



**indra**

AIR TRAFFIC MANAGEMENT

# **DOPPLER VHF OMNIDIRECTIONAL RANGE**

Supplying ATM systems around the world for more than 90 years

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# DOPPLER VHF OMNIDIRECTIONAL RANGE



DVOR-DME Antenna

Highly reliable equipment ready  
for the most severe climatic conditions

The Indra DVOR is the ultimate choice in Doppler VHF Omnidirectional Range equipment combining quality with exceptional value for money.

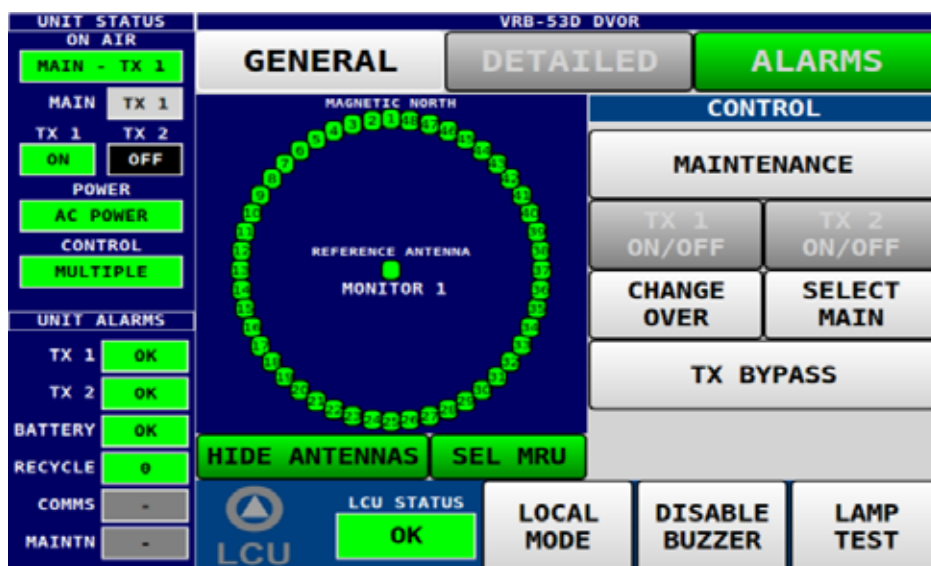
The equipment employs state of the art technology ensuring high reliability in order to meet the demands of both civil and military requirements.

Fundamental to the design concept of this unit are integrity, reliability, and maintainability.

The equipment has been tested under the most demanding environmental conditions, allowing equipment operation in any environment.

The Indra DVOR is an easy-to-use system requiring minimal maintenance, that meets or exceeds all requirements of ICAO annex 10, volume I edition 6, and EUROCAE ED-52, enabling interoperability with all currently available radio navigation aids on the market.

This equipment is another exceptional result of Indra's expertise in radio navigation aids.



DVOR LCU Screen

### Characteristics

#### GENERAL CHARACTERISTICS

Type	Double side band DVOR
Configuration	Single or Dual
Output power	25 W to >100 W adjustable in 0.1 W steps
Frequency range	108 to 117.95 MHz
Channel spacing	50 KHz channel
Carrier frequency stability	± 5ppm
Operating frequency	Digitally programable by Synthesiser
Bearing accuracy	± 0.5°
Bearing Adjustment	± 180° in 0.01° steps
Spurious Radiation	<-70 dBc typically
Antenna system	1 + 48 alford loops
Polarization	Horizontal
Status indication	Full local and remote indication
Module hot replacement	Yes
System monitoring (BITE)	Complete system / LRU monitoring
Local/remote interface	Ethernet / RS-232 and RS-485
Reliability	MTBF > 10,000 h (single) MTBO > 20,000 h (dual) MTTR < 30 m (15m typical)
Power Consumption	600 VA (single) 750 VA (warm standby)
Dimensions	One 19" standard rack (33u); 600 x 600 x 1467 mm (WxDxH)

#### ENVIRONMENTAL

Temperature	-20°C to +60°C Indoor -50°C to + 70°C Outdoor
Relative Humidity	95% Indoor 100% Outdoor
Maximum altitude	15,000 ft operating 45,000 ft inoperative
Wind	160 km/h operating 200 km/h survival
Hail/Ice	50 mm

## Indra DVOR

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The equipment is a state-of-the-art technology product ensuring high reliability and maintainability based on many years of operation in field systems in order to meet the demands of both civil and military requirements.

The system is a low-cost and high performance turn-key solution with high flexibility that can be adapted to customer sites and/or maintenance communications architecture needs.

The system makes use of the experience gained by Indra in developing and installing navaid systems for clients in a wide variety of countries all over the world under the most severe climatic conditions.

The main feature of the Indra DVOR is its high reliability.

The System is available in two options: single, and dual DVOR configuration, both employing the use of high quality electronic components.

The equipment has a modern and modular design which performs continuous monitoring of the main system parameters, providing high reliability and availability rates.

It provides extensive use of digital technology and a powerful monitoring and BIT processes in addition a global connectivity, thus providing multiple interfaces according the customer requirements.

## Main Characteristics

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- Dual transmitters, monitors, power supplies and control
- RF amplifiers modules based on solid state technology
- Multiple interfaces (RS-232, Ethernet, etc.)
- Extense use of the latest digital technology
- Friendly and intuitive user interface
- Multiple configurations
- Standard and flexible RMM architecture
- High level BITE

## Technology

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The Indra DVOR is based on a modular design architecture, solid state components and auto-diagnosis Built In Test (BIT) concept to provide a superior level of reliability.

Direct digital synthesizer (DDS) techniques are used for timing, frequency and waveform generation circuitry, derived from a single stable temperature-compensated crystal clock circuit which ensures accurate clocking of all critical time-dependent pulse generation and measurement circuits.

## Remote Maintenance Monitoring

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The equipment can be integrated with a versatile and robust software architecture that allows control and supervision performed locally or remotely, with several security levels.

The software architecture is based on standard protocols which provide intuitive and simple operation.

Different interfaces such as Ethernet, RS-232 and RS-485, thus are available allowing system compatibility and remote control connections by multiple means including dial-up modem, leased-lines, radio, IP-based virtual private network (VPN), Ethernet, and cellular networks.

## Maintenance and Reliability

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Includes a Built In Test (BIT) capability designed to detect, isolate and report any malfunction or condition out of tolerance by using automatic and non-interruptive self-tests down to LRU level.

These BIT (Built In Test) system capabilities dramatically reduce routine maintenance tasks and repair times, allowing the prediction of system performance degradation. The results of the BITE process are available both locally and remotely via L/RMM.

The maintenance concept is based on LRU modules, easily accessible and exchangeable.

All components of the Indra DVOR have been selected to provide maximum reliability and minimize maintenance costs.



DVOR Equipment

### Characteristics

#### VOICE INPUT FACILITIES

<b>Microphone input</b>	-52 dBm to -9 dBm @ 600 ohm
<b>Line input - analog</b>	-37 dBm to +6 dBm @ Balanced 600 ohm
<b>Digital input</b>	Optical S/PDIF In/Out Toslink
<b>Voice compandor</b>	User selectable

#### MODULATION SIGNAL CHARACTERISTICS

##### Reference phase

<b>Frequency</b>	30 Hz $\pm$ 5 ppm
<b>Modulation depth</b>	28% to 32% digitally adjustable
<b>Distortion Factor</b>	5%
<b>Harmonic Distortion</b>	<3% of fundamental

##### Ident code

	International morse up to 5 chars
<b>Modulation frequency</b>	1020 Hz $\pm$ 5 ppm
<b>Modulation depth</b>	0 to 20% digitally adjustable
<b>Repetition rate</b>	6 times per min., adjustable
<b>Operation mode</b>	Independent/Associated

##### Voice Modulation

<b>Frequency range</b>	300 Hz to 3000 Hz
<b>Modulation depth</b>	0% to 40% digitally adjustable
<b>Noise (due signal conmutation)</b>	better than 30 dB

##### Variable phase

<b>Frequency</b>	9960 Hz $\pm$ 5 ppm
<b>Mean depth</b>	28% to 32% digitally adjustable
<b>FM modulation index</b>	16 $\pm$ 1
<b>Sideband harmonic levels</b>	Better than ICAO and ED-52 $\pm$ 9960 Hz, reference 0 dB 2nd harmonic < -40 dBc 3rd harmonic < -50 dBc 4th and above < -60 dBc

#### MONITOR

<b>Configuration</b>	Single/dual
<b>Frequency</b>	108 MHz to 118 MHz
<b>Monitor voting</b>	AND/OR
<b>Alarm thresholds</b>	Digitally configurable
<b>Carrier power</b>	3dB $\pm$ 1dB, adjustable
<b>Bearing information</b>	$\pm$ 1° maximum, adjustable
<b>Reduction in modulation depth</b>	
<b>or 30 Hz AM</b>	15% $\pm$ 1%, adjustable
<b>or Sub-carrier 30 Hz FM</b>	15% $\pm$ 1%, adjustable
<b>or Ident</b>	50% $\pm$ 10%, adjustable
<b>Ident code</b>	Continuous / Absence of tone, Incorrect Code
<b>Antenna monitoring</b>	Individual antenna monitoring
<b>Primary Alarm Condition</b>	Diametrically opposite antenna pairs Three individual antenna failures.
<b>Monitor failure</b>	Yes (failsafe)
<b>Antenna sensors</b>	NFM and FFM (Yagi or dipole antenna)



ISO 9001:2000



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