2703/2705 SYSTEMS SPECIFICATIONS

2-1. Model 2703 Output Specifications

The amplitude accuracy specifications below apply for the specified period of time from the date of calibration. The accuracies apply at the calibration temperature ±3°C following a 30 minute warm-up period. The "Temperature Coefficient" specification applies to ambient temperatures outside this range. Percentages are given as ±% of setting ±% of range ±20μV, and apply to outputs above 1% of the range value.

Model 2703 Amplitude Accuracies			
Range	**10Hz to 10.000kHz**	**10.00kHz to 30kHz**	**30kHz to 100kHz**
	90 Day Accuracy		
.12V	±0.02% ±0.01%	±0.03% ±0.02%	±0.05% ±0.05%
1.2V	±0.02% ±0.01%	±0.02% ±0.01%	±0.03% ±0.03%
12V	±0.02% ±0.01%	±0.02% ±0.01%	±0.03% ±0.03%
120V	±0.02% ±0.01%	±0.02% ±0.01%	±0.05% ±0.03%
1200V[1]	±0.03% ±0.03%	N/A	N/A
	180 Day Accuracy		
.12V	±0.02% ±0.02%	±0.03% ±0.03%	±0.05% ±0.07%
1.2V	±0.02% ±0.02%	±0.02% ±0.02%	±0.04% ±0.04%
12V	±0.02% ±0.02%	±0.02% ±0.02%	±0.04% ±0.04%
120V	±0.02% ±0.02%	±0.02% ±0.02%	±0.05% ±0.05%
1200V[1]	±0.03% ±0.04%	N/A	N/A
	360 Day Accuracy		
.12V	±0.03% ±0.02%	±0.05% ±0.03%	±0.07% ±0.07%
1.2V	±0.03% ±0.02%	±0.03% ±0.02%	±0.05% ±0.05%
12V	±0.03% ±0.02%	±0.03% ±0.02%	±0.05% ±0.05%
120V	±0.03% ±0.02%	±0.03% ±0.02%	±0.07% ±0.07%
1200V[1]	±0.05% ±0.05%	N/A	N/A

[1] The 1200V range is limited to a maximum frequency of 1000 Hz.

2-1-1. Amplitude Setability, Resolution, and Drive Capability

Range	Setability	Resolution	Maximum Drive Capability
0.12V	.000000 to .122221	1μV	0.4mA
1.2V	0.00000 to 1.22221	10μV	100mA
12V	00.0000 to 12.2221	100μV	100mA
120V	000.000 to 122.221	1mV	100mA
1200V	0000.00 to 1222.21	10mV	7mA

2-1-2. 2703 Total Harmonic Distortion and Noise (THD+N)

Measured at full load with a 10Hz to 1MHz bandwidth THD+N meter.

Frequency	(Typical)	(Maximum)
10Hz to 4kHz	0.015% setting + 0.01% range + 80μV	0.04% setting + 0.03% range + 250μV
4kHz to 10kHz	0.04% setting + 0.01% range + 80μV	0.09% setting + 0.03% range + 250μV
10kHz to 50kHz	0.2% setting + 0.02% range + 80μV	0.4% setting + 0.05% range + 250μV
50kHz - 100kHz	0.4% setting + 0.03% range + 150μV	0.75% setting + 0.07% range + 500μV

Add 0.05% of range on 1200V range below 30Hz

2-1-3. Amplitude Temperature Coefficient

1/20th of the accuracy specification per °C.

2-1-4. Load Impedance

Minimum load impedance is 50 ohms.
Maximum load capacitance is 500pf, within output current limitations.

2-1-5. Load Regulation

Less than ±0.01% change from no-load to full-load. (The instrument must be connected in a 4-wire configuration and be operating in the Remote Sense mode.)

2-1-6. Frequency Setability and Resolution

Range	Setability	Minimum Step Change
100Hz	10.00Hz to 100.00Hz	±0.01Hz
1000Hz	100.0Hz to 1000.0Hz	±0.1Hz
10kHz	1.000kHz to 10.000kHz	±.001kHz
100kHz	10.00kHz to 100.00kHz	±1kHz (±10kHz above 50kHz)

2-1-7. Frequency Accuracy

±0.01% of setting for 1 year over the entire temperature range.

2-1-8. Frequency Stability

±0.0005% of setting per month
±0.0001% of setting per °C.

2-1-9. External Phase Lock Capability

The 2703's output frequency may be locked to an external signal that is within ±40% of the base frequency selected on the front panel. The rear panel BNC connector accepts input voltages from 1 VAC to 240 VAC, 600Hz to 20kHz. A front panel LED indicates an "UNLOCKED" condition if the 2703 cannot maintain the output frequency.

2-2. Model 2705 Specifications

The changes in specifications that apply to the Model 2705 are given in this section. The Amplitude Accuracies are the same as those of the 2703, with the following additions:

0.12V - 120V ranges, add ±0.02% of setting below 30Hz or above 4kHz
1200V range above 800Hz, add ±0.03% of setting
1200V range below 15Hz, add ±0.05% of setting

Note that the maximum frequency of the Model 2705 is 10.000 kHz.

2-2-1. 2705 Total Harmonic Distortion and Noise (THD+N)

These specifications are the same as for 2703, Section 2-1-2, in the range of 10Hz to 1000Hz. From 1kHz to 10kHz, the specification is dominated by "phase noise" as specified below.

2-2-2. Phase Accuracy:

10Hz to 1000Hz = ±0.25°
1kHz to 10kHz = ±1.5°

2-2-3. Phase Noise:

10Hz to 1000Hz = ±0.14°
1kHz to 10kHz = ±0.7°

2-2-4. Phase Sensitivity:

10Hz to 1000Hz = ±000.1° (0 to 360° lagging)
1kHz to 10kHz = ±001.0° (0 to 360° lagging)

2-2-5. 2703/2705 System Notes

1) The maximum common mode voltage is $100V_{PEAK}$.

2) A maximum of two slaves (2705) may be driven *in parallel* from one master (2703).

3) When operating a slave unit (2705) *in series* with another slave unit, phase variations and errors are cumulative from the master (2703) to the final slave unit.

2-3. Environmental, Physical and Power Specifications

Working Temperature Range: 0°C to 50°C

Storage Temperature Range: -30°C to 70°C

Maximum Relative Humidity: 70% RH at 40°C (non-condensing)

Power Requirements: 115 or 230VAC ±10%, @ 50 to 400Hz, 150VA maximum

Dimensions: 17"(43cm)W x 19½"(50cm)D x 7¼"(18.5cm)H

Weights: 42 lbs (19kg) NET; 52 lbs (24kg) SHIPPING

2703/2705 CALIBRATION PROCEDURE

8-1. General

This section contains routine maintenance procedures designed to provide maximum utility from the Model 2703/05. Included are cleaning instructions and a calibration procedure. It is assumed throughout this section that the calibration technician is familiar with operation of the 2703/05 as described in Section 6. If desired, the Model 2703/05 may also be returned to the factory for maintenance and calibration traceable to NIST.

8-2. Periodic Maintenance

As a recommendation, the Model 2703/05 should be operated in a dust-free, clean environment. However, if the unit is exposed to contaminants periodic cleaning will be required.

Loose dirt or dust on the exterior surfaces may be removed with a dry soft cloth or brush. Any remaining residue may be removed with a soft cloth dampened in a mild soap and water solution. **Do not use abrasive cleaners!**

The front panel may be cleaned with a soft cloth and a glass cleaner such as Windex or its equivalent. **Do not use petroleum based cleaners on the front panel!**

If required, the interior may be cleaned by blowing with dry compressed air. The filter for the intake fan is removable and should be kept clean to ensure maximum airflow. The filter element may be cleaned by blowing with compressed air. Replacement filter elements are available as Valhalla Stock #05-10494.

If the unit becomes heavily contaminated with dirt or other residue, a complete overhaul is recommended. Contact your local Valhalla Scientific representative or the factory for details.

8-3. Calibration Notes

The calibration procedure should be performed on a regular basis (annually is recommended) to ensure that the Model 2703/05 remains within the specifications set forth in Section 2. The 2703/05 should be allowed to warm-up for a minimum of 1 hour with the covers in place in a stable environment prior to beginning the procedure.

Due to the differences between the procedures for the Model 2703 and Model 2705, a separate procedure is provided for each instrument. Refer to section 8-4 for the 2703, and to section 8-5 for the 2705 procedure.

8-4. Model 2703 Calibration

This section describes routine calibration of the Model 2703. The procedure should be performed with all covers in place using the front panel controls. Adjustment of the internal potentiometers may be required following repair or component replacement. If internal adjustments are required, contact the factory for advice.

8-4-1. Required Test Equipment

Performance of the calibration procedure requires the following items:

- A precision AC measurement standard such as the DATRON 4920.

<u>or</u>

- A thermal-transfer AC measurement system such as the HOLT 6B, in conjunction with a DC voltage calibrator such as the Valhalla Model 2701C.

☞Most precision DVM's lack the accuracy, linearity, and bandwidth necessary to calibrate the Model 2703/05. Use of one of the devices listed above or its exact equivalent is required in order to calibrate the 2703/05 to the full range of its specifications.

8-4-2.Calibration Configuration Switch

The 2703/05 includes a switch that allows the user to select between a short or long calibration cycle, and to set the .12V range calibration voltage. The long cycle should be used for routine calibration in order to maintain the full range of specifications for the instrument. The short cycle may be used as a rough calibration following maintenance, but is not recommended for routine calibration.

The switches are accessed by removing the top cover of the instrument and locating the 5-pole DIP switch block on the left-hand microprocessor PCB. With the instrument turned off, set the switches as follows (in order from top to bottom):

_Always OPEN for 2703. Always CLOSED for 2705.

_Leave OPEN for the long calibration cycle of the 2703. Set CLOSED for the short cycle of 2703 (refer to Table 8-1). For 2705, leave this switch in the CLOSED position.

_Leave OPEN always.

_If OPEN, causes the 2703/05 to calibrate the .12V range at 1 volt instead of .1 volts. This is to ensure compatibility with most thermal voltmeters. Leave this switch CLOSED for normal calibration.

_Not used.

8-4-3. Calibration Procedure

The short calibration cycle consists of five "cal points", while the long cycle for the 2703 consists of 59 cal points. It is important that a high quality shielded lead set such as Valhalla Option "BBL" be used for calibration. It is also strongly recommended that the instrument be connected in the 4-wire (REMOTE SENSE) configuration for the greatest accuracy.

1. The calibration cycle is activated by turning the rear panel keyswitch to the CALIBRATE position. The display flashes "**cal 2703**" (or 2705) and moves to the first cal point.

2. **.100000, 1000Hz** Select OPERATE mode and wait for stabilization of the voltage measuring device. Adjust the voltage amplitude knobs until the output is exactly .100000 volts (or 1.00000 volts depending on the setting of the "calibration configuration switch").

3. After completing the adjustment, enter the correction by pressing the STANDBY/OPERATE switch again. The instrument moves to the next cal point.

4. Each cal point is calibrated in a similar manner. Table 8-1 lists the sequence of events in the calibration cycles.