ColecoVision ROM Update Project
Commercial Releases (1982 – 198x)

by Ikrananka - Version 2.2 – 13th November 2021

Contributors: AtariAge members NIAD, Pixelboy, nanochess, The Great Hierophant, Pitou, pearsoe & omonim2007.

Why Another ROM Set?

It is well known that many of the ColecoVision ROM files and ROM file collections available in the public domain are a mess and include major inconsistencies, multiple incorrect versions, missing versions, bad dumps, overdumps, underdumps, etc. This project seeks to rectify this situation by compiling the definitive ColecoVision ROM package for all titles that were commercially released throughout the 1980s.

Project Objective

The objective of this project is to compile a complete and clean set of ROM files for all of the titles commercially released for the ColecoVision from inception through to, and including, the 1980s Telegames releases. This project specifically excludes all non-commercial and unofficial releases such as demos, prototypes, hacks, bootlegs and test cartridges, but does include reproductions where they were commercially released as well as fixes to ROMS with known issues.

Methodology

Cartridge Dumping

All cartridges have been redumped using one of the following cartridge edge ROM dumpers in order of preference. Where issues were experienced dumping with the first option then the second option was used instead.

1. AtariMax Maxflash USB Cartridge Programmer with ColecoVision Cartridge Dumping Adaptor (http://www.atarimax.com/flashcart/documentation) with Maxflash Cartridge Studio 2.0 software.
2. AtariMax 128-in-1 USB Flash Multi-Cart (modified to dump roms) with handmade ColecoVision Cartridge Dumping Adaptor with ColecoVision Multi-Cart Studio 1.4 software modified to dump ROMs.

All cartridges were dumped three times and then the three files compared to ensure that the dumps were consistent. Where inconsistency was found the carts were re-dumped until consistency was achieved.

File Naming

File naming follows that of The Old School Emulation Center (TOSEC), as defined in detail in their latest "TOSEC Naming Convention" dated 27th August 2011. Clarifications to this were sought and discussed here: http://www.tosecdev.org/forum/tosec-naming-convention/colecovision-multiple-publishers.

Where a title was released by multiple publishers at different times, I have chosen to only specify the publisher for the first release unless it was absolutely necessary to specify more than one, for example in the case of multiple versions released in different regions. This approach was chosen to ensure that file names would be kept to a reasonable length.

Change Log

V2.2 (13 Nov 2021)

- Confirmed that the last 4K of the 16K James Bond 007 ROM is simply a copy of the prior 4K [omonim2007]. As such, this last 4K has been deleted with the 16K ROM now replaced with the correct 12K ROM. Refer to the "Repeated Code to Fill ROM" section of this document for details.

V2.1 (13 Oct 2021)

- Added a new "fixed" Moonsweeper ROM that eliminates the graphical glitches present in the original commercial cartridge releases [pearsoe]. The original Moonsweeper ROM is retained for completeness and historical accuracy.

V2.01 (6 Jul 2021)

- Confirmed that all known releases of Frogger included 16K of ROM data but with the last 4K being a copy of the prior 4K. While the 12K ROM included in v2.0 of this project is correct and excludes the superfluous last 4K, this document failed to include Frogger in the list of ROMs that included a repeat of the last 4K. Therefore, this document has been updated accordingly. [Pitou]
- Identified that both versions of the Miner 2049er ROM were also released in Canada and not just the US. [Pitou]
- Added an important note to the "Repeated Code to Fill ROM" section. [ChildOfCv]

V2.0 (17 Nov 2019)

- Frontline ROM renamed to Front Line, i.e. two words and not one.
- Canadian Choplifter! and Zaxxon cartridges dumped and found to be identical to the previously dumped US releases. So, no additions to the rom database necessary. Thanks to nanochess for loaning the carts to me way back in August 2015!
- The Meteoric Shower ROM in v1.2 of this project was identified by The Great Hierophant to be an overdump by 4KB. Meteoric Shower is included as the built-in game in the Dina 2-in-1 (also known as the Telegames Personal Arcade). The Great Hierophant found that if you separate the game from the BIOS, which is 8KB, and remove the last 4KB from the v1.2 of this project's ROM, the two files differ by exactly one byte. That byte is an ASCII 6, as in Copyright 1986 for the Dina BIOS version, and 3 as in Copyright 1983 for the ColecoVision cartridge version. Examination of this project's v1.2 overdumped ROM region (above 8KB) was indeed found to contain no game code/data and as such the 4KB overdump region has been deleted reducing the ROM size in v1.3 of this project to 8KB.
- The reason for there being two released versions of Pistop has been determined. One was an earlier release that contained a minor bug. The later release eliminated this bug. Refer to the Pitstop section of this document for details.
- Created a new **Phoenix-AtariMax ROM Set** designed to be simply copied to an SD card for direct use on a CollectorVision Phoenix console or an AtariMax Ultimate SD cartridge. This ROM set is simply a copy of the main TOSEC ROM set with the following changes:
    - All files unzipped as zipped files cannot be read by the Phoenix or the AtariMax Ultimate.
    - Changed the extension of the filenames from "bin" to "rom" as this allows the extension to be hidden on the AtariMax via a cartridge onboard setting.

- Shortened filenames to a maximum of 40 characters (the max supported by the Phoenix). Only a few names exceed the 32 character limit of the AtariMax but they are quite obvious what the game names are so I have left them as-is.
- Deleted the copy of the Pitstop game ROM that contains a known bug, leaving just the later bug fixed version in the Phoenix-AtariMax ROM set (see above).
- ROM files are organised both by Alphabet and by Publisher. Therefore, there are two copies of each ROM within this ROM set.

v1.2 (16 Aug 2014)

- Major update to Sector Alpha. The ROM has been updated from binaries obtained from reading each individual mask ROM on the cartridge PCB. 2KB of never dumped before data have been found. The new ROM is considered to be the definitive dump of the game. This has been fully documented in a major update to the Sector Alpha section of this document including instructions on how to fix your own cartridges to access the missing 2KB.
- Tank Wars (Bit Corp.) cartridge dumped by NIAD and found to be the same as the existing Telegames dump. NIAD has also confirmed that Tank Wars was releases in Europe in 1983 in CIB form meaning that the Telegames version was a re-release. As such, the Tank Wars ROM file has been renamed accordingly (the ROM content is identical).

v1.1 (30 Jun 2014)

- Initial public release.

v1.0 (9 May 2014)

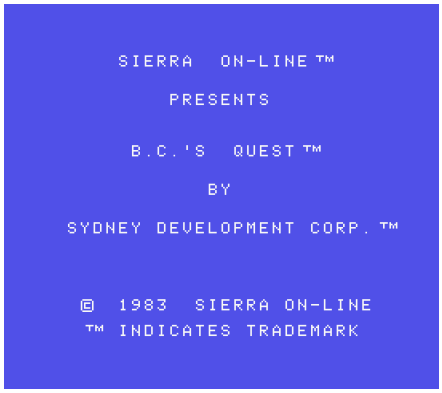
- Private limited release that excluded pending work on Donkey Kong, Sector Alpha and Victory.

Discussion of Major Findings

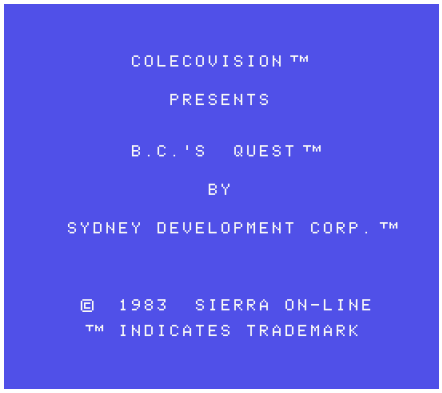
BC's Quest for Tires

The US and Canadian ROMS are different. The publisher's name on the title screen has been changed from "SIERRA ON-LINE" in the US version to "COLECOVISION" in the Coleco (Canada) version. The last byte is also different. Other than that the ROM files are identical and therefore should play exactly the same game (although the effect of the last byte being different is not known).

US Version



Canadian Version



BC's Quest for Tires II

The US and Canadian ROMS are different. The US version uses the standard ColecoVision title screen while the Canadian version uses a custom text title screen which subsequently shows a second screen with credits to the game developers. The ROM files contain over 1K of other differences and as such the game play may well be different between them.

US Version



Canadian Version

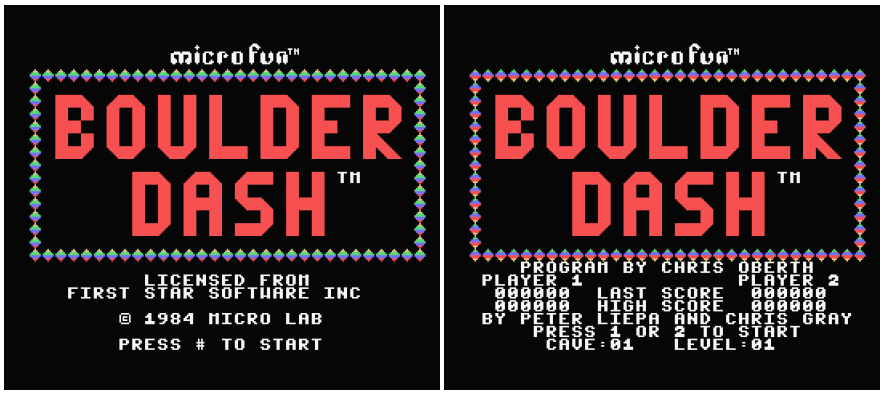




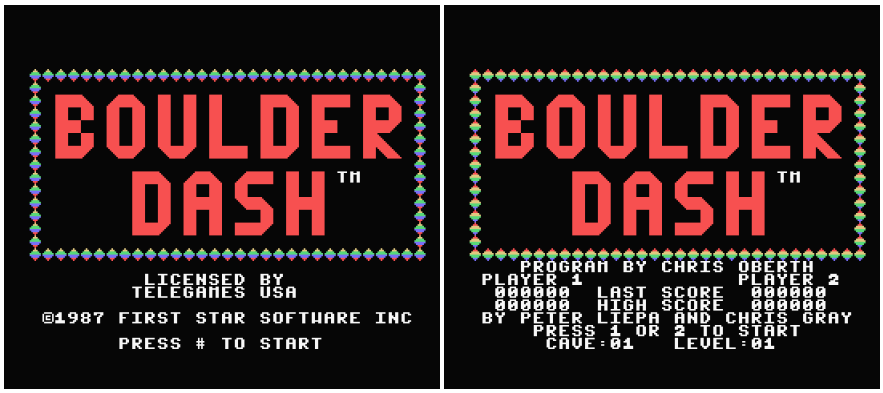
Boulder Dash

There are two main (unhacked) ROM files for Boulder Dash in the public domain, (i) a so called Micro Fun ROM that shows the Micro Fun logo and ©1984 on the title screen, and (ii) a Telegames USA version without the Micro Fun logo and ©1987 on the title screen - see screenshots of both below. Despite the game having been completed Micro Fun never did commercially release Boulder Dash. The Micro Fun ROM file that has been around for many years is believed to have been leaked – although this is unconfirmed. The Telegames USA release has been the only official commercial release of Boulder Dash and as such is the only version included with this project. It is interesting to note that when comparing the two ROM versions, Telegames USA deleted references to Micro Fun from the title screens as well as changing the licensing and copyright notices. There are also over 50 bytes of other differences between the two ROM files, however the purpose of these changes and if they affect game play is unknown.

Micro Fun Version



Telegames USA Version



There are also two “trained” (hacked) versions of Boulder Dash in the public domain that increase the number of lives from 3 to either 9 or 50. These trained ROM files are based on the Micro Fun ROM with the number of lives changed by modifying byte 0x19C0. However, trained/hacked ROMS are not commercial releases and as such they are not included with the ROM files in this project.

Cabbage Patch Kids - Adventures in the Park

New ROM dumps from a range of carts from different publishers, i.e. Coleco, Coleco (Canada) and CBS Electronics all resulted in the same ROM file. The title screen for this ROM displays "©1983 OAA, INC. ©1984

KONAMI" with "BABYLAND PARK " on the wall on the first game screen. This matches the so called OAA prototype ROM that has been in the public domain for many years. The long standing main public domain ROM file (i.e. the one not labelled as a proto) displays "©1984 COLECO" with "BABYLAND GENERAL " on the wall on the first game screen and also displays the name "ANNA LEE" in the bottom left-hand corner.

Enquiries on the AtariAge forums (http://atariage.com/forums/topic/110090-antarctic-adventure-cabbage-patch-kids-cv-rom-variants/ and http://atariage.com/forums/topic/215910-cabbage-patch-kids-adventure-in-the-park-cart-variants/) found that the cartridges owned by all of the respondents play the "OAA" version of the game. So far, we have not found a commercial release cartridge that plays the so-called "COLECO" version and therefore the source of this ROM is not known and may in fact be a proto or a hack. As such this version is NOT included in this ROM package.

Other observed differences between the two ROM files are as follows:

OAA Version

1. The title screen is contained within the game code at the end of the ROM file. This bypasses the standard BIOS title screen and has a 5 second display compared to the standard 10 seconds. Because of this it is not possible to skip the title screen using the modified BIOS with the skip on fire button feature.
2. The game select screen only displays two options, i.e. press 1 for a one player game or press 5 for a two player game. However, pressing 2, 3 or 4 also starts a one player game while pressing 6, 7 or 8 starts a two player game. It is not known if the game difficulty changes when pressing these other options.

So-called "Coleco" Version

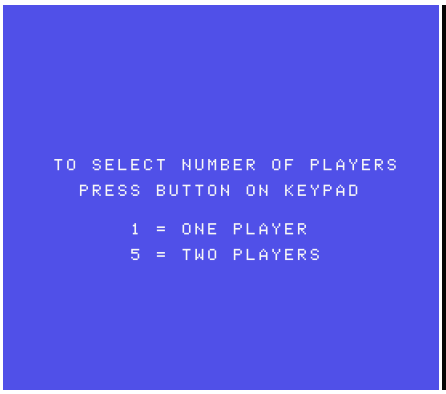
1. The bytes for the "OAA" title screen are not there and contain all 0xFF values. Therefore, it has been assumed that the main title screen is using the ColecoVision BIOS routines.
2. The bytes for the "OAA" game select screen are not there and contain all 0xFF values. Therefore, it has been assumed that the game select screen is using the ColecoVision BIOS routines (it is the standard 8 game options affair). With the rest of the ROM being more or less identical to the "OAA" version it is believed that pressing, for example, 3 in the game option screen will start exactly the same skill level in both versions despite the fact that the "OAA" game option screen doesn't explicitly indicate skill options. However, this has not been confirmed.

It should also be noted that an enhanced "Super Game" ROM exists. This is strictly a ColecoVision game and not anything enhanced specifically for the ADAM and has been around since the mid-1980s. Someone edited the title screen and added the text "128K" due to the fact that in order to play it on an ADAM, one needed at least a 64K Memory Expander installed (64K base memory plus 64K expanded memory = 128K) due to the program that was used to setup the ROM being on a self-booting ADAM disk or data pack. It is believed that this reliance on the additional 64K of expanded memory was removed with additional versions that people setup on self-booting ADAM media. The Super Game version is NOT included in this ROM package due to it not being commercially released on a ColecoVision cartridge.

Screenshots of the various versions are shown below.

OAA Version (Verified Release)

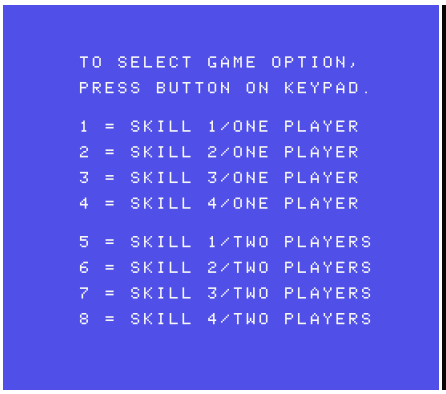






So-called “Coleco” Version (Unverified Release)

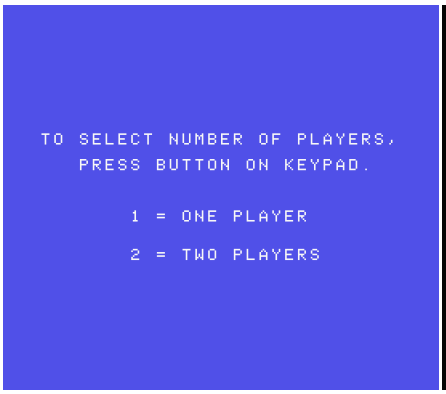




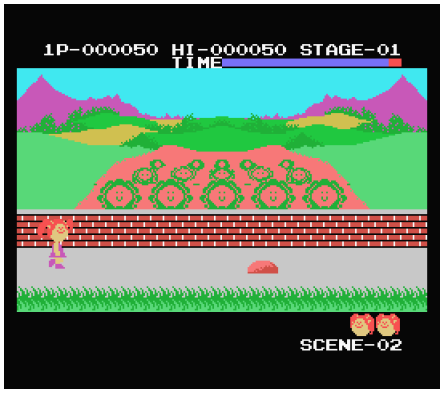


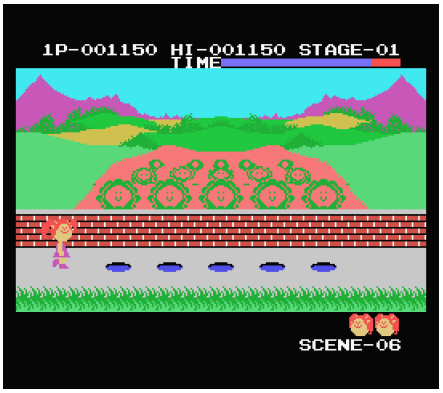
128K Game Version











Cabbage Patch Kids – Picture Show

The old public domain ROM file for Cabbage Patch Kids – Picture Show is 24K in size, the same as the new ROM dump. However, examination of the last 1K of the old ROM file highlighted something rather odd, i.e. the last 1K looks like code/data but is preceded by 160 bytes of free space marked with 0xFF values. Typically the start of a block of 0xFF values at the end of a ROM file indicates the end of the game code/data. The new ROM dump also had 0xFF values starting at the same location but they continue on to the end of the file and do not include the end of file 1K of code/data in the old ROM. Further investigation revealed that this 1K of code/data is NOT a copy of any of the other code/data found in the first 23K (see Repeated Code to Fill ROM section below). In fact the 1K of code/data has been copied from the "Popeye (1983)(Parker Brothers)" game ROM (starting at 0x2F00). Therefore, it has been concluded that the final 1K in the old public domain ROM was inserted by mistake and in fact should not be there. Regardless, with the extra code/data being inserted in an area that the game code does not access, the old public domain ROM was still fully playable. Needless to say, the new ROM does not include the bogus code/data from the Popeye game.

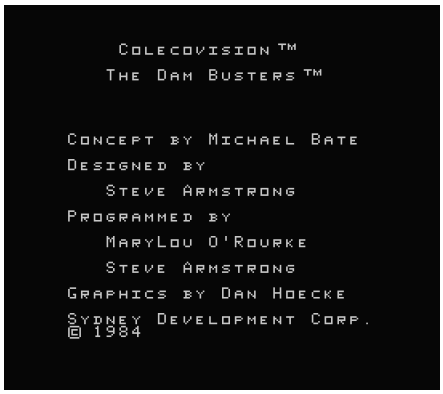
The Dam Busters

The US and Canadian ROMS are different. The US version uses the standard ColecoVision title screen while the Canadian version uses a custom text title screen that includes credits to those who created the game. The ROM files contain over 1K of other differences and as such the game play may well be different between them.

US Version



Canadian Version



Defender

The standard Defender ROM contains a couple of bugs:

1. **Problem:** PAL ColecoVision – Radar is blank.

   Reason: The PAL Video Display Processor (VDP) has a larger retrace time and it updates its sprite table too early so the radar doesn't appear on screen.

2. **Problem:** Coleco ADAM – Pressing "up" on the joystick doesn't work and the right side fire button (for smart bombs) doesn't work.

   Reason: The code doesn't have a wait time between selecting joystick/keyboard ports.

A new fixed [f] ROM has been developed to eliminate the above bugs. This fixed ROM automatically detects if the ColecoVision is an NTSC or PAL unit and if a PAL unit is detected adds the delay required for the radar to be displayed. Therefore, in theory, the fixed ROM could be considered to be the definitive Defender ROM and used on all systems. However, the fixed ROM has not been extensively tested on an NTSC unit and therefore in this case it is recommended to play the original ROM file.

Thanks to nanochess and NIAD from AtariAge for the above information, solution and fixed ROM file. Thanks to NIAD, ed1475 and ten-four from AtariAge for testing the new rom file on the various systems. Please refer to http://atariage.com/forums/topic/207140-defenders-radar-can-anyone-fix-it/ for the complete discussion on this topic.

Donkey Kong

Donkey Kong was the pack-in cartridge for the ColecoVison system and was originally released in the US {and Canada?} in August 1982 with a 24K ROM version of the game. Unfortunately, this version of Donkey Kong included a number of significant bugs (see the table below). Starting around January/February 1983, Coleco introduced a 16K ROM version of Donkey Kong as the system pack-in game. It is believed that the 16K version was introduced to address some of the bugs in the game while simultaneously reducing costs due to the reduction in the size of the ROM chips from 24K to 16K.

It should be noted that the ColecoVision was not released in the UK and Europe until well into 1983 and as such those regions only ever received the 16K version of Donkey Kong. This makes the 24K version exclusive to the US and Canada.

There are notable differences between the 24K and 16K ROM versions of Donkey Kong:

Item	24K Version	16K Version
Ramp Screen - Warp Bug 1. Climb halfway up the first broken ladder and then climb down. 2. Move 2 steps to the left (so Mario's back is barely touching the ladder). 3. Press RIGHT and after one or two steps press JUMP.	Mario disappears after execution of the glitch and then re-appears after about 12 seconds on the top girder next to Donkey Kong. However, Mario may lose a life when this is done because sometimes Donkey Kong may throw a barrel the very instant Mario lands on Donkey Kong's girder.	Executing this glitch causes Mario to fall down the girder and instantly go on to the Rivets screen.
Rivets Screen - Pauline's Hat Bug	Place Mario under Pauline's hat on the right-hand side of the Rivets' screen and jump - the hat will disappear and you'll receive the 300 points for collecting it.	Bug fixed – jumping up under Pauline's hat now has no effect.
Rivets & Elevator Screens – Pauline's Umbrella Bug	The stripes on the left-hand side of Pauline's umbrella do not continue to the right-hand side. Instead the top stripe is missing and the area between the bottom two stripes is filled in.	Bug fixed – Pauline's umbrella now includes three complete stripes from the left-hand side to the right-hand side.
Elevator Screen – Pass Through Platform Bug	At the start, if you time it so that Mario jumps off just as a platform is appearing he'll pass right through it and die.	Bug fixed – Mario now lands on the platform as he should.
All Screens - Stray Pixel Bug	There is a single stray pixel to the right of Donkey Kong when he is facing forwards.	Bug fixed - no stray pixel.
Maximum Bonus Points	Four digit bonus counter display. Maximum bonus is 8,000.	Five digit bonus counter. Maximum bonus is 99000 (@ level 97). It is believed that if this counter turns over to 00000 then Mario will instantly die (needs confirmation).
Low Bonus Warning Music	The low bonus warning music starts to play at 0900.	The low bonus warning music starts to play at 01000.
Bonus Points Death	If the bonus timer reaches 0000 you'll die.	If the bonus timer reaches 00100 you'll die. While the death music plays, the bonus timer continues to run and changes to 00000.
Ladder Speed Climb Bug	When climbing a ladder (up or down), push in the desired direction, briefly. Then let the stick center and move again. You will move twice as fast the second time.	Same as 24K version.
Mario's Death Music Bug	When Mario dies, the background music continues to play throughout the death music.	When Mario dies, the background music instantly stops and only the death music plays.

Further insight into the differences between the 16K and 24K ROM versions of Donkey Kong can be gleaned from the differences in the game instruction manuals. In the US, three versions of the guide were produced:

- Guide No. 78214 - August to October 1982 (24K ROM version)
- Guide No. 78214A - November 1982 to January 1983 (24K ROM version)
- Guide No. 78214B - February 1983 to April 1984 (16K ROM version)

US Guide No. 78214 & 78214A	US Guide No. 78214B
Front Cover Plays, sounds and scores like the DONKEY KONG™ arcade game!	**Front Cover** Plays like the DONKEY KONG™ arcade game!
There is no Step 11 in these versions of the guide.	**STEP 11: Round and round you go.** One round of play consists of five screens in this order: Ramps, Rivets, Elevators, Rivets and Elevators. Complete one round and you move on to the next, starting with Ramps at a higher level of difficulty.
SCORING **Starting Bonus Values** Level 1: 4000 points Level 2: 5000 points Level 3: 6000 points Level 4: 7000 points Level 5: 8000 points Jumping a barrel or fireball 100 points Eliminating a rivet 100 points Smashing a barrel or fireball 300 points Grabbing an accessory (hat, purse or umbrella) 300 points	**SCORING** **STARTING BONUS VALUES (ALL SKILL LEVELS)** Round 1: 4000 points Round 2: 5000 points *Round 3: 6000 points * For each succeeding round of play, add 1000 points to the previous Starting Bonus Value. Maximum Starting Bonus Value: 99000 points. Jumping a barrel or fireball 100 points Eliminating a rivet 100 points Smashing a barrel or fireball 300 points Grabbing an accessory (hat, purse or umbrella) 300 points

Notes:

1. The only differences between Guide No. 78214 and 78214A are the deletion of the word "programmable" when referring to the cartridge in "The Fun of Discovery" section and updates to the warranty.
2. It is believed that, even when the 16K ROM versions of the game were being sold with systems, at first these were accompanied by the 24K ROM guide (78214A) and only later did they include the correct 16K ROM guide (78214B).

Further discussion of the differences between the 24K and 16K ROM version as well as discussion of the various bugs (including those common to both versions) can be found online at the following locations:

- http://atariage.com/forums/topic/138997-colecovision-donkey-kong-16k-and-24k-versions/
- http://atariage.com/forums/topic/188222-cv-donkey-kong-instruction-manual-versions/
- http://www.digitpress.com/eastereggs/cvdonkeykong.htm
- http://atariage.com/forums/topic/196068-donkey-kong-16k24k-bugs/
- https://www.youtube.com/watch?v=y9pJhDb6TQw
- http://www.colecovisionzone.com/page/miscellaneous/variationcolecomanual.html

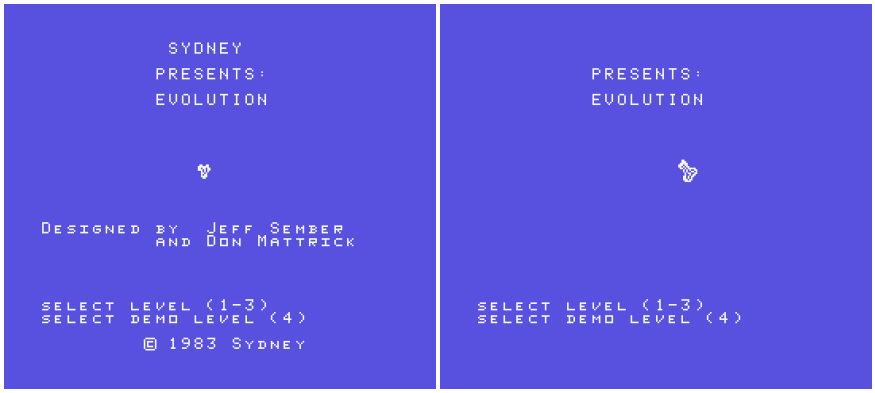
Because both the 24K and 16K ROM versions were commercially released, their ROM files have been included in this new ROM package.

Thanks to ColecoFan1981 & NIAD for their informative discussions on the AtariAge forums and for their permission to use the information that they posted in this document.

Evolution

The only difference between the Coleco Canada and Telegames releases is that Telegames removed the Sydney name as well as the game designer names from the title screen as shown below.

Coleco Canada Version **Telegames Version**



Flipper Slipper

The Telegames release of this game appears to be a simple hack of the original Spectravideo release. The only difference between the Spectravideo and Telegames releases is that Telegames removed the Spectravideo logo and all other references to Spectravideo from the title screen as shown below.

Spectravideo Version **Telegames Version**



The Heist

There are also two “trained” (hacked) versions of The Heist in the public domain that increase the number of lives from 3 to either 8 or 50 by modifying byte 0x0255 (also byte 0x15C9 has been changed from 0x00 to 0xFF). However, trained/hacked ROMS are not commercial releases and as such they are not included with the ROM files in this project.

Meteoric Shower

The ColecoVision cartridge version of Meteoric Shower has been shown to be almost identical to the version built into the BIOS ROM of the Dina 2-in-1 (also known as the Telegames' Personal Arcade), with there being only one-byte difference between them. That byte is an ASCII 6, as in Copyright 1986 for the Dina version, and an ASCII 3, as in Copyright 1983 for the ColecoVision cartridge version.

Miner 2049er

There are two correct ROM dumps for this game. Some carts have one version of the ROM while other carts have another. Regardless of the ROM version, the carts are identical Micro Fun cart shells with identical gold (US - English) or identical black and white (Canada – English/French) labels. The only way to identify which ROM your cart contains is to dump the ROM.

Comparing the two different ROM files shows that one ROM has had all of the 0x60, 0x61, and 0x62 byte values replaced correspondingly with 0x70, 0x71 and 0x72 (956 occurrences in total) - there are no other differences. It is believed that the developers reassembled the ROM changing the RAM location from 0x6000-0x63ff to 0x7000-0x73ff. This is reinforced by the fact that Coleco documentation states that the official location for RAM starts at 0x7000.

With Miner 2049er, if all the used RAM addresses fall within 0x6000 and 0x63FF, then it doesn't matter if the RAM is mirrored or not. On a ColecoVision 0x7000 to 0x73FF will be used, and on the ADAM 0x6000 to 0x63FF will be used, and the game software itself isn't aware of the difference.

It should be noted that the two ROMs that have been in the public domain for many years are as follows:

1. "Miner 2049er (1983)(Micro Fun)" = 0x6000-0x63ff version (this is actually a bad dump due to the last two bytes being incorrect)

2. "Miner 2049er (1983)(Micro Fun)[a]" = 0x7000-0x73ff version

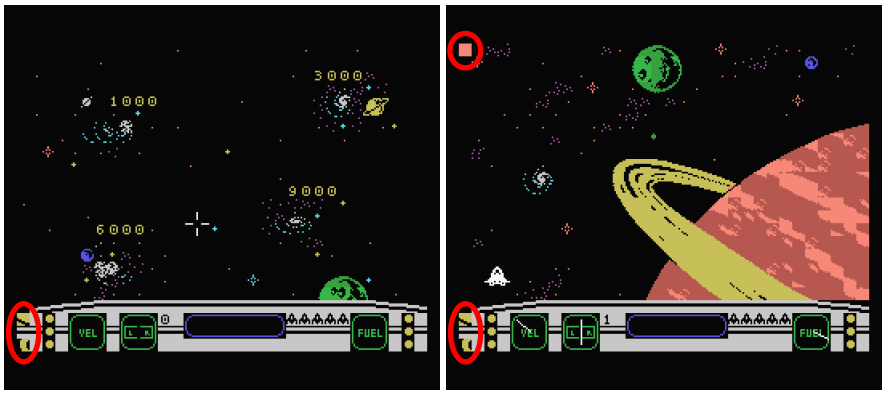
Based on the ROM reassembly described above it is believed that the 0x7000-0x73ff version is the later version and is also the most hardware compatible. Therefore, the alternate [a] tag should be applied to the 0x6000-0x63ff version and not the 0x7000-0x73ff version, i.e. the opposite to the current public domain ROM files. This change has been implemented for this new ROM dumping project.

The current public domain hacked ROMs marked as "trained" with a [t] were based on the 0x6000-0x63ff version but with the final two bytes being correct, i.e. they are not based on the bad dump mentioned above. However, trained/hacked ROMS are not commercial releases and as such they are not included with the ROM files in this project.

Moonsweeper

The cartridge release of Moonsweeper includes a couple of bugs that cause several graphical glitches on both the galaxy selection and game play screens. There are two incorrect graphic tiles in the bottom left of both screens and another incorrect tile in the top left of the game play screen. These are highlighted below within the red outlines.

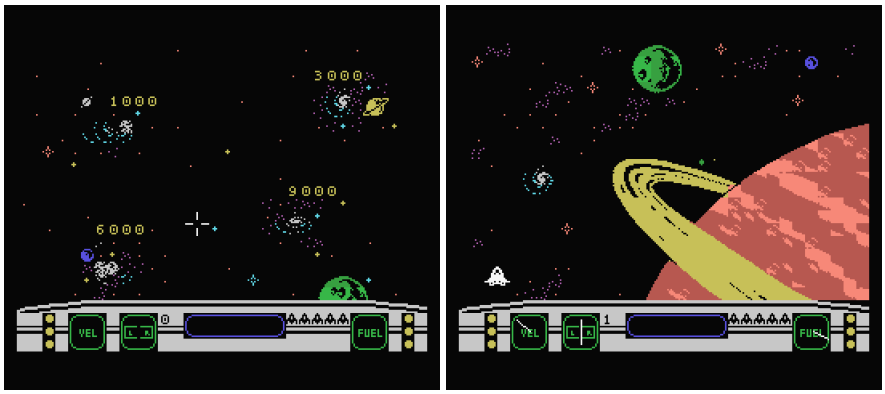
Galaxy Selection (original) **Game Play (original)**



A new fixed [f] ROM has been developed by AtariAge member pearsoe to eliminate the above bugs. Pearsoe had this to say: "The Moonsweeper ROM has two 768 byte name tables stored; one at $ACFF for the galaxy selection screen and one at $B43F for the game play screen. Both name tables had to be edited. Basically, the problem with the graphics was the wrong pattern generator was being used. I edited those name table entries to use (what I thought) should be the correct patterns."

The fixed screens now look like the following screenshots.

Galaxy Selection (fixed) **Game Play (fixed)**



Note that the original cartridge Moonsweeper ROM is retained in the ROM collection for completeness and historical accuracy.

Thanks to AtariAge member Keatah for identifying and highlighting this issue and to pearsoe for the fixed ROM. Please refer to https://atariage.com/forums/topic/325583-has-moonsweeper-ever-been-fixed-in-emulation. for the complete discussion on this topic.

Pitstop

Pitstop was published by Epyx in two different format cartridge shells, (i) an Imagic style shell and (ii) a Coleco style shell. The ROM in each of these two cart shell types differs by one byte part way through the code (at location 0x26A7). In the Imagic style shell the byte value is 0x20 while in the Coleco style shell the byte value is 0x10. Pitstop was also published in Canada by Coleco Canada and in Europe by CBS Electronics. The ROM contained in these carts is the same as that in the Epyx US published Coleco style shell, i.e. the byte at location 0x26A7 is set to 0x10.

So, what does changing this byte do to the game? Well, with the invaluable help of nanochess we managed to figure this out. Nanochess disassembled and analysed the game code and identified that this byte sets the limit of how far left the white cursor (**+**) can be moved when the player's car is in the pits. When the byte is set to 0x20 the left limit x-coordinate is 32 and with a byte value of 0x10 the left limit x-coordinate is 16. So, in the latter case the white cursor can be moved further to the left.

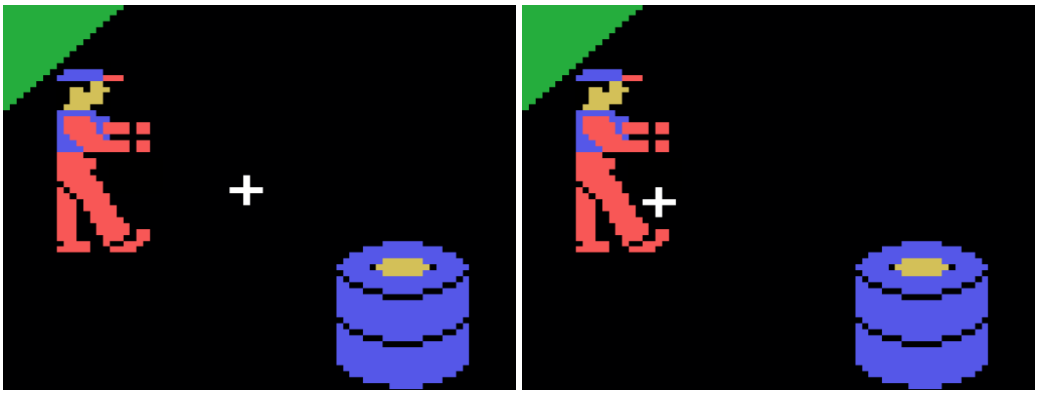
This then got me wondering as to why this byte was changed. After some investigation I believe I have come up with a credible explanation. It's safe to assume that Pitstop was first released in the US with the Canadian and European releases coming later. It's also relatively safe to assume that the initial release in the US was with the Imagic cart shell as this was the only version to not be sold in any other country and had "for Coleco" on the box and cart label. The wider scale release, that included Coleco Canada, CBS Electronics and the revised US Epyx release with a Coleco style cartridge shell and "for ColecoVision & ADAM" cart label and box, all contained the same revised ROM. Therefore, I believe that the Imagic style cart release (byte set to 0x20) came first and that the other releases (byte set to 0x10) came later. This also makes sense in the context that I believe the change from 0x20 to 0x10 was to fix a bug in the Imagic cart style shell release.

What bug I hear you ask? Well, first you need to understand that when your car is in the pits the limits of movement for the white cursor and the limits of movement of a selected crew member are different. Once you activate a crew member you can only move them freely within the black region, with their movement confined by the green grass and objects in the pits. However, the white cursor is not constrained by onscreen objects and backgrounds, instead there are simple horizontal (x-axis left and right) and vertical (y-axis top and bottom) limits set within which the cursor can be moved. The byte at 0x26A7 defines the left-hand limit for the cursor but does NOT change the left-hand limit for when you are moving a crew member.

But what about the bug? To discover the bug, you need to grab the crew member on the left side and move him to the far left, lowest corner that he will go and then release him there (by pressing the fire button). The white cursor will reappear – oddly outside of the normal cursor left limit. If you then move the cursor to the right, back into the normal movable region, and then move the cursor left again to try and grab the crew member you can't reach him. The crew member is now unreachable, and this is the bug I was referring to. The left-hand limit of 0x20 (x-coordinate = 32) is too far to the right.

However, in the later version with the left hand limit of 0x10 (x-coordinate = 16), where you can now move the cursor further to the left, it is possible to grab the crew member again even if you drop him in the lower left corner. Thus, this single byte change fixes the bug in the prior Imagic style cart shell release.

Imagic Style Cart (0x20) **All Other Carts (0x10)**



Despite the Imagic cart style ROM containing a known bug, this ROM will still be included (as it was before) in this project's main TOSEC ROM set as it is a version of the game that was officially released and sold in cartridge form. However, in the new Phoenix-AtariMax ROM set I have deleted the ROM with the known bug and only included the later bug fixed ROM. There seems little point including in the Phoenix-AtariMax ROM set a version of the game that contains a known bug when the difference between the versions is just one byte and is so minor in nature.

Q*bert's QUBES

The old public domain ROM file for Q*bert's QUBES is 16K in size while the new ROM dump was found to be only 12K. Examination of the last 4K of the old 16K ROM file highlighted something rather odd. The first 717 bytes of this 4K region are clearly marked as free space, with 0xFF values, while the remaining 3,379 bytes contain code/data. However, this code/data is NOT a copy of any of the other code/data found in the first 12K (see Repeated Code to Fill ROM section below). In fact the 3,379 bytes of code/data have been copied, with the exception of the last two bytes, from the "2010 - The Graphic Action Game (1984)(Coleco)" game ROM (starting at 0x32CD). Therefore, it has been concluded that the extra 4K in the old public domain ROM was inserted by mistake and in fact should not be there. Regardless, with the extra code/data being inserted in an area that the Q*bert's QUBES game code does not access, the old public domain ROM was still fully playable. Needless to say, the new ROM, being the correct 12K in size, does not include the bogus code/data from the 2010 game.

Sector Alpha

All initial dumps of Sector Alpha generated ROM files that produce corrupted graphics in the game, i.e. the landscape in the lower half of the game screen is shown as solid light red instead of the main background colour with coloured dots over it. This type of graphic corruption in ROM files for this game was first highlighted by AtariAge member ed1475 (http://atariage.com/forums/topic/204879-cbs-victory-for-colecovision/?p=2632249). Dumping the cartridge using the second method listed at the beginning of this document resulted in a different ROM file that created a different corruption in the same area of the graphics, this time the lower landscape was the correct background colour but again contained none of the graphical terrain features that it is supposed to. Comparison of the ROM files from the two dumpers highlighted that the only difference between them was a 2K region starting at 0x4800 (i.e. at the end of the first 18K).

When playing an actual cartridge of Sector Alpha on a real ColecoVision it is of particular note that the missing planet landscape is displayed as a repeat of the dotted graphic tile that is seen at the top of the landscape first and second ROM dumps. Examination of the ROM files indicates that this dotted graphic tile is called by a byte entry of 0x7E.

It turns out that Sector Alpha is one of two games that were commercially released for the ColecoVision with known manufacturing defects causing corruption of the ROM – the North American release of Victory being the other game.

First Dump **Second Dump** **Actual Cart in Real ColecoVision**



This problem was investigated further by Steve Tucker of AtariMax who reported the following to me after inspecting the inside of an actual Sector Alpha cart:

> *"The cartridge contains two 8KB mask PROMs (2364) that behave as expected. This is the first 16KB of the dump. It also contains a 4KB mask PROM (2332) that contains 2KB of normally readable memory, but when the high address pin is set, it behaves as if the chip is deselected and the output drivers do not drive the bus.*
>
> *I verified this by attaching a very weak pull-up resistor to the various data outputs on the cart. The two 8KB mask PROMs behaved normally, but the 4KB one displayed modified data in the screen area, the same areas you get changes in when you modify the 0x7E value in the ROM dump.*
>
> *I did not remove the PROMs from the PCB, but I expect what you get in the empty area would depend on the design of the EPROM programmer used to dump it. If it had no pull-up or pull-down current sources on the*

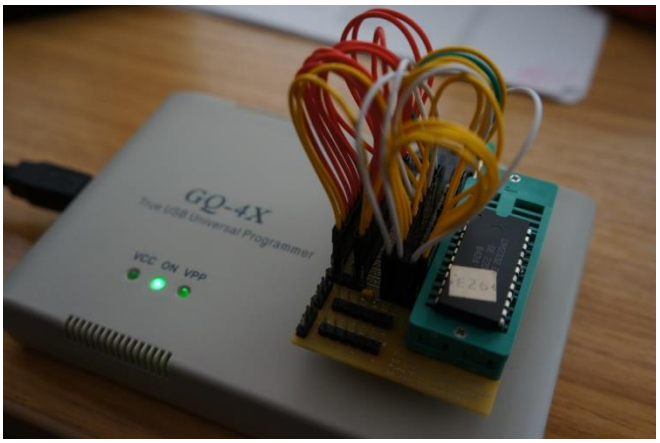
I/O pins during read-out, that area would likely seem to contain 0x7E as that's the last byte driven by the output buffers before they shut off.

The question is, was this by design or an error. I don't know enough about how these old mask PROMs were factory programmed to say if it's someone at the factory trying to shave a penny off the production cost, or if it was just by accident. One thing is sure, even though there are 20KB worth of devices, there is only 18KB of real data to be had in the cart."





To verify exactly what is contained in each individual ROM, they have been desoldered and read using a MCUmall GQ-4X Willem Programmer. This programmer is not able to directly read 2332 and 2364 ROMs, but is able to do so with the use of the bespoke EPROM Programmer Universal Adapter designed and sold by Matthew D'Asaro (http://www.dasarodesigns.com/product/eprom-programmer-universal-adapter). The setup is pictured below configured to dump the 2332 ROM.

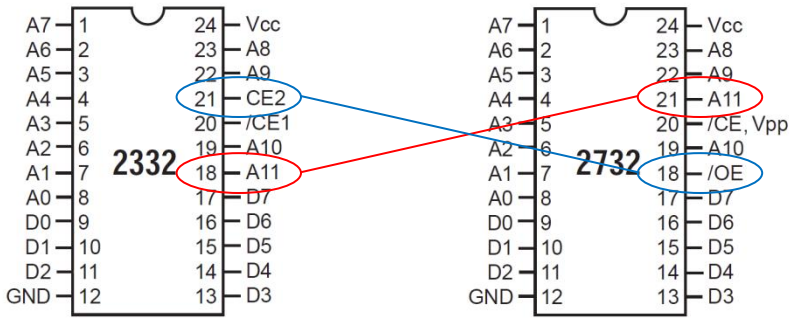




As expected, the two 8KB 2364 ROMs yield exactly the same data as already contained in the first 16KB of the existing (v1.1) ROM dump. Using the recommended Universal Adapter configuration, the 4KB 2332 ROM yielded 2KB of data followed by 2KB of 0xFF values. Analysis showed that the 2KB of data was in fact the last 2KB of the complete 20KB game ROM, i.e. starting at location 0x4800. Therefore, this configuration yielded the missing 2KB that the AtariMax cartridge dumpers had been unable to access. But how can this be? Why do the AtariMax dumpers only manage to read the first 2KB of data from the 2332 ROM while the GQ-4X programmer could only read the last 2KB?

The answer to the above question took some time to figure out. Following much trial and error, and assistance from Matthew D'Asaro, it has been determined that the pinout configuration of the Sector Alpha 2332 ROM is non-standard and instead matches that of a 2732 ROM. The two different pinouts are illustrated below. It can be seen that the Chip Select 2/Output Enable (CE2/OE) and Input Address 11 (A11) pins are swapped between the two different chips. Therefore, reading the Sector Alpha 2332 ROM as if it were a 2732 ROM results in the full 4KB of game data being obtained from this chip.

Standard 2332 Pinout **Standard 2732 (Non-Standard 2332?) Pinout**



Analysis of the 4KB of 2332 game data shows it to contain the following:

- ~0.8KB of critical game code (i.e. without this the game does not initialise and run correctly).
- ~0.6KB of screen border graphics
- ~0.5KB of upper landscape graphics (i.e. the mountains)
- ~1.4KB of lower landscape graphics (identical to the v1.1 ROM)
- ~0.6KB of demo mode player Artificial Intelligence – this is NEW to the v1.2 ROM and has never been dumped before.
- ~0.1KB of 6502 microprocessor code (the exact reason for this being here is unknown) – this is NEW to the v1.2 ROM and has never been dumped before.

Compared to the ROM included in the v1.1. ROM package, the new v1.2 ROM includes a demo mode player Artificial Intelligence. The demo mode can be seen by waiting a few seconds following the display of the blue game select screen. In the v1.1 ROM the demo mode player never moves or fires, while in the v1.2 ROM the player moves and fires and the demo mode lasts much longer, however it is the same every time.

Due to this now being a verified clean dump for this game, the ROM file included in this package is no longer described as “fixed” as it was with the v1.1 ROM package release.

Actual Cart in Real ColecoVision | **Correct Version** | **Full Correct Landscape**

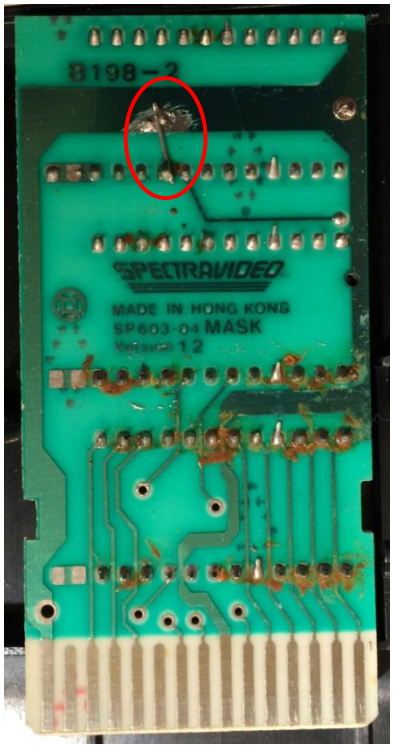


Be aware that there are four different Sector Alpha ROM files in the public domain and all of them exhibit problems of corrupted graphics in the lower landscape and do not include the demo mode player AI data. Consequently, these ROM files are all in fact bad dumps despite them not being marked as such.

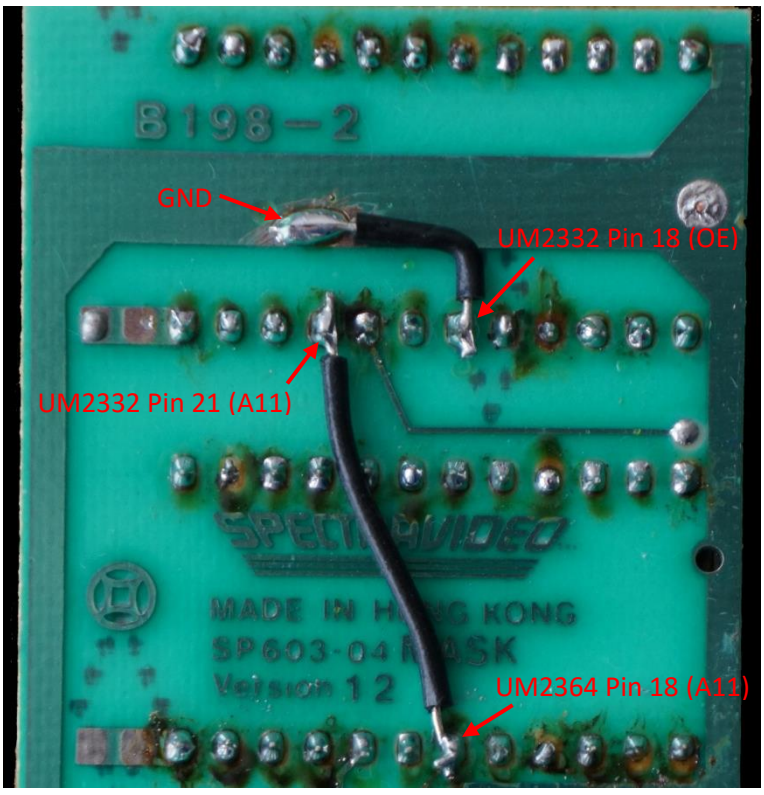
As an aside, it is fairly simple to fix your Sector Alpha cartridge so that it works as was intended by the game programmer with the full 20KB of the game accessible by a ColecoVision console. However, if you do follow these instructions you do so at your own risk. I cannot, and will not, be held responsible for any damage you cause to your game cartridge, ColecoVision console, or anything else for that matter, while following these instructions. That said, I have completed this fix myself successfully with no problems at all.

1. Gently heat the end label (a hairdryer works well for this) and slowly remove it.
2. Gently heat the main label and slowly lift it up from the bottom until the screws are visible.
3. Remove the two screws.
4. Gently prise the two halves of the cartridge apart. Note that Spectravideo carts include locking tabs and so the sides of the top half of the cart need to be pressed in as you try and separate the two halves.

5. Remove the PCB from the cartridge shell.
6. Look at the back of the PCB. Desolder and remove the short jumper wire highlighted below.

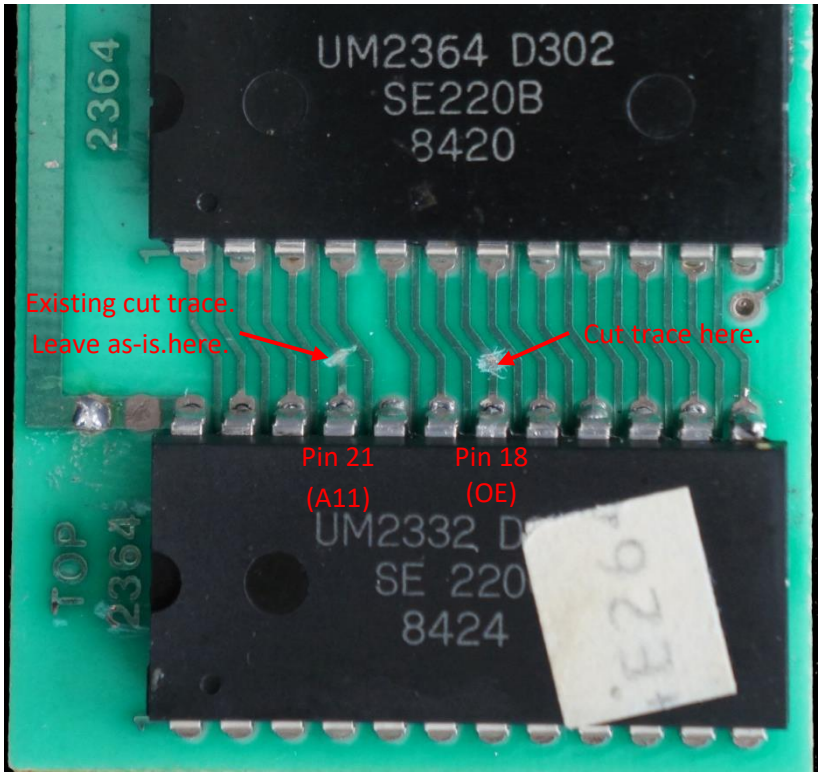


7. Using 24 gauge, solid core, insulated wire, solder in place two new jumper wires as shown below.



8. Turn over the PCB.

9. Cut the trace leading from Pin 18 of the UM2332 chip as shown below. Note that the trace leading from Pin 21 of the UM2332 chip was cut during manufacture and should be left as-is.



10. Test the bare PCB in a ColecoVision to verify that it works.
11. Reassemble the cartridge and reapply the labels.
12. Enjoy the game ☺

I have also put together a YouTube video describing the issues with the cartridge, including footage of the before and after demo mode, as well as illustrated instructions on how to fix the cartridge. The video can be found at https://www.youtube.com/watch?v=n9zgdHELkRE.

Thanks to AtariAge member ed1475 for first raising this issue (http://atariage.com/forums/topic/204879-cbs-victory-for-colecovision/?p=2632249) plus Steve Tucker of AtariMax, AtariAge member nanochess and Matthew D'Asaro of D'Asaro Designs for all of their help in finding the solution to this problem. Please refer to http://atariage.com/forums/topic/224593-sector-alpha-rom-corrupted *for the online discussion on this topic.*

Skiing

The initial dump of Skiing highlighted that the game code/data is contained in only the first 8K and yet there was an additional 8K of code/data giving a 16K ROM file. However, the bulk of this second 8K of code/data (8,064 bytes) has actually been copied from Boulder Dash with the remaining 128 bytes filled with 0xFF values. Weird!!!

It has been concluded that Skiing in fact only occupies the first 8K and as such the new ROM dump reflects this. Interestingly, most of the public domain ROMs for Skiing are 8K in size and are identical to the new dump.

Subroc

The new dump for Subroc was found to be consistent across all publishers, i.e. Coleco (US), Coleco Canada and CBS Electronics (Europe). However, compared to the main public domain ROM well over 900 bytes of code/data were found to be different with the differences scattered throughout the file. The source of the public domain file and the effect of the differences on the game are unknown. It should also be noted that the public domain ROM was padded with 4K of 0xFF values (with the exception of a single 0x00 value in the second from last byte). The actual game code/data is only 20K which is consistent between the new ROM dump and the old.

There is also a 32K over dump "[o]" or "[a]" ROM file available in the public domain. This file is exactly the same as the new dump in the first 20K. However, the next 4K is an exact copy of the 16 to 20K region while the 24 to 32K region is simply filled with 0xFF values. If we eliminate the 8K of 0xFF padding as well as the 4K of copied code/data, then the remaining ROM file is identical to the new dump. The conclusion is therefore that the public domain over dump ROM is exactly the same game (code/data) as the new dump other than the addition of 12K of unnecessary garbage that is never accessed.

Super Action Football (Coleco)

This is the North American Football version. The old public domain alternative "[a]" dump of this game is actually a Super Action Football [Soccer] ROM but with an error in the last byte. Needless to say that this is not part of the new ROM dump set.

Note the difference between the title screen for this game and the CBS Electronics Super Action Football as discussed in the next section.

Super Action Football (CBS Electronics)

This is the version popularly referred to as "soccer" in North America. The old public domain ROM is actually a hack of the original with the name on the title screen changed from "FOOTBALL" to "SOCCER". The new ROM set includes the untouched ROM that correctly displays "FOOTBALL". Interestingly, when comparing title screens, the North American Football (Coleco) game simply includes the addition of the word "PRESENTS" compared to the CBS Electronics Football ("soccer") game.

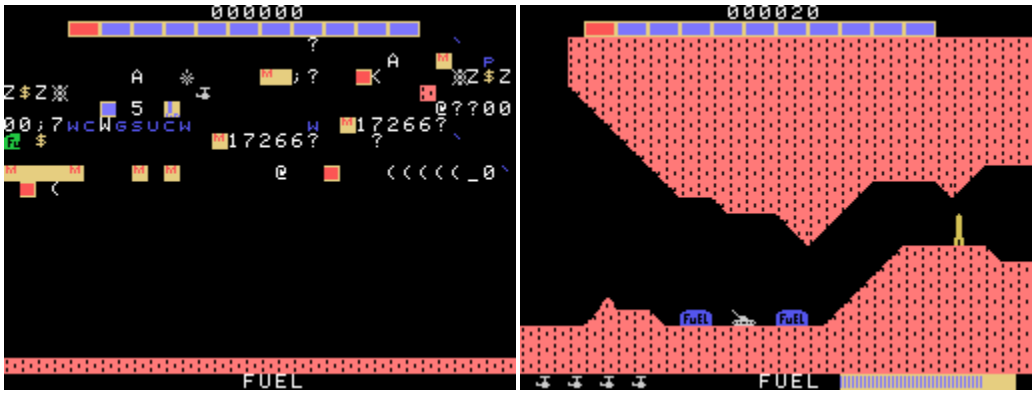
Correct CBS Version | **Old Hacked CBS Version** | **N. American (Coleco) Football Version**



Super Cobra

The Super Cobra cartridge and ROM contain a known bug:

Problem: Stand-Alone ADAM - the first screen displays a bunch of garbage characters, does not play the start-up music theme, starts playing the game with no helicopter sprite and will not accept any controller input (screenshots below). It is believed to work on the Expansion Module #3 ADAM due to its use of the ColecoVision's PCB.



Reason: The architecture of the ColecoVision allows for 8K of RAM, but to cut costs, Coleco only put 1K of RAM in the console, positioned at 0x7000-0x73ff within the main addressing range. The other 7K within the allowed 8K range are mirrors to that 1K of RAM. So if the game software writes a value at 0x6000, it's actually written at 0x7000 within the console hardware.

When a CV cartridge game runs on the ADAM, the ADAM's native 24K of RAM is used by the software. This means that there's no mirroring involved: if you write at 0x6000, you're NOT writing at 0x7000.

The reason why Super Cobra doesn't work on the ADAM is because RAM usage is a mess (it uses 0x6000-0x63ff and 0x7000-0x73ff sparely), a mess that works on the ColecoVision because of the mirroring

Solution: A new fixed [f] ROM has been developed to eliminate the above bug. This fixed ROM has had all references to address range 0x6000-0x63ff changed to 0x7000-0x73ff. This fix was implemented to resolve the issues when playing the game on an ADAM and this is where the fixed ROM is recommended for use. Although the fixed ROM appears to work on a ColecoVision, it has not been extensively tested and therefore in this case it is recommended to play the original ROM file.

Thanks to nanochess, NIAD and Pixelboy from the AtariAge forums for the above information and fix. Please refer to http://atariage.com/forums/topic/207140-defenders-radar-can-anyone-fix-it for a discussion of the memory issues and http://atariage.com/forums/topic/208451-super-cobra-patch-for-adam for a discussion of the fix.

Super Cross Force

The old public domain ROM file for Super Cross Force is 16K in size, while the new dump is 12K. Examination of the last 4K of the old ROM file highlighted something rather odd, i.e. in the middle of this section, there is around 2.8K of code/data which is preceded by 717 bytes, and followed by 1,229 bytes, of free space marked with 0xFF values. Typically the start of a block of 0xFF values at the end of a ROM file indicates the end of the game code/data. Further investigation revealed that this 2.8K of code/data is NOT a copy of any of the other code/data found in the first 12K (see Repeated Code to Fill ROM section below). In fact the 2.8K of code/data has been copied from the "Learning with Leaper (1984)(Sierra On-Line)" game ROM (starting at 0x32C2). Therefore, it has been concluded that the out of place 2.8K in the old public domain ROM was inserted by mistake and in fact should not be there. Regardless, with the extra code/data being inserted in an area that the game code does not access, the old public domain ROM was still fully playable. Needless to say, the new ROM does not include the bogus code/data from the Learning with Leaper game and in fact has been cut down to 12K to reflect where the actual game code/data ends (to the nearest 4K).

The alternative public domain ROM file for Super Cross Force, while not including the Learning with Leaper code/data, has actually had the last 256 bytes of the actual Super Cross Force game code/data deleted. This makes this alternative dump to in fact be a bad dump.

Both of the above old public domain ROM dumps have been replaced with the new dump from this project.

Victory

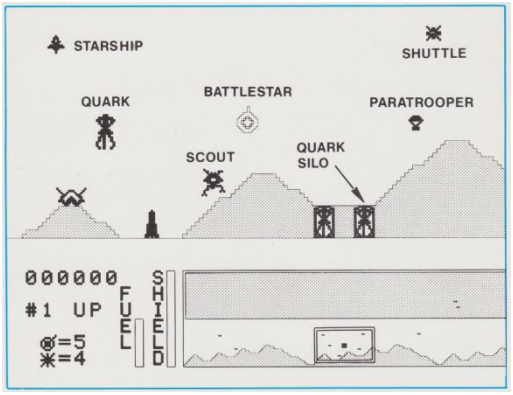
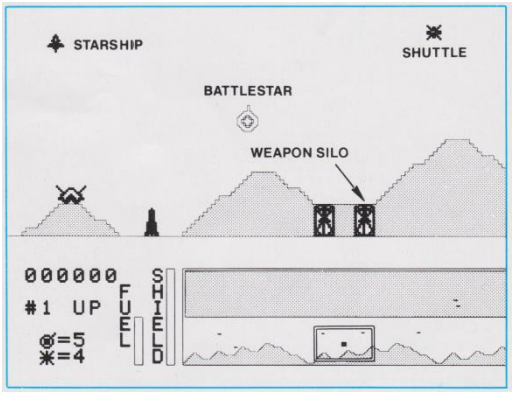
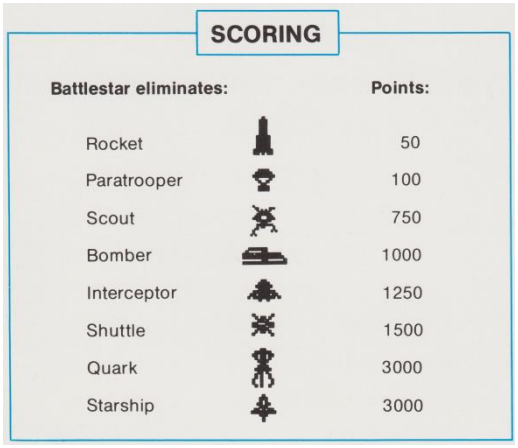
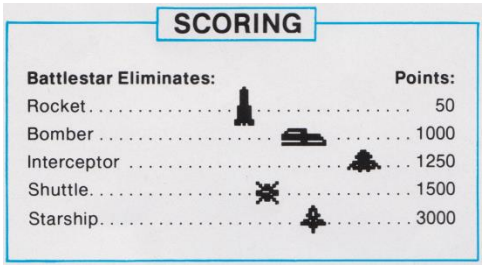
In an interview with ColecoNation magazine, Paul Jaquays stated that:

> "*...the game Victory was shipped broken. Somewhere between when the designer signed off on the game and when it was manufactured, the EPROMs containing the code had become corrupted. The game still operated, but just barely and not like it was supposed to. Coleco management chose to ship the monstrosity rather than repair it.*"

The complete interview can be found in Issue 9 of the magazine currently hosted online by Opcode Games - http://www.opcodegames.com/coleconation/coleconation_nine.pdf.

Of note is that Coleco produced two different instruction manuals for the US release of Victory, one contained details for the complete uncorrupted game (Guide No. 78135) and the other deleted or changed references so that the manual reflected the "corrupted" game play (Guide No. 14338). It is not known which manual was released first, although one can speculate that the 78135 manual had been preprinted and was included with the original batch of corrupted games and then later the manuals were "corrected" to match the corrupted game. It is also noteworthy that the manual provided with the European CBS Electronics release of the game is the same as the US uncorrupted game manual. This is particularly relevant to the later discussion of Victory ROM files.

The following are selected highlights of the differences between the two different manuals. The US release had paratroopers, scouts and quarks either invisible, as Guide No. 14338 would have you believe, or in fact completely missing as the actual cartridge game play would seem to indicate.

US Guide No. 78135 & CBS Instructions 2L2270	US Guide No. 14338
Paratroopers Don't trust those paratroopers falling out of the bombers and shuttles. If they touch ground, they change into scouts who roam the planet surface and release super deadly quarks. 	Entire section on paratroopers, scouts and quarks is missing. The screenshot also has these three enemies missing (see below). The "Quark Silo" has been renamed "Weapon Silo". 
Duel to the death! "Yellow Alert" flashes across your screen. A quark has just been released, and it's headed straight for you. Watch out for the quark's laser shots. A quark never rests until it has eliminated your battlestar or your battlestar has eliminated it!	**Quirky Quarks!** A "Yellow Alert" might occasionally flash on the screen. This is no idle warning! Invisible enemies hover nearby. They're the silent Quarks, the unseen alien force that tests you and toys with your nerves. Keep your eyes sharp, Cadet!
Don't dawdle. The longer you wait to eliminate the enemy squadron, the worse your situation becomes. Starships attack. Scouts release more quarks. And once all the quarks are released, everything homes in on your battlestar. Be quick! Get them all!	**Cache on the line.** Those silos on the planet's surface house your enemy's weaponry. Don't let the aliens near them! Protect the plant with the techniques you've learned. This is no textbook exercise Cadet!
Don't dawdle. The longer you wait to eliminate the enemy squadron, the worse your situation becomes. Starships attack. Scouts release more quarks. And once all the quarks are released, everything homes in on your battlestar. Be quick! Get them all!	**Dauntless and Dawdle-less.** Don't dawdle. The longer you wait to eliminate the enemy squadron, the worse your situation can become. Starships attack. Shuttles dart in. Be quick and get them all!.
Quark Bonus! You've eliminated the squadron. Now collect your reward. Each quark not released by a paratrooper is worth 1000 bonus points in the first play level. The more squadrons you eliminate, the greater your Quark Bonus!	**Unseen, unheard, unknown.** As you eliminate enemy squadrons, you prevent the cloaked Quarks from materializing. Collect your reward in Bonus Points. The more squadrons you eliminate, the greater your point gain!
Scoring 	**Scoring** 

Historically, the only ROM available in the public domain for Victory was that from the "corrupted" US release (it also happens to be an overdump from 20 to 24K). At the end of 2012, ed1475 from the AtariAge forums, provided a ROM dump from the European CBS Electronics' release of Victory, announcing that this was a different ROM to the US release and actually includes visible paratroopers, scouts and quarks (http://atariage.com/forums/topic/204879-cbs-victory-for-colecovision. All indications are that the CBS release is the full uncorrupted game that should have been released in the US but was not.

For completeness, this project has re-dumped both the US and CBS cartridges and includes both versions in this new ROM package. It is interesting to note that the two ROM files only differ by two bytes. For the reasons discussed above, the CBS ROM is considered to be the definitive version of this game for the ColecoVision.

Zaxxon

The ROM in the Taiwan Cooper cartridge differs from the official commercial release by 3 bytes starting at byte 0x47. The effect of this difference is unknown with no obvious differences have been noted when playing both games.

Zaxxon is a 24K game. The Taiwan Cooper cart contains a 32K ROM, the last 8K of which was found to contain the last 4K from Super Action Baseball followed by the second 4K from Meteoric Shower! The Taiwan Cooper ROM dump for this project excludes this last 8K of superfluous code.

Repeated Code to Fill ROM

The following carts contained ROM chips that exceeded the size of the game code with the free space at the end filled with a copy of the last 4K of game code/data rather than the typical 0xFF or 0x00 values. The ROM dumps for this project exclude the superfluous copied code.

- Frenzy – US
- Frogger – US, Canadian and European
- Gateway to Apshai – US and Canadian
- James Bond 007 – Parker Brothers
- Mouse Trap – US and Canadian
- Rocky Super Action Boxing – CBS Electronics
- Sector Alpha – Spectravideo International
- Tutankham – Parker Brothers

The following carts contained 32K ROM chips with the 16K game code occupying the first 16K and then copied to the last 16K to fill the ROM chip. The ROM dumps for this project exclude the superfluous copied code.

- Cosmic Crisis – Bit Corp.
- Rock n' Bolt – Telegames

The following carts contained 16K ROM chips with the 8K game code occupying the first 8K and then copied to the last 8K to fill the ROM chip. The ROM dumps for this project exclude the superfluous copied code.

- Word Feud – Xonox

IMPORTANT NOTE: If the ROM chips in a cartridge have a standard part number, it may be the case that the top-level chip may be smaller than the lower chip. If so, then this might explain why one might see an exact copy of that chip simply because, for example, it has 4K of address lines but still sits on the 8K select line. (Ref: https://atariage.com/forums/topic/322293-programmer-help-needed/?do=findComment&comment=4854580)