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Operation & Service Manual



Model 8310
Programmable Attenuator Units

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Frederick, Maryland
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SAFETY SUMMARY

DEFINITIONS.

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



WARNING

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.



CAUTION

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.



WARNING

- 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.

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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.

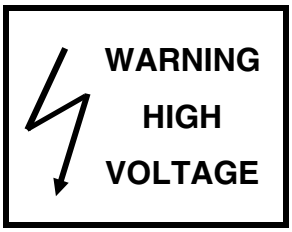
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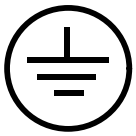
DO NOT return any instrument or component to Weinschel Corporation without receiving prior factory authorization.

SAFETY SYMBOLS.

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









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1. GENERAL INFORMATION:

1-1 PURPOSE: This manual contains setup and operation information for the Aeroflex / Weinschel's 8310 Series of Programmable Attenuator Units. The manual also provides component location, reference designators, part numbers, and nomenclature to identify all the assemblies and sub-assemblies of the Attenuator Unit.

1-2 SCOPE: This manual is to be used in conjunction with the operation and maintenance of a 8310 Series Programmable Attenuator Unit. The manual also provides a description of each assembly; assembly parts list; block diagrams: and general maintenance procedures to maintain the instrument.

1-3 EQUIPMENT DESCRIPTION: Aeroflex / Weinschel's 8310 Series Programmable Attenuator Units represents a new concept in programmable attenuation for bench test and subsystem applications. Standard Model 8310 designs house and control various Aeroflex / Weinschel Programmable Attenuator Models (3200T, 150T, and 4200 Series) via front panel controls or standard communications interfaces including GPIB (IEEE-488) and RS-232/RS-422/RS485. Special configurations also exist where the RF section is designed to specific customer requirements which can contain to multiple programmable attenuations used in-conjunction with other coaxial devices such as switches, power combiners, directional couplers, and filters creating single or multi-channel subsystems.



1-4 USING THE 8310: The 8310 Series provides front-panel and computer control for up to four channels of attenuation, RF switching, or other functions. The 8310 combines the features of the Aeroflex / Weinschel 8210A Device Controller with a front panel user interface to form a flexible, easy to use solution. Most 8310 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 Aeroflex / Weinschel programmable attenuators 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:

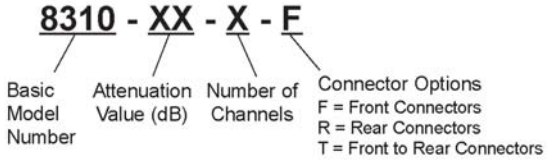
CH1 Port A (Front) to Port A (Rear)
CH2 Port B (Front) to Port B (Rear)
CH3 Port C (Front) to Port C (Rear)
CH4 Port D (Front) to Port D (Rear)

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

Typically Aeroflex / Weinschel digital attenuators are bi-directional and the RF signal can be applied to either Port connector. Channels can be selected by toggling the front panel CHAN button until the desired CH1-CH4 indicator is illuminated. Repeated depressions of the CHAN key will select the next available channel. The main display will show the current attenuation setting of the channel. A new attenuation setting in dB may be entered using the INCR/DECR or ENTRY keys. The front panel STEP key allows the user to define the attenuation step size used by the INCR and DECR keys. Remember that the attenuation step size (resolution) is limited to the physical size of the internal attenuator cells. For example a 0-70 unit with 10 dB steps can only be adjusted in 10 dB increments but larger increments such as 20, 30, 40 dB can be set using this key.

The REL key allows the user to set relative mode for attenuators. 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. Refer to Section 5 for more detailed information about the front panel keys and indicators. All 8310 Series functions can also be controlled via standard communications interfaces including GPIB (IEEE-488) and RS-232/RS-422 /RS485. Refer to Section 6 for bus setup and operating instructions when using the 8310 Series in the remote mode.

Model Number Index:



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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 Corporation 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 Corporation, 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 Aeroflex / Weinschel Corporation until a claim for damages has been established.

1-6. 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:

Aeroflex / 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 8310 Series Programmable Attenuator Unit is possible for extended periods without incurring damage to internal circuitry if the 8310 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

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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.

Manual	Title
H4-1 and H4-2	Federal Supply Code for Manufacturers Cataloging Handbook
IM-276	Operating & Installation Instructions for 3200T & 3201T Series Programmable Attenuators with Digital Interface
IM-275	Operating & Installation Instructions for 150T, 151T, 152T, & 152T Series Programmable Attenuators with Digital Interface
IM-248	Operating & Installation Instructions for 4226 & 4228 Series Programmable Attenuators with Digital Interface

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.

a. 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.

b. 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 Programmable Attenuator Unit.

1-12. POWER REQUIREMENTS: Aeroflex / 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°± 50°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.

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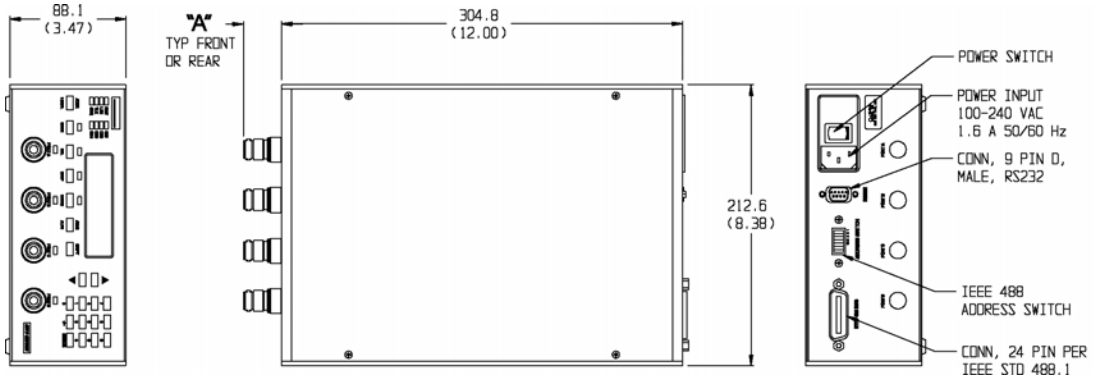
2. SPECIFICATIONS:

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 Tables (pg 9-10)

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:



Connector Type	DIM "A"
N	29.2 (1.15)
SMA	8.6 (0.34)
BNC	18.8 (0.74)
F	9.65 (0.38)

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

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2-3. CONFIGURATIONS\RF SPECIFICATIONS:

Table 1. 3200T & 150T Series-Mechanical Relay:

Model No	Attenuator Value	Frequency Range (GHz)	Insertion Loss	SWR	No of Channels	Attenuator Type	Connector Type	Connector Location	Drawing No
8310-1-F	63/1	dc-1.0 (75 Ω)	6.0 dB max	1.6 max	1	3250T-63	BNC/F	Front	193-7001-1
8310-1-R	63/1	dc-1.0 (75 Ω)	6.0 dB max	1.6 max	1	3250T-63	BNC/F	Rear	193-7001-1
8310-1-2-F	63/1	dc-1.0 (75 Ω)	6.0 dB max	1.6 max	2	3250T-63	BNC/F	Front	193-7001-2
8310-1-2-R	63/1	dc-1.0 (75 Ω)	6.0 dB max	1.6 max	2	3250T-63	BNC/F	Rear	193-7001-2
8310-1-3-T	63/1	dc-1.0 (75 Ω)	6.0 dB max	1.6 max	2	3250T-63	BNC/F	Front to Rear	193-7001-3
8310-2-F	63/1	dc-1.0 (75 Ω)	6.75 dB max	2.0 max	1	3250T-63	F/F	Front	193-7002-1
8310-2-R	63/1	dc-1.0 (75 Ω)	6.75 dB max	2.0 max	1	3250T-63	F/F	Rear	193-7002-1
8310-2-2-F	63/1	dc-1.0 (75 Ω)	6.75 dB max	2.0 max	2	3250T-63	F/F	Front	193-7002-2
8310-2-2-R	63/1	dc-1.0 (75 Ω)	6.75 dB max	2.0 max	2	3250T-63	F/F	Rear	193-7002-2
8310-35-F	127/1	dc-2	6.0 dB max	1.4 max	1	3200T-1	N/F	Front	193-7035-1
8310-35-R	127/1	dc-2	6.0 dB max	1.4 max	1	3200T-1	N/F	Rear	193-7035-1
8310-35-2-F	127/1	dc-2	6.0 dB max	1.4 max	2	3200T-1	N/F	Front	193-7035-2
8310-35-2-R	127/1	dc-2	6.0 dB max	1.4 max	2	3200T-1	N/F	Rear	193-7035-2
8310-35-3-T	127/1	dc-2	6.0 dB max	1.4 max	3	3200T-1	N/F	Front to Rear	193-7035-3
8310-35-4-T	127/1	dc-2	6.0 dB max	1.4 max	4	3200T-1	N/F	Front to Rear	193-7035-4
8310-35-F-E	127/1	dc-3	6.0 dB max	1.4 max	1	3200T-1E	N/F	Front	193-7035-5
8310-35-R-E	127/1	dc-3	6.0 dB max	1.4 max	1	3200T-1E	N/F	Rear	193-7035-5
8310-35-4-T-E	127/1	dc-3	6.0 dB max	1.4 max	4	3200T-1E	N/F	Front to Rear	193-7035-8
8310-36-F	64.5/0.1	dc-2	8.0 dB max	1.4 max	1	3209T-64.5	N/F	Front	193-7036-1
8310-36-R	64.5/0.1	dc-2	8.0 dB max	1.4 max	1	3209T-64.5	N/F	Rear	193-7036-1
8310-36-2-F	64.5/0.1	dc-2	8.0 dB max	1.4 max	2	3209T-64.5	N/F	Front	193-7036-2
8310-36-2-R	64.5/0.1	dc-2	8.0 dB max	1.4 max	2	3209T-64.5	N/F	Rear	193-7036-2
8310-36-3-T	64.5/0.1	dc-2	8.0 dB max	1.4 max	3	3209T-64.5	N/F	Front to Rear	193-7036-3
8310-37-F	63.75/0.25	dc-2	6.0 dB max	1.4 max	1	3200T-2	N/F	Front	193-7037-1
8310-37-R	63.75/0.25	dc-2	6.0 dB max	1.4 max	1	3200T-2	N/F	Rear	193-7037-1
8310-37-2-F	63.75/0.25	dc-2	6.0 dB max	1.4 max	2	3200T-2	N/F	Front	193-7037-2
8310-37-2-R	63.75/0.25	dc-2	6.0 dB max	1.4 max	2	3200T-2	N/F	Rear	193-7037-2
8310-37-3-T	63.75/0.25	dc-2	6.0 dB max	1.4 max	3	3200T-2	N/F	Front to Rear	193-7037-3
8310-37-4-T	63.75/0.25	dc-2	6.0 dB max	1.4 max	4	3200T-2	N/F	Front to Rear	193-7037-4
8310-38-F	63/1	dc-2	5.25 dB max	1.4 max	1	3206T-1	N/F	Front	193-7038-1
8310-38-R	63/1	dc-2	5.25 dB max	1.4 max	1	3206T-1	N/F	Rear	193-7038-1
8310-38-2-F	63/1	dc-2	5.25 dB max	1.4 max	2	3206T-1	N/F	Front	193-7038-2
8310-38-2-R	63/1	dc-2	5.25 dB max	1.4 max	2	3206T-1	N/F	Rear	193-7038-2
8310-38-3-T	63/1	dc-2	5.25 dB max	1.4 max	3	3206T-1	N/F	Front to Rear	193-7038-3
8310-38-4-T	63/1	dc-2	5.25 dB max	1.4 max	4	3206T-1	N/F	Front to Rear	193-7038-4
8310-38-F-E	63/1	dc-3	5.25 dB max	1.4 max	1	3206T-1E	N/F	Front	193-7038-5
8310-201-F	70/10	dc-18	3.25 dB max	1.75	1	150T-70	Sma/F	Front	193-7201-1
8310-201-R	70/10	dc-18	3.25 dB max	1.75	1	150T-70	Sma/F	Rear	193-7201-1
8310-201-2-F	70/10	dc-18	3.25 dB max	1.75	2	150T-70	Sma/F	Front	193-7201-2
8310-201-2-R	70/10	dc-18	3.25 dB max	1.75	2	150T-70	Sma/F	Rear	193-7201-2
8310-202-F	121/1	dc-18	5.25 dB max	1.95	1	150T-11+ 150T-110	Sma/F	Front	193-7202-1
8310-202-R	121/1	dc-18	5.25 dB max	1.95	1	150T-11+ 150T-110	Sma/F	Rear	193-7202-1
8310-203-F	105/1	dc-18	6.75 dB max	1.85	1	152T-15+ 152T-90	Sma/F	Front	193-7202-2
8310-203-R	105/1	dc-26.5	6.75 dB max	1.85	1	152T-15+ 152T-90	Sma/F	Rear	193-7202-2
8310-204-F	62/2	dc-18	3.25 dB max	1.95	1	150T-62	Sma/F	Front	193-7204-1
8310-204-R	62/2	dc-18	3.25 dB max	1.95	1	150T-62	Sma/F	Rear	193-7204-1
8310-204-2-F	62/2	dc-18	3.25 dB max	1.95	2	150T-62	Sma/F	Front	193-7204-1
8310-204-2-R	62/2	dc-18	3.25 dB max	1.95	2	150T-62	Sma/F	Rear	193-7204-1

Table 1, Continued on next page

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Table 1. 3200T & 150T Series-Mechanical Relay (Continued):

Model No	Attenuator Value	Frequency Range (GHz)	Insertion Loss	SWR	No. of Channels	Attenuator Type	Connector Type	Connector Location	Drawing Number
8310-352-1-F	0-103/1 dB	dc-6.0 GHz	6.0 dB max	1.55	1	3408T-103	N/F	Front	193-7403-1
8310-352-1-R	0-103/1 dB	dc-6.0 GHz	6.0 dB max	1.55	1	3408T-103	N/F	Rear	193-7403-1
8310-352-2-F	0-103/1 dB	dc-6.0 GHz	6.0 dB max	1.55	2	3408T-103	N/F	Front	193-7403-2
8310-352-2-R	0-103/1 dB	dc-6.0 GHz	6.0 dB max	1.55	2	3408T-103	N/F	Rear	193-7403-2
8310-352-3-T	0-103/1 dB	dc-6.0 GHz	6.0 dB max	1.55	3	3408T-103	N/F	Front-Rear	193-7403-3
8310-352-4-T	0-103/1 dB	dc-6.0 GHz	6.0 dB max	1.55	4	3408T-103	N/F	Front-Rear	193-7403-4

Table 2. 4200 Series-Solid-State, Pin Switched

Model No	Attenuator Value	Frequency Range (GHz)	Insertion Loss	SWR	No. of Channels	Attenuator Type	Connector Type	Connector Location	Drawing Number
8310-136-F	63.75/0.25	0.8-2.5	6.0 dB max	1.6 max	1	4226T-63.75	N/F	Front	193-7136-1
8310-136-R	63.75/0.25	0.8-2.5	6.0 dB max	1.6 max	1	4226T-63.75	N/F	Rear	193-7136-1
8310-136-2-F	63.75/0.25	0.8-2.5	6.0 dB max	1.6 max	2	4226T-63.75	N/F	Front	193-7136-2
8310-136-2-R	63.75/0.25	0.8-2.5	6.0 dB max	1.6 max	2	4226T-63.75	N/F	Rear	193-7136-2
8310-137-F	63/1	0.8-3.0	4.7 dB max	1.6 max	1	4226T-63	N/F	Front	193-7137-1
8310-137-R	63/1	0.8-3.0	4.7 dB max	1.6 max	1	4226T-63	N/F	Rear	193-7137-1
8310-137-2-F	63/1	0.8-3.0	4.7 dB max	1.6 max	2	4226T-63	N/F	Front	193-7137-2
8310-137-2-R	63/1	0.8-3.0	4.7 dB max	1.6 max	2	4226T-63	N/F	Rear	193-7137-2
8310-138-F	103/1	0.8-3.0	6.0 dB max	1.6 max	1	4228T-103	N/F	Front	193-7138-1
8310-138-R	103/1	0.8-3.0	6.0 dB max	1.6 max	1	4228T-103	N/F	Rear	193-7138-1
8310-138-2-F	103/1	0.8-3.0	6.0 dB max	1.6 max	2	4228T-103	N/F	Front	193-7138-2
8310-138-2-R	103/1	0.8-3.0	6.0 dB max	1.6 max	2	4228T-103	N/F	Rear	193-7138-2
8310-138-3-T	103/1	0.8-3.0	6.0 dB max	1.6 max	3	4228T-103	N/F	Front-Rear	193-7138-3
8310-138-4-T	103/1	0.8-3.0	6.0 dB max	1.6 max	4	4228T-103	N/F	Front-Rear	193-7138-4

3. INSTALLATION:

3-1. RACKMOUNTING: Standard 8310 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 8310 can also be rack mounted as a single unit using Rack Mounting Kit (P/N 193-8033-1) or two Model 8310's can be mounted together using Rack Mounting Kit (P/N 193-8033-2). Using these kits will allow the Model 8310 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 Attenuator Unit.

a. Perform inspection paragraph 1-5 prior to connecting the 8310 Series to any power source.

b. Check that the external power source outputs to the 8310 Series are in accordance with Section 2, Specifications.

c. Install the 8310 Series into a cabinet or rack, if desired.

d. Using the supplied power cord connect the 8310 Series to the external power source.

e. Setup the IEEE-488 bus address or RS-232/422 Communications options for your application using paragraphs 5-2. If using the RS-422 serial configure the selectable signal pair terminations using paragraph 5-4.

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3-3 INPUT/OUTPUT OPTIONS: The following paragraphs provide a description of the connections that can be made to the 8310 Series Attenuator Unit. Figure 1 shows the location of these connectors and switches.

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.

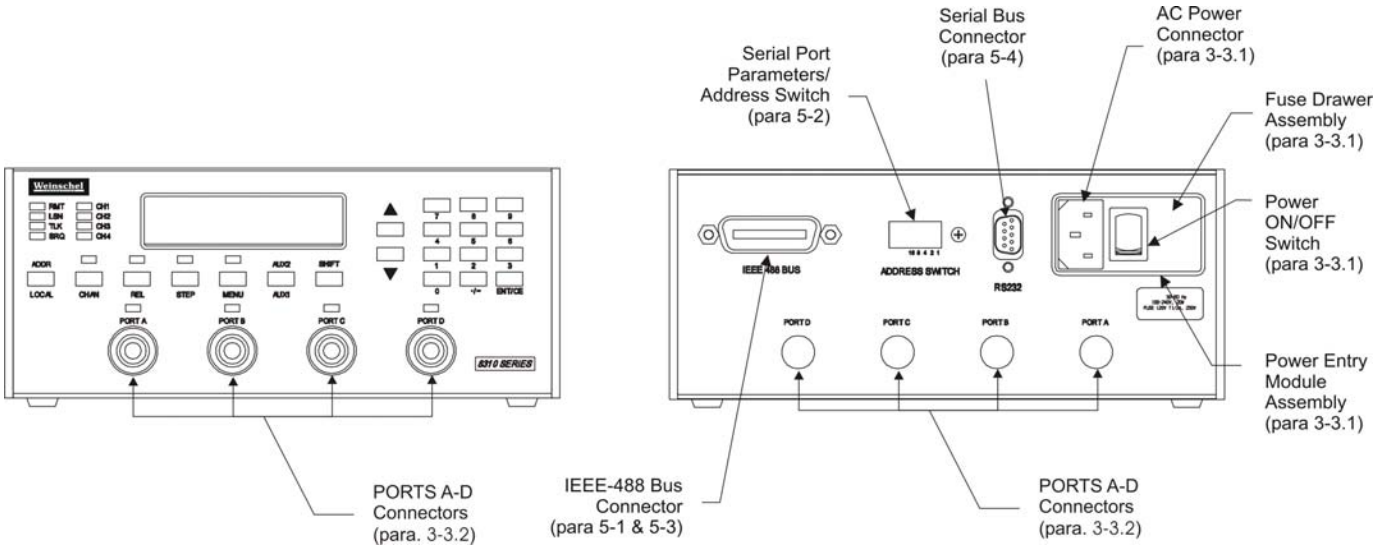


Figure 1. Front & Rear Panel Connectors

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 8310 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 8310.

3-3.2. PORTS A-D CONNECTORS: A typical 8310 Series Attenuator Unit contains 4 four standard D holes on the front and rear panel allowing for single or multi-channel configurations. Standard Model 8310'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 8310 (Connector location specified by customer when ordering). Some special configurations could contain Aeroflex / Weinschel's Model 1568 SMA Panel Adapters or other types of crowns (see accessories for other types).

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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 Aeroflex / Weinschel.

4. FRONT PANEL CONTROLS & INDICATORS:

The following paragraphs provide setup and general guidelines for operating the 8310 Series ***Programmable*** Attenuator Unit and its different bus configurations. Also provided is a general description of the internal circuitry of the 8310.

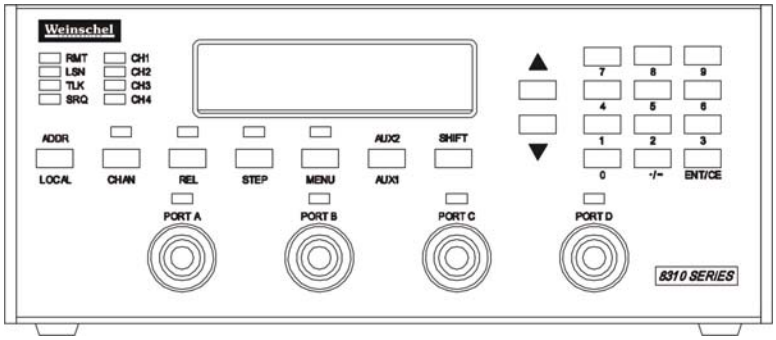


Figure 2. 8310 Series Front Panel

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.

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 8310 in local operation mode, unless the key function has been overridden via an IEEE-488.2 local lockout or execution of the LOCKOUT command.

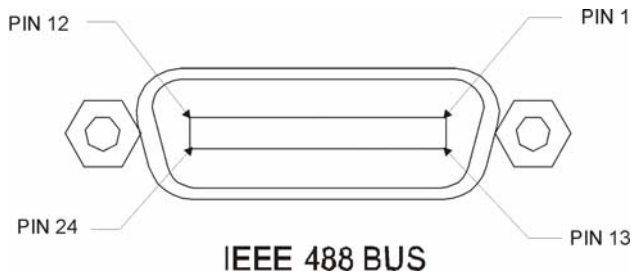
ADDR: This key displays the current IEEE-488.2 address. The address may be changed from the front-panel, however, the initial setting at power on is derived from the rear-panel address switch.

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5. REMOTE OPERATION:

The following paragraphs provide setup and general guidelines for operating the Model 8310 using an external controller.

5-1. IEEE-488 INTERFACE BUS CONNECTOR: Joining the Model 8310-1 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

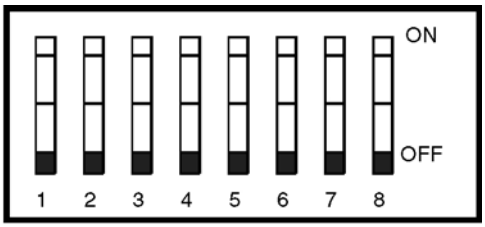
* GND (N) refer to the signal ground return of the referenced pin.
** Return pin on pin 24.

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.

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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 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

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

The internal functions of Model 8310 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 8310 *Programmable* Interface's IEEE-488 bus operation. During bus operation a flashing LSN indicates that the Model 8310 is receiving. The RMT indicator is illuminated when the Model 8310 is in the remote state.

The table below summarizes the IEEE-488.1 interface functions that are implemented by the Model 8310.

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 8310 is IEEE-488.2 compliant. The 8310 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 8310 program message units may be divided into two syntax groups: commands and queries. Refer to the section on command syntax for more information.

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5-4. Serial Operation: The serial interface (RS232/RS422) provides a means of remotely programming the 8310 via external computer. The 8310 provides for user-selectable communications parameters via a DIP switch (SW1), including baud rate, data format, and handshaking method. LED indicators are provided for transmit (TX) and receive (RX) activity. Selection between RS232/RS422 mode is controlled via an internal 4 position DIP switch SW2, which also provides for user-selectable 120 ohm terminations for the RS422 receiver lines. The RS422 mode transceivers are electrically compatible with RS485.

SW2	RS232	RS422 RS485	Description
1	OFF	User Select	CTS Termination On = Termination Off = No Termination
2	OFF	User Select	RXD Termination On = Termination Off = No Termination
3	OFF	ON	RI/RTS Select
4	ON	OFF	Serial Mode On = RS232 Off = RS422

The data format includes a start bit, eight data bits, and one stop bit (N81). The Baud Rate may be set to 2400, 9600, 19200, or 34800. Parity selections include settings for None, Even, or Odd parity. Handshaking may be enabled, if desired, and the method may be set to either hardware (RTS/CTS) or software (XON/XOFF). For interactive terminal use, echoing may be enabled, in which the 8210A will echo all characters received back to the terminal.

All data and commands are encoded using the ASCII character set. The syntax for commands is the same as for GPIB operation, and uses the syntax structure defined by IEEE 488.2, with the exception of the command termination rules. Commands sent to the 8210A may be terminated with either an ASCII CR (0x0D) or ASCII LF (0x0A) character. By default, all responses from the 8210A are terminated in an ASCII CR/LF sequence (0x0D followed by 0x0A).

Software handshaking uses the XON/XOFF scheme in which an ASCII DC3 (0x13) character is transmitted by the receiver to indicate that data transmission should be halted (XOFF), and an ASCII DC1 (0x11) character is transmitted to indicate that data transmission may continue (XON). Hardware handshaking utilizes the RTS and CTS lines. When the RTS output signal is asserted true, the unit is ready for data. This signal should be connected to the external computer's CTS input signal, so that when the receiver is ready, the transmitter may send data. When the unit is not ready for data, it unasserts the RTS signal, halting data transmission. Likewise, the unit monitors the CTS input signal during data transmission, halting transmission if the external computer unasserts it's RTS signal. In addition, the 8310 unasserts the RTS signal while command execution is in progress.

For those systems incorporating local front panel controls, the serial port can lockout local users, providing a Remote/ Local function similar to that of GPIB operation.

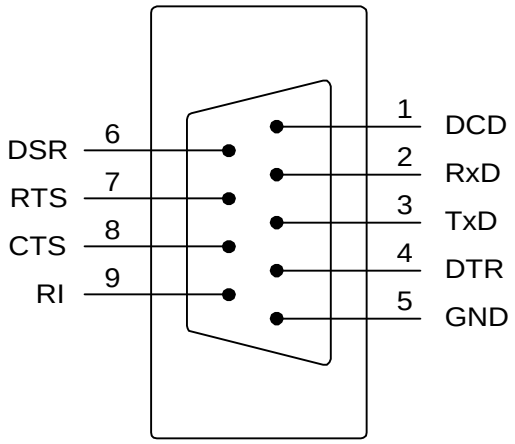
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5-4.1. RS-232 Operation: The RS-232 Serial port is a 9-pin connector that is compatible with the pin-out of the serial port on a PC. It allows the use of a null-modem style cable. The pin-out for the connector is show below. For clarity, the signal names and directions are relative to the 8310.

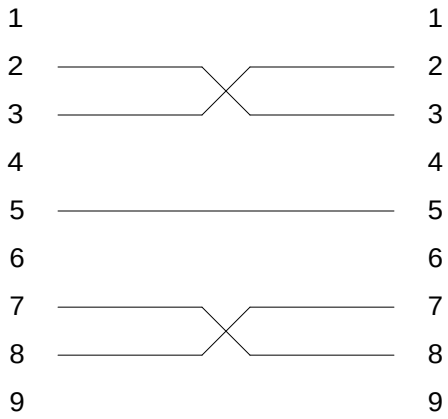
Pin	Signal Name	Description	Direction
1	DCD	unused	---
2	RxD	Receive data	input
3	TxD	Transmit data	output
4	DTR	Signals DTE is on-line	output
5	GND	Ground	---
6	DSR	unused	---
7	RTS	Signals DTE is ready	output
8	CTS	Signals DCE is ready	input
9	RI	unused	---

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

RS232
9-pin DB9
Pinout



Null Modem Cable

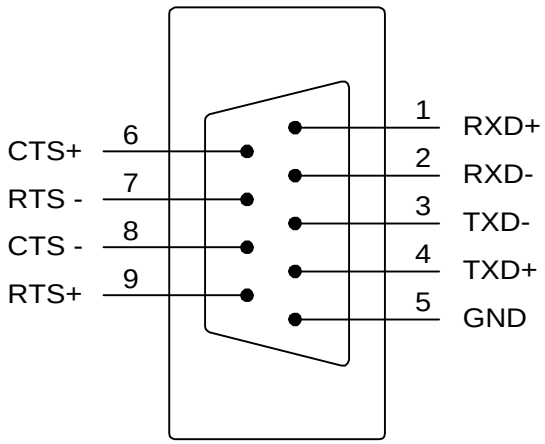


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5-4.2. RS-422/485 Operation: The RS-422/RS-485 Serial mode is useful in applications requiring long cable lengths (up to 5000 ft at 9600 baud), or in electrically noisy environments. All communication parameters available for the RS232 port are also 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 8310.

Pin	Signal Name	Description	Direction
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

RS422
9-pin DB9 Pinout



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5-5. Status Reporting

The 8310A implements the 488.2 Status Reporting Structure, which utilizes the IEEE488.1 status byte with additional data structures and rules. The Status Byte Register can be read with either a serial poll (IEEE-488 operation only) or the *STB? common query command. The Service Request Enable Register (SRE) allows the user to select which bits in the Status Byte Register may cause service requests. A bit value of one indicates that the corresponding event is enabled, while a bit value of zero disables an event. The Service Request Enable Register may be accessed with the *SRE and *SRE? common commands. The Status Byte Register may be cleared with the *CLS common command, with the exception of the MAV bit, which is controlled by the operation of the Output Queue. The SRE Register is set to 0 at power-on, disabling all events.

Status Byte Register/ Service Request Enable Register Formats

D7	D6	D5	D4	D3	D2	D1	D0
	RQS	ESB	MAV		EEQ		

Bit	Mnemonic	Description
6	RQS	Request Service: This bit, if set, indicates that the device is asserting the SRQ signal.
5	ESB	Event Status Bit: This bit is true when an enabled event in the Event Status Register is true.
4	MAV	Message Available: This bit is true when there is valid data available in the output queue.
2	EEQ	Error/Event Queue: This bit is true when there is Error/Event data available in the Error/Event queue.

The Standard Event Status Register is used to report various IEEE 488.2-defined events. The register contents may be accessed with the *ESR? command. An Event Status Enable Register allows the user to select which bits in the ESR that will be reflected in the ESB summary message bit of the Status Byte Register. The Event Status Enable Register may be accessed with the *ESE and *ESE? common commands. The Event Status Register is cleared by an *ESR? query or *CLS common command. The ESE Register is set to 0 at power-on, disabling all events.

Standard Event Status Register/ Standard Event Status Enable Register Formats

D7	D6	D5	D4	D3	D2	D1	D0
ON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Bit	Mnemonic	Description
7	PON	Power On: This bit indicates that the device has powered-on
6	URQ	User Request: This event bit indicates that a local control is causing a User Request
5	CME	Command Error: The parser has detected a syntax error in the current command.
4	EXE	Execution Error: The command could not be properly executed due to an illegal input range or other inconsistent data.
3	DDE	Device Dependent Error: A command could not properly complete due to some device specific error
2	QYE	Query Error: This bit indicates that either an attempt has been made to read data when there was none present, or that data in the Output Queue has been lost
1	RQC	Request Control: The device is requesting control (not implemented)
0	OPC	Operation Complete: This bit is generated in response to an *OPC command. It indicates that the ITS 2000 has completed all pending operations.

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The Status Reporting Registers may be used for serial communications, with certain limitations. The Status Byte Register can only be read via the *STB? query command, as the comm port does not provide for a serial poll operation. Also, as data in the Output Queue is sent automatically during serial operation, the MAV message available bit in the STB serves no purpose.

5-6. GENERAL SYNTAX STRUCTURE: The following paragraphs outline the general syntax and command structure for the Model 8310. This structure is common to all bus flavors of the Model 8310.

NOTE

In the descriptions that follow, the term whitespace is used to define a sequence of one or more combinations of ASCII Space (20h), Carriage return (0Dh), or Tab (09h) characters.

5-6.1 SYNTAX OF QUERIES: A query message unit is made up of a query header ending in an ASCII question mark character '?' (3FH), followed by optional whitespace, and ended by a program message terminator. To form a multiple query, separate the individual program message units with a semicolon.

Examples : "ATTN?"
"ASSIGN?"

b. Multiple Query Commands:

"ATTN?; ASSIGN?"

5-6.2 SYNTAX OF COMMANDS: A command message unit is made up of a command header, optionally followed by an argument and units, and ended by a program message terminator. If multiple commands are made on the same program line, separate the individual command messages with a semicolon.

Arguments - The 8310 supports a variety of argument types that can be used in program commands. These types are:

- Character Program Data
- Integer Numeric Program Data
- Real Numeric Program Data

Each data type has its own rules of syntax. The following paragraphs provide the syntax rules for each of the argument types listed above.

Character Program Data-This data type is comprised of the set of printable ASCII characters (excluding those used as delimiters). Character program data represents alpha or alphanumeric strings. The use of alpha characters is case-insensitive. If the first character of the string is not an alpha character, then the string must be delimited with either the ASCII single-quote (') or double-quote (") character in order to distinguish the string from a numeric data type.

Examples: ATTEN1
ON
"150T"

Integer Numeric Program Data-This data type is used to represent integer, binary, or hexidecimal numeric information, all of which may be used interchangeably. Integer data is comprised of the numeric digits '0'-'9', binary data is comprised of the digits '0' and '1' preceded by the characters '#B', and hexidecimal data is comprised of the digits '0'-'9', and the letters 'A'-'F', preceded by the characters '#H' or the C language style prefix '0x'.

Examples: 123 (integer)
#H55 (hex)
0xAA (hex)
#B1010 (binary)

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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 8310 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.

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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 *mask*
Argument(s): *mask* integer bitmask
Remarks: This function is used to set the Event Status Enable Register to the value specified by mask.
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: *mask* 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: *reg* integer register
Example(s): *ESR? returns the following '128'

***SRE**
Function: Sets the Status Byte Enable Register
Syntax: *SRE *mask*
Argument(s): *mask* integer bitmask
Remarks: This function is used to set the Status Byte Enable Register to the value specified by *mask*.
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: *mask* 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: *reg* 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: *mfg* integer count of devices
Example(s): *IDN? returns the following 'Weinschel,8310 Series, 123, 1.00A'

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***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 the8310 Series from executing any further commands or queries until there are no pending operations. The8310 Series executes all commands sequentially, and does not allow overlapping commands.
	Return Value:	none
	Example(s):	*WAI

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5-9. GENERAL COMMANDS:

CHAN

Function: Selects the currently active channel
Syntax: CHAN *chnum*
Argument(s): *chnum* 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: *chnum* integer current channel number
Example(s): CHAN? returns '1'

ATTN

Function: Set attenuation
Syntax: ATTN *atten*
Argument(s): atten real desired value, in dB
Remarks: This function sets the attenuation of the currently selected channel to atten.
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: *atten* real attenuation value, in dB
Example(s): ATTN? returns '63.00'

REL

Function: Sets relative display mode for the current channel
Syntax: REL *mode*
Argument(s): *mode* 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 mode 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: *refatten* real reference attenuation value, in dB
Example(s): REF? returns '30.00'

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RELATTN	**Function:**	Sets attenuation relative to the reference setting
	Syntax:	RELATTN atten
	Argument(s):	*atten* real desired value, in dB
	Remarks:	This function sets the attenuation of the currently selected channel to atten, 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:	*relatten* real relative attenuation value, in dB
	Example(s):	RELATTN? returns '-10.00'
STEPSIZE	**Function:**	Sets attenuation stepsize for the current channel
	Syntax:	STEPSIZE atten
	Argument(s):	*atten* real desired stepsize value, in dB
	Remarks:	This function sets the attenuation stepsize for the INCR and DECR commands for the current channel to atten. 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:	*atten* 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:	INCR
	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

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6. GENERAL CIRCUIT DESCRIPTION:

This section contains general descriptions and systematic explanation of the Model 8310's design and internal circuitry. Standard 8310 Series Programmable Attenuator Units contain internal circuitry to control a variety of Aeroflex / Weinschel programmable attenuators (3200T, 150T, and 4200 Series) via front panel controls or standard communications interfaces including GPIB (IEEE-488) and RS-232/RS-422 /RS485. Figure 5 provides a simplified block diagram of the 8310's internal circuitry.

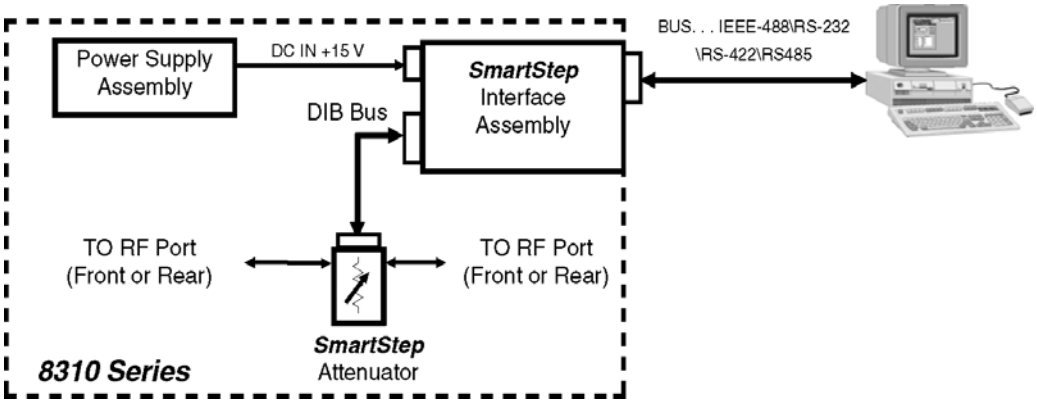


Figure 5. 8310 Series Simplified Block Diagram

6-1. POWER SUPPLY ASSEMBLY: The Model 8310 contains a high-efficiency switching type Power Supply Assembly (A3) which will operate with a 100 to 240 Vac input power source. The input power source is routed thru the Power Entry Module Assembly (XF1) before being applied to the Power Supply Assembly. The Power Entry Module Assembly allows the user to select between the two operational voltage ranges that can be accepted by the Power Supply Assembly. This Switching Power Supply provides the Model 8310 with +15 ±0.25 V @ 3.3 A outputs. These outputs are then routed to the Programmable Interface Assembly for distribution to the other assemblies located in the Model 8310. Drawing 193-8040 & 193-8087 shows the actual power distribution for all assemblies and modules located in the 8310.

6-2. STATUS DISPLAYS AND SWITCH CONTROL ASSEMBLY. This assembly located behind the front panel contains a group of LED's that indicates the status of bus operation and channel/port selection . The Switch/LED Status PCB Assembly contains control switches which are used to set the GPIB address information, selected desired port/channel, select the mode of operation (Local or Remote) and manually control and enter parameters for devices installed in the Model 8310. These control switches operate in a toggle fashion, i.e., push for ON and push for OFF. Refer to Section 5 for an operational description of each LED and switch located on the front panel.

6-3. DIGITAL INTERFACE ASSEMBLY: This assembly is responsible for programming and control of the Driver PCB Assembly, GPIB bus operation, and front panel Switch/LED control. The Digital Interface Assembly provides a high-level interface from a standard communications interface including GPIB (IEEE-488) and RS-232/RS-422/RS485, to the 8310's serial Driver Interface Bus. The Device Interface Bus (DIB) is a system for connecting a number of relatively low-speed I/O devices to a host, providing a simple, uniform, and inexpensive way to control a variety of devices via a single port. The DIB is based on the two-wire I^2C serial bus and several software protocol layers that allow the *Programmable* Interface Assembly to address the internal devices, with serial data rates of up to 100 KHz. The DIB may also be used to supply DC power to other devices that may be installed in custom applications, resulting in a simple, low-cost interconnection system.

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6-4. RF SECTION: Most Standard 8310 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 Aeroflex / Weinschel programmable attenuators 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 which can 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 8310 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.

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7. MAINTENANCE:

The following paragraphs provide general inspection and maintenance guide lines for the 8310 Series ***Programmable*** Attenuator Units.

7-1. INSPECTION: Perform a visual inspection in conjunction with the maintenance activities schedule when a malfunction is suspected, or whenever an assembly is removed or replaced.

7-2. PREVENTIVE MAINTENANCE: While the 8310 requires very little preventive maintenance, it should not be subjected to physical abuse, severe mechanical shock, high humidity, or operating temperatures outside the specification range. The instrument should be kept free of excessive dirt and dust, since these can interfere with connector functions and with normal heat dissipation. For cleaning instructions refer to paragraph 7-3 (special cleaning instructions). The following paragraphs provide the preventive maintenance that is to be performed on the Unit.

Care should be taken to prevent strain on the interconnecting cables, since damage here may not always be apparent. Occasionally check the external cables and connectors for signs of cracked insulation and/or bent or worn pins. Tests show that connectors must be clean for accuracy and stability. This requires an inspection and cleaning of each connector immediately before use. For connector cleaning instructions, refer to paragraph 4-3. When cleaning precautions are observed regularly, connectors can maintain their stability for over several thousand connection cycles. Refer to Appendix A for more information about cables and connectors.

7-3. SPECIAL CLEANING INSTRUCTIONS: The cleaning procedures for 8310 are divided into five general groups: microwave coaxial cable assemblies, circuit card and modules; machined surfaces and hardware, chassis cleaning, and connector cleaning.

7-3.1. MICROWAVE COAXIAL CABLE ASSEMBLIES: Appendix A (located at the end of this manual) provides all the necessary procedures for care, cleaning, and handling of microwave coaxial cable assemblies.

7-3.2 CIRCUIT CARDS AND MODULES: A protective coating is applied to circuit cards for protection from moisture, arcing, short-circuiting, and abrasion. To remove light dirt from circuit cards and modules proceed as follows:

CAUTION

- 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.

a. Briskly brush isopropyl alcohol onto area to be cleaned with fiber-bristle brush.

b. Carefully remove residue with a clean lint-free cloth and repeat step "a" as a rinse.

WARNING

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 15 psi to avoid personal injury.

c. When parts are thoroughly clean, dry parts using 5 psi of clean moisture free compressed air or preferably dry nitrogen (pressurized spray will work well).

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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/ faceshields 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.

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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.

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8. REPLACEABLE PARTS LIST:

This section lists and describes the parts located in Standard 8310 Series Programmable Attenuator Units (P/N 193-70XX-X). The Replaceable Parts Lists (RPL) are intended for use in identifying, locating, and requisitioning assemblies and components for the Model 8310.

8-1 UNDERSTANDING REFERENCE DESIGNATORS: All assemblies and electrical parts are identified by standard reference designators (resistors R1, for example). Reference designators are used in parts lists and on parts identification drawings. The title of a parts list or drawing contains the reference designator or the assembly or subassembly to which it applies. The designators in the parts list, as a prefix, but omitted from the list to make it easier to locate a specific part. To complete a reference designator in a parts list, precede the designator for the specific part (DS1, for example) with the designator in the title (A6, for example) to form a complete reference designator for the part (in this case, A6DS1).

8-2 ORDERING INFORMATION: When ordering parts from Weinschel, please include the following information:

- Aeroflex / Weinschel part number.
- Description of the component or part.
- Model and serial number of the instrument.
- Assembly number and assembly revision (if any) from the assembly (this information is on the component side of the PCB).

8-3 DRAWING NUMBER: The Aeroflex / Weinschel part number consists of a basic number with a dash number. The basic number should cross reference to a drawing number for most of the items. For those items that do not have a drawing number, the manufacturers part number is provided.

8-4 REPLACEABLE PARTS LIST (RPL): This RPL contains a breakdown of the instrument into its major assemblies and detailed parts. The following paragraphs describe the contents of each column of the RPL.

8-4.1 REFERENCE DESIGNATOR: This column contains reference designations arranged in alphanumerical sequence. The letters A thru Z have precedence, followed by numerals 0 thru 9. In addition to the reference designators that are listed, some mechanical parts are also listed. These items lack reference designators and are included because they are considered subject to wear and/or breakage, or because they are custom (non-standard) hardware or parts that might become lost or damaged. This column contains the word N/A for those items or parts not having a reference designator.

8-4.2 DESCRIPTION: This column contains the nomenclature located in the title block of the engineering drawing by the designing activity. The noun name is listed first, followed by modifiers and descriptive information to completely identify the part or assembly.

8-4.3 PART NUMBER: This column contains the Weinschel part number assigned to an assembly, sub-assembly, or detailed part. This also includes Weinschel numbers for specification control, source control, and altered items drawings.

8-4.4 VENDOR PART NO.: This column contains manufacturers part numbers for those parts Weinschel purchases, as off the shelf items and assigns Weinschel part numbers for internal control only. These parts may be ordered through the manufacturer or through Weinschel by the Weinschel part number.

8-4.5 CAGE CODE: This column provides the Commercial and Government Entity (CAGE) code on the same line as the applicable part number. Codes, names, and addresses of venders with an assigned CAGE are listed in Cataloging Handbook H4-1 and H4-2. Vendors that have not been assigned CAGE codes by the government are identified by the word NONE in this column. The names and addresses of these venders can be obtained from Weinschel. Part numbers that have no CAGE numbers listed are manufactured or altered by Weinschel.

8-4.6 ASSEMBLY AND COMPONENT LOCATION: The assembly/component location and schematic diagrams for the different 8310 series models are located in rear of this manual by the drawing number. Drawing find numbers have also been included to help locate components or hardware.

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Table 3. Model 8310-1-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7001-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-9207	MOUNTING PLATE	1	NA		
3	3250T-63	ATTEN PRGM, 63 dB/1 dB STEPS 75 OHMS	1	AT1		
4	193-9209	ASSY, CABLE, CONT TO ATTENUATORS	1	W1		
6	193-9135-2	ASSY, COAX CABLE, BNC MALE TO FEMALE, BULKHEAD, 75 OHM	1	NA		
7	193-9135-5	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	1	NA		
8	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
9	074-761	HOLE PLUG BLACK	6	NA	83330	3092
10	193-9213	SPACER, LOCKING	2	NA		
14	NAS662C2R4	SCR FLAT HD 2-56 X 1/4 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3249	ICD, ATTEN UNIT, MODEL 8310, 3250 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 4. Model 8310-1-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7001-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-9207	MOUNTING PLATE	1	NA		
3	3250T-63	ATTEN PRGM, 63 dB/1 dB STEPS 75 OHMS	2	AT1, AT2		
4	193-9209	ASSY, CABLE, CONT TO ATTENUATORS	1	W1		
6	193-9135-2	ASSY, COAX CABLE, BNC MALE TO FEMALE, BULKHEAD, 75 OHM	2	NA		
7	193-9135-5	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	2	NA		
8	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
9	074-761	HOLE PLUG BLACK	4	NA	83330	3092
10	193-9213	SPACER, LOCKING	4	NA		
12	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
14	NAS662C2R4	SCR FLAT HD 2-56 X 1/4 LG 100	4	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3249	ICD, ATTEN UNIT, MODEL 8310, 3250 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Weinschel Drawing 193-7001 for parts location.

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Table 5. Model 8310-1-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7001-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-9207	MOUNTING PLATE	1	NA		
3	3250T-63	ATTEN PRGM, 63 dB/1 dB STEPS 75 OHMS	3	AT1, AT2 AT3		
4	193-9209	ASSY, CABLE, CONT TO ATTENUATORS	1	W1		
6	193-9135-2	ASSY, COAX CABLE, BNC MALE TO FEMALE, BULKHEAD, 75 OHM	3	NA		
7	193-9135-5	COAXIAL CABLE ASSY, BNC MALE TO FEMALE BULKHEAD, 75 OHM	3	NA		
8	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
9	074-761	HOLE PLUG BLACK	4	NA	83330	3092
10	193-9213	SPACER, LOCKING	4	NA		
12	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
14	NAS662C2R4	SCR FLAT HD 2-56 X 1/4 LG 100	4	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3249	ICD, ATTEN UNIT, MODEL 8310, 3250 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Weinschel Drawing 193-7001 for parts location.

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Table 6. Model 8310-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7002-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-9207	MOUNTING PLATE	1	NA		
3	3250T-63	ATTEN PRGM, 63dB/1dB STEPS 75 OHMS	1	AT1		
4	193-9209	ASSY, CABLE, CONT TO ATTENUATORS	1	W1		
6	193-8077-1	ASSY, CABLE, COAXIAL BNC MALE TO F-MALE, 75 OHM	1	NA		
7	193-8077-2	ASSY, CABLE, COAXIAL, BNC MALE TO F-MALE, 75 OHM	1	NA		
8	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
9	074-761	HOLE PLUG BLACK	6	NA	83330	3092
11	063-277	ADAPTER, F-JACK TO F-JACK	2	NA	43321	BA330A
14	NAS662C2R5	SCR FLAT HD 2-56 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3249	ICD, ATTEN UNIT, MODEL 8310 3250 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 7. Model 8310-2-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7002-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310	1	NA		
2	193-9207	MOUNTING PLATE	1	NA		
3	3250T-63	ATTEN PRGM, 63 dB/1 dB STEPS 75 OHMS	2	AT1,AT2		
4	193-9209	ASSY, CABLE, CONT TO ATTENUATORS	1	W1		
6	193-8077-1	ASSY, CABLE, COAXIAL, BNC MALE TO F-MALE, 75 OHM	2	NA		
7	193-8077-2	ASSY, CABLE, COAXIAL, BNC MALE TO F-MALE, 75 OHM	2	NA		
8	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
9	074-761	HOLE PLUG BLACK	4	NA	83330	3092
11	063-277	ADAPTER, F-JACK TO F-JACK	4	NA	43321	BA330A
12	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
14	NAS662C2R5	SCR FLAT HD 2-56 X 5/16 LG 100	4	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3249	ICD, ATTEN UNIT, MODEL 8310, 3250 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Weinschel Drawing 193-7002 for parts location.

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Table 8. Model 8310-35-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 9. Model 8310-35-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY SMA M/M, CONFORMABLE DC - 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7035 for parts location.

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Table 10. Model 8310-35-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1	ATTEN PRGM, SMARTSTEP	3	AT1 - AT3		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	6			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 11. Model 8310-35-4-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-4):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1	ATTEN PRGM, SMARTSTEP	4	AT1 - AT4		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	8			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	8	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7035 for parts location.

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Table 12. Model 8310-35-F-E, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-5):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1E	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY SMA M/M, CONFORMABLE DC - 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 13. Model 8310-35-4-T-E, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-8):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1E	ATTEN PRGM, SMARTSTEP	2	AT1 - AT4		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	8			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	8	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7035 for parts location.

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Table 14. Model 8310-36-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7036-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3209T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 15. Model 8310-36-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7036-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3209T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY SMA M/M, CONFORMABLE DC - 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7036 for parts location.

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Table 16. Model 8310-36-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7035-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3209T-1	ATTEN PRGM, SMARTSTEP	3	AT1 - AT3		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	6			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7036 for parts location.

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Table 17. Model 8310-37-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7037-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-2	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 18. Model 8310-37-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7037-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-2	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY SMA M/M, CONFORMABLE DC - 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Weinschel Drawing 193-7037 for parts location.

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Table 19. Model 8310-37-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7037-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-2	ATTEN PRGM, SMARTSTEP	3	AT1 - AT3		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	6			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 20. Model 8310-37-4-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7037-4):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-2	ATTEN PRGM, SMARTSTEP	4	AT1 - AT4		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	8			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	8	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7037 for parts location.

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Table 21. Model 8310-38-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7038-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3206T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 22. Model 8310-38-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7038-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3206T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY SMA M/M, CONFORMABLE DC - 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7038 for parts location.

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Table 23. Model 8310-38-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7038-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3206T-1	ATTEN PRGM, SMARTSTEP	3	AT1 - AT3		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	6			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 24. Model 8310-38-4-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7038-4):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3206T-1	ATTEN PRGM, SMARTSTEP	4	AT1 - AT4		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	8			068-32-4/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	8	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7038 for parts location.

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Table 25. Model 8310-38-F-E, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7038-5):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3206T-1E	ATTEN PRGM, SMARTSTEP	4	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8039	MOUNTING PLATE	1	NA		
3	3200T-1	ATTEN PRGM, SMARTSTEP	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE DC TO 18 GHz	1	NA		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY SMA M/M, CONFORMABLE DC - 18 GHz	1	NA		068-32-12/0
8	193-8041	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3244	ICD, ATTEN UNIT, MODEL 8310, 3200 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7038 for parts location.

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Table 26. Model 8310-136-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7136-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2072-1	ASSY, ATTEN, PROG, 8 CELL, 63.75/.25dB, SMA F/F	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W9		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz DC - 18 GHz	1	W10		068-32-12/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	1	W11		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5 V)	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 27. Model 8310-136-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7136-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2072-1	ASSY, ATTEN, PROG, 8 CELL, 63.75/.25dB, SMA F/F	2	AT1, AT2		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W9, W12		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W10, W13		068-32-12/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	1	W11		
9	193-8086-2	ASSY, CABLE. ATTEN TO DISTRIBUTION	1	W14		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	NAS662C2LPR3	SCR, FLT HD, #2-56 X 3/16 LG, SELF-LOCK	4	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5 V)	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7136 for parts location.

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Table 28. Model 8310-137-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7137-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2070-1	ASSY, ATTEN, PROG, 6 CELL, 63.75/.25dB, 3 GHz, SMA F/F	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-5/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W9		068-32-5/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W10		068-32-12/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	1	W11		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5 V)	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 29. Model 8310-137-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7137-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 Z(+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2070-1	ASSY, ATTEN, PROG, 6 CELL, 63.75/.25dB, SMA F/F	2	AT1, AT2		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W9,W12		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W10,W13		068-32-12/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	1	W11		
9	193-8086-2	ASSY, CABLE. ATTEN TO DISTRIBUTION	1	W14		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	NAS662C2LPR3	SCR, FLT HD, #2-56 X 3/16 LG, SELF-LOCK	4	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5 V)	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7137 for parts location.

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Table 30. Model 8310-138-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7138-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2074-1	ASSY, ATTEN, PROG, 8 CELL, 103/1 dB, 3 GHz, SMA F/F	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W9		068-32-5/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W10		068-32-12/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	1	W11		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5 V)	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 31. Model 8310-138-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7138-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2074-1	ASSY, ATTEN, PROG, 8 CELL, 103/1 dB, 3 GHz, SMA F/F	2	AT1, AT2		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W9,W12		068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W10,W13		068-32-12/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	1	W11		
9	193-8086-2	ASSY, CABLE. ATTEN TO DISTRIBUTION	1	W14		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	NAS662C2LPR3	SCR, FLT HD, #2-56 X 3/16 LG, SELF-LOCK	4	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5 V)	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7138 for parts location.

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Table 32. Model 8310-138-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7138-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2074-1	ASSY, ATTEN, PRGM, 8 CELL, 8 CELL, 103dB/1dB, SMA F/F	3	AT1 - AT3		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	6	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	6	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	6	W9 - W13, W15, W16,		068-32-4/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	2	W11, W14		
10	193-8086-3	ASSY, CABLE, DIST BD, TO ATTEN	1	W17		
11	090-301	* LABEL STD 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	NAS662C2LPR3	SCR, FLT HD, #2-56 X 3/16 LG, SELF-LOCK	6	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
16	193-8086-4	ASSY, CABLE, DIST BD, TO ATTEN	1	W20		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5V)	0	NA		
20	IM289	O & S MANUAL, MODEL 8310	1	NA		

Table 33. Model 8310-138-4-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7138-4):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034-1	ASSY, ATTEN UNIT, BASE 8310 (+5 V) (Refer to Drawing 193-8034)	1	NA		
2	193-8084	MOUNTING PLATE	1	NA		
3	101-2074-1	ASSY, ATTEN, PRGM, 8 CELL, 8 CELL, 103dB/1dB, SMA F/F	4	AT1 - AT4		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	8	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	8	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	8	W9 - W13, W15, W16, W18, W19		068-32-4/0
8	193-8086-1	ASSY, CABLE, ATTEN TO DISTRIBUTION	2	W11, W14		
10	193-8086-3	ASSY, CABLE, DIST BD, TO ATTEN	1	W17		
11	090-301	* LABEL STD 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	NAS662C2LPR3	SCR, FLT HD, #2-56 X 3/16 LG, SELF-LOCK	8	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
16	193-8086-4	ASSY, CABLE, DIST BD, TO ATTEN	1	W20		
18	193-8087	WIRING DIAGRAM	0	NA		
19	089-3422	ICD, ATTEN UNIT, MODEL 8310 (+5V)	0	NA		
20	IM289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7138 for parts location.

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Table 34. Model 8310-201-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7201-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8042	MOUNTING PLATE	1	NA		
3	150T-70	ATTEN PRGM, SMARTSTEP	1	AT1		
4	1568	ADAPT, SMA BULKHD	2	NA		
5	068-32-10/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-10/0
7	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-6/0
8	193-8043	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3248	ICD, ATTEN UNIT, MODEL 8310, 150 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 35. Model 8310-201-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7201-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8042	MOUNTING PLATE	1	NA		
3	150T-70	ATTEN PRGM, SMARTSTEP	1	AT1		
4	1568	ADAPT, SMA BULKHD	4	NA		
5	068-32-10/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-10/0
7	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-6/0
8	193-8043	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	4	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3248	ICD, ATTEN UNIT, MODEL 8310, 150 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7201 for parts location.

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Table 36. Model 8310-202-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7202-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8042	MOUNTING PLATE	1	NA		
3	150T-11	ATTEN PRGM, SMARTSTEP	1	AT1, AT2		
4	1568	ADAPT, SMA BULKHD	2	NA		
5	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-10/0
7	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-6/0
8	193-8043	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
9	150T-110	ATTEN PRGM, SMARTSTEP	1	AT2		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3248	ICD, ATTEN UNIT, MODEL 8310, 150 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 37. Model 8310-203-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7202-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8042	MOUNTING PLATE	1	NA		
3	152T-15	ATTEN PRGM, SMARTSTEP	1	AT1		
4	1568	ADAPT, SMA BULKHD	2	NA		
5	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-10/0
7	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-6/0
8	193-8043	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
9	150T-90	ATTEN PRGM, SMARTSTEP	1	AT2		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3248	ICD, ATTEN UNIT, MODEL 8310, 150 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7202 for parts location.

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Table 38. Model 8310-204-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7204-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8042	MOUNTING PLATE	1	NA		
3	150T-62	ATTEN PRGM, SMARTSTEP	1	AT1		
4	1568	ADAPT, SMA BULKHD	2	NA		
5	068-32-10/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-10/0
7	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-6/0
8	193-8043	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3248	ICD, ATTEN UNIT, MODEL 8310, 150 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Table 39. Model 8310-204-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7204-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE 8310 (Refer to Drawing 193-8034)	1	NA		
2	193-8042	MOUNTING PLATE	1	NA		
3	150T-62	ATTEN PRGM, SMARTSTEP	2	AT1, AT2		
4	1568	ADAPT, SMA BULKHD	4	NA		
5	068-32-10/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-10/0
7	068-32-6/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	NA		068-32-6/0
8	193-8043	ASSY, CABLE, CONTROLLER TO ATTENUATORS	1	W1		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	4	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK, 4-40 X 1/4	6	NA		
18	193-8040	WIRING DIAGRAM	0	NA		
19	089-3248	ICD, ATTEN UNIT, MODEL 8310, 150 TYPE	0	NA		
20	IM-289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7204 for parts location.

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Table 40. Model 8310-352-1-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7403-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-10265	MOUNTING PLATE	1	NA		
3	3408T-103	PROG ATTEN, 103 dB, DC-6 GHz	1	AT1		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	2	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	2	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W8		B068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	1	W9		B068-32-12/0
8	193-8127	ASSY, CABLE, DRIVER	1	W7		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	6	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
					4963	SJ-5008SP
					24803	KFT12-BLK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	2	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	4	NA		
18	193-8128	WIRING DIAGRAM, ATTEN UNIT, MODEL 8310-352-X-X, DC-6 GHz	0	NA		
19	089-3822	ICD, ATTEN UNIT, MODEL 8310-352-X-X DC - 6 GHz	0	NA		
20	IM289	O & S MANUAL, MODEL 8310	1	NA		

Table 41. Model 8310-352-2-F & -R, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7403-2):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-10265	MOUNTING PLATE	1	NA		
3	3408T-103	PROG ATTEN, 103 dB, DC-6 GHz	2	AT1, AT2		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	4	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	4	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W8, W10		B068-32-4/0
7	068-32-12/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	2	W9, W11		B068-32-12/0
8	193-8127	ASSY, CABLE, DRIVER	1	W7		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	4	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
					4963	SJ-5008SP
					24803	KFT12-BLK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	4	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	4	NA		
18	193-8128	WIRING DIAGRAM, ATTEN UNIT, MODEL 8310-352-X-X, DC-6 GHz	0	NA		
19	089-3822	ICD, ATTEN UNIT, MODEL 8310-352-X-X DC - 6 GHz	0	NA		
20	IM289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7403 for parts location.

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Table 42. Model 8310-352-3-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7403-3):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-10265	MOUNTING PLATE	1	NA		
3	3408T-103	PROG ATTEN, 103 dB, DC-6 GHz	3	AT1 - AT3		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	6	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	6	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	6	W8 - W13		B068-32-4/0
8	193-8127	ASSY, CABLE, DRIVER	1	W7		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
12	074-761-1	HOLE PLUG 3/8 HOLE, NYLON BLACK	2	NA	83330	3091
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
					4963	SJ-5008SP
					24803	KFT12-BLK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	6	NA		
18	193-8128	WIRING DIAGRAM, ATTEN UNIT, MODEL 8310-352-X-X, DC-6 GHz	0	NA		
19	089-3822	ICD, ATTEN UNIT, MODEL 8310-352-X-X DC - 6 GHz	0	NA		
20	IM289	O & S MANUAL, MODEL 8310	1	NA		

Table 43. Model 8310-352-4-T, Attenuator Unit Assembly Replaceable Parts List (P/N 193-7403-4):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-8034	ASSY, ATTEN UNIT, BASE MODEL 8310	1	NA		
2	193-10265	MOUNTING PLATE	1	NA		
3	3408T-103	PROG ATTEN, 103 dB, DC-6 GHz	4	AT1 - AT4		
4	7004A-1	PLANAR BULKHEAD, 2.92 FEMALE	8	NA		
5	7005A-3	PLANAR CROWN, TYPE N FEMALE	8	NA		
6	068-32-4/0	COAXIAL CABLE ASSY, SMA M/M, CONFORMABLE, DC TO 18 GHz	8	W8 - W15		B068-32-4/0
8	193-8127	ASSY, CABLE, DRIVER	1	W7		
11	090-301	* LABEL STD, 1.5 X .75 IN	1	NA		
13	074-921	FEET NON-SKID	4	NA	4963	SJ-5008 BLACK
					4963	SJ-5008SP
					24803	KFT12-BLK
14	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	8	NA		
15	NAS1635-04LR4	SCR PAN HD SELFLOCK 4-40 X 1/4	8	NA		
18	193-8128	WIRING DIAGRAM, ATTEN UNIT, MODEL 8310-352-X-X, DC-6 GHz	0	NA		
19	089-3822	ICD, ATTEN UNIT, MODEL 8310-352-X-X DC - 6 GHz	0	NA		
20	IM289	O & S MANUAL, MODEL 8310	1	NA		

Refer to Aeroflex / Weinschel Drawing 193-7403 for parts location.

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Table 44. Model 8310 Base Attenuator Unit Assembly Replaceable Parts List (P/N 193-8034):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-9186	ENCLOSURE, MODIFIED	1	NA		
2	193-9174	CHASSIS	1	NA		
5	193-9176	ASSY CABLE PSU TO CONT	1	W4		
6	193-9177	ASSY CABLE PWR/INPUT TO PSU	1	W5		
7	193-8023-001	ASSY, PCB, CONTROLLER, W/IEEE CONN	1	A1		
9	193-9126-000	ASSY, PCB, ADDRESS SWITCH	1	NA		
10	193-8005-1	ASSY CABLE RS232 CONT TO R/P	1	W3		
13	193-9190	OVERLAY, FRONT PANEL	1	NA		
15	193-8029-000	ASSY, PCB, FRONT PANEL DISPLAY	1	A3		
16	193-8028-000	ASSY, PCB, CONTROL, FRONT PANEL	1	A4		
17	001-400-15	PSU SWITCHER, +15V DC, 3.3A	1	A2	6975	GLC50-15
18	051-40	FUSE HOLDER, POWER INPUT, W/SWITCH	1	XF1	5245	PSOSXSS6B
20	193-9193	ASSY, CABLE, CONTROLLER TO FRONT PANEL DISPLAY	1	W6		
22	062-184-5	CONN SCREW LOCK FEMALE	2	NA	71468	D20418-2
23	068-39-2	CABLE ASSY, 16 COND, RIBBON, 6 INCH LG	1	W2	D-KEY	A8PPG-1606M-ND
24	068-21	CORD PWR 3-CONDUCTOR DTCH 7.5FT 10A-125V NEMA5-15P/IEC320-C13	1	NA	16428	17250
31	062-380-1	SCREW LOCK, HARDWARE, KIT, METRIC, #6-32 UNC-2A EXT THDS	1	NA	779	554808-1
32	090-285	*NAMEPLATE HIGH VOLTAGE	1	NA		
33	193-9159	ASSY, CABLE, GND	1	W1		
34	052-1-1/5	FUSE 1.5 AMP, 250V	1	F1	75915	312.01.5
36	MS51957-19	SCR PAN HD 4-40 X 3/4 LG	2	NA		
37	090-353	* LABEL GROUND	1	NA		
38	090-467	* LABEL, POWER INPUT	1	NA		
39	MS51957-17	SCR PAN HD 4-40 X 1/2 LG	2	NA		
40	MS15795-803	WASHER FLAT .125 ID .250 OD	12	NA		
41	MS35338-135	WASHER LOCK #4	12	NA		
42	MS51957-14	SCR PAN HD 4-40 X 5/16 LG	10	NA		
43	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
44	MS35649-244	NUT HEX #4	1	NA		
45	MS51957-15	SCR PAN HD 4-40 X 3/8 LG	2	NA		
46	MS51859-2	WASHER FLAT #4 NYLON	2	NA		

Refer to Aeroflex / Weinschel Drawing 193-8034 for parts location.

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Table 45. Model 8310 Base (+5V) Attenuator Unit Assembly Replaceable Parts List (P/N 193-8034-1):

Find No.	Part Number	Description	Quantity Used	Reference Designator	CAGE Code	Vendor Part Number
1	193-9186	ENCLOSURE, MODIFIED	1	NA		
2	193-9174	CHASSIS	1	NA		
6	193-9177	ASSY CABLE PWR/INPUT TO PSU	1	W5		
7	193-8023-001	ASSY, PCB, CONTROLLER, W/IEEE CONN	1	A1		
8	193-8053-000	ASSY, PCB, DISTRIBUTION MODULE	1	A5		
9	193-9126-000	ASSY, PCB, ADDRESS, SWITCH	1	S1		
10	193-8005-1	ASSY, CABLE, RS232 CONT TO R/P	1	W3		
11	193-8085	ASSY, CABLE, CONTROLLER TO DISTRIBUTION	1	W7		
12	193-8088	ASSY, CABLE, DC PWR	1	W4		
10	193-8005-1	ASSY CABLE RS232 CONT TO R/P	1	W3		
13	193-9190	OVERLAY, FRONT PANEL	1	NA		
15	193-8029-000	ASSY, PCB, FRONT PANEL DISPLAY	1	A3		
16	193-8028-000	ASSY, PCB, CONTROL, FRONT PANEL	1	A4		
17	001-400-15	PSU SWITCHER, +15V DC, 3.3A	1	A2	6975	GLC50-15
18	051-40	FUSE HOLDER, POWER INPUT, W/SWITCH	1	XF1	5245	PSOSXSS6B
20	193-9193	ASSY, CABLE, CONTROLLER TO FRONT PANEL DISPLAY	1	W6		
22	062-184-5	CONN SCREW LOCK FEMALE	2	NA	71468	D20418-2
23	068-39-2	CABLE ASSY, 16 COND, RIBBON, 6 INCH LG	1	W2	D-KEY	A8PPG-1606M-ND
24	068-21	CORD PWR 3-CONDUCTOR DTCH 7.5FT 10A-125V NEMA5-15P/IEC320-C13	1	NA	16428	17250
31	062-380-1	SCREW LOCK, HARDWARE, KIT, METRIC, #6-32 UNC-2A EXT THDS	1	NA	779	554808-1
32	090-285	*NAMEPLATE HIGH VOLTAGE	1	NA		
33	193-9159	ASSY, CABLE, GND	1	W1		
34	052-1-1/5	FUSE 1.5 AMP, 250V	1	F1	75915	312.01.5
36	MS51957-19	SCR PAN HD 4-40 X 3/4 LG	2	NA		
37	090-353	* LABEL GROUND	1	NA		
38	090-467	*LABEL, POWER INPUT	1	NA		
39	MS51957-17	SCR PAN HD 4-40 X 1/2 LG	2	NA		
40	MS15795-803	WASHER FLAT .125 ID .250 OD	12	NA		
41	MS35338-135	WASHER LOCK #4	12	NA		
42	MS51957-14	SCR PAN HD 4-40 X 5/16 LG	10	NA		
43	MS24693-C3	SCR FLAT HD 4-40 X 5/16 LG 100	6	NA		
44	MS35649-244	NUT HEX #4	1	NA		
45	MS51957-15	SCR PAN HD 4-40 X 3/8 LG	2	NA		
46	MS51859-2	WASHER FLAT #4 NYLON	2	NA		

Refer to Aeroflex / Weinschel Drawing 193-8034 for parts location.

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9. APPLICATIONS:

Applications for the 8310 Series range from providing control of a single Programmable Attenuator in a bench test/lab environment using a PC and a terminal emulator, to complex system applications where the 8310 Series is employed to control many devices to create custom/semi-custom subsystems to reduce overall design cost. Weinschel can provide a variety of custom designed driver interfaces for various devices, such as RF switches, relays, pin attenuators, motorized step attenuators, displays, and other devices, as well as complete subsystem design and integration services. Contact us with your specialized needs.

10. ACCESSORIES:

Part Number	Description
193-8033-1	Rack Mounting Kit, Single 8310
193-8033-2	Rack Mounting Kit, Dual 8310
7005-X	PLANAR CROWNS® ...refer to data sheet in Appendix C for model numbers and applicable crown specifications.

11. CONTACTING AEROFLEX / WEINSCHEL:

In the event of a malfunction, contact Aeroflex / Weinschel. An apparent malfunction of an instrument or component may be diagnosed over the phone by first contacting the Customer Service Department at Aeroflex / Weinschel. DO NOT send the instrument or component back to the factory without prior authorization. When it is necessary to return an item, state the symptoms, catalog and type number of the instrument or component, and date of original purchase. Also write the Company name and your name and phone number on a card and tape the card to the item returned. Page provides further information regarding preparation of a unit for reshipment. Contact Aeroflex / Weinschel Customer Service Department as follows:

Via mail: Aeroflex / Weinschel, Inc.
5305 Spectrum Drive
Frederick, MD 21703-7362
U.S.A.

Via Telefax: 301-846-9116

Via Phone: Call TOLL FREE 800-638-2048
Toll call # 301-846-9222

Via Website: www.aeroflex-weinschel.com

Via e-mail: sales@aeroflex-weinschel.com

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12. AEROFLEX / WEINSCHEL WARRANTY:

PRODUCTS - Aeroflex / Weinschel warrants each product it manufactures to be free from defects in material and workmanship under normal use and service anywhere in the world. Aeroflex / Weinschel's only obligation under this Warranty is to repair or replace, at its plant, any product or part thereof that is returned with transportation charges prepaid to Aeroflex / Weinschel by the original purchaser within ONE YEAR from the date of shipment.

The foregoing Warranty does not apply Aeroflex / Weinschel's sole opinion to products that have been subject to improper or inadequate maintenance, unauthorized modifications, misuse, or operation outside the environmental specifications for the product.

SOFTWARE PRODUCTS- Aeroflex / Weinschel software products are supplied without representation or Warranty of any kind. Aeroflex / Weinschel, therefore, assumes no responsibility and will not accept liability (consequential or otherwise) arising from the use of program materials, disk, or tape.

The Warranty period is controlled by the Warranty document furnished with each product and begins on the date of shipment. All Warranty returns must be authorized by Aeroflex / Weinschel Corporation prior to their return.

Aeroflex / Weinschel's Quality System Certified to:



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APPENDIX A
CARE AND HANDLING OF MICROWAVE COAXIAL CABLE ASSEMBLIES

A-1 CARE AND HANDLING OF ASSEMBLIES.

To ensure accurate measurements and optimal performance of Weinschel products, the microwave coaxial cable assemblies used in system and test setups must be properly used and maintained. Proper connections, routine inspection of all cables, and cleaning of the connectors are extremely important procedures which can prolong the longevity and accuracy of equipment.

A-2 CABLE INSPECTION.

Routinely check external cables for signs of cracked insulation, dents, twists, flattening, signs of jacket abrasion, or other signs of abuse. Wrinkles in the jacket indicate that the minimum bend radius has been exceeded. Most often, this occurs near the marker tubes and connectors.

Also inspect the connector interfaces for the following:

- Bent pins (male).
- Bent or missing tines (female).
- Worn or chipped plating.
- Damaged or displaced dielectric inserts.
- Thread damage.
- Folded or mushroomed outer interface rims.
- Mushroomed pin shoulders (male) or tine ends (female).
- Score lines on pins and outer interface rims visible to the unaided eye.
- Recessed or protruding pins.

It is advisable to clean the connectors prior to inspection to make subtle damage more apparent. If any of the above is noted, replace the assembly before its further use results in equipment damage. Also inspect the mating connectors for similar damage.

Inspect the connector interface for signs of debris. Debris may be in the form of:

- Plating chips or other metal particles.
- Dust or dirt.
- Oily films.
- Other miscellaneous foreign particles.

If signs of debris are present, clean the connector interface as directed in Paragraph A-6.

A-3 MAKING INITIAL CONNECTIONS.

Exercise caution when mating cables. Poor connections lead to poor system performance. They can also damage not only the cable assembly, but more significantly, front or rear panel connectors on the equipment itself which may be more difficult to repair.

A-3.1 ALIGNING CONNECTORS. Align the center lines of two connectors before actual mating. Male retaining nuts contain a small amount of necessary play which may make it possible to mate the threads without the pins being properly aligned. Pin misalignment can damage pins and dielectric inserts.

A-3.2 MATING CONNECTORS. Gently mate the connectors by hand, taking care not to force the coupling nut at the slightest resistance. It is often possible to feel whether or not the pins are mated. If the coupling nut is difficult to turn, either the pins are not mated, the coupling nut is cross-threaded, or one of the connectors has been damaged by excess torque.

Never hold a male connector coupling nut stationary while screwing a female connector into it. This rotation can erode the plating and damage both the outer interface rim as well as the pin. If the pins become locked, serious damage can result to both the equipment and the cable assembly.

A-4 ENSURING PROPER CONNECTOR TORQUE.

A-4.1 OVERTORQUING. Once connectors have been properly mated, apply only the proper amount of torque. Overtorquing damages both connectors involved. Also, a connector which has been damaged by overtorquing, in turn, damages every connector to which it is subsequently mated. It usually leads to poor system performance as well. Overtorque can cause:

- Bent pins.
- Recessed or protruding pins.
- Recessed or protruding dielectrics.
- Chipped plating.
- Damaged coupling threads.
- Coupling nut retaining ring damage.
- Mushroomed outer interface shells.
- Mushroomed pin shoulders.

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A-4.2 HEX-NUT TYPES. To mate a connector of the hex-nut type, always use a torque wrench set to the correct torque value. Tighten the connector slowly until the wrench snaps. Tightening too quickly can cause the wrench to exceed its set limit. Do not snap the wrench more than once as this also causes overtorque.

A-4.3 KNURLED NUTS. Tighten connectors with knurled nuts by hand. If this does not provide sufficient tightness use a hex-nut connector and torque wrench instead. Never use pliers to tighten a connector. Table A-1 recommends torque specifications for the various types of connectors.

Table A-1. Recommended Torque Values

Connector	Recommended Torque
GPC-7 (7mm) w/hex nut	14 in/lbs ± 1 in/lbs
Type N w/hex nut	14 in/lbs ± 1 in/lbs
SMA, 2.92mm, 3.5mm 2.4mm, WPM, WPM-3 WPM-4	7.5 in/lbs ± 0.5 in/lbs
Type N & TNC (knurled)	Hand-tight
BNC (knurled)	Hand-tight

A-5 PROPER CABLE HANDLING.

Never exceed the minimum bend radius specified for a cable. Guard against tight bends at the end of connector strain relief tubing, or at the ends of marker tubing where they may be less noticeable. Although cable bend may seem slight, the actual radius of the bend at the point of angular departure may be far smaller than the acceptable radius.

Never pinch, crush or drop objects on cable assemblies. Also, do not drag a cable over sharp edges as this will pinch it and cause it to exceed the minimum bend radius.

Never use a cable assembly to pull a piece of equipment. Cables and connectors are not designed to support or move equipment.

A-5.1 SECURING CABLES. Use toothed, rubber-lined "P-clamps" to hold cables in place. If it is necessary to use tie-wraps, use the widest possible wrap and the lowest setting on the gun to ensure the minimum pressure on the cable.

A-5.2 STORING CABLES. When storing cables, minimize cable "set" by coiling them in large diameters (1 or 2 feet). Unroll the cable properly when it is ready to be used; do not pull the loops out hastily. Similarly, re-roll them when storing them away again.

A-6 CLEANING CONNECTOR INTERFACES.

Use the following guidelines in cleaning connector interfaces:

a. Do not use chlorinated solvents including common tap water. These solvents are extremely penetrating and sometimes ruin otherwise good devices and assemblies.

b. Moisten a cotton swab with isopropyl alcohol. Roll the swab on a paper towel to remove excess.

c. Use the moistened cotton swab to wipe away debris. Do not try to dissolve the debris by overwetting the swab.

d. Repeat the cleaning process using additional swabs as necessary. If metallic particles are embedded in the dielectric, use an eyeglass and a sharp pick in an attempt to dislodge them. Swab again.

e. When satisfied that the interfaces are clean, blow them dry with dry compressed air, or preferably dry nitrogen (pressurized spray cans work well). Do not use breath.

f. Clean the mating connectors. These may be the source of the debris.

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APPENDIX B – *488.2 Documentation*

Number	Required Item	Implementation
1	Interface Function Subsets Implemented	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0
2	Device behavior when the address is set outside of the 0-30 range.	The 8210A address is set to 10.
3	When is a user address changed recognized?	When the DIP switch setting is changed.
4	Description of settings at power-on.	User programmable via macro.
5	Message exchange options. a. Size and behavior of input buffer. b. Queries that return more than one <RESPONSE MESSAGE UNIT> c. Queries that generate a response when parsed. d. Queries that generate a response when read e. Commands that are coupled.	a. The GPIB input buffer is 2048 bytes in length. When the Input Buffer becomes full it processes the messages currently received before accepting additional messages. All data bytes received will be stored in the Input Buffer until 'end of message' is detected. The message(s) received are the processed in the order received. b. The 8210A contains no Query commands that return more than one <RESPONSE MESSAGE UNIT> c. All valid queries generate a response when parsed. The reply is generated at the time the Query message is received. d. none e. none
6	Functional elements used in construction of device specific commands	<PROGRAM MESSAGE> <PROGRAM MESSAGE TERMINATOR> <PROGRAM MESSAGE UNIT> <PROGRAM MESSAGE UNIT SEPARATOR> <COMMAND MESSAGE UNIT> <QUERY MESSAGE UNIT> <COMMAND PROGRAM HEADER> <QUERY PROGRAM HEADER> <PROGRAM HEADER SEPARATOR> <PROGRAM DATA SEPARATOR> <PROGRAM DATA> <DECIMAL NUMERIC PROGRAM DATA> <CHARACTER PROGRAM DATA>
7	Buffer size limitations for block data.	not implemented
8	<PROGRAM DATA> elements that may appear within an expression.	none
9	Response syntax for queries.	see command table
10	Description of device to device message transfer traffic that does not follow the rules for <RESPONSE MESSAGES>	none
11	Size of block data responses.	none
12	Common commands and queries that are imple-mented.	*IDN?, *RST, *OPC, *OPC?, *CLS, *SRE, *SRE?, *ESE, *ESE?, *STB, *TST?, *WAI
13	State of the 8210A following completion of the CAL? Query	not implemented
14	Max length of the trigger macro block.	not implemented
15	Macro parameters	not implemented (device specific forms used)
16	Response to *IDN?	<Weinschel, 8210A, Serial Number, Software Revision> Manufacturer string length = 16 chars max Model Number string length = 8 chars max Serial number string length = 16 chars max Software Revision string length = 8 chars max
17	*DDT implementation	not implemented
18	Size of *RDT/*RDT? resources	not implemented
19	States affected by *RST, *LRN, *RCL, and *SAV	*RST resets the Parser, Input Buffer, and Output Queue. *LRN, *RCL, and *SAV are not implemented
20	Scope of the self test performed by the *TST?	a. checks non-volatile memory contents. b. checks Device Interface Bus. c. checks front-panel interface.
21	Additional status data structures used in status reporting	none
22	Commands overlapped/sequential.	All commands are sequential
23	Functional criteria met with an operation complete message is generated in response to that command	Command is finish executing

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Appendix C
Internal Device Data Sheets

Click on link below to get internal device data sheet...

- 150 Series Programmable Attenuators...dc-18/26.5 GHz
- 3200 Series Programmable Attenuators...dc-2/3 GHz
- 3250 Series 75Ω Series Programmable Attenuators...dc-1.5 GHz
- 4226 & 4228 Series Solid-State Attenuators

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Model 8310A (IM-289) Revision Record

REVISION	DATE	DESCRIPTION	APPLICABLE SERIAL NUMBERS
A	5/00	Initial Issue	All Units
B	10/01	Incorporated Weinschel ECNs 01-109 & 01-381. Adding Models 8310-204-X & deleted 8310-203	8310-204-X
C	8/02	Revised & Rewritten in MS-Word format to include all new models	All Units
D	5/04	Incorporated Aeroflex name change.	All Units
E	9/08	Incorporated Aeroflex / Weinschel ECN 08-295	All units built after 9-4-08
F	1/10	Incorporated Aeroflex / Weinschel ECN 10-009	8310-204-F

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EC DECLARATION OF CONFORMITY

This is to certify that the:

SmartStep Attenuator Unit
8310 Series

Manufactured by:

Weinschel Corporation

Conforms with the protection requirements of Council Directive 89/336/EEC and the Amending Directive 93/68/EEC, relating to Electromagnetic Compatibility and Council Directive 73/23/EEC relating to LVD (Safety), by the application of:

EN50081-1:	1992 Generic Emissions Standard. (Class B Equipment)
EN50082-1:	1992 Generic Immunity Standard. (Class B Equipment)
EN61010-1:	1993 Safety requirements for electrical equipment for measurement, control and laboratory use.

Signed: _____ Position: Subsystem Manager

Of: Weinschel Corp. Date: 10/1/1999

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