

SERVICING THE PRIZE BOX SENSOR PCBs

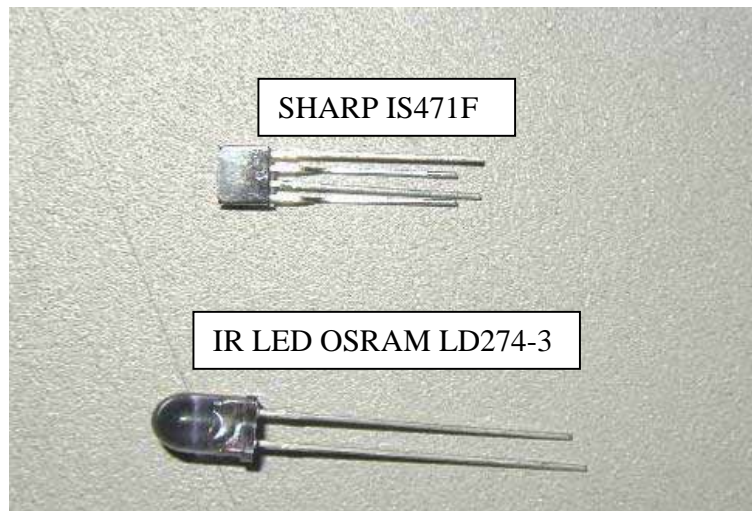
This document is to how to service Prize Box Sensor PCBs in LAI Games Prize Redemption Machines and to identify the different types of PCBs used.
(Timebuster, Sonic Beat, Lighthouse and Stacker)

THEORY OF OPERATION

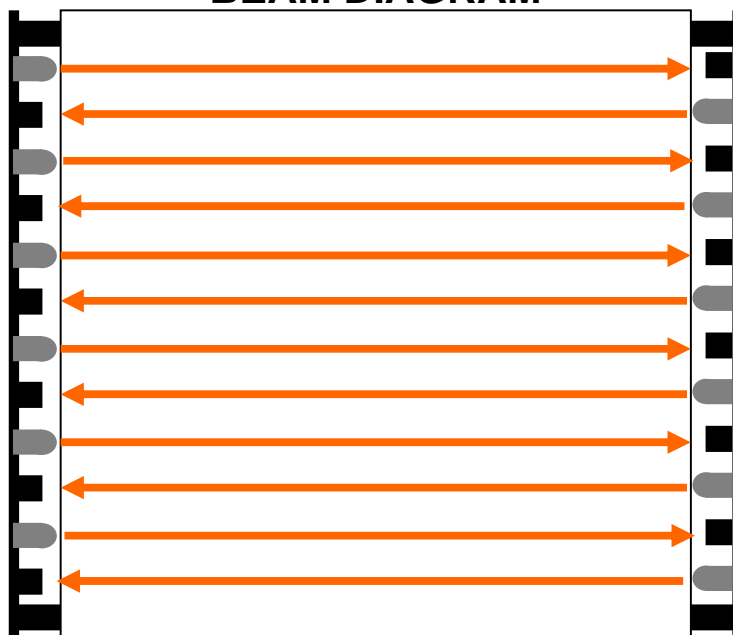
(Based on BA2602 & BA2603 Master / Slave PCBs)

The Prize Box Sensor is designed around the Sharp IS471F IR detector IC and the high-power Osram LD274-3 IR LED. There are 12 pairs of IR sensors and IR LEDs that cover the Prize Box chute area and blocking the IR path of any one of the 12 beams will trigger a common output.

IC & LED PHOTO

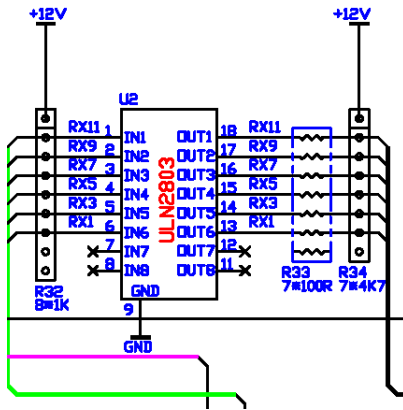


BEAM DIAGRAM



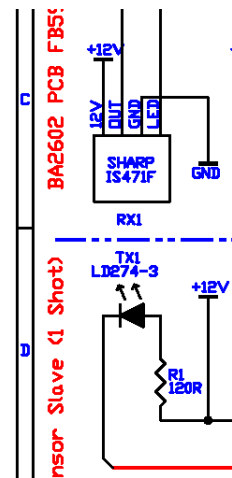
THEORY OF OPERATION Continued

Each Sharp IS471F IR IC is independent in its operation with the Sharp IC driving its own IR LED to minimize any other IR source interfering with detection. Rubber covers are also fitted to IR LEDs either side to prevent nearby Sharp ICs from interference.



The LED driver outputs of the Sharp ICs are double buffered through two ULN2803 Driver ICs.

One ULN2803 is to invert the Sharp IC drive signal and the second to drive the IR LED at maximum intensity.

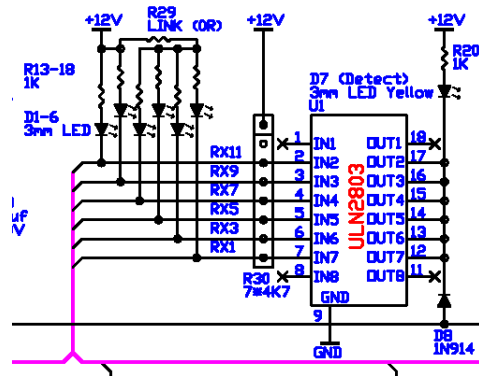


The Detect Output of each Sharp IC is then "OR" gated through a ULN2803 IC to a common output trigger line.

At this point there is connected to each detect output a small Yellow LED to visually indicate each Sharp IC's detect state.

As well a small yellow LED is connected to the common output trigger line.

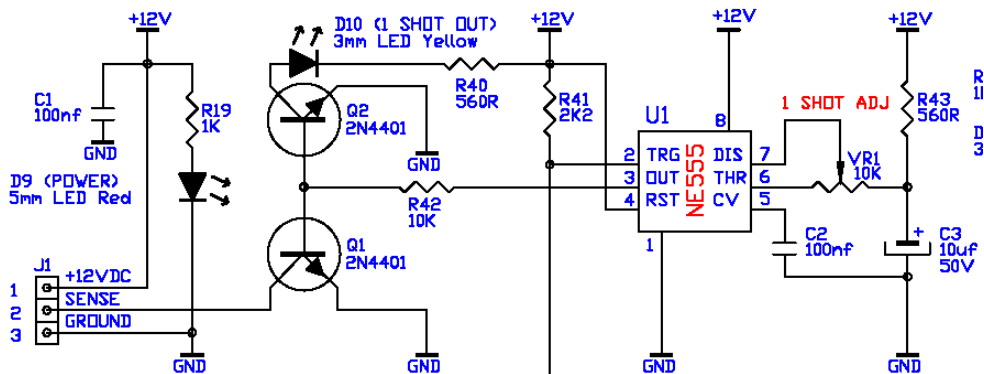
This circuit is also repeated on the Slave PCB



Finally the common outputs of both Master & Slave PCBs are fed into a "1 Shot" 555 timer circuit on the Master PCB. This circuit allows small trigger pulses to be lengthened and help the Game System to detect small prize drops.

A small Red indicator LED will light when the timer is triggered. VR1 is used to adjust the 1 shot pulse length. Factory setting is about mid range on the trim pot.

There are two large red LEDs to indicate when power is present on the Master and Slave Sensor PCBs



SENSOR PCB ASSEMBLY

The Master & Slave PCB are fitted with five brass M3 x 10mm standoffs. A M3 x 6mm screw holds the standoff on the PCB side.



When mounting the PCBs, first fit the Master PCB on the narrow side of the prize chute. Position the PCB in place and fit five M3 Washers and Nuts. Only finger tighten the nuts at this stage to allow the PCB some movement on the prize chute.



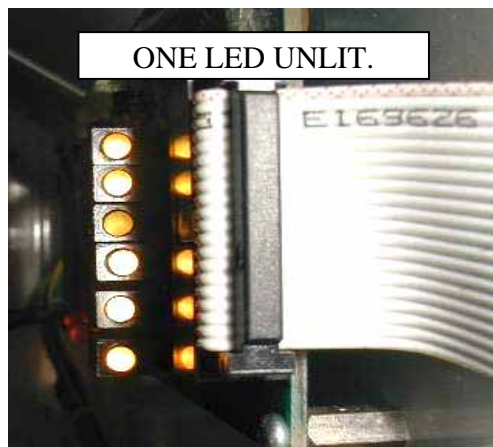
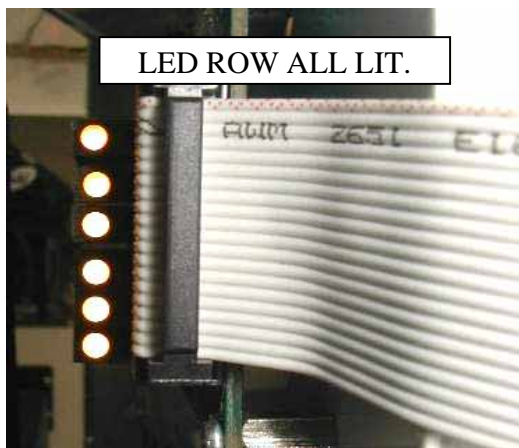
Move the PCB about until you have it centered in the range of movements. Then tighten the center standoff nut. Then using the same procedure, mount the Slave PCB on the Cash-box side of the prize chute and centering its range of movement and tightening the center standoff nut.



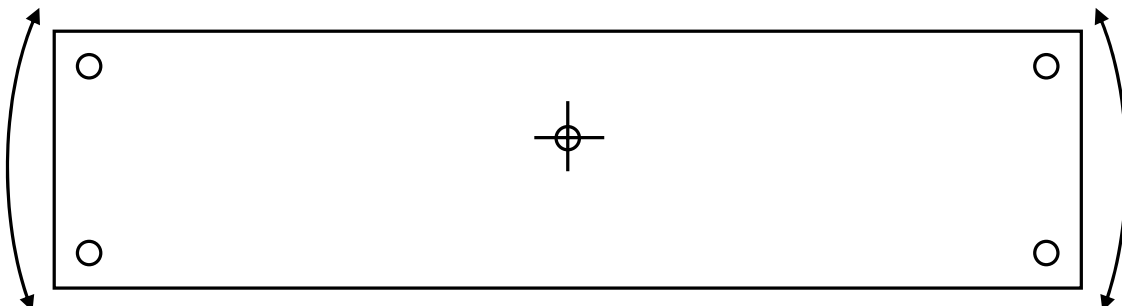
Connect the 20-way ribbon cable between the Master and Slave PCBs. Then plug in the 3-pin Connector to the Master PCB. You can now apply power to the machine and begin the alignment procedure.

SENSOR PCB ALIGNMENT

Power up the machine, at this time you can ignore any Sensor error messages the game might give. Looking from the back of the machine there are two rows of yellow LEDs, one on each of the Sensor PCBs. In its normal state all the yellow LEDs should be lit. If any are unlit, this indicates a blocked beam path or a faulty IR Beam pair.



While pivoting each of the Master and Slave Sensor PCBs on the tightened center standoff, observe the condition of the two rows of LEDs.



Once you have all rows of LEDs all lit up and stable (none flickering on-off). You can tighten the remaining standoff nuts on both sides. Give the prize chute a good shaking to test the stability of the alignment. Then use a thread locking agent on the nuts to prevent loosening.

It is a good idea to clear any error messages and observe the machine for about five to ten minutes to see if any Sensor errors are detected by the game software.

For more details on Sensor Error numbers for the relevant Game you are servicing. Please read the errors and troubleshooting section of your Game's Operator Manual.

PRIZE BOX SENSOR IDENTIFICATION

BA2003 PCB FB54 Prize Box Sensor TB-PV



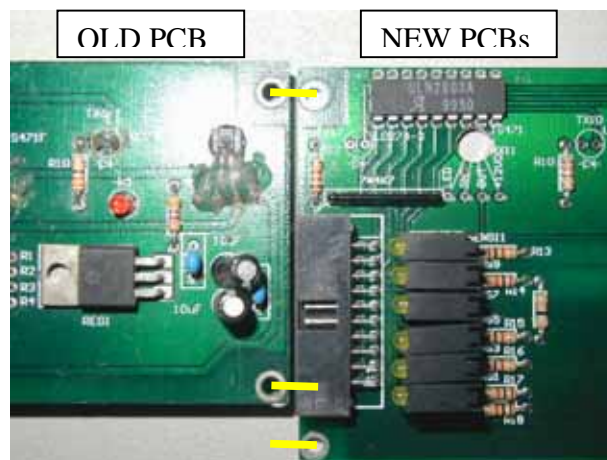
This sensor was used in the early production of Timebuster and was of a symmetric design that allowed the same PCB to be used on both sides of the Prize Box.

Problems with this design was the IR LEDs were not been driven hard enough by the IS471F IC and needed an additional Buffer PCB to overcome this. There is also no indication of which one of the 12 pairs of IR Sensors is holding the Output low making it very hard to troubleshoot or adjust the Sensor system in the machine

BA2005 PCB Prize Sensor Buffer

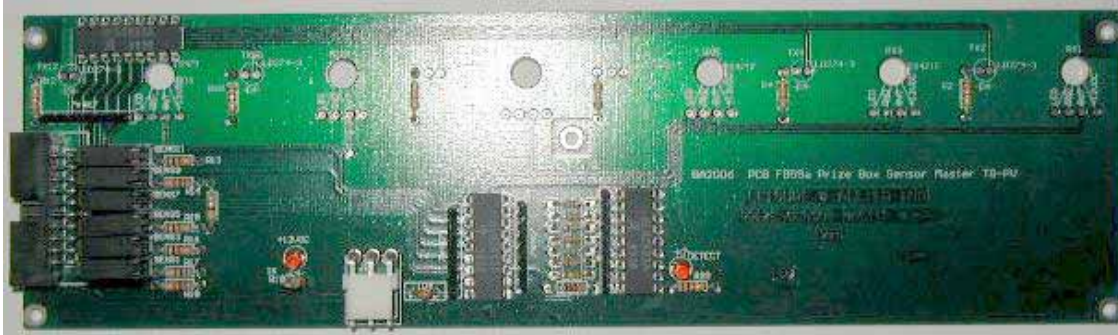


This Prize Box Sensor PCB system is now obsolete but all the components are available for PCB level repairs. The later Prize Box Sensor PCBs can be used as replacements but will need two new holes drilled in ether side of the Prize Box due to the larger PCB dimensions

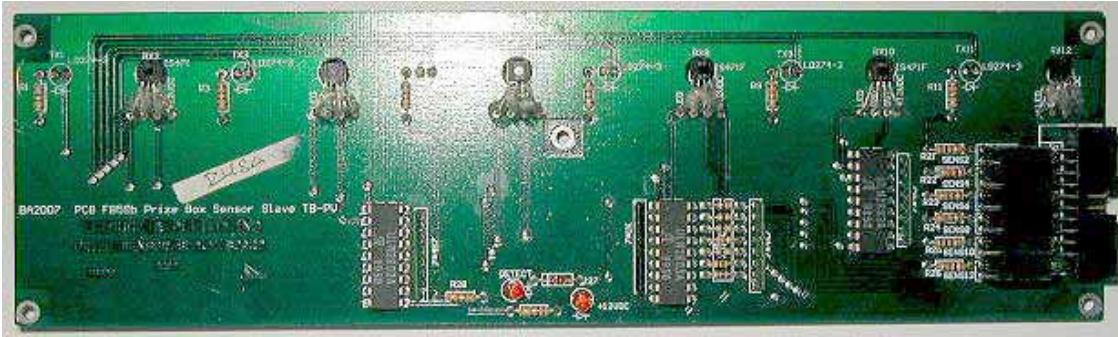


All the top holes on the Prize Box are the same only the two lower holes are different

BA2006 PCB FB59a Prize Box Sensor Master TB-PV

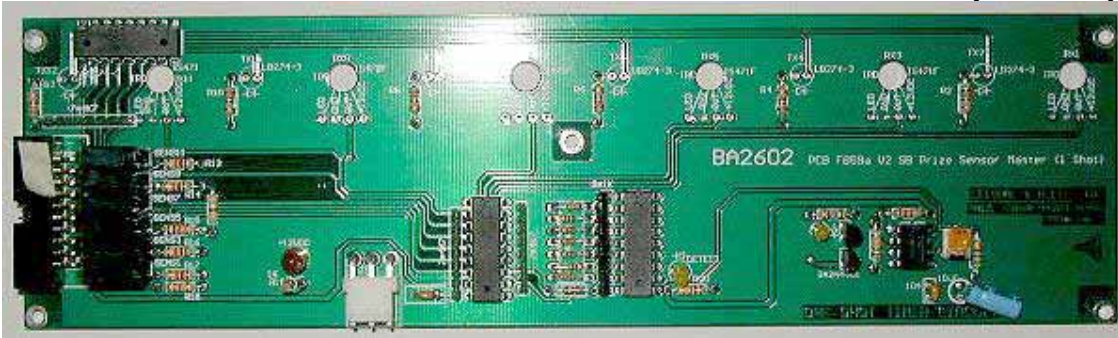


BA2007 PCB FB59b Prize Box Sensor Slave TB-PV



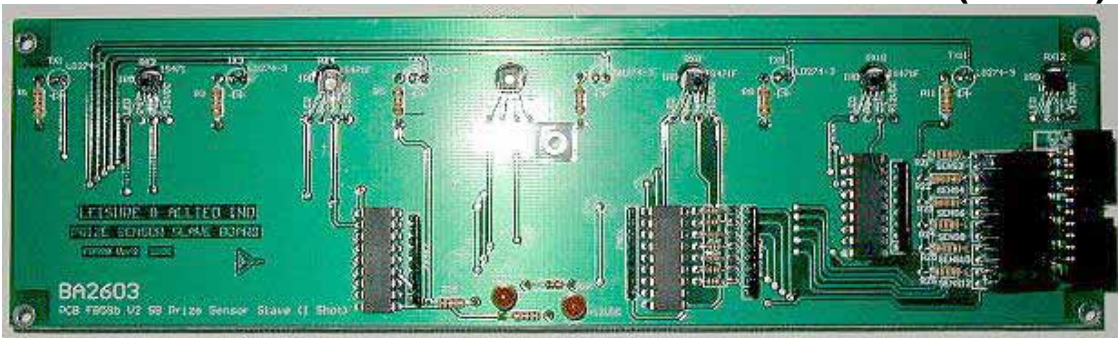
This improved Prize Box Sensor system is used on later models of Timebuster and Sonic Beat Machines. The system uses an asymmetric design requiring two pairs of different PCBs for one machine, One Master and One Slave. Improvements over the previous system was the incorporation of the IR LED Driver Buffer and orange LED indicators for each of the 12 sensor pairs to help in alignment and troubleshooting.

BA2602 PCB FB59a V2 SB Prize Sensor Master (1 Shot)

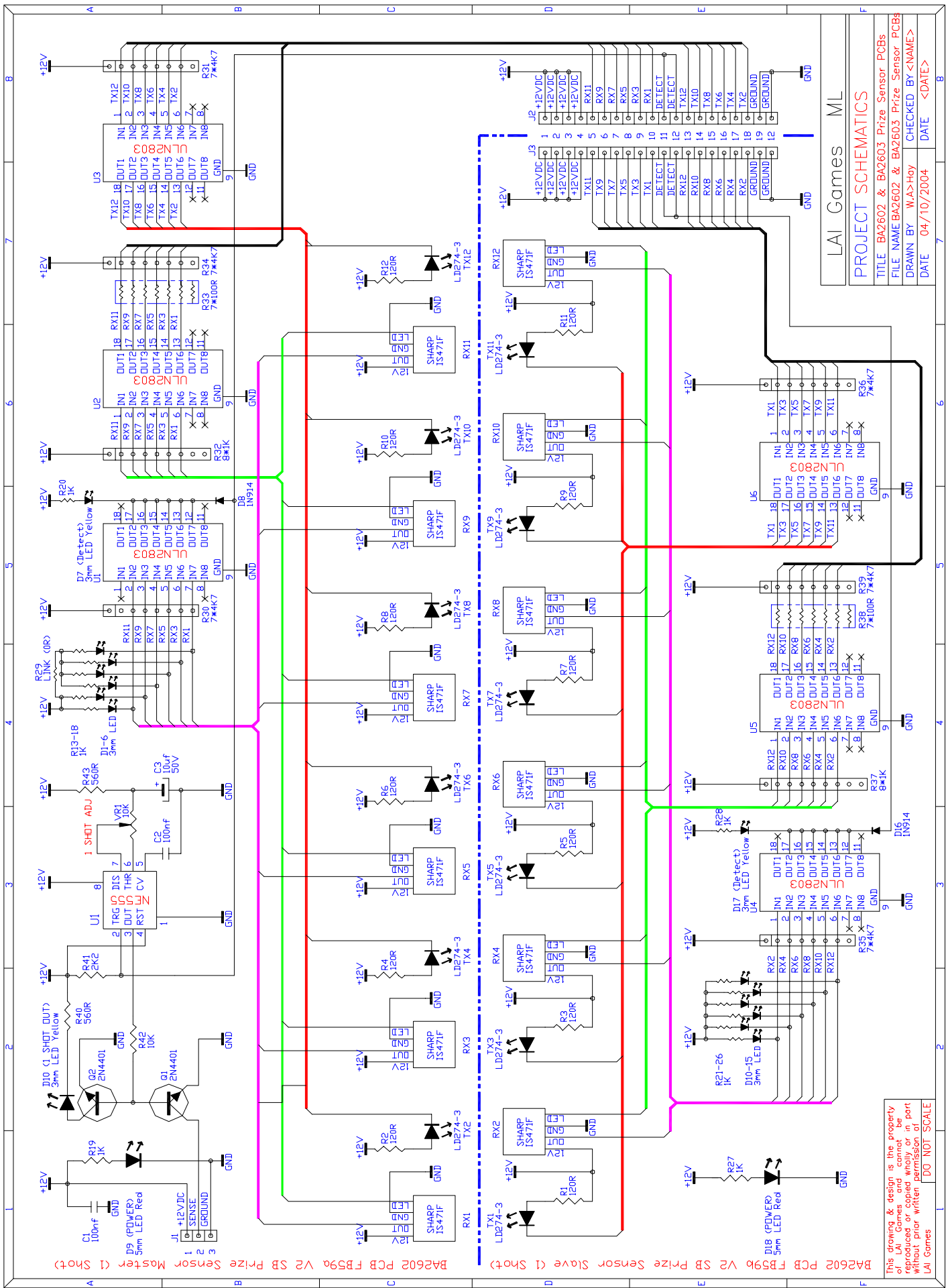


The BA2602 PCB FB59a V2 SB Prize Sensor Master (1 Shot) is a direct replacement for BA2006 PCB FB59a Prize Box Sensor Master TB-PV. The output has a one-shot pulse circuit to help lengthen the output when small prizes have dropped through the sensors. This is the latest Master Sensor and is used on all the Latest Prize Box games (Timebuster Sonic Beat Lighthouse and Stacker).

BA2603 PCB FB59b V2 SB Prize Sensor Slave (1 Shot)



The BA2603 PCB FB59b V2 SB Prize Sensor Slave (1 Shot) is direct replacement for the BA2007 PCB FB59b Prize Box Sensor Slave TB-PV and can be used with both of the Master Prize Box PCBs. This is the latest Slave Sensor and is used on all the Latest Prize Box games (Timebuster Sonic Beat Lighthouse and Stacker).



BA2602 PCB FB59a V2 SB Prize Sensor Master (1 Shot)

BA2602 PCB FB59b V2 SB Prize Sensor Slave (1 Shot)

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PROJECT SCHEMATICS

TITLE BA2602 & BA2603 Prize Sensor PCBs

FILE NAME BA2602 & BA2603 Prize Sensor PCBs

DRAWN BY W.A.S.Hoy

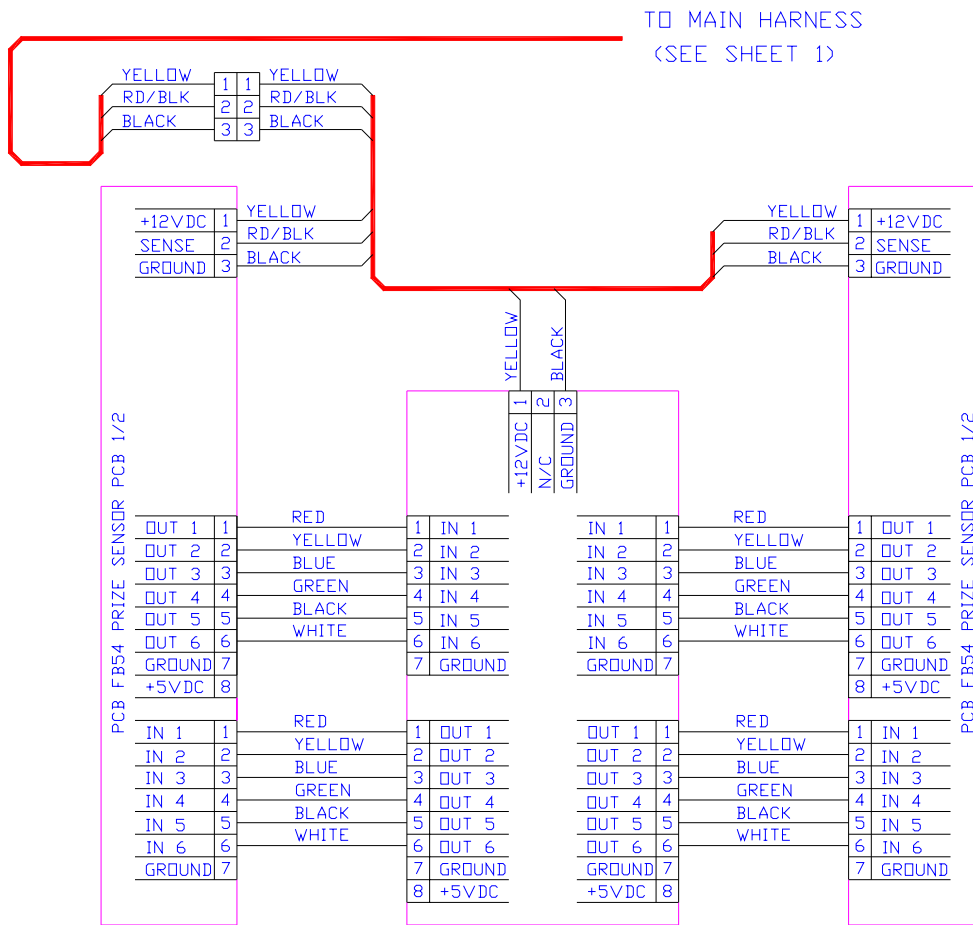
CHECKED BY <NAME>

DATE 04/10/2004

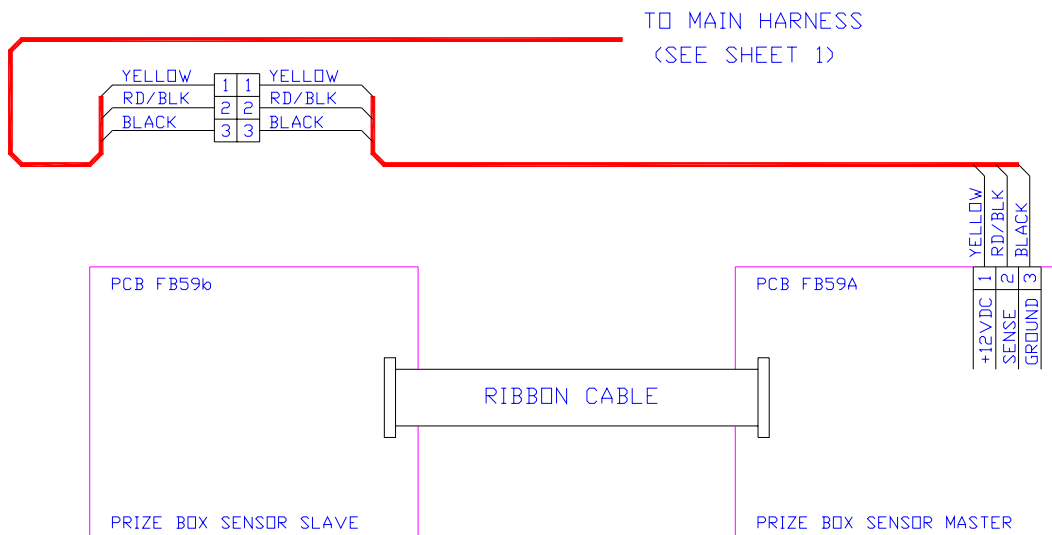
DATE <DATE>

WIRING FOR 2 * PCB FB54 WITH
BA2005 PCB SENSOR BUFFER INTERFACE

SHT No. 5



WIRING FOR NEW TYPE
PCB FB59a & PCB FB59b



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DATE 02/03/00	DATE 10/03/00