ND2099-DF-1 Dual Frequency Datasonde Technical and Operational Description

FCC ID K68ND2099A

Declaration of Equipment Characteristics

Type	Transmitter
Frequency Range	8 kHz or 33 kHz only
Method of Carrier Frequency Generation	Crystal
Channel Spacing	Wideband
Class of Emission	75H0K1D
Type of Modulation	Amplitude
Modulation Signal Input Level	N/A
Modulation Input Impedance	N/A
Modulation Bandwidth	N/A
Coupling Methods	Electrical
Number of Channels	1
Utilisation	Portable
Duplex operation	No
Antenna	Integral
Alternative Antenna	No
Operating temperature range	-20 °C to +55 °C

Transmitter

Rated Output	65.0 dB V/m
C.W. 2nd Harmonic output	28.0 dB V/m
Voltage supply range	2.55 to 3.0 V DC
Composition of Equipment	Single Unit

Radiodetection Dual Frequency Datasonde

Introduction

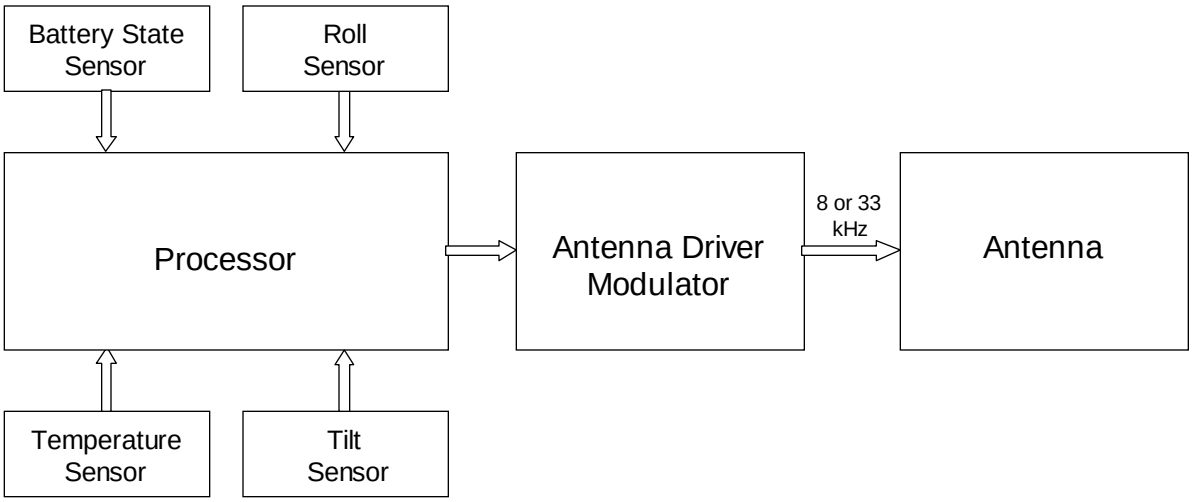
The Radiodetection Dual Frequency Datasonde (part no. ND2099-DF-1) is part of the Radiodetection Drilltrack system. The DrillTrack system is designed to provide the operator of a horizontal directional drill machine with information on the drillhead. The basic system consists of a Datasonde, a DrillTrack Receiver and a DrillTrack DataView.

The datasonde is mounted in the drilling machine drillhead and transmits information on its pitch, roll position, temperature and battery status to the DrillTrack Receiver. The information received by the DrillTrack Receiver is then relayed to the DataView by a separate radio link. The Dual Frequency Datasonde transmits at 8 kHz or 33 kHz.

Overview

The datasonde is a cylindrical device (380 mm long and 32 mm diameter) designed to fit into a cavity within a drillhead. It has a stainless steel case with a central plastic portion to allow it to transmit.

A block diagram of the datasonde is presented below:



The datasonde is microprocessor-controlled and powered by two C-cell alkaline batteries. It has two main circuit boards: the ND2095 Micro Board and the ND2096 Output Board. There are also two smaller boards: the RS1088 Roll Sensor Track Board and the RS1089 Roll Segment Board. Sensors within the datasonde measure the temperature, roll position and tilt angle of the datasonde and the state of the battery powering the unit. The sensor outputs are fed to the microprocessor. This information is interpreted by the microprocessor and encoded. The encoded information is then passed to a modulator and driver circuit which produces a signal to drive the

datasonde antenna. The antenna is a cylindrical coil with a ferrite core. It is mounted within the plastic portion of the datasonde case.

Modes of Operation

While a datasonde is turning in a drillhead, it continuously transmits coded information. If the datasonde stops rotating for more than 10 minutes, it enters a 'Standby' mode. In this mode, battery consumption is reduced by 50% and a pulsed signal is transmitted every ten seconds. If the datasonde begins rotating again, it automatically reverts to its normal transmission mode.

If a datasonde is to be left for some time, it can be switched to a 'Park' mode which reduces battery consumption by 65%. This is achieved monitoring the rotation position of the datasonde with a DrillTrack receiver, rotating the datasonde until the receiver indicates that the datasonde is in a special 'Park' position and leaving the datasonde for ten minutes. When in Park mode, the datasonde does not transmit but will revert to its normal mode as soon as rotation recommences.

Transmission Frequencies

Immediately after batteries are fitted in the datasonde, the unit operates in 8 kHz transmission mode. To switch the datasonde to 33 kHz mode (or back to 8 kHz mode), it is set to Park mode, rotated to a '3 o'clock' position and then rotated through 360º. After each rotation, the datasonde must be left until the DrillTrack Receiver monitoring its position gives an appropriate acknowledgement to the DrillTrack operator. When the DrillTrack acknowledges that the datasonde has been through a frequency-switching rotation sequence, it switches its receive frequency.

Transmission Data

The output from the datasonde is an amplitude-modulated 8 kHz or 33 kHz signal. Information is transmitted as a series of 10-bit words, each consisting of a start bit, seven data bits, a stop bit and an even parity bit. The data transmission rate is 75 baud.

The sequence of data words depends on whether the datasonde is normal mode, entering park mode or is overheating. Within each word sequence, roll and tilt information is repeated frequently and interleaved with information on the datasonde status.

When the datasonde is in normal mode or is over-temperature, a continuous series of data words is transmitted. In standby mode, the datasonde transmits a carrier wave pulse at approximately ten-second intervals. When the datasonde is entering park mode (parking), a parking sequence is transmitted for a few minutes and then all transmissions cease.

The three datasonde word sequences are detailed below:

	Datasonde Status		
Data Word	Normal Mode	Parking	Over-temperature
0	Roll	Roll	Roll
1	Datasonde Type	Configuration	Configuration
2	Roll	Parking	Roll
3	Low Tilt	Low Tilt	Over-temperature
4	Roll	Roll	Datasonde Type
5	High Tilt	High Tilt	Over-temperature
6	Roll	Parking	
7	Battery Level	Battery Level	
8	Roll	Roll	
9	Temperature	Low Tilt	
10	Roll	Parking	
11	Low Tilt	High Tilt	
12	Roll	Roll	
13	High Tilt	Temperature	
14	Roll	Parking	
15	Configuration	Datasonde Type	
16	Roll	Error/Status	
17	Steering		
18	Error/Status		