



• DESCRIPTION

As the successor of the NTC/2055, the SDH modulator NTC/2155 now became a full member of the AZIMUTH family offering increased modular flexibility for interfacing with other equipment.

Two IF output ranges are available:

A. IF version :

The NTC/2155/AA is standard equipped with an IF output. On top of this frequency, an L-band monitoring output is provided for connection of e.g. a spectrum analyzer.

B. L-Band version :

The NTC/2155/AB is standard equipped with an L-band output (IF-L). On top of this frequency, a wide range of frequency converter modules covering 950 MHz up to 18 GHz can be integrated in the chassis or used in a separate outdoor unit. (NTC/2505/ZL), yielding an extra L-band combining input.

The NTC/2155/Ax is equipped with the SDH base band interface board providing Electrical G703 and Multi- and Single- Mode Optical Interfaces.

The modulator data input is menu-selectable, while the selected Input signal is simultaneously available at the base band monitoring outputs on all interfaces.

A programmable digital equalizer is provided to compensate external amplitude slopes on the L-band or IF outputs.

All control and Monitor parameters are available locally on the front panel (LCD display & keyboard) and remotely via the RS485/232 interface and the 10 Base-T Ethernet connection.

Also, a dual contact closure output is available for 2 types of summary alarms: one contact is operated in case of device alarms, while the other contact opens (or closes) in case of input or output interface alarms.

• APPLICATIONS

Thanks to the 8PSK FEC8/9 modulation scheme, the SDH Satellite Modulator (NTC/2155) and Demodulator (NTC/2056) allows the fully transparent transmission of 155.52 Mbit/s over a 72 MHz satellite transponder.

Compared to the previous IF-only version (NTC/2055), this unit will match any existing Earth station configuration, as the customer can choose between IF, L-band and/or RF outputs.

Although initially designed for cable restoration, this combination is very often used for high data rate (transcontinental) IP backbones and in earthquake sensitive regions where communications are an absolute requisite under all circumstances and must be free from any terrestrial multi-hopper mishap during the data journey

In combination with the Demodulator, the equipment gives an excellent performance of BER and synchronization.

• FEATURES

- Rate : 155.52 Mbit/s STM-1/OC-3
- Specially adapted for B-ISDN, SDH (SONET) and fiber network restoration
- Bandwidth efficient 8PSK modulation, with 25% roll-off for low satellite cost
- Bandwidth requirements : 72 MHz transponder
- 6D-Trellis coder + Reed Solomon outer coder
- Excellent performance in combination with Satellite demodulator NTC/2056
- BER = $1E-10$ for $E_b/N_o = 8.1$ dB (typ)
- Ovenized 10.0 MHz reference frequency
- External 10.0 MHz reference input/output (option)
- Programmable amplitude slope equalizer
- L-Band monitoring output (fixed frequency and level)
- NTC/2155/AA : RF frequency in the range of 50 to 180 MHz.
- NTC/2155/AB : RF frequency in the range of 950 to 1750 MHz. With the NTC/3736 freq. converter option, RF frequencies up to 18400 MHz and an L-band combining input are available.
- Local & remote M&C access to all menus through a
 - * web interface (Http protocol)
 - * RS-485/RS-232 (RMCP v2 protocol)
 - * 10/100 Base-T Ethernet port (RMCP v2 protocol)
- Support for one SNMP alarm trap
- Dual alarm contact closures
- User programmable menu structure
- Action Keys (group of commands under 1 button)
- Introduction of external LO frequency
- Level indication offset
- Programmable level-steps
- Real-time clock for alarm occurrence logging
- Internal test-generator, PRBS counter
- Dynamic build-up of alarm menu
- Very compact: 1 RU (height : 4.4 cm !)
- Fully compatible with other Azimuth families
- Highly reliable and modular Newtec design
- CE label

• VERSIONS & OPTIONS

The modular architecture opens various possibilities and application fields.

Among other specific modules, frequency block converter modules can be installed within the unit, giving L-band + RF outputs up to 18.4 GHz.

1. Base band Data Interface Module :

Although the AZIMUTH architecture provides 2 slots for interchangeable base band interface modules, only one interface board is necessary for normal SDH use.

- NTC/3484 : SDH STM-1/OC-3 Modulator interface

2. Modulator Boards :

- NTC/7050.AA : Integrated IF (50-180 MHz) SDH Modulator Board (standard in NTC/2155/AA)
- NTC/7055.AA : Integrated IFL (950-1750MHz) SDH Modulator Board (standard in NTC/2155/AB)

3. Frequency Converter Modules NTC/3736 & 3750 series (optional) :

The field replaceable frequency converter modules are converting the standard L-band output of the NTC/2155/AB (NTC/7055.AA) to the required RF-band. They can be installed either within the same AZIMUTH chassis, or in the outdoor unit NTC/2505/ZL.

This band ranges from 1750 MHz up to 18 GHz :

- None installed : single L-band output only 950 - 1750 MHz.
- NTC/3736.DEx.A : L-band to 5850-6650 MHz Converter module
- NTC/3736.EZx.A : L-band to 12890-13250 MHz Converter module
- NTC/3736.FZx.A : L-band to 13750-14250 MHz Converter module
- NTC/3750.GEx.A : L-band to 13750-14500 MHz Converter module
- NTC/3736.HZx.A : L-band to 17300-17700 MHz Converter module
- NTC/3736.IZx.A : L-band to 17700-18100 MHz Converter module
- NTC/3736.KZx.A : L-band to 18100-18400 MHz Converter module
- NTC/3750.AE : 4 x active L-band outputs
- NTC/3750.AB : L-band + 10 MHz ref. on same able.
- NTC/3750.AC : L-band +100 MHz +DC+M&C conditioner for Outdoor Unit NTC/2505/ZL (2Q2003)

In special cases where a higher output level is required, line amplifiers are optionally available:

- NTC/3736.xx A : +20 dB L-band line amplifier
- NTC/3750.xx B : +20 dB Ku-band line amplifier
- NTC/3736.xx C : +20 dB C-band line amplifier
- NTC/3736.xx E : +18 dB line amplifier (17.3-18.4 GHz)

Following up converters (see above) are also fitted with an L-band output and an external L-band input, allowing the combining and up-conversion of a second L-band source:

NTC/3736.DE-EZ-FZ-HZ-IZ-KZ and 3750/GE-AA-AB-AC-AD-AE

4. 10 MHz Reference Board (optional) :

One of the following 10 MHz ref. boards is always required when an up converter NTC/3736 is installed. This is also necessary whenever an external 10 MHz reference input and/or output is required. This board is not needed if none of the above is applicable.

- NTC/3462.AB.A : 10 MHz OCXO reference Oscillator (normal use)
- NTC/3462.AA.A : 10 MHz OCXO High Stability Ref. Oscillator (recommended only with carriers < 1MHz)

Configuration help :

The AZIMUTH series provides a nearly non-exhaustive number of configuration possibilities. In order to assist you making the right choice, a web-based configuration tool will easily guide you through your selection criteria. Alternatively, Newtec's sales and support team are at your full disposal for any additional information you might need. (See last page for coordinates).

• DATA SUMMARY

BASEBAND DATA INTERFACE

- interface : Electrical G703 (BNC-F)
: Optical Multi Mode (SC)
: Optical Single-Mode (SC)
- frequency : 155.52 MHz +/- 20 ppm

IF- INTERFACE (NTC/2155/AA)

- Operational output
 - Impedance : 50 / 75 ohm
 - level : -30/+5 dBm (± 3 dB)
 - frequency : 50/180 MHz
 - connector : BNC(F)-75Ohm (BNC -50 Ohm on request)
 - Return loss : (50 Ohm) : > 11 dB
(75 ohm) : > 14 dB
 - Spurious : -65 dBc / 4 kHz @ -10 dBm
- L-BAND Monitoring output
 - level : -45 dBm
 - frequency : 1080 MHz
 - connector : SMA (F) - 50
 - return loss (50) : > 7 dB

L-BAND INTERFACE, NO UPCONVERTER (NTC/2155/AB)

- Operational output
 - level : -7/-50 dBm (± 2 dB) frequency
 - : 950 - 1750 MHz
 - connector : SMA (F) - 50
 - return loss (50) : > 10 dB
 - spurious : < -65 dBc / 4 kHz @ < -10 dBm and > 200 kbaud
- L-BAND Monitoring output
 - level : -45 dBm
 - frequency : 1080 MHz
 - connector : SMA (F) - 50
 - return loss (50) : > 7 dB

L-BAND INTERFACE, W. UPCONVERTER (NTC/2155/AB) (input + monitoring output)

- level : -7/-50 dBm (± 5 dB on output)
- frequency : 950 - 1750 MHz
- connector : SMA (F) - 50 Ohm
- return loss (50) : > 10 dB

RF OUTPUT : see data sheet NTC/3736

- level : -7/-50 dBm (± 5 dB)
- connector : SMA (F) - 50
- return loss (50) : > 12 dB
- spurious : < -65 dBc/4 kHz @ -10 dBm and 20 Mbaud

EXTERNAL 10.0 MHz REFERENCE (option)

- Input level : -3 dBm up to +7 dBm
- Output level : +7 dBm
- connector : BNC (F) - 50 Ohm

MONITOR & CONTROL INTERFACES

- a) protocol : RMCP
- connector : 9 pin sub-D female
- electrical : RS-485 / RS-232
- b) protocol : RMCP over TCP-IP or UDP
- connector : RJ-45
- electrical : Ethernet 10 base-T

ALARM INTERFACE

- connector : 9 pin sub-D (F)
- electrical : dual switch-over contacts

MECHANICAL

- 19" sub rack, height: 1RU, weight 6 kg, depth 51 cm

POWER SUPPLY

- 90-130/180-260V, 105VA, 47-63 Hz

TEMPERATURE

- operational : 0° up to +40°C
- storage : -40° up to +70°C

"Technical notice

Caution : Applicable as from Serial Number **SN 04100413**, the IF output level range of this modulator has been modified from -30 / -7dBm to -30 dBm / +5 dBm."

CONTROL

IF/IF-L and RF frequency (95 Hz resol.), RF level and attenuator, IFL transmit, RF transmit, external IFL input, 10.0 MHz source (internal or external), internal PRBS generator on/off, transmit clock (internal, external), interface type, spectrum inversion on/off, amplitude slope equalizer, serial interface hardware and address, user levels, screen saver, etc..

MONITORING

All control parameters, alarms (active and memorized), power supply voltages, internal temperature, transmit clock offset, buffer contents, occupied bandwidth, converter LO lock voltage, BER, etc.

• PERFORMANCE

BIT RATE

- user : 155.52 Mbit/s
- transmission : 63.283 Mbaud
- bandwidth 3 dB : 63.283 MHz
- spectrum at ± 40 MHz : < 26 dB centre
- base band shaping (roll-off filter) : 25%

FUNCTIONS

- synchronous scrambling (V.35)
- Reed Solomon (255,235) outer coding
- Block Interleaver
- RS Frame UW insertion
- 6-D Trellis inner code (rate FEC 8/9)
- 8-PSK modulation
- Test Data Generator: PRBS 223 - 1(HP3764 compatible)

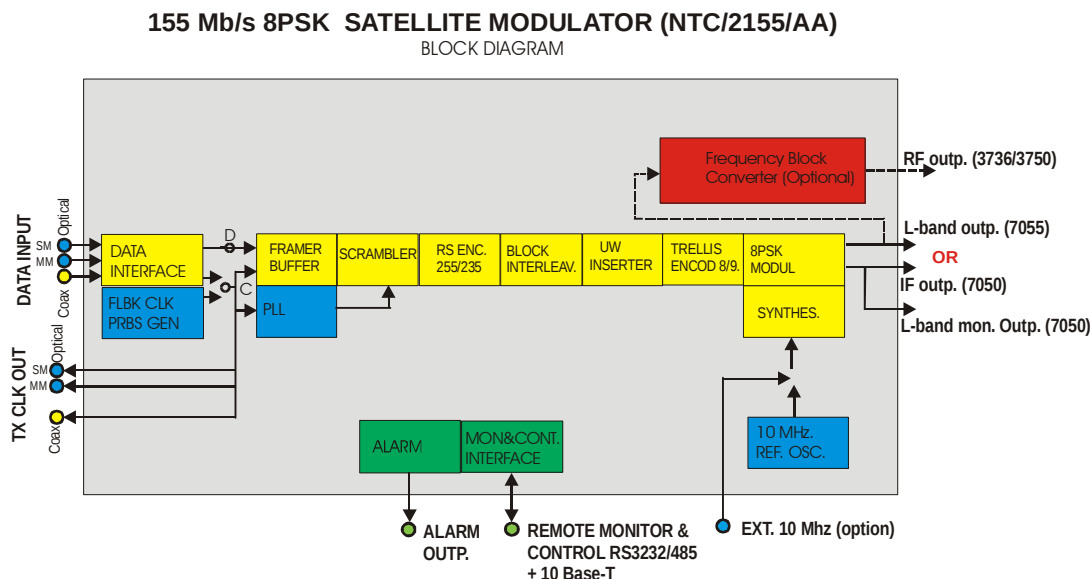
MODEM PERFORMANCE

- see data sheet Demodulator NTC/2056/AA

INTERNAL REFERENCE FREQUENCY

- standard : ± 5 ppm
- ageing : ± 5 ppm/10 years
- optional 10 MHz reference board :
See datasheet NTC/3462/Ax
AA version : ± 0.1 ppm
AB version : ± 0.5 ppm

• BLOCK DIAGRAM



• TECHNICAL LITERATURE & REFERENCES (ALSO AVAILABLE ON OUR WEBSITE)

Other related products

- | | |
|---------------|---|
| • AZIMUTH | Product families |
| • AZIMUTH | Modulator Family |
| • NTC/2073/zN | Stand-alone 4 or 8 L-band input combiner /Frequency converter |
| • NTC/3750/xx | Frequency converters and L-band conditioners |

Application notes

- | | |
|------------------|---|
| • NTC/2080/APN03 | Choice of QPSK, 8PSK or 16QAM in DVB satellite links |
| • NTC/2080/APN05 | DTV Uplink stations with HPA indoor or close to indoor |
| • NTC/2080/APN06 | DTV Uplink stations with outdoor HPA far away from indoor |
| • NTC/2080/APN07 | Channel equalization for high data rate modulators |

Technical publications

- | | |
|-------------------|---|
| • March 2001 | Fractional OC-3 ATM over a DVB/ASI satellite system |
| • OC-3 in the sky | Functional diagrams |
| • December 1996 | Performance considerations of multiphase and multilevel digital modulation techniques |
| • 1996 | A commercial 155MBit/s SDH Satellite Modem Compatible with Existing 72 MHz Satellite Transponders |

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