SECTION 1

GENERAL DESCRIPTION

1.1 SCOPE

This instruction manual provides operating and maintenance instructions for the Series SIM-31200 Synchro and Resolver Angle Simulators. (See figure 1-1.) The equipment is manufactured by ILC Data Device Corporation, Bohemia, New York.

1.2 PURPOSE

The Series SIM-31200 instruments comprise a family of precision microprocessor-based solid state angle simulators designed to meet the demand for compact, high quality synchro and resolver source standards. They are suitable for production testing systems, quality control inspections, laboratory instrumentation, and portable use in the field. Easily interfaced with external digital control and test systems, these instruments may be incorporated for control and display into a variety of systems including navigation equipment, antenna positioning devices, and machine tool control systems. To provide complete synchro/resolver stimuli and measurement capability for automatic and semi-automatic test equipment (ATE), any series SIM-31200 instrument can be connected to its sister instrument, the SR-203 (or HSR-203) Angle Indicator.

The SIM-31200, SIM-31201, and SIM-31202 differ only in terms of digital input/ouput capabilities: the SIM-31203 adds a rate feature and the SIM-31204 is MATE compatable. ALL instruments may be operated remotely from a parrallel digital input/output control. The SIM-31200 is intended primaily as a bench instrument as it includes a front panel keyboard and display withput the IEEE-488 interface. The model SIM-31201 includes both front panel capability and the IEEE interface. The SIM-31202 is intended primarily as an ATE instrument; it has a blank front panel (no keyboard or display) and includes the IEEE interface.

1.3 EQUIPMENT SUPPLIED

Each instrument is supplied with a mating connector (Amphenol 17-10500-1) for INSTRUMENT INTERFACE connector J1, a detachable line cord, and an instruction manual.

1.4 PHYSICAL DESCRIPTION

The Series SIM-31200 instruments are compact lightweight units. As shown in figure 1-1, the keyboard, status indicators, and binding posts are conveniently grouped on the front panels of the Models SIM-31200 and SIM-31201. The red 7-segment LED displays, 0.43 inches high, are plainly visible behind a rectangular cutout in the front panel.

Internally, the basic instrument consists of two printed circuit boards (top and bottom), a front panel (blank on the Model SIM-31202), a rear panel and interconnecting cabling. Removal of the case exposes the top and bottom PC boards. The top board (fig. 5-1) contains a D/R converter packaged in a compact module, sine and cosine power amplifiers, output transformers and switching relays. The 6-digit LED display, also located on this board, is mounted so that the display is visible behind the rectangular cutout in the front panel of the instrument.

The bottom PC board (fig. 5-2) houses the microcomputer circuits, the GPIB interface circuits (Models SIM-31201 and SIM-31202) and the power supply.

The rear panel (fig. 1-2) contains interface connectors J1 and J2, the power connector and RFI filter, and switches associated with remote operation. Mounted to the inner surface of the rear panel is a fan which provides for cooling.

1.5 TECHNICAL CHARACTERISTICS

Table 1-1 summarizes the principal characteristics of the Series SIM-31200 instruments. Data covering the optional IEEE-488 is included in Table 1-2.

Table 1-1. Technical Characteristics

Parameter	Value
Accuracy	
47 Hz - 2 kHz	$\pm.003^{\circ}$ no load; $\pm.004^{\circ}$ @ 1.5VA $\pm.008^{\circ}$ @ 5VA
10 kHz	$\pm.015^{\circ}$ no load; $\pm.03^{\circ}$ @ 1.5VA
NOTE Accuracy degrades as a linear function of frequency from 2 kHz to 11 kHz	
Angular Range	000.000° to 359.999° BCD 000.000° to 359.99966° Binary; continuous rotation

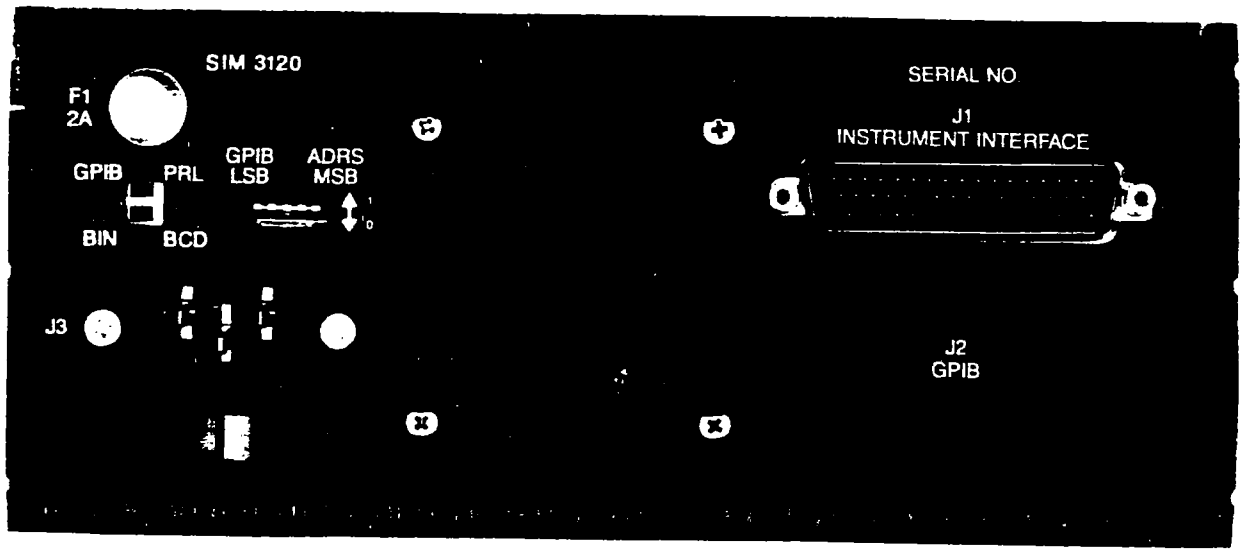

Figure 1-2. SIM-312Ø1, Rear View

Table 1-1. Technical Characteristics (Cont'd)

Display	
Output Angle	6-digit, 7-segment .43" LED with polarizing filter
Status Indicators	Local, remote, synchro, resolver, 11.8V, 26V, 90V, overload and reference loss LEDS
Digital Input/Output	
Parallel I/O	
Type	TTL compatible Open = "1" Gnd = "0"
Inputs	
Loading	1 LS TTL load
BCD/binary	Switch selectable format, 22 data lines
Angle input	6 decades BCD or 20-bit binary: 200°, 100°, 180/80°, 90/40°, 45/20°, 22.5/10°, 11/25/8°, 5.625/4°, 2.812/2°, 1.406/1°, .703/.8°, .351/.4°, .176/.2°, .088/.1°, .044/.08°, .022/.04°, .011/.02°, .0055/.01°, .0027/.008°, .0014/.004°, .00069/.002°, .00034/.001°
Other Inputs	Synchro/$\overline{\text{Resolver}}$, 11.8V, $\overline{\text{90V}}$ DATA T/$\overline{\text{H}}$, $\overline{\text{MPU RESET}}$
Outputs	
Drive capability	5 standard TTL loads
Signals	$\overline{\text{REF MISSING}}$ OVERLOAD PARALLEL INPUT RDY BIN/$\overline{\text{BCD}}$ GPIB/$\overline{\text{PARALLEL}}$
IEEE Interface	See Table 1-2.

Table 1-1. Technical Characteristics (Cont'd)

Reference Input	
Type	Transformer isolated
Voltage Levels	26 V RMS/115V RMS*
Frequency	47 Hz - 11 kHz
Input Impedance	@ 26V : 5Ø K min @ 115V : 23Ø K min
Harmonic content	10% max. allowable
Connection	Through either front panel binding posts or rear connector for both local and remote modes
Max. Allowable Operating Voltage	@ 115V nominal : 127V @ 26V nominal : 29V
Max. allowable Voltage - No damage	150V for 115V Nom. 35V for 26V Nom.
Breakdown Voltage	±5ØØV DC to logic gnd
Factory Calibration Frequencies and Ranges	
Synchro*	Freq / Factory Cal. at
9ØV	47-15Ø Hz / 6Ø Hz 2ØØ-1ØØØ Hz / 4ØØ Hz
11.8V	36Ø-2ØØØ Hz / 4ØØ Hz
Resolver*	
11.8V	36Ø-2ØØØ Hz / 4ØØ Hz 2ØØØ-11ØØØ Hz / 1Ø kHz
9ØV	2ØØ-2ØØØ Hz / 4ØØ Hz
User Calibration Frequencies	Anywhere within specified ranges

*These are the only outputs available on standard units, consult the factory for spaecial voltages.

Table 1-1. Technical Characteristics (Cont'd)

Synchro/Resolver Output	
Type	Transformer isolated synchro (S1,S2,S3) or resolver (S1, S2,S3,S4) outputs
Line-to-Line Output Levels	Programmable 11.8V, 26V or 90V RMS ±0.5% nom.
Output Connections	Front panel binding posts and rear panel connector (active in both local and remote modes)
Minimum L-L Load Impedance (Z_{L-L})	

	90V L-L	26V L-L	11.8V L-L
Synchro	1215 ohms	-	21 ohms
Resolver	1620 ohms	135 ohms	28 ohms

Driver Capability	Will drive loads with any phase angle from -90° to $+90^{\circ}$
Time Phase	$\pm.4^{\circ}$ max. with respect to reference input
Scale Factor Variation	±.025% simultaneous amplitude variation in all output lines as a function of digital angle
Protection	Momentary and continuous overcurrent protection; output overload and reference input loss front panel indications; overtemperature shutdown protection
Breakdown voltage	±500V DC to gnd
Response Time	7.5 mSec max upon receipt of input from parallel I/O or IEEE bus
Warm-up Time	30 seconds max.

Table 1-1. Technical Characteristics (Cont'd)

Power Input	
Connector	Rear connector which includes EMI/RFI filter; separate line cord supplied.
Voltage	Switch selectable 115V/230V RMS ±10%
Power Frequency	47 to 63 Hz; for 400 Hz line frequency, consult factory.
Power Consumption	60VA (worst case) .5A @ 115VAC .25A @ 230VAC
Fuse (on Rear Panel)	Buss, GMW-2, 2 amps
Isolation	Transformer
Physical Characteristics	
Size	8-1/8"W x 3-1/2"H x 14-1/2"D (20.6 cm x 8.9 cm x 36.8 cm)
Weight	14 lbs (6.4 kg)
Mounting	Half-rack standard Full-rack optional*
Temperature Range	
Operating	0° to 50°C
Storage	-65° to +100°C

*Consult factory

Table 1-2. IEEE-488 Interface Data

Command Functions: The following subset of the IEEE-488 standard is implemented:

SH1	Full Source Handshake capability
AH1	Full Acceptor Handshake capability
T6	Basic Talk capabilities with Serial Poll and untalk if my listen address.
L4	Basic Listen capabilities with unlisten if my talk address.
SR1	Full Service Request capability
RL1	Full Remote Local capability including Lockout
DC1	Full Device Clear capability
DT1	Full Device Trigger capability
C0	No Controller capability

Table 1-2. IEEE-488 Interface Data (Cont'd)

Device Commands

Control Word/String (ASCII)	Function
P	Preset to Synchro, 11.8V, "Angle" = "Delta" = 000.000°
S	Output Synchro Format
R	Output Resolver Format
1	Output 11.8 volt Line-to-Line
2	Output 26 volt Line-to-Line
9	Output 90 volt Line-to-Line
A + (6 ASCII digits)	BCD "Angle" Arming Command
D + (6 ASCII digits)	BCD "Delta" Arming Command
!	Output Armed Angle
>	Increment Armed Output "Angle" by amount "Delta"
<	Decrement Armed Output "Angle" by amount "Delta"
B	Blank Display
N	Display ON
L	Lamp Test
C	Calibrate
*	Enter Calibrate Mode
/	Exit Calibrate Mode

NOTE: Multiple commands may be concatenated to form input command strings. A terminating "linefeed" character must be appended to the end of the command string. Use of a "carriage return" before the "linefeed" is optional, but not necessary.

SRQ CONDITIONS

(1) Overload
(2) Illegal Command
(3) Reference Missing
(4) Following Power Turn-On
(5) D/R Converter Output angle updated to new value

Table 1-2. IEEE Interface Data (Cont'd)

<table>
<tr><th colspan="2">Status Byte</th></tr>
<tr><th>BIT</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>Overload { T - Overload
F - No overload</td></tr>
<tr><td>1</td><td>Illegal Command { T - Illegal Command Received
F - No Illegal Command Received</td></tr>
<tr><td>2</td><td>Not Used</td></tr>
<tr><td>3,4</td><td>Reference Frequency Range
<table>
<tr><th>Bit 4</th><th>Bit 3</th><th>Reference Frequency Range (Hz)</th></tr>
<tr><td>F</td><td>F</td><td>Reference Missing</td></tr>
<tr><td>F</td><td>T</td><td>47 - 150</td></tr>
<tr><td>T</td><td>F</td><td>151 - 2000</td></tr>
<tr><td>T</td><td>T</td><td>2000 - 11000</td></tr>
</table></td></tr>
<tr><td>5</td><td>Synchro/Resolver Output Valid Flag { T - Output signal updated
F - Output signal not updated</td></tr>
<tr><td>6</td><td>RQS (Request for Service)</td></tr>
<tr><td>7</td><td>Not used</td></tr>
</table>