LFHIT – read and play guide

The LFHIT (Little- or Light- FHIT) is a small and highly portable device, for connectivity (CT) and electrical (ET) tests of front-end hybrid (FEH) for CMS tracker. It can either be controlled with a computer or not.

Tests without computer control - HOWTO

1) Plug the FEH (when top panel LED is green or orange : Table 2)
2) Identify the FEH with the jumpers (Table 1)
3) Push START button
4) Test result is available on the front-panel LED (Table 2)

Optional : test details can be seen with serial[1] (RS232) connection to a computer, using a terminal[2].

Tests with computer control - HOWTO

1) Connect LFHIT to the computer via the serial[1] line
2) Start the terminal[2] on computer (settings in Table 4)
3) Plug the FEH (when top panel LED is green or orange : Table 2)
4) Send a command via the terminal (Table 5) e.g. : " **:**`P1663S[CR]`"
5) Test result is available on the front-panel LED (Table 2) and in the terminal output

Jumper (on top panel) position identifies the hybrid type, needed for FEH proper test. Set the jumpers to **DDDU** for remote identification with computer. Set the jumpers to **xxxD** for direct identification or no connection with computer. Table 3 summarizes the hybrid type according to its part number.

Jumper 1 : (left) ***Type definition***	
0 (D x x x)	TOB type or TEC type FEH
1 (U x x x)	TIB type FEH
Jumper 2 :	
0 (x D x x)	Position for FEH test (default)
1 (x U x x)	Reserved (should not be used)
Jumper 3 : ***APV number***	
0 (x x D x)	FEH with 4 APVs
1 (x x U x)	FEH with 6 APVs
Jumper 4 : (right) ***Jumper identification or remote control***	
0 (x x x D)	FEH type identification with jumpers 1 – 3
1 (x x x U)	FEH type identification with message from computer (DDDU)

Table 1 : Jumper layout (D is DOWN, U is UP).

LED colour	Front panel	Top panel
GREEN	CT and ET : OK	FEH can be (un)plugged ; START available[3]
ORANGE	FEH type unknown	FEH can be (un)plugged but bad jumper ID[3]
Flashing RED	Bad CT and no ET performed	–
RED	CT OK and Bad ET	Test under process ; do not unplug

Table 2 : Colour meaning for front- and top-panel LEDs.

[1] The connection works also with a Serial-to-USB cable (not provided).
[2] Any terminal application, like *TeraTerm Pro* (free download from http://www.fynu.ucl.ac.be/FHIT.html)
[3] When the top panel LED is green, the FEH can be plugged and the jumper layout defines a valid ID (Table 3). START button is enabled. If jumper layout does not define a proper ID, this LED is orange and START button is then disabled.

FEH are characterized by their **part number**, which is found in barcode, digits 4 to 7.
E.g. : in 30216630112345, part number is 1663 .

Part number :	FEH type :	APVs :	Switch layout :
1663	TEC_4_up	4	DDDD
1664	*Obsolete*	4	DDDU + computer
1665	TEC_6_up	6	DDUD
1666	TEC_6_down	6	DDUD
1667	*Obsolete*	4	DDDD
1668	TIB_4_rphi_down	4	UDDD
1669	*Obsolete*	6	DDDU + computer
1670	TIB_6_rphi_down	6	UDUD
1671	TOB_4_rphi_up	4	DDDD
1672	TOB_4_rphi_down	4	DDDD
1673	TOB_6_rphi_up	6	DDUD
1674	*Obsolete*	6	DDDU + computer
1675	TOB_4_stereo_up	4	DDDD
1676	TOB_4_stereo_down	4	DDDD
1677	TIB_6_stereo_up	6	UDUD
1678	TIB_6_stereo_down	6	UDUD

Table 3 : FEH Identification.

On the rear panel :

Reset button :
Performs a self-test for the FHIT[4] ; only needed after triggering the Load/Run switch.
All LEDs are flashing if FHIT self-test failed.

Load/Run switch :
Should be in **RUN** position for FEH tests.
Should be in **LOAD** position to upgrade the firmware from FHIT web page[5].
After triggering the **Load/Run** switch, the **Reset** button has to be pushed.

COM plug :
Connector for a serial RS232 cable (or Serial-to-USB)

Serial communication should be configured in the terminal application.

Serial port terminal software settings :	
Port : depends on your connection, usually **COM 1** or 2	
Baud Rate : **115200**	
Parity : **none**	Data : **8bit**
Stop bit : **1 bit**	Flow Control : **Xon / Xoff**
Receive : **CR + LF**	Local echo : **ON**

Table 4 : Serial port settings.

With the computer control, a specific syntax should be used. Every command should start with the column sign **:** and finish with a Carriage Return [CR] character ("Enter" key). Normal operation is **:PxxxxFS[CR]**, where *xxxx* is the part number**.** More commands, on debug modes or trigger generation, can be found in FHIT user guide[5].

Command :	Action :
S1 / S2 / S	Perform a CT only / CT and light ET (no APVs) / Full CT and ET
F / f	Log file produced (On / Off)
Y / y	Test @ Vnom (default) or also at Vmax and Vmin
P*xxxx*	Part number (where *xxxx* is the value)
X / x	IDET test (On / Off=default) (**proper hardware required**)

Table 5 : Command syntax.

[4] To see the self-test messages, start the terminal application before pushing reset.
[5] FHIT web page http://www.fynu.ucl.ac.be/FHIT.html