

16-3036-101
December 15, 1988



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



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

Control Locations

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

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

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



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

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

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

Power Turn-On

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

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



Game Operation

GAME START

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

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

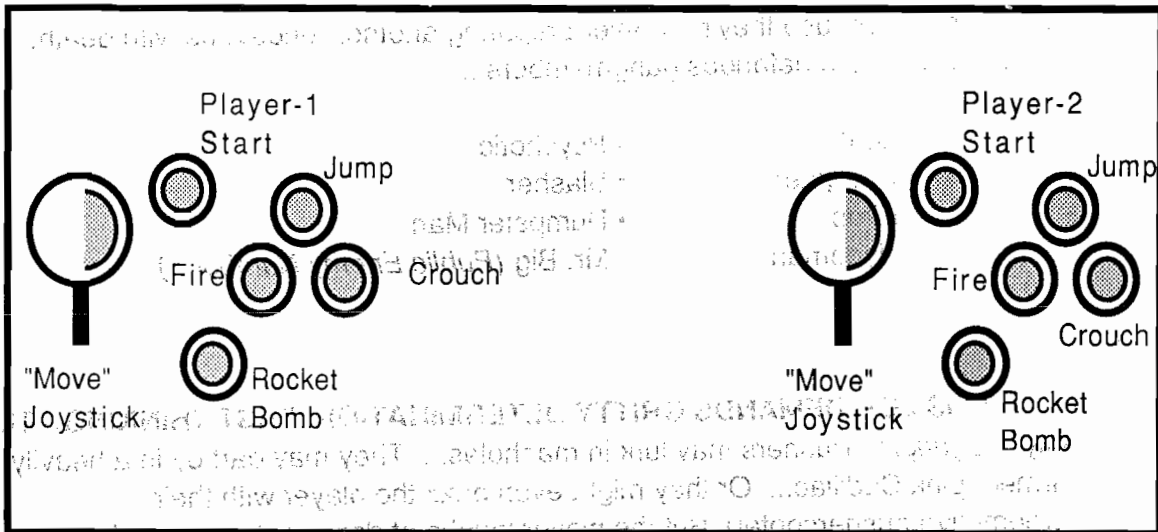
For a two-player game, at least two credits must be displayed. To initiate this two-player game, press the 2-PLAYER START button.

PLAYER CONTROLS

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

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

The logo for the game NARC, featuring the letters 'NARC' in a stylized, bold, black font with a slightly jagged, hand-drawn appearance.



Player Panel

GAMEPLAY

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

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



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.



NARC TEST MENU
NARC REVISION H.X

SELECT WITH UP/DOWN STICK
ACTIVATE WITH ANY BUTTON

DIAGNOSTIC TESTS
COIN BOOKKEEPING
GAME AUDITS
GAME ADJUSTMENT
UTILITIES
EXIT TO GAME OVER

VIEW GAMEPLAY
STATISTICS

Main Test Menu

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

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

NARC

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

GAME AUDITS

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

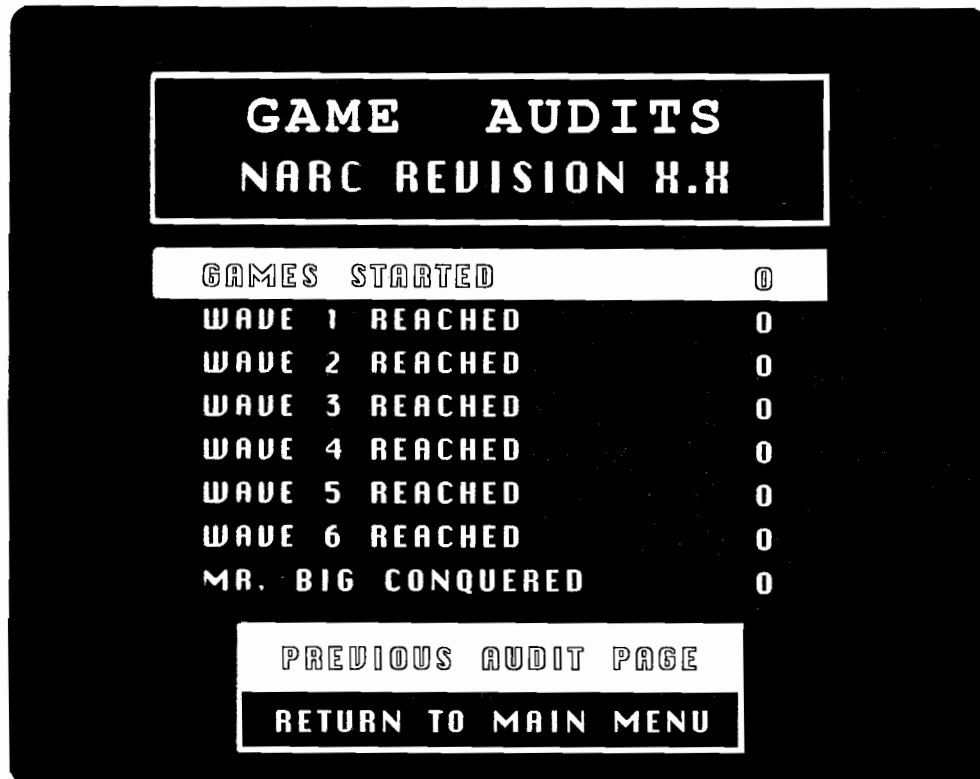
| GAME AUDITS | |
|--------------------------------|------|
| NARC REVISION X.X | |
| TOTAL PLAYS | 0 |
| EXTRA MEN EARNED | 0 |
| HOURS OF SINGLE PLAY | 0:00 |
| HOURS OF DUAL PLAY | 0:00 |
| TOTAL HOURS OF PLAY | 0:00 |
| AUG. "PLAYER" GAME TIME (MIN.) | 0:00 |
| AUG. ELAPSED TIME/PLAY | 0:00 |

NEXT AUDIT PAGE

RETURN TO MAIN MENU

Typical Audits Screen, Page 1

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.



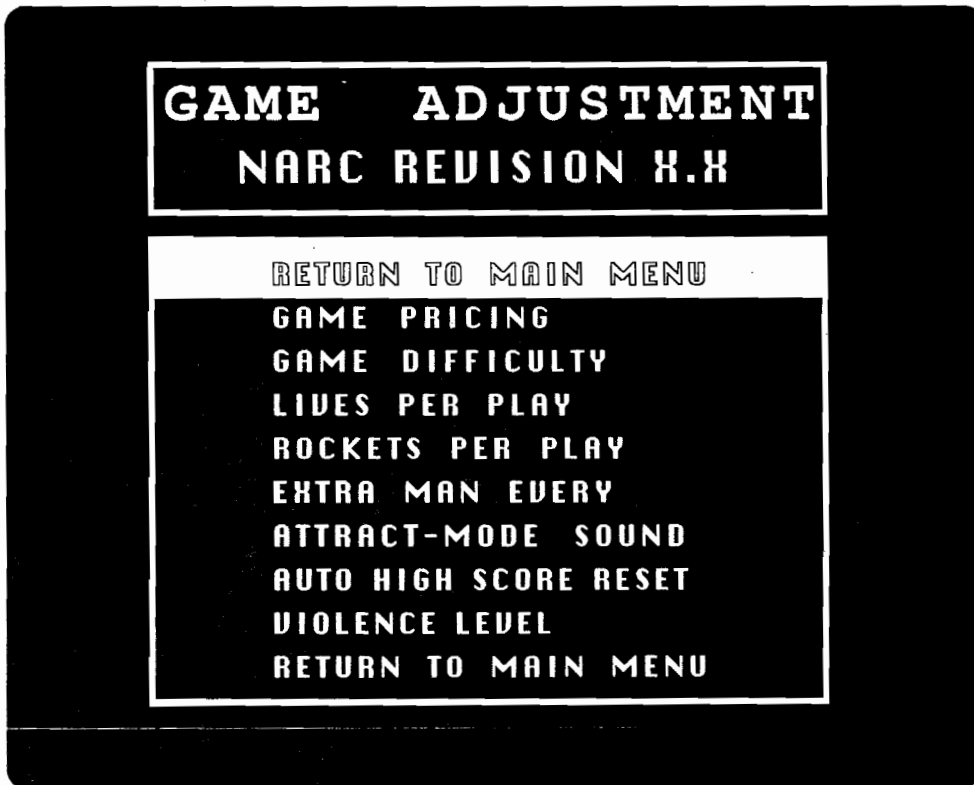
Typical Audits Screen, Page 2

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



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.

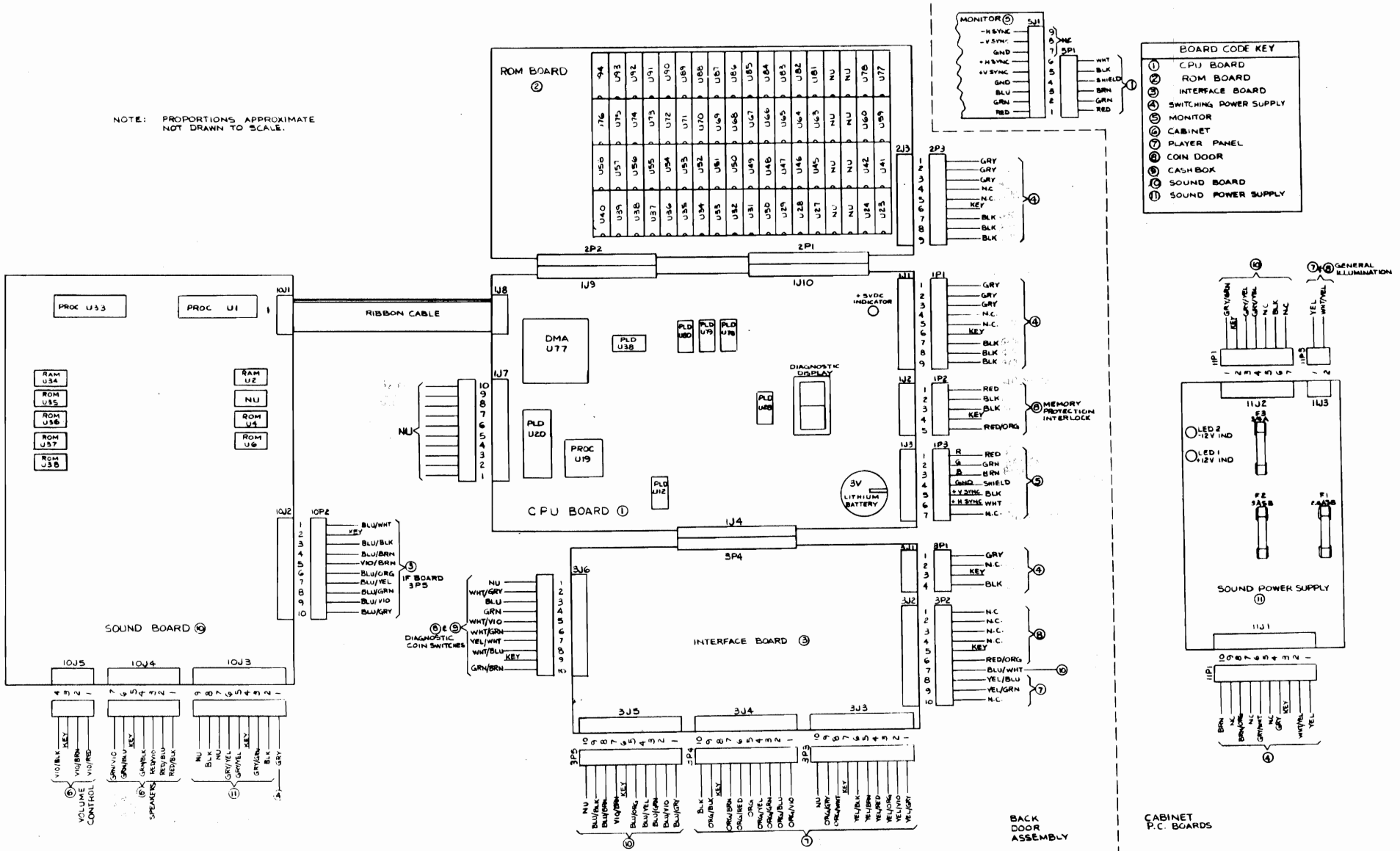
Here are some tailoring suggestions...

EXCLUSIVE GAME ADJUSTMENTS

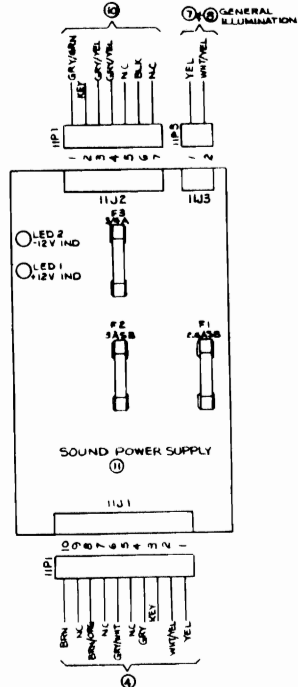
1. Press ADVANCE to enter the main test menu (*described earlier*).
2. Using either joystick, move the selection arrow down to GAME ADJUSTMENT.
3. To select GAME ADJUSTMENT, press any player panel button. Now you'll see the adjustment screen.
4. Use either joystick to highlight the feature you desire 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.



| BOARD CODE KEY | |
|----------------|------------------------|
| ① | CPU BOARD |
| ② | ROM BOARD |
| ③ | INTERFACE BOARD |
| ④ | SWITCHING POWER SUPPLY |
| ⑤ | MONITOR |
| ⑥ | CABINET |
| ⑦ | PLAYER PANEL |
| ⑧ | COIN DOOR |
| ⑨ | CASH BOX |
| ⑩ | SOUND BOARD |
| ⑪ | SOUND POWER SUPPLY |

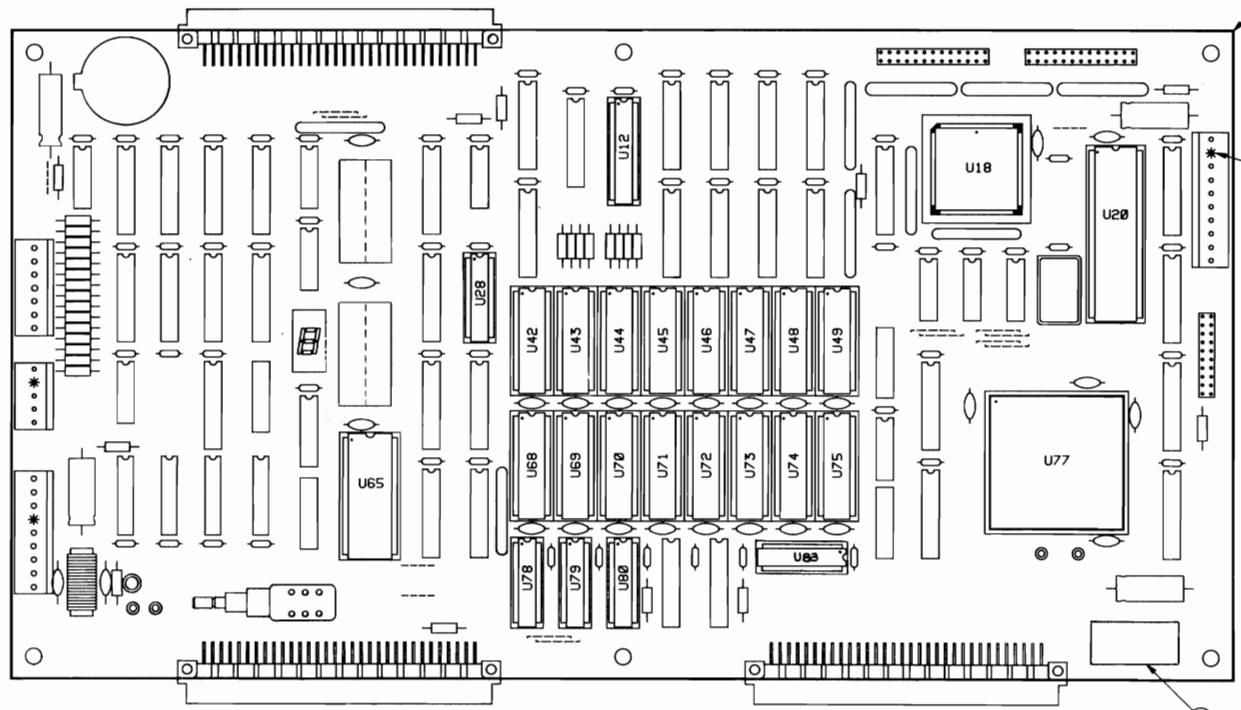


BACK DOOR ASSEMBLY

CABINET P.C. BOARDS

C-11879-

| REV | DESCRIPTION OF CHANGE | EGN NO DATE |
|-----|-----------------------|------------------|
| | NEW PART RELEASE | 19101 3-18-88 |
| A | SEE SHT 2 OF 2 | 19172 1-20-88 |



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

| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|------------------------------------|-----|---|-------------|--|-----|
| PROJ ENGR M. LOFFREDO | | DO NOT SCALE | | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| OWN BY DATE R. G. 3/1/88 | | WORK TO DIMENSIONS SHOWN | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE CHICAGO, IL 60618 | |
| CHECKED BY DATE [Signature] 4/12/88 | | FIRST PROJECT NO 3036-U | | DECIMAL X ± 0.00 ANGULAR ± 1/2° | | NAME SYS-Z CPU PCB ASSEMBLY | |
| APPROVAL DATE FIRST USAGE QTY [Signature] 5/12/88 D-12114 1 | | MATERIAL NONE | | XXX ± 0.05 FRACTIONAL ± 1/64 | | SCALE 1/1 SHT 1 OF 2 PART NO C-11879-1 REV A | |

DRAWING NO. 16-9017

| REV | DESCRIPTION OF CHANGE | ECN NO DATE |
|-----|---|------------------|
| | NEW PART RELEASE | 17101 5-18-88 |
| A | ITEM 5 WAS 5340-11219-00 ADDED ITEM 15 | 17122 7-30-88 |

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

| 20 | | | | |
|------|---------------|------------------|-----------------------------|------|
| 19 | | | | |
| 18 | | | | |
| 17 | | | | |
| 16 | | | | |
| 15 | 5880-11056-00 | B1 | BATTERY - LITHIUM 3V BUTTON | 1 |
| 14 | SEE CHART | U28 | IC, PLD-COLOR RAM CNTL | 1 |
| 13 | SEE CHART | U78 | IC, PLD-LOCAL CONTROL | 1 |
| 12 | SEE CHART | U79 | IC, PLD-VIDEO RAM CNTL | 1 |
| 11 | SEE CHART | U80 | IC, PLD-ADDRESS DECODE | 1 |
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |

BILL OF MATERIALS

| 10 | SEE CHART | U83 | IC, PLD-IMAGE ROM CNTL | 1 |
|------|---------------|----------------------|----------------------------|------|
| 9 | SEE CHART | U12 | IC, PLD-VIDEO RAM SEQ. | 1 |
| 8 | SEE CHART | U20 | IC, PLD-AUTOERASE CNTL | 1 |
| 7 | 5340-12079-00 | U65 | IC, RAM/S 5564 8Kx8 | 1 |
| 6 | 5340-12213-00 | U42 -U49 U68 -U75 | IC, RAM/V 4461 64Kx4 | 16 |
| 5 | | | | |
| 4 | 5400-12220-00 | U18 | IC, TMS34010 G.S.P. | 1 |
| 3 | 5410-12239-00 | U77 | IC, CUSTOM ASIC | 1 |
| 2 | 16-8850-210 | | LABEL, PCB IDENT. | 1 |
| 1 | C-11878 | | SYS-Z CPU PCB SUB-ASSEMBLY | 1 |
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |

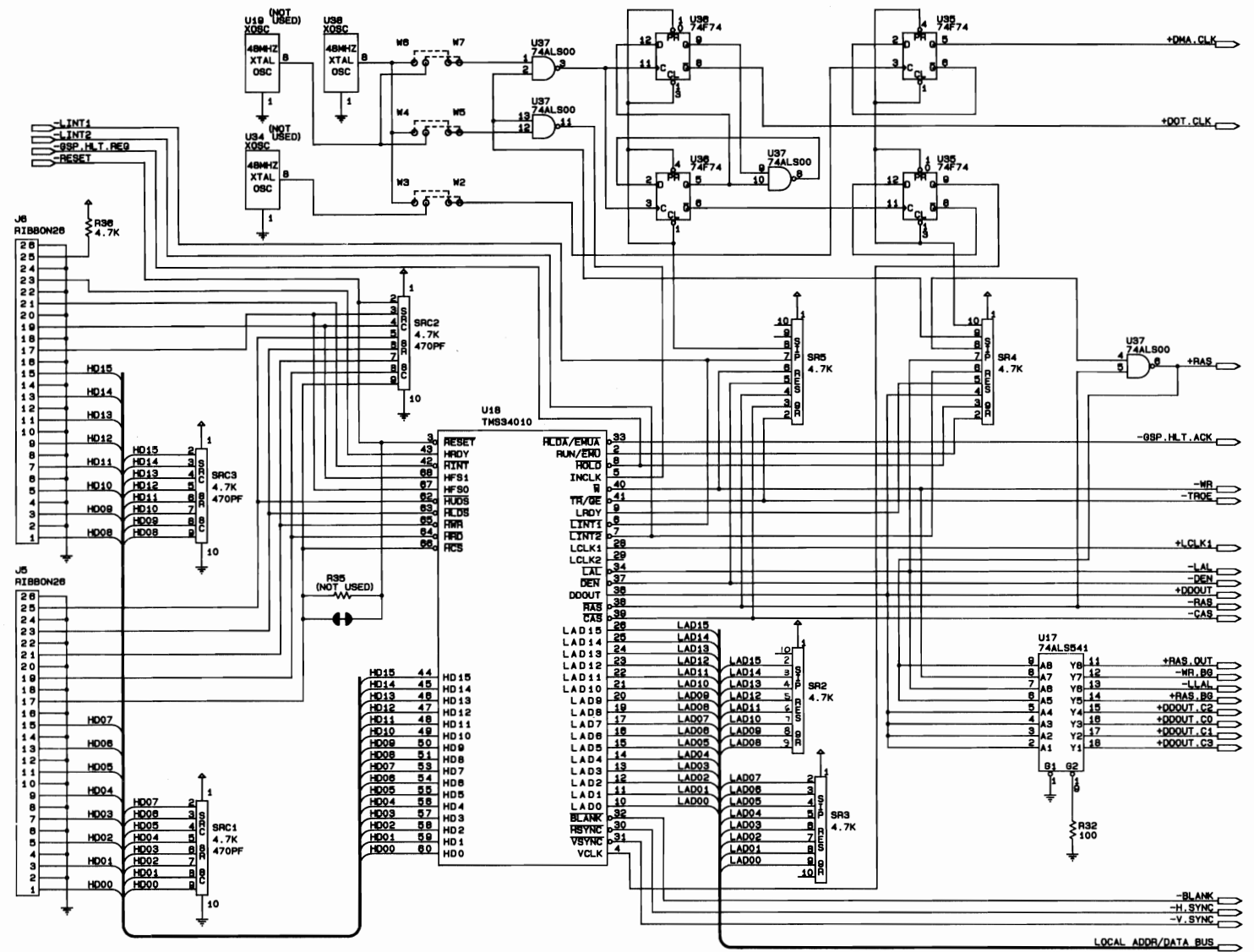
BILL OF MATERIALS

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

| | | | |
|------------------------------------|--|--|--|
| PROJ ENGR M. LOFFREDO | DO NOT SCALE WORK TO DIMENSIONS SHOWN | REMOVE BURRS - BREAK SHARP CORNERS @ EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED | WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 |
| DNW BY DATE R.G. 4/25/88 | CHECKED BY DATE AW 5/12/88 | DECIMAL $\frac{1}{16}$ ANGULAR $\pm 1/2^\circ$ XXX $\pm .005$ FRACTIONAL $\pm 1/64$ | NAME SYS-Z CPU PCB ASSEMBLY |
| APPROVAL DATE DW 5/12/88 | FIRST PROJECT NO 3036-U | MATERIAL | SCALE 1/8" = 1" |
| | FIRST USAGE QTY D-12114 1 | | SHT. 2 OF 2 C-11879 |

DRAWING NO. 16-9017

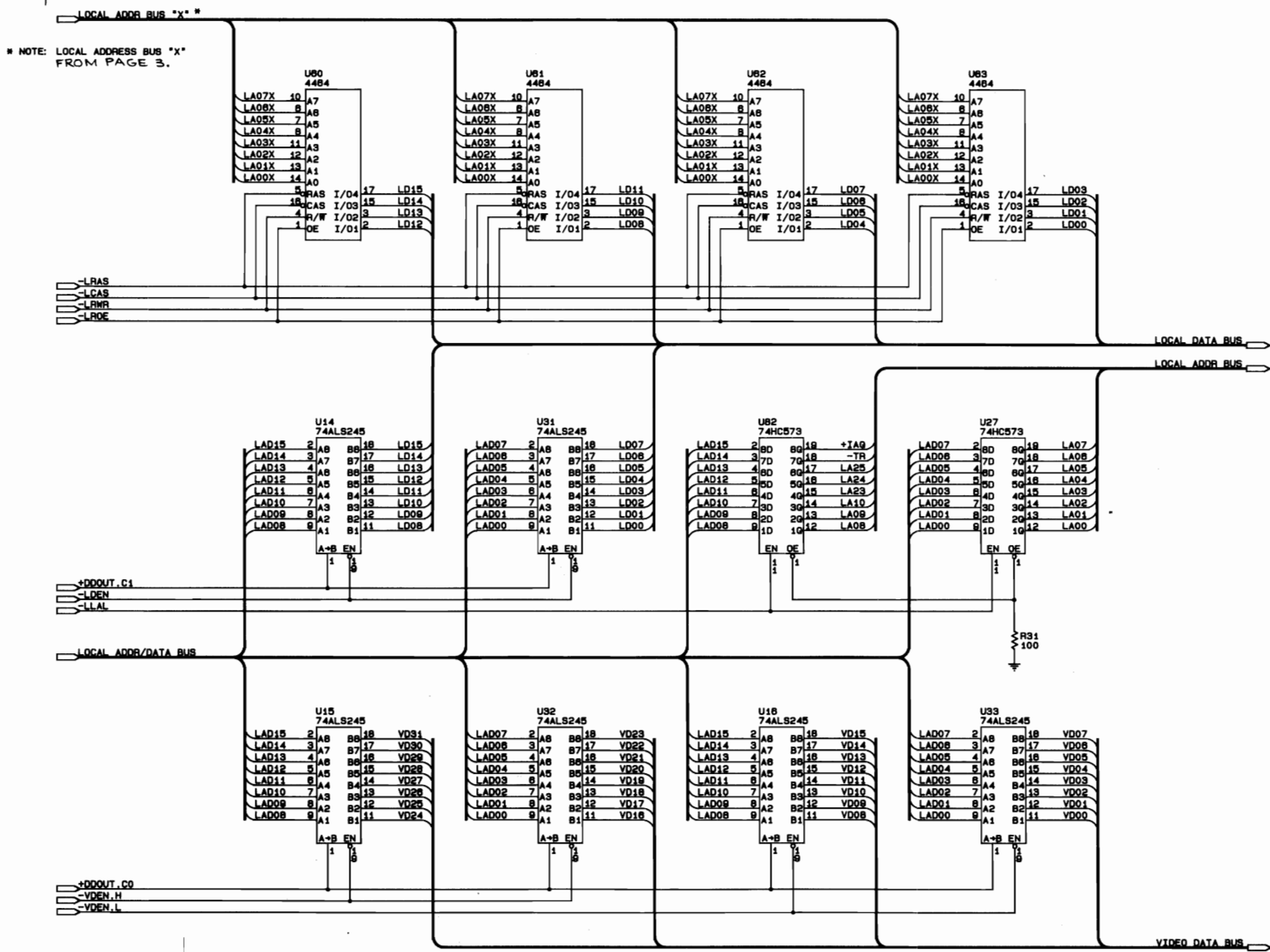
| REV | DESCRIPTION OF CHANGE | ESN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 17101 | 5-12-88 |
| A | SEE COVER SHT | 17122 | 7-30-88 |



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

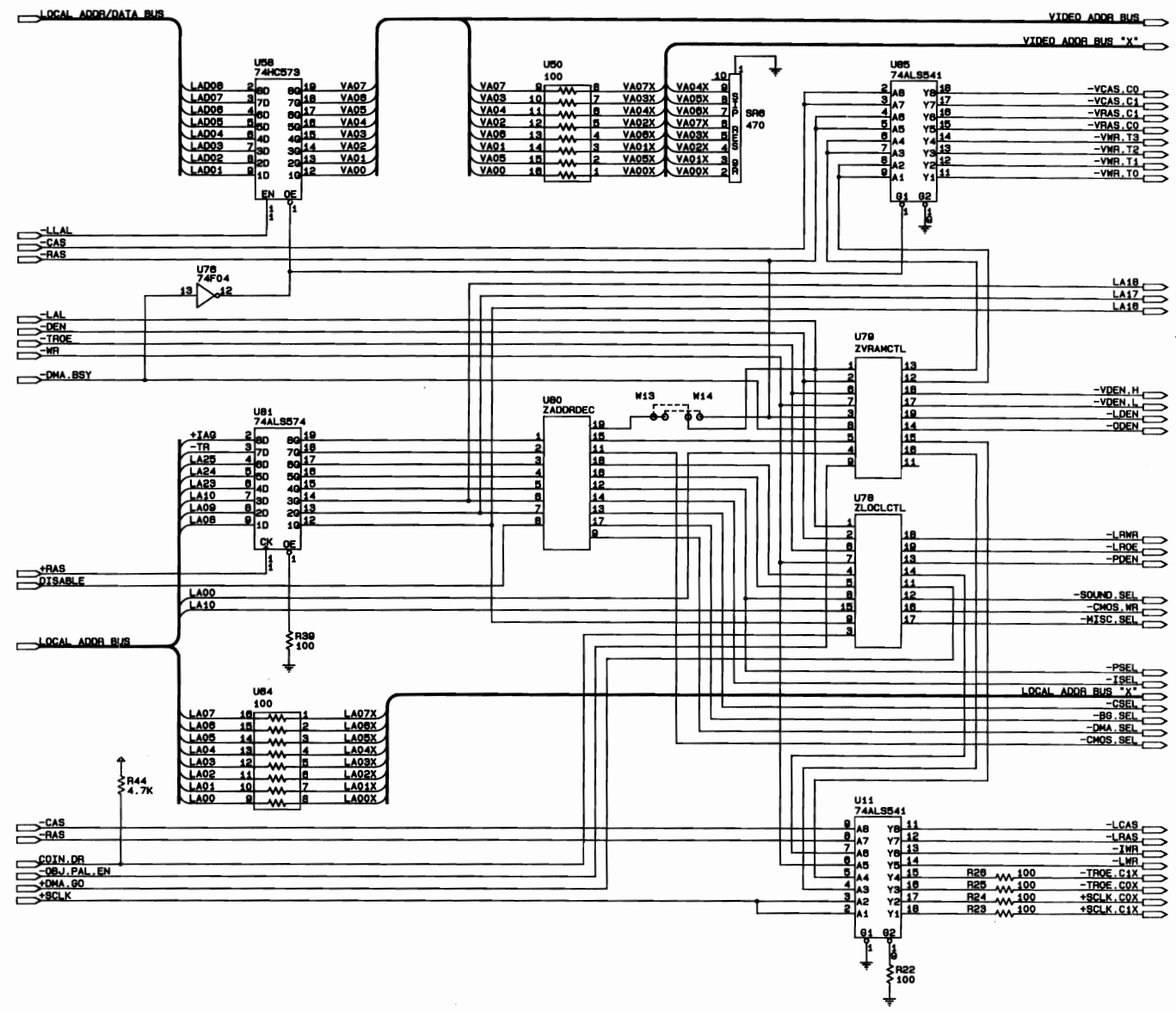
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|--|-----|--|-------------|-----------------------------------|-----|
| PROJ ENGR M. LOFFREDO | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY DATE G. SHIPP 5-11-88 | | FIRST PROJECT NO 3036-U | | 3401 N CALIFORNIA AVE CHICAGO IL 60618 | | NAME SYS-Z CPU BD SCHEMATIC | |
| CHECKED BY DATE [Signature] 5/12/88 | | FIRST USAGE C-11876 | | MATERIAL | | SCALE -/- | |
| APPROVAL DATE [Signature] 5/12/88 | | QTY | | SHT 1 OF 11 | | PART NO 16-9017 | |
| | | | | | | REV A | |

| REV | DESCRIPTION OF CHANGE | ECN NO DATE |
|-----|-----------------------|------------------|
| | NEW PART RELEASE | 11101 5-18-88 |
| A | SEE COVER SHT | 19722 4-30-88 |



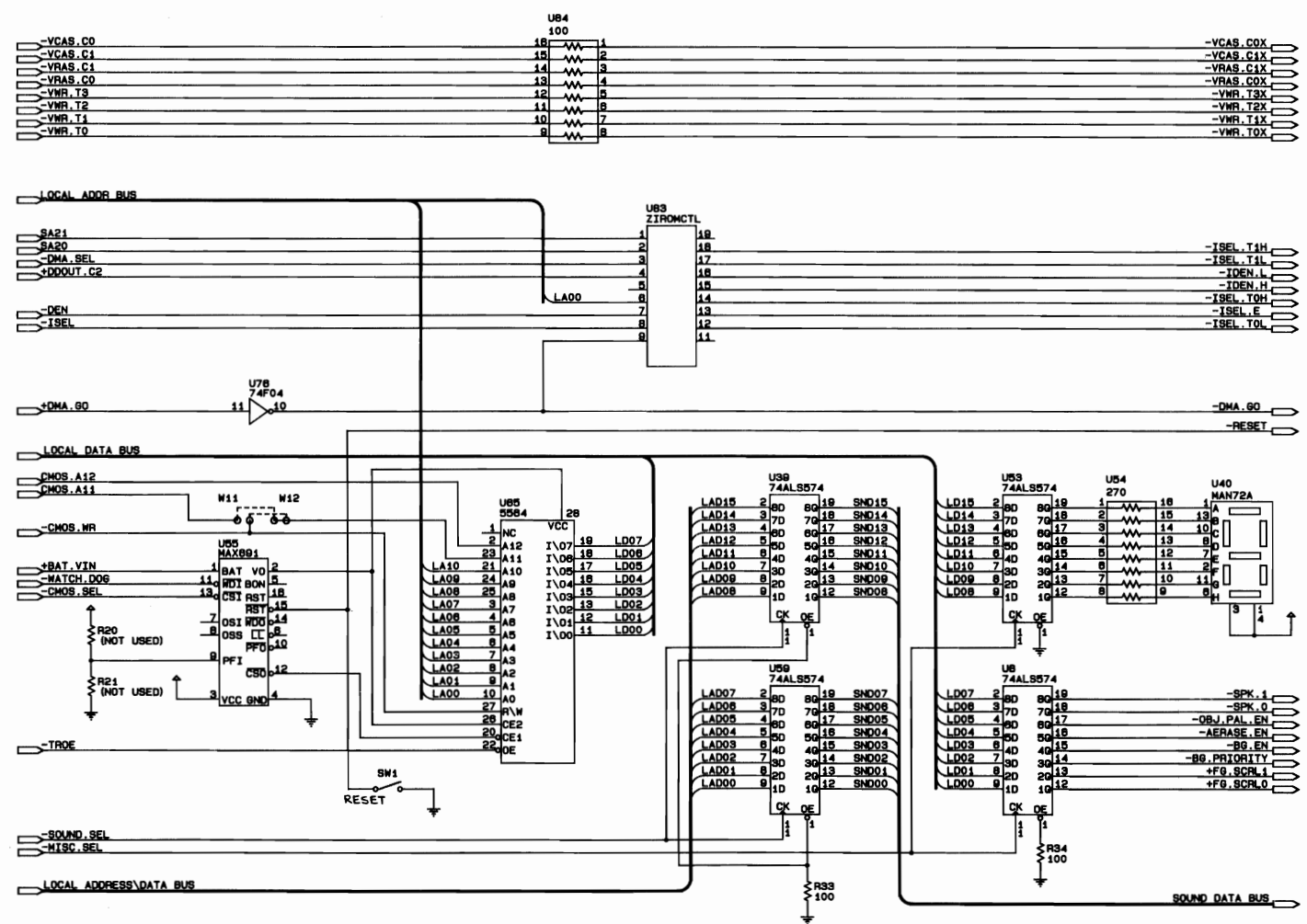
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|---|-------------|-------------|-----|------|-------------|---|-----|
| <p>PROJ ENGR M. LOFFREDO OWN BY DATE G. SHIPP 5-11-88 CHECKED BY DATE 5/12/88 APPROVAL DATE 5/12/88</p> <p>DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO. 3036-U FIRST USAGE C-1187B</p> <p>REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .X ±.030 ANGULAR ±1/2° XXX ±.005 FRACTIONAL ±1/64</p> <p>MATERIAL</p> | | | | | | | |
| <p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618</p> <p>NAME SYS-Z CPU BD SCHEMATIC</p> | | | | | | <p>SCALE 7/8 SHT 2 OF 11 PART NO. 16-9017 REV A</p> | |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 19101 | 5-18-88 |
| A | SEE COVER SMT | 19172 | 9-30-88 |



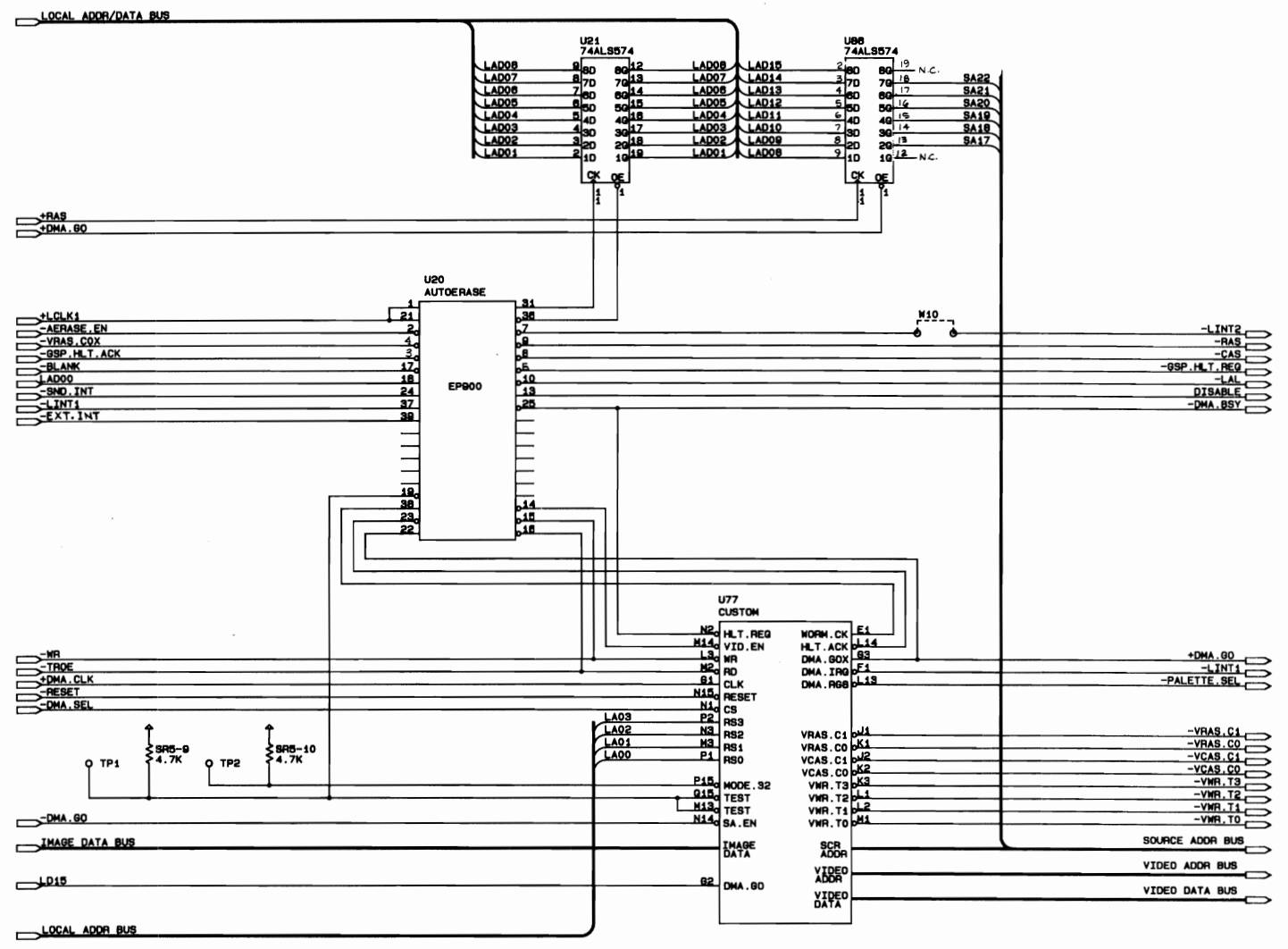
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------------|-------------|---------------------------------------|---------|--|------------------|----------------------------|------------------|
| PROJ ENGR | M. LOFFREDO | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DRAWN BY | G. SHIPP | DATE | 5-10-88 | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE | CHICAGO IL 60618 |
| CHECKED BY | DATE | FIRST PROJECT NO | 3036-U | DECIMAL | X ± 0.05 ANGULAR | ± 1/2° | |
| APPROVAL | DATE | FIRST USAGE | C-11878 | FRACTIONAL | XXX ± 0.05 | ± 1/64 | |
| | | | | MATERIAL | | | |
| | | | | SCALE | | | |
| | | | | SHT | 3 OF 11 | PART NO | 16-9017 |
| | | | | REV | | | A |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 19101 | 5-18-88 |
| A | SEE COVER SHT | 19722 | 9-30-88 |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|---|-------------|-------------|-----|---|-------------|---|-----|
| <p>PROJ ENGR: M. LOFFREDO DO NOT SCALE WORK TO DIMENSIONS SHOWN REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES: UNLESS OTHERWISE SPECIFIED DECIMAL: .XX ±.030 ANGULAR: 1/2° FRACTIONAL: XXX ±.005 FRACTIONAL: 2/64</p> | | | | | | | |
| <p>CHECKED BY: DATE: 5/14/88 APPROVAL: DATE: 5/10/88</p> | | | | <p>FIRST PROJECT NO: 3036-U FIRST USAGE: C-11878</p> | | | |
| <p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO IL. 60618</p> | | | | | | <p>NAME: SYS-Z CPU BD SCHEMATIC SCALE: -/ SHT: 4 OF 11 PART NO: 16-9017 REV: A</p> | |

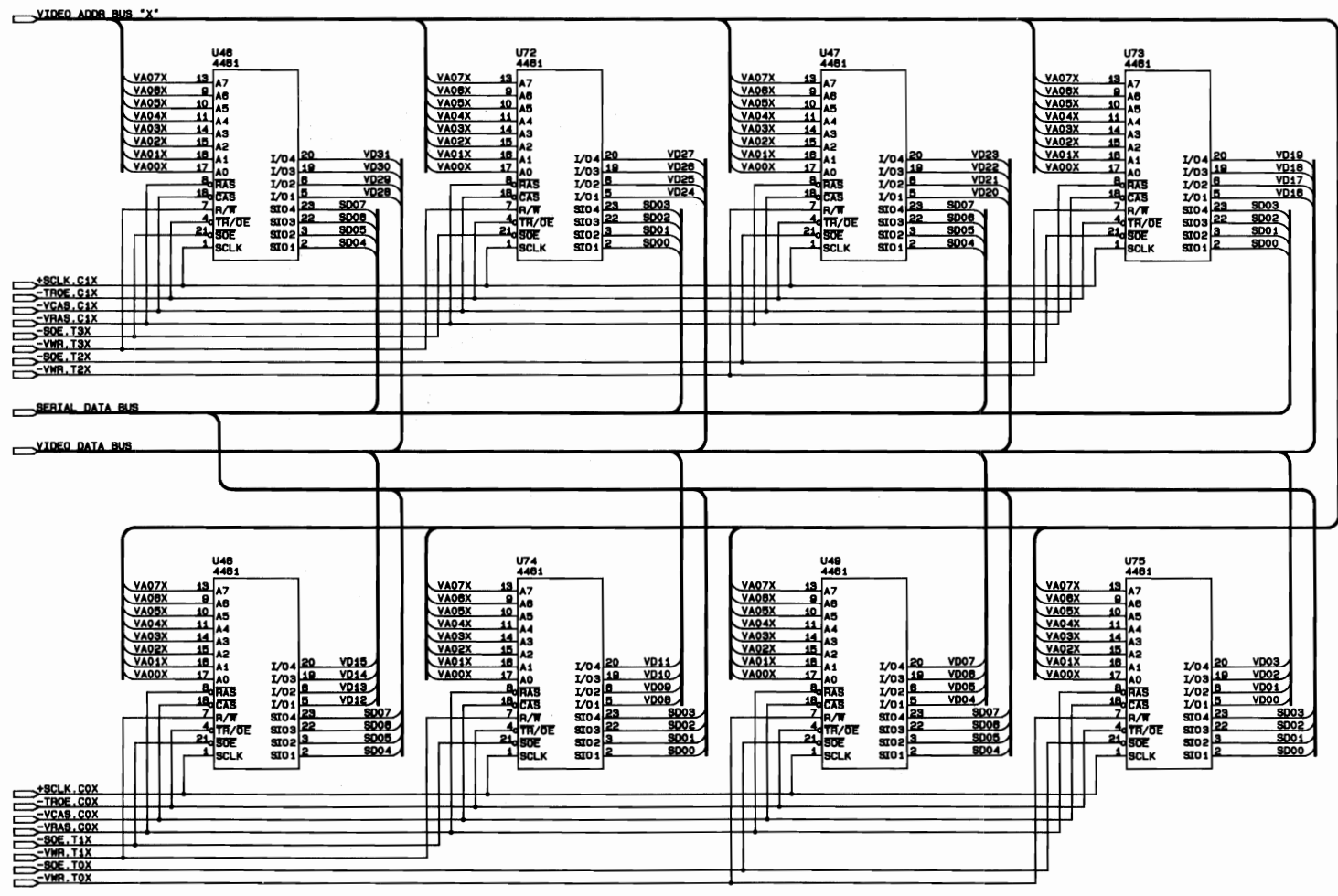
| REV | DESCRIPTION OF CHANGE | ECN NO. DATE |
|-----|-----------------------|------------------|
| | NEW PART RELEASE | 19101 5-18-88 |
| A | SEE COVER SHT | 19122 9-30-88 |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY | | | | |
|---|-------------|-------------|-----|--|-------------|-------------|-----|--|--|--|--|
| PROJ ENGR M. LOFFREDO DWN BY DATE G. SHIPP 5-11-88 | | | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL: .005 ANGULAR: 1/2° FRACTIONAL: 1/64 | | | |
| CHECKED BY DATE W. SHERA | | | | FIRST PROJECT NO. 3036-U | | | | WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | | | |
| APPROVAL DATE C. W. 5/13/88 | | | | MATERIAL C-11878 | | | | SYS-Z CPU BD SCHEMATIC SCALE: 1/1 SHT 5 of 11 PART NO: 16-9017 REV A | | | |

| REV | DESCRIPTION OF CHANGE | ECN NO DATE |
|-----|-----------------------|------------------|
| | NEW PART RELEASE | 17101 5-13-88 |
| A | SEE COVER SHT | 17722 7-30-88 |

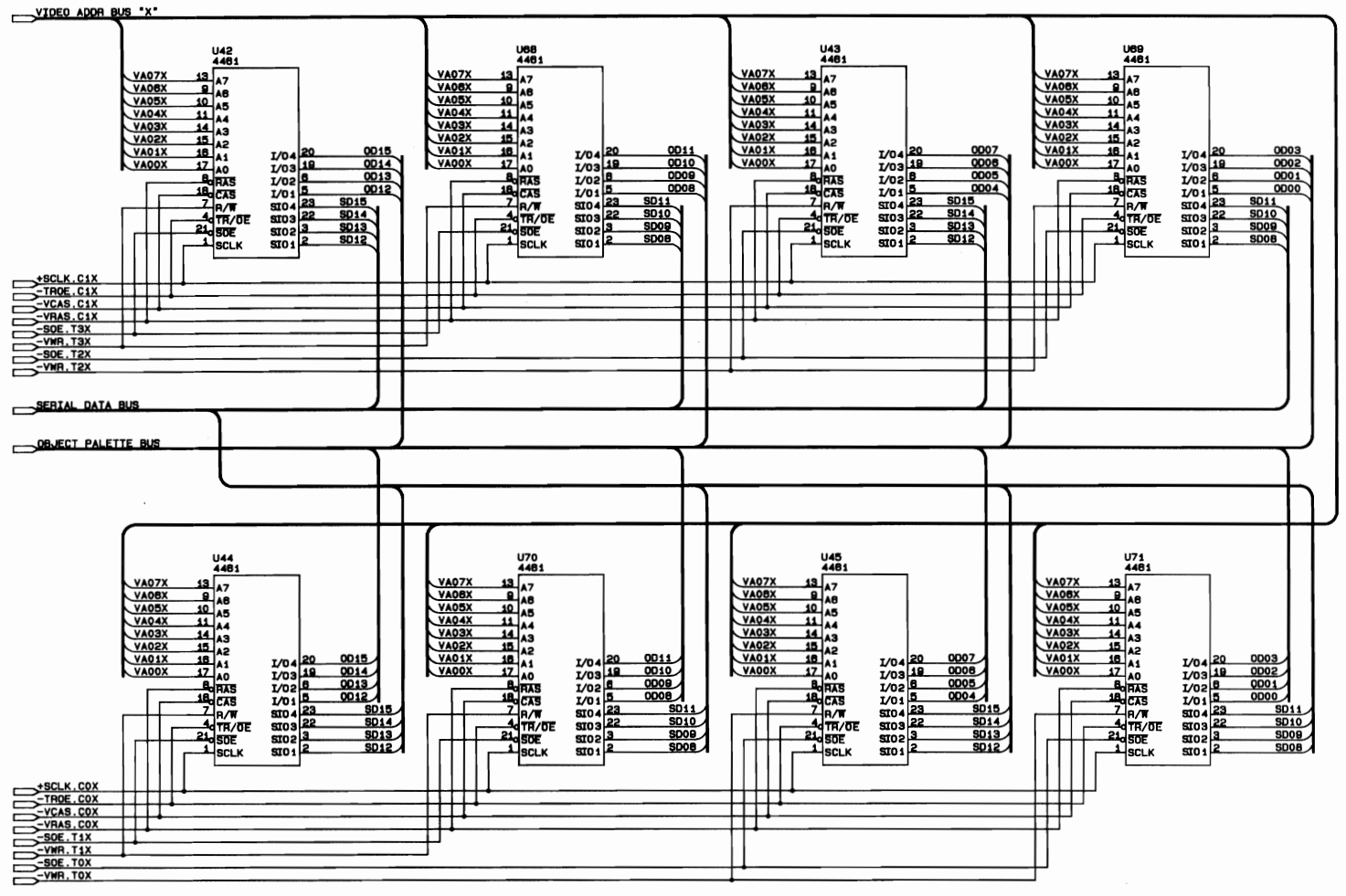
BIT MAP MEMORY



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|--|-----|--|-------------|---|-----|
| PROJ ENGR M. LOFFREDO | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY DATE G. SHIPP 5-11-88 | | FIRST PROJECT NO. 3036-U | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE. CHICAGO IL 60618 | |
| CHECKED BY DATE 5/12/88 | | FIRST USAGE DATE 5/12/88 | | DECIMAL: X ± 0.00 ANGULAR: ± 1/2° | | NAME SYS-Z CPU BD SCHEMATIC | |
| APPROVAL DATE 5/12/88 | | C-11878 | | FRACTIONAL: XX ± 0.05 FRACTIONAL: ± 1/64 | | SCALE: -/- SHT: 6 of 11 PART NO: 16-9017 REV: A | |

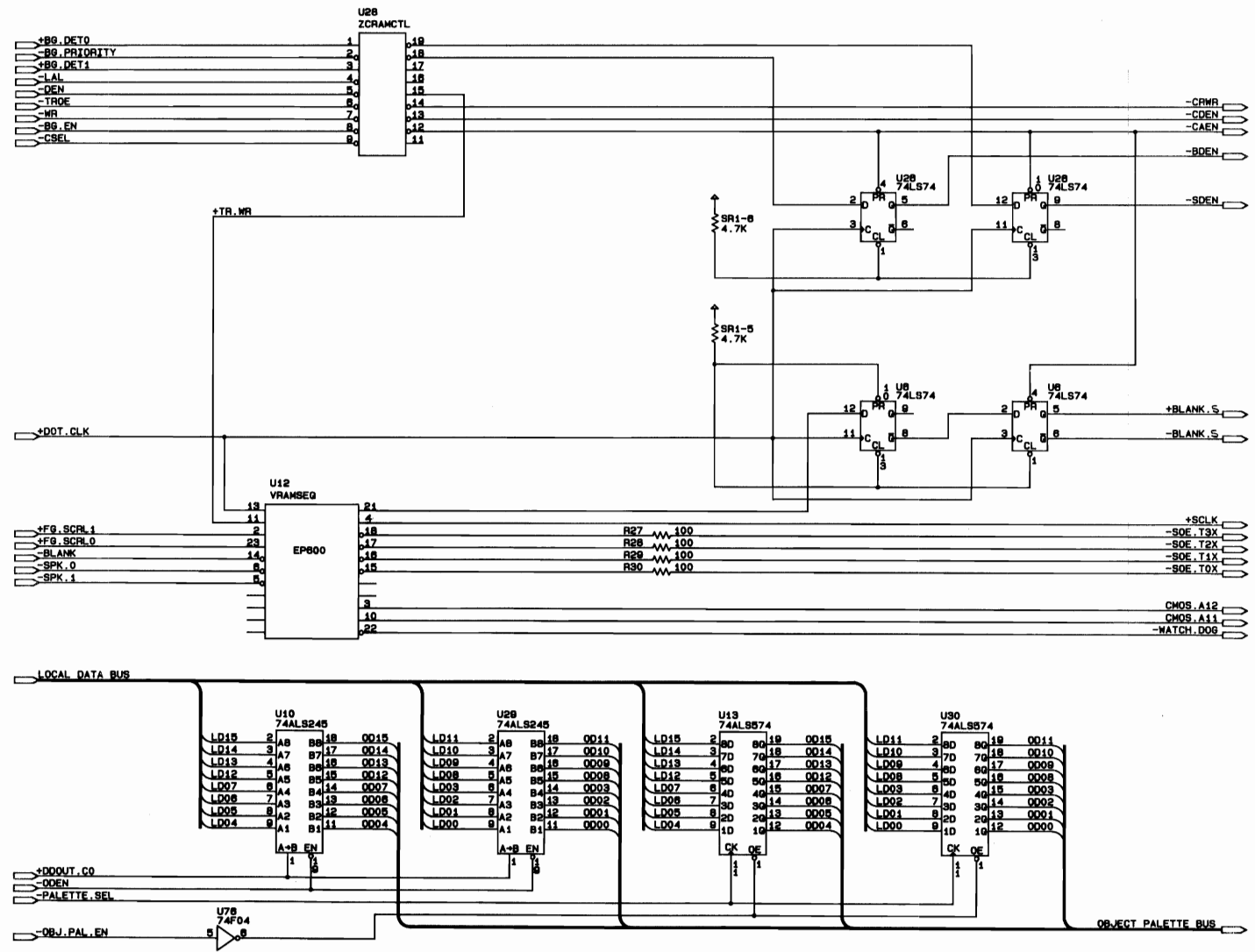
| REV | DESCRIPTION OF CHANGE | EPN NO DATE |
|-----|-----------------------|---------------|
| | NEW PART RELEASE | 1910 5-18-88 |
| A | SEE COVER SHT | 1912Z 1-30-88 |

OBJECT PALETTE MEMORY



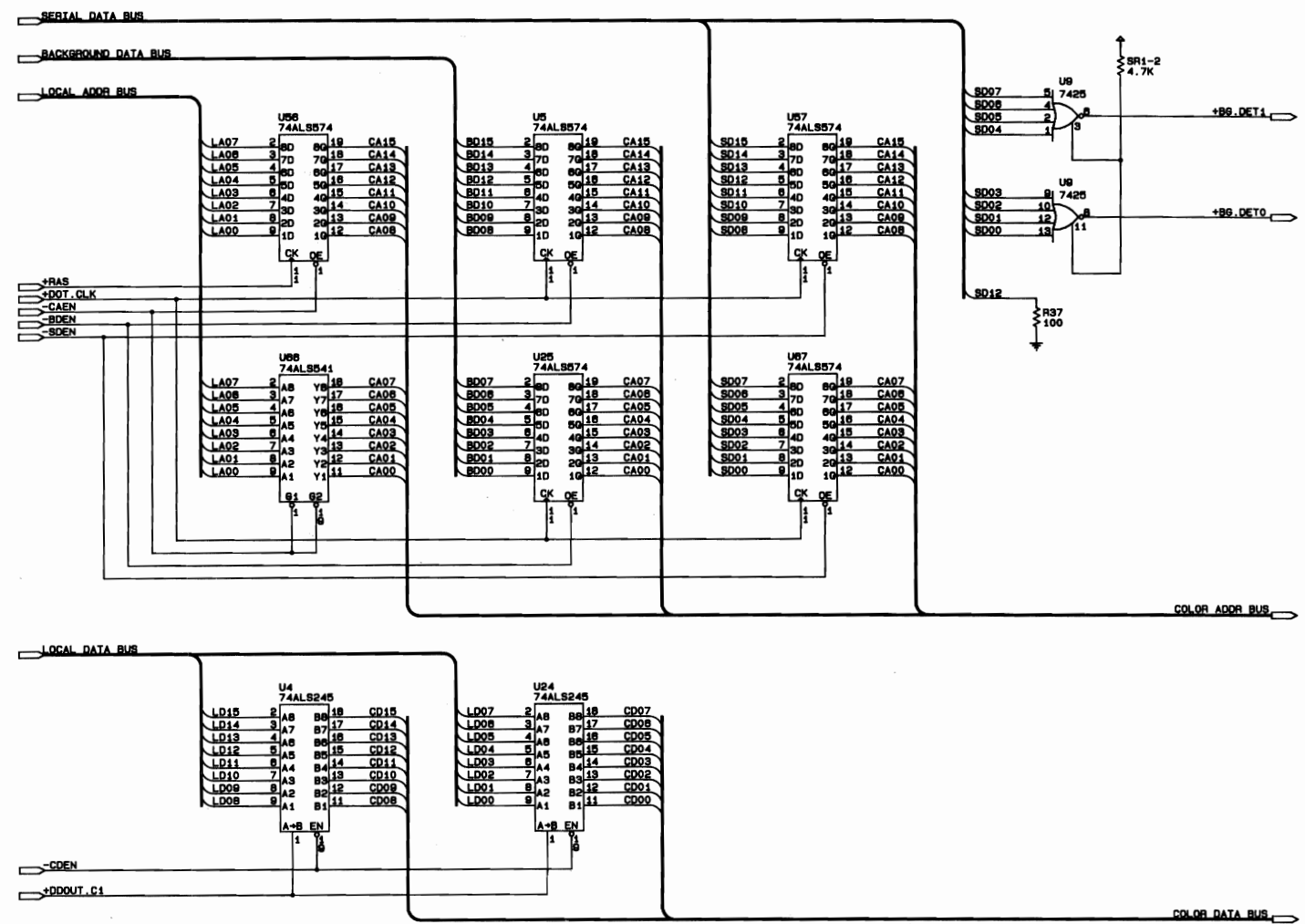
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|----------------------------|-------------|---------------------------------------|---------|--|-------------|-------------|--------|
| PROJ ENGR | M. LOFFREDO | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | | | |
| DWN BY | G. SHIPP | DATE | 5-11-88 | TOLERANCES UNLESS OTHERWISE SPECIFIED | | | |
| CHECKED BY | DATE | FIRST PROJECT NO | 3036-U | DECIMAL | ± 0.30 | ANGULAR | ± 1/2° |
| APPROVAL | DATE | FIRST USAGE | C-11618 | FRACTIONAL | ± 0.05 | | ± 1/64 |
| WILLIAMS ELECTRONICS, INC. | | | | 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | | | |
| SYS-Z CPU BD SCHEMATIC | | | | SCALE SHT 1 OF 11 PART NO 16-9017 REV A | | | |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 19101 | 5-17-88 |
| A | SEE COVER SHT | 19723 | 1-30-88 |



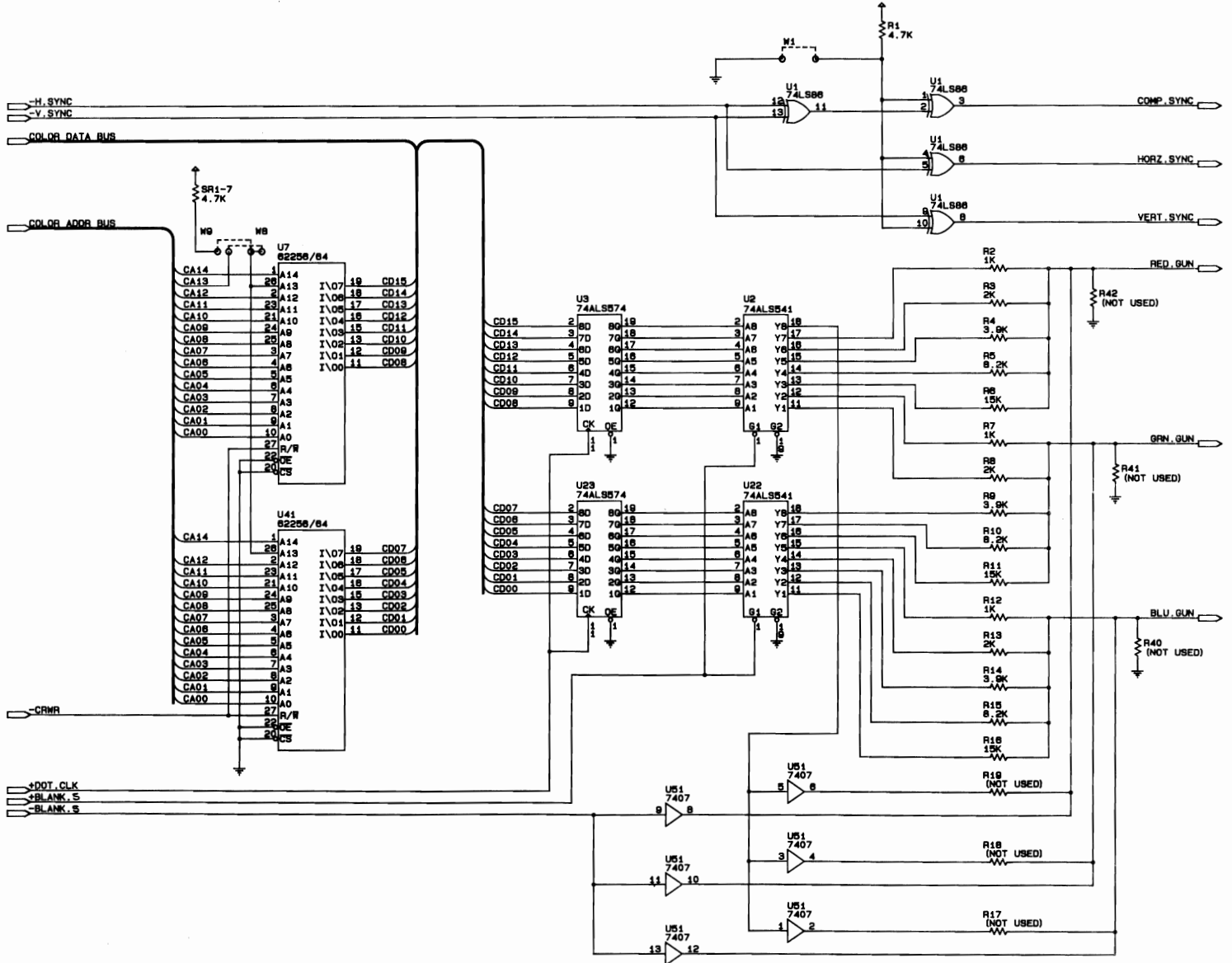
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|---------------------------------|-------------|---------------------------------|-----|--|-------------|-----------------------------------|-----|
| PROJ ENGR M. LOFFREDO | | DO NOT SCALE | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY DATE G. SHIPP 5-11-88 | | WORK TO DIMENSIONS SHOWN | | 3401 N. CALIFORNIA AVE. CHICAGO IL 60618 | | NAME | |
| CHECKED BY DATE LW 5/12/88 | | FIRST PROJECT NO 3036-U | | MATERIAL | | SYS-Z CPU BD SCHEMATIC | |
| APPROVAL DATE LW 5/12/88 | | FIRST USAGE C-1187B | | SCALE -/- | | SHT 8 OF 11 | |
| | | | | | | PART NO 16-9017 | |
| | | | | | | REV A | |

| | | |
|-----|-----------------------|---------------|
| REV | DESCRIPTION OF CHANGE | EGN NO DATE |
| | NEW PART RELEASE | 19701 5-18-88 |
| A | SEE COVER SHT | 19722 9-30-88 |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|-------------|-----|--|-------------|--|-----|
| <p>PROJ ENGR: M. LOFFREDO OWN BY DATE: G. SHIPP 5-11-88 CHECKED BY DATE: [Signature] 5/12/88 APPROVAL DATE: [Signature] 5/12/88</p> | | | | | | | |
| <p>DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO: 3036-U FIRST USAGE: C-1187B</p> | | | | <p>REMOVE BURRS - BREAK SHARP CORNERS & EDGES TOLERANCES: UNLESS OTHERWISE SPECIFIED DECIMAL: .030 ANGULAR: 1/2° FRACTIONAL: 1/64</p> | | | |
| <p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO IL. 60618</p> | | | | | | <p>NAME: SYS-Z CPU BD SCHEMATIC SCALE: -/- SHT: 2 of 11 PART NO: 16-9017 REV: A</p> | |

| REV | DESCRIPTION OF CHANGE | EON NO DATE |
|-----|-----------------------|---------------|
| | NEW PART RELEASE | 19101 5-18-88 |
| A | SEE COVER SHT | 19722 9-30-88 |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY | | | | |
|---|-------------|-------------|-----|--|-------------|-------------|-----|---|--|--|--|
| PROJ. ENGR M. LOFFREDO DOWN BY DATE G. SHIPP 5/11/88 CHECKED BY DATE D. W. 5/12/88 APPROVAL DATE D. W. 5/12/88 | | | | DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO 3036-U C-11878 | | | | REMOVE BURRS - BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .1 ±.030 ANGULAR ±1/2° FRACTIONAL 1/64 | | | |
| WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO, IL 60618 | | | | NAME SYS-Z CPU BD SCHEMATIC SCALE -/- SH10 OF 11 PART NO 16-9017 REV A | | | | | | | |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 19101 | 5-18-88 |
| A | SEE COVER SHT | 19112 | 9-30-88 |

PROGRAM INTERFACE

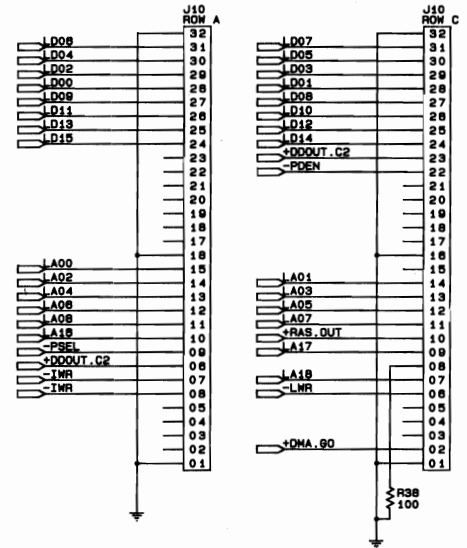
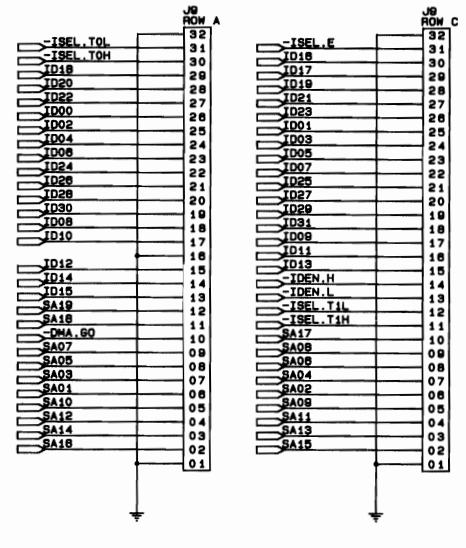
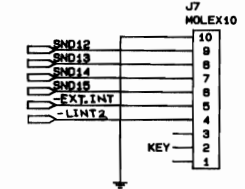


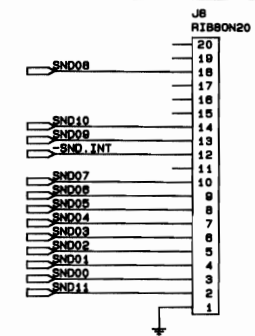
IMAGE INTERFACE



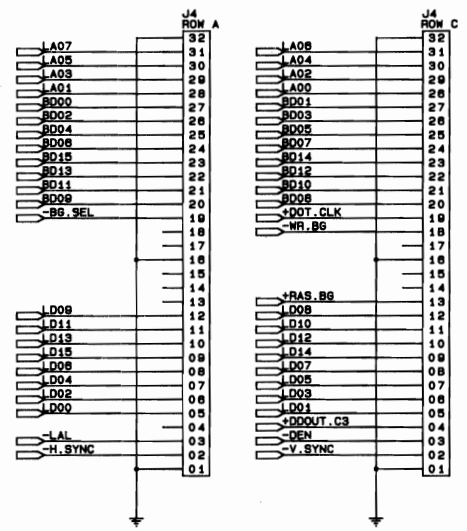
INTERRUPT INTERFACE



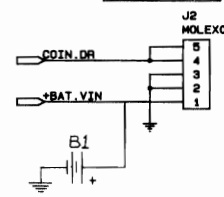
SOUND BOARD INTERFACE



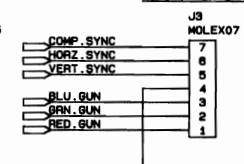
I/O INTERFACE



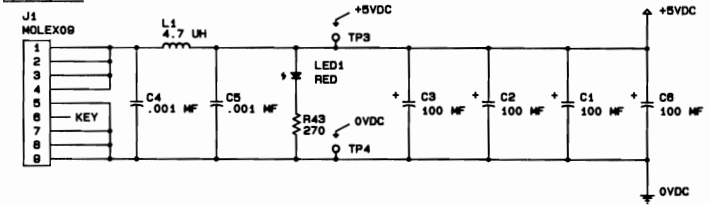
BATTERY BACKED-UP MEMORY INTERFACE



MONITOR INTERFACE



POWER INPUT

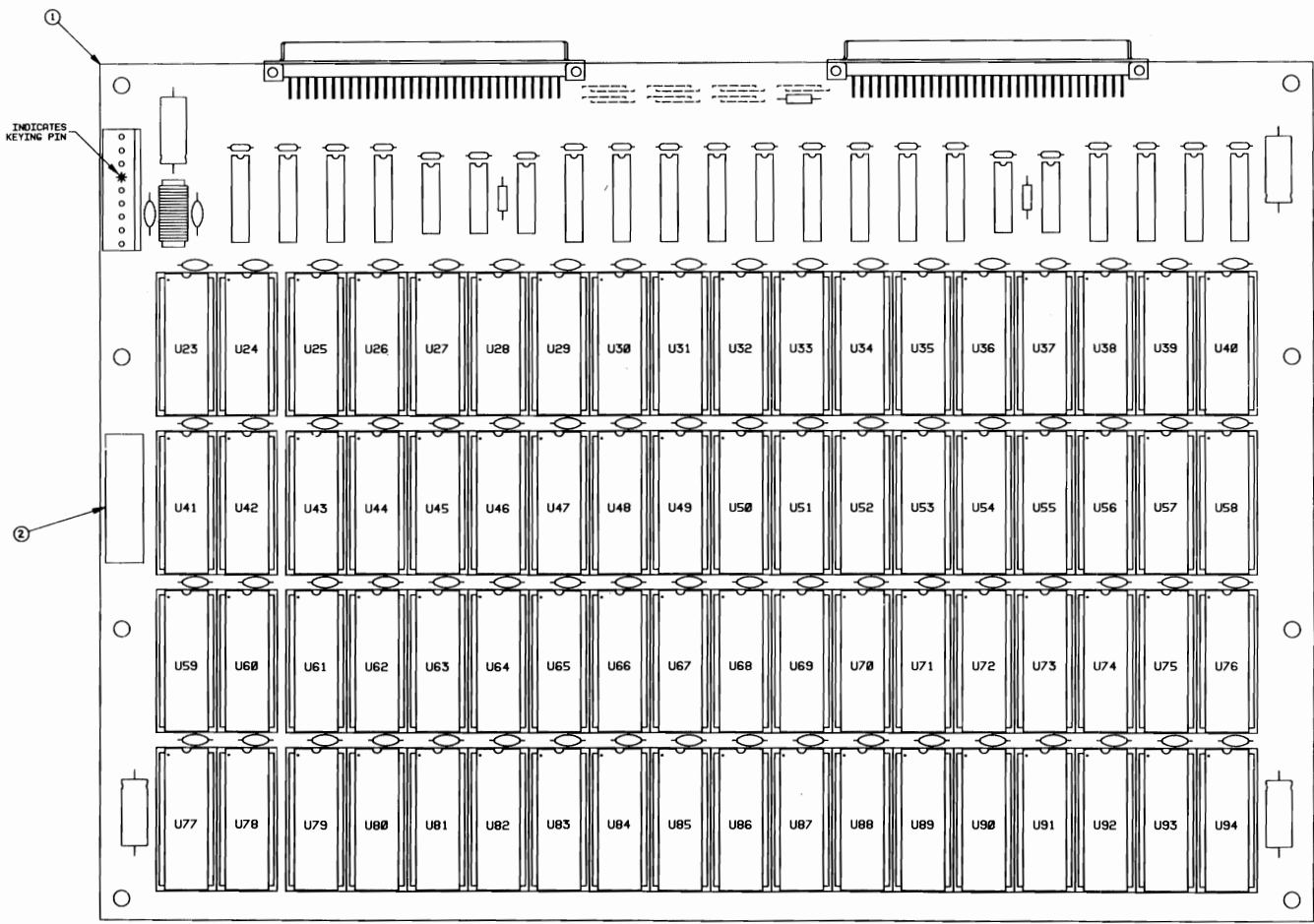


| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------------|-------------|---------------------------------------|---------|------------|-------------|--|-------|
| PROJ ENGR | M. LOFFREDO | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVED | | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | |
| DWN BY | G. SHIPP | DATE | 5-11-88 | TOLERANCES | | UNLESS OTHERWISE SPECIFIED | |
| CHECKED BY | DATE | FIRST PROJECT NO | 3036-U | DECIMAL | X 2 030 | ANGULAR | ±1/2° |
| APPROVAL | DATE | FIRST USAGE | C-1187B | XXX 2 005 | FRACTIONAL | | ±1/64 |
| | | | | MATERIAL | | | |
| | | | | SCALE | | | |
| | | | | SMT LLOFF | | | |
| | | | | PART NO | | | |
| | | | | 16-9017 | | | |
| | | | | REV | | | |
| | | | | A | | | |

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B
A

D
C
B
A

| REV | DESCRIPTION OF CHANGE | ECN NO DATE |
|-----|-----------------------|-----------------|
| | NEW PART RELEASE | 1997 8-10-88 |



NOTES: 1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-9041.
 2. 28-PIN DEVICES (I.E. 27512 EPROMS) SHOULD BE BOTTOM JUSTIFIED IN SOCKETS.

| | | | | | | | |
|------------------------------|--|---|------------------------|----------|--|-------------|----------------------------|
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| PROJ ENGR G. SHIPP | DO NOT SCALE WORK TO DIMENSIONS SHOWN | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | | WILLIAMS ELECTRONICS, INC. | | |
| OWN BY DATE R. G. 6/17/88 | CHECKED BY DATE M. W. 7/29/88 | FIRST PROJECT NO 3038-U1 | FIRST USAGE D-12260 | QTY 1 | 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | | |
| | | | | | NAME SYS-Z ROM-2 PCB ASSEMBLY | | |
| | | | | | SCALE 1/1 | SHT 1 OF 2 | PART NO C-12260- |
| | | | | | | | REV - |

DRAWING NO. 8001 504114

| | | |
|-----|-----------------------|------------------|
| REV | DESCRIPTION OF CHANGE | ECN NO. DATE |
| | NEW PART RELEASE | 19447 8-10-88 |

| | | | | |
|------------------|-----------|------|--|-------------|
| | GAME NAME | 3036 | | |
| | ASSY. NO. | | | |
| PART DESIGNATION | U23 | | | PART NUMBER |
| | U24 | | | |
| | U25 | | | |
| | U26 | | | |
| | U27 | | | |
| | U28 | | | |
| | U29 | | | |
| | U30 | | | |
| | U31 | | | |
| | U32 | | | |
| | U33 | | | |
| | U34 | | | |
| | U35 | | | |
| | U36 | | | |
| | U37 | | | |
| | U38 | | | |
| | U39 | | | |
| | U40 | | | |
| | U41 | | | |
| | U42 | | | |
| | U43 | | | |
| | U44 | | | |
| | U45 | | | |
| | U46 | | | |
| U47 | | | | |
| U48 | | | | |
| U49 | | | | |

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|------------------|-----------|------|--|-------------|
| | GAME NAME | 3036 | | |
| | ASSY. NO. | | | |
| PART DESIGNATION | U50 | | | PART NUMBER |
| | U51 | | | |
| | U52 | | | |
| | U53 | | | |
| | U54 | | | |
| | U55 | | | |
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| U74 | | | | |
| U75 | | | | |
| U76 | | | | |

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|------------------|-----------|------|--|-------------|
| | GAME NAME | 3036 | | |
| | ASSY. NO. | | | |
| PART DESIGNATION | U77 | | | PART NUMBER |
| | U78 | | | |
| | U79 | | | |
| | U80 | | | |
| | U81 | | | |
| | U82 | | | |
| | U83 | | | |
| | U84 | | | |
| | U85 | | | |
| | U86 | | | |
| | U87 | | | |
| | U88 | | | |
| | U89 | | | |
| | U90 | | | |
| U91 | | | | |
| U92 | | | | |
| U93 | | | | |
| U94 | | | | |

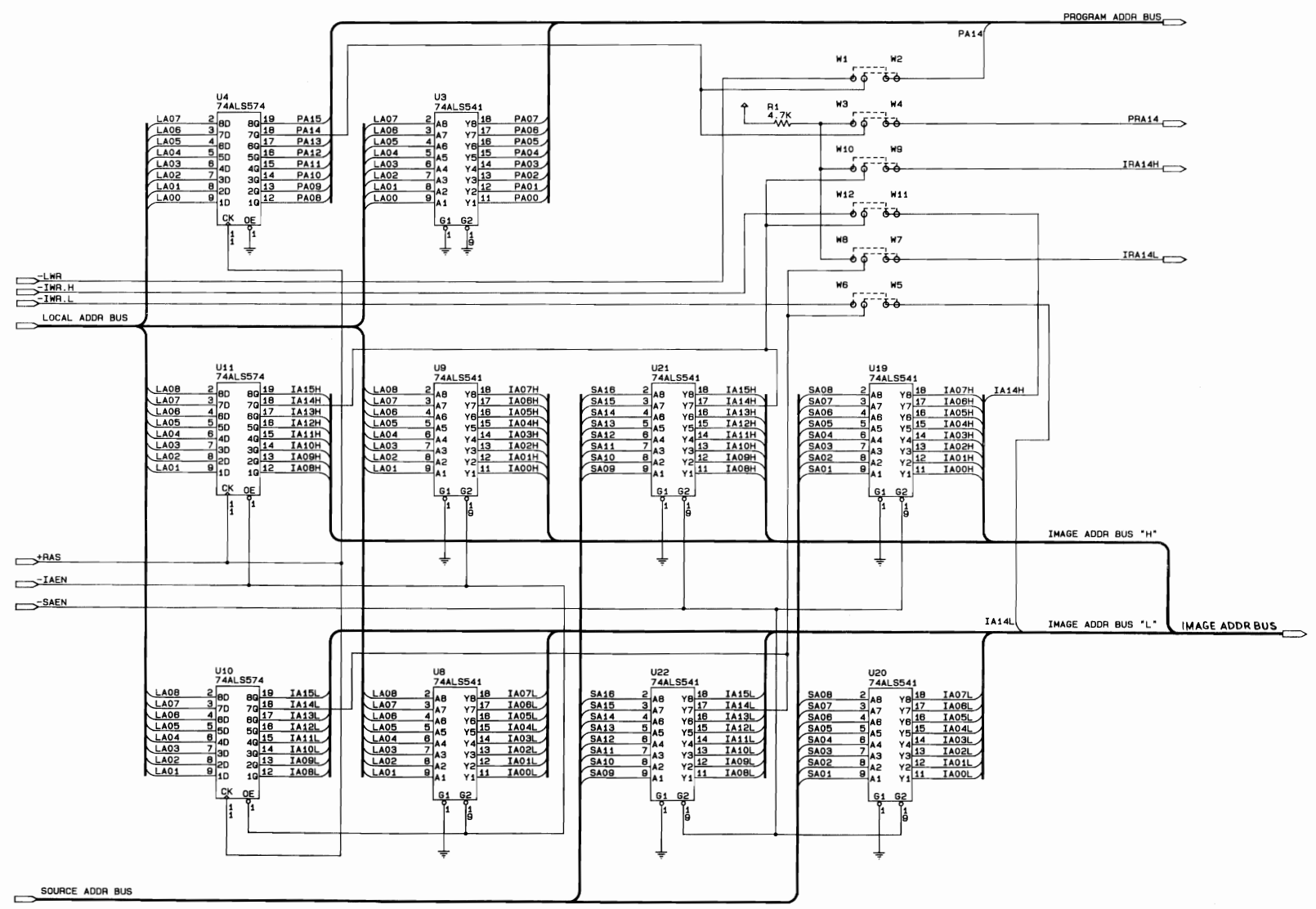
| | | | | |
|------|-------------|------------------|-----------------------|-----------|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | SEE CHART | SEE CHART | GAME ROM SET | SEE CHART |
| 2 | 16-8850-219 | | LABEL, PCB IDENT. | 1 |
| 1 | C-12261 | | SYS-2 ROM 2 SUB-ASSY. | 1 |
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |

BILL OF MATERIALS

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9041

| | | | |
|------------------------------|--|--|---|
| PROJ ENGR G. SHIPP | DO NOT SCALE WORK TO DIMENSIONS SHOWN | REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .X ±.030 ANGULAR 1/2° XX ±.015 FRACTIONAL ±1/64 | WILLIAMS ELECTRONICS, INC. 3401 N CALIFORNIA AVE CHICAGO IL 60618 |
| CHKD BY DATE G.S. 6-24-88 | FIRST PROJECT NO 3036-U1 | MATERIAL NONE | NAME SYS-2 ROM-2 PCB ASSEMBLY |
| APPROVAL DATE 7/29/88 | FIRST USAGE QTY D-12266 1 | SCALE -/- | SHT 2 OF 2 PART NO. C-12260- REV - |

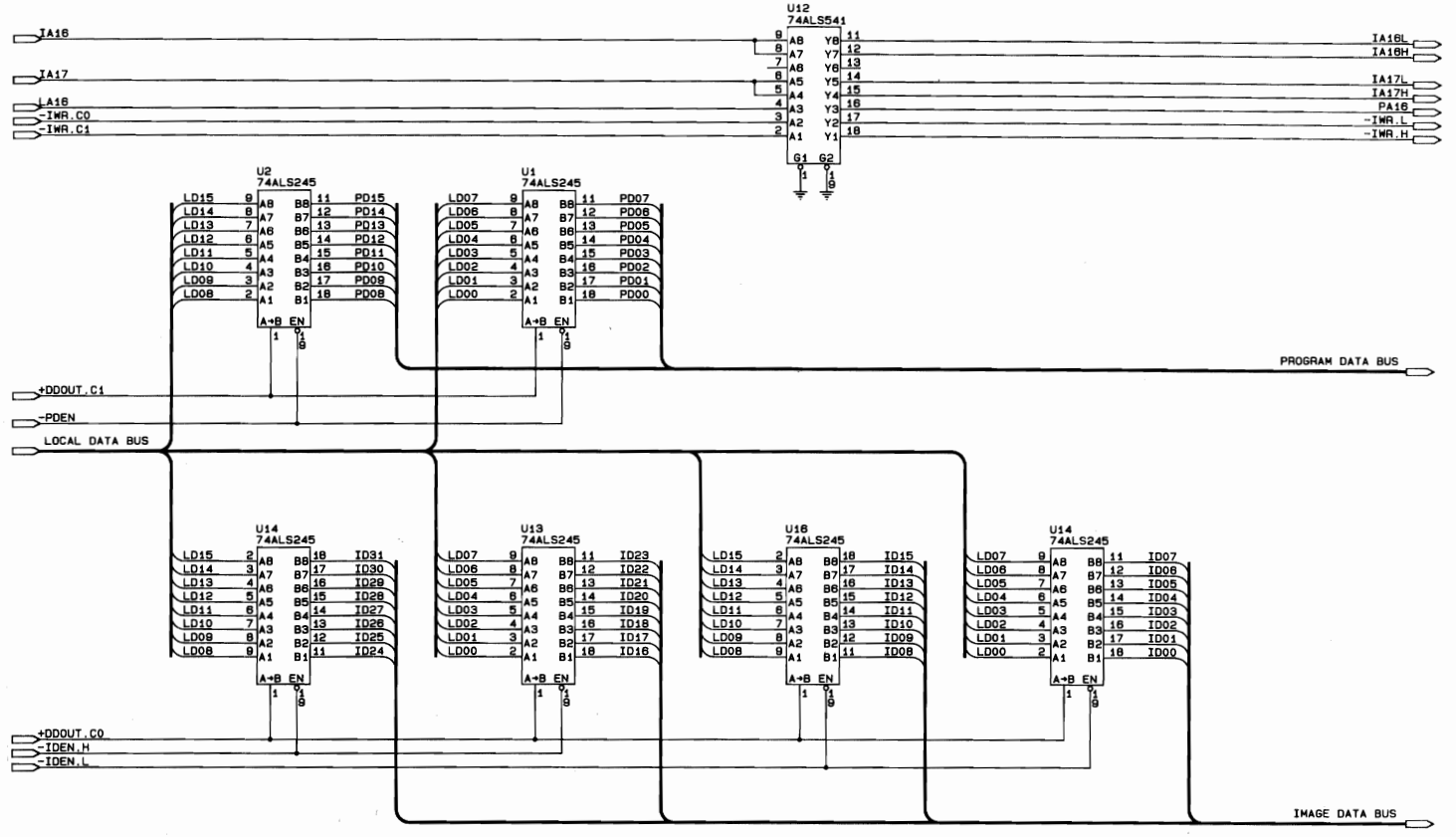
| REV | DESCRIPTION OF CHANGE | ECN NO |
|-----|-----------------------|---------|
| 1 | NEW PART RELEASE | 19417 |
| | | 8-10-88 |



| | | | | | | | |
|---------------------------------|-------------|--|-----|--|-------------|--|-----|
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| PROJ ENGR G. SHIPP | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | TOLERANCES UNLESS OTHERWISE SPECIFIED | |
| DWN BY DATE G.S. 6-24-88 | | FIRST PROJECT NO 3036-11 | | DECIMAL .X .030 ANGULAR .1/2° | | 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | |
| CHECKED BY DATE D.W. 7/29/88 | | FIRST USAGE C-12261 | | FRACTIONAL .1/64 | | NAME SYS-Z ROM-2 SCHEMATIC | |
| APPROVAL DATE | | MATERIAL | | SCALE -/- | | SHT. OF 1 PART NO 16-9041 | |
| | | QTY 1 | | | | REV - | |

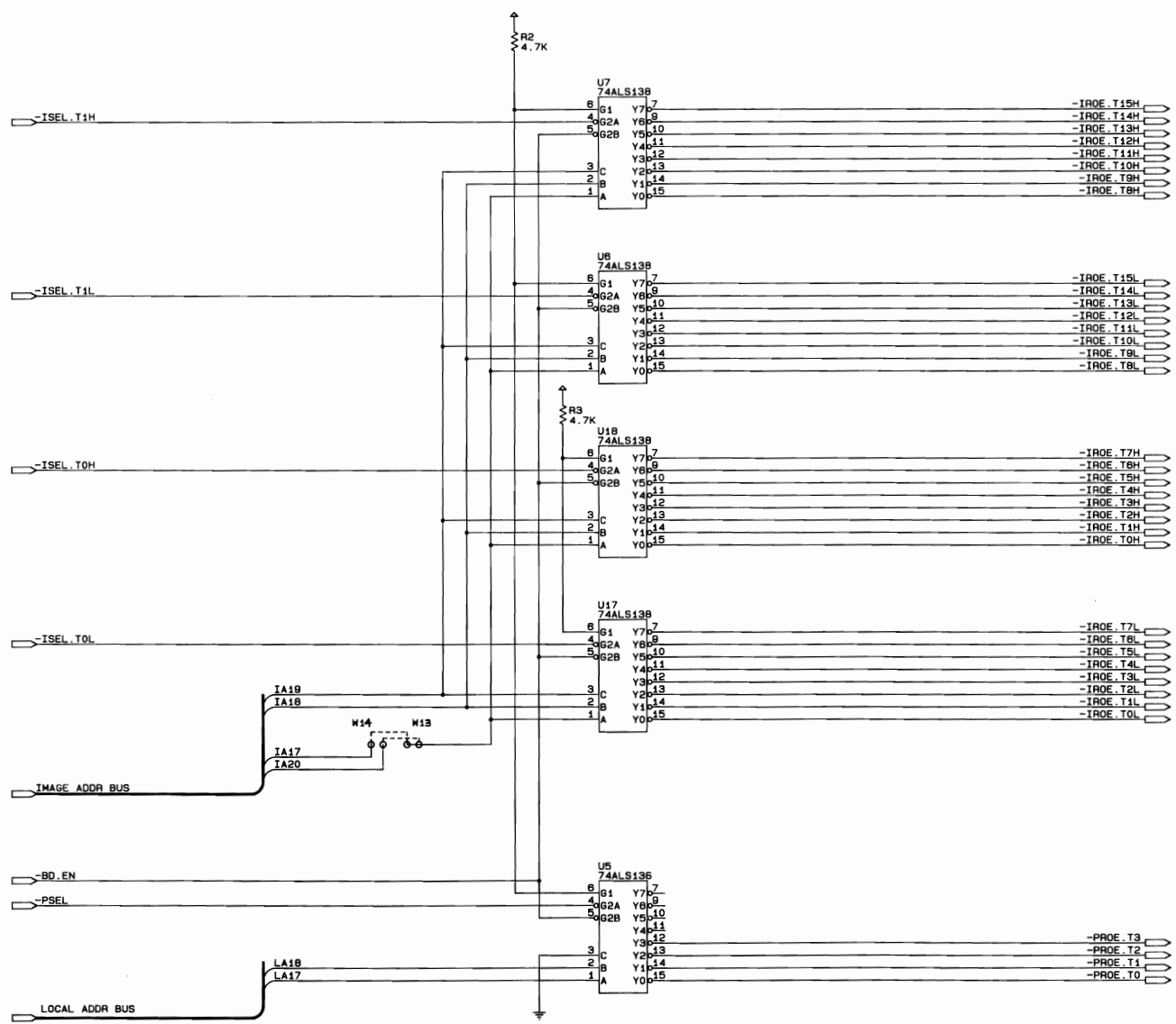
16-9041

| REV | DESCRIPTION OF CHANGE | ECO NO |
|------------------|-----------------------|--------|
| NEW PART RELEASE | 1997 | |
| | 8-10-88 | |



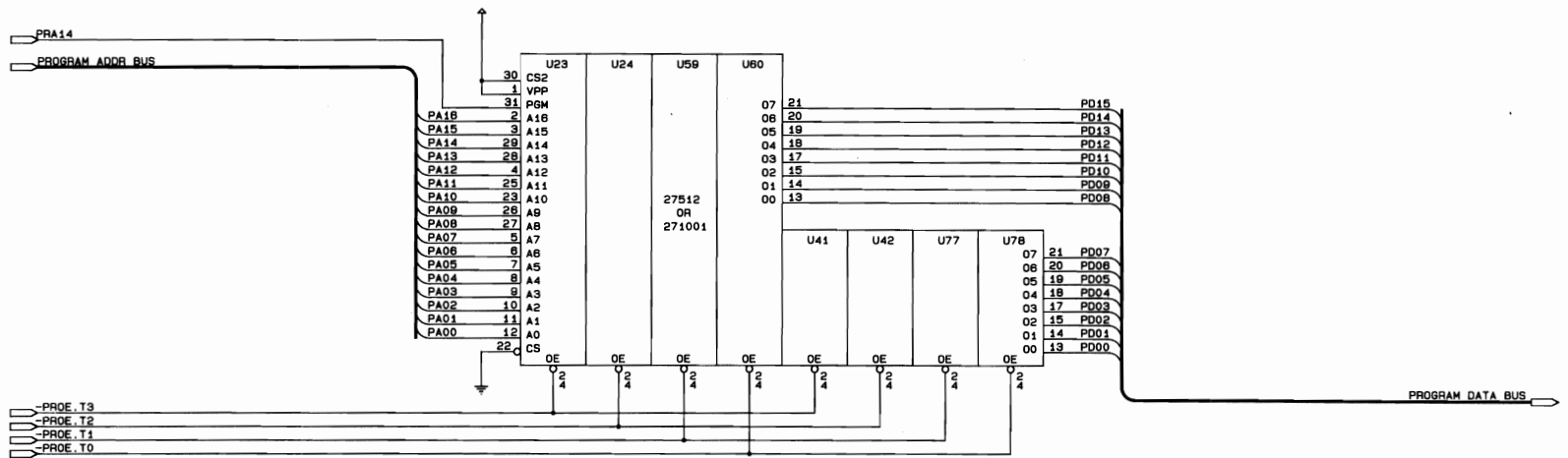
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|--|-----|--|-------------|---|-----|
| PROJ ENGR G. SHIPP | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY G.S. 6-24-88 | | DATE 7/29/88 | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | |
| CHECKED BY A. J. [Signature] | | DATE 7/29/88 | | DECIMAL XXX ± .030 ANGULAR XXX ± .005 FRACTIONAL | | NAME SYS-Z ROM-Z SCHEMATIC | |
| APPROVAL D.W. 7/29/88 | | DATE 7/29/88 | | FIRST PROJECT NO C-12261 | | SCALE -/- | |
| DATE 7/29/88 | | FIRST USAGE C-12261 | | QTY 1 | | SHT. 2 OF 1 | |
| | | | | | | PART NO 16-9041 | |
| | | | | | | REV - | |

| REV | DESCRIPTION OF CHANGE | CON NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 15417 | 8-10-88 |



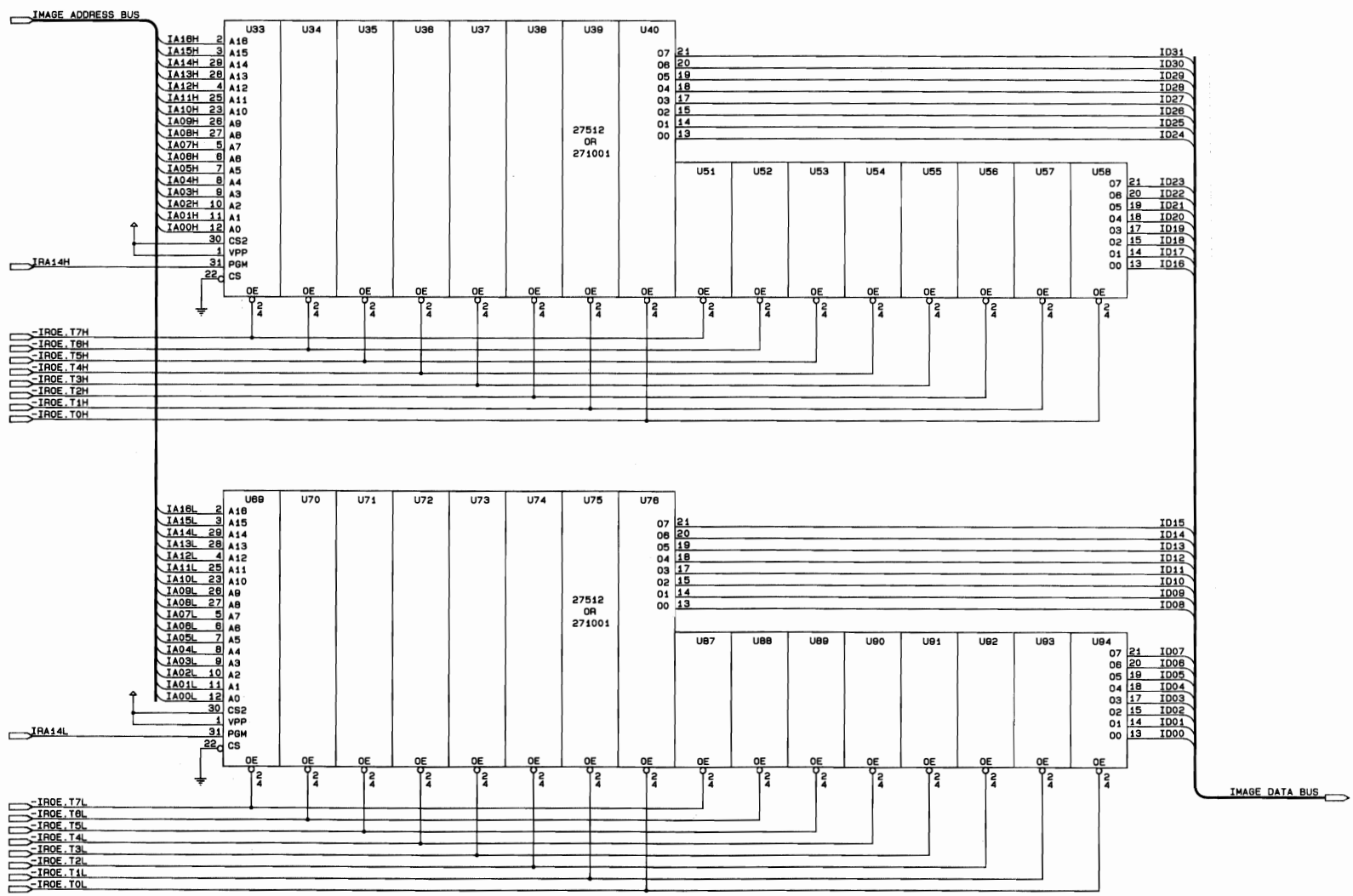
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|----------------------------|-------------|---------------------------------|-----|---|-------------|---|-----|
| PROJ ENGR G. SHIPP | | DO NOT SCALE | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DRAWN BY G.S. 6-24-88 | | WORK TO DIMENSIONS SHOWN | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | |
| CHECKED BY D.W. 7/29/88 | | FIRST PROJECT NO 3036-U1 | | DECIMAL .X ±.030 ANGULAR ±1/2° | | NAME SYS-Z ROM-2 SCHEMATIC | |
| APPROVAL D.W. 7/29/88 | | FIRST USAGE C-12261 | | XXX ±.005 FRACTIONAL ±1/64 | | SCALE 7/8 | |
| | | QTY 1 | | MATERIAL | | SHT. 3 OF 1 | |
| | | | | | | PART NO 16-9041 | |
| | | | | | | REV - | |

| REV | DESCRIPTION OF CHANGE | ECN NO. DATE |
|-----|-----------------------|------------------|
| | NEW PART RELEASE | 19497 8-10-88 |



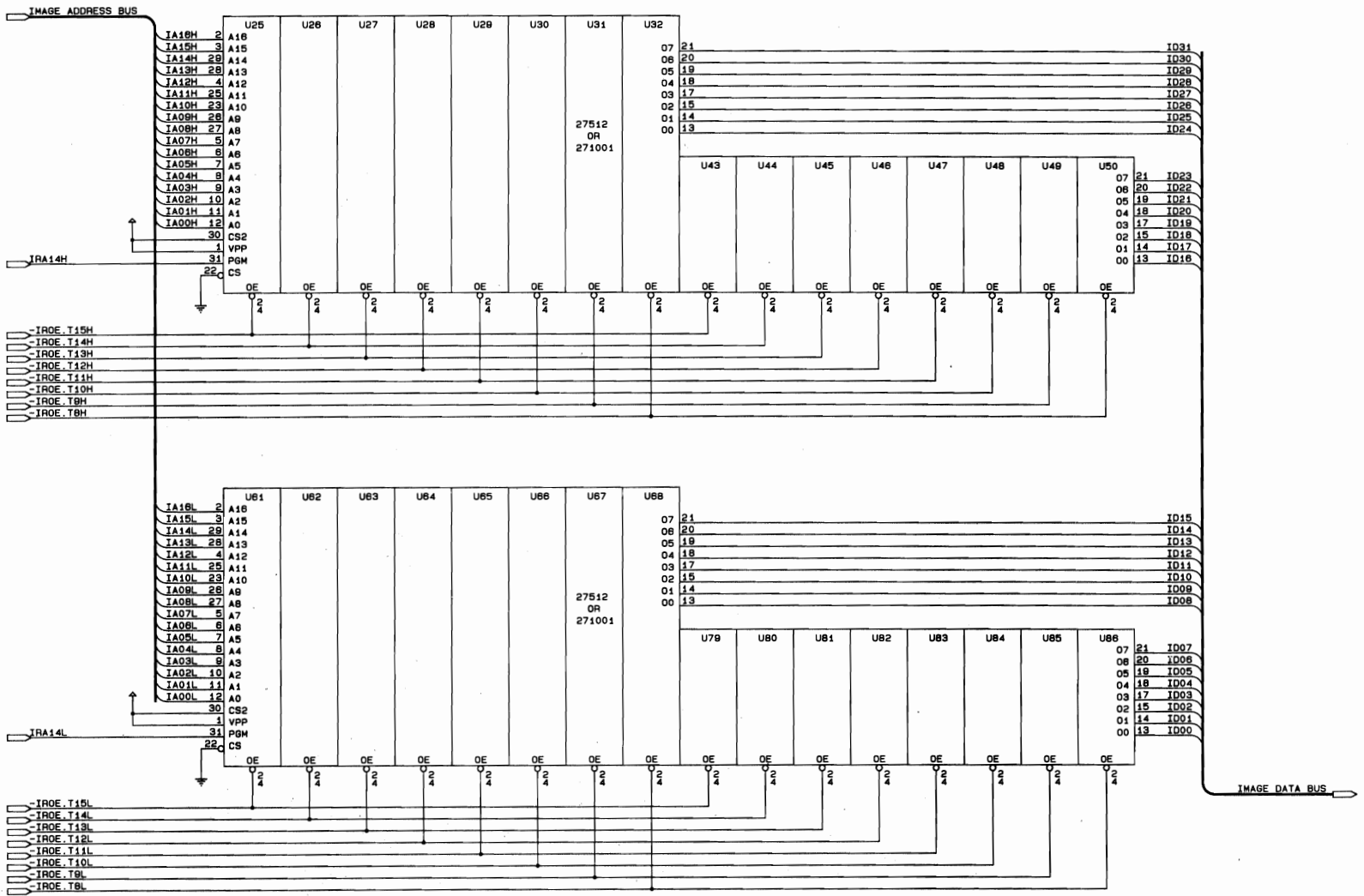
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------------------------------------|-------------|--|-----|--|-------------|--|-----|
| PROJ. ENGR G. SHIPP | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY G. S. | | DATE 6-24-88 | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE. CHICAGO IL 60618 | |
| CHECKED BY D.W. | | DATE 7/29/88 | | DECIMAL .1 .030 ANGULAR 11/2° | | NAME SYS-Z ROM-2 SCHEMATIC | |
| APPROVAL D.W. | | DATE 7/29/88 | | FRACTIONAL 1/64 | | SCALE -/- | |
| FIRST PROJECT NO 3036-U1 | | MATERIAL C-12261 | | FIRST USAGE 1 | | PART NO 16-9041 | |
| QTY 1 | | SCALE 1/4" = 1" | | SHEET 4 of 7 | | REV - | |

| REV | DESCRIPTION OF CHANGE | EFFECTIVE DATE |
|------------------|-----------------------|----------------|
| NEW PART RELEASE | | 8-10-88 |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------------------------|-------------|--|-----|---|-------------|---|-----|
| PROJ ENGR G. SHIPP | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| OWN BY G.S. 6-24-88 | | FIRST PROJECT NO 3036-U1 | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE CHICAGO IL 60618 | |
| CHECKED BY 7/4/88 | | DATE 7/4/88 | | DECIMAL XX ± 0.10 ANGULAR XXX ± 0.05 FRACTIONAL | | NAME SYS-2 ROM-2 SCHEMATIC | |
| APPROVAL 7/20/88 | | DATE 7/20/88 | | MATERIAL C-12261 1 | | SCALE -/- SHT 5 OF 7 | |
| | | FIRST USAGE C-12261 1 | | QTY 1 | | PART NO 16-9041 | |
| | | | | | | REV - | |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| 1 | NEW PART RELEASE | 19477 | 8-10-78 |



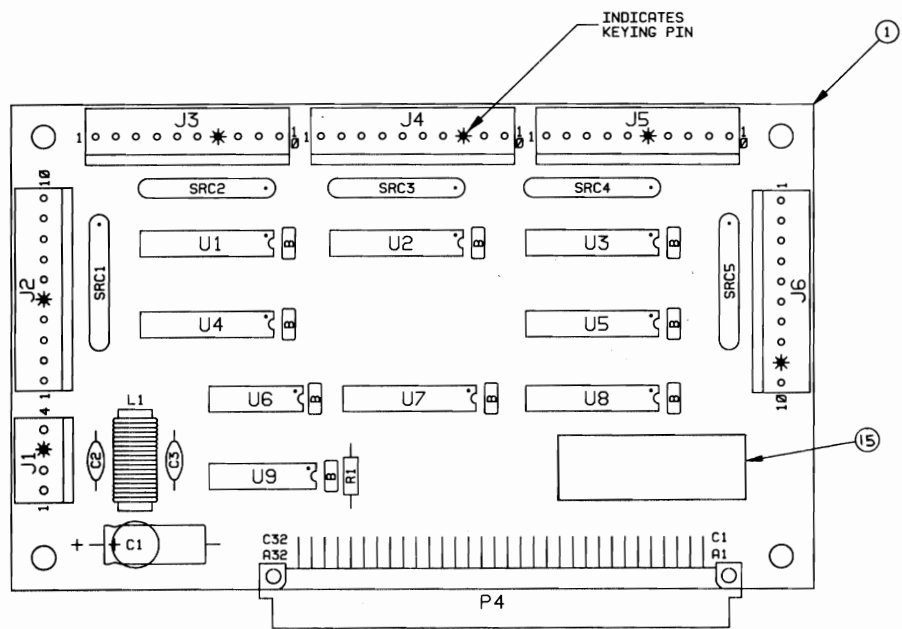
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|------------|-----------------|---------------------------------------|-----|--|-------------|--|--------|
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| PROJ ENGR | G. SHIRP | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | UNLESS OTHERWISE SPECIFIED | |
| DOWN BY | DATE | FIRST PROJECT NO | | DECIMAL | ± 0.30 | ANGULAR | ± 1/2° |
| CHECKED BY | DATE | 3036-U1 | | FRACTIONAL | ± 0.05 | FRACTIONAL | ± 1/64 |
| APPROVAL | DATE | FIRST USAGE | QTY | MATERIAL | | SCALE | |
| <i>Dgw</i> | 7/29/86 | C-12261 | 1 | | | SCALE | |
| | | | | WILLIAMS ELECTRONICS, INC. | | 3401 N. CALIFORNIA AVE. CHICAGO IL 60618 | |
| | | | | SYS-Z ROM-2 SCHEMATIC | | PART NO 16-9041 | |

| REV | DESCRIPTION OF CHANGE | EQA. NO. |
|----------|-----------------------|------------------|
| NEW PART | RELEASE | 15494 4-28-86 |

- 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



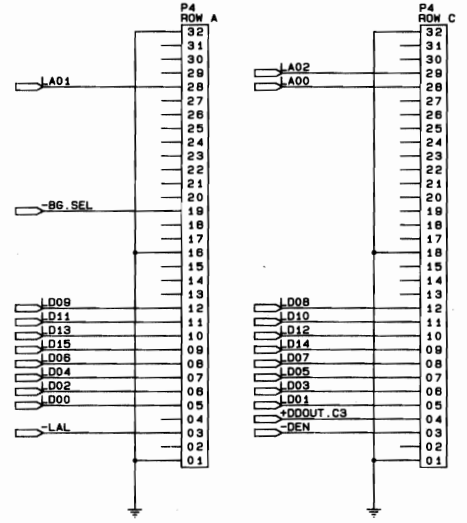
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |
|------|---------------|------------------------------|--|------|
| 15 | 16-8850-212 | | LABEL, PCB IDENT. | 1 |
| 14 | 5792-10026-00 | P4 | CONNECTOR, 64P EURO-DIN CARD CONN. FEMALE | 1 |
| 13 | 5791-10862-10 | J2, J3, J4, J5, J6 | CONNECTOR, 10P MOLEX, .156" CENTER PINS | 5 |
| 12 | 5791-10862-04 | J1 | CONNECTOR, 4P MOLEX, .156" CENTER PINS | 1 |
| 11 | 5043-09845-00 | C2, C3 | CAPACITOR, .001 MFD. | 2 |
| 10 | 5040-08986-00 | C1 | CAPACITOR, 100 MFD. | 1 |
| 9 | 5043-08980-00 | B | CAPACITOR, 0.01 MFD. | 9 |
| 8 | 5010-08991-00 | R1 | RESISTOR, 4.7K, 1/4W, 5% | 1 |
| 7 | 5060-10396-00 | SCR1, SCR2, SCR3, SRC4, SRC5 | SIP, 10P 8-RES/8-CAP NETWORK, 4.7K, 470 PF | 5 |
| 6 | 5551-09822-00 | L1 | INDUCTOR, 4.7 UH | 1 |
| 5 | 5311-10948-00 | U9 | 74HC138, H-CMOS 3/8 DECODER | 1 |
| 4 | 5317-12208-00 | U7, U8 | 74ALS245, ALS TTL OCTAL BUS TRANSCEIVER | 2 |
| 3 | 5311-10945-00 | U6 | 74HC32, H-CMOS QUAD 2-INPUT OR GATE | 1 |
| 2 | 5311-12287-00 | U1, U2, U3, U4, U5 | 74HC541, HC TTL OCTAL BUFFER | 5 |
| 1 | 5779-12265-00 | | BARE PC BOARD | 1 |

BILL OF MATERIALS

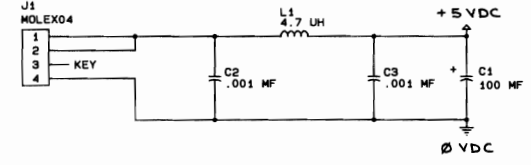
| | | | |
|--|--|--|--|
| PROJ ENGR M. LOFFREDO DWN BY R. G. 2/12/88 CHECKED BY DATE 4/27/88 APPROVAL DATE 4/27/88 | DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO 3036 FIRST USAGE D-12114 QTY 1 | REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .X .030 ANGULAR .1/2° XX 1.00 FRACTIONAL 21/64 MATERIAL NONE | WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 NAME SYS-Z I/O PCB ASSEMBLY SCALE 1.5/1 SHT. 1 of 1 PART NO. C-12037 REV - |
|--|--|--|--|

| REV | DESCRIPTION OF CHANGE | EDN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 15994 | 4-28-66 |

CPU INTERFACE



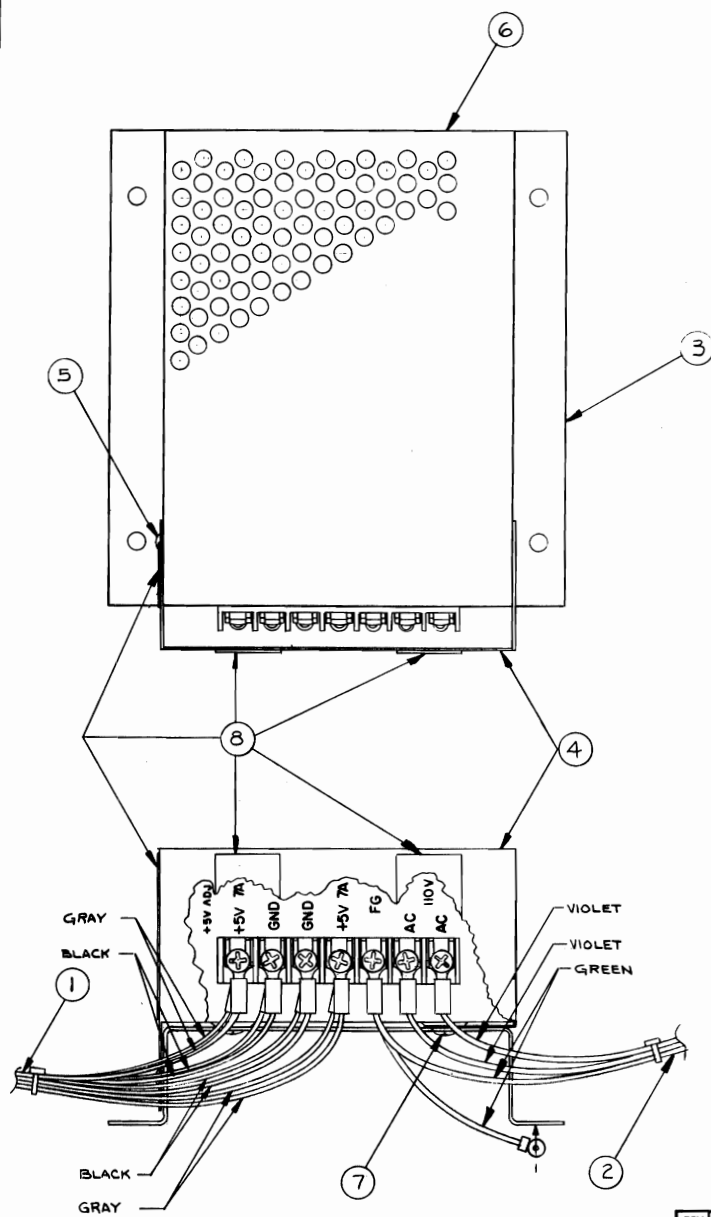
POWER



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------------|-------------|--------------------------|-----|--|--|-------------|-----------------|
| PROJ ENGR | M. LOFFREDO | DO NOT SCALE | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | WILLIAMS ELECTRONICS, INC. | | |
| DOWN BY | DATE | WORK TO DIMENSIONS SHOWN | | TOLERANCES UNLESS OTHERWISE SPECIFIED | 3401 N CALIFORNIA AVE CHICAGO IL 60618 | | |
| CHECKED BY | DATE | FIRST PROJECT NO | | DECIMAL .X ±.030 ANGULAR ±1/2° | NAME SYS-Z I/O SCHEMATIC | | |
| APPROVAL | DATE | FIRST USAGE | | XXX ±.005 FRACTIONAL ±1/64 | SCALE | SHT 2 OF 2 | PART NO 16-9028 |
| DJW | 4/27/66 | C-12087 | | | | | REV - |

DRAWING 16-9028 000118

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|----------|
| | N. P. R. | 11778 | 10-19-88 |

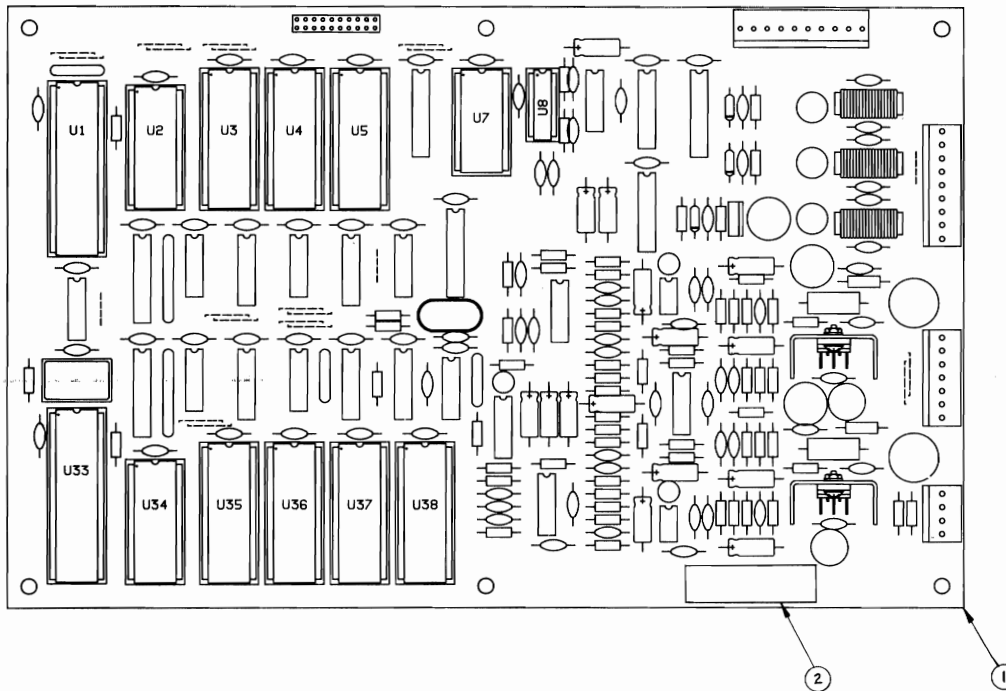


| ITEM | PART NUMBER | DESCRIPTION | QTY |
|------|---------------|----------------------|-----|
| 8 | 16-8587-101 | LABEL-HIGH VOLTAGE | 3 |
| 7 | 4005-01005-04 | MS 5-40 x 1/4 P-PH | 4 |
| 6 | 20-9574 | P/S SWITCHER | 1 |
| 5 | 03-8231 | FASTNER BUTTON | 1 |
| 4 | 01-9009 | SHIELD-SW POWER SPLY | 1 |
| 3 | 01-8991 | BRKT - SW POWER SPLY | 1 |
| 2 | H-12119 | POWER INTER PCB | 1 |
| 1 | H-10217-3 | VIDED SW/POWER CBL | 1 |

| | | | |
|--|---|---|---|
| PROJ ENGR A LASKO DWN BY DATE ROSS 10-11-88 CHECKED BY DATE DOW 10-24-88 APPROVAL DATE DOW 10/26/88 | DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO 3036-U1 FIRST USAGE 3036-U1 1 | REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .1 ±.030 ANGULAR 1/2° FRACTIONAL 1/64 | WILLIAMS ELECTRONICS, INC. 3401 N CALIFORNIA AVE CHICAGO IL 60618 NAME P/S SWITCHER ASSY SCALE 1/1 SHT. 1 OF 1 PART NO C-12401 REV |
|--|---|---|---|

MINIMUM .01500 .00175

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



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

| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|--|----------|---|-------------|-------------|-----|
| PROJ ENGR | M. LOFFREDO | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 NAME: SYS-Z SOUND-2 ASSEMBLY SCALE: 1/1 SHT 1 OF 2 PART NO: C-12350 REV: | | | |
| CHECKED BY | R.G. | DATE | 9-22-88 | FIRST PROJECT NO | 3036-U1 | MATERIAL | |
| APPROVAL | D.W. | DATE | 11-23-88 | FIRST USAGE | D-12266 | QTY | 1 |
| TOLERANCES | | UNLESS OTHERWISE SPECIFIED | | DECIMAL: .005 ANGULAR: 1/2° FRACTIONAL: 1/64 | | | |
| REMOVE BURRS - BREAK SHARP CORNERS & EDGES | | | | | | | |

16-9044
 16-9044
 16-9044

| REV | DESCRIPTION OF CHANGE | ECN NO. | DATE |
|-----|-----------------------|---------|------|
| | NEW PART RELEASE | | |

| | | | | | | | | | |
|------------------|-----------|------|--|--|--|--|--|--|--|
| | GAME NAME | 3036 | | | | | | | |
| | ASSY. NO. | | | | | | | | |
| PART DESIGNATION | U3 | | | | | | | | |
| | U4 | | | | | | | | |
| | U5 | | | | | | | | |
| | U35 | | | | | | | | |
| | U36 | | | | | | | | |
| | U37 | | | | | | | | |
| | U38 | | | | | | | | |
| | | | | | | | | | |

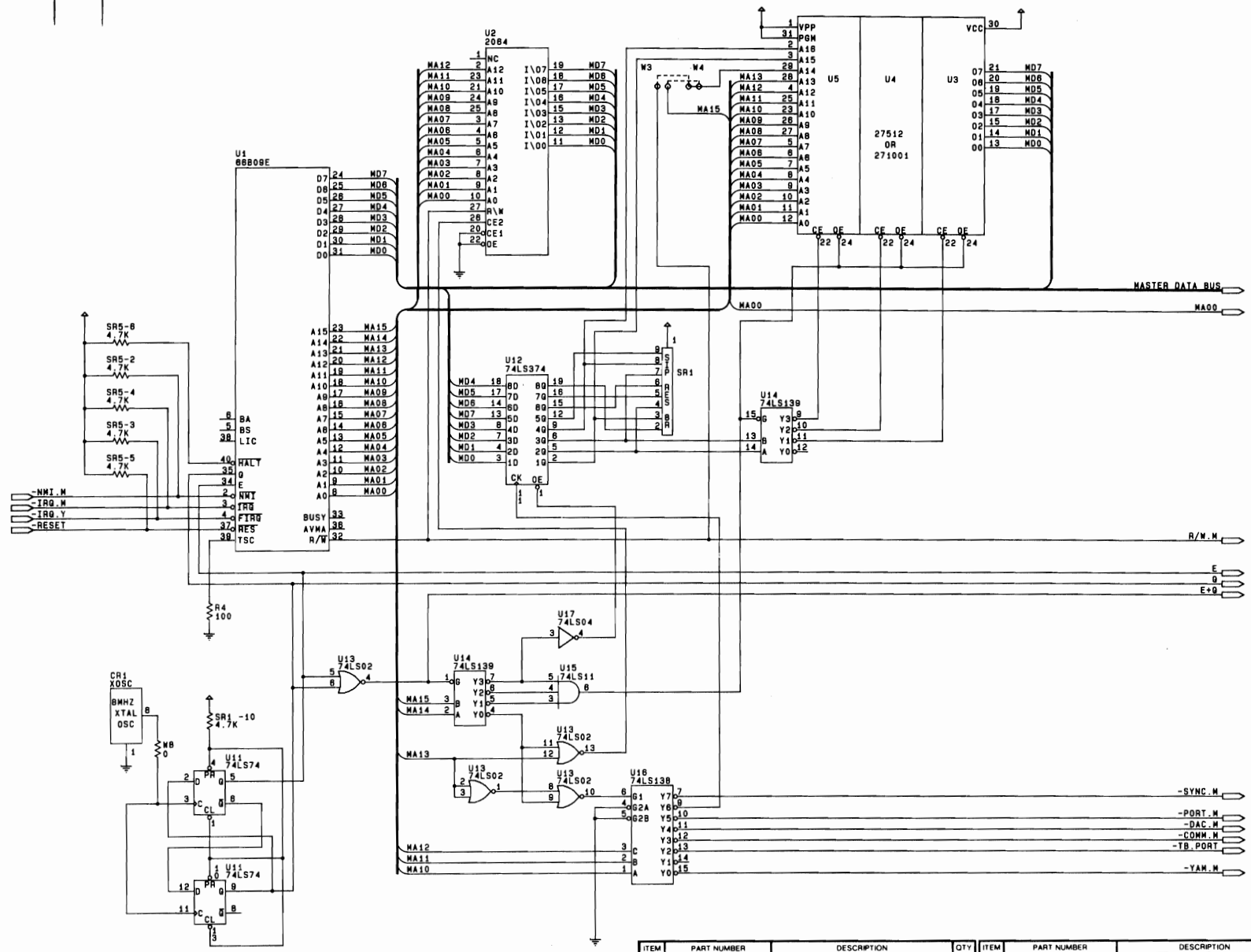
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|------|---------------|----------------------------------|-----------------------------|------|
| 14 | | | | |
| 13 | | | | |
| 12 | | | | |
| 11 | | | | |
| 10 | | | | |
| 9 | | | | |
| 8 | | | | |
| 7 | SEE CHART | U3, U4, U5, U35 U36, U37, U38 | 27512/1001 EPROM 250 NS | |
| 6 | 5971-11087-00 | U8 | YM3012 DUAL SERIAL DAC | 1 |
| 5 | 5370-11088-00 | U7 | YM2151 SOUND GENERATOR | 1 |
| 4 | 5340-12278-00 | U2, U34 | 8K X 8 STATIC RAM, 150NS | 2 |
| 3 | 5400-10320-00 | U1, U33 | 88808E MICROPROCESSOR | 2 |
| 2 | 18-8850-230 | | LABEL, PCB IDENT. | 1 |
| 1 | C-12350 | | SYS-2 SOUND BOARD SUB-ASSY. | 1 |
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 18-9044

BILL OF MATERIALS

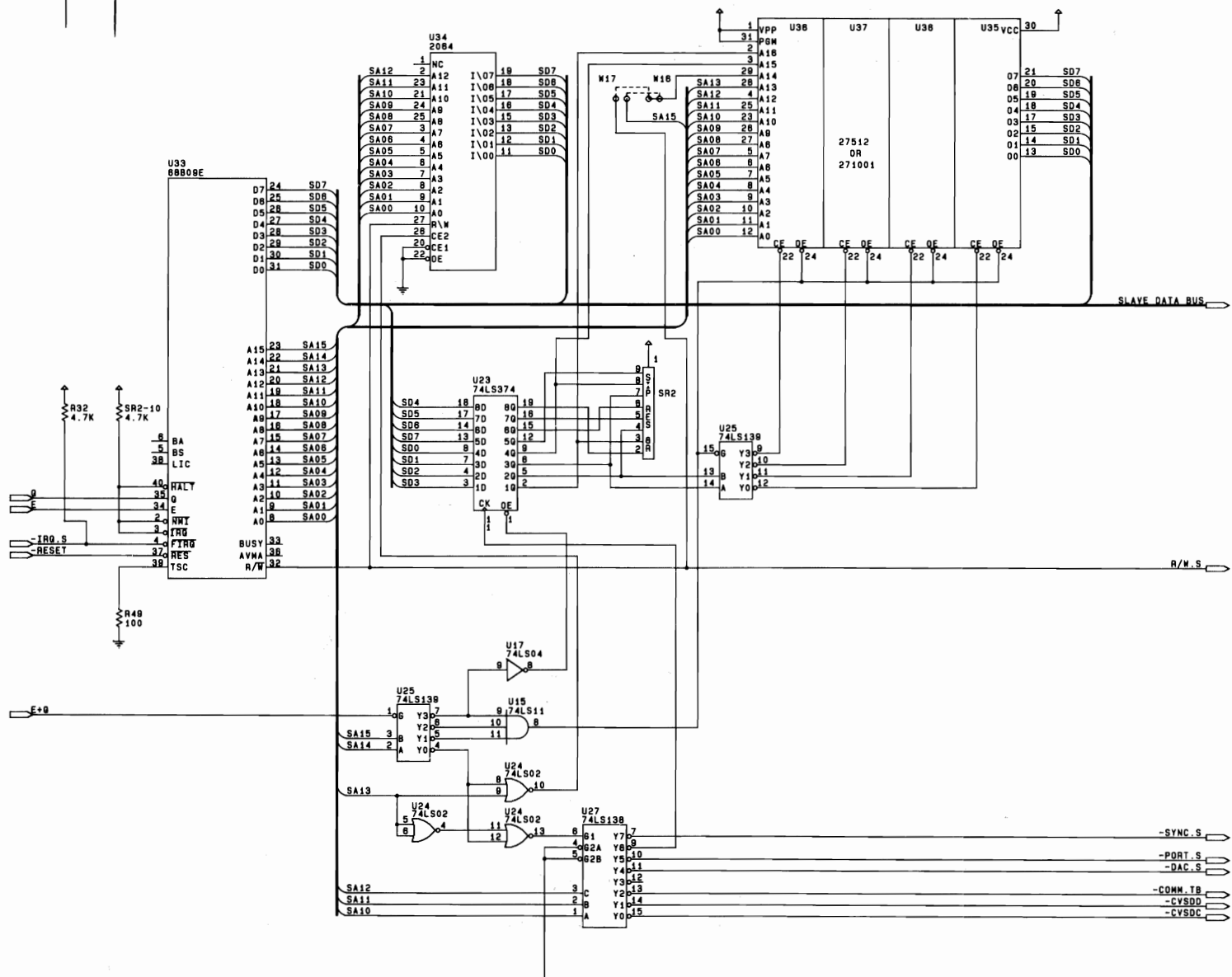
| | | | |
|--|--|--|---|
| PROJ ENGR M. LOFFREDO | DO NOT SCALE WORK TO DIMENSIONS SHOWN | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | WILLIAMS ELECTRONICS, INC. |
| DWN BY DATE RG 9-22-88 | FIRST PROJECT NO. 3036-U1 | TOLERANCES UNLESS OTHERWISE SPECIFIED | 3401 N CALIFORNIA AVE. CHICAGO IL 60618 |
| CHECKED BY DATE RS 11-23-88 | FIRST USAGE D-12266 | DECIMAL $\pm .030$ ANGULAR $\pm 1/2^\circ$ | NAME SYS-Z SOUND-2 ASSEMBLY |
| APPROVAL DATE 12/14/11-23-88 | QTY 1 | FRACTIONAL $\pm 1/64$ | MATERIAL W |
| | | SCALE -/- | SHT. 2 OF 2 |
| | | PART NO. C-12350 | |
| | | REV - | |

| REV | DESCRIPTION OF CHANGE | ECN NO. | DATE |
|-----|-----------------------|---------|------|
| | NEW PART RELEASE | | |



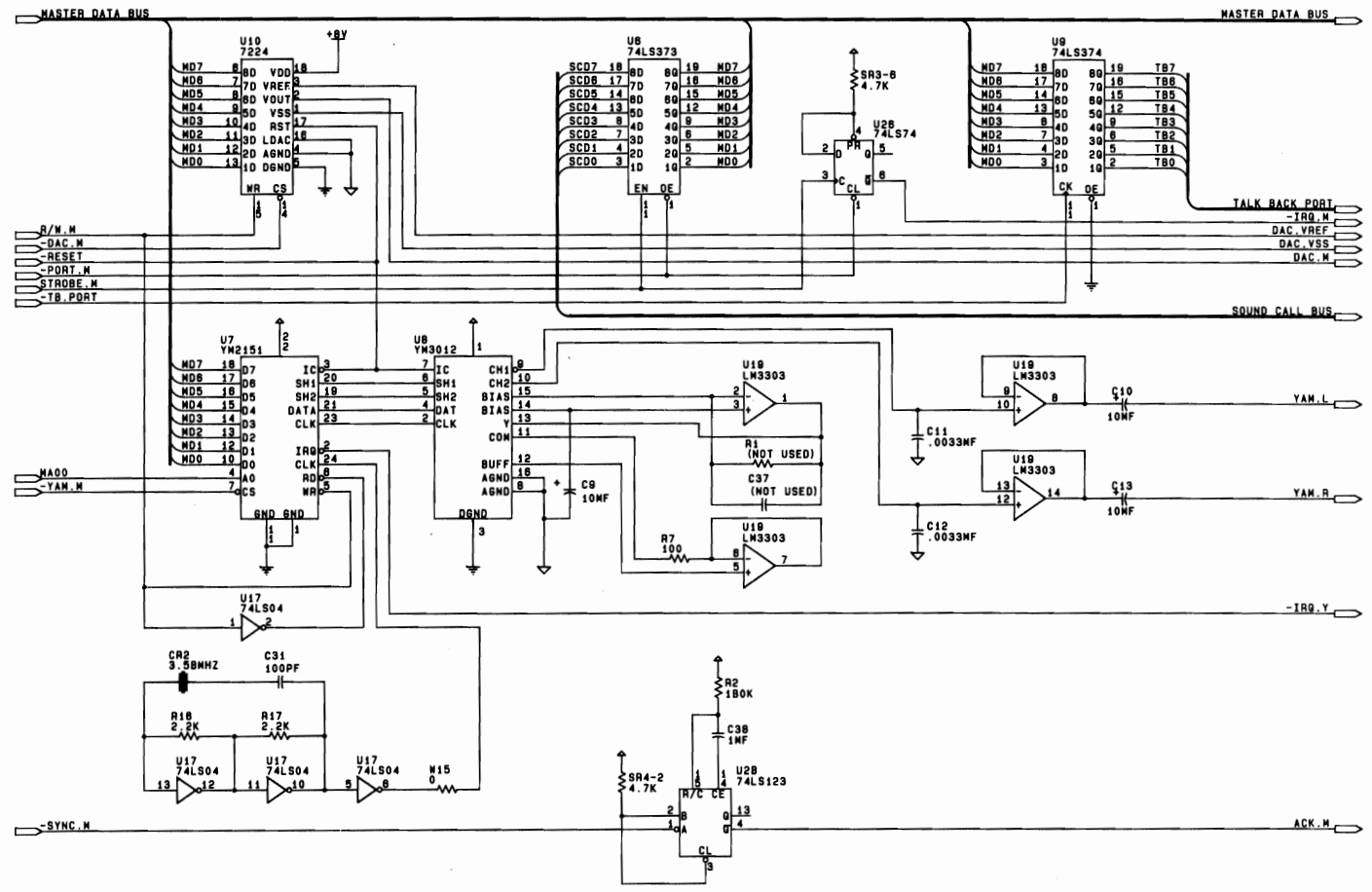
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|-------------------|-------------|--------------------------------|-----|--|-------------|-----------------------------|-----|
| PROJ ENGR | | DO NOT SCALE | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | TOLERANCES | |
| G. SHIPP | | WORK TO DIMENSIONS SHOWN | | UNLESS OTHERWISE SPECIFIED | | WILLIAMS ELECTRONICS, INC. | |
| DOWN BY DATE | | DECIMAL .X ±.030 ANGULAR ±1/2° | | 3401 N. CALIFORNIA AVE. | | CHICAGO IL 60618 | |
| G. SHIPP 10-19-80 | | XX ±.005 FRACTIONAL ±1/64 | | NAME | | SYS-2 SOUND-2 BD. SCHEMATIC | |
| CHECKED BY DATE | | FIRST PROJECT NO. | | MATERIAL | | SCALE | |
| JLW 11-23-80 | | 3036-U1 | | C-12349 | | SHT. OF 1 | |
| APPROVAL DATE | | FIRST USAGE | | QTY | | PART NO. | |
| 12/28/80 | | C-12349 | | - | | 16-9044 | |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|------|
| | NEW PART RELEASE | | |



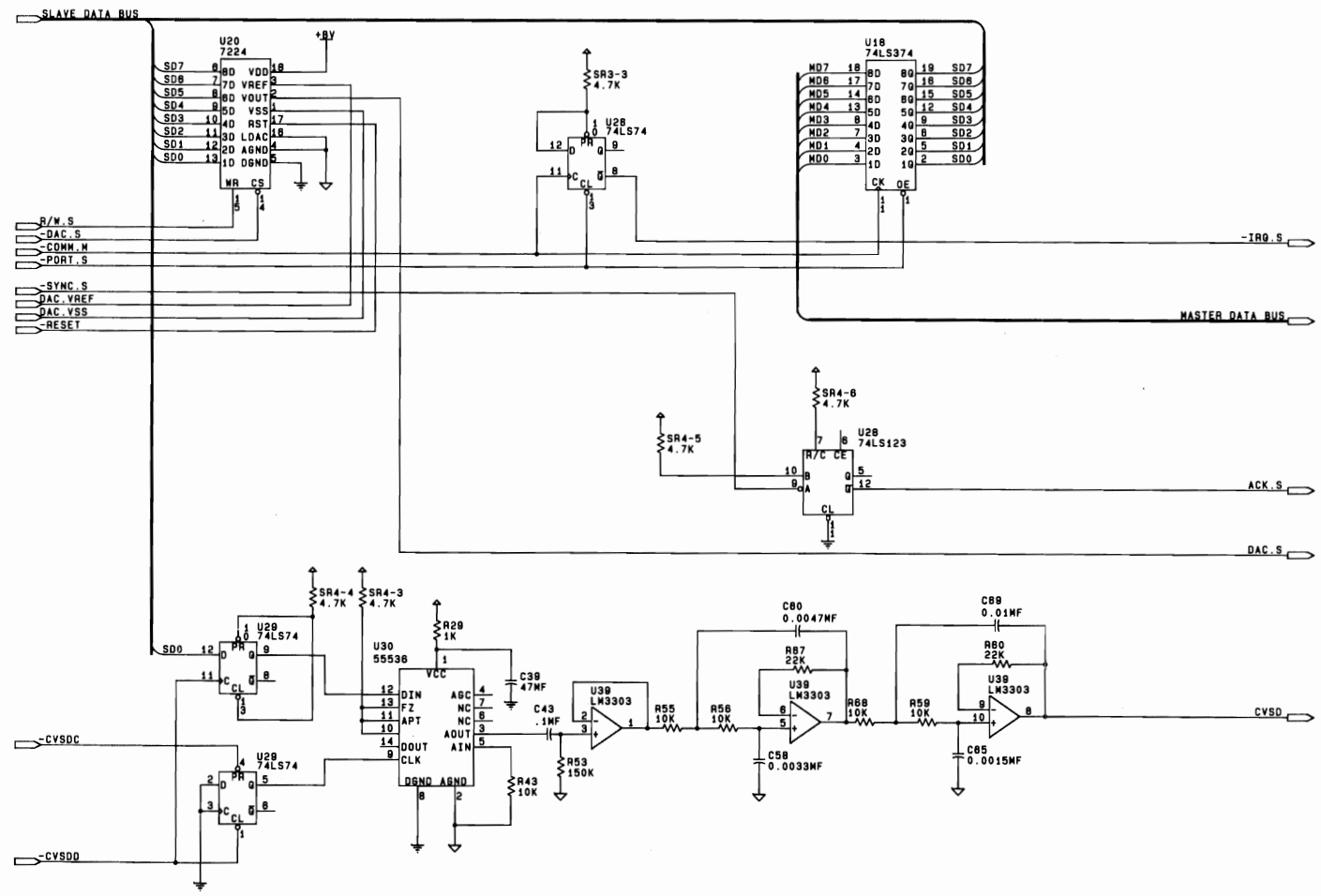
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|----------------------------------|-------------|--|-----|--|-------------|---|-----|
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| PROJ ENGR G. SHIPP | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS - BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY DATE G. SHIPP 10-13-88 | | FIRST PROJECT NO 3036-U1 | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE CHICAGO, IL 60618 | |
| CHECKED BY DATE 24 11-23-88 | | FIRST USAGE C-12349 | | DECIMAL X ± 0.30 ANGULAR ± 1/2° | | NAME SYS-Z SOUND-2 BD. SCHEMATIC | |
| APPROVAL DATE | | QTY | | FRACTIONAL XX ± 0.05 FRACTIONAL ± 1/64 | | SCALE -/- SHT 2 OF 7 PART NO 16-9044 | |
| MATERIAL | | | | | | REV - | |

| REV | DESCRIPTION OF CHANGE | ECN NO. | DATE |
|-----|-----------------------|---------|------|
| | NEW PART RELEASE | | |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|---|-------------|----------------------------|-----|--|-------------|------------------------|-----|
| <p>PROJ ENGR G. SHIPP G. SHIPP 10-19-88 CHECKED BY DATE 11-23-88 APPROVAL DATE 12/11/88</p> | | | | | | | |
| <p>DO NOT SCALE WORK TO DIMENSIONS SHOWN</p> | | | | <p>REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL ±.030 ANGLULAR ±1/2° FRACTIONAL ±1/64</p> | | | |
| <p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 NAME SYS-2 SOUND-2 BD SCHEMATIC MATERIAL</p> | | | | | | | |
| <p>APPROVAL DATE 12/11/88</p> | | <p>FIRST USAGE C-12349</p> | | <p>QTY -</p> | | <p>SCALE 1/8" = 1"</p> | |
| <p>SHEET 3 OF 7</p> | | | | | | <p>PART NO 16-9044</p> | |

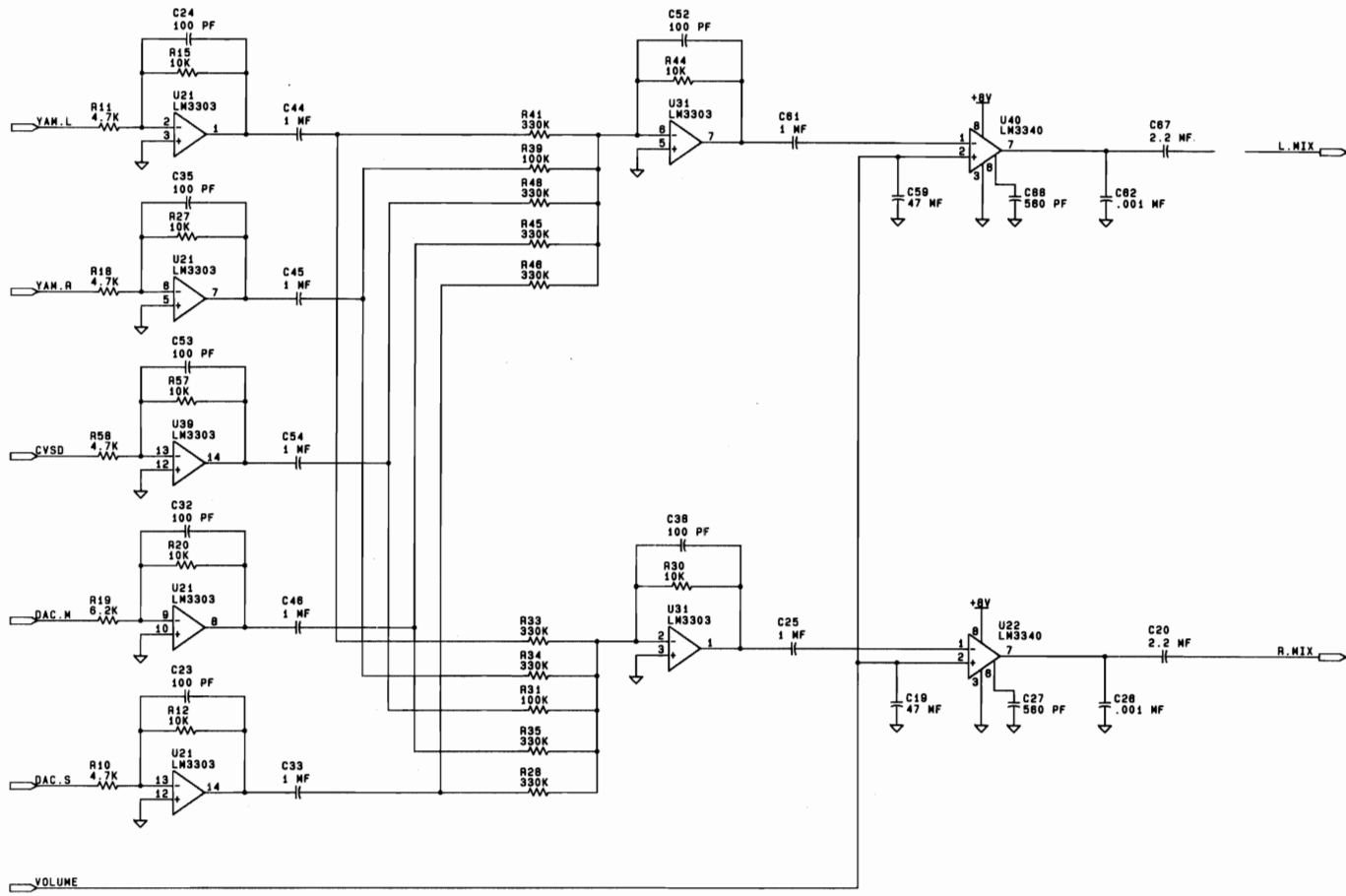
| REV | DESCRIPTION OF CHANGE | EQN NO | DATE |
|-----|-----------------------|--------|------|
| | NEW PART RELEASE | | |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|------------|-------------|---------------------------------------|---------|--|-------------|----------------------------|------------------|
| PROJ ENGR | G. SHIPP | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DOWN BY | DATE | | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE | CHICAGO IL 60618 |
| G. SHIPP | 10-13-88 | | | DECIMAL | 1/20 | ANGULAR | 1/2° |
| CHECKED BY | DATE | FIRST PROJECT NO | | XXX | 1/100 | FRACTIONAL | 1/84 |
| APPROVAL | DATE | FIRST USAGE | | MATERIAL | | | |
| D/W | 11-23-88 | C-12349 | | | | | |
| SCALE | SHT 4 OF 7 | PART NO | 16-9044 | REV | | | |

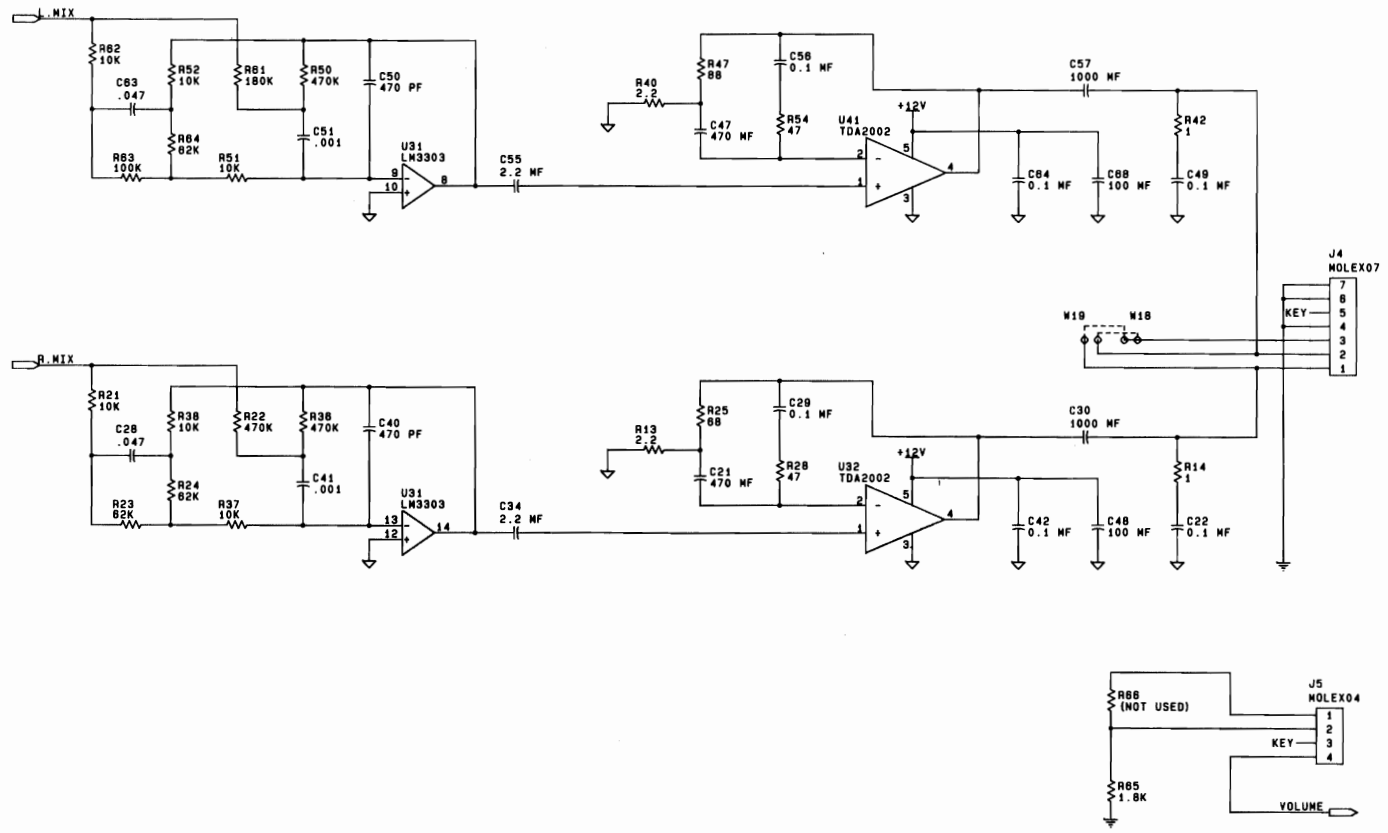
16-9044

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|------|
| | NEW PART RELEASE | | |



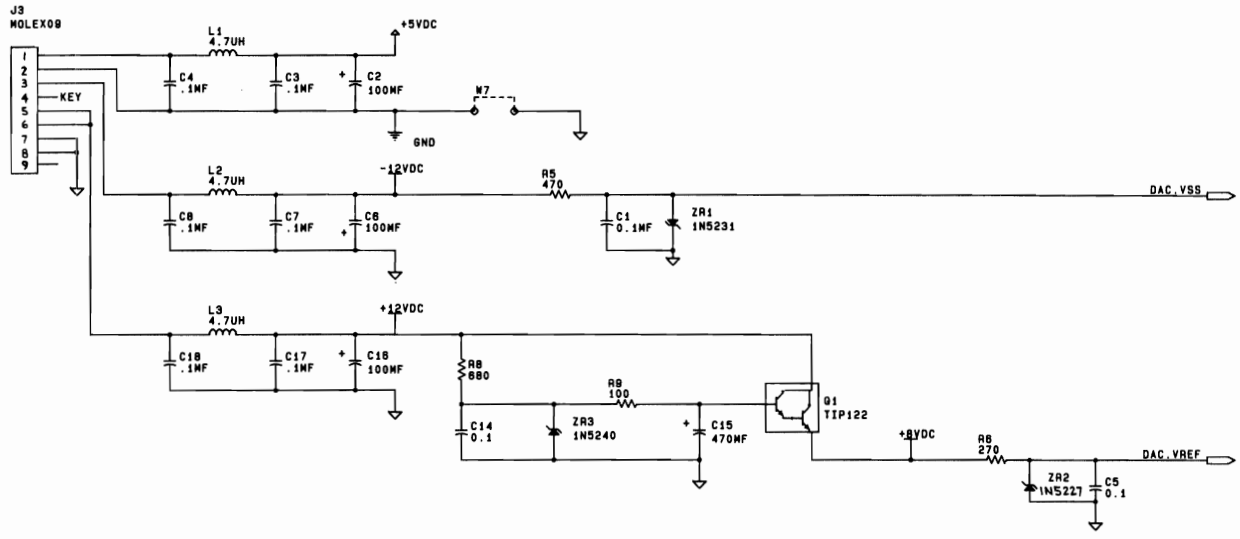
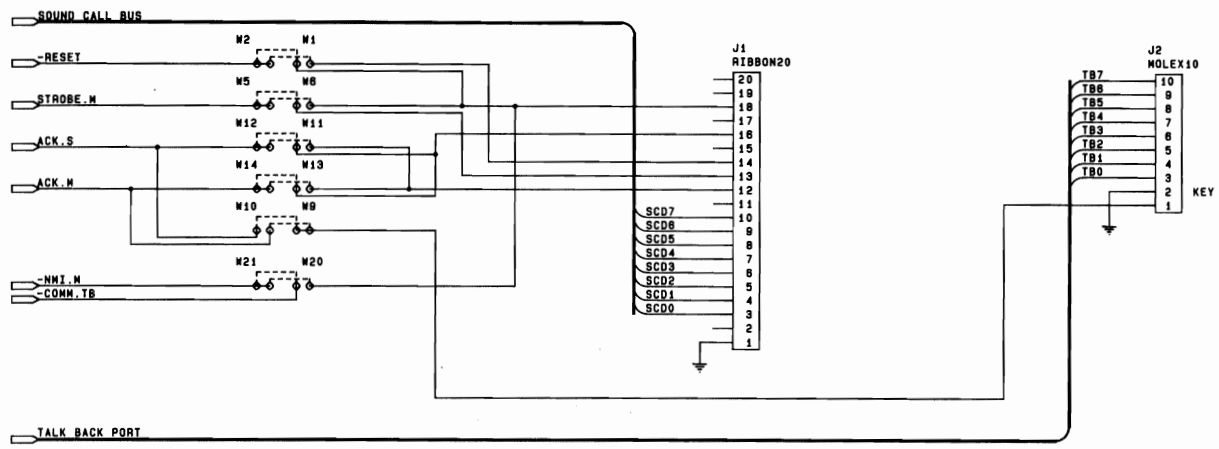
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|--|--|--|-----|------|-------------|---------------------------|------------|
| PROJ ENGR G. SHIPP | DO NOT SCALE WORK TO DIMENSIONS SHOWN | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| DATE 11-23-88 | CHECKED BY DATE 11-23-88 | FIRST PROJECT NO 3086-U1 | | | | | |
| APPROVAL DATE 12/11-23-88 | FIRST USAGE C-12349 | MATERIAL | | | | | |
| WILLIAMS ELECTRONICS, INC. 3401 N CALIFORNIA AVE CHICAGO IL 60618 NAME SYS-2 SOUND-2 BD. SCHEMATIC | | | | | | SCALE -/- | SHT 5 of 7 |
| | | | | | | PART NO 16-9044 | REV - |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|------|
| | NEW PART RELEASE | | |



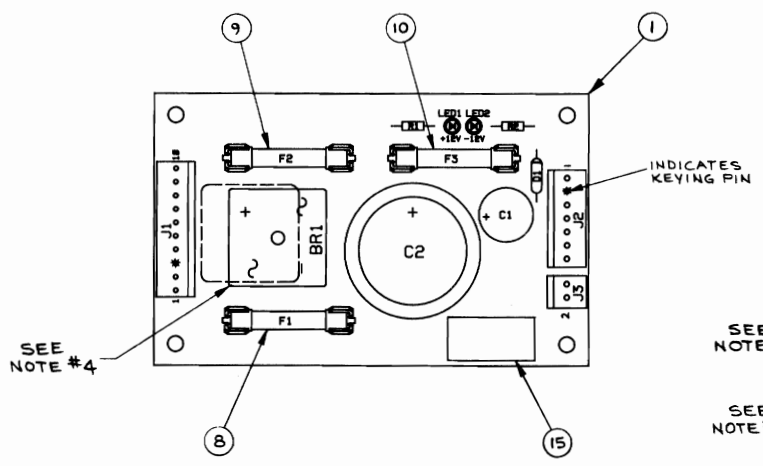
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|-----------------------------------|-------------|--|-----|--|-------------|--|-----|
| PROJ ENGR G. SHIPP | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED | | WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO IL. 60618 | |
| DWN BY DATE G. SHIPP 10-13-88 | | FIRST PROJECT NO. 3036-U1 | | DECIMAL .XX ± 0.30 ANGULAR ± 1/2° | | NAME SYS-Z SOUND-2 BD. SCHEMATIC | |
| CHECKED BY DATE J. D. 11-23-88 | | FIRST USAGE C-12349 | | MATERIAL | | SCALE -/- SHT. 52 OF 71 PART NO. 16-9044 REV - | |
| APPROVAL DATE J. D. 11-23-88 | | QTY | | | | | |

| REV | DESCRIPTION OF CHANGE | ECN NO. | DATE |
|-----|-----------------------|---------|------|
| | NEW PART RELEASE | | |



| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|--|-------------|-------------|-----|--|-------------|-------------|-----|
| <p>PROJ. ENGR: G. SHIPP DOWN BY: G. SHIPP 10-13-88 CHECKED BY: DATE: 11-23-88 APPROVAL: DATE: 11-23-88</p> | | | | | | | |
| <p>DO NOT SCALE WORK TO DIMENSIONS SHOWN</p> | | | | <p>REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL: X ± 0.30 ANGULAR: ±1/2° XXX ± 0.05 FRACTIONAL: ±1/64</p> | | | |
| <p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO, IL. 60618 NAME: SYS-Z SOUND-2 BD. SCHEMATIC SCALE: -/- SHT. 1 of 1 PART NO: 16-9044 REV: -</p> | | | | | | | |

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | | 5-18-88 |



SEE NOTE #4

SEE NOTE #3

SEE NOTE #2

- NOTES:**
1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-9037.
 2. ALL FUSES TO BE INSTALLED AFTER SOLDER WASH.
 3. EACH FUSEHOLDER CAN BE SUBSTITUTED WITH 2 FUSE CLIPS PT. NO. 5732-09178-00.
 4. BR1 MUST BE MOUNTED 1/8" ABOVE SURFACE OF PCB.

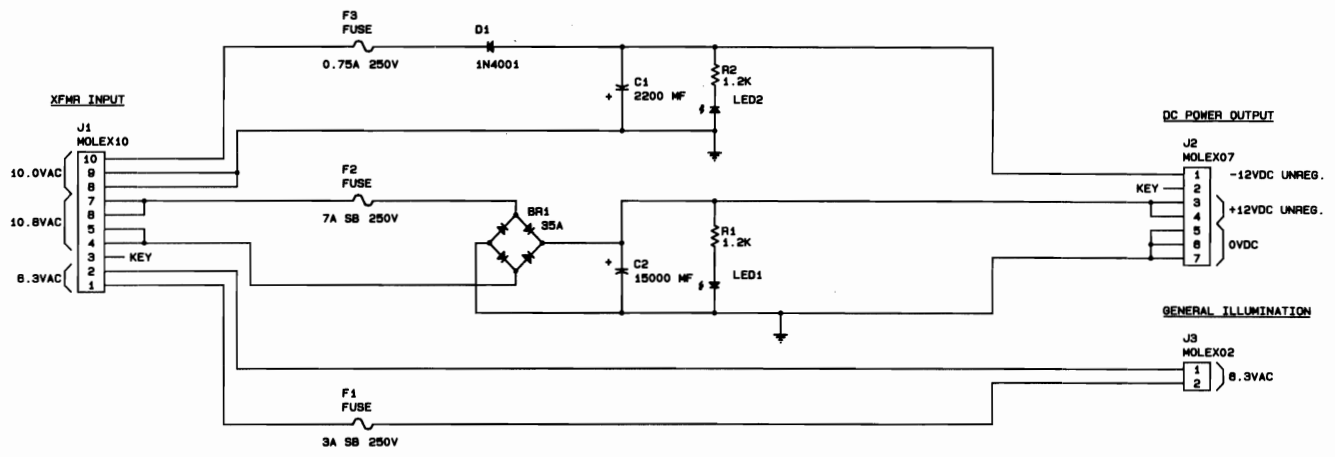
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |
|------|---------------|------------------|---|------|
| 15 | 16-8850-216 | | LABEL, PCB IDENT. | 1 |
| 14 | 5791-10862-10 | J1 | CONN., 10-PIN MOLEX, .156" CENTER PINS | 1 |
| 13 | 5791-10862-07 | J2 | CONN., 7-PIN MOLEX, .156" CENTER PINS | 1 |
| 12 | 5791-10862-02 | J3 | CONN., 2-PIN MOLEX, .156" CENTER PINS | 1 |
| 11 | 5733-12060-01 | F1, F2, F3 | FUSEHOLDER | 3 |
| 10 | 5730-09797-00 | F3 | FUSE, 0.75A, 250V | 1 |
| 9 | 5731-09432-00 | F2 | FUSE, 7A SB, 250V | 1 |
| 8 | 5731-10356-00 | F1 | FUSE, 3A SB, 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 | 5100-09418-00 | BR1 | BRIDGE RECTIFIER, 35V. | 1 |
| 3 | 5070-06258-00 | D1 | DIODE, IN4001 | 1 |
| 2 | 5010-09314-00 | R1, R2 | RESISTOR, C.F., 1.2K 5% 1/4 WATT | 2 |
| 1 | 5773-12309-00 | | BARE PC BOARD | 1 |

BILL OF MATERIALS

| | | | |
|--|--|--|---|
| PROJ ENGR M. LOFFREDO DWN BY R. G. 5/10/88 CHECKED BY 5/11/88 APPROVAL DATE 5/17/88 | DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO 3836-U FIRST USAGE C-12259 | REMOVE BURRS-BREAK SHARP CORNERS & EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .1 .2 .3 .4 .5 .6 .7 .8 .9 1.0 ANGULAR ±1/2° FRACTIONAL 1/16 1/8 1/4 3/8 1/2 3/4 1 | WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO IL 60618 NAME SYS-Z 12 UNREG P/S ASSY SCALE 1/1 SHT 1 OF 1 PART NO C-12218 |
|--|--|--|---|

16-9037

| REV | DESCRIPTION OF CHANGE | ECN NO | DATE |
|-----|-----------------------|--------|---------|
| | NEW PART RELEASE | 17900 | 5-18-88 |



| | | | | | | | |
|---------------------------|-----------------|--|-----|--|--|-------------------------------------|------------|
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
| PROJ ENGR M LOFFREDO | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS-BREAK SHARP CORNERS & EDGES | WILLIAMS ELECTRONICS, INC. | | |
| DWN BY G. SHIPP | DATE 5/10/88 | FIRST PROJECT NO 3036-U | | TOLERANCES UNLESS OTHERWISE SPECIFIED | 3401 N CALIFORNIA AVE CHICAGO IL 60616 | | |
| CHECKED BY [Signature] | DATE 5/11/88 | FIRST USAGE C-1221B | QTY | DECIMAL XXX 1.000 | ANGULAR 1/2° | NAME 12 UNREG P/S BD., SCHEMATIC | |
| APPROVAL DATE 2/2/88 | | | | FRACTIONAL 1/8" | | SCALE -/- | SHT 1 OF 1 |
| | | | | | | PART NO 16-9037 | REV - |

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 |



ATTENTION: GAME OPERATOR

The enclosed NARC operating manual is a preliminary draft. Please complete the bottom portion of this letter and return it to us. As soon as it becomes available, we'll send you a complete NARC manual.

NARC - 3036

Name of company _____

Address _____

City, State, Zip Code _____

(Send to Attention of:) _____

(Phone Number, including area code) _____