**Example of LTBMS Sensor Check Sheet**

**Exp. 380 C0006G LTBMS Sensor check sheet via borehole cable**

Date/Time:

Place:

Inspector:

Checked for:

**Check connection tool**

Connection: sensor - OCC cable - MINK-10 extension Cable b OK

Strainmeter - OCC cable　MINK extension cable - DB9 - DCDC24V - 422-232 - reverse – GPSunit – straight - USB232 --- PC (/dev/ttyUSB ? 57600bps /home/kimurat/Exp380/INSTALL\_CHECK/data/strain#3)

Tilt logger – OCC cable - MINK extension cable - DB9 - DCDC24V - 422-232 -reverse- GPSunit – straight - USB232 --- PC (/dev/ttyUSB ? 57600bps /home/kimurat/Exp380/ INSTALL\_CHECK/data/tiltlogger#2)

CMG – OCC cable - MINK extension cable - MIL - SYNCSVR --- DSUB - USB232 PC (Scream COM?? 38400bps /home/kimurat/Exp380/ INSTALL\_CHECK/data/cmg1979)

PC: Linux PC (Lenovo X250 SL7 ) + console\_borehole □ OK

RS422 – RS232C converter \*2 □ OK

RS232C-usb converter \*3 　　　　　　　　　　　 □

Extension cable (MINC – CCP – D-sub 20m+ \* 3) □ \*

※One cable is for Guralp Sync server

Confirm that the D-sub connector of the extension cable is inside the container □ OK

D-sub - MINK (Power line + 422 communication line) \*2 □ OK

D-sub cross cable \* 2 (Sensor side) 　　　　　　　　 □

D-sub straight cable \*2 (PC side) 　　　　　　　　　 □

GPS Receiver \* 2 　　　　　　　　　　　　　　　 □

GPS Antenna \* 3 　　　　　　　　　　　　　　　 □

GPS Antenna (cable 50m) should be placed outside the container

 ( )

GPS reradiation Antenna \*1 □

GPS booster \*1 □

DC Power supply 24VDC \* 2 (for strainmeter and tilt combo) □ OK

Guralp sync server □

Guralp GPS Cable & Antenna □ OK

Guralp sync server – PC connection cable □

Connection tool confirmation neOK start time ( )

Operation test for the tilt logger

Start time ( )

Console borehole: o OK

cd ~/Exp380/INSTALL\_CHECK/data/tiltlogger#2

./tiltlogger#2.sh

telnet localhost 20002

(tiltlogger#2.sh content)

ID=$1

/home/kimurat/console\_borehole/console\_borehole –verbose –borehole serial /dev/ttyUSB0 57600 –log ${ID}\_ –terminal 22 –console 20002 –shm\_key 2

Confirm log file name of console\_borehole ( ) 　□

**Tiltlogger operation test**

DC Power supply ON (24V) □ OK Voltage (　　　)V

Send “g” command to boot the tiltlogger, and confirm that the autoload of the program has started. □ OK

\*autoload srec.

Loading from tilt0315.mot

After activating the tiltlogger, check that whether “prologue.txt” has started reading. Confirm following message “Loading from tilt0315.mot” □ OK

Confirm “win\_ch\_base 2100” □ OK ( ) ch\_base

Receiving confirmation of GPS 1pps　 □eceivinSync time　( )

Check Accelerometer and geophone data □　eck A

AVR2 1109525 : -2.988e-02 -1.547e-02 +2.136e-03 -7.059e-06 +3.406e-06 -1.067e-05 T= 2300 Paro P,T= 0.00 0.0000 P,T= 0.00 0.0000

Acceleration: Ch1: ( ) Ch2: ( ) Ch3: ( ),

Geophone: Ch4: ( ) Ch5: ( ) Ch6: ( ),

※check that the geophone data does not change

Check SAHF data (thermistor cable) □ OK

SAHF 00:04:01 Stat 19 Q w 4 r 4 s 1 Data 23824 23821 23679 23362 23288 19998 DBUF w/r/c/ns 0/ 0/ 0/29

Ch1( ) Ch2( ) Ch3( ) Ch4( ) Ch5( ) Ch6( )

Convert resistance values to physical values (degC) using Excel conversion sheet

Ch1( ) Ch2( ) Ch3( ) Ch4( ) Ch5( ) Ch6( )

※the resistance value is low at high temperature, and high at low temperature.

※the temperature is ch1 > ch5 in the sea water, and ch1 < ch5 in the borehole.

End of reading prologue.txt □ OK

Indicate “offset drift” by sending command “print pps”, and confirm that the ptr value in FCON line increases. □ OK

time offset ( ) us ( ) ppb pwm ( )

Check time ( )

Send a command “win\_output b”, and check waveforms □avef

Send a command “sensor\_power\_on” to restart accelerometer acquisition □ OK

shmdump –tq –a 2 0 | wish8.5 /usr/local/bin/shmx 2100 2101 2102

🡪display accelerometer waveforms

Send a command “win\_output 0”, and stop WIN output of the tiltlogger □iltl

Send “sensor\_power\_off” to shutdown accelerometer acquisition □ OK

Send “exit”, and confirm “ready” in the command line □ OK

DC power supply OFF □ OK

⇒tiltlogger operation test finished. Check time　(　　　　　　　　　　)

**CMG Operation test**

Start time ( )

Boot Sync server， Connect power to AC 100V □ OK

Connect sensor power jumper connector of Sync server □ OK

Launch scream □ OK

cd scream-4.5

./scream.sh

Set base directory (Setup -> files) □ OK

/home/kimurat/ Exp380/ INSTALL\_CHECK/data/cmg1979 □ OK

Click the Rec. Tab and start recording data □ OK

File save confirmation　　File name ( .gcf ) □

Confirm the count value of each component

Z2 ( ) N2 ( ) E2 ( )

MC ( ) MF( )

MC/1250 (NS tilt) ( )deg MF/1250(EW tilt) ( ) deg

M8 ( ) M9 ( ) MA ( )

Confirmation on board (2019/01/\*\* S/N 1979)

Z2 -5355409 N2 5361800 E2 5357635

MC -1623 MF -1105

M8 -28112 M9 29784 MA 29792

Start terminal mode and send “masses?” command

※To start terminal mode, mouse on \*\*\*1979, right click and select pulldown menu “Terminal”

Response ( ) ( ) ( )

Response should be same values as M8, M9 and MA shown in scream

Send “go” command to return data packet mode.

Waveform check with Scream view □

file tab -> exit, and exit scream □ OK

Remove the sensor power jumper connector on the Sync server □ OK

Disconnect AC power from Sync server □ OK

Check time ( ) □ OK

End check of the CMG

**Strainmeter operation test**

Start time（ 　　）

Console borehole setting confirmation / activation: □ OK

cd ~/Exp380/INSTALL\_CHECK/data/strainmeter#3

./strainmeter#3.sh ID

telnet localhost 20001

(strainmeter#3.sh content)

ID=$1

/home/kimurat/console\_borehole/console\_borehole –verbose –borehole serial /dev/ttyUSB0 57600 –log ${ID}\_ –terminal 22 –console 20001 –shm\_key 1

Confirm log file name of console\_borehole ( ) 　□□

DC power supply on (24 V) □ Voltage(　　　)V

Send 'g' to activate the strain gauge □ OK

Confirm reading of prologue.txt □ OK

Confirm “Loading from stra0219.mot” □OK

win\_ch\_base 2200 □OK

Check the baudrate of the valve controller board (9300) □ ec

Check water pressure gauge data after “sensor\_power\_on”　(STRAIN line) STR

 P ( Pa), T ( deg)

Confirm that the water pressure data corresponds to the strain gauge depth（1000m=10MPa）　 □OK

Connect to valve controller by sending “a\_on”　(start outputting F0 line) □

V1 (O or S, pot= ), V3 (O or S, pot= ), V4 (O or S, pot= )

Confirm that the potentiometers of V1, V3 and V4 are open at 130-140. □on

Confirmation on board（2018/01/\*\* \*\*\*\*\*\*）Unit 3

　　　　　　V#:O/S/? pot curren value　　voltage value

F0 Valves 1:O 136 2:S 995 3:O 140 4:O 141 M I= 0mA V=11203mV cnt= 0

※V2 is an unused valbe

Confirmation of DT1 and DT2 data after starting dt2.

DT1 ( mv), DT2 ( mV)

Confirm that DT1 is about -600 mV. □OK

Confirmation on board（2018/01/14）

DT1 -601.5 mV DT2 -1024.3 mV

Accelerometer activation check ( check ch.3, 4, 5 on AVR 2 line)

X: Ch. 3 (　 　　 m/s2 ), Y: Ch. 4 ( 　　　m/s2 ), Z: Ch. 5 (　 　　m/s2 )

Is the data normal (Z is 9.8 m / s 2 X, Y is small) □OK

Confirmation on board（2018/01/14）Unit 3

X: Ch.3 +5.262e+00, Ch.4 +8.151e+00, Ch. 5 -3.480e-02

Confirm the end of prologue.txt □OK

Indicate “offset drift” by sending command “print pps”, and confirm that the ptr value in FCON line increases. □ OK

time offset ( ) us ( ) ppb pwm ( )

Check time ( )

Send a command “win\_output b”, and check waveforms □avef

shmdump –tq –a 3 0 | wish8.5 /usr/local/bin/shmx 2200 2201 2202 2203 2204

Display DT1 DT2 Accelerometer waveform (X, Y, Z)

Also perform continuous display during valve operation test, and check appropriately whether output is normal.

Hide AVR and AD lines, by sending following command “print –avr” and “print –ad”

□ OK

Valve operation check

Check initial position of each valve in F0 line (V1: ,V3: ,V4: )

※If the DT1 output changes by more than 100 mV while the valve is closed, immediately open the valve.

(time UTC, I peak mA , pot, valve status: Shut or Open, DT1, DT2)

fw 0 s 4 ( , I = mA , V4 pot = ,S or O, DT1 mV, DT2 mV )

fw 0 s 3 ( , I = mA , V3 pot = ,S or O, DT1 mV, DT2 mV )

fw 0 s 1 ( , I = mA , V1 pot = ,S or O, DT1 mV, DT2 mV )

fw 0 o 1 ( , I = mA , V1 pot = ,S or O, DT1 mV, DT2 mV )

fw 0 o 3 ( , I = mA , V3 pot = ,S or O, DT1 mV, DT2 mV )

fw 0 o 4 ( , I = mA , V4 pot = ,S or O, DT1 mV, DT2 mV )

Potential is 130-140 open, 620-650 shut

Confirm that all three valves are “Open” □ OK

Stop binary output by sending a command “win\_output 0” □ OK

Turn off DT2 by sending a command “dt2 off” □ OK

Confirm that DT 2 becomes 0 mV on the STRAIN line. □ OK

Accelerometer display ON with “print avr” □ OK

Turn off the accelerometer (”ccw” and “brake 100”) □ OK

Confirm that the accelerometer output (CH3 - 5) becomes 0 m/s2 on the AVR 2 line.□on

Turn off Valve controller by sending a command “a\_off”, and confirm that the F0 output has stopped. □ OK

Turn off motor power “motor\_power\_off” □ OK

Turn off sensor\_power “sensor\_power\_off” □OK

Confirm that the DT1 output is 0 mV and the pressure data do not change in the STRAIN line.

exit （time：　　　　　）　 □ OK

DC power supply OFF □ OK

⇒ strainmeter confirmation end time ( )

**End check of the strainmeter**

“prologue.txt” for tiltlogger#2

# prologue.txt for tiltcombo #2 for IODP C6 (line starting from # will be ignored)

# unitid 0

win\_ch\_base 2100

time reset

time sync

#set up ad coefficients

avrtype 1

pga 3

# ch att m/s2/V offset

# att 10/(510+10)=0.01923

# sensor 3mA/G \* 520 ohm =1.56 V/9.8m/s2=

adset 0 0.01923 6.282 16660930

adset 1 0.01923 6.282 16294820

adset 2 0.01923 6.282 16264049

# ch att m/s/V offset

adset 3 1 0.111 16563371

adset 4 1 0.111 15930659

adset 5 1 0.111 16662760

print -ad

ad\_settings

print avr

%30

#test geophone

add geophone

%10

geophone\_shunt 1

%10

avrtype 2

%5

sensor\_power\_on

%30

# start tiltmeter

print lily

add lily

tilt powerup

tilt start

%2

tilt powerdown

%1

tilt powerup

%30

# sahf thermometer start

print -lily

print sahf

add sahf

%1

sahf powerup

%1

sahf start

%70

print -sahf

# after check, disable and power down all sensors

file\_output 0

geophone\_shunt 1

sahf powerdown

tilt powerdown

motor\_power\_off

sensor\_power\_off

aux\_power\_off

# now you can exit

“prologue.txt” for strainmeter#3

# prologue.txt for strainmeter for IODP C06 (line starting from # will be ignored)

win\_ch\_base 2200

forward 0 9600 0

forward\_lineend 0 CRLF

sci\_adj 0 9300 0

time reset

time sync

print ad

print strain

file\_output 0

aux\_power\_off

# set ad coefficient

# ch.no att m/s2/V offset

# sensor strain 2V/mm DT2 1V/mm

# sensor ACC 3A/G\*500 ohm = 1.50V/9.8

adset 0 0.16666 0.5 16617214

adset 1 0.16666 1 16683625

adset 2 0.40000 6.57333 16097432

adset 3 0.40000 6.57333 16395259

adset 4 0.40000 6.57333 16597749

%10

sensor\_power\_on

add paro

# setting a paro cpefficient

paro\_coef 117240 8B7000-2 5.823828 -3881.088 -10598.94 -42572.57 1342.731 153786.7 0.037958 30.05372 1.606596 67.30207 212.6822

%20

# connect valve controller

motor\_power\_on

a\_on

%30

# winoutput\_b

#win\_output b

#%10

#dt2\_on

dt2 on

%30

#ACC\_on

cw

brake 100

print avr

%10

avrtype 2

%30