11.1

~~SECRET~~ HEXAGON 20053

SHUTTLE TRANSPORT SYSTEM (STS)

PANORAMIC CAMERA SYSTEM (PCS)

PERFORMANCE ANALYSIS STUDY

MID-STUDY BRIEFING

DECEMBER 1978

BYE-120478/78
HANDLE VIA BYEMAN
AD - 11 DEC 78

~~SECRET~~ HEXAGON 20053

CL: BYE-1 RVW 11 Dec 98

~~SECRET~~ HEXAGON 20053

STUDY OBJECTIVES

BASIC ASSUMPTIONS - SENSOR, STS, REQUIREMENTS

KEY PERFORMANCE RELATED ISSUES - ORBIT, SCHEDULE, STRATEGY

PROMISING OPERATING CONCEPTS

PRELIMINARY CONCLUSIONS

ISSUES WHICH SHOULD BE STUDIES FURTHER

PLAN FOR REMAINDER OF THIS STUDY

BYE 120478/78
HANDLE VIA BYEMAN
AD - 18 Jan 79

~~SECRET~~ HEXAGON 20053

BYE-1 RVW 18 Jan 99

Approved for Release: 2017/02/08 C05094762

STS PCS SENSOR SUBSYSTEM ASSUMPTIONS

- STS PALLET MOUNTED HEXAGON 1217 TYPE SENSOR SUBSYSTEM
- 142,000 FEET OF FILM PER SIDE
- SOLID-STATE STELLAR (S^3) SENSOR (REMOUNTED) IN COMBINATION WITH PANORAMIC CAMERA PROVIDES METRIC COVERAGE CAPABILITY SIMILAR TO THAT OF 1217 CLASS METRIC PAN CAMERA
- COMMAND/TELEMETRY THROUGH SCF

BYE 120478/78
HANDLE VIA BYEMAN
AD - 24 Jan 79

Approved for Release: 2017/02/08 C05094762

STS CAPABILITIES ASSUMPTIONS
(SAME MAY REQUIRE THRUST AUGMENTATION AND/OR OTHER ORBITER OPTIONS)

- 7- TO 30-DAY MISSIONS
- PERIGEE SHOULD REMAIN ABOVE 95 NM
- UP TO 57° INCLINATIONS FROM ETR
- UP TO 97° INCLINATIONS FROM WTR
- DRAG MAINTENANCE
- MAINTENANCE OF LATITUDE OF PERIGEE IS OPTIONAL

HEXAGON/STS PCS SCHEDULE ASSUMPTIONS

- THERE WILL BE SPRING TO FALL ONE HEXAGON MISSION PER YEAR THROUGH 1984 (MISSION 1220)

- STS PCS WILL ASSUME THE HEXAGON COLLECTION MISSIONS IN LATE 1984 OR EARLY 1985

- EARLIER STS PCS TEST MISSIONS WILL BE FLOWN IN THE GAP BETWEEN HEXAGON MISSIONS

BYE 120478/78
HANDLE VIA BYEMAN
AD - 18 Jan 79

~~SECRET~~ HEXAGON 20053

STS PCS COLLECTION REQUIREMENTS

- STANDING SEARCH - PRIMARY MISSION
- SPECIAL SEARCH - APPROXIMATELY 25 PERCENT OF FILM LOAD*
- MC&G METRIC AREA AND TARGETS - BONUS FROM STANDING SEARCH COLLECTION**
- MC&G NON-METRIC AREA - BONUS FROM STANDING SEARCH COLLECTION
- GENERAL SURVEILLANCE - BONUS FROM STANDING SEARCH COLLECTION

---

* INFORMAL GUIDANCE FROM CHAIRMAN, ICRS

** ASSUMES METRIC CAPABILITY AND STEREO SEARCH COVERAGE AGAINST NEW STANDING SEARCH REQUIREMENTS

BYE-120478/78
HANDLE VIA BYEMAN
AD - 11 DEC 78

L: BYE-1 RVW 11 Dec 98

~~SECRET~~ HEXAGON 20053

PROJECTED STANDING AREA SEARCH COLLECTION REQUIREMENTS FOR 1985-90

COLLECTION PERIOD	COLLECTION PERCENT*	MODE	AREA (MSNM)	MIN.REQD COVERAGE MSNM/YR	REQ'D NIIRS	DES'D NIIRS	DES'D NIIRS PERCENT
CURRENT							
2 MO	80	STEREO	.18	1.06	4	5	50
3 MO	80	STEREO	1.07	3.20	3	4	80
6 MO	80	STEREO	.75	1.51	3	4	80
9 MO	80	STEREO	1.69	2.25	3	4	80
12 MO	80	MONO	3.62	3.62	3	4	80
18 MO	80	MONO	3.41	2.27	3	4	80
24 MO	80	MONO	.44	.23	3	4	80
			11.16	14.14			
FUT							
9 MO	80	MONO	8.71	11.61	3	4	80
18 MO	80	MONO	9.73	6.49	3	4	80
24 MO	80	MONO	4.53	2.27	3	4	80
			22.97	20.38			
			34.13	34.52			

*[illegible] DATE POINT ON REQUIRED AGE DISTRIBUTION

BYE-120478/78
HANDLE VIA BYEMAN
AD - 11 DEC 78

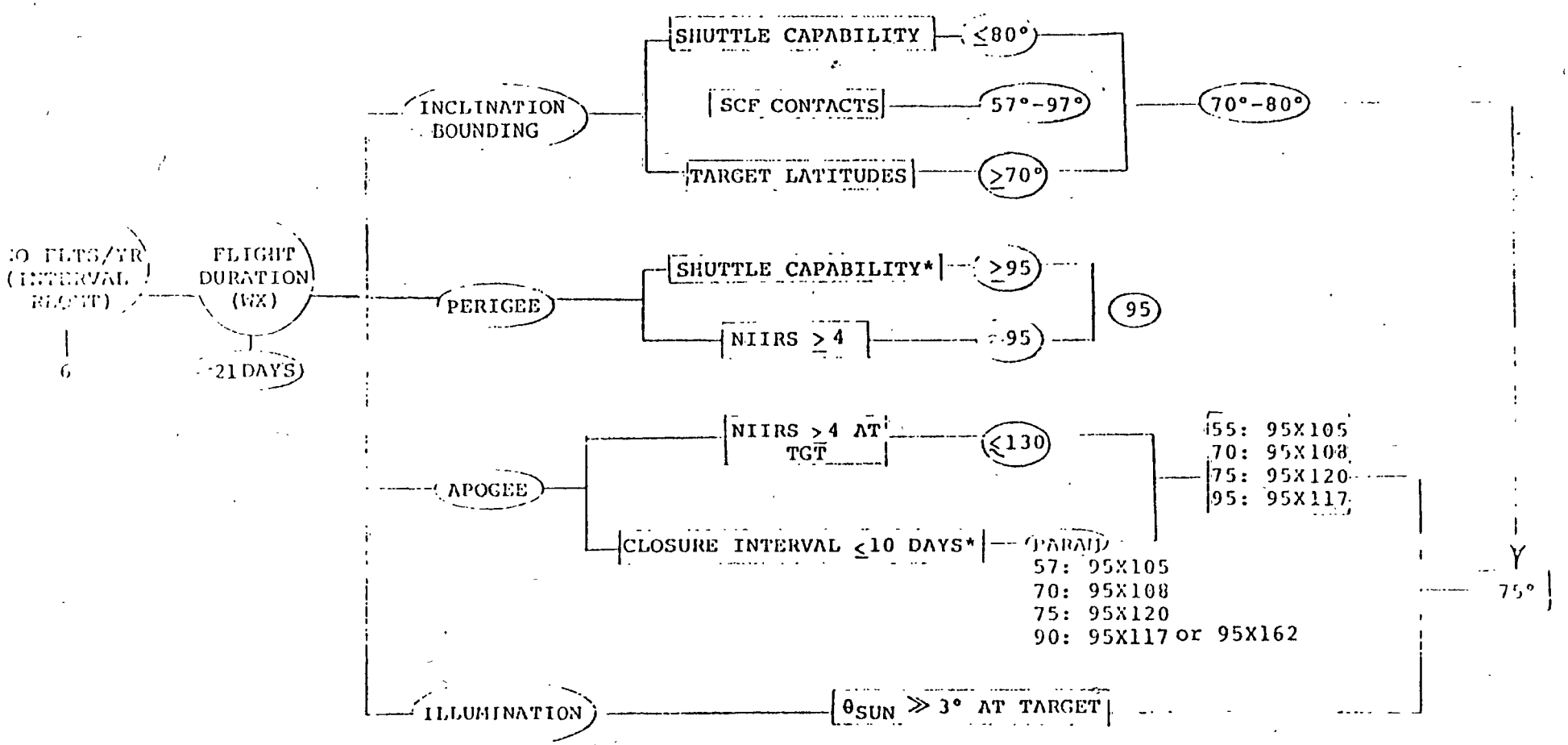
DL: BYE — 1 RVW 11 Dec 98

PRELIMINARY 1985-90 STANDI SEARCH REQUIREMENTS

NUMBER OF MSNM

	Region	Collection Period 2 Mo	4 Mo	6 Mo	9 Mo	12 Mo	18 Mo	24 Mo	Total
ent									
1	USSR (UR)	.13	.46	.34	.96	2.25	2.41	.31	6.86
2	PRC (CH)	.03	.32	.24	.48	.96	.66	.13	2.82
3	Mongolia (MG)	0	.004	.005	.02	.20	.23	0	.46
4	East Europe (EE)	0	.18	.10	.09	.04	0	0	.41
5	North Korea (KN)	.01	.03	.01	.01	.004	0	0	.06
6	S. East Asia (SE)	0	.02	.02	.06	.08	.06	0	.24
7	Cuba (CU)	0	.01	.01	.01	.01	.02	0	.06
8	Middle East (ME)	.01	.05	.02	.06	.08	.03	0	.25
	(Preliminary Version)								8.66
9	West Europe (WE)	0	0	0	0	0	.65	.51	1.16
10	North Africa (NA)	0	0	0	1.56	0	0	0	1.56
11	East Africa (EA)	0	0	0	1.47	0	0	0	1.47
12	West Africa (WA)	0	0	0	0	0	3.81	0	3.81
13	South Africa (SA)	0	0	0	1.64	0	.18	0	1.82
14	Near East (NE)	0	0	0	.89	0	.72	0	1.61
15	Far East (FE)	0	0	0	1.03	0	.75	.14	1.92
16	[redacted]	0	0	0	.21	0	0	0	.21
17	South Pacific (SP)	0	0	0	0	0	0	1.05	1.05
18	[redacted]	0	0	0	0	0	0	2.30	2.30
19	[redacted]	0	0	0	.51	0	.26	.02	.79
20	N. South America (NS)	0	0	0	.48	0	3.19	.51	4.18
21	S. South America (SS)	0	0	0	.92	0	.17	0	1.09
1	Current (b)(1) (b)(3) 10 USC 424	.18	1.07	.75	1.69	3.62	3.41	.44	11.16
1	New	0	0	0	8.71	0	9.73	4.53	22.97
:	Total	.18	1.07	.75	10.40	3.62	13.14	4.97	34.13

DETERMINATION OF KEY BASELINE MISSION PARAMETERS



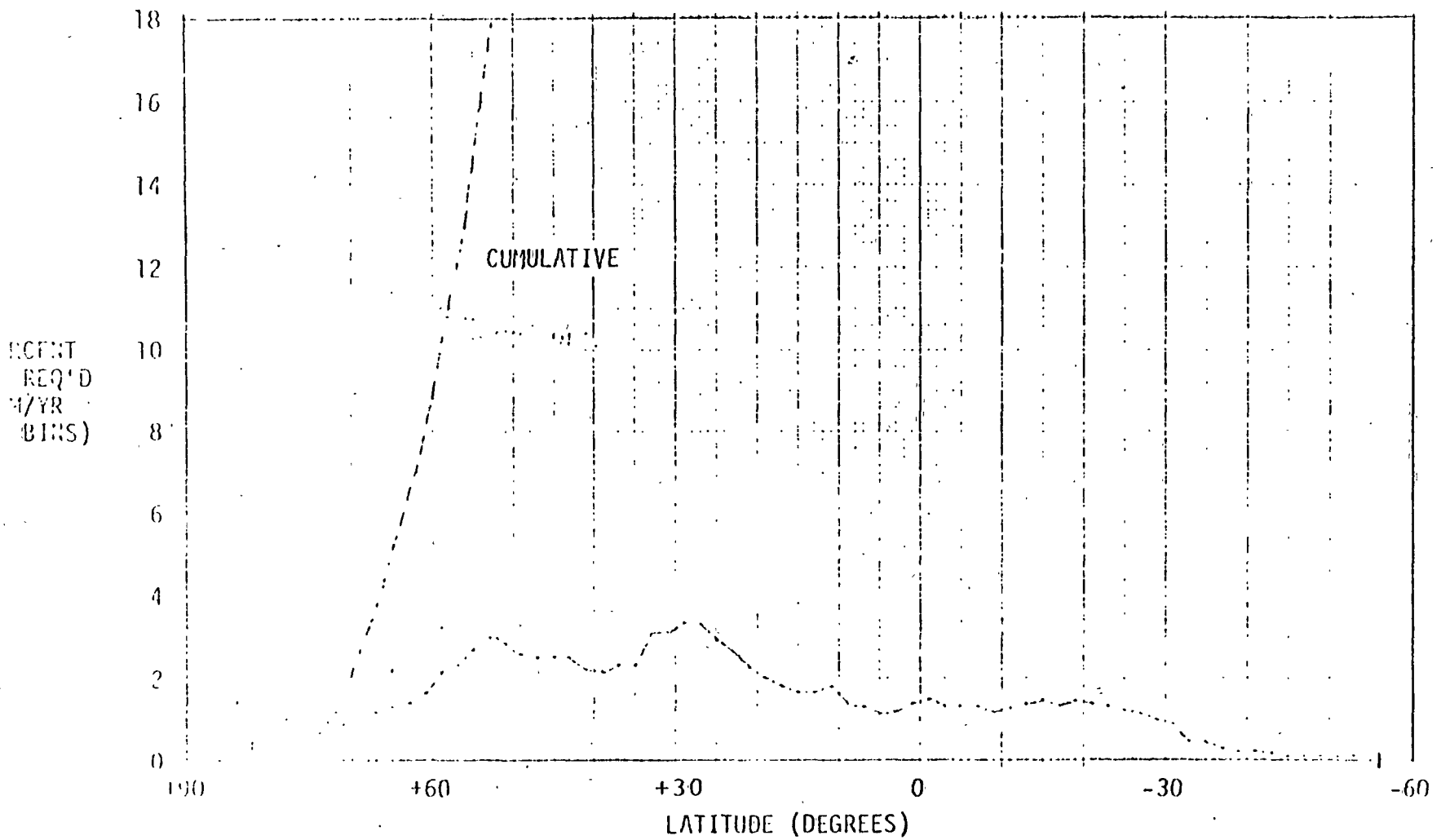
*ALLOCATED BY 21 DAY DURATION: TENTATIVE

BYE 120478-78
HANDLE VIA BYEMAN
AD - 8 Jan 79

[illegible]: BYE-1 RVW 8 Jan 99

CURRENT AND NEW REQUIREMENTS DENSITY VERSUS LATITUDE

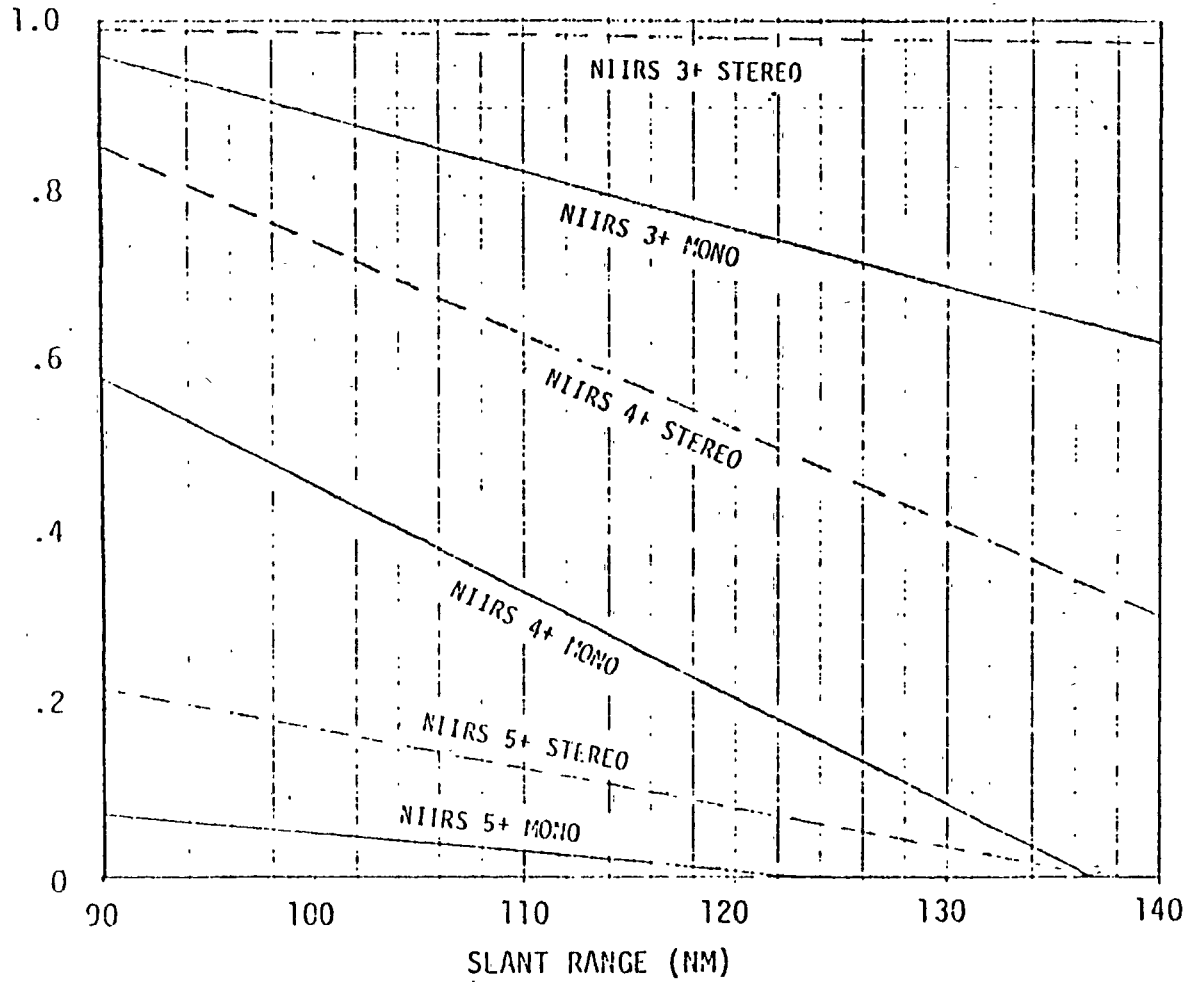
ONE PERCENT = 345 KSNM/YR



BYE-120478/78
HANDLE VIA BYEMAN

: BYE-1 RVW 18 Jan 99

NRO PROGRAM A HEXAGON SLANT RANGE NIIRS MODEL



PROBABILITY OF ACHIEVING INDICATED NIIRS OR BETTER

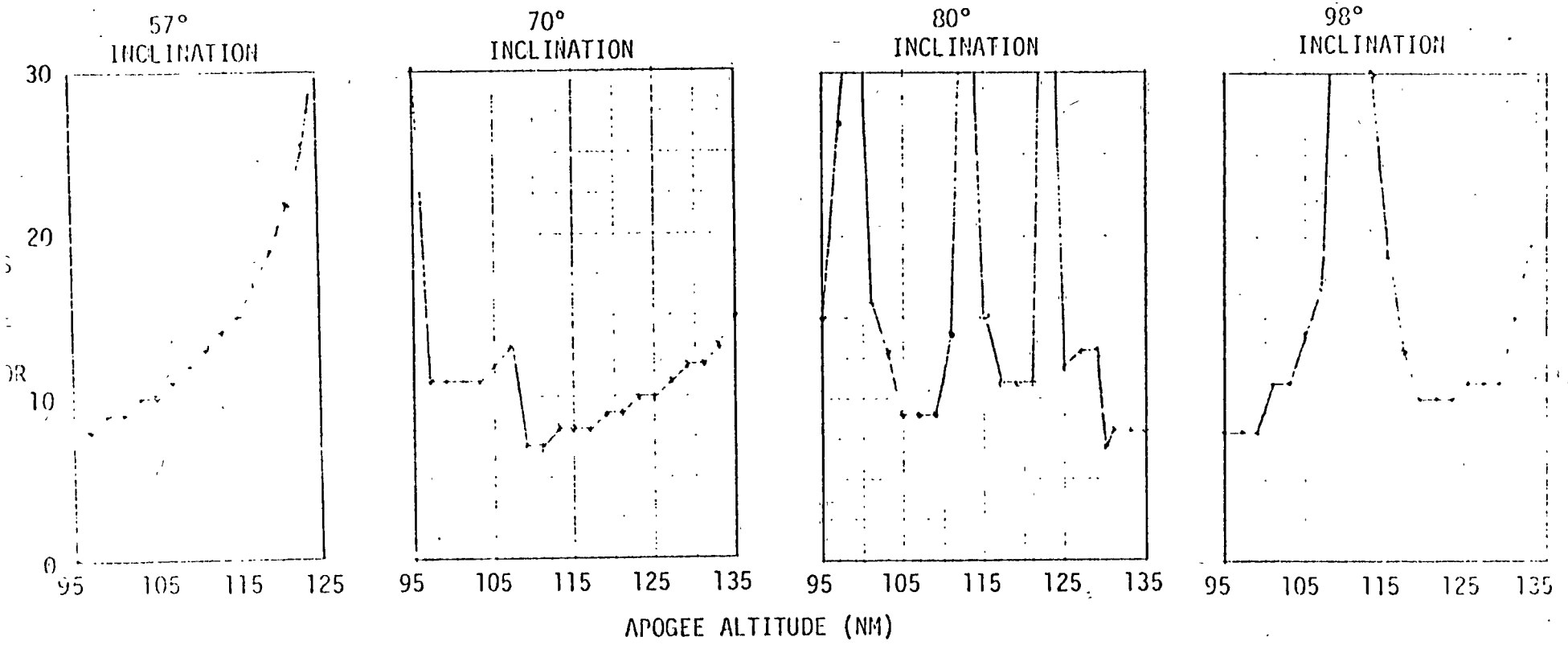
SLANT RANGE				
ALT NM	OBLIQUITY 15°	30°	45°	60°
85	88	98	120	170
95	93	110	134	190
105	109	121	148	210
115	119	133	163	230
125	129	144	177	250
135	140	156	191	270
145	150	167	205	290

BYE-120478/78
HANDLE VIA BYEMAN
AD - 5 JAN 79

TOP SECRET HEXAGON 20053

C: BYE-1 RVW 5 Jan 99

ACCESS CLOSURE TIME VERSUS APOGEE ALTITUDE
(95 NM PERIGEE, ±45 DEGREE SWATH)

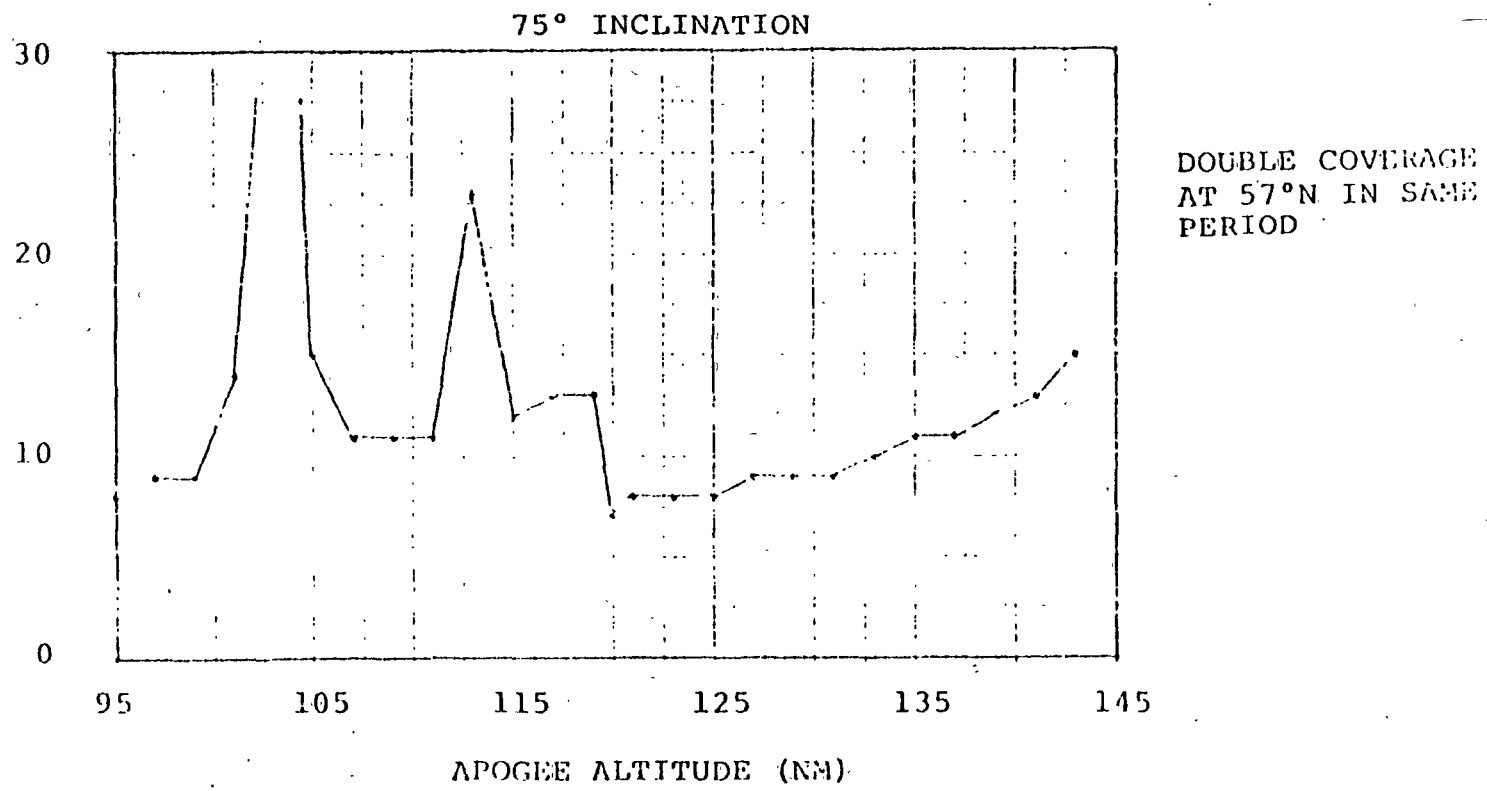


BYE-120478/78
HANDLE VIA BYEMAN

BYE-1 RVW 18 Jan 99

ACCESS CLOSURE TIME VERSUS APOGEE ALTITUDE

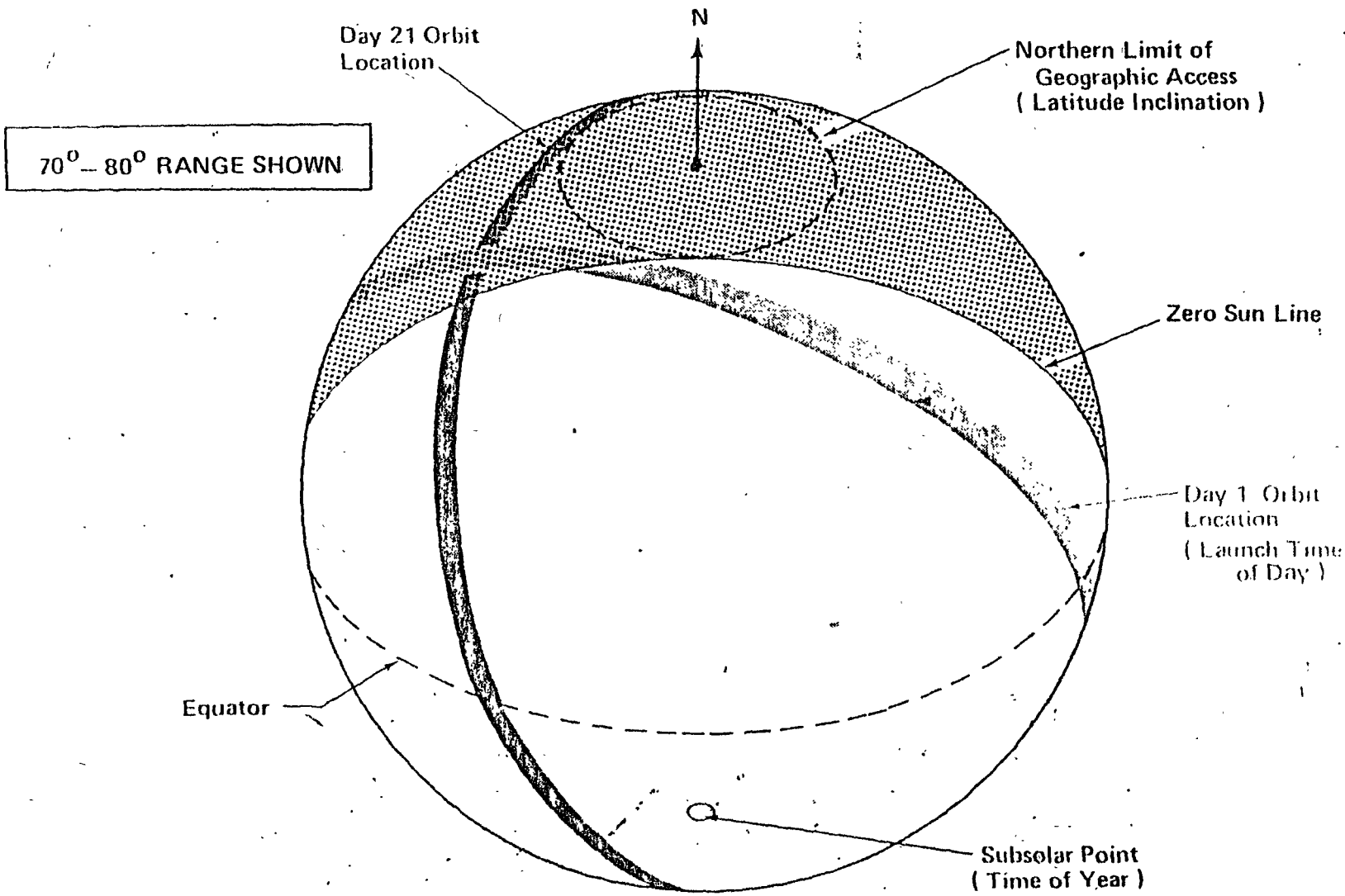
(95 NM PERIGEE, ±45 DEGREE SWATH)



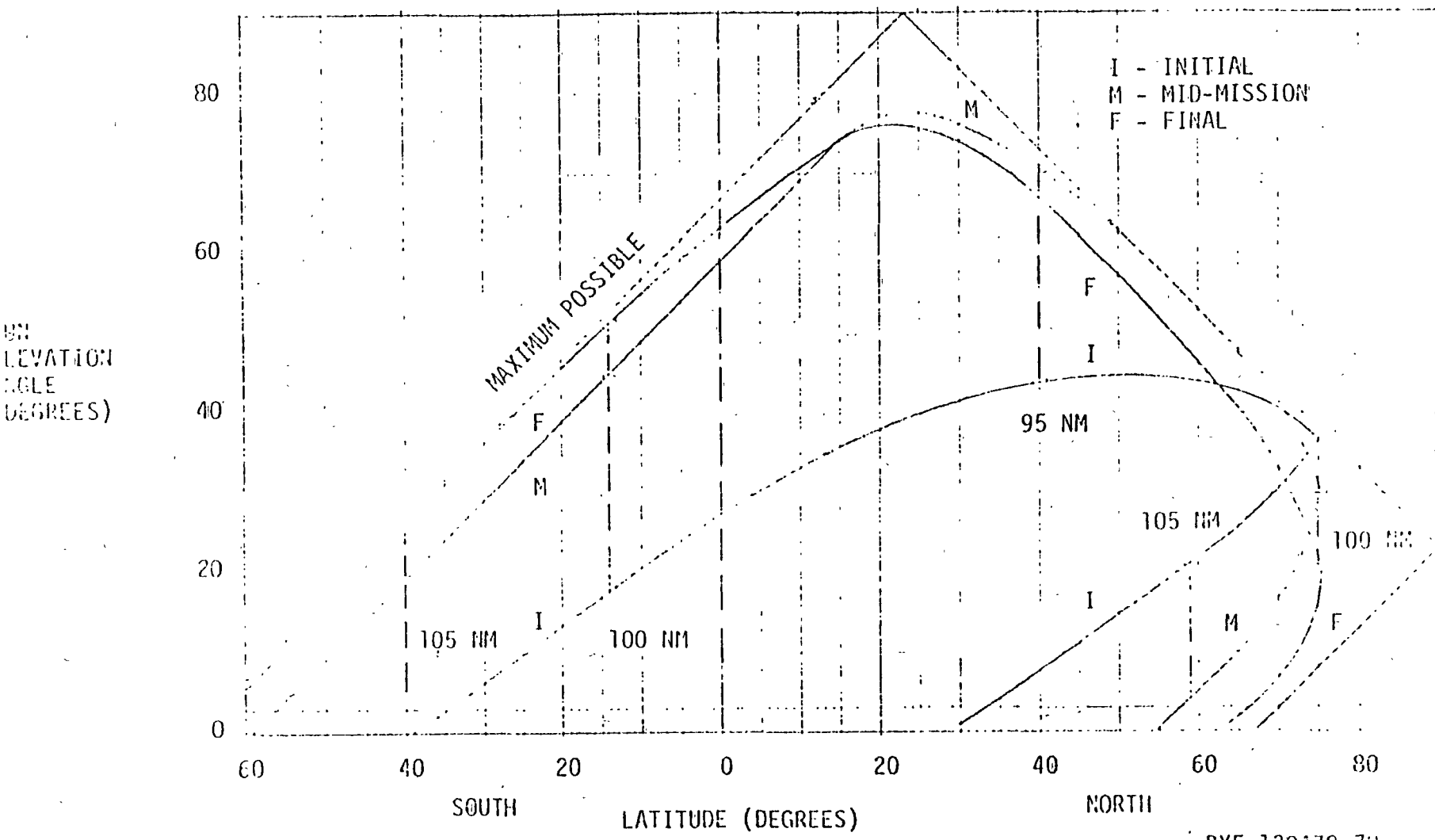
BYE 120478/78
HANDLE VIA BYEMAN
AD - 8 Jan 79

BYE-1 RVW 8 Jan 99

ORBIT INCLINATION CONSTRAINTS



ILLUMINATION VERSUS LATITUDE
75° INCLINATION, SUMMER SOLSTICE
21-DAY MISSION, 95x120 NM, PERIGEE FIXED AT 40°N



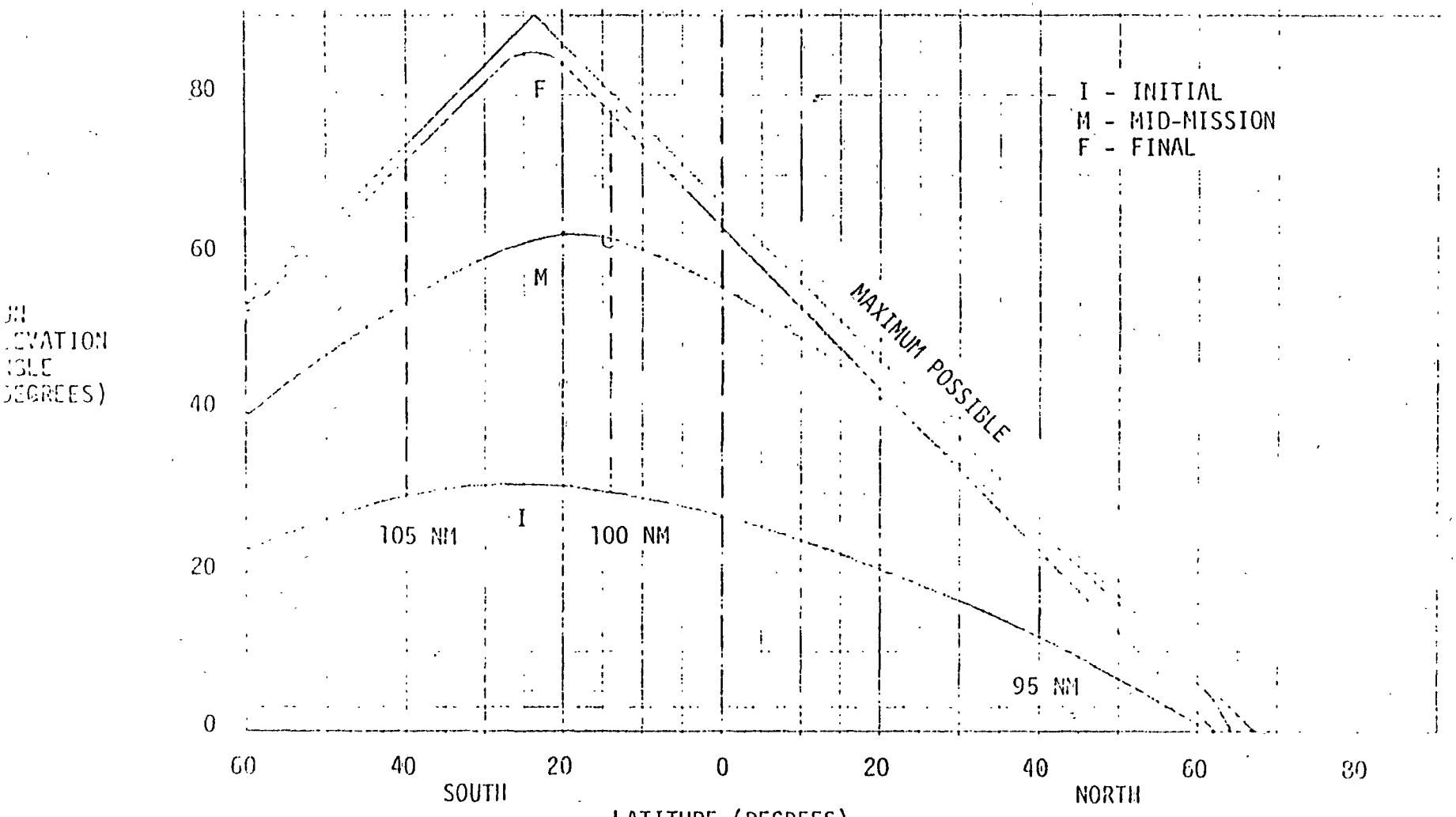
SUN
ELEVATION
ANGLE
(DEGREES)

BYE 120478-78
HANDLE VIA BYEMAN
AD - 29 Dec 78

: BYE 1-RVW 29 Dec 98

~~SECRET~~ HEXAGON 20053

ILLUMINATION VERSUS LATITUDE
75° INCLINATION, WINTER SOLSTICE
21-DAY MISSION, 95x120 NM, PERIGEE FIXED AT 40°N



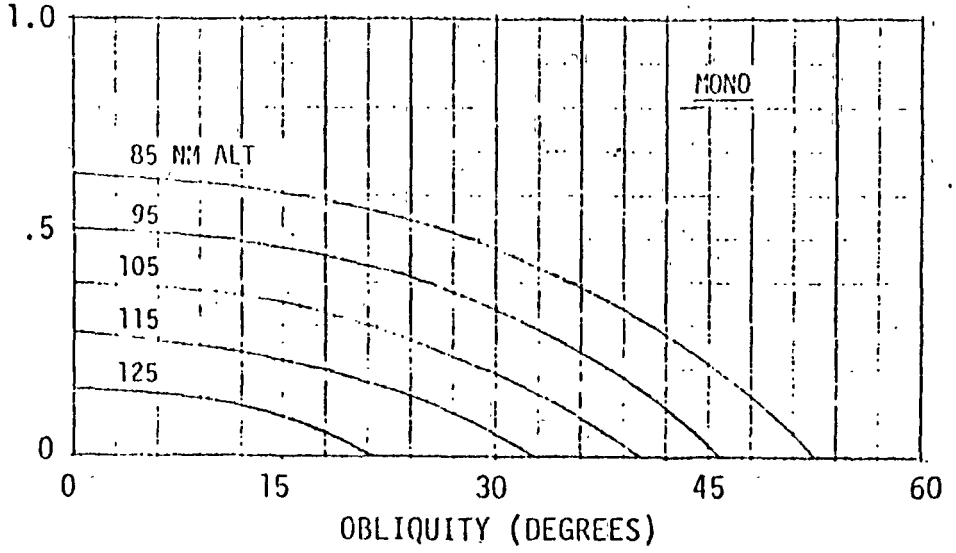
~~SECRET~~ HEXAGON 20053

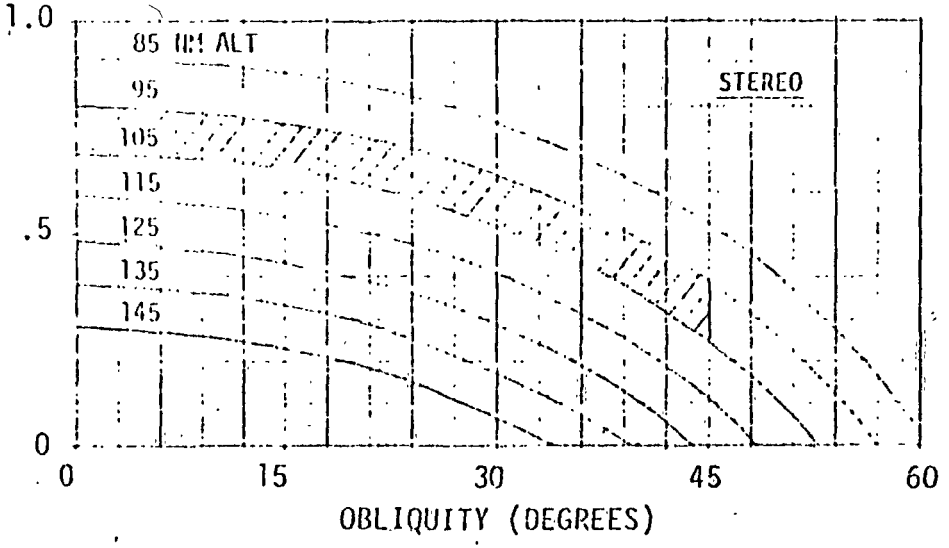
BYE 120478-78
HANDLE VIA BYEMAN
AD - 29 Dec 78

: BYE-1 NVW 29 Dec 98

NRO PROGRAM A HEXAGON SLANT RANGE NIIRS MODEL

PROBABILITY OF NIIRS 4 OR BETTER FOR DIFFERENT ALTITUDES AND OBLIQUITIES





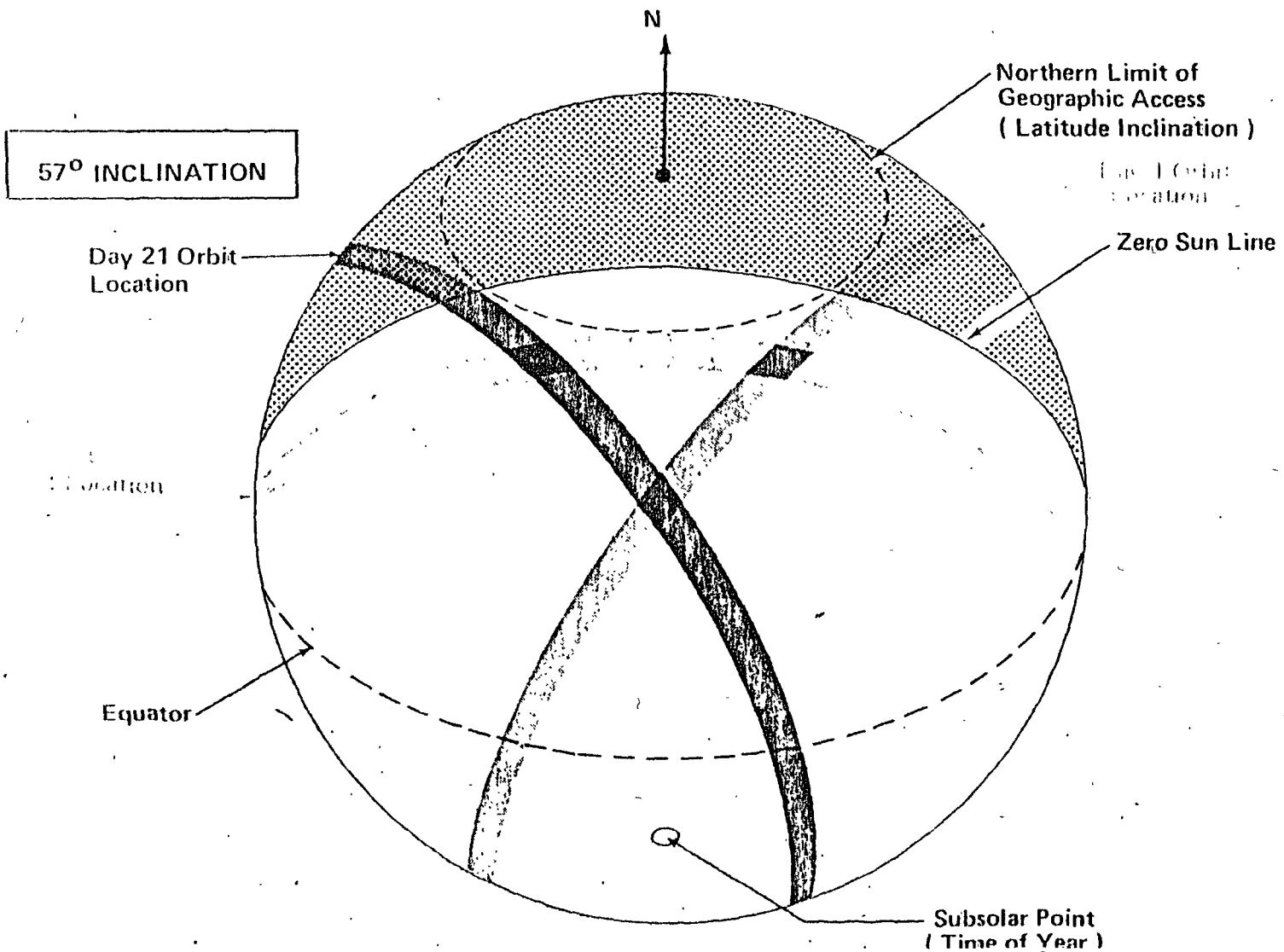
RECOMMENDATIONS

- o MAX. OBLIQUITY SHOULD BE 45 DEGREES
- o STEREO SHOULD BE USED FOR ALL MONO REQUIREMENTS
- o ALTITUDE SHOULD NOT EXCEED 105 NM WHEN IMAGING

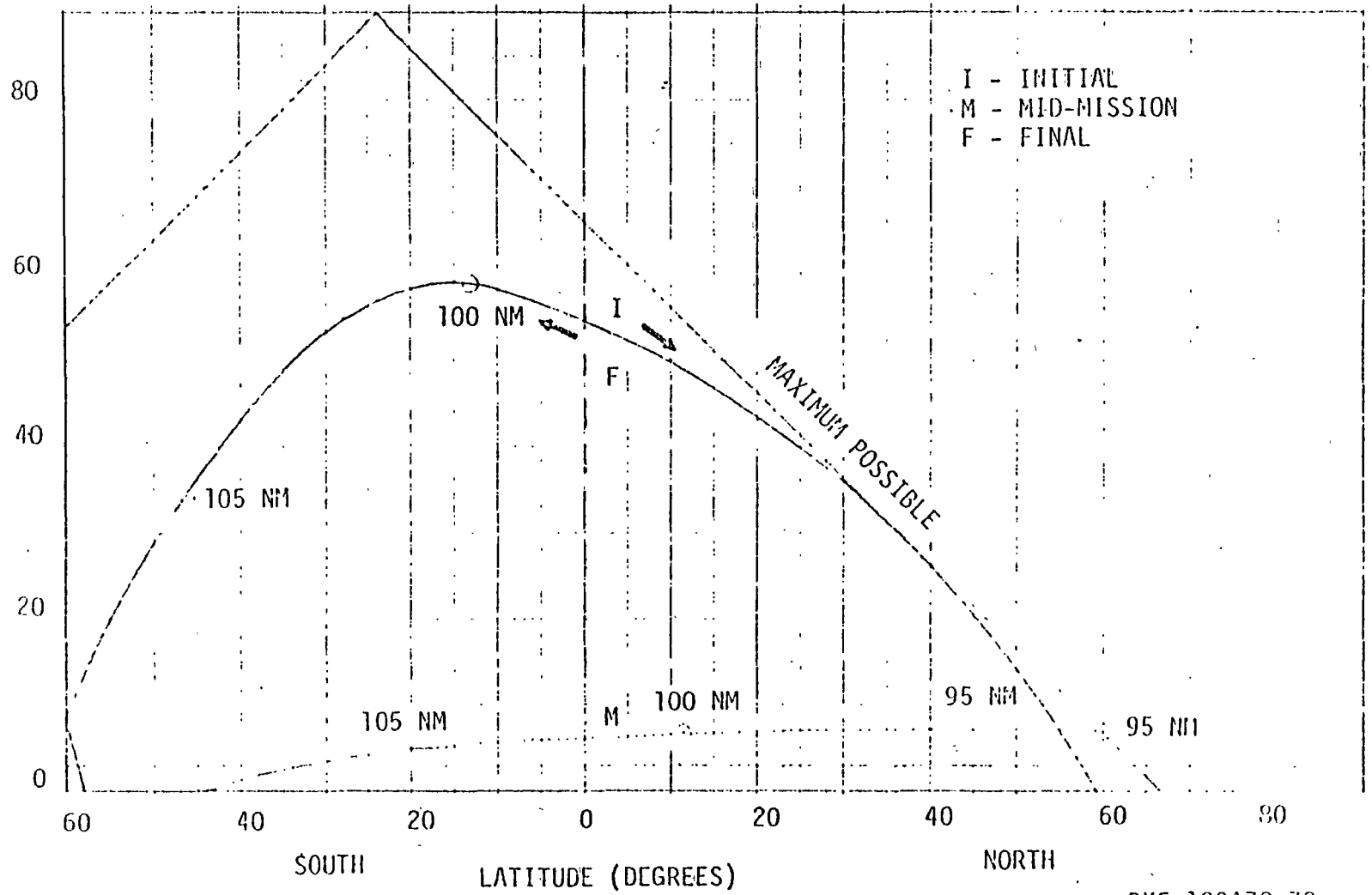
CL: BYE-1 RVW 5 Jan 99

BYE-120478/78
HANDLE VIA BYEMAN
AD - 5 JAN 79

ORBIT INCLINATION CONSTRAINTS



ILLUMINATION VERSUS LATITUDE
60° INCLINATION, WINTER SOLSTICE
21-DAY MISSION, PERIGEE DRIFT 52°-60°N



SUN ELEVATION ANGLE (DEGREES)

BYE 120478-78
HANDLE VIA BYEMAN
AD - 29 Dec 78

~~SECRET HEXAGON~~ 20053

E: BYE-1 RVW 29 Dec 98

STS PCS PERFORMANCE ANALYSIS STUDY

OPTIMAL ORBIT PARAMETERS AND RATIONALE

PARAMETER	MAGNITUDE	RATIONALE
INCLINATION	75° *	o COVERS MOST REQUIREMENTS (99.5%) o ASSUMES KE GETS REQ'TS NOT ACCESSED o BASELINE STS CAN ACHIEVE 21 DAY MISSIONS o REASONABLE SUN ANGLE COMPROMISE
LAUNCH RANGE	WTR	o REQUIRED FOR INCLINATIONS ABOVE 58 DEGREES
PERIGEE	95 NM**	o STS PERFORMANCE LIMIT TOWARD GOOD QUALITY
APOGEE	120 NM	o SEVEN DAY ACCESS CLOSURE AND GOOD QUALITY
PERIGEE MAINTAINED AT	40°N	o BEST QUALITY FOR OLD REQUIREMENTS o REASONABLE QUALITY FOR SO. HEMISPHERE REQ'TS
LOCAL LAUNCH TIME (APPROX) - 21 DAY MISSION - 14 DAY MISSION - 7 DAY MISSION	 3:25 PM 3:00 PM 1:55 PM	o BEST SUN ANGLE FOR ALL REQUIREMENTS OVER THE MISSION. THIS HOLDS FOR ALL DAYS OF THE YEAR.

*SHOULD BE 80° IF STS PERMITS (BETTER SUN, ACCESS MORE REQ'TS)
**SHOULD BE 85 OR 90 NM IF STS PERMITS (BETTER QUALITY)

BYE-120478/78
HANDLE VIA BYEMAN
AD - 5 JAN 79

: BYE-1 RVW 5 Jan 99

~~SECRET~~ HEXAGON 20053

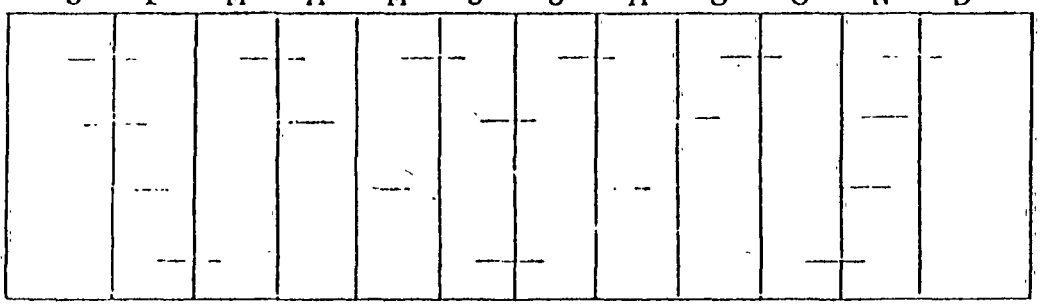
MISSION SCHEDULE CONSIDERATIONS

FACTORS

- REQUIREMENT COLLECTION PERIODS - LEAD TO EVEN SPACING AT 2-, 3-, or 4-MONTH INTERVALS
- SUN ANGLE - AVOID WINTER SOLSTICE
- INTELLIGENCE UTILITY - EMPHASIZE SPRING THROUGH FALL
- GENERAL - MINIMIZE NUMBER OF MISSIONS, MINIMIZE DURATION BEYOND 7 DAYS

SELECTED NOMINAL SCHEDULES FOR ANALYSIS

MISSIONS PER YEAR	DAYS BETWEEN LAUNCH
6	61
5	73
4	91
3	122



BYE 120478-78
HANDLE VIA BYEMAN
CHANNELS ONLY
AD - 11 Dec 78

..: BYE-1 RVW 11 Dec 98

COLLECTION TARGETING STRATEGY CONSIDERATIONS

- COLLECTION PROBLEM IS SIMILAR TO THAT OF HEXAGON

- COLLECTION STRATEGY SIMILAR TO THAT USED FOR HEXAGON
  - 'TUNITY OPERATION SELECTION LOGIC
  - SIMILAR COLLECTION CONTROL PARAMETERS

- EMPHASIS PLACED ON ACHIEVING QUALITY REQUIREMENTS
  - NEW CONTROL PARAMETERS: MAX ALT, MAX SLANT RANGE
  - STEREO COLLECTION AGAINST MONO REQUIREMENTS (MAY NOT BE REQUIRED WITH FILM TYPE, E.G., SO 315)

- VALUE FUNCTION MODIFIED SLIGHTLY
  - CELL AGE CONSIDERED ON A "MISSIONS OLD" BASIS FOR VALUE
  - ALTITUDE AND SLANT RANGE THRESHOLDS ADDED
  - PCUM MODIFIED TO INCORPORATE NIIRS

BYE 120478-78
HANDLE VIA BYEMAN
AD - 18 Jan 79

OPERATING CONCEPTS/PERFORMANCE MEASURES

OPERATING CONCEPT DEFINES:

ORBIT
DURATION, LAUNCH TIME
SCHEDULE

PRIMARY PERFORMANCE MEASURES:

STATUS: XN - ANY NIIRS
RN - REQUIRED NIIRS
DN - DESIRED NIIRS
CX - BASED ON RN, DN AND DESIRED NIIRS PERCENTAGE

LEVELS: OVERALL - ALL, CURRENT, NEW
COLLECTION PERIOD - ALL, CURRENT, NEW
REGION
REQUIREMENT CELL GROUP (67)

BYE 120478-78
HANDLE VIA BYEMAN
CHANNELS ONLY
AD - 11 Dec 78

CL: BYE-1 RVW 11 Dec 98

~~SECRET~~ HEXAGON 20053

DEFINITION OF COMIREX (CX) STATUS AND A/R

XN STATUS - PERCENT OF AREA UNIQUELY IMAGED CLOUD FREE WITHIN THE PAST COLLECTION PERIOD AT ANY NIIRS (XN)

RN STATUS - PERCENT OF AREA UNIQUELY IMAGED CLOUD FREE WITH REQUIRED NIIRS (RN) OR BETTER WITHIN THE PAST COLLECTION PERIOD

DN STATUS - PERCENT OF AREA UNIQUELY IMAGED CLOUD FREE WITH THE DESIRED NIIRS (DN) OR BETTER WITHIN THE PAST COLLECTION PERIOD

CX STATUS = LESSER OF [(RN STATUS) OR (DN STATUS · 100/DESIRED NIIRS PERCENT)]

A/R = ACCOMPLISHED STATUS/REQUIRED STATUS

TYPICAL EXAMPLE

REQUIREMENTS: RN = 3, DN = 4, DNP = 80, REQUIRED STATUS = 80%

XN STATUS = 88%
RN STATUS = 85%
DN STATUS = 60%

$$\text{CX STATUS} = \text{LESSER OF} \left[\begin{array}{c} 85\% \\ \text{OR} \\ 60 \cdot (100/80) = 75\% \end{array} \right] = 75\%$$

CX A/R = 75/80 = .94

CX A/R IS THE ONLY PERFORMANCE MEASURE WHICH DIRECTLY CONSIDERS ALL DELINEATION, QUANTITY/TIMELINESS, AND IMAGE SUCCESS CRITERIA ASPECTS OF SYSTEM PERFORMANCE RELATIVE TO THE STATED REQUIREMENTS.

BYE-120478/78
HANDLE VIA BYEMAN
AD - 5 JAN 79

DL: FYI-1 RVW 5 Jan 99

STUDY TOOLS

(b)(1)
(b)(3)
10 USC ⊥ 424

o STS PCS FIRST ORDER ANALYSIS MODEL (FOAM)

- FEATURES : RCG LEVEL CONTROL PARAMETERS
  HSIM LEVEL ACCESS DATA ACCURACY
  72-75 3DNEPH HISTORICAL WX
  DETAILED CELL VALUE FUNCTION
  PROGRAM A SLANT RANGE NIIRS MODEL (MONTE CARLO)
  AUTOMATIC ITERATIVE FILM USE ADJUSTMENT (DE VALUE THRESHOLD)
  EXTENSIVE PER MISSION OUTPUTS
  - AT RCG AND AGGREGATE LEVELS

- LIMITATIONS: MANUAL CONTROL PARAMETER SETTING
  SIMPLE SELECTION LOGIC: 40 SEC DEs (+45° SWATH)
  DE VALUE THRESHOLD

o MODIFIED HSIM AND HSIM OUTPUT PROCESSOR

- FEATURES : HSIM SELECTION LOGIC AND FIDELITY
  VERY EXTENSIVE PER MISSION AND MISSION SERIES OUTPUTS
  - AT RCG AND AGGREGATE LEVELS

- LIMITATIONS: MANUAL CONTROL PARAMETER SETTING
  RCG IS THE LOWEST LEVEL OF CONTROL (NO ACATS)
  DOWNWARD AUTOMATIC FILM ADJUSTMENT
  ACHIEVED BY DISCARDING LOWEST VALUED OPERATIONS

BYE 120478-78
HANDLE VIA BYEMAN
CHANNELS ONLY
AD - 11 Dec 78

: BYE-1 KW 11 Dec 98

PRELIMINARY FOAM ANALYSIS OF THREE MISSIONS PER YEAR, 95° INCLINATION CONCEPT

CASES A - OLD REQUIREMENTS ONLY, 21-DAY MISSIONS
B - OLD REQUIREMENTS ONLY, 14-DAY MISSIONS
C - ALL REQUIREMENTS, 21-DAY MISSIONS

CONDITIONS: LAUNCH DATES: 15 FEB, 17 JUN, 17 OCT (~122 DAYS BETWEEN LAUNCHES)
HX 1214 ORBIT: 91 x 140 NM
SIX MISSIONS PER CASE - RUN AS A SEQUENTIAL SERIES FOR 2 YEARS
OLD REQUIREMENTS INITIALIZED FROM 1214 END-OF-MISSION STATUS
NEW REQUIREMENTS ALL SET OVERDUE PRIOR TO FIRST MISSION
160,000 FEET (+20%) FILM PER SIDE (1.5 x .75 x 142,000)
1972 AND 1973 3DNEPH HISTORICAL WEATHER
CONTROL PARAMETERS SET MANUALLY USING EXPERIENCE IN CHECKOUT RUNS
DLS FOR TARGETING IS BASED ON REQUIRED NIIRS

CASE D - SAME AS CASE A WITH 75° INCLINCATION, 95x120 NM ORBIT

BYE 120478-78
HANDLE VIA BYEMAN
AD - 8 Jan 79

SIMULATED STS PCS 3 21-DAY MISSIONS PER YEAR PERFORMANCE

AGAINST CURRENT AND PROJECTED 1985 STANDING SEARCH REQUIREMENTS

	Cloud-Free (XN) EOM Status							COMIREX (CX) EOM Status						
Mission	1	2	3	4	5	6	AVG	1	2	3	4	5	6	AVG
CURRENT REQUIREMENTS														
All Current	93	93	96	96	93	97	95	90	90	94	94	90	94	92
Current 2 Mo	96	90	96	96	82	93	92	59	52	62	64	48	57	57
4 Mo	88	84	92	91	80	93	88	87	83	91	91	79	93	87
6 Mo	89	95	95	97	96	96	95	88	95	95	96	96	96	94
9 Mo	95	96	99	99	99	99	98	95	96	99	99	99	99	98
12 Mo	96	98	98	98	98	98	98	96	97	98	98	98	98	98
18 Mo	96	97	98	98	99	99	98	96	96	98	98	99	99	98
24 Mo	92	97	98	98	98	98	97	92	97	98	98	98	98	97
PCS REQUIREMENTS														
All Current & New	57	69	77	81	80	82	81	54	64	73	76	76	78	78
All Current	85	82	85	90	85	89	86	82	78	82	87	81	85	83
All New	37	59	71	74	77	78	78	34	55	67	69	73	73	73
Current 2 Mo	94	89	95	95	81	93	91	60	51	56	63	38	52	53
4 Mo	79	69	79	82	66	83	76	77	68	79	82	65	82	76
6 Mo	78	84	80	92	89	85	85	77	84	80	92	88	84	84
9 Mo	88	86	92	95	94	95	92	87	86	92	95	94	95	92
12 Mo	88	87	87	92	90	90	89	88	87	86	92	89	90	89
18 Mo	87	81	82	89	90	89	86	87	81	81	88	90	83	86
24 Mo	80	86	87	90	87	89	87	80	86	86	90	87	89	86
9 Mo	49	68	78	80	81	79	80 *	45	65	77	76	79	75	77 *
12 Mo	23	46	62	65	71	75	75**	20	41	56	59	66	71	71**
24 Mo	18	52	63	71	78	81	81**	13	41	50	57	63	69	69**

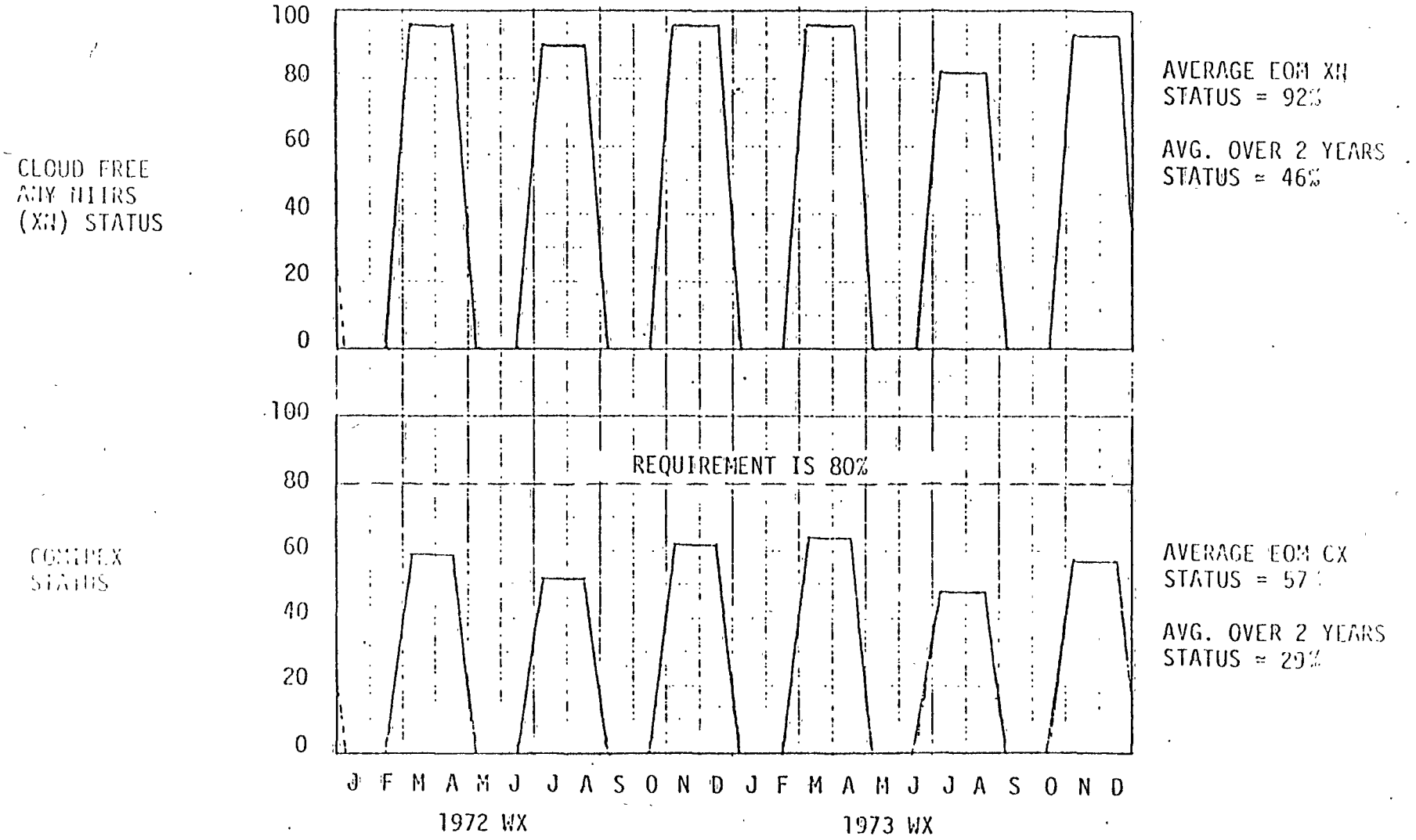
* [illegible] over last 4 missions

** [illegible] at the end of mission 6

Since new requirements were initialized with no status

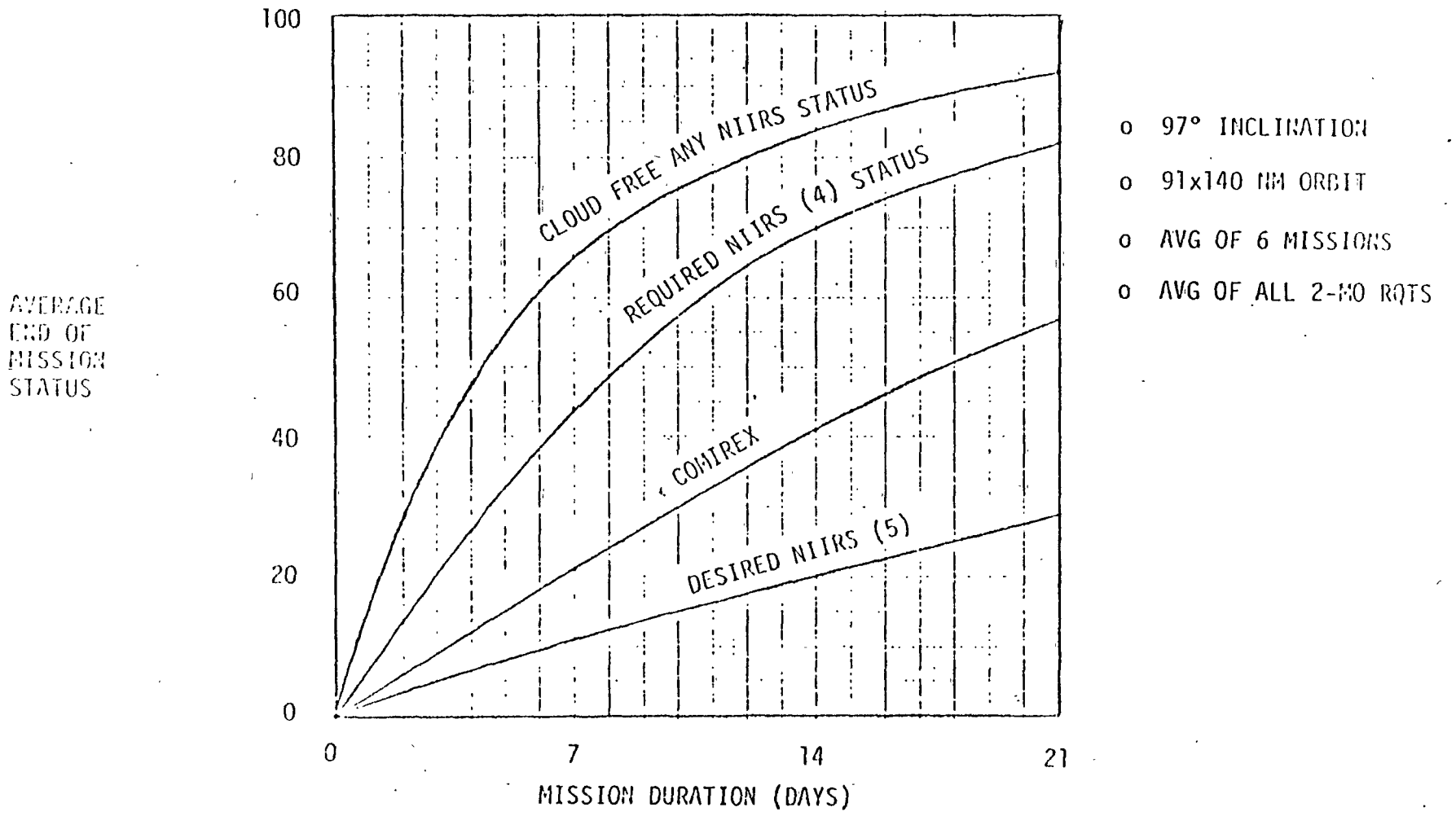
2-MONTH REQUIREMENTS PERFORMANCE VERSUS TIME

(97° INCLINATION, 3 21-DAY MISSIONS/YEAR, EACH CELL IMAGED ON EACH ACCESS)



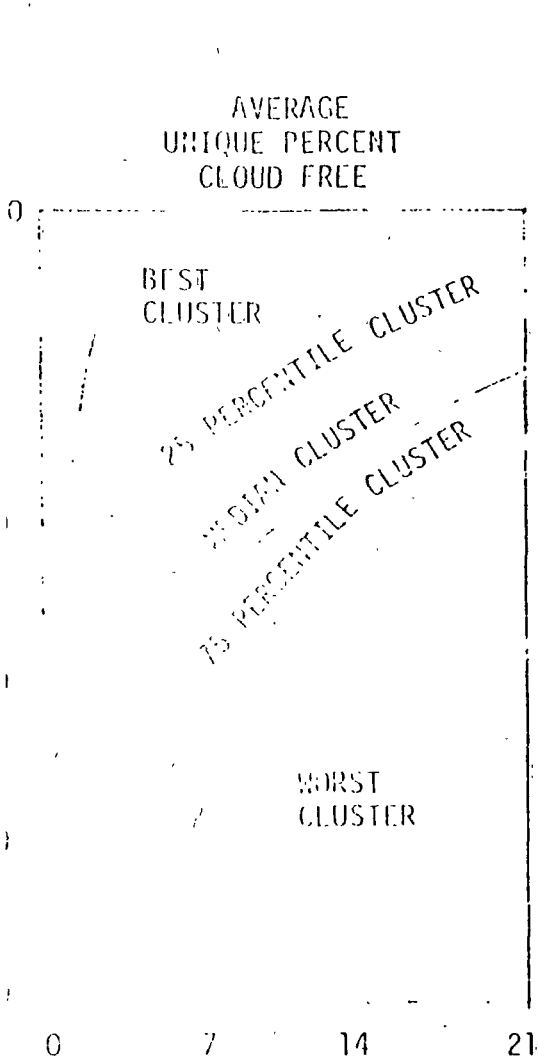
AVERAGE 2-MONTH REQUIREMENTS PERFORMANCE VERSUS MISSION DURATION

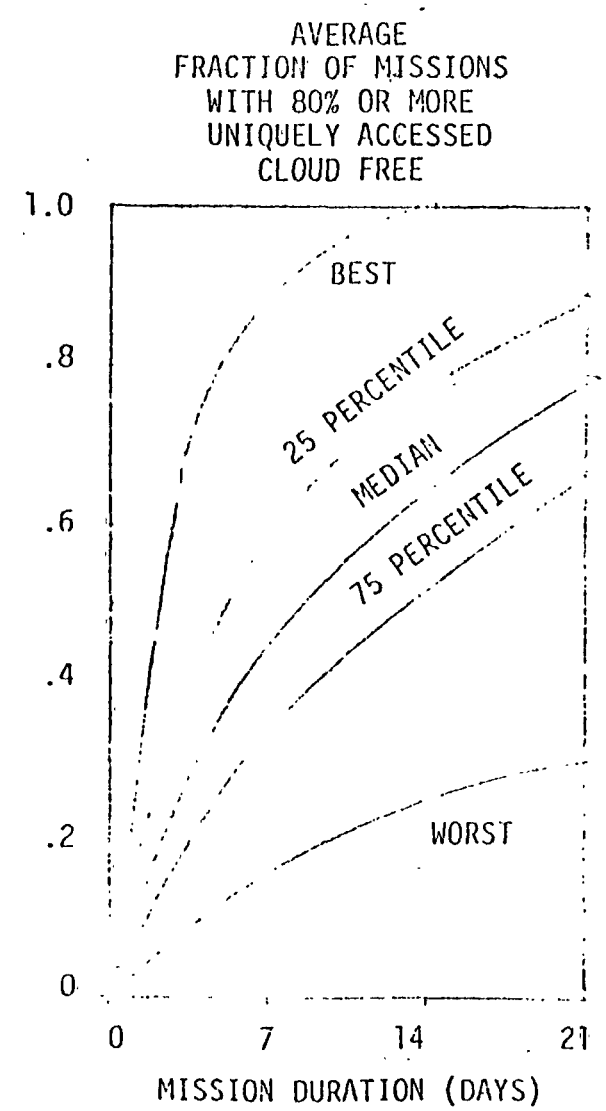
(EACH CELL IMAGED ON EACH ACCESS)

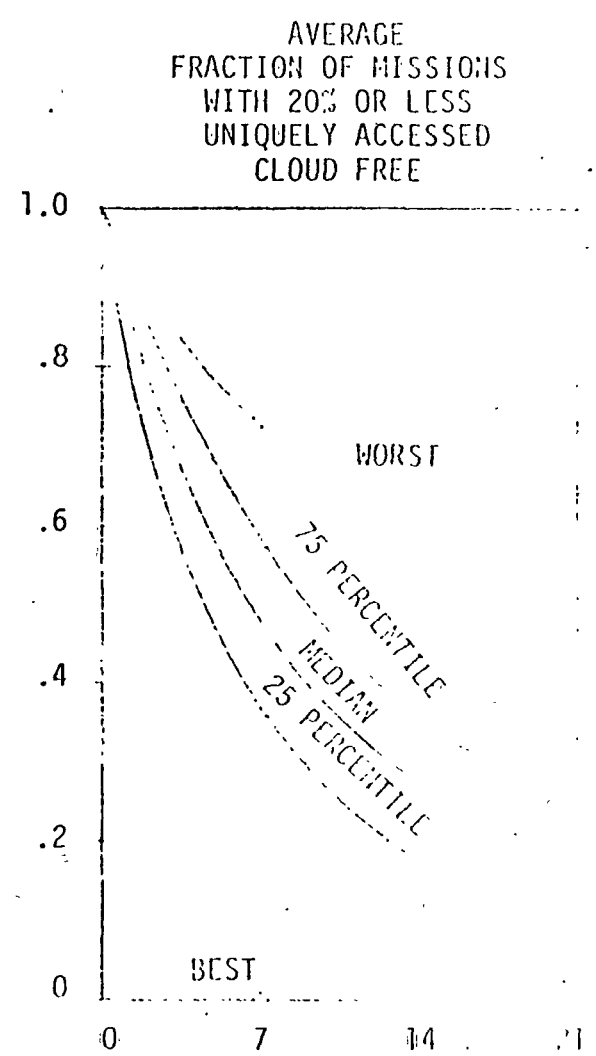


FOUR-YEAR WEATHER ANALYSIS OF THE 107 INDIVIDUAL 2-MONTH CLUSTERS

ASSUMPTIONS - 7-, 14-, and 21-DAY MISSIONS STARTING EACH DAY FOR 4 YEARS (3DNPEH)
- DAYS BETWEEN ACCESSES COMPUTED ANALYTICALLY, FIRST ACCESS RANDOM
- PERCENTILE RANKING DONE FOR EACH DURATION

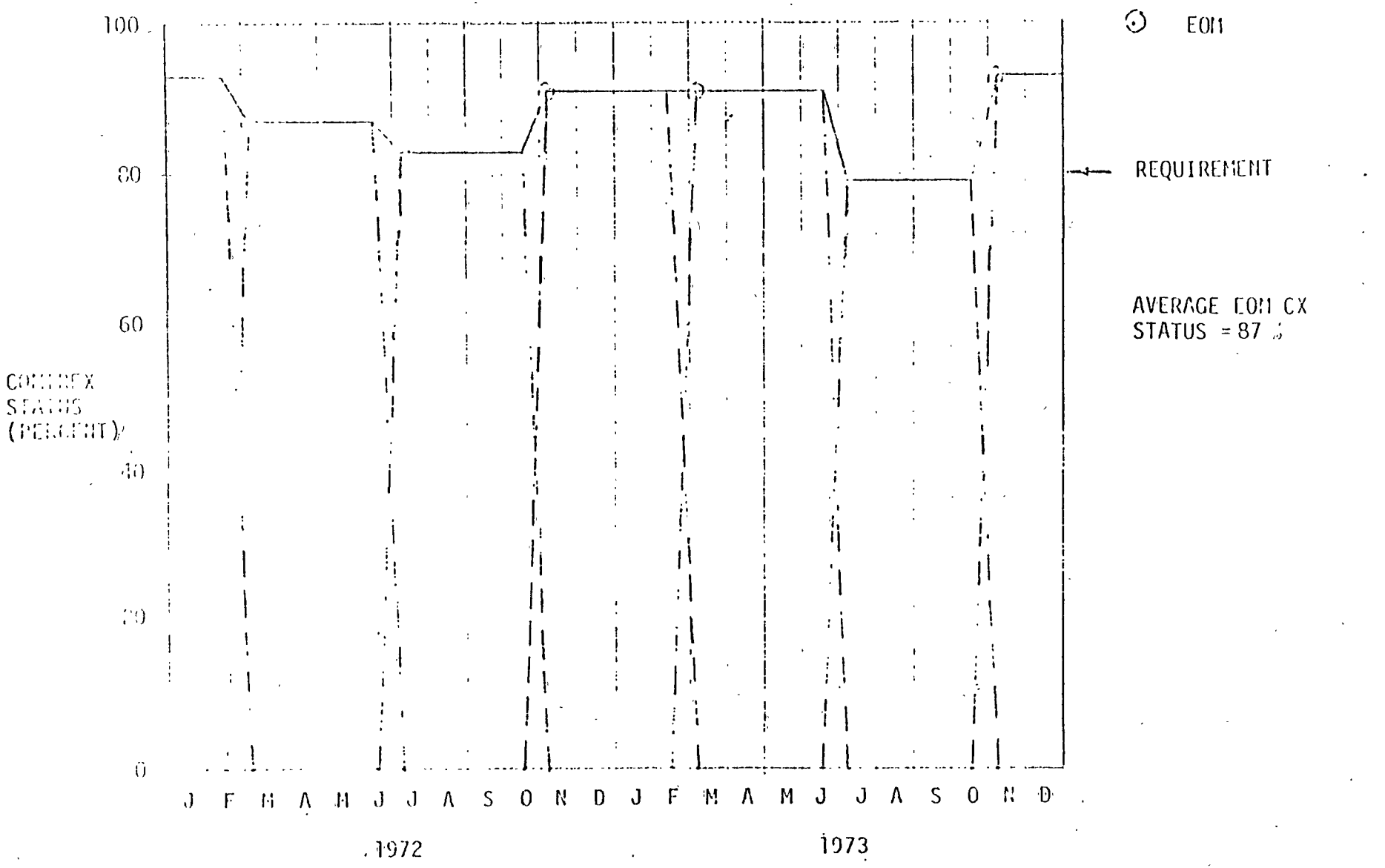




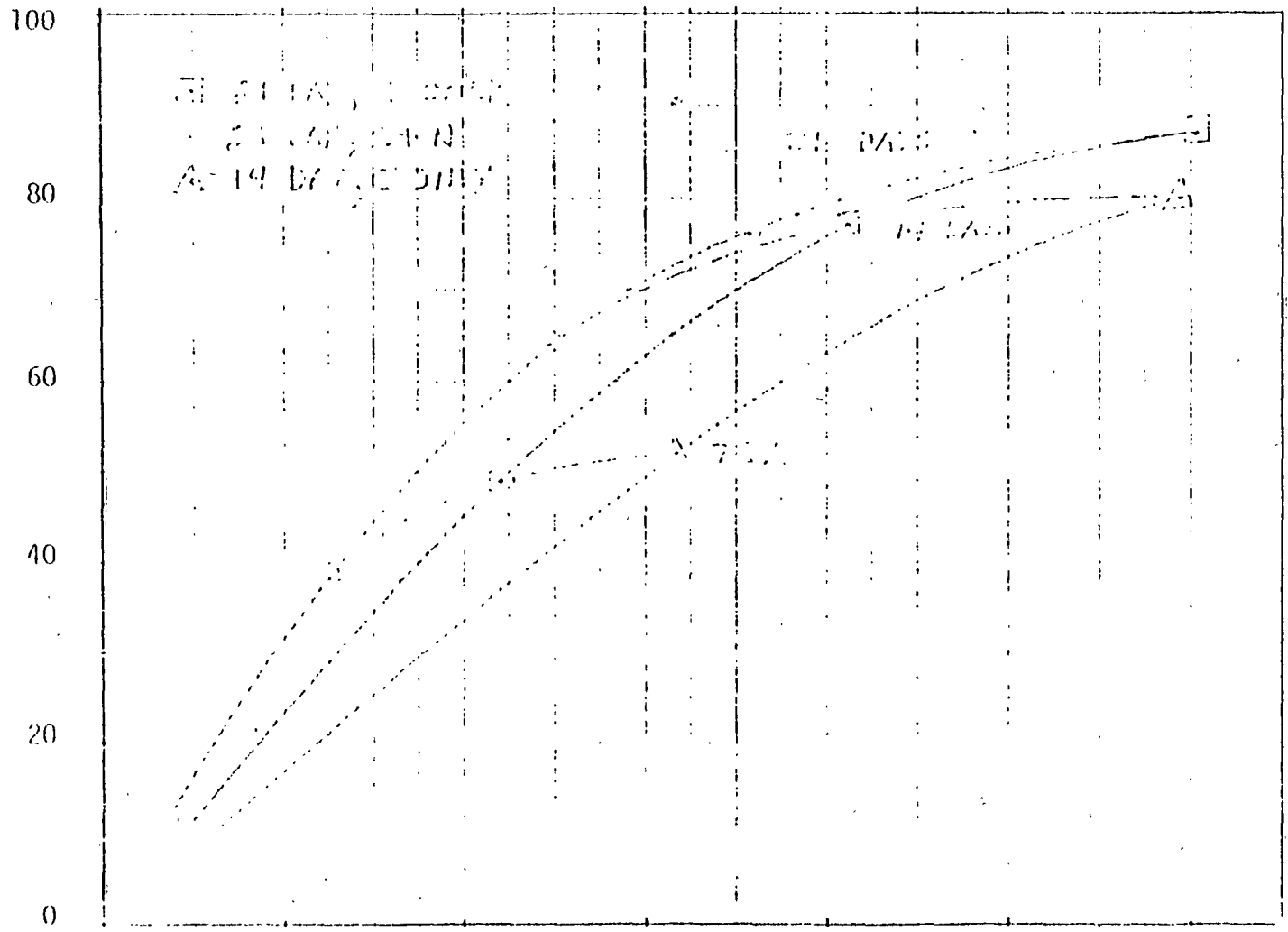


4-MONTH REQUIREMENTS PERFORMANCE VERSUS TIME

(97° INCLINATION, 3 21-DAY MISSIONS PER YEAR AGAINST CURRENT REQUIREMENTS



PERFORMANCE VERSUS FILM TRADES FOR DIFFERENT DURATIONS



MISSION
& TGT
MD. REQ'T
STATUS

BYE-1 ESU 22 Jan 79

BYE 120473-78
AD - 22 Jan 79

AVERAGE END-OF-MISSION COMIREX STATUS SUMMARY

(SIX MISSIONS SIMULATED PER CASE - 3/YEAR)

Case	Incl.	Dur.	Req'ts	All	All Cur-rent	All New	Current 2* Mo	Current 4 Mo	Current 6 Mo	Current 9 Mo	Current 12 Mo	Current 18 Mo	Current 24 Mo	New 9 Mo	New 18 Mo	New 24 Mo
A	97°	21	C only	-	92	-	57	87	94	98	98	98	97	-	-	-
B	97°	14	C only	-	89	-	40	80	91	96	97	98	97	-	-	-
C	97°	21	C +N	78	83	74	53	76	84	92	89	86	86	77	71	69
D	75°	21	C +N	81	80	82	39	74	83	91	89	81	87	86	78	70

* AVERAGE CONTINUOUS STATUS IS ≈ HALF OF AVERAGE EOM STATUS

BYE 120478-78
HANDLE VIA BYEMAN
AD - 22 Jan 79

Cl: [illegible] 1 RVW 22 Jan 99

STS PCS PERFORMANCE ANALYSIS STUDY
PRELIMINARY CONCLUSIONS

- o MONO REQUIREMENTS MUST BE TAKEN IN STEREO TO MEET QUALITY REQUIREMENTS
- o THREE 21-DAY (97°) MISSIONS PER YEAR CAN ACHIEVE SATISFACTION OF CURRENT REQUIREMENTS EXCEPT 2-MONTH REQUIREMENTS
  - AVERAGE END-OF-MISSION CX STATUS FOR 2-MONTH REQUIREMENTS IS 57 PERCENT
  - AVERAGE OVER TIME CX STATUS FOR 2-MONTH REQUIREMENTS IS ≈ 29 PERCENT
  - PERFORMANCE AGAINST 2-MONTH REQUIREMENTS SEVERELY LIMITED BY PCS QUALITY AS WELL AS NUMBER OF MISSIONS PER YEAR
  - MIXED CAPABILITY AGAINST SPECIAL SEARCH REQUIREMENTS
- o REDUCING MISSION DURATIONS FOR THE ABOVE CASE TO 14 DAYS CAUSES:
  - FURTHER REDUCTION IN 2-MONTH AVERAGE END-OF-MISSION STATUS (40 VS. 57 PERCENT)
  - OCCASIONAL MODERATE SHORTFALLS IN SPECIFIC REGIONS FOR 4-MONTH REQUIREMENTS
  - SUBSTANTIALLY REDUCED CAPABILITY AGAINST SPECIAL SEARCH REQUIREMENTS
  - CONTINUED SATISFACTION OF OTHER REQUIREMENTS

STS PCS PERFORMANCE ANALYSIS STUDY
PRELIMINARY CONCLUSIONS (CONTINUED)

- THE PERFORMANCE OF THREE 21-DAY 97° INCLINATION, 91x140 NM ORBIT MISSIONS PER YEAR, WHEN TASKED AGAINST THE PROJECTED 1985 SEARCH REQUIREMENTS:
  - HAS VERY SUBSTANTIAL SHORTFALLS AGAINST 2-MONTH REQUIREMENTS
    - 53 PERCENT AVERAGE END-OF-MISSION COMIREX STATUS
    - 27 PERCENT AVERAGE OVER 2 YEARS COMIREX STATUS
  - HAS MODERATE SHORTFALLS (≈70 PERCENT COMIREX STATUS) AGAINST THE NEW 18- AND 24-MONTH STANDING SEARCH REQUIREMENTS
  - ACHIEVES ALL OTHER STANDING SEARCH REQUIREMENTS
- THE PERFORMANCE OF THREE 21-DAY 75° INCLINATION 95x120 NM ORBIT MISSIONS PER YEAR, IS APPROXIMATELY THE SAME AS THE PERFORMANCE OF THREE 21-DAY 97° INCLINATION 91x140 NM ORBIT MISSIONS PER YEAR
  - CLUSTER PERFORMANCE IS REDUCED (39 VS 53 PERCENT AVG EOM CX STATUS)
  - NON-SUN SYNCHRONOUS ORBIT REDUCED ACCESSES WITH GOOD SUN ANGLES AND REDUCES AVERAGE SUN ANGLE
  - THE LOWER INCLINATION ORBIT IS MORE READILY ACHIEVABLE WITH THE STS

Cy: [illegible] RVW 22 Jan 79

BYE 120478/78
HANDLE VIA BYEMAN
AD - 22 Jan 79

ISSUES THAT SHOULD RECEIVE DETAILED ANALYSIS THAT WILL NOT BE ADDRESSED FURTHER IN THIS STUDY

- HOW SERIOUS IS COMIREX ABOUT (A) THE NEW REQUIREMENTS, (B) RN-4, DN-5, & DNP-50 FOR 2 MONTH REQUIREMENTS, (C) RN-3, DN-4, AND DNP-80 FOR CURRENT AND NEW MONO REQUIREMENTS?

- WILL THE RELATIVELY FEWER SEARCH SYSTEM DAYS ON ORBIT PER YEAR SIGNIFICANTLY DEGRADE INTELLIGENCE NEED SATISFACTION?

- WILL THE STS PCS IMAGERY, WITH APPROPRIATE GROUND PROCESSING, MEET PROJECTED MC&G METRIC REQUIREMENTS?

- HOW ACCURATE IS THE SLANT RANGE NIIRS PREDICTION MODEL? IT DOES NOT RECOGNIZE DIFFERENT SUN ANGLES.

- WILL NEW TYPES OF FILM (E.G., SO315) SUBSTANTIALLY INCREASE THE AVERAGE NIIRS? THIS COULD IMPACT SATISFACTION OF 2 MONTH REQUIREMENTS, MAY ALLOW MONO COVERAGE OF MONO REQUIREMENTS (~30% FILM SAVINGS), AND MAY ALLOW HIGHER ORBITAL ALTITUDES.

- WHAT IS THE IMPACT ON SEARCH EXPLOITATION RESOURCES OF 3 OR MORE STS PCS MISSIONS PER YEAR, EACH OF WHICH RETURN MUCH REDUNDANT AND CLOUD COVERED IMAGERY?

BYE-120478/78
HANDLE VIA BYEMAN
AD - 5 JAN 79

ISSUES THAT SHOULD RECEIVE DETAILED ANALYSIS THAT WILL NOT BE ADDRESSED FURTHER IN THIS STUDY (CONTINUED)

- WHAT IS THE IMPACT ON WEATHER FORECAST ACCURACY AND PERFORMANCE OF DMSP NOT BEING SYNCHRONIZED WITH THE STS PCS?

- A MORE DETAILED STUDY SHOULD BE PERFORMED TO EXAMINE VARIOUS PARAMETER TRADES FOR ORBITS WITH INCLINATIONS BETWEEN 70° AND 80°. STS LIFE SHOULD BE STUDIED IN DETAIL FOR DIFFERENT APOGEES AND PERIGEES. SUN ANGLE, QUALITY AND CLOSURE TRADES SHOULD ALSO BE STUDIED IN DETAIL.

- WHAT IS THE POTENTIAL FOR [redacted] TO ALLOW FEWER AND/OR SHORTER STS PCS MISSIONS?

  - 2-MONTH REQUIREMENTS
  - OVERDUE OTHER REQUIREMENTS
  - ASSIGNMENT OF SEARCH REQUIREMENTS IN LOW CONFLICT REGIONS TO [redacted]
  - METRIC MC&G REQUIREMENTS BEYOND STS PCS CAPABILITIES

(b)(1)
(b)(3)
10 USC § 424

BYE 120478/78
HANDLE VIA BYEMAN
AD - 18 Jan 79

[illegible] 18 Jan 99

(b)(1)
(b)(3)
10 USC 424

PLAN FOR REMAINDER OF STUDY

ACTIVITIES

- CALIBRATE FOAM AND HSIM
- FURTHER ANALYSIS OF 97° AND 75° INCLINATION ORBIT PERFORMANCE
  - ANALYSIS OF 14-DAY DURATION PERFORMANCE
  - USE OPERATIONAL HEXAGON SIMULATOR (HSIM) FOR ACCURATE PERFORMANCE PROJECTION
- ANALYSIS OF 57° INCLINATION ORBIT HX GAP FILLER PERFORMANCE
  - PERFORMANCE TRADES FOR DIFFERENT FILM LOADS AND DURATIONS FOR CURRENT REQUIREMENTS ONLY

PRODUCTS

o FINAL STUDY BRIEFING	4 APRIL 1979*
o FINAL STUDY REPORT	30 APRIL 1979*

* ONE MONTH SLIP FROM ORIGINAL PLAN

BYE 120478-78
HANDLE VIA BYEMAN
AD - 22 Jan 79

CL: BYE-1 RVW 22 Jan 79