

Instructions for War of the Bugs on single Galaxian board.

1. Make sure the Galaxian board is 100% functional before attempting the conversion.
2. Cut the track going to pin 1 of IC 2B (74366).
3. Cut the track on the bottom of the board going to pin 21 of IC 1K (2716 eeprom).
4. Cut the track on the bottom of the board going to pin 21 of IC 1H (2716 eeprom).
5. Join pins 21 of IC's 1H and 1K together and connect both to pin 1 of IC 2N (7408).
6. Remove IC's 1H and 1K and replace with new eeproms supplied (2732), ensuring that they are inserted in the same direction as the originals.
7. Remove program rom board and replace with new board supplied , ensuring that the eeproms face the same way as before.
8. Remove IC 6L and replace with new IC supplied .This IC may be soldered into the board - in which case it should be replaced with an IC socket and the new IC placed in the socket.
9. Install new controls in the machine and wire up as per the connection diagram supplied. For an upright machine only the 1 player controls need to be connected.
10. Double check all work done on the board, particularly the direction of all IC's replaced as an incorrectly inserted device will be destroyed.

CONVERSION INSTRUCTIONS

I. Installation:

a) **Conversion of Existing Board.**

Install board in machine. If new controls are required (i.e. 4 way joystick) connect to the edge connector according to the connection diagram supplied. Note that all controls are connected to a common ground - i.e. one side of every switch is grounded.

b) **Installation of New Board.**

Re-wire the edge connector according to the connection diagram supplied. Note that the new board only requires two voltages - +5 and +12 volts and that one side of the speaker is grounded. Also ensure that all ground leads (e.g. common lead to controls) are connected.

II. Common Problems and Solutions.

- a) Random character on screen/frozen display or game resets itself during play - usually caused by incorrect power supply voltage. Ensure voltage **on the board** is +5 volts + - 0.25 volts. Voltage should be measured at the board because there could be as much as 1/2 volt drop on the leads from the power supply, which could stop the board from working correctly.
- b) Not accepting credits or control not functioning. Ensure one side of coin micro or control switch is connected to ground (0 volt). To check connection/operation of switches measure voltage across switch - should normally be about 4.5 volts dropping to zero when switch is operated.
- c) Wrong Credits - Check dip switch settings on the board, check lead from coin i/p is connected to correct pin on edge connector - there is often more than we credit i/p to the board but for different coins. Also, there may be a "credit board" or small printed circuit board with dip switches - connected between coin mechanism and main logic board - if so check switch settings.
- d) Game runs but picture unstable - check connection to monitor including the ground connection. If picture is blue and unstable the sync and blue connections are reversed. If picture is steady but off set - i.e. moved up or down the screen then sync is wrong polarity. Most monitors have two sync inputs (+ ve and - ve) then change sync connection at monitor.

WAR OF THE BUGS VIDEO GAME.

ALL SWITCHES RETURN TO 0 VOLTS.

ALL COUNTERS RETURN TO +12 VOLTS.

VIDEO LOGIC BOARD PIN OUT DETAILS.

0 VOLTS	A	1	0 VOLTS.
0 VOLTS	B	2	0 VOLTS.
+5 VOLTS	C	3	+5 VOLTS.
+5 VOLTS	D	4	+5 VOLTS.
N/C	E	5	N/C.
N/C	F	6	N/C.
N/C	H	7	N/C.
25 CENT CREDIT	J	8	TWO PLAYER UP (TABLE TOP)
ONE PLAYER DOWN	K	9	ONE PLAYER UP.
ONE PLAYER START.	L	10	TWO PLAYER START.
ONE PLAYER LEFT.	M	11	ONE PLAYER RIGHT.
ONE PLAYER FIRE.	N	12	TWO PLAYER FIRE (TABLE TOP).
TWO PLAYER LEFT (TABLE TOP)	P	13	TWP PLAYER RIGHT (TABLE TOP).
N/C	R	14	TWO PLAYER DOWN (TABLE TOP).
0 VOLT SCREEN	S	15	0 VOLT SCREEN.
GREEN VIDEO	T	16	RED VIDEO.
SYNCH	U	17	BLUE VIDEO.
N/C	V	18	AUDIO OUTPUT.
+12 VOLTS	W	19	+12 VOLTS.
+12 VOLTS	X	20	+12 VOLTS.
0 VOLTS	Y	21	0 VOLTS.
0 VOLTS	Z	22	0 VOLTS.

FOR TABLE TOP GAME, SHORT SPECIAL LINK ADJACENT TO PIN S OF EDGE CONNECTER, ON THE COMPONENT SIDE OF THE BOARD.

DIP SWITCH SETTINGS.

1 OFF	2 OFF	1 COIN PER CREDIT.
1 OFF	2 ON	2 COINS PER CREDIT.
1 ON	2 OFF	2 COINS PER CREDIT.
1 ON	2 ON	FREE PLAY.
3 OFF	4 OFF	1 ROCKET.
3 OFF	4 ON	3 ROCKETS.
3 ON	4 OFF	2 ROCKETS.
3 ON	4 ON	4 ROCKETS.

POSITIONS 5 & 6 NOT IN USE.

CONTROLS REQUIRED. (UPRIGHT MACHINES).

1 OFF Joystick control, 4 way switch to 0 Volts.
3 OFF Push Button switches to 0 Volts.