

HUT

Memo: JWK 12-94.a Ref 12#1
Date: December 12,
1994

TO: HUT Team
FROM: Jeff Kruk
SUBJECT: Target Procedures for March 1995

Attached is the text of all the HUT target procedures as they presently exist. Some minor changes and clarifications have been made since we produced sequence database files for the January 12, 1995 timeline. In most cases you will use the same TP's that you selected before. You should read the new versions carefully however, to make sure.

The major changes are as follows:

- The C_LR2 TP is now self-contained: it no longer needs to be paired with the ICM_AP TP.
- The various manual acquisition TP's have now been more clearly defined. If you have used these before, please check them to make sure you are using them properly. The TP's in question are: HUTMAN, HUTMN1, MANLOC, MANUAL.
- There are several new TP's whose presence is required, not due to the nature of the target itself, but due to time-dependent factors such as sun or limb angles, or the SAA. Since these factors may change depending on launch time, or if targets are replanned, etc., we may want to insert these TP's as required during the mission, rather than putting them in now. The TP's are: BOSACQ, SAA_AC, SUN_60.

The SEQNUM file is presently due on December 28th. We need to have the TP's selected for each target by that time. You are strongly encouraged to have made a first pass through your sequence database files by that time as well, since that is when one encounters all the idiosyncrasies that necessitate specialized target procedures. This applies particularly to acquisitions: the generic TP's often don't match your circumstances. It is quite easy to produce target-specific TP's prior to the SEQNUM delivery, however, so: when in doubt, ask me to create a new one.

TP INSTRUCTIONS

TP files are text files which are used by the targetbook formatting program to automatically modify the nominal acquisition and observing procedure for particular targets. The nominal observing procedure (which is in TP format and is called NOMINAL.TP) is as follows:

Number	alt	gnd	dsp	command
-----	---	---	---	-----
01.000			JAC	ITEM 16_0 E
02.000				ck VIP < -6.85 < -6.85
03.000			JAC	CONFIG H W U
04.000				----- SETUP TIME -----
05.000			JAC	ALL SETUP - ITEM 2 E
06.000				CMD ISS_3927 E
07.000				ITEM 19 E (If required)
08.000				If MTA
09.000			MPC	MPC MODE - OP
10.000				Center Target in HUT FOV
11.000				MPC MODE - STBY
12.000			TV	ck Target Ident (HUT)
13.000				ck STAT -LOC XXX XXX
14.000				ck "IPS BIAS ENABLED"
15.000				ck Image Stable
16.000			JAC	IMC BEGIN - ITEM 7 E
17.000				ck AST TRACK *
18.000				ck HUT P,Y ERRORS stable
19.000			JOB	HUT IPS - ITEM 5 E
20.000				ck P,Y Error =< 1.2"
21.000			JOB	ck STAT -LOC -LOC RDY TRK
22.000			JOB	ALL BEGIN - ITEM 7 E
23.000				ck BIAS AST *
24.000			JOB	OBSERVE
25.000			JAC	ALL PREVIEW - ITEM 1_X_Y E
26.000			JAC	ALL QUIT - ITEM 91 E
27.000				----- QUIT TIME -----
28.000			JAC	ck STAT SLW STB STB STB
29.000			JAC	ITEM 16_1(2) E
30.000				ck VIP < -5.00 (< -5.00)
31.000		@		CMD TLC_S25D05 E
32.000				If PREVIEW after QUIT
33.000			JAC	WUPPE QUIT - ITEM 91 E
34.000				ALL E (Return to ALL)

In the format, there are five fields per line, separated by tabs. The first two lines are headers, which are required. The second line indicates the maximum field length. The first field is the procedure step number, the second is a single character (blank, *, or %) which controls insertions and deletions, the third specifies if the step is to be performed by the crew (field left blank) or by ground personnel (field contains a "@"), the fourth is a 3-letter DDU display mnemonic, and the fifth is a shorthand command description. In the nominal procedure, the steps accomplish the following:

- 1-2 Turn off HUT vac-ion pump
- 3 Configure the command routing to include all three instruments

4 Wait for setup time specified in PCAP
5 Initiate SETUP
6-11 Steps for manual target acquisition. Normal acquisition (IDOP)
would be done by MS at this point
12-13 Verify HUT LOCATE is successful
14-15 Verify IPS is ready for experiment bias
16-17 Start IMCS with AST
18-21 Bias the IPS to align with the HUT line-of sight
22 Start the observation
23 Verify AST is sending bias info to IPS
24 Perform observation monitoring
25 Preview for the next object
26 Quit the observation
27 Indicate the PCAP "quit" time-cue (flight crew begins maneuver)
28 Verify instruments are in slew configuration
29-30 Turn on HUT vac-ion pump
31 AST observation window dump
32-34 WUPPE exit from preview mode

To modify this procedure, one may enter lines in a TP file which:

a) Replace a nominal step with an alternate one by giving the nominal step number and placing a "*" in the second field,

b) Delete a nominal step by giving the nominal step number and placing a "%" in the second field (Note: the steps will not be renumbered), or

c) Insert line(s) between nominal steps by giving a decimal step number "xx.yzz" and placing a "*" in the second field. The new line will be between old steps xx and xx+1, and will be in order of "yzz" values. By convention, "y" is assigned as follows:

```
y=1 HUT
    2 WUPPE
    3 UIT

    4 HUT
    5 WUPPE
    6 UIT

    7 HUT
    8 WUPPE
    9 UIT
```

This allows an instrument to cause a step to be ordered "just after", between, or "just before" a nominal step during integration of multiple TP's. The "zz" may be used to define the order of sub-steps within an insertion.

TP files are named <name>.TP, where <name> is up to 6 capital letters or numbers, with "-" and "_" also allowed. This name is entered in the SEQNUM file by an instrument for those observation ID's for which the alternate procedure is to be used. The name will also appear in the PCAP and in a TP index in the JOTP book.

In the following example, the HUT PT_DR1.TP, a note is inserted at step 4 to alert the PS to the fact that the HUT large door is opening only part way, and that the TV magnitudes were modified in the sequence file to account for this. Steps 20.10X tells the PS (and the POCC) to change to door state 2 if the count rate is too high. Steps 25.70X safe the camera and detector prior to the QUIT, and steps 29,30 are deleted since they were performed early in

step 25.7.

Number	alt	gd	dsp	command
04.101	*			HUT +Y door opens to
04.102	*			200 cm**2 position.
04.103	*			TVMAG set high by 2.5
20.101	*	@	JOB	If HUT Rate > 10000 / 2s
20.102	*			Reduce G MAG by 2-3
20.103	*	@	HOP	ITEM 45_X E
20.104	*	@	HOP	ITEM 42_2 E (50cmsq)
25.701	*			Just prior to QUIT:
25.702	*		JOB	HUT ITEM 12_-5 E
25.703	*			ck FILTER 0 XX X
25.704	*		JAC	ITEM 16_1(2) E
25.705	*			ck VIP < -5.00 (<-5.00)
29.000	%			
30.000	%			

1068NE.TP

Alerts PS that HUT position is 9" to NE of nucleus, and that the nucleus must be kept outside of the slit.

Number alt gd dsp command
13.141 * TV NOTE: HUT pos offset 9" NE
13.142 * of NGC 1068 nucleus.
13.143 * Keep nucleus OUTSIDE the
13.144 * SW edge of the aperture.

1068SW.TP

Alerts PS that HUT position is 3" SW of NGC1068 nucleus, and that the nucleus should be kept inside of the slit.

Number alt gd dsp command
13.141 * TV NOTE: HUT pos offset 3" SW
13.142 * of NGC 1068 nucleus.
13.143 * Keep nucleus INSIDE the
13.144 * NE edge of the aperture.

1CMPHD.TP

Combines the 1CM_AP alt with the PHDMON alt. Used when there is yet another alt in force (such as C_LR2), since only two different alts can be specified for any particular pointing.

Number alt gd dsp command
01.000 * JAC VIP ON until door cracked
02.000 %
02.101 * @ ITEM 64_1 E (SAD to 1)
13.000 * JAC ck HUT STAT = -DET
13.100 * TV Verify HUT acq on TV
17.700 * HDC ITEM 66_2_10 E
17.701 * -- Crack Door --
17.702 * TV Verify no incr brtness
17.703 * JOB ITEM 16_0 E
24.441 * JOB NOTE: HUT ss mode dither
25.701 * HUT - ITEM 12_5 E (ND6)
25.702 * JOB ck FILTER 0 XX X
25.703 * JOB
25.704 * JAC ITEM 16_1(2) E
25.705 * ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %

1CM_AP.TP

Must be used whenever an observation is planned for the 1 cm**2 aperture.

Pressure will get very high inside the telescope from outgassing if it is sealed except for this small hole. We therefore crack open one of the large doors, so that telescope can outgas but no additional light leaks in. Pressure should be quite

comfortable in this case.

The reason we don't crack the door until the acquisition has been made is the following. We want the PS to monitor the brightness of the TV field while the door cracking takes place to confirm that the door does not open too far, leading to dangerous flux on the detector when the observation begins.

Note also that in order to save time at the SETUP command, we open the small aperture door during the slew so that at SETUP, the large doors swing closed and the small door is already in position.

Also moves neutral density filter to ND6 before QUIT command, because setup for SLEW will sometimes open large doors before adjusting TV camera parameters, exposing the camera to a 9 magnitude increase in light.

Number alt gd dsp command
01.000 * JAC VIP ON until door cracked
02.000 %
02.101 * @ ITEM 64_1 E (SAD to 1)
13.000 * JAC ck HUT STAT = -DET
13.100 * TV Verify HUT acq on TV
17.700 * HDC ITEM 66_2_10 E
17.701 * -- (Crack Door) --
17.702 * TV Verify no incr brtness
17.703 * JOB ITEM 16_0 E
25.701 * JOB Just prior to QUIT:
25.702 * HUT ITEM 12_5 E (ND6)
25.703 * JOB ck FILTER 0 XX X
25.704 * JAC ITEM 16_1(2) E
25.705 * ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %

50CMAP.TP

This is not the default 50 cm**2 observing alt; that is SMALAP.ALTA. This alt has been created to be on hand should we unexpectedly discover that the telescope module pressure is really rotten (> 3 X 10(-5) torr) with the 50 cm**2 door as well as the 1 cm**2 door.

We would therefore crack open one of the large doors, so that telescope can outgas but no additional light leaks in. Pressure should be quite comfortable in this case.

The reason we don't crack the door until the acquisition has been made is the following. We want the PS to monitor the brightness of the TV field while the door cracking takes place to confirm that the door does not open too far, leading to dangerous flux on the detector when the observation begins.

Note also that in order to save time at the SETUP command, we open the small aperture door during the slew so that at SETUP, the large doors swing closed and the small door is already in position.

Also moves neutral density filter to ND6 before QUIT command, because setup for SLEW will sometimes open large doors before adjusting TV camera parameters, exposing the camera to a 9 magnitude increase in light.

Number alt gd dsp command

```

01.000 * JAC VIP ON until door cracked
02.000 %
02.101 * @
ITEM 64_2 E (SAD to 2)
Verify HUT acq on TV
13.100 * @
ITEM 66_2_10 E
17.701 * -
- (crack door) -
17.702 * Verify no incr brtness
ITEM 16_0 E
17.703 *
17.704 *
17.705 *
25.701 * Just prior to QUIT:
HUT ITEM 12_5 E
25.702 * CK FILTER 0 XX X
25.703 *
25.704 *
25.705 *
29.000 % CK VIP < -5.00 (<-5.00)
30.000 %

```

```

*****
ALFILT.TP
*****

```

Used for going from observing with a clear filter and a small aperture to observing with the aluminum filter and the full aperture. Makes sure the camera and detector are safe before opening the large doors.

```

Number alt gd dsp command
-----
24.471 * @ JOB HUT will go to Alum filt
24.472 * @ JOB (Ap 3) after 1000 sec.
24.473 * @ JOB When HUT aperture = 3
24.474 * @ HDC ITEM 61_0 E (ND6 filt)
24.475 * @ HDC CK FILTER 0 0 OFF
24.476 * @ HOP ITEM 42_5 E (open doors)

```

```

*****
APCEN.TP
*****

```

The default acquisition slit for Astro-2 will be the observing slit. This ALT is used whenever one wishes to acquire using the blank slit. It changes the default back to the observing slit at the end.

```

Number alt gd dsp command
-----
00.401 * @ HOP ITEM 90_5_0 E (loc=slit 0)
30.401 * @ HOP ITEM 90_5_1 E (restore)

```

```

*****
BOSACQ.TP
*****

```

This TP is used for targets which will be acquired while the angle of the LOS with respect to the bright earth limb is less than the 20 degree earth bright object sensor trip point (but above our new nominal limit of 10 degrees!).

Tells the PS to disable the HUT EBOS once the maneuver and slew are finished, and the SETUP time passed. The PS is warned to safe the TV camera if it appears that too much stray light is entering the camera.

Necessity for this TP needs to be re-checked during real-time replanning during the mission.

It is likely that faint targets will be difficult to acquire at low limb angles!

```

Number alt gd dsp command

```

```

-----
04.701 *
04.702 *
04.703 *
04.704 *
04.705 *
30.101 *
-----
CAUTION
HUT TV damage may result
if pointed at bright earth
ck Slew/Maneuver complete
ITEM 63_0 E (Disable EBOS)
ITEM 63_1 E (Restore EBOS)
-----
HDC
HDC
-----
@

```

```

*****
BROUTW.TP
*****

```

Point of the TP is the following: if a very bright source is just outside the field, you may want to set up at a bright TV camera magnitude and bring up the TV magnitude slowly if it appears to be safe.

The camera is safe if:
 TV mag - bright star mag < 5 if TV mag <= 10
 TV mag - bright star mag < 6 if TV mag > 10

If these conditions are not met, use this TP and put a bright TV magnitude in the sequence load for setting up.

This TP assumes that the source is bright enough to be located with WUPPE (V mag <= 12), so that a WUPPE locate could be performed if necessary.

```

Number alt gd dsp command
-----
12.101 * TV Brt star just off field
12.102 * TV IF target is visible
12.103 * NPC center HUT target w/MPC
12.104 * JAC IF no Brt star vis
12.105 * JAC HUT ITEM 12_X inc mag
12.106 * NPC center HUT target w/MPC
12.107 * But watch for Brt star
12.108 * CK STAT HUT STAT = -LOC
12.109 * JAC ELSE
12.110 * JAC locate with WUPPE
13.000 %
17.997 * IF locate with WUPPE
17.998 * JOB ck WUPPE P,Y ERRS stable
17.999 * Do NOT perform ck HUT P,Y
18.997 * IF locate with WUPPE
18.998 * JOB WUPPE IPS - ITEM 5 E
18.999 * Do NOT perform HUT IPS
21.001 * IF locate with WUPPE
21.002 * ignore nominal HUT STAT

```

```

*****
BR_OUT.TP
*****

```

Point of the TP is the following: if a very bright source is just outside the field, you may want to set up at a bright TV camera magnitude and bring up the TV magnitude slowly if it appears to be safe.

The camera is safe if:
 TV mag - bright star mag < 5 if TV mag <= 10
 TV mag - bright star mag < 6 if TV mag > 10

If these conditions are not met, use this TP and put a bright TV magnitude in the sequence load for setting up.

This TP assumes that the source is too faint to be located with

WUPPE (V mag > 12), so that there's no point in attempting a WUPPE locate. If the source is brighter than V=12, you should use BROUWV.TP.

```

Number alt gd dsp command
-----
12.000 %
12.101 * TV Bright star just off field
12.102 * HUT TV set for brt star
12.103 * IF bright star is visible
12.104 * |move star out w/MPC
12.111 * HUT ITEM 12_X E (inc mag)
12.121 * Center HUT target w/MPC
12.122 * But watch for bright star

```

```

*****
BS_OFF.TP
*****

```

Alerts PS that HUT position is "blank sky", offset from nominal target.

Used for acquiring airglow on targets with little flux in our wavelength region.

```

Number alt gd dsp command
-----
24.451 * NOTE: HUT will offset from
24.452 * target to obtain airglow

```

```

*****
COMGAL.TP
*****

```

Used only for COMA-CL observations.

Inform PS that guide stars may be fuzzy galaxies; don't be surprised.

```

Number alt gd dsp command
-----
15.131 * TV Note: Guide stars may
15.132 * TV be fuzzy galaxies.

```

```

*****
C_HRP2.TP
*****

```

Not used in present timeline. Proper procedure is to set up on P2, and use C_LR3.TP to change to door 3 if the rate is low enough.

Used if setting at door state 3 or 4, and you suspect the count rate may actually be too high for safety.

If the observed count rate is >10000/2sec, tells PS to change to door state P2 (750 cm**2) and do the usual camera-protecting change to the ND6 filter before the QUIT in that case.

The ITEM 42 will not cause the TVMAG to change, since the DEP treats the partial opening as if it were a normal door 3 command, and the door is starting out at the half aperture setting. The TVMAG is incremented by 1 magnitude after the door state change to account for the reduction in area.

The safety count rate may also be redlined during the mission, if we get more bold (or less so).

```

Number alt gd dsp command
-----
20.101 * IF HUT Rate > 10000/2s
20.102 * go to 750 cmsq door
20.103 * ITEM 42_3_60 E
20.104 * ITEM 45_X E (G MAG + 1)
25.401 * IF moved to 750 cmsq door
25.402 * Just prior to QUIT:
25.403 * HUT ITEM 12_5 E (ND6)
25.404 * ck FILTER 0 XX X
25.405 * ITEM 16_I(2) E
25.406 * ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %

```

```

*****
C_HTIM.TP
*****

```

Used a few times where predicted rate was just above the 500/sec high time limit.

If observed rate is <1000/2sec, tells PS to change to high time resolution mode.

```

Number alt gd dsp command
-----
23.161 * IF HUT Rate < 1000/2s
23.162 * ITEM 39_4 E (ht mode)

```

```

*****
C_LR2.TP
*****

```

Tells PS to change to door 2 from door1 if rate < 200 c / 2s.

This TP now includes 1CM_AP.TP, so it is entirely self-contained. THIS IS A CHANGE FROM THE VERSION USED FOR THE JANUARY TIMELINE!

If opening to door 2 is safe, the 50 cm**2 door is opened with an ITEM 64, which will leave the large door cracked to keep the pressure in the telescope from rising. The ITEM 42_2 then simply closes the cracked door, and resets the TV camera magnitude.

The ND6 filter is put in place to protect the camera while the SAD is opening.

```

Number alt gd dsp command
-----
01.000 * JAC VIP ON until at obs slit
02.000 %
02.101 * HDC ITEM 64_1 E (SAD to 1)
13.000 * JAC ck HUT STAT = -DET
13.100 * TV Verify HUT acq on TV
17.700 * HDC ITEM 66_2_10 E
17.701 * -- (Crack Door) --
17.702 * TV Verify no incr brtness
21.000 * JOB ck STAT -DET -LOC RDY TRK
23.101 * JOB When HUT obs ap in place
23.102 * JOB ITEM 16_0 E
23.441 * JOB If Rate < 200 / 2s
23.442 * HOP | ITEM 39_1 E (hg mode)
23.443 * HDC | ITEM 61_0 E (ND6 filt)

```

```

23.444 * @ ck FILTER 0 0 OFF
23.445 * @ ITEM 64_2 E (50 cmsq)
23.446 * @ ck SMALL AP 2 2 OFF
23.447 * @ ITEM 42_2 E
25.701 * Just prior to QUIT:
25.702 * HUT ITEM 12...5 E (ND6)
25.703 * ck FILTER 0 XX X
25.704 * ITEM 16_1(2) E
25.705 * ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %

```

```

*****
C_LRP3.TP
*****

```

Used when setting up at door state P2 (750 cm**2), but predicted rate is just a bit over 1450/sec.

If observed rate is < 2900/2s, can safely open to door state 3 (2550 cm**2).

However, must first decrease the guide star magnitude by 1 (it was artificially increased by 1 in the sequence load to account for the fact that the DEP treats partial door settings as if the door were fully open).

```

Number alt gd dsp command
-----
04.101 * ---
04.102 * --- NOTE: HUT +Y door is in
04.103 * --- 750 cm**2 position.
23.151 * @ TVMAG set high by 1
23.152 * @ IF HUT Rate < 2900/2s
23.153 * @ ITEM 45_X E (X=G MAG-1)
                | ITEM 42_3 E (door 3)

```

```

*****
C_LRP5.TP
*****

```

Used when setting up at door state 3 or 4 (2550 cm**2), but predicted rate is just a bit over 2500/sec.

If observed rate is < 5000/2s, tells PS to open to door state 5 (full aperture). This one magnitude change does not require special camera precautions.

```

Number alt gd dsp command
-----
23.161 * @ JOB IF HUT Rate < 5000/2s
23.162 * @ HOP | ITEM 42_5 E (door 5)

```

```

*****
C_LRP1.TP
*****

```

Sets up for a 50 cm**2 observation, but advises to change to the 200 cm**2 door position if the rate is less than 1000 / s. the rate may be changed once we become more confident of the actual open area obtained for a given opening time.

There are no camera safing steps required for the 1.5 magnitude increase in light provided by the door opening. The DEP will issue low level commands to increase the TV magnitude by 4 (to account for the change from door state 2 to 3) immediately after issuing low level commands to close the SAD and

open the +Y door. Closing the SAD requires the inverter to run in the REVERSE direction. Opening the +Y door requires the inverter to be running in the FORWARD direction. If the filter wheel needs to move in response to the change in camera magnitude, it will be from position 1 to 2, or from 2 to 3 (requiring the inverter to be running FORWARD). Therefore, completion of the TV magnitude change will not have to wait until after the +Y door has finished opening, and will in fact be finished long before the +Y door has opened significantly.

Following the partial opening of the door however, the TVMAG must be increased by 2 or 3 since the DEP will reset the TV settings as if the shutter door were being fully opened. The ITEM 45 must follow the ITEM 42 so that the DEP doesn't crank up the TV gain while still in door 2 (since the DEP has already put in a 5 mag offset).

Note that since the DEP cannot simultaneously close the small aperture door and open the +Y door, the total time needed for instrument reconfiguration will be roughly three minutes.

This TP is the same as SMALLAP, except for the steps calling out the change to door P1.

```

Number alt gd dsp command
-----
01.000 * --- JAC VIP ON until at obs slit
02.000 % ---
02.101 * @ HDC ITEM 64_2 E (SAD to 2)
12.101 * --- JOB When HUT AP = obs
12.102 * --- JAC ITEM 16_0 E
23.401 * @ JOB If HUT Rate < 2000 / 2s
23.402 * @ | Go to 200 cm**2 door
23.403 * @ HOP | ITEM 42_3_37 E
23.404 * @ HOP | ITEM 45_X E (X=G MAG+2)
25.701 * --- Just prior to QUIT:
25.702 * --- HUT ITEM 12...5 E (ND6)
25.703 * --- ck FILTER 0 XX X
25.704 * --- JAC ITEM 16_1(2) E
25.705 * --- ck VIP < -5.00 (<-5.00)
30.000 % ---

```

```

*****
C_LRP2.TP
*****

```

Used for observations with partial opening of large (+Y) door to 200 cm**2 position, where rate might be low enough to permit use of 750 cm**2 position.

Sequence load instructs DEP to open door to 200 cm**2 position. This TP informs the PS that this is happening, and calls out a change to the 750 cm**2 position if the rate is low enough. The camera magnitudes are decremented by 1 since the DEP doesn't do this automatically for partial openings. Steps are included to safe the camera and detector from opening of large doors upon issuance of the QUIT command.

Door change commands are issued after BEGIN: since no HUT detector safety issues are involved, we shouldn't make other instruments wait while we change door states.

PS's are alerted for two reasons: "non-standard" values will appear on the various display pages, and the TV magnitude settings will be roughly 3.5 greater than the true magnitudes of the stars in the field (the DEP automatically rescales the TV magnitudes for full openings

of the large or small aperture doors, but not for partial openings).

The camera and detector safing steps are included to cover the case where the QUIT command is issued well before the IPS actually slews away from the target. To avoid cumulative errors in the knowledge of the door position, commands to open the doors further are handled by first closing the large doors if they are in a partially open state. Thus, the target must still be in the field of view after closing the door (2-4 seconds) and re-opening it at as far as it was originally (37 seconds) before flux levels higher than were present during the observation would be encountered.

```

Number alt gd dsp command
-----
04.101 * @ HOP NOTE: HUT +Y door opens
04.102 * @ HOP to 200 cm**2 position.
04.103 * @ HOP TVMAG set high by 2.5
23.401 * @ HOP If HUT Rate < 2200 / 2s
23.402 * @ HOP | NOTE: Reduce G MAG
23.403 * @ HOP | and go to 750 cm**2
23.404 * @ HOP | ITEM 45_X E (G MAG-1)
23.405 * @ HOP | ITEM 42_3_60 E
25.701 * @ HOP Just prior to QUIT:
25.702 * @ HOP HUT ITEM 12_5 E
25.703 * @ HOP ck FILTER 0 XX X
25.704 * @ HOP ITEM 16_1(2) E
25.705 * @ HOP ck VIP < -5.00 (<-5.00)
29.000 % @
30.000 % @
    
```

C_NOLC.TP

Used when acquisition is expected to be difficult, and we don't care all that much exactly where we are pointing.

This differs from NOLC.TP in that this is a real-time decision that HUT can't acquire.

If can't acquire with HUT, don't let that hold you up from beginning.

Usage of this TP should really be cleared with WUPPE & UIT.

```

Number alt gd dsp command
-----
13.000 * @ HOP NOTE: OK if HUT loc fails
17.751 * @ HOP IF HUT loc fails
17.752 * @ HOP | ignore HUT STATUS
17.753 * @ HOP | Do not perform HUT bias
    
```

DARK.TP

Used to alert PS that dark count data is being obtained.

Sequence file should have Primary_slit = 0.

```

Number alt gd dsp command
-----
23.471 * @ HOP HUT dark count only
    
```

DARKCT.TP

Used to acquire dark count data during a SLEW. The DARK TP is used to acquire dark count data during a normal observation where HUT cannot otherwise get useful data.

This TP changes the target name from SLEW to DARK following the QUIT (to make finding the data easier after the flight), and delays turning off the detector.

```

Number alt gd dsp command
-----
29.000 * @ HOP ITEM 35_DARK E (name=DARK)
30.000 % @
34.100 * @ JAC 5 min before SETUP
34.101 * @ JAC ITEM 16_1(2) E
34.102 * @ JAC ck VIP < -5.00 (<-5.00)
    
```

DO_F06.TP

Used during activation to tell PS to do F0-6B and F0-6C during the observation of HZ43.

```

Number alt gd dsp command
-----
00.401 * @ HOP ITEM 90_5_0 E (loc=slit 0)
24.101 * @ HOP Do HUT F0-6B
24.401 * @ HOP ITEM 41_6 E (slit 6)
24.402 * @ HOP Do HUT F0-6C
30.401 * @ HOP ITEM 90_5_1 E (restore)
    
```

DR2_P1.TP

Change to door P1 (200 cm**2) from door 2 after 600 seconds, if the rate < 1000 c/s.

Same as C_LRP1, except for 600 sec wait.

Used for relative door state calibration.

```

Number alt gd dsp command
-----
01.000 * @ JAC VIP ON until at obs slit
02.000 % @ HDC ITEM 64_2 E (SAD to 2)
02.101 * @ JOB When HUT AP = obs
12.101 * @ JAC ITEM 16_0 E
12.102 * @ JOB 600 sec after BEGIN:
24.401 * @ JOB If HUT Rate < 2000 / 2s
24.402 * @ JOB | Go to 200 cm**2 door
24.403 * @ HOP | ITEM 42_3_37 E
24.404 * @ HOP | ITEM 45_X E (X=G MAG+2)
25.701 * @ HOP Just prior to QUIT:
25.702 * @ JOB HUT ITEM 12_5 E (ND6)
25.703 * @ JAC ck FILTER 0 XX X
25.704 * @ JAC ITEM 16_1(2) E
25.705 * @ JAC ck VIP < -5.00 (<-5.00)
29.000 % @
    
```

30.000 %

DR5OFF.TP

Generic TP to tell PS to open to door 5 after a mirror offset from the nominal target.

In most cases an observation specific TP should be written to cover any special camera or detector related steps, but this procedure will be sufficient for simple cases.

The ITEM 16 is included prior to the QUIT to safe the detector in case the slew puts the star back in the slit.

```

Number alt gd dsp command
-----
24.401 * @ JOB          NOTE: Open to door 5 after
24.402 * @          offset
24.403 * @ JOB          When HUT FRAME END resets
24.404 * @          and begins decrementing:
24.405 * @ HOP          ITEM 42_5 E
24.406 * @          --- CAUTION ---
24.407 * @          KEEP STAR OUT OF HUT SLIT!
24.408 * @          Detector damage may result
25.701 * @          Just prior to QUIT:
25.702 * @          HUT ITEM 16_1(2) E
25.703 * @          Ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %
    
```

DR5_P2.TP

Change from door 5 to P2 after 600 seconds.

Used for GD394 relative door state calibrations.

The GUIDE MAG is incremented by 1 prior to the ITEM 42 to make up for the fact that the DEP sets the TV as if the door were being fully opened.

Includes camera and detector safing steps.

```

Number alt gd dsp command
-----
24.401 * @ JOB          600 sec after BEGIN:
24.402 * @          Go to 750 cmsq door:
24.403 * @ HOP          ITEM 42_3_50 E
24.404 * @ HOP          ITEM 45_X E (G MAG +1)
25.701 * @          Just prior to QUIT:
25.702 * @ JOB          HUT ITEM 12_5 E
25.703 * @          Ck FILTER 0 XX X
25.704 * @ JAC          ITEM 16_1(2) E
25.705 * @          Ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %
    
```

DRP1-2.TP

Changes from door P1 (200 cm**2) to door 2 (50 cm**2) after 600 seconds.

Used for BD75D325 relative door state calibration.

The low-level ITEM 64_2 is used to pre-set the SAD to position 2 prior to the high level ITEM 42_2, so that useful data will be obtained while the SAD is opening. The ITEM 42_2 then simply closes the +Y door. The GUIDE MAG is decreased by 2, since it was inflated by 2-3 by buildseq for use with the partially open initial door state. Includes usual detector and camera safing steps.

```

Number alt gd dsp command
-----
04.101 * @          HUT +Y door opens to
04.102 * @          200 cm**2 position.
04.103 * @          TVMAG set high by 2.5
24.401 * @ JOB          600 sec after BEGIN:
24.402 * @ HDC          ITEM 64_2 E (SAD to 2)
24.403 * @          Ck SMALL AP 2 2 OFF
24.404 * @ HOP          ITEM 45_X E (G MAG-2)
24.405 * @ HOP          ITEM 42_2 E (50cmsq)
25.701 * @          Just prior to QUIT:
25.702 * @ JOB          HUT ITEM 12_5 E
25.703 * @          Ck FILTER 0 XX X
25.704 * @ JAC          ITEM 16_1(2) E
25.705 * @          Ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %
    
```

DRP2-3.TP

Change from door P2 to door 3 after 600 seconds, if rate < 1450.

Same as C_LR3, except for 600 second wait.

Used for relative door state calibration.

```

Number alt gd dsp command
-----
04.101 * @          NOTE: HUT +Y door is in
04.102 * @          750 cm**2 position.
04.103 * @          TVMAG set high by 1
24.401 * @ JOB          600 sec after BEGIN:
24.402 * @ JOB          IF HUT Rate < 2900/2s
24.403 * @ HOP          | ITEM 45_X E (G MAG-1)
24.404 * @ HOP          | ITEM 42_3 E (door 3)
    
```

DR_2-1.TP

Used for door state 2 vs. 1 relative flux calibration.

Tells PS to change to 1 cm**2 position after 600 or TBD seconds. Because going to door state 1, gets door cracked for safety during 1 cm**2 portion of the observation. This TP includes SWALAP.TP, which takes care of the telescope pressure and camera safety considerations of 50 cm**2 aperture observations.

Note: the door is cracked immediately after the acquisition, so that the PS can verify that no additional light enters the telescope through the cracked door. The detector is turned on only after this point.

```

Number alt gd dsp command
    
```

```

-----
01.000 * -----
02.000 % DFT OFF till door cracked
05.101 * @
15.101 * HDC ITEM 64_2 E (SAD to 2)
15.102 * HDC ITEM 66_2_10 E
15.102 * - (crack door) -
15.103 * TV Verify no incr brtness
15.104 * JAC ITEM 16_0 E
24.401 * @ sec after BEGIN
24.402 * @ (default is 600 sec):
24.403 * @ ITEM 64_1 E (SAD to 1)
25.701 * Just prior to QUIT:
25.702 * JOB HUT ITEM 12_-5 E
25.703 * ck FILTER 0 XX X
25.704 * JAC ITEM 16_1(2) E
29.000 * ck VIP < -5.00 (<-5.00)
30.000 %

```

```

*****
DR_3-3.TP
*****
Used to open to half aperture for nebular observations after an initial
pointing at a bright central star requiring a smaller aperture configuration.
In this case the nebular emission is also too bright for the full aperture,
so the half-open door state 3 is used.

```

Tells PS to change to half aperture after TBD seconds (after mirror has offset from central star, as defined in sequence load, so that half aperture is now safe).

```

Number alt gd dsp command
-----
24.401 * @ NOTE: Open to door 3 after
24.402 * @ HUT mirror offset.
24.403 * @ JOB ck HUT FRAME END resets
24.404 * @ and begins decrementing
24.405 * @ ITEM 42_3 E (to half ap)
24.406 * @ --- CAUTION ---
24.407 * @ KEEP STAR OUT OF HUT SLIT!
24.408 * @ Detector damage may result

```

```

*****
DR_3-2.TP
*****
Used for door state 3 vs. 2 relative flux calibration.
Has PS prepare for a shutdown to door state 2 by giving a low level
command after the BEGIN to move the small ap to the 50 cm**2 position.
Tells PS to change to 50 cm**2 position after 600 seconds.
Because going to door state 2, includes camera-protecting procedure of
putting in ND6 filter before issuing QUIT.

```

```

Number alt gd dsp command
-----
24.121 * @ Soon after BEGIN,
24.122 * @ HDC ITEM 64_2 E (prep SAD)
24.401 * @ 600 sec after BEGIN:
24.402 * @ HOP ITEM 42_2 E (50 cmsq)
25.701 * @ Just prior to QUIT:

```

```

25.702 * JOB HUT ITEM 12_-5 E (ND6)
25.703 * ck FILTER 0 XX X
25.704 * JAC ITEM 16_1(2) E
25.705 * ck VIP < -5.00 (<-5.00)
30.000 %
*****
DR_3-5.TP
*****
Used to open to full aperture for nebular observations after an initial
pointing at a bright central star requiring a smaller aperture configuration.
Tells PS to change to full aperture after mirror has offset
from central star, as defined in sequence load, so that full aperture
is now safe.

```

```

Number alt gd dsp command
-----
24.401 * @ NOTE: Open to door 5 after
24.402 * @ HUT mirror offset.
24.403 * @ JOB ck HUT FRAME END resets
24.404 * @ and begins decrementing
24.405 * @ ITEM 42_5 E (to full ap)
24.406 * @ --- CAUTION ---
24.407 * @ KEEP STAR OUT OF HUT SLIT!
24.408 * @ Detector damage may result

```

```

*****
DR_5-2.TP
*****
Used for door state 5 vs. 2 relative flux calibration.
Has PS prepare for a shutdown to door state 2 by giving a low level
command after the BEGIN to move the small ap to the 50 cm**2 position.
Tells PS to change to 50 cm**2 position after 1200 seconds.
Because going to door state 2, includes camera-protecting procedure of
putting in ND6 filter before issuing QUIT.

```

```

Number alt gd dsp command
-----
24.121 * @ Soon after BEGIN,
24.122 * @ HDC ITEM 64_2 E (prep SAD)
24.401 * @ HOP 1200 sec after BEGIN,
24.402 * @ HOP ITEM 42_2 E (50 cm2)
25.701 * @ Just prior to QUIT:
25.702 * @ JOB HUT ITEM 12_-5 E (ND6)
25.703 * @ ck FILTER 0 XX X
25.704 * @ JAC ITEM 16_1(2) E
29.000 % ck VIP < -5.00 (<-5.00)
30.000 %

```

```

*****
DR_5-3.TP
*****
Used for door state 5 vs. 3 relative flux calibration (HZ43 and GD153 obs

```

in present timeline).

Tells PS to shut one door after 1200 seconds for relative door calibration.

```

Number alt gd dsp command
-----
24.401 * @ HOP 1200 sec after BEGIN,
24.402 * @ HOP ITEM 42_3 E (shut -Y DR)

```

```

*****
DR_OFF.TP
*****

```

This is a non-existent TP that appeared in a few sequence database files. I presume it was intended to be DR5OFF; but, since it always appears paired with DR_3-5, it actually serves no function. I have put in a comment line, just so the file manager's software won't gag on an empty file.

DO NOT USE THIS TP FOR THE MARCH TIMELINE

```

Number alt gd dsp command
-----
24.400 * -----
NOTE: offset to nebula

```

```

*****
EARTH.TP
*****

```

Used for first (aperture center) BR-EARTH observation.

This procedure protects the camera from the bright earth while passing through the color filters to reach the ND4 filter.

The original version of the TP closed the doors and moved to the ND4 filter prior to the SETUP. However, SETUP first moves the filter to ND6 before actually issuing any configuration commands, so this doesn't work.

This version requires the sequence load to set the TVMAG to -5. Following the SETUP, low level commands are issued to set the camera HV to zero, which should protect the camera while the filter is moving to the ND4 position. The HV is then raised to 1, which sets the camera to the desired magnitude (-3). The reverse procedure is used prior to the QUIT command.

Also keeps the detector off for this observation (deemed too early to look at bright down-looking airglow through large apertures).

```

Number alt gd dsp command
-----
00.410 * @ HDC ITEM 63_0 E (disable EBOS)
01.000 * @ JAC Leave VIP ON, DET OFF
02.000 %
18.000 %
19.000 %
20.000 %
21.000 %
23.100 * @ JOB ck STAT --DET -LOC RDY
23.101 * @ NO HUT DET OPS THIS PTG!
23.102 * @ HDC ITEM 70_0 E (TV HV=0)
23.103 * @ HDC ITEM 61_3 E (ND4 filt)
23.104 * @ HDC ck FILTER 3 3 OFF
23.105 * @ HDC ITEM 70_1 E (TV HV=1)
25.701 * @ HDC Perform HUT FO6A
Just prior to QUIT:

```

```

25.702 * @ HDC ITEM 70_0 E (TV HV=0)
25.703 * @ HDC ITEM 61_0 E (ND6 filt)
25.704 * @ HDC ck FILTER 0 0 OFF
29.000 %
30.000 %
30.412 * @ HDC ITEM 63_1 E (enable EBOS)

```

```

*****
EARTH.TP
*****

```

Not used for Astro-2.

Was used for second (aperture sizes, line profiles) BR-EARTH observation.

Uses same camera-protecting steps as EARTH, but allows normal pump and detector operations (late in mission, leave detector on for this observation, should be fine).

```

Number alt gd dsp command
-----
00.410 * @ HDC ITEM 63_0 E (disable EBOS)
18.000 %
19.000 %
20.000 %
23.101 * @ HDC ITEM 70_0 E (TV HV=0)
23.102 * @ HDC ITEM 61_3 E (ND4 filt)
23.103 * @ HDC ck FILTER 3 3 OFF
23.104 * @ HDC ITEM 70_1 E (TV HV=1)
23.105 * @ HDC Perform HUT FO6A
25.701 * @ Just prior to QUIT:
25.702 * @ HDC ITEM 70_0 E (TV HV=0)
25.703 * @ HDC ITEM 61_0 E (ND6 filt)
25.704 * @ HDC ck FILTER 0 0 OFF
30.411 * @ HDC ITEM 63_1 E (enable EBOS)

```

```

*****
ETACAR.TP
*****

```

Used for the ETA-CAR observation only.

Alerts PS that HUT will offset immediately after the BEGIN to observe the nebula during the night, and then offset back to the star for the day.

After the initial offset is complete, open -Y door. When offset back to central star begins, close -Y door. Closing door is done by removing power from the clutch, so it is independent of inverter direction (it won't have to wait for mirrors to finish!)

Could also write TP as follows: just leave detector off until offset is complete, and do acquisition with both doors open. This loses the nearly 5 minutes of data obtained through the half door during the offset, but gains 2 minutes of fully open door time.

```

Number alt gd dsp command
-----
24.101 * @ NOTE: HUT will offset to
24.102 * @ nebula 30 sec after BEGIN
24.103 * @ When offset complete:
24.104 * @ JOB ck HUT FRAME END resets
24.105 * @ and begins decrementing
24.106 * @ HOP ITEM 42_5 E (to full ap)
24.107 * @ --- CAUTION ---

```

24.108 * KEEP SPAR OUT OF HUT SLIT!
 24.109 * Detector damage may result
 24.401 * @ HOP When mirror begins offset
 24.402 * @ HOP back to star after 2000s:
 24.403 * @ HOP ITEM 42_3 E (close -Y DR)

 FNTQSO.TP

Used for the faint, high-redshift quasar observations where the target is so faint that the source locate is likely to fail. If it does fail, tells the PS to change to the blank slit and adjust the TV to see as faint as possible, including using software video integration to try to see the quasar. If this succeeds in acquiring the target, switch back to the 20" observing slit.

However, if the QSO is still invisible and source locate fails, tells the PS to switch to the 30" slit and use guide star locate.

```

Number alt   gd   dsp   command
-----
12.701 *     --   TV    IF HUT src loc fails
12.702 *     --   HOP    | ITEM 41_0 E (blank slit)
12.703 *     --   TV    | Adjust TV mag until
12.704 *     --   *     | src vis. Use SVI
12.705 *     --   *     | (HDC ITEM 74_X) if nec
12.706 *     --   TV    | IF src still not vis
12.707 *     --   HOP    | | ITEM 41_1 E (30" slit)
12.708 *     --   HOP    | | ITEM 36_2 E (gs loc)
12.709 *     --   *     | | ELSE (back to 20" slit)
12.710 *     --   HOP    | | ITEM 41_7 E
    
```

 FTSRC.TP

Used for targets where the attempted source locate mode is questionable because the target is faint, and where the guide stars are far enough away that there is concern about the target being in the slit if you switch to guide star locate.

Tells the PS to switch to the 30" slit if source locate fails and he has to switch to guide star locate. Changes SP to histogram mode to accommodate the increased airglow of the larger slit.

Also has him check rate after the BEGIN command--if rate is so low that source does not appear to be in slit even though source locate found something, again switch to 30" slit and histogram mode.

```

Number alt   gd   dsp   command
-----
12.701 *     --   TV    If HUT src loc fails
12.702 *     --   HOP    | ITEM 41_1 E (30" slit)
12.703 *     --   HOP    | | ITEM 39_1 E (histo mode)
12.704 *     --   HOP    | | ITEM 36_2 E (gs loc)
23.111 *     @     JOB    If src loc OK,
23.112 *     @     *     | but rate = airglow only
23.113 *     @     HOP    | | ITEM 41_1 E (30" slit)
23.114 *     @     HOP    | | ITEM 39_1 E (histo mode)
    
```

 G191DR.TP

Change to door P2 (750 cm**2) from P1 (200 cm**2) after 1000 sec.
 Used for door P1, P2 calibration during observation of G191-B2B.

Same as C_LRP2, with 1000 sec delay but no rate check.

```

Number alt   gd   dsp   command
-----
04.101 *     --   ---   NOTE: HUT +Y door opens
04.102 *     --   ---   to 200 cmsq position.
04.103 *     --   ---   TVMAG set high by 2.5
24.401 *     @     HOP    1000 sec after BEGIN:
24.402 *     @     HOP    ITEM 45_X E (G MAG -1)
24.403 *     @     HOP    ITEM 42_3_60 E (750cmsq)
25.701 *     *     JOB    Just prior to QUIT:
25.702 *     *     *     HUT ITEM 12_-5 E
25.703 *     *     *     ck FILTER 0 XX X
25.704 *     *     *     ITEM 16_1(2) E
25.705 *     *     *     ck VIP < -5.00 (<-5.00)
30.000 %     *     *
    
```

 GLOB.TP

Used for observations of globular clusters where we wish to obtain a spectrum of many stars, rather than of a single isolated star. Instructs the PS to center the aperture on the cluster.

Acquisition mode in the sequence file should be 3 (none locate).

```

Number alt   gd   dsp   command
-----
15.000 *     --   TV    Center HUT on cluster
15.101 *     *     *     with MPC
15.102 *     *     *     ck Image Stable
18.000 %     *     *
19.000 %     *     *
20.000 %     *     *
    
```

 HER-XI.TP

Used with HER-XI pointings.

High time resolution is required. If rate is >500/sec so that counts are being lost, mask Lyman alpha in effort to get full source spectrum in high time mode.

```

Number alt   gd   dsp   command
-----
24.111 *     @     JOB    Must keep high time mode
24.112 *     @     *     IF Rate > 1000/2s
24.113 *     @     HOP    | ITEM 40_1 E (mask 1216)
    
```

 HS1700.TP

This is a merging of the FNTQSO TP with the BR_OUT TP for the special case of HSI1700+64 where there is a bright star just outside the field. To ensure the safety of the TV camera, the setup is done at a bright TV magnitude. If the star is in the field, the PS is directed to move it out. Once it is verified that the star is not in the field, the TV mag is set to the expected source mag.

The faint, high-redshift quasar is so faint, however, that the source locate is likely to fail. If it does fail, the TP tells the PS to change to the blank slit and adjust the TV to see as faint as possible, including using software video integration to try to see the quasar. If this succeeds in acquiring the target, switch back to the 20" observing slit.

However, if the QSO is still invisible and source locate fails, tells the PS to switch to the 30" slit and use guide star locate.

```

Number alt   gd   dsp   command
-----
12.000 %    ---
12.101 *    TV      Brt star just off field
12.102 *    TV      IF Brt star is visible
12.103 *    MPC      |move star out w/MPC
12.111 *    JAC      HOT ITEM 12_17 inc mag
12.121 *    MPC      Center HUT target w/MPC
12.122 *    MPC      Bnt watch for Brt star
12.131 *    TV      IF HUT src loc fails
12.132 *    HOP      |ITEM 41_0 E (blank slit)
12.133 *    TV      Adjust TV mag until
12.134 *    TV      |src vis. Use SVI
12.135 *    TV      |(HDC ITEM 74_X) if nec
12.136 *    TV      IF src still not vis
12.137 *    HOP      || ITEM 41_1 E (30" slit)
12.138 *    HOP      || ITEM 36_2 E (gs loc)
12.139 *    HOP      |ELSE (back to 20" slit)
12.140 *    HOP      || ITEM 41_7 E

```

HUTMAN.TP

This is for a generic HUT "manual" locate.

A manual locate usually can be done faster using the MPC rather than with the HUT cursor. In this case, the sequence load should specify a NONE rather than a MANUAL LOCATE, and this TP should be specified. If you really want a true MANUAL LOCATE with the HUT cursor, you should use the MANLOC TP instead of this one.

This TP tells the PS to center up using the MPC, and deletes the HUT BIAS command to the IPS, since the HUT pointing error is fixed at -99.99 during a NONE Locate.

```

Number alt   gd   dsp   command
-----
00.401 *    @    HOP      ITEM 90_5_0 E (loc=slit 0)
12.000 %    ---
18.000 %    ---
19.000 %    ---
20.000 %    ---
30.401 *    @    HOP      ITEM 90_5_1 E (restore)

```

HUTMNL.TP

Used for observations of M104.

HUTMNL is used in the same manner as HUTMAN, but it also signals the PS that there is the potential for confusion in centering up on the proper source.

This will ordinarily be used in conjunction with a target-specific TP that helps indicate the proper source.

```

Number alt   gd   dsp   command
-----
00.401 *    @    HOP      ITEM 90_5_0 E (loc=slit 0)
12.000 *    ---
12.100 *    ---
12.101 *    ---
13.000 %    ---
18.000 %    ---
19.000 %    ---
20.000 %    ---
30.401 *    @    HOP      ITEM 90_5_1 E (restore)

```

INHSAATP

Not currently used in this timeline.

Inhibits receipt of SAA message and reenables after observation. Will be used if we decide that grazing crossing of SAA will be safe. Then use this ALT to prevent SP from going into hibernate when ECAS SAA enter message is received. ALT includes reenabling so that next full crossing of SAA is safely handled.

```

Number alt   gd   dsp   command
-----
00.421 *    @    HOP      ITEM 90_C_0 E (inh SAA)
30.421 *    @    HOP      ITEM 90_C_1 E (ena SAA)

```

JUPMAN.TP

Used for pointings at Jupiter itself (as opposed to Io torus).

Manual acquisition; instructs PS to center up on planet. (Sequence then rasters from pole to equator to other pole to equator, etc.) Jupiter is big enough to stick out of the 18" slit, so manual locate with the observing slit in place is appropriate.

Acquisition mode in the sequence file should be 3 (no locate).

```

Number alt   gd   dsp   command
-----
12.000 *    ---
18.000 %    ---
19.000 %    ---
20.000 %    ---

```

M104.TP

Used for observations of M104.

Same as HUTMAN, but adds comment to center HUT slit above the dust lane. Sequence load should specify guide star locate.

```

Number alt gd dsp command
-----
00.401 * @ HOP ITEM 90_5_0 E (loc=slit 0)
12.000 %
12.100 *
12.101 *
18.000 %
19.000 %
20.000 %
30.401 * @ HOP ITEM 90_5_1 E (restore)
    
```

 MANLOC.TP

 Used when you really want to center HUT using the cursor rather than the MPC.

The sequence database file should indicate MANUAL LOCATE mode.
 This TP uses the blank slit for the locate step, deletes the status check (since the DEP will always report a status of overbright LOC during a MANUAL LOCATE), and tells the PS to center the cursor on the desired target using PFK's.

```

Number alt gd dsp command
-----
00.401 * @ HOP ITEM 90_5_0 E (loc=slit 0)
12.000 %
13.000 %
13.101 *
30.401 * @ HOP PFK HUT cursor to src
ITEM 90_5_1 E (restore)
    
```

 MANUAL.TP

 Used for borderline cases where you aren't sure if the source will be visible (so you are stuck with a GUIDE STAR LOCATE), but where you think the PS can center better manually with the MPC if it is than the DEP will do with the guide stars.

The sequence database file should have a GUIDE STAR LOCATE specified.
 This TP uses the blank slit for the locate step, and tells the PS to center the source manually if it's visible.

```

Number alt gd dsp command
-----
00.401 * @ HOP ITEM 90_5_0 E (loc=slit 0)
15.121 * JAC IF HUT src visible
15.122 * | Center HUT src w/MPC
30.401 * @ HOP ITEM 90_5_1 E (restore)
    
```

 MOON.TP

 Disables EBOS in case the MOON is bright enough to trip it.

The camera will be set for safe values, but the EBOS might interfere with the SETUP.

```

Number alt gd dsp command
-----
04.701 * @ HDC ITEM 63_0 E (Disable EBOS)
30.101 * @ HDC ITEM 63_1 E (Restore EBOS)
*****
N2023.TP
*****
    
```

Used for NGC 2023 observation. Sequence calls for initial observation of the central star through door P2 for 500 seconds, followed by an offset of 40" to obtain a nebular spectrum.

This TP calls out a change to door 5 following the offset, and alerts the PS/MS to keep the star out of the slit.
 The GUIDE MAG is decreased by 1 prior to opening the door.
 PT_DR2.TP is included in this TP, and should not be called out separately in the SDF.

```

Number alt gd dsp command
-----
04.101 * NOTE: HUT +Y door opens to
04.102 * 750 cm**2 position.
04.103 * TVMAG set high by 1
20.101 * @ JOB If HUT Rate > 10000 / 2s
| ITEM 45_X E (G MAG+1)
20.102 * @ HOP | ITEM 42_3_37 E (200cmsq)
20.103 * @ HOP | 500 sec after BEGIN. HUT
24.401 * @ JOB mirror begins 40" offset
24.402 * @ JOB ck HUT FRAME END resets
24.403 * @ JOB and begins decrementing
24.404 * @ HOP ITEM 45_X E (G MAG-1)
24.405 * @ HOP ITEM 42_5 E (full ap)
24.406 * @ HOP --- CAUTION ---
24.407 * KEEP STAR OUT OF HUT SLIT!
24.408 * Detector damage may result
24.409 *
*****
N346_3.TP
*****
    
```

Used for observations of NGC346_3.
 Used in conjunction with HUTMNL. Tells PS that desired target is star #3 in the inset on the finder chart.

```

Number alt gd dsp command
-----
15.150 * TV NOTE: tgt is star #3 on
15.151 * finder chart.
*****
N346_4.TP
*****
    
```

Used for observations of NGC346_4.
 Used in conjunction with HUTMNL. Tells PS that desired target is star #4 in the inset on the finder chart.

```

Number alt gd dsp command
-----
    
```

15.150 * TV NOTE: tgt is star #4 on
 15.151 * finder chart.

 N346_6.TP

Used for observations of NGC346_6.

Used in conjunction with HUTM01. Tells PS that desired target is star #6 in the inset on the finder chart.

Number	alt	gd	dsp	command
15.150	*	--	TV	NOTE: tgt is star #6 on finder chart.
15.151	*	--		

 NOLOC.TP

Used when there is no hope or no interest in precise HUT acquisition of target.

For Jan 12 1994 timeline, this has been used for airglow pointings where there were guide stars available, and guide star locate has been specified.

Use of this TP should be cleared with the other teams.

TP is the same as C_NOLOC, except comment has been added indicating that this is an airglow pointing for HUT.

Astro-1 version:
 Removes HUT IPS bias step from the nominal procedure.

Number	alt	gd	dsp	command
13.000	*	--	JAC	NOTE: OK if HUT loc fails HUT airglow obs only
13.100	*	--		
17.751	*	--	JAC	IF HUT loc fails ck STAT XXX XXX RDY TRK Do not perform HUT bias
17.752	*	--		
17.753	*	--		

 NOOBS.TP

Used when no HUT detector operations are intended on a particular target (presumably because it is just too bright or risky because of sun angle or some such). Keeps VIP ON. Sequence loads for pointings using this ALT should choose slit 0 (blank) to completely rule out danger to the detector.

Use of the DARK TP is encouraged rather than this one, in order to increase the amount of dark count data we collect.

Number	alt	gd	dsp	command
01.000	*	--		No HUT obs; Keep VIP ON
02.000	%	--		
13.000	*	--	JOB	ck STAT -DET -LOC RDY TRK
21.000	*	--	TV	Verify HUT acq on TV
21.101	*	--		NO HUT DET OPS THIS PTG!
23.130	*	--		
29.000	%	--		

30.000 %

 NF_BRT.TP

Different from BR_OUT.ALT. Because the SETUP command is issued at the beginning of the IDOP command, the IPS pointing may be as much as 15 arcminutes off when the TV camera is configured for SETUP. We therefore need to worry about bright stars as far as 22.5 arcminutes from the target. BR_OUT is used for fields where a bright star is close to the edge of the field.

The camera is safe if:

```
TV mag - bright star mag < 5 if TV mag <= 10
TV mag - bright star mag < 6 if TV mag > 10
```

If these conditions are not met, we want to warn the PS to be on the lookout during the SETUP and be ready to turn the camera down.

Number	alt	gd	dsp	command
04.720	*	--		--- CAUTION --- Very brt star near field
04.721	*	--		Check TV, adj mag if nec
04.722	*	--		

 NUDGEIT.TP

Used for offset pointings on small planetary nebulae, where a spectrum is obtained centered on the central star, and then the mirror offsets by a small angle to put the star just outside the slit. If the star ends up on the edge of the slit instead of just outside, instructs the PS to use the MPC to nudge it out by a few arcseconds to keep from contaminating the nebular spectrum. This is supposedly possible up to about 5" of motion without screwing up the IMCS correction of UIT and WUPPE pointing.

Number	alt	gd	dsp	command
24.411	*	--		After HUT mirror offsets:
24.412	*	--	JOB	ck HUT FRAME END resets and begins decrementing
24.413	*	--	TV	If star on edge of slit
24.414	*	--	TV	nudge it out with MPC
24.415	*	--		

 PG1159.TP

Used for several visually faint PG 1159 objects, where acquisition is expected to be difficult (guide stars are far away).

Tells PS to peak up rate using MPC if rate is less than expected.

This is incompatible with the APCEN TP.

Number	alt	gd	dsp	command
21.111	*	--	JOB	If HUT rate < expected:
21.112	*	--	JOB	peak up using MPC.

PG1704.TP

Used for obs of PG 1704+221.

Alerts PS to presence of a 5.6 mag star 7.8 arcmin west of the lone usable guide star, so that the PS isn't fooled into using the wrong star!

```
Number alt gd dsp command
-----
04.731 * TV
04.732 * NOTE: watch for 5.6 mag
04.733 * star 7.8 arcmin W of real
guide star (mag 7.8)
```

PHDMON.TP

Used often throughout the timeline, whenever a dither to single scan mode is planned.

Simply warns the PS that a dither to single scan mode will occur, so he does not become concerned when the spectrum on the TV goes away, and the count rate goes to zero.

```
Number alt gd dsp command
-----
24.441 * NOTE: HUT ss mode dither
```

PTEST.TP

Sequence load should specify Door 5. Indicates no HUT detector ops. After target acquisition, sends PS or MS to HUT F09, which directly measures the pressure in the telescope module with the 50 cm**2 aperture in place.

```
Number alt gd dsp command
-----
00.100 * NO HUT DET OPS THIS PTG!
01.000 %
02.000 %
13.000 * ck HUT STAT = -DET
21.000 * ck STAT -DET -LOC RDY TRK
21.121 * Verify HUT acq on TV
23.120 * NO HUT DET OPS THIS PTG!
23.121 * Do HUT FO-9
29.000 %
30.000 %
```

PT_DR1.TP

Must be used for observations with partial opening of large (+Y) door to 200 cm**2 position.

Present plan is to have sequence load contain instructions to DEP to open door to this position. This TP informs the PS that this is happening, and safes the camera and detector from opening of large doors upon issuance of the QUIT command.

PS's are alerted for two reasons: "non-standard" values will appear on the various display pages, and the TV magnitude settings will be roughly 3.5 greater than the true magnitudes of the stars in the field (the DEP automatically rescales the TV magnitudes for full openings of the large or small aperture doors, but not for partial openings).

If the Count rate is too high, TP directs PS to close down to door state 2 (50 cm**2). Since the sequence load has artificially inflated the TV magnitudes by 2-3 for door P1, they have to be lowered for use with Door 2 (which the DEP handles properly). Note that the DEP issues an effective ITEM 32_GSMAG after issuing low level commands to change the door state as directed by the ITEM 42, so the ITEM 45 must precede the ITEM 42.

The camera and detector safing steps are included to cover the case where the QUIT command is issued well before the IFS actually slews away from the target. To avoid cumulative errors in the knowledge of the door position, commands to open the doors further are handled by first closing the large doors if they are in a partially open state. Thus, the target must still be in the field of view after closing the door (2-4 seconds) and re-opening it at as far as it was originally (37 seconds) before flux levels higher than were present during the observation would be encountered.

```
Number alt gd dsp command
-----
04.101 * HUT +Y door opens to
04.102 * 200 cm**2 position.
04.103 * TVMAG set high by 2.5
20.101 * @ JOB If HUT Rate > 10000 / 2s
20.102 * @ | Reduce G MAG by 2-3
20.103 * @ | ITEM 45_X E
20.104 * @ | ITEM 42_2 E (50cmsq)
25.701 * Just prior to QUIT:
25.702 * HUT ITEM 12_5 E
25.703 * JOB ck FILTER 0 XX X
25.704 * JAC ITEM 16_1(2) E
25.705 * ck VIP < -5.00 (<-5.00)
29.000 %
30.000 %
```

PT_DR2.TP

Must be used for observations with partial opening of large (+Y) door to 750 cm**2 position.

Present plan is to have sequence load contain instructions to DEP to open door to this position. This TP informs the PS that this is happening.

PS's are alerted for two reasons: "non-standard" values will appear on the various display pages, and the TV magnitude settings will be roughly 1 greater than the true magnitudes of the stars in the field (the DEP automatically rescales the TV magnitudes for full openings of the large or small aperture doors, but the partial openings are treated as if the door(s) were commanded fully open).

Note that the ITEM 45 must precede the ITEM 42, so that the DEP uses

the corrected GUIDE MAG when it resets the TVMAG as part of the ITEM 42.
 TP also has IPS BIAS command and STATUS checks done on JOB rather than JAC, so that the count rate can be monitored as the target moves into the slit. Otherwise, high count rates may be present for several minutes if the target is brighter than expected or if the door opening is larger than expected.

```

Number alt   gd   dsp   command
-----
04.101 *    --    ---    NOTE: HUT +Y door opens to
04.102 *    --    ---    750 cm**2 position.
04.103 *    --    ---    TVMAG set high by 1.
20.101 *    @    JOB    If HUT Rate > 10000 / 2s
20.102 *    @    HOP    | Increase G MAG by 1
20.103 *    @    HOP    | ITEM 45_X E
20.104 *    @    HOP    | ITEM 42_3_37 E (200cmsq)
    
```

 RHOOHP.TP

This TP handles obs of RHO-OPH itself through the 50 cm**2 door, with +Y door opening to the 200 cm**2 position after the mirror offsets to the nebula.

TP handles setup of small aperture door (VIP on till observing slit in place, pre-setup of SAD to save time), opening of +Y door, and final safing steps.
 DEP will adjust camera magnitude as if +Y door were being fully opened while the door is opening, so no safing steps are required.
 The ITEM 45 is needed to compensate for the fact that the door is being opened only part way. It must follow the ITEM 42 so that the DEP computes the effective magnitude offset AFTER it thinks it is dealing with door state 3, not door state 2.

This is incompatible with the APCEN TP; could be made compatible by moving VIP off command till after BEGIN, and deleting the STATUS check.

Since closing the SAD will take 2 minutes, it is possible that the pressure in the telescope will rise to unacceptable levels before the large doors start to open. Prior to issuing the ITEM 42_37, the detector is therefore turned off (and the VIP turned on) with a JAC ITEM 16_1(2). The detector is turned back on after the large door has begun to open.

These steps are written with JAC ITEM 16 commands; if they cannot be sent from the ground, ITEM 48 and HAC ITEM 5/6 commands will have to take their place.

```

Number alt   gd   dsp   command
-----
01.000 *    --    ---    JAC
02.000 *    --    ---    VIP on till at OBS slit
02.101 *    @    HDC    ITEM 64_2 E
12.101 *    @    JOB    When HUT AP = obs
12.102 *    @    JOB    ITEM 16_0 E (VIP OFF)
24.401 *    @    JOB    After Mirror Offset
24.402 *    @    JOB    ck HUT FRAME END resets
24.403 *    @    JAC    and begins decrementing
24.404 *    @    HOP    ITEM 16_1(2) E (det off)
24.405 *    @    JAC    ITEM 42_3_37 E (200cmsq)
24.406 *    @    HOP    ITEM 16_0 E (det on)
25.701 *    @    HOP    ITEM 45_X E (G MAG+2)
25.702 *    @    JOB    Just prior to QUIT:
25.703 *    @    JAC    ck FILTER 0 XX X
25.704 *    @    JAC    ITEM 16_1(2) E
    
```

25.705 *
 29.000 %
 30.000 %

 SAA_AC.TP

Used for any observation where SETUP occurs in SAA.

This only applies if the DEP is set to respond to SAA messages.

If the SP is in HIBERNATE, it will ignore the configuration command sent by the DEP during SETUP. This TP delays VIP turn-off till after SAA exit, and tells the PS to reissue the SETUP command to HUT after SAA exit.

If we find we cannot ignore SAA's, this TP will have to be inserted as required during real-time replanning during the mission.

```

Number alt   gd   dsp   command
-----
00.121 *    --    ---
01.000 %    --    ---
02.000 %    --    ---    NOTE: SETUP during SAA
13.000 %    --    ---
13.100 *    --    ---
13.101 *    --    ---
20.996 *    --    ---
20.997 *    JAC
20.998 *    JAC
20.999 *    JAC
    
```

If past SAA exit:
 | ck HUT STAT = -LOC
 After SAA Exit:
 ITEM 16_0 E
 ck VIP < -6.85 < -6.85
 HUT ITEM 2 E (SETUP)

 SATMAN.TP

Used for Saturn observations. Instructs PS to center planetary disk in the slit for manual acquisition. With the 11x60" slit the planet should be visible around the aperture edges.

Acquisition mode in the sequence file should be 3 (no locate).

```

Number alt   gd   dsp   command
-----
12.000 *    --    ---
18.000 %    --    ---    TV
19.000 %    --    ---
20.000 %    --    ---    Center HUT on planet w/MPC
    
```

 SLITS.TP

Same as SLIT_5.TP.

```

Number alt   gd   dsp   command
-----
02.730 *    @    JAC
02.731 *    @    HOP
02.732 *    @    HOP
02.733 *    @    HOP
24.130 *    @    JOB
24.131 *    @    JOB
24.132 *    @    JOB
    
```

Avoid HUT slit 5 in day!
 If SETUP prior to sunset:
 | ITEM 18 E (PREVIEW mode)
 | ITEM 41_6 E (slit 6)
 If HUT ap changed to 6
 prior to SETUP:
 | Wait for night,

```

24.133 * @ HOP | ITEM 41_5 E (slit 5)
24.761 * @ Avoid HUT slit 5 in day!
24.762 * @ JOB If Sunrise Prior To QUIT:
24.763 * @ HOP | ITEM 41_6 E

```

```

*****
SLIT_5.TP
*****

```

Used for all observations that use slit 5 (19xi197 arcsec).

Slit 5 is too large to be used safely during the day. This TP alerts PS to change slit to 6 if SETUP occurs prior to sunset (and change back later), or if QUIT occurs prior to sunrise.

```

Number alt gd dsp command
-----
02.730 * @ Avoid HUT slit 5 in day!
02.731 * @ JAC If SETUP prior to sunset:
02.732 * @ HOP | ITEM 18 E (PREVIEW mode)
02.733 * @ HOP | ITEM 41_6 E (slit 6)
24.130 * @ If HUT ap changed to 6
                | prior to SETUP:
24.131 * @ | Wait for night,
24.132 * @ | ITEM 41_5 E (slit 5)
24.133 * @ HOP |
24.761 * @ JOB Avoid HUT slit 5 in day!
24.762 * @ JOB If Sunrise Prior To QUIT:
24.763 * @ HOP | ITEM 41_6 E

```

```

*****
SMALAP.TP
*****

```

Used whenever an observation is in door state 2 (50 cm**2).

Because of possible pressure buildup in the telescope, leaves VIP on and detector off until the observing slit is in place. (Rotation of slit wheel allows high pressure in telescope to get into spectrograph.) Also protects TV camera at the end of the observation by putting the ND6 filter in place before QUIT, so that the doors do not open to the SLEW configuration with the camera set for the small aperture.

Also, to save time at the SETUP, moves the small aperture mechanism to the 50 cm**2 position during preceding SLEW. Then, when SETUP is commanded, large doors close, and small aperture is already in position for the observation.

To get the detector on ASAP, this TP has ITEM 16_0 issued at the end of SETUP, which makes this TP incompatible with APCEN.TP.

```

Number alt gd dsp command
-----
01.000 * @ JAC VIP ON until at obs slit
02.000 % @
02.101 * @ HDC ITEM 64_2 E (SAD to 2)
12.101 * @ JOB When HUT AP = obs
12.102 * @ JAC ITEM 16_0 E
25.701 * @ JOB Just prior to QUIT:
25.702 * @ JOB HUT ITEM 12_-5 E
25.703 * @ JOB ck FILTER 0 XX X
25.704 * @ JAC ITEM 16_1(2) E
25.705 * @ ck VIP < -5.00 (<-5.00)
29.000 % @
30.000 % @

```

```

*****
SMAPHD.TP
*****

```

Combin:S SMALAP.ALT with PHDMON.ALT, for situations where the second ALT slot is needed for something else.

```

Number alt gd dsp command
-----
01.000 * @ JAC VIP ON until at obs slit
02.000 % @
02.101 * @ HDC ITEM 64_2 E (SAD to 2)
12.101 * @ JOB When HUT AP = obs
12.102 * @ JAC ITEM 16_0 E
24.441 * @ JOB HUT will dither to ss
                | mode for part of obs.
24.442 * @ Just prior to QUIT:
25.701 * @ HUT ITEM 12_-5 E
25.702 * @ ck FILTER 0 XX X
25.703 * @
25.704 * @ JAC ITEM 16_1(2) E
25.705 * @ ck VIP < -5.00 (<-5.00)
29.000 % @
30.000 % @

```

```

*****
SPECI.TP
*****

```

Used for the first spectrograph focus pointing. Has been revised for use with new focus target ALF-AUR.

Before the observation, move the mirror -150 microns from the best focus position found in the TV camera focus procedure. We hope to get data at 50 microns intervals from -150 to +150 microns in the first ALF-AUR pointing. Guides PS to HUT F05B as well.

```

Number alt gd dsp command
-----
00.111 * @ As early as possible:
00.112 * @ HMH ITEM 79_-51 E (set dx)
00.113 * @ HMH ITEM 83 E (start mirror)
00.114 * @ HMH When motions complete:
00.115 * @ HMH ITEM 79_-99 E (-150 tot)
00.116 * @ HMH ITEM 83 E (start mirror)
00.401 * @ HMH When motions complete:
00.402 * @ HMH ITEM 76_0 E (set focus)
23.401 * @ Perform HUT F05B

```

```

*****
SPEC2.TP
*****

```

Used for the second spectrograph focus pointing. Has been revised for new focus target ALF-AUR.

Before the observation, moves the mirror to the +150 micron position if no additional data has come from the POCC after their analysis of the first spectrograph focus pointing. More likely, revised values of the starting position will be voiced up.

After the observation, sends mirror back to pre-flight focus. Again, values will have to be redeclined if a different best focus position is

found.

```

Number alt      dsp      command
-----
00.111 *      @      As early as possible
00.112 *      @      ITEM 80_2530 (or )
00.113 *      @      ITEM 81_2347 (or )
00.114 *      @      ITEM 82_2284 (or )
00.115 *      @      ITEM 83 (start mirror)
00.401 *      @      When motions complete
00.402 *      @      ITEM 76_0 (set focus)
23.401 *      @      Perform HUT F05C
29.421 *      @      ITEM 80_3742 (or )
29.422 *      @      ITEM 81_3559 (or )
29.423 *      @      ITEM 82_3496 (or )
29.426 *      @      ITEM 83 (start mirror)
29.427 *      @      When motions complete
29.428 *      @      ITEM 76_0 (set focus)

```

```

*****
SS-CYG.TP
*****

```

Used for observations of SS-CYG (3227).

Magnitude of target is quite uncertain (could be outburst). If source is bright, PS will want to preview an alternate sequence which sets up for a lower door state (750 cm**2).

This TP loads the high state sequence if needed, and includes the PT_DR2 TP needed for that sequence.

```

Number alt      gd      dsp      command
-----
11.701 *      @      TV      IF src is very bright
11.702 *      @      JAC      edit HUT seq num
11.703 *      @      JAC      ITEM 26_475 E
11.704 *      @      JAC      HUT ITEM 2 E
11.705 *      @      NOTE: HUT +Y door opens
11.706 *      @      to 750 cmsq pos.
11.707 *      @      TVMAG set high by 1
20.101 *      @      If HUT rate > 10000 / 2s
20.102 *      @      If HUT seq num = 475
20.103 *      @      HOP      ITEM 45_X E (G MAG+1)
20.104 *      @      HOP      ITEM 42_3_37 E (DR P1)
20.105 *      @      Else
20.106 *      @      HOP      ITEM 42_3 E (half ap)

```

```

*****
SU-UMA.TP
*****

```

Used for observations of sources whose visual brightness is known to vary significantly, but which are not expected to get bright enough to require the use of a different observing sequence depending on what the PS sees.

Simply warns the PS not to be surprised if the target is brighter or fainter, since it is quite variable. Does not have him preview a new sequence.

```

Number alt      gd      dsp      command
-----
04.121 *      @      TV      Variable star (could be
04.122 *      @      brighter or fainter).

```

```

04.123 *      TV      Adj. TVMAG as required.
*****
SUN_60.TP
*****

```

The sun will trip the EBOS whenever the target is within 60 degrees of the sun.

This TP disables the EBOS prior to the SETUP, and re-enables it following the detector turn-off after the QUIT.

This TP should be used whenever a target is planned within 60 degrees of the sun.

The necessity for this TP is not likely to be affected by real-time replanning; nevertheless, it needs to be checked at that time.

```

Number alt      gd      dsp      command
-----
04.701 *      @      HDC      ITEM 63_0 E (Disable EBOS)
30.101 *      @      HDC      ITEM 63_1 E (Restore EBOS)

```

```

*****
TO_2ND.TP
*****

```

Used for pointings at EUV sources in which a dither to the aluminum filter is planned.

Warns the PS that when the dither occurs, the count rate will drop enormously, to keep him from worrying about the detector.

```

Number alt      gd      dsp      command
-----
24.471 *      @      JOB      HUT will dither to Alum
24.472 *      @      JOB      filt (slit 3), R < 25/2s

```

```

*****
TVSENS.TP
*****

```

Used for the TV sensitivity pointing at SS-CYG during activation.

Refers the PS to HUT F05D, if source not in outburst.

```

Number alt      gd      dsp      command
-----
23.100 *      @      TV      If src not in outburst
23.101 *      @      HOP      (image not bloomed)
23.102 *      @      HOP      Perform HUT F05D

```

```

*****
U-GEN.TP
*****

```

Used for observations of U-GEN (3208).

Magnitude of target is quite uncertain (could be outburst). If source is bright, PS will want to preview an alternate sequence which sets up for a different SP mode (histogram instead of high time), door state, and higher expected count rate. Manually preview new sequence, and re-setup. High state sequence needs PT_DR2 TP, so that is also included.

Original sequence is set up for faintest magnitude of source, since brightest

magnitude would not exceed the camera danger limit anyway, so no TV mag editing required if the source is in the faint state.

```

Number alt   gd   dsp   command
-----
11.701 *    --    ---    IF src is very bright
11.702 *    TV    ---    edit HUT seq num
11.703 *    JAC    ---    ITEM 26_476 E
11.704 *    JAC    ---    HUT ITEM 2 E
11.705 *    JAC    ---    NOTE: HUT +Y door opens
11.706 *    ---    ---    to 750 cmsq pos.
11.707 *    ---    ---    TVMAG set high by 1
20.101 *    @    ---    ITEM 12_14 E (Faint mag)
20.102 *    @    ---    If HUT rate > 10000 / 2s
20.103 *    @    ---    If HUT seq num = 476
20.104 *    @    ---    ITEM 45_X E (G MAG+1)
20.105 *    @    ---    ITEM 42_3_37 E (DR P1)
20.106 *    @    ---    Else
                | ITEM 42_3 E (half ap)

```

 VENUS.TP

Used for observations of VENUS.

TP tells PS to center up on illuminated side of planet, and to make two offsets to measure geocoronal airglow (once early in the observation, and once near the end).

```

Number alt   gd   dsp   command
-----
12.000 %    ---    ---    ---
12.101 *    ---    ---    ---
12.102 *    TV    ---    Center HUT on bright
18.000 %    ---    ---    portion of planet w/MPC
19.000 %    ---    ---    ---
20.000 %    ---    ---    ---
24.101 *    ---    ---    Soon after BEGIN:
24.102 *    TV    ---    Offset from planet w/MPC
24.103 *    ---    ---    Obtain 2 min airglow data
24.104 *    ---    ---    Re-center HUT on bright
24.105 *    ---    ---    portion of planet w/MPC
25.401 *    ---    ---    3 min prior to QUIT:
25.402 *    TV    ---    Offset from planet w/MPC
25.403 *    ---    ---    Obtain airglow till QUIT

```

 VW-HYI.TP

Used for observations of VW-HYI (3206).

Magnitude of target is quite uncertain (could be outburst). If source is bright, PS will want to preview an alternate sequence which sets up for a lower door state (750 cm**2). Manually edit sequence number, re-preview and re-setup and go. PT_DR2.TP steps are included in this case.

Since V mag of the source varies by more than the camera safety limit, the low-state sequence has a TVMAG set somewhat brighter than expected for the low state. So if the source is not in outburst, the PS needs to adjust the TV camera accordingly.

```

Number alt   gd   dsp   command
-----

```

```

11.701 *    TV    ---    IF src is very bright
11.702 *    JAC    ---    edit HUT seq num
11.703 *    JAC    ---    ITEM 26_477 E
11.704 *    JAC    ---    HUT ITEM 2 E
11.705 *    ---    ---    NOTE: HUT +Y door opens
11.706 *    ---    ---    to 750 cmsq pos.
11.707 *    ---    ---    TVMAG set high by 1
11.708 *    JAC    ---    ELSE
11.709 *    JAC    ---    ITEM 12_14 E (Faint mag)
20.101 *    @    ---    If HUT rate > 10000 / 2s
20.102 *    @    ---    If HUT seq num = 477
20.103 *    @    ---    ITEM 45_X E (G MAG+1)
20.104 *    @    ---    ITEM 42_3_37 E (DR P1)
20.105 *    @    ---    Else
20.106 *    @    ---    ITEM 42_3 E (half ap)

```