

# F860

*Fixed Modulator*



## *Installation and Operation Manual*

# F860

## Fixed Modulator

- Re-broadcast quality performance
- Integrated BTSC Stereo (optional)
- 60 dBmV minimum adjustable output for optimum carrier-to-noise performance
- Preemphasis defeat switch provides easy stereo conversion
- Precision SAW filter for superior adjacent channel performance enables drop-in channel expansion
- Front panel controls and test point enable ease setup and monitoring
- Digital display provides quick channels identification and easy modulation adjustment
- Carrier-to-noise ratio >65 dB ensures superior picture quality
- Composite and separate audio and video IF loops allow compatibility with encoders, ghost cancellers, and video override applications
- MPX stereo loop provides encoded stereo input and compatibility with Emergency Alert equipment
- IRC and HRC input and output offset available for frequency setting in systems using offset channels



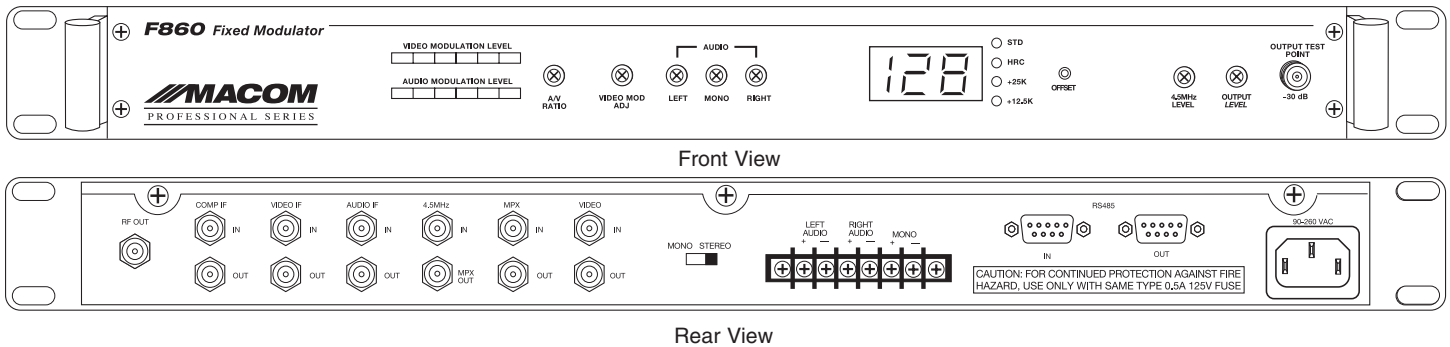
# F860

## Fixed Modulator

The **MACOM F860** is a professional re-broadcast grade microprocessor controlled phase-locked loop synthesized single channel audio-video modulator available with an optional BTSC stereo encoder. The **F860** provides 60 dBmV minimum output while accommodating HRC and IRC offset frequencies. The optional BTSC encoder enables delivery of high fidelity stereo without the cost of a stand-alone stereo encoder. This cost-effective modulator was designed for use in heavily loaded systems requiring high stability and superior picture and stereo sound quality. Its phase-locked loop frequency control and superior SAW filtering enhance stability, minimize adjacent channel interference and assure accurate and spurious free output. Superior out-of-band carrier-to-noise performance is achieved through band-pass filtering at the output amplifier. The modulator is shipped with all internal adjustments preset. FCC Docket 21006 offsets are standard. The **MACOM** line is backed by an industry leading 5-year limited warranty.

# F860

## Fixed Modulator



## Specifications

### RF OUTPUT

Frequency Range: 54-456 MHz  
Level: 60 dBmV min  
Level Adjustment: 20 dB  
Impedance: 75 ohms  
Frequency Stability:  $\pm 3$  kHz  
Audio/Video Ratio: -10 to -20 dB  
Adjustable

Output Return Loss: -18 dB  
In Band Spurious: -62 dB  
Out of Band Spurious: -65 dB  
C/N (In-Band): >62 dBc  
C/N (Out-of-Band): >65 dBc

### IF OUTPUT

Video Level: 38 dBmV  
Audio Level: 22 dBmV  
Composite Level: 35 dBmV  
Video Stability:  $\pm 3$  kHz  
Audio Stability:  $\pm 2$  kHz  
Impedance: 75 ohms

### 4.5 MHZ INPUT

Level: 37 dBmV  
Impedance: 75 ohms

### VIDEO INPUT

Level: 0.7 – 1.0 V p-p  
Frequency Response:  $\pm 1.0$  dB max  
Impedance: 75 ohms  
Differential Gain: <2% typ  
Differential Phase: <1° typ  
Chrom / Lumin Delay:  $\pm 8$  ns  
Hum and Noise: -60 dB

### AUDIO INPUT

Level – Mono: 0.5 V p-p – 1 V p-p  
Level – Left Audio: 0.5 V p-p – 1 V p-p  
Level – Right Audio: 0.5 V p-p – 1 V p-p  
Frequency Response:  $\pm 1.5$  dB max  
Impedance: 600 ohms  
Preemphasis: 75  $\mu$ s switchable

### MPX/BTSC STEREO

Level: 2.2 V p-p  
Impedance: 500 ohms  
Frequency Response: 1 dB, 50 Hz – 14 kHz  
Total Harmonic Distortion: <0.3%  
S/N: 75 dB  
Separation: 35 dB, 50 Hz – 12 kHz

### GENERAL

Power Input: 90-260 VAC, 28 W  
Operating Temperature: -10°C to 50°C  
Dimensions: 19"(L) x 12"(D) x 1.75"(H)  
Weight: 7.8 lbs.  
Connectors: RF & Video "F" type  
Audio: 600 ohms terminal strip

### RELATED PRODUCTS

D860 Agile A/V Stereo Demodulator  
EAS-12B Emergency Override System  
C860 Bi-Directional Combiner  
L860 Bi-Directional Launch Amplifier  
A860 Agile Modulator  
DSP806 HDTV Agile Channel Processor

## Ordering Information

**F860-\*** Fixed Channel Modulator  
**F860S-\*** Stereo Fixed Channel Modulator

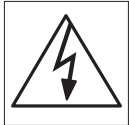
# F860

## Product Inspection

Inspect the equipment for shipping damage. Should any damage be discovered, immediately file a claim with the carrier.

## Important Safety Instructions

To ensure proper installation and operation, take a moment to read this guide before proceeding with the installation. If you have any questions or comments about the **F860** Fixed Modulator, please contact your dealer or have him contact the PICO MACOM Service Center at the phone number on the bottom of the page.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



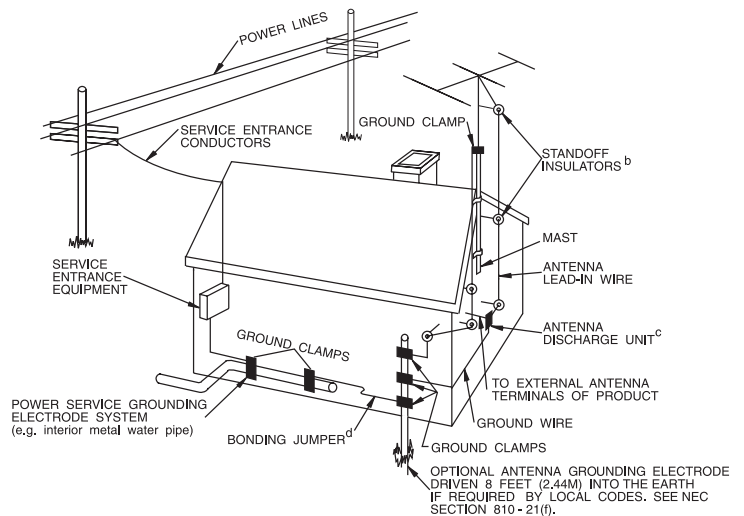
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

**WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. DO NOT OPEN THE CABINET. REFER SERVICING TO QUALIFIED PERSONNEL ONLY. TO PREVENT ELECTRIC SHOCK DO NOT USE THE (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.**

1. **Read Instructions:** All safety and operating instructions should be read before the appliance is operated.
2. **Retain Instructions:** The safety and operating instructions should be retained for future reference.
3. **Heed Warnings:** All warnings on the appliance should be adhered to.
4. **Follow Instructions:** All operating and user instructions should be followed.
5. **Cleaning:** Unplug this appliance from wall outlet. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleansers.
6. **Do Not Use Attachments** not recommended by the manufacturer; they may cause hazards.
7. **Accessories:** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to persons and serious damage to the appliance.
8. **Damage Requiring Service:** Disconnect this product from the system and refer servicing to qualified service personnel under the following conditions:
  - a. If liquid has been spilled, or objects have fallen into the product.
  - b. If the product has been exposed to rain or water.
  - c. If the product does not operate normally by following the operating instruction. Adjust only those controls that are covered by the operating instructions. An improper adjustment may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
  - d. If the product has been dropped or the cabinet has been damaged.
  - e. When the product exhibits a distinct change in performance — this indicates a need for service.
9. **Replacement Parts:** When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original parts.

10. **Safety Check:** Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating conditions.

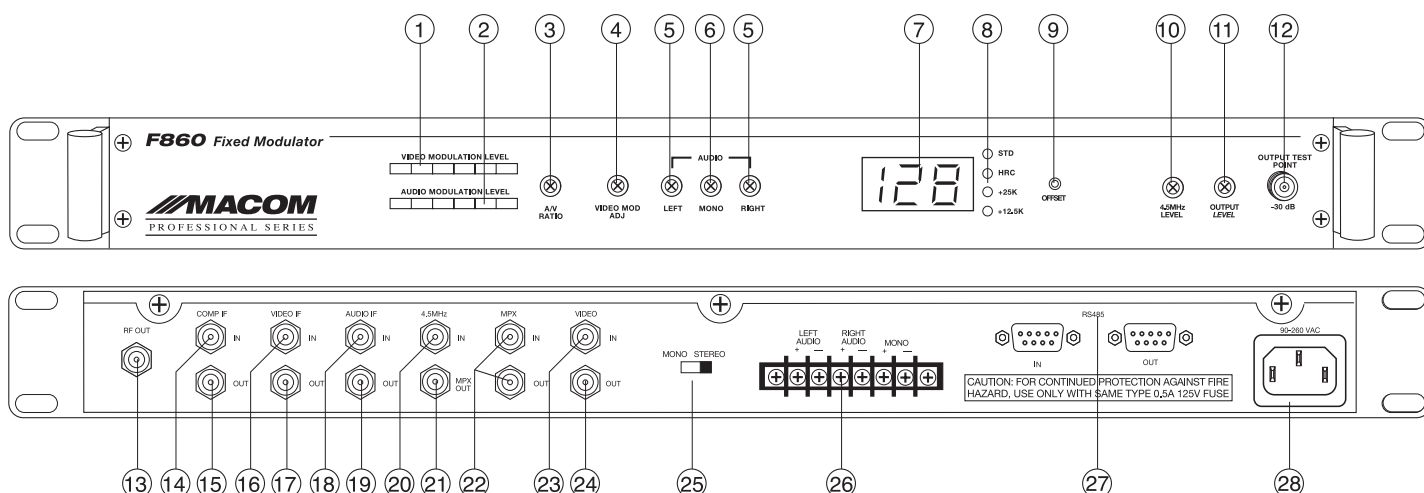
EXAMPLE OF ANTENNA GROUNDING ACCORDING TO  
NATIONAL ELECTRICAL CODE INSTRUCTIONS CONTAINED  
IN ARTICLE 810 - "RADIO AND TELEVISION  
EQUIPMENT"



### NOTE TO THE CATV SYSTEM INSTALLER

THIS REMINDER IS PROVIDED TO CALL THE CATV SYSTEM INSTALLER'S ATTENTION TO ARTICLE 820-22 OF THE NEC THAT PROVIDES GUIDELINES FOR PROPER GROUNDING AND, IN PARTICULAR, SPECIFIES THAT THE CABLE GROUND SHALL BE CONNECTED TO THE GROUNDING SYSTEM OF THE BUILDING, AS CLOSE TO THE POINT OF CABLE ENTRY AS PRACTICAL.

## F860



1. **Video Modulation Level:** Green LED indicates correct video modulation level.
2. **Audio Modulation Level:** Green LED indicates correct audio deviation level.
3. **A/V Ratio Adjustment:** Used to set level of audio carrier.
4. **Video Modulation Adjust:** Used to set the video depth of modulation
5. **Left / Right Stereo Level Adjust:** Used to set left or right channel audio level. (Active only with stereo option)
6. **Mono Adjustment:** Used to set mono level.
7. **Channel Display:** Indicates which channel is active.
8. **Offset Indicator LEDs:** Indicate if standard or offset formats are active.
9. **Offset Selector:** Used to select standard or offset formats.
10. **4.5MHz Level:** Used to adjust 4.5 MHz level.
11. **Output Level:** Used to set RF output level.
12. **-30 dB Test Point:** Used to monitor RF output level.
13. **RF Output Port:** Connect this port to distribution system.
14. **Composite I.F. Input:** Input from I.F. scrambler or I.F. output.
15. **Composite I.F. Output:** To I.F. input or to scrambling device.
16. **Video I.F. Input (45.75 MHz):** Video carrier I.F. input from video scrambling device or video carrier I.F. output.
17. **Video I.F. Output (45.75 MHz):** Video carrier I.F. output to scrambling device or video carrier I.F. input.
18. **Audio I.F. Input (41.25 MHz):** Sound carrier I.F. input from audio scrambling device or sound carrier I.F. output.
19. **Audio I.F. Output (41.25 MHz):** Sound carrier I.F. to audio scrambling device or sound carrier I.F. input.
20. **4.5 MHz Input:** Input for BTSC stereo encoder operation.
21. **MPX Out:** Used to provide MPX output to additional modulators when internal stereo encoder is present, eliminating need for additional encoders.
22. **MPX In/Out:** Loop the MPX Input and Output when internal stereo encoder is used.
23. **Video Loop In:** Connect baseband video to this port.
24. **Video Loop Out:** This port provides the video sync to external PM-SE stereo encoder.
25. **Mono/Stereo Switch:** Selects either mono or stereo modes. Stereo mode is only present on stereo encoder equipped models.
26. **Audio Input (Left, Right and Mono):** Accepts any baseband audio output source such as a satellite receiver, VCR, security camera or cable converter.
27. **RS485:** Not active at the present time.
28. **Power Cord Receptacle:** Connect power cord to this receptacle. The switching power supply accepts any input voltage from 90 to 260 VAC.



# F860

## Installation Procedures

*Adherence to these precautions will help prevent problems during initial installation of the F860.*

1. Connect an I.F. jumper from the composite I.F. output to the composite I.F. input on the rear panel.  
Connect an I.F. jumper from the video I.F. output to the video I.F. input on the rear panel.  
Connect an I.F. jumper from the audio I.F. output to the audio I.F. input on the rear panel.
2. Connect the **F860** to a 115 VAC grounded receptacle. Observe the front panel LEDs indicating the unit is active.
3. Using a signal level meter or spectrum analyzer, set the output level to 60 dBmV.
4. Check the aural carrier level. It should be set at 15 dBmV below the video carrier.

**WARNING:** When connecting the F860 directly to a TV set, attenuate the output sufficiently to prevent overdriving the TV. The front panel test point is useful for monitoring modulator output.

5. Connect a 1.0 volt peak-to-peak video source to the “**VIDEO IN**” on rear panel. Connect the “**RF OUT**” to a TV set, and compare the contrast and brightness to a known signal (use off-air signal to insure a proper modulation level). If necessary, adjust the video modulation until proper contrast is observed.
6. Connect an audio source to the “**AUDIO IN**” on rear of the unit. Set audio modulation (peak deviation) to 25 kHz with the audio modulation adjustment. A known off-air signal and a TV may be used to set adjustment for equal audio level.
7. Connect the “**RF OUTPUT**” to a combining network.

## FREQUENCY OFFSETS

The Federal Communications Commission requires that cable system modulators, which operate in the aircraft communications and navigation bands, are offset in frequency by 12.5 kHz. The **F860** PLL oscillator is factory set to comply with FCC requirements for frequency accuracy ( $\pm 5$  kHz) in the aeronautical communication and navigation bands.

FREQUENCY	CHANNEL	NUMBER	OFFSET
121.2625 – 137.7625 MHz	A,B,C	14,15,16	12.5 kHz
109.2750 – 119.7750 MHz	A-2, A-1	98, 99	25 kHz
229.2625 – 329.7625 MHz	L – EE	25 – 41	12.5 kHz
331.275 – 335.775 MHz	FF	42	25 kHz
337.2625 – 401.7625 MHz	GG – QQ	43 – 53	12.5 kHz

Harmonically Related Coherent (HRC) video carriers and Incrementally Related Coherent (IRC) video carriers are CATV channel assignment methods to reduce the effect of beat products. The technique is used in expensive phase-locked headends where all units are tied to a master 6.0003 MHz oscillator with a maximum error of 1 Hz.

# F860

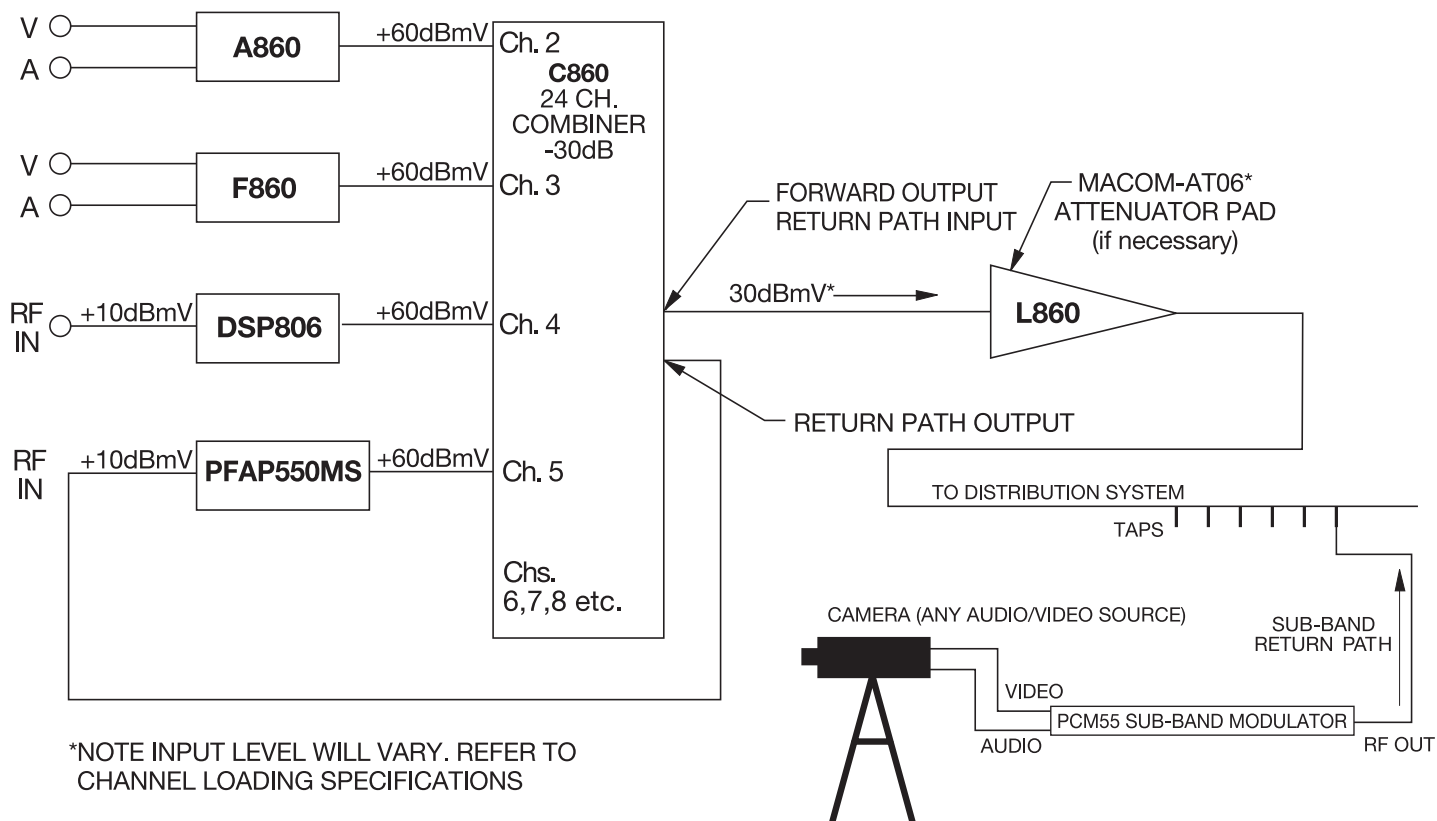
## Signal Combining Methods

The output levels of the modulator should be the same as the output of the off-air strip amplifiers. The **F860** modulators are usually combined with either the **DSP806** channel processors, or **XBS** series strip amplifiers. Three methods are suggested to combine strip amplifier, modulator and processor outputs.

The **C860** twenty-four channel combiner consists of two rows of directional couplers combined by a hybrid splitter. The directional coupler combining provides high isolation (>40 dB) between the inputs. Normally, the odd channels are combined on one row while even channels are combined on the other row of directional couplers. The combiner loss is 28-30 dB per channel. Used with an **L860** distribution/launch amplifier the system's RF output provides high quality, distortion-free programming.

The **CHC-16U/860** provides both signal combining and post-amplification of the headend signals. Up to 16 channels may be combined using the **CHC-16U/860**. The combiner gain is 15 dB per channel.

The final method of combining signals uses three hybrid splitters per headend rack. The odd channels are combined in one splitter, the even channels in another splitter and the two splitters are combined to a single output with a third splitter. Each rack is then combined with a final splitter prior to the **CA-30RK1000** or **L860** post amplifier.



# F860

## Five-Year Limited Warranty\*

Pico Macom, Inc. warrants to the original purchaser this product shall be free of defects in material and craftsmanship with only the limitations or exclusions set out below.

During the warranty period, Pico Macom, Inc. or an authorized Pico Macom service facility will provide, free of charge, the parts and labor necessary to correct defects in material and workmanship.

## Warranty Duration

This warranty shall terminate five years\* from the original date of purchase of the product or at a time the product is:

1. Misused or damaged due to neglect or improper installation
2. Modified
3. Repaired by someone other than the warrantor
4. Sold by the original purchaser

## Statement of Remedy

To obtain such a warranty service, contact the salesperson where the product was obtained. You will be issued a Return Authorization (RA) number which will be used to track your product. Be prepared to provide:

1. The model number and channel number of the product
2. The date of purchase
3. A specific identification of the problem

Deliver the products to Pico Macom, Inc. or ship the products in the original packing material to the address below. Include satisfactory evidence of the date of purchase.

Products will not be accepted by Pico Macom, Inc. without the RA number clearly indicated on the shipping label.

The foregoing constitutes the Pico Macom, Inc. entire obligation with respect to this product and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusions or limitation of incidental or consequential damages, so the above limitation and exclusion may or may not apply to you.

This warranty gives you specific legal rights, and you also have rights, which vary from state to state. (U.S.A.)

**Pico Macom, Inc.**  
6260 Sequence Drive  
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