System Fault Isolation with BIT



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14

IGF 2

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Outline

- Introduction to BIT
- BIT as a program included in a schedule
- Using BIT as a fault isolation aid
- Details of BIT testing and interpretation of results



Introduction to BIT

- Earlier systems had troubleshooting assistance mechanisms but nothing automated
- Built-In Test (BIT) was introduced as an automated mechanism to determine and report Digisonde health
- Run on a user defined basis
- First place to look when problems arise
- Valuable aid in locating system fault



BIT Program

- BIT is a type of program that can be scheduled
- Please ensure it is included in the routine sounding schedule
- Can be run manually in DCART's "manual" mode
- Data display is available in 2 forms
 - Built-In Test Display
 - BIT Report
- BIT Report is also available on the Web Page



Example of BIT Included in a Schedule

STOP S/by Dia	g Auto Info	s	ave Product File	es: ALL Save I	Raw Files: Per Prog	am	c	Command: Flu	sh SST Queue		▼ send		
EDITED PROGSCHE		Built-In Test	nannel Equalizin	g Tracker Calibrati	on HK Header	DVLP TOOLS]						
Prog # Title	Timesta Author		AM #01	1 Operation: Built	-In Test	💌 mea	surement	-					
SST 002 ORIG 003 drift PC 004 F day	File Action On-line										-		
005 F nigh 006 F drift	STOP S/by Diag			Save Product Files:		w Files: Per F			Command:	Flush 551	Queue		se
007 E drift 008 PGH in 009 PGH in	EDITED PROGSCHED			Channel Equalizing	Tracker Calibration	n HK Header	DVLP TOC	DLS					
010 24 p.t	Prog # Title Schd 001 Day 5 m	Timestamp Aut	hor SC	HEDULE #	002 Idle 🗔					Add	Insert	<u>D</u> elete	Clon
012 test 013 ORIG 014 ORIG	002 Day 7.5 003 Night 7.5 004 empty	5 2008.11	Auto	o 🔲 Duration:	7 min 30 s 0	ms 🔲 ASAP							
015 ion 1m	005 idle 006 EISCAT	2007.05 2008.05 GMK 2008.05 DP	#	Program		P Gap, ms Offs					nor Comme	ents	
016 ion 28 017 F drift 018 E drift	007 Standard 008 empty	1 2008.05 DP	002	P001 ORIG ion day P004 F day		16130	0 0 4 20	0	3 870 GMI 21 950 GMI	ĸ			-
019 spectr 020 24 pkt	009 empty 010 unknown 011 Day 5 m	n 2008.10 in 2008.05	004	P025 Channel eq P027 AO day		13050 4010	5 55 6 15	0 1) 15 990 GMI) 15 20 GMI				
021 ORIG	011 Day 5 m 012 Night 5 . 013 EISCAT			P011 BIT		1000	6 31	20 1	1 0 55				_
022 time te 023 time te 024 EISCA	014 EISCAT 015 HAARP	2. 2008.10 DP 2 2008.10 DP	007		2								_
025 Chanr 026 AG nic	016 empty 017 empty		009		17 17			-					_
027 AG da 028 F day 029 CHU 7	018 empty 019 empty 020 BIT Test	2008.12	011		N N								
030 CHU 3 031 ion da	020 Bit rest 021 empty 022 time test	2008.12 2006.10 GMK		30000 -									
032 unkno 033 empty	023 empty	2009.05 DP		-									
034 empty 035 EISCA 036 EISCA	025 EISCAT 026 EISCAT 027 HAARP	2 2008.05 DP 2 2008.05 DP 2 2008.05 DP 2 2008.05 DP	KH2	10000									
030 EISCA 037 empty 038 EISCA	027 HAARP . 028 empty 029 empty	2 2008.05 DP	c , k					-					
Operation	030 EISCAT 031 empty	2 2008.11 DP	c	3000 -				4			11	/	
Rename	032 empty 033 empty		E e										
Info	034 empty 035 empty			750									
Upload se	036 empty 037 empty 038 empty		Ľ	1									
Show Active PRO(Print and a second s	with schedule 002—		-									
	Rename	Copy Undo	Clear	100 + + + + + + + + + + + + + + + + + +	60 90 12	0 150	180 210	240 270	300 3	30 360	390	420	45
			Verify	0 30	00 30 12		dule Of			30 300	390	-+20	40
	Upload set	ected Run sele	cted Total p	programs: 5 / Duration: 7 n	n 30 s. / Data volume: 28	3225.4 kB							
	Show Active PROGS	CHED Activate cha	anges Save a	s active File: copy	of Active PROGSCHEE	<u>161</u>							

Indications of Potential Problems

- No data
- Blank data (empty ionograms)
- Observe weak data, strange directions, etc
- BIT is reporting errors



BIT as a Fault Isolation Aid

- Recommended as the first place to look
- Evaluate the BIT report
 - View BIT report within DCART or website
 - Interpret "raw" BIT sensor values
- When possible use the DPS-4D system as a troubleshooting tool through use of special operating modes.



DCART: BIT Tab

🛃 DCART v1.5.1 Millstone Hi	ill, model DPS-4D (DESC cont	nected since 2014.05.16 19:54:2	28.486)								_ 🗆 ×
File Action Tools Options	s Help										
								Thurk G	OT 0		
STOP S/by Diag Aut	to Info	Save Product Dat	ta: ALL Save Raw Data: F	Per Program		C	ommand:	Hush S	sT Queue		send
EDITED PROGSCHED So	ounding Mode 🟦 🛛 Built-In	Test 1 Channel Equalizing	1 Tracker Calibration 1	HK HEADER	†						
Suspend Data Display	Refresh every 250 ÷	ms								View Prog	yram
Built-In Test (BIT): Millstone Hill 2	014/05/17 21:09:23.315 Meas	isurement Show	all			- F	ailed	Report	Sys br	
†Mnemonic		Comment			Sensor	Raw	Phys	Units	GO R low	V Y low	Y hig
SD10_CMD_TIMEOUTS	Commanding Timeouts from				Cmd Timeouts	0		G			-
SD11_RF_NOISE_LOW_V		ltage in Antenna with 0 dB gain ir				0		G			
SD12_RF_NOISE_HIGH_V		ltage in Antenna with 9 dB gain ir	n antenna switch measured at th			0		G			
SD13_RX_CARD_TIMEOU		eouts since last BIT program			Rx Card Timeouts	0		G			
SD14_TRACKER1_CARD		ding Timeouts since last BIT pro			TRACKER1 Card	0		GO			
SD15_TRACKER2_CARD		ding Timeouts since last BIT pro			TRACKER2 Card	0		GO			
SD16_TRACKER3_CARD		ding Timeouts since last BIT pro			TRACKER3 Card	0		G			⊢ =
SD17_TRACKER4_CARD		ding Timeouts since last BIT pro	ogram		TRACKER4 Card	0		GO			
SD18_BIT_CARD_TIMEOU		neouts since last BIT program			BIT Card Timeouts	0	75.004			25 000	
L_DA00_AMP_RF1_V	RF voltage amplitude at the RF voltage amplitude at the				Amp RF1 V Amp RF2 V	19 552	75.281 \ 280.699 \		0G0 17 0 17		
1_DA01_AMP_RF2_V 1_DA02_TX_OUT1_V	Output voltage at transmitter				Tx Out1 V	552 699	4.17				
1_DA02_TX_00T1_V 1_DA03_TX_0UT2_V	Output voltage at transmitter				Tx Out2 V	699	4.17				
1_DA03_TX_0012_V	Maximum amplitude value i				Rx Max1	41728	41.728	G			
1 DA05 RX MAX2	Maximum amplitude value i				Rx Max2	38301	38,301	G			
1_DA06_RX_MAX3	Maximum amplitude value i				Rx Max3	38836	38,836	G			
1 DA07 RX MAX4	Maximum amplitude value i				Rx Max4	34141	34,141	G		32,000	
•			III								
			J. 11 21.03.J7.71J. NCW JK	asment st	nus, program a J	J, LINE 2	0147037		J. 00. 000		
2014.05.1	17 21:11:33 🚺 🛯 CMD ou	4. 040	5.17 21:10:13.413: sent P								^
	PM out:	15100	5.17 21:10:30.413: sent P	-							
	SCI in:	04007707	5.17 21:10:47.414: sent P	-							
10-2 V 3 1 5	HK in:	2074	5.17 21:11:04.412: sent P	-							
STATE:	Automatic SW Err		5.17 21:11:21.413: sent P	-							-
DCART S24 P50	55% Bad Pck		Interestion bolto 1	- Factor 20.							-
	,					_				17	
										XIV P	TERNATION

BIT Report Organization

- Report system failure if detected
- List suspected components
- Recommendations
- List of failed sensors, listing the "case" where failure occurred
- List of hardware by state: GO, NOGO, UNKNOWN
- List of sensor definitions
- List of sensor results by case

Digisonde Built-In Test

Station: MHJ45, Test Outcome: FAILED at 2014.05.14 20:24:22 UT

SYSTEM FAILURE DETECTED

Failed/Suspected Components:

Component State

RF_AMPLIFIER_1 NOGO

Recommendations:

Check for RF Amplifier channel 1 failure or TX1 cabling failure

Failed Sensors:

Sensor name	Case	Condition
AMP_RF1_V	Ext Loopback	RedLow
AMP_RF1_V	Dummy Load Tx	RedLow

Interpreting BIT Results

- Interpretation of BIT results may be required
- Having an understanding of how BIT tests the system helps
 - BIT runs 4 tests or "cases" to determine system health
- Understanding sensor names



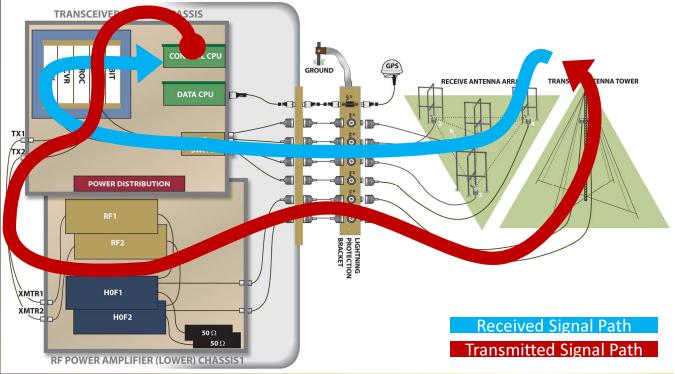
4 Cases

- Case 1: External Loopback
- Case 2: Internal Loopback
- Case 3: Internal Loopback without Trackers
- Case 4: Transmission into Dummy Load



Case 1: External Loopback

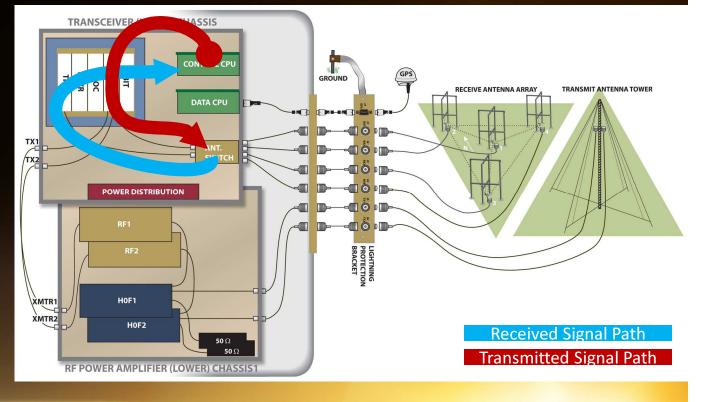
- External Loopback
- Normal transmission as would be made during measurement
- Listening for direct reception of the transmitter pulse
- Signal enters through the receive antennas as it would during normal sounding





Case 2: Internal Loopback

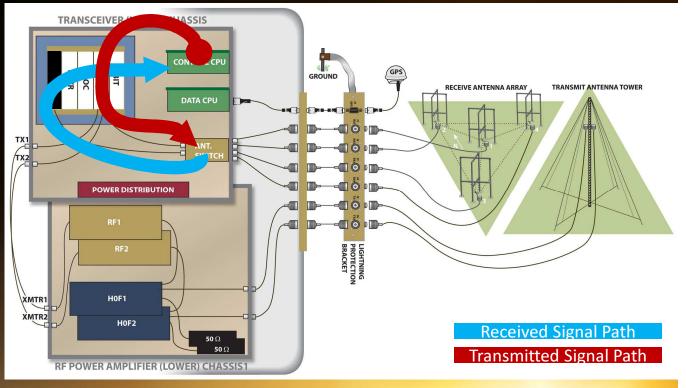
- Internal Loopback
- CAL output to Antenna Switch
- Antenna switch routes signal to trackers



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Case 3: Internal Loopback w/out Trackers

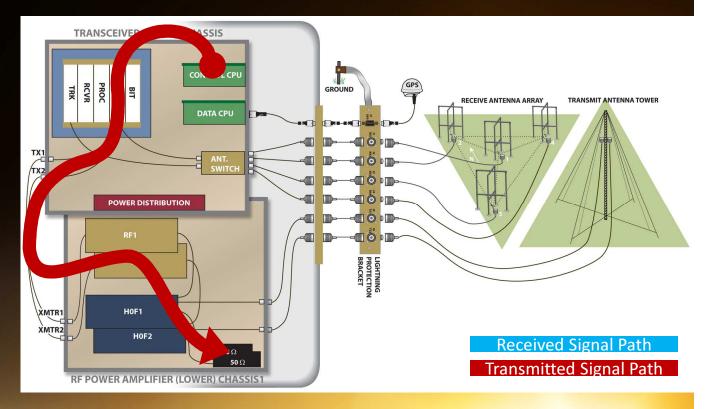
- Internal Loopback without trackers.
- CAL output to Antenna Switch
- Antenna switch routes signal to trackers
- Trackers switch input to output (are bypassed)





Case 4: Transmission into Dummy Load

- "Transmit" into dummy loads
- Half Octave Filters switch to dummy loads
- No transmission via transmit antenna
- This allows evaluation of the transmit antenna health





BIT Sensors

- X_YZAA_Name_Of_Sensor
 - X = Case Number
 - Y = When sensor is measured
 - S = Static
 - D = Dynamic
 - Z = Sensor type
 - D = Digital
 - A = Analog
 - AA = Sensor number, ie 04
 - Name = Name of sensor

↑Mnemonic	Comment
SD10_CMD_TIMEOUTS	Commanding Timeouts from last BIT program
SD11_RF_NOISE_LOW_V	Environmental RF noise voltage in Antenna with 0 dB gain in anter
SD12_RF_NOISE_HIGH_V	Environmental RF noise voltage in Antenna with 9 dB gain in anter
SD13_RX_CARD_TIMEOU	Rx Card Commanding Timeouts since last BIT program
SD14_TRACKER1_CARD	TRACKER1 Card Commanding Timeouts since last BIT program
SD15_TRACKER2_CARD	TRACKER2 Card Commanding Timeouts since last BIT program
SD16_TRACKER3_CARD	TRACKER3 Card Commanding Timeouts since last BIT program
SD17_TRACKER4_CARD	TRACKER4 Card Commanding Timeouts since last BIT program
SD18_BIT_CARD_TIMEOU	BIT Card Commanding Timeouts since last BIT program
1_DA00_AMP_RF1_V	RF voltage amplitude at the output of amplifier 1
1_DA01_AMP_RF2_V	RF voltage amplitude at the output of amplifier 2
1_DA02_TX_OUT1_V	Output voltage at transmitter card, channel 1
1_DA03_TX_OUT2_V	Output voltage at transmitter card, channel 2
1_DA04_RX_MAX1	Maximum amplitude value in the receiver channel 1
1_DA05_RX_MAX2	Maximum amplitude value in the receiver channel 2
1_DA06_RX_MAX3	Maximum amplitude value in the receiver channel 3
1_DA07_RX_MAX4	Maximum amplitude value in the receiver channel 4
2_DA00_AMP_RF1_V	RF voltage amplitude at the output of amplifier 1
2_DA01_AMP_RF2_V	RF voltage amplitude at the output of amplifier 2
2_DA02_TX_OUT1C_V	Output voltage at transmitter card rev C and above, channel 1
2_DA03_TX_OUT2_V	Output voltage at transmitter card, channel 2
2_DA04_RX_MAX1	Maximum amplitude value in the receiver channel 1
2_DA05_RX_MAX2	Maximum amplitude value in the receiver channel 2
2_DA06_RX_MAX3	Maximum amplitude value in the receiver channel 3
2_DA07_RX_MAX4	Maximum amplitude value in the receiver channel 4

Analog Sensors thresholds

	Red Low	Yellow Low	ОК	Yellow High	Red High	IGF 2@14
A CONTRACTOR OF THE OWNER						

Additional Tips

- DCART provides other useful information
- Check DCART settings (DCART.ini corruption)
- Use of the system as a diagnostic tool through data displays (can be done remotely)
- Make program changes to sustain operations, if possible



DCART: Important Places to Look

	DCART v1.1.27 (DESC is not connected)	
DUTUE HOUSCILL Total of an		DCART Log and Card Version / Status
Processing Stars The output for the stars Sounding Mode Measurement Start The output for the stars The output for the stars Sounding Mode Measurement Start The output for the stars The output for the stars Sounding Mode Measurement Start The output for the stars The output for the stars Sounding Mode Measurement Start The output for the stars The output for the stars Sounding Mode Measurement Start The output for the stars The output for the stars Sounding Mode Measurement Sounding Mode Start The output for the stars The output for the stars Sound for the stars Sound for the stars Sound for the stars Start The output for the stars The output for the stars Sound for the stars Sound for the stars Sound for the stars Start The output for the stars The output for the stars Sound for the stars Sound for the stars Sound for the stars Start The output for the stars Sound for the stars Sound for the stars Sound for the stars Sound for the stars Start The output for the stars Sou		
With Strip Origination data _ 2008 00000000000000000000000000000000		ait in Y P BIT Report Results
Image: State Connecting DESC is IDLE Image: State Connecting Desc is IDLE State Connecting Connecting Connection Co	Schd 001 ORIG on day 002 ORIG on night 2008. GMK CMK SST 003 drift PGH 003 drift PGH 004 F day 006 F night 006 F drift 007 C drift 2008. GMK 2008. GMK 006 F drift 007 F drift 008 PGH ion night 008 PGH ion night 010 24 ptds short. 2008. GMK 008 PGH ion night 010 24 ptds short. 2008. GMK 011 24 ptds short. 2008. GMK 013 PGH ion night 011 24 ptds short. 2008. GMK 013 ORIG ion day 014 ORIG ion night 016 ion 285 2008. GMK 013 FGH ion night 016 ion 285 2008. GMK 017 F drift 2008. GMK 2008. GMK 018 E drift 020 24 ptds short. 2008. GMK 021 24 ptds short. 2008. GMK 021 24 ptds short. 2008. GMK 022 time test 2008. GMK 023 time test 2008. GMK 023 time test 2008. GMK 023 time test 2008. GMK 024 ElSCAT 2008. GMK 2028. GMK 025 Channel eq 026 CHU 7335 2008. DP 036 ElSCAT 2008. DP 2031 lion day 2008. GMK 032 unknown 2008. GMK 2032 unknown 033 empty 2008. DP 2031 li	<complex-block> FREQUENCY STEPPING Media Stepping Law: Wei Freq Limi: Wei Protes Cher Tand Reade</complex-block>
	DCART STATE Connecting	Mout: 4867 3: 11:02.404: sent PM packet: 2008.12.04 23:11:02.000 Network SCI in: 47198 23:11:18.920: IP address: 10.0.0.2, port: 4100 Status HK in: 77 23:11:18.920: COMMAND Client is trying to connect Status IFSW Errs: 1 23:11:18.920: Communication error. Reset 23:11:18.920: Communication error. Reset
		RT.exe 🛛 😰 2 Java(TM) 2 🖓 4 Windows Ex 📝 2 WordPad 🕞 DCART_ERROR 🛛 🍘 4 Internet Exp 🛛 7 🚮 💑 🐙 🚇 🏷 🚳 11:11 PM 10-13

Internal Loopback Diagnostic Program

PR

FREQUENCY STEPPING	<u>.</u>		1	SYSTEM SETTINGS	-			
			-	Constant Gain:	full gain	i (50 dB)	-	
Freq Stepping Law:	linear	-		Auto Gain Control:	fixed		-	
Lower Freq Limit:	-		[kHz]	Rx Gain:	0 dB			
Upper Freq Limit:	-		[kHz]					
Coarse Freq Step:			[kHz]	Wave Form:	16-chip	complementary		
Number of Fine Steps:	none	-		Polarizations:	O only	Antennas enab	led: 1 2 3 4	
16	1197			🔲 Radio Silent	Sta	ndard 🔘 Oblique	Compatible	
Total frequencies	1197			4	ile:			
RANGE SAMPLING	-		. 1	DATA PROCESSING	3			
Start Range:	0) 🗸	[km]	Final Processing S	tep: l	onogram Calculation		
Number of Samples:	2	256 💌		Apply RFIM	F.1	Data Reduction		
Inter-Pulse Period: 🗾	auto	1	[5ms]	Apply Channel E	Q [🗌 Clear data below I	MPA	
Range coverage	0 to 637	.5 / max	749.5 km	View Process Cha	in			
PULSE INTEGRATION	-						Ĩ	
Number of Integrated Re	epeats:	1	-	Save product file	e	Save raw file		
Interpulse Phase Switcl	hing:	disable	d 💌					
Pulses/freg : CIT : total	2:2:23	104	1	DESC-to-DCART traffic		1197 packets = 9,	954 kR	

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DITED PROGSCHED	Soundi	ART Raw Data Dis ng Mode / Display Options. Note: Th	is program is started at 0 heig
Suspend Data Displa	y Display Options Refresh	every 250 * ms	View Prog
<mark>⊯</mark> dB sca	ale 🔘 Re/Im 💿 Mag/Ph 💽 Time do	main 🔿 Freq domain Phase difference 🔲 Min amplitude to show ph	hase: 40.0 Export Tabulated export
e zoom 🔲 1 hgt, km: 80	Look#		
x hgt, km: 127 900 x amp, dB: 50 69.5 0 colors 127 t,km 793 t,km 793 t,km 14.6 50 xmp1 43.20 xmp2 42.14 xmp3 53.83 0 xmp4 42.58		IONOGRAM AVGHIONOGRAM All steps of lonogram Calculation Raw Data Channel Equalizing Application Radio Frequency Interference Mitigation (RFIM) Pulse Compression Sum Complementary Doppler Calculation Ionogram Calculation 	1 3
h1 852 127 h2 158.4 h3 156.7 h4 166.7 50 0 127		Alternative step if chosen step is inactive in current program Show the closest active previous step show the closest active next step OK	1 400 500 500 700 800 900 1000 1100
50	a new protection of the		



Diagnostic Program for Oscope

FREQUENCY STEPPING		SYSTEM SETTINGS	;		
		Constant Gain:	full gain, Tracker (9) and Antenna Switch (0)	
Freq Stepping Law:	īxed	Auto Gain Control:	fixed		•
Fixed Frequency:	3275 [kHz]	Rx Gain:	-12 dB		
Fixed Freq Repeats:	255	Wave Form:	16-chip complemen	ntary	▼
Number of Fine Steps:	none	Polarizations:	O only - Anten	nas enabled: 1 2 3 4	
		Radio Silent		Oblique O Compatible	
Total frequencies	255	I Nauto Sherik	Standard 10	opiique	
RANGE SAMPLING		DATA PROCESSIN	G		
Start Range:	0 🔻 (kn	n] 🗌 🔲 RFIM	Raw Dat	а	
Number of Samples:	256 💌	CCEQ	-		
Inter-Pulse Period: 🗹 auto	1 [5n	ns] D-Spike O	ChipComp		
Range coverage	0 to 637.5 / max 749.5	km View Process Cha	ain		
PULSE INTEGRATION		OUTPUT FILES			
Number of Integrated Repeats:	256	Save product fil	e 🗌 Save	raw file	
nterpulse Phase Switching:	disabled	•			
Pulses/freq : CIT : total CIT time Exact Running Time	512 : 512 : 130560 2 s 560 ms 10 m 52 s 830 ms	DESC-to-DCART v DESC-to-DCART f Exact on-disk v	low 6,6	80 packets = 530,145 52 kbit/s	KB

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Sustainable Operations

- If damage has occurred along one or more receive channels, it may be possible to continue operating
- It may also be possible to operate if one transmit channel is damaged
- If computer damage or failure in a short (RF Amplifier) then it's unlikely system will be able to continue operating. DPS-4D could be off or unreachable



Damaged Receive Channel(s)

- Damage in Receive Antenna / Polarization Box, Antenna Switch, Tracker, or Receiver
- Switch from Precision Ranging RSF lonograms to SBF data format
- SBF does not calculate directional information (only Doppler)
- When making SBF data, the system is capable of generating data using less than 4 channels



Changing from Routine Operation to Reduced Health Program

mber of Fine Steps = 0			SYSTEM SETTINGS	-	Disable	Damaged C	nanne
Freq tepping Law:	near 🗖	-	Constant Gain:	full gain (50 dl	B)		
Lower Free Limit:	30	0 [kHz]	Auto Gain Control:	use existing a	iain table		
Upper Freq Linty		0 (kHz)	Rx Gain:	+30 dB			
Coarse Freq Step:	2	5 [kHz]					
Number of Fine Steps: 2			Wave Form:	16-chip comp	lementary		
Fine Freq Step:	1960 C	5 [kHz]	Polarizations:	O and X 💌 I	Antennas enal	oled: 1 2 3 4	August 1
Fine Step Multiplexing:	nabled		Radio Silent	Standard	Oblique	O Compatible	1
Total frequencies 85	8						
RANGE SAMPLING			DATA PROCESSING	S			
Start Range:	80	• [km]	Final Processing S	tep: lonogra	am Calculation	i -	-
Number of Samples:	512	-	Apply RFIM	Data R	eduction —	1	-
Inter-Pulse Period: 📝 auto	2	[5ms]	Apply Channel E	Q Clea	ar data below	MPA	
Range coverage 8	0 to 1357.5 / m	ax 1499 km	View Process Cha	in <mark>2-frequ</mark>	<mark>iency PGH (5 I</mark>	(Hz)	
PULSE INTEGRATION							
Number of Integrated Repea	ts: 8	-	Save product file	e 🗌 S	Save raw file		
Interpulse Phase Switching:	enabled	-	RSF	-			-
			DESC-to-DCART traffk		7456 packets =	vitch to SBF	Forma



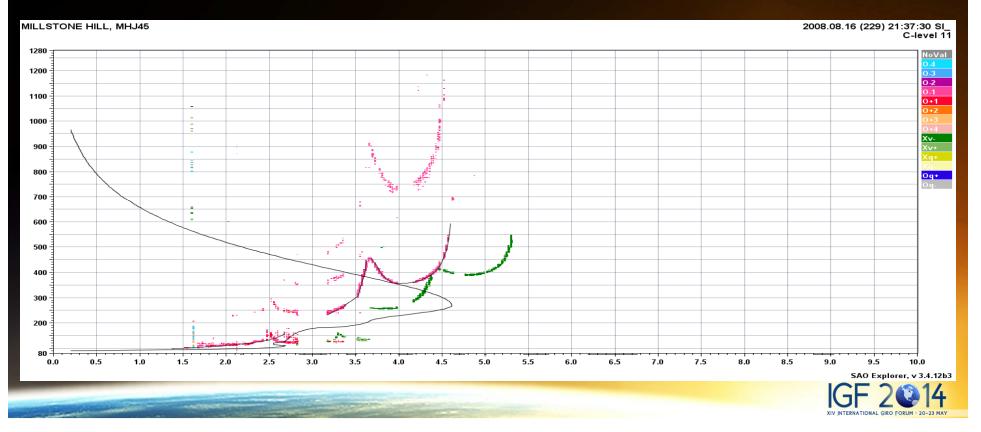
Reduced Health Program

REQUENCY STEPPING			SYSTEM SETTINGS			
		45	Constant Gain:	full gain (50 dB	3)	-
req Stepping Law: line	ear 💌		Auto Gain Control:	use existing g	ain table	-
ower Freq Limit:	300	[kHz]	Rx Gain:	+30 dB		-
Ipper Freq Limit:	11000					
Coarse Freq Step:		[kHz]	Wave Form:	16-chip compl	ementary	
lumber of Fine Steps:	ne 💌		Polarizations:	O and X 🔻 A	ntennas enabled: 12	34
			Radio Silent	Standard	🔾 Oblique 🛛 Com	atible
otal frequencies 429	8					
RANGE SAMPLING			DATA PROCESSING			
Start Range:	80 💌	[km]	Final Processing St	ep: lonogra	m Calculation	-
lumber of Samples:	512 💌		Apply RFIM	Data Re	eduction	
nter-Pulse Period: 📝 auto	2	[5ms]	Apply Channel E	Q 🗌 Clea	r data below MPA	
ange coverage 80	to 1357.5 / ma	× 1499 km	View Process Cha	n		
PULSE INTEGRATION	1.0					
lumber of Integrated Repeats	s: 8	-	Save product file	. ⊡ s	ave raw file	
nterpulse Phase Switching:	enabled	-	SBF	-		

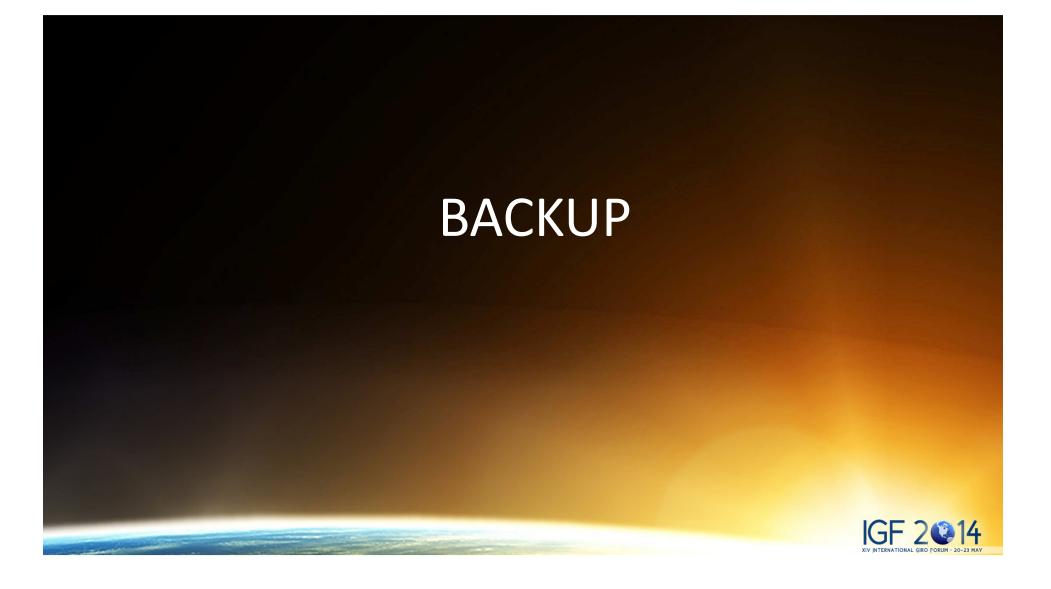


SBF lonogram

Millstone Hill DPS-4D generating SBF using 2 channels







Control Computer Display

- Control Computer was not intended for use by the end user (no rear case connections exist)
- DESC does produce output to the screen which may be useful for troubleshooting
- I5 pin VGA output is available on the rear of the transceiver chassis

 It is possible to connect a monitor (reset the control computer via the red reset button on the front of the transceiver chassis or cycle the switch on the power distribution board)

Investigation of the DESC display would be made in tandem with instruction from LDI or UML



Note Regarding Spares

Spares Include

Polarization Switch / Preamplifier

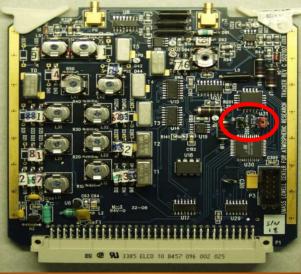
BIT

Transmitter

Pre-Processor

Receiver

- Run Receiver cross channel equalizing after replacement
- 1 Tracker
 - Must set jumpers for position
 - Run Tracker Calibration after replacement
- Power Distribution Card
- Antenna Switch
- Computer
 - BIOS must be configured for use!
 - If in "Data Computer" role, must set jumpers properly for GPS connection
 - If in "Control Computer" role, a PS2 Keyboard is needed for BIOS configuration



Most significant, Least significant binary number. No jumper = 1. This tracker is set to binary 10 = 2 (and so is configured as tracker 3)

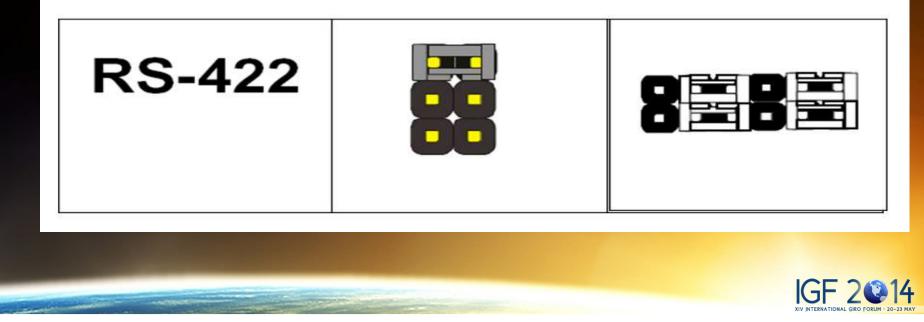


Data Computer Jumper Settings

The data computer should be jumper settings as follows:

JCSEL1

JCSEL2



Pre BIT Fault Isolation

