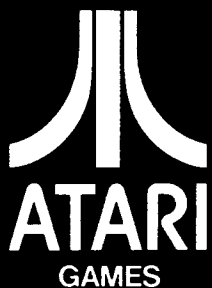
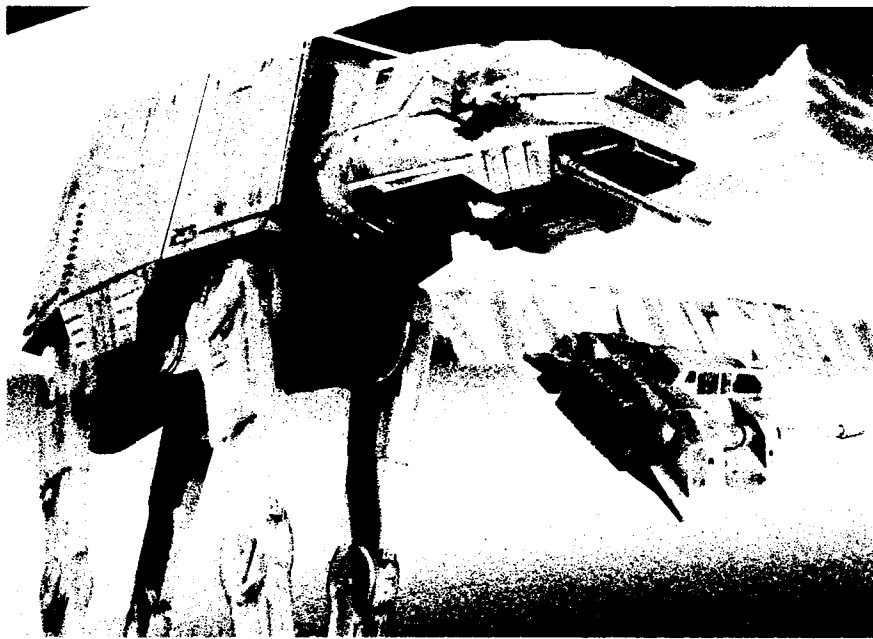




THE EMPIRE STRIKES BACK*

Instructions to Convert STAR WARS*
Cockpit and Upright Games





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Notice Regarding Non-Atari Parts

WARNING

Use of non-Atari parts or modifications of any ATARI® game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

You may void the game warranty (printed on the inside back cover of this manual) if you do any of the following:

- Substitute non-Atari parts in the game.
- Modify or alter any circuits in the game by using kits or parts *not* supplied by Atari.

NOTE

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area or modification to this equipment is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. If you suspect interference from an ATARI® game at your location, check the following:

- All green ground wires in the game are properly connected as shown in the game wiring diagram.
- The power cord is properly plugged into a grounded three-wire outlet.
- The game printed-circuit boards (PCB) are properly installed within the Electromagnetic Interference (EMI) cage.
- The EMI Shield PCB is properly installed and connected in series with the game PCB harness.
- All filter capacitors required on the EMI Shield PCB are properly soldered in place.

If you are still unable to solve the interference problem, please contact Customer Service at Atari Games, Inc. See the inside front cover of this manual for service in your area.

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THE EMPIRE STRIKES BACK*

INSTRUCTIONS TO CONVERT STAR WARS* UPRIGHT AND COCKPIT GAMES

INTRODUCTION

This document contains the instructions necessary for changing an upright or cockpit STAR WARS game into a THE EMPIRE STRIKES BACK game. The conversion includes modifying the game printed-circuit boards, changing the flight control graphics and attraction shield, and verifying that all previously announced modifications have been performed on the display.

Save the STAR WARS Operators Manual, Schematic Package, and the Self-Test label to fully document your converted game. As you complete the game conversion, these instructions will refer to the STAR WARS manual; be sure to have it on hand.

CAUTION

To prevent damage to the game, read all instructions before proceeding with any modifications.

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TOOLS REQUIRED

The tools listed in Table 2 are required to perform a complete conversion.

Table 2 Tools Required

Quantity	Description	Purpose
1	Phillips Screwdriver	Remove, disassemble, and reassemble the game PCB set
1	Wire Cutters	Trim jumper wires
1	Wire Strippers	Prepare jumper wires
1	15- to 27-Watt Soldering Iron & Solder	Solder jumper wires to PCB
1	X-ACTO™ Knife	Cut traces on PCB; install decals
1	24-Pin or 28-Pin IC Pullers	Remove ICs from PCBs
1	Flat-Head Jewelers Screwdriver	Remove Microcode ROM
1	Needle-Nose Pliers	Install jumper wires
1	1/8-Inch Allen Wrench	Remove attraction shield

B. DISASSEMBLE THE GAME PCB SET

Perform the following procedure to disassemble the STAR WARS game PCBs. (Refer to Figure 5-9 of your STAR WARS manual.)

1. Unplug the Interconnect Cable from the Sound PCB.
2. Use a screwdriver to remove the two screws securing the Sound PCB to the PCB spacers. Save this hardware for later reassembly. Pull off the Sound PCB from the Interconnect PCB and set it aside.
3. Pull the Interconnect PCB off the three remaining PCBs. (The Interconnect PCB is between the notches at the end of the game PCB set.)
4. Use a Phillips screwdriver to remove the two screws securing the Main PCB to the RF End Board spacer blocks. Save this hardware for later reassembly.
5. Lift the Main PCB from the Analog Vector-Generator PCB and set it aside.

C. MODIFY THE ANALOG VECTOR-GENERATOR PCB

Perform the following procedure to modify the Analog Vector-Generator PCB. (Refer to Figure 5-13 of your STAR WARS manual.)

NOTE

Be sure to orient the index of the replacement IC the same way the original IC was oriented. Take care not to damage the IC pins during installation into the socket.

1. Use an integrated-circuit puller to remove the integrated circuit (IC) at location LL. Save this IC for possible use in another STAR WARS game.
2. Locate the IC labeled "136031-011" in the conversion kit. Install this IC in the socket at location LL of the Analog Vector-Generator PCB.
3. Set aside the Analog Vector-Generator PCB.

D. MODIFY THE MAIN PCB

Perform the following procedures to modify the Main PCB. (Refer to Figures 1 and 2 of this manual.)

1. On the back (non-component) side of the Main PCB, locate the trace from pin 22 of the IC at location LH/J. (See Figure 1.)
2. Use an X-ACTO™ knife to cut the trace from IC LH/J, pin 22.

- On the component side of the PCB, use an integrated-circuit puller to remove the ICs at locations 1H/J, 1J/K, 1K/L, 1M, 1F, 7H, 7J, 7K, and 7L. Save these ICs for possible use in another STAR WARS game.

NOTE

Be sure to orient the index of the replacement IC in the same way the original IC was oriented. Take care not to damage the IC pins during installation into the socket.

- In the conversion kit, locate each IC given in column 1 of Table 3. Then install that IC in the socket at the location given in column 2.

Table 3 New ICs for Main PCB

IC Part Number	Location on Main PCB
136031-002	1J/K
136031-003	1K/L
136031-004	1M
136031-001	1F
136031-010	7H
136031-009	7J
136031-008	7K
136031-007	7L

- Find the Memory Expansion PCB in the conversion kit. Install this small PCB in the socket at location 1H/J as shown in Figure 2. Note how the small PCB is oriented. Set aside the Main PCB.
- If your STAR WARS main PCB does not have R59 installed and the game does not retain high scores or statistics, insert a 10K Ω resistor in series between pin 10 of 1E, and at the intersection of R100, CR3, and C94.

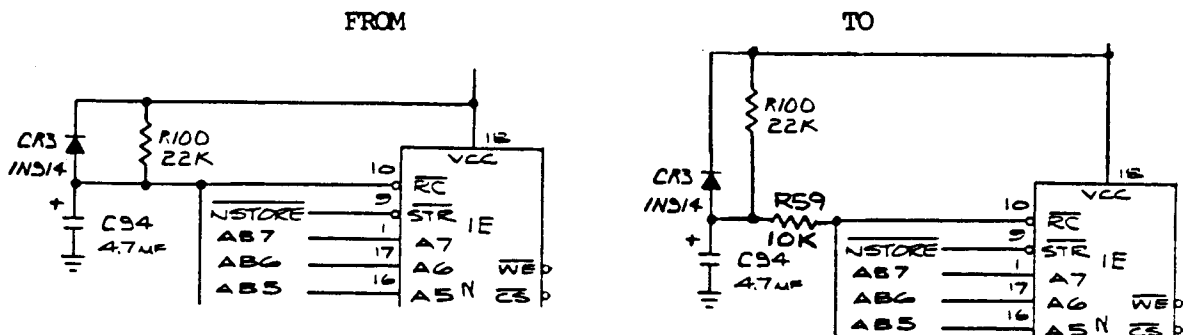


Figure 2 Modifying High Score and Statistics

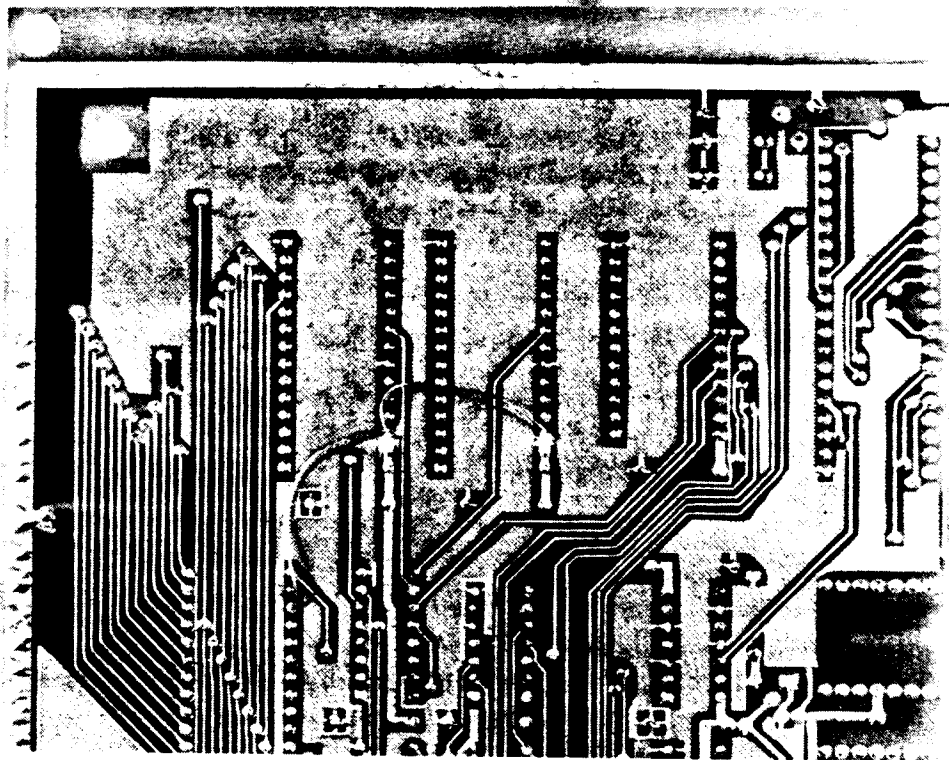


Figure 4 Modifying the Sound PCB

6. Solder the other end of this jumper wire to pin 23 of the IC socket at location 3K (see Figure 3).
7. Cut another 1 1/2-inch piece of jumper wire off the wire strand, and solder it to pin 26 of LJ/K.
8. Solder the other end of this wire to pin 26 of LH.
9. On the component side of the PCB, use an integrated-circuit puller to remove the ICs at locations LH and LJ/K. Save these ICs for possible use in another STAR WARS game.

NOTE

Be sure to orient the index of the replacement IC in the same way the original IC was oriented. Take care not to damage the IC pins during installation into the socket.

Table 4 Switch Settings for Game Play Options

Settings of 8-Toggle Switch on THE EMPIRE								Option
STRIKES BACK Main PCB (at 10D)								
1	2	3	4	5	6	7	8	
Off	On							2 Starting Shields
On	On							3 Starting Shields
Off	Off							4 Starting Shields**
On	Off							5 Starting Shields
		On	Off					Easy Play Difficulty
		Off	Off					Moderate Play Difficulty
		On	On					Hard Play Difficulty**
		Off	On					Hardest Play Difficulty
				Off	On			Level JEDI* Letter Mode
				On	Off			Increment Only JEDI Letter Mode
				On	On			Level Only JEDI Letter Mode
				Off	Off			Increment JEDI Letter Mode**
						On		No Music in Attract Mode
						Off		Music in Attract Mode**
						On		Freeze Mode
						Off		Normal Game Play Mode**

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 **Manufacturer's recommended settings.

H. INSTALL THE PCB SET IN THE CABINET

Perform the following procedure to install THE EMPIRE STRIKES BACK PCBs in the EMI cage.

1. Slide the PCB assembly into the EMI cage.
2. Push the nylon snap-in fasteners on the EMI Shield PCB to the locked position (in).
3. Plug in the harness connectors to the edge connectors on the EMI Shield PCB.
4. Replace any screws or tie wraps that secure the harness connectors to the EMI Shield PCB edge connectors.
5. Close and lock the rear access panel.

5. Check that the Memory Expansion PCB was properly installed.
6. Check that all PCBs are properly inserted into the Interconnect PCB and the EMI Shield PCB.
7. Check the connections of the main harness to the PCB set.

No Audio

1. Check that the ICs installed on the Sound PCB were properly installed in the correct location and oriented properly.
2. Check that the Sound PCB trace cuts for this conversion are truly open.
3. Check that no solder bridges or splashes occurred during the conversion of the Sound PCB.
4. Check the Audio Harness for the correct orientation and for proper connection on the Sound PCB and on the Main PCB.

Audio is OK But No Video

1. With an oscilloscope, check the X and Y video output signals from the Analog Vector-Generator PCB. (Refer to the STAR WARS manual).
2. With an oscilloscope, check that the X and Y video signals are present at the display. (Refer to the Color X-Y Display manual.)

K. ENSURE DISPLAY IS MODIFIED CORRECTLY

The following modifications must be made to the game display. These modifications were previously distributed by Atari in the form of a Tech Tip; however, the complete procedures for modifying the display are repeated in Table 6 for your convenience. Ensure that all the modifications listed in Table 6 have been made to your display.

1. Connect two type-1N754A zener diodes (part no. 131002-001) together by bending the anode ends of both diodes into a "fish-hook." Hook the two fish-hooked leads together and solder them. Remember that too much heat will destroy the semiconductor material.
2. Connect two type-1N756A zener diodes (part no. 32-1N756A) as described in step 1.
3. Remove diode CR2, and solder in a type-1N4002 diode (part no. 31-1N4002) in its place.
4. Remove diode CR11, and solder in a type-1N4002 diode in its place.
5. Remove resistor R12, and solder in a 12 Ω , 1/4 W resistor in its place.
6. Remove resistor R35, and solder in a 12 Ω , 1/4 W resistor in its place.
7. Find resistor R1. Connect the yellow wire that goes to R1 to the cathode of one of the type-1N754A diodes. Connect the cathode of the other type-1N754A diode to ground.
8. Find resistor R24. Connect the orange wire that goes to R24 to the cathode of one of the type-1N756A diodes. Connect the cathode of the other type-1N756A diode to ground.
9. Find transistor Q17 (type 2N3792). Solder the cathode lead of a type-1N4002 diode to the emitter, and solder the anode to the collector of transistor Q17.
10. Find transistor Q16 (type 2N3617). Solder the cathode lead of a type-1N4002 diode to the collector, and solder the anode to the emitter of this transistor.
11. Find transistor Q7 (type 2N3792). Solder the cathode lead of a type-1N4002 diode to the emitter, and solder the anode to the collector of transistor Q7.
12. Find transistor Q6 (type 2N3716). Solder the cathode lead of a type-1N4002 diode to the collector, and solder the anode to the emitter of Q6.
13. Find the zero-ohm jumpers W1 and W2. If these jumpers have brown insulation, replace them with pieces of wire. Note that the white and tan jumpers are good and don't need to be replaced.

High-Voltage PCB Modifications

Perform the following modifications on the display High-Voltage PCB.

1. Find capacitors C3 and C4. These capacitors were originally 100 μ F, 35 V capacitors.

NOTE: The glass attraction shield may be attached to the back of the decal. This decal and glass shield may be saved if in good condition.

5. Remove the backing from the attraction-shield decal included in the conversion kit.
6. Align the second set of three holes in the attraction-shield decal with the counterbored holes at the top of the attraction-shield panel. Align the edges of the decal on either side of the wood panel.
7. Starting at the top of the area, use the palm of your hand to smooth down the decal. Continue to smooth down the decal around the bends and over the new attraction-shield glass.
8. Reinstall the metal bracket back to the wood panel.
9. Use an X-ACTO™ knife to trim the edges as required.
10. Using a 1/8-inch Allen wrench, install the screws that secure the attraction shield to the cabinet.

COCKPIT GAME

Perform the following procedure to apply the attraction-panel decal to the cockpit game cabinet.

1. Using a 1/8-inch Allen wrench, loosen the screws that secure the top metal retaining bracket.
2. Using a 1/8-inch Allen wrench, remove the screws that secure the lower metal retaining bracket, set aside for later use.
3. Carefully slide the rear attraction glass down and place it on a flat surface.
4. Peel the backing from the decal and align it along one side and the top of the glass.

NOTE: Adhere this decal to the front exterior of the glass.

5. Use an X-ACTO™ knife to trim edges if required.
6. Reinstall glass and bottom metal retainer.
7. Tighten top metal retainer.

N. APPLY THE TITLE DECALS TO THE SIDE PANELS

Remove the backing and apply one decal on each side panel.

THE EMPIRE STRIKES BACK* GAME PLAY

THE EMPIRE STRIKES BACK is a one-player game with a color X-Y video display. You command LUKE SKYWALKER'S* SNOWSPEEDER* vehicle and HAN SOLO'S* MILLENNIUM FALCON* spacecraft with Atari's flight control. Your main goal is to reach the safety of the huge asteroid. To do this, you must reach the REBEL base on HOTH* and escape to the skies.

You must survive four levels of play to reach the huge asteroid. The first level of play will engage you in a battle on the surface of HOTH*. DARTH VADER* has released thousands of PROBOTS* in search of the REBEL hideout. Your goal, as LUKE SKYWALKER on a SNOWSPEEDER, is to stop the PROBOTS from sending pictures of the REBEL'S* power generator to DARTH VADER.

The second level of play continues with LUKE SKYWALKER on his SNOWSPEEDER engaging in a spectacular battle against two types of IMPERIAL WALKERS*. AT-ST WALKERS* are small but very mobile. AT-AT WALKERS* are huge and difficult to destroy with BLASTERS*. A limited number of tow cables can be fired at AT-AT legs by using the thumb buttons. The WALKERS are advancing toward the REBELS' power generator, so the race is on to reach the REBEL base.

The third level of play engages HAN SOLO in his MILLENNIUM FALCON against a swarm of TIE FIGHTERS*. This level features a new and exciting war in the stars. If you can survive the TIE FIGHTER attack, you will slip into the asteroid belt flurry of level four.

Level four features HAN SOLO in his MILLENNIUM FALCON amidst a turbulent asteroid field. Asteroids must be avoided to reach the safety of the huge asteroid. However, TIE FIGHTERS continue to attack. C-3PO* will alert you that you have reached the safe hiding spot of the huge asteroid. Upon reaching the Huge Asteroid, DARTH VADER will appear and express his feelings towards you for having eluded him. THE EMPIRE increases its forces as the player again tries to defend HOTH from DARTH VADER and THE EMPIRE.

In all levels of play you must avoid colliding with objects and enemy shots, or your number of deflector shields will decrease. Also, in all levels of play you can earn bonus points for exploding a certain number of targets. A JEDI* letter will be awarded in addition to the bonus points. Once all the letters that spell out JEDI have been awarded, you will have attained true JEDI FORCE*, which makes you invincible against all DARK SIDE* forces for a limited amount of time.

THE EMPIRE STRIKES BACK has five possible modes of operation: Attract, Select-a-Difficulty, Play, High Score, and Self-Test.

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Scoring Screen:

REBEL SCORING SCREEN

PROBOT*	25
FIREBALL	3
TRANSMISSION	5
AT-ST*	50
AT-AT*	75
FLYING BONUS	PROGRESSIVE 5,000
STAR SHOT	7
TIE FIGHTER*	100
WAVE COMPLETED	2,500
JEDI LETTER	5,000
JEDI BONUS	20,000

*10 x scoring happens after earning JEDI letter.

The fourth screen is the Credit Screen that displays the Atari staff who designed the game.

The fifth screen in the Attract Mode is the High-Score Screen. It displays a table containing the ten highest scores. The copyright message appears at the bottom of the screen. (The High-Score Screen shown here contains the default entries that will appear if no high scores are in the game's memory.) The game will retain and display the top ten scores entered into its memory even if the power is turned off and then on again.

High-Score Screen:

REBEL FORCE ROSTER

1. OBI	285,353
2. WAN	170,936
3. HAN	154,650
4. MLH	140,212
5. GJR	127,645
6. NLA	113,710
7. ROB	100,175
8. DAR	88,614
9. JED	75,800
10. DES	62,436

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The High-Score Screen holds 25 entries; by moving the flight control up or down you can look at all the entries. You may bring the High-Score Screen or the Point Score Screen into view at any time during the Attract Mode. Moving the flight control to the right displays the High-Score screen and moving it to the left displays the Point Score Screen.

YOUR COMMENTS, PLEASE!

Your comments will assist Atari in improving our publications. The comments are an important part of preparing for revisions of game manuals. Please write in the space below. No postage stamp is necessary if mailed in the U.S.A.

If you have any technical questions about certain ATARI games products, or are requesting additional publications, we will immediately forward your note to the appropriate person.

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Seller warrants that its electronic parts supplied in this kit are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. None of the Seller's other products or parts thereof are warranted.

If the electronic parts supplied in this kit fail to conform to this warranty, Seller's sole liability shall be, at its option, to repair, replace, or credit Buyer's account for such electronic parts which are returned to Seller during said warranty period, provided:

- (a) Seller is promptly notified in writing upon discovery by Buyer that said products are defective;
- (b) Such products are returned prepaid to Seller's plant; and
- (c) Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

In no event shall Seller be liable for loss of profits, loss of use, incidental or consequential damages.

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Select-a-Difficulty Mode

The Select-a-Difficulty Mode begins when the correct credit(s) is entered and a fire trigger is pulled. You will hear the voice of LUKE SKYWALKER saying, MAY THE FORCE BE WITH YOU*, and you'll have eight seconds to select one of the three starting difficulties or the instructions. A difficulty is selected by first maneuvering the flight control until the cursor on the screen is positioned on the desired picture and then by pulling the Laser Fire Trigger.

The difficulties are labeled easy, medium, and hard on the display. The easy difficulty awards no bonus for completion of the starting level as indicated by NO BONUS. The Medium Difficulty awards 100,000 points, and the Hard Difficulty awards 250,000 points. Failure to select a level within the countdown time automatically starts the Play Mode at the Easy level (wave one).

If the Rebel Manual Instructions are selected, the game automatically goes into the Easy Play Mode.

Play Mode

THE EMPIRE STRIKES BACK game play is enhanced by actual character voices communicating with the player.

Voices:

LUKE:	That armor's too strong for blasters.
C-3PO:	Between ourselves, I think MASTER LUKE is in considerable danger.
HAN:	DROID* of some kind.
VADER:	THE FORCE* is with you.
VADER:	General, prepare your troops for a surface attack.
LUKE:	Go for the legs, it might be our only chance of stopping them.
EMPEROR:	He could destroy us.
VADER:	He will join us or die.
LUKE:	MAY THE FORCE BE WITH YOU.
LUKE:	There's a meteorite that hit the ground near here.
RIEEKAN:	We've picked up something outside the base.
VADER:	That's it, the Rebels are there.
VADER:	Set your course for the HOTH SYSTEM.
DERLIN:	Shield doors must be closed.
EMPEROR:	The son of SKYWALKER must not become a JEDI.
RIEEKAN:	Start the evacuation.
VADER:	That is the system, and I'm sure SKYWALKER is with them.
LUKE:	Use your harpoons and tow cables.
TRENCH:	We have spotted IMPERIAL WALKERS.

Attract Mode

The Attract Mode begins when power is applied to the game; or when the Play, High-Score, or Self-Test Modes end. The Attract Mode ends either when a credit is entered and the game goes into Select-a-Difficulty, or when the self-test switch is turned on.

The first screen displayed in the Attract Mode is the Banner Screen. THE EMPIRE STRIKES BACK logo appears with a background of moving stars and then flies away to infinity. As it vanishes, the introductory story line moves into position from the bottom of the screen. The text pauses for about 20 seconds and then, one line at a time, quickly recedes into the distance.

Banner Screen Text:

IT IS A DARK TIME FOR
THE REBELS. THE EMPIRE HAS
LAUNCHED THOUSANDS OF PROBOTS
IN SEARCH OF THE REBEL HIDEOUT.
THE EMPIRE FEARS THE STRENGTH OF
THE FORCE WITHIN ONE REBEL.
...LUKE SKYWALKER...

The next screen in the Attract Mode is the Flight Instruction Screen. The text appears one line at a time, pauses for about 20 seconds, then fades away.

Flight Instruction Screen:

1. YOU BEGIN WITH ENOUGH FORCE TO PROTECT YOU FOR x* COLLISIONS.
2. FORCE STRENGTH IS LOST WHEN YOU COLLIDE WITH ENEMY SHOTS, WALKERS, AND ASTEROIDS.
3. AIM YOUR LASERS WITH CURSOR TO EXPLODE PROBOTS, WALKERS, TIE FIGHTERS AND SHOTS.
4. AVOID COLLISION WITH ASTEROIDS BY FLYING AROUND THEM.

*Replace x with 2, 3, 4, or 5 -- depending on option switch settings.

The top part of the banner screen should display the scoring chart and the wave number. The messages INSERT COIN(S) and X COINS PER PLAY should alternately flash if no credit is in the game. If the game has credits, then the message X CREDITS and PULL FIRE TRIGGER TO START will be displayed. These messages appear on all screens.

The third screen in the Attract Mode is the Scoring Screen. It lists targets in the game and their point values. This screen scrolls up from the bottom of the screen, then fades away.

O. INSTALL THE EMPIRE STRIKES BACK LABELS**NOTE**

Do not remove or mark any of the existing labels on the game cabinet.

Perform the following procedure to apply THE EMPIRE STRIKES BACK conversion kit labels on the game cabinet.

1. Remove the protective backing from the labels included in the kit.
2. Apply the labels to the back of the game cabinet directly above the rear access panel.

P. CORRECT THE SELF-TEST LABEL

Note that the STAR WARS self-test is nearly identical to THE EMPIRE STRIKES BACK self-test. Correct your self-test label to reflect the differences, which are listed below:

1. Refer to Table 4 in these instructions to change the switch settings for play options.
2. In the game option display, the "BONUS SHIELD" message is replaced by "JEDI letter mode." Also, the option switch settings are displayed below the "MUSIC IN ATTRACT" message.
3. In the accounting and game times display you can keep track of add-a-coin games.
4. A sound test screen has been added to the self-test. Moving the control up or down will select the sound number you choose. Firing any button will turn on that sound. The sound will automatically repeat every four seconds.

Q. FLIGHT CONTROL CHECK

1. Make sure all the buttons are working on the Flight Control. The thumb buttons are used to fire bolos, and trigger buttons fire regular shots.
2. Make sure both potentiometers are in good working order.

NOTE

You can use the switch test in the self-test mode to check the above two items.

3. Be sure the control handles are tight and the control does not bind when moving it right to left and up to down.

2. Replace them with 220 μ F, 35 V, low equivalent-series resistance capacitors (part no. 123009-227).

L. APPLY THE FLIGHT-CONTROL DECAL

Perform the following procedure to apply the decal to the flight-control cover. (Refer to Figure 5-2 of the STAR WARS manual.) This new decal is designed to be applied directly over the original decal. The flight-control cover does not need to be removed for this procedure.

1. Clean the surface of the original decal.
2. Remove the backing from the flight-control decal provided in the conversion kit.

NOTE

Be sure to orient the decal properly to avoid applying it upside down.

3. Align the holes in the flight-control decal with the top screws of the flight-control cover. Align the edges of the decal with the edges of the flight-control cover.
4. With the palm of your hand, press the flight-control decal onto the flight-control cover, smoothing it around the bends toward the underside of the cover. Once the new decal touches any surface, do not try to lift or move the decal or you will destroy it. The adhesive is very strong.
5. Use an X-ACTO™ knife to trim the edges of the decal.

M. APPLY THE GAME ATTRACTION-PANEL DECAL

UPRIGHT GAME

Perform the following procedure to apply the attraction-panel decal to the upright game cabinet.

1. Using a 1/8-inch Allen wrench, remove the screws that secure the attraction shield to the cabinet.
2. Using a screwdriver, remove the screws that secure the metal bracket to the attraction shield. Set aside for later use.
3. Remove the staples that secure the decal ends to the wood attraction shield.
4. Peel back the STAR WARS decal from the wood attraction shield.

Table 6 Display Modification Checklist

Location of Modification	Description of Parts
Deflection PCB	<ol style="list-style-type: none"> 1. Type-1N4002 diode (Atari part no. 31-1N4002) added to CR2. 2. Type-1N4002 diode (Atari part no. 31-1N4002) added to CR11. 3. Type-1N4002 diode (Atari part no. 31-1N4002) added to Q6. 4. Type-1N4002 diode (Atari part no. 31-1N4002) added to Q7. 5. Type-1N4002 diode (Atari part no. 31-1N4002) added to Q16. 6. Type-1N4002 diode (Atari part no. 31-1N4002) added to Q17. 7. Two type-1N754A zener diodes (Atari part no. 131002-001) added near R1. 8. Two type-1N756A zener diodes (Atari part no. 32-1N756A) added near R24. 9. R12 changed to 12 Ω, $\pm 5\%$, 1/4 W resistor (Atari part no. 110000-120). 10. R35 changed to 12 Ω, $\pm 5\%$, 1/4 W resistor (Atari part no. 110000-120).
High-Voltage PCB	<ol style="list-style-type: none"> 1. C3 changed to a 220 μF, 35 V, low equivalent-series resistance capacitor (Atari part no. 123009-227). 2. C4 changed to a 220 μF, 35 V, low equivalent-series resistance capacitor (Atari part no. 123009-227).

Deflection PCB Modifications

Perform the following modifications on the display Deflection PCB.

I. PERFORM A SELF-TEST

Perform the following procedure to ensure that the PCBs were modified correctly. Also refer to part Q. FLIGHT CONTROL CHECK in this manual.

1. Plug in the game power cord.
2. Set the power on/off switch to the ON position.
3. Open the upper coin door and set the self-test switch to the ON position (up).
4. Perform the self-test procedure given in Chapter 2 of the STAR WARS manual. When you have the Game Options Display on the screen, reset all the statistics, the high scores, and the options. Then test the NOVRAM following the procedure in the STAR WARS manual.

NOTE

Once reset, the game options displayed in self-test will correspond to the switches set on the Main PCB. Refer to the recommended option-switch settings given earlier in this Conversion Manual.

5. If the game is not working properly, proceed to part J. TROUBLESHOOTING GUIDE in this Conversion Manual.

J. TROUBLESHOOTING GUIDE

Use the information given in Table 5 as an aid in troubleshooting THE EMPIRE STRIKES BACK.

Table 5 Troubleshooting Guide

Symptom	Corrective Procedure(s)
No Video Displayed	<ol style="list-style-type: none"> 1. Check the Power On/Off Switch and the power plug. 2. Check that all ICs on the Main and Analog Vector-Generator PCBs were properly installed in the correct location and oriented correctly. 3. Check that the Main PCB trace cuts for this conversion are truly open. 4. Check that no solder bridges or splashes occurred during the conversion.

8. Locate the IC labeled "136031-012" in the conversion kit. Install this IC in the socket at location 1H of the Sound PCB.
9. Locate the IC labeled "136031-013" in the conversion kit. Install this IC in the socket at location LJ/K of the Sound PCB.

F. ASSEMBLE THE GAME PCB SET

Perform the following procedure to assemble THE EMPIRE STRIKES BACK game PCBs. (Refer to Figure 5-9 of your STAR WARS manual.)

1. Using a Phillips screwdriver and two pan-head screws, secure the Main PCB to the RFI Shield PCB spacer blocks.
2. Plug the Interconnect PCB onto the edge connectors between the notches of the two assembled PCBs.
3. Place the Sound PCB, with the component side up, on top of the Main PCB. Be sure to align the edge connectors at the notched ends of these PCBs.
4. Now push the Sound PCB into the Interconnect PCB.
5. Using a Phillips screwdriver and two pan-head screws, secure the Sound PCB to the standoffs on the Main PCB.
6. Plug in the keyed-to-fit interconnect cable from the Main PCB to the connector pins on the Sound PCB.

G. SET THE GAME OPTIONS

Locate the dual in-line package (DIP) switch at location 10D of the Main PCB. Table 4 lists all the game play options available for THE EMPIRE STRIKES BACK game. Set the switches as desired for game difficulty.

NOTE

The Coin and Credit Options (at location 10E/F) of the Main PCB remain exactly the same for THE EMPIRE STRIKES BACK as they were for STAR WARS. The recommended option settings are: 1 Credit, 1 Coin for the Left Coin Mechanism; 1 Credit, 1 Coin for the Right Coin Mechanism; and 0 Bonus Coins Added for the Bonus Coin Adder. Refer to Table 1-3 in the STAR WARS manual.

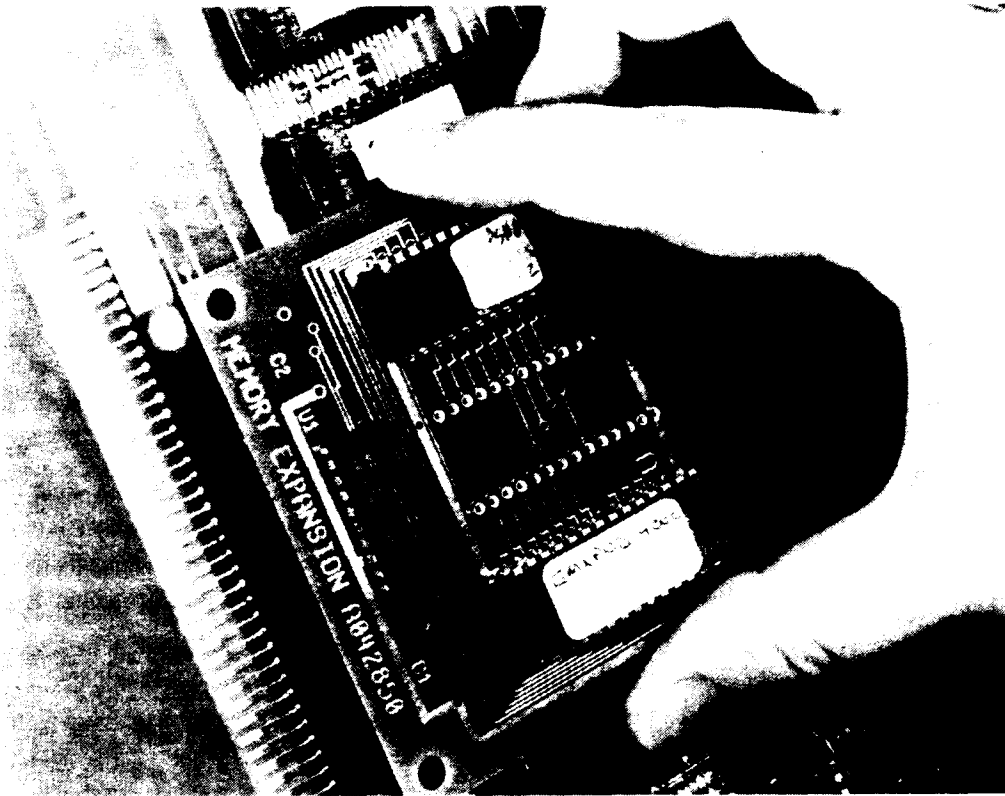


Figure 3 Installing the Memory Expansion PCB

E. MODIFY THE SOUND PCB

Perform the following procedure to modify the Sound PCB. (Refer to Figure 3 of this manual.)

1. On the back (non-component) side of the Sound PCB, locate the trace from pin 26 of the IC socket at location LJ/K and LH. (See Figure 3.)
2. Use an X-ACTO™ knife to cut the traces from pins 26 of the IC sockets at locations LH and LJ/K.
3. Use wire cutters to cut a 1 1/2-inch jumper wire from the wire strand included in the conversion kit.
4. Use wire strippers to strip 1/16 inch of the insulation off the ends of this jumper wire.
5. Use a soldering iron to solder one end of the jumper wire to pin 26 of the IC socket at location LJ/K.

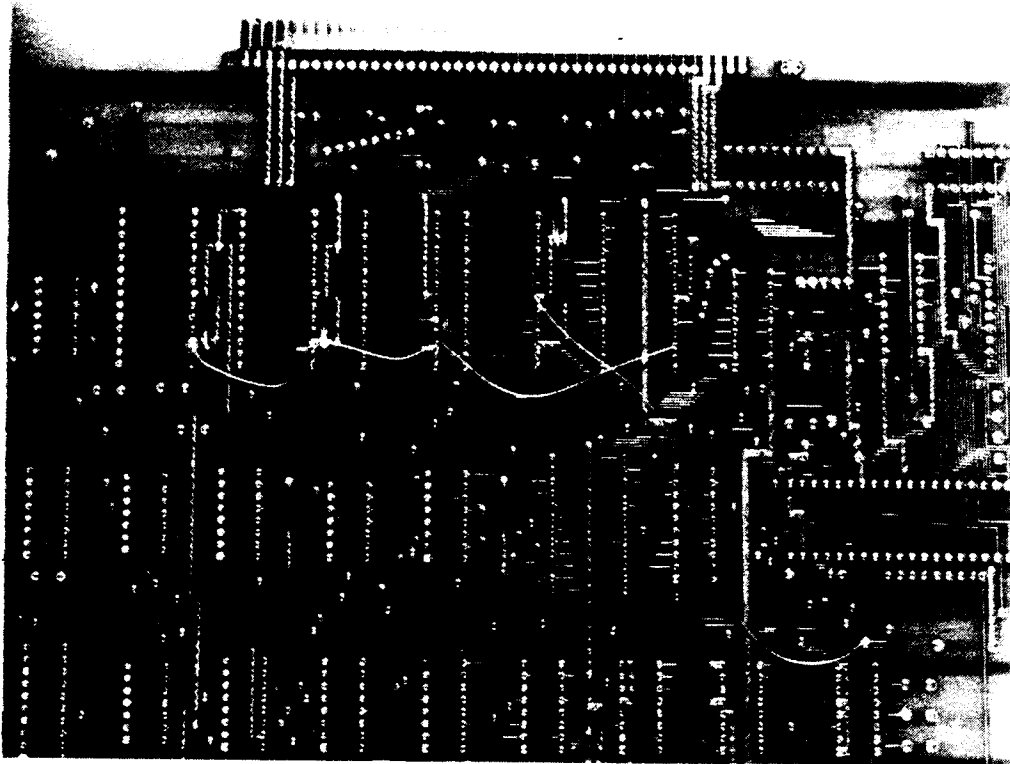


Figure 1 Modifying the Main PCB

3. Use the wire cutters to cut a 5-inch jumper wire off the wire strand included in the conversion kit.
4. Use the wire strippers to strip 1/16-inch of the insulation off the ends of this jumper wire.
5. Use a soldering iron to solder one end of the jumper wire to pin 22 of the IC socket at location 1H/J.
6. Solder the other end of this jumper wire to pin 34 of the IC socket at location 2C (see Figure 1).
7. On the back (non-component) side of the Main PCB, locate pins 26 of 1J/K, 1K/L, and 1M. Isolate all three pins 26 by cutting the traces on both sides of the pins (but only on one side of the chip 1J/K).
8. At 1M and 1K/L, solder a jumper around pins 26 to reconnect pins 27 to their bypass caps.
9. Solder one end of a jumper wire to pin 26 of 1F. Then connect the rest of that wire to pins 26 of 1J/K, 1K/L, and 1M.

CONVERSION INSTRUCTIONS**NOTE**

These procedures must be performed by qualified service personnel. All interior and exterior surfaces of the cabinet and the working area should be clean and free of foreign material before starting the procedures.

The following procedures are arranged in a sequence recommended for converting your game. The electronic parts of your game that are affected by the conversion are removed first. Necessary electronic modifications are done next, and THE EMPIRE STRIKES BACK graphics are installed afterwards.

WARNING

Unplug the game before performing the following procedures.

A. REMOVE THE PRINTED-CIRCUIT BOARDS

Perform the following procedure to remove the STAR WARS game printed-circuit boards (PCBs) from the cabinet. (Refer to Figure 5-1 of your STAR WARS manual.)

1. Unlock and remove the rear access panel.
2. Remove any screws or tie wraps that secure the edge connectors to the EMI Shield PCB. Disconnect the edge connectors.
3. To remove the game PCB set from the EMI cage, pull each of the nylon snap-in fasteners on the EMI Shield PCB to the unlocked position (out).
4. Carefully slide the EMI Shield PCB and the attached game PCBs straight out of their guides. Be careful not to twist the boards, as this may loosen connections or components.
5. Place the PCBs on a clean table in an area with good lighting.

KIT PARTS INVENTORY

Check the contents of THE EMPIRE STRIKES BACK Conversion Kit (A042980-01 for upright, A042980-02 for cockpit) before proceeding with the conversion procedure. The parts listed in Table 1 are included in THE EMPIRE STRIKES BACK Conversion Kit. If you are missing any parts from your Conversion Kit, contact the Atari Customer Service office listed on the inside front cover of this manual.

Table 1 Conversion Kit Contents
A042980-XX

Part No.	Quantity		Description
	Version -01	-02	
A042850-01	1	1	Memory Expansion PCB Assembly
ST-225	1	1	STAR WARS Self-Test Chart
TM-226	1	1	THE EMPIRE STRIKES BACK Conversion Instructions
038158-01	1	1	Non-UL Product Identification Label
042981-01	1	1	Flight-Control Cover Decal
042982-01	1		Upright Game Attraction Decal
042983-01		1	Cockpit Game Attraction Decal
042984-01	2	2	15-Inch Jumper Wire
042985-01	2	2	Side Panel Title Decal
040136-01	1		Attraction Panel Shield
136031-001	101	1	ROM Integrated Circuit
136031-002	102	1	ROM Integrated Circuit
136031-003	203	1	ROM Integrated Circuit
136031-004	104	1	ROM Integrated Circuit
136031-007	107	1	Microcode ROM Integrated Circuit
136031-008	108	1	Microcode ROM Integrated Circuit
136031-009	109	1	Microcode ROM Integrated Circuit
136031-010	110	1	Microcode ROM Integrated Circuit
136031-011	111	1	ROM Integrated Circuit
136031-012	112	1	ROM Integrated Circuit
136031-013	113	1	ROM Integrated Circuit

Safety Summary

The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply.

▲ WARNING ▲

Properly Ground the Game. Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded 3-wire outlet. If you have only a 2-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players may receive an electrical shock if the control panel is not properly grounded! After servicing any parts on the control panel, check that the grounding clip is firmly secured to the metal tab on the inside of the control panel. Only then should you lock up the game.

AC Power Connection. Before connecting the game to the AC power source, verify that the proper voltage-selection plug is installed on the game's power supply.

Disconnect Power During Repairs. To avoid electrical shock, disconnect the game from the AC power source before removing or repairing any part of the game. When removing or repairing the video display, extra precautions must be taken to avoid electrical shock because high voltages may exist within the display circuitry and cathode-ray tube (CRT) even after power has been disconnected. Do not touch internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing this area of the game. To discharge the CRT: Attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Momentarily touch the free end of the grounded jumper to the CRT anode by sliding it under the anode cap. Wait two minutes and discharge the anode again.

Use Only ATARI Parts. To maintain the safety integrity of your ATARI game, do not use non-Atari parts when repairing the game. Use of non-Atari parts or other modifications to the game circuitry may adversely affect the safety of your game, and injure you or your players.

Handle Fluorescent Tube and CRT With Care. If you drop a fluorescent tube or CRT and it breaks, it may implode! Shattered glass can fly six feet or more from the implosion.

Use the Proper Fuses. To avoid electrical shock, use replacement fuses which are specified in the parts list for this game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating. In addition, the fuse cover must be in place during game operation.

CAUTION

Properly Attach All Connectors. Make sure that the connectors on each printed-circuit board (PCB) are properly plugged in. Note that they are keyed to fit only one way. If they do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty.

Ensure the Proper AC Line Frequency. Video games manufactured for operation on 60 Hz line power (i.e., United States) must not be operated in countries with 50 Hz line power (i.e., Europe). The fluorescent light ballast transformer will overheat, causing a potential fire hazard if 60 Hz games are operated on power lines using 50 Hz. Check the product identification label of your game for the line frequency required.

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