

TMR 6100

HF naval digital receivers

- One or two high performance receivers in a single 4U chassis
- Multimode including high speed data transmission, L11, ALE and frequency hopping capabilities
- Automatic scanning of channels and frequencies
- Outstanding RF performance suited for severe cosite operation
- DSP technology and built-in high selectivity pre-selector
- Blank or operator's front panel
- Wide range of remote control facilities
- Comprehensive BITE



Receive cabinet with multicoupler and 12 receivers



The TMR 6100 family of receivers 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 and reciprocal mixing 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 6100 receivers 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 6100 receivers 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 6100 receivers 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-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 6100 receivers are available in single or dual configurations (one or two 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.

Remote control facilities

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

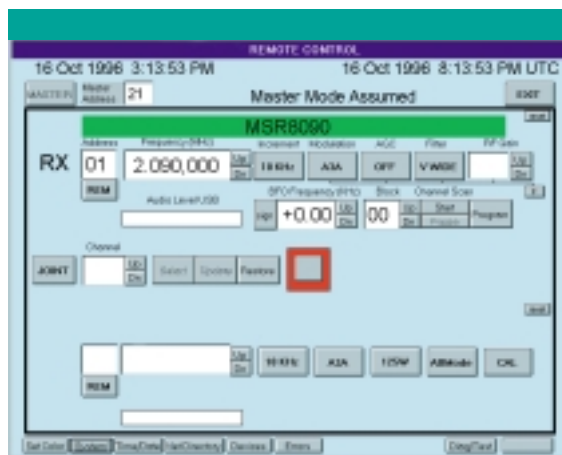
The RS-485 bus provides a built-in multi-addressing capability of up to 99 slaved radio functions controlled by:

- 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.



Single receiver with front panel



TMR 6100 remote control PC display

Receive antenna sub-system

TMR 6100 receivers are complemented by the exceptionally linear active antenna (AS 200) and the MCU 6000 family of active multicouplers that enable up to 4 antennas (including passive whips) to be coupled to as many as 36 receivers in any combination.

TMR 6100 - receiver specifications

Equipment configuration

One or two independent receivers in 4 U chassis.

General

Frequency range 10 kHz to 30 MHz in 1Hz steps

Tuning time < 10 ms

Frequency accuracy

Standard TCXO 3 parts in 10^7 ($0^\circ\text{C} - 35^\circ\text{C}$)

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

Modes of operation

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

Receiver

Sensitivity

LSB, USB, ISB: A signal of - 113 dBm ($1\ \mu\text{V}$ 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 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 RF level indication available

Interfaces (Interfaces with * are duplicated in a dual 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

Mute and desense interface

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

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

Miscellaneous

Temperature range

Operating temperature - 5°C to $+ 55^\circ\text{C}$

Storage temperature - 30°C to $+ 70^\circ\text{C}$

Environmental

MIL-STD-810 E (methods 500-3, 501-3, 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)

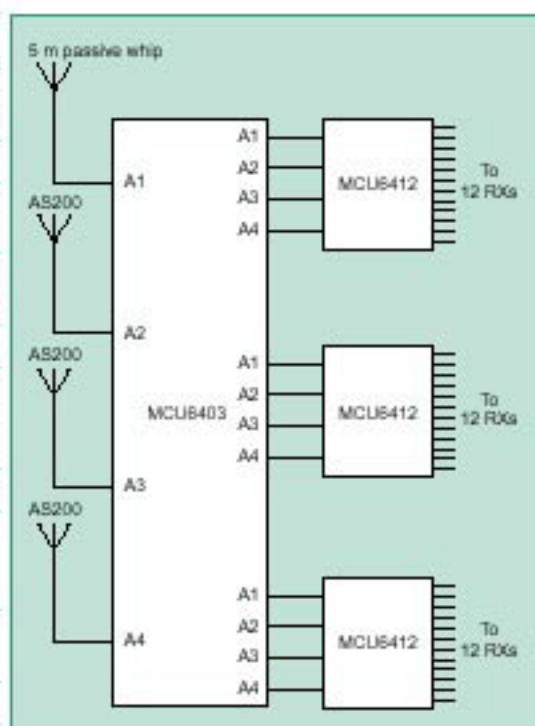
Front panel Blank front panel or operator's front panel

Multicoupler MCU 6403/6402 specifications

Configuration	MCU6403 MCU6402	4 antenna inputs with 3 outputs for each input 4 antenna inputs with 2 outputs for each input
Frequency range	10 kHz to 30 MHz	
Noise figure	≤ 9 dB with 50 ohms source and termination over the frequency range 60 kHz to 30 MHz	
Intermodulation products	Between 1.6 MHz and 30 MHz for two equal signals, the 3 rd order intercept is + 50 dBm	
BITE	Automatic detection to module level	
Remote control	No functions to control: only status information provided. BITE/status reported to MCU 6412 for onward transmission to a remote system	
Power supply	115 V to 230 V AC ± 10% 50 - 60 Hz ± 10%	
Temperature range	Operating temperature - 5° C to + 55° C Storage temperature - 30° C to + 70° C	
Environmental	MIL-STD-810 E, NES 1004 and MIL-STD-461D standards	
Size	13.3 H x 48.3 W X 36.0 D cm	
Weight	6 kg	
Front panel	Blank front panel with power ON/OFF indication. LED status indication for each output	

Multicoupler MCU 6412 specifications

Configuration	MCU6412	4 inputs to 12 outputs (any receiver output can be connected to any antenna input)
Frequency range	10 kHz to 30 MHz	
Noise figure	≤ 16 dB with 50 ohms source and terminations over the frequency range 60 kHz to 30 MHz	
Intermodulation products	Between 1.6 MHz and 30 MHz for two equal signals, the 3 rd order intercept point is + 50 dBm	
BITE	Automatic detection to module level	
Switching time	< 5 ms	
Input and output impedance	50 ohms nominal	
Remote control	RS-232 asynchrone interface	
Power supply	115 V to 230 V AC ± 10% 50 - 60 Hz ± 10%	
Temperature range	Operating temperature - 5° C to + 55° C Storage temperature - 30° C to + 70° C	
Environmental	MIL-STD-810 E, NES 1004 and MIL-STD-461D standards	
Size	13.3 H x 48.3 W X 47.0 D cm	
Weight	6 kg	
Front panel	Blank front panel with indication by LEDs of the input selected for each output and of potential faults	



Typical 4 antennas to 36 receivers arrangement



AS200 active antenna

Antenna AS200 specifications

Frequency range	10 kHz to 30 MHz	
Output impedance	50 Ohms unbalanced with a VSWR < 1.3:1	
Effective height	From 0.3 m (+ 20 %) at 2 MHz to 0.6 m (+ 20 %) at 30 MHz	
Linearity	In a two tone test the third order intercept point is typically + 50 dBm	
Noise factor	19 dB (2 MHz) to 16 dB (30 MHz)	
Polarisation	Vertical (omni-directional)	
Maximum input signal	An unwanted signal of 40 Wm will reduce a wanted signal of 2.5 Wm by less than 1 dB	
Power supply	DC AC Option	52 V DC nominal via RF coax cable 115 / 230 V AC power supply unit available
Temperature range	Operating temperature - 30° C to + 55° C Storage temperature - 40° C to + 70° C	
Environmental	MIL-STD-810 E and NES1004 standards	
Whip Height	1.6 m	

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