

A860

Agile Modulator



Installation and Operation Manual

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- ▶ Re-broadcast quality performance specifications match those of fixed channel modulators
- ▶ Integrated BTSC Stereo (optional)
- ▶ 60 dBmV minimum output for optimum carrier-to-noise performance
- ▶ Precision SAW filter for superior adjacent channel performance enables drop-in channel expansion
- ▶ State-of-the-art digital phase-locked loop (PLL) design guarantees precise frequency locking for solid drift-free operation
- ▶ Superior design including automatic band-splitting filters for excellent carrier-to-noise ratio (>65 dB)
- ▶ Bright LED bar graph provides simple modulation set-up
- ▶ Microprocessor tuning control provides digital display with push-button channel selection for ease of installation, configuration and servicing
- ▶ Rear panel interfaces accept baseband video and three audio formats to provide maximum installation flexibility
- ▶ 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



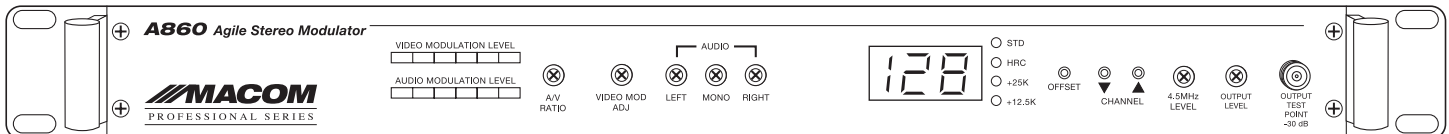
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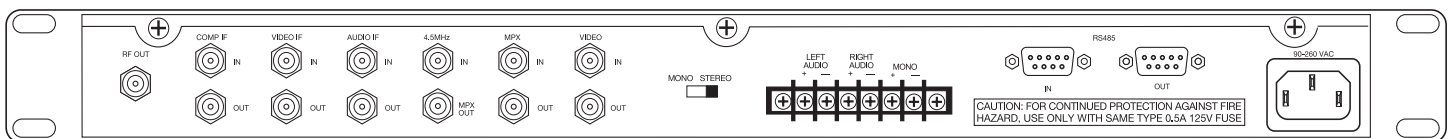
The **MACOM A860** agile modulator is a frequency agile audio/video professional re-broadcast grade, microprocessor controlled CATV modulator. Attractive and easy to operate, the sleek design highlights the useful front panel modulation bar-graphs and channel indicators. The simple push button tuning interface allows the **A860** to be configured for CATV standard, HRC, and IRC or North American broadcast channels with an RF output of 60 dBmV. The front panel output test point provides a quick reference test point prior to channel combining equipment, saving time and service interruption during setup and maintenance. The **A860** features rear panel interface connections for input of NTSC video and monaural and discrete left and right audio. The integrated stereo encoder (optional) will provide a BTSC stereo encoded output channel. MPX loop and 4.5 MHz (modulated) audio input connections are provided to bypass the internal stereo encoder for compatibility with external units; additionally, the MPX loop is useful when used with the **EAS-12B** emergency override system. A composite audio/video IF loop provides compatibility with scrambling encoders, ghost cancellers, and IF override applications. The unit conforms to FCC Docket 21006 for frequency accuracy. The **MACOM** line is backed by an industry leading 5-year limited warranty.

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Front View



Rear View

Specifications

RF OUTPUT

Frequency Range: 54-860 MHz
Level: 60 dBmV min
Level Adjustment: 20 dB
Impedance: 75 ohms
Frequency Stability: ± 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
VSB Response: -60 dB min
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: ± 3 kHz
Audio Stability: ± 2 kHz
Impedance: 75 ohms

4.5 MHz INPUT

Level: 37 dBmV
Impedance: 75 ohms

VIDEO INPUT

Level: .7-1.0 V p-p
Frequency Response: ± 1.0 dB max
Impedance: 75 ohms
Differential Gain: $<2\%$ typ
Differential Phase: $<1^\circ$ typ
Chrom / Lumin Delay: ± 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: ± 1.5 dB max
Impedance: 600 ohms
Preemphasis: 75 μ 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
DSP806 HDTV Agile Channel Processor

Ordering Information

A860 Agile Modulator
A860S Agile Stereo Modulator

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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 **A860** Agile 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.



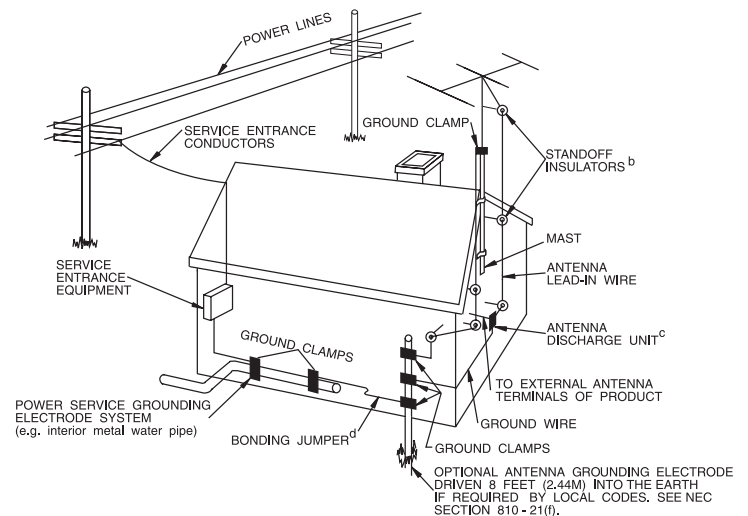
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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.

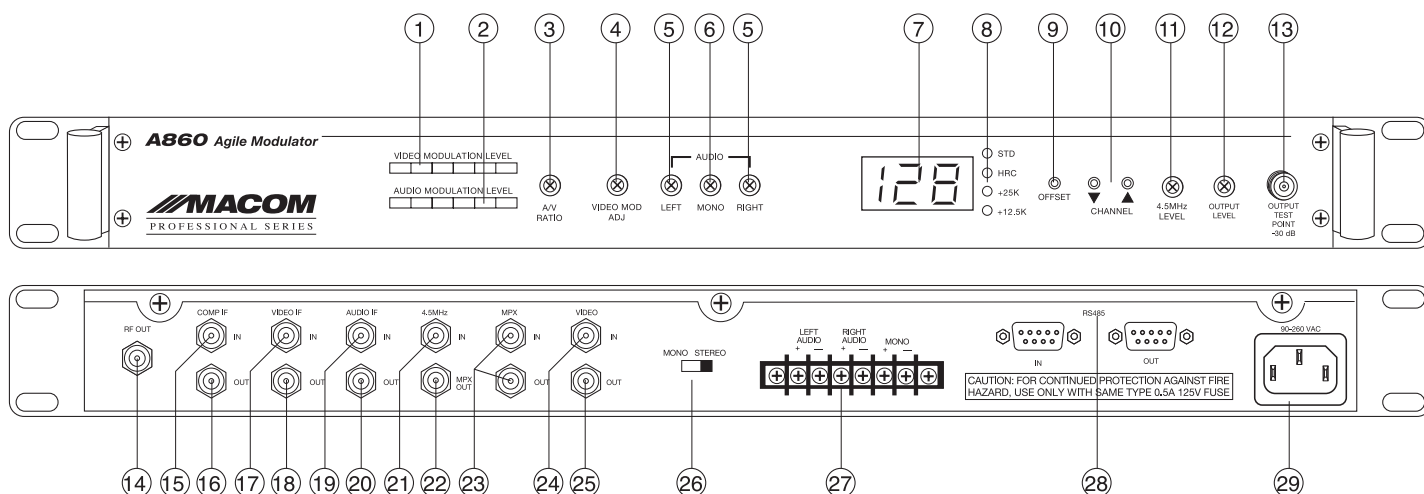
10. **Safety Check:** Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating conditions.

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.

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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 Adjustment:** Used to set 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. **Channel Select:** Up/Down button select channel of interest.
11. **4.5MHz Level:** Used to adjust 4.5 MHz level.
12. **RF Level Adjust:** Used to set RF level.
13. **-30 dB Test Point:** Used to monitor RF output level.
14. **RF Output Port:** Connect this port to distribution system.
15. **Composite I.F. Input:** Input from I.F. scrambler or I.F. output.
16. **Composite I.F. Output:** To I.F. input or to scrambling device.
17. **Video I.F. Input (45.75 MHz):** Video carrier I.F. input from video scrambling device or video carrier I.F. output.
18. **Video I.F. Output (45.75 MHz):** Video carrier I.F. output to scrambling device or video carrier I.F. input.
19. **Audio I.F. Input (41.25 MHz):** Sound carrier I.F. input from audio scrambling device or sound carrier I.F. output.
20. **Audio I.F. Output (41.25 MHz):** Sound carrier I.F. to audio scrambling device or sound carrier I.F. input.
21. **4.5 MHz Input:** Input for BTSC stereo encoder operation.
22. **MPX Out:** Used to provide MPX output to additional modulators when internal stereo encoder is present, thus eliminating need for additional encoders.
23. **MPX In/Out:** Loop the MPX Input and Output when internal stereo encoder is used.
24. **Video Loop In:** Connect baseband video to this port.
25. **Video Loop Out:** This port provides the video sync to external PM-SE stereo encoder.
26. **Mono/Stereo Switch:** Selects either mono or stereo modes. Stereo mode is only present on stereo encoder equipped models.
27. **Audio Input (Left, Right and Mono):** Accepts any baseband audio output source such as a satellite receiver, VCR, security camera or cable converter.
28. **RS485:** Not active at the present time.
29. **Power Cord Receptacle:** Connect power cord to this receptacle. The switching power supply accepts any input voltage from 90 to 260 VAC.

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Installation Procedures

Adherence to these precautions will help prevent problems during initial installation of the A860.

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 **A860** 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 A860 directly to a TV set, attenuate the outputs 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 **A860** PLL oscillator is factory set to comply with FCC requirements for frequency accuracy (± 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.

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Signal Combining Methods

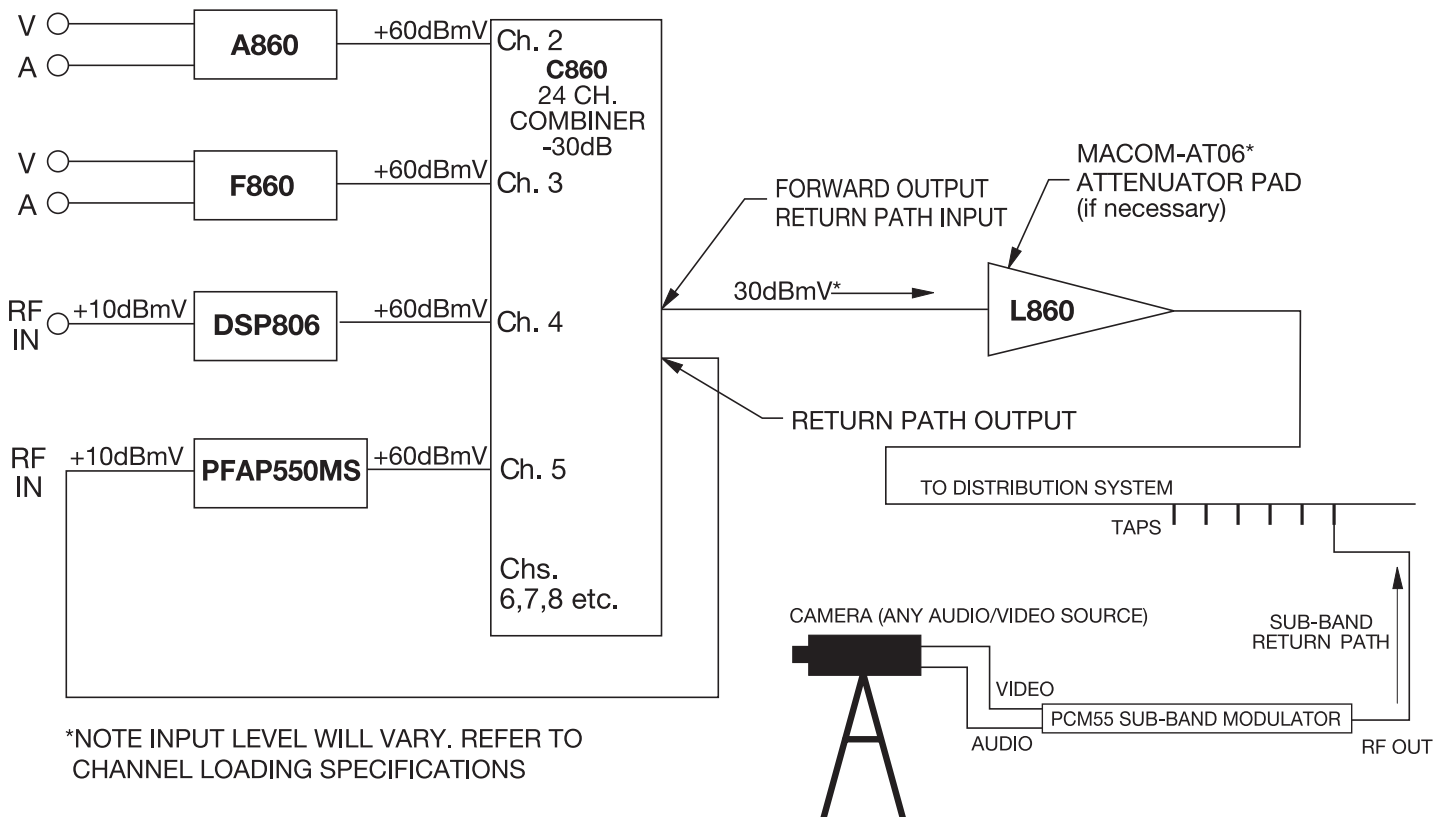
The output levels of the modulator should be the same as the output of the off-air strip amplifiers. The **A860** modulators are usually combined with either the **DSP806** channel processors, or **XBS** series strip amplifiers. Three methods are suggested to combine strip amplifier, modulator and processor 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.

XBS – Denotes low, medium, high and superband 2 volt strip amps.



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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.
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