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DOCUMENT

SOHO Central On-Board Software
Patch to Intermittent Recording to avoid Warm Startup

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1 INTRODUCTION

The second of three ESRs (ESR 27, 28 and 29) in early May 2012 also had a warm startup of the central data handling computer. It turned out the warm startup was caused by the Central On-Board Software (COBS) trying to command the Solid State Recorder (SSR) while the Remote Terminal Unit (RTU) through which the SSR command was sent was reconfigured by the ESR detection function. The first attempt to send the command did not succeed and the retry also failed (RTU reconfiguration takes several seconds), hence the COBS assumed a failure and restarted itself (warm startup).

Since a warm startup reloads the original code from PROM all patches are lost. This includes all the protections introduced to replace both failed attitude anomaly detectors. Therefore it is important to eliminate as many causes for a COBS warm startup as possible.

This technical note describes a small patch to the intermittent recording patch to avoid sending commands to the SSR while a RTU reconfiguration is on-going.

2 REFERENCE DOCUMENT

[RD1] COBS Intermittent Recording Patch – Technical Note, P-SHM-NOT-00012-SE, Issue 4, 2004-09-06.

3 SSR COMMANDING BY THE INTERMITTENT RECORDING PATCH

Because the intermittent recording patch has to examine every telemetry packet it does all its work on the high-priority 35 Hz cycle. All the user functions are executed on the 1 Hz low priority cycle. A single intermittent recording cycle is executed by a call to IntRecSW_Cyc. Here is the Ada code:

```
procedure IntRecSW_Cyc is

   -- Perform the following as part of the software cycle:
   --    1. Call RTU.Process, which was the statement replaced in SW_Cyc.
   --    2. Initialize the patch if ground has set InitPatch (true first time).
   --    3. Call all Process operations of the patch modules in bottom-up order.

begin

   RTU.Process;

   if IntRecGndIf.Par.InitPatch /= 0
   then
      IntRecGndIf.Initialize;   -- Also clears InitPatch parameter.
      PktBuf.Initialize;
      TM_Sync.Initialize;
      SSR.Initialize;
      Vc1Trk.Initialize;
```

```
      TM_Trf.Initialize;
   end if;

   TM_Sync.Process;
   SSR.Process;
   Vc1Trk.Process;
   TM_Trf.Process;

end IntRecSW_Cyc;
```

The SSR commanding is done by the procedure SSR.Process:

```
   procedure Process is

      -- Execute pending operations at their scheduled time.
      --
      -- Note: DefRec ensures operations are not scheduled for the same
      --       software cycle.

   begin

      for Op in RecOp_t
      loop

         if CmdTime (Op) > 0
         then
            CmdTime (Op) := CmdTime (Op) - 1;

            if CmdTime (Op) <= 0
            then
               PutCmd (Op);
            end if;
         end if;

      end loop;

   end Process;
```

The two possible operations (variable Op) are put SSR in Record and put SSR in Standby. For each operation there is a separate countdown timer (CmdTime(Op)). The OBDH command is sent in the cycle where the countdown timer reaches zero.
Note that when the timer has the value zero at procedure entry no command is sent.

The RTU reconfiguration is done in Ada package PCH (Peripheral Reconfiguration). When an RTU reconfiguration is triggered the AnomalyMode flag is set and all normal OBDH bus use is inhibited to avoid a warm startup. However the intermittent recording patch is unaware of the AnomalyMode flag.

The fix is simple: At each cycle check if AnomalyMode is set and if set zero the two countdown timers. This will inhibit the commanding of the SSR. The delicate timing of all the operations in the intermittent recording patch is not affected. The recorded telemetry will miss a few packets and if the standby command was suppressed some recorder space

will be wasted because recording continues till the next time the SSR is commanded to dtandby (extra VC0 packets and a lot of VC7 idle frames).

4 THE PATCH CODE

The patch occupies the memory area 0x9FDE to 0x9FE6 just after the “TCM in Macros” patch. The patch does the following:

- Replace call to SSR.Process at 0x9BFD in IntRecSW_Cyc at 0x983B with a call to this patch at 0x9FDE.
- Check the status of AnomalyMode by calling PCH.IsAnomalyMode at 0x2F7E.
- If AnomalyMode is set, zero the two countdown timers (array CmdTime(Op)) at 0xDA28 and 0XDA29.
- Continue execution at start of SSR.Process at 0x9BFD.

In assembly this looks as follows:

```
-------------------------------------------------------------------------------
                        MODULE FixIntRec
--                      ================
-------------------------------------------------------------------------------
-- ABSTRACT
--
--         Provides details for SOHO COBS SW patch
--
-----------------------------------------------------------------
-- Equates
-----------------------------------------------------------------
--
--    References to existing addresses
--
IS_ANOMALY_MODE         EQU     16#2F7E#
SSR_PROCESS             EQU     16#9BFD#
CMDTIME                 EQU     16#DA28#
--
--    Patch entry point
--
P_START                 EQU     16#9FDE#
--
--    Jump to patch (overwrite call to SSR.Process)
--
P_JUMP                  EQU     16#983B#
--
-----------------------------------------------------------------
--
INTRECFIX       CSECT   Instruction, ROM, Absolute
--
-----------------------------------------------------------------
--
--  Overwrite call to SSR.Process at 16#983B# with call to this patch
--
                ORG     P_JUMP
                SJS     15, P_START
--
--
--  Patch code located after TCM in macros patch
```

```
--
                ORG     P_START
                SJS     15, IS_ANOMALY_MODE
                BEZ     Out
                STC     0, CMDTIME     ; if anomaly mode zero out CmdTime
                STC     0, CMDTIME+1   ; this prevents start/stop SSR commands to execute
Out             JC      7, SSR_PROCESS

                END
```

The patch assembly listing can be found in Appendix A.

5 PATCH PROCEDURE

To load the patch use the following procedure:

- Prerequisite: COBS with Gyroless and Intermittent Recording patches loaded.

- Check TM mode (KKTMMODE) not HR/Record.
- Check Intermittent Record disabled (memory location 0xFC41 = 0x0000).
- Disable protection of memory area 0x9xxx:
  `KNK34000,0x01FF`
- Verify memory protection disabled for 0x9xxx.
- Put memory dump at address 0x9FDE.
- Expected values for area 0x9FDE - 0x9FE6 before patch: all zero.
- Load patch in area 0x9FDE - 0x9FE6:
  `KNK2C000,0x9FDE,0x7EF0,0x2F7E,0x7505,0x9100,0xDA28,0x9100,0xDA29,0x7070,0x9BFD`
- Verify patch area 0x9FDE - 0x9FE6 in memory dump.
- Put memory dump at 0x983B.
- Expected values for 0x983B - 0x983C: `0x7EF0,0x9BFD` (call to SSR.Process).
- Replace call to SSR.Process with call to this patch:
  `KNK2C000,0x983C,0x9FDE`
- Verify in memory dump (0x983B - 0x983C: `0x7EF0,0x9FDE`).
- Enable memory protection for 0x9xxx:
  `KNK34000,0x03FF`
- Verify memory protection enabled.

6 UNPATCH PROCEDURE

In case the patch needs to be removed follow the following procedure:

- Check TM mode (KKTMMODE) not HR/Record.
- Check Intermittent Record disabled (memory location 0xFC41 = 0000).
- Disable protection of memory area 0x9xxx:
  `KNK34000,0x01FF`
- Verify memory protection disabled for 0x9xxx.
- Put memory dump at 0x983B.
- Verify in memory dump area 0x983B - 0x983C: `0x7EF0,0x9FDE`.
- Restore original call to SSR.Process:

```
KNK2C000,0x983C,0x9BFD
```

- Verify in memory dump area 0x983B - 0x983C: `0x7EF0,0x9BFD`.
- Optionally zero out the patch code:
```
KNK2C000,0x9FDE,0x0000,0x0000,0x0000,0x0000,0x0000,0x0000,0x0000,0x0000,0x0000
```
- Enable memory protection for 0x9xxx:
```
KNK34000,0x03FF
```
- Verify memory protection enabled for 0x9xxx

7 MODULE TESTING

The module test consists of running several cycles of the patched SSR.Process function. The countdown timers at 0xDA28 for SSR Record and at 0xDA29 for SSR Standby are initialized to 1 and 2 respectively.
First we run three cycles with AnomalyMode (0xC9A7) set to false (= 0x0000). During the first cycle we expect the SSR Record command to be sent. On the second cycle the SSR Standby command should be sent and on the third cycle no commands should be sent.
Then we repeat the test but with AnomalyMode (0xC9A7) set to true (= 0xFFFF). Here we expect no commands to be sent and after the first cycle both countdown timers should be zero.
The test is executed using the simulator of the TLD Ada compiler. The detailed test steps are as follows:

- Load the patch

- Set break at OBDH.Put at 0x131D for check of parameters.
- Set program counter at call to SSR.Process at 0x983B.
- Set break after call to SSR.Process at 0x983D.
- Set CmdTime array for Record and Standby at 0xDA28 .. 0xDA29 to 1,2
- Clear AnomalyMode at 0xC9A7
- Run (should break at call to OBDH.Put)
- Check OBDH.Put call parameters: SVM RTU and ML address 4 (R3=0x0024) and SSR Record cmd (R4=0x1000)
- Continue (should break at 0x983D)
- Check CmdTime for Record=0 and Standby=1 and stack pointer back to 0xA2FF.
- Prepare for next cycle by resetting the program counter to 0x983B
- Run (should break at call to OBDH.Put)
- Check OBDH.Put call parameters: SVM RTU and ML address 4 (R3=0x0024) and SSR Standby cmd (R4=0x0001)
- Continue (should break at 0x983D)
- Check CmdTime for Record=0 and Standby=0 and stackpointer back to 0xA2FF.
- Prepare for last cycle (no OBDH commands) by resetting the program counter to 0x983B
- Run (should break at 0x983D)

- Set AnomalyMode at 0xC9A7 to true (0xFFFF)
- Set CmdTime for Record and Standby at 0xDA28 .. 0xDA29 to 1,2
- Set program counter to 0x983B

- Run (no OBDH commands, should break at 0x983D)
- Check CmdTime for Record=0 and Standby=0 and stackpointer back to 0xA2FF.

- End of test

The test performed as expected. The detailed test log (includes patch loading and instruction execution trace) can be found in Appendix B.

8 SPACECRAFT SIMULATOR TESTING

- Upload patch using the procedure in Section 5.
- Put memory dump on Intermittent Recording Status area (start address 0xFC60)
- Enable Intermittent Recording with a 'large' subset (e.g. VGMFL6). Using a large subset makes the counters below increase faster.

- Put data handling in Record.
- Watch following counters increase:
  0xFC62-0xFC63 Store Packet Counter
  0xFC66-0xFC67 Retrieve Packet Counter
  0xFC68-0xFC69 SSR Record Command Counter
  0xFC6A-0xFC6B SSR Standby Command Counter
- After a while put AnomalyMode variable to 0xFFFF:
  `KNK2C000,0xC9A7,0xFFFF`
- Expected: Store Packet and Retrieve Packet counters should continue to increase at the same rate as before. SSR Record and SSR Standby Command Counters should stop increasing.
- After a while put AnomalyMode back to 0x0000:
  `KNK2C000,0xC9A7,0x0000`
- Expected: Store Packet and Retrieve Packet counters should continue to increase at the same rate as before. SSR Record and SSR Standby Command counters should increase again at the same rate as at the start of the test.

The test was executed on August 15, 2012 and performed as expected. The page snaps from the simulator test are in Appendix C.
The first four snaps show the memory dumps before and after uploading the patch: k_ grp4_memdump1 through 4.
The remaining snaps are from the actual test:

Snap	Time (On-Board Time)	Description
k_grp4_memdump5	12-228-14:55:56.038	Subset loaded, IR inactive
k_grp4_memdump6	12-228-15:00:24.428	IR active, Anomaly Mode false
k_sw_status1	12-228-15:00:54.241	Anomaly Mode set
k_grp4_memdump7	12-228-15:02:53.491	IR active, Anomaly Mode set
k_sw_status2	12-228-15:03:23.303	Anomaly Mode cleared
k_grp4_memdump8	12-228-15:04:22.928	IR active, Anomaly Mode false
k_grp4_memdump9	12-228-15:05:52.392	IR inactive, End of Test

In the memory dump page snaps (k_grp4_memdump5 .. 9) the Store Packet counter is KK04DA60/61, the Retrieve Packet counter KK04DA64/65, the SSR Record command counter KK04DA66/67 and the SSR Standby Command counter KK04DA68/69.
Note that the SSR Record and SSR Standby counters stop increasing while Anomaly Mode is set, while the Store and Retrieve Packet counters continue to increase.
While the Intermittent Record patch is active the SSR Record counter is always one larger than the SSR Standby counter (meaning the SSR is recording at the time of the telemetry sample). When Intermittent Recording is disabled at the end of the test both the Store and Retrieve Packet counters are equal and the SSR Record and SSR Standby counters are equal as expected.

9 CONCLUSION

A small patch has been presented which prevents a warm startup during a RTU reconfiguration when Intermittent Recording is active. The patch has been module tested using the TLD Ada Simulator and verified on the spacecraft simulator.
It is recommended to include this patch in the TSTOL procedure which uploads the Intermittent Recording patch (k_ptch_intrec.prc).

Appendix A: Patch Assembly Listing

```
                                        . REGION  1
                                                CSECT
        000000                                  ORG             16#0#
        000000                          FIXINTREC
        000000                          FIXINTREC
                                        ------------------------------------------------------------------------------
                                                                MODULE FixIntRec
                                        --                      ================
                                        ------------------------------------------------------------------------------
                                        -- ABSTRACT
                                        --
                                        --         Provides details for SOHO COBS SW patch
                                        --
                                        ------------------------------------------------------------------
                                        -- Equates
                                        ------------------------------------------------------------------
                                        --
                                        --    References to existing addresses
                                        --
                2F7E                    IS_ANOMALY_MODE                 EQU     16#2F7E#
                9BFD                    SSR_PROCESS             EQU     16#9BFD#
                DA28                    CMDTIME                         EQU     16#DA28#
                                        --
                                        --    Patch entry point
                                        --
                9FDE                    P_START                         EQU     16#9FDE#
                                        --
                                        --    Jump to patch (overwrite call to SSR.Process)
                                        --
                983B                    P_JUMP                  EQU     16#983B#
                                        --
                                        ------------------------------------------------------------------
                                        --
        000000                          INTRECFIX       CSECT   Instruction, ROM, Absolute
```

```
                                        --
                                        ----------------------------------------------------------------
                                        --
                                        --    Overwrite call to SSR.Process at 16#983B# with call to this patch
                                        --
                                                        ORG     P_JUMP
000000                                          ORG             16#983B#
00983B      7E F 0  9FDE                                SJS     15, P_START
                                        --
                                        --
                                        --  Patch code located after TCM in macros patch
                                        --
                                                        ORG     P_START
00983D                                          ORG             16#9FDE#
009FDE      7E F 0  2F7E                                SJS     15, IS_ANOMALY_MODE
009FE0      75 05                                       BEZ     Out
009FE1      91 0 0  DA28                                STC     0, CMDTIME       ; if anomaly mode zero out CmdTime
009FE3      91 0 0  DA29                                STC     0, CMDTIME+1     ; this prevents start/stop SSR commands
009FE5      70 7 0  9BFD            Out                 JC      7, SSR_PROCESS

                                                        END
009FE7                                          ORG             16
```

Appendix B: Module Test Log

```
Log file started

TLD Ada Symbolic Debugger  VAX/1750A  V-3.1.H     6-AUG-2012  21:10:12
(c) TLD Systems, Ltd; 1992

1=> ! @setup.cmd
2=> ! ! Setup.cmd
2=> ! attach tldmps
TLD 1750A Multiple Processor System  v-1.3.3
(c) TLD Systems, Ltd; 1992
2=> ! ! Load COBS and patches
2=> ! load [-.cobsv14]start
Loading program to target
Loading at 16#0051A#
Loading at 16#00000#
Loading at 16#00000#
Loading at 16#073C3#
Loading at 16#07400#
Loading at 16#014AE#
Loading at 16#01811#
Loading at 16#01D5A#
Loading at 16#07906#
Loading at 16#0238B#
Loading at 16#027F6#
Loading at 16#07D88#
Loading at 16#02D5B#
Loading at 16#081C4#
Loading at 16#03569#
Loading at 16#03A9B#
Loading at 16#03FF3#
Loading at 16#04533#
Loading at 16#049AD#
Loading at 16#04EF2#
Loading at 16#0540D#
Loading at 16#05839#
Loading at 16#08686#
Loading at 16#05E54#
Loading at 16#06362#
Loading at 16#08AB3#
Loading at 16#06BDC#
Loading at 16#070F8#
Loading [-.cobsv14]START.trb
Loading [-.cobsv14]START.dbg
Proc   1  HALTED      Inst Count:*0                 Clock:*0.0
R0:*0000 *0000 *0000 *0000 *0000 *0000 *0000 *0000  IC:*0000 MK:*0000 SW:*0000
R8:*0000 *0000 *0000 *0000 *0000 *0000 *0000 *0000  PI:*0000 SU:*0   TSK:
Start at 16#0.0000#: JC        16#7#,16#30B#
2=> ! load [-.gyroless]gyroless_2
Loading program to target
Loading at 16#09001#
Loading at 16#09486#
Loading [-.gyroless]GYROLESS_2.trb
Loading [-.gyroless]GYROLESS_2.dbg
Proc   1  HALTED      Inst Count: 0                 Clock: 0.0
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC: 0000 MK: 0000 SW: 0000
R8: 0000  0000  0000  0000  0000  0000  0000  0000  PI: 0000 SU: 0   TSK:
Start at 16#0.0000#: JC        16#7#,16#30B#
```

```
2=> ! load [-.intrec]intrec_3
Loading program to target
Loading at 16#09821#
Loading at 16#09CFB#
Loading [-.intrec]INTREC_3.trb
Loading [-.intrec]INTREC_3.dbg
Proc   1  HALTED      Inst Count: 0                 Clock: 0.0
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC: 0000 MK: 0000 SW: 0000
R8: 0000  0000  0000  0000  0000  0000  0000  0000  PI: 0000 SU: 0   TSK:
Start at 16#0.0000#: JC        16#7#,16#30B#
2=> ! load [-.tcmmac]tcm_mac_2
Loading program to target
Loading at 16#09E74#
Loading [-.tcmmac]TCM_MAC_2.trb
Loading [-.tcmmac]TCM_MAC_2.dbg
Proc   1  HALTED      Inst Count: 0                 Clock: 0.0
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC: 0000 MK: 0000 SW: 0000
R8: 0000  0000  0000  0000  0000  0000  0000  0000  PI: 0000 SU: 0   TSK:
Start at 16#0.0000#: JC        16#7#,16#30B#
2=> ! ! Reload intermittent recording symbols
2=> ! load/symbols [-.intrec]intrec_3
Loading [-.intrec]intrec_3.trb
Loading [-.intrec]INTREC_3.dbg
2=> ! exa/ins 16#9831#..16#9842#
16#9831#: SJS       R15,TM_SYNC.INITIALIZE._40
16#9833#: SJS       R15,SSR.INITIALIZE._34
16#9835#: SJS       R15,VC1TRK.INITIALIZE._35
16#9837#: SJS       R15,TM_TRF.INITIALIZE._153
16#9839#: SJS       R15,TM_SYNC.PROCESS._48
16#983B#: SJS       R15,SSR.PROCESS._43
16#983D#: SJS       R15,VC1TRK.PROCESS._52
16#983F#: SJS       R15,TM_TRF.PROCESS._161
16#9841#: POPM      R1,R2
16#9842#: URS       R15
16#9843#: STC       16#0#,16#D8E3#
2=> ! exa/ins 16#9FD1#..16#9FFF#
16#9FD1#: ST        R4,16#ABFE#
16#9FD3#: STC       16#1#,16#1#,R15
16#9FD5#: STC       16#0#,16#A61F#
16#9FD7#: LB        R15,16#1#
16#9FD8#: LIM       R15,16#2#,R15
16#9FDA#: STB       R15,16#1#
16#9FDB#: POPM      R1,R5
16#9FDC#: URS       R15
16#9FDD#: URS       R15
16#9FDE#: LB        R12,16#0#
16#9FDF#: LB        R12,16#0#
16#9FE0#: LB        R12,16#0#
16#9FE1#: LB        R12,16#0#
16#9FE2#: LB        R12,16#0#
16#9FE3#: LB        R12,16#0#
16#9FE4#: LB        R12,16#0#
16#9FE5#: LB        R12,16#0#
16#9FE6#: LB        R12,16#0#
16#9FE7#: LB        R12,16#0#
16#9FE8#: LB        R12,16#0#
16#9FE9#: LB        R12,16#0#
16#9FEA#: LB        R12,16#0#
16#9FEB#: LB        R12,16#0#
16#9FEC#: LB        R12,16#0#
16#9FED#: LB        R12,16#0#
16#9FEE#: LB        R12,16#0#
```

```
16#9FEF#: LB        R12,16#0#
16#9FF0#: LB        R12,16#0#
16#9FF1#: LB        R12,16#0#
16#9FF2#: LB        R12,16#0#
16#9FF3#: LB        R12,16#0#
16#9FF4#: LB        R12,16#0#
16#9FF5#: LB        R12,16#0#
16#9FF6#: LB        R12,16#0#
16#9FF7#: LB        R12,16#0#
16#9FF8#: LB        R12,16#0#
16#9FF9#: LB        R12,16#0#
16#9FFA#: LB        R12,16#0#
16#9FFB#: LB        R12,16#0#
16#9FFC#: LB        R12,16#0#
16#9FFD#: LB        R12,16#0#
16#9FFE#: LB        R12,16#0#
16#9FFF#: STCI      16#4#,16#0#,R9
2=> ! ! Load our patch
2=> ! mod/hex 16#9FDE#..16#9FE6#:=7EF0,2F7E,7505,9100,DA28,9100,DA29,7070,9BFD
2=> ! ! Overwrite call to SSR.Process with call to our patch
2=> ! mod/hex 16#983C#:=9FDE
2=> ! ! Dump and check
2=> ! exa/ins 16#9831#..16#9842#
16#9831#: SJS       R15,TM_SYNC.INITIALIZE._40
16#9833#: SJS       R15,SSR.INITIALIZE._34
16#9835#: SJS       R15,VC1TRK.INITIALIZE._35
16#9837#: SJS       R15,TM_TRF.INITIALIZE._153
16#9839#: SJS       R15,TM_SYNC.PROCESS._48
16#983B#: SJS       R15,16#9FDE#
16#983D#: SJS       R15,VC1TRK.PROCESS._52
16#983F#: SJS       R15,TM_TRF.PROCESS._161
16#9841#: POPM      R1,R2
16#9842#: URS       R15
16#9843#: STC       16#0#,16#D8E3#
2=> ! exa/ins 16#9FD1#..16#9FEF#
16#9FD1#: ST        R4,16#ABFE#
16#9FD3#: STC       16#1#,16#1#,R15
16#9FD5#: STC       16#0#,16#A61F#
16#9FD7#: LB        R15,16#1#
16#9FD8#: LIM       R15,16#2#,R15
16#9FDA#: STB       R15,16#1#
16#9FDB#: POPM      R1,R5
16#9FDC#: URS       R15
16#9FDD#: URS       R15
16#9FDE#: SJS       R15,16#2F7E#
16#9FE0#: BEZ       16#9FE5#
16#9FE1#: STC       16#0#,16#DA28#
16#9FE3#: STC       16#0#,16#DA29#
16#9FE5#: JC        16#7#,SSR.PROCESS._43
16#9FE7#: LB        R12,16#0#
16#9FE8#: LB        R12,16#0#
16#9FE9#: LB        R12,16#0#
16#9FEA#: LB        R12,16#0#
16#9FEB#: LB        R12,16#0#
16#9FEC#: LB        R12,16#0#
16#9FED#: LB        R12,16#0#
16#9FEE#: LB        R12,16#0#
16#9FEF#: LB        R12,16#0#
16#9FF0#: LB        R12,16#0#
2=> ! ! Put an immediate return in OBDH.Put
2=> ! mod/hex 16#131D#:=7FF0
2=> ! ! Put stack pointer ar A2FF
```

```
2=> ! mod/hex \rf:=A2FF
Proc   1  HALTED      Inst Count: 0                 Clock: 0.0
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC: 0000 MK: 0000 SW: 0000
R8: 0000  0000  0000  0000  0000  0000  0000 *A2FF  PI: 0000 SU: 0   TSK:
2=> ! !
2=> ! exit
1=> ! !
1=> ! ! Set break at OBDH.Put (for check of parameters)
1=> ! set break 16#131D#
Breakpoint    1  at  16#131D#
    Action:  HALT execution
1=> ! !
1=> ! ! Set program counter at call to SSR.Process
1=> ! mod/hex \ic:=983b
Proc   1  HALTED      Inst Count: 0                 Clock: 0.0
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC:*983B MK: 0000 SW: 0000
R8: 0000  0000  0000  0000  0000  0000  0000  A2FF  PI: 0000 SU: 0   TSK:
1=> ! !
1=> ! ! Set break after call to SSR.Process
1=> ! set break 16#983d#
Breakpoint    2  at  16#983D#
    Action:  HALT execution
1=> ! !
1=> ! ! Set CmdTime for Record and Standby
1=> ! mod/hex 16#da28#..+1:=1,2
1=> ! !
1=> ! ! Clear AnomalyMode
1=> ! mod/hex 16#c9a7#:=0
1=> ! !
1=> ! ! Run
1=> ! trace/ins/into 200
16#0.9FDE#: SJS       R15,16#2F7E#
( 16#0.2F7E# ) PCH.ISANOMALYMODE/$ISECT$+16#0000#: L         R2,16#C9A7#
( 16#0.2F80# ) PCH.ISANOMALYMODE/$ISECT$+16#0002#: URS       R15
16#0.9FE0#: BEZ       16#9FE5#
16#0.9FE5#: JC        16#7#,SSR.PROCESS._43
( 16#0.9BFD# ) SSR.PROCESS._43+16#0000#: PSHM      R2,R12
( 16#0.9BFE# ) SSR.PROCESS._43+16#0001#: LIM       R15,16#FFFF#,R15
( 16#0.9C00# ) SSR.PROCESS._45+16#0000#: SR        R12,R12
( 16#0.9C01# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C02# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C04# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C05# ) SSR.PROCESS._47+16#0000#: SISP      R11,16#1#
( 16#0.9C06# ) SSR.PROCESS._47+16#0001#: ST        R11,16#DA28#,R2
( 16#0.9C08# ) SSR.PROCESS._48+16#0000#: BGT       SSR.PROCESS._52
( 16#0.9C09# ) SSR.PROCESS._49+16#0000#: LR        R3,R12
( 16#0.9C0A# ) SSR.PROCESS._49+16#0001#: SJS       R15,SSR.PUTCMD._20
( 16#0.9B98# ) SSR.PUTCMD._20+16#0000#: PSHM      R0,R11
( 16#0.9B99# ) SSR.PUTCMD._20+16#0001#: LIM       R15,16#FFFC#,R15
( 16#0.9B9B# ) SSR.PUTCMD._22+16#0000#: SJS       R15,INTRECGNDIF.STS._22
( 16#0.9A10# ) INTRECGNDIF.STS._22+16#0000#: LIM       R2,16#FC60#
( 16#0.9A12# ) INTRECGNDIF.STS._23+16#0000#: URS       R15
( 16#0.9B9D# ) SSR.PUTCMD._26+16#0000#: STB       R15,16#3#
( 16#0.9B9E# ) SSR.PUTCMD._26+16#0001#: SJS       R15,INTRECGNDIF.PAR._18
( 16#0.9A0D# ) INTRECGNDIF.PAR._18+16#0000#: LIM       R2,16#FC40#
( 16#0.9A0F# ) INTRECGNDIF.PAR._19+16#0000#: URS       R15
( 16#0.9BA0# ) SSR.PUTCMD._26+16#0003#: L         R11,16#1B#,R2
( 16#0.9BA2# ) SSR.PUTCMD._26+16#0005#: BEZ       SSR.PUTCMD._25
( 16#0.9BA4# ) SSR.PUTCMD._25+16#0000#: L         R2,16#DA27#
( 16#0.9BA6# ) SSR.PUTCMD._25+16#0002#: MISP      R2,16#4#
( 16#0.9BA7# ) SSR.PUTCMD._25+16#0003#: DL        R0,16#9DD7#,R2
( 16#0.9BA9# ) SSR.PUTCMD._25+16#0005#: DSTB      R15,16#0#
```

```
( 16#0.9BAA# ) SSR.PUTCMD._25+16#0006#: BR        SSR.PUTCMD._28
( 16#0.9BB1# ) SSR.PUTCMD._28+16#0000#: LR        R2,R3
( 16#0.9BB2# ) SSR.PUTCMD._28+16#0001#: L         R5,16#9DE3#,R3
( 16#0.9BB4# ) SSR.PUTCMD._28+16#0003#: L         R4,16#1#,R15
( 16#0.9BB6# ) SSR.PUTCMD._28+16#0005#: L         R3,16#0#,R15
( 16#0.9BB8# ) SSR.PUTCMD._28+16#0007#: SJS       R15,16#148A#
( 16#0.148A# ) RTU.PUTML/$ISECT$+16#0000#: PSHM      R0,R5
( 16#0.148B# ) RTU.PUTML/$ISECT$+16#0001#: LIM       R15,16#FFFD#,R15
( 16#0.148D# ) RTU.PUTML/$ISECT$+16#0003#: DL        R0,16#51E#
( 16#0.148F# ) RTU.PUTML/$ISECT$+16#0005#: DSTB      R15,16#1#
( 16#0.1490# ) RTU.PUTML/$ISECT$+16#0006#: LR        R2,R4
( 16#0.1491# ) RTU.PUTML/$ISECT$+16#0007#: LISP      R4,16#7#
( 16#0.1492# ) RTU.PUTML/$ISECT$+16#0008#: DSLL      R3,16#5#
( 16#0.1493# ) RTU.PUTML/$ISECT$+16#0009#: SRM       R3,16#1#,R15
( 16#0.1495# ) RTU.PUTML/$ISECT$+16#000B#: LIM       R3,16#1F#
( 16#0.1497# ) RTU.PUTML/$ISECT$+16#000D#: SRM       R2,16#1#,R15
( 16#0.1499# ) RTU.PUTML/$ISECT$+16#000F#: ST        R5,16#2#,R15
( 16#0.149B# ) RTU.PUTML/$ISECT$+16#0011#: DL        R3,16#1#,R15
( 16#0.149D# ) RTU.PUTML/$ISECT$+16#0013#: SJS       R15,16#131D#
( 16#0.131D# ) OBDH.PUT/$ISECT$+16#0000#: URS       R15
Proc   1  HALTED      Inst Count:*51                Clock:*0.000_022_7
R0: 0000  0000 *0004 *0024 *1000 *1000  0000  0000  IC:*131D MK: 0000 SW:*4000
R8: 0000  0000  0000  0000  0000  0000  0000 *A2D6  PI: 0000 SU: 0   TSK:
BP taken at OBDH.PUT/$ISECT$: URS       R15
1=> ! !
1=> ! ! Check call parameters: SVM RTU and ML address 4 (R3=0x0024) and SSR Record cmd
(R4=0x1000)
1=> ! ! Continue
1=> ! trace/ins/into 200
( 16#0.149F# ) RTU.PUTML/$ISECT$+16#0015#: LIM       R15,16#3#,R15
( 16#0.14A1# ) RTU.PUTML/$ISECT$+16#0017#: POPM      R0,R5
( 16#0.14A2# ) RTU.PUTML/$ISECT$+16#0018#: URS       R15
( 16#0.9BBA# ) SSR.PUTCMD._31+16#0000#: LR        R2,R2
( 16#0.9BBB# ) SSR.PUTCMD._31+16#0001#: BEZ       SSR.PUTCMD._30
( 16#0.9BBD# ) SSR.PUTCMD._30+16#0000#: DL        R2,16#9823#
( 16#0.9BBF# ) SSR.PUTCMD._30+16#0002#: L         R1,16#3#,R15
( 16#0.9BC1# ) SSR.PUTCMD._30+16#0004#: DA        R2,16#8#,R1
( 16#0.9BC3# ) SSR.PUTCMD._30+16#0006#: DST       R2,16#8#,R1
( 16#0.9BC5# ) SSR.PUTCMD._30+16#0008#: BR        SSR.PUTCMD._33
( 16#0.9BCE# ) SSR.PUTCMD._33+16#0000#: LIM       R15,16#4#,R15
( 16#0.9BD0# ) SSR.PUTCMD._33+16#0002#: POPM      R0,R11
( 16#0.9BD1# ) SSR.PUTCMD._33+16#0003#: URS       R15
( 16#0.9C0C# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C0D# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C0E# ) SSR.PROCESS._52+16#0002#: AISP      R12,16#1#
( 16#0.9C0F# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C10# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C12# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C13# ) SSR.PROCESS._47+16#0000#: SISP      R11,16#1#
( 16#0.9C14# ) SSR.PROCESS._47+16#0001#: ST        R11,16#DA28#,R2
( 16#0.9C16# ) SSR.PROCESS._48+16#0000#: BGT       SSR.PROCESS._52
( 16#0.9C1A# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C1B# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C1E# ) SSR.PROCESS._53+16#0000#: LIM       R15,16#1#,R15
( 16#0.9C20# ) SSR.PROCESS._53+16#0002#: POPM      R2,R12
( 16#0.9C21# ) SSR.PROCESS._53+16#0003#: URS       R15
( 16#0.983D# ) INTRECSW_CYC._22+16#0000#: SJS       R15,VC1TRK.PROCESS._52
Proc   1  HALTED      Inst Count:*79                Clock:*0.000_036_3
R0: 0000  0000 *0000 *0000 *0000 *0000  0000  0000  IC:*983D MK: 0000 SW:*1000
R8: 0000  0000  0000  0000  0000  0000  0000 *A2FF  PI: 0000 SU: 0   TSK:
BP taken at INTRECSW_CYC._22: SJS       R15,VC1TRK.PROCESS._52
1=> ! !
```

```
1=> ! ! Check CmdTime for Record=0 and Standby=1
1=> ! exa/hex 16#da28#..+1
16#DA28#: 16#0#
16#DA29#: 16#1#
1=> ! !
1=> ! ! Prepare for next cycle
1=> ! mod/hex \ic:=983b
Proc   1  HALTED      Inst Count: 79                Clock: 0.000_036_3
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC:*983B MK: 0000 SW: 1000
R8: 0000  0000  0000  0000  0000  0000  0000  A2FF  PI: 0000 SU: 0   TSK:
1=> ! !
1=> ! ! Run
1=> ! trace/ins/into 200
16#0.9FDE#: SJS       R15,16#2F7E#
( 16#0.2F7E# ) PCH.ISANOMALYMODE/$ISECT$+16#0000#: L         R2,16#C9A7#
( 16#0.2F80# ) PCH.ISANOMALYMODE/$ISECT$+16#0002#: URS       R15
16#0.9FE0#: BEZ       16#9FE5#
16#0.9FE5#: JC        16#7#,SSR.PROCESS._43
( 16#0.9BFD# ) SSR.PROCESS._43+16#0000#: PSHM      R2,R12
( 16#0.9BFE# ) SSR.PROCESS._43+16#0001#: LIM       R15,16#FFFF#,R15
( 16#0.9C00# ) SSR.PROCESS._45+16#0000#: SR        R12,R12
( 16#0.9C01# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C02# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C04# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C0C# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C0D# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C0E# ) SSR.PROCESS._52+16#0002#: AISP      R12,16#1#
( 16#0.9C0F# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C10# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C12# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C13# ) SSR.PROCESS._47+16#0000#: SISP      R11,16#1#
( 16#0.9C14# ) SSR.PROCESS._47+16#0001#: ST        R11,16#DA28#,R2
( 16#0.9C16# ) SSR.PROCESS._48+16#0000#: BGT       SSR.PROCESS._52
( 16#0.9C17# ) SSR.PROCESS._49+16#0000#: LR        R3,R12
( 16#0.9C18# ) SSR.PROCESS._49+16#0001#: SJS       R15,SSR.PUTCMD._20
( 16#0.9B98# ) SSR.PUTCMD._20+16#0000#: PSHM      R0,R11
( 16#0.9B99# ) SSR.PUTCMD._20+16#0001#: LIM       R15,16#FFFC#,R15
( 16#0.9B9B# ) SSR.PUTCMD._22+16#0000#: SJS       R15,INTRECGNDIF.STS._22
( 16#0.9A10# ) INTRECGNDIF.STS._22+16#0000#: LIM       R2,16#FC60#
( 16#0.9A12# ) INTRECGNDIF.STS._23+16#0000#: URS       R15
( 16#0.9B9D# ) SSR.PUTCMD._26+16#0000#: STB       R15,16#3#
( 16#0.9B9E# ) SSR.PUTCMD._26+16#0001#: SJS       R15,INTRECGNDIF.PAR._18
( 16#0.9A0D# ) INTRECGNDIF.PAR._18+16#0000#: LIM       R2,16#FC40#
( 16#0.9A0F# ) INTRECGNDIF.PAR._19+16#0000#: URS       R15
( 16#0.9BA0# ) SSR.PUTCMD._26+16#0003#: L         R11,16#1B#,R2
( 16#0.9BA2# ) SSR.PUTCMD._26+16#0005#: BEZ       SSR.PUTCMD._25
( 16#0.9BA4# ) SSR.PUTCMD._25+16#0000#: L         R2,16#DA27#
( 16#0.9BA6# ) SSR.PUTCMD._25+16#0002#: MISP      R2,16#4#
( 16#0.9BA7# ) SSR.PUTCMD._25+16#0003#: DL        R0,16#9DD7#,R2
( 16#0.9BA9# ) SSR.PUTCMD._25+16#0005#: DSTB      R15,16#0#
( 16#0.9BAA# ) SSR.PUTCMD._25+16#0006#: BR        SSR.PUTCMD._28
( 16#0.9BB1# ) SSR.PUTCMD._28+16#0000#: LR        R2,R3
( 16#0.9BB2# ) SSR.PUTCMD._28+16#0001#: L         R5,16#9DE3#,R3
( 16#0.9BB4# ) SSR.PUTCMD._28+16#0003#: L         R4,16#1#,R15
( 16#0.9BB6# ) SSR.PUTCMD._28+16#0005#: L         R3,16#0#,R15
( 16#0.9BB8# ) SSR.PUTCMD._28+16#0007#: SJS       R15,16#148A#
( 16#0.148A# ) RTU.PUTML/$ISECT$+16#0000#: PSHM      R0,R5
( 16#0.148B# ) RTU.PUTML/$ISECT$+16#0001#: LIM       R15,16#FFFD#,R15
( 16#0.148D# ) RTU.PUTML/$ISECT$+16#0003#: DL        R0,16#51E#
( 16#0.148F# ) RTU.PUTML/$ISECT$+16#0005#: DSTB      R15,16#1#
( 16#0.1490# ) RTU.PUTML/$ISECT$+16#0006#: LR        R2,R4
( 16#0.1491# ) RTU.PUTML/$ISECT$+16#0007#: LISP      R4,16#7#
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( 16#0.1492# ) RTU.PUTML/$ISECT$+16#0008#: DSLL      R3,16#5#
( 16#0.1493# ) RTU.PUTML/$ISECT$+16#0009#: SRM       R3,16#1#,R15
( 16#0.1495# ) RTU.PUTML/$ISECT$+16#000B#: LIM       R3,16#1F#
( 16#0.1497# ) RTU.PUTML/$ISECT$+16#000D#: SRM       R2,16#1#,R15
( 16#0.1499# ) RTU.PUTML/$ISECT$+16#000F#: ST        R5,16#2#,R15
( 16#0.149B# ) RTU.PUTML/$ISECT$+16#0011#: DL        R3,16#1#,R15
( 16#0.149D# ) RTU.PUTML/$ISECT$+16#0013#: SJS       R15,16#131D#
( 16#0.131D# ) OBDH.PUT/$ISECT$+16#0000#: URS       R15
Proc   1  HALTED      Inst Count:*136               Clock:*0.000_060_4
R0: 0000  0000 *0004 *0024 *0001 *0001  0000  0000  IC:*131D MK: 0000 SW:*4000
R8: 0000  0000  0000  0000 *0001  0000  0000 *A2D6  PI: 0000 SU: 0   TSK:
BP taken at OBDH.PUT/$ISECT$: URS       R15
1=> ! !
1=> ! ! Check call parameters: SVM RTU and ML address 4 (R3=0x0024) and SSR Standby cmd
(R4=0x0001)
1=> ! ! Continue
1=> ! trace/ins/into 200
( 16#0.149F# ) RTU.PUTML/$ISECT$+16#0015#: LIM       R15,16#3#,R15
( 16#0.14A1# ) RTU.PUTML/$ISECT$+16#0017#: POPM      R0,R5
( 16#0.14A2# ) RTU.PUTML/$ISECT$+16#0018#: URS       R15
( 16#0.9BBA# ) SSR.PUTCMD._31+16#0000#: LR        R2,R2
( 16#0.9BBB# ) SSR.PUTCMD._31+16#0001#: BEZ       SSR.PUTCMD._30
( 16#0.9BBC# ) SSR.PUTCMD._31+16#0002#: BR        SSR.PUTCMD._31
( 16#0.9BC6# ) SSR.PUTCMD._31+16#0000#: DL        R2,16#9823#
( 16#0.9BC8# ) SSR.PUTCMD._31+16#0002#: L         R1,16#3#,R15
( 16#0.9BCA# ) SSR.PUTCMD._31+16#0004#: DA        R2,16#A#,R1
( 16#0.9BCC# ) SSR.PUTCMD._31+16#0006#: DST       R2,16#A#,R1
( 16#0.9BCE# ) SSR.PUTCMD._33+16#0000#: LIM       R15,16#4#,R15
( 16#0.9BD0# ) SSR.PUTCMD._33+16#0002#: POPM      R0,R11
( 16#0.9BD1# ) SSR.PUTCMD._33+16#0003#: URS       R15
( 16#0.9C1A# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C1B# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C1E# ) SSR.PROCESS._53+16#0000#: LIM       R15,16#1#,R15
( 16#0.9C20# ) SSR.PROCESS._53+16#0002#: POPM      R2,R12
( 16#0.9C21# ) SSR.PROCESS._53+16#0003#: URS       R15
( 16#0.983D# ) INTRECSW_CYC._22+16#0000#: SJS       R15,VC1TRK.PROCESS._52
Proc   1  HALTED      Inst Count:*155               Clock:*0.000_071_8
R0: 0000  0000 *0000 *0000 *0000 *0000  0000  0000  IC:*983D MK: 0000 SW:*1000
R8: 0000  0000  0000  0000 *0000  0000  0000 *A2FF  PI: 0000 SU: 0   TSK:
BP taken at INTRECSW_CYC._22: SJS       R15,VC1TRK.PROCESS._52
1=> ! !
1=> ! ! Check CmdTime for Record=0 and Standby=0
1=> ! exa/hex 16#da28#..+1
16#DA28#: 16#0#
16#DA29#: 16#0#
1=> ! !
1=> ! ! Prepare for last cycle (no OBDH commands)
1=> ! mod/hex \ic:=983b
Proc   1  HALTED      Inst Count: 155               Clock: 0.000_071_8
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC:*983B MK: 0000 SW: 1000
R8: 0000  0000  0000  0000  0000  0000  0000  A2FF  PI: 0000 SU: 0   TSK:
1=> ! !
1=> ! ! Run
1=> ! trace/ins/into 200
16#0.9FDE#: SJS       R15,16#2F7E#
( 16#0.2F7E# ) PCH.ISANOMALYMODE/$ISECT$+16#0000#: L         R2,16#C9A7#
( 16#0.2F80# ) PCH.ISANOMALYMODE/$ISECT$+16#0002#: URS       R15
16#0.9FE0#: BEZ       16#9FE5#
16#0.9FE5#: JC        16#7#,SSR.PROCESS._43
( 16#0.9BFD# ) SSR.PROCESS._43+16#0000#: PSHM      R2,R12
( 16#0.9BFE# ) SSR.PROCESS._43+16#0001#: LIM       R15,16#FFFF#,R15
( 16#0.9C00# ) SSR.PROCESS._45+16#0000#: SR        R12,R12
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( 16#0.9C01# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C02# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C04# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C0C# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C0D# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C0E# ) SSR.PROCESS._52+16#0002#: AISP      R12,16#1#
( 16#0.9C0F# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C10# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C12# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C1A# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C1B# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C1E# ) SSR.PROCESS._53+16#0000#: LIM       R15,16#1#,R15
( 16#0.9C20# ) SSR.PROCESS._53+16#0002#: POPM      R2,R12
( 16#0.9C21# ) SSR.PROCESS._53+16#0003#: URS       R15
( 16#0.983D# ) INTRECSW_CYC._22+16#0000#: SJS       R15,VC1TRK.PROCESS._52
Proc   1  HALTED      Inst Count:*178               Clock:*0.000_082_3
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC:*983D MK: 0000 SW: 1000
R8: 0000  0000  0000  0000  0000  0000  0000  A2FF  PI: 0000 SU: 0   TSK:
BP taken at INTRECSW_CYC._22: SJS       R15,VC1TRK.PROCESS._52
1=> ! !
1=> ! ! Now set AnomalyMode to true
1=> ! mod/hex 16#c9a7#:=ffff
1=> ! !
1=> ! ! Set CmdTime for Record and Standby
1=> ! mod/hex 16#da28#..+1:=1,2
1=> ! !
1=> ! ! Reset program counter
1=> ! mod/hex \ic:=983b
Proc   1  HALTED      Inst Count: 178               Clock: 0.000_082_3
R0: 0000  0000  0000  0000  0000  0000  0000  0000  IC:*983B MK: 0000 SW: 1000
R8: 0000  0000  0000  0000  0000  0000  0000  A2FF  PI: 0000 SU: 0   TSK:
1=> ! !
1=> ! ! Run (no OBDH commands)
1=> ! trace/ins/into 200
16#0.9FDE#: SJS       R15,16#2F7E#
( 16#0.2F7E# ) PCH.ISANOMALYMODE/$ISECT$+16#0000#: L         R2,16#C9A7#
( 16#0.2F80# ) PCH.ISANOMALYMODE/$ISECT$+16#0002#: URS       R15
16#0.9FE0#: BEZ       16#9FE5#
16#0.9FE1#: STC       16#0#,16#DA28#
16#0.9FE3#: STC       16#0#,16#DA29#
16#0.9FE5#: JC        16#7#,SSR.PROCESS._43
( 16#0.9BFD# ) SSR.PROCESS._43+16#0000#: PSHM      R2,R12
( 16#0.9BFE# ) SSR.PROCESS._43+16#0001#: LIM       R15,16#FFFF#,R15
( 16#0.9C00# ) SSR.PROCESS._45+16#0000#: SR        R12,R12
( 16#0.9C01# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C02# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C04# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C0C# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C0D# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C0E# ) SSR.PROCESS._52+16#0002#: AISP      R12,16#1#
( 16#0.9C0F# ) SSR.PROCESS._46+16#0000#: LR        R2,R12
( 16#0.9C10# ) SSR.PROCESS._46+16#0001#: L         R11,16#DA28#,R2
( 16#0.9C12# ) SSR.PROCESS._46+16#0003#: BLE       SSR.PROCESS._52
( 16#0.9C1A# ) SSR.PROCESS._52+16#0000#: LR        R12,R12
( 16#0.9C1B# ) SSR.PROCESS._52+16#0001#: BNZ       SSR.PROCESS._53
( 16#0.9C1E# ) SSR.PROCESS._53+16#0000#: LIM       R15,16#1#,R15
( 16#0.9C20# ) SSR.PROCESS._53+16#0002#: POPM      R2,R12
( 16#0.9C21# ) SSR.PROCESS._53+16#0003#: URS       R15
( 16#0.983D# ) INTRECSW_CYC._22+16#0000#: SJS       R15,VC1TRK.PROCESS._52
Proc   1  HALTED      Inst Count:*203               Clock:*0.000_093_6
R0: 0000  0000 *FFFF  0000  0000  0000  0000  0000  IC:*983D MK: 0000 SW: 1000
R8: 0000  0000  0000  0000  0000  0000  0000  A2FF  PI: 0000 SU: 0   TSK:
```

```
BP taken at INTRECSW_CYC._22: SJS       R15,VC1TRK.PROCESS._52
1=> ! !
1=> ! ! Check CmdTime for Record=0 and Standby=0
1=> ! exa/hex 16#da28#..+1
16#DA28#: 16#0#
16#DA29#: 16#0#
1=> ! !
1=> ! ! End of test
1=> ! exit
=>
=> exit
Exiting Debugger.
```

Appendix C: Spacecraft Simulator Test Page Snaps

C.1: k_grp4_memdump1

```
UTC:    12-228-14:45:07.027      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2475
TAI:    12-228-14:45:40.807      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   IDLE            VC1:   42174
OBT:   12-228-14:45:14.888       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be1480  IDI     UTC       12-228-14:45:07.0
KKGROENT               0IDI*  KKLOBTF        6000    IDI     OKKLOBTS  12-228-14:45:20.0


CDMU MEMORY DUMP
KK04ADR        9fde    IDI KK04DUMP (LABEL)

KK04DA00         0IDI*  KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78         0IDI*
KK04DA01         0IDI*  KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02         0IDI*  KK04DA28         0IDI*   KK04DA54         0IDI*   KK04DA80         0IDI*
KK04DA03         0IDI*  KK04DA29         0IDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04         0IDI*  KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
KK04DA05         0IDI*  KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06         0IDI*  KK04DA32         0IDI*   KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07         0IDI*  KK04DA33      9249IDI    KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08         0IDI*  KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09         0IDI*  KK04DA35         0IDI*   KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10         0IDI*  KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11         0IDI*  KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12         0IDI*  KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13         0IDI*  KK04DA39         0IDI*   KK04DA65         0IDI*   KK04DA91         0IDI*
KK04DA14         0IDI*  KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15         0IDI*  KK04DA41         0IDI*   KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16         0IDI*  KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17         0IDI*  KK04DA43         0IDI*   KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18         0IDI*  KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19         0IDI*  KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20         0IDI*  KK04DA46         0IDI*   KK04DA72         0IDI*   KK04DA98         0IDI*
KK04DA21         0IDI*  KK04DA47         0IDI*   KK04DA73         0IDI*   KK04DA99         0IDI*
KK04DA22         0IDI*  KK04DA48         0IDI*   KK04DA74         0IDI*   KK04D100         0IDI*
KK04DA23         0IDI*  KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24         0IDI*  KK04DA50         0IDI*   KK04DA76         0IDI*
KK04DA25         0IDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

Patch area clear.

C.2: k_grp4_memdump2

```
UTC:    12-228-14:48:23.828      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2527
TAI:    12-228-14:48:56.898      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   IDLE            VC1:   43085
OBT:   12-228-14:48:28.721       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be1542  IDI     UTC       12-228-14:48:23.8
KKGROENT               0IDI*  KKLOBTF        2800    IDI     OKKLOBTS  12-228-14:48:34.0


CDMU MEMORY DUMP
KK04ADR        9fde    IDI KK04DUMP (LABEL)

KK04DA00       7ef0IDI   KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78         0IDI*
KK04DA01       2f7eIDI   KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02       7505IDI   KK04DA28         0IDI*   KK04DA54         0IDI*   KK04DA80         0IDI*
KK04DA03       9100IDI   KK04DA29         0IDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04       da28IDI   KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
KK04DA05       9100IDI   KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06       da29IDI   KK04DA32         0IDI*   KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07       7070IDI   KK04DA33      9249IDI    KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08       9bfdIDI   KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09         0IDI*  KK04DA35         0IDI*   KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10         0IDI*  KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11         0IDI*  KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12         0IDI*  KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13         0IDI*  KK04DA39         0IDI*   KK04DA65         0IDI*   KK04DA91         0IDI*
KK04DA14         0IDI*  KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15         0IDI*  KK04DA41         0IDI*   KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16         0IDI*  KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17         0IDI*  KK04DA43         0IDI*   KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18         0IDI*  KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19         0IDI*  KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20         0IDI*  KK04DA46         0IDI*   KK04DA72         0IDI*   KK04DA98         0IDI*
KK04DA21         0IDI*  KK04DA47         0IDI*   KK04DA73         0IDI*   KK04DA99         0IDI*
KK04DA22         0IDI*  KK04DA48         0IDI*   KK04DA74         0IDI*   KK04D100         0IDI*
KK04DA23         0IDI*  KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24         0IDI*  KK04DA50         0IDI*   KK04DA76         0IDI*
KK04DA25         0IDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

After loading the patch in area 0x9FDE .. 0x9FE6

C.3: k_grp4_memdump3

```
UTC:    12-228-14:50:15.029      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2557
TAI:    12-228-14:50:48.749      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   IDLE            VC1:   43599
OBT:   12-228-14:50:13.143       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be15b9  IDI     UTC       12-228-14:50:15.0
KKGROENT               0IDI*  KKLOBTF        6800    IDI     OKKLOBTS  12-228-14:50:33.0


CDMU MEMORY DUMP
KK04ADR        983b    IDI KK04DUMP (LABEL)

KK04DA00      7ef0IDI   KK04DA26      7ef0IDI    KK04DA52      8230IDI    KK04DA78      8141IDI
KK04DA01      9bfdIDI   KK04DA27      9bd2IDI    KK04DA53      7ef0IDI    KK04DA79      b133IDI
KK04DA02      7ef0IDI   KK04DA28      7ef0IDI    KK04DA54      9c22IDI    KK04DA80      7ef0IDI
KK04DA03      9d32IDI   KK04DA29      9d2aIDI    KK04DA55      7ef0IDI    KK04DA81      9c22IDI
KK04DA04      7ef0IDI   KK04DA30      8020IDI    KK04DA56      9d2fIDI    KK04DA82      8132IDI
KK04DA05      99a6IDI   KK04DA31      d8efIDI    KK04DA57      8f24IDI    KK04DA83      7ef0IDI
KK04DA06      8f12IDI   KK04DA32      8022IDI    KK04DA58      7ff0IDI    KK04DA84      9d93IDI
KK04DA07      7ff0IDI   KK04DA33        1cIDI    KK04DA59      9f15IDI    KK04DA85      85ffIDI
KK04DA08      9100IDI   KK04DA34      7507IDI    KK04DA60      85ffIDI    KK04DA86         2IDI
KK04DA09      d8e3IDI   KK04DA35      7ef0IDI    KK04DA61      fffeIDI    KK04DA87      8f15IDI
KK04DA10      9100IDI   KK04DA36      9da8IDI    KK04DA62      8550IDI    KK04DA88      7ff0IDI
KK04DA11      d8e7IDI   KK04DA37      8142IDI    KK04DA63        13IDI    KK04DA89      9f24IDI
KK04DA12      9100IDI   KK04DA38      8230IDI    KK04DA64      b144IDI    KK04DA90      85ffIDI
KK04DA13      d8ebIDI   KK04DA39      7ef0IDI    KK04DA65      8020IDI    KK04DA91      ffffIDI*
KK04DA14      9100IDI   KK04DA40      9c22IDI    KK04DA66      d8efIDI    KK04DA92      7ef0IDI
KK04DA15      d8ecIDI   KK04DA41      8f24IDI    KK04DA67      8032IDI    KK04DA93      9da8IDI
KK04DA16      9100IDI   KK04DA42      7ff0IDI    KK04DA68        17IDI    KK04DA94      8132IDI
KK04DA17      d8edIDI   KK04DA43      9f24IDI    KK04DA69      7ef0IDI    KK04DA95      7ef0IDI
KK04DA18      9100IDI   KK04DA44      8020IDI    KK04DA70      9a13IDI    KK04DA96      9d93IDI
KK04DA19      d8eeIDI   KK04DA45      d8efIDI    KK04DA71      8010IDI    KK04DA97      8143IDI
KK04DA20      7ff0IDI   KK04DA46      8022IDI    KK04DA72      d8efIDI    KK04DA98      8230IDI
KK04DA21      9f24IDI   KK04DA47        1dIDI    KK04DA73      8031IDI    KK04DA99      7ef0IDI
KK04DA22      7ef0IDI   KK04DA48      7507IDI    KK04DA74        18IDI    KK04D100      9c22IDI
KK04DA23      9843IDI   KK04DA49      7ef0IDI    KK04DA75      8112IDI
KK04DA24      7ef0IDI   KK04DA50      9da8IDI    KK04DA76      7ef0IDI
KK04DA25      9a79IDI   KK04DA51      8142IDI    KK04DA77      9a13IDI
```

Original call to SSR.Process (0x9BFD) at 0x983B

C.4: k_grp4_memdump4

```
UTC:    12-228-14:51:45.930      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2581
TAI:    12-228-14:52:19.240      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   IDLE            VC1:   44020
OBT:   12-228-14:51:42.606       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be1612  IDI     UTC       12-228-14:51:45.9
KKGROENT               0IDI*  KKLOBTF        d800    IDI     OKKLOBTS  12-228-14:52:02.0


CDMU MEMORY DUMP
KK04ADR        983b    IDI KK04DUMP (LABEL)

KK04DA00      7ef0IDI   KK04DA26      7ef0IDI    KK04DA52      8230IDI    KK04DA78      8141IDI
KK04DA01      9fdeIDI   KK04DA27      9bd2IDI    KK04DA53      7ef0IDI    KK04DA79      b133IDI
KK04DA02      7ef0IDI   KK04DA28      7ef0IDI    KK04DA54      9c22IDI    KK04DA80      7ef0IDI
KK04DA03      9d32IDI   KK04DA29      9d2aIDI    KK04DA55      7ef0IDI    KK04DA81      9c22IDI
KK04DA04      7ef0IDI   KK04DA30      8020IDI    KK04DA56      9d2fIDI    KK04DA82      8132IDI
KK04DA05      99a6IDI   KK04DA31      d8efIDI    KK04DA57      8f24IDI    KK04DA83      7ef0IDI
KK04DA06      8f12IDI   KK04DA32      8022IDI    KK04DA58      7ff0IDI    KK04DA84      9d93IDI
KK04DA07      7ff0IDI   KK04DA33        1cIDI    KK04DA59      9f15IDI    KK04DA85      85ffIDI
KK04DA08      9100IDI   KK04DA34      7507IDI    KK04DA60      85ffIDI    KK04DA86         2IDI
KK04DA09      d8e3IDI   KK04DA35      7ef0IDI    KK04DA61      fffeIDI    KK04DA87      8f15IDI
KK04DA10      9100IDI   KK04DA36      9da8IDI    KK04DA62      8550IDI    KK04DA88      7ff0IDI
KK04DA11      d8e7IDI   KK04DA37      8142IDI    KK04DA63        13IDI    KK04DA89      9f24IDI
KK04DA12      9100IDI   KK04DA38      8230IDI    KK04DA64      b144IDI    KK04DA90      85ffIDI
KK04DA13      d8ebIDI   KK04DA39      7ef0IDI    KK04DA65      8020IDI    KK04DA91      ffffIDI*
KK04DA14      9100IDI   KK04DA40      9c22IDI    KK04DA66      d8efIDI    KK04DA92      7ef0IDI
KK04DA15      d8ecIDI   KK04DA41      8f24IDI    KK04DA67      8032IDI    KK04DA93      9da8IDI
KK04DA16      9100IDI   KK04DA42      7ff0IDI    KK04DA68        17IDI    KK04DA94      8132IDI
KK04DA17      d8edIDI   KK04DA43      9f24IDI    KK04DA69      7ef0IDI    KK04DA95      7ef0IDI
KK04DA18      9100IDI   KK04DA44      8020IDI    KK04DA70      9a13IDI    KK04DA96      9d93IDI
KK04DA19      d8eeIDI   KK04DA45      d8efIDI    KK04DA71      8010IDI    KK04DA97      8143IDI
KK04DA20      7ff0IDI   KK04DA46      8022IDI    KK04DA72      d8efIDI    KK04DA98      8230IDI
KK04DA21      9f24IDI   KK04DA47        1dIDI    KK04DA73      8031IDI    KK04DA99      7ef0IDI
KK04DA22      7ef0IDI   KK04DA48      7507IDI    KK04DA74        18IDI    KK04D100      9c22IDI
KK04DA23      9843IDI   KK04DA49      7ef0IDI    KK04DA75      8112IDI
KK04DA24      7ef0IDI   KK04DA50      9da8IDI    KK04DA76      7ef0IDI
KK04DA25      9a79IDI   KK04DA51      8142IDI    KK04DA77      9a13IDI
```

Modified call to our patch (0x9FDE) at 0x983B

C.5: k_grp4_memdump5

```
UTC:    12-228-14:56:00.331      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2649
```

```
TAI:    12-228-14:56:34.131      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   IDLE            VC1:   45198
OBT:   12-228-14:55:56.038       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be1710  IDI     UTC       12-228-14:56:00.3
KKGROENT               0IDI*  KKLOBTF        4000    IDI     OKKLOBTS  12-228-14:56:16.0


CDMU MEMORY DUMP
KK04ADR        fc40    IDI KK04DUMP (LABEL)

KK04DA00         0IDI*  KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78        a7IDI
KK04DA01         0IDI*  KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02      ffffIDI*  KK04DA28      ffffIDI*   KK04DA54         0IDI*   KK04DA80      bb88IDI
KK04DA03      664eIDI   KK04DA29      ffffIDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04      44e6IDI   KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
KK04DA05      4e44IDI   KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06      e446IDI   KK04DA32         0IDI*   KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07      64e6IDI   KK04DA33         0IDI*   KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08      4644IDI   KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09      e646IDI   KK04DA35         0IDI*   KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10      6464IDI   KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11      4664IDI   KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12      e64eIDI   KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13      44e6IDI   KK04DA39         0IDI*   KK04DA65         0IDI*   KK04DA91         1IDI
KK04DA14      4664IDI   KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15      e446IDI   KK04DA41         0IDI*   KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16      6466IDI   KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17      4644IDI   KK04DA43         0IDI*   KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18      e646IDI   KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19      64e4IDI   KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20      4664IDI   KK04DA46         0IDI*   KK04DA72        a7IDI    KK04DA98         0IDI*
KK04DA21      3540IDI   KK04DA47         0IDI*   KK04DA73        a6IDI    KK04DA99         0IDI*
KK04DA22        43IDI   KK04DA48         0IDI*   KK04DA74        3aIDI    KK04D100         0IDI*
KK04DA23         1IDI   KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24        12IDI   KK04DA50         0IDI*   KK04DA76        a7IDI
KK04DA25      ffffIDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

Intermittent Recording inactive, subset VGMFL6 loaded.

C.6: k_grp4_memdump6

```
UTC:    12-228-15:00:19.223      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2718
TAI:    12-228-15:00:52.803      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   REC             VC1:   46042
OBT:   12-228-15:00:24.428       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be180d  IDI     UTC       12-228-15:00:19.2
KKGROENT               0IDI*  KKLOBTF        a800    IDI     OKKLOBTS  12-228-15:00:29.0


CDMU MEMORY DUMP
KK04ADR        fc40    IDI KK04DUMP (LABEL)

KK04DA00         0IDI*  KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78        b8IDI
KK04DA01      ffffIDI*  KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02      ffffIDI*  KK04DA28         0IDI*   KK04DA54         0IDI*   KK04DA80      bb88IDI
KK04DA03      664eIDI   KK04DA29      ffffIDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04      44e6IDI   KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
KK04DA05      4e44IDI   KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06      e446IDI   KK04DA32         1IDI    KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07      64e6IDI   KK04DA33       7ecIDI    KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08      4644IDI   KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09      e646IDI   KK04DA35       5d4IDI    KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10      6464IDI   KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11      4664IDI   KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12      e64eIDI   KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13      44e6IDI   KK04DA39       5cfIDI    KK04DA65         0IDI*   KK04DA91         1IDI
KK04DA14      4664IDI   KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15      e446IDI   KK04DA41        25IDI    KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16      6466IDI   KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17      4644IDI   KK04DA43        24IDI    KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18      e646IDI   KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19      64e4IDI   KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20      4664IDI   KK04DA46         0IDI*   KK04DA72        b8IDI    KK04DA98         0IDI*
KK04DA21      3540IDI   KK04DA47         0IDI*   KK04DA73        b7IDI    KK04DA99         0IDI*
KK04DA22        43IDI   KK04DA48         0IDI*   KK04DA74        3aIDI    KK04D100         0IDI*
KK04DA23         1IDI   KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24        12IDI   KK04DA50         0IDI*   KK04DA76        b8IDI
KK04DA25      ffffIDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

Intermittent Recording active. No Anomaly Mode. All counters increasing.

C.7: k_sw_status1

```
UTC:    12-228-15:00:50.723      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2726
TAI:    12-228-15:01:24.303      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   REC             VC1:   46134
OBT:   12-228-15:00:54.241       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_SW_STATUS                      Packet ID = SW                     UTC        12-228-15:00:50.7
```

```
KKLOBTS         66be182bIDI      KKLOBTF             7800IDI       OKKLOBTS   12-228-15:00:59.0
COBS Status                                                     Software Function Status      Software Function Status
COBS Startup Mode               KKSWSMOD            COLDIDI   KKSEUEIF        SCRU ENAIDI   KKAFES00        HG.ST.INIDI
COBS RMS State                  KKSCRRMS        ACT. OFAIIDI   KKDPDEIF        DAIP ENAIDI   KKAFES01        ESR.W.ENIDI
RMS Access ENA/INH Status       KKRMSEIS          RMS ENAIDI   KKTTQEIF        TTCM ENAIDI   KKAFES02  NODATANODATANONODAT
COBS Anomaly Mode Status        KKANMODE         ANO_MODEIDI   KKOBDOCA        OB CA ENIDI   KKAFES03        ESR.D.ENIDI
COBS Nominal Mode Status        KKNOMODE          NOMINALIDI   KKOBDEIF        OBDH ENAIDI   KKAFES04        EX.LC.ENIDI
COBS Memory Mode                KKMEMMOD          RAM MODIDI   KKUSOEIF         USO ENAIDI   KKAFES05  NODATANODATANONODAT
Gyroless Patch                  KKGYRLES         GYLES.ONIDI   KKTRSSEL      SSR/RED TRIDI   KKAFES06  NODATANODATANONODAT
Mem Single Event Upset Counter KKSEUCNT                 0IDI*   KKCCSSEL         CONV ENIDI   KKAFES07        HG.MO.INIDI
TM Information                                                  TC Watchdog Limit/Time Remain KKAFES08        HG.NO.INIDI
TM Format Identifier            KKTMFID           MR/HR 1IDI   KKTCWLIM            21600IDI   KKAFES09         IIDE.INIDI
Telemetry Format                KKTMMODE           RECORDIDI   KKTCWREM  NODATANODATANONODAT KKAFES0A  NODATANODATANONODAT
Prog. Dump Group ID             KKGROIDT          GROUP 4IDI   Last APME Y-/Z-Axis Command   KKAFES0B        MI.MX.ENIDI
Group Entry Number              KKGROENT                IDI*   KKLASTY                 0IDI*  KKAFES0C  NODATANODATANONODAT
Start Address of Mem Dump       KK04ADR              fc40IDI   KKLASTZ                 1IDI   KKAFES0D         FDE.INHIDI
Anomaly Information                                             IIDE Last Valid X/Y Acq (Hex) KKAFES0E        ST.MO.ENIDI
Anomaly Counter                 KKANOCNT                0IDI*  KKIIDEX                 0IDI*  KKAFES0F        SUBS.ENAIDI
Ident of Last Anomaly Entry     KKANOHDR                0IDI*  KKIIDEY                 0IDI*  KKAFES10        TC.WD.INIDI
Last Anomaly Time Add. Info     KKANOOBT                0IDI*                                 KKAFES11        TR.TC.ENIDI
Last Anomaly Time Add. Info     OKKANOOBT     00000000000000                                  KKAFES12        TR.TM.ENIDI
TFG Status Register                                                                           KKAFES13        TH.CT.ENIDI
TFG VC1 Status                  KKTFGRD1          TFG RDYIDI                                  KKAFES14        TH.MO.ENIDI
MF Even Indicator               KKTFGMFE           MF ODDIDI                                  KKAFES15        THRUS.INIDI
OBDH Configuration Status       KKTFGOBS         OBD NTONIDI                                  KKAFES16         ACUR.ENIDI
TFGS Configuration Status       KKTFGTFS         TFG NTONIDI                                  KKAFES17          CRP.ENIDI
PMS Configuration Status        KKTFGPMS          NOM PMSIDI                                  KKAFES18          RWS.ENIDI
                                                                                              KKAFES19           HX.INIDI
                                                                                              KKAFES1A         OFFP.ENIDI
```

Anomaly Mode active.

C.8: k_grp4_memdump7

```
UTC:    12-228-15:02:47.924      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2758
TAI:    12-228-15:03:21.024      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   REC             VC1:   46465
OBT:   12-228-15:02:53.491       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                      PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be18a2  IDI     UTC       12-228-15:02:47.9
KKGROENT               0IDI*  KKLOBTF        b800    IDI     OKKLOBTS  12-228-15:02:58.0


CDMU MEMORY DUMP
KK04ADR        fc40     IDI KK04DUMP (LABEL)

KK04DA00         0IDI*  KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78        c2IDI
KK04DA01      ffffIDI*  KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02      ffffIDI*  KK04DA28         0IDI*   KK04DA54         0IDI*   KK04DA80      bb88IDI
KK04DA03      664eIDI   KK04DA29      ffffIDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04      44e6IDI   KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
KK04DA05      4e44IDI   KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06      e446IDI   KK04DA32         1IDI    KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07      64e6IDI   KK04DA33       7ecIDI    KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08      4644IDI   KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09      e646IDI   KK04DA35       aa2IDI    KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10      6464IDI   KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11      4664IDI   KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12      e64eIDI   KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13      44e6IDI   KK04DA39       a9dIDI    KK04DA65         0IDI*   KK04DA91         1IDI
KK04DA14      4664IDI   KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15      e446IDI   KK04DA41        27IDI    KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16      6466IDI   KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17      4644IDI   KK04DA43        26IDI    KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18      e646IDI   KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19      64e4IDI   KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20      4664IDI   KK04DA46         0IDI*   KK04DA72        c2IDI    KK04DA98         0IDI*
KK04DA21      3540IDI   KK04DA47         0IDI*   KK04DA73        c1IDI    KK04DA99         0IDI*
KK04DA22        43IDI   KK04DA48         0IDI*   KK04DA74        3aIDI    KK04D100         0IDI*
KK04DA23         1IDI   KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24        12IDI   KK04DA50         0IDI*   KK04DA76        c2IDI
KK04DA25      ffffIDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

Anomaly Mode active. SSR Record and Standby counters stopped increasing. Store and Retrieve Packet counters continue increasing.

C.9: k_sw_status2

```
UTC:    12-228-15:03:31.024      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2769
TAI:    12-228-15:04:04.684      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   REC             VC1:   46586
OBT:   12-228-15:03:23.303       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_SW_STATUS                      Packet ID = SW                   UTC        12-228-15:03:31.0
KKLOBTS         66be18cfIDI      KKLOBTF             7000IDI       OKKLOBTS   12-228-15:03:43.0
COBS Status                                                     Software Function Status      Software Function Status
COBS Startup Mode               KKSWSMOD            COLDIDI   KKSEUEIF        SCRU ENAIDI   KKAFES00        HG.ST.INIDI
COBS RMS State                  KKSCRRMS        ACT. OFAIIDI   KKDPDEIF        DAIP ENAIDI   KKAFES01        ESR.W.ENIDI
RMS Access ENA/INH Status       KKRMSEIS          RMS ENAIDI   KKTTQEIF        TTCM ENAIDI   KKAFES02  NODATANODATANONODAT
```

```
COBS Anomaly Mode Status        KKANMODE        NO_ANOM.IDI
COBS Nominal Mode Status        KKNOMODE         NOMINALIDI
COBS Memory Mode                KKMEMMOD         RAM MODIDI
Gyroless Patch                  KKGYRLES        GYLES.ONIDI
Mem Single Event Upset Counter  KKSEUCNT               0IDI*
TM Information
TM Format Identifier            KKTMFID          MR/HR 1IDI
Telemetry Format                KKTMMODE          RECORDIDI
Prog. Dump Group ID             KKGROIDT         GROUP 4IDI
Group Entry Number              KKGROENT                IDI*
Start Address of Mem Dump       KK04ADR              fc40IDI
Anomaly Information
Anomaly Counter                 KKANOCNT               0IDI*
Ident of Last Anomaly Entry     KKANOHDR               0IDI*
Last Anomaly Time Add. Info     KKANOOBT               0IDI*
Last Anomaly Time Add. Info     OKKANOOBT     00000000000000
TFG Status Register
TFG VC1 Status                  KKTFGRD1         TFG RDYIDI
MF Even Indicator               KKTFGMFE         MF EVENIDI
OBDH Configuration Status       KKTFGOBS        OBD NTONIDI
TFGS Configuration Status       KKTFGTFS        TFG NTONIDI
PMS Configuration Status        KKTFGPMS         NOM PMSIDI
```

```
KKOBDOCA        OB CA ENIDI
KKOBDEIF        OBDH ENAIDI
KKUSOEIF         USO ENAIDI
KKTRSSEL      SSR/RED TRIDI
KKCCSSEL         CONV ENIDI
TC Watchdog Limit/Time Remain
KKTCWLIM           21600IDI
KKTCWREM  NODATANODATANONODAT
Last APME Y-/Z-Axis Command
KKLASTY                 0IDI*
KKLASTZ                 1IDI
IIDE Last Valid X/Y Acq (Hex)
KKIIDEX                 0IDI*
KKIIDEY                 0IDI*
```

```
KKAFES03        ESR.D.ENIDI
KKAFES04        EX.LC.ENIDI
KKAFES05  NODATANODATANONODAT
KKAFES06  NODATANODATANONODAT
KKAFES07        HG.MO.INIDI
KKAFES08        HG.NO.INIDI
KKAFES09         IIDE.INIDI
KKAFES0A  NODATANODATANONODAT
KKAFES0B        MI.MX.ENIDI
KKAFES0C  NODATANODATANONODAT
KKAFES0D         FDE.INHIDI
KKAFES0E        ST.MO.ENIDI
KKAFES0F        SUBS.ENAIDI
KKAFES10        TC.WD.INIDI
KKAFES11        TR.TC.ENIDI
KKAFES12        TR.TM.ENIDI
KKAFES13        TH.CT.ENIDI
KKAFES14        TH.MO.ENIDI
KKAFES15        THRUS.INIDI
KKAFES16         ACUR.ENIDI
KKAFES17          CRP.ENIDI
KKAFES18          RWS.ENIDI
KKAFES19           HX.INIDI
KKAFES1A         OFFP.ENIDI
```

Anomaly Mode cleared.

C.10: k_grp4_memdump8

```
UTC:    12-228-15:04:23.425      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2783
TAI:    12-228-15:04:57.405      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   REC             VC1:   46736
OBT:   12-228-15:04:22.928       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be18fc  IDI     UTC       12-228-15:04:23.4
KKGROENT                0IDI* KKLOBTF        2800    IDI     OKKLOBTS  12-228-15:04:28.0


CDMU MEMORY DUMP
KK04ADR        fc40    IDI KK04DUMP (LABEL)

KK04DA00         0IDI*  KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78        c8IDI
KK04DA01      ffffIDI*  KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02      ffffIDI*  KK04DA28         0IDI*   KK04DA54         0IDI*   KK04DA80      bb88IDI
KK04DA03      664eIDI   KK04DA29      ffffIDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04      44e6IDI   KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
KK04DA05      4e44IDI   KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06      e446IDI   KK04DA32         1IDI    KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07      64e6IDI   KK04DA33       7ecIDI    KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08      4644IDI   KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09      e646IDI   KK04DA35       d84IDI    KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10      6464IDI   KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11      4664IDI   KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12      e64eIDI   KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13      44e6IDI   KK04DA39       d7fIDI    KK04DA65         0IDI*   KK04DA91         1IDI
KK04DA14      4664IDI   KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15      e446IDI   KK04DA41        3fIDI    KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16      6466IDI   KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17      4644IDI   KK04DA43        3eIDI    KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18      e646IDI   KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19      64e4IDI   KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20      4664IDI   KK04DA46         0IDI*   KK04DA72        c8IDI    KK04DA98         0IDI*
KK04DA21      3540IDI   KK04DA47         0IDI*   KK04DA73        c7IDI    KK04DA99         0IDI*
KK04DA22        43IDI   KK04DA48         0IDI*   KK04DA74        3aIDI    KK04D100         0IDI*
KK04DA23         1IDI   KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24        12IDI   KK04DA50         0IDI*   KK04DA76        c8IDI
KK04DA25      ffffIDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

Anomaly Mode cleared. All counters increase again.

C.11: k_grp4_memdump9

```
UTC:    12-228-15:05:52.325      Tlm Station: SIM         Data Source:   TLM           Tlm Rate:    HR              VC0:    2807
TAI:    12-228-15:06:25.745      Cmd Mode:    2 STEP      Data Quality:  good          DHSS Mode:   REC             VC1:   47049
OBT:   12-228-15:05:52.392       Opmode:      PRIMARY     RT Frame Sync: lock          Sci Submode: 1               VC4:       0
K_GRP4_MEMDUMP                 PAGE  1                       PACKET ID = SW
KKGROIDT         GROUP 4IDI   KKLOBTS      66be1955  IDI     UTC       12-228-15:05:52.3
KKGROENT                0IDI* KKLOBTF        9800    IDI     OKKLOBTS  12-228-15:05:57.0


CDMU MEMORY DUMP
KK04ADR        fc40    IDI KK04DUMP (LABEL)

KK04DA00         0IDI*  KK04DA26         0IDI*   KK04DA52         0IDI*   KK04DA78        ceIDI
KK04DA01         0IDI*  KK04DA27         0IDI*   KK04DA53         0IDI*   KK04DA79         0IDI*
KK04DA02      ffffIDI*  KK04DA28         0IDI*   KK04DA54         0IDI*   KK04DA80      bb88IDI
KK04DA03      664eIDI   KK04DA29      ffffIDI*   KK04DA55         0IDI*   KK04DA81         0IDI*
KK04DA04      44e6IDI   KK04DA30         0IDI*   KK04DA56         0IDI*   KK04DA82         0IDI*
```

```
KK04DA05      4e44IDI   KK04DA31         0IDI*   KK04DA57         0IDI*   KK04DA83         0IDI*
KK04DA06      e446IDI   KK04DA32         0IDI*   KK04DA58         0IDI*   KK04DA84         0IDI*
KK04DA07      64e6IDI   KK04DA33         0IDI*   KK04DA59         0IDI*   KK04DA85         0IDI*
KK04DA08      4644IDI   KK04DA34         0IDI*   KK04DA60         0IDI*   KK04DA86         0IDI*
KK04DA09      e646IDI   KK04DA35       fefIDI    KK04DA61         0IDI*   KK04DA87         0IDI*
KK04DA10      6464IDI   KK04DA36         0IDI*   KK04DA62         0IDI*   KK04DA88         0IDI*
KK04DA11      4664IDI   KK04DA37         0IDI*   KK04DA63         0IDI*   KK04DA89         0IDI*
KK04DA12      e64eIDI   KK04DA38         0IDI*   KK04DA64         0IDI*   KK04DA90         0IDI*
KK04DA13      44e6IDI   KK04DA39       fefIDI    KK04DA65         0IDI*   KK04DA91         1IDI
KK04DA14      4664IDI   KK04DA40         0IDI*   KK04DA66         0IDI*   KK04DA92         0IDI*
KK04DA15      e446IDI   KK04DA41        53IDI    KK04DA67         0IDI*   KK04DA93         0IDI*
KK04DA16      6466IDI   KK04DA42         0IDI*   KK04DA68         0IDI*   KK04DA94         0IDI*
KK04DA17      4644IDI   KK04DA43        53IDI    KK04DA69         0IDI*   KK04DA95         0IDI*
KK04DA18      e646IDI   KK04DA44         0IDI*   KK04DA70         0IDI*   KK04DA96         0IDI*
KK04DA19      64e4IDI   KK04DA45         0IDI*   KK04DA71         0IDI*   KK04DA97         0IDI*
KK04DA20      4664IDI   KK04DA46         0IDI*   KK04DA72        ceIDI    KK04DA98         0IDI*
KK04DA21      3540IDI   KK04DA47         0IDI*   KK04DA73        cdIDI    KK04DA99         0IDI*
KK04DA22        43IDI   KK04DA48         0IDI*   KK04DA74        3aIDI    KK04D100         0IDI*
KK04DA23         1IDI   KK04DA49         0IDI*   KK04DA75         0IDI*
KK04DA24        12IDI   KK04DA50         0IDI*   KK04DA76        ceIDI
KK04DA25      ffffIDI*  KK04DA51         0IDI*   KK04DA77         0IDI*
```

Intermittent Recording disabled. Store and Retrieve Packet counters equal (0xFEF) and SSR Record and Standby counters equal (0x53).