

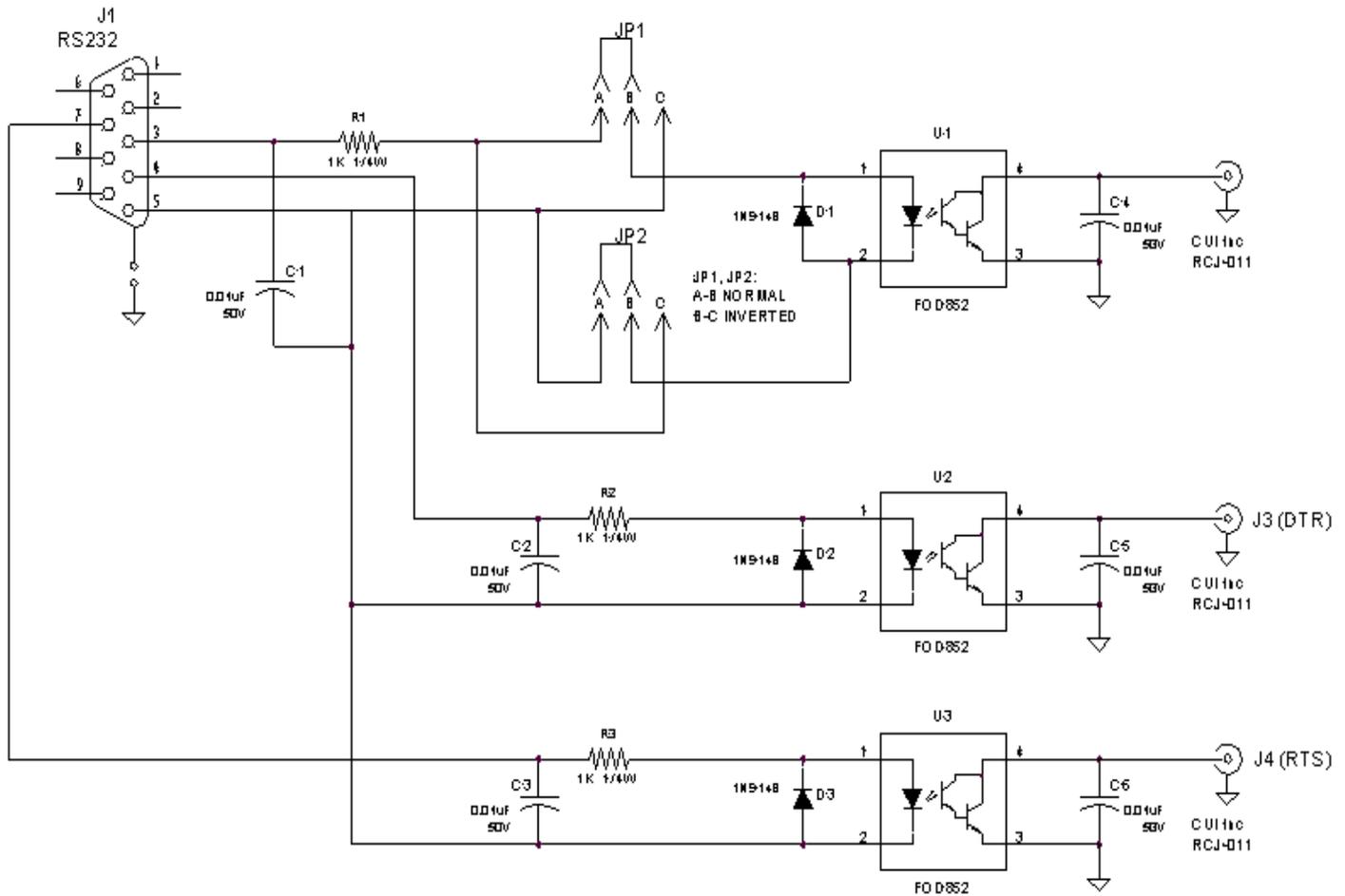
AC8Y FSK Keying Interface

Many popular FSK software packages can be configured to send FSK keying data through an RS-232 serial port. With a suitable interface, this signal can connect to the FSK input of an HF transceiver to produce spectrally pure FSK RTTY signals. The project described here is intended to be an easily constructed FSK interface circuit.

The RS232 communications standard defines the Mark signal voltage as -15 to -3 volts, the Space signal is +3 to +15 volts. The interface is designed to be compatible with signals within the defined voltage range.

The dimensions of the two connectors are critical for proper mounting on the prescribed circuit board. Otherwise, the components are fairly generic. All components were available from [Mouser Electronics](#).

Schematic Diagram



Parts List

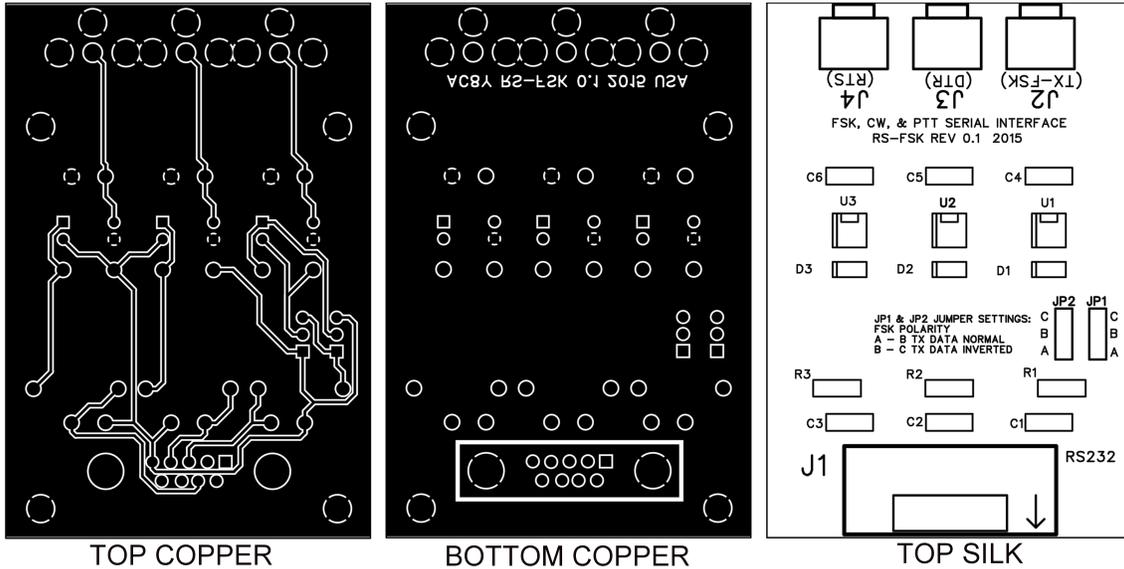
Reference	Quantity	Manufacturer	Part Number	Description
C1 – C6	6	Vishay	D103M29Z5UH6UJ5R	Ceramic Disc Capacitors .01uF
D1 – D3	3	Fairchild Semiconductor	1N914B	Diode, Rectifier
J1	1	Amphenol-FCI	D09S13A4GX00LF	D-Sub Connector DE9 Socket
J2, J3, J4	3	Rean	NYS354	RCA Phono Jack PCB, Right Angle
JP1, JP2	2	Amphenol-FCI	68786-202	Jumper Shunt
JP1, JP2	1	3M Electronic Solutions	961116-6404-AR	16 Pin Header, Cut to Length
R1 – R3	3	Vishay Dale	CCF071K00GKE36	Resistors, Through Hole 1K ohm
U1, U2, U3	3	Fairchild Semiconductor	FOD852300	Transistor Output Optocoupler

In addition to the RS232 TX data signal, the DTR and RTS signals can also be used for radio keying. These lines are typically used to key the CW or PTT radio inputs.

Optical photo couplers provide electrical isolation between the RS232 port and the radio interface ports. The Fairchild FOD852 was chosen for its high current transfer ratio. Numerous other 4 pin transistor-output photo-couplers could be substituted. The resistor values may need to be adjusted to match the characteristics of the photo-coupler. The absolute maximum reverse voltage on the FOD852 source lamp is 6 volts. Since RS232 signal voltages could exceed that value, the diodes were added to limit the reverse voltage. Although 6 volts maximum reverse voltage is fairly common for photo-couplers, if a substitute unit with a higher voltage rating was used, the diodes could be omitted.

LAYOUT

All components mount on a printed circuit board, no point-to-point wiring is required.



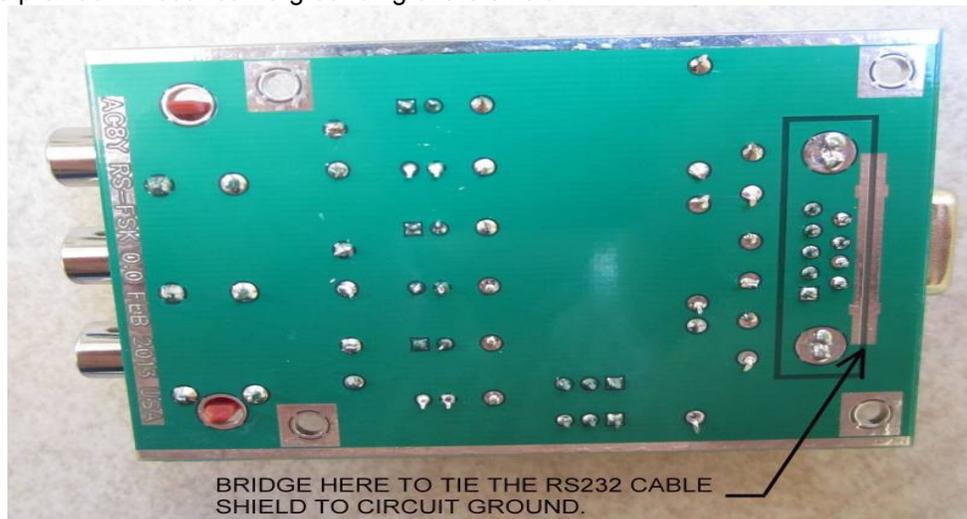
CONFIGURATION

With the JP1 & JP2 jumpers in the NORMAL position, a positive voltage on the RS232 TX pin will assert the J2 FSK output.

Note: Proper operation has been verified using MMTTY and various radios with the jumpers in the NORMAL position. Selecting the "Invert Logic" option on MMTTY Set-Up TX option tab inverts the polarity of the PTT signals.

EMI, RFI SUPPRESSION

C1 through C6 are intended to minimize the effects of RF pick up on the data or keying lines. The outer ring of the output connectors is tied to the circuit ground layer. The DB9 connector shell is isolated from the circuit ground. The RS232 cable shield could form a ground loop if the connector shell was tied to the circuit ground. But leaving the RS232 cable shield floating at one end could also cause EMI in some situations. For that reason, an unmasked area on the bottom side of the board was provided to allow the connector shell to be tied to circuit ground if necessary. SMT capacitors could be installed to provide RF but not DC grounding of the shield.



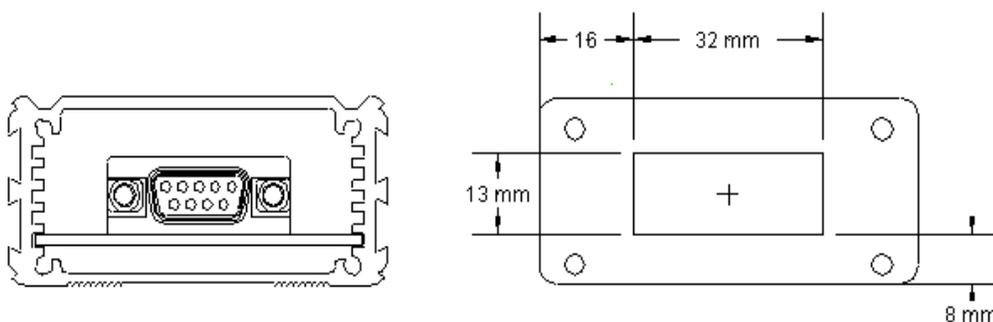
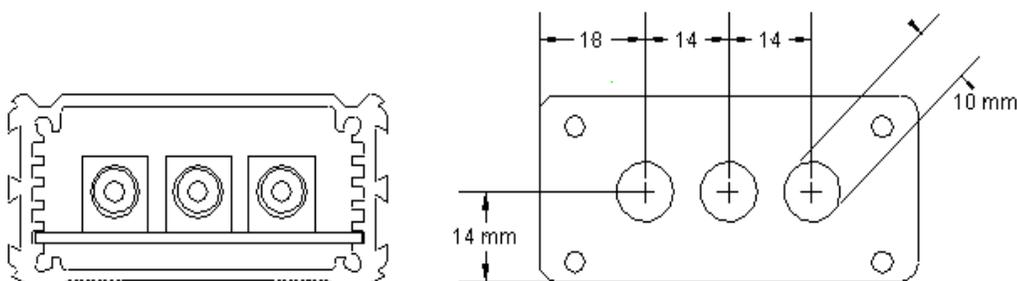
DATA DELAY

The measured turn-on delay of the optical isolators is about 2 μ s and turn-off delay is about 4 μ s. Those values would not be significant for normal data rates but since the circuit relies on the radio's internal pull-up resistors to pull the signal back high after turn-off, the rise-time is much more significant. With 0.01 μ F capacitors installed at C4, C5, & C6, the rise time was measured at 120 μ s which could be a problem for TTY data rates over 1 kb/s. At 45 or even 100 baud, that is insignificant but if the circuit is used for high rate data, the output capacitors should be removed or replaced with smaller values. For HF RTTY and Morse, the Fairchild FOD853 optocoupler used here is adequate. For other non-radio applications a faster unit may be required.

ENCLOSURE

No enclosure is necessary for proper operation. Grounded copper layers provide sufficient immunity from RF coupling. Adding an enclosure results in a nicer appearance and improves durability but at least doubles the assembly time and cost of the project.

The PC board dimensions were intended to match the [BEX Series 1](http://www.boxenclosures.com) 1.18" H x 2.5" W x 3.15" L extruded aluminum enclosures made by Box Enclosures. <http://www.boxenclosures.com>. These enclosures come in various colors and optional [rubber end caps](#) are available. Scaled drill and cutout templates can be downloaded at <http://thetower.us/FSK/FSKEnclosure.pdf>. Some colors are cheaper from [Newark Electronics](#).



A DE9 hole punch could also be used to save a lot of time nibbling the rectangular hole for the RS232 connector but could also allow the connector shell to contact the metal end plate. If electrical isolation of the RS232 connector shell is desired, some sort of insulator is needed.



This insulator was cut from a disposable microwave meal dish. Being microwave safe, it should have good dielectric properties.



AC8Y

<http://www.thetower.us/FSK>