

CALIBRATION PROCEDURE FOR FEC200
Last updated 05/08/07

EQUIPMENT NEEDED

- Digital Voltmeter with certified accuracy of $\pm 0.05\%$ or better
- Digital Storage Oscilloscope with certified timing accuracy of 1% or better
- Four terminal resistors with certified accuracy of $\pm 0.1\%$ or better. 0.1 Ohm and 1.0 Ohm
- Two terminal resistors with certified accuracy of $\pm 0.1\%$ or better. 1K Ohm 20W *
- Two terminal resistors with certified accuracy of $\pm 0.1\%$ or better. 1M Ohm *
- Two terminal resistors with certified accuracy of $\pm 2\%$, 1G Ohm

This calibration was performed on (date) _____

By _____

Tester serial number _____

Asset number _____

Next calibration due _____

DVM Model Number	_____	Serial number	_____
Oscilloscope Model Number	_____	Serial number	_____
0.1 Ohm Resistor Number	_____	Serial number	_____
1 Ohm Resistor Number	_____	Serial number	_____
1K Ohm Resistor Number	_____	Serial number	_____
1M Ohm Resistor Number	_____	Serial number	_____
1G Ohm Resistor Number	_____	Serial number	_____

Note 1: When connecting resistors to the tester, connect each end to of the resistor to both force and sense terminals of the tester with very short wires. Packaged resistors furnished by FEC may be plugged directly into the test station.

Note 2: This procedure assumes familiarity with programming and operating the tester.

STEP 1

There are several variables in the file CUSTOM.TXT for setting offset and scale factor corrections for various scales. The file should be edited before starting this procedure so that all of these variables are set to zero. If you wish to improve the accuracy of the tester further, you can re-edit these variables as required and then repeat this procedure using the new settings.

STEP 2

Remove the front panel that covers the plug-in board rack in order to get access to the jack labeled "COM", and the two BNC connectors labeled SYNC1 and SYNC2. Do not use the jack labeled "COM" on the top chassis as this is not sufficiently accurate.

STEP 3

Perform the following eight tests one at a time with the 1M Ohm resistor plugged into the manual test station. Connect the "low" probe of your DVM to the COM jack and the high probe to the "Cathode" end of the test resistor. The test time will be 5 Seconds long so that you will have time to read the DVM. Turn on WATCH for the test station you are using. In the chart below, record both the DVM reading and the reading displayed on the computer screen.

TEST 1 IR 1V	1UA	T5000 F2
TEST 1 IR 10V	10UA	T5000 F2
TEST 1 IR 100V	100UA	T5000 F2
TEST 1 IR 1000V	1MA	T5000 F2

Expect V1	DVM V2	Tolerance	Screen UA	Tolerance
1.000V	_____	±0.01	_____	UA=V2 ±0.0035
10.00V	_____	±0.05	_____	UA=V2 ±0.035
100.0V	_____	±0.5	_____	UA=V2 ±0.35
1000V	_____	±5	_____	UA=V2 ±3.5 or equivalent mA

TEST 1 VZ 1UA	1V	T5000
TEST 1 VZ 10UA	10V	T5000
TEST 1 VZ 100UA	100V	T5000
TEST 1 VZ 1MA	1000V	T5000

Expect V1	DVM V2	Tolerance	Screen V	Tolerance
1.000V	_____	±0.006	_____	V=V2 ±0.0035
10.00V	_____	±0.06	_____	V=V2 ±0.035
100.0V	_____	±0.6	_____	V=V2 ±0.35
1000V	_____	±6	_____	V=V2 ±3.5 or equivalent KV

STEP 4

Perform the following five tests one at a time with the 1K Ohm resistor plugged into the manual test station. Connect the “low” probe of your DVM to the “Anode” end and the high probe to the “Cathode” end of the test resistor. The test time will be 5 Seconds long so that you will have time to read the DVM. Turn on WATCH for the test station you are using. In the chart below, record both the DVM reading and the reading displayed on the computer screen.

TEST 1 IR 1V 1MA T5000 F2
 TEST 1 IR 10V 10MA T5000 F2

Expect V1	DVM V2	Tolerance	Screen MA	Tolerance
1.000V	_____	±0.006	_____	MA=V2 ±0.0035
10.00V	_____	±0.06	_____	MA=V2 ±0.035

TEST 1 VZ 1MA 1V T5000
 TEST 1 VZ 10MA 10V T5000
 TEST 1 VZ 100MA 100V T5000

Expect V1	DVM V2	Tolerance	Screen V	Tolerance
1.000V	_____	±0.005	_____	V=V2 ±0.0035
10.00V	_____	±0.05	_____	V=V2 ±0.035
100.0V	_____	±0.5	_____	V=V2 ±0.35

STEP 5

Perform the following two tests one at a time with the 1G Ohm resistor plugged into the manual test station. Connect the “low” probe of your DVM to the “COM” jack and the high probe to the “Cathode” end of the test resistor. The test time will be 5 Seconds long so that you will have time to read the DVM. Turn on WATCH for the test station you are using. In the chart below, record both the DVM reading and the reading displayed on the computer screen.

TEST 1 IR 1V 1NA T5000
 TEST 1 IR 10V 10NA T5000

Expect V1	DVM V2	Tolerance	Screen NA	Tolerance
1.000V	_____	±0.005	_____	NA=V2 ±0.25
10.00V	_____	±0.05	_____	NA=V2 ±0.8

STEP 6

Perform the following two tests one at a time with open clips. The force and sense terminals should be connected together with very short jumpers. The DVM is not needed for this test. Turn on WATCH for the test station you are using. In the chart below, record the reading displayed on the computer screen.

TEST 1 IR 100V	1NA	T5000
TEST 1 IR 1000V	10NA	T5000
Expect	Screen	Tolerance
	NA	
0.00NA	_____	+1.5NA
0.00NA	_____	+10.5NA

STEP 7

Perform the following four tests one at a time using the 1 Ohm resistor. The DVM is not needed for this test. Turn on WATCH for the test station you are using. In the chart below, record the reading displayed on the computer screen.

TEST 1 VF 50MA	1V	
TEST 1 VF 400MA	1V	
TEST 1 VF 500MA	1V	
TEST 1 VF 4A	4V	
Expect	Screen	Tolerance
50MV	_____	±0.5MV
400MV	_____	±3MV
500MV	_____	±3.8MV
4V	_____	±30MV

STEP 8

Perform the following two tests one at a time using the 0.1 Ohm resistor. The DVM is not needed for this test. Turn on WATCH for the test station you are using. In the chart below, record the reading displayed on the computer screen.

TEST 1 VF 5A	1V	
TEST 1 VF 20A	2V	
Expect	Screen	Tolerance
500MV	_____	±3.8MV
2V	_____	±15MV

STEP 9

Perform the following tests one at a time using the 1K Ohm resistor. The DVM is not needed for this test. Turn on WATCH for the test station you are using. In the chart below, record the reading displayed on the computer screen.

TEST 1 ZZT 1MA 10V	1KR	T50
TEST 1 ZZT 100UA 10V	1KR	T50

Expect	Screen	Tolerance
1KR	_____	±10R
1KR	_____	±10R

Note: If these readings are not in tolerance, you may turn the trim pot on the B530 circuit board to correct the readings. Set it for the best compromise between the two readings.

STEP 10

Set up the following test using any convenient 1A rated rectifier. Connect the oscilloscope as follows. Using a direct (BNC to BNC) cable, connect the BNC labeled SYNC2 to the external trigger input of the scope. Set the scope for external trigger, falling. The sync signal will be a TTL level, low going pulse. Connect the scope probe to the cathode of the rectifier being tested.

TEST 1 DVF 10MA 1A <100MV T10 D100

Make sure that the current station cursor is on the test station you are using (use <F4> to set it). Enter these two lines.

SYNC1 2
SYNC2 1

The scope will trigger (adjust trigger level if necessary) at the exact time that the FEC200 samples the "hot" VF reading at 10mA (IM). The scope will display the VF, which is a negative voltage. You should be able to easily see where the VF changes from a relatively high voltage at the 1A level to the lower voltage at 10mA. The waveform is not a neat step as observed in this manner however you are only interested in the time difference between the end of the 1A pulse and the time that the scope triggers. That time should be 100µS ± 5µS

EXPECTED		TOLERANCE
100µS	_____	±5µS