Service Bulletin Nº 72

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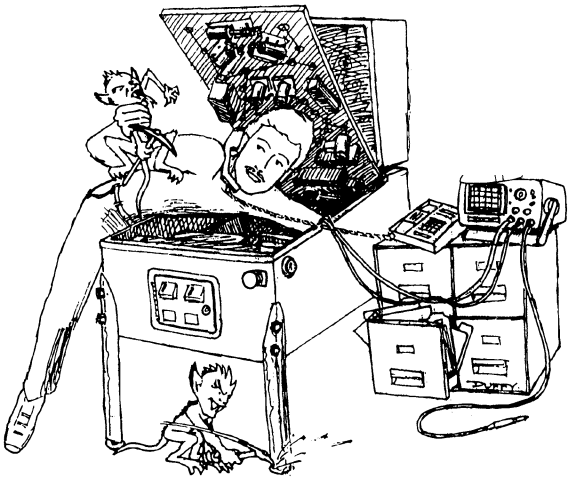


Joe Blackwell	Eric Winston	Ted Kilpin	Jay Alfer
Technical Support Manager	Technical Support Engineer	Technical Support Engineer	Tech. Doc. Administrator

TO: Parts & Service Managers

DATE: February 17, 1995

RE: MARY SHELLEY'S FRANKENSTEIN **Creature: A Technical Overview**

This game has a very unique feature. The Frankenstein Creature locks the ball in one of his hands and when Multiball is enabled, he throws the ball into play. This mechanism has been designed so that it works no different than any other solenoid activated device (e.g. flippers, diverters). This keeps maintenance minimal and troubleshooting no more difficult than any other drive circuit.

What we do want to discuss more in depth is the Creature Head Motion Servo Board Theory of Operation, since it is a little more complex. It's operation in the game is similiar to that of the display and sound boards in the sense that it receives instructions from the CPU Board on what routine to execute and the Servo Microcontroller takes over from there.

Note — The movement of the head and the function of the Servo Controller Board will not affect game play if there is a problem with this circuit.
Your machine still earns money.

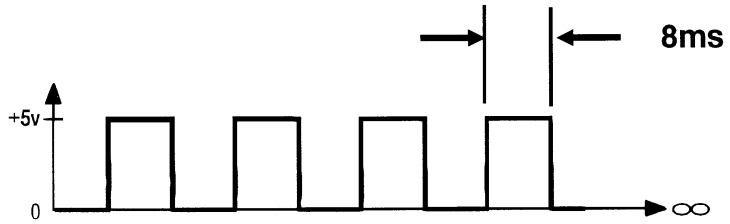
The Frankenstein Creature Theory of Operation is on pages 2 & 3.

If you have any questions or experience any problems, please call our Technical Support Department.

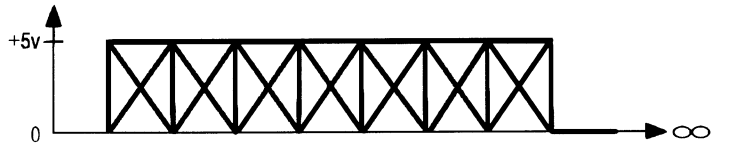
Serial Data is clocked out of the Main CPU Board to the Creature Head Motion Servo Board at 125 BPS. The data is accompanied by a Transition-Sensitive Clock (both rising and falling transitions) and an Active-High Enable. The CPU sends 8-bit Data Words to the Servo Board to trigger pre-recorded routines stored in the Micro-Controller on the Servo Board itself.

Since the clock is Transition-Sensitive, there are only 4 pulses on the clock for each 8-bit Data Word as shown:

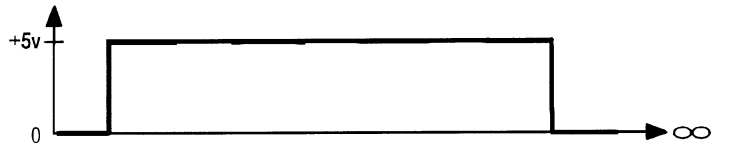
Input from CPU



Clock (Ref. Servo Bd. CN1-2)



Data (Ref. Servo Bd. CN1-3)

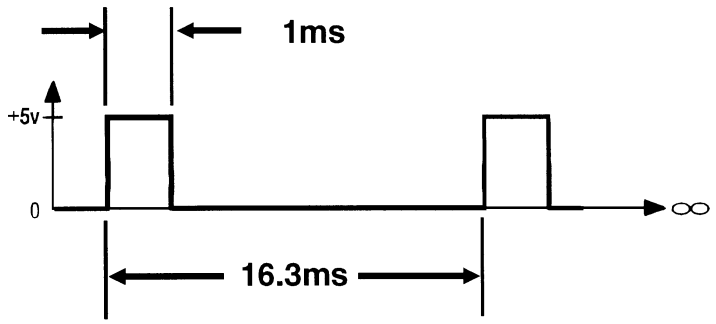


Enable (Ref. Servo Bd. CN1-4)

Data is sampled a fraction of a second after each transistion to insure a stable read of the Data State.

The signal to the Servo Motor consists of a short pulse of +5v ranging in duration from .3 to 1.7 milliseconds, repeating every 16.3ms. The duration of the short pulse determines the Servo's position - at 1 millisecond the Servo is centered. On power-up, the Servo Board will blink it's LED a few times and then send centering signals to all 4 of it's Servo's until it receives a command code from the CPU. (Note: Only Servo Output #1 is being used for the Creature.)

The signals should look like this:



Output to Servo Motor

Creature Head Motion Board, PN. 520-5113-00

Only Servo Output #1 is being used for the Creature.