

Mackay Marine **ITT**

Communications/Navigation Systems

Communications Systems

Digitally Synthesized Radio Receiver *model 3021A*

The ITT Mackay Marine Model 3021A Receiver is a second generation, maritime, and general purpose communications receiver. Identical in performance to the Mackay Marine Model 3020A, it offers continuous frequency coverage from 15 kHz to 29.9999 MHz. Frequency injections within the receiver are provided by a phase-lock digital frequency synthesizer.

Model 3021A offers frequency selection by means of a continuously rotatable knob. Clockwise rotation advances, and counterclockwise rotation recedes the tuned frequency. Associated with the tuning knob is a three-position rate selection switch. Position one (kHz) provides tuning in one hundred hertz steps at a rate of 10 kHz per rotation. Position two (MHz) provides tuning in one hundred kilohertz steps at a rate of approximately 2.5 MHz per rotation. Position three is a dial lock and provides a means of holding a selected frequency. In the kHz position, the entire frequency range from 15 kHz to 29.9999 MHz can be scanned at the rate of 10 kHz per turn of the tuning knob. The dialed frequency is continuously displayed on six numeric LED readouts located above the tuning knob. The system contains memory so that the last dialed frequency will be selected and displayed upon turn-on of the receiver.

The frequency synthesizer utilizes the most modern approach for generating required injection frequencies while remaining within the technology of recently developed components and proven techniques. Maximum use is made of integrated circuits to maximize reliability and assure a high degree of maintainability.

The receiver is designed with a minimum of trim components with easily replaceable printed circuit boards, thereby assuring minimum service time and cost.

Model 3021A meets British MPT, German FTZ, Norwegian NTA, Dutch and Spanish PTT, and Canadian DOC requirements.



www.radiopharos.it

Technical Specifications
MACKAY MARINE RECEIVER MODEL 3021A

Frequency Range
 15 kHz to 29.9999 MHz. Full sensitivity specifications from 100 kHz to 29.9999 MHz. Sensitivity is reduced uniformly between 100 kHz and 15 kHz by approximately 20 dB at 15 kHz.

Modes of Operation
 Upper sideband (USB), lower sideband (LSB), amplitude modulation (AM), continuous wave (CW), radio teletype (RTTY) and facsimile (FAX).

Frequency Selection
 Frequency selection is by manual rotation of a tuning knob. Selected frequency is displayed on six solid-state numeric readouts. Tuning rate (selectable by front panel switch) is in either 100 Hz or 100 kHz steps.

Frequency Stability
 Frequency drift does not exceed 1 Hz per MHz of tuned frequency over a temperature range of 0° to 50° C, and 1 Hz per MHz of tuned frequency per year after calibration of internal frequency standard.

Sensitivity	Max. Applied Input for	
	$\frac{S+N}{N}$	SSB/CW
IF Bandwidth	10 dB	
8 kHz	0.8 microvolt	
2 kHz	0.4 microvolt	
1 kHz	0.3 microvolt	
0.4 kHz	0.3 microvolt	
SSB	0.4 microvolt	

Image Rejection >70 dB **IF Rejection** >70 dB

Sideband Suppression
 Greater than 60 dB at 500 Hz into the unwanted sideband.

Cross Modulation
 With a wanted signal of 0.5 millivolt, an unwanted signal of 10 millivolts 30%, 400 Hz modulation and separated 10 kHz or more, produces an output at least 30 dB below output level due to the wanted signal.

Blocking
 The receiver output due to a wanted signal of 500 microvolts changes less than 3 dB when an unwanted signal of 50 millivolts at least 10 kHz removed is applied.

IF Bandwidth	Switch Position	6 dB down	60 dB down
8 kHz	8 kHz min.	20 kHz max.	
2 kHz	2 kHz min.	12 kHz max.	
1 kHz	1 kHz min.	6 kHz max.	
0.4 kHz	0.4 kHz max.	4 kHz max.	
USB	+350 Hz to +2700 Hz	<-500 Hz and <-3800 Hz	
LSB	-350 Hz to -2700 Hz	>+500 Hz and >+3800 Hz	

Automatic Gain Control
 Output rise 6 dB max. for input from 3 microvolts to 100,000 microvolts. Output rises 11 dB max. for input from 1 microvolt to 100,000 microvolts.

AGC	Slow	Fast
Attack Time	<10 milliseconds	< 10 milliseconds
Release Time	2 seconds (nominal)	150 ms (nominal)
Input Impedance	.015 to 29.9999 MHz	50 ohms (nominal) with preselector in wideband position. Preselector matches receiver input to typically electrically short antennas.
	100 kHz to 4 MHz	50 ohms (nominal) with preselector in tuned positions.
	4 to 30 MHz	1 watt at 5% max. distortion (internal or external speaker) + 10 dBm max. Balanced with separate line level control.
Audio Output	3.2 ohms	
	600 ohms	

Specifications subject to change without notice.

Warranty terms: Refer to warranty provisions of general terms and conditions of sale.

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 441 U.S. Highway #1
 Elizabeth, New Jersey 07202 USA
 Telephone: (201) 527-0300

2634 Edenborn Avenue
 Metairie, Louisiana 70002 USA
 Telephone: (504) 887-4200

Primary Power
 115/230 ($\pm 15\%$) single phase 50/60 Hz

Power Requirements
 Approximately 90 watts at full audio output level

Temperature, Operational
 0 to 50° (meets MPT specs requiring operation at -15° C)
 Humidity to 95%

Size
 5 1/4" H x 19"W x 17"D 13.34 cm H x 48.26 cm W x 43 cm D
Weight 30 pounds 13.6 Kg.

Controls
 All controls required for the operation of the 3021A Receiver are mounted on the front panel.

Frequency Selection
 Tuning Knob—Selects receiver tuned frequency. Clockwise rotation increases receiver tuned frequency, counterclockwise rotation recedes receiver tuned frequency.
 Tuning Rate Selector Switch — Three-position toggle switch which selects tuning rate. In the uppermost position ("kHz") tuning rate is approximately 10 kHz per rotation (in 100 Hz steps). In the center position ("MHz") tuning rate is approximately 2.5 MHz per rotation (in 100 kHz steps). In the bottom (down) position ("lock") the tuning knob is rendered inoperational.

RF Input/Audio Output Meter Display Switch
 Toggle switch which selects either audio or RF signal strength indication on the front panel meter. The audio display is derived from the rectified audio output, while the RF level indicator is derived from the AGC DC control voltage.

Audio Gain/Power On-Off
 Potentiometer which controls audio volume and switches AC power on/off.

Speaker On/Off Switch
 Pushbutton (push-push) switch which is used to silence speaker. (In position is speaker on.)

RF Gain Control/AGC On Switch
 Potentiometer which manually adjusts the 92 MHz amplifier gain and the 8 MHz IF amplifiers gain. Also switches the AGC on when the knob is fully counterclockwise (switched).

Preselector Range Switch and Tuning.
 The outer control is a ten-position switch which selects the appropriate tuned frequency range. The inner, variable control provides preselector tuning and is used in conjunction with the RF meter to peak the received input signal.

Antenna Attenuator In/Out
 Pushbutton (push-push) switch which connects a 20 dB (approximately) pad in receiver front-end. (In position is attenuator in circuit.)

Fine Tune
 Potentiometer varies tuning approximately ± 60 Hz.

Mode
 Four interlocking pushbutton switches select AM, CW, USB, or LSB. In AM position, the AM detector circuitry is enabled, while the product detector circuitry and the product detector injection are disabled. In the CW, USB, or LSB positions, the reverse is the case.

IF Bandwidth
 Four interlocking pushbutton switches select IF bandwidth of 8 kHz, 2 kHz, 1 kHz, or 0.4 kHz. These switches are automatically disabled when USB or LSB is selected.

AGC Fast/Slow
 Toggle switch selects fast or slow AGC release time. Normally fast AGC is utilized for CW signals and slow AGC for SSB signals.

CW Pitch
 Toggle switch selects either fixed or variable frequency product detector injection. For CW operation the variable frequency crystal oscillator is utilized for operator pitch control by the associated "variable" knob. The tuning range is approximately 1 kHz. In the fixed position the product detector injection is provided by the frequency standard and produces zero beat when the incoming CW signal is precisely at the frequency of the frequency select switch.

Phones
 Phone jack is provided.

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