T I M E
KILLERS™

INSTALLATION MANUAL
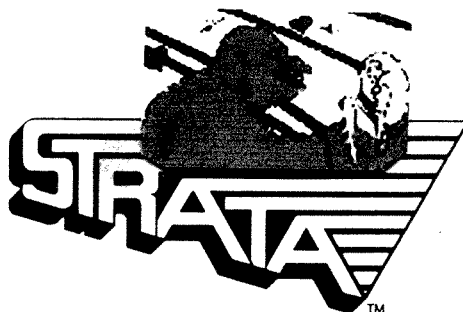
STRATA GROUP, INC.

SERVICE/SALES	**1-800-262-0323**
FAX	**(708) 870-0120**

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WARRANTY, REPAIR AND RETURN POLICY

1. Full 90-day warranty on all electronic components. All warranty periods begin on the date of purchase from **Strata Group, Inc.**

2. There is a minimum $40.00 service charge for all non-warranty repairs or returns.

3. For all servicing, return to **Strata Group, Inc.**

4. ANY non-factory repair or attempted repair voids warranty.

5. AAMA decal must not be removed from the PCB.

RETURN MERCHANDISE AUTHORIZATION

1. All returned merchandise must have an RMA number marked clearly on the outside of the package.

2. You must obtain all RMA numbers from your authorized **Strata Group, Inc.** distributor. Please have your **Strata Group, Inc.** serial number available when calling for an RMA number.

3. Merchandise returned without an RMA number will not be accepted.

4. Advance replacement boards will be shipped to distributors or, at the distributor's request, will be shipped directly to the operator.

5. Advance replacement boards will be billed to the distributor until **Strata Group, Inc.** receives the returned board, at which time a credit will be issued.

6. All repairs and/or replacements will be shipped within 24 hours of receipt or request (subject to availability).

FCC REGULATION COMPLIANCE

This equipment complies with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

UPRIGHT KIT

1) PCB assembly
1) Set of Nuts, Bolts, and Spacers
1) Connecting Wire Harness (JAMMA)
2) Joystick Assemblies
12) Button Assemblies
1) Marquee Styrene
1) Marquee Plexiglas
1) Control Panel Overlay
1) Set of Function Labels
1) Manual

TIME KILLERS is a dramatically different fighting video game for one or two players. With exciting art, animation, and interactive stereo sound, TIME KILLERS gives players a chance to become one of eight characters from different time zones:

CHARACTER	DESCRIPTION	MOVE
THUGG	Brawny Caveman with primitive stone axe	Blood Chop
LEIF	Bold and fearless Viking with battleaxe	Berserker
WULF	Brave Knight with broadsword	Flying Guillotine
MUSASHI	Clever, agile Samurai with two swords, katana and daito	Dragon's Bite
RANCID	Chainsaw-wielding Rebel and street fighter	Head Shred
ORION	Space Bounty Hunter with electric saber	Satellite Slash
MATRIX	Military Leader with photon blade	Photon Fury
MANTAZZ	Mutant Alien with serrated forearms and clawed feet.	Secare Slice

The game begins in the hall of time where warriors are chosen to do battle to the death. Once a single warrior has successfully destroyed all other opponents, there will be a final battle for the prize of immortality.

Each player has five buttons corresponding to the movements of a character's head, arms and legs. Players will have fun discovering the unique button and joystick patterns that release each character's special fighting skills and tricks.

TIME KILLERS surpasses other games in its ability to bring the characters and settings to life through use of interactive stereo sound and music. Character vocalizations and weapon sound effects add to the drama and player appeal.

RECOMMENDED TOOLS AND SUPPLIES

Phillips and Slotted Screwdrivers
Socket Set
Wire Cutters and Strippers
Pliers or Channel Locks
Electric Drill with 3/32", 1/4", and 7/16" Bits
1-3/16" Chassis or Sheet Metal Punch
Small File
Razor Knife and Sharp Blades
Straight Edge
Staple Gun and Staples
Soldering Iron and 60/40 Resin Core Solder
Vacuum Cleaner
Assorted Fastening Hardware
Heat Shrink Tubing (3/32", 1/8", and 3/16")
Masking Tape
3-1/2" or 4" Wire Ties
Mild Liquid Soap and Water Solution
Painting Supplies (if you do your own painting)
      Air Brush or Paint Sprayer
      Paint Roller and Pan
      Paint Brush
      Paint (and Primer)
      Sandpaper
      Putty Knife and Wood Putty

INSTALLATION PREPARATIONS

BEFORE YOU START

1. Have you checked to see if all the needed parts have been included? (See the Package Contents on page 3.)

2. Is the game you have chosen to convert able to supply all the required voltages for the new game (-5 vdc, +5vdc, & +12 vdc)?

NOTE

Some games (i.e. Ms. Pac Man, Galaxian, etc.) regulate their voltages on the main PCB. This makes the existing power supply inappropriate and hazardous to your new game. These games will require a power supply change. Many game supply houses can offer you a switching regulated power supply for a relatively low cost. Ask your distributor.

3. Is the monitor configuration compatible? It can be difficult to change the monitor from a vertical to a horizontal mount. Installation will be easier if you choose a horizontal mount cabinet.

4. Do you have the necessary tools? (See RECOMMENDED TOOLS & SUPPLIES above.)

POWER AND MONITOR REQUIREMENTS

POWER

-5 VDC	1 amp
+5VDC	5 amps
+12 VDC	2 amps

MONITOR

Horizontal mount raster scan with positive or negative composite sync

NOTE

Through the use of the very latest technology, this game requires far less power to operate than most games on the market. The outputs of many "regulated" switching power supplies actually vary with load. For this reason, the power supply from an old game may not be correctly adjusted for TIME KILLERS. Therefore, **it is very important to adjust the +5 VDC supply WITHOUT connecting the PCB, then readjusting later, after the PCB has been installed.** Damage will occur if the power supply is outside the acceptable limits (between 4.8 and 5.5 VDC).

CABINET SELECTION

You can choose either a new cabinet or a previously used cabinet for your TIME KILLERS game. Reusing a cabinet is by far the most cost-effective way to maximize the return of your initial investment. In either case, all you provide is the cabinet with a power supply and monitor. We provide the rest. The end result is a new game at a very low cost.

Spend time on the cabinet's appearance (i.e. marquee, control panel, and cabinet graphics). You will raise your profits with the introduction of a new game package, especially if the cabinet looks clean and new.

The "new game look" should always apply to the inside of your game as well. A few wire ties and shrink tubing on your harness, some fastening hardware on your subassemblies, and a sweep with the vacuum cleaner will ensure that glitches do not occur.

PREPARING A USED CABINET FOR THE NEW GAME

Remove the following:
1. Main Logic Board(s)
2. Control Panel
3. Monitor Plexiglas
4. Monitor Bezel
5. Marquee
6. Cabinet Graphics

Thoroughly **clean out your cabinet.** Remove all the old buttons, joysticks and wires from the control panel and set aside. Remove the original overlay. DO NOT remove monitor and speaker wires.

If your cabinet has wood grain sides, **remove the old graphics and adhesive.** Adhesive may be removed with lacquer thinner.

For a fresh look, **painting is highly recommended.** Spray painting gives a better finish but if an air brush or paint sprayer is unavailable, a roller is second best. Be sure to cover all exposed surfaces not to be painted, such as the coin door and monitor. Use a small brush to finish up the details. If you do not have the facilities for painting, try an auto body shop.

Control Panel Preparations

Important Note: Time Killers uses a unique 5-button configuration that maps to each character. The five buttons control each character's head, arms and legs.

Complex combination moves are executed by pressing more than one button at the same time. For example, pressing both leg buttons together might make a character jump up and kick with both legs.

Because of this unique feature, it is VERY IMPORTANT to lay out the buttons using the recommended configuration. If buttons are not laid out properly, players will be unable to execute the winning moves.

Shown below is a diagram of the recommended control panel layout. Try to match this layout as closely as possible. Use the button and joystick labels as templates to help you determine exactly where to drill the holes.

| START | | | | START |

| PLAYER ONE | | PLAYER TWO |
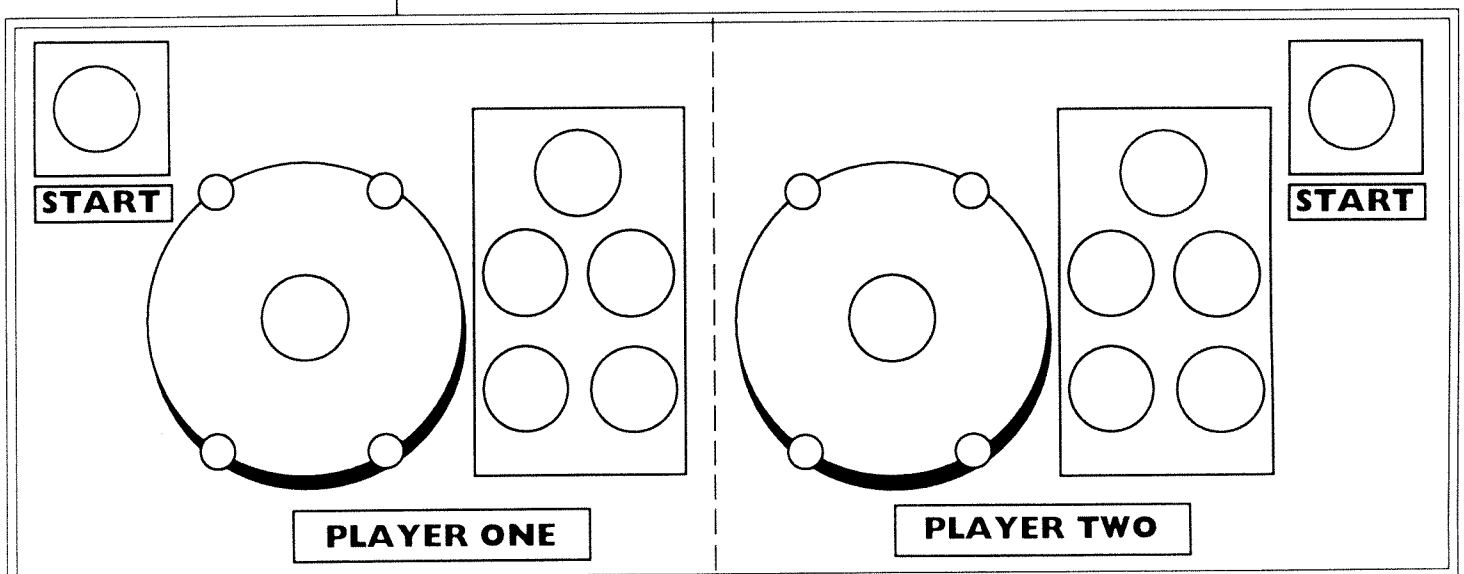
1. Drill or punch the holes marked for buttons or bolts. Use a chassis or sheet metal punch for best results on button holes.

2. Use a file to smooth any rough edges on the new holes.

3. Fill any old and unused holes with a wood or metal plate.

If you plan to cover your control panel with plexiglas, now would be a good time to cut it to fit while the dimensions and tools are at hand.

CONTROL PANEL OVERLAY

Make sure the control panel is clean and free from dust, grease, metal filings, and sawdust. The lexan background overlay provided with TIME KILLERS is oversized to accommodate most control panel sizes. The lexan overlay must be centered along its length. Be sure to leave enough excess material above and below the control panel in order to trim it evenly.

Remove the protective backing from the lexan overlay. Center the lexan overlay over the control panel and place down gently, making sure to keep it square. Using your hands, press down firmly, starting from the center and smooth the lexan overlay outward, making sure all bubbles have been pressed out for a clean, flat surface.

Using a sharp razor knife, trim any excess from the lexan overlay. Carefully pierce through overlay above each control panel hole that you have marked. Cut out material covering pre-drilled holes with the razor knife. Be sure to cut the lexan overlay above each hole and trim cleanly and evenly.

FUNCTION LABELS OVERLAY

Line up the supplied function labels with the corresponding control panel holes. Remove the backing and carefully press into place. Be sure they are straight. (Refer to the diagram on page 8 for placement of the button description labels.)

BUTTON AND JOYSTICK INSTALLATION

Install the controls into the control panel assembly. If you are using plexiglas for added protection, don't forget to place it on the panel before inserting the buttons. The five RED BUTTONS are used for PLAYER ONE (left side player) game control buttons. The BLUE BUTTONS are used for PLAYER TWO (right side player) game control buttons. The two WHITE BUTTONS are used as START BUTTONS.

Wire the buttons to the JAMMA harness from the wiring diagram on page 21.
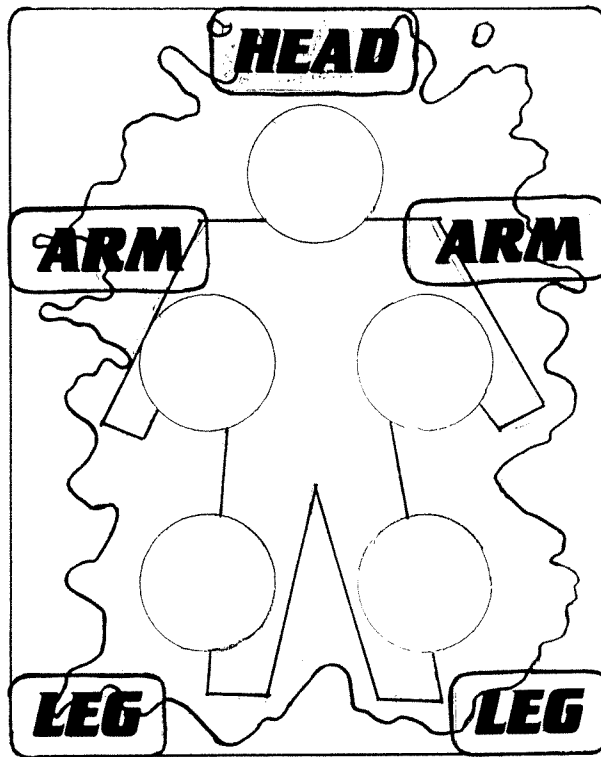
MARQUEE INSTALLATION

If your cabinet needs a new marquee glass, determine the correct size and cut the supplied plexiglas to fit. Using the old marquee glass as a template, center the plexiglas on your new marquee graphics, making sure that all the printed images will be visible. Using a razor knife, score the new marquee deeply, following the edges of the old glass. Carefully break off the styrene. Be sure the light behind the marquee works and that the glass is clean on both sides. Now install the marquee graphics and glass securely.

Wiring and Hardware Installation

REMEMBER! DO NOT work with any part of the system plugged in (lights, monitor, or power supply).

NOTE

All switch wires used in this game need to be wired to the normally open connection on the switches. Each switch requires a ground wire on the common connector and the appropriate control or switch wire on the other normally open connector of the switch.

CONTROL PANEL ASSEMBLY

Install all buttons on the control panel as per the control panel configuration. (See illustration on page 6).

PRINTED CIRCUIT BOARDS (PCBs)

Mount the PCB to the side of the cabinet with the edge connector toward the top. This will keep the wire harness from slipping off due to vibration. Attach six white PCB standoffs to the backside of the PCB by gently pushing the post into mounting holes of the board, being very careful not to flex the PCB in any way. Using the PCB mounting template as a guide, mark where to drill the mounting holes. Drill pilot holes (3/32") being careful to not drill through to the outside. Attach the PCB standoffs to the cabinet using wood screws and spacers -- snug but not too tight or the board may warp or crack. Be sure the board is not being flexed in any way.

WIRE HARNESS

If you are installing this game into a Dynamo cabinet with a pre-installed JAMMA harness, you will notice that it does not have a wire for the test switch. You will have to add a contact to the edge connector at the proper position (position 15). Some cabinets (Dynamo included) have only one coin switch input and the coin switches are wired together. Connect the designated wires to the coin switches separately. (See JAMMA HARNESS CONNECTIONS on page 21.)

Attach the wire harness connector to the PCB. This connector should be keyed and labeled "COMPONENT SIDE". Be sure it is mounted correctly.

It is best to use connectors (not supplied) whenever joining a set of harness wires to a subassembly. If you choose to solder wires together, follow this procedure:

1. Strip off about 1/2" of insulation from the wire.

2. Slide a piece of heat-shrink tubing over the end.

3. Do not leave a lot of excess wire spooled up in your cabinet. Cut the wires to the length you need plus a few extra inches. Leave enough for proper cable dressing--do not make it stretch across the inside of the cabinet.

4. Solder the new wire to the original wire. Use a straight in-line splice.

5. Melt the heat-shrink over the splice.

NOTE CONCERNING JAMMA HARNESSES

This game uses the JAMMA standard wiring harness. Therefore, if the cabinet you are using is not equipped with a JAMMA harness, you may want to change it. (See page 21 for JAMMA HARNESS CONNECTIONS).

POWER WIRES

1. Connect the wires that are designated for your power supply. You will need a supply of -5 vdc, +5 vdc, and +12 vdc. The -5 vdc must be regulated to within 5% (+ or - 0.25 vdc). **The +5 vdc must be regulated to within 5% (+ or - 0.25 vdc).** The +12 vdc may be unregulated but should not stray too far or the sound may be affected. **If the cabinet's supply does not provide these voltages, it will have to be replaced.** A switching-type supply is recommended.

2. You will notice that you have more than one wire for each voltage. **Use all wires supplied on the harness.** This will ensure better power transmission and prevent overloading of the edge connector pads.

3. Tin all power supply wires before connecting them to the power supply. **Loose strands may short out the supply.** For best results, connect spade lugs to the ends of the power wires and attach to the screw terminals of the power supply.

ALWAYS solder all wire splices. Just twisting the wires together will cause intermittent problems in the future.

ALWAYS use shrink tubing over wire splices. **NEVER** use electrical tape. Electrical tape may unravel due to heat inside the cabinet.

ALWAYS use wire ties to keep associated wires bundled. Attach to the cabinet whereever it seems necessary to keep them neat and secure.

AVOID bundling unrelated wires (such as the control panel and the monitor) as this may increase the likelihood of intermittent problems due to noise. Run different bundles separately.

COIN DOORS, TEST SWITCH AND SERVICE SWITCH WIRING

Wire the coin doors, service and test switch as per the JAMMA HARNESS CONNECTIONS information on page 21.

1. Connect the door lamps to the +12 vdc supply. Some games have separate power supply outputs for the lamps.

2. Mount a test switch and a service switch (not included) somewhere convenient inside the coin door area. Make them readily accessible through the coin door. The test switch allows you to enter adjustables, run diagnostics, and see or clear audits. Wire it to the test wire on the JAMMA Harness. Attach the appropriate wires to the service switch. The service switch allows the operator to give credits to players without affecting the game's credit audits. Example: A player puts in a coin and gets no credit, the operator can then push the service button (found in the cabinet) and a credit is given to the player without affecting the game's AUDITS.

3. Make sure your coin mechs are in good working order. A faulty coin mech can cause frustration in your players and lost revenue to you.

MONITOR WIRES

You will be connecting the RED, GREEN, and BLUE video drives along with the composite SYNC and video GROUND wires.

SYNC

This game generates a composite sync signal which is accepted by most monitors. A DIP switch (SW1) on the logic board allows you to choose between positive and negative composite sync. Most monitors require negative sync. If your monitor requires positive sync, flip the switch towards the OFF position.

If your monitor does not have a composite sync input but has separate horizontal and vertical sync inputs, try connecting the composite sync signal from the PCB to the negative horizontal sync signal on the monitor. This should produce a satisfactory result, although some adjustment of the monitor's sync controls may be necessary.

FINISHING TOUCHES

1. Check the game inside and out for any imperfections. Secure any loose wiring or fastening hardware.

2. Make sure the coin door is tight and the coin mechs are well adjusted.

3. Make sure all assemblies are firmly attached. Anything that is not mounted securely will rattle when the game is played. This game makes use of low-frequency sounds which can cause any loose joints to rattle.
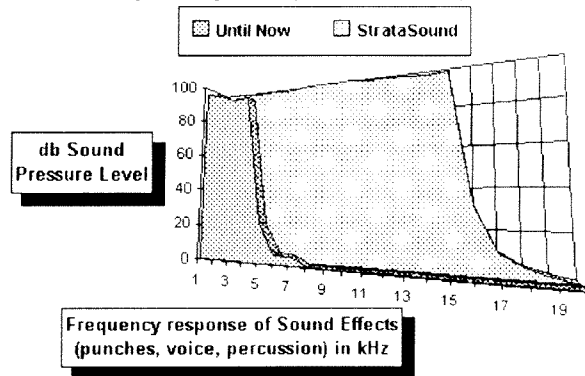
TIME KILLERS STEREO SOUND

TIME KILLERS features a new sound system called STRATA SOUND™. Until TIME KILLERS, no video game was able to reproduce the part of the frequency spectrum that gives sound effects such a stunning level of realism.

Now, STRATA SOUND reproduces and synthesizes sound effects and music across the entire bandwidth of sound, making TIME KILLERS the first kit game to feature fully interactive stereophonic, high fidelity sound.

Laser disk games on the market have had stereo sound, but the sound was not designed to be interactive. With TIME KILLERS, sound effects that a character on the left side of the screen makes will sound from the left speaker and sound effects from a character on the right will come from the right speaker. As game action moves from left to right or right to left, sounds come out of the appropriate position in the stereo sound field.

Frequency Response Comparison

Here is a comparison of the hardware features of STRATA SOUND.

IMPORTANT FEATURES	TIME KILLERS	STREET FIGHTER
Number of Simultaneous Sounds	**32**	12
Music Frequency Response	**20 Hz - 15 kHz**	20 Hz - 15 kHz
Sound Effect Frequency Response	**20 Hz - 15 kHz**	20 Hz - 3.9 kHz
Interactive Stereo	**YES**	No
Sample Space	**8 Million Bits**	2 Million Bits

NOTE

A sound system is only as good as its weakest link. Make sure your cabinet setup for TIME KILLERS does not have any weak links:

- **Power supply needs at least 2 amps on the 12-volt supply**
- **Use two speakers, each capable of reproducing sound from 100Hz to 15kHz**
- **Both speakers must be wired in phase and with the proper placement in the cabinet.**

Good conversion cabinets generally have two speaker holes, but might have inferior speakers. **You will not be able to benefit from TIME KILLERS' superior sound system if your speakers have any of the following problems:**

- Low efficiency (for a given input, the resulting sound output is low)
- Poor frequency response (the speakers' bandwidth is limited, thus only reproducing sounds in the middle of the audio spectrum)
- Inadequate power handling capability (typically cannot handle more than 6-8 watts at 4 ohms). STRATA SOUND's stereo amp can produce up to 12 watts without distortion.

GET GREAT SOUND FROM YOUR TIME KILLERS KIT

Replace the $2.00 speakers with $6.00 speakers available through your distributor or a reputable electronics store, such as Radio Shack. Part numbers 40-1909B and especially 40-1268C are good choices.

Mount the speakers properly. Connect the speaker wires, paying attention to their polarity.

Position the speakers as far from the monitor as possible. If placed too close, the speaker's magnet may deflect the monitor and cause strange coloration, which can usually be corrected by degaussing the monitor.

Be sure to attach each speaker securely with all four screws to minimize vibration and rattling. Make sure everything else in the cabinet is attached securely for the same reason.

Ensure that the speaker gasket is deep enough to keep the speaker cone from rubbing against the protective material (screen or vinyl grill material).

NOTE

If you are not using the JAMMA harness provided in the TIME KILLERS kit and have no provisions for a second speaker, do the following:
- Use the wire at the same position of your JAMMA harness.
- If there are no wires at these positions, you can use the 4-pin Molex speaker output connector at JP3 (see diagram at right).
- The orientation of the signals is on the legend of the board.

To confirm that everything has been connected properly, there is an operator diagnostic in the sound section that alternately says "Left..Right..."

The Strata Sound board features a line level output that is compatible with consumer sound reinforcement equipment. The 5-pin MOLEX connector at location JP2 has left and right line outputs and 12 volts (see diagram at right). This output makes it possible for you to externally amplify TIME KILLERS sound for promotional use. This line output can also be used if you want to provide headphone jacks.
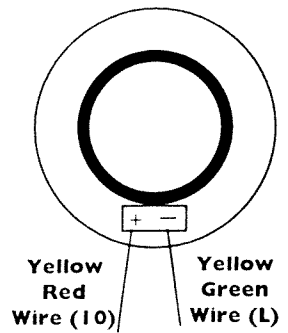
OPERATING TIME KILLERS FOR MAXIMUM EFFECT

TIME KILLERS' sound was designed with a maximum of 110db undistorted output. This is very loud. In some locations, however, it might be difficult to appreciate the wide variety of excellent sounds the game is making. For maximum effect,
- Locate the cabinet so there is at least 6-in of space between TIME KILLERS and other games
- Turn down the location's background music and turn up game sounds
- Adjust all games in the location so they are 95db. (Radio Shack sells an inexpensive Sound Level Meter that measures decibel levels.)

Following our recommendations can ensure that all games in your location can be heard. If your customers can hear and enjoy TIME KILLERS, you should benefit from their increased interest and higher earnings for this game.

LEFT SPEAKER

Yellow Red Wire (10)

Yellow Green Wire (L)

RIGHT SPEAKER

White Red Wire (11)

White Green Wire (M)

SPEAKERS

JP3   PIN I

○ ○ ○ ○

Left Speaker -
Left Speaker +
Right Speaker -
Right Speaker +

LINE OUT

JP2   PIN I

○ ○ ○ ○ ○
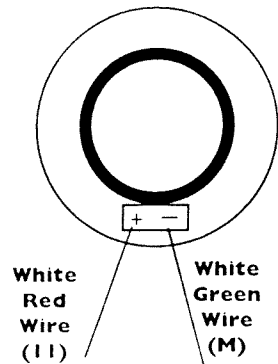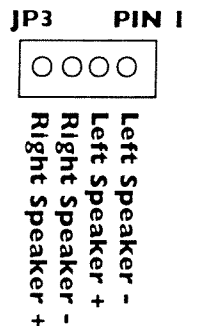
+12 V
Left Line Output -
Left Line Output +
Right Line Output -
Right Line Output +

Initial Power-Up

Applying Power
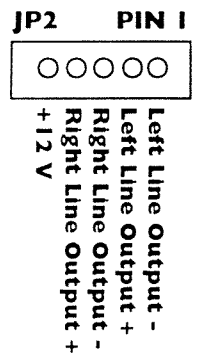
FINAL CHECK

1. Carefully inspect the game for loose power wires, exposed connections, and extra fastening hardware. Look for any stray strands from wires.

2. Make sure the PCB, monitor, power supply, and speakers are secure.

3. Doublecheck your connections.

4. With the board disconnected from the JAMMA harness, turn the power on and adjust the +5 vdc supply to be as close to +5 vdc as possible. This is very important to prevent damage to the game board. Turn the power off and connect the JAMMA harness to the board.

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1. Attach JAMMA Harness if needed. Plug in the game and turn it on.

2. Look and smell for smoke (**TURN IT OFF IMMEDIATELY IF ANY SMOKE IS NOTICED**).

3. Readjust the +5 vdc, making sure you measure the +5v on the PCB. (Not at power supply.)

4. Make sure the green and yellow LEDs on the PCBs are flashing. If they aren't -- something is wrong, turn off the game.

5. Listen for sound. A few notes should play on power up.

6. If you do not hear any sounds and the yellow LED is flashing, try turning up the volume and check the speaker connections. Dropping a coin through a coin switch should cause a sound.

7. Look at the image on the monitor. If it is not in sync and you cannot stop it from rolling by adjusting the monitor's sync controls, try flipping SW1 on the logic board.

8. How does the picture look?
   - Is it centered
   - Is it too bright or too dim?
   - Is it in focus?

Check your monitor manual to make adjustments. Some test patterns are available through the game's diagnostics by pressing the Test switch. Use these test patterns when making any adjustments. (See "DIAGNOSTICS" information on page 17. Proper monitor adjustment is very important.)

9. Try all coin switches. Drop quarters or tokens through to check the coin

mechs. Make sure the game is adding credits. You can use "DIAGNOS-TICS" Player Control Tests if you have hooked up the Test Switch. (See Page 17) If no test switch is hooked up, play the game. Do the select and face left/right switches work? Try playing the game with the volume up and listen for rattling as you play. Tighten anything that is making noise.

10. Upon initial power-up, the game will initialize to factory default settings. These settings affect game elements such as number of credits per coin, etc. The "OPERATOR MODE" section will describe how to alter these settings and view the system audits or run system diagnostics.

SETTING THE DIP SWITCHES

Position	ON	OFF
1	negative video sync	positive video sync
2	normal	screen flip
3	violence on	violence off
4	test mode normal	operator adjustables

NOTE ON VIOLENCE SETTINGS
Dip switch 3 allows for the violence of the TIME KILLERS game to be altered to suit your location. If violence off is set using dip switch 3, the game will not display blood or dismemberment of any kind. If violence on is set using dip switch 3, a number of options are available from the operator adjustables menu accessed in the test mode. See page 16, Violence Level Adjustments, for more details.

OPERATOR MODE
On-screen Operator Adjustables, Audits, and Diagnostics can be accessed by pressing the test switch at any time. Settings and audited accounts will be saved after the power switch is shut off. When power is turned back on, the message "SYSTEM STATUS OK" will be displayed. If for some reason any of the settings or accounts were corrupted, or if the power is being applied for the first time, the message "SYSTEM INITIALIZED" will be displayed and all factory defaults will be reinstalled. The system will always attempt to retain the operator adjustable data so as not to affect your current settings. If the system does go through an initialization, you may see the message "ADJUSTABLES RESTORED". This means that the audits have been reset but the operator adjustables have been restored to the previous settings.

The battery on the logic board should have a life of approximately five years. If you start seeing the "SYSTEM INITIALIZED" message often, it is possible that the battery may need replacing. Battery voltage should be between 2V - 3V.

Pressing the test switch will take you to the operator service mode main menu. You will see this:

> EXIT
> OPERATOR ADJUSTABLES
> AUDITS
> DIAGNOSTICS

One of these items will be highlighted in red. To select an item, move the player one joystick up or down to highlight the desired item and press the Player One Start Button to select.

The main menu will lead to a series of menus. Use the joystick and start button the same way to move from one menu to the next. Exiting any menu will lead back to the previous menu. When "EXIT" is selected from the main menu, the game will return to the attract mode.

OPERATOR ADJUSTABLES
The "OPERATOR ADJUSTABLES" menu allows you to customize the game by adjusting various game features.

GAME MODE
"GAME MODE" allows you to select between "FREE PLAY" or "COIN MODE". The default is "COIN MODE".

RESETS
There are three levels of resets. "RESET ADJUSTABLES, AUDITS & SCORES TO DEFAULT VALUES" will reset the Operator Adjustables, the High Scores and the Audits to their factory settings. "RESET HIGH SCORES ONLY" will reset the High Score information only. "RESET AUDITS ONLY" will reset the Audit information only.

ATTRACT MODE SOUNDS
The three levels of attract mode sounds are: "ALL ATTRACT MODE SOUND ON", "OCCASIONAL ATTRACT MODE SOUNDS", and "ALL ATTRACT MODE SOUND OFF". The default is "OCCASIONAL ATTRACT MODE SOUNDS."

VIOLENCE LEVEL ADJUSTMENTS
There are four levels of violence that can be chosen:

Level 0:   No blood, no dismemberment
Level 1:   Blood, but no dismemberment
Level 2:   Blood and dismembered limbs allowed
Level 3:   Blood, limb dismemberment and decapitation allowed

The default setting is Level 3.

This section provides the operator with coin totals, game times, etc. This section will help if you are trying to adjust operator settings.

TOTAL CREDITS

This is the total number of credits that the game has given for taking in some number of coins. This manual will refer to credits since a coin can be worth any number of credits. However, if the credits per coin setting is 1, then a credit and a coin are the same.

TOTAL BUY IN CREDITS

This is the total number of credits given for taking in some number of coins for the sake of continuing a game in progress.

AVERAGE CREDIT TIME

"AVERAGE CREDIT TIME" is the average amount of time (in seconds) being consumed for a player to use one credit.

TOTAL I PLAYER GAMES

This is the total number of single-player games played.

TOTAL 2 PLAYER GAMES

This is the total number of two-player games played.

VIDEO TESTS

Test color and linearity of video display.

MEMORY TESTS

Test for RAM and ROM validity.

SOUND TESTS

Test used for determining if the sound system is functioning.

CONTROL TESTS

Test functionality of all game controls.

GENERAL TROUBLESHOOTING

VIDEO PROBLEMS

Symptom	Probable Cause	Solution
No picture	Video inputs are not hooked up. (Refer to harness outputs & monitor specifications.)	Make sure switch 1 pos. 1 is in the correct position: ON for negative sync monitors and OFF for positive sync monitors. Most monitors are negative sync.
	Bad connections	Make sure there are good connections from the board's video outputs to the monitor's video inputs.
	Monitor	Make sure the monitor is operating correctly. (Check it with another compatible logic board.)
Scrambled Picture	Sync switch set incorrectly	SW1 pos.1, OFF for positive sync, ON for negative sync.
Missing colors or a washed out color	Bad video connections	Check the video red, green and blue connections.
Bright, blurry or rolling picture	Misadjusted monitor	Adjust the monitor, not the board. (Refer to your monitor manual.)
Picture too large, too small, or off center	Misadjusted monitor	Adjust the monitor, not the board. (Refer to your monitor manual.)
Video image is flipped	Misadjusted monitor	Manually flip the monitor or reverse the monitor's convergence wires. (Refer to your monitor manual.)
Bad images in picture	Bad GROM	Do GROM Test. Leave Diagnostic Menu. Check IC pins to make sure none are bent over.

CONTROL PROBLEMS

Symptom	Probable Cause	Solution
Buttons do not work or are partly inoperable	Switches not properly connected	Make sure that the common post of the switch is connected to ground.
		Make sure each individual switch is working.
		Make sure that the signal wire for that particular switch is connected to the normally open post of the switch.
Coin counter not working	Miscellaneous	Make sure that the signal wire has a connection from the switch to the board.
		Make sure +12v is hooked up to the counter.
		The signal wire is not connected to the coin counter. (Check continuity.)
		Verify that the counter is good.

SOUND PROBLEMS

Symptom	Probable Cause	Solution
No sound	+12v power supply is bad	Try another +12v power supply.
	Bad connection to the board	Check for +12v power on the board.
		Check for +5 v power on the board.
	Miscellaneous	Check the volume setting.
		Check the speaker connections.
		Make sure the sound status light is flashing on the board.

POWER UP PROBLEMS

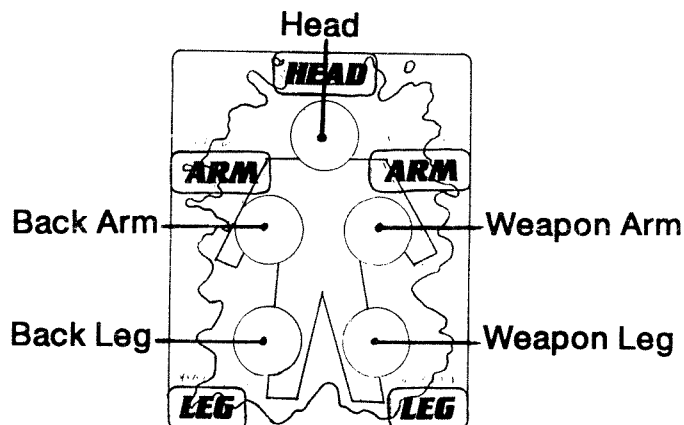| Symptom	Probable Cause	Solution
No reaction when game is turned on.	Blown fuse	Power supply is too high. Power should be between +5v & +5.2v. (Measured on the circuit board.)
		Cabinet is not connected to earth ground. (All metal should be connected to the earth ground.)
		Short between power and ground. Check for foreign material.
		Disconnect the harness and measure the resistance between power and ground. It should read around 800 ohms. (0 ohms is a dead short.)
		Make sure the harness is not shorting to anything, such as bare or frayed wires shorting out each other or hitting bare metal.
	No power from the power supply	Replace power supply.
	Power supply	Power supply too low. (Should ideally be between +5v & +5.2v.) (Measured on the circuit board.)
	Short on the board	Check for loose or foreign material on the board.
Power up song repeats itself	Open on socketed ICs	Check for bent pins on socketed parts.
		Make sure that all ICs are seated in their sockets properly.
	+5 v setting too low	Measured on the circuit board.

> **NOTE**
> If fuse continually blows, please call STRATA service department. Sending the board in for repair is usually not necessary.

JAMMA HARNESS CONNECTIONS
FOR TIME KILLERS

WIRE COLOR	SOLDER SIDE			PARTS SIDE	WIRE COLOR
Black	GND	A	1	GND	Black
Black	GND	B	2	GND	Black
Red	+5 v	C	3	+5 v	Red
Red	+5 v	D	4	+5 v	Red
	-5 v	E	5	-5 v	
Orange	+12 v	F	6	+12 v	Orange
	KEY	H	7	KEY	
Blue-Green	Ticket Counter	J	8	Coin Counter	Red-Green
		K	9		
Yellow-Green	Left Speaker -	L	10	Left Speaker +	Yellow-Red
White-Green	Right Speaker-	M	11	Right Speaker+	White-Red
Green-Black	Green	N	12	Red	Red-Black
White	C Sync	P	13	Blue	Blue-Black
Orange-Black	Service	R	14	Video GND	White-Black
		S	15	Test	Blue
Green-Blue	Coin 2	T	16	Coin 1	Red-Blue
Red-Yellow	Start 2	U	17	Start 1	Red-White
Green-Yellow	Player 2 Up	V	18	Player 1 Up	Green-White
Blue-Yellow	Player 2 Down	W	19	Player 1 Down	Blue-White
Black-Yellow	Player 2 Left	X	20	Player 1 Left	Black-White
Violet-Yellow	Player 2 Right	Y	21	Player 1 Right	Violet-White
Brown-Yellow	Player 2 Back Arm	Z	22	Player 1 Back Arm	Brown-White
White-Yellow	Player 2 Weapon Arm	a	23	Player 1 Weapon Arm	Yellow-White
Orange-Yellow	Player 2 Back Leg	b	24	Player 1 Back Leg	Orange-White
Grey-Yellow	Player 2 Weapon Leg	c	25	Player 1 Weapon Leg	Grey-White
Yellow-Black	Player 2 Head	d	26	Player 1 Head	Yellow-Orange
Black	GND	e	27	GND	Black
Black	GND	f	28	GND	Black

Head

Back Arm — Weapon Arm

Back Leg — Weapon Leg

Strata Group, Inc.
4010 Winnetka Avenue
Rolling Meadows, Illinois 60008-1374
(800) 262-0323