

Subsystems & Accessories



**Microwave & RF
Components &
Subsystems
Part 4**

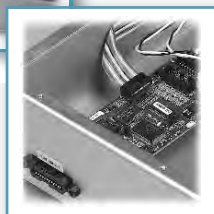
Subsystems & Accessories . . .



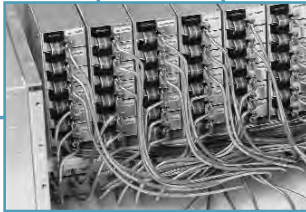
Aeroflex / Weinschel develops and manufactures high quality microwave and RF subsystems for a wide range of applications such as, RF distribution systems, switch matrices, attenuation matrices, RF link simulators, mobile unit fading simulators and cellular / cable test systems.

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:

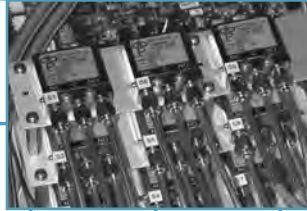
- /// Switch Matrices
- /// Complex RF Distribution Networks
- /// Attenuation Matrices & Multi-Channel Subsystems
- /// Mobile Unit (Radio & WLAN) Fading Simulators
- /// Subsystems with Low IM Performance
- /// Cable Modem Redundant Switches and Test Systems
- /// Programmable Attenuators with Built-In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



Subsystem Product Overview . . .



Multi-Channel Attenuation Subsystems



Switch Matrices



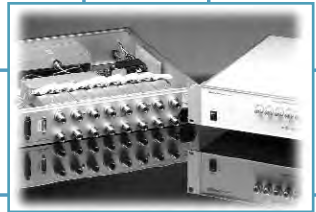
Complex RF Subsystems



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:

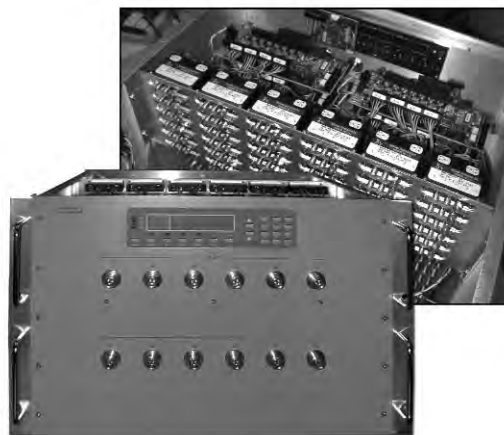
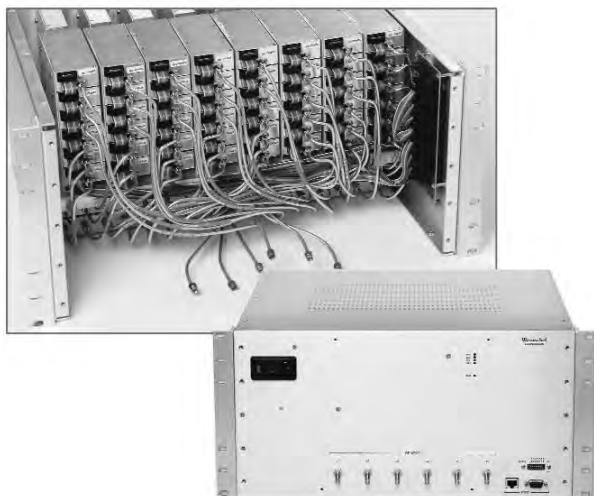
- /// Turnkey subsystems built to customer specified design & layout.
- /// Wide dynamic and frequency ranges.
- /// Low Phase Noise Design and Testing.
- /// Front panel and menu controls.
- /// Attenuation/switching schemes.
- /// Customer specified Input/Output parameters.
- /// Individual to complex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



Attenuation Matrices



Custom Configurations & Design



Description

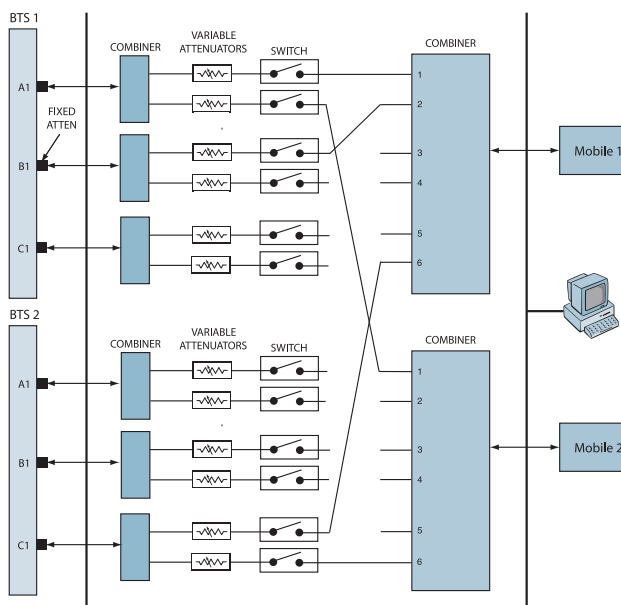
Aeroflex / Weinschel has designed and manufactured numerous versions of Attenuation Matrices for various applications. These units have typically been built in configurations that include 2x6, 3x6, 4x6, 6x6, 4x4, 4x8 and 8x8 configurations. For the typical UMTS, CDMA 2000, and GSM bands the units can 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:

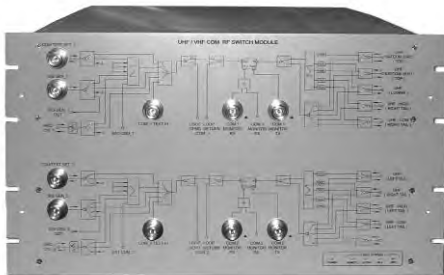
- /// Frequency Range: 800 MHz to 3 GHz
- /// Attenuation Range: 127 dB / 1 dB steps
- /// Impedance: 50 Ω nominal
- /// Insertion Loss: 25 dB @ 800 MHz (Target)
- /// 30 dB @ 3 GHz (Target)
- /// SWR: 1.50 maximum
- /// RF Power Input: 0 dBm average
- /// +30 dBm without damage
- /// Isolation Input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

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	60 dB
(different input)	
- /// 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

Subsystems & Accessories



Model 8314-1 Model 8314-2 WLAN System Simulator

2.0 to 4.0 GHz
2.0 to 6.0 GHz

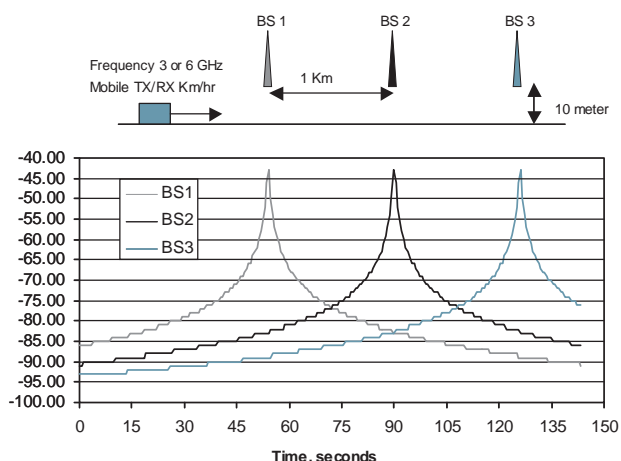
Simulate Connectivity over Distance & Speed



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. Several 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)

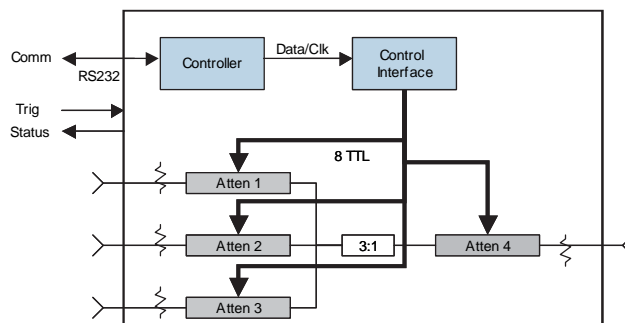


Figure 1. RF Simulator Block Diagram

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 continuous loop.

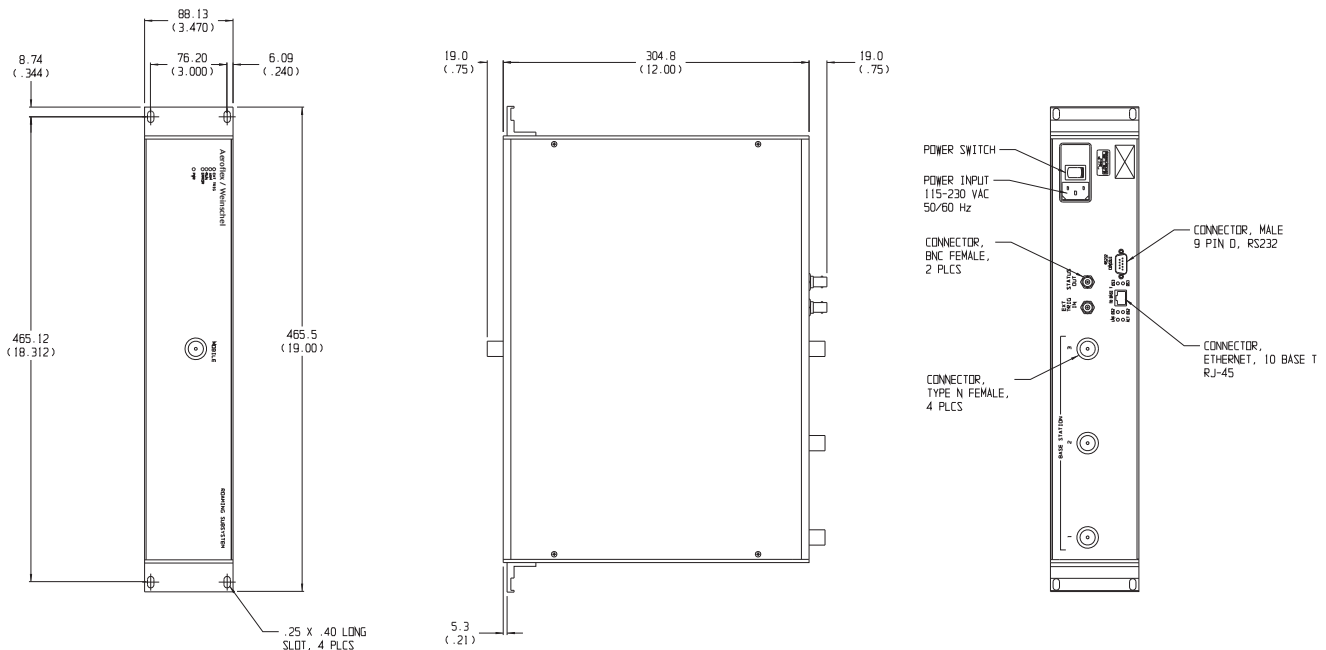
For additional information on the Model 8314, visit our website @ www.aeroflex.com/AW/8413.htm

Specifications

SPECIFICATION	DESCRIPTION	
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)
RS-232 Bus	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)
RF Characteristics	Attenuator (Qty 4):	Pin diode design
	Attenuation Range/Step Size:	0-63.75 dB/ 0.25 dB step
	Incremental Attenuation Accuracy:	+5% of selected value
	Frequency:	Model 8314-1: 2.0 - 4.0 GHz Model 8314-2: 2.0 - 6.0 GHz
	Configuration:	3 inputs, 1 output
	Impedance:	50 ohm
	Insertion Loss:	27 dB
	RF Input Power (P1dB):	+25 dBm
	RF Connector:	N Female
	VSWR:	1.75:1 Target
	Port to Point Isolation:	>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



Model 10044 Programmable Attenuator/Switch Unit

dc to 6.0 GHz



Ethernet (10/100 BaseT) Control

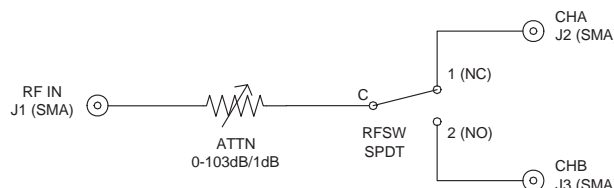


Description

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 values and attenuator types available.



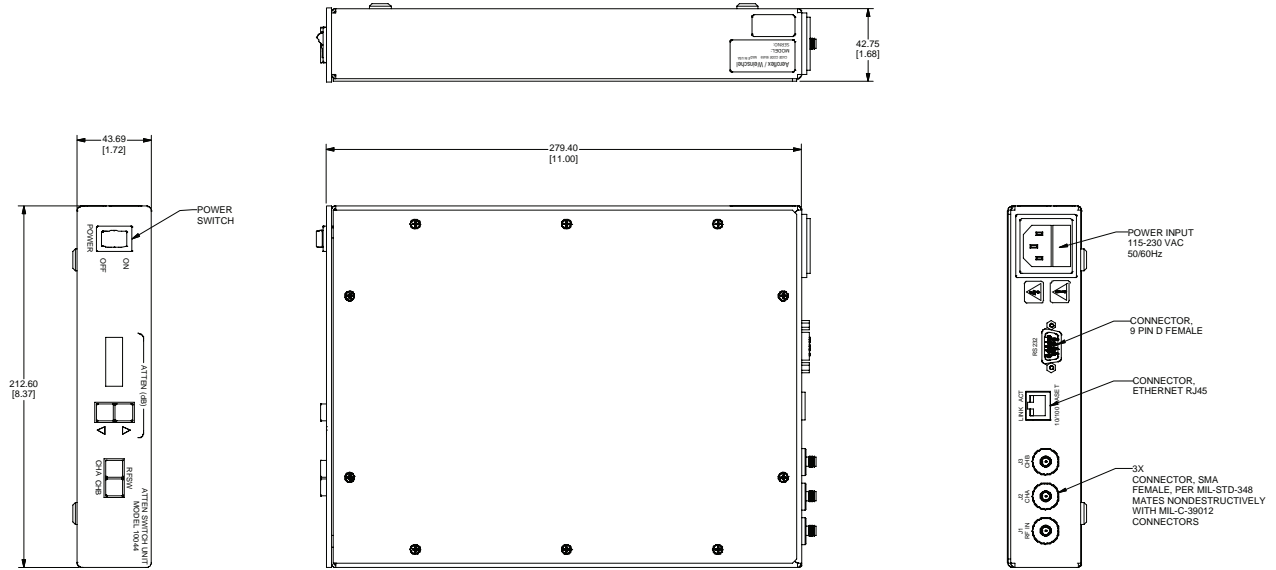
Model 10044 Schematic Diagram

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 attenuation 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

Physical Dimensions



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

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	

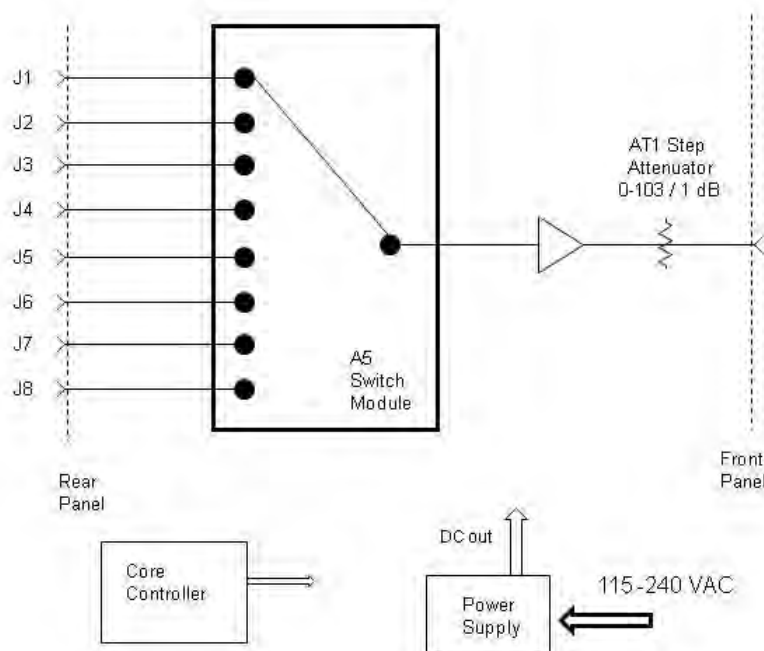
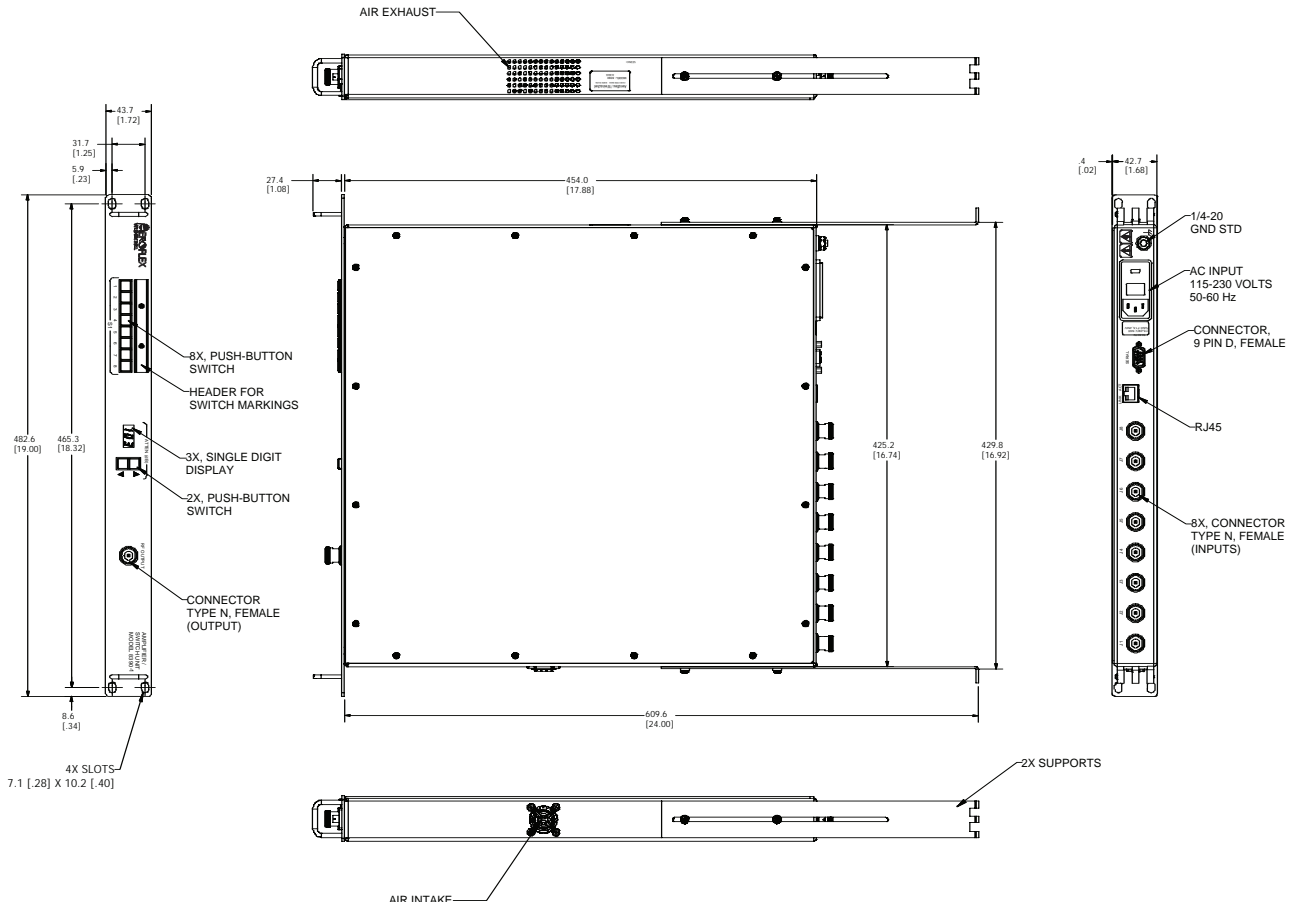


Figure 1. Model 8390 & 8390-1 System Block Diagram

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.)

Model 8501 High Power Programmable Switch 100 Watt Hot Switching Capability



RS232\RS422



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:

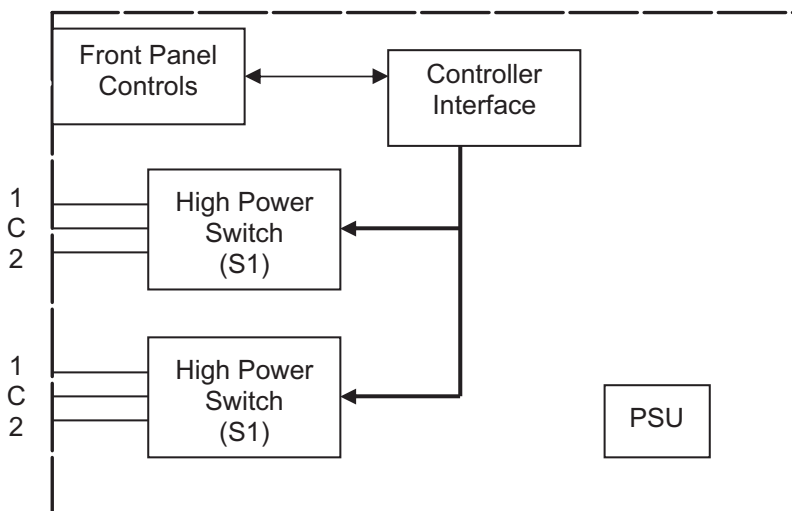
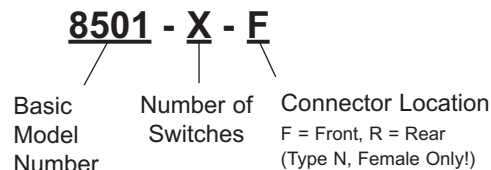


Figure 1. Model 8501 Block Diagram

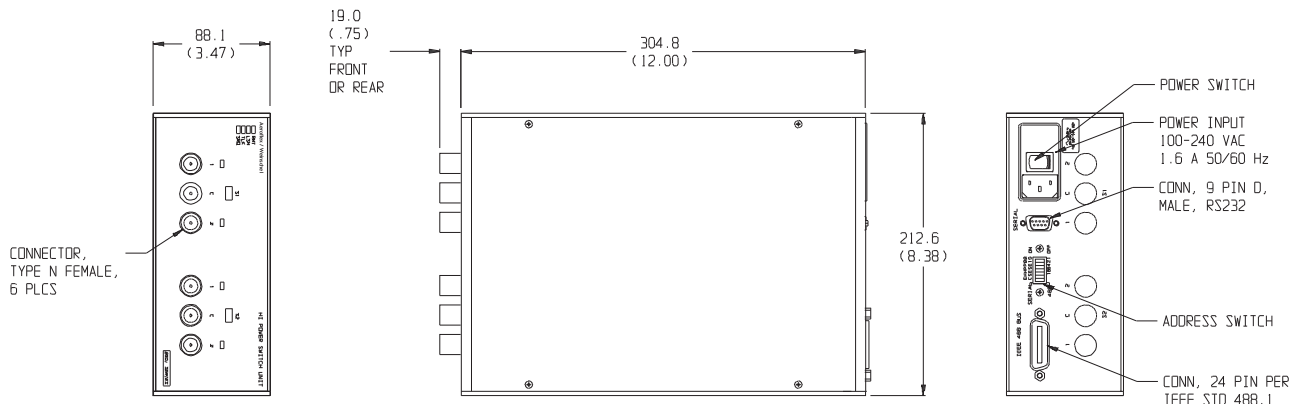
For additional information on the Model 8501, visit our website @ www.aeroflex.com/AW/8501.htm

Specifications

SPECIFICATION	DESCRIPTION	
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	Connector:	24-pin per IEEE-488.1
	Protocols:	per IEEE-488.2
	Indicators:	Remote (RMT), Listen (LSN), Talk (TLK), SRQ (SRQ)
RS-232 Bus	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⁾ signal GND	Connector:	9-pin male D
	Signals:	TXD+, TDX-, RXD+, RTX-, RTS+, RTS-, CTS+, CTS-, and
	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	Port Connectors:	Type N, Female
	Frequency Range:	dc - 13 GHz
	Impedance:	50 Ω
		<u>DC to 3</u> <u>3 to 5</u> <u>5 to 11</u> <u>11 to 13</u>
	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.

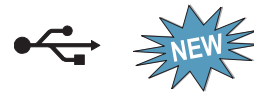
Physical Dimensions



8501-2-F SHOWN

Model 8502
Programmable Switch Unit
Local, Ethernet, USB & RS-232 Control

up to 18 GHz



Features

- /// Can be configured with up to 14 each, SP6T Switches
- /// Front panel local control and display make it ideal for lab and manual test environments
- /// DC to 18 GHz Operating Frequency Range
- /// Integrated Switch Cycle Counter
- /// Failsafe & Latching switching configurations available
- /// Accuracy & Repeatability.
- /// Low Insertion Loss and High Isolation
- /// Supplied with industry standard communication interfaces:
 - Ethernet (10/100 BaseT)
 - USB 2.0
 - RS-232 (Serial)
 - GPIB/IEEE-488 (HS-488 ready) optional
- /// Labview based Attenuation Control Software included
- /// Compact 2 RU, 19" Rack Mount Configuration

Applications

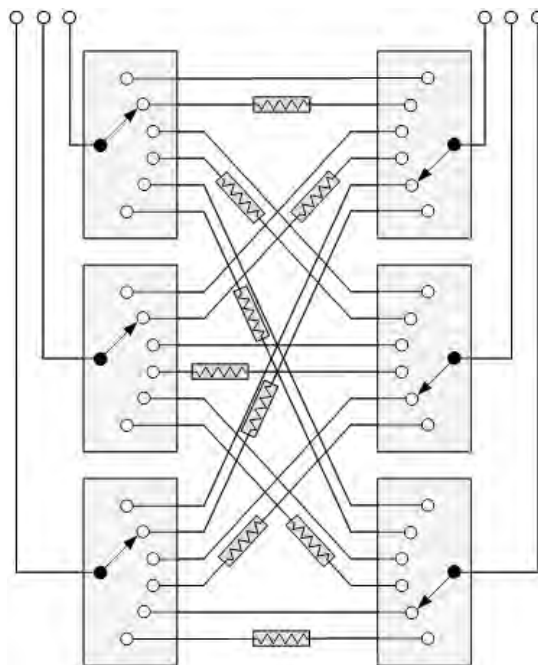
- /// User can remotely control up to 14 switches through a single connection
- /// Can be configured into multiple full-blocking matrices using external coaxial cables. Some examples for these matrices are: 2 x 2 and 3 x 3 with redundant paths, up to 6 x 6
- /// Can also be configured as a single pole, multi-throw (up to 1 x 66 throw) switch in addition to many other complex switching configurations
- /// The Failsafe version has a break-before-make operation which is suitable for non-contiguous applications while the Latching version has a make-before-break that can be suitable for high power signals

Description

Aeroflex / Weinschel's 8502 Series Programmable Switches represent a new streamlined approach in programmable switches for bench test and subsystem applications. Standard 8502 Series designs house and control up to 14 failsafe or latching electrometrical switches via front panel controls, Ethernet, USB and Serial communications interfaces. A GPIB/IEEE-488 interface is also available as an option.

The 8502 Series can be configured as a single input multi-channel configuration or can be configured for up to 14 channels each, SP6T switches interconnected externally in a variety of matrix arrangements or used independently.

Aeroflex / Weinschel also provides custom subsystems where a variety of test configurations can be incorporated within a single unit. Contact us with your specialized needs.



Sample Application Diagram

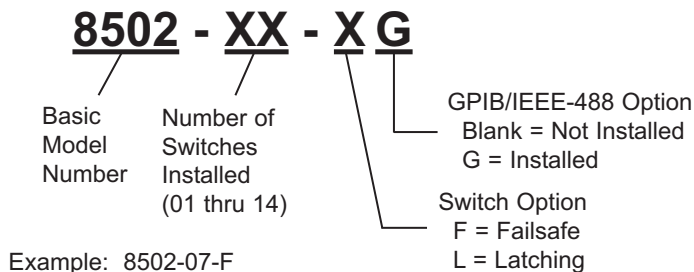
For additional information on the Model 8502, visit our website @ www.aeroflex.com/AW8502

Specifications

SPECIFICATION	DESCRIPTION																									
Input Power Requirements	ac 100 to 240 Vac, 50/60 Hz, 180 Watts																									
Environmental	Operating Temperature: 0° to +50°C Storage Temperature: -40° to +167 °F (-40° to +75°C) Humidity: 96% (non-condensing) Altitude: 40,000' (12,192M)																									
RS-232 Bus (1) Serial I/O	Connector: 9-pin male D Signals: TXD, RXD, RTS, CTS, GND Baud Rates: 9600 to 230400 Data Bits: 8 Handshaking: None, RTS/CTS Parity: None																									
USB 2.0	Connector: Mini B																									
Ethernet	10/100 Base T Connector: Standard RJ45																									
IEEE-488 Bus (2) (GPIB option)	Connector: 24-pin per IEEE-488.1 Protocols: per IEEE-488.2																									
RF Characteristics	Nominal Impedance: 50 Ω Frequency Range: DC-18 GHz <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th style="text-decoration: underline;">DC-3</th> <th style="text-decoration: underline;">3-8</th> <th style="text-decoration: underline;">8-12.4</th> <th style="text-decoration: underline;">12.4-18</th> </tr> </thead> <tbody> <tr> <td>VSWR (maximum):</td> <td>1.2:1</td> <td>1.3:1</td> <td>1.4:1</td> <td>1.5:1</td> </tr> <tr> <td>Insertion Loss (maximum):</td> <td>0.2 dB</td> <td>0.3 dB</td> <td>0.4 dB</td> <td>0.5 dB</td> </tr> <tr> <td>Isolation (minimum):</td> <td>75 dB</td> <td>70 dB</td> <td>60 dB</td> <td>60 dB</td> </tr> <tr> <td>Average Power (Typical)⁽³⁾:</td> <td>95 W</td> <td>55 W</td> <td>45 W</td> <td>35 W</td> </tr> </tbody> </table> Switching Action: Failsafe to Open (For Switch Option "F") Make Before Break (For Switch Option "L") Switching Time (maximum): 15 msec Life (minimum per position) ⁽³⁾ : 1 X 10 ⁶ cycles		DC-3	3-8	8-12.4	12.4-18	VSWR (maximum):	1.2:1	1.3:1	1.4:1	1.5:1	Insertion Loss (maximum):	0.2 dB	0.3 dB	0.4 dB	0.5 dB	Isolation (minimum):	75 dB	70 dB	60 dB	60 dB	Average Power (Typical) ⁽³⁾ :	95 W	55 W	45 W	35 W
	DC-3	3-8	8-12.4	12.4-18																						
VSWR (maximum):	1.2:1	1.3:1	1.4:1	1.5:1																						
Insertion Loss (maximum):	0.2 dB	0.3 dB	0.4 dB	0.5 dB																						
Isolation (minimum):	75 dB	70 dB	60 dB	60 dB																						
Average Power (Typical) ⁽³⁾ :	95 W	55 W	45 W	35 W																						

- RS-232 can be used with standard PC serial port for short and medium distances (up to approximately 50 ft).
- GPIB/IEEE-488 model allows user-selectable addresses, (Not included on standard models, must be ordered as an option).
- Hot switching is limited to 1 W CW maximum switching at higher power levels will reduce the life or the switch in terms of insertion loss accuracy repeatability.

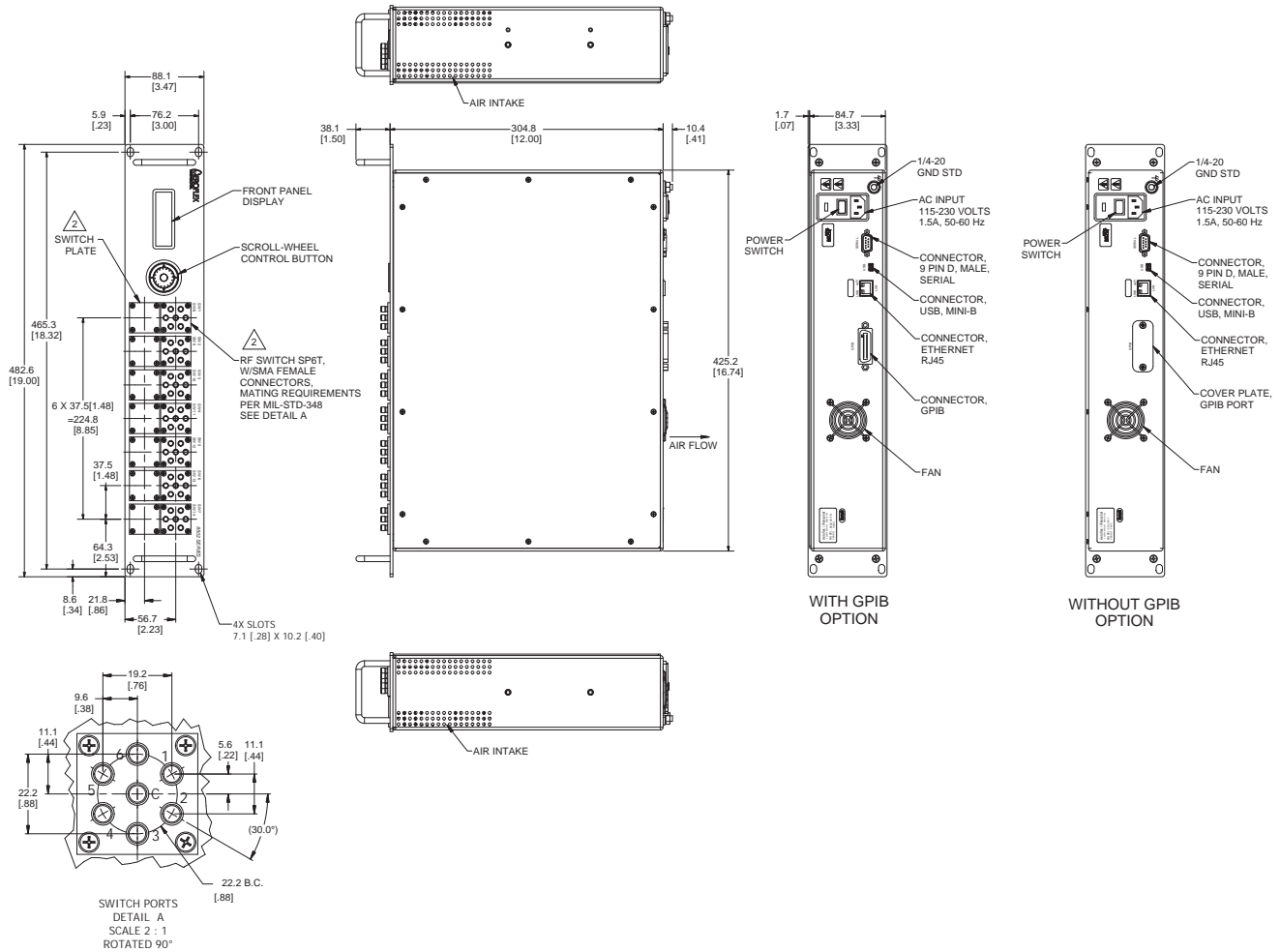
Model Number Configuration Matrix



Programmable Switches



Physical Dimensions

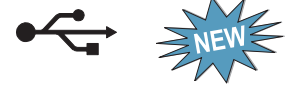


NOTE:

1. All dimensions are given in mm (inches).
2. RF Switches and switch plates as required and determined by configuration. Seven switch unit configuration shown.

Model 8304-5 RF Switching Subsystem *Simplifies Mobile Radio Testing*

DC to 2 GHz



Features

- /// DC - 2 GHz Frequency Range
- /// 50 Ohm Impedance
- /// 5 Radio Interfaces
- /// RS-232 Control

Description

Aeroflex /Weinschel's Model 8304-5 RF Switching System is part of an automated test set-up for various types of commercial and military radios. The difference in the test set up and configuration between different types of radios will be the control interconnect cables used.

The block diagram below shows the RF Switch Subsystem which is designed to control and test up to 5 radios at a time. The Aeroflex Test Solutions 3900 Series Digital Radio Test Set (Customer provided) will be used as the controller, signal stimulus and measurement instrument. The Aeroflex

Wichita Model 3901 Digital Radio Test Set is connected to the Aeroflex / Weinschel RF Switching Subsystem to enable the total system to automatically connect signals to 5 radios. The RF signals are routed through an electro-mechanical switch.

All switching selection occurs via the USB control port located on the rear panel of the Model 8304-5. The RF Switching System is an RF subsystem that utilizes an internal Micro Computer to provide control of the switches and relays via the USB to serial interface.

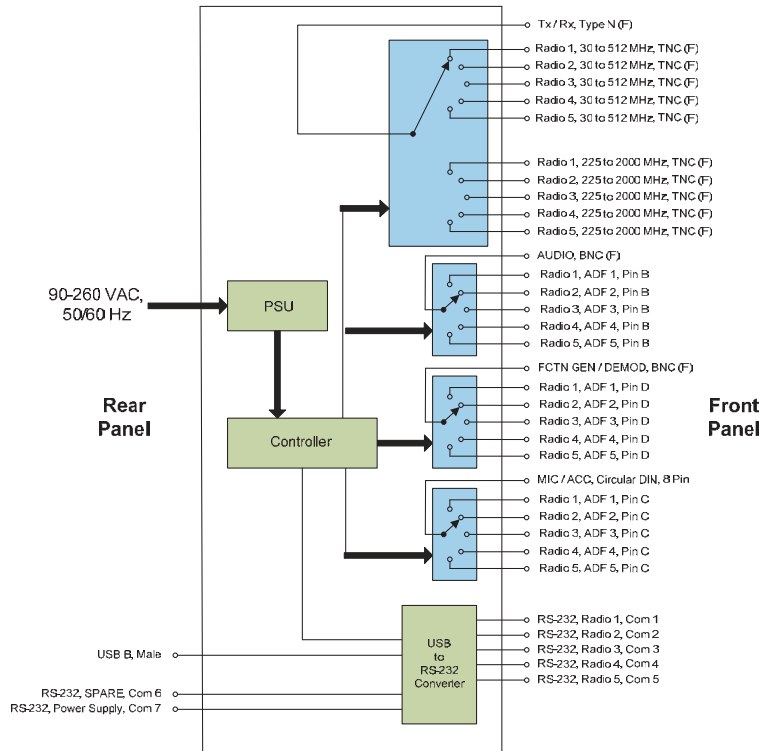


Figure 1. Block Diagram, Model 8304-5

Specifications

SPECIFICATION	DESCRIPTION	
Input Power Requirements	AC 115/230 Vac, 50/60 Hz, 1.5 A Connector per IEC320	
Environmental Operating	Temperature 0 to +50°C Storage Temperature -40° to +167 °F (-40° to +75°C)	
USB to 8 Serial Ports Adapter	Connector	9-pin male D
	Number of Ports	8
	Signals	TXD, RXD, RTS, CTS, DTR, DSR, DCD, GND
	Speed	up to 921.6 kbps
	Driver	Windows 98, ME, 2000, XP, 2003 Server, Vista, Linux (Kernel 2.4 and up built-in)
	Indicators (Front Panel) Tx (Transmit) and Rx (Receive)	
RF IN / OUT	Frequency Coverage	DC - 2000 MHz
	Impedance	50 Ω nominal
	VSWR	1.3:1 maximum
	Pin (CW maximum)	+30 dBm hot switching +43 dBm carrying
	Switching Operations	1 million minimum
	Switching repeatability (System)	+/- 0.1 dB
	Flatness	+/- 0.5 dB
	Insertion Loss	0.5 dB
	RF In Connector (1 Place)	Type N Female
	RF Out Connector (10 Places)	TNC Female
	Switching Speed	20 mSec from receipt of command at switch
Tx Audio	Frequency Range	500 Hz – 15 kHz
	Impedance	600 Ω nominal
	Connector In	BNC Female
	Output (5 Places)	Pin D ADF Connector
Rx Audio	Frequency Range	500 Hz – 15 kHz
	Impedance	600 Ω nominal
	Connector In	BNC Female
	Output (5 Places)	Pin B ADF Connector
Push to Talk	Signal Input	HI/GND TTL control
	Connector In	8 pin DIN
	Output (5 Places)	Pin C ADF Connector
FUNCTION GENERATOR / DEMO MOD	Connector IN	Circular DIN, 8 Pin, Female

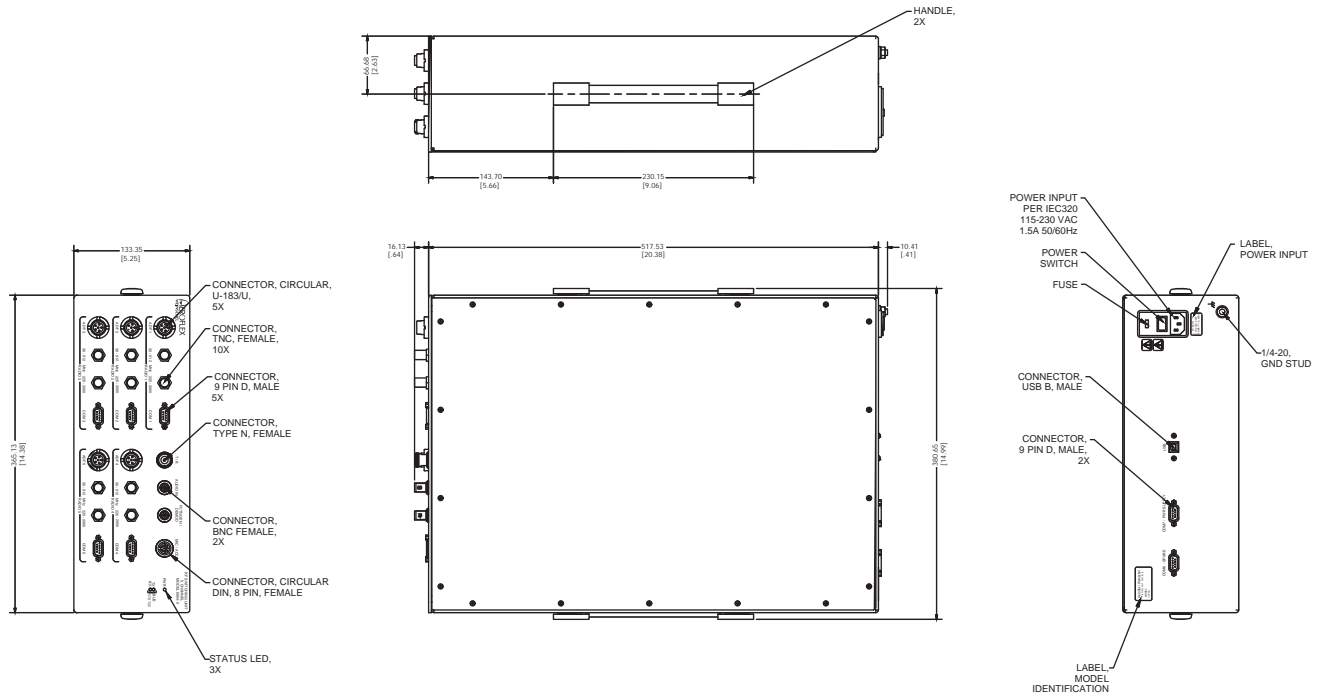
EXPORT CONTROL:

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.)

Physical Dimensions:



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

Interconnect Cables

The following interconnect cables are provided:

From Aeroflex Wichita Model 3901 Digital Radio Test Set to Aeroflex / Weinschel 6904 RF Switch Subsystem

TR to RF IN	N to N	P/N 068-72-12/0
Audio IN	BNC to BNC	P/N 068-95-12/0
Funct Gen/Demod	BNC to BNC	P/N 068-95-12/0
Mic	8 pin DIN to 8 pin DIN	P/N 193-10843

From Aeroflex / Weinschel 6904 RF Switch Subsystem to Radio Under Test

30-88 MHz In/Out	TNC to TNC	P/N TBD
90 - 512 MHz In/Out	TNC to TNC	P/N TBD
ADF Connector	A3012775-2 to A3012775-2	P/N 193-1084

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

950 to 2150 MHz



Description

Aeroflex / Weinschel's Model 10077 is a 8 x 8, Non Blocking - full fan-out Switch Matrix and is designed utilizing input 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. Position status is available via the front panel display.

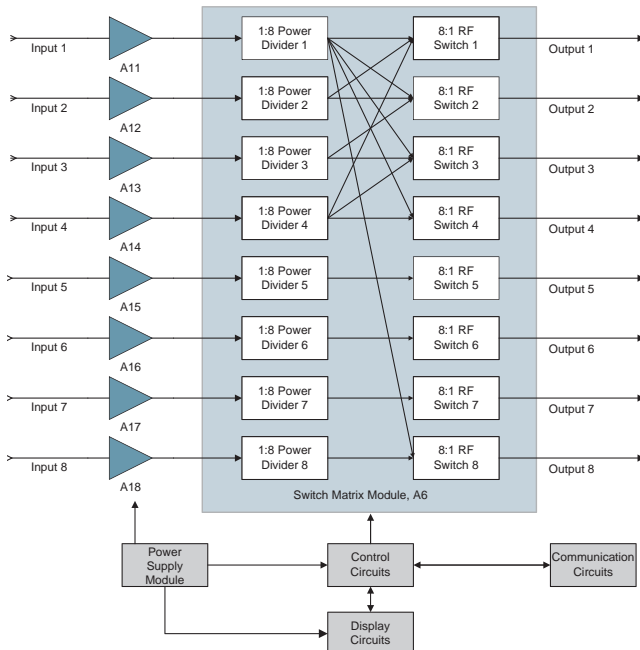


Figure 1. Model 10077 Block Diagram

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
- /// 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.

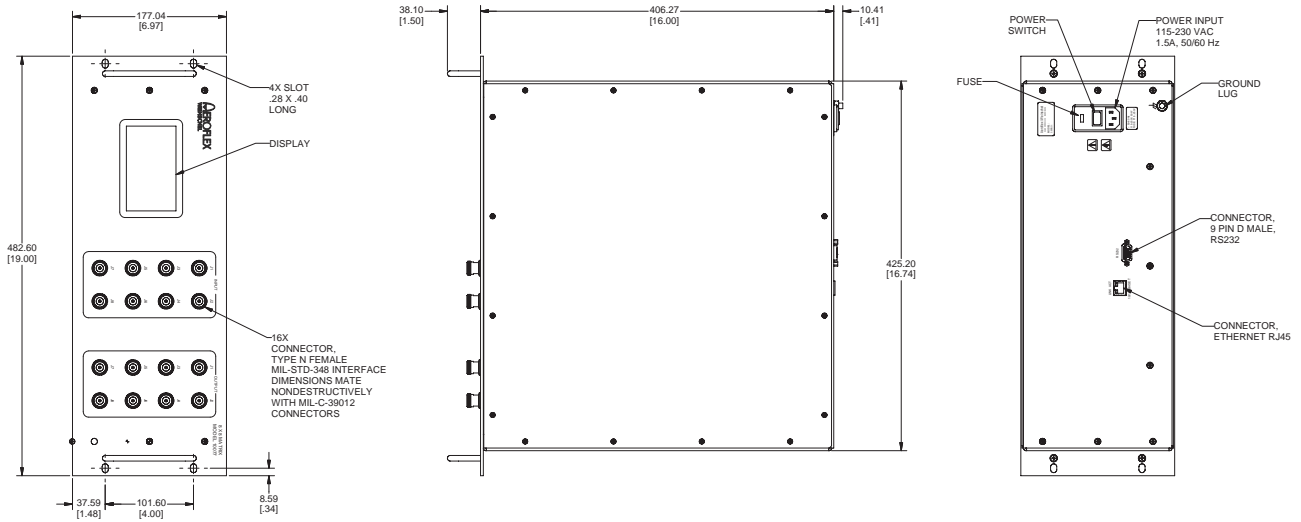
Specifications

- FREQUENCY RANGE: 950-2150 MHz minimum
- IMPEDANCE: 50 Ohm nominal
- RF SWITCH TYPE: Solid-State
- 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

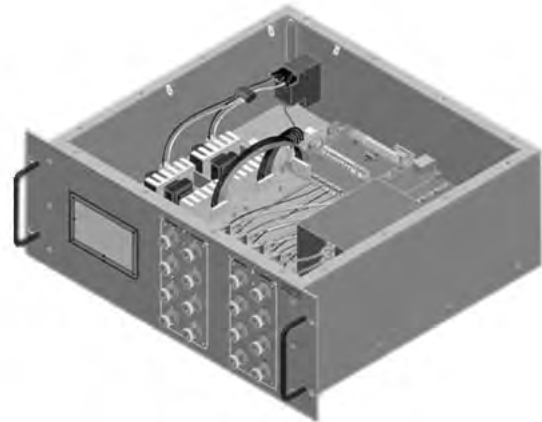
Subsystems & Accessories



Physical Dimensions



NOTE: All dimensions are given in mm (inches)

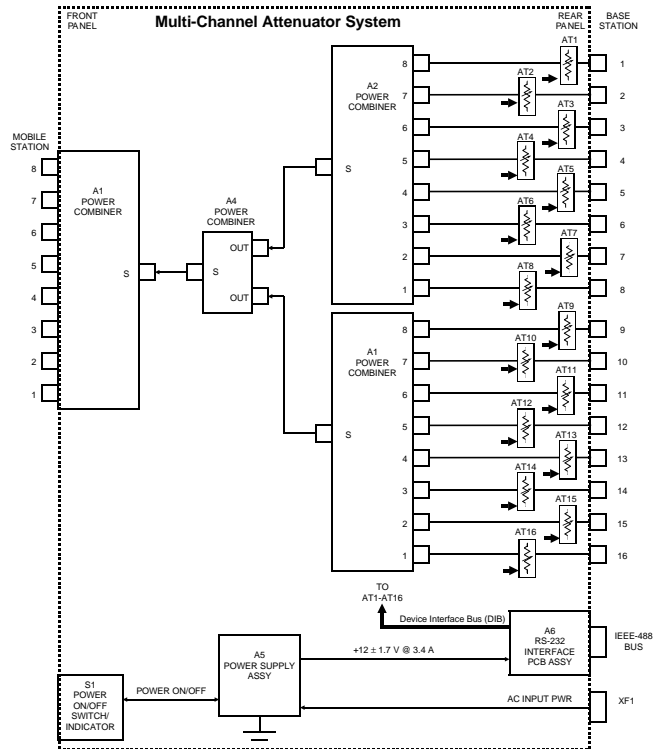


Mobile Unit Fading Simulators

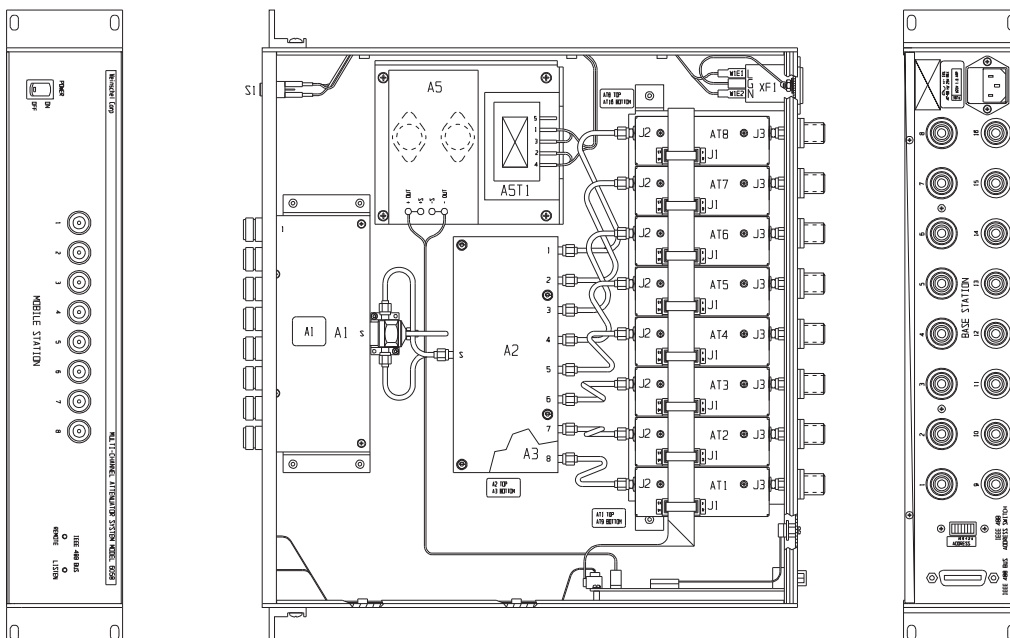


Aeroflex / Weinschel designs and manufactures multi-path attenuation subsystems for fading / simulation of a broad range of applications and subsystems. This subsystem illustrated features:

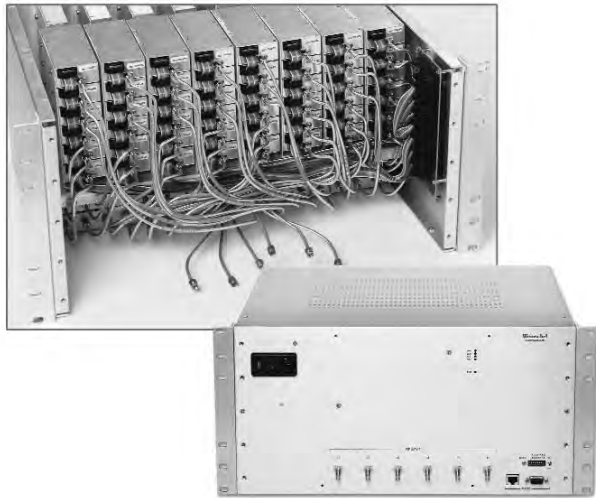
- /// 400 - 3500 MHz frequency range.
- /// 16 Input Channels to 8 Output Channels. (other configurations available)
- /// RS-232 Serial Interface.
- /// Wide Dynamic Range: 127/1 dB steps.
- /// Aeroflex / Weinschel 3200T Programmable Attenuators with 8210A Controller.



Mechanical Layout:



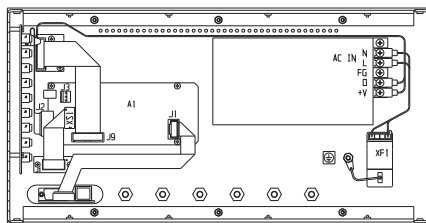
Complex Multi-Channel Attenuator



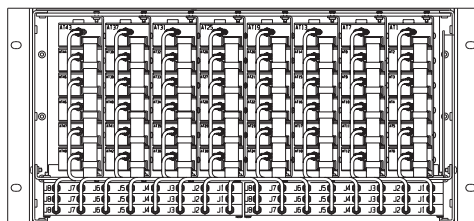
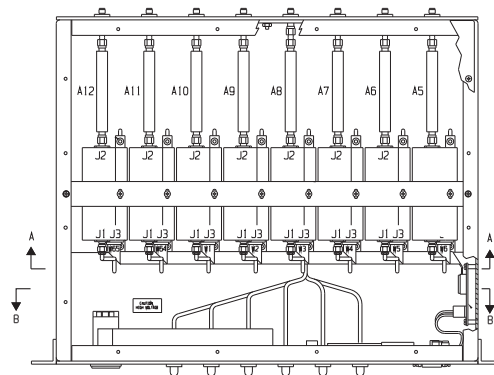
This application illustrates Aeroflex / Weinschel's ability to house and control a large number of solid-state programmable attenuators and power combiners creating a complex multichannel attenuator subsystems. Other features include:

- /// 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.

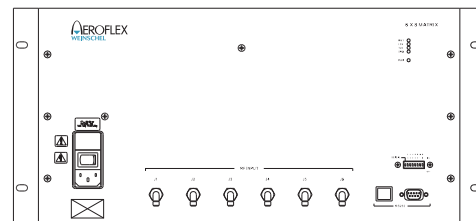
Mechanical Layout:



SECTION B-B



SECTION A-A



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:



- /// WiMAX & 3G/4G Fading Simulators.
- /// 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.



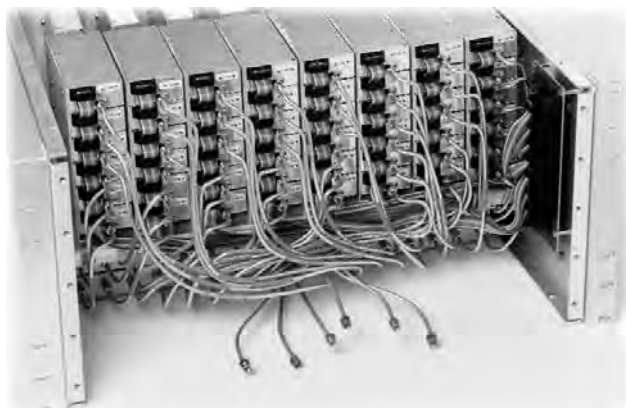
Subsystems & Accessories



Attenuation Matrices & Multi-Channel Subsystems:



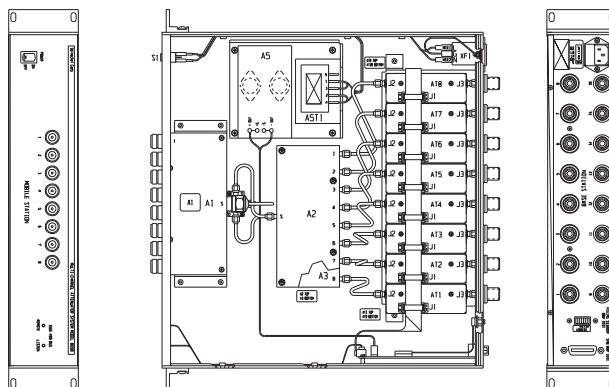
Whether the application is an individual attenuation module for satellites or complex matrix/channel configurations for cellular base station testing and operation, Aeroflex / Weinschel's design approach offers a versatile but simple method of creating and packaging fixed, solid-state and/or mechanical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



Low Intermodulation Subsystems & Signal Conditioning Networks...

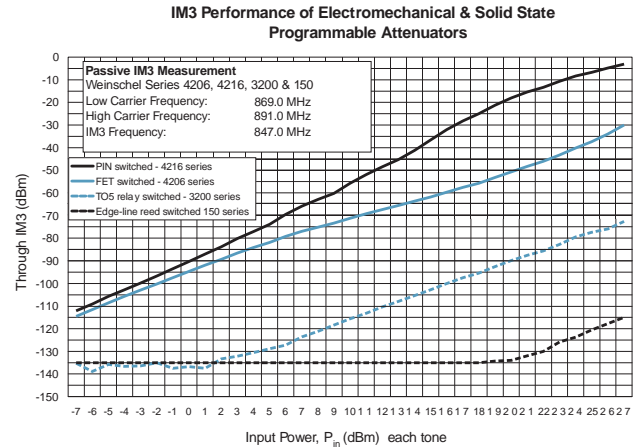
Some custom subsystem designs warrant the use of Low Intermodulation passive components such as programmable attenuators, terminations, fixed attenuators, couplers, cables, connectors and switches. Aeroflex / Weinschel is a leading manufacturer of the first three items. The following paragraphs briefly 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 f_1 and f_2 , the third order IM products at $2f_1 - f_2$ and $2f_2 - f_1$, are the most harmful distortion products. They are harmful because they are close to f_1 and f_2 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.



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.

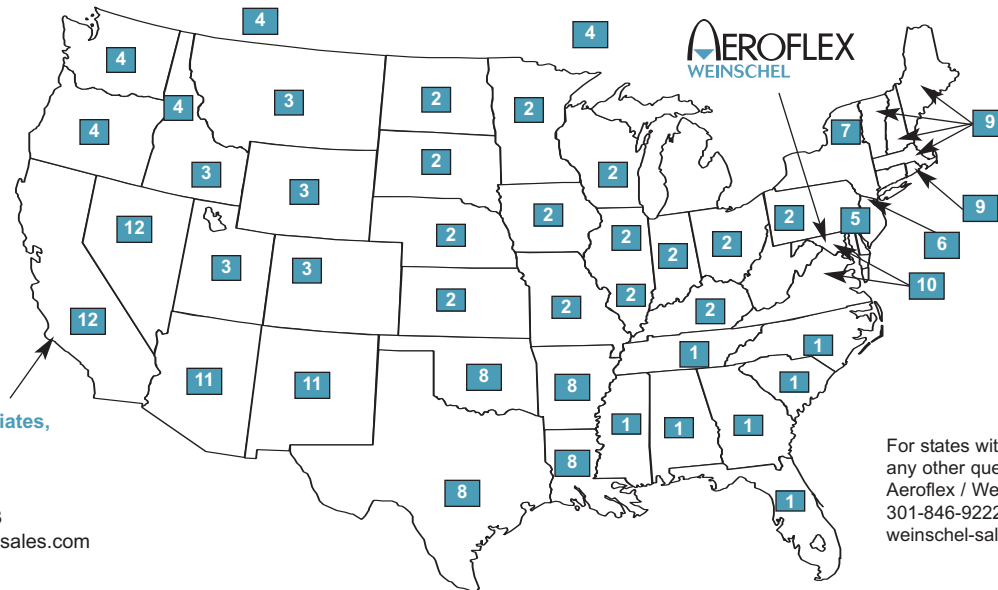
Couplers, Cables, Switches, Connectors, etc.

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.

General Information & Indexes



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Tel: 310-428-5715
Fax: 424-644-8043
email: gary@gmacsales.com

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any other questions contact
Aeroflex / Weinschel @
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weinschel-sales@aeroflex.com

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4. CAIN-SWEET CO.: 13401 Bel-Red Road Ste. A5, Bellevue, WA 98005, Tel: 425-562-6028, Fax: 425-562-2680, sales@cainsweet.com, www.cainsweet.com

Express: ARGOSY COMPONENT SALES: Toll Free: (800) 575-0962 or (800) 542-4457, Toll-Free Fax: (866) 562-2271, Tel: (425) 562-6112, Fax: (425) 562-2271, sales@argosysales.com, www.argosysales.com

5. EASTERN INSTRUMENTATION OF PHILADELPHIA: 710 E. Main Street, Moorestown, NJ 08057, Tel: 856-231-0668, Fax: 856-231-9022, jerry@eiphila.com, www.eiphila.com

6. SPECTRUM SALES: 40 Underhill Blvd. 2-D, Syosset, NY 11791, Tel: 516-921-5750, Fax: 516-921-5776, sales@spectrumsales.com, www.spectrumsales.com

7. NORTHERN TECHNICAL SALES: 30 Grove Street, Pittsford, NY 14534, Tel: 585-385-6480, Fax: 585-385-7546, bfox@ntsny.com, www.ntsny.com

8. PHASECOM: 99 Trophy Club Drive, Trophy Club, TX 76262, Tel: 817-410-5790, Fax: 817-410-5791, csangalli@phasecom.com, www.phasecom.com

9. dBm TECHNICAL SALES: One Olde North Road, Chelmsford, MA 01824, TEL: 978-256-7100, Fax: 978-256-9705,

10. R. L. ENGINEERING INC.: 3752 Farmland Drive, Fairfax, VA 22033, Tel: 703-819-9498, Fax: 703-865-8335, bobrle@gmail.com

11. TECHNICAL MARKETING SPECIALISTS: 7860 E. Berry Place, Suite 110, Greenwood Village, CO 80111, 303-488-0220, Toll Free: 800-342-8408, Fax: 303-488-0080, cbadzik@tmssales.com, www.tmssales.com

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WARD / DAVIS ASSOCIATES, SOUTH: 2623 Manhattan Beach Blvd., Redondo Beach, CA 90278-9981, Tel: 310-643-6977, Fax: 310-643-6035, sales@warddavis.com

For up-to-date sales, distributor listing and information, visit our website at www.aeroflex.com/weinschel-reps.cfm

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Sydney: Sales, Service & Calibration, Silverwater Central, Level 477-79, Parramatta Road, SILVERWATER, N.S.W., 2128, Tel: (61) 2 9648 4757, Fax: (61) 2 9648 4959

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BULGARIA: Amtest-TM s.r.o., Svatováclavská 408, Uherské Hradite, 686 01 Czech Republic, Tel: 420-572-572-028, Fax: 420-572-544-216, Roman.Honig@amtest.com, www.amtest-tm.com

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CANADA - WESTERN REGION: Cain-Sweet, Co., Alberta / Saskatchewan Office, Unit 2, 4404-12th Street, N.E., PO Box 82, Calgary, Alberta T2E 6K9, Tel: 403-250-7288, Fax: 403-250-7289, wes@cainsweet.com, www.cainsweet.com

CHILE: Mmwave - Shikatronics S A DE C V, M. Felix Cabrera No. 59, Office 203, Providencia, Santiago, Chile, Tel: (56)2-231-1454 Fax: (56)2-231-2782

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SWEDEN: Compomill Nordic Components AB, Dragonvägen 42, VASBY, SWEDEN, Tel: (46)8-594 111 50, Fax: (46)8-594 211 60, info@compomill.se, www.compomill.se

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THAILAND: Aerocomm Company Ltd.89 & 89\1 Intamara 41 Sutthisarn Rd.Dindang, Bangkok, 10400, Thailand, Tel: 66)2-693-8300, Fax: (66)2-693-8304, aerocomm@aerocommthailand.com, www.aerocommthailand.com

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NOTE: For Countries NOT listed contact the Sales Department at Aeroflex / Weinschel @ weinschel-sales@aeroflex.com or 301-846-9222.

General Information & Indexes



Ordering & Service Information...

HOW TO ORDER: Please order by both catalog model number and description of the component to avoid any misunderstanding (e.g., Model 1506A Broadband Coaxial Power Divider). Special features and modifications not listed in the specifications may be available at extra cost. Please contact the factory regarding any nonstandard features.

WHERE TO ORDER: Address all purchase orders and other communications to:

Aeroflex / Weinschel, Inc.
5305 Spectrum Drive, Frederick, MD 21703-7362
Phone #: 301-846-9222
Fax: 301-846-9116
email: weinschel-sales@aeroflex.com
Toll Free: 800-638-2048
Express: 800-542-4457 (Argosy Sales)

or contact your nearest Aeroflex / Weinschel Sales Representative.

Purchase orders will be accepted via phone, fax or email pending confirmation of your standard purchase order form. Determination of prices, terms and conditions of sale and final acceptance of orders are made only at Aeroflex / Weinschel.

DOMESTIC TERMS: Formal price quotations remain in effect for 60 days. Terms of payment are net 30 days for established accounts; new accounts are also net 30 days subject to credit approval. Aeroflex / Weinschel also accepts AMEX, VISA and Mastercard. If credit has not been established, payment must be received before shipment or shipment will be made C.O.D. to avoid delay. All prices are F.O.B. Frederick, Maryland and include commercial inspection and packing for shipment within the continental United States.

EXPORT TERMS: Export prices including the cost of packing are available from Aeroflex / Weinschel or from the export representatives. On orders placed directly with Aeroflex / Weinschel, payment terms are Cash in Advance or by major credit card. Irrevocable Letter of Credit through a U.S. Bank against presentation of our draft and corresponding documents will be accepted for orders valued at \$5,000 minimum. All prices are F.O.B. Frederick, Maryland.

SHIPPING INSTRUCTIONS: Unless specific instructions accompany the order, we shall use our judgment as to the best method of shipment. Shipments can be made by either air or surface transportation.

MINIMUM ORDER VALUE: Purchase orders amounting to \$500.00 net or less, will be billed at \$500.00 plus shipping costs.

SOURCE INSPECTION SURCHARGE: If customer or Government Source inspection is required, add \$350.00 or 5% of the purchase order value, whichever is greater.

CERTIFICATE OF COMPLIANCE: A Certificate of Compliance is shipped with every order along with the packing slip. Extra copies are available upon request at any time. The certificate states:

Aeroflex / Weinschel certifies that all items/materials are inspected and tested as applicable, and are in accordance with the purchase agreement, drawings, OEM specifications, and other applicable documentation. Calibration and equipment standards as applicable are traceable to the National Institute of Standards and Technology. Supporting documentation is on file at this facility.

WARRANTY: 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. 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 to, and in Aeroflex / Weinschel's sole opinion, products that have been subject to improper or inadequate maintenance, unauthorized modifications, misuse, or operation outside the environmental specifications for the product.

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.

IN-WARRANTY REPAIRS: When returning a component back to our factory, a Return Materials Authorization (RMA) number must be obtained from Aeroflex / Weinschel. When contacting us for an RMA number, please indicate the model number, serial number, and date of the original purchase order. Also include as much information as possible pertaining to nature of the malfunction or reason for return. The items returned should be accompanied with this information and include your company name, your name, and a phone number where you can be reached.

OUT-OF-WARRANTY REPAIR: Should it become necessary to return a component for repair, follow the procedure described in the preceding paragraph prior to shipping. Within one week after receipt at the factory, the unit will be evaluated and a formal quotation will be supplied. Repair will begin when authorization is received in the form of a Purchase Order. Weinschel gives a 90-day warranty on all out-of-warranty repairs.

CANCELLATION AND RETURNS: Orders placed with Aeroflex / Weinschel may be cancelled only after authorization by Weinschel. Any authorized cancellation is subject to cancellation charges as determined by Weinschel. A component returned for credit will be subject to a restocking charge. If more than 6 months has elapsed since original purchase, the item may not be accepted for credit. Nonstandard components cannot be returned for credit.

TEST & SERVICE: Aeroflex / Weinschel is committed to providing fast, professional customer service and support worldwide. You have the assurance of knowing our staff of highly trained professionals is available using approved procedures and instrumentation. Aeroflex / Weinschel Test and Service is always committed to quality as defined by the customer. Full lines of repair and test services are available.

Aeroflex / Weinschel does not provide calibration for any product or provide Certificates of Calibration in accordance with the requirements of Mil-Std 45662, ISO 9001, ISO 9002, ISO 10012-1, ANSI/NCSL-Z540, or ANSI/ISO/IEC 17025-2000 requirements. Aeroflex / Weinschel will assist our customers as following in obtaining Calibration of Product in accordance with the requirements of Mil-Std 45662, ISO 9001, ISO 9002, ISO 10012-1, ANSI/NCSL-Z540, or ANSI/ISO/IEC 17025-2000.

Aeroflex / Weinschel will provide Certificates of Conformance, Certificates of Test and Test Data Reports for products as required or as requested by a customer. These forms state that product has been tested to published specifications using equipment whose accuracies are traceable to the National Institute of Standards and Technology (NIST).

Test Data: Special and/or additional test data is available at a nominal charge.

Repair work: Accomplished repairs will return the item to its published specification. Aeroflex / Weinschel provides a 90-day warranty on repair services performed, with fixed price repairs on most products.

Telephone/E-mail Consultations: Our test and Service Department will gladly provide informal consultation over the telephone or through e-mail (service@weinschel.com) with testing and or service questions.

Alphabetical Index...

A dapters, Coaxial	177-184	2.92mm (SMK)	201, 233-234
Frequency Asked Questions	179	3.5mm	201, 224-232
General Information	177	Digital & MMIC	235-240, 247
High Performance Coaxial Adapter, N to SMA	183	General Information	199
Index, Precision Adapters (dc-26.5 GHz)	178	Frequently Ask Questions	203-205
OEM Precision Coaxial Panel Mount, SMA	180	Ethernet Control	248-253
Precision N to N	182	GaAS Switched	202,243-246, 252-254
Precision N to SMA	184	High Power, Hot Switching	255-257
Precision SMA to SMA	181	Index, Relay Switched, Basic Models, dc-6 GHz	200
Aeroflex / Weinschel	2-3	Index, Relay Switched w/built-in Microprocessor	200
Amplifier / Switch Units	268-270	Driver, dc-6 GHz	
Attenuation Matrices	263	Index, Relay Switched, Basic Models, dc-40 GHz	201
Attenuators, Variable (Step & Continuous)	133-150	Index, Relay Switched w/built-in Microprocessor	201
General Information	133	Driver, dc-26.5 GHz	
Frequency Asked Questions	135	Index, Solid-State & Digital	202
Index, Continuous Variable, dc-4.2 GHz	134	Intermodulation Distortion in Programmable	
Index, Manual Step Attenuators, dc-26.5 GHz	134	Attenuators	206-208
Manual Step, 2.92mm (SMK)	149-150	N	203, 248-257
Manual Step, N	146-148	Pin Switched	202, 241-242, 247, 252-254
Manual Step, RF	138	Programmable Attenuator Units	248-257
Manual Step, SMA	143-145	Relay Switched	209-223, 252-254
Precision Continuous Variable, N & SMA	136-137	RS-232 Control	209-223, 252-254
Attenuators, Coaxial Fixed	15-80	Solid-State	235-248, 252-254
2.4mm	32	SMA	200, 202, 209-232, 252-254
2.92mm (SMK)	31, 33, 39, 43, 44, 48, 49, 51, 55, 58, 59,	USB Control	239-240, 252-254
.....	62, 63, 73, 76-80		
3.5mm	30, 40, 52, 53, 56, 57, 60, 61, 66	B lind-Mate Connectors	185-194
7/16	50, 54, 64	2.92mm	186, 188-194
Bi-Directional	45, 49, 51, 52, 55, 56, 67, 73-75	Applications	187
Conductive Cooled	20, 65, 70, 71, 73-80	Attenuators, Example	192
Convection Cooled	45-72	Custom Examples	192-194
Forced Cooled	69	Description	185
Frequently Ask Questions	21-22	Features	185
General Information	15	Front Locking	186, 190
General Purpose	28, 34	General Information	187
Hex Body	29	Index, Blind-Mate Connectors	186
High Power	58-80	Frequency Asked Questions	179
High Reliability & Space	12, 41	Microstrip, Example	192
Index, Conduction Cooled, dc-40 GHz, 5-550 Watts	20	Pressurized	188
Index, Medium Power, dc-40 GHz, 10-50 Watts	17	Rear Locking	189, 191
Index, High Power, dc-18 GHz, 100-1,000 Watts	18	SMA	192-193
Index, High Reliability & Space, dc-40 GHz, 2 Watts	16	C onnectors, Blind-Mate	185-194
Index, Low Power, dc-40 GHz, 1-5 Watts	16	Connectors, Planar Crown	195-198
Index, Low IM, dc-26.5 GHz, 25-550 Watts	19	Complex Multi-Channel Attenuator	262, 277
Lab Standard	37	D C Blocks	171-176
Low IM	19, 50-52, 54-56, 60,62, 64, 65, 68, 70	General Information	171
Low Power, dc-40 GHz, 1-5 Watts	16, 26-444, 42-44, 73	Index, dc Blocks, dc to 18 GHz	171
Medium Power, dc-40 GHz, 10-50 Watts	17, 45-57	Inside	171-175
N	34, 36, 37, 40-41, 46, 47, 49, 51, 52, 55-72, 74, 76-80	Inside/Outside	176
Precision Sets	40	Planar Bulkhead	175
Selection Matrix	23	N	172
SMA	26-29, 38, 41, 42, 45	SMA	173-176
TNC	35	Directions to Weinschel	288
Understanding Temperature & Power	24-25	Dividers, Power	151-164
Coefficient in Attenuators		E xpress Overnight Shipment Service	9-11
Attenuator / Switch Units	267-268	F ixed Coaxial Attenuators	15-80
Attenuator/Switch Controllers	203, 216, 225, 258-260	H igh Power Programmable Attenuator	255-257
Attenuator, Manual Step	133-135, 138-150	High Power Programmable Switch	271-272
2.92mm	149-150	L ow Intermodulation Subsystems & Signal	280
General Information	133	Conditioning Networks	
Frequency Asked Questions	135	M anual Step Attenuators	133-150
Index, Manual Step Attenuators, dc-26.5 GHz	134	Mobile Unit Fading Simulators	262, 276
N	136, 146	Model Number Index	4-6
RF	138	O pen / Short / Load	82, 132
SMA	138-148	Ordering & Service Information	285
Attenuators, Programmable	199		


Phase Shifters	165-170	Switch Matrices & RF Distribution Systems	264
2.92mm (SMK)	166, 169	Subsystem Product Overview	262
3.5mm	166,170	WLAN Roaming Simulator	265-266
General Information	165	Splitters, Power	152, 154-158
Index, dc to 20 GHz	166	Solid-State & Digital Attenuators	235-247, 252-254
SMA	166-168	Switch Matrices & RF Distribution Systems	264
Miniature In-Line	169	T able of Contents	1
Planar Crown Connector System	195-198	Terminations & Loads	81-132
Pin Switched Programmables	241-242, 247, 252-254	2.4mm	82, 96
Power Splitters & Dividers	151-164	2.92mm (SMK)	82-87, 95, 99, 104, 106, 111, 114, 117-119, 121, 125, 126, 128-131
2.92mm (SMK)	154, 158, 163	3.5mm	82-85, 94, 107, 108, 112, 113, 116, 117, 127
3.5mm	155, 157, 162	7/16	105, 110, 120
4-Way	164	BNC	109
Dividers	151, 152, 159-164	Conduction Cooled	119, 121, 125-132
Frequently Ask Questions	153	Convection Cooled	85, 86, 111-124
General Information	151	Frequently Ask Questions	88-89
Index, Splitters	151-158	General Information	81
Index, Dividers	152	General Purpose	93
N	156, 161	High Power	84
Splitters, Matching	154-156	Index, High Power, dc-18 GHz, 100-1,000 Watts	84
SMA	152, 159, 160	Index, Low Power, dc-50 GHz, 1-5 Watts	82
Product Index	6-8	Index, Medium Power, dc-26.5 GHz, 10-50 Watts	83
Programmable Attenuators	199-257	Index, Low IM, dc-18 GHz, 25-550 Watts	85
R elay Switched Programmable Attenuators	199-201, 209-234	Lab Standard	91
RoHS Compliance	286	Low IM Options	85, 105-107, 110, 112, 117, 119-123
S ubsystems & Accessories	261-282	Low Power	83, 90-99
Application Specific Subsystems	278-279	Medium Power	82, 100-113
Attenuation Matrices	263	N	83-87, 91, 93, 97, 101-104, 106, 107, 109, 111-119, 121-124, 126, 128-131
Amplifier / Switch Units	269-270	Open / Short / Load	86, 132
Cellular & Wireless Test Solutions	273	Section Guide	87
Complex Multichannel Attenuator	277	SMA	82-83, 90, 92, 98, 100, 109
Custom Mechanical Packaging & Modular Design	279	Subminiature	92, 98
General Information	261	TNC	132
High Power Programmable Switch	271-272	U S Sales Representatives	283
L-Band 8X8 Switch Matrix	274-275	W LAN Roaming Simulator	265-266
Low Intermodulation Subsystems & Signal Conditioning Networks	280	Worldwide Sales Representatives	284
Mobile Unit Fading Simulators	276		
Programmable Attenuator / Switch Unit	267-268		

RoHS

Statement of Compliance on Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Aeroflex / Weinschel products are classified as Monitoring and Control Equipment (Category 9 of the WEEE Directive, which includes measuring, weighing, or adjusting appliances for household or as laboratory equipment) which is excluded from the RoHS Directive. However, Aeroflex / Weinschel is in the process of evaluating materials and processes to achieve RoHS compliance while maintaining our performance and quality standards.

RoHS compliance of products may be by exemption as stated in the Directive's annex, Point 6 (lead as an alloying element in steel containing up to 0.35% lead by weight, aluminum containing up to 0.4% lead by weight, and as a copper alloy containing up to 4% lead by weight); and/or Point 7 (lead in electronic ceramic parts); and/or Point 8 modified by Commission Decision of 21 October 2005 (Cadmium and its compounds in electrical contacts).

Throughout this catalog products that can be manufactured as RoHS Compliant products will contain the  RoHS symbol located at the upper right corner of the individual data sheet. Please inquire or specify RoHS compliant materials are required when ordering.

Directions to Aeroflex / Weinschel...

FROM DULLES/NATIONAL AIRPORTS: Take Dulles Access Road to Capitol Beltway/Route 495. Continue to exit for Route 270 North toward Frederick, Maryland. Travel approximately 37 miles on Rt 270, and you will get off at Exit 31A--Route 85/North. Proceed to stoplight and turn right into Francis Scott Key Mall entrance. Stay in left lane, going past the mall on right, various restaurants on left (Pargo's, ...Golden Corral--caution just past here for four-way stop signs!--continue past Pizza Hut). You are now on Spectrum Drive; continue on until you see cul-de-sac area with mailboxes on right; bear left into "Spectrum Place." Aeroflex / Weinschel building, 5305, is to the right. Visitor parking in front of building. Or take the SCENIC ROUTE (BACK WAY): Leaving Dulles Airport, watch immediately for the "Dulles Greenway," get on the Greenway and follow it all the way to the end (toll road-pay toll before exiting); The Greenway actually ends at Route 15 North (sign will say Frederick); stay on Route 15N, crossing bridge into Maryland--Rt 15N will merge with Route 340 West; continue on 340W to exit for Route 70 East toward Baltimore.

Coming off exit, you can either:

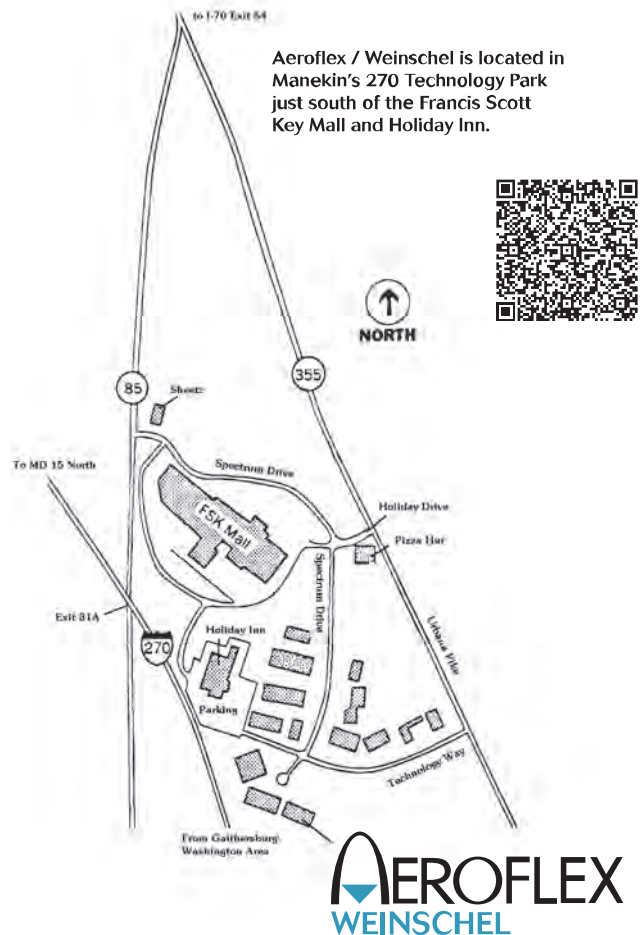
Stay in right lane of exit ramp, take 270 South to exit 31A (Rt 85 North). Proceed to stop light and turn right into Francis Scott Key Mall entrance. Stay in left lane, going past the mall on right, various restaurants on left (Pargo's, Golden Corral--caution just past here for four-way stop signs!--continue past Pizza Hut and Sleep Inn). You are now on Spectrum Drive; continue on until you see cul-de-sac area with mailboxes on right; bear left into "Spectrum Place." Aeroflex / Weinschel building, 5305, is to the right. Visitor parking in front of building.

NOTE: This is a long 2-lane exit; if it is backed up--and it often is at rush hours--it is better to proceed to next exit as follows.

Come off left lane of exit ramp onto 70E, go ~ one mile to very next Exit 54/Market Street/Rts 355S & 85. At top of exit ramp, turn left at the second traffic light (RT355). Go through next three traffic lights down Rt 355S, continue on past Home Depot...Target... Wickes Lumber on left/large red brick NorWest Mortgage building on right, to the entrance to 270 Tech Park/New Technology Way on right. Follow New Technology Way to STOP sign, turn left on Spectrum Drive and almost immediately--at cul-de-sac--turn left again into "Spectrum Place." Aeroflex / Weinschel building, 5305, is to the right. Visitor parking in front.

NATIONAL: Take George Washington Memorial Parkway North to Beltway/Rte 495. Continue on Rte 495 toward Maryland, then same as above.

FROM BALTIMORE/BWI AIRPORT: Take 195 out of airport, to 95 North (695 Exit)*; get on 95 North and move to far left lane. Exit onto 695 North (towards Catonsville/Towson). Stay on 695N until signs show 70 West/Frederick (~ 8-10 mls). Exit onto 70 West, and stay on 70W for ~ 35 mls; you will get off at Exit 54/Market Street/Rte 355. At top of exit ramp, turn right at the first traffic light and right at the



second light and stay in the left lane (RT355). Go through four traffic lights on 355 South, continue ~ 1.5 miles past Home Depot...Target...Wickes Lumber on left/large red brick NorWest Mortgage building on right, to the entrance to 270 Tech Park/New Technology Way on right. Follow New Technology Way to STOP sign, turn left on Spectrum Drive and almost immediately--at cul-de-sac--turn left again into "Spectrum Place." Aeroflex / Weinschel building, 5305, is to the right. Visitor parking in front.

*NOTE: Do not take 95 North (Harbor Tunnel) exit; proceed to second 95 North entrance.

FROM NEW YORK/NEW JERSEY: Take I-95 toward Baltimore; Exit onto Baltimore Beltway, Rt 695 West towards Towson; Exit from the Beltway onto I-70 toward Frederick. You will travel approximately 55 miles and come off at Exit 54 (Market Street)/Rte 355. At top of exit ramp, turn right at the first traffic light and right at the second light and stay in the left lane (RT355). Go through four traffic lights on 355 South, continue ~ 1.5 miles past Home Depot...Target...Wickes Lumber on left/large red brick NorWest Mortgage building on right, to the entrance to 270 Tech Park/New Technology Way on right. Follow New Technology Way to STOP sign, turn left on Spectrum Drive and almost immediately--at cul-de-sac--turn left again into "Spectrum Place." Aeroflex / Weinschel building, 5305, is to the right. Visitor parking in front.

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.