# LF80 Transmitter

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## GENERAL

### Transmitter Type

Low Frequency Communications Transmitter

### Power

RF Power Capability 80 kW

Adjustable from 25% to 100%

### Configuration

Two power amplifier cabinets plus one matching cabinet. Each power amplifier rack contains 12 power amplifier modules each configured with 2 power amplifiers for a total of 48 power amplifiers in the system. Typically, 4 amplifiers are held in active reserve as 44 amplifiers can produce 80 kW under normal conditions. Each RF Power Amp is hot-pluggable and paired with a dedicated switched mode power supply.

### Redundancy

The LF transmitters offer the highest level of system redundancy to deliver maximum system availability. Redundancy features of the LF80 include:

- 4 active reserve amplifiers (reserve capability may vary with RF load impedance)
- Fully redundant exciter and control logic
- Fully redundant external modulator inputs
- Dual/active reserve low voltage power supplies
- Each power amplifier is configured with its own switched mode prime power supply, for maximum redundancy and fault tolerance

On-air serviceable for the following lowest replaceable units (LRUs): Exciter, Control, RF Modules and Power Supplies.

### Power Amplifier

Each amplifier module includes two RF amplifiers. The amplifier is of the full bridge, Class D type with high thermal capacity MOSFETS in each leg. Maximum MOSFET junction temperatures are low for long life. The conservative power rating of 2 kW per amplifier allows for rated power operation with high reactive and reflected power typical of narrow band low frequency antennas. Fully bi-directional operation allows for excellent linearity and power efficiency. Fully static gate drive and control logic increases amplifier robustness under adverse conditions such as lightning or arcing.

### Power Supplies

Each power amplifier rack includes 24 380 V AC-DC power supplies. Each power supply is directly connected to one power amplifier for maximum redundancy and fault tolerance.

### Power Efficiency

AC to RF Efficiency > 82%

(Efficiency may be reduced when operating with high VSWR)

### RF Frequency

Available frequencies 30 - 160 kHz.
(Consult factory for specific requirements)

Optional automatic tuning capability

### RF Output Connection

50 ohm 3 1/8" or to customer specifications

### Emissions (system level performance)

ITU-R SM.328-10

ITU-R SM.329-12 / Category A (-60 dBc from 9 kHz to 1 GHz)

### RF Load VSWR

System will protect itself from damage during operation into any RF load

Rated Power delivered up to 3.0:1 VSWR (system configuration dependent)

Exceeding limits results in graceful power reduction

Consult factory for specific VSWR requirements

### Dual Exciters

The supplied dual DSP exciters may be operated with an external modulator or may be used for internal signal generation.

### Modulation Type

Pulse step envelope modulation

### Modulation Capability

STANAG 5030 and STANAG 4724 with external modulator:

- Radio telegraphy (A1A)
- 50 Baud FSK
- 100 Baud MSK-2
- 200 Baud MSK-4

STANAG 5065 with external modulator:

- 75 Baud FSK
- 300 Baud MSK

Consult factory for specific modulation requirements

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## AC INPUT

### Voltage

380 V, 5-wire system TN-S

Voltage Variation 320 V AC to 456 V AC

Frequency Variation 47 Hz to 63 Hz

Nautel recommends the use of a suitably rated 3-phase 50/60 Hz isolation transformer with shield between primary and secondary windings

Other 3-phase configurations and voltages can be accommodated with a transformer.

### Power Consumption

100 kVA typical (Modulation scheme and load dependent)

Power Factor 0.97 or better

## ENVIRONMENTAL

0°C to + 50°C
Derate 3°C per 500 m above sea level
(2°C per 1,000 ft)

### Humidity Range

0% to 95% non-condensing

### Altitude

0 m to 3048 m (0 ft to 10,000 ft)

### Cooling

Non-ducted, air-cooled

### Waste Heat

20 kW (51,182 BTU/hr) typical (Modulation scheme and load dependent)

## SAFETY

Compliant with EN60215:1996 Safety Requirements for Radio Transmitting Equipment

Optional International CSA Inspection

## PHYSICAL

### Maximum Dimensions

Power Amplifier Cabinet (x2)
120 cm D x 87 cm W x 229 cm H

Matching Cabinet

120 cm D x 250 cm W x 229 cm H

Maximum Overall Dimensions
120 cm D x 424 cm W x 229 cm H

Additional height required for RF connection on matching cabinet

## CONTROL AND MONITORING

The LF Series Local/Remote Interface provides the capability via RS-422 over the dual serial ports to configure, control, monitor and measure the critical parameters including but not limited to module level monitoring, RF Power, RF Current and RF Voltages, DC Voltages, Critical Temperatures and PA Cooling Fan Status. Fault and status reporting and diagnostic capability to Lowest Replaceable Unit (LRU) is also available via RS-422 over the dual serial ports.

A direct-wired interface with isolated inputs and outputs is also provided for remote control and monitoring.

### RF Monitor at Transmitter

RF output current sample with BNC connector

## MONITOR FAILURE THRESHOLDS

The changeover monitor detects RF-critical out of tolerance conditions and automatically transfers operation to the standby exciter, control and distribution stages with less than one second of signal interruption:

Exciter Failure

Exciter Not Responding

Rack Controller Failure

Reduction in output level

## CUSTOMER INPUT/OUTPUT CONNECTIONS

Top and bottom cable entry

AC Input: Terminal Block in Control/PA Cabinet and each PA cabinet

Serial Connection: DB-9 in Control/PA cabinet

Station Reference Ground

RF Output Connection located at top of Matching Cabinet as standard

Carrier Frequency Reference Clock: BNC

External Modulator RF: BNC

## OPTIONS

Custom designed antenna tuning and matching system

Antenna system modelling

## NOTES

Specifications defined in a laboratory environment with high grade source and measurement equipment. Standard factory measurements do not include all items.