7.3.4.1 System Trade-offs (Continued)

Table 7-9 shows the result of a typical frequency trade-off for constant beamwidth and a particular set of requirements on maximum range, tracking accuracy, etc.

7.3.4.2 Example C-Band Designs

One of the most critical technologies for any radar is the high power amplifier HPA (RF) generator.

C-band was chosen for the initial calculations because of the accessibility of space qualified technology in this frequency band. The US, Canada and the Europeans are engaged in programs to develop space qualified C-band HPA's.

The Canadian program calls for a 5.3 GHz (C-band) amplifier with mean power capability of 500 W and a peak power capability of 10 kW. The HPA is being developed for the Radarsat program which is scheduled for a 1990 launch. The Europeans are developing a slightly lower power (300 W) device for the ERS-1 (Earth Resources Satellite) program. At least one American company is working on solid-state C-band amplifiers for the NASA SIR (Shuttle imaging radar) program.

Operating the proposed Canadian HPA at its peak and mean power limits (and assuming they could be achieved simultaneously with a rather diffirent pulse length than the that proposed for Radarsat), it was found that an antenna diameter of about 2.5 m was required to obtain 200 km range. The relevant radar parameters used for this example option are listed in Table 7-10.

This example design had a number of major drawbacks in its resource deamnds upon the satellite.

(a) The power drain upon the satellite was very high.

(b) The HPA itself is very heavy (approximately 80 kg).

(c) The aperture of 2.5 m by 2.5 m was considered too large.

The following paragraphs take each of these objections in turn and indicate what may be done to overcome them.