PULSAR TRANSMITTER
AND
RECEIVER TECHNICAL
CHARACTERISTICS

TECHNICAL CHARACTERISTICS
OF THE
PULSAR DIGITAL SOLID-STATE RADAR SYSTEM

1.0   System Overview

The Pulsar Digital Solid-State Radar System consists of a fully coherent transmitter, receiver, digital signal processor and a horizontally polarized 1.7 degree pencil shaped beam antenna, with the capability to be scanned over a hemispherical volume consisting of 360 degrees in Azimuth and 0 to 90 degrees in elevation. The digital signal processor employs algorithms to process weather events for display, including "rainfall rate", "radial wind velocities", "turbulence", and rainfall accumulation. These weather data are made available to the Meteorologist for analysis and dissemination.

2.0   Technical Characteristics

The following tables describe the technical characteristics of the Pulsar Digital Solid-State Radar System Transmitter and Receiver:

2.1   Transmitter Characteristics

Nomenclature	Comments
Transmitter Type	Pulsed Solid-State Coherent Power Amplifier (SSPA)
Operating Frequency	Tunable from 5400MHz – 5700MHz
Duty Cycle	3% typical, 5% maximum
PRF	Preset Modes, ranging from 300pps – 3000pps
Pulse Widths	Preset Modes, ranging from 0.5μsec - 80μsec
Peak Pulse Power	125 Watt modules, power added to generate pulse power levels from 250W – 10kW when combined
TR Switch	3-port Circulator with Solid-State TR limiter

2.2   Receiver

Nomenclature	Comments
Receiver Type	Fully Coherent Superheterodyne, employing triple up conversion from a 60MHz source in the Signal Processor
Noise Figure	3dB maximum
UP/Down Block Converter	Digitally Tuned Phase Lock Loop (2)
Intermediate Frequency	60MHz, stable frequency or non-linear chirped (+/-2MHz) in pulse compression
IF Processor	IF is Digitized to 14-bits and couple to the digital signal processor, Digitizer rate is ~74MHz
Receiver Bandwidth	Matched Filter of 1/tau implemented digitally by the signal processor

Dynamic Range	Dependent on receiver bandwidth, ranges fro 90dB to 110dB
Sensitivity	As low as -130dB in wide pulse
Range Normalization (STC)	Algorithm, digitally applied in processor that is equal to $1/r^2$