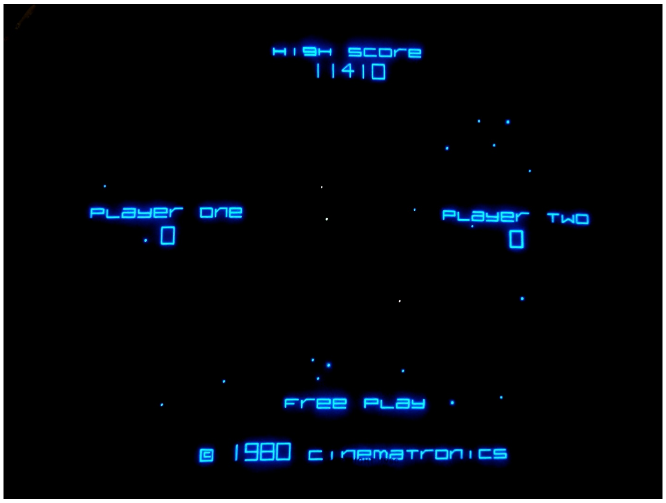
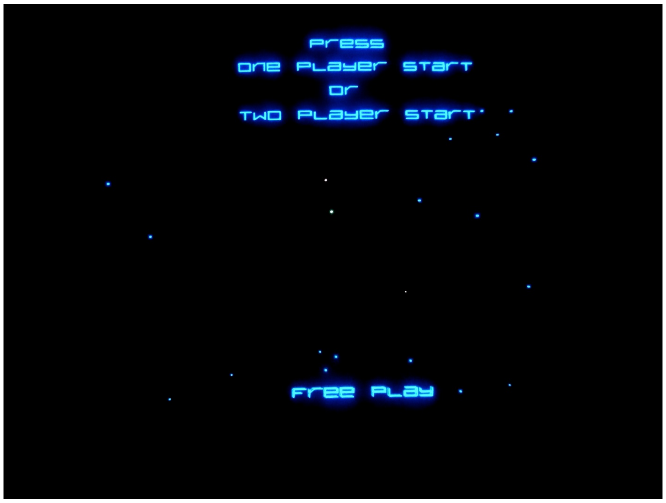
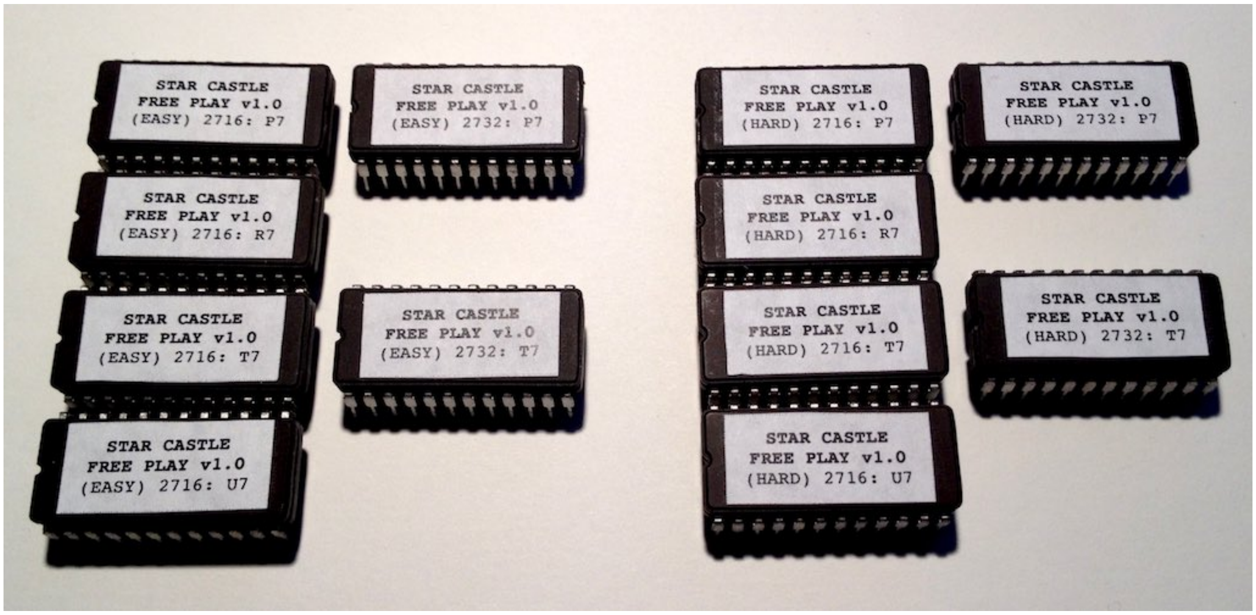
Cinematronics Star Castle Free Play v1.0





$49 including USPS First Class shipping (USA).
Choose one of the following four options:


STAR CASTLE FREE PLAY v1.0 (EASY) 2716: P7
STAR CASTLE FREE PLAY v1.0 (EASY) 2732: P7
STAR CASTLE FREE PLAY v1.0 (EASY) 2716: R7
STAR CASTLE FREE PLAY v1.0 (EASY) 2716: T7
STAR CASTLE FREE PLAY v1.0 (EASY) 2732: T7
STAR CASTLE FREE PLAY v1.0 (EASY) 2716: U7
STAR CASTLE FREE PLAY v1.0 (HARD) 2716: P7
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STAR CASTLE FREE PLAY v1.0 (HARD) 2716: U7

Easy Version: Four 2716 eproms, or two 2732 eproms
This is the easier version with high scores recorded of over 10,000,000.
Identified by display of “SHIPS LEFT” after destroying Star Castle only if player died.
Star Castle (older) (starcas1) in M.A.M.E.

Hard Version: Four 2716 eproms, or two 2732 eproms
This is the harder version with high scores recorded less than 30,000.
Identified by game always displaying “SHIPS LEFT” after destroying Star Castle.
Star Castle (Version 3) (starcas) in M.A.M.E.

Overview

The Star Castle Free Play adds the following features to the Star Castle roms:

1. A free play mode that can be toggled on or off via the test pattern dipswitch and replaces on-screen credits with FREE PLAY text. In free play mode the attract mode is not a static display, but continues to rotate between the Star Castle Demo, Scores & High Score Screen, and Press 1 or 2 Player Start Screen. Pressing 1 or 2 player start at any time during the attract mode starts a new game.

2. Switching between Free Play mode and Coin Operated mode can be done while the machine is on. Credits are set to zero when switched back to Coin Operated mode.

3. Fixes a minor bug in the original game in which the Scores Screen flashes on the display when a new game is started while on the Press Start Screen.

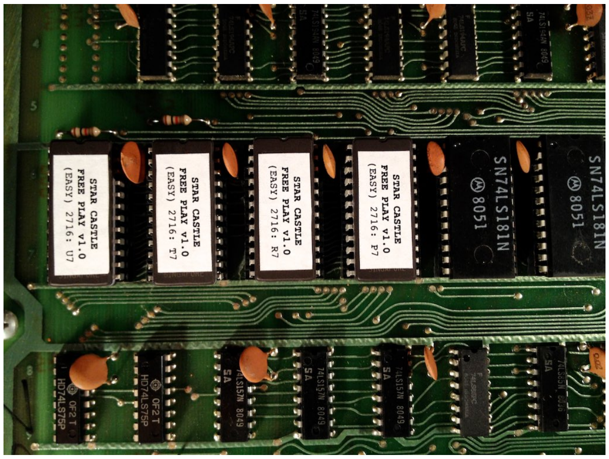
4. The free play roms can be installed into 8k (2716) Cinematronics PCBs using four 2716 eproms OR into 16k (2732) Cinematronics PCBs using two 2732 eproms. The 8k (2716) boards are standard for Star Castle. The 2732 eproms can be used to install the Star Castle Free Play in a board such as Cinematronics (not Rock-Ola) Armor Attack. Currently shipping on new ST Micro 2716 or 2732A eproms.

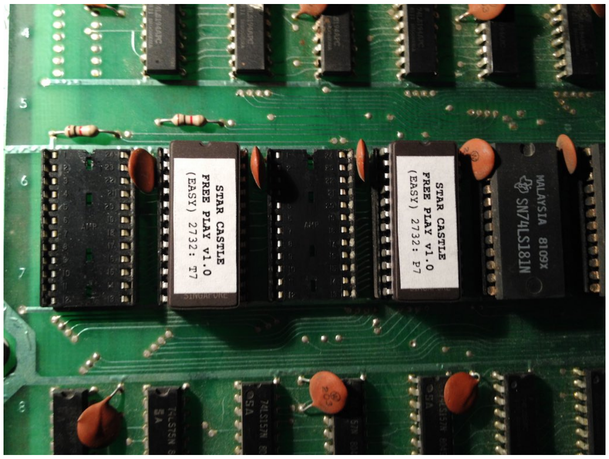
5. For those with an eprom burner, the initial high score can now be set by editing four bytes within one rom image and burning and installing the new eprom. This can be used as a rudimentary high score save. In the original roms, the high score is never specifically set- at startup a loop just clears all memory locations to $000.

Please Note:
There is very little free space available in the original Star Castle roms. The code for the test pattern has been removed in order to have space to add the free play option.

In free play attract mode, the Star Castle Demo remains on screen twice as long as in the coin operated mode.

Installation Overview





The Star Castle Free Play is a simple rom swap.

Power off the machine and insert the new eproms maintaining the same orientation (the notch on the chip) as in the previous chips. Since the roms are sent on new eproms, the legs may need to be bent inward slightly to properly fit in to the sockets on the Cinematronics PCB.

On a 8k board, replace P7,R7,T7,U7.

On a 16k board, replace P7 and T7. R7 and U7 are not accessed and can be unpopulated or can contain eproms left from another game.

Before powering up, verify that all the chip legs are in the sockets and that all the chips are oriented correctly. Inserting the chip backwards and powering up the game can destroy the chip.

Switching between Free Play and Coin Operation

Original Star Castle Option Switches:
Switch 7:
ON = NORMAL OPERATION
OFF = TEST PATTERN

Star Castle Free Play Option Switches:
Switch 7:
ON = COIN OPERATION
OFF = FREE PLAY

All others are identical.

Setting the Initial High Score:

Only the one rom containing the high score data needs to be updated to change the initial high score setting.

High Score Data Format: HHHLLL0
HHH: High Byte: Number between $000-$3E7 (000-999)
LLL: Low Byte: Number between $000-$3E7 (000-999)

I recommend using a programmer calculator for the calculations below (there is one built into MacOS and Windows as well as websites that will do the calculations). For both the high and low bytes do the following:

1. Take the 3 digit base-10 number (000-999) and note the binary values of bits 0 and 1. Store the corresponding hex value in the table below into the appropriate offset of the rom.

Bits (0-1)	Hex Value
00	$00
01	$01
10	$02
11	$03

2. Use the shift 1-bit to the right function TWICE. Switch the display to hexadecimal. Store this number into the appropriate offset of the rom.

3. Test in MAME to confirm all is well, then burn and install the updated rom.

Why is this so complex? A byte in the Cinematronics ram is 12-bits wide, while a byte in the roms are 8-bits wide. To store a 12-bit number in the roms, we have to break it into two 8-bit bytes and then reassemble them.

It seems like it would make more sense to store the top two bits (8 & 9) separately rather than the bottom two... This is done to save a few instructions in the reassembly code. Space is tight: I have 1 byte in the lower bank and 2 in the upper bank available.

Setting the High Score for 8k (2716) boards
2716: Edit Rom U7

Modify:
(Offset: $7FC) High Score High Byte (Bits 2-9): Number between $00 - $F9
(Offset: $7FD) High Score High Byte (Bits 0-1): Number between $00 - $03

(Offset: $7FE) High Score Low Byte (Bits 2-9): Number between $00 - $F9
(Offset: $7FF) High Score Low Byte (Bits 0-1): Number between $00 - $03

Setting the High Score for 16k (2732) boards

2732: Edit Rom T7

Modify:

(Offset: $FFC) High Score High Byte (Bits 2-9): Number between $00 - $F9

(Offset: $FFD) High Score High Byte (Bits 0-1): Number between $00 - $03

(Offset: $FFE) High Score Low Byte (Bits 2-9): Number between $00 - $F9

(Offset: $FFF) High Score Low Byte (Bits 0-1): Number between $00 - $03