

description

1. GENERAL

The ARC-159(V)1 Radio Set (figures 1 and 1A) is a single panel-mounted unit with integral control.

2. PURPOSE OF EQUIPMENT

The ARC-159(V)1 Radio Set provides radio-frequency transmission and reception of amplitude modulated (AM) signals on any of 7000 frequencies spaced in 25-kHz increments. The range of operating frequencies is 225.000 to 399.975 MHz. The radio set primarily provides AM normal voice and AM secure voice (wide band) simplex communications and has the following additional capabilities:

- a. Continuous guard frequency monitoring by a separate fixed tuned guard receiver operating independently of the main receiver.
- b. Reception of uhf automatic direction finder (adf) signals on any selected frequency.
- c. Transmission of signals from a Command Active Sonobuoy System (CASS) or Directional Command Active Sonobuoy System (DICASS) on a preselected frequency.
- d. Transmission of an internally generated 1000-Hz tone on any selected frequency.
- e. Automatic relaying. When two radio sets are interconnected, normal or secure voice signals received by one radio set are automatically retransmitted by the other.
- f. Guard channel precedence. When activated by an external control, the radio set is turned on and tuned to guard frequency.

3. EQUIPMENT SUPPLIED

Equipment supplied consists of the ARC-159(V)1 Radio Set, Collins part numbers 622-1524-001, -017, and -021 (with red lighting) and 622-1524-010, -018, and -022 (with white lighting). The -017, -018, -021, and -022 versions also have electronic memory.

4. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Antenna 50- Ω impedance, swr 3:1 or less within range of operating freq.

Headset 600- or 150- Ω impedance.

Microphone 100- Ω , carbon type.

Cabling Refer to figure 1, installation section.

5. OPTIONAL EQUIPMENT

ID-1972 Frequency Channel Indicator, Collins part number 622-1624-001.

C-9577 Radio Set Control, Collins part number 622-0629-001.

Automatic direction finding equipment Homing antenna and indicator.

Secure voice equipment Secure speech modem.

6. EQUIPMENT SPECIFICATIONS

6.1 General

Frequency range 225.000 to 399.975 MHz.

Number of channels 7000.

Channel separation 25 kHz.

Frequency accuracy ± 2 kHz from sel freq.

Primary power $+27.5 \pm 0.5$ V dc, 4.5 A.

Guard receiver frequency 243.000 MHz.

Method of tuning Electronic.

6.2 Environmental

Temperature limits -54 to $+55$ $^{\circ}\text{C}$ (-65 to $+131$ $^{\circ}\text{F}$).

Altitude Up to 15,240 m (50,000 ft).
Humidity Up to 100% (relative).
Shock 15 g operational;
30 g crash safety.
Vibration MIL-E-5400, Curve III (5 g).

6.3 Main Receiver

Sensitivity 3.5 μ V (open ckt) for 10-dB
snr (input modulated 30%,
1 kHz); 4 μ V (open ckt) for
10-dB snr at freq within
10 MHz of guard frequency
and at frequencies above
380 MHz.
Selectivity
Normal bandwidth 38-kHz min at -6-dB points;
80-kHz max at -60-dB
points.
Wide bandwidth 70-kHz min at -6-dB points;
170-kHz max at -60-dB
points.
Squelch Cnr type with snr adjust-
able between 5 and 10 dB.
Squelch isolation NLT 40 dB.
Audio output (with
1000- μ V rf input
modulated 30%,
1000 Hz)
Normal audio 250 mW into 150- or
600- Ω load.
Unattenuated audio ... 6.5 $\pm$ 1.0 V rms with 150-
or 600- Ω output properly
terminated.
Auxiliary (adf)
audio NLT 1.4 V rms across
20,000- Ω resistive load.
Wide-band audio NLT 0.25 V rms across
500- Ω resistive load.
Audio amplitude
variation +2 to -3 dB from ref level
for rf inputs from 3.5 μ V to
500 mV. (Ref level: 1000
 μ V rf modulated 30%,
1 kHz.)

Audio response
Normal audio 300 to 3500 Hz (+1 to -3 dB
from 1-kHz ref).
Auxiliary (adf)
audio 50 to 10,000 Hz ($\pm$ 2 dB from
1-kHz ref).
Wide-band audio 300 Hz to 25 kHz (+2 to -4
dB from 1-kHz ref).
Harmonic distortion NMT 10% total harmonic
distortion with rf input of
1000 μ V, 30% modulation.
Image rejection At least 60 dB below
response to desired
signal.
Duty cycle Continuous.

6.4 Guard Receiver

Sensitivity 3.5 μ V (open ckt) for 10-dB
snr (input modulated
30%, 1 kHz); 4 μ V (open
ckt) input for 10-dB snr
if main rcvr tuned within
-10 to +20 MHz guard freq.
Selectivity 38-kHz min at -6-dB points;
80-kHz max at -60-dB
points.
Squelch Cnr type with snr adjust-
able between 5 and 10 dB.
Squelch isolation NLT 40 dB.
Audio output
Normal audio Same as main rcvr.
Low-level audio 0.15 to 0.45 V rms across
600- Ω resistive load.
Audio amplitude
variation Same as main rcvr.
Audio response Same as main rcvr.
Harmonic distortion Same as main rcvr.
Image rejection Same as main rcvr.
Duty cycle Continuous.

6.5 Transmitter

Power output NLT 10 W carrier into 50- Ω resistive load.

Modulation

Normal NLT 90% (AM).

CASS or DICASS NLT 85% (AM).

Wide band NLT 90% (AM).

Modulation distortion NMT 10% total harmonic distortion in demodulated signal.

Transmitter audio response

Normal (voice) 300 to 3500 Hz (demodulated carrier audio within +1 to -3 dB demodulated 1-kHz ref).

Wide band 300-Hz to 35 kHz (demodulated carrier audio within ± 3 dB demodulated 1-kHz ref).

Carrier noise At least 40 dB below detected audio from carrier modulated 90% at 1000 Hz.

Carrier FM NMT 2-kHz peak freq deviation with carrier modulated (AM) 90% at 1000 Hz.

Tone modulation 1020 Hz $\pm 10\%$, NLT 85% modulation.

Voltage standing-wave ratio Can withstand open or short ckt at rf output terminal without damage.

Duty cycle 1:5 xmt to rcv.

7. PHYSICAL DESCRIPTION

Height 123.83 mm (4.875 in).

Width 146 mm (5.75 in).

Depth 254 mm (10.0 in).

Weight 4.31 kg (9.5 lb).

8. ELECTRICAL DESCRIPTION

The ARC-159(V)1 Radio Set consists of six plug-in modules (table 1) housed in an aluminum chassis. All operator controls and adjustments are located on the front panel of the unit.

Major test points to aid in fault isolation are located under an access cover on top of the radio set. Other test points are located on individual modules.

Table 1. ARC-159(V)1 Radio Set Module Complement.

REFERENCE DESIGNATION	NAME	COLLINS PART NUMBER
1A1	Frequency synthesizer	617-9618-001/-002
1A2	Rf translator/modulator	617-9621-004/-006
1A3	If/audio amplifier	608-9420-002/-003
1A4	Guard receiver	608-9419-002/-003
1A5	Power amplifier/power supply	622-1394-002
1A6	Control unit	622-1391-003/-004 or 635-8660-001/-002