

16-3036-101
December 15, 1988



Service Manual

Programmed Chip Summary

(Continued from Inside-Front Cover)

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
Image ROM	ROM	27512	ROM Board U55	A-5343-3036-43
Image ROM	ROM	27512	ROM Board U56	A-5343-3036-44
Image ROM	ROM	27512	ROM Board U57	A-5343-3036-45
Image ROM	ROM	27512	ROM Board U58	A-5343-3036-46
Program ROM	ROM	27512	ROM Board U59	A-5343-3036-41
Program ROM	ROM	27512	ROM Board U60	A-5343-3036-42
Image ROM	ROM	27512	ROM Board U61	A-5343-3036-47
Image ROM	ROM	27512	ROM Board U62	A-5343-3036-48
Image ROM	ROM	27512	ROM Board U63	A-5343-3036-49
Image ROM	ROM	27512	ROM Board U64	A-5343-3036-50
Image ROM	ROM	27512	ROM Board U65	A-5343-3036-51
Image ROM	ROM	27512	ROM Board U66	A-5343-3036-52
Image ROM	ROM	27512	ROM Board U67	A-5343-3036-53
Image ROM	ROM	27512	ROM Board U68	A-5343-3036-54
Image ROM	ROM	27512	ROM Board U69	A-5343-3036-55
Image ROM	ROM	27512	ROM Board U70	A-5343-3036-56
Image ROM	ROM	27512	ROM Board U71	A-5343-3036-57
Image ROM	ROM	27512	ROM Board U72	A-5343-3036-58
Image ROM	ROM	27512	ROM Board U73	A-5343-3036-59
Image ROM	ROM	27512	ROM Board U74	A-5343-3036-60
Image ROM	ROM	27512	ROM Board U75	A-5343-3036-61
Image ROM	ROM	27512	ROM Board U76	A-5343-3036-62
Program ROM	ROM	27512	ROM Board U77	A-5343-3036-13
Program ROM	ROM	27512	ROM Board U78	A-5343-3036-14
Image ROM	ROM	27512	ROM Board U79	A-5343-3036-63
Image ROM	ROM	27512	ROM Board U80	A-5343-3036-64
Image ROM	ROM	27512	ROM Board U81	A-5343-3036-65
Image ROM	ROM	27512	ROM Board U82	A-5343-3036-66
Image ROM	ROM	27512	ROM Board U83	A-5343-3036-67
Image ROM	ROM	27512	ROM Board U84	A-5343-3036-68
Image ROM	ROM	27512	ROM Board U85	A-5343-3036-69
Image ROM	ROM	27512	ROM Board U86	A-5343-3036-70
Image ROM	ROM	27512	ROM Board U87	A-5343-3036-71
Image ROM	ROM	27512	ROM Board U88	A-5343-3036-72
Image ROM	ROM	27512	ROM Board U89	A-5343-3036-73
Image ROM	ROM	27512	ROM Board U90	A-5343-3036-74
Image ROM	ROM	27512	ROM Board U91	A-5343-3036-75
Image ROM	ROM	27512	ROM Board U92	A-5343-3036-76
Image ROM	ROM	27512	ROM Board U93	A-5343-3036-77
Image ROM	ROM	27512	ROM Board U94	A-5343-3036-78

NARC

Service Manual

Programmed Chip Summary

(Continued on Inside-Back Cover)

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
CRAM Controller	PLD	EP153A	CPU Board U29	A-5346-3036-1
Local Ctrl	PLD	EP153A	CPU Board U78	A-5346-3036-2
Video RAM Ctrl	PLD	EP153A	CPU Board U79	A-5346-3036-3
Address Decoder	PLD	EP153A	CPU Board U80	A-5346-3036-4
Image ROM Ctrl	PLD	EP153A	CPU Board U83	A-5346-3036-5
Video RAM Seq.	PLD	EP600	CPU Board U12	A-5346-3036-6
Autoerase Ctrl	PLD	EP900	CPU Board U20	A-5346-3036-7
Program ROM	ROM	27512	ROM Board U23	A-5343-3036-7
Program ROM	ROM	27512	ROM Board U24	A-5343-3036-8
Image ROM	ROM	27512	ROM Board U25	A-5343-3036-15
Image ROM	ROM	27512	ROM Board U26	A-5343-3036-16
Image ROM	ROM	27512	ROM Board U27	A-5343-3036-17
Image ROM	ROM	27512	ROM Board U28	A-5343-3036-18
Image ROM	ROM	27512	ROM Board U29	A-5343-3036-19
Image ROM	ROM	27512	ROM Board U30	A-5343-3036-20
Image ROM	ROM	27512	ROM Board U31	A-5343-3036-21
Image ROM	ROM	27512	ROM Board U32	A-5343-3036-22
Image ROM	ROM	27512	ROM Board U33	A-5343-3036-23
Image ROM	ROM	27512	ROM Board U34	A-5343-3036-24
Image ROM	ROM	27512	ROM Board U35	A-5343-3036-25
Image ROM	ROM	27512	ROM Board U36	A-5343-3036-26
Image ROM	ROM	27512	ROM Board U37	A-5343-3036-27
Image ROM	ROM	27512	ROM Board U38	A-5343-3036-28
Image ROM	ROM	27512	ROM Board U39	A-5343-3036-29
Image ROM	ROM	27512	ROM Board U40	A-5343-3036-30
Program ROM	ROM	27512	ROM Board U41	A-5343-3036-9
Program ROM	ROM	27512	ROM Board U42	A-5343-3036-10
Image ROM	ROM	27512	ROM Board U43	A-5343-3036-31
Image ROM	ROM	27512	ROM Board U44	A-5343-3036-32
Image ROM	ROM	27512	ROM Board U45	A-5343-3036-33
Image ROM	ROM	27512	ROM Board U46	A-5343-3036-34
Image ROM	ROM	27512	ROM Board U47	A-5343-3036-35
Image ROM	ROM	27512	ROM Board U48	A-5343-3036-36
Image ROM	ROM	27512	ROM Board U49	A-5343-3036-37
Image ROM	ROM	27512	ROM Board U50	A-5343-3036-38
Image ROM	ROM	27512	ROM Board U51	A-5343-3036-39
Image ROM	ROM	27512	ROM Board U52	A-5343-3036-40
Image ROM	ROM	27512	ROM Board U53	A-5343-3036-41
Image ROM	ROM	27512	ROM Board U54	A-5343-3036-42

16-3036-101
December 15, 1988



SERVICE MANUAL

- operation
- adjustment
- unique parts

- bookkeeping
- diagnostics

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Programmed Chips on the Sound Board

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
Sound ROM	ROM	27512	Sound Board U3	Not Used
Sound ROM	ROM	27512	Sound Board U4	A-5343-3036-1
Sound ROM	ROM	27512	Sound Board U5	A-5343-3036-2
Sound ROM	ROM	27512	Sound Board U35	A-5343-3036-3
Sound ROM	ROM	27512	Sound Board U36	A-5343-3036-4
Sound ROM	ROM	27512	Sound Board U37	A-5343-3036-5
Sound ROM	ROM	27512	Sound Board U38	A-5343-3036-6



Jumper Table

CPU Board	Connected	Not Used
	W3	W1
	W4	W2
	W6	W5
	W9	W7
	W10	W8
	W11	W12
	W14	W13
ROM Board	1/2 3/4	(None)
	5/6	
	7/8	
	9/10	
	11/12	
	13/14	
	R1	
CPU Board	W3 W4 W6	W1 W2 W5
	W9	W7
	W10	W8
	W11	W12
	W14	W13
Sound Board	W1 W9 W4 W15	W2 W13 W3 W14
	W5 W17	W6 W16
	W7 W18	W10 W19
	W8 W20	W11 W21
		W12



Table of Contents

Chapter 1. Operating Procedures.....	1-5
Programmed Chip Summary--Part 1.....	1-2
Programmed Chips on the Sound Board.....	1-3
Jumper Table.....	1-4
Warnings and Notices.....	1-8
Examine Your Game.....	1-9
Control Locations.....	1-10
Power Turn-On.....	1-11
Game Operation.....	1-12
Player Panel (<i>Illustration</i>).....	1-13
Game Adjustments, Bookkeeping, Diagnostics.....	1-15
Main Test Menu (<i>Illustration</i>).....	1-16
Typical Audits Screen, Page 1 (<i>Illustration</i>).....	1-17
Typical Audits Screen, Page 2 (<i>Illustration</i>).....	1-18
Typical Game Adjustments Screen (<i>Illustration</i>).....	1-19
Electronic Drawings.....	1-21



N o t e s . . .

WARC

Service Manual 1- 6

Chapter 1. Operating Procedures

Warnings and Notices
Examine Your Game
Control Locations
Power Turn-On

Game Operation
Player Panel (*Illustration*)

Game Adjustments, Bookkeeping, Diagnostics
Main Test Menu (*Illustration*)

Typical Audits Screen, Page 1 (*Illustration*)

Typical Audits Screen, Page 2 (*Illustration*)

**Typical Game Adjustments Screen
(*Illustration*)**

Pricing Table



Warnings and Notices

WARNING

FOR SAFETY AND RELIABILITY, substitute parts or modifications are not recommended.

USE OF NON-WILLIAMS PARTS or circuit modifications may cause injuries or equipment damage.

SUBSTITUTE PARTS OR MODIFICATIONS may void FCC Type Acceptance.

SINCE THIS GAME IS PROTECTED by Federal copyright, trademark and patent laws. Unauthorized software or hardware modifications may be illegal under Federal law.

THIS "MODIFICATION" PRINCIPLE ALSO APPLIES to unauthorized facsimiles of **WILLIAMS** logos, designs, publications and assemblies. Moreover, facsimiles of **WILLIAMS** equipment (*or any feature thereof*) may be illegal under Federal law. Whether or not such facsimiles are manufactured with **WILLIAMS** components, this rule applies.

WARNING

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 a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this



equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARNING

FCC STICKER. Check the back of your game for an FCC sticker. When **WILLIAMS** ships a game, the game has been found to comply with FCC Rules. *The sticker is proof.* If the sticker is missing, *legal repercussions to the owner and distributor of the game* may result. If your game (manufactured after December 1982) has no FCC sticker, call **WILLIAMS** for advice. Or write us a note on your game-registration card. *Be sure the card bears your game's serial number.*

WARNING

THREE-WIRE PLUG. 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 ground pin. DO NOT cut off the ground pin.

RF-INTERFERENCE NOTICE

YOUR GAME'S CABLE-HARNESS PLACEMENT and ground-strap routing are very important. They are designed to keep RF radiation and conduction within levels accepted by FCC Regulations.

MAINTAIN THESE LEVELS. Servicing may require that you disconnect harnesses or ground straps. When you're finished, reposition and reconnect them as they were.

Examine Your Game

- **INSPECT THE OUTSIDE** of the carton or game cabinet for shipping damage.

The logo consists of the letters "WARC" in a stylized, hand-drawn font. The "W" is on top, followed by "A", "R", and "C". The "A" is slightly taller than the others, and the "R" and "C" are connected at the top.

- **UNLOCK AND OPEN** the bottom-rear door. Now check circuitry.
- **ARE CONNECTORS SECURELY ATTACHED?** Reconnect any found loose. *Don't force connectors!* They're keyed and only fit one way.
- **ARE PLUG-IN CHIPS FIRMLY SEATED** in their sockets?
- **UNWRAP THE POWER CORD** coiled inside the cabinet. *Don't plug it in yet!*
- **SCRUTINIZE MAJOR SUBASSEMBLIES**, such as the monitor, player panel, transformer chassis and power supply. Make sure they're securely mounted.
- **UNDO THE CONTROL-PANEL LATCHES.** You can reach these from the coin door by extending your arm upward and to either side. Now check connectors and circuitry as above.

Control Locations

THE ON-OFF SWITCH is above the back (*monitor*) door. Standing before the game, you'll find the switch at the game's top-left corner.

POWER INTERLOCK SWITCH. Your game has two power-interlock switches. These are located at the back of the game, behind the top and middle panels. Imagine that you're standing behind the game. An interlock is in the upper-right corner of each panel. Each interlock is a spring-loaded DPDT switch. It turns off the game when you remove the panel. For servicing purposes, pull the switch out and the game will power up.

THE VOLUME CONTROL is inside the coin door and to your right.



THREE DIAGNOSTIC SWITCHES are mounted together on a bracket behind the coin door. *These switches are useful for many purposes: Accessing Diagnostic Mode Tests, reading the bookkeeping totals or making game adjustments.* See relevant discussions later in this chapter.

THE MEMORY-PROTECT INTERLOCK SWITCH is behind the coin door. This switch must be open when you clear bookkeeping totals or make game adjustments. It automatically opens when the coin door is open. .

THE CPU-BOARD RESET SWITCH is on the CPU Board near the +5VDC indicator LED.

Power Turn-On

WHEN THE GAME IS FIRST TURNED ON general illumination should light. In a correctly running game, tests will be followed by the message "INITIAL CHECKS INDICATE: THIS GAME IS BITCHIN'." If failure messages come up on the screen instead, refer to **Built-In Test Procedures**.

DEMAGNETIZE THE GAME with a television degaussing coil. Besides the monitor, remember to degauss large steel parts (for example, the backdoor hinge). Do this whenever you move the game, and also as a regular, monthly procedure. Otherwise residual magnetism may cause color impurities that adversely affect your collections.



Game Operation

GAME START

INSERT COINS. The game allocates an adjustable number of credits per coin. This number appears on the CRT. For example, assume that your settings specify one credit for a quarter (*U.S. factory pricing*). A player deposits a quarter and presses 1-PLAYER START. On its screen, the game posts one credit. Then a one-player game begins.

Using player-2 controls for a one-player game is also possible: With one credit displayed, press 2-PLAYER START.

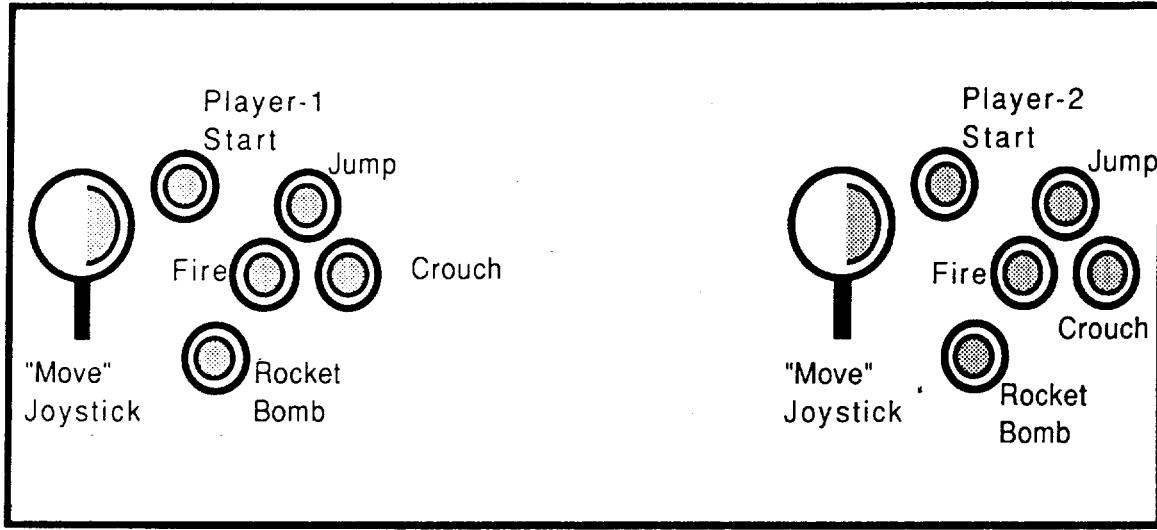
For a two-player game, at least two credits must be displayed. To initiate this two-player game, press the 2-PLAYER START button.

PLAYER CONTROLS

On its player panel, your **NARC™** game has four pushbuttons and a joystick. Players can...

- **FIRE** at evil pushers with the machine pistol.
- **PRESS ROCKET BOMB!** Eliminate several pushers in one blast!
- **JUMP** over broken sidewalks and other obstacles!
- **CROUCH** to duck bullets and garbage cans!
- **MOVE** in eight directions with the joystick.

The logo consists of the word "NARC" in a stylized, jagged font. The letters are thick and have sharp, irregular edges, giving them a rough, metallic appearance.



Player Panel

GAMEPLAY

THE CITY'S OVERRUN! Slashers! Gangsters! Pimps! The punks are everywhere! The scum of the earth! And only the player can restore law and order! Trigger finger spraying hot metal before him... ROCKET BOMB at the ready... The player is a macho urban guerilla, defending our city from the ultimate urban scourge! This is his neighborhood too. He's committed. He says NO to inner city decadence. He carries a badge and a moral code. And he backs them both with screaming lead.

FEARLESS, ALOOF... He blazes away with his machine pistol. Then he launches a devastating ROCKET BOMB to trap several baddies in simultaneous ambush! With JUMP and SQUAT buttons, he dodges bullets, dynamite and other missiles. But the lurking Loaf, death-dealing Dumpster Man, patronizing Pimp and horrible Hypoman are everywhere. And these mangy marauders stop at nothing. This is their turf. So they'll hurl more bombs and deal more

WADeC

corruption. Because they're forever preparing another rendezvous with death. Here's a list of the nefarious gangmembers...

- Loaf
- Gangster
- Pimp
- Hypoman
- Psychotic
- Slasher
- Dumpster Man
- Mr. Big (*Public Enemy Number 1*)

THIS JOB DEMANDS GRITTY DETERMINATION, FAST THINKING! The city is a *jungle*. Pushers may lurk in manholes... They may dart by in a heavily armed, pink Cadillac... Or they might even buzz the player with their preemptive pushercopter! But the player laughs at danger. He scores bonus points by seizing contraband (*evidence!*) hidden in the Cadillac. And by busting these parasites on society. Then he blows that manhole. And he downs that pushercopter. Because no pimp is too high... And no gangster's too low to eat hot justice!

ENTER BUILDINGS. The player must seek out and investigate gang strongholds. When enemies darts out of a tenement, the player must enter. If psycho fiends slither in the subway, the player relentlessly pursues them. Not bullets, not bombs, not even mad dogs can deter him. For our hero's sworn duty is to case the hideouts and seize the evidence. Then he can bust another offender!

THE PLAYER STARTS WITH 100 ENERGY UNITS. Busts and evidence win points. For every 25,000 points earned, the player receives 20 energy units. But there's a penalty whenever our hero's hit or if an innocent bystander's injured. Here are some of the major penalties...

- Hit by hypo, player loses 16 energy units



- Attacked by Slasher, player sacrifices 10 energy units
- Struck by a bullet, player's penalized five units

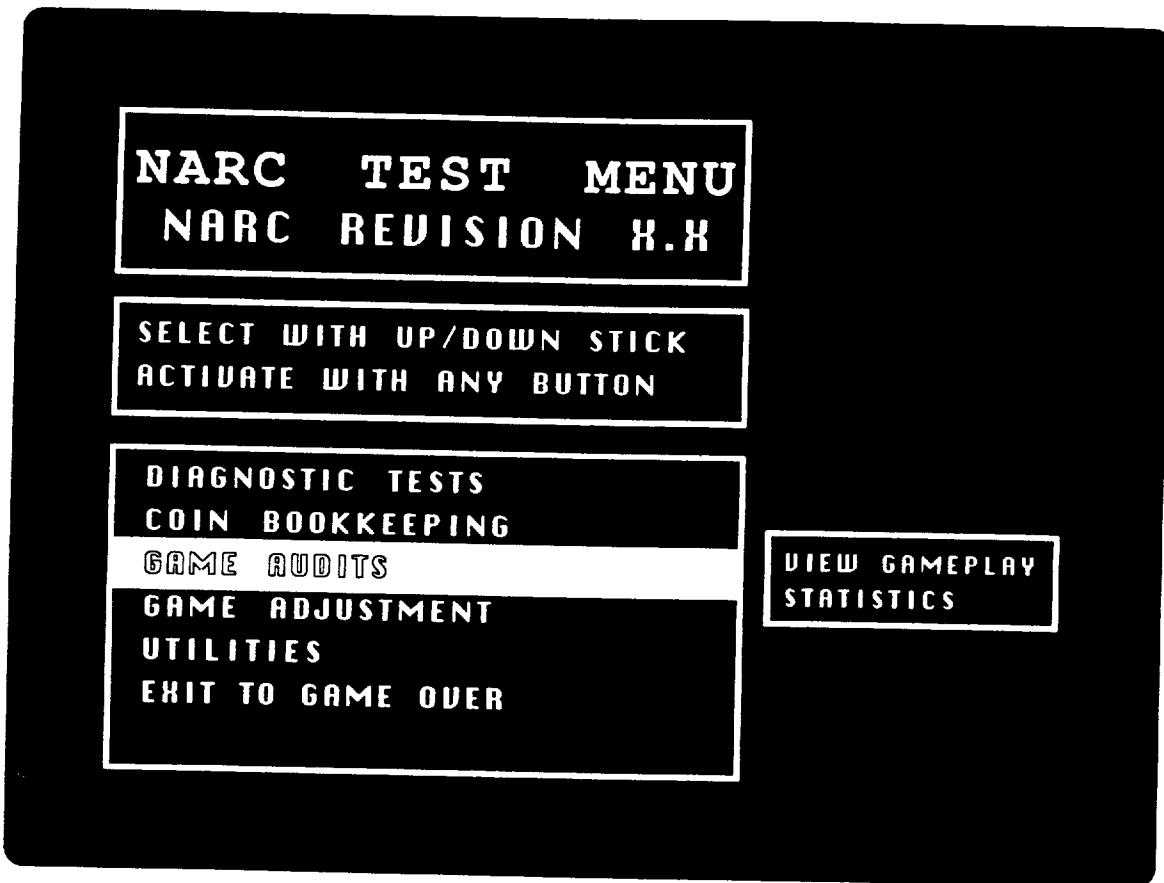
THE BIG TARGET. Ultimately the player pursues Public Enemy Number One, Mr. Big. Mr. Big is the shimmering, super slug king of the sleazy, slimy underworld empire. His glitzy, cosmopolitan crib is brimming with evidence. And he's the inevitable prospect for a megabust. But he's wily. He's quick. And he's amply equipped with the latest Hyper-Crimewave Technology. But the player must not permit him to escape! The dragnet must not fail!

Game Adjustments, Bookkeeping, Diagnostics

MENU CONCEPT. For your convenience, game adjustment, bookkeeping, audit totals and diagnostics are *menu-driven* features. Each *menu* is a list of several choices that you may act upon as desired.

LEVELS OF MENUS. Your game has several levels of menus. That is, one menu selection will send the game to another menu. The menus are arranged in outline fashion. That is, a menu of general options selects menus of more specific options.

PRESS ADVANCE. Adjustments, bookkeeping and diagnostics are available from the main test menu. Enter the main test menu by pressing the ADVANCE button inside the coin door. ADVANCE is mounted on a bracket bolted to the inside of the door. Besides initiating diagnostics and other modes, ADVANCE permits you to browse through and alter menus. When you press ADVANCE, the game steps through the options of one menu.



Main Test Menu

Normally you may exit the menu you're inspecting and return to the previous menu. In fact, "RETURN TO MAIN MENU" and "EXIT TO GAME OVER" are typical menu options. Suppose that you select "RETURN TO MAIN MENU": *The game returns to the option where it was before on the previous menu.*

Pressing and holding ADVANCE also causes the game to exit from a menu.

NARC

However when you press and hold ADVANCE, the game exits to the next lower option on the previous menu. This capability of the ADVANCE button allows you to access menu features even when player panel controls malfunction.

GAME AUDITS

GAME AUDITS SHOW YOU AT A GLANCE if game settings are bringing you a satisfactory return on your investment! Only games by WILLIAMS ELECTRONICS have this menu-driven feature. Think of it as a unique way to keep your **NARC** game the *leader of the pack when it comes to earnings...location after location, week in and week out!*

GAME AUDITS
NARC REVISION X.X

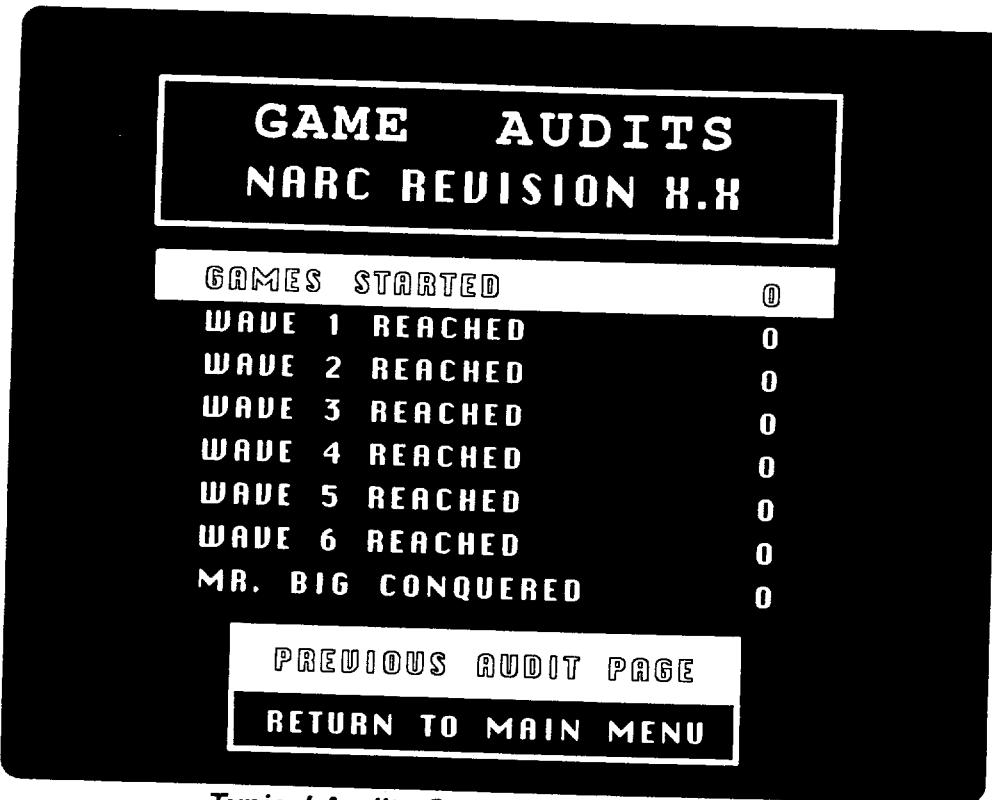
TOTAL PLAYS	0
EXTRA MEN EARNED	0
HOURS OF SINGLE PLAY	0:00
HOURS OF DUAL PLAY	0:00
TOTAL HOURS OF PLAY	0:00
AVG. "PLAYER" GAME TIME (MIN.)	0:00
AVG. ELAPSED TIME/PLAY	0:00

NEXT AUDIT PAGE
RETURN TO MAIN MENU

Typical Audits Screen, Page 1

NARC

ENTERING AUDIT MODE. Open the coin door and press ADVANCE. You'll see the main test menu on the CRT screen. Use either joystick to highlight GAME AUDITS. Now select GAME AUDITS by pressing any player panel button.



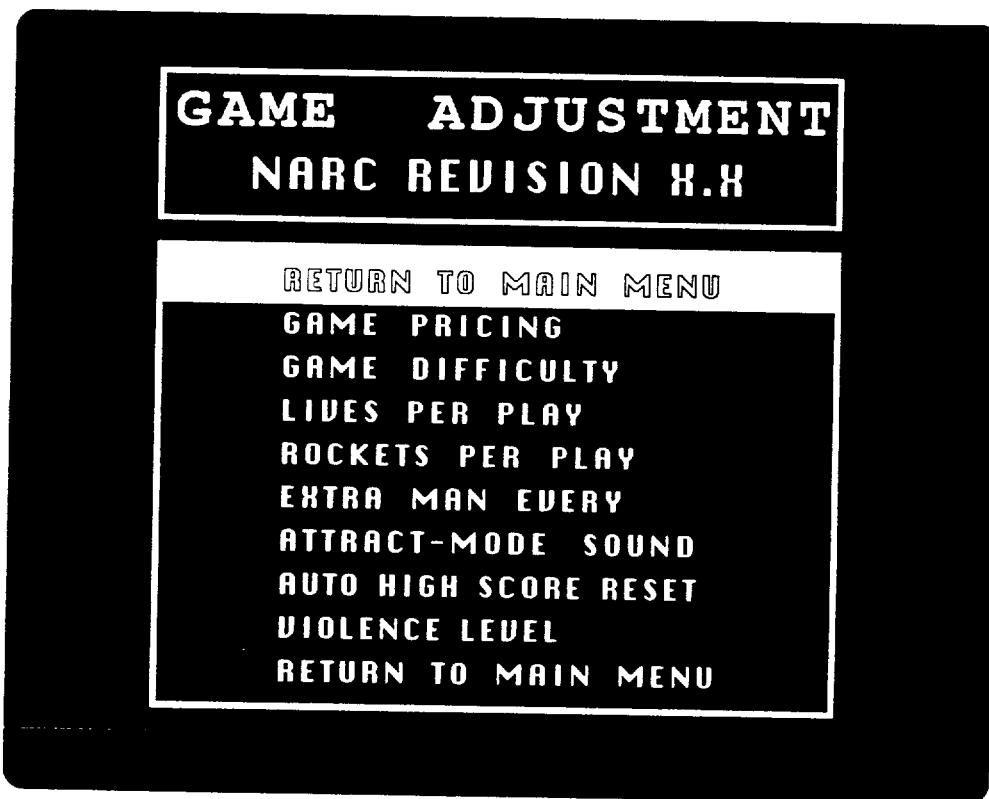
Typical Audits Screen, Page 2

The first GAME AUDITS page will appear. Total plays and the number of extra men that players earned are provided here. The remaining entries on this

NARC

page relate aspects of gameplay to time. The second audit page relates how many times players achieved each wave. (difficulty level). Now let's examine two audit entries...

AVERAGE TIME PER CREDIT: TWO MINUTES. Your most important figure on the first AUDITS page is AVG. PLAYER GAME TIME (MIN.). You'll want to pay special attention to this figure every day for this reason: Thorough field and factory research has shown that *two-minute games both satisfy players and also keep the quarters flowing.*



Typical Game Adjustments Screen

NARC

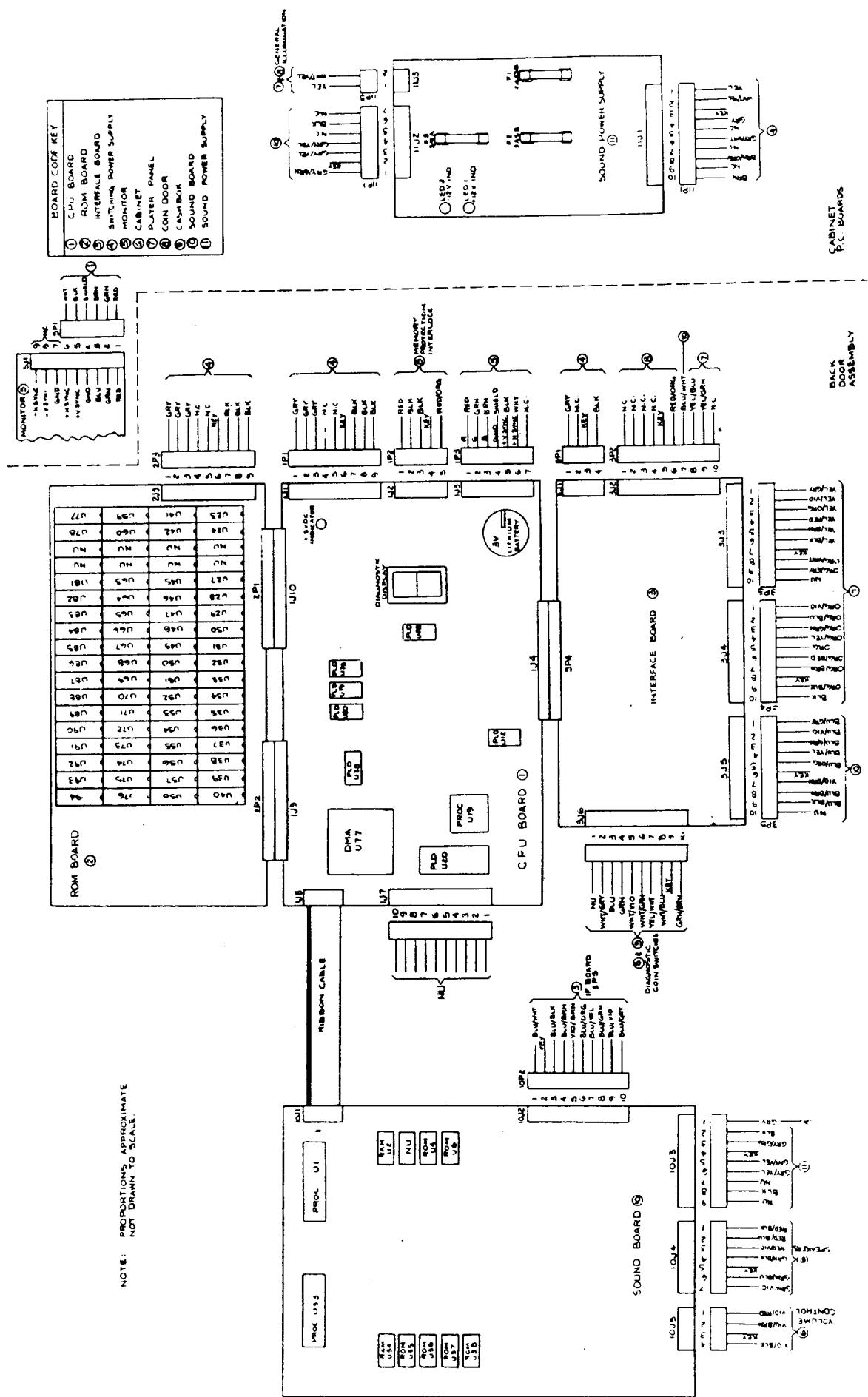
If games aren't running about two minutes long, then collections probably aren't at their peak. You'll want to tailor your game to your game-playing public. It's easy, and we'll talk about that subject in a moment. Meanwhile, another very useful figure is AVG. ELAPSED TIME/PLAY. This number tells you approximately how long your game must operate before earning a quarter.

Here are some tailoring suggestions...

EXCLUSIVE GAME ADJUSTMENTS

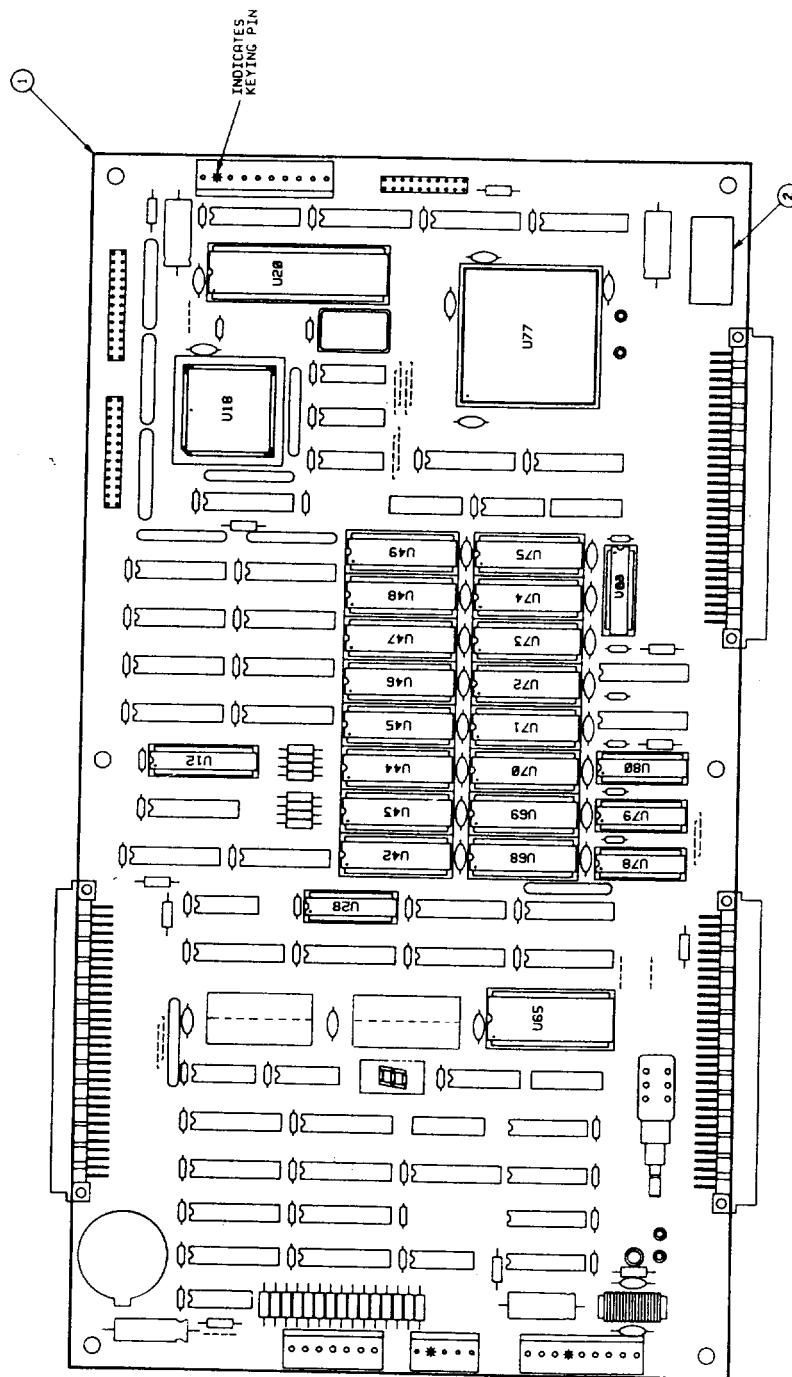
1. Press ADVANCE to enter the main test menu (*described earlier*).
2. Using either joystick, move the selection arrow down to GAME ADJUSTMENT.
3. To select GAME ADJUSTMENT, press any player panel button. Now you'll see the adjustment screen.
4. Use either joystick to highlight the feature you desire to adjust.
5. To select that feature, press any player panel button.
6. Use either joystick to alter the value of an adjustment.
(The joystick causes YES-NO settings to toggle between YES and NO.)
7. To return to Game-Over Mode, follow menu selections on your screen.

The logo consists of the letters "WARC" in a stylized, blocky font. The "W" and "A" are connected, as are the "R" and "C". The letters are dark grey or black against a white background.



REV	DESCRIPTION OF CHANGE	TYPE	DATE
	NEW PART RELEASE	19-11 S-188	1-18-88
A	SEE SHT 2 OF 2	19-12 1-20-88	

C-11879-



NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9017.

ITEM	PART NUMBER	DESCRIPTION		QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
		PROJ. ENGR	DO NOT SCALE				REMOVED DIMENSIONS	
	M. LOFFREDO	DATE	NOTES				LESS THAN OR EQUAL TO	
	3-1/88	3-1/88	DECIMAL				1-1/2"	
	R.G.		PROJECTION				1-1/2"	
			PROJECTED				1-1/2"	
			LINEAR				1-1/2"	
			ANGULAR				1-1/2"	
			ROTATIONAL				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
			LEFT				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
			BOTTOM				1-1/2"	
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			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
			LEFT				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
			LEFT				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
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			TOP				1-1/2"	
			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
			LEFT				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
			LEFT				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
			BOTTOM				1-1/2"	
			RIGHT				1-1/2"	
			LEFT				1-1/2"	
			FRONT				1-1/2"	
			BACK				1-1/2"	
			TOP				1-1/2"	
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		3036	
8		A-5346-	
		3036-7	
9		A-5346-	
		3036-6	
10		A-5346-	
		3036-5	
11		A-5346-	
		3036-4	
12		A-5346-	
		3036-3	
13		A-5346-	
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14		A-5346-	
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JUMPERS
REMOVED

10	SEE CHART	U83	IC, P/D-IMAGE ROM CNTL	1
9	SEE CHART	U12	IC, P/D-VIDEO RAM SEQ.	1
8	SEE CHART	U20	IC, P/D-AUTOFARESE CNTL	1
7	5340- 1209-00	U65	IC, 64x8K x 8 5564 RAM	1
6	5340-	U42 - U49	IC, RAM / V	1

5			
4	54000- 12220-00	U18	IC, TMS34010 G.S.R.
3	5410- 12239-00	U77	IC, CUSTOM ASIC
2	-16-8850 -210		LABEL, PCB IDENT.
	C-11077		SYS-2 CPU PCB

BILL OF MATERIALS

BILL OF MATERIALS

BILL OF MATERIALS					
ITEM	PART NO.	PART DESCRIPTION	DESCRIPTION	QTY	
20					
19					
18					
17					
16					
15	5880-1105G-00	BATTERY - LITHIUM 3V BUTTON	1		
14	SEE CHART	U28 IC, PLD-COLOR RAM CNTL	1		
13	SEE CHART	U78 IC, PLD-LOCAL CONTROL	1		
12	SEE CHART	U79 IC, PLD-VIDEO RAM CNTL	1		
11	SEE CHART	U80 IC, PLD-ADDRESS DECODE	1		

NOTE1 FOR SCHEMATIC REFER TO DRAWING NO. 16-9017.

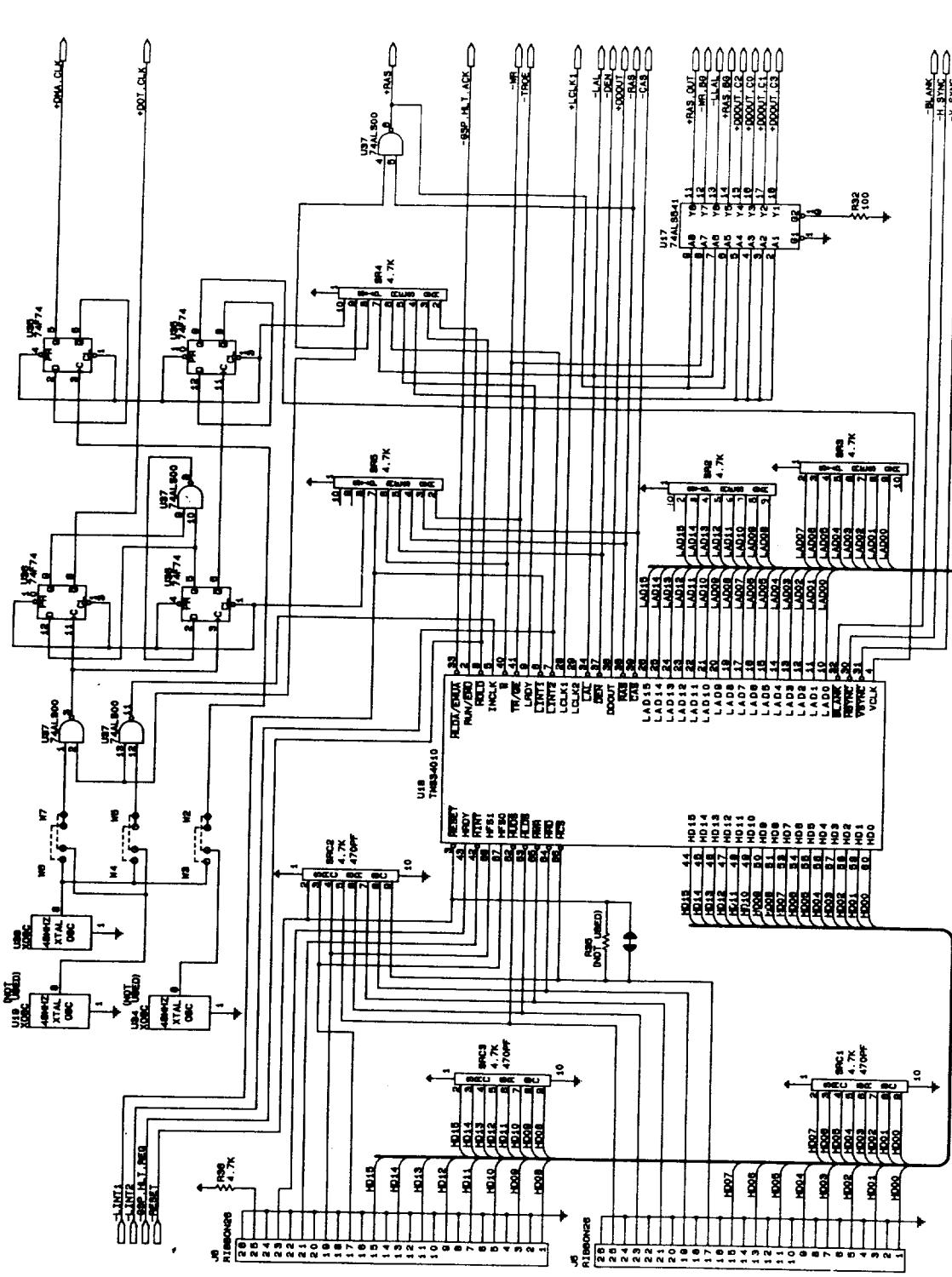
WILLIAMS ELECTRONICS, INC. CHICAGO IL
3401 N CALIFORNIA AVE

REV E DATE 2004 PART NO C-11879-1
SYS-Z CPU PCB ASSEMBLY

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	11-01 5-12-88
A	ITEM S WAS 5540-1111-15 A ADDED ITEM 15	11-02 9-30-88

1

REV	DESCRIPTION OF CHANGE	DATE
A	NEW PART RELEASE 518-58 SERIAL NUMBER 1101	11/12/87
B	COVER SHEET 1-30-88	



NOTE:

BUSES SIGNAL LABELS DESIGNATED WITH
AN "X" SUFFIX ARE FORMED FROM ROOT
SIGNALS DRIVEN THROUGH SERIES
RESISTORS.

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	BLANK	REMOVE WIRE - WIRE SHOWN	1	2	BLANK	DO NOT SCALE	1
3	BLANK	WORK TO DIMENSIONS	1	4	BLANK	TO SCALE	1
5	BLANK	ITEMS SPECIFIED	1	6	BLANK	UNLESS OTHERWISE	1
7	BLANK	SHOWN	1	8	BLANK	ITEMS	1
9	BLANK	PROJECT NO.	1	10	BLANK	ITEMS	1
11	BLANK	DATE	1	12	BLANK	ITEMS	1
13	BLANK	CHASSIS	1	14	BLANK	ITEMS	1
15	BLANK	DATE	1	16	BLANK	ITEMS	1
17	BLANK	MANUFACTURER	1	18	BLANK	ITEMS	1
19	BLANK	DATE	1	20	BLANK	ITEMS	1
21	BLANK	MANUFACTURER	1	22	BLANK	ITEMS	1
23	BLANK	DATE	1	24	BLANK	ITEMS	1
25	BLANK	MANUFACTURER	1	26	BLANK	ITEMS	1
27	BLANK	DATE	1	28	BLANK	ITEMS	1
29	BLANK	MANUFACTURER	1	30	BLANK	ITEMS	1
31	BLANK	DATE	1	32	BLANK	ITEMS	1
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35	BLANK	DATE	1	36	BLANK	ITEMS	1
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39	BLANK	DATE	1	40	BLANK	ITEMS	1
41	BLANK	MANUFACTURER	1	42	BLANK	ITEMS	1
43	BLANK	DATE	1	44	BLANK	ITEMS	1
45	BLANK	MANUFACTURER	1	46	BLANK	ITEMS	1
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55	BLANK	DATE	1	56	BLANK	ITEMS	1
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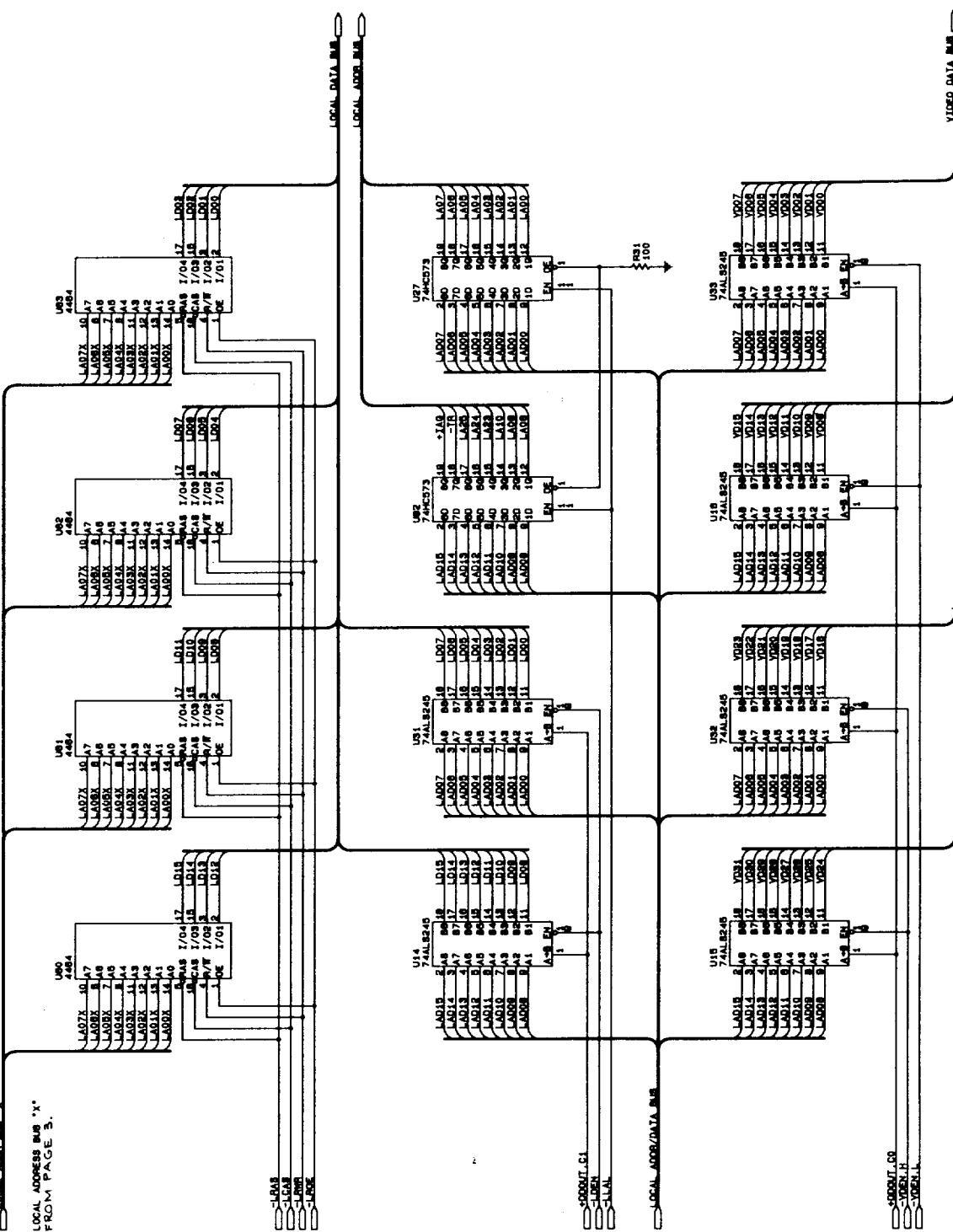
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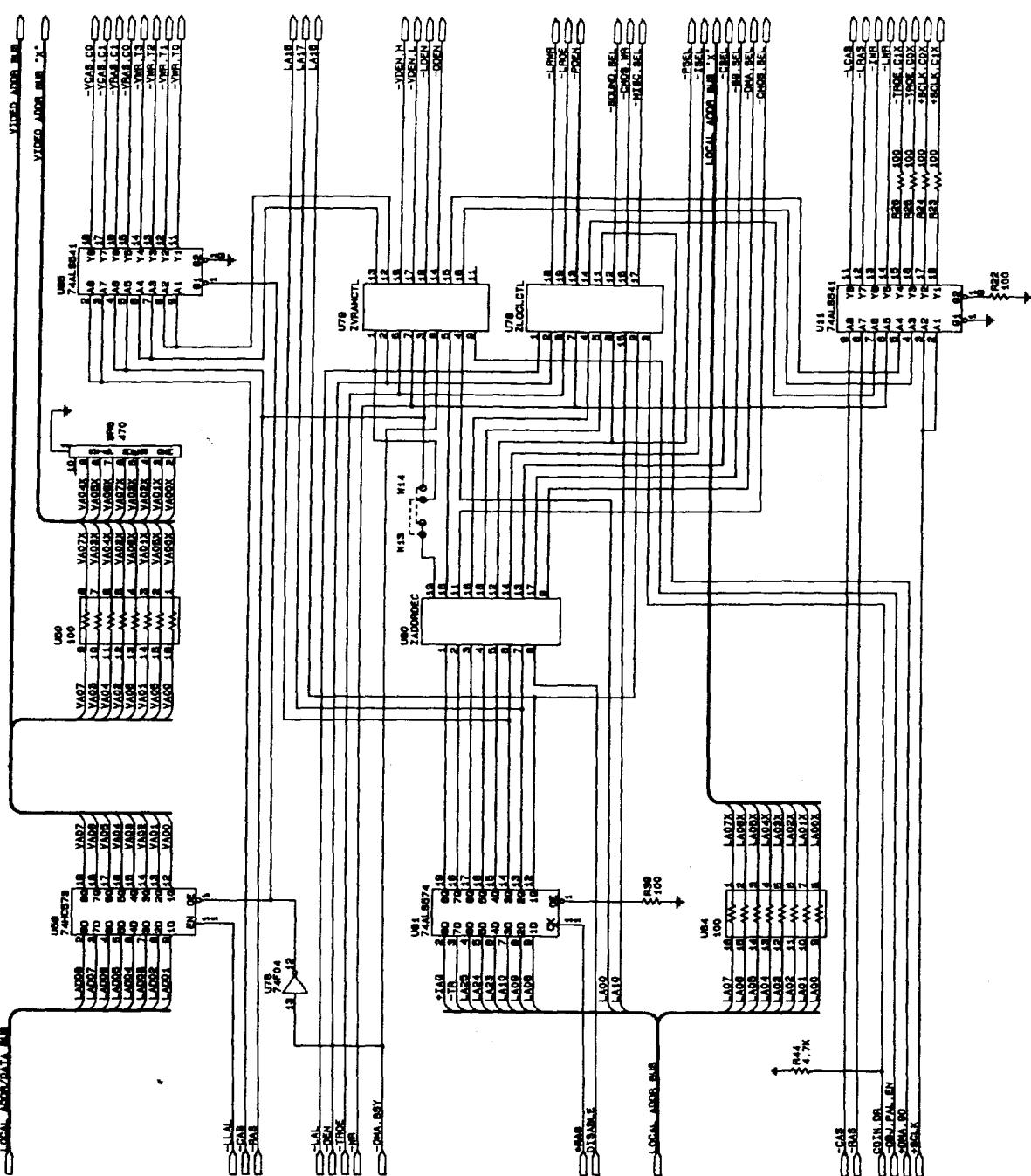
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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	1A-01 5-18-88
A	SEE COVER SHET	1722 430-88

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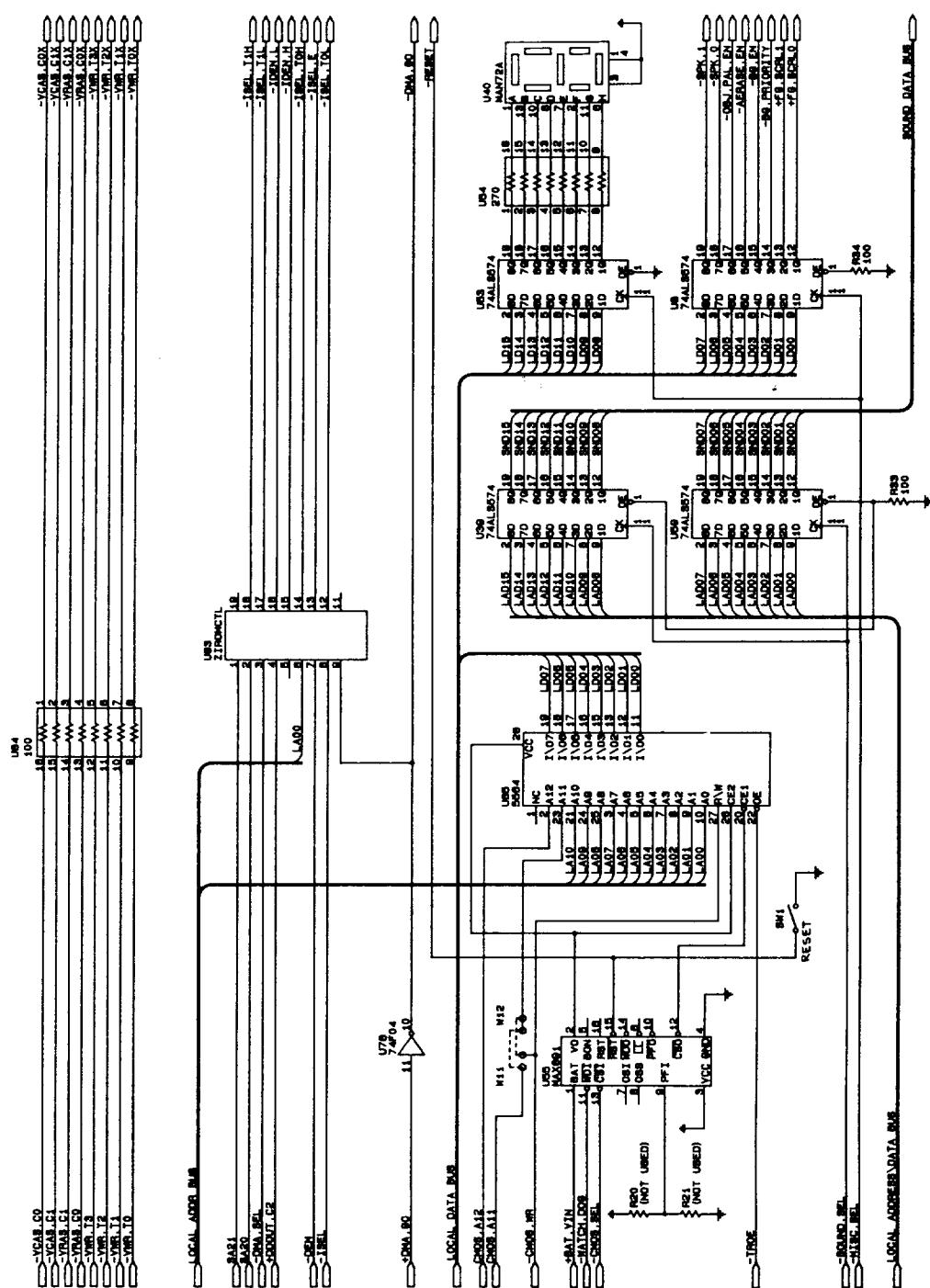
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ITEM	PART NUMBER	DESCRIPTION		QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
		PROJ. ENGR	MANUFACTURER					
1	WLM-100	DO NOT SCALE NO WORK TO DIMENSIONS SHOWN	REMOVE BURNS, BREAK SHARP CORNERS & EDGES		1	WLM-100	DO NOT SCALE NO WORK TO DIMENSIONS SHOWN	
2	WLM-100	SWING S-100 SWING BY SWING	TOLERANCES LESS THAN ONE-HALF SPECIFIED DECIMAL		2	WLM-100	SWING S-100 SWING BY SWING	1/2"
3	WLM-100	CHECKED 1/16	NAME DATE PROJECT 303-30		3	WLM-100	CHECKED 1/16	NAME DATE PROJECT 303-30
4	WLM-100	APPROV'D S-100	AMOUNT 100		4	WLM-100	APPROV'D S-100	FRACTIONAL 100
5	WLM-100	APPROV'D S-100	MATERIAL		5	WLM-100	APPROV'D S-100	MATERIAL

16-9017

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	5-17-88
A	SEE COVER SHET	11-12-88
		1-30-89



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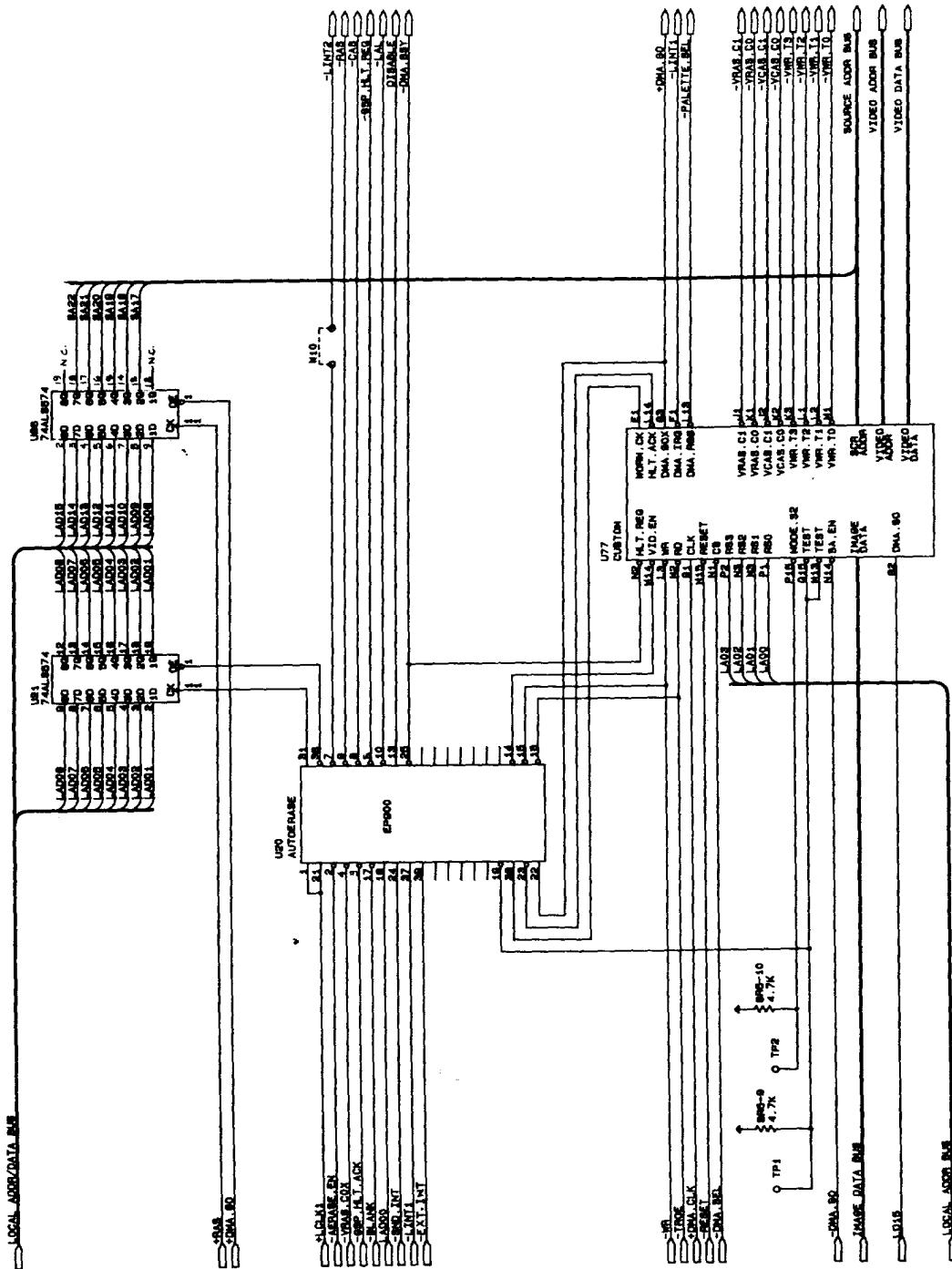
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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	11-01 5-18-88
A	SEE COVER SHT	11-22 4-20-88



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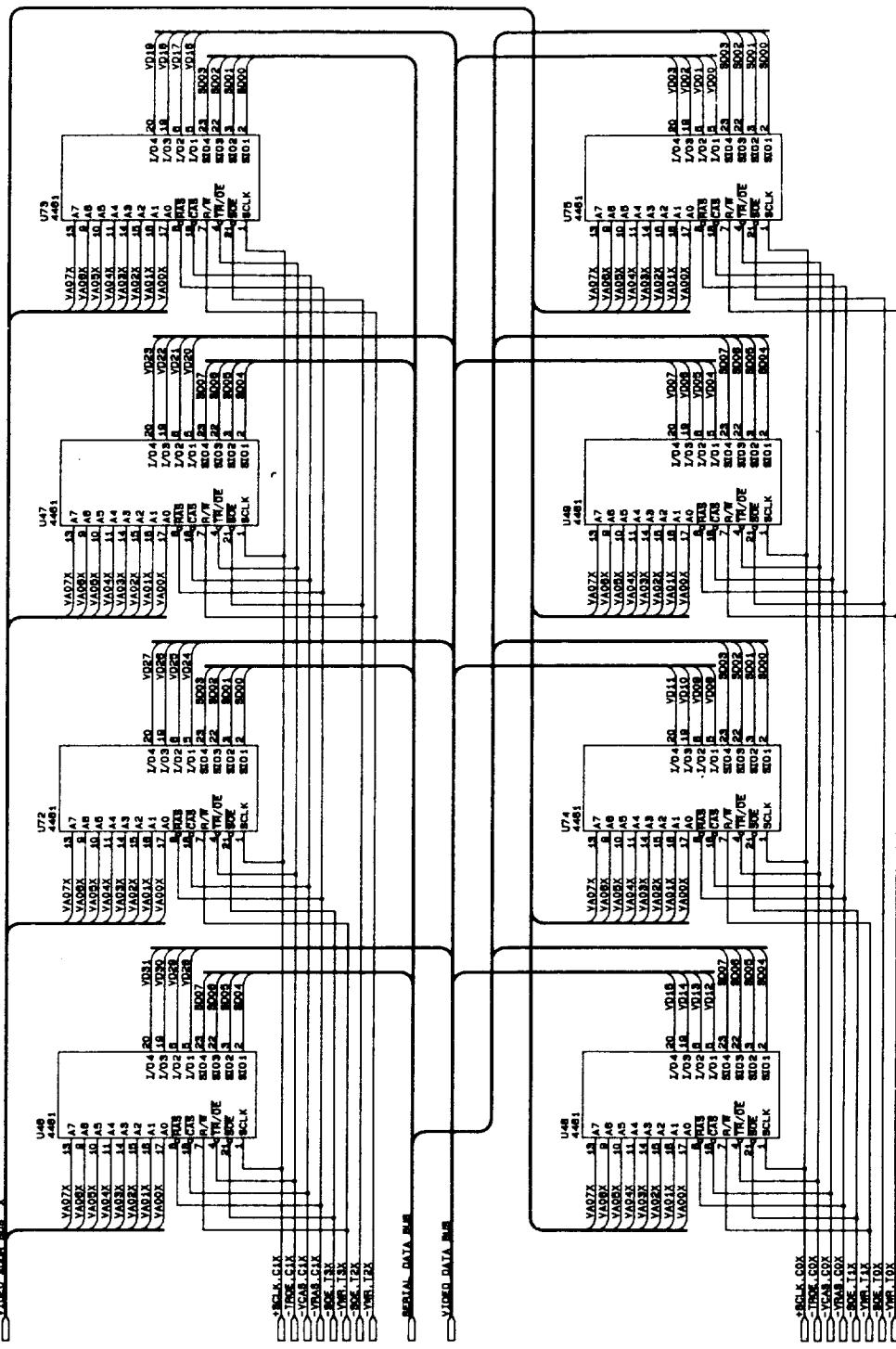
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A	SEE COVER SHT	17722 S-3C-88



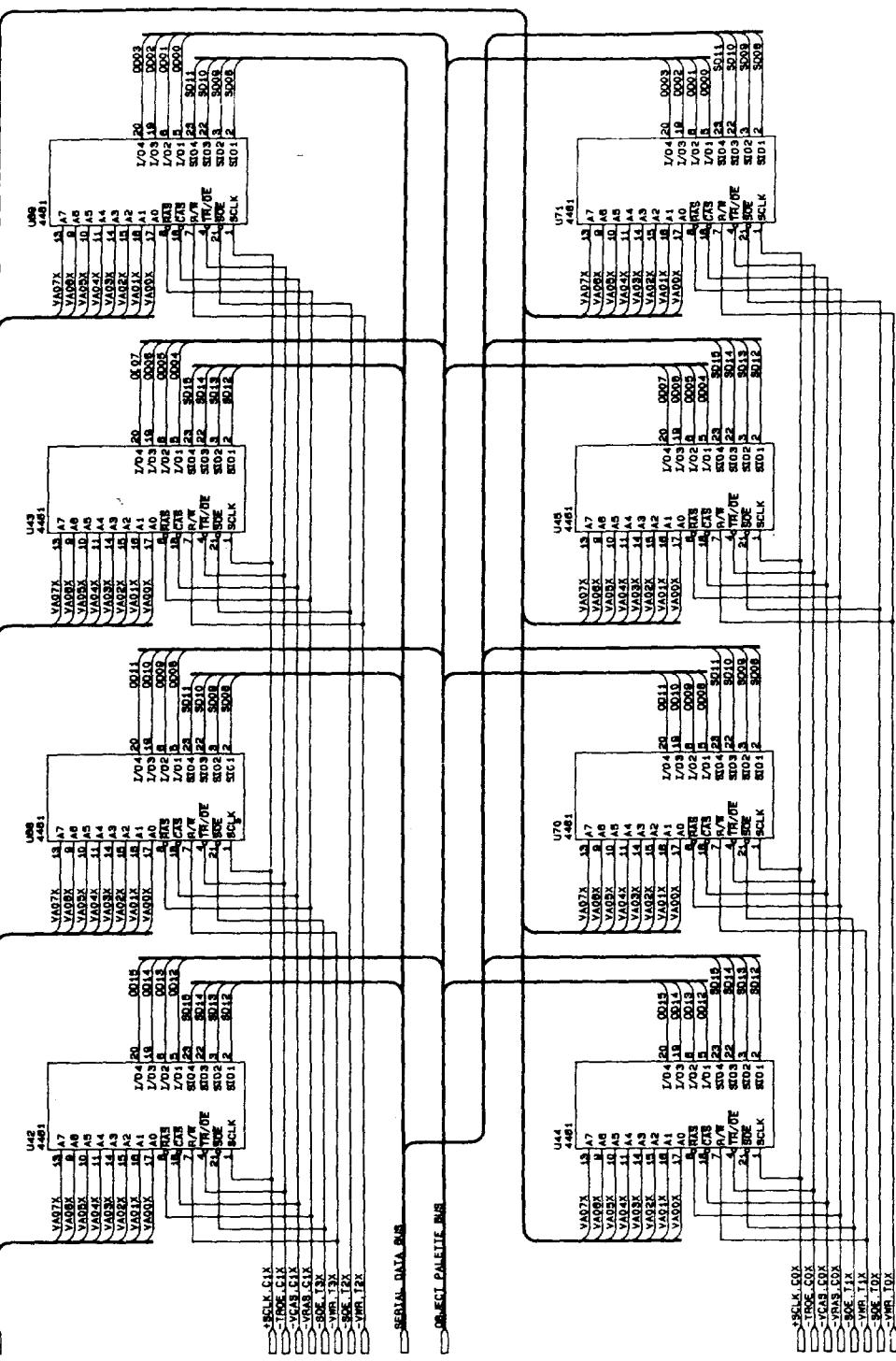
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REV	DESCRIPTION OF CHANGE	SPN/ND DATE
	NEW PART RELEASE	1916-58
A	SEE COVER SHT	1-30-68

CONNECT PACKET MEMORY

VIDEOPEDIA BLOG "X"

D
SELECT PALETTE MEMORY
VIDEO ADDRESS



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER
1A			10		
1M	LOFF REDO	DO NOT SCALE WORK TO DIMENSIONS DRAWN BY G. BURPP S-1188	1	1M	WILLIAMS ELECTRONICS, INC.
		REMOVE BURRS, BREAK SHARP CORNERS & EDGES UNLESS OTHERWISE SPECIFIED			CHICAGO, IL
		DECIMAL — X INCHES ANGULAR — °/°/°			310 N CALIFORNIA AVE
		FRACTIONAL — 1/8, 1/16, 1/32, 1/64, 1/128, 1/256			NAME
		MATERIAL			SYN-2 CPU BD SCHEMATIC
		PROJECTION			SCALE
		INCHES			—
		DATE			REV
		C-1188	07		16-9017
		BY			A

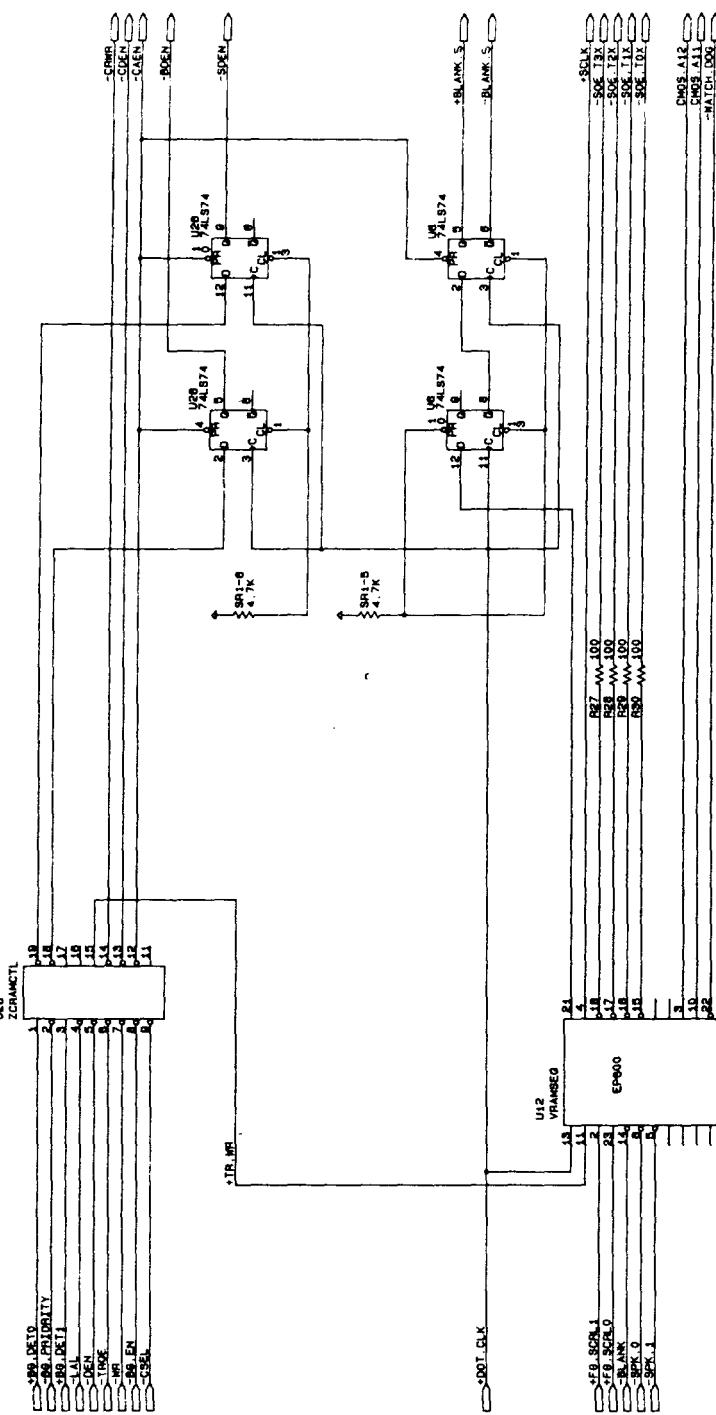
160-9017

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REF	DESCRIPTION OF CHANGE DATE	EDITION DATE
NEW PART RELEASE		19-11-86
A	SCIE COVER SHRT	19-11-86 1-30-86

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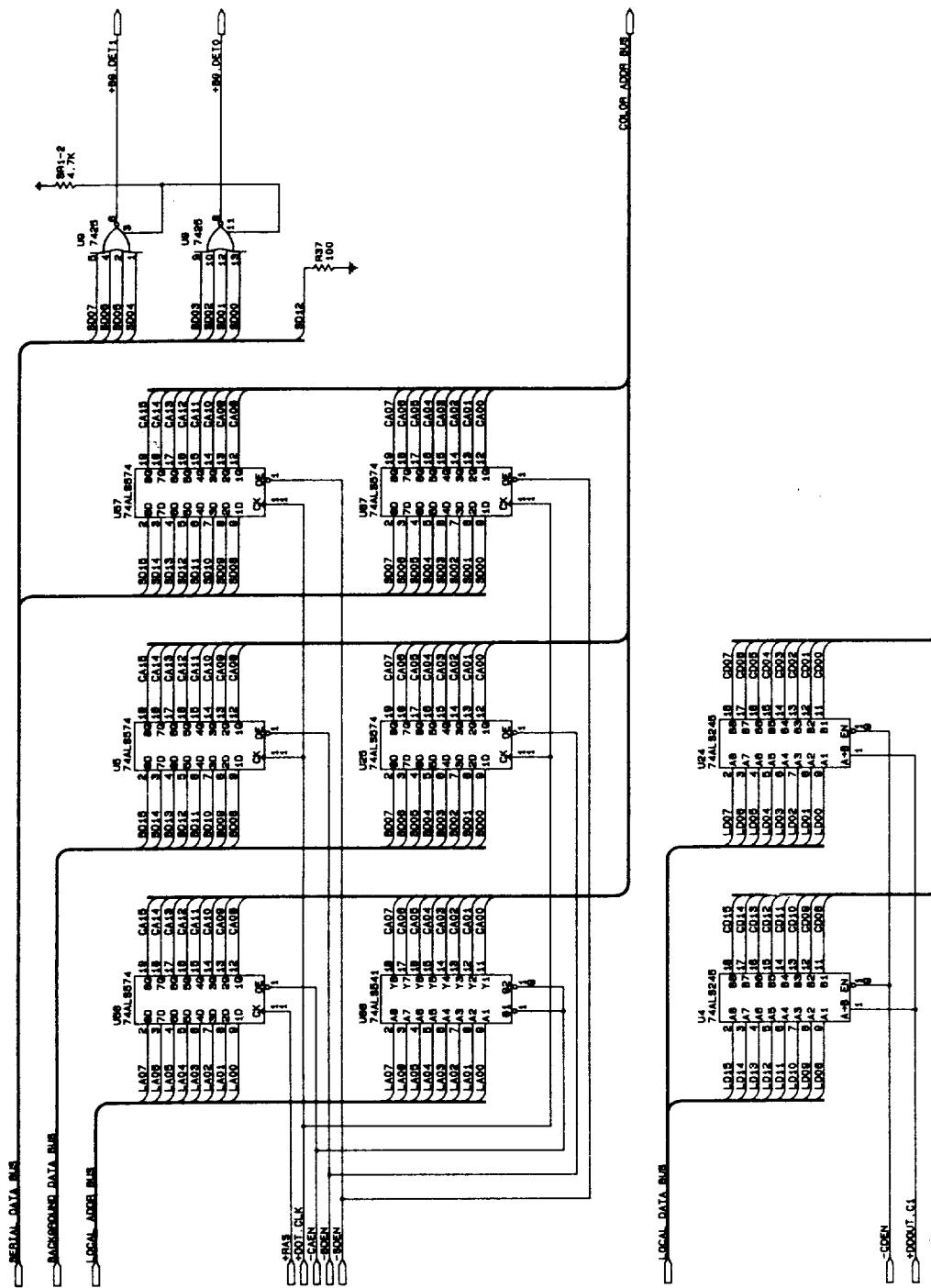
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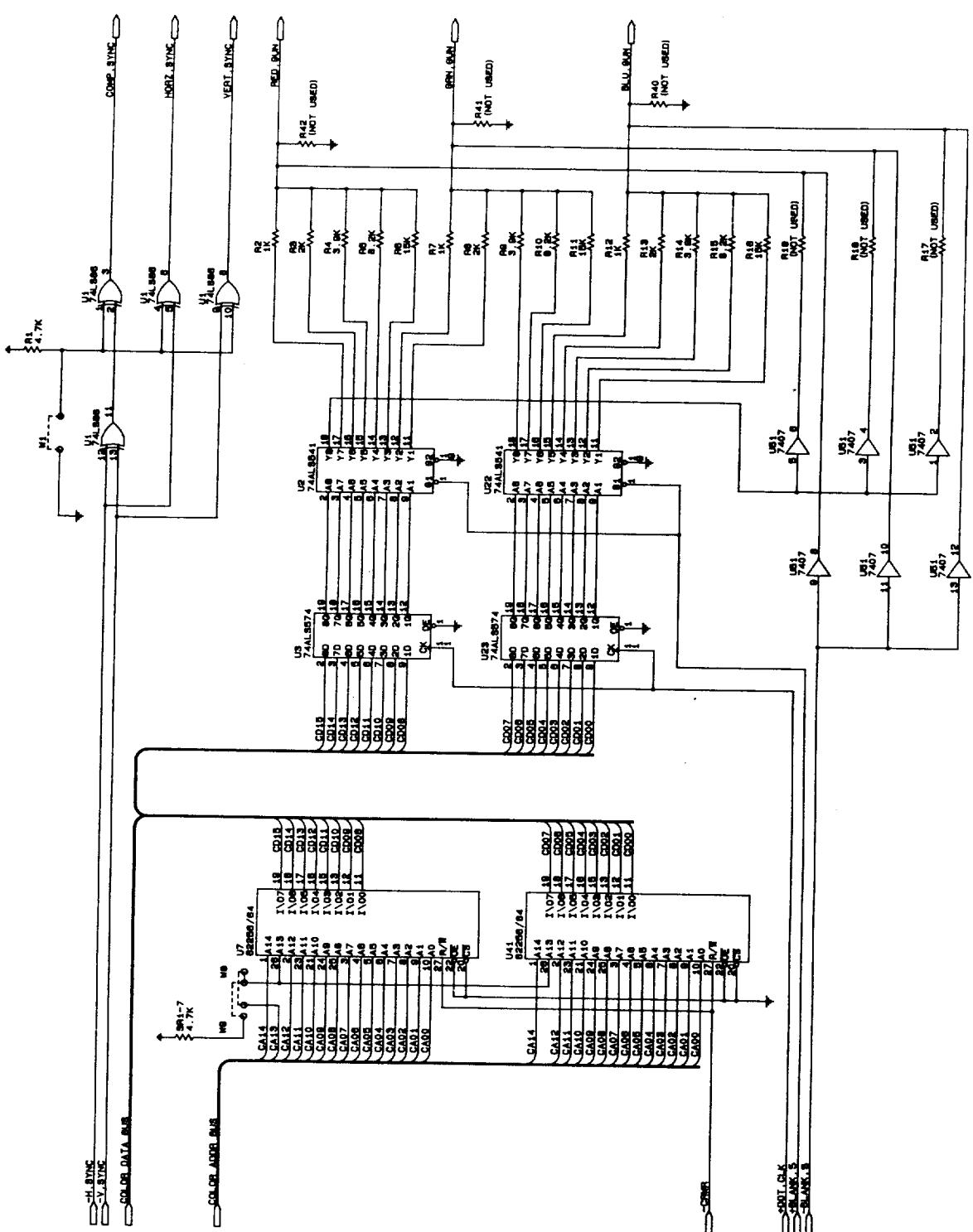
ITEM		DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	PART NUMBER			2	PART NUMBER		3	PART NUMBER	
4	PROJECT NUMBER	DO NOT SCALE		5	REMOVE BURRS-BREAK SWARPS		6	DETACH	
7	NAME	M. LOFFREDO		8	TOLERANCES		9	DETACH	
10	DATE			11	UNLESS OTHERWISE SPECIFIED		12	DETACH	
13	DRAWN BY			14	DECIMAL —————	1/2	15	DETACH	
16	SPC'D BY			17	ANGULAR —————	0°	18	DETACH	
19	CHECKED BY			20	FRACTIONAL —————	1/4	21	DETACH	
22	PROD. CO.	U		23	MATERIAL	1/16	24	DETACH	
25	PROJ. CO.	U		26	DETACH		27	DETACH	
28	PROJ. CO.	U		29	DETACH		30	DETACH	
31	PROJ. CO.	U		32	DETACH		33	DETACH	
34	PROJ. CO.	U		35	DETACH		36	DETACH	
37	PROJ. CO.	U		38	DETACH		39	DETACH	
40	PROJ. CO.	U		41	DETACH		42	DETACH	
43	PROJ. CO.	U		44	DETACH		45	DETACH	
46	PROJ. CO.	U		47	DETACH		48	DETACH	
49	PROJ. CO.	U		50	DETACH		51	DETACH	
52	PROJ. CO.	U		53	DETACH		54	DETACH	
55	PROJ. CO.	U		56	DETACH		57	DETACH	
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67	PROJ. CO.	U		68	DETACH		69	DETACH	
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73	PROJ. CO.	U		74	DETACH		75	DETACH	
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529	PROJ. CO.	U		530	DETACH		531		

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REV	DESCRIPTION OF CHANGE	END DATE
	NEW PART RELEASE	5-18-88
	A SEE COVER SHET	4-30-88

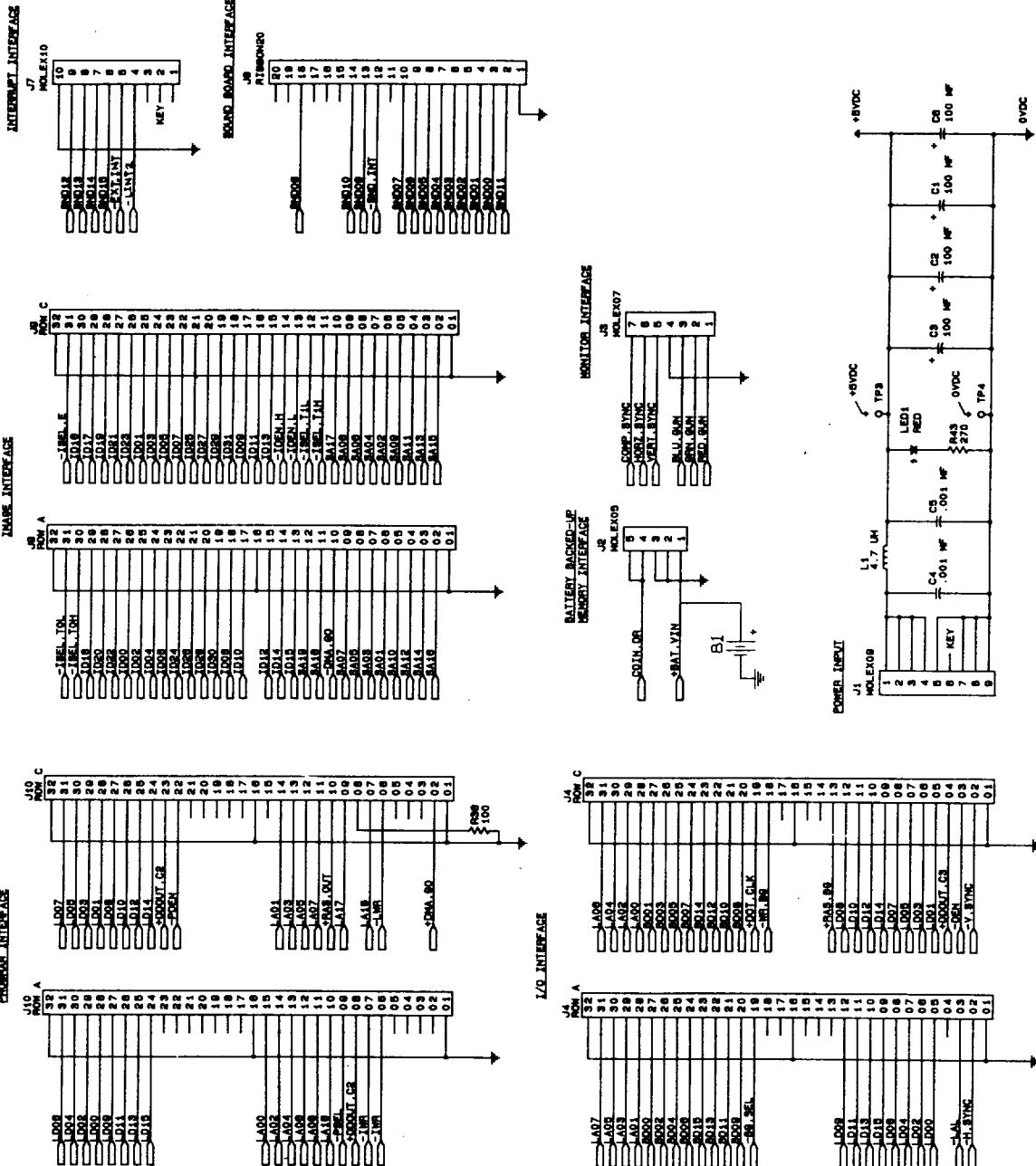


REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	11-01 5-10-88
A	SEE COVER SHEET	11-22 1-30-88



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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	11/01 5/18-88
A	SEE COVER SHT	11/22 4-86-88

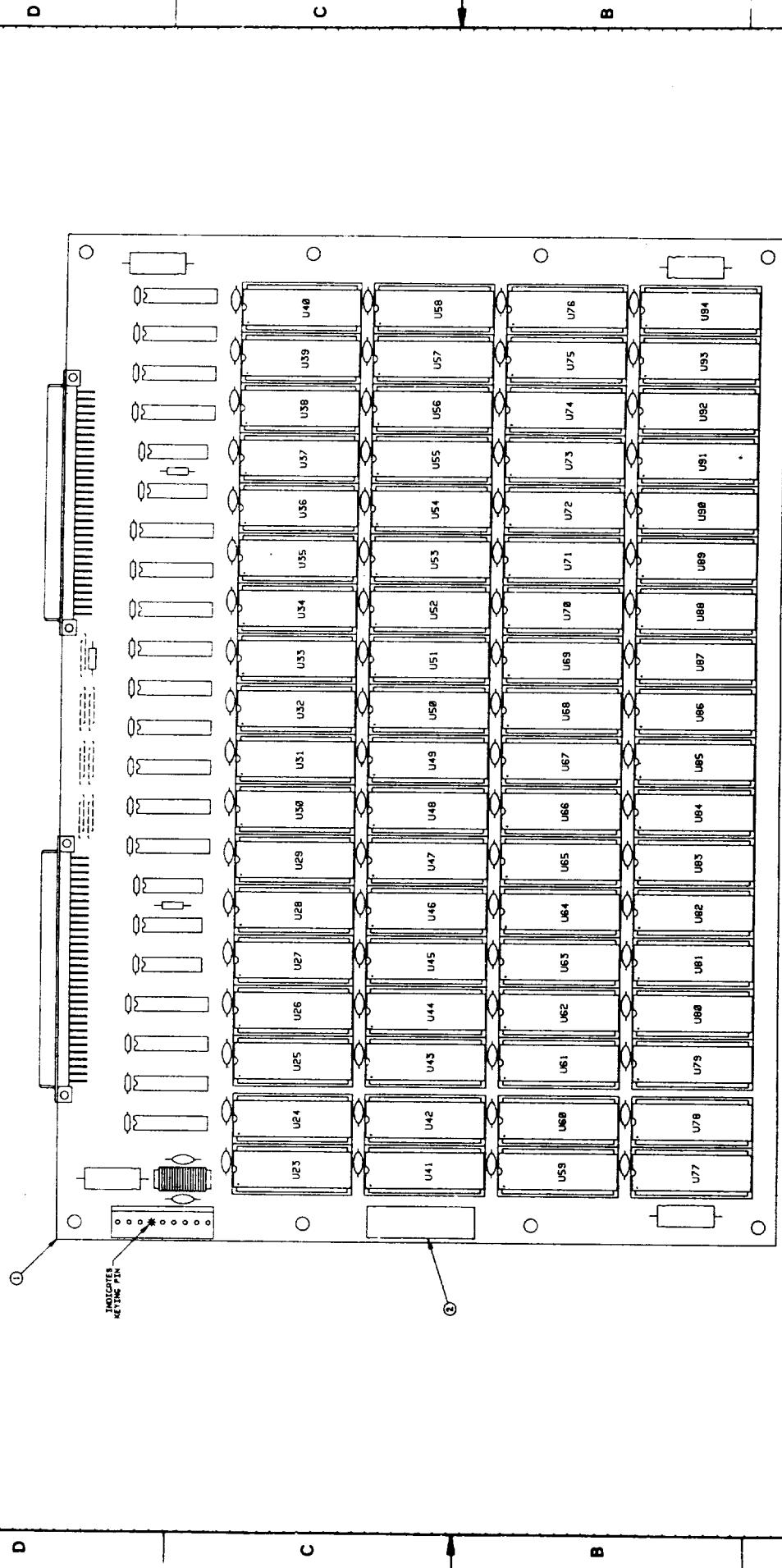


ITEM		DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
ITEM	PART NUMBER	DESCRIPTION		ITEM	DESCRIPTION	
1	WLM-1000	DO NOT SCALE TO WORK SCALE DOWN BY DATE DIMENSIONS SHIPPED S-100-18	1	2	REMOVE BURRS & BREAK BUMPS COMING IN BOX	1
3	WLM-1000	TOLERANCES UNLESS OTHERWISE SPECIFIED	1	4	TOLERANCES DECIMAL _____ X .000 ANGULAR X .000 FRACTIONAL X .000 MATERIAL	1
5	WLM-1000	FAST PROJECT NO	1	6	SCALE 1/4A	1
7	WLM-1000	DATE	1	8	SMALL PART NO	1
9	WLM-1000	DATE	1	10	REV	1
11	WLM-1000	DATE	1	12	DATE	1
13	WLM-1000	DATE	1	14	DATE	1
15	WLM-1000	DATE	1	16	DATE	1
17	WLM-1000	DATE	1	18	DATE	1
19	WLM-1000	DATE	1	20	DATE	1
21	WLM-1000	DATE	1	22	DATE	1
23	WLM-1000	DATE	1	24	DATE	1
25	WLM-1000	DATE	1	26	DATE	1
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431						

REF.	DESCRIPTION OF CHANGE	TYPE AND DATE
	NEW PART RELEASE	10-10-80

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C-12260-



NOTES: 1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-9041.
2. 28-PIN DEVICES (I.E. 2752 EPROMS) SHOULD
BE BOTTOM JUSTIFIED IN SOCKETS.

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	DO NOT SCALE G-SHIPP	REMOVE BURRS-BREAK CORNERS & EDGES	1	2	DO NOT SCALE TOLERANCES UNLESS OTHERWISE SPECIFIED	1	3
	PRINT BY 6/17/80	PRINT BY 7/17/80			4	1/2" ANGULAR DOZ. FRACTIONAL	1/8"
	SPECIFIED BY DATE PRINTED BY APRIL 1980	PRINTED BY DATE PROJECT NO. 300-11			MATERIAL	NONE	
					PRINT DATE	1/24/80	
					PRINT DATE	7/17/80	
					SCALING	1	
					PART NO.	C-12260-	

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C-12260-

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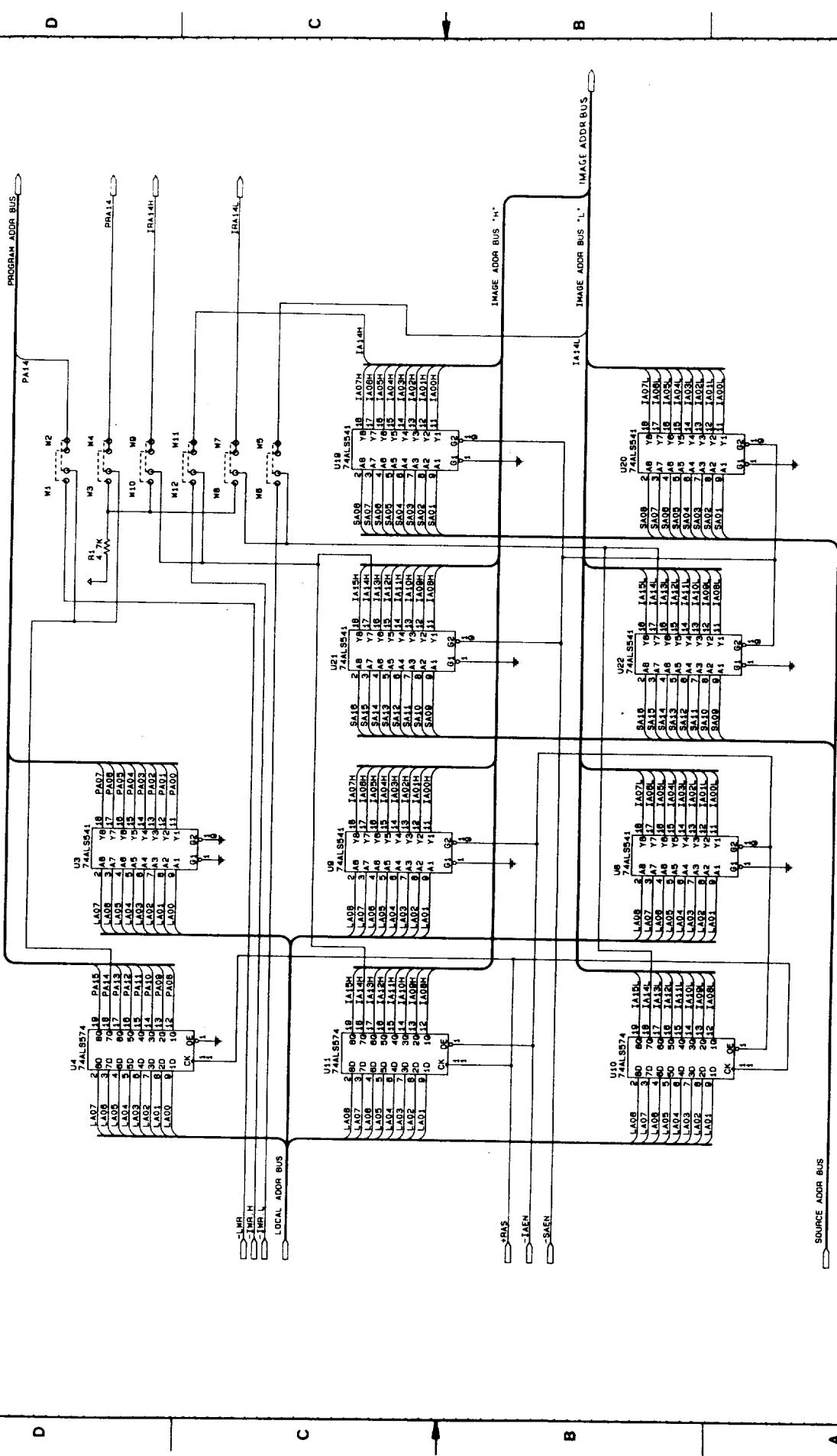
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NAME	3038	NAME	3038
ASSY. NO.		ASSY. NO.	
U23		U24	
U25		U26	
U28		U27	
U29		U30	
U31		U32	
U33		U34	
U35		U36	
U37		U38	
U39		U40	
U41		U42	
U43		U44	
U45		U46	
U47		U48	
U49			

NOTE: FOR SCHEMATIC REFER TO DRAWING NO. 10-0041

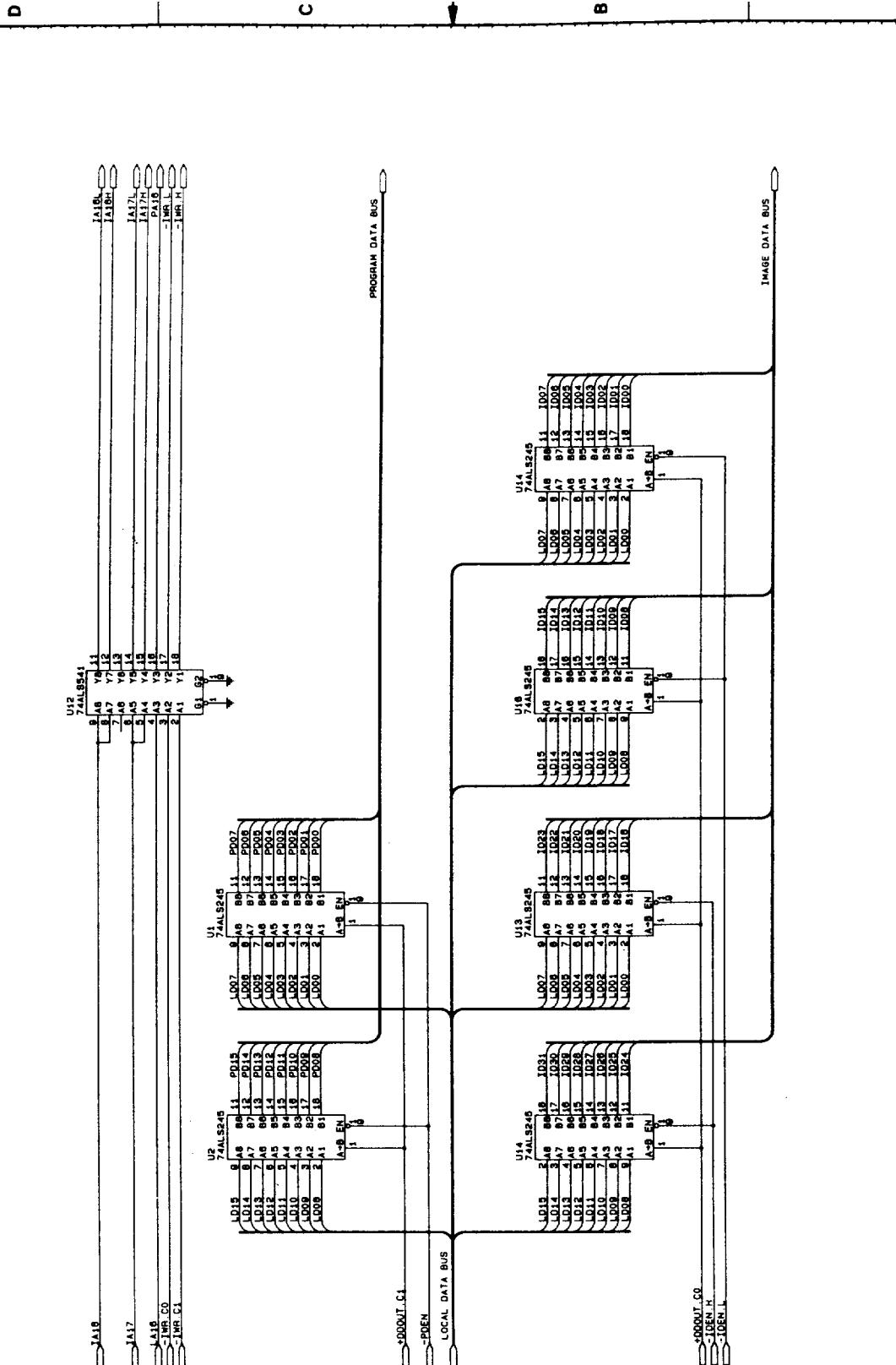
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
6			SEE CHART	SEE CHART
5				
4				
3	SEE CHART	SEE CHART	GAME ROM SET	
2	15-8880-218		LABEL, PCB IDENT.	1
1	C-12621		S19-2 ROM 2 SUB-ASSY	1



ITEM	PART NUMBER	DESCRIPTION	ITEM	PART NUMBER	DESCRIPTION
1	G. SHIPP	DO NOT SCALE REMOVE BURRS, BREAK CHAMPS & EDGES	1	WILLIAMS ELECTRONICS, INC.	C-1000-A
2	DRAWN BY	WORK TO LESS TOLERANCES	2	240 N. CALIFORNIA AVE.	CHICAGO, ILL.
3	C.S. 6-24-68	DIMENSIONS SHOWN	3	1/2"	NAME
4	CHECKED BY	DECIMAL	4	1 1/2"	PHONE
5	DATE	1 1/2" ANGULAR	5	1 1/2"	
6	DATE	1 1/2" FRACTIONAL	6	1 1/2"	
7	DATE	MATERIAL	7	1 1/2"	
8	DATE	FASTENERS	8	1 1/2"	
9	DATE	SHIPS	9	1 1/2"	
10	DATE	NO.	10	1 1/2"	
11	DATE	MANUFACTURE	11	1 1/2"	
12	DATE	TESTED	12	1 1/2"	
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REV	DESCRIPTION OF CHANGE	TYPE OF CHANGE	DATE

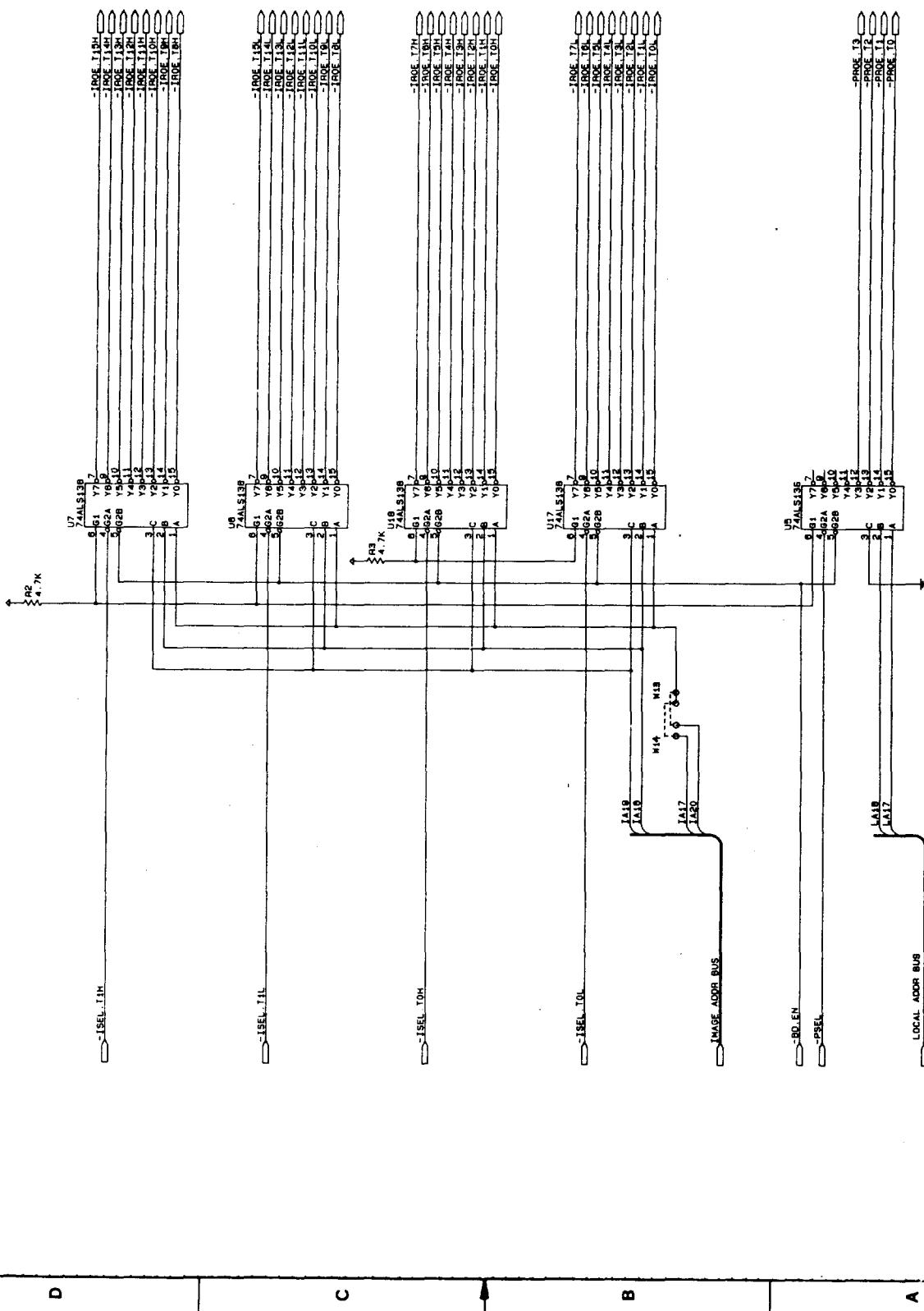
1 16-904-1



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ. NO.	G-5-SHIPP	DO NOT SCALE		ITEM	REMOVE BURNS - IMAGE DATA BUS			ITEM	WILLIAMS ELECTRONICS, INC.	CITY	
DATE	6-24-86	W/ DRAWING		ITEM	TO DRAWING			ITEM	3401 N CALIFORNIA AVE	STATE	
DESIGN BY	G-5	W/ DATE		ITEM	PRINTED			ITEM	CHICAGO, IL	CITY	
APPROVED BY	G-5	W/ DATE		ITEM	UNLESS OTHERWISE SPECIFIED			ITEM	1/16	SCALE	
REVIEWED BY	G-5	W/ DATE		ITEM	DECIMAL			ITEM	1/16	SCALE	
INITIALS		W/ DATE		ITEM	ANGULAR			ITEM	1/16	SCALE	
DATE		W/ DATE		ITEM	FRACTIONAL			ITEM	1/16	SCALE	
REVISION		W/ DATE		ITEM	MATERIAL			ITEM	1/16	SCALE	
7/19/86				ITEM	16-904-1	REV		ITEM		REV	

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	1-17-94
		8-16-94

16-9041



ITEM	PART NUMBER	DESCRIPTION	QTY.	ITEM	PART NUMBER	DESCRIPTION	QTY.
1	WES-1	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1	2	WES-2	REMOVE BURRS - BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED	1
3	WES-3	DECIMAL —	1	4	WES-4	1/16" ANGULAR 1/16" INCHES 1/16" FRACTIONAL	1
5	WES-5	PROJECT NO. DATE 2004-01-27	1	6	WES-6	MATERIAL	1
7	WES-7	PRINT C-1 2004-01-27	1	8	WES-8	PRINT C-2 2004-01-27	1
9	WES-9	PRINT C-3 2004-01-27	1	10	WES-10	PRINT C-4 2004-01-27	1
11	WES-11	PRINT C-5 2004-01-27	1	12	WES-12	PRINT C-6 2004-01-27	1
13	WES-13	PRINT C-7 2004-01-27	1	14	WES-14	PRINT C-8 2004-01-27	1
15	WES-15	PRINT C-9 2004-01-27	1	16	WES-16	PRINT C-10 2004-01-27	1
17	WES-17	PRINT C-11 2004-01-27	1	18	WES-18	PRINT C-12 2004-01-27	1
19	WES-19	PRINT C-13 2004-01-27	1	20	WES-20	PRINT C-14 2004-01-27	1
21	WES-21	PRINT C-15 2004-01-27	1	22	WES-22	PRINT C-16 2004-01-27	1
23	WES-23	PRINT C-17 2004-01-27	1	24	WES-24	PRINT C-18 2004-01-27	1
25	WES-25	PRINT C-19 2004-01-27	1	26	WES-26	PRINT C-20 2004-01-27	1
27	WES-27	PRINT C-21 2004-01-27	1	28	WES-28	PRINT C-22 2004-01-27	1
29	WES-29	PRINT C-23 2004-01-27	1	30	WES-30	PRINT C-24 2004-01-27	1
31	WES-31	PRINT C-25 2004-01-27	1	32	WES-32	PRINT C-26 2004-01-27	1
33	WES-33	PRINT C-27 2004-01-27	1	34	WES-34	PRINT C-28 2004-01-27	1
35	WES-35	PRINT C-29 2004-01-27	1	36	WES-36	PRINT C-30 2004-01-27	1
37	WES-37	PRINT C-31 2004-01-27	1	38	WES-38	PRINT C-32 2004-01-27	1
39	WES-39	PRINT C-33 2004-01-27	1	40	WES-40	PRINT C-34 2004-01-27	1
41	WES-41	PRINT C-35 2004-01-27	1	42	WES-42	PRINT C-36 2004-01-27	1
43	WES-43	PRINT C-37 2004-01-27	1	44	WES-44	PRINT C-38 2004-01-27	1
45	WES-45	PRINT C-39 2004-01-27	1	46	WES-46	PRINT C-40 2004-01-27	1
47	WES-47	PRINT C-41 2004-01-27	1	48	WES-48	PRINT C-42 2004-01-27	1
49	WES-49	PRINT C-43 2004-01-27	1	50	WES-50	PRINT C-44 2004-01-27	1
51	WES-51	PRINT C-45 2004-01-27	1	52	WES-52	PRINT C-46 2004-01-27	1
53	WES-53	PRINT C-47 2004-01-27	1	54	WES-54	PRINT C-48 2004-01-27	1
55	WES-55	PRINT C-49 2004-01-27	1	56	WES-56	PRINT C-50 2004-01-27	1
57	WES-57	PRINT C-51 2004-01-27	1	58	WES-58	PRINT C-52 2004-01-27	1
59	WES-59	PRINT C-53 2004-01-27	1	60	WES-60	PRINT C-54 2004-01-27	1
61	WES-61	PRINT C-55 2004-01-27	1	62	WES-62	PRINT C-56 2004-01-27	1
63	WES-63	PRINT C-57 2004-01-27	1	64	WES-64	PRINT C-58 2004-01-27	1
65	WES-65	PRINT C-59 2004-01-27	1	66	WES-66	PRINT C-60 2004-01-27	1
67	WES-67	PRINT C-61 2004-01-27	1	68	WES-68	PRINT C-62 2004-01-27	1
69	WES-69	PRINT C-63 2004-01-27	1	70	WES-70	PRINT C-64 2004-01-27	1
71	WES-71	PRINT C-65 2004-01-27	1	72	WES-72	PRINT C-66 2004-01-27	1
73	WES-73	PRINT C-67 2004-01-27	1	74	WES-74	PRINT C-68 2004-01-27	1
75	WES-75	PRINT C-69 2004-01-27	1	76	WES-76	PRINT C-70 2004-01-27	1
77	WES-77	PRINT C-71 2004-01-27	1	78	WES-78	PRINT C-72 2004-01-27	1
79	WES-79	PRINT C-73 2004-01-27	1	80	WES-80	PRINT C-74 2004-01-27	1
81	WES-81	PRINT C-75 2004-01-27	1	82	WES-82	PRINT C-76 2004-01-27	1
83	WES-83	PRINT C-77 2004-01-27	1	84	WES-84	PRINT C-78 2004-01-27	1
85	WES-85	PRINT C-79 2004-01-27	1	86	WES-86	PRINT C-80 2004-01-27	1
87	WES-87	PRINT C-81 2004-01-27	1	88	WES-88	PRINT C-82 2004-01-27	1
89	WES-89	PRINT C-83 2004-01-27	1	90	WES-90	PRINT C-84 2004-01-27	1
91	WES-91	PRINT C-85 2004-01-27	1	92	WES-92	PRINT C-86 2004-01-27	1
93	WES-93	PRINT C-87 2004-01-27	1	94	WES-94	PRINT C-88 2004-01-27	1
95	WES-95	PRINT C-89 2004-01-27	1	96	WES-96	PRINT C-90 2004-01-27	1
97	WES-97	PRINT C-91 2004-01-27	1	98	WES-98	PRINT C-92 2004-01-27	1
99	WES-99	PRINT C-93 2004-01-27	1	100	WES-100	PRINT C-94 2004-01-27	1
101	WES-101	PRINT C-95 2004-01-27	1	102	WES-102	PRINT C-96 2004-01-27	1
103	WES-103	PRINT C-97 2004-01-27	1	104	WES-104	PRINT C-98 2004-01-27	1
105	WES-105	PRINT C-99 2004-01-27	1	106	WES-106	PRINT C-100 2004-01-27	1
107	WES-107	PRINT C-101 2004-01-27	1	108	WES-108	PRINT C-102 2004-01-27	1
109	WES-109	PRINT C-103 2004-01-27	1	110	WES-110	PRINT C-104 2004-01-27	1
111	WES-111	PRINT C-105 2004-01-27	1	112	WES-112	PRINT C-106 2004-01-27	1
113	WES-113	PRINT C-107 2004-01-27	1	114	WES-114	PRINT C-108 2004-01-27	1
115	WES-115	PRINT C-109 2004-01-27	1	116	WES-116	PRINT C-110 2004-01-27	1
117	WES-117	PRINT C-111 2004-01-27	1	118	WES-118	PRINT C-112 2004-01-27	1
119	WES-119	PRINT C-113 2004-01-27	1	120	WES-120	PRINT C-114 2004-01-27	1
121	WES-121	PRINT C-115 2004-01-27	1	122	WES-122	PRINT C-116 2004-01-27	1
123	WES-123	PRINT C-117 2004-01-27	1	124	WES-124	PRINT C-118 2004-01-27	1
125	WES-125	PRINT C-119 2004-01-27	1	126	WES-126	PRINT C-120 2004-01-27	1
127	WES-127	PRINT C-121 2004-01-27	1	128	WES-128	PRINT C-122 2004-01-27	1
129	WES-129	PRINT C-123 2004-01-27	1	130	WES-130	PRINT C-124 2004-01-27	1
131	WES-131	PRINT C-125 2004-01-27	1	132	WES-132	PRINT C-126 2004-01-27	1
133	WES-133	PRINT C-127 2004-01-27	1	134	WES-134	PRINT C-128 2004-01-27	1
135	WES-135	PRINT C-129 2004-01-27	1	136	WES-136	PRINT C-130 2004-01-27	1
137	WES-137	PRINT C-131 2004-01-27	1	138	WES-138	PRINT C-132 2004-01-27	1
139	WES-139	PRINT C-133 2004-01-27	1	140	WES-140	PRINT C-134 2004-01-27	1
141	WES-141	PRINT C-135 2004-01-27	1	142	WES-142	PRINT C-136 2004-01-27	1
143	WES-143	PRINT C-137 2004-01-27	1	144	WES-144	PRINT C-138 2004-01-27	1
145	WES-145	PRINT C-139 2004-01-27	1	146	WES-146	PRINT C-140 2004-01-27	1
147	WES-147	PRINT C-141 2004-01-27	1	148	WES-148	PRINT C-142 2004-01-27	1
149	WES-149	PRINT C-143 2004-01-27	1	150	WES-150	PRINT C-144 2004-01-27	1
151	WES-151	PRINT C-145 2004-01-27	1	152	WES-152	PRINT C-146 2004-01-27	1
153	WES-153	PRINT C-147 2004-01-27	1	154	WES-154	PRINT C-148 2004-01-27	1
155	WES-155	PRINT C-149 2004-01-27	1	156	WES-156	PRINT C-150 2004-01-27	1
157	WES-157	PRINT C-151 2004-01-27	1	158	WES-158	PRINT C-152 2004-01-27	1
159	WES-159	PRINT C-153 2004-01-27	1	160	WES-160	PRINT C-154 2004-01-27	1
161	WES-161	PRINT C-155 2004-01-27	1	162	WES-162	PRINT C-156 2004-01-27	1
163	WES-163	PRINT C-157 2004-01-27	1	164	WES-164	PRINT C-158 2004-01-27	1
165	WES-165	PRINT C-159 2004-01-27	1	166	WES-166	PRINT C-160 2004-01-27	1
167	WES-167	PRINT C-161 2004-01-27	1	168	WES-168	PRINT C-162 2004-01-27	1
169	WES-169	PRINT C-163 2004-01-27	1	170	WES-170	PRINT C-164 2004-01-27	1
171	WES-171	PRINT C-165 2004-01-27	1	172	WES-172	PRINT C-166 2004-01-27	1
173	WES-173	PRINT C-167 2004-01-27	1	174	WES-174	PRINT C-168 2004-01-27	1
175	WES-175	PRINT C-169 2004-01-27	1	176	WES-176	PRINT C-170 2004-01-27	1
177	WES-177	PRINT C-171 2004-01-27	1	178	WES-178	PRINT C-172 2004-01-27	1
179	WES-179	PRINT C-173 2004-01-27	1	180	WES-180	PRINT C-174 2004-01-27	1
181	WES-181	PRINT C-175 2004-01-27	1	182	WES-182	PRINT C-176 2004-01-27	1
183	WES-183	PRINT C-177 2004-01-27	1	184	WES-184	PRINT C-178 2004-01-27	1
185	WES-185	PRINT C-179 2004-01-27	1	186	WES-186	PRINT C-180 2004-01-27	1
187	WES-187	PRINT C-181 2004-01-27	1	188	WES-188	PRINT C-182 2004-01-27	1
189	WES-189	PRINT C-183 2004-01-27	1	190	WES-190	PRINT C-184 2004-01-27	1
191	WES-191	PRINT C-185 2004-01-27	1	192	WES-192	PRINT C-186 2004-01-27	1
193	WES-193	PRINT C-187 2004-01-27	1	194	WES-194	PRINT C-188 2004-01-27	1
195	WES-195	PRINT C-189 2004-01-27	1	196	WES-196	PRINT C-190 2004-01-27	1
197	WES-197	PRINT C-191 2004-01-27	1	198	WES-198	PRINT C-192 2004-01-27	1
199	WES-199	PRINT C-193 2004-01-27	1	200	WES-200	PRINT C-194 2004-01-27	1
201	WES-201	PRINT C-195 2004-01-27	1	202	WES-202	PRINT C-196 2004-01-27	1
203	WES-203	PRINT C-197 2004-01-27	1	204	WES-204	PRINT C-198 2004-01-27	1
205	WES-205	PRINT C-199 2004-01-27	1	206	WES-206	PRINT C-200 2004-01-27	1
207	WES-207	PRINT C-201 2004-01-27	1	208	WES-208	PRINT C-202 2004-01-27	1
209	WES-209	PRINT C-203 2004-01-27	1	210	WES-210	PRINT C-204 2004-01-27	1
211	WES-211	PRINT C-205 2004-01-27	1	212	WES-212	PRINT C-206 2004-01-27	1
213	WES-213	PRINT C-207 2004-01-27	1	214	WES-214	PRINT C-208 2004-01-27	1
215	WES-215	PRINT C-209 2004-01-27	1	216	WES-216	PRINT C-210 2004-01-27	1
217	WES-217	PRINT C-211 2004-01-27	1	218	WES-218	PRINT C-212 2004-01-27	1
219	WES-219	PRINT C-213 2004-01-27	1	220	WES-220	PRINT C-214 2004-01-27	1
221	WES-221	PRINT C-215 2004-01-27	1	222	WES-222	PRINT C-216 2004-01-27	1
223	WES-223	PRINT C-217 2004-01-27	1	224	WES-224	PRINT C-218 2004-01-27	1
225	WES-225	PRINT C-219 2004-01-27	1	226	WES-226	PRINT C-220 2004-01-27	1
227	WES-227	PRINT C-221 2004-01-27	1	228	WES-228	PRINT C-222 2004-01-27	1
229	WES-229	PRINT C-223 2004-01-27	1	230	WES-230	PRINT C-224 2004-01-27	1
231	WES-231	PRINT C-225 2004-01-27	1	232	WES-232	PRINT C-226 2004-01-27	1
233	WES-233	PRINT C-227 2004-01-27	1	234	WES-234	PRINT C-228 2004-01-27	1
235	WES-235	PRINT C-229 2004-01-27	1	236	WES-236	PRINT C-230 2004-01-27	1
237	WES-237	PRINT C-231 2004-01-27	1	238	WES-238	PRINT C-232 2004-01-27	1
239	WES-239	PRINT C-233 2004-01-27	1	240	WES-240	PRINT C-234 2004-01-27	1
241	WES-241	PRINT C-235 2004-01-27	1	242	WES-242	PRINT C-236 2004-01-27	1
243	WES-243	PRINT C-237 2004-01-27	1	244	WES-244	PRINT C-238 2004-01-27	1
245	WES-245	PRINT C-239 2004-01-27	1	246	WES-246	PRINT C-240 2004-01-27	1
247	WES-247	PRINT C-241 2004-01-27	1	248	WES-248	PRINT C-242 2004-01-27</	

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	10-19-97 6-12-00

This diagram illustrates the connection between the PROGRAM ADDRESS BUS and the PROGRAM DATA BUS. The ADDRESS BUS is connected to the CS pin of U23, U24, U80, U81, U41, and U42. The DATA BUS is connected to the OE pins of U23, U24, U80, U81, U41, and U42. The connections are as follows:

- U23:** CS (Pin 20) connected to the ADDRESS BUS; OE (Pin 1) connected to the DATA BUS.
- U24:** CS (Pin 20) connected to the ADDRESS BUS; OE (Pin 1) connected to the DATA BUS.
- U80:** CS (Pin 20) connected to the ADDRESS BUS; OE (Pin 1) connected to the DATA BUS.
- U81:** CS (Pin 20) connected to the ADDRESS BUS; OE (Pin 1) connected to the DATA BUS.
- U41:** CS (Pin 20) connected to the ADDRESS BUS; OE (Pin 1) connected to the DATA BUS.
- U42:** CS (Pin 20) connected to the ADDRESS BUS; OE (Pin 1) connected to the DATA BUS.

The ADDRESS BUS is also connected to the CS pins of U24, U80, U81, U41, and U42. The DATA BUS is connected to the OE pins of U24, U80, U81, U41, and U42. The connections are summarized below:

Component	Address Bus Connection	Data Bus Connection
U23	CS (Pin 20)	OE (Pin 1)
U24	CS (Pin 20)	OE (Pin 1)
U80	CS (Pin 20)	OE (Pin 1)
U81	CS (Pin 20)	OE (Pin 1)
U41	CS (Pin 20)	OE (Pin 1)
U42	CS (Pin 20)	OE (Pin 1)

Logic components P215, P214, P213, P212, P211, P208, P207, P206, P205, P204, P203, P202, P201, and P200 are used to manage the address and data buses. The PROGRAM DATA BUS is labeled at the top right, and the PROGRAM ADDRESS BUS is labeled at the bottom left.

16-9041

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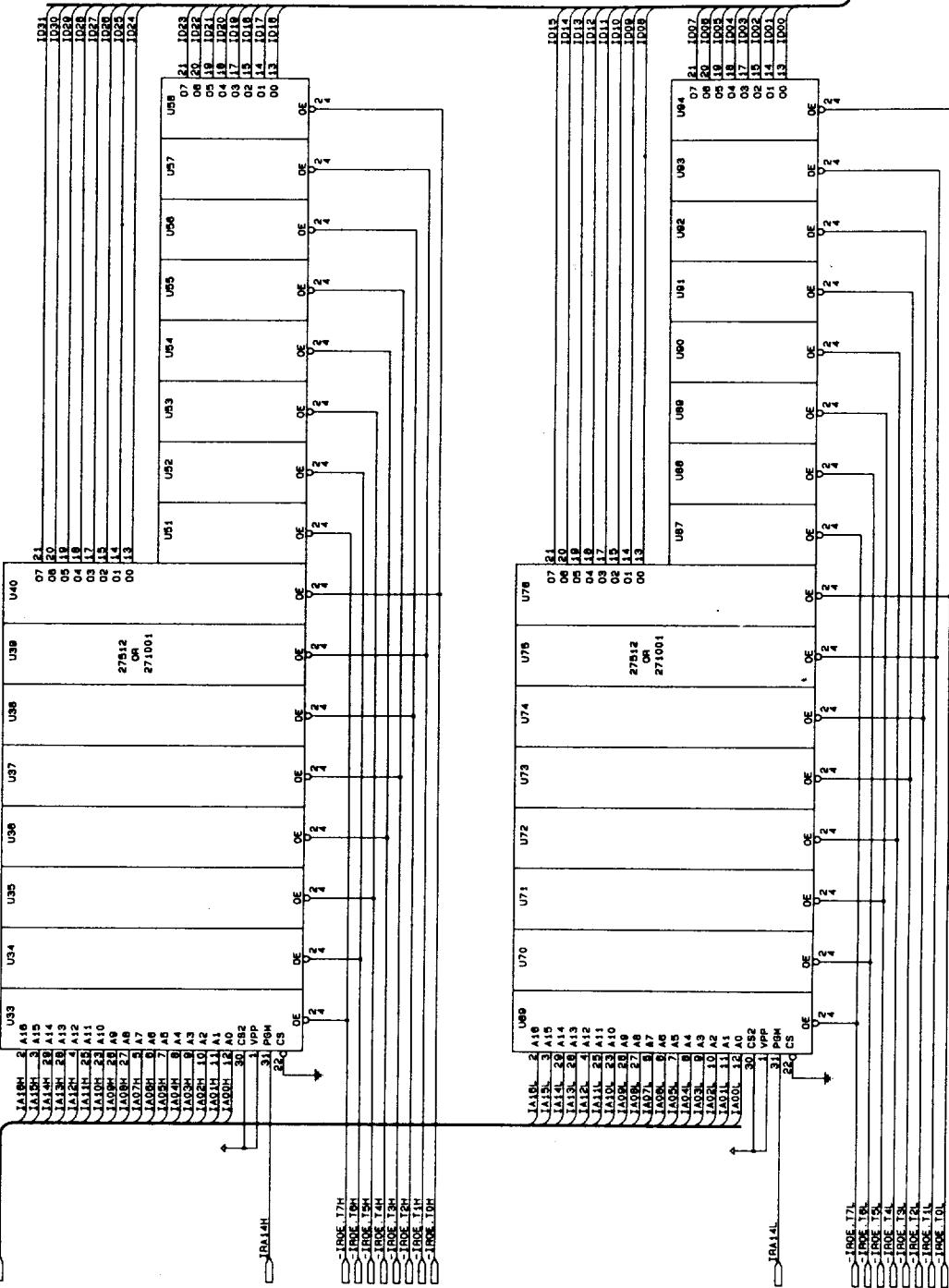
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IMAGE ADDRESS BUS

3

6

2



ITEM	PART NUMBER	DESCRIPTION	QTY
1	WILLIAMS ELECTRONICS, INC.	WILLIAMS ELECTRONICS, INC.	1
2	ROM-2	ROM-2 SCHEMATIC	1
3	SYS-2	SYS-2 ROM-2 SCHEMATIC	1
4	16-9041	16-9041	1

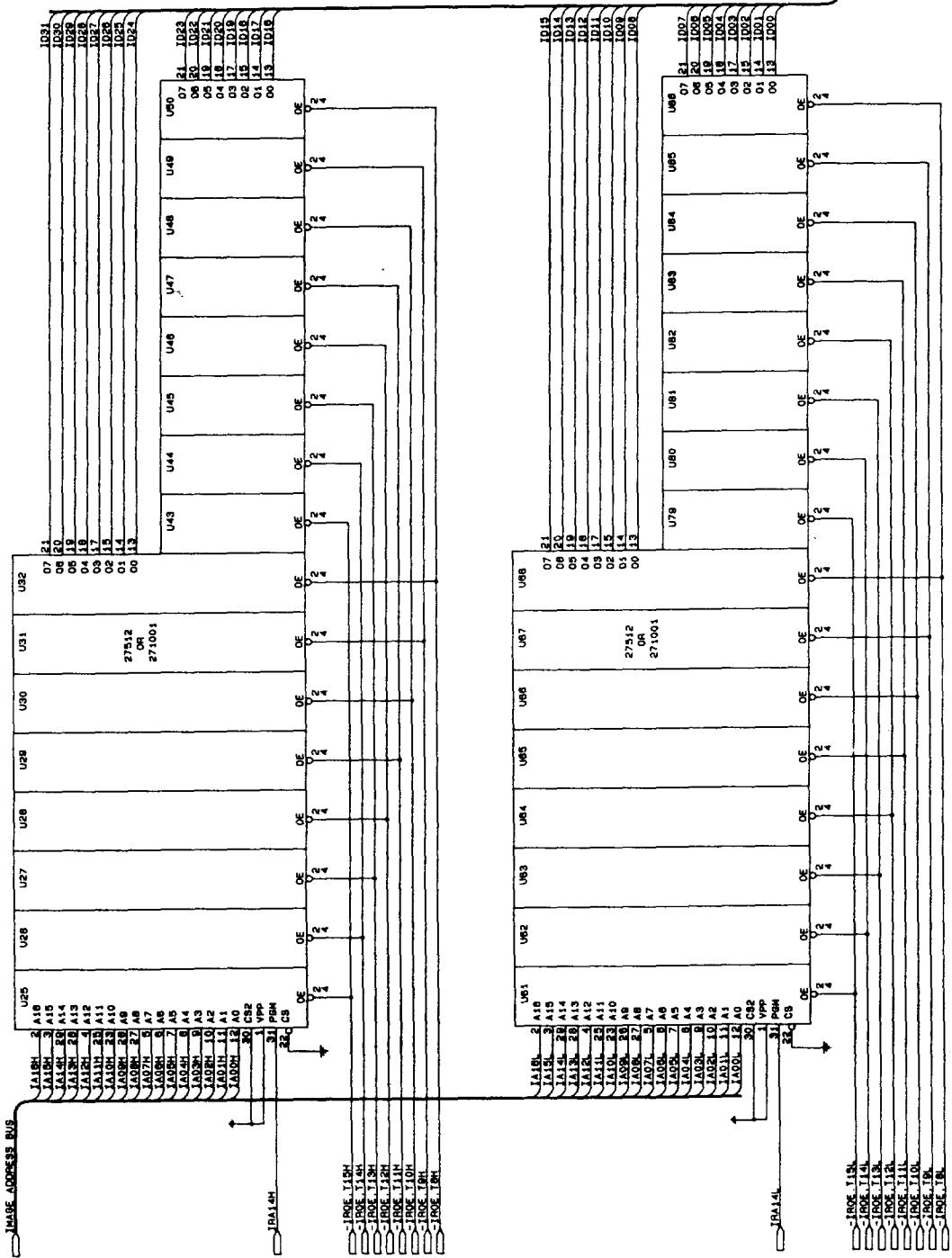
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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	1-1-88

1 16-9041



ITEM	PART NUMBER	DESCRIPTION	CNT	ITEM	PART NUMBER	DESCRIPTION	CNT
1	GASHI	DO NOT SCALE PROJECT NO. 303 DATE 7-15-88 SHEET 1 OF 2 DRAWN BY J. COOPER APPROVED BY J. COOPER REV. C-224	1	2	1056	IMAGE ADDRESS BUS IMAGE DATA BUS	1
2	1A18	21	1	3	1A15	21	1
3	1A19	21	1	4	1A16	21	1
4	1A14	20	1	5	1A17	20	1
5	1A15	19	1	6	1A18	19	1
6	1A16	19	1	7	1A19	18	1
7	1A17	18	1	8	1A20	18	1
8	1A18	17	1	9	1A21	17	1
9	1A19	17	1	10	1A22	17	1
10	1A20	16	1	11	1A23	16	1
11	1A21	16	1	12	1A24	16	1
12	1A22	15	1	13	1A25	15	1
13	1A23	15	1	14	1A26	15	1
14	1A24	14	1	15	1A27	14	1
15	1A25	14	1	16	1A28	14	1
16	1A26	13	1	17	1A29	13	1
17	1A27	13	1	18	1A30	13	1
18	1A28	12	1	19	1A31	12	1
19	1A29	12	1	20	1A32	12	1
20	1A30	11	1	21	1A33	11	1
21	1A31	11	1	22	1A34	11	1
22	1A32	10	1	23	1A35	10	1
23	1A33	10	1	24	1A36	10	1
24	1A34	9	1	25	1A37	9	1
25	1A35	9	1	26	1A38	9	1
26	1A36	8	1	27	1A39	8	1
27	1A37	8	1	28	1A40	8	1
28	1A38	7	1	29	1A41	7	1
29	1A39	7	1	30	1A42	7	1
30	1A40	6	1	31	1A43	6	1
31	1A41	6	1	32	1A44	6	1
32	1A42	5	1	33	1A45	5	1
33	1A43	5	1	34	1A46	5	1
34	1A44	4	1	35	1A47	4	1
35	1A45	4	1	36	1A48	4	1
36	1A46	3	1	37	1A49	3	1
37	1A47	3	1	38	1A50	3	1
38	1A48	2	1	39	1A51	2	1
39	1A49	2	1	40	1A52	2	1
40	1A50	1	1	41	1A53	1	1
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166	1A304	1	1	167	1A305	1	1
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168	1A308	1	1	169	1A309	1	1
169	1A310	1	1	170	1A311	1	1
170	1A312	1	1				

REV.	DESCRIPTION OF CHANGE	RECD BY
	NEW PART RELEASES	1-1-97
		8-10-98

16-9041

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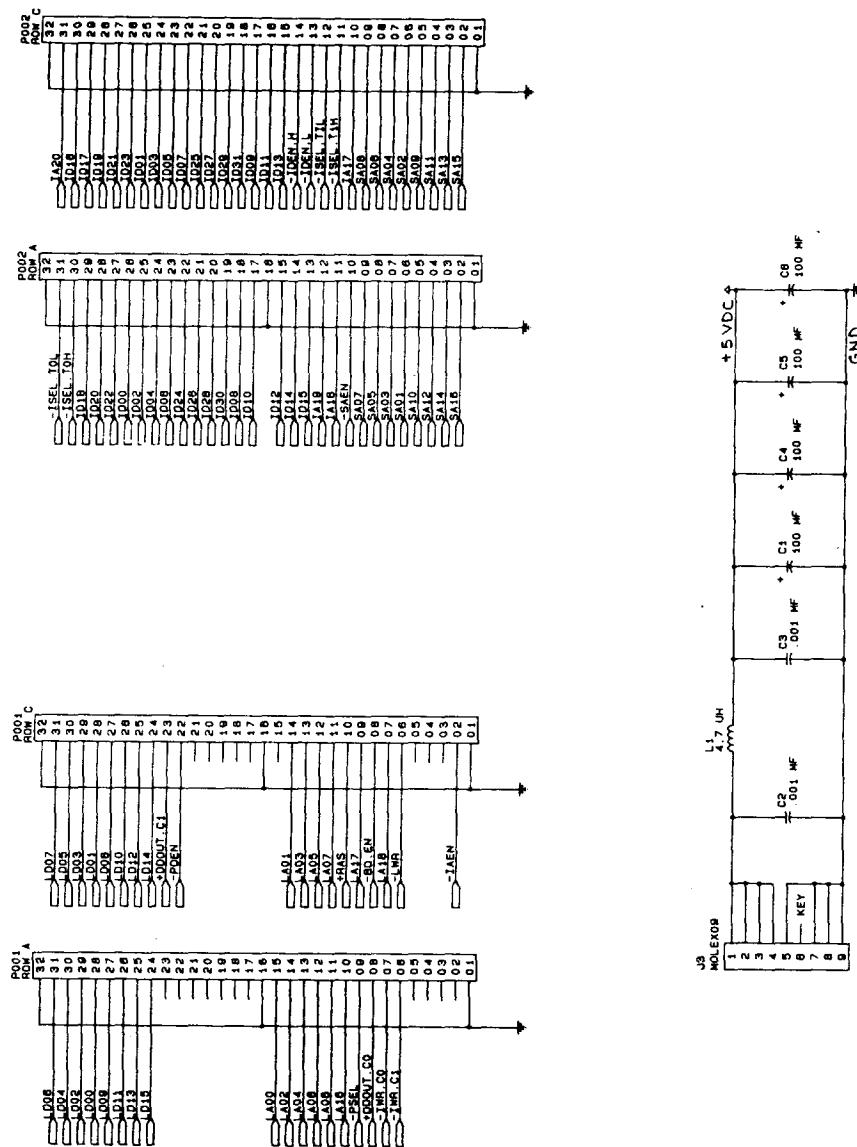
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ITEM		PART NUMBER	DESCRIPTION	ITEM	PART NUMBER	DESCRIPTION	ITEM		
1	2		DO NOT SCALE G.C. SHIPPED	3	4	REMOVE BURRS, BREAK SHARP CORNERS & EDGES TO TOLERANCES UNLESS OTHERWISE SPECIFIED	5	6	WILLIAMS ELECTRONICS, INC. 3401 CALIFORNIA AVE CHICAGO, ILLINOIS 60614 NAME
7	8		DO NOT SCALE G.C. SHIPPED	9	10	DECIMAL — 1.000 ANGULAR 1.000 LINEAR 1.000 FRACTIONAL	11	12	SCALE — 1.000
13	14		DO NOT SCALE G.C. SHIPPED	15	16	ST. PROJ. #1 DATE CHECKED BY DATE	17	18	MATERIAL
19	20		DO NOT SCALE G.C. SHIPPED	21	22	APPROVAL DATE 7/19/68	23	24	OTY
25	26		DO NOT SCALE G.C. SHIPPED	27	28	1ST - 2/26/68	29	30	OTY
31	32		DO NOT SCALE G.C. SHIPPED	33	34	2ND - 7/19/68	35	36	OTY
37	38		DO NOT SCALE G.C. SHIPPED	39	40	3RD - 7/19/68	41	42	OTY
43	44		DO NOT SCALE G.C. SHIPPED	45	46	4TH - 7/19/68	47	48	OTY
51	52		DO NOT SCALE G.C. SHIPPED	53	54	5TH - 7/19/68	55	56	OTY
59	60		DO NOT SCALE G.C. SHIPPED	61	62	6TH - 7/19/68	63	64	OTY
67	68		DO NOT SCALE G.C. SHIPPED	69	70	7TH - 7/19/68	71	72	OTY
75	76		DO NOT SCALE G.C. SHIPPED	77	78	8TH - 7/19/68	79	80	OTY
83	84		DO NOT SCALE G.C. SHIPPED	85	86	9TH - 7/19/68	87	88	OTY
91	92		DO NOT SCALE G.C. SHIPPED	93	94	10TH - 7/19/68	95	96	OTY
99	100		DO NOT SCALE G.C. SHIPPED	101	102	11TH - 7/19/68	103	104	OTY
107	108		DO NOT SCALE G.C. SHIPPED	109	110	12TH - 7/19/68	111	112	OTY
115	116		DO NOT SCALE G.C. SHIPPED	117	118	13TH - 7/19/68	119	120	OTY
123	124		DO NOT SCALE G.C. SHIPPED	125	126	14TH - 7/19/68	127	128	OTY
131	132		DO NOT SCALE G.C. SHIPPED	133	134	15TH - 7/19/68	135	136	OTY
139	140		DO NOT SCALE G.C. SHIPPED	141	142	16TH - 7/19/68	143	144	OTY
147	148		DO NOT SCALE G.C. SHIPPED	149	150	17TH - 7/19/68	151	152	OTY
155	156		DO NOT SCALE G.C. SHIPPED	157	158	18TH - 7/19/68	159	160	OTY
163	164		DO NOT SCALE G.C. SHIPPED	165	166	19TH - 7/19/68	167	168	OTY
171	172		DO NOT SCALE G.C. SHIPPED	173	174	20TH - 7/19/68	175	176	OTY
179	180		DO NOT SCALE G.C. SHIPPED	181	182	21ST - 7/19/68	183	184	OTY
187	188		DO NOT SCALE G.C. SHIPPED	189	190	22ND - 7/19/68	191	192	OTY
195	196		DO NOT SCALE G.C. SHIPPED	197	198	23RD - 7/19/68	199	200	OTY
203	204		DO NOT SCALE G.C. SHIPPED	205	206	24TH - 7/19/68	207	208	OTY
211	212		DO NOT SCALE G.C. SHIPPED	213	214	25TH - 7/19/68	215	216	OTY
219	220		DO NOT SCALE G.C. SHIPPED	221	222	26TH - 7/19/68	223	224	OTY
227	228		DO NOT SCALE G.C. SHIPPED	229	230	27TH - 7/19/68	231	232	OTY
235	236		DO NOT SCALE G.C. SHIPPED	237	238	28TH - 7/19/68	239	240	OTY
243	244		DO NOT SCALE G.C. SHIPPED	245	246	29TH - 7/19/68	247	248	OTY
251	252		DO NOT SCALE G.C. SHIPPED	253	254	30TH - 7/19/68	255	256	OTY
259	260		DO NOT SCALE G.C. SHIPPED	261	262	31ST - 7/19/68	263	264	OTY
267	268		DO NOT SCALE G.C. SHIPPED	269	270	32ND - 7/19/68	271	272	OTY
275	276		DO NOT SCALE G.C. SHIPPED	277	278	33RD - 7/19/68	279	280	OTY
283	284		DO NOT SCALE G.C. SHIPPED	285	286	34TH - 7/19/68	287	288	OTY
291	292		DO NOT SCALE G.C. SHIPPED	293	294	35TH - 7/19/68	295	296	OTY
299	300		DO NOT SCALE G.C. SHIPPED	301	302	36TH - 7/19/68	303	304	OTY
307	308		DO NOT SCALE G.C. SHIPPED	309	310	37TH - 7/19/68	311	312	OTY
315	316		DO NOT SCALE G.C. SHIPPED	317	318	38TH - 7/19/68	319	320	OTY
323	324		DO NOT SCALE G.C. SHIPPED	325	326	39TH - 7/19/68	327	328	OTY
331	332		DO NOT SCALE G.C. SHIPPED	333	334	40TH - 7/19/68	335	336	OTY
339	340		DO NOT SCALE G.C. SHIPPED	341	342	41ST - 7/19/68	343	344	OTY
347	348		DO NOT SCALE G.C. SHIPPED	349	350	42ND - 7/19/68	351	352	OTY
355	356		DO NOT SCALE G.C. SHIPPED	357	358	43RD - 7/19/68	359	360	OTY
363	364		DO NOT SCALE G.C. SHIPPED	365	366	44TH - 7/19/68	367	368	OTY
371	372		DO NOT SCALE G.C. SHIPPED	373	374	45TH - 7/19/68	375	376	OTY
379	380		DO NOT SCALE G.C. SHIPPED	381	382	46TH - 7/19/68	383	384	OTY
387	388		DO NOT SCALE G.C. SHIPPED	389	390	47TH - 7/19/68	391	392	OTY
395	396		DO NOT SCALE G.C. SHIPPED	397	398	48TH - 7/19/68	399	400	OTY
403	404		DO NOT SCALE G.C. SHIPPED	405	406	49TH - 7/19/68	407	408	OTY
411	412		DO NOT SCALE G.C. SHIPPED	413	414	50TH - 7/19/68	415	416	OTY
419	420		DO NOT SCALE G.C. SHIPPED	421	422	51ST - 7/19/68	423	424	OTY
427	428		DO NOT SCALE G.C. SHIPPED	429	430	52ND - 7/19/68	431	432	OTY
435	436		DO NOT SCALE G.C. SHIPPED	437	438	53RD - 7/19/68	439	440	OTY
443	444		DO NOT SCALE G.C. SHIPPED	445	446	54TH - 7/19/68	447	448	OTY
451	452		DO NOT SCALE G.C. SHIPPED	453	454	55TH - 7/19/68	455	456	OTY
459	460		DO NOT SCALE G.C. SHIPPED	461	462	56TH - 7/19/68	463	464	OTY
467	468		DO NOT SCALE G.C. SHIPPED	469	470	57TH - 7/19/68	471	472	OTY
475	476		DO NOT SCALE G.C. SHIPPED	477	478	58TH - 7/19/68	479	480	OTY
483	484		DO NOT SCALE G.C. SHIPPED	485	486	59TH - 7/19/68	487	488	OTY
491	492		DO NOT SCALE G.C. SHIPPED	493	494	60TH - 7/19/68	495	496	OTY
499	500		DO NOT SCALE G.C. SHIPPED	501	502	61ST - 7/19/68	503	504	OTY
507	508		DO NOT SCALE G.C. SHIPPED	509	510	62ND - 7/19/68	511	512	OTY
515	516		DO NOT SCALE G.C. SHIPPED	517	518	63RD - 7/19/68	519	520	OTY
523	524		DO NOT SCALE G.C. SHIPPED	525	526	64TH - 7/19/68	527	528	OTY
531	532		DO NOT SCALE G.C. SHIPPED	533	534	65TH - 7/19/68	535	536	OTY
539	540		DO NOT SCALE G.C. SHIPPED	541	542	66TH - 7/19/68	543	544	OTY
547	548		DO NOT SCALE G.C. SHIPPED	549	550	67TH - 7/19/68	551	552	OTY
555	556		DO NOT SCALE G.C. SHIPPED	557	558	68TH - 7/19/68	559	560	OTY
563	564		DO NOT SCALE G.C. SHIPPED	565	566	69TH - 7/19/68	567	568	OTY
571	572		DO NOT SCALE G.C. SHIPPED	573	574	70TH - 7/19/68	575	576	OTY
579	580		DO NOT SCALE G.C. SHIPPED	581	582	71ST - 7/19/68	583	584	OTY
587	588		DO NOT SCALE G.C. SHIPPED	589	590	72ND - 7/19/68	591	592	OTY
595	596		DO NOT SCALE G.C. SHIPPED	597	598	73RD - 7/19/68	599	600	OTY
603	604		DO NOT SCALE G.C. SHIPPED	605	606	74TH - 7/19/68	607	608	OTY
611	612		DO NOT SCALE G.C. SHIPPED	613	614	75TH - 7/19/68	615	616	OTY
619	620		DO NOT SCALE G.C. SHIPPED	621	622	76TH - 7/19/68	623	624	OTY
627	628		DO NOT SCALE G.C. SHIPPED	629	630	77TH - 7/19/68	631	632	OTY
635	636		DO NOT SCALE G.C. SHIPPED	637	638	78TH - 7/19/68	639	640	OTY
643	644		DO NOT SCALE G.C. SHIPPED	645	646	79TH - 7/19/68	647	648	OTY
651	652		DO NOT SCALE G.C. SHIPPED	653	654	80TH - 7/19/68	655	656	OTY
659	660		DO NOT SCALE G.C. SHIPPED	661	662	81ST - 7/19/68	663	664	OTY
667	668		DO NOT SCALE G.C. SHIPPED	669	670	82ND - 7/19/68	671	672	OTY
675	676		DO NOT SCALE G.C. SHIPPED	677	678	83RD - 7/19/68	679	680	OTY
683	684		DO NOT SCALE G.C. SHIPPED	685	686	84TH - 7/19/68	687	688	OTY
691	692		DO NOT SCALE G.C. SHIPPED	693	694	85TH - 7/19/68	695	696	OTY
699	700		DO NOT SCALE G.C. SHIPPED	701	702	86TH - 7/19/68	703	704	OTY
707	708		DO NOT SCALE G.C. SHIPPED	709	710	87TH - 7/19/68	711	712	OTY
715	716		DO NOT SCALE G.C. SHIPPED	717	718	88TH - 7/19/68	719	720	OTY
723	724		DO NOT SCALE G.C. SHIPPED	725	726	89TH - 7/19/68	727	728	OTY
731	732		DO NOT SCALE G.C. SHIPPED	733	734	90TH - 7/19/68	735	736	OTY
739	740		DO NOT SCALE G.C. SHIPPED	741	742	91ST - 7/19/68	743	744	OTY
747	748		DO NOT SCALE G.C. SHIPPED	749	750	92ND - 7/19/68	751	752	OTY
755	756		DO NOT SCALE G.C. SHIPPED	757	758	93RD - 7/19/68	759	760	OTY
763	764		DO NOT SCALE G.C. SHIPPED	765	766	94TH - 7/19/68	767	768	OTY
771	772		DO NOT SCALE G.C. SHIPPED	773	774	95TH - 7/19/68	775	776	OTY
779	780		DO NOT SCALE G.C. SHIPPED	781	782	96TH - 7/19/68	783	784	OTY
787	788		DO NOT SCALE G.C. SHIPPED	789	790	97TH - 7/19/68	791	792	OTY
795	796		DO NOT SCALE G.C. SHIPPED	797	798	98TH - 7/19/68	799	800	OTY
803	804		DO NOT SCALE G.C. SHIPPED	805	806	99TH - 7/19/68	807	808	OTY
811	812		DO NOT SCALE G.C. SHIPPED	813	814	100TH - 7/19/68	815	816	OTY
819	820		DO NOT SCALE G.C. SHIPPED	821	822	101ST - 7/19/68	823	824	OTY
827	828		DO NOT SCALE G.C. SHIPPED	829	830	102ND - 7/19/68	831	832	OTY
835	836		DO NOT SCALE G.C. SHIPPED	837	838	103RD - 7/19/68	839	840	OTY
843	844		DO NOT SCALE G.C. SHIPPED	845	846	104TH - 7/19/68	847	848	OTY
851	852		DO NOT SCALE G.C. SHIPPED	853	854	105TH - 7/19/68	855	856	OTY
859	860		DO NOT SCALE G.C. SHIPPED	861	862	106TH - 7/19/68	863	864	OTY
867	868		DO NOT SCALE G.C. SHIPPED	869	870	107TH - 7/19/68	871	872	OTY
875	876		DO NOT SCALE G.C. SHIPPED	877	878	108TH - 7/19/68	879	880	OTY
883	884		DO NOT SCALE G.C. SHIPPED	885	886	109TH - 7/19/68	887	888	OTY
891	892		DO NOT SCALE G.C. SHIPPED	893	894	110TH - 7/19/68	895	896	OTY
899	900		DO NOT SCALE G.C. SHIPPED	901	902	111TH - 7/19/68	903	904	OTY

REV	DESCRIPTION OF CHANGE	TYPE	DATE
NEW PART RELEASE			

3J2 Functions

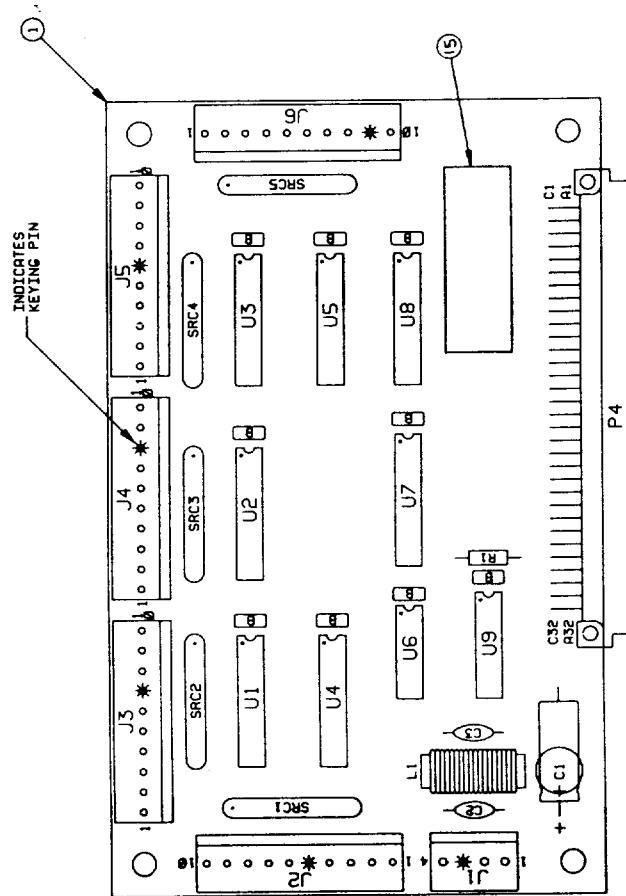
- Pin/Function
 - 1 - NC
 - 2 - NC
 - 3 - NC
 - 4 - NC
 - 5 - Key
 - 6 - Memory Protect
 - 7 - T/B Strobe
 - 8 - Player 2 Start
 - 9 - Player 1 Start

3J4 Functions

- Pin/Function
 - 1 - Player 1 Rocket
 - 2 - Player 1 Jump
 - 3 - Player 1 Fire
 - 4 - Player 1 Crouch
 - 5 - Player 1 Right
 - 6 - Player 1 Left
 - 7 - Player 1 Down
 - 8 - Key
 - 9 - Player 1 Up
 - 10-Ground

3J3 Functions

- Pin/Function
 - 1 - Player 2 Rocket
 - 2 - Player 2 Jump
 - 3 - Player 2 Fire
 - 4 - Player 2 Crouch
 - 5 - Player 2 Right
 - 6 - Player 2 Left
 - 7 - Key
 - 8 - Player 2 Down
 - 9 - Player 2 Up
 - 10-Ground



1 C-12037

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3

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D

C

B

A

BILL OF MATERIALS

ITEM	PRINT NO.	PRINT DESCRIPTION	DESCRIPTION	QTY
15	16-8850-212		LABEL, PCB IDENT.	1
14	5791-10026-00	P4	CONNECTOR, 10P, MOLEX, DIN CARD CONN, FEMALE	1
13	5791-10862-10	J2, J5, J6	.156 CENTER PINS	5
12	5791-10862-04	J1	.156 CENTER PINS	1
11	5043-09845-00	C2, C3	CAPACITOR, .001 MFD.	2
10	5040-09886-00	C1	CAPACITOR, .001 MFD.	1
9	08980-00	B	CAPACITOR, .0.01 MFD.	9
8	5010-08991-00	R1	RESISTOR, 10K, 1/4W, 5%	1
7	5060-10896-00	SCR1, SCR2, SCR3, SRC4, SRC5	SILICON SCHOTTKY DIODES, 10P, 8-RES/8-CAP NETWORK	5
6	5551-03922-00	L1	INDUCTOR, 4.7 UH	1
5	5311-10848-00	U9	74HC138, H-CHDOS	1
4	5317-12208-00	U7, U8	74ALS25, AL8 TTL OCTAL BUS TRANSCIEVER	2
3	5311-10845-00	U6	74HC32, H-CMOS QUAD 2-IN/PUT OR GATE	1
2	5311-12287-00	U1, U2, U3, U4, U5	74HC541, HC TTL OCTAL BUFFER	5
1	5279-12285-00		BARE PCB BOARD	1
ITEM	PRINT NO.	PRINT DESCRIPTION	DESCRIPTION	QTY

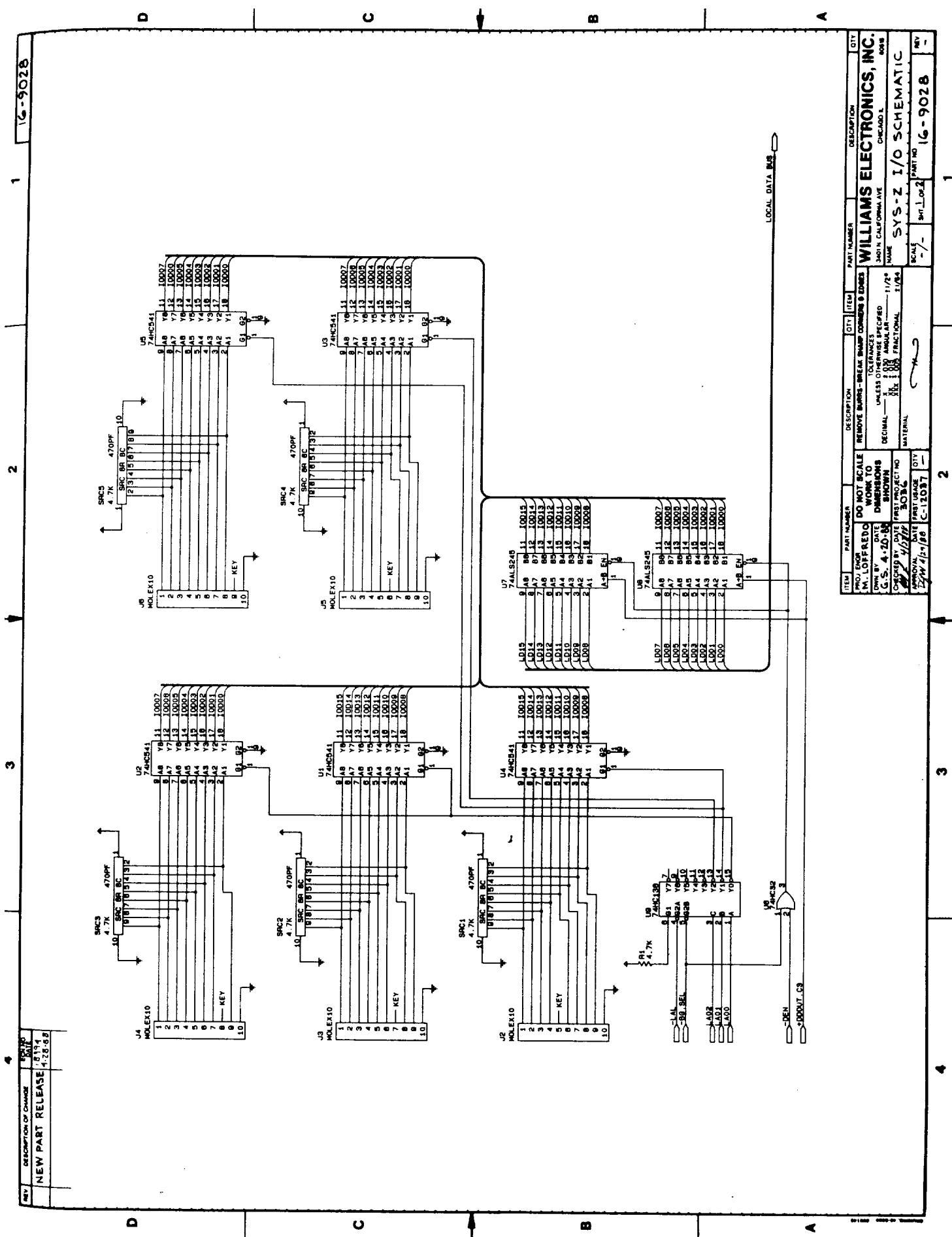
PRO. ENGR. M. LOFFREDO	DO NOT SCALE TO DRAWING	REMOVE SURFACE-RELIEF SWEEP DIMENSIONS	WORK TO DIMENSIONS SHOWN	UNLESS OTHERWISE SPECIFIED
DESIGN BY R.C. 2/12/86	PRINT DATE 1/27/86	PRINT NO. 3086	DECIMAL .001 INCHES .03125 INCHES .0625 INCHES .125 INCHES	1/16 INCHES .0625 INCHES .125 INCHES .25 INCHES
			MATERIAL	
			None	

WILLIAMS ELECTRONICS, INC.
2401 N CALIFORNIA AVE
CHICAGO, IL 60614
PHONE 312/226-1000

SYN-Z, I/O PCB ASSEMBLY
PART NO. C-12037
REV. A

NOTE: FOR SCHEMATIC REFER TO DRAWING NO. 16-9028.

2



ITEM	PART NUMBER	DESCRIPTION	CITY
1		REMOVE BURRS, BREAK CHAMPS & EDGES	CHICAGO IL
2		TOLERANCES UNLESS OTHERWISE SPECIFIED	ROBES
3		DECIMAL	
4		1/16 IN. ANGULAR	
5		1/16 IN. FRACTIONAL	
6		MATERIAL	
7		FIRST PROJECT NO	
8		DATE FIRST USAGE	
9		SECOND PROJECT NO	
10		DATE SECOND USAGE	
11		REMARKS	
12		INITIALS	
13		DATE	
14		INITIALS	
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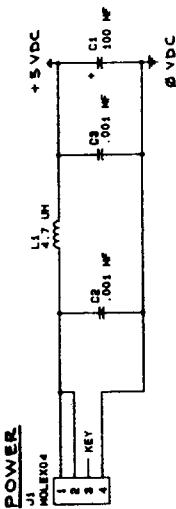
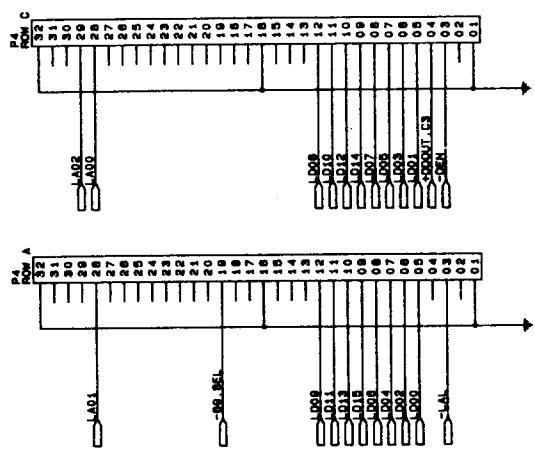
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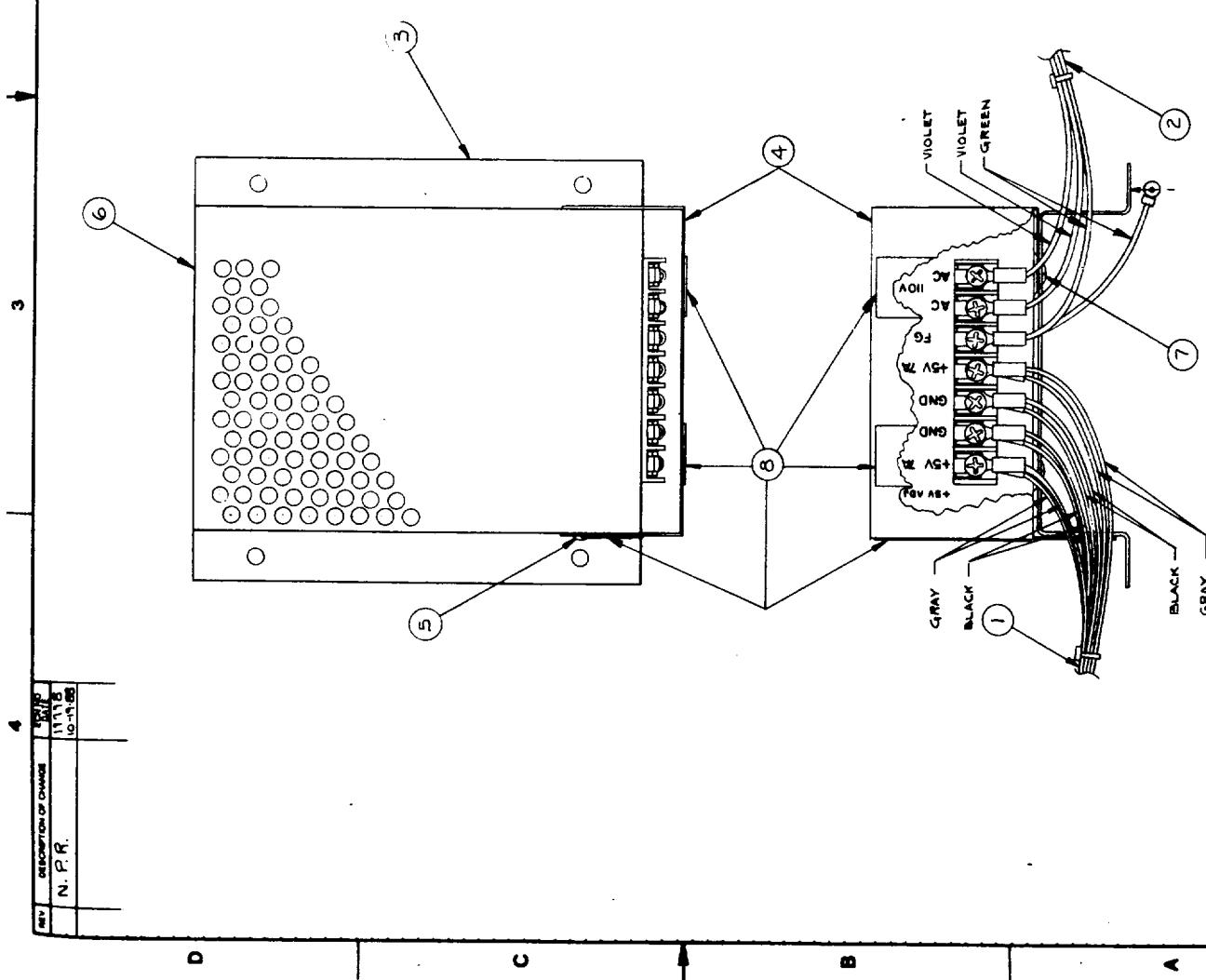
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REV	DESCRIPTION OF CHANGE	DATE APPROVED	DATE ISSUED
	NEW PART RELEASE	1895-1	4-26-84

CPU INTERFACE



ITEM
MOJ
M. 1
DWN
G. 8
CAG
A



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	LG-8587-101	LABEL - HIGH VOLTAGE	5	1	WILLIAMS ELECTRONICS, INC.	CHICAGO 1, 3401 N CALIFORNIA AVE	ONE
2	4005-0005-04	MS 5-40 A 1/4 P.T.H.	4	2	P/S SWITCHER		
3	20-9514	P/S SWITCHER	1	3	03-8251	FASTER BUTTON	1
4	01-9009	SHIELD - SW POWER SUPY	1	5	01-8911	BRIGHT - SW POWER SUPY	1
6	11-1219	POWER INTER PCB	1	7	1 H-10217-3	VIDEO SW/POWER CBL	1

REV	DESCRIPTION OF CHANGE	DATE
	N. P.R.	10-19-88

C-12350

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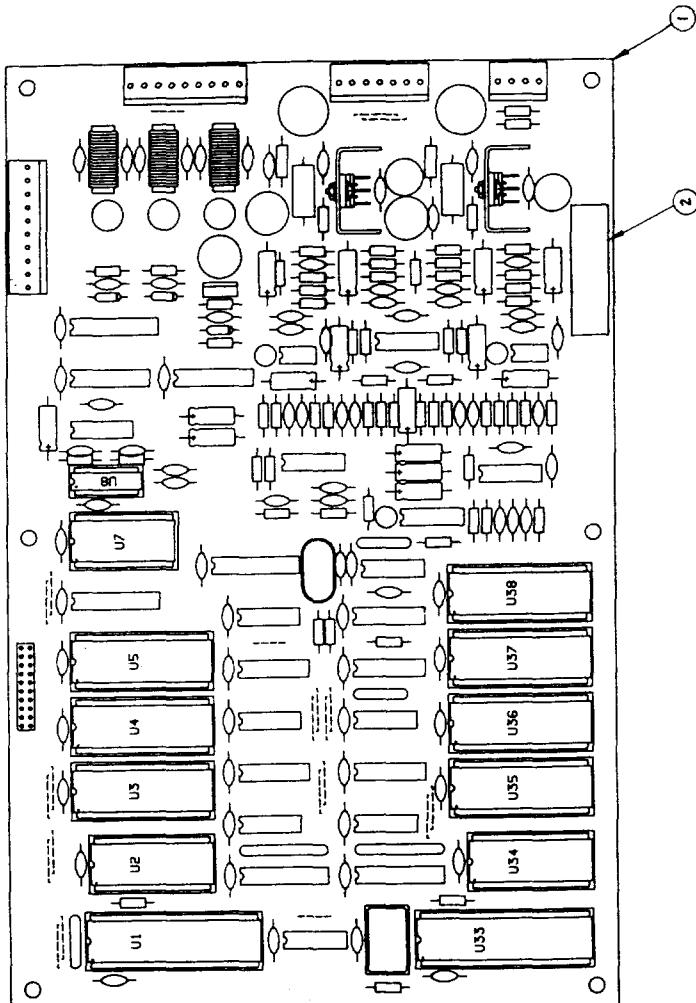
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D

C

E

A



NOTE:
FOR SCHEMATIC, REFER TO DRAWING NO. 16-9044.

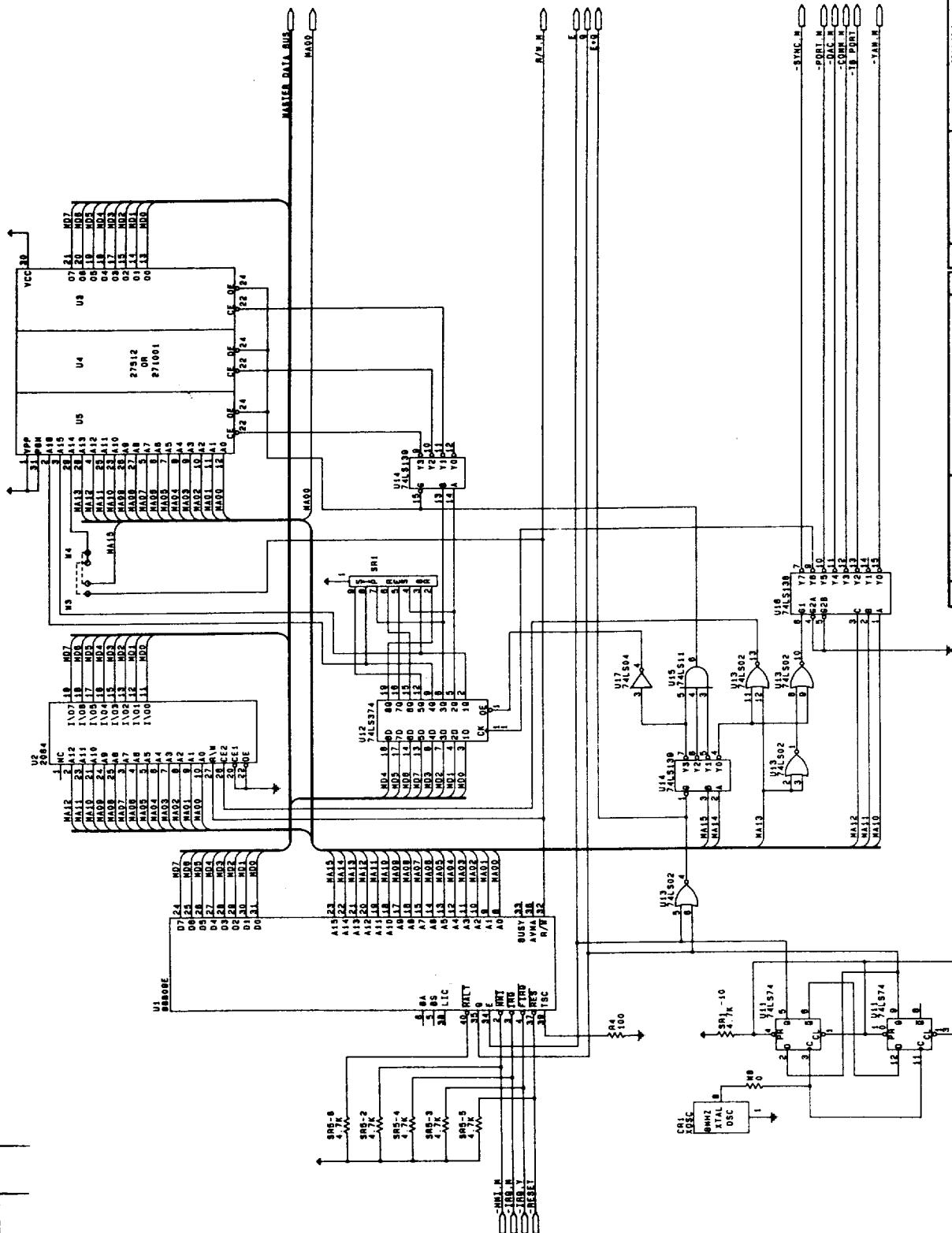
ITEM	PART NUMBER	DESCRIPTION	QTY	REF	PART NUMBER	DESCRIPTION	QTY	REF
1		DO NOT SCALE REMOVE BURN-BREAK SAW STOP WIRE						
2		PROJ. ENGR. M. LOFFREDI						
3		WORK TO DIMENSIONS SHOWN						
4		DRW BY R.G. 9-22-68						
5		DATE SPEC'D 11-3-68						
6		TOLERANCES UNLESS OTHERWISE SPEC'D 1/16" ANGULAR 1/32" FRACTIONAL 1/16" DECIMAL						
7		DECIMAL XX						
8		CHECKED BY DATE 11-3-68						
9		APPROVAL DATE 12-14-68						
10		MATERIAL 303-C U.L.						
11		FASTENING METHOD D-12266						
12		SCALE 1/16" = .625						
13		REV 16-9044						
14		NEW PART RELEASE						

ITEM	PART NUMBER	DESCRIPTION	QTY	REF
1		WILLIAMS ELECTRONICS, INC.		
2		ONE HUNDRED		
3		NAME		
4		SYS-2 SOUND - 2 ASSEMBLY		
5		SCALE		
6		1/1		
7		REV		
8		C-12350		

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.
1	C-12350	SYS-2 SOUND BOARD SUB-ASSY	BILL OF MATERIALS	1
2	230	LABEL, PCB IDENT.		1
3	230	SYS-2 SOUND BOARD SUB-ASSY		1
4	230	LABEL, PCB IDENT.		1
5	U3	DESIGNATION		1
6	U4	DESIGNATION		1
7	U5	DESIGNATION		1
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214	U212	DESIGNATION		1
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284	U282	DESIGNATION		1
285	U283	DESIGNATION		1
286	U284	DESIGNATION		

16-9044



REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	

REV	DESCRIPTION OR CHANGE	EO NO DATE
	NEW PART RELEASE	

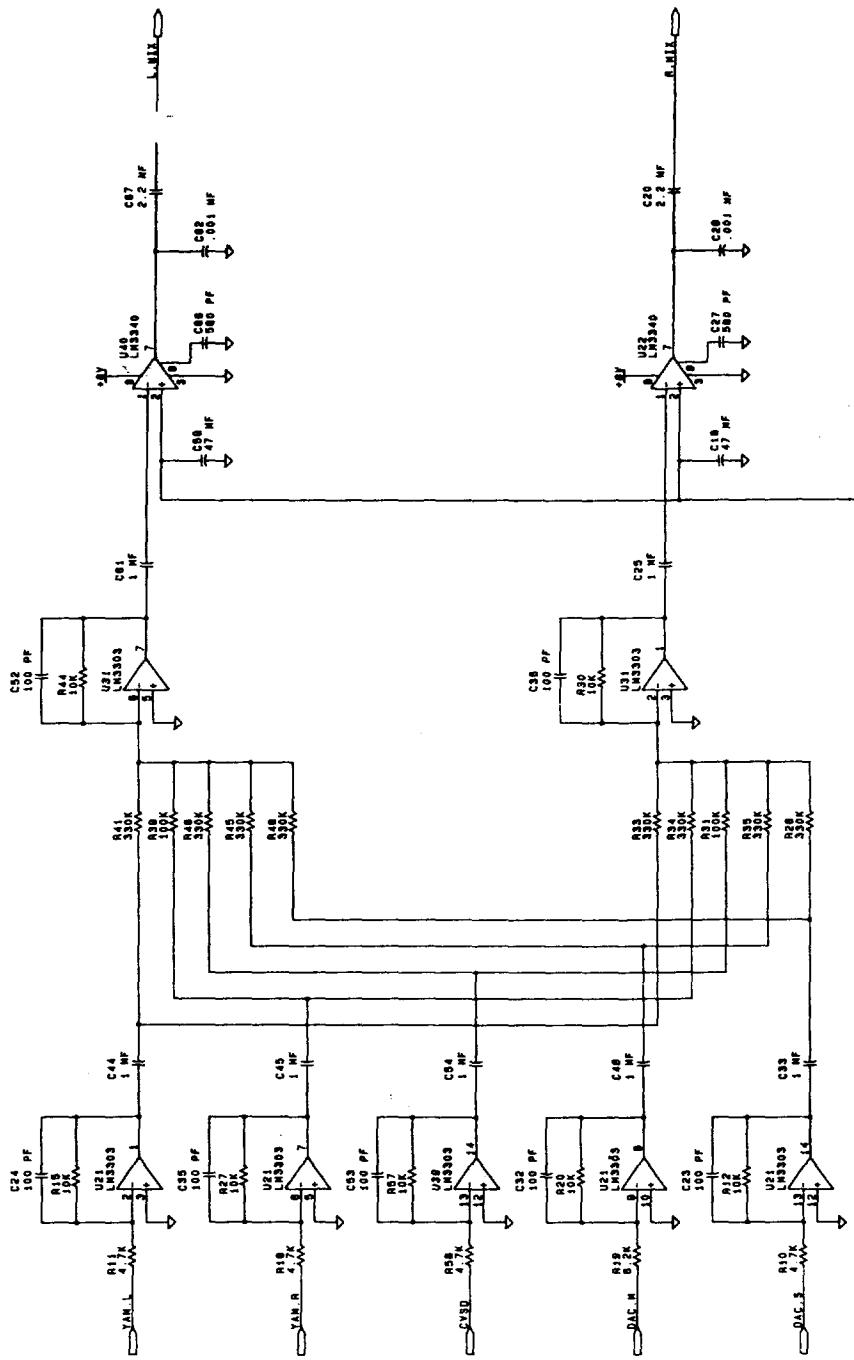
16-904

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1

REV. D DESCRIPTION OF CHANGE
NEW PART RELEASE

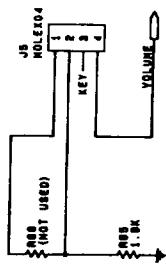
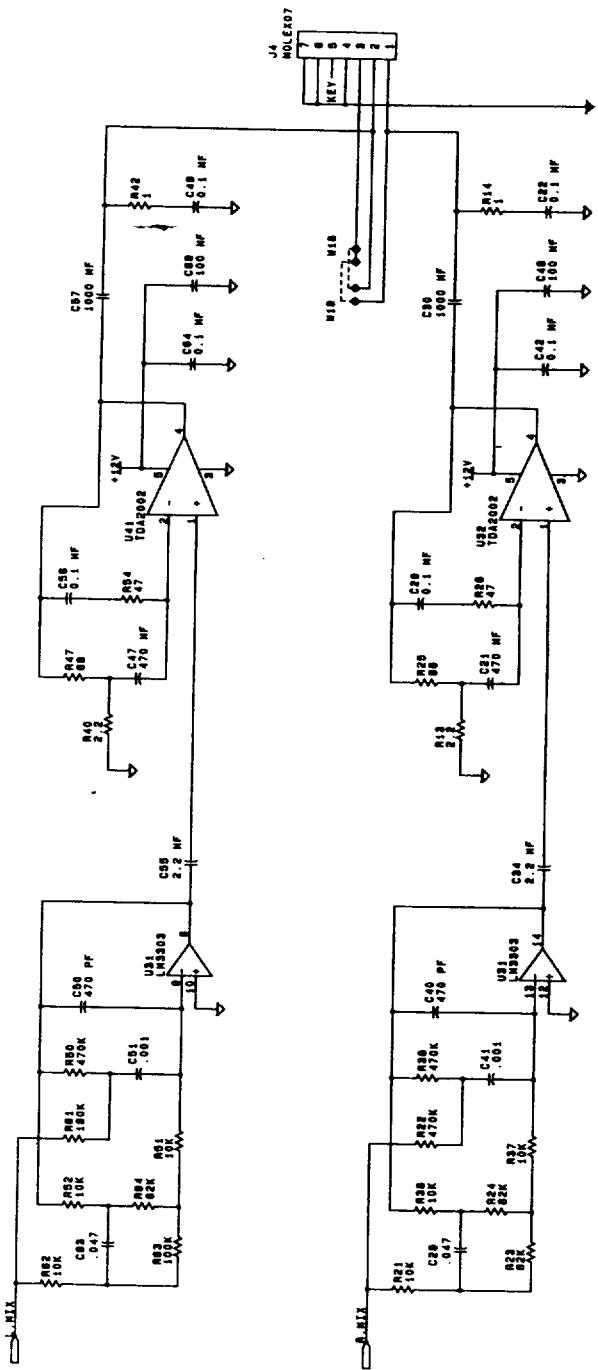
16-9044



ITEM		PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	PROJ. ENGR.	DO NOT SCALE	REMOVE BURRS - BREAK SWEEP COUNTERS & EDGES	1	2	ITEM	WILLIAMS ELECTRONICS, INC.	1
2	G. SHIP.	WORK TO	TOLENCES	1	3	ITEM	CHICAGO, IL	1
3	D.	DIMENSIONS	UNLESS OTHERWISE SPECIFIED	1	4	ITEM	3411 CALIFORNIA AVE	1
4	D.	SHOWN	DECIMAL	1	5	ITEM	1000 ANGUS, ARK.	1/2"
5	D.	PROJECT NO.	1/4"	1	6	ITEM	1000	1/4"
6	D.	PROJ. DATE	1/4"	1	7	ITEM	FRCTIONAL	1/4"
7	D.	DATE	1/4"	1	8	ITEM	MATERIAL	1/4"
8	D.	AMOUNT	1/4"	1	9	ITEM	SAC-5	1/4"
9	D.	DATE	1/4"	1	10	ITEM	SAC-5	1/4"
11	D.	DATE	1/4"	1	12	ITEM	SAC-5	1/4"
13	D.	DATE	1/4"	1	14	ITEM	SAC-5	1/4"
15	D.	DATE	1/4"	1	16	ITEM	SAC-5	1/4"
17	D.	DATE	1/4"	1	18	ITEM	SAC-5	1/4"
19	D.	DATE	1/4"	1	20	ITEM	SAC-5	1/4"
21	D.	DATE	1/4"	1	22	ITEM	SAC-5	1/4"
23	D.	DATE	1/4"	1	24	ITEM	SAC-5	1/4"
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27	D.	DATE	1/4"	1	28	ITEM	SAC-5	1/4"
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213	D.	DATE	1/4"	1	214	ITEM	SAC-5	1/4"
215	D.	DATE	1/4"	1	216	ITEM	SAC-5	1/4"
217	D.	DATE	1/4"	1	218	ITEM	SAC-5	1/4"
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221	D.	DATE	1/4"	1	222	ITEM	SAC-5	1/4"
223	D.	DATE	1/4"	1	224	ITEM	SAC-5	1/4"
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247	D.	DATE	1/4"	1	248	ITEM	SAC-5	1/4"
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251	D.	DATE	1/4"	1	252	ITEM	SAC-5	1/4"
253	D.	DATE	1/4"	1	254	ITEM	SAC-5	1/4"
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311	D.	DATE	1/4"	1	312	ITEM	SAC-5	1/4"
313	D.	DATE	1/4"	1	314	ITEM	SAC-5	1/4"
315	D.	DATE	1/4"	1	316	ITEM	SAC-5	1/4"
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323	D.	DATE	1/4"	1	324	ITEM	SAC-5	1/4"
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333	D.	DATE	1/4"	1	334	ITEM	SAC-5	1/4"
335	D.	DATE	1/4"	1	336	ITEM	SAC-5	1/4"
337	D.	DATE	1/4"	1	338	ITEM	SAC-5	1/4"
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341	D.	DATE	1/4"	1	342	ITEM	SAC-5	1/4"
343	D.	DATE	1/4"	1	344	ITEM	SAC-5	1/4"
345	D.	DATE	1/4"	1	346	ITEM	SAC-5	1/4"
347	D.	DATE	1/4"	1	348	ITEM	SAC-5	1/4"
349	D.	DATE	1/4"	1	350	ITEM	SAC-5	1/4"
351	D.	DATE	1/4"	1	352	ITEM	SAC-5	1/4"
353	D.	DATE	1/4"	1	354	ITEM</		

REV	DESCRIPTION OF CHANGE	TYPE	DATE
	NEW PART RELEASE		

16-9044



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	DO NOT SCALE	REMOVE BURRS - BREAK BURRS - SMOOTH	1	2	WILLIAMS ELECTRONICS, INC.		1
2	SK-100	WORK TO DIMENSIONS	1	3	2401 N. CALIFORNIA AVE	CHICAGO, ILLINOIS	1
3	PROJ. NO.	DATE DRAWN BY	1	4	ANAL. BY	1	1
4	1-100	DATE CHECKED BY	1	5	1/2"	1	1
5	1-100	DATE APPROVED	1	6	FRACTIONAL	1	1
6	1-100	DATE RECORDED	1	7	MATERIAL	1	1
7	1-100	DATE ISSUED	1	8	SCHEMATIC	1	1
8	1-100	DATE RECEIVED	1	9	PART NO	1	1
9	1-100	DATE REMOVED	1	10	REV	1	1

4

16-3044

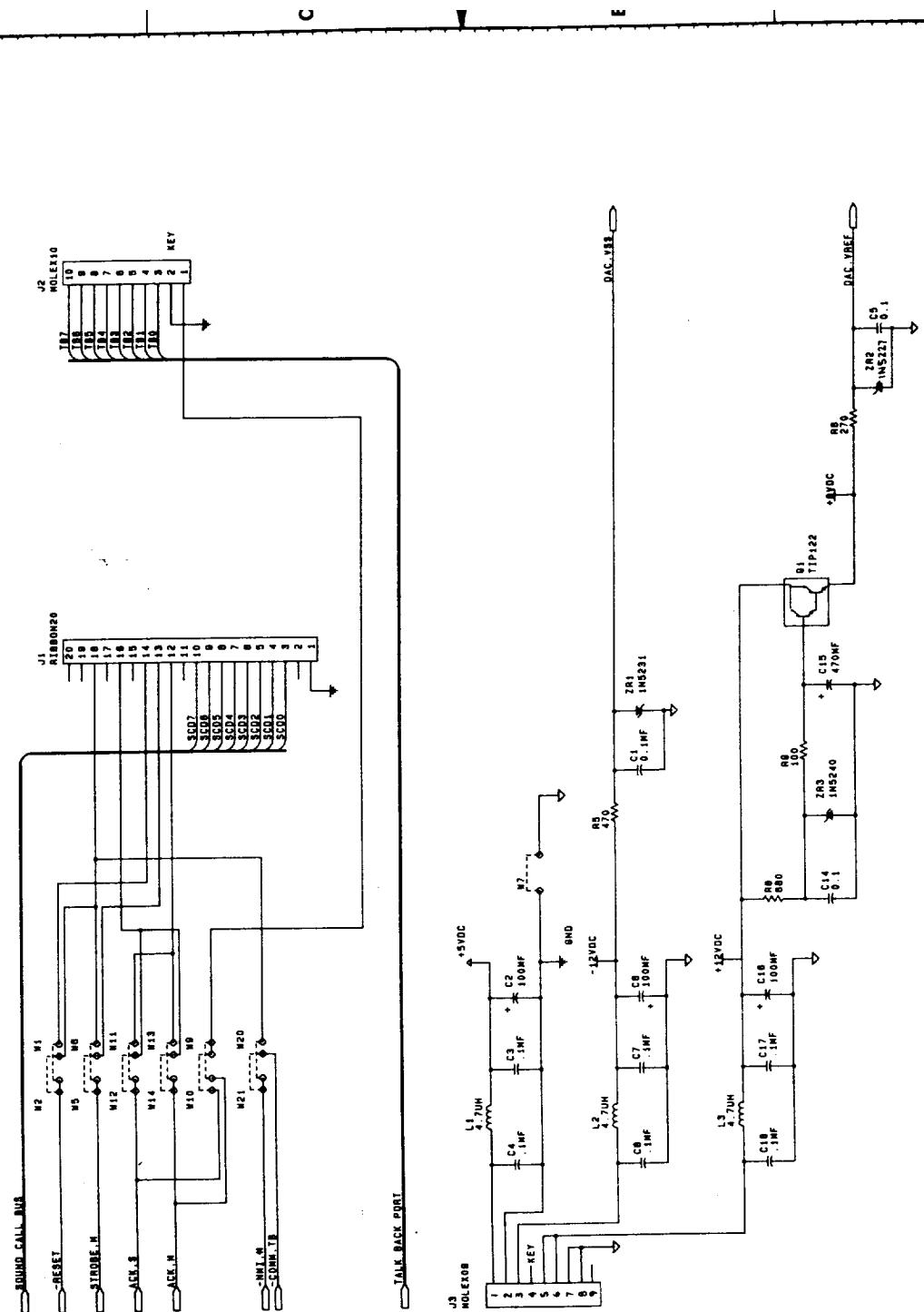
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ITEM #	DESCRIPTION OF CHANGE
1	NEW PART RELEASE



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	WILLIAMS ELECTRONICS, INC.	REMOVAL BUMPS - BREAK SWAMP CIRCUITS & EDS	1	2	CHEMLOC L SODA L SODA S	TO SPACES UNLESS OTHERWISE SPECIFIED	1
3	3401 CALIFORNIA AVE	DECIMAL — 1 0 0 ANGULAR SPECIFIED 1 0 0 FRACTIONAL 1 0 0 MATERIAL	1/24	4	SYS-2 SOUND-2 BD. SCHEMATIC	SCHEMATIC	1
5	16-9044	SCHEMATIC	1	6	SW-1001	SW-1001	1

REV.	DESCRIPTION OF CHANGE	TYPE OF CHANGE
	NEW PART RELEASE	5/10/68
		S-12218

1 C-12218

D C B A

SCHEMATIC

PARTS LIST

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.
1	16-8850-21G	LABEL, PCB IDENT.	LABEL, PCB IDENT.	1
2	5791-10862-10	J1	CONN., 10-PIN MOLEX, .156" CENTER PINS	1
3	5791-10862-07	J2	CONN., 7-PIN MOLEX, .156" CENTER PINS	1
4	5791-10862-02	J3	CONN., 2-PIN MOLEX, .156" CENTER PINS	1
5	5733-12060-01	F1, F2, F3	FUSEHOLDER	3
6	5130-09797-00	F3	FUSE, 0.75A, 250V	1
7	5131-09432-00	F2	FUSE, 7A SB, 250V	1
8	5131-10356-00	F1	FUSE, 3A SB, 250V	1
9	5040-12315-00	C2	CAPACITOR, ELECT., RAD., 1500 MFD, 25V	1
10	5040-12314-00	C1	CAPACITOR, ELECT., RAD., 2200 MFD, 25V	1
11	5671-09019-00	LED1, LED2	LIGHT EMITTING DIODE, RED	2
12	5100-09418-00	BRI	BRIDGE RECTIFIER, 55V	1
13	5070-06258-00	D1	DIODE, IN4001	1
14	5010-09314-00	R1, R2	RESISTOR, C. F., 1.2K 5% 1/4 WATT	2
15	5273-12389-00		BARE PC BOARD	1

NOTES:

1. FOR SCHEMATIC. REFER TO DRAWING NO. 16-9037.
2. ALL FUSES TO BE INSTALLED AFTER SOLDER WASH.
3. EACH FUSEHOLDER CAN BE SUBSTITUTED WITH 2 FUSE CLIPS PT NO. 5732-09178-00.
4. BRI MUST BE MOUNTED $\frac{1}{8}$ " ABOVE SURFACE OF PCB.

BILL OF MATERIALS

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.
1	C-12218	PCB	WILLIAMS ELECTRONICS, INC.	1
2	SYS-7-12	UNIREG P/S ASSY	1	
3	1	SH 1.0x1	REV. C-12218	1

PROJECTION

DO NOT SCALE	REFERENCE LINE	WORK TO	DIMENSIONS	TOLERANCES
LINE	LINE	LINE	LINE	LINE
LEOFFERD	LEOFFERD	LEOFFERD	LEOFFERD	LEOFFERD
5/10/68	5/10/68	5/10/68	5/10/68	5/10/68
P.C.	P.C.	P.C.	P.C.	P.C.
DECIMAL	DECIMAL	DECIMAL	DECIMAL	DECIMAL
X .1	X .1	X .1	X .1	X .1
1/16	1/16	1/16	1/16	1/16
1/8	1/8	1/8	1/8	1/8
1/4	1/4	1/4	1/4	1/4
1/2	1/2	1/2	1/2	1/2
1	1	1	1	1
2	2	2	2	2
4	4	4	4	4
8	8	8	8	8
16	16	16	16	16
32	32	32	32	32
64	64	64	64	64
128	128	128	128	128
256	256	256	256	256
512	512	512	512	512
1024	1024	1024	1024	1024
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4096	4096	4096	4096	4096
8192	8192	8192	8192	8192
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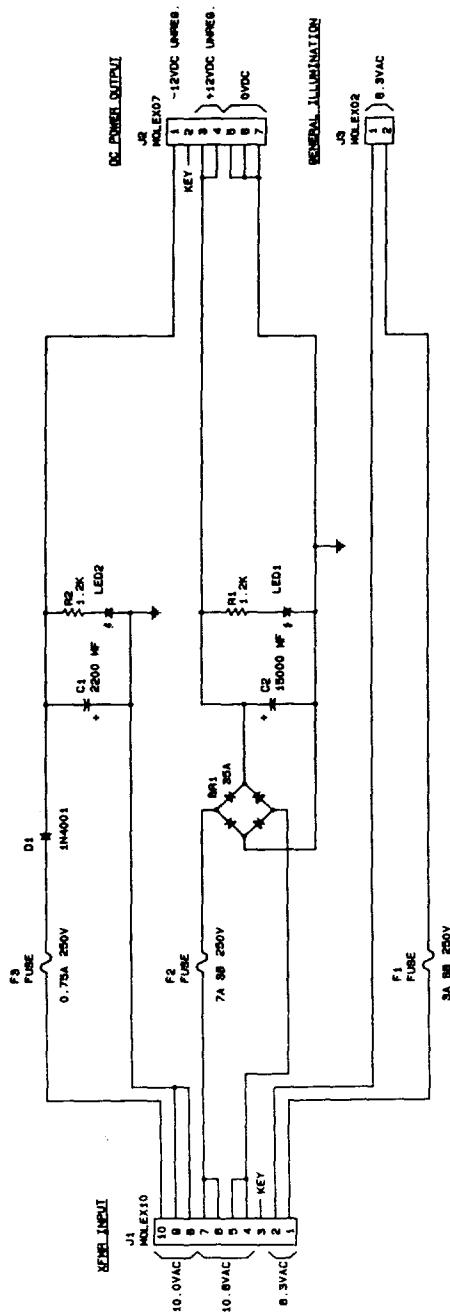
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REV	DESCRIPTION OF CHANGE	SPRING DATE
	NEW PART RELEASE	1/10/00 5/18/00