7.3.2.1 Summary or Ground Based Radars (Continued)

Example calculations demonstrating SEEM results used a satellite altitude of 400 km and radar accuracies as quoted to in Table 7-5. The resulting ephemeris prediction errors are shown in Figure 7-6, for the case of a single horizon-to-horizon observation of the satellite with unknown bias errors as shown in Table 7-4.

As can be seen from Figure 7-5, (reproduced from [53]), the dominant error is the along track prediction, which reaches a value of some 100 km after 9 hours. This may be substantially reduced by calibrating out bias errors and making multiple observations.

7.3.3 Existing Spaceborne Radar Systems

Three existing spaceborne radars have been identified which perform similar functions to that required of the Paxsat space segment. These are:

(a) Gemini Docking Radar

(b) Apollo Docking Radar

(c) STS (shuttle) Acquisition and Tracking Radar

Table 7-6 lists the radars with frequency and function. As can be seen from the table, Gemini and Apollo operated in a transponder (SSR) mode only. Table 7-7 gives a more detailed comparative assessment of these two systems [54].

The STS Ku-band system combines both communication and radar system [55,56,57]. The radar system can operate in either a transponder (SSR) or a skin return mode. However, the skin return mode maximum range is 19 nm against a 6.3 m^2 target. This is probably insufficient for the Paxsat mission. Figure 7-6 is a graph of predicted range measurement accuracy for the STS Ku-band radar [56]. It shows predictions by two different companies (Aximatic and Hughes) as well as the specified requirement on the same graph.