COMPLEX-X

COMPLEX-X IS HERE!

THE E-PROM KIT THAT PLUGS INTO —

QIX, ZOOKEEPER, ELECTRIC YO YO, OR SPACE DUNGEON

IT PLUGS RIGHT INTO THE BOARD!

NO SOLDERING OR WIRING!

FAST PLAY ACTION!

GET ERNIE OUT OF THE REACTOR

BEFORE HE DROWNS IN RADIOACTIVE SOUP!

LOOK OUT FOR THOSE NASTY NUCLEAR BUGS!

MANUFACTURED UNDER LICENSE FROM E.T.I., INC. BY —

P.G.D. INC.

1985 FRIENDSHIP DRIVE

Suite J

EL CAJON, CA. 92020

(619) 449-9010

PGD, INC.

COMPLEX-X Installation Instructions

1. Remove all EPROMS IC 4 through IC 19 and IC 27 from ROM I/O PC board.

2. Replace with COMPLEX-X ROMS U 6 thru U 10, U 15 thru U 19.

3. Remove U 1, U 22, U 29 from ROM I/O board.

4. Replace with jumper plugs provided with kit. Make sure pin 1 is in the proper position. Pin 1 is denoted by notched corner of plug.

5. Remove U 24 and replace with the Pal chip provided with the kit.

6. Remove 4-way joystick, 1 and 2 player buttons, slow and fast draw buttons.

7. Remove control panel lexan. Replace with new lexan provided in kit.

8. Install new 8-way joystick, 1 player, 2 player, and fire buttons provided in the kit.

9. Remove marquee glass. With a razor blade, scrape all paint off glass. Install COMPLEX-X overlay on blank glass using soapy water. Wet the glass lightly with soapy water, peel the protective backing off the COMPLEX-X decal and place the decal on the blank glass. The soapy water will allow you to position the decal properly. Let dry and trim excess. Reinstall COMPLEX-X marquee into game cabinet.

1985 Friendship Drive, Suite J • El Cajon, California 92020 • (619) 449-9010

STANDARD COIN SETTINGS

		Standard Setting	Left coin slot multiplier	Center coin slot multiplier	Right coin slot multiplier	Coin units for credit	Coin units for bonus	Minimum coin units
COIN DOOR MECHANISMS	CREDIT/MONEY							
STANDARD	1/.25, 4/*1	01	01	04	01	01	00	00
	1/.50, 3/*1, 6/*2	02	01	04	01	02	04	00
	1/.50	03	01	04	01	02	00	00
1 DM, 5 DM	1/1DM, 6/5DM	04	06	00	01	01	00	00
1 FRANC, 5 FRANC	1/2F, 3/5F ONLY	05	01	16	06	02	00	00
25 CENTS, 1 GUILDER	1/25, 4/1G	06	01	00	04	01	00	00
5 FRANCS, 10 FRANCS	1/5F, 2/10F	07	01	00	02	01	00	00
	1/10F	08	01	00	02	02	00	00
1 FRANC, 2 FRANC	2/1F, 5/2F	09	00	04	01	04	00	00
1 UNIT, 5 UNITS	1/2, 3/5	10	01	00	06	02	00	00
TWIN COIN	1/1 COIN	01	01	04	01	01	00	00
	1/2 COINS	03	01	04	01	02	00	00

CUSTOM COIN SETTINGS

		Standard Setting	Left coin slot multiplier	Center coin slot multiplier	Right coin slot multiplier	Coin units for credit	Coin units for bonus	Minimum coin units
COIN DOOR MECHANISMS	CREDIT/MONEY							
STANDARD	1/.25, 5/*1	00	01	04	01	01	04	00
	2/.50, 5/*1	00	01	04	01	01	04	02
	2/.50, 4/*1	00	01	04	01	01	00	02
	1/.50, 3/*1, 4/*1.25	00	03	12	03	04	15	00
	1/.50, 3/*1, 7/*2	00	12	48	12	14	96	24
20 CENTS, 1 GUILDER	1/.20, 3/.50	00	01	00	01	02	00	00
25 CENTS, 1 GUILDER	1/.25, 5/1G	00	01	00	04	01	04	00
100 LIRE, 200 LIRE	1/200 LIRE	00	01	00	02	02	00	00
TWIN COIN	1/3 COIN, 2/5	00	02	00	02	05	00	00
1 UNIT, 5 UNITS	1/1, 5/5	00	01	00	05	01	00	00
	1/3, 2/5	00	02	00	10	05	00	00

POWER ON/OFF SWITCH, INTERLOCK SWITCHES, MEMORY PROTECT SWITCH, SELF TEST SWITCH, VOLUME CONTROL, AND SERVICE OUTLET

To minimize the hazard of electrical shock while servicing the game a Power ON/OFF Switch, and two (2) Interlock Switches are provided. Two (2) Self Test Switches, a Volume Control and a Service Outlet have also been provided. (See Figures 5 and 6 for location of Switches).

1 POWER ON/OFF SWITCH, INTERLOCK SWITCHES

A Power ON/OFF Switch is located in the front of the game at the botton left side of the cabinet. There are two Power Interlock Switches, one is located on the inside of the Coin Door, the other switch is located at the inside rear of the Service Door. This switch removes all the power from the game without unplugging it from the wall outlet. Power may be restored for servicing by pulling out on the Interlock Switch Buttons.

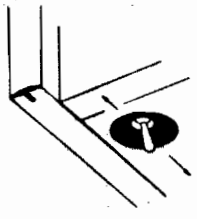


FIGURE 1-2 POWER ON/OFF SWITCH

2 MEMORY PROTECT SWITCH

The Memory Protect Switch is used to prevent erroneous writes to locations in the CMOS RAM which store the location program variables.

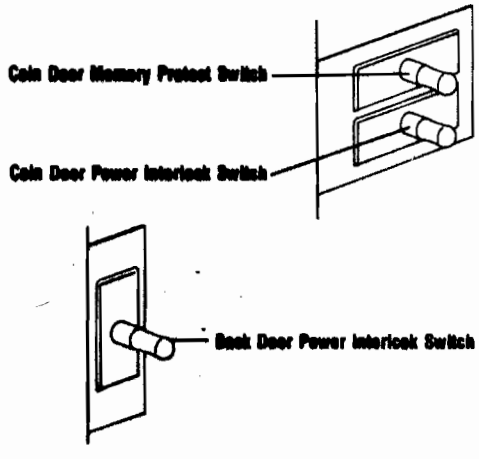
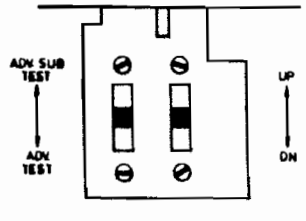


FIGURE 1-3 INTERLOCK SWITCHES & MEMORY PROTECT SWITCH

3 SELF TEST SWITCH

There are two (2) Self Test Switches and four (4) positions, located on the inside of the Coin Door. See Figure 5. The "QIX"™ game is capable of testing itself and provides data to demonstrate that the games circuitry and the controls are working properly. For further information on the Self Test Procedure refer to Section 1.8 and Figure 1-8.



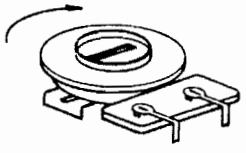
SELF TEST SWITCH

SWITCH	FUNCTION
Up	Reset To Factory Setting (Reset Line Lit) Increment Number (Variable Line Lit)
Down	Decrement Number
Advance Sub-Test	Move To Next Line
Advance Test	Move To The Next Screen

SELF TEST SWITCHES

4 VOLUME CONTROL SETTING

The Volume Control Setting is located on the Data/Sound P. C. Board, which is on the rear of the Service Door. The volume increases when turned clockwise as indicated in Figure 1-5.



VOLUME CONTROL SETTING

5 SERVICE OUTLET

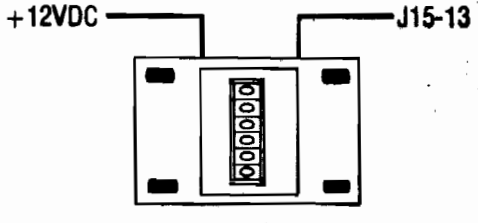
A Power Recepatacle has been provided to further aid servicing. The voltage at this receptacle will be the same as the line voltage the game is set at.

6 ELECTRONIC ACCEPTORS

This game is equipped with the capability of using 12VDC Electronic Coin Acceptors, such as Third Wave Electronics, Model TW12 or equivalent. Power for these units may be obtained from the Coin Entry Lamp terminals which provide 12VDC.

7 COIN METER

This game is also equipped with the capability of using a Coin Meter. See Illustration below.
Connect one lead to the +12VDC supply (available from the Coin Entry Lamp), another connection from the other lead on the Coin Meter to Connector J15-13 on the ROM/IO Board

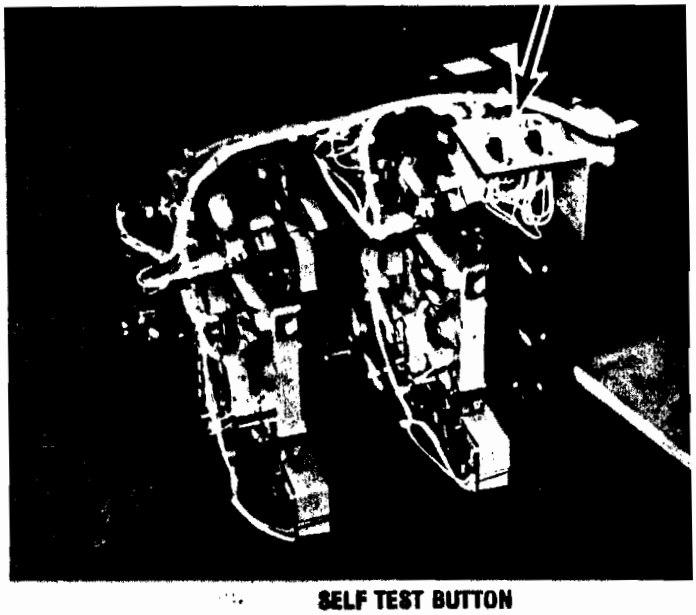


COIN METER

SELF TEST PROCEDURE

1 GENERAL

The Self Test Procedure is performed using the two (2) Switches located on the inside of the Coin Door, and the Self Test Button and the LED'S on the Video PC Board. (See Figure 1-7).



SELF TEST BUTTON

2 ENTERING INTO THE SELF TEST MODE

To enter the Self Test Mode, press the Advance Sub-Test Switch on the Coin Door or the Self Test Button found near the LED display. All the LED'S should blink on and the Hardware Tests should start. The Diagnostics can be entered at the Location Programming Screen (Section 1.8.16) by pressing the Advance Test Switch on the Coin Door.If a continual test of the Video Board is desired, press the Self Test Button twice to start the Video Test in the Auto Test Mode. In this mode, the machine will continually run the Hardware test until powered off. If the message "OPEN COIN DOOR TO TEST" appears the Coin Door must be opened or a jumper connected across J19, 1-2. This is because the CMOS RAM Test (Section 1.8.6) cannot be performed with the memory protected by the Coin Door Switch.

3 HARDWARE TESTS

These tests are performed in the following order:

VIDEO BOARD	DATA BOARD
ROM Checksum	ROM Checksum
Communications RAM	local RAM
CMOS RAM	Communications RAM
Color RAM	Handshake Test
Screen RAM	

HARDWARE TESTS

All LED values are shown Left to Right. 0 is OFF, 1 is ON and X is dependant upon the test results.

4 VIDEO BOARD ROM CHECKSUM

The ROM Checksum calculates the checksum of each Video ROM and compares it to the checksum stored for that ROM. If it differs from the stored value, the machine will halt and the value of the ROM with the bad checksum will be shown on the LED'S.

LED VALUES: TEST IN PROGRESS: 00 0001
FAILURE: 01 XXXX

LED VALUE	VIDEO	2716	2732
01 0000	A000-A7FF	N/A	U5
01 0001	A800-AFFF	N/A	U5
01 0010	B000-B7FF	N/A	U6
01 0011	B800-BFFF	N/A	U6
01 0100	C000-C7FF	U3	U7
01 0101	C800-CFFF	U4	U7
01 0110	D000-D7FF	U5	U8
01 0111	D800-DFFF	U6	U8
01 1000	E000-E7FF	U7	U9
01 1001	E800-EFFF	U8	U9
01 1010	F000-F7FF	U9	U10
01 1011	F800-FFFF	U10	U10

VIDEO BOARD ROM CHECKSUM

If the Checksum ROM is bad, it will show U10 to be bad first. If this test fails, the ROM indicated on the LED display will need to be replaced. The E-PROM Memory in a given game may be implemented as banks of either 2716 or 2732 E-PROMS. The E-PROM type for each bank is selected by the decoding jumper 26-00002-016 for 2716 or 26-00002-032 for 2732.

E-PROM BANK	LOCATION
VIDEO	U1
DATA	U22
SOUND	U29

DECODING JUMPER LOCATION

5 COMMUNICATIONS RAM FROM VIDEO BOARD

The Communications RAM Test determines the stability of memory shared by the two processors by storing a predefined series of numbers throughout the RAM, then reading it back to insure that it was stored correctly.

LED VALUE: 00 0010

A failure has been detected when the machine halts with the above display. Failure of Communications RAM during Video Board Tests may result from either defective RAM circuitry or failure of the Data Board. To isolate the failure, disconnect the Data Board at P6 and re-enter the test. A failure means trouble in U3, U4 or associated circuits. Passing the retest suggests Data Board problems.

6 VIDEO BOARD CMOS RAM

After saving values in another portion of memory, the CMOS RAM is tested in the same manner as the Communications RAM. If the CMOS RAM passes the test, all of the locations are restored to their previous values.

LED VALUE: 00 0011

A failure of the CMOS RAM has been detected when the machine halts with the above LED value displayed. If this occurs U85 and U86 or associated decoding should be checked.

7 VIDEO BOARD COLOR RAM

This tests the system Color RAM by storing predefined sequences of numbers in the Color RAM, then reading them back while testing for accuracy.

LED VALUE: 00 0100

A failure is indicated by the processor halting with the above value displayed on the LED'S. This signifies the need to check U56, U57 and associated multiplexing and decoding.

8 VIDEO BOARD SCREEN RAM

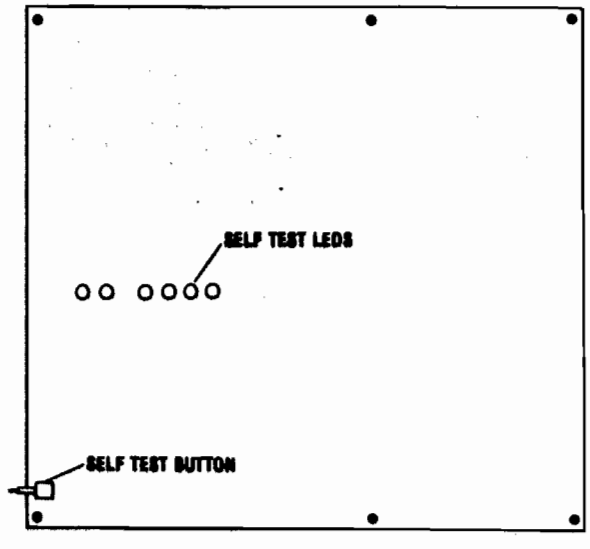
The Screen RAM is tested by writing a pattern to each page on the screen. The results of these writes is then compared to the original pattern. Any discrepancy causes the machine to halt with the LED displaying the faulty RAM.

LED VALUE: TEST IN PROGRESS: 00 0101
FAILURE: 1X XXXX

LED VALUE	RAM	11 XXXX	RAM
10 0000	U33	11 0000	U66
10 0001	U32	11 0001	U65
10 0010	U31	11 0010	U64
10 0011	U30	11 0011	U63
10 0100	U29	11 0100	U62
10 0101	U28	11 0101	U61
10 0110	U27	11 0110	U60
10 0111	U26	11 0111	U59
10 0000	U17	11 1000	U48
10 1001	U16	11 1001	U47
10 1010	U15	11 1010	U46
10 1011	U14	11 1011	U45
10 1100	U13	11 1100	U44
10 1101	U12	11 1101	U43
10 1110	U11	11 1110	U42
10 1111	U10	11 1111	U41

VIDEO BOARD RAM CHECKSUM

Upon failure of a screen RAM, locate the problem RAM and replace it.
If this Diagnostic appears to halt without indicating a RAM failure (00 0101 on LED'S), a failure to begin the next test (Data Hardware) is indicated. The interconnection to the Data Processor must be inplace and the Data Processor must be functional to continue.



VIDEO BOARD (ON BACK SERVICE DOOR)

1.8.9 DATA/SOUND BOARD SELF TESTS
DATA HARDWARE (ROM CHECKSUM)

The ROM Checksum calculates the checksum of each Data ROM and compares it to the checksum stored for that ROM. If it differs from the stored value, the machine will halt and the value of the ROM with the bad checksum will be shown on the LED'S.

LED VALUE: TEST IN PROGRESS: 00 0110
FAILURE: 01 XXXX

LED VALUE	DATA	2716	2732
01 0000	A000	N/A	U14
01 0001	A800	N/A	U14
01 0010	B000	N/A	U15
01 0011	B800	N/A	U15
01 0100	C000	U12	U16
01 0101	C800	U13	U16
01 0110	D000	U14	U17
01 0111	D800	U15	U17
01 1000	E000	U16	U18
01 1001	E800	U17	U18
01 1010	F000	U18	U19
01 1011	F800	U19	U19

DATA/SOUND BOARD ROM CHECKSUM

If this test fails in the field, the bad ROM will need to be replaced.

10 DATA/SOUND BOARD LOCAL MEMORY

The Data Processor uses a known sequence of numbers to test the bits in its Local Memory. If a bad bit is found the machine will halt with the following display.

LED VALUE: 00 0111

11 COMMUNICATIONS RAM ADDRESSING

The function of this test is to ensure that both the Data and the Video Processor address the Communicatons RAM in the same manner. The Data Processor requests the Video Processor to fill the RAM with a known pattern then, the Data Processor compares the result to the expected pattern. If it does not match, one of the processors is probably decoding the address incorrectly as the RAM itself was previously tested for stability by the Video Processor. The machine will halt with the following display.

LED VALUE: 00 1000

12 DATA/VIDEO HANDSHAKE

This test ensures that the Data Processor can send priority commands via interrupts to the Video Processor. The Video Processor is halted, then restarted by the data Processor after the proper command acknowledgements are received. The machine will halt with the following display.

LED VALUE: 00 1001

14 ALIGNMENT AND CONVERGENCE TEST

This screen is provided to align the color guns and correct the convergence on the screen. The screen is composed of a red and a green rectangle and white grid.
Adjust the screen width and length so that the red rectangle is slightly within the boundaries of the tube. The adjustment is to be made on the center of the lines which make up the rectangle. The corners of the rectangle will extend beyond the shadow mask.
The green rectangle defines the normal playfield and so should be visible from the players view point.
A grid of white squares is provided to help detect and correct any convergence problems the tube may have. Adjust the monitor until the squares are of equal size throughout the screen.
To advance to the next screen, activate the Advance Test Button on the Coin Door.

15 LOCATION PROGRAMMING SCREEN(LANGUAGE SELECTION)

This screen allows the user to select the language in which the Location Programming and the game will operate. Four (4) languages are provided. Use the Advance Sub-Test Button to move through the offered languages. When the desired language is green, depress the Advance Test Button, to advance to the next screen.

16 LOCATION PROGRAMMING

This screen allows the location to define the difficulty factor for the game. It also allows the location to set a maximum number of credits allowed in the machine prior to a game start up.
The user selects the line to be changed by using, the Advance Sub-Test Button until the desired line is changed to green. The value associated with this line is then modified with the UP or DOWN Switches. If the machine is to be reset to the factory settings, use the Advance Sub-Test Button until the reset line is lit in green, then press the UP Switch. The values will be reset and the user will be placed back on the first line for futher adjustments. Advance test will move to the next screen at any time.
The backup HSTD (High score to date) value is used to reset the high score on the next screen. Its value will initially determine the score needed for a player to have his own initials show with his score in the high scores.
The maximum credit defines a limit for the machine, which when crossed will disable the coin slots. This allows the location to set a limit on the amount of games a player will get if there is a line of people waiting. This value ranges from 1 to 99. However, it should not be set so close to 99 that a single coin can overflow the credits issued (maximum 99). A Free Play Mode may be selected by setting maximum credits to 0. The credits per coin are set in the coin slot programming screen.

17 HIGH SCORE TO DATE SCREEN

This screen shows the scores and initials of the players with the ten highest scores. It is used as an audit for the game. To reset the values to the backup HSTD selected on the previous screen, press the UP Switch. This will also set the initials to "TAC".
When the UP Button is activated it resets to default scores. To move to the next screen, activate the Advance Test Button on the Coin Door.

18 AUDIT TOTALS

This screen provides the audit totals for the game. Once they are recorded, they may be zeroed by pressing the UP Switch. The following audits are kept.

Total Credits	The total number of paid credits issued. This total is never zeroed, but it will wrap around to zero when its total reaches 1,000,000. The only time this total can be zeroed is by physically removing the battery or jumper W1, while the power is off.
Left Coins	The number of coins dropped into the left slot.
Center Coins	The number of coins droped in the center slot.
Right Coins	The number of coins dropped into the right slot.
Paid Credits	The number of credits issued for coins.
Awarded Credits	The number of credits awarded by the game.
% Free Plays	Awarded credits / paid credits + awarded credits *100
Minutes Played	Number of minutes the game has been in play mode.
Minutes Awarded	Number of minutes the game has been in extended or awarded play.
% Free Time	Awarded minutes / minutes played *100.
Average Game (Sec)	Minutes played / paid credits + awarded credits *60
High Scores	The number of times which a player scored high enough to bump someone else from the high score list.

AUDIT TOTALS

The UP Switch is used to zero the audits. To advance to the next screen, activate the Advance Test Button on the Coin Door.

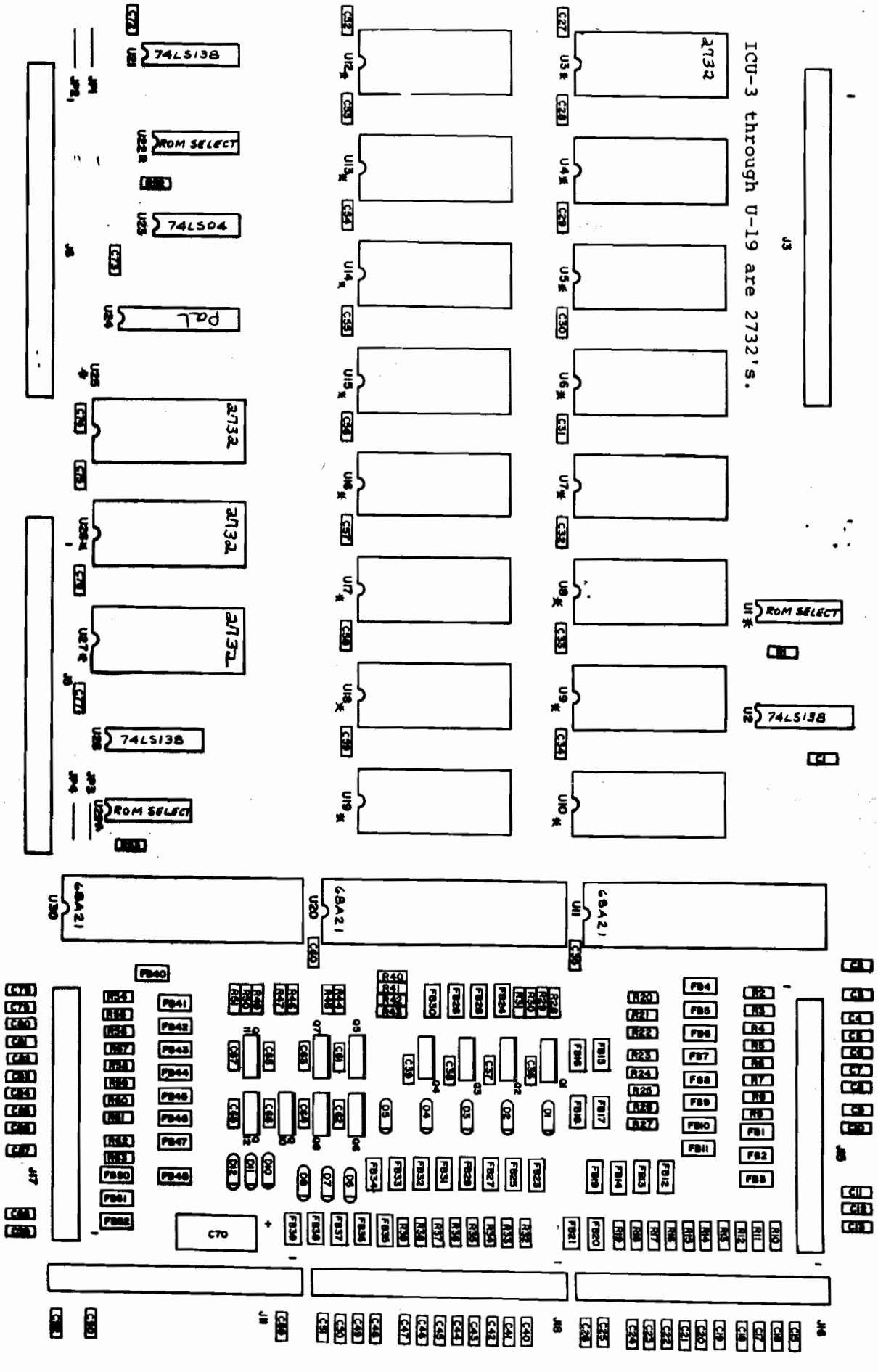
19 COIN SLOT PROGRAMMING

This screen allows the user to either select a standard coinage setting for the game or program his own. If a standard setting is desired, use the UP and DOWN Switch to adjust the coinage setting white it is lit in green. The values for the variable will change as this number is altered. When the right selection is set, use Advance Test to return to the game.
If a non-standard setting is desired, use Advance Sub-Test Switch to move down to the variables so that they may be programmed individually. Once this switch is pressed, the setting number is set to zero to show that the location has supplied their own settings. As the lower variables are unchanged, the user may minimize his effort by first selecting a setting close to the one he desires.
Once in the programming mode, the Advance Sub-Test Switch is used to move among the variables. It will also take you back to the standard settings, if you press it by mistake. The UP and DOWN Switches are used to increment or decrement the values. Advance Test Switch will return to the game when pressed.
The coin multiplier tells how many coin units are issued for each coin through a particular slot. Coin units for credit show the number of units necessary before a credit is issued. Coin units for bonus gives the number of units necessary before a bonus credit is issued.
Minimum coin is an optional value which will keep the credits from accumulating until the specified minimum amount of coin units is reached. It is not used in any of the standard settings.

20 CMOS MEMORY FAILURE

If the message "Memory Failure - Service Required" appears on the screen, the CMOS RAM which stores all of the location programming has failed. All the values stored in the RAM are set back to factory defaults. This condition probably indicates a battery failure.

ROM I/O P.C. ASSEMBLY



WIRING DIAGRAM