

Subject: Re: [External] Re: WBD Commissioning Data: Was: Re: Reprocessing of early BM2 operations
From: keith yearby <k.h.yearby@sheffield.ac.uk>
Date: 12/16/24, 11:10
To: Jolene Pickett <pickett@uiowa.edu>

Dear Jolene,

The answer your comments first, I've updated the overview plot to remove the waveform panel and include the units.

In the bm2_check, the excursion at 03:34:12.542 is 38.643 ms in the *obt_C4.txt file. This is at the time when the mode switched from duty cycle to filter, so I think this sort of glitch is to be expected.

Simon and I have compared the BM2 operations listed in the WECLLOG dataset, and compared these with the list at Iowa (<https://space.physics.uiowa.edu/plasma-wave/cluster/com-stat.html>). In the file wbd_bm2.xlsx, Simon has taken the list from Iowa and added column G with a Y if the operation is in the WECLLOG dataset, or N if not.

WECLLOG_WBD_BM2_listing_v2.txt lists all BM2s in the WECLLOG dataset, with a comment if it is also listed at Iowa. I also included in this list the deployed antenna half length as listed in the experiment header file. It would be good if you could confirm this agrees with any details you have.

These are the conclusions of the comparison:

1. The C1 operation on 2000-09-21 was in fact DSN, but is labeled BM2 in the Iowa list.
2. The operations in the Iowa list labeled as 'BM2 (DSN)' are not BM2 (probably DSN but I've not checked).
3. The C1 operation on 2000-09-30 is a successful BM2, but there is no RDM directory for this day at the CAA. Then I suppose that the raw data was downloaded from the DDS at the time (it is only kept there for 2 weeks) to make the plots you have at Iowa, but never made it to the archive. Fortunately Per-Arne has a copy of the raw data for this date which we can use for the reprocessing. I will also ask the CAA if they can use Per-Arne's data to create the missing RDM directories.
4. There are some BM2s in the WECLLOG dataset not listed at Iowa. Usually these are where the operation was repeated.

These I think are pretty much what you were expecting, apart from the missing RDM for 2000-09-30.

Best regards, Keith

On 11/12/2024 17:23, Jolene Pickett wrote:

Dear Keith,

Thanks for sending me the Dec. 1, 2000 Commissioning test case for review. I have a few comments:

1. The overview contains the waveform panel. None of our other overviews for the mission phase contains that. If that panel is easy to remove, do you think we should do it? I suppose when we review the documentation that describes some of these data products we could state the differences for the commissioning phase, including that the overview contains the waveform as well as spectrogram.
2. Also on the overview, the units of the electric field are not provided in the spectral plot. Maybe you could add it to the end of the title of that panel "FFT Power ... " as $V^2/m^2/Hz$, or whatever the units are for this plotter. If it is convenient to put it next to the color bar, that would be better, but if the other is easier, I am fine with it.

3. In the bm2_check directory, there is an excursion from the expected 119.16 ms to 38,6130 ms at around 09:34. Is this okay? Larger than expected differences are usually the result of data gaps so I always ignored them for the most part, but smaller than expected differences could indicate a problem. I believe this is the time when the mode is switched from duty cycling to digital filter, so this is probably the cause for this difference? Can you comment on this?

When I looked at the gifs, I thought there must be a problem with the ephemeris data on them because they were out at over 19 RE. I hadn't remembered Cluster being that far out in commissioning. A check of the ephemeris data with NASA's SSCWeb showed they were consistent, so there is no problem as far as I can tell with that. It was something I checked because we recently had problems with incorrect ephemeris data on all gif plots after about mid-September with the Panska Ves tracks. The cause was that the script for picking up the latest ephemeris data didn't work correctly when C2 was missing from the mix, it having re-entered. This wouldn't have affected BM2 since our last operation was right around the date of re-entry.

I will do a formal validation of this Dec. 1, 2000 track next week or some time after I receive your response to the above.

Apart from the issues with the overview plot, this process looks good and you can proceed with the other tracks. Thanks for pointing out that all of the TCOR files already exist at the CAA and that you have provided them to Prague for the commissioning DSN tracks.

Best regards,

Jolene

On 12/10/24 04:23, keith yearby wrote:

Dear Jolene,

I've completed the CDF processing for this one day of commissioning data, 2000-12-01, C4.

The L1 files, logs and plots are at:

<http://wecops2.shef.ac.uk/~wbd/processing>

in the usual sub-directories. The plots sub-directory includes the Autoplot overview as a PNG file as well as the Autoplot VAP and script. All the BM2 commissioning tests used the Ez antenna only in 8 bit mode so a single Autoplot overview is sufficient.

The procedure used to run the BM2 tests (written by Rich) is this one:

http://wecops2.shef.ac.uk/~wecops/info/esocpdf/FCP_WEC_C014.pdf

The CDF files are at:

<http://wecops1.shef.ac.uk/~wbd/archiving/cluster4/2000-12-01/>

again with the usual sub-directories, and a tracking sheet (with just one line) is attached. There are in fact three 'two panel' plots as it wasn't practical to cover more than one bandwidth on a single plot. The 9.5kHz plot covers both the duty cycle and digital filter data (from ~ 09:34:20) onwards (the frequency scale is not correct for this latter data).

As regards a list of BM2 tracks in commissioning, I'm planning to use the WECLLOG dataset produced by the DWP team for this. This scans through all the WEC telemetry and records which mode was being used with command words, telemetry bit rates, etc. Actually at present it doesn't detect the commissioning BM2s because these were commanded without using WEC macros, but I have updated the software so it works for these and we will re-generate the dataset for commissioning. I'll send you the list of BM2s when I have it.

I have already produced the TCOR data for commissioning (starting from 2000 September 1). These have been submitted to the CAA, and the special WBD version used by Prague is on the website in the usual place.

<http://wecops2.shef.ac.uk/~wecops/timing/tcordiff/>

If this one track looks good to you, I will start work on the others.

Best regards, Keith

On 02/12/2024 18:58, Jolene Pickett wrote:

Dear Keith,

Your plan sounds like the right way to start primarily because we begin with one date and see how it goes. If it looks like it will not take too much time and the entire processing/validation process goes smoothly for this one day, then we can decide whether to move forward with the rest of the BM2 dates in commissioning. There is a bit of up front work in making the software changes you mention in Nos. 3 and 4. Hopefully, that will not take too much time. So, as it seems you are onboard with the approach of testing the waters with the one date, let's go with that to start and then make a final decision.

I am a little worried whether Autoplot can be used to make just the one overview plot. Maybe all of the BM2 tracks were short enough that we did not include testing of 1 bit mode or use the magnetic antenna as we did with DSN. I suppose the solution with magnetic antenna would be to make two overview plots as we have done throughout the mission. If there is 1-bit data, maybe it could be put as fill for commissioning. I know you brought up actually archiving the 1 bit data from DSN during the mission where we cycled through the AKR conversion frequencies with 77 kHz. That is something that Jan and I will probably deal with well down the road, so any solution that might come out of that will not be available in time to deal with the commissioning data.

I am comfortable with not having a separate processing tracking sheet in addition to archiving, but rather just a combined one where we do everything at the same time. Your mention of tracking sheets brings to mind, though, that I have found some mistakes in Julie's listing in the commissioning directory. She noted some DSN tracks as BM2, and I believe some tracks may be missing. What will you use as your list of official BM2 tracks? Hopefully, you will be working from your own processing of these two tracks before sending the files to Iowa for processing to L1. I will independently try to come up with what I think is the official list and cross check with your list should be decide to process all the tracks.

Lastly, with regard to TCOR, is it the case that you will need to make these files for all the various dates/tracks? If that is the case, this would probably take you quite a lot of time? I'm asking not just for BM2, but for the DSN tracks for when Prague gets around to the commissioning tracks for archiving. I will be preparing what I think is better list of the DSN tracks than is currently on our website, but since you provided the commanding, you probably already have a list of them?

Jan and Misha are currently working on generating the missing gifs to eventually upload to Iowa. Not surprising, the bulk of the missing ones are from when Iowa was doing the processing. Since they are doing this gif processing now, they will probably not get to addressing the commissioning tracks for a couple months or so.

Best regards,

Jolene

P.S. I hope you are enjoying having more free time, especially not having to look daily after the operations and resultant problems. I am at that stage where I am ready to get on with the closeout of Cluster. I will be writing my last performance report before the end of the month, and will be happy to be through with such paperwork, although I will still have to write a final report in early 2026. One thing that has popped up recently is our President elect, or his co-President non-elect, Musk, is that all Federal workers are going to be made to work from their offices now, rather than at home or wherever. If that requirement flowed down to NASA's grants, Iowa would probably have to pass that on to me.

Obviously, I will never return to Iowa, and especially for such a small amount of my time to see a project through by the end of next year. I'm probably worrying over nothing, but the Trump presidency is probably going to affect so many people in bad ways they never expected. Here's hoping I'm wrong.

--

Keith Yearby, Space Instrumentation Group,
School of Electrical and Electronic Engineering,
University of Sheffield, Mappin Street, SHEFFIELD, S1 3JD

—Attachments:—

| | |
|-------------------------------|---------|
| wbd_bm2.xlsx | 12.6 KB |
| WECLOG_WBD_BM2_listing_v2.txt | 4.3 KB |