

Bally[®]

PROFESSIONAL ARCADE
FUN & BRAINS

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FEATURES

AUTOMATIC TV PROTECTION

The Bally Professional Arcade is designed with a TV protection circuit. If the unit is left unattended for approximately five minutes, the Bally Professional Arcade will automatically blank the screen and thus prevent any damage to a television receiver. To regain operation, all that is needed is to press any key on the calculator keypad.

PAUSE

The Bally Professional Arcade includes a pause feature. To operate the pause feature during the play of a game simply press the clear [C] key. Upon return, press clear [C] again to resume, the game will appear on the screen at the exact point at which it was when the pause was initiated.

REMOTE GAME SELECTION

All of the keypad entries required to select and initiate a game may be made using the #1 hand control.

Turn the power switch on and a listing of the games (menu) by number should appear on the TV screen.

1. Press the trigger. This signals the Arcade that you wish to use remote game selection. A red number will appear in the lower-left corner of the TV screen.
2. Twist the knob on the hand control to change the red number. Adjust the knob until the number of entry that you want is shown.
3. Press the trigger again. This time it will register your choice with the Bally Professional Arcade.

When a game is over, you can start another game by pulling the trigger to get the menu. Then pull trigger, adjust knob, and pull trigger again to enter your choice.

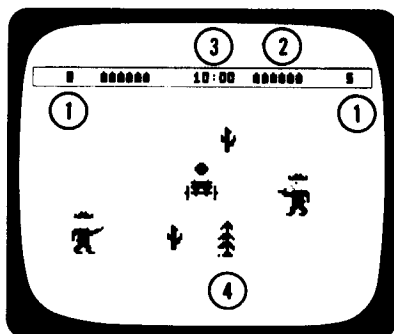
RESIDENT GAMES

Gunfight

Gunfight is a two-player game and uses the hand controls numbered "1" and "2".

HAND CONTROLS

Joy Stick Walks the gun fighter around the screen.
Knob Raises and lowers his arm.
Trigger Shoots



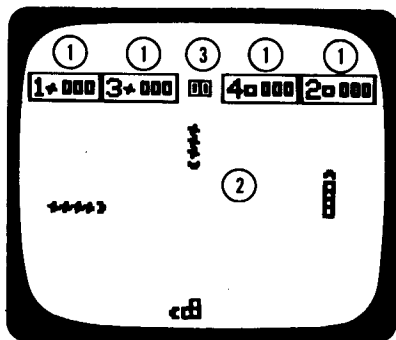
1. Each player's score.
2. The shots remaining.
3. Ten second timer starts after either player runs out of ammo.
4. Each "scoring set" will have different objects appear on screen between the gunfighters. Your gunfighter will be able to hide behind cacti, trees and even a covered wagon.

Checkmate (0 to 4 players)

Scoring is accomplished as indicated in the following example. In a game with four players, the first player to be eliminated scores zero, and the remaining three score one point each. The next player eliminated also scores zero, and the remaining two players each score another point. After all other players have been eliminated, the remaining player will have scored three points . . . and the game is over.

HAND CONTROLS

Joy Stick Moves your symbol horizontally, vertically and diagonally.
 Knob No function
 Trigger No function



1. Each player's symbol and score.
2. Each player's symbol on the playing field.
3. The number of games remaining.

Calculator

The programmable microprocessor unit in the Bally Arcade contains a 5- function, 10-memory printing keypad calculator that scrolls on the TV screen.

The convenient algebraic entry system allows problems to be entered in the same order they are written. If you want to calculate $3 + 4 - 5$ you need only to press [3][+][4][-][5][=].

After choosing the calculator by pressing [3] on the keypad, the TV screen should show a white background and a long orange horizontal bar near the bottom of the TV screen. This represents the viewing window of the calculator.

The calculator is easy to operate and can add, subtract, multiply, and divide. Using these four basic functions, we'll see exactly what takes place and how it looks on your TV screen. Let us perform the operation $6 + 5 - 4 \times 3 \div 7 = ?$, by pressing, in order, the number and functions keys [6][+][5][-][4][x][3][÷][7][=]. Looking at your TV screen, you'll see the answer—the sum total of your calculation, appears as "3 =" in the orange window.

The calculations appearing directly above this window are the beginning of a printed video tape revealing each entry and function performed. This unique feature of the calculator will continue to record and store your calculations up to a limit of 100 lines, allowing for lengthy and complex calculations. In addition, you may recall to the TV screen, any previous calculation by simply pressing and holding the scroll backward key [↓] until your calculations appears! At this point, it would be best to use the scroll forward key [↑], and return to the end of the video tape prior to any further calculations. Should you start new calculations while in the middle of the video tape, they will be added in their proper location at

the end. Therefore, you will not see them as before. Your only visible indication will be the line entries as they appear in the orange window. To clarify, the video tape must be scrolled forward until the end of tape is reached. Should your calculations exceed the 100 line limit, data at beginning of video tape will be omitted as new data is added, thus maintaining a tape of 100 lines.

Calculator Functions

(C) Clear Key	Removes all previous calculations including memory storage.
(CE) Clear Entry	Removes only the last entry from display.
(CH) Change Sign	The "CH" key changes the sign of the displayed number. Negative numbers will appear in red.
(MS) Memory Storage	Adds displayed number to memory, 10 individual entries to memory storage can be made. Each time the MS key is used it should be followed by pressing the appropriate number key (1, 2, 3, etc.), to establish numerical sequence within storage register.
(MR) Memory Recall	Recalls number in memory to display. Must be followed by appropriate number key to secure correct memory from storage.
(↑) Scroll Up	Moves video tape forward.
(↓) Scroll Down	Moves video tape backward.
(.) Decimal	Enters a decimal point.
(%) Percent	Calculates a percentage of the previous entry.

Calculator will display up to 10 digits to the left of the decimal point on your screen. It will also store up to 10 digits to the right of the decimal, which are not shown.

Scribbling

Scribbling is a fascinating creative game. By manipulating the various controls you can create a multi-color pattern on the TV screen and draw or write almost anything you choose.

How to Start

Press [4] on the keypad to get Scribbling on the screen.

Now that you've chosen Scribbling, the questions " # of players " will appear. You can choose from zero to four by pressing the appropriate number key on the keypad.

Before starting to scribble, place the plastic overlay for the keypad into position. This overlay outlines the functions controlled by the keys during Scribbling.

If you select zero players, the Arcade console will automatically trace an ever changing pattern on your TV screen and continues until you press the reset key or the clear key. (*The automatic television protective circuit will not function while in zero player mode.*)

When 1 to 4 player action is chosen you should see one to four colored squares on your screen. Movement of these squares is accomplished by movement of the Joy Stick in any of its eight directions. Squeezing and releasing the trigger of the control will place a colored square anywhere you desire. If you wish

to draw a line, squeeze the trigger and hold. Move the Joy Stick in the direction you wish to draw.

Rotate the top control knob to change the size and color of your square. In the counter clockwise position of this knob you will see a large blue square. As you begin to rotate in a clockwise direction the color will change to red, then green and finally white. Continue to rotate and the size of the square will decrease and again you will pass through the four basic colors.

One complete rotation from left to right produces 4 square sizes—large to small—and the 4 basic colors which in effect puts a 16 position switch at your fingertips.

Alternately squeezing and releasing the trigger while in motion produces a dotted line. To change from green in the display to orange, press the clockwise rotation key in the third row (Green) and hold, until green becomes orange and release. The color clockwise and counter clockwise keys appear in the first two rows (top to bottom) on the keypad, the next two rows of keys control the intensity level of a color. When changing to any color or intensity of color, the key must be held down until you reach the desired result.

Videocades

The Bally Arcade not only has four games built in, it has virtually hundred of game possibilities! With optional Videocade™ cassettes, one can have a veritable library of games and educational tools. Videocade™ cassettes are now available in a variety of programs that include an Educational Series, a Sports Series, an Action/Skill Series and a Strategy Series. And more are on the way!

CONNECTION TO TV RECEIVER

Included with the Bally Arcade is a TV adapter switch. This switch allows selection of either the Bally Arcade or regular TV viewing. Simply move the slide switch to the mode desired. "Game" position for Bally Arcade or "TV" position for television.

I. Adapter Switch Connections

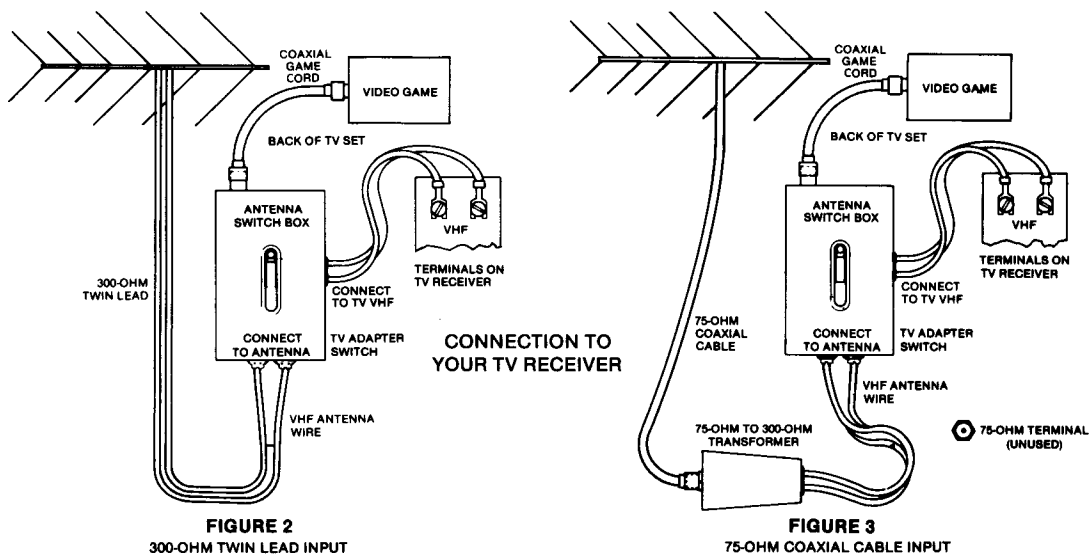
A. Connection to sets having 300 ohm antenna system with screw terminals. See figure 2.

1. Locate the VHF antenna terminal on the back of your television set. Remove the existing wires connected to the VHF terminals. Attach these wires to the terminals marked "Connect to Antenna" at the base of the adapter switch.
2. Connect the short length of antenna wires coming from the side of the adapter switch to the VHF terminals of your TV set.

B. Connection to sets having 75 ohm antenna system employing Round Coaxial Cable and Cylindrical Connector. See figure 3.

Note: In this installation it will be necessary for you to purchase 75 ohm to 300 ohm transformer, available from you local dealer or any television service organization.

1. Remove Coaxial Cable Connector from its socket on the back of the TV set, then connect it to the socket of the transformer. Avoid bending of center wire in cable.
2. Connect the 300 ohm flat twin-lead wire coming from the end of the transformer to the terminals marked "Connect to Antenna" on the adapter switch.
3. Connect the short length of 300 ohm antenna wire coming from the side of the adapter switch to the VHF terminals of your TV. (Additional TV adapter switches may be purchased at your local dealer so you may install one on each television set in your home.)



- II. Carefully unroll the Coaxial Cable from the Arcade console and plug it into the TV adapter switch receptacle marked "Game".
- III. Plug the power supply cord into a 120 volt AC outlet.

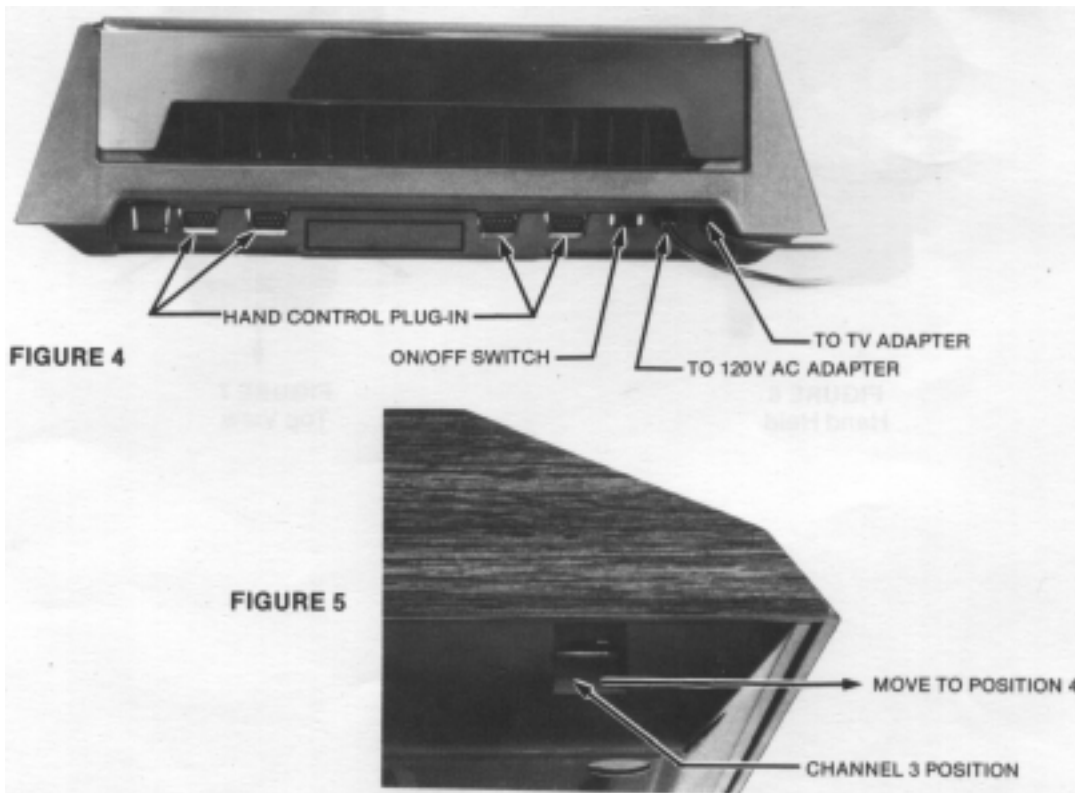
- IV. Plug each hand control unit into its appropriate plug on rear of console. See figure 4.
- V. Move console On/Off switch (on back of console) to "On" position. See figure 4.
- IV. Move slide switch on TV adapter to "Game" position.
- VII. Turn on TV set and set Channel Selector to Channel 3 position.

The menu should now appear on the TV screen. (If not, press the reset button.)

You now have a choice of Gunfight, or Checkmate Arcade Games, a 5-function, 10-memory printing calculator or Scribbling, an exciting art form game. Press the appropriate numbered button on the keypad to start the game of your choice.

- If the menu doesn't appear, check on the following:
- Is the On/Off switch on the back of the console in the "On" position?
 - Is the switch on the TV adapter in the "Game" position?
 - Is the coaxial cable securely inserted into the adapter switch?
 - Is the power supply cord securely inserted into a 120 volt outlet?
 - Is the flat twin-lead wire properly hooked up to the back of the TV set?
 - Is your Channel Selector set on Channel 3?

The Bally Arcade is factory set to operate on Channel 3. If there is interference from a Channel 3 TV station in your area, you can change to Channel 4 by moving the slide switch of the RF modulator to position 4 and setting your channel selector to Channe14. This switch is located on the left side of your console. See figure5.



HAND CONTROLS

Each hand control is numbered on the top of its knob. It is important to insert each control into its corresponding numbered location on the back of your Arcade (See figure 4).

The detailed action controlled by the hand controllers varies with the game being played. Each pistol grip hand control has several functions which determine the action seen on the screen.

Squeezing the trigger activates a switch for shooting as in Gunfight or placing a trace on the screen as in Scribbling.

The knob on top of the control can be moved in 8 directions, forward, backward, left, right, and at 45 degree angles.

These motions determine the movement of the image on your screen.

Rotating this knob positions the cowboy's hand during Gunfight, etc. Review hand control actions for each individual game. Notice that the knob moves easily. *Under no circumstances should the knob be forced.*



Figure 6
Hand Held

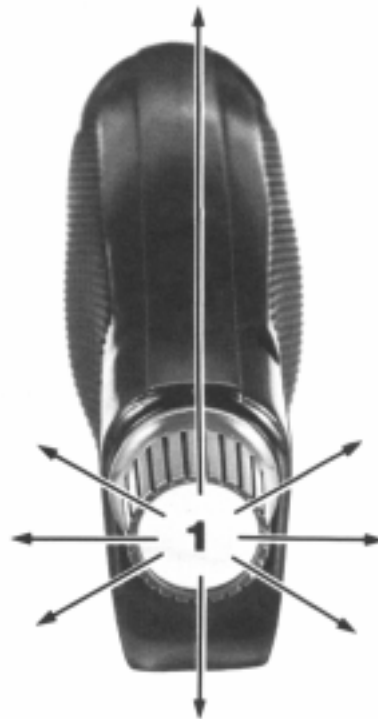


Figure 7
Top View

GENERAL SPECIFICATIONS

Microprocessor—Z-80

Memory

RAM (Scratchpad)	— 4K Bytes
ROM (Resident)	— 8K Bytes
ROM (Cassette)	— 8K Bytes (Max.)

Inputs

Calculator Keypad	— 24 Keys
Dial	— 4
Joystick	— 4
Light Pen-Bar Code Reader	— Provision

Output Graphics

Resolution	— 16,320
Configuration	— 160 x 102
Display	— Color—Black and White
Number of Colors	— 256

Output Audio — 1 Channel Triple Tone Tremelo and Vibrato

Output Signal — NTSC Standard Color

Output Channels — 3 and 4

Calculator

Keypad	— 24 Keys
Function	— Add, Subtract, Multiply, Divide and Percent
Memory	— 10 Separate

Power Requirements — Standard 120 VAC

Power Consumption — 12 WATTS (Ave.)

Additional Specifications with Bally Basic “Videocade”

Language — Basic

Baud (with Interface) — 300BPS

Output Text

Text Display	— 286
Text Capacity	— 26 x 11

SYSTEM OPERATION

GENERAL

The Bally Professional Arcade is a full color video game system based on the mass-ram-buffer technique. A mass-ram-buffer system is one in which one or more bits of RAM are used to define a color and intensity of a pixel (dot) on the screen. The picture on the screen is defined by the contents of RAM and can easily be changed by modifying RAM.

The system uses a Z-80 Microprocessor as its main control unit. The system contains 4K Byte RAM and 8K Byte ROM. The resident ROM has software for four games: Gunfight, Checkmate, Scribbling, and a five function 10 memory Calculator. Additional ROM in cassette form can be accessed through the cassette connector. Three custom chips are used for the video interface, special video processing functions, audio generation and keyboard and control handle interface.

The system will accommodate up to four player control handles at once. Each handle has five switches and a potentiometer. These switches are read by the Z-80 via the I/O chip. The signals from the potentiometers are changed to digital information by an 9 bit Analog to Digital Converter within the I/O chip.

Provisions for expansion are provided for a full keyboard via an IEEE Bus along with a separate input to accommodate a light pen.

OPERATION

When the Bally Arcade is turned on, the Z-80 microprocessor begins executing instructions out of ROM. This ROM can also be from a cassette that is plugged into the cassette connector. The first thing the Z-80 does is write data into the RAM so that the menu appears on the screen. What is seen on the screen is a continuous dump of the data in the RAM at that instant. The data in RAM is not exactly the same data that the Z-80 pulled from ROM. The data is modified along the way by the Z-80 dependant upon the state of the switches, knobs, or triggers. Depending on the state of these the Z-80 makes decisions and modifies the data accordingly on the way to the RAM.

MICROPROCESSOR (CPU)

The task of the microprocessor is to receive data in the form of binary digits (1's and 0's), to store the data for later processing, to perform arithmetic and logic operations on the data in accordance with previously stored instructions and to deliver the results to the user through an output mechanism. A block diagram of a typical microprocessor would show the following units: A decode and control unit (to interpret instructions from the stored program), the Arithmetic and logic unit or ALU (to perform arithmetic and logic operations), registers (to serve as easily accessible memory for data frequently manipulated), an accumulator (a special register closely associated with the ALU), address buffers (to supply the control memory with the address from which to fetch the next instruction), and input-output buffers (to read instructions or data into the microprocessor or to send them out).

MICROCYCLER

The task of the microcycler is to combine the 16 bit Address Bus and the 8 bit Data Bus from the Z-80 into one 16 bit Microcycle Data Bus to the Data Chip, Address Chip and I/O chip. This was done to reduce the pin count on the custom chips.

ADDRESS CHIP

The address chip has several tasks.

1. It provides an interface for the light pen.
2. It multiplexes the 16 bit Microcycle Data Bus from the Z-80 into a 6 bit bus for the RAM. This is necessary because the RAM's only have 6 pins available for information processing.
3. It synchronizes with the data chip to insure that the data being dumped from RAM, for display on the screen, is displayed at the proper time.
4. Because of the slow speed of the microcycler and of the address chip the address chip generates a wait signal to the Z-80 telling it to wait until the instruction being processed is completed before the next instruction is started.

DATA CHIP

One of the data chips most important functions is to generate the correct clock frequency used by the rest of the system. The data chip receives a 7 MHz frequency from the clock driver circuitry, and this frequency is divided down by counters to generate a frequency of 1.7 MHz, which is used throughout the system. The 1.7 MHz is shown on the schematic as 0.

The data chip also generates Pixclock (PXCLK) which is 3.547 MHz.

This is used to synchronize the RAM's with the data chip to insure the proper timing and colors when data is being dumped from the RAM's for display on the screen.

The data chip also generated R-Y, B-Y and the composite video which is output to the RF modulator.

I/O CHIP

The Z-80 communicates with the I/O chip through input and output instructions. The state of an 8 x 8 switch matrix can be read through the Switch Scan circuit. When an input instruction is executed, one of the S00-S07 lines will be activated. When a line is activated, the switch matrix will feed back 8 bits of data on S10-S17. This data is in turn fed to the Z-80 through MUXDO-MUXD7.

The Z-80 can read the position of the four hand control potentiometers through the Analog-Digital Convertor Circuit. These pots are continuously scanned by the A-D Convertor and the results of the conversions are stored in a RAM in the A-D Convertor Circuit. The Z-80 simply reads this RAM with input instructions.

Also included in the I/O chip are the audio registers.

The Z-80 loads data into the Music Processor with output instructions. This data determines the characteristics of the audio that is generated.

MUSIC PROCESSOR

The music processor can be divided into two sections. The first section generates the Master Oscillator Frequency and the second section uses the Master Oscillator Frequency to generate tone frequencies and the analog audio output. The contents of all registers in the Music Processor are set by output instructions from the Z-80.

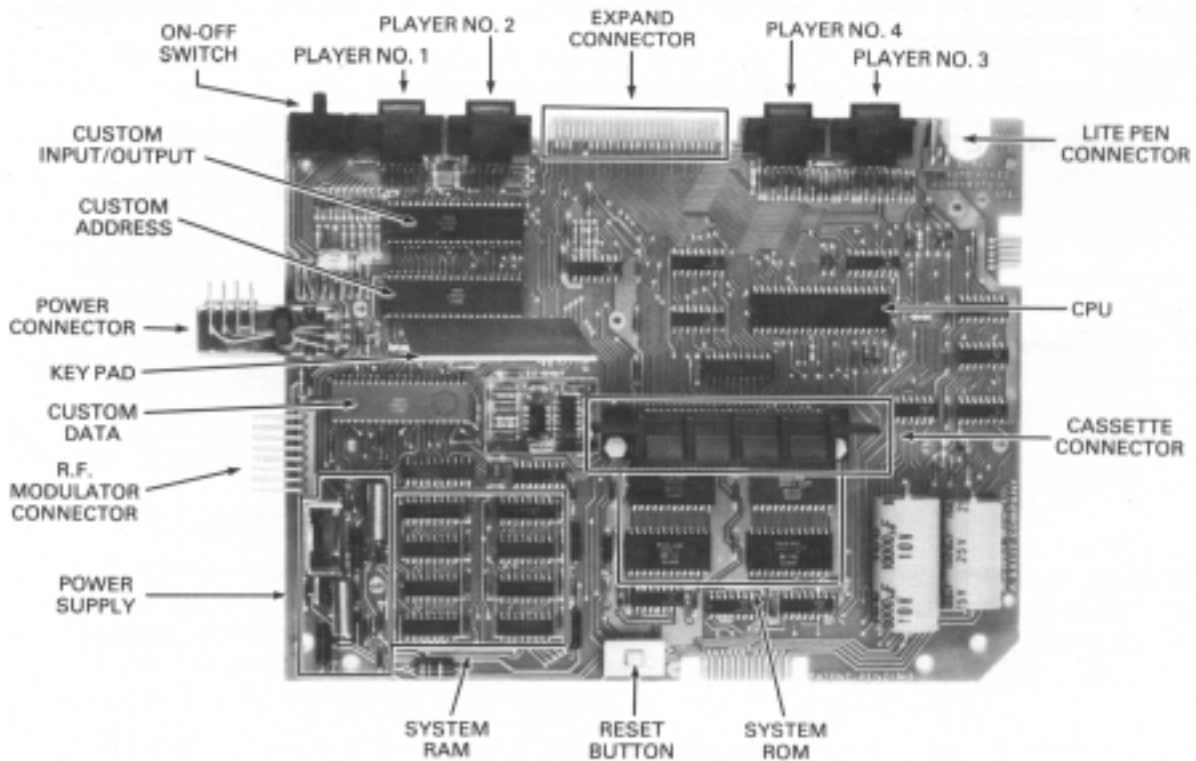
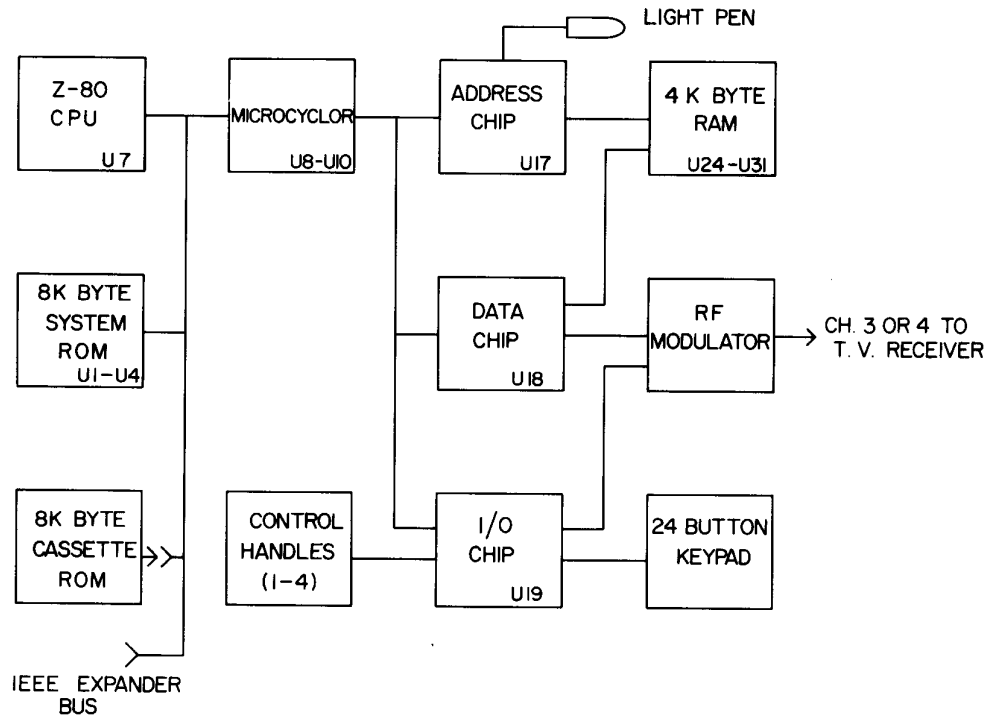
Master Oscillator Frequency is a square wave whose frequency is determined by the 8 binary inputs to the Master Oscillator. This 8-bit word is the sum of the

contents of the Master Oscillator Register and the output of the MUX. The MUX is controlled by MUX REG.

If MUX REG contains 0, then data from the Vibrato System will be fed through the MUX. The two bits from the Vibrato Frequency Register determine the frequency of the square wave output of the Low Frequency Oscillator. The 6-bit word at the output of the AND gates oscillates between 0 and the contents of the Vibrato Register. The frequency of oscillation is determined by the contents of the Vibrato Frequency Register. The 6-bit word, along with two ground bits are fed through the MUX to the Adder. This causes the Master Oscillator Frequency to be modulated between two values thus giving a vibrato effect.

If MUX REG contains 1, then data from the Noise System will be fed through the MUX. The 8-bit word from the Noise Volume Register determines which bits from the Noise Generator will be present at the output of the AND gates.

SYSTEM BLOCK DIAGRAM



DISASSEMBLY PROCEDURE FOR REPLACING GAME BOARD

1. Using a magnetized phillips screwdriver remove the five (5) screws on the bottom of the cabinet (figure 1 item 1). Holding the top and bottom sections together, turn the cabinet right-side up.
2. Lift up gently on the top section and it will separate from the bottom section.
3. On the left side of the unit you will see the R. F. Modulator, (figure 2 item 1) and the four (4) wire power connector (figure 2 item 2). Remove the R. F. Modulator by lifting up on the left side of it and pulling outwards to the left. The power connector can be removed by pulling it towards the rear of the unit.
4. Using a magnetized phillips screwdriver remove the four (4) screws in the corners of the board (figure 2 item 3). At this time the game board and keypad/cassette assembly can be removed from the bottom of the cabinet.
5. Remove the silver clips that are attached to the edges of the shielding (figure 2 item 4). After the clips are removed the metal shielding on the bottom of the game board can be removed.
6. Turn the board over and remove the four (4) remaining phillip screws that secure the keypad/cassette assembly to the game board (figure 3 item 1).
7. Holding the two pieces together turn them over and carefully lift the keypad/cassette assembly away from the game board.
8. Holding the keypad/cassette assembly in your right hand, press down gently on the keyboard itself with your left hand and slide the keyboard completely out.
9. Remove the reset button and the remaining plastic shielding by pulling them up and off gently.
10. Reverse the above steps to install a new game board.

IMPORTANT NOTE: Insure that all shielding is in place and secure to conform to FCC regulations.

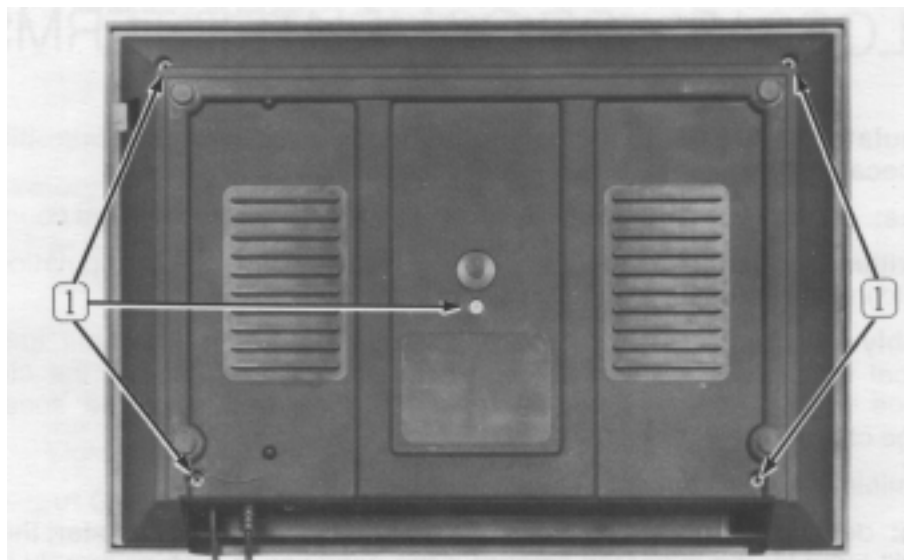


Fig. 1—BOTTOM VIEW

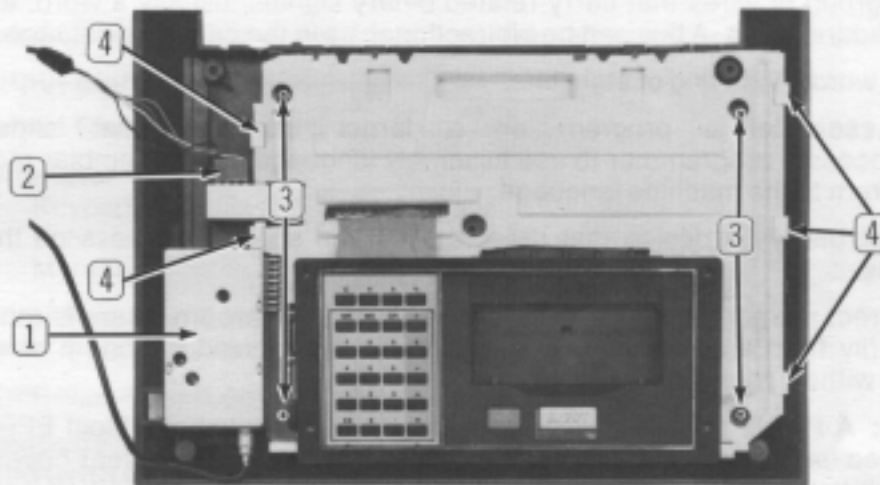


Fig. 2—UNIT WITH TOP REMOVED

1--R. F. Modulator 3--Four (4) Philips screws in corners of board
 2--Power Connector 4--Silver clips

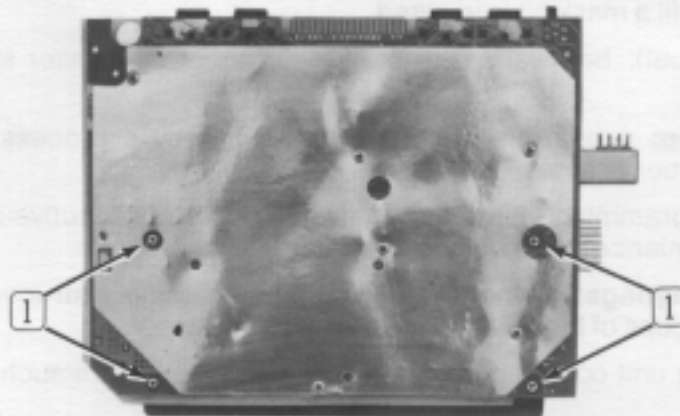


Fig. 3—BOTTOM OF GAME BOARD

GLOSSARY OF COMPUTER TERMS

Accumulator: a register in the microprocessor that operates on data. It is so-called because these registers were first used to accumulate totals.

Address: a specific memory location that is called out by the program counter.

ALU (arithmetic and logic unit): the circuitry that performs the manipulations on data held in the accumulator.

Assembly Language: a compromise between the user's thoughts and the numerical notation of the microprocessor. Assembly language is the closest technique to the actual numerical codes that still retains some speaking-language characteristics.

Bit: a minimum logic element. A binary number of either 0 or 1.

Branch: depending on the status of a particular bit in the status register, the program will jump by the indicated amount if the condition is met, or merely increment if not.

Bus: a group of wires that carry related binary signals, usually a word, as in a 16-wire address bus. A bus can be bidirectional, as in the case of a data bus.

Byte: a word consisting of eight bits.

Cross-Assembler: a program on a larger computer that allows a microprocessor programmer to use assembly language. The assembler reduces the program to the machine language.

Decoder: usually a device that detects a certain specific address on the address bus.

DMA (direct memory access): a process in which a microprocessor is removed temporarily from a system to allow data to be transferred rapidly in or out of memory without microprocessor control.

EPROM: A PROM that can be erased and reused indefinitely. Most EPROM's are erased under ultraviolet light and can be recognized by the clear cover over the silicon "chip."

Hex: short for hexadecimal: numbers calculated to the base 16.

Interrupt: an external signal that causes a microprocessor to jump to a specific subroutine. Interrupts are maskable or nonmaskable. A maskable interrupt may be delayed until a mask bit is lowered.

I/O (input/output): hardware that interfaces a microprocessor system with the outside world.

Iterative Loop: a programming technique whereby a process is repeated a specified number of times.

Jump: a programming instruction that breaks the consecutive-instruction programming sequence and resumes elsewhere in the program.

Machine Language: Numerical coding, representing instructions, usually in the form of groups of bytes, used by the microprocessor.

Peripheral: a unit operated with a microprocessor system such as a keyboard or a printer.

Port: a place through which inputs and outputs—either data or instructions—are channeled. A microprocessor can have more than one port of can address many. Port size, though, is often specified in bits, ranging from 4 to 16 bits.

Processor Status Word (PSW): a word of readily available status information provided to indicate the result of specific operations.

Program: a set of sequential instructions that a computer follows.

Program Counter: two 8-bit registers used to generate the 16-bit address. The registers are called PCH and PCL and are used for the higher-order and lower-order bytes, respectively.

PROM: a programmable ROM in which a program is entered by the user before installation into equipment, as opposed to a factory-programmed ROM.

RAM (random-access memory): a data-storage device that can retain and produce on demand any data placed in it.

Register: a device that stores one word of data, and often consists of several flip-flops.

ROM (read-only memory): a device that has data permanently entered into if to be outputted on demand.

R/W (read/write): a control output of the microprocessor that indicates if data are being transferred from the microprocessor to memory, or vice versa.

Scratchpad: an area of the main memory set aside for short and often done calculations.

Stack: storage for data during subroutines or interrupts.

Stack Pointer: two 8-byte registers containing the address of the top (most recent end) of the stack.

Subroutine: a program within a program that performs a specific, often-used function.

Vector: a specific address loaded into a microprocessor's program counter to force the microprocessor to start processing at a specific address.

MOTHER BOARD PARTS LIST

Component #	Description	Bally Part Number
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INTEGRATED CIRCUITS

U1	ROM 9316B HVSD	0066-851AX-HVSD
U2	ROM 9316B HVSC	0066-851AX-HVSC
U3	ROM 9316B HVSB	0066-851AX-HVSB
U4	ROM 9316B HVSA	0066-851AX-HVSA
U5	74LS367	0066-700AX-XXCX
U6	74LS04	0066-473XX-XXCX
U7	Z-80 CPU	0066-124BX-XXWX
U8	74LS257	0066-643AX-XXCX
U9	74LS257	0066-643AX-XXCX
U10	DP8304	0066-968AX-XXAX
U11	74LS02	0066-463XX-XXCX
U12	74LS00	0066-453XX-XXCX
U13	74LS10	0066-502XX-XXCX
U14	74LS10	0066-502XX-XXCX
U15	74LS02	0066-463XX-XXCX
U16	74LS74	0066-823XX-XXCX
U17	Custom Address	0066-115XX-XXYX
U18	Custom Data	0066-116XX-XXYX
U19	Custom I/O	0066-117XX-XXYX
U20	74LS174	0066-243AX-XXCX
U21	74LS74	0066-823XX-XXCX
U22	74LS74	0066-823XX-XXCX
U23	DM81LS95	0066-967AX-XXAX
U24-U31	MK4096N-15 RAM	0066-308XX-XXWX
U32	75361AP	0066-754AX-XXCX

CAPACITORS

C1	1500MF 25V	0061-297EX-5EBX
C2-C5	.1MFD50V Z5U	0061-132H8 1J5C
C6	10,000MF 10V	0061-322CX-5EBX
C7	15 MFD 20V	0061-207D4-4ERX
C8	6.8MFD 35V	0061-193G6-4ERX
C9	.1MFD 50V Z5U	0061-132H8-1J5C
C10	100MFD 16V	0061-233DX-5E2X
C11-C12	.1MFD 50V Z5U	0061-132H8-4ERX
C13	1MFD 35V	0061-163G6-4ERX
C14	.1MFD 50V Z5U	0061-132H8-4ERX
C15	100PF 50V	0061-043H6-1J5X
C16	27PF 50V 5%	0061-028H2-1J5X
C17	22PF 50V	0061-025H6-1J5X
C18	33PF 50V 5%	0061-020H2-1J5X
C19	.039MF 50V	0061-117H2-1J5X
C20-C47	470PF 50V	0061-061H6-1J5X

Component #	Description	Bally Part Number
C48	.1MFD 50V Z5U	0061-132H8-1J5C
C49-C50	33PF 50V 20%	0061-030H6-1J5X
C51	.1MFD 50V Z5U	0061-132H8-1J5C
C52-C55	22PF 50V	0061-025H6-1J5X
C56-C61	100PF 50V	0061-043H6-1J5X
C62-C64	15MFD 20V	0061-207D4-4ERX
C65-C106	.1MFD 50V Z5U	0061-132H8-1J5C

RESISTORS

R1	27ohm 1w 5%	0062-068F3-1XXX
R2	240ohm ¼w 5%	0062-135B3-1XXX
R3	150ohm ½w 5%	0062-122D3-1XXX
R4-R5	2K ohm ¼w 5%	0062-193B3-1XXX
R6	1M ohm ¼w 5%	0062-323B3-1XXX
R7	10k ohm ¼w 5%	0062-227B3-1XXX
R8	2.2k ohm ¼w 5%	0062-195B3-1XXX
R9	22k ohm ¼w 5%	0062-243B3-1XXX
R10	11k ohm ¼w 5%	0062-229B3-1XXX
R11	330 ohm ¼w 5%	0062-144B3-1XXX
R12-R13	82 ohm ¼w 5%	0062-104B3-1XXX
R14	62 ohm ¼w 5%	0062-095B3-1XXX
R15	47 ohm ¼w 5%	0062-086B3-1XXX
R16-R17	1k ohm ¼w 5%	0062-179B3-1XXX
R18	150 ohm ¼w 5%	0062-122B3-1XXX
R19-R21	2k ohm ¼w 5%	0062-193B3-1XXX
R22-R25	6.2k ohm ¼w 5%	0062-217B3-1XXX
R26-R31	8.2k ohm ¼w 5%	0062-223B3-1XXX
R32	1k ohm ¼w 5%	0062-179B3-1XXX
R33	3.3k ohm ¼w 5%	0062-203B3-1XXX
R34	8.2k ohm ¼w 5%	0062-223B3-1XXX
R35-R36	3.3k ohm ¼w 5%	0062-203B3-1XXX
R37-R38	47 ohm ¼w 5%	0062-086B3-1XXX
R39	10k ohm ¼w 5%	0062-227B3-1XXX
R40-R42	2K ohm ¼w 5%	0062-193B3-1XXX

TRANSISTORS

Q1	TIP 31	0065-485XX-XXMX
Q2	TIS 137	0065-500XX-XXMX

CRYSTAL

Y1	14.31818MHZ XTAL	0069-079XX-XX2X
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Component #	Description	Bally Part Number
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DIODES

CR1-CR8	IN4004	0064-030XX-XXPG
CR9-CR28	IN4148	0064-048XX-XXPX

VOLTAGE REGULATORS

VR1	LM342-P-15	0066-024BX-XXAX
VR2	LM342 P-10	0066-025BX-XXAX
VR3	UA78GUIC	0066-250BX-XXBX
VR4	LM320 MP	0066-026BX-XXAX

SWITCHES

S1	on, off switch	0017-00032-0049
S2	Reset switch	0017-00032-0048

JACKS

J1	R.F. Modulator Conn.	3000-16337-0000
J2-J5	Player Handle Conn.	0017-00021-0291
J6	Cassette Conn. 26 Pin	0017-00021-0273
J7	Lite Pen Conn.	3000-16336-0000

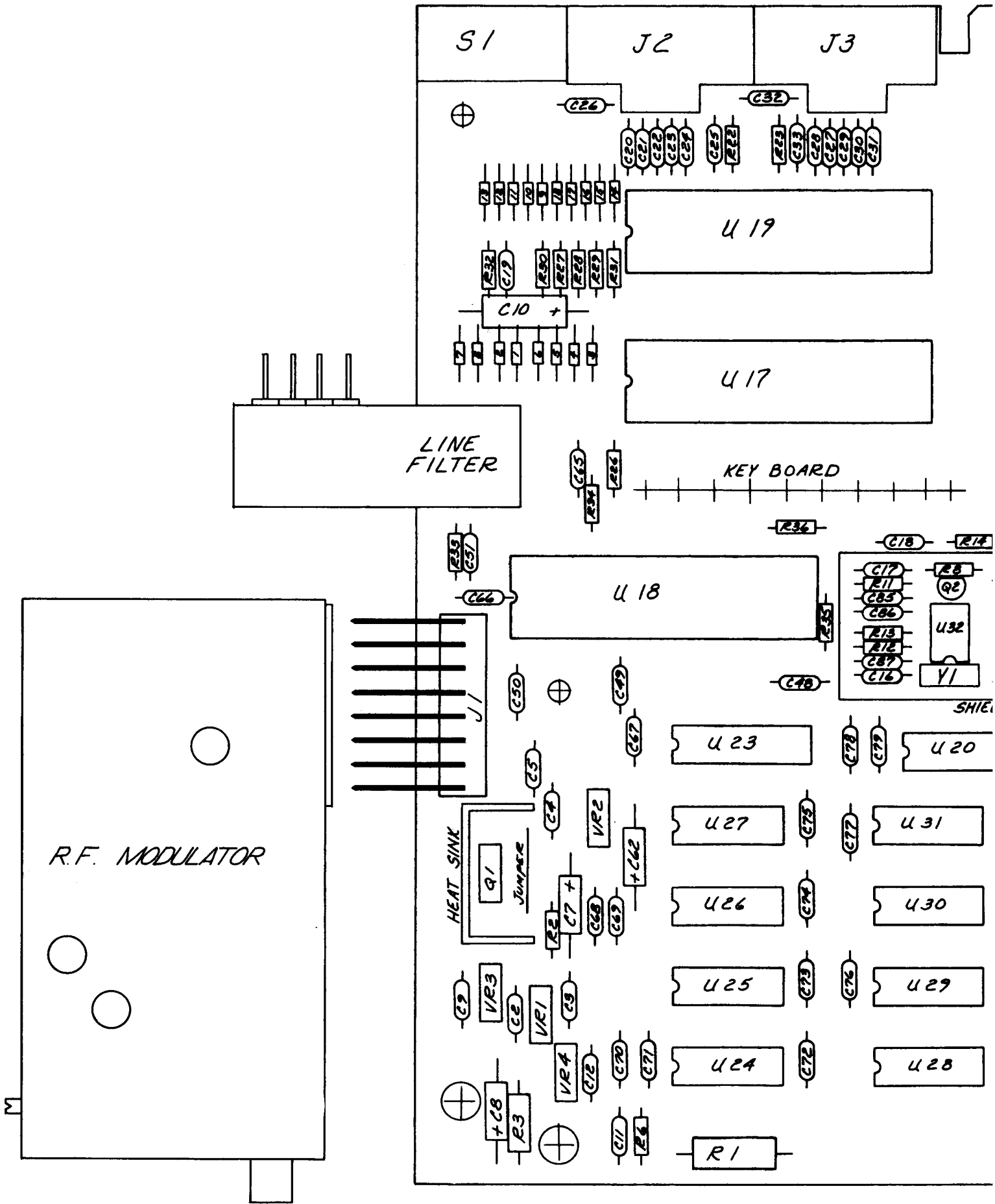
MISCELLANEOUS

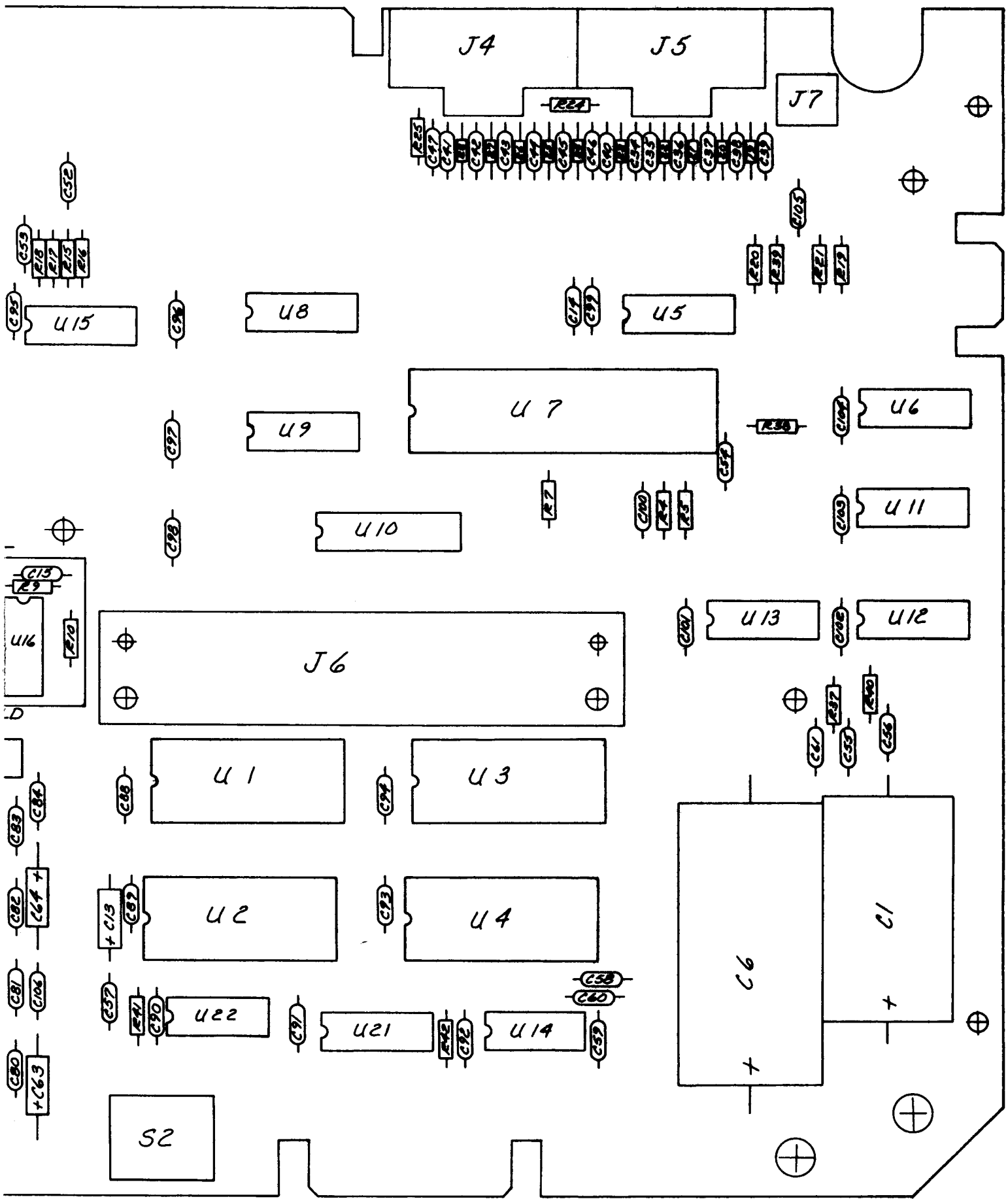
Oscillator Fence	0620-00114-0000
Thermalloy Heat Sink	0068-031XX-XXAX
Thermalloy Heat Sink (2)	0068-032XX-XXAX
Keyboard 24 Button	0017-00003-0191
6-32X 3/8 screw for cassette conn.	0017-00101-0774
6-32 nuts for above	0017-00103-0060
Line Filter Assy.	A620-00034-0000
Power Supply Conn. 4 pin	3000-16326-0400

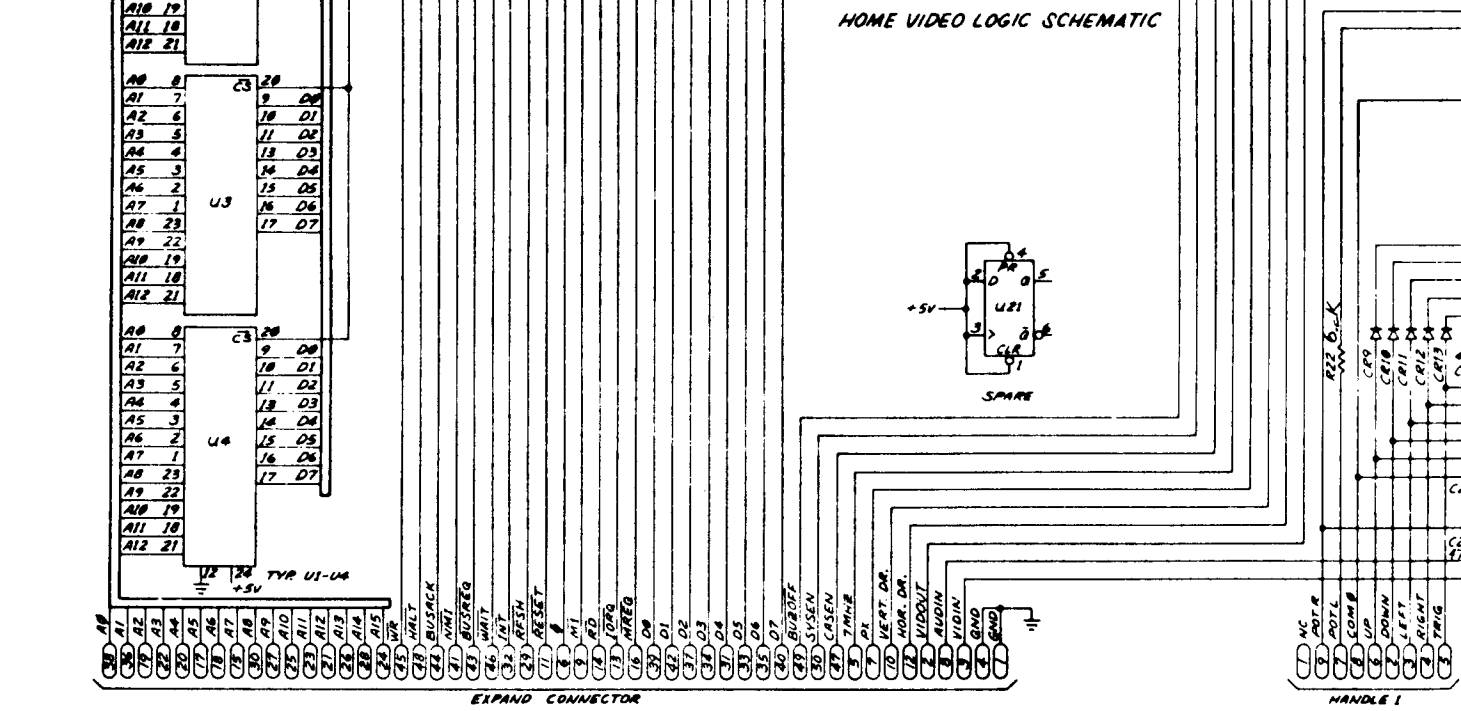
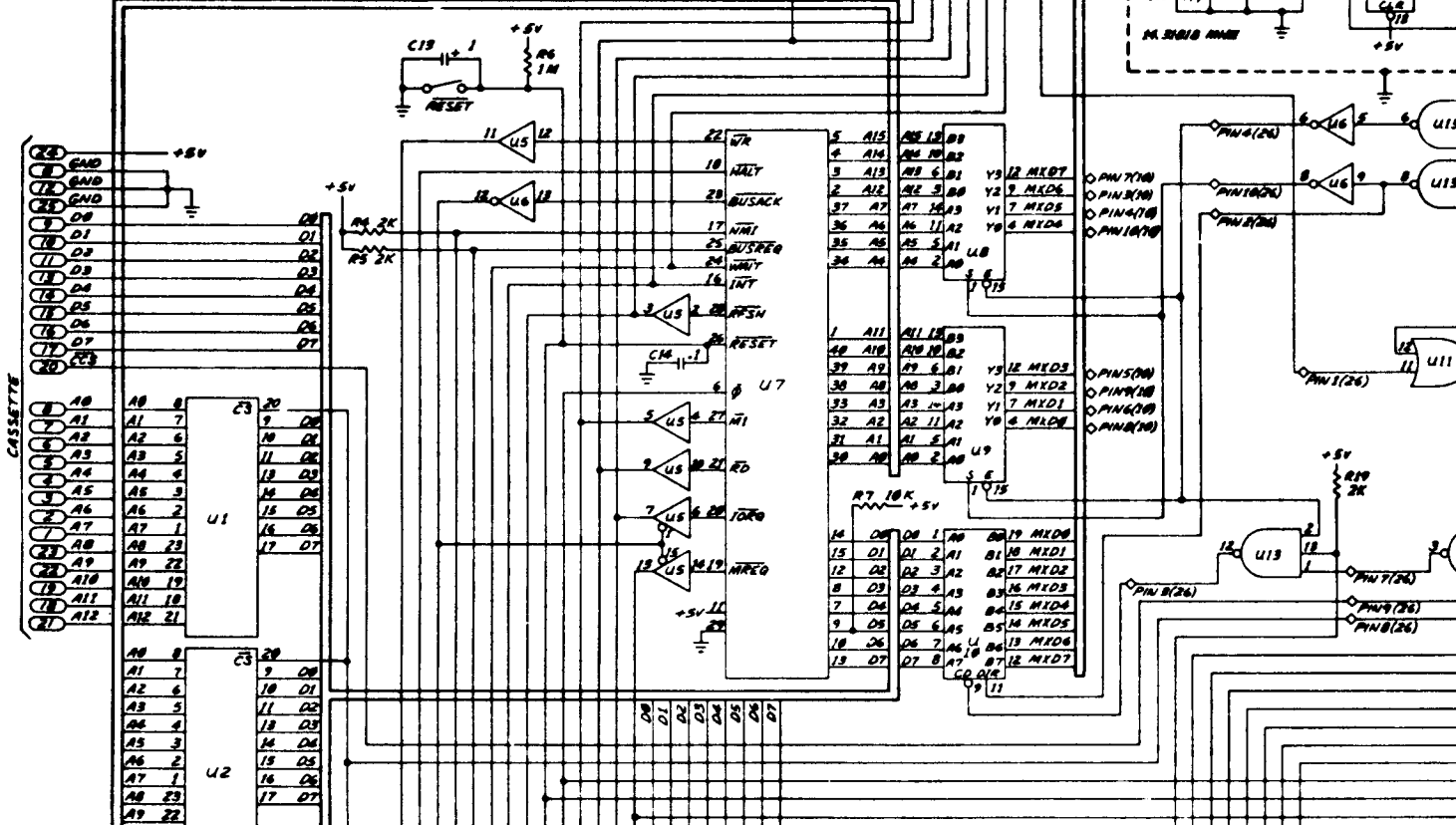
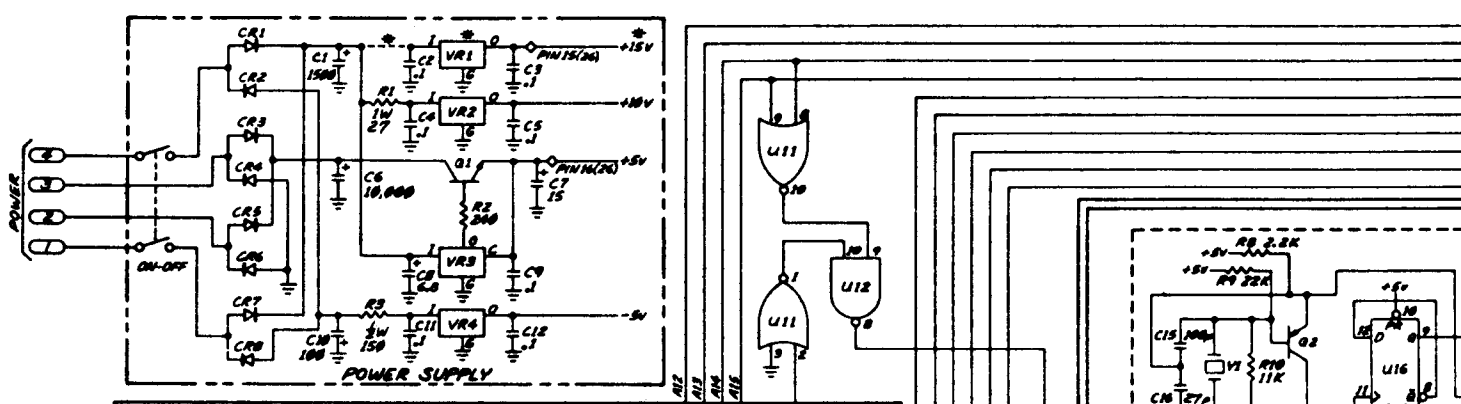
FINAL CABINET PARTS LIST

Bally Part Number	Description
0017-00003-0190	R. F. modulator
0017-00007-0135	U Clip 8/unit
0017-00101-0067	$\frac{9}{20} \times \frac{3}{8}$ 4/unit
0017-00101-0074	$\frac{9}{20} \times 1$ 4/unit
0017-00101-0776	$\frac{9}{32} \times \frac{3}{8}$ 5/unit
0017-00042-0170	Nylon Spacer 4/unit
0620-00011-0000	Consol Packaging Mat
0620-00111-0000	Keyboard Overlay
0620-00247-0000	Ejector Spring
0620-00302-0000	Owner's Manual
0620-00907-0200	Knob #2
0620-00907-0300	Knob #3
0620-00907-0400	Knob #4
0620-00910-0000	R. F. Coax Cable
0620-00912-0000	R. F. Adaptor
0620-00913-0000	Cabinet Top
0620-00914-0000	Cabinet Base
0620-00915-0000	Top Cover Tape Lid
0620-00916-0000	Keyboard Housing
0620-00919-0000	Ejector Button
0620-00920-0000	Ejector
0620-00921-0000	Reset Button
0620-00923-0000	Name Plate
0620-00939-0000	R. F. Shield Top
A620-00003-0100	Control Handle
A620-00004-0000	Power Supply Assembly
A620-00933-0800	Mother Board

NOTES

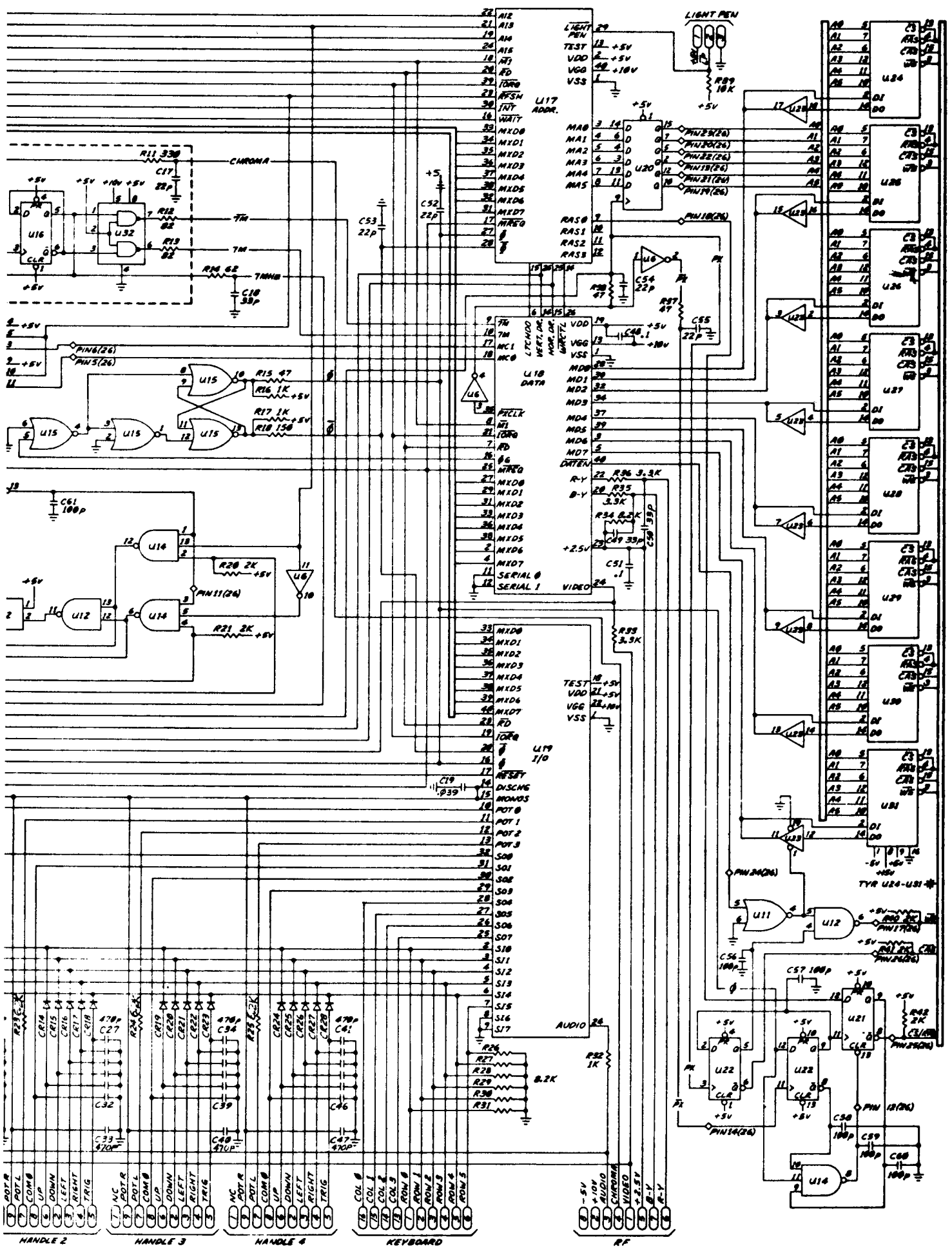






EXPAND CONNECTOR

HANDLE I



HANDLE 2
 HANDLE 3
 HANDLE 4
 KEYBOARD
 RF
 LIGHT PEN
 VIDEO
 AUDIO
 R-Y
 B-Y

Bally Service Manual
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