P-989 SATELLITE CONFIGURATION

The FARRAH system concept combines collection features of the present URSALA and RAQUEL missions and incorporates the technological improvements of the 1970s to produce a SIGINT collector which can satisfy general ELINT search, operational ELINT collection, and technical ELINT collection requirements. The FARRAH satellite, which is compatible with either the HEXAGON host or the Space Transportation System (STS), represents a significant improvement within the P-989 program for low-altitude satellite SIGINT collection.

Two factors facilitated the increased FARRAH collection capabilities. First, structurally improved pylons on the HEXAGON host permit increased weight; and; second, reduction of payload size by the use of microwave, integrated-circuit technology provided additional volume. This increased capacity permits simultaneous satisfaction of multiple missions (e.g., general ELINT search, operational ELINT collection, and technical ELINT collection) with greatly improved parameter-measurement accuracy.

The payload has independently-programmable Direction Finding (DF) and Omni Directional (Main Beam) receiver channels which cover 2 GHz to 18 GHz in 2 GHz frequency increments (bands). Frequency band switching will permit up to 14 GHz of frequency coverage per payload readin for all geographic areas observed by the DF antennas. The payload will measure and digitize the typical P-989 collection parameters of frequency (freq),

25X1

The payload will be fed by an improved array of antennas. A guard-band antenna will be used to suppress "pokethru" on the near-in sidelobes of the DF antennas. The three DF antennas will each have an improved, four-element, monopulse feed. The omni-directional antennas will feed the omni-directional (Main Beam) receiver and provide protection against pokethru for far-out sidelobes and backlobes of the DF antennas.

Improved antenna and payload performance greatly increases geopositioning accuracy. FARRAH will locate emitters with [redacted] degree accuracy on a single spin of data, as compared to the present [redacted] degree on three spins of data for URSALA and RAQUEL. The geopositioning improvements will permit the pulse-by-pulse geolocation results to be used as a powerful pulse deinterleaving tool for emitters with sophisticated modulation. 25X1

The expanded and improved payload capabilities will be supported by several spacecraft modifications. The power and command subsystems will be improved. The payload pulse code modulation data will be encrypted, and a lockout timer will be integrated into the command system. This provides for protection of all digital downlink data and prevents command access by unauthorized sources. A 13 to 1, 10 MHz bandwidth analog data compressor will be included, providing the collection of technical intelligence through a 10 MHz compressed bandwidth. This permits fine-grain analysis of the characteristics of intercepted pulse signals. The FARRAH system will have a 30-month Mean Mission Duration (MMD) and will be compatible with the Satellite Control Facility (SCF), the HEXAGON host, and the P-989 basic spacecraft. An option has been developed to include on-board data processing.

FARRAH is a strong SIGINT collector which could complement high-altitude SIGINT collection in the 1980s by performing the following tasks.

- Wide geo-frequency search.
- High-frequency coverage.
- CW signal locations.
- Exotic signal search and deinterleave capability.
- World-wide collection.
- Target main beam access.
- Sensitivity against signal sidelobes.