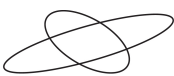


Operation & Service Manual



Model 8311 SmartStep[®] Programmable Attenuator Units

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› WEINSCHTEL

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Frederick, Maryland
2003 - 2010

SAFETY SUMMARY

DEFINITIONS.

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this manual.



An operating or maintenance procedure, practice, statement, condition, etc., which, if not strictly observed, could result in injury and/or death of personnel. Do not proceed beyond a WARNING symbol until all the indicated conditions have been fully understood and/or met.



An operating or maintenance procedure, practice, statement, condition, etc., which, if not strictly observed, could result in damage or destruction of the equipment or long-term health hazards to personnel. Do not proceed beyond a CAUTION symbol until all the indicated conditions have been fully understood and/or met.

NOTE

An essential operating or maintenance procedure, condition, or statement that must be highlighted.

GENERAL PRECAUTIONS.

The following are general precautions that are not related to any specific procedure and, therefore, do not appear elsewhere in this publication. These are precautions that personnel must understand and apply during various phases of instrument operation or service.



- Potentially lethal voltages are present in this instrument. Serious shock hazards from voltages above 70 volts may exist in any connector, chassis, or circuit board. Observe the following precautions:

- To minimize shock hazard, the instrument chassis must be connected to an electrical ground. Using the supplied three-conductor power cable ensures that the instrument can be firmly connected to the ac power source and electrical ground at a grounded power outlet. If using a 3-2 wire adapter be sure to connect the ground lead to earth ground.
- Use the buddy system any time work involving active high voltage components is required. Turn OFF the power before making/breaking any electrical connection. Regard any exposed connector, terminal board, or circuit board as a possible shock hazard. DO NOT replace any component or module with power applied.
- If test conditions to live equipment are required, ground the test equipment before probing the voltage or signal to be tested.
- Personnel working with or near high voltage should be familiar with modern methods of resuscitation.
- DO NOT wear jewelry (rings, bracelets, metal watches, and/or neck chains) while working on exposed equipment. Be very cautious about using hand tools near exposed backplanes, bus bars, and/or power supply terminals. Use properly insulated tools. When making test connections to the power supply terminals and bus bars, use only insulated probe tips.
- Verify that the instrument is set to match the available line voltage and the correct fuse is installed.
- DO NOT install substitute parts or perform any unauthorized modification to this instrument. Contact Weinschel Corporation to acquire any information on replacement parts or returning the instrument for repair. Unauthorized modification can cause injury to personnel and/or destruction of the instrument.
- Operating personnel must not remove instrument covers. Component replacement or adjustments MUST BE performed by qualified service personnel.
- DO NOT operate the instrument near or in the presence of flammable gases or fumes.

DETAILED PRECAUTIONS.

The following WARNINGS, CAUTIONS and NOTES appear throughout the text of this manual and are repeated here for emphasis.



CAUTION

- All procedures and/or steps identified as  must be followed exactly as written and according to industry accepted ESDS device handling procedures. Failure to comply WILL RESULT in ESDS damage.
- DO NOT use a nylon bristle brush in the solvent as the bristles may dissolve and cause damage to the circuit card or component.
- DO NOT use ultrasonic cleaning on parts or assemblies containing electrical or electronic components.
- DO NOT bend pins of electrical connectors when using fiber-bristle brush.
- Compressed air used for cleaning and/or drying can create airborne particles that may enter the eye. Goggles/faceshields should be worn. DO NOT direct air stream towards self or other personnel. Pressure should be restricted to a maximum of 15 psi to avoid personal injury.
- Under no circumstances should a wire brush, steel wool, or abrasive compound be used on any surface. Using these items will cause extensive damage to the instruments surface.

NOTE

DO NOT return any instrument or component to Weinschel Corporation without receiving prior factory authorization.

SAFETY SYMBOLS.

The following symbols are used to identify safety hazards found throughout this publication and/or located on the instrument.

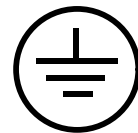
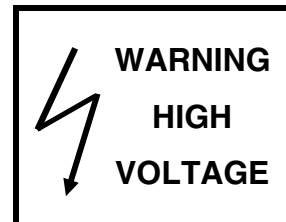


TABLE OF CONTENTS

1. GENERAL INFORMATION.....	5
1-1. PURPOSE	5
1-2. SCOPE	5
1-3. EQUIPMENT DESCRIPTION	5
1-4. USING THE 8311	5
1-5. UNPACKING AND INSPECTION	6
1-6. RESHIPMENT INSTRUCTIONS	6
1-7. STORAGE INSTRUCTIONS	6
1-8. RELATED MANUALS	7
1-9. ELECTROSTATIC DISCHARGE SENSITIVE (ESD).....	7
1-10. ABBREVIATIONS & ACRONYMS	7
1-11. SAFETY CONSIDERATIONS.....	7
1-12. POWER REQUIREMENTS	7
1-13. ENVIRONMENTAL REQUIREMENTS	7
2. SPECIFICATIONS	8
2-1. GENERAL SPECIFICATIONS.....	8
2-2. PHYSICAL DIMENSIONS	9
2-3. CONFIGURATIONS\RF SPECIFICATIONS.....	9
3. INSTALLATION	10
3-1. RACKMOUNTING	10
3-2. INTIAL SETUP	10
3-3. INPUT/OUTPUT OPTIONS.....	10
3-3.1. POWER ENTRY MODULE ASSEMBLY	11
3-3.2. CHANNEL PORT CONNECTORS.....	11
4. FRONT PANEL CONTROLS & INDICATORS	12
5. REMOTE OPERATION	13
5.1. IEEE-488 INTERFACE BUS CONNECTOR.....	13
5-2. GPIB ADDRESS/SERIAL COMMUNICATIONS SETTINGS.....	13-14
5-3. IEEE-488 (GPIB) BUS OPERATION	15
5-4. SERIAL OPERATION	16
5-4.1. RS-232 OPERATION	17
5-4.2. RS-422/485 OPERATION	18
5-5. STATUS REPORTING.....	19-20
5-6. GENERAL SYNTAX STRUCTURE	20
5-6.1. SYNTAX OF QUERIES.....	20
5-6.2. SYNTAX OF COMMANDS	20-21
5-6.3. OUTPUT DATA FORMAT.....	21
5-6.4. NOTATIONAL CONVENTION	21
5-7. 488.2 COMMON COMMANDS	22-23
5-8. GENERAL COMMANDS.....	24-25

6. GENERAL CIRCUIT DESCRIPTION.....	26-27
6-1. POWER SUPPLY ASSEMBLY	26
6-2. STATUS DISPLAYS AND SWITCH CONTROL ASSEMBLY.....	26
6-3. SMARTSTEP INTERFACE ASSEMBLY	26
6-4. RF SECTION	27
7. MAINTENANCE.....	28
7-1. INSPECTION.....	28
7.2. PREVENTIVE MAINTENANCE.....	28
7.3. SPECIAL CLEANING INSTRUCTIONS	28
7-3.1. MICROWAVE COAXIAL CABLE ASSEMBLIES	28
7-3.2. CIRCUIT CARDS AND MODULES	28
7-3.3. MACHINED SURFACES AND HARDWARE	29
7-3.4. CHASSIS CLEANING	29
7-3.5. CONNECTOR CLEANING.....	29
7.4. LINE VOLTAGE FUSE REPLACEMENT.....	30
8. REPLACABLE PARTS LIST	31
8-1. UNDERSTANDING REFERENCE DESIGNATORS	31
8-2. ORDERING INFORMATION.....	32
8-3. DRAWING NUMBER.....	31
8-4. REPLACEABLE PARTS LIST	31
8-4.1. REFERENCE DESIGNATOR.....	31
8-4.2. DESCRIPTION	31
8-4.3. PART NUMBER.....	31
8-4.4. VENDOR PART NUMBER	31
8-5.5. CAGE CODE	31
8-4.6. ASSEMBLY AND COMPONENT LOCATION	31
8311-1-6-R, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7301-1).....	32
8311-1-6-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7301-2)	33
8311-38-6-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7302-2)	34
8311-38-12-T, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7302-8)	35
8311-137-6-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7303-2)	36
8311-137-6-R, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7303-12)	37
8311-202-2-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7305-2)	38
8311-202-3-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7305-3)	39
8311-204-6-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7304-2)	40
8311-352-3-R, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7306-13)	41
8311-352-4-R, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7306-14)	42
8311-352-6-F, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7306-2)	43
8311-352-9-T, ATTENUATOR UNIT ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-7306-9)	44
BASIC MODEL 8311 ASSEMBLY REPLACEABLE PARTS LIST (P/N 193-8051).....	45
BASIC MODEL 8	

12. API / WEINSCHEL WARRANTY	48
13. ASSEMBLY/WIRING DIAGRAMS	
8311-1-6-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7301-2A
8311-38-6-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7302-2B
8311-38-12-T, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7302-8D
8311-137-6-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7303-2D
8311-137-6-R, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7303-12C
8311-202-2-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7305-2D
8311-202-3-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7305-3A
8311-204-6-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7304-12A
8311-352-3-R, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7036-13A
8311-352-4-R, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7036-14B
8311-352-6-F, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7036-2B
8311-352-9-T, ATTENUATOR UNIT ASSEMBLY DIAGRAM	193-7306-9C
BASIC MODEL 8311 ASSEMBLY REPLACE DIAGRAM	193-8051A
BASIC MODEL 8311 (+5 V) ASSEMBLY DIAGRAM	193-8051-1A
MODEL 8311 WIRING DIAGRAM	193-8102B
MODEL 8311 WIRING DIAGRAM	193-8108A
MODEL 8311 (+5V) WIRING DIAGRAM	193-8114B
MODEL 8311 (+5V) WIRING DIAGRAM	193-8120C
MODEL 8311 WIRING DIAGRAM (193-352-9-T)	193-8129C
ICD, SPECIFICATIONS 8311-1-X-X	089-3594A
ICD, SPECIFICATIONS 8311-38-X-X	089-3584C
ICD, SPECIFICATIONS 8311-137-6-R	089-3724B
ICD, SPECIFICATIONS 8311-137-6-X	089-3599C
ICD, SPECIFICATIONS 8311-20X-X-X	089-3574C
ICD, SPECIFICATIONS 8311-352-X-X	089-3868C

1-5. UNPACKING AND INSPECTION: Upon unpacking the equipment, retain the shipping container and packing material for future shipment for recalibration. Perform the following initial inspection:

- a. Carefully look at the outside of the shipping container for discoloration, stains, charring, or other signs of exposure to excessive heat, moisture, or liquid chemicals. Check for any physical damage to the shipping container such as dents, snags, rips, crushed sections or areas, or similar signs of excessive shock or careless handling.
- b. With the equipment and any accessory package removed from the shipping container, check each item against the packing list or Items Supplied List. If any items are missing, contact the Weinschel, Inc. Customer Service Department.
- c. Carefully inspect the equipment looking for dents, deep scratches, damaged or loose connector, or any other
- d. signs of physical abuse or careless handling. If damage is found, forward an immediate request to the delivering carrier to perform an inspection and prepare a concealed-damage report. DO NOT destroy any packing material until it has been examined by an agent of the carrier. Concurrently, report the nature and extent of damage to Weinschel, Inc., giving equipment model and serial numbers, so that necessary action can be taken. Under U.S. shipping regulations, damage claims must be collected by the consignee; DO NOT return the equipment to API / Weinschel, Inc. until a claim for damages has been established.

2-6. RESHIPMENT: Use the best packaging materials available to protect the unit during storage or reshipment. When possible, use the original packing container and cushioning material. If the original packing materials are not available, use the following procedure:

- a. Wrap the storage cases in sturdy paper or plastic;
- b. Place the wrapped storage cases in a strong shipping container and place a layer of shock-absorbing material (3/4 inch minimum thickness) around all sides of the unit to provide a firm cushion and to prevent movement inside the container.
- c. If shipping the unit for service, attach a tag to indicate:
 1. model and serial numbers
 2. service required
 3. description of malfunction
 4. return address
 5. authorization to conduct repairs
 6. return authorization number
- d. Thoroughly seal the shipping container and mark it FRAGILE. Ship to:

API / Weinschel, Inc.

Attn: Customer Service Department

5305 Spectrum Drive

Frederick, MD 21703-7362

or to an authorized sales representative.

1-7. STORAGE: Storage of the Model 8311 Series *SmartStep*™ Attenuator Unit is possible for extended periods without incurring damage to internal circuitry if the 8311 Series is packaged according to the instructions above. The safe limits for storage environment are as follows:

Temperature: 67° to +167 °F (-55° to +75 °C)

Humidity: less than 95% without condensation

Altitude: Up to 40,000 feet

1-8. RELATED MANUALS: The following manuals contain information that may be used in conjunction with this manual to operate, service, or calibrate this instrument.

<u>Manual</u>	<u>Title</u>
H4-1 and H4-2	Federal Supply Code for Manufacturers Cataloging Handbook
IM-275	Operating & Installation Instructions for 3200T & 3201T Series SmartStep Programmable Attenuators
IM-276	Operating & Installation Instructions for 150T, 151T, 152T & 152T Series SmartStep Programmable Attenuators
IM-248	Operating & Installation Instructions for 4226 & 4228 Series SmartStep Solid-State Programmable Attenuators

1-9. ELECTROSTATIC DISCHARGE SENSITIVE: The equipment documented in this manual contains certain Electrostatic Discharge Sensitive (ESDS) components or parts. Therefore, certain procedures/steps are identified by the use of the symbol . This symbol is used in two ways:



CAUTION

All procedures and/or steps identified as must be followed exactly as written and according to accepted ESDS device handling procedures. Failure to comply **WILL RESULT** in ESDS damage.

- When the ESDS symbol is placed between a paragraph number and title , all of that paragraph, including all subparagraphs, is considered ESDS device handling procedure.
- When the ESDS symbol is placed between a procedure/step number and the text , all of that procedure is considered an ESDS device handling procedure.

1-10. ABBREVIATIONS AND ACRONYMS: The following list contains abbreviations used throughout this manual. Abbreviations and acronyms that are not listed conform to MIL-STD-12D.

DUT	Device Under Test
ESDS	Electrostatic Discharge Sensitive
DIB	Device Interface Bus
TBD	To Be Determined

1-11. SAFETY CONSIDERATIONS: The Attenuator Unit and all related documentation must be reviewed for familiarization with safety markings and procedures before any operation and/or service. Refer to the SAFETY SUMMARY located at the beginning of this manual for a summary of safety information and procedures. Following these simple safety precautions will ensure safe operation and service of the Attenuator Unit.

1-12. POWER REQUIREMENTS: API / Weinschel supplies a detachable power cable (P/N 068-21) to connect an 100 to 240 Vac power source with a frequency between 50 to 60 Hz to the Attenuator Unit. To minimize shock hazard, the instrument chassis must be connected to an electrical ground. Using the supplied three-conductor power cable ensures that the instrument can be firmly connected to the ac power source and electrical ground (safety ground) at a grounded power outlet. Refer to paragraph 4-2 (Initial Setup) before applying any power to the instrument.

1-13. ENVIRONMENTAL REQUIREMENTS: This instrument performs best within its specifications when operated within a controlled environment having an ambient temperature of $0^{\circ}\pm 50^{\circ}\text{C}$, Relative Humidity of up to 95% non condensing, and a altitude of less than 40,000 feet. Operating beyond these limits can affect the accuracy and performance of the instrument and damage internal circuitry.

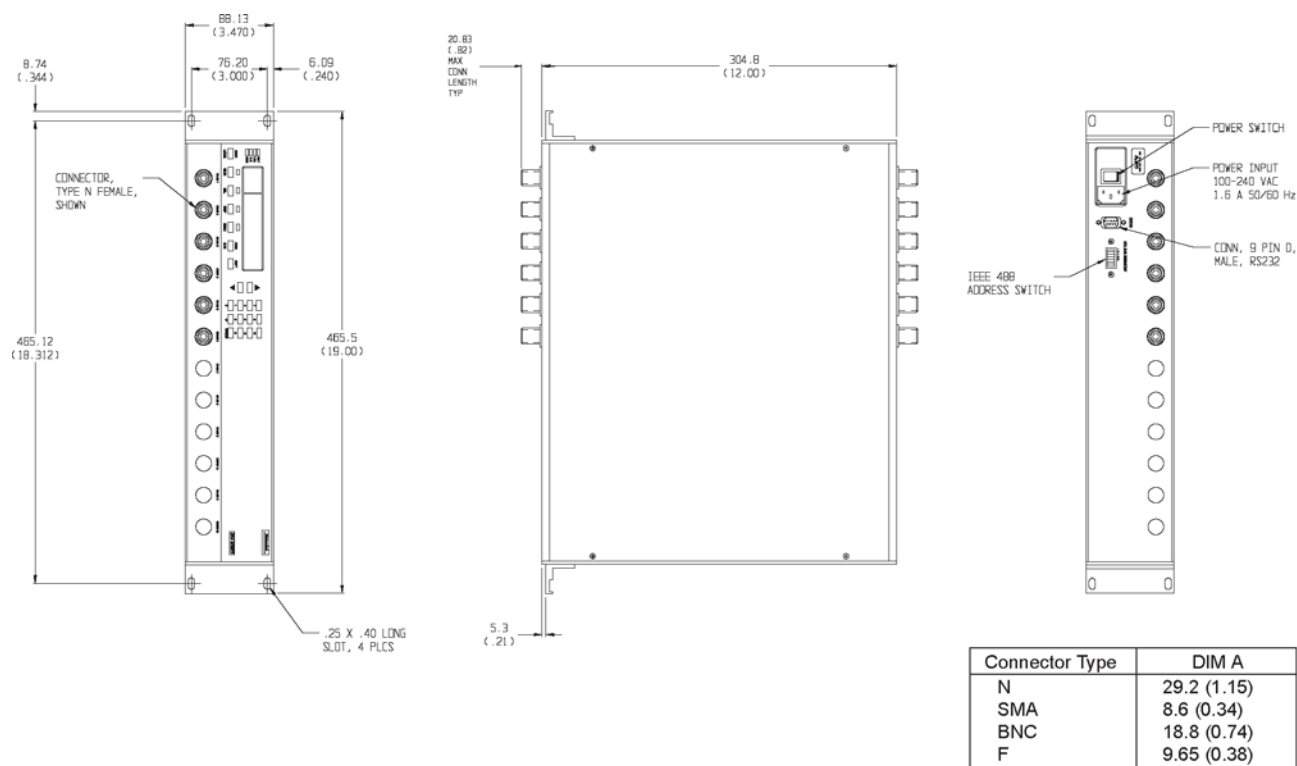
2. SPECIFICATIONS:

2-1. GENERAL SPECIFICATIONS:

Input Power Requirements	ac 100 to 240 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature: 0 to +50°C Storage Temperature: 67° to +167 °F (-55° to +75°C) Humidity: 96% Altitude: 40,000' (12,192M)
IEEE-488 Bus ⁽¹⁾	Connector: 24-pin per IEEE-488.1 Protocols: per IEEE-488.2 Indicators: Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)
RS-232 Bus ⁽²⁾	Connector: 9-pin male D Signals: TXD, RXD, RTS, CTS, DTR, GND Baud Rates: 2400, 9600, 19200, and 38400 Data Bits: 8 Handshaking: None, RTS/CTS, XON/XOFF Parity: None, Odd, Even Indicators: Tx (Transmit) and Rx (Receive)
RS-422 Bus ⁽³⁾ RS-485 Bus ⁽⁴⁾	Connector: 9-pin male D Signals: TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and signal GND Baud Rates: 2400, 9600, 19200, and 38400 Data Bits: 8 Handshaking: None, RTS/CTS, XON/XOFF Parity: None, Odd, Even Indicators: Tx (Transmit) and Rx (Receive)
RF Characteristics ⁽⁵⁾	See Model Configuration Table (pg 9)

NOTES:

1. GPIB/IEEE-488 model allows user-selectable addresses.
2. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
3. RS-422: designed for very long distance communications (4000 ft) and & optimized as a single node protocol, typically with one device connected to a single port.
4. RS-485: designed for very long distance communications (4000 ft) & optimized for multi-drop connections that can used to create a low cost network.
5. Refer to Individual data sheet (Appendix C) for detailed specifications on internal programmable attenuators.

2-2. PHYSICAL DIMENSIONS:

NOTE: All dimensions are given in mm (inches) and are maximum, unless otherwise

2-3. CONFIGURATIONSIRF SPECIFICATIONS:

Model No	Attenuator Value	Frequency Range (GHz)	Insertion Loss	SWR	No. of Channels	Attenuator Type	Connector Type	Connector Location	Drawing Number
8311-1-6-R	63/1	dc-1.0	6.00 dB max	1.6 max	6	3250T-63	BNC/F	Rear	193-7301-1
8311-1-6-F	63/1	dc-1.0	6.00 dB max	1.6 max	6	3250T-63	BNC/F	Front	193-7301-2
8311-38-6-F	63/1	dc-2.0	5.25 dB max	1.4 max	6	3206T-1	N/F	Front	193-7302-2
8311-38-12-T	63/1	dc-2.0	5.25 dB max	1.4 max	6	3206T-1	N/F	Front-Rear	193-7302-8
8311-137-6-F	63/1	dc-3.0	4.70 dB max	1.6 max	6	4226T-63	N/F	Front	193-7303-2
8311-137-6-R	63/1	dc-3.0	4.70 dB max	1.6 max	6	4226T-63	N/F	Rear	193-7303-12
8311-202-2-F	121/1	dc-18.0	5.25 dB max	1.95 max	2	150T-11, 150T-110	SMA/F	Front	193-7305-2
8311-202-3-F	121/1	dc-18.0	5.25 dB max	1.95 max	2	150T-11, 150T-110	SMA/F	Front	193-7305-3
8311-204-6-F	62/2	dc-18.0	3.25 dB max	1.95 max	6	150T-62	SMA/F	Front	193-7304-2
8311-204-6-R	62/2	dc							

3. INSTALLATION:

3-1. RACKMOUNTING: Standard 8311 Attenuator Units are shipped with four plastic feet mounted to the bottom cover, this allows the user to place the instrument on any bench or to stack the with other Weinschel instruments. The Model 8311 can also be rack mounted as a single unit using Rack Mounting Kit (P/N 193-8033-1). This kit allows the Model 8311 to be mounted in any rack or cabinet that is designed according to EIA RS-310 or MIL-STD-189.

3-2. INITIAL SETUP: The following initial setup procedures should be performed prior to operating the 8311 Unit.

- Perform inspection paragraph 1-5 prior to connecting the 8311 Series to any power source.
- Check that the external power source outputs to the 8311 Series are in accordance with Section 2, Specifications.
- Install the 8311 Series into a cabinet or rack, if desired.
- Using the supplied power cord connect the 8311 Series to the external power source.
- Setup the IEEE-488 bus address or RS-232/422 Communications options for your application using paragraph 4-2.6. If using the RS-422 serial configure the selectable signal pair terminations using paragraph 5-3.

3-3 INPUT/OUTPUT OPTIONS: The following paragraphs provide a description of the connections that can be made to the 8311 Series Attenuator Unit. Figure 1 shows the location of these connectors and switches.

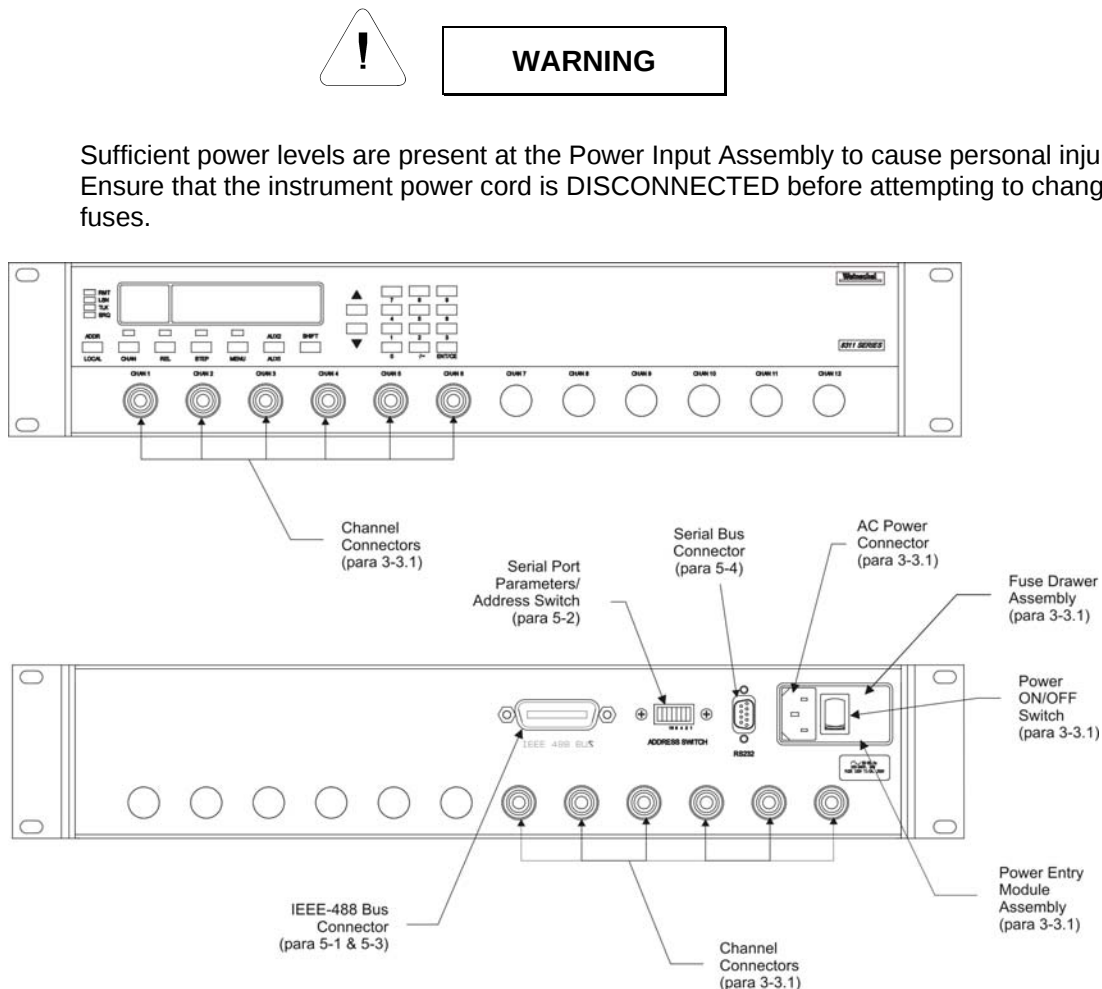


Figure 1. Front & Rear Panel Connectors

3-3.1 POWER ENTRY MODULE ASSEMBLY: The Power Entry Module Assembly located on the rear panel contains a three-prong ac power input connector and a fuse drawer assembly (Figure 1). The **Fuse Drawer Assembly** contains the line voltage fuse (Weinschel P/N 052-1-1.5). The Model 8311 uses a T 1.5A, 250 Vac fuse which is 5 x 20 mm in size. Refer to paragraph 8-4.1 for replacement of the fuse.

The **AC Power Connector**, located on the left side of XF1 (Figure 1), is a plug-type, prong insert connector with three conductors for connection of the power cord (P/N 068-21) to the Power Supply Assembly located within the Attenuator Unit. This connector also grounds the chassis of the Attenuator Unit when the ac power cord is connected to a grounded wall outlet. If necessary, use a three prong to two prong adapter and connect the adapter's ground lead to the outlet plate retaining screw.

The **Power ON/OFF Switch** is located on the rear panel and in part of the Power Entry Module Assembly. Placing the POWER ON/OFF switch in the ON position applies power to the instrument.



CAUTION

When applying an RF signal to the RF INPUT connector, DO NOT exceed the maximum allowable power level specifications of the Model 8311.

3-3.2. CHANNEL PORT CONNECTORS: A typical 8311 Series Attenuator Unit contains 12 standard D holes on the front and rear panel allowing for single or multichannel configurations. Standard Model 8311's are supplied with two PLANAR CROWN® Type N connectors that can be mounted on the front or rear panel. These connectors provide a input and output port where various types of RF signals can be applied to the devices internally mounted in the Model 8311 (Connector location specified by customer when ordering). Some special configurations could contain API / Weinschel's Model 1568 SMA Panel Adapters or other types of crowns (see accessories for other types).

NOTE

The use of the PLANAR CROWN® connectors provide the user with easy exchange of connector types, which eliminates the need for adapters and other devices that would create additional insertion loss. This type of connector also provides quick removal and replacement of defective connectors. For more information about the PLANAR CROWN® connectors contact the Sales Department at API / Weinschel, Inc.

4. FRONT PANEL CONTROLS & INDICATORS:

The following paragraphs provide setup and general guidelines for operating the 8311 Series **SmartStep** Attenuator Unit and its different bus configurations. Also provided is a general description of the internal circuitry of the 8311.

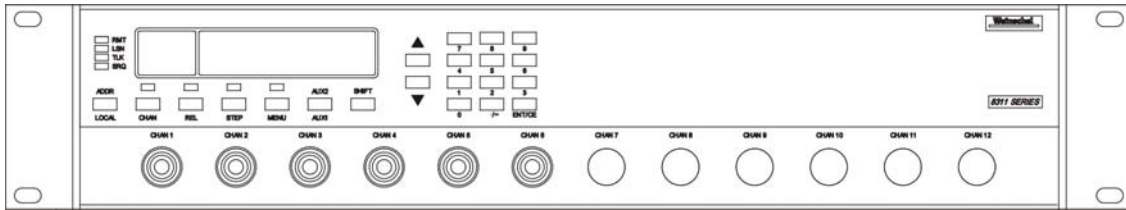


Figure 2. 8311 Series Front Panel

ENTRY keys: The numeric entry keys allow the user to directly enter numeric values. When using the keypad, values are not updated until the ENT (enter) key is pressed. The Minus (-) and CE (clear entry) functions may be accessed via first depressing the SHIFT key.

INCR & DECR : The INCR and DECR keys allow settings to be scrolled from their current value. Unlike the ENTRY keys, the new setting is updated immediately without the use of the ENT key.

CHAN: Allows the selection of the current channel, as indicated by the CH1-CH4 indicators. Repeated depressions of the CHAN key will select the next available channel. The main display will show the current setting of the channel. For configurations with 5 or more channels, selecting the CHAN key will display the current selected channel in the main display. Channels are then selected via the INCR and DECR keys.

REL: This key control allows the use of a relative mode for attenuators, as indicated by the REL mode indicator. When turned on, the currently displayed attenuation value is used as a reference value from which the attenuation may be set. In this mode, attenuation values may be positive or negative from the reference setting. When REL is turned off, the display returns to the actual attenuation setting for the channel.

STEP: This key allows the user to change the attenuation step size used by the INCR and DECR keys. When turned on, as, indicated by the STEP indicator, the current step size is displayed in the main display, and a new value may be entered using the INCR/DECR or ENTRY keys. The step size may be set to any multiple of the intrinsic step size for the currently selected channel.

MENU: Invokes the menu functions. Menu selections may be made via the INCR and DECR keys. (NOTE: menu functions are currently not implemented as of 3/8/99)

AUX1/AUX2: The function of these keys is user-programmable via remote operation. They invoke any currently defined AUX1 and AUX2 macros. Refer to the macro programming section for information on creating macro definitions.

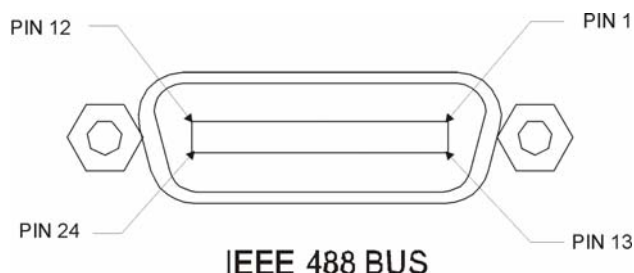
LOCAL: This key places the 8311 in local operation mode, unless the key function has been overridden via an IEEE-488.2 local lockout or execution of the LOCKOUT command.

ADDR: This key displays the current IEEE-488.2 address. The address may be changed from the front-panel, however, the initial setting at power on is derived from the rear-panel address switch.

5. REMOTE OPERATION:

The following paragraphs provide setup and general guidelines for operating the Model 8311 using an external controller.

5-1. IEEE-488 INTERFACE BUS CONNECTOR: Joining the Model 8311-1 to a system controller requires the connection of IEEE-488 control bus cable to the IEEE-488 INTERFACE BUS connector located on the rear panel. Figure 3 shows the connector's contact pin numbering scheme and lists the signal designator for signal present at each contact pin.

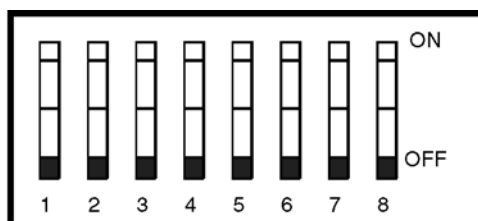


PIN No.	SIGNAL LINE	PIN No.	SIGNAL LINE
1	DIO 1	13	DIO 5
2	DIO 2	14	DIO 6
3	DIO 3	15	DIO 7
4	DIO 4	16	DIO 8
5	EOI (24)**	17	REN (24)**
6	DAV	18	GND (6)*
7	NRFD	19	GND (7)*
8	NDAC	20	GND (8)*
9	IFC	21	GND (9)*
10	SRQ	22	GND (10)*
11	ATN	23	GND (11)*
12	SHIELD	24	GND, LOGIC
* GND (N) refer to the signal ground return of the referenced pin.			
** Return pin on pin 24.			

Figure 3. IEEE-488 Interface Bus Pin Locations

5-2. GPIB ADDRESS/SERIAL COMMUNICATIONS SETTINGS: The GPIB Bus Address and Serial Communications options are programmed via an internal 8 position DIP switch SW1 which is located on the rear panel. The switch is shared between the two functions, with SW1-1 controlling the selection. When SW1-1 is OFF, the remaining switches set the GPIB bus address. Likewise, when SW1-1 is ON, the switches are used to select the various serial options, including baud rate, parity, and handshaking. Refer to Figure 4 for switch location.

To configure the IEEE-488 bus address or serial communications parameters, select the appropriate switch setting using the tables located in below (Figure 4).



Note: All switches are shown in the OFF position.

GPIB	SW1	Serial	Serial Parameters															
SP	1	SP	Mode Select On = Serial parameters Off = GPIB address															
---	2	Echo	Echo Echo Enable On = Echo received data Off = No echo															
---	3	HndshkSel	Handshaking Select On = RTS/CTS Off = XON/XOFF															
A4 (16)	4	HndshkEna	Handshake Enable On = Enabled Off = Disabled															
A3 (8)	5	ParitySel	Parity Select On = Odd Off = Even															
A2 (4)	6	ParityEna	Parity Enable On = Enabled Off = Disabled															
A1 (2) A0 (1)	7 8	BR1 BR2	BaudRate Select (see below) BaudRate Select <table> <tr> <th>BR1</th><th>BR0</th><th>RATE</th></tr> <tr> <td>0</td><td>0</td><td>2400</td></tr> <tr> <td>0</td><td>1</td><td>9600</td></tr> <tr> <td>1</td><td>0</td><td>19200</td></tr> <tr> <td>1</td><td>1</td><td>38400</td></tr> </table>	BR1	BR0	RATE	0	0	2400	0	1	9600	1	0	19200	1	1	38400
BR1	BR0	RATE																
0	0	2400																
0	1	9600																
1	0	19200																
1	1	38400																

Note: The GPIB Bus address is selectable from 0 to 30 via the rear panel dip switch. This switch is factory set to 10.

IEEE-488 Address Truth Table

Switch Number	4	5	6	7	8
Decimal Weight	16	8	4	2	1
Address:					
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
20	1	0	1	0	0
30	1	1	1	1	0

Figure 4. Internal Dip Switch

5-3. IEEE-488 (GPIB) Bus Operation

The internal functions of Model 8311 are controlled via an IEEE-488 bus and an external controller. The front panel LSN and RMT indicators (Figure 2) are used as status indicators for the Model 8311 *SmartStep* Interface's IEEE-488 bus operation. During bus operation a flashing LSN indicates that the Model 8311 is receiving. The RMT indicator is illuminated when the Model 8311 is in the remote state.

The table below summarizes the IEEE-488.1 interface functions that are implemented by the Model 8311.

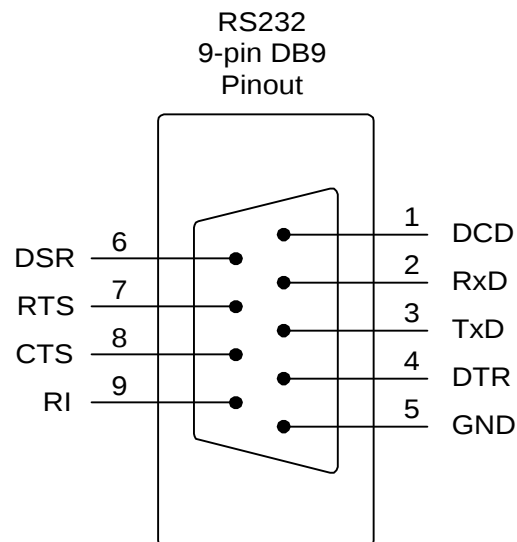
Interface Function	Subset	Description
Source Handshake	SH1	Fully implemented
Acceptor Handshake	AH1	Fully implemented
Talker	T6	All basic Talker functions No extended addressing
Listener	L4	All basic Listener functions. No extended addressing
Service Request	SR1	Fully implemented
Remote/Local	RL1	Fully implemented
Parallel Poll	PP0	No Parallel Poll Capability
Device Clear	DC1	Fully implemented
Device Trigger	DT0	No Trigger
Controller	C0	No Controller Functions
Electrical Interface	E2	All tri-state drivers

The GPIB interface of the 8311 is IEEE-488.2 compliant. The 8311 recognizes instructions and data sent via the GPIB interface in the form of program messages comprised of ASCII characters. A program message is comprised of a sequence of program message units separated by semicolons and terminated by a line terminator (LINE END). A line terminator takes the form of an ASCII LF character (0AH), or an EOI signal asserted with the last data byte, or both. The 8311 program message units may be divided into two syntax groups: commands and queries. Refer to the section on command syntax for more information.

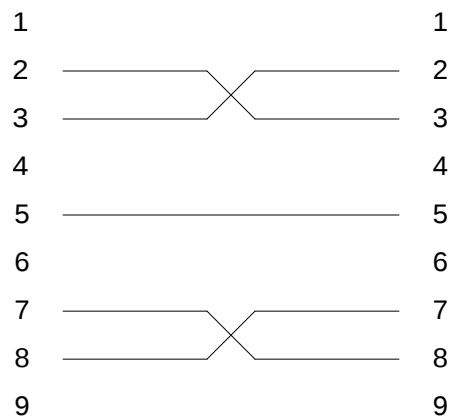
5-4.1. RS-232 Operation: The RS-232 Serial port is a 9-pin connector that is compatible with the pin-out of the serial port on a PC. It allows the use of a null-modem style cable. The pin-out for the connector is show below. For clarity, the signal names and directions are relative to the 8311.

<u>Pin</u>	<u>Signal Name</u>	<u>Description</u>	<u>Direction</u>
1	DCD	unused	---
2	RxD	Receive data	input
3	TxD	Transmit data	output
4	DTR	Signals DTE is on-line	output
5	GND	Ground	---
6	DSR	unused	---
7	RTS	Signals DTE is ready	output
8	CTS	Signals DCE is ready	input
9	RI	unused	---

The DTR signal is asserted when power is on, indicating that the unit is ready.

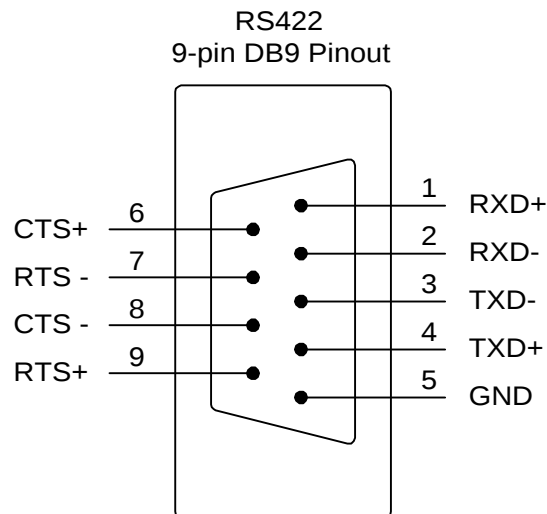


Null Modem Cable



5-4.2. RS-422/485 Operation: The RS-422/RS-485 Serial mode is useful in applications requiring long cable lengths (up to 5000 ft at 9600 baud), or in electrically noisy environments. All communication parameters available for the RS232 port are also available under RS-422 operation (baud rate, handshaking, etc). Full Duplex operation is supported. The RS-422 port utilizes a 9-pin connector. The pin-out for the connector is show below. For clarity, the signal names and directions are relative to the 8311.

<u>Pin</u>	<u>Signal Name</u>	<u>Description</u>	<u>Direction</u>
1	RxD+	Receive data	input
2	RxD-	Receive data	input
3	TxD-	Transmit data	output
4	TxD+	Transmit data	output
5	GND	Ground	---
6	CTS+	Clear To Send	input
7	RTS-	Request To Send	output
8	CTS-	Clear To Send	input
9	RTS+	Request To Send	output



Real Numeric Program Data-This data type includes decimal numbers containing a sign, decimal point, and/or an exponent. The format is as follows: [sign]digits[.[digits]][E[sign]digits]]

Examples: 2
 2.5
 -35.25E+2

In the command descriptions that follow, argument types are also described using the following additional conventions to indicate the relative size of the parameter:

byte	- used to indicate an 8-bit unsigned integer
word	- used to indicate a 16-bit unsigned integer
int8	- 8-bit integer
int16	- 16-bit integer
int32	- 32-bit integer
string	- character data, including the max number of characters allowable. (i.e., string8 has a max of 8 chars)

5-6.3 OUTPUT DATA FORMAT: Output data from the Model 8311 consists of a series of ASCII digits and message strings, terminated with an ASCII Line-Feed character (0AH), in response to a program message that contains one or more query commands. In the case of multiple query commands in the same program message, the data resulting from each of the individual message units will be separated by an ASCII comma (2CH) character.

5-6.4 NOTATIONAL CONVENTION.

- [] Brackets indicate optional arguments or parameters.
- { } One and only one of the enclosed entries must be selected unless the field is also surrounded by brackets, in which case it is optional.
- ... Ellipses indicate that the preceding argument or parameter may be repeated.
- [...] The preceding item may be repeated, but each repetition must be separated by a comma.

5-8. 488.2 COMMON COMMANDS

*CLS	Function: Clears the Status Byte and Event Status Registers. Syntax: *CLS Argument(s): none Remarks: This function is used to clear the Status Byte and the Event Status Registers. Return Value: none Example(s): *CLS
*ESE	Function: Sets the Event Status Enable Register. Syntax: *ESE <i>mask</i> Argument(s): <i>mask</i> integer bitmask Remarks: This function is used to set the Event Status Enable Register to the value specified by <i>mask</i> . Return Value: none Example(s): *ESE 255
*ESE?	Function: Reads the Event Status Enable Register. Syntax: *ESE? Argument(s): none Remarks: This function is used to read the Event Status Enable Register. Return Value: <i>mask</i> integer register mask Example(s): *ESE? returns the following '255'
*ESR?	Function: Reads the Event Status Register Syntax: *ESR? Argument(s): none Remarks: This function is used to read the Event Status Register. Reading the register clears it. Return Value: <i>reg</i> integer register Example(s): *ESR? returns the following '128'
*SRE	Function: Sets the Status Byte Enable Register Syntax: *SRE <i>mask</i> Argument(s): <i>mask</i> integer bitmask Remarks: This function is used to set the Status Byte Enable Register to the value specified by <i>mask</i> . Return Value: none Example(s): *SRE 255
*SRE?	Function: Reads the Status Byte Enable Register. Syntax: *SRE? Argument(s): none Remarks: This function is used to read the Status Byte Enable Register. Return Value: <i>mask</i> integer register mask Example(s): *SRE? returns the following '255'
*STB?	Function: Reads the Status Byte Register. Syntax: *STB? Argument(s): none Remarks: This function is used to read the Status Byte Register. Return Value: <i>reg</i> integer register Example(s): *STB? returns the following '96'
*IDN?	Function: Reads the system identification information. Syntax: *IDN? Argument(s): none Remarks: This function is used to read the system identification information, which is a string consisting of the following data: manufacturer, model, serial number, and firmware version. Return Value: <i>mfg</i> integer count of devices Example(s): *IDN? returns the following 'Weinschel,8311 Series, 123, 1.00A'

*RST	Function:	Performs a device reset.
	Syntax:	*RST
	Argument(s):	none
	Remarks:	This function is used to reset the device.
	Return Value:	none
	Example(s):	*RST
*OPC	Function:	Operation complete service request.
	Syntax:	*OPC
	Argument(s):	none
	Remarks:	This function generates the Operation Complete message (OPC) in the Standard Event Status Register when all pending device operations have finished.
	Return Value:	none
	Example(s):	*OPC
*OPC?	Function:	Operation complete query
	Syntax:	*OPC?
	Argument(s):	none
	Remarks:	This function loads a '1' into the output queue when the Program Message Unit is executed. Its primary use is to provide an indication of command completion by including the command as the last one in a series of commands.
	Return Value:	1 integer command completed
	Example(s):	SAVE ASSIGN; *OPC? returns a '1' when the SAVE ASSIGN command completes.
*WAI	Function:	Wait To Continue
	Syntax:	*WAI
	Argument(s):	none
	Remarks:	This function prevents the 8311 Series from executing any further commands or queries until there are no pending operations. The 8311 Series executes all commands sequentially, and does not allow overlapping commands.
	Return Value:	none
	Example(s):	*WAI

5-9. GENERAL COMMANDS:

CHAN	Function: Selects the currently active channel Syntax: CHAN <i>chnum</i> Argument(s): <i>chnum</i> integer channel number Remarks: This function is used to select the currently active channel. Return Value: none Example(s): CHAN 1
CHAN?	Function: Reads the current channel number Syntax: CHAN? Argument(s): none Remarks: This function is used to read the currently active channel number. Return Value: <i>chnum</i> integer current channel number Example(s): CHAN? returns '1'
ATTN	Function: Set attenuation Syntax: ATTN <i>atten</i> Argument(s): <i>atten</i> real desired value, in dB Remarks: This function sets the attenuation of the currently selected channel to <i>atten</i> . Return Value: none Example(s): ATTN 63 ATTN 12.25 ATTN 45.0
ATTN?	Function: Read attenuation Syntax: ATTN? Argument(s): none Remarks: This function reads the attenuation of the currently selected channel. Return Value: <i>atten</i> real attenuation value, in dB Example(s): ATTN? returns '63.00'
REL	Function: Sets relative display mode for the current channel Syntax: REL <i>mode</i> Argument(s): <i>mode</i> integer relative mode on/off Remarks: This function is used to set the relative display mode of operation for the current channel. A value of 0 for the parameter <i>mode</i> will turn relative mode off, while a value of 1 will turn relative mode on. Return Value: none Example(s): REL 1
REF	Function: Sets reference Syntax: REF Argument(s): none Remarks: This function sets the reference value for the active channel to the current attenuation setting. This command is used for the REL and RELATTN functions. Return Value: none Example(s): REF; REL 1 sets the reference, and turns on relative mode
REF?	Function: Read reference setting Syntax: REF? Argument(s): none Remarks: This function reads the reference setting of the currently selected channel. Return Value: <i>refatten</i> real reference attenuation value, in dB Example(s): REF? returns '30.00'

RELATTN	Function: Sets attenuation relative to the reference setting Syntax: RELATTN <i>atten</i> Argument(s): <i>atten</i> real desired value, in dB Remarks: This function sets the attenuation of the currently selected channel to <i>atten</i> , relative to the reference value set when the REL command was executed. Return Value: none Example(s): RELATTN 10 increases the attenuation setting 10dB from the reference setting RELATTN - 10 decreases the attenuation setting by 10dB from the reference setting 15.
RELATTN?	Function: Read relative attenuation of the current channel Syntax: RELATTN? Argument(s): none Remarks: This function reads the relative attenuation of the currently selected channel. Return Value: <i>relatten</i> real relative attenuation value, in dB Example(s): RELATTN? returns '-10.00'
STEPSIZE	Function: Sets attenuation stepsize for the current channel Syntax: STEPSIZE <i>atten</i> Argument(s): <i>atten</i> real desired stepsize value, in dB Remarks: This function sets the attenuation stepsize for the INCR and DECR commands for the current channel to <i>atten</i> . The default value of the attenuator's stepsize is the intrinsic resolution of the attenuator, i.e., a 127dB/1dB step attenuator has a default stepsize of 1dB. Return Value: none Example(s): STEPSIZE 10 changes the stepsize to 10dB
STEPSIZE?	Function: Read attenuation stepsize Syntax: STEPSIZE? Argument(s): none Remarks: This function reads the attenuation stepsize of the current channel. Return Value: <i>atten</i> real attenuation stepsize value, in dB Example(s): STEPSIZE? returns '10.00'
INCR	Function: Increments attenuation Syntax: INCR Argument(s): none Remarks: This function increments the attenuation setting of the current channel by the value of the attenuator's programmed stepsize (see STEPSIZE command). Return Value: none Example(s): INCR
DECR	Function: Decrements attenuation Syntax: DECR Argument(s): none Remarks: This function decrements the attenuation setting of the current channel by the value of the attenuator's programmed stepsize (see STEPSIZE command). Return Value: none Example(s): DECR

6-4. RF SECTION: Most Standard 8311 Series are single channel configurations where RF signal is routed through either the front or rear mounted Ports A & B connector (Ports A-A if the RF is routed front to rear) to a single or multiple Weinschel programmable attenuators (3200T, 150T, or 4200 Series) thus creating CH1 (Channel 1). Note that when a Port is in use the Port indicator will be illuminated. Dual channel units typically use Ports A and B for CH1 and Ports C and D for CH2 (Ports A-A if the RF is routed front to rear for CH1 and Ports B-B for CH2). Multi-channel (3-4) units are generally routed front to rear and configured as follows:

CH1 Port A (Front) to Port A (Rear)
CH2 Port B (Front) to Port B (Rear)
CH3 Port C (Front) to Port C (Rear)
CH4 Port D (Front) to Port D (Rear)

For specialized configurations refer to supplemental information in the front of this manual for details.

Typically API / Weinschel programmables are bi-directional and the RF signal can be applied to either Port connector. Refer to the individual data sheets located in the Appendix C for detailed and specific specifications pertaining to the internal mounted attenuators. Refer to the replaceable parts list for actual programmable attenuator part/model number.

Special configurations exist where the RF section is designed to specific customer requirements that contain signal programmable attenuators with custom attenuation ranges and step sizes to multiple programmables used in conjunction with other coaxial devices such as switches, power combiners, directional couplers, and filters creating single or multi-channel subsystems. All specialized 8311 series units will contain a supplement located in the front of this manual that outlines detailed configuration, operation and parts list for these Attenuator Units.

7-3.3 MACHINED SURFACES AND HARDWARE: To remove light dirt and dust from mechanical parts such as castings, covers and other hardware proceed as follows:

**WARNING**

Compressed air used for cleaning and/or drying can create airborne particles that may enter the eye. Goggles/ face-shields should be worn. DO NOT direct air stream towards self or other personnel. Pressure should be restricted to a maximum 15 psi to avoid personal injury.

**CAUTION**

- Under no circumstances use a wire brush, steel wool, or abrasive compound. Using these items will cause extensive damage to the instrument's surface.
 - DO NOT use a nylon bristle brush in solvent as the bristles may dissolve and cause damage to the circuit card or component.
- a. Use 5 psi of clean, moisture-free compressed air or preferably dry nitrogen to blow loose dirt and dust from surface of item.
 - b. Briskly brush isopropyl alcohol onto area to be cleaned with a fiber-bristle brush.
 - c. Remove residue with lint-free cloth and repeat step "b" as a rinse.
 - d. When parts are thoroughly clean, dry parts using 5 psi of clean, moisture-free compressed air or preferably dry nitrogen.
 - e. Clean smaller mechanical parts or hardware by dipping into a container of isopropyl alcohol. Remove dirt by brushing with fiber-bristle brush after parts have been immersed for several hours.
 - f. Remove parts from isopropyl alcohol and rinse by immersing into a different container of isopropyl alcohol.
 - g. When parts are thoroughly cleaned, dry parts using 5 psi of clean, moisture-free compressed air or preferably dry nitrogen.

7-3.4 CHASSIS CLEANING: Clean chassis using a lint-free cloth moistened with water and mild detergent. For harder to clean areas, such as inside corners of chassis, use a vacuum cleaner.

7-3.5 CONNECTOR CLEANING: Where small amounts of rust, corrosion, and/or oxide deposits are present on connectors, clean externally with a soft-bristle brush, aluminum wool, or internally with an acid brush; then wash with a non-corrosive solvent. MIL-C-83112 is recommended. Exercise care to ensure no metal filing or residue remains inside the connector and the connector is thoroughly dry. Where rust, corrosion, and/or oxide deposits are present in large quantities, replace the connector.

7-4. LINE VOLTAGE FUSE REPLACEMENT: The following steps provide procedures to replace the line voltage Fuse Assembly. This unit accepts a F1.5A, 250 Vac fuse for 115 Vac.

**WARNING**

Sufficient power levels are present at the Power Input Assembly to cause personal injury. Ensure that the instrument power cord is DISCONNECTED before attempting to change fuses.

**CAUTION**

DO NOT connect or apply power to this instrument until the Power Entry Module Assembly has been adjusted to the operational line voltage.

- a. Disconnect the power cord from the Power Entry Module Assembly.
- b. Use a small screwdriver to carefully open the Fuse Drawer.
- c. Slide out Fuse Drawer located in the center of the Power Entry Module Assembly.
- d. Remove defective fuse and replace with the correct fuse (Refer to applicable parts list for fuse part number).
- e. Snap the Fuse Drawer shut and re-connect ac power cord.

8311-1-6-R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7301-1, Rev. A):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051	ASSY, BASE UNIT, MODEL 8311	1	NA		
2	193-9207	MOUNTING PLATE	2	NA		
3	3250T-63	ATTEN PRGM, 63dB/1dB STEPS 75 OHMS	6	AT1 - AT6		
4	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA	24803	K2RMX-001A
5	193-8096	OVERLAY, FRONT PANEL	1	NA		
6	068-56-15/0	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	6	W8, W10, W12, W14 W16, W18	93459	B068-56/15/0
7	193-8049	OVERLAY, PANEL, BLANK	1	NA		
10	193-8117	ASSY, CABLE, CNTRL TO ATTEN (6 ATTEN)	1	W7		
11	NAS662C2R5	SCR FLAT HD 2-56 X 5/16 LG 100	12	NA		
13	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	12	NA		
15	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
16	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
17	074-889-4	LABEL, THERMAL TRANSFER, PERM MTLZ POLTEST, 1.50 X .75IN	1	NA	BRADY	THT-6-428-10
20	068-56-11/0	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	6	W9, W11, W13, W15, W17, W19	93459	B068-56-11/0
22	089-3594	ICD, MULTI-CHANNEL UNIT, MODEL 8311-1-XX	0	NA		
23	193-8114	WIRING DIAGRAM, MODEL 8311	0	NA		
24	IM-303	O & S, ATTEN UNIT, MODEL 8311	1	NA		

Refer to API / Weinschel Drawing 193-7301-1, Rev. A for parts location.

8311-1-6-F, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7301-2, Rev. A):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051	ASSY, BASE UNIT, MODEL 8311	1	NA		
2	193-9207	MOUNTING PLATE	2	NA		
3	3250T-63	ATTEN PRGM, 63dB/1dB STEPS 75 OHMS	6	AT1 - AT6		
4	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA	24803	K2RMX-001A
5	193-8096	OVERLAY, FRONT PANEL	1	NA		
6	068-56-15/0	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	6	W8, W10, W12, W14 W16, W18	93459	B068-56/15/0
7	193-8049	OVERLAY, PANEL, BLANK	1	NA		
10	193-8117	ASSY, CABLE, CNTRL TO ATTEN (6 ATTEN)	1	W7		
11	NAS662C2R5	SCR FLAT HD 2-56 X 5/16 LG 100	12	NA		
13	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	12	NA		
15	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
16	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
17	074-889-4	LABEL, THERMAL TRANSFER, PERM MTLZ POLTEST, 1.50 X .75IN	1	NA	BRADY	THT-6-428-10
20	068-56-11/0	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	6	W9, W11, W13, W15, W17, W19	93459	B068-56-11/0
22	089-3594	ICD, MULTI-CHANNEL UNIT, MODEL 8311-1-XX	0	NA		
23	193-8114	WIRING DIAGRAM, MODEL 8311	0	NA		
24	IM-303	O & S, ATTEN UNIT, MODEL 8311	1	NA		

Refer to API / Weinschel Drawing 193-7301-2, Rev. A for parts location.

8311-38-6-F, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7302-2, Rev. B):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051	ASSY, BASE UNIT, MODEL 8311	1	NA	24803	K2RMX-001A
2	193-8039	MOUNTING PLATE	2	NA		
3	3206T-1	ATTEN PRGM, SMARTSTEP	6	AT1 - AT6		
4	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA		
5	193-8096	OVERLAY, FRONT PANEL	1	NA		
6	068-32-13/0	COAXIAL CABLE ASSY, SMA M/ TYPE N FEMALE, CONFORMABLE, DC-11GHz	6	W8, W10, W12, W14, W16, W18		
7	193-8049	OVERLAY, PANEL BLANK	1	NA		
8	193-11347	SPACER, CONN, 12 POS	1	NA		
9	063-408	N - TYPE, CONNECTOR	12	NA		
10	193-8116	ASSY, CABLE, CNTRL TO ATTEN (6 ATTEN)	1	W7		
11	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	12	NA	BRADY	THT-6-428-10
13	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	12	NA		
15	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
16	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
17	074-889-4	LABEL, THERMAL TRANSFER, PERM MTLZ, POLTEST, 1.50 X .75IN	1	NA		
20	068-32-6/0	COAXIAL CABLE ASSY, SMA M/ TYPE N FEMALE, CONFORMABLE, DC-11GHz	6	W9, W11, W13, W15, W17, W19		
22	089-3584	ICD, MULTI CHANNEL UNIT, MODEL 8311-38-12-T	0	NA		
23	193-8114	WIRING DIAGRAM, MODEL 8311	0	NA		
24	IM-303	O & S, ATTEN UNIT, MODEL 8311	1	NA		

Refer to API / Weinschel Drawing 193-7302-2, Rev B for parts location.

8311-38-12-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7302-8, Rev. D):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051	ASSY, BASE UNIT, MODEL 8311	1	NA	24803	K2RMX-001A
2	193-8039	MOUNTING PLATE	1	NA		
3	3206T-1	ATTEN PRGM, SMARTSTEP	12	AT1-AT12		
4	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA		
5	193-8047	OVERLAY, FRONT PANEL, TYPE N	1	NA		
6	068-32-8/0	COAXIAL CABLE ASSY, SMA M/TYPE N FEMALE, CONFORMABLE, DC-18 GHz	12	W16-W23 W24, W26, W28, W30		
7	193-8052	OVERLAY, REAR PANEL, TYPE N	1	NA		
8	193-8106	MOUNTING PLATE, ATTEN	1	NA		
9	193-8107	MOUNTING PLATE, ATTEN	1	NA		
10	193-8105	ASSY, CABLE, CNTRL TO ATTEN (12 ATTEN)	1	W7		
11	MS24693-C3	SCR PAN HD 4-40 X 5/16 LG	24	NA	93459	068-50-6/0
12	193-11347	SPACER, CONN, 12 POS	1	NA		
13	NAS1635-04LR4	SCR PAN HD 4-40 X 5/16 LG	14	NA		
14	063-408	N -TYPE, CONNECTOR	12	NA		
15	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
16	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
17	074-889-4	LABEL	1	NA		
20	068-32-6/0	COAXIAL CABLE ASSY SMA M/TYPE N FEMALE, CONFORMABLE, DC-18 GHz	12	W8-W15 W25, W27, W29, W31		
21	IM-303	O & S, ATTEN UNIT, MODEL 8311	1	NA		
22	193-8114	WIRING DIAGRAM, MODEL 8311	0	NA		
23	089-3584	ICD ATTEN UNIT, MODEL 8311	0	NA		

8311-137-6-F, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7303-2, Rev. D)

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051-1	ASSY, ATTEN UNIT, BASE MODEL 8311(+5V)	1	NA		
2	193-8121	MOUNTING PLATE	2	NA		
3	101-2070-1	ASSY, ATTEN, PROG, 6 CELL, 63dB/1dB, 3 GHz, SMA F/F	6	AT1 - AT6		
4	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA	24803	K2RMX-001A
5	193-8096	OVERLAY, FRONT PANEL	1	NA		
6	32	COAXIAL CABLE ASSY, SMA M/ TYPE N FEMALE, CONFORMABLE, DC-11GHz	6	W9, W11, W13, W15, W17, W19	93459	068-50-6/0
7	193-8049	OVERLAY, PANEL BLANK	1	NA		
8	068-32-13/0	COAXIAL CABLE ASSY, SMA M/ TYPE N FEMALE, CONFORMABLE, DC-11GHz	6	W8, W10, W12, W14, W16, W18		
9	193-11347	SPACER, CONN, 12 POS	1	NA		
10	063-408	N -TYPE, CONNECTOR	12	NA		
11	NAS662C2R5	SCR FLAT HD 2-56 X 5/16 LG 100	12	NA		
13	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	12	NA		
15	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
16	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
17	074-889-4	LABEL, THERMAL TRANSFER, PERM MTLZ POL TEST, 1.50 X .75IN	1	NA	BRADY	THT-6-428-10
18	193-8086-3	ASSY, CABLE, DIST BD TO ATTEN	1	W23		
19	193-8086-4	ASSY, CABLE, DIST BD TO ATTEN	1	W24		
20	193-8086-5	ASSY, CABLE, DIST BD TO ATTEN	1	W25		
21	193-8086-6	ASSY, CABLE, DIST BD TO ATTEN	1	W20		
22	193-8086-7	ASSY, CABLE, DIST BD TO ATTEN	1	W21		
23	193-8086-8	ASSY, CABLE, DIST BD TO ATTEN	1	W22		
28	089-3599	ICD, MULTI-CHANNEL UNIT, MODEL 8311-137-X-X	0	NA		
29	193-8120	WIRING DIAGRAM, MODEL 8311(+5V)	0	NA		

8311-137-6-R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7303-12, Rev. C)

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051-1	ASSY, ATTEN UNIT, BASE MODEL 8311(+5V)	1	NA		
2	193-8121	MOUNTING PLATE	2	NA		
3	101-2070-1	ASSY, ATTEN, PROG, 6 CELL, 63dB/1dB, 3 GHz, SMA F/F	6	AT1 - AT6		
4	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA	24803	K2RMX-001A
5	193-8096-1	OVERLAY, REAR PANEL	1	NA		
6	068-32-6/0	COAXIAL CABLE ASSY, SMA M/TYP N FEMALE, CONFORMABLE, DC-11 GHz	6	W8, W10, W12, W14, W16, W18	93459	068-50-6/0
7	193-8049	OVERLAY, PANEL BLANK	1	NA		
8	068-32-13/0	COAXIAL CABLE ASSY, SMA M/TYP N FEMALE, CONFORMABLE, DC-11 GHz	6	W9, W11, W13, W15, W17, W19		
9	193-11347	SPACER, CONN, 12 POS	1	NA		
10	063-408	N -TYPE, CONNECTOR	12	NA		
11	NAS662C2R5	SCR FLAT HD 2-56 X 5/16 LG 100	12	NA		
13	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	12	NA		
15	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
16	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
17	074-889-4	LABEL, THERMAL TRANSFER, PERM MTLZ POLTEST,1.50 X .75IN	1	NA	BRADY	THT-6-428-10
18	193-8086-3	ASSY, CABLE, DIST BD TO ATTEN	1	W23		
19	193-8086-4	ASSY, CABLE, DIST BD TO ATTEN	1	W24		
20	193-8086-5	ASSY, CABLE, DIST BD TO ATTEN	1	W25		
21	193-8086-6	ASSY, CABLE, DIST BD TO ATTEN	1	W20		
22	193-8086-7	ASSY, CABLE, DIST BD TO ATTEN	1	W21		
23	193-8086-8	ASSY, CABLE, DIST BD TO ATTEN	1	W22		
28	089-3724	ICD, MULTI-CHANNEL ATTEN UNIT	0	NA		
29	193-8120					

8311-202-3-F, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7305-3, Rev. D):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8051	ASSY, BASE UNIT, MODEL 8311	1	NA		
2	193-8054	OVERLAY, FRONT PANEL SMA	1	NA		
3	193-8049	OVERLAY, PANEL BLANK	1	NA		
4	193-8042	MOUNTING PLATE	2	NA		
6	150T-11	ATTEN PRGM, SMARTSTEP	3	AT2, AT4, AT6		
7	150T-110	ATTEN PRGM, SMARTSTEP	3	AT1, AT3, AT5		
10	1568	ADAPT WPM 3 BULKHD	6	NA		
11	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	3	W9, W12, W15		068-32-4/0
12	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	2	W8, W10		068-32-6/0
13	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	4	W11, W13, W14, W16		B068-32-12/0
14	193-9646	CONNECTOR ADAPTER PLATE	6	NA		
15	193-8101	ASSY CONTROLLER TO ATTEN	1	W7		
16	074-912	KIT, RACK MOUNTING W/O HANDLES 3.5 H	1	NA	24803	K2RMX-001A
17	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
18	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
19	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	17	NA		
20	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	12	NA		
21	090-354	* LABEL WARNING, HIGH VOLTAGE	1	NA		
22	090-445	* LABEL, REFERENCE INSTRUCTION MANUAL	1	NA		
25	090-301	* LABEL STD 1.5 X .75 IN	1	NA		
26	IM-303	O & S, ATTEN UNIT, MODEL 8311	1	NA		
27	193-8102	WIRING DIAGRAM, MODEL 8311	0	NA		
28	089-3574	ICD, ATTEN UNIT, MODEL 8311 150 ATTENS	0	NA		

Refer to API / Weinschel Drawing 193-7

