



DATA EAST PINBALL, INC.

Service Bulletin #014

To: Service Manager

Date: April 3, 1989

Subject: Modification of a Laser War Style CPU.

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Enclosed is a procedure for modifying the original Laser War style 2K RAM CPU to the current style 2K RAM CPU. Once the modification is done, the board will work in any Data East Pinball game made. Please read through the instructions carefully before you start to modify the board. If you have any questions call us at 1-800-542-5377.

Pete Gustafson  
Field Service Manager  
Data East Pinball



Game Name	Cpu Ver. Note 1	ROM Loc.	Jumpers	
			Installed	Removed
Laser War	1	5C	J1b J3 J4 J6a* J7b J8	J1a J2 J6b* J7a
Laser War	2	5C	J1b J3 J4 J5a J6a J7b J8	Same as version 1
Laser War	3	5C	J1b J3 J4 J5a J6a J7b J8	J1a J2 J5 J5b J6b J7a
Secret Service	2	5B&5C	Same as Laser War ver. 1	Same as Laser War ver. 1
Secret Service	3	5B&5C	J1b J3 J4 J5b J6b J7b J8	J1a J2 J5 J5a J6a J7a
Torpedo Alley	2	5B&5C	Same as Laser War ver. 1	Same as Laser War ver. 1
Torpedo Alley	3	5B&5C	Same as Sec. Ser. ver. 3	Same as Secret Service ver. 3
Time Machine	2	5B&5C	Same as Laser War ver. 1	Same as Laser War ver. 1
Time Machine	3	5B&5C	Same as Sec. Ser. ver. 3	Same as Secret Service ver.3

Note 1: Refer to the attached previously published service bulletin for identifying CPU versions.

Note 2\*: Only a very few of the version 1 & 2 CPU boards that were manufactured for Laser War and Secret Service had jumpers J6a & J6b on them. (It was decided that these jumpers provided us with an option we would never need.) So don't go nuts looking for these jumpers. If they are on the board they will be 1/4" below the battery pack. Remember this only applies to version 1 & 2 style CPU boards.

Tools Required- 25 watt soldering iron  
small pair of side cutters  
small flat blade screw driver  
small pair of needle nose pliers

Parts Required- 6264 CMOS RAM  
28 pin DIP socket  
one 1/4" 23 gauge jumper wire  
one 1" 23 gauge jumper wire  
one 2 1/2" 23 gauge jumper wire  
one 3 1/2" 23 gauge jumper wire  
two 4" 23 gauge jumper wire

Time Required- appx. 1 hour

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- 1) Remove the 6116 CMOS RAM at location 5D.
- 2) De-solder and remove the 24 pin socket at 5D.
- 3) Cut the three traces shown in the attached diagram as indicated by the arrows.
- 4) De-solder and very carefully lift out of the board pin number 5 of 7C (refer to diagram).
- 5) Take the new 28 pin DIP socket in your hand and carefully bend out pin #1, #2, #27 and #28.
- 6) Install and solder the new 28 pin socket into the CPU at location 5D. (Because pin #1, #2, #27 and #28 are bent out only pins 3 through 26 will go into the CPU.)
- 7) Snip pin #1 of the 28 pin socket off. (It's not used.)
- 8) Solder one end of the 2 1/2" jumper wire to the bent out pin #2 of the 28 pin socket at 5D and solder the other end of the jumper wire to the bent out pin #5 of 7C.
- 9) Solder one side of a 3 3/4" jumper wire to the bent out pin #2 of the 28 pin socket at 5D and solder the other end of the jumper wire to the solder pad indicated on the diagram.
- 10) Solder a 1/4" jumper wire to the bent out pin #28 of the 28 pin socket at 5D and solder the other end of the jumper wire to the solder pad directly to the right of resistor R-9.

- 11) Solder a 1" jumper wire to the bent out pin #27 of the 28 pin socket at 5D and solder the other end of the jumper wire to the solder pad directly to the right of resistor R-6.
- 12) Solder a 4" jumper wire between the solder pad directly below resistor R-9 and the solder pad 1/2" above pin #1 of 7C.
- 13) Solder a 4" jumper wire between the solder pad directly below resistor R-9 and the solder pad 1/2" below 8-C.
- 14) Install the 6264 CMOS RAM into the CPU at location 5D.
- 15) Refer to the attached CPU jumper table for the jumper combinations of the game the CPU board is to go into.