

Design Note

To: All Receive converter owners, any Manufacture.

From: DEMI R&D Dept.

DN#: 009A

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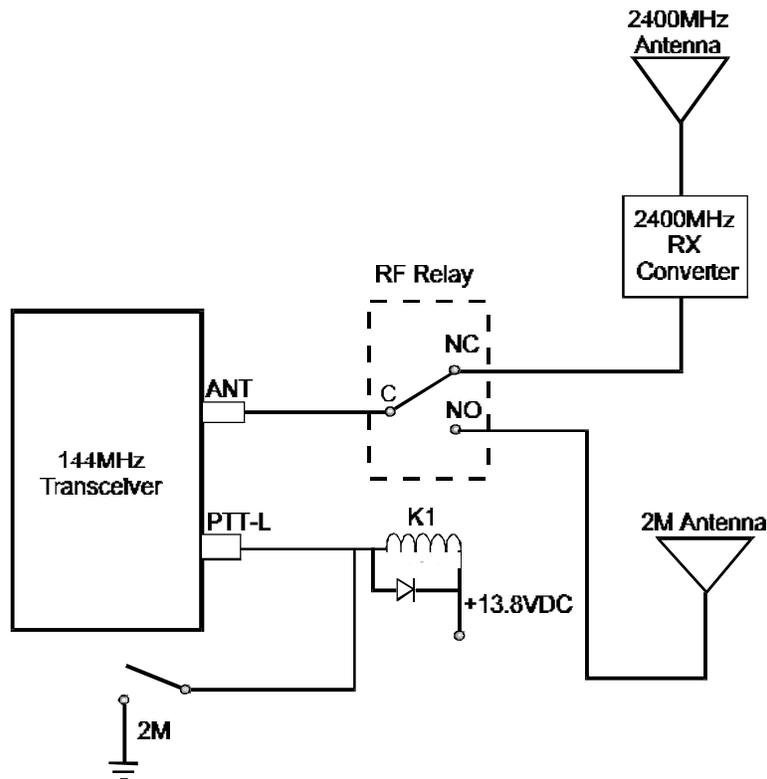
Re: Failsafe protection circuitry. See update on last page

Problem

When using a receive converter with a transceiver, damage may occur to the converter if the transceiver inadvertently transmits into the RX IF port of the converter. Severity of damage may vary depending on the design of the converter. Levels as small as 20 mW (+ 13dBm) may only cause minor repairs but will result in an incomplete QSO.

Solution

Solutions are as many as the number of transceiver-converter combinations conceived. With the various types and transmit levels of transceivers and the type of installations used with converters, a basic block diagram of protection circuitry is shown below but will need to be custom configured for your particular set-up .



Discussion

After reviewing the block diagram, compare it to your own standard system. It shows a 144 MHz. transceiver and a 2400 MHz converter. This scheme may be used with any frequency transceiver or converter design. The point is to install the protection circuitry between the transceiver and converter.

The idea of this circuitry is based on a quality RF relay capable of handling your transceivers operating frequency and power level at a safe margin. This RF relay should also have safe isolation specifications to protect the converter. Adding the additional DC switching circuitry to the transceivers Push-to-talk circuit will enable the transmitted signal to be diverted away from the converters output during and unintentional or intentional transmission. The additional switch included in the circuit enables you to switch the desired antennae to the correct port on your transceiver for normal transceive operation.

The RF relay requires enough isolation to protect the converter when you are using your transceiver for it's intended purpose. If you have a 100 watt 144 MHz. transceiver, most converters will require a minimum of 40 dB of isolation. This means that the converter will have 10 mW on its IF output port. This should be safe enough and considered a minimum. An extra 10 dB of isolation would be preferred for a safety margin. This margin will also help protect the converter during the switching transition as the relay is switching and the transmitter is ramping up in power.

The configuration shown may not work with your transceiver. Your transceiver may not have a Push-to-talk to ground circuit. It may have a positive voltage on transmit. If this voltage has enough current to drive a relay then it may be reconfigured in place of the 13.8VDC supply. If not you may need to drive a separate switching circuit to in turn drive the relay. It becomes more elaborate but will protect the converter.

If your transceiver does not have an external PTT control, you may need to find a control signal internal to your transceiver. Once located on the schematic, or through a service manual, the signal may be brought outside of the transceiver with a simple connector. Or you may find you wish to use a RF sensing circuit. This RF sensing circuit could also be incorporated into a solid state pin diode switch to replace the mechanical relay. A design of this nature is beyond the scope of this design note but may be researched in the ARRL Handbook for the Radio Amateur or other technical journals.

Conclusion

There are many ways that protection devices may be implemented into your system. We hope this design note has stimulated enough thought for you to design your own or simply copy the exact circuit if it will provide your system with adequate protection. Accidents will happen but many can be prevented to enable you to trouble free operation.

UPDATE!!!!!!

We have just released a new design that incorporates all of the desired function discussed above. Please see the SSBT product description. This is a self contained RF sensed unit that incorporates a DC voltage feed to our 2400-144RX converter. Please review the product description or visit our web site price list and click on the SSBT in the accessories section.

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