

MicroVib II Calibration Procedure

Drawing Number: 1391 Rev P Revised 10-9-2017 (Data Sheet Dwg 1300cal)

Title: MicroVib II Calibration Procedure (v1.30-1.35)

Model: MicroVib II Analyzer

By: Lloyd Johnson Creation Date: 29 July 2002

Test Equipment Required:

- Digital Multimeter - Fluke 87V or similar.
- Oscilloscope - Tektronix TDS1012 or similar.
- Function Generator - Protek B8010FD or similar.

DSS Equipment Required

- Battery Charger PN 1309, Signal Simulator PN 1117-2, Test Fixture PN 1637
- MUX Unit PN 1450 or any DSS MUX unit. Battery Tester PN 1852,
- Interface Cable PN 1311, PN 1871 USB Adapter (if needed)

Other Equipment Required

- PC running Windows and DSS MicroBase Professional Program

Equipment Setup:

- Attach Function Gen. Main Output to Acc Input on 1637 Fixture.*
- Attach DVM to Acc Input(+) and Ground Ref. (-) on 1637 Fixture.
- Set Function Generator to Sine Wave Output. Attach 1637 to MicroVib II

Procedure:

1. **SETUP INPUT PARAMETERS:** Turn the unit on and press the MODE key then CONTROL PANEL and RESTORE FACTORY DEFAULTS, RESTORE INPUT DEFAULTS, DONE. Set unit as follows:
 - FREQ SCALE IN CPM - OFF
 - LCD CONTRAST LEVEL - Adjust for best viewing.
 - SET INPUT PARAMETERS, SET VIB CH 1, 1.0 VOLT SENSITIVITY
 - SET INPUT PARAMS, SET VIBR CH 1, SENSOR POWER - OFF
2. **SETUP ANALYSIS PARAMETERS:** Press the DONE key 3 times followed by SPECTRUM ANALYSIS and START ANALYSIS. Press SPEC OPTIONS and set the unit as follows:
 - SET MAX FREQ & LINES - 400 lines.
 - SET DISPLAY UNITS - DISPLAY ACCEL UNITS.
 - SET DISPLAY UNITS - UNITS TYPE RMS **Press DONE**

*1637 fixture makes the following connections to 18 pin Jack on 1300. Signal Gen. and DVM+ lead to pin A. Signal Gen Return and DVM- lead to Pin B. Tach Signal to Pin D. +5V is on Pin M. -5V is on Pin G.

3. RETRIEVE CAL VALUES: Press START ANALYSIS, Press DOWN arrow and Lower Left key at the same time. Enter Cal Menu password “DSSMICRO” and press DONE. Press SET SYSTEM GAINS and SET GAIN=1. Write the gain value displayed down on the data sheet. Press OK and repeat for all 6 system gains. Press DONE, and SET FILTER GAINS. Press SET 250HZ GAIN and read gain value from screen and write it down on data sheet. Press OK and repeat for all 4 AA gain values. Press DONE, and SET CPU ADC GAINS. Press SET ADC BAT GAIN, read gain value and note on data sheet. Press OK and repeat for ADC TRUE RMS GAIN gain value. Press DONE. Press LOAD CAL DEFAULT VALUES, DOWN ARROW and SAVE CAL CHANGES TO DISK.

4. SET SYSTEM GAINS: Set function generator (input) frequency and amplitude per table below. Verify the full scale range (upper left part of MicroVib screen) is per table. Use arrow keys to position cursor at signal, press CURSR MODE to select Peak Locate Mode. Press AVERAGE DATA key and let unit average 4 readings. Read Vout as magnitude value at peak and Vin as DVM reading. Compute ratio of Vout/Vin and enter in data sheet. Multiply this ratio by the Ideal Gain value in table. Enter this value (Actual Gain) on data sheet. Enter Calibration Mode. (Press Down Arrow and lower left key at same time. Enter Password “DSSMICRO” if required). Select SET SYSTEM GAINS, Select Function and Enter the Actual Gain value from data sheet. Press OK, DONE, SAVE CAL CHANGES TO DISK. Read Vout and Vin again and compute final ratio, Write final ratio value on data sheet. Repeat for all 6 functions. For Int 1 and Int 2 press SPEC OPTIONS, SET DISPLAY UNITS, and select velocity or disp units per table. Limits All 6 functions final reading 1.000 +/-0.01.

Function	Input Freq	Input Amp	FS Range	Ideal Gain	Disp Units
Gain 1	~200	~ 1.5 V	~5.8	1	Acc
Gain 5	~200	~0.50 V	~1.2	5	Acc
Gain 20	~200	~0.150 V	~0.3	20	Acc
Gain 100	~200	~0.040 V	~0.1	100	Acc
Int 1 Gain	61.5 Hz	~1.0 V	Don't care	1.75	Velocity
Int 2 Gain	98.0 Hz	~1.0 V	Don't care	0.9	Displ.

5. SET FILTER GAINS: Setup: Set input frequency to ~200 Hz, Set input amplitude to ~1.0 volts. Press SPEC OPTS, SET DISPLAY UNITS, DISPLAY ACCEL UNITS, DONE. Procedure: Press SPEC OPTS, SET MAX FREQ & LINES, Select Filter to be calibrated, DONE, START ANALYSIS. Use arrow keys to position cursor at signal, press CURSR MODE to select Peak Locate Mode. Press AVERAGE DATA key and let unit average 4 readings. Read Vout as magnitude value at peak and Vin as DVM reading. Compute ratio of Vout/Vin (Gain) and enter in data sheet. Enter Calibration Mode. (Press Down Arrow and Key #12 at same time. Enter Password if required). Select SET FILTER GAINS, Select Filter Frequency and enter the Gain value from data sheet. Press OK, DONE, SAVE CAL CHANGES TO DISK. Read Vout and Vin again and compute final ratio, Write final ratio value on data sheet. Repeat procedure for all 4 Filters. Limits 1.000 +/-0.01 final ratio.

6. SET TRUE RMS GAIN: (Firmware V1.20 fwd) Leave input signal level and frequency the same $F \sim 200\text{Hz}$ Amplitude $\sim 1\text{V}$. Press MODE then SCAN MODES then select TRUE RMS SCAN and press START ANALYSIS. Press TRMS OPTS, then SET DISPLAY UNITS, then DISPLAY ACCEL UNITS, DONE, START ANALYSIS. Press AVG DATA key and note the highest and lowest reading over a 15 second period. Take the average of the hi and low value as V_{out} and measure the gain as V_{out}/V_{in} . Enter this value on the data sheet. Enter Calibration Mode. (Press Down Arrow and Key #12 at same time. Enter Password if required). Select SET CPU ADC GAINS, Select SET ADC TRMS GAIN and enter the Gain value from data sheet. Press OK, DONE, SAVE CAL CHANGES TO DISK. Read V_{out} and V_{in} again and compute final gain value. Write this value on data sheet. Limits 1.000 ± 0.02 final ratio.

Note: For S/N 2300 fwd, the averaging and noting high and low reading over a 15 second period is no longer required in step 6 above

6A. MEASURE BATTERY VOLTAGE: Press MODE, CONTROL PANEL, SYSTEM PARAMETERS. Note the battery voltage is displayed on screen(MV2). Use the DVM to measure the battery voltage at Pin C of J1. While monitoring both values, make a note of them and then use a calculator to compute the ratio $MV2/DVM$. Write this value on CAL data sheet. Battery gain..

6B. ENTER CALIBRATION MODE: Press DONE, DONE, SPECTRUM ANALYSIS, START ANALYSIS. Enter Calibration Mode. Press SET CPU ADC GAINS, SET ADC BAT GAIN, enter value determined in step 6A above. Press OK, DONE, SAVE CAL CHANGES TO DISK. Remeasure battery gain per step 6A above and write it on data sheet under Final Reading.

Note: Steps 6A and 6B do not apply to S/N 1001-1099. Battery voltage can only be accessed after unit is disassembled on those early units.

7. VERIFICATION CHECKS- Press MODE, CONTROL PANEL, SYSTEM PARAMETERS.

- Verify Last Calibration date is today's date
 - Verify Serial Number is correct. Press DONE.
 - Press Restore Factory Defaults, Restore Input Defaults, DONE
1. **Tach Test** - Apply $\sim 800\text{ Hz}$ @ $\sim 7\text{ Vrms}$ sine signal to Tach Input (J1-D) and Ground (J1-B). Press TACH RATIO DISPLAY, START ANALYSIS. Verify signal frequency equals display frequency $\pm 0.25\%$ ($\pm 2\text{Hz}$).
 2. **Tach Autorange Test** - Abruptly reduce input signal level to $\sim 50\text{mVrms}$. Verify tach signal is lost for $\sim 5-7$ sec and then returns.. Place check mark on data sheet.
 3. **Tach Vmin Test** - Note minimum voltage required for correct frequency reading. Write this value on data sheet. Limits $10-30\text{ mVrms}$.
 4. **Charge Test** - Leave unit in Tach Mode at $\sim 30\text{ Hz}$ input Connect charger and verify on-screen indicator shows "charging" and battery voltage reading on screen starts going up slowly. Place check mark on data sheet.

5. **Measure Voc** - Setup DVM to read VDC. Connect DVM from Acc Input (J1A)(+) to Gnd Ref. (J1-B)(-). Press MODE, SPECTRUM ANALYSIS, START ANALYSIS. Read DVM voltage and record on data sheet. Limits 17-23 volts.
6. **Measure ICP Current** - Leave DVM connected as before and leave unit running in Spectrum Mode. Setup DVM to read 0-20mA DC. Read ICP current and record on data sheet. Limits 1.8-2.3 mA
7. **Measure V+ Noise** - Remove Charger. Leave unit running in Spectrum Mode. Setup scope to read AC volts (X1 Probe). Connect Scope to +5V (J1-M) (Tip) and Gnd Ref. (J1-B) (gnd). Measure and record pk-pk noise level. Limits 5-90mv pk-pk
8. **Measure V- Noise** - Leave unit running in Spectrum Mode. Connect Scope to -5V (J1-G) (Tip) and Gnd Ref. (J1-B)(gnd). Measure and record pk-pk noise level. Limits 5-90mv pk-pk
9. **TTL Serial Test** - Press MODE, CONTROL PANEL, SYSTEM PARAMETERS. Note bottom line says CONNECT: TERMINAL MODE. Connect MUX unit. Verify bottom line changes and reads MUX type. Place check mark on data sheet
10. **PC Communications Test** - Connect unit to PC serial port using cable DSS PN 1311. PC must have MicroBase version 1.5 or later running. Turn MicroVib II ON and press MODE key. Run MicroBase and start download function. Verify PC finds host unit and files in host unit appear on the right side of PC screen. Place check mark on data sheet
11. **Keypad Test**: From MODE screen, press START ANALYSIS and TASK. Verify that each key in this menu works. Place check mark on data sheet.
12. **Backlight Test**: Dim the room lights or shade the unit to simulate night operation. With unit on, press the LEFT & RIGHT arrow keys at the same time. Verify backlight comes on. Place check mark on data sheet. Turn unit off.
13. **Charge Termination** - Connect charger to unit and set aside. Verify that within 4 hours, the charge LED goes out, indicating charge has terminated automatically. Place check mark on data sheet.
14. **TTSNew** - In System Parameters, note the TTSNew value on the data sheet. (Only recalls)
15. **Pin L Check** - Connect scope to Pin L (probe) and Pin B (gnd). Verify that when unit powers up, a series of clean +5 volt positive pulses appear on Pin L.
16. **Shock Test** - Perform standard shock test per DSS Dwg 1392.
17. **Battery Check** - Perform Battery Check Procedure per DSS Dwg 1853.
18. **Final Check** - Connect Signal Simulator PN 1117-2 and verify in Balance Mode that you get a reading of ~.8IPS at ~270 degrees at ~1920 RPM. (This is just a basic check).
19. End of procedure. Sign data sheet. Fill out calibration tag and apply to left end of unit. Unit is ready to return to service. Make a note of local temp and humidity on the datasheet. Restore Factory Defaults and Restore Input Defaults.

Notes:

1. Gain values will normally fall within 5% of nominal (ideal) values. If the value is outside this guideline, doublecheck everything you are doing (check common errors below) and then suspect a component failure.
2. Common errors: Using a square wave instead of a sine wave. Units type is set to peak or average instead of rms. Display units not set correctly. Input sensitivity not set right.
3. It is very rare for a gain value to change more than 1% from a previous calibration. If you find a shift of more than 1%, repeat the procedure for that value very carefully to be sure you have not made an error.
4. If you find all gain values are shifted from previous calibration by the same percentage, this implies your DVM calibration may be suspect.

Revision Record

Rev D 4-7-06. Add shock test.

Rev E 1-7-08. Add Tach Autorange test.

Rev F 6-4-08. Correct nomenclature Step 7-9

Rev G 2-2-09. Add steps 6A and 6B Battery gain.

Rev H 8-25-09. Add Restore Input Defaults to step 7 and 7-18.

Rev J 10-12-09. Add Final Check.

Rev K 2-2-12. Add Pin L Check

Rev L 9-5-12. Add Firmware V1.34&1.35. Increase Voc limit. Add step 6 note.

Rev M 4-30-13. Revise Voc limit.

Rev N 8-15-13. Add 1117-2, 1852, 1637 to required gear. Page 1. Add battery check to Page 4.

Rev P Oct 9, 2017 Add ADC bat Gain and True RMS Gain to step 3. On Step 7 items 7 and 8 change noise limit from 50 mv to 90 mv.

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Please direct any questions concerning this procedure to support@dssmicro.com.