North Atlantic Industries
Instruments Division

Model 8810

Synchro/Resolver Angle Position Indicator

- **0.001° Resolution**
- **0.004° Accuracy**
- **0-360° or ±180° Display**
- **Auto Line-to-Line Select**
- **Up to 10 kHz Frequency Range**
- **π/6 Phase Sensitive Detection**
- **Auto Phase Correction**
- **Optional IEEE-488 for Remote Programmability**

GENERAL

Based on North Atlantic Instruments Trig-Logic processor the Model 8810 truly represents a major step forward in synchro to digital converter technology. With a resolution of 0.001° this full tracking type II servo converter can track without velocity error to 1000°/sec.

The Model 8810 has front panel controls and input terminations while retaining the rear I/O and programming of the model 8800.

π/6 phase sensitive detection inherently rejects unwanted harmonics and noise contained in the incoming signal. Built-in auto-phase correction further reduces the possibility of errors caused by quadrature and harmonics when reference and signal are out of phase by as much as 30°.

The 8810 accepts any standard line-to-line level without pre selecting or programming the input signal. This unique feature is due to an autoranging circuit that displays the applied input signal voltage level on the front panel.

Two pushbutton front-panel selectable input channels are provided.

In the remote mode, the user can program the desired input channel. BCD outputs, data freeze and converter busy signals are standard features making the unit ideal for ATE applications requiring "hands-off operation".

A bright, easy to read, 0.55" gas discharge planar display makes the unit an easy to read instrument even in bright light.

Options include low band frequency response (47 to 440 Hz), and ±180° readout.

INPUT SPECIFICATIONS

Resolution	0.001° (0.005° with ±179.995° option)
Input Channels	2
Signal Inputs	*Ch.1:* Synchro 11.8, 26, or 90 V_{L-L} auto-ranging *Ch.2:* Resolver 11.8, 26, or 90 V_{L-L} auto-ranging (Non-standard input levels available; consult factory)
Accuracy	±0.004° (standard) ±0.010° (with ±179.995° option) (includes errors from all sources)
Frequency Range	360-1200 Hz ***(standard)*** or 47-440 Hz ***(optional)*** 360-10kHz ***(consult factory)***
Angular Range	0.000°-359.999° ***(standard)*** or ±179.995° ***(optional)***
Reference Voltage	3 V to 115 V (AGC)
Input Impedance	*Signal:* 1 MΩ min. *Reference:* 100 kΩ min.
Tracking Speed	200°/s (standard) 1000°/s (with ±179.995° option) 75°/s (with 47-440 Hz option) 180°/s (with ±179.995° and 47-440 Hz options)
Settling Time	1.5 s max. for 180° step change 400 ms max (with ±179.995° option) 3.0 s max (with 47-440 Hz option) 1.5 s max (with ±179.995° and 47-440 Hz options)
Digital Output	6 decade BCD (1-2-4-8) 10 TTL loads Logic 1: +2.5 V min Logic 0: +0.6 V max
Data Availability	Continuous or data freeze; DF (J1 pin 42) Track = 0 V or open; freeze = +5 V; DF (J1 pin 27) Track = +5 V or open; freeze = 0 V
Auto Phase Correction	Unit automatically corrects for up to a ±30° phase shift between stator and rotor signals.
Converter Busy	TTL compatible pulses, 1µs wide (nom.) Pulses present when tracking.
Temperature Range	0-70°C (operating) standard
Input Power	115/230 V_{rms} ±10% or 125/250 V_{rms} ±10% 47-440 Hz; 25 VA max.
Mating Connector	P/N 783718
Weight	8 lbs.
Dimensions	12.5" L x 9.5" W x 3.5" H

CONFIGURATION

The Model 8810 is available in various configurations. Order a Model 8810 by specifying the model followed by a two-digit number as follows:

8810-F ___ ___

Interface
1 = without IEEE-488
2 = with NATIVE IEEE-488

Display and frequency
1 = .001 Resolution
0.000^{o}-359.999^{o}
360-1200 Hz
2 = .001 Resolution
0.000^{o}-359.999^{o}
47-440 Hz
3 = .005 Resolution
$\pm 179.995^{o}$
360-1200 Hz
4 = .005 Resolution
$\pm 179.995^{o}$
47-440 Hz

*Consult Factory for Operation to 10Khz

For example: 8810-F12 is a 0.000^{o}-359.999^{o} unit with a 360-1200 Hz frequency range, and the IEEE interface bus.

IEEE Interface: When the IEEE NATIVE interface option is ordered, rear panel ground connections, tilt stand, and mounting feet are deleted. Power, reference, and signal inputs are applied through standard 50-pin input connector J5. It does not contain the following logic signals: BCD outputs, data freeze, and converter busy.

The logic signals are connected to the IEEE board which interfaces with the external computer lines by way of IEEE standard 24-pin connector J6 (table 2-3).

If desired, the unit may be operated as a standard API with BCD outputs and data freeze by removing P1 from J1 and connecting the input connector to J1 (power must then be applied to appropriate pins of J5). This mode of operation is convenient for servicing and alignment of the main API board.

Description of (supplied) Mating Connector Kit (783718)
API parallel I/O 50-pin mating connector, J1 is supplied by North Atlantic Industries, but cable assembly must be made by user. This kit consists of the following parts:

Description	AMP P/N	Qty
Shell	205211-1	1
Clamp	205732-1	1
Retainer	205980-1	2
Pins	66569-3	50

Accessories: The API 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	Mounts two units side by side in 19-inch rack **(3-1/2" rack height)**	548557
Tandem Full Rack Mounting	Mounts two units side by side in 19-inch rack **(increases rack height to 7")**	787026

J1 Pin Designations

Pin	Function	
1	Power input Hi	
2	Power input Lo	
3	Case ground	
4	Digital ground	
5	S1	Synchro
6	S2	
7	S3	
8	Not used	
9	R1	Synchro Ref
10	R2	
11	Converter busy	
12	0.04°	BCD Outputs
13	0.01°	
14	0.8°	
15	0.2°	
16	4°	
17	1°	
18	Not used	
19	Spare	
20	REM	
21	S1	Resolver
22	S2	
23	S3	
24	S4	
25	R1	Resolver Ref
26	R2	
27	Data freeze	(DF)
28	0.02°	BCD outputs
29	0.08°	
30	0.1°	
31	0.4°	
32	2°	
33	8°	
34	Not used	
35	Not used	
36	Spare	
37	Spare	
38	0.008°[2]	BCD outputs
39	0.002°[2]	
40	0.001°[2]	
41	Spare	
42	Data Freeze	(DF)
43	Remote Program	
44	0.004°[2]	
45	20°	BCD outputs
46	40°	
47	80°	
48	10°	
49	100	
50	200[3]	

J5 Pin Designations (IEEE)

Pin	Function	
1	Power input Hi	
2	Power input Lo	
3	Case ground	
4	Digital ground	
5	S1	
6	S2	Synchro
7	S3	
8	Spare	
9	R1	Synchro Ref
10	R2	
11-18	Do Not Use	
19	Spare	
20	Spare	
21	S1	
22	S2	Resolver
23	S3	
24	S4	
25	R1	Resolver Ref
26	R2	
27-35	Do Not Use	
36	Spare	
37	Spare	
38-50	Do Not Use	

J6 Pin Designations (IEEE)

Pin	Designation
1	DI01
2	DI02
3	DI03
4	DI04
5	E01
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	Shield
13	DI05
14	DI06
15	DI07
16	DI08
17	REN
18	Gnd, DAV
19	Gnd, NRFD
20	Gnd, NDAC
21	Gnd, IFC
22	Gnd, SRQ
23	Gnd, ATN
24	Gnd, LOGIC

Controls and Indicators

Control or Indicator	Function
OFF push button	Turns power off.
SYN push button	When pressed in, selects synchro operation and turns power on. If optional IEEE-488 interface is installed, and API is in Remote mode (see Remote push button below), the interface may select either synchro or resolver operation.
SYN LED	Optional LED used on units with IEEE-488 or MATE/CIIL interfaces. When lit, indicates synchro operation has been selected.
RES push button	When pressed in, selects resolver operation and turns power on. If optional IEEE-488 interface is installed, and API is in Remote mode (see Remote push button below), the interface may select either synchro or resolver operation.
RES LED	Optional LED used on units with IEEE-488 interface. When lit, indicates resolver operation has been selected.
REM push button	When pressed in, allows remote programming of synchro or resolver operation via rear panel remote connector and turns power on. When pressed in, and if optional IEEE-488 interface is installed, allows remote control of synchro or resolver operation via interface. If the IEEE-488 local lockout bus command is received by the API, remote control of synchro or resolver operation via the interface is allowed if either the SYN, RES, or REM push button is pressed in.
REM LED	Optional LED used on units with IEEE-488 or MATE/CIIL interfaces. When lit, indicates that the API is in Remote mode.
Numeric display	Displays angular information in degrees and decimal degrees.
HOLD momentary push button	Freezes display when pushed in.

115 V - 230 V Power switch (located on main chassis)	Allows unit to operate from either 115 V or 230 V power source
EXT-INT Reference switch (located on main chassis)	Provides a means of switching reference as required in calibration procedure. Normally is set to INT.
90 V LED	When lit, indicates that input signal is 90 V L-L.
26 V LED	When lit, indicates that input signal is 26 V L-L.
11.8V LED	When lit, indicates that input signal is 11.8 V L-L.
S1, S2, S3 or S4 terminals	Accepts synchro or resolver input data.
HI, LO REF terminals	Accepts input reference voltage.
GND terminal	Chassis ground
Power switch (rear panel)	Transfers power input to rear panel connector, J1 for use in rack mounted units

PROGRAMMING SPECIFICATIONS

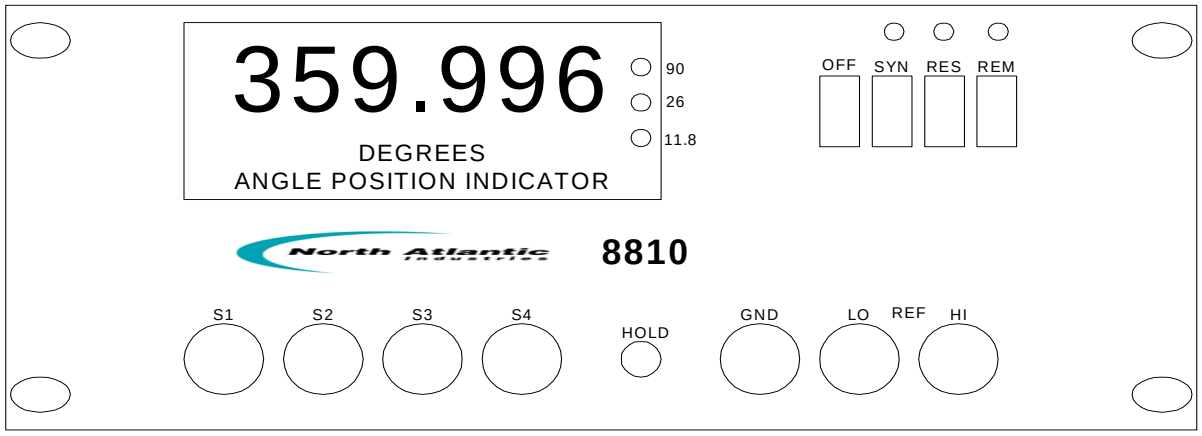
Line-to-Line The 8810 senses line-to-line level automatically and indicates the level selected on the front panel mounted LED's.

Mode The 8810 has Channel 1 pre-selected for synchro inputs and Channel 2 for resolver inputs.

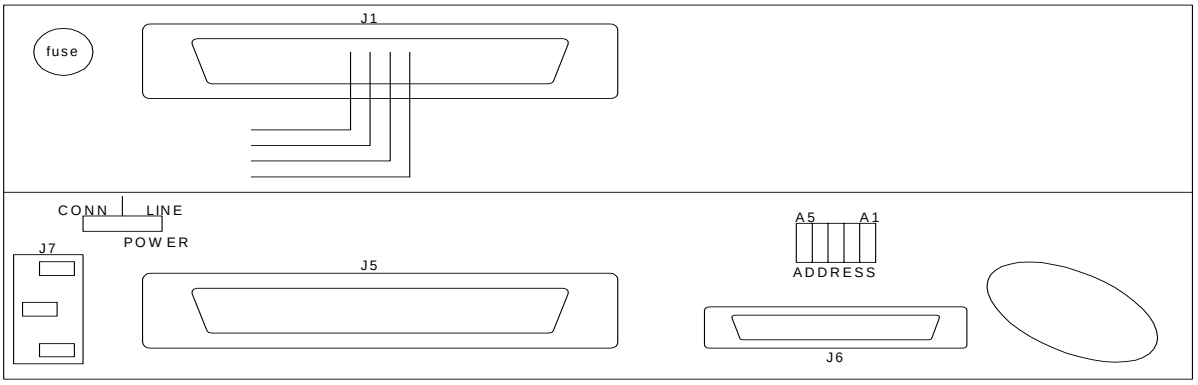
	Channel 1	**Channel 2**
	Resolver: Pin 34 open	*Resolver:* Pin 18 open
	Synchro: jumper pin 34 and 35	*Synchro:* jumper pin 18 and 35

Channel Selection The front panel buttons allow the selection Synchro or Resolver on the 8810. Channel selection may also be done remotely by depressing the REM button and programming J1 as follows:
Channel 1: Pin 43 0 V or ground
Channel 2: Pin 43 +5 V or open

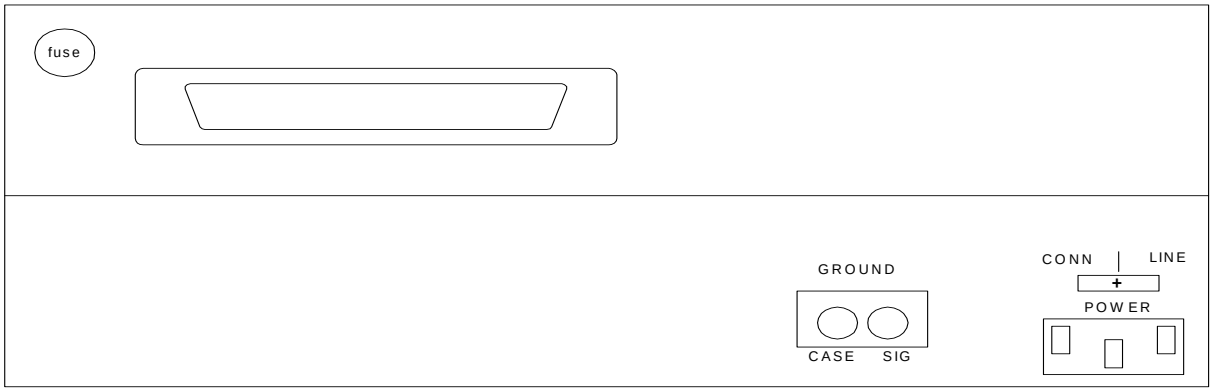
A +5 V output on pin 20 indicates that the Angle Position Indicator is set for local operation; 0 V output indicates it is in the remote mode.



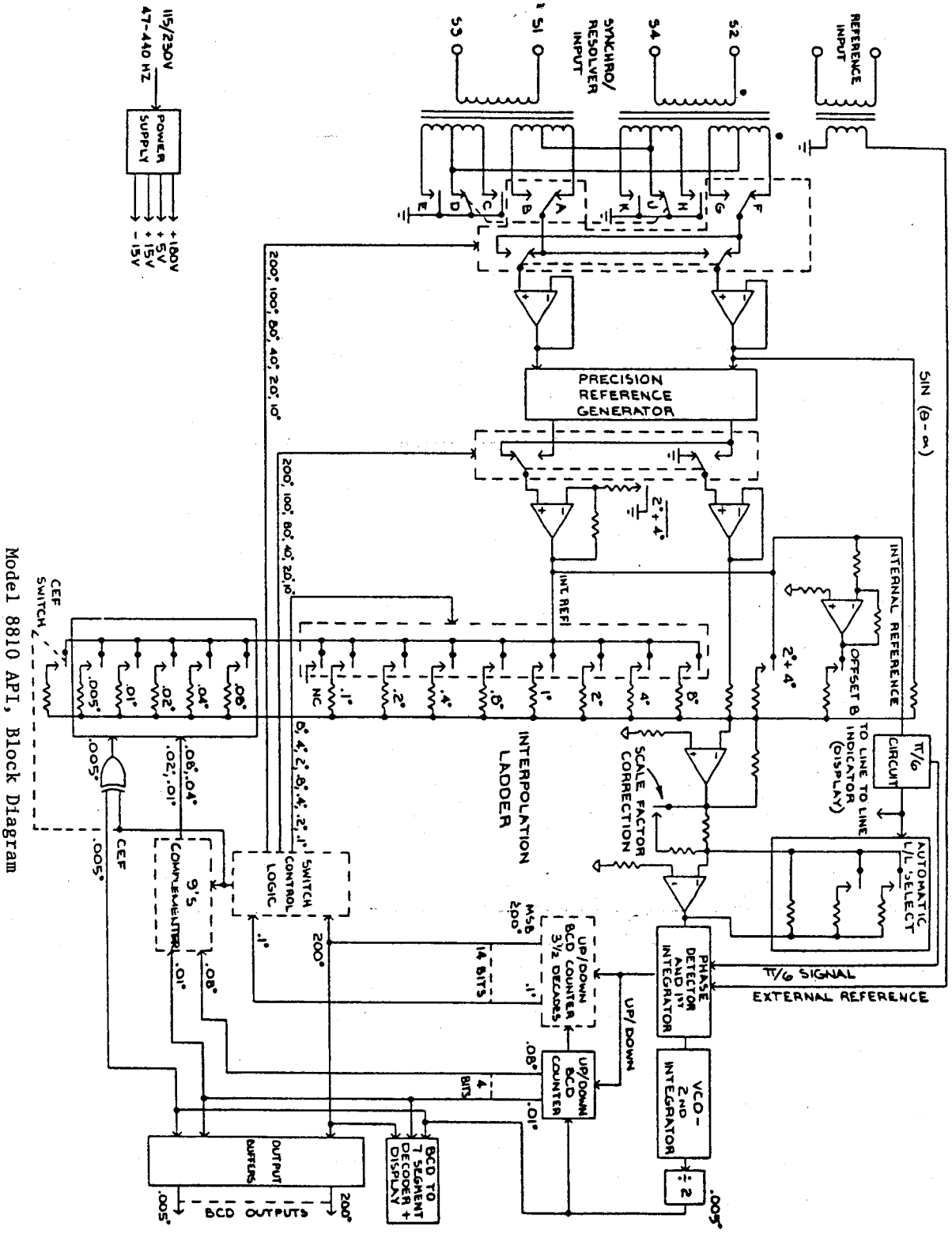
8810 FRONT PANEL VIEW



8810 REAR PANEL VIEW (**WITH** IEEE INTERFACE)



8810 REAR PANEL VIEW (**WITHOUT** IEEE INTERFACE)



Model 8810 API, Block Diagram