

WR-100 Receiver Specifications

Frequency Range..... 118-136 MHz
 Number of Channels..... 1
 Operating Temperature Range..... -40°C to + 60°C
 Sensitivity..... 4 μ v hard, 30% modulation
 for 10 db $\frac{S+N}{N}$, 3 μ v hard typical

Selectivity

Standard BW unit..... +9.8 KHz Min, 6db
 $\pm$ 21 KHz, Max, 80db
 Wide BW unit..... $\pm$ 14.8 KHz Min, 6db
 $\pm$ 28 KHz Max, 80db
 Image and Spurious Responses..... More than 100 db down
 Intermodulation..... More than 70 db above threshold
 sensitivity, 25 KHz spacing std. BW unit,
 50 KHz spacing wide BW unit
 Cross Modulation (ARINC
 characteristic 566A method)..... 80 db above threshold for audio 10 db
 down at $\pm$ 25 KHz (Std. BW unit)
 $\pm$ 50 KHz (Wide BW unit)

AGC

Dynamic Range..... $\pm$ 3 db from 3 to 300,000 μ v
 1 V maximum
 Response Time..... Attack time 10 milliseconds
 Release time 20 milliseconds
 Squelch..... $\frac{S+N}{N}$ squelch with carrier
 squelch backup — panel adjustable; or
 carrier squelch only — internally
 adjustable

Audio

Outputs..... Local speaker and balanced audio to a
 remote line
 Local Speaker Power..... 2 watts into 4 ohms (built in speaker), less
 than 6% distortion
 Remote Line Power..... +6 dbm into 600 ohms, less than 6%
 distortion
 Frequency Response..... $\pm$ 3 db, 300-3000 Hz, both outputs
 Power Requirements
 AC or DC..... 115/230 V 50/400 Hz 25 VA 28 V dc
 negative ground, 0.25 amps standby, 0.75
 amps receive
 Size..... 8"W (20.3 cm), 3 $\frac{1}{4}$ "H (8.4 cm), 12"D
 (30.5 cm)
 Weight..... 6 pounds (2.724 kg)

WT-100 Transmitter Specifications

Frequency Range..... 118 to 136 MHz
 Number of Channels..... 1
 Power Output..... 5 to 20 watts adjustable
 Load Impedance..... 50 ohms, burnout-proof infinite VSWR
 Duty Cycle..... 50% at +60°C
 Frequency Stability..... $\pm$ 0.0003% -40°C to + 60°C
 Modulation..... 100%

Emission..... 6A3 (voice) 13A9 (data)
 Audio Frequency Response..... 3 db 300-3000 Hz
 Audio Distortion..... Less than 7% at 90% modulation
 Audio Input..... -30 to 0 dbm 600 ohm remote line or
 local dynamic microphone
 Spurious..... 110 db below carrier
 Harmonics..... More than 70 db below carrier
 Keying Time..... Full power output in 15 milliseconds
 Time-Out Provision..... Adjustable transmitter time out circuit —
 range 30 to 180 seconds
 Audio Compressor..... 3 db rise in output with 20 db increase in
 audio input
 Tone Keying Circuit
 Frequency..... 2300 Hz (adjustable)
 Input Level..... 0 dbm to -40 dbm
 Power Requirements..... 115/230 VAC 50/400 Hz 150 VA or 28
 V dc negative ground, 0.1 amps standby,
 4 amps transmit
 Size..... 8"W (20.3 cm), 3 $\frac{1}{4}$ "H (8.4 cm), 13 $\frac{1}{4}$ "D
 (33.8 cm)
 Weight..... 11 pounds (5 kg)

WCS System Specifications

Battery backup provisions (internally diode switched)
 Command loop-back provision when using 4 wire (2 pair) telephone line
 Telephone Line Options
 Single pair, voice grade, without d-c return
 Tone receiver built in. Tone key reject filters available as an option
 Single pair with 5000 ohm maximum d-c return (floating d-c keying
 power supply provided)
 Two Pair, voice grade, without d-c return
 Two Pair with d-c return
 Receiver Muting..... 50 db muting of receiver when using
 single pair configuration.
 Mounting..... Optional desk-top or 3 $\frac{1}{4}$ " (8.9 cm) high
 relay rack configurations with
 microphone hanger provided
 WCS-100 Dimensions..... 3 $\frac{1}{4}$ "H (8.8 cm), 19"W (48.3 cm),
 13 $\frac{1}{4}$ "D (33.8 cm)
 (allow 1" (2.5 cm) for plugs)
 WCS-200 Dimensions..... 8"W (20.3 cm), 7"H (17.8 cm), 13 $\frac{1}{4}$ "D
 (33.8 cm) (allow 2", 5 cm for plugs)

NOTE: * Prices, delivery and specifications are subject to change without notice.

WULFSBERG
 ELECTRONICS, INC.
 Unit of Sundstrand Corporation



11300 WEST 89TH STREET • OVERLAND PARK, KANSAS 66214
 TELEPHONE (913) 492-3000 • TELEX WUD 424242 WULFSBERG OLPH

EXHIBIT 1 TO
 4-7700-STJ-91-283

4.3 Bandwidth

Bandwidth measurements were conducted in accordance with applicable parts of FCC Rules & Regulations, Part 2.989.

4.3.1 Emission Limitations

- a.) Figures 4 and 5 show spectrum analyzer displays of the transmitter occupied bandwidth for 20 and 5 watt outputs. The transmitter was modulated with 2500 Hz of sufficient level to produce 50% modulation, then increased 16 db to produce the spectrums shown.

Table 4.3.1

Power Output (unmodulated) = 20 watts

<u>Sideband Frequency</u>	<u>Power</u>
Carrier (fc)	17.8 watts
fc $\pm$ 2.5 KHz	3.16 watts
fc $\pm$ 5.0 KHz	63.1 mw
fc $\pm$ 7.5 KHz	5.62 mw
fc $\pm$ 10.0 KHz	0.224 mw
fc $\pm$ 12.5 KHz	70.8 uw
fc $\pm$ 15.0 KHz	11.2 uw
fc $\pm$ 17.5 KHz	8.91 uw
fc $\pm$ 20.0 KHz	3.55 uw
fc $\pm$ 22.5 KHz	1.0 uw

- b.) Requirement: From Part 87 Aviation Services, 87.71 (a), the mean power of emissions shall be attenuated below the level indicated in Figure 4-1.
- c.) Conclusion: The specification was met.

4.3.2 Occupied Bandwidth - Tone Modulation

- a.) Table 4.3.1 shows the power contained in the carrier and sidebands for 20 watts output.

The total power is:

$$\begin{aligned}
 &P_{\text{carrier}} + P_{\text{lower sideband \#1}} + P_{\text{lower sideband \#2}} + \dots \\
 &\quad + P_{\text{upper sideband \#1}} + P_{\text{upper sideband \#2}} + \dots \\
 &= 17.8 + 2(3.16) + 2(.0631) + 2(.00562) \\
 &\quad + 2(.224 \text{ mw}) + 2(.0708 \text{ mw}) + 2(.0112 \text{ mw}) \\
 &\quad + 2(.00891 \text{ mw}) + 2(.00355 \text{ mw}) + 2(.0010 \text{ mw}) \\
 &= 24.25808 \text{ watts}
 \end{aligned}$$

From Part 87.69 (a), the occupied bandwidth is the bandwidth that contains at least 99.0% of the total power. (99% of total power = 24.015 w). However, the carrier and first adjacent sidebands contain $17.8 \text{ w} + 2(3.16 \text{ w}) = 24.12 \text{ watts}$. Therefore, the occupied bandwidth is 5.0 KHz.

In a similar manner, the occupied bandwidth for 5 watts output was calculated and found to be 5.0 KHz.

- b.) Requirement: From Part 87 Aviation Services, 87.67 (b), the maximum allowable occupied bandwidth is 25 KHz.

Conclusion: The specification was met.

4.3.3 Occupied Bandwidth - Data Modulation

Test Method: The transmitter was modulated with an actual data signal, the format having been previously described in paragraph 2.1.1. The level of the input was adjusted to produce 90% modulation during audio peaks. The bit rate was 2400 per second.

The resultant spectrums are shown in Figure 6 for 20 watts output and Figure 7 for 5 watt output. This spectrum was strip integrated to determine the occupied bandwidth.

In this manner, the occupied bandwidth was determined to be 5100 Hz for 20 watts output and 7500 Hz for 5 watts output.

NARRATIVE STATEMENT

- (a) The complete program of research and experimentation proposed including description of equipment and theory of operation:

This radio station will provide an RF line between ACARS (Aircraft Communication Addressing and Reporting System) management units under test with the SITA Terrestrial Network. The ACARS management units will be delivered on Boeing 767 and 747 aircraft. This system provides a datalink between the aircraft and the ground.

- (b) The specific objectives sought to be accomplished:

Testing will provide a basis to demonstrate the intended function of each ACARS management unit to the FAA for the purpose of type certification. The use of this station will be limited to ACARS management units provided by airlines that will be using them with the SITA network.

- (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated:

Existing equipment allow a connection to the ARINC Terrestrial network. This station will allow testing with SITA, which provides service throughout Europe and the South Pacific. The SITA station will operate as a category B station, which permits the aircraft to uniquely identify the ground station it wants to address, whereas the ARINC Station operates as a category A station, which does not.

VHF 3 dB glassfibre colinear Type 7074

ELECTRICAL AND MECHANICAL SPECIFICATION

EXHIBIT 3 TO
4-7700-STJ-91-283

Type number	7074
Frequencies available	140-175 MHz (state exact frequency required)
Input impedance	50 ohms
V.S.W.R.	Less than 1.5/1 over the band
Maximum power	200 watts
Beamwidth (as a % of centre frequency)	Typically $\pm 1.5\%$
Gain over $\lambda/2$ wave dipole	3 dB
Half-power beamwidth	Typically 31°
Connection	'N' type socket
Mounting	Supplied with a pair of hot dipped galvanised steel clamps suitable for mounting alongside standard scaffold tubing $1\frac{7}{32}$ " (48.41 mm) outside diameter)
Elements	Brass rod
Shroud	Glassfibre laminate tapering from $1\frac{1}{2}$ " (38.1 mm) to $1\frac{1}{8}$ " (31.75 mm)
Weight	2.7 kg
Wind loading @ 160 kph	11.7 kgf
Length	10' (3048 mm)

Jaybeam reserve the right to supply antennas or components with an operational bandwidth, as outlined on this data sheet, which includes but does not necessarily centre on the frequency or frequencies specified on the order.
The device can be supplied where the frequency specified is the centre of the bandwidth providing this requirement is clearly stated at time of enquiry or ordering.

