

# The Un- Processor



# ModMinder – The Unprocessor

## What Is It?

ModMinder provides FM stations with a new method for measuring and reporting modulation. Most stations can increase modulation, reduce processing, or do some of both. ModMinder does not replace your existing modulation monitor. It supplements a conventional monitor with a unique and highly accurate measurement and display of peak modulation information.

Where most modulation monitors respond to peaks of less than 100 microseconds, ModMinder waits almost 1000 microseconds (1 millisecond) before registering a peak. This delayed response means the ModMinder ignores brief overshoots that contain very little power. With a more rapid response, these brief excursions would be counted as modulation robbing peaks. Once these short peaks are ignored, either the average modulation may be raised or the amount of processing greatly reduced. Often, doing some of each is most desirable. Typical improvements in modulation range from 1 to 4 dB, depending on the amount and type of processing employed.

ModMinder is a digital device, employing an 80C88 microprocessor as its CPU. It provides a comprehensive front panel display of modulation information, as well as extensive remote control capability.

Interface to a conventional broadcast remote control is provided by relay contacts and slowly varying DC signals. In addition, a completely new type of remote control capability is provided by an RS-232 data circuit. Using a conventional 1200 bits/second modem over dial phone lines, ALL functions of the ModMinder can be remotod to the studio, or across the country. This standard RS-232 interface also allows a personal computer to be connected to the ModMinder, opening a vast potential for analysis and control of modulation by computer.

The ModMinder is highly accurate. Most monitors have an accuracy of  $\pm 5.0\%$  and resolution no better than an operator's ability to read a moving pointer meter. ModMinder delivers an

accuracy of  $\pm 1.0\%$ , and a digital resolution of 0.5%.

## But Is It Legal?

Modminder is legal. It complies with the one millisecond peak flasher response time requirement of 47 CFR 73.332(d)(4)(i) and (ii), which was part of the most recent objective statement from the FCC on modulation monitor performance. That rule was deleted in 1983 by deregulation of the requirement that stations use type approved modulation monitors.

Modulation Sciences obtained an opinion of counsel from a respected Washington FCC attorney. This opinion explains that a monitor which meets the pre-1983 rules is in full compliance today. A copy of the opinion and its appendices, as well as informal comments about the ModMinder by a senior FCC staff member, are available from Modulation Sciences.

## Displays

**PEAK MODULATION:** The highest modulation peak attained during the previous second. Shown on a 3-digit numerical display.

This unique display eliminates the constant "tweaking" with the peak flasher control of a conventional monitor to find what the real peak modulation is. The PEAK MODULATION display is updated each second with the highest peak of modulation achieved in the previous second. The display is invaluable in setting up or verifying the performance of an air chain.

**ONE MINUTE COUNT:** The number of occurrences of overmodulation that have taken place in the past 60 seconds.

This is a "rolling" minute. Each occurrence of overmodulation increments the counter. When the occurrence is one minute old it decrements the counter. Thus the count is only of overmodulation events that have taken place in the past minute. The count is displayed on a 2-digit numerical readout. If the present limit is exceeded, the display flashes.

**OVERMOD:** This red LED lights for 0.25 (jumper option for 2.0) second each time the preset overmodulation limit is exceeded.

The shortest peak which is reported as an overmodulation event is 1 millisecond in the FCC mode. The minimum duration peak is user selectable in the PEAK WEIGHTING mode.

**AUDIO FAILURE:** If program audio fails, this red LED will come on. This is true whether the failure is silence or steady tone. Any total loss of dynamic range will trigger this alarm.

**PEAK WEIGHTING:** Indicates that the response time and standoff time parameters are user selected as opposed to being the pre-1983 FCC values (FCC mode). This is a green LED.

**THRESHOLD SETTING:** Under each numeric display is a yellow LED. When either is on, the preset limit for that display is shown. The UP and DN buttons control the limits settings.

**100% INDICATOR:** Red and green LEDs located on the rear panel near the INPUT LEVEL adjustment. Between 99.75% and 100.25% the green LED is on, and above 100.25%, the red indicator is on. When set using the Bessel null procedure, these indicators allow calibrating the ModMinder to ten times greater accuracy than the FCC ever required.

## Controls

**THRESHOLD SETTING:** A multi-function control that:

- 1) Toggles each of the displays between showing parameter values and preset limits. When the preset limits are displayed, the yellow LED beneath the display is on. Viewing the ONE MINUTE COUNT threshold automatically clears the one minute counter.
- 2) Allows setting the preset limits for peak modulation and the allowable number of overmodulation occurrences in a rolling minute.
- 3) During the turn-on diagnostics (a 4-second period after power on), pressing it puts the unit into level 2 or 3 diagnostics.

**UP and DN:** Push buttons recessed behind

the front panel. Used in conjunction with the THRESHOLD SETTING, sets the preset limits for overmodulation and maximum counts per minute. In the diagnostic mode these buttons select various options.

**INPUT LEVEL:** A rear panel 20-turn trimmer that sets the input sensitivity of the ModMinder. Used with the 100% INDICATOR to calibrate the unit.

**PEAK WEIGHTING (ON/OFF):** An internal jumper mounted on the main printed circuit board selects the dynamic characteristics of the peak detector and the one minute counter. With peak weighting OFF, the parameters fall within the specifications of 47 CFR 73.332(d)(4) as of October, 1982. With this function switched ON, the dynamic parameters are set by user selected components. Each ModMinder is provided with a calibration certificate listing the component values and the resulting parameters for that unit.

## Relay Outputs

**PEAK FLASH:** Closes for 0.25 or 2.0 seconds (jumper selectable) whenever the modulation exceeds the preset limit. Follows the action of the OVERMOD indicator.

**ONE MINUTE OVERCOUNT:** Closes whenever the one minute count exceeds its preset limit. Remains closed for as long as the count is above the maximum. The ONE MINUTE COUNT display flashes when this relay is closed.

**AUDIO FAIL:** Closes if there is a program audio failure. Any absence of dynamic range, whether silence or a steady tone, will activate this relay and its associated indicator.

## Analog Outputs

**LOCAL METER:** A fast DC output for driving a conventional moving pointer meter to provide a continuous indication of peak modulation. Uses a unique, easy-to-read ballistic. Any good quality zero to one milliamp meter may be used, or a meter and panel may be purchased.

**ONE SECOND PEAK MODULATION:** A DC voltage proportional to the highest peak attained in the previous second. The value is held for one second until it is updated with the new one second peak value.

**ONE MINUTE ROLLING COUNT:** A DC voltage proportional to the ratio of the number of occurrences of overmodulation to the counts-per-minute preset limit.

## Serial Data

An RS-232 input and output that allows for complete remote operation of the Modminder.

The output is a data stream carrying realtime modulation information fast enough at 1200 bits/second to accurately drive a moving pointer meter. All other front panel information is embedded in the data stream.

The RS-232 input duplicates the front panel controls of the ModMinder. It is not necessary to use this input. The output can be used as a one-way data stream.

## Diagnostics

**Level 1:** Whenever the ModMinder is powered up it automatically goes through a brief self-test diagnostic routine. All LEDs and indicators are turned on, all relays closed, and all analog outputs are taken to full scale for two seconds. Then the reverse happens, all of the items listed are turned off for two seconds. Then normal operation begins.

**Level 2:** If during the self-test mode the THRESHOLD SETTING button is pressed, ModMinder will enter level 2 diagnostics. Specific relays and analog outputs may be exercised in this mode.

**Level 3:** Pressing the UP button while the unit is in level 2 diagnostics will place the system in level 3 diagnostics. In this mode, any ASCII terminal connected to the RS-232 port provides full item-by-item diagnostic access.

## Parameters

**Overall Accuracy:**  $\pm 1.0$  percent at 100% modulation for any frequency from 50Hz to 100kHz.

**Operating Temperature:** 0° to 50° C

**Frequency Response:**  $\pm 0.5\%$  ( $\pm 0.043$ dB) at 100% modulation from 50Hz to 100kHz.

**Peak Flasher Response Time:**

FCC Mode—less than 1 millisecond.

Peak Weighted Mode—user selectable.

**One Minute Counter Standoff Delay:**

FCC Mode—5 milliseconds.

Peak Weighted Mode—30 milliseconds.

**Input Sensitivity:** 0.8 to 5 volts peak to peak for 75kHz - 100% modulation.

**Input Impedance:** 10 kOhms.

## Connectors

**Composite Input:** BNC.

**RS-232:** 25 pin "D" connector.

**Remote Control Interface:** 15 pin "D" connector.

**Relay Contacts:** 100 mA, 48 volts resistive load.

## DC Voltages

**Metering signals:** 0 to 2.5 volts, 5 mA maximum, negative common to ground.

**Source impedance:** 0 ohms at DC.

**Accuracy:**  $<0.4\%$  linearity error.

## RF Protection

All inputs and outputs RF suppressed.

## Dimensions and Power

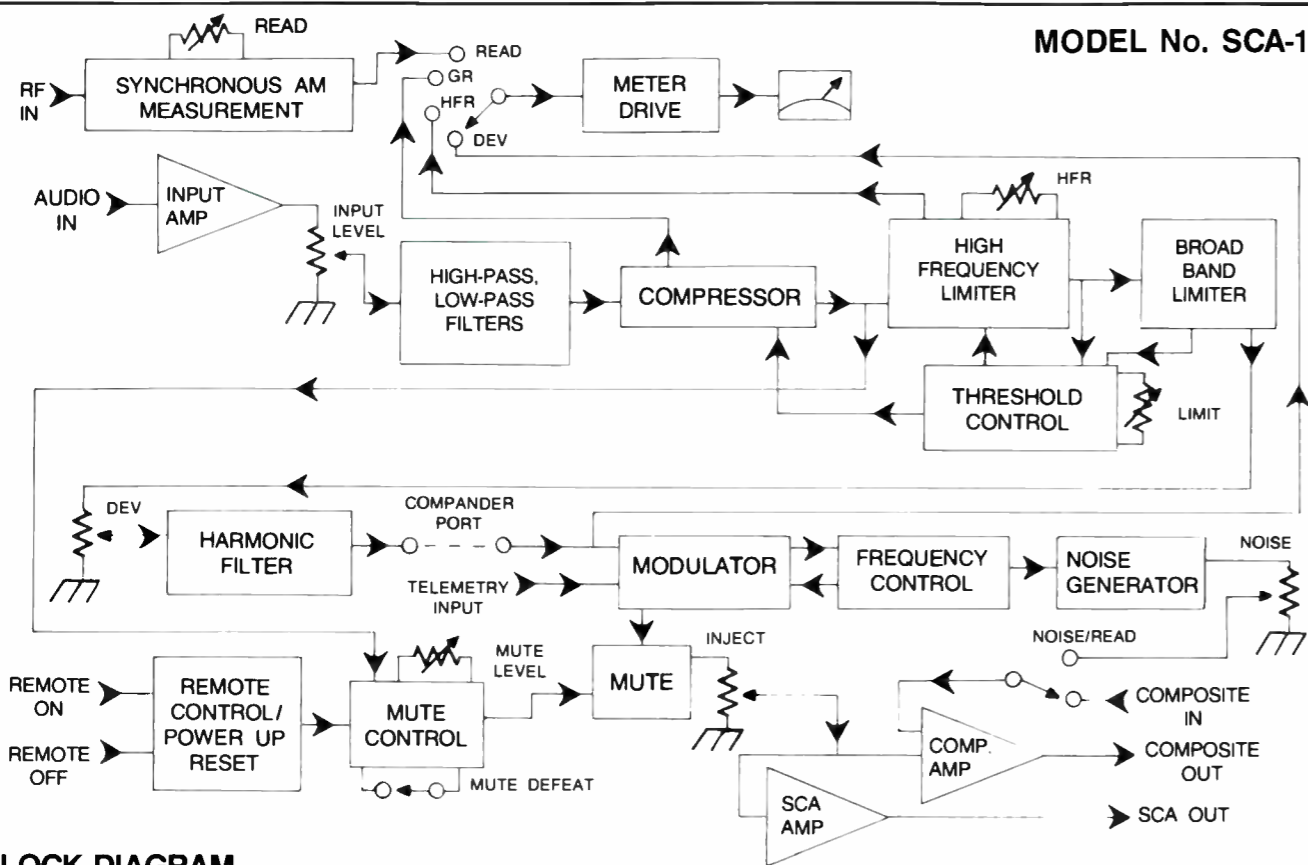
1.75"H x 19"W x 10"D.

50/60Hz AC; 100-130 VAC, fused for 3/16 A.

**ALLIED**   
BROADCAST EQUIPMENT  
— A HARRIS COMPANY —

**800-622-0022**

MODEL No. SCA-186



BLOCK DIAGRAM

**SPECIFICATIONS**

(Specifications subject to change without notice.)

**SIZE** Inches (mm)

FRONT PANEL: 3.5 (88.9) H x 19 (482.6) W  
 CHASSIS: 3.5 (88.9) H x 16.75 (425.5) W x 9.25 (235) D

**POWER** 95 to 130 VAC, 50/60 Hz, 12 W maximum  
 190 to 260 VAC option available

**TEMPERATURE RANGE**  
 0 to 50° C.

**RF PROTECTION**  
 All inputs and outputs RF suppressed, power supply  
 RF suppressed and shielded from main circuitry.

**CONTROLS**  
 See block diagram

**CONNECTORS/LEVELS/IMPEDANCES**

**AUDIO IN:** No. 6 screw terminals  
 -30 to +10 dBm  
 600 Ohm resistive ± 2%

**REMOTE CONTROL:** No. 6 screw terminals  
 6 to 24 VAC, 10 to 24 VDC

**COMPOSITE IN:** BNC connector  
 Unity gain to composite output  
 10 kOhm unbalanced

**COMPOSITE OUT:** BNC connector  
 Stereo level 0.4 to 4 V P-P  
 SCA level 0.04 to 0.4 V P-P  
 Noise test level 0.4 to 4 V P-P  
 50 Ohm output impedance  
 600 Ohm minimum load impedance

**SCA OUT:** BNC connector  
 .35 to 3.5 V P-P  
 50 Ohm output impedance  
 600 Ohm minimum load impedance

**TELEMETRY IN:** BNC connector  
 3.5 V P-P = ± 500 Hz deviation  
 10 kOhm

**RF IN:** BNC connector  
 0.1 to 2 W  
 50 Ohm

**FREQUENCY RESPONSE** (Note 1)  
 -3 dB @ 50 Hz and 5 kHz  
 ±1 dB 70 Hz to 4 kHz

**NOISE** (Note 2) 65 dB below 5 kHz deviation

**FREQUENCY ACCURACY** ±0.01% at 25°C.

**FREQUENCY DRIFT** ±0.005% from 0 to 50° C.

**SPURIOUS COMPONENTS** (Note 3)  
 2ND HARMONIC: better than 40 dB below subcarrier  
 3RD HARMONIC: better than 45 dB below subcarrier  
 ALL OTHER COMPONENTS, 50 HZ TO 100 KHZ:  
 better than 60 dB below subcarrier

**CARRIER SUPPRESSION WHEN MUTED**  
 Better than 50 dB below subcarrier

**MUTING LEVEL**  
 Adjustable from 10 to 30 dB below peak deviation  
 set by "DEV" control. See block diagram,  
 "Broadband Limiter".

**MUTING DELAY**  
 Selectable from 300 mS to 6 Seconds.

**METER CIRCUIT**  
 Peak deviation: ±5% accuracy  
 Synchronous AM: -20 to -60 dB sensitivity  
 Ref. 100% AM modulation

Note 1: Measured with signal below compression threshold.  
 Note 2: Measured with 150 μS preemphasis (generator) and deemphasis (receiver).  
 Note 3: Relative to 100% total modulation at 10% SCA injection; 60, 65 and 80 dB respectively.

modulation sciences

**SIDEKICK™**

An Integrated SCA Generator & Audio Processor

- Excellent RF and EMI Shielding
- Built In Transmitter Tuning Aid
- Stable Over Time and Wide Temperature range
- Peak Holding Deviation Meter eliminates the need for a Modulation Monitor.
- Quartz crystal controlled synthesizer can be set for any SCA frequency.
- Integral audio processor can be optimized for music or speech.
- The Industry standard. Hundreds in service nationwide.
- AVAILABLE NOW! Delivery from Stock.



modulation sciences, inc.

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## Modulation Sciences Clears the Air on SCA...

Now, In one superbly engineered unit is an SCA processor/generator that dramatically reduces crosstalk and answers technical objections to SCA operation.

The first new SCA technology in over twenty years, **Sidekick** is cost-effective and recognized as the Technology standard by every major broadcast group and industrial user.

**SIDEKICK** combines the four elements needed for successful SCA operation into one package: subcarrier generator, modulation monitor, audio processor and transmitter tuning aid. Engineered to work together, these components form an integrated system which provides a level of performance previously unattainable. Crosstalk is dramatically reduced, signal quality is significantly improved and operation is greatly simplified.

**SIDEKICK** is cost effective because there is no need for redundant power supplies, packaging, or input/ output interfacing.

Each subsystem of **SIDEKICK** is unique and has been specially engineered for its task:

### SUBCARRIER GENERATOR

**SIDEKICK** has the first crystal controlled SCA generator in the industry. Others use simple free-running oscillators which are easy to design and FM modulate, but whose frequency stability is a problem. The stability of the **SIDEKICK** is  $\pm 0.005\%$  from 0 to 50 degrees C.

### MODULATION MONITOR

A built-in modulation meter eliminates the need for an additional SCA modulation monitor. The modulation meter provided is simple to read and quite accurate. The peak holding circuitry lets the meter rise to the maximum deviation and re-

main there with out much wiggling. The meter can also be easily calibrated in the field with only a frequency counter and a DC voltage source.

### INTEGRATED AUDIO PROCESSOR

Audio processing has traditionally been a weak link in SCA transmission. It is not uncommon to find that the audio processors used for SCA are hand-me-down from the main channel. Unfortunately, the use of a 75 microsecond limiter in a 150 microsecond system results in almost no high-frequency peak control. In addition, SCA audio filters which roll off at 5 kHz have the same kind of overshoot and ringing as the infamous 15 kHz filters used in stereo generators. As in main channel operation, poor peak control means low average modulation. In SCA, this means increased susceptibility to crosstalk.

### TRANSMITTER TUNING AID

In many transmitters, proper tuning of the driver and PA stages plays a major role in the reduction of crosstalk between the main and SCA channels.

The **SIDEKICK** has a built-in noise generator and incidental AM noise meter. No other equipment is needed to noise load the entire baseband and measure the incidental AM from an RF sample. The RF tuning can then be "tweaked" to minimize the incidental AM. This often yields a dramatic reduction in crosstalk.



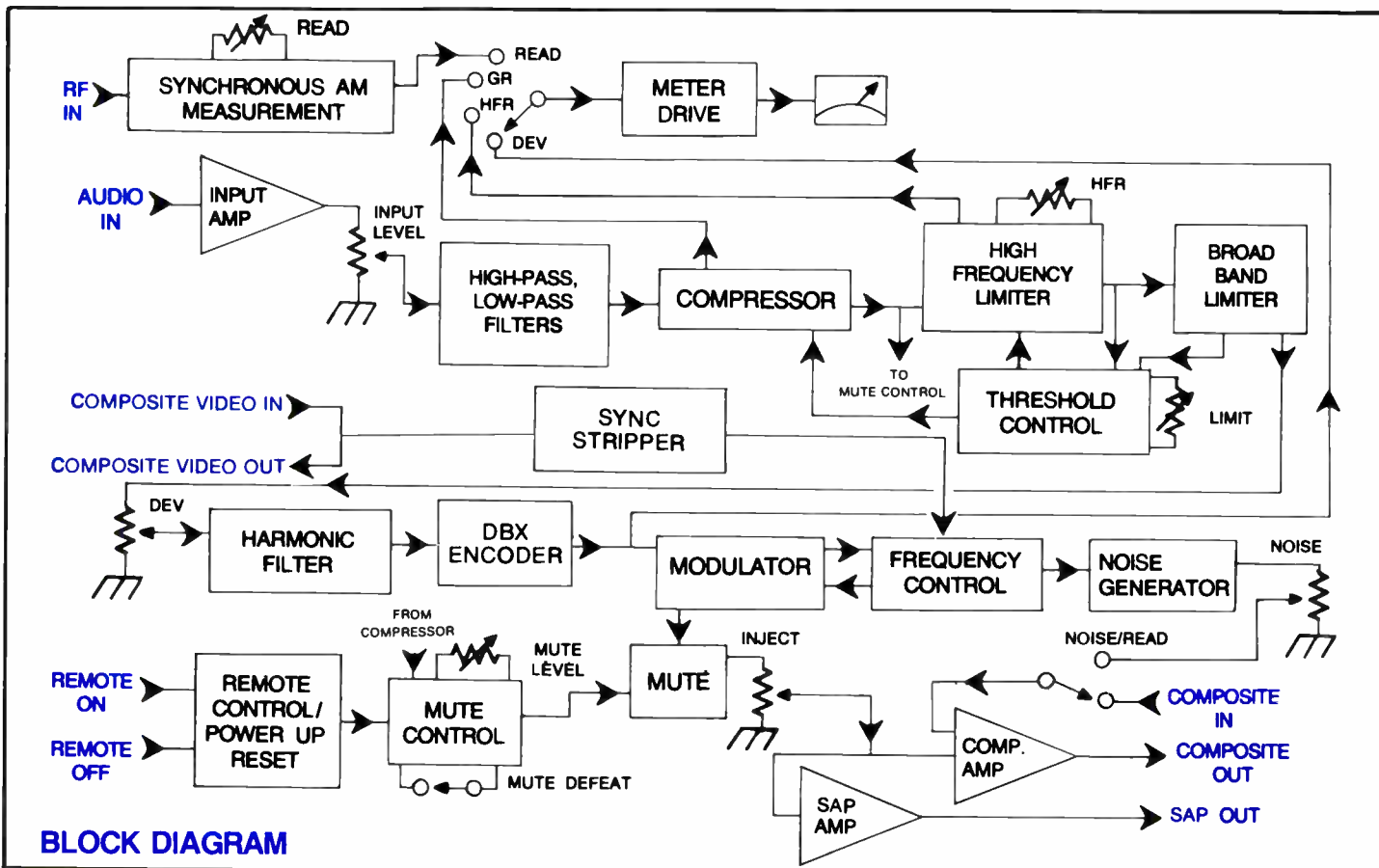
DESCRIPTION	UNIT PRICE
Modulation Sciences Model DSCA-189 "Data Sidekick". Features 4800bps data rate with measured bit error rate of <1 in 1E7. Operates synchronous or Asynchronous. RS-232/RS422 Standard input; Automatic check of data before transmission. (Specify SCA Frequency.)	\$4,200.00
Modulation Sciences Model CLD-2500 Composite Line Driver "Wired STL"; high quality system for carrying AM, FM or TV stereo composite baseband up to 2500 feet from signal source such as stereo generator via low-cost 78 Ohm twinax. Consists of Model 2501 Driver and Model 2502 Receiver.	\$1,550.00

# modulation sciences, inc.

## Modulation Sciences Radio Products

DESCRIPTION	UNIT PRICE
Modulation Sciences Model MYB-2 StereoMaxx operates in the spatial domain, enhancing and enlarging the stereo image. The effect is compelling and dramatic without becoming overwhelming. StereoMaxx gives the station a "BIG SOUND" stereo image that adds new audio excitement to hi-fi stereos, auto radios and even portable "boom-boxes". The StereoMaxx spatial image enlarger is totally mono compatible and avoids the undesirable side-effects of other image enhancement techniques.	\$3,195.00
Modulation Sciences Model CP-803 Composite baseband processor for FM Stereo. Automatically reduces filter overshoot present in every stereo generator or composite STL. Allows transmitter to be modulated with lower peak to average ratio. Restores "lost" modulation capability and loudness. Specify 120 or 240 VAC. Includes rack mount.	\$ 1095.00
Rack Mount only for earlier CP-803	\$ 35.00
Modulation Sciences Model SCA-186 "Sidekick" SCA generator with crystal-locked frequency synthesizer, built-in audio processor, and front panel deviation and gain reduction metering. Includes device to help minimize crosstalk-causing Incidental AM modulation. (Specify SCA operating frequency - 92 or 67 kHz).	\$2,875.00





**BLOCK DIAGRAM**

**SPECIFICATIONS**

(Specifications subject to change without notice.)

MODEL No. TSCA-189

**SIZE** Inches (mm)  
 Front panel: 3.5 (88.9) H x 19 (482.6) W  
 Chassis: 3.5 (88.9) H x 16.75 (425.5) W x 9.25 (235) D

**POWER** 95 to 130 VAC, 50/60 Hz, 12 W maximum  
 190 to 260 VAC option available

**TEMPERATURE RANGE**  
 0 to 50° C.

**RF PROTECTION**  
 All inputs and outputs RF suppressed

**CONTROLS**  
 See block diagram and accompanying explanation.

**CONNECTORS/LEVELS/IMPEDANCES**

**Audio In:** No. 6 screw terminals  
 -30 to +10 dBm  
 600 Ohm resistive  $\pm 2\%$

**Subcarrier Remote Control:** No. 6 screw terminals  
 6 to 24 VAC, 10 to 24 VDC

**TV Sync Locked Remote Status:** No. 6 screw terminals  
 Isolated relay closure

**Baseband In:** BNC connector  
 Unity gain to composite output  
 10 kOhm unbalanced

**Baseband Out:** BNC connector  
 Composite level 0.4 to 4 V P-P  
 SAP level 0.04 to 0.4 V P-P  
 Noise test level 0.4 to 4 V P-P  
 50 Ohm output impedance  
 600 Ohm minimum load impedance

**SAP Out:** BNC connector  
 .35 to 3.5 V P-P  
 50 Ohm output impedance  
 600 Ohm minimum load impedance

**Composite Video In/Out:** BNC connectors  
 Bridged loop thru

**RF In:** BNC connector  
 0.1 to 2 W  
 50 Ohm

**FREQUENCY RESPONSE** (Note 1)  
 -3 dB @ 50 Hz and 10 kHz  
 $\pm 1$  dB 70 Hz to 7.5 kHz

**SUBCARRIER FREQUENCY ACCURACY (UNLOCKED)** (Note 2)  
 $\pm 0.02\%$  at 25° C.

**SUBCARRIER FREQUENCY DRIFT (UNLOCKED)** (Note 2)  
 $\pm 0.005\%$  from 0 to 50° C.

**SURIOUS COMPONENTS**  
 2ND HARMONIC: better than 40 dB below sub-carrier  
 3RD HARMONIC: better than 45 dB below sub-carrier  
 ALL OTHER COMPONENTS, 50 Hz TO 100 kHz: better than 60 dB below sub-carrier

**SUBCARRIER SUPPRESSION WHEN MUTED**  
 Better than 50 dB

**MUTING LEVEL**  
 Adjustable from 10 to 30 dB below peak deviation set by "DEV" control. See block diagram, "Broadband Limiter."

**MUTING DELAY**  
 Selectable from 300 ms to 6 Seconds.

**METER CIRCUIT**  
 Peak deviation:  $\pm 5\%$  accuracy  
 Synchronous AM: -20 to -60 dB sensitivity

Note 1: Measured with signal below compression threshold.  
 Note 2: When locked to TV sync, frequency performance is a function of the accuracy and stability of the horizontal line rate.



**TV SIDEKICK**

*An Integrated Second Audio Program Generator*

The TV-SIDEKICK combines in one package all the functions needed to add a second audio program channel to a television station.



# The SAP Generator From The TV Stereo Experts.

A sync lockable subcarrier generator, dbx noise reduction encoding, audio processing, and a peak deviation meter are all integrated into one box. To allow tuning the aural transmitter system for minimum synchronous AM, a wideband noise source and AM detector are also provided.

The **TV-SIDEKICK** fully conforms to the FCC BTSC specifications for an SAP generator. The major elements needed include:

1. A subcarrier whose average frequency can be locked to five times horizontal sync (5H) and remain locked regardless of the modulating signal.
2. A 50Hz to 10kHz audio bandwidth.
3. Noise reduction encoding employing the dbx noise reduction system that won the approval of the EIA's Multichannel Sound Committee.

For compatibility with various aural exciters and to allow easy integration with stereo TV audio, **TV-SIDEKICK** provides two methods of exciter connection. In the first, called "Loop Thru," the composite

baseband is fed into the unit, buffered and mixed with the SAP subcarrier. The combined output then drives the wideband input of the aural exciter. In the alternate mode, a separate high level SAP signal can feed the "SCA" or auxiliary input of many aural exciters as well as Modulation Sciences' TSG™ Television Stereo Generator.

The audio processor portion of the **TV-SIDEKICK** is explicitly designed for subcarrier modulation—it is not some rehash of a main channel FM processor. It provides maximum intelligibility of dialogue and the best fidelity of music while delivering the greatest possible signal-to-noise ratio. Operation of the audio processor can be optimized for your needs by use of the separate broadband and high frequency limiter controls, as well as by setting the operating point of the compressor using the input level control.

- Subcarrier unconditionally locked to horizontal sync
- 50 Hz to 10kHz audio response
- dbx noise reduction for greater than 65 dB SNR
- Built in modulation monitor
- Integrated audio processor makes external processors unnecessary
- Sufficient input audio gain to allow direct connection to telephone lines
- Tuning aid minimizes aural transmitter synchronous AM
- Established hardware—basic design proven in FM SCA service
- Off the shelf (30 day) availability
- Synthesized subcarrier generator can be programmed to other frequencies for TV-SCA applications
- Excellent RF shielding
- Stable over a wide temperature range (0-50°C)
- Meets all requirements of EIA for SAP
- Crystal control takes over in event of TV sync loss
- Mute circuit switches off the subcarrier automatically when audio is removed

dbx is a registered trademark of dbx, Inc.

