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AIR FORCE TO 31R2-2GRC171-2

TECHNICAL MANUAL
SERVICE AND CIRCUIT DIAGRAM
RADIO SET
AN/GRC-171

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE

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CROSS-REFERENCE INDEX

(Prefix each Reference Number with the Chapter Number denoted by the Column.)
(KEY: Numbers preceded by "f" are illustrations; "t" are tables; others are paragraphs.)

OFFICIAL NOMENCLATURE Common Name	Chapter 1 General Information	Chapter 2 Installation	Chapter 3 Operation	Chapter 4 Principles of Operation	Chapter 5	
					Org/Itmd	Adjustment
AUDIO MODULE A4	12	27, f3		12, 13, 14 20, 25, 27 135 thru 181, f7, fFO-7, fFO-21	28, t3, f8	14, 15, 16, 17
CHASSIS A10	18	26, f2		10, 27, 30, 31, 34, fFO-33	46, t3, f8	
D/A SERVO AMPLIFIER MODULE A1	9			1, 9, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, fFO-4, fFO-18	19, t3, f8	
DC-DC CONVERTER MODULE A5	13			32, 33, 34 182 thru 212, fFO-8, fFO-13, fFO-22	31, t3, f8, f9	
FREQUENCY SYNTHESIZER MODULE A2	10			15, 16, 41 60, 61 thru 97, t2, f1, f2. f3, f4, f5., f6, fFO-5. fFO-11, fFO-12, fFO-19	22, t3, f8	
KEYER MODULE A9	17	29, f4		14, 28, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, fFO-32	43, t3, f11	

CROSS-REFERENCE INDEX (Cont)

OFFICIAL NOMENCLATURE Common Name	Chapter 1 General Information	Chapter 2 Installation	Chapter 3 Operation	Chapter 4 Principles of Operation	Chapter 5	
					Org/ltmd	Adjustment
POWER AMPLIFIER MODULE A8	16			12, 15, 16, 18, 21, 241 thru 291, f9, fFO-10, fFO-25, fFO-26 thru fFO-31	40, t3, f8	
RADIO RECEIVER- TRANSMITTER RT-980/GRC- 171 Receiver- Transmitter	f1, f2	4, 20, t1 IFO-1, fFO-2	1, 6, t1, f1	6, 7, 20, 36, fFO-3, fFO-15, fFO-15, fFO-16	8, t3, f1, f8	
RADIO SET CONTROL C-7999/ GRC-171 Radio Control	f1	5,. 22, t1 f1, fFO-2	8, t1, f2	6, 20, 27, 38, 39, 40, 41, fFO-17	8, t4	
RECEIVER RF MODULE A3	11	31, f5		7, 23, 24, 25, 98 thru 134. fFO-6, fFO-20	25, t3, f8	
RF FILTER MODULE A7	15			16, 23, 24, 26, 221 thru 240	37, t3, f8	
VOLTAGE REGULATOR MODULE A6	14			32, 213 thru 220, f8, fFO-23	34, t3, f8, f10	

INTRODUCTION

This technical manual provides information for servicing Radio Set AN/GRC-171, Collins part number 622-1627-001, manufactured by Collins Radio Group/ Rockwell International, Cedar Rapids, Iowa. Radio Set AN/GRC-171 consists of the following: Radio Receiver-Transmitter RT-980/GRC-171, Collins part number 622-1628-001; Radio Set Control C-7999/ GRC-171, Collins part number 622-1629-001; cable interface kit, Collins part number 622-7846-001; and slide mounting hardware kit, Collins part number 623-5818-001. Radio Set AN/GRC-171 provides air traffic control communications at collocated vhf/uhf receiver-transmitter sites. The equipment is capable of providing AM communications on any of the 7,000 channels in the 225to 399.975-MHz band with 20watt AM carrier output.

Chapter 1 provides an overall electrical and mechanical description of the equipment.

Chapter 2 provides information on installation, of the equipment.

Chapter 3 provides operating instructions.

Chapter 4 describes the basic operating principles of the equipment.

Chapter 5 provides maintenance instructions, including performance tests and adjustment procedures.

Chapter 6 provides information on the use of circuit diagrams and equipment effectivity. All foldout diagrams appear in chapter 6 of this manual regardless of their applicability to any one chapter.

A complete illustrated parts breakdown of the equipment is provided in TO 31R2-2GRC171-4.

The following publications were used in the preparation of this manual.

MILITARY STANDARDS

MIL-STD-12B Abbreviations for Use on Drawings and in Technical-Type manuals

VIII-STD-15-1A Graphic Symbols for Electrical and Electronic Diagrams

ASA-STD- Electrical and Electronic Reference
 Y32-16-1965 Designations

MILITARY SPECIFICATIONS

MIL-M-38730 Technical Manuals, General
 Requirements for Preparation of

MIL-M-4410 Technical Manuals: Title Pages, List of
 Effective Pages, and Reproduction
 Assembly Sheet; Photolith Negatives;
 Printing; and Binders

MIL-T-9941 Technical Manuals: Ground C-E
 Equipment Facility, Site, and System

TECHNICAL ORDERS

31-1-141 Basic Electronics Technology and
 Testing Practices

EFFECTIVITY

Each equipment, unit, and assembly provided is marked with a manufacturing alphabetic identifier in addition to the basic part number. The alphabetic identifier will be preceded by the letters REV(revision) and will start with 0 if no changes have been processed. The first change will be identified as A, the second as B, and continuing through Z to AA and ultimately to ZZ. Because minor electrical and/or mechanical differences exist between various revisions, where applicable, an effectivity-versus-revision identifier cross-reference is provided on the schematic diagram.

Each effectivity applies to a group of revision identifiers and is indicated by a key (◀) on both the effectivity table and the appropriate schematic diagram.

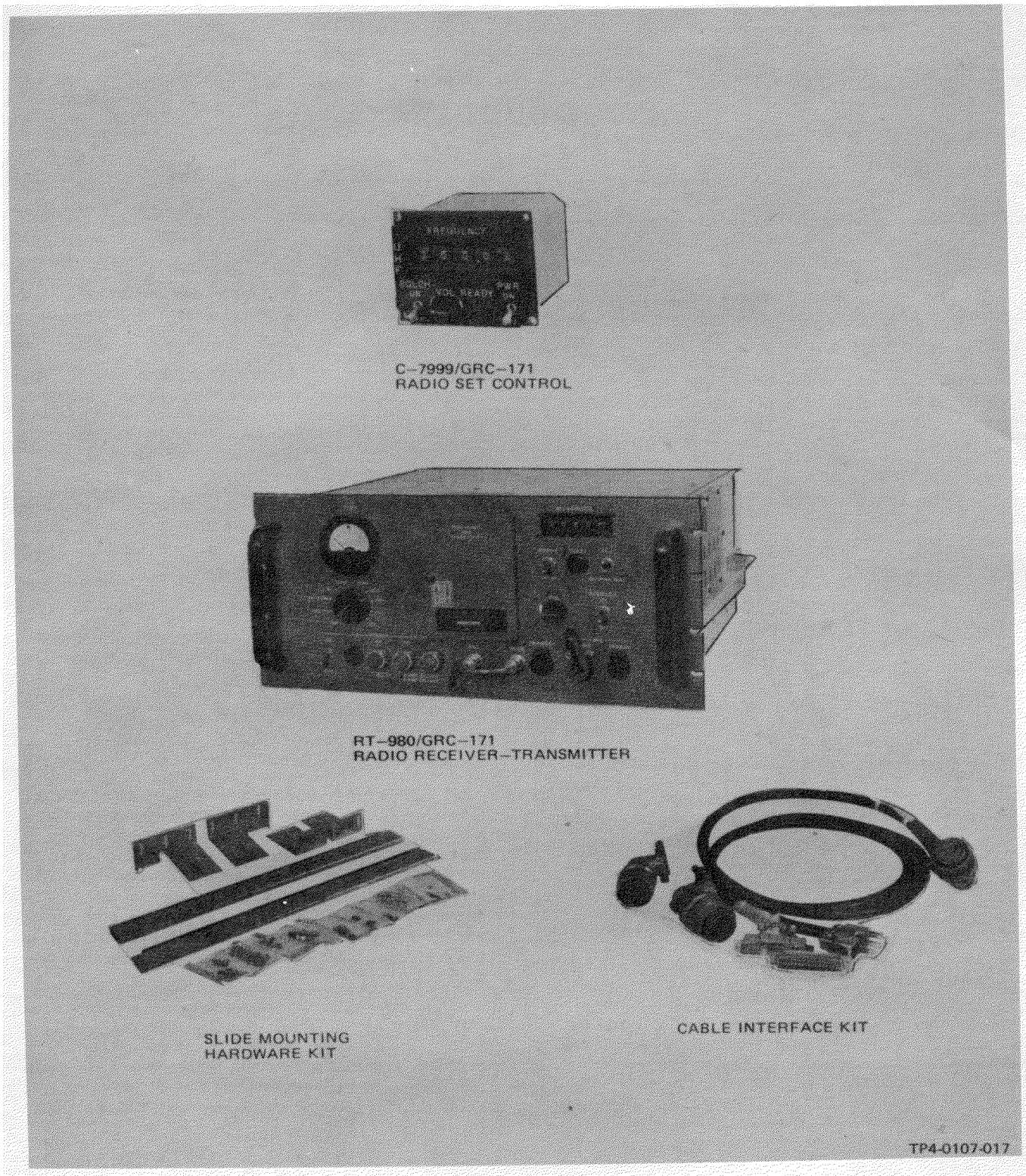


Figure 1-1. Radio Set AN/GRC-171 1-0

CHAPTER 1 GENERAL INFORMATION

1-1. DESCRIPTION AND PURPOSE.

1-2. PURPOSE. Radio Set AN/GRC-171, shown in figure 1-1, is a uhf receiver-transmitter for air traffic control communications at collocated vhf/uhf receiver-transmitter sites. The equipment provides AM and wide-band data communications on any 1 of 7000 channels (25-kHz channel spacing) in the 225 to 399.975-MHz band. The equipment is completely solid state providing 20-watt AM carrier output.

1-3. DESCRIPTION. Radio Set AN/GRC-171 (radio set) consists of Radio Receiver-Transmitter RT980/GRC-171 (receiver-transmitter), Radio Set Control C-7999/GRC-171 (radio control), a cable interface kit, and a slide mounting hardware kit.

1-4. The RT-980/GRC-171 consists of nine plug-in modules (shown in figure 1-2) contained within a chassis. The modules are attached to the chassis by captive screws or by a module retaining bracket. All electrical connections to the RT-980/GRC-171 are made through four connectors mounted on the rear panel of the chassis. Front panel test meter and test points are provided for maintenance and troubleshooting. The unit mounts in a standard 482.6-mm (19-in) rack cabinet and is cooled by convection. The RT-980/GRC-171 can be operated locally with front panel controls or remotely at distances up to 45.7 m (150 ft) with Radio Set Control C-7999/GRC-171.

1-5. The cable interface kit contains a 1.83-m (6-ft) 120-V ac power cord and all multiple pin mating connectors for the RT-980/GRC-171 and C-7999/GRC-171. All interconnecting wiring except the 120-V ac power cord is supplied by the user.

1-6. The slide mounting hardware kit contains the cabinet slides, brackets, and hardware required to mount the RT-80/GRC-171 in a standard 482.6-mm (19-in) rack cabinet. Slide rails are attached to the RT-980/GRC-171 at the factory.

1-7. Radio Set Control C-7999/GRC-171 contains controls for remote frequency select, power on-off, squelch on-off, and receive audio level control.

1-8. DESCRIPTION OF MODULES.

1-9. D/A SERVO AMPLIFIER MODULE A1. The d/a servo amplifier contains a digital-to-analog converter and servo amplifier that converts frequency select

information from the radio control into servo motor drive to position the rf filter in the rf filter module.

1-10. FREQUENCY SYNTHESIZER MODULE A2. The frequency synthesizer module contains a phase-locked loop (p11) and transmit/receive transfer switch that converts frequency select information from the radio control into transmit rf that is transferred to the power amplifier module or receive injection that is transferred to the receiver rf module.

1-11. RECEIVER RF MODULE A3. The receiver rf module contains a double conversion uhf receiver that converts receive rf from the rf filter module into receive audio (or data) to the audio module. The receiver rf module includes a noise channel to blank receive audio of impulse type noise.

1-12. AUDIO MODULE A4. The audio module contains a receive audio circuit with squelch, a transmit audio circuit, and a transmitter keying circuit. The audio circuit amplifies and shapes the frequency response of receive audio (or data) from the receiver rf module and applies the audio (or data) to the headset and main audio output (or data output) of the receiver-transmitter. The transmit audio circuit amplifies and shapes the frequency response of input audio (or data) and applies transmit audio (or data) to the modulator of the power amplifier module. The transmit keying circuit converts remote push-to-talk keying into transmit key lines.

1-13. DC-DC CONVERTER MODULE A5. The dc-dc converter module contains a regulating dc-dc converter and a nonregulating dc-dc converter. The regulating dc-dc converter converts unregulated dc from the transformer/rectifier circuit on the chassis into regulated +26 V dc. The nonregulating dc-dc converter converts +26 V dc into unregulated voltages to the voltage regulator module.

1-14. VOLTAGE REGULATOR MODULE A6. The voltage regulator module converts unregulated voltages to power circuits of the receiver-transmitter and radio control.

1-15. RF FILTER MODULE A7. The rf filter module contains a transmit/receive switch, tunable rf filter, and directional coupler that transfers and filters transmit rf from the power amplifier module to the antenna or receive rf from the antenna to the receiver rf module.