JSC-09212

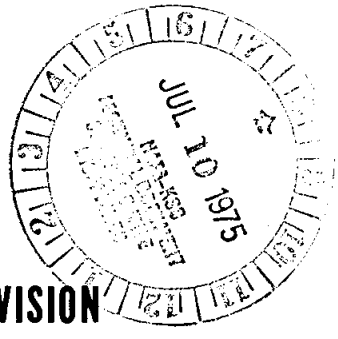
ASTP

FINAL

PCN-1

NOTE: This is a PAGE CHANGE NOTICE to be incorporated into the previous edition. DISCARD ONLY the changed out pages.

HP-65 RENDEZVOUS TARGETING CHECKLIST



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National Aeronautics and Space Administration

LYNDON B. JOHNSON SPACE CENTER

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HP-65 RENDEZVOUS TARGETING CHECKLIST

25 JUNE 1975

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AREA	NAME/BRANCH	LOCATION
TECHNICAL SUPPORT	FLIGHT CREW OPERATIONS McDONNELL DOUGLAS TECHNICAL SERVICES COMPANY (CONTRACT NAS 9-14023)	EXT. 3551 Bldg. 4 Rm 272
TECHNICAL SUPPORT	EJ6/DISPLAYS & CONTROLS SYSTEMS BRANCH GN&C DISPLAYS SECTION	
TYPING & GRAPHICS	KENTRON HAW. LTD. CREW PROCEDURES DATA GROUP	
ATS POINTING PROGRAM	MIKE HOLLARS CG2/FLIGHT PROCEDURES SECTION	EXT. 3048 Bldg. 4 Rm 211

CHANGE CONTROL RECORD

APOLLO/SOYUZ TEST PROJECT HP-65 RENDEZVOUS TARGETING CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
001	REFERENCE	3/5/75	
002	REFERENCE	3/5/75	
003	FINAL	5/13/75	
004	FINAL	5/13/75	
005	FINAL	5/13/75	
006	FINAL	5/13/75	
007	PCN-1	6/25/75	
008	PCN-1	6/25/75	

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HP-65 RENDEZVOUS TARGETING CHECKLIST

ASTP

LIST OF EFFECTIVE PAGES

BASIC	10/17/75
REFERENCE	3/5/75
FINAL	6/13/75
PCN-1	6/25/75

* Indicates current change

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CONTENTS

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CHECKOUT

1. HP65-ON/RUN

2. INSERT "DIAG-1" PROGRAM CARD and STOW
   KEY [R/S] - (Note -8.888888888-88 displayed)
   IF NOT - Record value displayed
   Turn HP65-OFF; then ON and repeat.
   IF SITUATION REPEATS - Unstow and checkout BACKUP HP65.

3. HP65-OFF; then ON

4. INSERT "DIAG-2" PROGRAM CARD and STOW
   KEY [R/S] - (Note -8.883888888-88 displayed)
   IF NOT - Turn HP65-OFF; then On and repeat.
   IF SITUATION REPEATS - Unstow and checkout BACKUP HP65.

5. HP65-OFF; then ON

6. INSERT "DIAG-3" PROGRAM CARD and STOW
   KEY [R/S] - (Note -8.833888888-88 displayed)
   IF NOT - Turn HP65-OFF; then ON and repeat.
   IF SITUATION REPEATS - Unstow and checkout BACKUP HP65.

7. HP65-OFF

8. IF DIAGNOSTIC TEST FAILED - REPORT RESULTS TO STDN

NOTE: VERIFY THAT BODY HAS BEEN GROUNDED PRIOR TO REMOVING PROGRAM CARDS FROM CARD HOLDER.

NSR

1. RECORD NSR INPUT DATA (Range measurements at NSR -28, -24, & -20 minutes) - Reference PAD A

2. HP65-ON/RUN

3. INSERT "NSR-1" PROGRAM CARD and STOW
   LOAD INPUT DATA (NCC TIG, TPI TIG and Range measurements from PAD A)
   NCC TIG (H.MS)/ [STO] / [1]
   **TPI TIG (H.MS)/ [STO] / [2]
   R28/ [STO] / [3]
   R24/ [STO] / [4]
   R20/ [STO] / [5]

   NOTE: To verify data loaded correctly:
   For NCC & TPI TIG; KEY [DSP] / [.] / [4] / [RCL] / ([1] or [2]), verify, then KEY [DSP] / [.] / [2]
   For Range data; KEY [RCL] / ([3], [4] or [5])

4. KEY [A] - (Note 222.22 displayed) *

   INSERT "NSR-2" PROGRAM CARD and STOW
   KEY [A] - (Note 333.33 displayed)

   INSERT "NSR-3" PROGRAM CARD and STOW
   KEY [A] - (Note 444.44 displayed)

   X X X X X X X X X X X X X X X X
   X CAUTION: DO NOT turn off HP65 X
   X X X X X X X X X X X X X X X X

5. RECORD NSR INPUT DATA (Range measurement at NSR -16 minutes) - Reference PAD A

6. INSERT "NSR-4" PROGRAM CARD and STOW
   LOAD INPUT DATA (Range at NSR -16 minutes) - Reference PAD A
   R16/ [STO] / [1]

7. KEY [A] - (Note 555.55 displayed) *

8. RECORD NSR INPUT DATA (Range measurement at NSR -12 minutes) - Reference PAD A

9. INSERT "NSR-5" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
   LOAD INPUT DATA (Range at NSR -12 minutes) - Reference PAD A
   R12/ [STO] / [2]

10. KEY [A] - COPY ΔVX (LV) * - (PAD B & RNDZ BOOK Pg 15)
    KEY [B] - COPY ΔVZ (LV) - (PAD B & RNDZ BOOK Pg 15)
    KEY [C] - COPY ORDEAL Burn Att - (PAD B & RNDZ BOOK Pg 15)) (CMC FAIL
    KEY [D] - COPY ΔV Total - (PAD B & RNDZ BOOK Pg 15)) ONLY
    STOW "NSR-5" PROGRAM CARD

11. HP65-OFF

*A Blinking 0.00 will be displayed if input data is missing.
To recover: key [CLX] , store correct data, key [A] , etc.
**TPI TIG used for NCC targeting; recorded on Pg 12 of RNDZ BOOK.

PAD A (NSR)

GET OF DATA	NSR INPUT DATA	STO
	NCC TIG (N11)	1
NSR TIG (N13)	TPI TIG (N37)**	2
-28	R28 (NM)	3
-24	R24 (NM)	4
-20	R20 (NM)	5
-16	R16 (NM)	1
-12	R12 (NM)	2

**TPI TIG used for NCC targeting; recorded on Pg 12 of RNDZ BOOK.

PAD B (NSR)

KEY	NSR RESULTS
A	$\Delta V_{(LV)}$ ΔVX
B	ΔVZ
C	ORDEAL BURN ATT
D	ΔVT (IN PLANE)

TPI TIG 1

1. RECORD TPI TIG 1 INPUT DATA at ~TPI-50 (Two Ranges two minutes apart & GET of second range measurement) - Reference PAD A

```
*****OPTIONAL*************************************
* CMC or STDN TPI TIG may be used for TPI TIG 1 *
**********************************************
```

2. HP65-ON/RUN

3. INSERT "TPI TIG 1" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
   LOAD INPUT DATA (Ranges and GET from PAD A)
   R1/ [STO] / [1]
   R2/ [STO] / [2]
   GET2 (H.MS)/ [STO] / [3]

```
*****OPTIONAL*************************************************
* If CMC or STDN TPI TIG is to be used for TPI TIG 1;        *
* LOAD TIG (H.MS)/ [STO] / [4]                               *
* (Note: R1, R2 & GET2 load not required)                    *
**********************************************************
```

> NOTE: To verify data loaded correctly:
> Key [RCL] /([1], [2], [3] or [4])

4. KEY [A] - COPY TPI TIG 1 (H.M)- (PAD B)
   KEY [B] - COPY TPI TIG 1 -32 (H.M)- (PAD B)
   KEY [C] - COPY TPI TIG 1 -24 (H.M)- (PAD B)
   KEY [D] - COPY TPI TIG 1 -16 (H.M)- (PAD B)
   KEY [E] - COPY TPI TIG 1 -14 (H.M)- (PAD B)
   STOW "TPI TIG 1" PROGRAM CARD

5. HP65-OFF

PAD A (TP1)

TP1 TIG 1 INPUT DATA								STO
R1 (M1)	X			•			X	1
R2 (M1)	X			•			X	2
GET 2			•		•			3

TPI

1. RECORD TPI INPUT DATA (NSR TIG (N13) and Range measurements at TPI TIG 1 -32 & -24 minutes) - Reference PAD B

2. HP65-ON/RUN

3. INSERT "TPI-1" PROGRAM CARD and STOW
   LOAD INPUT DATA (NSR TIG, TPI TIG 1 and Range measurements from PAD B)
   NSR TIG (H.MS)/ [STO] / [1]
   TPI TIG 1 (H.M)/ [STO] / [2]
   R32/ [STO] / [3]
   R24/ [STO] / [4]

   NOTE: To verify data loaded correctly:
   KEY [RCL] /([1] , [2] , [3] or [4])

4. KEY [A] - (Note 222.22 displayed) *

5. INSERT "TPI-2" PROGRAM CARD and STOW

   X X X X X X X X X X X X X X X X X
   X CAUTION: DO NOT turn off HP65 X
   X X X X X X X X X X X X X X X X X

6. RECORD TPI INPUT DATA (Range measurement at TPI TIG 1 -16 minutes) - Reference PAD B
   LOAD INPUT DATA (Range at TPI TIG 1 -16 from PAD B)
   R16/ [STO] / [1]

7. KEY [A] - (Note 333.33 displayed) *

8. RECORD TPI INPUT DATA (Range measurement at TPI TIG 1 -14 minutes) - Reference PAD B

9. INSERT "TPI-3" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
   LOAD INPUT DATA (Range at TPI TIG 1 -14 from PAD B)
   R14/ [STO] / [1]

   *****IF R14 NOT AVAILABLE********
   * LOAD TPI TIG 1 (H.M)/ [STO] / [2] *
   ****

10. KEY [A] - Copy TPI TIG 2 (H.MS) * - (PAD C & RNDZ BOOK Pg 17)
    KEY [B] - Copy TIG SLIP (H.MS) - (PAD C)
    KEY [C] - (Note 444.44 displayed)
    STOW "TPI-3" PROGRAM CARD

    INSERT "TPI-4" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
    KEY [A] - COPY ΔVX (LV) - (PAD C & RNDZ BOOK Pg 17)
    KEY [B] - COPY ΔVZ (LV) - (PAD C & RNDZ BOOK Pg 17)
    KEY [C] - COPY ORDEAL Burn Att - (PAD C & RNDZ BOOK Pg 17)) (CMC FAIL
    KEY [D] - COPY ΔV Total - (PAD C & RNDZ BOOK Pg 17)) (ONLY
    STOW "TPI-4" PROGRAM CARD

11. HP65-OFF

*A Blinking 0.00 will be displayed if input data is missing.
To recover: key [CLX] , store correct data, key [A] , etc.

PAD B (TPI)

KEY	GET OF DATA	TPI INPUT DATA	STO
		NSR TIG (N13)	1
A	TPI TIG 1 →	TPI TIG 1	2
B	-32	R32 (NM)	3
C	-24	R24 (NM)	4
D	-16	R16 (NM)	1
E	-14	R14 (NM)	1

PAD C (TPI)

KEY	TPI RESULTS
A	TPI TIG 2
B	TIG SLIP

A	$\Delta V_{(LV)}$	ΔVX
B		ΔVZ
C	ORDEAL BURN ATT	
D	ΔVT (IN PLANE)	

TPM1

1. RECORD TPM1 INPUT DATA (Range and Angle measurements)-
   Reference PAD A

```
*****FOR X AXIS TRACKING*******************
* Use 57.47° or value obtained during COAS *
* LOS DETERMINATION* for TA4:30 & TA8:30.  *
*******************************************
```

2. HP65-ON/RUN

3. INSERT "TPM1" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
   LOAD INPUT DATA (From PAD A)
   - θ4:30 / STO / 1
   - TA4:30/ STO / 2
   - R7:30 / STO / 3
   - R8:30 / STO / 4
   - θ8:30 / STO / 5
   - TA8:30/ STO / 6

   NOTE: To verify data loaded correctly, KEY RCL /(1,2,3,4,5 or 6)

4. KEY A - COPY ΔVX (LOS) - (PAD B & RNDZ BOOK Pg 18)
   KEY B - COPY ΔVZ (LOS) - (PAD B & RNDZ BOOK Pg 18)
   STOW "TPM1" PROGRAM CARD

5. HP65-OFF

TPM2

1. RECORD TPM2 INPUT DATA (Range and Angle measurements)-
   Reference PAD C

```
*****FOR X AXIS TRACKING*******************
* USE 57.47° or value obtained during COAS *
* LOS DETERMINATION*  for TA16:30 & TA20:30*
*******************************************
```

2. HP65-ON/RUN

3. INSERT "TPM2" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
   LOAD INPUT DATA (From PAD C)
   - θ16:30 / STO / 1
   - TA16:30/ STO / 2
   - R19:30 / STO / 3
   - R20:30 / STO / 4
   - θ20:30 / STO / 5
   - TA20:30/ STO / 6

   NOTE: To verify data loaded correctly, KEY RCL /(1,2,3,4,5 or 6)

4. KEY A - COPY ΔVX (LOS) - (PAD D & RNDZ BOOK Pg 18)
   KEY B - COPY ΔVZ (LOS) - (PAD D & RNDZ BOOK Pg 18)
   STOW "TPM2" PROGRAM CARD

5. HP65-OFF

*COAS LOS DETERMINATION values recorded in RNDZ BOOK Pg 11.

PAD A (TPM 1)

GET OF DATA	TPM1 INPUT DATA	STO
TPI+4:30	θ4:30 (DEG)	1
	TA4:30 (DEG)	2
TPI+7:30	R7:30 (NM)	3
TPI+8:30	R8:30 (NM)	4
	θ8:30 (DEG)	5
	TA8:30 (DEG)	6

PAD B (TPM1)

KEY	TPM1 RESULTS
A	$\Delta V_{(LOS)}$ ΔVX
B	ΔVZ

PAD C (TPM2)

GET OF DATA	TPM2 INPUT DATA	STO
TPI+16:30	θ16:30 (DEG)	1
	TA16:30 (DEG)	2
TPI+19:30	R19:30 (NM)	3
TPI+20:30	R20:30 (NM)	4
	θ20:30 (DEG)	5
	TA20:30 (DEG)	6

PAD D (TPM2)

KEY	TPM2 RESULTS
A	$\Delta V_{(LOS)}$ ΔVX
B	ΔVZ

RECOVERY NOTES

Accidentally key [f], [f-1] or [g]
If one of these are keyed, it should be cancelled before continuing. To cancel: Key [f], [PREFIX]. If it was not cancelled before keying another key, turn HP-65 OFF and start over at step one.

Accidentally key [STO]
If [STO] is keyed, it should be cancelled before continuing. To cancel: Key [CLX]. If it was not cancelled before keying another key, turn HP-65 OFF and start over at step one.

Accidentally key [CHS] instead of [STO]
This changes the sign on the displayed number. Correct the number by keying [CHS] again.

Multiple Decimal Point Display
Continuous - The battery provides ~3 hours of continuous operation. All decimal points light in the display (superimposed onto the current display) when 2 to 5 minutes of operation time remains.
While reading card - If the decimal points light while reading a card and then go out, the battery is almost discharged. Can expect a continuous display of decimals after additional usage.
Recovery - Turn HP-65 OFF, replace battery pack, and start over at step one.
Power is best conserved by displaying only a decimal (Key [.]) when the HP-65 is ON but not in use.

Blinking Display
Used to indicate that input data is missing in NSR steps 4, 7 & 10 and TPI steps 4, 7 & 10. Key [CLX], store correct data, Key [A], and continue

After a calculation - due to an improper operation such as $\sqrt{-x}$, $x \neq 0$, etc
Recovery - Turn HP-65 OFF and start at step one.
After loading a card- due to reading a blank card, or bit or word was dropped during reading. Could indicate that card was inserted upsidedown or backwards, or inserted before turning HP-65 ON
Recovery - First, key [CLX] to stop blinking display. Then, reload the card.
If blinking reoccurs, key [CLX] and load the backup card.

Display of 00.00, 0.00, 0.0, etc after keying [A]
This could be a result of loading the card upside down or backwards. To recover: key [CLX], reload the card, verify all associated input data, then key [A], etc.
If display reoccurs, key [CLX] and load the backup card.

Blank Display
Turn HP-65 OFF and start over at step one. If display still blank, change batteries and start over at step one.

RECOVERY NOTES

00 00 Displayed in Right of Window

The W/PRGM/RUN switch is in the W/PRGM position. Place the switch in the RUN position, reload the last card, verify all input data associated with the last card, and continue with the current step.

Bad Answer Obtained

If a bad answer (garbage) is obtained, a general rule of thumb is to turn the HP-65 OFF and start over at step one. In some situations, the following list of hints might save you some time.

1. For NSR or TPI last card -
   a. Have to key [A] before results of keying [B], [C] or [D] are valid.
      If [A] was not keyed, go ahead and key [A] now; then cont.
   b. For NSR, verify correct R16 & R12 data in storage.
      If R12 data not correct, store correct data, then continue.
      If R16 data not correct, store correct data, load NSR-4 card, key [A], load NSR-5 card, key [A], etc.
   c. If 555.55 (444.44 for TPI) is displayed after keying [A], this is telling you that the last ("NSR-5" or "TPI-4") card had not been loaded. You can still load the last card; key [A], etc.
2. For TPI TIG 1, TPM1 or TPM2 card -
   First, verify stored data. Then -
   a. If data not correct, store the correct data; then continue.
   b. If data is correct, do not turn HP-65 OFF before reloading card. This way, the data does not have to be reloaded (stored).

TPM1 & TPM2 answers are invalid if S/C is tracking heads down, unless θ is corrected, where

$$\theta = \theta + 2*(57.47 - TA)$$

Additional Notes

1. When answers are to be displayed, you always have to key [A] before answer is valid.
2. When answers are not to be displayed, keying [B], [C], [D] or [E] will result in proper execution of program.
3. Keying [A] more than once (for any card) will not degrade the answer.
   In fact, keying [A], [B], [C], [D] or [E] any number of times will not degrade the answer.
4. If you're not sure you keyed [A], Key [A] again.
5. The numbers (111.11, 222.22, etc) indicate which card has to be executed next. Pay attention to these numbers.
   If you accidentally fail to load a card, the correct program card number will be displayed after keying [A] ([C] For TPI-3).
6. A blinking 0.00 is displayed if data is missing in NSR steps 4, 7 & 10 and TPI steps 4, 7 & 10.

DATA SOURCES

	NSR/TPI	TPM1/TPM2
NOMINAL	Range- EMS (For B/U, use V76/N76 Reg 1)	Range- EMS θ - FDAI ORDEAL PITCH TA - Trunnion Angle with Soyuz centered in SXT
CMC FAIL	Range- EMS only (NO B/U)	Range- EMS θ - Track Soyuz in COAS Read FDAI ORDEAL PITCH TA - Use value from COAS LOS DETERMINATION* or 57.47°
IMU FAIL	Range- EMS (For B/U, use V76/N76 Reg 1)	Range- EMS θ - Track Soyuz in COAS Read FDAI ORDEAL PITCH TA - Use value from COAS LOS DETERMINATION* or 57.47°
NO VHF RNG	(HP-65 soln not available)	(HP-65 soln not available)
EMS RNG DISPLAY BLANK	Range- V76E, Load N72, PRO, N76E Read R in R1 For TPI - 14: V76E, load N72 with ZERO's PRO, N76E Read current R in R1	Range- V76E, load N72 with ZERO's, PRO, N76E Read current R in R1 θ - FDAI ORDEAL PITCH TA - Trunnion Angle with Soyuz centered in SXT
SOYUZ TRACK LITE FAIL	Range- EMS (For B/U, use V76/N76 Reg 1)	(HP-65 soln not available)
MARK BUTTON FAIL	Range- EMS (For B/U, use V76/N76 Reg 1)	RANGE- EMS θ - FDAI ORDEAL PITCH TA - Trunnion Angle with Soyuz centered in SXT
OPTICS** FROZEN	Range- EMS (For B/U, use V76/N76 Reg 1)	Range- EMS θ - FDAI ORDEAL PITCH Track Soyuz in SXT with MIC TA***- Trunnion Angle with Soyuz centered in SXT
CANNOT SEE THRU OPTICS	Range- EMS (For B/U, use V76/N76 Reg 1)	Range- EMS θ - Track Soyuz in COAS Read FDAI ORDEAL PITCH TA - Use value from COAS LOS DETERMINATION* or 57.47°

*COAS LOS DETERMINATION values recorded in RNDZ BOOK Pg 11.
**HP-65 solution is NO-GO for optics frozen at large shaft angle ($\geq$ 10 deg).
***For negative TA (i.e. TPAC = 350° to 360°): TA = TPAC - 360°.

ATS POINTING

ATS

ASSUMPTIONS:
- Longitude of Ascending Node and Time of Ascending Node are updated at least daily and after major trajectory changes, including NC1, NC2 and DOCKING. Orbital Period will only be updated as required. (Prelaunch nominal and update nominal data provided on page A-3. Use nominal data if update not provided.)
- Time of Ascending Node and Time of ATS Acquisition are referenced to the same time base.
- Spacecraft attitude is referenced to LVLH and IMU is aligned to a nominal in-plane REFSMMAT.
- Yaw = 0. [HP-65 results OK for small yaw angles (≈±30 deg.); for larger yaw angles: maneuver spacecraft to yaw = 0 prior to comp.]
- Pitch angle obtained from V83 or Ordeal FDAI.
- Pitch angle read as close as possible to Time of ATS Acquisition.
- Program executed ASAP such that Time of ATS Acquisition = present time.

1. RECORD ATS INPUT DATA (Reference PAD A):
   - Ω (Longitude of Ascending Node)
   - T_Ω (Time of Ascending Node)
   - τ (Orbital Period)
   - T_{ACQ} (Time of ATS Acquisition)
   - R_{LVLH} (Roll-LVLH) - FROM FDAI
   - P_{LVLH} (Pitch-LVLH) - FROM V83

   ********FOR CMC FAIL**********
   * Set Ordeal and obtain P_{LVLH} *
   * from Ordeal FDAI. *
   ****

2. HP65-ON/RUN

3. INSERT "ATS-1" PROGRAM CARD and STOW
   LOAD INPUT DATA (Reference PAD A):
   - Ω (Deg., East positive)/ STO / 1
   - T_Ω (H.M)/ STO / 2
   - τ (H.H)/ STO / 3
   - T_{ACQ} (H.M)/ STO / 4
   - R_{LVLH} (Deg.)/ STO / 5
   - P_{LVLH} (Deg.)/ STO / 6

   NOTE: To verify data loaded correctly, KEY RCL /(1 , 2 , 3 , 4 , 5 or 6)

   KEY A - (Note 2.22 displayed)

4. INSERT "ATS-2" PROGRAM CARD and STOW
   KEY A - (Note 3.33 displayed)

5. INSERT "ATS-3" PROGRAM CARD and STOW
   KEY A - (Note 4.44 displayed)

6. INSERT "ATS-4" PROGRAM CARD and PLACE IN UPPER "WINDOW" SLOT
   KEY A - COPY P (Antenna PITCH) - (PAD B)
   KEY B - COPY Y (Antenna YAW) - (PAD B)
   STOW "ATS-4" PROGRAM CARD

7. HP65-OFF

8. Compare computed P(Pitch) and Y(Yaw) Antenna Positioning Angles with the Antenna Limitations Chart on page A-4:
   If in acceptable zone: ACQUIRE ATS HGA: MAN, WIDE; DIAL COMPUTED P and Y; REACQ, NARROW.
   If in "no coverage" zone: ROLL spacecraft 180 deg and GO TO STEP 1.

ATS NOMINAL DATA

INPUT \ PHASE →	INS → NC1	UPDATE	UPDATE
Ω (deg.)	- 1 2 5		
T_Ω (H.M) *	0 0 1 2 4		
τ (H.H)	1 4 6 1		

INPUT \ PHASE →	NC1 → NC2	UPDATE	UPDATE
Ω (deg.)	+ 1 6 7		
T_Ω (H.M)	0 1 3 1 7		
τ (H.H)	1 4 7 5		

INPUT \ PHASE →	UPDATE	UPDATE	UPDATE
Ω (deg.)	- 1 2 5		
T_Ω (H.M)	0 3 2 3 7		
τ (H.H)	1 4 7 5		

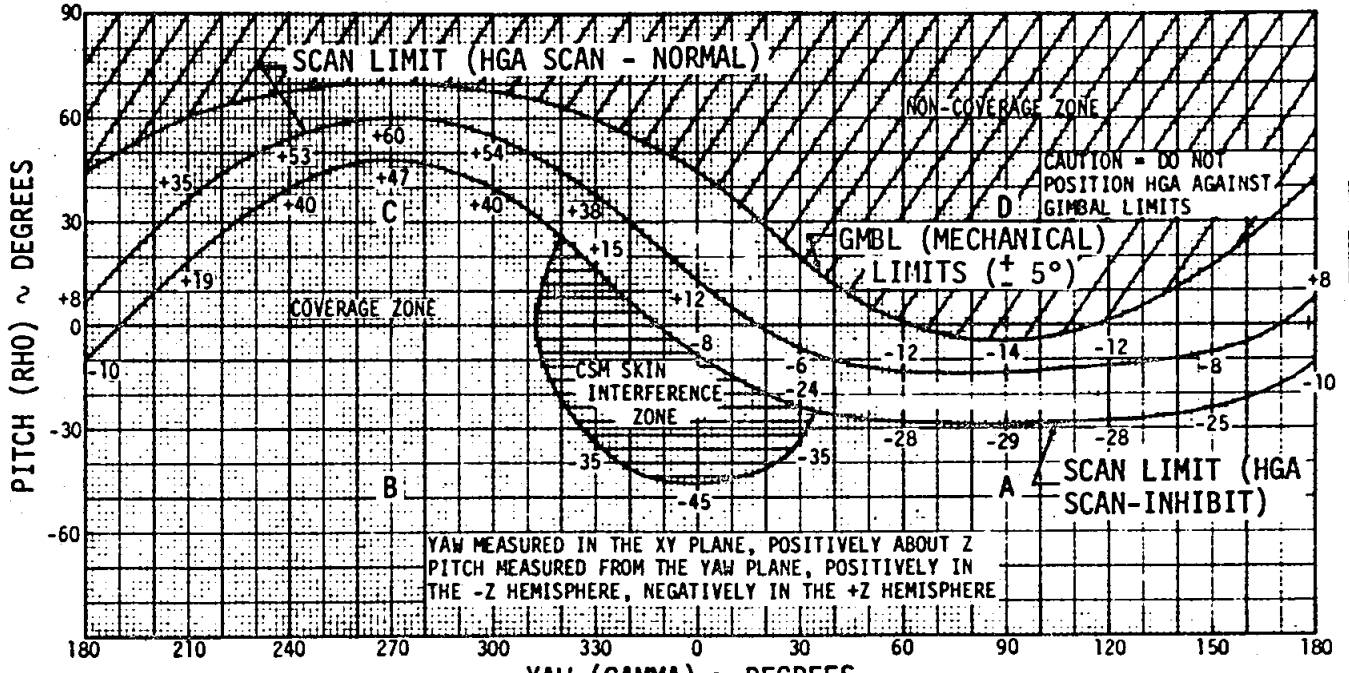
INPUT \ PHASE →	NC2 → DOCK	UPDATE	UPDATE
Ω (deg.)	- 0 1 2		
T_Ω (H.M)	0 4 8 3 8		
τ (H.H)	1 4 6 8		

INPUT \ PHASE →	POST DOCK	UPDATE	UPDATE
Ω (deg.)	- 0 8 0		- 0 8 3
T_Ω (H.M)	0 5 3 0 4		1 0 0 2 7
τ (H.H)	1 4 8 2		1 4 8 1

INPUT \ PHASE →	UPDATE	UPDATE	UPDATE
Ω (deg.)		- 1 3 2	
T_Ω (H.M)		1 5 0 4 6	
τ (H.H)		1 4 8 0	

*Apollo GET; all others Soyuz GET.

ANTENNA LIMITATIONS CHART



HIGH-GAIN ANTENNA SCAN LIMITS
YAW-PITCH COORDINATES (CSM)

PAD A (ATS)

INPUT	DATA
Ω (deg.)	
T_Ω (H.M)	
τ (H.H)	
T_{ACQ} (H.M)	
R_{LVLH} (deg.)	
P_{LVLH} (deg.)	

DATA

DATA	STO
	1
	2
	3
	4
	5
	6

PAD B (ATS)

KEY	OUTPUT	RESULTS
A	P (deg.)	
B	Y (deg.)	

RESULTS

RESULTS

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DATE 5/13/75

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