LLRF Master IOCs Reboot Procedure

(as of 14-Feb-2012)

- 1. Have Ops turn off beam
- 2. Have Ops turn off MATLAB Feeback (or fast feeback)
 - If 6X6 is running:
- L23 Abstraction Layer must be disabled. But this alone is insufficient.
- Ensure individual 6X6 feedbacks are all disabled (DL1 Energy, BC1 Energy, BC1 Pk Current, BC2 Energy, BC2 Pk Current, DL2 Energy)



If Fast Feedback is running:

LCLS Subsystems and Areas	: fbck ell		اولد
LCLS Subsystems	and Areas: Global Feedba	icks	Help Home Screen Exit
	Global IN20 LI21 LI22 L	123 LI24 LI25 LI26 LI27 LI28 LI29 LI3	0 85Y0 LTUI UNDI DMPI FEEI NEHI FEHI
All	Frank and Francisco Ministerio	Council For Back Counterly	Other Day Back
BPM/Toro/FC/BLen	Feedback Summary Displays	General Predback Contracts	Other Peedbacks
Feedback	Feedback Control	Feedback Lowest TMIT 200,000e+06 N	H
Magnet		12 Energy 12 Chirp 13 Energy	L3 Chira
Profile Monitor	Lamch Summary Piets	Actual 455270 MeV 545855 MeV 00 Me	ev OB MeV
Wire Scanner	Longitudinal Summary Plots		
Collimator/Motion			
Laser	Update Refs (All Trans)		
RF			
Event		Longitudinal Feedback	Fast Feedback Installation HELP
Network	Switch To Fast Longitudie		Switch to Jae's 6x6
Watr/Pwr/Gas/Smok		Feedback Status Fee	stback Control
Vacuum	Loogitudioal	OFF 594812 INABLE Update Act Pers. Pestore	Acts. Config / Ref. Orbit. Log.
Temperature		Choose the Longitudinal parameters you wish to	maintain.
MPS	DL1	enerav BC1 enerav BC1 bunch BC2 enerav BC	2 bunch DL2 enerov
PPS	1000	matted Disabled Disabled Disabled	Disabled Disabled
BCS	DEAC	WATED: to use click 'Switch to East I anotherinal'	then Start this feedback
ADS/X-Ray/Misc	Denci	terres to dae, once switch to rear congrituinal	
ODUCTION		fock_all_main.edl	02/14/2012 14:41:01

3. Deactivate the L2/L3 Abstraction Layer in the RF/Global -> L2 -> Abstraction Debugging screen



4. Stop the RF ChannelWatcher

ssh laci@lcls-daemon2 /etc/init.d/st.cwRF stop

5. Reboot ioc-in20-rf01

Watch the iocConsole output for any errors.

Wait until the boot process is complete as denoted by the Boot Indicator: IOC:IN20:RF01:READY should have a value "READY"

Note: Move dbpf("IOC:IN20:RF01:READY", "READY") from st-prod.cmd to the end of startup.cmd to allow for diagnostics printouts to be completed fully)

6. Check all L2/L3 PAC regulation loop and communication.

Click on each of the RF station buttons below and turn on the station's local feedback and PAC regulation loops:



7. Enabling the PAC regulation loop:

After reboot, the PAC's regulation loop and local feedback come back in a disabled state. This is to ensure that a consious attempt to turn feedback on is done.

Example:

Gun Station:

First enable the "Sending I and Q adjusts to the PAC" button. Next enable the local Amplitude Feedback button. Finally, enable the local Phase Feedback button.

Note: When disabling these buttons, the reverse order should be applied.



8. Special additional check for the L2 and L3 SPACs:

When the L2 button is clicked, additionally check that the Klystron Kly 24-X PAC's actual I/Q values match with the I & Q set points in the screen below:

Example:

Ng VME L2									_10
LCLS LLRF Station: L2 ACCL:LI24							Help	Home Screen	Ext
Phase & Amplitude									
(have a ranging as	Klystron 24-1	Klystron 24-2	Klystron 24-3	Klystron 24-4	Klystron 24-5	Klystron 24-6	L2 Reference	S24 Reference	L2 Abstraction
Desired Phase (deg 2856 MHz)	117.320	-168.265	0.000				122.876	0.000	-25.604
Phase Offset Correction (deg 2856 MHz)	158.768	92.068	74.490				161.504		
Phase Setpoint (desired + offset) (deg 2856 MHz)	2.004	76.7	745				2044		
Phase Setpoint (desired + offset) (deg 476 MHz)							- 49.4		
	Eq	ert only. Althou	in these amplitud	des are modifiate	é, they are not	expected to cha	nget		
Desired Amplitude (IQ Mag)	9000	6000	10000				10000	10000	5091
&O Setpoints for SPACs				_					
Scale	1.000	1.000	1.000				1.000	1.000	
Set = A Des x cos(P Set) x I Scale	99510	1077.0	2674.0			and the second sec	61990	10000.0	
Scale	1.000	1.000	1.000				1.000	1.000	
2 Set = A Des x sin(P Set)x Q Scale	-8944.0	-5613.0	3655(0)				- 7380.0		
anding I and Q adjust to SPAC	Enabled	Enabled	Enabled				Enabled	Enabled	
Expert panels									
Destination PAC Operations	KJy 24-1	KJy 24-2	KJy 24-3	KJy 24-4	KIY 24-5	Kiy 24-8	LZ Ref	SZ4 Ref	
Destination PAC Calibration	KJy 24-1	KJy 24-2	KJy 24-3	Kily 24-4	Kly 24-5	KJy 24-6	L2 Ref	SZ4 Ref	
	Max for PIDES	Max for POES	Mur for PDES				Mul for PDES		Men for PDE 5
	Becter ADES	He BrADES	Max for ADES				Mus for ADES		Men for ADES
	ilinese 👘	24-1/24-2							Abstraction Debepair
Klystron Selector for L2 Ampl/phase	feedback	24-2/24-3	18 Warnin	g HI	whet with the new	v Abstraction I as	NAME OF TAXABLE		2834W=
		24-1/24-3	Please, w	rait to use it until	completion of imp	Sementation	100		

Valid Range Valid Range S2765 S2765 S2765 External Internal CPU Ext Tri	Min Max Delay (in 9 g Width (in	Filtentitity F DAC Delay (in 9.8 ns increments) SSSB Delay (in 9.8 ns increments) Width (in 9.8 ns increments) Range of I & C Char 8 ns increments) 9.8 ns increments)	Print Exit 2839 3070 100 2 Adjust ange 3070 53 10
Valid Range S2765 S2765 External Internal CPU	Min Max Delay (in 9 g Width (in	DAC Delay (n 9.8 ns increments) SSSB Delay (n 9.8 ns increments) Width (n 9.8 ns increments) Range of 1.8 C Cha	2839 3070 100 2 Adjust ange 3070 5 10
External Internal CPU	Delay (in 9 g Width (in	SSS8 Delay (in 9.6 ns increments) Width (in 9.8 ns increments) Range of 1 & C Cha 8 ns increments) 9.8 ns increments	3070 100 2 Adjust ange 3070 3070 s) 10
External Internal CPU	Delay (in 9	Range of I & C Cha 8 ns increments) 9.8 ns increments	2 Adjust ange) 3070 s) 10
External Internal CPU Ext Trig	Delay (in 9 g Width (in 1	8 ns increments) 9.8 ns increments	3070 s) 10
ADC Values		Slone	Official
AC Temp (deg C)		5/0pe	20.000
Temp (deg C)		0.00305000	20.000
SSB Temp (deg C)		0.00305000	20.000
Forward (V)		0.00122000	0.000
Reflected (V)		0.00122000	0.000
SSB Pwr Supply (V)		0.00122000	0.000
5 Volts		0.00122000	0.000
12 Volts	-11.051	-0.0012200	0.000
	AC Temp (deg C)) Temp (deg C) SSB Temp (deg C) Forward (V) Reflected (V) SSB Pwr Supply (V) 5 Volts 12 Volts	AC Temp (deg C) 2 Temp (deg C) SSB Temp (deg C) Forward (V) SSB Pwr Supply (V) 5 Volts 12 Volts SSB Temp (deg C) 13 000 14 000 15 0000 15 000 15 000 15 0000 15 0000 15 0000 15 0000	Slope AC Temp (deg C) 0.00305000 0 Temp (deg C) 0.00305000 SSB Temp (deg C) 0.00305000 Forward (V) 0.000 Reflected (V) 0.00122000 SSB Pwr Supply (V) 0.00122000 5 Volts 0.00122000 12 Volts -0.00122000

9. The Beam Phase Cavity 3 Minimum amplitude shows purple box (PINI has to be set correctly).

Until the fix is in, accept 10.0

Similarly check to see if there are PVs that come up with purple boxes around them after reboot.

Check Archiver plus Channel Watcher values to see if the new values are same as what was prior to reboot. If yes, accept the new values by hitting enter in those fields.

10. Now, with all the PACs' local regulation loops activated and the local feedbacks on, we are ready to Activate the L2/L3 Abstraction layer.

Choose the 'Activate' button:

/dis/side/g/ie	ls/tools/edm/displ	ay/lirf/rf_abstr_	_debug.edl			_IOI ×
L2 Abstract	tion					EXIT
L2 PDES L2 ADES	-28.380 Offs 5259.626	et 📗	19.532 FCOM	-28.386 5258.630	-28.413 5258.375	
L2 Flat Total	5823.8	5823.8170	L2 Fudge factor	0.9400	[0.9400	
L2 reference Ala -83 -84 -86 -86 -86	rm limit 3.356 4.356 5.356 7.356	-76.868 -77.868 -79.868 -80.868	-99.998 -100.998 -102.998 -103.998	Resync L2		
		1	51.548 94 848	Dictore		
			DS1 Of	fset Resync DS2 Offs	et Resync DS3 Offset Resync	
L3 Abstract	ion					
L3 PDES	0.000 Offs	et	5.505 FCOM	0.000	0.000	
L3 ADES	5421.128			5425.074	5434.484	
L3 ADES	5421.128 4743.4	4743.3660	L3 Fudge factor	5425.074 1.0000	5434.484 [1.0000	
L3 ADES L3 Flat Total S29 Flat Total Main Drive Line F	5421.128 4743.4 1435.3 Phase	[4743.3660 [1435.3060	L3 Fudge factor S30 Flat Total	5425.074 1.0000 1286.7	5434.484 [1.0000 [1286.6710	
L3 ADES L3 Flat Total S29 Flat Total Main Drive Line F - 90	5421.128 4743.4 1435.3 Phase 1.852	4743.3660 1435.3060 - 90.852	L3 Fudge factor S30 Flat Total -90.852	5425.074 1.0000 1286.7 Resync L3	5434.484 [1.0000 [1286.6710	
L3 ADES L3 Flat Total S29 Flat Total Main Drive Line F - 90	5421.128 4743.4 1435.3 Phase 1.852	4743.3660 1435.3060 - 90.852	L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	5425.074 1.0000 1286.7 Resync L3 Disable	5434.484 [1.0000 [1286.6710	
L3 ADES L3 Flat Total S29 Flat Total Main Drive Line F -90	5421.128 4743.4 1435.3 Phase 1.852	4743.3660 1435.3060 -90.852	L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	5425.074 1.0000 1286.7 Resync L3 Disable	5434.484 [1.0000 [1286.6710 20ffset Resync DS3 Dffset Resyn	×
L3 ADES L3 Flat Total S29 Flat Total Main Drive Line F -90	5421.128 4743.4 1435.3 Phase 0.852	4743.3660 1435.3060 - 90.852	L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	5425.074 1.0000 1286.7 Resync L3 Disable 1 Offset Resync DS2 SoftIOC Abstract	5434.484 [1.0000 [1286.6710 Offset Resync DS3 Offset Resync Ion Layer	*

11. Check in the Reference VME IOC to see if the desired Phase and Amplitude shows the value saved by CW (snapshot) prior to reboot:

₩ YME REF					_10);
LCLS LLRF Station: REF LLRF IN20:RH:REF				Help Hom	e Screen Exit
I&Q Readouts from PAD	2856MHz Ref	S21 2856MHz	119MHz EVG	25.5MHz	CLOCK
I Average from PAD	-13691.0	15195.0	57720	-1765.0	CLOCK
Q Average from PAD	18018.0	-7945.0	4577.0	5155.0	
I Standard Deviation	3.0	3.9	3.2	1.6	
Q Standard Deviation	2.4	4.8	22	1.0	
Phase & Amplitude					
Actual Phase + offset (deg)	2.2	-63.6	5,6	0.5	
Actual Amplitude * scale factor (MV)	22629.4	19956.7	5931,0	5445,1	
Actual Power * scale factor (MW)	512091805.0	394290229 0	35176913.0	29692701.0	
Desired Phase (degrees Freq)	0.000	NEW 5/5/8	-90.852	-167.800	48.500
Frequency used in phase units	2856 MHz	Converge Active	7 476 MHz	2830.5 MHz	102 MHz
Previous Phase Setpoint (degrees Freq)	In Progress (1)	-91.8		
Phase Setpoint (degrees Freq)		Done(0)	-90.9		
Phase Setpoint Max Stepsize (degrees	Freq)	0	1.000		-
Desired Amplitude (MV)	10000.000		16000.000	12500.000	13000.000
I&Q Setpoints for SPACs	_	_			
I Scale	1.000		1.000	1.000	1.000
I Set = A Des x cos(P Des) x I Scale	10000.0		-287.8	-12217.7	86141
Q Scale	1.000		1.000	1.000	1.000
Q Set = A Des x sin(P Des)x Q Scale	0.0		-15996.2	-2641.6	9736.4
Sending I and Q adjust to SPAC	Enabled		Enabled	Enabled	Enabled
Expert panels					<u></u>
Destination SPAC Operations	RF Ref N	IDL Frequency in H	z MDL Ref	Local Osc	Clock
Destination SPAC Calibration	RF Ref	475999747.56 Hz	MDL Ref	Local Osc	Clock
Source PAD Processed WFs	Adjust scalars, o	ffsets & alarm limits		Phas	e Locked Loop
			_		and the second

12. Repeat 5-11 for ioc-li24-rf01

Reboot ioc, enable corresponding PAC regulation loops and turn on local feedbacks.

Order of rebooting ioc-in20-rf01 and ioc-li24-rf01 does not matter.

13. Have Ops activate MATLAB 6X6 or Fast Feedback.

Once again ensure that L23 Abstraction Layer is enabled as well as the individual feedbacks.

13. Start Channel Watcher

ssh laci@lcls-daemon2 /etc/init.d/st.cwRF start

14. Note of caution:

In the VME L2 screen, all the Desired Phase, offset and Amplitude fields show as editable (write).

However, these values take effect only when the L2/L3 Abstraction layer is deactivated.

When the Abstraction Layer is activated, the values in these fields are over-written by the AL software.

This is true for the VME L3 screen as well the Reference VME REF screens.

DO NOT EDIT these fields while ABSTRACTION LAYER IS ACTIVATED.

15. Have Ops turn the beam ON.

16. Verify that in the L2/L3 Abstraction layer screen, the L2 and L3 PDES and ADES are chaning by little amounts.

/afs/slac/	g/icis/too	as/eam/displa	y/lirt/rt_abstr	aebug.edi			
L2 Abstr	action						EX
L2 PDES		-24.566 Offse	et 🛒	19.532 FCOM	-24.566	-24.592	
L2 ADES	4	5291.829			5291.829	5294.464	
L2 Flat Total		5823.8	5823.8170	L2 Fudge factor	0.9400	0.9400	
L2 reference	Alarm lim	it					
	-87.111		-76.868	-115.272			
	-88.111		-77.868	-116.272	Second La		
	-90.111		-79.868	-118.272	Resync L2		
	-51.111		-00.050	-119.272	Disable		
			1	57.730			
				91.030			
				DSI Of	fset Resync DS2 Offs	et Resync DS3 Offset Re	esync
L3 Abstra	action						
L3 Abstra	action	0.000 Offse	t	5.505 FCOM	0.000	0.000	
L3 Abstra L3 PDES L3 ADES	action s	0.000 Offse 225.564	t ji	5.505 FCOM	0.000 5225.564	0.000 5235.616	
L3 Abstra L3 PDES L3 ADES .3 Flat Total	action s	0.000 Offse 225.564 4743.4	t [4743.3660	5.505 FCOM	0.000 5225.564 1.0000	0.000 5235.616 [1.0000	
L3 Abstra L3 PDES L3 ADES L3 Flat Total	action s	0.000 Offse 225.564 4743.4 1435.3	t [4743.3660	5.505 FCOM L3 Fudge factor	0.000 5225.564 1.0000 1286.7	0.000 5235.616 [1.0000	
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Total Main Drive L	action 5	0.000 Offse i225.564 4743.4 1435.3	t [4743.3660 [1435.3060	5.505 FCOM L3 Fudge factor S30 Flat Total	0.000 5225.564 1.0000 1286.7	0.000 5235.616]1.0000]1286.6710	
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Tota Main Drive L	action 5 I ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	14743.3660 1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852	0.000 5225.564 1.0000 1286.7	0.000 5235.616 [1.0000 [1286.6710	
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Tota Main Drive Li	action 5 I ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	1 14743.3660 1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852	0.000 5225.564 1.0000 1286.7 Resync L3	0.000 5235.616]1.0000]1286.6710	
L3 Abstra L3 PDES L3 ADES L3 Flat Total 529 Flat Tota Main Drive Li	action 5 I ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	1 [4743.3660 [1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852 -177.637	0.000 5225.564 1.0000 1286.7 Resync L3 Disable	0.000 5235.616]1.0000]1286.6710	
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Tota Main Drive Li	action 5 1 ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	1 [4743.3660 [1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	0.000 5225.564 1.0000 1286.7 Resync L3 Disable	0.000 5235.616]1.0000]1286.6710	
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Tota Main Drive Li	action 5 1 ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	1 4743.3660 1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	0.000 5225.564 1.0000 1286.7 Resync L3 Disable	0.000 5235.616 [1.0000 [1286.6710	
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Tota Main Drive Li	action 5 I ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	1 4743.3660 1435.3060 - 90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	0.000 5225.564 1.0000 1286.7 Resync L3 Disable	0.000 5235.616 [1.0000 [1286.6710 Offset Resync] DS3 Offs	et Resync
L3 Abstra L3 PDES L3 ADES L3 Flat Total S29 Flat Total Main Drive Li	action 5 I ne Phase -90,852	0.000 Offse i225.564 4743.4 1435.3	1 [4743.3660 [1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	0.000 5225.564 1.0000 1286.7 Resync L3 Disable	0.000 5235.616 [1.0000 [1286.6710 Offset Resync DS3 Offs	et Resync
L3 Abstra L3 PDES .3 ADES .3 Flat Total 529 Flat Tota Aain Drive Li Activate Ab-	action 5 I ne Phase -90.852	0.000 Offse i225.564 4743.4 1435.3	1 4743.3660 1435.3060 -90.852	5.505 FCOM L3 Fudge factor S30 Flat Total -90.852 -177.637 128.302	0.000 5225.564 1.0000 1286.7 Resync L3 Disable 31 Offset Resync DS2 SoftIOC Abstract	0.000 5235.616 [1.0000 [1286.6710 0ffset Resync DS3 Offset on Layer	et Resync