

# TMR 6200

## HF naval digital transceivers

- One or two high performance 500 W and 1 kW transceivers in a single cabinet
- 125 W high performance transceiver in a 4 U chassis
- Multimode including high speed data transmission, L11, ALE and frequency hopping capabilities
- Outstanding RF performance suited for severe cosite operation
- DSP technology and built-in high selectivity pre/post-selector
- Blank or operator's front panel
- Wide range of remote control facilities
- Comprehensive BITE



*Dual 1 kW transceiver*



The TMR 6200 family of transceivers is part of the cost-effective Series 6000 HF naval range which has been designed to meet the requirements of today's naval forces. Particular attention has been given to sensitivity, intermodulation, reciprocal mixing and wide band noise to achieve the RF performance required for severe co-site operation. DSP technology and a compact and robust design give all the flexibility required for easy integration within the communications system.

In keeping with all equipment in the Series 6000 HF naval range, the TMR 6200 transceivers are designed to meet the shore - ship and ship - ship multimode communication requirements of the naval environment, particularly demanding in terms of radio electrical performance, environmental constraints and logistic support.

Ideally suited for use on submarines and on surface ships, from patrol boats to aircraft carriers, TMR 6200 transceivers can operate independently or within a complete integrated end-to-end naval communications system offering voice, messages, data files and facsimile high speed transfer capability.

### State of the art technology

TMR 6200 transceivers are digital, microprocessor controlled, synthesised units that utilise DSP (Digital Signal Processing) technology for cost effective and highly flexible solutions in complex HF naval communications systems.

DSP technology offers a flexible, programmable approach to narrow band filtering and baseband signal processing for all modes of operation, including Independent SideBand (ISB).

Embedded agile pre/post-selector provides an outstanding RF performance necessary for operation in severe co-site situations with a 5% spacing between transmitting and receiving frequencies.

### A modular design

Series 6000 radio functions (receiver, exciter / receiver, exciter) are based on a common set of modules to plug in a 4 U chassis. The chassis can accommodate either a blank front panel or a flexible and user friendly operator's front panel.

TMR 6200 exciters / receivers are available in single or dual configurations (one or two exciter / receiver functions in one chassis). Provision is made for embedding add-on processing modules to support high speed modem capability, as well as ALE controller.

### Easy maintenance

All modules are plug-in screened boards that can be quickly removed and replaced. Each module contains extensive built-in-test (BITE) circuitry allowing modules to be tested on site. On-board maintenance consists of replacement at module level. The common set of modules within the Series 6000 offer many logistic advantages, leading to economic and flexible solutions.



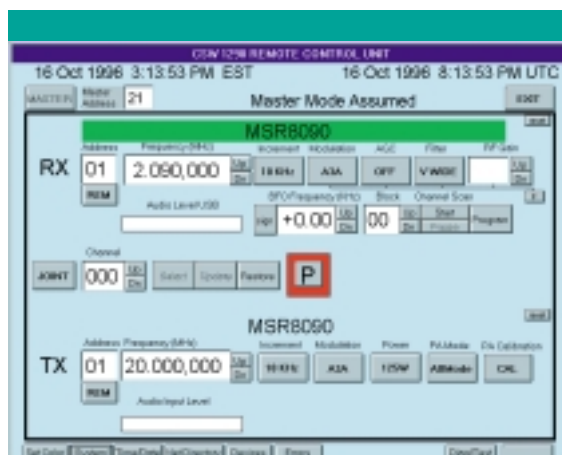
Dual exciter with front panel

### Remote control facilities

Each Series 6000 radio function includes RS-485 and RS-232 interfaces.

The RS-485 bus provides a built-in multi-addressing capability of up to 99 slaved radio functions controlled by:

- the operator's front panel of one Series 6000 radio equipment,
  - the Series 6000 remote control unit (layout identical to radio operator's front panel),
  - a remote PC (communication management system).
- In addition, it is possible to connect to each radio function an external ALE or frequency hopping controller. All amplifier functions (including BITE) are controlled through the exciter / receiver.



TMR 6200 remote control display

### Range of configurations

Available transceiver configurations are:

- single 125 W transceiver in a 4 U chassis (TMR 6201),
- single or dual 500 W transceivers (TMR 6205: 25 U cabinet),
- single or dual 1 kW transceivers (TMR 6209: 34 U cabinet).

Superb linearity and graceful degradation are part of the power amplifier design.

### Antenna sub-system

The transceivers can be operated with whip antennas (via AEA177 and AEA172-1 fast antenna tuning units), loop antennas (AS6000) or wide band antennas (via CA6000 common aerial working system with flexible power management capability). Transceivers, antenna coupling units and common aerial working systems have been designed to achieve optimum spectral purity by assuring that inter-transmitter (back-door) intermodulation products are below the level generated by the superstructure.

A separate receiving antenna input can be used to couple the transceivers to the Series 6000 family active antennas and reception multicouplers.

# TMR 6200 - Exciter/receiver specifications

## Equipment configuration

One or two independent exciter/receiver in one 4 U chassis.

## General

**Frequency range**  
 Rx 10 kHz to 30 MHz in 1 Hz steps  
 Tx 1.5 MHz to 30 MHz in 1Hz steps

**Tuning time** < 10 ms

### Frequency accuracy

Standard TCXO 3 parts in 10<sup>7</sup> (0° C - 35° C)

Optional high stability frequency reference (OCXO) in accordance with STANAG 5511 (Link 11)

10 Mhz external frequency standard output

External frequency input: 0.1, 1, 5 or 10 MHz

Level between - 10 dBm to + 13 dBm

<b>Modes of operation</b>	CW	A1A, A1B
	MCW	A2A, A2B
	AM	A3E
	FAX	F1C, F3C
	FSK	F1B, F2B
	USB/LSB	H2A, H2B, H3E
		J2A, J2B, J3E
		R2A, R2B, R3E
	ISB	B7E, B8E, B9W
	FM	F3E (restricted bandwidth)

STANAGs 4203, 4285, 4529 and 5511 (Tadil-A) compatible

### IF filter

The equipment has digital filters with the following bandwidths (symmetrical or non-symmetrical) 0.3 kHz, 1.1 kHz, 3 kHz, 6 kHz

### Channel store

1000 channels non-volatile stored including frequency, mode, IF filter, AGC and BFO

**BITE** Automatic detection to module level

## Exciter

**In-band noise** < -90 dBc/Hz (with 300 Hz to 3 kHz)

### Wideband noise

At 2 MHz, the noise level is < -165 dBc/Hz for all frequencies removed by more than 5% from the tuned frequency

At 30 MHz, the noise level is < -176 dBc/Hz for all frequencies removed by more than 5% from the tuned frequency

**Carrier suppression** > 60 dB

**Unwanted sideband suppression** > 60 dB

### Spurious emissions

< -90 dB at all frequencies removed by more than 5% from the tuned frequency

## Receiver

### Sensitivity

LSB, USB, ISB: A signal of - 113 dBm (1 µV emf) in a 3 kHz bandwidth gives an (S+N)/N of 10 dB for the frequency range 0.1 - 30 MHz. The corresponding noise figure is 16 dB. High sensitivity position also available

### AGC

An increase in input of 120 dB above - 103 dBm produces an output change of less than 3 dB

Attack time	10 ms
Decay time	fast, medium, slow-compatible with all modes
	Fully compliant with L11

**BFO** Tunable ± 3 kHz in 1 Hz steps

### In-band intermodulation products

In SSB and in ISB modes, for two 50 mV emf carriers, resulting in audio outputs at 1100 Hz and 1700 Hz, all intermodulation products and harmonics are 35 dB or more below each tone. For two 250 mV emf carriers at the same frequencies all intermodulation products and harmonics are 14 dB or more below each tone

### Out of band intermodulation products

Between 1.5 MHz and 30 MHz for two equal signals removed from the tuned frequency by 5 and 10 %, the 3rd order intercept point is + 55 dBm

### Reciprocal mixing

The level of interfering carrier required to cause a 3 dB reduction in sensitivity (corresponding to a noise level of - 123 dBm) is more than + 7 dBm for a 5 % separation between the tuned frequency and the interfering carrier

### Cross modulation

A 30 % modulated unwanted signal A3 (400) removed by at least 20 kHz from a wanted signal of 1.0 mV emf can have a level up to 300 mV emf before 3 % cross modulation occurs

### Blocking

A - 53 dBm wanted signal is not compressed by more than 1 dB by an interfering carrier of + 1 dBm removed by not less than 20 kHz from the tune frequency

### IF rejection

The rejection of all IF frequencies is 100 dB or more below the wanted signal

### Image rejection

The rejection of the first image frequency is > 100 dB below the wanted signal.

The rejection of the second image frequency is > 100 dB below the wanted signal at frequencies below 15 MHz. Elsewhere it is > 80 dB

### Spurious rejection

At frequencies more than 20 kHz from the tuned frequency, the spurious signal rejection is at least 80 dB

### Internally generated spurious

Fewer than 50, 3 kHz channels have spurious levels above - 121 dBm referred to the input in the range 100 kHz to 30 MHz. No channels have spurious responses above - 112 dBm

### Mute and desense

Typically 126 dB of desense is available in less than 2 ms (minimum 110 dB)

Resensitisation occurs typically in less than 1 ms (2 ms max)

### Scan mode

Channel scan between designated channels with selected dwell time on each channel (0.1 s to 9.99 s). Scanning may be stopped on detection of a signal above a programmable threshold. The receiver has a tape recorder activate line when a signal is detected

**Metering** Rflevel indication available

## Interfaces (Interfaces with \* are duplicated in a dual exciter/receiver)

### Antenna input\*

Input impedance 50 Ohms nominal

No damage is caused by input signals up to 100 V emf from a 50 Ohms source at any frequency between 60 kHz and 30 MHz with the power supply connected or disconnected

### Antenna radiation

The level of any discrete frequency component radiated in the range 0-100 MHz measured in 50 Ohms does not exceed - 87 dBm

**IF output\*** 452.4 kHz IF output with 10 kHz bandwidth

### AF outputs\*

One line output for each sideband providing - 20 dBm to + 10 dBm into 600 Ohms balanced  
 User facility to switch the two lines

**Sidetone inputs\*** One line input for each sideband  
 Level between 0 dBm into 600 Ohms balanced

**Miscellaneous interfaces\*** Tape recorder interface

**RF output\*** Load impedance 50 Ohms  
 Power output: 17 dBm ± 1 dB

**PA interface\*** RS-232 serial control interface

### AF inputs\*

One line input for each sideband.

Level between - 20 dBm to + 10 dBm into 600 Ohms balanced

User facility to switch the lines

### Sidetone outputs\*

One line input for each sideband providing - 20 dBm to + 0 dBm into 600 Ohms balanced

### Remote control\*

One single RS-485 addressable bus (up to 99 equipments)

Data rate selectable from 1200 to 9600 bits/s.

Asynchronous interface.

RS-232 serial point to point control interface also available.

<b>Power supply</b>	AC	90 to 270 V AC / 47 - 440 Hz auto-ranging
	DC	Autoselect DC with loss of AC line 20 to 32 V DC Protected against reverse polarity without damage

## Miscellaneous

### Temperature range

Operating temperature	- 5° C to + 55° C
Storage temperature	- 30° C to + 70° C

### Environmental

MIL-STD-810 E (methods 500-3, 501-3, 502-3, 507-3 and 514-4), NES 1004 and MIL-STD-461D standards

**Size** 17.8 H x 48.3 W X 50.0 D cm

**Weight** 15 kg (depending on the configuration)

**Front panel** Blank front panel or operator's front panel



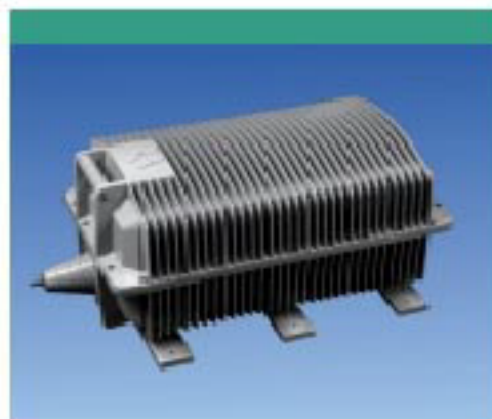
## Series 6000 Power amplifier specifications

### 500 W and 1 kW power amplifiers

Frequency range	1,5 MHz to 30 MHz in 1 Hz steps	
Forward intermodulation products	41 dB (below PEP)	
Inter-transmitter intermodulation products		
Based on a 18 dB coupling between two equal power transmitters (through a CAW or on the air through coupling between whips), third order inter transmitter intermodulation products are at -50 dBc with standard low pass filter. With band pass filter option, -80 dBc is achieved if the transmitters are operating in different frequency bands-or when operating in same frequency band, for the products which fall outside the band		
BITE	To module level	
RF output		
Output power 1000 / 500 W ≥ 600/300 W	± 1 dB into: 1.05:1 VSWR ± 1 dB into 2:1 VSWR Reduced power down to 1 W in 3 dB steps	
Power supply (3-phase)	440 V, 3-phase, 3-wire, 47 - 63 Hz	
Required power	5 kW / 3 kW power factor 0.9 (1000 W / 500 W)	
Temperature range		
Operating temperature	- 5° C to + 55° C	
Storage temperature	- 30° C to + 70° C	
Environmental	MIL-STD-810 E and NES 1004 standards	
Cooling	Fan-assisted air-cooling, front exhaust Water cooling (option)	
Acoustic noise	< 66 dBA	
Transceiver cabinet	Height	34U (dual configuration)
	Width	19 in (483 mm)
	Depth	800 mm
	Weight	275 kg (dual configuration)

#### Transmit antennas

Can be operated with whip antennas (via AEA177 fast antenna tuning unit), loop antennas (A56000) or wideband antennas (via CA6000 common aerial working system with flexible power management capability)



AEA 177 - 1 kW fast antenna tuning unit

### 125 W power amplifier

Frequency range	1,5 MHz to 30 MHz in 1 Hz steps	
Forward intermodulation products	34 dB (below PEP)	
Inter-transmitter intermodulation products		
Based on a 18 dB coupling between two equal power transmitters (on the air through coupling between whips), third order inter transmitter intermodulation products are at -50 dBc with standard low pass filter.		
BITE	To module level.	
RF output		
Output power 125 W	± 1 dB into: 1.05:1 VSWR Reduced power down to 1 W in 3 dB steps	
Power supply		
AC	90 to 270 V AC / 47 - 440 Hz auto-ranging Automatic changeover to DC reserve battery when available	
DC	20 to 32 V DC Protected against reverse polarity without damage	
Required power	600 W power factor ≥ 0.9	
Temperature range		
Operating temperature	- 5° C to + 55° C	
Storage temperature	- 30° C to + 70° C	
Environmental	MIL-STD-810 E and NES 1004 standards	
Size of the transceiver	17.8 H x 48.3 W X 55.0 D cm	
Weight of the transceiver	20 kg	
Transmit antennas		
Can be operated with whip antennas (via AEA172-1 fast antenna tuning unit) or loop antennas.		



AEA 172-1 125 W fast antenna tuning unit

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