

*finished product*

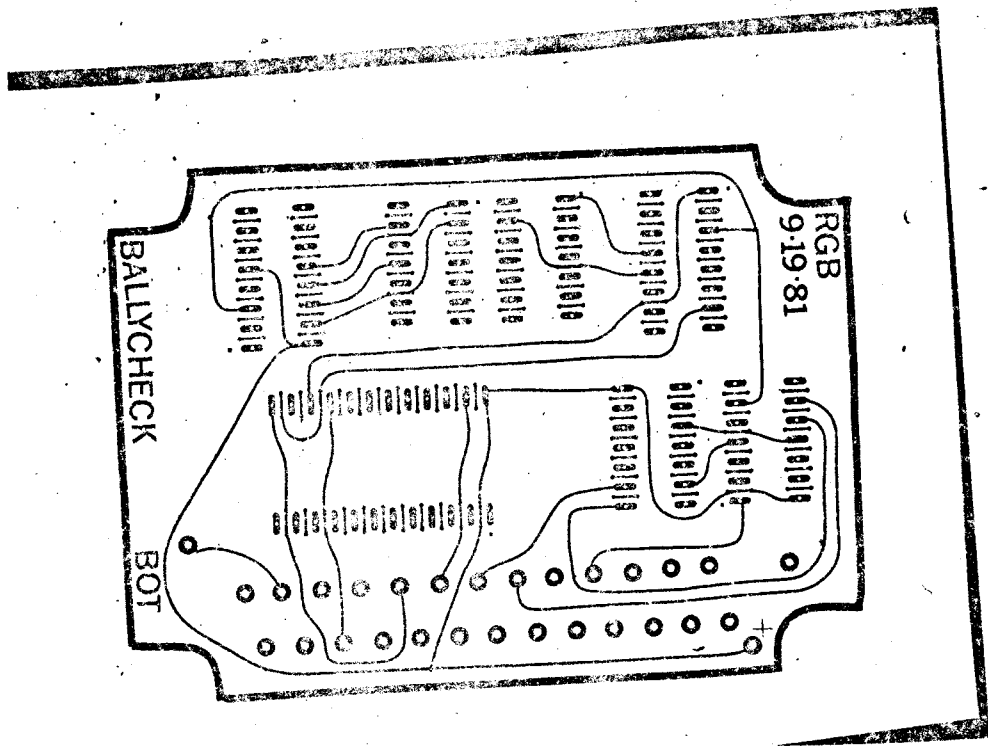
### HOME VIDEO GAME BURN-IN TESTER

The BALLYCHECK Burn-In Tester performs functional as well as static test on the operation of the (BALLY)-ASTROCADE home video game. The functional test performed check for correct operation of system ROM (read only memory), RAM (random access memory) and CUSTOM CHIP functions as data shift, flip-flop, expand, OR and XOR. Static tests performs exercise all the system I/O ports by reading and writing to them. Included in the tester are 8 routines to enable the user to generate constant CPU signals for checking data and control logic circuitry, monitor activity on system input ports, generate color display, and enter a program directly into system RAM for execution. While the Burn-in tester is in operation the LED display on the tester module will blink the following; NN-error code number, (possible error codes, key pad, screen interrupt, ROM checksum, RAM, shifter, rotator (not implemented), flopper, or, xor, or intercept, xor intercept, expander, trigger/joystick & pot ERRORS. XX-Information Byte gives information to help isolate the error condition. There is in the BALLYCHECK manual the error codes description sheets for more detailed information. Also while the Burn-In tester is running the user can access the special routines by pressing one of 8 keys, #1 memory read routine #2 memory write, #3 input port read, #4 output port write, #5 memory read & write routines, #6 display all input devices to screen, #7 Rainbow color display all possible colors, #8 enter machine code from key pad layout shown in picture above. The BALLYCHECK Manual has further description sheets for details on individual routines. These routines are so thorough for example the functional RAM test checks for bad bits in the RAM array they use a pattern starting with "I" and ending with "80H" is written into RAM (the complement is also written) and checked that the correct pattern was stored, and the information displayed on the LED'S and checked with the manual can tell you which RAM chip is bad. On the other hand if the CPU's stack doesn't know where to go the system is locked up and the tester will read FF, so it won't always tell you what's wrong but 99% of the time it's FANTASTIC!!! I've sold over 200 BALLYCHECK Testers even NITRON, division of ASTROCADE. The cost of a BALLYCHECK TESTER, is \$80.00 each & \$5.50 for shipping and handling. THE BALLYCHECK MANUAL, is \$7.00 each & \$1.50 for S&H and both are ready for immediate delivery. Call or write for more details.

RGB ELECTRONICS.  
Richard G. Belton  
4906 Willshire Ave.  
Baltimore, MD. 21206  
ph #(301)488-2806

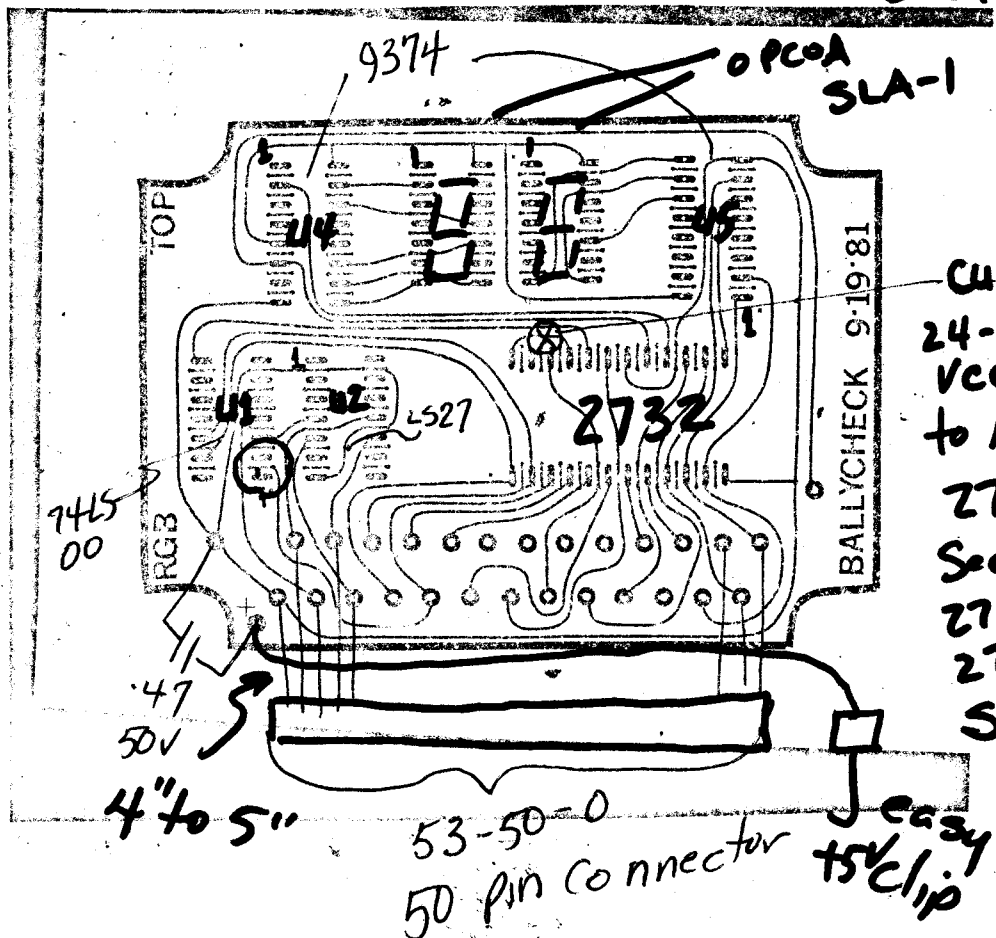
Also available is the DAVE NUTTING ENGINEERING MANUAL for the (bally) Astrocade, a 300 page manual of list-of ROM, timing pulses, schematics Music gen. all phases of the Game. DAVE NUTTING MANUAL \$30.00 & \$2.50

S&H. These manuals are also available from Bob Fabris of the "ARCADIAN".

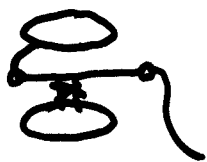


7-18-83

Don I know this is rough dwgs. I am  
 So busy. Please excuse the delay -  
 if you need Any PTS please write or call  
 Dick



CUT foil pin 1  
 Jump to pin 2



CUT-foil  
 24-21-  
 VCC  
 to Add  
 2732  
 See -  
 2716-  
 2732  
 Sheet

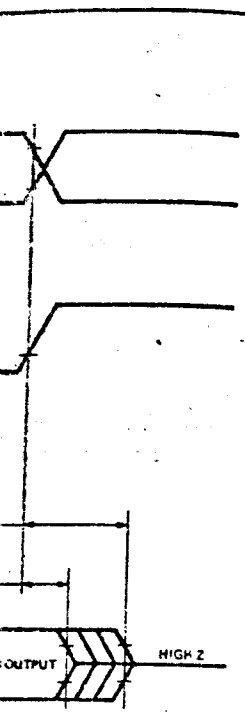
4" to 5"

53-50-0  
 50 pin Connector

easy  
 15V clip

# Ballycheck OWNERS; modification update, Now use Ballycheck to test System ROM's 1 & 2

**intel** Burn your own Chip or modification will be made for \$19.50 + 2.50 S&H or 2732 burn 2716 for \$10.50 + 2.50 S&H  
**16K (2K x 8) UV ERASABLE PROM**



- Fast Access Time
  - 350 ns Max. 2716-1
  - 390 ns Max. 2716-2
  - 450 ns Max. 2716
  - 490 ns Max. 2716-5
  - 650 ns Max. 2716-6
- Single +5V Power Supply
- Low Power Dissipation
  - 525 mW Max. Active Power
  - 132 mW Max. Standby Power
- Pin Compatible to Intel® 2732 EPROM
- Simple Programming Requirements
  - Single Location Programming
  - Programs with One 50 ms Pulse
- Inputs and Outputs TTL Compatible during Read and Program
- Completely Static

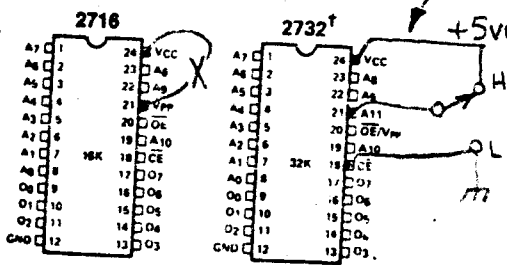
The Intel® 2716 is a 16,384-bit ultraviolet erasable and electrically programmable read-only memory (EPROM). The 2716 operates from a single 5-volt power supply, has a static standby mode, and features fast single address location programming. It makes designing with EPROMs faster, easier and more economical.

The 2716, with its single 5-volt supply and with an access time up to 350 ns, is ideal for use with the newer high performance +5V microprocessors such as Intel's 8085 and 8086. A selected 2716-5 and 2716-6 is available for slower speed applications. The 2716 is also the first EPROM with a static standby mode which reduces the power dissipation without increasing access time. The maximum active power dissipation is 525 mW while the maximum standby power dissipation is only 132 mW, a 75% savings.

The 2716 has the simplest and fastest method yet devised for programming EPROMs — single pulse TTL level programming. No need for high voltage pulsing because all programming controls are handled by TTL signals. Program any location at any time—either individually, sequentially or at random, with the 2716's single address location programming. Total programming time for all 16,384 bits is only 100 seconds.

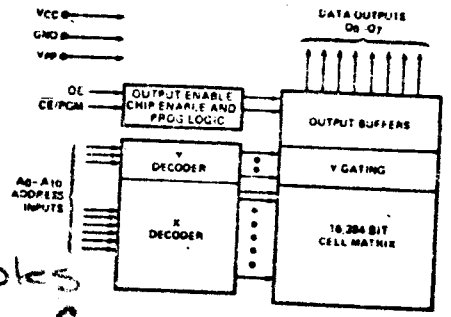
X=Cut foil

### PIN CONFIGURATION



MODE	PINS	CE/PGM (18)	OE (20)	Vpp (21)	VCC (24)	OUTPUTS (9-11, 13-17)
Read		VIL	VIL	+5	+5	OUT
Standby		VIH	Don't Care	+5	+5	High Z
Program		Pulsed VIL to VIH	VIH	+25	+5	DIW
Program Verify		VIL	VIL	+25	+5	OUT
Program Inhibit		VIL	VIH	+25	+5	High Z

### BLOCK DIAGRAM



†Refer to 2732 data sheet for specifications

System = Bally-Astrocade GAMES

A0-A10	ADDRESSES
CE/PGM	CHIP ENABLE/PROGRAM
OE	OUTPUT ENABLE
O0-O7	OUTPUTS

To read 2732 (L) @ ALL enables  
 Low order address & (H) @ ALL enables High order address of 2732

System 1 ROM (L) = Old Games [GUNFIGHTER Score =

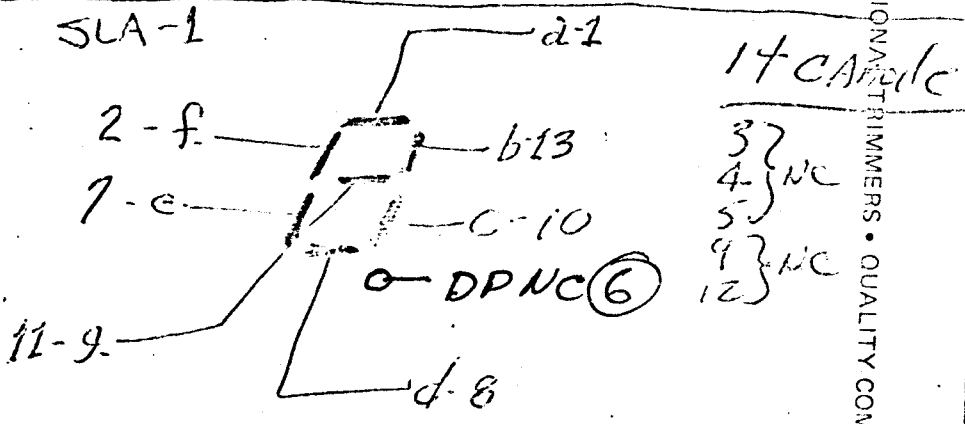
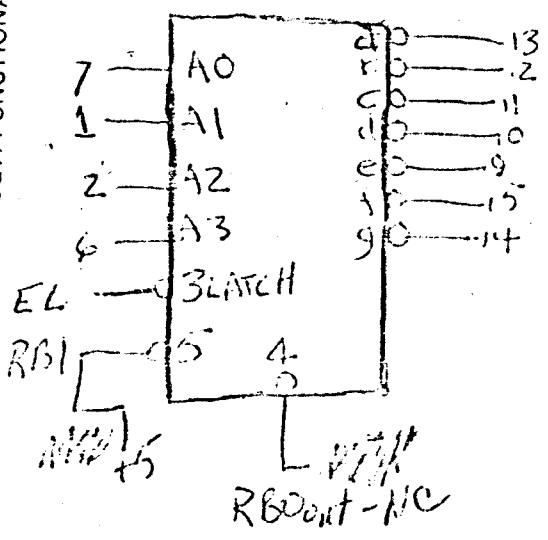
0-99 also Menu reads (bottom) (c) Bally Mfg (1977)

System 2 ROM (H) = New Games [GUNFIGHTER Score =

0-9999 also Menu reads (bottom) (c) Bally Mfg (1978)

RESISTIVE COMPONENTS • POTENTIOMETERS • MULTI-FUNCTIONAL TRIMMERS • QUALITY COMPONENTS

9374 - DRIVE  
Fairchild. ANODE Vec 16  
Gnd 8



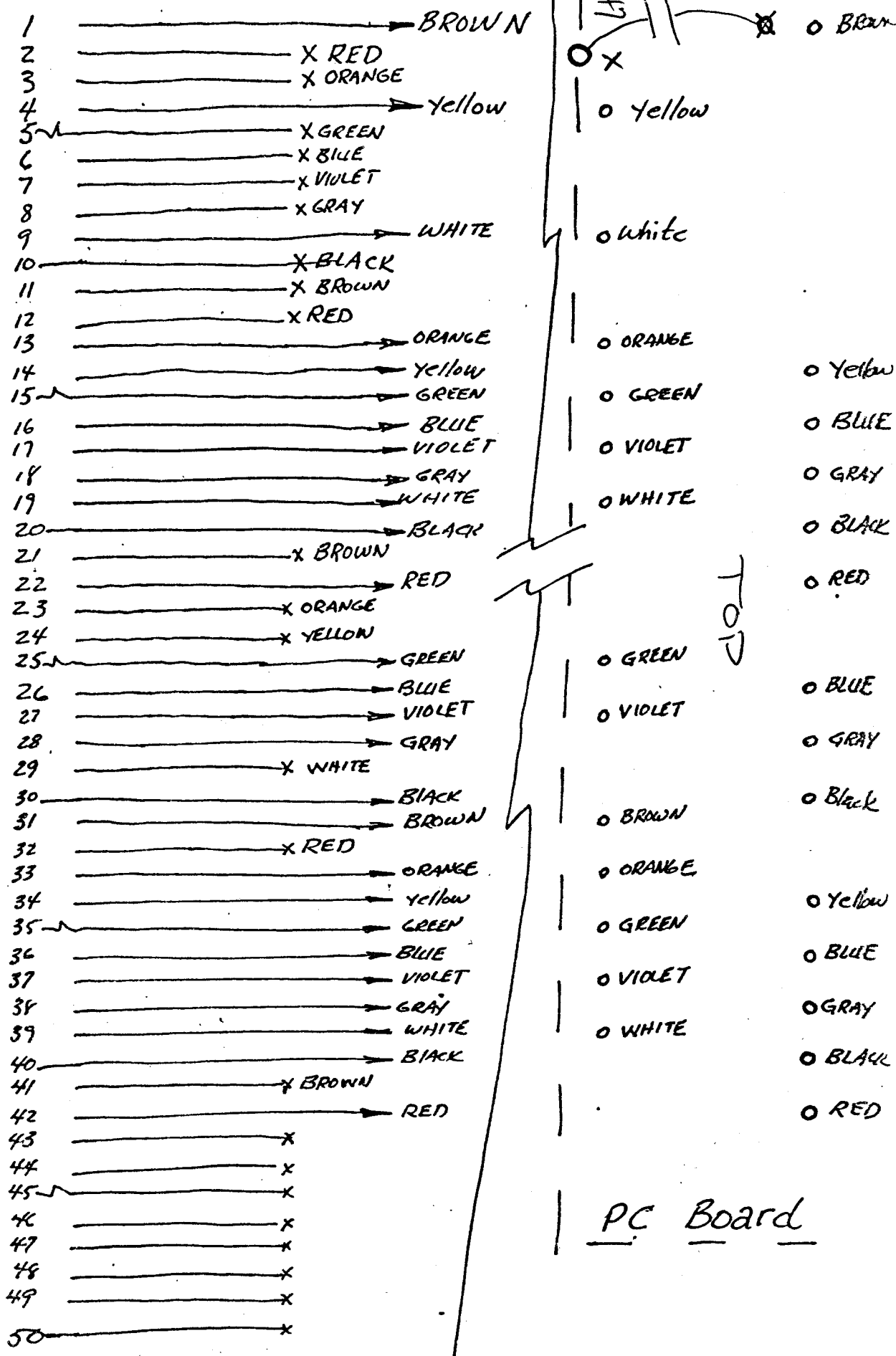
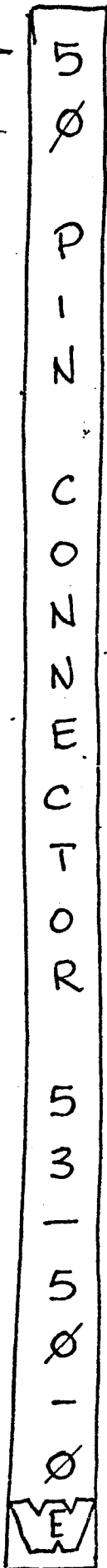
POTENTIOMETERS • RESISTIVE COMPONENTS • POTENTIOMETERS • QUALITY COMPONENTS

**BOURNS** from **Hamilton** **Wheat**  
ELECTRONICS

Baltimore--(301) 796-5000  
South New Jersey--(609) 424-0100  
Raleigh--(919) 829-6030

Daily Check Plus Assembly Wiring

1  
↓  
BALLY  
TOP



TOP

PC Board

SPECIAL FUNCTIONS:

	1	2	3	4
Key Pad	5	6	7	8
Layout	9	A	B	C
	D	E	F	Ø
	Q/S	X	X	X
	CE	X	X	GO

While the Burn-In Tester is running the user can access the special routines by pressing one of the following keys:

- Key #1 - Memory Read Routine
- 2 - Memory Write Routine
- 3 - Input Port Read Routine
- 4 - Output Port Write Routine
- 5 - Memory Read & Write Routine
- 6 - Display All Input Devices
- 7 - Rainbow Color Display
- 8 - Enter Machine Code From Key Pad

See Key Pad description sheets for details on individual routines.

Function Keys:

Q/S - This key operates differently in the rack tester than in the bench tester.

*NO* X  
Rack Tester—When the tester starts running it will stay in operation, burning in the unit, until reset or one of the 8 special function keys are pressed. If the "Q/S" key is pressed while the tester is running, the program will execute 3 more passes and terminate displaying an "E1" in the LEDS, indicating the unit is okay.

*YES* {  
Bench Tester—In this version the program will execute 4 complete passes and then terminate displaying an "E1", if the unit is okay. If the "Q/S" key is pressed the tester program will execute indefinitely, or until reset or one of the special function keys are pressed.

CE - Used as "Clear Entry" in special function routines.

GO - Used only in Routine #8 of the special functions used to execute user typed machine code.

AO = - 0 04 04 08 08 CB HE DE LP AA --	U27 Pulled	AA -- 04 4-RAM 80- 0B HE DE LP AO - 0	U131
---	---------------	--	------

AA 04 CB ? DE AA	<del>U26</del> 26	AA -- 04 4-RAM 40 CB HE DE LP AO - 0	U130
------------------------------	----------------------	---	------

AO - 0 04 4-RAM 02 CB - HE DE LP AA --	U25	AA 04 20 CB DE AO-	U129
---	-----	-----------------------------------	------

AA - 0 04 4-RAM 01 CB DE AA	U24	AA -- 04 4-RAM 10- 0B HE DE LP AO - 0	U128
--	-----	--	------

- □ - □ - □ - □	} = AA 04 0F CB DE AA
--------------------------	---

AA 04 FF CB DE AA	} Dead-? } = U17? } BAD = FF
----------------------------------	------------------------------------

```

0002 ;*****
0003 ;*
0004 ;*          B A L C H E C K          ;*
0005 ;*
0006 ;*          Check Bally Mother-boards ;*
0007 ;*
0008 ;*
0009 ;*          4/29/80
0010 ;*          5/13/82 - includes New listing ;*
0011 ;*****

```

```

(00FF) 0012 DSPLY EQU 0FFH ; Test unit display port
0013 ; Display patterns
0014 ; 0 = 0
0015 ; . .
0016 ; . .
0017 ; 9 = 9
0018 ; A = -
0019 ; B = E
0020 ; C = H
0021 ; D = L
0022 ; E = P
0023 ; F = blank
0641 LIST ON
0642 ;
4FFF 0643 ORG FIRSTC
0644 ;
2000 03AD20 0645 JP BCHK ; Go start testing
0646 ;
0647 ; Multiply A by 16; Shift A left 4
2003 87 0648 R2003 ADD A,A ; x2
2004 87 0649 ADD A,A ; x4
2005 87 0650 ADD A,A ; x8
2006 87 0651 ADD A,A ; x16
2007 09 0652 RET
0653 ;
2008 2F 0654 T2008 DB 00101111B ; Key masks
2009 0F 0655 DB 00001111B
200A 0F 0656 DB 00001111B
200B 2F 0657 DB 00101111B
0658 ;
0659 ; Expander Test patterns
200C 0055AFFF 0660 T200C DB 0,55H,0AAH,0FFH
0661 ;
0662 ; Interrupt vectors
2010 2827 0663 T2010 DW A2728 ; Display all input devices
2012 7727 0664 T2012 DW A2777 ; Rainbow Interrupt Routine
2014 1620 0665 T2014 DW A2016 ; Normal Interrupt Routine
0666 ;
0667 ; Normal Interrupt routine
0668 ; Keypad Layout
0669 ; Port 17 16 15 14
0670 ; Bit 0 1 2 3 4
0671 ; 1 5 6 7 8
0672 ; 2 9 A B C
0673 ; 3 D E F 0
0674 ; 4 Q/S x x x
0675 ; 5 CE x x Go

```

UPDATED  
5/16/82

old HEX Code for All 300 baud & old Bally Basic  
NEW = HEX Code for 2000 baud & NEW Astro Basic



		0847 ; Start repetitive tests		
		0848 ; Checksum check ROMs		
211B	010000	0849 A211B	LD	BC,2048
211E	210000	0850	LD	HL,SCREEN
2121	AF	0851 A2121	XOR	A
2122	86	0852 A2122	ADD	A,(HL)
2123	57	0853	LD	D,A
2124	23	0854	INC	HL
2125	0D	0855	DEC	C
2126	20FA	0856	JR	NZ,A2122
2128	05	0857	DEC	B
2129	20F7	0858	JR	NZ,A2122
212B	7A	0859	LD	A,D
212C	FEFF	0860	CP	0FFH
212E	200A	0861	JR	NZ,A213A
2130	010000	0862	LD	BC,800H
2133	7C	0863	LD	A,H
2134	FE28	0864	CP	[FIRSTC+2048] SHR 8
2136	2812	0865	JR	Z,A214A
2138	18E7	0866	JR	A2121
		0867 ;		
213A	1E03	0868 A213A	LD	E,3
213C	7C	0869	LD	A,H
213D	D603	0870	SUB	8
213F	4F	0871	LD	C,A
2140	2002	0872	JR	NZ,A2144
2142	0EA0	0873	LD	C,0A0H
2144	214A21	0874 A2144	LD	HL,A214A
2147	03E623	0875 A2147	JP	A23E6
		0876 ;		
		0877 ; Test RAM		
214A	F3	0878 A214A	DI	
214B	FD215121	0879	LD	IY,T2151
214F	1813	0880	JR	A2164
		0881 ;		
2151	1804	0882 T2151	JR	A2157
2153	4E	0883	DB	78
2154	50	0884	DB	80
2155	004F	0885	DW	NORMEN+3840
		0886 ;		
2157	FB	0887 A2157	EI	
2158	FD215E21	0888	LD	IY,T215E
215C	1806	0889	JR	A2164
		0890 ;		
215E	1868	0891 T215E	JR	A21C8
2160	3F	0892	DB	63
2161	4F	0893	DB	79
2162	0040	0894	DW	NORMEN
		0895 ;		
		0896 ; Memory test routine		
2164	0E00	0897 A2164	LD	C,0
2166	0601	0898	LD	B,1
2168	FD6605	0899 A2168	LD	H,(IY+5)
216B	FD6E04	0900	LD	L,(IY+4)
216E	70	0901 A216E	LD	(HL),B
216F	7E	0902	LD	A,(HL)
2170	A3	0903	XOR	B

211D →  
 #8  
 NEW 2φ

212D-04  
 NEW AA

C34A21  
 NEW

; Start with low memory  
 ; Initialize checksum  
 ; Accumulate checksum

; Checksum bad

; Error 3 ROM checksum err.

; "-0" on display  
 ; Where to continue testing

; Test 4F00 - 4FFF

; Test 4000 - 4EFF