

Rockwell Collins, Inc.

VHF-2200

Users Manual



This manual provided to the FCC for product guidance, it should not be used by our OEM customers.

Scope:

This document will detail information required to install and use the VHF-2200 unit.

Introduction:

The Rockwell Collins® VHF-2200 contains two independent VHF communications transceivers. Each VHF communications transceiver consists of a direct sampling A/D converter type receiver, PLL controlled frequency synthesizer and RF amplifier transmitter, I-Q modulator, DSP, and power supply. Both transceivers share a System Processor that provides common Maintenance Reporting as well as ARINC 429 serial and discrete interfaces.

Each transceiver within the VHF-2200 operates in a frequency range from 118.000 MHz to 136.992 MHz selectable in 8.33-kHz increments. The VHF-2200 also operates in the frequency range from 118.000 MHz to 136.975 MHz selectable in 25-kHz increments. The VHF-2200 provides both voice and data communications. The 8.33-kHz channels only support voice mode for receiver and transmitter communications, and the 25-kHz channels support both voice and data mode for receiver and transmitter communications.

Primary control functions are provided by the ARINC defined aircraft radio management panel (RMP), this is accomplished by serial word control according to the ARINC 429 standard. Analog voice, VDL Mode A data, and VDL Mode 2 data communications capabilities are provided by the VHF-2200.

A complete self-test capability checks critical components in all receivers and transmitters for proper operation. The ARINC 429 serial tune bus is also tested to ensure that the unit is receiving valid tuning information from the frequency selector system. LED indicators are provided to verify LRU, external frequency control and antenna/transmission line integrity.

Mechanical Description

The VHF-2200 VHF Communications Transceiver is housed in a 3 MCU case designed to mount in a rack that conforms to the provisions of ARINC specification 600. The VHF-2200 is structured with formed aluminum members that include a front panel, a rear panel, a bottom panel, a top panel, a central partition that rigidly maintains the alignment of the other panels, and swing-out side panels.

Design

The table below details the characteristics of the VHF-2200.

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
Weight	4.8 kg (10.6 lbs) max
Cooling	Blow-through cooling metered along the plenum with various sized holes
Overall dimensions	Width: 94.9 mm (3.74 in), max Height: 200.0 mm (7.87 in), max Length: 380.26 mm (14.98 in), max
Test report reference	FAA TSO- C128a, C160, C169a
Design specification	ARINC 429P1-16, 429P2-15, 429P3-18, 600-9, 604-1, 615-3, 618-8, 631-5, 714-3, 716-11, 724B, 748, 750-4, 758-2

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
documents	RTCA DO-160E, DO-178B, DO-186B, DO-207, DO-224B, DO-254, DO-281A EUROCAE ED-12B, ED-14E, ED-23B, ED-67, ED-92

Receiver Characteristics

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
Receiver	
25-kHz Bandwidth	
Sensitivity (voice and analog data)	2 μ V hard (-107 dBm) for 6 dB (s+n)/n
Sensitivity (VDL Mode 2)	-98 dBm for .001 BER (.159 BFR)
Selectivity	6 dB maximum attenuation at \pm 8.0 kHz 60 dB minimum attenuation at \pm 17.0 kHz
8.33-kHz Bandwidth (voice only)	
Sensitivity	2 μ V hard (-107 dBm) for 6 dB (s+n)/n
Selectivity	6 dB maximum attenuation at \pm 2.8 kHz 60 dB minimum attenuation at \pm 7.3 kHz
Undesired Signal Frequency	Attenuated at least 60 dB (80 dB image)
Cross Modulation	Audio output at least 10 dB below that produced by a 10- μ V signal modulated 50% by 1000 Hz
Undesired Signal Frequency	Undesired level (50% modulation with signal strength of 100 to 100 000 μ V)
\pm 25 kHz	10 000 μ V
\pm 50 kHz	20 000 μ V
\pm 100 kHz	60 000 μ V
\pm 500 kHz	100 000 μ V
\pm 1.0 MHz and greater	200 000 μ V
Desired Signal	10- μ V signal modulated 50% by 1000 Hz
Audio Power Output	40 mW maximum, adjustable to less than 5 mW into a 600 ohm \pm 20% resistive load (The nominal setting should be 10 mW at 1000Hz with a RF input modulated at 85%)

Transmitter Characteristics

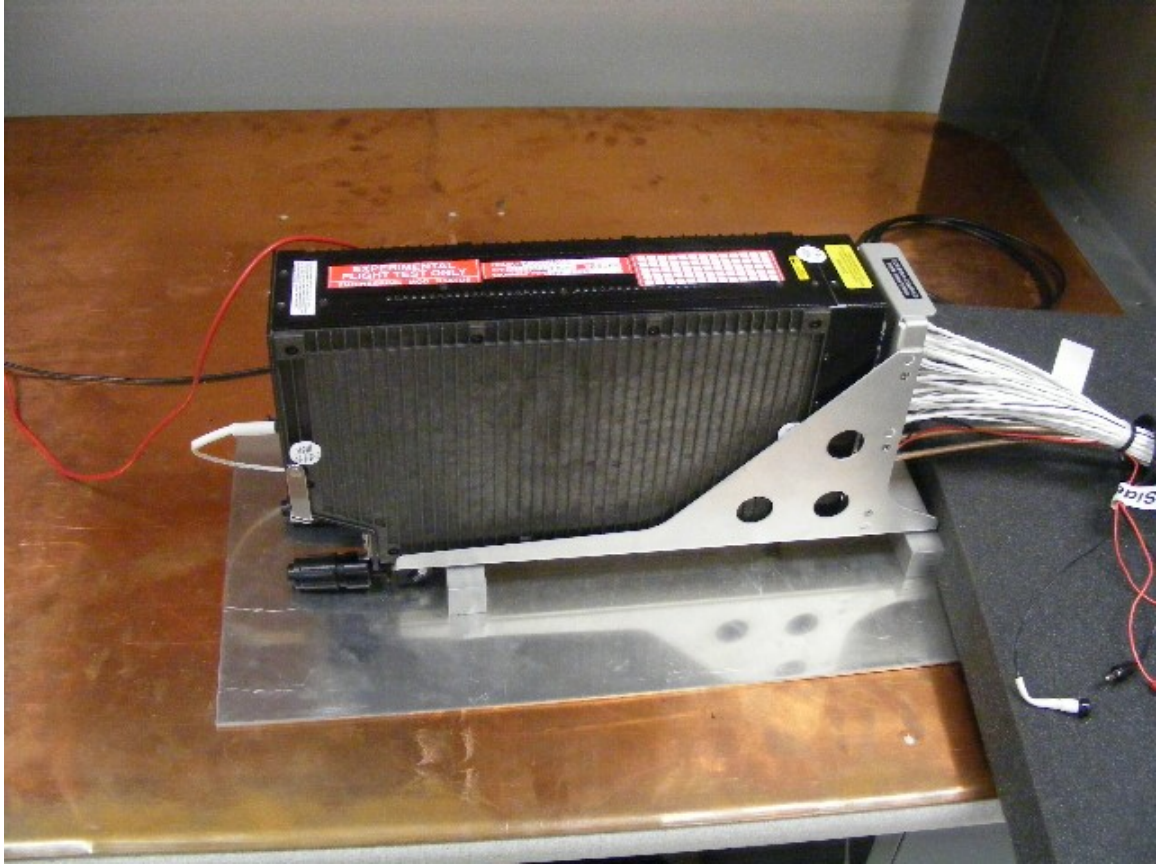
See table below

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
Transmitter	
Output Power	25 watts minimum into a 50 ohm resistive load (voice, analog data and Mode A); 15 watts minimum into a 50 ohm resistive load (VDL Mode 2)
Antenna Impedance	50 ohms
Frequency Stability	5 parts per million ($\pm 0.0005\%$)
Sidetone	40 mW maximum, adjustable to less than 5 mW into a 600 ohm $\pm 20\%$ resistive load (The nominal setting should be 10 mW at 1000Hz with a RF input modulated at 85%)
Transmitter Spurious Emissions	Harmonic and other, less than -46 dBW
Modulation Level (voice and analog data)	0.125 V rms input at 1000 Hz will modulate the transmitter at least 90%; adjustable for levels up to 20 dB higher
Speech Processing (voice and analog data)	Greater than 20 dB of compression (automatic volume control)
Transceiver Operation	
Transmit-to-Receive Time	50 ms, maximum (voice, analog data and Mode A) 1.5 ms, maximum (Mode 2)
Receive-to-Transmit Time	50 ms, maximum (voice, analog data and Mode A) 2.75 ms, maximum (Mode 2)
Frequency Range	118.000 to 136.992 MHz
Channel Spacing	25 kHz and 8.33 kHz
Tuning Input	Dual serial inputs, per ARINC 429
Data Inputs	Dual serial HS inputs, per ARINC 750

Installation:

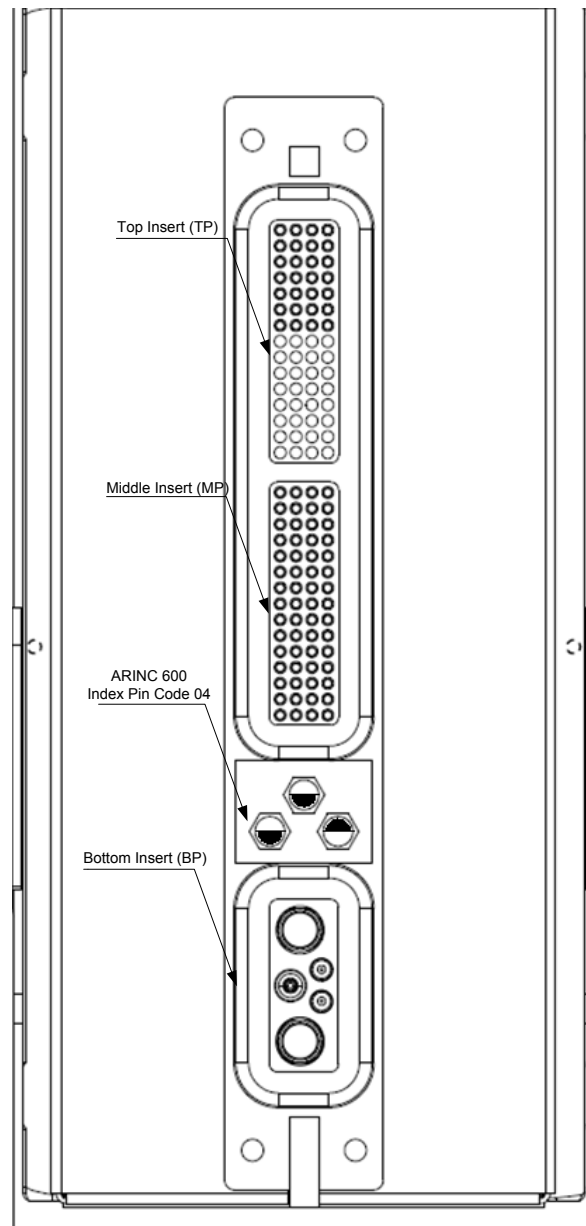
The picture below details the VHF-2200 unit mounted in the ARINC 600 3MCU mount. These type mounts have mechanical mechanisms to allow capture and restraint of the front feet of the unit. This restraint ensures the unit will not come loose from the mount and also that the ARINC defined connector does remains in contact with the rear pins.

The harness that connects the RMP to the VHF-2200 is defined by the aircraft manufacturer. The pinout is defined by the ARINC 750 and 716 standard to allow interchangeable product migration. The VHF-2200 pinout can be found below.



Rear Pin Out

Error! Reference source not found. The following pictures provide a generic depiction of the VHF-2200 rear connector. The top, middle and bottom insert will be defined later in this chapter.



VHF-2200 Rear Connector Layout (not to scale)

	A	B	C	D
1	TEFO Enable Input Discrete	COM B Mic. PTT Input Discrete	COM B Analog Data Output - Hi	COM B Analog Data Output - Lo
2	Reserved for Monitor Port Transmit	COM B Voice/Data Select Input Discrete	Crosslink Output - Hi	Crosslink Output - Lo
3	Crosslink Input - Hi	Crosslink Input - Lo	DC Ground	Reserved for Monitor Port Receive
4	COM B ACR Data 429 Output - Hi	COM B ACR Data 429 Output - Lo	COM B ACR #1 Data 429 Input - Hi	COM B ACR #1 Data 429 Input - Lo
5	COM B Mic Input - Hi	COM B Mic Input - Lo	COM B Audio/Sidetone Output - Hi	COM B Audio/Sidetone Output - Lo
6	Shop Mode Input Discrete	COM B Mic Key Event Output Discrete	COM B ACR #2 Data 429 Input - Hi	COM B ACR #2 Data 429 Input - Lo
7	COM B Mic Input Ground	Audio Ground	CMS Bus #2 429 Output - Hi	CMS Bus #2 429 Output - Lo
8	SPARE	SPARE	SPARE	SPARE
9	SPARE	SPARE	SPARE	SPARE
10	SPARE	SPARE	SPARE	SPARE
11	SPARE	SPARE	SPARE	SPARE
13	SPARE	SPARE	SPARE	SPARE
14	SPARE	SPARE	SPARE	SPARE
15	SPARE	SPARE	SPARE	SPARE

VHF-2200 Top Plug

	A	B	C	D
1	COM A Mic Input - Hi	COM A Mic Input - Lo	COM A Mic. PTT Input Discrete	COM A Mic Key Event Output Discrete
2	Tx Timer Disable Program Pin	COM A Mic Input Ground	Data Load 429 Input - Hi	Data Load 429 Input -Lo
3	NON-TEFO Power Return	NON-TEFO Power Return	Installation Configuration Program Pin #2	DC Ground
4	Self Test Input Discrete	Audio Ground	Data Load 429 Output - Hi	Data Load 429 Output - Lo
5	Analog Data Input - Hi	Analog Data Input - Lo	Installation Configuration Program Pin #1	8.33 kHz Program Output Discrete
6	CMS #1 429 Input - Hi	CMS #1 429 Input - Lo	CMS #2 429 Input - Hi	CMS #2 429 Input - Lo
7	Tuning Port B 429 Input - Hi	Tuning Port B 429 Input - Lo	COM A Voice/Data Select Input Discrete	COM A Data Key Line Input Discrete
8	+28 VDC NON - TEFO Power Input	Data Load Enable Input Discrete	+28 VDC NON - TEFO Power Input	Data Key Line Return
9	SDI_1 Program Pin	SDI_0 Program Pin	SDI Common Ground	COM B Muting Output Discrete
10	Program Pin Common	Spare Input Discrete	COM A ACR Data 429 Output - Hi	COM A ACR Data 429 Output - Lo
11	Tuning Port A 429 Input - Hi	Tuning Port A 429 Input - Lo	Maintenance System ID #2 Input Discrete	Freq/Func Data Select Input Discrete
12	COM A ACR #1 Data 429 Input - Hi	COM A ACR #1 Data 429 Input - Lo	COM A ACR #2 Data 429 Input - Hi	COM A ACR #2 Data 429 Input - Lo
13	COM A Analog Data Output - Hi	COM A Analog Data Output - Lo	Reserved for Squelch Disable Input Discrete	Reserved for Squelch Disable Return
14	Maintenance System ID #1 Input Discrete	Air/Ground Input Discrete	CMS Bus #1 429 Output - Hi	CMS Bus #1 429 Output - Lo
15	COM A Audio/Sidetone Output - Hi	COM A Audio/Sidetone Output - Lo	COM A Muting Output Discrete	Muting Return

VHF-2200 Middle Plug

BP1
ANTENNA COAX
COM A

BP3
RESERVED
(RF CROSSLINK)

BP5
ANTENNA COAX
COM B

BP2
+28 VDC
TEFO POWER

BP4
+28VDC TEFO
Power Return
(Isolated from Chassis)

VHF-2200 Bottom Plug