Pluto 5 / Pluto 5 Casino Evaluation Board Software User Guide

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1 INTRODUCTION

This document describes the software 81-16950 supplied with the Pluto 5/ Pluto 5 Casino Evaluation Board 01-16786.

If the Evaluation Board is supplied as part of the Pluto 5 Enhanced Development Kit 01-16923, the Pluto 5 Casino is fitted with software 81-16950 in U1 & U2.

If the Evaluation Board is supplied separately as a Pluto 5 / 5C Boxed Evaluation Board, it is supplied with software in a single EPROM and matching FPGA pair for use with Pluto 5, and a second EPROM and matching FPGA pair for use with Pluto 5 Casino (5C).

Pluto 5:
- FPGA part number 21-15041-5
- EPROM part number 20-81023 programmed with software 81-16952 to produce programmed part number 21-16976.

Pluto 5 Casino:
- FPGA part number 21-15829-3
- EPROM part number 20-81023 programmed with software 81-16950 to produce programmed part number 21-16975.

The Evaluation Board is used with an external Pluto 5 or Pluto 5C controller board. The EPROM's, FPGA, Pluto 5 Casino Controller Board and Evaluation Board are supplied as part of the Pluto 5 Enhanced Development Kit. The Pluto 5 or Pluto 5C controller board can optionally be fitted with a Calypso 16 video control board, also supplied as part of the Enhanced Development Kit.

The software performs a series of tests to verify that a controller board is functioning correctly. This is intended as a service aid for customers, and not as development product. The tests are divided into two main areas, those that are automated and those that are driven from a user menu. If a Calypso 16 video control board has been fitted, basic video tests can be performed using the same software.

1.1 Pluto 5 Casino tests

Tests that are in ***Bold Italics*** are only applicable to the Pluto 5 Casino controller board.

2 AUTOMATED TESTS

The automated tests are divided into two types; those performed on system start-up and those activated in interrupt routines.

2.1 Tests performed at start-up

	Functionality	**Test**
1	Sound	Sound is played on audio channel 2. (Ensure speaker 'AUDIO RIGHT' is switched ON.)
2	Multiplexed Outputs	An X is displayed on the multiplexed outputs
3	VFD	A test message is displayed on the VFD
4	Multiplexed LEDs	The multiplexed LEDs display the characters 0 – F
5	Video Control Board	If a Calypso16 Video Board is fitted to the control board and connected to a monitor 'Pluto' will be displayed on a white background.

2.2 Tests performed in interrupt routines

	Functionality	Test
1	Inputs/Open Drain Outputs	Outputs 0 – 31 are updated based on the state of inputs 0 – 31.
2	Open Drain Outputs	Outputs 32 – 63 are stepped 'ON' then 'OFF' in succession

3 MENU DRIVEN TESTS

3.1 Menu Controls

A user menu is displayed using the VFD on the Evaluation Board. The menu can be navigated using switches connected to the inputs IP13, IP14 and IP15. The menu control functionality is described in Table 1.

Switch Number	**IP13**	**IP14**	**IP15**
Functionality	SELECT This switch allows the user to select the menu item that is currently displayed on VFD1	SCROLL This switch allows the user to scroll through the current active menu	RETURN This switch allows the user to return from a sub-menu to the main menu
Note: The three inputs can be activated using either the input toggle switches or the labelled dedicated buttons. The toggle switches can be switched ON/OFF or toggled. The functionality associated with a particular switch will only be activated after the switch has returned to the OFF position.			

Table 1. Menu control switch functionality

3.2 Tests Driven from the VFD Menu

3.2.1 Main Menu

The menu system contains a top-level main menu that lists the functional areas that can be tested. The functional areas are shown below.

	Main Menu Item	Description
1	AUDIO	Provides entry to the Audio sub-menu
2	REELS	Provides entry to the Reels sub-menu
3	UART	Provides entry to the UART sub-menu
4	DIL SW	Provides entry to the DIL Switches sub-menu
5	METER	Allows the meter sense to be tested
6	VFD2	Allows VFD2 to be tested
7	EEPROM	Provides entry to the E^2 EEPROM sub-menu
8	RTC	Provides entry to the Real Time Clock sub-menu
9	***PIC***	***Provides entry to the PIC sub-menu***
10	EPROM	Allows the EPROM checksum to be verified
11	***PL5CSRAM***	***Provides entry to the Pluto 5 Casino SRAM sub-menu***
11	VIDEO	Provides entry to the Calypso 16 Video sub-menu

3.2.2 Audio Menu

The Audio menu allows the following tests to be run:

	Audio Menu Item	Description
1	PLAY SND CH1	Plays a sound sample on channel 1
2	PLAY SND CH2	Plays a sound sample on channel 2
3	INC VOL	Increases the volume on both channels 1 and 2
4	DEC VOL	Decreases the volume on both channels 1 and 2

3.2.3 Reels Menu

To run the following tests, 4 Starpoint 12 RM, 48 step reels must be attached to the Evaluation Board. The Reels menu allows the following tests to be run:

	Reels Menu Item	Description
1	INIT	The reels initialise to their reference positions. If the reference position is attained OK is displayed. If the initialisation is unsuccessful BAD is displayed
2	STEP1	Step reel 1 through 1 position. (1/16 rev)
3	STEP2	Step reel 2 through 1 position. (1/16 rev)
4	STEP3	Step reel 3 through 1 position. (1/16 rev)
5	STEP4	Step reel 4 through 1 position. (1/16 rev)
6	SPIN	Spin all reels and wait for them to stop in sequence, but not necessarily in their initialisation position.
7	STATUS	Report the reel status in the following format TAB= Number of times a reel tab has been expected but not detected. COR= Number of times the position of the reel has been corrected as a result of the tab being detected. The reel status is then cleared.

3.2.4 UART Menu

The UART menu allows the following tests to be run:

	UART Menu Item	Description	Output
1	RX CH A	Receives a character on channel A.	Displays PASS or FAIL on the VFD
2	RX CH B	Receives a character on channel B.	Displays PASS or FAIL on the VFD
3	***RX TX CH C***	***Receives and transmits a character on channel C.***	***Displays PASS or FAIL on the VFD***
4	***RX TX CH D***	***Receives and transmits a character on channel D.***	***Displays PASS or FAIL on the VFD***
5	***RX TX CH E***	***Receives and transmits a character on channel E.***	***Displays PASS or FAIL on the VFD***
6	***RX TX CH F***	***Receives and transmits a character on channel F.***	***Displays PASS or FAIL on the VFD***
7	***RX TX CH G***	***Receives and transmits a character on channel G.***	***Displays PASS or FAIL on the VFD***
8	RX TX CGA VGA	Receives and transmits on the CGA/VGA UART.	Displays PASS or FAIL on the VFD

Reception on channels A and B can be tested by:

- connecting a PC be to the relevant connector and a terminal emulation program used to send a character to the UART
- setting the channel loop back switch on the Evaluation Board to receive the character that is sent out in the 250ms interrupt routine

When channels C –G are tested a character is transmitted and the software waits for up to 5 seconds to receive a character. Reception can be tested by:

- ***connecting a PC be to the relevant connector and using a terminal emulation program used to send a character to the UART***
- ***setting the channel loop back switch on the Evaluation Board to receive the character that is sent out in the transmit part of the test***

Channel H is TTL RS422/RS485. This signal is not RS232 buffer inverted.

When a Calypso 16 video control board is fitted and the CGA/VGA UART is tested a character is transmitted and the software waits for up to 5 seconds to receive a character. Reception can be tested by:

- connecting a PC be to the CGA/VGA serial connector and using a terminal emulation program used to send a character to the UART
- setting the channel loop back switch on the Evaluation Board to receive the character that is sent out in the transmit part of the test

3.2.5 DIL Switch Menu

The DIL Switch menu allows the following tests to be run:

	DIL Switch Menu Item	**Description**
1	READ DIL1	Read the current setting of the first bank of DIL switches and display the result on the VFD: 0 = Off, 1 = On
2	READ DIL2	Read the current setting of the second bank of DIL switches and display the result on the VFD: 0 = Off, 1 = On

3.2.6 Meter Sense

This test will display the state of the meter sense switch on the Evaluation Board. A 0 is displayed on the VFD if the switch is OFF, and a 1 if the switch is ON. The RETURN switch will exit from this option and return to the main menu.

3.2.7 VFD2

To run this test a VFD must be connected to the VFD 2 connector on the Evaluation Board. The test will display a scrolling alphabet on VFD2. The RETURN switch will exit from this option and return to the main menu.

3.2.8 EEPROM Menu

The EEPROM menu allows the following tests to be run:

	EEPROM Menu Item	**Description**	**Output**
1	WRITE EEPROM	Writes a character to the E^2 EEPROM device	Displays PASS or FAIL on the VFD
2	READ EEPROM	Reads a character from the E^2 EEPROM device	Displays PASS or FAIL on the VFD

3.2.9 RTC Menu

The RTC menu allows the following tests to be run:

	RTC Menu Item	**Description**	**Output**
1	READ RTC	Reads the real time clock	Displays the time since the last PIC reset on the VFD
2	WRITE RTC	Writes to the real time clock	RTC is reset to 0. This can be verified by reading the RTC.

3.2.10 PIC Menu

The PIC menu allows the following tests to be run:

	PIC Menu Item	Description	Output
1	***READ PIC***	***Reads the PIC status bit***	***Displays PASS or FAIL on the VFD***
2	***WRITE PIC***	***Writes to the PIC status bit***	***Displays PASS or FAIL on the VFD***
3	***PIC RTC READ***	***Reads the PIC RTC value***	***Displays the current PIC RTC value on the VFD***
4	***PIC RTC RESET***	***Resets the PIC RTC to 00:00:00***	***Displays a reset message on the VFD***
5	***POWER OFF INPUTS Note: This test will be implemented in a future release***	***Read the Power off input log latest entry***	***Displays the switch status and timestamp of the latest log entry on the VFD***

3.2.11 EPROM checksum

This option will calculate the checksum of the EPROM and compare it to the value stored on the EPROM. If the values match CHKSUM PASS will be displayed on the VFD. If a mismatch occurs CHKSUM FAIL will be displayed. The RETURN switch will exit from this option and return to the main menu.

3.2.12 PL5CSRAM Menu

The PL5CSRAM menu allows the following test to be run:

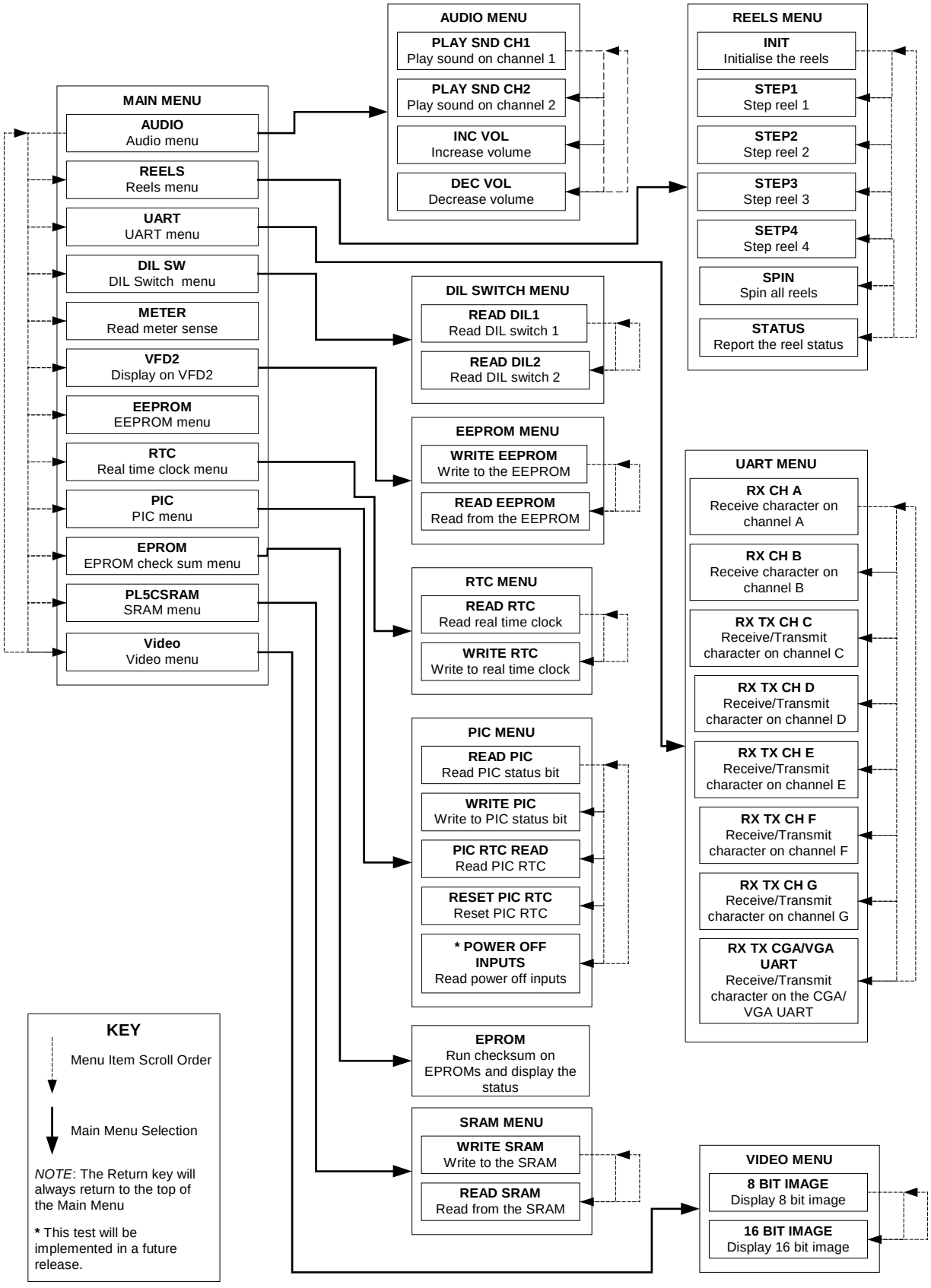
	PL5CSRAM Menu Item	Description	Output
1	***W R SRAM***	***Writes a character to the Secondary SRAM and reads the character back.***	***Displays PASS or FAIL on the VFD***

3.2.13 VIDEO Menu

If a Calypso 16 video control board has been fitted, the Video menu allows the following tests to be run:

	VIDEO Menu Item	Description	Output
1	DISPLAY 8 BIT	Display an 8-bit image on the video display.	An 8-bit image of the Queen of Hearts playing card is displayed on the video monitor.
2	DISPLAY 16 BIT	Display a 16-bit image on the video display.	A 16-bit fractal image is displayed on the video monitor

Figure 1 – VFD Menu Structure



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