2.1.1 HARDWARE REQUIREMENTS: A NEW GENERATION PARTIAL REFLECTION RADAR FOR STUDIES OF THE EQUATORIAL MESOSPHERE

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A new partial reflection radar is being developed for operation at the proposed Equatorial Observatory. The system is being designed to make maximum use of recent advances in solid-state technology in order to minimize the power requirements. In particular, it is planned to use a solid-state transmitter in place of the tube transmitters previously used in PR systems. Solid-state transmitters have the advantages that they do not need high voltage supplies, they do not require cathode heaters with a corresponding saving in power consumption and parts are readily available and inexpensive; the cost of high voltage vacuum tubes is becoming prohibitive. It should be possible to achieve 25 kW peak powers with recently announced fast switching transistors. Since high mean powers are desirable for obtaining good signal-to-noise ratios, it is also planned to phase code the transmitted pulses and decode after coherent integration.

All decoding and signal processing will be carried out in dedicated microprocessors before the signals are passed to a microcomputer for on-line analysis. Recent tests have shown that an Olivetti M24 micro (an IBM compatible) running an 8-MHz clock with a 8087 coprocessor can analyze data at least as fast as the minicomputers presently being used with the Adelaide PR radar and at a significantly lower cost. The processed winds data will be stored in nonvolatile CMOS RAM modules; about 0.5 to 1 Mbyte is required to store one week's information.

By using solid state, a modularized construction and keeping the use of moving parts to a minimum (i.e. no tape or disk drives) the system will be more rugged and compact than previous systems and will be significantly more power efficient. These are important considerations when the system will be used in a hot and humid environment.