Set RM Alarm Polarity
File: H_CRP_AOC_D2AP.xls
Author: dsalt-hp

Procedure Summary

Objectives

Alarm inputs are bilevel signals which may be generated both internally and externally to the ACC. The RM provides the possibility to define whether the alarm is considered active when the polarity of the input signal is either high or low. This is achieved by including a polarity stage in the alarm filtering chain which allows the polarity of some alarm signals to be inverted. The polarity of each alarm is defined by a single bit in the alarm polarity register. The alarms for which the polarity is defined as "high" (polarity bit = 1) are not inverted by the polarity stage. This implies that the filtered alarm signal used by the RM in matching against alarm patterns stored in the PAP table has the same polarity as the input signal, i.e., the filtered alarm becomes active (high) when the input signal is high. Alarms for which polarity is defined as "low" (polarity bit = 0) are inverted by the polarity stage; i.e., the filtered alarm signal becomes active when the status of the input signal is "low".

This implementation of the polarity stage implies that the high/low setting of the polarity bit corresponds to the status of the input signal for which the alarm is considered active. For the WD alarm, the setting of polarity has not effect, since the triggering occurs when the input signal is not toggled within the specified delay interval and does not depend on the high/low status of the signal.

Manipulation of alarm polarity must be done with extreme care, since inversion of polarity for alarms that are enabled and are part of alarm patterns recognised by the RM will cause the alarm pattern to trigger causing a PM reconfiguration (for internal ACC alarms, there will be a double trigger at level 3a and 3b).

The consequences of inverting the polarity of the WD Enable alarm signal are even more dramatic. This signal represents the status of the WD Enable relay of the RM. Contrary to its misleading name, the relay in the H-P implementation does not control the triggering of the WD alarm, and is used insstead by the logic of survival mode to detect at initialisation whether or not post-separation coasting has been completed. The signal must be high throughout the mission except during lauch up to the end of the post-separation coasting phase. The ASW obtains the setting of the relay from the filtered status of the corresponding alarm. This implies that inverting the polarity for the WD Enable signal will cause the ASW to read the status of the relay as "low" during the normal mission phase. If the inversion is carried out for both RM's, the SM logic will assume the spacecraft is still in the coasting phase and attitude control will remain passive causing SM to fail(!)

Inversion of polarity for the PM Select signal has a similarly drastic effect, since it will prevent the RM from recognising any level 3 and level 4 trigger for the current ACC configuration(!)

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USAGE:

For most alarms, change of default polarity should never be necessary. If an alarm signal fails and becomes "stuck" in a state that can trigger the RM, the problem of blocking the undesired triggers should be solved by disabling the alarm rather than changing its polarity.

During flight operations, the command should be used to resolve contingencies in the following specific cases:

1. Failure of one or more separation strap inputs. If the status of one of the separation strap signals remains "low" after physical separation from the launcher, the RM will not respond either to the AAD (strap 2) or both ARAD alarms (strap 1). The only way to solve the problem is to change the polarity of the failing strap input to "low".
2. Recovery from a bit flip in the alarm polarity register. In this case, the operator should reload the desired settings of the polarity bits. Except in the case in which a separation strap input failure has also occurred, this should imply reloading the default values according to the list above.

NOTES:

1. Polarity change for the AAD alarm. Because of limitations on the initial settings of ARAD thresholds, the polarity of the AAD alarm at power-on is set to "low" which causes the alarm to be raised when the threshold is exceeded. During normal mission, the alarm should trigger when the AAD signal is below the threshold. In order to achieve this, the polarity of the alarm must be inverted. This task is carried out on ground during the final configuration of the spacecraft on the launcher.
2. Polarity of alarms in TC_SET_RM_ALARM_POLARITY. The interpretation of raw bit values is different in the TC and in the alarm polarity register(!). The bits in the polarity regiseter are set according to the convention: 1 = high , 0 = low. The interpretation of the bits is inverted in the TC: 1 = low, 0 = high.

Summary of Constraints

N/A

Spacecraft Configuration

Start of Procedure

N/A

End of Procedure

N/A

Reference File(s)

Status : Version 2 - Unchanged
Last Checkin: 02/02/09

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Input Command Sequences

Output Command Sequences

HRAD2AP1
HRAD2AP2
HRAD2AP3
HRAD2AP4

Referenced Displays

ANDs	GRDs	SLDs
ZAAM2999		
ZAA07999		

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
10/01/09		1	Created	dsalt-hp	
02/02/09	2	2	Checked-in for FOP release (02/02/09)	dsalt-hp	

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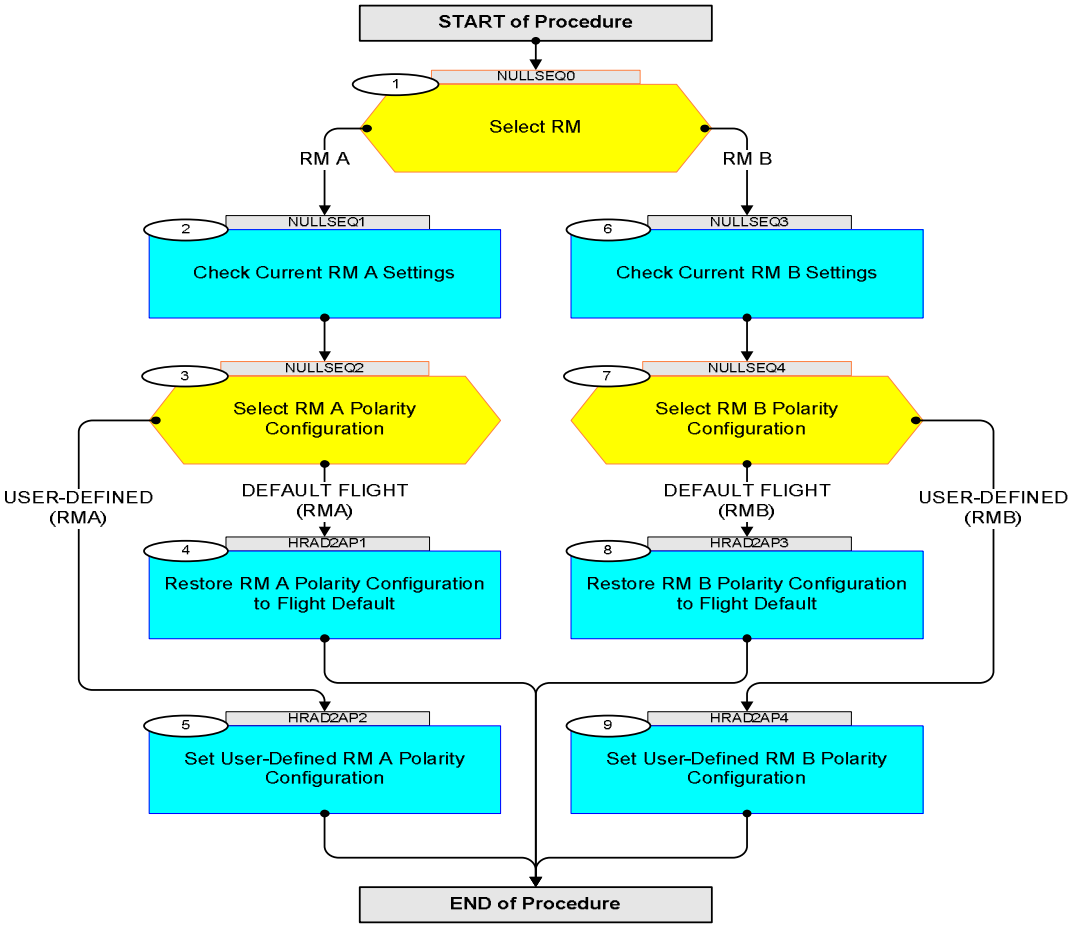
Procedure Flowchart Overview



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :NULLSEQ0 ( ) *TimeTag Type: N* *Sub Schedule ID:*		
1		*Select RM*		Next Step: RM A 2 RM B 6
		Select the reconfiguration module that needs change of alarm polarity configuration: *RM A -> GO TO STEP 2* *RM B -> GO TO STEP 6*		
		TC Seq. Name :NULLSEQ1 ( ) *TimeTag Type:* *Sub Schedule ID:*		
2		*Check Current RM A Settings*		Next Step: 3
		This step verifies if the current alarm polarity configuration is as expected. The polarity setting of each alarm can be read from the RMH_APOL macro parameter, which is part of the telemetry packet returned by the TC_GET_RM_STATUS command.		
2.1		*Uplink Sequence HFADRMR1*		
		Execute Sequence **HFADRMR1 GetRmAstatusReport**		
2.2		*Check RM Alarm Polarity Configuration*		
		Verify Telemetry **APOL WD** **AEW4G109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS1** **AEW4H109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS2** **AEW4J109**	**<to be read>**	AND=ZAAM2999

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Step No.	Time	Activity/Remarks		TC/TLM	Display/ Branch
		Verify Telemetry **APOL CRS3**	**AEW4K109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL AAD1**	**AEW4L109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL AAD2**	**AEW4M109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap1**	**AEW4N109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap2**	**AEW4P109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL Ext8**	**AEW4R109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA CPU**	**AEW4S109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA COCOS**	**AEW4T109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA UVD**	**AEW4U109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA SW**	**AEW4V109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB CPU**	**AEW4W109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB COCOS**	**AEW4X109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB UVD**	**AEW4Y109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB SW**	**AEW4Z109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PM Select**	**AEW50109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL WD Enable**	**AEW51109**	**<to be read>**	AND=ZAAM2999

TC Seq. Name :NULLSEQ2 ( )

TimeTag Type:
Sub Schedule ID:

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
3		*Select RM A Polarity Configuration*		Next Step: DEFAULT FLIGHT (RMA) 4 USER-DEFINED (RMA) 5
		Options are to restore the default polarity configuration for flight or to define a new alarm polarity configuration: *Restore flight defaults -> GO TO STEP 4* *Define new configuration -> GO TO STEP 5* *WARNING:* *For most alarms, change of default polarity should never be necessary. During flight operations, this sequence should be used to resolve contingencies in the following specific cases:* *1. Failure of one or more separation strap inputs.* *2. Recovery from a bit flip in the alarm polarity register.*		
		TC Seq. Name :HRAD2AP1 (SetRmAdefaultPolCfg) *TimeTag Type: N* *Sub Schedule ID:* □		
4		*Restore RM A Polarity Configuration to Flight Default*		Next Step: END
		This step restores the default RM alarm polarity configuration for flight. Default configuration is as highlighted in table 1 attached at the back of this procedure. Keep in mind the inversion of the interpretation of raw values between command and telemetry.		
4.1		*Uplink Sequence HRAD2AP1*		□
4.1.1		*Disable RM A*		□

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Ext_ACC_RM_A_Disable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM A Disable - Mission Specific	**DCM22170**	
		Verify Telemetry **RMA_fromTTR-RMA** **AEE91050**	**= DISABLED**	AND=ZAA07999
		Verify Telemetry **RMA_fromTTR-RMB** **AEE92050**	**= DISABLED**	AND=ZAA07999
4.1.2		*Set RM Alarm Polarity Configuration*		
		WARNING: *Polarity of alarms in TC_SET_RM_ALARM_POLARITY. The interpretation of raw bit values is different in the command and in the alarm polarity register(!). The bits in the polarity register are set according to the convention: 1 = high , 0 = low. The interpretation of the bits is inverted in the command: 1 = low, 0 = high.*		
		NOTE: *At the time of creating this procedure (10 January 2009) the implementation of the instantiated command in the current version of the SCOS database was still incorrect with bit values inverted with respect to the desired settings. The problem should be solved (TBC) in the next Industry database delivery. The generic command can be used as a temporary workaround.* *Instantiated commands for future use:* *ACZWE109 Def-FlightAlarmPol RMA* *ACZWF109 Def-FlightAlarmPol RMB*		
		Execute Telecommand **SetAlarmPolarity RMA** *Command Parameter(s) :* **AlarmPolF86Cmd** **AH8H3001** **AlarmPolDD86Cmd** **AH8H4001** **AlmPol WD Togg** **AHF81001** **AlarmPol CRS1** **AHF82001** **AlarmPol CRS2** **AHF83001** **AlarmPol CRS3** **AHF84001** **AlarmPol AAD1** **AHF85001** **AlarmPol AAD2** **AHF86001** **AlmPol SepStr1** **AHF87001** **AlmPol SepStr2** **AHF88001** **AlmPol Extrnl7** **AHG8A001**	**ACZWA109** **Enable 86** **Enable 86** **0 <dec>** **1 <dec>** **1 <dec>** **1 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		AlmPol PMASyEr AHG8B001 **AlmPol PMAAlAl AHG8C001** **AlarmPol PMAUnV AHG8D001** **AlmPol PMASwAl AHG8E001** **AlmPol PMBSyEr AHG8F001** **AlmPol PMBAlAl AHG8G001** **AlarmPol PMBUnV AHG8H001** **AlmPol PMBSwAl AHH81001** **AlarmPol Sel PM AHH82001** **AlmPol NotUse1 AHH83001** **AlmPol NotUse2 AHH84001** **AlmPol NotUse3 AHH85001** **AlarmPol WD Ena AHH86001** *TC Control Flags :*	**1 <dec>** **0 <dec>** **1 <dec>** **0 <dec>** **1 <dec>** **0 <dec>** **1 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>**	
		GBM IL DSE **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) SET ALRM - SetAlarmPolarity RMA		
		Execute Telecommand **Fire SetRMAlarmPolarity** *Command Parameter(s) :* **FireFun DF86Cmd AH8F1001** **FireFun DD86Cmd AH8F2001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,4) Fire Command - Fire SetRMAlarmPolarity	**ACZ3N109** **Enable 86** **Enable 86**	
4.1.3		*Verify Update via RM A Status Report*		
		Execute Telecommand **Get RM-A status** *Command Parameter(s) :* **RMStat DF86Cmd AH841001** **RMStat DD86Cmd AH842001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) - Get RM-A status	**ACZZ4109** **Enable 86** **Enable 86**	
		Verify Packet Reception **TM 8-6 for RM Status parametrized** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**A86_RMStatus** **512** **8** **6** **41600** **1**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **APOL WD AEW4G109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL CRS1 AEW4H109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL CRS2 AEW4J109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL CRS3 AEW4K109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL AAD1 AEW4L109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL AAD2 AEW4M109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL Strap1 AEW4N109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL Strap2 AEW4P109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL Ext8 AEW4R109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMA CPU AEW4S109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMA COCOS AEW4T109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMA UVD AEW4U109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMA SW AEW4V109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMB CPU AEW4W109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMB COCOS AEW4X109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMB UVD AEW4Y109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMB SW AEW4Z109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PM Select AEW50109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL WD Enable AEW51109**	**= High**	AND=ZAAM2999
4.1.4		*Enable RM A*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Ext_ACC_RM_A_Enable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM A Enable - Mission Specific	**DCM21170**	
		Verify Telemetry **RMA_fromTTR-RMA** **AEE91050**	**= ENABLED**	AND=ZAA07999
		Verify Telemetry **RMA_fromTTR-RMB** **AEE92050**	**= ENABLED**	AND=ZAA07999
		TC Seq. Name :HRAD2AP2 (SetRmAuserDefPolCfg) *TimeTag Type: N* *Sub Schedule ID:* *Formal Parameter List :* AlmPol WD Togg ApolWdTg= AlarmPol CRS1 ApolCrs1= AlarmPol CRS2 ApolCrs2= AlarmPol CRS3 ApolCrs3= AlarmPol AAD1 ApolAad1= AlarmPol AAD2 ApolAad2= AlmPol SepStr1 ApolSep1= AlmPol SepStr2 ApolSep2= AlmPol PMASyEr ApolAcpu=		
		AlmPol PMAAlAl ApolAcoc= AlarmPol PMAUnV ApolAuvd= AlmPol PMASwAl ApolAswA= AlmPol PMBSyEr ApolBcpu= AlmPol PMBAlAl ApolBcoc= AlarmPol PMBUnV ApolBuvd= AlmPol PMBSwAl ApolBswA= AlarmPol Sel PM ApolPmSe= AlarmPol WD Ena ApolWdEn=		
5		*Set User-Defined RM A Polarity Configuration*		Next Step: END
		This step lets you define a new RM alarm polarity configuration. For most alarms, change of default polarity should never be necessary. If an alarm signal fails and becomes "stuck" in a state that can trigger the RM, the problem of blocking the undesired triggers should be solved by disabling the alarm rather than changing its polarity. *During flight operations, this sequence should be used to resolve contingencies in the following specific cases:* *1. Failure of one or more separation strap inputs.* *2. Recovery from a bit flip in the alarm polarity register.*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
5.1		*Uplink Sequence HRAD2AP2*		
5.1.1		*Disable RM A*		
		Execute Telecommand **Ext_ACC_RM_A_Disable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM A Disable - Mission Specific	**DCM22170**	
		Verify Telemetry **RMA_fromTTR-RMA** **AEE91050**	**= DISABLED**	AND=ZAA07999
		Verify Telemetry **RMA_fromTTR-RMB** **AEE92050**	**= DISABLED**	AND=ZAA07999
5.1.2		*Set RM Alarm Polarity Configuration*		
		WARNING: *Polarity of alarms in TC_SET_RM_ALARM_POLARITY. The interpretation of raw bit values is different in the command and in the alarm polarity register(!). The bits in the polarity register are set according to the convention: 1 = high , 0 = low. The interpretation of the bits is inverted in the command: 1 = low, 0 = high.*		
		When loading this command sequence on the Manual Stack, it will ask you to enter values for the formal parameters inside the sequence. The formal parameters are: - ***ApolWdTg*** *= Watchdog toggle alarm polarity* - ***ApolCrs1*** *= CRS 1 alarm polarity* - ***ApolCrs2*** *= CRS 1 alarm polarity* - ***ApolCrs3*** *= CRS 1 alarm polarity* - ***ApolAad1*** *= AAD 1 alarm polarity* - ***ApolAad2*** *= AAD 2 alarm polarity* - ***ApolSep1*** *= Separation strap 1 alarm polarity* - ***ApolSep2*** *= Separation strap 2 alarm polarity*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		- ***ApolAcpu*** = *PM A CPU alarm polarity* - ***ApolAcoc*** = *PM A COCOS alarm polarity* - ***ApolAuvd*** = *PM A undervoltage detection alarm polarity* - ***ApolAswA*** = *PM A software alarm polarity* - ***ApolBcpu*** = *PM B CPU alarm polarity* - ***ApolBcoc*** = *PM B COCOS alarm polarity* - ***ApolBuvd*** = *PM B undervoltage detection alarm polarity* - ***ApolBswA*** = *PM B software alarm polarity* - ***ApolPmSe*** = *PM select alarm polarity* - ***ApolWdEn*** = *Watchdog enable alarm polarity*		
		Execute Telecommand **SetAlarmPolarity RMA** *Command Parameter(s) :* **AlarmPolF86Cmd AH8H3001** **AlarmPolDD86Cmd AH8H4001** **AlmPol WD Togg AHF81001** **AlarmPol CRS1 AHF82001** **AlarmPol CRS2 AHF83001** **AlarmPol CRS3 AHF84001** **AlarmPol AAD1 AHF85001** **AlarmPol AAD2 AHF86001** **AlmPol SepStr1 AHF87001** **AlmPol SepStr2 AHF88001** **AlmPol Extrnl7 AHG8A001** **AlmPol PMASyEr AHG8B001** **AlmPol PMAAlAl AHG8C001** **AlarmPol PMAUnV AHG8D001** **AlmPol PMASwAl AHG8E001** **AlmPol PMBSyEr AHG8F001** **AlmPol PMBAlAl AHG8G001** **AlarmPol PMBUnV AHG8H001** **AlmPol PMBSwAl AHH81001** **AlarmPol Sel PM AHH82001** **AlmPol NotUse1 AHH83001** **AlmPol NotUse2 AHH84001** **AlmPol NotUse3 AHH85001** **AlarmPol WD Ena AHH86001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) SET ALRM - SetAlarmPolarity RMA	**ACZWA109** **Enable 86** **Enable 86** **ApolWdTg** **ApolCrs1** **ApolCrs2** **ApolCrs3** **ApolAad1** **ApolAad2** **ApolSep1** **ApolSep2** **0 <dec>** **ApolAcpu** **ApolAcoc** **ApolAuvd** **ApolAswA** **ApolBcpu** **ApolBcoc** **ApolBuvd** **ApolBswA** **ApolPmSe** **0 <dec>** **0 <dec>** **0 <dec>** **ApolWdEn**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Fire SetRMAlarmPolarity** *Command Parameter(s) :* **FireFun DF86Cmd AH8F1001** **FireFun DD86Cmd AH8F2001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,4) Fire Command - Fire SetRMAlarmPolarity	**ACZ3N109** **Enable 86** **Enable 86**	
5.1.3		*Verify Update via RM A Status Report*		
		Execute Telecommand **Get RM-A status** *Command Parameter(s) :* **RMStat DF86Cmd AH841001** **RMStat DD86Cmd AH842001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) - Get RM-A status	**ACZZ4109** **Enable 86** **Enable 86**	
		Verify Packet Reception **TM 8-6 for RM Status parametrized** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**A86_RMStatus** **512** **8** **6** **41600** **1**	
		Verify Telemetry **APOL WD AEW4G109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS1 AEW4H109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS2 AEW4J109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS3 AEW4K109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL AAD1 AEW4L109**	**<user defined setting>**	AND=ZAAM2999

Step No.	Time	Activity/Remarks		TC/TLM	Display/ Branch
		Verify Telemetry **APOL AAD2**	**AEW4M109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap1**	**AEW4N109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap2**	**AEW4P109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL Ext8**	**AEW4R109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMA CPU**	**AEW4S109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA COCOS**	**AEW4T109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA UVD**	**AEW4U109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA SW**	**AEW4V109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB CPU**	**AEW4W109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB COCOS**	**AEW4X109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB UVD**	**AEW4Y109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB SW**	**AEW4Z109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PM Select**	**AEW50109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL WD Enable**	**AEW51109**	**<user defined setting>**	AND=ZAAM2999
5.1.4		*Enable RM A*			

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Ext_ACC_RM_A_Enable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM A Enable - Mission Specific	**DCM21170**	
		Verify Telemetry **RMA_fromTTR-RMA** **AEE91050**	**= ENABLED**	AND=ZAA07999
		Verify Telemetry **RMA_fromTTR-RMB** **AEE92050**	**= ENABLED**	AND=ZAA07999
		TC Seq. Name :NULLSEQ3 ( ) *TimeTag Type:* *Sub Schedule ID:*		
6		*Check Current RM B Settings*		Next Step: 7
		This step verifies if the current alarm polarity configuration is as expected. The polarity setting of each alarm can be read from the RMH_APOL macro parameter, which is part of the telemetry packet returned by the TC_GET_RM_STATUS command.		
6.1		*Uplink Sequence HFADRMR2*		
		Execute Sequence **HFADRMR2 GetRmBstatusReport**		
6.2		*Check RM Alarm Polarity Configuration*		
		Verify Telemetry **APOL WD** **AEW4G109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS1** **AEW4H109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS2** **AEW4J109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS3** **AEW4K109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL AAD1** **AEW4L109**	**<to be read>**	AND=ZAAM2999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **APOL AAD2 AEW4M109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap1 AEW4N109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap2 AEW4P109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL Ext8 AEW4R109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA CPU AEW4S109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA COCOS AEW4T109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA UVD AEW4U109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA SW AEW4V109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB CPU AEW4W109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB COCOS AEW4X109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB UVD AEW4Y109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB SW AEW4Z109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL PM Select AEW50109**	**<to be read>**	AND=ZAAM2999
		Verify Telemetry **APOL WD Enable AEW51109**	**<to be read>**	AND=ZAAM2999
		TC Seq. Name :NULLSEQ4 ( ) *TimeTag Type:* *Sub Schedule ID:* □		
7		*Select RM B Polarity Configuration*		Next Step: DEFAULT FLIGHT (RMB) 8 USER-DEFINED (RMB) 9

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Options are to restore the default polarity configuration for flight or to define a new alarm polarity configuration: *Restore flight defaults -> GO TO STEP 8* *Define new configuration -> GO TO STEP 9* *WARNING:* *For most alarms, change of default polarity should never be necessary. During flight operations, this sequence should be used to resolve contingencies in the following specific cases:* *1. Failure of one or more separation strap inputs.* *2. Recovery from a bit flip in the alarm polarity register.*		
		TC Seq. Name :HRAD2AP3 (SetRmBdefaultPolCfg) *TimeTag Type: N* *Sub Schedule ID:*		
8		*Restore RM B Polarity Configuration to Flight Default*		Next Step: END
		This step restores the default RM alarm polarity configuration for flight. Default configuration is as highlighted in table 1 attached at the back of this procedure. Keep in mind the inversion of the interpretation of raw values between command and telemetry.		
8.1		*Uplink Sequence HRAD2AP3*		
8.1.1		*Disable RM B*		
		Execute Telecommand **Ext_ACC_RM_B_Disable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM B Disable - Mission Specific	**DCM25170**	
		Verify Telemetry **RMB_fromTTR-RMA** **AEE93050**	**= DISABLED**	AND=ZAA07999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **RMB_fromTTR-RMB AEE94050**	**= DISABLED**	AND=ZAA07999
8.1.2		*Set RM Alarm Polarity Configuration*		
		WARNING: *Polarity of alarms in TC_SET_RM_ALARM_POLARITY. The interpretation of raw bit values is different in the command and in the alarm polarity register(!). The bits in the polarity register are set according to the convention: 1 = high , 0 = low. The interpretation of the bits is inverted in the command: 1 = low, 0 = high.*		
		NOTE: *At the time of creating this procedure (10 January 2009) the implementation of the instantiated command in the current version of the SCOS database was still incorrect with bit values inverted with respect to the desired settings. The problem should be solved (TBC) in the next Industry database delivery. The generic command can be used as a temporary workaround.* *Instantiated commands for future use:* *ACZWE109 Def-FlightAlarmPol RMA* *ACZWF109 Def-FlightAlarmPol RMB*		
		Execute Telecommand **SetAlarmPolarity RMB** *Command Parameter(s) :* **AlarmPolF86Cmd AH8H3001** **AlarmPolDD86Cmd AH8H4001** **AlmPol WD Togg AHF81001** **AlarmPol CRS1 AHF82001** **AlarmPol CRS2 AHF83001** **AlarmPol CRS3 AHF84001** **AlarmPol AAD1 AHF85001** **AlarmPol AAD2 AHF86001** **AlmPol SepStr1 AHF87001** **AlmPol SepStr2 AHF88001** **AlmPol Extrnl7 AHG8A001**	**ACZWB109** **Enable 86** **Enable 86** **0 <dec>** **1 <dec>** **1 <dec>** **1 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		AlmPol PMASyEr AHG8B001 **AlmPol PMAAlAl AHG8C001** **AlarmPol PMAUnV AHG8D001** **AlmPol PMASwAl AHG8E001** **AlmPol PMBSyEr AHG8F001** **AlmPol PMBAlAl AHG8G001** **AlarmPol PMBUnV AHG8H001** **AlmPol PMBSwAl AHH81001** **AlarmPol Sel PM AHH82001** **AlmPol NotUse1 AHH83001** **AlmPol NotUse2 AHH84001** **AlmPol NotUse3 AHH85001** **AlarmPol WD Ena AHH86001** *TC Control Flags :*	**1 <dec>** **0 <dec>** **1 <dec>** **0 <dec>** **1 <dec>** **0 <dec>** **1 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>** **0 <dec>**	
		GBM IL DSE **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) SET ALRM - SetAlarmPolarity RMB		
		Execute Telecommand **Fire SetRMAlarmPolarity** *Command Parameter(s) :* **FireFun DF86Cmd AH8F1001** **FireFun DD86Cmd AH8F2001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,4) Fire Command - Fire SetRMAlarmPolarity	**ACZ3N109** **Enable 86** **Enable 86**	
8.1.3		*Verify Update via RM B Status Report*		
		Execute Telecommand **Get RM-B status** *Command Parameter(s) :* **RMStat DF86Cmd AH841001** **RMStat DD86Cmd AH842001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) - Get RM-B status	**ACZZ5109** **Enable 86** **Enable 86**	
		Verify Packet Reception **TM 8-6 for RM Status parametrized** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**A86_RMStatus** **512** **8** **6** **41600** **1**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **APOL WD AEW4G109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL CRS1 AEW4H109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL CRS2 AEW4J109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL CRS3 AEW4K109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL AAD1 AEW4L109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL AAD2 AEW4M109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL Strap1 AEW4N109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL Strap2 AEW4P109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL Ext8 AEW4R109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMA CPU AEW4S109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMA COCOS AEW4T109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMA UVD AEW4U109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMA SW AEW4V109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMB CPU AEW4W109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMB COCOS AEW4X109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMB UVD AEW4Y109**	**= Low**	AND=ZAAM2999
		Verify Telemetry **APOL PMB SW AEW4Z109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PM Select AEW50109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL WD Enable AEW51109**	**= High**	AND=ZAAM2999
8.1.4		*Enable RM B*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Ext_ACC_RM_B_Enable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM B Enable - Mission Specific	**DCM24170**	
		Verify Telemetry **RMB_fromTTR-RMA** **AEE93050**	**= ENABLED**	AND=ZAA07999
		Verify Telemetry **RMB_fromTTR-RMB** **AEE94050**	**= ENABLED**	AND=ZAA07999
		TC Seq. Name :HRAD2AP4 (SetRmBuserDefPolCfg) *TimeTag Type: N* *Sub Schedule ID:* *Formal Parameter List :* AlmPol WD Togg ApolWdTg= AlarmPol CRS1 ApolCrs1= AlarmPol CRS2 ApolCrs2= AlarmPol CRS3 ApolCrs3= AlarmPol AAD1 ApolAad1= AlarmPol AAD2 ApolAad2= AlmPol SepStr1 ApolSep1= AlmPol SepStr2 ApolSep2= AlmPol PMASyEr ApolAcpu=		
		AlmPol PMAAlAl ApolAcoc= AlarmPol PMAUnV ApolAuvd= AlmPol PMASwAl ApolAswA= AlmPol PMBSyEr ApolBcpu= AlmPol PMBAlAl ApolBcoc= AlarmPol PMBUnV ApolBuvd= AlmPol PMBSwAl ApolBswA= AlarmPol Sel PM ApolPmSe= AlarmPol WD Ena ApolWdEn=		
9		*Set User-Defined RM B Polarity Configuration*		Next Step: END
		This step lets you define a new RM alarm polarity configuration. For most alarms, change of default polarity should never be necessary. If an alarm signal fails and becomes "stuck" in a state that can trigger the RM, the problem of blocking the undesired triggers should be solved by disabling the alarm rather than changing its polarity. *During flight operations, this sequence should be used to resolve contingencies in the following specific cases:* *1. Failure of one or more separation strap inputs.* *2. Recovery from a bit flip in the alarm polarity register.*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
9.1		*Uplink Sequence HRAD2AP4*		
9.1.1		*Disable RM B*		
		Execute Telecommand **Ext_ACC_RM_B_Disable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM B Disable - Mission Specific	**DCM25170**	
		Verify Telemetry **RMB_fromTTR-RMA** **AEE93050**	**= DISABLED**	AND=ZAA07999
		Verify Telemetry **RMB_fromTTR-RMB** **AEE94050**	**= DISABLED**	AND=ZAA07999
9.1.2		*Set RM Alarm Polarity Configuration*		
		WARNING: *Polarity of alarms in TC_SET_RM_ALARM_POLARITY. The interpretation of raw bit values is different in the command and in the alarm polarity register(!). The bits in the polarity register are set according to the convention: 1 = high , 0 = low. The interpretation of the bits is inverted in the command: 1 = low, 0 = high.*		
		When loading this command sequence on the Manual Stack, it will ask you to enter values for the formal parameters inside the sequence. The formal parameters are: - ***ApolWdTg*** *= Watchdog toggle alarm polarity* - ***ApolCrs1*** *= CRS 1 alarm polarity* - ***ApolCrs2*** *= CRS 1 alarm polarity* - ***ApolCrs3*** *= CRS 1 alarm polarity* - ***ApolAad1*** *= AAD 1 alarm polarity* - ***ApolAad2*** *= AAD 2 alarm polarity* - ***ApolSep1*** *= Separation strap 1 alarm polarity* - ***ApolSep2*** *= Separation strap 2 alarm polarity*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		- ***ApolAcpu*** = *PM A CPU alarm polarity* - ***ApolAcoc*** = *PM A COCOS alarm polarity* - ***ApolAuvd*** = *PM A undervoltage detection alarm polarity* - ***ApolAswA*** = *PM A software alarm polarity* - ***ApolBcpu*** = *PM B CPU alarm polarity* - ***ApolBcoc*** = *PM B COCOS alarm polarity* - ***ApolBuvd*** = *PM B undervoltage detection alarm polarity* - ***ApolBswA*** = *PM B software alarm polarity* - ***ApolPmSe*** = *PM select alarm polarity* - ***ApolWdEn*** = *Watchdog enable alarm polarity*		
		Execute Telecommand **SetAlarmPolarity RMB** *Command Parameter(s) :* **AlarmPolF86Cmd AH8H3001** **AlarmPolDD86Cmd AH8H4001** **AlmPol WD Togg AHF81001** **AlarmPol CRS1 AHF82001** **AlarmPol CRS2 AHF83001** **AlarmPol CRS3 AHF84001** **AlarmPol AAD1 AHF85001** **AlarmPol AAD2 AHF86001** **AlmPol SepStr1 AHF87001** **AlmPol SepStr2 AHF88001** **AlmPol Extrnl7 AHG8A001** **AlmPol PMASyEr AHG8B001** **AlmPol PMAAlAl AHG8C001** **AlarmPol PMAUnV AHG8D001** **AlmPol PMASwAl AHG8E001** **AlmPol PMBSyEr AHG8F001** **AlmPol PMBAlAl AHG8G001** **AlarmPol PMBUnV AHG8H001** **AlmPol PMBSwAl AHH81001** **AlarmPol Sel PM AHH82001** **AlmPol NotUse1 AHH83001** **AlmPol NotUse2 AHH84001** **AlmPol NotUse3 AHH85001** **AlarmPol WD Ena AHH86001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) SET ALRM - SetAlarmPolarity RMB	**ACZWB109** **Enable 86** **Enable 86** **ApolWdTg** **ApolCrs1** **ApolCrs2** **ApolCrs3** **ApolAad1** **ApolAad2** **ApolSep1** **ApolSep2** **0 <dec>** **ApolAcpu** **ApolAcoc** **ApolAuvd** **ApolAswA** **ApolBcpu** **ApolBcoc** **ApolBuvd** **ApolBswA** **ApolPmSe** **0 <dec>** **0 <dec>** **0 <dec>** **ApolWdEn**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Fire SetRMAlarmPolarity** *Command Parameter(s) :* **FireFun DF86Cmd AH8F1001** **FireFun DD86Cmd AH8F2001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,4) Fire Command - Fire SetRMAlarmPolarity	**ACZ3N109** **Enable 86** **Enable 86**	
9.1.3		*Verify Update via RM B Status Report*		
		Execute Telecommand **Get RM-B status** *Command Parameter(s) :* **RMStat DF86Cmd AH841001** **RMStat DD86Cmd AH842001** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 20* Det. descr. : TC(8,1) - Get RM-B status	**ACZZ5109** **Enable 86** **Enable 86**	
		Verify Packet Reception **TM 8-6 for RM Status parametrized** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**A86_RMStatus** **512** **8** **6** **41600** **1**	
		Verify Telemetry **APOL WD AEW4G109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS1 AEW4H109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS2 AEW4J109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL CRS3 AEW4K109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL AAD1 AEW4L109**	**<user defined setting>**	AND=ZAAM2999

Step No.	Time	Activity/Remarks		TC/TLM	Display/ Branch
		Verify Telemetry **APOL AAD2**	**AEW4M109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap1**	**AEW4N109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL Strap2**	**AEW4P109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL Ext8**	**AEW4R109**	**= High**	AND=ZAAM2999
		Verify Telemetry **APOL PMA CPU**	**AEW4S109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA COCOS**	**AEW4T109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA UVD**	**AEW4U109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMA SW**	**AEW4V109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB CPU**	**AEW4W109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB COCOS**	**AEW4X109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB UVD**	**AEW4Y109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PMB SW**	**AEW4Z109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL PM Select**	**AEW50109**	**<user defined setting>**	AND=ZAAM2999
		Verify Telemetry **APOL WD Enable**	**AEW51109**	**<user defined setting>**	AND=ZAAM2999
9.1.4		*Enable RM B*			

Set RM Alarm Polarity
File: H_CRP_AOC_D2AP.xls
Author: dsalt-hp

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Ext_ACC_RM_B_Enable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : External ACC RM B Enable - Mission Specific	**DCM24170**	
		Verify Telemetry **RMB_fromTTR-RMA** **AEE93050**	**= ENABLED**	AND=ZAA07999
		Verify Telemetry **RMB_fromTTR-RMB** **AEE94050**	**= ENABLED**	AND=ZAA07999
		End of Procedure		

Tables & Figures

No.	Alarm	Default RM Alarm Polarity Configuration for Flight	
		TM Convention (1 = high, 0 = low)	TC Convention (0 = high, 1 = low)
(00)	Watchdog Toggle	1	0
(01)	CRS 1	0	1
(02)	CRS 2	0	1
(03)	CRS 3	0	1
(04)	AAD 1	1	0
(05)	AAD 2	1	0
(06)	Separation Strap 1	1	0
(07)	Separation Strap 2	1	0
(08)	External 8	1	0
(09)	PM A CPU	0	1
(10)	PM A COCOS	1	0
(11)	PM A Under-Voltage Detection	0	1
(12)	PM A Software Alarm	1	0
(13)	PM B CPU	0	1
(14)	PM B COCOS	1	0
(15)	PM B Under-Voltage Detection	0	1
(16)	PM B Software Alarm	1	0
(17)	PM Select	1	0
(18)	Unused	1	0
(19)	Unused	1	0
(20)	Unused	1	0
(21)	Watchdog Enable	1	0
(22)	Unused	0	1
(23)	Unused	0	1
(24)	Unused	0	1
(25)	Unused	0	1
(26)	Unused	0	1
(27)	Unused	0	1
(28)	Unused	0	1
(29)	Unused	0	1
(30)	Unused	0	1
(31)	Unused	0	1

Table 1 : Default Polarities of the Alarms in the Flight Configuration