



OPERATING INSTRUCTIONS FOR THE RDX-EM2 EMAT DIPLEXER

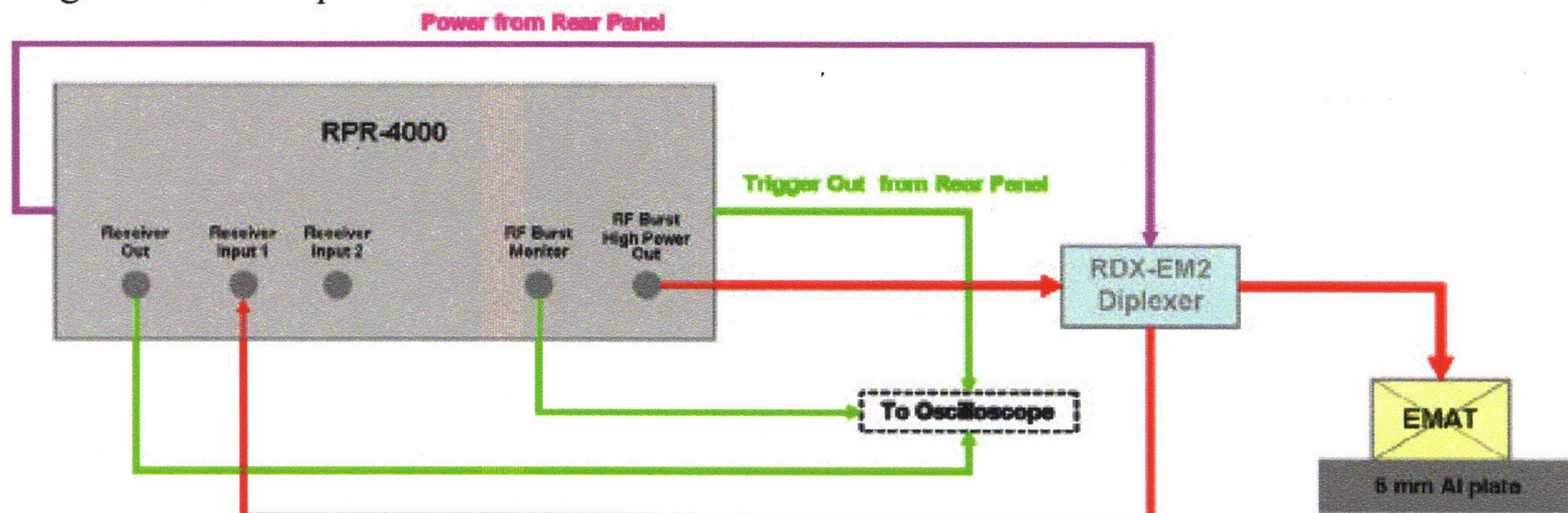
The RDX-EM2 Diplexer is an active device for use in pulsed ultrasonic systems employing a single transmit/receive EMAT (“Pulse Echo” operation). The unit features a unique resistor and diode arrangement to deliver high power RF pulses to an EMAT while return signals from the same EMAT are transferred to a receiver via a 20dB pre-amplifier. In the process, the receiver is protected from overdrive, and a fast recovery is provided.

To use this diplexer, connect the “IN” connector on the RDX-EM2 to the “High Voltage RF PULSE OUTPUT” connector on the pulse source using a short BNC cable. Connect the “OUT” connector on the RDX-EM2 to an appropriate EMAT and connect the “TO REC.” connector to the input of the receiver.

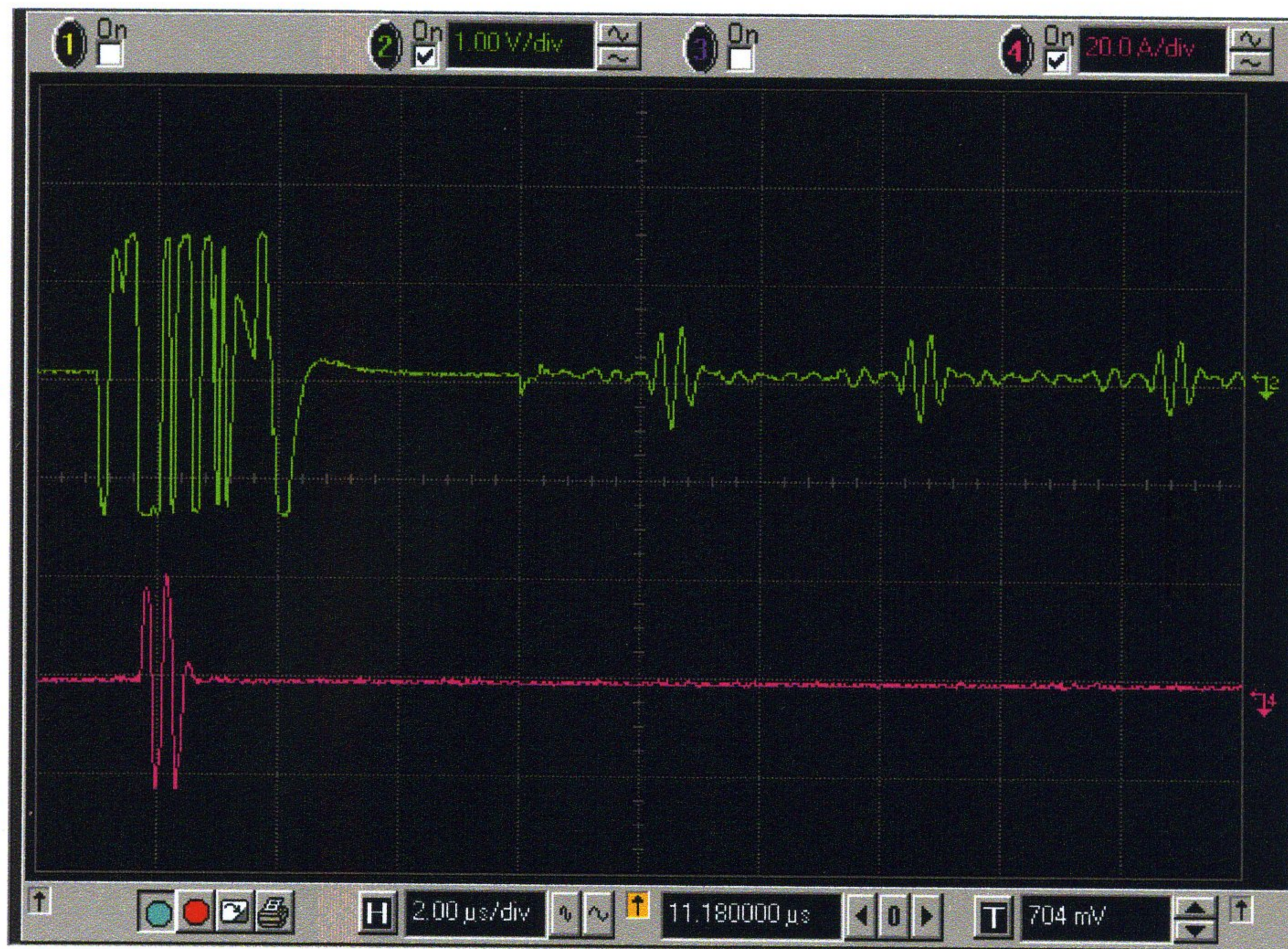
The knob on the side labeled “LOW FREQ CUT-OFF” switches in a shunt inductor to ground at the input of the pre-amplifier. This knob allows the user to adjust the low frequency cutoff. The table below lists the -3dB points of the diplexer at the different positions. The upper -3dB frequency is 10.3 MHz.

Position	1	2	3	4	5
-3 dB frequency [kHz]	3.0	210	480	850	2100

The low frequency cut-off knob can be used to improve the recovery time of a receiver by protecting the receiver from signals that can cause blanking and overdrive. A pulse-echo measurement using an RPR-4000 and an RDX-EM2 was done. A spiral coil EMAT was used on a 6 mm thick aluminum plate. The output of the diplexer was fed into the receiver of the RPR-4000, and the current present in the EMAT was monitored with a current probe. A block diagram of the setup is shown below.



The figure below shows the output of the receiver with the knob at position 1 (top trace, green) and the output of the current probe (lower trace, red). The first shear wave echo in the plate is lost during the receiver recovery period.



By adjusting the low frequency cut-off knob, the first echo is recovered, as shown in the figure below.

