7.3.4.4 Technological Choices/Alternatives

Table 7-12 summarizes possible alternative technologies used in radars. It is divided into three columns representing the antenna, the transmitter and the receiver/signal processor. Technology chosen for the example design is set in heavier type and underlined. thus we have a system with a 1 m diameter mechanically scanned reflector (flat plate Cassegrain) with a crossed field amplifier of the coaxial magnetron type. The radar processing is incoherent and angular information is derived from monopulse sum and difference signals.

The configuration of the radar upon the sensor platform is illustrated in Figure 7-7, with all the various assemblies constituting the radar indicated separately. The two orthogonal diffference channels are multiplexed pulse-pulse (or burst-burst) down a single channel.

A single redundant receiver was assumed, which may be used for either the sum of difference channel in case of failure. A single redundant tube has also been assumed.

The radar has an estimated mass of 83 kg and a DC power requirement of 280 W.

7.3.4.5 Summary on Paxsat Space Segment Radar

All existing space-space radar systems depend upon cooperative target transponders for ranges greater than a few tens of a kilometer.

Ranges of several hundres of kilometers will require powerful high powered amplifiers and large antennas. The radar technology is feasible but the impacts upon the size, mass and maneuverability of the satellite are highly undesirable.

The final configuration chosen was designed to give several tens of a kilometer range with an aperture limited to 1 m diameter. To keep the mass down, magnetrons were chosen as the RF source. The cost is a high peak power and the need to pressurize much of the high power circuitry.