INSTRUCTION MANUAL

DANGER

BERMUDA TRIANGLE

VERTICAL MONITOR CONVERSION KIT
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I. GAME PACKAGE CONTENTS

1 - Main Printed Circuit Board (PCB) Assembly
1 - PCB Shield (F.C.C. Compliance)
1 - SNK Wire Harness
1 - Joystick Assembly Package Includes:
   2 - Rotary Joysticks
   2 - Rotary Wire Harness Connectors
   1 - Knob Setting Tool (See Page 7)
1 - Marquee
1 - Control Panel Overlay
2 - Side Graphic Decals
1 - Monitor Card
6 - Control Buttons
1 - Instruction Manual

Inspect the entire contents of your game package to assure it is complete and in satisfactory condition. If any damages have occurred during shipment, please notify your SNK distributor immediately.
II. WARNINGS AND NOTICES

F.C.C. WARNINGS:
The PCB shield supplied with this game package must be utilized and terminated to
ground at the time of installation of the PCB. This is required in order to comply with
the limits for a class A computing device pursuant to subpart J of part 15 of F.C.C.
rules. These rules are designed to provide reasonable protection against harmful
interference to radio communications when operated in a commercial environment.
Operation of this equipment in a residential area is likely to cause RF interference in
which case the user at his or her own expense will be required to take whatever
measures necessary to correct the interference.
SNK recommends that the control panel be grounded and a grounded 3 wire outlet to
be used for supplying power. These steps will assure a clear picture.

NOTICE:
Specifications and modifications may be changed without advance notice or
warning.

DANGER:
DO NOT SOLDER control buttons or rotary joysticks or they will malfunction and the
warranty will voided. Only use crimp lugs on all controls.
Whenever you change parts or insert/disconnect connector, always check to make
sure power is off!
If your PCB is clearly found defective, please do not attempt to troubleshoot or check
it with a tester, etc. The IC's may be destroyed by the voltage of a tester and your
warranty will be voided.
SNK recommends a **12 volt coin counter** be connected to the +12 volt line only. Do
not use a +6 volt coin counter. A +6 volt coin counter will cause a voltage drop on the
+5 volt line which could cause the game to function improperly or cause possible IC
damage.
When handling monitor, stay clear of the High Voltage Sections.
III. REQUIREMENTS

A. MONITOR:

This game requires a Vertically Mounted Raster Scan type monitor with composite sync. If your monitor is one which requires separate or inverted syncs you may use the following illustration to conform to your monitor specifications.

NOTE: Separate syncs may be found at the sync separator chip on the BOTTOM PCB IC # 5R 74LS86.

B. POWER SUPPLY:

SNK recommends the use of a switching type power supply with minimum current ratings as stated below:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>+12 VDC</td>
<td>1 Amp</td>
</tr>
<tr>
<td>+ 5 VDC</td>
<td>8 Amps</td>
</tr>
<tr>
<td>- 5 VDC</td>
<td>1 Amp</td>
</tr>
<tr>
<td>Ground</td>
<td></td>
</tr>
</tbody>
</table>
C. PCB SPECIFICATIONS:

Operating Requirements
Voltage - +5.00 volts to 5.10 volts D.C., -5VDC, +12VDC.
Amperage - 7.5 amps
Power - 38.5 watts
Temperature - 0° - 30°C or 32° - 100°F
Humidity - 95% relative

The 5 volt supply draws about 7.5 amps on this PCB design and the power supply should be adjusted. When the voltage is correct, both LEDs will be lit. If only one LED is lit the 5 volt supply must be adjusted. Replace the power supply with one of a higher current rating if the voltage does not indicate 5 volts.

D. JOYSTICK ROTARY CONNECTIONS:

*NOTE: "R"(Rotary) for proper direction of harness connection.
IV. INSTALLATION PROCEDURES

A. PLACEMENT OF PCB:

Before mounting PCB, make certain that the wire harness has sufficient "slack/play" between both joystick rotary connectors and the PCB connections. (See Page #5) Mount all four corners of the PCB to assure stability. Allow room for the PCB shield away from the power supply section. Before mounting please check wire harness layout.

B. WIRE HARNESS LAYOUT:

Mark it, PARTS SIDE in order not to reverse connection which may cause damage to the PCB and/or power supply. Layout your wire harness from one and two player control panel to the PCB edge connector to assure that it is long enough. Remember that the voltage of an intermediate wire harness decreases by contact resistance, so please connect all of the wires provided for the supply voltages and grounds in order to assure sufficient voltage and to avoid contact burning on the PCB.

C. CONTROL PANEL CONFIGURATION

![Diagram of control panel configuration]

POSSIBLE 1 AND 2 PLAYER START CONTROL BUTTON LOCATIONS
Control Button A is for FIRE. Control Button B is for GUARD FORMATION.

NOTE: DO NOT SOLDER CONTROLS.

D. POWER UP CHECKLIST

1. Make sure that the Main Wire Harness is wired properly to the Power Supply by measuring it with a volt meter.
2. Allow the Power Supply to discharge the voltage for about 10 seconds before connecting or disconnecting the edge connector.
3. Use crimp lugs on all CONTROLS and ROTARY JOYSTICKS and only solder other connections.
4. Ground all ground wires and the control panel.
5. Adjust the Power Supply and the Monitor.
6. Check all Controls and set the Dip Switches.
7. Secure the Main Wire Harness with wire ties.
E. LS30 - 24 JOYSTICK ASSEMBLY DIAGRAM

HOW TO REMOVE KNOB OF JOYSTICK ASSEMBLY.

1. Insert "fingers" of joystick tool under knob. Make sure to align fingers with dots under knob. Push up to open top cap.
2. Use hex wrench to remove shaft nut.

PARTS NO.  PARTS NAME
LS30- 1  Knob
   A  Cap
   B  Knob (M6)
   C  Knob (Main Body)
   D  Fastener
LS30- 2  Lever mask
LS30- 3  Main guide
LS30- 4  Micro Switch Plate
LS30- 5  Micro Switch
LS30- 6  90 C-Clip
LS30- 7  Spacer (B)
LS30- 8  Spacer (A)
LS30- 9  Washer (small)
LS30-10  Shaft Holder
LS30-11  Shaft Holder Stand
LS30-12  Washer (large)
LS30-13  Spring
LS30-14  120 C-Clip
LS30-15  Shaft
LS30-16  Star Washer
LS30-17  Rotary Switch Installation Plate (SUS)
LS30-18  Rotary Switch
LS30-18H  Harness
LS30-19  Rotary Switch Stopper
LS30-20  Stand
LS30-21  Steel Base
LS30-22  Knob setting tool
LS30-24  Complete Assembly
V. DISPLAY TEST MODE

A. SELF ROM CHECK

The memories are automatically self checked whenever power is applied. To enter the test mode, hold the test switch on when the power is turned on until PICTURE 0 is displayed. Press the test switch to continue the display tests or press the one-player Start Button to start the game.

B. PICTURE 0 - CROSS HATCH

Adjust the monitor for a SQUARE PATTERN throughout the display and on the edge of the monitor.

C. PICTURE 1 - COLOR TEST

Assures that the correct colors are properly wired to the monitor.

D. PICTURE 2 - CONTROL TEST

As a lever or switch turns on, 0 on the monitor will change to 1. Turning the joystick dial clockwise increments the LEVER DIAL by one. Turning the joystick dial counter-clockwise decrements the LEVER DIAL by one. Insert coin and confirm that the COIN change from a 0 to 1. The service switch can also be checked here.
E. PICTURE 3 - MODE CHECK

Set desired mode by setting the DIP SWITCHES on the PCB. (Refer to the OPTIONAL SETTINGS.) When the switch turns on, the number of that BIT will change from 0 to 1. The actual mode will also be displayed.

3 MODE

<table>
<thead>
<tr>
<th>DIP 12345678</th>
<th>DIP 12345678</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 00100000</td>
<td>2 10101000</td>
</tr>
</tbody>
</table>

DISPLAY NORMAL

HERO 3

1COIN1 1PLAY 1COIN2 6PLAY

LEVEL 2

DEMO SOUND ON

1ST BONUS 35,000P

2ND BONUS 70,000P ONLY

CONTINUE

F. PICTURE 4 - FONT TEST

Confirm that the Characters are displayed on the monitor. There are eight different colors of characters that will be displayed 0 thru 7 automatically.

4 FONT 1

COLOR 0

FONT CHARACTER

G. PICTURE 5 - SOUND CHECK

Set up the sound Code ("?") to 41-7F, 81-BF or CO-FF by moving the joystick. The music, special effects or voice will activate when you press 2nd Player Control Button A. If you want to stop the sound, set the Code to OE and press 2nd Player Control Button A.

5 SOUND CHECK

SOUND CODE = ?

MUSIC 41-7F
EFFECT 81-BF
VOICE CO-FF
STOP OE
VI. GAME OPERATION

A. HOW TO PLAY

Bermuda Triangle is a 1 or 2 player space-action shooting game. Either player can join in at any stage during play. The game is over when all the PLANES of each player have been destroyed.

The rotary joystick controls PLANES movement and fire direction of the turret. Button A fires missiles in the air and bombs the ground simultaneously. Button B selects the formation of the battle guard cruisers.

Pick up E for added power and energy. Depending on the level of energy you may obtain added fire power.

There are six areas to play. You will reach the enemies base at the end of each area automatically. You must destroy the enemies base the moment the middle turret opens to fire to move on to the next area.

When full power is obtained and with three battle guard cruisers positioned up in front in the triangle formation, all enemies may be eliminated by firing one shot.

GOOD LUCK, you are now ready to launch!

B. GAME STYLE

1. STANDARD PLAY

   2-Players can play simultaneously or either player can join at any stage during play. The game will continue until all PLANES of both players are destroyed.

2. COIN-UP CONTINUE

   In addition to standard play you may receive additional PLANES by inserting up to 10 coins and depressing 1 or 2 player start controls.
### VII. OPTIONAL SETTINGS

#### DIP SW NO. 1

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SPECIFICATION</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAME STYLE</td>
<td>STANDARD</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COIN UP CONTINUE</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISPLAY</td>
<td>NORMAL PICTURE</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INVERSE PICTURE</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BONUS</td>
<td>*EVERY BONUS</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>**LIMITED BONUS</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NUMBER OF HERO</td>
<td>3</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COIN 1</td>
<td>1 COIN 1 PLAY</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 COIN 1 PLAY</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 COIN 1 PLAY</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 COIN 1 PLAY</td>
<td>ON</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Every Bonus ..... Credit one ship (HERO) every 2nd bonus
**Limited Bonus ..... Credit one ship (HERO) at 1st and 2nd bonus only.
No further heros awarded.

### DIP SW NO. 2

<table>
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<th>ITEM</th>
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<th>6</th>
<th>7</th>
<th>8</th>
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<tr>
<td>LEVEL OF DIFFICULTY</td>
<td>EASY</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td>LEVEL 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NORMAL</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td>LEVEL 2</td>
<td></td>
<td></td>
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<td></td>
<td>HARD</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
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<td>LEVEL 3</td>
<td></td>
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<td></td>
<td>DIFFICULT</td>
<td>ON</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>LEVEL 4</td>
<td></td>
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<tr>
<td>ATTRACTION SOUND</td>
<td>WITHOUT SOUND</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td>DEMO SOUND OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WITH ATTRACTION SOUND</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td>DEMO SOUND ON</td>
<td></td>
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<tr>
<td>MONITOR SETTING</td>
<td>STOP VIDEO DISPLAY</td>
<td>ON</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>STOP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONTINUOUS PLAY</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>NEVER RESTART</td>
<td></td>
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</tr>
<tr>
<td>BONUS</td>
<td>25,000/50,000</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POINTS</td>
<td>35,000/70,000</td>
<td>ON</td>
<td>OFF</td>
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<tr>
<td>SETTING</td>
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<td>OFF</td>
<td>ON</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1ST/2ND</td>
<td>NO BONUS</td>
<td>ON</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**NOTE:** Bold face suggests factory recommended settings.
# IX. MAIN HARNESS CONNECTIONS

**CONNECTOR CR7E - 56 DA - 3.96 E (HIROSE)**

![Connector Diagram]

(A) \( \rightarrow \) (f)

**Color Key:** Stripe / Background

<table>
<thead>
<tr>
<th>WIRE COLOR</th>
<th>SOLDER SIDE</th>
<th>PIN NAME</th>
<th>PIN #</th>
<th>PARTS SIDE</th>
<th>WIRE COLOR</th>
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<tr>
<td>BLACK</td>
<td>Ground</td>
<td>A</td>
<td>1</td>
<td>Ground</td>
<td>Black</td>
</tr>
<tr>
<td>BLACK</td>
<td>Ground</td>
<td>B</td>
<td>2</td>
<td>Ground</td>
<td>Black</td>
</tr>
<tr>
<td>RED</td>
<td>+5VDC</td>
<td>C</td>
<td>3</td>
<td>+5VDC</td>
<td>RED</td>
</tr>
<tr>
<td>RED</td>
<td>+5VDC</td>
<td>D</td>
<td>4</td>
<td>+5VDC</td>
<td>RED</td>
</tr>
<tr>
<td>GREEN</td>
<td>-5VDC</td>
<td>E</td>
<td>5</td>
<td>-5VDC</td>
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<td>YELLOW</td>
<td>+12VDC</td>
<td>F</td>
<td>6</td>
<td>+12VDC</td>
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<tr>
<td></td>
<td></td>
<td>H</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>8</td>
<td>Coin Counter 1 (-)</td>
<td>BROWN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHITE</td>
<td>Speaker (-)</td>
<td>L</td>
<td>10</td>
<td>Speaker (+)</td>
<td>WHITE</td>
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<tr>
<td></td>
<td></td>
<td>M</td>
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<tr>
<td>LIGHT GREEN</td>
<td>Video Green</td>
<td>N</td>
<td>12</td>
<td>Video Red</td>
<td>PINK</td>
</tr>
<tr>
<td>GRAY/WHITE</td>
<td>Video Sync</td>
<td>P</td>
<td>13</td>
<td>Video Blue</td>
<td>LIGHT BLUE</td>
</tr>
<tr>
<td>VIOLET</td>
<td>Service Switch</td>
<td>R</td>
<td>14</td>
<td>Video Ground</td>
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<tr>
<td>GRAY</td>
<td>Tilt or Reset Switch</td>
<td>S</td>
<td>15</td>
<td>Test Switch</td>
<td>ORANGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T</td>
<td>16</td>
<td>Coin Switch 1</td>
<td>VIOLET/WHITE</td>
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<tr>
<td>WHITE/BLACK</td>
<td>Start Switch 2</td>
<td>U</td>
<td>17</td>
<td>Start Switch 1</td>
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<tr>
<td>BROWN/BLACK</td>
<td>2P Control 1 UP</td>
<td>V</td>
<td>18</td>
<td>1P Control 1 UP</td>
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<tr>
<td>RED/BLACK</td>
<td>2P Control 2 DOWN</td>
<td>W</td>
<td>19</td>
<td>1P Control 2 DOWN</td>
<td>RED/WHITE</td>
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<tr>
<td>ORANGE/BLACK</td>
<td>2P Control 3 RIGHT</td>
<td>X</td>
<td>20</td>
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<td>Y</td>
<td>21</td>
<td>1P Control 4 LEFT</td>
<td>YELLOW/WHITE</td>
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<td>2P Control 5 PUSH 1</td>
<td>Z</td>
<td>22</td>
<td>1P Control 5 PUSH 1</td>
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<td>BLUE/BLACK</td>
<td>2P Control 6 PUSH 2</td>
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<td>23</td>
<td>1P Control 6 PUSH 2</td>
<td>WHITE/BLUE</td>
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