

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-5343-3036-11
Program ROM	ROM	27512	ROM Board U60	A-5343-3036-12
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



Service Manual

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 Ctlr	PLD	EP153A	CPU Board U78	A-5346-3036-2
Video RAM Ctlr	PLD	EP153A	CPU Board U79	A-5346-3036-3
Address Decoder	PLD	EP153A	CPU Board U80	A-5346-3036-4
Image ROM Ctlr	PLD	EP153A	CPU Board U83	A-5346-3036-5
Video RAM Seq.	PLD	EP600	CPU Board U12	A-5346-3036-6
Autoerase Ctlr	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





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	(None)
	3/4	
	5/6	
	7/8	
	9/10	
	11/12 13/14 R1	
CPU Board	W3	W1
	W4	W2
	W6	W5
	W9	W7
	W10	W8
	W11	W12
	W14	W13
Sound Board	W1 W9	W2 W13
	W4 W15	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



Notes...



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 imputities 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.

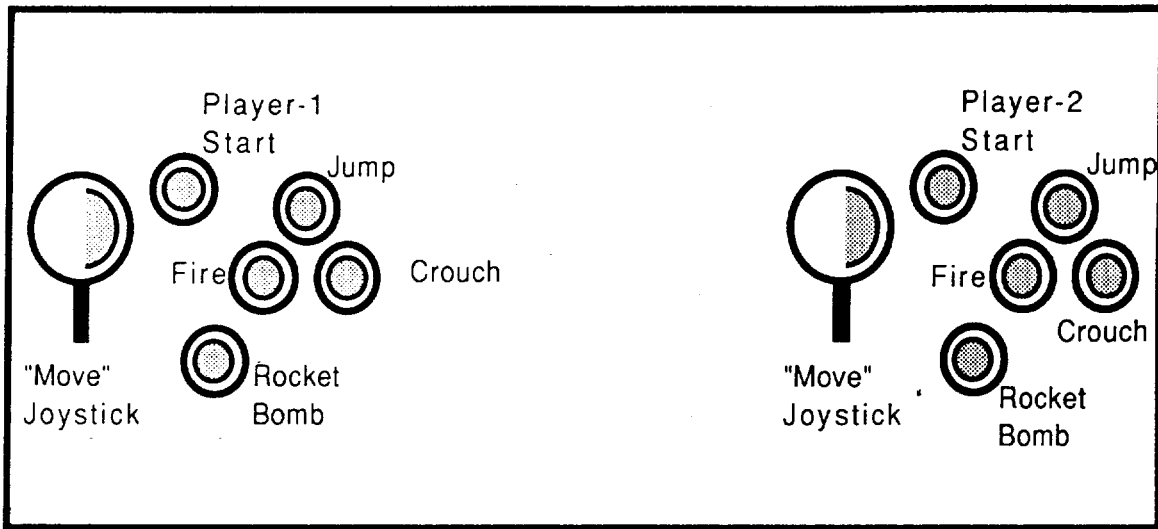
For a two-player game, at least two credits must be displayed. To initiate this two-player game, press the 2-PLAYER START button.

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.





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

NARC

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 dart 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!

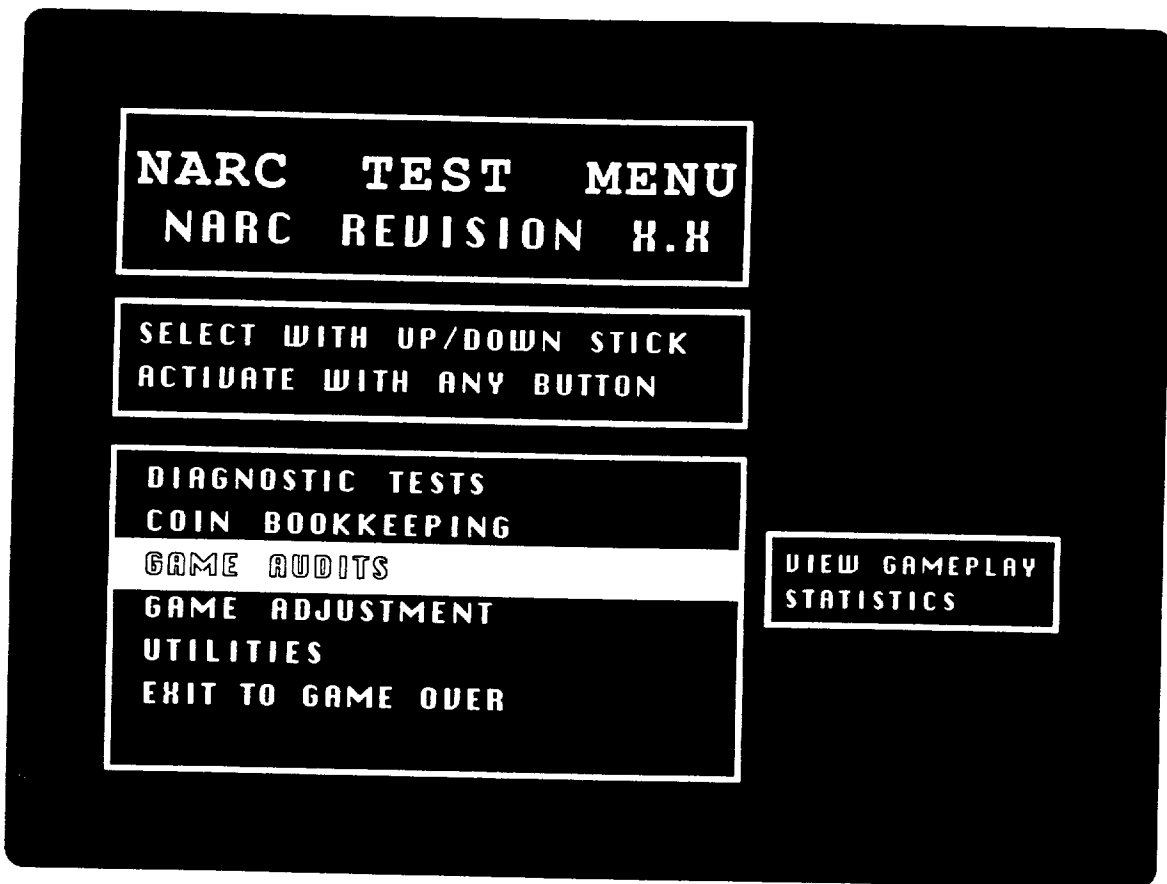
Game Adjustments, Bookkeeping, Diagnostics

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.*

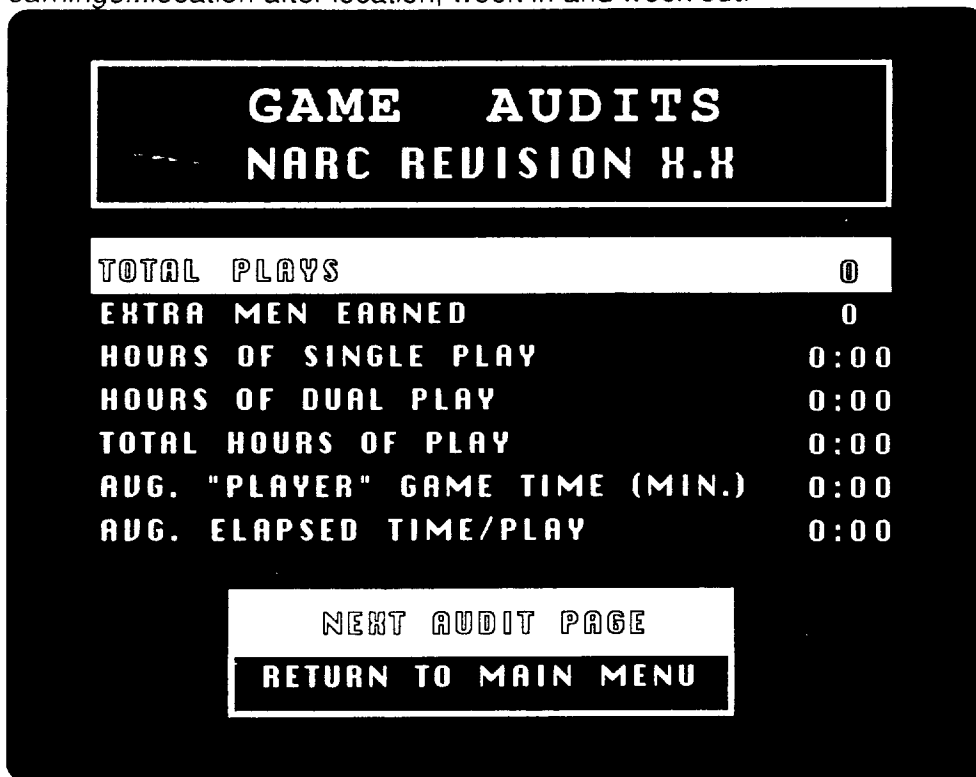
Pressing and holding ADVANCE also causes the game to exit from a menu.

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

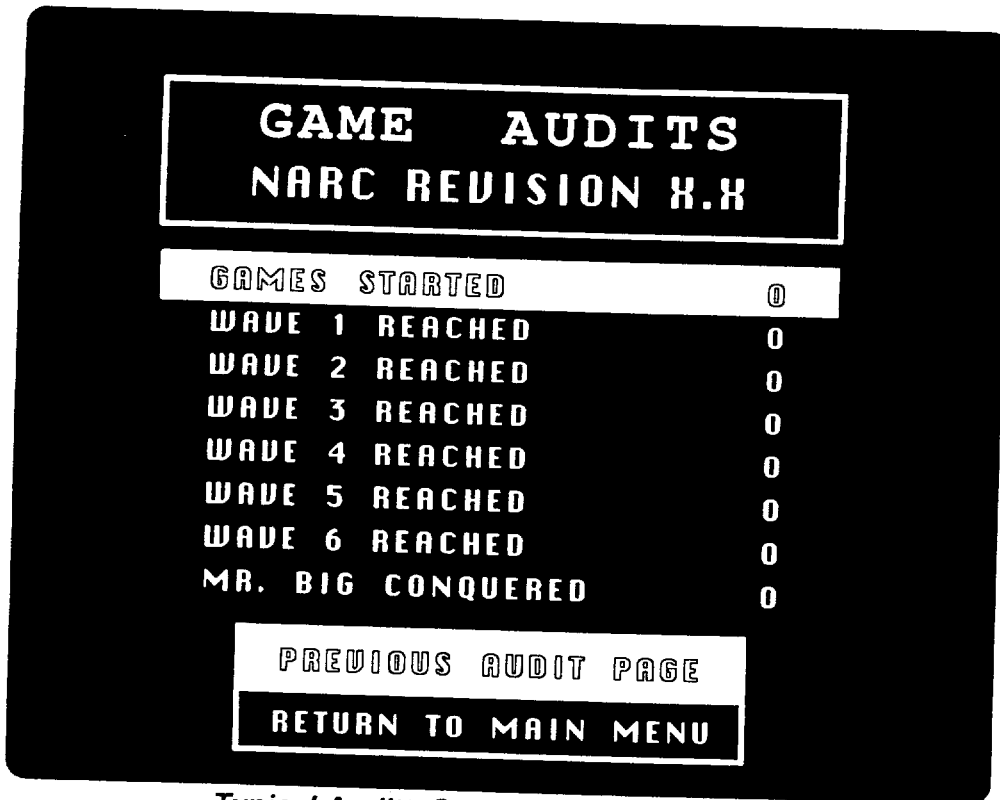
GAME AUDITS SHOW YOU AT A GLANCE if game settings are bringing you a satisfactory return on your investment! *Only games by WILLIAMS ELECTRONICS have this menu-driven feature.* Think of it as a unique way to keep your **NARC** game the *leader of the pack when it comes to earnings...*location after location,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



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.



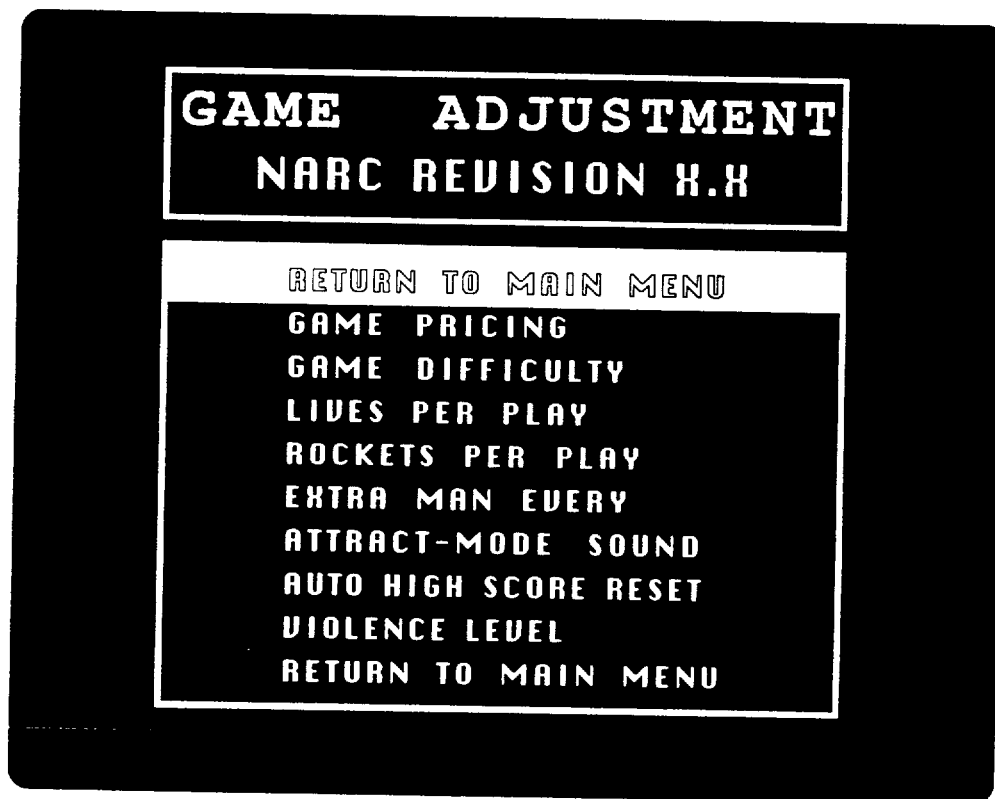
Typical Audits Screen, Page 2

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



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.

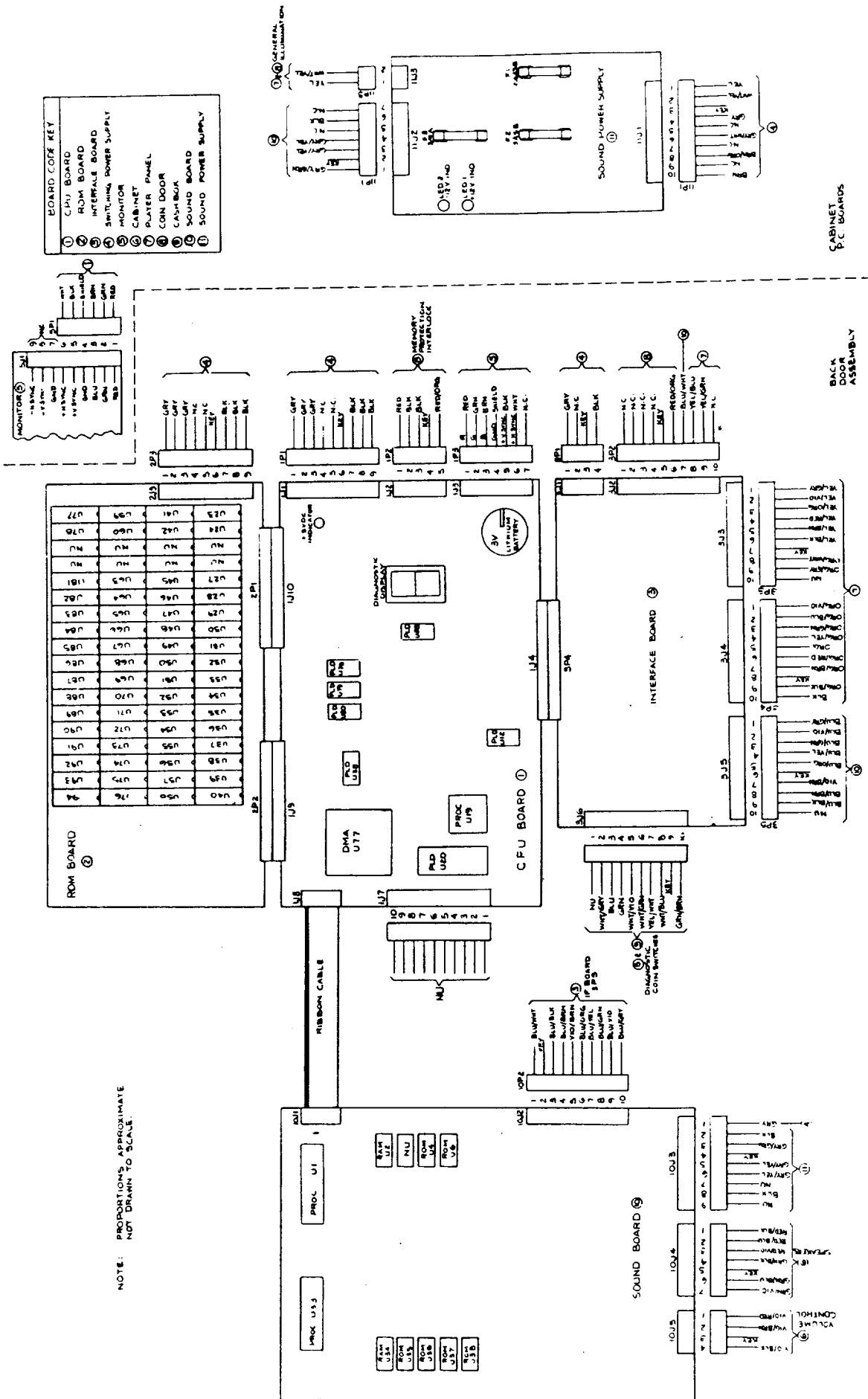
Here are some tailoring suggestions...

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.



NOTE: PROPORTIONS APPROXIMATE
NOT DRAWN TO SCALE.



CABINET
P.C. BOARDS

BACK
BOARD
ASSEMBLY

GAME NAME	3036
ASSY. NO.	C-11879-3036
8	A-5340-3036-7
9	A-5341-3036-6
10	A-5342-3036-5
11	A-5343-3036-4
12	A-5344-3036-3
13	A-5345-3036-2
14	A-5346-3036-1
JUMPERS REMOVED	NONE

ITEM	DESCRIPTION	QTY
20		
19		
18		
17		
16		
15	BATTERY - LITHIUM 3V BUTTON	1
14	IC, PLD-COLOR RAM CNTL	1
13	IC, PLD-LOCAL CONTROL	1
12	IC, PLD-VIDEO RAM CNTL	1
11	IC, PLD-ADDRESS DECODE	1

ITEM	DESCRIPTION	QTY
10	IC, PLD-IMAGE ROM CNTL	1
9	IC, PLD-VIDEO RAM SEQ.	1
8	IC, PLD-AUTOERASE CNTL	1
7	IC, RAM/S 5524 8K x 8	1
6	IC, RAM/V 4461 24K x 4	1
5		
4	IC, TMS34010 G.S.P.	1
3	IC, CUSTOM ASIC	1
2	LABEL, PCB IDENT.	1
1	SYS-Z CPU PCB SUB-ASSEMBLY	1

ITEM	DESCRIPTION	QTY
10	SEE CHART U83	
9	SEE CHART U12	
8	SEE CHART U20	
7	5340-12019-00 U42-U49 U68-U75	
6	12219-00	
5		
4	5400-12220-00 U18	
3	5410-12239-00 U77	
2	16-8850-210	
1	C-11870	

BILL OF MATERIALS

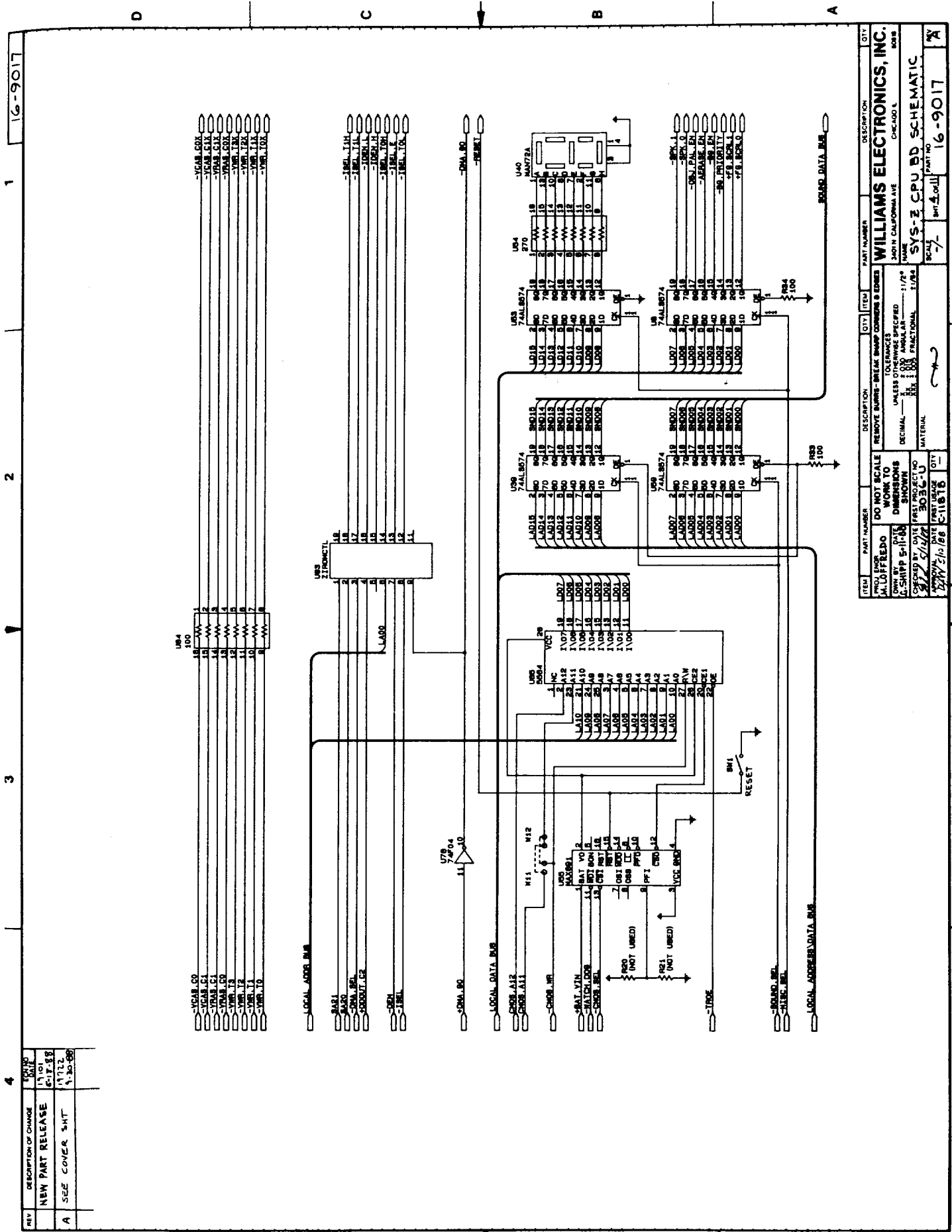
BILL OF MATERIALS

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9817.

WILLIAMS ELECTRONICS, INC.
3801N CALIFORNIA AVE CHICAGO, ILL 60638

NAME: SYS-Z CPU PCB ASSEMBLY
SCALE: 1/8" = 1" PART NO: C-11879

APPROVAL: 12-MAY 2 1988 D-12114



16-9017

1

2

3

4

16-9017

1

2

3

4

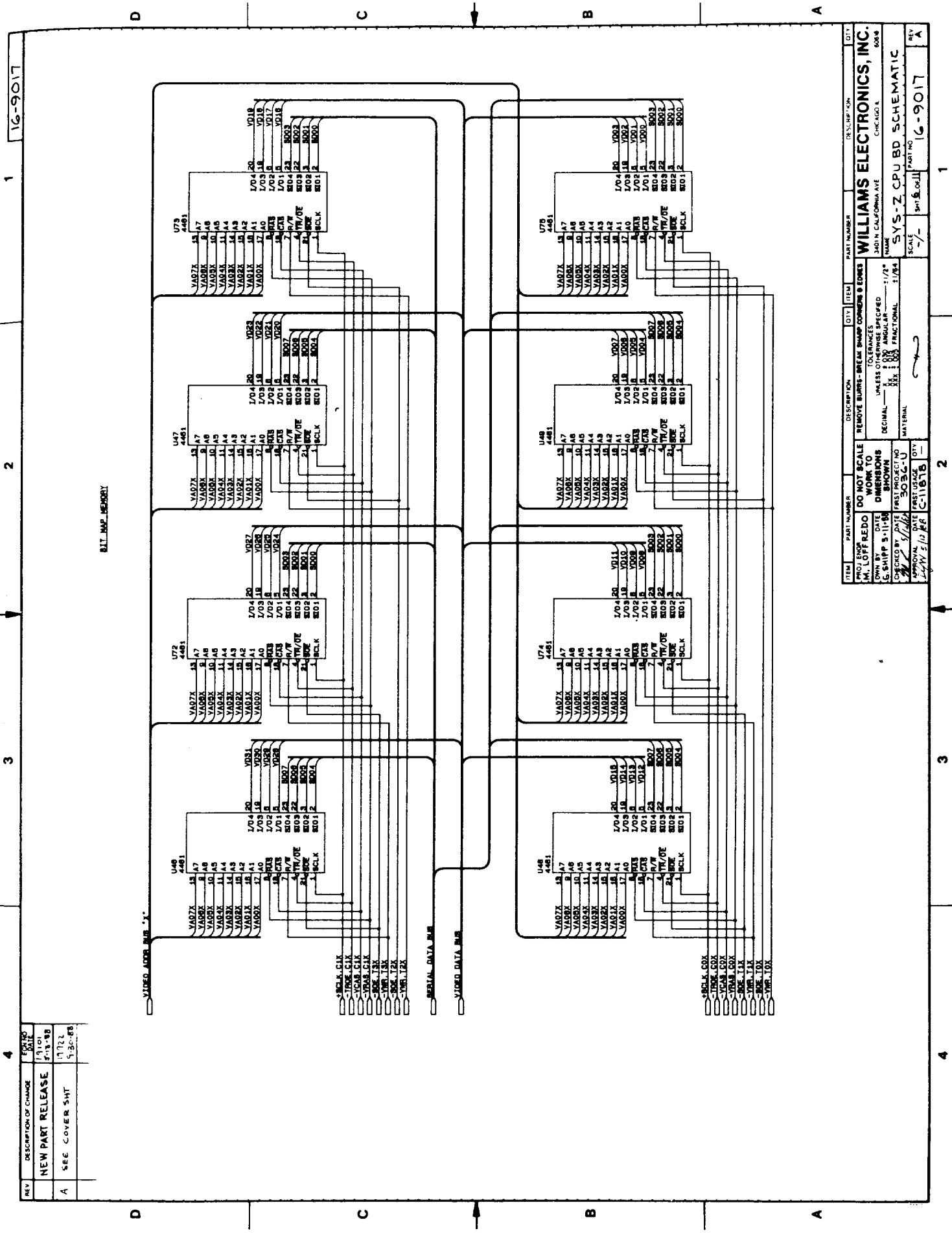
REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	11/01/88
2	A SEE COVER SHT	11/22/88

ITEM	PART NUMBER	QTY	ITEM	DESCRIPTION	QTY	DESCRIPTION
U40	74ALS07	1	U41	74ALS07	1	74ALS07
U42	74ALS07	1	U43	74ALS07	1	74ALS07
U44	74ALS07	1	U45	74ALS07	1	74ALS07
U46	74ALS07	1	U47	74ALS07	1	74ALS07
U48	74ALS07	1	U49	74ALS07	1	74ALS07
U50	74ALS07	1	U51	74ALS07	1	74ALS07
U52	74ALS07	1	U53	74ALS07	1	74ALS07
U54	74ALS07	1	U55	74ALS07	1	74ALS07
U56	74ALS07	1	U57	74ALS07	1	74ALS07
U58	74ALS07	1	U59	74ALS07	1	74ALS07
U60	74ALS07	1	U61	74ALS07	1	74ALS07
U62	74ALS07	1	U63	74ALS07	1	74ALS07
U64	74ALS07	1	U65	74ALS07	1	74ALS07
U66	74ALS07	1	U67	74ALS07	1	74ALS07
U68	74ALS07	1	U69	74ALS07	1	74ALS07
U70	74ALS07	1	U71	74ALS07	1	74ALS07
U72	74ALS07	1	U73	74ALS07	1	74ALS07
U74	74ALS07	1	U75	74ALS07	1	74ALS07
U77	74ALS07	1	U78	74ALS07	1	74ALS07
U80	74ALS07	1	U81	74ALS07	1	74ALS07
U83	74ALS07	1	U84	74ALS07	1	74ALS07
U87	74ALS07	1	U88	74ALS07	1	74ALS07
U91	74ALS07	1	U92	74ALS07	1	74ALS07
U95	74ALS07	1	U96	74ALS07	1	74ALS07
U99	74ALS07	1	U100	74ALS07	1	74ALS07

ITEM	PART NUMBER	QTY	DESCRIPTION
U40	74ALS07	1	74ALS07
U41	74ALS07	1	74ALS07
U42	74ALS07	1	74ALS07
U43	74ALS07	1	74ALS07
U44	74ALS07	1	74ALS07
U45	74ALS07	1	74ALS07
U46	74ALS07	1	74ALS07
U47	74ALS07	1	74ALS07
U48	74ALS07	1	74ALS07
U49	74ALS07	1	74ALS07
U50	74ALS07	1	74ALS07
U51	74ALS07	1	74ALS07
U52	74ALS07	1	74ALS07
U53	74ALS07	1	74ALS07
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U56	74ALS07	1	74ALS07
U57	74ALS07	1	74ALS07
U58	74ALS07	1	74ALS07
U59	74ALS07	1	74ALS07
U60	74ALS07	1	74ALS07
U61	74ALS07	1	74ALS07
U62	74ALS07	1	74ALS07
U63	74ALS07	1	74ALS07
U64	74ALS07	1	74ALS07
U65	74ALS07	1	74ALS07
U66	74ALS07	1	74ALS07
U67	74ALS07	1	74ALS07
U68	74ALS07	1	74ALS07
U69	74ALS07	1	74ALS07
U70	74ALS07	1	74ALS07
U71	74ALS07	1	74ALS07
U72	74ALS07	1	74ALS07
U73	74ALS07	1	74ALS07
U74	74ALS07	1	74ALS07
U75	74ALS07	1	74ALS07
U76	74ALS07	1	74ALS07
U77	74ALS07	1	74ALS07
U78	74ALS07	1	74ALS07
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U82	74ALS07	1	74ALS07
U83	74ALS07	1	74ALS07
U84	74ALS07	1	74ALS07
U85	74ALS07	1	74ALS07
U86	74ALS07	1	74ALS07
U87	74ALS07	1	74ALS07
U88	74ALS07	1	74ALS07
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U93	74ALS07	1	74ALS07
U94	74ALS07	1	74ALS07
U95	74ALS07	1	74ALS07
U96	74ALS07	1	74ALS07
U97	74ALS07	1	74ALS07
U98	74ALS07	1	74ALS07
U99	74ALS07	1	74ALS07
U100	74ALS07	1	74ALS07

ITEM	PART NUMBER	QTY	DESCRIPTION
U40	74ALS07	1	74ALS07
U41	74ALS07	1	74ALS07
U42	74ALS07	1	74ALS07
U43	74ALS07	1	74ALS07
U44	74ALS07	1	74ALS07
U45	74ALS07	1	74ALS07
U46	74ALS07	1	74ALS07
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U63	74ALS07	1	74ALS07
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U67	74ALS07	1	74ALS07
U68	74ALS07	1	74ALS07
U69	74ALS07	1	74ALS07
U70	74ALS07	1	74ALS07
U71	74ALS07	1	74ALS07
U72	74ALS07	1	74ALS07
U73	74ALS07	1	74ALS07
U74	74ALS07	1	74ALS07
U75	74ALS07	1	74ALS07
U76	74ALS07	1	74ALS07
U77	74ALS07	1	74ALS07
U78	74ALS07	1	74ALS07
U79	74ALS07	1	74ALS07
U80	74ALS07	1	74ALS07
U81	74ALS07	1	74ALS07
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U89	74ALS07	1	74ALS07
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U93	74ALS07	1	74ALS07
U94	74ALS07	1	74ALS07
U95	74ALS07	1	74ALS07
U96	74ALS07	1	74ALS07
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U98	74ALS07	1	74ALS07
U99	74ALS07	1	74ALS07
U100	74ALS07	1	74ALS07

WILLIAMS ELECTRONICS, INC.
16-9017



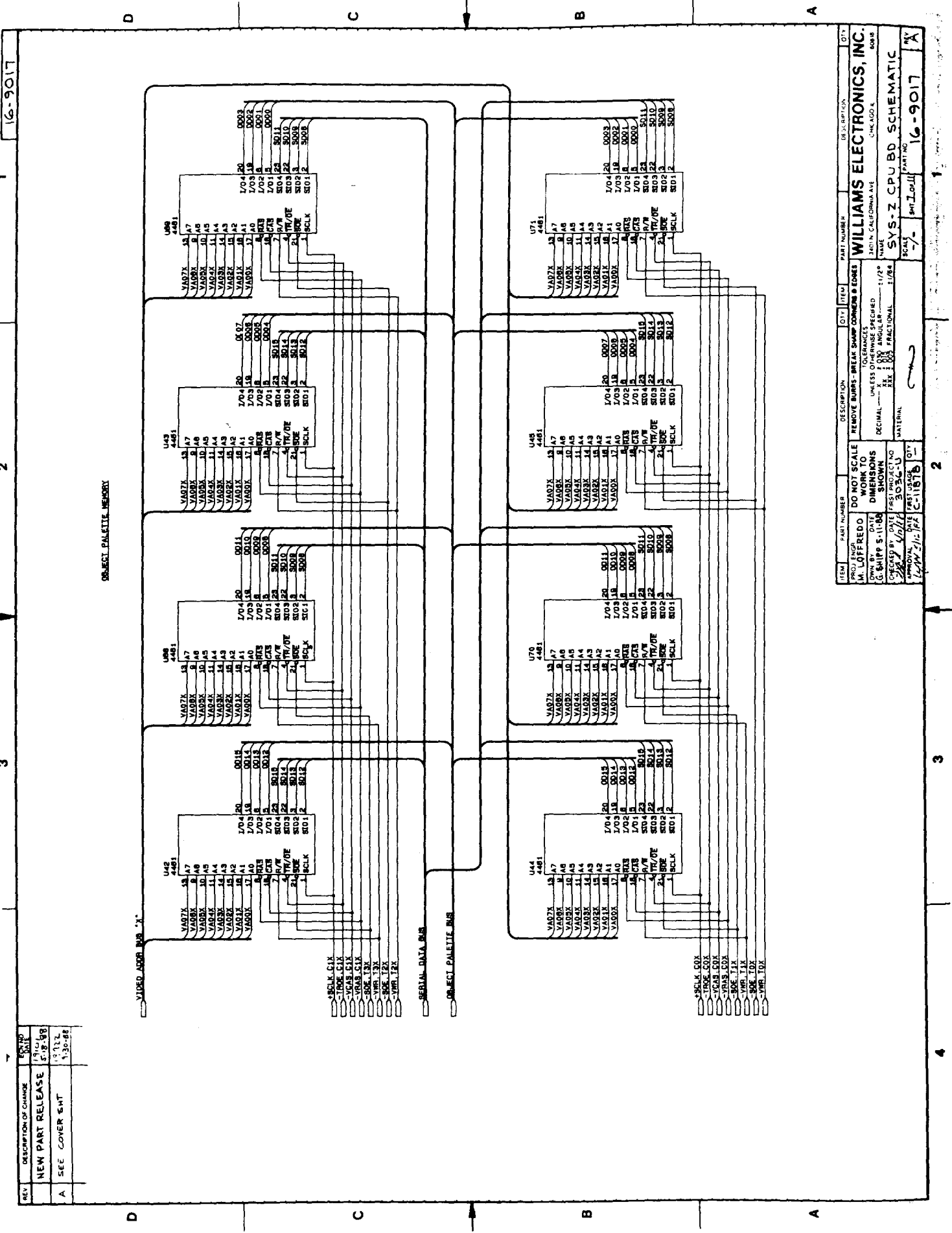
BIT MAP MEMORY

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	9/10/81
2	SEE COVER SHT	5-30-83

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	QTY	REV
1	U73	4481	13	U73	4481	1
2	U74	4481	13	U74	4481	1
3	U75	4481	13	U75	4481	1
4	U76	4481	13	U76	4481	1
5	U77	4481	13	U77	4481	1
6	U78	4481	13	U78	4481	1
7	U79	4481	13	U79	4481	1
8	U80	4481	13	U80	4481	1
9	U81	4481	13	U81	4481	1
10	U82	4481	13	U82	4481	1
11	U83	4481	13	U83	4481	1
12	U84	4481	13	U84	4481	1
13	U85	4481	13	U85	4481	1
14	U86	4481	13	U86	4481	1
15	U87	4481	13	U87	4481	1
16	U88	4481	13	U88	4481	1
17	U89	4481	13	U89	4481	1
18	U90	4481	13	U90	4481	1
19	U91	4481	13	U91	4481	1
20	U92	4481	13	U92	4481	1
21	U93	4481	13	U93	4481	1
22	U94	4481	13	U94	4481	1
23	U95	4481	13	U95	4481	1
24	U96	4481	13	U96	4481	1
25	U97	4481	13	U97	4481	1
26	U98	4481	13	U98	4481	1
27	U99	4481	13	U99	4481	1
28	U100	4481	13	U100	4481	1

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	QTY	REV
1	U47	4481	13	U47	4481	1
2	U48	4481	13	U48	4481	1
3	U49	4481	13	U49	4481	1
4	U50	4481	13	U50	4481	1
5	U51	4481	13	U51	4481	1
6	U52	4481	13	U52	4481	1
7	U53	4481	13	U53	4481	1
8	U54	4481	13	U54	4481	1
9	U55	4481	13	U55	4481	1
10	U56	4481	13	U56	4481	1
11	U57	4481	13	U57	4481	1
12	U58	4481	13	U58	4481	1
13	U59	4481	13	U59	4481	1
14	U60	4481	13	U60	4481	1
15	U61	4481	13	U61	4481	1
16	U62	4481	13	U62	4481	1
17	U63	4481	13	U63	4481	1
18	U64	4481	13	U64	4481	1
19	U65	4481	13	U65	4481	1
20	U66	4481	13	U66	4481	1
21	U67	4481	13	U67	4481	1
22	U68	4481	13	U68	4481	1
23	U69	4481	13	U69	4481	1
24	U70	4481	13	U70	4481	1
25	U71	4481	13	U71	4481	1
26	U72	4481	13	U72	4481	1
27	U73	4481	13	U73	4481	1
28	U74	4481	13	U74	4481	1
29	U75	4481	13	U75	4481	1
30	U76	4481	13	U76	4481	1
31	U77	4481	13	U77	4481	1
32	U78	4481	13	U78	4481	1
33	U79	4481	13	U79	4481	1
34	U80	4481	13	U80	4481	1
35	U81	4481	13	U81	4481	1
36	U82	4481	13	U82	4481	1
37	U83	4481	13	U83	4481	1
38	U84	4481	13	U84	4481	1
39	U85	4481	13	U85	4481	1
40	U86	4481	13	U86	4481	1
41	U87	4481	13	U87	4481	1
42	U88	4481	13	U88	4481	1
43	U89	4481	13	U89	4481	1
44	U90	4481	13	U90	4481	1
45	U91	4481	13	U91	4481	1
46	U92	4481	13	U92	4481	1
47	U93	4481	13	U93	4481	1
48	U94	4481	13	U94	4481	1
49	U95	4481	13	U95	4481	1
50	U96	4481	13	U96	4481	1
51	U97	4481	13	U97	4481	1
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53	U99	4481	13	U99	4481	1
54	U100	4481	13	U100	4481	1

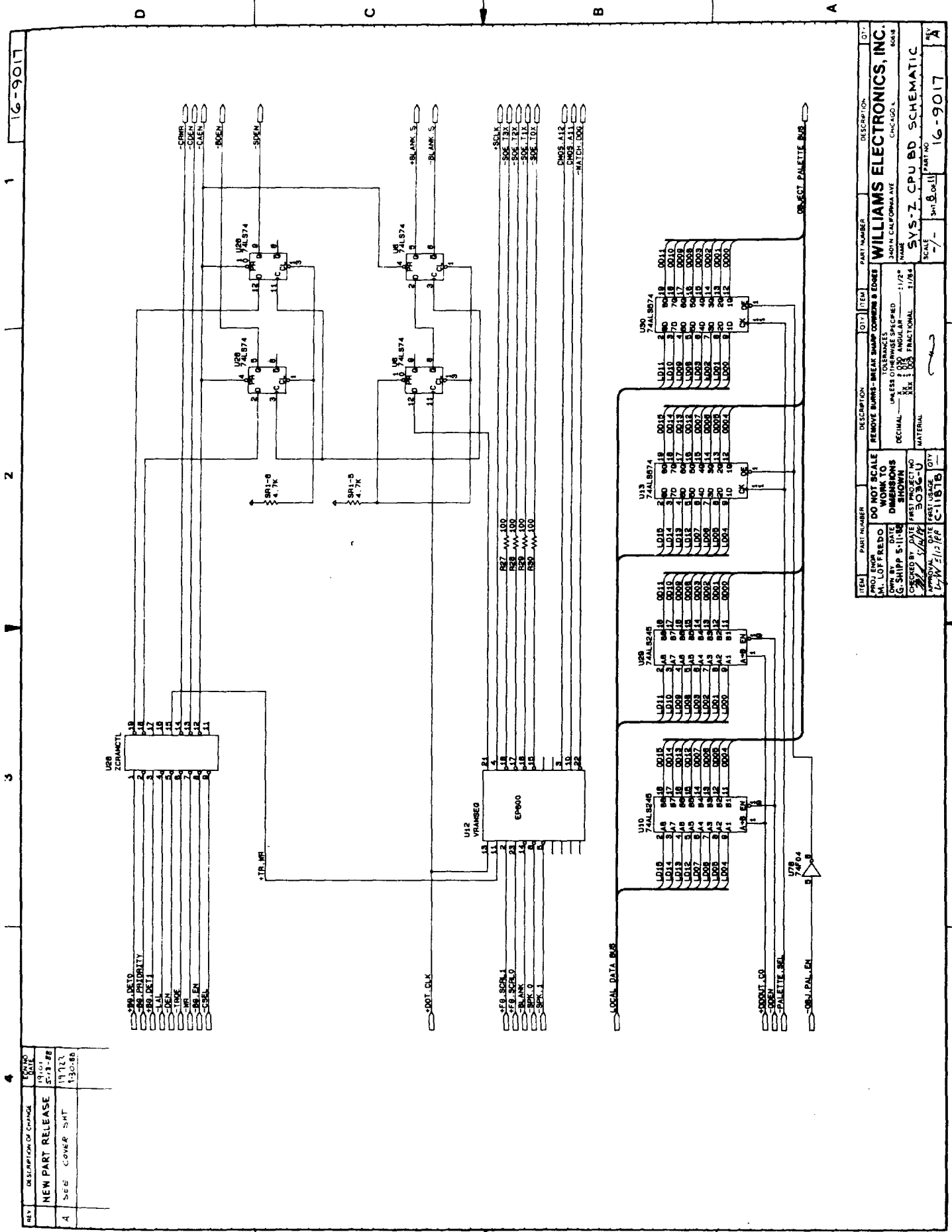
WILLIAMS ELECTRONICS, INC.
 2401 N. CALIFORNIA AVE
 CHICAGO, IL 60640
 SYS-Z CPU BD SCHEMATIC
 PART NO 16-9017
 REV A



OBJECT PALETTE MEMORY

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	12-16-88
2	SEE COVER SMT	1-30-88

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	U44 4481	VAR7X 13	1	1	U76 4481	VAR7X 13	1
2	U44 4481	VAR7X 14	1	2	U76 4481	VAR7X 14	1
3	U44 4481	VAR7X 15	1	3	U76 4481	VAR7X 15	1
4	U44 4481	VAR7X 16	1	4	U76 4481	VAR7X 16	1
5	U44 4481	VAR7X 17	1	5	U76 4481	VAR7X 17	1
6	U44 4481	VAR7X 18	1	6	U76 4481	VAR7X 18	1
7	U44 4481	VAR7X 19	1	7	U76 4481	VAR7X 19	1
8	U44 4481	VAR7X 20	1	8	U76 4481	VAR7X 20	1
9	U44 4481	VAR7X 21	1	9	U76 4481	VAR7X 21	1
10	U44 4481	VAR7X 22	1	10	U76 4481	VAR7X 22	1
11	U44 4481	VAR7X 23	1	11	U76 4481	VAR7X 23	1
12	U44 4481	VAR7X 24	1	12	U76 4481	VAR7X 24	1
13	U44 4481	VAR7X 25	1	13	U76 4481	VAR7X 25	1
14	U44 4481	VAR7X 26	1	14	U76 4481	VAR7X 26	1
15	U44 4481	VAR7X 27	1	15	U76 4481	VAR7X 27	1
16	U44 4481	VAR7X 28	1	16	U76 4481	VAR7X 28	1
17	U44 4481	VAR7X 29	1	17	U76 4481	VAR7X 29	1
18	U44 4481	VAR7X 30	1	18	U76 4481	VAR7X 30	1
19	U44 4481	VAR7X 31	1	19	U76 4481	VAR7X 31	1
20	U44 4481	VAR7X 32	1	20	U76 4481	VAR7X 32	1
21	U44 4481	VAR7X 33	1	21	U76 4481	VAR7X 33	1
22	U44 4481	VAR7X 34	1	22	U76 4481	VAR7X 34	1
23	U44 4481	VAR7X 35	1	23	U76 4481	VAR7X 35	1
24	U44 4481	VAR7X 36	1	24	U76 4481	VAR7X 36	1
25	U44 4481	VAR7X 37	1	25	U76 4481	VAR7X 37	1
26	U44 4481	VAR7X 38	1	26	U76 4481	VAR7X 38	1
27	U44 4481	VAR7X 39	1	27	U76 4481	VAR7X 39	1
28	U44 4481	VAR7X 40	1	28	U76 4481	VAR7X 40	1
29	U44 4481	VAR7X 41	1	29	U76 4481	VAR7X 41	1
30	U44 4481	VAR7X 42	1	30	U76 4481	VAR7X 42	1
31	U44 4481	VAR7X 43	1	31	U76 4481	VAR7X 43	1
32	U44 4481	VAR7X 44	1	32	U76 4481	VAR7X 44	1
33	U44 4481	VAR7X 45	1	33	U76 4481	VAR7X 45	1
34	U44 4481	VAR7X 46	1	34	U76 4481	VAR7X 46	1
35	U44 4481	VAR7X 47	1	35	U76 4481	VAR7X 47	1
36	U44 4481	VAR7X 48	1	36	U76 4481	VAR7X 48	1
37	U44 4481	VAR7X 49	1	37	U76 4481	VAR7X 49	1
38	U44 4481	VAR7X 50	1	38	U76 4481	VAR7X 50	1
39	U44 4481	VAR7X 51	1	39	U76 4481	VAR7X 51	1
40	U44 4481	VAR7X 52	1	40	U76 4481	VAR7X 52	1
41	U44 4481	VAR7X 53	1	41	U76 4481	VAR7X 53	1
42	U44 4481	VAR7X 54	1	42	U76 4481	VAR7X 54	1
43	U44 4481	VAR7X 55	1	43	U76 4481	VAR7X 55	1
44	U44 4481	VAR7X 56	1	44	U76 4481	VAR7X 56	1
45	U44 4481	VAR7X 57	1	45	U76 4481	VAR7X 57	1
46	U44 4481	VAR7X 58	1	46	U76 4481	VAR7X 58	1
47	U44 4481	VAR7X 59	1	47	U76 4481	VAR7X 59	1
48	U44 4481	VAR7X 60	1	48	U76 4481	VAR7X 60	1
49	U44 4481	VAR7X 61	1	49	U76 4481	VAR7X 61	1
50	U44 4481	VAR7X 62	1	50	U76 4481	VAR7X 62	1
51	U44 4481	VAR7X 63	1	51	U76 4481	VAR7X 63	1
52	U44 4481	VAR7X 64	1	52	U76 4481	VAR7X 64	1
53	U44 4481	VAR7X 65	1	53	U76 4481	VAR7X 65	1
54	U44 4481	VAR7X 66	1	54	U76 4481	VAR7X 66	1
55	U44 4481	VAR7X 67	1	55	U76 4481	VAR7X 67	1
56	U44 4481	VAR7X 68	1	56	U76 4481	VAR7X 68	1
57	U44 4481	VAR7X 69	1	57	U76 4481	VAR7X 69	1
58	U44 4481	VAR7X 70	1	58	U76 4481	VAR7X 70	1
59	U44 4481	VAR7X 71	1	59	U76 4481	VAR7X 71	1
60	U44 4481	VAR7X 72	1	60	U76 4481	VAR7X 72	1
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62	U44 4481	VAR7X 74	1	62	U76 4481	VAR7X 74	1
63	U44 4481	VAR7X 75	1	63	U76 4481	VAR7X 75	1
64	U44 4481	VAR7X 76	1	64	U76 4481	VAR7X 76	1
65	U44 4481	VAR7X 77	1	65	U76 4481	VAR7X 77	1
66	U44 4481	VAR7X 78	1	66	U76 4481	VAR7X 78	1
67	U44 4481	VAR7X 79	1	67	U76 4481	VAR7X 79	1
68	U44 4481	VAR7X 80	1	68	U76 4481	VAR7X 80	1
69	U44 4481	VAR7X 81	1	69	U76 4481	VAR7X 81	1
70	U44 4481	VAR7X 82	1	70	U76 4481	VAR7X 82	1
71	U44 4481	VAR7X 83	1	71	U76 4481	VAR7X 83	1
72	U44 4481	VAR7X 84	1	72	U76 4481	VAR7X 84	1
73	U44 4481	VAR7X 85	1	73	U76 4481	VAR7X 85	1
74	U44 4481	VAR7X 86	1	74	U76 4481	VAR7X 86	1
75	U44 4481	VAR7X 87	1	75	U76 4481	VAR7X 87	1
76	U44 4481	VAR7X 88	1	76	U76 4481	VAR7X 88	1
77	U44 4481	VAR7X 89	1	77	U76 4481	VAR7X 89	1
78	U44 4481	VAR7X 90	1	78	U76 4481	VAR7X 90	1
79	U44 4481	VAR7X 91	1	79	U76 4481	VAR7X 91	1
80	U44 4481	VAR7X 92	1	80	U76 4481	VAR7X 92	1
81	U44 4481	VAR7X 93	1	81	U76 4481	VAR7X 93	1
82	U44 4481	VAR7X 94	1	82	U76 4481	VAR7X 94	1
83	U44 4481	VAR7X 95	1	83	U76 4481	VAR7X 95	1
84	U44 4481	VAR7X 96	1	84	U76 4481	VAR7X 96	1
85	U44 4481	VAR7X 97	1	85	U76 4481	VAR7X 97	1
86	U44 4481	VAR7X 98	1	86	U76 4481	VAR7X 98	1
87	U44 4481	VAR7X 99	1	87	U76 4481	VAR7X 99	1
88	U44 4481	VAR7X 100	1	88	U76 4481	VAR7X 100	1
89	U44 4481	VAR7X 101	1	89	U76 4481	VAR7X 101	1
90	U44 4481	VAR7X 102	1	90	U76 4481	VAR7X 102	1
91	U44 4481	VAR7X 103	1	91	U76 4481	VAR7X 103	1
92	U44 4481	VAR7X 104	1	92	U76 4481	VAR7X 104	1
93	U44 4481	VAR7X 105	1	93	U76 4481	VAR7X 105	1
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95	U44 4481	VAR7X 107	1	95	U76 4481	VAR7X 107	1
96	U44 4481	VAR7X 108	1	96	U76 4481	VAR7X 108	1
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99	U44 4481	VAR7X 111	1	99	U76 4481	VAR7X 111	1
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103	U44 4481	VAR7X 115	1	103	U76 4481	VAR7X 115	1
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105	U44 4481	VAR7X 117	1	105	U76 4481	VAR7X 117	1
106	U44 4481	VAR7X 118	1	106	U76 4481	VAR7X 118	1
107	U44 4481	VAR7X 119	1	107	U76 4481	VAR7X 119	1
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117	U44 4481	VAR7X 129	1	117	U76 4481	VAR7X 129	1
118	U44 4481	VAR7X 130	1	118	U76 4481	VAR7X 130	1
119	U44 4481	VAR7X 131	1	119	U76 4481	VAR7X 131	1
120	U44 4481	VAR7X 132	1	120	U76 4481	VAR7X 132	1
121	U44 4481	VAR7X 133	1	121	U76 4481	VAR7X 133	1
122	U44 4481	VAR7X 134	1	122	U76 4481	VAR7X 134	1
123	U44 4481	VAR7X 135	1	123	U76 4481	VAR7X 135	1
124	U44 448						



REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	1971
2	SEE COVER SMT	1972
3		1973
4		1974

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	DO NOT SCALE	REMOVE BURRS - BREAK SWAGE CORNERS & EDGES		1	WILLIAMS ELECTRONICS, INC.	CHICAGO, ILL.	8068
2	WORK TO DIMENSIONS SHOWN	UNLESS OTHERWISE SPECIFIED		2	3401 N. CALIFORNIA AVE.		
3	DATE	DECIMAL	1/16"	3	NAME		
4	DATE	FRACTIONAL	1/8"	4	SYS-Z CPU BD SCHEMATIC		
5	DATE	FRACTIONAL	1/8"	5	SCALE	1/8" = 1"	
6	DATE	FRACTIONAL	1/8"	6	PART NO.	16-9017	
7	DATE	FRACTIONAL	1/8"	7			
8	DATE	FRACTIONAL	1/8"	8			
9	DATE	FRACTIONAL	1/8"	9			
10	DATE	FRACTIONAL	1/8"	10			
11	DATE	FRACTIONAL	1/8"	11			
12	DATE	FRACTIONAL	1/8"	12			
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14	DATE	FRACTIONAL	1/8"	14			
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17	DATE	FRACTIONAL	1/8"	17			
18	DATE	FRACTIONAL	1/8"	18			
19	DATE	FRACTIONAL	1/8"	19			
20	DATE	FRACTIONAL	1/8"	20			
21	DATE	FRACTIONAL	1/8"	21			
22	DATE	FRACTIONAL	1/8"	22			
23	DATE	FRACTIONAL	1/8"	23			
24	DATE	FRACTIONAL	1/8"	24			
25	DATE	FRACTIONAL	1/8"	25			
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41	DATE	FRACTIONAL	1/8"	41			
42	DATE	FRACTIONAL	1/8"	42			
43	DATE	FRACTIONAL	1/8"	43			
44	DATE	FRACTIONAL	1/8"	44			
45	DATE	FRACTIONAL	1/8"	45			
46	DATE	FRACTIONAL	1/8"	46			
47	DATE	FRACTIONAL	1/8"	47			
48	DATE	FRACTIONAL	1/8"	48			
49	DATE	FRACTIONAL	1/8"	49			
50	DATE	FRACTIONAL	1/8"	50			
51	DATE	FRACTIONAL	1/8"	51			
52	DATE	FRACTIONAL	1/8"	52			
53	DATE	FRACTIONAL	1/8"	53			
54	DATE	FRACTIONAL	1/8"	54			
55	DATE	FRACTIONAL	1/8"	55			
56	DATE	FRACTIONAL	1/8"	56			
57	DATE	FRACTIONAL	1/8"	57			
58	DATE	FRACTIONAL	1/8"	58			
59	DATE	FRACTIONAL	1/8"	59			
60	DATE	FRACTIONAL	1/8"	60			
61	DATE	FRACTIONAL	1/8"	61			
62	DATE	FRACTIONAL	1/8"	62			
63	DATE	FRACTIONAL	1/8"	63			
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65	DATE	FRACTIONAL	1/8"	65			
66	DATE	FRACTIONAL	1/8"	66			
67	DATE	FRACTIONAL	1/8"	67			
68	DATE	FRACTIONAL	1/8"	68			
69	DATE	FRACTIONAL	1/8"	69			
70	DATE	FRACTIONAL	1/8"	70			
71	DATE	FRACTIONAL	1/8"	71			
72	DATE	FRACTIONAL	1/8"	72			
73	DATE	FRACTIONAL	1/8"	73			
74	DATE	FRACTIONAL	1/8"	74			
75	DATE	FRACTIONAL	1/8"	75			
76	DATE	FRACTIONAL	1/8"	76			
77	DATE	FRACTIONAL	1/8"	77			
78	DATE	FRACTIONAL	1/8"	78			
79	DATE	FRACTIONAL	1/8"	79			
80	DATE	FRACTIONAL	1/8"	80			
81	DATE	FRACTIONAL	1/8"	81			
82	DATE	FRACTIONAL	1/8"	82			
83	DATE	FRACTIONAL	1/8"	83			
84	DATE	FRACTIONAL	1/8"	84			
85	DATE	FRACTIONAL	1/8"	85			
86	DATE	FRACTIONAL	1/8"	86			
87	DATE	FRACTIONAL	1/8"	87			
88	DATE	FRACTIONAL	1/8"	88			
89	DATE	FRACTIONAL	1/8"	89			
90	DATE	FRACTIONAL	1/8"	90			
91	DATE	FRACTIONAL	1/8"	91			
92	DATE	FRACTIONAL	1/8"	92			
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94	DATE	FRACTIONAL	1/8"	94			
95	DATE	FRACTIONAL	1/8"	95			
96	DATE	FRACTIONAL	1/8"	96			
97	DATE	FRACTIONAL	1/8"	97			
98	DATE	FRACTIONAL	1/8"	98			
99	DATE	FRACTIONAL	1/8"	99			
100	DATE	FRACTIONAL	1/8"	100			

16-9017

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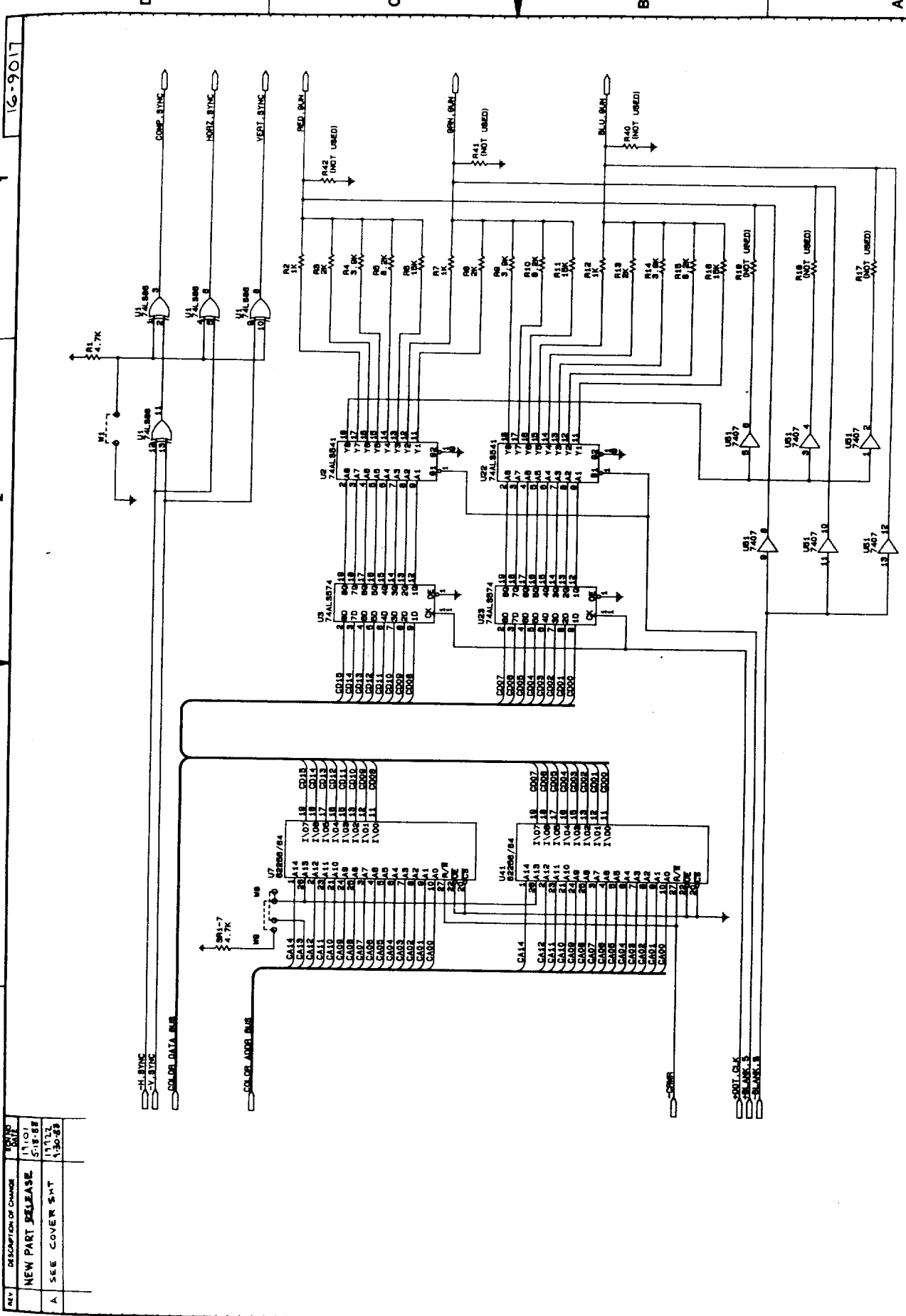
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REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	11/01/58
2	SEE COVER SMT	11/12/58
3		1/30/59



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	W-107	REMOVE BURR-BREAK SWAMP CONTACTS & ERRORS		1	W-107	REMOVE BURR-BREAK SWAMP CONTACTS & ERRORS	
2	W-108	UNLESS OTHERWISE SPECIFIED		2	W-108	UNLESS OTHERWISE SPECIFIED	
3	W-109	DECIMAL	1/100	3	W-109	DECIMAL	1/100
4	W-110	FRACTIONAL	1/25	4	W-110	FRACTIONAL	1/25
5	W-111	MATERIAL		5	W-111	MATERIAL	

PROJ. ENGR.	DATE	FIRST PROJECTING	QTY
M. LOFFREDO	5-11-68	3036-U	1
OWN BY	DATE	FIRST USAGE	QTY
G. SHIPP	5-11-68	C-1167B	1
CHECKED BY	DATE	FIRST USAGE	QTY
W. J. JONES	5-11-68	C-1167B	1
APPROVAL	DATE	FIRST USAGE	QTY
D. W. JONES	5-11-68	C-1167B	1

SCALE	PART NO.	DESCRIPTION
1/2"	16-9011	16-9017

16-9017

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	11/11/78

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

GAME NAME	3038	3038	3038
ASSY. NO.			
U50			
U51			
U52			
U53			
U54			
U55			
U56			
U57			
U58			
U59			
U60			
U61			
U62			
U63			
U64			
U65			
U66			
U67			
U68			
U69			
U70			
U71			
U72			
U73			
U74			
U75			
U76			

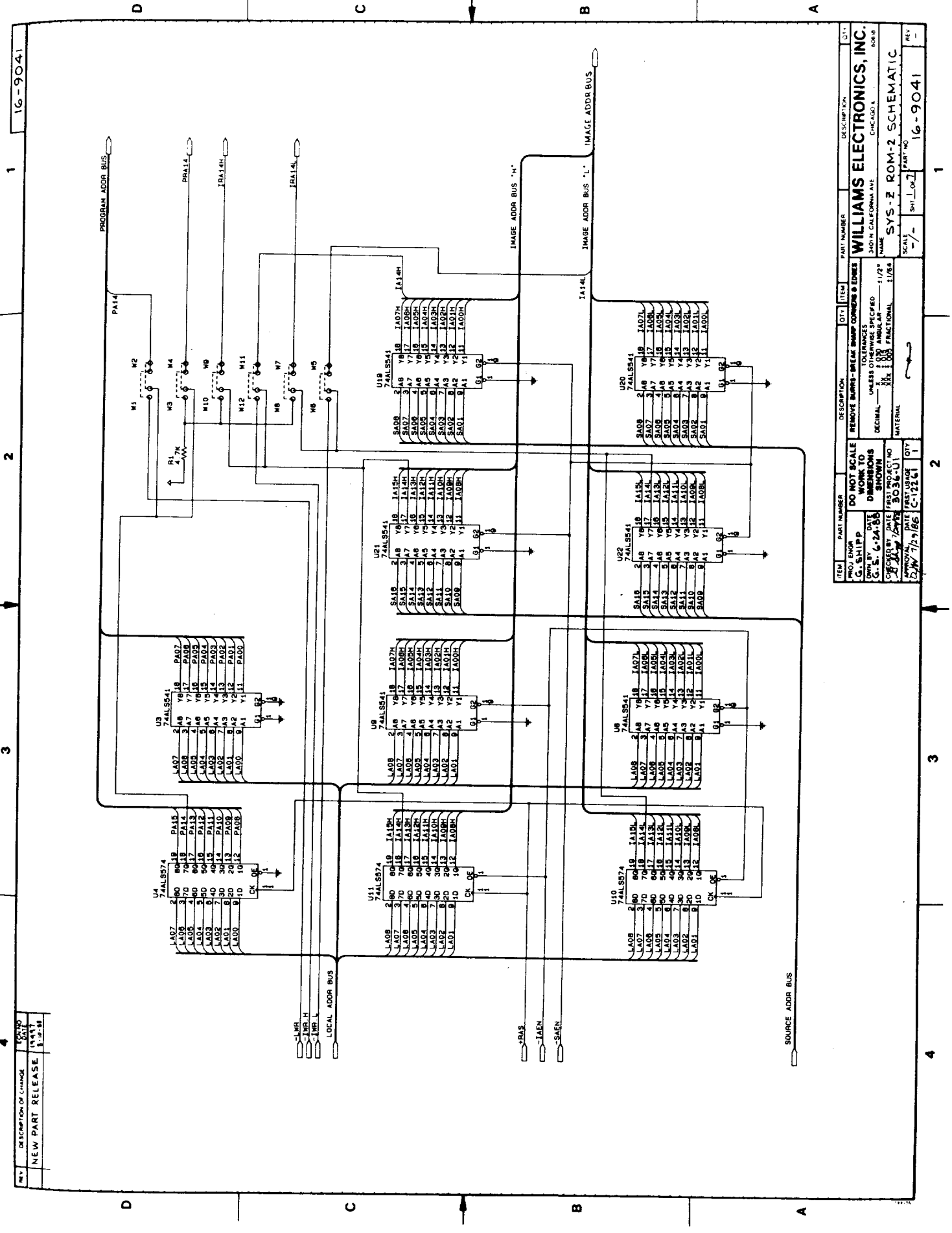
GAME NAME	3038	3038	3038
ASSY. NO.			
U77			
U78			
U79			
U80			
U81			
U82			
U83			
U84			
U85			
U86			
U87			
U88			
U89			
U90			
U91			
U92			
U93			
U94			

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
3		SEE CHART	GAME ROM SET	SEE CHART
2	1P-8800-219		LABEL, PCB IDENT.	1
1	C-12261		SYS-2 ROM 2 SUB-ASSY	1

BILL OF MATERIALS

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 18-9041

DO NOT SCALE DIMENSIONS SHOWN		REMOVE BURRS-BREAK SHARP CORNERS & EDGES UNLESS OTHERWISE SPECIFIED	
DECIMAL 1/16"	FRACTIONAL 1/8"	ANGULAR 1/2°	CHICAGO L 0019
DATE 6-24-88	PROJECT NO. 3036-U1	MATERIAL NONE	NAME WILLIAMS ELECTRONICS, INC.
CHECKED BY JAL	DATE 7/15/88	PART NO. C-12260-1	REV -
APPROVAL [Signature]	DATE 7/15/88	TITLE 12.02	CHICAGO L 0019



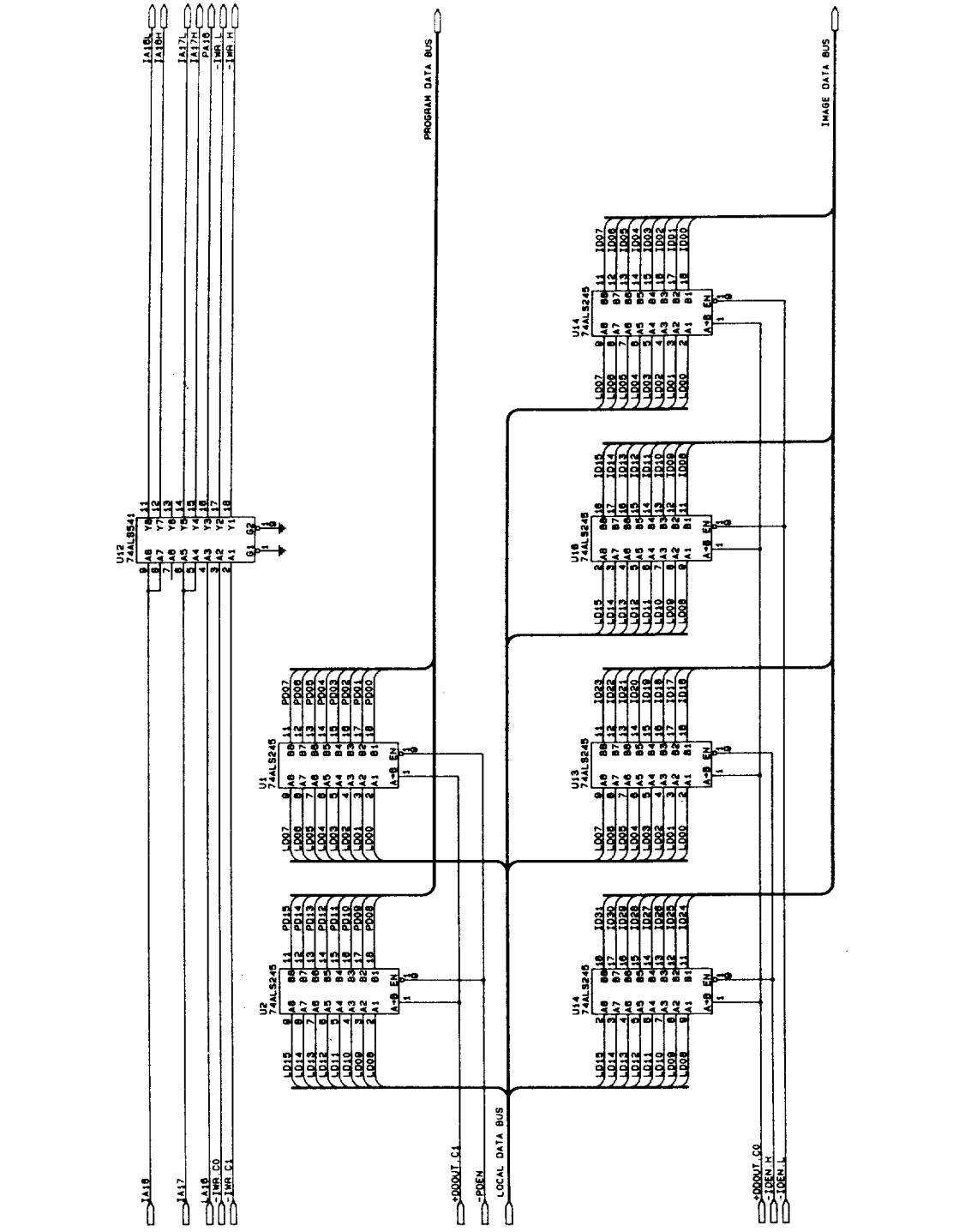
NEW PART RELEASE

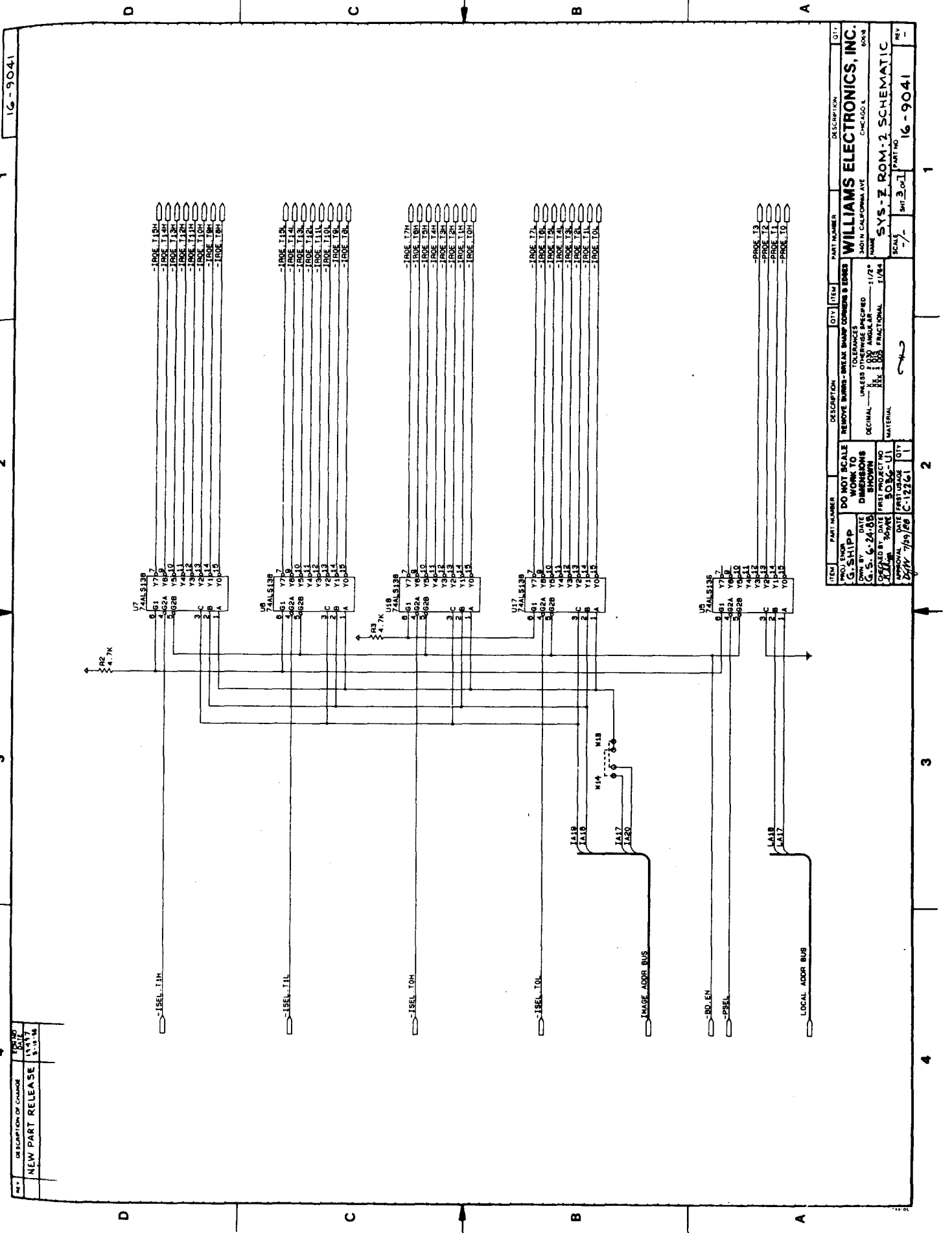
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	74ALS574	REMOVE BURR - BREAK SWAMP CORNERS & EDGES	1	1	74ALS574	1
2	74ALS541	REMOVE BURR - BREAK SWAMP CORNERS & EDGES	1	2	74ALS541	2
3	74ALS574	REMOVE BURR - BREAK SWAMP CORNERS & EDGES	1	3	74ALS574	3
4	74ALS541	REMOVE BURR - BREAK SWAMP CORNERS & EDGES	1	4	74ALS541	4

DO NOT SCALE WORK TO DIMENSIONS SHOWN
 TOLERANCES UNLESS SPECIFIED
 DECIMAL: 1/100 ANGLE: 1/12"
 FRACTIONAL: 1/64
 MATERIAL: 3036-U1
 FAST PROTECTING
 DATE: 7/29/85
 APPROVAL: C-12261

WILLIAMS ELECTRONICS, INC.
 JACON CALIFORNIA AVE
 CHICAGO, ILL
 NAME: SYS-2 ROM-2 SCHEMATIC
 SCALE: 16-9041
 PART NO: 16-9041
 REV: -

REV	DESCRIPTION OF CHANGE
1	NEW PART RELEASE





16-9041

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16-9041

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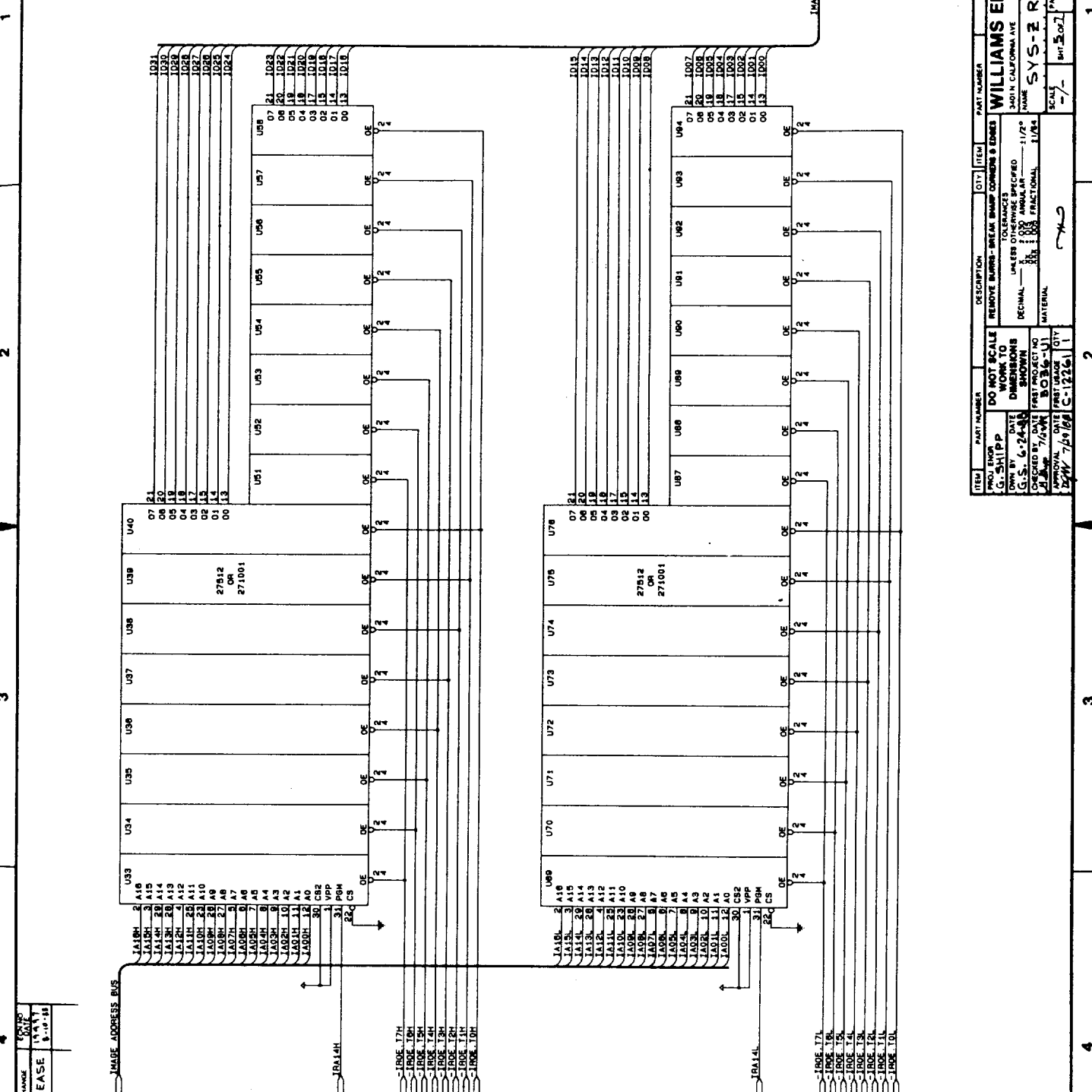
16-9041

1 2 3 4

16-9041

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
WILLIAMS ELECTRONICS, INC. 2001 CALIFORNIA AVE CHICO, CALIF. 95926							
PROJ. ENG. G. SHIPP DATE: 5-16-78 DRAWING NO: 100-1100 PART NO: 100-1100 MATERIAL: 3036-U1 APPROVAL: 2/11/78 DATE: 7/29/78 C-12261							
DO NOT SCALE WORK TO DIMENSIONS UNLESS OTHERWISE SPECIFIED DECIMAL: 1/16" FRACTIONAL: 1/16"							
REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES: DECIMAL: 1/16" FRACTIONAL: 1/16"							
SYST. Z. ROM-2 SCHEMATIC SCALE: 1/1"=1" PART NO: 16-9041 REV: -							

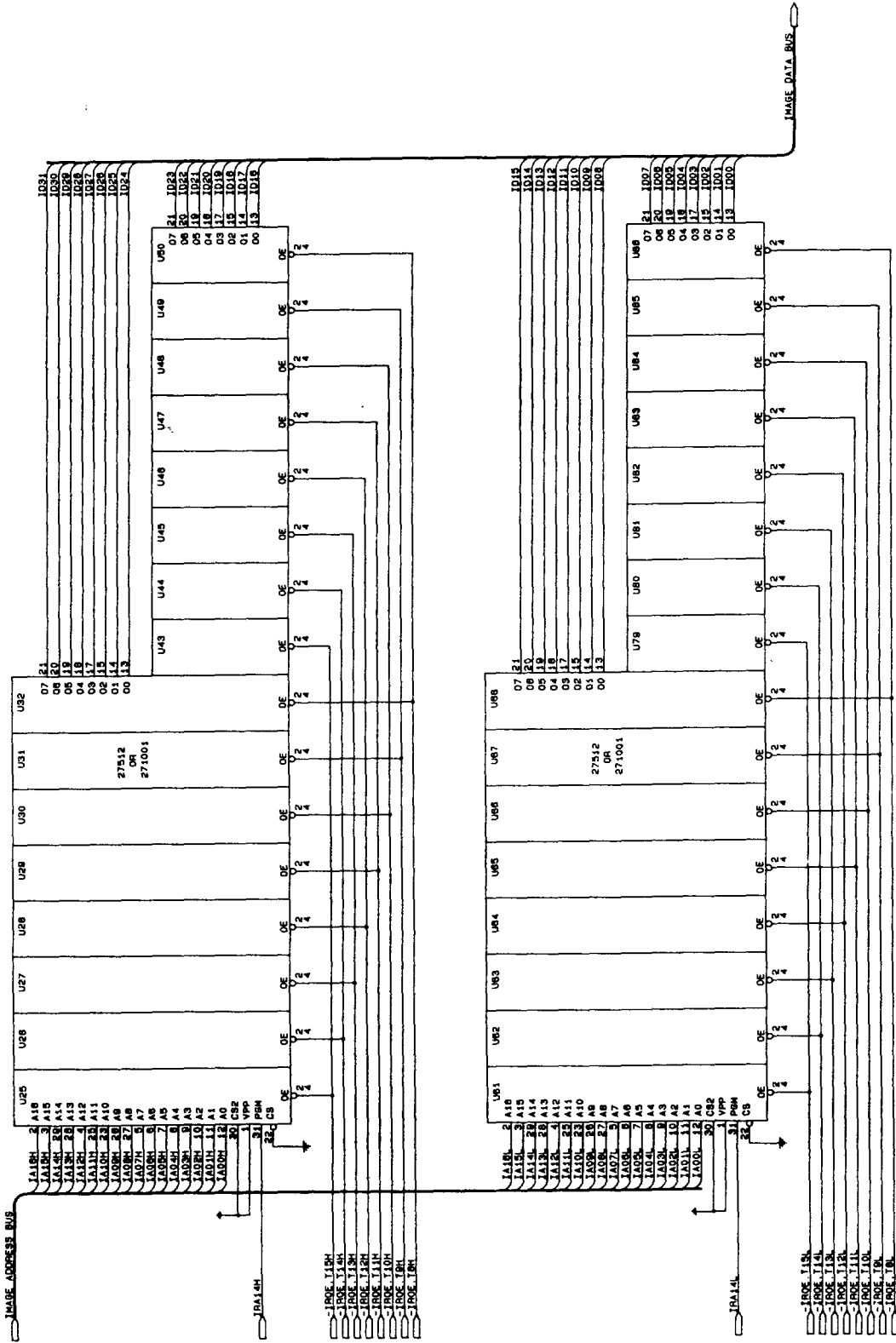
16-9041



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	G. SHIPP	REMOVE BURRS - BREAK SWAMP CONDENS & EDGES		PROJ ENGR	G. SHIPP	REMOVE BURRS - BREAK SWAMP CONDENS & EDGES	
DATE	6-24-68	UNLESS OTHERWISE SPECIFIED		DATE	6-24-68	UNLESS OTHERWISE SPECIFIED	
SCALE	AS SHOWN	DECIMAL - 1/16" ANGLE		SCALE	AS SHOWN	DECIMAL - 1/16" ANGLE	
APPROVED BY	WJW	PER OBJECT TO		APPROVED BY	WJW	PER OBJECT TO	
DRAWN	WJW	PART CASE - 1011		DRAWN	WJW	PART CASE - 1011	
MATERIAL	6061 (C-1236)			MATERIAL	6061 (C-1236)		
REV				REV			
DESCRIPTION OF CHANGE				DESCRIPTION OF CHANGE			
NEW PART RELEASE				NEW PART RELEASE			
DATE	6-10-68			DATE	6-10-68		

WILLIAMS ELECTRONICS, INC. CHICAGO, ILL. 60608
 SYS-2 ROM-2 SCHEMATIC
 PART NO 16-9041
 REV -

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	10/1/78



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	G. S. HILP	DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP CORNERS & EDGES		TOLERANCES UNLESS OTHERWISE SPECIFIED	
OWN BY	G. S. 6-24-88	DECIMAL		IN		ANGULAR	
DESIGNED BY	7/27/78	FIRST PROJECT NO	3036-U1	FRACTIONAL		F/64	
APPROVAL	DATE	FIRST ISSUE	QTY	MATERIAL			
1/28/78	1/28/88	C-12261	1				

WILLIAMS ELECTRONICS, INC.		CHICAGO, ILL.
3401 CALIFORNIA AVE		
SYS-Z ROM-2 SCHEMATIC		
SCALE	SHEET NO.	PART NO.
1/4"	16-9041	16-9041

REV	DESCRIPTION OF CHANGE	DATE	BY
1	NEW PART RELEASE	1-22-86	

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C-12037

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

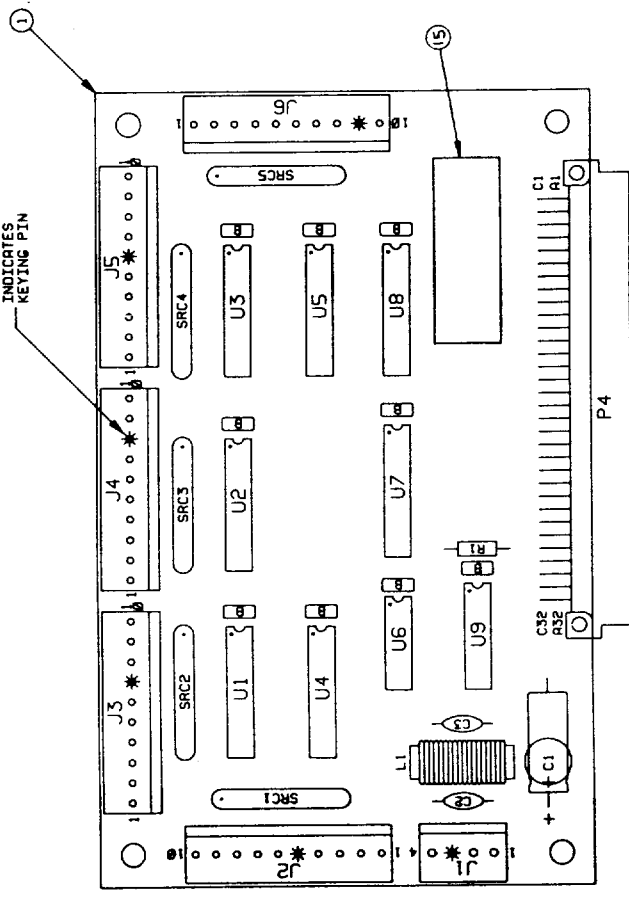
3J4 Functions

- 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

INDICATES KEYING PIN



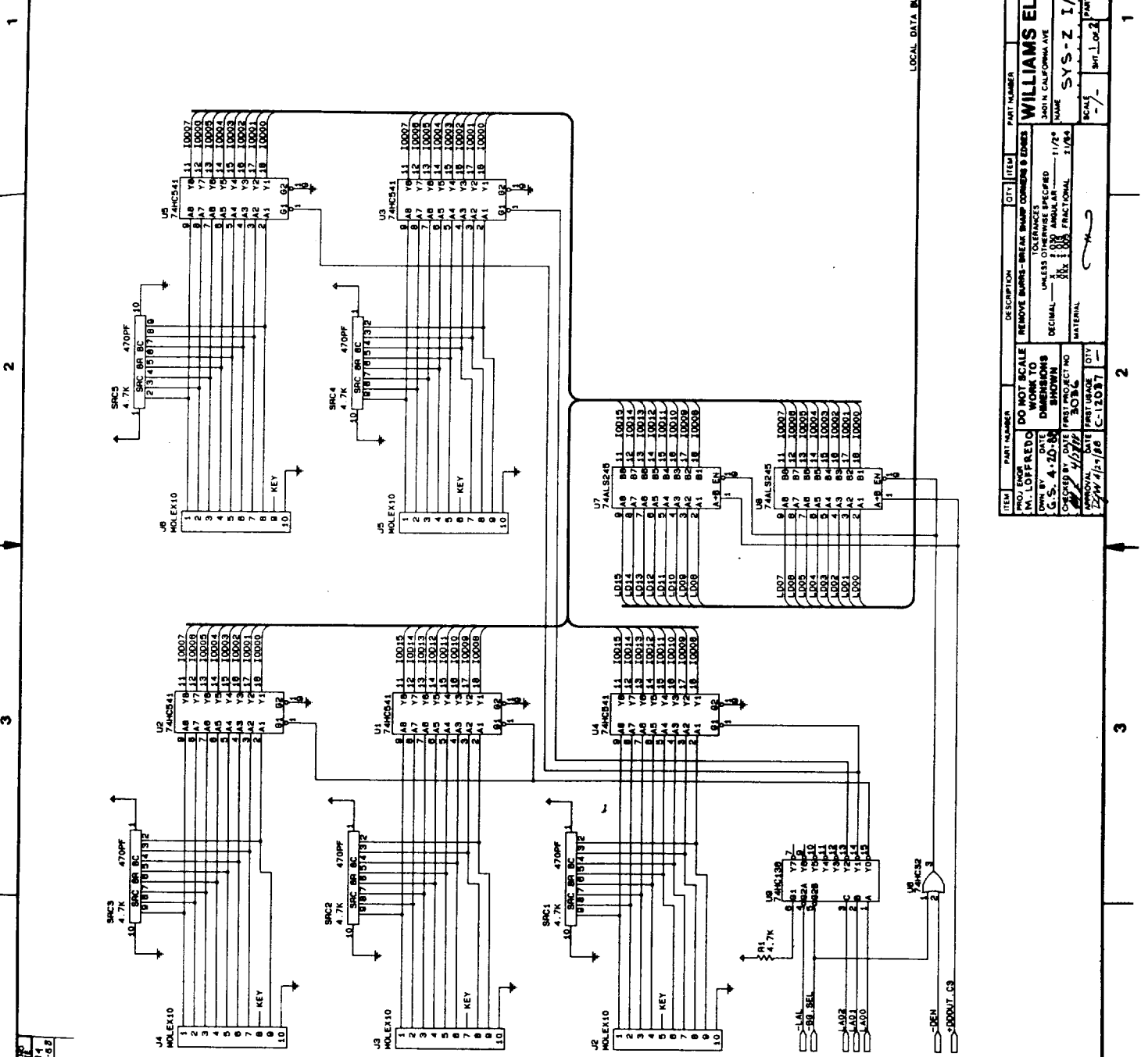
ITEM	PART NO.	PART DESCRIPTION	DESCRIPTION	QTY
15	16-8650		LABEL, PCB IDENT.	1
14	5792- 10826-00	P4	CONNECTOR, 64P EURO-DIN CARD CONN. FEMALE	1
13	5791- 10862-10	J2, J3 J4, J5, J6	CONNECTOR, 10P MOLEX, .156" CENTER PINS	5
12	5791- 10862-04	J1	CONNECTOR, 4P MOLEX, .156" CENTER PINS	1
11	5043- 09845-00	C2, C3	CAPACITOR, .001 MFD.	2
10	5040- 08986-00	C1	CAPACITOR, 100 MFD.	1
9	5043- 08980-00	8	CAPACITOR, 0.01 MFD.	9
8	5010- 08991-00	R1	RESISTOR, 4.7K, 1/4W, 5%	1
7	5069- 10396-00	SCR1, SCR2, SCR3, SRC4, SRC5	SIP, 10P 8-RES/8-CAP NETWORK, 4.7K, 470 PF	5
6	5551- 09822-00	L1	INDUCTOR, 4.7 UH	1
5	5311- 10948-00	U9	74HC138, H-CMOS 3/8 DECODER	1
4	5317- 12208-00	U7, U8	74ALS245, ALS TTL OCTAL BUS TRANSCEIVER	2
3	5311- 10945-00	U6	74HC32, H-CMOS QUAD 2-INPUT OR GATE	1
2	5311- 12287-00	U1, U2, U3, U4, U5	74HC541, HC TTL OCTAL BUFFER	5
1	5779- 12285-00		BARE PC BOARD	1

BILL OF MATERIALS

DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .005 ANGLULAR 1/2° FRACTIONAL 3/16"	
PROJ. ENGR R. LOFFREDO	DATE 2/12/86	DRAWN BY J. B. B.	CHECKED BY J. B. B.
CREAT. DATE 12/17/85	FIRST ISSUE NO. 1	PART NO. C-12037	REV. 1
MATERIAL NONE		SCALE 1.5/1	
WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO, IL 60618			
SYS-Z I/O PCB ASSEMBLY			

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

16-9028



REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	4-10-88

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	M. LOFFREDO	DO NOT SCALE WORK TO DIMENSIONS SHOWN		PART NAME	WILLIAMS ELECTRONICS, INC		
DATE	4-20-88	TOLERANCES UNLESS OTHERWISE SPECIFIED		NAME	3401 N. CALIFORNIA AVE	CHICAGO, ILL	60618
DESIGNED BY	DAVE PEST	UNLESS OTHERWISE SPECIFIED	1/16"				
CHECKED BY	1/27/88	DECIMAL	1/100				
		ANGULAR	1/32				
		FRACTIONAL	3/16"				
		MATERIAL					
		PREPARED BY					
		DATE					
		PROJECT NO					
		DRAWING NO					
		REV					
		PART NO					
		REV					

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	4-10-88

16-9028

16-902B

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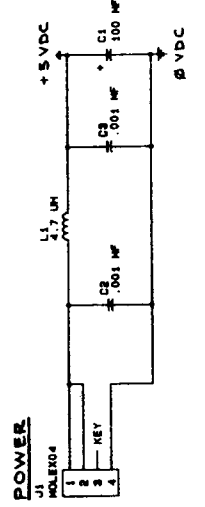
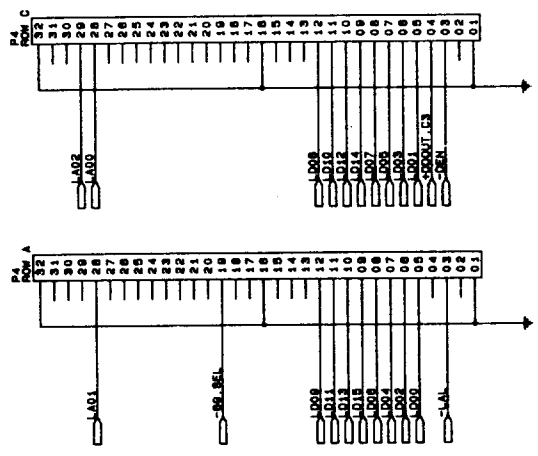
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REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	10/23/54

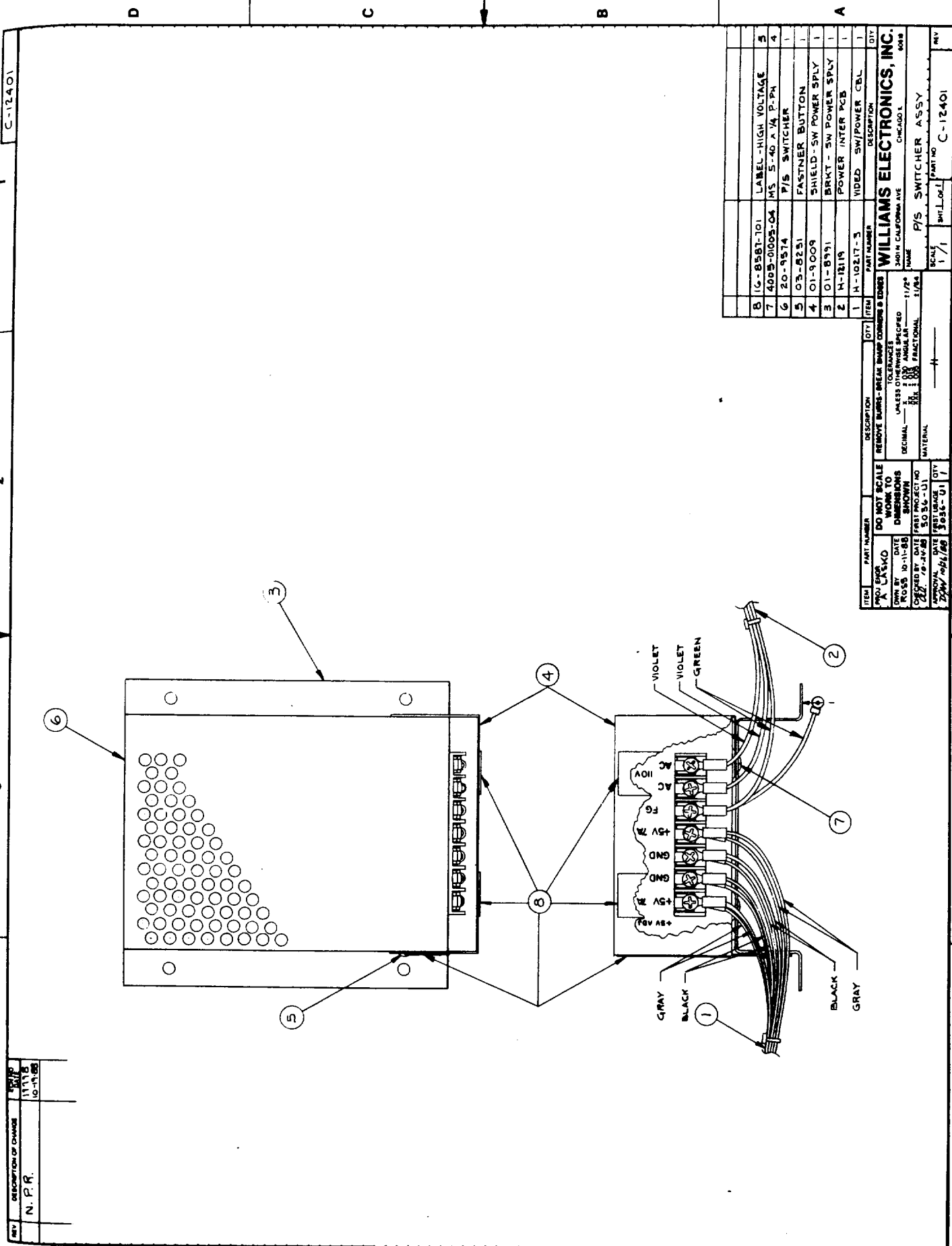
CPU INTERFACE



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR		DO NOT SCALE		REMOVED		REMOVE BARRIS - BREAK SWAMP CORNERS & EDGES	
DATE		WORK TO		TOLERANCES		UNLESS OTHERWISE SPECIFIED	
OWN BY		DIMENSIONS		DECIMAL		FRAC	
G.S.	4-20-54	SHOWN		1/16		1/32	
CHECKED	DATE	PREP	PROJECT NO	MATERIAL			
WJ	10/23/54	BOB	16-902B				
DATE	PART NO	QTY					
10/23/54	16-902B	1					

WILLIAMS ELECTRONICS, INC.		DESCRIPTION	QTY
1401N CALIFORNIA AVE			
CHICAGO, ILL			
SYS-Z I/O SCHEMATIC			
SCALE	PART NO	PART NO	REV
-/-	16-902B	16-902B	-

REV	DESCRIPTION OF CHANGE	DATE
1	N. P. R.	11/18/58
2		10-17-60



ITEM	PART NUMBER	DESCRIPTION	QTY
1	H-10217-3	VIDEO SW/POWER CBL	1
2	H-12119	POWER INTER PCB	1
3	O1-8991	BRKT - SW POWER SPLY	1
4	O1-9009	SHIELD-SW POWER SPLY	1
5	O3-8231	FASTNER BUTTON	1
6	20-9574	P/S SWITCHER	1
7	4005-01003-04	M5 5-40 A 1/4 P-PH	4
8	G-8581-101	LABEL-HIGH VOLTAGE	3

PROJ ENGR	A. LASKO	DATE	10-11-58
DESIGNED BY	W. J. B. / M. J. B.	CHECKED BY	W. J. B. / M. J. B.
APPROVAL DATE	2/24/74	BY	W. J. B. / M. J. B.
SCALE	1/1	PH. LOC.	
DESCRIPTION: REMOVE BURRS - BREAK SHARP CORNERS & EDGES TOLERANCES: UNLESS OTHERWISE SPECIFIED DECIMAL: .001 FRACTIONAL: 3/16 MATERIAL: 304 IN CALIFORNIA AVE CHICAGO IL 60618 NAME: WILLIAMS ELECTRONICS, INC. P/S SWITCHER ASSY PART NO: C-12401 REV: 1/1			

C-12350

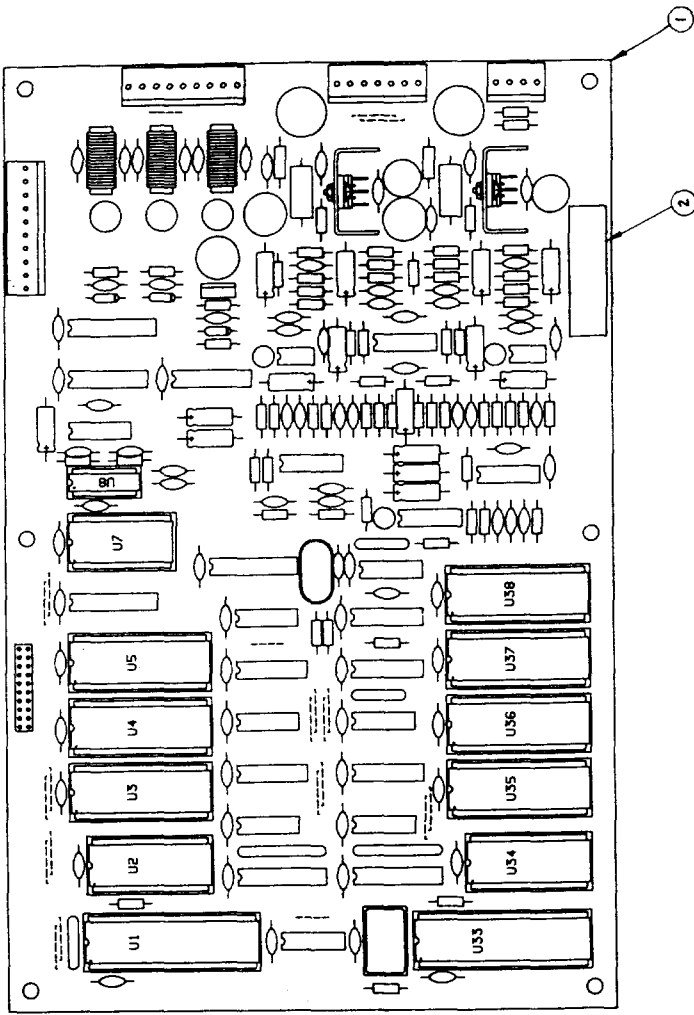
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REV	DESCRIPTION OF CHANGE
1	NEW PART RELEASE



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

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY
PROJ ENG	DO NOT SCALE	REMOVE BURRS-BREAK SHARP CORNERS & EDGES			WILLIAMS ELECTRONICS, INC.		
DESIGN	WORK TO DIMENSIONS	UNLESS OTHERWISE SPECIFIED			2401 N. CALIFORNIA AVE		
DATE	9-22-68	DECIMAL	1/16"		CHICAGO, ILL.		
CHECKED BY	DATE	FIRST PROTECT NO	3036-11		NAME	SYS-2 SOUND-2 ASSEMBLY	
APPROVAL	DATE	FIRST USAGE	D-12350		SCALE	1/1	
					PART NO	C-12350	
					REV		

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1 C-12350

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REV	DESCRIPTION OF CHANGE
NEW	NEW PART RELEASE

BASE NAME	3038
ASSY. NO.	
U3	
U4	
U5	
U35	
U38	
U37	
U36	

PART DESIGNATION

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
15				
14				
13				
12				
11				
10				
9				
8				
7	SEE CHART	U3, U4, U5, U35, U36, U37, U38	27512/1001 EPROM 250 NS	1
6	5371-11087-00	U8	YM3012 DUAL SERIAL DAC	1
5	5370-11088-00	U7	YM2151 SOUND GENERATOR	1
4	5340-12278-00	U2, U34	8K X 8 STATIC RAM, 150MS	2
3	5400-10320-00	U1, U33	88800E MICROPROCESSOR	2
2	18-8850-235		LABEL, PCB IDENT.	1
1	C-12350		SYS-2 SOUND BOARD SUB-ASSY	1

BILL OF MATERIALS

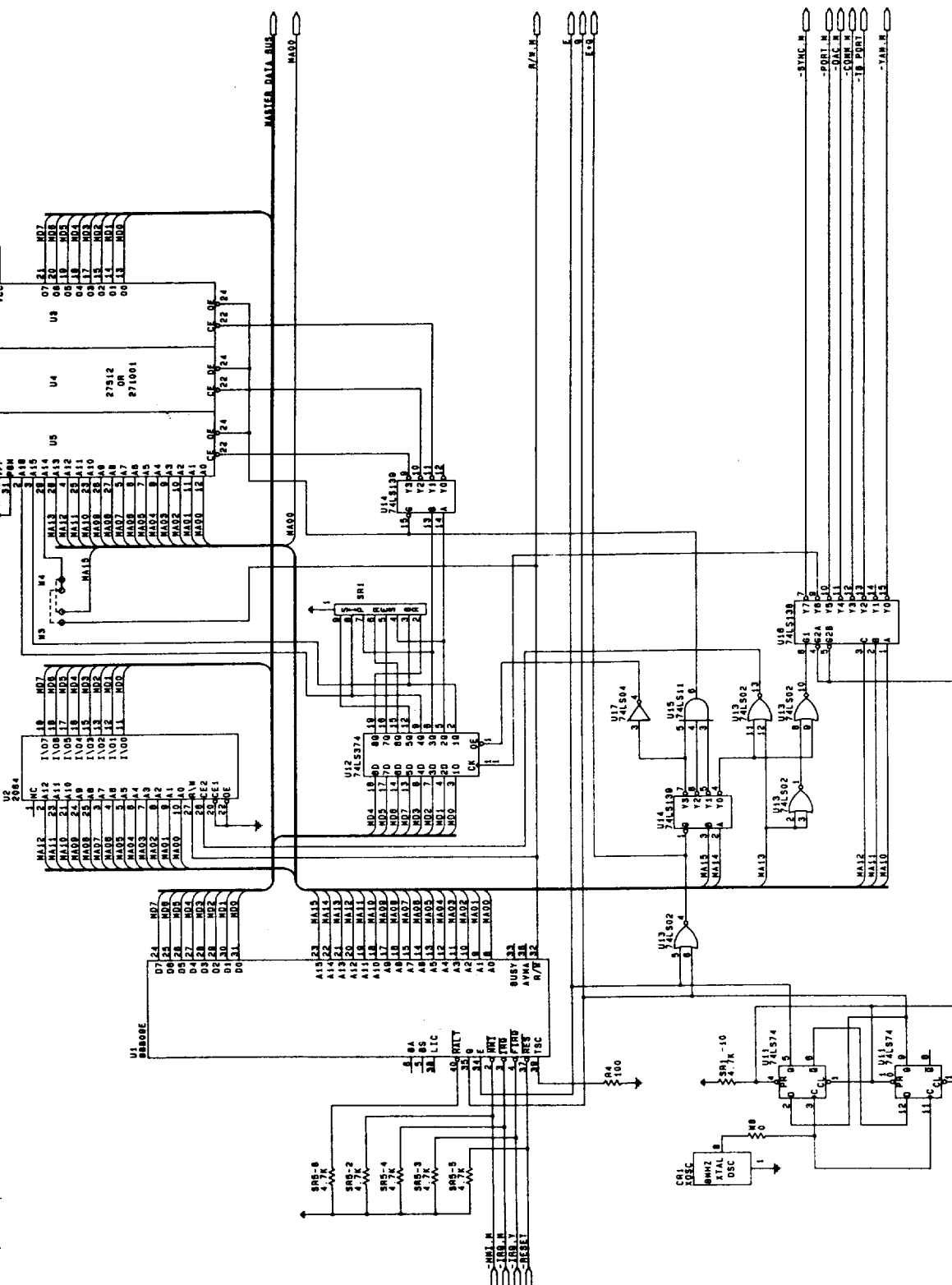
NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9044

PROJ. ENGR M. L. OFFREDO	DO NOT SCALE WORK TO DIMENSIONS SHOWN	REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL - .000 ANGULAR - 1/2° MIN. 2.000 FRACTIONAL - 1/64	QTY 6034
DATE 9-22-88	DATE 9-22-88	NAME SYS-2 SOUND-2 ASSEMBLY	REV -
CHECKED BY M. L. OFFREDO	FIRST PROJECT NO. 3038-U1	SCALE 1/16"	PART NO. C-12350
DATE 9/22/88	DATE 9/22/88	MATERIAL	

WILLIAMS ELECTRONICS, INC.
 3401 N. CALIFORNIA AVE. CHICAGO, IL 60644

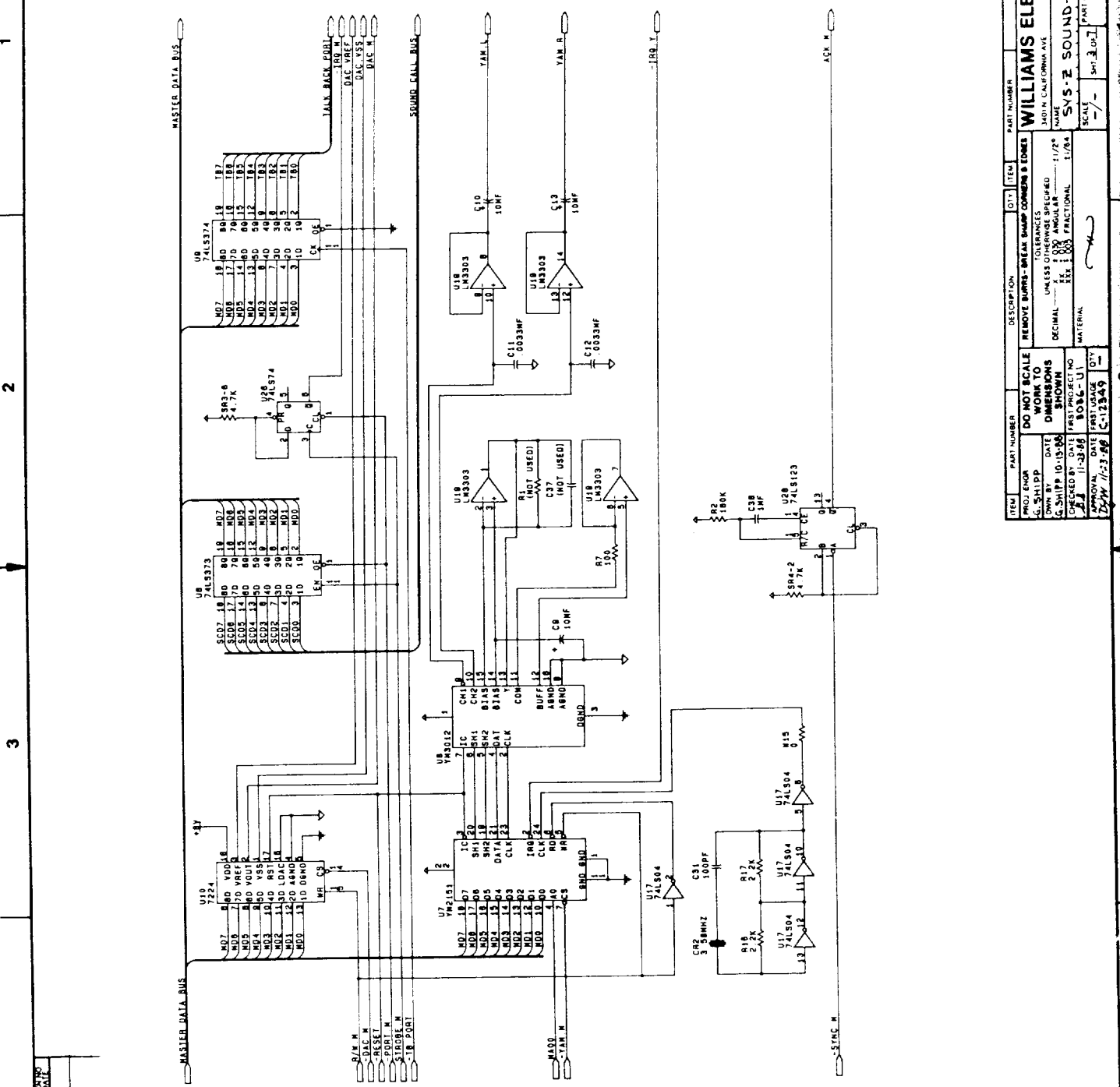
1 2 3 4 1 2 3 4

REV	DESCRIPTION OF CHANGE



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PRO ENGR		REMOVE BURRS-BREAK SHARP CORNERS & EDGES					
C. SHIPP		TO FRANCES					
OWN BY	DATE	UNLESS OTHERWISE SPECIFIED	1/2"				
G. SHIPP	10-13-68	DECIMAL	3/16"				
CHECKED BY	DATE	FIRST PROJECT NO	1/8"				
APPROVAL	DATE	FRSTURAGE	1/8"				
Copy	11-22-68	C-11843					

WILLIAMS ELECTRONICS, INC.		DESCRIPTION	QTY
3401N CALIFORNIA AVE			
CHICAGO IL			
NAME		SCALE	REV
SYS-Z SOUND-2 BD. SCHEMATIC		1/2"	16-9044
SHEET NO		PART NO	
1			

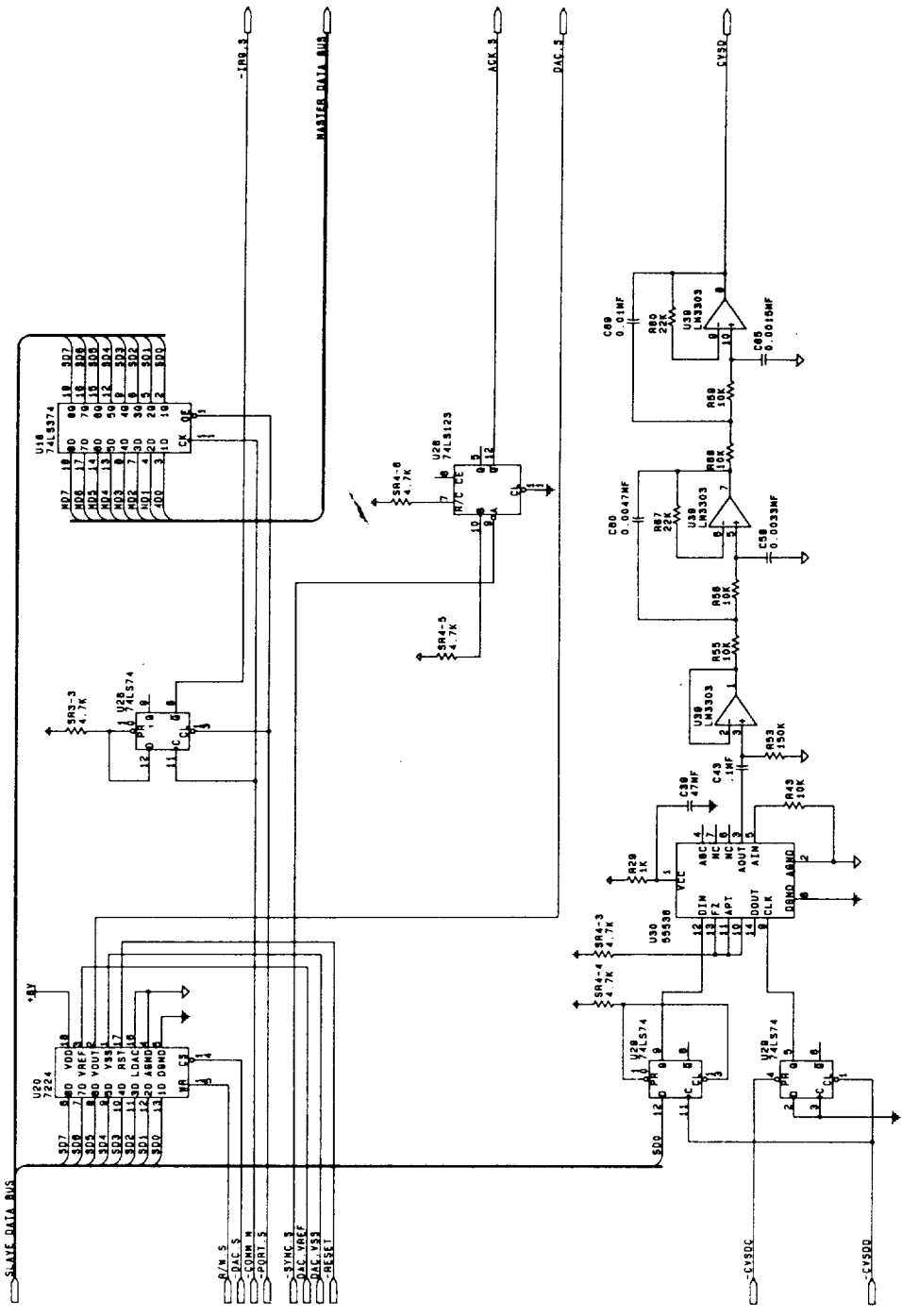


REV	DESCRIPTION OF CHANGE	DATE	BY
1	NEW PART RELEASE		

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	DESCRIPTION	QTY	UNIT
1	74LS123	MONOSTABLE MULTIVIBRATOR	1	PCB	74LS123	1	PCB
2	74LS04	HEX INVERTER	1	PCB	74LS04	1	PCB
3	74LS374	8-BIT D-TYPE FLIP-FLOP	2	PCB	74LS374	2	PCB
4	74LS123	MONOSTABLE MULTIVIBRATOR	1	PCB	74LS123	1	PCB
5	74LS04	HEX INVERTER	1	PCB	74LS04	1	PCB

WILLIAMS ELECTRONICS, INC. JADIN, CALIFORNIA, U.S.A. SYS-2 SOUND-2 BD SCHEMATIC PART NO 16-9044

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	

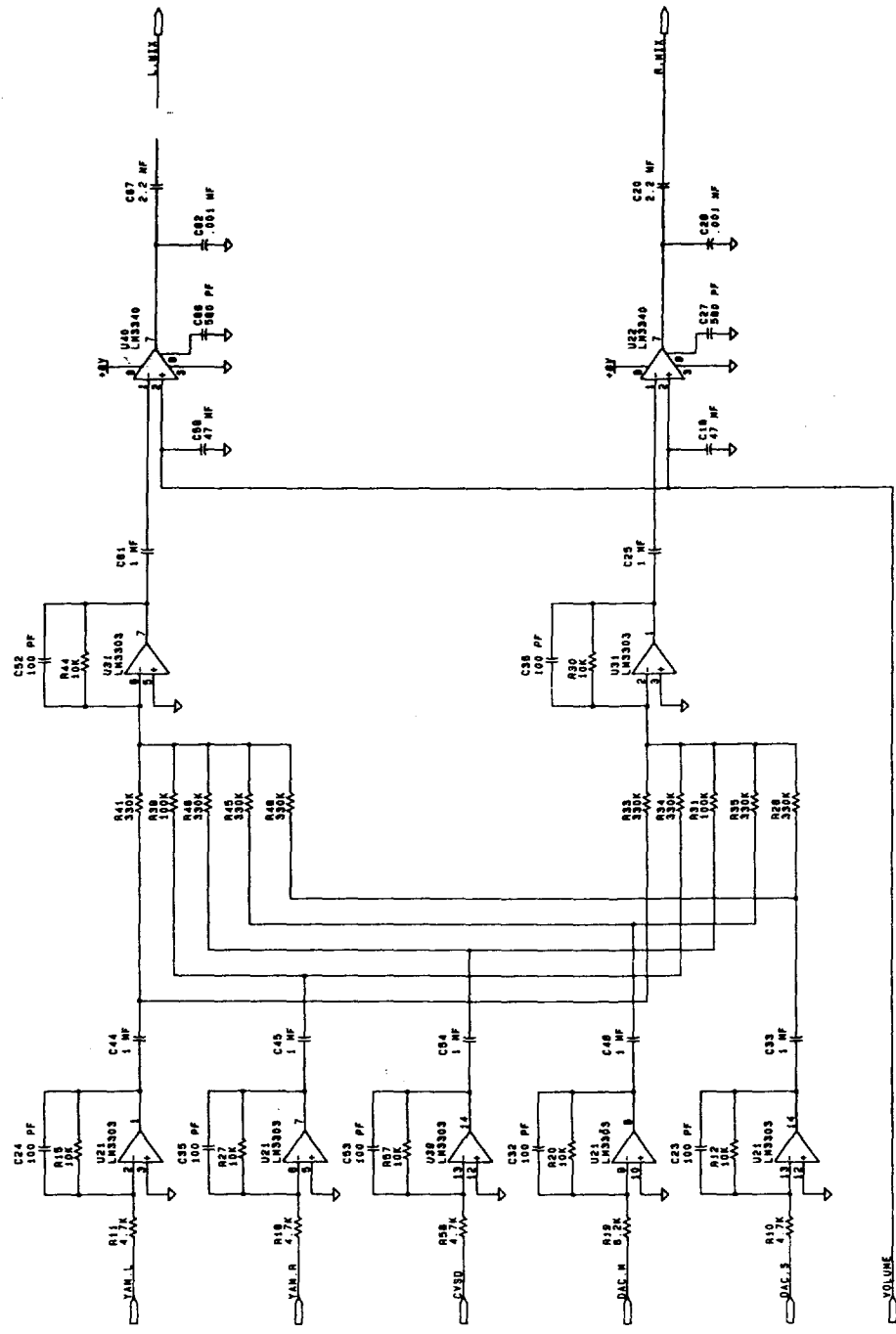


ITEM	PART NUMBER	QTY	ITEM	DESCRIPTION	DESCRIPTION
1	74LS374	1	1	74LS374	74LS374
2	74LS74	1	2	74LS74	74LS74
3	LM3303	3	3	LM3303	LM3303
4	74LS123	1	1	74LS123	74LS123
5	RESISTORS	12	12	RESISTORS	RESISTORS
6	CAPACITORS	8	8	CAPACITORS	CAPACITORS

DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	1/16"
WORK TO DIMENSIONS SHOWN	UNLESS OTHERWISE SPECIFIED	1/16"
DATE	DATE	DATE
11-23-80	11-23-80	11-23-80
BY	BY	BY
WJ	WJ	WJ
CHECKED BY	CHECKED BY	CHECKED BY
WJ	WJ	WJ

WILLIAMS ELECTRONICS, INC.	DESCRIPTION
3401 N. CALIFORNIA AVE.	CHICAGO, ILL.
11/79	11/79
16-9044	16-9044

REV	DESCRIPTION OF CHANGE
	NEW PART RELEASE



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ. ENGR		DO NOT SCALE		REMOVE BURRS-BREAK SHARP CORNERS & EDGES			
DWG. SHIP		WORK TO		TOLERANCES			
DATE	10-18-58	UNLESS OTHERWISE SPECIFIED		DECIMAL	1/100	ANGULAR	1/100
DRAWN BY		SHOW		FRACTIONAL	1/64		
CREATED BY		DATE	11-21-58	PREL PROJECT NO			
APPROV		DATE	11-23-58	3046-U1			
		PREL DRAWING					

WILLIAMS ELECTRONICS, INC.		CHICAGO, ILL.
3401 N. CALIFORNIA AVE.		
NAME	SYB-E SOUND-2 BD. SCHEMATIC	
SCALE	1/16" = 1"	
PART NO.	16-9044	

16-9044

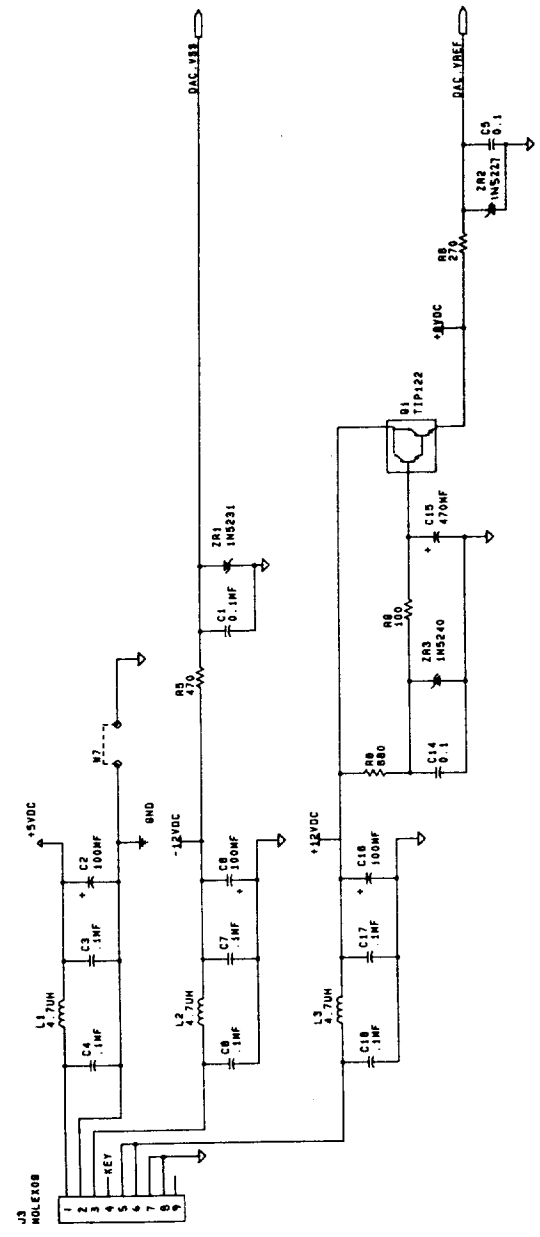
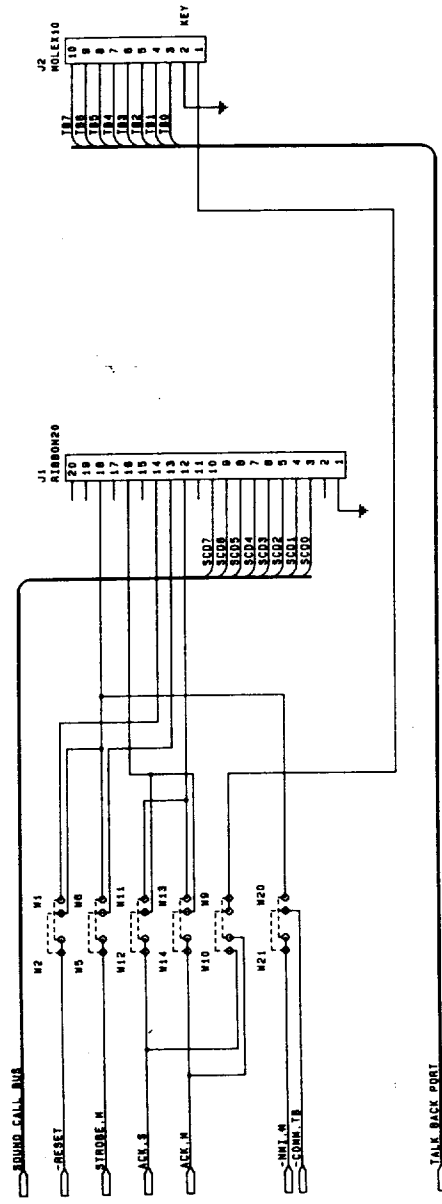
1

2

3

4

REV	DESCRIPTION OF CHANGE
1	NEW PART RELEASE



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	G. SHIPP	REMOVE BURRS-BREAK SWAMP CORNERS & EDGES		PROJ ENGR	G. SHIPP	REMOVE BURRS-BREAK SWAMP CORNERS & EDGES	
DATE	10/18/58	UNLESS OTHERWISE SPECIFIED		DATE	11/22	UNLESS OTHERWISE SPECIFIED	
DESIGNED BY	J. J. B.	DECIMAL		DESIGNED BY	J. J. B.	DECIMAL	
CHECKED BY	J. J. B.	FRACTIONAL		CHECKED BY	J. J. B.	FRACTIONAL	
MATERIAL				MATERIAL			
PROJ NO	16-9044			PROJ NO	16-9044		
REV	1			REV	1		

WILLIAMS ELECTRONICS, INC.
 14014 CALIFORNIA AVE
 CHICAGO, ILL.
 NAME: SYS-2 SOUND-2 BD SCHEMATIC
 SCALE: 1/16"=1"

16-9044
 16-9044

16-9037

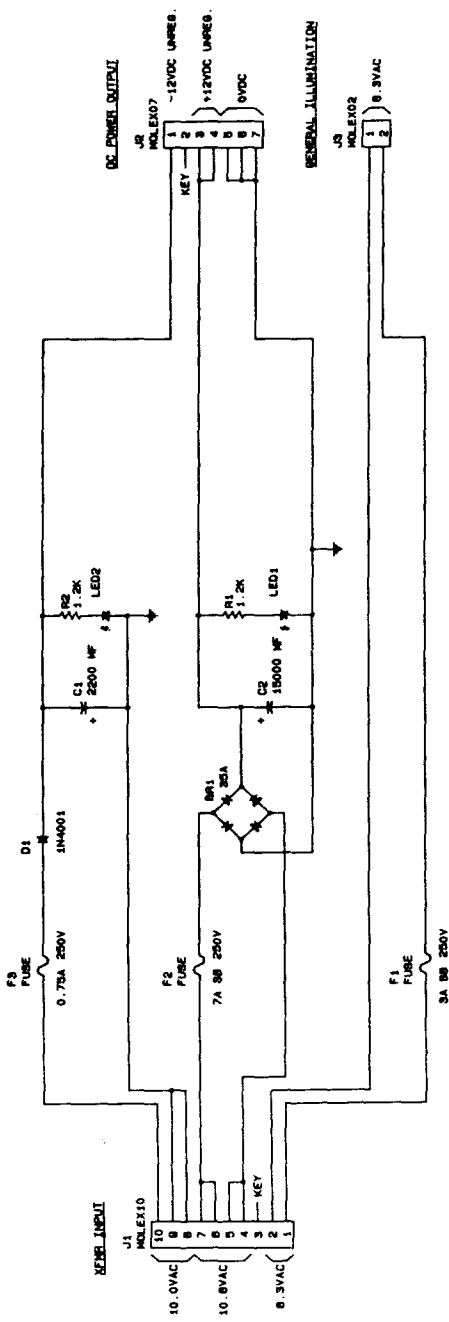
1

2

3

4

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	12/18/66



REV	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY
		REMOTE MOUNTED POWER SUPPLY CONTAINS 8 TUBES					
OWN BY	DATE	UNLESS OTHERWISE SPECIFIED					
G. SHIPP	5/1/66	ANGULAR	1/2"				
CHECKED BY	DATE	FRACTIONAL	1/8"				
APPROVAL	DATE	FIRST USAGE	QTY				
	12/18/66	C-1221B	1				
				SCALE	PART NO.		REV
				-/-	16-9037		16-9037
				WILLIAMS ELECTRONICS, INC.			
				3401 N. CALIFORNIA AVE.			
				CHICAGO, ILL.			
				NAME 12 UNREG P/S BD., SCHEMATIC			