

Serial Audio Video Remote (SAVR) **IR Emitter Modification**

*Requires Previous Modifications for SAVR2 Microcontroller and Firmware
Refer to <http://www.blackboxdesigns.com> for Details*

Revision IR – April 23, 2005

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Revision History

Rev	Date	Pages	Change Description
IR	Apr 23, '05	All	Initial Version



Discussion

The SAVR (Serial Audio Video Remote) has been designed for optimum reliability in cable remote applications. However, the implementation of IR emitter support for previously upgraded SAVR units is possible with some additional modifications. The modification described in this document will enable a SAVR, *which has already been upgraded to a SAVR2*, to support standard IR emitters on any or all of the three data ports without compromising the existing function of those ports for Control-A1, Control-A1 II, or Control-S. This document provides detailed instructions for the end user to make this modification.

Required Materials

The following materials are required to modify a previously upgraded SAVR to additionally support IR emitters:

- SAVR (P/N: 200000-01) -> *Previously upgraded to SAVR2*
- 200 ohm 1/8 watt resistors (1 for each modified channel)
- 10,000 ohm 1/8 watt resistors (1 for each modified channel)
- J309 JFET Transistor in TO-92 package (1 for each modified channel)
- Soldering iron with fine tip
- Tin based flux core solder (fine spool recommended)
- #1 screw driver
- #2 screw driver
- Pliers
- Small wire cutter
- Drill (optional)
- 3/64 drill bit (optional)

Modification Instructions

1. Before beginning, ensure you have all the required components (**Figure 1** below).

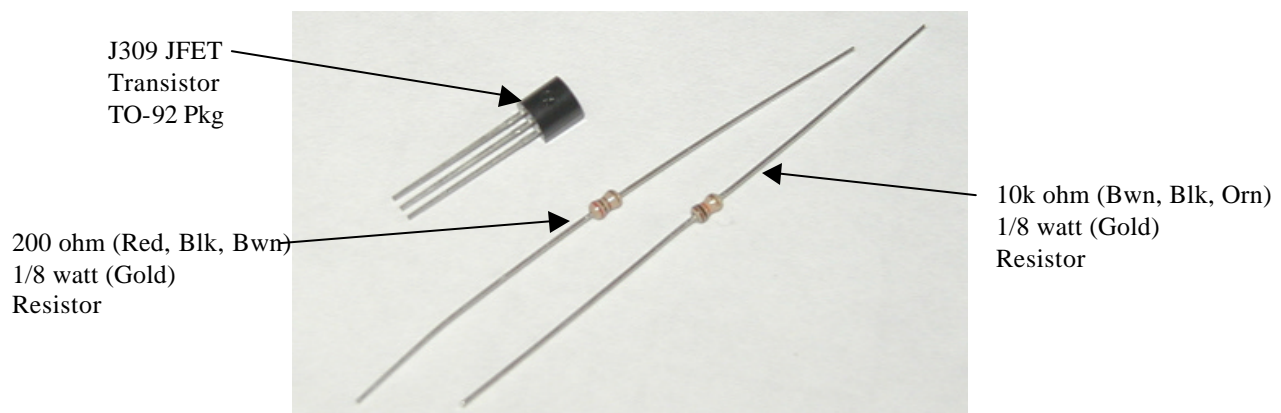


Figure 1: Required components for IR modification. (One set per channel)

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- Using a small screw driver (#1), remove the four screws securing the SAVR cover (**figure 2**).

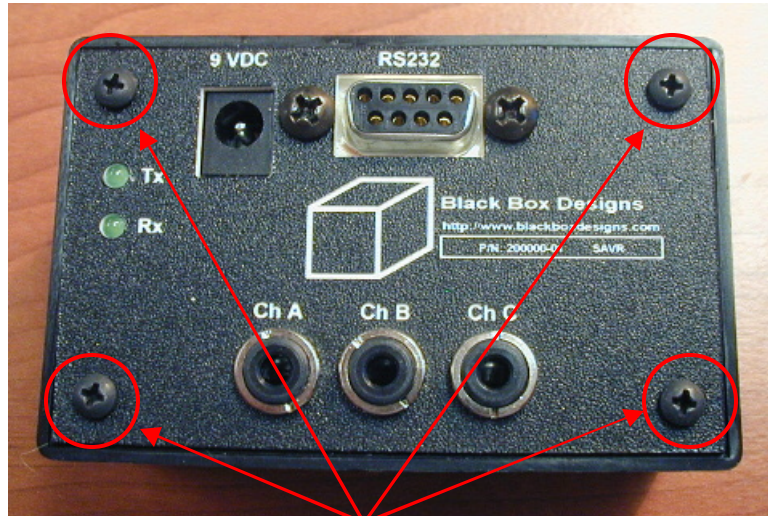


Figure 2: SAVR cover screws.

- Remove the face plate from the SAVR by removing two screws from the RS232 connector (#2 screw driver) and three retaining rings around the data ports Ch A, Ch B and Ch C using a pliers (**figure 3**).

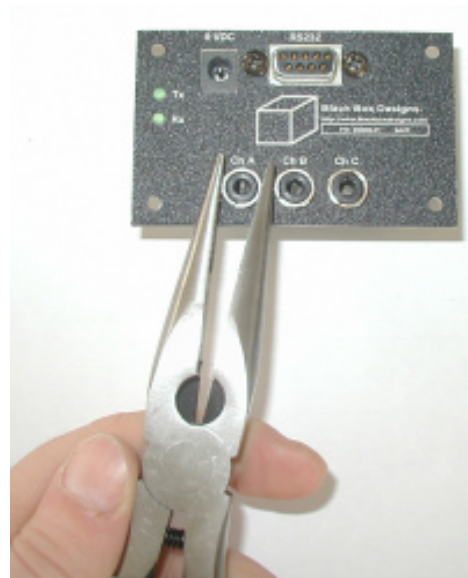


Figure 3: Remove the face plate



4. Locate the existing drive resistor SIP and remove it from the channels you intend to modify for IR use. You may cut the SIP into sections to accomplish selective removal. The sections of the SIP related to each data port are identified in the **Figure 4** below, and the SIP is shown cut into several pieces in **Figure 5** at right.

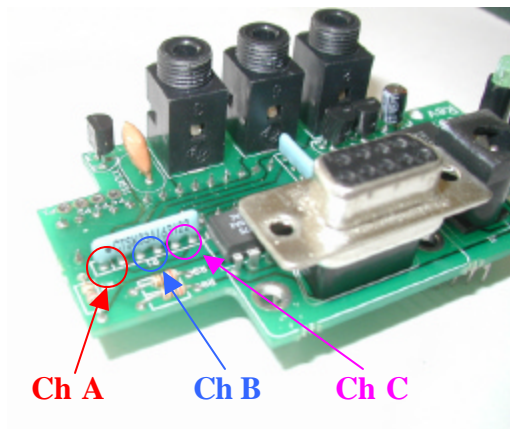


Figure 4: Sections of the SIP



Figure 5: SIP cut for complete removal

***Note:** If you damage the SIP severely, but only intend to modify one or two channels, you can install any 1/8 watt resistor between 200 ohms and 1.2k ohms. Simply insert the resistor into the place of the SIP for Ch A, B, or C as necessary.*

5. After removing the old resistor SIP it may be necessary to remove excess solder from the mounting holes to allow installation of the new parts. This can be accomplished using solder suction tools, desoldering braid, or using a 3/64" drill to reopen the holes. For any of these methods care should be taken not to do damage to the circuit traces or solder pads on the circuit board.
6. Take the J309 JFET (**Figure 6**) and bend the gate leg (G) away from the flat side. The source (S) and drain (D) legs will be inserted in place of the SIP shortly. Orientation is critical, and several steps precede inserting the part, so do not install it until instructed to do so.



Figure 6: J309 JFET Pin Identification



7. Solder the 200 ohm and 10k ohm resistors to the gate leg of the JFET as shown in **figure 7** below. The resistor values should be identified by colored stripes. The 200 ohm resistor will be red, black, brown, gold; and the 10k ohm resistor will be brown, black, orange, gold.

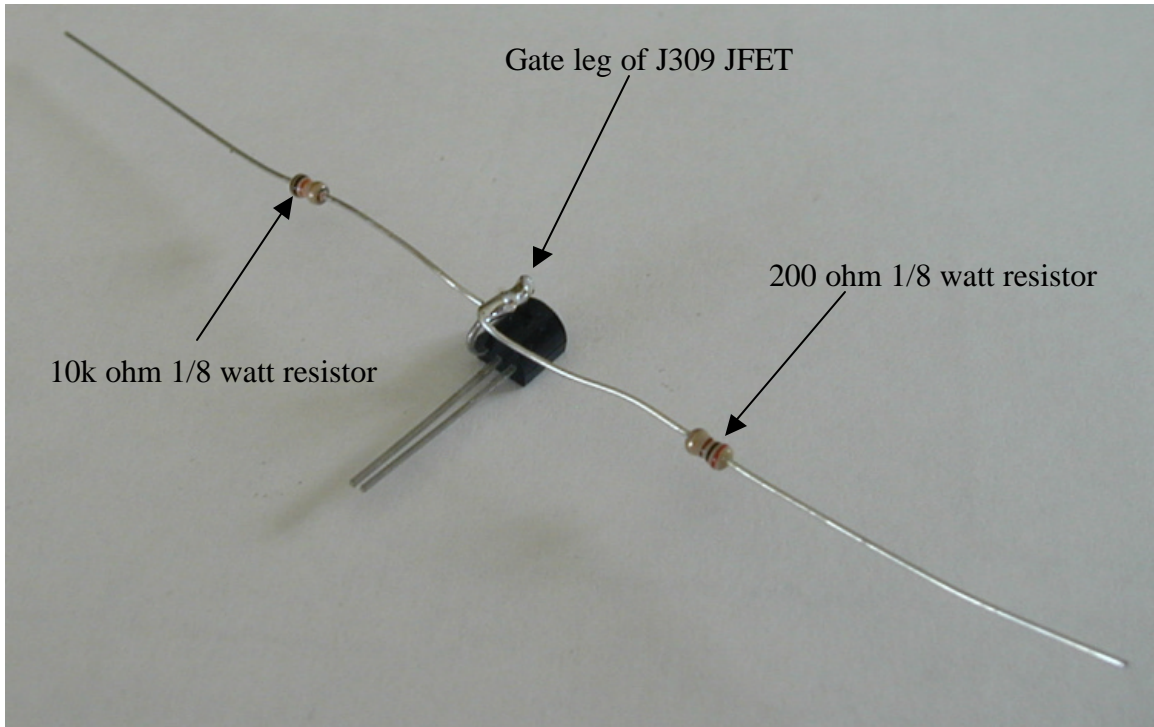


Figure 7: JFET and resistors prior to installation in upgraded SAVR circuit board



8. Install the J309 JFET with attached resistors into the appropriate location for the channel you wish to modify for IR support. Note the orientation of the JFET. The flat side of the part should be facing the P1-P4 upgrade solder pads as shown in **figure 8** (right).
9. Connect the free leg of the 200 ohm resistor to the upgrade solder pad for the channel you are modifying. The following pads are used for Ch A-C.

Data Channel	Connect to Solder Pad
Ch A	P1
Ch B	P2
Ch C	P4

10. If modifying only one channel, skip to step XX.
11. Install additional J309 JFETs and resistors as required to modify the desired number of channels (**figure 9**).

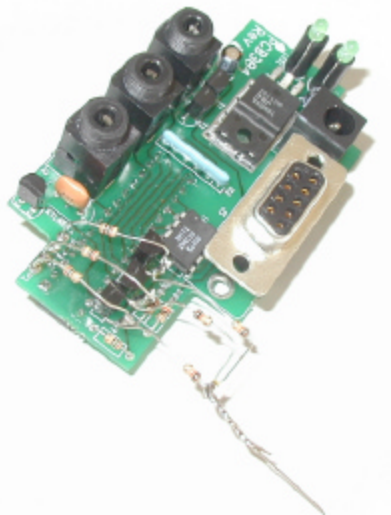


Figure 9: All three channels modified

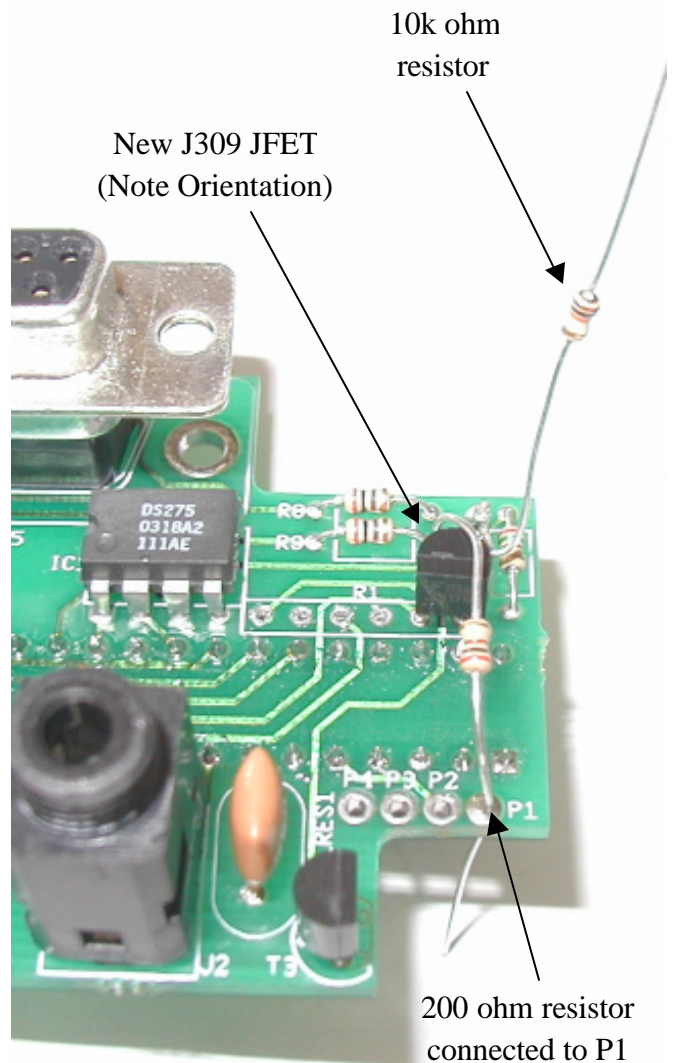


Figure 8: Install JFET and resistors assembly
(Ch A / P1 modification shown)



12. Tie all of the free 10k ohm resistor legs together as shown in **figure 10**.
13. Connect the free end of the 10k ohm resistors to ground at the corner contact for resistor R7. See **figures 11 and 12**.

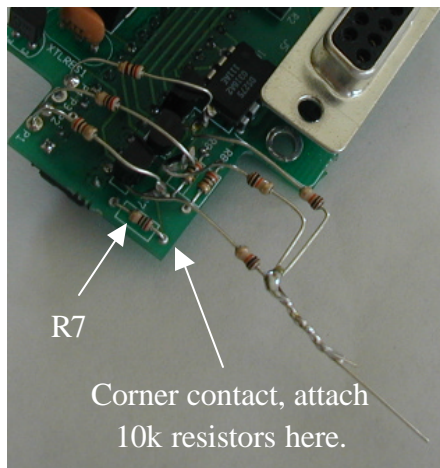


Figure 11: R7 contact identification

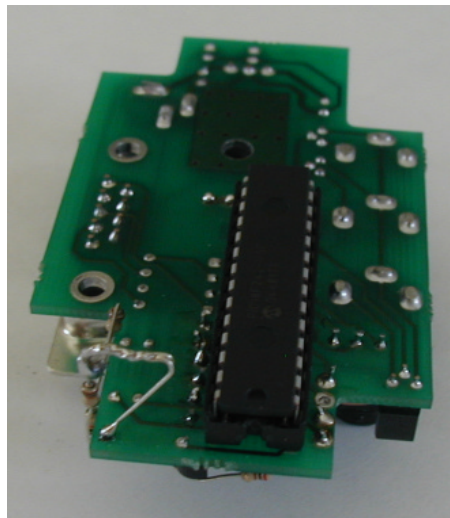


Figure 12: Far side of board with connection to R7 ground contact.



Figure 10: Tie all free ends of 10k ohm resistors together

14. The 10k ohm resistors must pass through a narrow space between the circuit board and its plastic housing, so form the wires closely to the board without actually bringing them into contact with any parts unnecessarily.
15. Ensure that there are no unintentional connections between the exposed component legs and other parts or contact pads. Unnoticed connections can inhibit function or **damage components** and it very important to consider components that could move or make connections when the face plate and housing are reinstalled.
16. Reinstall the face plate and re-inspect the components carefully for any unintentional contact.



17. Reinsert the SAVR circuit board and face plate into the plastic housing (*note the clearances for the new 10k resistors around the side posts*) and reinstall the screws.

This completes the upgraded SAVR modifications to support IR emitters. The SAVR will now correctly drive standard IR emitters when configured for IR modes and continue to support Control-S and Control-A1 on the same channels. Due to limits with the power available on the SAVR, this modification does not drive IR emitters at their maximum intensity. As a result, range may be limited and only single emitters are recommended. Using multiple element emitters or emitters with visible light secondary lamps may cause the SAVR to reset, but will not damage the device. If you encounter this problem, switch to single IR emitters without visible lamps.