

**S98 Rev 266 Rings Occultation
DOY 081, March 22, 2017
DSS-43, DSS-35**

Ops: Elias (RSR/DSS-35), Clement (RSR/DSS-43, first support), Danny (WVSR/DSS-43), Jay (WVSR/DSS-35), Aseel

NOA: Lu, Jack

ACE: Bill then Mike

Station Crew D then B

Fgains:

43X 62

43S 50

35X 57

35Ka 57

1-way offsets:

S 745,700

X 2,734,250

Ka 10,390,150

DSS-35 pointing model was updated by Canberra. From Graham Baines:

"I note in your planned activities for DOY 081 that the radio science observations are predominantly during the local night ending at ~23:00z. This is very fortuitous as I've been seeing a strong Sun rise – alidade tilt / elevation offset problem in recent monopulse data. I've already updated the DSS-35 XKa-Band pointing model based on the DOY 076 pass results, ignoring the Sun rise effect in that data as I made my update. Hopefully this will give you good pointing during your activities."

Backup rcvr

VSR

PRSR is red

WVSR known software bug

Start w/ standard gain then "fgain a 0 1" when the s/c is Earth pointed and signal is at full strength

1220 **DSS-43 Pre-cal**

X DC04

S DC01

Equipment: green

Weather: fine

1320 DSS-43 BOT

1321 DSS-35 Pre-cal

X DC02 Ka DC09

ACE briefing: Downlink only. BOT 1440. Don't expect tlm but may see downlink signal prior to Tlm off at 1503. Should be able to acquire ka-band 1508

35 ->

Equipment: green

Weather: fine

Table: 35XKa

1322 NOA to 35

Even though your track is downlink only, we want you to calibrate the transmitter as backup

1342 DSS-43 transmitter on 16.859 kW. A few minutes later it went up to 17.8 kW

1440 DSS-35 BOT

1447 X-band signal. Weak. Around 17 dB-Hz

1448 RS to NOA

Starting to see X-band signal. Increasing in power

NOA -> x-band only?

RS -> correct. S-band will be on in about 15 mins

X-band sfro 1 -780

Estimate Ka-band sfro 1 -2370

S-band leave alone (will be at ~-130)

1450 ACE to 43

See you are in lock on x-band. Any luck locking up on 1896?

43 -> negative

150230 TLM off

X-band power

43X 54.1

35X 48.54

1503 S-band on

43S 42.0

1508 Ka-band on

35K 47.11

Signal at 363 in 1 KHz. Adjust after monopulse enable

151020 RS to RS

Enable monopulse

Offsets: AZ 1.55, EL -0.63, elevation 28.31

1511 Adjust 1Khz ka-band offset to -2250
Residual now at 242 Hz

1513 Pc/No 1-way baseline
WVSRs

43X	54.17	54.4
43S	41.77	41.9
35X	48.80	48.4
35Ka	47.21	46

1514 Asked ACE if it's OK for him to turn Conscan on.
-> no problem

1514 ACE to 43
Could you turn Conscan on

1522 Lu called. Monopulse doesn't seem to be working right. Will check

1524 NOA to 35
Do you have copy of BM?
35 -> affirmative
Lu -> didn't see directive you are supposed to enter for monopulse.

1527 Lu called
Is monopulse looking ok?
Me -> yes
Lu -> Problem with 20% of data getting
20% of offset sent from rcvr to antenna get thrown out because noisy
Graham talked about this in the past
Doesn't show green in his area. Shows yellow. Can stop and try to re-enable. Have time?
Me -> yes

1529 NOA to 35
Wondering if you still have to enter that offset -1????
35 -> that's negative
Lu -> Are you still required to enter that for this track?
35 -> that's negative
Directives that you were talking about earlier they were automated directives

1535 Lu called
Are power levels for X & ka as expected?
Me -> yes they are good
Lu -> then will keeps as is. Will not mess around with it

1545 35 to NOA
Talking about Monopulse
Decided to disable and re-enable using directives
1547 Monopulse disabled, offsets kept
1548 Monopulse re-enabled. No jump

1549 35 to NOA
looked good for about 15 secs and then stopped being green
Lu -> let me check and get back to you

1551 Lu called
How is it working?
Me -> it's looking fine
Lu -> probably issue with Monopulse that discard 20% of data to receiver. When that happens, the antenna will show the antenna id from 0 to 9. That's what happens when they through away some of the data. He didn't do the procedure the step by step as he wanted, but as long as data is looking good, then ok. How are signal levels?
Me -> 47.5. A little low. How about we conscan?
Lu -> how much time do we have?
Me -> we still have time. Can conscan for 10 mins.

1553 Lu to 35
RS wants us to conscan on x-band, so at this time go ahead and disable monopulse and reconfigure that rcvr for conscan

1554 35 disabled monopulse and kept offsets (AZ 2.75, EL -2.10). Now going to conscan on x-band

1557 NOA to 35
We want to Conscan for 4 cycles and then disable

1558 Called Lu
How about DSS-43 pointing?
Lu -> 3 mdeg in AZ and 2 mdeg in EL. Very small. We can disable and clear

1600 NOA to 43
At this time you can go ahead and disable conscan and clear the offsets

DSS-43:
w/ Conscan: X43 54.5, S43 41.96
w/o Conscan: X43 54.46, 43S 42.16

1605 Lu called
DSS-35 conscan: -1.8 in AZ, 5.2 mdeg in EL, -1.4 mdeg in XEL
Keep or clear?
Me -> clear
Didn't really see a change in

160540 Lu to 35
At this time disable Conscan and clear the offsets

We didn't see any change in x-band power. Ka-band was fluctuating during conscan

1607 Lu to 35
At this time go ahead and reconfigure for Monopulse

1609 35 Mono enabled
it may be rcvr 9 that's sending bad points to antenna
Me -> is there another rcvr?
Lu -> have to calibrate
Me -> can they use rcvr 9 calibration values?
Lu -> let me check

1612 Lu to 35
RS is wondering if we have another Ka-band rcvr available
35 -> that's affirm
Is it possible you can put it in the link and use the calibration values from rcvr 9 for that rcvr
-> that's affirmative
Can you try to put it in the link and acquire Ka-band to see if we get improvement
-> that's affirmative

Lu on phone
Think it's dc09 that discards 20% of data
Have receiver 6 now

161730 Ka-band signal power is looking better

161835 35 to NOA
Locked up rcvr6 and it's doing the same as dc09
Would it be possible to boot 9
Lu -> go ahead

1620 Lu called
We have data coming in from rcvr6 now
Me -> It's looking a little better actually
Lu -> see still discard 6. They are going to reboot 9 to see if it gets a little better. If not, we'll stay with 6

1622 35 Ka-band signal power dropped again
coming back but a little lower

1625 Lu to 35

Do you have monopulse enabled?

35 -> yes

Lu -> you need to enable on downlink side. Perform enable on downlink side as well

162645 RS to 35

We need to disable monopulse before the switch to 3-way, so at this time, can you
please disable without clearing the offsets

Offsets: AZ 1.05, EL 0.99, elevation 43.82

Lu said they had monopulse enabled on dc06. Which is better?

Me -> Too much was going on. Let's wait for switch to coherent and decided

Switch to coherent

Told Lu to enable Mono on DC06 first then DC 09

1609 NOA to 35

Go ahead and enable monopulse on DC06

No jump but very slight improvement. ~0.2 dB

1633 Lu to 35

At this time you can halt the monopulse, clear the offsets on 6, and try monopulse on
9

Offsets kept AZ 3.15, EL 0.74 according to eDMD display

1635 Mono enabled on dc09

Lu: Looks like Monopulse is green now

Then went to yellow

1636 Lu to 35

The antenna still show that monopulse is still dc06, so looks like you may have to ...

35 -> Toggling between 6 and 9 now

Lu on phone

How is it looking now?

Me -> looking fine. We should stop. Need a stable signal.

Lu -> dc09?

Me -> yes. There's really no difference

163730 NOA to 35

At this time you can remove DC06 from the link

1643 Pc/No Coherent Baseline

		WVSRs
43X	54.83	55.05
43S	42.41	42.24
35X	49.25	49.1
35Ka	48.59	47.8

1653 Lu called

Antenna people here asking if can disable monopulse for 5 minutes and enter directives. Think bandwidth issues. Too much data coming in

Me -> So even though Monopulse seems to be working ok, you don't think it's working perfectly?

Lu -> want to resolve data issue

1655 43 X-band Spurs at 300 Hz!

Could it be fgain? Data clipping

Histogram looks good

Increased number of FFT averages on subchannel1. Wait for update

1655 NOA to 35

Have antenna OE on counsel and asked them if could enter "ap mono d" directive, then secs, enter "ap mono e"

43 X-band fft updated. Spurs more prominent. They are at +/- 180 and +/- 300 Hz
About to end thermal stabilization period. Do quick fgain change subchannel 1 only to see if it's data clipping

170753 fgain changed to 70

spurs still there! Change back

170914 fgain back to 62

(sorry Essam!)

1721 Lu called

How is 35 Ka-band?

Me -> Looks good

Lu -> Looks like bandwidth. Interface between receiver and antenna. Looks like somebody messed up with LAN

Setting on local network between receiver and antenna

DR?

Me -> yes. Let's document it

Lu -> Will open DR but no impact to RS data

1918 Monopulse offsets

AZ 2.33, EL 3.17, elevation 74.78

1919 DSS-35 X SNT 23.626

1928 RS to 35
at 1934, disable monopulse w/o clearing the offsets

1934 35 Monopulse disabled
high offsets (should have disabled sooner?)
AZ 12.22, EL -3.66, elevation 76.3 degrees

195210 Very brief 1-way signal (one peak)

200840 1-way. Residual -500 on X-band
201045 2-way

201328 DSS-43 transmitter off

203645 RS to 35
The timeline has you enabling monopulse at 203800, but if you are not in lock by that time, please enable monopulse as soon as you are in lock after that

203850 35 monopulse enabled
~0.5 dB jump in power
offsets: AZ 6.83, EL -3.67, elevation 73.03 degrees

205250 RS to 35
At 205500 disable monopulse w/o clearing the offsets

2055 35 to RS
Monopulse disabled
EL 8.28, AZ -1.41

Signals drifting! Affect of atmosphere

Loss of Ka-band
Then X
~2210 last S-band (was in an out)

2230 RS to 43 and 35
We've lost all signals in the open-loop receivers. We're now recording a noise baseline. We should be done a little earlier than what's in the timeline ... probably in 15 mins or so. Will let you know.

2245 Disabled the open-loop recordings

2247 RS to 43 and 35

We are done with the open-loop recordings and completed the experiment.
Everything was nominal so thank you very much for your excellent supports. Please standby for the ACE and NOA

2248 NOA to ACE

Want me to release the station or you want to do that?

Mike -> I'll take care of it. I think we have tlm and rng coming in in a few

Lu -> s/c is behind saturn

Mike -> copy. Go ahead and release them

2249 NOA to 43 and 35

Thank you for your good support. We'll see you again in two weeks

2255 Called Lu

Are you going to request a DR?

Lu -> already did

Checking for DR number ...

C112607 central lan switch

Me -> what was indication that there was an issue?

Lu -> have monopulse displays

Toggle in and out between receiver 0 and receiver 9, throw out 20% from data from receiver that is sent to antenna

Receiver sends offset to antenna for processing and throws out some data

Antenna can process more data but the receiver is only sending half because of the bandwidth so if it's late then the antenna rejects these data

Causes concern for operation because there's a concern that it may not be working but it was working fine today

End of another successful experiment!