check the power input wires to the main power supply transformer on your game to be sure they are connected to taps which correspond to your local line voltage. If necessary, reconnect the power input wires to the transformer in accordance with the Transformer Chart in Section 3.

If the line voltage in your area falls outside the upper or lower limits of the range of voltage inputs covered by the main power supply transformer, DO NOT PLUG YOUR GAME IN until you have contacted your distributor or the MIDWAY Service Department and obtained a solution to the problem. Otherwise, you could damage your game.

8. Lay the line cord (connected to the Power Chassis) in the slot along the bottom edge of the lower rear cabinet door/panel. Install the rear cabinet door/panel and screw (lock) securely. Close and lock the front coin and cash box doors.

9. Connect the line cord to a grounded (3-terminal) AC wall outlet.

10. Switch ON the game, using the ON/OFF switch located on the upper left rear of the cabinet, to verify proper operation.

GAME LOCATION REQUIREMENTS

Power
Domestic 115V @ 60 Hz
Foreign 230V @ 50 Hz

Temp.
32° F to 100° F
(0° C to 38° C)

Humidity
Not to exceed 95% relative.

25" Cabinet (Rear View)

25" Cabinet (Front View)

Marquee Glass

Viewing Glass

Monitor Screen

Buttons

Joystick

Latches to release
Control Panel

Latches to release
Control Panel

Coin Door

Cabinet Assembly

Joystick

Joystick

Start/Transform

Start/Transform

Weapon
Select

Fire

Weapon

Weapon

Fire

Weapon
Select

Fire

Weapon

Control Panel Assembly

1-4
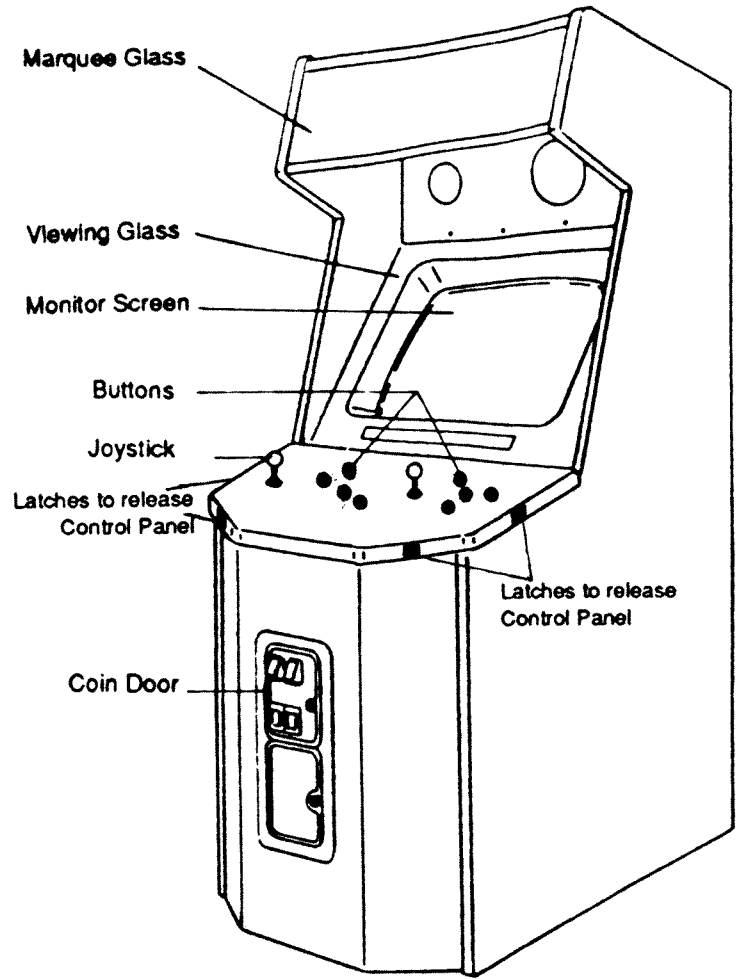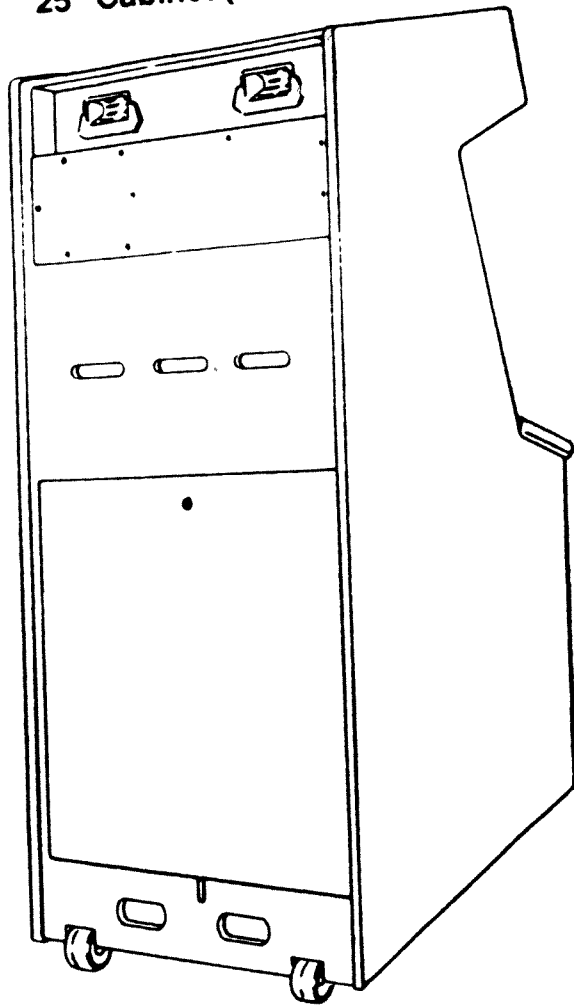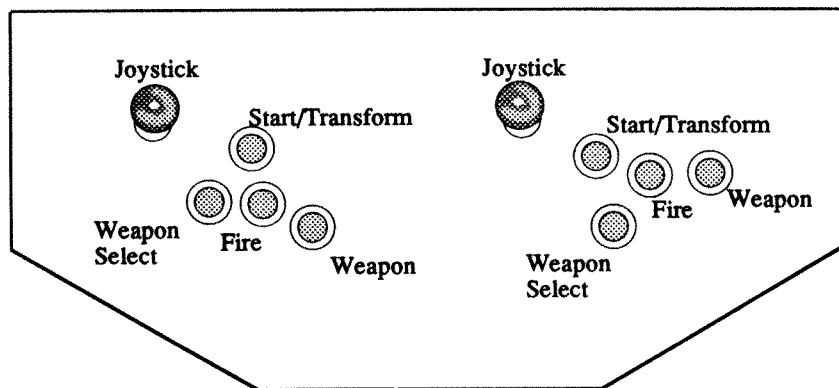
Servicing

■ Servicing the Control Panel

Switch OFF power to the game. The control panel is held in place by latches (located on the left and right sides of the cabinet) which provide constant pressure on the strikes. The latches can be reached through the coin door opening. To release the latches, lift the latch handle and unhook the wire fasteners. Carefully use the joysticks to lift the control panel. Rest the panel on its support bracket, while working on it. To reinstall the control panel, check for proper cable connections, including the ground strap, and use the joysticks to lower it into position, avoiding pinched wires. Reclamp the latches.

> ### *NOTE*
> To remove the control panel for bench servicing, release the latches (located on the sides of the control panel) and lift the control panel, until it rests on its support bracket. Note, be careful not to reach directly through the control panel as you might damage the Monitors remote controls board. Disconnect the cables and the ground strap. Lift the control panel out of the game cabinet.

■ Removal of Viewing Glass

Switch OFF power to the game, and open the control panel. Remove mountings at the bottom of the glass and remove the protective black plastic strip. Carefully lift the glass from its bottom groove and lift it clear of the cabinet.

■ Removal of Monitor Bezel

Switch OFF power to the game, and remove the viewing glass. Remove the bezel securing screws to free the monitor bezel.

■ Monitor Replacement

Read the WARNINGS section thoroughly before beginning this procedure.
Switch OFF power to the game. Open the upper rear door/ panel. Remove the viewing glass and the monitor bezel. Completely disconnect the monitor from all of its cabling, including its chassis ground strap. Remove the four bolts securing the monitor's mounting flanges to its mounting panel. Pull the monitor carefully from the cabinet front.

(CAUTION)

The monitor DOES NOT contain an isolation transformer in its chassis (it is mounted instead in the Power Chassis Assembly located on the floor of the cabinet). When servicing the monitor on a test bench, YOU MUST ISOLATE THE MONITOR FROM THE LINE VOLTAGE WITH AN ISOLATION TRANSFORMER.

(CAUTION)

While removing the four bolts, firmly support the monitor from the front of the CRT so that it will not slip.

■ Removal of the Marquee Glass

Switch OFF power to the game. Remove the screws in the
black plastic strip on top of the cabinet. Remove the strip and
carefully lift the glass. Store the glass carefully to prevent
damage.

The fluorescent tube is now accessible for replacement.
Remove plastic or cardboard lock, if necessary. Grasp the
tube, give it a quarter turn, and remove it from its socket.
Carefully place a new tube into the socket, and turn to
reinstall.

■ Removal of the Fluorescent Light Assembly

Switch OFF power to the game. Remove the marquee glass.
Disconnect the fluorescent light assembly from its power
cable. Remove the screws fastening the assembly to the
cabinet and lift out the assembly.

■ Removal of the Speakers

Switch OFF power to the game. Remove the upper rear
cabinet door/panel, taking care to *not* damage the speaker
enclosure seals. Disconnect the speakers from their cabling.
Remove the nuts on the speaker mounting bolts. Remove the
speakers. Because the speakers are mounted in an acousti-
cal enclosure, carefully reinstall the seals upon completing
any task in the speaker enclosure.

■ Volume Control, Test/Diagnostics Switch, and Service Credit Switch

Open the coin door to locate the game's volume control and
Diagnostic switches on the small panel atop the cash box
cover. The Volume Control is the white knob on left end of
the panel. Turning the knob clockwise increases the sound
level. The upper right switch on the bracket is the Test/Di-
agnostics Switch that enables activating the game's test
mode. The lower right switch is the Service Credit Switch,
which allows adding credits to a game for service testing
without affecting the game's bookkeeping total.

Game Features

Start Up

Switch ON power to the game. A "rug" pattern appears on the CRT screen. When the "rug" pattern ends, the screen shows CHECKING SCRATCH RAMS, and then CHECKING ROMS. The next screen shows REVISION LEVEL, CMOS TEST OK and the COIN SETTING. The game then moves to the attract mode. After the proper coinage has been inserted, the game exits the attract mode and enters the play mode.

Player Controls

Each player has an 8-way joystick and four buttons. The joystick controls the movement of the ship. The buttons are Start/Transform, Fire, Weapon and, Weapon Select.

Each **START/TRANSFORM** button is used to start or continue a game. If a game is in progress, this button toggles the player between ship and turret modes. The ship is more mobile than the turret, but the turret has better firepower. During a 2-player game, if one player is the ship and the other player is the turret, the turret is docked onto the ship unless the player does a quick double-click on the START/TRANSFORM button when transforming.

Each **FIRE** button is used to fire the player's standard weapon. When this button is held down, the weapon goes into rapid-fire mode. The Rapid Fire Counter is incremented by 100 each time a Rapid Fire Icon is picked up. The greater the Rapid Fire Counter value, the faster the weapon fires.

Each **WEAPON** button is used to fire the special weapons in the player's arsenal. The player is awarded special weapons by starting or continuing a game, by finding them on the planet's surface or, by rescuing colonists. When two players are docked together, they are both awarded a picked up weapon. There are over twelve weapons to discover and master.

Each **WEAPON SELECT** button is used to select weapons in the player's arsenal. Players accumulate weapons and use them as needed. The weapon currently being used is in a flashing box. Each time the WEAPON SELECT button is pressed, the current weapon moves to the end of the arsenal and the rest of the weapons are shifted one to the left. The game announces the name of the chosen weapon so the player knows what is selected without watching the arsenal. It's helpful to keep the sound level loud enough to hear the game's speech clearly.

STRIKE FORCE is a one or two player game that allows two players to play simultaneously.

(**NOTE**)

When an error is detected during Start-up Tests, game start-up does not progress, and an error message appears on the screen.
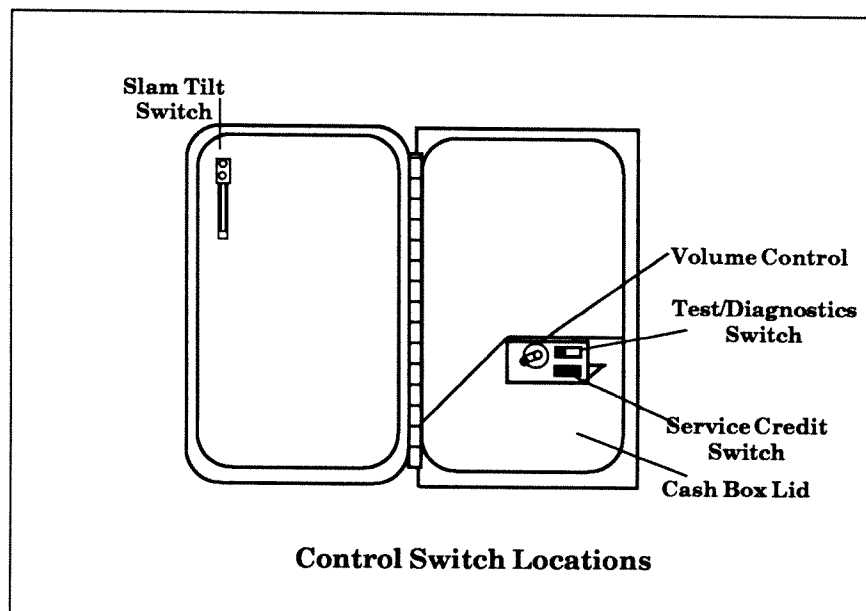
Game Operation

STRIKE FORCE is a one- or two-player video game with a color monitor. From the player's perspective, the game has two modes of operation: Ready-to-Play and Play. For the owner/operator, the game has an additional mode of operation called Game Diagnostics and Adjustments.

Control Switches

▓ The **SLAM TILT SWITCH** detects any forceful vibrations against the Coin Door. This eliminates pounding for free games.

▓ The **VOLUME CONTROL** allows increasing or decreasing the sound level of the game's music and speech. For greater earnings, set your game's sound level at its maximum.

▓ The **TEST/DIAGNOSTICS SWITCH** allows you to enter the Game's Diagnostics mode. Move the Test Switch left to enter the Game Diagnostics mode. To exit this mode, move the Test/Diagnostic Switch right.

▓ The **SERVICE CREDIT SWITCH** is a special-feature switch that provides credits during game testing without affecting the game's bookkeeping total.

▓ The **POWER INTERLOCK SWITCH** is a safety switch that ensures power to the game switches off during servicing. This switch is located inside the lower rear door/panel.

Control Switch Locations

Game Audits, Diagnostics & Adjustments

Operation
All Game Audits and Diagnostics are accessible via the Test/Diagnostic Switch and the Service Credit Switch located inside the coin door. Game Adjustments are set or changed using the DIP switches located on the CPU Board.

GAME AUDITS
To access the Audit Table, move the Test/Diagnostic switch (on the cashbox lid) to the left. To clear the Audits, move both joysticks toward the center of the Control Panel.
Note: Audits cannot be set; they can only be cleared.

To exit the Game Audit Table, move the Test/Diagnostic Switch to the right.

AUDIT TABLE

Audit	Audit Value
Left Chute (# of Left Chute Coins)	0
Right Chute (# of Right Chute Coins)	0
Center Chute (# of Center Chute Coins)	0
Fourth Chute (# of Fourth Chute Coins)	0
Service Credits (# of Service Credit Coins)	0
Credits Played (# of Credits Played - sum of starts & continues)	0
Player 1 Starts (# of times Player1 started a Game)	0
Player 2 Starts (# of times Player 2 started a Game)	0
Player 1 Continues (# of times Player1 continued a Game)	0
Player 2 Continues (# of times Player 2 continued a Game)	0
One Player Seconds (# of seconds for one player game)	0
Two Player Seconds (# of seconds for two player game)	0
Plays to High Score Reset (# of plays without making H. S. until Reset)	0
Average Seconds per Credit (Average # of seconds played per Coin)	0
Burn-in Loops (# of Burn-in Loops completed)	0
Credits (# of unplayed Credits available)	0
Idle Minutes (# of Idle Minutes)	0
Wins (# of Games played to Completion; starbase destroyed)	0

DIAGNOSTIC TESTS

To access the Tests/Diagnostic Mode, first move the Test/Diagnostic Switch to the left. The Audit Table is shown.

To exit the Test/Diagnostic Mode from any test, move the Test/Diagnostic Switch to the right.

CPU Test

To enter the CPU Test from the Audit Table press the Player 2 Weapons Button.

The CPU Test allows the operator to check the game's memory RAM and program ROM chips. The screen shows the layout of the RAMs and ROMs on the CPU Board. A good chip turns green. A faulty chip turns red. If no error is found the test cycles back to the Audit Table.

Burn-in Test

To access this test from the Audit Table, press the Player 1 Weapons Button.

The Burn-in Test repeats some of the Diagnostic Tests continually. When the Burn-In Test detects a error, the test stops. Use this test to detect intermittent problems that may not show up during the initial tests.

Monitor Test

To access the Monitor Test from the Audit Table, press the Player 1 Start Button.

This test allows the operator to check the monitor operation. There are red, green, and blue screens provided for color adjustments, as well as a crosshatch pattern for alignment adjustments.

During the Monitor Test, the colors should appear sharp and clear. The crosshatch pattern fills the screen with a grid of lines and dots. The pattern should be clear, and the dots should be round.

DIP Switch Test

To access the DIP Switch Test from the Monitor Test, press the Player 1 Start Button.

The DIP Switch Test allows the operator to check the CPU Board DIP Switch settings.

Switch Test

To access the Switch Test from the DIP Switch Test, press the Player 1 Start Button.

The Switch Test allows the operator to check the switches. Pressing a switch causes the corresponding switch location on the screen to light. Release the switch, and the screen returns to normal.

$$(\text{NOTE})$$

There are front- mounted monitor controls (beneath the monitor and within the Control Panel opening) for easier monitor adjustments.

Adjust the black level to just before the black portion turns gray. Adjust the contrast to just before the text starts to blur.

1-10

GAME ADJUSTMENTS

To change the Game Adjustments, use the DIP switches on the CPU.

The Adjustments allow the operator to change the game Pricing and Difficulty levels, among other game features. Use the following DIP Switch Tables to change the desired adjustment.

DIP Switch 1

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
Difficulty								
Level 1	Off	On	On					
Level 2	Off	Off	On					
Level 3	Off	On	Off					
Level 4*	Off	Off	Off					
Level 5	On	Off	Off					
Level 6	On	Off	On					
Level 7	On	On	Off					
Level 8	On	On	On					
Ships per Credit								
3*				Off				
4				On				
Point per Extra Ship								
40, 000					Off	On		
50, 000*					Off	Off		
75, 000					On	Off		
100, 000					On	On		
Start/Continue								
1 credit start, 1 credit continue*							Off	
2 credits start, 1 credit continue							On	
Coin Meters								
Meter 1 sums all switches								Off
Meter 1=switch 1, (3); Meter 2=switch 2, (4)								On
(UK Electronic Door-Meter 1 is #10 Pence units through all switches.)								

Note: * denotes factory setting

DIP Switch 2

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
Game Mode* **Test Mode**	Off On							
Coin Modes for Chute 1								
1 coin, 1 credit*		Off	Off	Off	Off			
1 coin, 2 credits		Off	Off	Off	On			
1 coin, 3 credits		Off	Off	On	Off			
1 coin, 4 credits		Off	Off	On	On			
1 coin, 5 credits		Off	On	Off	Off			
1 coin, 6 credits		Off	On	Off	On			
2 coins, 1 credit		Off	On	On	Off			
3 coins, 1 credit		Off	On	On	On			
4 coins, 1 credit		On	Off	Off	Off			
5 coins, 1 credit		On	Off	Off	On			
1 coin, 1 credit 2 coins, 3 credits		On	Off	On	Off			
1-2 coins, 1-2 credits 3 coins, 4 credits		On	Off	On	On			
1-3 coins, 1-3 credits 4 coins, 5 credits		On	On	Off	Off			
1-4 coins, 1-4 credits 5 coins, 6 credits		On	On	Off	On			
3 coins, 1 credit 5 coins, 2 credits		On	On	On	Off			
1 coin, 2 credits 2 coins, 5 credits		On	On	On	On			
Coin Modes for Chute 2								
1 coin, 1 credit*						Off	Off	Off
1 coin, 2 credits						Off	Off	On
1 coin, 3 credits						Off	On	Off
1 coin, 4 credits						Off	On	On
1 coin, 5 credits						On	Off	Off
1 coin, 6 credits						On	Off	On
UK Electronic Door chute 1 - 1 pound, 7 credits chute 2 - 50 pence, 3 credits chute 3 - 20 pence, 1 credit chute 4 - 10 pence, 1/2 credit						On	On	Off
Free Play						On	On	On

Note: * denotes factory setting

Troubleshooting

Problem	Possible Solution
NO PICTURE OR DISTORTED PICTURE.	Check for faulty CPU Board or monitor. Check for disconnected video signal cable.
TURN GAME ON & NOTHING HAPPENS	Check line fuse. Check for +5V DC at pins C, D, 3, and 4 of the JAMMA Connector.
NO SOUND	Check the speaker and speaker connection to pins L and 10 on JAMMA Connector. Check volume control setting. Check for +12V DC at pins F and 6 on the JAMMA Connector. Check interboard wiring from CPU Board to Sound Board.
MOVE JOYSTICK, AND OBJECTS DO NOT MOVE	Check for open wires between joystick and CPU Board. Check for contamination on joystick switch contacts and CPU Board pins. Check for proper ground.
PRESS CONTROL PANEL BUTTON AND NOTHING HAPPENS	Check for open wires between button and CPU Board. Check for contamination on CPU Board pins or button switch blade contacts. Check for proper ground.
NO CREDIT GIVEN WHEN COINS ARE INSERTED	Check DIP switch coin setting. Check for contamination on coin switch contacts. Check for an open wire between Coin Switch 1 and pin 16 on JAMMA Connector or Coin Switch 2 and pin T of JAMMA Connector.
TOO MANY CREDITS FOR NUMBER OF COINS INSERTED	Check Game Pricing setting. Check for a short between pins T & 16 on JAMMA Connector.
GAME STAYS IN THE TEST MODE.	Check that the Test Switch in the coin door is set to OFF.

NOTES

Parts Information

Cabinet Hardware

Cabinet Assembly	A-14456-43313
Caster Wheel Assembly	B-13086
Leg Leveler Plate	01-9155
Leg Adjuster	08-7377
Back Door Assembly	B-13574
Lock Retainer	01-7264
Upper Door Lock Cam	01-8989
Rear Wood Door	11-934
Door Cam Lock	20-6542-TB
Line Voltage Cable Assembly	C-12773-4
Mtg Plt Toggle Assembly	A-9958
Interlock Spring Brkt Assy	B-12907
Line Voltage Cable	H-13555
Toggle Switch DPST	5640-10932-00
Interlock Cheat Switch	5643-09556-00
Coin Door	D-13250
Test Switch	A-13115
Coin Door Cable	H-13215
Coin Door USA	09-20000-V-1
12 pin "Z" Header	5791-12235-12
Glass Retainer Bracket	01-9607
Speaker Grille	01-9634
20" Vent Hole Cover	03-7602
Vent Hole Cover	03-7839
Marquee Retainer	03-8252-2
Lock Lamp	03-8327
Glass Edge Channel	03-8358
25" CRT Bezel	03-8387
Vent Hole Cover	03-8413
Speaker Wood Door	11-935
Toggle Latch	20-9347
Marquee	31-1613-42413
Glass CRT Cover	31-1552-43313
Screened Overlay	31-1627-43313

Speakers

Piezo Speaker Assembly	B-13587
Piezo Speaker, 4", 50W	5555-12068-00
Piezo Speaker Cable	H-13557
Round Speaker, 8 ohm, 20W	5555-12015-00

Fluorescent Lamp

Fluorescent Housing & Bracket	C-12679
Housing Mounting Brkt	01-9146
Light Fixture	20-9590
18" Fluorescent Bulb, 15 W	24-8809

PC Boards

Y-Unit CPU Assembly	A-13234-43313
Power Supply Assembly	C-13253-1
Audio Sound Board Assembly	A-13971-43313

Transformer Assembly

Power Pack Assembly	D-13252
Line Cord Assembly	A-13340
Power Transformer	A-13771
Power Pack Chassi Assy	C-13251
Power Pack Jumper Cable	H-13265
Line Filter Jumper Cable	H-13344
Transformer Jumper Cable	H-13378
Varistor, 130V, 10J	5017-09044-00
Line Filter, 5Amp	5102-08895-00

Control Panel

Control Panel Assembly	A-14557
Button, Red	C-9214-4
Button, Purple	C-9214-22
Button, Yellow	C-9214-23
Joystick, Purple	20-9319-6
Joystick, Yellow	20-9319-4
Control Panel Bracket	01-9651
Latch Bracket	01-6994
Latch Bracket	01-9605
Switches	03-7614
Wood Control Panel	11-968
5/8 Palnut	20-9222
Screened Overlay	31-1627-43313

Monitor

Monitor	5675-12787-00

Cables

Switch/Power Cable	H-10217-4
Sound Board Jumper Cable	H-12758
Speaker Cable	H-13213
Coin Door Cable	H-13215
Sound/Power Speaker Cable	H-13257
Volumn Control Cable	H-13258-2
Power Pack Jumper Cable	H-13265
Line Filter Jumper Cable	H-13344
Transformer Jumper Cable	H-13378
Line Voltage Cable	H-13555
Piezo Speaker Cable	H-13557
Main Harness Cable	H-13583
Control Panel Cable	H-13945
Ground Jumper Cable	H-13953
20 pin Ribbon Cable	5795-10937-18

Manuals

Monitor Manual	16-3000-103
Instruction Manual	16-42413-101
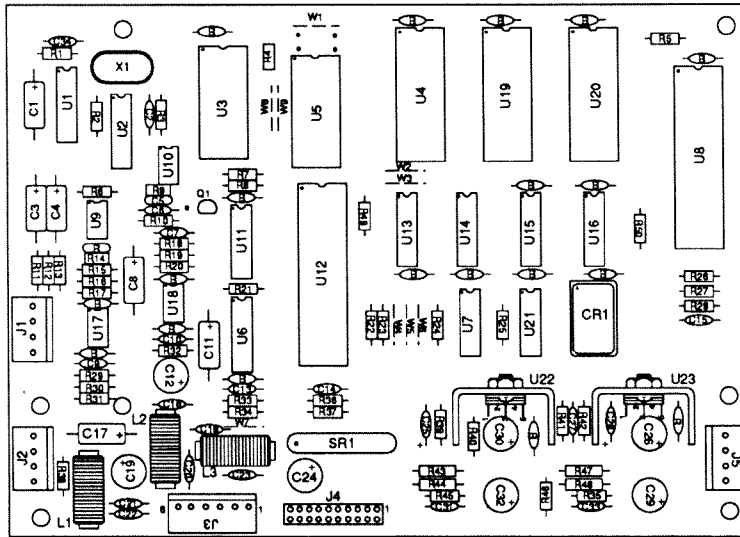
A-13971-43313
Audio Board Assembly

Part No.	Ckt Designator	Description	Part No.	Ckt Designator	Description
			5010-10985-00	R14, R15	Resistor, 20K, 1/4w, 5%
5766-12130-00		Bare P. C. Board	5010-09034-00	R22-R24, R17, R34	Resistor, 10K, 1/4w, 5%
5371-11087-00	U1	IC, D/A Conv, YM3012	5010-09324-00	R6, R19, R20, R21	Resistor, 27K, 1/4w, 5%
a) 5700-09006-00		Socket, IC, 16-pin (U1)	5010-09162-00	R39	Resistor, 100K, 1/4w, 5%
5370-11086-00	U3	IC, Sound Processor, YM2151	5010-09331-00	R16	Resistor, 13K, 1/4W, 5%
a) 5700-09004-00		Socket, IC, 24-pin (U3)	5013-09427-00	R13	Resistor, 4.99KΩ, 1/4W, 1%
5400-10320-00	U8	IC, μProcessor, MC68B09E	5010-08772-00	R18	Resistor, 15KΩ, 1/4W, 5%
a) 5700-08985-00		Socket, IC, 40-pin (U8)	5010-08824-00	R32	Resistor, 43KΩ, 1/4W, 5%
A-5343-43313-19	U4	IC, Audio ROM 1	5010-08846-00	R31	Resistor, 220KΩ, 1/4W, 5%
A-5343-43313-20	U19	IC, Audio ROM 2	5010-09219-00	R38	Resistor, 8.2K, 1/4W, 5%
A-5343-43313-21	U20	IC, Audio ROM 3	5010-10258-00	R40	Resistor, 1M, 1/4w, 5%
a) 5700-10176-00		Socket, IC, 28-pin (U4, U19)	5010-09179-00	R10	Resistor, 3.3M, 1/4w, 5%
A-13970-1		Sub-assembly PCB	5010-09333-00	R29	Resistor, 180KΩ, 1/4W, 5%
5370-09691-00	U6	IC, 55536, CVSD	5010-09342-00	R30	Resistor, 36KΩ, 1/4W, 5%
5371-09152-00	U11	IC, D/A Convtr, MC1408	5010-09534-00	W2, W9, W11	Resistor, 0Ω, 1/4w, 5%
5430-10322-00	U12	IC, PIA, MC68B21	5046-09350-00	C9	Capacitor, 180pfd, 100V, ± 5%
5340-10139-00	U5	IC, RAM/S 5516-2 2Kx8	5048-10992-00	C10	Capacitor, 4700pfd, 50V, ±10%
5281-09487-00	U16, U7	IC, Dual D Flipflop, 74LS74	5046-09346-00	C7	Capacitor, 1200pfd, 50V, ±5%
5281-10043-00	U13	IC, 74LS175	5040-09365-00	C11	Capacitor, 1μfd, 63V, ±10%
5281-09235-00	U21	IC, Triple NAND, 74LS10	5040-09343-00	C1, C3, C4, C8, C17	Capacitor, 10μfd, 20v, ±20%
5370-09321-00	U9, U10, U17, U18	IC, Op Amp, MC1458	5040-10974-00	C12, C19, C24	Capacitor, 100μfd, 35v
5281-09215-00	U2	IC, Hex Inv, 74LS04	5040-09776-00	C26, C30	Capacitor, 470μfd, 16v; +50, -10%
5281-09246-00	U14	IC, 2-4 Dec, 74LS139	5040-12006-00	C29, C32	Capacitor, 1000μfd, 16v, 20%
5281-09745-00	U15	IC, Dual Mux, 74LS138	5041-09243-00	C25, C28	Capacitor, 10μfd, 10v,±10%
5370-09156-00	U22, U23	IC, Audio Amp, TDA2002	5043-08980-00	C5, B (21)*	Capacitor, 0.01μfd, 50v,+80, -20%
a) 5705-09199-00		Heatsink, #6030B	5043-08996-00	C31, C33	Capacitor, 0.1μfd, 50v, ±20%
b) 4006-01003-06		Mach. Screw, 6-32 x 3/8	5043-09065-00	C13 - C15	Capacitor, 470 pfd, 50v, ±20%
c) 4406-01117-00		Nut, 6-32 Hex.	5043-09492-00	C2, C34	Capacitor, 100 pfd, 50v, ±10%
d) 4703-00007-00		Lockwasher, #6 Ext.	5043-09844-00	C6	Capacitor, 47 pfd, 50v, ±20%
5160-10269-00	Q1	Transistor, 2N3904, NPN	5043-09845-00	C16, C18, C20 - C23, C27	Capacitor, 1000 pfd, 50v, ±20%
5060-10396-00	SP1	SIP 4.7K & 470pfd, 8R8C			
5010-09181-00	R44, R48	Resistor, 1.0Ω, 1/2w, 5%	5520-09020-00	X1	Crystal, 3.58 MHz
5010-09161-00	R35, R45	Resistor, 2.2Ω, 1/4w, 5%	5521-10931-00	CR1	Oscillator, 8 MHz
5010-09361-00	R43, R46, R47	Resistor, 220Ω, 1/2w, 5%	5551-09822-00	L1 - L3	Inductor, 4.7 μH, 3A
5010-09358-00	R41, R42	Resistor, 1K, 1/4w, 5%	5791-09437-00	J4	Connector, 20 pin, (Hdr), Rib. Cbl
5010-08998-00	R2, R3,	Resistor, 2.2K, 1/4w, 5%	5791-10862-04	J1, J2, J5	Connector, 4 pin (Hdr)
5010-08983-00	R7-R9	Resistor, 3.3K, 1/4w, 5%	5791-10862-06	J3	Connector, 6 pin (Hdr)
5010-08991-00	R1, R4, R5, R11,	Resistor, 4.7K, 1/4w, 5%	16-8850-310		P.C.B. I.D. Label
	R12, R25 - R28, R33,		20-9229		Thermal Compound
	R36, R37, R49, R50		5010-09086-00	R	Resistor, 6.8K, 1/4W, 5%

NOTES:

* 21 capacitors (shown on diagram with "B" symbol) provide +5VDC filtering for ICs.
   All capacitors are ceramic, 50v, axial, unless otherwise noted.
   All resistors are 5%, 1/4w, Carbon Film, unless otherwise noted.

Y-UNIT CPU
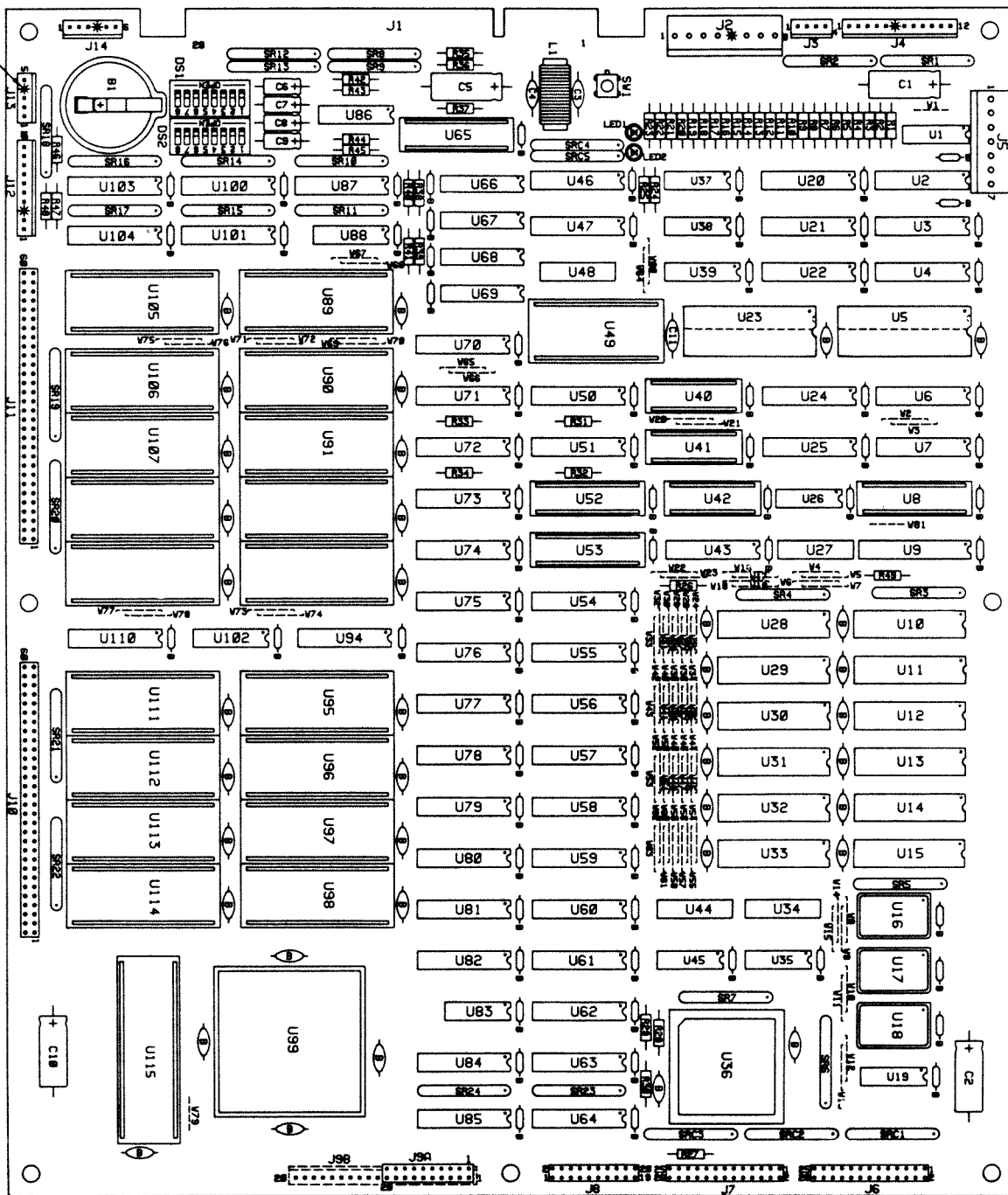
A-13234-43313
Y-UNIT CPU BOARD ASSEMBLY

Part No.	Ckt.Designator	Description	Part No.	Ckt.Designator	Description
5770-12555-00		Bare PC Brd.	5043-08980-00	B	Cap. .01 µfd 10V
5281-09737-00	U1	IC, 74LS 86	5040-08986-00	C1, C2, C5, C10	Cap. 100µfd 10V
5317-12211-00	U2, U20, U24, U43		5043-09845-00	C3, C4	Cap. .001µfd 10V
	U61, U62, U70	IC, 74ALS541	5041-09243-00	C6-C9	Cap. 10µfd 10V
5317-12212-00	U3, U6, U7, U21, U25	74ALS574	5043-8996-00	C11	Cap. .1µfd
	U50, U58, U63, U64		5019-12611-00	SR1, SR2, SR8	SIP, 470Ω 5 Res.
	U71, U72, U74, U79, U84, U85			SR9, SR12, SR13	
5317-12208-00	U4, U22, U54-U57	74ALS245		SR18	
	U59, U60, U75-U78		5019-09362-00	SR3, SR4, SR6	SIP, 4.7KΩ
	U80, U81, U94, U110			SR7, SR11, SR15	
5340-12242-00	U5, U23	IC, 8K x 8 S RAM		SR17, SR19-SR24	
5700-12047-00	U8, U52, U53, U65	24 pin Socket		SRC1-SRC3	
5340-12213-00	U10, U11, U28-U33	IC, 4461 VRAM	5019-10143-00	SR5	SIP, 470Ω 9 Res.
5521-10421-00	U16	48 MHZ Xtal	5060-10396-00	SRC4, SRC5	SIP. 4.7KΩ 470pf
5521-10318-00	U17	24 MHZ Xtal		SRC10, SRC14	
5283-10468-00	U19, U45	IC, 74F74		SRC16	
5019-10849-00	U27, U34, U44, U48	100Ω DIP Res.	5671-09019-00	LED1, LED 2	LED, Red
5317-12305-00	U35	IC, 74ALS00	5551-09822-00	L1	Inductor, 4.7UH
5700-12253-00	U36	68 pin Socket	5645-09025-00	DS1, DS2	DIP. Sw. 16 pin
5280-09309-00	U37	IC, 7407	5641-12551-00	SW1	Pushbutton Sw.
5281-09487-00	U38	IC, 74LS74	5881-12315-00	B1	Battery Holder
5434-12255-00	U39	IC, MAX691	5791-10862-08	J2	8 pin Connector
5700-09915-00	U40-U42	20 pin Socket	5791-12461-12	J4	12 pin Connector
5311-12287-00	U47, U46, U87, U100	IC, 74HC541	5791-10850-00	J6, J7	26 pin Ribbon
	U101, U103, U104				Connector
5700-10176-00	U49	28 pin Socket	5791-09437-00	J8	20 pin Ribbon
5311-12285-00	U51, U73, U82	IC, 74HC573			Connector
5340-12014-00	U66-U69	IC, 4464 DRAM	5791-12461-10	J12	10 pin Connector
5283-10552-00	U83	IC, 74F04	5700-12252-00	U12-U15	24 pin Socket
5370-12602-00	U86	IC, ULN2064B	5719-12461-05	J13	50 pin Connector
5317-12023-00	U88	IC, 74ALS138	C-13235-2		CPU Sub-assembly
5700-12088-00	U89-U93, U95-U98	32 pin Socket	A-5346-43313-1	U8	IC, PLD Color RAM
	U105-U109, U111-U114		5400-12220-00	U36	IC, TMS34010-50
5700-12254-00	U99	144 pin Socket	A-5346-43313-2	U40	IC, PLD Address Decoder
5317-12024-00	U102	IC, 74ALS139	A-5346-43313-3	U41	IC, PLD Video RAM
5700-08985-00	U115	40 pin Socket	A-5346-43313-4	U42	IC, PLD Local Control
5010--08991-00	R1,R24, R27	Res. 4.7KΩ 5% 1/4W	5340-12558-00	U49	IC 8Kx8 Static RAM 100ns
5010-10204-00	R2, R7, R12	Res. 1KΩ 2% 1/4W	A-5346-43313-5	U52	IC, PLD Video RAM Sequ.
5010-10205-00	R3, R8, R13	Res. 2KΩ 2% 1/4W	A-5346-43313-6	U53	IC, PLD Image ROM
5010-10000-00	R4, R9, R14	Res. 3.9KΩ 5% 1/4W	A-5346-43313-7	U65	IC, PLD Miscellaneous
5010-09219-00	R5, R10, R15	Res. 8.2KΩ 5% 1/4W	A-5346-43313-8		IC, PLD, Autoerase
5010-08772-00	R6, R11, R16	Res. 15KΩ 5%1/4W	A-5346-43313-10		IC, PLD, Local Controller
5010-09001-00	R23, R25	Res. 330Ω 5% 1/4W	A-5346-43313-11		IC, PLD, RAM Seq.
5010-09036-00	R26, R29-R34	Res. 100Ω 5% 1/4W			
5010-09416-00	R35-R37, R46-R48	Res. 470Ω 5% 1/4W	A-5343-43313-1	U89	IC, Game EPROM
5010-08997-00	R38-R45	Res. 2.7Ω 5% 1/4W	A-5343-43313-2	U90	IC, Game EPROM
5010-09534-00	W2, W8, W11, W12,	Res. 0Ω	A-5343-43313-3	U91	IC, Game EPROM
	W14, W21, W22, W24,		A-5343-43313-6	U95	IC, Game EPROM
	W27, W28, W31, W32,		A-5343-43313-7	U96	IC, Game EPROM
	W35, W37, W39, W41,		A-5343-43313-8	U97	IC, Game EPROM
	W43, W44, W46, W48,		A-5343-43313-9	U98	IC, Game EPROM
	W50, W52, W54, W56,		5410-12239-00	U99	IC, Custom ASIC
	W58, W60, W62, W66,		A-5343-43313-10	U105	IC, Game EPROM
	W68, W69, W72, W74,		A-5343-43313-11	U106	IC, Game EPROM
	W76, W78, W80		A-5343-43313-12	U107	IC, Game EPROM
			A-5343-43313-15	U111	IC, Game EPROM
			A-5343-43313-16	U112	IC, Game EPROM
			A-5343-43313-17	U113	IC, Game EPROM
			A-5343-43313-18	U114	IC, Game EPROM
			A-5343-43313-0	U115	IC, Game EPROM
			5880-11056-00	B1	Battery, Lithium 3V

C-13253-1
POWER SUPPLY SWITCHER ASSEMBLY

Part Number	Description
20-9633	Power Supply, 85W
01-9254	Shield
16-8587-701	High Voltage Label

CAUTION
HIGH VOLTAGE
PRESENT WHEN GAME
IS PLUGGED IN
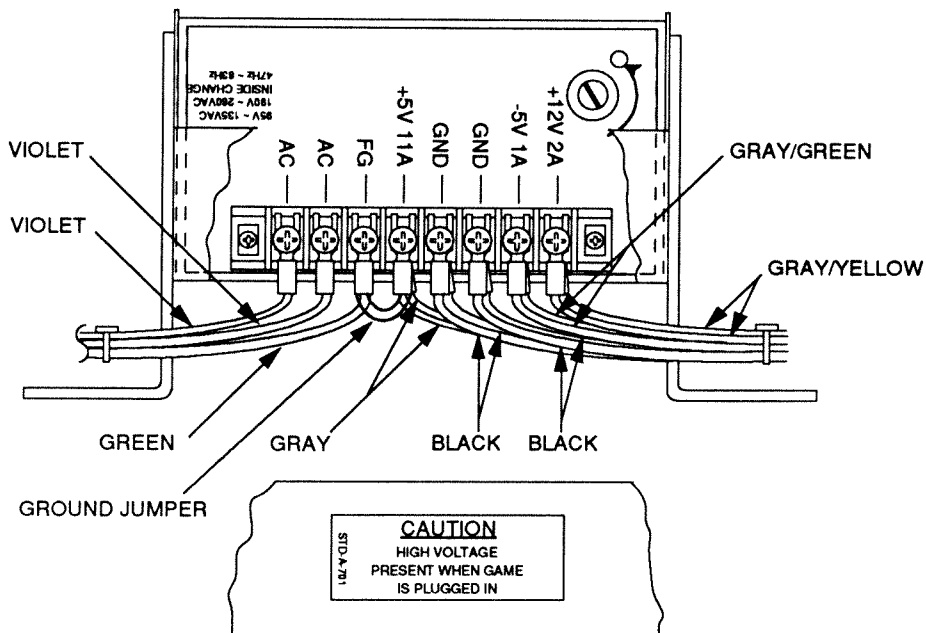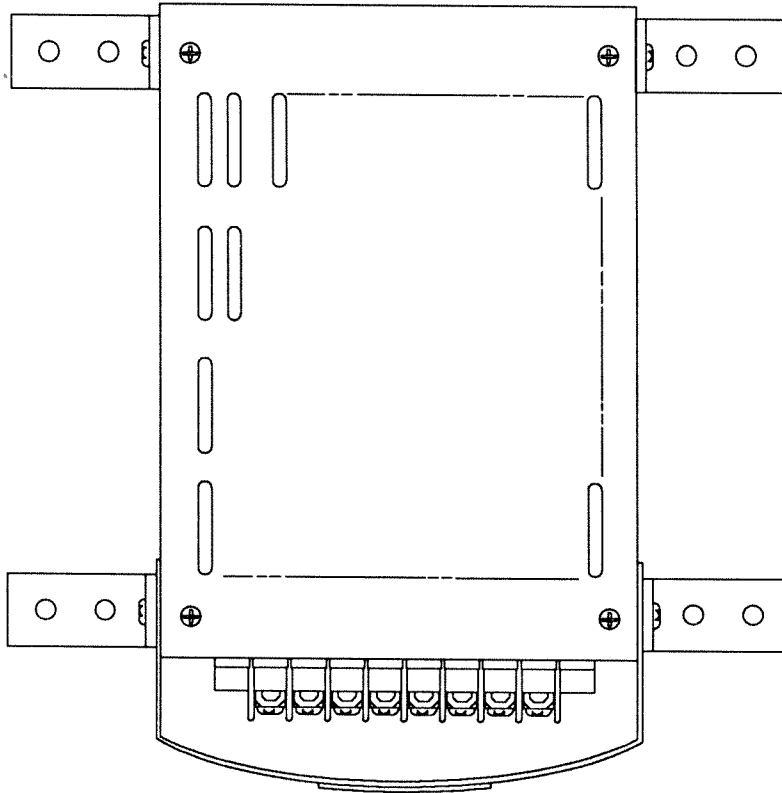
Diagrams & Schematics

AUDIO SCHEMATIC
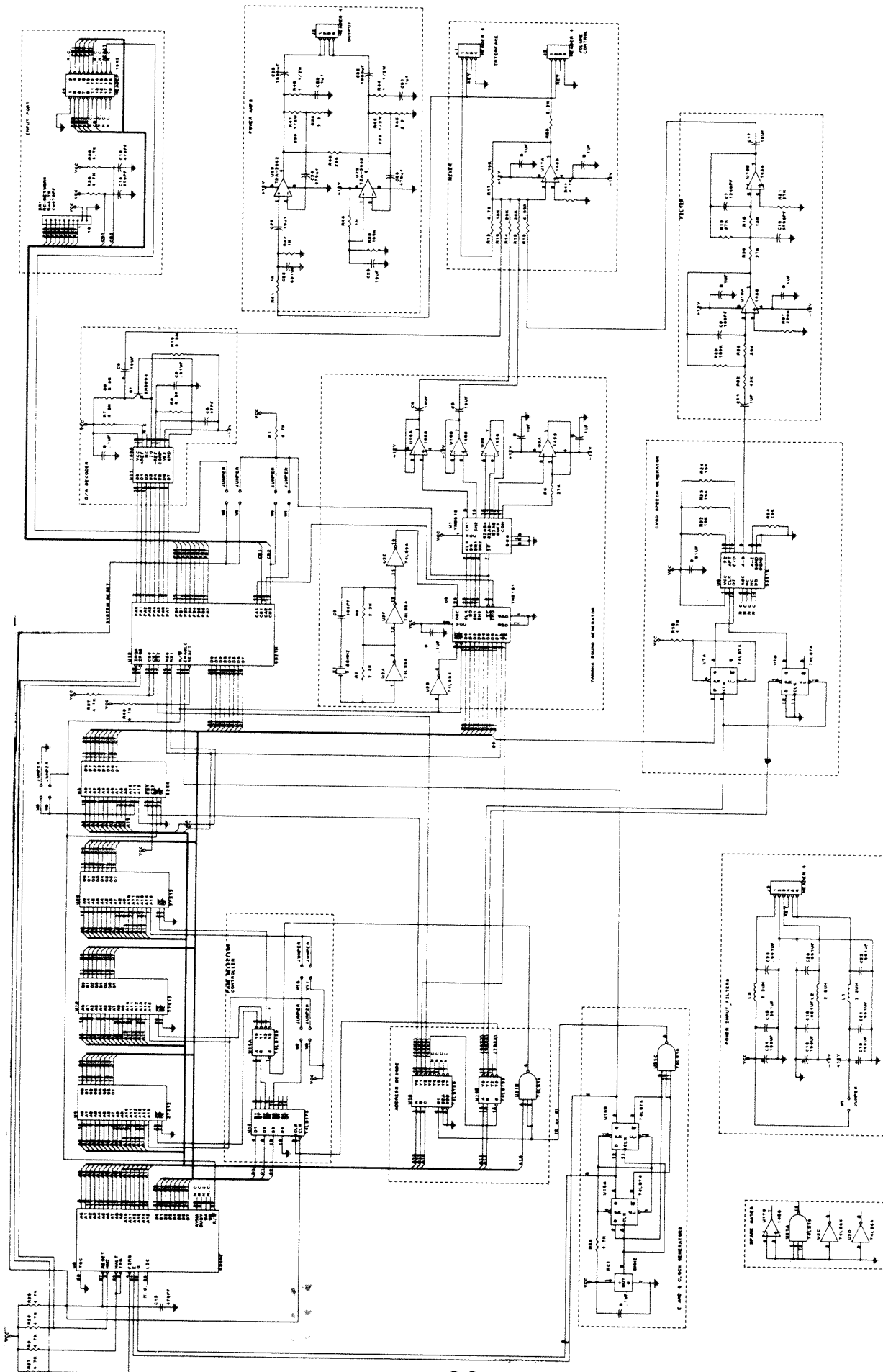
CPU Schematic
Sheet 1 of 16
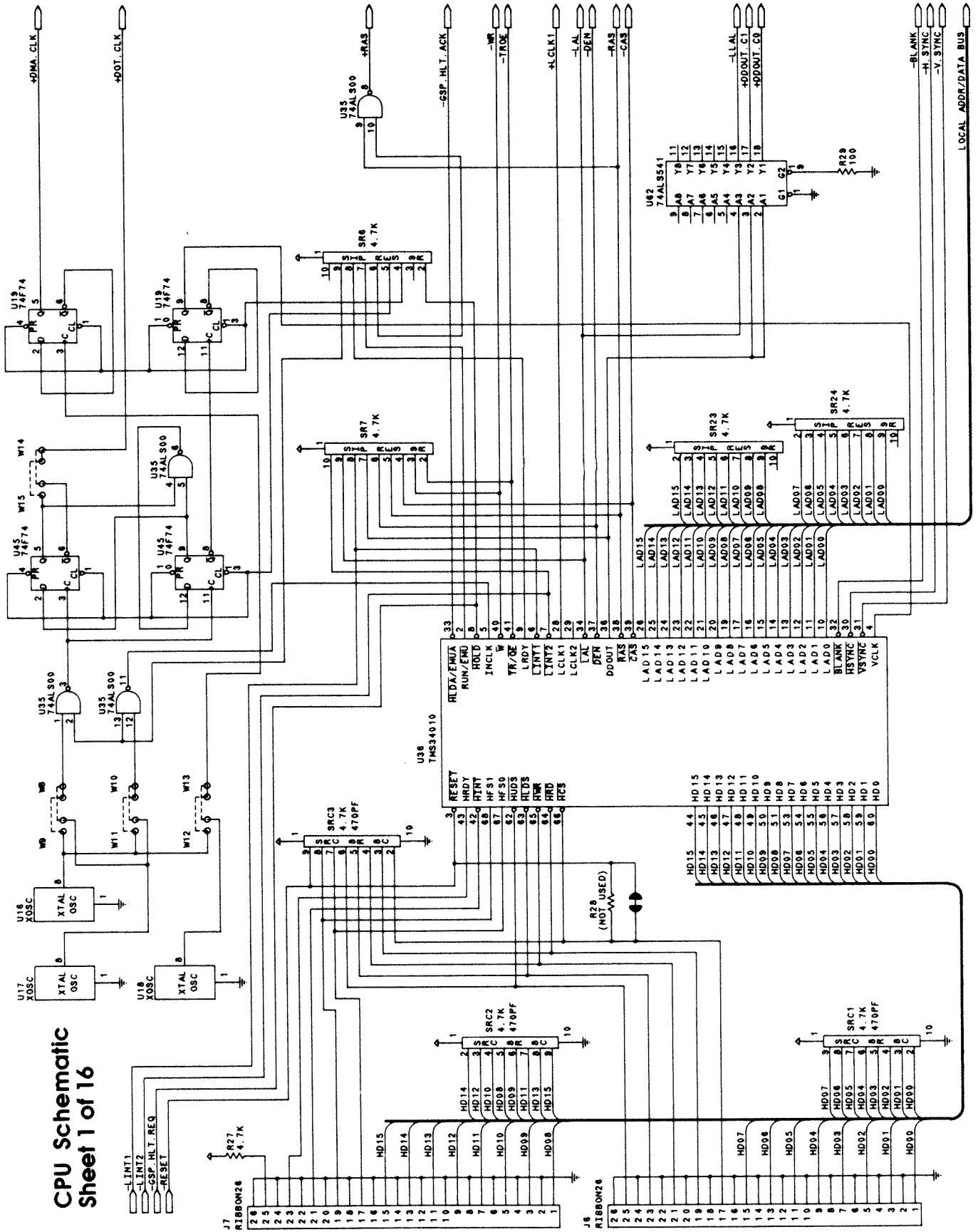
CPU Schematic
Sheet 2 of 16
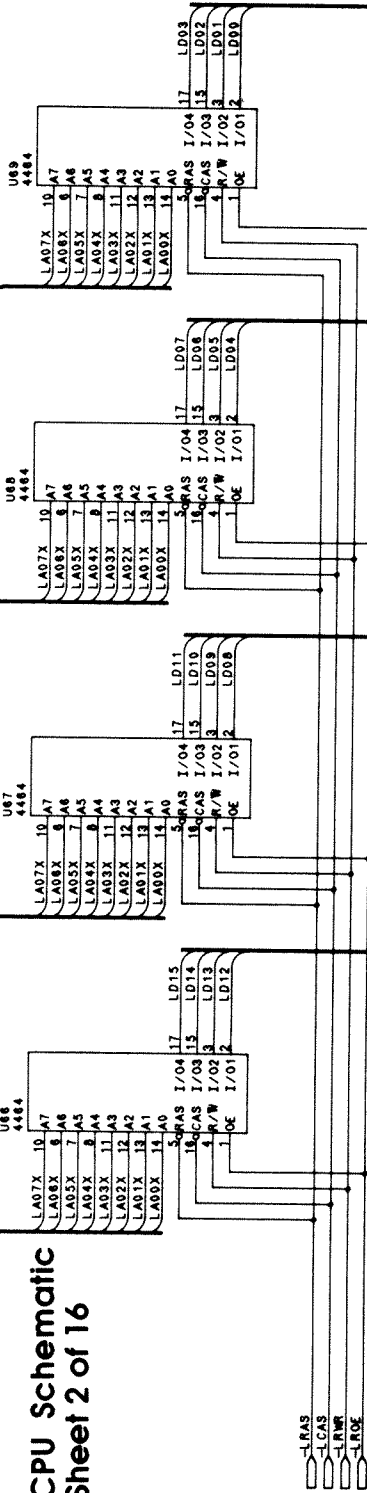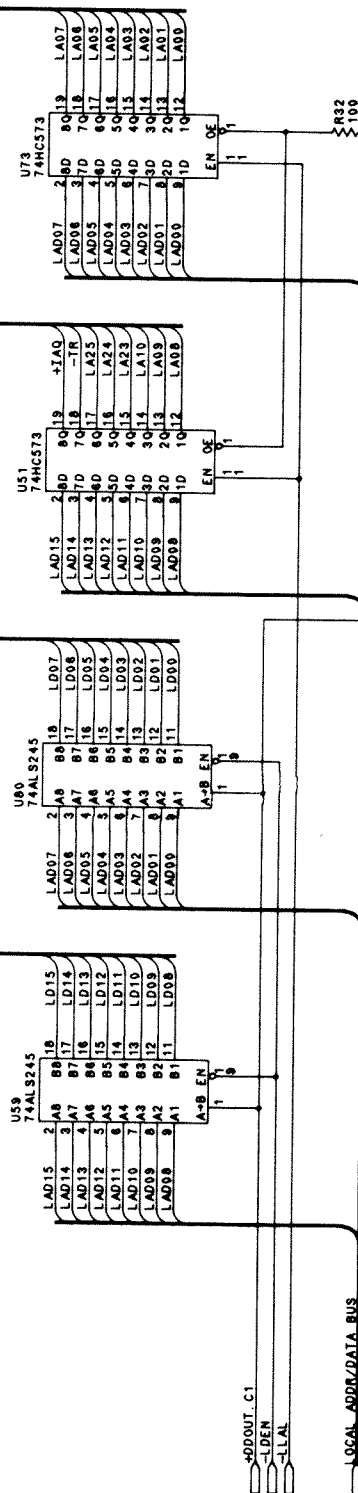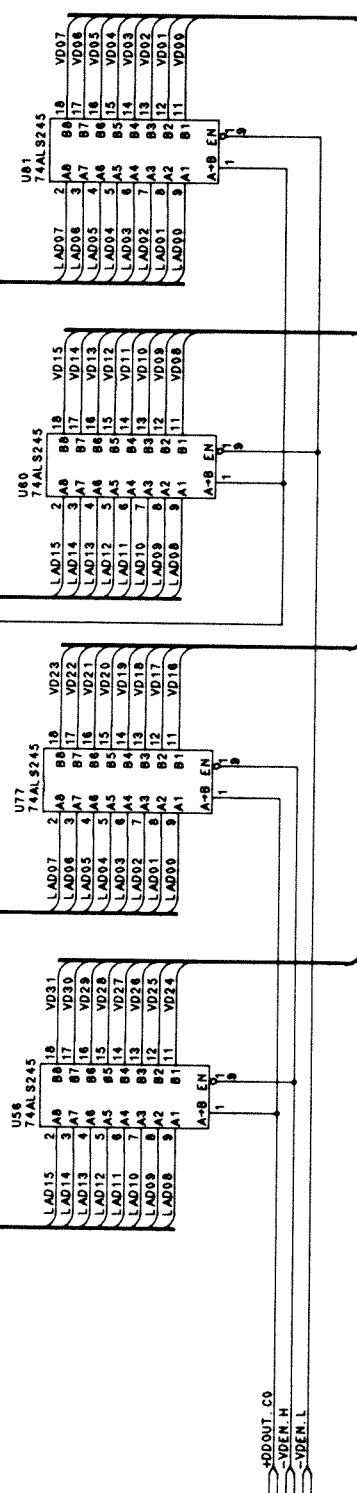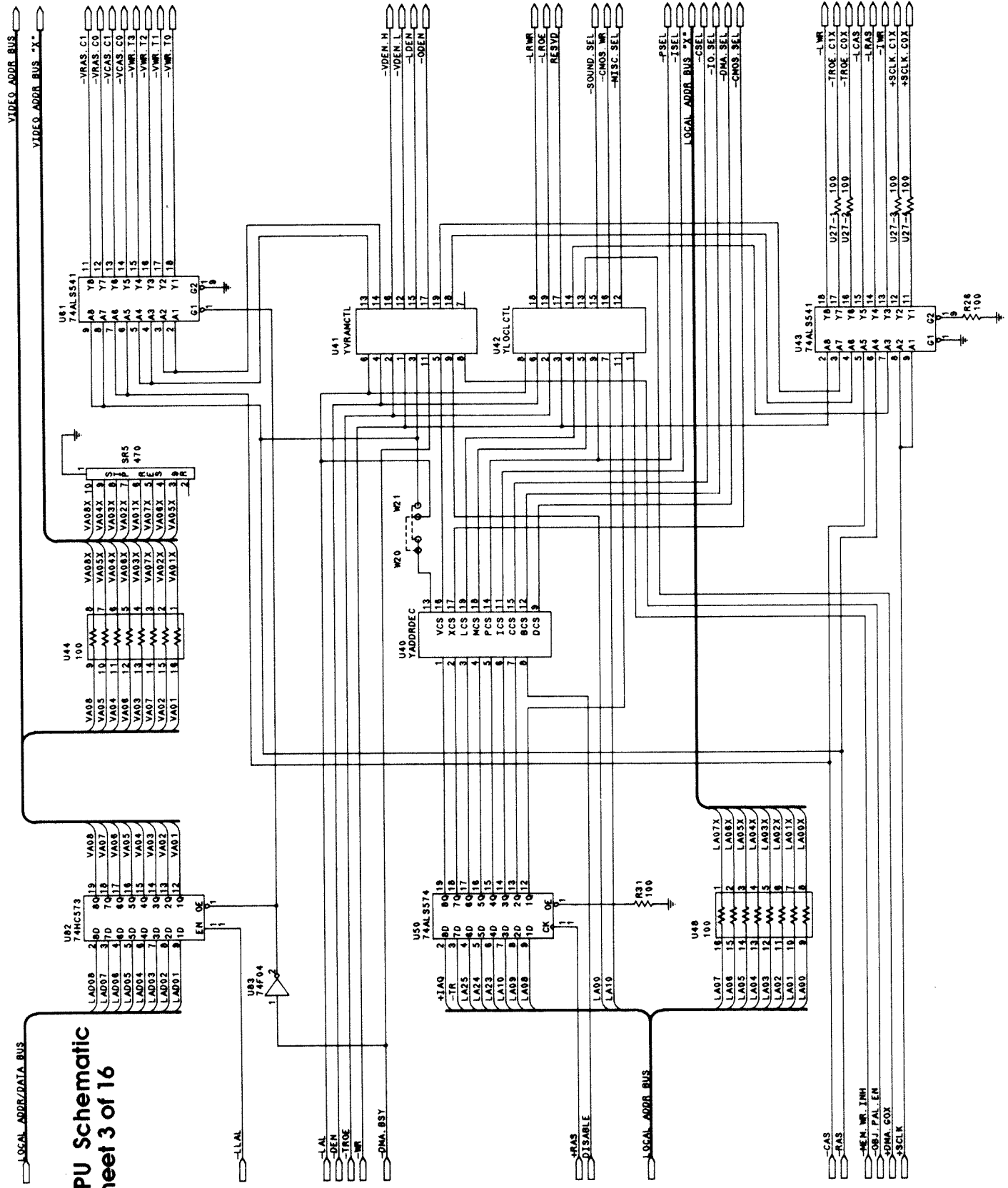
CPU Schematic
Sheet 3 of 16
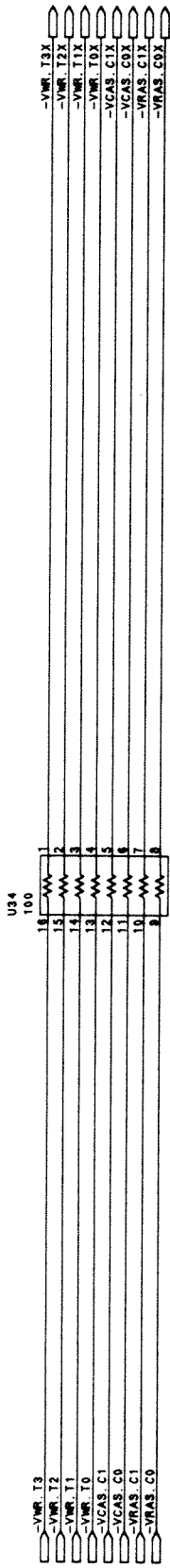
CPU Schematic
Sheet 4 of 16
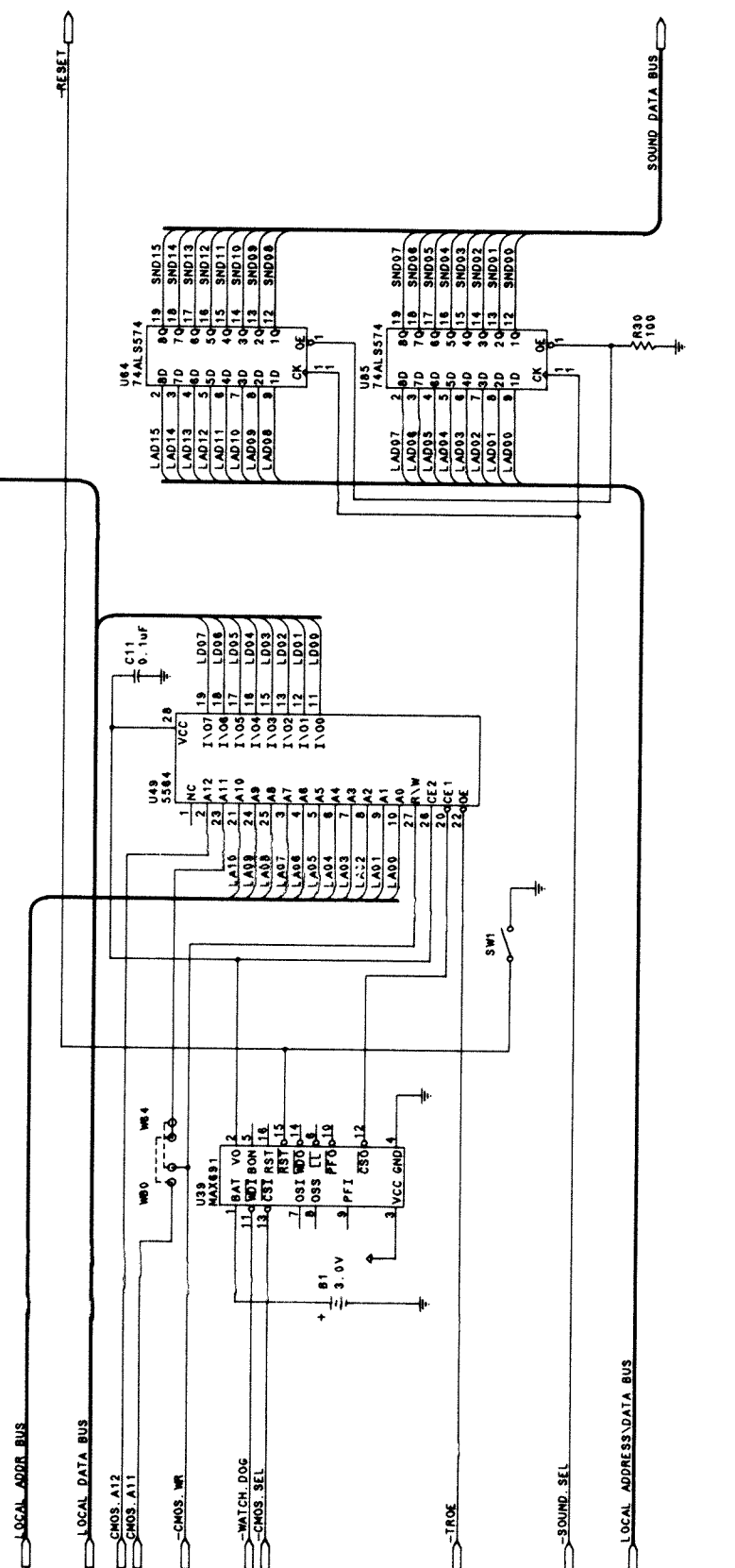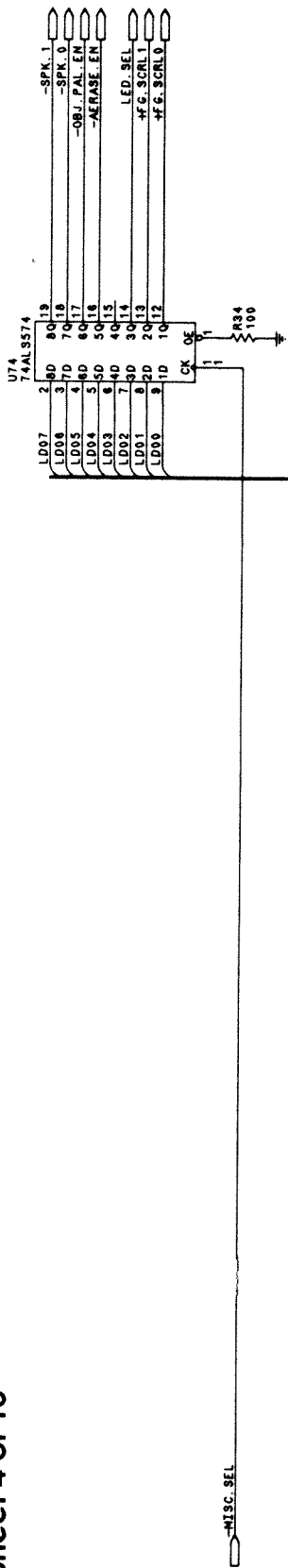
CPU Schematic Sheet 5 of 16

PROGRAM MEMORY
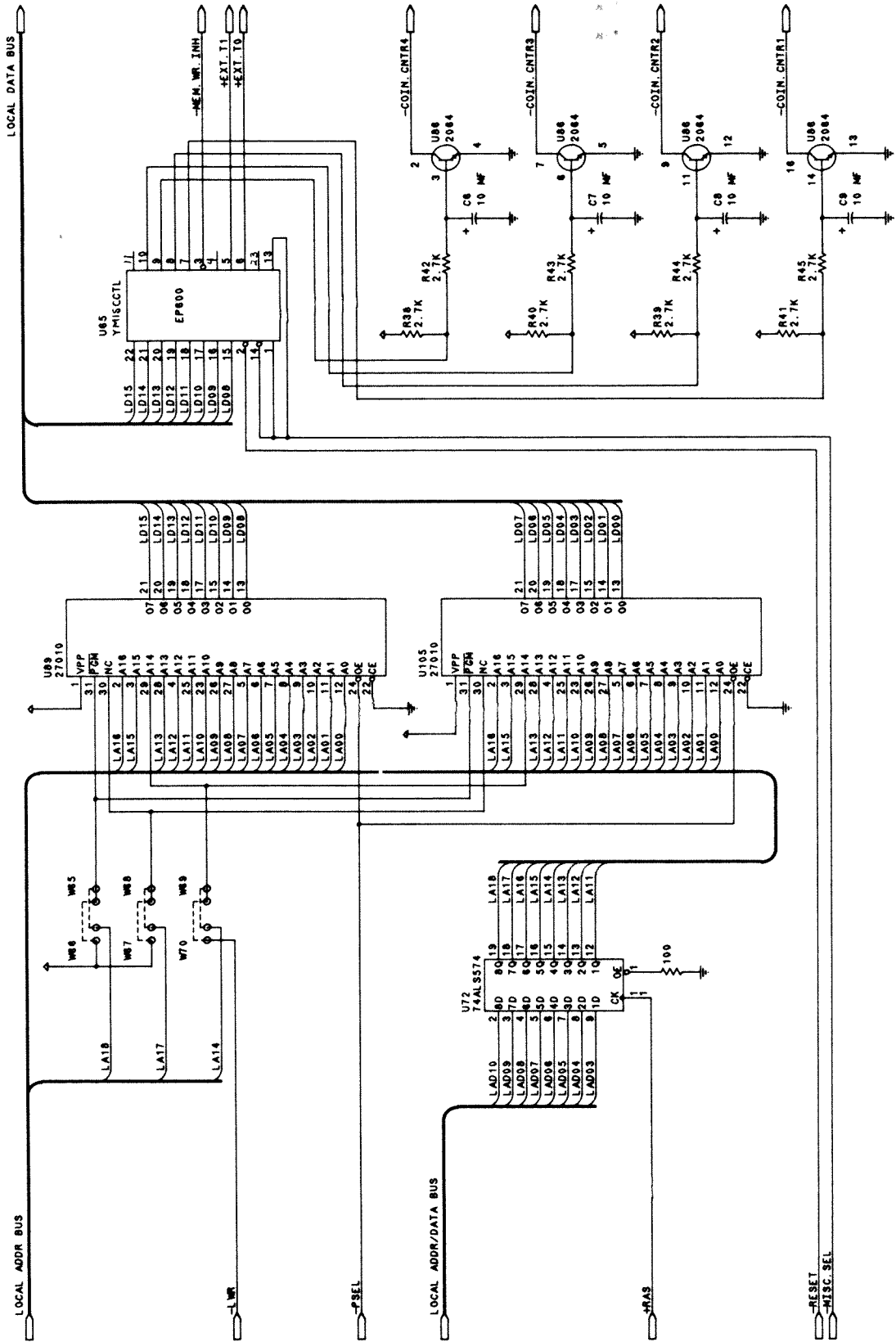
CPU Schematic
Sheet 6 of 16
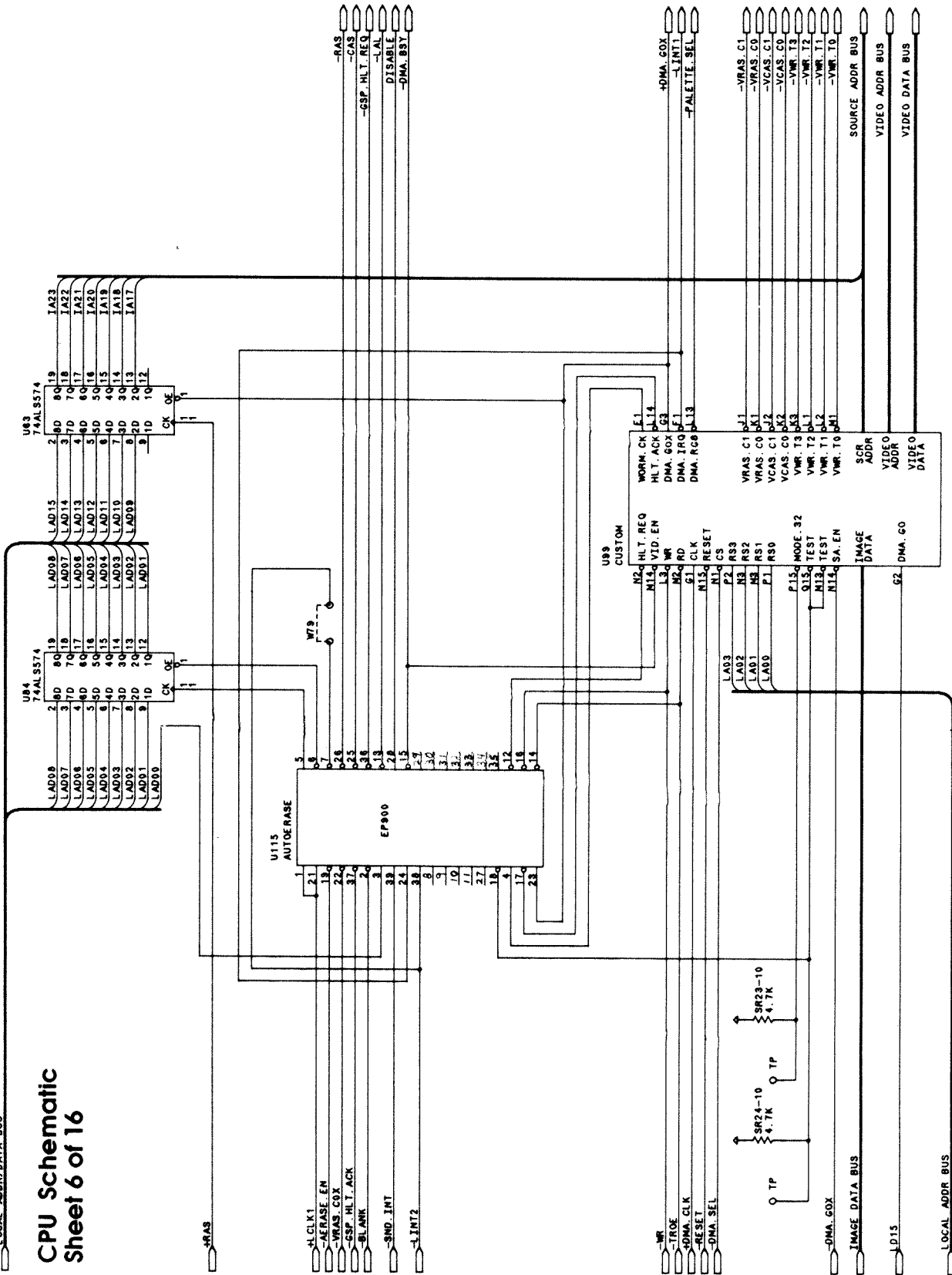
CPU Schematic
Sheet 7 of 16
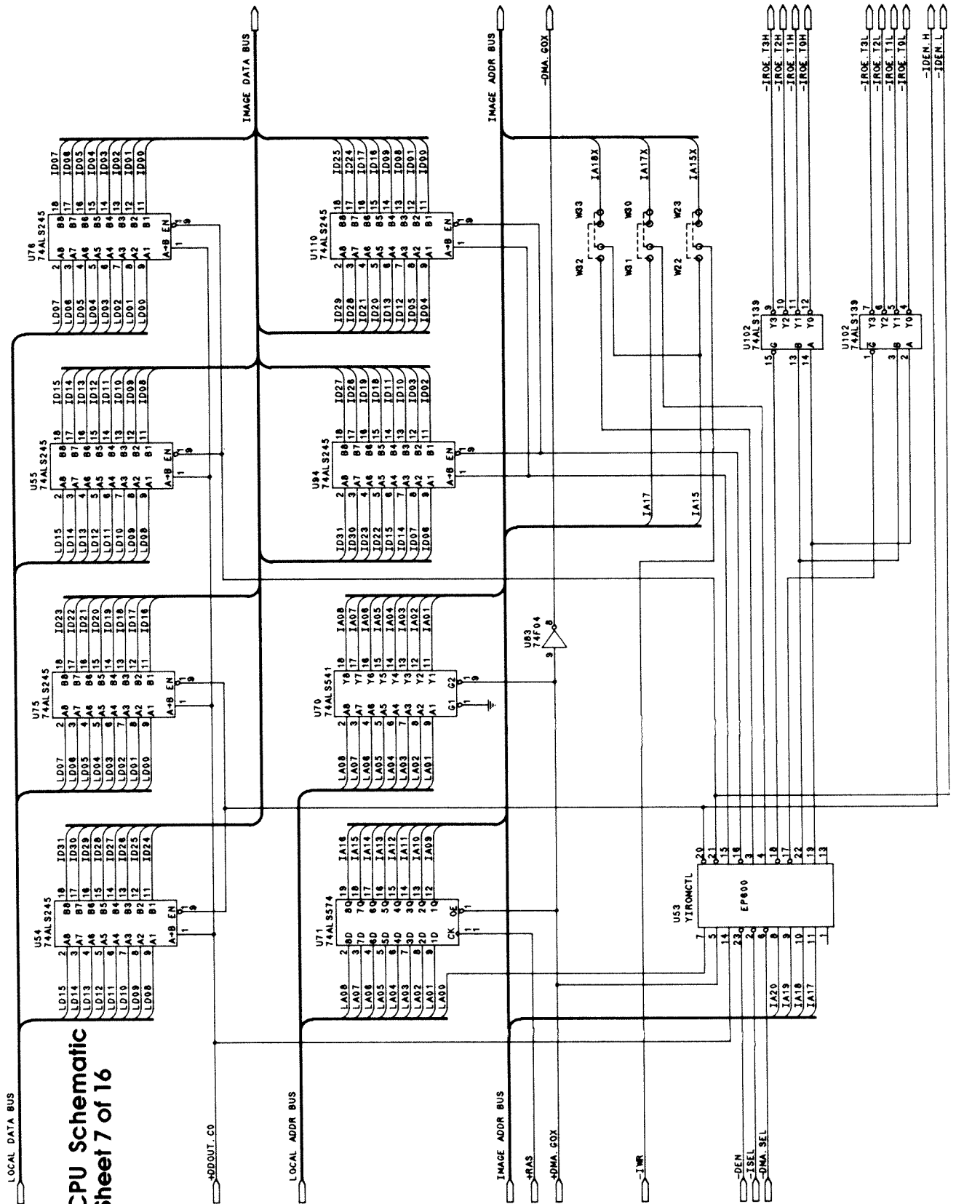
CPU Schematic
Sheet 8 of 16

IMAGE MEMORY
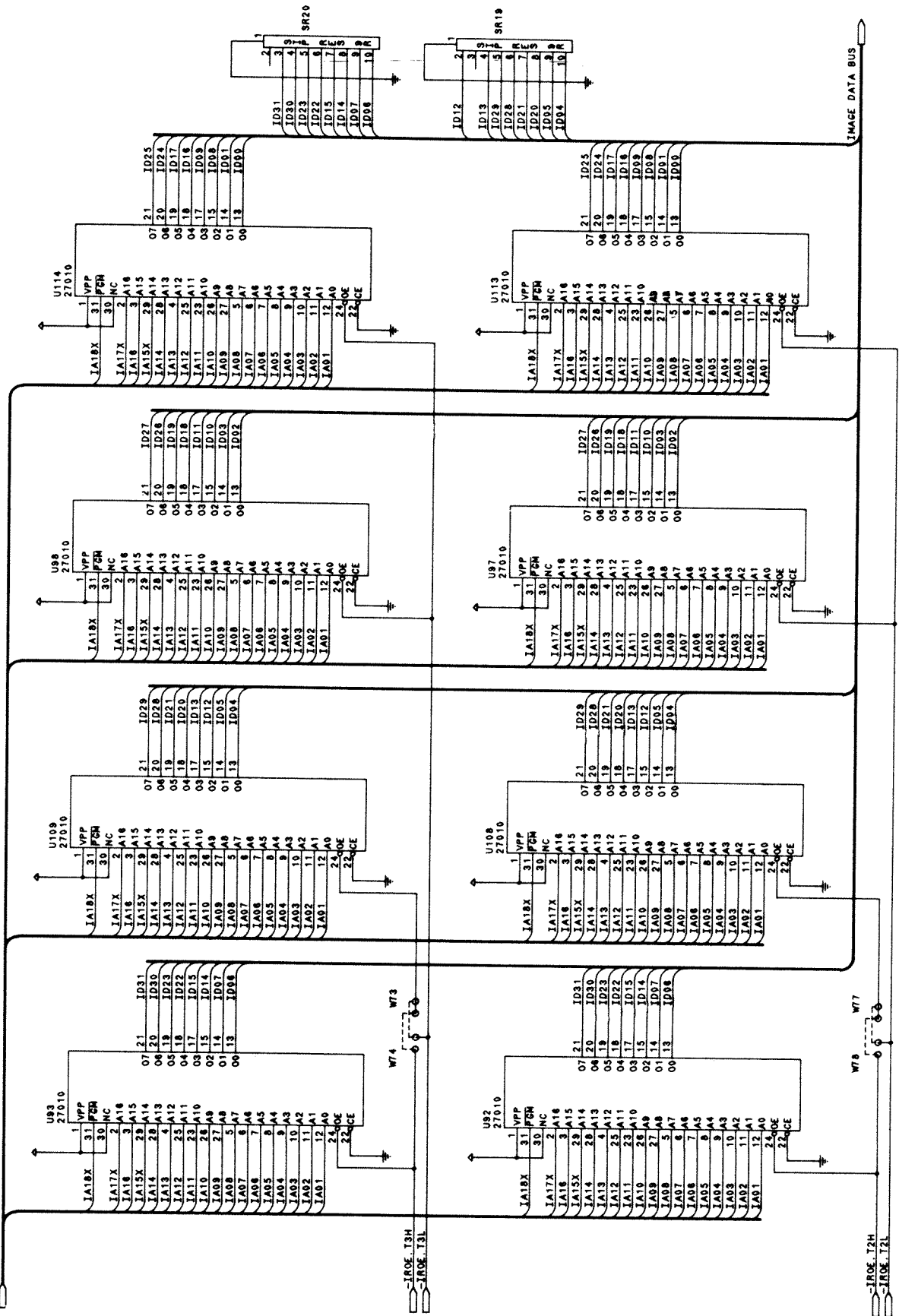
CPU Schematic
Sheet 9 of 16

IMAGE MEMORY

CPU Schematic
Sheet 11 of 16
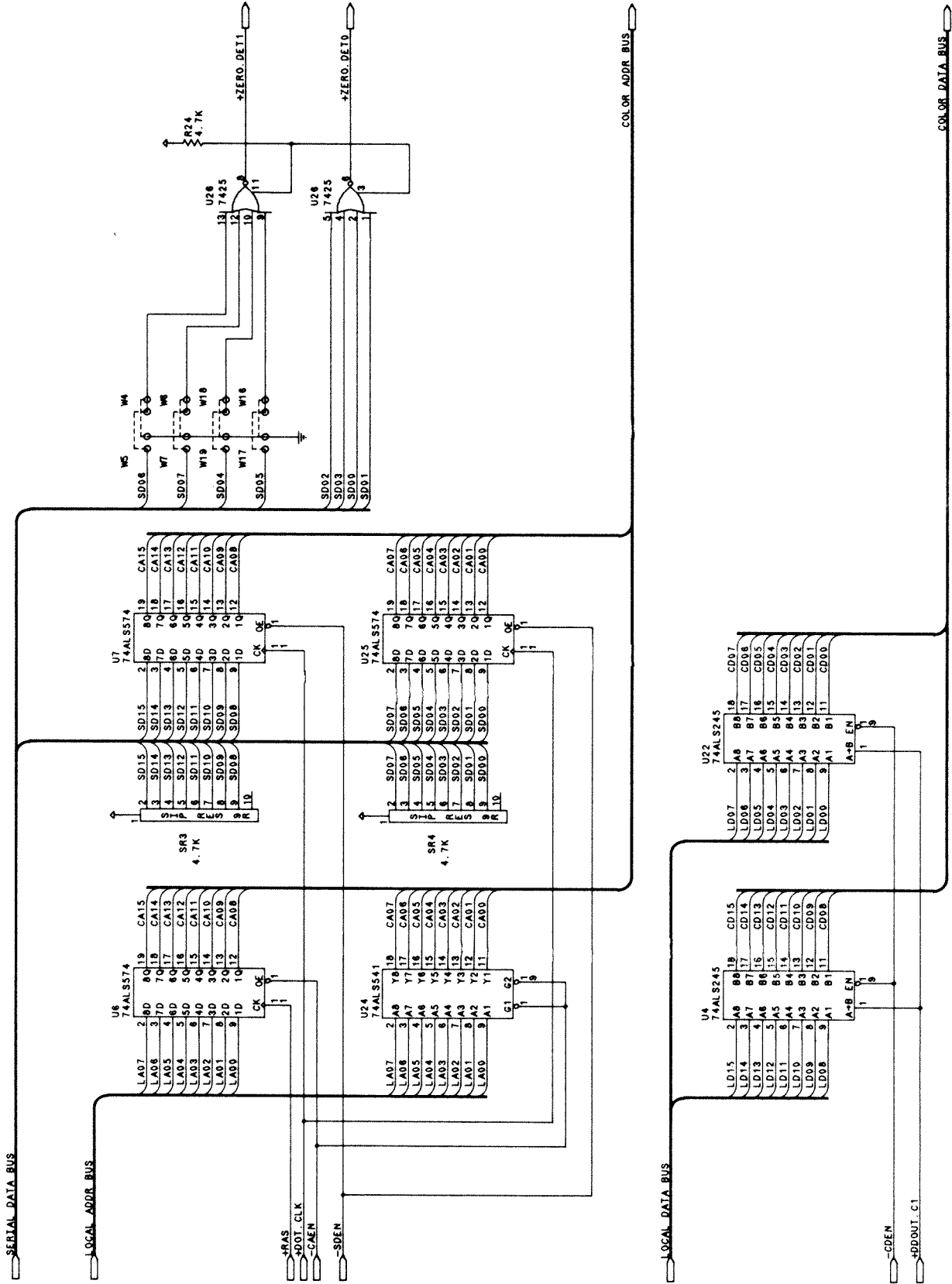
CPU Schematic Sheet 14 of 16

CPU Schematic
Sheet 15 of 16

LOCAL DATA BUS

LOCAL ADDR BUS
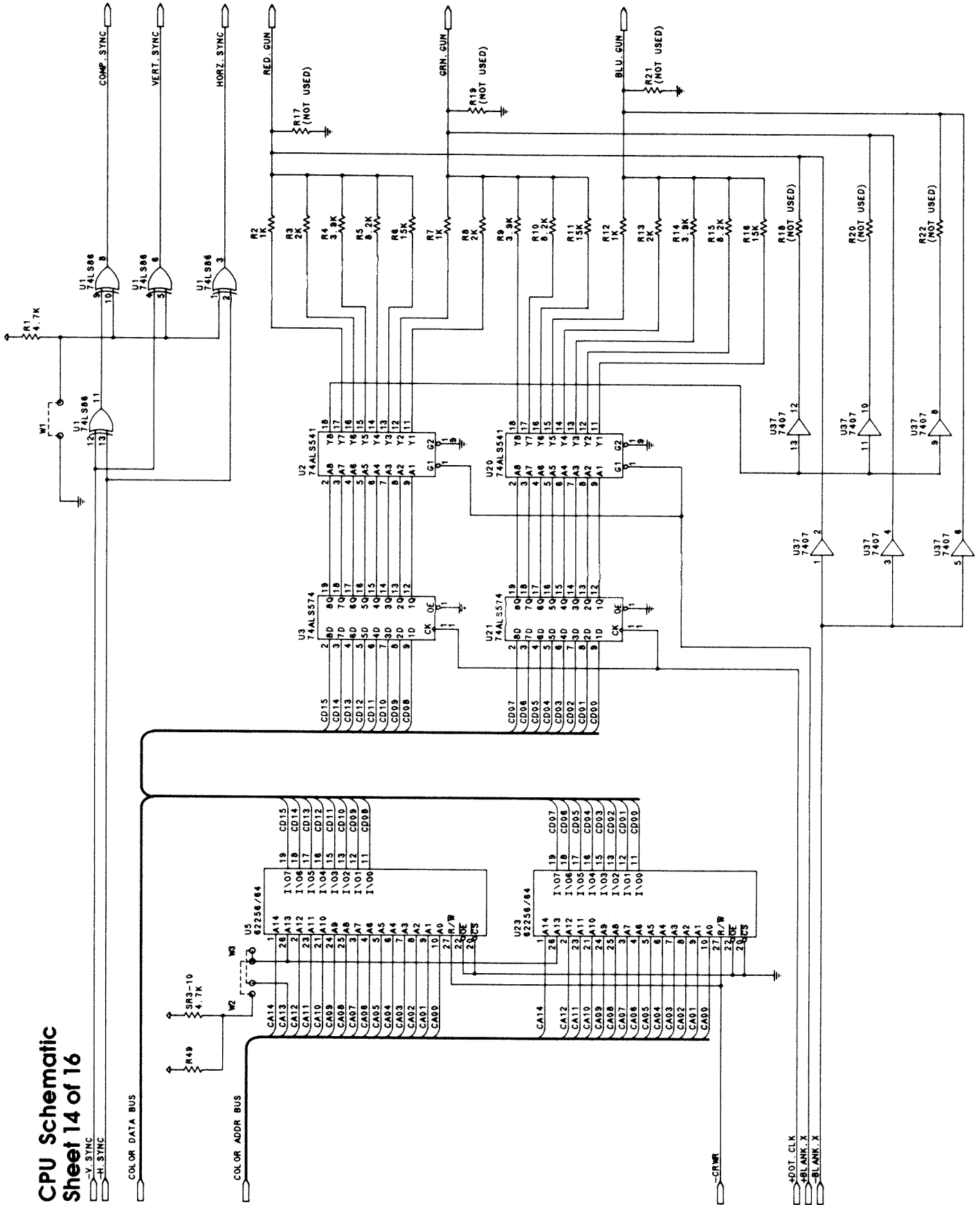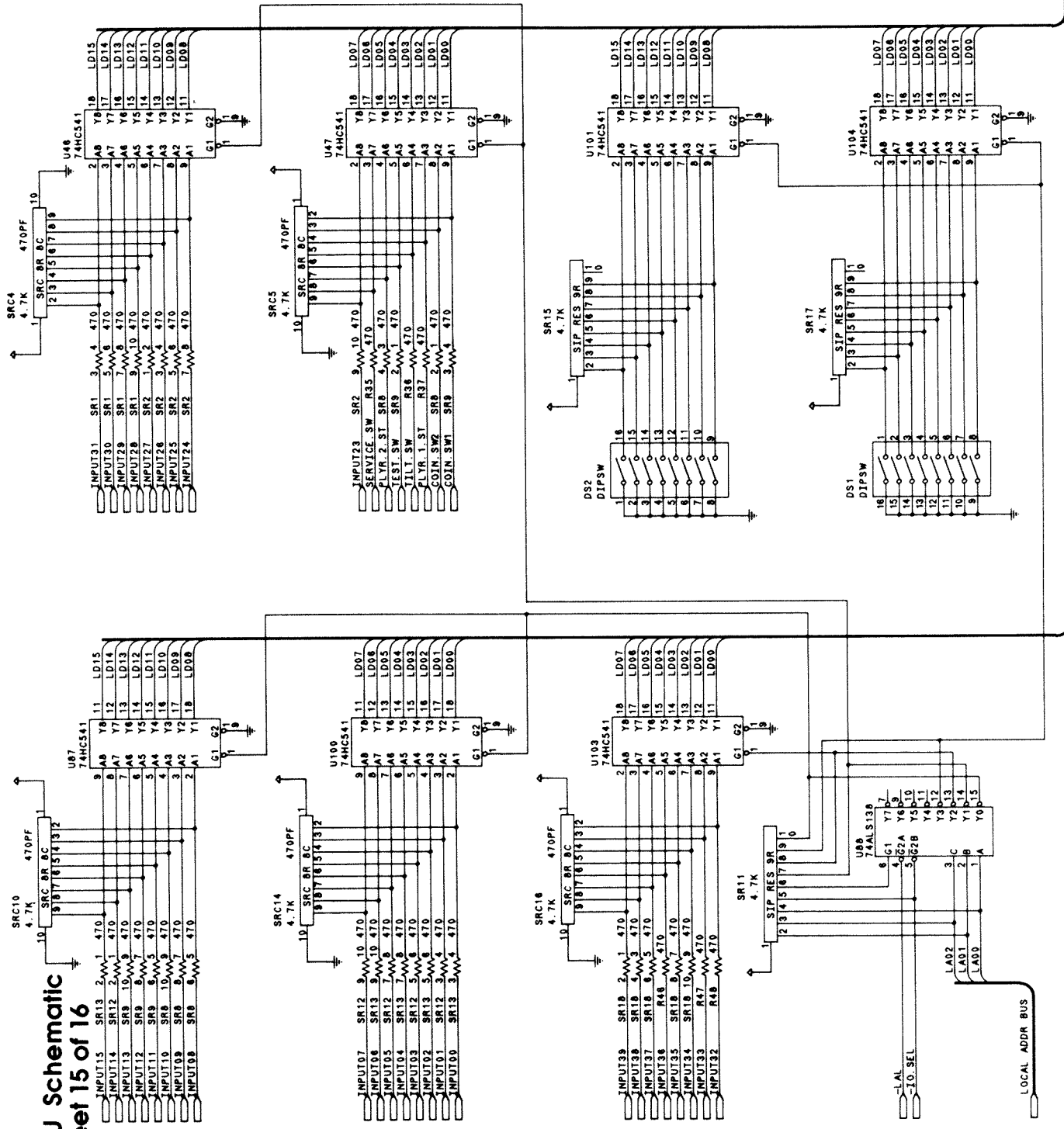
CPU Schematic
Sheet 16 of 16
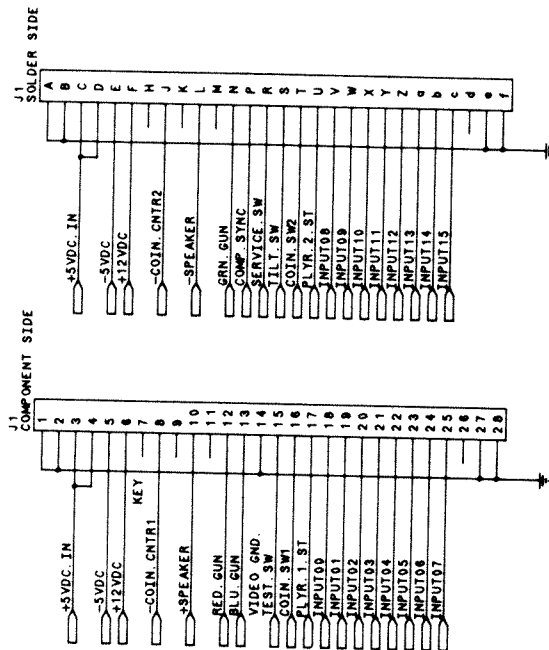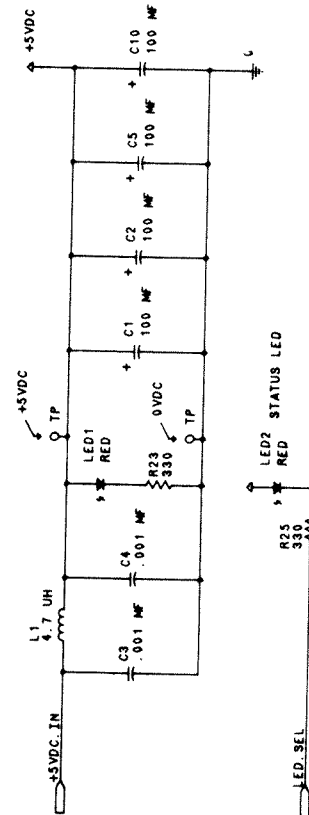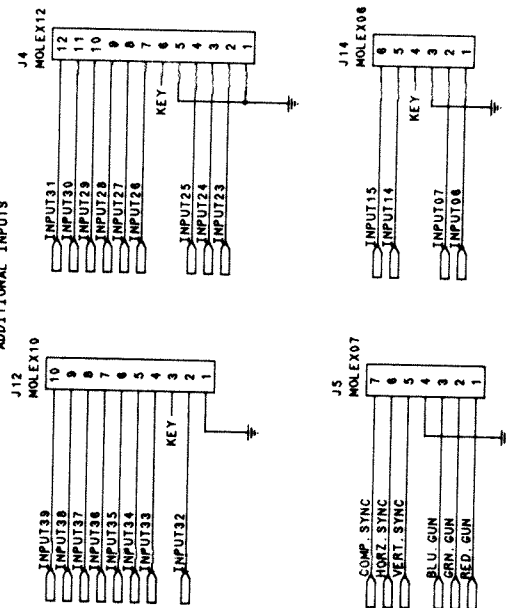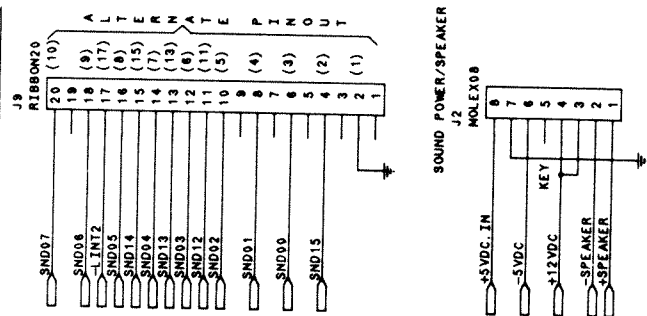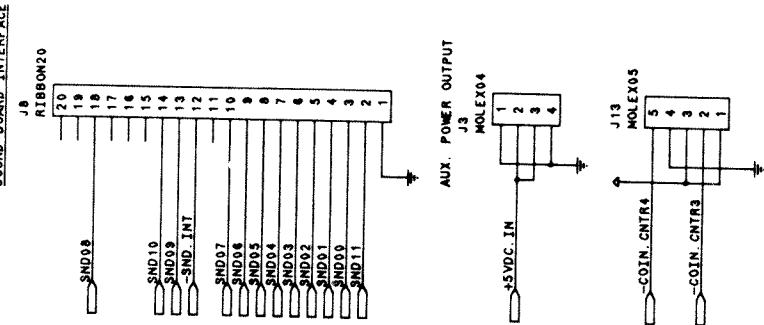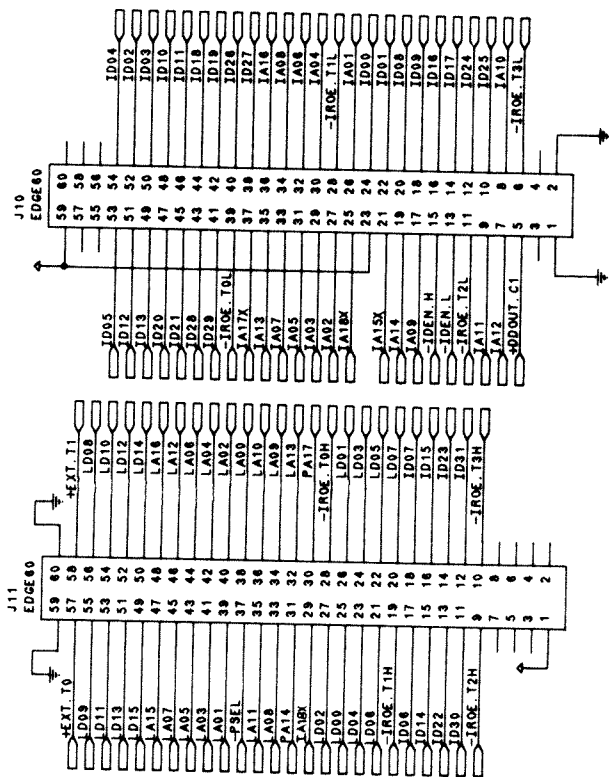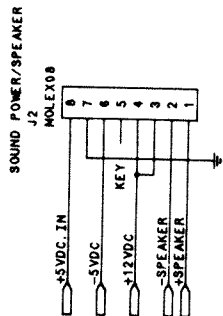
JAMMA Chart

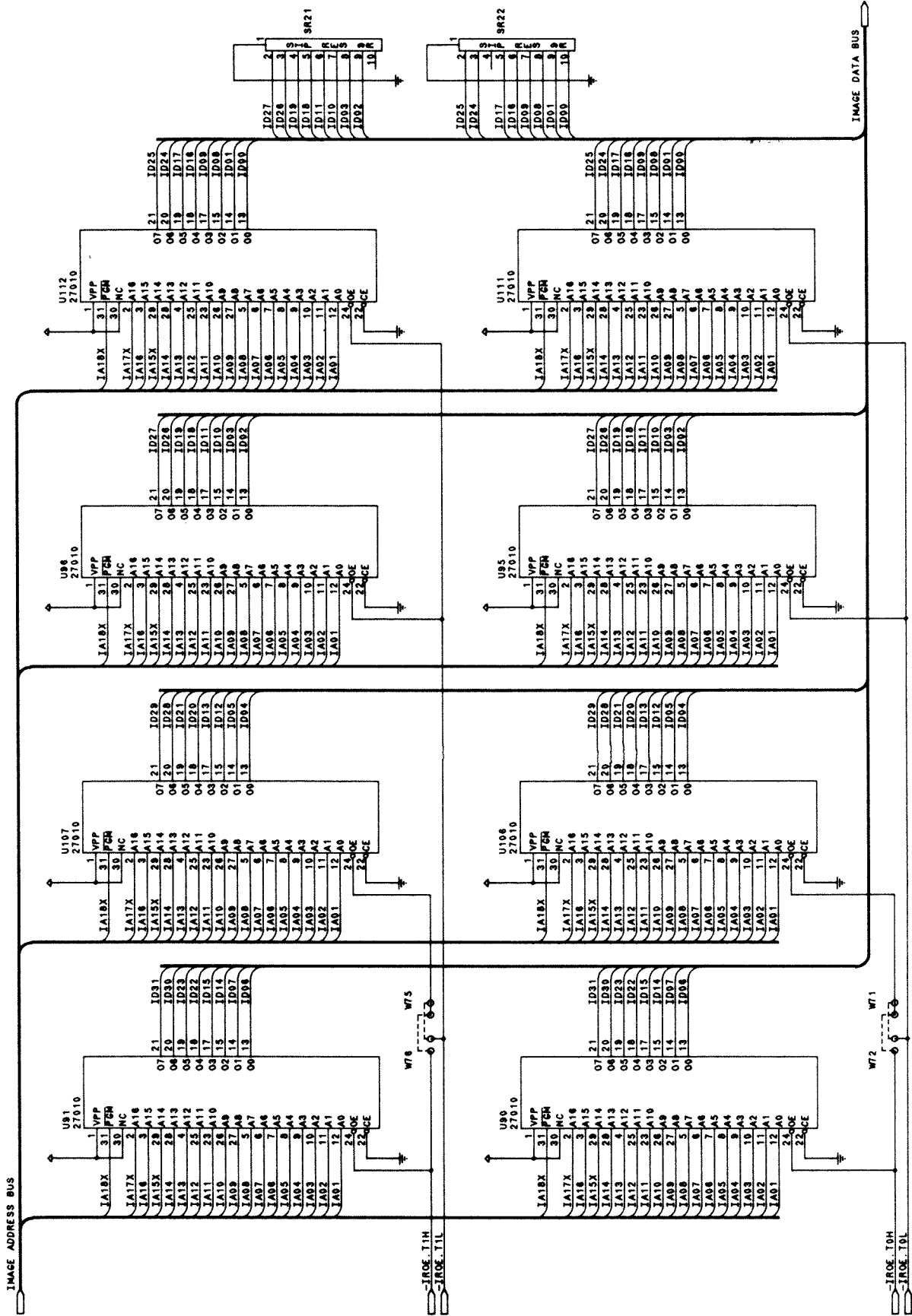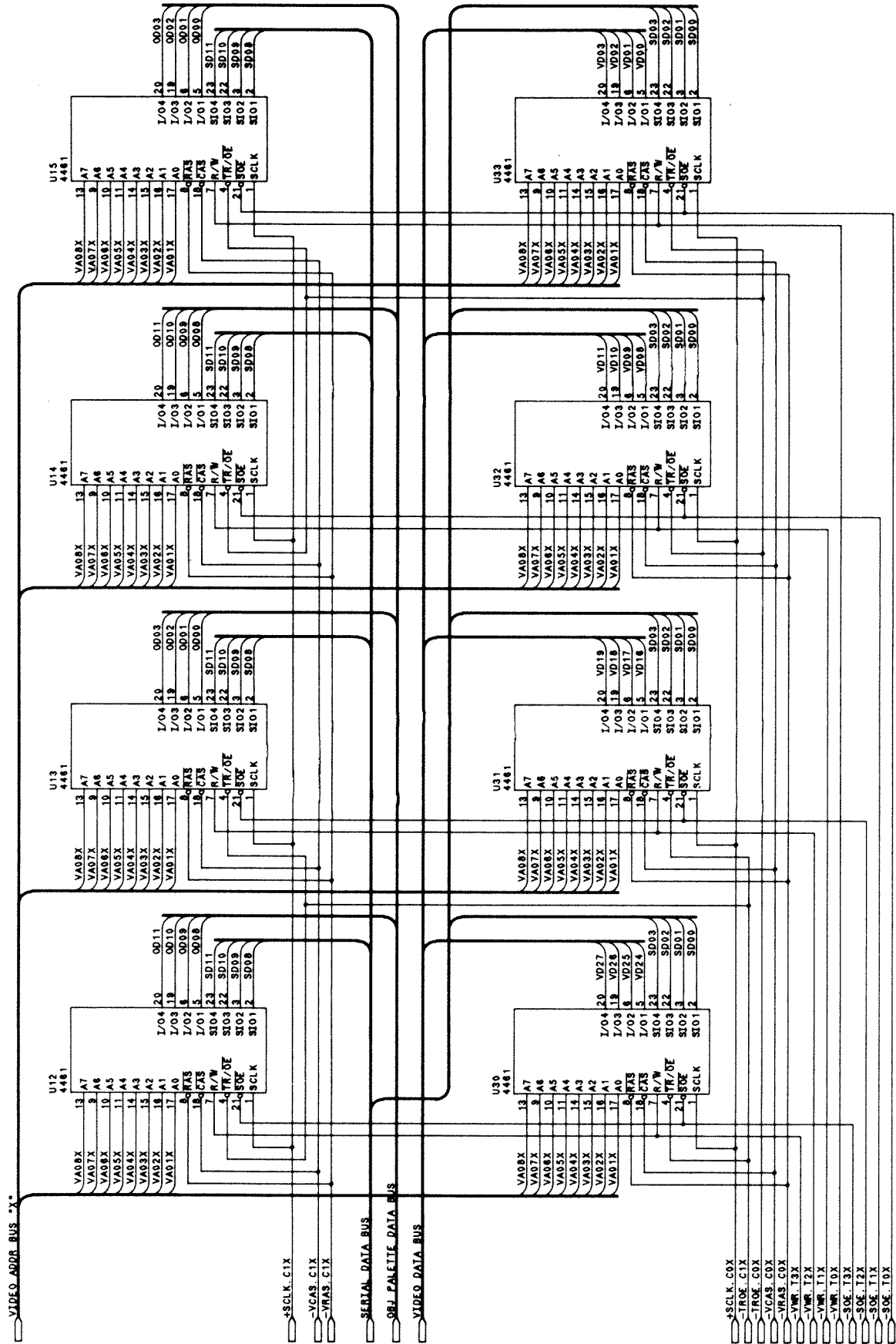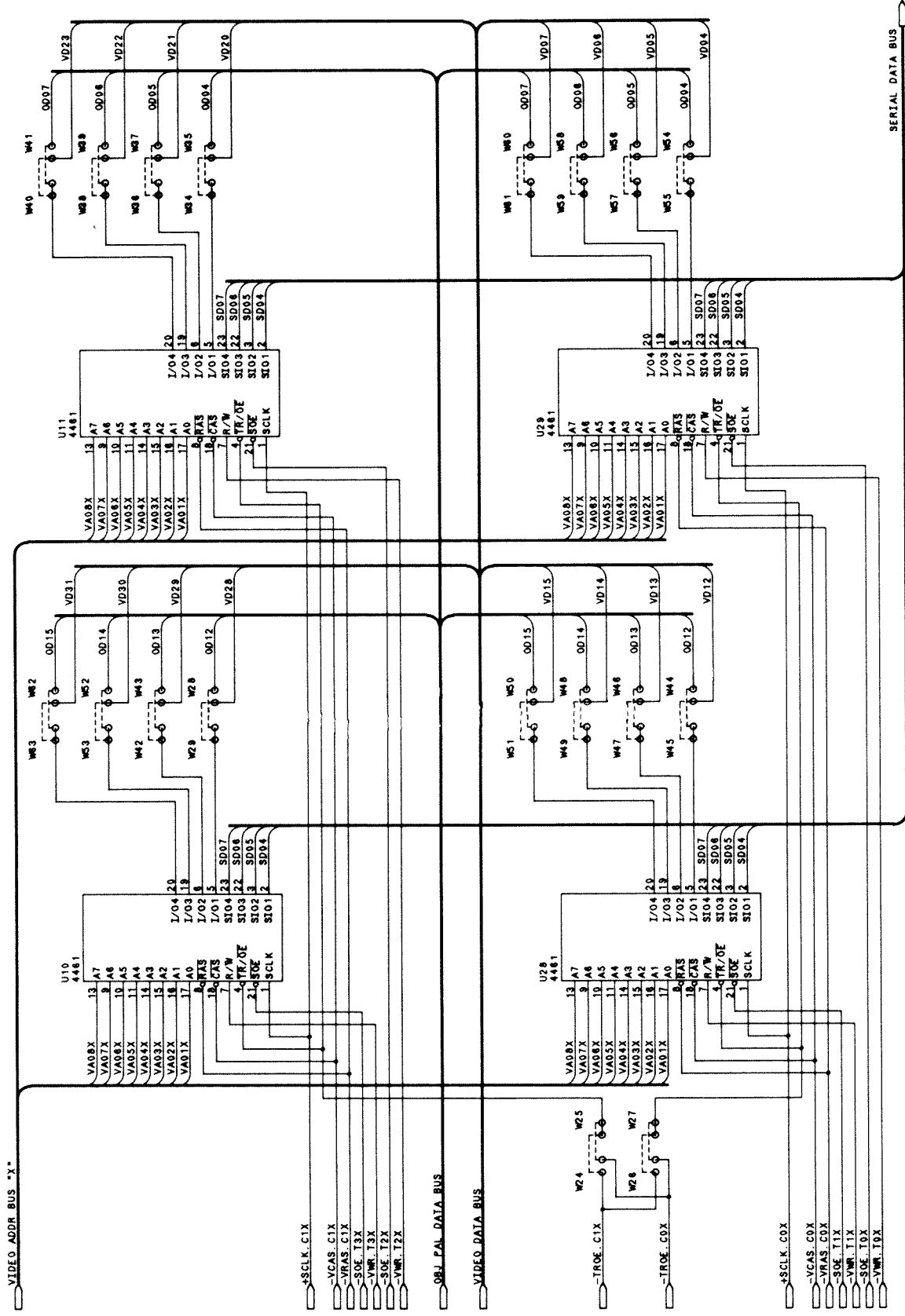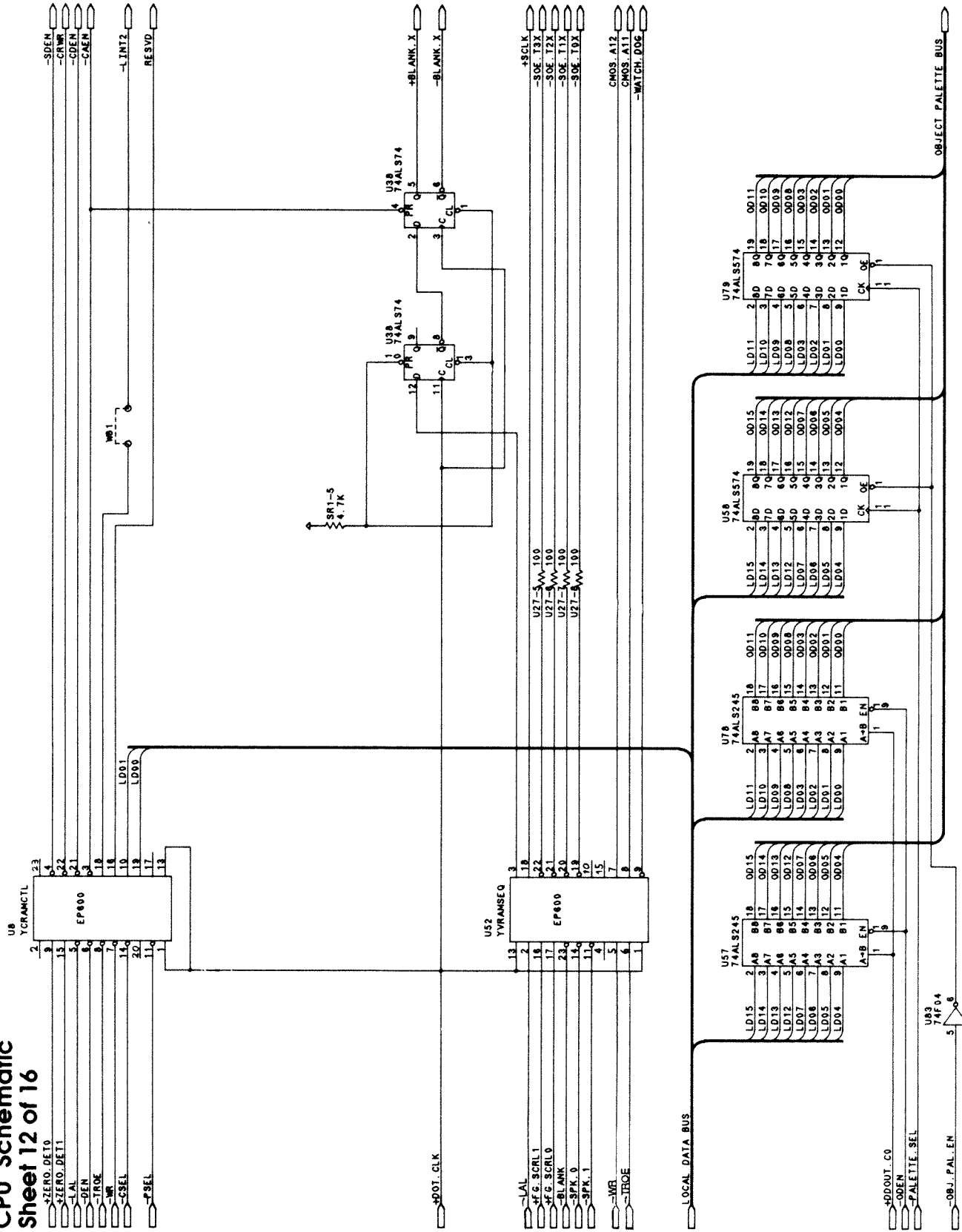| FUNCTION	WIRE COLOR	PIN	PIN	WIRE COLOR	FUNCTION
Ground	Blk	1	A	Blk	Ground
Ground	Grn-Brn	2	B	Blk	Ground
+5 Volts DC	Gry	3	C	Gry	+5 Volts DC
+5 Volts DC	Gry	4	D	Gry	+5 Volts DC
-5 Volts DC	Gry-Grn	5	E	Gry-Grn	-5 Volts DC
+12 Volts DC	Gry-Yel	6	F	Gry-Yel	+12 Volts DC
	Key	7	H	Key	
Counter 1	Wht-Orn	8	J	Wht-Grn	Counter 2
	NC	9	K	NC	
Speaker (+)	Red-Vio	10	L	Grn-Vio	Speaker (-)
	NC	11	M	NC	
Video Red	Red	12	N	Grn	Video Grn
Video Blue	Brn	13	P	Wht	Video Sync
Video Grd	Shield	14	R	Wht-Red	Service Credit
Test	Grn	15	S	Wht-Vio	Slam Tilt
1 Coin (Left)	Wht-Blu	16	T	Yel-Wht	2 Coin (Right)
1 Start/Transform	Yel-Grn	17	U	Yel-Blu	2 Start/Transform
1 Up Move	Org-Blk	18	V	Yel-Blk	2 Up Move
1 Down Move	Org-Brn	19	W	Yel-Brn	2 Down Move
1 Left Move	Org-Red	20	X	Yel-Red	2 Left Move
1 Right Move	Org	21	Y	Yel-Org	2 Right Move
1 Fire	Org-Yel	22	Z	Yel-Vio	2 Fire
1 Weapon	Org-Grn	23	a	Yel-Gry	2 Weapon
1 Weapon Select	Org-Blu	24	b	Vio-Blk	2 Weapon Select
Not Used	Org-Vio	25	c	Vio-Brn	Not Used
NC	Org-Gry	26	d	Vio-Red	NC
	NC	27	e	NC	
Ground	Blk	28	f	Blk	Ground

CABINET WIRING

Control Panel

Player 1 / Player 2 control panel wiring

Coin Meter

BLK
RED

Coin Door

WHT-RED	Sense
WHT-ORG	Counter 1
WHT-BLU	Coin 1
WHT-VIO	Tilt
KEY	
GRN	Test
NC	+5
GRY	Coin 2
YEL-WHT	Ground
GRN-BRN	
YEL	5.9 VAC
WHT-YEL	5.9 VAC

Coin Chute Lights #259 (or #555) bulb

See Power Wiring Diagram

FUTURE USE
WHT-BLK COIN 1
GRY-YEL +12V
WHT-BRN COIN 4
BLK GROUND

MONITOR BOARD

VIDEO COMPOSITE

SHIELD
BRN VIDEO BLU
GRN VIDEO GRN
RED VIDEO RED
WHT SYNC

NC
NC
GROUND

WHT Motor-On
WHT-GRY Notch
NC
BLK GROUND

Sound Board

Volume Control

J2: RED / BLK / KEY / SHIELD
J1: BLK / NC / NC / BLK

BLU - SPK
NC
VIO + SPK
GRY +5V
GRD
GRY-GRN -5V
KEY
GRY-YEL +12V
GRY-YEL +12V

20 Pin Ribbon Cable

SPEAKER

RED-VIO +
GRN-VIO -

SWITCHER POWER SUPPLY

GRY +5V
GRY-YEL +12V
GRY-GRN -5V
BLK GROUND

CPU VIDEO BOARD

J2: VIO / BLU / GRY-YEL / GRY-YEL / KEY / GRY-GRN / BLK / GRY
+ SPK / - SPK / +12V / +12V / KEY / -5V / GROUND / +5V

J4: NC / WHT-BLK / NC / WHT-BRN / NC / KEY / NC / NC / NC / WHT-GRY / NC

JAMMA EDGE CONNECTOR J1

SHIELDED VIDEO CABLE

J13: NC / NC / KEY / WHT / NC

3-20

POWER WIRING DIAGRAM

ON/OFF SWITCH

BACK DOOR SWITCH

BLK-YEL

3A.SLO
BLK
130 V VARISTOR

LINE FILTER

BLU

YEL

WHT

GRN

AC PLUG

GROUND

WHT-RED

SEE TRANSFORMER CHART

VIO A
VIO - YEL A
VIO B
VIO - YEL B

1 2 3 4   1 2 3 4

VIO A
VIO - YEL A
VIO B
VIO - YEL B

YEL-WHT

YEL

1 2   1 2

5.9 VAC
TO COIN DOOR

1 2 3 4   1 2 3 4
BLK
GRN
WHT
BLU

TO LIGHT FIXTURE
60 Hz
50 Hz

1 2 3   1 2 3
VIO
BLK
VIO-YEL

TO POWER SUPPLY

1 2 3   1 2 3
BLK
GRN - YEL
WHT

TO MONITOR

TRANSFORMER CHART

FROM POWER SWITCHES

YEL

BLU

NOTE: SHOWN AS JUMPERED FOR 115 VOLT OPERATION

SEE VOLTAGE SELECTION TABLE

15 PIN CONNECTOR

Pin		
3	WHT	O
6	WHT	
9	BRN	103.5
12	BLK	115
15	RED	132
5	BLU - WHT	O
8	BLU - BRN	103.5
11	BLU - BLK	115
14	BLU - RED	132
7	BLK	
10	BLK	
13	BLK	

XFMR 5610 - 12559 - 00

4 PIN CONNECTOR

VIO   3
VIO   1

2A

VIO - YEL   4
VIO - YEL   2

120

120V ISOLATED FOR MONITOR AND POWER SUPPLY

YEL - WHT 1
5.9V 600 mA YEL 2

5.9V FOR COIN DOOR LIGHTS

2 PIN CONNECTOR

TO POWER SWITCHES
WHT - RED   2   WHT - RED   FROM LINE
BLK - YEL   1   BLK - YEL   FILTER

Voltage Selection Table

VOLTAGE	JUMPER PINS
103.5	5 - 6, 7 -8, 10 - 9
115	5 - 6, 7 - 11, 10 - 12
132	5 - 6, 7 - 14, 10 - 15
207	5 - 9, 10 - 8
218.5	5 - 9, 10 - 11
230	5 -12, 10 -11
247	5 - 12, 10 -14

INTERBOARD WIRING

SOUND BOARD

J1
BLK	4	Jumper
NC	3	
NC	2	
BLK	1	

J2 — To Volume Control Pot
SHIELD	4	
KEY	3	
BLK	2	
RED	1	

J5 — To J2 on CPU
BLU	4	
NC	3	
NC	2	
VIO	1	

Power From CPU **J3**
6	5	4	3	2	1
GRY	BLK	GRY-GRN	KEY	GRY-YEL	GRY-YEL
+5V	Grd	-5V		+12V	+12V

J4 RIBBON CABLE TO CPU

Y-UNIT CPU BOARD

To Control Panel Connector — **J4**
WHI-GRY	12
NC	11
NC	10
NC	9
NC	8
KEY	7
NC	6
WHI-BRN	5
NC	4
WHI-BLK	3
NC	2
	1

Power To Sound Board J3 / From Sound Board J5 — **J2**
+5V	GRY	8
GROUND	BLK	7
-5V	GRY-GRN	6
KEY		5
+12V	GRY-YEL	4
+12V	GRY-YEL	3
	BLU	2
	VIO	1

JAMMA Edge Connector see JAMMA CHART

J14 Not Used

J13
1	2	3	4	5
NC	KEY	NC	WHI	NC

J12 Not Used

J6 Not Used

J7 Not Used

J8 From J4 On Sound Board

J9 A   J9B Not Used

3-22

Control Panel Wire Colors

Player 1

Start/Transform
>Yellow-Green
>Black

Move Up
>Brown
>Black

Move Down
>Violet
>Black

Move Left
>Orange-Brown
>Black

Move Right
>Red
>Black

Fire
>Orange-Yellow
>Black

Weapon
>Orange-Green
>Black

Weapon Select
>Orange-Blue
>Black

Player 2

Start/Transform
>Yellow-Blue
>Black

Move Up
>Brown
>Black

Move Down
>Violet
>Black

Move Left
>Orange-Brown
>Black

Move Right
>Red
>Black

Fire
>Yellow-Violet
>Black

Weapon
>Yellow-Gray
>Black

Weapon Select
>Violet-Black
>Black

NOTES

Inserted Jumpers

Audio Board

> **W2**
> **W9**
> **W11**

CPU Video Board

> **W2, W8, W11, W12**
> **W14, W21, W22, W24**
> **W27, W28, W31, W32**
> **W35, W37, W39, W41**
> **W43, W44, W46, W48**
> **W50, W52, W54, W56**
> **W58, W60, W62, W66**
> **W68, W69, W72, W74**
> **W76, W78, W80**

WARNINGS & NOTICES

Warning

USE OF NON-MIDWAY PARTS OR CIRCUIT MODIFICATIONS MAY CAUSE SERIOUS INJURY OR EQUIPMENT DAMAGE! USE ONLY MIDWAY AUTHORIZED PARTS.

* For safety and reliability, substitute parts and modifications are not recommended.

* Substitute parts or modifications may void FCC type acceptance.

* This game is protected by Federal copyright, trademark and patent laws. Unauthorized modifications may be illegal under Federal law. This also applies to MIDWAY logos, designs, publications and assemblies. Moreover, facsimiles of MIDWAY equipment (or any feature thereof) may be illegal under federal law, regardless of whether or not such facsimiles are manufactured with MIDWAY components.

Warning

This equipment generates, uses and can emit radio frequency energy and, if not installed properly and used according to the directions in this 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 to radio communications, in which the user, at his or her own expense, will be required to take whatever measures may be needed to correct the interference.

Warning

Prevent shock hazard and assure proper game operation. Only plug this game into a properly grounded outlet. Do not use a cheater plug to defeat the power cord's grounding pin. Do not cut off the ground pin.

Notice

When MIDWAY ships a game, it is in compliance with FCC regulations. Your sticker is proof. If the sticker is missing or damaged, legal repercussions to the owner or distributor of the game may result. If your game does not contain an FCC sticker, call MIDWAY immediately.

Notice

No part of this publication may be reproduced by any mechanical , photographic, or electronic process, or in the form of a phonographic recording, nor may be transmitted, or otherwise copied for public or private use, without permission from the publisher.

For Service:
Call your Authorized MIDWAY Distributor.

MIDWAY Manufacturing
3401 N. CALIFORNIA AVE.
CHICAGO, ILLINOIS 60618