

# NORMARC 7000B

### Instrument Landing System

NORMARC 7000 ILS systems are available in a wide range of configurations all meeting the most stringent ICAO Level 4 requirements and designed to be cost-effective, easy to install and operate, and above all, dependable.

ORMARC 7000 INSTRUMENT LANDING SYSTEM (ILS) LOCALIZER GLIDE PATH		GLIDE PATH
SYSTEM		
Coverage – course – clearance	25NM/±10° 17NM/±35°	10NM/±8° azimuth
Course width	2° to 6° adjustable	$\pm$ 0.24 x glide path angle
Glide path angle	-	2° to 4° adjustable
Course stability	< ± 1m (typical)	< ± 0.04°
TRANSMITTER		
Frequency range	108 to 112 MHz	328.6 to 335.4 MHz
Frequency tolerance	± 0.0004%	± 0.0004%
Output power CSB (Course and Clearance)	5 - 25W adjustable (Course/Clearance)	3 - 8W adjustable (Course) 0.3 - 1W adjustable (Clearance)
Modulation depth 90/150 Hz nominal	20%	40%
Adjustable range (each tone)		10-25% 10-44%
Frequency tolerance (90/150 Hz)	± 0.01%	± 0.01%
Total harmonic distortion (90/150 Hz)	1% maximum	1% maximum
Phase locking (90 Hz to 150 Hz)	5° maximum ref 150 Hz	5° maximum ref 150 Hz
CSB/SBO adjustment range		360° 360°
IDENTITY KEYER		
Modulation Frequency	1020 Hz ± 0.5 Hz	
Modulation depth	5 - 15% adjustable	
Built- in interface for DME co-location, ILS can be ident master or slave		
MONITORING		
Alarm parameter (selectable)	Integral course line Integral displacement sensitivity Near- field course line Integral clearance (two frequency only) Identity	Integral Glide path angle Integral displacement sensitivity Near field Glide path angle Integral clearance (two frequency only)
Total period of radiation out of tolerance	1 to 10 seconds	1 to 6 seconds
Additional near- field time delay	0 to 20 seconds	0 to 20 seconds

## NORMARC 7000B

Instrument Landing System

### NORMARC 7000 INSTRUMENT LANDING SYSTEM (ILS)

### REMOTE MAINTENANCE MONITORING

3 x RS232 interface for connection to modem/PC Event log, alarm log, self diagnostic, historical data, fully electronically controlled TX and all functions needed during flight check from one window

### MARKER BEACON

According to ICAO Annex 10 paragraphs 3.1.7 and 3.6

REMOTE CONTROL	
Data transmission medium	2-wire line, 600 ohm, FSK or RS232
ENVIRONMENTAL CHARACTERISTICS	
Operational temperature	
Indoor	- 10 to + 55°C
Outdoor	- 40 to + 70°C
Storage temperature	- 30 to + 60°C
Wind	Up to 200 km/h
Ice	50 mm maximum
Non-destructive hall size	Up to 15 mm (diameter)

LOCALIZER ANTENNA SYSTEMS					
	NORMARC 3523B	NORMARC 7212	NORMARC 3525	NORMARC 7216	NORMARC 7220
	Single-frequency	Two-frequency	Two-frequency	Two-frequency	Two-frequency
Number of elements	12	12	24	16	20
Width of Array	37m	26m	48m	38m	52m
Beam-width CSB (-3 dB)	±3.8°	±3.6°	±2.0°	±2.5°	±2.0°

### GLIDE PATH ANTENNA SYSTEMS

Antenna System	Sideband Ref., M-array, O-Ref.
Frequency band	328 - 336 MHz
Glide path angle	2.0° to 4.0°
Antenna element	Stacked dipoles with reflector
Gain	12.5 dBi
Beamwidth	Horizontal +/- 12.5°
Front-to-back ratio	Min. 17 dB
Antenna mast	Self-supporting steel construction
Height	7 - 18m







Indra Navia AS (head office) Olaf Helsets vei 6 P.O. Box 150 Oppsal NO-0619 OSIO, Norway T: (+47) 23 18 02 00 F: (+47) 23 18 02 10 sales@indra.no www.indracompany.com Indra Navia AS Bromsveien 17 P.O. Box 145 NO-3191 Horten, Norway T (+47) 23 18 02 00 F (+47) 23 12 37 20 sales@indra.no www.indracompany.com

Indra reserves the right to modify these specifications without prior notice.



### Far Field Monitor



## The NORMARC 7720 ILS Far Field Monitor (FFM) is an accurate, reliable and user-friendly piece of equipment.

Easy installation and flexible connections make it an ideal companion to ILS equipment. The receiver unit is selfcontained for mounting in a shelter. It is typically located between threshold and the Middle Marker site with monitor antenna(s). Two receivers are included in the receiver unit as standard; one is for Course Line (CL) monitoring and the other is (at the customer's option) used for Course Sector (CS) monitoring.

The receiver unit receives and processes the ILS signal to provide information on DDM, SDM, and RF level for both channels. The ILS signal information is transmitted either to a NORMARC 7000 ILS, or to a connected PC with control software, normally located inside the radio equipment room, usually through external modems.

Far Field Monitor

### NORMARC 772

NORTHRICE / / LO	
SPECIFICATIONS	
Frequency range*	108.1-111.95 MHz
Channel spacing	50 kHz
RF level range	0 dBm to -80 dBm
DDM range	0-40%
DDM	
Centring	0.07% DDM
Deviation	0.07% DDM
	± 1.25% of DDM-reading
SDM range	0-95%
SDM error	0.5% SDM
Input connectors	2 BNC female
Output connectors	Ethernet RJ45 RS-232
User Interface	Graphical colour 5.7" LCD Keys for selecting function and parameter
Power input	115VAC or 230VAC nominal voltage
Internal battery capacity	4 hours (12V)
Dimensions (WxHxD)	400 x 500 x 220 mm
Weight	19 kg
Antenna type	2-element Yagi
Antenna mast height	Typically 6 m
Antenna cable	50 $Ω$ coaxial
Temperature range, operating	-10° to +50°C

\* The FFM includes GP receivers in addition to Localizer receivers, hence, it can also be used for Glide Path monitoring

### Not part of NORMARC 7720





canso

**AIRPORTS COUNCIL** 

INTERNATIONAL

Indra Navia AS (head office) Olaf Helsets vei 6 P.O. Box 150 Oppsal NO-0619 Oslo, Norway T: (+47) 23 18 02 00 F: (+47) 23 18 02 10 sales@indra.no www.indracompany.com Indra Navia AS Bromsveien 17 P.O. Box 145 NO-3191 Horten, Norway T (+47) 23 18 02 00 F (+47) 23 12 37 20 sales@indra.no www.indracompany.com

Indra reserves the right to modify these specifications without prior notice.





# NORMARC 7710 NAV Analyzer

For the perfect touchdown



The NORMARC 7710 NAV Analyzer is used to adjust, verify and record parameters of ILS (Localizer, Glide Path, Marker Beacon) and VOR ground systems according to ICAO 8071. The NAV Analyzer's functionality substitutes instruments like ILS/VOR receivers, modulation meters and frequency counters. It incorporates all ILS and VOR channels selectable without any tuning or equipment changes. Facilitates measurement of

- 1. Carrier and Audio frequencies, Modulation Depth (DDM and SDM), RF level and Ident/Voice
- 2. Phase measurements of 30Hz tones for bearing information of VOR

The NAV Analyzer is a portable, batteryoperated weatherproof unit to be used outdoors, in a vehicle or inside the equipment shelter. It is supplied with a dipole antenna with a unipod support and coaxial cable. The analyzer has a rough outdoor design and is protected against damage during transport. The NAV Analyzer is based on a microprocessor/controller architecture and digital signal processing with storage functions. Full control from a remote system by use of network technology is possible.

The user interface is a graphical display (GUI) with function keys. Night conditions is supported. Audio jack for Identity/Voice monitoring is incorporated.

### **FACILITY FEATURES**

### 1. Low weight and small size

- 2. More than 6 hours operation from fully charged condition
- 3. Charging from 10.8-30V DC source directly or 110-240V using external adaptor
- 4. Automatic tuning to the input signal
- 5. User named measuring points/sequences and selectable measurement intervals/rates
- 6. Auxiliary connector for external event button
- 7. Dual-band antenna
- 8. Performance analyzes of ILS Localizer, Glide Path, Marker Beacon and VOR
- 9. Supports CAT III ILS Localizer in accordance with ICAO 8071
- 10. All controls and measurements available through external interfaces
- 11. RS-232 or Ethernet interface for data access via personal computer
- 12. Data storage capacity for minimum 1 hour of continuous measurements

Prameters	Localizer	Glide Path	VOR	Marker Beacon
Frequency range	108.1-111.95 MHz	328.6-335.4 MHz	108.0-118 MHz	75 MHz
Channel spacing	50 kHz	150 kHz	50 kHz	
Frequency tolerance	0.0004%	0.0004%	0.0004%	0.0004%
RF level range	0 dBm to -80 dBm	10 dBm to -70 dBm	0 dBm to -80 dBm	0 dBm to -50 dBm
DDM range	0-40%	0-80%		
DDM/Bearing error	Centring: 0.07% DDM	Centring: 0.15% DDM	0.3°	
SDM/Mod. depth range	0-95%	0-95%	10-50%	80-100%
SDM/Mod depth error	0.5% SDM	1% SDM	0.5% Mod depth	0.5% Mod depth
Ident/Voice freq. range	300-3000 Hz		300-3000 Hz	300-3000 Hz
Ident/Voice depth of modulation range	1-55%		1-55%	
ldent depth of modulation error	1% mod. depth		1% mod. depth	

Input connectors	BNC female	
Output connector	Ident/Voice audio-jack Aux. Connector for Event button etc. Ethernet connector RS-232 connector	
User Interface	Graphical colour 5.5" LCD Keys for selecting functions and parameters	
Power supplies	NiMH rechargeable battery, (min. 6 hours use) External charger, 110-240V AC	
Power input	10.8VDC to 30VDC	
Dimensions (WxHxD)	240 x 160 x 140 mm	
Weight	4.5 kg	
Antenna type	Dipole, telescopic	
Antenna mast height	2.9 m (1.6 m retracted) with level	
Antenna cable	RG-223, 4 m	
Temperature range	-10°C to +50°C	
Protection	IP54	





🧼 ındra

Indra Navia AS (head office) Olaf Helsets vei 6 P.O. Box 150 Oppsal NO-0619 Oslo, Norway T: (+47) 23 18 02 00 F: (+47) 23 18 02 10 sales@indra.no www.indracompany.com

Indra Navia AS Bromsveien 17 PO. Box 145 NO-3191 Horten, Norway T (+47) 23 18 02 00 F (+47) 23 12 37 20 Sales@indra.no www.indracompany.com

Indra reserves the right to modify these specifications without prior notice.



Ground Based Augmentation System



# GBAS is a new satellite based landing system which can provide significant capacity, efficiency, safety and environmental benefits for airlines, airports and air navigation service providers.

One physical rack can provide service to several runways and runway ends, with several approach patterns for each runway end, and provides azimuth, elevation and distance guidance in one system. Siting flexibility and reduced requirements to flight inspection makes GBAS a cost effective alternative for the future.

Indra Navia participates in SESAR in order to define and develop concepts and systems for the Single European Sky. GBAS CAT II/III is one of these concepts. The NORMARC 8100 GBAS System is designed to meet the ICAO Annex 10 requirements currently under development for CAT II/III conditions, and Eurocae ED-114 for CAT I conditions. It is a single constellation (GPS) single frequency system. The robust design is based on decades of experience with Instrument Landing Systems and Special Category I GPS-based landing systems. The NORMARC 8100 provides a flexible architecture and user friendly interfaces developed through close cooperation with users of our other landing systems. The system allows up to four GPS receivers and up to four VHF transmitters/receivers, where two of the four sets can be located on a remote location to accommodate sites where VHF coverage is challenging. The architecture is selected from a safety and security perspective, aiding operational approval.

Ground Based Augmentation System

### NORMARC 8100 GROUND BASED AUGMENTATION SYSTEM (GBAS)

TRANSMITTER				
Frequency Range	108 - 117.975 MHz			
Output Power Range	20 – 80 W			
Coverage:				
Laterally	28 km ± 35°, 37 km ± 10°			
Vertically	0,75 - 7°			
ENVIRONMENTAL CHARACTERISTICS				
Operational Temperature:				
Indoor	-10 - 50 °C			
Outdoor	-40 - 55 °C			
Humidity:				
Indoor	95% below 35 deg			
	60% above 35 deg			
Outdoor	95% below 35 deg			
	60% above 35 deg			
Rain	100 mm/h			
Icing	50 mm			
Wind	130 km/h			
Solar radiation	1120W/m <sup>2</sup>			
ACCURACY				
Range Accuracy	ED-114 GAD C			
Position Accuracy	ICAO Annex 10 (16m horizontally and 4 m vertically 95%)			
BATTERY BACKUP				
Battery Operation	3 - 30 h depending on # of transmitters, output power and duty cycle			
PHYSICAL CHARACTERISTICS				
Power Consumption	400-2000 W depending on # of transmitters, output power and duty cycle			
Dimensions (HxWxD)	1020x600x550			
Weight	100-110 kg depending on configuration, excluding battery bank and antennas			
REMOTE CONTROL				
Data transmission medium	2-wire lined, 600 ohm, FSK or RS-232			
MAINTENANCE & MONITORING				
PC-based over Ethernet local or remote, for configuration, alarm log, diagnostics, validation				
RECORDING				
In-rack one week of legal recording				





Indra reserves the right to modify these specifications without prior notice.

## ındra

Indra Navia AS (head office) Olaf Helsets vei 6 P.O. Box 150 Oppsal NO-0619 Oslo, Norway T: (+47) 23 18 02 00 F: (+47) 23 18 02 10 sales@indra.no www.indracompany.com Indra Navia AS Bromsveien 17 P.O. Box 145 NO-3191 Horten, Norway T (+47) 23 18 02 00 F (+47) 23 12 37 20 sales@indra.no www.indracompany.com



AIR TRAFFIC MANAGEMENT

## DOPPLER VHF OMNIDIRECTIONAL RANGE

Supplying ATM systems around the world for more than 90 years

indracompany.com



AIR TRAFFIC MANAGEMENT

## DOPPLER VHF OMNIDIRECTIONAL RANGE



DVOR-DME Antenna at Ipiales - Colombia in 2011

# A low cost and highly reliable equipment ready for the most severe climatic conditions

#### Introduction

The Indra DVOR is the ultimate choice in Doppler VHF Omnidirectional Range equipments 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 Indras' expertise in radio navigation aids.



Characteristics	
MONITOR	
Configuration	Single/dual
Frequency	108 MHz to 118 MHz
Monitor voting	AND/OR
Alarm thresholds	Digitally configurable
Carrier power	3dB ± 1dB, adjustable
Bearing information	± 1° maximum, adjustable
Reduction in modulation depth	
or 30 Hz AM	15% ± 1%, adjustable
or Sub-carrier 30 Hz FM	15% ± 1%, adjustable
or ldent	50% ± 10%, adjustable
ldent code	Continuous / Absence of tone, Incorrect Code
Antenna monitoring	Individual antennas
	Diametrically opposite antenna pairs
	Three individual antennas failure.
Monitor failure	Yes
Antenna sensors	NFM and FFM (Yagi or dipole antenna)
VOICE INPUT FACILITIES	
Microphone input	-52 dBm to -9 dBm @ 600 ohm
Line input - analog	-37 dBm to +6 dBm @ Balanced 600 ohm
Digital input	Optical S/PDIF In/Out Toslink
Voice compandor	User selectable
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

The equipment is an state-of-the-art technology product ensuring high reliability and maintainability based on many years of operation in fielded 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 to be adapted, if required to customers sites and/or maintenance communications architecture necessities.

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

#### Technology

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. The main and most advanced 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.

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

### Main characteristics

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

### RMM

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.

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

### Maintenance and reliability

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 reduce dramatically routine maintenance tasks and repair times, allowing the chance of predicting a degradation of system performances. The results of the BITE process are available both local 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

GENERAL CHARACTERISTICSTypeDouble side band DVORConfigurationSingle or DualOutput power25 W to >100 W adjustable in 0.1 W steps
Type     Double side band DVOR       Configuration     Single or Dual       Output power     25 W to >100 W adjustable in 0.1 W steps
ConfigurationSingle or DualOutput power25 W to >100 W adjustable in 0.1 W steps
Output power25 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
<b>Operating frecuency</b> Digitally programable by Syntheziser
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
ReliabilityMTBF > 10,000 h (single)
MTBO > 20,000 h (dual)
MTTR < 30 m (15m typical)
Power Consumption 650 VA (single) 750 VA (warm standby)
Dimensions One19" standard rack (33u):
600 x 600 x 1467 mm (WxDxH)
MODULATION SIGNAL CHARACTERISTICS
Reference phase
Frequency30 Hz ± 5 ppm
Modulation depth28% to 32% digitally adjustable
Distortion Factor 5%
Harmonic Distortion   <3% of fundamental
Ident code International morse up to 5 chars
Modulation frequency IU20 Hz ± 5 ppm
Modulation depth     U to 20% digitally adjustable       Departicion metric     C times acquiring the stable
Repetition rate     6 times per min., adjustable
Uperation mode Independent/Associated
Frequency range     3UU HZ TO 3UUU HZ       Modulation doath     0% to 40% digitally adjustable
rooulation depth         U% to 40% digitally adjustable
Variable obace
Mean depth 28% to 22% digitally adjustable
<b>EM modulation index</b> 16 + 1
Sideband harmonic levels Rotter than ICAO and ED-52
$\pm$ 5000 LZ, TETETETETE 0 UD 2nd harmonic < 10 dRc
2  truthatmonic < -50  dRc
4th and above < - 60 dBc



## Indra

### AIR TRAFFIC MANAGEMENT

## DISTANCE MEASURING EQUIPMENT

Supplying ATM systems around the world for more than 90 years

indracompany.com

AIR TRAFFIC MANAGEMENT

## DISTANCE MEASURING EQUIPMENT



DME Antenna

## The result of Indra's expertise in radio navigation is a new distance measuring equipment highly reliable and low cost

The Indra DME is the ultimate choice in Distance Measuring 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.

Integrity, reliability and maintainability are fundamental to the design concept of this system.

The equipment has been tested under the most demanding environmental conditions, ensuring equipment operation in any environment. The Indra DME 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-57, this enables interoperability with all currently available radio navigation aids on the market.

Introduction

UNIT STA	TUS	LDB-103 DME						
ON AIR MAIN - T)	R XP B	GENERAL		DETAILED			ALARMS	
MAIN T	ХР В		S	SYSTEM A		Т	SYSTEM B	
	XP B	MONITOR	-		-		1	4
		BEACON DELAY	-		-	5	0.000 us	49.950 us
AC POWE	ER	PP SPACING	-		-	1	1.950 us	12.000 us
CONTRO	L	EFFICIENCY	-				87 %	88 %
MULTIP	LE	TX RATE	-				745 PPPS	750 PPPS
UNIT ALA	RMS	RADIATED POWER	-			5	0.95 dBm	50.68 dBm
ΤΧΡ Α	ОК	TX POWER	-			5	1.05 dBm	51.32 dBm
ТХР В	ок	REQUENCY ERROR	-				1 PPM	2 PPM
BATTERY	ок	TXP A ON/OFF O	TXP B		CHANGE OVER	s	ELECT MAIN	ALARM INHIBIT
RECYCLE	θ							
	-		STATUS	Ļ	OCAL	DI	SABLE	LAMP
MAININ	-	LCU				Б		TEST

DME LCU Screenshot

System	
Configuration	Single or Dual
Standard Compliance	ICAO Annex 10
	ICAO Doc 8071,
	EUROCAE ED-57
	RCM & CE Marking
Aircraft Handling Capacity	> 200 Interrogators
Design	Full solid-state and modular
Module Hot Replacement	Yes
Status Indication	Full Local and Remote indication
System Monitoring (BITE)	Complete System & LRU Monitoring
	based on HW
Remote/Local Control Interface	Ethernet (RS-232 & RS-485)
Environmental Conditions	Operating Temperature:
	<ul> <li>-20°C to +60°C for indoor installed parts</li> </ul>
	<ul> <li>-50°C to +70°C for outdoor parts</li> </ul>
	Relative Humidity:
	<ul> <li>95% (-20°C to 35°C)</li> </ul>
	<ul> <li>60% (35°C to 60°C)</li> </ul>
	Operating Altitude: 15,000 ft
Reliability	MTBO > 20,000 hours for dual system
Power Consumption	< 350 VA (dual System and hot standby)
Dimensions	One19" standard rack:
	600 mm (Wide)
	600 mm (Deep)
	1467 mm (High)

#### Indra DME

The Indra DME is the result of extensive Indra's expertise in radio navigation aids that combines efficient operation and accurate distance measurement with an intuitive user friendly interface.

It is a solid state system developed with state-of-the-art technology achieving high reliability.

Its modular design in conjunction with its powerful BITE system allows fast failure location and minimum repair time.

The main and most advanced characteristics of the Indra DME is its high reliability.

Is available in two configurations, single, and dual DME, 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, including reply delay, pulse pair spacing, transmission power, reply efficiency, receiver sensitivity and pulse shape. This provides high reliability and fast failure location, as well as the ability to anticipate critical parameter degradation.

With all these features the equipments operational availability is maximized.

#### Main characteristics

- Modular design
- Solid state components
- Multiple interfaces (Ethernet, RS-232, RS-485)
- FPGA logic and embedded PC
- Friendly and intuitive user interface
- Easy and fast installation
- Multiple configurations
- Standard and flexible RMM architecture
- High level BITE

### **Built in test**

The BITE (Built In Test) system reduces the requirement for routine maintenance to an absolute minimum.

The BITE systems fault location facility enables dramatically reduced repair times to be achieved.

integrated test system is possible to perform

easy and fast maintenance procedures.

In order to achieve this aim, critical parameters of the system are constantly checked, giving the possibility to predict the degradation of the systems characteristics and minimizing the maintenance task.

The results of the BITE process are available both remotely, at the Remote Monitoring and Maintenance system (RMM), and locally.

Maintenance and reliability	RMM	
Indra DME offers high reliability that is reflected in its high MTBF and low MTTR, resulting in minimum maintenance. Thanks to its	The equipment can be integrated with a versatile and robust software architecture that allows control and supervision to be	The software architecture is based on standard protocols which provide intuitive and simple operation.

performed locally or remotely, with several

security levels.



DME Equipment

Characteristics		
TRANSMITTER CHARACTERISTICS		
Peak Power Output	> 100W (terminal DME)	
	> 1KW (en-route DME)	
Power Output Control	4 dB (0.25dB steps)	
Frequency Range	960 MHz to 1215 MHz	
Frequency Stability	± 2 ppm	
Channels	252 (126 X and 126 Y)	
RF Pulse Spectrum	ICAO Annex 10	
Pulse Rise Time	2.5 (-1; +0.25) μs	
Pulse Decay Time	2.5 ± 0.5 µs	
Pulse Width	3.5 ± 0.5 µs	
Pulse Pair Spacing	X Channel: 12 ± 0.1µs	
	Y Channel: 30 ± 0.1 µs	
RF Pulse Spectrum	En-route (1KW):	
·	47 dB @ 0.8 MHz	
	65 dB @ 2 MHz	
	Terminal (100W):	
	37 dB @ 0.8 MHz	
	55 dB @ 2 MHz	
CW EIRP	≤ -10 dBm	
Souitter Pulses	700 to 850 pp/s (programmable)	
RECEIVER CHARACTERISTICS	,	
Frequency Range	1025 to 1150 MHz	
Input Maximum Level	Operational: -5 dBm	
····F · · · · · · · · · · · · · ·	Survival: +20 dBm (in band)	
Transponder Sensitivity	-94 dBm	
Adjacent Channel Rejection	> 90 dB	
Image frequency Rejection	> 75 dB	
Other Spurious Rejection	> 85 dB (960 to 1215 MHz)	
Decoding	X Channel: 12 ± 1 µs	
5	Y Channel: 36 ± 1 µs	
TXP Dead Time	Adjustable from: 50 to 150us (0.05 us step)	
Short and Long Distance Echo Suppression	Yes (programmable)	
MONITOR PERFORMANCES		
Configuration	Two or four independent monitors with	
5	embedded interrogator	
Decision	Configurable: AND / OR	
Alarm configuration	Configurable between primary and secondary	
Alarm Thresholds	Configurable	
POWER SUPPLY CHARACTERISTICS	0	
Configuration	Triple redundancy:	
-	Dual PSU;	
	Dual internal AC/DC	
	Dual battery banks	
Input Voltage Range	+90 VAC to +276 VAC & Soft Start	
Input Frequency	45 Hz to 70 Hz	
···· ··· ·····························		