

## GENERAL INFORMATION

NextLevel Systems Inc., formerly General Instrument, was founded in 1948 as Jerrold Electronics. As the Broadband industry has evolved over the past 50 years, so have we. Whether you know us as Jerrold, GI or now as NextLevel, all are synonymous with achievement and excellence in communications. We are recognized as the pioneers of the industry and will continue this commitment as the move to the NextLevel.

## MILESTONES

- 1948 — Milton Jerrold Shapp forms Jerrold Electronics. His first product is a small booster, which enhances television pictures.
- 1956 — Jerrold's "Golden Cascade" distribution amplifiers increase channel capacity from three to five, causing a noticeable shift in the industry.
  - Jerrold becomes involved with the first pay TV experiment in Bartlesville, OK.
- 1967 — Jerrold introduces the first electro-mechanical cable converter to deliver 20 channels of programming to a standard television.
  - Jerrold is acquired by General Instrument (GI), becoming a wholly-owned subsidiary
- 1979 — GI introduces multi-level scrambling/descrambling.
- 1986 — GI enters the pay-per-view industry with a programming service called Cable Video Store.
- 1991 — GI introduces and demonstrates its digital technology for the cable industry.
- 1995 — The first advanced analog CFI 2200 set-top is deployed, introducing interactivity to the cable industry.
- 1996 — The first digital cable system is rolled out in a TCI system in Hartford CT.
  - NETadvantage™ a complete package of professional services, network management and software systems are launched.
- 1997 — General Instrument is restructured creating NextLevel Systems, Inc. a division focusing on broadband, satellite, data and telephone services.

## NEXTLEVEL PRODUCTS

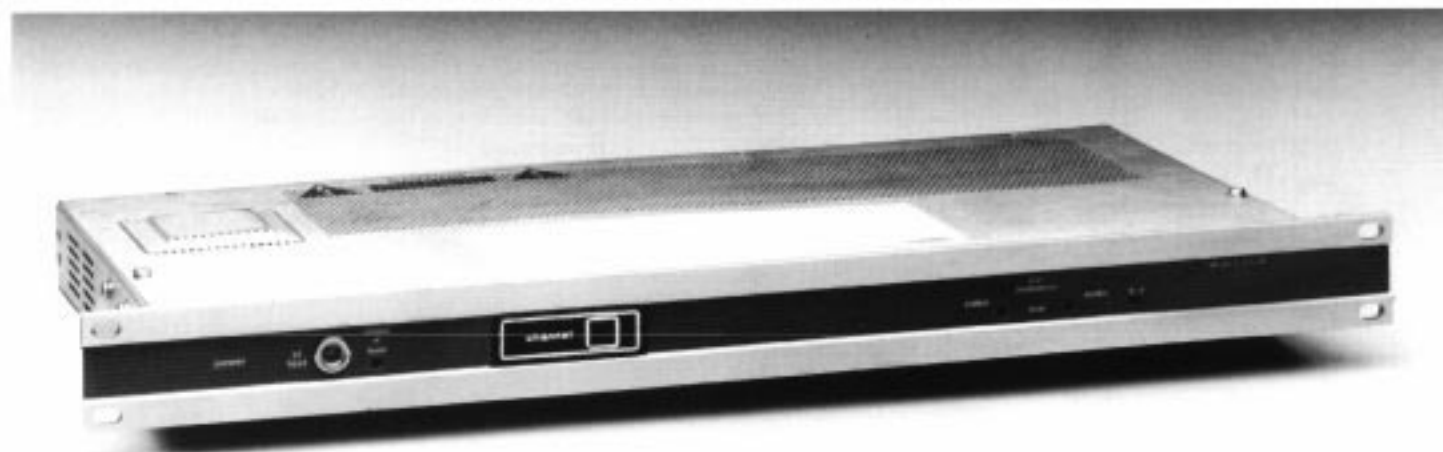
Your key contact for NextLevel products is the Account Manager or Account Executive designated to serve you. He or she is backed by the industry's most extensive support team, including field engineering, application engineering, customer service, and marketing services.

This catalog is organized into several sections, each reflecting a logical grouping or a major line of NextLevel's products. Any item in this catalog can be fully explained or easily ordered from your nearest Account Executive. Your Account Executive will also supply you with other literature concerning our products. Printed material is also available by contacting:



Purchasing  
Services Group, Inc.  
6995 NW 46th. Street  
Miami, Florida 33 166  
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NEXTLEVEL™

**Frequency Agile to 450 MHz . . . Stereo Compatible****FEATURES**

- **FREQUENCY AGILE FROM 50 TO 450 MHz**
- **BTSC STEREO COMPATIBLE**
- **FRONT PANEL CONTROLS**
- **1.75 INCHES HIGH**
- **FCC COMPLIANT**

The S450M-II modulator is a full-featured frequency agile modulator that is designed to economically meet the needs of the cable system operator.

**FRONT PANEL CONTROLS**

All adjustments, with the exception of stereo operation, can be made via convenient front panel controls.

Output frequency can be selected by dipswitches located behind a sliding cover. Also included in the dipswitch selection is the ability to set the required FCC offsets of either +12.5 kHz or +25 kHz.

Video depth-of-modulation and audio deviation adjustments are made by the controls located next to their associated overmodulation indicators. The LED indicator adjacent to the video control is activated when video modulation exceeds 87.5%. The audio LED indicator lights up when the deviation exceeds 25 KHz. The A/V (audio/ video ratio) control adjusts the level of the aural carrier in relation to the video. This is preset at -15 dB at the factory.

Other front panel features include an RF level adjustment control and a 20 dB RF test port. LED indicates power on/off.

**STEREO COMPATIBLE**

The S450M-II can accept either baseband or 4.5 MHz BTSC stereo signals. A simple relocation of internal "suitcase" jumpers allows complete stereo compatibility.

**SCRAMBLING COMPATIBLE**

External IF loops enable the S450M-II to be compatible with NextLevel and other manufacturers' scrambling systems.

**SUB-CHANNEL OUTPUT**

The S450M-II is available with sub-channel output as an option. Specify S450M-T when ordering.

**NEXT LEVEL™**

## Specifications

**RF**

Output Channels

2-69 IRC and FCC offsets per rule 76.612,  
all front panel switchable, sub-channel output (optional)

Output Level

60 dBmV Min., 10 dB adjustable

Spurious Output

&gt; 60 dB down @ 60 dBmV output, 50 to 450 MHz

In-band C/N

64 dB Minimum

Out-of-band C/N

80 dB Minimum

Frequency Stability

 $\pm 5$  kHz (conforms to FCC requirements)

Output Return Loss

&gt; 12 dB

Audio/video ratio

-12 dB to -25 dB adjustable (preset @ -15 dB)

Picture IF Output Level

35 dBmV nominal

Sound IF Output Level

20 dBmV nominal

**VIDEO**

Input Level

0.7 V P-P min. for 87.5% modulation

Input Type

Composite NTSC, sync negative

Input Impedance

75 Ohms

Input Match

&gt; 30 dB

Differential Gain

&lt; 5% (0.4 dB) @ 87.5% modulation, APL 10% to 90%

Differential Phase

&lt; 3° @ 87.5% modulation, APL 10% to 90%

K Factor

4% Maximum

Tilt of 60 Hz Square Wave

1% Maximum

Modulation Range

0 to 100%

Overall Group Delay

75 nsec

Chrominance - Luminance Delay

 $\pm 40$  ms (80 ms P-P)

Signal To Noise

60 dB Minimum

Flatness

 $\pm 1$  dB from 25 Hz to 4.18 MHz**AUDIO**

Baseband Input Impedance

600 Ohms balanced/unbalanced

Baseband Input Level

-10 dBm (250 mV) to +10 dBm (2.5V) for  $\pm 25$  kHz deviation

Preemphasis

75 microseconds  $\pm 1$  dB, 50 Hz to 15 kHz

Defeatable by internal jumper for BTSC stereo operation

Harmonic Distortion

1.5% Max. @  $\pm 25$  KHz deviation, 50 Hz to 15 kHz

Flatness

2.0 dB Max., 50 Hz to 15 KHz, including preemphasis

4.5 MHz BTSC Stereo Input

+35 dBmV to +45 dBmV

Input Level

-5 dBm to +10 dBm (with 25 kHz deviation)

Signal to Noise

-50 dB Minimum (@ 1 kHz)

Inter-carrier Frequency

4.5 MHz  $\pm 500$  Hz**GENERAL**

AC Power Requirements

108 to 132 V, 60 Hz, 15 W

Fuse

0.5A slo-blo, external

Weight

6 lbs (2.72 kgs)

Rack Mounting Dimensions

19"W x 1.75"H (single EIA rack unit) (48.07 cm x 4.42 cm)

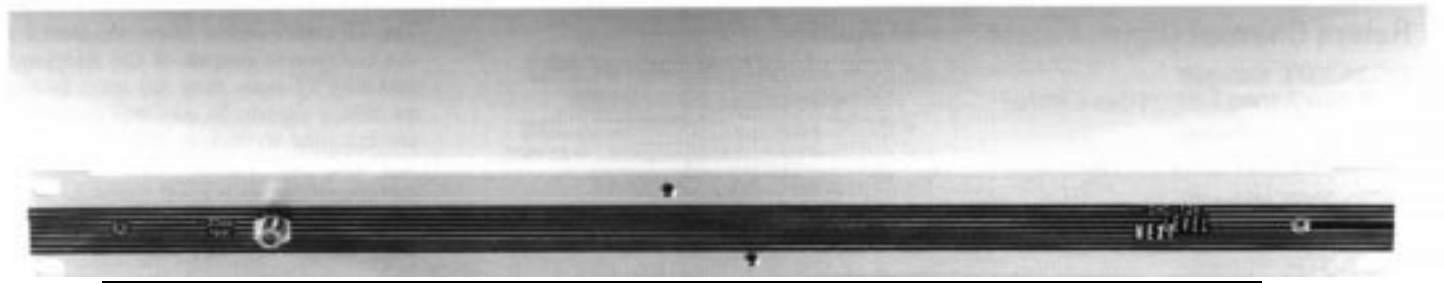
Overall Dimensions

6"D x 19"W x 1.75"H (15.18 cm x 48.07 cm x 4.42 cm)

Operating Temperature Range

32°F to 120°F (0°C to 50°C)

Specifications subject to change without notice.



CHC-12X  
Headend Combiner

The CHC- 12X Headend Combiner consists of twelve directional couplers — is used to combine twelve separate channel signals into a single output, or to split one input into twelve separate outputs. The nominal attenuation from any input to the output is 20 dB.

The rear panel includes twelve input/output connectors (J1 to J12), and RF OUT connector. A -20 dB TEST connector is located on the front panel for easy accessibility. All connectors on the rear panel accept coaxial cables with F-type connectors. The -20 dB TEST point provides a sample of the RF output signal which is 20 dB below the level at the RF

| SPECIFICATIONS     |                                                     |              |          |
|--------------------|-----------------------------------------------------|--------------|----------|
| CHC-12X            |                                                     |              |          |
| RF                 |                                                     |              |          |
| Frequency Range    | 50-86 MHz                                           | 860          | 1000 MHz |
| Input Ports        | 12                                                  | 12           |          |
| output Ports       | 1                                                   | 1            |          |
| Insertion Loss     | 20 dB *2 dB                                         | 20 dB r3 dB  |          |
| Flatness           | +1.5 dB                                             | e1.5 dB      |          |
| Isolation          | 30 dB Min.                                          | 30 dB Min.   |          |
| Impedance          | 7.5 Ohms                                            | 75 Ohms      |          |
| Input Return Loss  | 16 dB Min.                                          | 16 dB Min.   |          |
| Output Return Loss | 16 dB Min.                                          | 16 dB Min.   |          |
| Test Point         | -20 dB +2 dB                                        | -20 dB *3 dB |          |
| MECHANICAL         |                                                     |              |          |
| Dimensions         | 19"W x 1.75"H x 8"D (48.07 cm x 4.42 cm x 20.24 cm) |              |          |
| Weight             | 8 lbs (3.62 kgs)                                    |              |          |

Specifications subject to change without notice.



dbx<sup>TM</sup> Noise Reduction ... BTSC Stereo ... Second Audio Program Option

## FEATURES

- BASEBAND AUDIO INPUTS ENCODED INTO BTSC STEREO FORMAT
- 4.5 MHz AND 41.25 MHz OUTPUT STANDARD FOR MAXIMUM FLEXIBILITY
- AUTOMATIC NON-CLIPPING OVER-MODULATION PROTECTION
- SECOND AUDIO PROGRAM (SAP) OPTION FOR BILINGUAL TRANSMISSION
- COMPACT DESIGN FOR EASE OF INSTALLATION

The NextLevel Commander Multichannel Television Sound (CMTS) Encoder enables cable operators to upgrade to true stereo TV sound. The CMTS is an economical means of upgrading system capabilities and subscriber service packages, thereby increasing overall system revenues. It allows a system operator to easily encode both stereo and secondary audio programming (SAP) for transmission and includes dbx noise reduction circuitry to ensure a quality signal.

## 4.5 MHz AND 41.25 MHz OUTPUT STANDARD

The CMTS encoder generates a linear, non-filtered composite spectrum for optimum stereo separation without requiring phase adjustment. This encoder/modulator transforms baseband stereo and SAP input (optional plug-in module) into BTSC multichannel sound which is then modulated to both a 4.5 MHz subcarrier output and a 41.25 MHz IF output.

The integral precision 4.5 MHz crystal phase locked voltage-to-frequency converter included in the CMTS encoder provides unmatched linearity and minimum phase noise while the 41.25 MHz crystal upconverter is provided for interfacing with non-stereo compatible modulators.

## DESIGNED TO FIT IN TIGHT SPACES

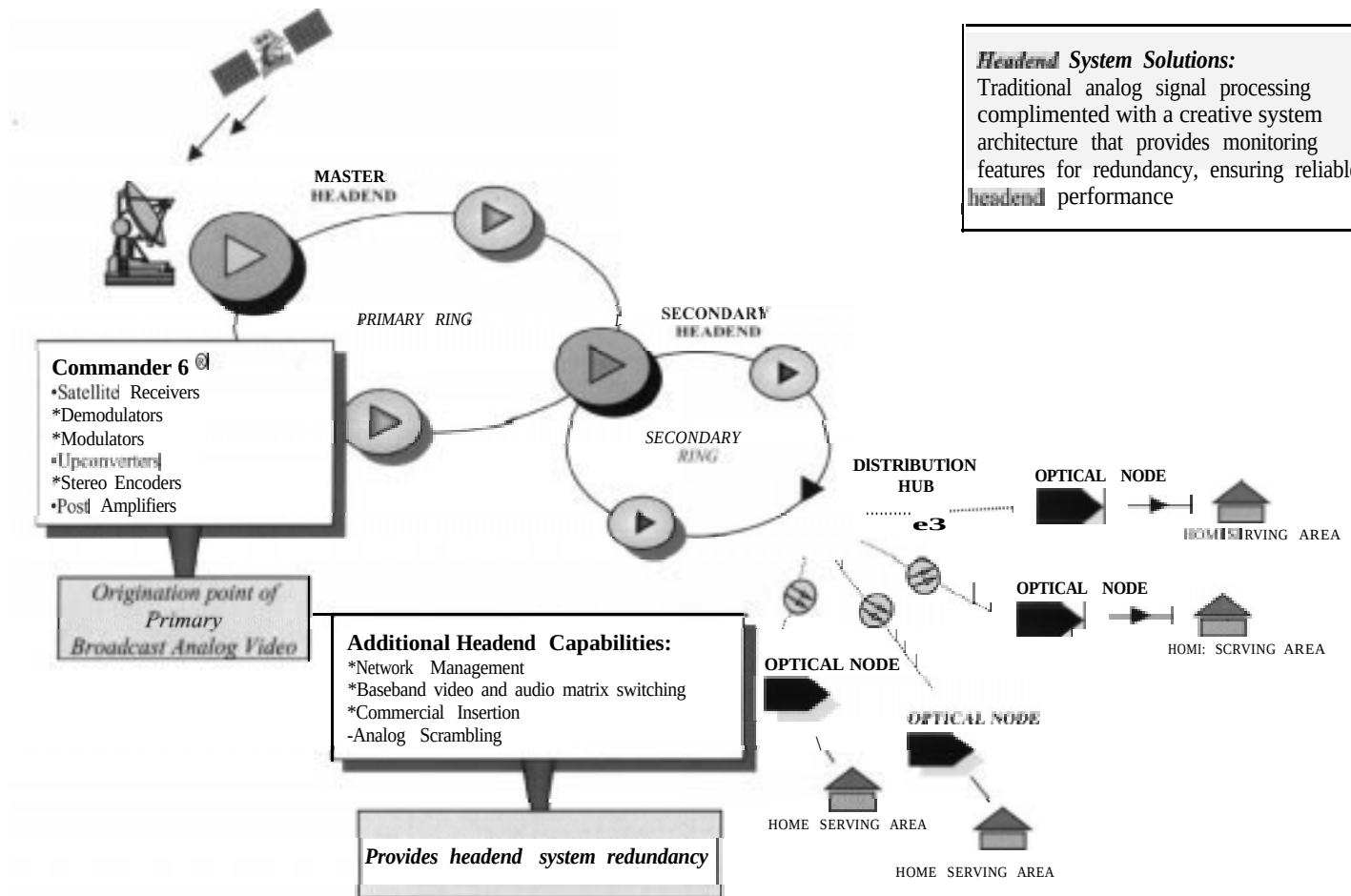
The CMTS is a rack-mounted unit with a 1.75 inch high chassis, enabling the operator to easily locate the unit even in most space-restricted configurations. It provides front panel access to all audio input level controls and includes bar graph indicators on the front panel for

left, right and SAP channels. The bar graph indicators provide a true peak deviation metering of incoming audio signals, helping ensure that subscribers are receiving a high quality audio signal. In addition, the CMTS encoder includes automatic non-clipping over-modulation protection on all channels; a video lock indicator; and offers remote-controllable A/B input for automatic commercial insertion.

The CMTS encoder provides a cost-effective solution to stereo transmission in cable systems.

NEXT LEVEL<sup>™</sup>

**Headend System Solutions:**  
Traditional analog signal processing complimented with a creative system architecture that provides monitoring features for redundancy, ensuring reliable headend performance



As analog headend architectures become more complex, NextLevel Broadband Networks Group is leading the way in providing true system solutions. Complimenting our traditional portfolio of high performance Commander 6 signal processing solutions is the ability to look at the headend as a system rather than just individual components. This approach offers not only flexibility but also crucial redundancy features as well.

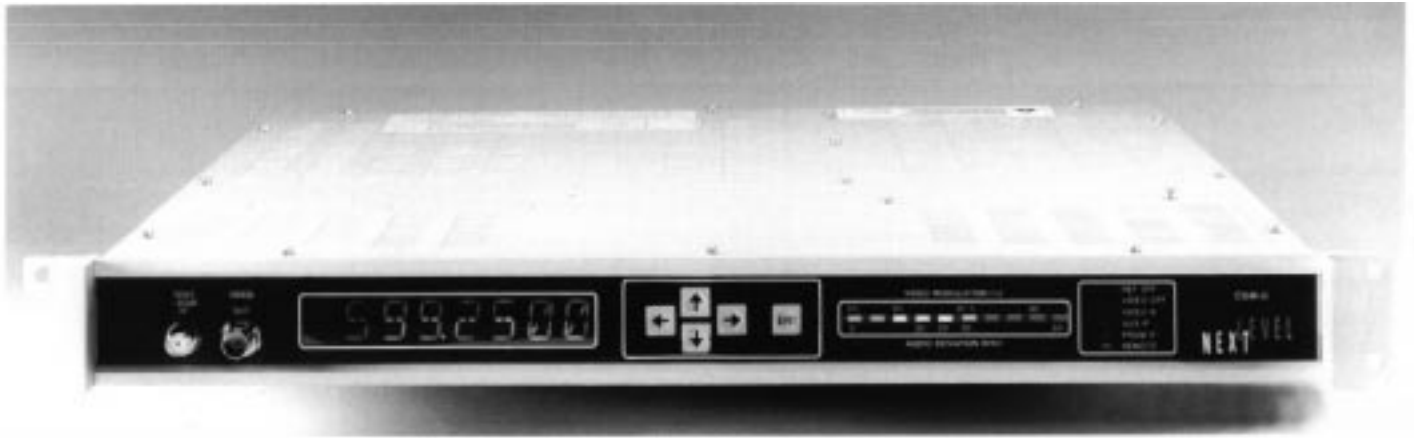
NextLevel has also developed a complete headend monitoring system called

LIFEnet™ for Headend Control and Monitoring. The software follows Simple Network Management Protocols (SNMP) standard and is therefore easily added to a broadband operators Network Management System.

**LIFEnet Headend Monitoring:** All Commander 6 modules have complete monitoring parameters. Through LIFEnet, our complete headend software package, the broadband operator will remotely monitor the RF and Cableoptics@ headend parameters.

**Custom Pre-packaged Headend Designs:** Every headend situation is unique. To help facilitate an efficient plan for design, layout, equipment selection and channel line-ups, our engineers work with each customer to fully understand their system requirements. After the headend is designed and assembled in our facility, we transport it to your location, install and provide proof-of-performance testing verification.

**NEXTLEVEL™**



#### FEATURES

- 1 GHz FREQUENCY AGILE TUNING
- FREQUENCY SELECTION IN 12.5 kHz STEPS OR BY HRC, IRC, EIA OR NEXTLEVEL (STD) CHANNEL MAPS
- USER FRIENDLY FRONT PANEL INTERFACE
- NETWORK MANAGEMENT CAPABLE
- BASEBAND INPUT SWITCHING, 4.5 MHz SUBCARRIER INPUT, BASEBAND AGC CAPABLE (OPTIONAL WITH MOB)
- INTEGRATED BTSC STEREO ENCODER
- DC POWER CAPABLE

#### DESCRIPTION

The Commander 6 Modulator Version II, (model C6M-II) NTSC video modulator, delivers versatility, flexibility and ease of maintenance to all existing and new

broadband communications headends. The C6M-II is frequency agile from 50 MHz to 1 GHz in a single rack unit (1U) package, using the latest technology in switching power supplies to minimize heat and increase power efficiency.

The C6M-II provides control of most parameters from the large eight-digit alpha-numeric LED display on the front panel. All parameters are microprocessor controlled for precision, accuracy, stability and reliability. In addition to the standard rear panel connections, a video test port and a -20 dB RF test port are available on the front panel for easy testing access.

Upon frequency or channel selection, the microprocessor automatically engages internal bandpass filters, ensuring that a combined carrier-to-noise (C/N) ratio for up to 149 channels is at least 60 dB. Typical combined C/N ratios of 63 dB are much more common with the C6M-II.

The precision frequency stability of the C6M-II meets the band frequency accu-

racy requirements for the FCC. The FCC mandated frequency offsets of +12.5 kHz and +25 kHz are generated automatically as well. The C6M-II also exceeds all FCC RF and baseband signal performance requirements.

#### SYSTEM COMPATIBILITY

The C6M-II is compatible with commercial scrambling systems, offering a composite IF input connection to facilitate interfacing with NextLevel's model MVP-II in all scrambling modes, and dual IF loop-through connections for other encryption systems.

The C6M-II modulators also interface easily with NextLevel's model CMTS, BTSC stereo encoder; model C6R, analog satellite receiver; model DSR-4500, DigiCipher@ II satellite receiver, and model C6BD, broadcast demodulator. The C6M-II is compatible with all present and past NextLevel headend equipment.



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**&EVEL'**



## FEATURES

- BROADCAST QUALITY PERFORMANCE IN NTSC/PAL/SECAM/AND MAC FORMATS.
- C AND KU BAND FREQUENCY AGILITY, 950 - 1750 MHz
- PRECISION MICROPROCESSOR CONTROLLED DUAL CONVERSION PLL TUNING
- DIGITAL AFC TRACKING CIRCUIT WITH CONTINUOUS FINE TUNING ABILITY
- 70 MHz IF WITH SPECTRUM INVERSION CIRCUIT FOR UPLINK TURNAROUNDS
- TERRESTRIAL INTERFERENCE (TI) LOOP.
- FRONT PANEL TEST POINTS FOR VIDEO AND 70 MHz IF
- AUTO CALIBRATING REAL-TIME C/N METER
- OPTIONAL MULTI-STANDARD BROADCAST QUALITY STEREO AUDIO DEMODULATOR

The C6R-MS1 is an international, multi-standard satellite receiver capable of receiving satellite transmitted signals in NTSC/PAL/SECAM/ and MAC formats. Frequency agile with an input RF bandwidth of 950 to 1750 MHz, the PLL synthesized COMMANDER 6 receiver is designed for broadcast quality performance.

Featuring digitally locked, continuously tuning AFC and microprocessor controls, the received C/Ku-band radio frequency (RF) signal inputs are dual converted to a commercial, industry standard 70 MHz intermediate frequency (IF).

The C6R-MS1's design uses a new 70 MHz IF inversion circuit that enables direct satellite RF processing at the up/downlink site. This circuit provides more consistent and reliable video performance. It offers advantages in applications in which signal processing can be performed at an Intermediate Frequency (I.F.), rather than at baseband audio/video.

## USER FRIENDLINESS

The front panel includes a three function meter indicating carrier-to-noise (C/N), fine tuning, and RF signal strength. The real-time C/N meter and alarm features consistently monitor the receive signals with maximum power ability. The tune meter enables precision, fine tuning of the input RF signal, and the RF input

level signal meter is calibrated like a spectrum analyzer in dBm units.

The multiple video low pass filters and de-emphasis networks enable the C6R-MS1 for NTSC/PAL/SECAM/ and MAC operation along with all known video scrambling formats. The multi-tap power supply, with 3 voltage settings, decreases heat and power consumption and is designed for continuous 24-hour operation.

## OPTIONAL ACCESSORIES/ORDERING INFORMATION

The flexible, 1.75 inch receiver design is an open architecture with field-installable options. The receiver can be ordered without audio to minimize cost in dedicating scrambling systems. It can also be ordered with the following:

### ASD-MSI OPTION

Audio option with PLL frequency agile dual channel stereo audio demodulator with five adjustable IF filters (55,110,220,440,880 KHz), and multi-format audio de-emphasis networks (50, 75, J-17, and sliding) or a flat audio.

### BPF-900

Front panel adjustable, multiple SAW filtered module with six 70 MHz IF band-pass filters (16,18,22,25,27, and 36).

NEXT LEVEL™

## Specifications

### RF CHARACTERISTICS

|                            |                   |
|----------------------------|-------------------|
| RF Frequency Range (stock) | 950 to 1750 MHz   |
| Input Impedance            | 75 Ohms           |
| Input Level                | -20 to -65 dBm    |
| Input Return Loss          | ≥12 dB            |
| Noise Figure               | ≤13 dB            |
| Stock IF Bandwidth         | 27 MHz            |
| Tuning                     | 1.0 MHz           |
| Fine Tuning Pot            | 100 kHz           |
|                            | Resolution ±2 MHz |
| C/N Meter                  | 7 - 25 dB         |
| Tuning Meter               | ±2.0 MHz          |
| Signal Meter               | -20 to -60 dBm    |
| Static Threshold           | <7.0 dB           |

### IF CHARACTERISTICS

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| 1st IF Center Frequency                                              | 612 MHz   |
| 2nd IF Center Frequency                                              | 70 MHz    |
| Min. input level for max.<br>IF gain (1 dB change<br>from reference) | ≤ -65 dBm |
| FM Dynamic Threshold C/N<br>first sparkles with<br>color bars        | ≤12 dB    |
| FM Static Threshold C/N                                              | ≤7 dB     |
| IF Test Output Impedance                                             | 75 Ohms   |

### TUNING

|                   |          |
|-------------------|----------|
| AFC Capture Range | ±2.0 MHz |
| Fine Tuning Range | ±2.0 MHz |

### 525 PERFORMANCE (VIDEO 1 & 2)

|                                                          |                      |
|----------------------------------------------------------|----------------------|
| Chroma-Luma                                              |                      |
| Delay Inequality                                         | ±15 nsec             |
| Field-Time Distortion                                    | ≤3.0%                |
| Differential Gain                                        | ≤3.0%                |
| Differential Phase                                       | 1.5°                 |
| Deviation Range for<br>1 V p-p output                    | 10.0 to 27.6 MHz p-p |
| Composite Output<br>Impedance                            | 75 Ohms              |
| Line Time Distortion                                     | ±1.0%                |
| Short Time Distortion                                    | ±2.0%                |
| Chroma-Luma Gain                                         |                      |
| Inequality                                               | ±4.0%                |
| Luminance Nonlinearity                                   | ≤5.0%                |
| Chroma-Luma                                              |                      |
| Intermodulation                                          | ±2.0%                |
| Chroma NL Gain                                           | ±3.0%                |
| Chroma NL Phase                                          | ±2.0°                |
| #2 Video/Video Test Output Level<br>Ref. #1 Video Output | ±1.0%                |

### COMPOSITE

|                                       |                      |
|---------------------------------------|----------------------|
| Deviation Range for<br>1 V p-p output | 10.0 to 27.6 MHz p-p |
| Video Output Impedance                | 75 Ohms              |
| Line Time Distortion                  | ±1.0%                |
| Short Time Distortion                 | ±2.0%                |
| Chroma-Luma Delay<br>Inequality       | ±15 nsec             |

### Chroma-Luma Gain

|                                              |          |
|----------------------------------------------|----------|
| Inequality                                   | ±4.0%    |
| Differential Gain                            | ≤3.0%    |
| Differential Phase                           | ≤1.5°    |
| Luminance Nonlinearity                       | ±5.0%    |
| Chroma NL Gain                               | ±2.0%    |
| Chroma NL Phase                              | ±2.0°    |
| Gain Frequency Distortion<br>15 Hz - 4.2 MHz | ±0.51 dB |
| Chroma-Luma Intermodulation                  | ±2.0%    |
| Field-Time Distortion                        | ≤1.0%    |
| Dispersal Rejection                          | ≥40 dB   |
| Vertical Interval Distortion                 | ≤2.0 IRE |
| 70 MHz IF Signal Leakage                     | ≤-65 dBm |
| Video Test Output Impedance                  | 75 Ohms  |

### 625 PERFORMANCE (VIDEO 1 & 2)

|                                                          |                  |
|----------------------------------------------------------|------------------|
| Chroma-Luma Delay Inequality                             | ±20 nsec         |
| Field-Time Distortion                                    | ≤4.0%            |
| Differential Gain                                        | 3.0%             |
| Differential Phase                                       | 1.5°             |
| Deviation Range for<br>1 V p-p output                    | 5 to 14 MHz Peak |
| Composite Output Impedance                               | 75 Ohms          |
| Line Time Distortion                                     | ±2.0%            |
| Short Time Distortion                                    | ±3.0%            |
| Chroma-Luma Gain Inequality                              | ±3.0%            |
| Luminance Nonlinearity                                   | ≤5.0%            |
| Chroma-Luma Intermodulation                              | ±2.0%            |
| #2 Video/Video Test Output Level<br>Ref. #1 Video Output | ±1.0%            |

### COMPOSITE

|                                       |                   |
|---------------------------------------|-------------------|
| Deviation Range for<br>1 V p-p output | 9.0 to 24 MHz p-p |
| Video Output Impedance                | 75 Ohms           |
| Line Time Distortion                  | ±2.0%             |
| Chroma-Luma Delay Inequality          | ±20 nsec          |
| Chroma-Luma Gain Inequality           | ±3.0%             |
| Differential Gain                     | ≤3.0%             |
| Differential Phase                    | ≤1.5°             |
| Luminance Nonlinearity                | ±5.0%             |
| Field-Time Distortion                 | ≤4 IRE            |
| Video Test Output Impedance           | 75 Ohms           |

### GENERAL

|                    |                                                       |
|--------------------|-------------------------------------------------------|
| Power              | 50 to 60 Hz                                           |
| (115,230,240 V)    | -10 to +50%                                           |
| Dimensions (HxWxD) | 1.75"H x 19"W x 18.9"D<br>(4.5 cm x 48.3 cm x 48.0cm) |
| Voltage            | 115, 230, 240 Vac                                     |
| Current (max)      | 25 W                                                  |
| (with option)      | ≤50 W                                                 |
| (without option)   | ≤35 W                                                 |

### ENVIRONMENT (OPERATIONAL)

|             |                                   |
|-------------|-----------------------------------|
| Temperature | +14° to +122°F<br>(-10° to +50°C) |
| Altitude    | 0 to 15,000 ft.<br>(0 to 4,572 M) |

Specifications subject to change without notice.

Worldwide telephone: (U.S.) 215-674-4800; fax: (U.S.) 215-956-6497; website: www.abv.com. Offices in Asia, Australia, Europe, North America, and South America.

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## Specifications

**RF**

|                                 |                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------|
| Channels                        | 2 to 161 (HRC, IRC, EIA, or NextLevel STD Frequency plans;<br>Frequency tunable in 12.5 kHz steps) |
| Frequency Range                 | 50 to 1000 MHz, tunable in 12.5 kHz steps                                                          |
| Frequency Accuracy              | ±5 kHz Maximum, ±500 Hz Typical                                                                    |
| Output level                    | +60 dBmV Minimum                                                                                   |
| Recommended operating range     | +57 to +61 dBmV                                                                                    |
| Spurious                        | -60 dBc Minimum @ +60 dBmV (50 to 1000 MHz)<br>with sound carrier at -15 dBc                       |
| Output Return Loss              | 14 dB Minimum within channel (50 to 750 MHz)<br>13 dB Minimum within channel (750 to 1000 MHz)     |
| Sound Carrier Level             | Adjustable, -10 to -20 dB relative to video carrier                                                |
| C/N Ratio (normalized to 4 MHz) |                                                                                                    |
| In-band                         | 68.0 dB Minimum, 70.0 dB Typical                                                                   |
| Adjacent channel                | 72.0 dB Minimum, 74.0 dB Typical                                                                   |
| Wideband                        | 75.5 dB Minimum, 76.0 dB Typical                                                                   |
| RF Carrier Phase Noise          |                                                                                                    |
| @ 1 kHz offset                  | -68 dBc/Hz Minimum                                                                                 |
| @ 10 kHz offset                 | -95 dBc/Hz Minimum                                                                                 |

**IF**

|                                        |                                    |
|----------------------------------------|------------------------------------|
| Picture IF Output Frequency            | 45.75 MHz                          |
| Picture IF Output Level                | +35 dBmV @ 87.5% modulation        |
| Sound IF Output Frequency              | 41.25 MHz                          |
| Sound IF Output Level                  | +15 to +25 dBmV                    |
| Composite IF Output Level (Picture IF) | +30 dBmV ± 1 dB @ 87.5% modulation |
| CW IF Output Frequency                 | 45.75 MHz                          |
| CW IF Output Level                     | +50 dBmV ± 5 dB                    |

**Video**

|                                         |                                      |
|-----------------------------------------|--------------------------------------|
| Standard Baseband Input                 | 0.5 to 2.0 Vp-p for 87.5% modulation |
| Encoded Video Input Level               | 1.0 Vp-p for 87.5% modulation        |
| Video Input Impedance                   | 75 Ohms                              |
| Video Input Return Loss                 | 30 dB Minimum                        |
| K factor                                | 2% Maximum                           |
| S/N Ratio (luminance weighted)          | 64 dB Minimum                        |
| Chroma delay, relative to precorrection | ±50 nsec                             |
| Frequency Response                      | ±0.5 dB from 0 to 4.1 MHz            |
| Differential Gain                       | ±3% @ 87.5% modulation               |
| Differential Phase                      | 1.0° p-p Maximum @ 87.5% modulation  |
| Tilt                                    | 1% Maximum                           |

Specifications subject to change without notice.

## Specifications

### Audio

#### Input Level Range (switchable)

Low

-10 to +10 dBm,  $Z_o = 600\ \Omega$

High

+5 to +25 dBm,  $Z_o = 600\ \Omega$

#### Input Impedance (switchable)

Low

600  $\Omega$  balanced

High

15 k  $\Omega$  Minimum

#### Frequency Response

\*1.0 dB from 30 Hz to 15 kHz

#### Preemphasis

75 psec, defeatable

#### Harmonic Distortion

1% Maximum from 30 Hz to 15 kHz @  $\pm 25$  kHz deviation

#### Hum and Noise

-60 dBc Maximum @  $\pm 25$  kHz deviation

#### Aural Subcarrier Frequency

4.5 MHz  $\pm$  500 Hz

#### Aural Subcarrier Input Level Range

+35 to +45 dBmV,  $Z_o = 75\ \Omega$

### General

#### AC voltage Requirements

100 to 240 Vrms, 50 to 60 Hz

#### Power Requirements

40 watts Maximum

#### Operating Temperature

0" to 50" c

#### Weight

13.5 lbs (6.11 kgs) Maximum

#### Dimensions

19" W x 1.75" H x 17.5" D (48.07 cm x 4.42 cm x 44.28 cm)

Specifications subject to change without notice.

**NEXT** LEVEL™

## Specifications

**AUDIO CHARACTERISTICS**

|                                        |                                                                                               |
|----------------------------------------|-----------------------------------------------------------------------------------------------|
| Audio Input Range (for full deviation) | -10 to +10 dBm (600 Ohms balanced)                                                            |
| Frequency Response                     |                                                                                               |
| Left, Right                            | (50 Hz to 14.5 kHz) $\pm 1$ dB                                                                |
| -3 dB Point                            | 57 kHz Minimum                                                                                |
| SAP                                    | (50 Hz to 10 kHz) $\pm 1$ dB                                                                  |
| Channel Separation                     | > 26 dB from 50 Hz to 100 Hz<br>> 30 dB from 100 Hz to 8 Hz<br>> 26 dB from 8 kHz to 14.5 kHz |
| Total Harmonic Distortion              |                                                                                               |
| Left, Right                            | <.2%                                                                                          |
| SAP                                    | <.5%                                                                                          |
| Dynamic Range                          | 75 dB Minimum                                                                                 |
| Common Mode Hum Rejection              | > 75 dB                                                                                       |
| Crosstalk                              | > 60 dB down                                                                                  |
| Composite BTSC Output Level            | 0 dBm typical (600 Ohms balanced)                                                             |
| L-R Carrier Suppression                | > 60 dB                                                                                       |

**OUTPUT CHARACTERISTICS**

|                               |                                       |
|-------------------------------|---------------------------------------|
| Video Level (Video Loop-Thru) | 1 Volt P-P $\pm 60$ dB                |
| 4.5 MHz Output:               |                                       |
| Output Level                  | +40 dBmV nominal into 75 Ohms         |
| Spurious                      | -60 dB from 4.5 MHz                   |
| 41.25 MHz Output:             |                                       |
| Output Level                  | +15 to +30 dBmV variable into 75 Ohms |
| Spurious                      | -60 dB from 41.25 MHz                 |

Note: Accepts vestigial video IF in and provides composite IF out.  
Preliminary specifications subject to change without notice.



**Return Channel Diplex Filters**

**TF-26-XHE Subsplit**  
(5-26/47-1000 MHz) Diplex Filter

**TF-30-XHE Subsplit**  
(5-32/52-1000 MHz) Diplex Filter

**TF-40-XHE Subsplit**  
(5-40/50-1000 MHz) Diplex Filter

**TF-55-XHE Midsplit**  
(5-60/85-1000 MHz) Diplex Filter

**FEATURES**

- **LOW INSERTION LOSS NEARLY TRANSPARENT TO SYSTEM**
- **EXCELLENT BAND SEPARATION**
- **1 GHz FULL BANDWIDTH RATING**
- **FORWARD AND REVERSE EQUALIZATION OPTIONAL \***

The TF series diplex filters are placed after the composite output of the headend. In two-way systems they are used to extract the return signals. In one-way systems they are installed to reduce noise ingress from the unused return band. NextLevel recommends the use of a diplex filter on each trunk output regard-less of whether two-way operation is planned.

| SPECIFICATIONS                                             |                             |                             |                             |                             |
|------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| MODEL #                                                    | TF-26XHE-III                | TF-30XHE-III                | TF-40XHE-III                | TF-55XHE-III                |
| Passband                                                   | 5-26 MHz and<br>47-1000 MHz | 5-32 MHz and<br>52-1000 MHz | 5-40 MHz and<br>50-1000 MHz | 5-60 MHz and<br>85-1000 MHz |
| Maximum Insertion Loss                                     | 3.0 dB                      | 3.0 dB                      | 3.0 dB                      | 3.0 dB                      |
| Stopband                                                   | 26-47 MHz                   | 32-52 MHz                   | 40-50 MHz                   | 60-85 MHz                   |
| Stopband Attenuation                                       | 25 dB Min.                  | 25 dB Min.                  | 25 dB Min.                  | 25 dB Min.                  |
| Isolation, Between Highpass<br>and Lowpass Ports           | 40 dB Typ.                  | 40 dB Typ.                  | 40 dB Typ.                  | 40 dB Typ.                  |
| Terminal Match, Return Loss<br>75 Ohms Impedance (Minimum) | 16 dB                       | 16 dB                       | 16 dB                       | 16 dB                       |

## Frequency Agile to 450 MHz ... Stereo Compatible ... Heterodyne



## FEATURES

- FREQUENCY AGILE FROM 50 TO 450 MHz
- BTSC STEREO COMPATIBILITY
- FRONT PANEL CONTROLS
- 1.75 INCHES HIGH
- AUTOMATIC ON-CHANNEL OPERATION
- SUB-BAND OPTION AVAILABLE
- FCC COMPLIANT

The S450P, the NextLevel full-featured frequency agile heterodyne processor, offers an economical way to process off-air or cable-delivered signals in CATV headends without sacrificing performance.

## FRONT PANEL CONTROLS

All adjustments are made via convenient front panel controls; no internal adjustments are required.

Input frequency selection is accomplished with front panel dipswitches located behind a sliding cover. The S450P accepts VHF, UHF and cable channels to 450 MHz.

Output channel selection is also accomplished with front panel dipswitches that tune in 0.25 MHz increments from 50 to 450 MHz.

Other front panel adjustments include: an audio/video ratio (A/V) control which adjusts the aural carrier from -12 dB to -17 dB below the video carrier; an offset adjustment control which enables the output frequency to meet FCC requirements; and an RF output level control which can be adjusted 10 dB down from typical 60 dBmV output.

## STEREO COMPATIBLE

The S450P can accept and process BTSC stereo delivered signals with no added signal degradation.

## OPTIONS

The S450P is available with sub-channel (Model S450P-T) and HRC (Model S450P-HRC) processing capabilities. Please specify the proper model when ordering to suit your application.

NextLevel™

**Frequency Agile to 801.25 MHz ... Stereo Compatible****FEATURES**

- HANDLES VHF, UHF AND ALL CABLE CHANNELS TO 470 MHz FOR STANDARD, HRC AND **IRQ** FREQUENCY FORMATS
- SUB-BAND OPTION AVAILABLE
- MPX OUTPUT FOR BTSC STEREO ENCODED SIGNALS
- 1.75 INCHES HIGH

The **NextLevel S890D** is a frequency agile television demodulator that covers the frequency spectrum from **54** MHz to 801.25 MHz in 0.25 MHz steps. Frequency selection is by convenient front panel dipswitch. The unit provides baseband audio and video outputs as well as a multiplex output for BTSC stereo encoded signals. SAW filtering is utilized for excellent video and adjacent channel performance. The unit is packaged in a 1.75" rack mount enclosure and has very low total power dissipation, less than 8 watts.

The **S890D** now offers two video outputs, both rear panel switchable to composite, as standard. The unit also offers a rear panel IF testpoint, and a separate 4.5 MHz audio subcarrier output.

**SUB-BAND OPTION**

The **S890D** is available with sub-channel input capability, for use in applications where a return channel, **5** to 30 MHz is demodulated and then re-modulated for distribution. Specify **S890D-T1** when ordering.

**NEXT LEVEL™**

## Specifications

|                         |                                                                                                                                                                      |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VHF/UHF Input           | 54 MHz to 801.25 MHz<br>Selectable by front panel dipswitch in 0.25 MHz increments, including all cable channels to 470 MHz<br>Optional 5 to 30 MHz input capability |
| RF Input level          | -10 dBmV to +25 dBmV off-air<br>-10 dBmV to +10 dBmV off-cable                                                                                                       |
| Video Output            | 1 V P-P (75 Ohms)                                                                                                                                                    |
| Audio Output            | 500 MV P-P (600 Ohms unbalanced)                                                                                                                                     |
| MPX Output              | 500 MV P-P (600 Ohms unbalanced)                                                                                                                                     |
| Input Connectors        | VHF and Cable—type F (75 Ohms)<br>UHF—type F (75 Ohms)                                                                                                               |
| Size                    | 19"W x 1.75"H x 12"D (48.07 cm x 4.42 cm x 30.36 cm)                                                                                                                 |
| Power                   | 115 Vac @ 60 Hz, 8 Watts                                                                                                                                             |
| Differential Gain       | 4% Typical                                                                                                                                                           |
| Differential Phase      | 2° Typical                                                                                                                                                           |
| Noise Figure            | VHF 7 dB<br>UHF 9 dB                                                                                                                                                 |
| Audio Subcarrier Output | +40 dBmV (75 Ohms)                                                                                                                                                   |

Specifications subject to change without notice.

## Specifications

**RF INPUT**

|                        |                                                                      |
|------------------------|----------------------------------------------------------------------|
| Input Channels         | VHF, UHF and cable channels to 450 MHz<br>Sub-Band (Optional)        |
| Impedance              | VHF: 75 Ohms<br>UHF: 75 Ohms                                         |
| Signal Level Range     | Off-Air Channels: -15 to +25 dBmV<br>Cable Channels: -15 to +10 dBmV |
| Adj. Channel Rejection | ≥ 60 dB                                                              |
| AGC Range              | -15 to +25 dBmV                                                      |
| Carrier To Noise       | 55 dB (Typical, with +10 dBmV input level)                           |
| Noise Figure           | VHF 8 dB (Typical)<br>UHF 10 dB (Typical)                            |
| Frequency Response     | 2.5 dB P-P                                                           |

**RF OUTPUT**

|                      |                                              |
|----------------------|----------------------------------------------|
| Output Channels      | Channel 2 through 69, (50 to 445.25 MHz)     |
| FCC Offset           | Front Panel Adjustable +12.5 kHz and +25 kHz |
| Output Level         | +55 dBmV min, +60 dBmV typical               |
| Output Level Control | 10 dB                                        |
| Spurious Output      | > 60 dB below video carrier level            |
| Out-of-Band Noise    | > 80 dB below video carrier level            |
| Output Impedance     | 75 Ohms                                      |

**GENERAL**

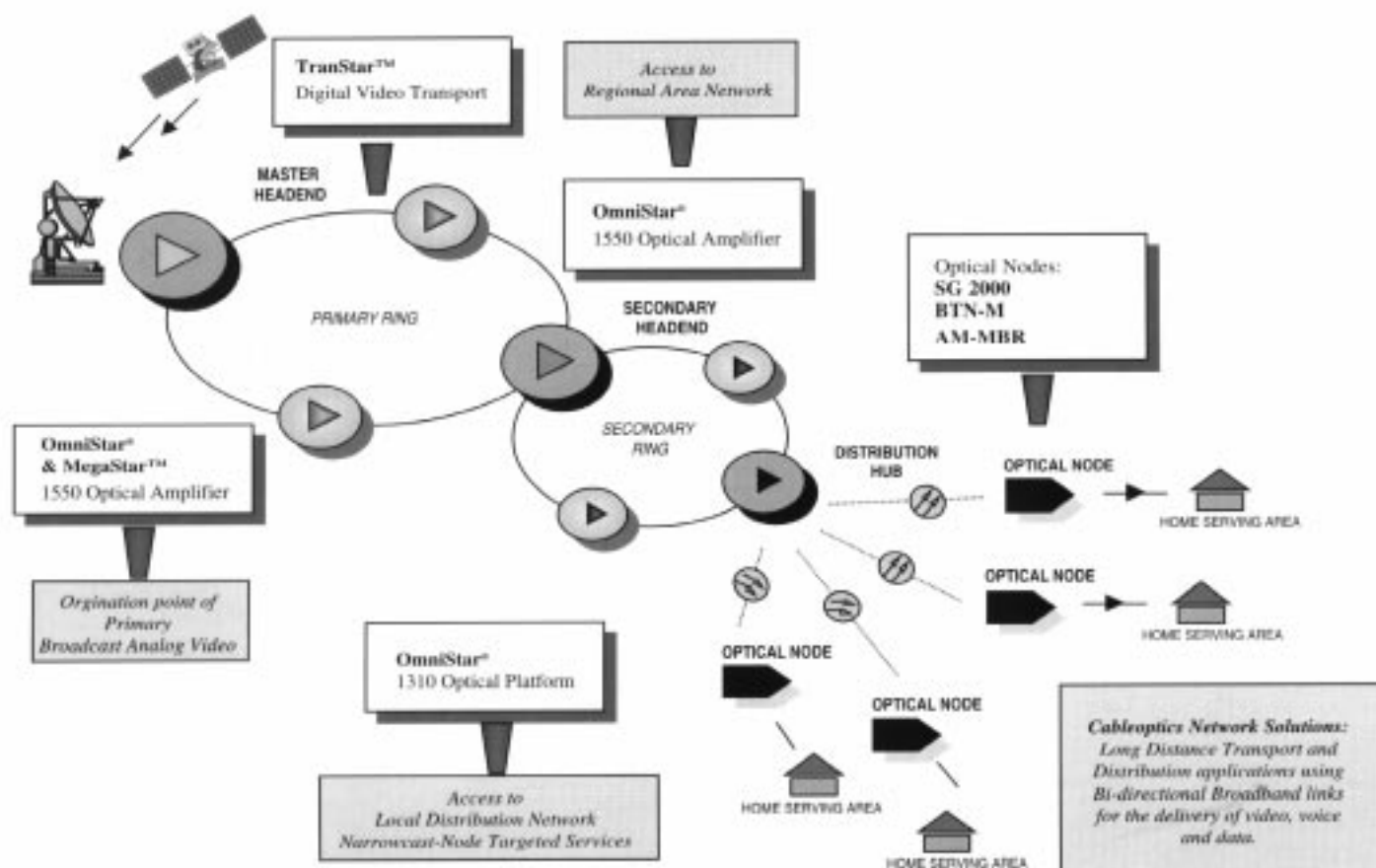
|                    |                                                     |
|--------------------|-----------------------------------------------------|
| Fuse               | 0.5A, 250 V, slo blo                                |
| Power Requirements | 117 VAC, 60 Hz, 35W                                 |
| Dimensions         | 19"W x 1.75"H x 7"D (48.07 cm x 4.42 cm x 17.71 cm) |
| Input Impedance    | 75 Ohms                                             |

**CONTROLS/INDICATORS**

|                               |                                                                                                                                                  |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Front Panel LED Indicator     | Power on                                                                                                                                         |
| Front Panel Controls          | Input Channel Selection<br>Output Channel Selection<br>RF Output Level<br>Audio/Video Ratio<br>-20 dB test point (MG connector)<br>Offset Adjust |
| Rear Panel Connectors, Type F | UHF Input<br>VHF/CATV Input<br>RF Output<br>IF Out<br>IF In                                                                                      |

Specifications subject to change without notice.

## Product Overview



Fiber optic technology can be used in Broadband Transmission systems requiring the added reliability and advanced technology inherent in fiber transmission. NextLevel offers a complete array of two-way fiber optic products marketed under the Cableoptics trade name. Cableoptics products are designed and manufactured to provide customers with significant solutions through systems selection.

There are several types of system solutions, NextLevel has developed a universal platform to meet any of them. A digital fiber transport system (TranStar™) was designed for SONET ring applications, OmniStar™ 1550 nm for long haul and headend to headend connections and OmniStar 1310 nm for typical headend to hub applications.

**Forward/Return Transmitter:** The signal is combined into an optical signal for transmission from the master or secondary headend to a forward receiver located at a remote headend or node location. Forward/Return transmitters can either be a digital fiber transport, 1550 nm, or 1310 nm.

- AM-OMNI-1550 TX1
- AM-OMNI-LM® 750A/860D
- AM-OMNI-RPTD

**Forward/Return Receiver:** The receiver converts the optical signal back to an RF signal ready for reprocessing at a remote headend or distribution throughout the system.

- AM-OMNI-860R
- AM-OMNI-RPR/2
- AM-750RS-HE

**LIFEnet™ Headend Monitoring:** All OmniStar modules have complete status monitoring parameters. Through LIFEnet's complete software package a broadband operator can remotely monitor the OmniStar and Commander 6® platform parameters.

NEXTLEVEL™



**FEATURES:**

- **5- 200 MHz PASSBAND**
- 2 INDEPENDENT RECEIVERS
- FRONT PANEL PLUG-IN MODULE WITH PLUG-N-PLAY OPERATION
- ACCEPTS VIDEO AND DATA MODULATION FORMATS
- OPERATIONAL WAVELENGTH AT 1310 nm AND 1550 nm

**DESCRIPTION**

The **AM-OMNI-RPR/2** Dual Return Path Receiver Module for the OmniStar platform provides a universal compact solution to meet the requirements of advanced upstream video and data traffic applications. The **RPR/2** is controlled and monitored locally through front panel features, and remotely through the OmniStar Control Module and **LIFEnet™** Headend Control Software.

The **AM-OMNI-RPR/2** is the perfect answer when Return Path data/video is needed to support upstream information transmission from either traditional node locations, or from hub sites where the potential need for frequency stacking or up conversion requires increased upstream bandwidth. The Dual Return Path Receiver is also ideal for systems where status monitoring services and interactive services, such as VOD, NVOD, Telephony and PCS, demand further processing of upstream information.

The **AM-OMNI-RPR/2** features test points for received optical power and RF output level for each detector path. And for flexible user configuration, the **AM-OMNI-RPR/2** offers manual gain control for variable output level.

**NEXT LEVEL™**

## Specifications

|                                                   |                                                                                              |
|---------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Frequency Passband</b>                         | 5 - 200 MHz                                                                                  |
| <b>Wavelength</b>                                 | 1310 nm $\pm$ 20, 1550 nm $\pm$ 20                                                           |
| <b>Optical Input Range</b>                        | -16 dBm to 0 dBm                                                                             |
| <b>Channel Loading</b>                            | 1 Video channel and 2 data @ -16 to 0 dBm<br>Up to 50 data channels @ -16 to 0 dBm           |
| <b>Output RF Return Loss</b>                      | >16 dB                                                                                       |
| <b>RF Output Level*</b>                           |                                                                                              |
| <b>Recommended Maximum Operating Output Level</b> | 40 dBmV                                                                                      |
| <b>Minimum RF Output Level</b>                    | 15 dBmV                                                                                      |
| <b>Manual Gain Control Range</b>                  | 20 dB (front panel adjustable)                                                               |
| <b>Output Flatness</b>                            | $\pm$ 0.5 dB                                                                                 |
| <b>Operational Gain</b>                           | 40 dB Minimum                                                                                |
| <b>RF Test Point</b>                              | -20 dB, $\pm$ 0.5 dB                                                                         |
| <b>Optical Test Point</b>                         | 2.0 V/mW (DC voltage) @ 1310 nm wavelength<br>2.1 V/mW (DC voltage) @ 1550 nm wavelength     |
| <b>Optical Alarm Limits</b>                       | Major Alarm, -18 dBm and +3 dBm                                                              |
| <b>Data/Control Interface</b>                     | Serial Peripheral Interface (SPI) using LIFEnet™ Software                                    |
| <b>Optical Connector</b>                          | SC/APC                                                                                       |
| <b>Temperature Range</b>                          | 0° to +50°C (+32° to +122°F)                                                                 |
| <b>Power Consumption</b>                          | 7.0 watts                                                                                    |
| <b>Dimensions</b>                                 | 1.5" W x 6.5" H x 14.25" D (single OmniStar module width)<br>(3.81 cm x 16.51 cm x 36.20 cm) |
| <b>Weight</b>                                     | 2.5 lbs (1.1 kgs)                                                                            |
| <b>Mounting</b>                                   | AM-OMNI-HSG* equipment shelf,<br>any of slots 3 through 10                                   |

Specifications subject to change without notice.

**Note:**

\* All RF output levels are based on typical input levels to all our return transmitters.





OMNISTAR 860 MHz Laser Module for 550 MHz Analog Transmission

#### FEATURES:

- 50 - 860 MHz PASSBAND
- HIGH PERFORMANCE DFB LASER WITH INTERNAL ISOLATOR AND LEADING EDGE PREDISTORTION
- FRONT PANEL PLUG-IN MODULE WITH PLUG-N-PLAY OPERATION
- INTEGRATED PRE-AMP FOR RF INPUT LEVEL OF ONLY +15 dBmV
- BROADCAST AND NARROWCAST INPUTS
- AVAILABLE IN 8 OUTPUT POWER RANGES

#### DESCRIPTION

The OmniStar laser module offers an innovative approach to optical transmission with unparalleled performance. The 860 MHz laser family consists of eight models with optical power ranging from 2 mW (4 dBm) to over 16 mW (12 dBm) offering a choice for the most cost effective solution based on designed loss budget, performance criteria, and splitting ratio considerations. The OmniStar laser has an integrated preamp allowing for a fixed RF input level of only +15 dBmV per channel with 77 NTSC channels while maintaining superior distortion performance. All laser modules have separate broadcast and narrowcast RF inputs eliminating the need for external combiners.

As an integrated unit providing all optical, RF signal processing, and control functions, each laser module features an internal optical isolator and RF linearization circuitry to provide superior carrier-to-noise and distortion performance. Optical performance of each laser is characterized at the factory where its optimal operating point is stored in non-volatile memory so that user adjustment of the RF laser drive level is unnecessary. The link performance is guaranteed upon power-up. The three user controlled modes of operations are *preset* - factory set AGC for optimal laser performance, *set* - user adjust-able AGC, and *manual* - user adjustable fixed gain. The *set* and *manual* modes let the user customize the RF drive level for desired carrier-to-noise and distortion performance based on channel loading and system requirements. Continuous wave and video signal input modes are also user selective.

NEXT LEVEL

**OMNISTAR 860 MHz Analog and Digital Laser Module**

**Specifications**

**RF Characteristics:**

|                       |              |
|-----------------------|--------------|
| Operational Bandwidth | 50 - 860 MHz |
| RF Input Impedance    | 75 Ohms      |
| RF Input Return Loss  | 14 dB min.   |
| RF Connector Type     | G-type       |

**Optical Characteristics:**

|                        |                                                            |
|------------------------|------------------------------------------------------------|
| Optical Wavelength     | 1310 nm +/- 20 nm                                          |
| Distortion Performance | (see link performance specs.)                              |
| Optical Connector Type | SC/APC                                                     |
| Laser Shutdown         | Enable/Disable via. Control Module using LIFEnet™ Software |
| Eye Protection         | Optical Safety Shutter                                     |

**Power Requirements:**

|                             |               |
|-----------------------------|---------------|
| DC Currents Minimum/Maximum |               |
| +5 Vdc                      | 90 mA/1.7 A   |
| +12 Vdc                     | 350 mA/450 mA |
| +24 Vdc                     | 400 mA/550 mA |
| Power Consumption           | 25 watts      |

**User Interface:**

|                          |                                                           |
|--------------------------|-----------------------------------------------------------|
| Front Panel              | Tri-state Module Status LED                               |
| Operational Mode         | Push-button Selectable, LED display indication            |
| Optical Power Test Point | 5 mW/1 V, Scaled DC Voltage of Optical Output Power       |
| RF Test Point            | +17 dBmV/channel with 77 NTSC channel loading             |
| Data/Control Interface   | Serial Peripheral Interface (SPI) using LIFEnet™ Software |

**Environmental:**

|                                   |                              |
|-----------------------------------|------------------------------|
| Operating Temperature Range       | -20° to 65°C (-4°F to 149°F) |
| Storage Temperature Range         | -40° to 80°C (-40° to 176°F) |
| Over Temperature Laser Protection | Software and Hardware active |

**Physical Properties:**

|            |                                                            |
|------------|------------------------------------------------------------|
| Dimensions | 1.5" W x 6.5" H x 14.25" D (3.81 cm x 16.51 cm x 36.20 cm) |
| Weight     | 4.0 lbs (1.8 kgs)                                          |
| Mounting   | AM-OMNI-HSG® equipment shelf, any of slots 3 - 10          |

Specifications subject to change without notice.

**OMNISTAR 860 MHz Analog and Digital Laser Module**

**LINK PERFORMANCE SPECIFICATIONS**

|                                           |                                                           |                                                                 |
|-------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------|
| Operational Bandwidth                     | 50 - 860 MHz (50 - 550 MHz Analog, 550 - 860 MHz Digital) |                                                                 |
| Input RF Signal Level:                    |                                                           |                                                                 |
| Broadcast                                 | Analog                                                    | +15 dBmV, 50 - 550 MHz<br>(77 channels NTSC or 65 PAL channels) |
|                                           | Digital                                                   | +17 dBmV for Models AM-OMNI 11LD and 12LD                       |
| Narrowcast                                | Analog/Digital                                            | +5 dBmV, 550 - 860 MHz                                          |
| <b>CABLEOPTICS LINK PERFORMANCE</b>       |                                                           | 22 dB above Broadcast input levels                              |
| CTB                                       |                                                           | -66 dB worst case                                               |
| CSO                                       |                                                           | -63 dB worst case                                               |
| <b>CARRIER-TO-NOISE PERFORMANCE (dB):</b> |                                                           |                                                                 |

|             |                       | OPTICAL LOSS (dB) |      |      |      |      |      |      |      |      |      |      |      |
|-------------|-----------------------|-------------------|------|------|------|------|------|------|------|------|------|------|------|
| LASER MODEL | (Min - Max)<br>mW/dBm | OUTPUT POWER      |      |      |      |      |      |      |      |      |      |      |      |
|             |                       | 4                 | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   |
| LM-4        | 2-3.2/3-5             | 52.0              | 51.0 | 50.0 | 49.0 | 48.0 | 47.0 |      |      |      |      |      |      |
| LM-6        | 2.5-4/4-6             |                   | 52.5 | 51.5 | 50.5 | 49.5 | 48.5 |      |      |      |      |      |      |
| LM-7        | 4-6.3/6-8             |                   |      |      | 52.0 | 51.0 | 50.0 | 49.0 | 48.0 |      |      |      |      |
| LM-9        | 6.3-10/8-10           |                   |      |      |      |      | 51.5 | 51.0 | 50.0 | 49.0 | 48.0 |      |      |
| LM-11       | 10-14/10-11.5         |                   |      |      |      |      |      |      | 51.5 | 50.5 | 49.5 | 48.5 | 47.5 |
| LM-11LD     | 10-14/10-11.5         |                   |      |      |      |      |      |      | 51.5 | 50.5 | 49.5 | 48.5 | 47.5 |
| LM-12       | 12.6-20/11-13         |                   |      |      |      |      |      |      |      | 52.0 | 51.0 | 50.0 | 49.5 |
| LM-12LD     | 14-22.4/11.5-13.5     |                   |      |      |      |      |      |      |      | 52.0 | 51.0 | 50.0 | 49.5 |

Specifications subject to change without notice.

**Notes:**

Link performance specifications are based on 50-550 MHz Analog (77 channels NTSC or 65 PAL channels) and 550-860 MHz Digital.  
 C/N specifications measured using RM-9 receiver and are worst case, add 1 dB for typical performance.  
 Specifications are measured using CW carriers per NCTA.  
 AM-OMNI-LM-4 specifications are for optical link budgets that include a maximum of 7.5 km of fiber (0.4 dB/km).  
 AM-OMNI-LM-6, -7, -9, -11LD, and -12LD specifications are for all fiber (0.4 dB/km) optical loss budgets and include 1 dB for connector loss.  
 AM-OMNI-LM-11 specifications are for optical link budgets that include a maximum of 20 km of fiber (0.4 dB/km).  
 AM-OMNI-LM-12 specifications are for optical link budgets that include a maximum of 15 km of fiber (0.4 dB/km).  
 AM-OMNI-LM-11LD, and 12LD require an input level of +17 dBmV for 50-550 MHz Analog (77 channels NTSC or 65 PAL channels).  
 All link budgets include 1 dB for connector loss and meter inaccuracy.

**NEXT LEVEL™**



#### FEATURES:

- UNIVERSAL CHASSIS FOR FLEXIBLE CONFIGURATION
- AC AND DC POWERING OPTIONS
- POWER REDUNDANCY CAPABLE
- INTEGRATED STATUS MONITORING AND REMOTE NETWORK MANAGEMENT CAPABILITY
- ACCEPTS FRONT PANEL PLUG-IN MODULES WITH PLUG-N-PLAY OPERATION
- INCREASED OPERATIONAL DENSITY PER RACK UNIT SPACE (8 ACTIVE MODULES IN 5 RU SPACE)

#### DESCRIPTION

OmniStar, the next generation of Cableoptics headend products, is a fiber optic analog signal transmission platform that supports advanced Broadband Hybrid Fiber/Coax Telecommunications Systems. It is the perfect solution for modern broadband network systems where increasingly smaller node sizes and the deployment of point-to-point lasers require optimal headend or central office space. As a compact rack-mount optical platform it is ideal for complete two-way broadband transmission and also for applications which use rack-mount transmission equipment in a Distribution Hub or OTN.

The OmniStar design incorporates a printed circuit board back-plane providing easy plug-in interface to a Serial Peripheral Interface (SPI) bus. The SPI bus distributes power and control signals to eight universal module slots within the unit. Additionally, there are two slots dedicated for AC or DC powering options (120/240 V ac or -48 Vdc) and another slot in the chassis is dedicated to the unit's microprocessor controller or Control Module (CM). A separate rear panel houses the AC or DC input power connection, and remote connector interface.

The use of shared resources within the chassis allows for configuration flexibility, improving the overall cost effectiveness of the OmniStar system. Based on application requirements, the OmniStar system will accommodate power supply options and any variation of laser transmitters, receivers, or a series of other modules available in the near future.

NEXT LEVEL

## Specifications

**Dimensions:**

AM-OMNI-HSG/5/\* (5 RU Configuration) 8.75" H x 19" W x 17" D (22.2 cm x 48.3 cm x 43.2 cm)

AM-OMNI-HSG/5/\*/FAN (5 RU with fans) 8.75" H x 19" W x 17" D (22.2 cm x 48.3 cm x 43.2 cm)

**Weight:**

AM-OMNI-HSG/5/\* 14 lb (6.4 kgs)

AM-OMNI-HSG/5/\*/FAN 16 lb (7.3 kgs)

5 RU configuration fully loaded\* 40.75 lbs (18.48 kgs) approx.

**Environmental:**

Operating Temperature Range 0° to 50°C (+32° to 122°F)  
0° to 25°C (No Fans required)

Storage Temperature Range -40° to 80°C (-40° to 176°F)

Fans, AM-OMNI-HSG/5/\*/FAN only 4 fans @ 22 cfm each

**User Interface:**

Communications Port RS-485 Interface, In and Out, RJ-11 (off-set latch)

Alarm Relay Contact closure, 250 mA/40 Vac or Vdc Max.

RF Connectors F-Type, floating barrel, 5 per module slot

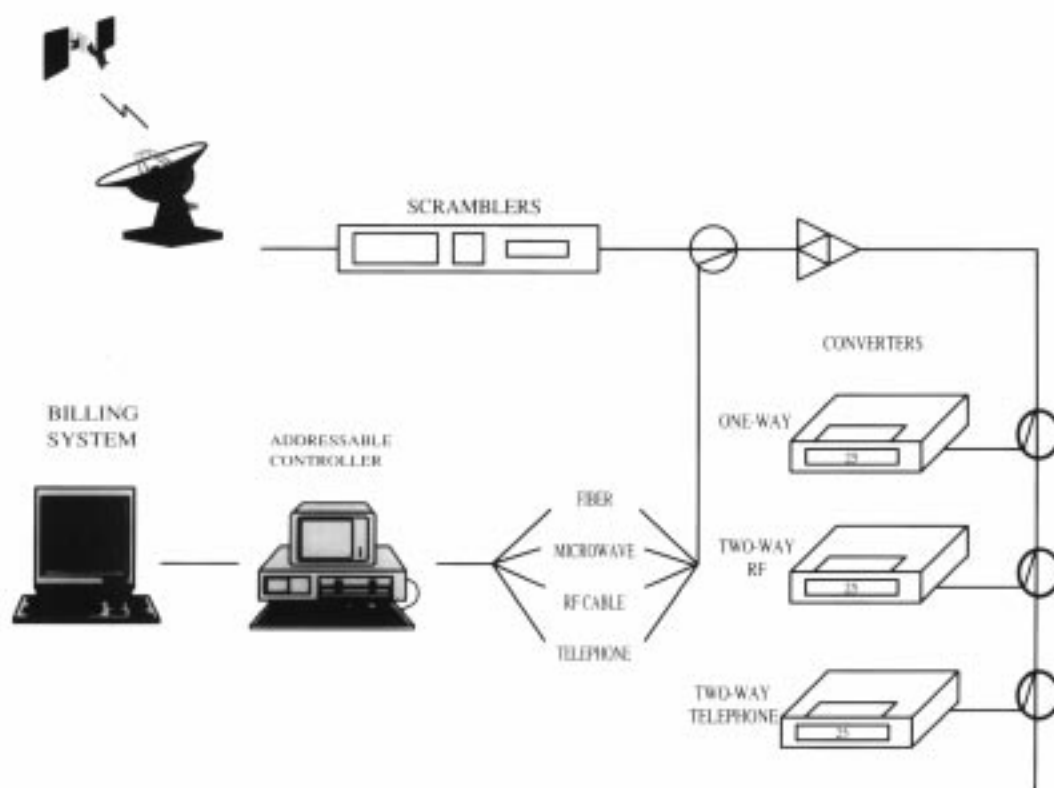
**Powering:**

AC Input Voltage (Auto-sensing) 95 - 264 Vac @ 47 - 63 Hz (120/220 Vac applications)  
requires an AC Power Input Unit sub-assembly

DC Input Voltage 40 - 56 Vdc (-48 Vdc application) requires a DC Power  
Input Unit sub-assembly

Specifications subject to change without notice.

\*Based on a fully loaded shelf with PS/AC, 8 laser modules, and control module.



## FEATURES

- **ONE- OR TWO-WAY IMPULSE CAPABILITY**
- **COMPATIBLE WITH LARGE AND SMALL SYSTEMS**
- **RF AND BASEBAND SCRAMBLING**
- **COMPLETE SERVICE AND TECHNICAL RESPONSE**

NextLevel is the world's leading provider of addressable systems. The IMPULSE® 7000 system incorporates state-of-the-art technology with traditional forward addressability and the option to upgrade to either an RF or telephone return "impulse" system. The store-and-forward impulse system combines the benefits of impulse pay-per-view purchasing with the advantages of non real-time communications. The addressable system has four main components: the addressable controller, data path equipment, scramblers and addressable terminals.

## ADDRESSABLE CONTROLLERS

NL's addressable controller is the heart of the system, controlling total operations.

Various controllers are available to meet the needs of the smallest one-way operator and the largest two-way system. Addressable control data can be linked to the system via any distribution medium (RF, telephone, fiber, microwave), providing complete flexibility in tying the business office with the headend. The addressable controllers can be operated in a standalone mode or operated as a slave to any of the billing system via a standard wirelink interface.

## SCRAMBLERS

A headend encoder, which can be remotely controlled from the addressable controller, provides video channel scrambling in RF, baseband or mixed modes. Each scrambler maintains a queue of future scheduled events to simplify operation in a pay-per-view environment.

## RF AND BASEBAND Terminals

The IMPULSE® 7000 terminal family consists of the full-featured CFT-2200, an 860 MHz interactive-capable terminal, and 550 MHz digitally controlled addressable terminals, which includes the

CFT-2000 on-screen display model and the basic DP7100P RF design. These terminals provide the ultimate in consumer features, including upgradability to two-way impulse-pay-per-view operation with an internal module. Remote control options consist of a range of units from the top-of-the-line universal remote through the basic limited function unit.

## COMPLETE PROJECT MANAGEMENT

To insure proper operation of the system, NL provides a complete project management capability from application design through system installation and training. A 24-hour technical response center and a field support organization is available should any additional assistance be required.

**NEXT LEVEL**



## FEATURES

- POWERFUL, SCALEABLE INTEL-BASED PLATFORM (PENTIUM® PRO)
- MULTI-TASKING/MULTI-USER
- USER-FRIENDLY GRAPHICAL USER INTERFACE
- DOWNLOADS ADDRESSABLE OPERATING PARAMETERS TO ONE-WAY AND TWO-WAY SET-TOPS
- FULL REMOTE CONTROL OF MODULATING VIDEO PROCESSORS (MVPS) AND SCRAMBLING ENCODERS
- WORKS WITH ALL OF OUR ANALOG AND ADVANCED SET-TOPS INCLUDING CFT-2200
- STARVUE™ AND STARFONE™ IPPV SYSTEMS COMPATIBILITY
- MUSIC CHOICE™ SUPPORT
- SEGA™ SUPPORT
- ANIC-A SUPPORT

## INTRODUCTION

The ACC-4000 Family of Controllers represents the latest development in a long tradition of access controller design. The new releases of ACC-4000 Lite, ACC-4000 Classic and ACC-4000 RAID

offer solutions for a full spectrum of system requirements. The ACC-4000 Lite is the ideal access controller for systems with less than 30,000 set-tops. Fully featured like the ACC-4000 Classic, the ACC-4000 Lite is the perfect lower cost companion for smaller system operators.

The ACC-4000 Classic is the natural evolution of a staple product in the cable industry. The ACC-4000 Classic features a hardware and software operating environment with improved power, including our state-of-the-art Software Application.

The ACC-4000 RAID employs a Redundant Array of Independent Disks serving as the high-end solution in a family of robust and reliable controllers.

## ADVANTAGES

### Powerful

The ACC-4000 access controllers are Intel-based and incorporate a server platform designed to meet the growing needs of cable operations. The standard tower configuration includes three 2 GB Hard Drives, 64 MB of Error Correcting Code RAM (for single-bit and double-bit error correction), one 3.5" Floppy Drive, one 2.0-5.0 GB QIC Tape Drive for

Database backups, a 17" SVGA Monitor, a Port Multi-plexer and a Remote Diagnostics Modem.

### Scaleable

Based on the fast Pentium® Pro architecture (Digital's Prioris™ HX6200), the ACC-4000 Family forms a highly scaleable set of controllers to keep pace with an operator's changing requirements. The Prioris™ HX6200 expansion capabilities includes up to 1 GB of ECC memory, 6 PCI slots, 5 EISA slots and a total 11 bays to name a few.

For further expansion capability, we offer a migration path from one controller to another. Five flexible upgrade packages are available with the ACC-4000 Family of Access Controllers:

- External RAID Upgrade Kit for the ACC-4000/XP.

*Provides a RAID solution to owners of the ACC-4000/XP, an earlier version of the access controller.*

NEXTEL

## CUSTOMER SERVICE

Our comprehensive range of Customer Service options include:

- Certified Classroom Training Seminar
- On-Site Installation and Overview Training
- Standard Telephone Support
- Emergency Telephone Support
- Telephone Technical Literature Retrieval System Access
- Internet Access
- Preventive On-Site Maintenance
- Standard Remote Minor Software Update

- Emergency Remote Minor Software Update
- Standard Minor Software Upgrade, loaded On-Site
- Hardware Platform Warranty
- On-Site Security Implementation
- Code Object (Set-top Applications) Download
- IR Codes Downloads (for IR Blaster)
- Emergency On-Site Service

These customer service options may be purchased individually or as part of one of the following packages:

- Initial ServiPac™

- Silver ServiPac™
- Gold ServiPac™
- Platinum ServiPac™

All of the ACC-4000 controllers include the Initial ServiPac™. The ACC-4000 Classic also includes one year of Silver ServiPac™, and the ACC-4000 RAID includes one year of Gold ServiPac™.

The ACC-4000 Family of Access Controllers

## SPECIFICATIONS

|                                       | ACC-4000 Lite                                 | ACC-4000 Classic                            | ACC-4000 RAID                               |
|---------------------------------------|-----------------------------------------------|---------------------------------------------|---------------------------------------------|
| <b>HARDWARE OPERATING ENVIRONMENT</b> |                                               |                                             |                                             |
| Server Platform                       | Digital Priors™ I-IX6200 with 512 KB L2 Cache | Digital Priors™ HX6200 with 512 KB L2 Cache | Digital Priors™ HX6200 with 512 KB L2 Cache |
| CPU                                   | Intel's Pentium® Pro (200 MHz)                | Intel's Pentium® Pro (200 MHz)              | Intel's Pentium® Pro (200 MHz)              |
| Display                               | SVGA 15" Monitor                              | SVGA 17" Monitor                            | SVGA 17" Monitor                            |
| Memory                                | 48MB ECC RAM                                  | 64 MB ECC RAM                               | 64 MB ECC RAM                               |
| Hard Drive                            | 1 x 2.0 GB Fast- Wide SCSI HD                 | 3 x 2.0 GB Fast- Wide SCSI I-ID             | 3 x 2.0 GB Fast- Wide SCSI HD               |
| Hard Drive Controller                 | Built-in SCSI controller                      | Built-in SCSI Controller                    | 2 Channel PCI RAID Controller               |
| Disk Drive                            | 1 x 1.44 MB 3.5" Drive                        | 1 x 1.44 MB 3.5" Drive                      | 1 x 1.44 MB 3.5" Drive                      |
| Redundant Power Supply                | Option                                        | Option                                      | Standard                                    |
| Expansion Kit                         | 4 Port Multiplexer,<br>8 Port Concentrator    | 4 Port Multiplexer,<br>8 Port Concentrator  | 4 Port Multiplexer,<br>8 Port Concentrator  |
| Surge Protection                      | APC SU1000                                    | APC SU1000                                  | APC SU1000                                  |
| Backup                                | 2.0 - 5.0 GB QIC Tape Drive                   | 2.0 - 5.0 GB QIC Tape Drive                 | 2.0 - 5.0 GB QIC Tape Drive                 |
| Cable Interface                       | ANIC or ANIC-A                                | ANIC or ANIC-A                              | ANIC or ANIC-A                              |
| Printer                               | Option                                        | Standard                                    | Standard                                    |
| <b>SOFTWARE OPERATING ENVIRONMENT</b> |                                               |                                             |                                             |
| Operating System                      | SCO® OSE (UNIX@) 3.0                          | SCO® OSE (UNIX®) 3.0                        | SCO® OSE (UNIX@) 3.0                        |
| Database Manager                      | Sybase® System 10                             | Sybase® System 10                           | Sybase® System 10                           |
| Graphical User Interface              | Unify ACCELL                                  | Unify ACCELL                                | Unify ACCELL                                |
| <b>SOFTWARE APPLICATION</b>           |                                               |                                             |                                             |
| Our Software Application              | ACC-4000 Lite<br>(Max. of 30,000 Set-tops)    | ACC-4000 Classic                            | ACC-4000 RAID                               |

Specifications subject to change without notice.



## ACC-4000 Lite, Classic and RAID

- RAID Upgrade Kit for the ACC-4000 Lite. *Upgrades an ACC-4000 Lite with RAID capability.*
- RAID Upgrade Kit for the ACC-4000 Classic. *Converts an ACC-4000 Classic to an ACC-4000 RAID.*
- ACC-4000 Classic Upgrade Kit for the ACC-4000 Lite. *Converts an ACC-4000 Lite to an ACC-4000 Classic.*
- ACC-4000 Classic Upgrade Kit for the ACC-4000 Lite and RAID. *Converts an ACC-4000 Lite with RAID to an ACC-4000 RAID.*

### UPS

The ACC-4000 Controllers are all configured with an intelligent UPS System and software to safeguard an orderly shutdown of the operating system in the event of a power failure or brownout. The UPS kit also includes 2 CATV surge protectors for the ANIC (one for the ANIC input and one for output) and one **Telco** Surge Protector for the Diagnostics Modem. The Multiplexer comes equipped with its own surge protector.

### Flexible

The controllers are located at the Central Office or a local cable **headend** and operate in stand-alone mode or as slaves to a Business System Interface.

The 'Analog **WireLink**' communication protocol used by the ACC-4000 controllers is already supported by all major third party Business System Vendors and operator-specific billing systems.

### Supports wide range of analog addressable terminals

The ACC-4000 Family of Controllers is fully compatible with the complete range of our addressable set-tops. It is also designed to support one-way **STARVUE** and **STARFONE** terminals with the addition of a modem kit. Compatibility with emerging technologies is built-in. Our current software release supports advanced analog set-tops such as the CFT-2000, Music **Choice** and **SEGA**

### Operator Friendly

The ACC-4000 Lite, Classic and RAID all feature a straightforward, user-friendly Graphical User Interface ensuring easy integration into new or existing addressable systems.

## HARDWARE OPERATING ENVIRONMENT

### Up To Three Hard Drives

The ACC-4000 Classic and RAID are configured with three 2 GB hard drives, the ACC-4000 Lite with one 2GB hard drive. The first drive in the ACC-4000 Classic stores the operating system, the second the database and the third drive serves as a spare, used for database backup to ensure that the system is continuously on-line.

### Streaming Tape Drive

The high capacity streaming tape drive accepts tapes up to 5 GB. The drive handles loading the initial system software and routine database backups. In addition, it is ideal for installing software upgrades as new enhancements are made available to users.

### Diagnostics Modem

All platforms include a modem for our service engineers to communicate with any controller installed in the field and perform remote diagnostics so that necessary remedial steps are accomplished without an on-site visit. *(Always connect the modem to a separate, dedicated line that is not part of the PBX system in the cable office.)*

### Printer

The ACC-4000 Classic and RAID packages include a Dot Matrix printer for printing reports available to the user through the operating system.

### Addressable Network Interface Card (ANIC)

The ANIC interfaces with the cable system via a bi-phase 14 KB datastream. The proprietary card encodes the input and output datastreams to ensure transportation to all addressable devices.

### ANIC-A Ready

The ACC-4000 controllers support ANIC-A, our newly released **rack**-mountable component. When present, the ANIC-A connects to the ACC-4000 Lite, Classic or RAID via an Ethernet **10BaseT** link. The separation allows more than one ANIC-A to be assigned to a single controller thereby increasing data throughput between a controller and its set-tops.

## WireLink Addressable Control

The Controllers operate in a stand-alone mode or under the control of a Business System (also referred to as a Subscriber Management System). The **WireLink** Ports are provided standard with each controller package. Our 'Analog **WireLink**' protocol is given to the interface provider upon execution of a Trade Secret License Agreement.

## SOFTWARE OPERATING ENVIRONMENT

The ACC-4000 Lite, Classic and RAID ship with **Sybase** powerful relational database, **SCO** UNIX and Unify Accell's Graphical User Interface software.

## SOFTWARE APPLICATION

The ACC-4000 Family includes our **powerful** Software Application, a pinnacle in Software Research and Development designed by our World Class Engineering Team. The Software Application controls all subscriber authorizations, terminal functions, channel maps, service codes, packages, impulse and one-way events, message management, and extensive reporting. Moreover, the Software Application is constantly being updated with improved functionality.

The Software Application used in the ACC-4000 Lite is feature-identical to that in the ACC-4000 Classic. However, the Software Application in the ACC-4000 Lite is customized for systems with a maximum of 30,000 set-tops.

NEXT LEVEL™



### Modulates Controller's Bi-Phase Data Stream

#### FEATURES

- **THREE SEPARATE UNIT FUNCTIONS**
  - **FREQUENCY AGILE DATA MODULATOR, 73-122.9 MHz**
  - **SIX PORT BI-PHASE DATA SPLITTER**
  - **SIX PORT BI-PHASE DATA COMBINER**
- **FRONT PANEL FREQUENCY SELECTION**
- **ONLY 1.75 INCHES HIGH**
- **FOR ONE-WAY ADDRESSABLE SYSTEMS**

The Data Path Modulator (Model DPM) is a multi-function, frequency agile data modulator used in the NextLevel Addressable Control Systems. The DPM modulates the controller's bi-phase data stream to an RF carrier for distribution on the cable system, controlling addressable terminals in subscribers' homes.

With a frequency range of 73.0 to 122.9 MHz, the DPM can control numerous terminal types in both domestic and international markets.

#### MULTI-FUNCTIONAL

In addition to its primary function as a frequency modulator, the DPM incorporates two other addressable headend control features: a six port bi-phase data splitter and six port bi-phase data combiner.

The data splitter receives a single data feed, providing six identical data outputs that can be used to addressably control six different headend devices, such as NL's MVP encoders. The data combiner allows for six separate data inputs such as six MVP encoder data outputs to be combined into one composite bi-phase data output. The combiner output can be connected directly to the data receiver port of the addressable controller or to other bi-phase data communications equipment for transmission back to the controller.

#### MANAGES HEADEND PPV OPERATIONS

Various addressable system application configurations to manage headend pay-per-view operations can be accommodated with the DPM's multi-function capabilities to modulate, split and combine the addressable control data stream.

This versatile data path communications device is housed in a standard 19-inch wide, 1.75-inch high, space-saving, rack-mountable enclosure.

Frequency selection is achieved through a four digit switch on the front panel that tunes in 100 kHz increments. Front panel LEDs offer quick visual status checks of modulator data present, modulator output on, combiner data present, RF synthesizer lock and power on.

## Specifications

Modulation Method

Delay

Frequency Range

Selectability

Level

Spurious Outputs

Frequency Accuracy

Frequency Stability

Modulation Rate

Modulation Depth

Load Impedance

Data Format

Source Impedance

Delay to Any Output

Delay from Any Output

Logical "1" Voltage

Load Impedance

Supply Voltage

Power Dissipation

Signal Connections

Power Connection

Dimensions

Weight

Operating Temperature

Storage Temperature

## RF OUTPUT

Frequency Modulation

50  $\mu$ sec Max

73.0 to 122.9 MHz

100 kHz steps

+ 60 dBmV Minimum

- 55 dBc at  $\pm 500$  kHz from carrier center frequency $\pm 0.008\%$  $\pm 0.005\% + 0.0001\%/degree\ C$ 

13,980 K bits/sec

 $\pm 75$  kHz,  $\pm 20\%$ 75  $\pm 5$  Ohms

## SPLITTER

Biphase digital data\*

75  $\pm 5$  Ohms1  $\mu$ sec Max

## COMBINER

1  $\mu$ sec Max1.4  $\pm 0.2$  V into 75 Ohms75  $\pm 5$  Ohms

## GENERAL

105 to 125 Vac or 210 to 250 Vac

50 or 60 Hz

A switch, located in the IEC rear panel connector block, selects either the (nominal) 115 or 230 Vac input voltage.

10 W Max

Female "F" type connectors.

IEC connector allows the use of any suitable AC power cord

1.75"H x 19"W x 18.35"D (including rear panel connectors and front panel protrusions)

6.75 lbs

0 to +50 degrees C

- 25 to + 75 degrees C

\*Proprietary NL DataChannel™ format

Specifications subject to change without notice.



### Scrambles, Encodes and Addresses

#### FEATURES

- UP TO EIGHT CONTROLLED CHANNELS PER ENCLOSURE
- BASEBAND ENCODED RANDOM DYNAMIC SCRAMBLING
- MICROPROCESSOR CONTROLLED
- DYNAMIC EVENT CONTROL WITH INTEGRAL REAL-TIME CLOCK
- STANDARD 19-INCH EQUIPMENT RACK MOUNT

The HVP-III Headend Video Processor is a third generation processor that provides scrambling, encoding and addressing for baseband addressable terminals.

The HVP-III provides secure video scrambling using random dynamic baseband video inversion, compression and sync suppression. Data to descramble is encrypted for greater security and is constantly changed.

#### OPERATION

The HVP-III inserts both addressing and channel control information within the video bandwidth portion of each HVP-III channel. This information includes system ID, channel packages and event numbers on pay-per-view programs. Picture quality is enhanced by video clamps, AGC and a peak white clipper.

The HVP-III is controlled by the Micro-ACS headend computer. Alterable parameters may be changed through the addressing computer without a technician's presence at the headend location. HVPs may be co-located with the Micro-ACS or remotely located via a phone line or an RF communication link.

#### USER FEATURES

HVP-III channel controls may be reconfigured from the Micro-ACS or by direct HVP-III input through a terminal. A selectable alternate video generator may be set for addressing even in the absence of a video source following channel sign-off.

Standard BNC connectors serve as signal input-output points on the HVP-III rear panel. A third bank of rear-panel connectors also lets any channel serve as a loop-through source for another channel.

HVP-III multicolored LED indicators give the technician visual confirmation of Micro-ACS/HVP-III communication for test and calibration purposes. Adjustments, switch settings, and test points are also conveniently located along the front edge of each HVP-III for in-place testing.

NEXT LEVEL™

## Specifications

**Video Inputs:**

Bridging Video Input Impedance:  
> 3K Ohms (DC to 6 MHz)  
Level:  
0.67 to 2.0 V pp

**Video Outputs:**

Return Loss:  
> 16 dB (30 Hz to 6 MHz)  
Impedance:  
75 Ohms (Nominal)  
Level:  
1 V pp into 75 Ohms (Nominal)  
DC Offset:  
Blanking Level = 0.0 Vdc ( $\pm 0.25$  Vdc)  
Isolation Output One to Output Two:  
< 60 dB (30 Hz to 6 MHz)

**AGC Specifications:**

Output Level Change for 6 dB Input Change:  
< 0.5 dB  
Manual Level Set Response Time:  
Less Than 5 Seconds

**Data Level at Video Output:**

80 IRE Nominal

**Composite Sync Output:**

Output Level:  
0.28 V pp into 75 Ohms

**Indicators:**

ACS Receive and Transmit Data  
Scrambling  
White Clip  
Detected Scene Change  
Voltage Supply  
Self Test

**User Adjustments:**

Reset  
Baud Rate  
Hub ID  
Channel ID  
Video Offset  
Video Inverting Offset  
AGC Level  
Sync Level  
Sync Pull Up  
White Clip

**Test Points:**

Input Video  
Composite Sync  
Power  
Output Video

**AC Input:**

110 Volts AC, 60 Hertz

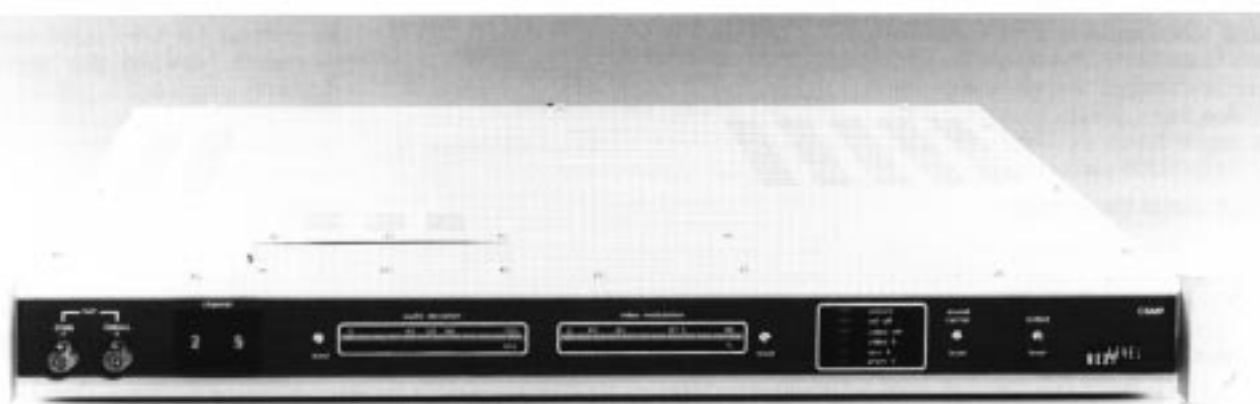
**Mount:**

Standard 19-Inch Rack Mount

**Size:**

19.0" Wide  
20.5" Deep  
10.5" High

NOTE: Specifications subject to change without notice.



## FEATURES

- **FREQUENCY AGILE FROM 50 TO 600 MHz**
- **FRONT PANEL CONTROLS**
- **IF AND BASEBAND SWITCHING FUNCTIONS**
- **BTSC STEREO COMPATIBLE**
- **CONTINUOUS VIDEO DEPTH OF MODULATION DISPLAY**
- **CONTINUOUS AUDIO FREQUENCY DEVIATION DISPLAY**
- **1.75 INCHES HIGH**

Commander 6 Modulators are state-of-the-art, frequency agile units capable of satisfying the most demanding CATV applications.

The C6MP operates on standard, EIA, HRC or IRC channel assignments between 50 and 600 MHz. The system is packaged in a space saving 1.75 inch rack-mounted housing and utilizes efficient switching power supply regulators to minimize heat dissipation and power consumption.

### FRONT PANEL CONTROLS

The C6 utilizes a front panel switch to select all channel assignments between 50 and 600 MHz.

Internal bandpass filters are automatically engaged upon frequency selection, ensuring that a weighted signal-to-noise ratio of greater than 60 dB is maintained with no external filtering required, regardless of the number of units combined.

Front Panel Bar Graphs indicate video depth of modulation and audio deviation

allowing for quick visual status checks.

In addition, the front panel includes RF and IF test points, and indicators for phaselock status, video input and IF switching status. Digital channel select switches, and picture and sound carrier as well as RF output level controls are also included on the front panel.

### AUTOMATIC SIGNAL SWITCHING

A switched IF input is provided which can be controlled externally or automatically on loss of video input. Additional levels of switching are offered with the options package, Module C6 MOB.

The IF to channel output converter system is frequency agile from 50 to 600 MHz. The aeronautical band frequency accuracy requirement is met and the FCC required frequency offsets of +12.5 KHz and +25 KHz are generated automatically. The RF channel output is available at a full 60 dBmV level with low spurious and high carrier-to-noise ratio.

### SCRAMBLING COMPATIBILITY

The C6MP is compatible with commercial scrambling systems. The C6 Modulator is compatible with the NextLevel Scrambler, Model MVP, in all scrambling modes. The C6 offers a composite IF input connection to facilitate scrambling with the MVP.

### STEREO COMPATIBLE

The C6 Modulators are easily interfaced with the NextLevel CMTS, stereo

encoder. Stereo encoder interfacing can be done with 41.25 MHz or 4.5 MHz sound carrier inputs. Maximum consideration was given to simplifying the required interconnect wiring.

### HRC - IRC SWITCHABLE

The output of model C6MP can be set for either harmonic or incremental related carrier (HRC or IRC) operation. The C6 phaselock modulator is connected to a phaselock reference generator, such as NL's CCG-\* family, via a convenient built-in loop-through input. When the external reference signal is unavailable, carrier frequency is maintained by a precise internal reference.

### OPTION PACKAGE, MODULE C6 MOB

A single option module, model C6 MOB allows the user to conveniently add baseband audio and video input switching, a 4.5 MHz sound carrier input and an additional switched IF input. These inputs are externally selectable and can be programmed for automatic switching upon loss of video input. The options module also includes defeatable video and audio AGC for applications involving variable baseband signal levels.

**NEXT LEVEL**



**AUDIO/VIDEO AGC**

When the option board is installed, separate audio and video automatic gain control operation is available. Preset modulation levels are maintained despite changes in audio/video input levels resulting from varying signal levels or when switching between audio/video sources.

**BASEBAND INPUT SWITCHING**

A baseband video and audio switching facility is provided. The video switch system includes video A signal sensing to allow automatic switching to video B input when the video A signal is absent.

A rear panel connection provides for external control as well. Audio Input switching follows the video input selection automatically.

**SECOND IF SWITCH**

The option board offers an additional IF signal input called PROGRAM. This is identical to AUX IF switching except that it has a lower priority. The PRGM IF switch is used for program switching or automatic program replacement when the AUX IF switch is used for the emergency alert function.

**4.5 MHz AUDIO INPUT**

When installed, the option board provides an external 4.5 MHz input and a facility to switch between that input and the internally generated sound signal. The 4.5 MHz input provides for simple audio interfacing to the output of a stereo encoder or demodulator.

**WIDE VARIETY OF BENEFITS**

The Commander 6 Modulator is compatible, with all present and past NL Headend equipment, and provides all the features you've come to expect from Commander products.

**Specifications****RF**

|                     |                                                                |         |
|---------------------|----------------------------------------------------------------|---------|
| Frequency Range     | Channels 2 to 94<br>50 to 600 MHz<br>(HRC, IRC, Standard, EIA) |         |
| Frequency Accuracy  | ±5 kHz                                                         |         |
| Output Level        | 60 dBmV Minimum                                                |         |
| Spurious            | -60 dBc Maximum                                                |         |
| Output Impedance    | 75 Ohms                                                        |         |
| Output Return Loss  | 14 dB minimum within the output channel                        |         |
| Sound Carrier Level | Adjustable from -5 to -25 dB relative to picture carrier       |         |
| C/N Ratio           | Typical                                                        | Minimum |
| In-band             | 70 dB                                                          | 67 dB   |
| Adjacent channel    | 74 dB                                                          | 70 dB   |
| Wideband            | 78 dB                                                          | 75 dB   |

**IF**

|                             |                  |
|-----------------------------|------------------|
| Picture IF Output Frequency | 45.75 MHz        |
| Picture IF Output Level     | 35 dBmV nominal  |
| Sound IF Output Frequency   | 41.25 MHz        |
| Sound IF Output Level       | 10 to 30 dBmV    |
| CW IF Output Frequency      | 45.75 MHz        |
| CW IF Output Level          | 52 dBmV ± 5.0 dB |

**GENERAL**

|                    |                                                         |
|--------------------|---------------------------------------------------------|
| Power Requirements | 40 Watts                                                |
| Weight             | 12.8 lbs (5.8 kgs)                                      |
| Dimensions         | 19"W x 1.75"H x 17"D<br>(48.07 cm x 4.42 cm x 43.01 cm) |

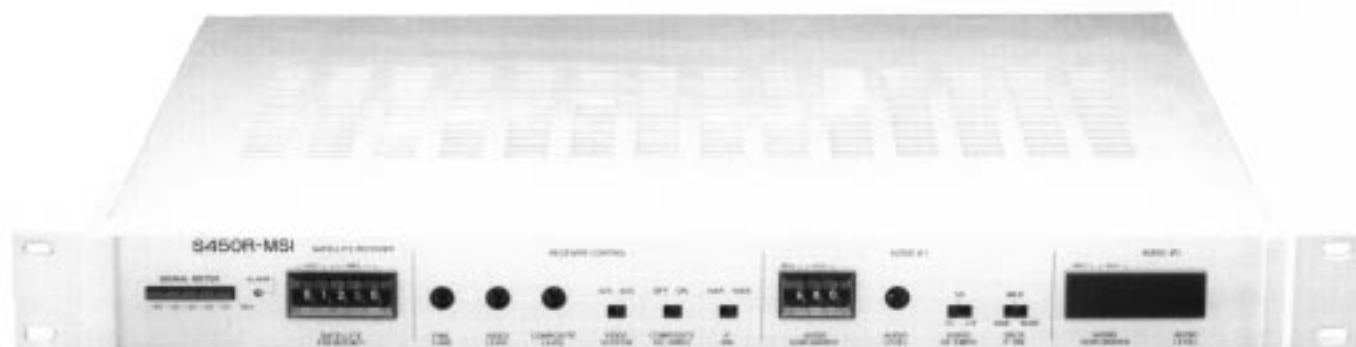
**VIDEO**

|                                              |                                       |
|----------------------------------------------|---------------------------------------|
| Standard Baseband                            | 0.5 to 2.0 V P-P for 87.5% modulation |
| Input level range                            | 1.75 V P-P nominal for 87.5%          |
| Encoded Video Input Level                    | 75 Ohms                               |
| Video Input Impedance                        | 30 dB Minimum                         |
| Video Input Return Loss                      | 2% Maximum with 2T pulse              |
| K Factor                                     | 64 dB Minimum per NTC-7, 3.16         |
| S/N Ratio (Lum weighted)                     |                                       |
| Chroma Delay, relative to std. precorrection |                                       |
| 15° to 25° C                                 | ±50 nSec                              |
| 0° to 50° C                                  | ±65 nSec                              |
| Frequency Response                           | ±0.5 dB Maximum from 25 Hz to 4.1 MHz |
| Differential Gain                            | 87.5% mod. ±3%                        |
| Differential Phase                           | 1 Degree p-p Maximum.                 |
| Hum and Noise                                | -60 dB at 87.5% mod.                  |
| Tilt                                         | 1.0% Maximum per NTC-7, 3.3           |

**AUDIO**

|                           |                                                   |
|---------------------------|---------------------------------------------------|
| Input Level Range         | Dual input range selectable                       |
| Range 1                   | -10 to +10 dBm                                    |
| Range 2                   | +5 to +25 dBm                                     |
| Input Impedance           | Dual input range selectable                       |
| Low Impedance             | 600 Ohms balanced                                 |
| High Impedance            | Greater than 10k Ohms                             |
| Frequency Response        | ±1.0 dB Maximum from 30 Hz to 15 kHz              |
| kHz as ±25 kHz deviation. |                                                   |
| Harmonic Distortion       | 1.0% Maximum from 30 Hz to 15 kHz at ±25 kHz dev. |
| FM hum and noise          | -60 dB Maximum with respect to ±25 kHz deviation  |
| Subcarrier Frequency      | 4.5 MHz ± 500 Hz                                  |

Specifications subject to change without notice.



## FEATURES

- **COMMERCIAL-QUALITY PERFORMANCE ON NTSC, PAL, AND SECAM SIGNALS**
- **AFC TRACKING CIRCUIT WITH CONTINUOUS FINE TUNING ABILITY TO CORRECT FOR LNB DRIFT**
- **TWO IF BANDPASS FILTERS (27 MHz = WIDE BANDWIDTH, 18 MHz = NARROW BANDWIDTH)**
- **AGC TUNING VOLTAGE FOR ANTENNA PEAKING**
- **FIVE-SEGMENT BAR GRAPH RF SIGNAL METER**
- **MICROPROCESSOR-CONTROLLED SINGLE CONVERSION PLL RF TUNING**
- **MULTI-STANDARD FREQUENCY AGILE AUDIO DEMODULATOR**

The S450R-MSI is a multi-standard, international, commercial-quality 950-2050 MHz satellite receiver. It incorporates a fully synthesized PLL tuning circuit. The tuning logic provides continuous tuning AFC and microprocessor control with 100 KHz accuracy.

The multiple video low pass filters and de-emphasis networks provide commercial-quality performance for NTSC, PAL, SECAM, and MAC operation, along with all known video scrambling formats. The multi-tap power supply with two voltage settings reduces heat and decreases power consumption. It is designed for continuous operation 24 hours a day.

You can select a microprocessor-controlled 24-channel frequency, or dial the desired frequency directly. The S450R-MSI automatically tracks all known LNBs without conversion charts.

The flexible receiver design is an open architecture with field-installable options. The S450R-MSI can be ordered with the ASD-NDB option that provides expanded audio functionality.

## SD-NBD OPTION

This option provides a second audio channel (#2 audio subcarrier) with PLL frequency agile audio demodulator. When set at 110 KHz bandwidth, this option supports Panda 1\* 15 kHz audio only.



## Specifications

**RF**

|                        |                |
|------------------------|----------------|
| RF Frequency Range     | 950 - 2050 MHz |
| Input Impedance        | 75 Ohms        |
| Input Level            | -20 to -60 dBm |
| Input Return Loss      | ≥12 dB         |
| Noise Figure           | ≤13 dB         |
| Tuning                 | 1.0 MHz        |
| Fine Tuning Resolution | ±2.0 MHz       |
| AFC Capture Range      | ±3.0 MHz       |
| Static Threshold       | <7 dB          |

**IF**

|                     |           |
|---------------------|-----------|
| IF Frequency        | 479.5 MHz |
| IF Bandwidth        |           |
| Wide                | 27 MHz    |
| Narrow              | 18 MHz    |
| FM Static Threshold | ≤7 dB     |

**VIDEO**

|                               |                      |                   |
|-------------------------------|----------------------|-------------------|
| Frequency Response            | 10.0 to 27.6 MHz p-p | 9.0 to 24 MHz p-p |
| Deviation Range for 1.0 V p-p | 1.5                  | 1.5               |
| Chroma/luma Delay             | ±33 nS               | ±33 nS            |
| DIF Gain                      | ≤4.0%                | 4.0%              |
| DIF Phase                     | 4.0°                 | 4.0°              |
| Luminance Non-Linearity       | ±5.0%                | <5.0%             |

**COMPOSITE VIDEO**

|                                      |               |              |
|--------------------------------------|---------------|--------------|
| Deviation Range for 1.0 V p-p Output | 10.0-27.6 MHz | 9.0-24.0 MHz |
|--------------------------------------|---------------|--------------|

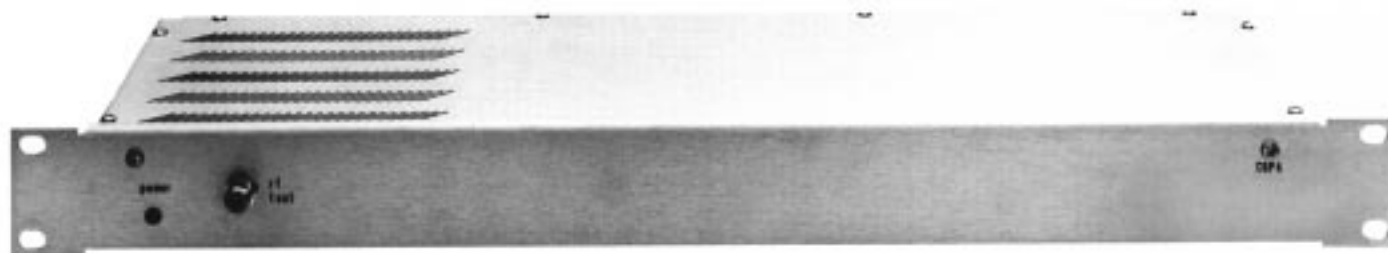
**AUDIO**

|                                   |                   |
|-----------------------------------|-------------------|
| Audio Thd                         | 1.5%              |
| Subcarrier Frequency              | 5.0 - 8.5 MHz     |
| Output Level                      | ≥18 dBm           |
| Output Impedance                  | 600 Ohms balanced |
| Frequency Response 20 Hz - 15 kHz | ±1.5 dB           |
| Hum and Noise                     | ≥68 dB            |

**GENERAL**

|                   |                                                  |
|-------------------|--------------------------------------------------|
| AC Voltage        | 110, 220                                         |
| AC Line Frequency | 50-60 Hz                                         |
| Power             | 28 W Maximum                                     |
| Temperature       | 32°F-120°F (0°C-50°C)                            |
| Dimensions        | 1.75"Hx19"Wx12"D (4.42 cm x 48.07 cm x 30.36 cm) |
| Weight            | 8.5 lbs (3.86 kgs)                               |

Specifications subject to change without notice.



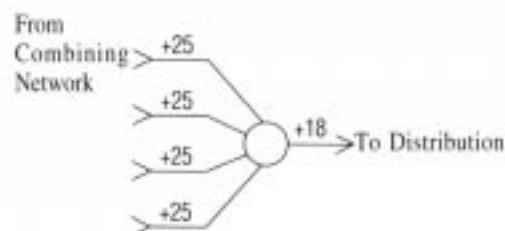
## FEATURES

- 22 dB GAIN
- FEEDFORWARD TECHNOLOGY FOR LOW DISTORTION
- 1.75 INCHES HIGH
- 550 MHz

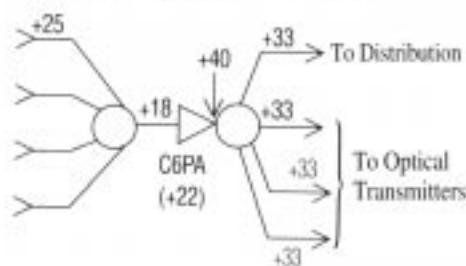
The Commander 6® headend post amplifier, model C6PA, is a rack-mounted, broadband amplifier designed to provide maximum performance to overcome system combining losses and supply low distortion input signals for fiber optic transmission. Feedforward amplifier technology was selected for its gain and distortion characteristics to minimize the impact on overall system performance.

The C6PA is a broadband 550 MHz amplifier designed to easily fit existing headend systems. The unit is packaged in a 1.75" rack-mounted chassis with rear panel "F" connections for the RF input and output. A front panel -20 dB test point is provided for monitoring of the RF output. A LED indicator for POWER ON is located on the front panel for status checks.

## TYPICAL APPLICATION Existing Combining Network



## Revised Combining Network



## Specifications

**ELECTRICAL SPECIFICATIONS:**

|                               |                  |
|-------------------------------|------------------|
| RF Input Return Loss          | 16 dB Typical    |
| RF Output Return Loss         | 16 dB Typical    |
| -20 dB test Point Return Loss | 16 dB Typical    |
| RF in to out gain             | 22 dB            |
| Maximum input level           | + 25 dBmV        |
| Maximum output level          | + 47 dBmV        |
| Noise Figure                  | 11.0 dB Maximum  |
| CTB @ + 42 dBmV out           | - 80 dBc Typical |
| X-mod @ + 42 dBmV out         | - 74 dBc Typical |
| SSO @ + 42 dBmV out           | - 80 dBc Typical |

**CONNECTIONS:**

|                            |             |
|----------------------------|-------------|
| RF input, F-type           | Rear Panel  |
| RF output, F-type          | Rear Panel  |
| -20 dB test point, F-type  | Front Panel |
| AC outlet fuse (removable) | Rear Panel  |
| LED power on indicator     | Front Panel |

**GENERAL SPECIFICATIONS:**

|                             |                                      |
|-----------------------------|--------------------------------------|
| Power Requirements          | 100-135 V, 50 to 60 Hz, 35W Maximum  |
| Dimensions                  | 19" W x 1.75" H (48.07 cm x 4.42 cm) |
| Operating Temperature Range | 32°F to 120°F (0°C to 50°C)          |

Specifications subject to change without notice.

**FEATURES:**

- **AUTO-SENSING INPUT FOR 110 OR 220 Vac APPLICATIONS**
- **FRONT PANEL PLUG-IN MODULE WITH PLUG-N-PLAY OPERATION**
- **MODULE STATUS ALARM INDICATION**
- **PROVIDES REGULATED +5, +12, AND +24 Vdc**
- **FRONT PANEL TEST POINTS AND STATUS LEDs**

**DESCRIPTION**

The AM-OMNI-PS/AC power supply module provides all required DC voltages for the OmniStar equipment shelf. Operational input voltage is auto-ranging from 95 to 264 Volts AC, the module is suited for 110 Vac and 220 Vac applications. The power supply protects against AC input surges, and over-current and over-voltage for the DC outputs. As with all OmniStar modules, a tri-state status LED is conveniently located on the front panel to reference the module's operational condition. And, for module interrogation, DC voltage LEDs and test points are located on the front panel.

The AM-OMNI-PS/AC occupies the first two slots in the OmniStar shelf and should be deployed when using an AC input voltage source. The unique design of the sub-assembly module allows easy access and replacement from the front of the OmniStar shelf facilitating low Time-To-Repair (TTR).

Power is applied to the power supply through an auxiliary connector and filter assembly called the AC Power Input Unit, model AM-OMNI-PIU/AC. The power input unit is mounted on the rear of the OmniStar shelf and interfaces to the power supply module through the use of a blind-mate connector.



## Specifications

**Power Requirements:****AC Voltage Input Range**

95 to 264 Vrms, auto sensing

**AC Voltage Frequency Range**

47 Hz to 63 Hz

**AC Current:**

- @ 95 V

4.0 Amps rms Maximum

- @ 117 V

3.3 Amps rms Maximum

- @ 264 V

1.4 Amps rms Maximum

**Efficiency**

72% Minimum at full load

**Power Consumption \***

Operational 220 Watts, Maximum 380 Watts

**Surge Protection**

Transzorb and EMI/RFI Filter

**Fuse (circuit breaker)**

250 V, 9 Amps (resetable, push button breaker located on the AC Power Input Unit)

**Output Power:****Output Voltages:**

+5 Vdc Range

4.9 to 5.1 Vdc

+12 Vdc Range

11.8 to 12.2 Vdc

+24 Vdc Range

23.7 to 24.3 Vdc

**Output Current:**

+5 Vdc min/max

1.5 Amps/13.1 Amps

+12 Vdc min/max

0.5 Amps/4.4 Amps

+24 Vdc min/max

0.75 Amps/6.0 Amps

**Environmental:****Operating Temperature Range**

0° to 50°C (+32° to 122°F)

**Storage Temperature Range**

-40° to 80°C (-40° to 176°F)

**Physical Properties:****Dimensions**3.0" W x 6.5" H x 14.25" D (2 OmniStar modules wide)  
(7.62 cm x 16.51 cm x 36.20 cm)**Weight**

8.3 lbs (3.7 kgs)

**Mounting**

AM-OMNI-HSG\*/AC equipment shelf, slot 1 and 2

Specifications subject to change without notice.

**Notes:**

\* Power consumption is based on powering a fully loaded shelf with 8 laser modules.



**FEATURES:**

- **CONTINUOUSLY MONITORS CRITICAL PARAMETERS FOR ALL CHASSIS MODULES**
- **LOCAL AND REMOTE INTERFACES FOR STATUS MONITORING AND CONTROL**
- **SHELF SUMMARY ALARM INDICATORS**
- **FRONT PANEL PLUG-IN MODULE WITH PLUG-N-PLAY OPERATION**

**DESCRIPTION**

The OmniStar Control Module (CM1) continuously monitors the critical parameters of all chassis modules and provides a convenient front panel summary status/alarm indicator. The AM-OMNI-CM1 provides a digital control interface across the chassis Serial Peripheral Interface bus and an external computer connected to either of its two communication ports. The unit contains an RS-232D Local-Control PC interface for single chassis and an RS-485 Remote-Control interface for multiple chassis. The user controls and monitors operating performance parameters through either or both the local or remote PC interface. With the LIFEnet™ Headend Control Software - an element level Network Monitoring System - status information for any of the modules within an OmniStar shelf is displayed and control functions are executed right at the PC.

The AM-OMNI-CM1 controls chassis and module alarm indication and rear chassis alarm contact closures. Shelf alarm conditions are displayed. The Control Module also monitors power supply voltages, including minor and major alarm reporting, and DC currents for the cooling fans.

In addition, to the interrogation of all modules and status reporting, the OmniStar Control Module performs self diagnostics and fault identification. It is the perfect interface medium for operating program, module identities and other critical system information.

**NEXT LEVEL**

## Specifications

**Communications Interface:****RS-232D Communications Port**

|             |                                      |
|-------------|--------------------------------------|
| Data Format | Asynchronous, 8 bits plus 1 stop bit |
| Data Rate   | 38.4 kb/sec                          |
| Connector   | DB9, female                          |
| Port Format | DCE, Data Communication Equipment    |

**RS-485 Communications Port**

|             |                                               |
|-------------|-----------------------------------------------|
| Data Format | Asynchronous, 8 bits plus 1 stop bit          |
| Data Rate   | 38.4 kb/sec                                   |
| Connector   | RJ-11, offset latch                           |
| Alarm Relay | Contact closure, 250 mA/40 Vac or Vdc Maximum |

**User Interface:**

|                        |                                               |
|------------------------|-----------------------------------------------|
| Control                | Control Module Reset, push button             |
| Status Indicators      | Tri-state LED, OmniStar shelf status          |
| Operational Indicators | Condition LED's - Remote, Local, TxD, and RxD |

**Power Requirements:**

|                  |                                                  |
|------------------|--------------------------------------------------|
| 24 Vdc           | 50 mA, supplied by OmniStar Power Supply Module  |
| 12 Vdc           | 200 mA, supplied by OmniStar Power Supply Module |
| 12 Vdc (back-up) | 450 mA, supplied by OmniStar Power Supply Module |
| 5 Vdc            | 250 mA, supplied by OmniStar Power Supply Module |

**Environmental:**

|                             |                              |
|-----------------------------|------------------------------|
| Operating Temperature Range | 0° to 50°C (+32° to 122°F)   |
| Storage Temperature Range   | -40° to 80°C (-40° to 176°F) |

**Physical Properties:**

|            |                                                          |
|------------|----------------------------------------------------------|
| Dimensions | 0.75" W x 6.5" H x 13.5" D (1.9 cm x 16.5 cm x 34.29 cm) |
| Weight     | 1 lb (453 g)                                             |
| Mounting   | AM-OMNI-HSG* equipment shelf, slot 11                    |

Specifications subject to change without notice.



OMNISTAR 860 MHz Laser Module for 750 MHz Analog Transmission

**FEATURES:**

- 50 - 860 MHz PASSBAND
- HIGH PERFORMANCE DFB LASER WITH INTERNAL ISOLATOR AND LEADING EDGE PREDISTORTION
- FRONT PANEL PLUG-IN MODULE WITH PLUG-N-PLAY OPERATION
- INTEGRATED PRE-AMP FOR RF INPUT LEVEL OF ONLY +13.5 dBmV WITH 110 ANALOG CHANNELS
- BROADCAST AND NARROWCAST INPUTS
- AVAILABLE IN 8 OUTPUT POWER RANGES

**DESCRIPTION**

The OmniStar 750A/860D laser module offers unparalleled performance for applications requiring increased analog channel transmission. The AM-OMNI-LM\*750A/860D family consists of eight models with optical power ranging from 2 mW (4 dBm) to over 16 mW (12 dBm) offering choice for the most cost effective solution based on designed loss budget, performance criteria and splitting ratio considerations. The 750A/860D laser has an integrated pre-amp allowing for a fixed RF input level of only 13.5 dBmV per channel with 110 NTSC channels applied while maintaining superior distortion performance. All laser modules have separate broadcast and narrowcast RF inputs eliminating the need for external combiners.

As an integrated unit providing all optical, RF signal processing, and control functions, each laser module features an internal optical isolator and RF linearization circuitry to provide superior carrier-to-noise and distortion performance. Optical performance of each laser is characterized at the factory where its optimal operating point is stored in non-volatile memory so that user adjustment of RF or laser drive levels is unnecessary. The link performance is guaranteed upon power-up. The three user controlled modes of operations are *preset* - factory set AGC for optimal laser performance, *set* - user adjustable AGC, and *manual* - user adjustable fixed gain. The set and manual modes let the user customize the RF drive level for desired carrier-to-noise and distortion performance based on channel loading and system requirements. Continuous wave and video signal input modes are also user selective.

NEXT LEVEL™



**OMNISTAR 860 MHz Laser Module for 750 MHz Analog Transmission**

**SPECIFICATIONS**

**RF Characteristics:**

|                       |              |
|-----------------------|--------------|
| Operational Bandwidth | 50 - 860 MHz |
| RF Input Impedance    | 75 Ohms      |
| RF Input Return Loss  | 14 dB min.   |
| RF Connector Type     | G-type       |

**Optical Characteristics:**

|                        |                                                            |
|------------------------|------------------------------------------------------------|
| Optical Wavelength     | 1310 nm +/- 20 nm                                          |
| Distortion Performance | (see link performance specs.)                              |
| Optical Connector Type | SC/APC                                                     |
| Laser Shutdown         | Enable/Disable via. Control Module using LIFEnet™ Software |
| Eye Protection         | Optical Safety Shutter                                     |

**Power Requirements:**

|                             |               |
|-----------------------------|---------------|
| DC Currents Minimum/Maximum |               |
| +5 Vdc                      | 90 mA/1.7 A   |
| +12 Vdc                     | 350 mA/450 mA |
| +24 Vdc                     | 400 mA/550 mA |
| Power Consumption           | 25 watts      |

**User Interface:**

|                          |                                                               |
|--------------------------|---------------------------------------------------------------|
| Front Panel              | Tri-state Module Status LED                                   |
| Operational Mode         | Push-button Selectable, LED display indication                |
| Optical Power Test Point | 5 mW/1 V, Scaled DC Voltage of Optical Output Power           |
| RF Test Point            | +14 dBmV, ± 0.5 dB, per channel with 110 NTSC channel loading |
| Data/Control Interface   | Serial Peripheral Interface (SPI) using LIFEnet™ Software     |

**Environmental:**

|                                   |                              |
|-----------------------------------|------------------------------|
| Operating Temperature Range       | -20° to 65°C (-4° to 149°F)  |
| Storage Temperature Range         | -40° to 80°C (-40° to 176°F) |
| Over Temperature Laser Protection | Software and Hardware active |

**Physical Properties:**

|            |                                                            |
|------------|------------------------------------------------------------|
| Dimensions | 1.5" W x 6.5" H x 14.25" D (3.81 cm x 16.51 cm x 36.20 cm) |
| Weight     | 4.0 lbs (1.8 kgs)                                          |
| Mounting   | AM-OMNI-HSG* equipment shelf, any of slots 3 - 10          |

Specifications subject to change without notice.

**OMNISTAR 860 MHz Laser Module for 750 MHz Analog Transmission**

**LINK PERFORMANCE SPECIFICATIONS**

|                              |                                                                                                         |
|------------------------------|---------------------------------------------------------------------------------------------------------|
| Operational Bandwidth        | 50 - 860 MHz ( 50 - 750 MHz Analog, 750 - 860 MHz Digital)                                              |
| Optical Wavelength           | 1310 nm +/- 20 nm                                                                                       |
| Input Signal Level:          |                                                                                                         |
| Broadcast      Analog        | + 13.5 dBmV, 50 - 750 MHz, 110 NTSC channels<br>+ 15.5 dBmV for models AM-OMNI-LM-11LD/750 and 12LD/750 |
| Digital                      | 3.5 dBmV, 750 - 860 MHz                                                                                 |
| Narrowcast    Analog/Digital | 22 dB above Broadcast input levels                                                                      |

**CABLEOPTICS LINK DISTORTION PERFORMANCE**

|     |                   |
|-----|-------------------|
| CTB | -64 dB worst case |
| CSO | -60 dB worst case |

**CARRIER-TO-NOISE PERFORMANCE (dB):**

| LASER MODEL | OUTPUT POWER<br>(Min - Max)<br>mW/dBm | OPTICAL LOSS (dB) |      |      |      |      |      |      |      |      |      |      |      |  |
|-------------|---------------------------------------|-------------------|------|------|------|------|------|------|------|------|------|------|------|--|
|             |                                       | 4                 | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   |  |
|             |                                       |                   |      |      |      |      |      |      |      |      |      |      |      |  |
| LM-4/750    | 2-3.2/3-5                             | 50.5              | 49.5 | 48.5 | 47.5 | 46.5 |      |      |      |      |      |      |      |  |
| LM-6/750    | 2.5-4/4-6                             |                   | 51.0 | 50.0 | 49.0 | 48.0 | 47.0 |      |      |      |      |      |      |  |
| LM-7/750    | 4-6.3/6-8                             |                   |      |      | 50.5 | 49.5 | 48.5 | 47.5 | 46.5 |      |      |      |      |  |
| LM-9/750    | 6.3-10/8-10                           |                   |      |      |      | 50.0 | 49.5 | 48.5 | 47.5 | 46.5 |      |      |      |  |
| LM-11/750   | 10-14/10-11.5                         |                   |      |      |      |      |      |      | 50.0 | 49.0 | 48.0 | 47.0 | 46.0 |  |
| LM-11LD/750 | 10-14/10-11.5                         |                   |      |      |      |      |      |      | 50.0 | 49.0 | 48.0 | 47.0 | 46.0 |  |
| LM-12/750   | 12.6-20/11-13                         |                   |      |      |      |      |      |      |      | 50.5 | 49.5 | 48.5 | 48.0 |  |
| LM-12LD/750 | 14-22.4/11.5-13.5                     |                   |      |      |      |      |      |      |      | 50.5 | 49.5 | 48.5 | 48.0 |  |

Specifications subject to change without notice.

**Notes:**

Link performance specifications are based on 50-750 MHz All Analog (110 NTSC channels).

C/N specifications measured using RM-9 receiver and are worst case, add 1 dB for typical performance.

Specifications are measured using CW carriers per NCTA.

AM-OMNI-LM-4 specifications are for optical link budgets that include a maximum of 7.5 km of fiber (0.4 dB/km).

AM-OMNI-LM-6, -7, -9, -11LD, and -12LD specifications are for all fiber (0.4 dB/km) optical loss budgets and include 1 dB for connector loss.

AM-OMNI-LM-11 specifications are for optical link budgets that include a maximum of 20 km of fiber (0.4 dB/km).

AM-OMNI-LM-12 specifications are for optical link budgets that include a maximum of 15 km of fiber (0.4 dB/km).

AM-OMNI-LM-11LD, and 12LD require an input level of +15.5 dBmV for 50-550 MHz Analog (110 NTSC channels).

All link budgets include 1 dB for connector loss and meter inaccuracy.



#### ADVANTAGES OF 1550 NM WINDOW

- **Lower fiber attenuation** (0.25 dB/km @ 1550 nm vs. 0.35 dB/km @ 1310 nm)
- Optical amplification allows repeating without distortion degradation
- **Higher output powers** allow for longer reach or increase number of nodes served
- Increases network architecture flexibility

#### BENEFITS OF AM-1550-TX1 AND AM-1550-OA

- Proprietary SBS suppression circuitry enables higher direct launch power (17 dBm) into the fiber, increasing the ability to serve remote locations and reducing overall system cost by reducing the number of optical amplifiers required.
- Easy set-up and operation; no specific application “tweaking” required
- 13 dBm and 17 dBm launch powers increase system design flexibility
- Low noise, telecom proven reliable EDFA technology
- Automatic output power compensation increases system reliability (dual pump OA model)

#### APPLICATION OVERVIEW:

The MegaStar 1550 nm products are designed to complement NextLevel's OmniStar® 1310 and 1550 nm platform, providing the most cost-effective network solution to both transport and distribution applications. The MegaStar 1550 nm product family is ideally suited for applications that exceed the limitations of 1310 nm products such as Headend to Hub interconnect (point-to-point or point to multi-point), long-haul and redundant ring architectures. MegaStar optical amplifiers are used as launch amplifiers or in-line amplifiers to repeat the optical signal with minimal performance degradation. The high optical output power can also be split for the distribution of signals in broadcast applications. If no narrowcast services are required, the broadcast signals can be optically amplified at the hub site and directly transmitted to the node. In headend consolidation applications, broadcast analog signals are transported from one central headend facility to other headend or hub sites in a metropolitan/regional network. The broadcast signals can then be combined with local origination and target service signals at the hub and then transmitted to the node using 1310 nm DFB technology.

NEXTLEVEL™

## AM-1 550-TX1/SD AM-1 550-OA/

## MEGASTAR™ 1550 nm Externally Modulated Transmitter and Optical Amplifier

### PRODUCT DESCRIPTION:

MegaStar is a 1550 nm fiber optic analog transmission product family that supports advanced Broadband Hybrid Fiber/Coax Telecommunications systems. The AM-1550-TX1 transmitter and AM-1550-OA optical amplifier family of products incorporate the latest state-of-the-art 1550 nm technology. These products have been optimized for the stringent requirements of analog signal transmission and for use with standard 1310 nm optical fiber (non-dispersion shifted).

### EXTERNALLY MODULATED TRANSMITTER:

The AM-1550-TX1/SD transmitter consists of a high performance 1550 nm DFB laser source, a lithium niobate (LiNbO<sub>3</sub>) Mach-Zehnder electro-optic modulator, proprietary linearized RF drive circuitry, and Stimulated Brillouin Scattering (SBS) suppression circuitry. Both transmitter models have a dual minimum output power of 6 dBm that, when used in conjunction with an AM-OMNI-OA/13S or AM-OMNI-OA/17D provides an optical

launch power of 13 dBm or 17 dBm respectively. The 17 dBm combination is dual pumped for increased output power and reliability. Proprietary SBS suppression circuitry allows up to 17 dBm of optical power to be launched directly into a single fiber, allowing for point-to-point transmission of 77 NTSC channels up to 65 km without signal regeneration while maintaining superior CNR and distortion performance. The integrated RF pre-amp and automatic gain control support a minimum RF input level of 18 dBmV and allow for easy user set-up. The transmitter models are available in a 3.5" (2 RU high) x 19" housing that includes a built-in microprocessor to perform continuous critical parameter monitoring, and provides front panel summary status/alarm indication through user-friendly front panel LEDs.

### OPTICAL AMPLIFIER:

The AM-1550-OA/SD optical amplifier is specifically optimized for transmitting and repeating analog signals with minimal signal degradation. NextLevel optical

amplifiers incorporate EDFA technology that has been deployed and proven reliable in telecommunication applications. Each optical amplifier contains one or two pump lasers, erbium-doped fiber, and control circuitry. The input and output optical power is continuously monitored to insure optimum operation. The MegaStar family includes two optical amplifiers, with output powers of 13 dBm or 17 dBm. The 13 dBm model features a single, highly reliable pump laser. The 17 dBm model features dual pump lasers, offering output power compensation in the event of pump failure or degradation. The optical amplifier models are available in a space efficient 1.75" (1 RU high) x 19" housing that includes a built-in microprocessor to perform continuous parameter monitoring and provides front panel summary status/alarm indications. Operating performance parameters of the transmitters and amplifiers can be controlled and monitored by either front panel user interfaces or an RS-232 local PC interface.

## AM-1 550-TX1/SD

## 1550 nm Externally Modulated Transmitter

**MegaStar** 1550 nm Transmitter Technical Specifications  
 AM-1 550-TX1/SD

| link Specifications <sup>(1)</sup>                                                                                                                                                                                                       | 77 NTSC | 60 NTSC | 40 NTSC | 60 PAL B/G |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|------------|
| CNR                                                                                                                                                                                                                                      | 51      | 52      | 53.5    | 51         |
| c s o                                                                                                                                                                                                                                    | -65     | -65     | -65     | -65        |
| CTB                                                                                                                                                                                                                                      | -65     | -65     | -65     | -65        |
| XMOD                                                                                                                                                                                                                                     | -60     | -60     | -60     | -60        |
| (1) Specifications are worst case and are measured using CW carriers per NCTA and include receiver and fiber degradation. CNR is measured with 0 dBm into an RM-9 receiver through 45 km (using OA/13S) or 65 km (using OA/17D) of fiber |         |         |         |            |

| RF Specifications                     | MIN | TYP    | MAX  | UNITS    |
|---------------------------------------|-----|--------|------|----------|
| bandwidth                             | 50  |        | 750  | MHz      |
| flatness p-p:                         |     |        |      |          |
| 50-550 MHz                            |     |        | 1.25 | dB (P-P) |
| 50-750 MHz                            |     |        | 2.0  | dB (P-P) |
| input level w/ AGC (77 NTSC channels) | 18  |        | 30   | dBmV/ch  |
| connector type                        |     | F-type |      |          |
| input impedance                       |     | 75     |      | Ohms     |
| return loss (50-750 MHz)              | 16  |        |      | dB       |
| hum mod                               | 65  |        |      | dB       |

| Optical Specifications                                                                                               | MIN                               | TYP  | MAX  | UNITS |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------|------|------|-------|
| optical output power: <sup>(2)</sup>                                                                                 |                                   |      |      |       |
| with AM-1550-OA/13S                                                                                                  | 13.0                              | 13.5 | 14.0 | dBm   |
| with AM-1550-OA/17D                                                                                                  | 16.0                              | 16.5 | 17   | dBm   |
| maximum power into single fiber <sup>(3)</sup>                                                                       |                                   |      | 17   | dBm   |
| maximum transmission distance <sup>(3)</sup>                                                                         |                                   |      | 100  | km    |
| optical output wavelength                                                                                            | 1550                              | 1555 | 1560 | nm    |
| optical connector type                                                                                               | SC/APC bulkhead w/ safety shutter |      |      |       |
| (1) measured over temperature and polarization sensitivity;<br>(2) limited by SBS<br>(3) limited by fiber dispersion |                                   |      |      |       |

| Electrical, Mechanical,<br>and Environmental Specifications | MIN                                                 | TYP     | MAX | UNITS |
|-------------------------------------------------------------|-----------------------------------------------------|---------|-----|-------|
| power supply input voltage                                  | 100                                                 | 110/220 | 240 | Vac   |
| power consumption                                           |                                                     |         | 60  | Watts |
| operating temperature                                       | 0                                                   |         | 50  | °C    |
| storage temperature                                         | -20                                                 |         | 65  | °C    |
| dimensions                                                  | 3.5"H x 19"W x 18"D (8.85 cm x 48.07 cm x 45.54 cm) |         |     |       |
| weight                                                      | 20 lbs (9.06 kgs)                                   |         |     |       |

Specifications subject to change without notice

NEXT LEVEL

**MegaStar- 1550 nm Line Amplifier Technical Specifications**  
**AM-1550-OA/13S and AM-1550-OA/17D**

| Optical Specifications    | MIN                               | TYP  | MAX  | UNITS |
|---------------------------|-----------------------------------|------|------|-------|
| optical input power       | 0                                 | +3   | +10  | dBm   |
| optical output power**    |                                   |      |      |       |
| AM-1550-OA/13S            | 13.0                              | 13.5 | 14.0 | dBm   |
| AM-1550-OA/17D            | 16.0                              | 16.5 | 17   | dBm   |
| optical output wavelength | 1550                              | 1555 | 1560 | nm    |
| gain flatness             | -1.5                              |      | +1.5 | dB    |
| number of pump lasers:    |                                   |      |      |       |
| AM-1550-OA/13S            |                                   | 1    |      |       |
| AM-1550-OA/17D            |                                   | 2    |      |       |
| optical connector type    | SC/APC bulkhead w/ safety shutter |      |      |       |

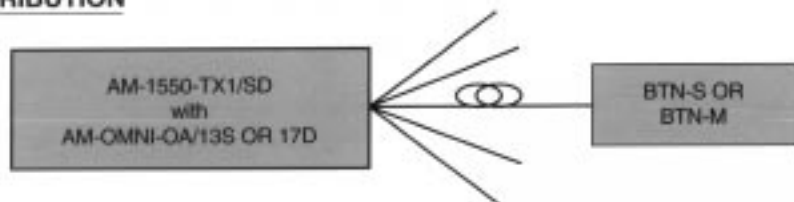
\*\*measured over temperature, polarization sensitivity and specified input power range

| Electrical, Mechanical,<br>and Environmental Specifications | MIN                                                  | TYP     | MAX | UNITS |
|-------------------------------------------------------------|------------------------------------------------------|---------|-----|-------|
| power supply input voltage                                  | 100                                                  | 110/220 | 240 | Vac   |
| power consumption                                           | 15                                                   |         | 40  | Watts |
| operating temperature                                       | 0                                                    |         | 50  | °C    |
| storage temperature                                         | -20                                                  |         | 65  | °C    |
| dimensions                                                  | 1.75"H x 19"W x 18"D (4.42 cm x 48.07 cm x 45.54 cm) |         |     |       |
| weight                                                      | 10 lbs (4.53 kgs)                                    |         |     |       |

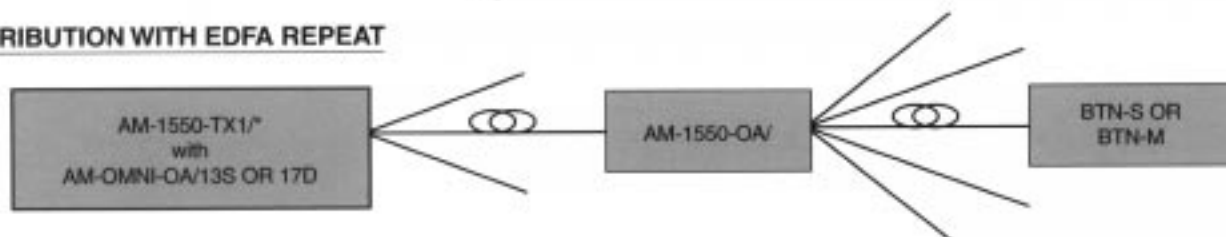
Specifications subject to change without notice

*MegaStar - Typical Product Applications*

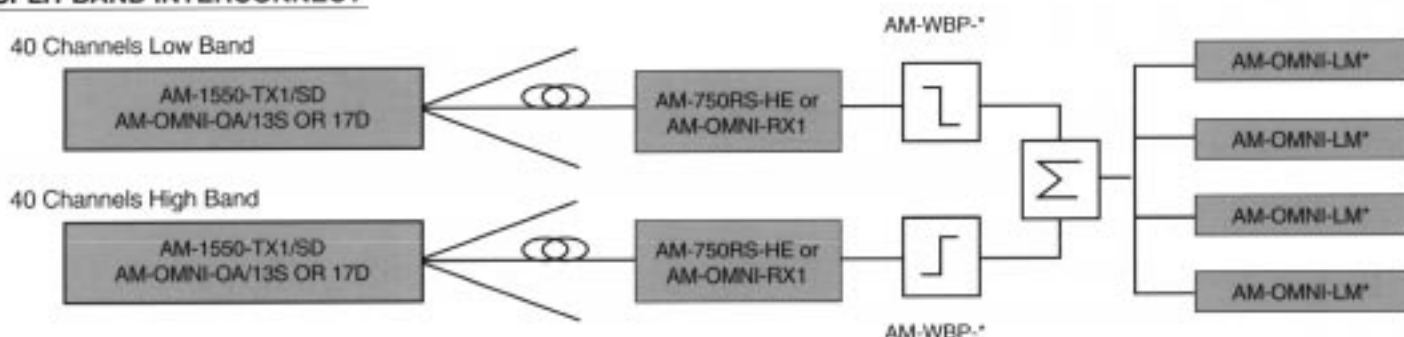
**DISTRIBUTION**



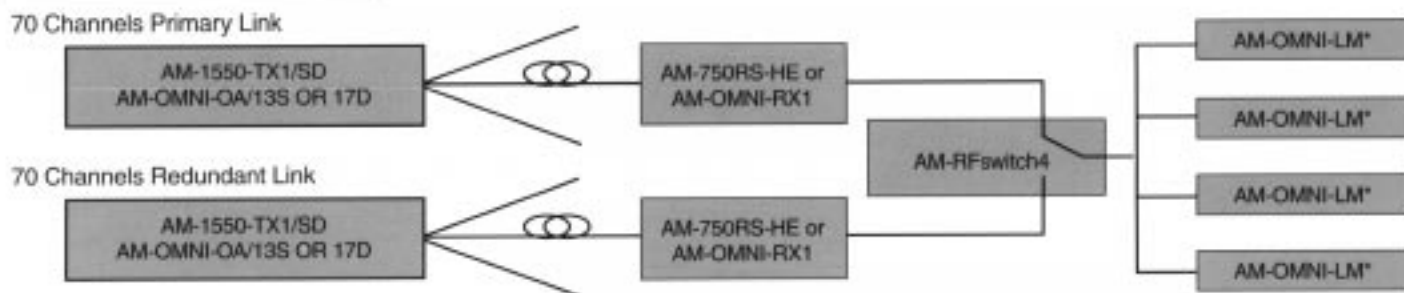
**DISTRIBUTION WITH EDFA REPEAT**



**SPLIT-BAND INTERCONNECT**



**REDUNDANT INTERCONNECT**





- AUTOMATIC OR MANUAL SWITCHING BETWEEN PRIMARY OR SECONDARY SOURCES
- ADJUSTABLE SWITCHING THRESHOLD
- CONSTANT MONITORING OF BOTH PORTS
- LOCAL OR REMOTE CONTROL USING **LIFEnet™** SOFTWARE
- EXTERNAL CONNECTIONS TO SWITCH BETWEEN CHASSIS
- FRONT PANEL PLUG-IN MODULE WITH PLUG-N-PLAY OPERATION

The AM-OMNI-SWITCH provides automatic switching between the primary and secondary signal sources during the loss or degradation of the primary signal for either the forward or return path. Constant monitoring of both inputs allows for instantaneous switching in case of primary input failure. Three independent modes of operation allow switching for any style of **NextLevel** fiber receiver. Automatic or manual switching is possible either by the front panel or by remote control using **LIFENet Headend Control Software**.

In a typical application, redundant fiber paths are fed to a hub location where they

are optically received and converted to RF and applied to the AM-OMNI-SWITCH. RF detection mode is used when constant RF needs to be monitored. For heavy data monitoring where RF is not always constant such as in upconversion or internet services the digital control mode or optical detection mode will monitor the optical path. Any mode will switch between primary and secondary if the signal level changes by -6 dB or by any selected threshold using LIFE<sup>net</sup> software. The first is the RF detection mode, the AM-OMNI-SWITCH will switch between RF in "A" and "B" on the rear panel and can be fed by any RF source. The second mode is the Digital Control mode in which the unit changes between the primary

or secondary mode depending on a TTL level voltage out of the **AM-OMNI-860R**, **AM-OMNI-BCR** or the **AM-OMNI-RPR/2C1**. The third mode is the Optical Detection Mode, similar to the digital control mode a front panel jumper from the optical received test point on any older style receiver such as the **AM-OMNI-RPR/3** and the **AM-750RSHE** to the optical power input on the **AM-OMNI-SWITCH**.



## Specifications

### RF Switching

|                                          |                                              |
|------------------------------------------|----------------------------------------------|
| Operational Bandwidth                    | 5 - 864 MHz (Forward and Return Frequencies) |
| RF Flatness                              | ± 0.75 dB p-p from 5-864 MHz.                |
| Insertion Loss                           | 4.0 dB Maximum, 3 dB typical                 |
| RF Input Range                           | 15 dBmV to 50 dBmV                           |
| Isolation (Between RF in A,B and RF Out) | -60 dB, 5-750 MHz<br>-55 dB, 750-864 MHz     |
| RF Return Loss                           | 16 dB, 5-750 MHz<br>14 dB, 750-864 MHz       |
| RF Input Impedance                       | 75 Ohms                                      |

### Optical Switching

|                               |                                                             |
|-------------------------------|-------------------------------------------------------------|
| Digital Control (Rear Panel)  | 0.5 Vdc low, 2.7 Vdc high, TTL logic Voltages               |
| Optical Control (Front Panel) | 2 Vdc to 0.05 Vdc (0 dBm to -16 dBm Received Optical Power) |

### User Interface:

|                              |                                                         |
|------------------------------|---------------------------------------------------------|
| RF Test Point                | -20 dB ± 0.5 dB                                         |
| Source Select                | A or B RF inputs                                        |
| Normalized Optical Threshold | -6 dB from operating level                              |
| Status Indicators            | Tri-state LED, Module status                            |
| Data/Control Interface       | Serial Peripheral Interface(SPI)using LIFENet™ Software |

### Power Requirements:

|        |                                                  |
|--------|--------------------------------------------------|
| 12 Vdc | 200 mA, supplied by OmniStar Power Supply Module |
| 5 Vdc  | 100 mA Supplied by OmniStar Power Supply Module  |

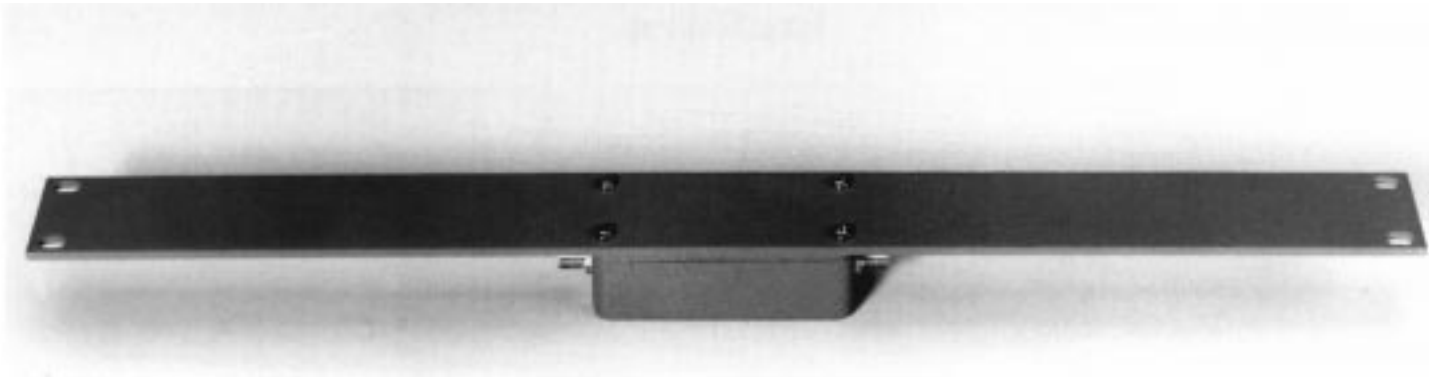
### Environmental:

|                             |                                |
|-----------------------------|--------------------------------|
| Operating Temperature Range | 0° to +50° C (+32° to +122° F) |
| Storage Temperature Range   | -40° to 80° C (-40° to 176° F) |

### Physical Properties:

|            |                                                         |
|------------|---------------------------------------------------------|
| Dimensions | 1.5"W x 6.5"H x 14.25"D (3.81 cm x 16.51 cm x 36.20 cm) |
| Weight     | 3.0 lbs (1.36 kgs)                                      |
| Mounting   | AM-OMNI-HSG® equipment shelf, any of slots 3-10         |

Specifications subject to change without notice.



FEATURES:

- FLAT PASS BAND
- LOW INSERTION LOSS
- LOW GROUP DELAY
- 50 - 750 MHz CHANNEL SELECTION
- FACTORY ALIGNED TO SELECTED BAND SPLIT
- EXCELLENT NOISE REJECTION

DESCRIPTION:

The AM-WBP-\*/\*\* Wide Bandpass Filter is used to pass selected groups of channels and reject the remainder of the spectrum. In a Supertrunk application typical pass band splits are selected to pass only those channels in the passband, limiting the amount of channels passed per fiber link between the Headend and a Hub location. At the Hub location signals are then combined and re-transmitted to the distribution plant. Available pass band splits correspond to either an 8 fiber, 4 fiber, or 2 fiber link system.

| Passband Types */*  | Model No.      | Passband      | Center Freq. |
|---------------------|----------------|---------------|--------------|
| 8 fiber, band split | AM-WBP-501108  | 50 - 108 MHz  | 79 MHz       |
|                     | AM-WBP-108/174 | 108 - 174 MHz | 141 MHz      |
|                     | AM-WBP-174/240 | 174 - 240 MHz | 207 MHz      |
|                     | AM-WBP-2401306 | 240 - 306 MHz | 273 MHz      |
|                     | AM-WBP-3061372 | 306 - 372 MHz | 339 MHz      |
|                     | AM-WBP-3721432 | 372 - 432 MHz | 402 MHz      |
|                     | AM-WBP-4321492 | 432 - 492 MHz | 462 MHz      |
|                     | AM-WBP-4921750 | 492 - 750 MHz | 621 MHz      |
| 4 fiber, band split | AM-WBP-50/108  | 50 - 108 MHz  | 81 MHz       |
|                     | AM-WBP-108/216 | 108 - 216 MHz | 162 MHz      |
|                     | AM-WBP-2161384 | 216 - 384 MHz | 300 MHz      |
|                     | AM-WBP-3841750 | 384 - 750 MHz | 567 MHz      |
| 2 fiber, band split | AM-WBP-50/282  | 50 - 282 MHz  | 166 MHz      |
|                     | AM-WBP-2821750 | 282 - 750 MHz | 516 MHz      |
| 2 fiber, band split | AM-WBP-501330  | 50 - 330 MHz  | 190 MHz      |
|                     | AM-WBP-3301750 | 330 - 750 MHz | 540 MHz      |

Specifications

|                            |                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------|
| Impedance                  | 75 Ohms                                                                              |
| Connectors                 | F-type (Female on both Input and Output)                                             |
| Insertion Loss             | 1 dB Maximum across selected passband                                                |
| Return Loss (Input/Output) | ≥ 16 dB in pass band, typical 18 dB                                                  |
| Ripple                     | ≤ 1 dB (Peak to Peak) in pass band                                                   |
| Stop band Rejection        | ≥ -10 dB ± 10 MHz from knee<br>≥ -30 dB ± 20 MHz from knee                           |
| Group Delay                | not to exceed 1.5 nsec.                                                              |
| Temperature Range          | 0° to +60° C                                                                         |
| Dimensions                 | 1.51 H x 4.5" W filter, mounted on a 1 U 19" rack-mount panel<br>(3.81 cmx 11.39 cm) |

Specifications subject to change without notice.

**Optical  
Splitters**

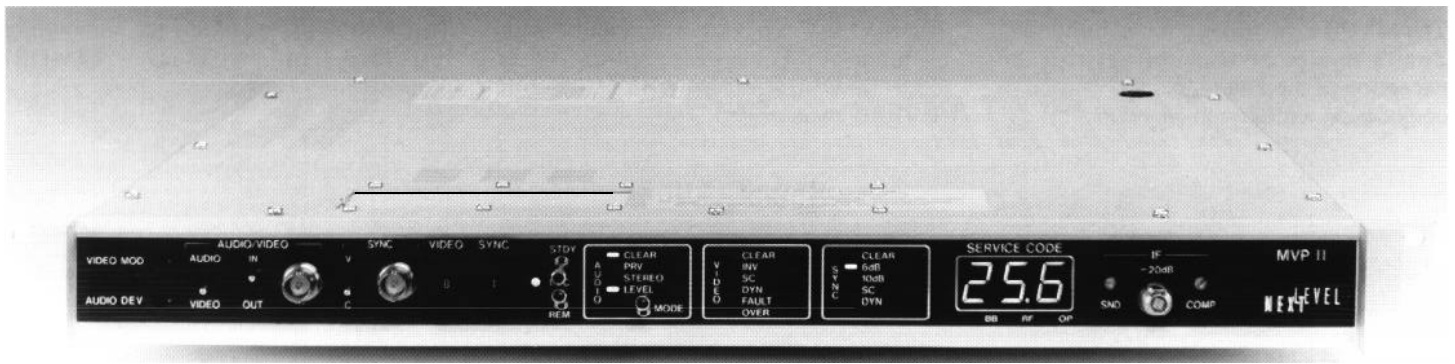
| <b>Model No.</b> | <b>Split Ratio</b> | <b>Max. Insertion<br/>Loss (dB)</b> | <b>Typ. Insertion<br/>Loss (dB)</b> |
|------------------|--------------------|-------------------------------------|-------------------------------------|
| AM-DC50          | 50% / 50%          | 3.7 / 3.7                           | 3.2 / 3.2                           |
| AM-DC55          | 55% / 45%          | 4.1 / 3.2                           | 3.7 / 2.8                           |
| AM-DC60          | 60% / 40%          | 4.7 / 2.8                           | 4.2 / 2.4                           |
| AM-DC65          | 65% / 35%          | 5.3 / 2.4                           | 4.7 / 2.0                           |
| AM-DC70          | 70% / 30%          | 6.1 / 2.0                           | 5.5 / 1.6                           |
| AM-DC75          | 75% / 25%          | 6.8 / 1.7                           | 6.3 / 1.5                           |
| AM-DC80          | 80% / 20%          | 7.8 / 1.4                           | 7.3 / 1.2                           |
| AM-DC85          | 85% / 15%          | 9.1 / 1.1                           | 8.4 / 1.0                           |
| AM-DC90          | 90% / 10%          | 11.2 / 0.8                          | 10.5 / 0.7                          |
| AM-DC95          | 95% / 05%          | 15.5 / 0.6                          | 14.0 / 0.4                          |

**General Specifications:**

|                  |                      |                |
|------------------|----------------------|----------------|
| <b>Physical:</b> | Fiber Pigtail length | 1.0 m          |
|                  | Body length          | 150.0 mm       |
|                  | Diameter             | 15.0 mm        |
| <b>Optical:</b>  | Spectral range       | 1260 - 1360 nm |
|                  |                      | 1480 - 1580 nm |
|                  | Optical Return loss  | ≤ -55 dB       |
|                  | Directivity          | ≤ -55 dB       |
|                  | Temperature range    | -40° to 85° C  |

Specifications subject to change without notice.

NEXT LEVEL™



## Multiple Mode Scrambler for Impulse Systems

### FEATURES

- RF AND BASEBAND SCRAMBLING
- ENHANCED SECURITY MODES
- FRONT PANEL ADJUSTMENTS FOR VIDEO AND AUDIO MODULATION
- ACCEPTS STEREO AUDIO SIGNAL FROM A 4.5 MHz OR BASEBAND SOURCE

The Modulating Video Processor II (MVP-II) is a feature and performance enhanced version of the original MVP scrambler. The MVP-II can be used for all STARCOM pay and addressable terminal/descramblers by emulating any previous NextLevel encoder.

The MVP-II is designed to allow increased flexibility in installation and more standard operating modes primarily in the areas of compatibility and signal security.

### EASY INSTALLATION

There are four user adjustments on the MVP-II: composite IF and sound IF levels, and video modulation and audio deviation adjustments.

A user reference card is provided, located on the top cover, in addition to the operation manual, to help make the task of selecting the optimum operating mode an easy one.

### EASY TO USE

Along with the standard remote control interface the front and rear panel switches

and display have been improved to provide operational information quickly and easily.

Set up options can be selected either at the rear panel or through an access door on the top cover.

An accessory package is included with each MVP that provides spare lugs for the terminal block as well as extra screws.

### STEREO COMPATIBLE

The MVP-II provides two stereo interfaces: 4.5 MHz and composite baseband. The desired interface is chosen via a switch on the rear panel and a Stereo LED on the front panel indicates when either mode is selected.

### REMOTE CONTROL OPERATION

ACC-2000, 4000 or the MVP-II can be remotely controlled from all NLS addressable controllers.

### OPERATING MODES

There are three basic operating modes in the MVP-II: RF, BASEBAND, and MIXED. In the RF mode, the MVP-II scrambles the video signal by suppressing the sync information. Timing and Data information are amplitude modulated (AM) on the sound carrier. When emulating a DS/E several multi-mode scrambling algorithms can be employed to provide enhanced signal security. In the BASEBAND mode, all the features of DS/E mode are available plus several

baseband video inversion modes as well as audio privacy. The Baseband mode uses an in-band data scheme that is MULTIPORT compatible and does not require AM modulating on the sound carrier. The MIXED mode is used when both RF and baseband type terminals reside in the same system. Both data formats are transmitted and the operating modes are limited to the various sync suppression modes which are compatible with both terminal types.

Hamlin and Eagle emulation modes are both standard on all MVP's.

### SECURITY MODES

The MVP-II offers many enhanced security features. Please contact your NextLevel account executive for information on enhanced security modes of operation.

### MVP-II: PRODUCT RANGE

The Model MVP II- DIU is a MVP II encoder that includes a data inserter unit (DIU) option board. This option provides the capability of carrying row teletext data in video channels. These data channels are carried on two horizontal lines during the vertical blanking interval (VBI) on the video signal.

The MVP-II-WLC provides compatibility with Scientific Atlanta's scrambling modes and is used in conjunction with a Scientific Atlanta encoder.

NEXT LEVEL™

The MVP-II-Z provides compatibility with Zenith modes of scrambling with the exception of the PM mode, and is used in conjunction with Zenith encoders.

The MVP-II-T provides compatibility with all modes of Tocom scrambling and is used in conjunction with a Tocom (HVPIII) encoder.

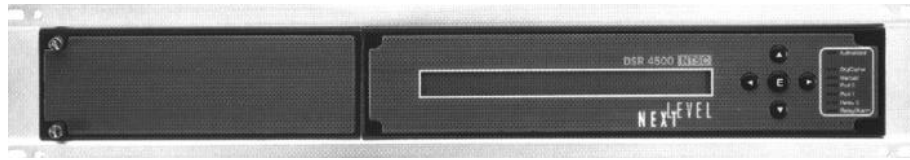
The MVP-II-SIF provides the scrambling interface in wireless (MMDS) transmission systems.

## Specifications

|                                     |                                                             |                                        |                                              |
|-------------------------------------|-------------------------------------------------------------|----------------------------------------|----------------------------------------------|
| <b>Video</b>                        |                                                             | <b>Composite IF Output (continued)</b> |                                              |
| Input                               | 1V p-p Pal-B standard (75 Ohm), 625 line, 50 Hz             | Sound Carrier Deviation                | $\pm 50$ kHz $\pm 2$ kHz                     |
| Video AGC Range                     | $\pm 6$ dB (0.5V to 2.0 Vp-p)                               | Video S/N                              | 64 dB Minimum (66 dB typical)                |
| Video Input Return Loss             | 25 dB Minimum                                               | Video Frequency Response               | 50 Hz to 5.0 MHz $\pm 1$ dB                  |
| Video output                        | 1 V p-p (in Standby); other modes encoded                   | Video Group Delay                      | Pal B General 1/2 correction                 |
| Video output Return Loss            | 25 dB                                                       | Video DG                               | 2.50%                                        |
|                                     |                                                             | Video DP                               | 2 deg                                        |
|                                     |                                                             | Video Modulation at Center Detent      | 80% $\pm 2$ %                                |
|                                     |                                                             | Nominal Adjustment Range               | $\pm 35$ mV                                  |
| <b>Audio</b>                        |                                                             | Audio S/N                              | -70 dB                                       |
| Normal Input Level (attenuator off) | 0 dBm (0.775 Vrms)                                          | Audio THD                              | 0.50%                                        |
| Normal Input Level (attenuator on)  | +12 dBm (3.085 Vrms)                                        | Audio Frequency Response               | 50 Hz to 14 kHz $\pm 1$ dB                   |
| Input Attenuator                    | 12 $\pm 0.5$ dB switchable                                  | Audio Deviation at Center Detent       | 50 $\pm 2$ kHz                               |
| Audio ALC Range                     | $\pm 10$ dB                                                 | Nominal Adjustment Range               | $\pm 6$ dB                                   |
| Audio Pre-emphasis                  | 50 $\mu$ sec $\pm 5$ %                                      | Minimal Adjustment Range               | 4.5 dB                                       |
| Audio Input Impedance               | 600 Ohm balanced or 50 K Ohm unbalanced, switchable         |                                        |                                              |
| Audio Output Level                  | 0 dB ( $\pm 1$ dB) relative to the input signal in Standby) | <b>Remote Control</b>                  |                                              |
| Audio Output Impedance              | 600 Ohm balanced                                            | Bi-Phase In/Out                        | 13,980 bps                                   |
|                                     |                                                             | Address                                | selectable (260097 to 260999)                |
| <b>Scrambling</b>                   |                                                             | <b>Auxiliary IF Switch Drive</b>       |                                              |
| Video                               | Clear/inverted                                              | Actuator Voltage                       | $< 0.5$ v                                    |
| Sync                                | 0 dB / 6 dB / 10 dB                                         | Maximum Input Voltage                  | $\pm 12$ v                                   |
| Audio                               | Clear / 2H Subcarrier                                       | Minimum Input Voltage                  | -12 v                                        |
| <b>Composite IF Output</b>          |                                                             | <b>Test Point</b>                      |                                              |
| Picture IF Frequency                | 38.9 MHz                                                    | Video                                  | Selectable In/Out                            |
| Sound IF                            | 33.4 MHz                                                    | Video Test Point Level                 | 1 V p-p into 75 Ohms                         |
| Level (adjustable)                  | $\pm 25$ dBmV to $\pm 45$ dBmV                              | Audio                                  | Selectable In/Out                            |
| Ext. Pix to Input Level             | $\pm 40$ $\leq$ levels $\leq$ $\pm 50$ dBmV                 | Audio Test Level                       | 0 dB $\pm 1$ dB relative to the input signal |
| Intercarrier (5.5 MHz)              | $\pm 10$ dBmV Minimum                                       | Sync                                   | Selectable Vertical/Composite                |
| Input Level                         |                                                             | IF                                     | -20 dB (relative to composite IF out)        |
| Return Loss                         | 15 dB Minimum                                               |                                        |                                              |
| Sound Carrier Level                 | -15 dB from 38.9 MHz adjustable $\pm 5$ dB                  |                                        |                                              |

Specifications subject to change without notice

the professional solution for cable operations

**FEATURES:**

- DIGITAL TRANSMISSIONS WITH MULTIPLE CHANNELS ON ONE TRANSPONDER
- MPEG-2 DIGITAL STANDARD COMPATIBLE, ALSO COMPATIBLE WITH DIGICIPHER®II SYSTEM ENHANCEMENTS
- OUTPUTS NTSC FORMATS WHEN NTSC IS TRANSMITTED (CAN OUTPUT PAL FROM DIGITAL SIGNALS)
- RECEIVES CLEAR ANALOG NTSC FORMATS
- ASYNCHRONOUS 1200-19200 BAUD RS-232 DATA CHANNEL
- HIGH-SPEED SYNCHRONOUS DATA CHANNEL (UP TO 9 MBPS)
- AUTO-RANGING POWER INPUT FOR INTERNATIONAL USE
- CUE-TONES VIA SUBCARRIER, DIGITAL AUDIO, OR GENERATED BY OVER-THE-SATELLITE COMMANDS
- DIGITAL STEREO DOLBY® AC-3 AUDIO
- DISPLAYS SUBTITLES TRANSMITTED WITH PROGRAM MATERIAL
- EXTENDED RANGE TUNER, 950-1550 MHZ (OPTIONAL 2150 MHZ)
- RETUNE-READY
- TWO CLEAR ANALOG SUBCARRIERS FOR STEREO OUTPUT
- TWO LINE, 40-CHARACTER BACKLIT LCD WITH FIVE FRONT PANEL KEYS TO OPERATE MENUS
- UNIQUE ADDRESS FOR ACCESS CONTROL

- VIRTUAL CHANNEL MAPS DOWNLOADED OVER SATELLITE LINK
- OPERATING SYSTEM FIRMWARE CAN BE DOWNLOADED OVER SATELLITE LINK
- CLOSED CAPTION PASS-THROUGH, F1/F2
- CONTROLLABLE BY PCS/WORKSTATIONS OR REMOTE SITE
- INTERNALLY GENERATES VIDEO, AUDIO, AND VITS TEST SIGNALS
- FINGERPRINTING FOR PIRACY REDUCTION
- SEPARATE DIAGNOSTIC ON-SCREEN DISPLAY AND TEXT SCREENS OUTPUT
- STANDARD RACK MOUNTING
- TWO FORM C CONTACTS THAT CAN BE CONTROLLED OVER THE SATELLITE LINK OR USED AS SUMMARY ALARM
- SUPPORTS BOTH C- AND KU-BAND
- TVPASS™ CARD RENEWABLE SECURITY-READY
- ONE YEAR LIMITED WARRANTY

**PRIMARY FEATURES**

**Meets international standards:** Fully MPEG-2 compliant video and transport formats with DigiCipher®II system enhancements.

**Receives two types of satellite signals:** DigiCipher®II and clear analog NTSC formats

**Digital stereo audio:** Dolby® AC-3 CD4 quality sound

**Secondary language capability:** Two stereo pairs for SAP

The DSR-4500 drops into current headend using existing LNB and outputs to match existing modulators. With a full complement of features, the DSR-4500 has everything you're looking for in a professional receiver for cable operations. As part of NextLevel Systems' end-to-end DigiCipher® system, the DSR-4500 receives and processes digital DigiCipher®II and clear NTSC signals. Compliant with MPEG-2 international standards for video and transport, the DSR-4500 ensures a common platform for current as well as future applications.

Feature packed and easy-to-use, the DSR-4500 is equipped with a full range of outputs including two stereo pairs — each with derived mono — and on-screen display for troubleshooting, to name a few.

The DSR-4500 combines simple operations with advanced technology. Virtual channel maps transmitted by the programmer assure simple receiver tuning in the most complex environment. All audio and data connections accept traditional CATV wiring, yet a receiver can be swapped in seconds, thanks to its quick disconnect feature. Rack mounting is standard.

Also standard is our proven security system. Security enhancements, if they are ever needed, are as simple as inserting a TvPass™ Card into the IRD.

The DSR-4500 is another fine product from NextLevel Systems, formerly General Instrument, the world leader in quality, end-to-end digital transmission systems.

**NEXT LEVEL™**

## Specifications

|                                                            |                                                                                               |                              |                                                     |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------|
| <b>RF</b>                                                  |                                                                                               | Impedance                    | 600 $\Omega$ $\pm 2\%$ balanced                     |
| Input Frequency Range                                      | 0.95-1.55 GHz C/Ku switchable                                                                 | Mono Level Balance           | $\pm 0.5$ dB Typ                                    |
| Input Level Range                                          | -65 to -25 dBm                                                                                | <b>ELECTRICAL/MECHANICAL</b> |                                                     |
| RF Port Impedance                                          | 75 $\Omega$                                                                                   | Power Requirements           | 90 TO 250 Vac, 47/63 Hz, 70 W                       |
| Return Loss                                                | 8 dB worst case                                                                               | LNB Power Supply             | fixed 16 V min., 480 mA loaded                      |
| Port to Port Isolation (Lunes)                             | 40 dB min.                                                                                    | <b>PHYSICAL ENVIRONMENT</b>  |                                                     |
| <b>VIDEO*</b>                                              |                                                                                               | RF In                        | F-Type                                              |
| Output Level                                               | 1 V p-p into 75 $\Omega$                                                                      | Video Out                    | BNC                                                 |
| Frequency Response<br>(Composite, Component Y,<br>and OSD) | $\pm 0.75$ dB, 1 kHz to 4.2 MHz                                                               | Audio                        | screw terminal on quick disconnect<br>barrier strip |
| Frequency Response BB output                               | 10 kHz - 8.5 MHz                                                                              | Auxiliary Data               | screw terminal on quick disconnect<br>barrier strip |
| Chrominance/Luminance                                      | $\pm 40$ nsec (composite only)                                                                | High Speed Data              | screw terminal on quick disconnect<br>barrier strip |
| Delay Inequality                                           |                                                                                               | Relay Contacts               | screw terminal on quick disconnect<br>barrier strip |
| Differential Gain                                          | 4% p-p max. (10-90% APL)                                                                      | Dimensions                   | 8.9 cm H x 48.3 cm W x 45.7 cm D                    |
| Differential Phase                                         | 4% p-p max. (10-90% APL)                                                                      | Weight With Decoder          | 6.6 kgs                                             |
| Signal/Noise Ratio                                         | 57 dB luminance weighted                                                                      | <b>OTHER</b>                 |                                                     |
| Signal Types                                               | QPSK DigiCipher®II clear NTSC                                                                 | Limited Warranty             | one year                                            |
| <b>AUDIO</b>                                               |                                                                                               | UL/TUV/CE                    | listed/approved                                     |
| Output Level                                               | +16.0 dBm, $\pm 0.1$ dB into 600 $\Omega$<br>balanced attenuator, adjustable<br>(0 to -15 dB) |                              |                                                     |
| Frequency Response                                         | 1.0 dB, 20 Hz to 20 kHz                                                                       |                              |                                                     |
| Total Harmonic Distortion                                  | 0.3% or better<br>RE: +10 dBm                                                                 |                              |                                                     |
| Signal/Noise Ratio                                         | 85 dB or better at 1 kHz,<br>RE: +16 dBm measured at 1 kHz                                    |                              |                                                     |
| Isolation                                                  | 70 dB, 20 Hz to 20 kHz                                                                        |                              |                                                     |

\*The DigiCipher®II Commercial Integrated Receiver/Decoder meets the above video specifications for the composite video output when operating with a signal supplied by a component test generator (TSG 1000) to a DigiCipher®I encoder, at an IRD ambient temperature of 25°C with the input static test signal supplied to all encoder channels simultaneously, and the encoder to 70 MHz output translated to the IRD input frequency (noise-free). Refer to NTC7 for measurement methods, These specifications do not apply to the composite video OSD output.

For more information on the DSR-4500 or the rest of the DigiCipher®II product line, please call, fax, or write us at the numbers and address listed below.

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Headend Channel Assignment Reference Table

| Channel Designation |     | Pict      | Carrier Frequency |           |
|---------------------|-----|-----------|-------------------|-----------|
| GI                  | EIA | STD       | HRC               | IRC       |
| 54                  | 11  | N/A       | 72.0036           | 73.2625   |
| 2                   | 2   | 55.2500   | 54.0027           | 55.2625   |
| 3                   | 3   | 61.2500   | 60.0030           | 61.2625   |
| 4                   | 4   | 67.2500   | 66.0033           | 67.2625   |
| 5                   | 5   | 77.2500   | N/A               | N/A       |
| 6                   | 6   | 83.2500   | N/A               | N/A       |
| 55                  | 5   | N/A       | 78.0039           | 79.2625   |
| 56                  | 6   | N/A       | 84.0042           | 85.2625   |
| 7                   | 7   | 175.2500  | 174.0087          | 175.2625  |
| 8                   | 8   | 181.2500  | 180.0090          | 181.2625  |
| 9                   | 9   | 187.2500  | 186.0033          | 187.2625  |
| 10                  | 10  | 193.2500  | 192.0096          | 193.2625  |
| 11                  | 11  | 199.2500  | 198.0099          | 199.2625  |
| 12                  | 12  | 205.2500  | 204.0102          | 205.2625  |
| 13                  | 13  | 211.2500  | 210.0105          | 211.2625  |
| 14                  | 14  | 121.2625  | 120.0060          | 121.2625  |
| 15                  | 15  | 127.2625  | 126.0063          | 127.2625  |
| 16                  | 16  | 133.2625  | 132.0066          | 133.2625  |
| 17                  | 17  | 139.2500  | 138.0069          | 139.2625  |
| 18                  | 18  | 145.2500  | 144.0072          | 145.2625  |
| 19                  | 19  | 151.2500  | 150.0075          | 151.2625  |
| 20                  | 20  | 157.2500  | 156.0078          | 157.2625  |
| 21                  | 21  | 163.2500  | 162.0081          | 163.2625  |
| 22                  | 22  | 169.2500  | 168.0084          | 169.2625  |
| 23                  | 23  | 217.2500  | 216.0108          | 217.2625  |
| 24                  | 24  | 223.2500  | 222.0111          | 223.2625  |
| 25                  | 25  | 229.2625  | 228.0114          | 229.2625  |
| 26                  | 26  | 235.2625  | 234.0117          | 235.2625  |
| 27                  | 27  | 241.2625  | 240.0120          | 241.2625  |
| 28                  | 28  | 247.2625  | 246.0123          | 247.2625  |
| 29                  | 29  | 253.2625  | 252.0126          | 253.2624  |
| 30                  | 30  | 259.2625  | 258.0129          | 259.2625  |
| 31                  | 31  | 265.2625  | 264.0132          | 265.2625  |
| 32                  | 32  | 271.2625  | 270.0135          | 271.2625  |
| 33                  | 33  | 277.2625  | 276.0138          | 277.2625  |
| 34                  | 34  | 283.2625  | 282.0141          | 283.2625  |
| 35                  | 35  | 289.2625  | 288.0144          | 289.2625  |
| 36                  | 36  | 295.2625  | 294.0147          | 295.2625  |
| 37                  | 37  | 301.2625  | 300.0150          | 301.2625  |
| 38                  | 38  | 307.2625  | 306.0153          | 307.2625  |
| 39                  | 39  | 313.2625  | 312.0150          | 313.2625  |
| 40                  | 40  | 319.2625  | 318.0159          | 319.2625  |
| 41                  | 41  | 325.2625  | 324.0162          | 325.2625  |
| 42                  | 42  | 331.2750* | 330.0165          | 331.2750* |
| 43                  | 43  | 337.2625  | 336.0168          | 337.2625  |
| 44                  | 44  | 343.2625  | 342.0171          | 343.2625  |
| 45                  | 45  | 349.2625  | 348.0174          | 349.2625  |
| 46                  | 46  | 355.2625  | 354.0177          | 355.2625  |

| Channel Designation |     | Pict     | Carrier Frequency |          |
|---------------------|-----|----------|-------------------|----------|
| GI                  | EIA | STD      | HRC               | IRC      |
| 47                  | 47  | 361.2625 | 360.0180          | 361.2625 |
| 48                  | 48  | 367.2625 | 366.0183          | 367.2625 |
| 49                  | 49  | 373.2625 | 372.0186          | 373.2625 |
| 50                  | 50  | 379.2625 | 378.0189          | 379.2625 |
| 51                  | 51  | 385.2625 | 384.0192          | 385.2625 |
| 52                  | 52  | 391.2625 | 390.0195          | 391.2625 |
| 53                  | 53  | 397.2625 | 396.0198          | 397.2625 |
| 62                  | 54  | 403.2500 | 402.0201          | 403.2625 |
| 63                  | 55  | 409.2500 | 408.0204          | 409.2625 |
| 64                  | 56  | 415.2500 | 414.0207          | 415.2625 |
| 65                  | 57  | 421.2500 | 420.0210          | 421.2625 |
| 66                  | 58  | 427.2500 | 426.0213          | 427.2625 |
| 67                  | 59  | 433.2500 | 432.0216          | 433.2625 |
| 68                  | 60  | 439.2500 | 438.0219          | 439.2625 |
| 69                  | 61  | 445.2500 | 444.0222          | 445.2625 |
| 70                  | 62  | 451.2500 | 450.0225          | 451.2625 |
| 71                  | 63  | 457.2500 | 456.0228          | 457.2625 |
| 72                  | 64  | 463.2500 | 462.0231          | 463.2625 |
| 73                  | 65  | 469.2500 | 468.0234          | 469.2625 |
| 74                  | 66  | 475.2500 | 474.0237          | 475.2625 |
| 75                  | 67  | 481.2500 | 480.0240          | 481.2625 |
| 76                  | 68  | 487.2500 | 486.0243          | 487.2625 |
| 77                  | 69  | 493.2500 | 492.0246          | 493.2625 |
| 78                  | 70  | 499.2500 | 498.0249          | 499.2625 |
| 79                  | 71  | 505.2500 | 504.0252          | 505.2625 |
| 80                  | 72  | 511.2500 | 510.0255          | 511.2625 |
| 81                  | 73  | 517.2500 | 516.0258          | 517.2625 |
| 82                  | 74  | 523.2500 | 522.0261          | 523.2625 |
| 83                  | 75  | 529.2500 | 528.0264          | 529.2625 |
| 84                  | 76  | 535.2500 | 534.0267          | 535.2625 |
| 85                  | 77  | 541.2500 | 540.0270          | 541.2625 |
| 86                  | 78  | 547.2500 | 546.0273          | 547.2625 |
| 87                  | 79  | 553.2500 | 552.0276          | 553.2625 |
| 88                  | 80  | 559.2500 | 558.0279          | 559.2625 |
| 89                  | 81  | 565.2500 | 564.0282          | 565.2625 |
| 90                  | 82  | 571.2500 | 570.0285          | 571.2625 |
| 91                  | 83  | 577.2500 | 576.0288          | 577.2625 |
| 92                  | 84  | 583.2500 | 582.0291          | 583.2625 |
| 93                  | 85  | 589.2500 | 588.0294          | 589.2625 |
| 94                  | 86  | 595.2500 | 594.0297          | 595.2625 |
| 95                  | 87  | 601.2500 | 600.0300          | 601.2625 |
| 96                  | 88  | 607.2500 | 606.0303          | 607.2625 |
| 97                  | 89  | 613.2500 | 612.0306          | 613.2625 |
| 98                  | 90  | 619.2500 | 618.0309          | 619.2625 |
| 99                  | 91  | 625.2500 | 624.0312          | 625.2625 |
| 100                 | 92  | 631.2500 | 630.0315          | 631.2625 |
| 101                 | 93  | 637.2500 | 636.0318          | 613.2625 |
| 102                 | 94  | 643.2500 | 642.0321          | 643.2625 |

Headend Channel Assignment Reference Table

| Channel Designation |     | Picture Carrier Frequency |          |           |
|---------------------|-----|---------------------------|----------|-----------|
| GI                  | EIA | STD                       | HRC      | IRC       |
| 57                  | 95  | 91.5000                   | 90.0045  | 91.2625   |
| 58                  | 96  | 97.2500                   | 96.0048  | 97.2625   |
| 59                  | 97  | 103.2500                  | 102.0051 | 103.2625  |
| 60                  | 98  | 109.2750*                 | 108.0250 | 109.2750* |
| 61                  | 99  | 115.2750*                 | 114.0250 | 115.2750* |
| 103                 |     | 649.2500                  | 648.0324 | 649.2625  |
| 104                 |     | 655.2500                  | 654.0327 | 655.2625  |
| 105                 |     | 661.2500                  | 660.0330 | 661.2625  |
| 106                 |     | 667.2500                  | 666.0333 | 667.2625  |
| 107                 |     | 673.2500                  | 672.0336 | 673.2625  |
| 108                 |     | 679.2500                  | 678.0339 | 679.2625  |
| 109                 |     | 685.2500                  | 684.0342 | 685.2625  |
| 110                 |     | 691.2500                  | 690.0345 | 691.2625  |
| 111                 |     | 697.2500                  | 696.0348 | 697.2625  |
| 112                 |     | 703.2500                  | 702.0351 | 703.2625  |
| 113                 |     | 709.2500                  | 708.0354 | 709.2625  |
| 114                 |     | 715.2500                  | 714.0357 | 715.2625  |
| 115                 |     | 721.2500                  | 720.0360 | 721.2625  |
| 116                 |     | 727.2500                  | 726.0363 | 727.2625  |
| 117                 |     | 733.2500                  | 732.0366 | 733.2625  |
| 118                 |     | 739.2500                  | 738.0369 | 739.2625  |
| 119                 |     | 745.2500                  | 744.0372 | 745.2625  |
| 120                 |     | 751.2500                  | 750.0375 | 751.2625  |
| 121                 |     | 757.2500                  | 756.0378 | 757.2625  |
| 122                 |     | 763.2500                  | 762.0381 | 763.2625  |
| 123                 |     | 769.2500                  | 768.0384 | 769.2625  |
| 124                 |     | 775.2500                  | 774.0387 | 775.2625  |
| 125                 |     | 781.2500                  | 780.0390 | 781.2625  |
| 126                 |     | 787.2500                  | 786.0393 | 787.2625  |
| 127                 |     | 793.2500                  | 792.0396 | 793.2625  |
| 128                 |     | 799.2500                  | 798.0399 | 799.2625  |
| 129                 |     | 805.2500                  | 804.0402 | 805.2625  |
| 130                 |     | 811.2500                  | 810.0405 | 811.2625  |
| 131                 |     | 817.2500                  | 816.0408 | 817.2625  |
| 132                 |     | 823.2500                  | 822.0411 | 823.2625  |
| 133                 |     | 829.2500                  | 828.0414 | 829.2625  |
| 134                 |     | 835.2500                  | 834.0417 | 835.2625  |
| 135                 |     | 841.2500                  | 840.0420 | 841.2625  |
| 136                 |     | 847.2500                  | 846.0423 | 847.2625  |
| 137                 |     | 853.2500                  | 852.0426 | 853.2625  |
| 138                 |     | 859.2500                  | 858.0429 | 859.2625  |
| 139                 |     | 865.2500                  | 864.0432 | 865.2625  |
| 140                 |     | 871.2500                  | 870.0435 | 871.2625  |
| 141                 |     | 877.2500                  | 876.0438 | 877.2625  |
| 142                 |     | 883.2500                  | 882.0441 | 883.2625  |
| 143                 |     | 889.2500                  | 888.0444 | 889.2625  |
| 144                 |     | 895.2500                  | 894.0447 | 895.2625  |
| 145                 |     | 901.2500                  | 900.0450 | 901.2625  |

| Channel Designation |     | Picture Carrier Frequency |          |          |
|---------------------|-----|---------------------------|----------|----------|
| GI                  | EIA | STD                       | HRC      | IRC      |
| 146                 | —   | 907.2500                  | 906.0453 | 907.2625 |
| 147                 | —   | 913.2500                  | 912.0456 | 913.2625 |
| 148                 | —   | 919.2500                  | 918.0459 | 919.2625 |
| 149                 | —   | 925.2500                  | 924.0462 | 925.2625 |
| 150                 | —   | 931.2500                  | 930.0465 | 931.2625 |
| 151                 | —   | 937.2500                  | 936.0468 | 937.2625 |
| 152                 | —   | 943.2500                  | 942.0471 | 943.2625 |
| 153                 | —   | 949.2500                  | 948.0474 | 949.2625 |
| 154                 | —   | 955.2500                  | 954.0477 | 955.2625 |
| 155                 | —   | 961.2500                  | 960.0480 | 961.2625 |
| 156                 | —   | 967.2500                  | 966.0483 | 967.2625 |
| 157                 | —   | 973.2500                  | 972.0486 | 973.2625 |
| 158                 | —   | 979.2500                  | 978.0489 | 979.2625 |
| 159                 | —   | 985.2500                  | 984.0492 | 985.2625 |
| 160                 | —   | 991.2500                  | 990.0495 | 991.2625 |
| 161                 | —   | 997.2500                  | 996.0498 | 997.2625 |

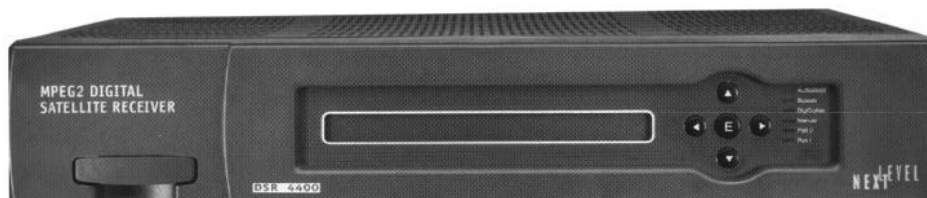
\*Special Assignment

Sound carrier is 4.5 MHz above the picture carrier.

Color subcarrier is 3.579545 MHz above the picture carrier.

EIA refers to the Electronic Industries Association, Washington, DC

the cost-effective solution for SMATV and basic cable operations



**FEATURES:**

- **DIGICIPHER®II DIGITAL VIDEO**
- **DIGITAL TRANSMISSIONS WITH MULTIPLE CHANNELS ON ONE TRANSPONDER**
- **MPEG-2 DIGITAL STANDARD COMPATIBLE**
- **OUTPUTS NTSC FORMATS WHEN NTSC IS TRANSMITTED VIA DIGICIPHER®II**
- **OUTPUTS PAL FORMATS WHEN PAL IS TRANSMITTED VIA DIGICIPHER®II**
- **AUTO-RANGING POWER INPUT FOR INTERNATIONAL USE (OPTION)**
- **ASYNCHRONOUS 1200-19200 BAUD RS-232 DATA CHANNEL**
- **CUE-TONES VIA SUBCARRIER OR DIGITALLY GENERATED (OPTION)**
- **DIGITAL STEREO DOLBY® AC-3 AUDIO**
- **DISPLAYS BIT-MAPPED SUBTITLES**
- **EXTENDED RANGE TUNER, 950-1550 MHZ (OPTIONAL 2150 MHZ)**
- **RETUNE-READY**
- **TWO LINE, 40-CHARACTER BACKLIT LCD WITH FIVE FRONT PANEL KEYS TO OPERATE MENUS**
- **VIRTUAL CHANNEL MAPS DOWNLOADED OVER SATELLITE LINK**

- **OPERATING SYSTEM FIRMWARE CAN BE DOWNLOADED OVER SATELLITE LINK**
- **UNIQUE ADDRESS FOR ACCESS CONTROL**
- **CLOSED CAPTION PASS-THROUGH, F1/F2**
- **FINGERPRINTING FOR PIRACY REDUCTION**
- **STANDARD RACK MOUNTING**
- **SUPPORTS BOTH C- AND KU-BAND**
- **ONE YEAR LIMITED WARRANTY**

**PRIMARY FEATURES**

**Meets international standards:** Fully **MPEG-2** compliant video and transport formats with **DigiCipher®II** system enhancements.

**Digital stereo audio:** Dolby® AC-3 CD-quality sound

**Provides bypass capability:** Auxiliary inputs are routed to IRD outputs when **DigiCipher®** signal is unavailable.

The DSR-4400 is the affordable, easy-to-use entry to the world of digital television delivery. Compliant with MPEG-2 international standards for video and transport, the DSR-4400 is designed to deliver outstanding video and audio performance in an economical package. This outstanding player can output either

NTSC or PAL baseband video formats, automatically matching the programmer's input format.

The DSR-4400 combines simple operations with advanced technology. Downloadable virtual channel maps assure consistent and accurate retune and network management. Receiver operations can be updated by downloading a new code over the satellite link.

Other features include closed caption pass-through and cue-tone generation. Rack mounting is standard. Also standard is our proven security system. Security enhancements, if they are ever needed, are as simple as inserting a **TvPass™** Card into the IRD.

The DSR-4400 is another fine product from **NextLevel Systems**, formerly **General Instrument**, the world leader in quality, end-to-end digital transmission systems.

**NEXT LEVEL™**

## Specifications

### INPUT SPECIFICATIONS

|                           |                                                       |
|---------------------------|-------------------------------------------------------|
| Input Frequency           | 0.95 to 1.55 <b>GHz</b><br>(2.15 <b>GHz</b> optional) |
| Input Impedance           | 75 $\Omega$                                           |
| Input Connector           | one F-type                                            |
| LNB power out F-connector | 16 Vdc min./450mA                                     |

### DIGITAL PROCESSING

|                          |                                                  |
|--------------------------|--------------------------------------------------|
| Formats                  | MPEG-2, <b>DigiCipher® II</b>                    |
| MCPC QPSK Rates          | <b>19.5, 29.3</b> Msps                           |
| Forward Error Correction | <b>5/11 I, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 7/8</b> |

### VIDEO

|                    |                                        |
|--------------------|----------------------------------------|
| Frequency Response | $\pm 1$ <b>dB</b> 1 kHz-4.2 <b>MHz</b> |
| Signal/Noise Ratio | 57 <b>dB</b> min.                      |
| Differential Gain  | 5% max.                                |
| Differential Phase | 5 deg. max.                            |
| Output Impedance   | 75 $\Omega$                            |
| Output Level       | <b>1.0 V p-p</b>                       |

### AUDIO

|              |                                                                                                                                         |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| outputs      | 1 stereo pair                                                                                                                           |
| Output Level | <b><math>\pm 16.0</math> dBm, <math>\pm 1.0</math> dB</b> into 600 $\Omega$<br>balanced attenuator, adjustable<br>(0 to -15 <b>dB</b> ) |

|                           |                                        |
|---------------------------|----------------------------------------|
| Frequency Response        | A.3 <b>dB</b> 20 Hz to 20 kHz          |
| Total Harmonic Distortion | 0.3% or better at 1 <b>kHz</b>         |
| Signal/Noise Ratio        | 85 <b>dB</b> or better at 1 <b>kHz</b> |
| Isolation, <b>L/R</b>     | 80 db, 1 <b>kHz</b>                    |
| Connector                 | screw terminals                        |

### PHYSICAL/ENVIRONMENTAL

|             |                                                                                                      |
|-------------|------------------------------------------------------------------------------------------------------|
| Temperature | 0° to 40° C ambient                                                                                  |
| Humidity    | 95% relative, max.                                                                                   |
| Dimensions  | <b>48 cm W x 38 cm D x 7.9 cm H</b>                                                                  |
| Weight      | 6.6 kgs                                                                                              |
| Power Input | 90-250 <b>Vac</b> 47-63 H, 40 W<br>(international)<br>90-140 <b>Vac</b> 57-63 H, 40 W<br>(US/Canada) |
| UL          | listed                                                                                               |

### OTHER

|                  |                 |
|------------------|-----------------|
| Limited Warranty | one year        |
| <b>UL/TUV/CE</b> | listed/approved |

For more information on the DSR-4400 or the rest of the **DigiCipher® II** product line, please call, fax, or write us at the numbers and address listed below.

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