

V/UHF MULTIMODE TRANSCEIVER

The ER 940 V/UHF transceiver has been designed to meet the operational and tactical requirements of the Air to Ground aeronautical military communications in the VHF and UHF ranges, as well as to provide a rugged and comprehensive solution to the radio communications needs of civilian authorities who also handle or monitor defence force communications.

Its fully modular design permits an easy and fast maintenance and enables appropriate mix of options to propose adapted technical configurations to customer specific interface.



The equipment can be fed with an integrated a.c./d.c. power supply or with external 28 V d.c. ; switching to d.c. power supply, in case of VAC failure, is automatic.

Nominal output power :

- In VHF : 50 W AM or 75 W FM
- In UHF : 30 W AM or 45 W FM

It operates in the following modes :

- VHF frequency range : 118-163 MHz or 108-174.975 MHz (optional)
- UHF frequency range : 225-400 MHz
- Classes of emission : A3E - F3E (clear voice)
- Encrypted voice, Digital Data 16 kbits/s COMSEC (NRZ or Diphase) - A1D, F1D, with external crypto device
- Link 11
- Teletype AM or FM, with external modem
- Remote control serial interface RS 485, JBUS protocol.

OTHER FEATURES

- Reduced power mode (programmable),
- Optional integrated guard receiver 121.5 MHz and 243 MHz, with the possibility to monitor permanently the operating frequency + the two emergency frequencies,
- Real time SWR protection to permit the operation with filters or with automatic frequency tuning multicouplers,
- VHF and UHF separate antenna access for transmitter as well as for receiver ; optionally, two or three coaxial relays may be added to the transceiver for operation with two or one antenna,
- Slaving control for carrier power and modulation,
- Voice modulation compressor (switchable),
- Modulation limiter (clipper),
- Internal integrated test (BITE),
- Separate inputs and outputs for Voice, Data, Link 11 and RTTY (with external modem),
- Protections against d.c. power supply polarity inversion, SWR (dynamic power reduction) and against infinite SWR, abnormal internal parameters (T°, voltages and regulation),
- Movable ergonomic control front panel,
- Direct access functions (menu) with keyboard and LCD screen (four lines of 40 characters).

CONNECTIONS

The main following connections are located on the rear panel :

- 110/240 V a.c. input, connected to the mains power supply (with optional a.c. power supply).
- 28 V a.c. input, connected to the standby supply.
- Connection to the operation.
- Serial link for the remote control.

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COMPOSITION OF THE TRANSCEIVER

The transceiver is composed of a 19" support frame which permits the interconnection of 16 plug-in sub-assemblies. Seven modules or PCB's (*) are directly pluggable on the mother board after removal of the front panels.

The sub-assemblies are :

- VHF and UHF amplifier modules, filters and couplers installed on a heatsink section,
- The slaving PCB (*),
- Interface and AF processing PCB (*),
- Control module of the transceiver with micro-processor (*),
- The synthesizer module (*),
- IF reception module (*),
- RF reception module (*),
- Auxiliary power supplies and power supplies switching PCB,
- Guard receiver PCB - optional (*),
- Operation control/monitoring panel,
- Optional a.c. power supply.

REMOTE CONTROL OF THE TRANSCEIVER

Three possibilities to operate this transceiver :

- Locally, from the control and operation panel.
- Remotely, using a PE940 remote control unit.
- Remotely, by means of RS485 serial link operating under JBUS protocol.



GENERAL CHARACTERISTICS

- **Frequency range :**
 - VHF : 100-163 or 108-174.975 MHz (optional)
 - UHF : 225-400 MHz
- **Frequency spacing :**
 - VHF : 12.5 kHz or 8.33 kHz
 - UHF : 12.5 kHz
- **Preset channels :**
99
- **Frequency stability :**
≤ 1 ppm
- **Types of transmission :**
A3E, F3E, A1D, F1D for data transmission 16 kbits/s (NRZ and diphase modes), F7D Link 11
- **Operation in simplex mode (P.T.T.)**
- **Power consumption :**
95 V at 255 V a.c. / 45 Hz at 65 Hz
- **D.c. voltage (28 V nominal) :**
21 V to 31 V.
Power reduction in AM mode for voltage < 28 V.
Automatic switching to d.c. voltage in a case of mains failure.
- **Consumption :**
 - a.c. voltage :
Standby : 0,3 A
UHF transmission : AM 1 A / FM 1,1 A
VHF transmission : AM 1.5 A / FM 1.6 A
 - d.c. voltage :
Standby : 1.3 A
UHF transmission : AM 8 A / FM 10 A
VHF transmission : AM 10 A / FM 12 A
- **Duty cycle :**
Continuous
- **Dimensions :**
 - Width x Height x Depth :
483 mm x 182 mm x 540 mm
 - Weight :
25 kg approximately
- **Temperature :**
-20°C to +55°C
- **Storage :**
-40°C to +85°C
- **Relative humidity :**
95% at 40°C (without condensation)

TRANSMITTER CHARACTERISTICS

- **Output power on 50 ohms :**
 - VHF : 50 W AM / 75 W FM
 - UHF : 30 W AM / 45 W FM
- **Over frequency band :**
± 0.5 dB
- **Output power reduction :**
Programmable from -1 to -7 dB
- **Protections against VSWR :**
Progressive power reduction with VSWR > 2
- **Permissible mismatch :**
VSWR infinite (without any damage)
- **Protections against overheat :**
 - T° > 70°C : progressive power reduction
 - T° > 85°C : disjunction
- **Spurious :**
< -80dBc
- **Harmonics :**
 - ≤ -80 dBc except H2 :
 - < -65 dBc in UHF, -83 dBc in VHF
- **RF noise :**
< 150 dBc/Hz (at 1% of the carrier)

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- **AM :**
 - Modulation index : > 80% at the comp. threshold
 - Modulation limiter : ± 95%
 - Signal/noise ratio : > 50 dB (ref. 1000Hz, mod. 80%)
- **FM :**
 - Freq. deviation : ± 5.6 kHz (nominal) adjustable
 - Signal/Noise ratio : > 40 dB (ref. 1000Hz, ΔF = ± 5.6 kHz)

CLEAR VOICE COMMUNICATION :

- **Audio input :**
600 ohms balanced. Level adjustable from -30 dBm to 0 dBm (at the compressor threshold)
- **Modulation regulation :**
With compressor < 1 dB with 30 dB audio level variation above compressor threshold (AF compressor may be by-passed)
- **Modulation limiter :**
By clipper (95% about)
- **Audio frequency :**
< 3 dB from 300 to 3400 Hz (ref 1000 Hz)
- **Distortion :**
< 5%

DATA COMMUNICATION :

- **Data input :**
600 ohms unbalanced
Digital 5.2 V p.p. ± 1 V
Analog 5.2V p.p. (AM 80% - FM ΔF = ± 5.6 kHz)
- **Frequency response :**
 - NRZ : < 3 dB from 25 to 11000Hz (ref 1000Hz)
 - Diphase : < 3 dB from 300 to 22000Hz (ref 1000Hz)
- **Modulation distortion:**
 - < 5% for frequencies < 5 kHz
 - < 8% for frequencies > 5 kHz
- **Modulation index (AM) :**
> 80%
- **Frequency deviation (FM) :**
ΔF = ± 5.6 kHz

LINK 11 (UHF RANGE) :

- **Link 11 input :**
600 ohms balanced
- **Nominal level :**
2 V eff. (8.2 dBm) for ΔF = ± 20 kHz at 1000 Hz
- **Band-pass :**
< 3 dB from 300 Hz to 3400 Hz

RECEIVER CHARACTERISTICS

CLEAR VOICE COMMUNICATION :

- **Intermediate frequency (I.F.) :**
21.4 MHz
- **I.F. selectivity :**
 - at -6 dB : $\geq \pm 11$ kHz
 - at -60 dB : $\leq \pm 25$ kHz
- **AF outputs :**
600 ohms balanced.
Adjustable level from -20 dBm to 10 dBm
- **Squelch :**
Adjustable on the front panel from 1 to 99 μ V (desactivable)
- **Squelch response :**
< 50 ms
- **AM :**
 - Sensitivity for $(S+N)/N = 10$ dB : ≤ 1.5 μ V in VHF / ≤ 1.8 μ V in UHF (for 30% of modulation at 1 kHz, CCITT weighting)
 - Image rejection : > 80 dB
 - 3rd order intermodulation : ≥ 75 dB (2 signals 0.5 and 1 MHz apart, ref. 0.5 μ V)
 - Crossmodulation : ≥ 95 dB (0.5 MHz apart, ref. 1.5 μ V)
 - A.G.C. regulation : ≤ 3 dB for 1.5 μ V to 250 mV variation
 - AF response : < 3 dB between 300 and 3400 Hz (ref. 1000 Hz)
 - Harmonic distortion : $\leq 5\%$ with 60% of modulation
- **FM :**
 - Sensitivity for $(S+N)/N = 10$ dB : ≤ 1.5 μ V in VHF / ≤ 1.8 μ V in UHF (1 kHz, CCITT weighting, for $\Delta F = 1.5$ kHz)
 - AF response : < 3 dB between 300Hz and 3400Hz (ref. 1000Hz)
 - Harmonic distortion : $\leq 8\%$ with $\Delta F = 5.6$ kHz

DATA COMMUNICATION :

- **Output signal :**
600 ohms unbalanced (nominal = 5.2 V p.p.)
- **Narrow band :**
 - IF selectivity : $\geq \pm 11$ kHz at -6 dB / $\leq \pm 25$ kHz at -60 dB
 - AF response : ≤ 3 dB between 30 Hz and 11 kHz (ref. 1000 Hz)
- **Wideband :**
 - IF selectivity : $\geq \pm 37.5$ kHz at -6 dB / $\leq \pm 80$ kHz at -60 dB
 - AF response : ≤ 3 dB between 300 Hz and 22 kHz (ref 1000 Hz)

LINK 11 :

- **Output signal :**
600 ohms balanced, nominal level
- **Nominal output level :**
2V eff. (8.2 dBm) for $\Delta F = 20$ kHz
- **Band pass :**
< 3 dB from 300 Hz to 3400 Hz

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GUARD RECEIVER CHARACTERISTICS

OPTIONAL

- **Frequencies :**
121.5 MHz and 243 MHz
- **Frequency stability :**
 ≥ 8 p.p.m.
- **Sensitivity for $(S + N)/N = 10$ dB :**
< 2.5 μ V for modulation 30% at 1 kHz, CCITT weighting)
- **IF selectivity :**
 - at -6 dB : $\geq \pm 15$ kHz
 - at -60 dB : $\leq \pm 35$ kHz
- **Image rejection :**
 ≥ 80 dB
- **3rd order intermodulation :**
 ≥ 75 dB with 2 signals 0.5 and 1 MHz apart, ref. 0.5 μ V
- **Crossmodulation :**
 ≥ 80 dB / 2,5 μ V with signal 0.5 MHz apart, ref. 2.5 μ V
- **AGC regulation :**
AF variation ≤ 4 dB
- **Harmonic distortion :**
 $\leq 5\%$ with modulation 60%