

#### Features

- Programmable Display Options
- 1 to 90 VLL
- Resolution: 0.0001°
- Accuracy: Up to 2 arc/sec ( $\pm 0.0005^\circ$ )
- Output protection
- Dynamic Modes
- IEEE-488 Interface
- Internal Reference Source



**The 5300** is a laboratory-grade instrument capable of simulating a synchro or resolver. As such, the 5300 may be used as a standard for calibrating or testing automatic test equipment (ATE), angle position indicators (API) and Resolver/Synchro-to-digital converters. The output parameters can be varied and modulated over a wide range as determined by the operator. The 5300 is self-contained and can be remotely controlled by a computer via the interface connector on the rear panel. The 5300 has provision for sensing its applied output at the load and comparing it to its set output. In this manner, the 5300 can automatically compensate for differences due to line losses.

**The 5300** may also use an external reference source. The external inputs utilize protected autoranging technology that make connection and setup safe, easy, and efficient. The outputs completely isolate the load in the event of an overload.

**The 5300** is self-calibrating. On command the instrument checks its calibration, and if an error is detected, the unit immediately generates a digital error correction factor. Self-calibration not only compensates for errors due to changes in voltage and frequency settings, but also those due to temperatures and long-term drifts.

#### **Benefits:**

- Unmatched Accuracy of up to 2 arc-seconds is maintained through built-in automatic calibration which reduces costly, periodic lab calibrations.
- Fully integrated design includes power reference oscillator, digital modulator and reference to output phase shifter.
- Wide Frequency range of up to 20kHz prevents obsolescence, due to higher frequency requirements.
- Low output impedance and remote sensing assure high voltage accuracy.
- Floating output stages and isolated power supplies allow for low common-mode errors.
- Allows for a wide variety of dynamic characteristics are simulated by continuous or cyclical angular modulation.
- Built-in digitally generated reference with precise variable phase shift to outputs which simulate real servos.
- Ease of use through front panel controls and IEEE programmable interface.

#### **Typical Applications:**

- **True Resolver/Synchro standard...**for calibration/metrology labs, engineering design, ATE & Production Test environments. The 5300 can be used to calibrate the most accurate Angle Position Indicators (API) or Synchro/Resolver-to-Digital Converters.
- **Simulation...**of a variety of static or continuous Resolver/Synchro rotation from slow roll to fast slew rates.
- **Calibration & Testing...**of high accuracy Resolver/Synchro to digital converters for static or dynamic characteristics such as tracking rate and bandwidth.

|  | 5300   |                           |                           |                                    |                           |
|--|--|---------------------------|---------------------------|------------------------------------|---------------------------|
| SPECIFICATION  | SYNCHRO MODE   |                           |                           | RESOLVER MODE                      |                           |
| <b>Reference Input</b>                                       |  |                           |                           |                                    |                           |
| Operating Frequency Range                                    | 47Hz to 1.2KHz   |                           |                           | 360Hz to 20KHz                     |                           |
| Voltage Range:   |  |                           |                           |                                    |                           |
| 47Hz to 1.2KHz   | 2 to 115 Vrms  |                           |                           |                                    |                           |
| >1.2KHz to 20KHz   | <i>Not Applicable</i>                                      |                           |                           | 2 to 26 Vrms                       |                           |
| Input Impedance  | 200KΩ minimum  |                           |                           |                                    |                           |
| <b>Reference Output</b>                                      |  |                           |                           |                                    |                           |
| Voltage Range vs. Frequency:                                 |  |                           |                           |                                    |                           |
| 47Hz to 1.2KHz   | 2 to 115 Vrms  |                           |                           |                                    |                           |
| >1.2KHz to 20KHz   | 2 to 26 Vrms   |                           |                           |                                    |                           |
| Output Impedance   | < 0.2Ω (< 2KHz); < 0.4Ω (< 10KHz); < 1.0Ω (10KHz to 20KHz) |                           |                           |                                    |                           |
| Voltage Accuracy   | ±3% of setting   |                           |                           |                                    |                           |
| Voltage Resolution   | 3 digits   |                           |                           |                                    |                           |
| <b>Output Current:</b>                                       |  |                           |                           |                                    |                           |
| 2 to 26 V rms  | 100 mArms maximum  |                           |                           |                                    |                           |
| >26 to 115 V rms   | 25 mArms maximum   |                           |                           |                                    |                           |
| DC Offset  | 5 mV maximum   |                           |                           |                                    |                           |
| Phase Shift Range  | 0 to ±180° (to 0.001° Resolution)                          |                           |                           |                                    |                           |
| <b>Phase Shift Accuracy:</b>                                 |  |                           |                           |                                    |                           |
| 47Hz to 2KHz   | ±0.5°  |                           |                           |                                    |                           |
| >2KHz to 20KHz   | ±5.0°  |                           |                           |                                    |                           |
| <b>Outputs (isolated)</b>                                    |  |                           |                           |                                    |                           |
| Voltage Accuracy   | ±2% of setting   |                           |                           |                                    |                           |
| Voltage Resolution   | 1% of setting minimum                                      |                           |                           |                                    |                           |
| DC Offset  | 5 mV maximum   |                           |                           |                                    |                           |
| Voltage Range (line-to-line)                                 | 1 to 90 Vrms   |                           |                           |                                    |                           |
| <b>Angular Accuracy vs. Frequency:</b>                       |  |                           |                           |                                    |                           |
|  | <b>6 to 11.8VLL</b>  | <b>&gt;11.8 to 50VLL</b>  | <b>&gt;50 to 90VLL</b>    | <b>6 to 26VLL</b>                  | <b>&gt;26 to 90VLL</b>    |
| 47Hz to 360Hz  | <i>Not Applicable</i>                                      | ±3 arc-sec                | ±3.5 arc-sec              | <i>Not Applicable</i>              | <i>Not Applicable</i>     |
| >360Hz to 600Hz  | ±2 arc-sec <sup>(d)</sup>                                  | ±2 arc-sec <sup>(d)</sup> | ±3 arc-sec <sup>(d)</sup> | ±2 arc-sec <sup>(d)</sup>          | ±2 arc-sec <sup>(d)</sup> |
| >600Hz to 800Hz  | ±2 arc-sec <sup>(d)</sup>                                  | ±3 arc-sec                | ±4 arc-sec                | ±2 arc-sec <sup>(d)</sup>          | ±2 arc-sec                |
| >800Hz to 1.2KHz   | ±2 arc-sec <sup>(d)</sup>                                  | ±4 arc-sec                | ±5 arc-sec                | ±2 arc-sec <sup>(d)</sup>          | ±5 arc-sec                |
| >1.2KHz to 10KHz   | <i>Not Applicable</i>                                      | <i>Not Applicable</i>     | <i>Not Applicable</i>     | ±2 - 15 arc-sec <sup>(b)(d)</sup>  | <i>Not Applicable</i>     |
| >10KHz to 20KHz  | <i>Not Applicable</i>                                      | <i>Not Applicable</i>     | <i>Not Applicable</i>     | ±15 - 60 arc-sec <sup>(b)(d)</sup> | <i>Not Applicable</i>     |
| <b>Angular Accuracy vs. Load (remote sensing capability)</b> |  |                           |                           |                                    |                           |
| 47Hz to 2KHz   | ±0.00055°/ VA  |                           |                           | ±0.00041°/ VA                      |                           |
| >2KHz to 4KHz  | <i>Not Applicable</i>                                      |                           |                           | ±0.00083°/ VA                      |                           |
| >4KHz to 10KHz   | <i>Not Applicable</i>                                      |                           |                           | ±0.00167°/ VA                      |                           |
| >10KHz to 20KHz  | <i>Not Applicable</i>                                      |                           |                           | ±0.00333°/ VA                      |                           |
| Angular Resolution   | 0.0001° (0.36 arc-sec)                                     |                           |                           |                                    |                           |
| Angular Accuracy vs. Temperature                             | ±0.000055°/C maximum                                       |                           |                           |                                    |                           |

<sup>(a)</sup> Applies over the full voltage range unless otherwise indicated and includes resolution uncertainty.

<sup>(b)</sup> Accuracy varies logarithmically with frequency.

<sup>(c)</sup> 0° to 70° inductive load; outputs are overload and short-circuit protected.

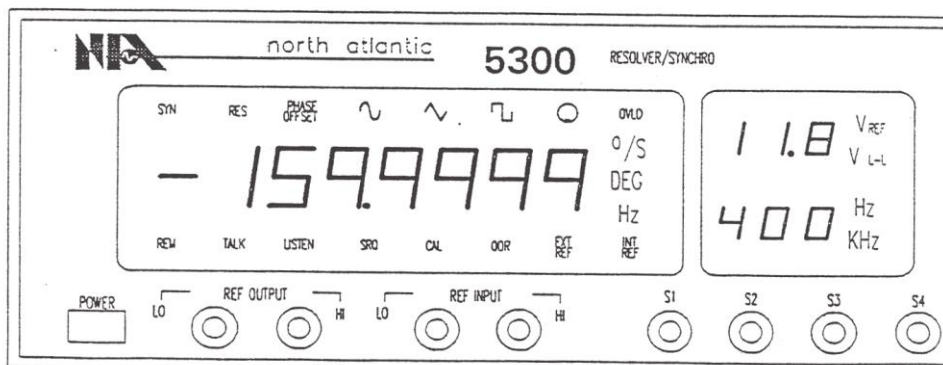
<sup>(d)</sup> Accuracy de-rates logarithmically from the 6-volt rating to the 1 V rating with a 50% increase in specification at 1 V.

| SPECIFICATION (continued)          | SYNCHRO MODE   | RESOLVER MODE |
|------------------------------------|--|---------------|
| <b>Output Drive Capability:</b>    |  |               |
| 2 to 26Vrms                        | 4 VA maximum limited to 330 mA rms maximum                     |               |
| >26 to 90Vrms                      | 4 VA maximum limited to 33 mA rms maximum                      |               |
| <b>Output Impedance (maximum):</b> |  |               |
| 47Hz to 2KHz                       | < 0.2Ω   |               |
| >2KHz to 10KHz                     | <i>Not Applicable</i>  | < 0.40Ω       |
| >10KHz to 20KHz                    | <i>Not Applicable</i>  | < 1.0Ω        |
| Radius (Sinusoidal) Accuracy       | ±0.005% typical  |               |
| <b>Dynamic Mode Operation</b>      |  |               |
| Continuous (CW or CCW)             | To 100,000°/sec (278 rps)                                      |               |
| Cyclical                           | Sine, Triangle or Square wave to 1kHz or between preset angles |               |
| Incremental                        | Successive equal angles on command                             |               |

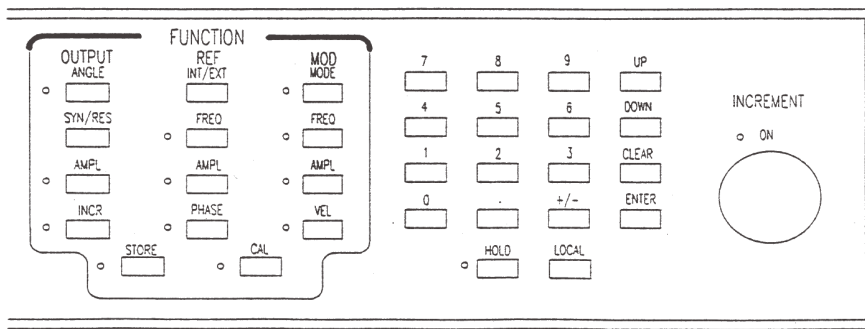
| <b>Other</b>                      |  |
|-----------------------------------|--|
| Front Panel Control               | Push Buttons; additional rotary control for manual angular positioning                             |
| Remote Programming                | IEEE-488   |
| Remote Control Connector/Location | IEEE-488/Rear panel  |
| Operating Temperature             | 0° C to 50° C  |
| Storage Temperature               | -40° C to 71° C; per MIL-T-28800E, Type III, Class 6, Style E                                      |
| Installation                      | Bench or Rack Mounting   |
| Dimensions                        | 16.78" W (42.6cm); 19" W (48.3cm) with Rack Mounting Handles<br>3.47" H (8.9cm)<br>18.4 L (46.7cm) |
| Weight                            | 35 lbs.  |
| Power                             | 115/220 VAC ±10%, 47Hz to 440Hz, 115 VA  |

| <b>Accessories Included with 5300 Order</b> |                 |
|---|-----------------|
| Description                                 | NAI Part Number |
| Installation & Operation manual             | OM-I-6006       |
| Line cord                                   | 870165          |
| 115 V line fuse (2 A slo-blo)               | 800935          |
| 230 V line fuse (1 A slo-blo)               | 800118          |
| Rack mounting handles (2)                   | 210079          |

### Front Panel Indicators



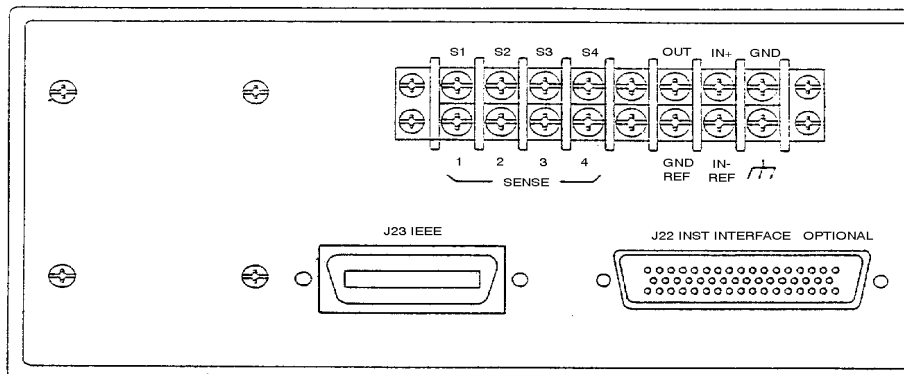
### Front Panel Controls



### Front Panel Terminal Connections

| SIGNAL          | FUNCTION                           | RESOLVER CONVENTION | SYNCHRO CONVENTION |
|-----------------|------------------------------------|---------------------|--------------------|
| S1              | Synchro/Resolver S1                | Sine Low (-)        | X                  |
| S2              | Synchro/Resolver S2                | Cosine High (+)     | Z                  |
| S3              | Synchro/Resolver S3                | Sine High (+)       | Y                  |
| S4              | Resolver S4                        | Cosine Low (-)      |                    |
| REF INPUT – HI  | External Reference High Input (+)  |                     |                    |
| REF INPUT – LO  | External Reference Low Input (-)   |                     |                    |
| REF OUTPUT – HI | Internal Reference High Output (+) |                     |                    |
| REF OUTPUT – HI | Internal Reference Low Output (-)  |                     |                    |

## Rear Panel Diagram



## Rear Panel Terminal Block Connections

| SIGNAL  | FUNCTION                           | RESOLVER CONVENTION | SYNCHRO CONVENTION |
|---------|------------------------------------|---------------------|--------------------|
| S1      | Synchro/Resolver S1                | Sine Low (-)        | X                  |
| S2      | Synchro/Resolver S2                | Cosine High (+)     | Z                  |
| S3      | Synchro/Resolver S3                | Sine High (+)       | Y                  |
| S4      | Resolver S4                        | Cosine Low (-)      |                    |
| SENSE1  | Remote sense for S1                |                     |                    |
| SENSE2  | Remote sense for S2                |                     |                    |
| SENSE3  | Remote sense for S3                |                     |                    |
| SENSE4  | Remote sense for S4                |                     |                    |
| REF IN+ | External Reference High Input (+)  |                     |                    |
| REF IN- | External Reference Low Input (-)   |                     |                    |
| REF OUT | Internal Reference High Output (+) |                     |                    |
| REF GND | Internal Reference Low Output (-)  |                     |                    |
| GND     | Analog Ground                      |                     |                    |
| CHASSIS | Chassis Ground                     |                     |                    |

**5300 Outline and Dimensions**

