

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-5343-3036-66 |
| Image ROM   | ROM         | 27512 | ROM Board U83 | A-5343-3036-67 |
| Image ROM   | ROM         | 27512 | ROM Board U84 | A-5343-3036-68 |
| Image ROM   | ROM         | 27512 | ROM Board U85 | A-5343-3036-69 |
| Image ROM   | ROM         | 27512 | ROM Board U86 | A-5343-3036-70 |
| Image ROM   | ROM         | 27512 | ROM Board U87 | A-5343-3036-71 |
| Image ROM   | ROM         | 27512 | ROM Board U88 | A-5343-3036-72 |
| Image ROM   | ROM         | 27512 | ROM Board U89 | A-5343-3036-73 |
| Image ROM   | ROM         | 27512 | ROM Board U90 | A-5343-3036-74 |
| Image ROM   | ROM         | 27512 | ROM Board U91 | A-5343-3036-75 |
| Image ROM   | ROM         | 27512 | ROM Board U92 | A-5343-3036-76 |
| Image ROM   | ROM         | 27512 | ROM Board U93 | A-5343-3036-77 |
| Image ROM   | ROM         | 27512 | ROM Board U94 | A-5343-3036-78 |



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 |
|-------------|-----------|----------|
| CPU Board   | 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      |          |
| CPU Board   | 11/12     |          |
|             | 13/14     |          |
|             | R1        |          |
|             | W3        | W1       |
|             | W4        | W2       |
| CPU Board   | 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       |          |



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# 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-HARNESSE PLACEMENT** and ground-strap routing are very important. They are designed to keep RF radiation and conduction within levels accepted by FCC Regulations.

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

## **Examine Your Game**

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

The Williams logo is a stylized, handwritten-style wordmark for the name "WILLIAMS". The letters are bold and interconnected, with a slightly slanted, dynamic feel.

- **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.

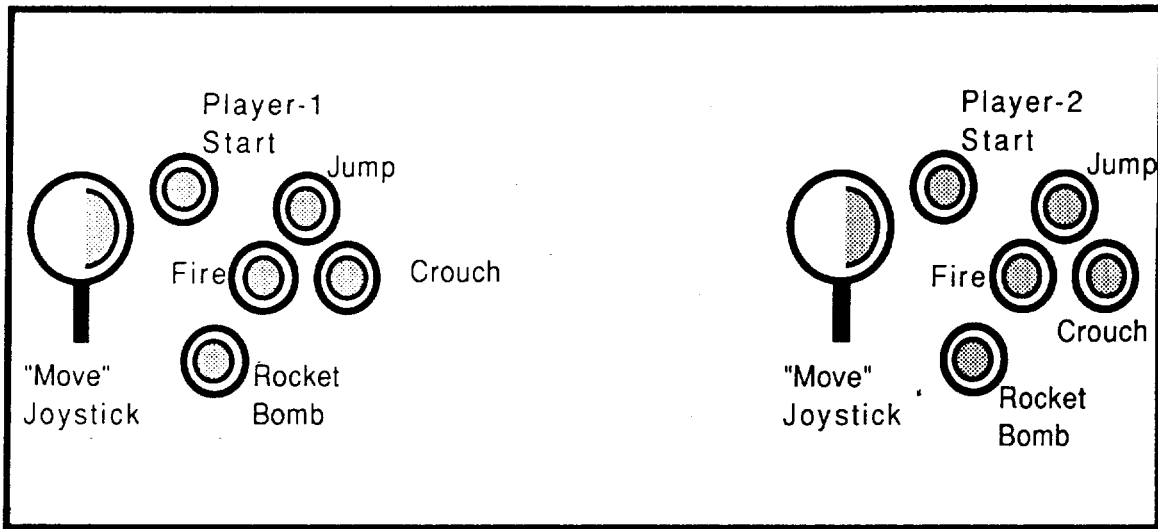
For a two-player game, at least two credits must be displayed. To initiate this two-player game, press the 2-PLAYER START button.

### 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.





*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



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**

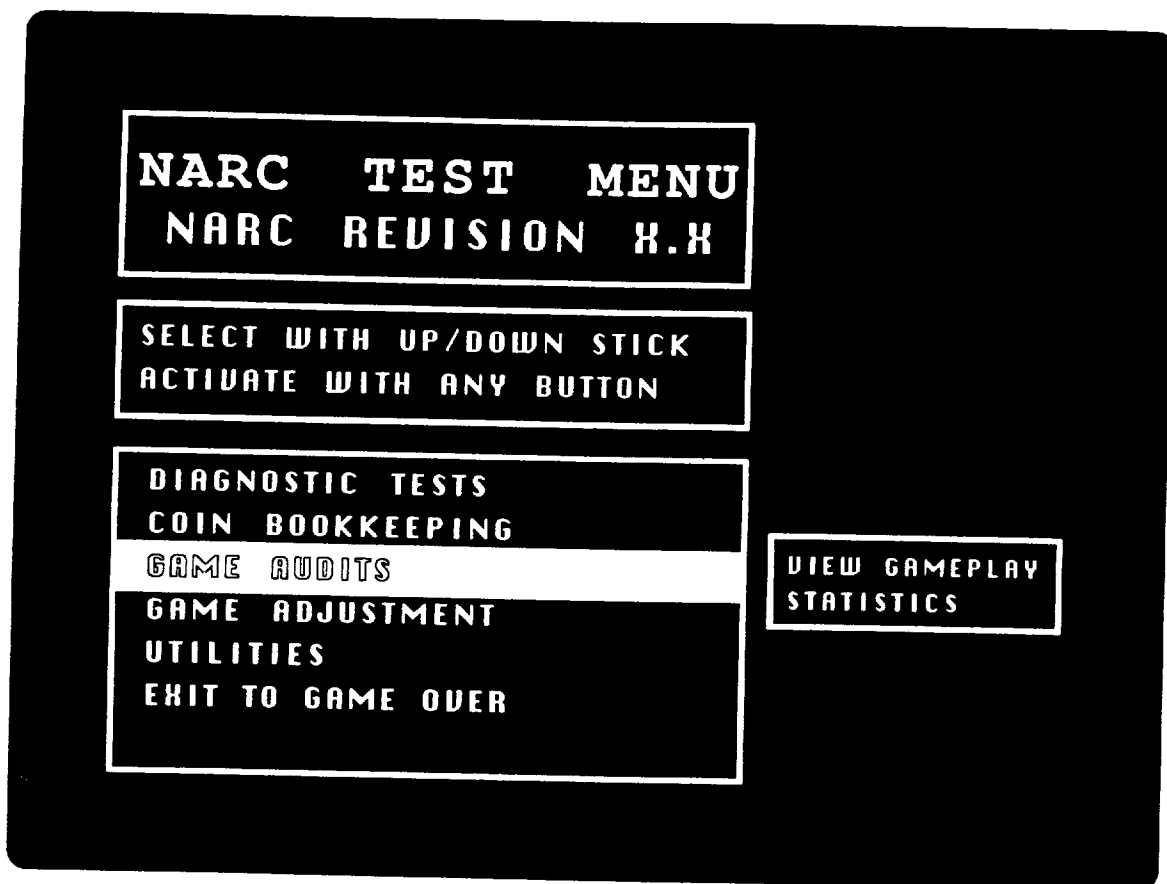
**MENU CONCEPT.** For your convenience, game adjustment, bookkeeping, audit totals and diagnostics are *menu-driven* features. Each *menu* is a list of several choices that you may act upon as desired.

**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.*

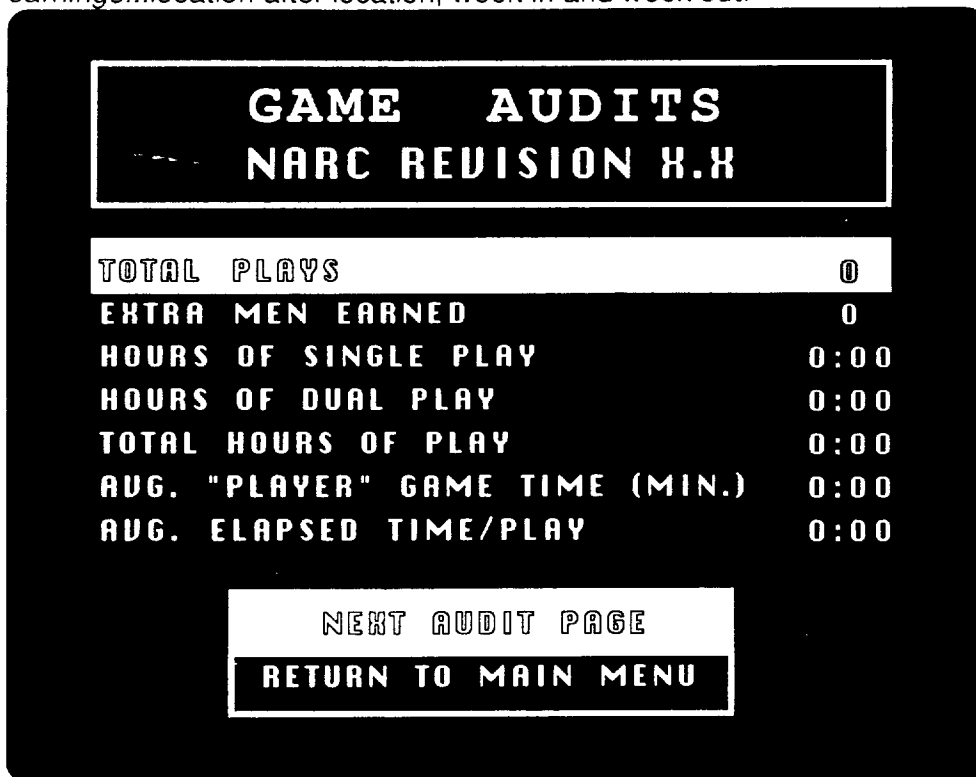
Pressing and holding ADVANCE also causes the game to exit from a menu.

The logo for the game NARC, featuring the word "NARC" in a stylized, bold, black font with a white outline.

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

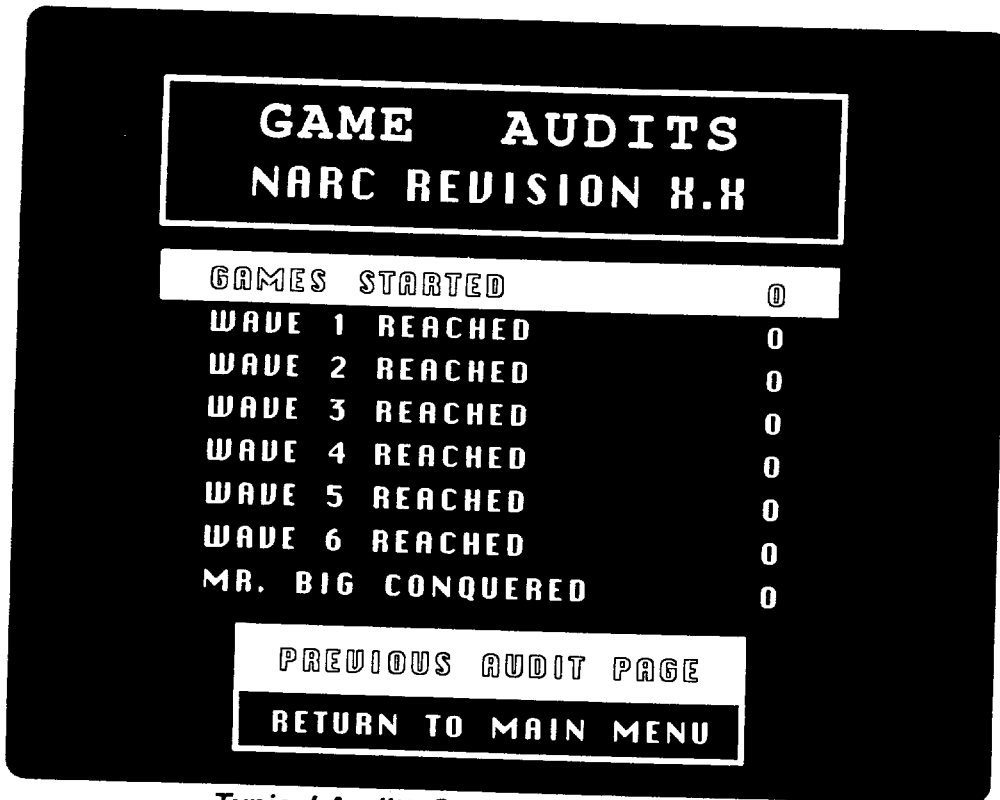
**GAME AUDITS SHOW YOU AT A GLANCE** if game settings are bringing you a satisfactory return on your investment! *Only games by WILLIAMS ELECTRONICS have this menu-driven feature.* Think of it as a unique way to keep your **NARC** game the *leader of the pack when it comes to earnings...*location after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



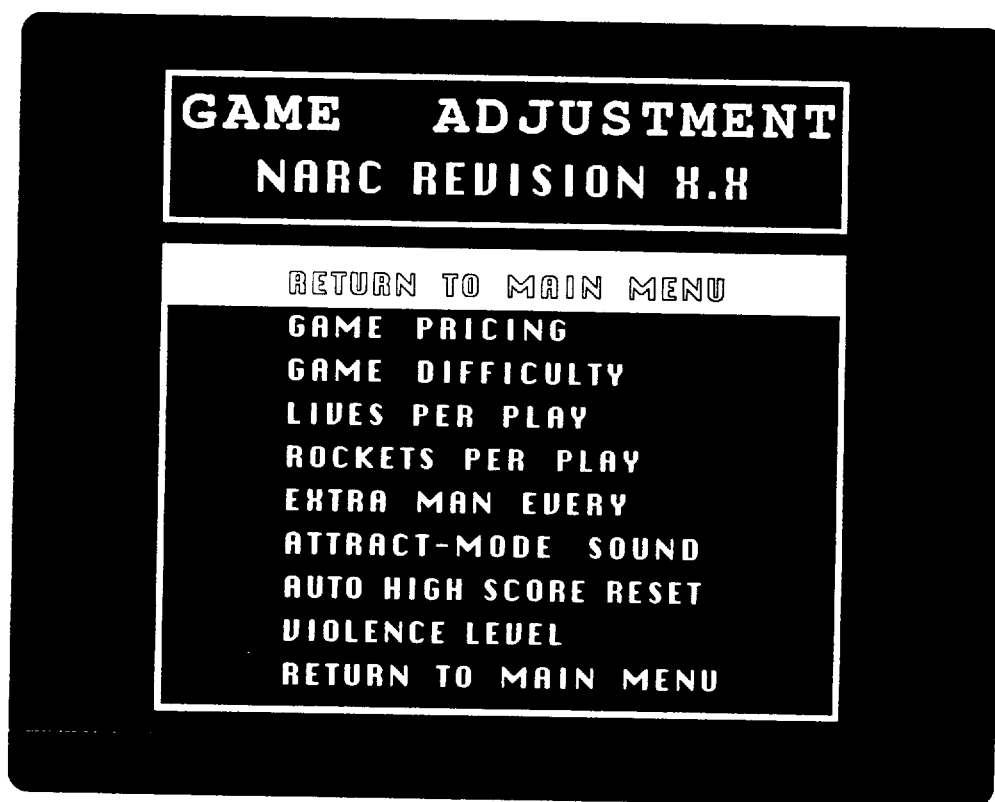
*Typical Audits Screen, Page 2*

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.

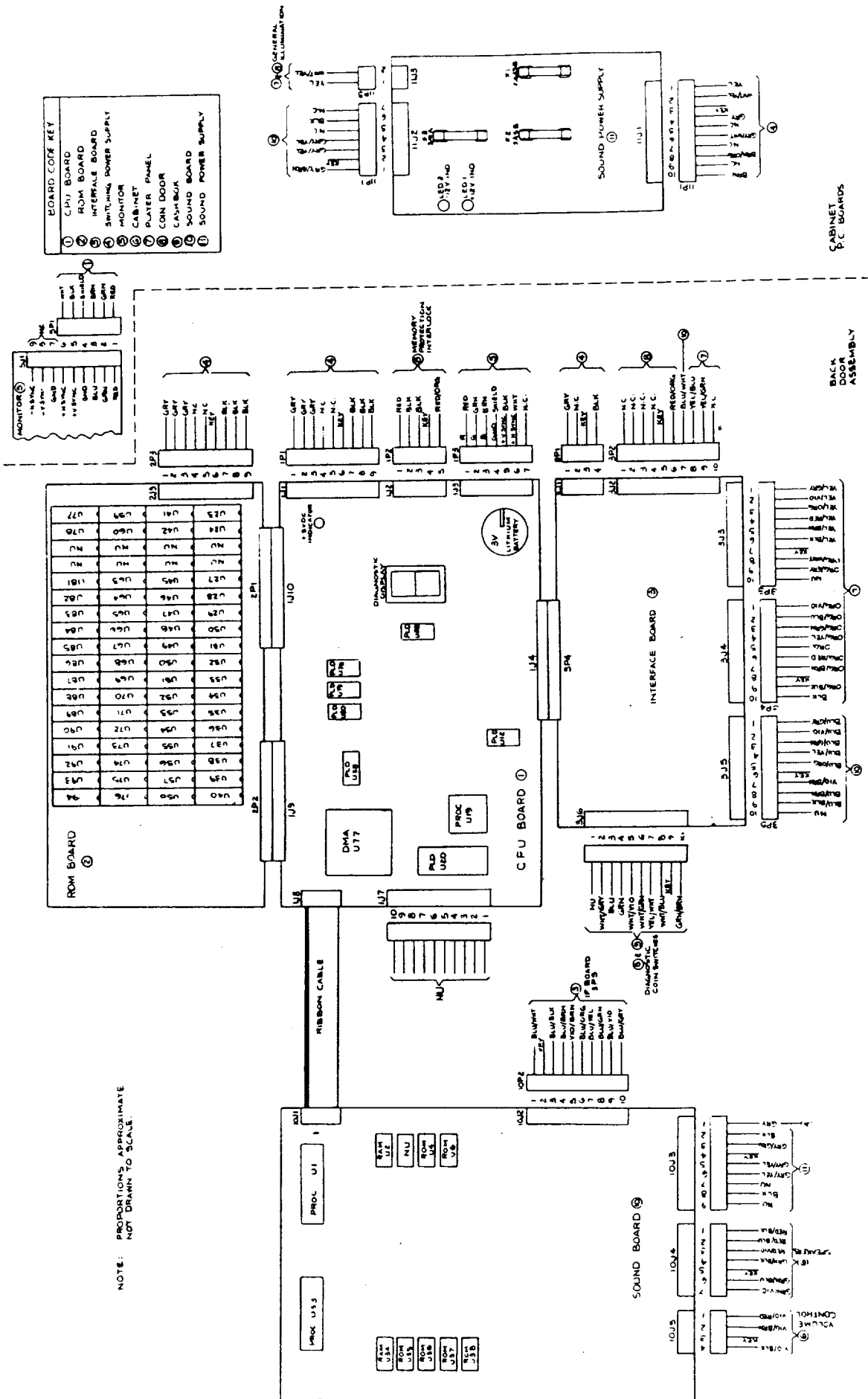
Here are some tailoring suggestions...

## **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.



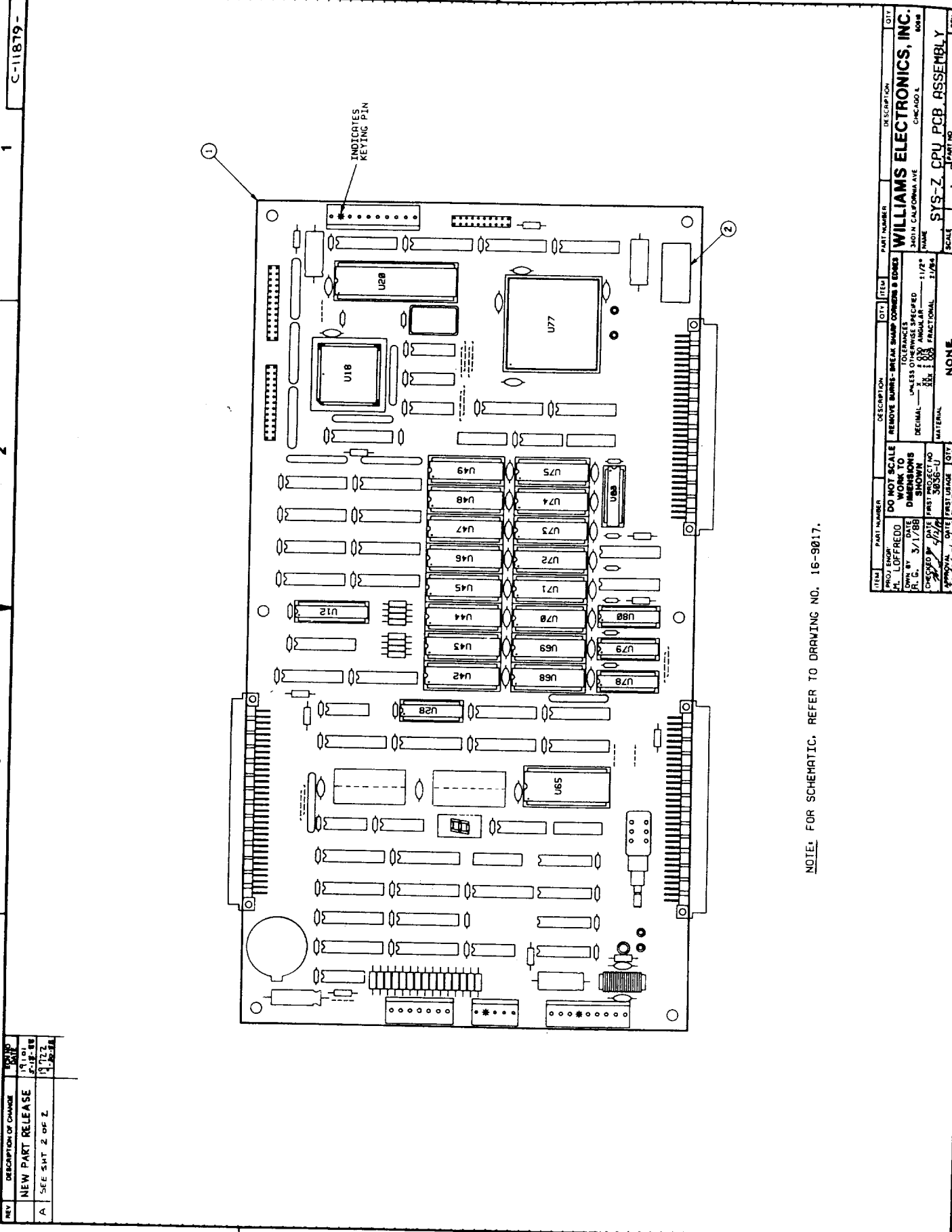
NOTE: PROPORTIONS APPROXIMATE  
NOT DRAWN TO SCALE.



CABINET  
P.C. BOARDS

BACK  
BOARD  
ASSEMBLY

| REV | DESCRIPTION OF CHANGE              | DATE                 |
|-----|------------------------------------|----------------------|
| A   | NEW PART RELEASE<br>SEE SHT 2 OF 2 | 11/11/88<br>11/12/88 |



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

|  |             |   |     |
|--|-------------|---|-----|
| ITEM NO.   | PART NUMBER | DESCRIPTION   | QTY |
| 1  | 1           | WILLIAMS ELECTRONICS, INC.  | 1   |
| REMOVE BURRS - BREAK SHARP CORNERS & EDGES<br>TO SURFACES<br>UNLESS OTHERWISE SPECIFIED<br>DECIMAL - 1/100 ANGIULAR - 1/2°<br>FRACTIONAL - 1/32" |             |   |     |
| PROJECT NO. 16-9017<br>DATE 3/1/88<br>DESIGNED BY J.P.   |             | PART NO. C-11879-1<br>REV. 1  |     |
| MATERIAL NONE  |             | NAME SYS-Z CPU PCB ASSEMBLY<br>3401 N. CALIFORNIA AVE<br>WILLIAMS ELECTRONICS, INC. |     |

| REV | DESCRIPTION OF CHANGE | DATE    |
|-----|-----------------------|---------|
| A   | NEW PART RELEASE      | 5-11-88 |
|     | ITEMS WAS 5330-11411  | 11/72   |
|     | ADDED ITEM 15         | 1-30-88 |

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

ITEM NUMBER

| ITEM | SEE CHART           | DESCRIPTION                | QTY |
|------|---------------------|----------------------------|-----|
| 10   | U83                 | IC, PLD-IMAGE ROM CNTL     | 1   |
| 9    | U12                 | IC, PLD-VIDEO RAM SEQ.     | 1   |
| 8    | U20                 | IC, PLD-AUTOERASE CNTL     | 1   |
| 7    | U45                 | IC, RAM/S 5524 8K x 8      | 1   |
| 6    | U42 - U49 U68 - U75 | IC, RAM/V 4461 24K x 4     | 16  |
| 5    |                     |                            |     |
| 4    | U18                 | IC, TMS34010 G.S.P.        | 1   |
| 3    | U77                 | IC, CUSTOM ASIC            | 1   |
| 2    |                     | LABEL, PCB IDENT.          | 1   |
| 1    | C-11876             | SYS-Z CPU PCB SUB-ASSEMBLY | 1   |

BILL OF MATERIALS

| ITEM | PART NO. | DESCRIPTION                 | QTY |
|------|----------|-----------------------------|-----|
| 20   |          |                             |     |
| 19   |          |                             |     |
| 18   |          |                             |     |
| 17   |          |                             |     |
| 16   |          |                             |     |
| 15   | B1       | BATTERY - LITHIUM 3V BUTTON | 1   |
| 14   | U28      | IC, PLD-COLOR RAM CNTL      | 1   |
| 13   | U78      | IC, PLD-LOCAL CONTROL       | 1   |
| 12   | U79      | IC, PLD-VIDEO RAM CNTL      | 1   |
| 11   | U80      | IC, PLD-ADDRESS DECODE      | 1   |

BILL OF MATERIALS

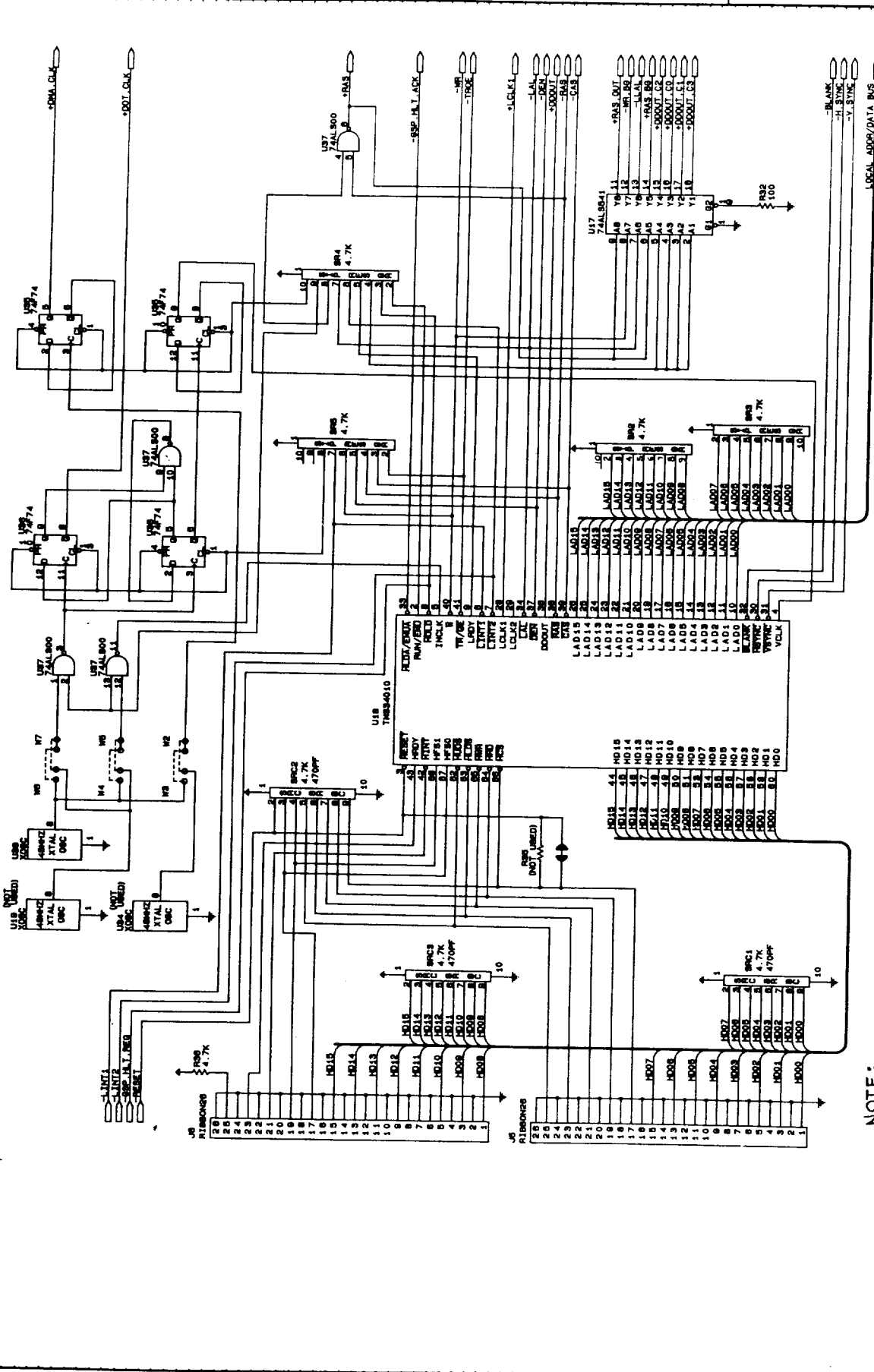
WILLIAMS ELECTRONICS, INC.  
 3401N CALIFORNIA AVE CHICAGO, IL 60648  
 NAME: SYS-Z CPU PCB ASSEMBLY  
 SCALE: 7 - 1/8" = 1" PART NO: C-11879  
 TOLERANCES - UNLESS OTHERWISE SPECIFIED: 1/16" ANGULAR 1/32"  
 DECIMAL 1/100 FRACTIONAL 1/16"  
 MATERIAL: MATERIAL

DO NOT SCALE  
 ALL DIMENSIONS TO WORK TO UNLESS OTHERWISE SPECIFIED  
 DRAWING BY: 4/25/88  
 CHECKED BY: DATE: 5/11/88  
 APPROVAL: DATE: 5/12/88  
 D-12114 D-12114 1

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



| REV | DESCRIPTION OF CHANGE | DATE    |
|-----|-----------------------|---------|
| A   | NEW PART RELEASE      | 1/10/88 |
|     | SEE COVER SMT         | 1/12/88 |
|     |                       | 1/30/88 |

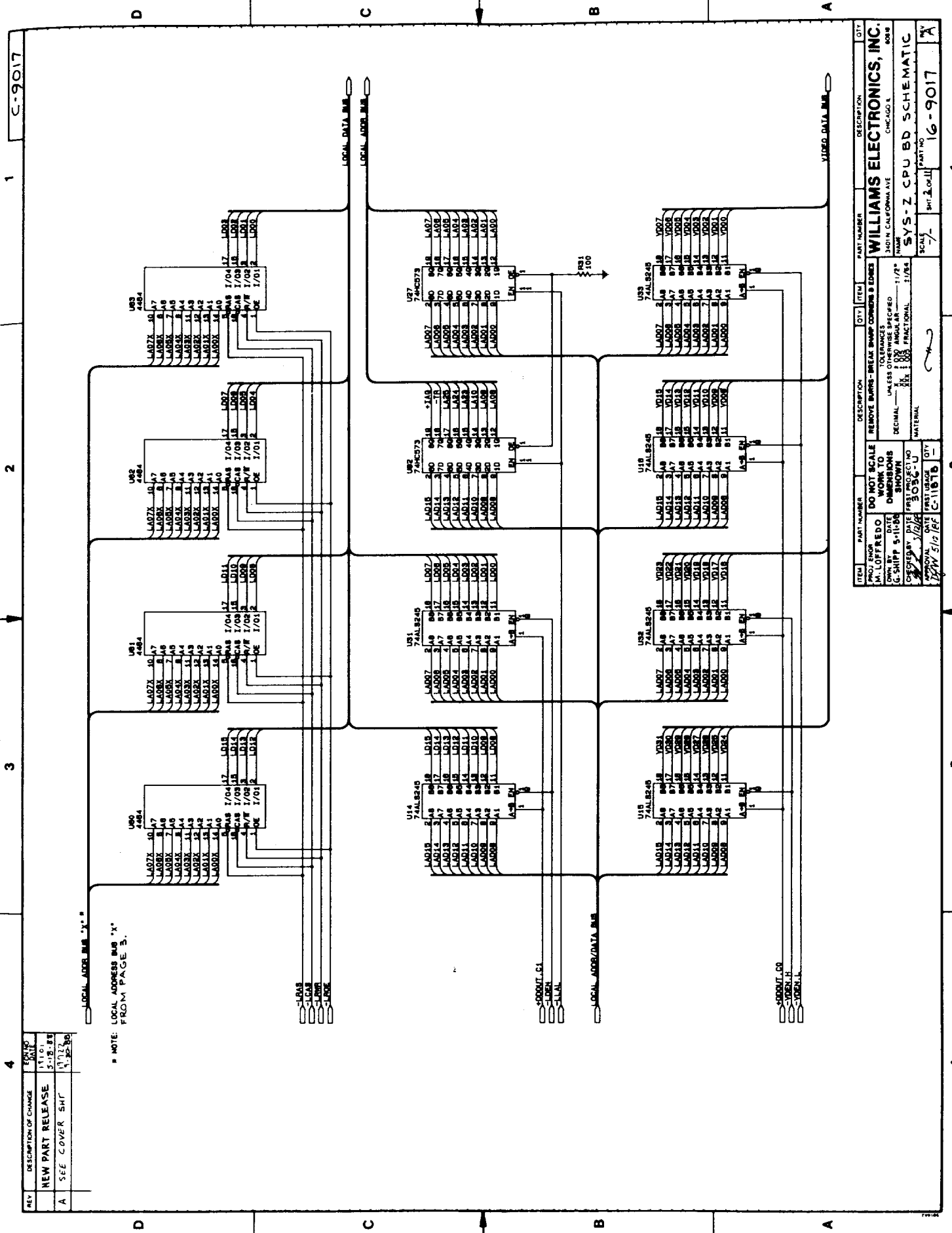


| ITEM | PART NUMBER | DESCRIPTION                               | QTY | ITEM | QTY     |
|------|-------------|---|-----|------|---------|
| 1    | 74ALS94     | REMOVE BURR - BREAK SWAMP CORNERS & EDGES |     | 1    | 74ALS94 |
| 2    | 74ALS94     | UNLESS OTHERWISE SPECIFIED                |     | 2    | 74ALS94 |
| 3    | 74ALS94     | DECIMAL                                   |     | 3    | 74ALS94 |
| 4    | 74ALS94     | FRACTIONAL                                |     | 4    | 74ALS94 |
| 5    | 74ALS94     | MATERIAL                                  |     | 5    | 74ALS94 |

DO NOT SCALE WORK TO DIMENSIONS SHOWN  
 DATE: 1/10/88  
 BY: M. LOFFERDO  
 CHECKED: G. SHIPP  
 APPROVAL: 1/12/88  
 DATE: 1/30/88  
 BY: C. SHIPP  
 CHECKED: 1/30/88  
 APPROVAL: 1/30/88

PART NUMBER: 16-9017  
 DESCRIPTION: SYS-Z CPU BD SCHEMATIC  
 SCALE: 1/4"=1"  
 PART NO: 16-9017  
 REV: A

NOTE: BUS & SIGNAL LABELS DESIGNATED WITH AN 'X' SUFFIX ARE FORMED FROM ROOT SIGNALS DRIVEN THROUGH SERIES RESISTORS.



| REV | DESCRIPTION OF CHANGE | DATE     | BY      |
|-----|-----------------------|----------|---------|
| 1   | NEW PART RELEASE      | 11/01    | 3-13-83 |
| A   | SEE COVER SHEET       | 11/13/83 | 1-25-83 |

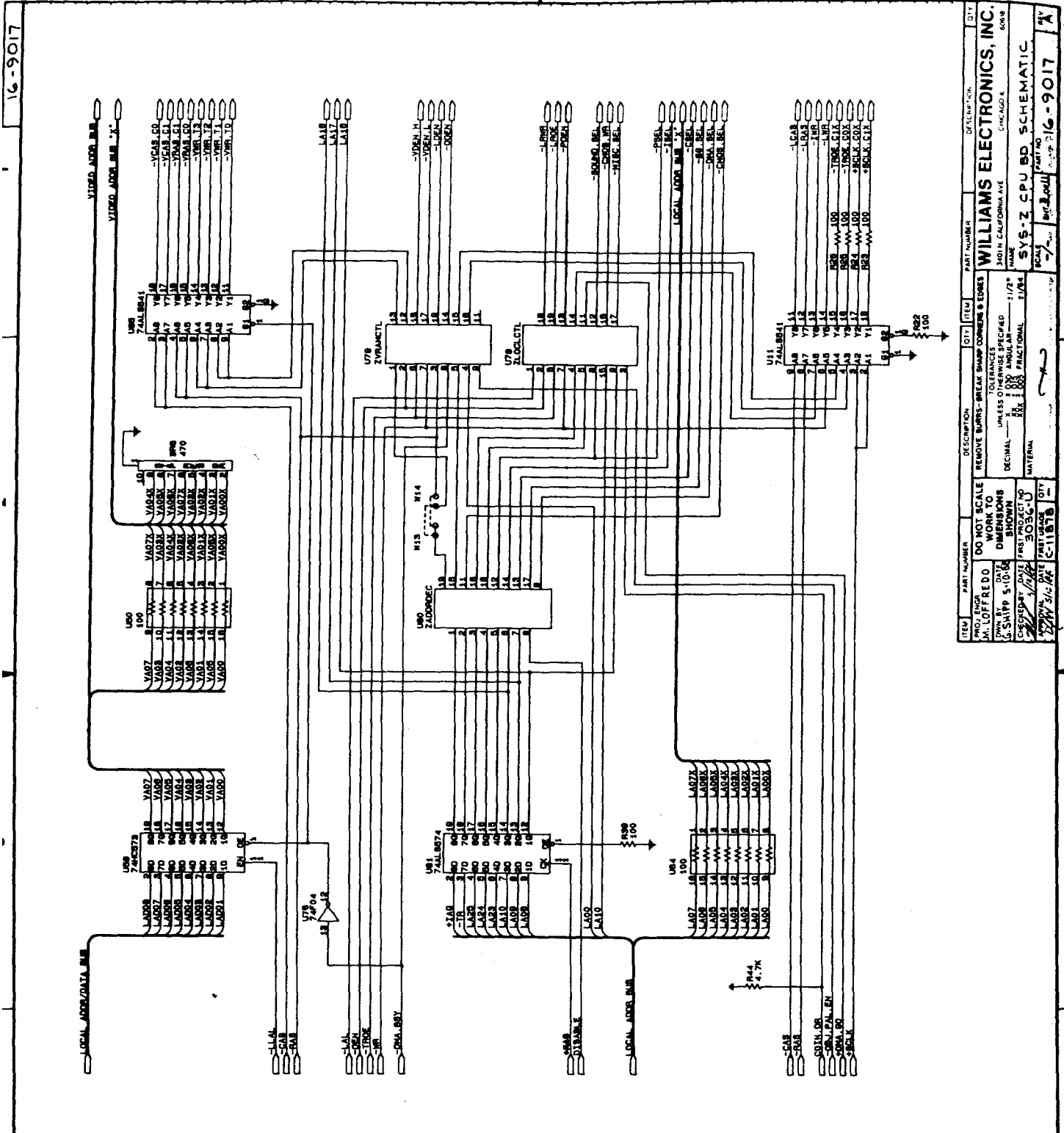
NOTE: LOCAL ADDRESS MAP "X" FROM PAGE 3.

| ITEM        | PART NUMBER | DESCRIPTION                    | QTY |
|-------------|-------------|--------------------------------|-----|
| PROJ ENGR   | M. LOFFREDO | DO NOT SCALE                   |     |
| DATE        | 5-11-83     | WORK TO DIMENSIONS             |     |
| DESIGNED BY | J. J. COLE  | UNLESS OTHERWISE SPECIFIED     |     |
| CHECKED BY  | J. J. COLE  | TOLERANCES                     |     |
| DATE        | 5/12/83     | DECIMAL - .0005                |     |
| SCALE       | 1/2"        | FRAC. - 1/16"                  |     |
|             |             | ANGULAR - 1/2°                 |     |
|             |             | MIN. HOLE FUNCTIONAL - 1/8"    |     |
|             |             | MATERIAL - SEE 1000 FUNCTIONAL |     |
|             |             | WARRANTY - SEE 1000 FUNCTIONAL |     |

| ITEM | PART NUMBER | DESCRIPTION                                  | QTY |
|------|-------------|--|-----|
| 1    | 74ALS245    | REMOVE BUBBLES - BREAK SWAMP CONDENS 3 LINES | 1   |
| 2    | 74ALS245    | REMOVE BUBBLES - BREAK SWAMP CONDENS 3 LINES | 1   |
| 3    | 74ALS245    | REMOVE BUBBLES - BREAK SWAMP CONDENS 3 LINES | 1   |
| 4    | 74ALS245    | REMOVE BUBBLES - BREAK SWAMP CONDENS 3 LINES | 1   |

| WILLIAMS ELECTRONICS, INC. | CHICAGO, IL      |
|----------------------------|------------------|
| 3401 N. CALPORNIA AVE.     |                  |
| SYN-Z CPU BD SCHEMATIC     |                  |
| SCALE: 1/2"                | PART NO: 16-9017 |
|                            | REV: A           |

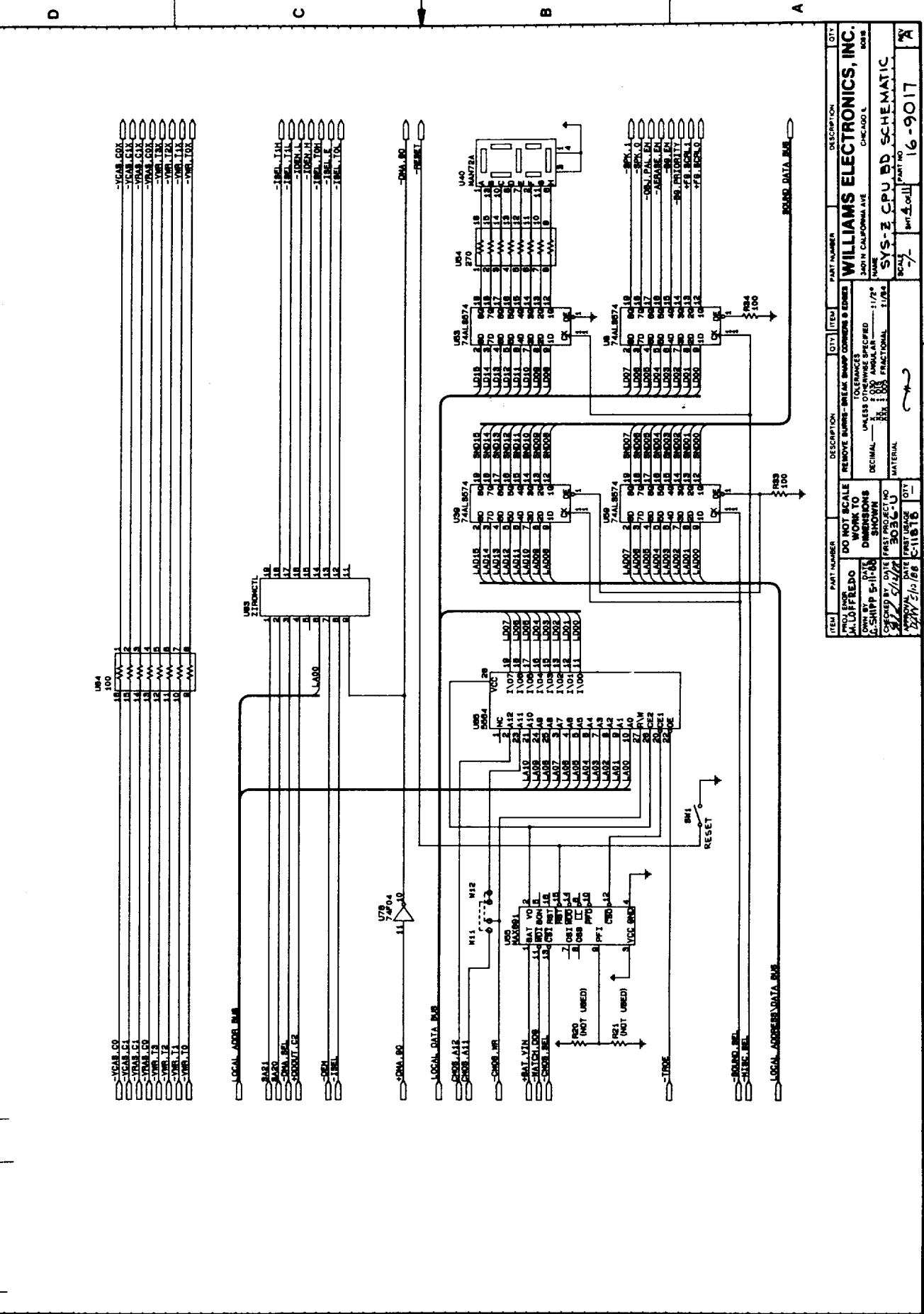
| REV | DESCRIPTION OF CHANGE | DATE     |
|-----|-----------------------|----------|
| 1   | NEW PART RELEASE      | 11/01/77 |
| 2   | SEE COVER SHT         | 11/22/77 |
| 3   |                       | 1/30/88  |



|                                       |                            |  |     |
|---------------------------------------|----------------------------|--|-----|
| ITEM NO.                              | PART NUMBER                | DESCRIPTION                              | QTY |
| 16-9017                               | WILLIAMS ELECTRONICS, INC. | REMOVE BURRS-BREAK SHARP CORNERS & EDGES |     |
| TOLERANCES UNLESS OTHERWISE SPECIFIED |                            |  |     |
| DIMENSIONS SHOWN                      |                            |  |     |
| FRACTIONAL 1/64                       |                            |  |     |
| DECIMAL 0.000 ANGULAR 1/2°            |                            |  |     |
| MATERIAL                              |                            |  |     |
| DATE                                  | FIRST PROJECT NO.          | QTY                                      |     |
| 11/22/77                              | 3063-U                     |  |     |
| DATE                                  | PART NAME                  | QTY                                      |     |
| 11/22/77                              | C-11878                    |  |     |
| SYNOPSIS: 16-9017                     |                            |  |     |
| PART NO. 16-9017                      |                            |  |     |
| SCHEMATIC                             |                            |  |     |
| CHICAGO, ILL.                         |                            |  |     |

1  
2  
3  
4

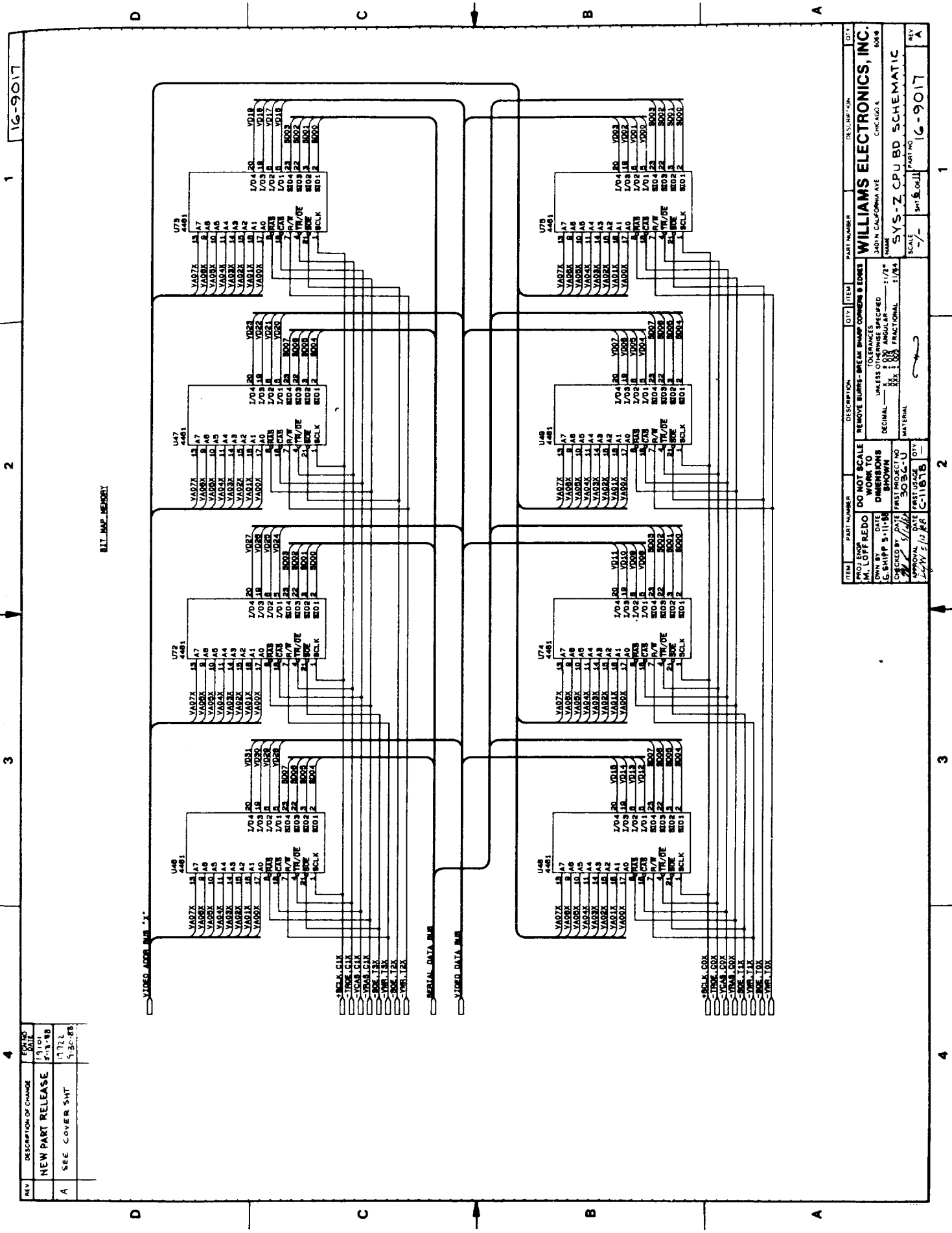
|     |                       |          |
|-----|-----------------------|----------|
| REV | DESCRIPTION OF CHANGE | DATE     |
| A   | NEW PART RELEASE      | 11-01-66 |
| B   | SEE COVER SHT         | 1-20-66  |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------|-------------|-------------|-----|------|-------------|-------------|-----|
| 1    | U84         | 74ALS74     | 1   | 1    | U90         | 74ALS74     | 1   |
| 2    | U85         | 74ALS74     | 1   | 2    | U91         | 74ALS74     | 2   |
| 3    | U86         | 74ALS74     | 1   | 3    | U92         | 74ALS74     | 1   |
| 4    | U87         | 74ALS74     | 1   | 4    | U93         | 74ALS74     | 1   |
| 5    | U88         | 74ALS74     | 1   | 5    | U94         | 74ALS74     | 1   |
| 6    | U89         | 74ALS74     | 1   | 6    | U95         | 74ALS74     | 1   |
| 7    | U90         | 74ALS74     | 1   | 7    | U96         | 74ALS74     | 1   |
| 8    | U91         | 74ALS74     | 1   | 8    | U97         | 74ALS74     | 1   |
| 9    | U92         | 74ALS74     | 1   | 9    | U98         | 74ALS74     | 1   |
| 10   | U93         | 74ALS74     | 1   | 10   | U99         | 74ALS74     | 1   |
| 11   | U94         | 74ALS74     | 1   | 11   | U100        | 74ALS74     | 1   |

|   |                  |
|---|------------------|
| WILLIAMS ELECTRONICS, INC.  | CHICAGO, ILL.    |
| NAME: SYS-2 CPU BOARD SCHEMATIC   | DATE: 11-01-66   |
| SCALE: 1/2" = 1"  | PART NO: 16-9017 |
| TOLERANCES UNLESS OTHERWISE SPECIFIED: 1/16"  | REV: 4           |
| FRAC. 1/16" 1/32" 1/64" 1/128" 1/256"   | QTY: 1           |
| DECIMAL .001 .002 .003 .004 .005 .006 .007 .008 .009 .010 .012 .015 .020 .025 .030 .0375 .050 .0625 .075 .0875 .100 .125 .150 .1875 .250 .3125 .375 .500 .625 .750 .875 1.000 | 2                |
| DO NOT SCALE WORK TO DIMENSIONS UNLESS OTHERWISE SPECIFIED  | 3                |
| DATE FIRST PROJECT NO. DATE FIRST ISSUE   | 4                |
| DATE PREPARED   | 5                |
| DATE CHECKED  | 6                |
| DATE APPROVED   | 7                |
| DATE SHIPPED  | 8                |
| DATE RECEIVED   | 9                |
| DATE TESTED   | 10               |
| DATE IN STOCK   | 11               |
| DATE OUT OF STOCK   | 12               |
| DATE ON ORDER   | 13               |
| DATE IN TRANSIT   | 14               |
| DATE DELIVERED  | 15               |
| DATE RECEIVED BY  | 16               |
| DATE SHIPPED BY   | 17               |
| DATE RECEIVED BY  | 18               |
| DATE SHIPPED BY   | 19               |
| DATE RECEIVED BY  | 20               |
| DATE SHIPPED BY   | 21               |
| DATE RECEIVED BY  | 22               |
| DATE SHIPPED BY   | 23               |
| DATE RECEIVED BY  | 24               |
| DATE SHIPPED BY   | 25               |
| DATE RECEIVED BY  | 26               |
| DATE SHIPPED BY   | 27               |
| DATE RECEIVED BY  | 28               |
| DATE SHIPPED BY   | 29               |
| DATE RECEIVED BY  | 30               |





16-9017

2

3

4

BIT MAP MEMORY

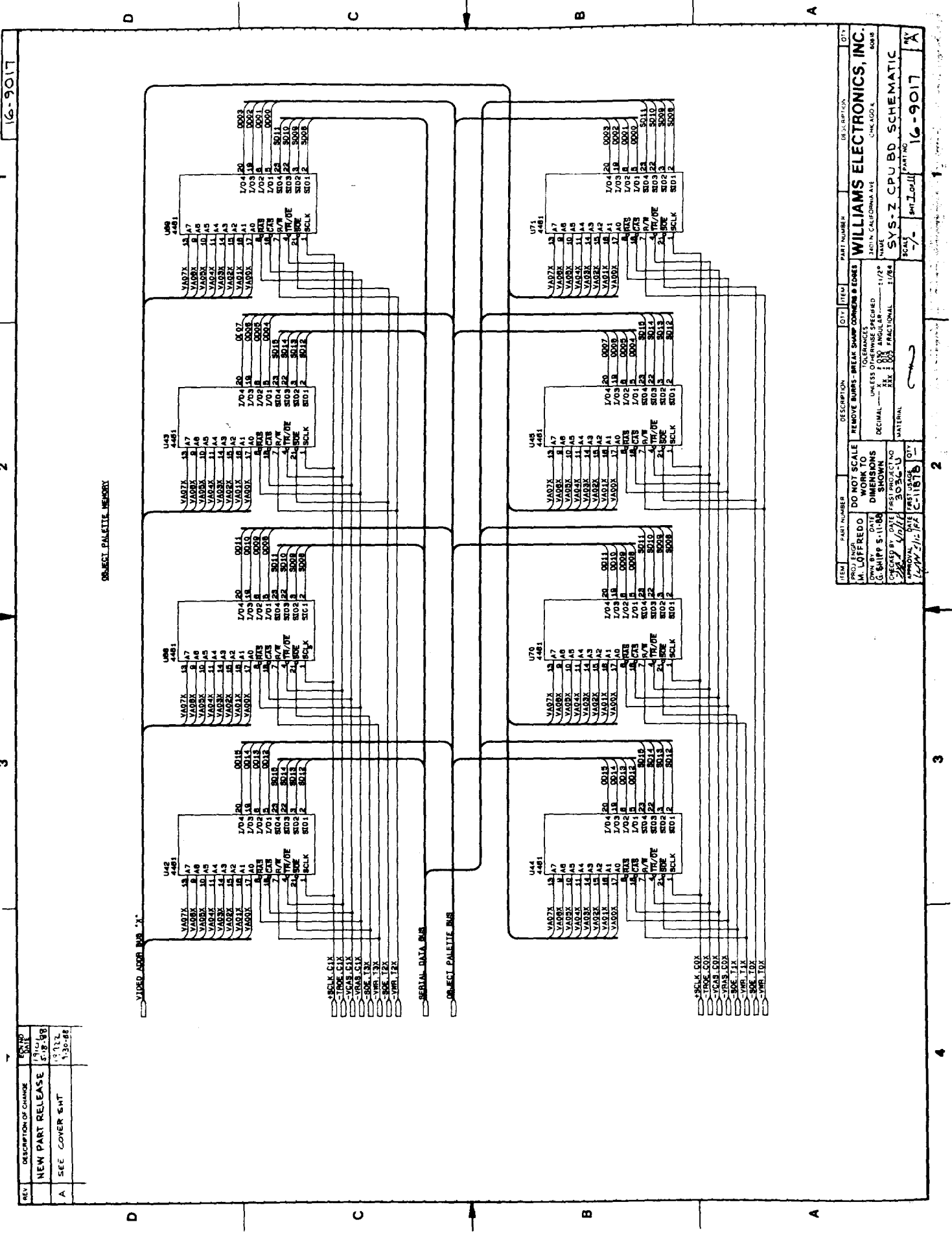
| REV | DESCRIPTION OF CHANGE | DATE    |
|-----|-----------------------|---------|
| A   | NEW PART RELEASE      | 9/10/81 |
|     | SEE COVER SHT         | 5-30-83 |

| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | QTY  |
|------|-------------|-------------|-----|------|-------------|------|
| 1    | U72         | 4481        |     | 1    | U72         | 4481 |
| 2    | U74         | 4481        |     | 2    | U74         | 4481 |
| 3    | U76         | 4481        |     | 3    | U76         | 4481 |
| 4    | U77         | 4481        |     | 4    | U77         | 4481 |
| 5    | U78         | 4481        |     | 5    | U78         | 4481 |
| 6    | U79         | 4481        |     | 6    | U79         | 4481 |
| 7    | U80         | 4481        |     | 7    | U80         | 4481 |
| 8    | U81         | 4481        |     | 8    | U81         | 4481 |
| 9    | U82         | 4481        |     | 9    | U82         | 4481 |
| 10   | U83         | 4481        |     | 10   | U83         | 4481 |
| 11   | U84         | 4481        |     | 11   | U84         | 4481 |
| 12   | U85         | 4481        |     | 12   | U85         | 4481 |
| 13   | U86         | 4481        |     | 13   | U86         | 4481 |
| 14   | U87         | 4481        |     | 14   | U87         | 4481 |
| 15   | U88         | 4481        |     | 15   | U88         | 4481 |
| 16   | U89         | 4481        |     | 16   | U89         | 4481 |
| 17   | U90         | 4481        |     | 17   | U90         | 4481 |
| 18   | U91         | 4481        |     | 18   | U91         | 4481 |
| 19   | U92         | 4481        |     | 19   | U92         | 4481 |
| 20   | U93         | 4481        |     | 20   | U93         | 4481 |
| 21   | U94         | 4481        |     | 21   | U94         | 4481 |
| 22   | U95         | 4481        |     | 22   | U95         | 4481 |
| 23   | U96         | 4481        |     | 23   | U96         | 4481 |
| 24   | U97         | 4481        |     | 24   | U97         | 4481 |
| 25   | U98         | 4481        |     | 25   | U98         | 4481 |
| 26   | U99         | 4481        |     | 26   | U99         | 4481 |
| 27   | U100        | 4481        |     | 27   | U100        | 4481 |

| PROJECT                    | ENGINEER    | DATE    | DESCRIPTION                                 | SCALE | REV |
|----------------------------|-------------|---------|---|-------|-----|
| WILLIAMS ELECTRONICS, INC. | M. LOFFREDO | 5/11/88 | REMOVE BURST BREAK BOARD COMPONENTS & BUSES | 1/2"  | A   |
|                            |             |         | TOLERANCES UNLESS OTHERWISE SPECIFIED       |       |     |
|                            |             |         | DECIMAL                                     | 1/32" |     |
|                            |             |         | ANGULAR                                     | 1/8°  |     |
|                            |             |         | FRACTIONAL                                  | 1/8"  |     |
|                            |             |         | MATERIAL                                    |       |     |
|                            |             |         | SOIC-U                                      |       |     |
|                            |             |         | DATE FIRST USAGE                            |       |     |
|                            |             |         | 1-27-81                                     |       |     |
|                            |             |         | DATE FIRST USAGE                            |       |     |
|                            |             |         | 1-18-81                                     |       |     |
|                            |             |         | DATE FIRST USAGE                            |       |     |
|                            |             |         | 1-18-81                                     |       |     |

WILLIAMS ELECTRONICS, INC.  
3401 N. CALIFORNIA AVE  
CHICAGO, IL 60641

16-9017  
SYS-Z CPU BD SCHEMATIC  
PART NO 16-9017  
REV A



OBJECT PALETTE MEMORY

| REV | DESCRIPTION OF CHANGE | DATE       |
|-----|-----------------------|------------|
| 1   | NEW PART RELEASE      | 1970-06-28 |
| A   | SEE COVER SMT         | 1971-12-13 |
|     |                       | 1981-08-13 |

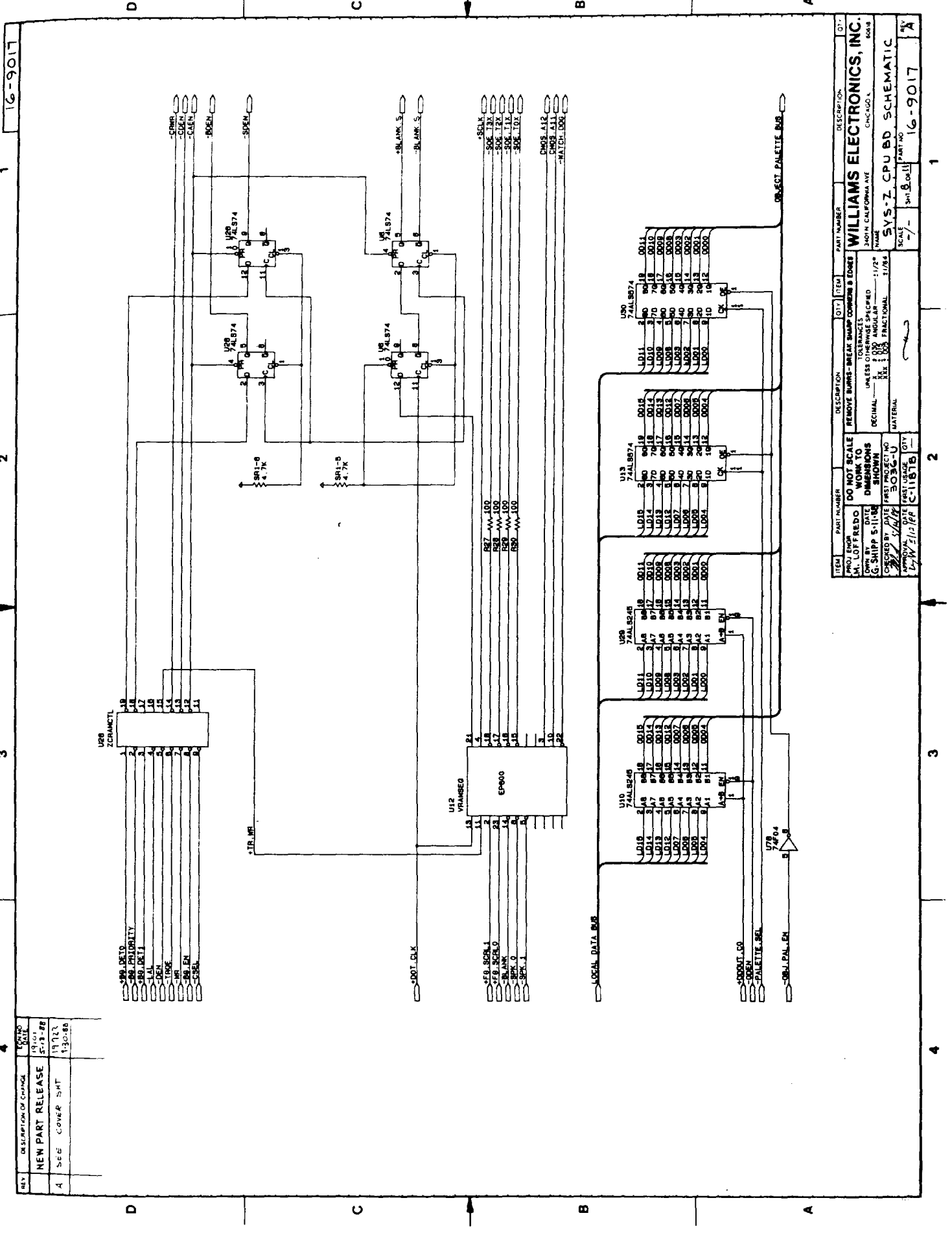
| ITEM | PART NUMBER | DESCRIPTION  | QTY | ITEM | PART NUMBER | DESCRIPTION  | QTY |
|------|-------------|--|-----|------|-------------|--|-----|
| 1    | U44 4461    | REMOVE BURNS - BREAK SHARP CORNERS & EDGES                 |     | 1    | U76 4461    | REMOVE BURNS - BREAK SHARP CORNERS & EDGES                 |     |
| 2    | U46 4461    | DO NOT SCALE WORK TO DIMENSIONS UNLESS OTHERWISE SPECIFIED |     | 2    | U70 4461    | DO NOT SCALE WORK TO DIMENSIONS UNLESS OTHERWISE SPECIFIED |     |
| 3    | U70 4461    | TOLERANCES UNLESS OTHERWISE SPECIFIED                      |     | 3    | U46 4461    | TOLERANCES UNLESS OTHERWISE SPECIFIED                      |     |
| 4    | U76 4461    | DECIMAL - 1/100 FRACTIONAL                                 |     | 4    | U70 4461    | DECIMAL - 1/100 FRACTIONAL                                 |     |
| 5    | U46 4461    | MATERIAL   |     | 5    | U76 4461    | MATERIAL   |     |
| 6    | U70 4461    | DATE FIRST USAGE   |     | 6    | U46 4461    | DATE FIRST USAGE   |     |
| 7    | U44 4461    | APPROVAL   |     | 7    | U76 4461    | APPROVAL   |     |
| 8    | U76 4461    | SCALE  |     | 8    | U44 4461    | SCALE  |     |
| 9    | U44 4461    | PART NO  |     | 9    | U76 4461    | PART NO  |     |
| 10   | U76 4461    | REV  |     | 10   | U44 4461    | REV  |     |
| 11   | U44 4461    | PROJ. ENGINEER   |     | 11   | U76 4461    | PROJ. ENGINEER   |     |
| 12   | U76 4461    | CHECKED BY   |     | 12   | U44 4461    | CHECKED BY   |     |
| 13   | U44 4461    | DATE   |     | 13   | U76 4461    | DATE   |     |
| 14   | U76 4461    | APPROVAL   |     | 14   | U44 4461    | APPROVAL   |     |
| 15   | U44 4461    | APPROVAL   |     | 15   | U76 4461    | APPROVAL   |     |
| 16   | U76 4461    | APPROVAL   |     | 16   | U44 4461    | APPROVAL   |     |
| 17   | U44 4461    | APPROVAL   |     | 17   | U76 4461    | APPROVAL   |     |
| 18   | U76 4461    | APPROVAL   |     | 18   | U44 4461    | APPROVAL   |     |
| 19   | U44 4461    | APPROVAL   |     | 19   | U76 4461    | APPROVAL   |     |
| 20   | U76 4461    | APPROVAL   |     | 20   | U44 4461    | APPROVAL   |     |

WILLIAMS ELECTRONICS, INC.  
 2070 CALIFORNIA AVE  
 CHULA VISTA, CA 92011  
 TEL: 619/441-1111  
 FAX: 619/441-1112

SYS-Z CPU BD SCHEMATIC  
 SCALE: 1:1  
 PART NO: 16-9017  
 REV: 1

16-9017

1 2 3 4



REV DESCRIPTION OF CHANGE DATE  
 1 NEW PART RELEASE 1978-08  
 2 SEE COVER SMT 1978-08  
 3  
 4

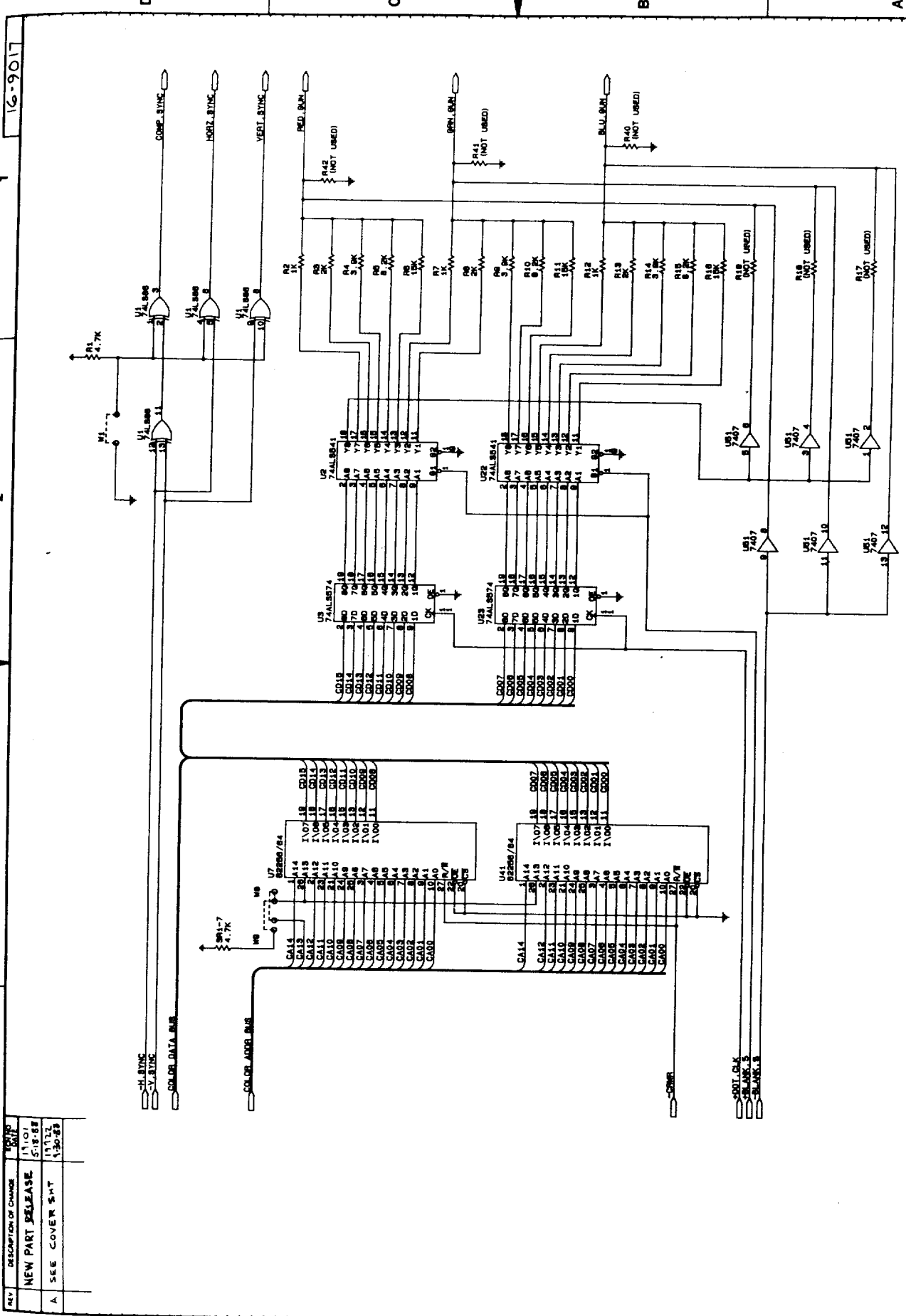
| ITEM         | PART NUMBER | DESCRIPTION                                | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--------------|-------------|--|-----|------|-------------|-------------|-----|
| PROJ ENGR    |             | DO NOT SCALE                               |     |      |             |             |     |
| M. LOTT REDO |             | REMOVE BURRS - BREAK SWAGE CORNERS & EDGES |     |      |             |             |     |
| OWN BY       |             | WORK TO DIMENSIONS SHOWN                   |     |      |             |             |     |
| G. SHIPP     | 5-11-88     |  |     |      |             |             |     |
| CHECKED BY   |             | DATE                                       |     |      |             |             |     |
| APPROVED BY  |             | DATE                                       |     |      |             |             |     |
| DATE         | 5/2/88      |  |     |      |             |             |     |
| PROJECT NO   | 3036-U      |  |     |      |             |             |     |
| PART NO      |             |  |     |      |             |             |     |
| SCALE        | 1/8"        |  |     |      |             |             |     |
| MATERIAL     |             |  |     |      |             |             |     |

WILLIAMS ELECTRONICS, INC.  
 3401 N. CALIFORNIA AVE  
 CHICAGO, IL 60618  
 NAME  
 SYS-7 CPU BD SCHEMATIC  
 SCALE 1/8" = 1" ANGULAR 1/16"  
 PART NO 16-9017  
 QTY 1





| 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 SWAP CONTACTS & ERRORS |      | 1    | W-107       | REMOVE BURR-BREAK SWAP CONTACTS & ERRORS |      |
| 2    | W-108       | UNLESS OTHERWISE SPECIFIED               |      | 2    | W-108       | UNLESS OTHERWISE SPECIFIED               |      |
| 3    | W-109       | DECIMAL                                  | 1/10 | 3    | W-109       | DECIMAL                                  | 1/10 |
| 4    | W-110       | FRACTIONAL                               | 1/24 | 4    | W-110       | FRACTIONAL                               | 1/24 |
| 5    | W-111       | MATERIAL                                 |      | 5    | W-111       | MATERIAL                                 |      |

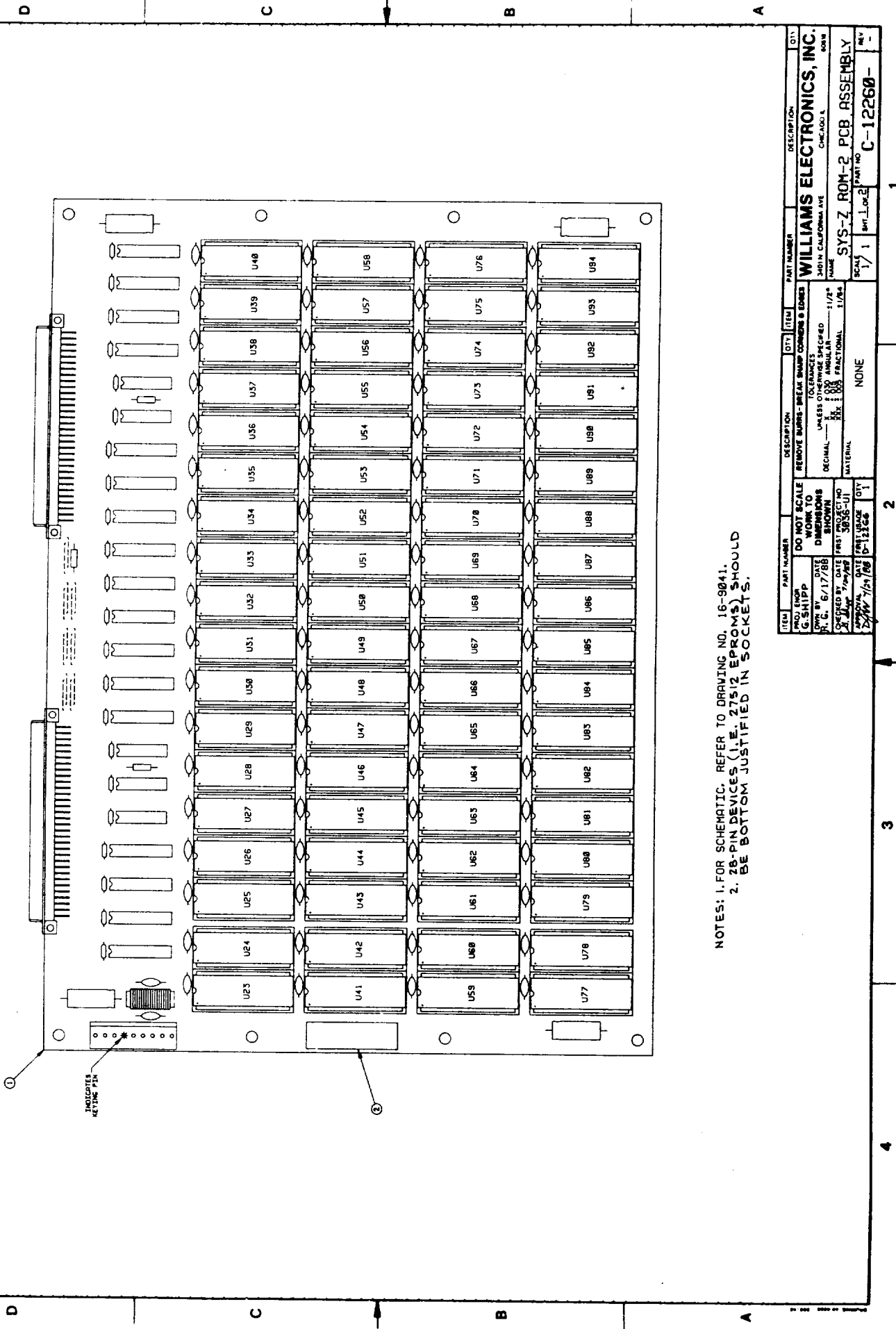
|             |         |                                       |         |
|-------------|---------|---------------------------------------|---------|
| PROJ. ENG.  | DATE    | DESCRIPTION                           | QTY     |
| W. LOFFREDO | 5-11-58 | DO NOT SCALE WORK TO DIMENSIONS SHOWN | 3036-U  |
| DATE        | DATE    | FIRST PROJECTING                      | DATE    |
| 5/11/58     | 5/11/58 | 3036-U                                | 5/11/58 |
| APPROVAL    | DATE    | FIRST USAGE                           | QTY     |
| 5/11/58     | 5/11/58 | C-1167B                               | 2       |

WILLIAMS ELECTRONICS, INC.  
3401 CALIFORNIA AVE  
CHICAGO, ILL.  
SYS-Z CPU BD SCHEMATIC  
SCALE 1/16"=1"



|    |                       |         |
|----|-----------------------|---------|
| #1 | DESCRIPTION OF CHANGE | DATE    |
|    | NEW PART RELEASE      | 5/10/88 |

C-12260-



NOTES: 1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-9041.  
 2. 28-PIN DEVICES (I.E. 27S12 EPROMS) SHOULD BE BOTTOM JUSTIFIED IN SOCKETS.

|      |                            |   |     |      |             |             |     |
|------|----------------------------|---|-----|------|-------------|-------------|-----|
| ITEM | PART NUMBER                | DESCRIPTION                               | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| 1    | WILLIAMS ELECTRONICS, INC. | REMOVE BURR - METAL SHARP CORNERS & EDGES |     |      |             |             |     |
| 2    | WILLIAMS ELECTRONICS, INC. | TOLERANCES UNLESS OTHERWISE SPECIFIED     |     |      |             |             |     |
| 3    | WILLIAMS ELECTRONICS, INC. | DECIMAL - 1/100 ANGULAR - 1/16°           |     |      |             |             |     |
| 4    | WILLIAMS ELECTRONICS, INC. | FRACTIONAL - 1/16                         |     |      |             |             |     |
| 5    | WILLIAMS ELECTRONICS, INC. | MATERIAL - NONE                           |     |      |             |             |     |
| 6    | WILLIAMS ELECTRONICS, INC. | DO NOT SCALE DRAWING TO DIMENSIONS SHOWN  |     |      |             |             |     |
| 7    | WILLIAMS ELECTRONICS, INC. | DATE 6/17/88                              |     |      |             |             |     |
| 8    | WILLIAMS ELECTRONICS, INC. | DESIGNED BY DATE 7/27/88                  |     |      |             |             |     |
| 9    | WILLIAMS ELECTRONICS, INC. | APPROVAL DATE 7/27/88                     |     |      |             |             |     |
| 10   | WILLIAMS ELECTRONICS, INC. | PROJECT NO. 3856-U1                       |     |      |             |             |     |
| 11   | WILLIAMS ELECTRONICS, INC. | PART USAGE 1                              |     |      |             |             |     |
| 12   | WILLIAMS ELECTRONICS, INC. | DATE 5-12-88                              |     |      |             |             |     |
| 13   | WILLIAMS ELECTRONICS, INC. | SCALE 1/1                                 |     |      |             |             |     |
| 14   | WILLIAMS ELECTRONICS, INC. | NAME SYS-Z ROM-2 PCB ASSEMBLY             |     |      |             |             |     |
| 15   | WILLIAMS ELECTRONICS, INC. | ADDRESS 2015 CALIFORNIA AVE               |     |      |             |             |     |
| 16   | WILLIAMS ELECTRONICS, INC. | CHEVROLET                                 |     |      |             |             |     |
| 17   | WILLIAMS ELECTRONICS, INC. | PART NO. C-12260-1                        |     |      |             |             |     |
| 18   | WILLIAMS ELECTRONICS, INC. | REV. 1                                    |     |      |             |             |     |

C-12260-

1

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| REV | DESCRIPTION OF CHANGE | DATE    |
|     | NEW PART RELEASE      | 1/11/78 |

| GAME NAME | 3038 |
|-----------|------|
| ASSY. NO. |      |
| U77       |      |
| U78       |      |
| U79       |      |
| U80       |      |
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| U93       |      |
| U94       |      |

| GAME NAME | 3038 |
|-----------|------|
| ASSY. NO. |      |
| U50       |      |
| U51       |      |
| U52       |      |
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| U75       |      |
| U76       |      |

| GAME NAME | 3038 |
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| ASSY. NO. |      |
| U23       |      |
| U24       |      |
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| U45       |      |
| U46       |      |
| U47       |      |
| U48       |      |
| U49       |      |

| 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

**WILLIAMS ELECTRONICS, INC.**  
 CHICAGO, ILL. 60619  
 3401N CALIFORNIA AVE

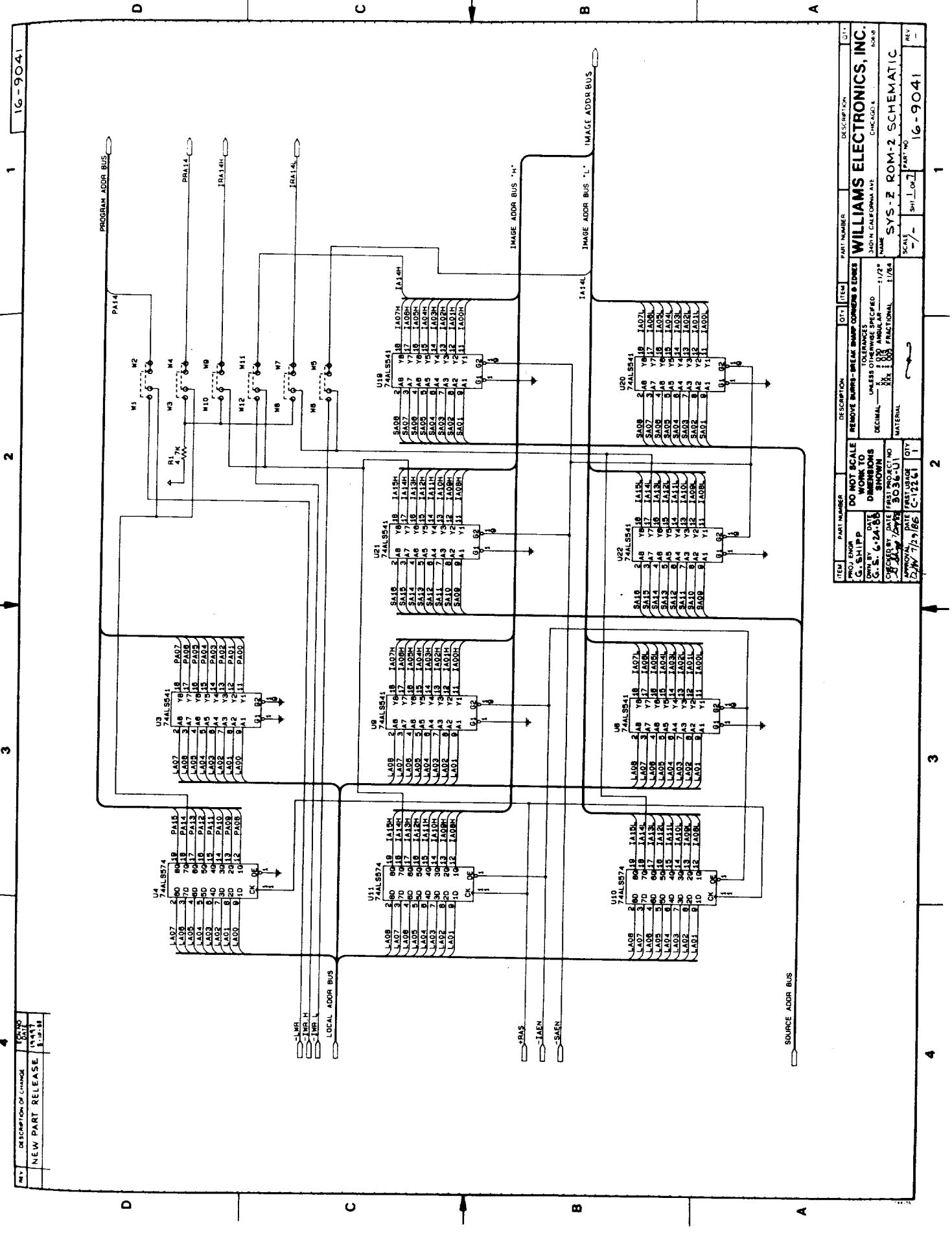
DO NOT SCALE  
 DIMENSIONS SHOWN  
 UNLESS OTHERWISE SPECIFIED

DATE: 6-24-88  
 CHECKED BY: JAL  
 APPROVAL DATE: 7/18/88

DECIMAL: 1/16" FRACTIONAL: 1/8"  
 ANGULAR: 1/8° FRACTIONAL: 1/8°

MATERIAL: NONE

SY5-2 ROM-2 PCB ASSEMBLY  
 PART NO: C-12260-  
 REV: -

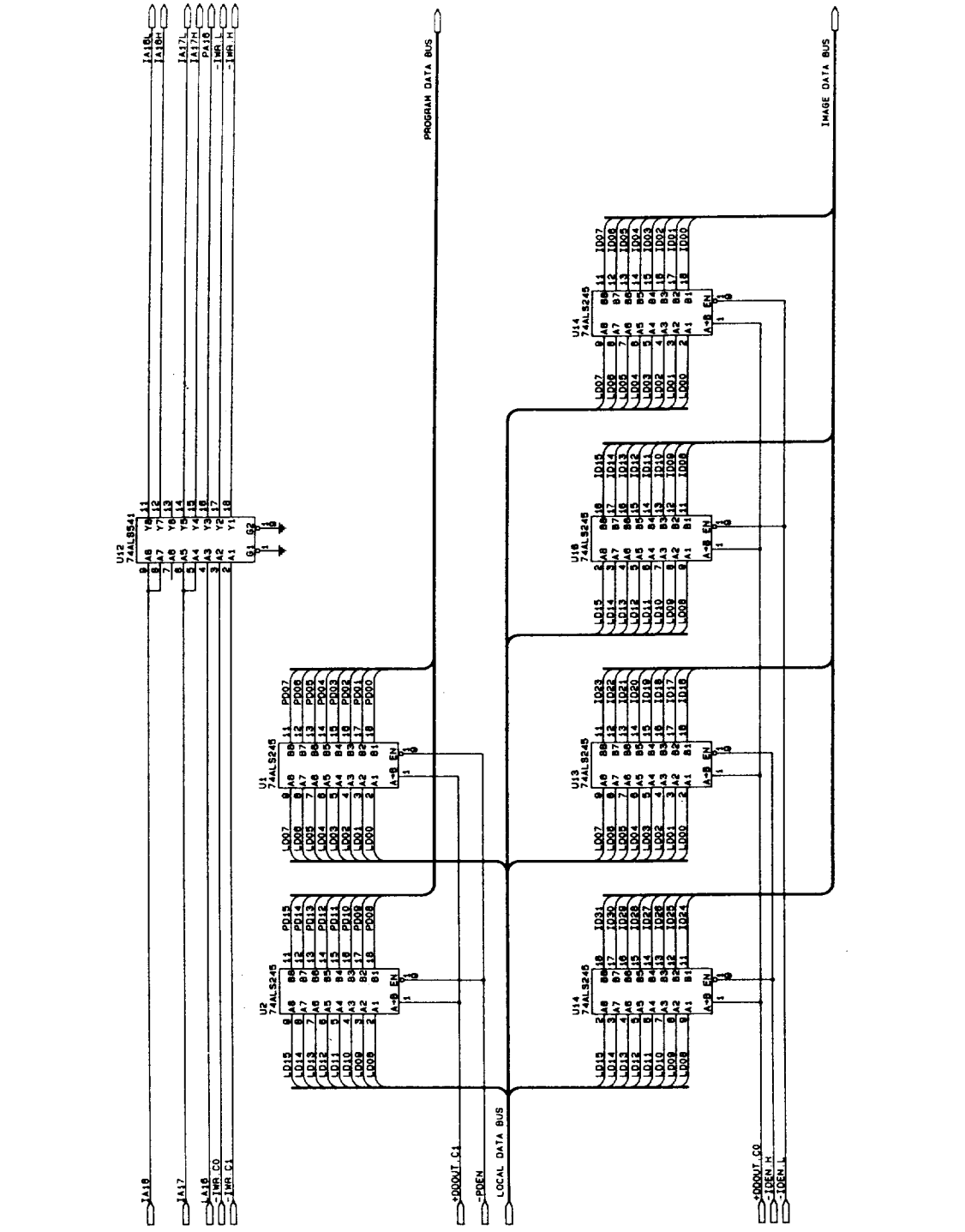


16-9041

16-9041

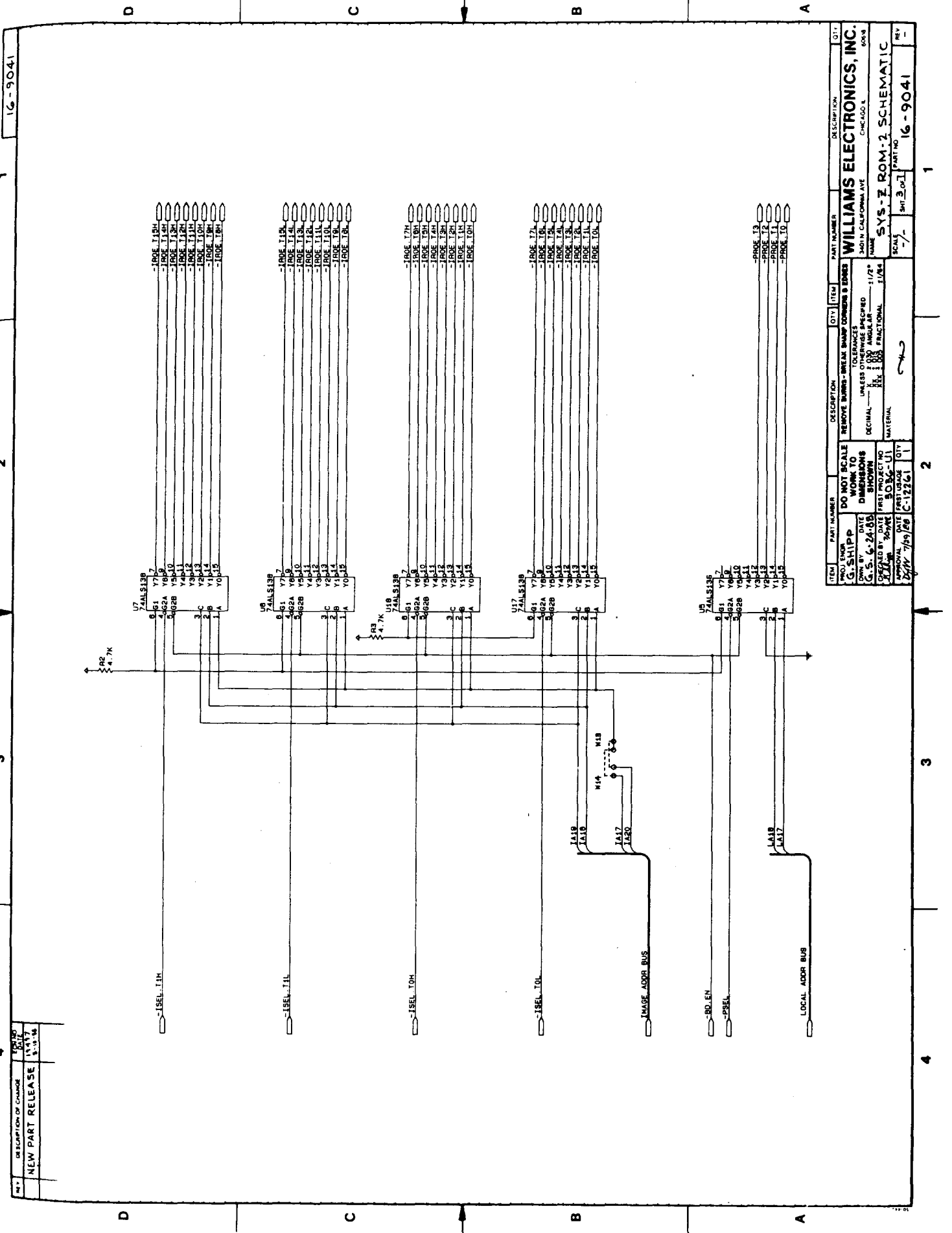
| ITEM | PART NUMBER | DESCRIPTION  | QTY | ITEM | DESCRIPTION | QTY |
|------|-------------|--|-----|------|-------------|-----|
| 1    | 74ALS574    | LA07 2, LA08 3, LA09 4, LA10 5, LA11 6, LA12 7, LA13 8, LA14 9, LA15 10, LA16 11, LA17 12, LA18 13, LA19 14, LA20 15, LA21 16, LA22 17, LA23 18, LA24 19, LA25 20, LA26 21, LA27 22, LA28 23, LA29 24, LA30 25, LA31 26, LA32 27, LA33 28, LA34 29, LA35 30, LA36 31, LA37 32, LA38 33, LA39 34, LA40 35, LA41 36, LA42 37, LA43 38, LA44 39, LA45 40, LA46 41, LA47 42, LA48 43, LA49 44, LA50 45, LA51 46, LA52 47, LA53 48, LA54 49, LA55 50, LA56 51, LA57 52, LA58 53, LA59 54, LA60 55, LA61 56, LA62 57, LA63 58, LA64 59, LA65 60, LA66 61, LA67 62, LA68 63, LA69 64, LA70 65, LA71 66, LA72 67, LA73 68, LA74 69, LA75 70, LA76 71, LA77 72, LA78 73, LA79 74, LA80 75, LA81 76, LA82 77, LA83 78, LA84 79, LA85 80, LA86 81, LA87 82, LA88 83, LA89 84, LA90 85, LA91 86, LA92 87, LA93 88, LA94 89, LA95 90, LA96 91, LA97 92, LA98 93, LA99 94, LA100 95, LA101 96, LA102 97, LA103 98, LA104 99, LA105 100, LA106 101, LA107 102, LA108 103, LA109 104, LA110 105, LA111 106, LA112 107, LA113 108, LA114 109, LA115 110, LA116 111, LA117 112, LA118 113, LA119 114, LA120 115, LA121 116, LA122 117, LA123 118, LA124 119, LA125 120, LA126 121, LA127 122, LA128 123, LA129 124, LA130 125, LA131 126, LA132 127, LA133 128, LA134 129, LA135 130, LA136 131, LA137 132, LA138 133, LA139 134, LA140 135, LA141 136, LA142 137, LA143 138, LA144 139, LA145 140, LA146 141, LA147 142, LA148 143, LA149 144, LA150 145, LA151 146, LA152 147, LA153 148, LA154 149, LA155 150, LA156 151, LA157 152, LA158 153, LA159 154, LA160 155, LA161 156, LA162 157, LA163 158, LA164 159, LA165 160, LA166 161, LA167 162, LA168 163, LA169 164, LA170 165, LA171 166, LA172 167, LA173 168, LA174 169, LA175 170, LA176 171, LA177 172, LA178 173, LA179 174, LA180 175, LA181 176, LA182 177, LA183 178, LA184 179, LA185 180, LA186 181, LA187 182, LA188 183, LA189 184, LA190 185, LA191 186, LA192 187, LA193 188, LA194 189, LA195 190, LA196 191, LA197 192, LA198 193, LA199 194, LA200 195, LA201 196, LA202 197, LA203 198, LA204 199, 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| REV | DESCRIPTION OF CHANGE | DATE     |
|-----|-----------------------|----------|
| 1   | NEW PART RELEASE      | 11/21/68 |



| ITEM                  | PART NUMBER   | DESCRIPTION                                | QTY   | ITEM                  | PART NUMBER   | DESCRIPTION                                | QTY   |
|-----------------------|---------------|--|-------|-----------------------|---------------|--|-------|
| PROJ ENGR             | G. SHIPP      | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |       | PROJ ENGR             | G. SHIPP      | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |       |
| DATE                  | 12/04/68      | UNLESS OTHERWISE SPECIFIED                 |       | DATE                  | 12/04/68      | UNLESS OTHERWISE SPECIFIED                 |       |
| DWG BY                | G. S. G-24-88 | DECIMAL                                    | 1/16" | DWG BY                | G. S. G-24-88 | DECIMAL                                    | 1/16" |
| CHECKED BY            | J. J. J.      | ANGULAR                                    | 1/32" | CHECKED BY            | J. J. J.      | ANGULAR                                    | 1/32" |
| DATE FIRST PROTECTING | 3/28/68       | FRACTIONAL                                 | 1/64" | DATE FIRST PROTECTING | 3/28/68       | FRACTIONAL                                 | 1/64" |
| DATE PREPARED         | 7/19/68       | MATERIAL                                   |       | DATE PREPARED         | 7/19/68       | MATERIAL                                   |       |
| QTY                   | 1             |  |       | QTY                   | 1             |  |       |
|                       |               |  |       |                       |               |  |       |

|                            |  |                       |  |
|----------------------------|--|-----------------------|--|
| WILLIAMS ELECTRONICS, INC. |  | CHICAGO, ILL.         |  |
| 340 N. CALIFORNIA AVE.     |  | CHICAGO, ILL.         |  |
| NAME                       |  | SYS-Z ROM-2 SCHEMATIC |  |
| SCALE                      |  | 1/2" = 1"             |  |
| PART NO.                   |  | 16-9041               |  |



16-9041

1 2 3 4

DESCRIPTION OF CHANGE  
NEW PART RELEASE  
DATE 11-17-68  
BY 11-17-68

| ITEM   | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION |
|--|-------------|-------------|-----|------|-------------|-------------|
| <b>WILLIAMS ELECTRONICS, INC.</b><br>2001 CALIFORNIA AVE<br>CHICO, CALIF. 95926  |             |             |     |      |             |             |
| <b>PROJ. ENG. G. SHIPP</b><br>DATE 5-16-68<br>DRAWN BY 2-10-68<br>CHECKED BY 2-10-68<br>APPROVAL DATE 7/29/68 C-12261                            |             |             |     |      |             |             |
| <b>DO NOT SCALE WORK TO DIMENSIONS</b><br>UNLESS OTHERWISE SPECIFIED<br>DECIMALS TO 3 SIG FIGS FRACTIONAL 1/64" MATERIAL                         |             |             |     |      |             |             |
| <b>REMOVE BURRS-BREAK SHARP CORNERS &amp; EDGES</b><br>TOLERANCES UNLESS OTHERWISE SPECIFIED<br>DECIMALS TO 3 SIG FIGS FRACTIONAL 1/64" MATERIAL |             |             |     |      |             |             |
| <b>SYN-Z ROM-2 SCHEMATIC</b><br>SCALE 1:1 PART NO 16-9041 REV -  |             |             |     |      |             |             |

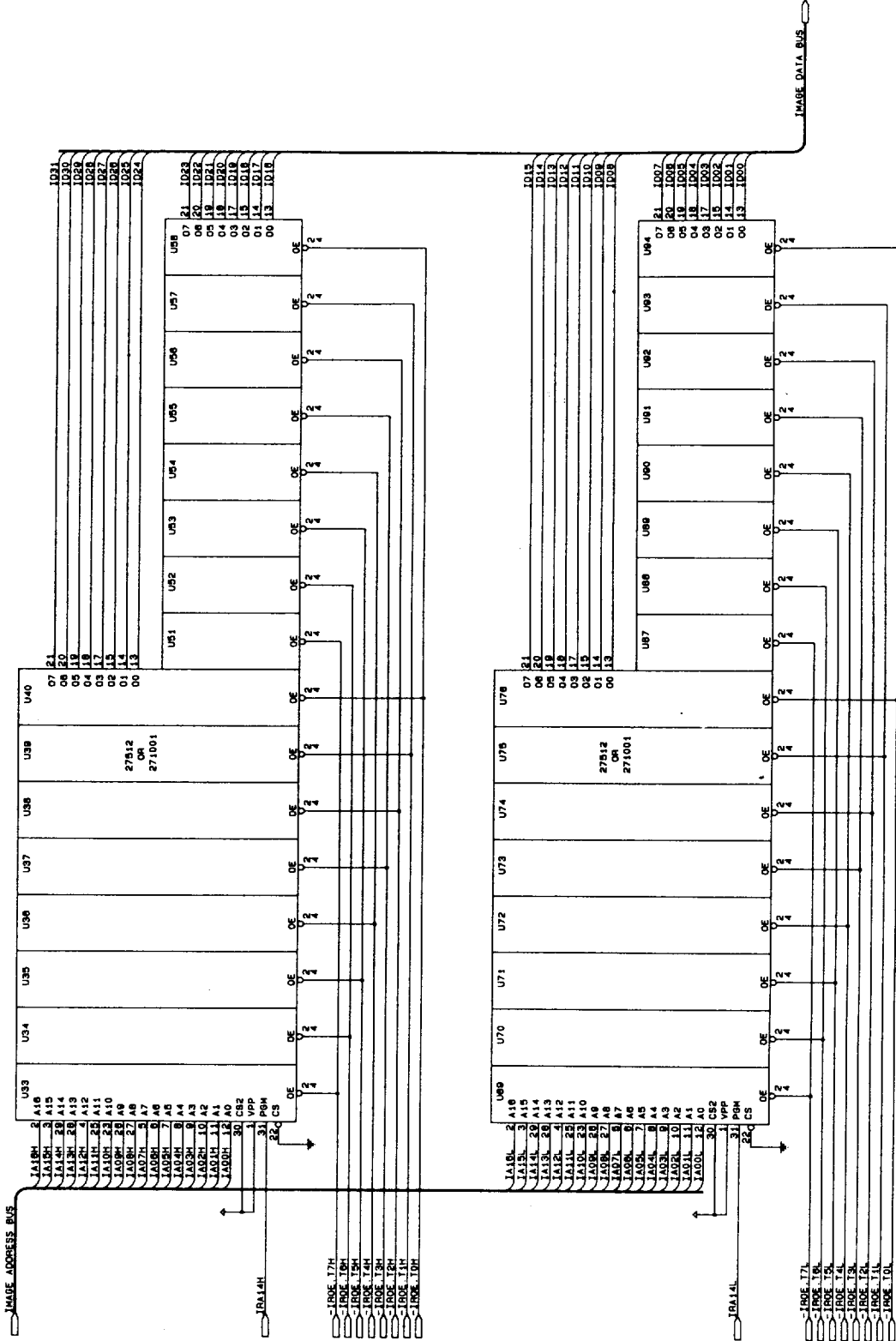
| U7   | 74ALS13B | 8-01   | Y7-7   | -PROE.T1H |
|------|----------|--------|--------|-----------|
| 8-02 | Y6-8     | Y6-9   | Y6-10  | U8        |
| 8-03 | Y6-11    | Y6-12  | Y6-13  | 74ALS13B  |
| 8-04 | Y6-14    | Y6-15  | Y6-16  | 8-01      |
| 8-05 | Y6-17    | Y6-18  | Y6-19  | Y7-7      |
| 8-06 | Y6-20    | Y6-21  | Y6-22  | 8-02      |
| 8-07 | Y6-23    | Y6-24  | Y6-25  | Y6-8      |
| 8-08 | Y6-26    | Y6-27  | Y6-28  | Y6-9      |
| 8-09 | Y6-29    | Y6-30  | Y6-31  | Y6-10     |
| 8-10 | Y6-32    | Y6-33  | Y6-34  | Y6-11     |
| 8-11 | Y6-35    | Y6-36  | Y6-37  | Y6-12     |
| 8-12 | Y6-38    | Y6-39  | Y6-40  | Y6-13     |
| 8-13 | Y6-41    | Y6-42  | Y6-43  | Y6-14     |
| 8-14 | Y6-44    | Y6-45  | Y6-46  | Y6-15     |
| 8-15 | Y6-47    | Y6-48  | Y6-49  | Y6-16     |
| 8-16 | Y6-50    | Y6-51  | Y6-52  | Y6-17     |
| 8-17 | Y6-53    | Y6-54  | Y6-55  | Y6-18     |
| 8-18 | Y6-56    | Y6-57  | Y6-58  | Y6-19     |
| 8-19 | Y6-59    | Y6-60  | Y6-61  | Y6-20     |
| 8-20 | Y6-62    | Y6-63  | Y6-64  | Y6-21     |
| 8-21 | Y6-65    | Y6-66  | Y6-67  | Y6-22     |
| 8-22 | Y6-68    | Y6-69  | Y6-70  | Y6-23     |
| 8-23 | Y6-71    | Y6-72  | Y6-73  | Y6-24     |
| 8-24 | Y6-74    | Y6-75  | Y6-76  | Y6-25     |
| 8-25 | Y6-77    | Y6-78  | Y6-79  | Y6-26     |
| 8-26 | Y6-80    | Y6-81  | Y6-82  | Y6-27     |
| 8-27 | Y6-83    | Y6-84  | Y6-85  | Y6-28     |
| 8-28 | Y6-86    | Y6-87  | Y6-88  | Y6-29     |
| 8-29 | Y6-89    | Y6-90  | Y6-91  | Y6-30     |
| 8-30 | Y6-92    | Y6-93  | Y6-94  | Y6-31     |
| 8-31 | Y6-95    | Y6-96  | Y6-97  | Y6-32     |
| 8-32 | Y6-98    | Y6-99  | Y6-100 | Y6-33     |
| 8-33 | Y6-101   | Y6-102 | Y6-103 | Y6-34     |
| 8-34 | Y6-104   | Y6-105 | Y6-106 | Y6-35     |
| 8-35 | Y6-107   | Y6-108 | Y6-109 | Y6-36     |
| 8-36 | Y6-110   | Y6-111 | Y6-112 | Y6-37     |
| 8-37 | Y6-113   | Y6-114 | Y6-115 | Y6-38     |
| 8-38 | Y6-116   | Y6-117 | Y6-118 | Y6-39     |
| 8-39 | Y6-119   | Y6-120 | Y6-121 | Y6-40     |
| 8-40 | Y6-122   | Y6-123 | Y6-124 | Y6-41     |
| 8-41 | Y6-125   | Y6-126 | Y6-127 | Y6-42     |
| 8-42 | Y6-128   | Y6-129 | Y6-130 | Y6-43     |
| 8-43 | Y6-131   | Y6-132 | Y6-133 | Y6-44     |
| 8-44 | Y6-134   | Y6-135 | Y6-136 | Y6-45     |
| 8-45 | Y6-137   | Y6-138 | Y6-139 | Y6-46     |
| 8-46 | Y6-140   | Y6-141 | Y6-142 | Y6-47     |
| 8-47 | Y6-143   | Y6-144 | Y6-145 | Y6-48     |
| 8-48 | Y6-146   | Y6-147 | Y6-148 | Y6-49     |
| 8-49 | Y6-149   | Y6-150 | Y6-151 | Y6-50     |
| 8-50 | Y6-152   | Y6-153 | Y6-154 | Y6-51     |
| 8-51 | Y6-155   | Y6-156 | Y6-157 | Y6-52     |
| 8-52 | Y6-158   | Y6-159 | Y6-160 | Y6-53     |
| 8-53 | Y6-161   | Y6-162 | Y6-163 | Y6-54     |
| 8-54 | Y6-164   | Y6-165 | Y6-166 | Y6-55     |
| 8-55 | Y6-167   | Y6-168 | Y6-169 | Y6-56     |
| 8-56 | Y6-170   | Y6-171 | Y6-172 | Y6-57     |
| 8-57 | Y6-173   | Y6-174 | Y6-175 | Y6-58     |
| 8-58 | Y6-176   | Y6-177 | Y6-178 | Y6-59     |
| 8-59 | Y6-179   | Y6-180 | Y6-181 | Y6-60     |
| 8-60 | Y6-182   | Y6-183 | Y6-184 | Y6-61     |
| 8-61 | Y6-185   | Y6-186 | Y6-187 | Y6-62     |
| 8-62 | Y6-188   | Y6-189 | Y6-190 | Y6-63     |
| 8-63 | Y6-191   | Y6-192 | Y6-193 | Y6-64     |
| 8-64 | Y6-194   | Y6-195 | Y6-196 | Y6-65     |
| 8-65 | Y6-197   | Y6-198 | Y6-199 | Y6-66     |
| 8-66 | Y6-200   | Y6-201 | Y6-202 | Y6-67     |
| 8-67 | Y6-203   | Y6-204 | Y6-205 | Y6-68     |
| 8-68 | Y6-206   | Y6-207 | Y6-208 | Y6-69     |
| 8-69 | Y6-209   | Y6-210 | Y6-211 | Y6-70     |
| 8-70 | Y6-212   | Y6-213 | Y6-214 | Y6-71     |
| 8-71 | Y6-215   | Y6-216 | Y6-217 | Y6-72     |
| 8-72 | Y6-218   | Y6-219 | Y6-220 | Y6-73     |
| 8-73 | Y6-221   | Y6-222 | Y6-223 | Y6-74     |
| 8-74 | Y6-224   | Y6-225 | Y6-226 | Y6-75     |
| 8-75 | Y6-227   | Y6-228 | Y6-229 | Y6-76     |
| 8-76 | Y6-230   | Y6-231 | Y6-232 | Y6-77     |
| 8-77 | Y6-233   | Y6-234 | Y6-235 | Y6-78     |
| 8-78 | Y6-236   | Y6-237 | Y6-238 | Y6-79     |
| 8-79 | Y6-239   | Y6-240 | Y6-241 | Y6-80     |
| 8-80 | Y6-242   | Y6-243 | Y6-244 | Y6-81     |
| 8-81 | Y6-245   | Y6-246 | Y6-247 | Y6-82     |
| 8-82 | Y6-248   | Y6-249 | Y6-250 | Y6-83     |
| 8-83 | Y6-251   | Y6-252 | Y6-253 | Y6-84     |
| 8-84 | Y6-254   | Y6-255 | Y6-256 | Y6-85     |
| 8-85 | Y6-257   | Y6-258 | Y6-259 | Y6-86     |
| 8-86 | Y6-260   | Y6-261 | Y6-262 | Y6-87     |
| 8-87 | Y6-263   | Y6-264 | Y6-265 | Y6-88     |
| 8-88 | Y6-266   | Y6-267 | Y6-268 | Y6-89     |
| 8-89 | Y6-269   | Y6-270 | Y6-271 | Y6-90     |
| 8-90 | Y6-272   | Y6-273 | Y6-274 | Y6-91     |
| 8-91 | Y6-275   | Y6-276 | Y6-277 | Y6-92     |
| 8-92 | Y6-278   | Y6-279 | Y6-280 | Y6-93     |
| 8-93 | Y6-281   | Y6-282 | Y6-283 | Y6-94     |
| 8-94 | Y6-284   | Y6-285 | Y6-286 | Y6-95     |
| 8-95 | Y6-287   | Y6-288 | Y6-289 | Y6-96     |
| 8-96 | Y6-290   | Y6-291 | Y6-292 | Y6-97     |
| 8-97 | Y6-293   | Y6-294 | Y6-295 | Y6-98     |
| 8-98 | Y6-296   | Y6-297 | Y6-298 | Y6-99     |
| 8-99 | Y6-299   | Y6-300 | Y6-301 | Y6-100    |





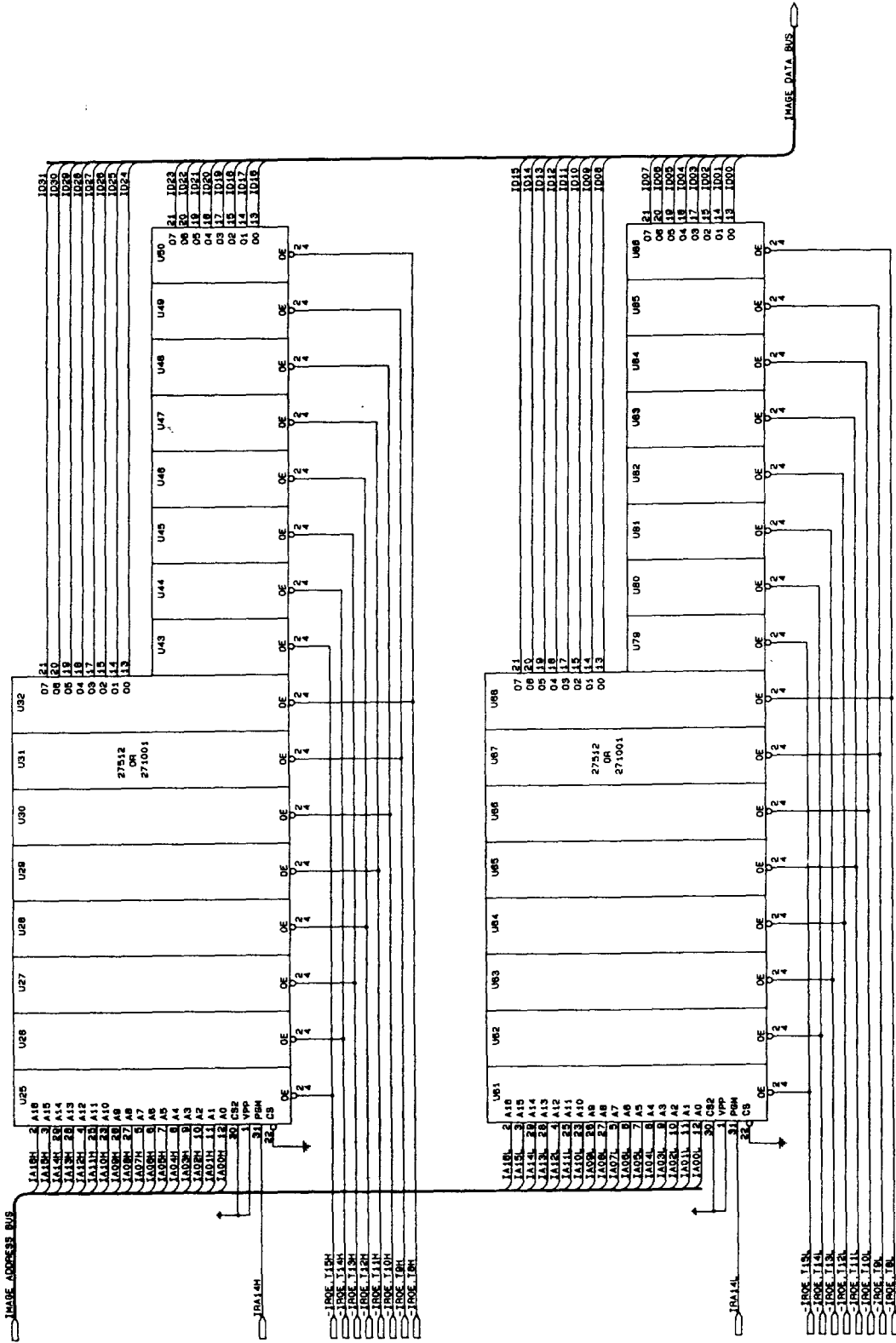
REV. 4  
DESCRIPTION OF CHANGE  
NEW PART RELEASE  
DATE  
9-10-68

16-9041



| ITEM   | PART NUMBER        | DESCRIPTION                                | QTY | ITEM  | PART NUMBER        | DESCRIPTION                                | QTY |
|--|--------------------|--|-----|---|--------------------|--|-----|
| PRO. ENGR  | G. SHIPP           | REMOVE BURRS - BREAK SWAMP CONDENS & EDGES |     | PRO. 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                                    |     | SCALE   | AS SHOWN           | DECIMAL                                    |     |
| APPROVED BY  | W. J. ...          | PER SUBJECT TO                             |     | APPROVED BY   | W. J. ...          | PER SUBJECT TO                             |     |
| DRAWN  | W. J. ...          | PART CASE - 1011                           |     | DRAWN   | W. J. ...          | PART CASE - 1011                           |     |
| MATERIAL   | 62W 7/6/68 C-12261 |  |     | MATERIAL  | 62W 7/6/68 C-12261 |  |     |
| <b>WILLIAMS ELECTRONICS, INC.</b><br>3401N CALIFORNIA AVE<br>CHICAGO, ILL. 60698 |                    |  |     | <b>SYS-2 ROM-2 SCHEMATIC</b><br>PART NO 16-9041<br>SHEET 2 OF 2 |                    |  |     |

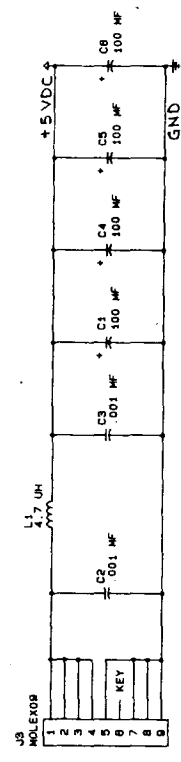
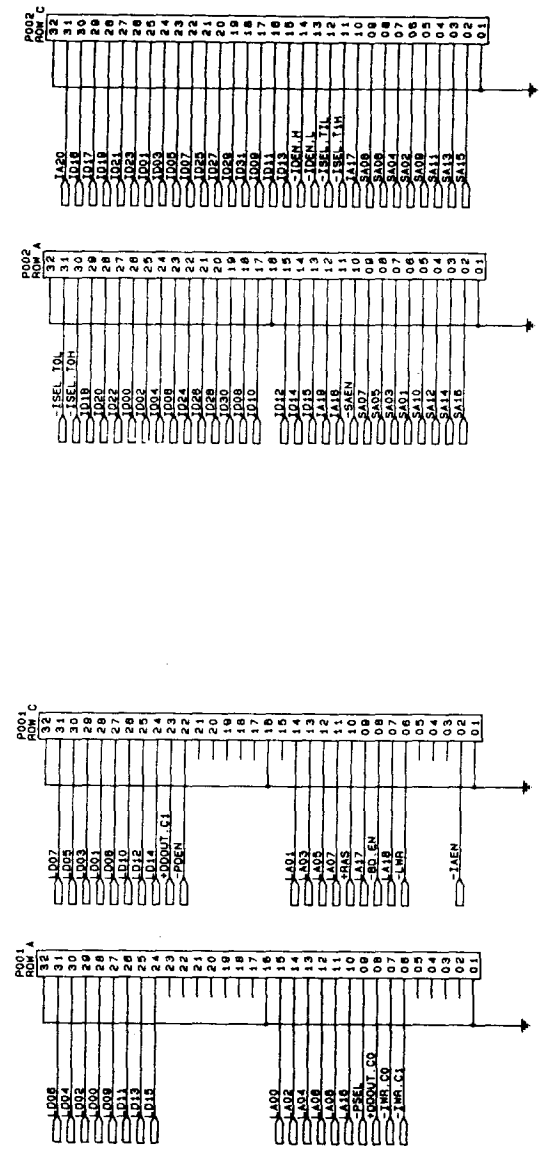
|     |                       |          |
|-----|-----------------------|----------|
| REV | DESCRIPTION OF CHANGE | DATE     |
| 1   | NEW PART RELEASE      | 10/17/88 |



|              |             |  |     |                                       |             |                                       |     |
|--------------|-------------|--|-----|---------------------------------------|-------------|---------------------------------------|-----|
| ITEM         | PART NUMBER | DESCRIPTION                                | QTY | ITEM                                  | PART NUMBER | DESCRIPTION                           | QTY |
| 1            | 16-9041     | DO NOT SCALE WORK TO DIMENSIONS SHOWN      | 1   | 1                                     | 16-9041     | WILLIAMS ELECTRONICS, INC. CHICAGO IL | 1   |
| PROJ ENGR    |             | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |     | TOLERANCES UNLESS OTHERWISE SPECIFIED |             | 3/018 CALIFORNIA AVE CHICAGO IL 60618 |     |
| DATE         |             | DECIMAL                                    |     | ANGULAR                               |             | 1/16"                                 |     |
| G.S. 6-24-88 |             | FRAC                                       |     | FRACTIONAL                            |             | 1/64"                                 |     |
| DESIGNED BY  |             | FIRST PROJECT NO                           |     | MATERIAL                              |             | SYS-Z ROM-2 SCHEMATIC                 |     |
| 17/2/88      |             | 3036-U1                                    |     | SCALE                                 |             | SMT 5.0x7                             |     |
| APPROVAL     |             | DATE                                       |     | PART NO                               |             | 16-9041                               |     |
| 1/2/88       |             | 12/26/11                                   |     | REV                                   |             | -                                     |     |

|     |                       |         |
|-----|-----------------------|---------|
| REV | DESCRIPTION OF CHANGE | DATE    |
| 1   | NEW PART RELEASE      | 3-10-63 |

16-9041



|     |                       |         |     |             |         |
|-----|-----------------------|---------|-----|-------------|---------|
| REV | DESCRIPTION OF CHANGE | DATE    | REV | DESCRIPTION | DATE    |
| 1   | NEW PART RELEASE      | 3-10-63 | 1   | 16-9041     | 3-10-63 |

|      |  |  |     |      |  |  |     |
|------|--|--|-----|------|--|--|-----|
| ITEM | PART NUMBER                                | DESCRIPTION                                | QTY | ITEM | PART NUMBER                                | DESCRIPTION                                | QTY |
| 1    | WILLIAMS ELECTRONICS, INC.                 | WILLIAMS ELECTRONICS, INC.                 |     | 1    | WILLIAMS ELECTRONICS, INC.                 | WILLIAMS ELECTRONICS, INC.                 |     |
| 2    | DO NOT SCALE DIMENSIONS TO SHOWN           | DO NOT SCALE DIMENSIONS TO SHOWN           |     | 2    | DO NOT SCALE DIMENSIONS TO SHOWN           | DO NOT SCALE DIMENSIONS TO SHOWN           |     |
| 3    | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |     | 3    | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |     |
| 4    | TOLERANCES UNLESS OTHERWISE SPECIFIED      | TOLERANCES UNLESS OTHERWISE SPECIFIED      |     | 4    | TOLERANCES UNLESS OTHERWISE SPECIFIED      | TOLERANCES UNLESS OTHERWISE SPECIFIED      |     |
| 5    | DECIMAL FRACTIONAL                         | DECIMAL FRACTIONAL                         |     | 5    | DECIMAL FRACTIONAL                         | DECIMAL FRACTIONAL                         |     |
| 6    | 1/2"                                       | 1/2"                                       |     | 6    | 1/2"                                       | 1/2"                                       |     |
| 7    | 1/8"                                       | 1/8"                                       |     | 7    | 1/8"                                       | 1/8"                                       |     |
| 8    | MATERIAL                                   | MATERIAL                                   |     | 8    | MATERIAL                                   | MATERIAL                                   |     |
| 9    | PROJECT NO.                                | PROJECT NO.                                |     | 9    | PROJECT NO.                                | PROJECT NO.                                |     |
| 10   | 3036-01                                    | 3036-01                                    |     | 10   | 3036-01                                    | 3036-01                                    |     |
| 11   | DATE                                       | DATE                                       |     | 11   | DATE                                       | DATE                                       |     |
| 12   | 12/26/61                                   | 12/26/61                                   |     | 12   | 12/26/61                                   | 12/26/61                                   |     |
| 13   | APPROVAL                                   | APPROVAL                                   |     | 13   | APPROVAL                                   | APPROVAL                                   |     |
| 14   | DATE                                       | DATE                                       |     | 14   | DATE                                       | DATE                                       |     |
| 15   | 12/26/61                                   | 12/26/61                                   |     | 15   | 12/26/61                                   | 12/26/61                                   |     |

|     |                       |         |     |             |         |
|-----|-----------------------|---------|-----|-------------|---------|
| REV | DESCRIPTION OF CHANGE | DATE    | REV | DESCRIPTION | DATE    |
| 1   | NEW PART RELEASE      | 3-10-63 | 1   | 16-9041     | 3-10-63 |

|      |  |  |     |      |  |  |     |
|------|--|--|-----|------|--|--|-----|
| ITEM | PART NUMBER                                | DESCRIPTION                                | QTY | ITEM | PART NUMBER                                | DESCRIPTION                                | QTY |
| 1    | WILLIAMS ELECTRONICS, INC.                 | WILLIAMS ELECTRONICS, INC.                 |     | 1    | WILLIAMS ELECTRONICS, INC.                 | WILLIAMS ELECTRONICS, INC.                 |     |
| 2    | DO NOT SCALE DIMENSIONS TO SHOWN           | DO NOT SCALE DIMENSIONS TO SHOWN           |     | 2    | DO NOT SCALE DIMENSIONS TO SHOWN           | DO NOT SCALE DIMENSIONS TO SHOWN           |     |
| 3    | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |     | 3    | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | REMOVE BURRS - BREAK SHARP CORNERS & EDGES |     |
| 4    | TOLERANCES UNLESS OTHERWISE SPECIFIED      | TOLERANCES UNLESS OTHERWISE SPECIFIED      |     | 4    | TOLERANCES UNLESS OTHERWISE SPECIFIED      | TOLERANCES UNLESS OTHERWISE SPECIFIED      |     |
| 5    | DECIMAL FRACTIONAL                         | DECIMAL FRACTIONAL                         |     | 5    | DECIMAL FRACTIONAL                         | DECIMAL FRACTIONAL                         |     |
| 6    | 1/2"                                       | 1/2"                                       |     | 6    | 1/2"                                       | 1/2"                                       |     |
| 7    | 1/8"                                       | 1/8"                                       |     | 7    | 1/8"                                       | 1/8"                                       |     |
| 8    | MATERIAL                                   | MATERIAL                                   |     | 8    | MATERIAL                                   | MATERIAL                                   |     |
| 9    | PROJECT NO.                                | PROJECT NO.                                |     | 9    | PROJECT NO.                                | PROJECT NO.                                |     |
| 10   | 3036-01                                    | 3036-01                                    |     | 10   | 3036-01                                    | 3036-01                                    |     |
| 11   | DATE                                       | DATE                                       |     | 11   | DATE                                       | DATE                                       |     |
| 12   | 12/26/61                                   | 12/26/61                                   |     | 12   | 12/26/61                                   | 12/26/61                                   |     |
| 13   | APPROVAL                                   | APPROVAL                                   |     | 13   | APPROVAL                                   | APPROVAL                                   |     |
| 14   | DATE                                       | DATE                                       |     | 14   | DATE                                       | DATE                                       |     |
| 15   | 12/26/61                                   | 12/26/61                                   |     | 15   | 12/26/61                                   | 12/26/61                                   |     |

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

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**

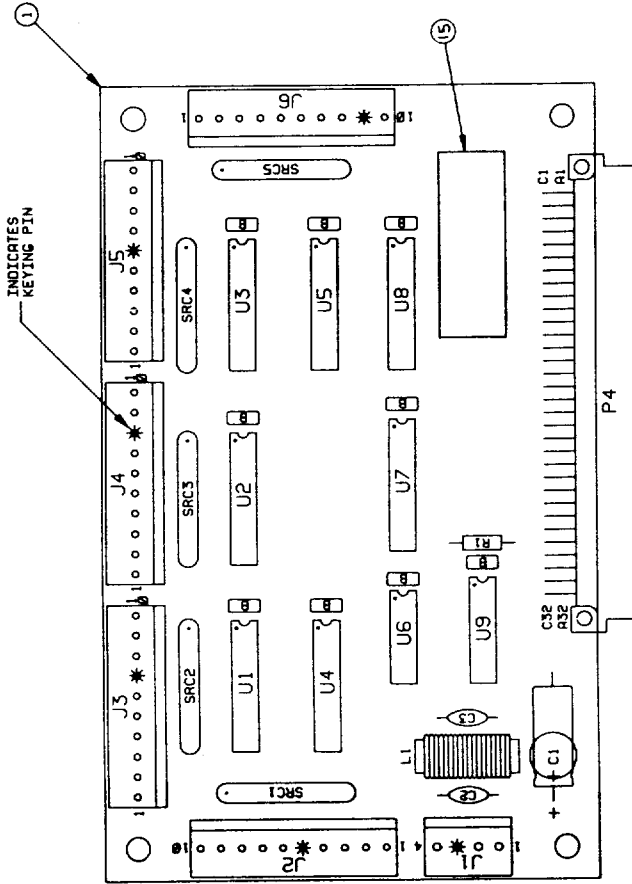
Pin/Function

- 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



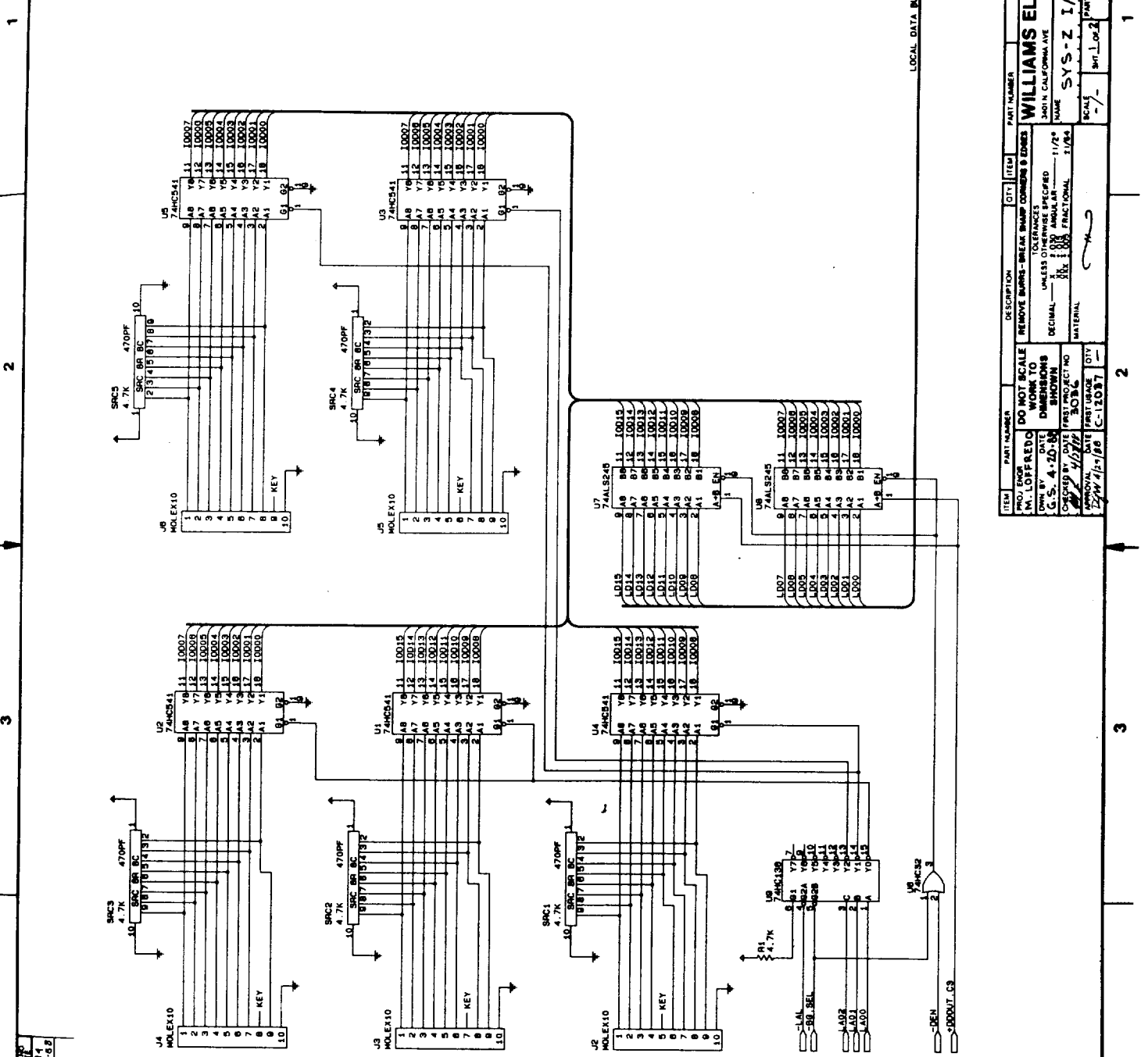
NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9028.

| ITEM | PART NO.          | PART DESCRIPTION             | DESCRIPTION  | QTY |
|------|-------------------|------------------------------|--|-----|
| 15   | 16-8650           |                              | LABEL, PCB IDENT.  | 1   |
| 14   | 5792-<br>10826-00 | P4                           | CONNECTOR, 64P EURO-DIN CARD CONN. FEMALE                              | 1   |
| 13   | 5791-<br>10862-10 | J2, J3<br>J4, J5, J6         | CONNECTOR, 10P MOLEX, .156" CENTER PINS                                | 5   |
| 12   | 5791-<br>10862-04 | J1                           | CONNECTOR, 4P MOLEX, .156" CENTER PINS                                 | 1   |
| 11   | 5043-<br>09845-00 | C2, C3                       | CAPACITOR, .001 MFD.   | 2   |
| 10   | 5040-<br>08986-00 | C1                           | CAPACITOR, 100 MFD.  | 1   |
| 9    | 5043-<br>08980-00 | 8                            | CAPACITOR, 0.01 MFD.   | 9   |
| 8    | 5010-<br>08991-00 | R1                           | RESISTOR, 4.7K, 1/4W, 5%<br>SIP, 10P 8-RES/8-CAP NETWORK, 4.7K, 470 PF | 1   |
| 7    | 5050-<br>10396-00 | SCR1, SCR2, SCR3, SRC4, SRC5 | SIP, 10P 8-RES/8-CAP NETWORK, 4.7K, 470 PF                             | 5   |
| 6    | 5551-<br>09822-00 | L1                           | INDUCTOR, 4.7 UH   | 1   |
| 5    | 5311-<br>10948-00 | U9                           | 74HC138, H-CMOS 3/8 DECODER  | 1   |
| 4    | 5317-<br>12208-00 | U7, U8                       | 74ALS245, ALS TTL OCTAL BUS TRANSCEIVER                                | 2   |
| 3    | 5311-<br>10945-00 | U6                           | 74HC32, H-CMOS QUAD 2-INPUT OR GATE                                    | 1   |
| 2    | 5311-<br>12287-00 | U1, U2, U3, U4, U5           | 74HC541, HC TTL OCTAL BUFFER   | 5   |
| 1    | 5779-<br>12285-00 |                              | BARE PC BOARD  | 1   |

**BILL OF MATERIALS**

|  |                 |   |                 |  |           |
|--|-----------------|---|-----------------|--|-----------|
| DO NOT SCALE<br>WORK TO<br>DIMENSIONS<br>SHOWN |                 | REMOVE BURRS-BREAK SHARP CORNERS & EDGES<br>TOLERANCES<br>UNLESS OTHERWISE SPECIFIED<br>DECIMAL .005 ANGULAR 1/2° |                 | <b>WILLIAMS ELECTRONICS, INC.</b><br>2401 N. CALIFORNIA AVE<br>CHICO, CALIF. 95926 |           |
| PROJ. ENGR<br>R. LOFFREDO                      | DATE<br>2/12/86 | CHECKED<br>4/29/86  | DATE<br>2/17/86 | PART NO.<br>C-12037  | REV.<br>1 |
| MATERIAL<br>NONE                               |                 | SCALE<br>1.5/1  |                 | SYS-Z I/O PCB ASSEMBLY   |           |

16-9028



| REV | DESCRIPTION OF CHANGE | DATE    |
|-----|-----------------------|---------|
| 1   | NEW PART RELEASE      | 4-10-68 |

| 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        | 4-20-68     | UNLESS OTHERWISE SPECIFIED            |       | NAME      | 3401 N. CALIFORNIA AVE    | CHICAGO, ILL. | 60644 |
| DESIGNED BY | DAVE PERI   | ANGULAR                               | 1/16" |           |                           |               |       |
| CHECKED BY  | 1/27/68     | FRACTIONAL                            | 3/16" |           |                           |               |       |
| DATE        | 1/27/68     |                                       |       |           |                           |               |       |
| REV         | 1           |                                       |       |           |                           |               |       |

| REV | DESCRIPTION OF CHANGE | DATE    |
|-----|-----------------------|---------|
| 1   | NEW PART RELEASE      | 4-10-68 |

16-9028

16-902B

1

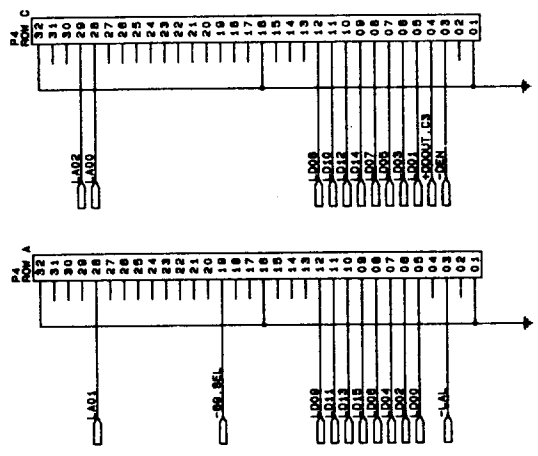
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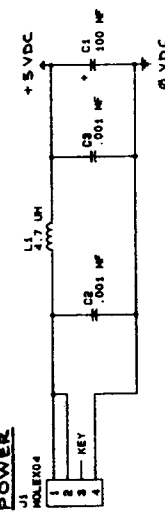
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|                  |                       |          |
|------------------|-----------------------|----------|
| REV              | DESCRIPTION OF CHANGE | DATE     |
| NEW PART RELEASE |                       | 10-29-64 |

CPU INTERFACE

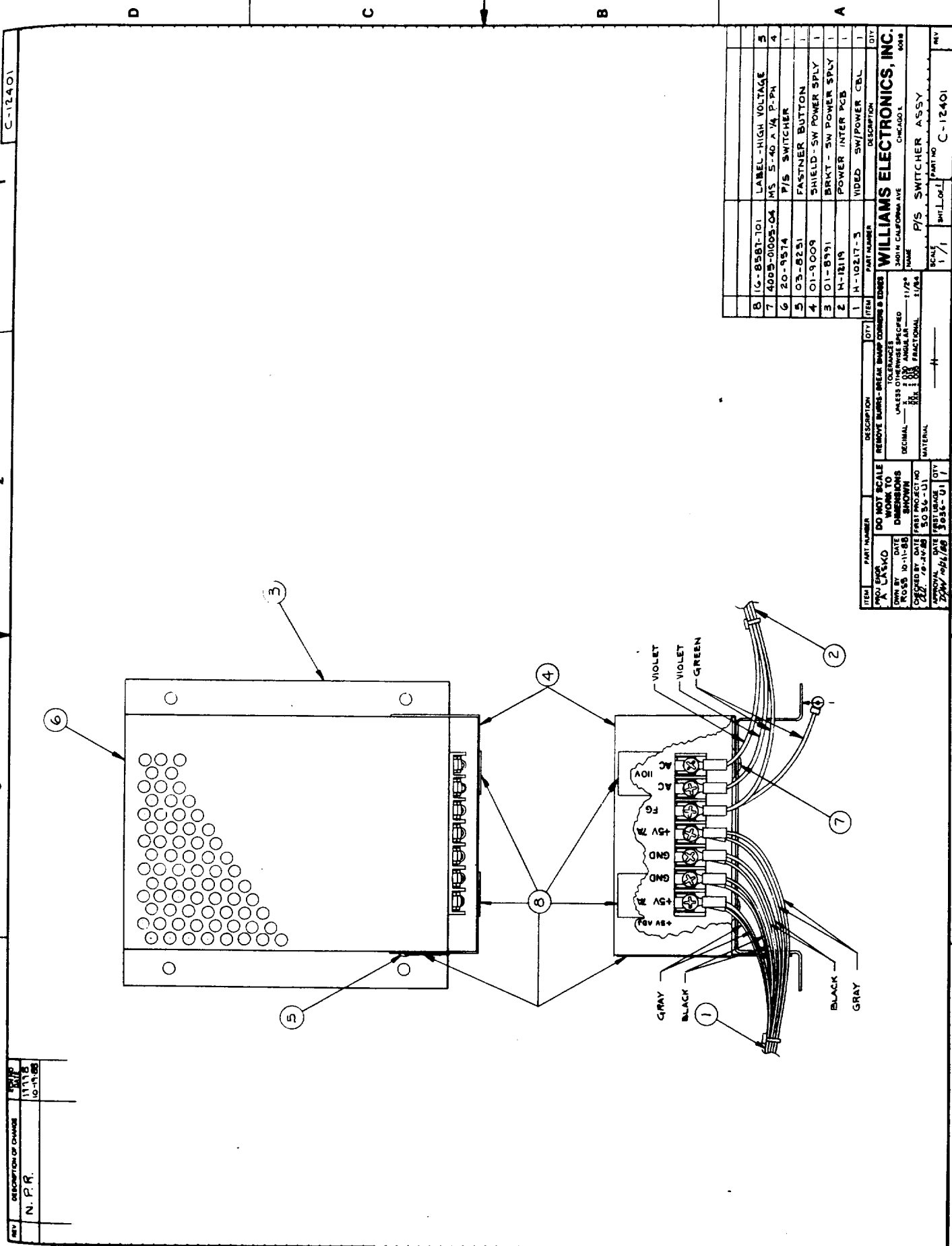


POWER



| ITEM  | PART NUMBER | DESCRIPTION | QTY | ITEM   | PART NUMBER | DESCRIPTION | QTY |
|---|-------------|-------------|-----|--|-------------|-------------|-----|
| <p><b>DO NOT SCALE WORK TO DIMENSIONS SHOWN</b></p> <p><b>UNLESS OTHERWISE SPECIFIED</b></p> <p>TOLERANCES DECIMAL — .01 FRACTIONAL — 1/32</p> <p>DATE: 4-20-64 DRAWN BY: G.S. CHECKED BY: DATE: 10/29/64</p> <p>PROJECT NO: 16-902B DRAWN BY: DATE: 10/29/64</p> <p>MATERIAL: C-120B3 QTY: 2</p> |             |             |     |  |             |             |     |
| <p>PROJECT NO: 16-902B</p> <p>DATE: 10/29/64</p> <p>DRAWN BY: G.S.</p> <p>CHECKED BY: DATE: 10/29/64</p> <p>PROJECT NO: 16-902B</p> <p>DRAWN BY: DATE: 10/29/64</p> <p>MATERIAL: C-120B3 QTY: 2</p>   |             |             |     | <p>DESCRIPTION: WILLIAMS ELECTRONICS, INC. CHICAGO, ILL.</p> <p>PART NUMBER: 16-902B</p> <p>SCALE: 1/1</p> <p>REV: 1</p> |             |             |     |

| 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<br>A. LASKO      | DATE<br>10-11-58 | DO NOT SCALE<br>WORK TO<br>DIMENSIONS<br>SHOWN     | DESCRIPTION<br>REMOVE BURRS-BREAK SWAMP CORNERS & EDGES | QTY<br>1                         |
| DESIGNED BY<br>2278-0-0-08 | DATE<br>7/24/58  | UNLESS OTHERWISE SPECIFIED<br>DECIMAL<br>DIM. 1/32 | TOLERANCES<br>FRACTIONAL<br>3/16, 1/8, 3/16             | DESCRIPTION<br>P/S SWITCHER ASSY |
| APPROVAL<br>2278-0-0-08    | DATE<br>7/24/58  | SCALE<br>1/1                                       | MATERIAL<br>304 IN CALIFORNIA AVE                       | QTY<br>1                         |

WILLIAMS ELECTRONICS, INC.  
340 N CALIFORNIA AVE  
CHICAGO 1, ILL  
NAME  
P/S SWITCHER ASSY  
SCALE 1/1  
PART NO C-12401  
REV



C-12350

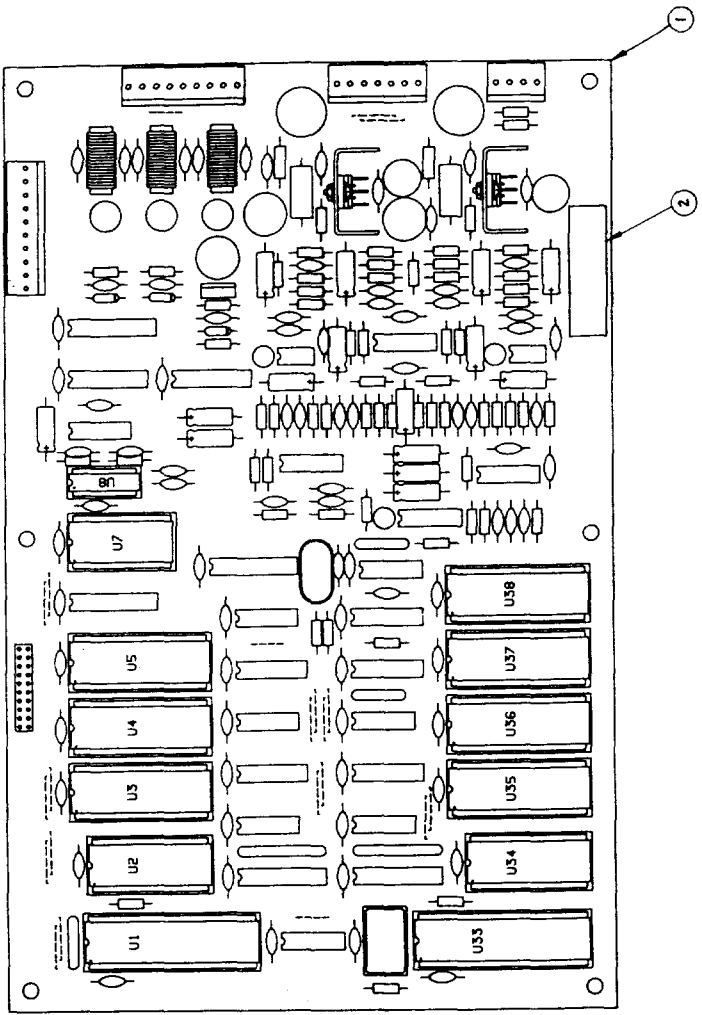
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|     |                       |
|-----|-----------------------|
| REV | DESCRIPTION OF CHANGE |
| 1   | NEW PART RELEASE      |



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               | ANGULAR                                  | 30°   |      | NAME                       | SYS-2 SOUND-2 ASSEMBLY |     |
| APPROVAL   | DATE               | FRACTIONAL                               | 1/8"  |      | SCALE                      | 1/1                    |     |
|            | 11-23-68           | MATERIAL                                 |       |      | PART NO                    | C-12350                |     |
|            |                    |  |       |      | REV                        |                        |     |

C-12350

1

2

3

4

|     |                       |
|-----|-----------------------|
| REV | DESCRIPTION OF CHANGE |
|     | 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-     | U8                             | YM3012 DUAL SERIAL DAC     | 1   |
| 5    | 5370-     | U7                             | YM2151 SOUND GENERATOR     | 1   |
| 4    | 5340-     | U2, U34                        | 8K X 8 STATIC RAM, 150MS   | 2   |
| 3    | 5400-     | U1, U33                        | 888006 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<br>M. L. OFFREDO | DO NOT SCALE<br>WORK TO<br>DIMENSIONS<br>SHOWN | REMOVE BURRS-BREAK SHARP CORNERS & EDGES<br>TOLERANCES<br>UNLESS OTHERWISE SPECIFIED<br>DECIMAL - .000 ANGULAR - 1/2°<br>MIN. 2.000 FRACTIONAL - 1/64 | QTY<br>6034         |
| DATE<br>9-22-88             | DATE<br>9-22-88                                | SCALE<br>1/2" = 1"  | REV<br>-            |
| CHECKED BY<br>M. L. OFFREDO | FIRST PROJECT NO.<br>3038-U1                   | MATERIAL<br>SYS-2 SOUND-2 ASSEMBLY  | PART NO.<br>C-12350 |
| DATE<br>9/22/88             | DATE<br>9/22/88                                | SCALE<br>1/2" = 1"  | REV<br>-            |

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

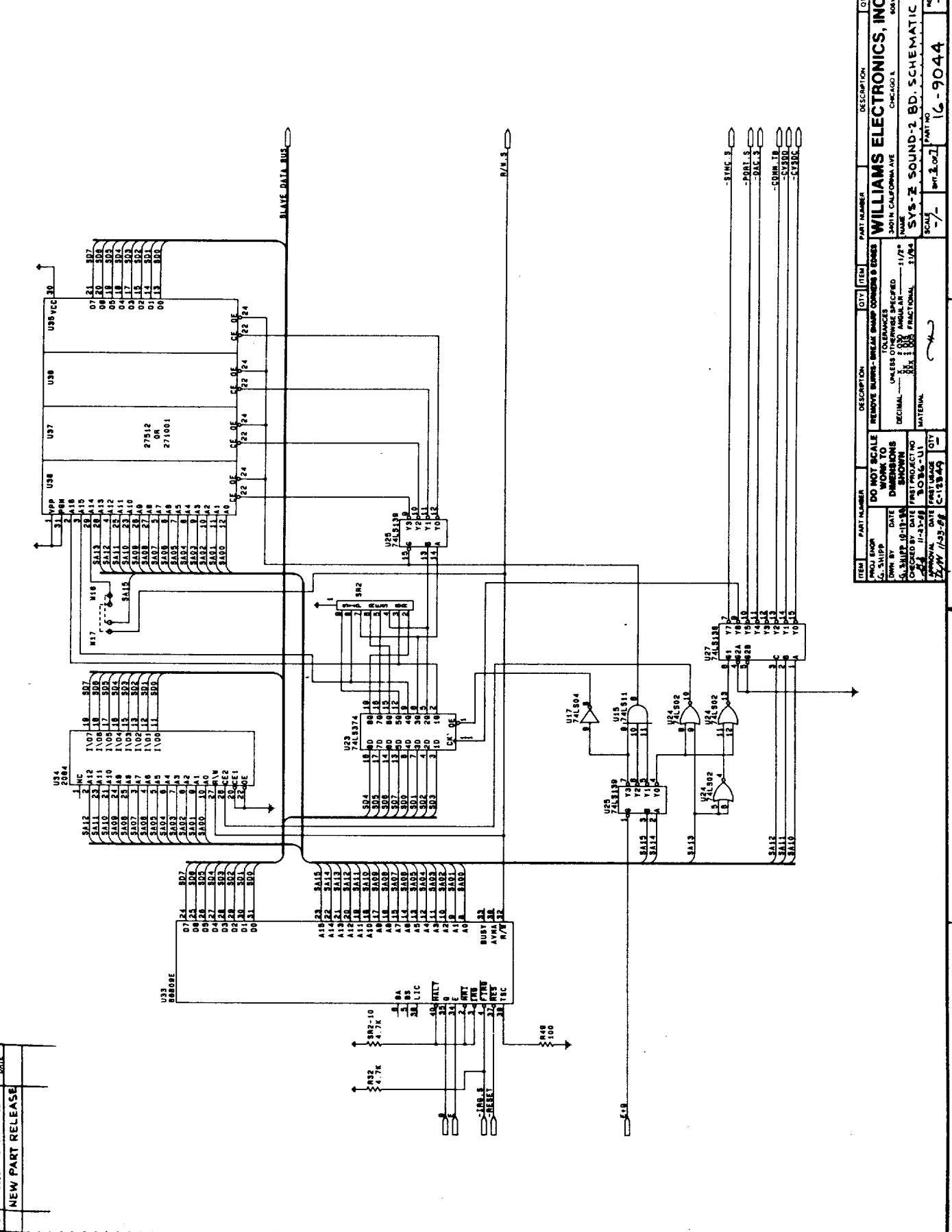
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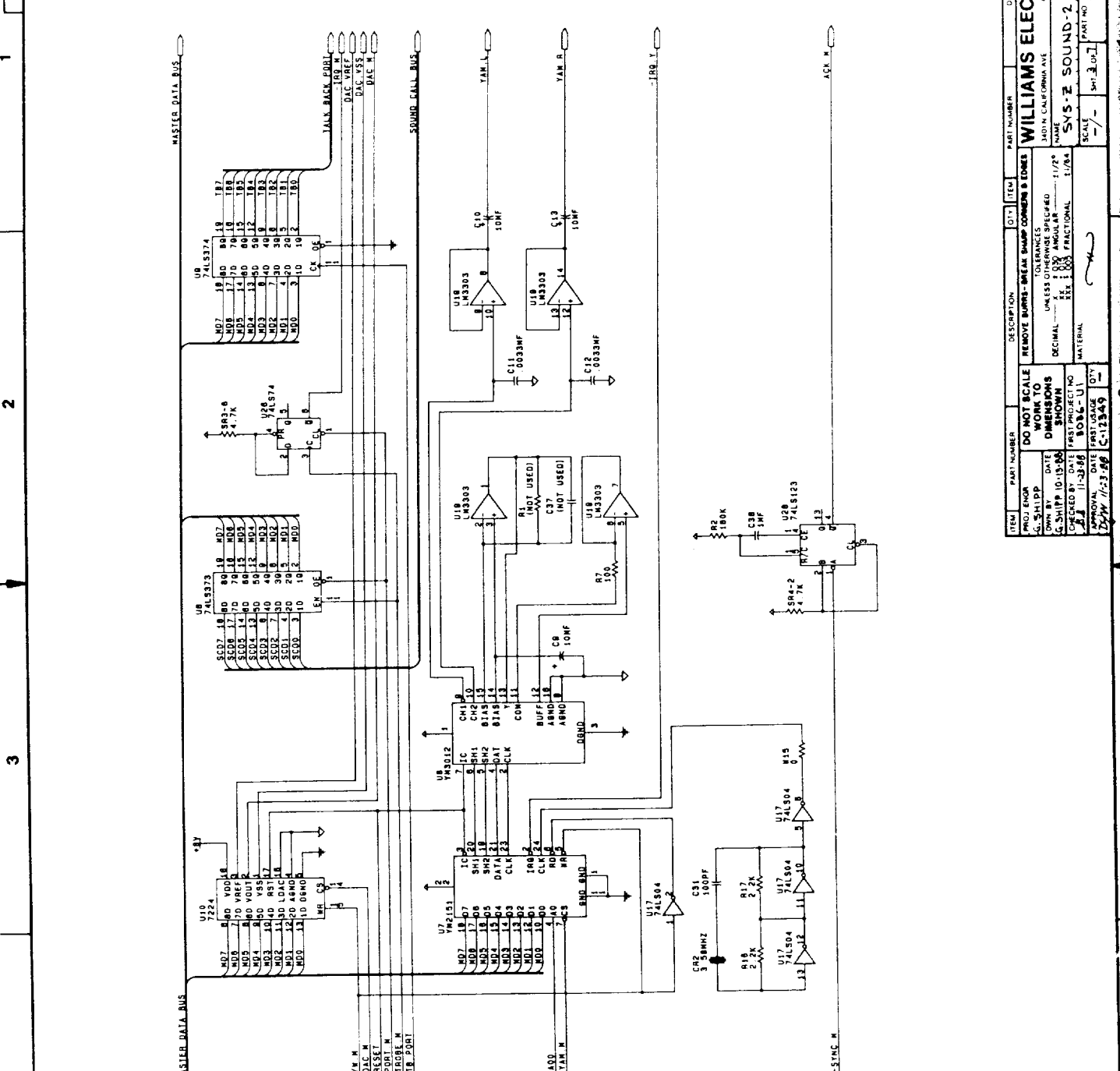




| ITEM | QTY | DESCRIPTION    | REVISION | DATE     | BY | CHKD | APP'D |
|------|-----|----------------|----------|----------|----|------|-------|
| 1    | 1   | SLAVE DATA BUS | 1        | 11-23-88 | WJ |      |       |
| 2    | 1   | SLAVE DATA BUS | 2        | 11-23-88 | WJ |      |       |
| 3    | 1   | SLAVE DATA BUS | 3        | 11-23-88 | WJ |      |       |
| 4    | 1   | SLAVE DATA BUS | 4        | 11-23-88 | WJ |      |       |

| ITEM | QTY | DESCRIPTION    | REVISION | DATE     | BY | CHKD | APP'D |
|------|-----|----------------|----------|----------|----|------|-------|
| 1    | 1   | SLAVE DATA BUS | 1        | 11-23-88 | WJ |      |       |
| 2    | 1   | SLAVE DATA BUS | 2        | 11-23-88 | WJ |      |       |
| 3    | 1   | SLAVE DATA BUS | 3        | 11-23-88 | WJ |      |       |
| 4    | 1   | SLAVE DATA BUS | 4        | 11-23-88 | WJ |      |       |

|   |  |
|---|--|
| <b>WILLIAMS ELECTRONICS, INC.</b><br>3401 N. CALIFORNIA AVE.<br>CHICAGO, IL 60642 |  |
| <b>SYST-2 SOUND-2 BD. SCHEMATIC</b>   | PART NO. 16-9044<br>REV. 1                         |
| DO NOT SCALE<br>DIMENSIONS<br>UNLESS OTHERWISE SPECIFIED                          | TOLERANCES<br>DECIMAL - 1/100<br>FRACTIONAL - 1/64 |
| CHECKED BY: WJ<br>DATE: 11-23-88  | MATERIAL:  |
| APPROVAL: WJ<br>DATE: 11-23-88  | QTY: 1   |

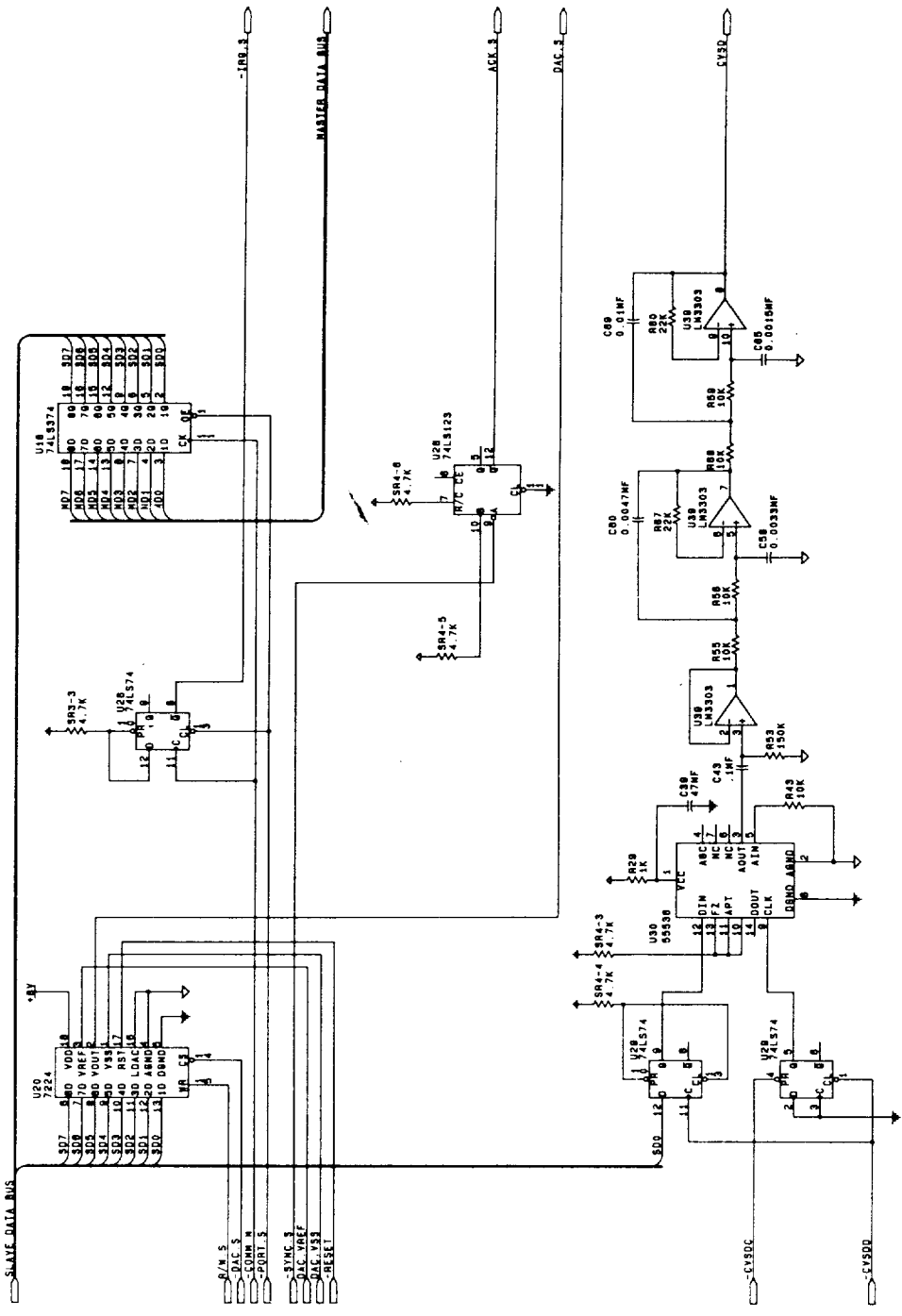


| REV | DESCRIPTION OF CHANGE | DATE | BY |
|-----|-----------------------|------|----|
| 1   | NEW PART RELEASE      |      |    |

| ITEM | PART NUMBER | DESCRIPTION | QTY | U/C | REV | DESCRIPTION | QTY |
|------|-------------|-------------|-----|-----|-----|-------------|-----|
| 1    | 74LS374     | 74LS374     | 2   |     |     |             |     |
| 2    | 74LS04      | 74LS04      | 15  |     |     |             |     |
| 3    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 4    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 5    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 6    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 7    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 8    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 9    | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 10   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 11   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 12   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 13   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 14   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 15   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 16   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 17   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 18   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 19   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 20   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 21   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 22   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 23   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 24   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 25   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 26   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 27   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 28   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 29   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 30   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 31   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 32   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 33   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 34   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 35   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 36   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 37   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 38   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 39   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 40   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 41   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 42   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 43   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 44   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 45   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 46   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 47   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 48   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 49   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 50   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 51   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 52   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 53   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 54   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 55   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 56   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 57   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 58   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 59   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 60   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 61   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 62   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 63   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 64   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 65   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 66   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 67   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 68   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 69   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 70   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 71   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 72   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 73   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 74   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 75   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 76   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 77   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 78   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 79   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 80   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 81   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 82   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 83   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 84   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 85   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 86   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 87   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 88   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 89   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 90   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 91   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 92   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 93   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 94   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 95   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 96   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 97   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 98   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 99   | 74LS123     | 74LS123     | 3   |     |     |             |     |
| 100  | 74LS123     | 74LS123     | 3   |     |     |             |     |

WILLIAMS ELECTRONICS, INC.  
 16-9044

|     |                       |      |
|-----|-----------------------|------|
| REV | DESCRIPTION OF CHANGE | DATE |
|     | NEW PART RELEASE      |      |

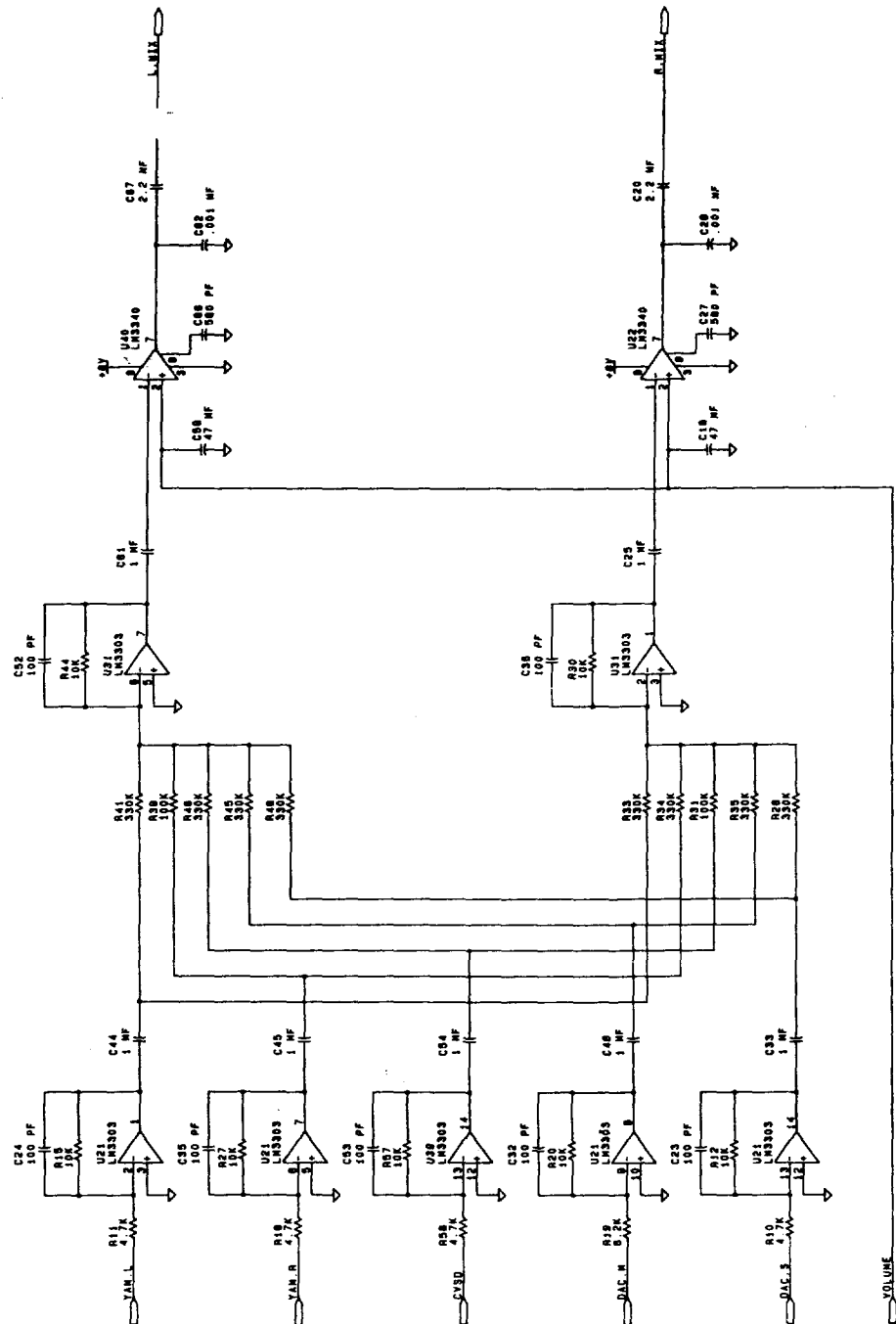


|      |             |     |      |             |             |     |
|------|-------------|-----|------|-------------|-------------|-----|
| ITEM | PART NUMBER | QTY | ITEM | DESCRIPTION | DESCRIPTION | QTY |
| 1    | 74LS374     | 1   | 1    | 74LS74      | 1           | 1   |
| 2    | LM3303      | 3   | 2    | RESISTOR    | 10K         | 2   |
| 3    | RESISTOR    | 10K | 3    | CAPACITOR   | 0.0015MF    | 3   |
| 4    | RESISTOR    | 10K | 4    | CAPACITOR   | 0.0033MF    | 4   |
| 5    | RESISTOR    | 10K | 5    | CAPACITOR   | 0.0015MF    | 5   |
| 6    | RESISTOR    | 10K | 6    | CAPACITOR   | 0.0033MF    | 6   |
| 7    | RESISTOR    | 10K | 7    | CAPACITOR   | 0.0015MF    | 7   |
| 8    | RESISTOR    | 10K | 8    | CAPACITOR   | 0.0033MF    | 8   |
| 9    | RESISTOR    | 10K | 9    | CAPACITOR   | 0.0015MF    | 9   |
| 10   | RESISTOR    | 10K | 10   | CAPACITOR   | 0.0033MF    | 10  |

|      |             |     |      |             |             |     |
|------|-------------|-----|------|-------------|-------------|-----|
| ITEM | PART NUMBER | QTY | ITEM | DESCRIPTION | DESCRIPTION | QTY |
| 1    | 74LS374     | 1   | 1    | 74LS74      | 1           | 1   |
| 2    | LM3303      | 3   | 2    | RESISTOR    | 10K         | 2   |
| 3    | RESISTOR    | 10K | 3    | CAPACITOR   | 0.0015MF    | 3   |
| 4    | RESISTOR    | 10K | 4    | CAPACITOR   | 0.0033MF    | 4   |
| 5    | RESISTOR    | 10K | 5    | CAPACITOR   | 0.0015MF    | 5   |
| 6    | RESISTOR    | 10K | 6    | CAPACITOR   | 0.0033MF    | 6   |
| 7    | RESISTOR    | 10K | 7    | CAPACITOR   | 0.0015MF    | 7   |
| 8    | RESISTOR    | 10K | 8    | CAPACITOR   | 0.0033MF    | 8   |
| 9    | RESISTOR    | 10K | 9    | CAPACITOR   | 0.0015MF    | 9   |
| 10   | RESISTOR    | 10K | 10   | CAPACITOR   | 0.0033MF    | 10  |

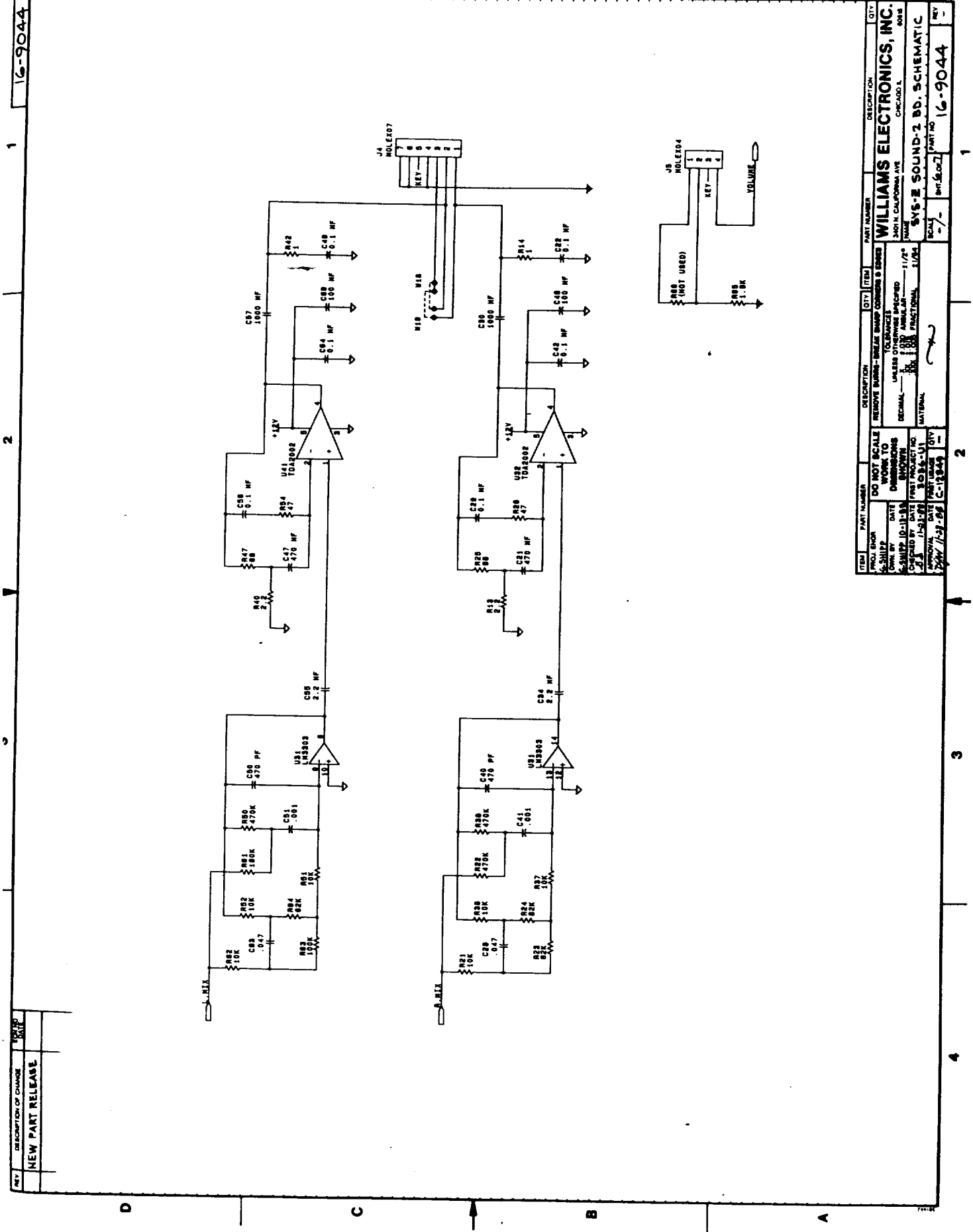
WILLIAMS ELECTRONICS, INC.  
 3401 N. CALIFORNIA AVE  
 CHICAGO, IL 60641  
 SYS-E SOUND-2 BD SCHEMATIC  
 REV 16-9044

|     |                       |
|-----|-----------------------|
| REV | DESCRIPTION OF CHANGE |
|     | NEW PART RELEASE      |



|            |                 |  |       |      |             |     |
|------------|-----------------|--|-------|------|-------------|-----|
| ITEM       | PART NUMBER     | DESCRIPTION                              | QTY   | ITEM | DESCRIPTION | QTY |
| PROJ ENGR  | DO NOT SCALE    | REMOVE BARRS-BREAK SHARP CORNERS & EDGES |       |      |             |     |
| DWG BY     | WORK TO         | TOLERANCES                               |       |      |             |     |
| DATE       | DIMENSIONS      | UNLESS OTHERWISE SPECIFIED               |       |      |             |     |
| 10-18-88   | SHOW            | DECIMAL                                  | 1/16" |      |             |     |
| CREATED BY | PREL PROJECT NO | FRACTIONAL                               | 1/64  |      |             |     |
| 11-21-88   | 30-86-111       |  |       |      |             |     |
| APPROV'D   | DATE            | PRT NUMBER                               | QTY   |      |             |     |
|            | 11-23-88        | 16-9044                                  | 1     |      |             |     |

WILLIAMS ELECTRONICS, INC.  
 3401 N. CALIFORNIA AVE.  
 CHICAGO, IL 60642  
 NAME: SYS-E SOUND-2 BD. SCHEMATIC  
 SCALE: 1/2"=1"



1 16-9044

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

1 16-9044

|             |   |  |     |      |             |     |
|-------------|---|--|-----|------|-------------|-----|
| ITEM        | PART NUMBER                                   | DESCRIPTION                              | QTY | ITEM | DESCRIPTION | QTY |
| PROJ. ENGR  | DO NOT SCALE                                  | REMOVE BURRS - BREAK WIRE COVERS & BUSES |     |      |             |     |
| DRAWN BY    | WORK TO DIMENSIONS UNLESS OTHERWISE SPECIFIED |  |     |      |             |     |
| CHECKED BY  | UNLESS OTHERWISE SPECIFIED                    |  |     |      |             |     |
| APPROVED BY | DECIMAL - 1/16" ANGULAR - 1/16" TYPICAL       |  |     |      |             |     |
|             | FRACTIONAL - 1/16" TYPICAL                    |  |     |      |             |     |
|             | NATURAL                                       |  |     |      |             |     |
| DATE        | PROJECT NO.                                   |  |     |      |             |     |
| 11/29/66    | C-12849                                       |  |     |      |             |     |
|             |   |  |     |      |             |     |
|             |   |  |     |      |             |     |

**WILLIAMS ELECTRONICS, INC.**  
3401 N. CALPORNIA AVE. CHICAGO, ILL. 60641

**SYS-2 SOUND-2 BD. SCHEMATIC**

SCALE: 1/8" = 1.00"

PART NO: 16-9044

REV: -



16-9044

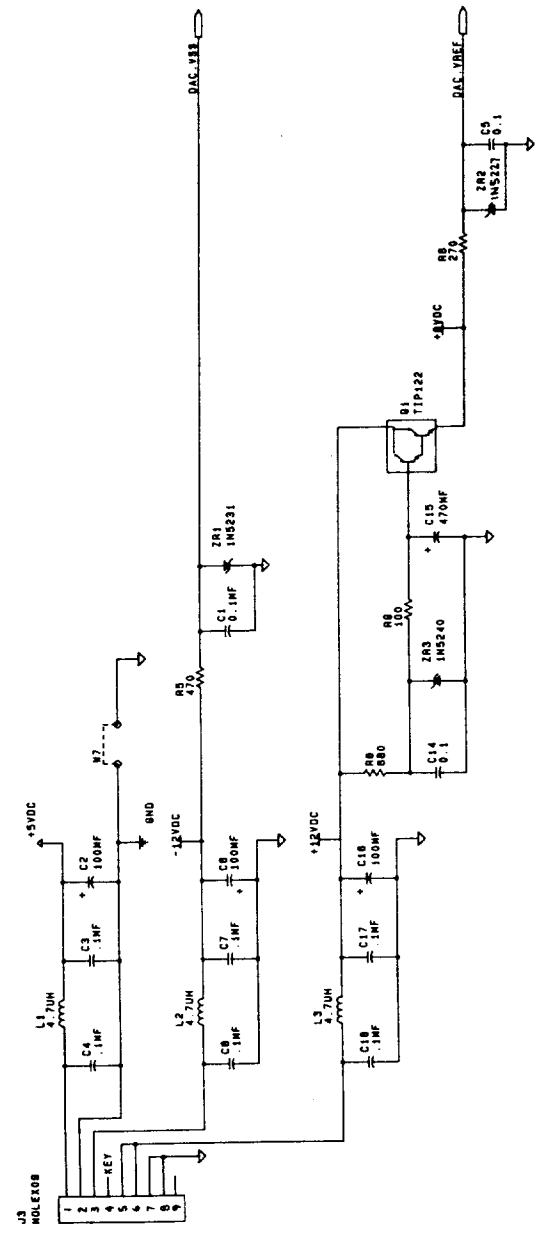
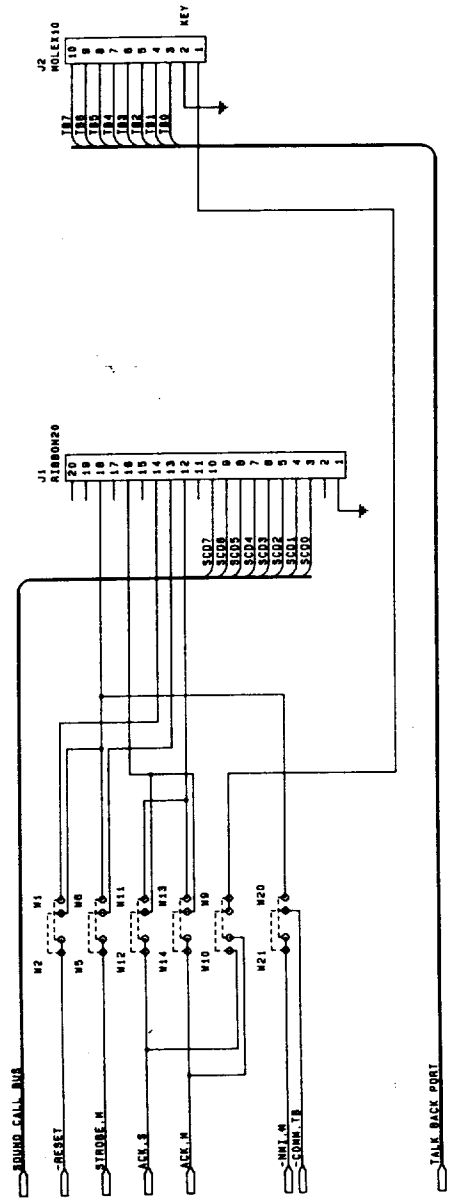
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|     |                       |
|-----|-----------------------|
| REV | DESCRIPTION OF CHANGE |
| 1   | NEW PART RELEASE      |

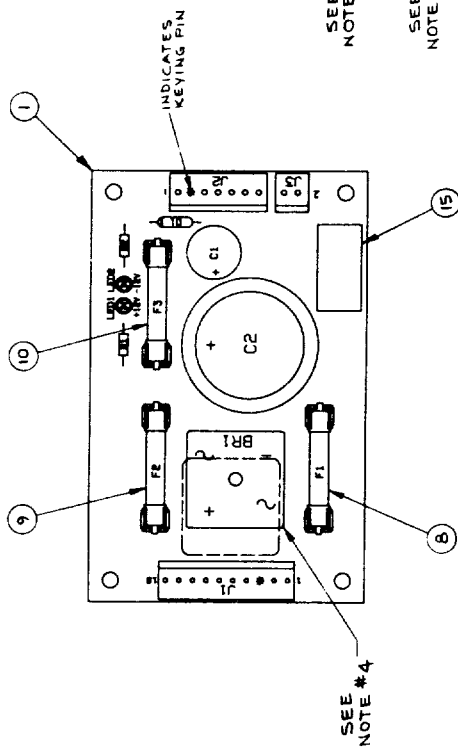


|             |             |  |     |             |             |  |     |
|-------------|-------------|--|-----|-------------|-------------|--|-----|
| ITEM        | PART NUMBER | DESCRIPTION                              | QTY | ITEM        | PART NUMBER | DESCRIPTION                              | QTY |
| PROJ ENGR   | G. SHIPP    | REMOVE BURRS-BREAK SWAMP CORNERS & EDGES |     | PROJ ENGR   | G. SHIPP    | REMOVE BURRS-BREAK SWAMP CORNERS & EDGES |     |
| DATE        | 10/15/88    | 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                               |     |
| APPROVED BY | J. J. B.    | MATERIAL                                 |     | APPROVED BY | J. J. B.    | MATERIAL                                 |     |
| PROJECT NO  | 11-23-88    |  |     | PROJECT NO  | 11-23-88    |  |     |
| REV         | 1           |  |     | REV         | 1           |  |     |

WILLIAMS ELECTRONICS, INC.  
 14011 CALIFORNIA AVE  
 CHICAGO, IL  
 NAME: SYS-2 SOUND-2 BD SCHEMATIC  
 SCALE: 1/1  
 PART NO: 16-9044  
 REV: -

|     |                       |         |
|-----|-----------------------|---------|
| REV | DESCRIPTION OF CHANGE | DATE    |
|     | NEW PART RELEASE      | 5/18/88 |

C-1221B



| ITEM | PART NO.      | PART DESCRIPTION | DESCRIPTION                             | QTY. |
|------|---------------|------------------|---|------|
| 15   | 16-BB50-216   |                  | LABEL, PCB IDENT.                       | 1    |
| 14   | 5791-10662-10 | J1               | CONN., 10-PIN MOLEX, .156" CENTER PINS  | 1    |
| 13   | 5791-10662-07 | J2               | CONN., 7-PIN MOLEX, .156" CENTER PINS   | 1    |
| 12   | 5791-10662-02 | J3               | CONN., 2-PIN MOLEX, .156" CENTER PINS   | 1    |
| 11   | 5733-12060-01 | F1, F2, F3       | FUSEHOLDER                              | 3    |
| 10   | 5730-09197-00 | F3               | FUSE, 0.75A, 250V                       | 1    |
| 9    | 5731-09432-00 | F2               | FUSE, 7A 5B, 250V                       | 1    |
| 8    | 5731-10356-00 | F1               | FUSE, 3A 5B, 250V                       | 1    |
| 7    | 5040-12313-00 | C2               | CAPACITOR, ELECT., RAD., 1500 MFD. 25V. | 1    |
| 6    | 5040-12314-00 | C1               | CAPACITOR, ELECT., RAD., 2200 MFD. 25V. | 1    |
| 5    | 5671-09019-00 | LED1, LED2       | LIGHT EMITTING DIODE, RED               | 2    |
| 4    | 09418-00      | BR1              | BRIDGE RECTIFIER, 55V.                  | 1    |
| 3    | 5070-06258-00 | DI               | DIODE, IN4001                           | 1    |
| 2    | 5010-09314-00 | R1, R2           | RESISTOR, C.F., 1.2K 5% 1/4 WATT        | 2    |
| 1    | 5773-12389-00 |                  | BARE PC BOARD                           | 1    |

NOTE 1: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9837.  
 2. ALL FUSES TO BE INSTALLED AFTER SOLDER WASH.  
 3. EACH FUSEHOLDER CAN BE SUBSTITUTED WITH 2 FUSE CLIPS PT. NO. 5732-0917B-00.  
 4. BR1 MUST BE MOUNTED 1/8" ABOVE SURFACE OF PCB.

SEE NOTE #3  
 SEE NOTE #2  
 SEE NOTE #4

| TOLERANCES                 |       |  |
|----------------------------|-------|--|
| UNLESS OTHERWISE SPECIFIED | 1/2"  |  |
| ANGULAR                    | 1/8"  |  |
| FRACTIONAL                 | 1/16" |  |
| MATERIAL                   |       |  |
| NONE                       |       |  |
| SCALE                      | 1/1   |  |
| REV                        |       |  |

|               |          |
|---------------|----------|
| PROJECT NO.   | 16-9837  |
| DATE          | 5/18/88  |
| CHECKED BY    | J. J. J. |
| APPROVAL DATE | 5/18/88  |

DO NOT SCALE REMOVE BURRS-BREAK SHARP CORNERS & EDGES

UNLESS OTHERWISE SPECIFIED DIMENSIONS SHOWN

WILLIAMS ELECTRONICS, INC. CHICAGO, IL 60606

SYS-Z J2 UNREG. P/S. ASSY

C-1221B

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16-9037

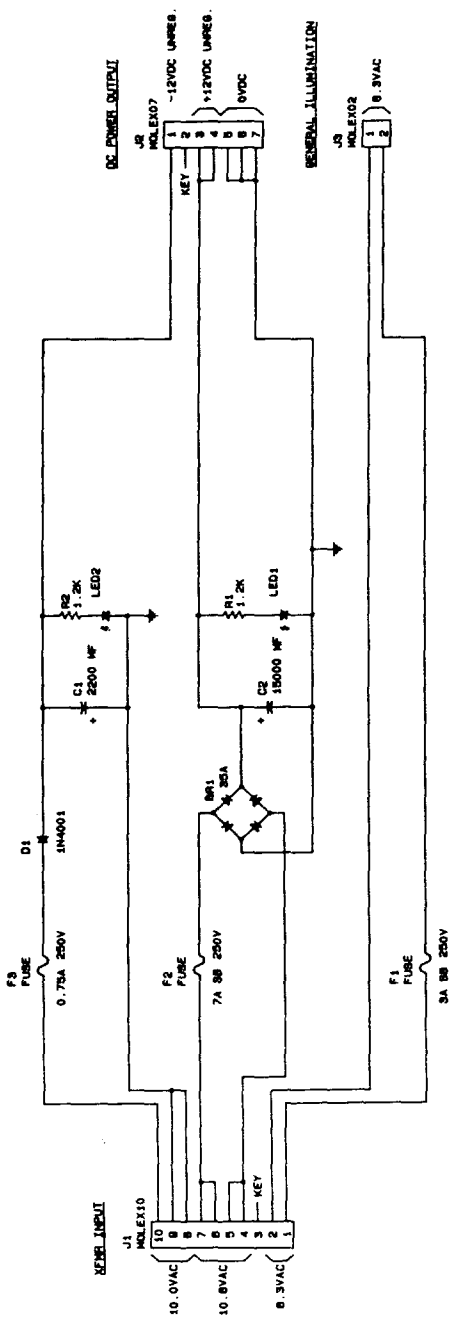
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|     |                       |          |
|-----|-----------------------|----------|
| REV | DESCRIPTION OF CHANGE | DATE     |
|     | NEW PART RELEASE      | 12-18-66 |



|                            |                             |  |       |
|----------------------------|-----------------------------|--|-------|
| REV                        | PART NUMBER                 | DESCRIPTION                                  | QTY   |
|                            |                             | REMOTE MOUNTED POWER SUPPLY CONTAINS 8 TUBES |       |
| DO NOT SCALE               | UNLESS OTHERWISE SPECIFIED  | UNLESS OTHERWISE SPECIFIED                   |       |
| IN OFFERS                  | UNLESS OTHERWISE SPECIFIED  | UNLESS OTHERWISE SPECIFIED                   |       |
| DATE                       | ANGULAR                     | ANGULAR                                      |       |
| 5/1/66                     | 1/2°                        | 1/2°   |       |
| 3.036 U                    | FRACTIONAL                  | FRACTIONAL                                   |       |
| 3.036 U                    | 1/16                        | 1/16   |       |
| DATE                       | FIRST USAGE                 | QTY  |       |
| 5/1/66                     | C-1221B                     | -  |       |
| APPROVAL                   | DATE                        | FIRST USAGE                                  | QTY   |
| 22-11-517166               | C-1221B                     | -  |       |
| SCALE                      | PART NO.                    | DESCRIPTION                                  | QTY   |
| -/-                        | 16-9037                     | 16-9037                                      |       |
| WILLIAMS ELECTRONICS, INC. | 3401 N. CALIFORNIA AVE.     | CHICAGO, ILL.                                | 60648 |
| NAME                       | 12 UNREG P/S BD., SCHEMATIC |  |       |