

SWA Emergency Switch Off File: IA-CRP-001.xls Author: daniel lakey	 
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Procedure Summary

Objectives

Handle SWA Emergency Switch Off Request

Summary of Constraints

This will turn off the Decontamination heaters, if they are currently on.

DO NOT ALLOW AIAC001D/E TO EXECUTE AROUND THE TIME OF A SPICE DECONTAMINATION HEATER SWITCHING:
 ATCF400A SPICE_OU_DEC_HTR_ON
 ATCF400B SPICE_CE_DC_N_HTR_ON
 ATCF400E SPICE_CE_DC_R_HTR_ON
 ATCF401A SPICE_OU_DEC_HTR_OFF
 ATCF401B SPICE_CE_DC_N_HT_OFF
 ATCF401E SPICE_CE_DC_R_HT_OFF

Spacecraft Configuration

Start of Procedure

SWA + Sensors ON

End of Procedure

SWA + Sensors OFF

Reference File(s)

Input Command Sequences

AIAF830A
 AIAF002A
 AIAF830B

Output Command Sequences

ADUMMYSQ
 AIAC001A
 AIAC001B
 AIAC001C
 AIAC001D
 AIAC001E

Referenced Displays

ANDs GRDs SLDs

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
08/05/2020		1	SOL_FCR-310 - SWA Procedure Overhaul	dlakey	M7

Configuration Control Information

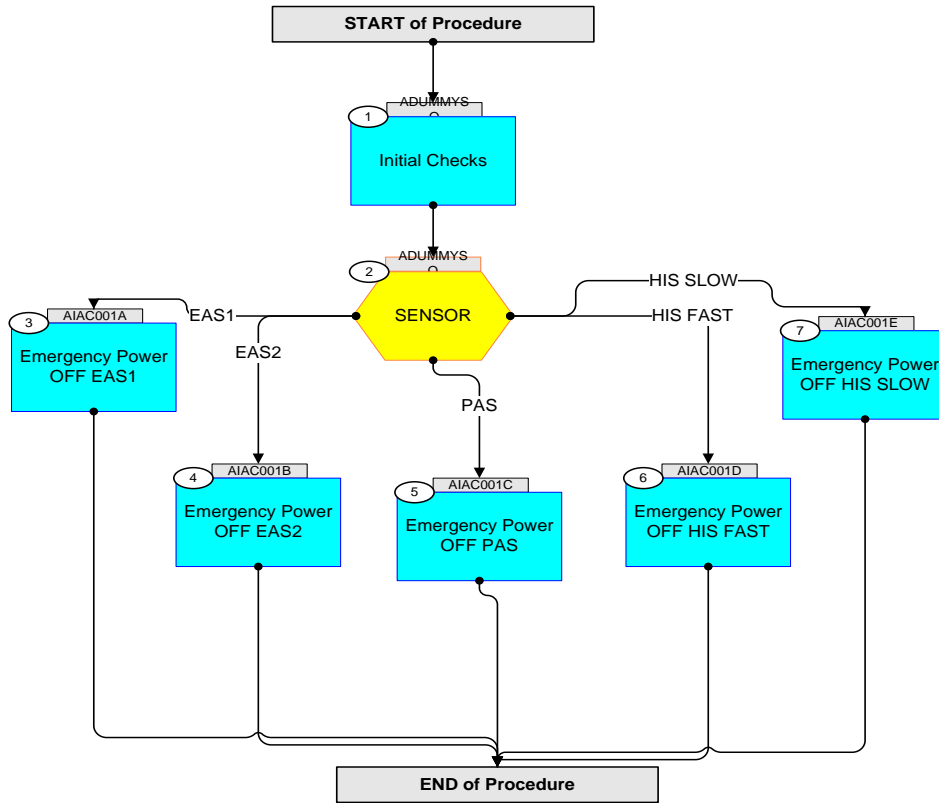
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solar orbiter



Procedure Flowchart Overview



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Step	Label/Time	Activity/Remarks/Branch	CK	Display
Beginning of Procedure				
Beginning of Sequence				
ADUMMYSQ				
TimeTag type : B				
1		<p style="text-align: center;">Initial Checks</p> <p><i>Next step(s):</i> -> 2</p>		
		This procedure will safely shut down SWA and any active sensors.		
		<p>In the emergency case, the TM Checks may be skipped at the request of SWA, in which case:</p> <p>==> EXECUTE EAS1 BRANCH ==> EXECUTE EAS2 BRANCH ==> EXECUTE PAS BRANCH ==> EXECUTE HIS FAST BRANCH ==> SWITCH OFF DPU</p> <p>TM(1,8) will be expected for any sensor not powered</p>		
		ENABLE S3 in VC0		
		A telemetry check is required to determine which sensors are currently powered. This is available in real-time telemetry on VC0 after the forwarding sequences has been executed.		
		<p>Execute Sequence AIAF830A SWA Enab OBC S3 RT v03 Sequence Grouping = -</p> <p>This Sequence Reference is not included in the generated sequence Subsch ID : SWA (109)</p>		
		Check which SWA sensors are powered ON		
		EAS1		
		Check if EAS1 is ON (EAS1_STATE not equal to 3)		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
		NIAD4410 Parameter Check NIAD4410 EAS1_STATE <> 3 <dec>		PKT=YIA58998
		==> EXECUTE EAS1 BRANCH		
		EAS2		
		Check if EAS2 is ON (EAS2_STATE not equal to 3)		
		NIAD4416 Parameter Check NIAD4416 EAS2_STATE <> 3 <dec>		PKT=YIA58998
		==> EXECUTE EAS2 BRANCH		
		PAS		
		Check if PAS is ON (PAS_STATE not equal to 3)		
		NIAD4422 Parameter Check NIAD4422 PAS_STATE <> 3 <dec>		PKT=YIA58998
		==> EXECUTE PAS BRANCH		
		HIS		
		Check if HIS is ON (HIS_STATE equals 1)		
		NIAD4408 Parameter Check NIAD4408 HIS_STATE = 1 <dec>		PKT=YIA58998
		IF Emergency Switch-Off Requested THEN ==> EXECUTE HIS FAST BRANCH ELSE ==> EXECUTE HIS SLOW BRANCH		
		DPU		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
		In all cases, after switching off the sensors, power off the DPU		
		Execute Sequence AIAF002A SWA Power OFF v06 Sequence Grouping = - This Sequence Reference is not included in the generated sequence Subsch ID : SWA (109)		
		DISABLE S3 in VC0		
		If previously enabled, disable the HKTM in VC0		
		Execute Sequence AIAF830B SWA Disab OBC S3 RT v03 Sequence Grouping = - This Sequence Reference is not included in the generated sequence Subsch ID : SWA (109)		
2		SENSOR Next step(s): -> 3 EAS1 -> 4 EAS2 -> 5 PAS -> 6 HIS FAST -> 7 HIS SLOW		
ADUMMYSQ		End of Sequence		
AIAC001A		Beginning of Sequence		
		SWA Emerg SWOFF EAS1 SeqFlags [Crit/Plan/Stdalone/Sched] : NNYN Forced Subschedule : SWA (109) TimeTag type : B		
3		Emergency Power OFF EAS1 Next step(s): -> END		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
		EAS1 OFF SEQUENCE START: Run this sequence only if EAS1 is ON		
		Halt science on EAS1		
	+00.00.00	Send SWA_TC_EAS1_MAIL_WR ZIA58771 SWA_TC_EAS1_MAIL_WR TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60031 MAILBOX_ID = MBOX1 (Def) PIA60446 MBV0 = 0 <hex> PIA60447 MBV1 = 0 <hex> PIA60448 MBV2 = 0 <hex>		
		Disable EAS1 FDIR		
	+00.00.20	Send SWA_TC_PARS_MON_DIS ZIA58064 SWA_TC_PARS_MON_DIS TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60452 NUM_OF_MON_ID = 12 <dec> PIA60449 MON_ID = EAS1SPWHB_MI <hex> PIA60449 MON_ID = E1_3V3_MI <hex> PIA60449 MON_ID = E1_1V5_MI <hex> PIA60449 MON_ID = E1OPTMPMON <hex> PIA60449 MON_ID = E1HVOUTVMON <hex> PIA60449 MON_ID = E1MCPVMON <hex> PIA60449 MON_ID = E1GRIDVMON <hex> PIA60449 MON_ID = E110VAPOSVMON <hex> PIA60449 MON_ID = E128VPOSVMON <hex> PIA60449 MON_ID = E1HVGENTHERMON <hex> PIA60449 MON_ID = E1HVMODTHERMON <hex> PIA60449 MON_ID = EAS1MISSACK_MI <hex>		
		Power off EAS1		
	+00.00.01	Send SWA_TC_EAS1_PWR_OFF ZIA58761 SWA_TC_EAS1_PWR_OFF TC Control Flags: GBM IL DSE --Y NC ---		
		EAS1 SEQUENCE END		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
AIAC001A		End of Sequence		
		Beginning of Sequence		
AIAC001B		SWA Emerg SWOFF EAS2 SeqFlags [Crit/Plan/Stdalone/Sched] : NNYN Forced Subschedule : SWA (109) TimeTag type : B		
4		Emergency Power OFF EAS2 <i>Next step(s):</i> -> END		
		EAS2 OFF SEQUENCE START: Run this sequence only if EAS2 is ON		
		Halt science on EAS2		
	+00.00.00	Send SWA_TC_EAS2_MAIL_WR ZIA58819 SWA_TC_EAS2_MAIL_WR TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60031 MAILBOX_ID = MBOX1 (Def) PIA60446 MBV0 = 0 <hex> PIA60447 MBV1 = 0 <hex> PIA60448 MBV2 = 0 <hex>		
		Disable EAS2 FDIR		
	+00.00.20	Send SWA_TC_PARS_MON_DIS ZIA58064 SWA_TC_PARS_MON_DIS TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60452 NUM_OF_MON_ID = 12 <dec> PIA60449 MON_ID = EAS2SPWHB_MI <hex> PIA60449 MON_ID = E2_3V3_MI <hex> PIA60449 MON_ID = E2_1V5_MI <hex> PIA60449 MON_ID = E2OPTMPMON <hex> PIA60449 MON_ID = E2HVOUTVMON <hex> PIA60449 MON_ID = E2MCPVMON <hex> PIA60449 MON_ID = E2GRIDVMON <hex> PIA60449 MON_ID = E210VAPOSVMON <hex> PIA60449 MON_ID = E228VPOSVMON <hex> PIA60449 MON_ID = E2HVGENTHERMON <hex> PIA60449 MON_ID = E2HVMODTHERMON <hex> PIA60449 MON_ID = EAS2MISSACK_MI <hex>		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
		Power off EAS2		
	+00.00.01	Send SWA_TC_EAS2_PWR_OFF ZIA58809 SWA_TC_EAS2_PWR_OFF TC Control Flags: GBM IL DSE --Y NC ---		
		EAS2 SEQUENCE END		
AIAC001B		End of Sequence		
		Beginning of Sequence		
	AIAC001C	SWA Emerg SWOFF PAS SeqFlags [Crit/Plan/Stdalone/Sched] : NNYN Forced Subschedule : SWA (109) TimeTag type : B		
5		Emergency Power OFF PAS Next step(s): -> END		
		PAS OFF SEQUENCE START: Run this sequence only if PAS is ON		
		Halt science on PAS		
	+00.00.00	Send SWA_TC_PAS_STOP_SCIENCE ZIA58944 SWA_TC_PAS_STOP_SCIENCE TC Control Flags: GBM IL DSE --Y NC ---		
		Disable PAS FDIR		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
	+00.00.20	Send SWA_TC_PARS_MON_DIS ZIA58064 SWA_TC_PARS_MON_DIS TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60452 NUM_OF_MON_ID = 28 <dec> PIA60449 MON_ID = V_MON_C_MI <hex> PIA60449 MON_ID = V_MON_L_MI <hex> PIA60449 MON_ID = I_MON_C_MI <hex> PIA60449 MON_ID = I_MON_L_MI <hex> PIA60449 MON_ID = T_MON_C_MI <hex> PIA60449 MON_ID = T_MON_L_MI <hex> PIA60449 MON_ID = P24_VCEMOUT_MI <hex> PIA60449 MON_ID = P5_VCEMOUT_MI <hex> PIA60449 MON_ID = P12_VHTOUT_MI <hex> PIA60449 MON_ID = M12_VHTOUT_MI <hex> PIA60449 MON_ID = P3V_3_FPGA_OMI <hex> PIA60449 MON_ID = P1V_5_FPGA_OMI <hex> PIA60449 MON_ID = TEMP_DCDC_MI <hex> PIA60449 MON_ID = TEMP_FPGA_MI <hex> PIA60449 MON_ID = HK_IP24V_CEMMI <hex> PIA60449 MON_ID = HK_IP5V_CEMMI <hex> PIA60449 MON_ID = HK_IP12V_HTMI <hex> PIA60449 MON_ID = HK_IM12V_HTMI <hex> PIA60449 MON_ID = HK_I3V3_FPGAMI <hex> PIA60449 MON_ID = HK_IP28V_PRIMI <hex> PIA60449 MON_ID = HK_I1V5_FPGAMI <hex> PIA60449 MON_ID = HK_MHV_POSMI <hex> PIA60449 MON_ID = HK_MHV_NEGMI <hex> PIA60449 MON_ID = TEMP_HVPS_MI <hex> PIA60449 MON_ID = HK_IP28V_PRSCI <hex> PIA60449 MON_ID = PASampOverCurr <hex> PIA60449 MON_ID = PASSPWHB_MI <hex> PIA60449 MON_ID = PASMISSACK_MI <hex>		
		Power off PAS pre-amps		
	+00.00.01	Send SWA_TC_PAS_WR_PREAMP_CTRL_REG ZIA58862 SWA_TC_PAS_WR_PREAMP_CTRL_REG TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA58062 PRE_AMP1 = OFF PIA58063 PRE_AMP2 = OFF		
		Ramp down PAS CEM HVs		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
	+00.00.01	Send SWA_TC_PAS_HV_RAMP_DOWN ZIA58857 SWA_TC_PAS_HV_RAMP_DOWN TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60790 NOMINAL_VAL = 0 <hex> PIA60791 INIT_VALUE = 570 <hex> PIA60792 STEP_VALUE = 52 <hex> PIA60793 HV_WAIT = 32 <hex>		
		Disable PAS CEM HV		
	+00.03.00	Send SWA_TC_PAS_WR_MASTER_CTRL_REG ZIA58863 SWA_TC_PAS_WR_MASTER_CTRL_REG TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60343 REG_VAL = 1E <hex>		
		Power off PAS		
	+00.00.01	Send SWA_TC_PAS_PWR_OFF ZIA58859 SWA_TC_PAS_PWR_OFF TC Control Flags: GBM IL DSE --Y NC ---		
		PAS SEQUENCE END		
AIAC001C		End of Sequence		
AIAC001D		Beginning of Sequence		
		SWA Em SWOFF HIS FST SeqFlags [Crit/Plan/Stdalone/Sched] : NNYN Forced Subschedule : SWA (109) TimeTag type : B		
6		Emergency Power OFF HIS FAST Next step(s): -> END		
		HIS FAST OFF SEQUENCE START: Run this sequence only if HIS is ON and it is an emergency, not a no-uplink		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
		DO NOT ALLOW AIAC001D TO EXECUTE AROUND THE TIME OF A SPICE DECONTAMINATION HEATER SWITCHING: ATCF400A SPICE_OU_DEC_HTR_ON ATCF400B SPICE_CE_DC_N_HTR_ON ATCF400E SPICE_CE_DC_R_HTR_ON ATCF401A SPICE_OU_DEC_HTR_OFF ATCF401B SPICE_CE_DC_N_HT_OFF ATCF401E SPICE_CE_DC_R_HT_OFF		
		10 MINUTE RAMP-DOWN		
		Halt science on HIS		
		Ramp down HIS HVs		
	+00.00.00	Execute Telecommand ZIA58940 SWA_TC_HIS_SAFE_EMERGENCY TC Control Flags: GBM IL DSE --Y NC ---		
		Disable HIS HeartBeat monitor		
	+00.10.00	Send SWA_TC_PARS_MON_DIS ZIA58064 SWA_TC_PARS_MON_DIS TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60452 NUM_OF_MON_ID = 01 <dec> (Def) PIA60449 MON_ID = HISHEARTB_MI <hex>		
		Send DPU HIS power off TC		
	+00.00.01	Send SWA_TC_HIS_OFF ZIA58730 SWA_TC_HIS_OFF TC Control Flags: GBM IL DSE --Y NC ---		
		Switch Off LCL/Relay		
		OBC to switch power off to HIS Note; this will temporarily switch off the decontamination heaters, if on, as they share an LCL.		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
	+00.00.01	Execute Telecommand ZCS2Z09W Decont. HIS A LCL Off TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09Y Decont. HIS B LCL Off TC Control Flags: GBM IL DSE --Y NC ---		
		Set Relay switch positions SWA-HIS Return_1 = RB1_5_OFF SWA-HIS Return_2 = RB2_5_ON SWA-HIS Nominal = RB1_6_OFF SWA-HIS Redundant = RB2_6_OFF <i>Note; we switch off HIS Redundant to ensure clean configuration</i>		
	+00.00.01	Execute Telecommand ZCS2Z09D RIU SHP SWA_HIS_Ret1Pos2 TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09E RIU SHP SWA_HIS_Ret2Pos1 TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09H RIU SHP SWA_HIS_NominOFF TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09K RIU SHP SWA_HIS_RedunOFF TC Control Flags: GBM IL DSE --Y NC ---		
		Switch Relay Box LCLs back on		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
		Both are always commanded on; the relay state is used to ensure electrical isolation of HIS		
	+00.00.01	Execute Telecommand ZCS2Z09V Decont. HIS A LCL On TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09X Decont. HIS B LCL On TC Control Flags: GBM IL DSE --Y NC ---		
		HIS FAST SEQUENCE END		
AIAC001D		End of Sequence		
AIAC001E		Beginning of Sequence		
		SWA Em SWOFF HIS SLW SeqFlags [Crit/Plan/Stdalone/Sched] : NNYN Forced Subschedule : SWA (109) TimeTag type : B		
7		Emergency Power OFF HIS SLOW <i>Next step(s):</i> -> END		
		HIS SLOW OFF SEQUENCE START: Run this sequence only if HIS is ON and it is a no-uplink, not an emergency		
		DO NOT ALLOW AIAC001E TO EXECUTE AROUND THE TIME OF A SPICE DECONTAMINATION HEATER SWITCHING: ATCF400A SPICE_OU_DEC_HTR_ON ATCF400B SPICE_CE_DC_N_HTR_ON ATCF400E SPICE_CE_DC_R_HTR_ON ATCF401A SPICE_OU_DEC_HTR_OFF ATCF401B SPICE_CE_DC_N_HT_OFF ATCF401E SPICE_CE_DC_R_HT_OFF		
		50 MINUTE RAMP-DOWN		
		Halt science on HIS		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
	+00.00.00	Send SWA_TC_HIS_MODE ZIA58917 SWA_TC_HIS_MODE TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA59011 MODE = HVSTDBY		
		Ramp down HIS HVs		
	+00.00.20	Send SWA_TC_HIS_SAFE_NOMINAL ZIA58941 SWA_TC_HIS_SAFE_NOMINAL TC Control Flags: GBM IL DSE --Y NC ---		
		Disable HIS HeartBeat monitor		
	+00.51.00	Send SWA_TC_PARS_MON_DIS ZIA58064 SWA_TC_PARS_MON_DIS TC Control Flags: GBM IL DSE --Y NC --- Command Parameters : PIA60452 NUM_OF_MON_ID = 01 <dec> (Def) PIA60449 MON_ID = HISHEARTB_MI <hex>		
		Send DPU HIS power off TC		
	+00.00.01	Send SWA_TC_HIS_OFF ZIA58730 SWA_TC_HIS_OFF TC Control Flags: GBM IL DSE --Y NC ---		
		Switch Off LCL/Relay		
		OBC to switch power off to HIS Note; this will temporarily switch off the decontamination heaters, if on, as they share an LCL.		
	+00.00.01	Execute Telecommand ZCS2Z09W Decont. HIS A LCL Off TC Control Flags: GBM IL DSE --Y NC ---		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
	+00.00.01	Execute Telecommand ZCS2Z09Y Decont. HIS B LCL Off TC Control Flags: GBM IL DSE --Y NC ---		
		Set Relay switch positions SWA-HIS Return_1 = RB1_5_OFF SWA-HIS Return_2 = RB2_5_ON SWA-HIS Nominal = RB1_6_OFF SWA-HIS Redundant = RB2_6_OFF <i>Note; we switch off HIS Redundant to ensure clean configuration</i>		
	+00.00.01	Execute Telecommand ZCS2Z09D RIU SHP SWA_HIS_Ret1Pos2 TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09E RIU SHP SWA_HIS_Ret2Pos1 TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09H RIU SHP SWA_HIS_NominOFF TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09K RIU SHP SWA_HIS_RedunOFF TC Control Flags: GBM IL DSE --Y NC ---		
		Switch Relay Box LCLs back on		
		Both are always commanded on; the relay state is used to ensure electrical isolation of HIS		

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Step	Label/Time	Activity/Remarks/Branch	CK	Display
	+00.00.01	Execute Telecommand ZCS2Z09V Decont. HIS A LCL On TC Control Flags: GBM IL DSE --Y NC ---		
	+00.00.01	Execute Telecommand ZCS2Z09X Decont. HIS B LCL On TC Control Flags: GBM IL DSE --Y NC ---		
		HIS SLOW SEQUENCE END		
AIAC001E		End of Sequence		
End of Procedure				