TIMED
Test Conductor
Users Guide

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Table of Contents

1.0 Overview

This document is intended to assist the TIMED Test Conductor (TC) in operating the ground support equipment (GSE) and the TIMED spacecraft (S/C).

2.0 EPOCH Startup

Alf:

Alf is the main computer used for commanding GSE and the TIMED S/C. It is located in the Mission Operations Center (MOC).
Login: cmder
Password: jtkirk98

To start the EPOCH software which is used to operate the GSE and TIMED S/C, click on the Big Mac icon at the bottom of the window or click on the computer terminal icon and type 'tws'. After a few seconds, a window labeled EUI manager will appear. An sc1_rt Stream will be started automatically. The following event messages will be seen in the event portion of the EUI manager window:

```
alf 2000-332-13:26:48.391 proc1  START /homes/epoch/timed/database/procedures/timed/eui_tc_startup.prc 1
alf 2000-332-13:26:48.414 proc1  PROCEDURE POPUP
alf 2000-332-13:26:48.444 proc1  START: eui_tc_startup.prc
alf 2000-332-13:26:48.472 proc1  Host name is: alf
alf 2000-332-13:26:48.475 proc1  Starting Stream: sc1_rt on alf
alf 2000-332-13:26:48.475 proc1  If Following command rejected, it means the stream is already active.
Alf 2000-332-13:26:48.483 proc1  INIT REALTIME sc1_rt DBASE /homes/epoch/timed/database/reports/timed/timed_20001120_01.lis
alf 2000-332-13:26:48.520 nodesrv Initializing sc1_rt stream ...
```

A viewer needs to be selected before continuing. Under the File pulldown, select Layout
- in the directory /homes/epoch/timed/database/edl/timed/ , select timed1.scr and click OK

To initialize the viewer –

Under the Stream pulldown,
select Status,
highlight sc1_rt ON alf DBASE /homes/epoch/timed/database/reports/timed/timed_....lis
click Init Viewer

The following messages will appear in the EUI manager event window:

```
alf 2000-332-13:28:36.264 cmder  INIT VIEWER sc1_rt
alf 2000-332-13:28:36.505 viewer1 Viewer 4.10 starting execution...
alf 2000-332-13:28:39.880 viewer1 completed database initialization for stream (sc1_rt)
alf 2000-332-13:28:40.064 viewer1 Connected to primary stream (sc1_rt)  host (alf)
alf 2000-332-13:29:37.500 viewer1 Initialization completed.
```

After a minute or two, the timed1.scr viewer will appear. The name timed1.scr will appear near the top right of the window next to the green FREEZE button.

Lisa:

Lisa is the backup computer used for commanding GSE and the TIMED S/C. It is located in the GSE equipment room in Building 23 at APL and will be shipped to VAFB with the TIMED S/C for launch activities.
Login: cmder
Password: jtkirk98

To start the EPOCH software,

click on the Big Mac icon at the bottom of the window or click on the computer terminal icon an type 'tws'.
Unlike on Alf, you do not have to select layout or init stream. It is all performed automatically in a procedure.

2.1 Front End Viewer

Bring up a terminal window and perform the following steps:

xhost +
telnet timdews2
user: gsa
password: spring.time
aui.sh - this brings up a window titled LEO-T
Ground Equipment Stream Status should be UP
Scheduler Status should be UP
Command Queue Server Status should be UP
Under Automatic System Monitor and Testing pulldown,
select Invoke Epoch 2000 – this brings up a window titled
'EUI manager timedfe2_1.0.7'
A procedure will automatically bring up a front end viewer.

2.2 EPOCH Shutdown

After completing testing, the EPOCH software should be terminated properly with the following steps:

On the timed1 viewer, select File pulldown and select Exit
On the EUI manager window, select Stream pulldown, select Status
- select sc1_rt stream and click Terminate Stream
After sc1_rt stream disappears, close stream window
On EUI manager window, select File pulldown, select Exit
On a terminal window, type 'killer.pl' to terminate any remaining processes
Two pages of the Uptime Report will be printed to the alice printer after the spacecraft power down procedure has completed. These pages should be placed in the Uptime Report binder located in the MOC.

3.0 Spacecraft Power On

To power the TIMED spacecraft, under the Procedure pulldown on the timed1 viewer under the directory /homes/epoch/timed/database/procedures/timed/ select procedure **sc_pwrup.prc** for normal power up or **sc_pwrup_pad.prc** for field operations. This should establish command and telemetry connections.

4.0 Commanding:

To command IEM side 1 (A),
verify CMD_SIDE = 1 and ZCDH_SIDE = 1 one quarter of the way down on the timed1 viewer on the left side. If not,
select COMMAND CONTROL pushbutton,
select IEM Side,
select 1 to set CMD_SIDE to 1.
Select COMMAND CONTROL pushbutton,
select CDH Side,
select 1 to set ZCDH_SIDE to 1.

To command IEM side 2 (B),
verify CMD_SIDE = 2 and ZCDH_SIDE = 2
If not,
select COMMAND CONTROL pushbutton,
select IEM Side,
select 2 to set CMD_SIDE to 2.
Select COMMAND CONTROL pushbutton,
select CDH Side,
select 2 to set ZCDH_SIDE to 2.

Note: When the S/C is powered with side 2 as the bus controller and a new epoch viewer is started, it defaults to side 1, so you must set commanding for side 2 as described above.

Commands to the FE, BCU, RFGSE, SAS, TASTIE, or GPS simulator do not require selecting the IEM side or selecting baseband or RF commanding as described below.

4.1 Commands from the command line:

All spacecraft and GSE commands sent from the timed1 viewer command line must be preceded with **cmd.**
For example **cmd cd_no_op**

There are 2 types of S/C commanding, baseband and RF.

4.2 Baseband

To select baseband for side A,
send command **cmd bu_upa_en_bb**
or in the timed1 viewer, one quarter of the way down the page,
select COMMAND CONTROL pushbutton,
select BCU Commanding,
select BB Side A

To select baseband for side B,
send command **cmd bu_upb_en_bb**
or in the timed1 viewer,
select COMMAND CONTROL pushbutton,
select BCU Commanding,

select BB Side B

To verify selection, look on **bcu.pag** display page. In the Command Status section, look at telemetry for Rcvr A, Rcvr B, Baseband A and Baseband B.

To verify baseband commanding through Alf, run the procedure **cmd_bb.prc** This procedure configures the front end, BCU and RFGSE for baseband commanding.

4.3 RF

To select RF for side A,
send command **cmd bu_upa_ds_bb**
or in the timed1 viewer,
select COMMAND CONTROL pushbutton,
select BCU Commanding,
select RF Side A

To select RF for side B,
send command **cmd bu_upb_ds_bb**
or in the timed1 viewer,
select COMMAND CONTROL pushbutton,
select BCU Commanding,
select RF Side B

There is a toggle switch at the bottom on the back of the RFGSE Downlink rack in the building 23 GSE room. It must be selected down to command RF through alf (FE2) or up to command RF through ralph (FE3).

To command RF through Alf, run the procedure **cmd_rf.prc** This procedure configures the front end, BCU and RFGSE for RF commanding. Carrier (RX1_CAR_LOK for CDH1 or RX2_CAR_LOK for CDH2) and subcarrier (RX1_SBCAR_LOK for CDH1 or RX2_SBCAR_LOK for CDH2) must be LOCK to command RF. These telemetry points can be found on **i_comm.pag.**

To command RF through Ralph, the ground station must perform a sweep to lock the carrier and subcarrier.

4.4 Command counters

For commands to be accepted by the CDH, the Ground COP1 command counter (ZCF_COP1_VS2 for CDH1 or ZCF_COP1_VS3 for CDH2) must be the same as the S/C command counter (CC_VC2_RPT_VAL for CDH1 or CC_VC3_RPT_VAL for CDH2).
These can be found on the **sc_crit_new.pag.**
If they are not the same,
select COMMAND CONTROL pushbutton,
select SYNC_GROUND_SEQNO,
select Do it.

Verify counters are the same.

To verify the command process is functioning properly, check the CDH total command counter C1_TOT_CMD_CNT for CDH1 or C2_TOT_CMD_CNT for CDH2 on **sc_crit_new.pag** and send a no_op cmd.

cmd cd_no_op

Verify command counter incremented.

4.5 CV

CV WAIT - waits for command to be executed by the CDH before sending the Command Verification successful message to the EPOCH event window. This then allows the next command to be sent.

CV NOWAIT - waits only for the command to be transmitted to the S/C before allowing another command to be sent

CV OFF - allows commands to be sent with no verification between commands

To select desired CV,

select COMMAND CONTROL pushbutton,
select CV,
select desired value

4.6 Bypass

This is typically used when no telemetry is available when attempting to send commands.

CMDIF SET_BYPASS_MODE OFF - turns off checking of commands by the CDH

CMDIF SET_BYPASS_MODE ON - turns on checking of commands by the CDH

To select desired Bypass,

select COMMAND CONTROL pushbutton,
select Bypass,
select On or Off

4.7 Command Failures:

If commands are not being executed and the above conditions have been checked, look on **fe_tlm2_moc.pag**. Verify CF01_HOST = "alf" and CF01_CONN = "Connected". If not, run the procedure **cmd_alf_dirs.prc** and try no-op command again.

4.8 Selecting Commands:

If you need to find a specific command to send, use the Command Generator.

select APL PROGRAMS pulldown on the timed1 viewer,
select Command Generator,
select desired subsystem,
select desired command,
click View to get information on selected command
click Generate,
select parameters if necessary,
Click Send to Stream – this will send the command to the spacecraft or GSE.

4.9 Lockout:

To recover from the lockout condition, CC_LOCKOUT_FLG = "LOCKOUT" on **sc_crit_new.pag,**
Run procedure **sync_ground_seqno.prc**
Select CV OFF,
Send command **cmd cc_unlock**
Verify that CC_LOCKOUT_FLG = "NO_LOCKOUT"
Select CV WAIT

4.10 POC Queues

The POC queues are used for storing and forwarding commands from the instruments POCs to their respective instrument.
To check whether commands are being directed to alf or ralph, perform the following:
Bring up a terminal window,
xhost +
telnet kimball
user: relmgr
password: cmguru00
more fwdirlist.txt
A listing similar to the following will appear, the first line indicating whether pocd is set for ralph or alf:

```
# This list used for pocd on ralph
#
# Revision information
#
# 09/25/00  William Dove  added revision information & dropbox for firewall
# 09/27/00  William Dove  added cdh_dumps and pam_dumps directories
#
kimball::/d17/ftpusers/poc/incoming|alf::/disks/d10/home/epoch/timed/out/sc2_rt/mpcf_in
kimball::/d17/shuttle/dropbox|alf::/disks/d10/home/cmder/epoch/timed/inbox
kimball::/d17/shuttle/cdh_dumps|alf::/disks/d10/home/epoch/timed/output/alf/timed/max
kimball::/d17/shuttle/pam_dumps|alf::/disks/d10/home/epoch/timed/output/alf/timed/pam
kimball::/d17/shuttle/displays|alf::/disks/d10/home/epoch/timed/database/edl/timed
kimball::/d17/shuttle/displays/gandc|alf::/disks/d10/home/epoch/timed/database/edl/gandc
kimball::/d17/shuttle/displays/gandcv|alf::/disks/d10/home/epoch/timed/database/edl/gandcv
kimball::/d17/shuttle/displays/gns|alf::/disks/d10/home/epoch/timed/database/edl/gns
kimball::/d17/shuttle/displays/iem|alf::/disks/d10/home/epoch/timed/database/edl/iem
kimball::/d17/shuttle/displays/iemv|alf::/disks/d10/home/epoch/timed/database/edl/iemv
kimball::/d17/shuttle/procs|alf::/disks/d10/home/epoch/timed/database/procedures/timed
kimball::/d17/shuttle/procs/gandc|alf::/disks/d10/home/epoch/timed/database/procedures/gandc
kimball::/d17/shuttle/procs/gandcv|alf::/disks/d10/home/epoch/timed/database/procedures/gandcv
kimball::/d17/shuttle/procs/gns|alf::/disks/d10/home/epoch/timed/database/procedures/gns
kimball::/d17/shuttle/procs/iem|alf::/disks/d10/home/epoch/timed/database/procedures/iem
kimball::/d17/shuttle/procs/iemv|alf::/disks/d10/home/epoch/timed/database/procedures/iemv
kimball::/d17/shuttle/files|alf::/disks/d10/home/epoch/timed/database/files/timed
kimball::/d17/shuttle/files/AIU|alf::/disks/d10/home/epoch/timed/database/files/timed/AIU
kimball::/d17/shuttle/files/APC|alf::/disks/d10/home/epoch/timed/database/files/timed/APC
kimball::/d17/shuttle/files/GNS|alf::/disks/d10/home/epoch/timed/database/files/timed/GNS
kimball::/d17/shuttle/files/CDH|alf::/disks/d10/home/epoch/timed/database/files/timed/CDH
kimball::/d17/shuttle/gns_elsets|alf::/disks/d10/home/epoch/timed/output/alf/timed/gns_elsets
```

If the POC queues need to be switched from alf to ralph, enter
fw_to_alf.pl

If the POC queues need to be switched from ralph to alf, enter
fw_to_ralph.pl

If instrument commands are still not being accepted, verify that firewall shuttle is running by entering:
ps –ef | grep shut
A message similar to the following will indicate if the shuttle is running:
relmgr 21826 1 2 Nov 29 ? 68:37 /usr/bin/perl /disks/d3/home/epoch/timed/bin_SOL/fwshuttle.pl

Also verify that pocd is running on **alf** by bringing up a new terminal window and entering:
ps -ef | grep pocd
A message similar to the following will indicate that pocd is running:
iem 7845 1 1 Nov 21 ? 63:35 pocd

If pocd is not running, enter the following:
cd $EPOCH_BIN
pocd &
Check as described above to verify pocd is running.

To view the current POC queues, look at display page **poc_queue_stat.pag**. This display shows the overall POC queue status as well as the four instrument queues. For commands to be sent to an instrument from the queues, the overall POC queue must be enabled as well as the individual instrument queue.

To enable/disable an instrument queue,
select COMMAND CONTROL pushbutton,
select GUIV, SABER, SEE, or TIDI
select ENABLE or DISABLE

To enable/disable the overall POC queue,
select COMMAND CONTROL pushbutton,
select POC QUEUE
select ENABLE or DISABLE

To flush instrument commands from the POC queue,
select COMMAND CONTROL pushbutton,
select GUIV, SABER, SEE, or TIDI
select FLUSH

When commands are successfully sent, an event message similar to the following will be seen:
POC File Processing Complete; Name = 2000339213007_SE339AAN.CMF, Status = Success
↑↑
SE = SEE
SA = SABER
TI = TIDI
GU = GUVI

Note: Instrument commands update the COP1 command counters but do not increment the CDH total command count. Instead, instrument commands are tracked with the packet delivery command count, C1_PKTDEL_SUCCT for CDH1 or C2_PKTDEL_SUCCT for CDH2.

5.0 BCU

Verify all units on the BCU rack are powered before starting Labview on the BCU PC.
Power on the BCU PC if it is not already powered. You may receive a popup indicating unable to verify network password. Click ok. This is due to the PC no longer being on the Space Department network.
Start Labview program on the BCU PC.
Double click the icon in the middle of the window labeled TIMED BCU_ver17.vi.
Click the arrow -> near the top left corner of the Labview window.
The TLM and CMD Connect Status boxes should be green and the iteration counter should be incrementing.
Verify that PCAnywhere is running in a Waiting or In Session status.
If it is not running,
click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Be A Host PC,
select TIMED GSE PC , double click
Status should go to Waiting.
Note: pcANYWHERE is needed for TC to access the BCU from the Mission Ops Center.

To verify commanding is available to the BCU from EPOCH, send the command:
cmd BU_YELL_LITE_ON. This is essentially a no-op command. If it fails, you will see messages similar to the ones below:

```
scl_rt 2000-333-21:07:29.710 EVT:1776 CmdIf> GSE_RFGSE_Client: Read the wrong number of bytes, read -43
scl_rt 2000-333-21:07:29.710 EVT:1713 CmdIf> GSE_RFGSE_Client: Connection Problem detected, Closing Connection!
scl_rt 2000-333-21:07:29.710 EVT:379  S/C command RG_DL_BB10KB queued
scl_rt 2000-333-21:07:29.765 ALM:376  Command Generator Error: Closing connection to GSE_RFGSE_Client, Aborting this cmd awaiti
scl_rt 2000-333-21:07:29.765          >ng XMIT, sent@ 11/28/00 21:07:29  expires@ 11/28/00 21:08:04
scl_rt 2000-333-21:07:29.765          Rejected. Uplink process failed while processing command RG_DL_BB10KB: Closing connection
scl_rt 2000-333-21:07:29.765          > to GSE_RFGSE_Client, Aborting this cmd awaiting XMIT, sent@ 11/28/00 21:07:29  expires@
scl_rt 2000-333-21:07:29.765          > 11/28/00 21:08:04.
```

If this occurs, login to the BCU PC via pcANYWHERE on timedmoc4 computer.
Click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Remote Control,
select GSE,
select TIMED GSE PC which should be green for available,
click OK,
login: cmder,
password: jtkirk98,
Status should go to In Session.
Stop Labview with the big red STOP button and then restart Labview.
If the big STOP button does not work, try the smaller stop button above the large one. This will either stop Labview or you will receive a popup "Resetting VI: Timed BCUver17.vi".
If it stops, simply restart Labview.

If it does not stop, try exiting Labview and restart.
If you cannot exit Labview, it is necessary to reboot the PC. Try to restart via the Start button, then Restart button.
If you cannot access the Start button, then the restart must be done at the computer.
If you cannot get Labview restarted, verify that the Main Bus is in control of the S/C load and try power cycling the Command Bus Power supply on the BCU rack. This is necessary when the GPIB connection between the BCU rack and BCU PC becomes hung.
If you are able to restart the PC and Labview, resend the BCU no-op command and you should receive a message similar to the one below:

```
scl_rt 2000-334-19:04:43.467 EVT:379  S/C command BU_YELL_LITE_ON queued
scl_rt 2000-334-19:04:54.167 EVT:315  Command Verification pending for s/c command BU_YELL_LITE_ON
scl_rt 2000-334-19:04:54.167 EVT:306  S/C command BU_YELL_LITE_ON uplinked
scl_rt 2000-334-19:04:54.167 EVT:316  Command Verification successful for s/c command BU_YELL_LITE_ON
scl_rt 2000-334-19:04:54.167 EVT:307  Processing completed for s/c command BU_YELL_LITE_ON
```

Note2: TIMED BCU_lisa_ver17.vi on the BCU PC is to be used if S/C control is switched to Lisa.

For more information on the BCU, refer to the TIMED BCU Reference Guide, SEI-00-036.

To end the PCAnywhere session, click the X button on the top right corner of the PCAnywhere window. DO NOT CLOSE THE BCU LABVIEW WINDOW.
Click Yes to End Session.

6.0 RFGSE

Verify all units on the Downlink rack and all units on the Uplink rack except the 7192 Link Analyzer and 3rd bit sync are powered before starting Labview on the RFGSE PC.
Power on the RFGSE PC if it is not already powered. You may receive a popup indicating unable to verify network password. Click ok. This is due to the PC no longer being on the Space Department network.
Start Labview program on the RFGSE PC.
Double click the icon in the middle of the window labeled TIMED RF GSE ver7.vi
Click the arrow -> near the top left corner of the labview window.
The TLM and CMD Connect Status boxes should be green and the iteration counter should be incrementing.
Verify that PCAnywhere is running in a Waiting or In Session status.
If it is not running,
click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Be A Host PC,
select TRFGSE2., double click.
Status should go to Waiting.
Note: pcANYWHERE is needed for TC to access the RFGSE from the Mission Ops Center.

To verify commanding is available to the RFGSE from EPOCH, send the command:
cmd RG_SIDE_SEL A. This is essentially a no-op command. If it fails, you will see messages similar to the ones below

```
scl_rt 2000-333-21:07:29.710 EVT:1776 CmdIf> GSE_RFGSE_Client: Read the wrong number of bytes, read -43
scl_rt 2000-333-21:07:29.710 EVT:1713 CmdIf> GSE_RFGSE_Client: Connection Problem detected, Closing Connection!
scl_rt 2000-333-21:07:29.710 EVT:379  S/C command RG_DL_BB10KB queued
scl_rt 2000-333-21:07:29.765 ALM:376  Command Generator Error: Closing connection to GSE_RFGSE_Client, Aborting this cmd awaiti
scl_rt 2000-333-21:07:29.765          >ng XMIT, sent@ 11/28/00 21:07:29  expires@ 11/28/00 21:08:04
scl_rt 2000-333-21:07:29.765          Rejected. Uplink process failed while processing command RG_DL_BB10KB: Closing connection
scl_rt 2000-333-21:07:29.765          > to GSE_RFGSE_Client, Aborting this cmd awaiting XMIT, sent@ 11/28/00 21:07:29  expires@
scl_rt 2000-333-21:07:29.765          > 11/28/00 21:08:04.
```

If this occurs, login to the RFGSE PC via pcANYWHERE on timedmoc4 computer.
Click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Remote Control,
select GSE,
select TRFGSE2 which should be green for available,
click OK,
login: cmder,
password: jtkirk98,
Status should go to In Session.
Stop Labview with the big red STOP button and then restart Labview.
If the big STOP button does not work, try the smaller stop button above the large one. This will either stop Labview or you will receive a popup "Resetting VI: TIMED RF GSE ver7.vi".

If it stops, simply restart Labview.
If it does not stop, try exiting Labview and restart.
If you cannot exit Labview, it is necessary to reboot the PC.
Try to restart via the Start button, then Restart button. If you cannot access the Start button, then the restart must be done at the computer.
If you cannot shutdown the PC properly using the Start/Restart option, it will be necessary to push the reset button on the PC.

If this happens, you may receive a message from Scandisk indicating a problem.
Click the Don't Fix button and continue.

If you cannot get Labview restarted, try power cycling the two bit syncs on the RFGSE rack. This is necessary when the GPIB connection between the RFGSE rack and RFGSE PC becomes hung.
After restarting the PC and Labview, send the RFGSE no-op command and you should receive a message similar to the one below:

```
scl_rt 2000-334-19:04:56.667 VWR:cmder cmd rg_side_sel a
scl_rt 2000-334-19:04:56.667 EVT:1705 CmdIf> Packe 14 70 d2 14 00 02 2c 00 00
scl_rt 2000-334-19:04:56.667 EVT:379 S/C command RG_SIDE_SEL queued
scl_rt 2000-334-19:04:56.767 EVT:315 Command Verification pending for s/c command RG_SIDE_SEL
scl_rt 2000-334-19:04:56.767 EVT:306 S/C command RG_SIDE_SEL uplinked
scl_rt 2000-334-19:04:56.767 EVT:316 Command Verification successful for s/c command RG_SIDE_SEL
scl_rt 2000-334-19:04:56.767 EVT:307 Processing completed for s/c command RG_SIDE_SEL
```

Note2: TIMED RF GSE ver7 lisa.vi on the RFGSE PC is to be used if S/C control is switched to Lisa.

To end the PCAnywhere session, click the X button on the top right corner of the PCAnywhere window. DO NOT CLOSE THE RFGSE LABVIEW WINDOW.
Click Yes to End Session.

7.0 Telemetry

The normal configuration for retrieving telemetry is alf to receive data from front end 2 (FE2). The mission ops team will normally use ralph to receive data from front end 3 (FE3).

There are 2 types of S/C telemetry, baseband and RF.

7.1 Baseband

The S/C CDH must be commanded to downlink baseband telemetry using the downlink format command. If the CDH is downlinking baseband data, it will be received by the BCU. For the alf sc1_rt stream to receive this data, the RFGSE must be commanded to look for the downlink at the desired rate and the front end must be commanded to look for data at the correct rate.
The normal procedures to set the RFGSE, front end and CDH downlink rate for baseband data are:

cdh_bb_10kb.prc – baseband data at 10kb rate
cdh_bb_4mb.prc – baseband data at 4Mb rate

7.2 RF

The S/C CDH is always configured to downlink RF telemetry using the downlink format command. For the alf sc1_rt stream to receive RF data, the RFGSE must be commanded to look for the downlink at the desired rate and the front end must be commanded to look for data at the correct rate. In addition to this, the RF transmitter must be commanded ON.
The normal procedures to set the RFGSE, front end, CDH downlink rate and RF transmitter for RF data are:

cdh_rf_10kb.prc – RF data at 10kb rate
cdh_rf_4mb.prc – RF data at 4Mb rate

The normal procedure for establishing RF or baseband telemetry on alf is **tlm_on_sc.prc**. If for some reason telemetry is not present, run the **tlm_on_sc.prc** procedure.
To switch to lisa as a backup, run the procedure **tlm_on_sc3_rt.prc** on the lisa computer.

All S/C telemetry and GSE telemetry comes to alf through tmdc-ts3 computer located in the building 23 gse room.

7.3 Telemetry pages

There are two types of telemetry pages, the generic epoch pages with the pushbutton to the left of each telemetry mnemonic and the user-built pages. To view information about a specific mnemonic on an epoch page, left click the pushbutton in, right click the pushbutton and select Attributes. The Attributes window gives a description of the mnemonic, location including apid and position within the packet, any limits defined for the mnemonic, discrete states defined, and will also allow you to change how the mnemonic is displayed on the page.
To view a mnemonic on a user-built page, hold down the control key on the keyboard and left click on the data portion of the specific mnemonic.

To bring up a telemetry display,

Select Display pulldown menu on the timed1 viewer.
Select desired view or window to bring up a display that can be moved to different locations.
Select desired display.

Or from the timed1 viewer command line, type

Display window *pagename*	-displays to a window
Display view *view_number pagename*	-displays to selected view

The following lists the most used displays and their function:
In /homes/epoch/timed/database/edl/timed/ directory

AUT1_hsk.pag	Autonomy for CDH1
AUT2_hsk.pag	Autonomy for CDH2
bcu.pag	Blockhouse Control Unit
fe_tlm2_moc.pag	Front End 2 data
i_cdh.pag	CDH 1&2 housekeeping, load/dump status, RT status
i_comm.pag	IEM 1&2 uplink and downlink status, CDH 1&2 command status
i_ssr.pag	SSR 1&2 housekeeping
instrument.pag	GUVI, SABER, SEE, and TIDI housekeeping
mdc_stat.pag	MDC status
poc_queue_stat.pag	POC queue status for all instruments
power.pag	Power, Battery, Solar Array, and Relay status
pyro.pag	Arm/Safe status for all pyros, separation status
rfgse.pag	RFGSE status
riux_temp.pag	RIU temperature status where x= 1-6
sas.pag	Solar Array Simulator status
sc_crit.pag	critical GSE and CDH status
sc_curr.pag	spacecraft currents
sc_stat.pag	spacecraft relay status

In /homes/epoch/timed/database/edl/timed/controlled/default_contact/ directory

gns_1_health_status	GNS 1
gns_2_health_status	GNS 2
TIMED_health_status	Spacecraft health status, side 1 is BC
TIMED_health_status_side2	Spacecraft health status, side 2 is BC

In /homes/epoch/timed/database/edl/timed/gandc/ directory

gandc_hsk_states.pag	Guidance and Control housekeeping

In /homes/epoch/timed/database/edl/timed/sims/ directory

sim_statuses.pag	Simulation status

7.4 Telemetry Dropouts:

There are different cases of telemetry loss during normal operations. The most common are explained below.

a) All telemetry lost.

If there is no telemetry from the front end, **fe_tlm2_moc.pag** is not updating (purple); GSE telemetry is not updating (**bcu.pag** and **rfgse.pag** are purple; s/c telemetry pages are purple (**sc_crit_new.pag**); MDC telemetry (**mdc_stat.pag**) is purple.
This typically indicates a network outage.

Try to ping specific computers to see if the network is down. This is done by bringing up a terminal window and typing,
ping tmdc-ts3
If the link is up, you should receive a message similar to the following:
tmdc-ts3.jhuapl.edu is alive
If the link is down, there will be no response.

We have normal network outages that last approximately 10 minutes. If telemetry outage lasts longer than 10 minutes, contact network engineers to report problem. Phone numbers are in green TC notebook.
If outage lasts more than 10 minutes, run contingency procedure in Appendix A to switch S/C control from alf to lisa. If you are alone, this means going to building 23 gse room to run procedure from lisa.

b) GSE, FE2, and S/C telemetry lost

If **mdc_stat.pag** is updating except for TS3, there is a problem with the MDC which lasts approximately 9 minutes. If it does not reappear after 10 minutes, notify MDC engineer.
When telemetry reappears, it may be necessary to re-establish command connection to the front end using **cmd_bb.prc** and to restart BCU and RFGSE labview programs. Any PCAnywhere connections will need to be restarted as well.
Also, when the command link to the front end is restarted, the POC queues are automatically disabled and need to be re-enabled.

c) GSE data lost

If BCU or RFGSE telemetry is lost but S/C telemetry is available, try stopping and restarting the appropriate Labview program to recover.

d) S/C telemetry lost, GSE telemetry present

This indicates the network from building 23 is ok, but the front end is not collecting data or is collecting a format different than RFGSE or front end is expecting. This can happen if the S/C autonomy switches data rates or a stream on ralph commands the S/C to a different rate. In this case, run the procedure **cdh_bb_10kb.prc** if you think the S/C has switched from high to low rate. Run **cdh_bb_4mb.prc** if you think the S/C has switched from low to high rate.

e) alf has telemetry but instruments lose telemetry

Check **mdc_stat.pag**. The number of dropped frames on TS1 may be updating. This normally indicates a network problem which should resolve itself within 10 minutes. If not, contact MDC engineer or network engineer.

7.5 Telemetry Limits:

The default values for limits are defined in the telemetry database. They are defined for red low, yellow low, yellow high, and red high. Normally, yellow limits are acceptable values but should be watched for further degradation. Red limits indicate a problem that should be corrected.
To receive a listing of the current telemetry point out of limits,

Select Telemetry pulldown on the timed1 viewer
Select LIMITS

This list gives the time of the first occurrence of the telemetry violation, the mnemonic name, the type of limit violation, the limit violation value and the current value.
If the mnemonic is back within normal limits, the color of the current value will be black.
If you want to clear the mnemonics that are within limits and display only those out of limits,

Select Refresh

If you want to remove a mnemonic from the list that you know is not valid (for instance, a mnemonic for a subsystem that is not connected),

Left click the pushbutton to the left of the mnemonic

Select Delete – Note: if you select Refresh, any Deleted items will reappear.

To turn on/off limits for a specific mnemonic,

Limits *mnemonic* on/off – from the timed1 viewer command line

To turn on/off limits globally,

Limits * on/off – from the timed1 viewer command line

To modify the current limits for a parameter,

DBASE MODIFY GLOBAL *mnemonic* YELLOWH value

Similarly you could change YELLOWL, REDL, REDH

Note: these changes will be lost if the current viewer is restarted.

8.0 Procedures

SPACECRAFT POWER ON/OFF

sc_pwrup.prc - This procedure is used for powering ON the TIMED S/C.

- Pauses to verify correct procedure is being run.
- There is a prompt for which IEM side will be the 1553 bus controller (BC).
- It selects the desired pages for the timed1 viewer.
- Turns on telemetry with a call to **tlm_on_sc.prc**
- Checks MDC status and sets MDC limits in **tmdc_setup_alarms.prc**
- Has pauses for turning on RFGSE, BCU racks and labview programs and starting 1553 monitor.
- Sets up COP1 variables with call to **tune_cmds_mix.prc**
- Pauses to goto side select if this procedure is used for recovering from a stream crash.
- Turns on DTIU and Fiber on the BCU
- Configures RFGSE and EPOCH to command selected BC side, selects GNS for selected BC and select BCU commanding for baseband on selected BC
- Verifies BCU command bus and main bus power supply settings
- Pauses to bring up front end 2 viewer and stream, and turns on ftp and autodelete of vc6 and vc7 files
- Turns on uptime (record of on/off times of all S/C relays)
- Pauses before enabling command bus power supply, turns yellow light on
- Sends commands to critical command decoder to select BC and power on IEM relay. Note: both of these commands generate a popup window to OK or cancel the command.
- Waits 45 seconds for CDH to boot up and then suspends all autonomy except emergency shutdown bin 511
- Selects 10kb downlink and syncs ground and S/C command counters
- Turns on PSE 1553 interfaces 1 and 2
- Calls **sc_pwrup-status.prc** to verify that all other S/C relays are OFF
- Pauses before enabling main bus power supply
- Sets S/C time to current GMT time
- Powers on RIU for selected BC side
- Clears invalid sticky telltales left from IEM power on
- Turns on checking of all limits
- Pauses to continue to power on using Battery or **STOP** if not using battery to exit procedure
  - If using battery, configures power subsystem, BCU, SAS, and battery GSE or S/C battery

sc_pwrdn.prc - This procedure is used for powering ON the TIMED S/C.

- Pauses to verify correct procedure is being run.
- There is a prompt for which IEM side is the 1553 bus controller (BC).
- Suspends all autonomy except emergency shutdown bin 511
- Pauses for choice of data rate change. If downlinking RF, then continue. If downlinking baseband, then GOTO P1.
- If rate change option is chosen, S/C is changed to 10kb baseband telemetry with call to **cdh_bb_10kb.prc** and baseband commanding via call to **cmd_bb.prc**

- Calls **sc_pwrdn_status.prc** to power off all relays except IEM
- Pauses with a prompt to continue if powered via battery or GOTO TEMP if not on battery.
- If on battery, steps are given to configure power subsystem, BCU, SAS, and battery GSE.
- If not on battery, at TEMP label, RF transmitter is turned off if needed
- Turns off all limit checking
- Powers on RIU relays
- Pauses to record Main Bus voltage and current
- Powers off main bus power supply
- Powers off IEM relays
- Pauses to record Command Bus voltage and current
- Powers off command bus power supply
- Pauses to record Command Bus voltage and current
- Turn off yellow light and power off BCU DTIU and Fiber
- Sets BCU sides 1 and 2 to baseband commanding
- Commands front end into standby mode
- Pauses to terminate BCU and RFGSE labview programs, disable 1553 monitor, and power off BCU and RFGSE racks
- Prints uptime report to printer alice – place into runtime binder
- Pauses to verify battery is in trickle charge

Note: Similar versions of power on and off to be run while TIMED is on launch pad at VAFB exist. **sc_pwrup_pad.prc** and **sc_pwrdn_pad.prc**

IEM POWER ON

i1_pwrup.prc or **i2_pwrup.prc** – to power on other IEM, assumes S/C is already powered

- turns on RIU for selected side
- turns on IEM via command through critical command decoder
- waits 45 seconds for IEM to boot and suspends all autonomy except for emergency shutdown bin 511
- sets instrument packet limits to new flight values
- clears invalid sticky telltales from power on
- turns on remote terminal telemetry

INSTRUMENT POWER ON/OFF

NOTE: All instrument relay on/off commands are defined in the command database as critical commands. You will be prompted with a popup window to OK or cancel the relay command.

guvi_pwrup.prc

- Prompts TC to enter BC side
- Pauses to verify with GUVI instrumenter OK to power on
- Clears GUVI power down warning flag
- Powers ON GUVI power/heater relay
- Clears ping-pong error if necessary
- Pauses to enable POC queue if required

guvi_pwrdn.prc

- Prompts TC to enter BC side
- disables GUVI POC queue
- Sends GUVI power down warning flag
- Pauses to verify with GUVI instrumenter OK to power down
- Powers OFF GUVI power/heater relay
- Clears GUVI power down warning flag

saber_pwrup.prc

- Prompts TC to enter BC side
- Pauses to verify with SABER instrumenter OK to power on Op heater
- Powers ON SABER operational heater
- Pauses to verify with SABER instrumenter OK to power on SABER
- Clears SABER power down warning flag
- Powers ON SABER power relay
- Clears ping-pong error if necessary
- Pauses to enable POC queue if required

saber_pwrdn.prc

- Prompts TC to enter BC side
- disables SABER POC queue
- Sends SABER power down warning flag
- Pauses to verify with SABER instrumenter OK to power down
- Powers OFF SABER power and heater relays
- Clears SABER power down warning flag

see_pwrup.prc

- Prompts TC to enter BC side
- Pauses to verify with SEE instrumenter OK to power on
- Clears SEE power down warning flag
- Powers ON SEE power/heater relay
- Pauses to enable POC queue if required

see_pwrdn.prc

- Prompts TC to enter BC side
- disables SEE POC queue
- Note: SEE does not use power down warning flag
- Pauses to verify with SEE instrumenter OK to power down
- Powers OFF SEE power/heater relay

tidi_pwrup.prc

- Prompts TC to enter BC side
- Pauses to verify with TIDI instrumenter OK to power on
- Clears TIDI power down warning flag

- Powers ON TIDI power/heater relay
- Powers OFF TIDI survival heater if necessary
- Pauses to enable POC queue if required

tidi_pwrdn.prc

- Prompts TC to enter BC side
- disables TIDI POC queue
- Sends TIDI power down warning flag
- Pauses to verify with TIDI instrumenter OK to power down
- Powers OFF TIDI power/heater relay
- Clears TIDI power down warning flag

Data Rate Changes

cdh_bb_10kb.prc – switch to 10kb baseband telemetry (also known as low rate)

- Commands RFGSE to 10kb baseband
- Sets front end 2 to lock on low rate baseband data
- Commands BC CDH to downlink 10kb data with baseband enabled
- Pauses to verify low rate data is received. Telemetry displays should change from purple to green. Data rate for CDH 1 can be seen on **i_comm.pag** on Comm 1 window with mnemonic C1_DL_DATA_RATE = "9.0_kbps". For CDH2, on Comm 2 window, C2_DL_DATA_RATE = "9.0_kbps"

cdh_bb_4mb.prc – switch to 4Mb baseband telemetry (also known as high rate)

- Commands RFGSE to 4Mb baseband
- Sets front end 2 to lock on high rate baseband data
- Commands BC CDH to downlink 4Mb data with baseband enabled
- Pauses to verify high rate data is received. Telemetry displays should change from purple to green. Data rate for CDH 1 can be seen on **i_comm.pag** on Comm 1 window with mnemonic C1_DL_DATA_RATE = "4.0_Mbps". For CDH2, on Comm 2 window, C2_DL_DATA_RATE = "4.0_Mbps"

cdh_rf_10kb.prc – switch to 10kb RF telemetry (also known as low rate)

- Prompts TC to enter BC side
- Commands RF transmitter for selected side ON
- Commands RFGSE to 10kb RF
- Sets front end 2 to lock on low rate RF data
- Commands BC CDH to downlink 10kb data with baseband enabled (RF is always enabled)
- Resend RFGSE commands to ensure locked on RF data
- Pauses to verify low rate data is received. Telemetry displays should change from purple to green. Data rate for CDH 1 can be seen on **i_comm.pag** on Comm 1 window with mnemonic C1_DL_DATA_RATE = "9.0_kbps". For CDH2, on Comm 2 window, C2_DL_DATA_RATE = "9.0_kbps"

cdh_rf_4mb.prc – switch to 4Mb RF telemetry (also known as high rate)

- Prompts TC to enter BC side
- Commands RF transmitter for selected side ON
- Commands RFGSE to 4Mb RF
- Sets front end 2 to lock on high rate RF data
- Commands BC CDH to downlink 4Mb data with baseband enabled (RF is always enabled)
- Resend RFGSE commands to ensure locked on RF data
- Pauses to verify high rate data is received. Telemetry displays should change from purple to green. Data rate for CDH 1 can be seen on **i_comm.pag** on Comm 1 window with mnemonic C1_DL_DATA_RATE = "4.0_Mbps". For CDH2, on Comm 2 window, C2_DL_DATA_RATE = "4.0_Mbps"

Note: If RF high rate data does not lock up, run procedure rfgse_loop_unlock.prc to unlock RFGSE.

Switch Bus Controller

sc_sw_sides – switches to opposite IEM as bus controller

- Prompts TC to enter BC side
- Pauses to command SAS if running on battery
- Pauses to disable Peak Power Tracking (PPT)
- Commands RFGSE to look for telemetry on new BC
- Sets ground command side and GNS side to new BC
- Enables baseband commanding
- Commands RFGSE to downlink 10kb baseband data
- Configures front end 2 for baseband commanding
- Configures front end 2 for low rate baseband data
- Pauses before commanding new BC
- Commands selected BC to be bus controller
- turns on IEM via command through critical command decoder
- waits for IEM to boot
- Suspends all autonomy except shutdown bin 511
- Sets downlink to 10kb baseband
- Sync ground and S/C command counters with call to sync_ground_seqno.prc
- Sets battery coulometer count and charge/discharge ratio
- Sets CDH time to current GMT time
- Turns on RIU for new BC
- Turns on all limits
- Pauses to enable PPT if on battery. If not GOTO SWOFF
- Pauses to power off old BC (now the RT) or STOP procedure if RT is to be left ON
- If RT is to be turned OFF, RT transmitter, RIU, and IEM are powered OFF

Note: Similar version of switch sides to be run while TIMED is on launch pad at VAFB exist. **sc_sw_sides_pad.prc**

Turn on Remote terminal telemetry

i_cd_rt_tlm_en.prc(BC) – where BC is bus controller 1 or 2

Note: this file is located in the /timed/controlled/iem/ directory

SSR to Record Mode

i_ssr_rec.prc(arg1,arg2,arg3)

arg1 = 1 for SSR1 or 2 for SSR2
arg2 = 1 for segment 1 or 2 for segment 2
arg3 = no argument for Enable recording or 1 to disable recording

i_ssr_pbk.prc(arg1,arg2,arg3)

arg1 = 1 for SSR1 or 2 for SSR2
arg2 = 1 for segment 1 or 2 for segment 2
arg3 = 9 for 10kb data rate or 4 for 4Mb data rate

9.0 Front End File Maintenance

There are three types of history files:
.VC6 – Includes telemetry dumped from the solid state recorders
.VC7 – Includes realtime telemetry
.CMP – Includes both VC6 and VC7
During normal operations, when VC6 and VC7 files are closed on the front end they are ftp'd from FE2 to the MDC. After these files are successfully ftp'd, they are automatically deleted. The CMP files are not ftp'd to the MDC and thus are not deleted. These files need to be manually deleted periodically.
Look at display page **fe_tlm2_moc.pag** to verify ftp and autodelete status.
To locate the history files on FE2, bring up a terminal window and type the following:
telnet timedws2
user: gsa
password: spring.time
out - this is an alias to the directory /home/gsa/timedfe/output/timedfe2/timed
where the history files are located
ll – this is an alias that gives a listing of files in the directory. The results will be similar to those below:

```
total 14107
drwxr-x---  2 gsa    epoch     46848 Nov 29 16:13 .
drwxr-x---  4 gsa    epoch       768 Dec 23  1998 ..
-rw-r-----  1 gsa    epoch  37591977 Aug 10 17:16 00223210645_channel2.cmp.save.Z
-rw-r-----  1 gsa    epoch  25835289 Aug 10 17:48 00223213737_channel2.cmp.save.Z
-rw-r-----  1 gsa    epoch   7404576 Nov 29 02:09 00334061921_channel2.cmp
-rw-r-----  1 gsa    epoch    671848 Nov 29 02:27 00334071039_channel2.cmp
-rw-r-----  1 gsa    epoch     41648 Nov 29 02:31 00334073047_channel2.cmp
-rw-r-----  1 gsa    epoch     28496 Nov 29 03:54 00334085406_channel2.cmp
-rw-r-----  1 gsa    epoch  14014552 Nov 29 05:27 00334085458_channel2.cmp
-rw-r-----  1 gsa    epoch     24112 Nov 29 05:29 00334102847_channel2.cmp
-rw-r-----  1 gsa    epoch 488807232 Nov 29 16:01 00334154933_channel2.cmp
-rw-r-----  1 gsa    epoch 174806520 Nov 30 09:14 00334210201_channel2.cmp
-rw-r-----  1 gsa    epoch         0 Nov 29 16:02 00334210201_channel2.vc6
-rw-r-----  1 gsa    epoch 174806520 Nov 30 09:14 00334210201_channel2.vc7
```

The bottom 3 files (.cmp, .vc6, and .vc7) are the files currently open. The other .cmp files can be deleted.

To delete a file, type:
rm *filename*.cmp

To check on the amount of disk space remaining, type:
df –k --- results will be similar to below:

```
Filesystem          kbytes    used   avail capacity  Mounted on
/dev/dsk/c0d0s0      480815  366285   66450    85%    /
/proc                     0       0       0     0%    /proc
fd                        0       0       0     0%    /dev/fd
/dev/dsk/c0d0s7     2131875 1599964  318731    84%    /export/home
swap                 369500      12  369488     1%    /tmp
timedfe2:/home/gsa/timedfe/database
                    1000000  441172  558828    45%    /export/home/gsa/timedfe/database
timedfe2:/arc2/output
                    3391272  650024 2741248    20%    /export/home/gsa/timedfe/output/archive
timedfe2:/home/gsa/timedfe/output/local
                    4000000 1029504 2970496    26%    /export/home/gsa/timedfe/output/timedfe2
```

The last number, in this case 26%, is the directory we are concerned with keeping low. After deleting old .cmp files, the value should be less than 10%.

If there are VC6 or VC7 files that still need to be ftp'd, perform the following steps:
telnet timedfe2
user: gsa
password: spring.time
out
ll
ftp tmdc-ts4
cd incoming
bin
put *filename*.vc6

10.0 MDC

To clear the MDC Dropped Frames Count (MDRO_FRMDRP_41A) on the **mdc_stat.pag** and on the header portion of the timed1 viewer, perform the following:
Bring up terminal window,
telnet tmdc-ts1 3110
RESET
CLOSECONSOLE

11.0 1553 PASS Monitor

The 1553 PASS Monitor is located in the building 23 GSE room. The computer name is timed-bus-mon.
Login: iem
Password: boxbox1
The 1553 monitor is used to record all transactions on the 1553 bus for troubleshooting purposes.

To access the 1553 PASS monitor PC, login via pcANYWHERE on timedmoc4 computer.

Click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Remote Control,
select GSE,
select **TIMED-BUS-MON** which should be green for available,
click OK,
login: cmder,
password: jtkirk98,
Status should go to In Session.

The following steps can be executed via PCAnywhere or at the PC.
Click on shortcut to PASS Cmd.exe ,
Click on directory for storing files and select the one with the most memory
Click start logging

Each file is approximately 50 kbytes is size and will open a new file automatically when the current file fills.

To end the PCAnywhere session, click the X button on the top right corner of the PCAnywhere window. DO NOT CLOSE THE PASS WINDOW.
Click Yes to End Session.

11.1 Testing the PASS/1553 connection

1.Testing the PASS/1553 connection

1.What you do -

In order to make sure the PASS is connected ok you must shut down the data logging program, start the regular PASS software and look at the data.

2.Steps

1.Spacecraft must be on

To have some data an IEM must be powered up.

2.Check the directory data is being logged to.

Go to the PASS and check the directory data is being logged to so you know where to put data when you restart this program.

3.Stop data logging, shut down PASSCMD program

Stop data logging, then end this program.

4.Start the PASS program

There should be an "SBS" icon that says PASS somewhere on the desktop. Start this program. Things will click the program should start without any errors. You can not run this program and the PASSCMD/data logger program at the same time, they will not share the system, if you try you will have to shutdown the system and restart it. When this

program starts it says "Protocol Analysis and Simulation System PASS-1000" at the top of the screen.

5.Go to Monitor
Chose the "Monitor" menu item. Then chose "Snapshot Mode". This will start another window.

6.Run
Push the "Run" button at the lower right of this window. There should be a message "logging data" and a count of bytes of buffer area being used. If the PASS doesn't log any data this could mean the IEM is off, or the PASS 1553 cables are totally disconnected.

7.Stop
Let the system run for about 10 seconds then push "Stop".

8.Look at the data.
When you pushed stop the screen should have been filled with data. This data is every 1553 transaction that happened while the system was running. These individual transactions are separated by horizontal lines. You will see many of these transactions have a status of "Status response timeout" at the end of the message, this is ok but what you want to find is at least one good transaction. A good transaction will have no errors, no "Status response timeout" or any other error. You may have to scroll through some data to find a good transaction this depends on how many devices on the 1553 are powered up. The more devices on the more good transactions you will see. If the PASS sees one good transaction that should be enough to know it is connected ok.

9.Shutdown the PASS program
10.Restart the PASSCMD program restart data logging to the directory from step 1.2.2.

11.2 Inspect 1553 Data

You cannot look at data and record at the same time. If you need to look at previous data, close the 1553 monitor logging tool and click on the PASS icon. Select Monitor, select data logging mode, select Find button in Display window on right side of screen, select appropriate RT, T/R bit for transmit or receive, and subaddress. You can then search for the desired data with Next or Last button.

12.0 SAS

The SAS LabVIEW software interfaces with the SAS via HP-IB. The SAS LabVIEW software allows the SAS to be commanded remotely via TCP/IP socket from the Mission Operations Center (MOC) or from the TIMED Attitude System Test and Integration Equipment (TASTIE). In a mission simulation, the TASTIE sends a data message to the SAS once per second. The SAS LabVIEW software needs to be running in the TASTIE Mode for it to be processing TASTIE data messages.

When commanding the SAS from the MOC, the SAS LabVIEW software needs to be running in the Manual/MOC Mode. In addition, the MOC Commanding switch needs to be in the On position. When controlling the SAS locally, the MOC Commanding switch needs to be in the Off (Manual) position.

The MOC also receives SAS telemetry via TCP/IP socket.

12.1 SAS Power-up Procedure

The SAS rack has a panel-mounted 120Vac Isobar located at the bottom of the rack. Turn the 120Vac power strip on. The power strip provides power to the muffin fans, Isc power supplies, the Power Distribution Unit, the Output Distribution Unit, and a +5Vdc power supply module which is used to power the panel meters. On the Heatsink Temperature Monitor Panel, turn on the temperature meters. At this point, everything in the rack is turned on with the exception of the Voc and Isc power supplies. This is the nominal standby state. The rack can be left unattended in this state.

If the SAS is used for Power System Electronics qualification, the power-up procedure is as follows :

a) Turn on the SAS rack (switch is located at lower right of rack)
b) Reset the OVP trip protection
c) Turn on the Voc power supplies and Isc power supplies.
d) Set the Wing A and Wing B Voc power supply as follows :
   Voltage = 0.00V
   Current = 15 A
   OV = 52.00 V
e) Set the Wing A and Wing B Isc power supplies as follows :
   Voltage = 0.00V
   Current = 3.50 A
   OV = 10.5 V
f) Increase the Voc power supply voltage to the desired Voc voltage for each wing.
g) Increase the Isc power supply voltage on each wing until the desired Isc current is achieved.

If the SAS is used to power the spacecraft for I&T, environmental testing, or pre-launch checkout, follow the power up instructions given by the Test Conductor. The SAS can be remotely commanded from the MOC through the LabVIEW software interface and commands to power up the SAS should be incorporated in the power up procedure. The spacecraft power up procedure is somewhat involved due to the numerous spacecraft and ground support system modes and is not included here.

12.2 SAS Operating Precautions

There are two precautions when operating the SAS. They are as follows :

a) None of the Current Limit LEDs should come on. If any of them comes on during spacecraft testing, please notify the Test Conductor immediately to power-down the spacecraft. The SAS needs to be serviced if this condition occurs.

b) None of the heatsink temperatures should exceed 45%C. If only one heatsink temperature is high, there may be a problem with that heatsink assembly (most likely the fans on that heatsink are not operating). It is recommended that the SAS be powered down for further investigation. If all four heatsink assembly temperatures are high, check to make sure that the rear door vents and the top panel vents are not obstructed. If the vents are not obstructed, then it is suggested that either cooler air be forced through the rear door vents or the Isc current setting be decreased to a suitable level if at all possible. If these steps are taken and the overtemperature condition persists, it is recommended that the rack be powered down for further investigation.

12.3 SAS Power-down Procedure

If the SAS is used for Power System Electronics qualification, the power-down procedure is as follows:

a) Decrease the voltage on the Isc power supplies to 0Vdc.
b) Decrease the voltage on the Voc power supplies to 0Vdc
c) Turn off the Voc power supplies and Isc power supplies.
d) The SAS is now in the standby mode and can be left in this state if desired.

If the SAS is used to power the spacecraft during I&T, follow the power-down instructions given by the Test Conductor. The SAS can be remotely commanded from the Mission Operations Center (MOC) through the LabVIEW software interface and commands to power down the SAS should be incorporated in the power down procedure. The spacecraft power down procedure is somewhat involved due to the numerous spacecraft and ground support system modes and is not included here.

For more information on the SAS, refer to the TIMED Solar Array Simulator User's Guide.

13.0 TASTIE

TASTIE is the TIMED attitude subsystem simulator located in the building 23 GSE room.

13.1 TASTIE Power ON

- Verify both Test Mode Switches are in the "DISABLE" position.
- Apply power to rack on main power supply at bottom of rack. If this fails, hit the reset button in the back of the rack.
- Power ON TASTIE chassis with the power switch above TASTIE AIU TEST CONTROL.
- Place the 2813 programmable power supply to operational by hitting the OPR/STBY button.
- The panel should read: 1 5.0V 0.08A
- Verify with the Test Conductor the test switches can be enabled.
- Place the TEST MODE Switches to the "ENABLE" position.

13.2 TASTIE Power OFF

- Place the TEST MODE Switches to the "DISABLE" position.
- Place the 2813 programmable power supply to standby by hitting the OPR/STBY button.
- The panel should read: Standby
- Power OFF the TASTIE chassis with the power switch above TASTIE AIU TEST CONTROL.
- Power OFF the rack with the main power supply at the bottom of the rack.

13.3 Reconnect TASTIE to MOC

This procedure is used to reconnect TASTIE to the MOC stream in the event the MOC stream has been terminated and restarted.

Bring up a terminal window to login to tints-tastie computer

telnet tatints
user: tints
password: user
mmrestart - TASTIE command to reconnect to MOC
You should see the original processes (mm_bldtp and mm_tacmd) killed and then restarted.

From the EPOCH command line:

cmd ta_no_op

Verify on /homes/epoch/timed/database/edl/timed/gandc/tastie_mon.pag with TACMD_CNT430 mnemonic that command counter increments.

14.0 GPS Simulator

The GPS simulator is located in the building 23 GSE room.

14.1 GPS Simulator PC

To login to the GPS Simulator PC:

user: gpssim
password: nicola

Start the GPS simulator PC software:

Double click GPS06 icon in center of PC screen
A window appears that controls the GPS Simulator – MOC interface

If TASTIE will NOT be used,

Click the USE TASTIE button to turn OFF the TASTIE interface.

If TASTIE will be used,

Do nothing.

14.2 GPS Alpha computer

To login to the alpha computer:

user: gpssim
password: nicola

The GPS simulator software should start automatically. Two windows will be created. In one of them, a "run scenario" button should appear. Click the "run scenario" to complete the initialization of the GPS software.

Note: this does NOT start a GPS simulation, it only initializes the software.

Once the software initializes, the two original windows will disappear. A single window should the appear. The status text will change as the software loads. When it is finished, the status should say "Waiting for Initialization".

When the waiting for initialization status word appears, the simulator is ready to be commanded by the MOC.

14.3 Simulations

If you want to run a generic simulation using a nominal TIMED orbit, you can run the EPCOH procedure "gps_simulator_test.prc" which is located in the "/procedures/sims/" directory. This starts a simulation with a start time of Dec 31, 1999-11:30:00pm.

14.4 Troubleshooting

If the GPS simulator does not respond properly to MOC commands, it most likely needs to be rebooted. Log out of both the alpha and PC before attempting to re-login to either computer. Log out of the PC as you would any windows PC, click the "START" button and select "Shutdown". To log out of the alpha, click on "SESSION" in the small session manager window which is usually located in the lower right corner of the alpha display. From the session button, select "END SESSION". This will log you out of the alpha. After logging out of both machines, repeat the steps for logging in above. This clears most problems with the GPS simulator interface. If this doesn't work, call your local GPS simulator specialist.

14.5 Remote Access

The GPS simulator can also be accessed from the MOC using PCAnywhere in the MOC.
To access the 1553 PASS monitor PC, login via pcANYWHERE on timedmoc4 computer.
Click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Remote Control,
select GSE,
select **GPSSIMPC2** which should be green for available,
click OK,
login: cmder,
password: jtkirk98,
Status should go to In Session.

To end the PCAnywhere session, click the X button on the top right corner of the PCAnywhere window. DO NOT CLOSE THE GPS SIMULATOR WINDOW.
Click Yes to End Session.

15.0 PFR Generation

The steps to be followed for generating a Problem/Failure Report (PFR) can be found in the APL document "Problem/Failure Report Procedure", R&QA No.: 8.037.

To access the PFR database, go to the SOR website:

http://sorweb/scripts/cgiip.exe/WService=wpabase/pfj_browse.r
Anyone can view existing PFRs.
To view current PFRs,

Select PFR QUERY CRITERIA
Program Code: TIMED/SC
Deselect Open P/FRs only button to view all TIMED PFRs
Click Accept
Click Submit Criteria
Click EDIT/VIEW EXISTING PFRs - this brings up a list of PFRs which can then be selected for more information

To enter a new PFR, you must login. Only approved personnel can login.
From the main menu,

Click Login
Login: *user_specfic*
Password: *user_specific*
Click Sign On
Click Create a New PFR
Enter appropriate information
Click Submit when finished

16.0 Big Brother

To view the current status of the TIMED ground system computers, go to the Big Brother website: http://oliver/bb/

All icons should be Green. You can view additional information about an individual computer by clicking on the Green/Red button. To view information about computers not on the TIMED network, Big Brother should be viewed on timedmoc3 computer or another computer with access to the outside network.

17.0 S/C Emergency Shutdown

Procedure for bringing down the TIMED Spacecraft while in full-up condition.
Assumes that the Battery and SAS are On and the MOC has crashed out from under you.

NOTE: If bypassing BCU Labview, if it is locked up, hit shift or local on all 4 meters before proceeding. WARNING: Battery current meter is presently a factor of 10 off (it has been adjusted in the Labview meter but not on the rack meter yet).

1. Determine which IEM is on, and is the bus controller if both are on.
   If you don't already know this, look in the log - it should be there.

2. On the BCU rack, hit the panic switch for the IEM side you noted in step one.
   NOTE: you could hit both, one-at-a-time, if both IEM's are on but, one is enough.

3. Stop the SAS Labview program and then go to the SAS rack and switch the Isc power supplies to local mode and select voltage. Bring the voltage down

to 0V for both wings.

4. Next at the SAS rack, switch the Voc power supplies to local mode and select voltage. Bring the voltage down to 0V for both wings.
SAS is now off-line and the Spacecraft is running on Battery only.

5. Back to the BCU, where you will note the battery current.
(should be a negative number about 3-5 amps)

6. Now you will match the Main SC bus voltage with the Battery voltage by raising the main bus power supply voltage. This number will be higher then the battery voltage due to the long lines and diode drops. The main bus spacecraft voltage should be within 50mv, that's 0.050V, of the battery voltage. The two voltages are the top two voltage displays on the Labview program and the top two voltmeters down by the power supplies on the rack.

The main bus power supply current should now be carrying all the current that you saw in step 5. The battery current should be around 0.

7. The following can be done on Labview (preferable) or on the rack, if necessary. After the voltages are matched you are ready to bring the battery off-line. First, turn on the 56V power supply, then turn the SAFE/ARM switch to ARM, and finely Push the Battery Off switch. The Battery should be off-line now. The power supply will still be caring the current and battery current should be about 0. The next step will really prove that the battery is off-line.

8. Lower the main bus power supply voltage, about a volt will do but don't go below 30V just to be safe. If the spacecraft main bus voltage drops (following the power supply voltage that you are lowering) then the battery IS off-line, go to step 9. If it doesn't drop but current does, step 7 didn't work, try again.

9. On the BCU, turn the SAFE/ARM switch to SAFE, and then turn off the 56V power supply.

10. Turn MB on/off switch (A6 on rack) to OFF and MB PS out ON/OFF to off (output on/off on the power supply). The spacecraft should now be on minimum power, PSE & possibly IEM, and on command bus only. You can now decide to recover from this point or just power cmd bus down bringing the s/c down completely.

18.0 StanCam

The StanCam is used for monitoring the cleanroom and the TIMED S/C via the internet. The computer used to control StanCam is located in the building 23 GSE room.

To access the TIMEDCAM PC, login via pcANYWHERE on timedmoc4 computer.
Click the Start window,
select Programs,
select pcANYWHERE32,
select pcANYWHERE,
select Remote Control,
select GSE,
select **TIMEDCAM** which should be green for available,
click OK,
login: cmder,
password: jtkirk98,
Status should go to In Session.

The following steps can be executed via PCAnywhere or at the PC:
Double Click RealProducer 7.0 icon
Click OK on New Session window
Window appears with an input section and output section. The input should be a streaming video of the TIMED spacecraft/cleanroom. The output is a RealProducer picture.
Click Controls pulldown
Select Start
The output section should now match the input.

To end the PCAnywhere session, click the X button on the top right corner of the PCAnywhere window. DO NOT CLOSE THE REALPRODUCER WINDOW.
Click Yes to End Session.

19.0 Purge Monitor

The spacecraft purge monitor is connected to the BCU which has a telephone paging feature to notify appropriate personnel of any anomalies. The following describes the process of acknowledging alarms and also of checking the purge monitor status at any time.

Alarm Acknowledgement

When OMA-EXPRESS dials out with an alarm message, it will request acknowledgement before hanging up. Acknowledgement indicates to OMA-EXPRESS that the alarm message has been received. Upon acknowledgement, OMA_EXPRESS will cease the dial out sequence. The Red LED for the alarm will stop blinking and glow steady until the alarm condition has been resolved.

There are three ways that an alarm can be acknowledged: LOCALLY BY CODE, BY CALL-IN CODE ACKNOWLEDGEMENT and CALLBACK AUTOMATIC ACKNOWLEDGEMENT.

1. Local alarm acknowledgement: On the OMA-EXPRESS keyboard is the ALARM CANCEL key. When an alarm exists, press the ALARM CANCEL key to acknowledge the alarm.
   OMA-EXPRESS will say "OK" and the red LED for that input will stop blinking.

2. Code Acknowledgement: This feature allows you to call-in to OMA-EXPRESS from a touch-tone phone and enter the acknowledgement code. To do this, call APL at (240) 228-8232 after receiving a page from OMA-EXPRESS. When OMA-EXPRESS answers, you will receive the alarm dial out message followed by a request for alarm acknowledgement: "Please acknowledge". You have 10 seconds to enter the code "555" by pressing the corresponding key on the touch-tone phone keypad. If the correct code is entered within 10 seconds, it will say "OK. Have a nice day" to indicate that the alarm was acknowledged. The dial out sequence is stopped. The red LED will stop blinking and glow steady until the alarm condition is resolved.
   If you did not enter a correct code with 10 seconds, OMA-EXPRESS will say: "Have a good day" and hang up. The alarm has not yet been acknowledged.

3. Call-in automatic acknowledgement: To obtain a status report, call APL at (240) 228-8232. An example of what the unit will recite when it answers:
   This is 555-3833 (unit phone number)
   The temperature is xx degrees (current room temperature)
   The electricity is on (BCU power status)
   No alarm exists (alarm status)
   Listen for 15 seconds (on-site sound monitoring)
   OK
   (10 second wait)
   Have a good day (hangs up)

Appendix A: TIMED Acronym List

BC	Bus Controller
BCU	Blockhouse Control Unit
DTIU	Delta Tower Interface Unit
CV	Command Verification
FE	Front End
GPIB	General Purpose Interface Bus
GSE	Ground Support Equipment
MDC	Mission Data Center
MOC	Mission Operations Center
RFGSE	RF Ground Support Equipment
RT	Remote Terminal
SAS	Solar Array Simulator
S/C	Spacecraft
TC	Test Conductor
TIMED	Thermosphere Ionosphere Mesosphere Energetics and Dynamics
VAFB	Vandenburg Air Force Base

Appendix B: MOC/GSE Control Switchover
Memo titled: "What to do when the network link between MOC and S/C goes down, and you want to assume control of the TIMED spacecraft to LISA – Rev 2- 10/20/00"

1) How do you know that the network link between MOC and S/C has gone down?

   The following are symptoms that may indicate the link between APL and S/C has gone down, but they are inconclusive without further investigation:

   - Voice communications between APL and S/C stops working
   - Spacecraft and GSE telemetry stops updating

2) What do you do if voice communications between APL and S/C stops working?

   a. GSE TC re-establish voice communications with MOC TC via telephone
      - 240/228-8447
      - 240/228-8268

   b. If MOC TC is still receiving good spacecraft telemetry, GSE TC to re-establish voice communications with MOC by dialing into TIMED VCS (appendix C)

3) What do you do if you think the network link between APL and GSFC is down?

   a. MOC TC – check the status of the link from the following website and then look at the entry for timed-ext-hub at the bottom of this page. Green means the link is up, red means the link is down http://oliver.jhuapl.edu/bb/

   b. MOC TC - ping the following nodes: lisa, tmdc-ts3, timedfe2. If any of these are successful, the link is working, but there may be a problem with the MOC or MDC. If all are unsuccessful, make a decision as to whether or not we want to have the GSE TC assume control of the spacecraft.

   c. GSE TC – ping the following nodes: alf and ralph. If any of these are successful, the link is working, but there may be a problem with the MOC or MDC. If all are unsuccessful, make a decision with the MOC TC as to whether or not we want to have the GSE TC assume control of the spacecraft.

   d. GSE TC - On the sc3_rt stream viewer, you may check the status of the link by bringing up the **mdc_ts3_status.pag**. Check the value of MDRO_FRMDRP_41B (i.e. the MDC ts3 to ts1 connection frame drop counter). If it is incrementing, then the link between tmdc-ts3 and tmdc-ts1 is down. Make a decision with the MOC TC as to whether or not we want to have the GSE TC assume control of the spacecraft.

4) What is the procedure for the GSE TC to assume control of the spacecraft once you have decided that this is what you want to do?

a. GSE TC - You should already have an sc3_rt stream up on lisa. If not, bring up the sc3_rt stream on lisa. Note that the viewer selected for the sc3_rt stream at GSFC should be timed1_lisa.scr since this viewer sends snaps to the printer eleanor. Also note that the **tlm_on_sc3_rt.prc** STOL procedure should be used to start the flow of telemetry to your viewer once it is up on lisa. Normally, this viewer and that procedure are automatically selected and run when EPOCH is started.

b. GSE TC - Run the **cmd_lisa_dirs_sc3.prc** STOL procedure on the lisa sc3_rt stream. This reconfigures front-end 2 commanding to point to lisa. You can verify that this works by looking at the telemetry page **fe_tlm2_moc.pag** which can be launched via the "FE2 TLM" button at in the lower left hand corner of the viewer. Make sure that the value of CF01_HOST is "lisa" and the value of CF01_CONN is "connected".

c. Make sure that you are configured to command the correct side of the spacecraft by checking the point CMD_SIDE in the black rectangle towards the upper left corner of the viewer. If you need to change it to the other side, select COMMAND CONTROL in the same rectangle and select the proper IEM SIDE.

d. GSE TC - Run the **sync_ground_seqno.prc** STOL procedure on the lisa sc3_rt stream.

e. GSE TC - Send **cmd cd_no_op** on the lisa sc3_rt stream. Make sure that this command works.

f. GSE TC - Change BCU command socket from alf to lisa. This change is made at the BCU PC:
   - Press the labview stop button.
   - If the program doesn't stop, press the labview stop sign.
   - From the labview file menu, select exit. You should be back on the desktop.
   - Double click on the TIMED BCU_lisa_ver17.vi on the desktop to launch labview with the command socket on lisa.
   - Push the right arrow to start the labview program.

g. GSE TC - - Run the **bcu_resync_labview.prc** STOL procedure on the alf sc1 stream.

h. GSE TC - Repeat step f for the SAS if necessary.

i. GSE TC - Repeat step f for the RFGSE.

j. GSE TC – Run the procedure which matches the spacecraft's current mode:
   - cdh_bb_10kb
   - cdh_bb_4mb
   - cdh_rf_10kb
   - cdh_rf_4mb

k. MOC TC & GSE TC determine whether you want to power down the spacecraft

l. If so, GSE TC run the **sc_pwrdn.prc** or **sc_pwrdn_pad.prc** STOL procedure to power down the spacecraft.

5) What is the procedure for MOC TC to re-assume control of the spacecraft once the link is re-established and you have decided that this is what you want to do?

a. MOC TC - You should already have an sc1 stream up on alf. If not, bring up the sc1 stream on alf and run **tlm_on_sc.prc** STOL procedure. This is used to start the flow of telemetry to your viewer once it is up on alf.

b. MOC TC - Run the **cmd_alf_dirs.prc** STOL procedure on the alf sc1 stream. This reconfigures front-end 2 commanding to point to alf. You can verify that this works by looking at the telemetry page fe_tlm2_moc.pag which can be launched via the "FE2 TLM" button at in the lower left hand corner of the viewer. Make sure that the value of CF01_HOST is "alf" and the value of CF01_CONN is "connected".

c. Make sure that you are configured to command the correct side of the spacecraft by checking the point CMD_SIDE in the black rectangle towards the upper left corner of the viewer. If you need to change it to the other side, select COMMAND CONTROL in the same rectangle and select the proper IEM SIDE.

d. MOC TC - Run the **sync_ground_seqno.prc** STOL procedure on the alf sc1 stream.

e. MOC TC - Send **cmd cd_no_op** on the alf sc1 stream. Make sure that this command works.

f. GSE TC - Change BCU command socket from lisa to alf. This change is made at the BCU PC:
- Press the labview stop button.
- If the program doesn't stop, press the labview stop sign.
- From the labview file menu, select exit. You should be back on the desktop.
- Double click on the TIMED BCU_ver17.vi on the desktop to launch labview with the command socket on alf.
- Push the right arrow to start the labview program.

g. GSE TC - - Run the **bcu_resync_labview.prc** STOL procedure on the alf sc1 stream.
h. GSE TC - Repeat step f for the SAS if necessary.
i. GSE TC - Repeat step f for the RFGSE.
j. GSE TC – Run the procedure which matches the spacecraft's current mode:
- cdh_bb_10kb
- cdh_bb_4mb
- cdh_rf_10kb
- cdh_rf_4mb

Appendix C: Voice Network

1. Personnel Call Signs

Call Sign	Call Sign Description
MOCTC	MOC Test Conductor
ITC	VAFB S/C Test Conductor
PRO	VAFB S/C GSE personnel
SCF	APL Ground Station
C&DH	C&DH subsystem Engineer
G&C	G&C subsystem Engineer
POWER	Power subsystem Engineer
GNS	GNS subsystem Engineer
THERMAL	Thermal subsystem Engineer
RF	RF subsystem Engineer
MAE	Mission Autonomy Engineer
SME	Spacecraft Mechanical Engineer
GUVI	GUVI instrument Engineer
SABER	SABER instrument Engineer
SEE	SEE instrument Engineer
TIDI	TIDI instrument Engineer
ACOM	APL Communications Support Engineer
MDC	Mission Data Center
GSE	Ground System Engineer
STD	Spacecraft Test Director
SSE	Spacecraft System Engineer
SPM	Spacecraft Program Manager
NPM	NASA Program Manager
SQA	Spacecraft Quality Assurance
MOM	Mission Operations Manager

2. Channel Identifiers

Channel ID	Channel Description
S/C1	TIMED Launch Operations channel
S/C2	TIMED Engineering channel
S/C3	TIMED Management channel
MOPS1	TIMED Mission Operations channel 1
MOPS2	TIMED Mission Operations channel 2
MOPS3	TIMED Mission Operations channel 3
MOPS4	TIMED Mission Operations channel 4
TDRS1	TDRSS Coordination channel 1
TDRS2	TDRSS Coordination channel 2
CDOWN	Launch Countdown Primary channel
CDWNB	Launch Countdown Backup channel
FLGHT	Flight Commentary channel
WEATH	Range Weather Channel
BOOST	Booster Detank/Anomaly channel

3. Channel Usage Matrix

	S/C1	S/C2	S/C3	MOPS1	MOPS2	MOPS3	MOPS4	TDRS1	TDRS2
MOCTC	P	S	S	S	S	S	S	S	S
ITC	P								
GSE	P								
SCF	P			S				S	S

C&DH	P	S							
G&C	P	S							
POWER	P	S							
GNS	P	S							
THERMAL	P	S							
RF	P	S						S	S
MAE	P	S							
SME	P	S							
GUVI	P				S	S	S		
SABER	P				S	S	S		
SEE	P				S	S	S		
TIDI	P				S	S	S		
ACOM	P	S	S	S	S	S	S	S	S
MDC	P	S	S	S					
GSE	P	S	S	S					
STD	P	S							
SSE	P	S							
SPM	P	S							
NPM	P	S							
SQA	P	S							
MOM	P	S	S	S	S	S	S		

P = Primary channel used to communicate with the Test Conductor (MOC TC)
S = Secondary channel used to communicate with other personnel

4. Channel Descriptions

I. S/C 1 Channel

- S/C1 is the primary voice channel for the TIMED spacecraft test & launch operations.
- The MOC TC can be reached on S/C1 at all times.
- All other communications shall be conducted on alternate channels... (keep the chatter off this channel, except when communicating directly with the test conductor)

II. S/C 2 Channel

- S/C2 is the TIMED Engineering Team channel.
- S/C2 is used for anomaly troubleshooting and Engineering Team interaction.
- In the event of a S/C1 failure, S/C2 becomes the primary voice channel and the Engineering Team transfers to S/C3.

S/C 3 Channel

- S/C3 is the TIMED Management Team channel.
- S/C3 is used for Program Management,
- In the event of a S/C2 failure, S/C2 personnel transfer to S/C3 and share this asset with the TIMED Management Team.
- In the event of a S/C3 failure, S/C3 personnel transfer to S/C2 and share this asset with the Engineering Team.

MOPS1 Channel

- MOPS1 is the TIMED MOT flight operations channel

- In the event of a MOPS1 failure, MOPS2 becomes the primary flight operation channel and personnel on MOPS2 transfer to MOPS3.
- Personnel in the field cannot monitor MOPS1 channel.

MOPS2 Channel
- MOPS2 is an off line flight operations channel and the backup TIMED MOT flight operations channel.
- In the event of a MOPS1 failure, personnel transfer to MOPS2 and continue operations.
- Personnel in the field cannot monitor MOPS2 channel.

MOPS3 Channel
- MOPS3 is an off line flight operations channel
- Personnel in the field cannot monitor MOPS3 channel.

MOPS4 Channel
- MOPS4 is an off line flight operations channel
- Personnel in the field cannot monitor MOPS4 channel.

TDRS1 Channel
- TDRS1 is reserved for communication between the MOC TC and the TDRSS operations center for early ops support.
- Only the MOC TC, RF Engineer and SCF are authorized to talk on this channel.
- In the event of a TDRS1 failure, personnel transfer to TDRS2 and continue operations.
- Personnel in the field cannot monitor TDRS1 channel.

TDRS2 Channel
- TDRS2 is the backup for TDRS1, and is used for communication between the MOC TC and the TDRSS operations center for early ops support.
- Only the MOC TC and RF Engineer are authorized to talk on this channel.
- Personnel in the field cannot monitor TDRS2 channel.

CDOWN Channel
- CDOWN is the Launch Countdown voice channel.
- This channel is monitor only.

CDWNB Channel
- CDOWN is the backup Launch Countdown voice channel.
- This channel is monitor only.

FLGHT Channel
- FLGHT is the Delta II Flight Commentary voice channel.
- This channel is monitor only.

WEATH Channel
- WEATH is the Range Weather Status voice channel.
- This channel is monitor only.

BOOST Voice Channel
- BOOST is the Delta II Booster Detank/Anomaly voice channel.
- This channel is monitor only.

5. Language

- All parties on operational nets must speak clearly and slowly and be polite (you never know who is listening).

- It is helpful to use the phonetic alphabet process for acronyms such as "alpha", "bravo", "charley" ..."whiskey", "x-ray", "Yankee", "Zulu" and so forth.
- Use phrases such as "affirmative" (for yes), "negative" (for no), "copy" (for I understand),"standby" (for hold-on), "please repeat" (for what?).
- Do not use words such "hold" or "what" or "uh-huh". When the booster goes into the last few minutes of the terminal count, if the word "hold" is used on ANY net, the launch director will hold the launch. A great way to become famous - NOTE: ALL operational voice nets are recorded by the Range and NASA.

A – Alpha	J – Juliet	S – Sierra
B – Bravo	K – Kilo	T – Tango
C – Charlie	L – Lima	U – Uniform
D – Delta	M – Mike	V – Victor
E – Echo	N – November	W – Whiskey
F – Foxtrot	O – Oscar	X – X-ray
G – Golf	P – Papa	Y – Yankee
H – Hotel	Q – Quebec	Z – Zulu
I - India	R – Romeo	

6. Communication

- When trying to contact another party on any net: Identify the other person by his call sign and identify yourself by your call sign and the net you are using.

  Example: "MOCTC, this is the SCF on S/C1."

- If it turns out that the subject of discussion is not correct for that particular net, the parties need to decide whether to meet on another net or move to a black phone.
- Once the discussion is complete, both parties must sign off to ensure that the net is available for someone else. Example: "MOCTC is clear", "SCF is clear".

7. Remote Access via telephone

a. Dial one of the ten phone numbers (see list below)

- you will here the Passcode prompt (deedle, deedle, deedle)

Area code	Exchange	Extension	Information
240	228	see below	Washington, DC line
443	778	see below	Baltimore, MD line

Extension	User	Label
x5703	SEE	SEE
x5754	SABER	SABER
x5167	TIDI	TIDI
x5199	Generic	RA 1
x5699	Generic	RA 2
x5994	Generic	RA 3
x5997	Generic	RA 4
x5611	Generic	RA 5
x6960	Generic	RA 6
x5831	Generic	RA 7

b. Key in the Passcode (POCS or 7627)

- If accepted, you will here the Netcode prompt (doo, doo, doo, doo), followed by a quick beep.
- If denied, you will here Passcode prompt again. Re-enter Passcode.

Key in Netcode (see list below)

- If accepted, you will here a quick beep
- If denied, you will here dah duh. Re-enter Netcode.

Netcode	Function	Channel	Description
10	Talk/Listen	S/C1	TIMED S/C 1 channel
11	Talk/Listen	S/C2	TIMED S/C 2 channel
12	Talk/Listen	S/C3	TIMED S/C 3 channel
13	Talk/Listen	MOPS1	TIMED Mission Operations channel 1
14	Talk/Listen	MOPS2	TIMED Mission Operations channel 2
15	Talk/Listen	MOPS3	TIMED Mission Operations channel 3
16	Talk/Listen	MOPS4	TIMED Mission Operations channel 4
17	Talk/Listen	TDRS1	TDRSS Coordination channel 1
18	Talk/Listen	TDRS2	TDRSS Coordination channel 2
20	Listen	S/C1	TIMED S/C 1 channel
21	Listen	S/C2	TIMED S/C 2 channel
22	Listen	S/C3	TIMED S/C 3 channel
23	Listen	MOPS1	TIMED Mission Operations channel 1
24	Listen	MOPS2	TIMED Mission Operations channel 2
25	Listen	MOPS3	TIMED Mission Operations channel 3
26	Listen	MOPS4	TIMED Mission Operations channel 4
27	Listen	TDRS1	TDRSS Coordination channel 1
28	Listen	TDRS2	TDRSS Coordination channel 2
29	Listen	CDOWN	Launch Countdown Primary channel
30	Listen	CDWNB	Launch Countdown Backup channel
31	Listen	FLGHT	Flight Commentary channel
32	Listen	WEATH	Western Range Weather channel
33	Listen	BOOST	Booster Detank/Anomaly channel
00	Clear Last Path		
99	Clear All Talk/Listen Paths		

- Note – multiple netcodes can be keyed to setup multiple talk/listen paths. (See example)

Example:

To configure for talk/listen on S/C1, listen on S/C2, listen on S/C3, and listen on MOPS2:

- key in 10 (you will hear beep), then
- key in 21 (you will hear beep), then
- key in 22 (you will hear beep), then
- key in 24 (you will hear beep)

To reconfigure for talk/listen on S/C1, listen on S/C2, and listen on S/C3:

- key in 00, or
- key in 99, ten repeat steps 1,2, & 3 above

To reconfigure for talk/listen on S/C, and listen S/C2:

- key in 00, or
- key in 99, ten repeat steps 1 & 2

Support

- Make it clear that during launch operations, if you are experiencing a problem with a voice net, DO NOT just begin an independent Comm check.
- Contact the APL Communications Support engineer (call sign – ACOM) and he will report the problem to either the NEMO or the NASA MOD. They will coordinate troubleshooting (this is true for all Comm - not just voice).