

VHF DATA RADIO COMMUNICATION SYSTEMS

EM 9000 TRANSMITTER

- Wide band 118-136.975 MHz,
- Output power up to 50 W for AM and D8PSK,
- Compliant New Mask for D8PSK,
- Built-in-test,
- Internal protections against overvoltage, overheat, VSWR...
- Telesupervising facilities.



RE 9000 RECEIVER

- Wide band 118-136.975 MHz,
- Built-in-test,
- Internal protections,
- Telesupervising facilities.

EM 9000 and RE 9000 have been designed for multimode operations (A3E, ACARS, Mode 2, Mode 3, etc.).

SYSTEM FEATURES

A new concept in ATC and VHF Data Link :

- AM, ACARS, Mode 2 capabilities - upgradable Mode 3, Mode 4,
- Fully compatible with 8.33 kHz frequency channel spacing,
- Local and remote control operations,
- Telemonitoring and telemeasuring facilities,
- Digital signal processing technology.



GENERAL DATA

- **Modes :**
 - A3E (AM voice)
 - ACARS (AM - MSK internal modem)
 - Mode 2 (D8PSK 31.5 kbps - CSMA)
 - Mode 3 (D8PSK 31.5 kbps - TDMA)
 - Upgradable Mode 4
- **Frequency range :**
 - 118-136.975 MHz
 - Option :
 - 118-144 MHz
 - Note: For GBAS operation in 108-117.950 MHz, please refer to series 9009*
- **Frequency stability :**
 - ≤ 1 ppm (0°C to 50°C)
- **Channel spacing :**
 - 25 kHz and 8.33 kHz
- **Climatic conditions :**
 - Operation assured :
 - between -20°C and +55°C
 - Relative humidity :
 - 95% at 40°C (without condensation)
 - Storage :
 - 40°C to +80°C
- **Power supply :**
 - 24 V d.c. (21-31 V), 240/120 V. a.c. ± 10% (option A)
 - (automatic switchover AC-to-DC)
- **Telemonitoring / Radio control / Maintenance :**
 - Local or remote control serial port with RS 232 and RS 485 interfaces.
 - Maintenance :
 - built-in test actuation and report.
 - Software maintenance (version, loading)
 - Setup functions :
 - mode,
 - frequency,
 - operation parameters...
 - Measurements :
 - direct output power,
 - VSWR,
 - modulation depth (AM),
 - d.c. voltage,
 - Rx AGC voltages
- **Data interfaces :**
 - RS 485 interface, up to 64 kbps

EM 9000 TRANSMITTER CHARACTERISTICS

- **Mechanical characteristics :**
 - Front panel : 19", 3 units drawer
 - Overall depth : 430 mm
 - Mass : < 14 kg
- **Consumption (50 W 80%) :**
 - 230 V a.c. : 2.2 A (Typ.)
 - 24 V d.c. : 10 A (Typ.)
- **Carrier offset operation according to I.C.A.O. - annex 10 - for up to 4-carrier offset system**
- **Output power :**
 - 50 W carrier adjustable from 10 to 50 W into 50 ohms
- **Duty cycle :**
 - 100%
- **Protections :**
 - Power reduction on overheat, overvoltage and VSWR.
 - Infinite VSWR with standing capability without damage
- **VSWR :**
 - Operation capability with a VSWR of 2:1 without power reduction
- **AM voice mode :**
 - Modulation :
 - adjustable up to 95%. THD < 3% with m = 85%
 - Line input sensitivity :
 - adjustable from -30 to 0 dBm
 - Max level +10 dBm/600 ohms
 - Regulation level :
 - < 0.5 dB for 30 dB variation of the AF input level
- **AF and data responses :**
 - A3E (voice) :
 - 25 kHz channel spacing
 - > 300-3400 Hz at -3 dB (voice)
 - < 5000 Hz at -40 dB
 - A3E (voice) :
 - 8.33 kHz channel spacing
 - > 300-2500 Hz at -3 dB
 - < 3200 Hz at -40 dB
 - ACARS (Internal modem) :
 - > 200-3400 at -3 dB
- **Tx time out :**
 - Adjustable from 1 to 5 mn (can be disabled)
- **Spectral purity :**
 - Harmonics : < -36 dBm (< 83 dBc)
 - Spurious : < -54 dBm (< 101 dBc)
 - Noise at 1% of Fo : < -150 dBc/Hz
- **Adjacent channel power :**
 - AM-MSK and AM voice with 25 kHz channel spacing :
 - < -70 dBc
 - Voice with 8.33 kHz channel spacing :
 - < -70 dBc
 - D8PSK (up to 50 W output power) :
 - 1st channel : < -18 dBm (16 kHz)
 - 2nd channel : < -28 dBm (25 kHz)
 - 4th channel : < -38 dBm (25 kHz)

RE 9000 RECEIVER CHARACTERISTICS

- **Mechanical characteristics :**
 - Front panel : 19", 1 unit drawer
 - Overall depth : 430 mm
 - Mass : < 4 kg
- **Consumption :**
 - 230 V a.c. : 180 mA (Typ.)
 - 24 V d.c. : 500 mA (Typ.)
- **Sensitivity :**
 - A3E (voice) : < 1.5 μ V for a 10 dB (S+N)/N ratio with m = 0.3 at 1kHz (CCITT)
 - ACARS : -102 dBm (> 99% of messages)
 - D8PSK : -101 dBm (BER < 10⁻³ without Forward Error Correction)
- **IF selectivity :**
 - 25 kHz channel spacing :
 - 6 dB at \pm 10 kHz / -80 dB at \pm 30 kHz
 - 8.33 kHz channel spacing :
 - 6 dB at \pm 3.5 kHz / -60 dB at \pm 7 kHz
- **Image rejection :**
 - \geq 80 dB
- **3rd order intermodulation :**
 - \geq 80 dB (2 signals 500 kHz appart, ref. 0.5 μ V), typ. 85 dB
- **Crossmodulation :**
 - \geq 100 dB, ref. 1 μ V (jammer 500 kHz spaced out)
- **Spurious response :**
 - > 80 dB (at 100 kHz from desired frequency), except 1/2 Fi > 70 dB
- **Squelch :**
 - Adjustable and switchable from local or remote control
- **AGC :**
 - AF output within 3 dB over a 100 dB variation
- **AGC attack time :**
 - \leq 7.5 ms (AM-MSK) / \leq 50 ms (voice) to reach AF at 90% for 1 mV RF, m = 30% at 1000 Hz
- **AGC release time :**
 - \leq 15 ms (AM-MSK)
 - \leq 100 ms (voice) to reach AF at 90% for a RF decrease of 1 mV to 10 μ V, m = 30% at 1000 Hz
- **Audio line output :**
 - 600 ohms, adjustable from 0 to 10 mW
- **AF responses :**
 - A3E (voice) :
 - 25 kHz channel spacing : > 300-3400 Hz at -3 dB
 - 8.33 kHz channel spacing : > 300-2500 Hz at -3 dB
- **Harmonic distortion :**
 - < 5% THD m = 50% over AF bandwidth
 - RF between 0.1 and 100 mV
- **Muting or blank :**
 - Remote control

9000 SERIES

PERIPHERALS

- **BNS 9008** : Main/Stand-By switching unit
- **PGM 9000** : Maintenance terminal for local control of the transmitter and the receiver
- **PCR 9008** : Remote control unit for AM operation
- **REST 26154** : Fast switching PIN Diode Relay for Digital Modes
- Compatibility with peripherals of the 900 series (CPV900, etc.)

AM TRANSCEIVER OPERATION

