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FAST MISSION

IDPU to FAST Spacecraft Integration Procedure
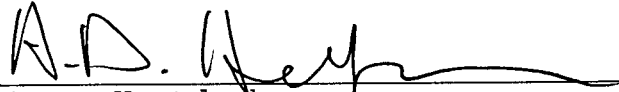

Revision E
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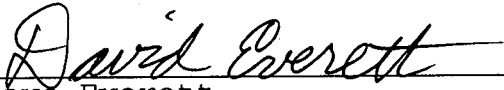APPROVED BY: NAME   DATE

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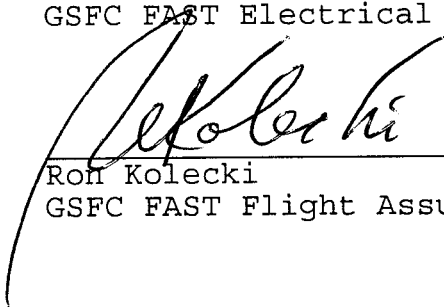A.D. Heetderks   27 JAN 94
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IDPU TO FAST SPACECRAFT ELECTRICAL INTEGRATION PROCEDURE

TEST EQUIPMENT LIST

ITEM	MAKE/MODEL	I/D NO.	CAL DUE DATE

SUMMARY

This procedure is intended to be used for the initial electrical tests of the FAST IDPU following installation into the FAST spacecraft. It verifies that all required instrument connections are made in the spacecraft wiring harness, checks for most inadvertant cross connections involving power and ground lines, checks most inadvertant connections on data and signal lines, verifies proper operation of the IDPU-MUE interface, and verifies the basic operation of the payload data system portion of the IDPU electronics.

GENERAL NOTES

1)   All voltage and resistance measurements are made with respect to spacecraft ground unless otherwise specified.

2)   Measurements of resistance are made with an approved Digital Multimeter.

PROCEDURE PART 1 -- Check out and mating of connectors to IDPU

1)   Notify Q.A. of intent to do test.
     Verify that connector mate/de-mate log is in place.

2)   Mate P1, P4, and P8 connectors with break-out boxes. Record in log. All shunts out. Verify that pyro shorting plug is installed. Install breakout boxes in harness side only of connectors P3, P5, P6, P7, P9, P10, P11, P12, P13, P14, P19, P22, P23, and P26.

3)   Resistance measurements made with spacecraft not powered:
     A)   Connector P1:
          1)   On the S/C side of the connector, verify less than 1 ohm to S/C ground on pins 17, 18, 19, 20, 21, 22, and 26.
          2)   On the IDPU side of the connector, make the following resistance measurements:
               a) Using a DMM with the red probe connected to pin 2, measure and record resistance between pins 2 and 17:
                  _____   (Greater than 20 ohms)

               b)   Using a DMM with the red probe connected to pin 3, measure and record resistance between pins 3 and 18:
                    _____   (Greater than 20 ohms)

               c)   Using a DMM with the red probe connected to pin 4, measure and record the resistance between pins 4 and 19:
                    _____   (Greater than 20 ohms)

d) Using a DMM with the red probe connected to pin 5, measure and record resistance between pins 5 and 20:

_____ (Greater than 20 ohms)

e) Using a DMM with the red probe connected to pin 6, measure and record resistance between pins 6 and 21:

_____ (Greater than 20 ohms)

f) Using a DMM with the red probe connected to pin 7, measure and record resistance between pins 7 and 22:

_____ (Greater than 20 ohms)

g) Measure and record the resistance between pins 25, and pin 26.

_____ (Approx 10K ohms)

B) On connector P4:
1) On the S/C side of the connector:
   a) Verify less than 1 ohm to S/C ground on pins 1, 13, and 15.
   b) With the black probe of the ohmmeter connected to S/C ground, on the S/C side of the connector, verify greater than 10 megohm to S/C ground on pins 5, 6, 7, and 8.
2) On the IDPU side of the connector:
   a) Verify less than 1 ohm to S/C ground on pins 6, 7, and 15.
   b) With the black probe connected to S/C ground, verify greater than 10 Meg ohms resistance to S/C ground on pins 1, 13, and 5.
   c) With the black probe of a DMM connected to pin 15, measure and record the resistance to each of the following pins:

3	T/MCLK	_____	(>1K)
4	PIPPER	_____	(>1K)
9	EARTH/SPACE	_____	(>1K)
10	SPACE/EARTH	_____	(>1K)
11	1HZ	_____	(>1K)
12	S/CCLK	_____	(>1K)
14	T/MDAT	_____	(>1K)

C) On connector P8:
1) On the S/C side of the connector:
   a) Verify less than 1 ohm to S/C ground on pins 9, 11, and 13.
   b) With the black probe of the ohmmeter connected to S/C ground, verify greater than 10 megohm to S/C ground on pins 1, 3, 4, 6, and 8.
2) On the IDPU side of the connector:
   a) Verify less than 1 ohm to S/C ground on pins 4, 6, and 13.

b) With the black probe of the ohmmeter
            connected to S/C ground, verify greater than 10
            megohm to S/C ground on pins 1, 3, 8, 9, and 11.

D) Make the following measurements on the S/C side of the
    indicated connectors:
    1) With the black probe connected to S/C ground, verify
        greater than 10 Megohms to S/C ground on all pins of
        connectors P3, P5, P6, P7, P9, P10, P11, P12, P13, P14,
        P19, P22, P23, and P26.

    2) On connectors P5, P6, P7, P9, and P10, verify less
        than 1 ohm resistance between the following pins:
        P5-22 to P9-1
        P6-22 to P9-2 to P9-3 to P10-11 to P10-12 to P7-22 to
                        P9-4 to P9-5 to P10-24 to P10-25

        P5-1 to P5-9
        P5-23 to P5-24
        P6-1 to P6-9
        P6-23 to P6-24
        P7-1 to P7-9
        P7-23 to P7-24
        P6-12 to P6-13
        P7-12 to P7-13

3A) Remove break out box from P3 and mate P3 to J3 on the IDPU.
    Record in mate/de-mate log.

4) Power up spacecraft and transition to normal mode.

5) Make the following voltage measurements on the S/C side of
    connector P1:
    A) Verify all space craft controlled instrument power
        services are off.
    B) Verify voltage wrt S/C ground of all pins is
        between 0 and .10 volts, except pin 25 is between 0
        and 5 volts.
    C) Turn on spacecraft IDPU Power Service A:
                /IDPUAPWR ON
    D) Verify voltage between +24 and +32 volts wrt S/C
        ground on pin 2, record. _____
    E) Verify between 0 and .10 volts wrt S/C ground on
        pins 3, 4, 5, 6, and 7.
    F) Turn on spacecraft IDPU Power Service B:
                /IDPUBPWR ON
    G) Verify voltage between +24 and +32 volts on pin 3._____
    H) Verify between 0 and .10 volts wrt S/C ground on
        pins 4, 5, 6, and 7.
    I) Turn on spacecraft Instrument Power Service A:
                /INSTRAPWR ON
    J) Verify voltage between +24 and +32 volts on pin 4._____
    K) Verify between 0 and .10 volts wrt S/C ground on
        pins 5, 6, and 7.
    L) Turn on spacecraft Instrument Power Service B:
                /INSTRBPWR ON

M)   Verify voltage between +24 and +32 volts on pin 5._____

N)   Verify between 0 and .10 volts wrt S/C ground on
     pins 6 and 7.

O)   Turn on spacecraft Motor Power Service:
                    /IWBOOMPWR ON

P)   Verify voltage between +24 and +32 volts on pins 6
     and 7._____

Q)   Turn off Instrument A and Motor spacecraft
     power services:
                    /IWBOOMPWR OFF
                    /INSTRAPWR OFF

R)   Verify between 0 and .10 volts wrt S/C ground on
     pins 6, 7, and 4.

S)   Turn off Instrument B power service:
                    /INSTRBPWR OFF

T)   Verify between 0 and .10 volts wrt S/C ground on
     pin 5.

U)   Turn off IDPU A power service:
                    /IDPUAPWR OFF

V)   Verify between 0 and .10 volts wrt S/C ground on
     pin 2.

W)   Turn off IDPU B power service:
                    /IDPUBPWR OFF

X)   Verify between 0 and .10 volts wrt S/C ground on
     pins 2, 3, 4, 5, 6 and 7.

6) Perform the following measurements of the IDPU currents:

A)   Install shunt in P1 pin 17. Install ammeter in series
     with P1 pin 2 and set for 1 amp full scale.

B)   Turn on IDPU A power:
                    /IDPUAPWR ON

C)   Measure and record the current measured: _____
     (180 +/- 50 mA)

D)   Record IDPU current from TCW display: _____

E)   Turn off IDPU power:
                    /IDPUAPWR OFF
                    verify current is zero

F)   Remove ammeter from P1 pin 2. Install shunts in P1 pins
     2, 3, 18 and 19. Install ammeter in series with P1 pin 4
     and set for 1 amp full scale.

G)   Turn on IDPU B and Instrument A power:
                    /IDPUBPWR ON
                    /INSTRAPWR ON

H)   Measure and record the current measured: _____

I)   Record IDPU and instrument current from TCW display:
     IDPU _____   Instrument _____

J) Turn off IDPU B and Instrument A power:

                /IDPUBPWR OFF
          verify
                /INSTRAPWR OFF
          verify

K) Remove ammeter and install all remaining shunts in connector.

7) Make the following measurements on S/C side of connector P4:

A) Turn on MUE Port B:

                /S900KTLM

B) Stimulate HCI and Sun Sensor with MUE GSE.

C) Use oscilloscope to verify logic outputs as listed below:

        2   T/MREQ
        3   T/MCLK
        4   PIPPER
        9   EARTH/SPACE
       10   SPACE/EARTH
       11   1HZ
       12   2**22 HZ (about 4.2 MHz)

D) Use oscilloscope to verify less than .1 volts on input T/MDATA on pin 14.

E) Return to 4k telemetry: /s4ktlm

8) Make the following measurements on the S/C side of connector P8:

A) Turn on MUE Port A:

                /IDPUAPWR ON

B) Use oscilloscope to verify logic outputs listed below:

        2   Data A, MUE to IDPU
      10   Data B, MUE to IDPU

C) Send commands to set IDPU level commands low:

              /IDPURESET OPERATE
              /IDPUROMSEL BANK0
              /IDPUARTSEL LOW

D) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:

      7 Reset, MUE to IDPU cpu   (low) _____
     14 IDPUROM Select, MUE to IDPU cpu (low) _____
     15 IDPUART Select, MUE to IDPU cpu (low) _____

E) Send command to set IDPU reset high:

              /IDPURESET RESET

F) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:

      7 Reset, MUE to IDPU cpu   (high)_____
     14 IDPUROM Select, MUE to IDPU cpu (low) _____
     15 IDPUART Select, MUE to IDPU cpu (low) _____

G) Send commands to set the IDPU reset low and PROM select to bank 1:
/IDPURESET OPERATE
/IDPUROMSEL BANK1

H) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:
7   Reset, MUE to IDPU cpu   (low) _____
14 IDPUROM Select, MUE to IDPU cpu(high)_____
15 IDPUART Select, MUE to IDPU cpu(low) _____

I) Send commands to set the IDPU ROM to bank 0 and the UART select to high:
/IDPUROMSEL BANK0
/IDPUARTSEL HIGH

J) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:
7   Reset, MUE to IDPU cpu   (low) _____
14 IDPUROM Select, MUE to IDPU cpu(low) _____
15 IDPUART Select, MUE to IDPU cpu(high)_____

K) Send the command to set the IDPU UART select low:
/IDPUARTSEL LOW

L) Use the oscilloscope to verify less than .1 volts on the logic inputs listed below:
5   Data A, IDPU to MUE
12 Data B, IDPU to MUE

9) Make the following measurements on the IDPU side of connector P8:

A) Turn on IDPU and Instrument power:
/IDPUAPWR ON
/INSTRAPWR ON

B) Use the oscilloscope to verify the logic signals listed below:
5 Data A, IDPU to MUE
12 Data B, IDPU to MUE

C) Use the oscilloscope to verify less than .1 volts on the input lines listed below:
2   Data A, MUE to IDPU
7   Reset, MUE to IDPU Processor
10 Data B, MUE to IDPU
14 IDPUROM Sel, MUE to IDPU Proc
15 IDPUART Sel, MUE to IDPU Proc

10) Power down spacecraft.

11) Remove break-out boxes from connectors P1, P4, and P8 and mate connectors, installing UCB Dwg. A0131 Port B Passive Tap Assembly in series with connector P4. Mate A0131 to UCB GSE System using 50-foot DA15 extension cable. Install breakout boxes in harness side only. Record all connector mates and de-mates in log.

12) Power up spacecraft.

13) Run SHOMON2 on UCB SOC. Turn on IPDU power:
                    /IDPUAPWR ON
                    /IDPUBPWR ON
                    /INSTRAPWR ON
                    /INSTRBPWR ON
    Record total current monitor on SOC: _____ (240 +/- 50 mA)
       SHOVAL PNEBCURR _____ (240 +/- 50 mA)

14) Perform check of IDPU functions by running STOL procedure
    IDPUCHECK. (Leaves IDPU powered off when complete.)

15) Connect breakout boxes to harness side only of connectors
    P15, P16A, and P16B.

16) Turn on all instrument power services:
         /IDPUAPWR ON
         /INSTRAPWR ON
         /IWBOOMPWR ON

17) Turn on all instrument controlled +28 volt power services:
         /IPWRLEVEL 3
         /ICDI VALUE=H'xxxxxx'   (ESA HV enable code 1)
         /ICDI VALUE=H'yyyyyy'   (ESA HV enable code 2)
         /ICDI VALUE=H'F8FFFF'   (All services on)
         /ICDI VALUE=H'F9FFFF'   (All services on)

18) Record current readings below:
       TCW Monitors: UCB SOC Monitors:
          IDPUCURR   _____   MCMON1 _____
          INSTRCURR _____   MCMON2 _____
          IWBOOMCURR _____   MCMON3 _____

19) Print page of SHOMON2 on UCB SOC.

20) Use oscilloscope to verify voltage on all pins of connectors
    P5, P6, P7, P9, P10, P11, P12, P13, P14, P19, P22, P23, and
    P26 is less than .1 volts.

21) Use oscilloscope to verify voltage on all pins of 15, P16A,
    and P16B. Verify all values are less than .1 volts, except
    those listed below. For those listed, record value.
             P15-11   _____   (+21 to +32 volts)
             P15-13   _____   (+21 to +32 volts)
             P16A-11   _____   (+21 to +32 volts)
             P16A-12   _____   (+21 to +32 volts)
             P16B-11   _____   (+21 to +32 volts)
             P16B-12   _____   (+21 to +32 volts)
22) Turn off all IDPU, Instrument, and Motor power:
         /IWBOOMPWR OFF
         /INSTRAPWR OFF
         /INSTRBPWR OFF
         /IDPUAPWR OFF
         /IDPUBPWR OFF

23) Demate breakout boxes from connectors P15, P16A, and P16B. Connect breakout boxes to connectors P16C, and P16D.

24) Use oscilloscope to verify voltage on all pins of P16C, P16D, P17A, P17B, P17C, P17D, and P21. Verify all values are less than .1 volts, except those listed below. For those listed, record value.

Pin	Value	Range
P16C-11	_____	(+21 to +32 volts)
P16C-12	_____	(+21 to +32 volts)
P16D-11	_____	(+21 to +32 volts)
P16D-12	_____	(+21 to +32 volts)
P17A-1	_____	(+21 to +32 volts)
P17A-2	_____	(+21 to +32 volts)
P17B-1	_____	(+21 to +32 volts)
P17B-2	_____	(+21 to +32 volts)
P17C-1	_____	(+21 to +32 volts)
P17C-2	_____	(+21 to +32 volts)
P17D-1	_____	(+21 to +32 volts)
P17D-2	_____	(+21 to +32 volts)
P21-1	_____	(+21 to +32 volts)

25) Mate connectors P5, P6, P7, P9, P10, P11, P12, P13, and P14, and record in log.

PROCEDURE PART 2 -- Checkout of instrument interface connectors

RESISTANCE MEASUREMENTS MADE WITH S/C NOT POWERED:

Make the following measurements with a break-out box installed in
the harness side of the connectors only.

1) P15 checkout:
   A) With the black probe of the ohmmeter connected to S/C
      ground, verify greater than 10 megohm to S/C ground on
      pins 4, 6, 7, 8, 9, 12, 18, 20, 21, 22, and 24.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 25.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following
      pins and ground:

      5   _____   (> 1K)
      19   _____   (> 1K)

2) P16A checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
      7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following
      pins and ground:

      5   _____   (> 1K)
      19   _____   (> 1K)
      8   _____   (> 1K)
      21   _____   (> 1K)
      9   _____   (> 1K)

3) P16B checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
      7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following
      pins and ground:

      5   _____   (> 1K)
      19   _____   (> 1K)
      8   _____   (> 1K)
      21   _____   (> 1K)
      9   _____   (> 1K)

3) P16C checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
      7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following

pins and ground:

5	_____	(> 1K)
19	_____	(> 1K)
8	_____	(> 1K)
21	_____	(> 1K)
9	_____	(> 1K)

4) P16D checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6, 7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16, 23, and 24.
   C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	_____	(> 1K)
19	_____	(> 1K)
8	_____	(> 1K)
21	_____	(> 1K)
9	_____	(> 1K)

5) P17A checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.

   B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, 14, and A1 shield and A2 shield.

   C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	_____	(> 1K)
7	_____	(> 1K)
12	_____	(> 1K)
A1	_____	(> 1K)
A2	_____	(> 1K)

6) P17 B checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.
   B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, 14, and A1 shield and A2 shield.
   C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	_____	(> 1K)
7	_____	(> 1K)
12	_____	(> 1K)
A1	_____	(> 1K)
A2	_____	(> 1K)

7) P17C checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.

B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, 14, and A1 shield and A2 shield.

C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	_____	(> 1K)
7	_____	(> 1K)
12	_____	(> 1K)
A1	_____	(> 1K)
A2	_____	(> 1K)

8) P17D checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.
   B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, 14, and A1 shield and A2 shield.
   C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	_____	(> 1K)
7	_____	(> 1K)
12	_____	(> 1K)
A1	_____	(> 1K)
A2	_____	(> 1K)

9) P21 Checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.
   B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, 14, and A1 shield and A2 shield.
   C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	_____	(> 1K)
7	_____	(> 1K)
12	_____	(> 1K)
A1	_____	(> 1K)
A2	_____	(> 1K)

10) P22 Checkout:
    A) Verify less than 1 ohm to S/C ground on pins 3, 4, 12, 15 21, 22, 24, 25, and 26.
    B) Verify greater than 10 megohm to S/C ground on pins 5, 13, 14, and 23.

11) P23 checkout.
    A) Verify less than 1 ohm to S/C ground on pins 14, 16, 18, 19, 25, and 26.
    B) Verify greater than 10 megohm to S/C ground on pins 2, 6, 7, 8, 11, 12, 13, 20, and 24.

MEASUREMENTS MADE WITH SPACECRAFT POWERED

All voltage measurements are made with an oscilloscope and are referenced to S/C ground.

12) Power up spacecraft.

13) Run SHOMON2 on UCB SOC. Turn on IPDU, Instrument, and Motor power services:
              /IDPUAPWR ON
              /IDPUBPWR ON
              /INSTRAPWR ON
              /INSTRBPWR ON
              /IWBOOMPWR ON
              /IPWRLEVEL 3
     Verify total current drawn by IDPU is 240 +/- 50 mA.
     Record current readings below:
        TCW Monitors: UCB SOC Monitors:
          IDPUCURR _____   MCMON1 _____
          INSTRCURR _____   MCMON2 _____
          IWBOOMCURR_____   MCMON3 _____

14) P15 checkout:
     A)   Turn on TEAMS only:
                    /ICDI VALUE=H'F90000'
                    /ICDI VALUE=H'F80203'   (Services 1,2,5 on)
     B)   Use the oscilloscope to measure and record the voltage to S/C ground on the pins below:
                    11 _____ (Approx +28 Volts)
                    13 _____ (Approx +28 Volts)

15) P16A checkout:
     A)   Turn on ESA 1 HV only:
                    /ICDI VALUE=H'F80403'   (Services 1,2,15 on)
     B)   Use the oscilloscope to measure and record the voltage to S/C ground on the pins below:
                    11 _____ (Approx 0 Volts)
                    12 _____ (Approx +28 Volts)

     C)   Turn on ESA 1 LV only:
                    /ICDI VALUE=H'F80007'   (Services 1,2,19 on)
     D)   Use the oscilloscope to measure and record the voltage to S/C ground on the pins below:
                    11 _____ (Approx +28 Volts)
                    12 _____ (Approx 0 Volts)

16) P16B checkout:
     A)   Turn on ESA 2 HV only:
                    /ICDI VALUE=H'F80803'   (Services 1,2,16 on)
     B)   Use the oscilloscope to measure and record the voltage to S/C ground on the pins below:
                    11 _____ (Approx 0 Volts)
                    12 _____ (Approx +28 Volts)

C)   Turn on ESA 2 LV only:
                /ICDI VALUE=H'F8000B'   (Services 1,2,20 on)
D)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
                11 _____ (Approx +28 Volts)
                12 _____ (Approx 0 Volts)

17) P16C checkout:
A)   Turn on ESA 3 HV only:
                /ICDI VALUE=H'F81003'   (Services 1,2,17 on)
B)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
                11 _____ (Approx 0 Volts)
                12 _____ (Approx +28 Volts)

C)   Turn on ESA 3 LV only:
                /ICDI VALUE=H'F80013'   (Services 1,2,21 on)
D)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
                11 _____ (Approx +28 Volts)
                12 _____ (Approx 0 Volts)

18) P16D checkout:
A)   Turn on ESA 4 HV only:
                /ICDI VALUE=H'F82003'   (Services 1,2,18 on)
B)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
                11 _____ (Approx 0 Volts)
                12 _____ (Approx +28 Volts)

C)   Turn on ESA 4 LV only:
                /ICDI VALUE=H'F80023'   (Services 1,2,22 on)
D)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
                11 _____ (Approx +28 Volts)
                12 _____ (Approx 0 Volts)

19) P17A and P17B checkout: (Tests done on both connectors.)
A)   Turn on Rad 1 & 2 Motor Power only:
                /ICDI VALUE=H'F80003'   (Services 1,2 on)
                /ICDI VALUE=H'F90100'   (Service 25 on)
B)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
          P17A-1 _____   P17B-1 _____   (Approx 0 Volts)
          P17A-2 _____   P17B-2 _____   (Approx +28 Volts)

C)   Turn on Radial 1 & 2 LV only:
                /ICDI VALUE=H'F80043'   (Services 1,2,6 on)
                /ICDI VALUE=H'F90000'
D)   Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
          P17A-1 _____   P17B-1 _____   (Approx +28 Volts)
          P17A-2 _____   P17B-2 _____   (Approx 0 Volts)

20) P17C and P17D checkout: (Tests done on both connectors.)
    A)   Turn on Rad 3 & 4 Motor Power only:
                        /ICDI VALUE=H'F80003' (Services 1,2 on)
                        /ICDI VALUE=H'F90100' (Service 25 on)
    B)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pins below:
              P17C-1 _____   P17D-1 _____ (Approx 0 Volts)
              P17C-2 _____   P17D-2 _____ (Approx +28 Volts)

    C)   Turn on Radial 1 & 2 LV only:
                        /ICDI VALUE=H'F80043' (Services 1,2,6 on)
                        /ICDI VALUE=H'F90000'
    D)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pins below:
              P17C-1 _____   P17D-1 _____ (Approx +28 Volts)
              P17C-2 _____   P17D-2 _____ (Approx 0 Volts)

21) P21 checkout:
    A)   Turn on Axial Boom LV Power only:
                        /ICDI VALUE=H'F80103' (Services 1,2,24 on)
    B)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pin below:
                        P21-1 _____ (Approx +28 Volts)

22) P19 and P26 checkout.
    A)   Connect UCB Dwg. No. A0125 Mag Boom Test Panel to
         P19 and P26. Need 6-foot DE9 extension cable to
         make connection.
    B)   Run SHOMAGSW on UCB SOC.
    C)   Press TURNSMAG_A button on Mag Boom Test Panel.
    D)   Hold for two seconds, then release.
    E)   In DEPLOY STAT window see LENG7 value increment by
         two.
    F)   Press TURNSMAG_B button on Mag Boom Test Panel.
    G)   Hold for two seconds, then release.
    H)   In DEPLOY STAT window see LENG8 value increment by
         two.
    I)   In MON 140 window see MAGLATA value greater than
         2.000V.
    J)   Press and hold MAGLAT_A button on Mag Boom Test Panel.
    K)   In MON 140 window see MAGLATA value less than 0.300V
              within one minute.
    L)   Release MAGLAT_A button.
    M)   In MON 140 window see MAGLATB value greater than
         2.000V.
    N)   Press and hold MAGLAT_B button on Mag Boom Test
         Panel.
    O)   In MON 140 window see MAGLATB value less than 0.300V
         within one minute.
    P)   Release MAGLAT_B button.

23) P22 checkout.
   A) Install ETU Flux gate Magnetometer into connector P22
      using 26S-26S gender changer.
   B) Set up to test Flux Gate Mag by sending commands:
```
/IDPURESET RESET
/IDPURESET OPERATE
/IPWRLEVEL VALUE=3
/ISVCXMIT VC2=1,VC2X=1,VC3=1,VC4=1,VC5=1
/ISETBIT ADR=H'F9', BIT=0  (Service 7 on)
/ISETBIT ADR=H'F9', BIT=1  (Service 8 on)
/ICDI VALUE=H'A80000'
/ICDI VALUE=H'800000'
/ICDI VALUE=H'827100'
/ICDI VALUE=H'D90000'
/ICLRBIT ADR=H'D8', BIT=8 (Enable Survey 0)
/ICLRBIT ADR=H'D8', BIT=9 (Enable Survey 1)
/ICLRBIT ADR=H'D8', BIT=10 (Enable Survey 2)
/ISETBIT ADR=H'F8', BIT=14 (Service 4 on)
/ISETBIT ADR=H'F8', BIT=15 (Service 3 on)
```
   C) Run SHOFLUX on UCB SOC.
   D) Rotate ETU Magnetometer in Earth's field. Verify
      appropriate change in display.

24) P23 checkout.
   A) Measure and record voltages as listed below:
      9 _____ (Should be +5 Volts)
      15 _____ (Should be +15 Volts)
      17 _____ (Should be -15 Volts)

25) Turn off all IDPU, Instrument, and Motor power:
```
/IWBOOMPWR OFF
/INSTRAPWR OFF
/INSTRBPWR OFF
/IDPUAPWR OFF
/IDPUBPWR OFF
```

26) Power down spacecraft.
   Remove ETU Flux Gate Magnetometer.

SMEX

FAST MISSION

IDPU to FAST Spacecraft Integration Procedure

STARTED : 1-28-94

Completed : 1-30-94

By: HENRY HEETDERKS
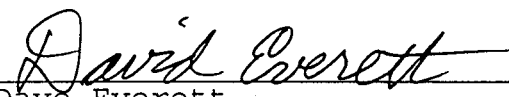TERESA LAFOURCADE

Revision E
31 January 1994

APPROVED BY: NAME   DATE
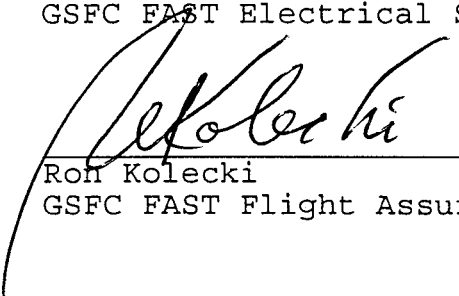
Peter R. Harvey   28 Jan 94
Peter Harvey
UCB FAST Software Manager

H-D. Heetderks   27 JAN 94
Henry Heetderks
UCB FAST Project Manager

David Everett   1/27/94
Dave Everett
GSFC FAST Electrical System Engineer

Kolecki   1/28/94
Ron Kolecki
GSFC FAST Flight Assurance Manager

IDPU TO FAST SPACECRAFT ELECTRICAL INTEGRATION PROCEDURE

TEST EQUIPMENT LIST

ITEM	MAKE/MODEL	I/D NO.	CAL DUE DATE
MULTI-METER	BECKMAN RHS 3030	460431	2 MAR 94
OSCILLOSCOPE	IWATSU SS6122	189077	2 MAR 94
MAG SWITCH TESTER	UCB dwg No. A0125	—	—
UCB ETU FLUXGATE MAGNETOMETER	N/A	N/A	N/A

SUMMARY

This procedure is intended to be used for the initial electrical
tests of the FAST IDPU following installation into the FAST
spacecraft. It verifies that all required instrument connections
are made in the spacecraft wiring harness, checks for most
inadvertant cross connections involving power and ground lines,
checks most inadvertant connections on data and signal lines,
verifies proper operation of the IDPU-MUE interface, and verifies
the basic operation of the payload data system portion of the IDPU
electronics.

GENERAL NOTES

1) All voltage and resistance measurements are made with respect
    to spacecraft ground unless otherwise specified.

2) Measurements of resistance are made with an approved Digital
    Multimeter.

PROCEDURE PART 1 -- Check out and mating of connectors to IDPU

1) Notify Q.A. of intent to do test.
    Verify that connector mate/de-mate log is in place.

2) Mate P1, P4, and P8 connectors with break-out boxes. Record
    in log. All shunts out. Verify that pyro shorting plug is
    installed. Install breakout boxes in harness side only of
    connectors P3, P5, P6, P7, P9, P10, P11, P12, P13, P14, P19,
    P22, P23, and P26.

3) Resistance measurements made with spacecraft not powered:
    A) Connector P1:
        1) On the S/C side of the connector, verify less than 1
            ohm to S/C ground on pins 17, 18, 19, 20, 21, 22, and
            26.
        2) On the IDPU side of the connector, make the following
            resistance measurements:
            a) Using a DMM with the red probe connected to pin 2,
               measure and record resistance between pins 2 and
               17:
               _____ .443 _____ (Greater than 20 ohms)

            b) Using a DMM with the red probe connected to pin
                3, measure and record resistance between pins 3
                and 18:
                _____ .5 _____ (Greater than 20 ohms)

            c) Using a DMM with the red probe connected to pin
                4, measure and record the resistance between
                pins 4 and 18:
                _____ .5 _____ (Greater than 20 ohms)

d) Using a DMM with the red probe connected to pin 5, measure and record resistance between pins 5 and 20:

~~MM~~ .5 M   (Greater than 20 ohms)

e) Using a DMM with the red probe connected to pin 6, measure and record resistance between pins 6 and 21:

~~MM~~ OL   (Greater than 20 ohms)

f) Using a DMM with the red probe connected to pin 7, measure and record resistance between pins 7 and 22:

~~MM~~ OL   (Greater than 20 ohms)

g) Measure and record the resistance between pins 25, and pin 26.

~~MM~~ 12.56 K   (Approx 10K ohms)

B) On connector P4:
  1) On the S/C side of the connector:
     a) Verify less than 1 ohm to S/C ground on pins 1, 13, and 15. *~~OPEN~~ P310 on MVE WAS NOT MATED.*
     b) With the black probe of the ohmmeter connected to S/C ground, on the S/C side of the connector, verify greater than 10 megohm to S/C ground on pins 5, 6, 7, and 8. *AFTER MATING P310 MEASUREMENT WAS VERIFIED.*
  2) On the IDPU side of the connector:
     a) Verify less than 1 ohm to S/C ground on pins 6, 7, and 15. *– HDH*
     b) With the black probe connected to S/C ground, verify greater than 10 Meg ohms resistance to S/C ground on pins 1, 13, and 5. *OK PINS 1 AND 13 GROUNDED TO S/C*
     c) With the black probe of a DMM connected to pin 15, *– HDH* measure and record the resistance to each of the *CONT COG* following pins: *DISCREP*

3	T/MCLK	~1 M	HDH	(>1K)
4	PIPPER	~1 M	HDH	(>1K)
9	EARTH/SPACE	~1 M	HDH	(>1K)
10	SPACE/EARTH	~1 M	HDH	(>1K)
11	1HZ	~1 M	HDH	(>1K)
12	S/CCLK	~1 M	HDH	(>1K)
14	T/MDAT	~>20M	HDH	(>1K)

C) On connector P8:
  1) On the S/C side of the connector:
     a) Verify less than 1 ohm to S/C ground on pins 9, 11, and 13. *– HDH*
     b) With the black probe of the ohmmeter connected to S/C ground, verify greater than 10 megohm to S/C ground on pins 1, 3, 4, 6, and 8. *OK PINS 4 AND 6 ARE GROUNDED TO S/C*
  2) On the IDPU side of the connector: *– HDH*
     a) Verify less than 1 ohm to S/C ground on pins 4, 6, and 13. *– HDH CERT LOG DISCREP*

b) With the black probe of the ohmmeter
   connected to S/C ground, verify greater than 10
   megohm to S/C ground on pins (1, (3, (8, (9, and (11) -HDH
   OK OK OK OK OK 28 JAN 94

D) Make the following measurements on the S/C side of the
   indicated connectors:
   1) With the black probe connected to S/C ground, verify
      greater than 10 Megohms to S/C ground on all pins of
      connectors P3, (P5) (P6) (P7) (P9) (P10) (P11) (P12) (P13) P14) -HDH
      OK OK OK OK OK OK OK 28 JAN 94
      P19) (P22) (P23) and (P26)
      OK OK OK OK

   2) On connectors P5, P6, P7, P9, and P10, verify less
      than 1 ohm resistance between the following pins:
      P5-22 to P9-1
      P6-22 to P9-2 to P9-3 to P10-11 to P10-12 (to) P7-22) OPEN OK
      P9-4 to P9-5 to P10-24 to P10-25

P7-2
3
13
14
17
18
20
24
25
26
very eratic on all scales
operator error? ohmmeter
lead touching s/c
HDH 1/28/94

P13-25
P14-23
P23-25
P22-22
shows .2Ω to s/c gnd
" " " " "
OK, this is over shield
-HDH
HDH 1/28/94

      P5-1 to P5-9
      P5-23 to P5-24
      P6-1 to P6-9
      P6-23 to P6-24
      P7-1 to P7-9
      P7-23 to P7-24
      P6-12 to P6-13
      P7-12 to P7-13

3A) Remove break out box from P3 and mate P3 to J3 on the IDPU.
    Record in mate/de-mate log.

4) Power up spacecraft and transition to normal mode.

5) Make the following voltage measurements on the S/C side of
   connector P1:
   ✓A) Verify all space craft controlled instrument power
       services are off.
-HDH OK ✓B) Verify voltage wrt S/C ground of all pins is
       between 0 and .10 volts, except pin 25 is between 0
       and 5 volts. 2.5v
   ✓C) Turn on spacecraft IDPU Power Service A:
                /IDPUAPWR ON
   ✓D) Verify voltage between +24 and +32 volts wrt S/C
       ground on pin 2, record. 31.5v
   ✓E) Verify between 0 and .10 volts wrt S/C ground on
       pins 3, 4, 5, 6, and 7.
   ✓F) Turn on spacecraft IDPU Power Service B:
                /IDPUBPWR ON
   ✓G) Verify voltage between +24 and +32 volts on pin 3. 31.5 v
   ✓H) Verify between 0 and .10 volts wrt S/C ground on
       pins 4, 5, 6, and 7.
   ✓I) Turn on spacecraft Instrument Power Service A:
                /INSTRAPWR ON
   ✓J) Verify voltage between +24 and +32 volts on pin 4. 31.5 v
   ✓K) Verify between 0 and .10 volts wrt S/C ground on
       pins 5, 6, and 7.
   ✓L) Turn on spacecraft Instrument Power Service B:
                /INSTRBPWR ON

M) Verify voltage between +24 and +32 volts on pin 5. 31.5 ✓

N) Verify between 0 and .10 volts wrt S/C ground on pins 6 and 7.

O) Turn on spacecraft Motor Power Service:

      /IWBOOMPWR ON

P) Verify voltage between +24 and +32 volts on pins 6 and 7. 31.5

Q) Turn off Instrument A and Motor spacecraft power services:

      /IWBOOMPWR OFF

      /INSTRAPWR OFF

R) Verify between 0 and .10 volts wrt S/C ground on pins 6, 7, and 4.

S) Turn off Instrument B power service:

      /INSTRBPWR OFF

T) Verify between 0 and .10 volts wrt S/C ground on pin 5.

U) Turn off IDPU A power service:

      /IDPUAPWR OFF

V) Verify between 0 and .10 volts wrt S/C ground on pin 2.

W) Turn off IDPU B power service:

      /IDPUBPWR OFF

X) Verify between 0 and .10 volts wrt S/C ground on pins 2, 3, 4, 5, 6 and 7.

6) Perform the following measurements of the IDPU currents:

A) Install shunt in P1 pin 17. Install ammeter in series with P1 pin 2 and set for 1 amp full scale.

B) Turn on IDPU A power:

      /IDPUAPWR ON

C) Measure and record the current measured: _138 mA_

   (180 +/- 50 mA)

D) Record IDPU current from TCW display: _136 mA_

E) Turn off IDPU power:

      /IDPUAPWR OFF

      verify current is zero

F) Remove ammeter from P1 pin 2. Install shunts in P1 pins 2, 3, 18 and 19. Install ammeter in series with P1 pin 4 and set for 1 amp full scale.

G) Turn on IDPU B and Instrument A power:

      /IDPUBPWR ON

      /INSTRAPWR ON

H) Measure and record the current measured: _61 mA_

I) Record IDPU and instrument current from TCW display:

   IDPU _124 mA_   Instrument _59 mA_

J) Turn off IDPU B and Instrument A power:

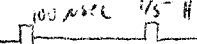　　　　　　　/IDPUBPWR OFF
　　　　　　verify
　　　　　　　/INSTRAPWR OFF
　　　　　　verify

K) Remove ammeter and install all remaining shunts in connector.

7) Make the following measurements on S/C side of connector P4:

A) Turn on MUE Port B: ← *Turn on IDPU:*
　　　　　/S900KTLM　　　　*/IDPUA PWR ON*

- GROUND SCOPE TO PIN 15 OF P4 -HOH JL-1/28/94

B) Stimulate HCI and Sun Sensor with MUE GSE.

C) Use oscilloscope to verify logic outputs as listed below:

　　　2　T/MREQ　} *always low; signal not running w/o Port A communication up*
　　　3　T/MCLK　} *100 µsec 1/5 Hz*
　　　4　PIPPER
　　　9　EARTH/SPACE } *.1 msec at 1/5 Hz*
　　10　SPACE/EARTH }
　　11　1HZ　*~ 50µ sec pulse at 1 Hz*
　　12　2**22 HZ (about 4.2 MHz)

D) Use oscilloscope to verify less than .1 volts on input T/MDATA on pin 14. *OK - picking up clock*

E) Return to 4k telemetry:　/s4ktlm

8) Make the following measurements on the S/C side of connector P8:

A) Turn on MUE Port A:
　　　　　/IDPUAPWR ON

(GROUND) SCOPE to P8-13

B) Use oscilloscope to verify logic outputs listed below:

　　　2　Data A, MUE to IDPU } *see ~ 2 msec packets occurring*
　　10　Data B, MUE to IDPU } *every 50→300 msec*

C) Send commands to set IDPU level commands low:
　　　　　/IDPURESET OPERATE
　　　　　/IDPUROMSEL BANK0
　　　　　/IDPUARTSEL LOW

D) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:
　　　7　Reset, MUE to IDPU cpu　　　　　　(low)　*Low*
　　14　IDPUROM Select, MUE to IDPU cpu　(low)　*Low*
　　15　IDPUART Select, MUE to IDPU cpu　(low)　*Low*

E) Send command to set IDPU reset high:
　　　　　/IDPURESET RESET

F) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:
　　　7　Reset, MUE to IDPU cpu　　　　　　(high)　*high*
　　14　IDPUROM Select, MUE to IDPU cpu　(low)　*low*
　　15　IDPUART Select, MUE to IDPU cpu　(low)　*low*

G) Send commands to set the IDPU reset low and PROM select to bank 1:
> /IDPURESET OPERATE
> /IDPUROMSEL BANK1

H) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:
> 7   Reset, MUE to IDPU cpu   (low) _low_
> 14   IDPUROM Select, MUE to IDPU cpu(high) _high_
> 15   IDPUART Select, MUE to IDPU cpu(low) _low_

I) Send commands to set the IDPU ROM to bank 0 and the UART select to high:
> /IDPUROMSEL BANK0
> /IDPUARTSEL HIGH

J) Use oscilloscope to verify the following. Record the value as read from the scope screen in the space provided:
> 7   Reset, MUE to IDPU cpu   (low) _low_
> 14   IDPUROM Select, MUE to IDPU cpu(low) _low_
> 15   IDPUART Select, MUE to IDPU cpu(high) _high_

K) Send the command to set the IDPU UART select low:
> /IDPUARTSEL LOW

L) Use the oscilloscope to verify less than .1 volts on the logic inputs listed below:
> 5   Data A, IDPU to MUE open
> 12   Data B, IDPU to MUE open

9) Make the following measurements on the IDPU side of connector P8:

~~A)   Turn on IDPU and Instrument power:~~   ·
> ~~/IDPUAPWR ON~~   Already on
> ~~/INSTRAPWR ON~~

OK

B) Use the oscilloscope to verify the logic signals listed below:
> 5   Data A, IDPU to MUE   Always low   looks like low impedance
> 12   Data B, IDPU to MUE   Always low   (i.e. not open)

OK   C) Use the oscilloscope to verify less than .1 volts on the input lines listed below:
> 2   Data A, MUE to IDPU
> 7   Reset, MUE to IDPU Processor   look like inputs
> 10   Data B, MUE to IDPU
> 14   IDPUROM Sel, MUE to IDPU Proc
> 15   IDPUART Sel, MUE to IDPU Proc

10) Power down spacecraft.

11) Remove break-out boxes from connectors P1, P4, and P8 and mate connectors, installing UCB Dwg. A0131 Port B Passive Tap Assembly in series with connector P4. Mate A0131 to UCB GSE System using 50-foot DA15 extension cable. Install breakout boxes in harness side only. Record all connector mates and de-mates in log.

12) Power up spacecraft.

✓13) Run SHOMON2 on UCB SOC. Turn on IPDU power:
                        /IDPUAPWR ON
                        /IDPUBPWR ON
                        /INSTRAPWR ON
                        /INSTRBPWR ON
        Record total current monitor on SOC: _____ (240 +/- 50 mA)
          SHOVAL PNEBCURR _____ (240 +/- 50 mA)

completed ✓14) Perform check of IDPU functions by running STOL procedure
28 Jan 94   IDPUCHECK. (Leaves IDPU powered off when complete.)

1-29-94 15) Connect breakout boxes to harness side only of connectors
              P15, P16A, and P16B.

        16) Turn on all instrument power services:
                        /IDPUAPWR ON
                        /INSTRAPWR ON
                        /IWBOOMPWR ON

        17) Turn on all instrument controlled +28 volt power services:
                        /IPWRLEVEL 3
                        /ICDI VALUE=H'xxxxxx'   (ESA HV enable code 1) B23CA6
                        /ICDI VALUE=H'yyyyyy'   (ESA HV enable code 2) B5F965
                        /ICDI VALUE=H'F8FFFF'   (All services on)
                        /ICDI VALUE=H'F9FFFF'   (All services on)

        18) Record current readings below:
              TCW Monitors: UCB SOC Monitors:
                IDPUCURR   263 mA   MCMON1   252 mA
                INSTRCURR 372 mA   MCMON2   314 mA
                IWBOOMCURR 0 a   MCMON3   8 mA

        X19) Print page of SHOMON2 on UCB SOC.   UCB PRINTER NOT YET INSTALLED
                                                  BUT DATA IS RECORDED 28 JAN 94
                                                                      -HOH

use s/c ✓20) Use oscilloscope to verify voltage on all pins of connectors HOH
chassis for /NOTE 1   P5, P6, P7, P9, P10, P11, P12, P13, P14, P19, P22, P23, and
scope GND   P26 is less than .1 volts.
-HOH   OK

        ✓21) Use oscilloscope to verify voltage on all pins of 15, P16A,
              and P16B. Verify all values are less than .1 volts, except
              those listed below. For those listed, record value.
                        P15-11   +32   (+21 to +32 volts)
                        P15-13   +32   (+21 to +32 volts)   See
                        P16A-11   +32   (+21 to +32 volts)   Attached
                        P16A-12   +32   (+21 to +32 volts)   Data
                        P16B-11   +32   (+21 to +32 volts)   Sheets
                        P16B-12   +32   (+21 to +32 volts)

        ✓22) Turn off all IDPU, Instrument, and Motor power:
                        /IWBOOMPWR OFF
Turn off partial power do   /INSTRAPWR OFF
do current mon calib.   /INSTRBPWR OFF
                        /IDPUAPWR OFF
ICDI =H'F9FFF0'   /IDPUBPWR OFF

NOTE 1 - All these pins were clearly open as evidenced by 60 Hz pick up on scope while they were
being checked - HOH 28 JAN 94   Page 9 of 10

23) Demate breakout boxes from connectors P15, P16A, and P16B. Connect breakout boxes to connectors P16C, and P16D.

24) Use oscilloscope to verify voltage on all pins of P16C, P16D, P17A, P17B, P17C, P17D, and P21. Verify all values are less than .1 volts, except those listed below. For those listed, record value.

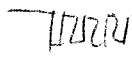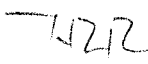*Do steps 16), 17) to turn instrument back on JL*

P16C-11 _____ (+21 to +32 volts)
P16C-12 _____ (+21 to +32 volts)
P16D-11 _____ (+21 to +32 volts)
P16D-12 _____ (+21 to +32 volts)
P17A-1 _____ (+21 to +32 volts)
P17A-2 _____ (+21 to +32 volts)
P17B-1 _____ (+21 to +32 volts)
P17B-2 _____ (+21 to +32 volts)
P17C-1 _____ (+21 to +32 volts)
P17C-2 _____ (+21 to +32 volts)
P17D-1 _____ (+21 to +32 volts)
P17D-2 _____ (+21 to +32 volts)
P21-1 _____ (+21 to +32 volts)
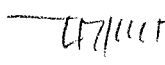
See attached Data sheets

DONE OUT OF ORDER AFTER STEP 20
25) Mate connectors P5, P6, P7, P9, P10, P11, P12, P13, and P14, and record in log.
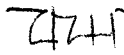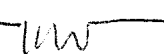
P15-1   O
    2   +5v
    3   Nor. high logic level with clock ⊓⊔⊓⊔
    4   OPEN with Neg clock cross Tack
    5   "
    6   O
    7   O
    8   O
    9   O
    10   O
    11   +32v
    12   OPEN - low junk
    13   +32v
    14   Logic high with data out?   ⊔⊓⊓⊓   IP
    15   ∓5 v
    16   ~O
    17   OPEN O
    18   " O
    19   O
    20   OPEN O
    21   O
    22   OPEN
    23   OPEN O
    24   "
    25   "

P16 A- 1   0
        2   +5v
        3   ~~clock~~ clock LLI/IIII   IIII
        4   0
        5   OPEN   0
        6   "   ι
        7   "   "
        8   "   "
        9   0
        10   OPEN   "
        11   +32v
        12   +32v
        13   OPEN   0
        14   Data out   LLLW
        15   1 MHz clock
        16   OPEN   0
        17   "   "
        18   0
        19   OPEN   0
        20   "
        21   "
        22   "
        23   "
        24   "
        25   "

P16B-1   O

2   strobe

3   HiH

4   OPEN   LOW

5   "   "

6   "   "

7   "   "

8   "

9   "

10   "

11   +32V

12   +32 V

13   OPEN   w/ junk Low

14   Data

15   1 MHz clock

16   O

17   O

18   O

19   OPEN

20   OPEN

21   "

22   "

23   "

24   O

25   OPEN
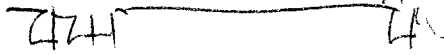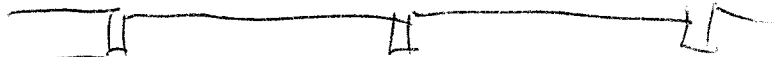
P16 C-1   O
     2   strobe
     3   clock
     4   open
     5   "
     6   "
     7   "
     8   "
     9   "
    10   "
    11   +32v
    12   +32V
    13   open
    14   Data
    15   1 MHz
    16   open
    17   O
    18   O
    19   OPEN
    20   "
    21   O
    22   Open
    23   O
    24   Open
    25   "

AOD - 1   open
       2   strobe
       3   clock
       4   open
       5   "
       6   "
       7   "
       8   O
       9   O
      10   open
      11   +32v
      12   +32v
      13   open
      14   Data
      15   1 MH4
      16   open
      17   "
      18   "
      19   "
      20   "
      21   O
      22   open
      23   "
      24   "
      25   "

17A — A1   O
A2   O
1   +52
2   +52
3   O
4   Stdore
5   10996 high
6   O
7   OPEN
8   8 "
9   O
10   OPEN
11   O
12   logic high
13   open
14   O
15   OPEN

P17B — A1   0
A2   0
1   +32
2   +32
3   0
4   store
5   logic high
6   open
7   "
8   "
9   0
10   0
11   open
12   logic high
13   open
14   "
15   0

P17 C - A1   0

A4   open

1   +32

2   +32

3   0

4   Stone

5   logic high

6   0

7   open

8   "

9   0

10   0

11   0

12   logic high

13   0

14   open

15   "

17D- A1   0
A2   0
1   +32v
2   +32v
3   open?
4   Strobe
5   logic high
6   0
7   open
8   "
9   0
10   0
11   0
12   logic high
13   0
14   open
15   open

7   1

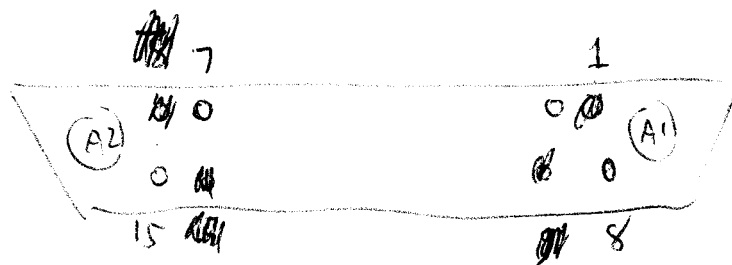A2   A1

15   8

93634

P21 — A1   O
A2   OPEN
1   +32
2   OPEN
3   O
4   Strobe
5   logic high
6   O
7   O
8   OPEN
9   O
10   OPEN
11   O
12   logic high
13   O
14   O
15   O

PROCEDURE PART 2 -- Checkout of instrument interface connectors

RESISTANCE MEASUREMENTS MADE WITH S/C NOT POWERED:

Make the following measurements with a break-out box installed in
the harness side of the connectors only.

1) P15 checkout:
   A) With the black probe of the ohmmeter connected to S/C
      ground, verify greater than 10 megohm to S/C ground on
      pins 4, 6, 7, 8, 9, 12, 18, 20, 21, 22, and 24.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 25.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following
      pins and ground:

5	OL	(> 1K)
19	101 K	(> 1K)

2) P16A checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
      7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following
      pins and ground:

5	OL	(> 1K)
19	~100K	(> 1K)
8	100 K	(> 1K)
21	100K	(> 1K)
9	100K	(> 1K)

C
3) P16B checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
      7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following
      pins and ground:

5	OL	(> 1K)
19	~100K	(> 1K)
8	100K	(> 1K)
21	100K	(> 1K)
9	100	(> 1K)

B
3) P16C checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
      7, 13, 18, 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
      23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
      measure and record the resistance between the following

```
                     pins and ground:
                              5        OL         (> 1K )
                             19     ~ 100K        (> 1K )
                              8      100K         (> 1K )
                             21      100K         (> 1K )
                              9      100K         (> 1K )
```

4) P16D checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 4, 6,
       7, 13, (18) 20, 22, and 25.
   B) Verify less than 1 ohm to S/C ground on pins 1, 10, 16,
       23, and 24.
   C) With the black ohmmeter probe connected to S/C ground,
       measure and record the resistance between the following
       pins and ground:

```
                              5        OL         (> 1K )
                             19     ~ 104 K       (> 1K )
                              8      100K         (> 1K )
                             21      100K         (> 1K )
                              9      100K         (> 1K )
```

5) P17A checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and
       15.

   B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10,
       11, and 13, (14) and A1 shield and A2 shield.
            (OPEN)

   C) With the black ohmmeter probe connected to S/C ground,
       measure and record the resistance between the following
       pins and ground:

```
                              5      18 MΩ        (> 1K )
                              7       OL          (> 1K )
                             12      18 MΩ        (> 1K )
                             A1      100K         (> 1K )
                             A2      100K         (> 1K )
```

6) P17 B checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and
       15.
   B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10,
       11, and 13, (14) and A1 shield and A2 shield.
                  (OPEN)
   C) With the black ohmmeter probe connected to S/C ground,
       measure and record the resistance between the following
       pins and ground:

```
                              5       OL          (> 1K )
                              7       OL          (> 1K )
                             12      18 M         (> 1K )
                             A1      100K         (> 1K )
                             A2      100K         (> 1K )
```

7) P17C checkout:
   A) Verify greater than 10 megohm to S/C ground on pins 8 and
       15.

B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, (14, *OPEN*) and A1 shield and A2 shield.

C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	18M	(> 1K)
7	OL	(> 1K)
12	18M	(> 1K)
A1	100K	(> 1K)
A2	100K	(> 1K)

8) P17D checkout:
A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.
B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, 10, 11, and 13, (14, *OPEN*) and A1 shield and A2 shield.
C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	~18M	(> 1K)
7	OL	(> 1K)
12	~18M	(> 1K)
A1	100K	(> 1K)
A2	100K	(> 1K)

9) P21 Checkout:
A) Verify greater than 10 megohm to S/C ground on pins 8 and 15.
B) Verify less than 1 ohm to S/C ground on pins 3, 6, 9, (10, *OPEN*) 11, and 13, (14, *OPEN*) and A1 shield and A2 shield.
C) With the black ohmmeter probe connected to S/C ground, measure and record the resistance between the following pins and ground:

5	~18M	(> 1K)
7	OL	(> 1K)
12	~18M	(> 1K)
A1	100K	(> 1K)
A2	100K	(> 1K)

10) P22 Checkout:
A) Verify less than 1 ohm to S/C ground on pins 3, 4, 12, 15 21, 22, 24, 25, and 26.
B) Verify greater than 10 megohm to S/C ground on pins 5, 13, 14, and 23.

10) P23 checkout.
A) Verify less than 1 ohm to S/C ground on pins 14, 16, 18, 19, 25, and 26.
B) Verify greater than 10 megohm to S/C ground on pins 2, 6, 7, 8, 11, 12, 13, 20, and 24.

P13
~1 OL
~3 OL
~4 OL
~5 tuns 3Ω
~9 54K
~10 OL
~15 ~5M
~16
~17 ~100K
~21 OL
~22 OL
~ .3Ω

P22
1 OL
2 2mΩ
5
6 ~8vK
7 ~45K
8 ~45K
9 ~45K
10 576Ω
11 OL
16 ~45K
17 ~45K
18 ~45K
19 OL
20 2ooΩ

MEASUREMENTS MADE WITH SPACECRAFT POWERED

All voltage measurements are made with an oscilloscope and are referenced to S/C ground.

✓12)   Power up spacecraft.

✓13)   Run SHOMON2 on UCB SOC. Turn on IPDU, Instrument, and Motor
       power services:
               /IDPUAPWR ON
               /IDPUBPWR ON
               /INSTRAPWR ON
               /INSTRBPWR ON
               /IWBOOMPWR ON
               /IPWRLEVEL 3
       Verify total current drawn by IDPU is 240 +/- 50 mA.
       Record current readings below:
           TCW Monitors: UCB SOC Monitors:
               IDPUCURR   164 wA   MCMON1   141
               INSTRCURR   59 wA   MCMON2   0
               IWBOOMCURR   0   MCMON3   0

14) P15 checkout:
   ✓A)   Turn on TEAMS only:
                   /ICDI VALUE=H'F90000'
                   /ICDI VALUE=H'F80203'   (Services 1,2,5 on)
   ✓B)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pins below:
                       11   +32   (Approx +28 Volts)
                       13   +32   (Approx +28 Volts)

15) P16A checkout: send HV enable commands
   ✓A)   Turn on ESA 1 HV only: /ICDI VALUE = H'B2 3C A6'
                                             /ICDI VALUE = H'B3 F9 65'
                   /ICDI VALUE=H'F80403'   (Services 1,2,15 on)
   ✓B)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pins below:
                       11   + 4v   (Approx 0 Volts)
                       12   + 28v   (Approx +28 Volts)

   ✓C)   Turn on ESA 1 LV only:
                   /ICDI VALUE=H'F80007'   (Services 1,2,19 on)
   ✓D)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pins below:
                       11   +28v   (Approx +28 Volts)
                       12   +4 v   (Approx 0 Volts)

16) P16B checkout:
   ✓A)   Turn on ESA 2 HV only:
                   /ICDI VALUE=H'F80803'   (Services 1,2,16 on)
   ✓B)   Use the oscilloscope to measure and record the voltage to
         S/C ground on the pins below:
                       11   +4v   (Approx 0 Volts)
                       12   +28v   (Approx +28 Volts)

C) Turn on ESA 2 LV only:
            /ICDI VALUE=H'F8000B'   (Services 1,2,20 on)
D) Use the oscilloscope to measure and record the voltage to
   S/C ground on the pins below:
                11   +*28,   (Approx +28 Volts) 27.955 ou
                12   + 4v   (Approx 0 Volts)

17) P16C checkout:
   A) Turn on ESA 3 HV only:
            /ICDI VALUE=H'F81003'   (Services 1,2,17 on)
   B) Use the oscilloscope to measure and record the voltage to
      S/C ground on the pins below:
                11   + 4v   (Approx 0 Volts)
                12   +*28   (Approx +28 Volts)

   C) Turn on ESA 3 LV only:
            /ICDI VALUE=H'F80013'   (Services 1,2,21 on)
   D) Use the oscilloscope to measure and record the voltage to
      S/C ground on the pins below:
                11   +*28,   (Approx +28 Volts) 27.955v
                12   +4v   (Approx 0 Volts)

18) P16D checkout:
   A) Turn on ESA 4 HV only:
            /ICDI VALUE=H'F82003'   (Services 1,2,18 on)
   B) Use the oscilloscope to measure and record the voltage to
      S/C ground on the pins below:
                11   + 4v   (Approx 0 Volts)
                12   +28v   (Approx +28 Volts)

   C) Turn on ESA 4 LV only:
            /ICDI VALUE=H'F80023'   (Services 1,2,22 on)
   D) Use the oscilloscope to measure and record the voltage to
      S/C ground on the pins below:
                11   +*28v   (Approx +28 Volts) 27.955
                12   + 4   (Approx 0 Volts)

19) P17A and P17B checkout: (Tests done on both connectors.)
   A) Turn on Rad 1 & 2 Motor Power only:
            /ICDI VALUE=H'F80003'   (Services 1,2 on)
            /ICDI VALUE=H'F90100'   (Service 25 on)
   B) Use the oscilloscope to measure and record the voltage to
      S/C ground on the pins below:
      P17A-1 +4 v   P17B-1 +4v   (Approx 0 Volts)
      P17A-2 +32v   P17B-2 +32v   (Approx +28 Volts) 31.197

   C) Turn on Radial 1 & 2 LV only:
            /ICDI VALUE=H'F80043'   (Services 1,2,6 on)
            /ICDI VALUE=H'F90000'
   D) Use the oscilloscope to measure and record the voltage to
      S/C ground on the pins below:
      P17A-1 +28 v   P17B-1 +28v   (Approx +28 Volts) 27.884
      P17A-2 + 4   P17B-2 +4 v   (Approx 0 Volts)

20) P17C and P17D checkout: (Tests done on both connectors.)
  A) Turn on Rad 3 & 4 Motor Power only:
                    /ICDI VALUE=H'F80003' (Services 1,2 on)
                    /ICDI VALUE=H'F90700' (Service 25 on)
  B) Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
         P17C-1 +4 v   P17D-1 +4 v   (Approx 0 Volts)
         P17C-2 +32v   P17D-2 +52v   (Approx +28 Volts) 31.197
  C) Turn on Radial 3 & 4 LV only: 8
                    /ICDI VALUE=H'F80043' (Services 1,2,8 on)
                    /ICDI VALUE=H'F90000'   23
  D) Use the oscilloscope to measure and record the voltage to
     S/C ground on the pins below:
         P17C-1 +28v   P17D-1 +28v   (Approx +28 Volts) 27.884
         P17C-2 +4v   P17D-2 +4v   (Approx 0 Volts)

21) P21 checkout:
  A) Turn on Axial Boom LV Power only:
                    /ICDI VALUE=H'F80103' (Services 1,2,24 on) 27.884
  B) Use the oscilloscope to measure and record the voltage to
     S/C ground on the pin below:
                    P21-1 +28   (Approx +28 Volts)

22) P19 and P26 checkout.
  A) Connect UCB Dwg. No. A0125 Mag Boom Test Panel to
     P19 and P26. Need 6-foot DE9 extension cable to
     make connection.   IDEPPAIR   MAG
  B) Run SHOMAGSW on UCB SOC.
  C) Press TURNSMAG_A button on Mag Boom Test Panel.
  D) Hold for two seconds, then release.
  E) In DEPLOY STAT window see LENG7 value increment by
     two.
  F) Press TURNSMAG_B button on Mag Boom Test Panel.
  G) Hold for two seconds, then release.
  H) In DEPLOY STAT window see LENG8 value increment by
     two.
  I) In MON 140 window see MAGLATA value greater than 3.7v
     2.000V.
  J) Press and hold MAGLAT_A button on Mag Boom Test Panel.
  K) In MON 140 window see MAGLATA value less than 0.300V 0.0 v
          within one minute.
  L) Release MAGLAT_A button.
  M) In MON 140 window see MAGLATB value greater than 4.2 v
     2.000V.
  N) Press and hold MAGLAT_B button on Mag Boom Test
     Panel.
  O) In MON 140 window see MAGLATB value less than 0.300V 0.00
     within one minute.
  P) Release MAGLAT_B button.

23) P22 checkout.
    A) Install ETU Flux gate Magnetometer into connector P22
       using 26S-26S gender changer.
    B) Set up to test Flux Gate Mag by sending commands:
                /IDPURESET RESET   /S 900KTLM
                /IDPURESET OPERATE
                /IPWRLEVEL VALUE=3
                /ISVCXMIT VC2=1,VC2X=1,VC3=1,VC4=1,VC5=1
                /ISETBIT ADR=H'F9', BIT=0 (Service 7 on)
                /ISETBIT ADR=H'F9', BIT=1 (Service 8 on)
                /ICDI VALUE=H'A80000'
                /ICDI VALUE=H'800000'
                /ICDI VALUE=H'827100'
                /ICDI VALUE=H'D90000'
                /ICLRBIT ADR=H'D8', BIT=8 (Enable Survey 0)
                /ICLRBIT ADR=H'D8', BIT=9 (Enable Survey 1)
                /ICLRBIT ADR=H'D8', BIT=10 (Enable Survey 2)
                /ISETBIT ADR=H'F8', BIT=14 (Service 4 on)
                /ISETBIT ADR=H'F8', BIT=15 (Service 3 on)
    C) Run SHOFLUX on UCB SOC.
    D) Rotate ETU Magnetometer in Earth's field. Verify
       appropriate change in display.

24) P23 checkout.
    A) Measure and record voltages as listed below:
          9   +5   (Should be +5 Volts)
        15   +11v   (Should be +15 Volts)
        17   -10v   (Should be -15 Volts)

25) Turn off all IDPU, Instrument, and Motor power:
    /IWBOOMPWR OFF
    /INSTRAPWR OFF
    /INSTRBPWR OFF
    /IDPUAPWR OFF
    /IDPUBPWR OFF

26) Power down spacecraft.
    Remove ETU Flux Gate Magnetometer.