Bally Space Flight
Owner's Manual - Solid State Sound (S^3) Replacement Unit

Model # S^3-01   July 8, 2018 **www.GameRoomRepair.com**

*** PLEASE READ THIS ENTIRE MANUAL BEFORE INSTALLING UNIT   ***

INTRODUCTION:

Thank you for purchasing this Solid State Sound unit (or "S^3" for short). It is designed as a "drop-in" replacement for the original 8-track tape deck. No modifications to the original game or its internal wiring are required. This sound unit contains all 42 audio messages (almost eight full minutes of audio) from the original 8-track tape. The S^3-01 unit also replicates all of the original tape deck's functions, which are as follows:

- Initiating the start of each lunar module decent (each landing attempt), every 18.5 seconds. Each landing attempt is initiated when the "CUE" output signal (located on the violet wire of the 6-pin Jones connector) gets pulled to ground by the S^3-01 unit. This "normally floating" output goes low to energize the "CUE" relay on the game's main relay logic assembly, located inside the cabinet.

- Monitoring the "OK" input signal (located on the blue wire of the 6-pin Jones connector). A successful landing causes 13VDC (approximately) to be placed onto this wire from the relay logic assembly. This signal is received by the S^3-01 unit.

- Coordinating the correct audio playback during each landing attempt.   A"Decent" message is played followed by either the "Abort" message or the "Landing OK" message, as appropriate.

- Volume Control of message playback.

Please Note: This sound unit, like the original 8-track deck, only triggers the start of each landing "attempt" and the playing of the audio files. All other game functions are controlled by the main relay logic assembly located inside the cabinet. All of the game's electro-mechanical assemblies and circuits on the relay logic assembly and in the overhead X-Y gantry must be working properly before the S^3-01 unit is installed. Functions not controlled by the S^3-01 include:

- The number of landing attempts per game and the number of extra landings awarded.
- The speed at which the lunar module descends and reversing the motors to raise it up again.

IMPORTANT:

The original Bally Space Flight Owner's Manual states that the lunar module "decent time" must be adjusted so that it takes between 8.5 and 9.0 seconds from the time that the module starts to decend towards the moon's surface, until the motor reverses and starts to *"reel in"* the lunar module strings. The S^3-01 also requires this "decent time" to fall between 8.5 and 9.0 seconds. A potentiometer located on top of the lunar module's X-Y carriage will adjust this time.

WARNING: – ELECTRICAL SHOCK HAZARD !!!

110VAC is sent to the original 8-track tape player while a game is in progress. This voltage is used to run the tape deck motor. The S^3-01 monitors this same 110VAC to determine when a game is in play. Therefore, 110VAC is present on the black and white wires of the wiring harness and is sent to the S^3-01 printed circuit board (PCB).
Use extreme caution to avoid getting shocked. Do not touch the S^3-01 while the game is in operation !!!
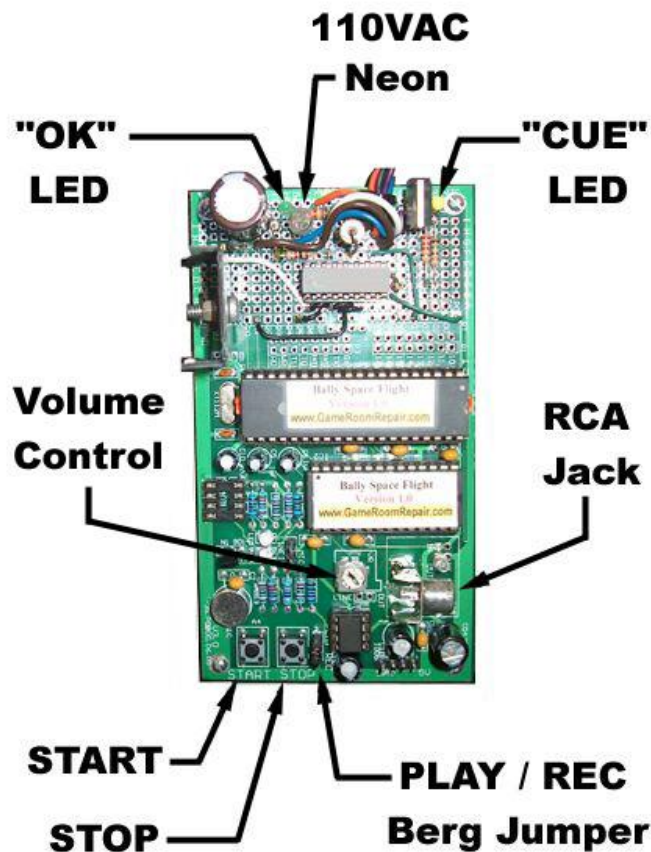
ADDITIONAL FEATURES:

The S³-01 includes additional features that were not in the original 8-track tape deck:

- A "Power-On" message plays when the game is turned on. This indicates that the S³-01 is working properly.

- The first time a game is played after the machine is turned on, the S³-01 selects a random "Decent" message to start its playback with. This feature causes more of the 42 messages to be heard if used in an arcade where only a few games are played each time the machine is turned on.

- An "Attract Mode" message plays every few minutes when the game sits idle. This feature can be disabled.

- A diagnostic routine plays all 42 messages in order, when activated.

- Individual messages can be played manually to test the PCB, when the game is not in use (sitting idle).

- The following lamps are included, and indicate:
    - **Red** LED :   +5VDC power is being produced by the S³-01on-board voltage regulator.
    - **"Busy"** LED: An audio file (message) is being played from the solid state audio memory chip.
    - Neon Lamp: Lights to indicate that 110VAC is on during game play.
    - **Yellow** LED: "CUE" output signal. Lights to indicate the start of the lunar module decent sequence.
    - **Green** LED: "OK" input signal. Lights to indicate a successful landing has been detected.

INSTALLATION and SETUP:

The S³-01 can be mounted in any location. One suggestion is on the inside of the coin door, which allows for easy access to all S³-01 controls and indicator lamps. Mount the unit as follows:

- Turn off the main power switch on the game and unplug the power cord.

- Mount the S³-01 using the four supplied wood screws and standoffs.

- Plug the speaker into the RCA jack on the S³-01.

- Insert the 6-pin Jones plug of the S³-01 into the connector jack where the original tape deck was connected.

- To enable or disable the Attract Mode messages, find the 3 pin "Berg" style terminal on the S³-01 PCB that is marked "PLAY/REC". Install the Berg jumper in the PLAY position to enable the Attract Mode. Remove the jumper or move it to the REC position (which is unused) to disable the Attract Mode messages.

Coin Door

- Turn on the main power switch, the "Power-On" message will play.

- Press the Start Button on the S³-01 PCB. A message will play. During playback, use a small screwdriver to adjust the audio volume level by turning the potentiometer on the S³-01. **Note:** Clockwise rotation decreases the volume level. Counter-Clockwise increases volume.

Jones Plug

- Insert a coin and begin the game. Follow the instructions in the original Space Flight Owner's Manual to adjust the "Decent Time" of the lunar module for 8.5 to 9.0 seconds. This adjustment is critical for proper game operation and for synchronization of the audio playback.
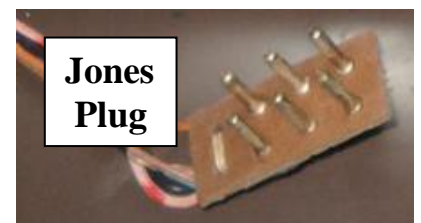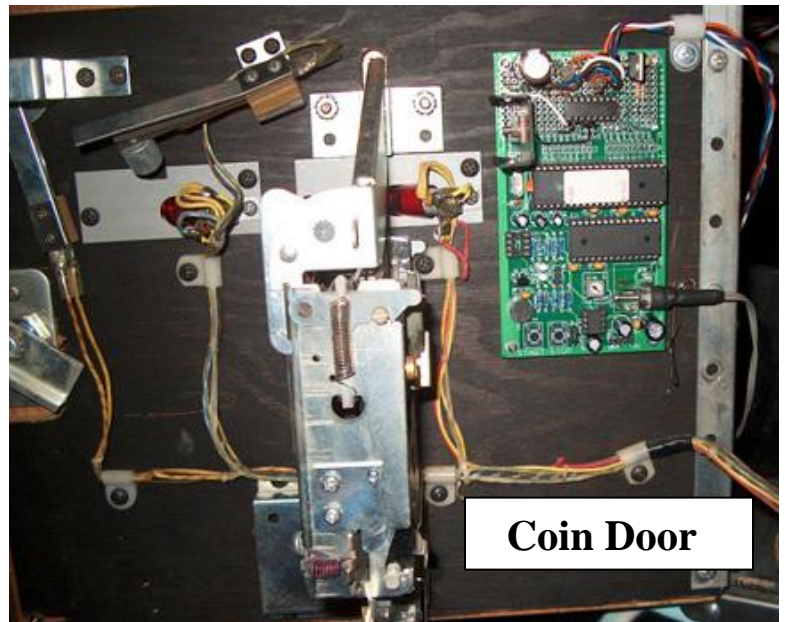
DIAGNOSTICS:
        After following the instructions above, the S³-01 is ready to go! No further adjustments are required <mark>if</mark> your game was working properly before installing the S³-01. Several diagnostic features exist that help to verify the S³-01is functioning properly. The following is an explanation of each diagnostic feature:

- **Main +5VDC Power Indicator:**
        Two red LEDs on the S³-01 PCB will always be lit while the game is turned on. These LEDs indicate that the S³-01 is powered up and ready to operate.

- **Message Playing Indicator:**
        While a message is playing, the red "BUSY" LED on the S³-01 will flash. Audio playback should be heard from the speaker whenever this LED is blinking.

- **Play All 42 Messages:**
        From a game "powered off" condition, press <u>and hold</u> the START button on the S³-01 <u>while</u> turning on the game's main power switch. START button can then be released. A test announcement message will play, followed by approximately 7-1/2 minutes of continuous audio, which is all 42 messages from the original 8-track tape. The messages are arranged so that one "Decent" message plays along with its associated "Abort" message, and then followed by its corresponding "OK" message for that specific Decent message. Many of the messages re-use the same words and phrases, but the combinations of these words and phrases are different from one message to the next. The playback of this entire audio file can be terminated at any time during play, by pressing the STOP button on the S³-01 PCB.

- **Play a Single Message:**
        At any time while the game is sitting idle, the START button on the S³-01 PCB can be pressed to hear the <u>next message</u> in the solid state memory chip. The playback heard will either be the next combined "Decent" and "Abort" message which plays for 17 seconds, <u>or</u> the next "OK" message which plays for 5 seconds. Continuing to press the START button after each message is heard will step the S³-01 through all 42 messages.

- **110VAC Power (input) Indicator:**
        The neon lamp located on the S³-01 PCB will illuminate whenever 110 volts AC is present. This indicates that a game is in play and 110VAC is being delivered to the S³-01. The presence of this voltage informs the microcontroller to perform the audio playback, "CUE", and the "OK" monitoring functions.

- **CUE (output) Indicator:**
        As each Decent sequence begins, the yellow LED located on the S³-01 PCB will illuminate for 1.5 seconds. During this time, a logic level "low" (0 volts or ground potential) is placed on the violet wire of the wiring harness and sent to the relay logic board in the game's cabinet. This energizes the "CUE Relay" on the relay logic board and starts the decent of the lunar module towards the moon's surface.

- **OK (input) Indicator:**
        Each time a landing is successful, an "unfiltered/pulsating" 13 VDC signal from the main cabinet is placed on the blue wire of the Jones plug as is delivered to the S³-01. While this voltage is present, the green LED on the S³-01 PCB will illuminate to confirm that the "Landing OK" signal is being received. This causes the microcontroller to play the appropriate "OK" message, instead of playing the "Abort" message.

<mark>***   IMPORTANT NOTES: ***</mark>

1) If the game is ever powered off <u>while</u> the S³-01 is in the middle of playing a sound file, the S³-01 may not properly initialize itself if the power is <u>immediately</u> turned back on again. This will result in garbled sound files being played. To correct this problem, simply turn the game off and let the game sit for five minutes powered off. This will insure that all "stored-up" voltage will drain from the capacitors on the S³-01 PCB. The S³-01 will return to playing its audio messages correctly, once the game is powered up after several minutes.
2) <mark>Always turn the main cabinet power off</mark> before inserting or removing the 6-pin Jones plug to avoid damaging the S³-01solid state circuitry.