



INSTRUCTION MANUAL

HE-12/HE-4

Modular Headend Chassis

Model	Stock No.	Description
MIRC-12V	7715	Chassis
MIRC-4D	7711	Chassis
MIRC-4CUBE-CH	7703	Chassis

Modular Headend Products

Model	Stock No.	Description
MIPS-12C	7722C	Power Supply
MIRC-4CUBE-PS	7702	Power Supply
AMCM-860B	7766B	Agile Modulator
AMCM-860HB	7766HB	Agile Modulator (Horizontal)
AMCM-860S	7766S	Stereo Agile Modulator
AMCM-860HS	7766HS	Stereo Agile Modulator (Horizontal)
MICM-45C	7797C	A/V Modulator
MICM-45S	7797S	Stereo A/V Modulator
MIDM-806C	7740C	Demodulator
DHDC-DV	6264A	Digital High Definition Downconverter (Vertical)
DHDC-DH	6261A	Digital High Definition Downconverter (Horizontal)
DHDC-UV	6265A	Digital High Definition Upconverter (Vertical)
DHDC-UH	6262A	Digital High Definition Upconverter (Horizontal)
AMM-806	7763	Agile Micro Modulator
MSBC	7727	Sub-Band Block Converter

We recommend that you write the following information in the spaces provided below.

Purchase Location Name:	
Purchase Location Telephone Number:	
Serial Number:	

The information contained herein is subject to change without notice. Revisions may be issued to advise of such changes and/or additions.

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General & Safety Instructions



The STOP sign symbol is intended to alert you to the presence of REQUIRED operating and maintenance (servicing) instructions that if not followed, may result in product failure or destruction.



The YIELD sign symbol is intended to alert you to the presence of RECOMMENDED operating and maintenance (servicing) instructions.



The LIGHTNING flash symbol is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be sufficient magnitude to constitute a risk of electrical shock.

**TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER FROM THIS UNIT.
NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.**

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE

NOTE TO CATV SYSTEM INSTALLER

This reminder is provided to call the CATV System Installer's attention to Article 820-40 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.

Safety Instructions

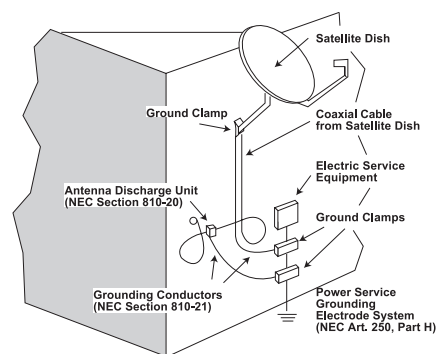


**YOU SHOULD ALWAYS FOLLOW THESE INSTRUCTIONS TO HELP ENSURE
AGAINST INJURY TO YOURSELF AND DAMAGE TO YOUR EQUIPMENT.**

- Read all safety and operating instructions before you operate the unit.
- Retain all safety and operating instructions for future reference.
- Heed all warnings on the unit and in the safety and operating instructions.
- Follow all installation, operating, and use instructions.
- Unplug the unit from the AC power outlet before cleaning. Use only a damp cloth for cleaning the exterior of the unit.
- Do not use accessories or attachments not recommended by Blonder Tongue, as they may cause hazards, and will void the warranty.
- Do not operate the unit in high-humidity areas, or expose it to water or moisture.
- Do not place the unit on an unstable cart, stand, tripod, bracket, or table. The unit may fall, causing serious personal injury and damage to the unit. Install the unit only in a mounting rack designed for 19" rack-mounted equipment.

Safety Instructions - continued

- Do not block or cover slots and openings in the unit. These are provided for ventilation and protection from overheating. Never place the unit near or over a radiator or heat register. Do not place the unit in an enclosure such as a cabinet without proper ventilation. Do not mount equipment in the rack space directly above or below the unit.
- Operate the unit using only the type of power source indicated on the marking label. Unplug the unit power cord by gripping the plug, not the cord.
- The unit is equipped with a three-wire ground-type plug. This plug will fit only into a ground-type power outlet. If you are unable to insert the plug into the outlet, contact an electrician to replace the outlet. Do not defeat the safety purpose of the ground-type plug.
- Route power supply cords so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit from the unit.
- Be sure that the outdoor components of the antenna system are grounded in accordance with local, federal, and National Electrical Code (NEC) requirements. Pay special attention to NEC Sections 810 and 820. See the example shown in the following diagram:



- We strongly recommend using an outlet that contains surge suppression or ground fault protection. For added protection during a lightning storm, or when the unit is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the lines between the unit and the antenna. This will prevent damage caused by lightning or power line surges.
- Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing the antenna, take extreme care to avoid touching such power lines or circuits, as contact with them can be fatal.
- Do not overload wall outlets or extension cords, as this can result in a risk of fire or electrical shock.
- Never insert objects of any kind into the unit through openings, as the objects may touch dangerous voltage points or short out parts. This could cause fire or electrical shock.
- Do not attempt to service the unit yourself, as opening or removing covers may expose you to dangerous voltage and will void the warranty. Refer all servicing to authorized service personnel.
- Unplug the unit from the wall outlet and refer servicing to authorized service personnel whenever the following occurs:
 - The power supply cord or plug is damaged;
 - Liquid has been spilled, or objects have fallen into the unit;
 - The unit has been exposed to rain or water;
 - The unit has been dropped or the chassis has been damaged;
 - The unit exhibits a distinct change in performance.
- When replacement parts are required, ensure that the service technician uses replacement parts specified by Blonder Tongue. Unauthorized substitutions may damage the unit or cause electrical shock or fire, and will void the warranty.
- Upon completion of any service or repair to the unit, ask the service technician to perform safety checks to ensure that the unit is in proper operating condition.

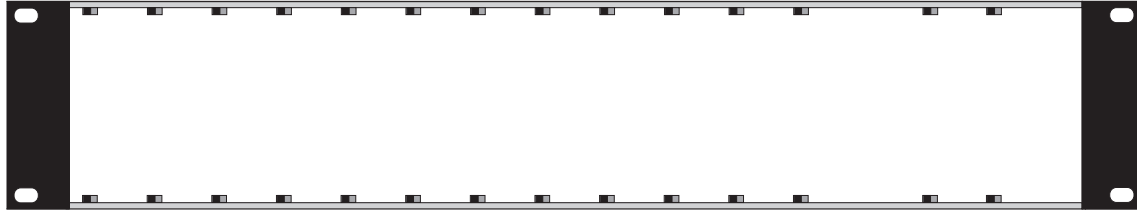
Returning Product for Repair (or Credit)

A Return Material Authorization (RMA) Number is required on all products returned to Blonder Tongue, regardless if the product is being returned for repair or credit. Before returning product, please contact the Blonder Tongue Service Department at 1-800-523-6049, Ext. 4256 or visit our website: www.blondertongue.com for further information.

Modular Headend Chassis

MIRC-12V Description

The MIRC-12V is a professional quality modular headend system designed to maximize rack space. The 2 RU MIRC-12V chassis will house up to 12 single width modules and one MIPS-12C power supply. Modular components consist of modulators and demodulators. These modular components are fully shielded and are field installable. The MIRC-12V chassis allows the compact modules to be added from the front of the chassis without removing the chassis from the rack. Field service and channel upgrades are plug and play. The MIRC-12V chassis is fully compatible with all MICM, MIDM, AMCM and DHDC series units.



MIRC-12V Chassis

MIRC-12V Specifications

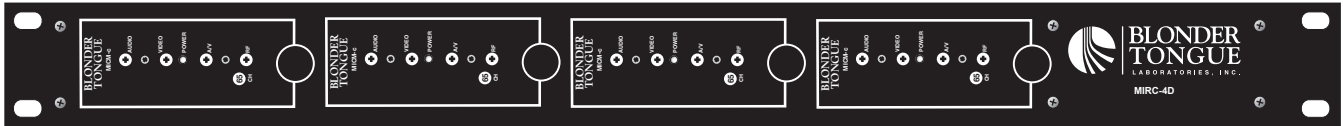
Mechanical

Dimensions (W x H x D): 19 x 3.5 x 7.5 inches

Weight: 1.1 lbs (0.5 kg)

MIRC-4D Description

The 1RU MIRC-4D chassis includes the modular power supply and holds up to four modules. The chassis (Stock No. 7711) is compatible with all modules.



MIRC-4D

MIRC-4D Specifications

General

Power Requirements: 100 VAC to 240 VAC

Frequency: 50 to 60 Hz

Temperature Range: 0° to +50° C

Output Voltage & Current Capacity:

+12 VDC @ 1.8 Amps

+ 5 VDC @ 1.8 Amps

Connectors/Impedance

AC Input: IEC

DC Output: 4 sets of cables

Accessories Supplied

AC Power Cable, 6 ft., IEC, USA

Mechanical

Dimensions (W x H x D) : 19 x 1.75 x 8.0 inches

Weight: 3 lbs (1.4 kg)

MIRC-4CUBE-CH Description

The MIRC-4CUBE-CH is a standalone version of the MIRC-4. It can be used in any installation where modulators are required and no standard headend rack is available. The CUBE system consists of a chassis (MIRC-4CUBE-CH), power supply (MIRC-4CUBE-PS) and any combination of up to four modules.

MIRC-4CUBE-CH Specifications

Dimensions (W x H x D): 7.25 x 6.625 x 7.75 inches
 Weight: 6.0 lbs

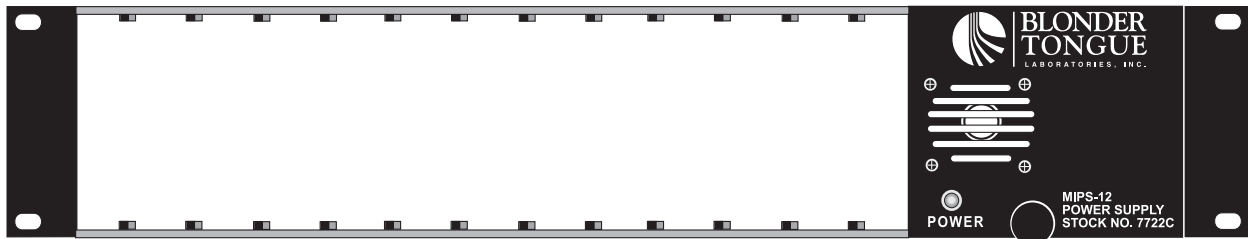
MIRC-4CUBE-PS Specifications

General

Power Requirements: 120 VAC to 240 VAC
 Frequency: 50 to 60 Hz
 Temperature Range: 0° to +50° C
 Output Voltage & Current Capacity:
 +12 VDC @ 1.8 Amps
 + 5 VDC @ 1.8 Amps



MIRC-12V Chassis with MIPS-12C Power Supply



Specifications MIPS-12C (Stock #7722C) (Typical)

General

Power Requirements:
 100 VAC to 250 VAC Frequency: 50 to 60 Hz
 Temperature Range: 0° to +50° C
 Output: +5 VDC @ 5.5 Amps, +12 VDC @ 4 Amps

Mechanical

Dimensions (W x H x D) : 4.16 x 3.5 x 7.50 inches
 Weight: 1.10 lbs (0.50 kg)

Connectors/Impedance

AC Input: IEC
 DC Output: 37 pin D

Indicators

Power 1 ON: LED, green

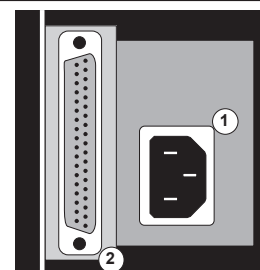
Accessories Supplied

AC Power Cable: 6 Ft, IEC, USA

MIPS-12C Power Supply Connections

All the connectors on the power supply are located on the rear panel.

1. AC INPUT - The power supply accepts standard 100 to 250 VAC inputs.
2. DC Output - The polarized D connector provides 12 sets of +12 VDC, +5 VDC and ground cables for the modules.



AMCM-860B MHz Agile Micro Modulator



Description

The AMCM-860B is a professional quality agile audio/video modulator with an output frequency range of 54-860 MHz. It joins Blonder Tongue's impressive family of modular headend components and works in conjunction with the MIRC-4D and MIRC-12V rack chassis, MIRC-4CUBE-CH and MIPS-12C power supply.

The unit provides a modulated aural & visual carrier on any channel in the 54 to 860 MHz range. Frequency plans including Standard CATV, IRC, HRC and Broadcast are accommodated via front panel selection. Channel tuning is easily accomplished with the use of front panel switches following the entry instructions. All channels with appropriate FCC offsets are pre-programmed and tuned electronically via microprocessor.

Features

- Supports all Broadcast and CATV channels, including HRC and IRC assignments from 54 to 860 MHz.
- Meets FCC docket 21006 aeronautical frequency response offset requirements
- Front panel access to all level controls and indicators
- Integrated stereo encoder available
- Die-cast chassis offers superior RFI protection



The AMCM-860 dissipates twice the wattage in comparison to other Blonder Tongue HE-12 modulators and demodulators. Due to this wattage increase, care must be taken when installing AMCM-860's into an existing MIRC-12 configured with MIPS-12 power supplies (Stock No. 7722 or 7722B). These power supplies can only support one (1) AMCM-860. Installing more than one AMCM-860 will cause the power supply to fail. Should two (2) or more AMCM's be required, the power supply must be changed to the new MIPS-12C (Stock #7722C) power supply. The "C" version power supply can easily be identified by the presence of fan vents on the front panel.

A further enhancement to our HE Series product line is the MIRC-12V (Stock #7715) chassis. It is designed to provide increased ventilation for improved heat dissipation.

Specifications AMCM-860B (Typical)

RF

Frequency Range: 54-860 MHz
 Channels: CATV, VHF, UHF (STD, HRC, IRC)
 FCC Offset (pre-programmed):
 0, +12.5, or 25 kHz
 Output Level - Min: +45 dBmV
 Output Level Adjust: 15 dB
 Aural/Visual Carrier Ratio: -10 to -17 dB
 Visual Carrier Frequency Tolerance
 Standard Channels: ± 5 kHz
 FCC Aeronautical Channels: ± 3 max kHz
 4.5 MHz Aural Inter Carrier Frequency:
 ± 150 Hz
 Channel Selectivity:
 Adjacent Aural and Below: -40 dB
 Adjacent Picture and Above: -50 dB
 Spurious Outputs: -60 dBc
 C/N Ratio In Channel: 65 dB
 Broadband Noise: -76 dBc
 Output Impedance: 75 Ω
 Output Return Loss: 12 dB

Video

Input Level: 1.0 V p-p
 Frequency Response
 fv-0.5 MHz to fv+4.2 MHz: ± 1.0 dB
 P-P Video to RMS Hum Ratio: 65 dB
 Video Signal-to-Noise Ratio,
 NTC-7 Weighted: 62 dB
 Differential Gain: 2.0 %
 Differential Phase: 1.0 °
 Over Modulation Indicator: 87.5, ± 2.5 %
 Input Impedance: 75 Ω
 Input Return Loss: 24 min, dB

Audio

Input Level: 140 mV RMS minimum
 Input Impedance: 10k Ω , Unbalanced
 Total Harmonic Distortion (%): 1.0
 Stereo Separation (AMCM 860S):
 50 Hz - 100 Hz: 15 dB
 100 Hz - 1 kHz: 25 dB
 12 kHz: 18 dB

General

Power Requirement: 5 W
 Voltage:
 12 VDC @ 280 mA
 5 VDC @ 470 mA
 Temperature Range: 0 to +50 ° C

Mechanical

Dimensions (W x H x D):
 1.15 x 3.5 x 7.5 in.
 29 x 89 x 191 mm
 Weight: .8 lbs., .36 kg

Connectors

Video Input: "F" Female
 L/R Audio Input: RCA Phono (2)
 RF Output: "F" Female

Controls

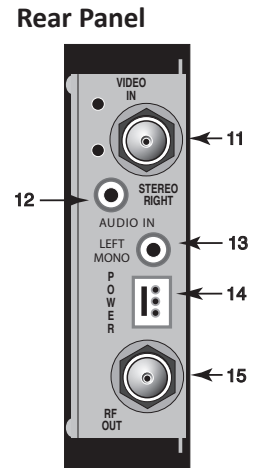
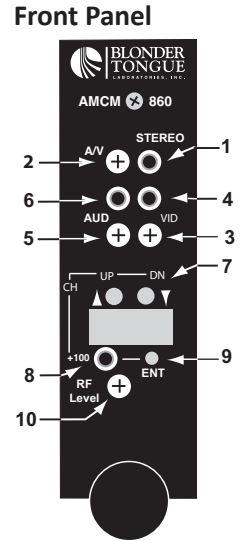
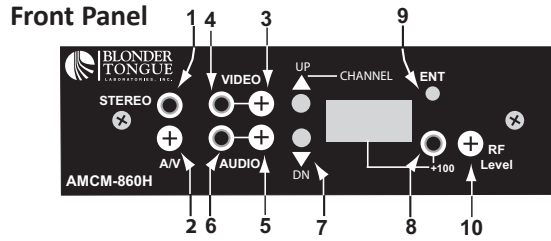
Channel Selection:
 Push-Button Switches, UP/DOWN
 Video Level: Control
 A/V Ratio: Control
 Audio Level: Control
 RF Output Level: Control
 Channel Enter: Push Button

Indicators

Channel Indicator: 2 Digit LED, Red
 Video Over Modulation: LED, Red
 Audio Over Modulation: LED, Red
 Stereo Indicator: LED, Green

Operating Controls and Indicators

1. **Stereo Indicator** - Lit when video and stereo audio are present.
2. **Audio/Video Ratio Adjustment** - Adjustment of the A/V Ratio is permitted from approximately -17 dB (full clockwise position) to approximately -10 dB (full counterclockwise position) by rotating the potentiometer.
3. **Video Adjustment** - Adjustment of the Video Modulation Level is permitted by rotating the potentiometer.
4. **Video Over Modulation LED Indicator**
5. **Audio Adjustment** - Adjustment of the Audio Modulation Level is permitted by rotating the potentiometer.
6. **Audio Over Modulation LED Indicator**
7. **Up/Down Buttons** - Used to set the desired channel or mode.
8. **+100 Indicator** - Lights when channel settings are 100 -135.
9. **Channel ENT Button** - Enter button used to enter a desired channel or mode.
10. **RF Level Adjustment** - Potentiometer adjustment used to set the output level. Has a range of 15 dB, optimum performance with a 10 dB adjustment.
11. **Video Input** - "F" Connector
12. **Right Stereo Audio In** - RCA Connector
13. **Left Stereo Audio or Mono In** - RCA Connector
14. **Power Connector**
15. **RF Output** - "F" Connector



It is strongly recommended to use the Blonder Tongue MIPS-12C or the MIRC-4D power supplies with the AMCM-860. It is also recommended to use the optional headend fan unit (QTHF, Stock No. 6235) when deploying more than 6 AMCM-860 units in the MIRC-12V chassis. A rack space above and below the chassis unit is suggested for heat dissipation and air flow.

Programming the Unit

The AMCM unit comes factory set to operate in the Standard CATV mode. The unit has 4 valid operating modes: STD CATV, IRC, HRC & Broadcast UHF/VHF. (Skip to the next section for programming the operating mode)

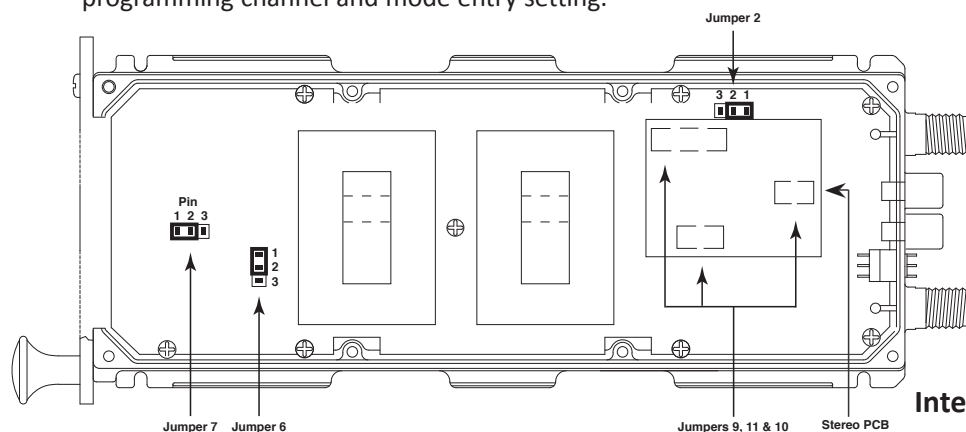
Programming a Channel

1. Navigate to the desired channel number by depressing the ▲ UP and ▼ DN buttons.
 - a. Continuous past 99 for channels 100-135, the +100 red LED will illuminate.
2. Press **ENTER** when you reach the desired channel setting. This will tune the modulator output to the corresponding channel frequency for this entry.
 - a. The LED display will blink continuously during the channel programming process and will not change the output frequency the unit is programmed until **ENTER** is depressed.
 - b. The unit has a special feature that alerts an operator of an inadvertent or desired change to the channel display by flashing the LED readout. The LED display will continue to flash for 30 seconds if **ENTER** is not depressed and then will return to the display of the previously programming channel entry setting.

Operating Mode Selection

The unit has 4 valid operating modes: STD CATV, IRC, HRC & Broadcast UHF/VHF. The AMCM unit comes factory set to operate in the Standard CATV mode. To change the operating mode:

1. Simultaneously depress ▲ UP and ▼ DN for approximately 5 seconds.
2. The Channel LED display will switch to the operating mode selection.
3. Use ▲ UP or ▼ DN to select the desired mode:
 - a. C = STD CATV
 - b. H = HRC
 - c. I = IRC
 - d. U = Broadcast (VHF/UHF)
4. After selecting the desired mode depress **ENTER** to set the mode.
5. The unit will return to the channel display mode.
 - a. Programming will reflect the mode chosen – See Appendix A for a detailed frequency plan.
 - b. The programming mode will also flash continuously during the programming process. The LED display will continue to flash for 30 seconds if **ENTER** is not depressed and then will return to the display of the previously programming channel and mode entry setting.



JUMPER SETTINGS	
MONO Stock No. 7766B	STEREO Stock No. 7766S
J2 - PIN 2-3	J2 - PIN 1-2
J6 - PIN 2-3	J6 - PIN 1-2
J7 - PIN 2-3	J7 - PIN 1-2

Internal Jumper Settings - AMCM-860B

Troubleshooting - AMCM-860

A continuous flashing CH Display indicates a Error Condition detected by the unit microcontroller. Sample conditions include:

- Channel Selector Entry does not match the channel number on which the modulator is operating, the display will flash for 30 seconds and then revert back to the previous CH entry.
- E1 is displayed if the Input & VCO is Not Locked
- E2 is displayed if the Output VCO is Not Locked

Possible Error Condition Scenarios

1. An Error Condition may occur when a channel number was accidentally altered by changing the push button switch to a number that is different from the output channel set in memory, or if there was a switch malfunction.
2. An Error Condition may occur when a user sets a new mode and the previously programmed channel is not in the new mode's channel range.



**SEE APPENDIX A FOR A COMPLETE LIST OF AVAILABLE CHANNELS.
STD CATV; IRC & HRC 1-135 AND BROADCAST 2-69**

Correction Suggestions

The User should perform the following steps to correct an Error Condition:

1. Check that the Channel Display is set to the desired channel and reset as appropriate
2. Check that the unit is set to the appropriate desired operating mode
3. Verify the unit output on a spectrum analyzer
4. Disconnect and reconnect power to the unit

If an error condition continues to be displayed, unit should be replaced and serviced.

MICM-45 Modulators

Description

The MICM-45 is a professional quality, channelized, heterodyne audio/video modulator. The unit provides modulated RF carrier output on any single VHF channel, including: broadcast TV (2-13), CATV (14-135). The MICM-45 is ideal for placing audio and video onto any unused VHF channel. Any standard audio/video source can be used, such as satellite receivers, television cameras, video tape recorders, or television demodulators.

The MICM-45 utilizes SAW filtering with FCC group delay pre-distortion to provide true vestigial sideband selectivity. This makes the MICM-45 perfect for use in adjacent channel systems.

The MICM-45C takes baseband audio and video and modulates these signals onto the desired output channel. The MICM-45S takes baseband L/R audio and video and modulates these signals into the desired output channel. The heterodyne conversion process used in the MICM-45 employs a crystal referenced, PLL synthesized local oscillator. This guarantees rock solid, no-drift output for the life of the modulator. The MICM-45 meets FCC Docket 21006 aeronautical frequency offset requirements (± 5 kHz video carrier accuracy). The modulator accepts standard polarity (sync negative) video in the range of 0.7 to 2.5 V p-p.

The MICM-45C has field defeatable audio pre-emphasis to provide stereo compatibility with any external BTSC stereo generator providing a composite stereo baseband output.

The MICM-45S is a stereo A/V modulator providing a stereo audio and video modulated RF carrier on any single VHF channel. All other features and specifications are identical to the MICM-45C except as noted below.

Specifications MICM-45 (Typical)

RF

Frequency Range:
54-860 MHz (Broadcast 2-13, Cable 14-135)
Output Level: +45 dBmV
Output Level Range: 10 dB continuously adjustable
Aural/Visual Carrier Ratio:
-11 to -19 dB continuously adjustable
Visual Carrier Frequency Tolerance:
 ± 10 kHz (standard channels) ± 5 kHz
(aeronautical channels)
Aural Carrier: 4.5 MHz above visual
Frequency Setting: ± 1.5 kHz
Spurious Outputs: -60 dBc, minimum
C/N Ratio In Channel: 60 dB
Broadband Noise: -90 dB
Output Return Loss: 12 dB
IF (Internal) Frequency: 45.750 MHz

Video

Input Level: 1.0 V p-p for 87.5 % modulation
Frequency Response fv -0.5 MHz to fv +4.2 MHz:
 ± 1.0 dB
Video C/N: 60 dB (4 MHz BW)
P-P Video to RMS Hum Ratio: 60 dB
Differential Gain: ± 4.0 % @ 87.5% Modulation
Differential Phase: $\pm 2^\circ$ @ 87.5% Modulation
Input Return Loss: 18 dB

Audio

Input Level: 140 mV RMS for 25 kHz peak deviation
Input Impedance: 10k Ohm, unbalanced
Frequency Range: 20 Hz to 20 kHz (MICM-45C)
Frequency Response:
 ± 1.0 dB, (50 Hz to 12 kHz) Reference to Std.
75 μ s Pre-emphasis (MICM-45C)
 ± 0.3 dB (50 Hz to 50 kHz) (MICM-45S)
in Stereo Configuration w/o pre-emphasis
Total Harmonic Distortion (%):
1.0 at 25 kHz Deviation

Stereo Separation (MICM-45S):
50 Hz - 100 Hz: 15 dB
100 Hz - 1 kHz: 25 dB
12 kHz: 18 dB
Aural Intercarrier: ± 5 kHz (0° to $+50^\circ$ C), std.

General

Power Requirements
External: +12 VDC @ 160 mA
+5 VDC @ 130 mA (MICM-C)
+5 VDC @ 180 mA (MICM-S)
Temperature Range: 0° to $+50^\circ$ C

Mechanical

Dimensions (W x H x D): 1.2 x 3.5 x 7.5 inches
Weight: 0.65 lbs (0.30 kg)

Connectors/Impedance

Audio Input: RCA Phono, female (MICM-45C)
L/R Audio Inputs: RCA Phono, female
Video Input: 75 ohm "F" type, female
RF Output: 75 ohm "F" type, female
Power: 3 Pin Header

Controls

Video Level: Pot
Audio Level: Pot
Aural Carrier Level: Pot
RF Output Level: Pot

Indicators

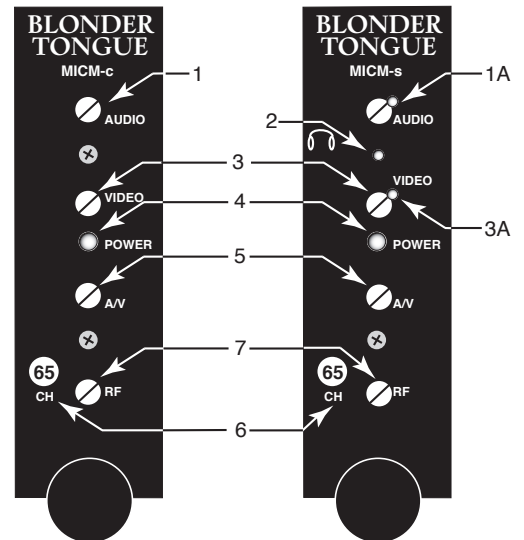
Power ON: LED, green
Video Over Modulation: LED, red (MICM-45S)
Audio Over Modulation: LED, red (MICM-45S)
Stereo Indicator: LED, red (MICM-45S)

Operating Controls and Indicators - MICM-45

Front Panel

All operating controls are located on, or are accessible from the front panel.

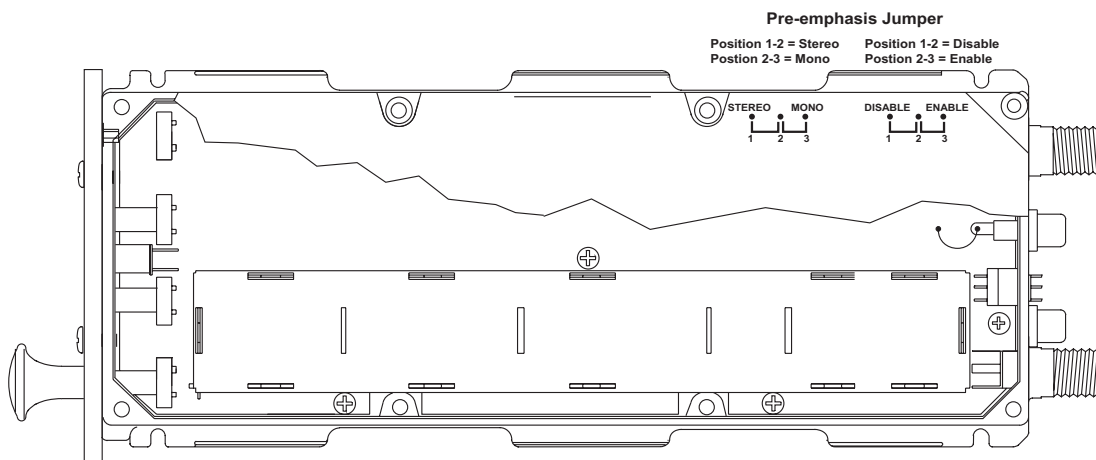
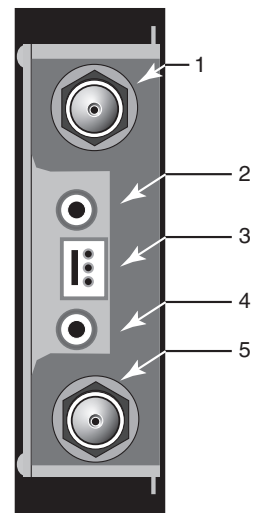
1. **Audio** - Adjusts the aural carrier modulation.
 1A Audio - Aural carrier modulation control/overmodulation indicator.
2. **Stereo Indicator**
3. **Video** - Adjusts the modulation percentage.
 3A Video - Modulation control/overmodulation indicator.
4. **Power** - The green LED indicates power is present and the fuse is good.
5. **A/V** - Controls the amplitude of aural RF carrier to change aural/visual ratio.
6. **Channel** - The modulator is factory aligned to the channel number indicated.
7. **RF** - The RF pot simultaneously adjusts the amplitude of aural and visual carriers to the final drive amplifier.



Rear Panel

All the connectors on the Modulator are located on the rear panel.

1. **Video Input** - The modulator accepts standard negative sync video at a 0.7 to 2.5 Vp-p level.
2. **Audio Input** - The modulator accepts 140 mV RMS for 25 kHz peak deviation (MICM-C).
 Left audio input for MICM-S only.
3. **Power** - The polarized power connector accepts +12 VDC +5 VDC and ground.
4. **Right Audio Input** for MICM-S only. Connector not used in MICM-C (capped)
5. **RF Out** - The filtered RF signal is available for connection to a headend combiner.



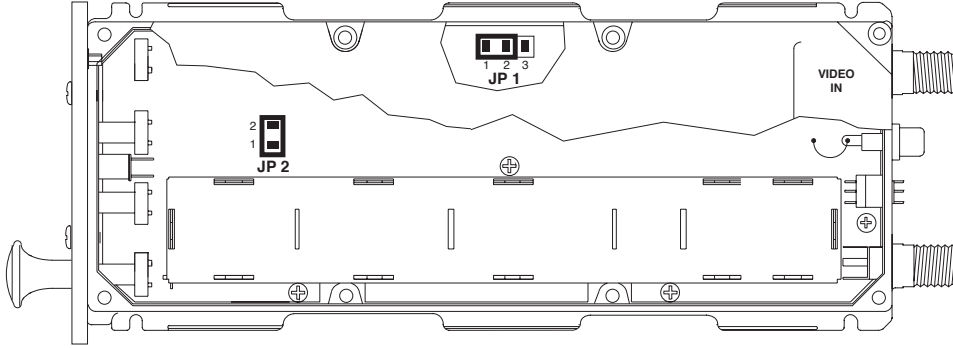
DC Input
 +5 V
 +12 V
 GND

Internal Jumper Settings



MICM-45C comes factory set for audio pre-emphasis enabled.

Internal Jumper Settings - MICM-45B


MICM-45B comes factory set for audio pre-emphasis enabled. There are three (3) MICM-45B PC Board layout revisions available. Choose the applicable one from the diagrams below.

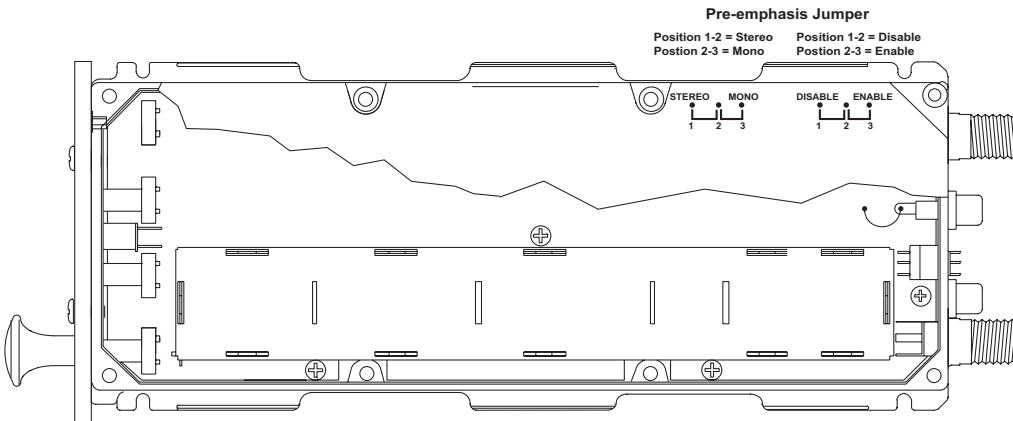
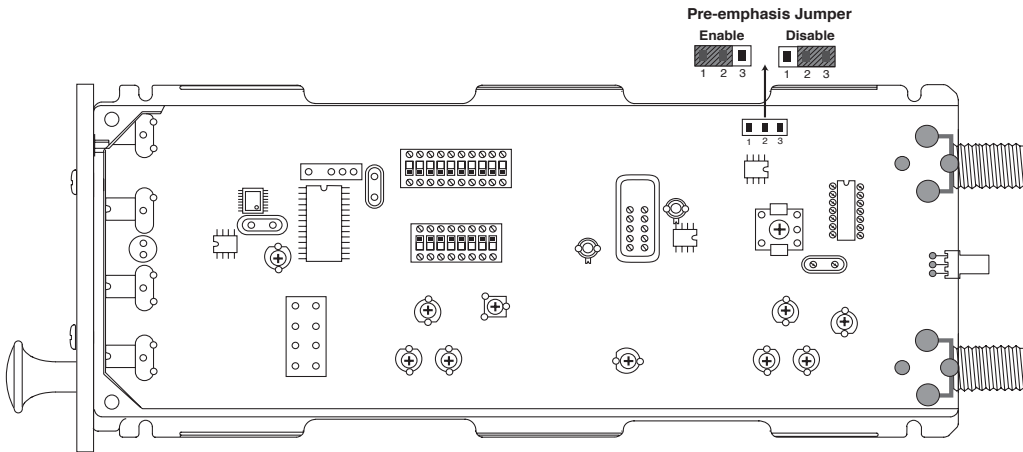


Jumper 1 - Audio Pre-Emphasis Setting

- 1-2 position = Enabled . . . 
- 2-3 position = Disabled . . . 

Jumper 2 - Not Used

Jumper must be set to 1-2 position. . . 



AMM-806 — Agile Micro Modulator

Description

The AMM-806 is an economical CATV agile audio/video modulator. It joins Blonder Tongue's family of modular headend components and works in conjunction with the MIRC-12V rack chassis and MIPS-12C power supply. It covers channel frequencies between 54-806 MHz. Channel selection is done by easy to use front panel DIP switches. FCC frequency offsets per Docket 21006 are automatic via the units internal pre-programmed micro processor.

The AMM-806 accepts standard audio/video sources such as satellite receivers, television camera, video tape recorders or demodulators. The advanced design ensures access for all level and over-modulation controls via the front panel. The audio pre-emphasis can be disabled internally for use with a BTSC Stereo Encoder.

RF

CATV Frequency Range:
 AMM-806 (CH 2-125)
 Output Level - Min: 35-45 dBmV, Continuously Variable
 Aural/Visual Carrier Ratio: -12 to -18 dB
 Visual Carrier Frequency Tolerance
 Standard Channels: ±10 kHz
 FCC Aeronautical Channels (AMML Only): ±5 kHz
 4.5 MHz Aural Inter Carrier Frequency: ±150 Hz (max)
 Spurious Outputs: -60 dBc
 C/N Ratio In Channel: 60 dB
 Broadband Noise: -75 dBc
 Output Impedance: 75 ohm
 Output Return Loss: 10 dB

Video

Input Level: 1.0 V p-p
 Frequency Response: fv-0.5 MHz to fv+4.2 MHz: ±1.0 dB
 Input Impedance: 75 ohm
 Input Return Loss: 18 dB min
 Differential Phase: 2.0°
 Differential Gain: 1.0%
 Group Delay Response:
 Meets FCC CATV Predistortion Requirements
 for Color Operation

Audio

Input Level: 0.4 to 4.0 V p-p
 Frequency Range: 30 Hz to 15 kHz, ± 0.5 dB
 (Exceeds 100 kHz with Pre-emphasis Defeated)
 Input Impedance: 10k ohm, Unbalanced
 Distortion: 30 Hz to 15 kHz 0.6%

General

Power Requirements
 Voltage: +12 VDC @ 155mA
 Power: +5 VDC @ 265mA
 Temperature: 0° to 50° C

Mechanical

Dimensions (W x H x D):
 1.15 x 3.5 x 7.5 in., 29 x 89 x 191 mm
 Weight: 0.8 lbs, 0.36 kg

Connectors (Rear Panel)

Video Input: "F" Type, Female
 Audio Input: RCA Phono
 RF Output: "F" Type Female
 Power: 3 Pin Header

Controls (Front Panel)

Channel Selection: Dip Switches
 Video Level: Control
 A/V Ratio: Control
 Audio Level: Control
 RF Output Level: Control

Indicator (Front Panel)

Power ON: LED

Setting up the AMM-806 Output Channel

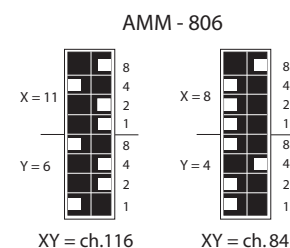
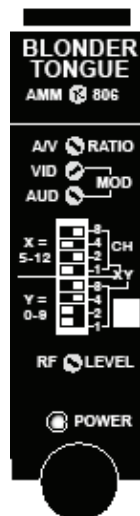
Channel setting is accomplished by setting the channel switch to the desired output channel.

The switch is divided into 2 sections, the Tens section (denoted as "X") and the Ones section (denoted as "Y").

In each section, there are 4 switches labeled - 8,4,2,1. This corresponds to the switch value.

Setting the switch to the right invokes the corresponding value of the switch.

The user sets the Tens section and the Ones section to reflect the desired channel. (i.e., For CH 116, you set 11 Tens and 6 ones for 116. For single digit channels, the Tens switch is set to zero.)



Examples of switch settings for various channels

MSBC - Sub-Band Block Converter

Description

The MSBC is a modular sub band block up-converter designed for use in Blonder Tongue’s HE Series rack chassis’. The unit provides sub-band capability to MIDM-806C demodulators by block converting sub-band channels T7 to T13 to receivable VHF channels 7 to13. The MIDM-806C A/V outputs can then be connected to a modulator such as a MICM-45C, AMCM 860 or AMM Series for a complete modular headend processing solution.

Specifications (Typical)

RF

Input Frequency Range: 5.75-47.75 MHz
(Channels T7-T13)
Output Frequency Range: 174-216 MHz
(Channels 7-13)
Recommended Input Level Range: 0 to +20 dBmV
Conversion Gain: 3 dB
Flatness: 1.5 dB P/V
LO Frequency accuracy @ 25 deg. C: +/- 500 Hz
Intermod Distortion: -60 dBc
(In band Ch. 7-13 @ 0 to + 20 dBmV input)
Input/Output Impedance: 75 Ohm
Return Loss: Input: 15 dB/ Output: 17 dB

Mechanical

Dimensions: 1.15 x 3.5 x 7.5 in.
Weight: 13.5 oz.
Temperature Range: 0 to 50 degrees C

Connectors (Rear)

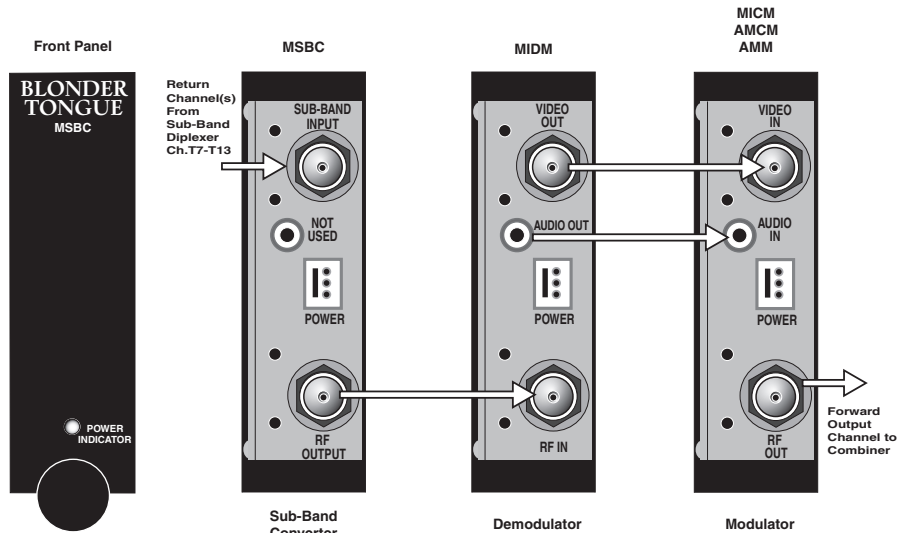
Sub-Band Input: “F” Type Female
RF Output: “F” Type Female
Power: 3 Pin Header

Indicators (Front)

Power Green LED

Electrical

+12 VDC, 100 mA
1.2 Watts



INPUT		LO FREQ.	OUTPUT	
Channel	Frequency		Channel	Frequency
T7	7 MHz	168.25 MHz	7	175.25 MHz
T8	13 MHz	168.25 MHz	8	181.25 MHz
T9	19 MHz	168.25 MHz	9	187.25 MHz
T10	25 MHz	168.25 MHz	10	193.25 MHz
T11	31 MHz	168.25 MHz	11	199.25 MHz
T12	36 MHz	168.25 MHz	12	205.25 MHz
T13	43 MHz	168.25 MHz	13	211.25 MHz

MIDM-806C Demodulators

Description

The MIDM-806C is a professional quality single channel, agile audio/video demodulator. It provides an A/V output from any VHF, UHF or CATV channel (54-806 MHz) and is designed for use in the Blonder Tongue Modular Headend System. The MIDM-806C demodulator and an MICM/AMCM modulator can be paired to perform off-air channel processing or to cherry pick cable channels.

☛ Note: A MIPS-12C, (Stock #7722C) Power Supply is required for full chassis deployment.

The MIDM-806C can demodulate any single Broadcast or CATV, VHF & UHF channel in the 54 to 806 MHz frequency range. It is ideal for off-air signal processing (audio/video processing and remodulation) and CATV cherry picking applications.

The MIDM-806C series features rock solid, phase lock loop (PLL) synthesized frequency control. Agile frequency selection is accomplished via front panel channel up/down buttons with a LED channel readout for easy on-the-fly channel changes. A channel lockout mode is also provided to prevent accidental channel changes. Non-volatile memory maintains the programmed channel selection in case of power loss. All MIDM series units are compatible with any modulators requiring a baseband input, and can be used in any combination with the MIPS-12C power supply in a MIRC-12V chassis.

Specifications MIDM-806C (Typical)

RF

Frequency: Range:
54-806 MHz, VHF, UHF, CATV (Std., IRC, HRC)

Input Level Range: -5 to +30 dBm VHF/UHF,
+2 to +12 dBmV (CATV)

Noise Figure: 8 dB

Image Rejection: VHF 60 dB

Input Impedance: 75 ohm

Video

Output Level: 1.0 V p-p

Output Impedance: 75 ohm

Audio

Output Level: 1 Vp-p

Output Impedance: 600 ohm, unbalanced

General

Power Requirements - External:
+12 VDC @ 140 mA, 5 VDC @ 150 mA

Temperature Range: 0° to +50° C

Mechanical

Dimensions (W x H x D): 1.0 x 3.5 x 7.5 inches
Weight: 1.2 lbs (0.56 kg)

Connectors/Impedance

Audio Output: RCA Phono, female

Video Output: 75 ohm "F" type, female

RF Input: 75 ohm "F" type, female

Power: Locking Header, 3 pin

Controls

Channel Selection: Push buttons

ANT/CATV: Push button

Power On/OFF: Push button

Channel Lock: Push button

Audio Level: Pot

Video Level: Pot

Indicators

Channel: 2 digit, 7 segment LED

Operating Controls & Indicators - MIDM-806C

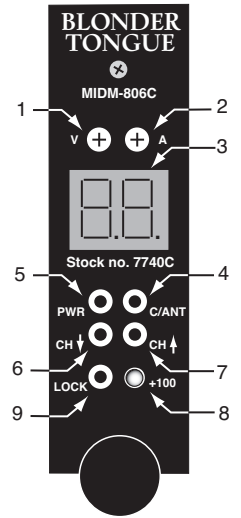
Front Panel

All operating controls are located on, or are accessible from the front panel.

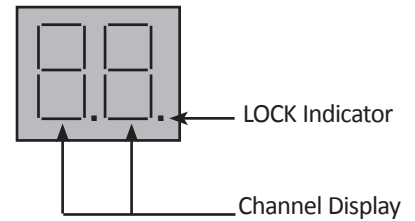
1. **Video** - Adjusts video output level
2. **Audio** - Adjusts audio output level
3. **Channel LED** - Displays ANT or CATV channel number
4. **C/ANT Mode Button** - Push button to enter the mode selection menu. Use the channel Up/Down keys to select the type of channel system required as follows:

Display	Channel System
S	STD CATV
H	HRC
I	IRC
U	Broadcast U/V

5. **Power** - On / Off push button
6. **Channel Down** - Increments channel by -1
7. **Channel Up** - Increments channel by +1
8. **+100 LED** - When depressed, red LED lights to indicate channels 100 and higher
9. **Lock** - Depressing Lock button locks present channel or mode in memory preventing inadvertent change. A user must depress the lock button again for any channel mode/changes



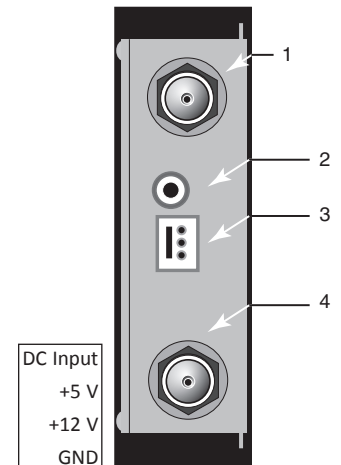
3. LED Display - Lights when in standby



Rear Panel

All the connectors are located on the rear panel.

1. **Video Output** - Standard negative sync video at a 0.5 to 1.5 Vp-p level.
2. **Audio Output** - Adjustable 0.5 to 1.5 Vp-p
3. **Power** - The polarized power connector accepts +12 VDC +5 VDC and ground
4. **ANT/CATV** - RF input from antenna or CATV drop



DHDP - Digital High Definition Processor Series

DHDC-DV (Downconverter) • Stock No. 6264A

DHDC-UV (Upconverter) • Stock No. 6265A

DHDC-DH (Downconverter-Horizontal) • Stock No. 6261A

DHDC-UH (Upconverter-Horizontal) • Stock No. 6262A

DHDP-V - Vertical Combo Pack • Stock No. 6266B; (Combo: 6262A + 6265A)

DHDP-H - Horizontal Combo Pack • Stock No. 6263A; (Combo: 6261A + 6262A)

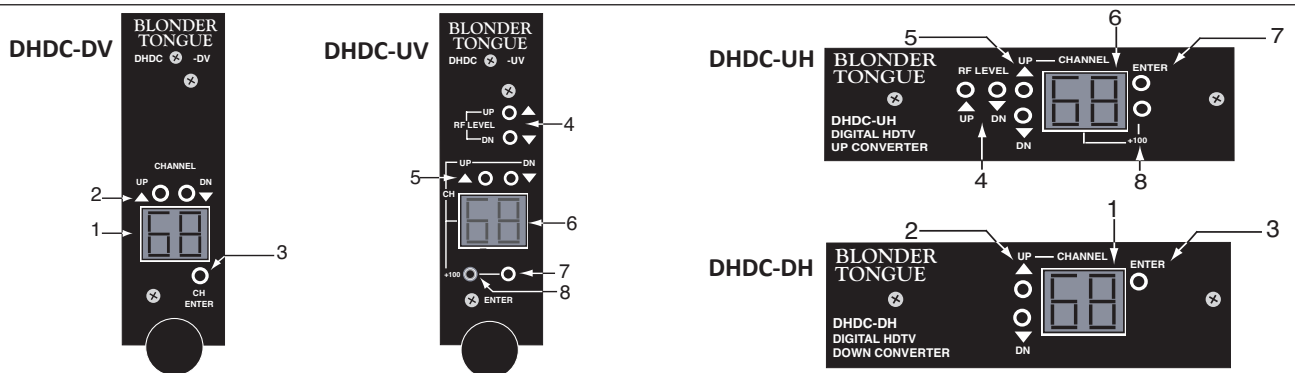
Description: The DHDP Series consists of 2 parts, the DHDC-D (Downconverter) and the DHDC-U (Upconverter). The units are intended to operate as a system in order to process digital & high definition television (HDTV) signals.

Operating Controls and Indicators

Front Panel

1. 2-Digit LED Display — 2 digit LED Channel display
2. Up/Down Channel Buttons — Up & down push button controls for setting the channel.
3. Enter Button - Button used to enter the displayed channel into memory.
4. Up/Down RF Level Buttons — Up & down push button controls for RF level.
5. Up/Down Channel Buttons — Up & down push button controls for channel and mode adjustment.
6. 2-Digit LED Display — 2 digit LED display for Channel, mode and RF level information.
7. Enter Button — Button used to “enter” channel, mode or RF level selection into memory.
8. +100 Channel LED Indicator — LED illuminates to indicate CATV channels 100 to 135.

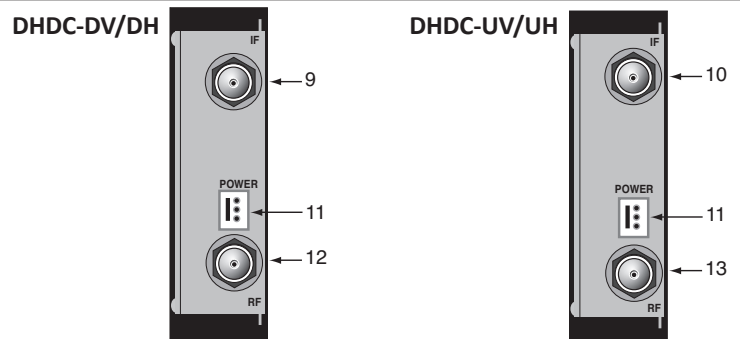
Front Panel Views



Rear Panel

9. IF Output - “F” Connector
10. IF Input - “F” Connector
11. Power Connector
12. RF Input - “F” Connector
13. RF Output - “F” Connector

Rear Panel Views



Specifications

DHDC-D Down Converter

Input Tuning Range (Off-Air 8VSB) (54-216, 470-864 MHz)

VHF: CH 2-13, UHF: CH 14-69, CH 70-78 Extended UHF

Operating Input Level Range: -20 to +25 dBmV

Installation Input Range: -15 to +20 dBmV

(any undesired channel < +25 dBmV)

Max undesired to desired channel ratio: < +25 dBc

Max adjacent to desired channel ratio: < +15 dBc

IF Output Level Digital: +30 dBmV*

Rejection of Adjacent Analog Channels: -70 dB Typical

Power Requirements:

110 mA @ +12 VDC, 370 mA @ +5 VDC

DHDC-U Up Converter

IF Input Level: +30 dBmV

Output Frequency Range:

Standard CATV, IRC, HRC & Broadcast 54-864 MHz

RF Output Level Digital: +45 dBmV*

Display Error: ±2 dB

Output Level Adjustment Range: +35 to +45 dBmV

Spurious Output (54-864 MHz): -60 dBc

Phase Noise @ 10 kHz Offset: -95 dBc/Hz

Broadband Noise, Out of Channel: -70 dBc (5.5 MHz BW)

Power Requirement:

310 mA @ +12 VDC, 320 mA @ +5 VDC

* Average Measurement

Setting Up the Units

1. Place each of the units into the appropriate Blonder Tongue Micromodular chassis by sliding the unit into the retaining rails.
 - a. It is recommended to physically place one Downconverter and one Upconverter next to one another in the chassis.
2. Connect the digital or HDTV signal (8VSB format) to the RF 'F' connector on the DHDC-D unit.
3. Connect the IF 'F' connector of the DHDC-D to the IF 'F' connector of the DHDC-U.
4. Connect the RF 'F' connector of the DHDC-U to the appropriate combining device.
5. Connect each unit to the power supply using one of the power supply cables.

Programming the Unit

The DHDC-D unit is intended to accept any digital UHF or VHF signal and convert it to IF. The DHDC-U unit is intended to accept any digital IF signal and process it to any channel from 54-864 MHz. The unit has 4 valid operating modes, STD CATV, IRC, HRC & Broadcast UHF/VHF. It comes factory set to operate in Standard CATV Mode. If you wish to change the operating mode skip to the Operating Mode Selection section.

Programming the DHDC-D

1. Navigate to the desired channel number by depressing the CH ▲ UP and ▼ DN buttons.
 - a. Press and hold the CH ▲ UP or ▼ DN arrow button for fast scrolling.
2. Press the ENTER button when you reach the desired channel setting. This will tune the downconverter input to the corresponding frequency for this entry.
 - a. The LED display will blink continuously during the channel programming process and will not change the channel until the ENTER button is depressed.
 - b. The unit has a special feature that alerts an operator of an inadvertent or desired change to the unit by flashing LED readout. The LED will continue to flash for 30 seconds if the ENTER button is not depressed and if no additional entries are made then the readout will return to the display of the previously programmed channel entry setting.

Programming the DHDC-U

The DHDC-U unit comes factory set to operate in the Standard CATV mode. The unit has 4 valid operating modes: STD, CATV, IRC, HRC & Broadcast UHF/VHF (see the operating mode selection section for programming information).

Programming a Channel

1. Navigate to the desired channel number by depressing the CH ▲ UP and ▼ DN buttons.
 - a. Continue past 99 for channels 100-135, the +100 LED will illuminate.
 - b. Press and hold the CH ▲ UP or ▼ DN arrow button for fast scrolling.
2. Press the ENTER button when you reach the desired channel setting. This will tune the upconverter output to the corresponding frequency for this entry.
 - a. The LED display will blink continuously during the channel programming process and will not change the output channel until the ENTER button is depressed.
 - b. The unit has a special feature that alerts an operator of an inadvertent or desired change to the unit by flashing LED readout. The LED will continue to flash for 30 seconds if the ENTER button is not depressed and if no additional entries are made then the readout will return to the display of the previously programmed channel entry setting.

Programming the DHDC-U (Continued)

Programming RF Level

1. Depress the RF Level ▲ UP or ▼ DN buttons to increment or decrement the RF output level to the desired setting.
 - a. The unit has a specified adjustment range of +35 dBmV to +45 dBmV output. The unit software however, will permit entries from +33 to +47 dBmV, the out of range entries of 33-34 & 46-47 dBmV are meant for usage to correct any display error, allowing the unit to be operated in the specified range.

ATTENTION!

It is also recommended to set the output level to +45 dBmV for optimum noise performance and externally attenuate down to a desired level.

2. Press **ENTER** when you reach the desired RF Level setting. This will tune the upconverter output to the corresponding level entry.
 - a. The LED display readout will also flash continuously during the RF Level programming process. The LED display will continue to flash for 30 seconds if **ENTER** is not depressed and then will return to the display of the previously programmed channel entry setting.

Operating Mode Selection

The unit has 4 valid operating modes: STD CATV, IRC, HRC & Broadcast UHF/VHF.

The DHDC-U unit comes factory set to operate in the Standard CATV mode.

To change the operating mode

1. Simultaneously depress the RF Level ▲ UP and ▼ DN buttons for approximately 5 seconds.
2. The Channel LED display will switch to the operating mode selection.
3. Use the RF Level ▲ UP and ▼ DN buttons to select the desired mode:
 - a. C = STD CATV
 - b. H = HRC
 - c. I = IRC
 - d. U = Broadcast (VHF/UHF)
4. After selecting the desired mode depress **ENTER** to set the mode.
5. The unit will return to the channel display mode.
 - a. Programming will reflect the mode chosen – See Appendix for detailed frequency plans.
 - b. The operating mode will also flash continuously during the mode selection process. The LED display will continue to flash for 30 seconds if **ENTER** is not depressed and then will return to the display of the previously programmed channel & mode entry setting. **NOTE: THE MODE PRESENTLY IN MEMORY WILL BE DISPLAYED WITHOUT FLASHING DURING THE MODE SELECTION PROCESS.**

Trouble Shooting

A continuously flashing Channel Display indicates an Error Condition detected by the unit microcontroller.

Sample conditions include:

- Channel Selector Entry does not match the channel number on which the unit is operating, the display will flash for 30 seconds and then revert back to the previous CH entry
- E1 is displayed if the Input VCO is Not Locked
- E2 is displayed if the Output VCO is Not Locked

Correction Suggestion

The User should perform the following steps to correct an Error Condition:

1. Check that the Channel Display is set to the desired channel & reset as appropriate.
2. Check that the unit is set to the appropriate desired operating mode.
3. Verify the unit output on a spectrum analyzer.
4. Disconnect and reconnect power to the unit.

If an error condition continues to be displayed, unit should be replaced and serviced.

Appendix A

Frequency Allocation Tables

EIA Chan.	Standard Video	Incremental Video (IRC)	Harmonic Video (HRC)
02	55.2500	55.2625	54
03	61.2500	61.2625	60
04	67.2500	67.2625	66
01	NA	73.2625	72
05	77.2500	79.2625	78
06	83.2500	85.2625	84
95	91.2500	91.2625	90
96	97.2500	97.2625	96
97	103.2500	103.2625	102
98	109.2750	109.2750	Cannot lock to comb
99	115.2750	115.2750	ref: refer to FCC regs
14	121.2625	121.2625	120
15	127.2625	127.2625	126
16	133.2625	133.2625	132
17	139.2500	139.2625	138
18	145.2500	145.2625	144
19	151.2500	151.2625	150
20	157.2500	157.2625	156
21	163.2500	163.2625	162
22	169.2500	169.2625	168
07	175.2500	175.2625	174
08	181.2500	181.2625	180
09	187.2500	187.2625	186
10	193.2500	193.2625	192
11	199.2500	199.2625	198
12	205.2500	205.2625	204
13	211.2500	211.2625	210
23	217.2500	217.2625	216
24	223.2500	223.2625	222
25	229.2625	229.2625	228
26	235.2625	235.2625	234
27	241.2625	241.2625	240
28	247.2625	247.2625	246
29	253.2625	253.2625	252
30	259.2625	259.2625	258
31	265.2625	265.2625	264
32	271.2625	271.2625	270
33	277.2625	277.2625	276
34	283.2625	283.2625	282
35	289.2625	289.2625	288
36	295.2625	295.2625	294
37	301.2625	301.2625	300
38	307.2625	307.2625	306
39	313.2625	313.2625	312
40	319.2625	319.2625	318
41	325.2625	325.2625	324
42	331.2750	331.2750	330
43	337.2625	337.2625	336
44	343.2625	343.2625	342
45	349.2625	349.2625	348
46	355.2625	355.2625	354
47	361.2625	361.2625	360
48	367.2625	367.2625	366
49	373.2625	373.2625	372
50	379.2625	379.2625	378
51	385.2625	385.2625	384
52	391.2625	391.2625	390
53	397.2625	397.2625	396
54	403.2500	403.2625	402
55	409.2500	409.2625	408
56	415.2500	415.2625	414
57	421.2500	421.2625	420
58	427.2500	427.2625	426
59	433.2500	433.2625	432
60	439.2500	439.2625	438
61	445.2500	445.2625	444
62	451.2500	451.2625	450

EIA Chan.	Standard Video	Incremental Video (IRC)	Harmonic Video (HRC)
63	457.2500	457.2625	456
64	463.2500	463.2625	462
65	469.2500	469.2625	468
66	475.2500	475.2625	474
67	481.2500	481.2625	480
68	487.2500	487.2625	486
69	493.2500	493.2625	492
70	499.2500	499.2625	498
71	505.2500	505.2625	504
72	511.2500	511.2625	510
73	517.2500	517.2625	516
74	523.2500	523.2625	522
75	529.2500	529.2625	528
76	535.2500	535.2625	534
77	541.2500	541.2625	540
78	547.2500	547.2625	546
79	553.2500	553.2625	552
80	559.2500	559.2625	558
81	565.2500	565.2625	564
82	571.2500	571.2625	570
83	577.2500	577.2625	576
84	583.2500	583.2625	582
85	589.2500	589.2625	588
86	595.2500	595.2625	594
87	601.2500	601.2625	600
88	607.2500	607.2625	606
89	613.2500	613.2625	612
90	619.2500	619.2625	618
91	625.2500	625.2625	624
92	631.2500	631.2625	630
93	637.2500	637.2625	636
94	643.2500	643.2625	642
100	649.2500	649.2625	648
101	655.2500	655.2625	654
102	661.2500	661.2625	660
103	667.2500	667.2625	666
104	673.2500	673.2625	672
105	679.2500	679.2625	678
106	685.2500	685.2625	684
107	691.2500	691.2625	690
108	697.2500	697.2625	696
109	703.2500	703.2625	702
110	709.2500	709.2625	708
111	715.2500	715.2625	714
112	721.2500	721.2625	720
113	727.2500	727.2625	726
114	733.2500	733.2625	732
115	739.2500	739.2625	738
116	745.2500	745.2625	744
117	751.2500	751.2625	750
118	757.2500	757.2625	756
119	763.2500	763.2625	762
120	769.2500	769.2625	768
121	775.2500	775.2625	774
122	781.2500	781.2625	780
123	787.2500	787.2625	786
124	793.2500	793.2625	792
125	799.2500	799.2625	798
126	805.2500	805.2625	804
127	811.2500	811.2625	810
128	817.2500	817.2625	816
129	823.2500	823.2625	822
130	829.2500	829.2625	828
131	835.2500	835.2625	834
132	841.2500	841.2625	840
133	847.2500	847.2625	846
134	853.2500	853.2625	852
135	859.2500	859.2625	858

VHF Broadcast Channels Channel	Video (MHz)
2	55.25
3	61.25
4	67.25
5	77.25
6	83.25
7	175.25
8	181.25
9	187.25
10	193.25
11	199.25
12	205.25
13	211.25
UHF Broadcast Channels Channel	Video (MHz)
14	471.25
15	477.25
16	483.25
17	489.25
18	495.25
19	501.25
20	507.25
21	513.25
22	519.25
23	525.25
24	531.25
25	537.25
26	543.25
27	549.25
28	555.25
29	561.25
30	567.25
31	573.25
32	579.25
33	585.25
34	591.25
35	597.25
36	603.25
37	609.25
38	615.25
39	621.25
40	627.25
41	633.25
42	639.25
43	645.25
44	651.25
45	657.25
46	663.25
47	669.25
48	675.25
49	681.25
50	687.25
51	693.25
52	699.25
53	705.25
54	711.25
55	717.25
56	723.25
57	729.25
58	735.25
59	741.25
60	747.25
61	753.25
62	759.25
63	765.25
64	771.25
65	777.25
66	783.25
67	789.25
68	795.25
69	801.25

NOTE: Refer to unit specifications for their respective operating ranges.

Appendix B

DHDC-D Input & DHDC-U Output Center Frequencies

VHF Broadcast Channels Channel	(MHz)
2	57
3	63
4	69
5	79
6	85
7	177
8	183
9	189
10	195
11	201
12	207
13	213
UHF Broadcast Channels Channel	(MHz)
14	473
15	479
16	485
17	491
18	497
19	503
20	509
21	515
22	521
23	527
24	533
25	539
26	545
27	551
28	557
29	563
30	569
31	575
32	581
33	587
34	593
35	599
36	605
37	611
38	617
39	623
40	629
41	635
42	641
43	647
44	653
45	659
46	665
47	671
48	677
49	683
50	689
51	695
52	701
53	707
54	713
55	719
56	725
57	731
58	737
59	743
60	749
61	755
62	761
63	767
64	773
65	779
66	785
67	791
68	797
69	803

Appendix C

DHDC-U Center Frequencies

EIA Chan.	Standard CATV	Incremental (IRC)	Harmonic (HRC)	EIA Chan.	Standard CATV	Incremental (IRC)	Harmonic (HRC)
2	57	57	55.75	63	459	459	457.75
3	63	63	61.75	64	465	465	463.75
4	69	69	67.75	65	471	471	469.75
1	75	75	73.75	66	477	477	475.75
5	79	81	79.75	67	483	483	481.75
6	85	87	85.75	68	489	489	487.75
95	93	93	91.75	69	495	495	493.75
96	99	99	97.75	70	501	501	499.75
97	105	105	103.75	71	507	507	505.75
98	111	111	109.75	72	513	513	511.75
99	117	117	115.75	73	519	519	517.75
14	123	123	121.75	74	525	525	523.75
15	129	129	127.75	75	531	531	529.75
16	135	135	133.75	76	537	537	535.75
17	141	141	139.75	77	543	543	541.75
18	147	147	145.75	78	549	549	547.75
19	153	153	151.75	79	555	555	553.75
20	159	159	157.75	80	561	561	559.75
21	165	165	163.75	81	567	567	565.75
22	171	171	169.75	82	573	573	571.75
7	177	177	175.75	83	579	579	577.75
8	183	183	181.75	84	585	585	583.75
9	189	189	187.75	85	591	591	589.75
10	195	195	193.75	86	597	597	595.75
11	201	201	199.75	87	603	603	601.75
12	207	207	205.75	88	609	609	607.75
13	213	213	211.75	89	615	615	613.75
23	219	219	217.75	90	621	621	619.75
24	225	225	223.75	91	627	627	625.75
25	231	231	229.75	92	633	633	631.75
26	237	237	235.75	93	639	639	637.75
27	243	243	241.75	94	645	645	643.75
28	249	249	247.75	100	651	651	649.75
29	255	255	253.75	101	657	657	655.75
30	261	261	259.75	102	663	663	661.75
31	267	267	265.75	103	669	669	667.75
32	273	273	271.75	104	675	675	673.75
33	279	279	277.75	105	681	681	679.75
34	285	285	283.75	106	687	687	685.75
35	291	291	289.75	107	693	693	691.75
36	297	297	295.75	108	699	699	697.75
37	303	303	301.75	109	705	705	703.75
38	309	309	307.75	110	711	711	709.75
39	315	315	313.75	111	717	717	715.75
40	321	321	319.75	112	723	723	721.75
41	327	327	325.75	113	729	729	727.75
42	333	333	331.75	114	735	735	733.75
43	339	339	337.75	115	741	741	739.75
44	345	345	343.75	116	747	747	745.75
45	351	351	349.75	117	753	753	751.75
46	357	357	355.75	118	759	759	757.75
47	363	363	361.75	119	765	765	763.75
48	369	369	367.75	120	771	771	769.75
49	375	375	373.75	121	777	777	775.75
50	381	381	379.75	122	783	783	781.75
51	387	387	385.75	123	789	789	787.75
52	393	393	391.75	124	795	795	793.75
53	399	399	397.75	125	801	801	799.75
54	405	405	403.75	126	807	807	805.75
55	411	411	409.75	127	813	813	811.75
56	417	417	415.75	128	819	819	817.75
57	423	423	421.75	129	825	825	823.75
58	429	429	427.75	130	831	831	829.75
59	435	435	433.75	131	837	837	835.75
60	441	441	439.75	132	843	843	841.75
61	447	447	445.75	133	849	849	847.75
62	453	453	451.75	134	855	855	853.75
				135	861	861	859.75

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