6.1A T/R SWITCH DESIGN FOR SHORT-RANGE MEASUREMENTS

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The PIN diode switch is designed to protect the receiver from burnout or damage on transmission and channel the echo signal to the receiver on reception. The transmitter peak power of Urbana Radar is a megawatt or more. The receiver must be protected firmly.

A schematic diagram of a TR-ATR switch for the Urbana Radar shown in Figure 1. The T/R switch consists of a half wavelength coaxial cavity with tuning condenser and PIN diodes.

PIN diodes UM4300 produced by Unitrode Corporation are selected for the system. Two UM4300 PIN diodes were mounted between the inner and outer conductor. The dc biasing voltage required for the PIN diodes is supplied by a control circuit. On transmission, the PIN diodes are forward biased to about 0.5 amperes. On reception, about 10 volts reverse voltage is applied to the diodes, which produces an initial reverse current to speed the recovery time.

The T/R switch characteristics were estimated by testing on the Urbana Radar. Figure 2 shows the result of testing at different peak transmitter powers from 410 kW to 1500 kW.

The next step is that we are going to mount 4 PIN diodes on a circle in coaxial line to suffer more transmitter power. The cross section of the 4 PIN diodes T/R switch is shown in Figure 3.

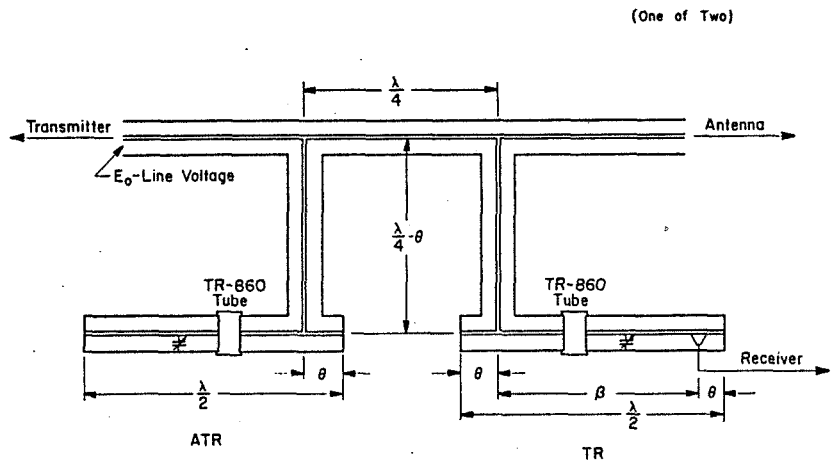
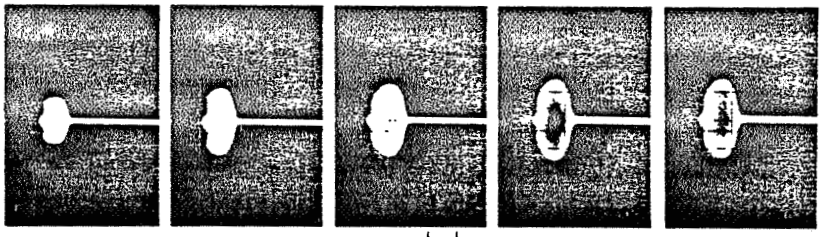


Figure 1. TR-ATR switch of the Urbana radar.



	1	2	3	4	5
Average Power	3.3 kW	5.5 kW	7.3 kW	9.8 kW	12.1 kW
Peak Power	410 kW	690 kW	910 kW	1230 kW	1500 kW
H. V.	16 kV	18 kV	20 kV	22 kV	24 kV
R. V.	17 V	23 V	27 V	30 V	31 V
Receiver Isolation	54.5 dB	54.1 dB	54.0 dB	54.3 dB	54.9 dB

Figure 2. The result of testing in different transmitter powers.

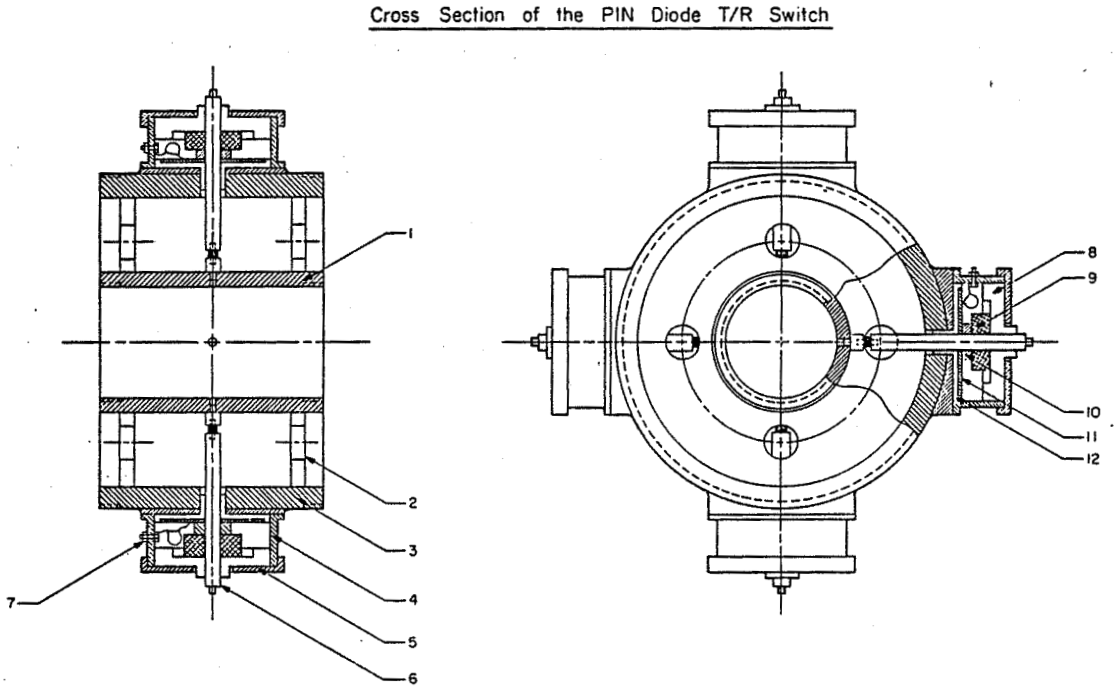


Figure 3.