



OPERATING INSTRUCTIONS CLAMPED DIPLEXER MODEL RCDX-2

The RCDX-2 is an active device for use in pulsed ultrasonic systems employing a single transmit/receive transducer (“Pulse Echo” operation). The Unit features a unique transformer/diode arrangement to deliver high power pulses to a transducer while return signals from the same transducer are transferred to a receiver. In the process the receiver is protected from overdrive, and fast recovery is provided. Active clamping of one end of the transformer connected to the pulse source is provided throughout the receive time. The clamping function is disabled during the high power pulse transmit time.

Because the process of diplexing is never perfect, additional items have been added to the unit. The first of these is a set of seven switch selectable inductors in parallel with the primary winding of the transformer with is shown as T1 in the following diagram. Their primary purpose is to destroy the low frequency response of the transformer (when that is acceptable) which will then result in further improvement in recovery time of the system. (One cause of poor recovery time is low frequency baseline distortion in the transmitted pulse when driving a highly reactive load such as a piezo-electric transducer.) The second is a set of eight switch selectable resistors across the secondary winding of the transformer. Values range from 4.75 ohms up to a total of nearly 1300 ohms. These are of value when a high impedance is presented by the receiver input, from a pre-amplifier for example. They aid in damping out transducer ringing. (If the receiver has a 50 ohm input impedance, the “Damping” control should normally be left in position “1”.) The third item is a switch selectable Diode Expander at the input of the unit. (All diodes are fast switching silicon devices with 0.7 volt thresholds.) They remove 0.7 volts of driving signal from either side of the baseline, and they also successfully block any leakage (including noise) from the transmitter from appearing at the receiver input. (If the driving pulse level is set very low, the Diode Expander should not be used because it will produce severe baseline distortion in the pulse.) The fourth item is a pair of attenuators (1 and 2 dB), under switch control, which can be switched into the transmit/receive system to serve as a load for the transmitter to aid in improving the quality of the driving pulse when a highly reactive load such as a ceramic piezo-electric transducer is used.

The inductors in the "Low Frequency Cut-Off" control decrease in value as do the resistors in the "Damping" circuit when their respective switches are turned clockwise. For exact component values in any given switch position, refer to the schematic diagram.

To use this Diplexer connect the "In" connector on the RCDX-2 to the "High Power R. F. Pulse Out" on the pulse source using a short BNC cable; connect the "Out" connector of the RCDX-2 to the transducer via an appropriate length coax cable; connect the "To Rec." connector to the input of the receiver; and connect the "Gated Amp. Pre-Gate Monitor" on the rear panel of the RAM to "Pos. Gate" input on the RCDX-2. In addition, the power cable supplied with the unit must be connected from the rear panel of the RAM to the RCDX-2. A second power output is available on the RCDX-2 if a pre-amplifier is to be used.

Frequency for the RCDX-2 extends from below 50 kHz to above 20 MHz. Adjustment of the various switch selectable items is usually carried out on a trial-and-error basis for best overall performance of the pulser/receiver system.

The Diplexer supplied with High Power RAM unit has been modified for high voltage operation. It will withstand R.F. voltages in excess of 2000 volts peak-to-peak.