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ESA instrument adjustments - reverse engineering



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1:00pm  (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/126879>)

Hello Everyone,

While working on my own E4407B I uncovered a few things. My own machine had an untuned YTF in the RYTHM which I have since successfully corrected. I discovered from the N7800 docs that no special equipment is used except an external synthesizer with great enough frequency range and a GPIB interface. I therefore set about looking for hidden commands for the SCPI interface.

Here are some that I have found so far, with my own notes on format/function calls.

Disclaimer: Using these commands can mess with your calibration data, making your unit worse. Please use with caution.

```
SCPI Command Function call
DIAG:CAL:ADC?\n
DIAG:CAL? nnn,n\n GetStateEEPROM, nnn,n = address
DIAG:CAL nnn,n,xxx.yyy\n SetStateEEPROMData (RAM), nnn,n = address, xxx.yyy = new value
DIAG:CAL:BEG\n SetStateEEPROMBegin
DIAG:CAL:STOR %s\n SetStateEEPROMStore
DIAG:CAL:END\n SetStateEEPROMEnd
DIAG:CAL:SOUR?\n GetStateCalSource
DIAG:CAL:SOUR %s\n SetStateCalSource
SYST:PASS %s\n SetStatePassword
DIAG:CAL:PIECE %s\n SetStateUpdate
DIAG:OPT %s\n SetStateEEPROMOption
DIAG:PARK:LO?\n GetStateParkLO
DIAG:PARK:LO %d\n SetStateParkLO
DIAG:CARD? %s\n GetStateInformation
DIAG:TEMP? %s\n GetStateTemperature
DIAG:LATC:VAL %f\n SetStateRAM
DIAG:LATC:SEL %s\n
DIAG:LATC:VAL?\n GetStateRAM
```

In addition, I have started mapping out the address space accessible with the DIAG:CAL? nnn,n command. Here a few of the addresses and their corresponding register contents

```
Addr: Keyword:
43,0 TG CAL OFFSET
43,1 TG CAL SLOPE
111,0 IF CAL LEVEL
112,0 RF CAL LEVEL
112,0
112,1 50 MHZ CAL ADJUST DAC (EEPROM)?
113,0 COARSE SET FREQ REF
113,1 FINE SET FREQ REF
114,0 LO LEVEL DAC (EEPROM)
115,0 COARSE RF GAIN DAC
120,0 BITG LO LEVEL DAC (EEPROM)
121,0 TG CORNER
122,0 TG MOD OFFSET
123,0 TG GAIN
124,0 TG A OFFSET
```

124,1 TG LB OFFSET
124,2 TG A SLOPE
125,0 TG X OFFSET
125,1 TG X SLOPE
126,0 TG F SLOPE
131,0 FEXT B1 LO LEVEL DAC
131,1 FEXT B2 LO LEVEL DAC
131,2 FEXT B3 LO LEVEL DAC
131,3 FEXT B4 LO LEVEL DAC
131,4 FEXT TG LO LEVEL DAC
131,5 FEXT B5 LO LEVEL DAC
131,6 FEXT MIX LO LEVEL DAC
132,0 YTF TUNE A0
132,1 YTF TUNE A1
132,2 YTF TUNE A2
132,3 YTF TUNE A3
132,4 YTF TUNE EXT 0
132,5 YTF TUNE EXT 1
132,6 YTF TUNE EXT 2
132,7 YTF TUNE EXT 3
133,0 FEXT YTF DELAY OFFSET 0
133,1 FEXT YTF DELAY OFFSET 1
133,2 FEXT YTF DELAY OFFSET 2
133,3 FEXT YTF DELAY OFFSET 3
133,4 FEXT YTF DELAY OFFSET 4
133,5 FEXT YTF DELAY OFFSET 5
133,6 FEXT YTF DELAY OFFSET 6
133,7 FEXT YTF DELAY OFFSET 7
133,8 FEXT YTF DELAY OFFSET 8
133,9 FEXT YTF DELAY OFFSET 9
134,0 B0 REF TEMP PA OFF 0
134,1 B0 REF TEMP PA OFF 1
134,2 B0 REF TEMP PA OFF 2
135,0 B0 REF TEMP PA ON 0
135,1 B0 REF TEMP PA ON 1
135,2 B0 REF TEMP PA ON 2
136,0 B1 REF TEMP 0
136,1 B1 REF TEMP 1
136,2 B1 REF TEMP 2
137,0 B2 REF TEMP 0
137,1 B2 REF TEMP 1
137,2 B2 REF TEMP 2
138,0 B3 REF TEMP 0
138,1 B3 REF TEMP 1
138,2 B3 REF TEMP 2
139,0 B4 REF TEMP 0
139,1 B4 REF TEMP 1
139,2 B4 REF TEMP 2
140,0 LO PRETUNE CONST 0
140,1 LO PRETUNE CONST 1
142,0 FEXT YTF DELAY SLOPE 0
142,1 FEXT YTF DELAY SLOPE 1
142,2 FEXT YTF DELAY SLOPE 2
142,3 FEXT YTF DELAY SLOPE 3
142,4 FEXT YTF DELAY SLOPE 4
142,5 FEXT YTF DELAY SLOPE 5

142,6 FEXT YTF DELAY SLOPE 6
142,7 FEXT YTF DELAY SLOPE 7
142,8 FEXT YTF DELAY SLOPE 8
142,9 FEXT YTF DELAY SLOPE 9
143,0 FEXT BREATHING ROOM 0
143,1 FEXT BREATHING ROOM 1
143,2 FEXT BREATHING ROOM 2
143,3 FEXT BREATHING ROOM 3
145,0 FEXT PULSE WIDTH
145,1 FEXT SWEEP DWELL
145,2 FEXT OVERTUNE FREQ
145,3 FEXT OVERTUNE STATE
145,4 FEXT MIX PULSE WIDTH
145,5 FEXT MIX SWEEP DWELL
145,6 FEXT MIX OVERTUNE FREQ
145,7 FEXT MIX OVERTUNE STATE
145,6 FEXT MIX OVERTUNE FREQ
146,0 B5 REF TEMP 0
146,1 B5 REF TEMP 1
146,2 B5 REF TEMP 2
147,0 EXT MIX REF TEMP 0
147,1 EXT MIX REF TEMP 1
147,2 EXT MIX REF TEMP 2

Perhaps with the community's help we can find out more on these units and work together on keeping them running going forwards.
Best regards

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