

# Model 9825M NTSC Modulator (50 – 870 MHz) Model 9825S NTSC Modulator (50 – 870 MHz) with Integrated Stereo Encoder Model 9815 Rear Interface Module (RIM)

## Introduction

The Models 9825M and 9825S Modulators and Model 9815 Rear Interface Module (RIM) are Scientific-Atlanta's latest additions to our well-known product family of Continuum® Headend Systems. The Continuum Headend System product family provides users with a vertically oriented, compact, full-featured ensemble of headend functions. Continuum products give today's video information providers an integrated, high-performance platform for many vital headend applications.

## Description

The Models 9825M (mono) and 9825S (stereo) Modulators have been specifically designed to provide support for versatile system architectures where space saving efficiency is of major importance. The Model 9825M Modulator is a full-featured modulator that provides a monaural NTSC television signal on any selected CATV channel between 50-870 MHz. The Model 9825S Modulator has an integrated BTSC stereo encoder that mounts internally, in place of the mono audio board. It is designed for cable television headends that must encode locally originated or satellite-delivered stereo audio programming in BTSC stereo format. An optional SAP (Second Audio Program) circuit is also available as an integrated feature.



The Models 9825M and 9825S Modulators utilize some of the latest advancements in Scientific-Atlanta technology. Both models provide a new upconverter design that contains a custom ASIC (Application Specific Integrated Circuit). The use of ASIC technology allows the upconverter section of the modulator to consume approximately half the power and is less than half the size of traditional upconverter circuits. The new design maintains excellent RF performance with the added benefit that it can tune from 50-870 MHz in a single device. The Model 9825S Modulator stereo version integrates a true DSP (Digital Signal Processing) BTSC Stereo Encoder and optional SAP module into the modulator. The use of DSP technology for stereo encoding provides unprecedented improvements in stereo separation and distortion that were previously unachievable. Furthermore, by digitally generating the audio subcarrier, no critical calibration of the BTSC signal will ever be required.

The Models 9825M and 9825S Modulators process a baseband video and audio signal to produce a VSB signal at a selected CATV channel frequency. At its inputs, a fully equipped Model 9825S Modulator can accept any NTSC standard video input plus mono, left, right, and SAP baseband audio. Other available inputs include 4.5 MHz audio subcarrier and an external IF port that can accept either digital or composite IF (analog) signals. The Model 9825M Modulator can be used with external stereo encoders or can be upgraded to a Model 9825S Modulator with the installation of a stereo encoder upgrade kit.

**Note:** Model 9811/9814 Controller Modules are required to take advantage of the additional features and capabilities of the Series 9825 Modulators. Existing Continuum Model 9810/9813 Controllers can be upgraded to be compatible with Series 9825 equipment. Contact Scientific-Atlanta factory service for details.

# Model 9825M Modulator, Model 9825S Modulator w/ Integrated Stereo Encoder & Model 9815 Rear Interface Module (RIM)

## Features

- Compact size with vertical orientation can hold up to 8 stereo channels with SAP in a 5 RU chassis
- Fully frequency agile from 50-870 MHz in a single applications module
- Digitally Integrated Stereo Encoder with optional SAP (Model 9825S)
  - Full Digital Signal Processing (DSP) Implementation
    - Digitally processed AGC for precise control of audio levels
    - Digitally processed Metering for accurate display of audio levels
  - Exceeds OET-60 Specifications for FCC recommended broadcast stereo
  - Peak Limiter circuit limits peaks without distortion or audible loudness changes
  - Front panel LCD Peak Program Meter (PPM) displays L, R, & SAP separately
  - No critical calibration required
- New upconverter circuitry uses custom Application Specific Integrated Circuit (ASIC) technology
  - Uses less power, creates less heat
  - 20 dB improvement of close-in phase noise
  - Robust rejection of vibrations/microphonics
- Mechanically Improved Connector System
- Fully compatible with existing Continuum Model 9800 Chassis
- “Plug and Play” capability
- Status Monitoring and Control of all functions - Compatible with Transmission Network Control System (TNCS) Software
- STD, HRC, and IRC frequency plans
- Customized “Special Frequency Plans” (SFP) are available
- Automatic Backup capability either in-chassis or out-of-chassis via TNCS control
- Main and Alternate inputs for Video, Audio, Subcarrier Audio, and IF
- -48 Volt DC backup powering is standard feature
- Audio, Video, and IF Automatic Gain Control (AGC)

## Definitions

**Application Module** – A module inserted into the front of the chassis that performs a prescribed set of independent functions (e.g., modulator, upconverter).

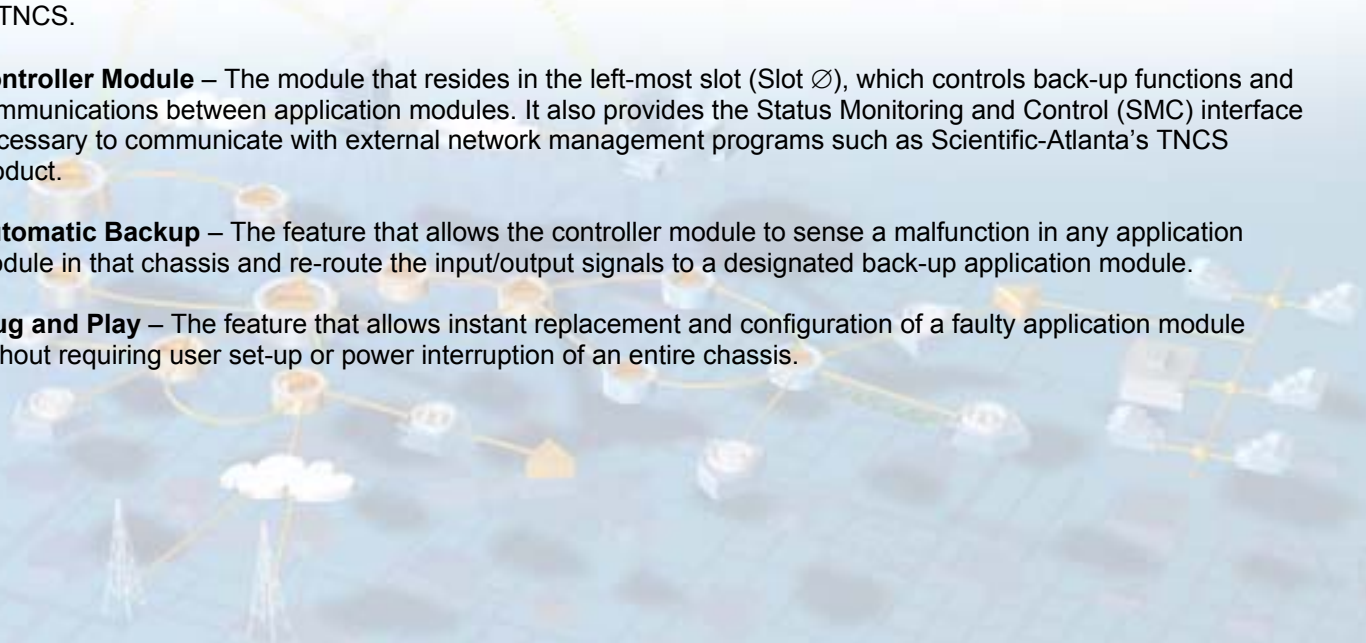
**Rear Interface Module (RIM)** – A module inserted into the rear of the chassis to configure a slot for a specified application module.

**Transmission Network Control System** - TNCS is a comprehensive element management system that provides centralized end-to-end monitoring and control of broadband transmission networks. TNCS is a mixture of software and hardware components that is used as a headend, hub, and HFC equipment status monitoring and management tool. Minimizing downtime and increasing the broadband network reliability are the primary objectives of TNCS.

**Controller Module** – The module that resides in the left-most slot (Slot 0), which controls back-up functions and communications between application modules. It also provides the Status Monitoring and Control (SMC) interface necessary to communicate with external network management programs such as Scientific-Atlanta’s TNCS product.

**Automatic Backup** – The feature that allows the controller module to sense a malfunction in any application module in that chassis and re-route the input/output signals to a designated back-up application module.

**Plug and Play** – The feature that allows instant replacement and configuration of a faulty application module without requiring user set-up or power interruption of an entire chassis.



# Model 9825M Modulator, Model 9825S Modulator w/ Integrated Stereo Encoder & Model 9815 Rear Interface Module (RIM)

## Model 9825M and Model 9825S Specifications

Video Specifications	Value
Differential Gain	≤ 1.5% (1% typical) at 87.5% modulation
Differential Phase	≤ 1.0° (0.5° typical) at 87.5% modulation
Frequency Response	± 0.5 dB, 10 Hz to 4.15 MHz (-1.5 dB maximum at 4.2 MHz)
Video S/N	≥ 70 dB from 10 kHz to 4.2 MHz, weighted
Chrominance -to- luminance gain inequality	≤ ± 4.5% (2.5% typical)
Chrominance -to- luminance delay inequality	≤ ± 40 nsec (-20 nsec typical)
Chrominance -to- luminance intermodulation	≤ ± 0.5%
Chrominance nonlinear gain	≤ ± 0.5%
Chrominance nonlinear phase	≤ ± 0.5°
K-factor – 2T Pulse	≤ 2.0% (1.0% typical)
Group delay response	Meets FCC Predistortion No. 73.687 for color transmission
ICPM	≤ 1.0° p-p
Mono Audio Specifications, Model 9825M	Value
Input level	-15 dBm to +15 dBm for 25 kHz deviation @ 400 Hz input
S/N Ratio	≥ 70 dB ± 25 kHz deviation (ref @ 400 Hz)
Frequency Response	≤ 0.5 dB p-p (0.3 dB p-p typical) from 30 Hz to 15 kHz (75 μsec pre-emphasis)
Total Harmonic Distortion	≤ 0.30% from 30 Hz to 15 kHz @ 25 kHz deviation
Stereo Audio Specifications Model 9825S	Value
Input Level (L, R, & optional SAP)	- 15 to +15 dBm for 100% modulation at 400 Hz input
Audio input impedance	600 Ω Balanced or high impedance (selectable)
Audio common mode hum rejection	≥ 40 dB
Frequency Response (left, right)	≤ ± 0.4 dB (30 Hz to 14.5 kHz) and ≤ -3 dB @ 15 kHz
S/N Ratio	≥ 68 dB at 100% input (reference @ 400 Hz & 0 dBm input)
Stereo Separation (10% to 100% EIM)	≥ 35 dB from 50 Hz to 14 kHz (typically 40 dB)
Distortion (left and right)	≤ 0.3% 30 Hz to 7.5 kHz at 100% input
Distortion (optional SAP)	≤ 0.5% 30 Hz to 5.0 kHz at 100% input
4.5 MHz Subcarrier output level	39 to 41 dBmV
RF Output Specifications	Value
Output frequency	50-870 MHz (fully agile)
Channel plans	Standard, IRC, HRC, Special Frequency Plans (SFP)
Frequency stability	≤ ± 5 kHz (with internal reference)
Combined C/N up to 137 channels	≥ 65 dB
Carrier phase noise (Measured at 1 Hz bandwidth)	≤ -95 dBc @ 1 kHz offset ≤ -101 dBc @ 10 kHz offset ≤ -101 dBc @ 20 kHz offset
Output Level	+50 dBmV to +61 dBmV
Spurious Outputs	≤ -63 dBc (-65 dBc typical) relative to +60 dBmV video carrier and audio carrier at +45 dBmV
Composite IF Specification	Value
Output Level	36 dBmV ± 2dB with video IF input level @ 47 dBmV
Vestigial sideband response	≤ -20 dB at channel edge ≤ -45 dB at adjacent video audio carrier frequencies and all frequencies farther removed from channel.
General Specifications	Value
Power Dissipation	Model 9825M 35 Watts Model 9825S 39 Watts
Operating temperature range	0°C to 50°C (32°F to 122°F)
Shipping Weight	Modulator: 8 lbs (3.6 kg) 9815 RIM: 3 lbs (1.4 kg)



# Model 9825M Modulator, Model 9825S Modulator w/ Integrated Stereo Encoder & Model 9815 Rear Interface Module (RIM)

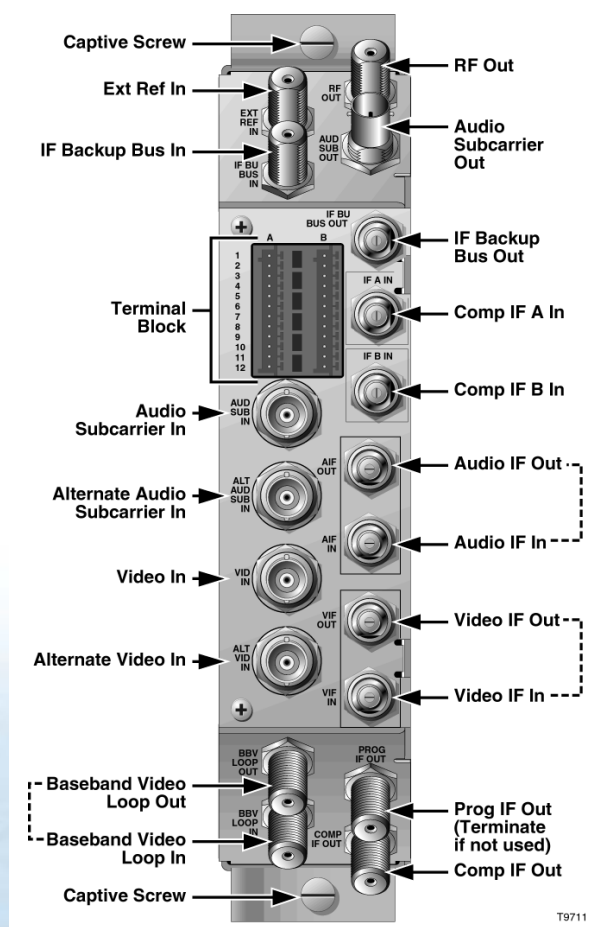
## Ordering Information

Description	Part Number
Model 9825M Monaural Modulator	741140
Model 9825S Modulator with Integrated Stereo Encoder (w/o SAP)	748605
Model 9825S Modulator with Integrated Stereo Encoder (with SAP)	741130
Model 9815 Rear Interface Module (RIM)	741150

Other Options and Related Accessories	Part Number
Model 9811 AC/DC Controller Module with expanded memory <i>Note: Model 9825 product must use the Model 9811 Controller for proper operation.</i>	741160
Model 9814 DC/DC Controller Module with expanded memory	748030
Model 9811/9814 Memory Upgrade service for Model 9810/9813 Controller (contact S-A factory service)	748606
Stereo Upgrade Kit (9825M to 9825S with SAP)	748607
Stereo Upgrade Kit (9825M to 9825S w/o SAP)	748608
SAP Upgrade Kit (9825S w/o SAP to 9825S with SAP)	748609

## Model 9815 Rear Interface Module (RIM)

Note: A Model 9815 Rear Interface Module must be present in the chassis for the Model 9825M and 9825S Modulator front application module to be operational.



- “Integrates” all features of traditional Model 9804 Dual (slot width) RIM into a single Continuum slot
- Works with both Continuum Models 9825M and 9825S Modulators
- Fully compatible with existing Continuum Model 9800 Chassis
- Can fit side by side with other existing RIM models
- Includes IF backup capability
- Mechanically improved connector system with “keyed” lockout that only accepts Continuum Model 9825M/9825S application modules



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