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FCC ID: NZI126E1075203C  
MANUAL & THEORY OF OPERATION

FCC ID: NZI26E1075203B

## General description.

## UHF DATA LINK TRANSMITTER SPECIFICATIONS

<b>Output Power :</b>	* P = 0.5W (27 dBm) Maximum Adjusted in factory
<b>Operating Frequency band</b>	* F=401 MHz à/to 470 MHz
<b>Channelling :</b>	* 12.5 kHz (4801 channels)
<b>Modulations</b>	* DQPSK 1200 bits/s standard BELL 212A, sub-carrier 1200Hz * GMSK 4800 bits/s, basic band BT=0.5
<b>Data signal</b>	* From differential RS422 port
<b>Voltage supply</b>	* 10-16V
<b>Power supply</b>	* 15W
<b>EMI specifications</b>	* ETS 300 279
<b>Radio specifications</b>	* ETS 300 113
<b>Impermeability</b>	* IP65
<b>Operating temperature</b>	* -20°C à/to +55°C
<b>Code CCIR</b>	* 3K-F1D/5K6-F1D

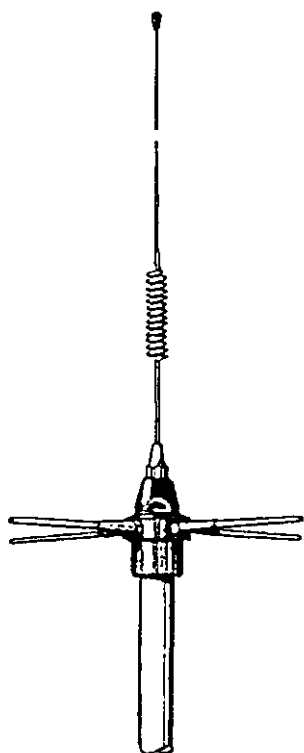
### Type Approvals of the 26E1075203C UHF Radio Transmitter

COUNTRY	REFERENCE
Denmark	98.3141-27
France	98 0218 PP 0
Canada	3125195420A
Finland	FI98090010
Germany	G134189K
Netherlands	NL98041470
Portugal	ICP-045TC-98
USA, United Kingdom, Norway, China...	PENDING

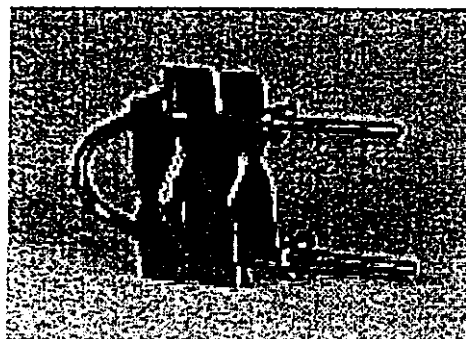
## 5. UHF TRANSMITTER OPTION (5001SD and 5002SK stations )

### 5.1 DESCRIPTION

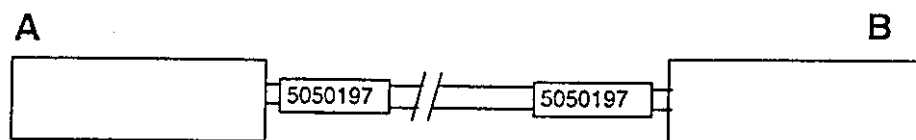
The UHF transmission optional module consists of the following elements:



UHF GP 450-3 PROCOM antenna  
(3310202).



Antenna mount bracket



KX15 coaxial cable, 6.5 m long (50500197)

A and B are male N-type coax plugs (RADIAL R161062.000 type or equivalent)

## UHF TRANSMITTER OPTION (5001SD and 5002SK stations )

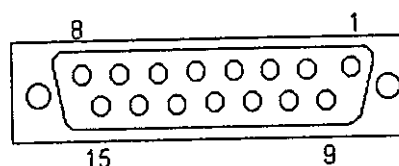
### INSTALLATION

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## 5.2 INSTALLATION

The UHF transmitter module is fitted on the rear panel of the unit and secured by four screws. The power supply voltage and commands are relayed through the 15-pin connector.

Pin number	Signal
1	TX+
2	TX-
3	RX+
4	RX-
5	
6	GND
7	GND
8	VIN+
9	
10	
11	PPS+
12	PPS-
13	PSLITE +
14	PSLITE -
15	



## 5.3 SOFTWARE SETUP

The Aquarius receiver automatically detects the presence of the UHF transmitting module. However, the way the UHF module is controlled and its data are transmitted depends on the software options enabled in the unit (e. g. Reference Station mode, etc.).

For more information on how to enable the software options, see par. 6.3.

After you enable the desired options you can set the reception parameters in two ways:

- either using the reference station control software (see AQUARIUS User's Manual),
- or by sending the necessary remote control words, using a communications software such as WinComm. The following five commands are required:

**\$PDAS, FIXMOD**

**\$PDAS, DGPDAT**

**\$PDAS, DGPS,MODE**

**\$PDAS, DGPS,STATION**

**\$PDAS, PREFLL**

For detailed information on commands, see Par. 8.3.

## UHF TRANSMITTER OPTION (5001SD and 5002SK stations) THEORY OF OPERATION

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### 5.4 THEORY OF OPERATION

The frequency bits/s QPSK modulation is supported, for the sake of compatibility with early-design DSNP products. For the station to transmit the necessary messages for dual-frequency receivers, a faster modulation is used: GMSK modulation at 4800 Bauds (Gaussian minimum Shift Keying).

The frequency bandwidth of the transmitter ranges from 410MHz to 470 MHz in 12.5-KHz steps, complying with the ETS 300-113 standard. This requires a very high spectral purity of the UHF local oscillator and leads to the breaking off from the traditional technology relying on bipolar class-C operation power transistors.

For the spectral occupation requirements to be consistent with a bit rate of 4800 bits/s, a basic modulation needs to be employed. The GMSK modulation meets those requirements while achieving an excellent reception sensitivity.

The digital information from the GPS receiver is input to the micro-controller via the RS422 port. The micro-controller sets the data to the appropriate format for the enabled MODEM. It can use PPS signal to trigger a modulo 1 second synchronous transmission. In addition, it processes the incoming remote control words from the RS422 port (request for version number, frequency, modulation type, etc.). The parameters are saved in an EEPROM memory (IC19). The micro-controller sets the parameters of the MODEM and UHF synthesizer according to the transmission channel.

The digital multiplexer (IC9/IC22) relays the digital data to the enable MODEM.

The filtered digital signal from the GMSK MODEM (IC21) is handled on two channels. One channel modulates the VCO (IC1) for the high frequencies and the other channel is fed to the VTCXO (MY1) for the low frequencies.

The QPSK modulation, with 12.5-KHz sub-carrier, is only fed to the VCO. Analog multiplexers IC5 and IC7 select the modulation type.

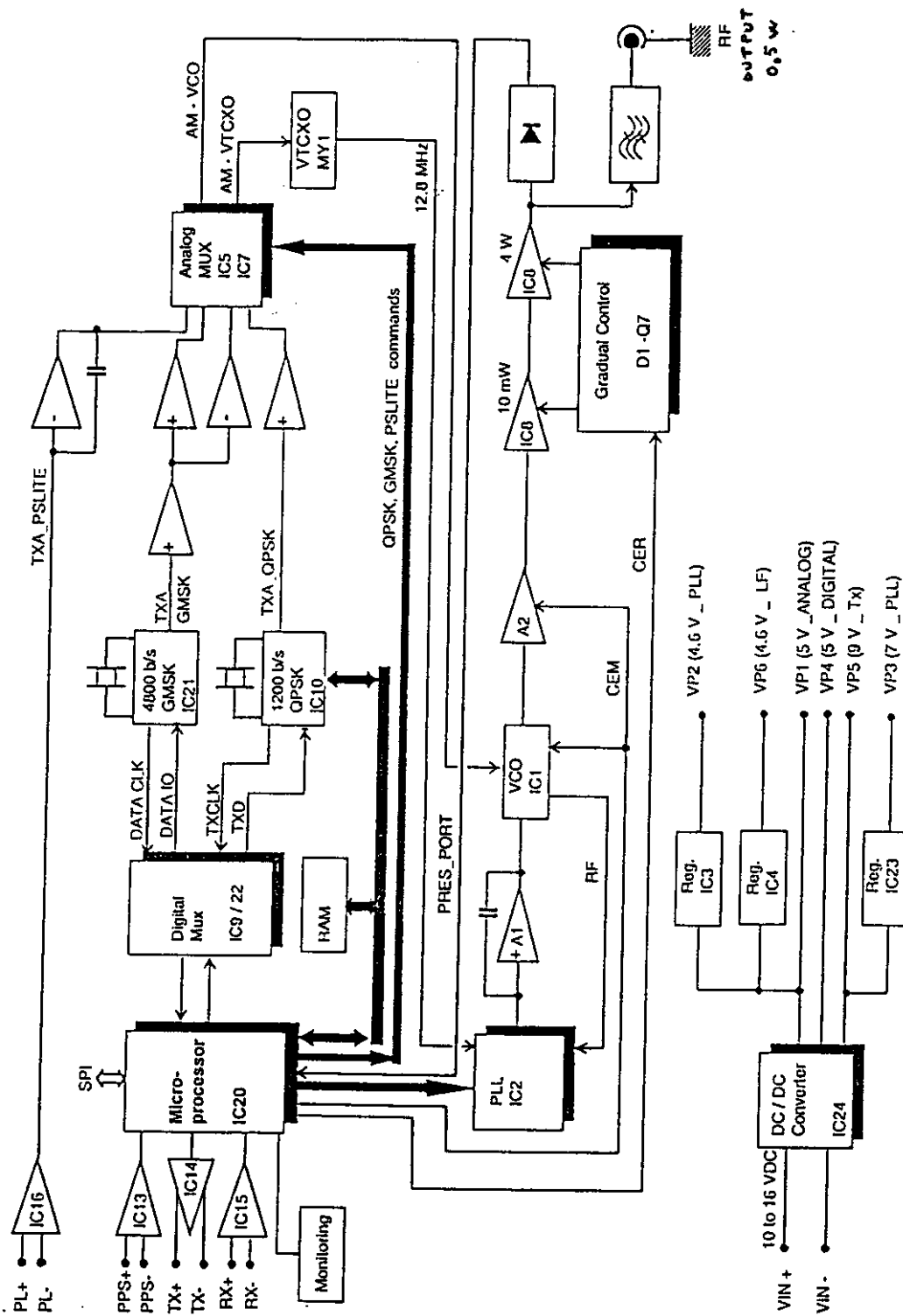
The modulated UHF signal generated by the VCO is fed to amplifier A2 that provides 'anti-pulling' protection for the power stages. The circuit made up of D1/Q7 controls the power of the output stages. The output power of the power module is 0.5W (27dBm) maximum.

A diode (D2) detects the output signal to inform the micro-controller of the presence of a carrier frequency.

A high-cut filter made up of three PI network is used to reject harmonics from the output stage.

Two DC/DC converters generate the power supply voltages. From the 10 to 16 VDC input voltage IC24 generates the 9 volts (1.5A) voltage required for the power module. The efficiency of this module is 90%. Q8 generates the logic and analog 5-volt power supply voltages.

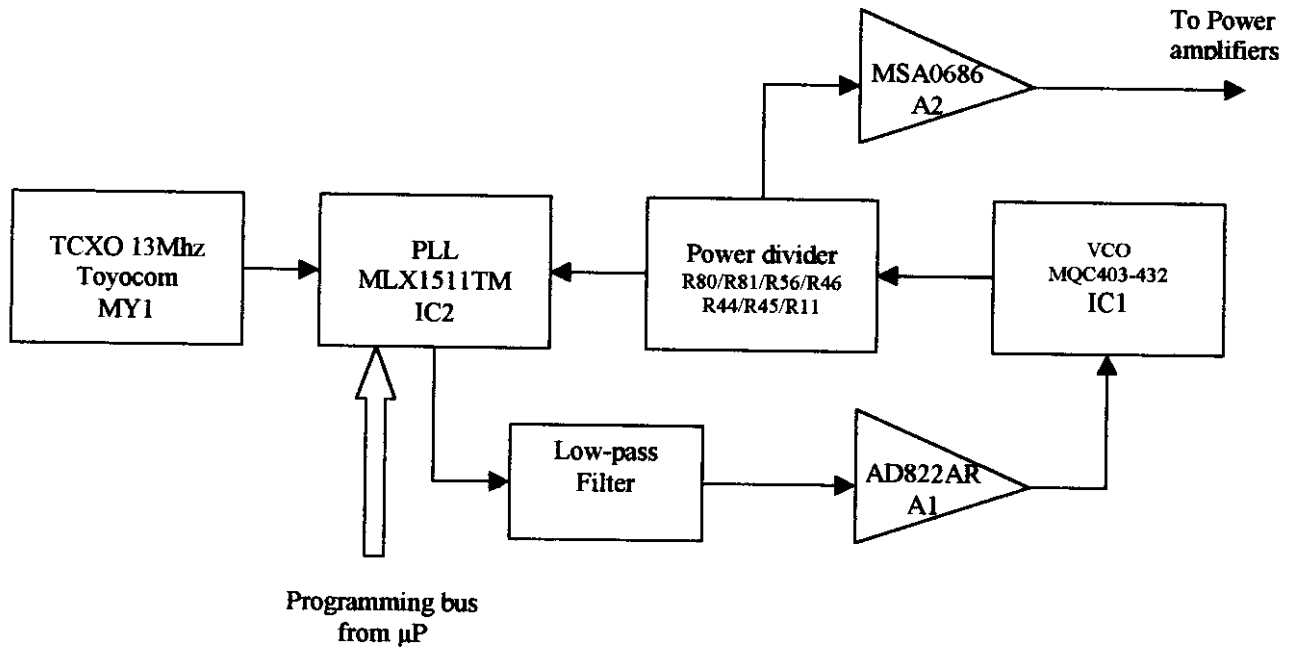
# UHF TRANSMITTER OPTION (5001SD and 5002SK stations ) THEORY OF OPERATION



UHF Transmitter Option Block Diagram

## **SYNTHESIZER CIRCUITRY**

The bloc diagram of the synthesizer is as follows :



The technique used in that frequency synthesizers is the so-called « pulse swallowing » technique which uses two ratio counters at high frequency. That technique allows an easier filtering.

The signal from TCXO at 13Mhz is divided by 1040 in IC2 in order to provide the comparison frequency at 12.5 KHz which is applied to one of the inputs of the phase/frequency comparator. The TCXO frequency stability is  $\pm 2.5\text{ppm}$  max. at temperature from  $-30^{\circ}$  to  $+70^{\circ}$ .

And on the other hand, the PLL IC2 receives the 400Mhz signal from the VCO through the adaptor/divider circuitry. This signal is divided by internal prescaler/counters that are programmed by data register depending on the desired transmission frequency. The 12.5kHz frequency signal, thus divided, is applied to the other input of the phase/frequency comparator in order to generate correction pulses that are routed to a low band filter. The output low band filter voltage is then amplified by 2 in A1 and sent to IC1 to correct the oscillator frequency.

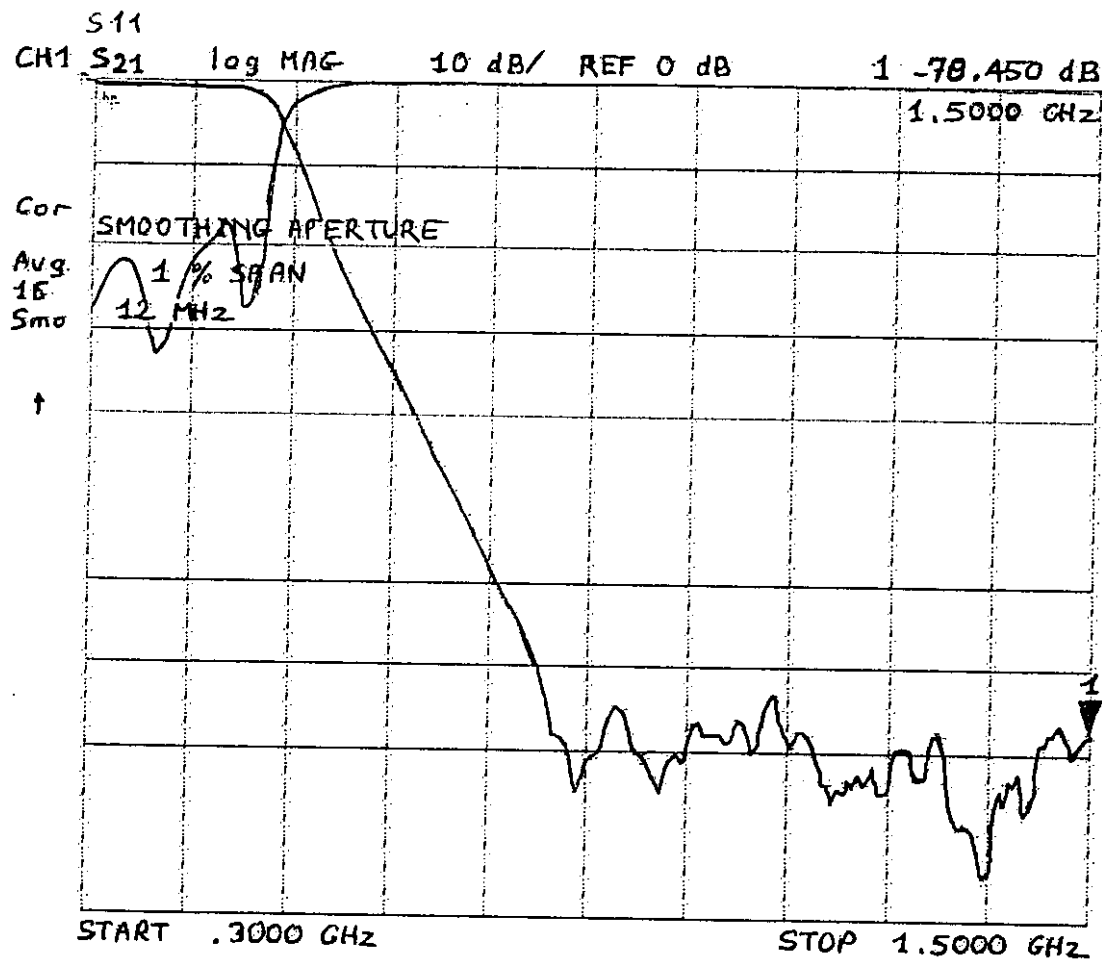
## Filter suppressing harmonic emissions.

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See schematic diagrams sheet 3 for details.

A high-cut filter made up of three PI networks is used to reject harmonics from the out stage. Rejection at 800Mhz is better than 60db.

The diagram below shows the filter response curve.



TDEA 75203 B

Pièce SMA soudée à l'accès antenne du CI.  
Relevé sans mécanique, coaxiaux d'entrée  
et de sortie éloignés l'un de l'autre  
au maximum.

F (Hz)	300	400	470	515	600	700	800
A (dB)	0,32	0,51	0,74	3,00	29,6	42,6	120