



REFURBISHED EQUIPMENT CATALOG 2018

**Nota : The availability must be verified at the time of the request
Please contact the sales department for information**

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1 AVAILABLE EQUIPMENT LIST

ITEM	MODEL	DESCRIPTION
1	1580	Pattern Recorder
2	1780	Programmable Receiver
3	1795	Programmable Receiver
4	2180/2186 0,1-18 Ghz	Signal source + synthesizer
5	2180/2186 0,1-40 Ghz	Signal source + synthesizer
6	4131	Single axis Controller
7	4139	4 Axes Controller
8	4180	6 Axes SCR Controller
9	1885	3 Axes Synchro Display
10	1886	3 Axes expansion for 1885
11	2012	Positioner Programmer
12	2013	Synchro Selector
13	5023	High Precision Positioner Az/EI
14	53050	Posizionatore Az/EI
15	56161A	Posizionatore Azimuth (o Roll)

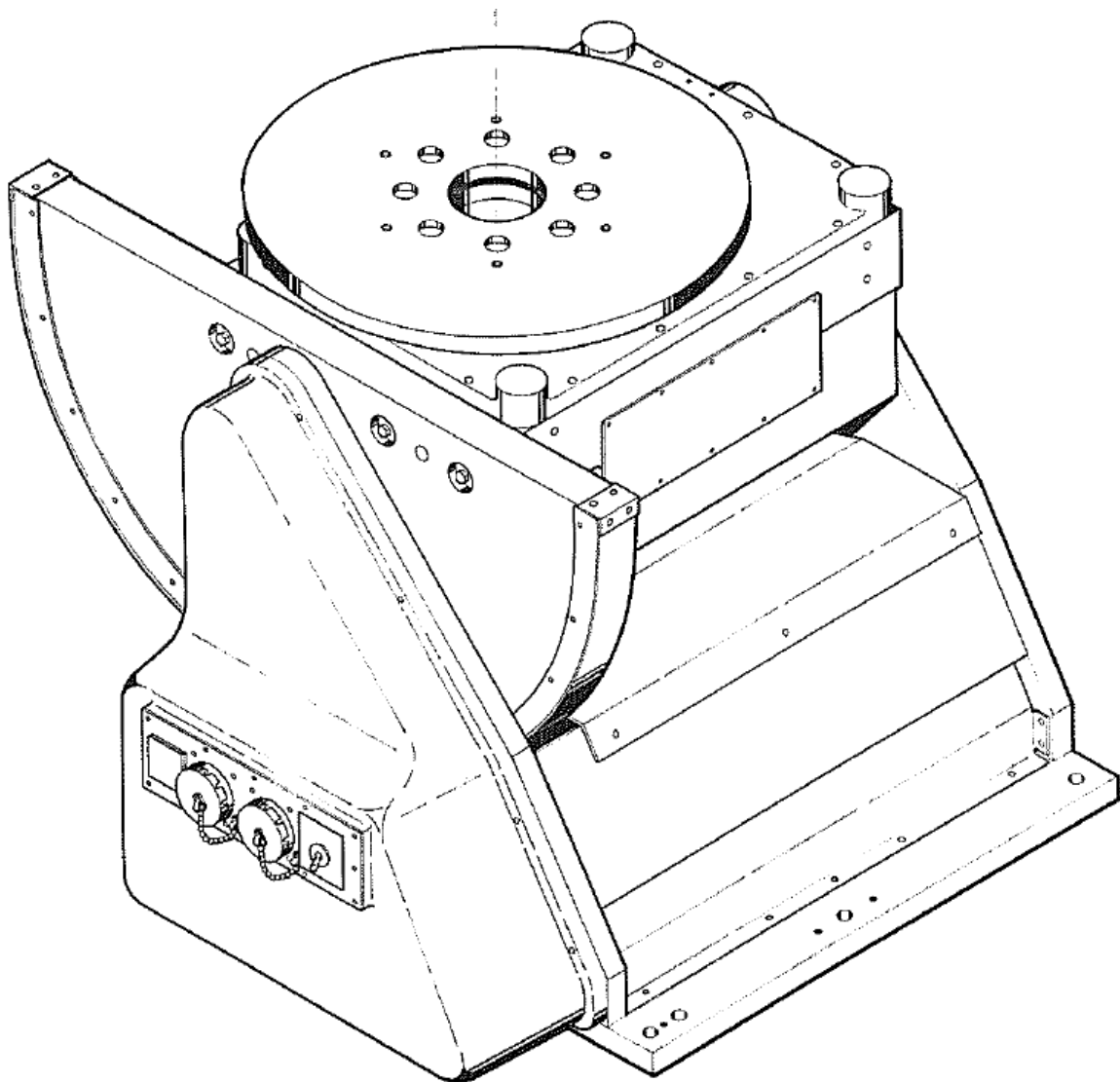
2 AZ POSITIONER/ POLARIZATION POSITIONER MODEL 56160



Specifications

Parameter	Units	56160D
Maximum Load	lbs	1,000
	N	4,448
Maximum Bending Moment	ft-lbs	1,000
	Nm	1,356
Maximum Load Inertia Polar	slug-ft ²	20.00
	Kg-m ²	27.12
Drive Motor	hp	1/15
	kW	0.05
Maximum Full Load Operating Speed	rpm	1.3
Delivered Torque	ft-lbs	100
	Nm	136
Withstand Torque	ft-lbs	200
	Nm	271
Position Readout Accuracy	deg	0.05
Maximum Total Drive Gear Backlash	deg	0.2
Limit Switches		Yes
Limit-to-Limit Rotation	deg	400
Turntable Diameter	in	8
	mm	203.2
Center Hole Diameter	in	3.7
	mm	94.0
Overall Dimension	in	13x20x10
	mm	353x523x256
Net Weight	lbs	110
	kg	50

3 POSITIONER AZ / EL MODEL 53050



Characteristic	Model Numbers	53010	53050A
Total Bending Moment (ft-lbs)		80	800
Total Vertical Load (lbs)		50	800
Drive Motor Horsepower	Elevation	1/70	1/3
	Azimuth	1/36	1/15
Tachometer Provided		OPTIONAL	YES
Delivered Torque (ft-lbs)	Elevation	60	800
	Azimuth	25	100
Withstand Torque (ft-lbs)	Elevation	80	800
	Azimuth	40	200
Max. Full Load Operating	Elevation (deg/min)	180	200
	Azimuth (rpm)	0.9	1.2
Position Accuracy	Elevation (deg)	0.05	0.05
	Azimuth (deg)	0.05	0.05
Total Max. Drive Gear Backlash	Elevation (deg)	0.15	0.08
	Azimuth (deg)	0.20	0.20
Total Elevation Limit-to-Limit Travel (degrees)		+93, -48	+95, -45
Turntable Diameter (inches)		7.88	16
Center Access Hole Diameter (inches)		1.13	3- $\frac{3}{4}$
Mounting Base Provided		NO	YES
Total Height at 0° Elevation with Base Removed (inches)		12.6	21- $\frac{1}{2}$
Total Height at 0° Elevation with Base Installed (inches)		NA	26
Recommended Positioner Control			4181A-1
Net Weight (lbs)		48	390
Shipping Weight (lbs)		85	430
Options			
Option () -13 Coaxial Rotary Joint (Az Axis Only)		YES	YES
Option () -14 RF Switch Wiring		NA	NA
Option () -15 Wiring for Model Tower		NA	NA
Option () -17 Slip Rings (Az Only) (1)		NA	NA
Option () -18 50Hz Operation		YES	YES
Option () -20 Encoder Option for Azimuth Axis		NA	NA
Option () -21 Encoder Option for Elevation Axis		NA	NA

4 POSITIONER AZ / EL MODEL 5023

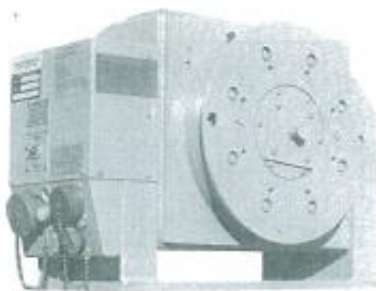
Series 5020 High Accuracy Positioners



Model 5023A Azimuth-over-Elevation Positioner



Model 5021A Azimuth Positioner



Model 50260A Polarization Positioner

SCR Wiring

The Series 5020 Positioners are provided with SCR wiring and tachometers, making them compatible with all current Scientific-Atlanta positioner controllers. The Series 5020 Positioners are ideal for automatic systems applications where exact speed regulation is required.

Simplified Cable Routing

All internal RF and control cables are pre-routed through the support structure of the positioner. Modular plugs provide quick connect/disconnect when "daisy chaining" the various axis configurations. The modular plugs also simplify maintenance and service of the positioner. Every electrical component of the Series 5020 is terminated to a connector which plugs into the basic positioner harness assembly. All barrier strips and soldered connections have been eliminated, resulting in a safe, reliable, serviceable positioner.

RF Signal Path

A RF signal path is provided in the Series 5020 Positioners which covers a DC-4 GHz. DC-18 GHz is available as an option. Continuous rotation of the azimuth, polarization, and roll axes can be provided by adding the optional slip ring/rotary joint.

Limit Switch Adjustment

The Series 5020 Positioners utilize a common limit switch assembly in each axis. The key features are adjustability, modularity, and accuracy. The limits are screwdriver adjustable over the $\pm 200^\circ$ range in azimuth, roll, and polarization, and over the $\pm 90^\circ$ range in elevation. Because the limit switch assembly is directly connected to the same turntable gear which provides the position sensing, accuracy and repeatability is maintained up to 0.25° . No limits are available with the Model 50261A Polarization Positioner.

Elevation Axis Lock Option

The Model 5023A Azimuth-over-Elevation Positioner can be equipped with a manually-engaged axis lock to fix the elevation axis in a specific orientation. The manual lock eliminates backlash and provides added stability in the elevation axis.

Safety

Safety is designed into all models of the Series 5020. Safety switches on the positioner give maintenance personnel control of positioner movement while adjustments are being made.

Each positioner (except the 5026A) is provided with a disable switch to prevent inadvertent motion during servicing or critical adjustments.

In addition to the disable switch, the elevation axis is provided with a safety interlock which will stop motion of the positioner in the event of foreign objects accidentally being captured in the sector gear or upper azimuth/elevation drive train area. This prevents all positioner motion until the obstruction is removed and the sensing switch is reset. The sector gear is covered with a flexible cover to avoid accidental contact with open gearing.

Compatibility

The Series 5020 Positioners are compatible with all the current Series 4100 Positioner Controllers as well as Series 1500 Recorders and Series 1900 and 1860 Digital Position Indicators.

Series 5020 High Accuracy Positioners

Series 5020 Individual Axis Specifications

Characteristics	5021A Az	5023A Az/EI	50260A Pol	50261A Pol	5028A Roll	5028A/5023A Roll/Az/EI	5028A/50 Roll/Az
1. Total Bending Moment (ft-lbs)	600	600	600	600	400	400	400
2. Total Vertical Load (lbs)	800	800	1000	1000	150	50	150
3. Delivered Torque (ft-lbs)	100	100/500	100	30	25	25	25
4. Withstand Torque (ft-lbs)	150	150/600	150	10*	40	40	40
5. Drive Train Gear Backlash (degrees)	0.10	0.10/10	0.10	.20	0.10	NA	NA
6. Limit to Limit Travel Maximum (degrees)	±200	±200/±92	±200	No Limits	±200	See Individual Axis	See Individual Axis
7. Synchro Accuracy (Degrees)	0.03	0.03	0.03	.10	0.03	0.03	0.03
8. Maximum Full Speed (RPM)	3	3/1	3	30	3	3/3/1	3/3
9. Turntable Diameter (inches)	12	12	12	12	12	12	12
10. Center Access Hole (inches)	2.80	2.80	OPT	OPT	OPT	2.80	2.80
11. Tachometer Provided (yes/no)	yes	yes	yes	yes	yes	yes	yes
12. Drive Motor (HP)	1/3	1/3	1/3	1/3	1/3	1/3	1/3
13. Total Height (inches)	14.8	20.2	15.0	15.0	43.0	72.2	57.8
14. Net Weight (lbs)	180	300	180	180	118	430**	250

*Due to high speed, axis will not resist overhauling.

**Includes 9 inch base extension.

5020 Positioning Specifications †

Maximum Global Position Error (rss)	0.06°
Maximum Readout Error (rss)	0.03°
Orthogonality Error	±0.05°
Intersection Error	±0.02"
Wobble	±0.01°
Axis Runout	±0.005"

†Loaded at 40% maximum load and 40% maximum bending moment.

Typical RF Path Specifications Standard RF Path (DC - 4 GHz)

Insertion Loss

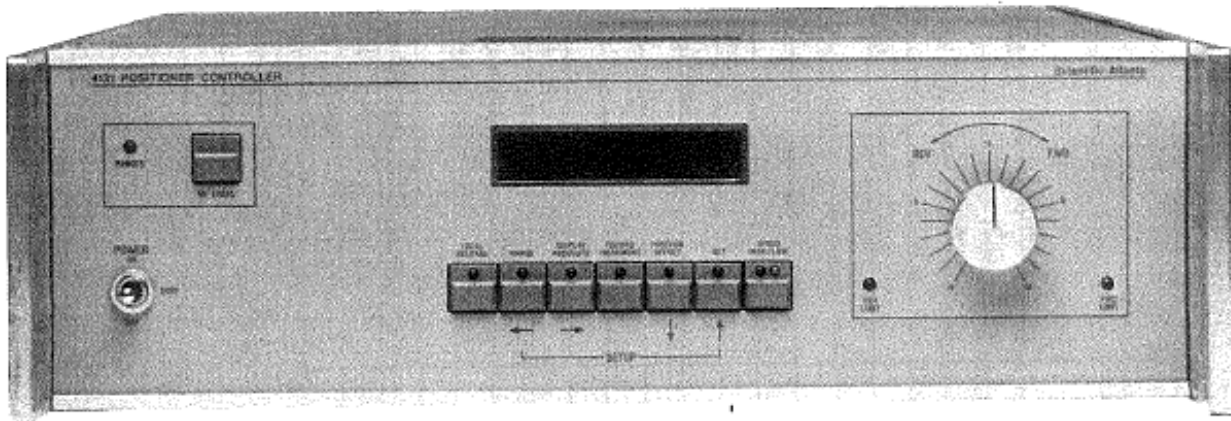
Models 5021A, 5023A, and 50260A:	DC - 2 GHz	.7 dB
	2 - 4 GHz	1.2 dB
Model 5028A:	DC - 2 GHz	1.0 dB
	2 - 4 GHz	1.8 dB

Precision RF Path (DC - 18 GHz) ††

Freq. GHz	Model	5021A Az 50260A Pol 50261A Pol	5023A Az/EI Az EI	5028A Roll
	Insertion Loss dB	DC - 2	1.0	1.0
	2 - 4	1.5	1.5	1.75
	4 - 12.4	3.0	3.0	3.25
	12.4 - 18	3.5	3.5	4.0
Phase Variation	DC - 4	2°	2° 5°	2°
	4 - 12.4	2°	2° 8°	2°
	12.4 - 18	3°	3° 10°	3°
Amplitude Variation With Axis Rotation dB	DC - 2	.2	.2 .3	.2
	2 - 4	.2	.2 .4	.2
	4 - 12.4	.2	.2 .5	.2
	12.4 - 18	.3	.3 .6	.3

††See Option (-25) for specified expanded precision RF path performance to 18 GHz.

5 POSITIONER CONTROLLER 4131



Model 4131 Single Axis Positioner Controller

Key Features

- Provides Single Axis Position Control
- High Resolution Position Display
- Operates with 1:1 And 1:136:1 Synchros
- Programmable via IEEE-488 or RS-232C Interface
- Acceleration/Deceleration Profiles Programmable Via Front Panel
- Programmable Record Increment Output

Description

The Model 4131 Positioner Controller provides single axis position control and display in angular or linear units. An accessory hand-held Local Control Unit - Model 4132 is available when it is necessary to control the positioner locally. The Model 4131 is a microprocessor-based unit which controls a single axis fractional horsepower positioner. The Positioner Controller processes single speed (1:1) and dual speed (36:1 and 1:1) analog synchro data from most position transducers used in antenna test positioners and tracking systems.

Position Measurement and Display

The Model 4131 features a built-in six digit-plus sign display. The resolution of the display varies according to the type of synchro transmitter input. A single speed synchro transmitter produces a display resolution of 0.1 degrees for rotary axes and 0.01 units for linear axes. Dual speed synchro transmitters produce a display resolution of 0.001 degrees for rotary axes and 0.0001 for linear axes. Position offset can be entered from the front panel. Position data is updated every 10 milliseconds.

In the manual mode, position control is accomplished with the front panel pushbuttons and rotary control. Acceleration and deceleration profiles can be entered as a part of the Controller

set up procedure and may be changed as test requirements vary. Start and stop positions for record increment generation are programmable from the front panel or the optional IEEE-488 or RS-232C interfaces. Record increment output is available at the rear panel as a TTL compatible pulse or via the optional IEEE-488 bus interface.

The Model 4131 provides a separate BCD position data output for interfacing with the Scientific-Atlanta Series 1580 Antenna Pattern Recorder. Data may be read at any time via the BCD, or the optional IEEE-488 and RS-232C interfaces. Once entered upon installation, the instrument setup state is stored in non-volatile memory and configures itself to this state when power is applied.

Communications Interface

The Positioner Controller may be ordered with an optional Communications Interface which provides programmable control of all functions via IEEE-488 and RS-232C interfaces or can be easily upgraded in the field at a later date.

Summary of Functions

The Series 4131 Positioner Controller allows you to:

1. Select the display and output range.
2. Adjust the offset angle for display and output.
3. Control the position speed and direction of motion.
4. Enable the record increment output function.
5. Set high or low speed.
6. Observe limit indications.

Optional commands include:

1. Return to local capability when a digital controller is used on the IEEE-488 or RS-232C interfaces.
2. Local release function when the Model 4132 Local Control Unit is used.

Series 4130 Positioner Controllers

Specifications

Model 4131

Position Accuracy

- Single Speed (1:1)
 ± 0.5 degree
- Dual Speed (1:1 and 36:1)
 ± 0.01 degree

Position Resolution

- Single Speed (1:1)
0.1 degree
- Dual Speed (1:1 and 36:1)
0.001 degree

Front Panel Displays

- Position
6 character LED seven segment, .43 inches high for position display.
- Limits
Two LED's, one each for forward and reverse

Range Selection

- Linear
Single Speed (1:1)
-1799 to +1800 or 00.00 to 35.99
- Dual Speed (1:1 and 36:1)
-179999 to +180000 or 00.0000 to 35.9999

Rotary

- Single Speed (1:1)
-179.9 to +180.0 degrees or 000.0 to 359.9 degrees
- Dual Speed (1:1 and 36:1)
-179.999 to +180.000 or 000.000 to 359.999 degrees.

Position Input (synchro only)

- Single Axis input of single speed (1:1) or dual speed (1:1 and 36:1) directly from size 15 or size 23 synchros.

Synchro Rotor Excitation

- 120 VAC 50/60 Hz
(capable of driving one dual speed synchro package)

Serial Interface (Optional)

- RS232C compatible, Baud rates from 300-9600
- Configurable for 7 or 8 data bits, 1 or 2 stop bits, and even, odd or no parity bits.

IEEE-488 Interface (Optional)

- ANSI/IEEE-488 Standard (488-1978) IEEE Standard
- Digital interface for programmable instrumentation

Position Output

- Parallel BCD, 6 digits, sign bit, update and inhibit control lines. Compatible with SA Series 1580 Pattern Recorders

Position Update Rate

- Front Panel—10 msec
- BCD Output—10 msec

Record Increment Output

- Hardware Output—rear panel BNC connector, TTL compatible, positive true, 24 microsecond pulse width
- IEEE-488 Output—bit #1 in serial poll byte when SPO is enabled

Record Increment Range

- Programmable from 0.010 to 9.990 degrees

Record Increment Rate

- 5 kHz maximum

Motor Driver

- Pulse Width
Modulated 20 kHz switching rate

Motor Armature Supply

- 120 VDC 7.9A maximum

Motor Direction

- Bidirectional

Dynamic Braking

- Built-in activated by stop command or when a limit is sensed

Armature Current Limiting

- Internal DIP switch programmable—0-7.875 A in 0.125 A steps.

Motor Field Supply

- 105 VDC 1 A maximum

Tachometer Input

- + or -12 VDC at full motor speed (1725 RPM)

Speed/Direction Control

- Front panel manual control
- programmable via optional digital interfaces
- Local control unit interlock

Speed Control Range

- High speed setting 0-100%;
- Low speed setting 0-10% (without Tach feedback);
- Low speed setting 0-1% (with Tach feedback)

Speed Regulation

- with Tach feedback
0.2% of set speed
- without Tach feedback
3% of set speed

Acceleration/Deceleration Profiles

- 10 settings—programmable from front panel

Position Limit Indicators

- Front Panel—LEDs for both Forward and Reverse Limits

Dimensions

- 5.25"H x 17"W x 21"D
- 13.4 cm x 43.6 cm x 53.8 cm
- fits standard 19 inch rack

Weight

- 53 lbs (approx)

Power Requirements

- 102-138 VAC 47-63 Hz 10A maximum, single phase
- 204-276 VAC 47-63 Hz 5 A maximum, single phase

Operating Temperature

- 0 to +50° C

Storage Temperature

- 20 to +75 Degrees C

6 PRECISION POSITIONER CONTROLLER 4180

Series 4180 Positioner Control Units

Precision Positioner Control Series 4180

Description

The Series 4180 Positioner Controllers are SCR, speed regulated devices used to operate Scientific-Atlanta antenna positioners. Provisions for sensing limit switch status and tachometer feedback make these controllers compatible with most positioner models. Tachometer feedback provides a high degree of speed regulation for applications where constant speed is required such as in automatic antenna measurement systems. For positioner axes without tachometer feedback, load compensation provides good speed regulation. The Series 4180 allows programming of individual axes for either type of speed regulation.

For applications involving high loads, the Series 4180 utilizes acceleration/deceleration limiting. This feature controls the rate at which the positioner accelerates to a commanded speed or decelerates when commanded to stop, thereby reducing induced inertial loads applied to the positioner structure and to the load itself.

Two Series 4180 Controllers are available. The Model 4181-1 can control up to six axes having motors of up to $\frac{3}{4}$ horsepower. The Model 4181-2 controls up to six axes; three axes can have motors up to $\frac{3}{4}$ horsepower and three axes up to five horsepower.

The Series 4180 offers remote control of positioning systems over a single control cable at distances up to 1000 meters (3,280 feet). An optional local control unit provides control at the positioner site.

A speed control range of greater than 100:1 is provided. Speed regulation is better than 1% of full speed over the entire range (utilizing tachometer feedback).

The remote control unit may be rack-mounted or installed in an optional Model 2256-5 Cabinet. An outdoor enclosure is available for the SCR power amplifier and associated units. Single phase, 220V ac input power for the control system is required at the positioner.

A standard feature of the precision, speed-regulated control units is the provision for programmed operation via IEEE 488 Bus when used with a Model 2012A Positioner Programmer. The programmer provides complete positioner control so that a programmed scan over the sphere of radiation or a selected sector can be generated.

P/N 220738 Local Control Unit may be used with either of the Series 4180 speed regulated controllers. The hand-held, outdoor control unit utilizes the basic control, limit, and supply circuits of the main unit to allow the operator to control the motion of up to six axes from the positioner site.



Series 4180 Positioner Control Units

Specifications

	4181-1	4181-2
Number of Axes	6	5
Maximum Motor Size	¾ hp	3 @ ¾ hp, 3 @ 5 hp
Armature Supply	0 - 115V dc 0 - 8 amps	0 - 115V dc 0 - 35 amps
Field Supply	105V dc 3 amps	105V dc 3 amps
Direction	Bidirectional	Bidirectional
Current Limiting	Selectable 1, 4, or 8 amps	Selectable 1, 4, 8 or 35 amps
Input Power	220V ac ± 15%	220V ac ± 15%
Mainframe	50/60 Hz 2.3 kVA	50/60 Hz 9.0 kVA
Remote Control Unit	115/230V ac 50/60 Hz 400 VA	115/230V ac 50/60 Hz 400 VA

Speed Regulation

- With Tachometer Feedback: 1%
- With Load Compensation: 10%

Tachometer Input

- 15V dc at full motor speed

Speed Control Range

- High Speed: 0 - 100%
- Low Speed: 0 - 1% (approximate)

Auxiliary Brake Control

- Available on 4 axes

Acceleration/Deceleration Limiting

Maximum Cable Distance, Remote Control Unit to Mainframe
1000 meters (3280 feet)

Automatic Operation

- Programmable via IEEE-488 I/O when used with Model 2012 Positioner Programmer

Dimensions (excluding connectors)

Mainframe:

- Height — 26.67 cm (10.5 in.)
- Width — 48.26 cm (19.0 in.)
- Depth — 50.80 cm (20.0 in.)

Remote Control Unit:

- Height — 13.34 cm (5.25 in.)
- Width — 48.26 cm (19. in.)
- Depth — 53.34 cm (21 in.)

Local Control Unit:

- Height — 7.62 cm (3 in.)
- Width — 8.89 cm (3.5 in.)
- Depth — 21.59 cm (8.5 in.)

Weight

Mainframe:

- Net: 36.5 kgs (80 lbs.)
- Ship: 45.5 kgs (100 lbs.)

Remote Control Unit:

- Net: 10 kgs (22.5 lbs.)
- Ship: 13 kgs (28.5 lbs.)

Local Control Unit:

- Net: 1 kgs (2.2 lbs.)
- Ship: 1.7 kgs (3.7 lbs.)

Ordering Information

Model 4181-1 Positioner Controller, 6 Axis, ¾ hp maximum

- Includes:
- 1 each — Mainframe
 - 1 each — Remote Control Unit
 - 1 each — P/N 82081 Power Cable, 7.5 feet (remote control unit)
 - 1 each — P/N 220729 Power Cable, 7.5 feet (mainframe)
 - 1 each — P/N 220726 Tachometer cable 15 feet
 - 1 each — P/N 102320 Motor Cable, 3 Axis, 15 feet

Model 4181-2 Positioner Controller, 6 axis, 3 @ ¾ hp maximum and 3 @ 5 hp maximum

- Includes:
- 1 each — Mainframe
 - 1 each — Remote Control Unit
 - 1 each — P/N 82081 Power Cable, 7.5 feet (remote control unit)
 - 1 each — P/N 220727 Tach/Limit Cable, 15 feet
 - 1 each — P/N 220728 Brake/Limit Cable, 15 feet
 - 1 each — P/N 48290 Motor Cable, 1 axis, 5 hp, 15 feet
 - 1 each — Motor Cable 254858
 - 1 each — Motor Cable 254859

Accessories

P/N 220738 Local Control Unit (includes 15 foot interconnect cable P/N 220736)

P/N 220205 Rack Mount Kit, RCU

P/N 220206 Rack Mount Kit, Mainframe

Model 2256-5 Cabinet (RCU)

Model 2256-10 Cabinet (Mainframe)

P/N 220208 Outdoor Enclosure (Mainframe)

Cables

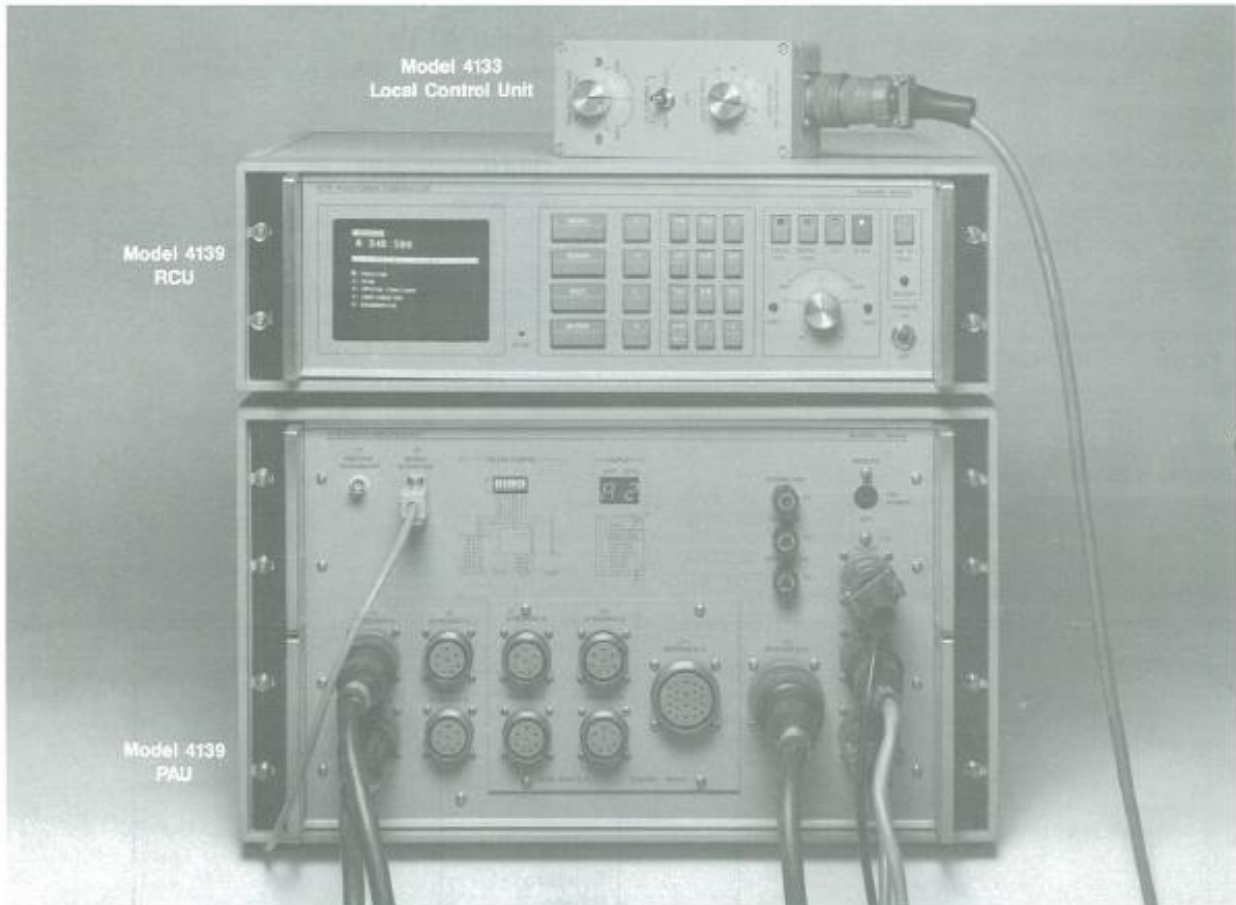
P/N 220643 Mainframe to Remote Control Unit

P/N 220728 Brake/Sec Limit Cable, 15 feet

P/N 102320 Motor Cable, 3 axis, ¾ hp, 15 feet

Please contact your local Scientific-Atlanta Sales Office for current price and delivery information.

7 POSITIONER CONTROLLER 4139



Model 4139 Positioner Controller

Features

- Provides integrated position control and display
- Closed loop control of up to eight axes of positioner motion
- Processes and displays either single or dual speed analog synchro data
- Operates under manual or automatic control
- Controls two Power Amplifier Units with a single Remote Control Unit
- Fully integrated programmer with two speed scan and record increments
- RS-232C/449 serial link eliminates expensive range cabling
- IEEE/RS-232C programming interface option
- CRT display for system status, position indication and front panel programming
- Acceleration/deceleration control
- Position data offset
- Hi/lo speed control

The Model 4139 Positioner Controller integrates the positioner control, indication, and programming functions into a single unit for various positioner applications. The controller can be used for short indoor ranges as well as outdoor far-field ranges where remote operation is required. The basic Model 4139 Positioner Controller consists of a RCU (Remote Control Unit) and a PAU (Power Amplifier Unit). The two units are interfaced via a single serial interface cable.

Modes of Operation

The Model 4139 Positioner Controller can be operated in any one of the following modes by front panel pushbutton or programmable operation:

Manual – Positioner Axis, Speed, and Direction are selected and controlled from the front panel in this mode.

Position – Positioner Axis, Speed, Direction, and required position are selected and entered for operation of this mode.

Scan – Parameters are entered for performing a single or multi-scan operation.

Model 4139 RCU/PAU Specifications-continued

Scan Mode:

Functions

Programmable axis scan: Single, Bidirectional, Continuous, or Retrace Raster scan using 1 or 2 step axes.

Scan Axis

Programmable:
Any one of up to eight
Any two of eight (-44 opt)

Scan Limits

Programmable:
0.000 to 359.999
-180.000 to 179.999
0.0000 to 35.9999
-18.0000 to 17.9999

Record Increment

Programmable:
.01 to 9.99 angular units

Scan Speed

Programmable
1-99% in 1% steps
.1-1% in .1% steps

Scan Direction

Programmable:
Forward or reverse

Step Axes

Programmable
Any two of up to eight

Step Increment

Programmable:
.01 to 9.99 angular units

Step Direction

Programmable:
Forward or reverse

Step Limits

Programmable:
0.000 to 359.999
-180.000 to 179.999
0.0000 to 35.9999
-18.0000 to 17.9999

Step Speed

Programmable
1-99% in 1% steps
.1-1% in .1% steps

Diagnostics Mode:

Functions

IEEE-488 Bus History
Display error buffer
Clear error buffer
Firmware ID display
Reset All
Pristine Reset

Special Functions Mode:

Functions

Speed margin (IEEE/RS232 Operation Only)
Ring Delay
1885 Source
Display 8 Axis
Multi-Axis
PAU 1 or 2 Baud Rate
Exp. BCD Mode

Position Accuracy

Single Speed (1:1)
0.5 degree
Dual Speed (1:1 and 36:1)
0.01 degree

Position Resolution

Single Speed (1:1)
0.1 degree
Dual Speed (1:1 and 36:1)
0.001 degree

Front Panel Displays

Position
1 up to 8 axis CRT display; user selectable Limits Forward and Reverse LED indicators for the selected axis

Position Range Selection

Linear -
Single Speed (1:1)
-179.9 to +180.0 or
000.0 to 359.9
Dual Speed (1:1 and 36:1)
-179.999 to +180.000 or
000.000 to 359.999

Position Range Selection

Rotary -
Single Speed (1:1)
-179.9 to +180.0 or
000.0 to 359.9
Dual Speed (1:1 and 36:1)
-179.999 to +180.000 or
000.000 to 359.999

Synchro Input (Power Amplifier Unit)

Up to eight axes, single speed (1:1) or dual speed (1:1 and 36:1), directly from size 15 or size 23 synchros.

BCD Input (Remote Control Unit)

BCD Parallel
S-A Model 1885 format
Only one axis of simultaneous axis operation may be read from the 1885

Axis Select Output (RCU)

S-A Model 1885 format

Synchro Rotor Excitation

120 VAC 50/60 Hz (capable of driving eight dual speed synchro packages--4 amp continuous)

Serial Control Interface (Optional)

Modified EIA RS-232C
Baud rates from 300-9600
Configurable for 7 or 8 data bits, 1 or 2 stop bits, and even, odd or no parity bits.

IEEE-488 Interface (Optional)

ANSI/IEEE-488 Standard (488-1978)
IEEE Standard Digital Interface for programmable instruction

Serial Data Interface (PAU to RCU)

RS-449, 300-9600 baud full duplex

Position Output

Digital
2 separate outputs, programmable axis. Bit parallel, byte parallel BCD, 6 digits, sign bit, update and inhibit control lines. Compatible with SA Series 1580 Pattern Recorders.
Analog
0 to +10 VDC corresponding to 0-360 degrees or
0 to +10 VDC corresponding to -180 to +180 degrees (depending on configuration)

Specifications-continued

Position Update Rate
Front Panel—15 msec
BCD Outputs—10 msec
Analog Output—10 msec

Record Increment Output
Hardware Output—rear panel BNC connector, TTL compatible, jumper selectable negative or positive true, 20–200 microsecond pulse width
IEEE-488 Output—bit #3 in serial poll byte when SRQ is enabled

Record Increment Range
Programmable:
0.010 to 9.990 degrees

Record Increment Rate
1 kHz maximum (soft)
5 kHz maximum (hard)

Record Increment Output Latency
15–20 millisecc for 19.2k BAUD PAU to RCU communications
A Direct Record Increment Link is available by way of 30 ft. max coax cable activated by a PAU jumper; RI latency—100 μ sec.

Motor Driver
Pulse Width Modulated
20 kHz switching rate

Motor Armature Supply
120 VDC, 8A maximum

Motor Direction
Bidirectional

Dynamic Braking
Built-in
Activated by stop command or when a limit is sensed.

Armature Current Limiting
Internal DIP switch, programmable
0.7.875 A in .125 A steps

Motor Field Supply
105 VDC, 5A maximum continuous duty

Tachometer Input
Eight axes
+ or – 12 VDC at full motor speed (1725 RPM)

Speed/Direction Control
Manual Mode:
Front panel rotary control
Position/Scan Modes:
Programmable from front panel or by way of optional digital interfaces.

Speed Control Range
High speed setting 1-99%
Low speed setting 1-10%
(without Tach feedback)
Low speed setting .1-1%
(with Tach feedback)

Speed Regulation
with Tach feedback
.2% of full scale speed
without Tach feedback
3% of full scale speed

Acceleration/Deceleration Profiles
10 settings
Programmable by way of front panel or digital interfaces.

Instrument Setup State
Last state retained in non volatile memory as the next power up state. Ten stored setup states available for recall.

Dimensions
RCU
5.25"H x 17"W x 21"D
PAU
10.5"H x 17"W x 21"D

Weight
RCU: 26 lbs. (approx.)
PAU: 88 lbs. (approx.)

Power Requirements
85–125 VAC 47–63 Hz
20A maximum, single phase
204–265 VAC, 47–63 Hz
10A maximum, single phase

Operating Temperature
0 to +50°C
Storage Temperature
–20 to +75°C

Model 4133 Local (Hand Held) Control Unit

Function Control
Disabled
High Speed Enabled
Low Speed Enabled
Axis Select
Speed Control

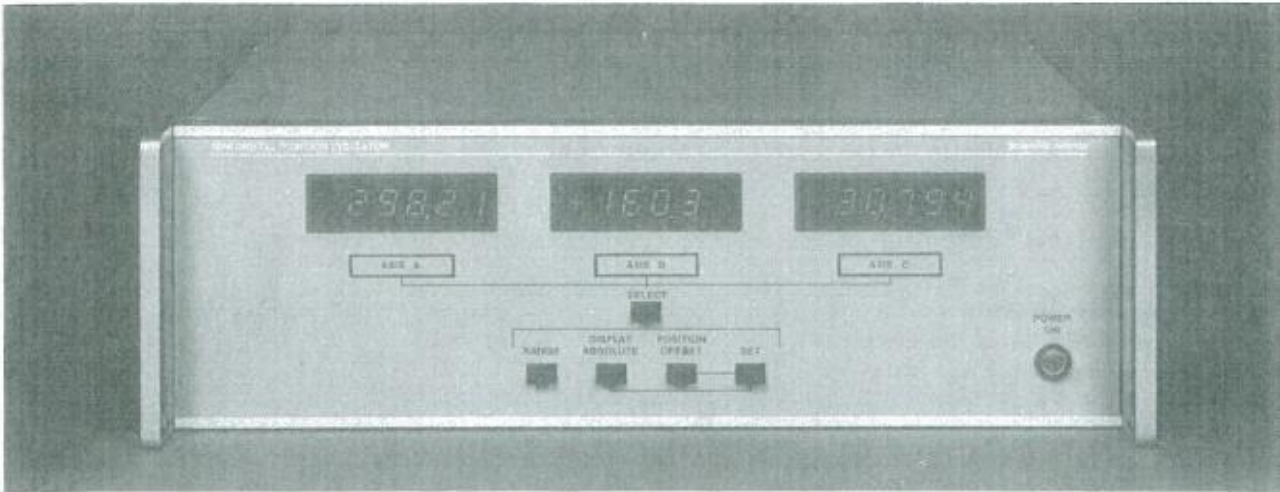
Motor Control Functions
Stop, Forward, Reverse

Dimensions
4.9" x 3.2" x 2.4"

Power Requirements
Furnished by Model 4139

Operating Temperature
0 to +50°C
Storage Temperature
–20 to +75°C

8 DIGITAL POSITION INDICATOR 1844



The Model 1844 Digital Positioner Indicator provides an easy-to-read display of shaft angle information from three synchro transmitters. The Model 1844 Position Indicator accepts single or dual speed synchro inputs and outputs both digital and analog position information to pattern recorders. The Digital Position Indicator is compatible with all Scientific-Atlanta antenna positioners.

The Series 1844 Digital Position Indicator features programmable angle offset. Absolute angle can be displayed at any time while the display is in the offset mode. Two display ranges may be selected.

Displays of 0–360 and ± 180 or 0–36 and ± 18 are selectable. The operator can select the channel to be output to the recorder with the Axis Select pushbutton.

Specifications

Accuracy

- Single Speed, 1:1
 $\pm 1.0^\circ$
- Dual Speed, 1:1 & 36:1
 $\pm 0.03^\circ$

Resolution

- Single Speed, 1:1
 $\pm 0.1^\circ$
- Dual Speed, 1:1 & 36:1
 $\pm 0.01^\circ$

Channel Identification

LED in upper left hand corner of display

Range Selection

	Range Select	
	± 180	0 - 360
Single Speed:		
Range 1 - 179.9 to +180.0		000.0 to 359.9
Range 2 - 17.99 to +18.00		00.00 to 35.99

Dual Speed

Range 1 - 179.99 to +180.00	000.00 to 359.99
Range 2 - 17.999 to +18.000	00.000 to 35.999

Range 1 or 2 are internally selected.

Display Modes

Display Absolute Mode

The absolute angle will be displayed. The operator can clear the offset angle of the selected channel if desired.

Position Offset Mode

The offset angle of the selected channel is adjusted.

Inputs	Size 23 Synchro Transmitter	Size 15 Synchro Transmitter	Size 15 Synchro Transmitter
Stator Voltage	90V rms	6V rms	90V rms
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Single Speed	1:1	1:1	1:1
Dual Speed	1:1 & 36:1	1:1 & 36:1	1:1 & 36:1

Compatibility

Compatible with all Scientific-Atlanta Series 50000 Positioners

Rotor Voltages

- Size 23 Synchros
115 Volts, supplied externally
- Size 15 Synchros
115 Volts, supplied externally
- Size 15 Synchros
20 Volts, .75 amps, supplied internally

Outputs

- Analog
Synchro transmitters—stator voltages
Size 15 synchro transmitter—20V rotor voltages
- Compatibility

For size 23 synchro transmitters and size 15 115V. compatible with Scientific-Atlanta Series 1520 Antenna Pattern Recorders and Series 1580 Antenna Pattern Recorders

Compatibility

1580 Pattern Recorder

Front Panel Display

One for each channel, five decade .5 inch LED display

5.25"H x 19"W x 20"D

13.4cmH x 48.3cmW x 50.8cmD

Power

115/230V ac, 60/50 Hz, 75 watts

Weight

30 lbs

Operating Temperature Range

0°C to 40°C

Ordering Information**Model 1844-3 in Rack Mount Configuration**

Three channel digital position indicator

1 each 3 channel display unit

1 each accessory kit

Accessory Kit includes:

Manual: operator and maintenance

Axis identification labels

Power cord

Fuses

Extender board

Accessories:

Rack mount standard

Model 2256-5 Stand alone cabinet

P/N 256120 Upgrades 1844-1 to 1844-3

P/N 256088 Upgrades 1844-2 to 1844-3

P/N 256121 Mating Connector kit

Cables:P/N 162962 Interface cable to Model 1581
Pattern Recorder BCDP/N 158598 Interface Cable to Model 1581
Pattern Recorder AnalogP/N 158598 Interface Cable to Model 1520
Pattern Recorder AnalogP/N 92436 Rotor Voltage Supply from Models
4116& 4180 Positioner Controllers to
1844P/N 310395 Position Indicator
Rotor Voltage Supply from Model
4111

Positioner Controller

Spare Parts Kit:

257029 field level spare parts kit

257032 depot level spare parts kit

9 POSITIONER PROGRAMMER 2012

Model 2012A Positioner Programmer



Description

The Model 2012A Positioner Programmer provides programmed control for antenna positioners and manages the data recording functions of antenna test systems.

Advantages of Programmed Position Control

- Reduces the load on the controller in automatic systems — because the Positioner Programmer handles all the positioner control information, the system computer is free to perform other functions.
- **Repeatability** — Uniformity of test position parameters allows accurate comparison between tests. *Ideal for production test situations.*
- **Reduces Test Expense** — Automatic scanning reduces the time required to test antennas, therefore, reducing the cost of testing.

Where to Use the Positioner Programmer

The Model 2012A Positioner Programmer is applicable for antenna development, production, and maintenance environments. The repeatability and decreased time required for taking data contribute to a cost effective test situation.

The Positioner Programmer is ideal for use in antenna test systems which require automatic data acquisition for analysis or recording purposes.

The Positioner Programmer is also usable for driving a positioner to a desired angle from either a digital controller or manual input.

The Model 2013 Synchro Selector is an accessory unit which simplifies system design where multi-axis positioning systems are to be programmed. Receiving axis select commands from the 2012A Programmer, the synchro selector multiplexes up to six axes of 1 or 2 speed synchro data to a common synchro to digital converter/display. Use of the 2013 synchro selector therefore reduces the number of S/D converters and cables required to provide the necessary position data to the 2012A programmer.

Modes of Operation

The Model 2012A utilizes digital position information to control the antenna test positioner and manage the data recording cycle. It can be programmed via the front panel keyboard or the IEEE-488 Interface Bus to operate in a POSITION or RECORD Mode.

Position Mode

The POSITION MODE allows a specific axis to be selected

and driven to a commanded location. The following functions are programmable:

1. Axis Selection
2. Command Position
3. Direction

Record Mode

The RECORD MODE provides programming of a raster scan through control of two axes. One axis is scanned over a selected sector while the other axis is stepped in discrete increments. The Model 2012A triggers the system controller or recording device to take data at selected angular increments. The following functions are programmable:

1. Scan Axis
2. Scan Start and Stop
3. First and Second Scan Direction
4. Record Increment
5. Scan Speed
6. Number of Scans
7. Step Axis
8. Step Direction
9. Step Increment

Specifications

Program Entry

Front panel key pad or IEEE-488 Interface Bus

Front Panel Display

40 character alpha numeric LED

Axis Identification

A through F

Input

Position

Two axes; digital BCD parallel +999.9999 to -999.9999

Optional

2 or 4 additional axes +999.99 to -999.99 compatible with Scientific-Atlanta Models 1840 and 1885

Synchro Display

Program

*IEEE-488 1978 Interface Bus

Output

()-2 or -3 Option

Compatible with program inputs of Model 4116A-10 or 4161 Control Units respectively

*NOTE: An internal switch allows the IEEE-488 Interface Bus to be switched off and a simple interface consisting of one record pulse output line and one system busy input line to be picked up at the connector normally used for the IEEE-488 Interface Bus.

Operating Modes

Position and Record

Model 2012A Positioner Programmer

Position Mode

Controlled Axis
Any one of up to six

Operating Mode

Position and Record

Position Mode

Control Axis: Any one of up to six
Command Position: Programmable 0.0000 to 359.9999 or
-180.0000 to 179.9999 or -999.9999 to +999.9999
depending on type of axis (linear or angular)
Direction: Forward, reverse, or shortest route (default)
Speed: Controlled profile for rapid, accurate positioning
Threshold: Settable from 0.0001 to 9.9999. Setting must
match the positioning accuracy of the positioner axis
being controlled
Rampdown: Selectable profile (linear or parabolic) and
length (0 to 180 degrees)
Position Accuracy: Error = \pm (threshold setting + / position
readout error/)

Record Mode

Function: Scans one axis and steps another, to generate a
raster pattern

Scan Parameters:

Axis: Any one of the up to six available axes
Range: Any contiguous section of available axis positions.
(May cross the $\pm 180^\circ$ or 0-360° boundary on angular
axis)
Length: Up to 359.9999° for angular axes, -999.9999 to
+999.9999 for linear axes

Record Increments: 0.0001 to 99999 degree intervals
Speed: Low speed range (0 to 255) linearly covers the
range from 0. to .4% of the axis slew speed. High speed
range (256 to 510) linearly covers the range from .4% to
100% of the axis slew speed

Direction: First scan may be forward or reverse
Second scan may be forward, reverse, or retrace
Number of Scans: May range from 0 to 999 scans
Rampdown: Selectable ON/OFF

Step Parameters:

Axis: Any one of the up to six available axes
Range: Any contiguous section of available axis positions
(May cross the $\pm 180^\circ$ or 0-360° boundary on angular
axes)
Direction: May be forward or reverse
Increment: 0.0000 to 9.9999 degrees

Power

115/230V ac, 50/60 Hz 85 watts

Dimensions

13.34H x 44.13W x 54.61 cm
5.25H x 16.38W x 21.5 inch

Weight

15 kg, 33 lb.

Mounting

Rack mountable — rackslides furnished. For accessory
cabinets, see Series 2256 cabinets in catalog

Model 2013

Furnished with Option ()-6

Purpose

Provides Model 2012A Programmer selection of any one
of up to six axes of any one or two speed analog

synchro data. (Two speed data required for operation
with Series 1840 Digital Displays)

Input

Position
Number
6
Type
3-wire analog synchro data, single or dual speed
Program
Compatible with Model 2012A Programmer

Output

Selected axis two speed analog synchro data

Size

13.34 x 44.26 x 22.86 cm
5.25 x 19.00 x 9.00 inch

Weight

3.64 kg, 8 lb.

Mounting

Rack mountable — rack slides furnished. For accessory
cabinets, see Series 2256 Cabinets in the catalog.

Ordering Information

Series 2012A Programmer

Model 2012A — () Control Interface Option
() Position Input Options

Control Interface Options (defaults to 4180)

()-2 4116 Compatible Control Interface*
()-3 4160 Compatible Control Interface*

Position Input Options

(Two axis digital position input is standard)

()-4 Additional two axis digital position input**
()-5 Additional four axis digital position input**
()-6 Synchro selector, six axis (requires external
synchro/digital converter) may be used in
addition to options -4 or -5.

* Option -2 and -3 cannot be plugged into the Positioner
Programmer at the same time.

** Options -4 and -5 cannot be used at the same time.

Accessories

2013 Synchro Selector, 6-axis (included when
Option 6 is ordered)
219442 Digital Interconnect Cable, 2012A Programmer to
Series 1840 Synchro Displays, 10 ft.
158341 Interconnect Cable, Model 2012A Programmer to
Model 4116A-10 Control Unit, 6 ft.
(included when Option 2 is ordered)
128797 Interconnect Cable, Model 2012A Programmer to
Series 4160 Control Unit, 12 ft.
(included when Option 3 is ordered)
45502 Interconnect Cable, Model 2012A Programmer to
Series 4160 SCR Amplifier (specify length)
221307 Mating Connector Kit for Model 2012A
254838 Interconnect Cable Model 2013 Synchro Selector
to Series 1800 display

10 DIGITAL PATTERN RECORDER 1580



Description

The Scientific-Atlanta Series 1580 Antenna Pattern Recorder plots measurement data from antennas and other devices whose output characteristics vary as a function of position or other parameters such as frequency. This includes photometers, transducers, and infrared/optical devices. The Series 1580 is designed for recording antenna data in development or production testing environments.

The Series 1580 Antenna Pattern Recorder offers many improvements which speed set-up and simplify operation.

Features

Switch Selectable Functions Include:

- Polar or Rectangular Recording Formats.
- Log, Linear, Square, and Square Root Recording Modes. No Plug-In Potentiometers Required.
- 10/20, 20/40, 40/80 dB* Dynamic Range for Amplitude Data.
- ± 180 , ± 45 , ± 18 Degrees for Phase Data (Digital Input).
- Electronic Pen Smoothing to Minimize the Effects of Noise.

Options Provide Versatility

By selecting appropriate pen input and chart options, this Series 1580 can be tailored to your particular application.

Pen Input Options

- 2 Digital Input - Accepts digital signal input — BCD byte or parallel.
- 3 Analog AC Input - Accepts analog ac signals. Consists of an AC Amplifier (Model 1586) and a recorder interface card.
- 4 Analog DC Input - Accepts analog dc signals. Consists of a dc amplifier (Model 1587) and recorder interface card.
- 5 Analog AC & DC Input - Accepts both analog ac and dc signals. Ac and dc amplifiers with a common interface card are included.

Chart Input Options

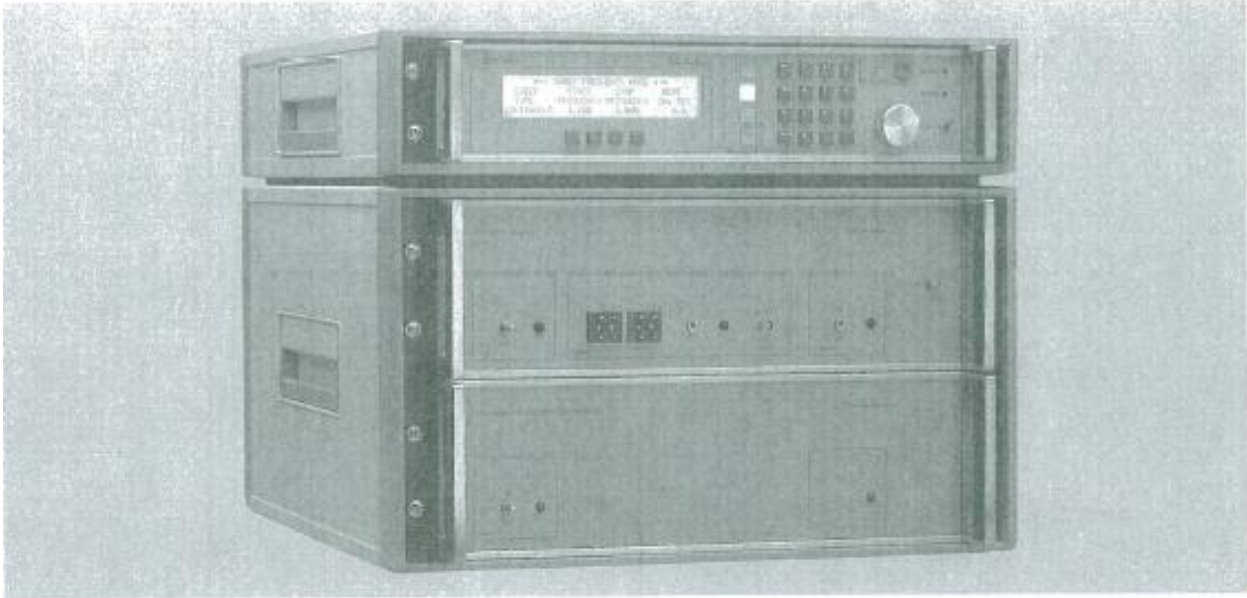
- 6 Digital Input - Accepts digital position input - BCD byte or parallel.
- 7 Analog Synchro Input - Accepts analog synchro input - one axis.
- 8 Analog Synchro Input - Accepts analog synchro inputs - four axes. Includes Synchro Selector (Model 1588).

Other Options

- 9 Polar display option. Provides polar patterns in addition to rectangular plots.
- 10 IEEE Interface - Allows remote control via IEEE 488-1975 Interface Bus.
- 11 60 dB Chart Scale Expansion - For use with the Model 1711 and 1712 in the expanded range mode.

* 10, 20, 40 refers to Square Law Signal Input.
20, 40, 80 refers to Linear Signal Input.

11 DIGITAL SIGNAL SOURCE 2180



Description

Designed specifically for all types of antenna ranges where remote RF frequency tuning is desired, the 2180 is ideal for outdoor ranges, and can be used for indoor testing, as well.

- 2 to 20 GHz Frequency Coverage Standard
- 0.1 to 60 GHz Frequency Coverage Optional

The standard Model 2180 offers 2–20 or, optionally, .1–20 GHz, continuous frequency coverage!

- Remoteability

Two units make up the Model 2180—the Control Unit and the RF Signal Source. Typically located at the operator console, the Control Unit can be located up to 4,000 ft. from the RF Signal Source, using a dedicated dual-twisted pair, shielded cable. By using modems, however, the separation distance limitations disappear, and remoteability becomes virtually limitless.

Standard interface between the Control Unit and RF Source is an RS-232C/449 compatible full-duplex serial link with a selectable Baud rate of up to 19.2 Kbit/sec maximum.

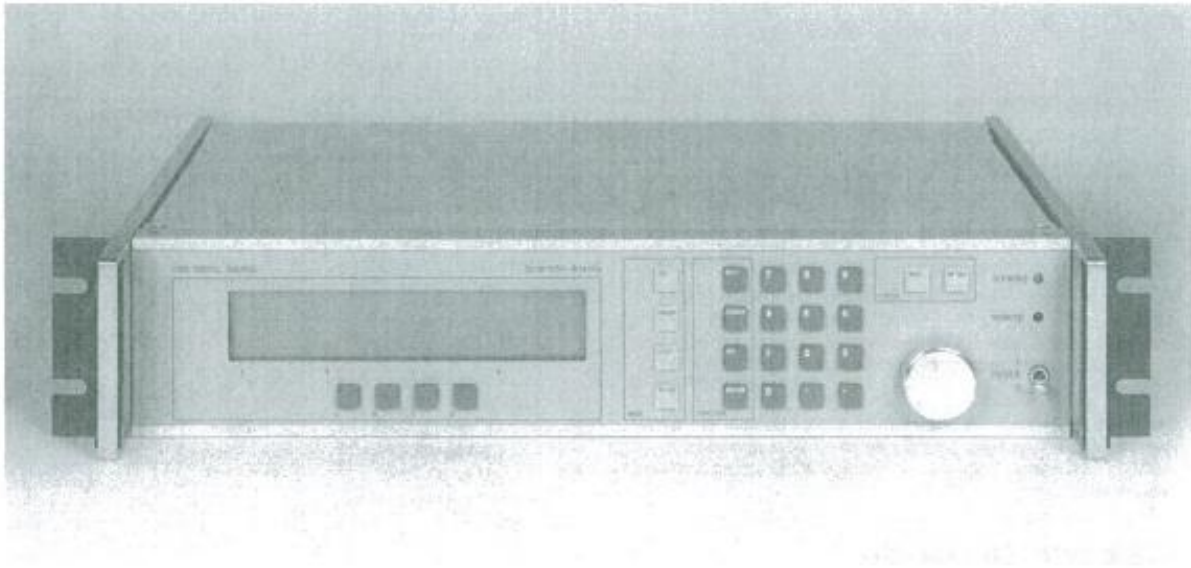
The lightweight RF heads, located at the transmit antenna to minimize RF signal losses at millimeter frequencies, is available for:

- 18 to 26.5 GHz
- 26.5 to 40 GHz
- 40 to 60 GHz

Unlike signal sources designed primarily for laboratory use, the Model 2180 will operate within specifications at 0 to 50 degrees Celsius over a humidity range of 0 to 90%. An outdoor enclosure is available for mounting the RF source outdoors. Operating temperature range is –20 to +50 degrees Celsius in this configuration.

- Full Compatibility

The Model 2180 is fully compatible with all Scientific-Atlanta phase-locked programmable receivers. This allows you full frequency tuning while maintaining receiver phaselock.



- Manual Control or Computer-Controlled Automatic Operation

For automatic operation, the Signal Source Control Unit accepts control signals from a computer via an IEEE-488 interface bus. Commands are provided to allow specification of a single frequency, multiple frequencies for step mode, and all parameters associated with stepping and sweeping.

Status information is provided to indicate when the commanded frequency has been reached. Control is provided for:

- Leveling,
- Amplitude modulation,
- Slew rate and
- Many other functions.

- Easy to Set Up and Use

The Model 2180 is operator friendly. A large LCD display provides the operator with menu choices which lead him through the set-up process and keep him advised on the status and operating parameters of the Signal Source.

The operator may load multiple frequencies into a storage table and run tests using the selected frequencies simply by specifying the table, eliminating the tedious task of re-entering individual frequencies for each test.

- Sweep Mode

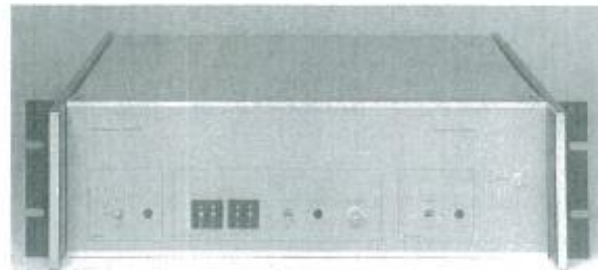
The Model 2180 Signal Source may be used in the swept-frequency mode with the stop-start frequencies programmed from the Control Unit. Either single or continuous sweeps may be selected.

The sweep rates are programmable from 0.1 to 100 GHz per second in 0.1 GHz increments. Sweep linearity is less than

0.25% across any band. Both internal and external leveling are available to maintain constant output power.

- Programmable Receiver Interface

The Model 2180 Signal Source Control Unit provides an analog output tuning voltage for coarse frequency tuning of external instruments. This feature allows the Signal Source to be used with computer-controlled test systems employing the Scientific-Atlanta Series 1780 Programmable Receiver.



Model 2186 Frequency Synthesizer

- Dependable Frequency Generation in High Humidity and Temperatures
- Exceptional Accuracy and Stability

The Model 2186 Frequency Synthesizer provides high accuracy frequency tuning and signal stability for frequencies in the 0.1 to 60 GHz range. The synthesizer may be used with the Model 2180 Signal Source in either the manual or computer-controlled modes.

With the Model 2186 synthesizer, frequency accuracy is typically $\pm 2.5 \times 10^{-7}$. Stability is $1 \times 10^{-10}/^{\circ}\text{C}$. Provisions have also been made for an external reference oscillator for applications where even greater frequency stability is required.

When interfaced with the Model 2180 Signal Source, the Synthesizer has a maximum tuning rate of 18 GHz per second, allowing high-speed frequency stepping without losing receiver phase-lock.

Model 2180 Specifications

Frequency Characteristics (Without Optional Synthesizer)

Frequency Range

0.1 to 60 GHz (as shown below)

Basic Unit

2 to 20 GHz with optional 0.1 to 2 GHz (field or factory upgradeable)

Remote Heads (to operate with Basic Unit)

18 to 26.5 GHz

26.5 to 40 GHz

40 to 60 GHz

Accuracy (at 25°C. after a 30-minute warmup)

0.1 to 2 GHz ± 15 MHz

2 to 8 GHz $\pm 0.3\%$

8 to 20 GHz $\pm 0.4\%$

18 to 60 GHz $\pm 0.4\%$

Stability (at 0 to 50°C.)

0.1 to 8 GHz ± 0.5 MHz/ $^{\circ}\text{C}$. ave

8 to 20 GHz ± 2 MHz/ $^{\circ}\text{C}$. ave

Residual FM (1kHz Bandwidth)

0.1 to 8 GHz 15 kHz

8 to 20 GHz 35 kHz

18 to 40 GHz 70 kHz

40 to 60 GHz 100 kHz

Residual FM measured after 30-minute warmup at a single frequency using a spectrum analyzer set for 3 kHz bandwidth, 20 kHz scan width, and 20 msec scan per division with filter capacitor in.

Frequency Resolution

Vernier (offset)

.1 - 20 GHz 1 MHz

18 - 40 GHz 2 MHz

40 - 60 GHz 3 MHz

Frequency Selection

Manual: Keyboard and Vernier

Automatic: IEEE-488

Sweep (Slew)

Start-Stop frequency programmable within band.

Single/continuous sweep

Rate: 0.1 to 100 GHz/sec programmable in 0.1 GHz/sec increments and a max rate of change

Output Characteristics

Unleveled Output Power:

0.1 to 8 GHz	+10 dBm min (± 3 dB max variation)
8 to 18 GHz	+10 dBm min (± 4 dB max variation)
18 to 20 GHz	+8 dBm min

Remote RF Heads*

18 to 26.5 GHz	-2 dBm min
26.5 to 40 GHz	-2 dBm min
40 to 60 GHz	-6 dBm min

Power Leveling (Internal)

Stability

0.1 to 20 GHz	± 0.02 dB/ $^{\circ}\text{C}$
18 to 60 GHz	± 0.06 dB/ $^{\circ}\text{C}$

Variation with Frequency

0.1 to 1 GHz	± 1 dB
1 to 20 GHz	± 1 dB/octave band
18 to 60 GHz	± 2.5 dB/band

Control

0.1 to 20 GHz—one fixed and two variable (settable from front panel of Source with 20 dB minimum control)

18 to 60 GHz—same as above, with 10 dB minimum control.

Leveling Frequency Response

5 kHz min.

Modulation

1 kHz squarewave with ON/OFF 20 dB minimum at maximum leveled output power.

Spectral Purity

Harmonic and related subharmonics

2 to 60 GHz—less than -10 dBc at rated output

.1 to 2 GHz (+10 dBm output) less than -20 dBc

Nonharmonically related—less than -50 dBc

* For six feet of RF cable between the RF source and the remote head. Output power varies as a function of cable length at 0.5 dB/ft.

Model 2180 Specifications – continued

Signal Source With Optional Synthesizer

Frequency

Stability

Temperature: typical $1 \times 10^{-10}/^{\circ}\text{C}$

Aging: less than $1 \times 10^{-9}/\text{day}$ after 30-day warmup

Aging Rate

$\pm 2.5 \times 10^{-7}$ per year

Frequency Change Speed (at 19.2 K-baud operation within frequency band)

1 MHz Resolution

10 ms/freq with steps 100 MHz or less in fast trigger slew mode

22 ms/freq + slew time when in fast trigger mode and 18 GHz/sec slew rate

35 ms/freq + slew time when individual frequencies are programmed in fast slew mode. This is the time between the reception of a new frequency from the bus to the time that change is indicated on the bus.

100 kHz Resolution

Up to 5 ms additional from 1 MHz resolution

Spectral Purity

Harmonic (subharmonic) related same as without synthesizer.

Nonharmonic related less than -40 dBc.

Phase Noise (dBc/1 Hz at 3 GHz)

-60 dBc at 20 kHz from carrier

Reference Oscillator

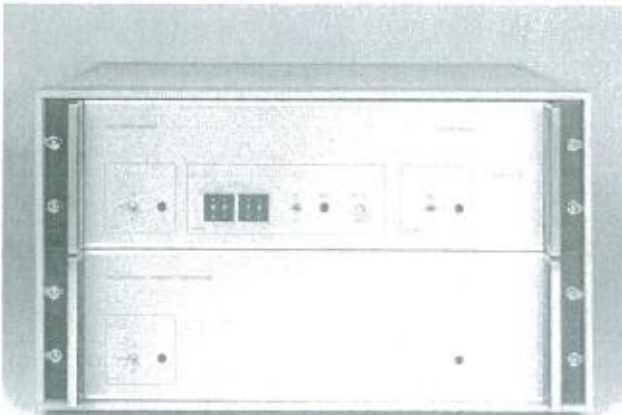
10 MHz

Frequency Resolution

0.1 to 20 GHz 100 kHz

18 to 40 GHz 200 kHz

40 to 60 GHz 300 kHz



Miscellaneous

Frequency Functions

Continuous Wave (CW) Fixed Frequency

Frequency Steps

1. Programmed increments up to 1024 steps (external trigger to change)
2. Programmed increments up to 1024 steps with dwell time from 50 ms to 1 sec in 50 ms increments.

Sweep

Start/stop

Single/continuous

Temperature Range

Operational 0 to 50°C

Storage -20 to 65°C

AC Power

115/230V, 50/60 Hz $\pm 10\%$

Size and Weight

Remote Control 3-1/2"H x 19"W, 14 lbs.

RF Source 5-1/4"H x 19"W, 36 lbs.

Synthesizer 5-1/4"H x 19"W, 40 lbs.

External Program Input

IEEE-488 (with an external fast trigger mode)

Remote Control Unit to RF Source Interface

1. Dual-twisted pair up to 4,000 feet.

2. Modems

Auxiliary Analog Sweep Input (differential input)

0 to 10V—full band of 0.1 to 2 GHz, 2 to 8 GHz, and 8 to 20 GHz.

External Leveling Input

Receiver Interface

1. Digital Band Data

2. Analog Step Data (proportional to frequency within band)

Analog Output From RF Source

0 to 10V—full band of 0.1 to 2 GHz, 2 to 8 GHz, and 8 to 20 GHz.

Ordering Information

Model 2180 Signal Source—2 to 20 GHz

Options

- (01) 0.1 to 2 GHz Module Installed
- (2) 50 Hz Operation
- (30) Outdoor enclosure (P/N 322416) in lieu of 2256 cabinet

Millimeter Heads

Model 2182-18, 18 – 26.5 GHz Remote Head

Model 2182-26, 26.5 – 40 GHz Remote Head

Model 2182-40, 40 – 60 GHz Remote Head

Model 2186 Frequency Synthesizer

Accessories

P/N 314054 Control Unit to RF Source interface cable (4000 ft. max)

P/N 325024 Remote RF Head Cable Set

P/N 325023 RF Cable for Remote Head

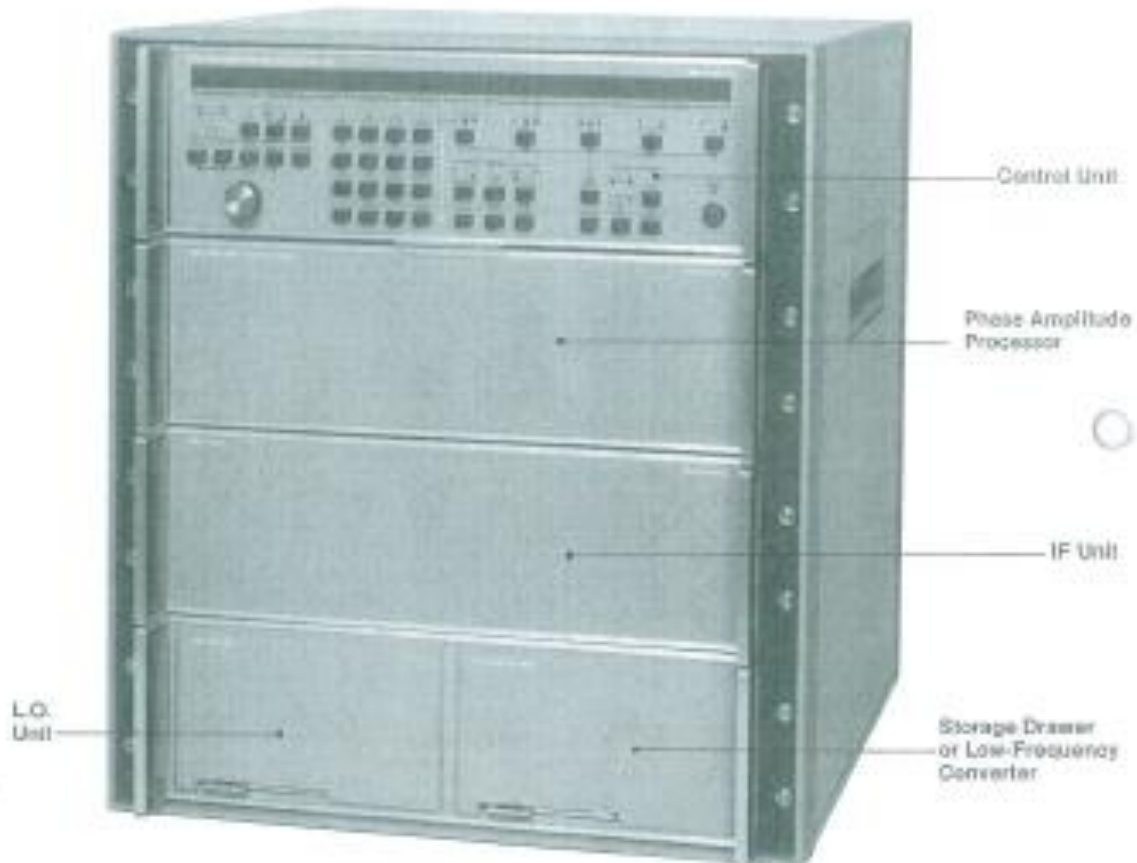
P/N 324645 Power Cable for Remote Head

NOTES:

1. The Model 2180 Signal Source includes 15 feet of control cable—see ACCESSORIES for longer cables up to 4000 ft.
2. Remote RF Head Cable Set includes an RF cable and a power cable—six ft. long. Optional cable lengths are available. Individual cables are also available.

12 RECEIVER 1780 FAMILY

Series 1780 Programmable Microwave Receivers



- High Data Rate.
- Programmable bandwidth and data averaging.
- IEEE-488 compatible.

Features

- Wide frequency range.
- Phase and amplitude measurement.
- High data rate capability.
- Manual or automatic control.
- Dual microprocessor based.
- Two-channel or three-channel programmable operation.
- IEEE-488 — 1978 compatible.
- Integral digital phase and amplitude displays.
- Remote mixer capability.
- Programmable compensation for IF system errors.
- Digital and analog outputs.
- Programmed service mode.
- Programmable IF bandwidth and data averaging.
- Front panel programming storage/recall.
- Pull out instruction sheet.

The Series 1780 Programmable Microwave Receivers are microprocessor controlled wide-band, high speed measurement receivers with relative amplitude and phase measurement capability. They can be used in manually operated measurement systems or in computer controlled systems.

They provide linear conversion over an 80 dB dynamic signal range. Frequency coverage from 1 to 40 GHz is provided in the automatic mode and 1 to 100 GHz in the manual mode. An accessory Low Frequency Converter with internal mixers extends frequency coverage to 0.08 GHz.

Two Series 1780 models are available—the Model 1782 Two-Channel Programmable Receiver and the Model 1783 Three-Channel Programmable Receiver. Either model can be operated in a (DUAL MIXER MODE) or in a (SHARED MIXER MODE). The 1783 can be operated either as a two channel receiver (DUAL-MIXER MODE) or as a Three-Channel Receiver (SHARED-MIXER MODE). This feature permits near-field phase/amplitude measurements with a single scan by measuring both polarizations simultaneously. Two digital amplitudes and one digital phase are displayed on the control unit of the 1782. The 1783 displays three amplitudes and two phases.

Series 1780 Programmable Microwave Receivers

Specifications

Frequency Range (Programmable Capability)

1.0 to 18.0 GHz

With Model 14-5 mixers furnished:

0.5 to 18.0 GHz

With Model 14-5 mixers furnished and optional Scientific-Atlanta Model 1773 Low Frequency Converter.

Extended Frequency Range

0.1 to 40.0 GHz

Programmable but requires that mixer cannot be optimized for each frequency. With optional Scientific-Atlanta Model 14-6-1 and Model 14-7-1 fixed-tuned mixers and Models 1773 Low Frequency Converters.

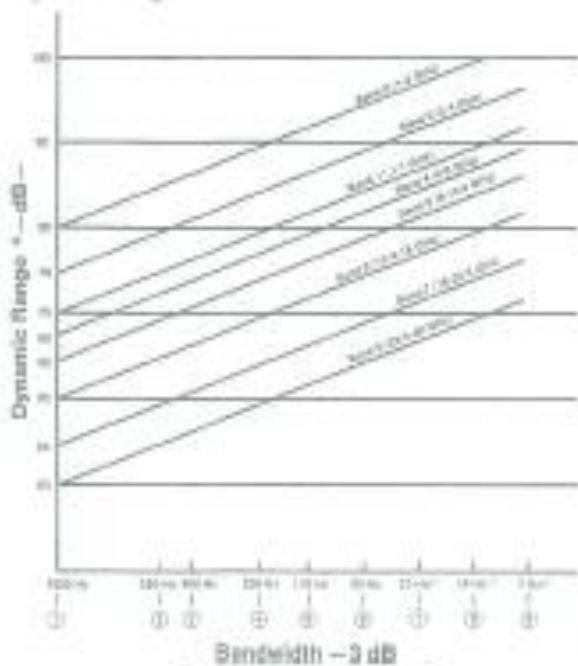
Extended Frequency Range (Fixed Frequency)

40-60 GHz with optional Scientific-Atlanta Model

14-8-1 and 100 GHz with commercially available

harmonic mixers.

Dynamic Range



Dynamic range measured from maximum RF signal level at -30 dBm to minimum RF signal level where signal-to-noise equals one. Data plotted for Dual mode with no RF switch. Maximum continuous Dynamic Range = 80 dB.

*Synthesized signal source recommended for operation at narrow bandwidths.

Interchannel Isolation

50 dB minimum

Frequency Display Accuracy

0.5% of frequency ± 1 count or 0.11 MHz whichever is larger.

Amplitude Accuracy (Excluding effects of temperature, crosstalk and noise)

Over 1st 3 dB dynamic range below full scale output:

± 0.2 dB/3 dB ± 0.3 dB

For a minimum dynamic range of 60 dB (typical

dynamic range = 80 dB)

± 0.05 dB/10 dB ± 0.1 dB

Maximum input level = -30 dBm for DUAL mode

and -25 dBm for the SHARED mode.

Frequency Tuning Rate (Receiver Tracking)

15 GHz/second maximum (1 to 18 GHz)

10 GHz/second maximum (1 to 15 GHz)

Phase Accuracy

(Excluding effects of temperatures, crosstalk and noise)

For a minimum dynamic range of 60 dB (Typical dynamic range = 80 dB)

± 0.40 degree/10 dB ± 0.1 degree

Maximum input level = -30 dBm for DUAL mode

and -25 dBm for the SHARED mode.

Errors due to temperature change, crosstalk, and noise can be determined from the following:

Receiver IF System

Data acquisition slew rate (rise slew rate not related to bandwidth)

2 IF Channels = 2500 dB/second minimum

3 IF Channels = 2100 dB/second minimum

Pre-Detection Filtering (BANDWIDTH)

Nine selections — 7 Hz to 1600 Hz.

Post-Detection Filtering (AVG. SAMPLE)

Twelve selections — 5 Hz to 1600 Hz.

Temperature Stability

Typical errors due to temperature change are as follows:

Amplitude Stability (Uncompensated)

0.05 dB/°C

Amplitude Stability (error compensated)

± 0.25 dB Total (0°C to 50°C)

Phase Stability (uncompensated)

0.2°/°C

Phase Stability (error compensated)

$\pm 1.0^\circ$ (0°C to 50°C)

RF Cables

Attenuation (dB)

$\pm 0.2\%/^\circ\text{C}$

Phase Stability (Flexible braided outer conductor with

solid polyethylene dielectric)

-90 to -480 PPM/°C

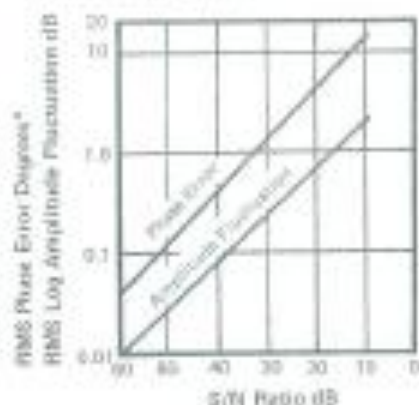
Air dielectric, semi-flexible type

$+3.8$ to $+12.6$ PPM/°C

Series 1780 Programmable Microwave Receivers

Signal-to-Noise

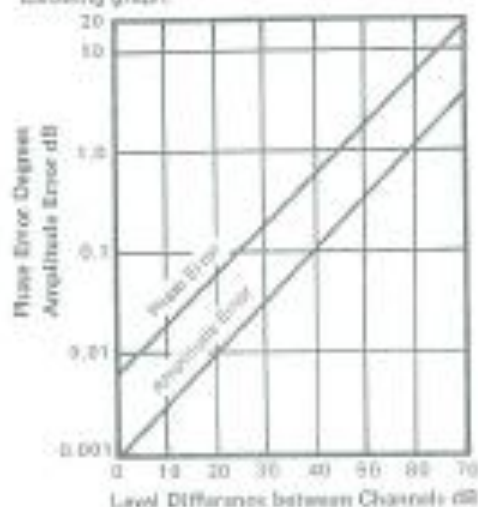
Typical errors due to signal-to-noise ratio are shown by the following graph:



* For AVG. SAMPLES = 1; Mean Log Amplitude and Phase errors are zero for S/N Ratios of 0 dB or greater.

Crosstalk

Typical errors due to crosstalk are shown by the following graph:



Local-Oscillator Range-Extender Amplifier Specifications

	P/N 218024	P/N 218025
Frequency Range	1.82 GHz to 3.37 GHz	
Minimum Gain	+45	
1.8 GHz to 2.17 GHz	+45	
3.37 GHz Operating Loss	+1.85	
1 dBm Output Level	+30 dBm	
Maximum Output Level	+20 dBm	
Connections (Input and Output)	Type "N" Female	
Reduction of Series 1780 Engine Channel Interactions due to use of amplifier and/or cables	3.28 to 3.48	
Maximum allowed L.O. Terminals Signal Channel Power Level (dBm) to 0.1% (1/2" CW)	+1.85 dBm Series 1780 Receivers	
Power Requirements	1.15 ± 10% V, 50/60 Hz, 30/40 W	1.15 ± 10% V, 50/60 Hz, 30 W
Size	8.5 x 8.5 x 1.5	
Weight	1.4 pounds	

Receiver Inputs

From Signal Source

Analog

Tuning voltage (0 to 10V)

Digital

Freq. range select

From Computer

IEEE-488-1978 Standard Digital Interface

Receiver Outputs

To Computer

IEEE-488-1978 Standard Digital Interface

To Recorder

Model 1782

Byte-serial output programmable to be either of two amplitudes or their ratios or one phase output

Model 1783

Byte-serial output programmable to be any one of three amplitudes or their ratios or either of two phase outputs

Analog Outputs

Model 1782

One dc output programmable to be either of two amplitude outputs or a phase output

Model 1783

One dc output programmable to be either of three amplitude outputs or one of two phase outputs

DC Output Format

Amplitude—Linear = 20%/volt

100% = 5 volts

Amplitude Logarithmic (-80 dB to +2.0 dB)

= 10 dB/volt, 0 dB = 0 volt

* Amplitude Ratio (-80 dB to +80 dB) = 10 dB/volt

0 dB = 0 volt

To Digital Frequency Display

(Scientific Atlanta Model 1871A)

LO sample frequency range GHz local/remote tuning status phase lock status

General

Size

21Hx19Wx21D inches (54Hx48Wx54D cm)

Weight

140 lb (63 kg)

Power

1.15 V ac ± 10%, 50/60 Hz

330 V ac ± 10%, 50/60 Hz, 500 watts

Temperature Range (Ambient)

0° to 50°C

Operating (L.O. Unit only)

-10° to +55°C

Storage

-25° to +75°C

* Combination of ratio and product outputs available. Consult factory.

13 FAST RECEIVER 1795

Model 1795 Microwave Receiver



Features

Fast

Take 5000 data points per second—drastically shortening test time and improving antenna test range productivity.

Up to four measurement channels and one reference channel allow rapid testing of complex multiport antennas.

Fast Trak Receiver/Signal Source tuning provides fast frequency stepping to cut overall test time.

Optional external high speed local oscillator provides instantaneous frequency changes—allowing multifrequency data to be acquired at even higher speeds.

Versatile

Wide frequency coverage—0.1 to 140 GHz.

Wide dynamic range—greater than 100 dB.

User selectable output formats—Phase/Amplitude or IQ—to simplify data processing.

A remote LO (up to 2000 feet separation) allows maximum dynamic range and sensitivity.

Operates in manual or automatic systems.

Easy to Use

Menu-driven—easy to use set-up for measurements, control, display and configuration.

Color CRT is easy to read.

The Best Microwave Receiver Ever Made For Antenna Measurements

Increasing antenna complexity. Pressure to improve productivity. Growing competition. The antenna measurement environment is changing.

Scientific-Atlanta has developed a microwave receiver to help you meet these new challenges. Capable of taking up to 5000 data points per second for a single measurement channel and 1250 dps over four measurement channels, the Series 1795 receiver offers a way to significantly improve antenna measurement productivity. And, because it is designed specifically for antenna testing by the world leader in antenna measurement instrumentation, it meets the requirements of your antenna range. Whether you take antenna measurements on outdoor ranges, indoor ranges, compact ranges, or nearfield ranges, the Model 1795 Receiver surpasses any other receiver or network analyzer in speed and performance.

Modern antennas have evolved into sophisticated devices with multiple output ports, polarization diversity and wide frequency coverage. Using conventional antenna measurement or laboratory equipment to fully characterize these complex antennas can take weeks or months.

Higher Measurement Speed

To test today's antennas efficiently and thoroughly requires a measurement system that is both fast and versatile. The Series 1795 Microwave Receiver offers the antenna test engineer the performance he needs:

- Multiple measurement channels
- Rapid frequency agility
- Measure up to 5000 data points per second

The Series 1795 Microwave Receiver provides significantly higher data acquisition speeds than anything currently available. To further enhance system capability, the Receiver, operating in conjunction with the Scientific-Atlanta Series 2180 Signal Source in the FAST-TRAK configuration, maintains phase lock even at frequency slew rates of 40 GHz/second or greater. The Series 1795 also supports an optional external high speed local oscillator which results in multifrequency measurement rates as high as 5000 frequencies per second.

Simultaneous measurement of up to four signal channels and a reference channel is optionally available with the Model 1795. The Receiver automatically controls the timing and sequencing of optional transmit and receive RF multiplexers. Even multi-channel, full-polarization matrix measurements can be made and controlled automatically by the Microwave Receiver.

Model 1795 Microwave Receiver

Convenience Is Designed In

The Model 1795 offers ease-of-use and configuration convenience not found in other receiving equipment. The large, full color CRT displays menus which lead the operator through the configuration, display, control, and measurement modes. Measurement bins are provided to independently display phase and amplitude data or I-Q values of each active channel. An information window displays key operating parameters of the receiver as well as entry and error status. A frequency display can also be enabled for viewing the actual received frequency.

To improve convenience and measurement sensitivity, a remote local oscillator is used. The oscillator can be colocated with the antenna under test (up to 2000 feet (610 meters) from the receiver mainframe), reducing signal losses due to cable attenuation. A fiber optic link and coaxial cables provide the necessary communications between the receiver and local oscillator and pass IF signal and reference data to the receiver. This configuration also significantly reduces the cabling costs when multiple RF paths are required. An added advantage is that a single coaxial cable is used to pass the LO drive signal and IF signals between the LO and mixers—simplifying the cabling through the antenna test positioner.

Improved Productivity

The Model 1795 Microwave Receiver improves antenna range productivity by providing an instrument for solving even the most complex measurement task. The 1795 provides a simple solution to increasing antenna measurement productivity.

The Model 1795 CW measurement speed has been improved by a factor of 50 over previous Scientific-Atlanta receivers. And it's considerably faster than any other microwave signal analyzer available today. Maximum measurement speed is 5000 samples per second for a signal and reference channel. A variety of floating point and integer numerical formats are available for amplitude and phase or I-Q data.

For multifrequency measurements, the Model 1795 utilizes the FASTTRAK system for tuning the receiver from a Scientific-Atlanta Series 2180 Signal Source. FASTTRAK tuning ensures that the receiver remains phased locked to the transmit source even while the source is changing frequency. The Model 1795 tuning rate is 40 GHz per second, when used with the Scientific-Atlanta Model 2180 Signal Source.

For the measurement that requires hundreds or even thousands of frequencies in a relatively short period of time, the optional Model 1795 High Speed Local Oscillator is available to provide multifrequency measurement rates up to 5000 frequencies per second when used with a high speed transmit synthesized signal source.

Multichannel measurements of up to four signal channels (plus a reference channel) can be achieved with the use of accessory Channel Multiplexers. The receiver automatically controls the desired timing and switch sequence for the

operations that have been entered from either the front panel or the digital controller interfaces. Transmit source polarization can now be controlled with a transmit multiplexer. Setup menus allow the user to configure any combination of transmit and receive switch settings to provide multichannel, full polarization matrix measurements to be made and controlled automatically by the 1795.

Instantaneous dynamic range in the Model 1795 is a function of measurement speed and received frequency. For any given measurement, users can optimize speed or dynamic range to meet their requirements. Dynamic ranges in excess of 100 dB are easily attainable with the 1795 for frequencies up to 18 GHz.

The Model 1795 utilizes a remote local oscillator concept that preserves the sensitivity and dynamic range features at antenna range installations. The LO unit may be placed as close to the AUT as is practical, thus reducing loss of the test signal due to cable attenuation. This concept also minimizes the use of expensive cabling when multiple RF paths are required for testing. All 1795 specifications can be met with the LO unit remotest from the control unit by up to 2000 feet (610 meters). Additional separation can be accommodated with a slight decrease in dynamic range. An important feature of the remote LO and mixer concept is the ability to pass LO drive to the mixer and IF input to the 1795 over a single coaxial cable. This feature maximizes measurement accuracy by allowing use of only a single channel RF rotary joint when cabling through the antenna test positioner.

Although the Model 1795 will most often be used with its companion harmonic mixer, the Model 14-11-20, the receiver is fully compatible with fundamental mixing to facilitate the greatest sensitivity and dynamic range possible.

A complete antenna measurement solution must include interfacing range support equipment into an efficient system. The Model 1795 offers a variety of interfacing capabilities. Controller interfaces consist of both the IEEE-488 Bus and the RS 232/449 serial interface. In addition, two dedicated data output ports are available. One, a high speed parallel port for receiver data. The second, a parallel port for direct reading of the internal frequency counter. Also, two Scientific-Atlanta Series 1580 antenna pattern recorder compatible digital and analog outputs are provided from the Model 1795 control unit.

An internal frequency counter is a standard feature of the Model 1795. It provides a true indication of received frequency with 10 kHz resolution. The counted frequency value is displayed prominently on the color display but may be blanked by the user if required for security concerns.

The Model 1795 control features are coordinated with a color CRT data display. The instrument is menu driven, utilizing 4 major operating menus, none of which are more than 2 levels deep. Softkeys along the right side of the CRT and a numeric keypad provide for manual operation.

Model 1795 Microwave Receiver

Model 1795 Microwave Receiver Specifications

Frequency Range

0.1 to 140.0 GHz in ranges as follows:

Frequency Range

With Model 14-11-20 Mixers supplied with receiver
2.0 to 20 GHz

With optional Low Frequency Converter Unit
0.1 to 20 GHz

Extended Frequency Range

With Model: 14-11-28 Mixer – 18 to 26.5 GHz
14-11-40 Mixers – 26.5 to 40 GHz
14-11-60 Mixers – 40.0 to 60 GHz
14-11-90 Mixers – 60.0 to 90 GHz
14-11-140 Mixers – 90.0 to 140 GHz

Maximum RF Input Power – 20 dBm 0.1 to 20 GHz
– 25 dBm 20 to 40 GHz

Dynamic Range (dB)

Frequency	Number of Samples											
	1	2	4	8	16	32	64	128	256	512	1024	2048
0.1-2	88	91	94	97	100	103	106	109	112	115	118	121
2-4	86	91	94	97	100	103	106	109	112	115	118	121
4-8	85	88	91	94	97	100	103	106	109	112	115	118
8-12.4	84	87	90	93	96	99	102	105	108	111	114	117
12.4-18	79	81	84	87	90	93	96	99	102	105	108	111
18-26.5	57	60	63	66	69	72	75	78	81	84	87	90
26.5-40	53	56	59	62	65	68	71	74	77	80	83	86
40-60	43	46	49	52	55	58	61	64	67	70	73	76
60-90	38	41	44	47	50	53	56	59	62	65	68	71
90-140	35	38	41	44	47	50	53	56	59	62	65	68

Values base on the following maximum mixer input levels:

1-20 GHz –20 dBm

18-40 GHz –25 dBm

Note: 1 sample corresponds to a 5000 measurement per second data rate.

Accuracy (Excluding effects of temperature, crosstalk, and noise)

Amplitude

Linear (%) Mode 1% of Full Scale
Logarithmic (dB) Mode .02 over 3 dB dynamic range
below full scale
.05 dB/10 dB

Phase

Over full dynamic range
0.4 degrees/10 dB
Over full dynamic range

Resolution (operator selectable)

Low .1% or .1 dB Amplitude 1 degree Phase
Medium .01% or .01 dB Amplitude .1 degree Phase
High .001% or .001 dB Amplitude .01 degree Phase

Minimum Measurement Interval (milliseconds)

This is the minimum interval between triggers which will allow the receiver sufficient time for data settling, data sampling, data processing, and data transfer.

Number of Samples	Number of Signal Channels Plus a Reference Channel			
	1	2	3	4
1	.2	.4	.6	.8
2	.4	.8	1.2	1.6
4	.8	1.6	2.4	3.2
8	1.6	3.2	4.8	6.4
16	3.2	6.4	9.6	12.8
32	6.4	12.8	19.2	25.6
64	12.8	25.6	38.4	51.2
128	25.6	51.2	76.8	102.4
256	51.2	102.4	153.6	204.8
512	102.4	204.8	307.2	409.6
1024	204.8	409.6	614.4	819.6
2048	409.6	819.6	1228.8	1839.2

Reference Channel to Signal Channel Isolation, 110 dB

(Reference Channel at –40 dBm)

Channel-to-Channel Isolation, 100 dB

(Signal Channels)

Local Oscillator Frequency

1.9 to 4.6 GHz

Receiver Frequency Tracking Rate, 40 GHz/second

(Phase Locked L.O.)

Mixer Bias Current

1 to 9.99 mA (programmable)

Mixer to L.O. Cable Length

50 ft. maximum, REF Channel

100 ft. maximum, Signal Channel

Frequency Counter

Resolution: 10 kHz

Accuracy: ± 20 kHz

Update Rate (free running) 1.66 milliseconds

Mixers

	Model 14-11-20	Model 14-11-28	Model 14-11-40	Model 14-11-60	Model 14-11-90	Model 14-11-140
Frequency Range						
RF Frequency (GHz)	2-20	18-26.5	26.5-40	40-60	60-90	90-140
LO Frequency (GHz)	1.5-4.6	1.9-4.6	1.9-4.6	1.9-4.6	1.9-4.6	1.9-4.6
IF Frequency (MHz)	20-50	20-50	20-50	20-50	20-50	20-50

Model 1795 Microwave Receiver

Physical Specifications

	Control Unit	RF Processor	Local Oscillator Unit
Size (H*W*D")	8.75"x19"x21" (22.2x48.3x53.3)	5.25"x19"x17" (13.3x48.3x43.2)	7"x19"x17" (17.7x48.3x43.2)
Weight (lbs.)	58	22	45
Ambient Temp. (C)	(25.3)	(9.1)	(25.4)
Operating	+10 to +45	+10 to +45	0 to +55 -20 to +55 With Accessory Outdoor Enclosure
Storage	-25 to +75	-25 to +75	-25 to +75
Power Consumption (W)	240 Max.	supplied by control unit	130 Max.
Power Requirements	105 to 130 VAC, or 208 to 240 VAC.	47 to 63 Hz 47 to 63 Hz	
Optional: Low Frequency Converter			
Frequency Range	0.10 to 2.0 GHz		
RF Input	0.10 to 2.0 GHz		
Conversion Loss	8 dB (typical)		
RF Input Power at .01 dB Compression Point (minimum)	-20 dBm		
Noise Figure	15 dB (maximum)		
Optional: Model 1796 High Speed Local Oscillator			
Frequency Range	1.9 - 4.6 GHz		
Output Power	+20 dBm		
Control Format	BCD parallel, TTL compatible		
Connector	Type N		
Frequency Settling Time	Less than 5 microseconds		
Size (H*W*D")	5.25"x19"x17" (13.3x48.3x43.2 cm)		
Weight	40 lbs. (18.1 kg)		
Ambient Temperature Range			
Operating	+10 to +40C		
Storage	-25 to +75C		
Power	105 to 130 VAC, 47 to 63 Hz 208 to 240 VAC, 47 to 63 Hz Power consumption 100 watts maximum		

Interfaces

Channel Multiplexer (Electrical Interface RS-422)
Transmit-multiplexer interfaces to 1795 Control Unit and will switch two positions of either the two position or four position switch.

Receive-multiplexer interfaces to the 1795 L.O. Unit and can switch two, three, or four channels.

Reference Frequency Output
10,000 MHz +10 dBm into 50 ohms from L.O. Unit

External Reference Input
10,000 MHz TTL/CMOS level compatible

Standard Digital Interface
IEEE-488-1978 (IEEE-488.1)

Serial Port
RS-232C/449 serial interface electrical specifications apply.

Signal Source

A connector is provided for the Fast-Trak tuning interface for Scientific-Atlanta Series 2150 and 2180 Signal Sources.

Pattern Recorder

Two digital parallel outputs programmable to be any two measurement bins (amplitude and phase) are available. The data format is compatible with the Scientific-Atlanta Series 1580 Pattern Recorder. Two analog outputs which duplicate the selected digital outputs are also available simultaneously on the same connector.

High Speed Data Port

A 16 bit wide high speed data bus is provided with hand-shaking control lines. Two 16 bit words are presented per data item and two data items per bin are output for each bin which is enabled as a result of every trigger received through the control interface. The output update rate is equal to the trigger rate up to the minimum measurement interval for the specified operating condition. An internal FIFO register will buffer up to 512 words.

Data Output Formats

The following formats are supported on both the High Speed Data Port and the IEEE-488 Port.

IEEE-754 32 bit floating point short real
32 bit integer
32 bit floating point DEC "F"
32 bit floating point alternate
SA-1780 2020 format integer

Frequency Counter Output

The digital output of the internal frequency counter is provided as a 19 bit binary number of the Local Oscillator and the harmonic number used at the time. Data may be read as four bytes, two 16 bit words, or 28 parallel bits. The LSB weight is 10 kHz. The update rate is 1.7 milliseconds. The count in progress is reset on an internal or external trigger.

LO/Control Unit and Control Unit/LO Interfaces

The remote control interfaces are 10 Mbit/second fiber optic data links. Maximum cable length is 2000 feet (610 meters).

Auxiliary Video Output

VGA compatible RGB output 640 x 480 pixel mode.

14 TYPICAL TEST RANGE BLOCK DIAGRAM

