

Downloading and Decoding CP6 data using the KPC-9612 Plus, ICOM-910, SatPC32 and CPX Data Decoder Software

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Wiring:

SatPC32 places the ICOM-910 into the satellite mode. In this mode the receiver uses the sub-band data port. Make sure to use a cable wired for 1200 bps from this data port to Port 1 on the KPC-9612 plus TNC. PDF Pages 237-239 in the KPC9612 plus manual give the port1 pin settings....table follows for ICOM-910,

ICOM 910 sub-band mini din pin settings

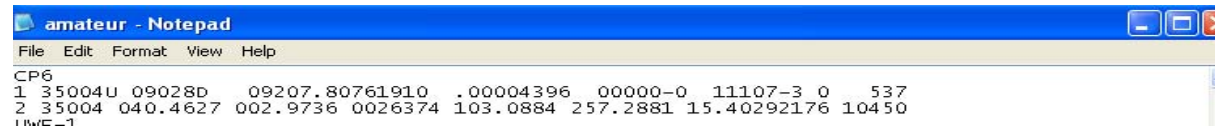
DATA Socket		Pin No.	Pin Name	Description
q e t	w y r	1	NC	No connection.
		2	GND	Ground line for the DATA IN, DATA OUT and AF OUT.
		3	NC	No connection.
		4	DATA OUT	Received data output terminal for 9600 bps operation.
		5	AF OUT	Received data output terminal for 1200 bps operation.
		6	SQL	Output terminal for squelch condition (Open/Close). Outputs grounded level signal when squelch is opened, +8 V level signal when squelch is closed.

SatPC32 set-up for tracking CP6

Current TLE for CP6:

CP6

```
1 35004U 09028D 09207.80761910 .00004396 00000-0 11107-3 0 537
2 35004 040.4627 002.9736 0026374 103.0884 257.2881 15.40292176 10450
```



```
amateur - Notepad
File Edit Format View Help
CP6
1 35004U 09028D 09207.80761910 .00004396 00000-0 11107-3 0 537
2 35004 040.4627 002.9736 0026374 103.0884 257.2881 15.40292176 10450
IIVE_1
```

Make sure to enter the TLE into the Kepler folder of your choice (i.e amateur) within the Sat32PC program directory and set up a corresponding Doppler.sqf file so your Doppler shift will track. (use menu item marked “?”, Auxillary files to enter).

CP6,437365,0,LSB,LSB,NOR,0,0



```
DOPPLER.SQF - Notepad
File Edit Format View Help
CP6,437365,0,LSB,LSB,NOR,0,0
ISS,145800,437800,FM,FM,NOR,0,0,Cross band repeater
ISS,145800,145900,FM,FM,NOR,0,0,Packet
ISS,145800,145200,FM,FM,NOR,0,0,Voice Region 1
ISS,145800,144490,FM,FM,NOR,0,0,Voice Region 2/3
FO-20,435848,75,145948,55,LSB,LSB,REV,0,0
FO-20,435848,45,145948,55,LSB,LSB,REV,0,0
```

Use the Satellites menu item to add CP6 to your selected satellite list and then select it for your use...

SatPC32-Ic [Standard H:CP6] [Registered Version]

File Tracking Satellites CAT Rotor Mode Setup Programs Accy ?

QTH: -82.0 / 29.6 **Eclipsed** Downlink 0 Corr.(+/-) 0 Uplink 20 100 500 1K 5K D-Corr: Upl/Dwnl

R+ C+ A- U+ T1 U CW- AL 437367.234 145899.255 30.07.2009
 H+ Z1 G- S+ D+ W3 2D BM 2.234 -0.745 04:06:02 U

Satellites

Source Files: amateur.txt, geo.txt, intelsat.txt, nasa.all, noaa.txt, Orbs008n.txt, weather.txt

Available: OSCAR 3 (OSCAF), OSCAR 5 (AO-5), OSCAR 6 (AO-6), AO-7, OSCAR 8 (AO-8), AO-10, UO-11, JAS-1 (FO-12), UO-14, UOSAT 4 (UO-15), AO-16, DOVE (DO-17)

Selected [Standard]: *A FO-29, *B AO-07, *C AO-51, *D SO-50, *E GO-32, *F ISS, *G AO-27, *H CP6

Path: H:\PROGRAMS\1\SatPC32\Kepler\
 Click on "Update Keps" to download Keplerian data files from the internet!

Update Keps

Azimuth Elevation MA Height Range L SSP B Orbit Squint Aos Los MaxE

161.4	-26.3	132.7	470	6557	296	-28	1095	--	09:02	09:12	17
-------	-------	-------	-----	------	-----	-----	------	----	-------	-------	----

A B C D E F
G H I J K L

KPC-9612 Plus considerations:

Place the TNC into the correct mode and setting for passing data to the data decoder software. I used hyperterminal connecting to the computer at 9600 baud. If the TNC has been hard reset at the speed of communication and your callsign in the default new user mode. ? gives you a list of newuser mode commands, which is limited.

Change to the terminal mode using <intface terminal>. ? now gives you an extensive list of commands.

Make sure you are using port 1 <port 1> command;

Make sure the TNC abaud is 9600 <abaud 9600>;

Confirm TNC hbaud is 1200/9600 so port 1 will receive at 1200 bps;

Now change controller to Kiss mode for satellite AX.25 packets <intface kiss>;

```

CP6_9600 - HyperTerminal
File Edit View Call Transfer Help
cmd:port 1
PORT was 1
cmd:intface kiss
INTFACE was KISS
cmd:abaud
ABAUD 9600
cmd:hbaud
HBAUD 1200/9600
cmd:N6CP>N6CP/1: <<UI>>:
♦COMM A
N6CP>N6CP/1: <<UI>>:
↓mq      ⬆️      *%_*æ£ —↔♥0öÄ||±Dî%îT-x|γ±±-Π♠^r|†T♥0γr||-↓
                                ▶♦vw{γγâ||i÷% (râ||i÷√
ΠL000gC w#Π ⬆️ &
£∞qs||nuβ/δα||NB
N6CP>N6CP/1: <<UI>>:
♦COMM A

```

Data bursts as seen by the TNC in KISS Mode, prior to setting it up for decoding

Now that you are in Kiss mode you need to issue the command <RESET> to pass through data packets to data decoder software.

Note that the TNC will not echo any more entries. After you use data decoder if needed for other uses do a hard reset using jumper J12 on the TNC board to enter into newuser mode again, if needed.

Now its time to exit hyperterminal and start running SatPC32 and the CPX data decoder software,

For KISS mode info page 149 (157 pdf) of manual, For KPC-9612pus commands pg 159 (pdf 167) of manual

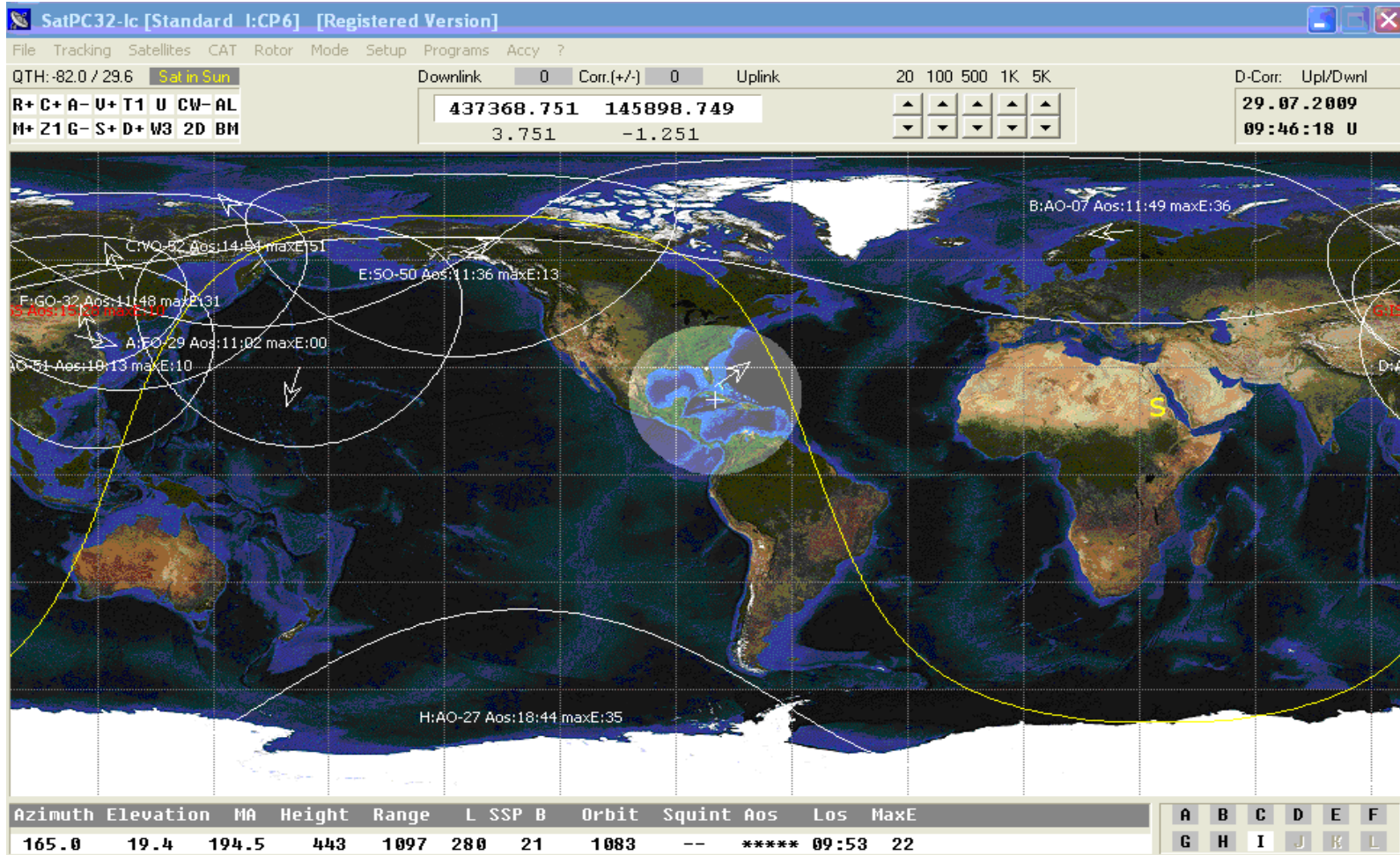
Using the software with the IC-910:

From here out it is fairly conventional. Use the antenna tracking and CAT control features of your SatPC32 software and select CP6 as the satellite to track. Set-up the data decoder software with the most recent TLE, your location and the speed you are communicating with your TNC (9600). Register and log-in so the packets received will be forwarded to the CP6 team and track your progress online.

For the best tracking purposes even with Doppler tracking within SatPC32, tuning will still be a minor issue. The best way to counter the satellite transceiver frequency drift is to start with the calculated frequency and adjust the radio frequency manually as soon as you hear a beacon. This is part of the reason why they have 4 seconds of CW before the AX.25 data packet.

Other online resources: <http://www.ne.jp/asahi/hamradio/je9pel/cp6beaco.htm>,
<http://moredbs.atl.calpoly.edu/downloads/cpxdd>, and <http://en.wikipedia.org/wiki/AX.25>

Screenshots and Downloaded and decoded data follow:



SatPC32 tracking CP6, what follows is the CPX data decoder doing its thing!

Battery A Data:

Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CHARGE_PROTECTION CELL_OVERVOLTAGE_FAULT (0
Status Byte: 199
Voltage: 4.138 V
Temp: -4.000 degC
Current: -5.000 mA
Acc Cur: -2415.750 mA

Battery B Data:

Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CELL_OVERVOLTAGE_FAULT (0x-7D)
Status Byte: 199
Voltage: 4.255 V
Temp: -3.000 degC
Current: -5.000 mA
Acc Cur: -2856.000 mA

CDH:

Status: SENSOR_SNAP_NOW (0x01)
State: Normal Ops
Reset Count: 1
Payload Control: PAYLOAD_RUNNING (0x08)

Comm:

Status: CMD_RECVD XCVR_CAL_READY SEL_RX SEL_RF (0x67)
CC1000 CAL: 38
CC1000 POW: 8
CC1000 RSSI: 35

Payload:

Status: (0x00)
Proc Temp: 322.458 degC
3V PL: 0.000 V
5V PL: 0.000 V

Timers:

Normal Ops: 576518
Sensor Snap Rate: 14
ADCS Snap Rate: 14
Beacon Rate: 20
CDH Snaps Left to Take: 0

CP6

Position

Azimuth: 172.28
Elevation: -22.49
Range: 5860.0
Latitude: -80.040
Longitude: -126.972
Altitude: 447.2

Next Pass

Elapsed Time: 10:07:34
Max Elevation: 48.6
Pass Length: 11:28

More dBs

You are logged in as **AA4FL**.

Logout



CP6 Pass Log

Page 1 of 141.

First Prev 1 2 3 4 5 6 7 8 9 10 ... Next Last

AOS Time	Operator	Notes	Packets	
29-Jul-2009 21:03:29	jfoley		6	Details
29-Jul-2009 20:46:08	JO1PTD		1	Details
29-Jul-2009 20:41:42	JA0CAW		9	Details
29-Jul-2009 20:41:09	JH1BCL		11	Details
29-Jul-2009 20:39:12	ja6pl		9	Details
29-Jul-2009 11:19:25	AA4FL		0	Details
29-Jul-2009 19:24:18	djourdai	Exit code and partial file list	5	Details
29-Jul-2009 19:04:08	JH1BCL		3	Details
29-Jul-2009 11:19:25	AA4FL		0	Details
29-Jul-2009 17:45:58	theffern		8	Details
29-Jul-2009 11:19:25	AA4FL		1	Details
28-Jul-2009 20:04:31	jfoley	Completed the queue, files deleted and renamed	13	Details
29-Jul-2009 11:19:25	AA4FL		1	Details
28-Jul-2009 20:04:31	jfoley	payload on	7	Details
29-Jul-2009 11:19:25	AA4FL		1	Details
28-Jul-2009 20:04:31	jfoley		6	Details
29-Jul-2009 11:19:25	AA4FL		0	Details
28-Jul-2009 20:04:31	jfoley		0	Details
29-Jul-2009 09:41:40	Anonymous		0	Details
29-Jul-2009 07:23:31	vk5hi		8	Details

See your data automatically be posted to
<http://moredbs.atl.calpoly.edu/satellites/CP6/passes>

Data decoded from three passes of 1 packet each on 7/29/09:

Ack:
Packet Type: 4
Ack Data: COMM A
Ack:
Packet Type: 4
Ack Data: COMM B
Ack:
Packet Type: 4
Ack Data: COMM A
Sensor Snapshot:
Packet Type: 25
Sequence Number: 29037
Timestamp: 2009-Jul-02 13:02:45
JP5:
Solar Panel Voltage: 4.776 V
Solar Panel Current: 11.029 mA
Magnetometer Current: 9.191 mA
Magnetometer A: 180
Magnetometer B: 255
Internal Temp: -31.207 degC
External Temp: -16.880 degC
3V SP: 3.074 V
JP6:
Solar Panel Voltage: 4.847 V
Solar Panel Current: 22.059 mA
Magnetometer Current: 3.676 mA
Magnetometer A: 169
Magnetometer B: 240
Internal Temp: -5.453 degC
External Temp: -5.453 degC
3V SP: 3.027 V
JP7:
Solar Panel Voltage: 4.588 V
Solar Panel Current: 20.221 mA

Magnetometer Current: 14.706 mA
Magnetometer A: 127
Magnetometer B: 29
Internal Temp: 8.967 degC
External Temp: 9.898 degC
3V SP: 3.043 V
JP8:
Solar Panel Voltage: 4.776 V
Solar Panel Current: 468.750 mA
Magnetometer Current: 12.868 mA
Magnetometer A: 153
Magnetometer B: 51
Internal Temp: -0.982 degC
External Temp: -0.657 degC
3V SP: 3.043 V
JP9:
Solar Panel Voltage: 4.635 V
Solar Panel Current: 56.985 mA
Magnetometer Current: 9.191 mA
Magnetometer A: 178
Magnetometer B: 132
Internal Temp: -2.245 degC
External Temp: -2.552 degC
3V SP: 3.059 V
CDH Data:
RF Amp A Current: 27.574 mA
RF Amp B Current: 9.191 mA
3V CDH: 2.886 V
RF Amp Temp: -6.000 degC
3V Comm A: 2.918 V
3V Comm B: 2.902 V
VSUM: 4.635 V
Power Data:
CDH Current: 31.250 mA
SPA Current: 0.000 mA
SPB Current: 22.059 mA
Comm A Current: 23.897 mA
Comm B Current: 7.353 mA
Payload Current: 0.000 mA
CDH Temp: -8.336 degC
Comm A Temp: -8.830 degC
Comm B Temp: -9.556 degC
3V SPA: 2.886 V

3V SPB: 2.886 V
Battery A Data:
Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CHARGE_PROTECTION CELL_OVERVOLTAGE_FAULT (0x-75)
Status Byte: 199
Voltage: 4.138 V
Temp: -8.000 degC
Current: -5.000 mA
Acc Cur: -2423.500 mA
Battery B Data:
Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CELL_OVERVOLTAGE_FAULT (0x-7D)
Status Byte: 199
Voltage: 4.255 V
Temp: -8.000 degC
Current: 5115.000 mA
Acc Cur: -2863.750 mA
CDH:
Status: SENSOR_SNAP_NOW (0x01)
State: Normal Ops
Reset Count: 1
Payload Control: (0x00)
Comm:
Status: CMD_RECVD XCVR_CAL READY SEL_RX SEL_RF (0x67)
CC1000 CAL: 38
CC1000 POW: 8
CC1000 RSSI: 67
Payload:
Status: TESTING EXECUTING NEED_SS NAMES_READY CHUNK_READY INFO_READY KILL_ME <UNUSED> (0x-1)
Proc Temp: -31.207 degC
3V PL: 4.000 V
5V PL: 4.000 V
Timers:
Normal Ops: 542239
Sensor Snap Rate: 14
ADCS Snap Rate: 14
Beacon Rate: 20
CDH Snaps Left to Take: 0
ADCS Snaps Left to Take: 65535
Last Error:
Timestamp: 02-Jul 12:53:57
Error Code: -100
Address: 0x000071ec
I2C Stats:
Accepted: 50400

Rejected: 30146
Read: 15010
Sent: 58305
Resent: 0
Failures: 42455
CDH NRL Status:
NRL Control: TAKE_STATUS CHECK_POWER (0x42)
Ack:
Packet Type: 4
Ack Data: COMM A
Ack:
Packet Type: 4
Ack Data: COMM A
Sensor Snapshot:
Packet Type: 25
Sequence Number: 29037
Timestamp: 2009-Jul-02 14:43:34
JP5:
Solar Panel Voltage: 4.823 V
Solar Panel Current: 11.029 mA
Magnetometer Current: 9.191 mA
Magnetometer A: 254
Magnetometer B: 64
Internal Temp: -31.207 degC
External Temp: -8.336 degC
3V SP: 3.074 V
JP6:
Solar Panel Voltage: 5.223 V
Solar Panel Current: 161.765 mA
Magnetometer Current: 5.515 mA
Magnetometer A: 168
Magnetometer B: 44
Internal Temp: 5.116 degC
External Temp: 5.928 degC
3V SP: 3.027 V
JP7:
Solar Panel Voltage: 4.729 V
Solar Panel Current: 11.029 mA
Magnetometer Current: 14.706 mA
Magnetometer A: 193
Magnetometer B: 189
Internal Temp: 16.836 degC
External Temp: 17.447 degC

3V SP: 3.027 V
JP8:
Solar Panel Voltage: 5.035 V
Solar Panel Current: 25.735 mA
Magnetometer Current: 12.868 mA
Magnetometer A: 127
Magnetometer B: 218
Internal Temp: 6.764 degC
External Temp: 6.764 degC
3V SP: 3.027 V
JP9:
Solar Panel Voltage: 4.941 V
Solar Panel Current: 73.529 mA
Magnetometer Current: 9.191 mA
Magnetometer A: 169
Magnetometer B: 64
Internal Temp: 5.519 degC
External Temp: 5.519 degC
3V SP: 3.043 V
CDH Data:
RF Amp A Current: 27.574 mA
RF Amp B Current: 0.000 mA
3V CDH: 2.886 V
RF Amp Temp: 0.680 degC
3V Comm A: 2.902 V
3V Comm B: 2.902 V
VSUM: 4.729 V
Power Data:
CDH Current: 34.926 mA
SPA Current: 0.000 mA
SPB Current: 22.059 mA
Comm A Current: 31.250 mA
Comm B Current: 9.191 mA
Payload Current: 0.000 mA
CDH Temp: -3.454 degC
Comm A Temp: -4.040 degC
Comm B Temp: -4.896 degC
3V SPA: 2.886 V
3V SPB: 2.886 V
Battery A Data:
Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CHARGE_PROTECTION CELL_OVERVOLTAGE_FAULT (0x-75)
Status Byte: 199
Voltage: 4.138 V

Temp: -4.000 degC
Current: -5.000 mA
Acc Cur: -2415.750 mA
Battery B Data:
Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CELL_OVERVOLTAGE_FAULT (0x-7D)
Status Byte: 199
Voltage: 4.255 V
Temp: -3.000 degC
Current: -5.000 mA
Acc Cur: -2856.000 mA
CDH:
Status: SENSOR_SNAP_NOW (0x01)
State: Normal Ops
Reset Count: 1
Payload Control: PAYLOAD_RUNNING (0x08)
Comm:
Status: CMD_RECVD XCVR_CAL READY SEL_RX SEL_RF (0x67)
CC1000 CAL: 38
CC1000 POW: 8
CC1000 RSSI: 35
Payload:
Status: (0x00)
Proc Temp: 322.458 degC
3V PL: 0.000 V
5V PL: 0.000 V
Timers:
Normal Ops: 576518
Sensor Snap Rate: 14
ADCS Snap Rate: 14
Beacon Rate: 20
CDH Snaps Left to Take: 0
ADCS Snaps Left to Take: 65535
Last Error:
Timestamp: 02-Jul 14:41:36
Error Code: -13
Address: 0x00007250
I2C Stats:
Accepted: 51640
Rejected: 30191
Read: 16295
Sent: 58696
Resent: 0
Failures: 42708

CDH NRL Status:
NRL Control: TAKE_STATUS CHECK_POWER (0x42)
Sensor Snapshot:
Packet Type: 25
Sequence Number: 29037
Timestamp: 2009-Jul-02 16:20:27
JP5:
Solar Panel Voltage: 4.588 V
Solar Panel Current: 22.059 mA
Magnetometer Current: 9.191 mA
Magnetometer A: 109
Magnetometer B: 232
Internal Temp: -31.207 degC
External Temp: -3.156 degC
3V SP: 3.074 V
JP6:
Solar Panel Voltage: 4.541 V
Solar Panel Current: 88.235 mA
Magnetometer Current: 3.676 mA
Magnetometer A: 163
Magnetometer B: 205
Internal Temp: 8.512 degC
External Temp: 8.967 degC
3V SP: 3.043 V
JP7:
Solar Panel Voltage: 4.541 V
Solar Panel Current: 53.309 mA
Magnetometer Current: 14.706 mA
Magnetometer A: 92
Magnetometer B: 44
Internal Temp: 16.836 degC
External Temp: 17.447 degC
3V SP: 3.043 V
JP8:
Solar Panel Voltage: 4.659 V
Solar Panel Current: 466.912 mA
Magnetometer Current: 12.868 mA
Magnetometer A: 139
Magnetometer B: 59
Internal Temp: 8.512 degC
External Temp: 8.512 degC
3V SP: 3.059 V
JP9:

Solar Panel Voltage: 4.659 V
Solar Panel Current: 292.279 mA
Magnetometer Current: 9.191 mA
Magnetometer A: 160
Magnetometer B: 177
Internal Temp: 8.065 degC
External Temp: 7.624 degC
3V SP: 3.059 V
CDH Data:
RF Amp A Current: 27.574 mA
RF Amp B Current: 0.000 mA
3V CDH: 2.886 V
RF Amp Temp: 7.624 degC
3V Comm A: 2.902 V
3V Comm B: 2.902 V
VSUM: 4.094 V
Power Data:
CDH Current: 31.250 mA
SPA Current: 0.000 mA
SPB Current: 20.221 mA
Comm A Current: 31.250 mA
Comm B Current: 7.353 mA
Payload Current: 312.500 mA
CDH Temp: 2.083 degC
Comm A Temp: 1.373 degC
Comm B Temp: 0.680 degC
3V SPA: 2.886 V
3V SPB: 2.886 V
Battery A Data:
Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CELL_OVERVOLTAGE_FAULT (0x-7D)
Status Byte: 199
Voltage: 4.177 V
Temp: 2.000 degC
Current: 5115.000 mA
Acc Cur: -2489.750 mA
Battery B Data:
Prot Byte: DISCHARGING_ENABLED CHARGING_ENABLED CELL_OVERVOLTAGE_FAULT (0x-7D)
Status Byte: 199
Voltage: 4.177 V
Temp: 2.000 degC
Current: 5115.000 mA
Acc Cur: -2939.250 mA
CDH:

Status: SENSOR_SNAP_NOW (0x01)
State: Normal Ops
Reset Count: 1
Payload Control: PAYLOAD_RUNNING (0x08)
Comm:
Status: CMD_RECVD XCVR_CAL READY SEL_RX SEL_RF (0x67)
CC1000 CAL: 38
CC1000 POW: 8
CC1000 RSSI: 30
Payload:
Status: (0x00)
Proc Temp: 9.898 degC
3V PL: 3.106 V
5V PL: 3.294 V
Timers:
Normal Ops: 576669
Sensor Snap Rate: 14
ADCS Snap Rate: 14
Beacon Rate: 20
CDH Snaps Left to Take: 0
ADCS Snaps Left to Take: 65535
Last Error:
Timestamp: 02-Jul 16:19:58
Error Code: -101
Address: 0x0000c6c8
I2C Stats:
Accepted: 53743
Rejected: 30215
Read: 18422
Sent: 59465
Resent: 0
Failures: 42874
CDH NRL Status:
NRL Control: TAKE_STATUS CHECK_POWER (0x42)