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1. SYSTEM DESCRIPTION

NON - DIRECTIONAL RADIO BEACON TRANSMITTER (NDB)

JTM-30C

1. SYSTEM DESCRIPTION

1.1 OVERALL SYSTEM DESCRIPTION

The JACOTRON Marine JTM-30C is a Non-Directional Radio Beacon (NDB) Transmitter designed for use onboard oilrigs and ships, as well as for other applications at sea or land.

The JTM-30C is available in two different RF Power output versions (100W PEP or 250W PEP), and :

- Single NDB Transmitter configuration with one complete transmit chain
- DUAL (or Redundant) NDB Transmitter. This configuration has two complete transmit chains with fault detection/reporting and automatic changeover.

If purchased a Single version first it is very easy to upgrade to a Dual version by adding one extra Exciter and one extra RF Power Amplifier. This upgrade can be carried out on site by personnel on the ship/rig and on land installation.
The equipment is a totally new, but well tested concept now used for NDB transmitters utilizing a digital Exciter (DDS).

The transmitters have the following main features:

- Operates on frequency from 190 kHz to 2000 kHz (2 MHz) , in steps of 1 Hz.
- Frequency generation by Direct Digital Synthesis (DDS) featuring high linearity and stability of carrier and modulation, low noise and excellent frequency accuracy
- The output power is 100W, alternatively 250W Peak Envelope Power (PEP), from the RF Power Amplifier
- The Exciter provides full power control of the carrier.
- The transmitters operate with N0N/A2A, N0N/A1A or N0N/A3E emission. MSK modulation is available as Option.
- A Timer function enables four different operational modus
  - Continuous modulation / Morse keying with automatic keying sequence repetition.
  - Transmit one Morse keying sequence only.
  - Transmit repeated Morse keying sequences during a specified interval.
  - Transmit the Morse keying sequence once for every specified interval.
- The Exciter enables four different Morse sequence (Ship ID)
  - a sequence with : “VVV VVV VVV QTG DE TEST TEST TEST --- ---“
  - a sequence with only ship Id. E.g. “TEST “
  - two additional Morse sequence is available for individual programming
- The equipment is equipped with functions for monitoring of carrier, modulation and failure conditions.
- Remote Control and monitoring
- Flexible control (ON/OFF) and monitoring of basic parameters from Remote Control Unit(s)
- Remote Control and Monitoring of all Transmitter parameters from a local PC via RS485, or communication between Transmitter and PC over Internet is possible via the RS-485/LAN Interface unit. Communication over Internet can be with or without encryption.

- The PC SW includes (as standard) both “Single Site” and “Multi Site” operation capability
- In “Multi Site” modus it is possible to monitor & control up to ninety (90) world-wide remote located NDB Transmitter from one (1) PC over Internet

Through the RS-485/USB or RS-485/LAN remote control interface, the following parameters may be read and/or programmed:

- Carrier frequency
- RF power
- Modulation type - Morse, Audio or GPS (option)
- Modulation depth
- Morse tone frequency
- Morse keying rate
- Four different Morse messages can be typed in as plain text.

The JTM-30C has a built-in non-volatile memory sufficient for storage of the entire transmitter configuration, and enabling stand-alone un-attended operation. Saving the configuration in solid-state memory is controlled via the PC interface.

The PC SW provides an event log that records all system events, such as restart, parameter changes and error events.

In addition to the PC interface, the JTM-30C also offers Remote Control Units that can be attached via a separate galvanic isolated port to provide simple operation of the transmitter from a remote location(s). The Remote Control Units may be daisy chained to more than one location.

As standard the JTM-30C transmitter (Single or DUAL) consists of one self-contained unit including Antenna Matching and Antenna Tuning mounted inside an IP66 weatherproof and ruggedized cabinet. The cabinet operates from 24V DC.

As option we may supply an AC Mains to 24V DC Power Supply installed inside the same Transmitter Cabinet. The Power Supply also provides an interface for battery backup input. During an AC Mains failure, the transmitter will automatically be powered from an external 24V battery (if connected).

This makes the installation low cost relative to equipment having separate Antenna Tuner and Transmitter where cables a required to be installed between these two units.

<u>Basic delivery</u>
NDB Transmitter Type JTM-30C, 100W, alternatively 250WPEP, Manual Tuning, operating from 24V DC, without Power Supply and Remote Control Unit.
RS-485/USB Converter, SW and Documentation are included in basic version.

Options
1. AC /DC Power Supply arrangement (installed inside Transmitter Cabinet)
2. DUAL Transmitter version

3. AUTO Tune version
4. Remote Control Unit(s)
5. RS-485/LAN converter arrangement
6. MSK Modulation

The JTM-30C shall be mounted at or near the antenna location. Solid grounding connection must be available at the mounting site. The ground terminals of the transmitter must be connected to site ground (ship deck) through low impedance copper wires.

Transmitter tuning to match the antenna impedance is a manual procedure.
Auto Tune Unit is offered as an option.

A heater element is installed inside the cabinet to reduce humidity at low temperatures. Heater element will automatically be activated when the temperature is below + 4^{o} C.

1.2 BASIC MODULES

TRANSMITTER CABINET (Single or Dual) operation from 24VDC comprising:
- ANTENNA TUNING COIL Manually tuned (Auto tune Option)
- ANTENNA MATCHING TRANSFORMER
- 100W, alternatively 250W, PEP RF POWER AMPLIFIER(S)
- POWER CONTROL UNIT (PCU)
- EXCITER MODULE(S)

RS-485/USB Interface
- RS-485/USB Converter for connection to PC at the Transmitter or at the Remote Controls

Documentation & PC SW
- A CD contains SW for the RS-485 Interface units and the "JACOTRON NDB PC SW" This CD also contains updated documentation

- A CD contains PC SW for "Singe Site" and "Multi Site", the RS-485 Interface and One set of documentation covering:

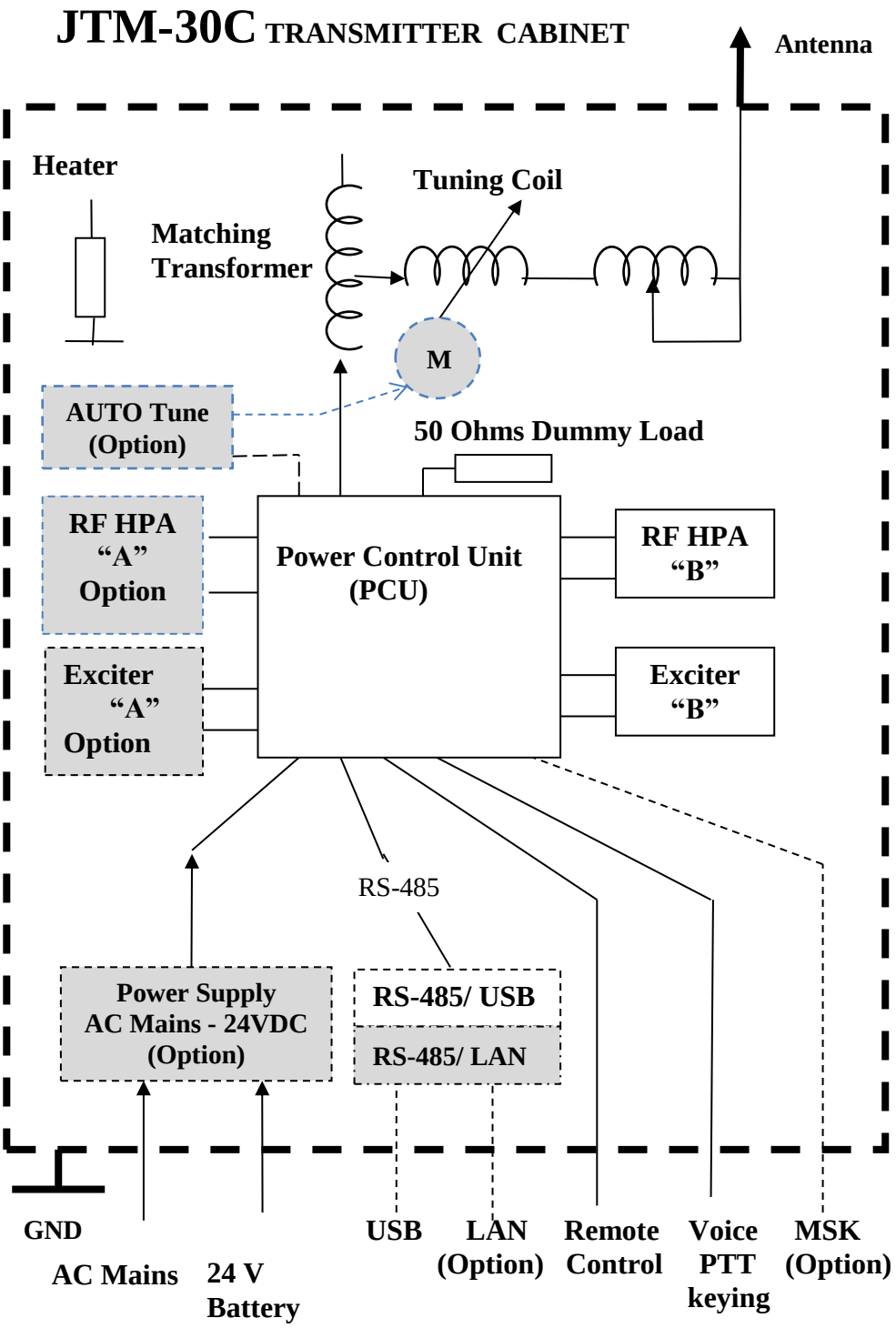
  - PAMPHLET & SYSTEM DESCRIPTION
  - INSTALLATION MANUAL
  - COMMISSIONING MANUAL
  - CONFIGURATION MANUAL
  - OPERATOR MANUAL
  - MAINETENCE & FAULTFINDING MANUAL
  - SPARE PARTS & OPTIONS

POWER SUPPLY AC Mains / 24V DC (Option)
- Installed inside Transmitter Cabinet

REMOTE CONTROL UNIT (Option)
- CONTROL BOARD JTM-30R

RS-485/LAN Interface (Option)
- RS-485/LAN Converter for transmitter connection to a PC via Internet (Option)

1.3 SYSTEM BLOCK DIAGRAM



1.4 ELECTRICAL & MECHANICAL CARACTHERISTICS

Frequency range		:	190 to 2000 kHz
Frequency stability		:	2,5 p.p.m.
Antenna impedance		:	R : 2 to 25 ohm, C:150 to 500 pF
Types of emission		:	N0N/A2A, N0N/A1A or N0N/A3E. ***(MSK Option)***
Modulation tone		:	Any freq. 300-1350 Hz. Typical 400/1020 Hz
Identification code		:	Any combination of code (512 bits)
Morse speed		:	3 to 20 word per minute
Audio Input (N0N/A3E)		:	Unbalanced 600 ohm 0 dBm
Voice Enable (Push-to-talk)		:	Make-brake Microphone PTT contact
Inter-modulation		:	Better than 31 dB rel. to PEP
Distortion (A2A or A3E)		:	Less than 5%
Harmonic attenuation		:	More than 60 dB
Frequency generation		:	By synthesizer
Antenna tuning		:	Manual ***(Auto tune option)***
Operation from		:	24 VDC
DC voltage tolerance		:	+30% / -10%
Power into Antenna Tuning circuits		:	Up to 100W PEP (25W carrier) Up to 250W PEP (63 W carrier)
Power input DC current		:	at 100W PEP = maximum 8 Amps at 250W PEP = maximum 13 Amps
Power Dissipation		:	Maximum 320 Watts
Outdoor temperature range		:	-35 ^{o}C to + 55 ^{o}C
Indoor temperature range		:	+10 ^{o}C to + 45 ^{o}C
<u>Transmitter Cabinet</u>	Height	:	600 mm + Insulator110 mm **Protection IP 66**
(Incl. Power Supply)	Width	:	400 mm + heat sink 40 mm
	Depth	:	320 mm
	Weight	:	Single version 34 kg, Dual version 35,6 kg
	Cable glands	:	4 pcs PG16 and 1 pc PG29
Power Supply (Option).		:	Installed inside Transmitter Cabinet
Additional weight		:	5.*0 kg)*
Remote Control Unit	Height	:	110 mm **Protection IP41**
	Width	:	250 mm
	Depth	:	45 mm
	Weight	:	0,35 kg

1.5 OPERATION

The transmitter is provided with a Timer circuit for various interval or continuous operation.
The Transmitter is designed for continuous operation (over years) on the selected frequency and with the selected keying sequence as long as it has sufficient supply of DC-voltage or during a specified time and intervals based on the configuration programmed from PC.

Dual Transmitters operation. If "MAIN TRANSMITTER" fails due to no modulation or continuous modulation, or reduced RF–power output (reduced by 3-5 dB or more), the equipment automatically will switch over to "RESERVE TRANSMITTER".
(Default time both for Modulation Failure and Carrier Reduction is 1 minute)

Reserve Transmitters operation. If failure of same parameters as above it may be selected through the PC interface if the Reserve Transmitter shall be switch OFF, or to continue after failure.

For information on Transmitter control via the PC interface please refer to the Instruction Manual for this option.

Control & Monitoring
The Transmitter may be controlled & Monitored from local Remote Control(s) and/or from a PC locally, or from one (1) PC over Internet as "Single Site" or "Multi Site" (up to 90 pcs NDB Transmitters).

1.6 MAINTENANCE

No special maintenance is required for the Transmitter/Tuner, Power Supply and Remote Controls are required, other than vacuum cleaning.

It is, however, of utmost importance that Antenna Insulator on offshore installations are cleaned on regular basis. Minimum once every month.

1.7 LIST OF TOOLS AND INSTRUMENTS

No special tools are required for installation.
A PC is needed for configuration of the equipment.