

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-5343-3036-68
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

Programmed Chip Summary

(Continued on Inside-Back Cover)

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
CRAM Controller	PLD	EP153A	CPU Board U28	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

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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 W4 W6	W1 W2 W5
	W9 W10 W11	W7 W8 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 W10 W11	W7 W8 W12
	W14	W13
Sound Board	W1 W9 W4 W15	W2 W13 W3 W14
	W5 W17 W7 W18 W8 W20	W6 W16 W10 W19 W11 W21
		W12



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ANARC

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.



- **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.

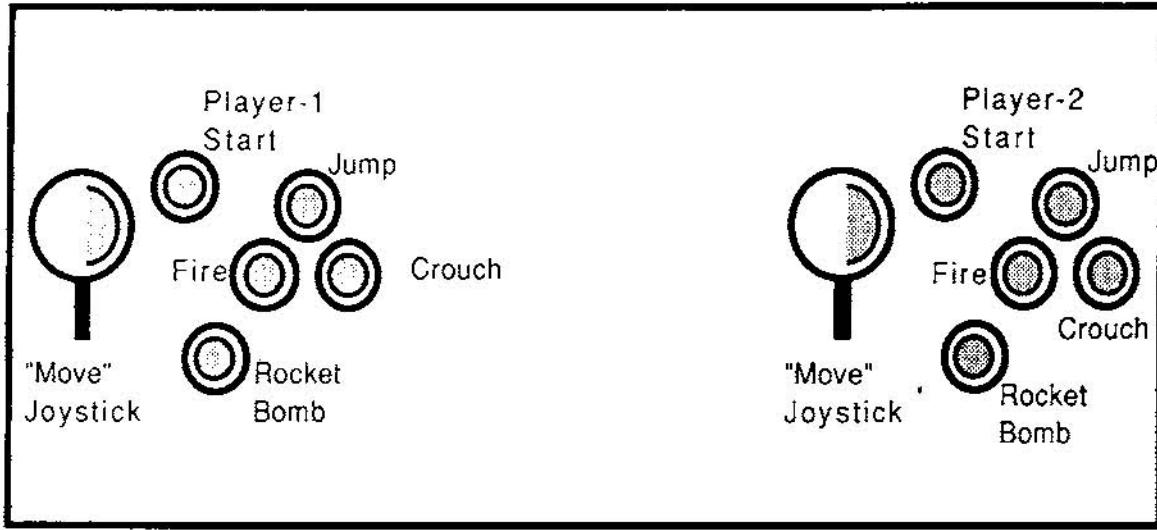
For a two-player game, at least two credits must be displayed. To initiate this two-player game, press the 2-PLAYER START button.

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, blocky font. The letters are slightly slanted and have a distressed, hand-drawn 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

WARC

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!

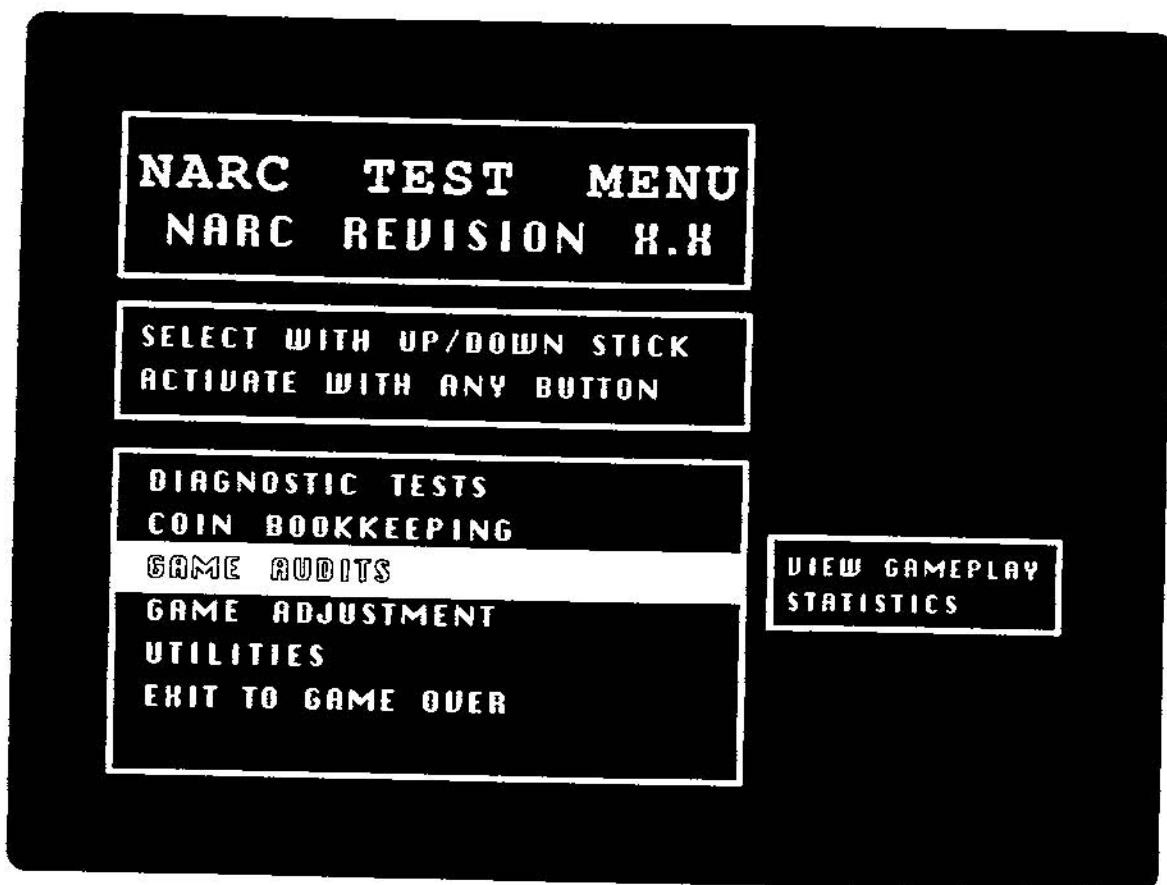
Game Adjustments, Bookkeeping, Diagnostics

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.

The logo consists of the letters "WARC" in a stylized, hand-drawn font. The "W" and "A" are connected, as are the "R" and "C". The letters are black and have a textured, ink-like appearance.



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.*

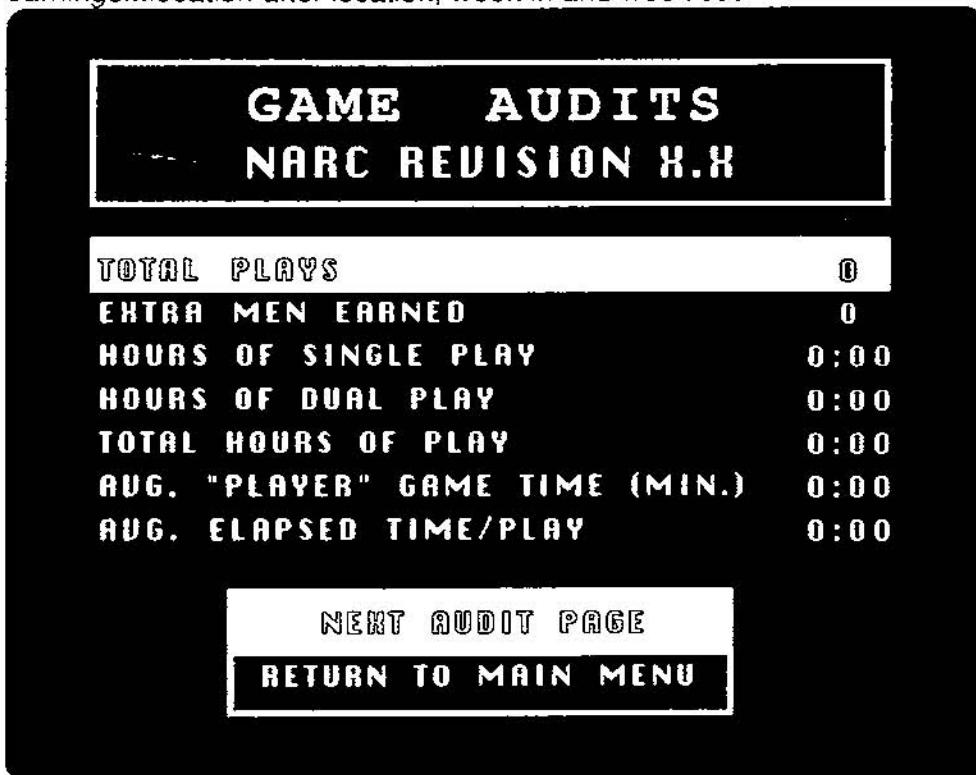
Pressing and holding ADVANCE also causes the game to exit from a menu.

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

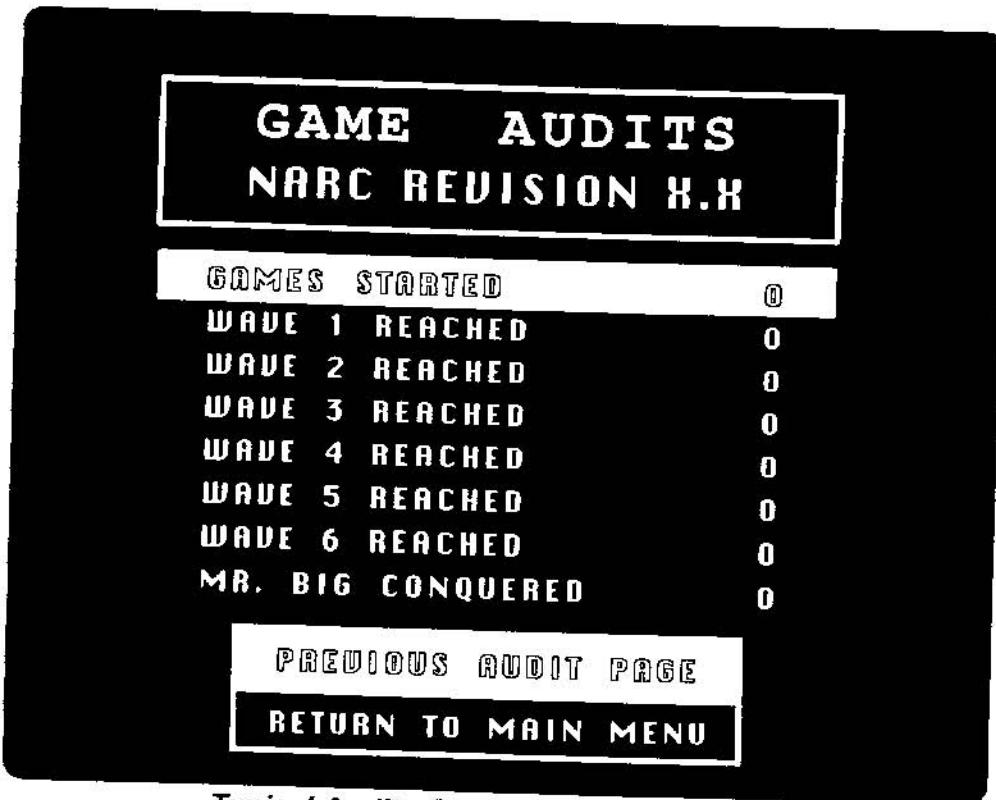
GAME AUDITS SHOW YOU AT A GLANCE if game settings are bringing you a satisfactory return on your investment! Only games by WILLIAMS ELECTRONICS have this menu-driven feature. Think of it as a unique way to keep your **NARC** game the *leader of the pack when it comes to earnings...location after location,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



Typical Audits Screen, Page 1

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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.



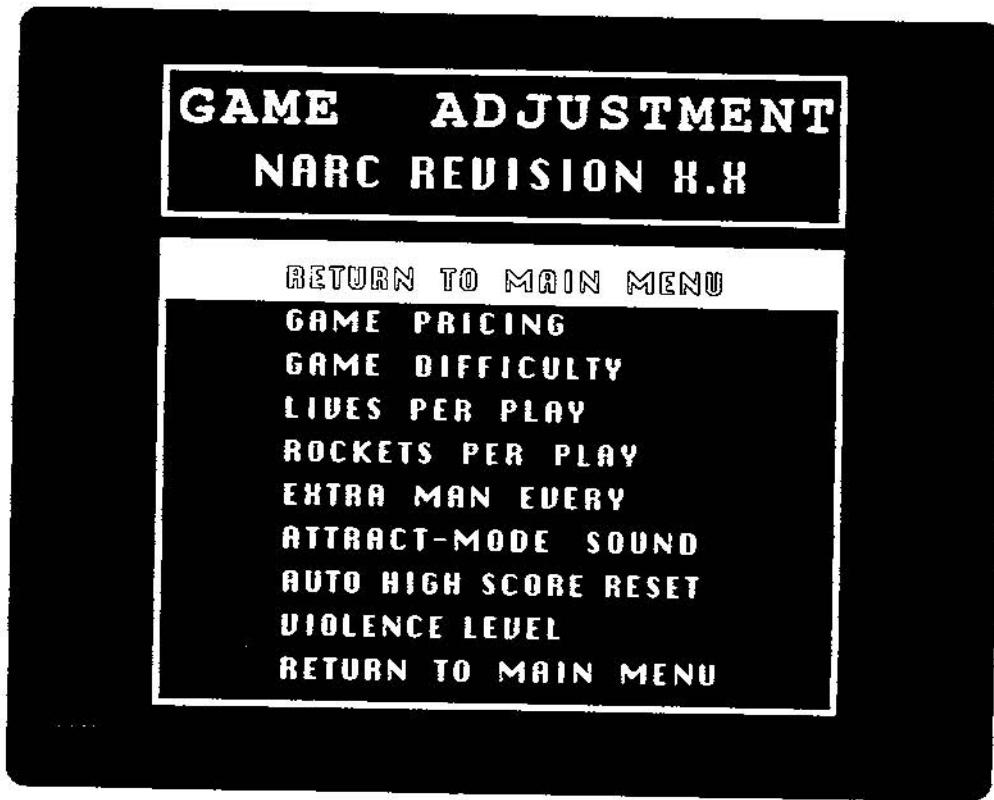
Typical Audits Screen, Page 2

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

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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.

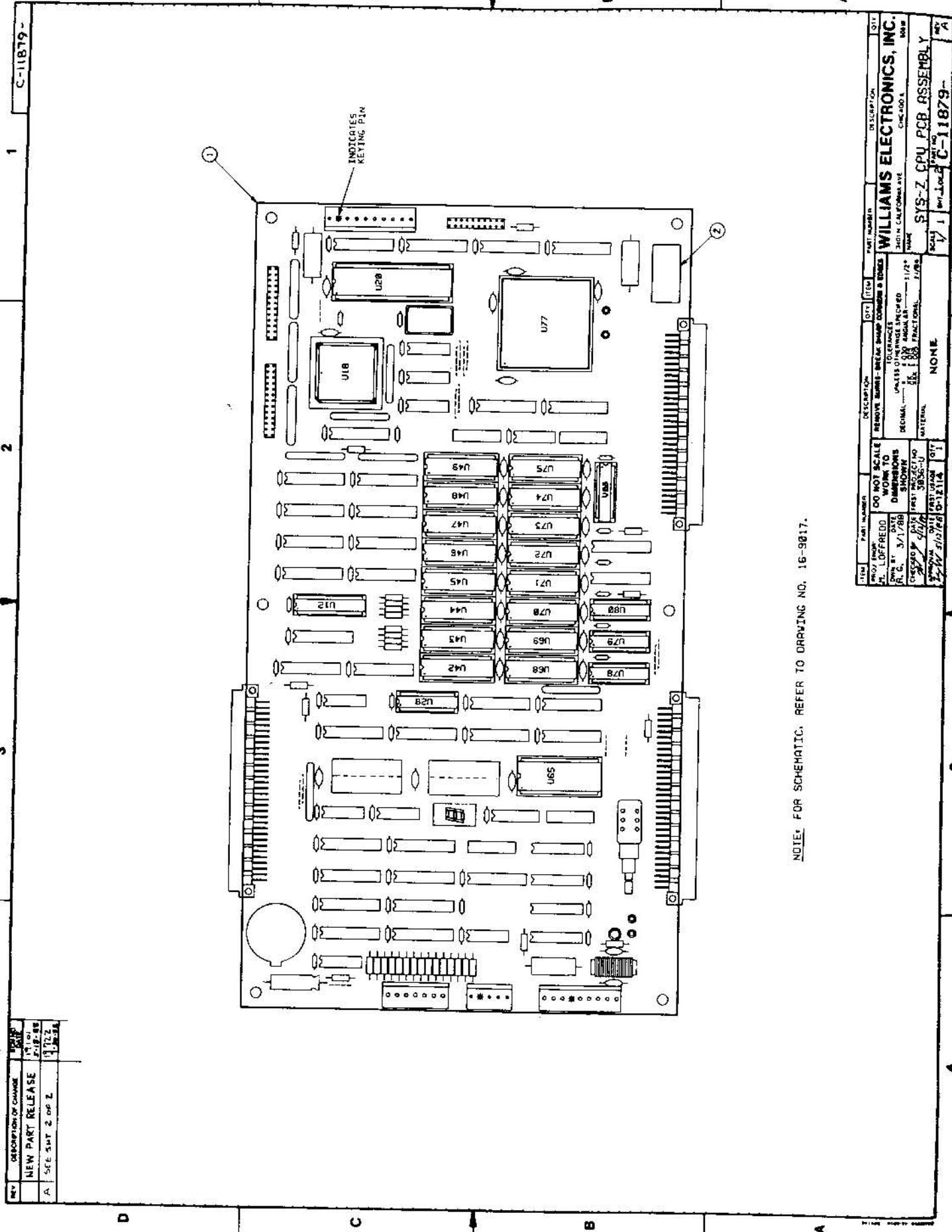
Here are some tailoring suggestions...

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.

NARC

REV:	DESCRIPTION OF CHANGE
	NEW PART RELEASE
A	SEE SHEET 2 OF 2 1-1879



ITEM	PART NUMBER	DESCRIPTION		QTY	FILE	PART NUMBER	DESCRIPTION
		PCB DESIGN	DO NOT SCALE				
1	WILLIAMS ELECTRONICS, INC. 301 N CALIFORNIA AVE CHICAGO, IL 60654	PRINTED CIRCUIT BOARD	DO NOT SCALE	1	16-9017	1	16-9017
2	WILLIAMS ELECTRONICS, INC. 301 N CALIFORNIA AVE CHICAGO, IL 60654	PRINTED CIRCUIT BOARD	DO NOT SCALE	1	16-9017	1	16-9017

Ref.	Description of change	Date
	NEW PART RELEASE	11-10-81
A	ITEMS WAS 1180-1181 ADDED ITEM 15	11-12-82

ITEM NUMBER	JUMPERS REMOVED	NONE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

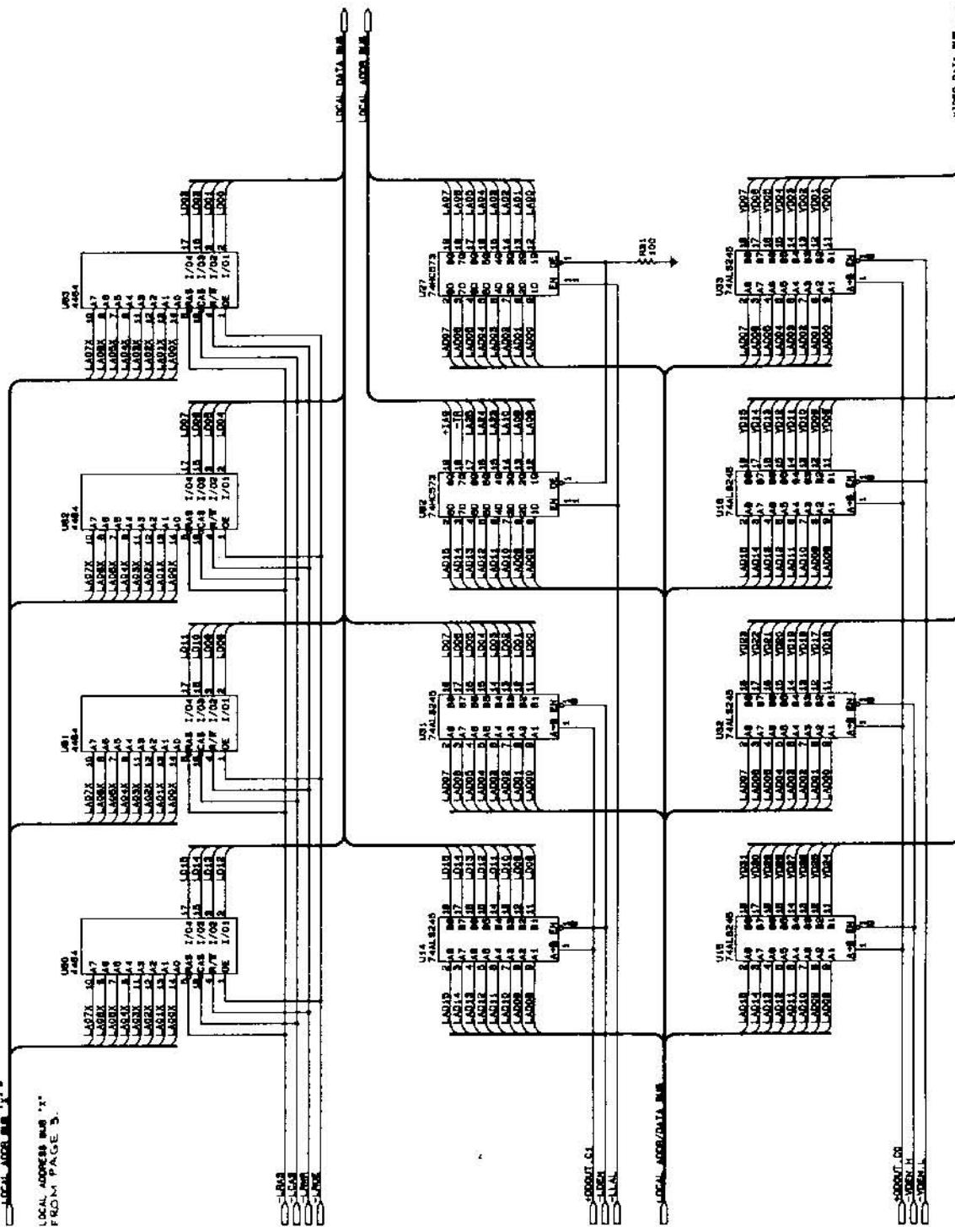
A		B		C		D	
10	SEE CHART	U83	IC, PLD-IMAGE	1			
9	SEE CHART	U12	IC, PLD-VIDEO	1			
B	SEE CHART	U20	IC, PLD-AUTOERASE	1			
7	5340-	U65	IC, RAM/S	1			
6	5340-	U42-U49	SS64 8Kx8				
6	12213-00	U6B-U15	IC, RAM/V	1G			
5		44C1	44Kx4				
15	5880-00	5V	BATTERY - LITHIUM				
14	SEE CHART	U28	IC, PLD-COLOR	1			
15	SEE CHART	U78	IC, PLD-LOCAL	1			
12	SEE CHART	U79	IC, PLD-VIDEO	1			
11	SEE CHART	U80	IC, PLD-ADDRESS	1			
TION	PART NO.	PRINT DESIGNATION	DESCRIPTION	QTY	PART NO.	PRINT DESIGNATION	QTY

BILL OF MATERIALS

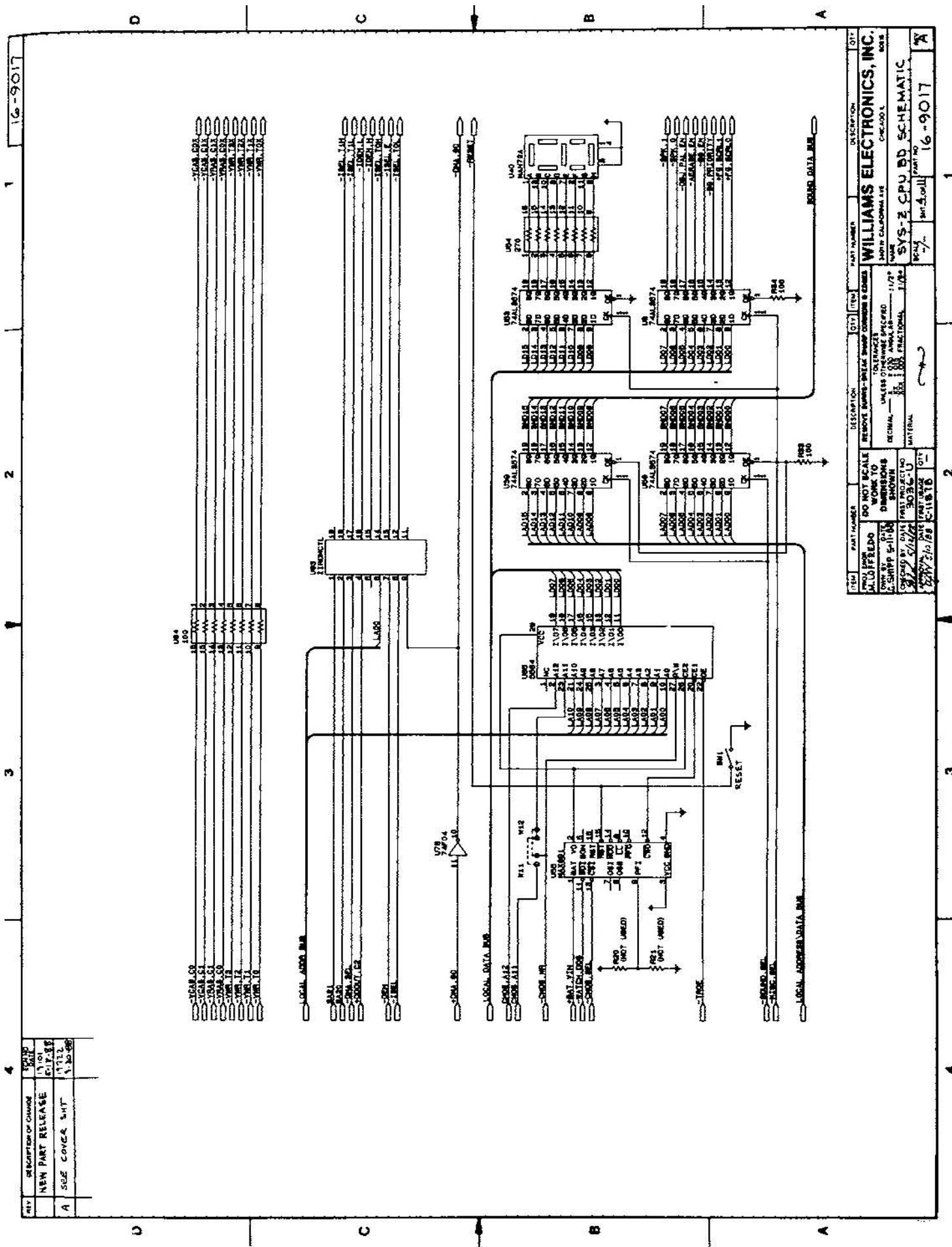
A		B		C		D	
NOTE: FOR SCHEMATIC. REFER TO DRAWING NO. 16-9817.		PROJECTION	DO NOT SCALE	REMOVE BARS - BREAK SHAPES	REMOVED	WILLIAMS ELECTRONICS, INC.	
		H. DEFERRED	WORK TO	TO ENTRANCE	TO ENTRANCE	CALIFORNIA AV.	
		Open at	DATE	OPEN	OPEN	LOS ANGELES	
		R.G.	4/25/82	OPEN	OPEN	1/24	
		CREATED BY	INITIALS	OPEN	OPEN	NAME	
		PRINTED BY	DATE	OPEN	OPEN	MATERIAL	
		W.D.H.	1-12-82	OPEN	OPEN	SCALE	
		D-1214	1	OPEN	OPEN	1/2"	

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	11/15/87
A	SEE COVER SHEET	11/17/87

NOTE: LOCAL ADDRESS BUS "Y" FROM PAGE 3.



ITEM	PART NUMBER	DESCRIPTION	QTY	PART NUMBER	DESCRIPTION	QTY
MATERIAL		DO NOT SCALE PRINT TO INCHES G-SHIPS & 1/16 IN. DESIGN DATE REVISED DATE MANUFACTURE DATE DRAWING SHEET NO. REV.	1	WILLIAMS ELECTRONICS, INC. 300 CALIFORNIA AVE NAME SY/S-Z CPU BD SCHEMATIC 1/17/87 C-11076	CHECKED REV'D 16-9017	1



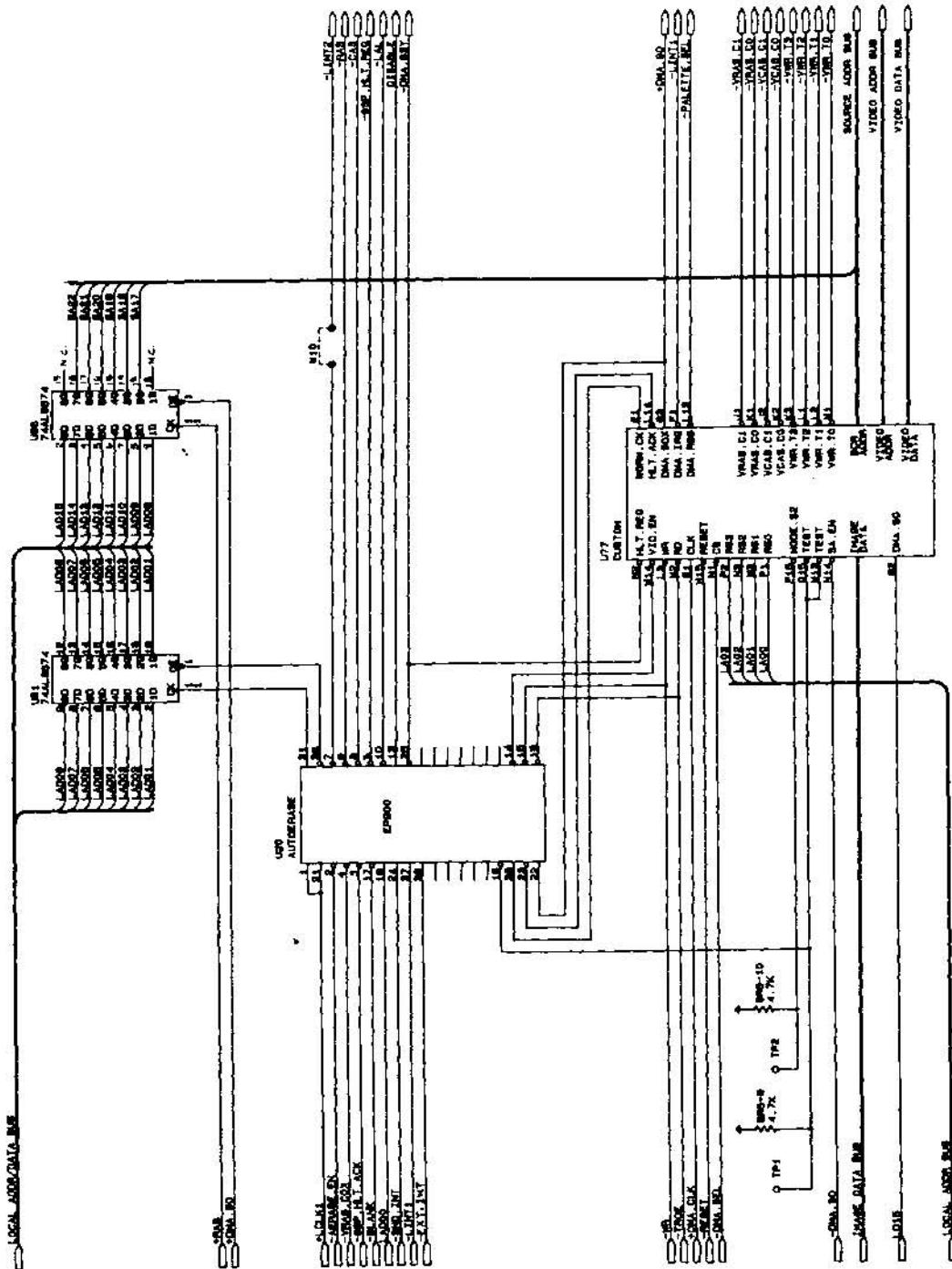
L101-91

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REF#	DESCRIPTION OR CHANGE	DATE
	NEW PAINT RELEASES	11/10/04
	SEE COVER SHEET	11/12/04
4		11/12/04



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2

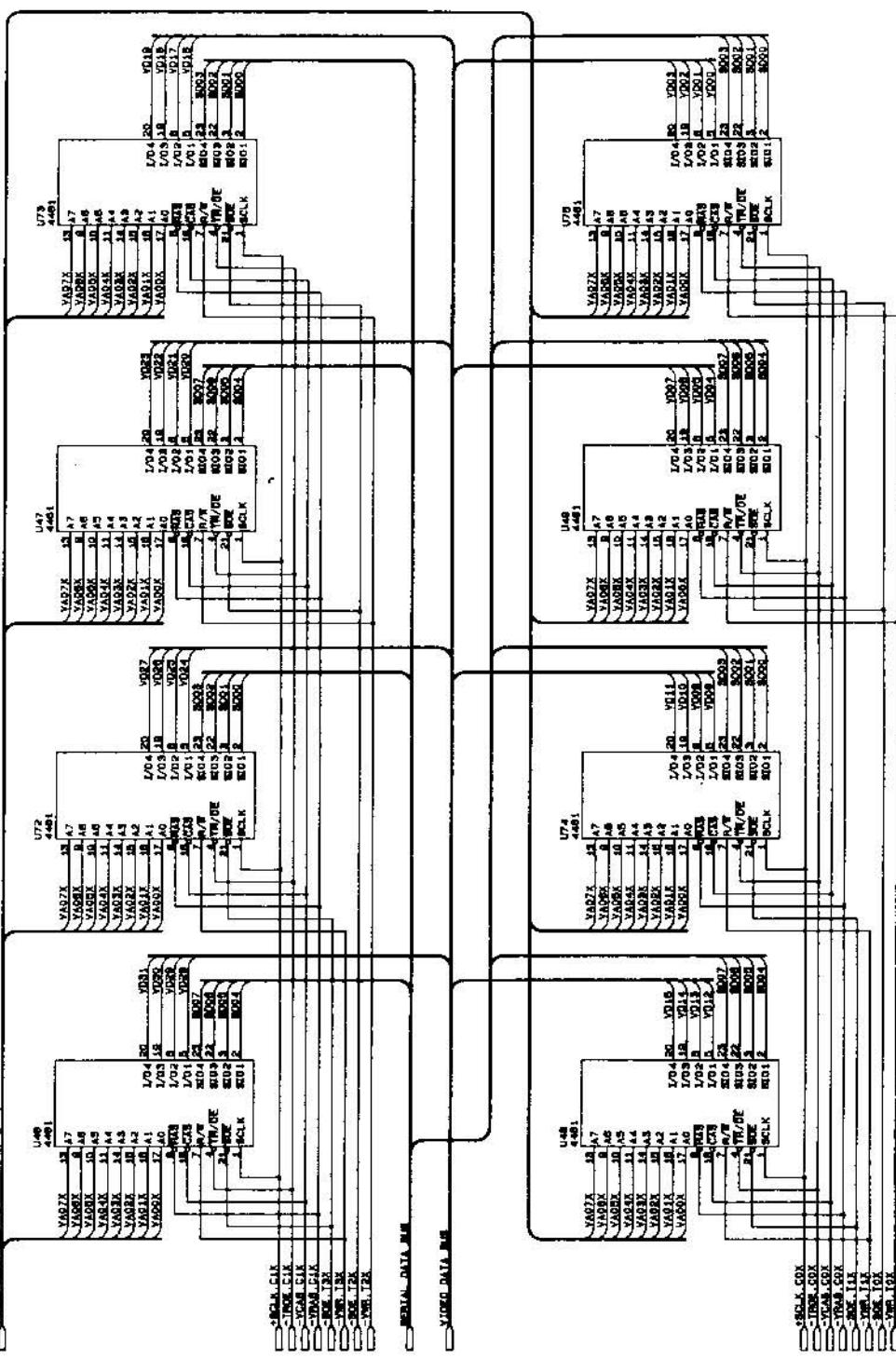
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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	1910 5-15-88
A	SEC COVER SHT	1722 5-30-88

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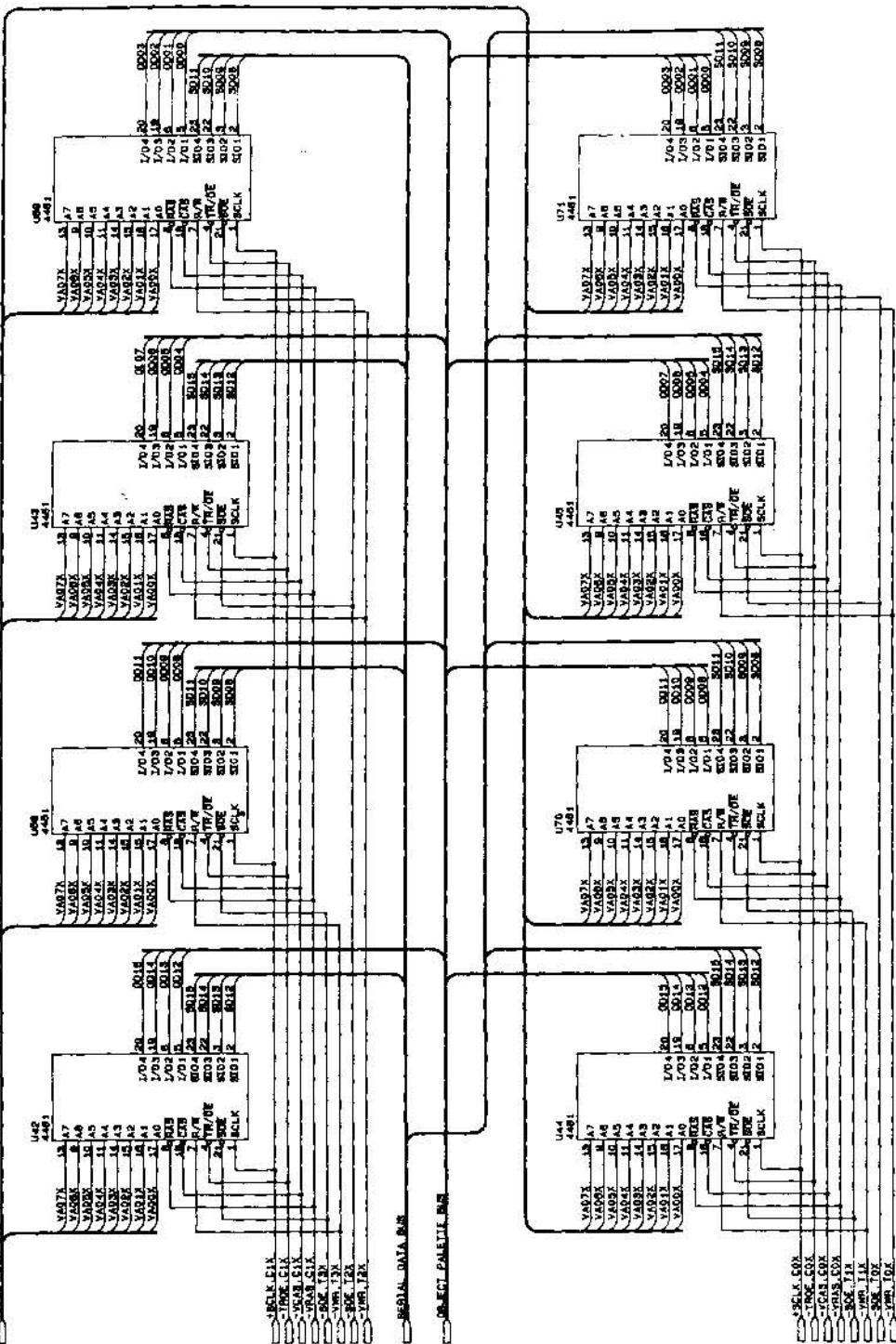
7

REV	DESCRIPTION OF CHANGE	EDITION
	NEW PART RELEASE	1914-68
A	SEE COVER SHET	1-12-68
		1-30-68

Digitized by srujanika@gmail.com

VIVID AND VAGUE

D
DRAFTS OF THE CONSTITUTION OF THE UNITED STATES



Yield
10%

ITEM	PART NUMBER	DESCRIPTION		DRAWING NO.
		DO NOT SCALE	REACTIVE BUSES - BREAK SHAPES	
PROJ. ENGR. NO. 8	WILLIAMS ELECTRONICS, INC.	TOOLROOMS		WILLIAMS
PROJ. MGR. J. F. LOBREDO	DO NOT DO WORK TO	UNLESS OTHERWISE SPECIFIED		NO. 1000
DATE 1-1-68	DIMENSIONS	DECIMAL	1/16" ANGULAR	1/16"
DRAWN BY D. H. GRIFFIN	SHOWN	MM	MM	MM
CHECKED BY D. H. GRIFFIN	NOT PROPORTIONAL	FRONTRAL		1/16"
APRIL 1968	3036-U	MATERIAL		

SYS-Z CPU BD SCHEMATIC

PART NO. 6-9017

1 16-9017

4 4

ITEM	DESCRIPTION OF PART	QTY	REF.
1	NEW PART RELEASE	1	16-9017
2	SOE COVER SHEET	1	16-9017

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3 3

4 4

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C C

B B

A A

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2 2

3 3

4 4

D D

C C

B B

A A

1 1

2 2

3 3

4 4

D D

C C

B B

A A

1 1

2 2

3 3

4 4

D D

C C

B B

A A

1 1

2 2

3 3

4 4

D D

C C

B B

A A

1 1

2 2

3 3

4 4

D D

C C

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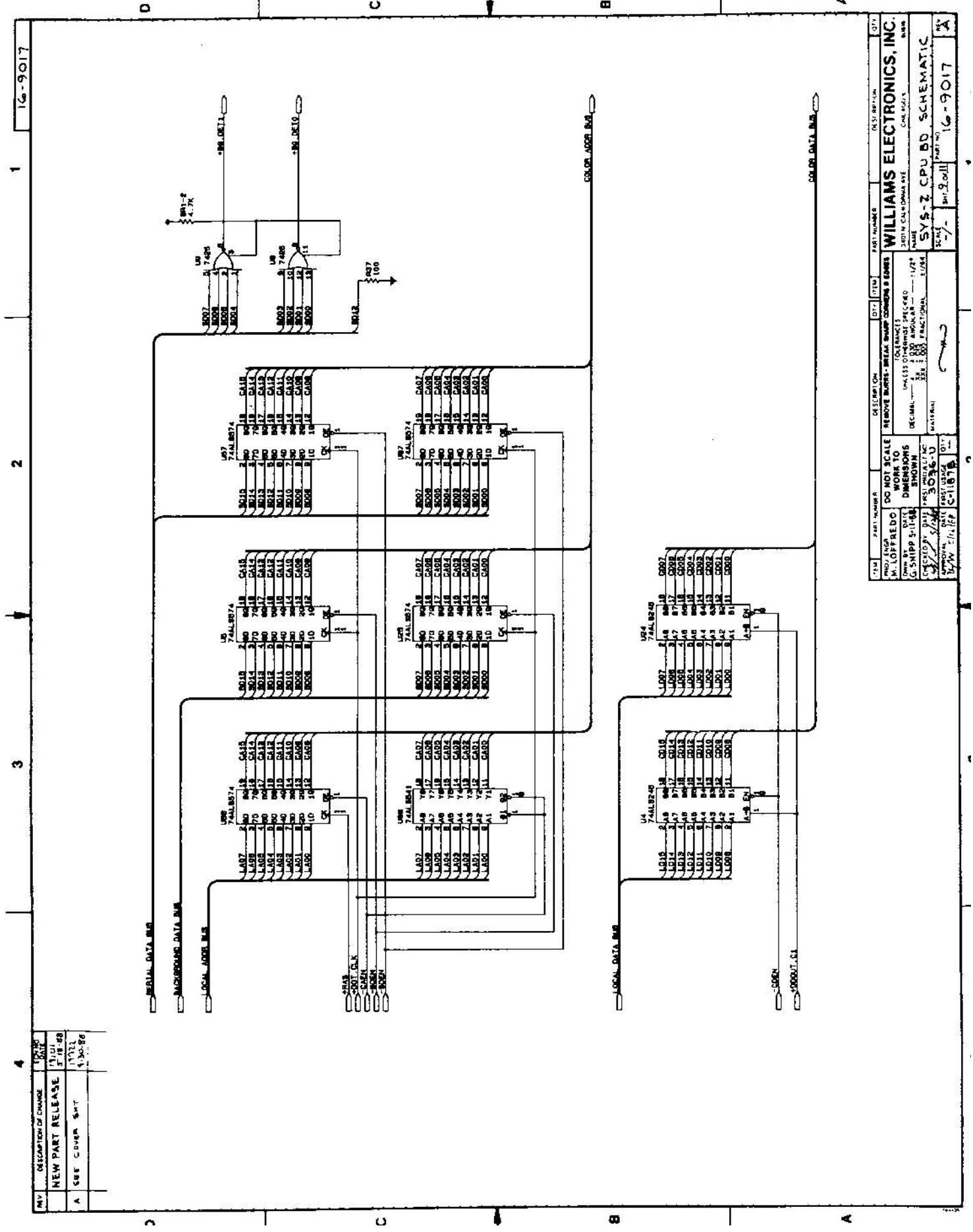
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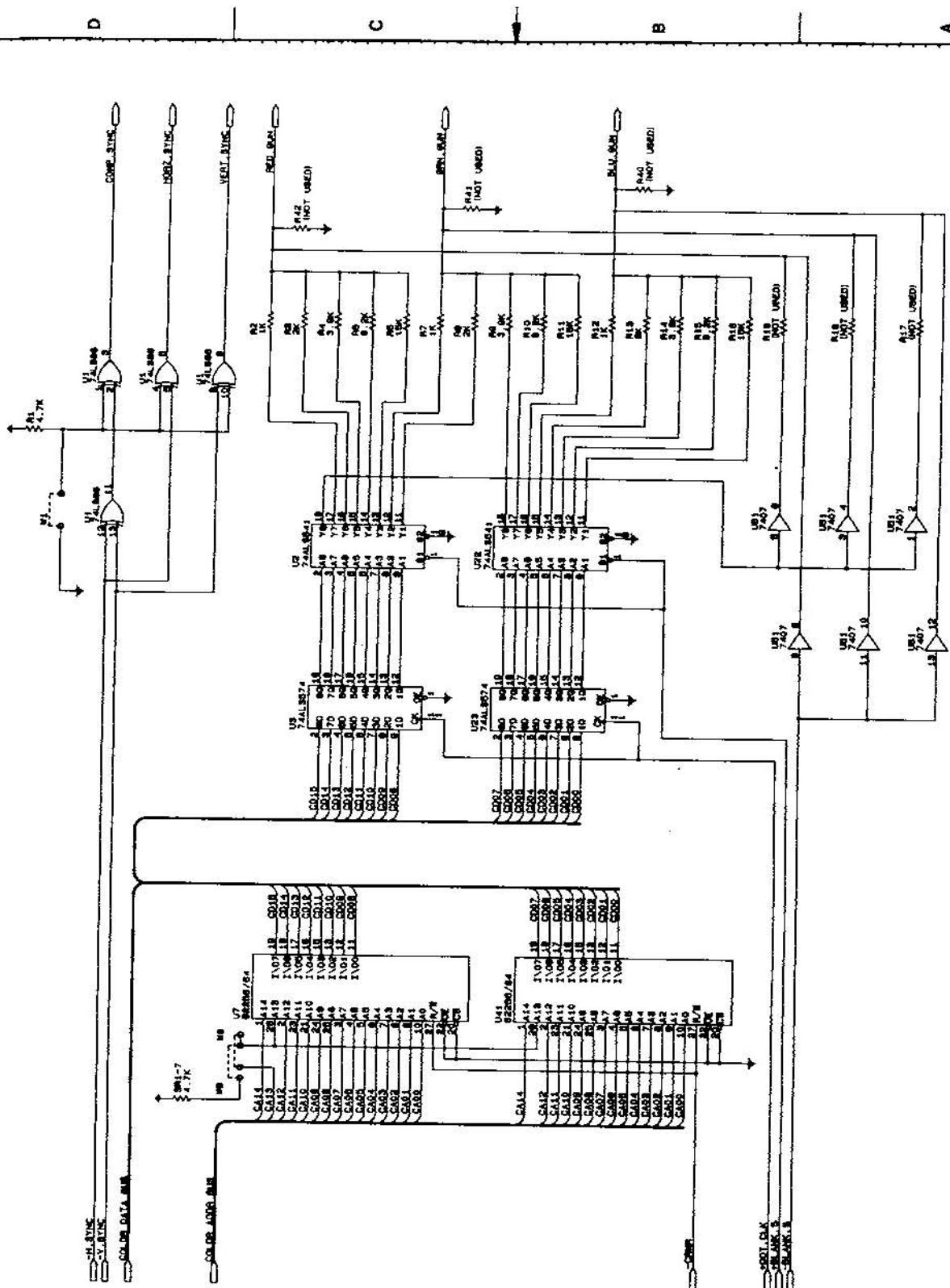
3 3

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REV	DESCRIPTION OF CHARGE	TYPE
	NEW PART RELEASE	110-1 5-18-68
	A SEE COVER SHEET	110-1 4-30-68



THE
HARVARD
LAW
REVIEW
Volume
XXVII
1904

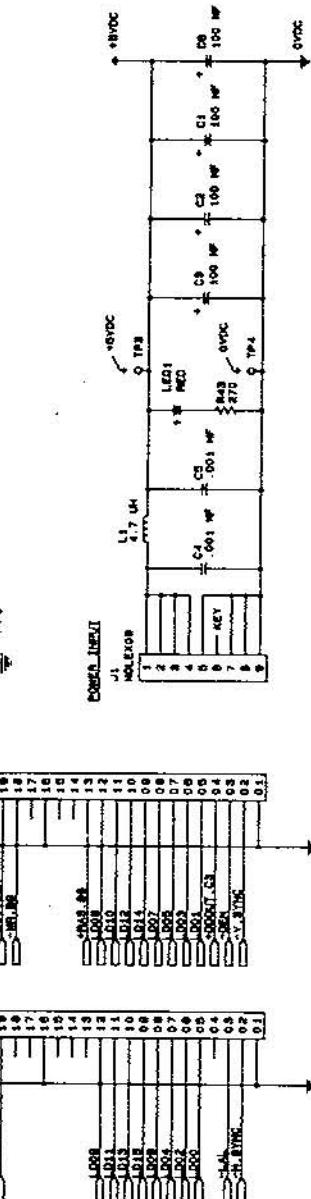
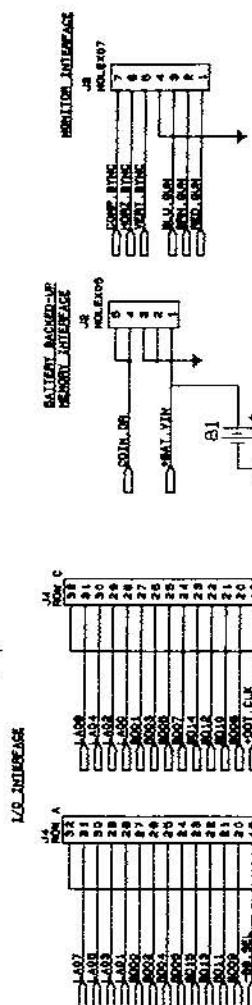
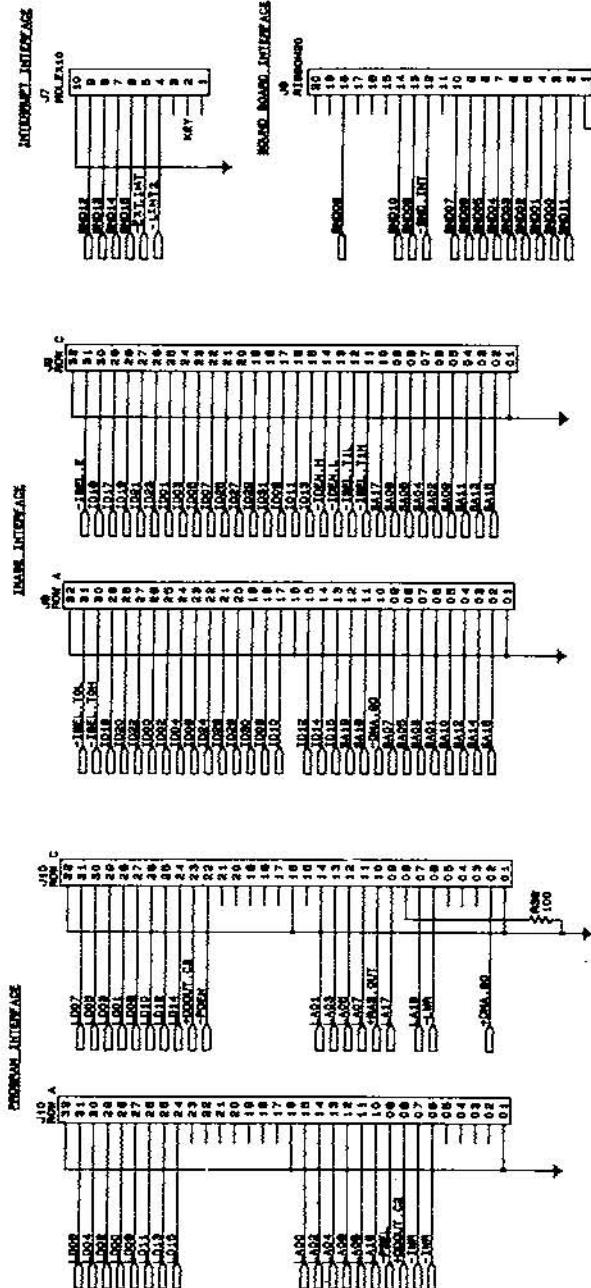
16-9017

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ITEM	DESCRIPTION OF CHANNEL	EXPIRED
	NEW PART RELEASE	11/01 5/18-87
A	SEE COVER SHT	1/12/86 4/10/86

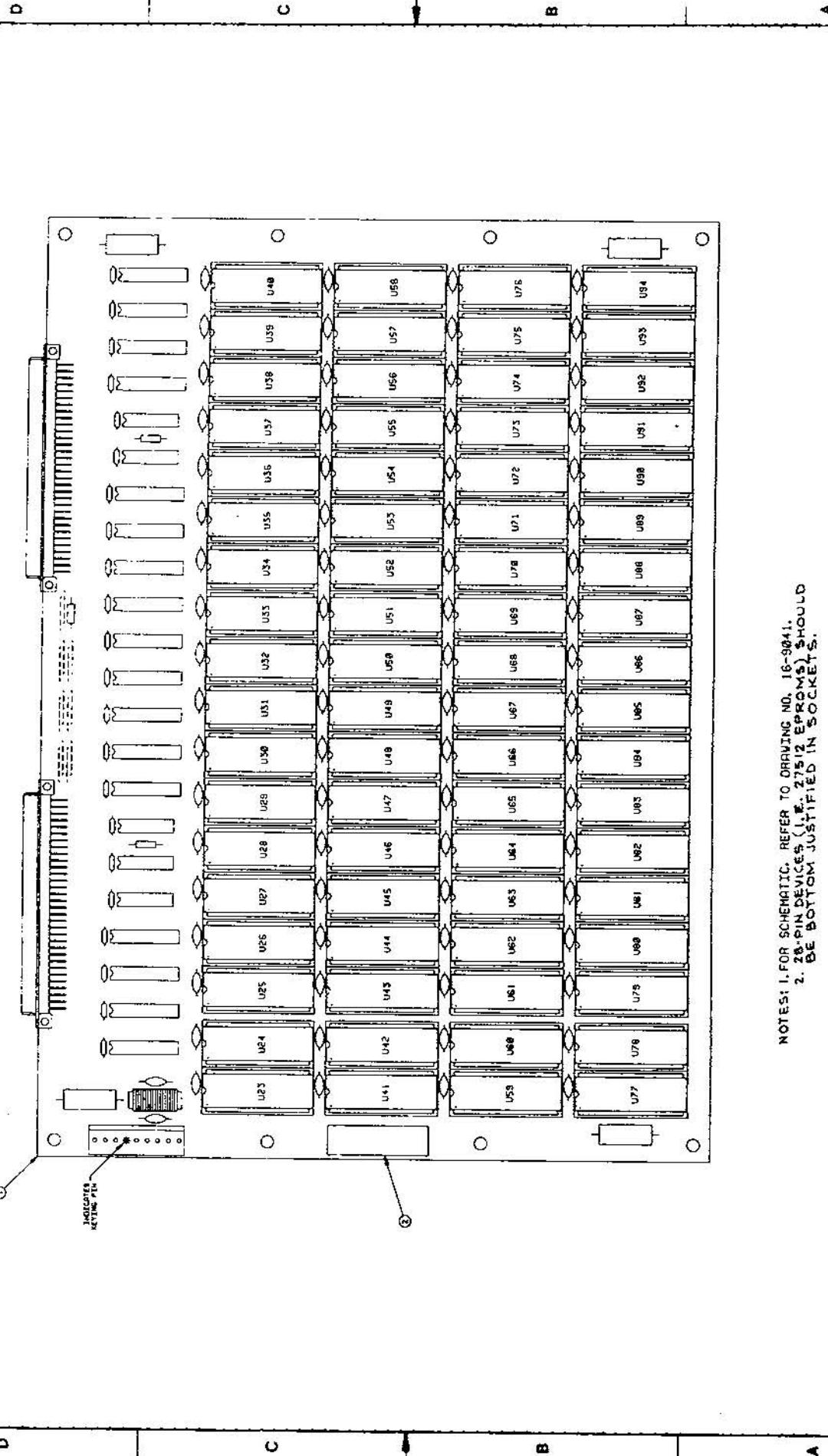


ENCLOSURE ON DRAWING
TOP SIDE
NEW PART RELEASE
DRAFT

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

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY	UNIT
PROJ. NO.	DO NOT SCALE	REMOVE BURN-IN LINEAR SAW CHIP C. SHIPP	1	PCB	DO NOT SCALE	REMOVE BURN-IN LINEAR SAW CHIP C. SHIPP	1	PCB
REF ID:	DO NOT SCALE	TO DRAWINGS UNLESS OTHERWISE SPECIFIED	1	PCB	DO NOT SCALE	TO DRAWINGS UNLESS OTHERWISE SPECIFIED	1	PCB
DATE 6/17/88	DIM.	INCHES	1/16"	INCHES	INCHES	INCHES	1/16"	INCHES
RELEASER	OFFICIAL	1/16"	1/16"	1/16"	OFFICIAL	1/16"	1/16"	1/16"
RELEASER	PRINTED	1/16"	1/16"	1/16"	PRINTED	1/16"	1/16"	1/16"
RELEASER	NO. 1000	1/16"	1/16"	1/16"	NO. 1000	1/16"	1/16"	1/16"
RELEASER	FRONT	1/16"	1/16"	1/16"	FRONT	1/16"	1/16"	1/16"
RELEASER	BACK	1/16"	1/16"	1/16"	BACK	1/16"	1/16"	1/16"

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	1	WILLIAMS ELECTRONICS, INC.	1	PCB	1	1	WILLIAMS ELECTRONICS, INC.	1	PCB
2	1	1	1	PCB	2	1	1	1	PCB
3	1	1	1	PCB	3	1	1	1	PCB

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	1	SYS-Z ROM-2 PCB ASSEMBLY	1	PCB	1	1	SYS-Z ROM-2 PCB ASSEMBLY	1	PCB
2	1	1	1	PCB	2	1	1	1	PCB
3	1	1	1	PCB	3	1	1	1	PCB

REF.	DESCRIPTION OF CHANGE
1000	NEW PART RELEASE
1	1-2-81

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1 C-12260-

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PART NUMBER		PART NUMBER	
P-A01 DESIGNATION		P-A01 DESIGNATION	
U23			
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U25			
U26			
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U76			

PART NUMBER		PART NUMBER	
P-A01 DESIGNATION		P-A01 DESIGNATION	
U77			
U78			
U79			
U80			
U81			
U82			
U83			
U84			
U85			
U86			
U87			
U88			
U89			
U90			
U91			
U92			
U93			
U94			

PART NUMBER		PART NUMBER	
P-A01 DESIGNATION		P-A01 DESIGNATION	
ITEM	PART NO.	PART NO.	PART DESCRIPTION
1	C-12281	C-12281	SEE CHART
2	18-48000-210	18-48000-210	SEE CHART
3	C-12281	C-12281	SEE CHART
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NOTE: FOR SCHEMATIC. REFER TO DRAWING NO. 10-B01

ITEM NO.	REF ID:	DESCRIPTION	QTY
1	G-2480	SYNTHETIC DIAMOND	1
2	18-48000-210	SYNTHETIC DIAMOND	1
3	C-12281	SYNTHETIC DIAMOND	1
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WILLIAMS ELECTRONICS, INC.

C-12260

PCB ASSEMBLY

SYNTHETIC DIAMOND

C-12260

BILL OF MATERIALS

DO NOT SCALE

PRINTED DIMENSIONS

IN INCHES

MM

UNLESS OTHERWISE SPECIFIED

INCHES

MM

1/16"

1.58mm

1/16"

1.58mm

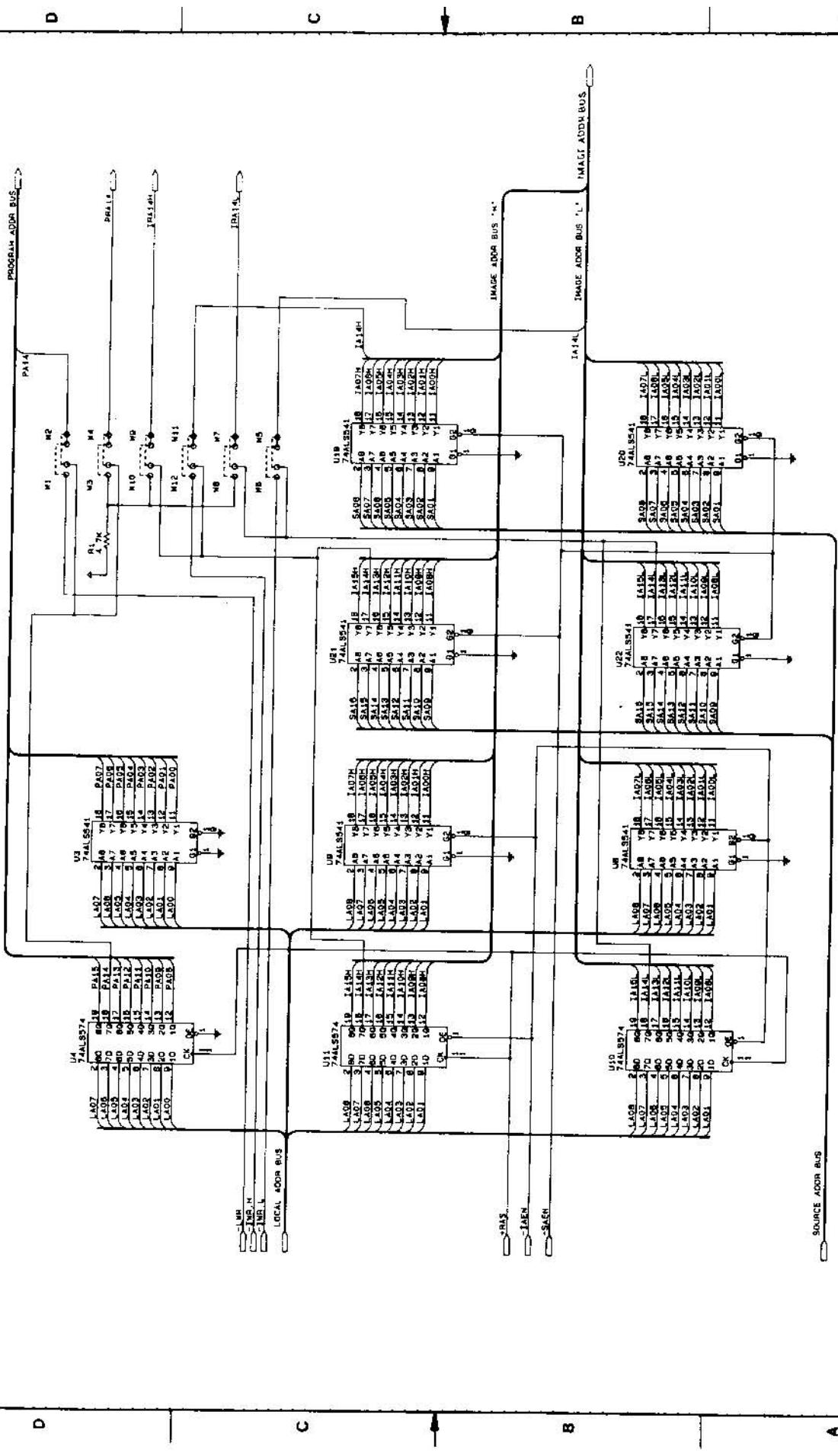
1/16"

1.58mm

1/16"

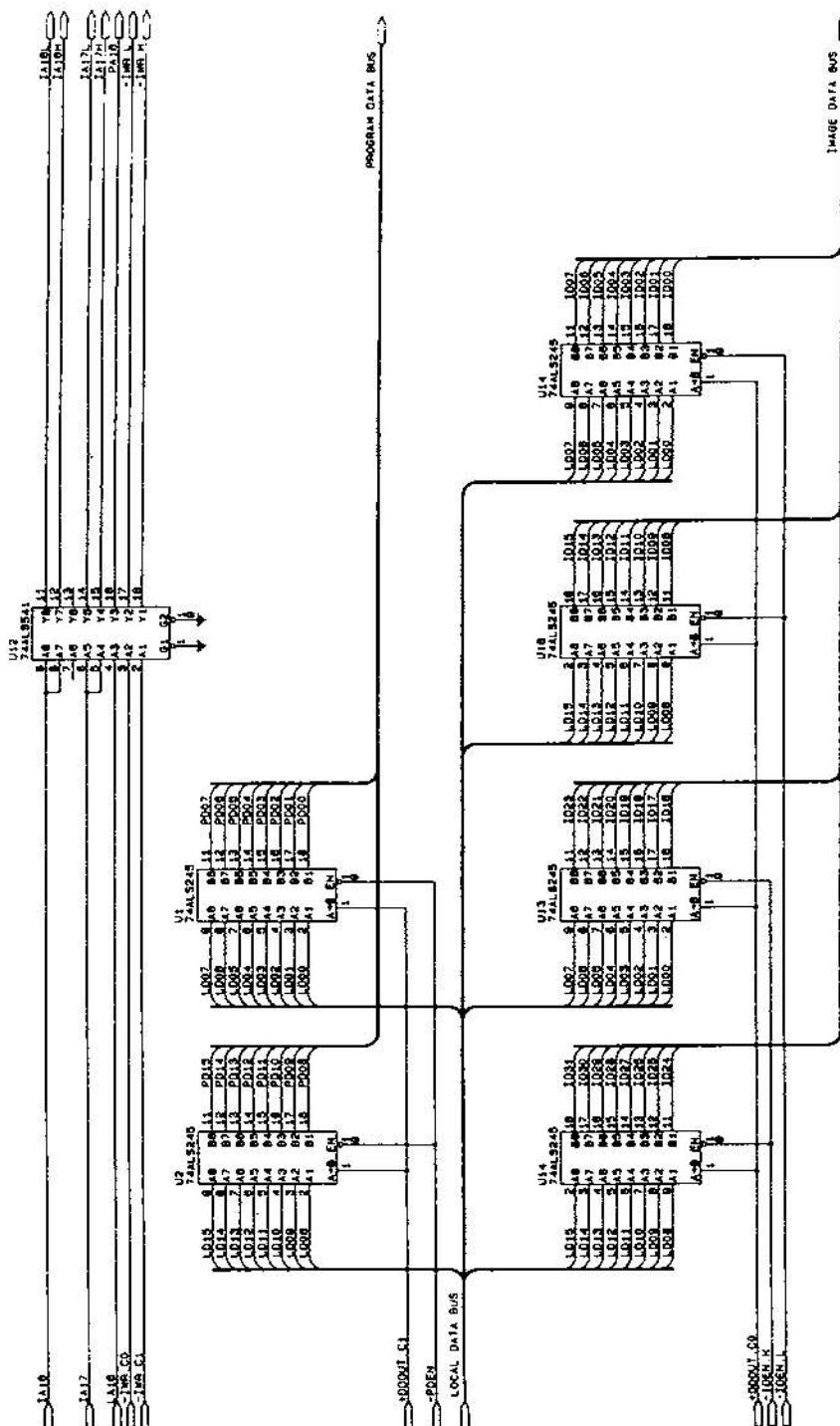
1.58mm

REV A



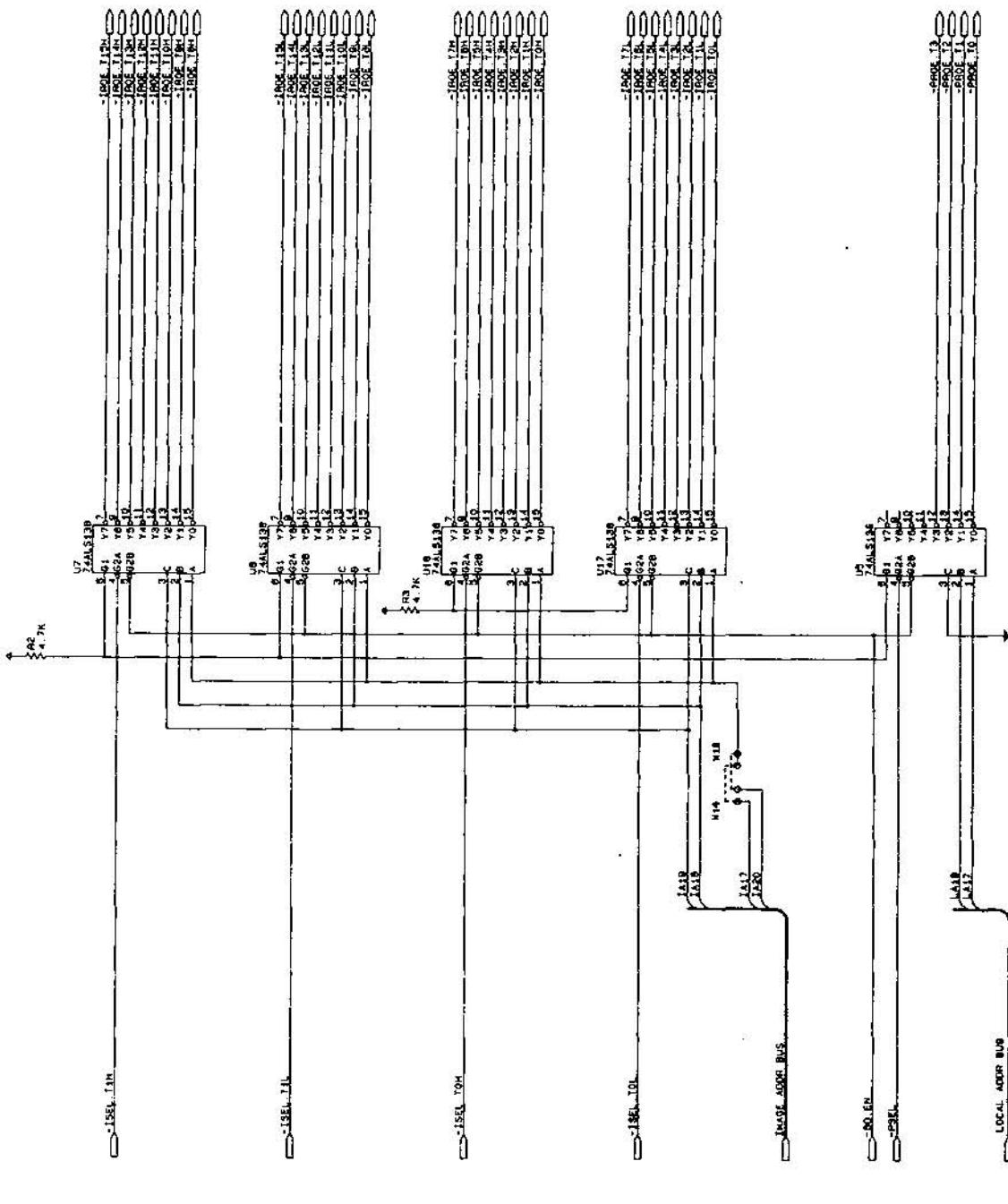
ITEM	PLATE NUMBER	DESCRIPTION	QTY	ITEM	PLATE NUMBER	DESCRIPTION	QTY
PRO. ENGR.	WILLIAMS	DO NOT SCALE	1	PRO. ENGR.	WILLIAMS	BRIDGE BUMPS - WELD, SINTER, COATING & LUBRIC.	1
PRO. S.H.P.	WILLIAMS	WORK TO SCALE	1	PRO. S.H.P.	WILLIAMS	TOLERANCE	1
DRAWN BY	WILLIAMS	DIMENSIONS	1	DRAWN BY	WILLIAMS	UNLESS OTHERWISE SPECIFIED	1
G.C. - DATA	WILLIAMS	SHOWNS	1	G.C. - DATA	WILLIAMS	DECIMAL	1/16
SPEC'D BY	WILLIAMS	PRODUCED NO	1	SPEC'D BY	WILLIAMS	ANGLE IN DEGREES	1/2°
REVIEWED BY	WILLIAMS	PRODUCED NO	1	REVIEWED BY	WILLIAMS	ANGLE IN RADIANS	0.02618
APPROVED BY	WILLIAMS	PRODUCED NO	1	APPROVED BY	WILLIAMS	FRACTIONAL	1/64
DATE	WILLIAMS	MATERIAL	1	DATE	WILLIAMS	INCHES	-
7-24-65	WILLIAMS	FT	-	7-24-65	WILLIAMS	MM	-
C-12-61	WILLIAMS	YARD	-	C-12-61	WILLIAMS	CM	-
07	WILLIAMS	INCHES	-	07	WILLIAMS	MICRONS	-
0.02618	WILLIAMS	MM	-	0.02618	WILLIAMS	MM	-
0.02618	WILLIAMS	CM	-	0.02618	WILLIAMS	CM	-
0.02618	WILLIAMS	MICRONS	-	0.02618	WILLIAMS	MICRONS	-

REV	DEPARTMENT OF CHARGE	TYPE DATE
	NEW PART RELEASE	1-1-01



RELEASE DATE
8-15-94

16 - 9041



THE JOURNAL OF CLIMATE

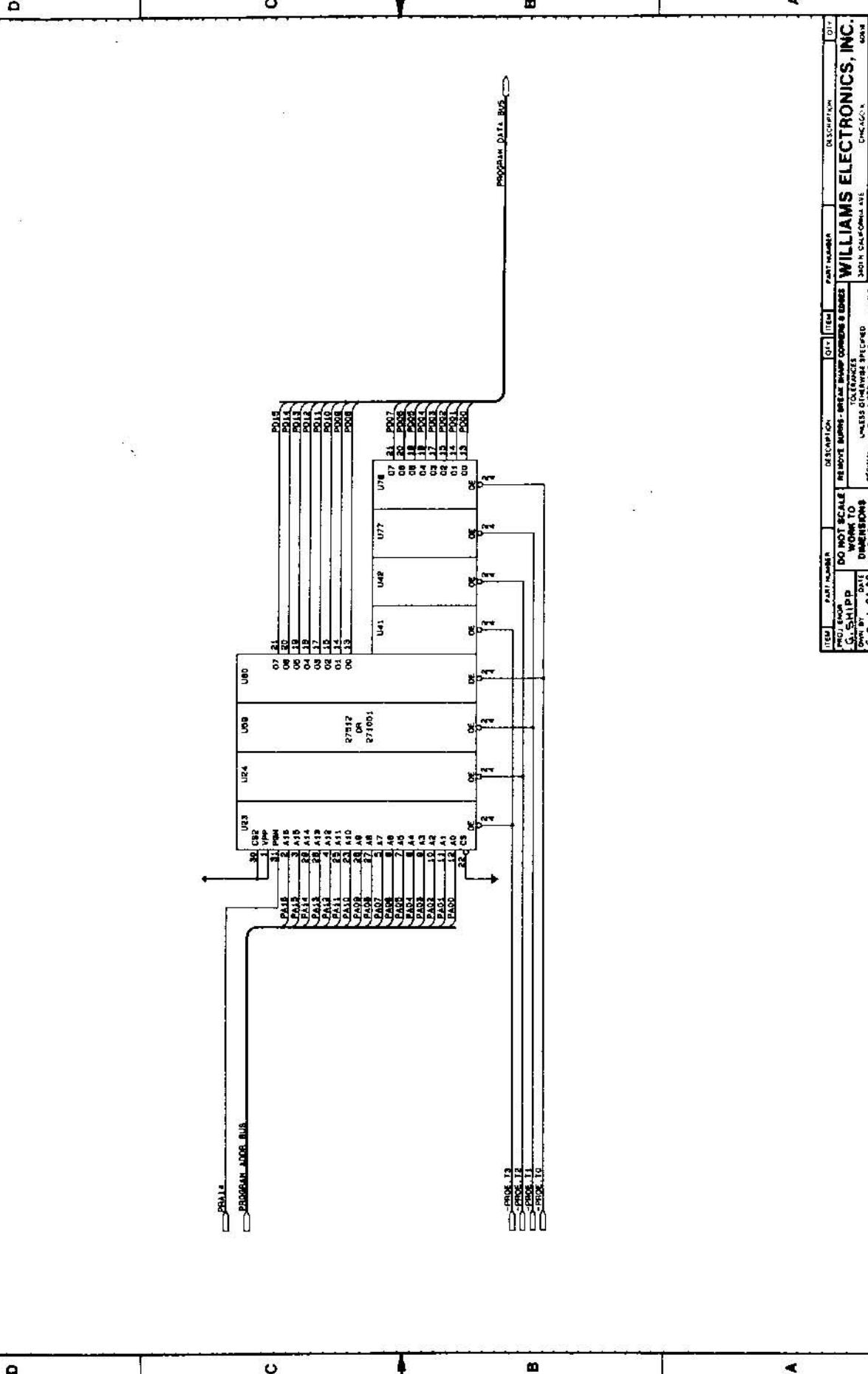
REV	DESCRIPTION OF OWNER	U.P.C.
	NEW PART RELEASE	W411 State

1 16-9041

2

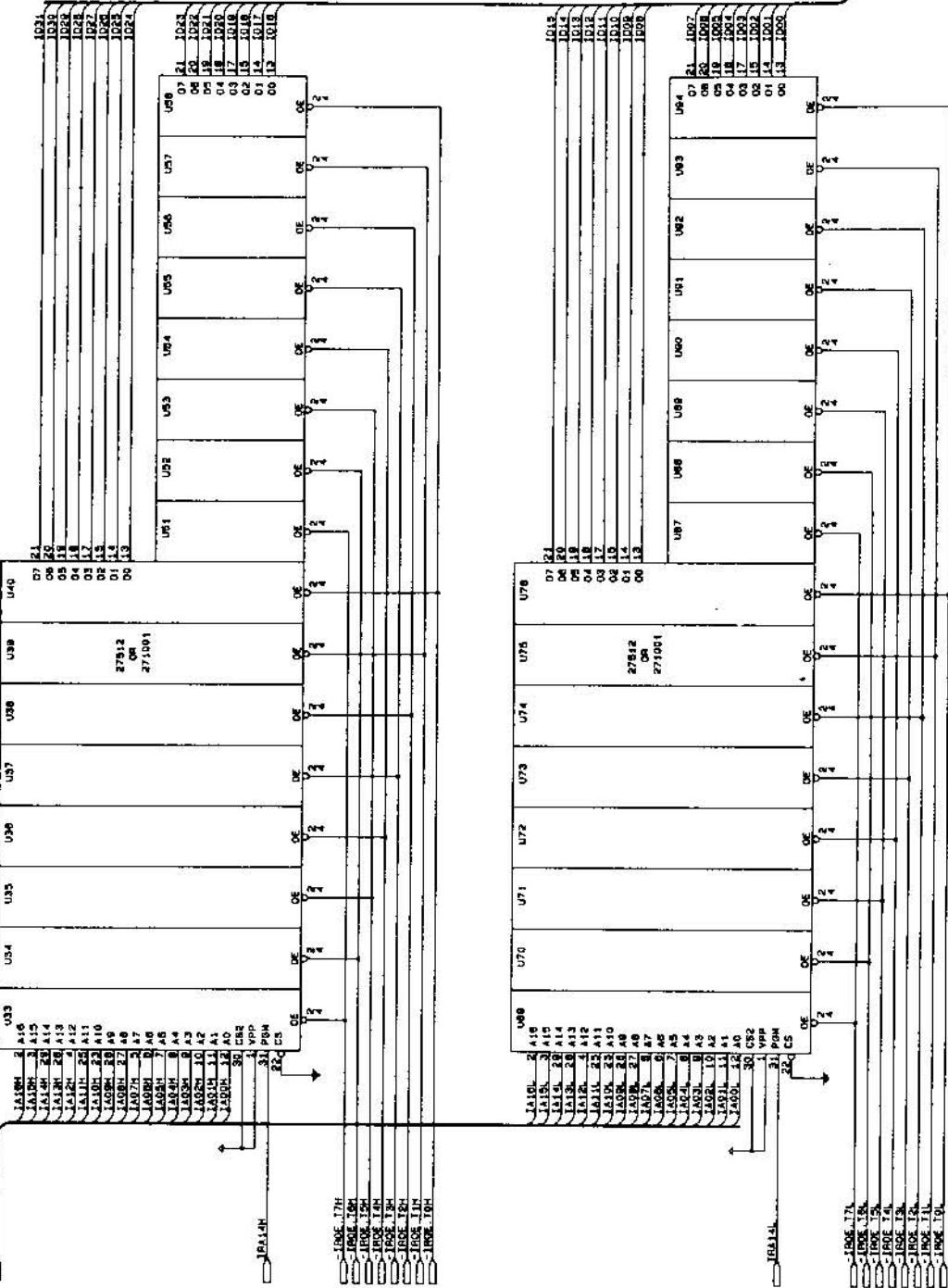
3

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ART.	DESCRIPTION OF CHANGE	CHARGE
	NEW PART RELEASE	\$10.00

IMAGE ACCOUNTS



5

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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	1-17-97

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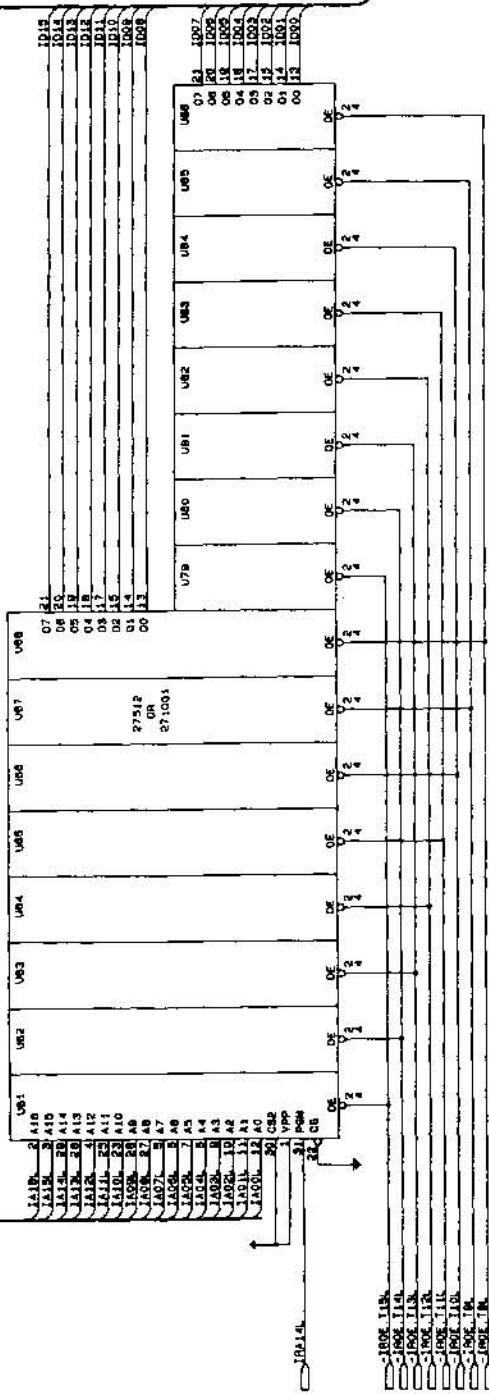
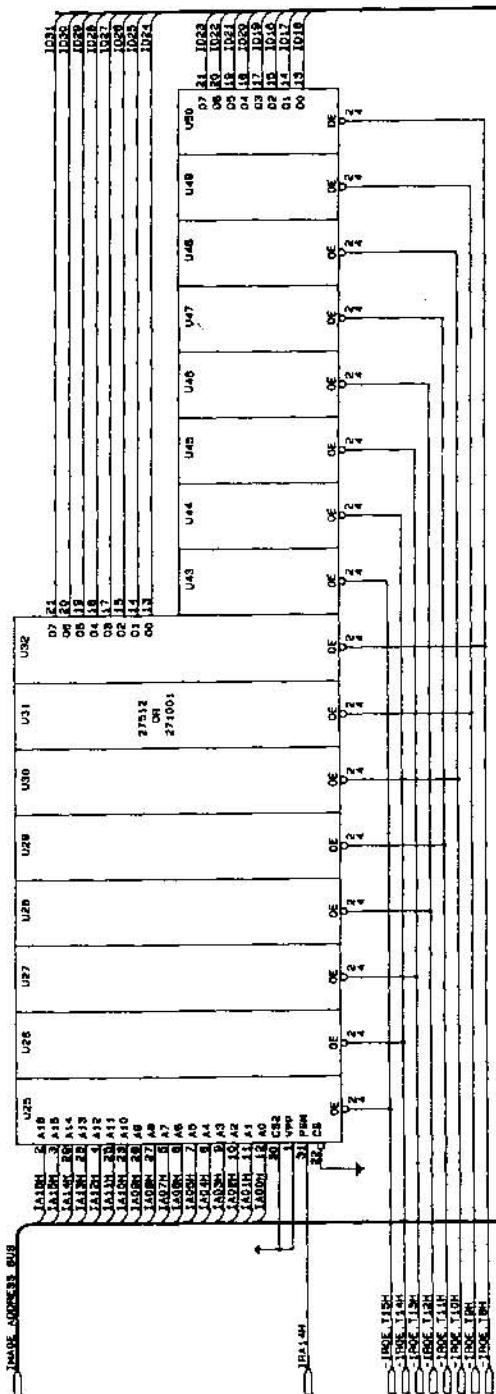
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Image Addressing

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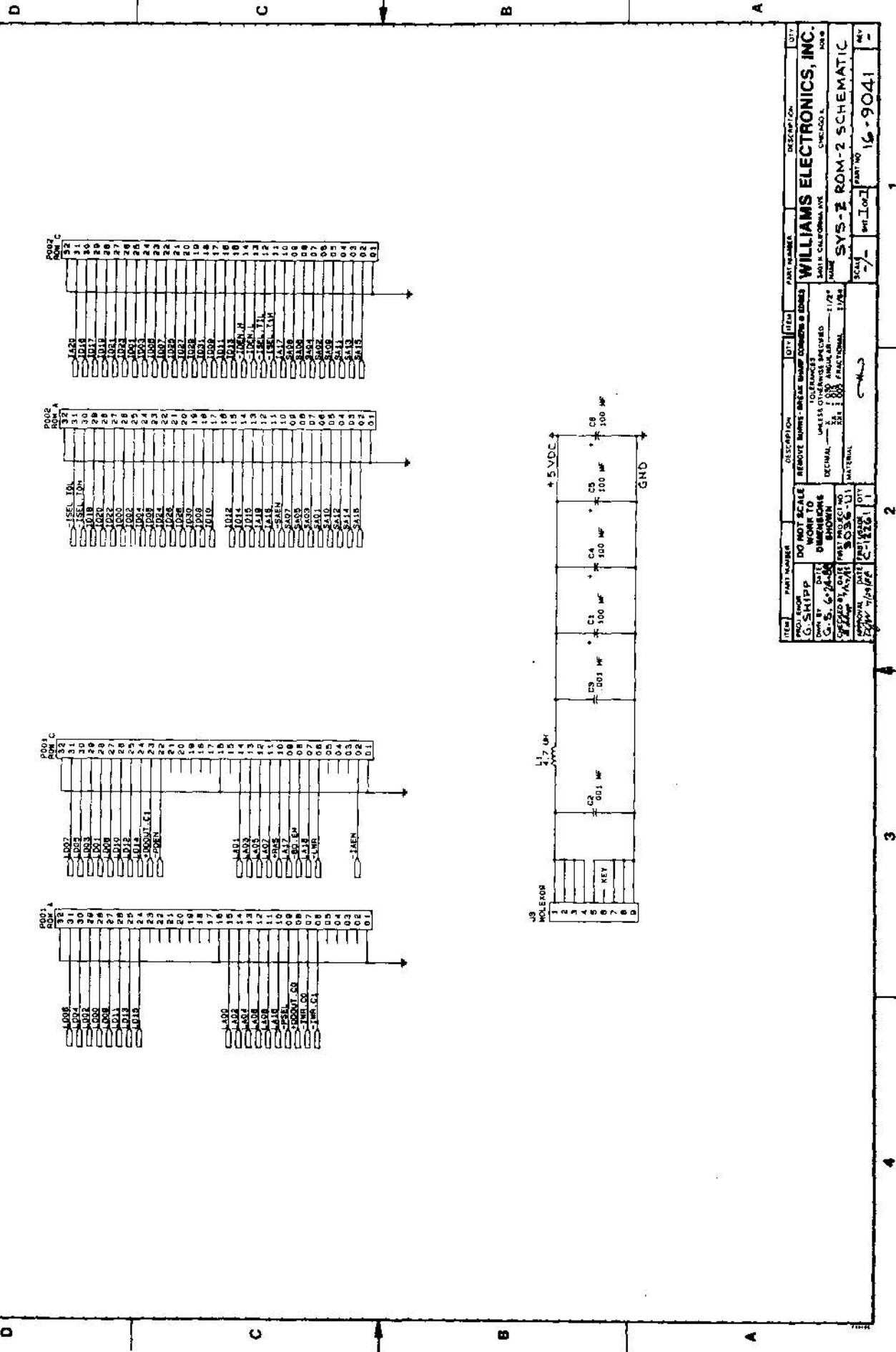
2

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ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	WLM-1000	DO NOT SCALE FRONTAGE SURFACE - BREAD BOARD COMBINING 8 BUSES	1	2	WILLIAMS ELECTRONICS, INC.		1
2	G-SH1000	TOLERANCES UNLESS OTHERWISE SPECIFIED	1	3	CHICAGO 8 2101 CALIFORNIA AVE		1
3	D-1000	DECIMAL DIMENSIONS SHOWN IN INCHES	1	4	1000-1000-1000-1000	1/16"	1
4	G-S-624-008	TEST PROJECT NO. 1000-1000-1000-1000	1	5	1000-1000-1000-1000	FRAC-TOTAL	1/164
5	71000-0000	PROJECT NO. 1000-1000-1000-1000	1	6	1000-1000-1000-1000	MATERIAL	1
6	DATA	DATA	1	7	DATA	DATA	1
7	DATA	DATA	1	8	DATA	DATA	1

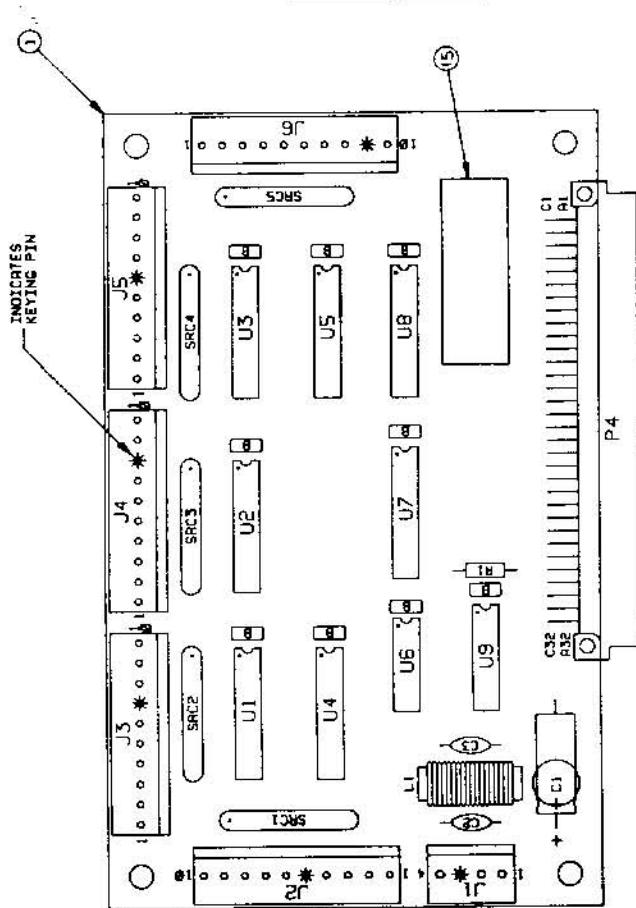
REV
DEPARTMENT OF CHARGE
NEW PART RELEASE
5-10-71



Part	Description of Component	Value
NEW Part Release	42-0000	

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



REF ID	QTY	DESCR.	VAL	NOTES
IS	16-8850	LABEL, PCB IDENT.		
14	5792-00	P4		
13	5791-10	J2, J5, J6		
12	5791-04	J1		
11	5043-00	C2, C3		
10	5040-00	C1		
9	5043-00	B		
8	5040-00	R1		
7	5050-00	SCR1, SCR2, SCR3, SCR4, SCR5		
6	5551-00	L1		
5	10048-00	U9		
4	122008-00	U7, U8		
3	5511-00	U6		
2	12287-00	U1, U2, U3, U4, U5		
1	5279-00	BARE PCB BOARD		
ITEM	PRINT NO.	PRINT DESCRIPTION	ITEM	PRINT DESCRIPTION

BILL OF MATERIALS

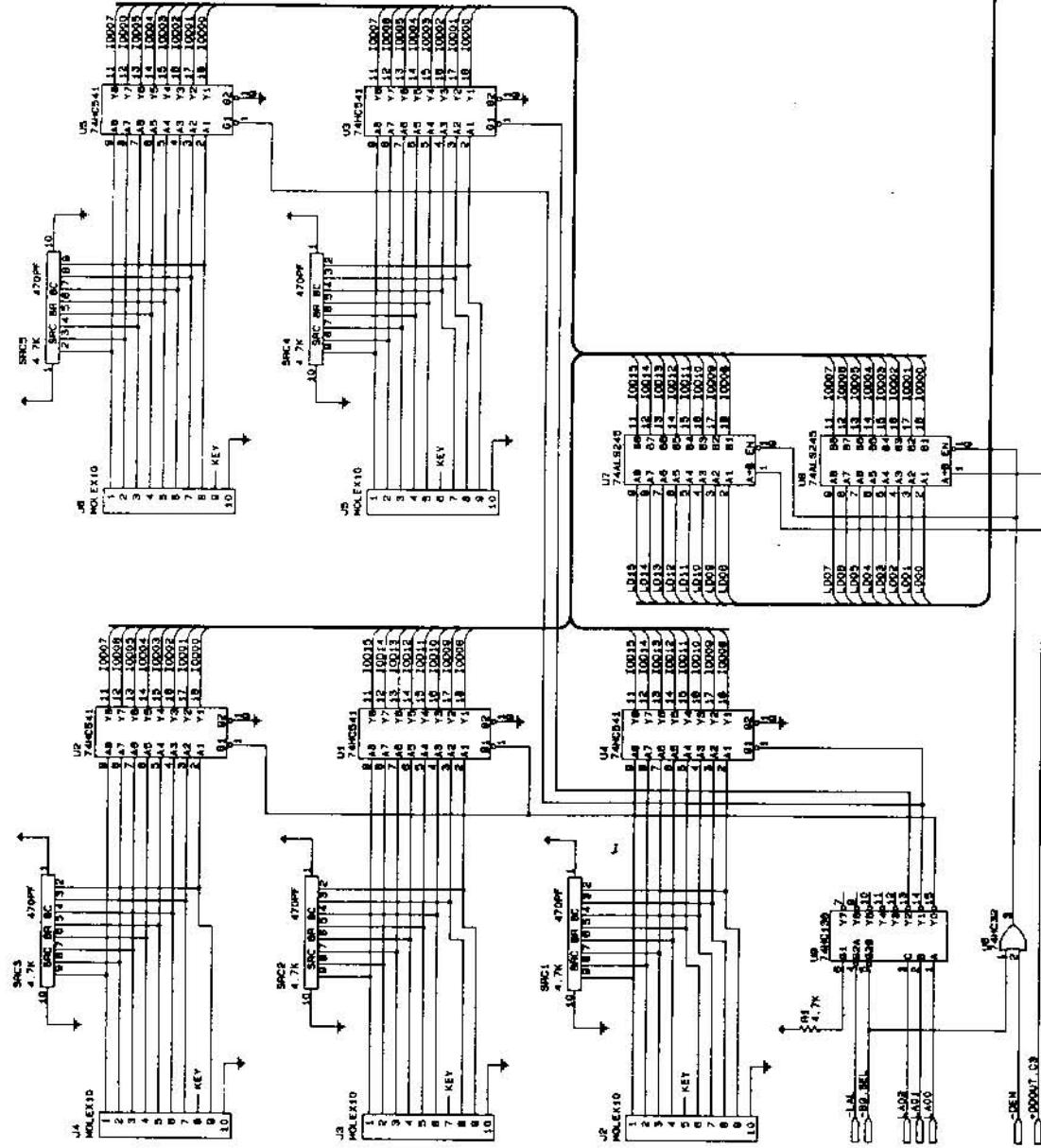
REF ID	QTY	COMPONENT	DESCRIPTION	NOTES
1	1	WILLIAMS ELECTRONICS, INC.	200 N CALIFORNIA AVE. CINCINNATI, OHIO 45204	
2	1	SYS-Z, I/O PCB ASSEMBLY	2 1/4" X 1 1/4"	
3	1	PCB	1/8" FRACTIONAL	
4	1	PCB	1/8" FRACTIONAL	
5	1	PCB	1/8" FRACTIONAL	
6	1	PCB	1/8" FRACTIONAL	
7	1	PCB	1/8" FRACTIONAL	
8	1	PCB	1/8" FRACTIONAL	
9	1	PCB	1/8" FRACTIONAL	
10	1	PCB	1/8" FRACTIONAL	
11	1	PCB	1/8" FRACTIONAL	
12	1	PCB	1/8" FRACTIONAL	
13	1	PCB	1/8" FRACTIONAL	
14	1	PCB	1/8" FRACTIONAL	
15	1	PCB	1/8" FRACTIONAL	

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

A

A

1
C-9026
NEW PART RELEASE 4-28-88

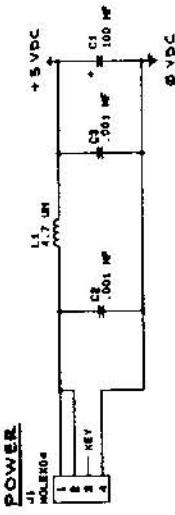
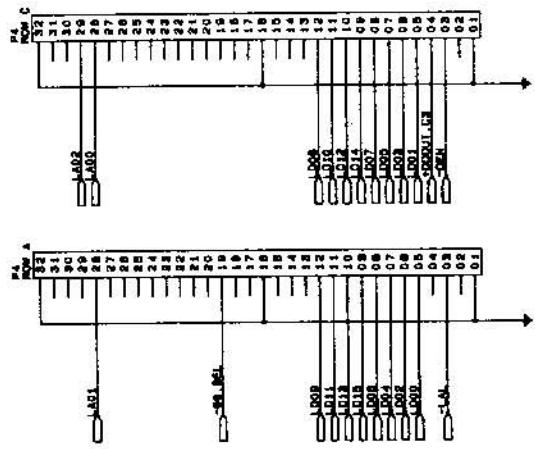


ITEM	PART NUMBER	DESCRIPTION	QTY	STOCK	PART NUMBER	DESCRIPTION	QTY	STOCK
PROJ. FROM IN. LOFT REIG	DO NOT SCALE	REMOVE BREAK, BREAK COMPONENTS	•	1	WILLIAMS ELECTRONICS, INC.	DET.	1	1
DRW. BY G.S. 4-28-88	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	•	1	100 N CALIFORNIA AVE	ADDRESS	1	1
CHANGED BY H/B/P	ONE-UP	ANGLE 60°	1	1	11/2"	FRONT	1	1
REMOVED C/N 4/28/88	1/4"	FRONT PROJECTION	1	1	1/4"	FRONT	1	1
DATE C-2037	1/4"	TOE	1	1	MATERIAL	1	1	1
1 C-9026	1/4"	FRONT	1	1	1 C-9026	1/4"	FRONT	1

REV	NUMBER OF DRAWINGS
A	1

NEW PART RELEASE
16-9028

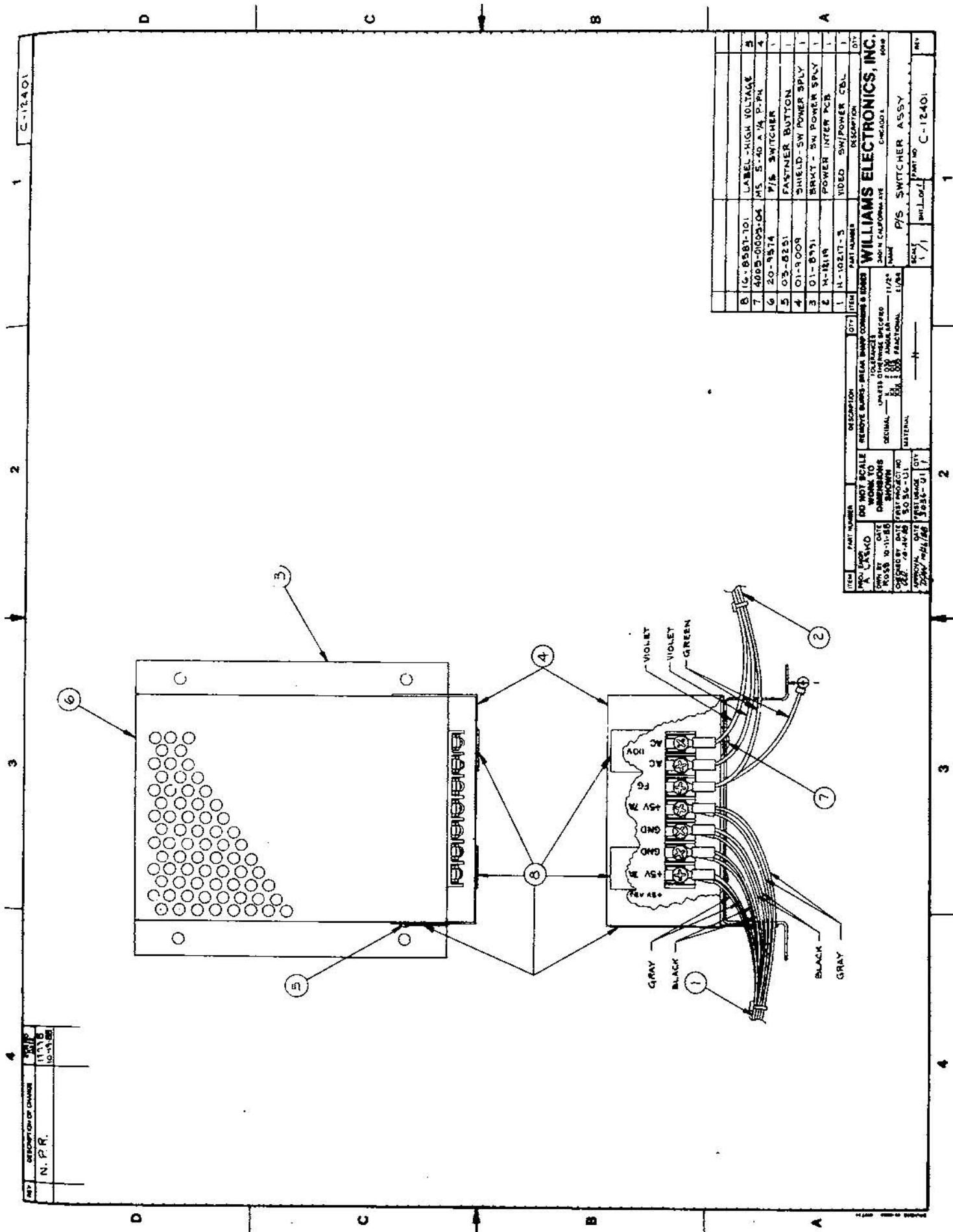
CPU INTERFACE



ITEM	PART NUMBER	DESCRIPTION	QTY	SIZE	PART NUMBER	DESCRIPTION	QTY	SIZE
1	DO NOT SCALE	REMOTE BURN-IN SCAFFOLD	1	1/4"	2	DO NOT SCALE	1	1/4"
2	DO NOT SCALE	WORK TO	1	1/4"	3	DO NOT SCALE	1	1/4"
3	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	4	DO NOT SCALE	1	1/4"
4	DO NOT SCALE	DIMENSIONS	1	1/4"	5	DO NOT SCALE	1	1/4"
5	DO NOT SCALE	SHOWN	1	1/4"	6	DO NOT SCALE	1	1/4"
7	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	8	DO NOT SCALE	1	1/4"
9	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	10	DO NOT SCALE	1	1/4"
11	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	12	DO NOT SCALE	1	1/4"
13	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	14	DO NOT SCALE	1	1/4"
15	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	16	DO NOT SCALE	1	1/4"
17	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	18	DO NOT SCALE	1	1/4"
19	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	20	DO NOT SCALE	1	1/4"
21	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	22	DO NOT SCALE	1	1/4"
23	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	24	DO NOT SCALE	1	1/4"
25	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	26	DO NOT SCALE	1	1/4"
27	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1	1/4"	28	DO NOT SCALE	1	1/4"

ITEM	PART NUMBER	DESCRIPTION	QTY	SIZE	ITEM	PART NUMBER	DESCRIPTION	QTY	SIZE
1	WILLIAMS ELECTRONICS, INC.	2401 N CALIFORNIA AVE	1		2	WILLIAMS ELECTRONICS, INC.	2401 N CALIFORNIA AVE	1	
3	NAME	CHICAGO, IL	1		4	NAME	SYS - Z I/O SCHEMATIC	1	
5	SCAL	+5 VDC	1		6	SCAL	+5 VDC	1	
7	SCAL	-5 VDC	1		8	SCAL	-5 VDC	1	
9	SCAL	0 VDC	1		10	SCAL	0 VDC	1	

REF	DESCRIPTION OF DRAWING
N.P.R.	1118 10-1-85

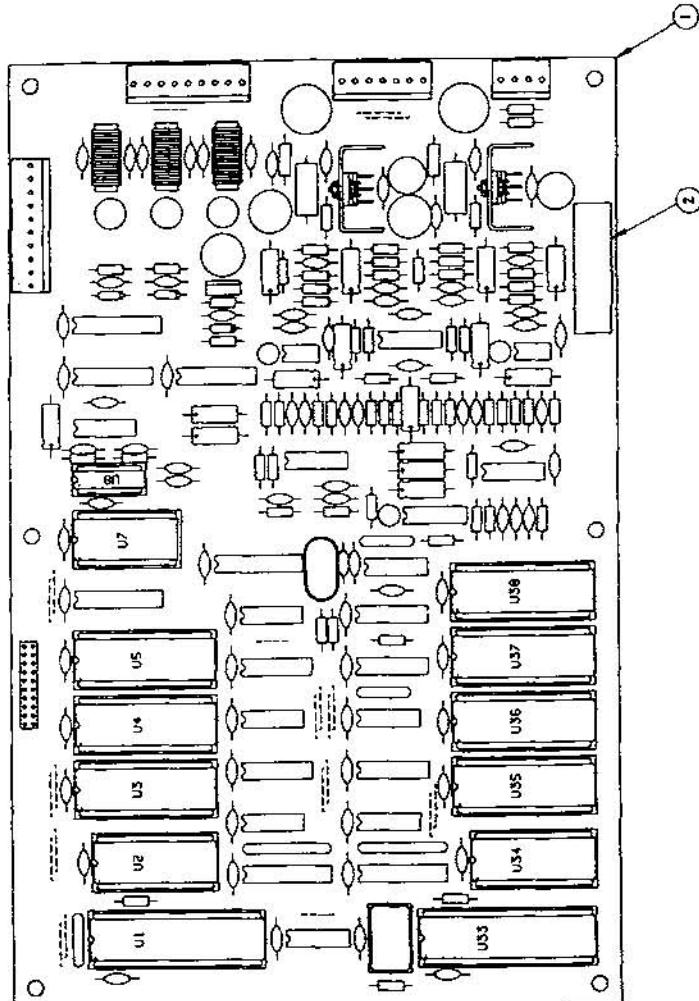


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NOTE:
FOR SCHEMATIC, REFER TO DRAWING NO. 16-9044.

ITEM		Part Number	Description	On	Off	Part Number	QTY.	DESCRIPTION
1	1	MO. 16-9044	DO NOT SCALE REMOVE BURN-BRIDGE SOLDER & CERAMIC					WILLIAMS ELECTRONICS, INC.
2	2	MO. L-07-160	WORK TO DIMENSIONS					One California Ave Oceanside, CA 92054
3	3	DRN BY	TOLERANCES UNLESS OTHERWISE SPECIFIED					Phone 714/433-1200
4	4	R.G. 9-22-38	ORIGINAL	1/16"				TELE
5	5	CREATED BY	1/16" OR 1/32" ANGULAR					SYS-2 SOUND - 2 ASSEMBLY
6	6	DATA	1/32" INCHES					PCB
7	7	PROJ. NO.	3.03.C.U1					PCB
8	8	CREATED	MATERIAL					1
9	9	DATA	FR-4					PCB
10	10	AMOUNT	1					PCB
11	11	DATA USED	1					PCB
12	12	DATE	D-12-16-68					PCB
13	13	APPROV	D-12-16-68					PCB

4
AVY
DESCRIPTION OF CHANGES
NEW PART RELEASE

1 C-12350

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B

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PART NUMBER	
4351-40	0028
U3	
U4	
U5	
DESIGNATION	4351
U36	
U37	
U38	

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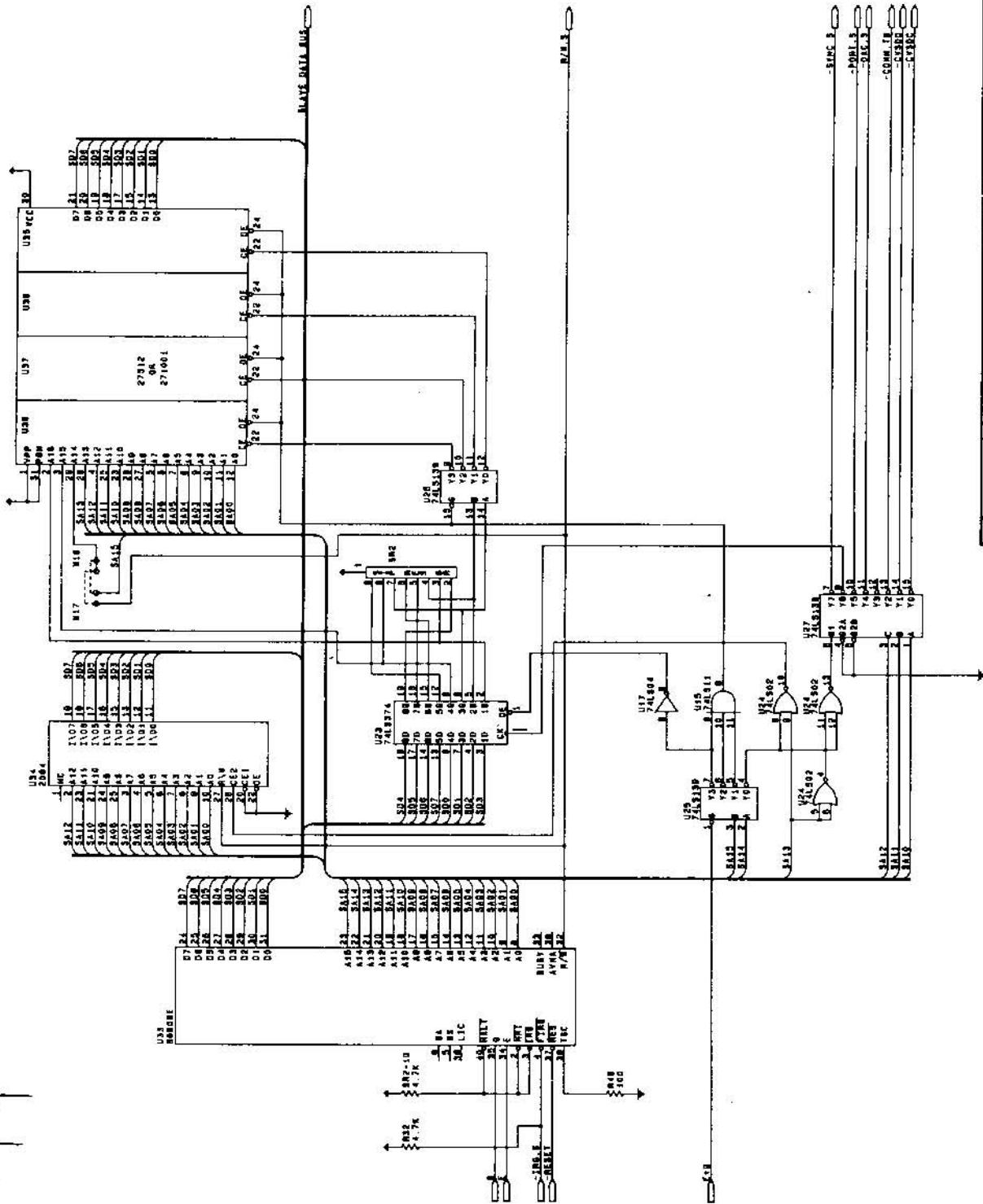
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
BILL OF MATERIALS				
1	SPEC CHART	U3, U4, U5, U5 U36, U37, U38	27512/1001 EPROM 256 HS	1
2	5521- 11088-00	U5	Y13012 DUAL SERIAL DAC	1
3	5370- 11088-00	U3	Y12151 SOUND GENERATOR	1
4	5348- 12278-00	U2, U34	8X 4 STATIC RAM 1604S	2
5	9401- 10320-00	U1, U33	68004 MICROPROCESSOR	2
6	1B-0050- 230		LABEL, PCB 10647	1
7	C-12350		STS-2 SOUND BOARD SUB-4351	1

WILLIAMS ELECTRONICS, INC.						
CIRCLE 102						
1401 N. CALIFORNIA AVE.						
DETROIT, MICHIGAN 48206						
TELEPHONE (313) 221-3211						

PROJECT NO.	MICROFLEX	DO NOT SCALE	REMOTE BURRS - REAR SWEEP	COMPONENTS & SOURCES
DATE	DEC. 9-72-BB	TOOLING	UNLESS OTHERWISE SPECIFIED	
DES.	1	DECIMAL —	1/8"	
SPEDER	1	0.125 INCHES	1/8"	
COMPONENT NO.	10320-U1	FRCTIONAL	1/8"	
AMOUNT	1	1/8" dia.	1/8"	
DATE	11-23-88	MATERIAL		
REMOVED	10-15-89	QTY		
REMOVED	11-23-89	1		
	1	STOCK #	STOCK #	
		1		REV.
		1	2	
		1	1	
		1	0	
		1	C-12350	

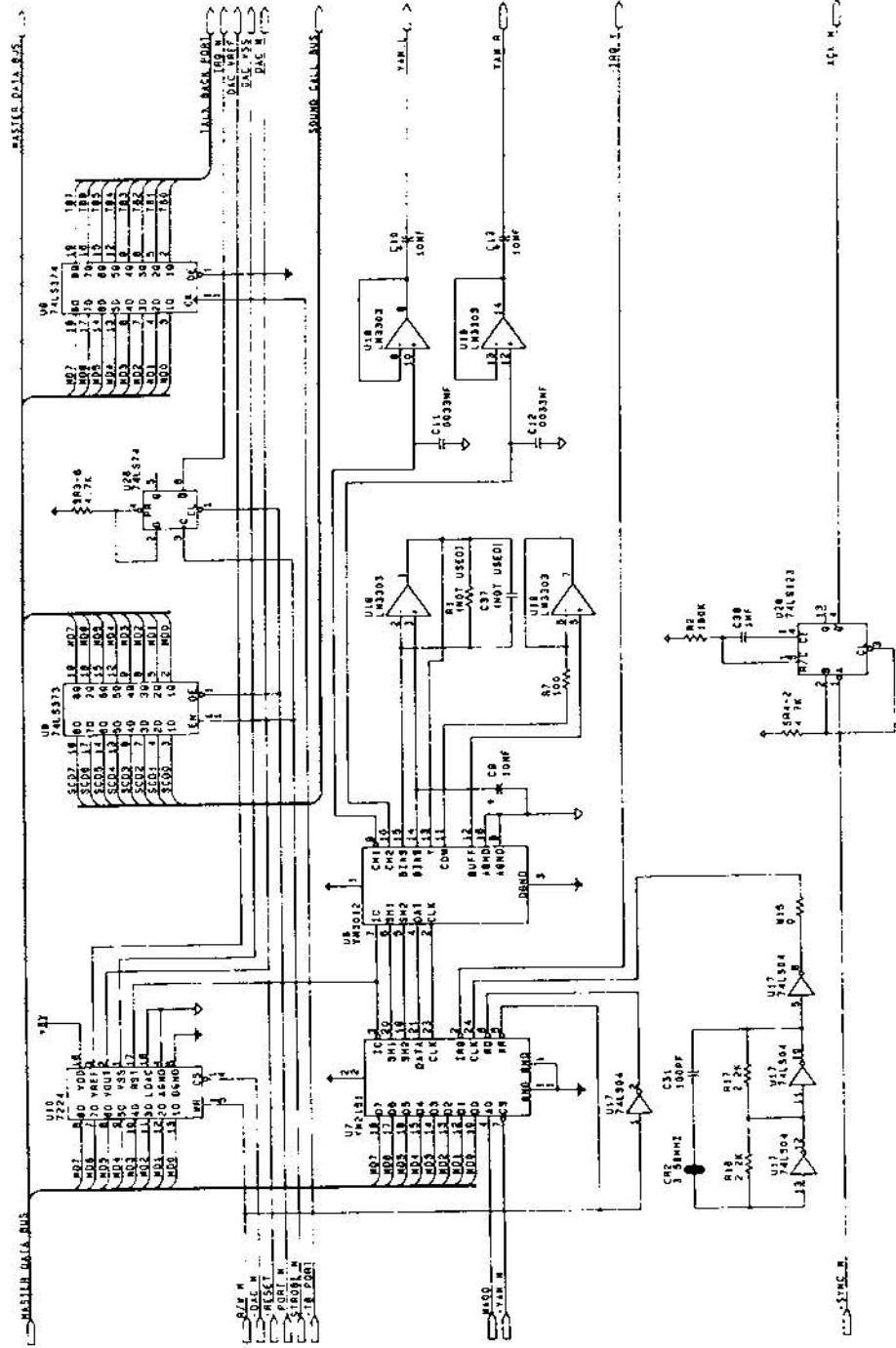
1	
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NEW PART RELEASE	DATE
DESCRIPTION OF CHANGE	CHG#



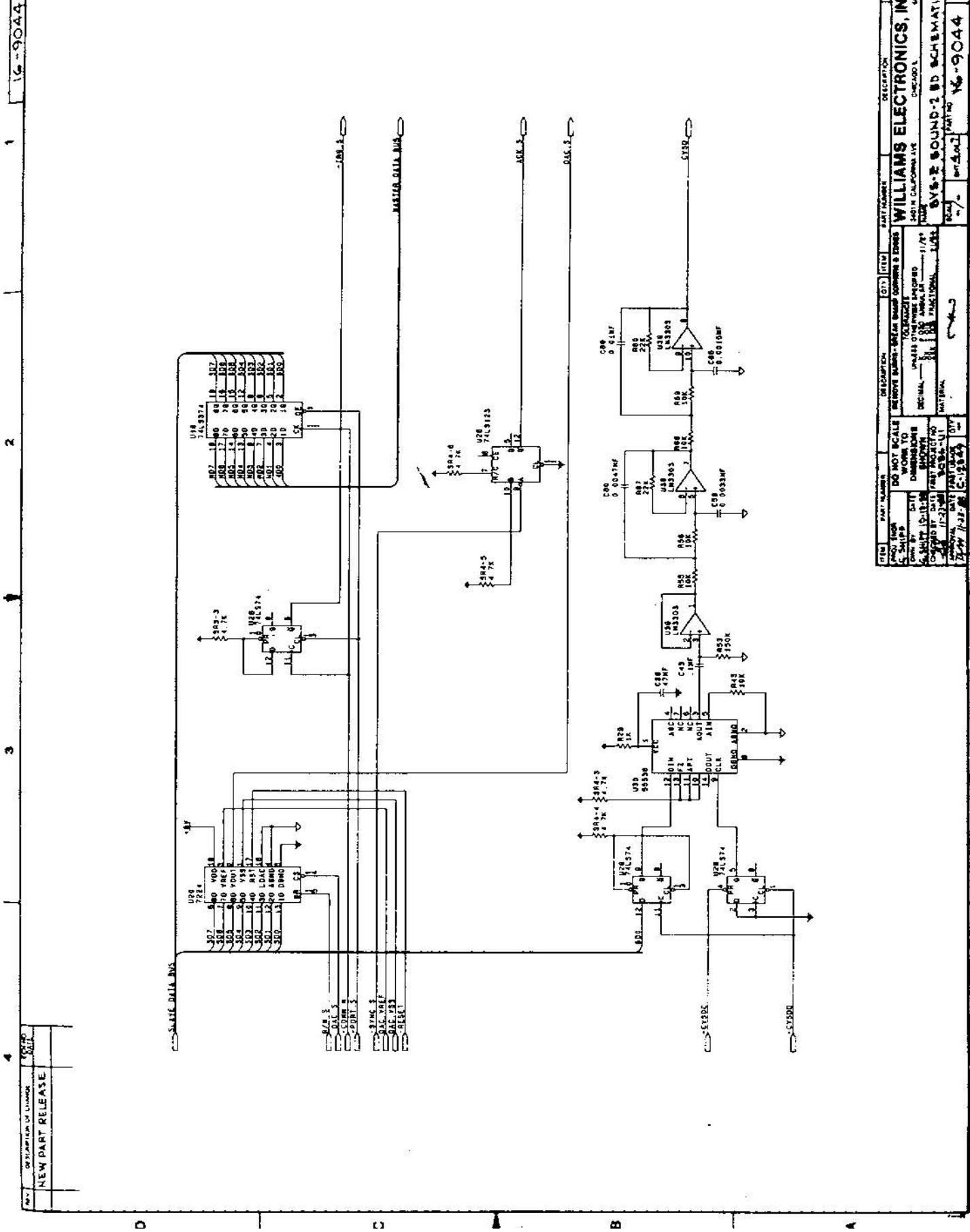
ITEM	PART NUMBER	DESCRIPTION	C17 REF	PART NUMBER
1	2114	4K X 1 RAM	U17	74LS138
2	74LS04	4-NOT GATE	U19	555
3	74LS137	4-TO-16 DECODE	U23	74LS137
4	74LS137	4-TO-16 DECODE	U24	74LS137
5	74LS137	4-TO-16 DECODE	U25	74LS137
6	74LS02	2-NAND GATE	U26	74LS02
7	74LS02	2-NAND GATE	U27	74LS02
8	74LS02	2-NAND GATE	U28	74LS02
9	74LS02	2-NAND GATE	U29	74LS02
10	74LS02	2-NAND GATE	U30	74LS02
11	74LS02	2-NAND GATE	U31	74LS02
12	74LS02	2-NAND GATE	U32	74LS02
13	74LS02	2-NAND GATE	U33	74LS02
14	74LS02	2-NAND GATE	U34	74LS02
15	74LS02	2-NAND GATE	U35	74LS02
16	74LS02	2-NAND GATE	U36	74LS02
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18	74LS02	2-NAND GATE	U38	74LS02
19	74LS02	2-NAND GATE	U39	74LS02
20	74LS02	2-NAND GATE	U40	74LS02
21	74LS02	2-NAND GATE	U41	74LS02
22	74LS02	2-NAND GATE	U42	74LS02
23	74LS02	2-NAND GATE	U43	74LS02
24	74LS02	2-NAND GATE	U44	74LS02
25	74LS02	2-NAND GATE	U45	74LS02
26	74LS02	2-NAND GATE	U46	74LS02
27	74LS02	2-NAND GATE	U47	74LS02
28	74LS02	2-NAND GATE	U48	74LS02
29	74LS02	2-NAND GATE	U49	74LS02
30	74LS02	2-NAND GATE	U50	74LS02
31	74LS02	2-NAND GATE	U51	74LS02
32	74LS02	2-NAND GATE	U52	74LS02
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37	74LS02	2-NAND GATE	U57	74LS02
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39	74LS02	2-NAND GATE	U59	74LS02
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43	74LS02	2-NAND GATE	U63	74LS02
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211	74LS02	2-NAND GATE	U232	

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	

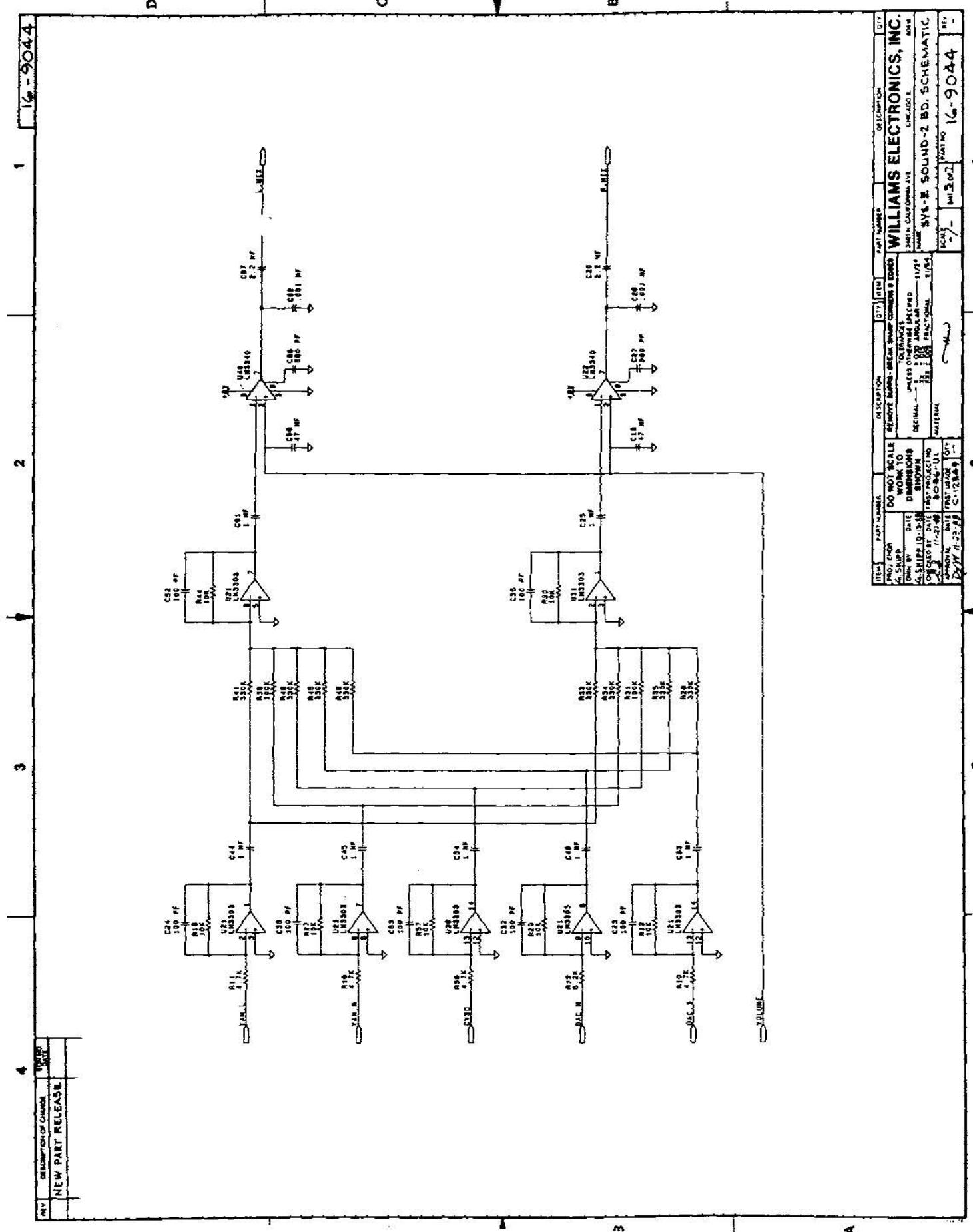


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DISCLOSURE OF SOURCE
NOT
NEW PART RELEASE



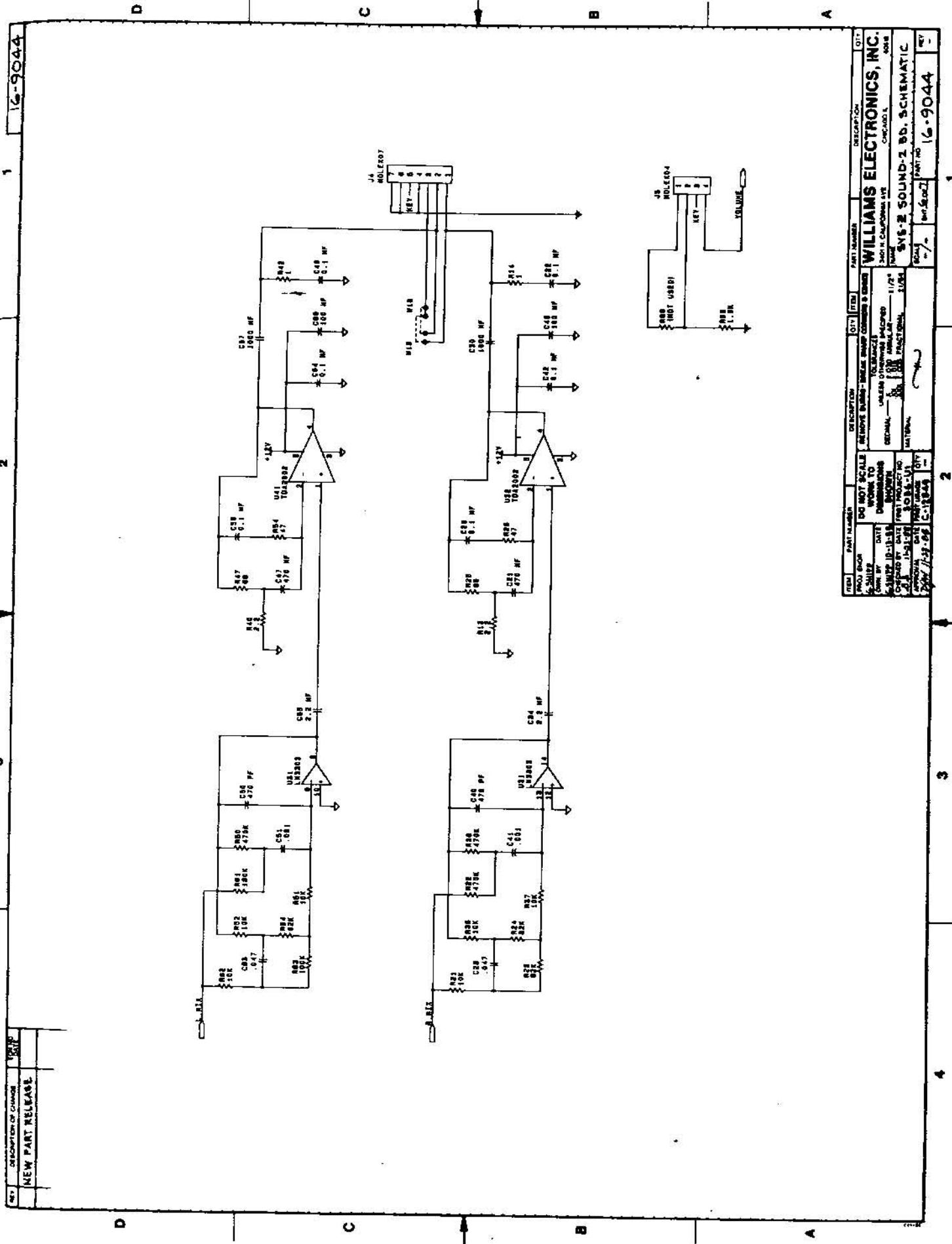
REV	DESCRIPTION OF CHANGE
NEW PART RELEASE	



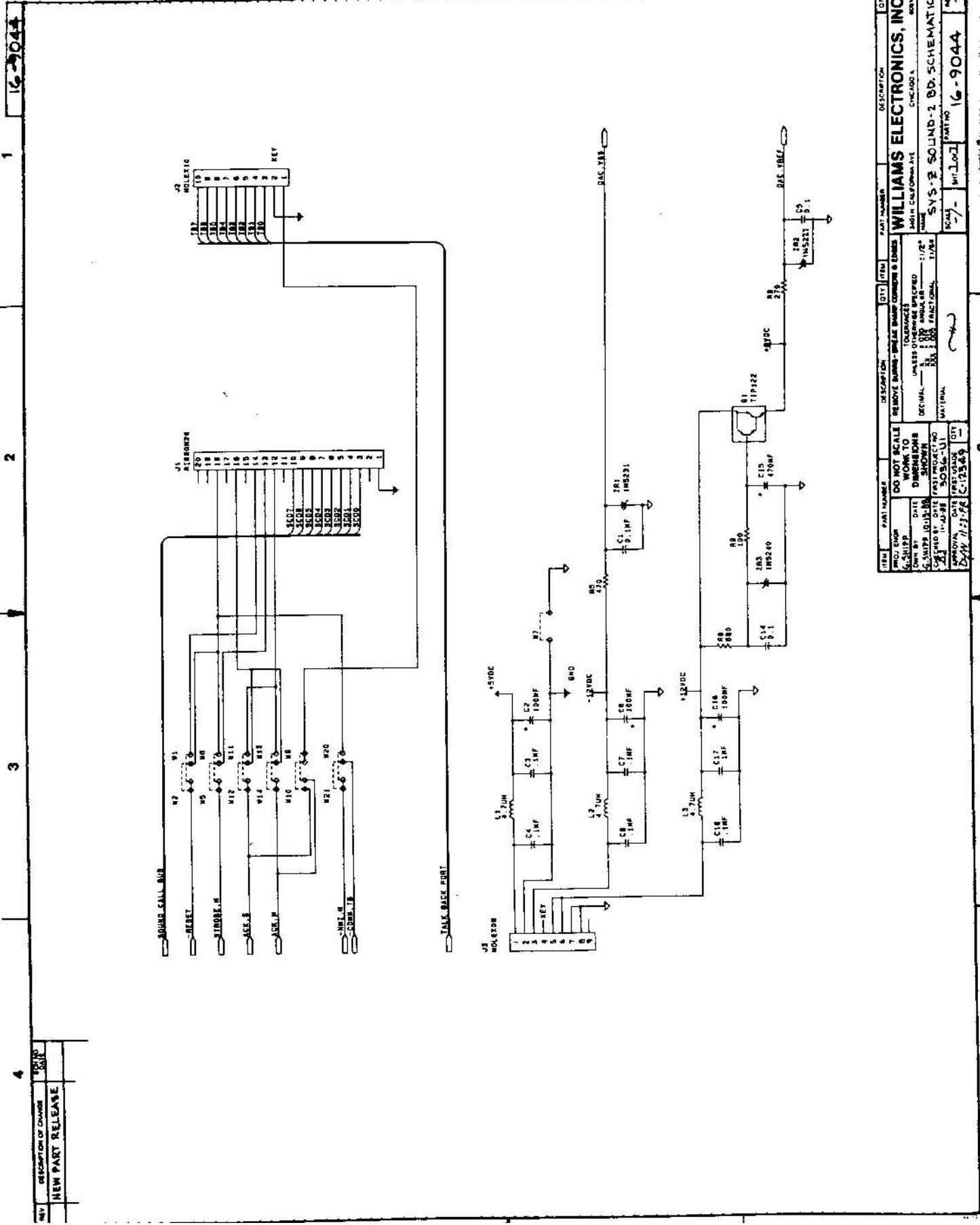
ITEM	PART NUMBER	DESCRIPTION	QTY	STK	PART NUMBER	DESCRIPTION	QTY	STK
1	R10	DO NOT SCALE	1		R11	DO NOT SCALE	1	
2	C1	DISCRETE CAPACITOR	1		C2	DISCRETE CAPACITOR	1	
3	U21	DISCRETE OPERATIONAL AMPLIFIER	1		U22	DISCRETE OPERATIONAL AMPLIFIER	1	
4	R12	DISCRETE RESISTOR	1		R13	DISCRETE RESISTOR	1	
5	U23	DISCRETE OPERATIONAL AMPLIFIER	1		U24	DISCRETE OPERATIONAL AMPLIFIER	1	
6	R14	DISCRETE RESISTOR	1		R15	DISCRETE RESISTOR	1	
7	U25	DISCRETE OPERATIONAL AMPLIFIER	1		U26	DISCRETE OPERATIONAL AMPLIFIER	1	
8	R16	DISCRETE RESISTOR	1		R17	DISCRETE RESISTOR	1	
9	U27	DISCRETE OPERATIONAL AMPLIFIER	1		U28	DISCRETE OPERATIONAL AMPLIFIER	1	
10	R18	DISCRETE RESISTOR	1		R19	DISCRETE RESISTOR	1	
11	U29	DISCRETE OPERATIONAL AMPLIFIER	1		U30	DISCRETE OPERATIONAL AMPLIFIER	1	
12	R20	DISCRETE RESISTOR	1		R21	DISCRETE RESISTOR	1	
13	U31	DISCRETE OPERATIONAL AMPLIFIER	1		U32	DISCRETE OPERATIONAL AMPLIFIER	1	
14	R22	DISCRETE RESISTOR	1		R23	DISCRETE RESISTOR	1	
15	U26	DISCRETE OPERATIONAL AMPLIFIER	1		U27	DISCRETE OPERATIONAL AMPLIFIER	1	
16	R24	DISCRETE RESISTOR	1		R25	DISCRETE RESISTOR	1	
17	U28	DISCRETE OPERATIONAL AMPLIFIER	1		U29	DISCRETE OPERATIONAL AMPLIFIER	1	
18	R26	DISCRETE RESISTOR	1		R27	DISCRETE RESISTOR	1	
19	U25	DISCRETE OPERATIONAL AMPLIFIER	1		U26	DISCRETE OPERATIONAL AMPLIFIER	1	
20	R28	DISCRETE RESISTOR	1		R29	DISCRETE RESISTOR	1	
21	U22	DISCRETE OPERATIONAL AMPLIFIER	1		U23	DISCRETE OPERATIONAL AMPLIFIER	1	
22	R30	DISCRETE RESISTOR	1		R31	DISCRETE RESISTOR	1	
23	U24	DISCRETE OPERATIONAL AMPLIFIER	1		U25	DISCRETE OPERATIONAL AMPLIFIER	1	
24	R32	DISCRETE RESISTOR	1		R33	DISCRETE RESISTOR	1	
25	U26	DISCRETE OPERATIONAL AMPLIFIER	1		U27	DISCRETE OPERATIONAL AMPLIFIER	1	
26	R34	DISCRETE RESISTOR	1		R35	DISCRETE RESISTOR	1	
27	U28	DISCRETE OPERATIONAL AMPLIFIER	1		U29	DISCRETE OPERATIONAL AMPLIFIER	1	
28	R36	DISCRETE RESISTOR	1		R37	DISCRETE RESISTOR	1	
29	U25	DISCRETE OPERATIONAL AMPLIFIER	1		U26	DISCRETE OPERATIONAL AMPLIFIER	1	
30	R38	DISCRETE RESISTOR	1		U27	DISCRETE OPERATIONAL AMPLIFIER	1	

16-9044

NEW PART RELEASE	
16-9044	
DESCRIPTION OF CHANGE	
DATE	



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	16-9044	DO NOT SCALE	1	2	16-9044	DO NOT SCALE	1
2	16-9044	SCALING	1	3	16-9044	SCALING	1
3	16-9044	DATE	1	4	16-9044	DATE	1
4	16-9044	REVISION	1	5	16-9044	REVISION	1
5	16-9044	NAME	1	6	16-9044	NAME	1
6	16-9044	COMPONENTS	1	7	16-9044	COMPONENTS	1
7	16-9044	DESIGNER	1	8	16-9044	DESIGNER	1
8	16-9044	DATE	1	9	16-9044	DATE	1
9	16-9044	REVISION	1	10	16-9044	REVISION	1
11	16-9044	NAME	1	12	16-9044	NAME	1
13	16-9044	COMPONENTS	1	14	16-9044	COMPONENTS	1
15	16-9044	DESIGNER	1	16	16-9044	DESIGNER	1
17	16-9044	DATE	1	18	16-9044	DATE	1
19	16-9044	REVISION	1	20	16-9044	REVISION	1
21	16-9044	NAME	1	22	16-9044	NAME	1
23	16-9044	COMPONENTS	1	24	16-9044	COMPONENTS	1
25	16-9044	DESIGNER	1	26	16-9044	DESIGNER	1
27	16-9044	DATE	1	28	16-9044	DATE	1
29	16-9044	REVISION	1	30	16-9044	REVISION	1
31	16-9044	NAME	1	32	16-9044	NAME	1
33	16-9044	COMPONENTS	1	34	16-9044	COMPONENTS	1
35	16-9044	DESIGNER	1	36	16-9044	DESIGNER	1
37	16-9044	DATE	1	38	16-9044	DATE	1
39	16-9044	REVISION	1	40	16-9044	REVISION	1
41	16-9044	NAME	1	42	16-9044	NAME	1
43	16-9044	COMPONENTS	1	44	16-9044	COMPONENTS	1
45	16-9044	DESIGNER	1	46	16-9044	DESIGNER	1
47	16-9044	DATE	1	48	16-9044	DATE	1
49	16-9044	REVISION	1	50	16-9044	REVISION	1
51	16-9044	NAME	1	52	16-9044	NAME	1
53	16-9044	COMPONENTS	1	54	16-9044	COMPONENTS	1
55	16-9044	DESIGNER	1	56	16-9044	DESIGNER	1
57	16-9044	DATE	1	58	16-9044	DATE	1
59	16-9044	REVISION	1	60	16-9044	REVISION	1
61	16-9044	NAME	1	62	16-9044	NAME	1
63	16-9044	COMPONENTS	1	64	16-9044	COMPONENTS	1
65	16-9044	DESIGNER	1	66	16-9044	DESIGNER	1
67	16-9044	DATE	1	68	16-9044	DATE	1
69	16-9044	REVISION	1	70	16-9044	REVISION	1
71	16-9044	NAME	1	72	16-9044	NAME	1
73	16-9044	COMPONENTS	1	74	16-9044	COMPONENTS	1
75	16-9044	DESIGNER	1	76	16-9044	DESIGNER	1
77	16-9044	DATE	1	78	16-9044	DATE	1
79	16-9044	REVISION	1	80	16-9044	REVISION	1
81	16-9044	NAME	1	82	16-9044	NAME	1
83	16-9044	COMPONENTS	1	84	16-9044	COMPONENTS	1
85	16-9044	DESIGNER	1	86	16-9044	DESIGNER	1
87	16-9044	DATE	1	88	16-9044	DATE	1
89	16-9044	REVISION	1	90	16-9044	REVISION	1
91	16-9044	NAME	1	92	16-9044	NAME	1
93	16-9044	COMPONENTS	1	94	16-9044	COMPONENTS	1
95	16-9044	DESIGNER	1	96	16-9044	DESIGNER	1
97	16-9044	DATE	1	98	16-9044	DATE	1
99	16-9044	REVISION	1	100	16-9044	REVISION	1



NEW PART RELEASE	NO.
DESCRIPTION OF CHANGE	TYPE
STAMP	DATE

C-12218

D C B A

BILL OF MATERIALS

ITEM	PART NO.	PRINT DESIGNATION	DESCRIPTION	QTY.
1	SEE NOTE #3		LABEL PCB IDENT	1
2	16-8450-21G		CONN. 10PIN MOLEX, .156" CENTER PINS	1
3	5191-10862-10	J1	CONN. 7PIN MOLEX, .156" CENTER PINS	1
4	5191-10862-07	J2	CONN. 2PIN MOLEX, .156" CENTER PINS	1
5	5191-10862-02	J3	CONN. 2PIN MOLEX, .156" CENTER PINS	1
6	5133-12060-01	F1, F2, F3	FUSEHOLDER	3
7	5130-09197-00	F3	FUSE, 0.75A, 250V	1
8	5131-09432-00	F2	FUSE, 7A SB, 250V	1
9	5130-10356-00	F1	FUSE, 3A SB, 250V	1
10	5040-12313-00	C2	CAPACITOR, ELECT., RAD, 1500 MFD, 25V	1
11	5040-12314-00	C1	CAPACITOR, ELECT., RAD, 2200 MFD, 25V	1
12	5671-09019-00	LED1, LED2	LIGHT EMITTING DIODE, RED	2
13	5100-09418-00	BRI	BRIDGE RECTIFIER, 55V	1
14	5070-06258-00	DI	DIODE, IN4001	1
15	5010-09314-00	R1, R2	RESISTOR, C. F., 1.2K 5% 1/4 WATT	2
16	5273-12389-BB		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.

WILLIAMS ELECTRONICS, INC.

DO NOT SCALE REMOVE DOWNSCALE DRAWINGS

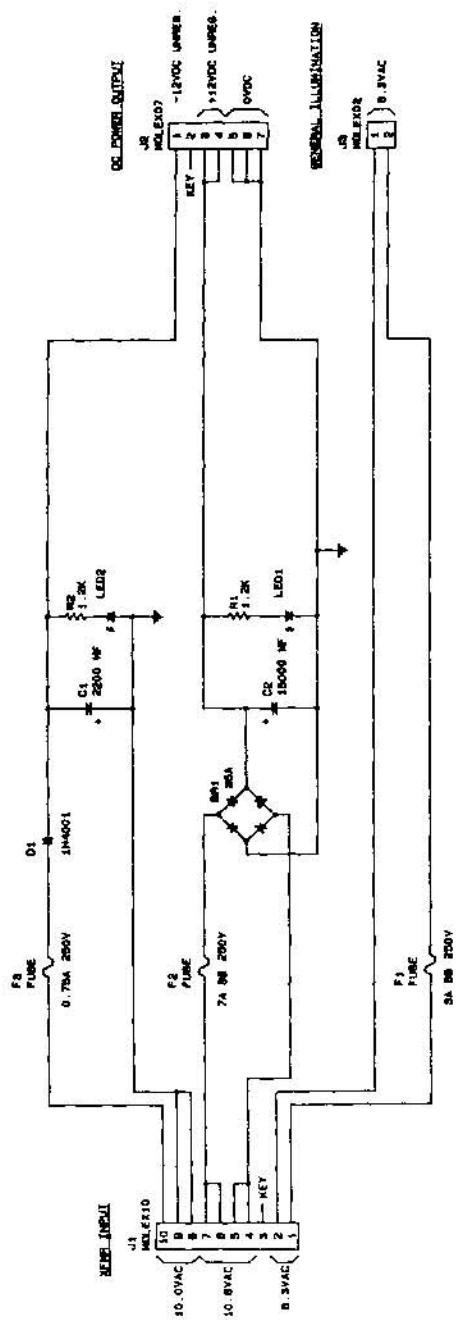
LOFFERD	WORK TO SPECIFICATIONS SHOWN
S.C. 5110/08	TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL — .0001 INCH — .00001 MM — .001 NAME —
PRINT BY DATE 1/1/78	PRINT DATE 1/1/78
PRINT NO. C-12218	PRINT NO. C-12218
REV. A	REV. A

SYN-Z-12 UNREG. P/S ASSY

C-12218

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	7/10/80

1 16-9037



REF ID	ITEM NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	QTY	UNIT	PART NUMBER
		DO NOT SCALE PHOTOGRAPHED WHEN OFF FIELD			REMOVE BURNS-OUT OR SHORT CIRCUITED TOLERANCES UNLESS OTHERWISE SPECIFIED			ORT
		DRAW BY DRAFTSMAN			UNLESS OTHERWISE SPECIFIED DIMENSIONS SHOWN			CHG-CODE
		C. SHIPP. WEIGHT			DECIMAL INCHES MM			REV
		CHARACTERISTICS TESTED			FUNCTIONAL TESTS			SCALING
		APPROVAL TESTS			MATERIAL			MANUFACTURER
		250V 5/16" C-121b			OTV			
		250V 5/16" C-121b						

REF ID	ITEM NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	QTY	UNIT	PART NUMBER
		WILLIAMS ELECTRONICS, INC.			3401 CALIFORNIA AVE SUITE 1000 MINNEAPOLIS, MINNESOTA 55401			ORT
		12 UNREG P/S BD, SCHEMATIC						CHG-CODE
		SCALING						REV
		MANUFACTURER						SCALING
		16-9037						MANUFACTURER