

COLECO VISION™

EXPANSION MODULE # 2

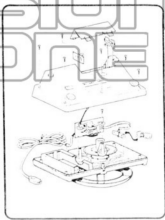


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COLECO VISION ZONE

Introduction

Coleco's Expansion Module #2 turns the ColecoVision game system into a high performance race car. The module is equipped with a tabletop console that includes an arcade-style steering wheel and a floor-operated accelerator foot pedal. The Coleco Vision controller mounts in the driving module console to become the gear shift.

In repairing Expansion Module #2, Coleco will require service centers to troubleshoot to the component level.

For ease in selecting important information this repair manual is separated into eight basic sections.

I. Table of Contents

II. Introduction

II. Theory of Operation—examines Expansion Module #2's three basic parts and their descriptions.

IV. Disassembly/Assembly Instructions—simple instructions for taking apart and putting together Expansion Module #2. Also includes dimensional drawings of the three parts to assist in identifying component parts.

V. Schematic and Drawings—includes a parts list and detailed drawings of component locations.

VI. Testing and Troubleshooting—includes a list of required test equipment, description of the diagnostic cartridge, and how it pertains to turbo and flow charts, along with a description on how to follow the flow charts.

VII. ColecoVision Updates—will be an area to file modifications, parts changes or additional information as it becomes available to repair centers.

VIII. Notes—A place to keep personal notes which are helpful in servicing ColecoVision in efficient, professional methods. ColecoVision welcomes additions or changes from the service center personnel, so that they may be included in the ColecoVision updates.

Theory of Operation

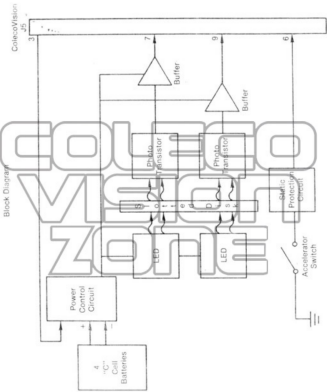
Expansion Module #2 consists of three basic parts: photo coupler, power control circuit and an accelerator circuit.

The photo coupler circuit converts rotational movements of the steering wheel into electrical pulses compatible with the basic ColecoVision. The circuit consists of two LEDs, a slotted disc, two photo transistors and Schmitt trigger buffer circuitry. The slotted disk is situated between the two LEDs and two photo transistors. The disk and fixture holding the LEDs and photo transistors are constructed to optimally produce 50-50 duty cycles and a 180° phase difference between the two pulses. Pulses are made by the slotted disk breaking the beam of light emitted by the LEDs. As this happens the photo transistor turns off. If the beam does not break, the transistor remains on. Four Schmitt trigger NAND gates (used as inverters), two diodes, and four resistors interlace the photo transistors to the ColecoVision handcontrol inputs.

The power control circuit extends battery life by disabling the power when the game is turned off. This is accomplished by using three transistors, passive resistors, and a timer capacitor. To power the unit up, a signal (2.5v through 22K) is received from the ColecoVision which ultimately turns on all three transistors.

The accelerator circuit is simply a switch connected to ground. As the foot pedal is depressed a ground is outputted to ColecoVision by closing the switch. Two diodes and one capacitor are used to suppress static discharge.

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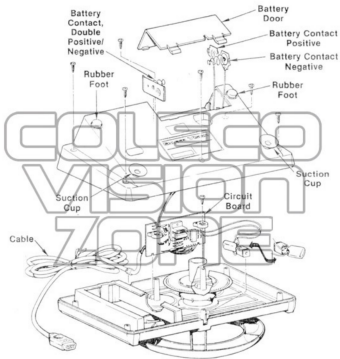
Disassembly

1. Turn unit over so that bottom is in an upright position.
2. Remove four screws to pull bottom housing off.
3. Remove single screw holding circuit board.
4. Gently remove board, without bending the slotted disk.

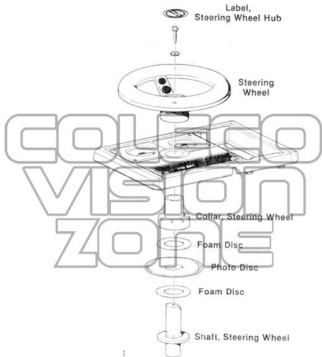
Assembly

1. Carefully replace the board, again do not bend the slotted disk.
2. Replace single screw holding circuit board.
3. Replace bottom housing and four screws.
4. Turn unit over and test.

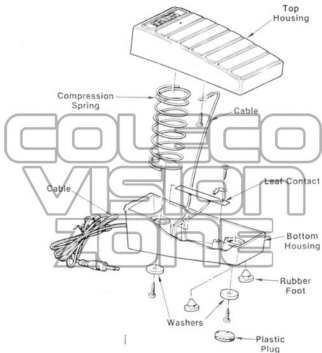
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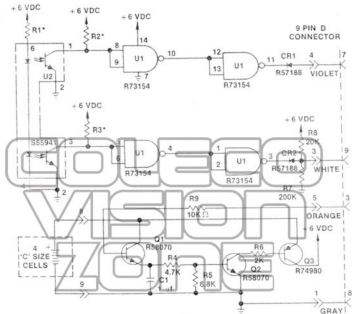
Complete Unit Exploded View



Top Housing Exploded View

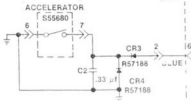


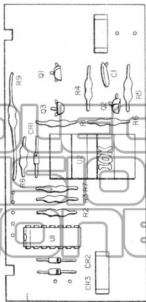
Foot Pedal Exploded View



*R1, R2 and R3 must be matched to photo coupler case color per chart

U ₂ case color	R1	R2	R3
Blue	82Ω	10K	10K
Black	82Ω	33K	33K
Yellow or yellow dot	100Ω	2.2K	2.2K





Circuit Board

Capacitors

<u>REFERENCE/ DESIGNATOR</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
C1	.1 μ F	R72284
C2	.33 μ F	R72315

Diodes

<u>REFERENCE/ DESIGNATOR</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
CR1	1N4148	R57188
CR2	1N4148	R57188
CR3	1N4148	R57188
CR4	1N4148	R57188

Integrated Circuits

<u>REFERENCE/ DESIGNATOR</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
U1	CMOS Schmitt trigger NAND gate	R73154

Photo Coupler

<u>REFERENCE/ DESIGNATOR</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
U2	Dual photo coupler	555941

Resistors

<u>REFERENCE/ DESIGNATOR</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
R1	82K	R58282
R1	100K	R57271
R2	2.2K	R57800
R2	10K	R57266
R2	33K	R58005
R3	2.2K	R57800
R3	10K	R57266
R3	33K	R58005
R4	4.7K	R57295
R5	6.8K	R58219
R6	2K	R58504
R7	200K	R74907
R8	20K	R57919
R9	10K	R57266

Transistors

<u>COMP</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
Q1	NPN trans	R58070
Q2	NPN trans	R58070
Q3	PNP trans	R74980

Miscellaneous

<u>DESCRIPTION</u>	<u>PART NUMBER</u>
Housing, top	F55676
Collar, steering wheel	F55841
Shaft, steering wheel	F55842
Photo disc.	F55885
Foam disc.	F55920
Foot pedal assembly	S55680
Housing, bottom (foot pedal)	F55685
Housing, top (foot pedal)	F55690
Plastic plug	F91606
Cable (foot pedal)	R55890
Leaf contact	R55892
Compression spring	R55893
Foot, rubber (foot pedal)	R55908
#6ABX 3/8 phillips screw	R75999

Miscellaneous

<u>DESCRIPTION</u>	<u>PART NUMBER</u>
Flat washer	R76000
Housing, bottom assy.	S55951
Housing, bottom	F55844
Battery contact, positive	F74922
Battery contact, negative	F74923
Battery contact, double pos/neg	F74924
Rubber foot	R55908
Suction cup	R58003
Door, battery	F55845
#6AB X 3/8 phillips screw	R52693
Cable, main unit	R55891
Steering wheel and label assembly	S74852
Steering wheel	F55673
Label, steering wheel hub	R55680
Label, steering wheel spokes	R55953
Label, speedometer	R55688
Label, tachometer	R55684
Label, expansion module #2	R55681
#10 AB X 5/8 phillips screw	M51817
#10 washer	M55049
#6 AB X 1/2 phillips screw	R52692
Cartridge assy, turbo	S74814
Label, cartridge (turbo)	R78257
Owner's guide, cartridge	S92016
Instruction sheet	R55704
Owner's manual, expansion module #2	R75701
Warranty card, expansion module #2	R91661
Warranty card, cartridge (turbo)	R91660
Carton, retail	R55703
Insert, top (foam)	R74811
Insert, bottom (foam)	R74812

Troubleshooting Equipment

The following test equipment is required for repairing Expansion Module #2 in the ColecoVision series —

- A digital multimeter
- A properly adjusted color television
- A diagnostic cartridge
- A working ColecoVision
- An Expansion Module #2 Repair Manual

Diagnostic Cartridge

The diagnostic cartridge was developed to aid in the testing of the basic ColecoVision. However, Turbo game cartridges can be substituted to test the Expansion Module, but constant game resetting will be required and will not be as simple a test.

The only test using the diagnostic cartridge for testing Expansion Module #2 is the handcontroller test. After insertion into the ColecoVision the diagnostic cartridge will automatically cycle through several tests until it gets to the handcontroller test. The handcontroller test indicates each handcontrol function for each player with the letters on a white background. When the function is selected on the handcontroller, the letter should turn white surrounded by a black box. After this function is deselected, the letter will blank out. The accelerator function is tested by observing the fire left function while depressing the accelerator pedal.

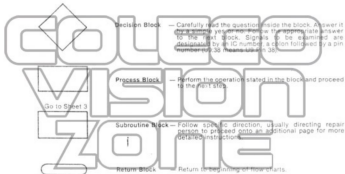
The diagnostic cartridge also provides a method of checking the photo coupler circuit. While viewing the area on the screen between the fire left and the fire right blocks, turn the steering wheel. At this point an arrow should flash. Changing the direction of rotation will cause the arrow to flash in the opposite direction.

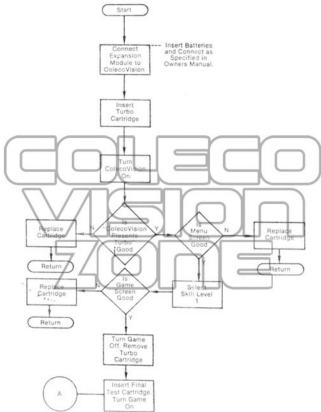
Explanation of Troubleshooting

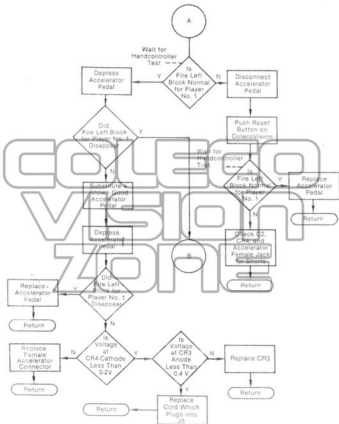
This manual is written as a guideline to aid in troubleshooting. It will lead the repair person to a level where individual isolation techniques can take over and diagnose the failure.

The troubleshooting guide uses flow charts, signal pictures and a list of technical tips. The signal pictures demonstrate how the signals should look in a perfect situation with an explanation and methods of examining each signal.

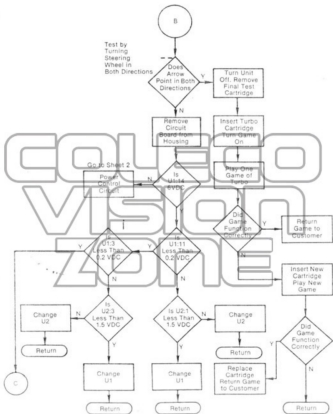
Following is a description of each symbol used in the flow charts.



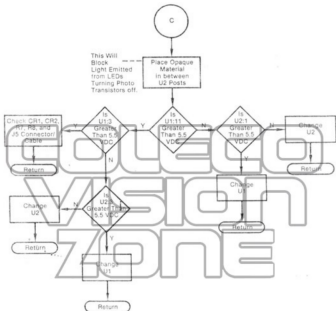




SHEET 1 (CONT'D)



SHEET 1 (CONT'D)



SHEET 2

