989

1. PROGRAM DESCRIPTION

a. Baseline

A baseline 989 Program has been developed as a result of the ELINT Interaction Study which will emphasize the unique capabilities of the P-989 satellites while defining a new 989 low orbit satellite system within the program budget. The unique P-989 capabilities projected for the 1980-1984 time frame are primarily high sensitivity sidelobe intercept of pulse and CW signals in the frequency range 8 to 18 GHz in support of Operational ELINT and Search (for new and unusual signals) missions. The unique TI capability of RAQUEL I and RAQUEL IA for known emitters [redacted] The all URSALA Program, after RAQUEL IA, is the least expensive program and offers the potential for reducing the Satellite Control Facility support to as few as one or two Remote Tracking Stations in about 1979. This would not be practical with an all RAQUEL Program. Definition of a new P-989 low orbit satellite to operate in a complementary manner [redacted] This effort would emphasize the ELINT Interaction Study findings, which show that a low orbit satellite system can be built using demonstrated technology to: (1) operate with a single CONUS Ground Tracking Station (no SCF support); (2) process Operational ELINT data on-board the satellite in real time; (3) relay processed Operational ELINT data in real time to field users; (4) [redacted] (5) store Technical ELINT data on-board for later readout; (6) cover the frequency range 2 to 42 GHz; (7) provide both mainbeam and sidelobe collection capability; [redacted] 95% confidence, or better; (9) have secure uplinks and downlinks; (10) use spacecraft developed and flown by other programs; and (11) use payload and antenna designs developed by SAFSP. Cost-effective trades could be made to take maximum advantage of demonstrated low orbit technology by defining a new low orbit ELINT satellite [redacted]

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The Baseline Program consists of launching URSALA III (2 to 12 GHz-Search and Operational ELINT Mission) in July 1976, continuing the development of RAQUEL IA (4 to 18 GHz - Search/TI Mission), maintaining URSALA IV (2-12 GHz - Search & Operational ELINT Mission) in launch ready condition until RAQUEL IA is launched then modifying it to an URSALA IVR configuration (4 to 18 GHz-Search and Operational ELINT Mission). URSALA IVR will be launched to replace RAQUEL IA. URSALA V will be equivalent to URSALA IVR and will be launched to replace URSALA IVR. The Baseline Program also supports development of a SIGINT Pallet (26 to 42 GHz-Search Mission) to provide additional coverage from the Host Satellite Vehicle.

The Baseline Program provides one satellite on-orbit to cover the 4 to 18 GHz frequency range. It also provides for support of satellites in development and those on orbit. Minor modifications required to the [redacted] 25X1 the missions and system concept for a new low orbit ELINT satellite. The Baseline Program is our recommended Program.

(1) RAQUEL IA: Provides for design, development, fabrication, test, launch, on-orbit checkout of the RAQUEL IA satellite, and the NRO portion of the supporting software. Lockheed is the prime contractor and E-Systems, the payload supplier, is the major subcontractor.

(a) FY77: Complete the RAQUEL IA payload, integrate the payload with the spacecraft, conduct system test, and mate RAQUEL IA to the Host Vehicle.

(b) FY78: Support launch operations, configure the spacecraft for operation, and conduct on-orbit verification and validation.

(2) URSALA IVR: Provides for the modification and test of URSALA IVR satellite. Lockheed is the prime contractor and Motorola, the payload supplier, is the major subcontractor. This is a new item that has been added since it provides the least expensive method of continuing 4 to 18 GHz coverage. The present age and scheduled launch date of URSALA IV make some refurbishment essential even if the frequency is not changed.

(a) FY78: Modify the URSALA IV spacecraft and payload and convert it to an URSALA IVR with 4 to 18 GHz frequency coverage; provide for solar radiation hardening; replace parts exceeding shelf life; and add command storage and modify tape recorders to allow the option of single or dual tracking station operation.

(3) URSALA V: Provides for the design, development, fabrication, test, launch, on-orbit checkout of the URSALA V (4 to 18 GHz) satellite, and the NRO portion of the supporting software. The Build schedule is 30 months because of the start up time at Motorola. This will be a three year MMD satellite due to the long life tape recorders and the inherent redundancy of the URSALA payload.

(a) FY79-82: Design, develop, fabricate, test, integrate, launch, and check out URSALA V. Develop, validate, and verify the operational software for URSALA V.

(4) URSALA VI: Same as URSALA V.

(a) FY79-82: Design, develop, fabricate, test, integrate, launch, and check out URSALA VI. Develop, validate, and verify the operational software for URSALA VI.

(5) URSALA VII: Same as URSALA V.

(a) FY79-82: Design, develop, fabricate, test, integrate URSALA VII. Develop, validate, and verify the operational software for URSALA VII.

(6) DEFINITION STUDY: Study Low Orbit System Concepts [redacted]

(a) FY77: Define Low Orbit System Concepts in parallel with the [redacted]

(b) FY78: Perform cost effective evaluations in conjunction with [redacted] to ascertain the most cost effective High and Low Altitude ELINT system. 25X1

(c) FY79: Define a low orbit system to complement [redacted]

(7) Program Support: Provides for satellite storage, maintenance, and retest engineering support of on-orbit satellites and overall program management. Lockheed is the contractor.

(a) FY77: Provides Program Management and on-orbit support to TOPHAT II, MABELI, RAQUEL I, and URSALA III and maintains URSALA IV in storage and in launch ready condition.

(b) FY78: Provides Program Management and on-orbit support to TOPHAT II.

(c) FY79-82: Provides Program Management and on-orbit support to URSALA III, RAQUEL IA, URSALA IVR, URSALA V, and URSALA VI.

(8) Payload Techniques: Provides ELINT threat environment analysis, advanced payload receiver development, investigation and consulting support by ARGO Systems.

(a) FY77: Provide threat analysis, advanced payload receiver development and consulting support.

(b) FY78: Provide threat analysis, advanced payload receiver development and consulting support. Increases level of support to the Program Definition study and SIGINT Pallet.

(c) FY79-82: Same as FY78.

[redacted]

(a) FY77: Provides Management Operations and Manitenance to the [redacted] These tasks are performed in conjunction with NSA funded data processing, analysis, and reporting.

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(b) FY78: Same as FY77.

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(c) FY79-82: Same as FY77.

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(a) FY77: Begin converting and expanding the 989 unique software program to operate with IOS.

(b) FY78: Complete conversion effort.

(11) Mission Planning: Provides for maintenance of satellite scheduling and tasking software used by the Satellite Control Facility to generate Program 989 satellite commands. Contractor is PRC. Mission Planning Upgrade is no longer required since RAQUEL II will not be built.

(a) FY77: Maintain satellite scheduling and tasking software.

(b) FY78: Same as FY77.

(c) FY79-82: Same as FY77.

(12) SCF Mods: Provides for SCF modifications performed by various contractors to support Program 989.

(a) FY77: Perform minor modifications to SCF Satellite Test Center and Remote Tracking Stations in support of P-989 on-orbit satellites and planned satellites.

(b) FY78: Same as FY77.

(c) FY79-82: Same as FY77.

(13) Aerospace MTS: Provides Aerospace Systems Engineering support of Program 989 design, development, test, launch, operation, and data processing.

(a) FY77: Current level of five equivalent MTS will be maintained.

(b) FY78: Same as FY77.

(c) FY79-82: Same as FY77.

(14) SIGINT Pallet: Provides for design, development, fabrication, test, launch, on-orbit checkout and the NRO portion of operation and maintenance of Pallet I (26 to 42 GHz-ESE) Contractors are Lockheed (Antennas and Pallet) and ARGO Systems (Payload).

(a) FY77: Design and develop payload and antennas.

(b) FY78: Integrate, payload, antennas, and pallet; test system; develop processing system.

(c) FY79-82: Complete integration and test, launch, and operate for six months on orbit.

(15) NSA Line Items Applied to the Baseline, Alternatives 1 and 2

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GDPS Development: This line item provides the NSA portion of the ground data processing system development effort required for each of the spacecraft defined in the NRO program narrative. GDPS development schedules are identical to the spacecraft schedules.

SIGINT Experiment: This line item provides NSA funding for Pallet GDPS development and O&M.

(a) FY 77: GDPS development begins.

(b) FY 78: GDPS development is completed.

(c) FY 80: Data processing is performed for the six month flight period.

b. Alternative 1

Alternative 1 emphasizes Technical ELINT and Search and consists of the same course of action as the Baseline Program for URSALA III, RAQUEL IA, and the SIGINT Pallet. URSALA IV will be maintained in launch ready condition until RAQUEL IA is launched, then it will be modified to include solar radiation shielding and to replace parts exceeding shelf life. URSALA IV will ba launched as a replacement for URSALA III. RAQUEL IB and RAQUEL IC will be equivalent to RAQUEL IA and each will be launched to replace the previous vehicle. This alternative does not offer the potential to reduce Satellite Control Facility Remote Tracking Station support.

(1) URSALA IV: Provides for modifying URSALA IV to incorporate refurbished tape recorders, improved radiation shielding, and replace components exceeding shelf life. Lockheed is the prime contractor with Motorola, the payload supplier, as the major subcontractor.

(a) FY77: N/A

(b) FY78: Refurbish tape recorders and other parts exceeding shelf life and modify the spacecraft as described above.

(c) FY79-82: N/A

(2) RAQUEL IA: Same as Baseline Program.

(3) RAQUEL IB: Provides for the design, development, fabrication, test, launch, on-orbit checkout of the RAQUEL IB satellite and the NRO portion of the supporting software. Lockheed is the prime contractor with E-Systems, the payload supplier, as the major subcontractor.

(a) FY77: N/A

(b) FY78: Design and develop the RAQUEL IB payload and spacecraft components. Develop operational software modifications to accept the RAQUEL IB vehicle.

(c) FY79-82: Complete development and fabrication, test system, launch and checkout on-orbit performance.

(4) RAQUEL IC: Same as RAQUEL IB, except RAQUEL IC requires procurement of new basic spacecraft kit, extending build schedule to 30 months.

(a) FY79-82: Design, develop, fabricate, test, launch, and on-orbit checkout.

(5) RAQUEL ID: Same as RAQUEL IC.

(a) FY79-82: Design, develop, fabricate, test, launch and on-orbit checkout.

(6) RAQUEL IE: Same as RAQUEL IC.

(a) FY79-82: Design, develop, and fabricate.

Remaining lines same as Baseline.

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c. Alternative 2

Alternative 2 emphasizes Technical ELINT and consists of the same course of action as the Baseline Program for URSALA III, RAQUEL IA and the SIGINT Pallet. URSALA IV is the same as Alternative 1. RAQUEL II (1.5 to 10 GHz-TI Mission), RAQUEL III (0.1 to 1.5 GHz TI Mission), and RAQUEL IV (10 to 18 GHz) provide phase determination and enhanced power measurement capability. The advanced RAQUELs will be launched on two year centers. This Alternative does not offer the potential for reducing SCF Remote Tracking Station support.

(1) URSALA IV: Same as Alternative 1.

(2) RAQUEL IA: Same as Baseline Program.

(3) RAQUEL II: Provides for the design, development, fabrication, test, launch, on-orbit checkout of the RAQUEL II (1.5 to 10 GHz) satellite and the NRO portion of the supporting software including Mission Planning Upgrades. Lockheed is the prime contractor with E-Systems, the payload supplier, as the major subcontractor.

(a) FY77: N/A

(b) FY78: Develop and begin fabrication of the RAQUEL II payload and spacecraft components. Begin software development for new processing system and improved mission planning.

(c) FY79-82: Complete hardware and software and provide on-orbit checkout.

(4) RAQUEL III: Provides for procurement of mainbeam Technical ELINT satellite system with frequency converage 0.1 to 1.5 GHz. Lockheed and E-Systems are probable contractors.

(a) FY79-82: Design, develop, fabricate, test, launch, and check out on-orbit. Design and develop software.

(5) RAQUEL IV: Provides for procurement of mainbeam Technical ELINT satellite system with frequency coverage 10 to 18 GHz. Lockheed and E-Systems are probable contractors.

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(a) FY79-82: Design, develop, and fabricate. Design and develop software.

Remaining line items are same as Baseline.

d. Option I

Option I provides for fund protection in FY79, FY80, FY81 and FY82 to support transition of Program 989 to a multimission ELINT satellite designed to [redacted] 25X1 This would be a low orbit satellite designed to perform Operational ELINT, General Search, EOB update and Technical ELINT Missions. The following, features would be considered and could be included in each satellite. (1) operate with a single CONUS Ground Tracking Station (no SCF support); (2) process Operational ELINT data on-board the satellite in real time; (3) relay processed Operational ELINT data in real time to field users; (4) [redacted] 25X1 (5) store Technical ELINT data on-board for later readout; (6) cover the frequency range 2 to 42 GHz; (7) provide both mainbeam and sidelobe collection capability; [redacted] 95% confidence, or better; (9) have 25X1 secure uplinks and downlinks (10) use spacecraft developed and flown by other programs; and (11) use payload and antenna designs developed by SAFSP. By defining a new low orbit ELINT satellite and the [redacted] cost effectiveness 25X1 trades can be made to take maximum advantage of demonstrated low orbit technology.

This Option continues the effort of the Definition Study included in the Baseline and all Alternatives and provides for the design, development, fabrication, test, [redacted] and on-orbit checkout of a new satellite. Major decision milestones for this Option would be [redacted] 25X1

Cost of this Option is shown as a change to the Baseline and each Alternative. A decision in 1980 to proceed with this procurement would result in cancellation of the last two satellites of the Baseline and each Alternative, i.e., approval of this Option would result in cancellation of plans in the Baseline to procure URSALA VI and URSALA VII and application of funding for those satellites to this Option. In Alternative I, RAQUEL ID and RAQUEL IE would be cancelled. In Alternative II, RAQUEL III and RAQUEL IV would be cancelled.

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This Option when included with the Baseline P-989 program and combined with [redacted] have a total cost less than the combined SIGINT wedge, [redacted] and approved P-989 program. 25X1

This Option is recommended for approval.

(1) SAT I: Define, develop, fabricate, and launch a new satellite which will have multiple mission ELINT capabilities [redacted]

(a) FY 77: N/A

(b) FY 78: N/A

(c) FY 79-82: Conduct in-depth funded competitive system definition studies, design, and develop new satellite. Procurement time is four years.

(2) SAT II: Design, develop, fabricate, launch a low orbit satellite.

(a) FY 79-82: Design, develop, and fabricate a multimission satellite.

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e. Option II

Option II applies to the Baseline and all Alternatives

[redacted] 25X1

(a) FY77: N/A

(b) FY78: Initiate engineering, planning, and start the move.

(c) FY79-82: [redacted] 25X1

25X1

[redacted]

[redacted]/UTILIZATION

Fund Source	FY 77	FY 78	FY 79	FY 80	FY 81	FY 82
NRO	4.4	4.9	5.3	5.7	6.2	6.6
NSA	5.1	5.6	6.1	6.7	7.4	8.2
Program Utilization						
989						
NRO	3.0	3.3	3.6	4.0	4.4	4.8
NSA	4.9	5.4	5.9	6.4	7.1	7.9

[redacted]

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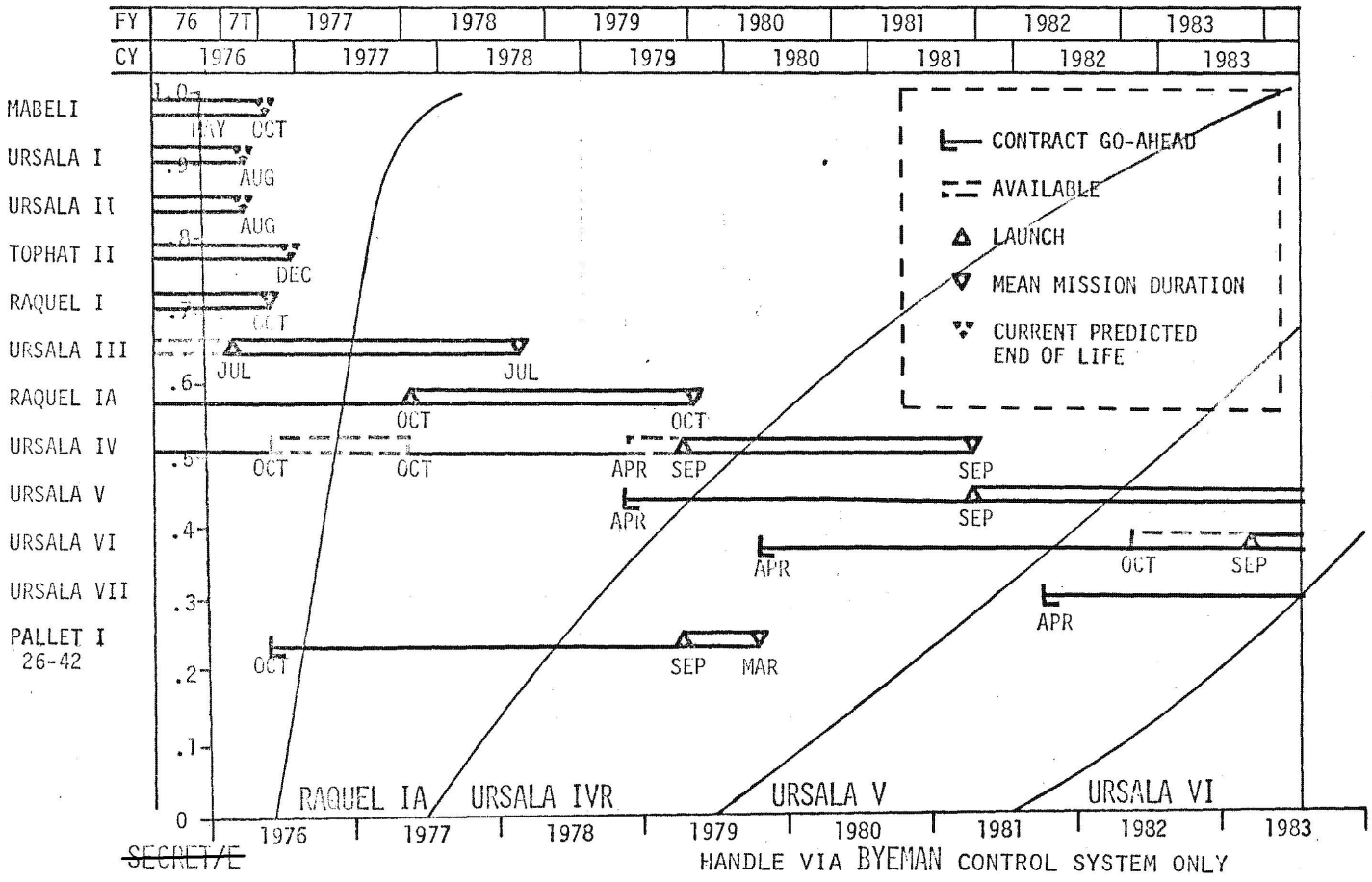
AVAILABILITY AND GAP ANALYSIS

	AVAILABILITY	EXPECTED GAPS	0-6 MO	6-12 MO	12-18 MO	18 MO
BASELINE	0.665	2.732	19.3	40.9	29.6	10.2
ALTERNATIVE I	.674	2.711	18.7	43.6	28.7	9.0

2. LAUNCH AVAILABILITY AND MILESTONES

PROBABILITY OF NEED 4 - 18 GHz
PROGRAM 989 --- BASELINE



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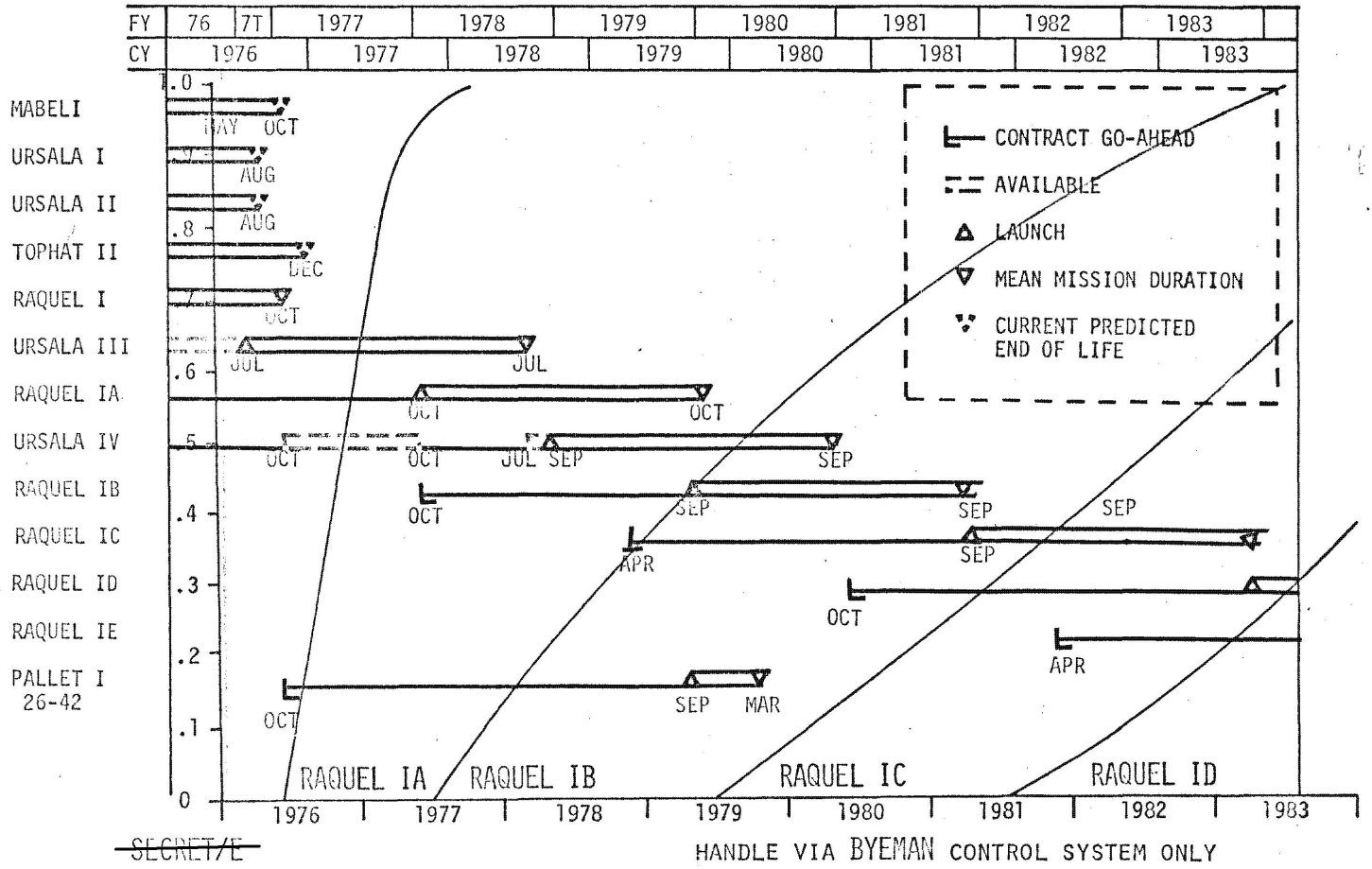
2. LAUNCH AVAILABILITY AND MILESTONES

PROBABILITY OF NEED 4 - 18 GHz

PROGRAM 989 --- ALTERNATIVE I



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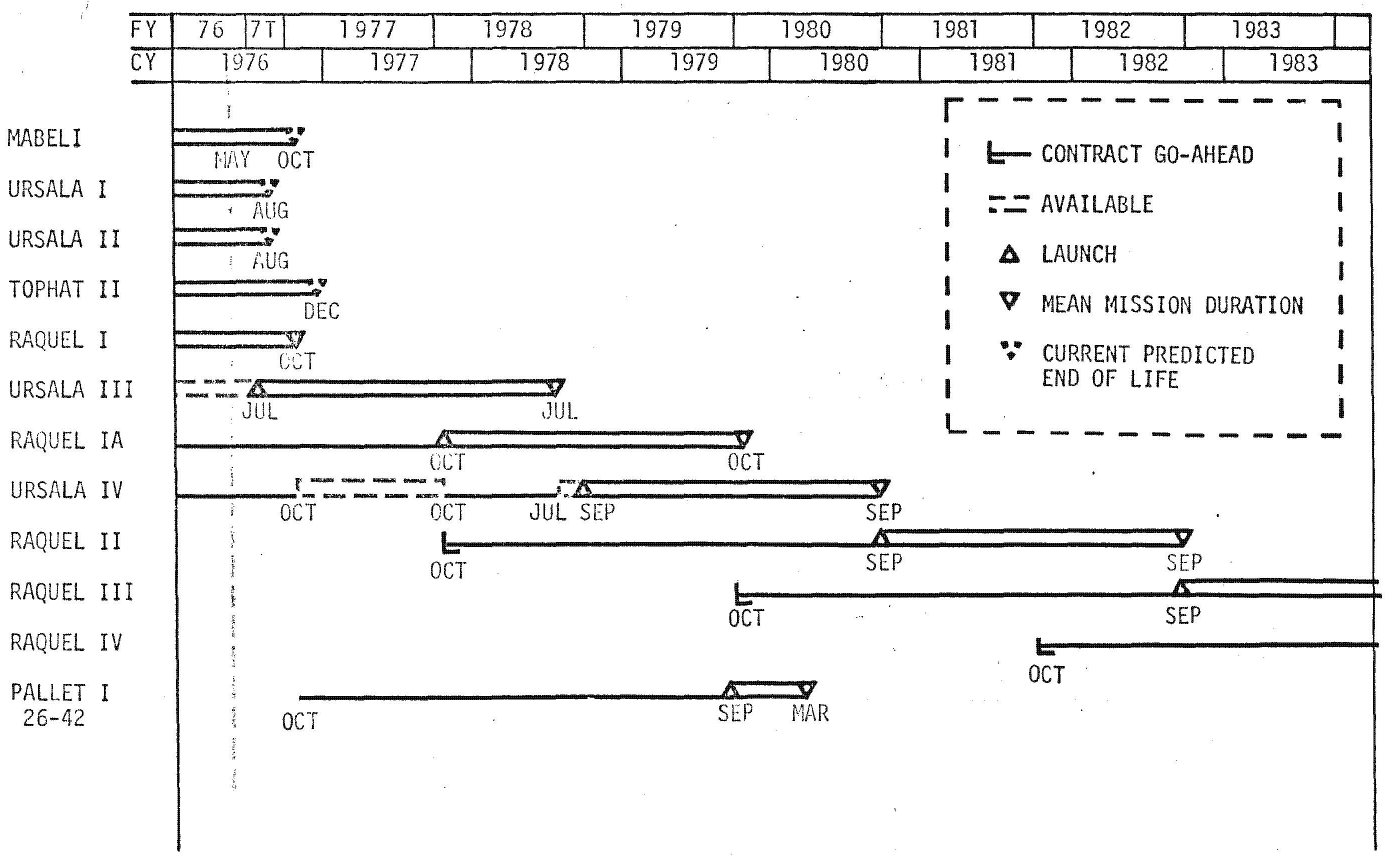
2. LAUNCH AVAILABILITY AND MILESTONES

PROGRAM 989 --- ALTERNATIVE II



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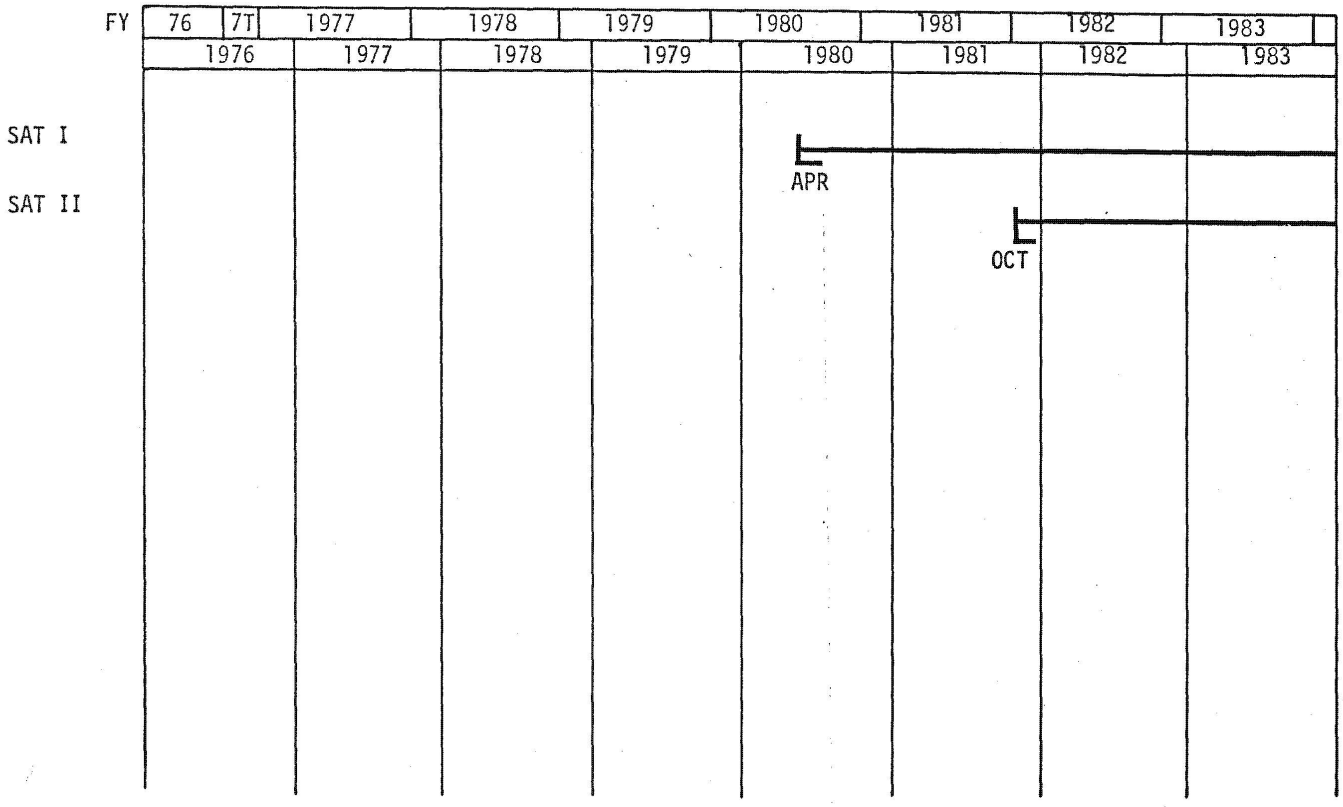
2. LAUNCH AVAILABILITY AND MILESTONES

PROGRAM 989 - OPTION II



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