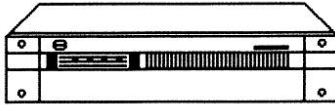


NABU

ADAPTOR



Technical Manual
[2024]



NABU Adaptor - Demodulator Assembly
MJP - 2024

INTRODUCTION:

In 1983 the NABU Adaptor was introduced with the NABU Computer and NABU Network. It was the analog equivalent to today's modern-day internet modem. It connected the NABU Computer to the NABU Network through a Cable TV provider and allowed communication with NABU Servers.

FUNCTION:

The Demodulator shall accept a 3.6 Mbps offset - QPSK modulated signal on CATV channel R (264 to 270 MHz) originating in a NABU HECA-1. The Demodulator shall amplify, filter, demodulate, and convert the signal to a format suitable for application to the NA (NABU Adaptor) Logic Board Assembly.

The Demodulator shall include:

- (a) A super heterodyne receiver consisting of RF amplification, mixer with PLL controlled oscillator, and a high gain IF amplifier with automatic gain control.

The PLL oscillator shall be selectable in steps of 1 MHz. Frequency selection shall be under software control via the NA Logic Board. Only channel R (267 MHz center frequency) is required to be selected.

- (b) A carrier recovery circuit.
- (c) An off-set QPSK demodulator circuit.
- (d) A clock recovery circuit.
- (e) A circuit for conversion of differentially encoded signal to NRZ data and clock.

The Demodulator shall operate in conjunction with a Channel Bandpass Filter (CBF) which attenuates most of the channels adjacent to channel R before application to the Demodulator RF input.

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PERFORMANCE:

Error Rate

When using the above described 0-QPSK signal at a $C/N_0 = 84$ dB or better the probability of an error will be less than 1×10^{-9} .

Where C is average carrier's power and N_0 is equal to the noise power spectral density, that is, average noise power in 1 Hz bandwidth.

CW Interference

The results above shall not be altered when a CW carrier at the frequency and level of the lower adjacent sound carrier and lower adjacent chroma carrier are presented, nor by the presence of a video carrier at the upper adjacent position.

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INTERFACE DEFINITION:

Input Signal Interface

Connector Type:	F61
Nominal Impedance:	75 ohm
Frequency Range:	264 – 270 MHz
Return Loss (75 ohm load circuit):	10 dB min.
Egress:	Per GRR Part II for Converters 5 – 30 MHz -50 dBmV max. 30 – 53 MHz -35 dBmV max. 54 – 300 MHz -31 dBmV max. 300 – 1000 MHz -10 dBmV max.
Operating Carrier Frequency:	267 MHz
Operating Carrier Tolerance:	+/- 2 Khz
Operating Carrier Level:	-13 dBmV to +17 dBnV, 2.5% AQL -20 dBmV to +20 dBmV, 6.5% AQL
Desired Carrier/Noise Ratio:	(See <u>Error Rate</u>)
Out of Band Signal Levels:	+20 dB maximum relative to desired signal
Recommended Adjacent T.V. Signal Level:	+3 dB
Noise Figure (CBF in place):	16 dB naximum

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INTERFACE DEFINITION (Cont.):

Clock and Data Outputs

Clock and data outputs are low power schottky TTL logic outputs and can drive only normal "LS" loads. The clock signal is a square wave at a repetition rate equal to the clock rate of the data stream which is nominally 6.312 MHz.

The data signals are NRZ (positive logic) and timed for mid-bit at the rising edge of the clock.

AGC Output

This signal shall be a DC voltage normally in inverse proportion to signal strength. It shall consist of the IF Amplifier Assembly AGC control voltage with a 4.7 K resistor in series for short circuit protection, made available to the Demodulator exterior on a 1000 pF (nominal) feed through capacitor. Signal range shall be approximately 2 volts minimum for the input signal of +10 dBmV or greater, and 16 volts maximum for input signals of -9 dBmV or less.

QPSK Lock Voltage

This output shall be a DC voltage indicating the operating point of the carrier recovery phase locked loop circuit. It shall consist of the output from the loop error voltage amplifier with a 2.2 K resistor in series for short circuit protection, and shall be available to the exterior of the Demodulator on a 1000 pF (nominal) feed through capacitor. Scale factor shall be 5 KHz/V with 267.00000 MHz at 9 V +/- 1.0 V.