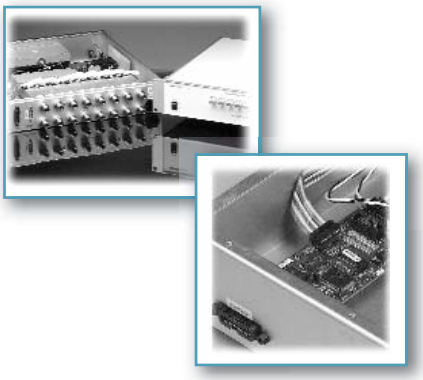
Subsystems & Accessories . . .

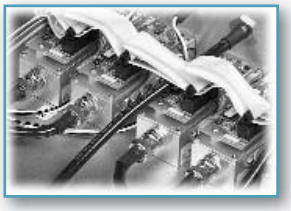
AEROFLEX
A passion for performance.

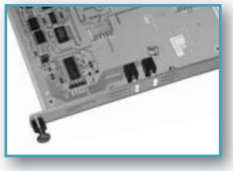
Aeroflex / Weinschel develops and manufactures high quality microwave and RF subsystems for a wide range of applications such as, RF distribution systems, switch matrices, attenuation matrices, RF link simulators, mobile unit fading simulators and cellular / cable test systems.

Aeroflex / Weinschel's subsystem products are employed in OEM and system test environments, standards laboratories, manufacturing and test departments, engineering development facilities, telephone (Mobile & VoIP) networks, military qualification and conformance verification labs of communications and aerospace companies, as well as government agencies and private research firms throughout the world. Applications include satellite and ground communications systems, cable modem signal switching, cell telephone testing, telecommunications, radar, OEM, signal analysis, air traffic control, and precision microwave related instruments and system use. Aeroflex / Weinschel's subsystems products and capabilities include:

- Switch Matrices
- Complex RF Distribution Networks
- Attenuation Matrices & Multi-Channel Subsystems
- Mobile Unit (Radio & WLAN) Fading Simulators
- Subsystems with Low IM Performance
- Cable Modem Redundant Switches and Test Systems
- Programmable Attenuators with Built-In Digital Interface
- Custom Module and Mechanical Applications







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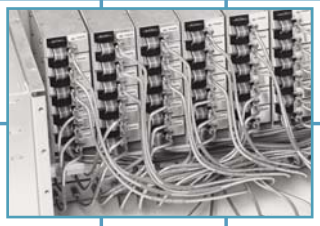
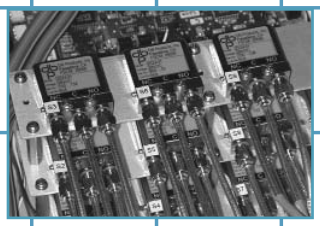
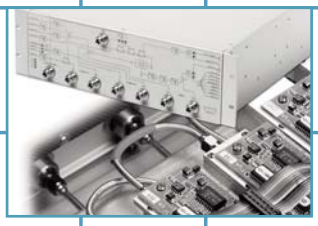
Subsystem Product Overview . . .



Multi-Channel Attenuation Subsystems

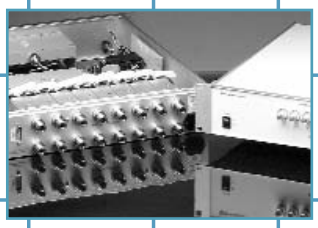


Switch Matrices

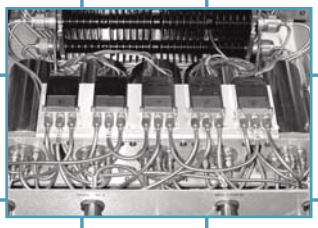


Complex RF Subsystems

RF Translator Subsystems



Mobile Unit Fading Simulators



Cellular & Wireless Test Solutions

Cable Modem Redundant Switches

Programmable Attenuator & Controllers

Customized Mechanical Packaging

Aeroflex / Weinschel's Subsystem technology streamlines system designs and device integration by providing both a flexible bus interface and components that are simple to configure and control.

Creating subsystems using Aeroflex / Weinschel's unique approach streamlines the design and layout of application specific subsystems that include a wide range of microwave and RF components such as programmable/fixed attenuators, power combiners/dividers/splitters, directional couplers, amplifiers, filters, noise sources and switches which can be controlled using various standard communications interfaces including IEEE-488, RS232, RS422, Ethernet (SNMP option) and RS485. Subsystem design options can also include:

- Turnkey subsystems built to customer specified design & layout.
- Wide dynamic and frequency ranges.
- Low Phase Noise Design and Testing.
- Front panel and menu controls.
- Attenuation/switching schemes.
- Customer specified Input/Output parameters.
- Individual to complex matrix/channel configurations.
- Specialized testing and calibration.

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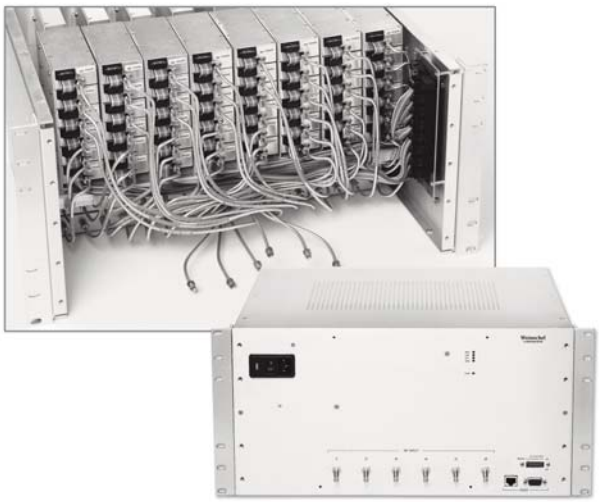
Attenuation Matrices

IEEE-488

RS232\RS422

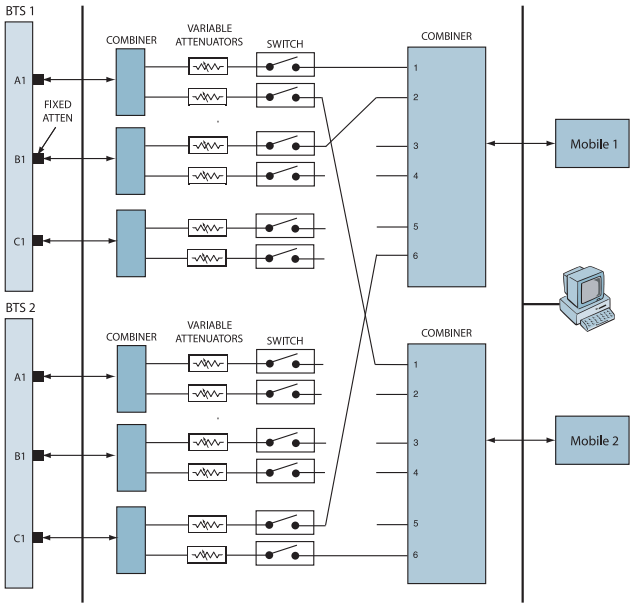
Custom Configurations & Design



Description

Aeroflex / Weinschel has designed and manufacturered numerous versions of Attenuation Matrices for various applications. These units have typically been built in configurations that include 2x6,3x6, 4x6, 6x6, 4x4, 4x8 and 8x8 configurations., For the typical UMTS, CDMA 2000, and GSM bands the units can operate over 800 -3 GHz frequency range. However multiple units have been built for other applications and span the frequency range of DC to 18 GHz in multiple sub-band configurations.

The attenuation units available include all available Aeroflex / Weinschel programmable attenuators (relay based, PIN and GasFet types) and can be controlled using industry standard interfaces such as IEEE-488, RS-232 and Ethernet (10 BaseT).



Typical Specifications

Typical specifications for an 8 x 8 UMTS configuration are:

- Frequency Range: 800 MHz to 3 GHz
- Attenuation Range: 127 dB / 1 dB steps
- Impedance: 50 Ω nominal
- Insertion Loss: 25 dB @ 800 MHz (Target)
- 30 dB @ 3 GHz (Target)
- SWR: 1.50 maximum
- RF Power Input: 0 dBm average
- +30 dBm without damage
- Isolation Input to Input: 40 dB minimum
- Isolation Output to Output: 35 dB minimum

Optional Specifications:

- High Isolation configurations
- Phase Compensated Paths
- High Power Inputs
- Fast Switching Configurations
- Front Panel Control
- Ethernet Control (10BaseT)

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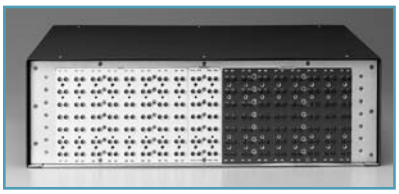
Switch Matrices & RF Distribution Subsystems



Description

Aeroflex / Weinschel designs and manufactures custom switch matrices. The matrices consist of 50Ω and 75Ω designs with high isolation and gain flatness being critical performance parameters within our designs.

Designs are constructed using coaxial components for high frequency microwave applications, GaAs MMIC Switching design for fast switching applications and surface mount board designs for lower frequency, high density applications.

Typical Features

GaAs MMIC Switching Design:

- Frequency Range: 3.4-4.2 GHz
- Gain, any path: -14±1.5 dB @ 3.8 GHz @ 20°C
- Gain Bal between Channels: ±1.0 dB max @ 3.8 GHz
- Gain Stability ±0.2 dB over +/- 5°C
- Gain Variation vs. Frequency:
  - ±0.20 dB over any 40 MHz segment
  - ±0.50 dB over any 80 MHz segment
  - ±1.5 dB over any 3.4-4.2 GHz
- Isolation (minimum): Input/Input 60 dB; Input/Output 60 dB; Output/Output (different input) 60 dB
- Noise Figure: 15 dB maximum
- VSWR (50 Ω): Input: 1.3:1 maximum; Output: 1.5:1 maximum

75 Ω System - Board Design:

- Front Panel Serviceability: No down time for RF paths.
- All active modules are front panel replaceable using simple tools.
- 10 Base T Ethernet control (SNMP)
- Module Hot Swap capability.
- Modularity/Serviceability
- Input and Output Impedances: 75 Ω
- Maximum RF Input Power: +15 dBm
- Switch Type: Electro-mechanical, absorptive
- Frequency Range: 54 to 860 MHz
- Insertion Loss: -5.5 dB
- Flatness: ±1.1 dB
- Return Loss: > 15.5 dB
- Isolation: > 60 dB

Coaxial Designs:

- Full Access Blocking Design
- 0.03 dB switch repeatability
- 5 Million switch cycles minimum
- 50 Ohm system
- Latching relays
- IEEE-488 and RS-232 control
- Frequency: DC-20 GHz
- Impedance: 50 ohm
- VSWR (maximum): DC - 4 GHz 1.43:1; 4 - 12 GHz 1.65:1; 12 - 18 GHz 1.8:1; 18 - 20 GHz 2.2:1
- Insertion Loss: 3 dB typical; 4 dB maximum @ 20 GHz
- Insertion Loss Repeatability: 0.05 dB typical

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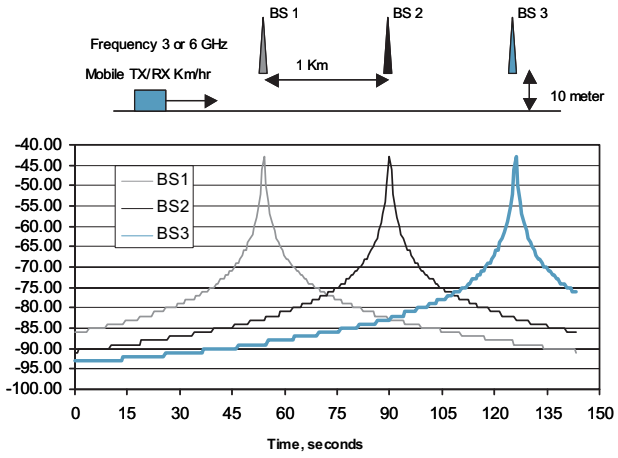
Model 8314-1 2.0 to 4.0 GHz
Model 8314-2 2.0 to 6.0 GHz
WLAN System Simulator

Simulate Connectivity over Distance & Speed

Description

This specialized subsystem is used to simulate the connectivity between a mobile unit running along a line of 3 base stations spaced from 250 to 1000 meters apart. The test subsystem is able to simulate the variation of the RF signal from the base stations reaching the mobile (as well as the signal from the mobile reaching the base stations) when the mobile is moving at speeds of up to 250 km/h. Serveral variations of this have been developed and produced.

The simulator attenuates the simulated Base Station signal through three independent attenuators, then combines the signals. Each attenuator has a dynamic range of 60 dB in 1 dB steps. The operation of the unit is via a RS232 interface, ASCII commands can input parameters into the controller. Upon receiving a trigger the controller executes the program to simulate the link loss to all three Base stations as seen from the mobile transceiver.



Calculated signal level from each Base Station.

(mobile unit moving at 100 km/hr)

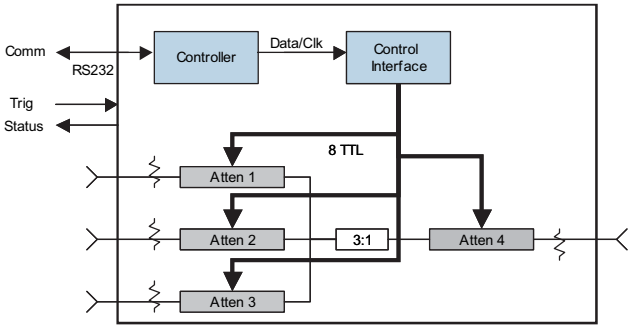


Figure 1. RF Simulator Block Diagram

TRIGGER: The signal to begin a run can be either a hardware based trigger generated external from the controller, or via RS232 command. If it is desirable to synchronize the beginning of a train run with other external hardware/ software, a hardware based trigger is recommended. The controller will also output a status signal to indicate that the train is running. Once triggered, this signal is active for the duration of the run.

OPERATOR CONTROLLED PARAMETERS: Using the RS-232 control interface the operator has the ability to control the following parameters to set up any mobile unit simulation:

- Base Station Positions (X meters, A station, B station, C station, + offset from the track), 0-3000 meters for station positions and 10-100 meters for offset from the track.
- Mobile Transceiver Start/Stop Position (x , y meters): 0-10, 000 meters.
- Mobile Velocity (Y km/hr): 0-250 km/hr
- Time Resolution (1,10,100,1000 mS or auto to fill memory)
- Frequency: 2 to 6 GHz
- Ant Gain for Mobile and Base Station
- Transmitter Antenna Gain: -10 to +10 dB
  Receiver Antenna Gain: -10 to +10 dB
- Loop Command: Used to simulate the train running in a continuos loop.

For additional information on the Model 8314, visit our website @ www.aeroflex.com/AW/8413.htm

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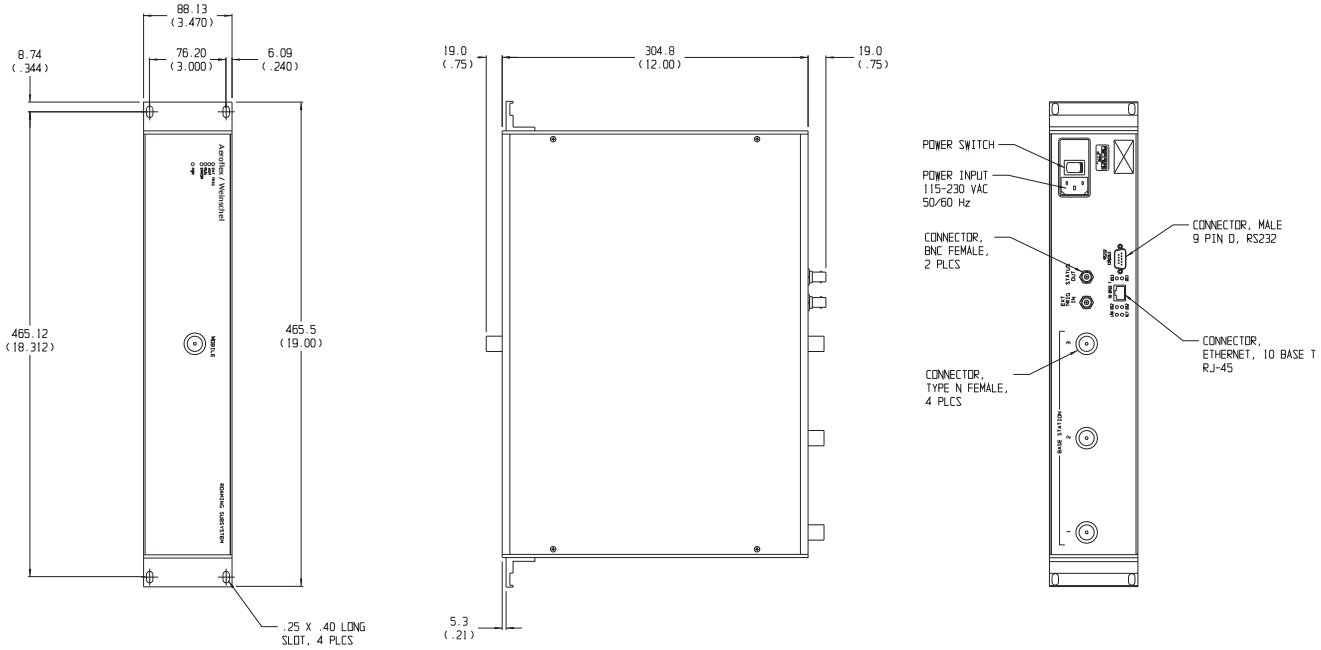
Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	ac	100 to 240 Vac, 50/60 Hz, 50 Watts
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)
RS-232 Bus	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)
RF Characteristics	Attenuator (Qty 4): Attenuation Range/Step Size: Incremental Attenuation Accuracy: Frequency: Configuration: Impedance: Insertion Loss: RF Input Power (P1dB): RF Connector: VSWR: Port to Point Isolation:	Pin diode design 0-63.75 dB/ 0.25 dB step +5% of selected value Model 8314-1: 2.0 - 4.0 GHz Model 8314-2: 2.0 - 6.0 GHz 3 inputs, 1 output 50 ohm 27 dB +25 dBm N Female 1.75:1 Target >40 dB

1. RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).

Physical Dimensions



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Model 10044
Programmable Attenuator/Switch Unit

dc to 6.0 GHz

NEW

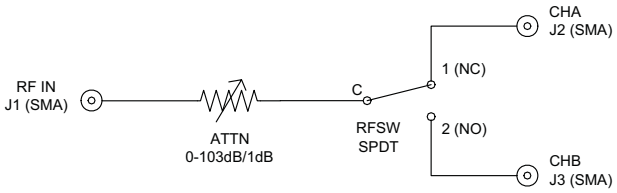
Ethernet (10/100 BaseT) Control

Description

Aeroflex / Weinschel's Model 10044, Attenuator/Switch Unit (Figure 1) is comprised of a step attenuator and a two-position SPDT switch. The attenuator is a relay-based step attenuator (Model 3408-103) that provides 0-103 dB of attenuation in 1 dB steps. The common port of the RFSW is connected internally to the attenuator, and can be used to provide either single input/dual output or dual input/single output functionality, as the unit is bidirectional in nature. The unit includes a front-panel interface for status and control, and supports programming via a serial RS232 port and/or 10/100BaseT Ethernet port.

Features

- Low profile half rack space saving design
- Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.
- DC to 6.0 GHz Operation.
- Designed to interface with industry standard communication interfaces:
  - Ethernet (10/100BaseT)
  - RS-232 (Serial)
- Other configurations and attenuation vaules and attenuator types available.



Model 10044 Schematic Diagram

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	AC	90 to 260 Vac, 57/63 Hz, Single phase, 25 Watts
Environmental	Operating Temperature Storage Temperature:	0 to +50°C 67° to +167 °F (-55° to +75°C)
Ethernet TC/IP	10 Base T Connector: Console Connector:	Standard RJ45 9-pin male D
RF Characteristics	Port Connectors: Frequency Range: Impedance: Switch Life: Switching Speed (Switch): RF Power Input: RF Insertion Loss: VSWR (All Ports): RF Isolation (J1-J2/J3, J2-J3):	SMA Female 2000 to 4000 MHz minimum, dc to 6 GHz typical 50 Ω 1 X 10 cycles, minimum 20 mseconds maximum +30 dBm C.W maximum 4.9 dBm (0 dB attenution Setting) 1.5:1 maximum (referenced to 50 Ω) 70 dB minimum

For additional information on our subsystem capabilities, visit our website @ www.aeroflex.com/weinschel

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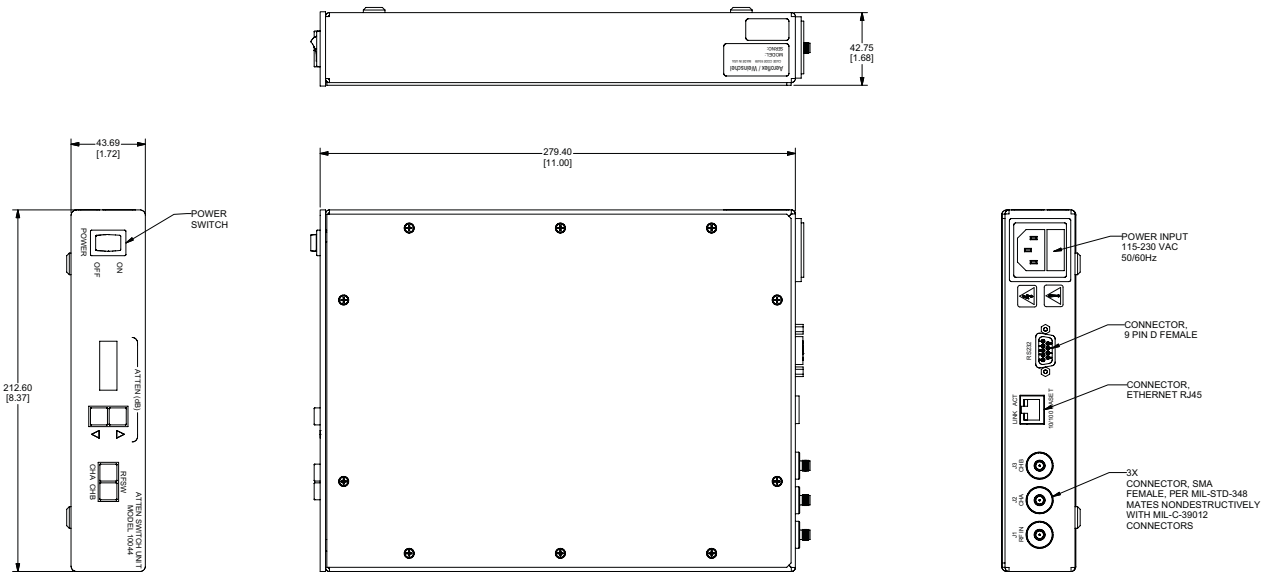
Physical Dimensions



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

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Model 8390 & 8390-1 Amplifier / Switch Units

Features

- Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.
- Choice of Frequency Ranges.:
  - Model 8390: 3.4 to 4.2 GHz
  - Model 8390-1: 0.95 to 13 GHz
- Designed to interface with industry standard communication interfaces:
  - RS-232 / Serial
  - Ethernet Control (10/100 BaseT)
- Can be rack mounted into any rack or cabinet designed per EIA RS-310 or MIL-STD-189.

Description

Aeroflex / Weinschel's Models 8390 and 8390-1, Amplifier / Switch Unit is comprised of an eight-position terminating input switch (S1), an RF amplifier, and a relay-based step attenuator that provides 0-103 dB of attenuation in 1dB steps. The unit includes a front-panel interface for status and control, and supports programming via a serial RS232 port and/or 10/100BaseT Ethernet port.

Specifications

Frequency Range:	Model 8390:	3.4 to 4.2 GHz
	Model 8390-1:	0.95 to 13 GHz
P1 dB INPUT:	Model 8390:	-5 dBm
	Model 8390-1:	-2.2 dBm minimum
P1 dB OUTPUT (0 dB in the ATTEN):		
	Model 8390:	+26.0 dBm minimum
	Model 8390-1:	+23.5 dBm minimum
VSWR:	2:1 Typical	
IMPEDANCE:	50 Ω nominal	
PATH GAIN (0 dB in the ATTEN):		
	Model 8390:	31.5 dBm typical
	Model 8390-1:	26.7 dB minimum
CONTROL INTERFACE: Ethernet 10/100 BASE-T		
NOISE FIGURE:		
Model 8390:	10.0 dB Typical (0 dB ATTEN. state)	
Model 8390-1:	10.0 dB Typical (0 dB ATTEN. state)	
ATTENUATION. RANGE:		
	Model 8390:	103 dB / 1 dB steps
	Model 8390-1:	31 dB / 1 dB steps
TEMPERATURE RANGE:	0 TO +50°C	
INPUT POWER:	115 to 230 Vac, 50/60 Hz	
WEIGHT:	TBA	

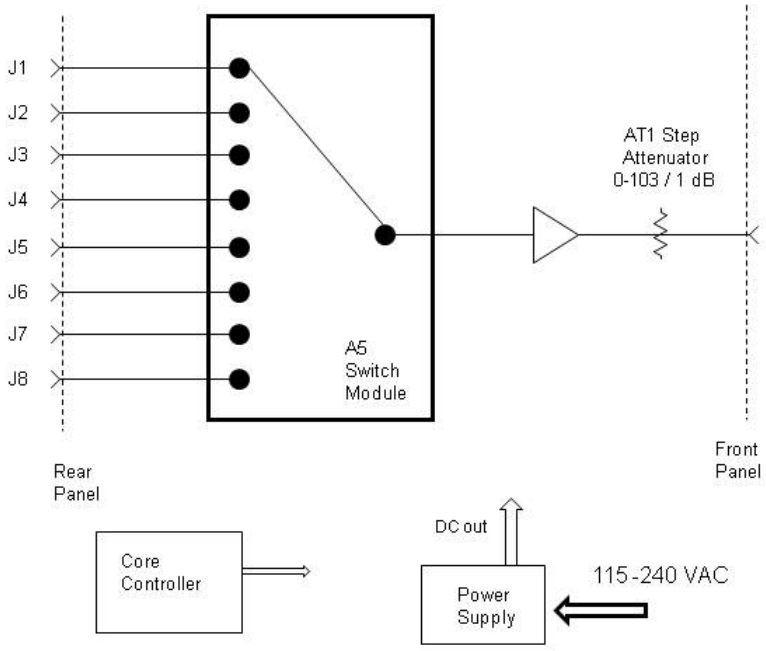

Figure 1. Model 8390 & 8390-1 System Block Diagram

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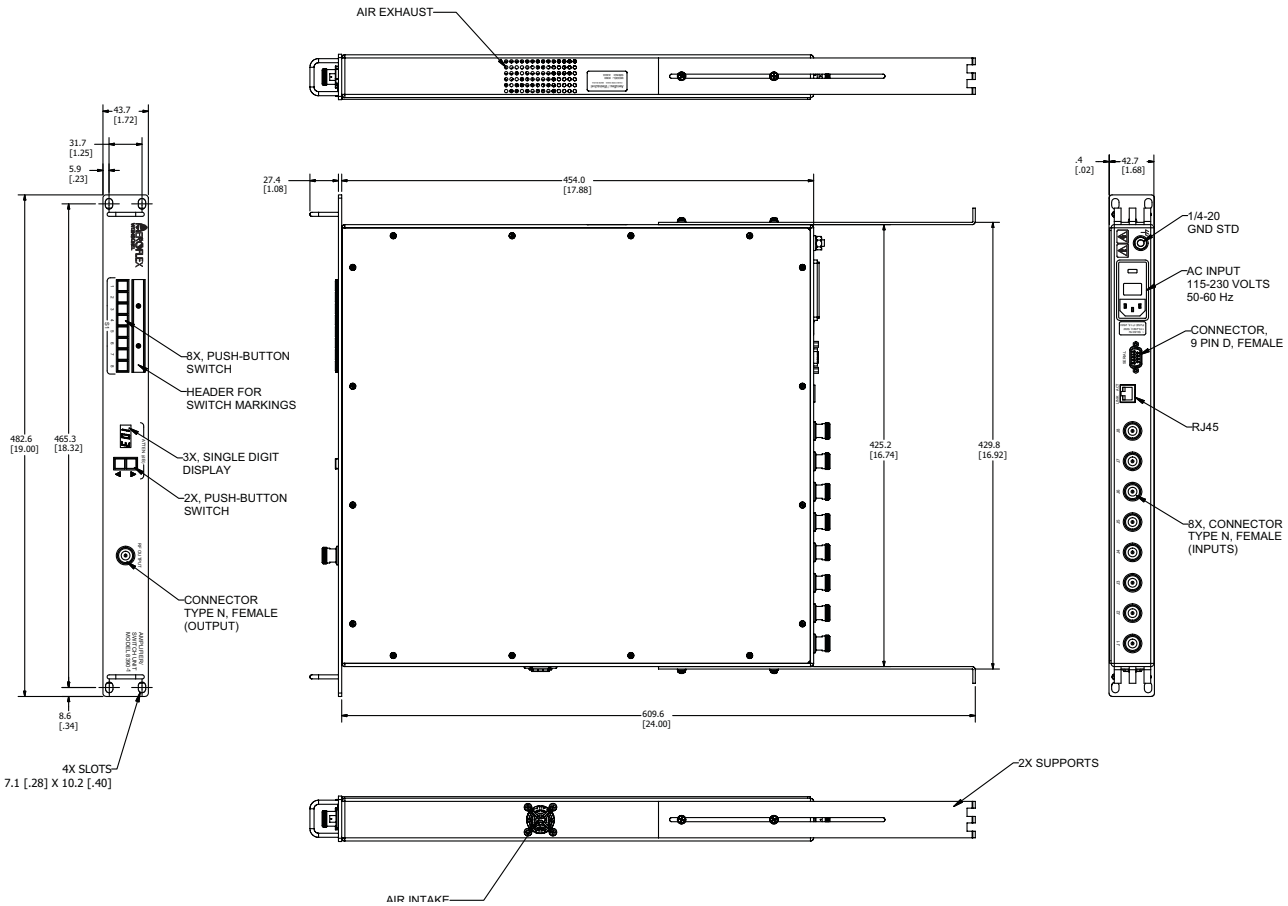
PHYSICAL DIMENSIONS



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

EXPORT CONTROL:
This product is controlled for export under the International Traffic in Arms Regulations (ITAR). A license from the U.S. Department of State is required prior to the export of this product from the United States.

EXPORT WARNING:
Aeroflex's military and space products are controlled for export under the International Traffic in Arms Regulations (ITAR) and may not be sold or proposed or offered for sale to certain countries. (See ITAR 126.1 for complete information.)

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AEROFLEX WEINSCHEL

Model 8501
High Power Programmable Switch

IEEE-488

RS232\RS422

100 Watt Hot Switching Capability

Description

Aeroflex / Weinschel's 8501 Series provides front-panel and computer control for up to two channels of high power RF switching (Figure 1), where RF signals are routed through either the front or rear mounted switch port connectors labeled 1, C, 2.

Special configurations designed to specific customer requirements may contain other coaxial devices such as power combiners, directional couplers, and filters to create single or multi-channel subsystems. The 8501 can also contain and control a separate programmable attenuator channel.

Features

- Provides a flexible, easy to program, low cost solution for your bench test/calibration setups and subsystem applications.
- Single or Dual Switch Configurations
- DC to 13.0 GHz Operation.
- Power Hot switching up to 100 Watts average
- Designed to interface with industry standard communication interfaces:

  - GPIB/IEEE-488 (HS-488 ready)
  - RS-232, RS-422

- Rack Configurable: Using a Rack Mounting Kit allows the Model 8501 to be easily mounted into any rack or cabinet that is designed per EIA RS-310 or MIL-STD-189.

MODEL NUMBER DESCRIPTION:

Example:

8501 - X - F

Basic Model Number	Number of Switches	Connector Location F = Front, R = Rear (Type N, Female Only!)

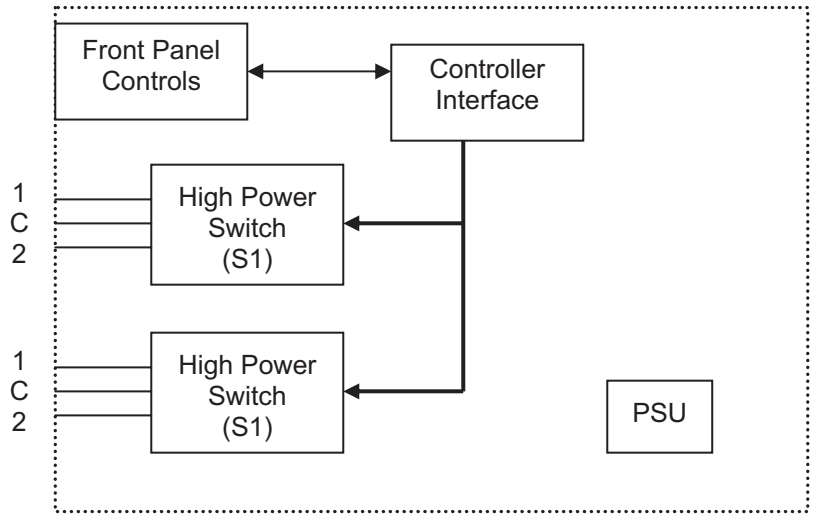

Figure 1. Model 8501 Block Diagram

For additional information on the Model 8210A, visit our website @ www.aeroflex.com/AW/8501.htm

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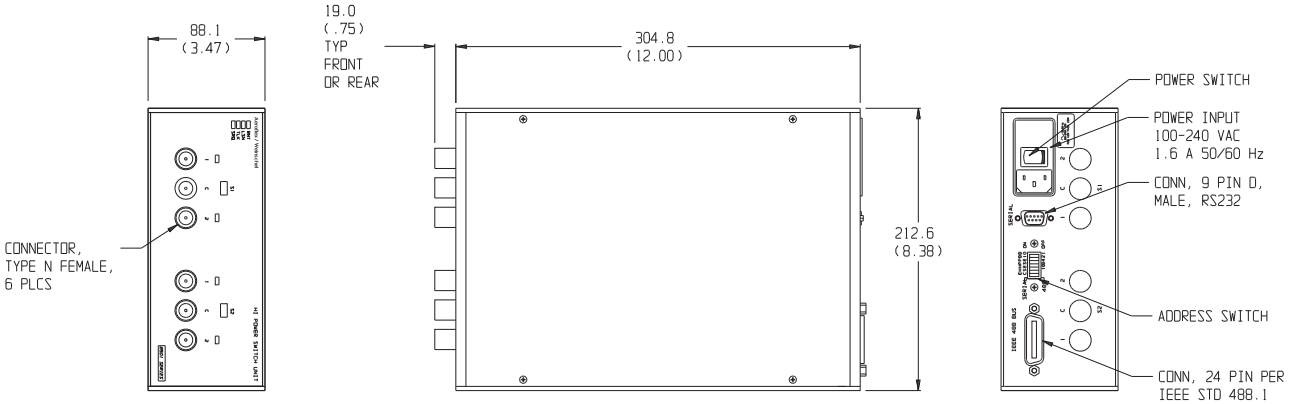
Revision Date: 9/25/2012

Specifications

SPECIFICATION	DESCRIPTION				
Input Power Requirements	AC	100 to 240 Vac, 50/60 Hz, 50 Watts			
Environmental	Operating Temperature Storage Temperature: Humidity: Altitude:	0 to +50°C 67° to +167 °F (-55° to +75°C) 96% 40,000' (12,192M)			
IEEE-488 Bus	Connector: Protocols: Indicators:	24-pin per IEEE-488.1 per IEEE-488.2 Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)			
RS-232 Bus	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD, RXD, RTS, CTS, DTR, GND 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)			
RS-422 BUS(3) signal GND	Connector: Signals: Baud Rates: Data Bits: Handshaking: Parity: Indicators:	9-pin male D TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and 2400, 9600, 19200, and 38400 8 None, RTS/CTS, XON/XOFF None, Odd, Even Tx (Transmit) and Rx (Receive)			
RF Characteristics	Port Connectors: Frequency Range: Impedance:	Type N, Female dc - 13 GHz 50 Ω			
		DC to 3	3 to 5	5 to 11	11 to 13
	SWR (maximum):	1.25	1.45	1.70	1.70
	Insertion Loss (dB maximum):	0.25	0.30	0.50	0.65
	Isolation (dB maximum):	70	60	50	50
	RF Average Power Handling (CW):	100 W to 3 GHz 50 W to 13 GHz			
	Hot Switch Cycling:	100K @ 100 Watts CW @ 2 GHz			

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.

Physical Dimensions



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

8501-2-F SHOWN

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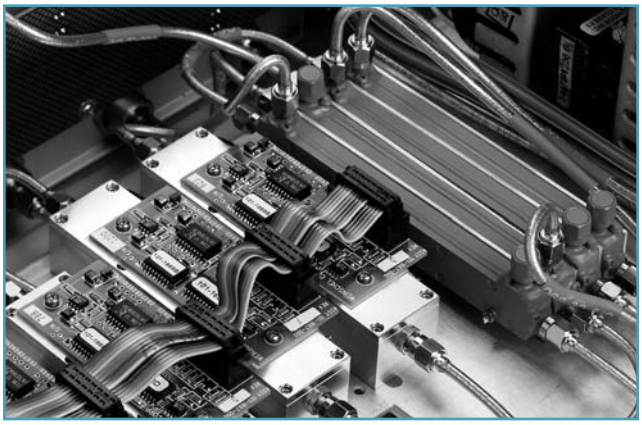
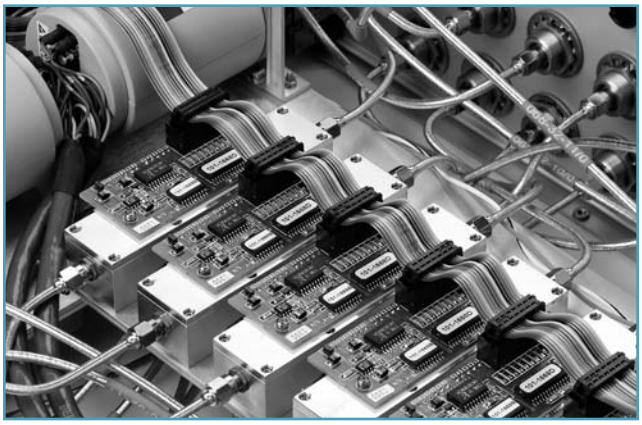
Cellular & Wireless Test Solutions

This Subsystem contains a wide variety of high performance mechanical switches, combiners, directional couplers, and other standard microwave components creating a complex multi-function RF matrix that is controlled over various industry standard bus interfaces. Other features include:

- 450 MHz - 3 GHz Frequency Range
- Customized front panel layout and graphics.
- IEEE-488 & RS-232 Serial interfaces.
- Optional rack mounting hardware.
- Standard Stainless Steel Type N Connectors on front & rear panel.
- Aeroflex / Weinschel 3200T Programmable Attenuators with built-in driver circuitry and 8210A Controller.





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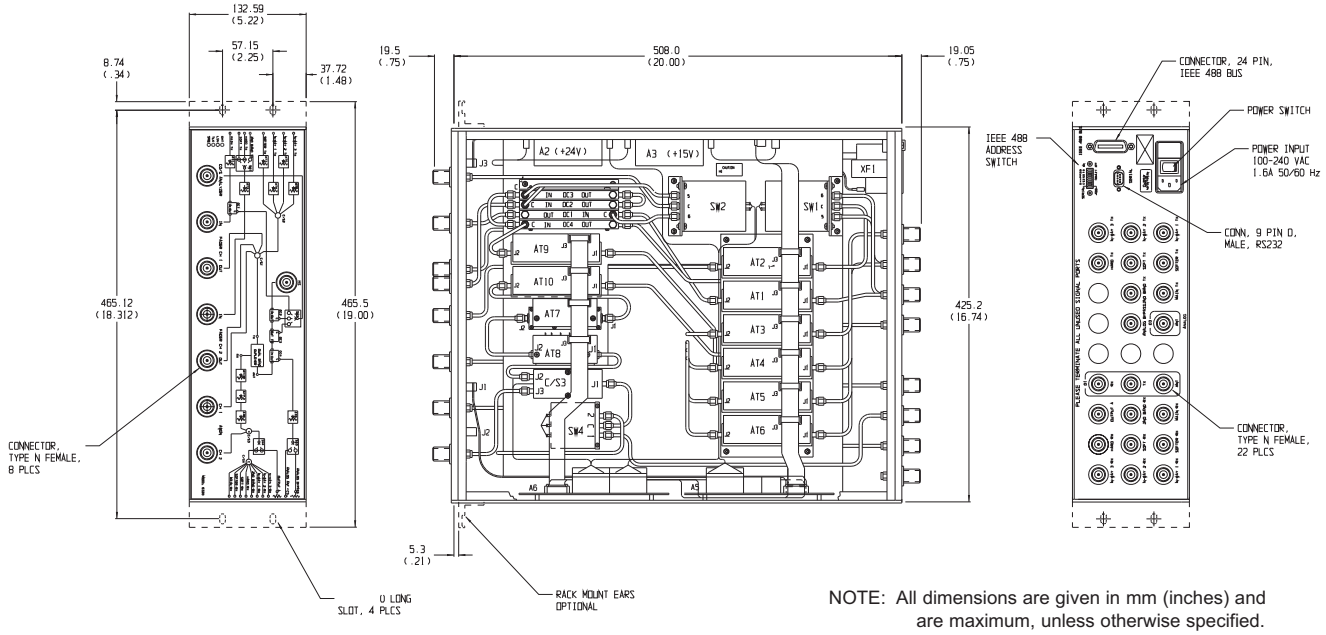

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Model 10077
L-Band 8 X 8 Switch Matrix
with Ethernet Control (10/100 BaseT)

950 to 2150 MHz

NEW

Description

Aeroflex / Weinschel's Model 10077 is a 8 x 8, Non Blocking - full fan-out Switch Matrix and is designed utilizing input and output isolation amplifiers, high isolation Power Dividers, and SP8T solid state switches (Figure 1).

This unit includes a front-panel display for status, and supports programming via a serial RS232 port and/or 10/100 BaseT Ethernet port. with position status available via a front panel display.

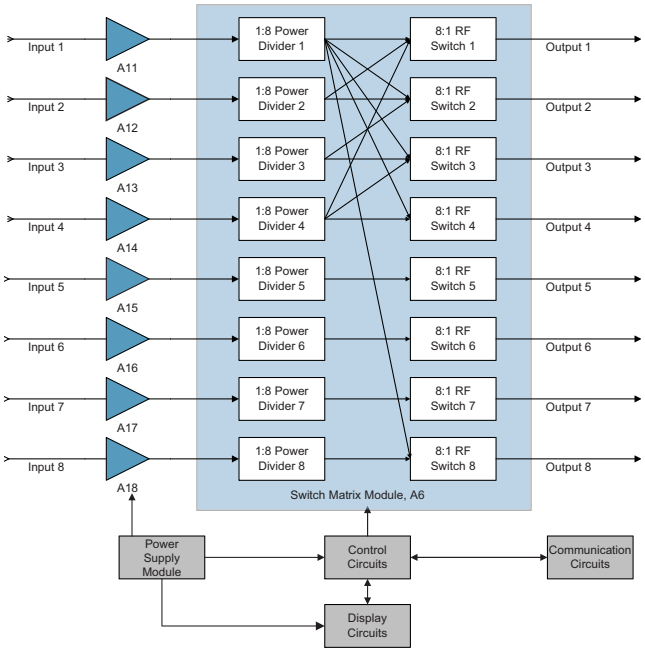

Figure 1. Model 10077 Block Diagram

Features

- 950 to 2150 MHz operation
- Non-Blocking, Full Fan-Out Configuration
- High Reliability, Solid State RF Switching
- Low Insertion Loss/High Isolation
- Front Panel Display with Local Control
- Designed to interface with industry standard communication interfaces:
  - RS-232 / Serial
  - Ethernet Control (10/100 BaseT)
- Can be rack mounted into any rack or cabinet designed per EIA RS-310 or MIL-STD-189.

Specifcations

FREQUENCY RANGE:	950-2150 MHz minimum
IMPEDANCE:	50 Ohm nominal
RF SWITCH TYPE:	Solid-State
SWITCH LIFE:	10 X 10 Cycles minimum
SWITCHING SPEED:	500 nSEC. maximum (Switches only, does not include command processing time)
RF POWER INPUT:	-10 dBm maximum
RF INSERTION LOSS:	6.0 dB maximum
PASSBAND FLATNESS:	Within +/-2.0 dB over 950 to 2150 MHz, within +/-0.5 dB over any 40 MHz segment
VSWR:	1.7:1 maximum IN/OUT, referenced to 50 OHMS
1 dB COMPRESSION POINT:	+5 dBm minimum
NOISE FIGURE (@1550 MHz):	15 dB maximum
RF ISOLATION;	
INPUT TO INPUT:	60 dB minimum
INPUT TO OUTPUT:	60 dB minimum
OUTPUT TO OUTPUT:	60 dB minimum when switches are in different states
CONTROL INTERFACE:	RS-232 (9 PIN D)
	Ethernet 10/100 BASE T(RJ45)
AC POWER REQUIREMENTS:	90-260 VAC, single phase, 50-60 Hz, 1.5 A.
TEMPERATURE RANGE,	
OPERATING:	-10 to +45 °C
STORAGE:	-30 to +70 °C
RELATIVE HUMIDITY:	5 TO 85% Non-codensing

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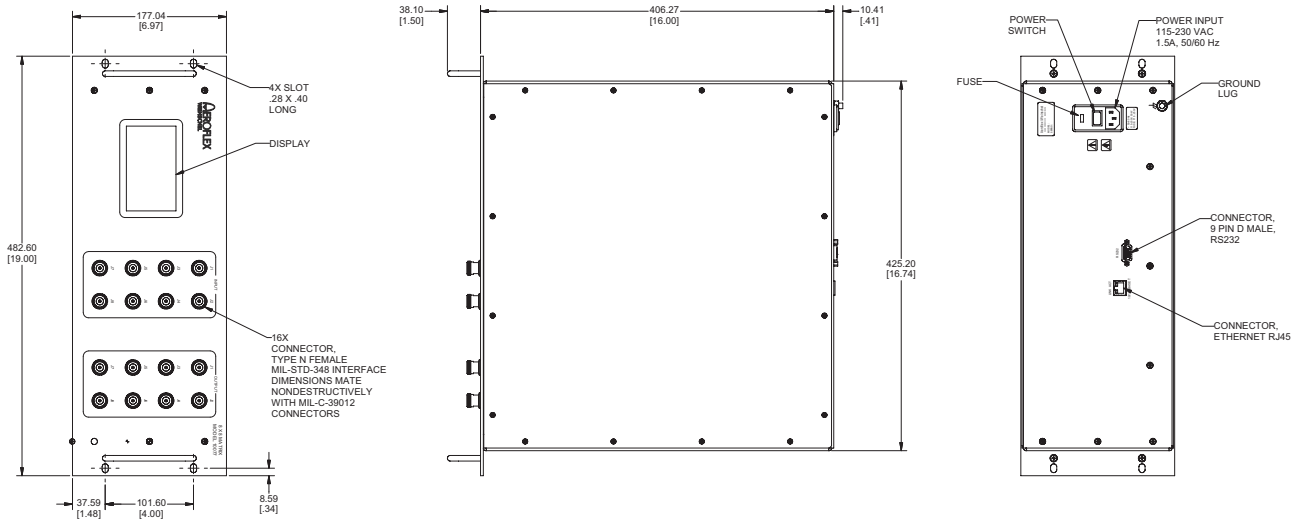
Physical Dimensions



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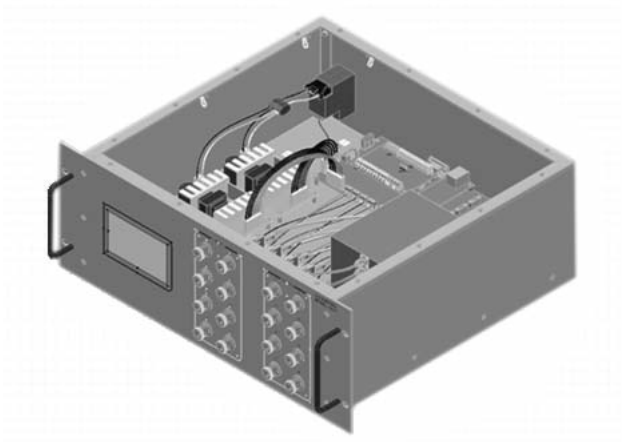

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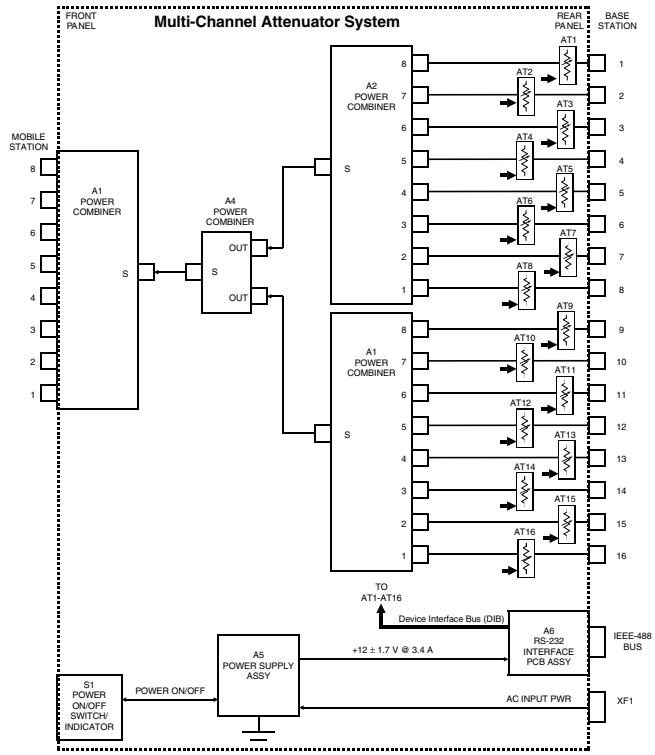
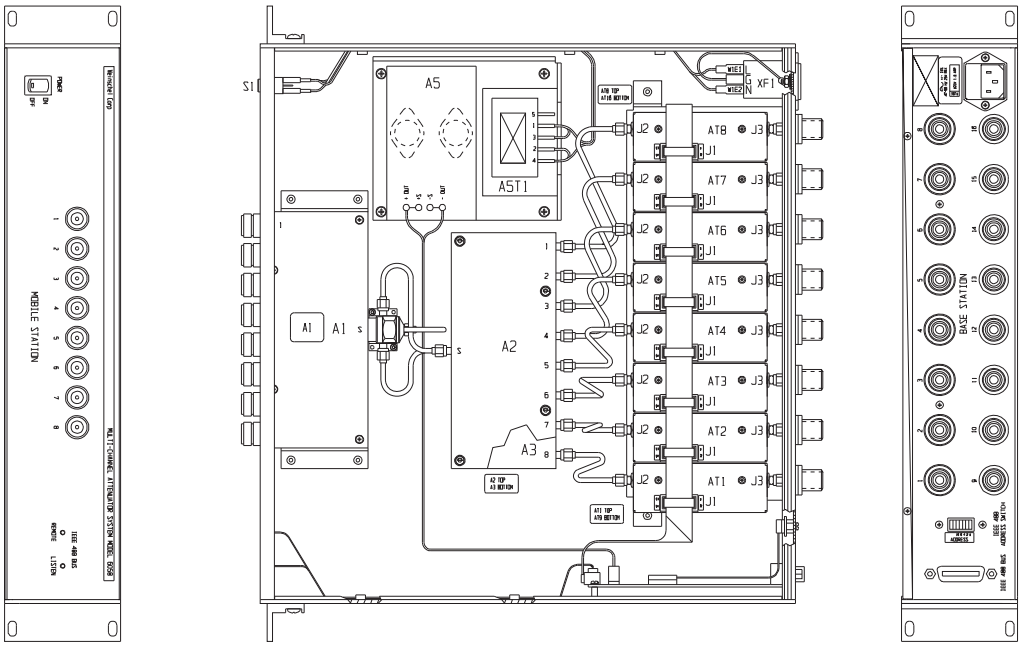
Mobile Unit Fading Simulators



Aeroflex / Weinschel designs and manufactures multi-path attenuation subsystems for fading / simulation of a broad range of applications and subsystems. This subsystem illustrated features:

- 400 - 3500 MHz frequency range.
- 16 Input Channels to 8 Output Channels. (other configurations available)
- RS-232 Serial Interface.
- Wide Dynamic Range: 127/1 dB steps.
- Aeroflex / Weinschel 3200T Programmable Attenuators with 8210A Controller.

Mechanical Layout:



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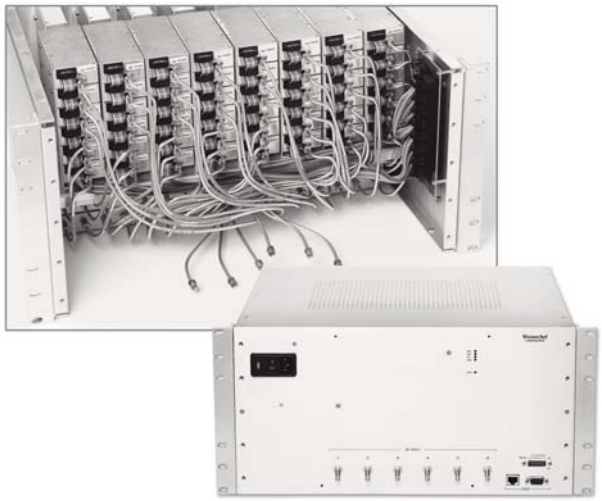
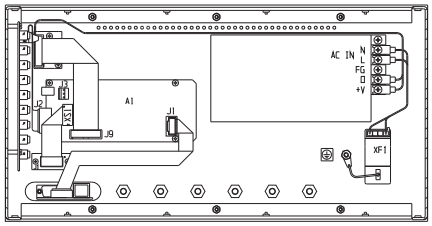
Complex Multi-Channel Attenuator



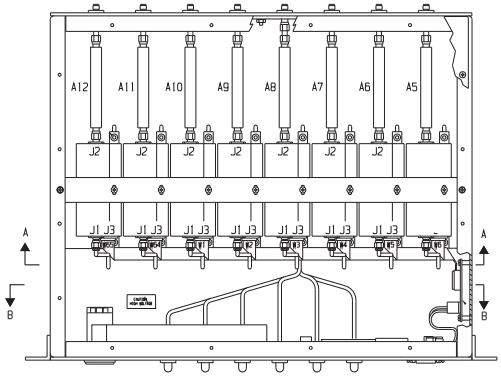
This application illustrates Aeroflex / Weinschel's ability to house and control a large number of solid-state programmable attenuators and power combiners creating a complex multichannel attenuator subsystems. Other features include:

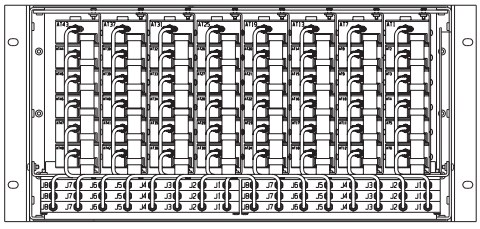
- 800 MHz - 6 GHz frequency range.
- 6 front panel Input channels to 8 rear panel Output Channels (other configurations available)
- Wide Dynamic Range: 95 dB in 1 dB steps.
- RS-232 Serial Interface.
- Combiner Isolation 20 dB maximum.
- Designed to customer specified packaging requirements.
- 64 Aeroflex / Weinschel Solid-State Programmable Attenuators.
- Removable mounting brackets that can be located on either end of unit, can be mounted into racks or cabinets designed per EIA RS-310 or MIL-STD-189.

Mechanical Layout:

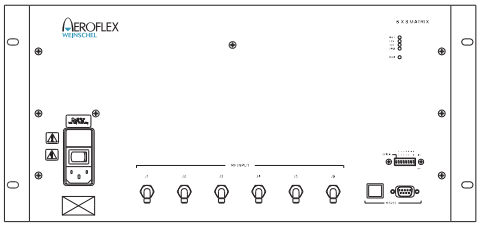


SECTION B-B





SECTION A-A



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Application Specific Subsystems....

Switch Matrices & RF Distribution Networks:

Switch matrices are modularly designed which allows the end customer to order a variety of 8 x 8, 8 x 16 or 16 x 16 configurations. Switch matrices are designed using latching relays so that the signal path integrity can be maintained even during power outages or loss of IEEE-488, RS-232 and/or Ethernet control. These subsystems can be delivered either as a 50 or 75 Ω system.

Aeroflex / Weinschel's standard design approach, our designers use a highly adaptable platform that allows a dense integration of switches.

- Customer defined configurations, layout and packaging.
- Coaxial or surface mount designs available.
- Modular Design allows easily exchange of front and rear panel switches, controllers or power modules.
- IEEE-488, Serial or Ethernet (SNMP option) Interface for computer control.
- Switch Matrix System firmware can be controlled through a 10 Base T TCP/IP software link as well as field level software upgrades or maintenance will be available through a TCP/IP link.

Microwave switch matrix products and subsystems are designed for Satellite Earth Stations applications such as, Uplink/ Downlink Routing, Cellular Base Stations, Metrology, Downlink and IF Signal Routing.

Cellular & Wireless Solutions:

Aeroflex / Weinschel has many years of product development experience in satellite and communications systems, test, measurement and simulation of wireless systems. This includes:

- 3G, WCDMA, CDMA 2000, UMTS, PCS, & GSM.
- Cable Modem Test Sets.
- Precision RF & Microwave Instrumentation.

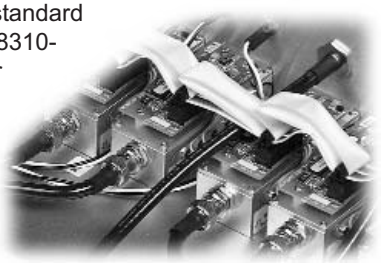
Combining Aeroflex / Weinschel's years of experience with our subsystem design approach enables our designers to provide the wireless infrastructure market with an almost endless amount of subsystem solutions.

Cable Modem & VoIP Testing Subsystems:

The need to calibrate and test 75 Ω operational performance is critical. Aeroflex / Weinschel's testing solution starts with the design and manufacturing of 75 Ω subsystems that offer:

- Multi-channel inputs and outputs with front or rear panel connector mounting options.
- Operation over the dc to 1.2 GHz frequency range.
- High Isolation / Low SWR.
- IEEE-488, Serial or Ethernet (SNMP option) Interface for computer control.
- Wide dynamic range by employing Aeroflex / Weinschel Programmable Step Attenuators.
- Custom Mechanical Design & Layout.

For convenience, Aeroflex / Weinschel also offers standard 75 Ω attenuator units (8310-1-X) that operates over the dc-1 GHz frequency range and provides an adjustable attenuation range of 0-63 dB in 1 dB steps.



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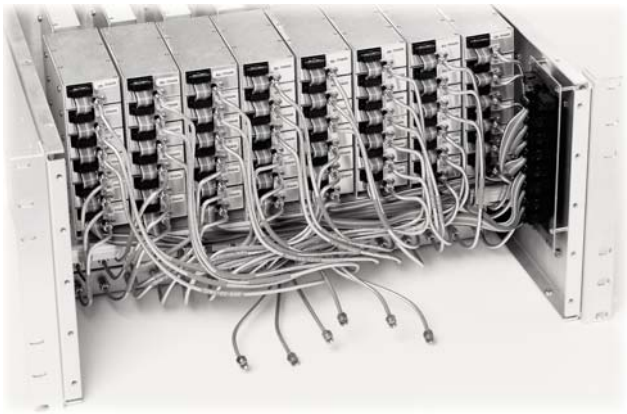
Attenuation Matrices & Multi-Channel Subsystems:

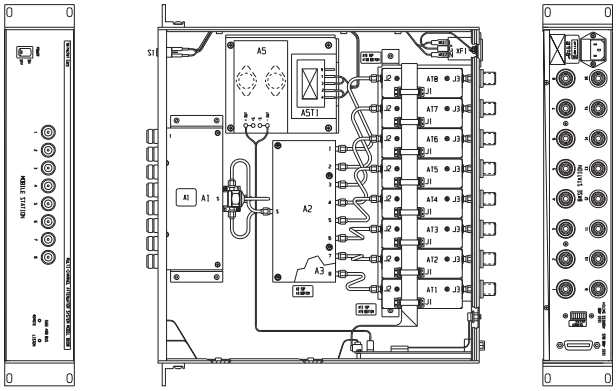
Whether the application is an individual attenuation module for satellites or complex matrix/channel configurations for cellular base station testing and operation, Aeroflex / Weinschel's design approach offers a versatile but simple method of creating and packaging fixed, solid-state and/or mechanical (relay) attenuators into customer specified modules and subsystems.



Advanced attenuation/switching schemes using other components such as switches, combiners/ dividers/splitters and directional couplers have already been designed. Our designers use the advanced intelligent Interface firmware to create virtual devices with attenuation ranges up to 127 dB with resolutions of 0.25 dB that can operate over the dc-26.5 GHz frequency band. Other designs can include:

- Complex Matrix/Channel Configurations. Typical configuration include 8x8, 4x8, 2x6, 3x6, 6x6
- Custom Mechanical Design & Layout.
- IEEE-488, Serial or Ethernet (SNMP option) Interface for computer control.
- Wide dynamic range & frequency range options available.
- Phase compensated attenuation designs.
- Solid-State (GaAs FET & PIN) designs available.
- Customer specialized testing and calibration can also be supplied.

Customized Mechanical Packaging & Modular Design:



The strength of Aeroflex / Weinschel's subsystem design approach starts with an experienced engineering design staff. Using today's modern design tools and the latest software allows Aeroflex / Weinschel's engineering staff to offer its customers a wide range of customized mechanical packaging & modular design solutions.

Specific PCB and driver configurations can be designed for operating various types of devices or retrofitting an existing device to operate within a subsystem application!

Subsystems are easily configured for mounting into any rack or cabinet designed per EIA RS-310 or MIL-STD-189.

Although Aeroflex / Weinschel specializes in the design of customized module and cabinet configurations, most subsystems are designed using off-the-shelf components, devices and cabinet configurations which allows Aeroflex / Weinschel to design and manufacture subsystems with reduced lead times as well as lower overall design cost.

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Low Intermodulation Subsystems & Signal Conditioning Networks...

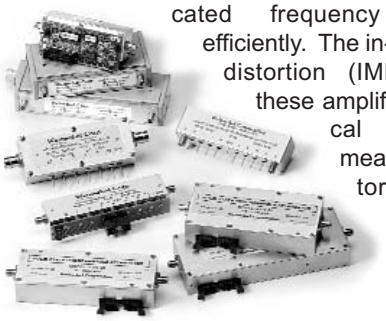
Some custom subsystem designs warrant the use of Low Intermodulation passive components such as programmable attenuators, terminations, fixed attenuators, couplers, cables, connectors and switches. Aeroflex / Weinschel is a leading manufacturer of the first three items. The following paragraphs briefly describe the importance of low intermodulation and some design features and comparative test data for the same.

Programmable Attenuators

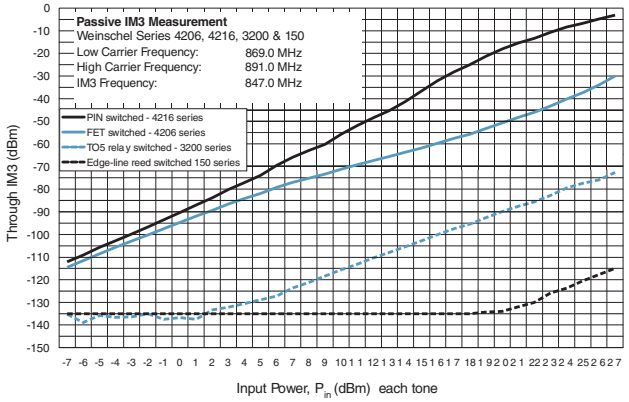
Historically the most demanding specifications for programmable components and subsystems have been low insertion loss and SWR, combined with a reasonable life expectancy of several million switching cycles. This was usually adequate for RF instruments like spectrum analyzers and signal generators, where the attenuator bandwidth rather than the switching speed was of prime concern. To achieve wide bandwidths, the programmable attenuators were mostly of electromechanical design and the linearity of these passive components was only taken for granted. Intermodulation distortion discussions and problems were usually limited to components such as amplifiers, mixers and filters.

In recent years, however, wireless communication systems employing complex digital modulation schemes, increased channel capacity, high transmit power and extremely low receiver sensitivity have put into question the linearity of passive components. Even very low level multi-tone intermodulation products generated by attenuators can seriously degrade the efficiency of a system/instrument if these products fall within the user passband. For two closely spaced tones at frequencies f1 and f2, the third order IM products at 2f1 - f2 and 2f2 - f1 , are the most harmful distortion products. They are harmful because they are close to f1 and f2 and virtually impossible to filter out.

In today's base stations the multi-carrier power amplifier (MCPA) is replacing banks of single-channel amplifiers and their corresponding power combining network. MCPAs have the capability of carrying a number of modulation schemes simultaneously and can also employ schemes such as dynamic channel allocation (DCA) to use the allocated frequency spectrum more efficiently. The in-band intermodulation distortion (IMD) performance of these amplifiers is extremely critical and needs to be measured using low distortion programmable multi-tone generators with superior IMD performance.



IM3 Performance of Electromechanical & Solid State Programmable Attenuators



Electromechanical programmable attenuators obviously provide a far superior IMD performance than their corresponding solid state counterparts employing semiconductor switching elements. However, their slow switch speed, in the order of milli-seconds, and short switch life in the order of 5-10 million cycles make them unattractive in some applications like cell phone testing and other ATE systems. Solid State programmable attenuators do overcome these two problems and are, therefore, included here for IMD performance comparison. The goal is to provide some good basic IMD test data for a variety of commercial programmable attenuators and permit the end user to select the most appropriate type for his system application.

Fixed Attenuators & Terminations

These seemingly linear components generate low levels of IMD which must be considered, especially when incident power levels are high. Some of Aeroflex / Weinschel custom subsystem designs include low IM versions of medium and high power fixed attenuators and terminations. These components are supplied with specified 3rd order through and reflected intermodulation levels (IM3) measured with a passive IM analyzer. Typically, the IM3 levels for these components are -110 dBC . Standard Models with this LIM (low IM) option are models 33, 24, 49, 53, 57, 58 and the corresponding terminations, ranging in incident power ratings of 25 to 500 Watts. Features of these components include specifically designed connectors and carefully processed and trimmed thin film resistors for low IM performance.

Couplers, Cables, Switches, Connectors, etc.

For these other passive components Aeroflex / Weinschel works very closely with our suppliers, providing them pertinent design input to achieve the lowest possible IMD performance on such products.

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