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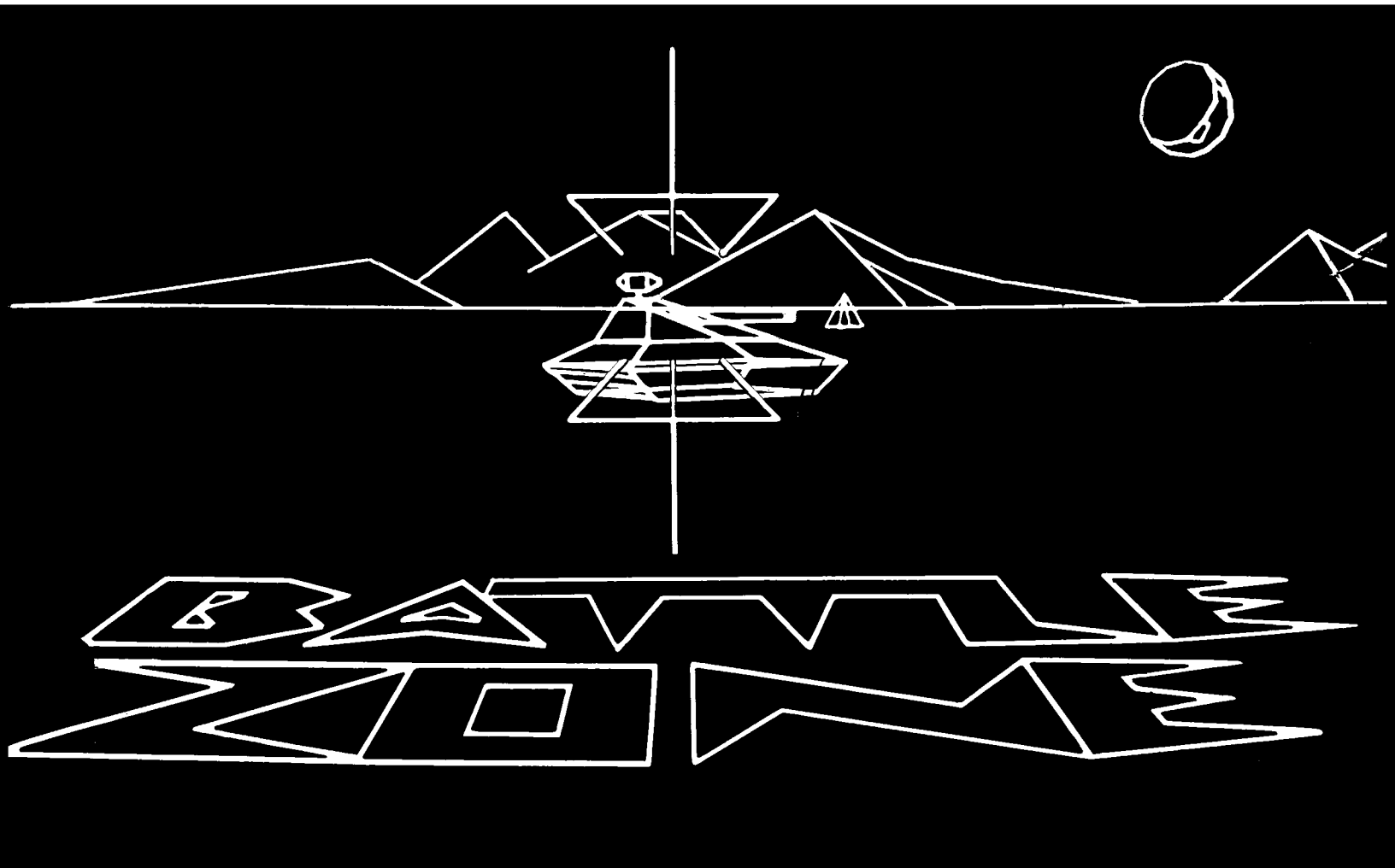
ATARI®

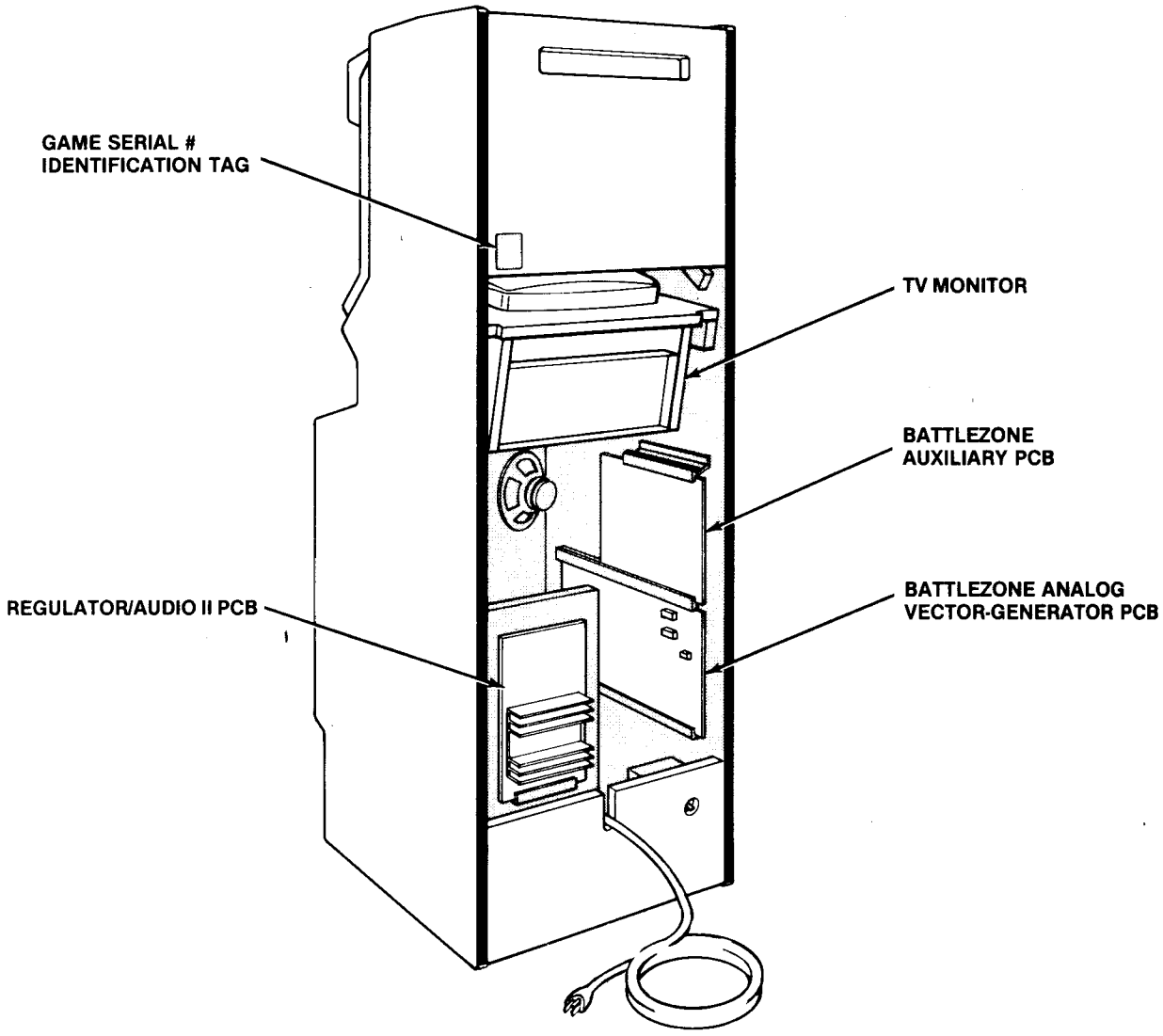
# Operation Maintenance and Service Manual

Complete with Illustrated Parts Lists



# GAME SERIAL NUMBER LOCATION

Your game's serial number is stamped on a plate on the outside of the game. The same number is also stamped on the chassis of the TV monitor, Regulator/Audio II PCB, Battlezone Analog Vector-Generator PCB, and Battlezone Auxiliary PCB. Please mention this number whenever calling your distributor for service.



# Operation, Maintenance and Service Manual

Complete with Illustrated Parts Lists

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## NOTE

If reading through this manual does not lead to solving a certain maintenance problem, call Tele-Help™ at the Atari Customer Service office in your geographical area, as shown in one of the two maps below. Order all parts from the California office.

## WEST and CENTRAL U.S.A.

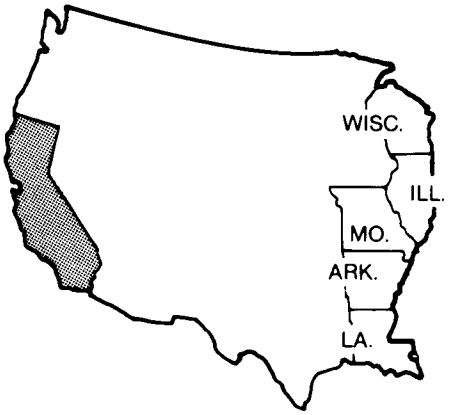
Parts for all Atari Customers. Sales and Service

Atari Coin-Op Customer Service
1344 Bordeaux Drive, Sunnyvale, CA 94086
Telex 17-1103

(Monday - Friday, 7:30 - 4:00 pm Pacific Time)

☎ From California, Alaska or Hawaii
(408) 745-2900

☎ From anywhere else in this area
toll-free (800) 538-1611




## EAST U.S.A.

Sales and Service Only

Atari Inc.
New Jersey Customer Service Office
Cottontail Lane, Somerset, NJ 08873
Telex 37-9347

(Monday - Friday, 7:30 - 4:00 pm Eastern time)

☎ From New Jersey
(201) 469-5993

☎ From anywhere else in this area
toll-free (800) 526-3849

# Notice Regarding Non-Atari Parts

## ⚠ WARNING ⚠

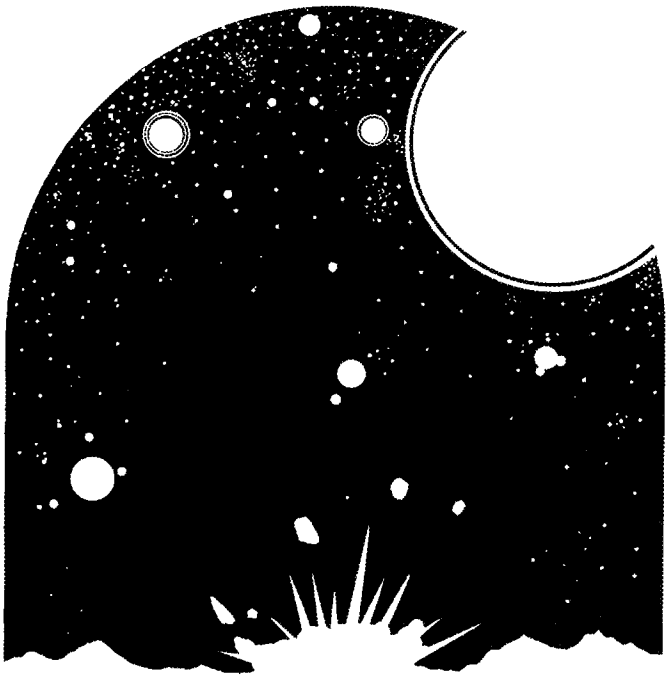
Use of non-Atari parts or modifications of your Atari game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

Atari, Inc.'s warranty (printed on the inside back cover of this manual) may be voided, if you do any of the following:

1.) you substitute non-Atari parts in your coin-operated game, or

2.) you modify or alter any circuits in your Atari game by using kits or parts **not** supplied by Atari.

Not only may the use of any non-Atari parts void your warranty, but any such alteration may also adversely affect the safety of your game, and may cause injury to you and your players.



# Location Setup

## A. New Parts

The Battlezone™ game has five new parts. If you have worked on Atari games in the past, then you should be aware of these important differences. The new parts are:

- The **control handle** is a redesign of the Atari gear shifter. It has been strengthened by adding several additional ribs to the interior and exterior of the housing. These ribs keep the assembly properly aligned to assure proper switch contact. Another new feature is the rubber centering bellows; it acts as a centering spring to return the control handle to the center position. The microswitches are now mounted with locknuts for easy replacement.

**⚠ WARNING - SHOCK HAZARD ⚠**

This game is designed to be connected only to 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 electric shock** if this game is not properly grounded!

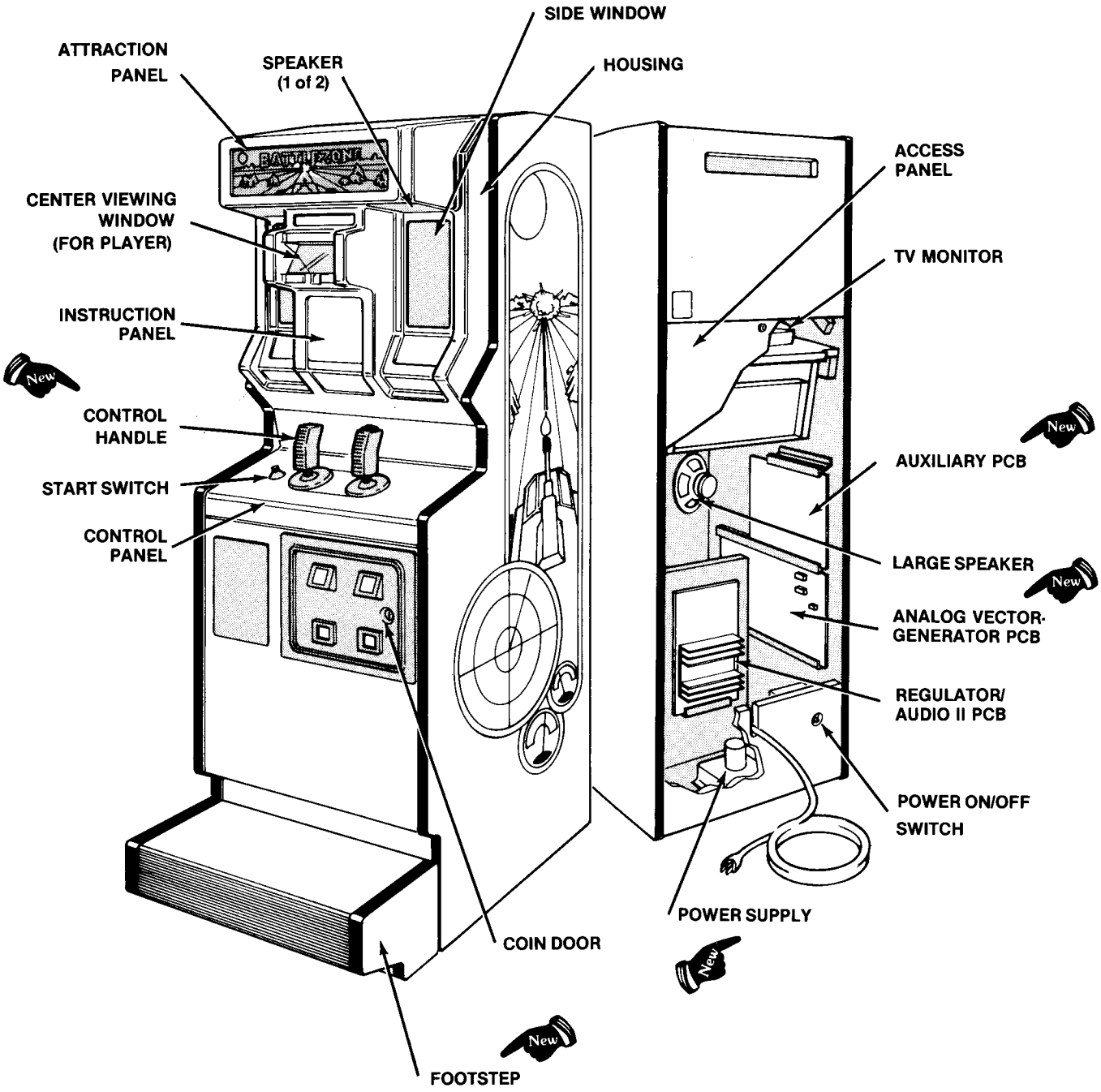



**Figure 1 Overview of Game**

- Atari's X-Y game circuitry has expanded into **two interconnected printed-circuit boards**—the Analog Vector-Generator and the Auxiliary PCBs. The circuitry produces more lines on the screen at a faster rate, thus creating a smoother screen image.
- This game includes a newly designed **power supply assembly.** This power supply has a larger transformer to handle the increased power requirements of the expanded game circuitry.
- Battlezone's **new cabinet design** will accept Atari's new deep-well coin box that holds more coins. The cabinet also includes a removable footstep for the convenience of shorter players. (If you do not wish to mount this footstep on the front of the game, you can store the footstep inside the cabinet.)

These new parts, as well as all other major parts in the game, are illustrated in Figure 1. Throughout this manual, wherever one of these new parts is mentioned, you will see this symbol:

# B. Game Inspection

This new game is ready to play upon removal from the shipping carton. However, your careful inspection is needed to supply the final touch of quality control. Please follow these steps to help us insure that your new game was delivered to you in good condition.

**NOTE**

Do not plug the game in yet!

1. Examine the exterior of the game cabinet for dents, chips, or broken parts.
2. Unlock and open the access panel of the cabinet and inspect the interior of the game as follows:
   - Check that all plug-in connectors (on the game harness) are firmly seated. Replug any connectors found unplugged. **Don't force connectors together.** The connectors are keyed so they only go on in the proper orientation. **A reversed edge connector will damage a PCB.**
   - Check that all plug-in integrated circuits on the game PCB are firmly seated in their sockets.

**⚠ WARNING ⚠**

To avoid possible unpleasant electrical shock, do not touch internal parts of the TV monitor with your hands or metal objects held in your hands!

- Note the location of the game's serial number—it is printed on the special label on the outside of the game cabinet. Verify that the serial numbers also stamped on the Battlezone Analog Vector-Generator PCB, Auxiliary PCB, Regulator/Audio II PCB and TV Monitor are all identical. A drawing of the serial number locations is on the inside front cover of this manual. Please mention this number whenever you call your distributor for service.

- Check all major subassemblies such as the power supply, control panel and TV monitor for secure mounting.
- Finally, turn on the game and look at the screen through the player's viewing hole. Check that the radar "screen" is centered in the bright orange-banded round hole of the graphics bezel. If it's misaligned, locate the tape that holds the graphics bezel to the wood mounting. You will find the tape at the rear of the monitor, and the graphics bezel is the upper cardboard. Carefully remove the tape. Then shift the bezel until the TV-monitor image is centered in the hole of the bezel.

# C. Game Installation

**Figure 2 Installation Requirements**

| | |
|---|---|
| Power | 175 watts |
| Temperature | 0 to 38°C (32 to 100°F) |
| Humidity | Not over 95% relative |
| Space Required | With footstep: 64 × 84½ cm (25¼ × 33¼ in.)<br>Without footstep: 64 × 64 cm (25¼ × 25¼ in.) |
| Game Height | 190 cm (74¾ in.) |

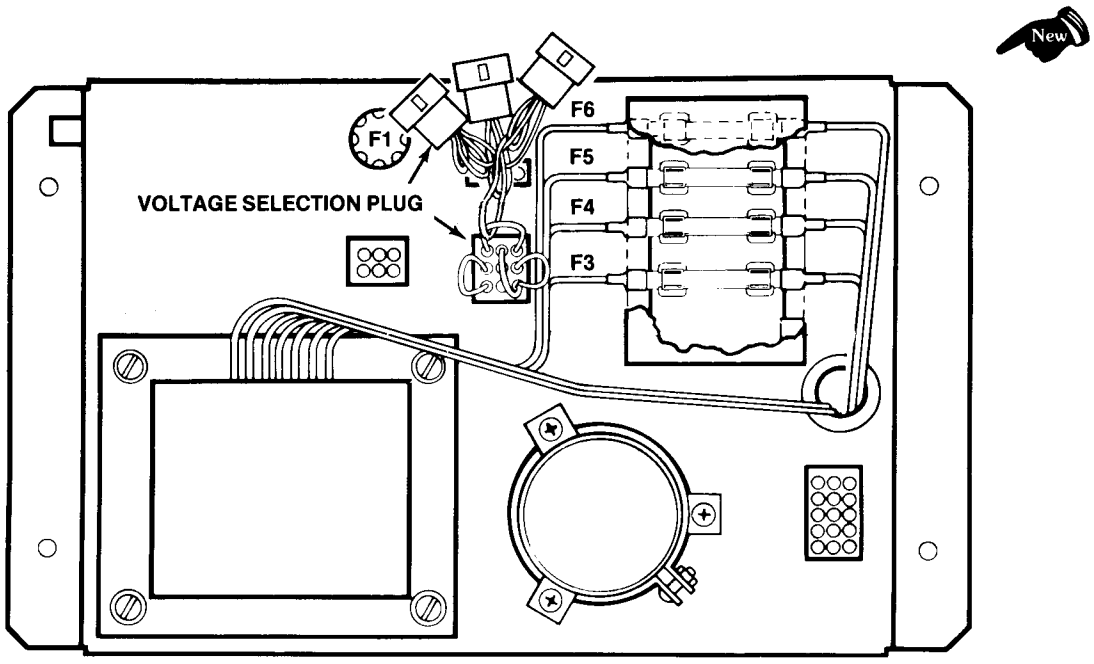



**Figure 3 Line Voltage Selection**

## 1. Line Voltage Selection

Before plugging in your game, make sure that the voltage selection plug on the power supply (see Figure 3) is correct for your location's line voltage. Check the wire color on the plug and see if it is correct per the list below.

| Line Voltage Range | Voltage Selection Plug Color |
|---|---|
| 90-110 VAC (100) | Violet |
| 105-135 VAC (120) | Yellow |
| 200-240 VAC (220) | Blue |
| 220-260 VAC (240) | Brown |

## 2. Interlock and Power On/Off Switches

To minimize the hazard of electrical shock while working on the inside of the game cabinet, two interlock switches have been installed (see Figure 4). One is located behind the access panel and one is behind the coin door. These switches remove all AC line power from the game circuitry when a door is opened.

Check for proper operation of the interlock switches by performing the following steps:

- Unlock and open the access panel and the coin door.
- Plug the AC line power cord into an AC outlet.
- Close the access panel and coin door.
- Set the power on/off switch to the on position. Within 30 seconds the TV monitor should display a picture.
- Slowly open the access panel. The TV monitor picture should disappear when the panel is opened approximately 2.5 cm (1 inch). Close and lock the access panel and repeat this step with the coin door.
- If the results of the preceding step are satisfactory, the interlock switches are operating properly. If the TV monitor doesn't go off as described, check to see if the corresponding interlock switch is broken from its mounting or stuck in the "on" position.

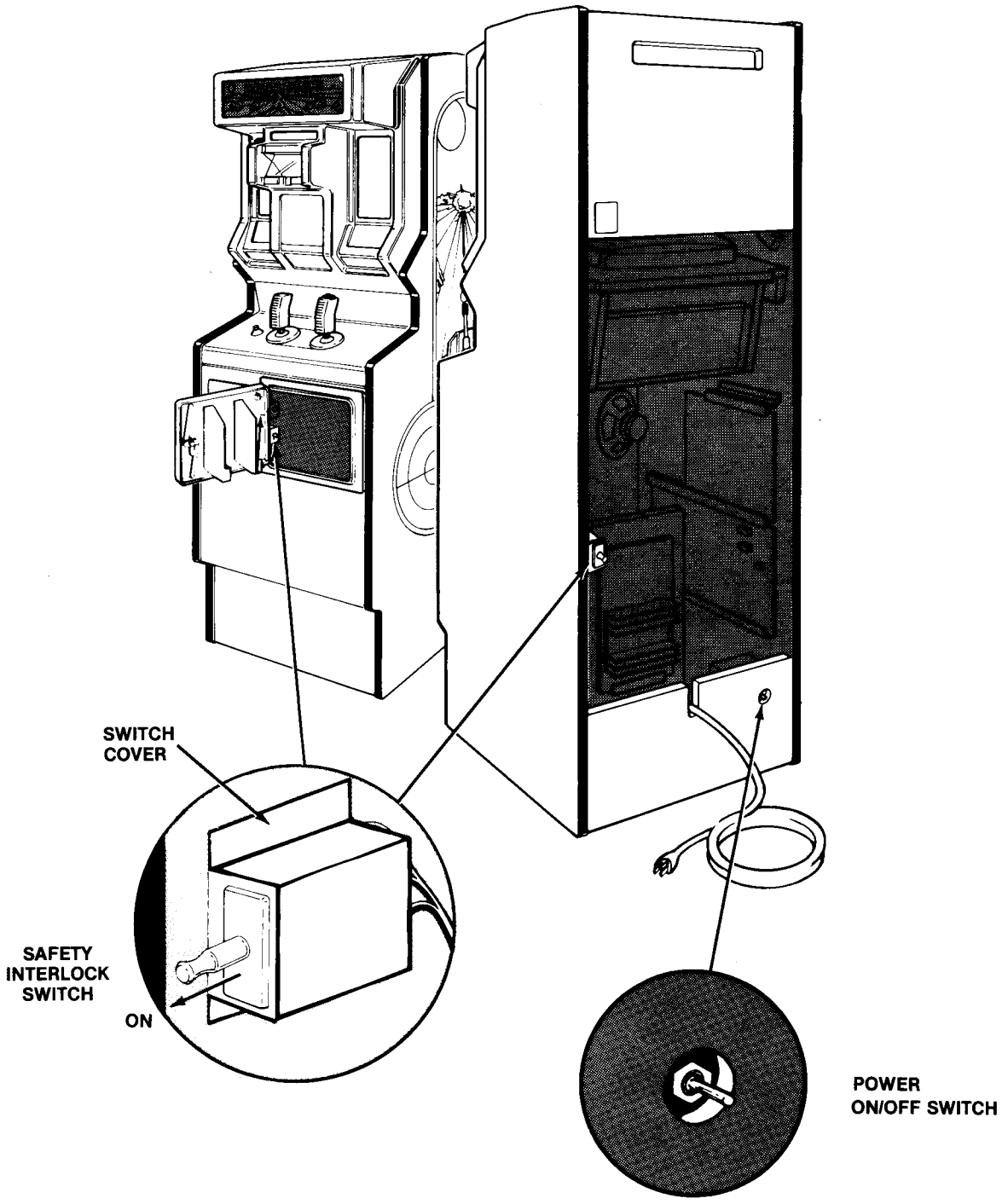



**Figure 4 Interlock and Power On/Off Switches**

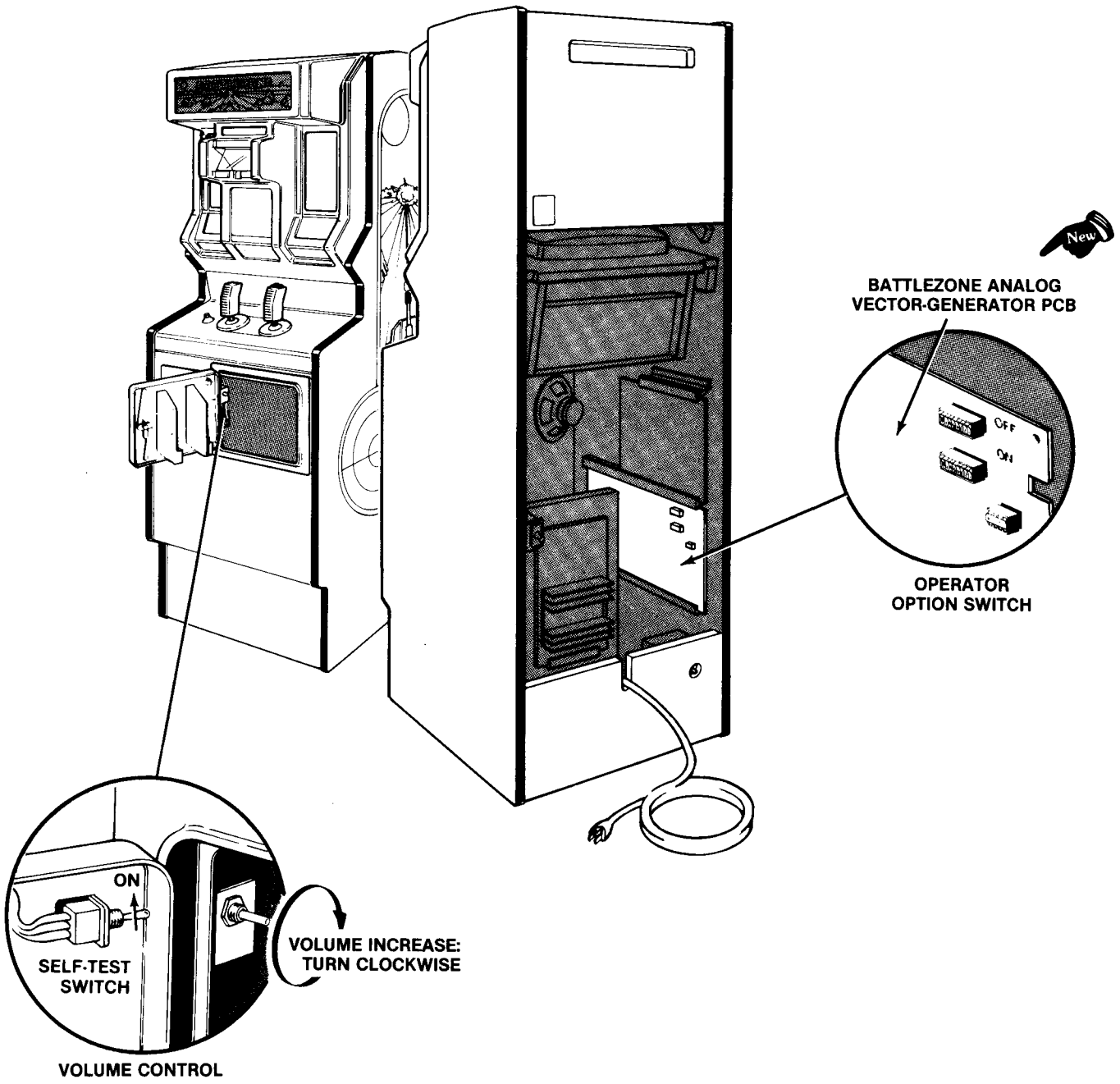



**Figure 5 Location of Self-Test Switch, Volume Control and Option Switches**

# D. Self-Test Procedure

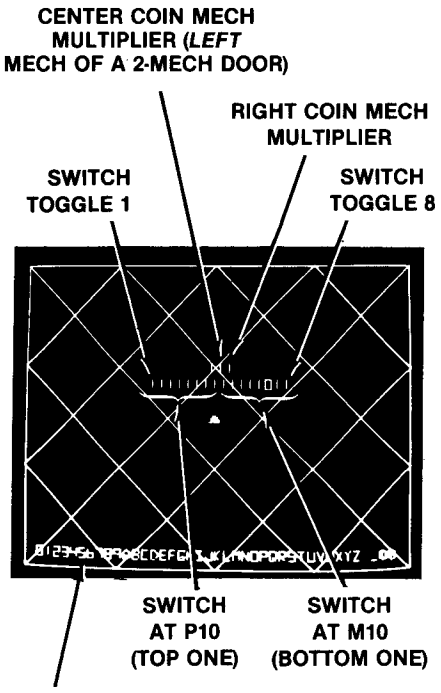
This game will test itself and provide data to demonstrate that the game's circuitry and controls are operating properly. The data is provided on the TV monitor and the game speaker; no additional equipment is necessary.

Part of the self-test procedure includes a display of the operator-selectable game options. Therefore, we suggest you run the self-test procedure anytime you need to change the game's options.

To run the self-test, follow the instructions outlined in Figure 6.

## Figure 6 Self-Test Procedure

| Instruction | Results if Test Passes | Results if Test Fails |
|---|---|---|
| 1. Set self-test switch to **on** position (see Figure 5). | After about 3 seconds, the TV monitor displays the picture below. | **RAM FAILURE** is indicated by a sequence of 1 to 10 tones. You will hear a short low tone for each good RAM chip, and a long high tone for a failing RAM chip. The test stops with the first failing RAM chip. To restart the sequence, press the reset pushbutton on the Battlezone™ Analog Vector-Generator PCB, or set the self-test switch to off, then again to the on position. Identify the bad RAM chip with the table below. Example: four short low tones followed by a long high tone indicates failure of RAM at location B2. |




| Long High Tone | Bad RAM Chip Location |
|---|---|
| 1st | J2 |
| 2nd | H2 |
| 3rd | A2 |
| 4th | A1 |
| 5th | B2 |
| 6th | B1 |
| 7th | C2 |
| 8th | C1 |
| 9th | D2 |
| 10th | D1 |

**ROM/PROM FAILURE** is indicated by two columns of numbers on the left side of the screen. The number in the left column indicates the failing ROM/PROM(s). Identify the bad ROM/PROM with the table immediately below.

The number in the right column indicates the failing data bit of the failing ROM/PROM. Identify the bad bit with the second table below. If more than one bit is failing, the displayed number(s) are hexadecimal combinations of the numbers shown in the second table. Examples:

1) If bits D2 and D3 fail, **C** is displayed.
2) If bits D2, D3 and D7 fail, **8C** is displayed.
3) If bits D4 and D5 fail, **30** is displayed.
4) If bits D1, D3, D5 and D6 fail, **6A** is displayed.

| Displayed No. | Failing ROM | Failing PROM |
|---|---|---|
| 0 | B/C3* | B/C3*, E3 |
| 1 | A3 | A3, F/H3 |
| 2 | E1 | |
| 3 | F/H1 | |
| 4 | J1 | |
| 5 | K1 | |
| 6 | LM/1 | |
| 7 | N1 | |

*If ROM or PROM B/C3 is bad, you will hear a continuous low tone, and the program may be unable to display a number.

## Figure 6 Self-Test Procedure, continued

| Instruction | Results if Test Passes | Results if Test Fails |
|---|---|---|
| | | **Displayed No.** / **Failing Bit**<br>1 — D0<br>2 — D1<br>4 — D2<br>8 — D3<br>10 — D4<br>20 — D5<br>40 — D6<br>80 — D7<br><br>**MATH BOX FAILURE** is indicated by a single letter displayed in the upper right corner of the display. Identify the failure with the table below.<br><br>**Displayed Letter** / **Failure**<br>T — Time out error<br>H — Data error—high byte<br>L — Data error—low byte |
| 2. Activate slam switch, all control panel switches and coin door switches. When satisfied with test, set self-test switch to **off** position. | As switch activates, you'll hear a low beep. As switch deactivates, you'll hear a high beep. | You will not hear a low or high beep for the defective switch. |

**3. Sounds Test (Optional)**
You may test the hardware-generated sounds by starting a game and proceeding as follows:

**Engine Rumble (Idle):** Should be heard as soon as start button is pushed.

**Engine Rumble (Active):** Pushing both control handles forward should cause an increase in pitch. Releasing control handles should cause engine rumble to return to idle.

**Loud Shot:** Press the fire button.

**Loud Explosion:** Heard when you get hit, indicated by cracked windshield.

**Soft Explosion:** Is heard when you hit an enemy tank or another object.

# E. Option Switch Settings

## 1. Bonus Play Feature

Battlezone™ offers a bonus play for certain combinations of coins inserted. This bonus feature is operator-selectable, meaning you may choose to offer it or not.

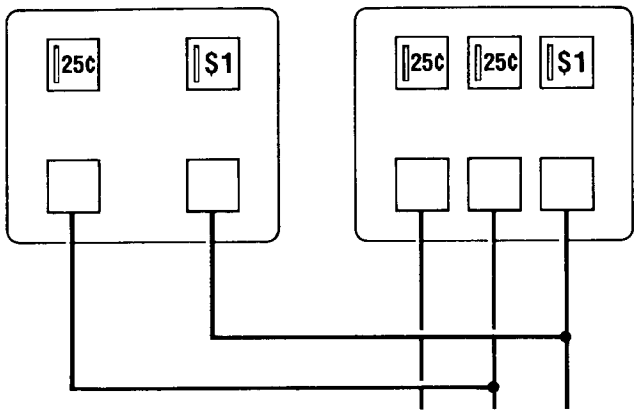
For example, with your game set at 50¢ per play, players who deposit four successive quarters or a $1.00 coin, then press the start button, can receive a bonus play. Therefore, players can receive 3 plays for $1.00.

This bonus feature encourages players to insert more money than just the minimum 50¢ required for one game. Various other bonuses are also available (see Figure 8).

## 2. Coin Mechanism Multipliers

Since early in 1980, Atari has made available its new coin door which has either two or three mechanisms. All recent Atari game PCBs identify the different mechanisms in a certain pattern.

The right coin mechs are all the same to the game's logic, regardless of whether you have two or three mechs in your door. In addition, the logic sees the left mech in a 2-mech door and the center mech in a 3-mech door as the same. Refer to the diagram below.




This pattern is important for you to know, so you can correctly set the "multipliers" for each mech. The multipliers determine how much each mechanism will be worth to the game's logic.

The basic unit of measurement is 25¢, which equals a multiplier of ×1. Therefore, if you have a 25¢/25¢/$1 coin door, you will probably want to set the center and right option-switch multipliers at ×1/×4. (The left mech in a 3-mech door always has a value of ×1—you cannot change its value.)

You can set these multipliers with toggles 3 thru 5 on the Battlezone PCB switch assembly at location P10. For exact settings of these toggles, refer to Figure 8.

## 3. Examples of Option Switch Settings

To explain the options, we have provided in Figure 8 fourteen examples of the most common U.S. situations. The toggles mentioned are all in the switch at location P10; they **only** relate to game price, coin mechanism multipliers, and bonus play. You should set the toggles relating to other functions as you see fit, although Figure 7 provides "**$**" symbols indicating Atari's recommendations.

## Figure 7 Game Option Settings

To change toggle positions on the switch assemblies, you need not remove the game PCB. The switches, usually colored blue, are easily accessible when the Battlezone Analog Vector-Generator PCB is mounted in place.

When changing the options, verify proper results on the TV monitor display **by performing the self-test.** Note that changing an option on any of the following eight toggles will cause an immediate change on the TV monitor screen during the self-test.

| Toggle Settings of 8-Toggle Switch on Battlezone PCB *(at M10)* (BOTTOM switch when PCB is in game) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Option |
| | | | | | | On | On | Game starts with 2 tanks |
| | | | | | | On | Off | Game starts with 3 tanks **$** |
| | | | | | | Off | On | Game starts with 4 tanks |
| | | | | | | Off | Off | Game starts with 5 tanks |
| | | | | On | On | | | Missile appears after 5,000 points |
| | | | | On | Off | | | Missile appears after 10,000 points **$** |
| | | | | Off | On | | | Missile appears after 20,000 points |
| | | | | Off | Off | | | Missile appears after 30,000 points |
| | | On | On | | | | | No bonus tank |
| | | On | Off | | | | | Bonus tank at 15,000 and 100,000 points **$** |
| | | Off | On | | | | | Bonus tank at 25,000 and 100,000 points |
| | | Off | Off | | | | | Bonus tank at 50,000 and 100,000 points |
| On | On | | | | | | | English language **$** |
| Off | On | | | | | | | French language |
| On | Off | | | | | | | German language |
| Off | Off | | | | | | | Spanish language |

# Figure 8 Game Price Settings

The white block below contains the manufacturer's suggested settings. All numbers 1 thru 8 are toggle settings on the 8-toggle switch at location P10, on the Battlezone™ Analog Vector-Generator PCB (the **top** switch assembly).

## 50¢ PER PLAY:

| | No bonus | Bonus<br>$1.00 = 3 plays | Bonus<br>$.50 = 1 play<br>$.75 = 2 plays<br>$1.00 = 3 plays |
|---|---|---|---|
| **Straight 25¢ Door** | (1)<br>8 On, 7 On, 6 On, 5 On<br>4 On, 3 On, 2 Off, 1 Off | (3)<br>8 On, 7 Off, 6 Off, 5 On<br>4 On, 3 On, 2 Off, 1 Off | (4)<br>8 On, 7 On, 6 Off, 5 On<br>4 On, 3 On, 2 Off, 1 Off |
| **25¢/$1.00 Door or 25¢/25¢/$1.00 Door** | (1)<br>8 On, 7 On, 6 On, 5 On<br>4 On, 3 Off, 2 Off, 1 Off | (3)<br>8 On, 7 Off, 6 Off, 5 On<br>(5) 4 On, 3 Off, 2 Off, 1 Off | (4)<br>8 On, 7 On, 6 Off, 5 On<br>(5) 4 On, 3 Off, 2 Off, 1 Off |

## 25¢ PER PLAY:

| | No bonus | Bonus<br>$.50 = 3 plays | Bonus<br>$1.00 = 5 plays | Bonus<br>$1.25 = 6 plays |
|---|---|---|---|---|
| **Straight 25¢ Door** | (2)<br>8 On, 7 On, 6 On, 5 On<br>4 On, 3 On, 2 Off, 1 On | (2)<br>8 On, 7 On, 6 Off, 5 On<br>4 On, 3 On, 2 Off, 1 On | (2)<br>8 On, 7 Off, 6 On, 5 On<br>4 On, 3 On, 2 Off, 1 On | (2)<br>8 Off, 7 On, 6 On, 5 On<br>4 On, 3 On, 2 Off, 1 On |
| **25¢/$1.00 Door or 25¢/25¢/$1.00 Door** | (2)<br>8 On, 7 On, 6 On, 5 On<br>4 On, 3 Off, 2 Off, 1 On | (2)<br>8 On, 7 On, 6 Off, 5 On<br>4 On, 3 Off, 2 Off, 1 On | (2)<br>8 On, 7 Off, 6 On, 5 On<br>4 On, 3 Off, 2 Off, 1 On | (2)<br>8 Off, 7 On, 6 On, 5 On<br>4 On, 3 Off, 2 Off, 1 On |

Circled numbers refer to coin-door labels you should use with each situation (labels are illustrated on opposite page).

# Figure 8 Game Price Settings, continued

For your information, we have defined below the switch settings for those options relating to game price, coin mechanism multipliers, and bonus play. This information is useful in case you need to temporarily set the Battlezone™ game on free play, or if you have German coin mechanisms in your door.

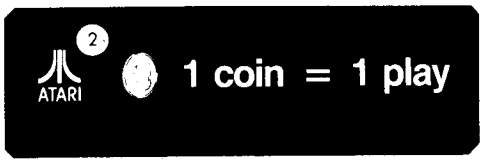
| Toggle Settings of 8-Toggle Switch on Battlezone PCB *(at P10)*. TOP switch when PCB is in game | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 | Option | |
| | | | On | On | Free play | |
| | | | On | Off | 1 coin* for 2 plays | |
| | | | Off | On | 1 coin* for 1 play | |
| | | | Off | Off | 2 coins* for 1 play | $ |
| | On | On | | | Right coin mech × 1 | $ |
| | On | Off | | | Right coin mech × 4 | |
| | Off | On | | | Right coin mech × 5 | |
| | Off | Off | | | Right coin mech × 6 | |
| On | | | | | Center coin mech × 1 | $ *(Both these settings affect the **left** mech in a 2-mech door)* |
| Off | | | | | Center coin mech × 2 | |

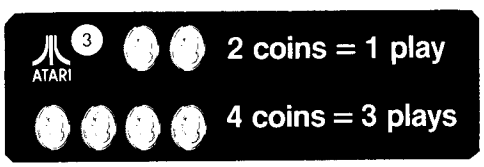
| Toggle Settings of 8-Toggle Switch on Battlezone PCB *(at P10)*. TOP switch when PCB is in game | | | |
|---|---|---|---|
| 8 | 7 | 6 | Option |
| On | On | On | No bonus coins |
| On | On | Off | For every 2 coins* inserted, game logic adds 1 more coin* |
| On | Off | On | For every 4 coins* inserted, game logic adds 1 more coin* |
| On | Off | Off | For every 4 coins* inserted, game logic adds 2 more coins* $ |
| Off | On | On | For every 5 coins* inserted, game logic adds 1 more coin* |

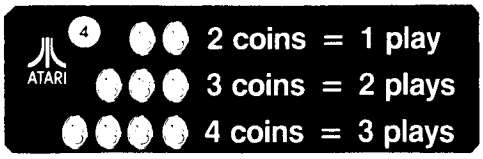
**In the U.S., a "coin" is defined as 25¢. In Germany a "coin" is 1 DM.*

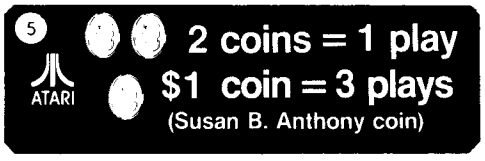
*$ Manufacturer's suggested settings*

*To achieve bonus plays, all coins must be inserted before pushing start button.*



*Note: Battlezone **cannot** be set for a 2-coin minimum. Therefore, do not stick the above label no. 6 on the Battlezone coin door.*

## Figure 9 Coin Counter Option Settings

***[These toggles determine which coin mechanisms activate which counters]***

| Toggle Settings of 4-Toggle Switch on Game PCB (at L11) | | | | For Games Having These Coin Doors: | Option |
|---|---|---|---|---|---|
| 4 | 3 | 2 | 1 | | |
| | | On | On | Thai 1 Baht/1 Baht, German 1 DM/1 DM, U.S. 25¢/-25¢, Belgian or French 5 Fr/5 Fr, Swiss or French 1 Fr/1 Fr, U.S. 25¢/25¢/25¢, Japanese Y100/Y100, Swedish 1 Kr/1 Kr, U.K. 10 P/10 P, Australian 20¢/-20¢, or Italian 100 L/100 L. | All 3 coin mechanisms are same denomination; all register on **one** coin counter. |
| | | Off | On | German 2 DM/1 DM, German 1 DM/5 DM, U.S. 25¢/-25¢/$1, or U.S. 25¢/$1. | Left and center mechanisms are same denomination; right mech is another denomination. Requires **two** coin counters. |
| | | On | Off | *No coin door is currently designed for this configuration.* | Left mech is one denomination; center and right mech are another denomination. Requires **two** coin counters. |
| | | Off | Off | German 1 DM/2 DM/5 DM. | Left, center and right mechs are 3 different denominations. Requires **three** coin counters. |

# F. Game Play

Atari's Battlezone™ is a one-player game with an X-Y or vector-generation monitor. The game depicts a first-person view from inside a tank. The battles are fought in a large valley that is completely surrounded by mountains and volcanos. The valley floor contains pyramids and boxes that can provide temporary protection for players. (These cannot be destroyed by shots.)

The enemy consists of slow and fast "super" tanks and intelligent missiles—all of which become more evasive as the game progresses. In addition, flying saucers appear periodically. These don't shoot at players, but players can get very high point scores for shooting them.

The Battlezone game has five possible modes of operation: Attract, Ready-to-Play, Play, High Score Initial, and Self-Test. Self-test is a special mode for checking the game switches and computer functions. You may enter this mode at any time. When entered, all game credits are cancelled and the high score initials are reset.

## 1. Attract Mode

The attract mode begins when power is applied to the game, after a play or high score initial mode, or after self-test. This mode is continuous and is only interrupted when a game is paid for and accepted or when in self-test.

In this mode, the TV monitor displays three possible pictures. One is a simulation of a typical game, another is the high score table, and the third picture shows the **Battlezone** logo rolling up from the bottom of the screen.

## 2. Ready-to-Play Mode

This mode begins when sufficient coins have been accepted for a game. It ends when the start pushbutton is pressed. When this mode begins, the message **PUSH START** flashes in the center of the

screen, and the start button will also flash on and off. The sequence of displayed pictures are otherwise the same as those shown in the attract mode.

## 3. Play Mode

The play mode begins when the start pushbutton is pressed. The start LED will then stay on, and the audio will begin. The mode ends when the player's last tank of the game is lost.

The game starts with the slow tank visible on the screen. The player can determine the position of either type of tank or the missile by reading the messages in the upper left corner of the screen. For example, **ENEMY TO RIGHT** may be displayed. In addition, the sweeping radar display shows a dot for the enemy's location, accompanied by a sonar "blip" sound.

The upper pie-shaped area on the radar represents the player's range of view on the screen below. If the enemy falls within this area, it will be shown on the screen below and will be accompanied by the message **ENEMY IN RANGE.**

Occasionally the flying saucer appears on the screen. It is a harmless observer to the battle and will not destroy the enemy or player. Its position is never shown on the radar, but players can earn 5,000 points for shooting it down. The saucer **does** act as a distraction, though, since it usually appears at the same time as the enemy tanks or missile. Saucers can be shot down by the player as well as enemy tanks.

Scoring for hitting the enemy is as follows: the slow tank earns a player 1,000 points; the missile earns 2,000 points; and the super tank earns 3,000 points. A super tank moves and turns twice as fast as both the slow tank and the player's tank.

Several options allow operators to set the Battlezone™ game for 2 through 5 tanks, for giving a bonus tank after earning various point scores, and for adjusting difficulty by having the missile appear for the first time at various point scores. For information on how to set your game for these options, refer to Figure 7 in this manual.

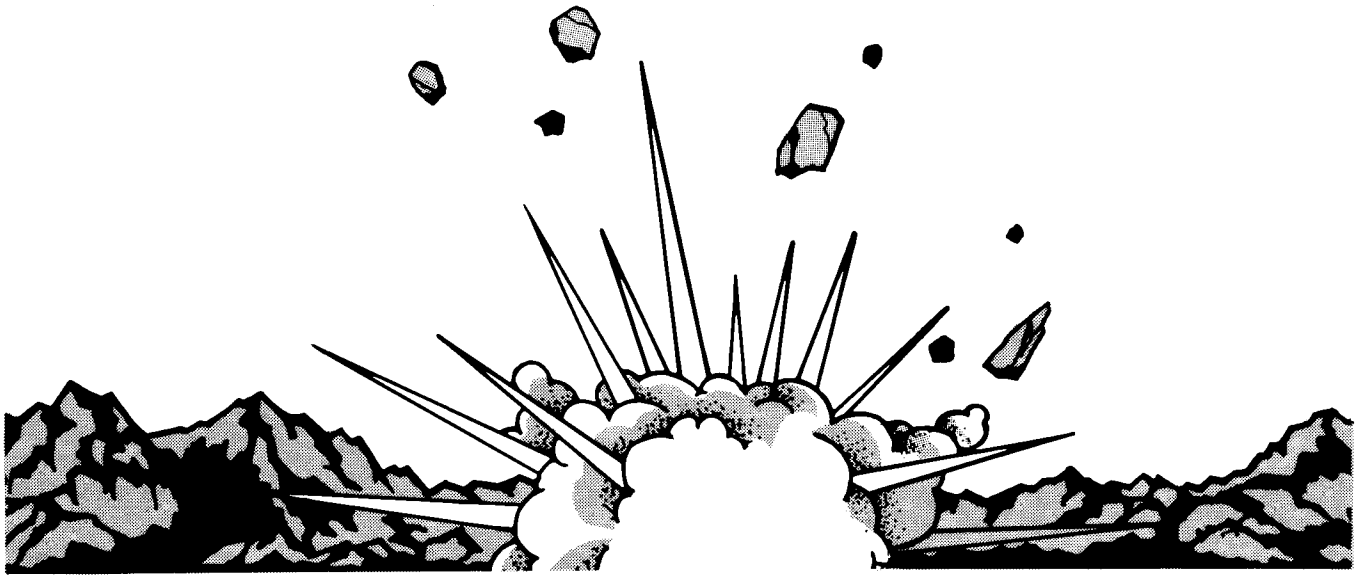
## 4. High Score Initial Mode

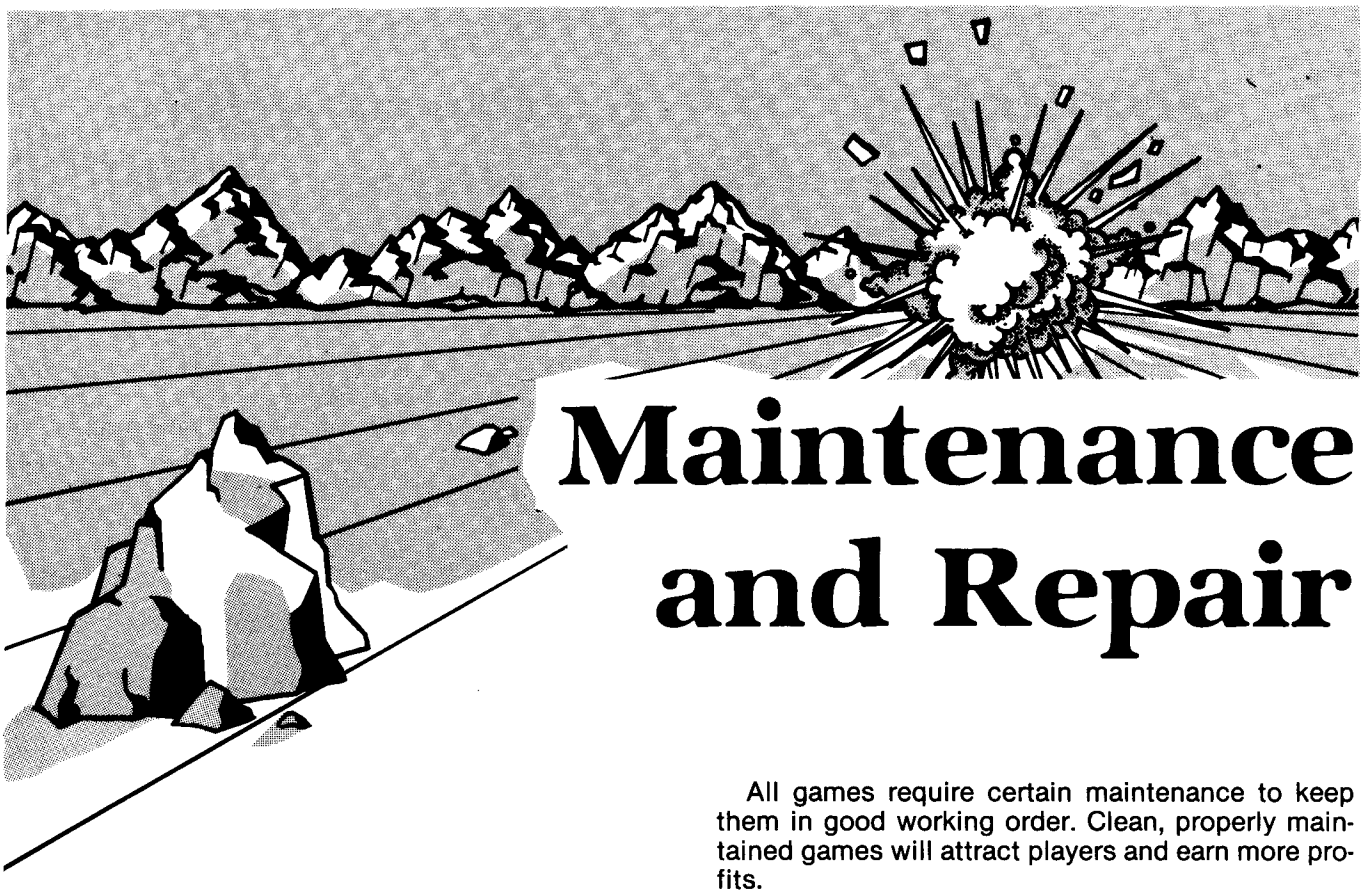
If a player's score exceeds the minimum on the high score initial list, he or she may put up to three initials on this list at the end of the game. The instructions are self-explanatory and are provided in four languages.

Note that this list is erased whenever you enter the self-test, press the RESET button on the Battlezone™ Analog Vector-Generator PCB, or turn off the power. This resetting will put a list of ten "highest" scores and initials on the screen (to provide player challenge).




Any score on the list over 100,000 points is specially highlighted with a tank symbol following the player's initials. If a player doesn't enter his or her initials within about 60 seconds, the game will automatically enter dashes instead. After this, the game reverts to the attract mode.





# Maintenance and Repair

All games require certain maintenance to keep them in good working order. Clean, properly maintained games will attract players and earn more profits.

The most important maintenance item is running the self-test every time you collect money from the cash box. Just looking at a game will not tell you if the control handle switches, fire button, or start switch is broken, or if the LED has burned out. The self-test will inform you of any of these possible problems.

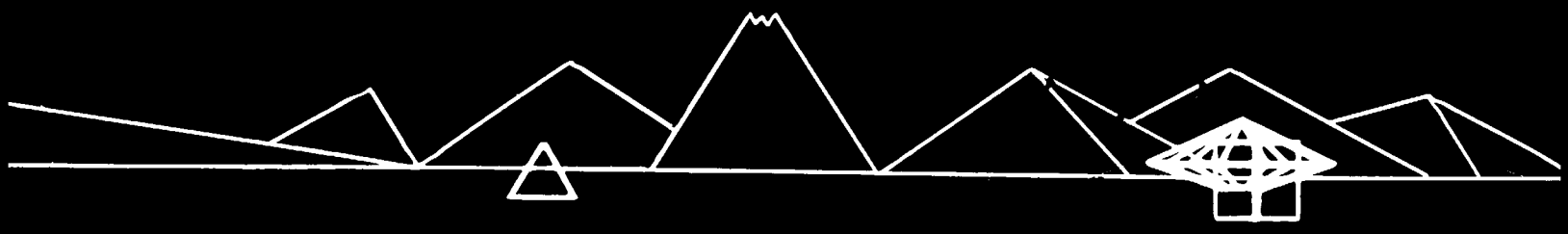
Second, you should regularly clean the outside of the game and the coin mechanisms. In addition, you will need to regularly lubricate the control handle: for details see this chapter.

2

Battlezone™

# A. Cleaning

# C. Opening the



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