Specifications for Model 8810A

Angle Position Indicator (API)

Two Synchro/Resolver Measurement and
One optional Reference supply

- **Direct replacement for all 8810's**
- **High resolution touch-screen**
- **Two isolated Input Channels**
- **0.0001° Resolution**
- **±0.004° Accuracy (Optional ±0.0015°)**
- **LXI compatible**
- **Programmable display options**
- **Auto-ranging Signal and Reference**
- **47 Hz to 20 KHZ Frequency Range**
- **DC rate or angle output**
- **Auto Phase Correction**
- **Optional 2.2 VA internal Reference**
- **Measures and displays Reference Voltage, frequency, and VL-L**
- **Ethernet, USB, IEEE-488 and parallel ports**
- **CE compliant**



GENERAL

This second generation API, Model 8810A, truly represents a major step forward in synchro to digital conversion technology. The use of an intelligent DSP design eliminates push buttons and allows all programming to be done either via an integrated touch-screen or a mouse interface. In addition, IEEE-488, Ethernet, and USB interfaces have been added to extend remote operation capabilities. The display can be set for one of three display modes; 0-360º, ±180°, or Degrees, Minutes, Seconds. A wide (47 Hz to 20 KHz) frequency range is standard. As an option, a programmable 2.2 VA internal reference supply can be specified.

Improved flexibility is provided by two **fully independent** inputs that can be used to simultaneously read two separate input signals or can be combined to measure multi-speed Synchros or Resolvers. The gear ratio, for the two-speed mode, is programmable from 2:1 to 255:1

Built-in phase correction eliminates errors caused by quadrature and harmonics when reference and signal are out of phase by as much as 60°.

The 8810A automatically accepts and displays input voltages from 1.0 to 90 V_{L-L} and Reference voltages from 2 to 115 Vrms over a broad frequency range of 47 Hz to 20 KHz. Therefore, one Instrument can handle most known Synchro and Resolver measurement requirements.

The 8810A is a direct replacement for all variations of the previously supplied North Atlantic Industries Model 8810. Special versions (P/N = 8810 –Sxxxx), contact factory to determine compatibility.

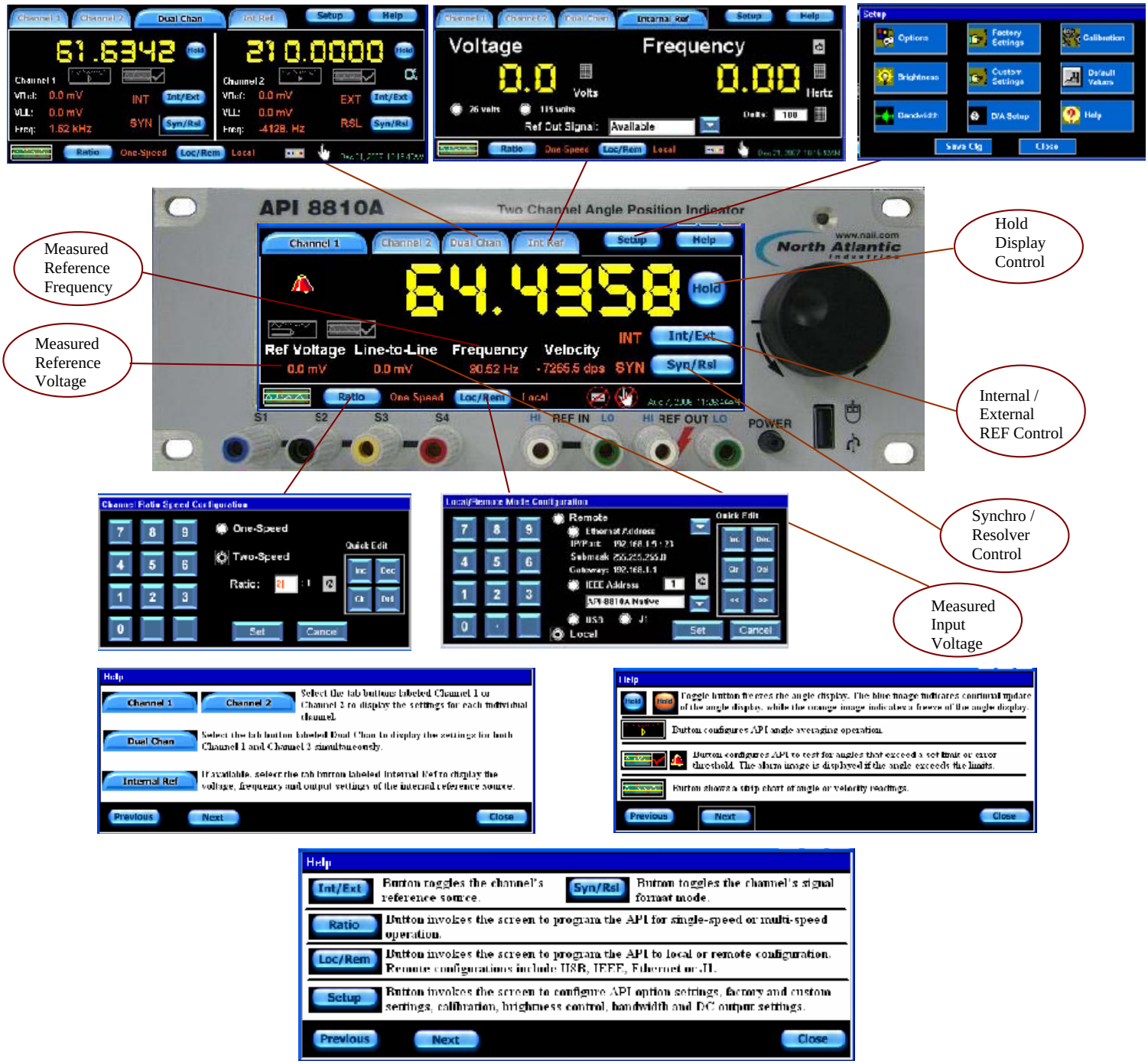
Optional Reference: This design can also incorporate a 2.2 VA programmable reference generator that is used for stand alone applications (See P/N)

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Angle Position Indicator (API)

Two Synchro/Resolver Measurement and
One optional Reference supply

(Drop In Replacement for NAI API Model 8810 with significant new features)



Specifications for Model 8810A

Angle Position Indicator (API)

Two Synchro/Resolver Measurement and
One optional Reference supply

SPECIFICATIONS

Resolution	0.0001°
Input Channels	2 separate isolated Inputs
Signal Inputs	Ch.1: Synchro/Resolver programmable. 1-90V_{L-L} auto-ranging Ch.2: Synchro/Resolver programmable. 1-90V_{L-L} auto-ranging Each channel measures the Input V_{L-L}, Reference voltage and frequency. Data is displayed on the front panel and also available via various digital outputs.
Accuracy	See detailed Accuracy Specifications below.
Frequency Range	47 Hz – 20 kHz. See detailed Accuracy Specifications below.
Angular Range	0.0000°-359.9999° or ±179.9999° programmable, or output angle can be viewed in degrees, minutes and seconds
Two-speed mode	Both inputs can be combined with a ratio from 2 to 255
Reference Voltage	2V to 115 V auto-ranging
Input Impedance	Signal: >28 V $_{L-L}$ 200 kΩ ; >11.8 V $_{L-L}$ 60kΩ; <11.8 V $_{L-L}$ 13.3 kΩ
Tracking Speed	2.76 rps. at 60 Hz 4.68 rps. at 360 Hz or higher
Settling Time	1.5 s max. for 180° step change (Based on Bandwidth selected) 3.0 s max. at 47-66 Hz (Based on Bandwidth selected)
Phase Correction	Automatically corrects for up to a 60° phase shift between stator and rotor
Velocity or DC angle for Ch.1 & Ch.2	±1000 °/sec = ±10 VDC ±100 °/sec = ±10 VDC 0 to 359.99°= 0 -10 VDC ±179.99° = ±10 VDC
Band width	Automatically set to 28% of frequency up to a max. of 100 Hz. User can change this parameter as desired.
Data averaging	Selectable from 10 ms to 10 seconds
Converter Busy	TTL compatible pulses, 1µs wide nom. Pulses present when tracking.
Digital Output	6 decade BCD (1-2-4-8) 10 TTL loads
Serial Interfaces	Ethernet, USB, and IEEE-488, and legacy 50 pin connector
Temperature Range	0-50°C operating
Input Power	85 Vrms to 265 Vrms, 47 to 440 Hz
Weight	4 lbs.
Dimensions	12.5" L x 9.5" W x 3.5" H

REFERENCE GENERATOR SPECIFICATIONS: Optional, see part number

Voltage Output: 2 Vrms to 115 Vrms, Programmable with a resolution of 0.1 V

- 2.0 to 9.9 Vrms / 47 Hz to 20 KHz frequency range
- 10.0 to 27.9 Vrms / 47 Hz to 4 KHz frequency range
- 28.0 to 115.0 Vrms / 47 Hz to 800 Hz frequency range

Accuracy:	±3% of setting
Harmonic Content:	2.0% maximum
Output Drive:	2.2 VA (See Operation manual for detail description of Output Drive)
Output Protection:	Over-current and over-temperature
Frequency:	47 Hz to 20 kHz Programmable with 0.1 Hz steps
Frequency accuracy:	0.1% FS

DETAIL ACCURACY SPECIFICATIONS

Accuracy: 8810A	**SPECIFICATIONS APPLY AFTER A 15 MINUTE WARMUP AND CALIBRATION**
Resolver mode: 2.0 to 28 V_{L-L}	±0.004° from 47 Hz to 5 KHz
Resolver mode: 28 to 90 V_{L-L}	±0.004° from 47 Hz to 1 KHz
Resolver mode: 2.0 to 12 V_{L-L}	±0.004° to ±0.008° from 5 KHz to 10 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.008° to ±0.015° from 10 KHz to 15 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.015° to ±0.02° from 15 KHz to 20 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.006° from 47 Hz to 5 KHz
Resolver mode: 1.0 to 2.0 VL-L	±0.006° to ±0.015° from 5 KHz to 10 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.015° to ±0.025° from 10 KHz to 15 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.025° to ±0.035° from 15 KHz to 20 KHz derated linearly
Synchro mode: 2.0 to 90 V_{L-L}	±0.004° from 47 Hz to 1 KHz

Accuracy: 8810AH	**SPECIFICATIONS APPLY AFTER A 15 MINUTE WARMUP AND CALIBRATION**
Resolver mode: 2.0 to 28 V_{L-L}	±0.0015° from 47 Hz to 5 KHz
Resolver mode: 28 to 90 V_{L-L}	±0.002° from 47 Hz to 1 KHz
Resolver mode: 2.0 to 12 V_{L-L}	±0.0015° to ±0.005° from 5 KHz to 10 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.005° to ±0.01° from 10 KHz to 15 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.010° to ±0.015° from 15 KHz to 20 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.0025° from 47Hz to 5 KHz
Resolver mode: 1.0 to 2.0 VL-L	±0.0025° to ±0.01° from 5KHz to 10 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.010° to ±0.02° from 10 KHz to 15 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.02° to ±0.03° from 15 KHz to 20 KHz derated linearly
Synchro mode: 2.0 to 28 V_{L-L}	±0.0015° from 47 Hz to 1 KHz
Synchro mode: 28 to 90 V_{L-L}	±0.0025° from 47 Hz to 1 KHz

CALIBRATION

When unit is turned on it will automatically initiate calibration. After warm-up of 15 minutes, unit will again automatically calibrate the channel or channels being used. Once calibrated, unit will monitor usage. Should frequency or voltage of measured signal change by more than 12.5%, unit will automatically recalibrate the channel in use. Calibration takes about 2 seconds.

INTERFACES

The 8810A is available with several different interfaces for ATE applications. Interfaces include, Ethernet, USB, IEEE-488, and a legacy 50 pin connector for API parallel BCD outputs. The legacy 50 pin connector and the IEEE-488 are both 100% backwards compatible with the model 8810. Below is information, for each interface. Detail programming commands / information are included in **"8810A Programmer's Reference Guide."** The Ethernet connector and the USB connector J3, are industry standard connections.

(Table 4) J1 CONNECTOR, API PARALLEL PIN DESIGNATIONS

DD50P, Mate DD50S or equivalent

Pin	Designation	Pin	Designation	Pin	Designation	Pin	Designation	Pin	Designation
1	***Do Not Use**	11	Converter busy	21	S1 Ch. 2	31	0.4º	41	DC out Ch.1
2	***Do Not Use**	12	0.04º	22	S2 Ch. 2	32	2 deg. (BCD)	42	Data Freeze
3	Chassis ground	13	0.01º	23	S3 Ch. 2	33	8 deg. (BCD)	43	Remote Ch. select
4	Digital ground	14	0.8º	24	S4 Ch. 2	34	Do Not Use	44	0.004º or 0.005º for
5	S1 Ch. 1	15	0.2º	25	R1 Ch.2 Ref Hi	35	Do Not Use	45	20 deg. (BCD)
6	S2 Ch. 1	16	4º	26	R2 Ch. 2 Ref LO	36	Reference Out Hi	46	40 deg. (BCD)
7	S3 Ch. 1	17	1º	27	Not Data Freeze	37	Reference Out Lo	47	80 deg. (BCD)
8	S4 Ch. 1	18	Do Not Use	28	0.02º	38	0.008º	48	10 deg. (BCD)
9	R1 Ch. 1 Ref HI	19	DC out Ch.2	29	0.08º	39	0.002 º	49	100 deg. (BCD)
10	R2 Ch. 1 Ref LO	20	Local/Rem select	30	0.1º	40	0.001º or 0.005º for 179.99	50	200º or + bit for 179.9º

* Previous models allowed power input at pins 1 & 2. To meet new safety requirements, power input is ONLY via the Power Entry module.

(Table 5) J2 CONNECTOR, IEEE - 488 PIN DESIGNATIONS

Standard IEEE Interface Connector

Pin	Designation	Pin	Designation
1	DIO1	13	DIO5
2	DIO2	14	DIO6
3	DIO3	15	DIO7
4	DIO4	16	DIO8
5	EOI	17	REN
6	DAV	18	Gnd., DAV
7	NRFD	19	Gnd., NRFD
8	NDAC	20	Gnd., NDAC
9	IFC	21	Gnd., IFC
10	SRQ	22	Gnd., SRQ
11	ATN	23	Gnd., ATN
12	Shield	24	Gnd., Logic

ORDERING INFORMATION

Part numbers:

8810A- * Standard accuracy ±0.004° (See Detail Accuracy Specifications)
└ Add "R" for an internal programmable 2.2 VA Reference Generator

8810AH- * Optional high accuracy unit ±0.0015° (See Detail Accuracy Specifications)
└ Add "R" for an internal programmable 2.2 VA Reference Generator

NOTE: The 8810A (all models) are CE compliant

ACCESSORIES

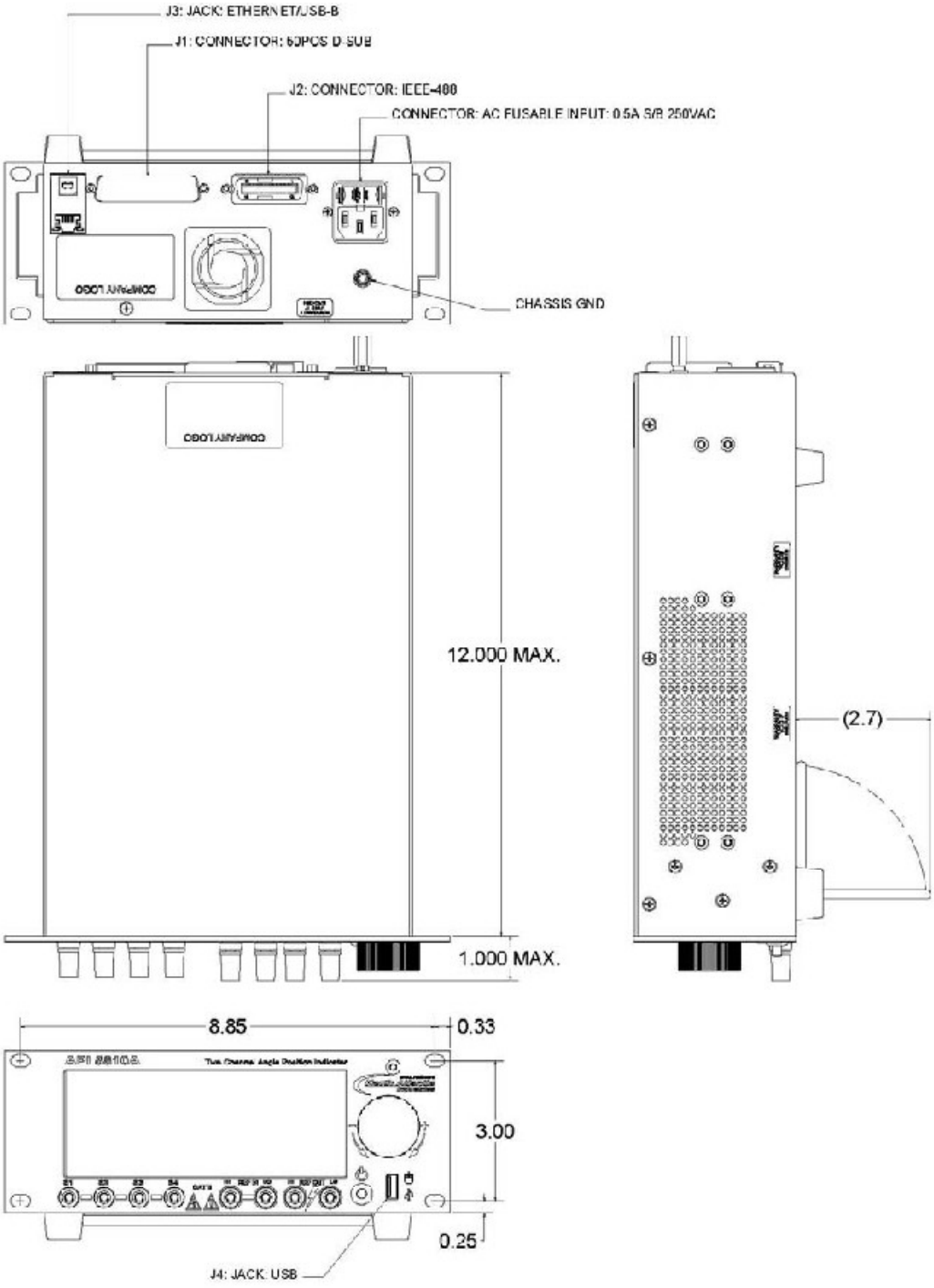
Included with the 8810A is an accessory kit NAI part number 8810A-ACCESSORY-KIT.
Kit includes the following items:

Description	NAI P/N
50 Pin Mating connector for J1	05-0053
Fuse, 5 x 20mm, 2A, slo-blo	99-0146
Line Cord	202-0002

Optional Mounting Accessories
The 8810A can be ordered with mounting adapters for mounting either one or two units in a standard 19-inch equipment rack. The table below describes full rack and tandem full rack mounting accessories.

Type of Mount	Description	NAI P/N
Full Rack Mounting	Mounts one unit in 19-inch rack	783893
Tandem Full Rack Mounting ½ height	Mounts two units side by side in 19-inch rack (3-1/2" rack height)	548557

MECHANICAL OUTLINE, Model 8810A



Revision History

Revision	Description of Change	Engineer	Date
A	Preliminary Release	FH / as	05 DEC 05
A1	Preliminary Re-release	FH / as	06 JAN 06
B	Initial Release	AS	10 FEB 06
C	Corrected discrepancies (Resolution / accuracy) with operations manual	FR	30 JUN 06
D	Restated accuracy specifications pg 1 & pg 3, changed operating temp. to 50 deg C max. added high accuracy P/N 8810AH	FR	18 JUL 06
E	Updated all screen shots to latest actual units, added additional connector interface information, added Mechanical outline drawing, modified Title of document, changed file name from "8810A-B001 revX" to from "8810A-A001 revX" for consistency.	FR	07 AUG 06
F	Corrected Tilt stand information (standard, not optional)	FR	08/11/06
F1	Deleted mouse as a purchase option, changed Ref. Generator output to 1.2VA	FR	08/22/06
F2	New Address	KL	04/25/07
F3	Edited accuracy specifications pg 1& 3, changed Band Width statement pg.3, added page after "SPECIFICATIONS" with Accuracy Tables for "A" & "AH" models & added CALIBRATION statement. Edited Part numbers re: accuracy. Changed power output rating for Optional reference from 1.2 VA to 2.2 VA on pgs 1, 3 & 6.	FR	09/27/07
F4	Added **|** compliant statement to page 1 & 6.	FR	10/09/07
F5	Corrected minor typo. errors pages 1,3 & 4, added note re: Reference Output Drive details.	FR	10/11/07
G	Added REF frequency characterization for voltage output, changed max REF harmonic content from 1% to 2% (Reference Generator Specifications pg.3).	AS	11/07/07
H	Updated 3 screen shots on page 2 (Dual Ch., Int. Ref. & Loc./Remote). Updated "Mechanical Outline" drawing on pg. 7.	FR	1/02/08