

# FIRE ESCAPE

TM



THE **HOT** NEW GAME FROM



FIRE ESCAPE SERVICE MANUAL

**Every building MUST have one!**

## **ANOTHER HIT**

I.C.E., the maker of CHEXX, a proven success, does it again with FIRE ESCAPE™, an electro-mechanical diversion from the "heat" of video doldrums.

## **UNBELIEVABLE PRICE**

At a time when prices are skyrocketing, FIRE ESCAPE™ takes you down to an affordable exit from financial disaster. It's a matter of life and wealth.

## **SOMETHING DIFFERENT**

Race down the FIRE ESCAPE™. Get out of the burning building. Jump, if you dare, to the safety of the bird's nest. Save valuable time by sliding down the drainage pipe. Then help put out the fire. Speed, nerves, and skill make you the Fire Chief.

## **UNLIMITED POTENTIAL**

Unique in an arcade, steady in a street location, FIRE ESCAPE'S™ electronic scoring and incredibly realistic sound effects require that...

**REALLY,  
every building  
MUST  
have one!!**

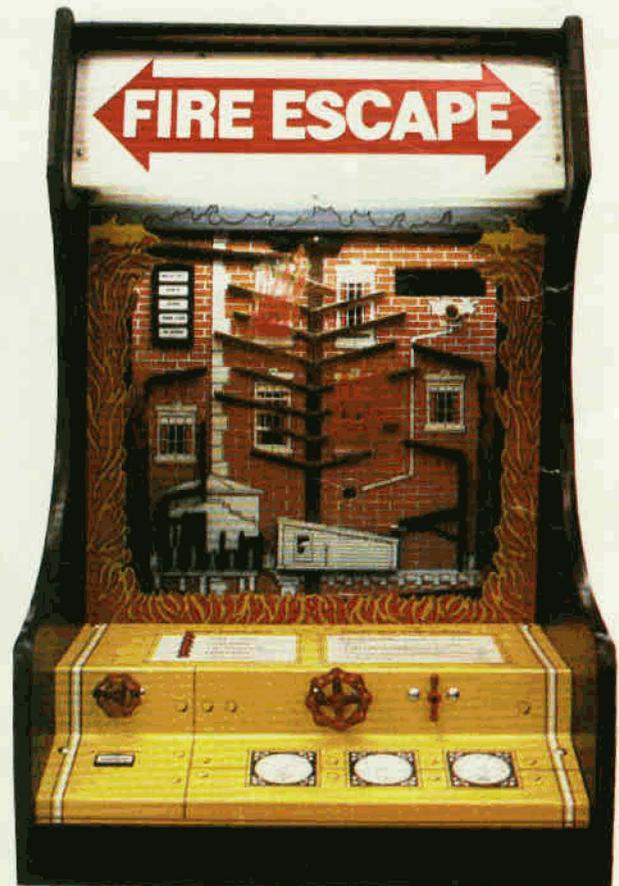
Find out more about FIRE ESCAPE™.  
Call your distributor  
or Steve Bernstein at 800-342-3433.  
In N.Y.S. call collect 716-693-9535.

**FIRE ESCAPE**™

from

**ICE**

*Innovative  
Concepts  
in Entertainment  
Games more people  
play*



FIRE ESCAPE tm

OWNERS AND SERVICE MANUAL  
WITH COMPLETE PARTS LISTING  
FIRST EDITION

MECH-TRONIC GAMES, INC.  
P.O. BOX 384  
TONAWANDA, NEW YORK 14151

\* FIRE ESCAPE tm is designed and engineered by Mech-Tronic Games, Inc. - Manufactured under contract by Innovative Concepts In Entertainment, Inc.

©P 1984 Mech-Tronic Games, Inc.

MECH-TRONIC GAMES, INC.

Copyright © 1984 MECH-TRONIC GAMES, INC.

All Rights Reserved

No part of this publication may be reproduced by any mechanical, photographic, or electronic process, or in the form of a phonographic recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without permission from the publisher.

The FIRE ESCAPE tm game play, all graphic designs, this technical manual, its accompanying schematic diagrams, and the trouble-shooting guide are protected by the new Copyright Act of 1976.

This Act provides for increased penalties for violating federal copyright laws. Courts CAN IMPOUND infringing articles while legal action is pending. If infringers are convicted, courts can ORDER DESTRUCTION of the infringing articles.

In addition, the Act provides for payment of statutory damages of up to \$50,000 in certain cases. Infringers may also have to pay costs and attorneys' fees, fines up to \$25,000, and face an imprisonment of up to one year.

Mech-Tronic Games, Inc. will aggressively enforce its copyrights against any infringers. WE WILL USE ALL LEGAL MEANS to immediately halt any manufacture, distribution or operation of a copy of any product made by us. Anyone who purchases such copies risks forfeiting such a game.

Published By:  
Mech-Tronic Games, Inc.  
P.O. Box 384  
Tonawanda, NY 14151

\*FIRE ESCAPE is designed and engineered by Mech-Tronic Games, Inc.  
- Manufactured under contract by Innovative Concepts in Entertainment, Inc.

© (P) 1984 Mech-Tronic Games, Inc.

## TABLE OF CONTENTS

- I. INTRODUCTION
- II. FEATURES
- III. GAME PLAY
- IV. GAME SET UP
- V. GAME OPERATION & TESTING PROCEDURES
- VI. MAINTENANCE
- VII. INTRODUCTION TO MAINTENANCE/MECHANICAL REPAIR
- VIII. MAINTENANCE/ELECTRONIC REPAIR
- IX. REPAIR/QUICK REFERENCE
- X. MECHANICAL PARTS LIST
- XI. ELECTRONICS PARTS LIST
- XII. SCHEMATICS

## FIRE ESCAPE

### INTRODUCTION

FIRE ESCAPE<sup>tm</sup> is the newest in a series of electro mechanical games brought to you by I.C.E. Following in the tradition of quality, FIRE ESCAPE<sup>tm</sup> is designed to offer many new benefits in addition to features that are proven money earners.

FIRE ESCAPE <sup>tm</sup> was designed and manufactured for reliability, durability, and longevity. There are very few moving parts meaning less maintenance than on previous electro-mechanical designs. All parts are readily accessible for quick, easy replacement.

## FEATURES

- 1) All Steel Playfield Chassis - eliminates warpage and other problems commonly associated with plastic or wood type game sub assemblies. The playfield is computer designed and manufactured, resulting in precision tolerances and highest quality.
- 2) Modular Electronics - provides for fast, easy replacement of any electronic components. Major I.C.'s are socketed.
- 3) Printed Side Graphics - Eliminates the possibility of peeling off decals.
- 4) Tempered playfield glass - this eliminates hazing which often results from the use of lexan or other plastic type materials.
- 5) Over, Under Coin Door - The preferred industry standard, helps eliminate damage to coin mechs in the event of a break-in.
- 6) Realistic Sound Effects - enhances the game play, yet are simple and contained on one inexpensive standard chip.
- 7) Flickering Lights - add to realism making the building look as if its "On Fire".
- 8) Convenient Size - since this game uses a standard "video" style cabinet, it can go in virtually any location.
- 9) Optional Ticket Dispenser - each game can easily accept a ticket dispenser with a ten minute installation kit. A real must for arcades and other locations where "redeemers" are desirable.
- 10) Priced For Today & Tomorrow - reduces the risk element inherent in many games, due to initial price. FIRE ESCAPE tm is the lowest priced game of its kind on the market.

## GAME PLAY

Object of the game:

Become the Fire Chief by rushing your man (ball) down the FIRE ESCAPE of the burning building as quickly as possible. Collect as many buckets of water as you can to help put out the fire.

Game Play:

- Insert coin(s)
- Man (ball) is released by turning small lever on the left when emergency indicator lights.
- Proceed down the fire escape by raising and lowering the ramps, by turning the large knob (center) left or right.
- Reach the bottom of the building and launch the man (ball), the chute with the most water by flipping the handle.

Hints:

- Bonus points are determined by the speed in reaching the bottom of the building, multiplied by the score in the water chute the man (ball) lands in. The faster you get down, the higher the bonus.
- You can collect 500,000 additional points by jumping off the fire escape into the bird's nest allowing you to land at the bottom of the gutter pipe, saving valuable time.
- Launch the man (ball) into the water supply area, attempting to land in the chute with the most water.

## GAME SET UP

This game will be ready for operation after a few simple safety checks.

1. The on/off switch located on the top of the game should be toggled to the OFF position.
2. Pull out the electrical cord from the rear of the game and plug into a standard THREE (3) PRONG GROUNDED OUTLET. This model is designed to operate on A.C. voltage of 100±130 volts.

WARNING - A STANDARD THREE (3) PRONG GROUNDED OUTLET MUST BE USED. FAILURE TO GROUND THE GAME WILL VOID YOUR WARRANTY AND COULD SERIOUSLY DAMAGE GAME ELECTRONICS AND MAY ALSO ADVERSELY AFFECT THE SAFETY OF YOUR GAME AND CAUSE INJURY TO YOURSELF AND OTHERS.

3. Open the rear game access door. Carefully see that all connectors and chips are seated fully in their sockets. DO NOT TOUCH THE CHIPS ANY MORE THAN ABSOLUTELY NECESSARY.
4. Adjust cost per game and tickets dispensed (Ticket Dispenser Optional) using the four (4) pole slide switches on the main P.C. board.

The switch for the game cost is on the left hand side of the P.C. board. Position 1 (far left) = \$.25, position 2 = \$.50, position 3 = \$.75, and position 4 = \$1.00.

The switch for the ticket dispenser is the switch on the right side of the P.C. board. If your game is outfitted with a ticket dispenser and you do not wish to dispense tickets, you must disconnect the ticket dispenser at the harness. You can control the number of tickets dispensed by adjusting the switch position as follows:

Switch Position	*1	2	3	4
Fire Chief	1	2	3	4
Captain	0	1	2	3
Leutenant	0	0	1	2
Fireman	0	0	0	1

\* 1 = Far Left Position

## GAME OPERATION & TESTING PROCEDURES

- 1) Turn the game on. If any unusual sounds are heard, shut off the game immediately and check to see if any connectors are loose or installed improperly. Restart the game.
- 2) Before starting game see that all knobs and levers work smoothly: if not, adjust as described in maintenance section.
- 3) Check to see that all the balls are in the correct areas, all of the balls except for one should be in the ejector channel. The other ball will be either on the ejector rack gear or by the solenoid ball door.

IF ANY BALLS HAVE COME OUT DURING SHIPMENT, HOLD THE SOLENOID BALL DOOR OPEN BY HAND AND OPERATE THE BALL EJECTOR LEVER UNTIL ALL THE BALLS ARE RELOADED IN THE EJECTOR CHANNEL.

- 4) Insert the proper coin in the coin assembly to start the game. If the coin door is open, your money will be returned to you.
- 5) Run the game through once to see that all the mode indicators such as "Bonus", "Score", etc. are in working order.
- 6) Sound effects should be noted for each mode of operation. If any sounds are not present or do not seem correct, first check the main p.c. board to be sure the volume is turned up sufficiently. If problems are still present, refer to maintenance section.
- 7) Check to see that all of the mechanical levers operate smoothly and freely.

PLEASE NOTE = A NEW GAME MAY REQUIRE 10-20 GAMES TO "BREAK IN". SLIGHT MECHANICAL RESISTANCE IS NORMAL AND SHOULD NOT CAUSE CONCERN.

If any mechanical problems are encountered, please see the maintenance section.

- 8) Play a few games to see that all the micro switches are operating correctly by directing the ball down various chutes. It is important to check this, as a faulty micro switch will force the game out of sequence and cause malfunction. A more detailed explanation of micro switch function is described in the maintenance section.

## MAINTENANCE

Although every FIRE ESCAPE tm game is manufactured to the most stringent quality control standards, occasionally a small problem may occur. Most problems can be corrected with adjustments and rarely should a part replacement be necessary.

Most repairs and adjustments can be easily accomplished by opening the rear access door of the game.

LUBRICATION = This should be done every 1000 games using an I.C.E. approved lubricant.

WARNING: USE OF ANY OTHER LUBRICANT MAY VIOLATE YOUR WARRANTY AND IRREVERSABLY DAMAGE YOUR GAME.

Lubricate the game sparingly, and completely coat both sets of rack and pinion gears. The control rod bearings may also be lubricated, however, it is not necessary. DO NOT lubricate any other parts on the game.

### CLEANING:

Cabinet - The cabinet exterior should be cleaned using a mild soap and water solution if desired. A spray furniture polish such as "Pledge" should be used to keep the finish sealed and shining. The cabinet interior should be vacuumed out at least once every six months to remove dirt and dust that accumulate on the bottom of the cabinet.

Playfield - To clean the playfield a small amount of disassembly is required:

1. Remove the marquis by removing the six security head screws with the driver provided with the game.
2. Remove the outer playfield glass.
3. Remove the cardboard bezel from the playfield by CAREFULLY pulling it away by the velcro tabs. Bend the bezel forward by pulling the top down and outward. Reassemble in reverse order.
4. Remove the 8-32 x 1/2 screws that hold the plexiglass cover to the playfield.

Clean the playfield by using a cleaner like "Fantastic" or "409". Pinball cleaner can be used if done sparingly. Polish the surface with a spray furniture polish.

Clean the plexiglass cover with "Windex" and polish with a spray furniture polish.

**WARNING:** DO NOT USE ANY CLEANERS ON THE PLEXIGLASS THAT CONTAIN A PETROLEUM DISTILLATE. AS THIS MAY REMOVE THE PRINTING OR DAMAGE THE PLEXIGLASS.

**Coin Mechanisms:** Mechanisms should be cleaned periodically to remove dirt and residue that could jam the mechanism. Clean metal particles off the magnet in applicable models.

**Marquis Light:** To change the bulb remove the six security head screws with the tool provided. Remove the marquis and rotate the bulb to remove it. Reassemble in reverse order.

**Ticket Dispenser:** Clean and inspect periodically for foreign material that could jam the mechanisms - Lubricate once a year with 3-in-1 oil. Put two drops on each gear and bearing.

**Nut and Bolts:** Check periodically to ensure tightness on all bearings and see that all screws are snug. The screws and nylok nuts for the fire escapes should be loose to ensure smooth operation.

INTRODUCTION TO MAINTENANCE/  
MECHANICAL REPAIR

Although all mechanical components in FIRE ESCAPE tm are easy to understand and replace, this section has been provided to help ease replacement of certain items.

Before removing any components for adjustment or replacement, please make the following observations.

- 1) Please note the parts' exact position in relationship to other parts.
- 2) Make sure to check bolt tightness and remember to reattach parts with the same amount of torque.
- 3) Is the apparent problem really the problem? Check other surrounding components as possible reasons for an apparent problem. Many times problems are due to something totally different than that first thought of.
- 4) On a questionable problem, work slowly and carefully, labeling parts so as not to confuse them.
- 5) If you are still unsure of a problem, call our Customer Service Department for technical assistance before proceeding with repair work.

**HANGLES:** When removing handles, be sure to note the exact position before proceeding. First loosen the set-screws on the long and short collars, then slide the mechanisms apart. When reassembling push the handles on as far as possible remembering to use the appropriate spaces that locate the handles to the control panel.

DO NOT FORGET TO USE THESE SPACERS AS DAMAGE TO THE PLAYFIELD COULD OCCUR.

Tighten the collars in their original position and torque the screws very securely.

MAKE SURE THE SMALL COLLAR IS UP AGAINST THE CONTROL PANEL BEARING WHEN TIGHTENED, this short collar prevents handles from being pulled out of the game so make sure to tighten it securely.

**BEARINGS:** To remove most bearings the handles must first be removed. In cases where a front and rear bearing must be aligned such as with the launcher bearings, first snug the nuts and bolts,

slide a rod assembly through to align them, then tighten securely. Use a small amount of lubricant on the bearings if desired.

**BALL EJECTOR RATCHET ASSEMBLY:** This assembly should require little adjustment, however, if necessary, observe the following procedure. Loosen the mounting screws and check for looseness of the part. Pull the ratchet out by hand a little to make sure it will clear the micro switch bracket assembly. Move the entire unit up or down and perform the following test. Operate the ejector handle and see that when fully turned the ratchet will first move out then pop back in 3/4 of the way with a little room to spare. If the ratchet just pops back in when the handle is at the end of its travel then move the ratchet assembly door a little. If replacement is necessary, change parts and observe the above adjustment procedure. See that the ratchet smoothly moves through the slot in the playfield.

**UPPER RATCHET ASSEMBLY:** The only problem to be encountered here would be a broken spring. When replacing the spring make sure there is enough tension, if not then bend the spring and reattach. Tighten the nut as much as possible and leave just a tiny bit of free play. If resistance is felt in the ratchet, back off a little on the nut.

**SCORE MICRO SWITCHES:** If a score micro switch appears to be defective, try switching it from the rear of the game. If the switch then works, the wire may be bent. Next, check the switch for continuity with an ohm meter. If the switch is good then check the electronics. If a switch is faulty, it must be replaced. First remove the micro switch bracket assembly by removing the four REP NUTS. Pull the micro switch bracket off slowly to make sure that if any spacer washers are behind the bracket they are not lost. Unscrew the micro switch bracket from the assembly that contains the faulty micro switch, then unscrew and remove the switch. Assembly is in reverse order.

**PLEASE NOTE:** CARE SHOULD BE TAKEN WHEN REASSEMBLING THE UNIT TO MAKE SURE ALL MICRO SWITCH WIRES PASS THROUGH THE PLAYFIELD SLOTS AND DO NOT BIND.

**GUTTER PIPE MICRO SWITCH:** If a gutter pipe micro switch proves defective due to mechanical or electrical failure, it must be replaced. Remove the old switch from the mounting bracket and observe the bend in the wire in relationship to the micro switch housing. If the new switches' wire is not bent, bend it to match the old switch before installing. Reassemble.

**ACTUATOR MICRO SWITCH:** This switch is located at the far top end

of the playfield. If after testing for mechanical and electrical failure, the switch proves defective, replace it. Remove the mounting screws and install the new switch. Check to make sure the wire cleanly passes through the slot in the playfield.

**BALL EJECTOR RACK & PINION ASSEMBLY:** This assembly, although simple in design, must be adjusted properly to work smoothly and freely. Whenever work is done on this assembly, always remove all old grease and dirt and relubricate before assembling. Failure to lubricate may result in excess dirt, wear, and premature failure of the parts.

TO CHANGE THIS ASSEMBLY THE MARQUIS, PLAYFIELD GLASS AND BEZEL MUST BE REMOVED.

To replace the unit, first remove the handle assembly and the long and short collars. Next remove the two screws which hold the bearing to the playfield. Remove the bearing and pinion gear. Remove the sub washer. Remove the rack gear and unscrew the spring. To reassemble, screw the spring to the rack gear. Clean and lightly lubricate the rack gear and mating surfaces. Install by hand and check for smooth operation. Put a light coating of lubricant on the sub washer, pinion gear and inside surfaces of the bearing. Subassemble the parts. Install on the playfield making sure the rack and pinion gears teeth mesh in the correct place. Tighten the mounting screws as much as possible without stripping. When reattaching the handle see that the pinion gears' rod lines up with the handles' rod. If not, push a collar on the pinion gears rod and bend by hand until lined up correctly. IT IS VERY IMPORTANT THAT THESE UNITS OPERATE SMOOTHLY TOGETHER OR THE EJECTOR WILL NOT FUNCTION CORRECTLY. After the unit and game is totally reassembled, from inside the game and playfield, the rack and pinion gears apart slightly with a screw driver. This will give the gears some free play and set the bearing in the correct position. If the balls do not eject freely, tap the bearing towards the top of the cabinet. Check for smooth operation. If the ejector spring tension is too tight, stretch the spring slightly by hand. Close rear access door, and play a few test games.

**FIRE ESCAPE RACK & PINION ASSEMBLY:** This assembly is easy to replace and the only thing of real concern is to make sure that all parts are lightly lubricated when being reassembled. Do not forget to use the spacer washers.

**LAUNCHER ASSEMBLY:** This unit should not need adjustment, however, if a spring breaks off if the playfield is disassembled, the following information will be helpful. When replacing a spring,

check tension with the launcher handle and stretch the spring if necessary to lighten up the force necessary to operate the unit. When reassembling the unit to the playfield, connect the launcher to the handle assembly and slide back against the micro switch mounting bracket. Then tighten the front small collar to keep the launcher assembly from pulling forward.

**SOLENOID ASSEMBLY:** To remove the solenoid, loosen the rear mounting screw and remove the front mounting screw disconnect the power wires and remove the solenoid. Make sure the solenoid ball door has an "O" ring on it. If the ring is broken or missing it MUST be replaced. Assemble the unit. Adjust position of the unit so that when the solenoid door is fully pulled in, it sticks out of the playfield by about 1/32 of an inch. MAKE SURE THE DOOR WORKS SMOOTHLY AND CANNOT BIND UP.

## MAINTENANCE/ELECTRONIC REPAIR

The 6502 micro processor controls all aspects of the games operation including scoring, sound generation, timing, numerical displays and indicators. A 2532 EPROM contains all of game's machine code required to support the above functions. Temporary storage is provided by a 128 x 8, 6810 RAM. The system clock is generated by two 74LS04 inverters and a 4M Hz crystal. It is divided down by two 74LS74 D flip flops to obtain a 1M Hz clock for the 6502's IO input. The RESET is generated by an LM358 configured as a voltage comparator. The inverting side of the comparator is referenced to 1 Vdc while the non-inverting side is connected to the ras +12V from the transformer secondary. A TIS92 transistor inverts the LM358's output to obtain RESET. This circuit is designed to shut down the game in an orderly fashion in the event of a power loss. Additionally, it will allow the game sufficient time to initialize itself properly when power is applied. A decoder consisting of a NAND gate (74LS00) and an inverter (74LS04) is used to select the 2532 EPROM at address \$F000 > \$FFFF.

A 74LS365 hex bus driver directs the programming switch data and the sensor common to the micro-processor. One programming switch controls the number of coins required to start the game while the other determines the number of tickets dispensed at the end of a game. The sensor common is connected to the game micro switches used to start the bonus multiplier and determine any points scored.

The number of coins inserted into the coin box is counted by a micro switch mounted in the coin slot. Each coin causes a switch closure which in turn generates a non maskable interrupt (NMI). The switch signal is routed thru a 7417 buffer and an RC filter network to the NMI input of the micro processor.

A 6522 VIA is used to interface the AY8912 programmable sound generator (RSG) to the micro processor. The VIA provides all of the necessary control signals and programming data to the PSG. Four bits of the VIA (PB0-73) are used to control a sixteen bit decoder formed by two 74LS138's. This decoder, together with the sensor common is used to determine the points scored during a game. The micro processor causes each of the first ten outputs of the decoder to sequentially go to a logic low. The outputs of the decoder are routed to the micro switches thru 7417 open collector buffers. When a switch closure occurs, the decoders low logic level will be transmitted to the micro processor via the sensor common and the Hex Bus Drive (7463365). Knowing which decoder output was low, the micro processor now knows which switch closed. The VIA also is used to control the ball release solenoid thru a 7404 inverter and a TIP110 transistor. Another output of the VIA (PB7) generates pulses which are shaped by the transistor circuit (TIS93) and the 3080 voltage controlled amplifier (VCA) to obtain the hear beat sound. The serial data and clock used to drive the game indicators and

display are obtained from the VIA outputs CB1 and CB2. Two outputs of the decoder (11 & 12) are used to control the flame circuit via a 74LS74 connected as a SR F-F. The Q output of the F-F is used to gate the flame enable on and off via a 7400 Nand gate. A noise source (MM5837) is used to modulate a LM358 connected as an astable whose output is connected to the other input of the 7400. The output of the 7400 is buffered by a 7417 and routed to the H11J1 triac driver. The 04406 triac switches the bulb on and off at a random rate determined by the noise generator, creating a flame effect.

The game's ticket dispenser is controlled by bit #14 of the decoder. This signal is inverted by a 7404 and then by a 7400 whose other input is connected to RESET. A H11J1 triac driver is connected to the output of the 7400 thru a 7417 open collector buffer. The triac driver controls the Q4006 triac which switches the ticket dispenser on and off.

The output of the PSG is routed to a 3080 VCA which is used to provide any envelope shaping that may be required. A shaping circuit consisting of a TIS93 transistor and its associated components generates an exponential waveform which is routed to the VCA's control input (Pin 5).

A power amplifier consisting of two TDA2002's is used to drive an 8 OHM speaker in a push-pull configuration.

The incandescent and LED indicators are driven by NPN transistors. Serial data from the microprocessor is shifted thru the 74LS164 shift registers which in turn drive the transistors. Numerical display decoders (74LS47) are used to decode the serial data presented to them by the shift registers. They drive the two digit displays via 560 OHM current limiting resistors.

MEMORY MAP:

EPROM	\$F000	FFFF	FFFF
RAM	\$0000	FFFF	007F
VIA	\$4000	FFFF	400F
SWITCHES	\$8000		

TICKET DISPENSER SWITCH SETTINGS:

	Switch Position:	1	2	3	4
RANK:	Chief	1	2	3	4
	Captain	0	1	2	3
	Lieutenant	0	0	1	2
	Fireman	0	0	0	1
	Arsonist	0	0	0	0

RANK RATINGS:

Chief	>	8,000,000
Captain	>	6,000,000
Lieutenant	>	4,000,000
Fireman	>	2,000,000
Arsonist	>	2,000,000

REPAIR/QUICK REFERENCE

PROBLEM	CAUSE	REMEDY
Ball will not eject.	1. Solenoid not working 2. Solenoid not receiving power 3. Solenoid ball door jammed 4. Lower ball ratchet spring broken 5. Ejector gears broken	1. Replace solenoid 2. Check electronic circuitry 3. Realign door 4. Replace spring 5. Replace gears
Extra balls will eject.	1. Upper ratchet spring broken 2. Upper ratchet out of alignment	1. Replace spring 2. Adjust bolt
Ball ejector does not work smoothly.	1. Pinion gear not aligned with handle rod 2. Return spring broken 3. Mechanism full of dirt & debris	1. Bend gear assembly for correct alignment 2. Replace spring 3. Clean & relubricate
Fire escape does not go up & down smoothly	1. Rack & pinion gears misaligned 2. Rack extender is bent 3. Fire escape connecting screw too tight 4. Bearing loose allowing gear shaft to rub against playfield 5. Fire escape slide bent	1. Align gears and lubricate 2. Straighten part 3. Loosen screw 4. Tighten bearing & adjust position 5. Straighten slide
Ball Launcher does not return	1. Is spring broken?	1. Replace spring
Ball launcher does not work smoothly	1. Launcher rubbing against micro switch mounting bracket or plexiglas playfield cover 2. Launcher bearings binding	1. Adjust position 2. Loosen, adjust, and retighten
Lights do not flicker	1. Bulb burned out 2. Malfunction in electronics	1. Replace bulb 2. Check switching

transistor &  
I.C.'s

Marquis light does not work	<ol style="list-style-type: none"><li>1. Bulb burned out</li><li>2. Starter defective</li></ol>	<ol style="list-style-type: none"><li>1. Replace bulb</li><li>2. Replace starter</li></ol>
Sound does not work	<ol style="list-style-type: none"><li>1. Volume too low</li><li>2. Speaker bad</li><li>3. Bad wiring harness</li><li>4. Bad I.C.s</li></ol>	<ol style="list-style-type: none"><li>1. Turn up volume</li><li>2. Replace speaker</li><li>3. Replace harness</li><li>4. Replace I.C.s</li></ol>
Games loses sequence	<ol style="list-style-type: none"><li>1. Micro switch wire bent</li><li>2. Micro switch defective</li><li>3. Defective wiring harness</li><li>4. Bad I.C.s</li></ol>	<ol style="list-style-type: none"><li>1. Straighten wire</li><li>2. Change switch</li><li>3. Repair harness</li><li>4. Replace I.C.s</li></ol>
Indicators do not work properly	<ol style="list-style-type: none"><li>1. Indicator burned out</li><li>2. Bad wiring harness</li><li>3. Bad I.C.s</li></ol>	<ol style="list-style-type: none"><li>1. Replace indicator</li><li>2. Repair harness</li><li>3. Replace I.C.s</li></ol>
Score readouts do not work	<ol style="list-style-type: none"><li>1. Readouts bad</li><li>2. Defective wiring harness</li><li>3. Bad I.C.s</li></ol>	<ol style="list-style-type: none"><li>1. Replace readouts</li><li>2. Replace harness</li><li>3. Replace I.C.s</li></ol>
Game looks dim and has humming sound	<ol style="list-style-type: none"><li>1. Low line voltage</li><li>2. Bad transformer</li></ol>	<ol style="list-style-type: none"><li>1. Check line voltage</li><li>2. Replace transformer</li></ol>
Ball gets caught on micro switch	<ol style="list-style-type: none"><li>1. Micro switch broken &amp; will not toggle</li><li>2. Micro switch wire too long</li></ol>	<ol style="list-style-type: none"><li>1. Replace switch</li><li>2. Remove switch and shorten wire</li></ol>
Ticket dispenser does not work	<ol style="list-style-type: none"><li>1. Dispenser not hooked up</li><li>2. Four position switch broken or between positions.</li><li>3. Bad I.C.s</li><li>4. No more tickets in dispenser</li><li>5. Dispenser micro switch broken</li></ol>	<ol style="list-style-type: none"><li>1. Hook up</li><li>2. Inspect</li><li>3. Replace I.C.s</li><li>4. Add more tickets</li><li>5. Replace switch</li></ol>

MECHANICAL PARTS LIST

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>PCS. PER GAME</u>
F001	CABINET	1
F101	PLAYFIELD	1
F102	CONTROL PANEL	1
F103	TOP FRAME ANGLE	1
F104	BOTTOM FRAME ANGLE	1
F105	LEFT SIDE FRAME ANGLE	1
F106	RIGHT SIDE FRAME ANGLE	1
F107	BALL RETAINER RAIL	1
F108	BALL EJECTOR RACK	1
F109	BALL EJECTOR PINION	1
F110	INDICATOR LIGHT BRACKET	1
F111	ACTUATOR SWITCH BRACKET	1
F112	GUTTER PIPE SWITCH BRACKET	1
F113	SCORE MICRO SWITCH BRACKET	10
F114	SOLENOID BRACKET	1
F115	SCORE MICRO SWITCH TOP BRACKET	1
F116	SCORE MICRO SWITCH BOTTOM BRACKET	1
F117	F.E. RACK GEAR	1
F118	F.E. PINION GEAR	1
F119	LONG ROD COLLARS	3
F120	SHORT ROD COLLARS	3
F121	SOLENOID BALL DOOR	1
F125	POWER SWITCH MTG. BRACKET	1
1016	CABINET DOOR HINGE	1
F123	DRILL, TAP, & CHAMFER BALL EJECTOR RACK	1
F124	TICKET DISPENSER ACCESS DOOR	1
F201	SYSTEM ASSEMBLY 997-046182-001	1
F201A	MAIN BOARD ASSEM. 996-046181-101	1
F201B	<del>DISPLAY BOARD ASSEM. 996-046181-201</del>	1
F201C	CONTROL BOARD ASSEM. 996-046181-301	1
F201D	POWER HARNESS ASSEM. 994-046183-101	1
F201E	DISPLAY HARNESS ASSEMBLY	1
F201F	SENSOR LIGHT HARNESS 994-046183-301	1
F201G	COIN BOX HARNESS 994-046183-401	1
F201H	POWER TRANSFORMER 994-046183-501	1
F201I	POWER CORD 994-040183-601	1
F202	T.D. SYSTEM ASSEM. 997-046182-002	1
F202A	T.D. MAIN BOARD 996-046181-102	1
F202B	T.D. DISPLAY BOARD 996-046181-201	1
F202C	T.D. CONTROL BOARD 996-046181-302	1
F202D	T.D. POWER HARNESS 994-046183-101	1
F202E	<del>T.D. DISPLAY HARNESS 994-046183-201</del>	1
F202F	T.D. SENSOR LIGHT 994-046183-301	1

8 DIGITS

ANF 105C

300V

VW-1 MX

F202G	T.D. COIN BOX 994-046183-401	1
F202H	T.D. POWER TRANSFORMER 994-046183-501	1
F202I	T.D. POWER CORD 994-046183-6012	1
F202J	T.D. HARNESS 994-046183-701	1
F202K	TICKET DISPENSER	1
2004	SEQUENCE MODE INDICATORS	5
F204	RANKING/EMERGING INDICATORS	6
F205	MICRO SWITCHES	12
2001	GAME COUNTER	1
F207	BUG LIGHT SOCKETS	1
F208	18" FLOURESCENT FIXTURE	1
F209	18" FLOURESCENT TUBE	1
2007	SPEAKERS	1
2008	SOLENOID	1
F212	60W YELLOW BUG LIGHT	1
F301	PLAYFIELD INNER COVERING	1
F302	PLAYFIELD OUTER COVERING	1
F303	TOP SLIDE GUIDE	1
F304	BOTTOM BALL GUIDE	1
F305	BALL LAUNCH RAMP ASSEMBLY	1
F306	FIRST HORIZONTAL	1
F306A	SECOND HORIZONTAL	1
F306B	THIRD HORIZONTAL	1
F306C	FOURTH HORIZONTAL	1
F306D	FIFTH HORIZONTAL	1
F306E	SIXTH HORIZONTAL	1
F307	FIRST VERTICAL	1
F307A	SECOND VERTICAL	1
F307B	THIRD VERTICAL	1
F307C	FOURTH VERTICAL	1
F307D	FIFTH VERTICAL	1
F307E	SIXTH VERTICAL	1
F308	BALL EJECTOR FRONT BEARING	1
F309	FIRE ESCAPE FRONT BEARING	1
F310	LAUNCHER FRONT BEARING	1
F311	FIRE ESCAPE STANDOFF WASHERS	15
3036	DOME FASTENER WASHER	10
F312	TI D. BIN	1
F314	SCORE MICRO SWITCH TOP BRACKET STANDOFFS	2
F315	GUTTER PIPE	1
F316	LAUNCHER REAR BEARING	1
F317	FIRE ESCAPE RACK & PINION BEARING	1
F318	RACKET BEARING	1
F319	CONTROL PANEL BEARING	3
F320	LEXAN MARQUIS	1
F321	MARQUIS STYRINE	1
F322	CONTROL KNOB SPACER	2
F323	PLAYFIELD INNDR COVER SPACER	4

F324	BIRDS NEST CUP	1
F325	L.E.D. FILTER	1
F326	CASH BOX	1
F327	DRAIN CUP	1
F328	SCORE INDICATOR MTD. BRACKET	1
4002	GOALIE STOPS	3
F501	FIRE ESCAPE SLIDE	1
F502	FIRE ESCAPE TOP/CENTER ARM	1
F503	F.E. FIRST LEFT	1
F504	F.E. FIRST RIGHT	1
F505	F.E. SECOND LEFT	1
F506	F.E. SECOND RIGHT	1
F507	F.E. THIRD LEFT	1
F508	F.E. THIRD RIGHT	1
F509	F.E. FOURTH LEFT	1
F510	F.E. FOURTH RIGHT	1
F511	F.E. FIFTH LEFT	1
F512	F.E. FIFTH RIGHT	1
F513	F.E. SIXTH LEFT	1
F514	F.E. SIXTH RIGHT	1
F515	F.E. SEVENTH LEFT	1
F516	F.E. SEVENTH RIGHT	1
F517	BALL RACKET	2
F517A	UPPER BALL RACHET	1
F518	BALL RACHET SPRING	1
F518A	UPPER RACHET SPRING	1
F519	BALL BEARINGS	31
F520	BALL LAUNCH SPRING	2
5011	SOLENOID SPRING	1
F522	LAUNCHER	1
F523	F.E. RACK GEAR EXTENDER	1
5003	SPEAKER GRILL	1
F525	COIN DOOR	1
F527	BALL EJECT. KNOB ASSEMBLY	1
F528	F.E. KNOB ASSEMBLY	1
F529	BALL LAUNCH KNOB ASSEMBLY	1
F530	CABINET HASP	1
F531	CABINET LOCK	1
F532	MARQUIS REINFORCEMENT	1
F533	FIRE ESCAPE KNOB	1
F534	BALL LAUNCH KNOB	1
F535	BALL EJECT KNOB	1
6010	GOALIE CLUTCH O RING	6
6004	PHILLIPS HEAD M.S. 8-32 X 1/2	39
6004A	KEP NUTS 8-32	40
6005	PHILLIPS HEAD M.S. 8-32 X 1/4	20
F604	SLOT HEAD M.S. 4-40 X 3/4	25
F605	HEX NUT 4-40	24

6026	CABLE TIE DOWNS	8
6028	NYLOK NUTS 8-32	15
F607	PHILLIPS HEAD M.S. 10-24 X 1/2	1
6021	SOLENOID RIVET	1
F609	8-32 X 1-1/2 PHILLIPS HEAD M.S.	8
F610	PHILLIPS HEAD M.S. 8-32 X 1	10
F611	# 8 EYE HOOK SCREW	1
F612	4-40 NYLOK NUT	2
F613	PAN HD. PHIL. HD. SELF TAPPER 8 X 1/2	90
F614	1/2" COTTER PIN	1
F623	BALL DOOR O RING	1
6020	#10 FLAT WASHER OH SENSOR WASHER	8
F624	1/8 X 3/4 ROLL PIN PLATED	1
6029	8 x 1 PH. SELF TAPPER	2
6029A	8 X 3/4 PAN PD. PHIL HD. SELF TAPPER	12
F616	1/4 x 20 X 4 CARRIAGE BOLTS	4
F617	1/4 X 20 HEX NUT	4
F618	1/4 FLAT WASHER 3/4 Q.D. .030 THICK	4
F619	8 X 1 SQUARE DRIVE PHIL. HD. TYPE A	10
F620	8 X 2 DRILL BIT	1
F621	#8 PARTICAL BD. PHIL. HEAD, FLAT HEAD	8
F622	TRUSSHEAD SQUARE DRIVE SCREW	1
F625	6 x 5/8 PH. SELF TAPPER	8
F701	FIRE ESCAPE PRINTED MARQUIS	1
F703	CONTROL PANEL DECAL OVERLAY	1
F704	GLASS GRAPHICS	1
F705	PLEXI GRAPHICS	1
F706	PLAYFIELD BRICK BLDG. DECAL	1
F707	INDICATOR DECALS	1
F708	SERIAL # TAG	2
F709	I.D. TAG	1
F710	RAMP DECAL	1
F711	COPYRIGHT DECAL	2
F712	PROGRAM C P DECAL	1
8006	DOUBLE SIDED TAPE .032	2 FT.
F802	WHITE VELCRO 1000 LOOP	1 FT.
F803	WHITE VELCRO 65 HOOK	1 FT.
F804	BLACK VELCRO 1000 LOOP	21"
8004	DOUBLE SIDED TAPE 1/8"	6"
F805	BLACK VELCRO 80 LOOP	21"
F807	3/4" BLACK VINYL ELECTRICAL TAPE	4 FT.
F808	DUCT TAPE	2"
F901	BEZEL MATERIAL	1
F902	BEZEL FABRICATION	1
F903	REPAIR MANUAL	1
F904	FELT DOTS	30
F905	FELT STRIPS	4"
F906	SHIPPING CRATE SET	1

F907	TAPED TUBE, 350 # DW	1
F908	PAD 350# DW	2
F909	COVERS 350# DW	2
F910	LONG INSERT 200# DW	2
F911	SHORT INSERT 200# DW	2

ELECTRONICS PARTS LIST

<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
996-046181-001	Electronic P.C. Board Assembly	1
980-046180-001	Electronic P.C. Board	1
993-046179-000	Schematic	Reference
993-046187-001	Operating Program	Reference
939-041620-010	Fuse, 2A Slo-Blo	1
906-041345-001	P.C. Fuse Clip	2
968-046184-001	Heat Sink	1
905-040498-005	Rivet 1/8 D x .328 Lg.	3
934-041437-001	Heat Sink Compound	AR
913-045398-005	Label	1
910-041737-004	Tab, 250	2
905-040498-004	Rivet, 1/8 D x .265	4
910-042531-003	Header, .156 C/L, 3 Pin	1
910-046058-005	Header, .10 C/L, 5 Pin	1
910-046058-011	Header, .11 Pin	1
910-046058-003	Header, .3 Pin	1
910-042531-008	Header, .156 C/L 8 Pin	1
910-042531-008	Header, .156 C/L 8 Pin	1
910-046058-007	Header, .10 C/L 7 Pin	1
910-041325-003	Header, .25 C/L UML 3 Pin	1
910-042531-003	Header, .156 C/L, 3 Pin	1
910-046058-003	Header, .10 C/L, 3 Pin	1
910-047325-003	Header, .25 C/L UML 3 Pin	1
910-041325-002	Header, .25 C/L UML 2 Pin	1
910-041325-002	Header, .25 C/L UML 2 Pin	1
960-046059-001	Switch, 2P4I P.C.	1
960-046059-001	Switch, 2P4T P.C.	1
906-045188-006	Dip Socket, 6 Pin	1
906-045188-0L4	Dip Socket, 24 Pin	1
906-045188-028	Dip Socket, 28 Pin	1
906-045188-040	Dip Socket, 40 Pin	2
921-045313-001	Crystal, 4 MHZ	1
991-045950-365	IC Hex Tri State Buffer	1
991-045950-074	IC Hex Inverter	1
991-045950-074	IC Dual D F-F	1
991-046061-001	IC Micro Processor	1
991-045950-000	IC Quad Nand	1
991-045307-001	IC UV Eprom 4K x 8	1
991-046060-001	IC 128 x 8 Static Ram	1
991-046062-001	IC 8 Bit VIA	1
991-046177-001	IC Prog. Sound Gen.	1
991-045950-138	IC Decoder/Demux	1
991-045950-138	IC Decoder/Memux	1
991-045305-001	IC Hex Buffer	1
991-045305-001	IC Hex Buffer	1
991-045305-001	IC Hex Buffer	1

991-045950-164	IC Serial In. Shift Reg.	1
991-045950-164	IC Serial In. Shift Reg.	1
991-045950-074	IC Dual D F-F	1
991-042016-001	IC Noise Source	1
991-041084-001	OP. AMP. HI Current	1
991-046106-001	IC Opto Triac Driver	1
991-046106-001	IC Opto Traic Driver	Reference
991-041089-004	IC OP AMP. Trans Cond.	1
991-046176-001	IC Power Amplifier	1
991-046176-001	IC Power Amplifier	1
991-045950-164	IC Serial in Shift Reg.	1
991-045950-164	IC Serial In Shift Reg.	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-164	IC Serial In Shift Reg.	1
991-045750-164	IC Serial In Shift Reg.	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-047	IC BCD to 7 Seg. Driver	1
991-045950-047	IC BCD to 7 Seg. Driver	1
939-042633-002	IC Display LED, 2 Char	1
939-042633-002	IC Display, LED, 2 Char	1
939-042633-002	IC Display, LED, 2 Char	1
991-043687-001	IC Volt Reg. + 5V @ 100 MG	1
991-045309-001	IC Volt Reg. + 5V @ 1A	1
991-046064-001	Transistor, Power	1
991-045852-004	Triac	1
991-045852-004	Triac	1
991-041061-001	Transistor, NPN	1
991-041062-001	Transistor, PNP	1
991-041062-001	Transistor, PNP	1
991-046064-001	Transistor, Power	1
991-046064-001	Transistor, Power	1
991-041061-001	Transistor, NPN	1
991-041061-001	Transistor, NPN	1
919-046082-001	Transorb .5V	1
919-042019-001	Diode, Rect, 1A 200 PIV	1
919-042019-001	Diode, Rect., 1A 200 PIV	1
919-042296-001	Diode, Rect. 6A 400 PIV	1
947-045183-104	Capacitor, Ceramic Mono	1
947-045011-103	Capacitor Ceramic Tub	1
947-045008-200	Capacitor Ceramic Tub	1
947-045008-200	Capacitor Ceramic Tub	1
947-045183-104	Capacitor Ceramic Mono	1
947-045183-104	Capacitor Ceramic Mono	1
945-042836-002	Capacitor Elec. Bipolar	1
945-044465-007	Capacitor, Alum. Elec.	1
947-045011-103	Capacitor, Ceramic Mono	1
947-045183-104	Capacitor, Ceramic Mono	1

947-045183-104	Capacitor, Ceramic Mono	1
946-041978-474	Capacitor, Polyester	1
946-041978-474	Capacitor, Polyester	1
947-045183-104	Capacitor, Ceramic Mono	1
946-046178-104	Capacitor, Polyester	1
946-041978-104	Capacitor, Polyester	1
947-045011-103	Capacitor, Ceramic Tub	1
947-045183-103	Capacitor, Ceramic Mono	1
945-044465-007	Capacitor, Alum. Elec.	1
946-041978-104	Capacitor Polyester	1
945-044465-007	Capacitor Alum. Elec.	1
947-045008-102	Capacitor, Ceramic Tub	1
945-040209-016	Capacitor Alum. Elec.	1
945-044465-005	Capacitor Alum Elec.	1
945-044465-005	Capacitor Alum. Elec.	1
946-041978-333	Capacitor Polyester	1
946-041978-224	Capacitor Polyester	1
946-041978-224	Capacitor Polyester	1
946-041978-333	Capacitor Polyester	1
946-041978-224	Capacitor Polyester	1
945-040209-009	Capacitor Alum. Elec.	1
947-045183-104	Capacitor Ceramic Mono	1
947-045183-104	Capacitor Ceramic Mono	1
945-040209-009	Capacitor Alum. Elec.	1
946-041978-224	Capacitor, Polyester	1
945-044465-007	Capacitor, Alum. Elec.	1
947-045183-104	Capacitor, Ceramic, Mono	1
947-045183-104	Capacitor, Ceramic Mono	1
945-044465-007	Capacitor Alum. Elec.	1
945-044465-007	Capacitor Alum Elec.	1
947-045183-104	Capacitor Ceramic Mono	1
947-045183-104	Capacitor Ceramic Mono	1
945-044465-007	Capacitor Alum. Elec.	1
947-045183-104	Capacitor Ceramic Mono	1
945-044465-007	Capacitor Alum. Elec.	1
947-045183-104	Capacitor Ceramic Mono	1
945-045580-001	Capacitor, Alum. Elec.	1
947-045183-104	Capacitor Ceramic Mono	1
945-044465-005	Capacitor, Alum. Elec.	1
852-312102-001	Resistor, 1/4 W + 5% CF	1
852-312102-001	Resistor	1
852-312151-001	Resistor	1
852-312471-001	Resistor	1
852-312471-001	Resistor	1
852-312102-001	Resistor	1
852-312103-001	Resistor	1
852-312271-001	Resistor	1
852-312102-001	Resistor	1
852-312102-001	Resistor	1
852-312104-001	Resistor	1
852-312104-001	Resistor	1



852r312561r001	Resistor	1
852r312561r001	Resistor	1
852r312221r001	Resistor	1
852r312331r001	Resistor	1
852r312221r001	Resistor	1
852r312331r001	Resistor	1
852r312224r001	Resistor	1
852r312470r001	Resistor	1
852r312151r001	Resistor	1
852r312022r001	Resistor	1
852r312022r001	Resistor	1
852r312102r001	Resistor	1
852r312102r001	Resistor	1
997r046182r001	System Assembly	1
997r046182r002	System Assembly with Ticket Dispenser	1
996r046181r001	Electronics P.C. Board Assembly	1
948r046106r001	Opto Triac Driver	1
921r046038r001	Game Counter	1
957r041367r902	Power Cord	1
954r046039r002	Power Transformer	1
993r046183r101	Wire Assembly	1
994r046183r201	Wire Assembly	1
994r046183r301	Wire Assembly	1
994r046183r401	Wire Assembly	1
994r046183r501	Wire Assembly	1
994r046183r601	Wire Assembly	1
994r046183r701	Wire Assembly	1



