Receiver Guard 5000HD and 5000 Receiver Front-End Protectors

DXE-RG-5000HD and DXE-RG-5000

DXE-RG-5000-INS Rev 1

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Introduction and General Information

The **DX Engineering Receiver Guard 5000HD** and **5000** are advanced electronic receiver RF limiters that were developed over years of extensive research and testing. The rugged **DXE-RG-5000HD** and **DXE-RG-5000** offer performance superior to other devices on the market, covering 0.5 to 150 MHz with under 0.15 dB of insertion loss. (<0.15 dB at 50 MHz and <0.3 up to 150 MHz). These highly effective and inexpensive receive RF limiters prevent front-end damage due to high RF levels that can result in costly radio repairs.

The DX Engineering **DXE-RG-5000HD** or **DXE-RG-5000** Receiver Guard should be used on any radio **receive only antenna input** for low-cost front-end "insurance" in these common RF situations, among others:

- Receive antennas in very close proximity to transmit antennas
- Field-day operations with many transmitters in close range
- Multi-transmitter contesting sites
- Neighboring Amateur and CB operators
- Frequent high-power mobile encounters

DX Engineering offers two Receiver Guards, to provide automatic protection for every receive equipment application:

- The **DXE-RG-5000HD** works for all radios and offers the ultimate performance *required* by the upper tier of transceivers tested to have the best narrow-spaced third-order dynamic range or published RMDR (Reciprocal Mixing Dynamic Range). These transceivers include **Elecraft K3 series, FlexRadio 6700, 5000A** and **3000, Icom IC-7851, Kenwood TS-990S** and **590S(G), TenTec Orion** series, **Yaesu FTdx-5000** series, and other radios with similar performance.

- The **DXE-RG-5000** offers excellent dynamic range and performance characteristics to cover the capabilities of all other transceivers and receivers.

It has been confirmed with extensive testing and real world use that these inexpensive Receiver Guards offer the best available protection for your transceiver or receiver investment. Combined with RF filters, placed on the antenna side of the Receiver Guard, exceptional signal control and protection is possible. DX Engineering offers the highest level of protection for your receiver's front end.

The Receiver Guard was developed specifically to protect the crucial receiver front-ends of expensive high performance transceivers at contesting super-station, K3LR. At this world class multi-transmitter contest station, dedicated receive antennas are exposed to high levels of RF radiated from close-by transmit antennas. **DXE-RG-5000HD** and **DXE-RG-5000** Receiver Guards multi-stage receive input protectors employed at K3LR have never failed, as none of the expensive radios have ever required front-end repairs. And they keep on racking up great scores at K3LR, even in the harshest of receiving environments. Why? Because, the DX Engineering Receiver Guard produces far lower harmonic and

noise products across the spectrum than any competing RX front-end saving device, allowing competitive contest operations to continue unfettered!

At the heart of each Receiver Guard is a highly effective electronic RF limiter covering 500 kHz to 150 MHz with an insertion loss under 0.15 dB at 50 MHz and under 0.3 dB to 150 MHz. The multi-stage design includes a gas discharge tube for maximum pulse energy protection. The Receiver Guard is a passive electronic limiter, *not a filter*, so competitive contesting stations must still use separate band filters. For example, the Receiver Guard HD limiter can reject 10 watts of catastrophic receive antenna feedline RF while passing a signal of about 87 dB over S-9, which is only 25 mw. That level is well under the point of front end damage.

When there are high levels of RF on your receive antennas, DX Engineering's Receiver Guards generate far less harmonic noise than other limiters on the market, which allows your station to continue to operate safely and competitively. At normal HF signal levels Receiver Guard operates continuously with no effect on the performance of your station while providing the best possible protection for your radio. The Receiver Guard does ***not*** pass DC. If you are using the Receiver Guard in a system that requires a DC voltage, insert the DC as shown in **Figure 7**.

This is a *Receive Only* Accessory
Do not connect the DXE-RG-5000HD or DXE-RG-5000 Receiver Guard to a transmitter output
DO NOT TRANSMIT through the Receiver Guard

The Receiver Guard is is NOT a filter. The Receiver Guard operates by clamping or limiting very strong RF signals

Features

- Keeps stray high levels of RF from damaging your receiver input
- Ideal for separate 160 and/or 80 meter receive systems
- Uses state of the art components for maximum protection of receivers
- Under 6 nsec response time
- Multi-Stage protection
- Very low insertion loss
- Uses BNC type connectors to avoid accidently connecting to a transmit line
- Has been developed and tested in a world-recognized multi-multi contest station

Specifications - DX Engineering Receiver Guard

Frequency Range: 0.5 through 150 MHz
Insertion Loss: < 0.15 dB at 50 MHz, < 0.3 dB 50 MHz up to 150 MHz
VSWR: < 1.2:1
Max Output Level: RG-5000HD: +14 dBm at 10 W input. RG-5000: +10 dBm at 10 W input.
Maximum Power Handling: 10 W CCS (Continuous Commercial Service)
System Impedance: 50 to 75 ohms, unbalanced
Connectors, Input and Output: BNC

Operations with the DX Engineering Receiver Guard

Receiver front-end circuitry is susceptible to damage from very strong signals arriving via the antenna from nearby high power transmitters. Dedicated receivers and certain transceivers with separate receive-only antenna inputs generally lack protection from unintended overload and damage.

Dedicated band pass, low pass and high pass filters offer high levels of protection in engineered systems. However, they are generally expensive and are designed to handle specific offending signals. Other front-end saving units temporarily disconnect the receiver input for a high level of protection, but they require extra keying connections. Plus, rapidly keyed relays that produce noise and pulses cannot be used on receive antennas in contesting stations.

The Receiver Guard is an advanced multi-stage receive signal limiting device that is virtually RF transparent at normal receiving levels, all the way up to -10 dBm, or approximately 63 dB over S-9. In typical operations, installed on the RX Input of the transceiver or dedicated receiver, you cannot tell that the limiter is installed. At slightly higher than normal receive antenna input RF levels, the Receiver Guard has a specially designed mechanism of limiting that reflects higher than normal levels of RF energy while generating minimal harmonics and noise. That, plus it has extremely low insertion loss are the most important differences between the Receiver Guard and other protection devices.

What happens if the receive antenna is extremely close to the transmit antenna, or there is an antenna support or other system failure that causes a high RF level to enter the receive antenna input? The **DX Engineering Receiver Guard** can save the day!

Some Amateur Radio Operators have an antenna installation arrangement where their Beverage wire antenna, or other receive antenna, is installed in close proximity to the transmit antenna. With the Receiver Guard installed, when RF signal levels on the receive antenna line rise above the -10 dBm level, the specially designed circuit limits the output signal, with a resulting rise in the input SWR. The Receiver Guard 5000 can dissipate a continuous 3 watts input, while only allowing only a 76 dB over S-9 signal out to the receiver. Ultimately, the Receiver Guard 5000 can handle a continuous 10 watt input, allowing no more than +10 dBm (0.010 watts) output, which is only 83 dB over S-9 (The Receiver Guard 5000HD is +14 dBm [0.025 watts] output, which is over 87 dBm over S-9) to the receiver front-end, preventing damage, while the reflected energy at the Receiver Guard input is nearing 100%. To help prevent catastrophic damage to the receive input from an extremely high RF level, the Receiver Guard contains a modern gas discharge tube, a fast acting clamp component at the antenna input connector.

This is a *Receive Only* Accessory - Do not connect the DXE-RG-5000 or DXE-RG-5000HD Receiver Guard to a transmitter output
DO NOT TRANSMIT through the Receiver Guard

The Receiver Guard is is NOT a filter. - The Receiver Guard operates by clamping or limiting very strong RF signals

Some good scenarios:

Separate Receiving Antennas (a Beverage receiving antenna, for example): If a receiving antenna is located too close to the transmitting antenna, RF power can flow back into the receiving line during transmit. The Receiver Guard will limit stray RF energy presented to the receiver (or other sensitive devices such as a preamp).

Contest Stations: There are many different configurations of contest stations. If it is possible to be receiving on one radio while another is transmitting, a Receiver Guard would make good sense to use. If the radios are on different bands, and if there is substantial filtering on each band, then the Receiver Guard might not be necessary. The Receiver Guard is a good 'insurance policy' to have in case one of the filter/band/antenna settings is incorrect, and high levels of RF energy is accidentally applied to a receiver.

Skimmer Antennas: Many stations run a CW skimmer, where bands are monitored for CW activity and automatically decoded by the skimmer software running on a PC. The skimmer antennas are usually located in the same area as all of the normal station antennas. If a transmitter is keyed, the receiving antenna can pick up substantial RF power, especially if resonant. The Receiver Guard will protect the skimmer receiver. The Receiver Guard would be installed between the antenna and the SDR antenna input.

High Power AM Station Nearby: The Receiver Guard is not a filter. If the bothersome RF source is a constant high power broadcast station, the Receiver Guard will reduce the AM energy, but it will also reduce all desired signals as well. The limiting is not frequency specific. Therefore, if a strong signal on 1 MHz causes 20 dB of limiting, then all signals on all frequencies will drop by the same 20 dB. That's probably not what the operator wants.

For high RF environmental problems, like the nearby strong AM station, inline RF filters should be used to remove AM band energy from amateur antennas.

Additional Items Suggested but not Supplied

DX Engineering RG-8X 50 Ω BNC Coaxial Cable Assemblies
DXE-1155 Coaxial Cable Adapter - BNC Male to F-Type Female
DXE-RLP-75FF - Lightning Protector, Receive 75Ω, DC Pass, F Connectors

See the **Optional Items** page near the end of this manual for complete details about these items as well as other suggested options.

NOTE: Examples of the **DXE-RG-5000** Receiver Guard installation are shown in the following diagrams.

The **DXE-RG-5000HD** works for all radios and offers the ultimate performance *required* by the upper tier of transceivers tested to have the best narrow-spaced third-order dynamic range or published RMDR (Reciprocal Mixing Dynamic Range). These transceivers include **Elecraft K3 series, FlexRadio 6700, 5000A** and **3000, Icom IC-7851, Kenwood TS-990S** and **590S(G), TenTec Orion** series, **Yaesu FTdx-5000** series, and other radios with similar performance.

The **DXE-RG-5000** offers excellent dynamic range and performance characteristics to cover the capabilities of all other transceivers and receivers.

Installation

The **DXE-RG-5000** or **DXE-RG-5000HD** Receiver Guard is intended to be installed indoors, at the radio. The following pages show various setups using the Receiver Guard. There are many more combinations possible beyond these basic diagrams.

NOTE: Examples of the **DXE-RG-5000** Receiver Guard installation are shown in the following diagrams.

For the newer, higher dynamic range radios described in the introduction, the **DXE-RG-5000HD** would be used.

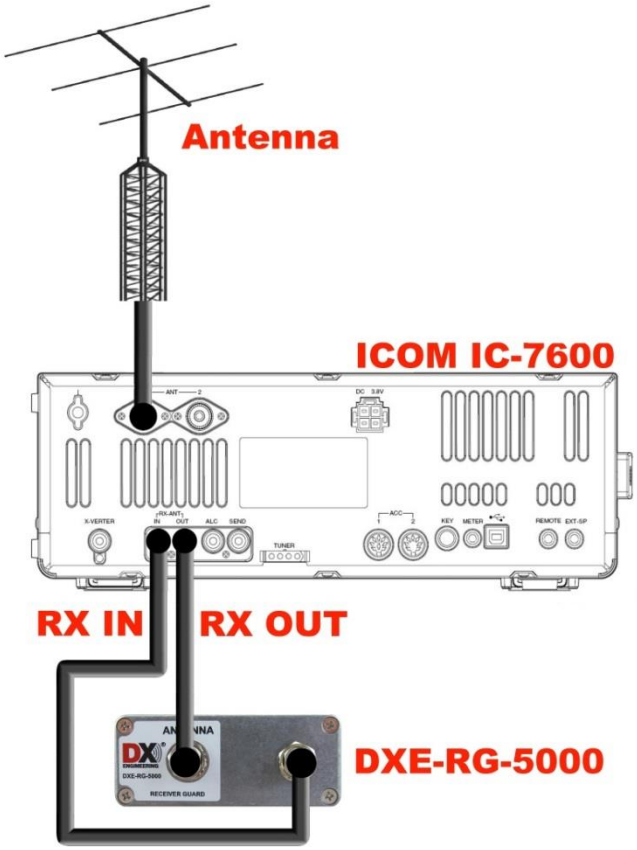


Figure 1 - Home or Field Day protection

The **DXE-RG-5000** Receiver Guard is installed into the "receiver loop" between the RX OUT and RX IN connectors. On the ICOM IC-7600, press and hold the ANT selector until 1/R is displayed on the screen as the selected antenna. This will bring the **DXE-RG-5000** into the receive loop. By doing this, you will prevent front-end blowout from nearby transmitters received on the transmit antenna being used by the IC-7600. Consult your transceiver manual regarding the use of RX OUT and RX IN connections.

Note there are optional items used all of the diagrams shown in this manual.

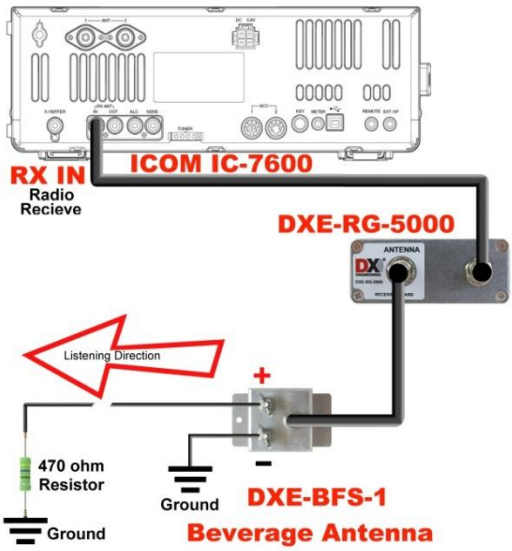


Figure 2 - Basic Receive Antenna Installation

The DX Engineering Receiver Guard is installed between the receive antenna (in this example, the **DXE-BFS-1** Beverage Antenna) and the transceiver's RX ANT IN connection (receive antenna input). On the ICOM IC-7600, press and hold the ANT selector until 1/R is displayed on the screen as the selected antenna. This will connect the transceiver's receive input to the Receiver Guard and the Beverage antenna. Consult your transceiver manual regarding the use of RX OUT and RX IN connections.

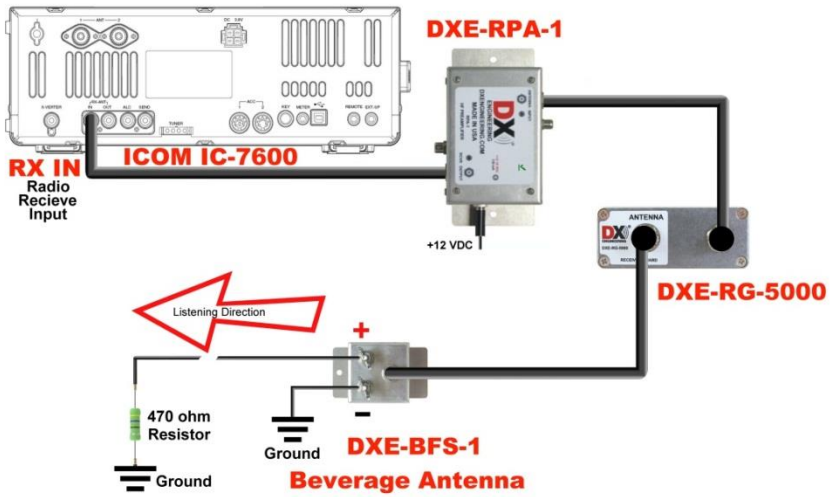


Figure 3 - Basic Receive Antenna Installation with optional DXE-RPA-1 Preamplifier

Figure 3 is the same set up as **Figure 2** with the popular addition of the optional **DXE-RPA-1** Preamplifier. Consult your transceiver manual regarding the use of RX OUT and RX IN connections.

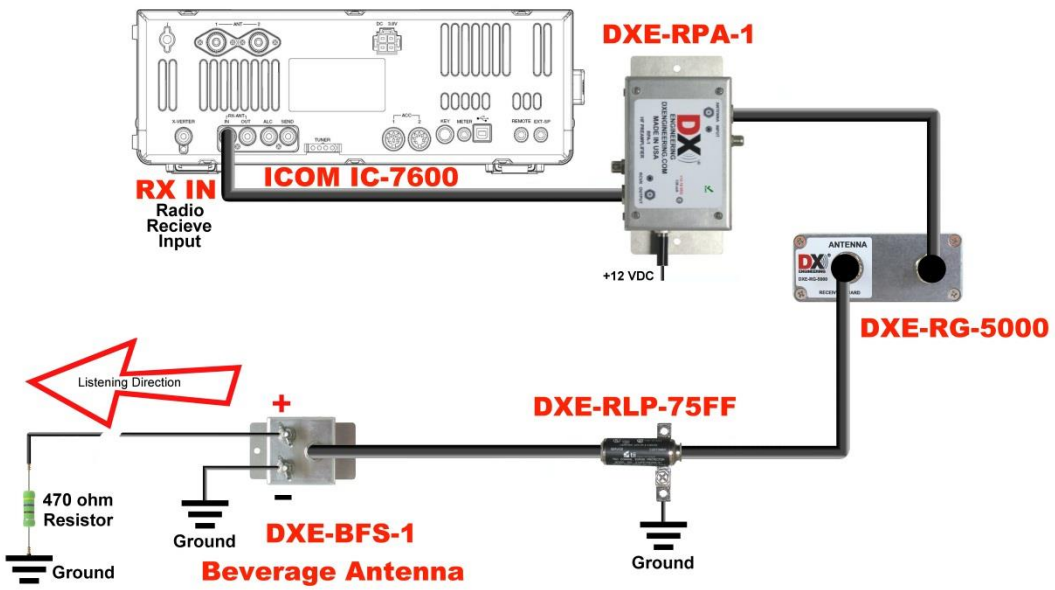


Figure 4 - Typical Beverage Receive Installation with optional Preamplifier and Lightning Protection

Figure 4 expands the options shown in **Figure 3** by including the optional **DXE-RLP-75FF** Lightning Protector installed. Consult your transceiver manual regarding the use of RX OUT and RX IN connections.

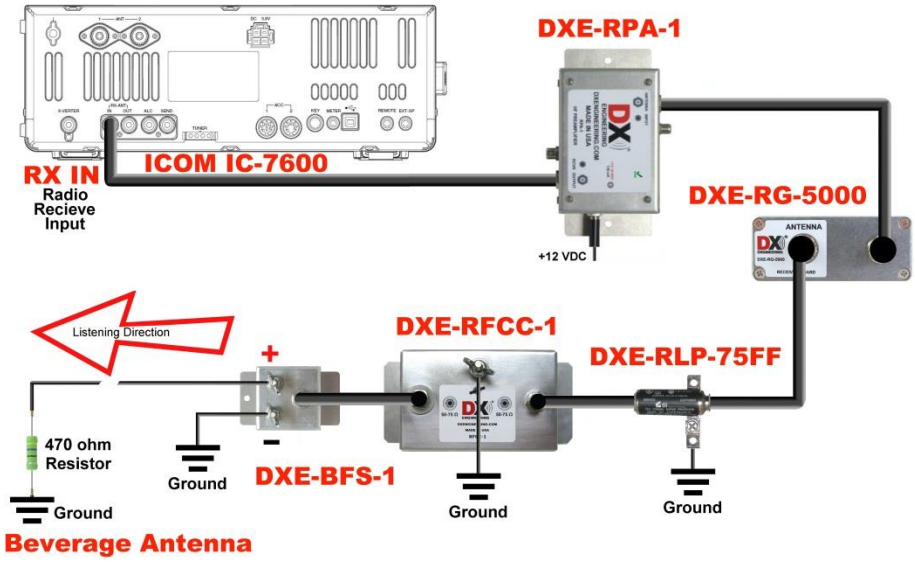


Figure 5 - Typical Beverage Receive Installation with optional Preamplifier, Lightning Protection and Receive Feedline Current Choke

Figure 5 expands the options shown in **Figure 5** by including the optional **DXE-RFCC-1** Receive Feedline Current Choke installed. Consult your transceiver manual regarding the use of RX OUT and RX IN connections.

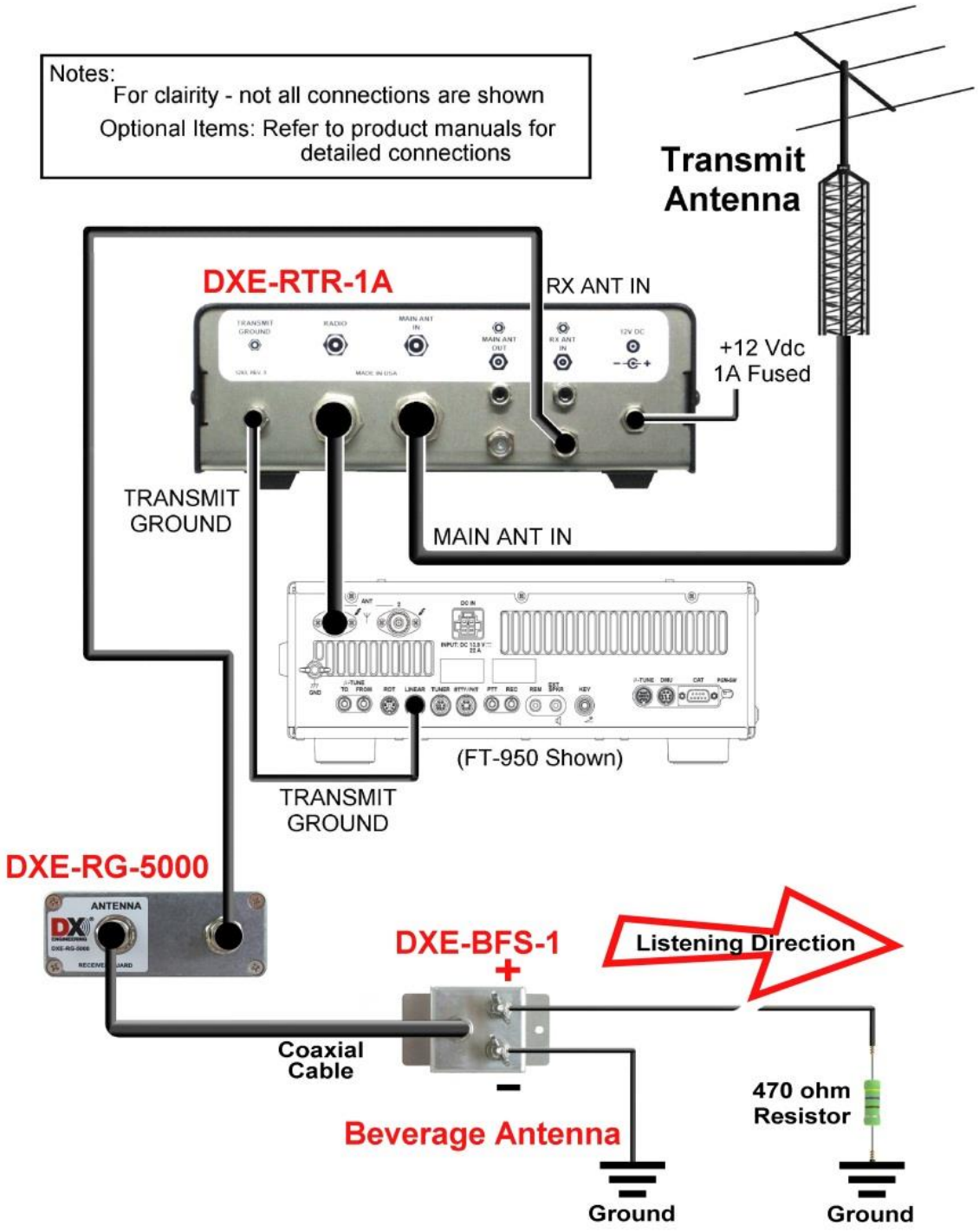


Figure 6 - Installation for a Transceiver without Separate Receive Antenna Input

Figure 6 shows a transceiver that does not have a separate RX-IN. By using the optional **DXE-RTR-1A** Receive Antenna Interface to switch from the transmit antenna to the receive antenna, the Receiver Guard is then connected in-line with a typical Beverage receive antenna to provide protection from the transmitted RF. Consult **DXE-RTR-1A** Receive Antenna Interface manual regarding the detailed use and connections for this application.

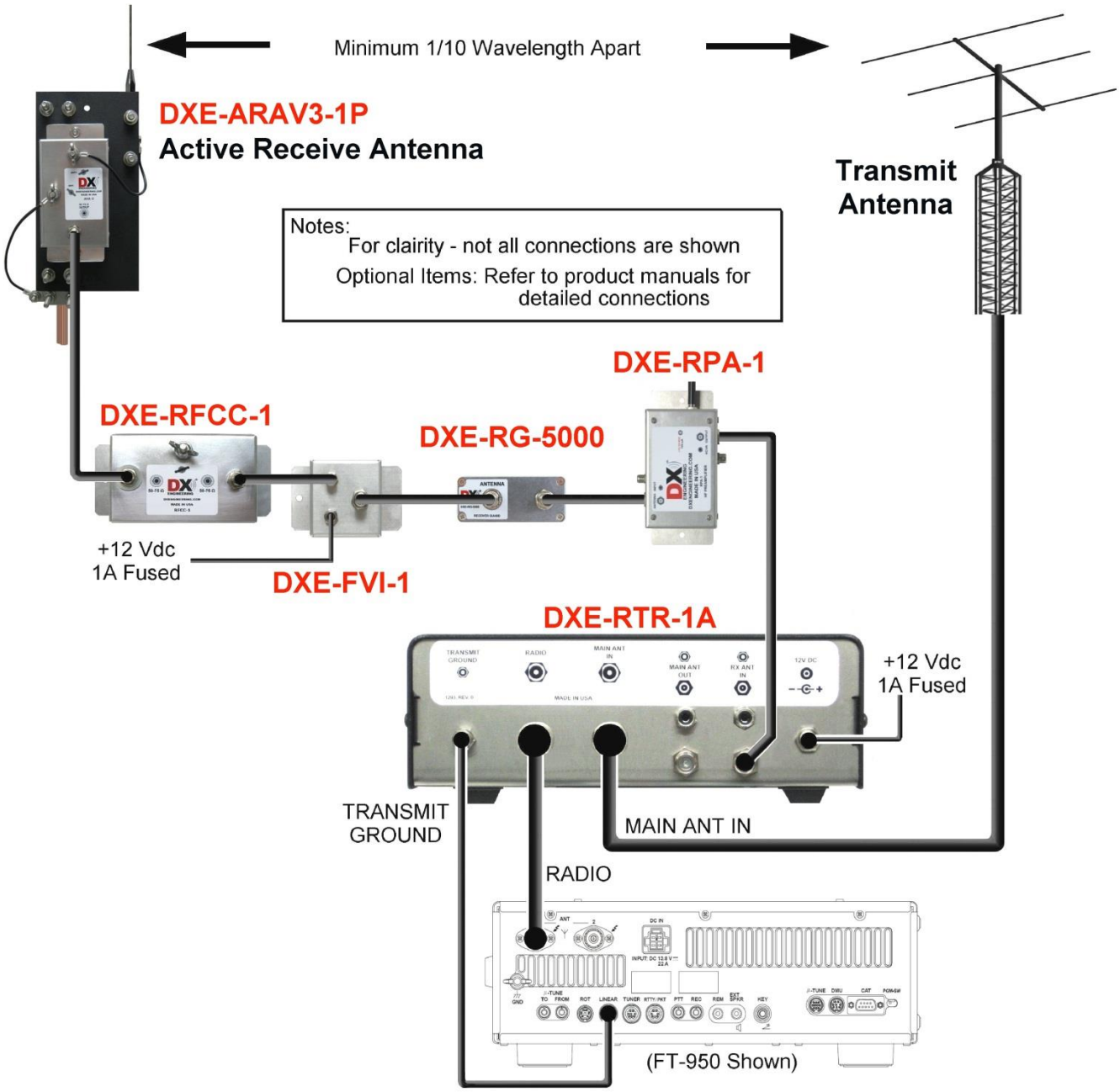


Figure 7 - Using the DX Engineering Receiver Guard in an Active Receive System with an Active Receive Antenna and a Transceiver that does not have a Separate Receive Input

Figure 7 shows a Transceiver without a RX IN. The **DXE RTR-1A** provides the required switching needed between the transmit antenna and the **DXE-ARAV3-1P** Active Receive antenna. Note the **DXE-FVI-1** Voltage Injector must be located inline on the active receive antenna side of the Receiver Guard. The Receiver Guard does ***not*** pass DC.

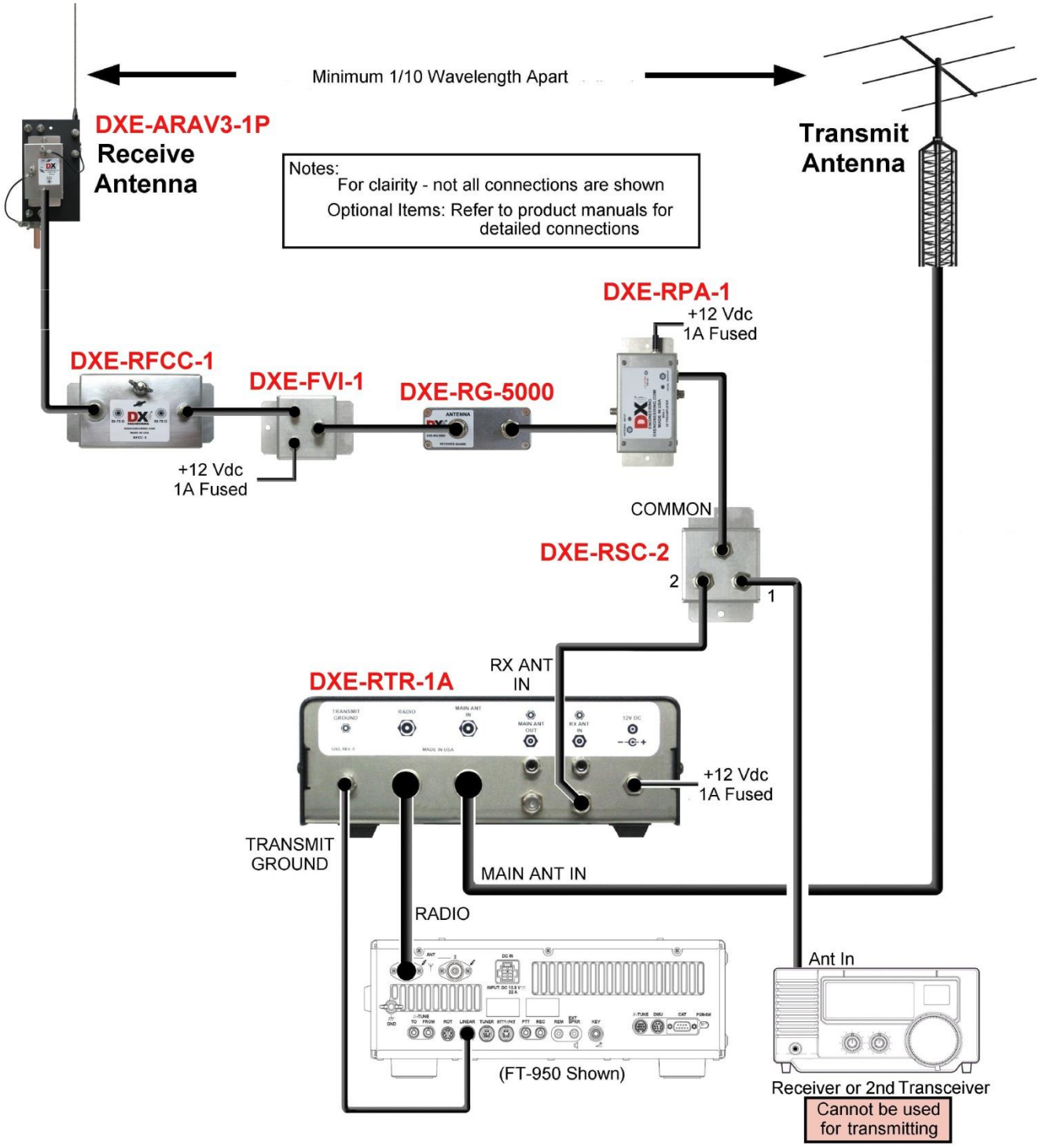


Figure 8 - System using a separate Receiver

Figure 8 expands further on **Figure 7** by using a separate receiver in conjunction with the **DXE-RSC-2** 2-Port Splitter / Combiner to allow using the receiver. Note the **DXE-FVI-1** Voltage Injector must be located inline on the active receive antenna side of the Receiver Guard. The Receiver Guard does ***not*** pass DC.

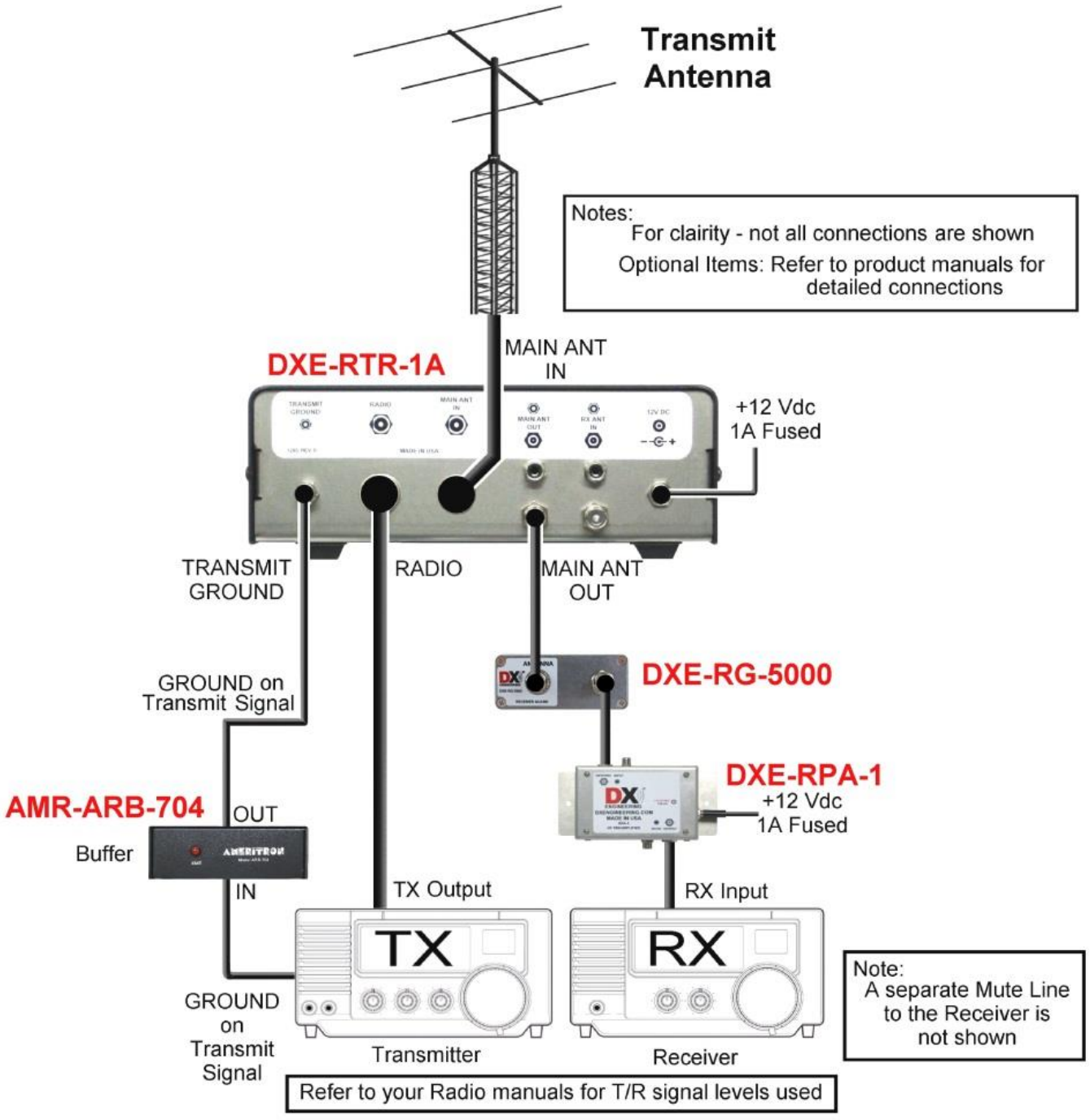


Figure 9 - Classic T/R Relay application used with the DXE-RTR-1A and the DXE-RG-5000

Figure 9 shows a classic transmitter and receiver combination using the **DXE-RTR-1A** along with the Ameritron **AMR-ARB-704** to provide the switching needed. The **DXE-RG-5000** Receiver Guard is shown in-line with the **DXE-RPA-1** Receive Preamplifier.

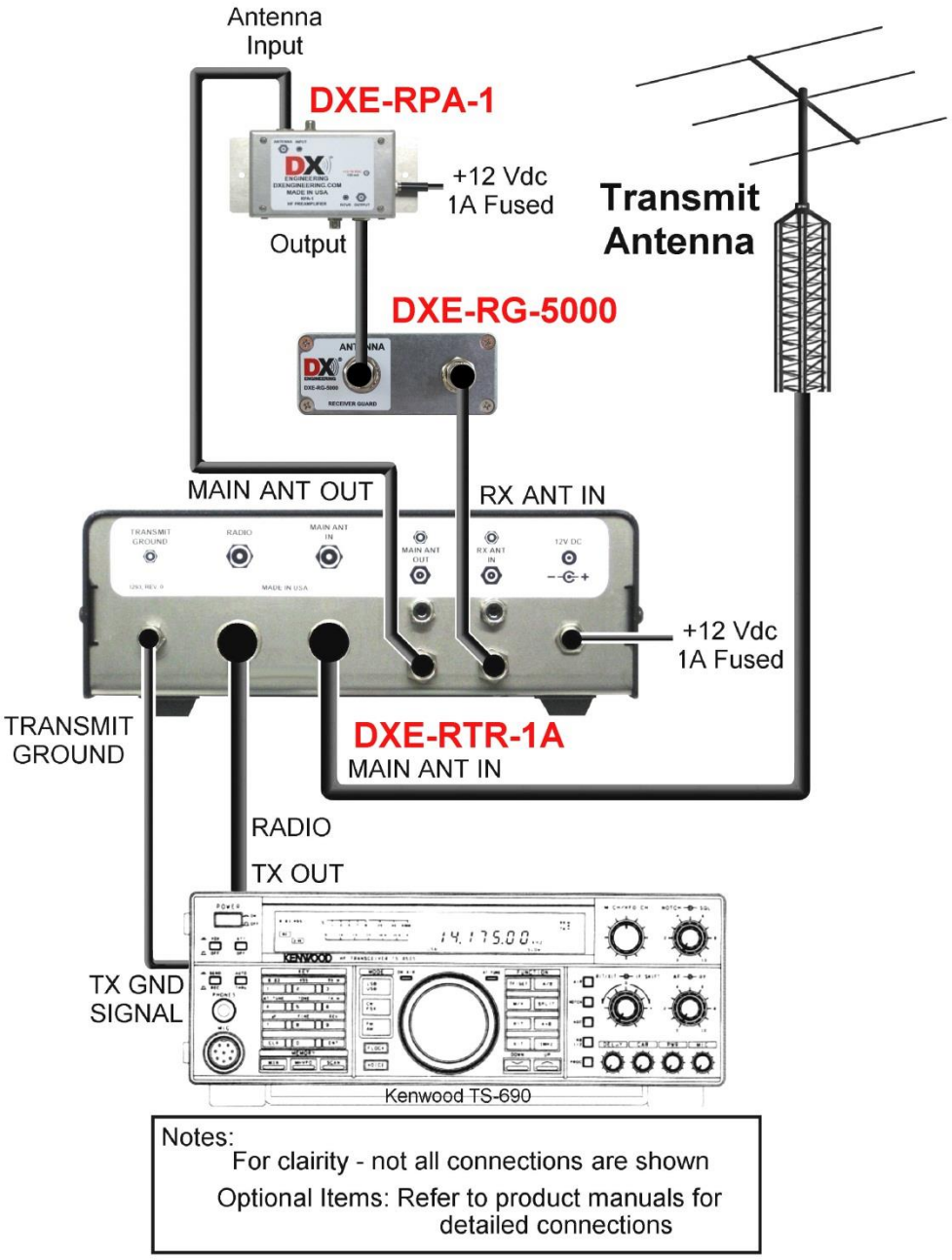


Figure 10 - Adding the DXE-RG-5000 Receiver Guard to a transceiver without separate RX input and using one antenna for Transmit and Receive

Figure 10 shows the **DXE-RG-5000** Receiver Guard being used with a Kenwood TS-690 system that uses one antenna for both transmit and receive and the transceiver does not have a separate RX IN connection. To accomplish this task, the **DXE-RTR-1A** Receive Antenna Interface provides the needed switching between transmit and receive. The popular option of the **DXE-RPA-1A** Receive Preamplifier is also shown.

Optional Items

DXE-1155 Connector Adapter - BNC Male to F-Type Female

DX Engineering Coaxial RF Connector Adapters feature a wide selection of high quality coaxial adapters. These adapters are used for changing connectors to different types and genders as well as connecting RF cables and equipment with different types of connectors.

DXE-1140 Connector Adapter - RCA Male to BNC Female

DX Engineering Coaxial RF Connector Adapters feature a wide selection of high quality coaxial adapters. These adapters are used for changing connectors to different types and genders as well as connecting RF cables and equipment with different types of connectors.

DXE-RLP-75FF - Lightning Protector, Receive 75Ω, DC Pass, F Conn

Unique In-Line® design is impedance matched to 75Ω and is virtually transparent to all analog or digital bi-directional signals from DC to 1.0 GHz. Tii's patented proprietary coaxial gas tube surge protector is equipped with an integral fail short mechanism for a power-cross condition which shunts both the coaxial cable's center conductor and sheath for a common path to ground. The protection element is designed to reset after each over voltage event. Metallic housing of the Tii In-Line® Coaxial Lightning Surge Protector provides necessary EMI shielding. When properly connected the protector is environmentally sealed (15 psi) to prevent ingress of moisture and humidity encountered in broadband pedestals, vaults and stand alone applications.

DX Engineering RG-8X 50-ohm BNC Coaxial Cable Assemblies

DX Engineering RG-8X 50-ohm BNC Coaxial Cable Assemblies are low-loss, foam-dielectric, braided shield cable intended for moderate-power VHF/UHF stations or mobile or portable applications where short runs and flexibility are key factors. Slightly larger than RG-58 cable, DX Engineering 8X offers better handling characteristics, good shielding, and low loss. Our RG-8X 50-ohm BNC Coaxial Cable Assemblies come complete with high-quality nickel-body Delrin-dielectric BNC connectors. Their machine-crimped shields feature 360 degrees of complete mechanical and electrical contact for maximum reliability. Their gold-plated center conductors are hand soldered and inspected. All DX Engineering Cable Assemblies are Hi-Pot tested and heat-shrink weather-sealed for the ultimate in service longevity.

Part Number	Description
DXE-8XDB002	BNC Male to BNC Male RG-8X Coaxial Cable Jumper - 2 feet long
DXE-8XDB003	BNC Male to BNC Male RG-8X Coaxial Cable Jumper - 3 feet long
DXE-8XDB006	BNC Male to BNC Male RG-8X Coaxial Cable Jumper - 6 feet long
DXE-8XDB012	BNC Male to BNC Male RG-8X Coaxial Cable Jumper - 12 feet long
DXE-8XDB025	BNC Male to BNC Male RG-8X Coaxial Cable Jumper - 25 feet long
DXE-8XDB050	BNC Male to BNC Male RG-8X Coaxial Cable Jumper - 50 feet long

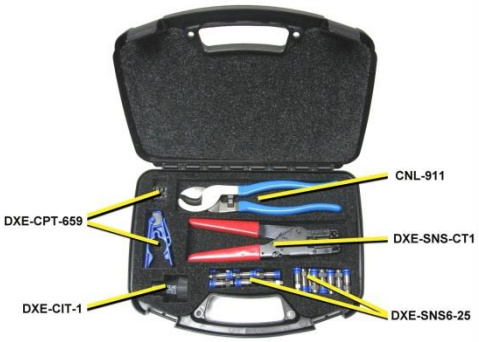
DXE-F6-1000 - 75Ω F-6 Style Direct Bury Coax, 1000 ft. Spool Hi Quality "Flooded" Coax

Center Conductor: 18 AWG Copper-Clad Steel, Nominal Diameter: 0.040 in.
Dielectric: Gas Expanded Polyethylene, Nominal Diameter Over Dielectric: 0.180 in.
Shield: 1st Shield: Aluminum-Polypropylene-Aluminum, Laminated Tape with overlap Bonded to the Dielectric, Nominal Diameter Over Tape: 0.187 in.
2nd Shield: 34 AWG Aluminum Braid Wire, 60% Coverage
Jacket: PE (Flooded for Underground), Nominal Diameter Over Jacket: 0.272 in., Nom Jacket Thickness: 0.030 in.
Electrical Properties: Impedance: 75.0 +/- 3.0 Ω, Velocity of Propagation: 85.0% Nominal
Sold by the spool, or as Custom Cable Assemblies

DXE-UT-KITF - F-Connector Coaxial Cable Prep Tool Kit

This cost-saving kit provides a handsome, convenient carrying case complete with the DX Engineering F-6 coaxial cable prep tools and accessories. It features a rugged, lockable enclosure fitted with a precut foam insert with a home for each tool.
The **DXE-UT-KITF** kit provides the case complete with the following:

DXE-CPT-659- Stripping Tool for RG-59/F-6 size cable w/extra blades
DXE-SNS6-25 - Snap-N-Seal Watertight F Connectors - qty. 25 pcs
DXE-SNS-CT1 - SNS Connector Compression Tool
CNL-911 - Coaxial Cable Shears
DXE-CIT-1 - F Connector Tightening Tool



DXE-SNS6-25 - Watertight Coax Connector, Snap-N-Seal for CATV F-6 Cable, 25 pieces

Snap-N-Seal is an environmentally sealed CATV F coax connector system for harsh environments. The connectors have a unique, 360 degree radial compression system that offers the signal leakage protection required for high performance receive systems.

- Quad sealed system prevents moisture from migrating into the connection
- 360 degree radial compression provides superior RF integrity (-95 dB typical, 60% bonded foil cable)
- Easy cable preparation
- Connector to cable retention of 40 lbs minimum
- Superb impedance match to 1 GHz
- Manufactured of high quality 360 brass, cadmium plated with yellow chromate coating for maximum corrosion resistance
- UV-resistant plastic and O-rings provide a reliable environmentally sealed connector

An installation tool, such as the **DXE-SNS-CT1**, is required to install the connectors. Normal crimping tools or pliers will not work.

DX Engineering RG-6/U 75-ohm Quad-Shield Coaxial Cable Assemblies

DX Engineering RG-6/U 75-ohm Quad-Shield Coaxial Cable Assemblies are constructed from premium DX Engineering brand RG-6/U 75 ohm cable and superior quality weather-sealed nickel-plated compression F connectors. Their best-in-class design reduces loss and provides greater protection against electromagnetic interference. Available in specific lengths between 3 ft. and 200 ft., these pre-assembled cables with F connectors are your most convenient ultra-high quality RG-6/U cable solution.

The RG-6/U cable assemblies are ideal for many applications such as active or passive HF Amateur Radio receive antenna systems, magnetic loop antennas, Beverage antennas, over the air TV reception, FM broadcast reception, CATV systems, raw video distribution and satellite radio installations like Sirius/XM.

DX Engineering RG-6/U cable assemblies have gas-injected polyethylene foam dielectric for flexibility and moisture resistance. Their 18 AWG center conductor is copper-clad steel and is durable. There are two foil shields plus two high-density aluminum braids for ultimate four-layer RF shielding. The UV protected black exterior jacket is tough PVC (polyvinyl chloride). DX Engineering RG-6/U cable impedance is 75 ohms with an 83 percent velocity factor. This is absolutely the best RG-6/U cable available and is also RoHS compliant.

Part Number	Description
DXE-RG6UQF003	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 3 foot length
DXE-RG6UQF006	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 6 foot length
DXE-RG6UQF012	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 12 foot length
DXE-RG6UQF025	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 25 foot length
DXE-RG6UQF050	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 50 foot length
DXE-RG6UQF100	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 100 foot length
DXE-RG6UQF150	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 150 foot length
DXE-RG6UQF200	Coaxial Cable Assembly, RG-6/U, 75 ohm, Quad Shield, Male Type F connectors - 200 foot length

Technical Support

If you have questions about this product, or if you experience difficulties during the installation, contact DX Engineering at (330) 572-3200. You can also e-mail us at:

DXEngineering@DXEngineering.com

For best service, please take a few minutes to review this manual before you call.

Manual Updates

Every effort is made to supply the latest manual revision with each product. Occasionally a manual will be updated between the time your DX Engineering product is shipped and when you receive it. Please check the DX Engineering web site (www.dxengineering.com) for the latest revision manual.

Warranty

All products manufactured by DX Engineering are warranted to be free from defects in material and workmanship for a period of one (1) year from date of shipment. DX Engineering's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by DX Engineering. If DX Engineering's products are claimed to be defective in material or workmanship, DX Engineering shall, upon prompt notice thereof, issue shipping instructions for return to DX Engineering (transportation-charges prepaid by Buyer). Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing. The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation, damaged from severe weather including floods, or abnormal environmental conditions such as prolonged exposure to corrosives or power surges, or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's specifications. In addition, DX Engineering's warranties do not extend to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to DX Engineering. The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR DX ENGINEERING ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.

Specifications subject to change without notice.

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