



Wulfsberg Electronics Division
A Chelton Group Company

INSTALLATION MANUAL

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Wulfsberg Electronics, a Division of Chelton Avionics, Inc.*

WULFSBERG C-5000

COMMUNICATION MANAGEMENT CONTROLLER

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Wulfsberg Electronics Division
A Chelton Group Company
Prescott, AZ 86301 U.S.A.

C-5000 COMMUNICATION MANAGEMENT CONTROLLER INSTALLATION MANUAL

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SECTION 1 - INTRODUCTION

IMPORTANT

This manual contains information pertaining to the installation of the C-5000 Communication Management Controller with FLEXCOMM II and FLEXCOMM I. FLEXCOMM II consists of the RT-5000 Transceiver, appropriate antennas, and optional equipment as required. FLEXCOMM I consists of the RT-9600 Transceiver, RT-9600F Transceiver, RT-7200 Transceiver, and optional combinations of up to three of the following FLEXCOMM Transceivers: RT-30, RT-118, RT-138(F), RT-406F, RT-450, appropriate antennas, and optional equipment as required. The C-5000 can also interface with combined applications of FLEXCOMM II and FLEXCOMM I, i.e., a hybrid RT System configuration that consists of both RT-5000 and FLEXCOMM I Transceivers.

1. Using This Manual

This manual is divided into the following sections:

SECTION 1- INTRODUCTION

This section contains an overview of the contents of this manual and lists the components installed in FLEXCOMM I and FLEXCOMM II systems using the C-5000.

SECTION 2 - SYSTEM INSTALLATION

This section covers the general system characteristics, interface capabilities and power requirements.

SECTION 3 - MECHANICAL INSTALLATION

This section contains system component dimensions, the racking requirements, weights, and component installation data.

SECTION 4 - FLEXCOMM II ELECTRICAL INSTALLATION

This section contains the wiring information to install the C-5000 Control Unit with the FLEXCOMM II Transceiver in an aircraft.

SECTION 5 - FLEXCOMM I ELECTRICAL INSTALLATION

This section contains the wiring information to install the C-5000 Control Unit with the FLEXCOMM I Transceiver in an aircraft.

SECTION 6 - SYSTEM CONFIGURATION AND PRESET CHANNEL PROGRAMMING

This section contains the system configuration and preset channel programming procedures for the system.

SECTION 7 - SYSTEM CHECKOUT

This section contains checkout procedure for the system after installation.



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2. Components

The following components can be installed:

A. Communication Management Controller

C-5000 PN 31300-1X02-1XX0 (See Figure 1-1)

B. FLEXCOMM II

(1) Transceivers

RT-5000 PN 400-015525-XXXX (See Table 1-1)

(2) Antennas Systems (Refer to Table 1-2)

AT-560 PN 121-040130-XX

AT-160 PN 121-040129-01

AT-5000 PN 121-040045-01

AT-550 PN 121-017850-01

AT-150 PN 153-017822-01

AT-50 PN 121-016587-01

AT-51 PN 121-016796-01

AT-140 PN 121-016584-01

AT-400 PN 121-16821-01

FC-50 Logic Converter PN 153-016586-01

FC-5000 Logic Converter PN 153-040047-01

FC-550 Logic Converter PN 153-017851

(3) RT-5000 Mounting Trays

Vertical Mounting Tray PN 300-316605-01

Horizontal Mounting Tray PN 300-316835-01



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C. FLEXCOMM I

(1) Transceivers

RT-30	PN 400-0098-XXX (See Table 1-3)
RT-118	PN 400-0119-XXX (See Table 1-4)
RT-138	PN 400-0102-XXX (See Table 1-5)
RT-138F	PN 400-014525-XX/5X (See Table 1-6)
RT-406F	PN 400-012785-XX/5X (See Table 1-7)
RT-450	PN 400-0103-XXX (See Table 1-8)
RT-7200	PN 400-0087-XXX (See Table 1-9)
RT-9600	PN 400-0052-XXX (See Table 1-10)
RT-9600F	PN 400-0140-XXXX (See Table 1-11)

(2) Antennas

AT-35 System	PN 121-014235-XX
AT-270	PN 121-0002-000
AT-461	PN 121-0011-000
AT-462	PN 121-014378-01
AT-695	PN 121-0019-000
AT-960	PN 121-0010-000

Note: Refer to the following for information on FLEXCOMM I antennas and installation:

- a FLEXCOMM I Installation Manual, WED Manual No. 150-040011-000, for information on FLEXCOMM Antennas.
- b WED Manual No. 150-0061-000 for information on RT-9600 and RT-7200 Antennas.



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D. Part Numbering

The C-5000's basic unit part number 31300-XXXX-XXXX is configured as follows:

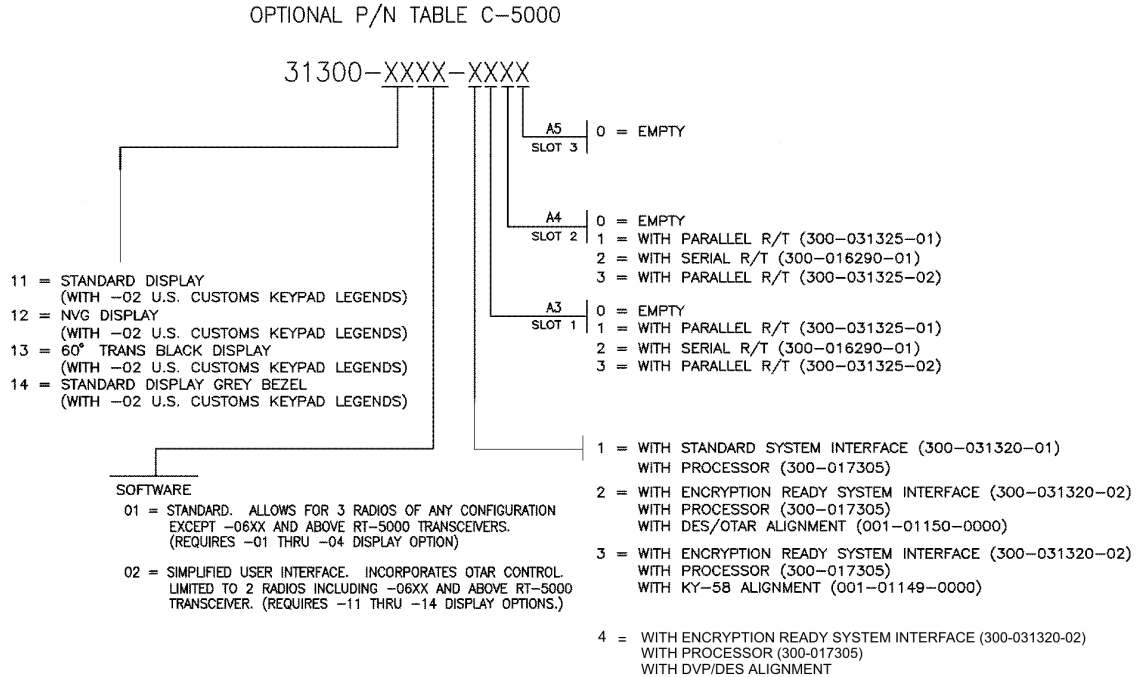


Figure 1-1. C-5000 Part Numbering

Note: Processor board PN 300-031315 can only be used with Parallel R/T board PN 300-031325. Processor board PN 300-017305 can be used with Parallel R/T PN 300-031325 and Serial R/T board PN 300-016290.

The installation and operation of the Frequency Agile C-5000 Control Unit is limited to aircraft installations per FCC Rules and Regulations, Part 90, Section 90.423 and 90.203(h). A non-frequency agile C-5000 is available for other than aircraft installations and is in compliance with FCC Rules and Regulations 90.203(g).



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Table 1-1. RT-5000 Part Numbers

Part Number	RT-5000 Description
400-015525-0101	Transceiver, No Guard Receiver
400-015525-0201	Transceiver, Crystal Controlled Guard Receiver, 30MHz -50MHz
400-015525-0301	Transceiver, Crystal Controlled Guard Receiver, 138 MHz - 174 MHz
400-015525-0401	Transceiver, Crystal Controlled Guard Receiver, 406 MHz - 512 MHz
400-015525-0501	Transceiver, Synthesized Guard
400-015525-0611	Transceiver, D.E.S. Encrypted VHF 138-174 MHz MTM Guard Receiver
400-015525-0711	Transceiver, VHF 138 MHz MTM Guard Receiver
400-015525-0811	Transceiver, D.E.S. Encrypted UHF403 MHz MTM Guard Receiver
400-015525-0911	Transceiver, UHF403 MHz MTM Guard Receiver
400-015525-1011	Transceiver, D.E.S. Encrypted UHF450-520 MHz MTM Guard Receiver
400-015525-1111	Transceiver, UHF520 MHz MTM Guard Receiver
400-015525-1211	Transceiver, D.E.S. Encrypted UHF800 Trunk MHz MTM Guard Receiver
400-015525-1311	Transceiver, UHF800 MHz MTM Guard Receiver
400-015525-1411	Transceiver, D.E.S. Encrypted VHF138 MHz MTM Guard Receiver and UHF800 MHz MTM Guard Receiver
400-015525-1511	Transceiver, VHF138 MHz MTM Guard Receiver and UHF800 MHz MTM Guard Receiver
400-015525-1611	Transceiver, D.E.S. Encrypted VHF138 MHz MTM Guard Receiver and D.E.S. Encrypted UHF800 MHz MTM Guard Receiver
400-015525-1711	Transceiver, VHF138 MHz MTM Guard Receiver and D.E.S. Encrypted UHF800 MHz MTM Guard Receiver
400-015525-1811	Transceiver, D.E.S. Encrypted VHF138 MHz MTM Guard Receiver and UHF520 MHz MTM Guard Receiver
400-015525-1911	Transceiver, VHF138 MHz MTM Guard Receiver and UHF520 MHz MTM Guard Receiver
400-015525-2011	Transceiver, D.E.S. Encrypted VHF138 MHz MTM Guard Receiver and D.E.S. Encrypted UHF520 MHz MTM Guard Receiver
400-015525-2111	Transceiver, VHF138 MHz MTM Guard Receiver and D.E.S. Encrypted UHF520 MHz MTM Guard Receiver
400-015525-2211	Transceiver, D.E.S. Encrypted VHF138 MHz MTM Guard Receiver and UHF403 MHz MTM Guard Receiver

continues...



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Table 1-1. RT-5000 Part Numbers (cont'd)

Part Number	RT-5000 Description
400-015525-2311	Transceiver, VHF138 MHz MTM Guard Receiver and UHF403 MHz MTM Guard Receiver
400-015525-2411	Transceiver, D.E.S. Encrypted VHF138 MHz MTM Guard Receiver and D.E.S. Encrypted UHF403 MHz MTM Guard Receiver
400-015525-2511	Transceiver, VHF138 MHz MTM Guard Receiver and D.E.S. Encrypted UHF403 MHz MTM Guard Receiver
400-015525-2611	Transceiver, DVI-XL UHF520 MHz MTM Guard Receiver
400-015525-2711	Transceiver, DVI-XL UHF800 MHz MTM Guard Receiver

Table 1-2. FLEXCOMM II Antenna Part Numbers

Part Number	Antenna Description
121-040130-01	AT-560 -- 29.7 - 960 MHz 9.5" Tuned Multiband White
121-040130-02	AT-560 -- 29.7 - 960 MHz 9.5" Tuned Multiband Black
121-040129-01	AT-160 -- 29.7 - 960 MHz 9.5" Passive Multiband
121-040045-01	AT-5000 -- 29.7 - 960 MHz 5.5" (FC-5000 Req) White
121-040045-02	AT-5000 -- 29.7 - 960 MHz 5.5" (FC-5000 Req) Black
121-017850-01	AT-550 -- 29.7 - 960 MHz (FC-550 Req) White
153-017822-01	AT-150 -- 29.7 - 960 MHz (poor 30-88 MHz) White
121-016587-01	AT-50 -- 29.7 - 400MHz Autotuned Blade White
121-016796-01	AT-51 -- 29.7 - 400MHz Autotuned Blade White
121-016584-01	AT-140 -- 29.7MHz - 400MHz Blade White
121-016821-01	AT-400 -- 400MHz - 960MHz Jet Blade White
153-016586-01	FC-50 Logic Converter -- Antenna Tuner for AT-50/51
153-040047-01	FC-5000 -- Antenna Tuner for AT-5000 and AT-560
153-017851	FC-550 Logic Converter
146-016958-01	Gasket, AT-400
146-014960-01	Gasket, AT-51
146-014959-01	Gasket, AT-50



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Table 1-3. RT-30 Part Numbers

Part Number	RT-30 Description
400-0098-000	Transceiver, FLEXCOMM Lo Band VHF, 29.70-49.99 MHz.
400-0098-001	Transceiver, FLEXCOMM Lo Band VHF, 29.70 - 49.99 MHz, with Guard Receiver
400-0098-002	Transceiver, FLEXCOMM Lo Band VHF, 29.70 - 49.99 MHz, with Guard Receiver and Guard Receiver CTCSS Tones.

Table 1-4. RT-118 Part Numbers

Part Number	RT-118 Description
400-0119-000	Transceiver, FLEXCOMM VHF-AM Band 118.000 - 137.975 MHz, Standard Receiver IF Bandwidth
400-0119-001	Transceiver, FLEXCOMM VHF-AM Band 118.000 - 137.975 MHz, Wide Receiver IF Bandwidth

Table 1-5. RT-138 Part Numbers

Part Number	RT-138 Description
400-0102-000	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz
400-0102-001	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with Guard Receiver.
400-0102-002	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with Guard Receiver and Guard Receiver CTCSS Tones
400-0102-003	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with increased sensitivity (precludes Guard).



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Table 1-6. RT-138F Part Numbers

Part Number	RT-138F Description
400-014525-00	Transceiver, FLEXCOMM Hi Band VHF, 138.0000-173.9975 MHz.
400-014525-01	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with Guard Receiver.
400-014525-02	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975MHz, with Guard Receiver and Guard Receiver CTCSS Tones.
400-014525-03	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with increased sensitivity (precludes Guard).
400-014525-50	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, Voice Encryption interface compatible.
400-014525-51	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with Guard Receiver, Voice Encryption interface compatible.
400-014525-52	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with Guard Receiver, Guard Receiver CTCSS Tones and Voice Encryption interface compatible.
400-014525-53	Transceiver, FLEXCOMM Hi Band VHF, 138.0000 - 173.9975 MHz, with increased sensitivity and Voice Encryption interface compatible (precludes Guard).

Note: All RT-138F units are compatible with Voice Encryption systems utilizing Non Return to Zero (NRZ) modulation at a data rate of 12 Kbit/sec or less. The -5X units are specifically wired to readily interface with Motorola and General Electric encryption modules. Additionally, all RT-138F units are compatible with Digital Coded Squelch Systems (Motorola Digital Private Line and GE Digital Channel Guard).



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Table 1-7. RT-406F Part Numbers

Part Number	RT-406F Description
400-012785-00	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz.
400-012785-01	Transceiver, FLEXCOMM UHF Band, 406-0000 511.9875 MHz, with Guard Receiver.
400-012785-02	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz, with Guard Receiver and Guard Receiver CTCSS Tones.
400-012785-03	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz, with increased sensitivity (precludes Guard).
400-012785-50	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz, Voice Encryption interface compatible
400-012785-51	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz, with Guard Receiver, Voice Encryption interface compatible
400-012785-52	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz, with Guard Receiver, Guard Receiver CTCSS Tones and Voice Encryption interface compatible
400-012785-53	Transceiver, FLEXCOMM UHF Band, 406.0000 511.9875 MHz, with increased sensitivity and Voice Encryption interface compatible (precludes Guard).

Note: All RT-406F units are compatible with Voice Encryption systems utilizing Non Return to Zero (NRZ) modulation at a data rate of 12 Kbit/sec or less. The -5X units are specifically wired to readily interface with Motorola and General Electric encryption modules. Additionally, all RT-406F units are compatible with Digital Coded Squelch Systems (Motorola Digital Private Line and GE Digital Channel Guard).

Table 1-8. RT-450 Part Numbers

Part Number	RT-450 Description
400-0103-000	Transceiver, FLEXCOMM UHF Band, 450.0000 - 469.9875 MHz.
400-0103-001	Transceiver, FLEXCOMM UHF Band, 450.0000 - 469.9875 MHz, with Guard Receiver.
400-0103-002	Transceiver, FLEXCOMM UHF Band, 450.0000 - 469.9875 MHz, with Guard Receiver and Guard Receiver CTCSS Tones.
400-0103-003	Transceiver, FLEXCOMM UHF Band, 450.0000 - 469.9875 MHz, with increased sensitivity (precludes Guard).



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Table 1-9. RT-7200 Part Numbers

Part Number	RT-7200 Description
400-0087-000	Transceiver, RT-7200 VHF HI-Band, 138.0000 - 173.995 MHz, 14/28 VDC, 100mW Audio, Recessed Connector.
400-0087-001	Transceiver, RT-7200 VHF HI-Band, 138.00 - 173.995 MHz, 14/28 VDC, 100mW Audio, Recessed Connector, with Guard Receiver.
400-0087-002	Transceiver, RT-7200 VHF HI-Band, 138.0000 - 173.995 MHz, 14/28 VDC, 100mW Audio, Recessed Connector, with CTCSS Tones.
400-0087-003	Transceiver, RT-7200 VHF HI-Band, 138.0000 - 173.995 MHz, 14/28 VDC, 100mW Audio, Recessed Connector, with Guard Receiver and CTCSS Tones.

Table 1-10. RT-9600 Part Numbers

Part Number	RT-9600 Description
400-0052-002	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector
400-0052-005	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector, with Guard Receiver
400-0052-008	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 4/28 VDC, 100 mW Audio, Protruding Connector with CTCSS Tones
400-0052-011	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector, with Guard Receiver and CTCSS Tones
400-0052-024	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28VDC, 100 mW Audio, Recessed Connector
400-0052-025	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with Guard Receiver
400-0052-026	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with CTCSS Tones
400-0052-027	Transceiver, RT-9600 VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with Guard Receiver and CTCSS Tones



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Table 1-11. RT-9600F Part Numbers

Part Number	RT-9600F Description
400-0140-002	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector
400-0140-005	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector, with Guard Receiver
400-0140-008	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector with CTCSS Tones
400-0140-011	Transceiver, RT-9600F VHF HI-Band, 14/28 VDC, 100 mW Audio, Protruding Connector, with Guard Receiver and CTCSS Tones
400-0140-024	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28VDC, 100 mW Audio, Recessed Connector
400-0140-025	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with Guard Receiver
400-0140-026	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with CTCSS Tones
400-0140-027	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with Guard Receiver and CTCSS Tones
040-0140-052, 400-0140-152	Transceiver, RT-9600F VHF HI-Band, 150.0000 -173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector and Voice Encryption interface compatible
400-0140-055, 400-0140-155	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector, and Voice Encryption interface compatible
400-0140-058, 400-0140-158	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector with CTCSS Tones, and Voice Encryption interface compatible
400-0140-061, 400-0140-1611	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Protruding Connector, with Guard Receiver and CTCSS Tones, and Voice Encryption interface compatible
400-0140-074, 400-0140-174	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, and Voice Encryption interface compatible
400-0140-075, 400-0140-175	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with Guard Receiver, and Voice Encryption interface compatible

continues...



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Table 1-11. RT-9600F Part Numbers (Cont'd)

Part Number	RT-9600F Description
400-0140-076, 400-0140-176	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with CTCSS Tones, and Voice Encryption interface compatible
400-0140-077, 400-0140-177	Transceiver, RT-9600F VHF HI-Band, 150.0000 - 173.995 MHz, 14/28 VDC, 100 mW Audio, Recessed Connector, with Guard Receiver and CTCSS Tones, and Voice Encryption interface compatible

Note: All RT-9600F units are compatible with Voice Encryption systems utilizing Non Return to Zero (NRZ) modulation at a data rate of 12 Kbit/sec or less. The -05X, -06X, and -07X units are specifically wired to readily interface with Motorola encryption modules. Additionally, all RT-9600F units are compatible with Digital Coded Squelch Systems (Motorola Digital Private Line and GE Digital Channel Guard).



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SECTION 2 - SYSTEM INSTALLATION

1. General

This section contains system specifications, interface information, and examples of typical system configurations for the C-5000 Communication Management Controller installed with FLEXCOMM II, FLEXCOMM I, or a configuration consisting of both FLEXCOMM II and FLEXCOMM I transceivers. System power requirements are included in Table 2-1. Figures 2-1 through 2-6 show generalized system interface diagrams.

2. Sample Systems

The following are examples of ways to configure your aircraft installation:

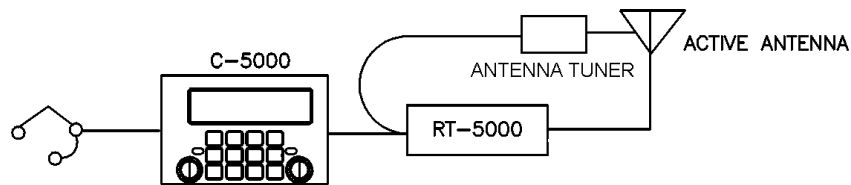


Figure 2-1. Single RT-5000 with Active Antenna

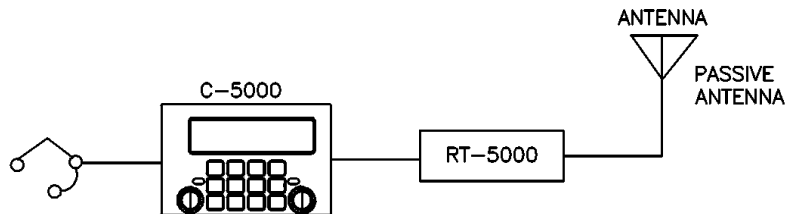


Figure 2-2. Single RT-5000 with Passive Antenna

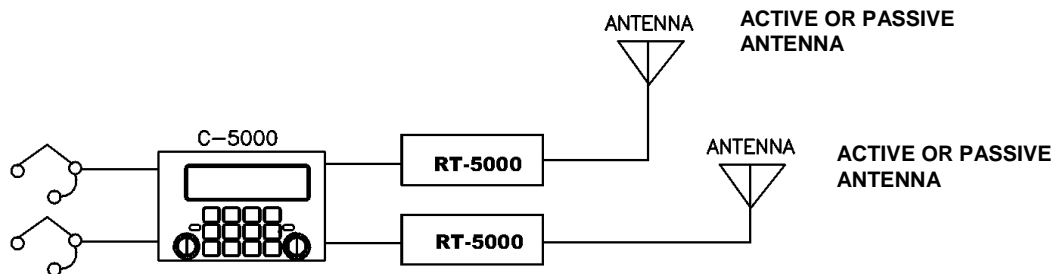


Figure 2-3. Dual RT-5000 with Dual Mic/Headset



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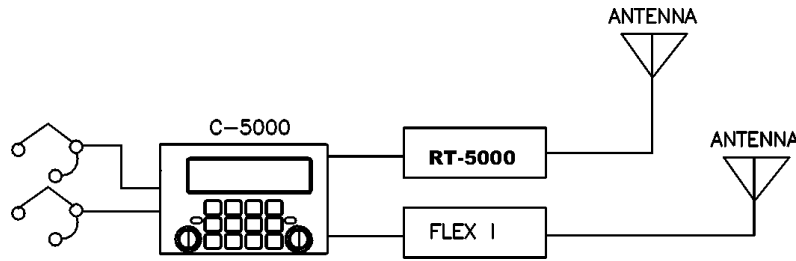


Figure 2-4. Dual Transceiver, RT-5000 and Flexcomm I

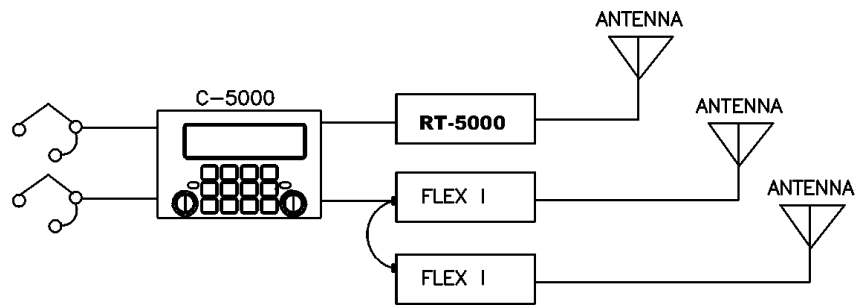


Figure 2-5. Dual Transceiver, RT-5000 and Parallel Flexcomm I Transceivers

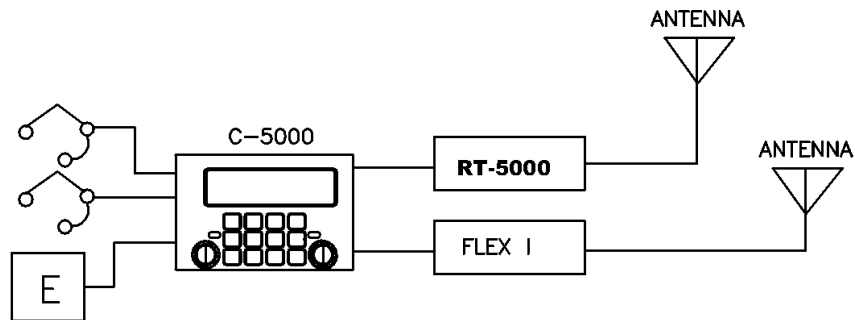


Figure 2-6. Dual Transceiver with External Encryption



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3. Component Specifications

COMPONENT	POWER REQUIREMENTS
C-5000	VOLTAGE: 27.5 Vdc ± 20% Aircraft CURRENT: 0.4 amps (typical) 1.3 amps (maximum external loading)
FLEXCOMM II RT-5000	VOLTAGE: 27.5 VDC Aircraft STANDBY: 1.7 amps RECEIVE: 1.7 amps TRANSMIT: 10.0 amps
FLEXCOMM I	RT-30 Refer to <i>FLEXCOMM I Transceiver System Installation Manual</i> , Manual Number 150-040011, for power requirements. RT-118 RT-138 RT-138F RT-406F RT-450 RT-9600 Refer to <i>VHF/FM Transceivers RT-7200, RT-9600, AN/ARC-513(V) Installation /Operators Manual</i> , Manual Number 150-0061-000, for power requirements. RT-9600F RT-7200

Table 2-1. System Power Requirements

A. C-5000 Communication Management Controller

Note: The installation and operation of the Frequency Agile C-5000 Control Unit is limited to aircraft installations per FCC Rules and Regulations, Part 90, Section 90.423 and 90.203(h). A non-frequency agile C-5000 is available for other than aircraft installations and is in compliance with FCC Rules and Regulations 90.203(g).

- (1) Number of Channels: 350 programmable channels
- (2) Temperature: -30° to + 60° C
- (3) Panel Lighting: 5 Vdc, 5 Vac, or 28 Vdc
- (4) Keypad Lighting: Type: Electro Luminescent (E.L.) Lighting
 Color: Blue/white (standard)
 Green NVG (optional)



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- (5) Audio Output: Standard: 100 mV into 600 ohm load, shop adjustable
0.1 to 250 mW, 600 ohms
Unsquelched Audio: 0.5 VRMS/2k ohms, adjustable 0.1
to 1.5 V
- (6) Audio Input Level: Std. Voice: 0.25 Vrms 150 ohm balanced pair, shop
adjustable 30 mV to 1.5 Vrms Narrowband: same as
voice, 2K single ended
- (7) Microphone Interface: Carbon or equivalent

B. FLEXCOMM II (RT-5000)

- (1) RT-5000 Transceiver
- a) Tunability: 1.25 kHz Incremental Tuning Simplex/Semi-duplex.
- b) Mode: FM/AM/P25/Trunking
- c) Frequency Bands: 29.7-88 MHz (FM Band)

108-116 MHz (receive only)
118-156 MHz (AM Band)
138-174 MHz (FM Band)
220-225 MHz (AM/FM)
225-400 MHz (AM/FM)

FM:
403-512 MHz
512-806 MHz
806-960 MHz
- d) Channeling: 12.5/20/25/30/50 kHz
- e) Temperature: -30° C to + 60° C
- f) Altitude: 51,000 feet above MSL
- g) Control: C-5000 Serial Tuning Bus
- h) Tx Power: 10 Watts FM/P25
15 Watts AM



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C. RT-5000 Antennas

- 1) AT-560 Antenna
 - 1) Frequency: 29.7 - 960 MHz
 - 2) VSWR: 2.5:1 maximum
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) Power: 20 Watts
 - 7) Gain: 30 MHz, -14 dBi
88 MHz, -6 dBi
108-174 MHz, 0 dBi
220-960 MHz, 0 dBi
 - 8) Temperature: -55°C to + 70°C
 - 9) Altitude: 40,000 feet
- 2) AT-160 Antenna
 - 1) Frequency: 29.7 - 960 MHz
 - 2) VSWR: 2.5:1 maximum
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) Power: 20 Watts
 - 7) Gain: 30 MHz, -21 dBi
60 MHz, -21 dBi
88 MHz, -12 dBi
108-174 MHz, -3 dBi
225-960 MHz, 0 dBi
 - 8) Temperature: -55°C to + 70°C
 - 9) Altitude: 40,000 feet
- 3) AT-5000 Antenna



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- 1) Frequency: 29.7 - 960 MHz
 - 2) VSWR: 2.5:1 maximum
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) Power: 20 Watts
 - 7) Gain: 30 MHz, -15 dBi
88 MHz, -7.5 dBi
118-174 MHz, -3 dBi
225-960 MHz, 0 dBi
 - 8) Temperature: -55°C to + 70°C
 - 9) Altitude: 55,000 feet
- 4) AT-550 Antenna
- 1) Frequency: 29.7 - 960 MHz
 - 2) VSWR: 2.5:1 maximum
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) Power: 20 Watts
 - 7) Gain: 30 MHz, -14 dBi
88 MHz, -6 dBi
108-174 MHz, 0 dBi
225-960 MHz, 0 dBi
 - 8) Temperature: -55°C to + 70°C
 - 9) Altitude: 40,000 feet



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- 5) AT-50 Antenna
 - 1) Frequency: 29.7 - 400 MHz
 - 2) VSWR: 2: 1 maximum
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) Power: 20 Watts
 - 7) Gain: 30 MHz, -11 dBi
88 MHz, -6 dBi
108-174 MHz, 0 dBi
225-400 MHz, + 2 dBi
 - 8) Temperature: -54°C to + 71°C
 - 9) Altitude: 50,000 feet

- 6) AT-51 Antenna
 - 1) Frequency: 29.7 - 400 MHz
 - 2) VSWR: 2.5: 1 maximum
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 Ohms
 - 6) Power: 15 Watts
 - 7) Gain: 30 MHz, -14 dBi
88 MHz, -7 dBi
108-174 MHz, -3 dBi
225-400 MHz, 0 dB
 - 8) Temperature: -54°C to + 71°C
 - 9) Altitude: 50,000 feet



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- 7) AT-140 Antenna
 - 1) Frequency: 29.7 - 400 MHz
 - 2) VSWR: 2.5: 1 at 30-88 MHz
5.0: 1 at 108-117 MHz
2.5: 1 at 118-174 MHz
2.0: 1 at 225-400 MHz
 - 3) Radiation Pattern: Omnidirectional in azimuth
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) Power: 50 Watts
 - 7) Gain:

30 MHz	-22.5 dBi
88 MHz	-10 dBi
108 - 174 MHz	-2 dBi
225 - 400 MHz	+2 dBi
 - 8) Temperature: -54°C to + 71°C operating
-62°C to + 85°C non-operating
 - 9) Altitude: 50,000 ft
- 8) AT-400 Antenna.
 - 1) Frequency: 400 - 960 MHz
 - 2) VSWR: 2.0: 1 maximum
 - 3) Radiation Pattern: Typical of $\lambda/4$ stub
 - 4) Polarization: Vertical
 - 5) Impedance: 50 ohms
 - 6) RF Power: 100 Watts
 - 7) Efficiency: 90% min. 400 - 960 MHz
 - 8) Temperature: -55°C to +70°C
 - 9) Altitude: 50,000 ft



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D. FLEXCOMM I

Note: Refer to FLEXCOMM I Transceiver System Installation Manual, Manual Number 150-040011, for specification data on FLEXCOMM Transceivers and Antennas. Refer to VHF/FM Transceivers RT-7200, RT-9600, AN/ARC-513(V) Installation /Operators Manual, Manual Number 150-0061-000, for specification data on RT-9600 and RT-7200 transceivers.



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SECTION 3 - MECHANICAL INSTALLATION

1. General

This section contains instructions and considerations for the proper mechanical installation of the C-5000 Communication Management Controller with FLEXCOMM II and FLEXCOMM I Systems.

The information presented here is necessary for the proper operation and satisfactory performance of the equipment.

The FLEXCOMM II System consists of the RT-5000 Transceiver, appropriate antennas, and optional equipment as required.

The FLEXCOMM I System consists of an RT-9600F, or an RT-9600, or an RT-7200, or a combination of up to 3 of the following transceivers: RT-30, RT-118, RT-138, RT-138F, RT-406F, RT-450, appropriate antenna(s), and optional equipment as required.

Note: An RT-138 transceiver or an RT-138F transceiver (not both) may be installed in the same RT-System. An RT-406F transceiver or an RT-450 transceiver (not both) may be installed in the same RT System.

Refer to FLEXCOMM I Transceiver System Installation Manual, Manual Number 150-040011, for mechanical installation information on FLEXCOMM transceivers. Refer to VHF/FM Transceivers RT-7200, RT-9600, AN/ARC-513(V) Installation /Operators Manual, Manual Number 150-0061-000, for mechanical installation information on the RT-9600, and RT-7200 transceivers.

For instructions and considerations on the mechanical installation of a configuration that consists of both FLEXCOMM II and FLEXCOMM I transceivers, refer to applicable information in this section for the installation of FLEXCOMM II transceivers, and to the documents noted in the previous paragraph for installation of FLEXCOMM I transceivers.

2. Unpacking and Inspecting Equipment

Physically compare the presence of each item in the shipment with that shown on the packing list. Exercise care when unpacking each unit. Make a visual inspection of each unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim. When all equipment is unpacked, it is suggested the carton and packing materials be saved for possible reshipment.



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3. General Installation Requirements

A. Component Weights

Component	Weight
C-5000	3.1 to 3.9 lbs (1.4 to 1.8 kg) depending on configuration
RT-5000	16.2 to 19.7 lbs (7.3 to 8.9 kg) depending on configuration
AT-560	2.7 lbs (1.2 kg)
AT-160	2.7 lbs (1.2 kg)
AT-5000	3.5 lbs (1.6 kg)
AT-550	2.7 lbs (1.2 kg)
AT-150	2.7 lbs (1.2 kg)
AT-50	4.8 lbs max (2.18 kg)
AT-51	3.1 lbs max (1.41 kg)
AT-140	4.0 lbs max (1.8 kg)
AT-400	.75 lbs max (.34 kg)
FC-50	1.65 lbs max (0.75 kg)
FC-5000	1.65 lbs (0.75 kg)
FC-550	1.75 lbs (0.79 kg)
HA-4	1.13 lbs (0.51 kg)
FLEXCOMM I Components	Refer to appropriate Installation Manual

Table 3-1. Component Weights



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4. Installation of Multipin Crimp Connectors

A. Contacts and Crimp Tool Information

Contacts, D-Sub, Min. Crimp or Solder	WED PN 129-115451-01 Positronic PN FC8122D, crimp (or equivalent) or Positronic FS8122D, solder (or equivalent)
--	---

Crimp Tools (Suggested supplier: Daniels Manufacturing Corporation 526 Thorpe Road Orlando, FL 32824)	C-5000 Serial RT Card interface Connector Handle - M22520/2-01 Positioner - M22520/2-08 C-5000 Parallel RT Card Interface Connector Handle - M22520/2-01 Positioner - M22520/2-06 RT-5000 Interface Connector Tool Frame - M22520/1-01 Turret - M22520/1-02 Positioner - M22520/2-08
--	---

Insertion/Removal Tool	Positronic M81969/1-04 or equivalent
------------------------	--------------------------------------

B. Contacts and Insertion/Removal Tool Manufacturer Name and Address:

Positronic Industries, Inc.
423 N. Campbell Ave.
PO Box 8247
Springfield, Missouri 65801

5. Installation of C-5000

Mount C-5000 on Dzus/rails per MIL MS-25213.

See Figure 3-1 for mounting dimensions.

6. Installation of RT-5000

The RT-5000 is designed for horizontal or vertical fixed tray mounting. However, vertical mounting results in better cooling. **A minimum of 1 inch clearance is required on all sides.**

1. **Firmly** hand-tighten the rack knobs to secure the RT-5000 in the mounting tray. See Figures 3-2 through 3-4 for mounting dimensions.
2. Attach antenna cabling [Connector J103 (N Type, less-than-or equal-to 400 MHz), and J102 (TNC Type, greater-than-or-equal-to 400 MHz)]. Insure proper connector mating.
3. Attach RT-5000 mating Connector J101 (55 pin).



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7. Installation of Antennas

The antenna should be mounted on the bottom of the aircraft if possible.

Unpainted aluminum base must make good electrical contact with airframe. Antenna should be installed on flat surface.

A bead of sealant such as Dow Corning RTV-738 should be applied to the outside perimeter of the mounting surface.

See Figures 3-5 through 3-15 for appropriate antenna mounting dimensions.

A. AT-560 and AT-5000

See the AT-560 and AT-5000 envelope drawings, Figures 3-5 and 3-7, for dimensions.

Mount antenna with No. 10 screws.

B. FC-5000

Note: The FC-5000 Logic Converter is required for the AT-560 and AT-5000 antennas.

See the FC-5000 envelope drawing, Figure 3-15, for dimensions.

C. AT-160 and AT-150

See the AT-160 and AT-150 envelope drawings, Figures 3-6 and 3-9, for dimensions.

Mount antenna with No. 10 screws.

D. AT-550

See the AT-550 envelope drawing, Figure 3-8, for dimensions.

Mount antenna with No. 10 screws.

D. FC-550

Note: The FC-550 Logic Converter is required for the AT-550 antenna.

See the FC-550 envelope drawing, Figure 3-16, for dimensions.

F. AT-50 and AT-51

If antenna is installed on top of aircraft, drainage holes at smaller end of antenna should be plugged with blanking plugs and RTV. Drainage holes in antenna base flange at mounting face should not be obstructed.

If antenna is installed on underside of aircraft, drainage holes at smaller end of antenna base flange at mounting face should be sealed with a small fillet of RTV.



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Note: For full 29.7-900 MHz frequency coverage, the user must also install the AT-400 antenna for 400-960 frequencies.

See the AT-50 and AT-51 envelope drawings, Figures 3-10 and 3-11, for dimensions.

Mount antenna with No. 10 screws.

G. FC-50

Note: The FC-50 Logic Converter is required for the AT-50 and AT-51 antennas.

See the FC-50 envelope drawing, Figure 3-14, for dimensions.

H. AT-400

See the AT-400 envelope drawing, Figure 3-13, for dimensions.

Mount antenna with No. 8 screws.

I. AT-140

Note: For full 29.7-400 MHz frequency coverage, the user must also install the AT-140 antenna for 400-960 frequencies.

See the AT-140 envelope drawing, Figure 3-12, for dimensions.

Mount antenna with No. 10 screws.



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Remove this page and insert:

154-031300, Sheet 1 of 1 (Figure 3-1)

154-015525, Sheet 1 of 1 (Figure 3-2)

300-316835, Sheet 1 of 1 (Figure 3-3)

300-316605, Sheet 1 of 1 (Figure 3-4)

121-040130, Sheet 1 of 1 (Figure 3-5)

121-040129, Sheet 1 of 1 (Figure 3-6)

121-040045, Sheet 1 of 1 (Figure 3-7)

121-017850, Sheet 1 of 1 (Figure 3-8)

153-017822, Sheet 1 of 1 (Figure 3-9)

121-016687, Sheet 1 of 1 (Figure 3-10)

121-016796, Sheet 1 of 1 (Figure 3-11)

121-016584, Sheet 1 of 1 (Figure 3-12)

121-016821, Sheet 1 of 1 (Figure 3-13)

153-016586, Sheet 1 of 1 (Figure 3-14)

153-040047, Sheet 1 of 1 (Figure 3-15)

153-017851, Sheet 1 of 1 (Figure 3-16)



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SECTION 4 - ELECTRICAL INSTALLATION

1. General

The following section describes the wiring requirements and options for the installation of the system. Because the system has so many features and options, it is recommended that the installer take the time to read pin descriptions and all notes on wiring diagrams before designing an installation.

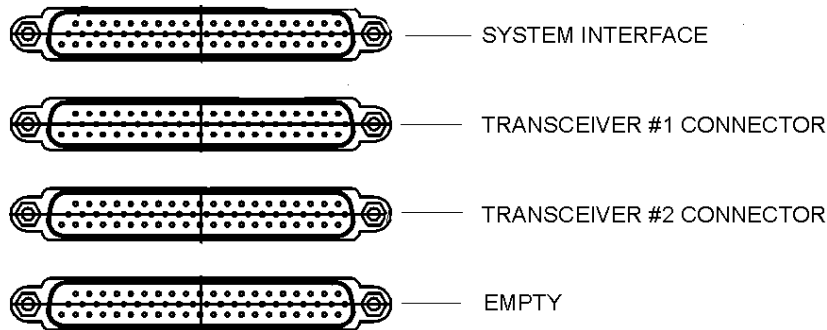


Figure 4-1 Rear View of C-5000

2. Wiring Considerations

To simplify the systems design, follow the steps below:

Step 1: Determine the type and number of radios. The C-5000 can control one or two transceiver systems. The word system is used because a Flexcomm I installation can be made of multiple transceivers electrically daisy chained to make one system. Based on the type of radio, chose the part number of C-5000 that applies to your application.

Step 2: Determine the type of antenna. For each transceiver, determine the appropriate antenna. For Flexcomm I transceivers, see the proper installation manuals for options. For the RT-5000, the process begins by determining if the user needs optimum 30-88MHz performance. If so, the recommended antenna system will be an "active" antenna (i.e. one that is electrically tuned for maximum performance). If the user rarely uses 30-88 MHz, then passive antenna is suggested. Passive antennas are less expensive and less complex to install. Remember that performance in the 30-88 MHz frequency range is very degraded vs. an active antenna.

Step 3: Microphone/Headset. If only one radio is installed, use the primary mic/headset port. If two radios are installed, use primary mic/headset for transceiver system #1 and secondary mic/headset for transceiver system #2. If only one mic/headset port is available on the audio panel, use the primary mic/headset port and configure the C-5000 to operate in "single mic mode".



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Step 4: Panel Lighting. Select the input pin on P500 for the desired backlighting. Options are 28 Vdc (pin 30) or 5 Vdc/5vrms (pin 8).

Step 5: System Wiring. Based on steps 1-5, choose the wiring diagrams from this section that apply to your configuration. Note that if you have two RT-5000's in your system, copy the wiring illustrated for P501 to P502. In other words, choose the wiring for each radio and apply it to the appropriate connector.

A. C-5000 System Interface Connector, P500 Wiring Considerations

- (1) P500 Connector

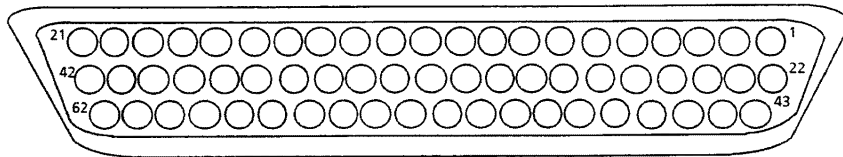


Figure 4-2 P500 Connector



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(2) System Interface Connector P500 Pin Names.

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	RT-X REXMT AUDIO OUT	32	RESERVED SPARE C
2	RS-422 TX LO	33	RT-X SELECT B
3	XMT AUDIO IN HI	34	RT-X REXMT CONTROL KEY OUT
4	XMT AUDIO COMMON	35	PLAIN/CIPHER SEL
5	INTERNAL CIPHER SEL A	36	EXT. CIPHER ACTIVE
6	INTERNAL CIPHER SEL B	37	RT-X WB MN RCV AUDIO OUT
7	REXMT AUDIO IN	38	RCV'NG EXT ENCRYP TEXT
8	5V LITES	39	HEADSET AUDIO COMMON
9	PRIMARY CARBON MIC HI	40	PRIMARY HEADSET AUDIO HI
10	SECONDARY CARBON MIC LO	41	SECONDARY MIC PTT
11	SHIELD	42	EXT RT-X DECODED RCV AUDIO
12	CIPHER/PLAIN SEL	43	A/C POWER GND
13	RT-X GUARD AUDIO OUT	44	27.5 VDC A/C POWER
14	INTERNAL CIPHER DISABLE	45	RS-422 TX HI
15	PTT FROM EXT CIPHER	46	RS-422 RX1 HI
16	RT-X SELECT A	47	RS-422 RX1 LO
17	SECONDARY CARBON MIC HI	48	MIC OUT LO
18	PRIMARY MIC PTT	49	MIC OUT HI
19	XMT'NG EXT ENCRYP TEXT	50	28V LITES
20	SECONDARY HEADSET AUDIO HI	51	RESERVED SPARE E
21	RESERVED SPARE C	52	RESERVED SPARE G
22	SYSTEM (GRD) PRECEDENCE CHN IN	53	RESERVED SPARE A
23	BW CONTROL IN	54	RESERVED SPARE F
24	RS-422 RX2 HI	55	INTERNAL CIPHER SEL C
25	RS-422 RX2 LO	56	PTT TO CIPHER
26	ZEROIZE	57	SPARE B
27	AUX AUDIO IN HI	58	AUX -15VDC
28	AUX +5 VDC	59	SPARE A
29	PRIMARY CARBON MIC LO	60	AUX +15 VDC
30	LITES COMMON	61	EXT RT-X WB XMT AUDIO
31	RESERVED SPARE B	62	AUX GND

Table 4-1. System Interface Connector P500 Pin Names



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(3) Primary Carbon Mic HI/LO (Pins 9, 29)

These pins provide a 150 Ohm input impedance for the crew microphone input. Standard Carbon Mic bias of 15V through 300 Ohms is provided. Standard modulation of 1 kHz tone at 0.25 Vrms is factory set for ± 3 kHz deviation although an adjust range of 30 mV to 1.5 Vrms is provided by A2R174 on the system interface board.

(4) Primary Mic PTT (Pin 18)

This pin, when grounded, activates the transceiver system(s) selected for the primary mic/headset interface.

Note: The primary mic LO and PTT should be connected together at the mic interface (audio panel or mic jack). Alternately, the mic LO should be grounded at the mic interface as mic bias is not provided unless mic LO is DC grounded.

(5) Primary Headset Audio HI/COMMON (Pins 39, 40)

The pins provide receive and sidetone audio output for the transceiver system(s) selected for the primary mic/headset interface. Standard audio levels of 100 mW into 600 Ohm load is provided for standard modulation although an adjustment range of 0.5 to 200 mW is provided by A2R86 of the system interface board.

(6) Secondary Carbon Mic HI/LO, Secondary PTT, and Secondary Headset Audio (Pins 10, 17, 20, 41)

These pins provide a similar interface as the primary counterparts with some functional exceptions. Although levels and impedances provided are the same, the secondary interface provides the limited function of talk and listen in clear, non-encrypted audio. Features provided by the primary interface i.e. Selectable audio routing through internal or external encryption systems integrated with the C-5000 are not supported at the secondary interface.

(7) Shield (Pin 11)

All shields of signals originating at the C-5000 and terminating at other equipment should be connected to this pin and left unterminated at the other equipment. Similarly, the shields of signals originating at other equipment and terminating at the C-5000 should be grounded at the other equipment and left unterminated at the C-5000.

(8) 27.5 Vdc A/C Power and Ground (Pin 43, 44)

These pins provide aircraft 27.5 Vdc power to the C-5000 system. Typical loading is approximately 350 mA, however with external loading by auxiliary equipment connected to ± 15 V and +5 V pins provided, the current requirement can be 1.3 Amp at 27.5 Vdc and approach 2 Amps at low voltage. Appropriate circuit breaker should be provided with consideration given to separately powered radio equipment as part of the basic communications equipment being controlled by the C-5000.



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(9) 28V, 5V, Common Lites (Pins 8, 30, 50)

These pins provide for aircraft lite dimmer bus control of the keyboard lighting. Either 28 Vdc, 5 Vrms or 5 Vdc lighting may be used. The C-5000 does not draw power from the buss but simply monitors the voltage for proper lite tracking. Only 5 V or 28 V may be connected at once.

(10) RS-422 TX, RS-422 RX1, RS-422 RX2 HI/LO (Pins 2, 24, 25, 45, 46, 47)

These pins provide for a bi-directional digital data buss to other equipment on board the aircraft. Two separate receive inputs are provided and the transmit pair may be connected to multiple RS-422 devices. The receive shields should be connected only at the originating equipment and the transmit shield should only be connected to the C-5000 shield pin.

(11) Internal Cipher Select A, B, C (Pins 5, 6, 55)

These pins are normally left unterminated and Internal Cipher Selection is managed from the C-5000. Alternately, pins A, B, and C may be grounded in a binary fashion to provide external selection of 1 of 7 internal cipher modes.

(12) Internal Cipher Disable (Pin 14)

This pin, when left unterminated, causes audio routing within the C-5000 to include the Internal Cipher Interface. By grounding this pin, audio routing of the following signals is to/from the external system interface for utilization with External Encryption Equipment, auxiliary systems and functions generally used in conjunction with military equipment. Associated signals routed to the External Interface are:

Mic output, voice band transmit audio input, wideband transmit audio input, wideband receive audio output, voice band receiver audio output, decoded/de-encrypted voice band received audio input, guard receiver voice band audio output.

This pin should normally be grounded unless an Internal Cipher module (or other special module) is installed in the C-5000 and then it should be switched for Internal or External routing of the "RT-X" signals.

(13) External Cipher Active (Pin 36)

This pin, when grounded, indicates to the C-5000 computer that external encryption equipment connected to the system interface card is active and activated by external control.

(14) XMT Audio IN HI/COMMON (Pins 3, 4)

This pair provides a voice band input to the transmitter(s) as selected by the crew. Typical use is with external encryption equipment in which the mic input to the C-5000 is routed out to the encryption unit and when the encryption unit is not active, the mic input (voice band) is returned to this port for normal voice transmit. Standard levels are 0.9 Vrms into 600 Ω , although A2R160 and A2JP3 provide adjustment range of approximately 40 mV (150 Ω) to 5.4 V (600 Ω).



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(15) Aux Audio IN HI (Pin 27)

This port provides an auxiliary input to the headset audio amplifiers (primary and secondary). It is not switched and all inputs to this port will appear at the headset(s). Typical use is alert tones, progress tones, medical telemetry equipment like Doppler Monitors, etc. Typical input level of 0.5 Vrms (5k Ohm) will yield standard audio although A2R102 on the system interface board provides an adjustment range of 0.33 to 7.75 Vrms.

(16) Plain/Cipher Select (Pin 35)

This output provides control signals to external equipment for activating encryption equipment. For normal operation, this output is an open circuit. An active pull to ground is provided for encryption active.

(17) Cipher/Plain Select (Pin 12)

This output is similar to Plain/Cipher, but is opposite polarity and provides a ground for normal operation.

(18) Receiving External Encrypted Text (Pin 38)

This input, when grounded, indicates to the C-5000 computer that the external encryption equipment at the system interface is receiving properly decoded and encrypted text.

(19) Transmitting External Encrypted Text (Pin 19)

When grounded, this input indicates to the C-5000 computer that the external encryption equipment is active and is providing cipher text for wideband modulation to the crew selected transmitter.

(20) PTT To Cipher (Pin 56)

This pin provides a ground to repeat the mic input (primary only).

(21) PTT From External Cipher (Pin 15)

When grounded, this pin will cause the C-5000 to remain in transmit mode. Transmitter end of text messages can be transmitted after mic PTT has been released by utilizing this input as a stretched or delayed PTT input.

(22) Zeroize (Pin 26)

This pin provides an output from the C-5000 to external encryption (internal as well) equipment to erase key variables. This output is configured as standard to provide an open circuit under normal operation and provide 27.5 Vdc to Zeroize key variables in encryption equipment. By changing A2JP8 on the system interface board from "1 to 2" to "2 to 3", the output provides an active ground for Zeroizing (open circuit = normal).



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(23) Mic Out HI/LO (Pins 48, 49)

This pair provides a buffered primary mic output. As standard configuration, the balanced mic output is a combination of Primary Mic Input, REXMT Audio In, XMT Audio In and Internal Cipher Voice XMT Audio. The level is set for 0.25 Vrms for standard modulation. When external (or internal) encryption equipment is connected to the system interface board, A2JP2 on the system interface board is typically moved from "1 to 2" to "2 to 3" and zero Ohm resistor A2R140 (system interface board) is removed. With A2JP2 changed and A2R140 removed, the mic out is only the buffered primary mic input. In addition, the primary mic input is isolated from the rest of the C-5000 such that normal clear text voice modulation must be routed from mic out Hi/Lo. In this configuration, the external encryption equipment must be installed to complete the audio path from the primary mic input to the selected transmitter(s). Jumpers from mic out Hi/Lo to XMT Audio In Hi/Lo may be used temporarily when the external encryption equipment is disconnected. Audio levels are typically 0.9 Vrms (600 Ω) although A2R170 on the system interface board provides considerable adjustment range.

(24) Guard Precedence In or System Precedence Channel Select (Pin 22)

This pin, when grounded, disables nearly all of the C-5000 functions and channels the system to a pre-stored precedence channel. The volume control is functional. This mode is useful for an emergency mode in which all functions are disabled except basic talk/listen on the pre-stored system precedence channel. Normal operation is with this pin open circuited.

(25) Bandwidth Control In (Pin 23)

This pin, when grounded, activates the wideband mode on new WED radio equipment. Normal mode is open circuit.

(26) RT-X Select A & B (Pins 16,33)

These pins, when grounded, provide and external selection (in binary format) of the selected radio system 1, 2 or 3 to be routed to the internal or external system interface for encryption or other functions connected to the system interface. Normal mode with C-5000 selection of the RT-X (1, 2 or 3) system is provided when these lines are open circuit.

	B	A
NORMAL	OPEN	OPEN
RT-X = SYSTEM 1	OPEN	GND
RT-X = SYSTEM 2	GND	OPEN
RT-X = SYSTEM 3	GND	GND

(27) RT-X Guard Audio Out (Pin 13)

This pin provides the selected RT System Guard RCV Audio (voice band) signal for use with external equipment. Typically the plain text guard audio is summed with decoded main RCV audio and routed to the C-5000 for combined main (recovered cipher) and guard (clear) to the headset. Standard levels are 2 Vrms at low impedance, although A2R114 on the system interface board provides adjustment range of 0.5 to 4 Vrms.



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(28) REXMT Audio In (Pin 7)

This input provides an auxiliary voice band transmit audio input and is summed with the primary mic audio. The receive audio from other equipment can be routed to this port and in conjunction with the "PTT from Ext. Cipher" (an auxiliary PTT input), a multi-system relay can be established. A level of 2 Vrms for standard modulation is standard, although A2R167 on the system interface board provides an adjustment range of 0.1 to 7.75 Vrms.

(29) RT-X REXMT Audio Out (Pin 1)

This pin provides a voice band receive audio output from the selected RT system (1, 2 or 3). The audio is normal audio from the selected radio system and includes both main and guard audio as well as sidetone during XMT. In conjunction with REXMT control key out, (squench activity from this system and PTT input to other aircraft equipment) this signal may be used in a multi system relay to provide receive audio from this system to transmit audio to other equipment on board the aircraft.

Typical application with external encryption equipment connected to the system interface utilizes this signal as clear text receive audio to be routed to, and returned from, the external equipment in time of nonencrypted reception to the RT-X Decoded Audio Input. The signal level is 2 Vrms for standard voice, although A2R108 on the system board provides an adjustment range of 0.2 to 7.75 Vrms.

(30) RT-X REXMT Control Key Out (Pin 34)

This signal provides a ground output when the selected radio system (1, 2 or 3) main receiver is active (squench activity). This signal provides a PTT input to other aircraft equipment in a multi-system relay mode.

(31) RT-X WB MN RCV Audio Out (Pin 37)

This signal is a wideband received audio signal from the selected RT system (1, 2 or 3) main receiver. It is not squench gated and typically is used with external encryption equipment connected to the system interface. The standard level is 6 Vpp although A2R135 provides an adjustment range of 1.2 to 12 Vpp. The Motorola encryption equipment requires 4 Vpp.

(32) EXT RT-X Decoded RCV Audio (Pin 42)

This input is typically used with external encryption equipment connected to the system interface. The signal is the decoded or de-encrypted voice band clear text from the encryption system. By proper C-5000 system programming, this signal can be routed directly as the selected RT system (1, 2 or 3) recovered audio or it can be internally summed with the selected RT system guard audio, sidetone, or both. In addition, the recovered audio can also be programmed to provide de-emphasis if required. A level of 2 Vrms is standard, although A2R131 provides an adjustment range of 0.25 to 7.75 Vrms.



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(33) EXT RT-X WB XMT Audio (Pin 61)

This input provides for wideband digital audio (encrypted or cipher text) modulation input to the selected RT system (1, 2 or 3). Modulation level of 6Vpp is standard, although A2R141 on the system interface board provides an adjustment range of 1.2 to 12 Vpp.

(34) AUX +15 Vdc (Pin 60)

This output can be used to power external auxiliary equipment. Total load cannot exceed 600 mA. In addition, the combined external load of +15V, -15V and +5V outputs cannot exceed 11.5 Watts.

(35) AUX -15 Vdc (Optional) (Pin 28)

This optional output can be used to power external auxiliary equipment. A jumper must be installed on the system interface board to activate this output. Total load for this output cannot exceed 100 mA. In addition, the combined external load of +15V, -15V and +5V outputs cannot exceed 11.5 Watts.

(36) AUX +5 VDC (Optional) (Pin 58)

This optional output can be used to power external auxiliary equipment. A jumper must be installed on the system interface board to activate this output. Total load for this output cannot exceed 200 mA. In addition, the combined external load of +15V, -15V and +5V outputs cannot exceed 11.5 Watts.

(37) AUX GND (Pin 62)

This is a C-5000 power ground connection suitable for electrical reference ground to other auxiliary equipment.



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Remove this page and insert 147-014995 Sheet 1 of 1 (Figure 4-3)



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**C-5000 COMMUNICATION MANAGEMENT CONTROLLER
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B. C-5000 Transceiver Interface to RT-5000 Transceiver Wiring Considerations

(1) P501/P502 Connectors

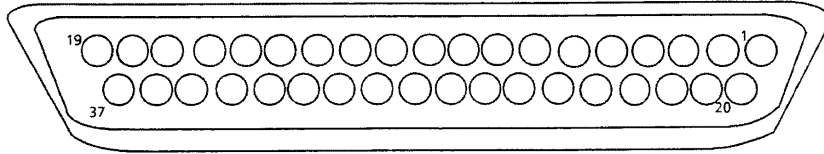


Figure 4-4. P501/P502 Connectors

(2) C-5000 Transceiver (RT-5000) Connector P501, P502.

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DIGITAL SHIELD	23	SPARE
2	CONTROL TX L	24	SPARE
3	ON/OFF	25	RESERVED OUT SPARE B
4	CONTROL TX H	26	VOICE AUDIO LO
5	CONTROL RX L	27	RESERVED OUPUT SPARE
6	SPARE	28	SPARE
7	IN SPARE NO 1	29	SHIELD
8	CONTROL RX H	30	MIC HI
9	SPARE	31	UNSQL MN RCV AUDIO
10	SPARE	32	SPARE
11	MIC LO/PTT	33	TX
12	SPARE	34	IN SPARE NO 3
13	VOICE AUDIO HI	35	SPARE
14	CIPHER/PLAIN	36	IN SPARE NO 2
15	SPARE	37	GROUND
16	PLAIN/CIPHER		
17	TAKE CONTROL		
18	EXT XMT AUDIO		
19	GROUND		
20	CONTROL GROUND		
21	UNSQL GD RCV AUDIO		
22	SPARE		

Table 4-2. C-5000 Transceiver (RT-5000) Connector P501, P502 Pin Names



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Note: Verify that the C-5000 Serial RT Card is installed in for this interface.

(3) Digital Shield (Pin 1)

Shield ground connection for RS-422.

(4) Control TX L (Pin 2)

This output is the active low sense serial data output and meets EIA RS-485 voltage levels. The data from this output goes to the RT-5000.

(5) On/Off (Pin 3)

When this output is pulled to ground, power is applied to the RT-5000.

(6) Control TX H (Pin 4)

This output is the active high sense serial data output and meets EIA RS-485 voltage levels. The data from this output goes to the RT-5000.

(7) Control RX L (Pin 5)

This input is the active low sense serial data input, meets EIA RS-485 voltage levels, and is tri-stated when the TAKE CONTROL line is grounded.

(8) Spare (Pin 6)

(9) In Spare #1 (Pin 7)

(10) Control RX H (Pin 8)

This input is the active high sense serial data input, meets EIA RS-485 voltage levels, and is tri-stated when the TAKE CONTROL line is grounded.

(11) Spare (Pin 10)

(12) MIC LO/PTT (Pin 11)

(13) Spare (Pin 12)

Headset output for R/T.

(14) Voice Audio HI (Pin 13)

This is the high side differential audio input. It can drive a 150 Ohm load to 100 mW and a 600 Ohm load to 25 mW. 3 dB bandwidth is 300 Hz to 3 kHz.

(15) Cipher/Plain (Pin 14)

30 mA to ground activates cipher; open is standard.



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(16) Spare (Pin 15)

(17) Plain/Cipher (Pin 16)

30 mA to ground is standard; open is cipher.

(18) Take Control (Pin 17)

Grounding tri-states RS-422 TX lines.

(19) EXT XMT Audio (Pin 18)

This output is the single ended extra wide band audio output. It has a nominal impedance between 2k Ohms and 5k Ohms and a 3 dB bandwidth of 1 Hz to 40 kHz. The output is adjustable from 0.1 Vrms to 1.5 Vrms and set to .6 Vrms.

(20) Ground (Pin 19)

Ground.

(21) Control Ground (Pin 20)

Ground connection to R/T.

(22) UNSQL GD RCV AUDIO (Pin 21)

Unsquelled guard receive audio input.

(23) Spare (Pin 22)

(24) Reserved Out Spare B (Pin 25)

(25) Voice Audio LO (Pin 26)

This is the low side differential audio input. It can drive a 150 Ohm load to 100 mW and a 600 Ohm load to 25 mW. 3 dB bandwidth is 300 Hz to 3 kHz.

(26) Reserved Out Spare A (Pin 27)

Spare output A.

(27) Shield (Pin 29)

Audio output shield ground connection.

(28) Mic HI (Pin 30)

This output is the standard 150 Ohm carbon microphone high output. The nominal output is .25 Vrms and is adjustable over a range of .125 Vrms to 1.5 Vrms. The 3 dB bandwidth is 100 Hz to 8.7 kHz for raw audio and 300 Hz to 3 kHz for processed audio per EIA specifications. Unsquelled main receive audio input.



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(29) UNSQL MN RCV AUDIO (Pin 31)

(30) Spare (Pin 32)

(31) TX (Pin 33)

Grounding activates transmit.

(32) In Spare No. 3 (Pin 34)

(33) Spare (Pin 35)

(34) In Spare No. 2 (Pin 36)

(35) Control Ground (Pin 37)

Loss of this ground may disable the RT-5000 or cause intermittent function.



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C. RT-5000 Transceiver Installation Wiring Considerations

- (1) J101 Connector

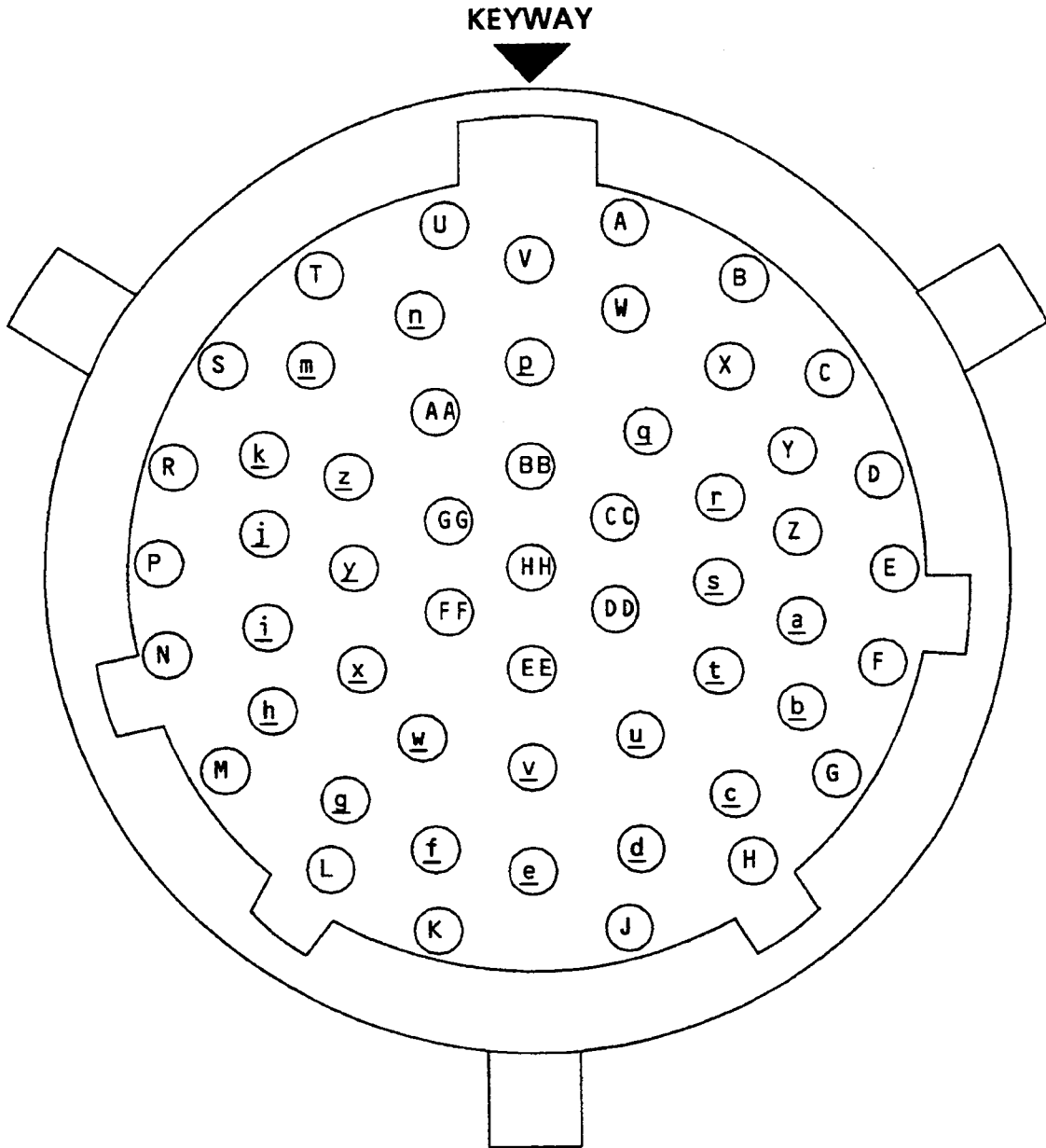


Figure 4-5 Connector J101



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(2) RT-5000 Transceiver Connector J101 Pin Names.

PIN	SIGNAL NAME	PIN	SIGNAL NAME
A	AUX AUDIO IN	i	GUARD AUDIO INHIBIT
B	AUX SIDETONE	j	AUDIO HI
C	RES SPARE A	k	AUDIO LO
D	CONTROL GND	m	AUDIO SHIELD GND
E	ANT RX H	n	EXTRA WB MAIN RX AUDIO
F	ANT RX L	p	MAIN SQUELCH DISABLE
G	ANT TX L	q	WIDE BAND MAIN RX AUDIO
H	ANT TX H	r	DF ENABLE
J	CONTROL RX H	S	DF AUDIO
K	CONTROL RX L	t	XMIT INHIBIT
L	CONTROL TXL	U	HOMING SIGNAL STRENGTH
m	CONTROL TX H	V	MN RX 180 ENABLE
N	DATA SHIELD GND	w	WIDE BAND GUARD RX AUDIO
P	MAIN SQUELCH ANNUN	x	GD RX 180 ENABLE
R	GUARD SQUELCH ANNUN	y	GUARD RX AUDIO
S	RES SPARE B	z	TX 180 ENABLE
T	RES SPARE C	AA	+27.5VDC A/C POWER
u	RES SPARE D	BB	+27.5VDC A/C POWER
v	RES SPARE E	CC	+27.5VDC A/C POWER
w	ON/OFF	DD	+27.5VDC A/C POWER
x	GUARD SQUELCH DISABLE	EE	A/C POWER GROUND
Y	MIC HI	FF	A/C POWER GROUND
z	MIC LO/PTT	GG	A/C POWER GROUND
a	EXTERNAL PTT	HH	A/C POWER GROUND
b	PTT OUTPUT		
C	SWITCHED +15V		
d	TX SWITCHED +15V		
e	SWITCHED +27.5V		
f	MAIN AUDIO INHIBIT		
g	EXTRA WIDE BAND AUDIO IN		
h	WIDE BAND AUDIO IN		

Table 4-3. RT-5000 Transceiver Connector J101 Pin Names



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(3) RT-5000 Connector J101

(a) Aux Audio In (Pin A)

This input will take audio from an external source unit and add to the normal transceiver audio.

(b) Aux Sidetone (Pin B)

This input will take alert tone audio from an external source and produce headset sidetone.

(c) Key (Pin C)

This input is used to input MTM information.

(d) Control Gnd (Pin D)

This ground goes to the control head. Loss of this ground may disable the RT-5000 or cause intermittent function.

(e) Ant RX H (Pin E)

This output is the active high sense serial data output and meets EIA RS-485 voltage levels. The data from this output controls the RT-5000 antenna.

(f) Ant RX L (Pin F)

This output is the active low sense serial data output and meets EIA RS-485 voltage levels. The data from this output controls the RT-5000 antenna.

(g) ANT TX L (Pin G)

This input is the active low sense serial data output and meets EIA RS-485 voltage levels. The data from this input comes from the RT-5000 antenna.

(h) ANT TX H (Pin H)

This input is the active high sense serial data output and meets EIA RS-485 voltage levels. The data from this input comes from the RT-5000 antenna.

(i) CONTROL RX H (Pin J)

This output is the active high sense serial data output, meets EIA RS-485 voltage levels, and is tri-stated when the TAKE CONTROL line is grounded.

(j) CONTROL RX L (Pin K)

This output is the active low sense serial data output, meets EIA RS-485 voltage levels, and is tri-stated when the TAKE CONTROL line is grounded.



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(k) CONTROL TX L (Pin L)

This input is the active low sense serial data input and meets EIA RS-485 voltage levels. The data from this input comes from the C-5000.

(l) CONTROL TX H (Pin M)

This input is the active high sense serial data input and meets EIA RS-485 voltage levels. The data from this input comes from the C-5000.

(m) DATA SHIELD GND (Pin N)

This ground shields lines E, F, J, and K.

(n) MAIN SQUELCH ANNUN (Pin P)

This output sinks 30 mA to ground when the main receiver signal-to-noise squelch conditions are met.

(o) GUARD SQUELCH ANNUN (Pin R)

This output sinks 30 mA to ground when the guard receiver signal-to-noise squelch conditions are met.

(p) RS232-RXD (Pin S)

This pin is used to transfer information to the MTM guard.

(q) RS232-TXD (Pin T)

This pin is used to transfer information to the MTM guard.

(r) RS232-CTS (Pin U)

This pin is used to transfer information to the MTM guard.

(s) Attenuator Control (Pin V)

When this input is pulled to ground, the RT-5000 will engage a 10 dB receive attenuator in both main and crystal synthesized guard receivers.

(t) On/Off (Pin W)

When this input is pulled to ground, power is applied to the RT-5000.

(u) Guard Squelch Disable (Pin X)

When this input is pulled to ground, the guard squelch conditions are overridden.

(v) MIC HI (Pin Y)



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This input is the standard 150 Ohm carbon microphone high input. The nominal input is .25 Vrms and is adjustable over a range of .125 Vrms to 1.5 Vrms. The 3 dB bandwidth is 100 Hz to 8.7 kHz for raw audio and 300 Hz to 3 kHz for processed audio per EIA specifications.

(w) MIC LO/PTT (Pin Z)

This input when pulled to ground, places the radio in transmit mode if the transmit bit is set in the serial data stream. This input also forms the low side of the standard 150 Ohm carbon microphone.

(x) External PTT (Pin a)

The radio will remain in transmit mode when this input is pulled to ground.

(y) PTT Output (Pin b)

This output sinks 30ma to ground when the RT-5000 is transmitting.

(z) Switched +15 V (Pin c)

This output is capable of supplying +15 V \pm 1.5 V at 500 mA.

(aa) TX SWITCHED +15V (Pin d)

When the RT-5000 is placed in transmit mode, this output supplies +15V \pm 2.5V at a maximum of 100 mA.

(bb) SWITCHED +27.5V (Pin e)

This output is capable of supplying unregulated +27.5V at 500 mA.

(cc) MAIN AUDIO INHIBIT (Pin f)

When this input is pulled to ground, the main receiver audio is disabled.

(dd) EXTRA WIDE BAND AUDIO IN (Pin g)

This input is the single ended extra wide band audio input. It has a nominal impedance between 2k Ohms and 5k Ohms and a 3 dB bandwidth of 1 Hz to 40 kHz. The input is adjustable from 0.1 Vrms to 1.5 Vrms and set to .6 Vrms.

(ee) WIDE BAND AUDIO IN (Pin h)

This input is the single ended wide band audio input. It has a nominal impedance between 2k Ohms and 5k Ohms and a 3 dB bandwidth of 1 Hz to 27.5 kHz. The input is adjustable from .1 Vrms to 1.5 Vrms and set to .6 Vrms.

(ff) GUARD AUDIO INHIBIT (Pin i)

When this input is pulled to ground, the guard receiver audio is disabled.



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(gg) AUDIO HI (Pin j)

This is the high side differential audio output. It can drive a 150 Ohm load to 100 mW and a 600 Ohm load to 25 mW. 3 dB bandwidth is 300 Hz to 3 kHz.

(hh) AUDIO LO (Pin k)

This is the low side differential audio output. It can drive a 150 Ohm load to 100 mW and a 600 Ohm load to 25 mW. 3 dB bandwidth is 300 Hz to 3 kHz.

(ii) AUDIO SHIELD GND (Pin m)

This ground is for shielding the audio outputs.

(jj) EXTRA WIDE BAND MAIN RX AUDIO (Pin n)

This output is the single ended extra wide band audio output. It is capable of driving a 2k Ohm impedance and has a 3 dB bandwidth of 1 Hz to 40 kHz. The output is adjustable from .1 Vrms to 1.5 Vrms and set to .6 Vrms.

(kk) MAIN SQUELCH DISABLE (Pin p)

When this input is pulled to ground, the main squelch conditions are overridden.

(ll) WIDE BAND MAIN RX AUDIO (Pin q)

This output is the single ended audio output. It is capable of driving a 2k Ohm impedance and has a bandwidth of 1 Hz to 27.5 kHz.

(mm) DF ENABLE (Pin r)

Grounding this input enables the DF audio output.

(nn) DF AUDIO (Pin s)

This output produces an output proportional to the AM signal. The output has a 3 dB bandwidth of 1Hz to 10 kHz. The output will drive a 2k Ohm impedance. The output is adjustable from. 1 Vrms to 1.5 Vrms and set to .6 Vrms.

(oo) RS232-RTS (Pin t)

This pin is used to transfer information to the MTM guard.

(pp) HOMING SIGNAL STRENGTH (Pin u)

This output produces an output based on the signal strength that varies between 0 and 8 VDC, and is capable of driving a 2k Ohm load. This signal has a 3 dB bandwidth between DC and 50 Hz.

(qq) MN RX 180 ENABLE (Pin v)



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Grounding this input causes 180 degrees of phase shift in the main received audio. This phase shift may be required when using an external encryption device.

(rr) WIDE BAND GUARD RX AUDIO (Pin w)

This output is the single ended wide band guard audio output. It is capable of driving a 2k Ohm impedance and has a 3 dB bandwidth of 1 Hz to 27.5 kHz. The output is adjustable from .1 Vrms to 1.5 Vrms and set to .6 Vrms.

(ss) GD RX 180 ENABLE (Pin x)

Grounding this input causes 180 degrees of phase shift in the guard received audio. This phase shift may be required when using an external encryption device.

(tt) GUARD RX AUDIO (Pin y)

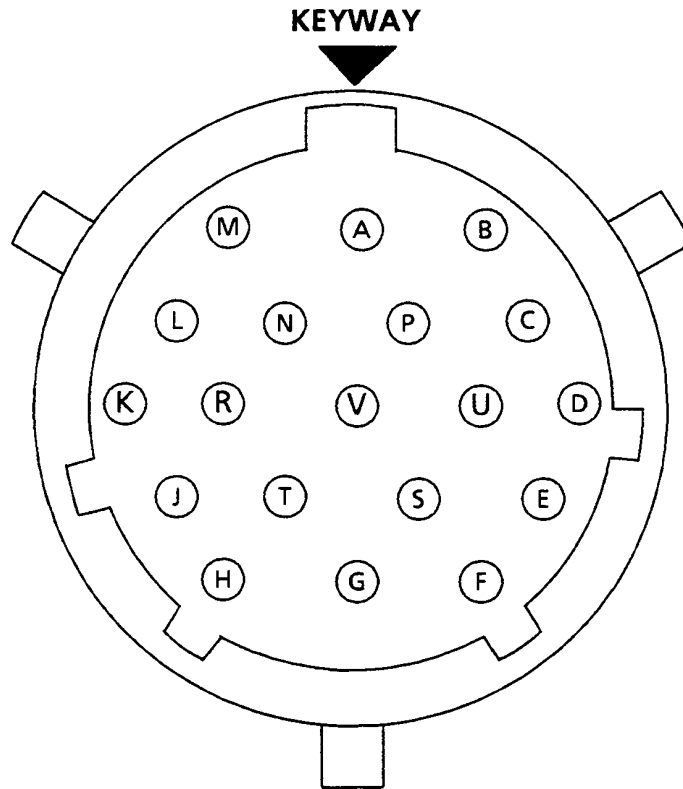
This output is the single ended guard audio output. It is capable of driving a 2k Ohm impedance and has a 3 dB bandwidth of 1 Hz to 3kHz. The output is adjustable from .1 Vrms to 1.5 Vrms and set to .6 Vrms.

(uu) TX 180 ENABLE (Pin z)

Grounding this input causes 180 degrees of phase shift in the transmitted audio. This phase shift may be required when using an external encryption device.



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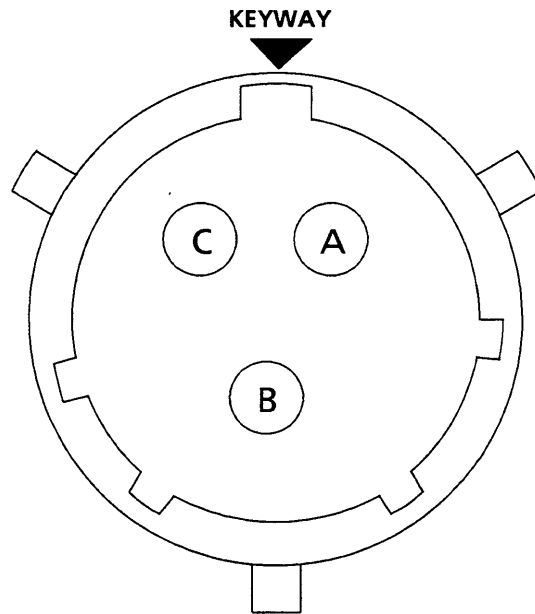


PIN	SIGNAL NAME	PIN	SIGNAL NAME
A	RECEIVE HI	L	S0
B	RECEIVE LO	M	GROUND
C	TRANSMIT HI	N	
D	TRANSMIT LO	P	GROUND
E	GROUND	R	
F		S	S3
G		T	NC
H	GROUND	U	NC
J	NC	V	
K	NC		

Figure 4-6. FC-50 / FC-550 / FC-5000 Connector J1



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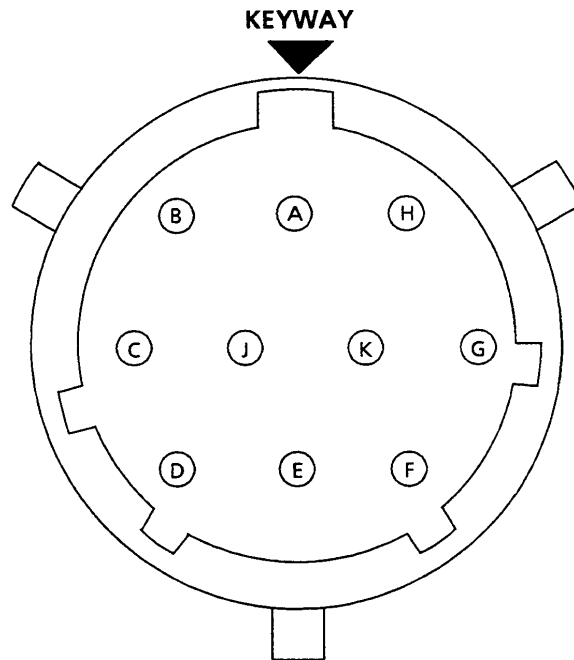


PIN	SIGNAL NAME	PIN	SIGNAL NAME
A	+27.5 VDC		
B	DC RETURN		
C	GND		

Figure 4-7. FC-50 / FC-550 / FC-5000 Connector J2



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NOTE: FC-50 Connector J3 connects to AT-50/AT-51 antennas. These pins provide proprietary channeling information to the antenna.

PIN	SIGNAL NAME	PIN	SIGNAL NAME
A	Proprietary	<u>E</u>	Proprietary
B	Proprietary	<u>G</u>	Proprietary
C	Proprietary	<u>H</u>	Proprietary
D	Proprietary	<u>J</u>	Proprietary
E	Proprietary	<u>K</u>	Proprietary

Figure 4-8. FC-50 / FC-550 / FC-5000 Connector J3



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Remove this page and insert 152-140131 Sheet 1 of 4 (Figure 4-9)



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D. C-5000 Communication Management Controller Installation Wiring Considerations

- (1) C-5000 Transceiver (FLEXCOMM I) Connector P501 or P502.

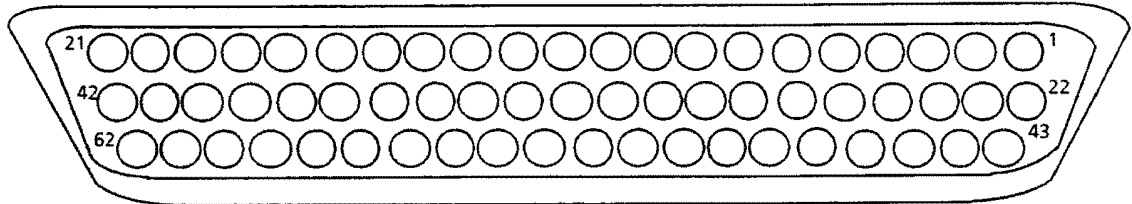


Figure 4-10. C-5000 Transceiver (FLEXCOMM I) Connector P501 or P502



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(2) C-5000 Transceiver (FLEXCOMM I) Connector P501 or P502.

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	TONE C LINE	32	4 MHZ CHN LINE
2	TX PWR LITE	33	MIC LO/PTT
3	0.08 MHZ CHN LINE	34	0.01 MHZ CHN LINE
4	120 MHZ CHN LINE	35	0.005 MHZ CHN LINE
5	80 MHZ CHN LINE	36	RESRV SPARE GUARD TONE ENABLE
6	TONE E LINE (MSB)	37	40 MHZ CHN LINE
7	SPARE #2	38	CIPHER/PLAIN
8	ON/OFF	39	TX
9	10.0025 MHZ CHN LINE	40	PLAIN/CIPHER
10	2 MHZ CHN LINE	41	AUDIO LO
11	MIC HI	42	MN VOL SET
12	TONE A LINE (LSB)	43	TONE B LINE
13	MAIN RCVR AUDIO DISABLE	44	0.04 MHZ CHN LINE
14	TX PWR SELECT	45	EXTERNAL ENCODE IN
15	CHN MEMORY DISCRETE NO. 2	46	DF DISABLE
16	CHN MEMORY DISCRETE NO. 3	47	TAKE CONTROL
17	CHN MEM DISCRETE NO. 4	48	GUARD SQUELCH LITE
18	SPARE #3	49	0.1 MHZ CHN LINE
19	GD SELECT	50	GD VOL SET
20	ZEROIZE	51	800 MHZ CHN LINE
21	UNSQUELCHED MAIN AUDIO	52	0.4 MHZ CHN LINE
22	SHIELD	53	0.2 MHZ CHN LINE
23	MAIN TONE ENABLE	54	GUARD RCVR AUDIO DISABLE
24	SPARE #1	55	0.8 MHZ CHN LINE
25	SQUELCH DISABLE	56	CHN MEMORY DISCRETE NO. 1
26	10 MHZ CHN LINE	57	0.02 MHZ CHN LINE
27	100 MHZCHN LINE	58	MAIN SQUELCH LITE
28	1400 MHZ CHN LINE	59	CHN MEM DISCRETE NO. 5
29	TONE D LINE	60	UNSQUELCHED GUARD AUDIO
30	1 MHZ CHN LINE	61	AUDIO HI
31	8 MHZ CHN LINE	62	AUX GND NO. 20 AWG

Table 4-4. C-5000 Transceiver (FLEXCOMM I) Connector P501 or P502



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E. C-5000 Transceiver Interface FLEXCOMM Transceivers, RT-30, RT-118, RT-138, RT-138F, RT-406F and RT-450

(1)

Figure 4-11.

(2)

Table 4-5.

(3) CHANNEL LINES (Pins 3, 4, 5, 9, 10, 26, 27, 28, 30, 31, 32, 34, 35, 37, 44, 49, 51, 52, 53, 55, 57)

The channeling lines use BCD (Binary Coded Decimal) negative logic to control the Transceiver channel frequency. These lines are grounded by the Control Unit to channel the Transceiver to the selected frequency. The channel is determined by adding the weighted value of each line. To channel a transceiver to 157.135 MHz, the following lines would be grounded:

100	MHz line
40	MHz line
10	MHz line
4	MHz line
2	MHz line
1	MHz line
0.1	MHz line
0.02	MHz line
0.01	MHz line
0.005	MHz line
<hr/>	
157.135	MHz

Unselected channel lines should exceed +8 Vdc.

(4) TONE A, B, C, D, E (Pins 1, 6, 12, 29, 43)

These lines are used to provide pre-programmed control of a synthesized CTCSS encoder/decoder in the transceiver. The order of the lines follows a binary code with E the most significant bit and A the least significant. Logic "0" is a ground line and logic "1" must be greater than 8 volts. Refer to Section 6, Preset Channel Programming, for information on programming tones and Table 6-2, Section 6, for available frequencies.

(5) MAIN TONE ENABLE (Pin 23)

This line, when grounded, will activate the continuous tone controlled squelch system (CTCSS) for either transmit tone encode or main receiver tone decode. The tone frequency is determined by the Tone A, B, C, D, E lines.

(6) ON/OFF (Pin 8)



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This line, when grounded, will activate the 28 V system relay and provide +27.5 Vdc aircraft power to the Transceiver.

(7) MAIN RX AUDIO DISABLE (Pin 13)

Grounding this line mutes Main Receiver audio, but does not affect sidetone or Guard Receiver audio. The main squelch test function is disabled, yet the main channel indicator shows channel activity.

(8) GUARD RX AUDIO DISABLE (Pin 54)

Grounding this line disables guard audio, but does not affect Main Receiver or sidetone audio. The guard channel indicator continues to indicate guard channel activity.

(9) MAIN SQUELCH LITE (Pin 58)

The Transceiver pulls this line low to activate the main squelch annunciator in the Control Unit.

(10) GUARD SQUELCH LITE (Pin 48)

The Transceiver Guard Module pulls this line low to activate the guard squelch annunciator in the Control Unit.

(11) TX POWER LITE (Pin 2)

The transceiver pulls this line low to activate the transmit annunciator in the Control Unit.

(12) SQUELCH DISABLE (Pin 25)

This line is grounded by the test (squelch disable) button on the Control Unit. It opens the squelch gate for the Main or Guard Receiver unless:

- In the Transmit Mode.
- Main or Guard RCVR Audio is disabled by the Control Unit.
- Frequency Synthesizer not locked (Main only).

In addition, the Main and Guard Squelch indicators will activate unless disabled by the following conditions:

- Transmit Mode.
- Frequency Synthesizer not locked (Main only)

(13) RESERVED SPARE (Pins 15, 16, 56)

These lines provide a user programmable combination of discrete electronic switches for each channel. Each channel memory discrete state may differ between transmit and receive on any channel. These outputs are programmed when the channel information and tone code information are entered into the Control Unit.

Some possible uses for these include:



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- Antenna switching
- External encoder enable (disable).
- External decoder enable (disable).
- Any functional or equipment switching associated with a given channel.

These switch closures may be combined with a digital decoder to expand the capabilities.

These switches are open collector drivers. Open switch voltages may not exceed +30 V, and in the closed condition, the switches will sink up to 40 mA.

(14) CONTROL UNIT GROUND (Pin 62)

This line provides signal ground reference for the Control Unit. (The Control Unit electronics are isolated from the chassis).

(15) AUDIO HI AND LO (Pin 41, 61)

These lines provide a balanced 600 Ohm audio output from the Transceiver and are set for 100 mW into a 600 Ohm load. (7.75 Vrms)

(16) MIC HI AND LO/PTT (Pin 11, 33)

These lines are used for voice modulation and to enable the transmitter. Mic sensitivity is factory set for an input of 0.25VRMS at 1 kHz to provide ± 3 kHz FM deviation, 85% AM modulation. The MIC LO/PTT line activates the transmitter when grounded and disables the receiver outputs.

(17) TX (Transceiver Or Control, Pin 39)

The Transceiver and control pull their respective TX lines low during transmit to provide TX information to auxiliary equipment.

(18) EXTERNAL ENCODE IN (Pin 45)

This line provides for modulating the transmitter from external encoding devices in the frequency range of 60 to 3000Hz. Inputs of 1.0 Vrms will yield approximately ± 2.5 to ± 3 kHz deviation. The RT-138F and RT-406F Frequency Range is approximately 1Hz to 6 kHz.

(19) UNSQUELCHED MAIN AUDIO (Pin 21)

This line provides unsquelched audio from the Main Receiver. The frequency response is flat from 60 Hz to 5 kHz. A received signal of 1 kHz tone at ± 3 kHz deviation will produce approximately 0.6 Vrms into a 20k Ohm load. The RT-138F and RT-406F Frequency Range is approximately 1 Hz to 6 kHz.

(20) UNSQUELCHED GUARD AUDIO (Pin 60)

This line provides an unsquelched audio output of the Guard Receiver for use with external audio decoders. The frequency response is approximately flat from 60 Hz to



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5 kHz. Standard 3 kHz modulation of a 1 kHz tone will produce approximately 0.6 Vrms into a 20k Ohm load.

(21) MAIN AUDIO INHIBIT (Pin 13)

This line will mute Main Receiver audio when grounded and can be paralleled for use with external decoders. The squelch test will open the audio squelch gate regardless of the status of this line.

(22) GUARD AUDIO INHIBIT (Pin 54)

This line will mute Guard Receiver audio when grounded and can be paralleled for use with external decoders. The squelch test will open the audio squelch gate regardless of the status of this line.



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- ⚠** ALL RT-138F AND RT-406F TRANSCEIVERS ARE INHERENTLY ENCRYPTED OR DIGITAL CODED SQUELCH COMPATIBLE UNITS WITH A -05X PART NUMBER SUFFIX ARE COMMONLY REFERRED TO AS ENCRYPTION COMPATIBLE DUE TO THE SPECIFIC WIRING CHANGES TO THE CHASSIS WHICH FACILITATES INSTALLATION WITH AN ENCRYPTION SYSTEM WIRED DIRECTLY TO THE RADIO. THE C-5000 PROVIDES FOR SHARED ENCRYPTION WITH A SINGLE ENCRYPTION FUNCTION AT THE C-5000 AND RADIO UNIT SELECTION FROM THE C-5000. FOR THOSE INSTALLATIONS, CONNECT STD C-0000 RADIO UNITS AS SHOWN IN POSITION 1 AND REFER TO THE C-5000 SYSTEM INTERCONNECT DIAGRAM 147-014995 FOR SPECIFIC DETAILS OF THE C-5000 INTERFACE TO ENCRYPTION EQUIPMENT.
- ⚠** TRANSFER BETWEEN TRANSCEIVERS IS AUTOMATIC AND THE APPROPRIATE TRANSCEIVER WILL BE ACTIVE AS CONTROLLED BY THE 3CD CHANNELLING FROM THE CONTROL UNIT. THE SYSTEM MAY NOT BE CONFIGURED WITH MORE THAN ONE (1) TRANSCEIVER OF THE SAME FREQUENCY RANGE. CONSULT GLOBAL-WULFSBERG CUSTOMER ENGINEERING WHEN USING AN RT-450 AND AN RT-406F IN THE SAME INSTALLATION.

SHOULD THE VHF AM RT-118 AND THE RT-138(F) BE REQUIRED TO COVER THE FREQUENCY RANGE OF 118 TO 150 MHZ, BOTH THE RT-118 AND THE RT-138(F) MUST BE MODIFIED. CONSULT GLOBAL-WULFSBERG CUSTOMER ENGINEERING.

A SEPARATE ANTENNA IS REQUIRED FOR EACH TRANSCEIVER.

REPEAT APPROPRIATE CONNECTIONS AS REQUIRED FOR ADDITIONAL ENCRYPTION OR NON-ENCRYPTION TRANSCEIVERS. DO NOT INTERCHANGE ENCRYPTION TRANSCEIVERS AND NON-ENCRYPTION TRANSCEIVERS (-05X AND -00X) WITHIN THE WIRING HARNESS.
- ⚠** A COMMON APPROPRIATELY RATED CIRCUIT BREAKER MAY BE USED INSTEAD OF SEPARATE CIRCUIT BREAKERS. WIRE SIZE TO THE CIRCUIT BREAKER SHOULD BE CHANGED ACCORDINGLY.
- ⚠** GUARD RECEIVER AUDIO MAY BE TRANSFERRED FROM AN UNCHANNELLED TRANSCEIVER TO THE ACTIVE TRANSCEIVER BY CONNECTING TOGETHER THE GUARD AUDIO TRANSFER LINES AND THE GUARD SQUELCH CONTROL TRANSFER LINES. AS AN EXAMPLE, THIS ALLOWS MONITORING A UHF GUARD CHANNEL WHILE A VHF CHANNEL IS SELECTED.
- CAUTION** IF TWO OR MORE TRANSCEIVERS ARE CONNECTED WITH COMMON GUARD AUDIO TRANSFER AND GUARD SQUELCH CONTROL TRANSFER LINES, ONLY ONE (1) TRANSCEIVER MAY HAVE A GUARD RECEIVER MODULE INSTALLED. IF MORE THAN ONE (1) TRANSCEIVER HAS A GUARD RECEIVER MODULE INSTALLED, THE GUARD TRANSFER LINES MUST BE LEFT UNCONNECTED TO THE ADDITIONAL TRANSCEIVERS WITH THE INSTALLED GUARD MODULE.
- ⚠** IF AN EXTERNAL DECODER IS USED WITH THE GUARD RECEIVER AND THE GUARD TRANSFER PINS ARE CONNECTED PER NOTE 4, THEN THE GUARD AUDIO INHIBIT PINS MUST ALSO BE PARALLEL CONNECTED.
- ⚠** ANTENNA CABLE PLUG CONNECTOR TYPE "M" MATES WITH TYPE "N" BULKHEAD JACK (FM TRANSCEIVERS).

A) TYPE "M" CABLE PLUG FOR 58A/U -UG 563B/U OR EQUIVALENT.

B) TYPE "N" CABLE PLUG FOR RG 8/U -UG 1185A OR EQUIVALENT.
- ⚠** PIN OUTS ARE PROVIDED FOR EXTERNAL CARRIER ENCODED SQUELCH DECODERS AND CARRIER DECODERS. THE TX SWITCHED +V VDC OUTPUT WILL BE ACTIVE IN ALL UNITS DURING TRANSMIT. MULTIPLE NON-ENCRYPTION TRANSCEIVERS CAN UTILIZE A COMMON ENCODER BY PARALLEL CONNECTING THE EXTERNAL ENCODE IN LINES. DO NOT USE EXTERNAL ENCODERS/DECODERS WITH ENCRYPTION UNITS.

WHEN USING THE C-5000 ENCRYPTION OR ENCODE FUNCTIONS, AN RT-138F OR RT-406F CAN BE CONNECTED FOR AUTO C-5000 R/T SELECTION. IF ENCRYPTION UNITS ARE INTERNAL OR EXTERNAL TO THE C-5000, THEN THE EXTERNAL ENCODE INPUT MUST BE CONNECTED AT THE C-5000.
- ⚠** FM TRANSCEIVER CABLE PLUG TYPE BT06AC-24-62S OR EQUIVALENT MATES WITH BT02A24-61P. VHF AM TRANSCEIVER CABLE PLUG TYPE BT06AC-18-32S OR EQUIVALENT MATES WITH BT02A-18-32P. CONTROL HEAD CABLE PLUG TYPE P50X GWS P/N 129-215344-02 (POSITRONICS 00D62F00760C-9142) THIS CONNECTOR HAS 1 EACH MALE/FEMALE JACK SCREW WITH MALE NEAR PIN 1.
- 9. ALL WIRE NO. 24 AVG OR GREATER UNLESS OTHERWISE INDICATED. ANTENNA COAX CABLE RG 8, 8A, 8 FOAM, 98A, 58C 58A FOAM, OR EQUIVALENT.
- 10. MOTOROLA, DVP/DES ARE REGISTERED TRADEMARKS OF MOTOROLA, INC.
- 11. GE, D.V.G. & VOICE GUARD ARE REGISTERED TRADEMARKS OF GENERAL ELECTRIC, INC.
- 12. SEE "INSTALLATION WIRING CONSIDERATIONS" SECTION OF INSTALLATION MANUAL FOR PERTINENT ADDITIONAL INFORMATION TO THIS DIAGRAM.
- ⚠** PINS C, D, L, M, N, T, X OF P-210 ON FM TRANSCEIVERS HAVE BEEN REASSIGNED IN -F MODEL TRANSCEIVERS (-05X). DO NOT INTERCHANGE -00X AND -05X TRANSCEIVERS AS DAMAGE MAY RESULT. ONLY RT-406F'S (400-012785-3X) AND RT-138F'S (400-14525-3X) TRANSCEIVERS ARE CONFIGURED FOR DIRECT MOTOROLA DVP/DES OR GE VOICE GUARD CONNECTIONS AS SHOWN. ALL RT-138F'S AND RT-406F'S ARE COMPATIBLE WITH ENCRYPTION OR DIGITAL CODED SQUELCH MODULATION SCHEMES. AN F MODEL RADIO (-00X) CAN BE CONNECTED AS SHOWN IN THE FIRST TRANSCEIVER POSITION AND UTILIZED WITH ENCRYPTION EQUIPMENT CONNECTED TO THE C-5000. (SEE INSTALLATION WIRING DIAGRAM 147-014995).
- ⚠** DVP/DES CONNECTORS, (MOTOROLA P/N'S 14-84556804 AND 14-84556816), THE 15K OHM 1/4W RESISTOR, AND THE 6.2V ZENER DIODE ARE CUSTOMER SUPPLIED. PIN T OF ENCRYPTION TRANSCEIVERS HAS BEEN REASSIGNED FOR ENCRYPTION USE. CONNECT ALL TRANSCEIVERS AS SHOWN. THIS DOES NOT AFFECT OPERATION OF STANDARD TRANSCEIVERS. WHEN INSTALLING MOTOROLA DVP/DES UNITS WITH FLEXCOMM RADIOS CONSULT 100-014648 TECHNICAL CONSIDERATIONS DOCUMENT AND FLEXCOMM TECHNICAL UPDATES FOR ADDITIONAL INFORMATION.
- 15. REFER TO 147-0121-000 FOR EXISTING FLEXCOMM INSTALLATIONS.
- ⚠** GE VOICE GUARD INTERCONNECT FOR DEDICATED VOICE GUARD INSTALLATIONS.

GE P/N'S 19C320257P1 P1, P2, P3, P4
 19A116781P4 CONTACTS 16 REQ'D.
- ⚠** WHEN INSTALLING GE VOICE GUARD UNITS WITH FLEXCOMM RADIOS, CONSULT 100-01716 TECHNICAL CONSERATIONS DOCUMENT AND THE FLEXCOMM TECHNICAL UPDATES FOR ADDITIONAL INFORMATION.
- ⚠** THE FC-1 WAS HIGHLY RECOMMENDED FOR FLEXCOMM INSTALLATIONS AND MAY REMAIN WHEN C-1000'S ARE REPLACED BY C-5000 CONTROL UNITS. HOWEVER, IT IS NOT NEEDED. THE SWITCHED 27.5 VDC PRODUCED BY THE FC-1 MAY BE CONSIDERED FOR SUPPLYING THE C-5000 SYSTEM ALTHOUGH THE 27.5 VDC AND GROUND INPUTS TO THE C-5000 ARE ON THE SYSTEM INTERFACE CONNECTOR P500 (SEE WIRING DIAGRAM 147-014995).
- 19. THIS WIRING DIAGRAM (147-014995) PERTAINS TO THE FLEXCOMM TRANSCEIVER INTERFACE CONNECTOR P50X OF THE C-5000. SEE INTERCONNECT WIRING DIAGRAM 147-014995 FOR THE SYSTEM INTERFACE P500. A C-5000 CAN INCLUDE UP TO 3 RT INTERFACE TRANSCEIVER CONNECTIONS (P50X (P501, P502, P503). SPECIAL MARKING OF THE CONNECTORS IS RECOMMENDED TO ASSURE PROPER MATING OF SYSTEM 1, 2, OR 3 CONNECTIONS.
- ⚠** THE "TAKE CONTROL" PIN IS NORMALLY OPEN CIRCUITED. IN A DUAL C-5000 SYSTEM, WIRE THE TRANSCEIVER INTERFACE IN PARALLEL TO BOTH C-5000 UNITS. CONNECT THE "TAKE CONTROL" PIN FROM EACH C-5000 TO A SWITCH SUCH THAT ONE OR THE OTHER C-5000 TRANSCEIVER IS ALWAYS SUPPLIED WITH A GROUND WHICH TAKES CONTROL AWAY FROM THE UNIT WITH THE GROUNDED PIN. WITH THREE TRANSCEIVER INTERFACES IN DUAL C-5000 SYSTEMS, 3 SEPARATE TAKE CONTROL SWITCHES ARE REQUIRED (ONE FOR EACH PAIR OF TRANSCEIVER INTERFACES).
- ⚠** THE ZEROIZE FUNCTION PROVIDES AN OUTPUT FROM THE C-5000 TO ENCRYPTION EQUIPMENT TO ERASE KEY VARIABLES. THE OUTPUT CAN BE CONFIGURED ONE OF TWO WAYS: NORMALLY OPEN CIRCUIT WITH ACTIVE GROUND TO ZEROIZE OR NORMALLY OPEN AND ACTIVE 27.5 VDC TO ZEROIZE. STANDARD CONFIGURATION IS ACTIVE GROUND TO ZEROIZE. JUMPER AWJPI ON THE RT INTERFACE BOARD CAN BE MOVED FROM '1 TO 2' TO '2 TO 3' TO YIELD ACTIVE 27.5 VDC FOR ZEROIZE.

**Figure 4-12a. FLEXCOMM Transceivers Installation Wiring Diagram (Sheet 1 of 3)
 RT-30, RT-118, RT-138, RT-138F, RT-450 and RT-406F
 (Dwg No 147-014991, Rev B)**



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F. C-5000 Transceiver Interface, RT-9600, RT-9600F, RT-7200 Transceivers

- (1) Connector P501/P502

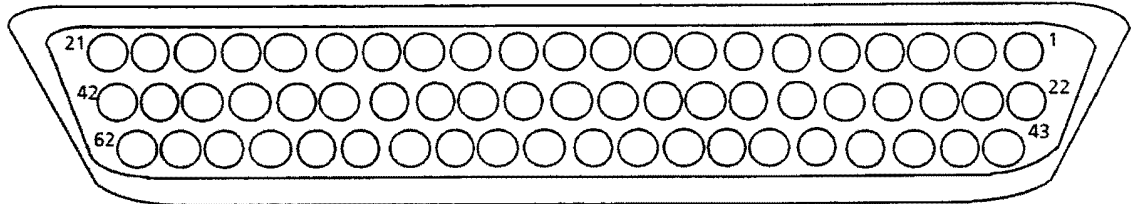


Figure 4-13. Connector P501/P502



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(2) C-5000 Transceiver (RT-9600(F)/7200) Connector P50X (P501, P502, or P503)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	TONE SELECT C	32	4 MHZ
2	TX POWER ANNUNCIATE	33	PTT
3	0.08 MHZ	34	0.01 MHZ
4	20 MHZ	35	0.005 MHZ
5	80 MHZ	36	GUARD TONE ENABLE
6	TONE E	37	RT7200: 40 MHZ, RT9600(F): .0025 MHZ, RT9600F w/DVP/DES: 40 MHz
7	SPARE #2	38	RT7200, RT9600(F):CIPHER/PLAIN RT9600F w/DVP/DES: CH PVT/STD
8	ON/OFF	39	RT7200, RT9600(F): TX RT9600F w/DVP/DES: RAD PTT
9	RT7200: 40 MHZ, RT9600(F): .0025 MHZ, RT9600F w/DVP/DES: .002MHZ	40	PLAIN/CIPHER
10	2 MHZ	41	AUDIO LO
11	MIC HI	42	MAIN VOLUME
12	TONE SELECT A	43	TONE SELECT B
13	MAIN AUDIO INHIBIT	44	0.04 MHZ
14	TX PWR SELECT	45	EXTERNAL CTCSS ENCODE IN
15	CHN MEMORY DISCRETE NO. 2	46	DF DISABLE
16	CHN MEMORY DISCRETE NO. 3	47	TAKE CONTROL
17	CHN MEMORY DISCRETE NO. 4	48	GUARD SQUELCH ANNUNCIATE
18	SPARE #3	49	0.1 MHZ
19	GUARD SELECT	50	GUARD VOLUME
20	ZEROIZE	51	800 MHZ
21	UNSQUELCHED MAIN AUDIO	52	0.4 MHZ
22	SHIELD	53	0.2 MHZ
23	TONE SELECT D	54	EXTERNAL GUARD AUDIO INHIBIT
24	SPARE #1	55	0.8 MHZ
25	SQUELCH DISABLE	56	CHN MEMORY DISCRETE NO. 1
26	10 MHZ	57	0.02 MHZ
27	100 MHZ	58	MAIN SQUELCH ANNUNCIATE
28	400 MHZ	59	CHN MEM DISCRETE NO. 5
29	TONE D	60	UNSQUELCHED GUARD AUDIO
30	1 MHz	61	AUDIO HI
31	8 MHZ	62	CONTROL GROUND 22 AWG

Table 4-6. C-5000 Transceiver (RT-9600(F)/7200) Connector P50X (P501, P502, or P503)



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(3) AUDIO AND SIDETONE HI AND LO (Pins 13, 14, 15 and 16)

These wires are provided separately for those systems that have separate transmitter sidetone circuits. They should be paralleled when driving a speaker directly. 10 Watt audio rated transceivers are not accommodated. In the case of the 100 mW transceivers, the audio and sidetone outputs (output impedance of 600 Ohms) must be set for 7.8 Vrms into 600 Ohms.

(4) DF DISABLE (Pin 54)

This line will disable the linear IF inside the unit and provide superior squelch action and sensitivity when connected airframe ground. It should be permanently grounded at the mounting rack when DF equipment is not installed in the aircraft. If used with DF equipment, this line must be open during Direction Finding operations.

(5) DF AUDIO (Pin 19)

Provides an audio output for use with DF equipment requiring AM receiver response. With an output impedance of 500 Ohms, the DF Audio output can supply 400 mVrms open circuit with an RF signal modulated 50% at 1000 Hz.

When the RT-7200 or RT-9600(F) is used in conjunction with the Collins DF301E automatic Direction Finder, knowledge of the Transceiver modulation phase delay at 5.68 kHz is necessary for proper DF301E compensation. This phase information is found on a label on the rear panel of the RT-7200, or RT-9600, RT-9600F.

For DF or ADF systems designed to be used in conjunction with FM receivers, use UNSQUELCHED MAIN AUDIO as the audio connection from the transceiver to the DF or ADF unit.

(6) UNSQUELCHED MAIN AUDIO (Pin 12)

Buffered output of the main FM receiver, unaffected by squelch action. Provided for use with external audio decoders. Standard modulation produces 0.58 Vrms into 1k Ohm or greater impedance. Do not load this output with less than 600 Ohms.

(7) UNSQUELCHED GUARD AUDIO (Pin 30)

Buffered output for the guard receiver, unaffected by squelch action. Provided for use with external audio decoders. Standard modulation produces 0.58 Vrms into 1k Ohm or greater impedance. Do not load this output with less than 600 Ohms.

(8) MAIN AUDIO INHIBIT (Pin 26)

When grounded, will mute audio outputs from the main receiver.

(9) EXTERNAL GUARD AUDIO INHIBIT (Pin 25)

When grounded, will mute audio outputs for the guard receiver.



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(10) EXTERNAL CTCSS TONE IN (Pin 18)

Provision for modulating the transmitter with audio outside the normal audio frequency range of 300 to 3000 Hz. Approximately 0.3 Vrms will give 5 kHz deviation.

(11) TRANSMITTER POWER SELECT (Pin 27)

When used with control units not providing transmitter power selector switches, grounding this line at the mounting rack will provide 10 watts of RF output power. The C-920 has this line grounded inside the control unit and will provide 10 watts when used.

(12) 14V SWITCHED (Pins 65 And 66)

Provision for switched 14 V power from the RT-7200/RT-9600. These pins will provide 14 Vdc. Exercise caution not to exceed a combined current drain of 500 mA from pins 65 and 66.

(13) PTT OUT (Pin 64)

May be used to key external accessories such as Tone Encoders. This pin is grounded through the microphone PTT switch.



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Remove this page and insert 147-014992 Sheet 1 of 1 (Figure 4-14.)



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FLEXCOMM II COMPONENT	UNIT CONNECTOR	MATING CONNECTOR
C-5000		
System Interface Board P500	WED PN 129-214800-01	D-Sub (62 Pin, with backshell and two male jackscrews), POSITRONICS PN ODD62F00Y60C-914.1 (129-215344-01)
R/T Board P501 or P502 RT-5000	WED PN 129-217474-01	D-Sub (37 Pin, with backshell and one each female and male jackscrews), POSITRONICS PN ODD62F00Y60C-914.2 (129-217474-01)
FLEXCOMM I, RT-9600(F), RT-7200 P50X	WED PN 129-214800-02	D-Sub (62 Pin, with backshell and one each female and male jackscrews), POSITRONICS PN ODD62F00Y60C-914.2 (129-215344-02)
RT-5000		
	J101	PN 129-216657-01 (PT06SE-22-55S-SR)
	J102	"TNC" UP "TNC" Type
	J103	"N" Type "N" Type
AT-50/AT-51		
		"N" Type DC Connector, PN 129-217323-01 (PT06SE-12-10S-SR)
FC-50		
	J1	PN 129-217321-01 (PT06SE-14-19S-SR)
	J2	PN 129-217324-01 (PT06SE-8-33S-SR, 3 Pin Connector)
	J3	PN 129-214346-01 (PT06SE-12-10P-SR)
AT-400		
		"N" for RG-58 Right Angle, PN 129-016858-01 "N" for RG-58 Straight, PN 129-016858-02
AT-140		
		"N" for RG-58 Right Angle, PN 129-016858-01 "N" for RG-58 Straight, PN 129-016858-02

Note: Numbers in parentheses are Wulfsberg Part numbers. Equivalent connectors by other manufacturers may be substituted.

Table 4-7. Connectors Used



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Section 5 – Configuration and Programming

Introduction

The Wulfsberg C-5000 Communication Management Controller (CMC) is a microprocessor-based control head device that controls one or two Wulfsberg transceivers. The C-5000 supports the full line of Wulfsberg FLITECOMM, FLEXCOMM I, and FLEXCOMM II transceivers. This manual is intended to quickly instruct the user on the basic operations of the C-5000 and also outline the advanced operations that set the C-5000 apart from any other communication device.

Features

The C-5000 provides a host of powerful features, including

- Controls Wulfsberg RT-5000, RT-406F, RT-450, RT-138(F), RT-30, RT-9600(F) and RT-7200 transceivers.
- 350 preset channels, programmable from the front panel or using Wulfsberg's Remote Programmer software.
- Users can dial in frequencies, PL tones, and transmit power on two "manual" channels.
- Advanced multi-radio modes, such as Simulcast, Relay, Repeater, and Relay-Simulcast.
- Control encryption functions embedded in the RT-5000 transceiver such as P25 Digital Modulation and encryption with Over the Air Rekey (OTAR) capability.

Transceiver Overview

The C-5000 provides support for the Wulfsberg FLITECOMM, FLEXCOMM I, and FLEXCOMM II transceivers. It is very important that users know how many radios and what type are connected to the C-5000 since transceivers have very different capabilities and features. Here is a summary of the supported transceivers and their capabilities.

FLEXCOMM II

This product line consists of the RT-5000 AM/FM transceivers covering the 29.7 to 960 MHz frequency range. The optional Guard Receiver can be specified as a single channel crystal guard (available in three frequency ranges), a 29.7 – 960 MHz receiver capable of being programmed with two Guard channels, or a receiver with one or two modules capable of RT-5000's are equipped with CTCSS and DCS tones on both the Main and Guard Receivers. The MTM Guard variant of the RT-5000 adds support for P25 and Trunking channels, with encryption and over-the-air-rekey (OTAR) capability.

FLEXCOMM I

This product line currently consists of the RT-30, RT-138F, and RT-406F transceivers. The C-5000 also supports the RT-118, RT-138, and RT-450 transceivers, which are no longer manufactured but remain in wide use. The RT-30, RT-138F, and RT-406F FM transceivers cover the 29.7 to 49.99 MHz, 138.0 to 173.9975 MHz, and 406.0 to 511.9975 MHz frequency ranges, respectively. These transceivers can be specified with a single-channel, crystal-controlled, Guard Receiver that operates on a customer-specified frequency. An optional Guard Receiver CTCSS decoder with programmable Guard Receiver tone can also be specified.

FLITECOMM

This product line is no longer manufactured, but remains in wide use. It consisted of the RT-7200, RT-9600, and RT-9600F transceivers. They were available with a two-channel, crystal-controlled, Guard Receiver that could be user-specified for any Guard frequency between 138.000 and 173.9950 MHz (RT-7200) or between 150.000 and 173.9975 MHz (RT-9600/9600F). They were equipped with CTCSS tones on both the Main and Guard Receivers.



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Steps to Successful Setup and Operation

While we would like to pull products out of the box and immediately start to use them, this system is one that takes a little work to get to that point. The following checklist will help installers and initial users setup the C-5000 and RT-5000.

1. Connect C-5000 to the transceivers. Note part numbers of the Control head and all transceivers.

C-5000 Part Number = 31300-1X02- _____

Radio #1 Model # = _____ Part Number = _____

Radio #2 Model # = _____ Part Number = _____

2. Configure the C-5000 using the steps outlined in the manual. You must know the last four digits of the C-5000 part number and the last four digits of any RT-5000's or the model type of any Flexcomm/Flitecomm Transceiver.
3. If Radio #1 is an RT-5000 that has a MTM Guard Receiver (-06XX or greater) connect a PC to the 9-pin programming port of the RT-5000 and run the Motorola RSS software.
4. Put the C-5000 in RSS mode for radio #1 and select the first ITM to appear.
5. Using the RSS software, read the codeplug out of the ITM.
6. Modify system settings for your application. Program personalities. Assign zone/Channels. These steps require significant knowledge of the Motorola software. We encourage enlisting the help of someone familiar with Motorola RSS software to successfully program the ITM.

NOTE: ZONE 1 CHANNEL 1 MUST BE ASSIGNED TO A PERSONALITY THAT HAS DIFFERENT RECEIVE AND TRANSMIT FREQUENCIES!!!!

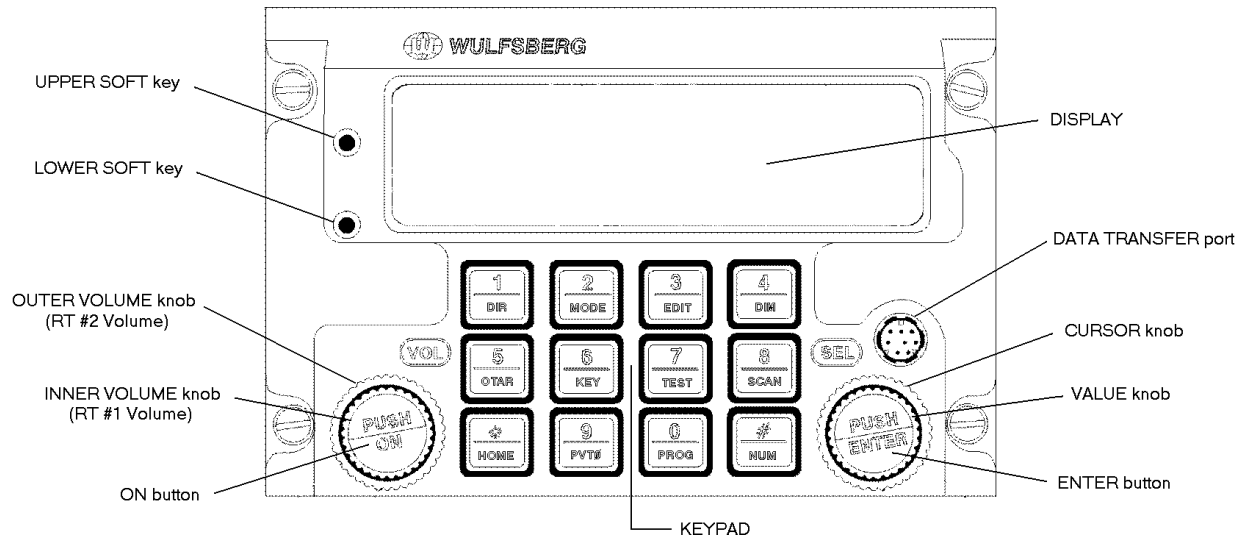
7. Save the modified codeplug to disk and load it into the ITM.
8. Make a listing of all ZONE/CHANNELS Information needed by the C-5000 preset channel programming.

Zone _____ Channel _____
 RX Frequency = _____ RX Tone = _____
 TX Frequency = _____ TX Tone = _____
 Modulation = _____(FM,P25,TRK)

9. Do the above for the second ITM if there is one in Radio #1
10. Do the above for Radio #2 only if its an RT-5000 with an MTM Guard (-06XX or greater)
11. Using the front panel or better yet the Wulfsberg RP software, program all preset channels including the ones programmed into each ITM module in the steps above.
12. Using a communication analyzer or over the air test, verify that each radio and channel operates properly.

Basic Operation

Front Panel & Controls



DISPLAY - The C-5000 has a 2 line display, with 20 characters on each line. It provides the visual feedback for the system. Exactly what is displayed depends on the current operating mode of the C-5000. During normal operation, the top line shows information for transceiver #1 and the bottom line shows information for transceiver #2.

UPPER SOFT key – This key’s use depends on the current operating mode of the C-5000. Some examples of its use are: increasing the display brightness, and selecting radio 1’s guard receiver.

LOWER SOFT key - This key’s use depends on the current operating mode of the C-5000. Some examples of its use are: decreasing the display brightness, and selecting radio 2’s guard receiver.

OUTER VOLUME knob – This rotary switch is used to control the volume of radio 2.

INNER VOLUME knob – This rotary switch is used to control the volume of radio 1.

ON button – This button is used to turn the C-5000 on or off.

CURSOR knob – This rotary switch is used to move the cursor around the display.

VALUE knob – This rotary switch is used to modify values above the cursor.

ENTER button – This button’s use is dependent on the C-5000’s current operating mode, but is primarily used to finalize data entry operations.

DATA TRANSFER PORT – This serial port is used to transfer data between the C-5000 and the Wulfsberg Remote Programmer software. **While preset channels can be programmed from the front panel, the best method is to use a PC and the Wulfsberg Remote Programming(RP) software.**



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KEYPAD – The C-5000 has a 12 button keypad. Each button's primary functions are described below.

1:DIR Toggles the transceiver under cursor control in and out of DIRECT mode. Use this button to enter a "1" during keypad entry mode.



2:MODE This button will cycle through the enhanced modes of operation. Use this button to enter a "2" during keypad entry mode.



3:EDIT This button will display the EDIT PAGE for the transceiver under cursor control. Use this button to enter "3" during keypad entry mode.



4:DIM This button will display the page used to control the display's brightness. Use this button to enter a "4" during keypad entry mode.



5:OTAR This button will initiate an "Over The Air Rekey" for the transceiver under cursor control. Use this button to enter a "5" during keypad entry mode.



6:KEY This button will prompt the user for a transmit encryption key to override the preset value for the transceiver under cursor control. Use this button to enter a "6" during keypad entry mode.



7:TEST This button will override the squelch system of the radio under cursor control, allowing the user to set the volume level. Use this button to enter a "7" during keypad entry mode.



8:SCAN FUNCTION NOT AVAILABLE AT THIS TIME. Use this button to enter a "8" during keypad entry mode.



***:HOME** This button will display the HOME PAGE, except in some advanced modes of operation, where it will return the user to a previous page or mode of operation. Use this button to enter a "*" during keypad entry mode.



9:PVT This button will toggle the transceiver under cursor control in and out of private mode. Use this button to enter a "9" during keypad entry mode.



0:PROG This button will display the programming password page. Use this button to enter a "0" during keypad entry mode.

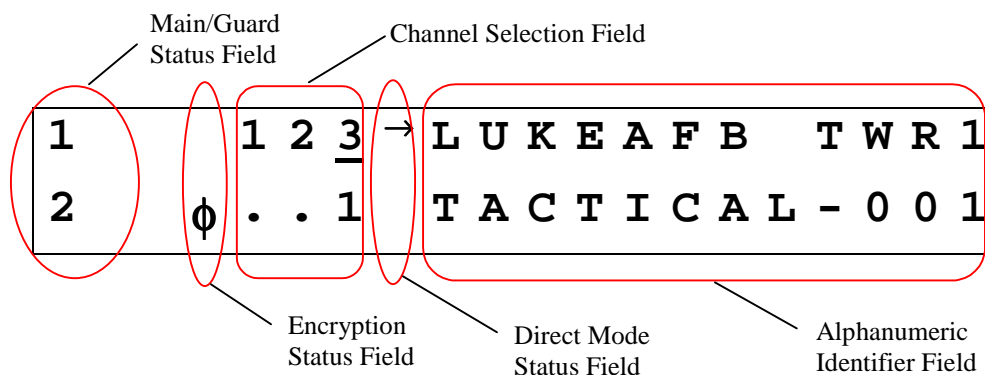


#:NUM This button will select keypad entry mode, such as for entering a channel number or frequency using the keypad. Use this button to enter a "#" during keypad entry mode.

The Home Page

The HOME PAGE is the primary operational page of the C-5000. The HOME PAGE becomes visible when the C-5000 is ready for user input, immediately after the power up and initialization sequences have completed. The C-5000 can control two radios. When viewing the HOME PAGE, Radio 1 is always displayed on the top line. Radio 2 is always displayed on the bottom line. Virtually all keypad-initiated operations are performed on the radio under cursor control. The radio under cursor control is the radio whose line the cursor is currently located on. The cursor can be quickly toggled between radios (display lines) by pressing the ENTER button.

The following illustration is an example of what the HOME PAGE looks like.



Main/Guard Status Fields – These fields display symbols indicating the current status of all the available transceivers in the system. The symbols are as follows.

- – Indicates a radio is available, but not enabled.
- ▶ – Indicates a radio is transmitting.
- 1** – Indicates radio 1 is available and enabled.
- 2** – Indicates radio 2 is available and enabled.
- 1** – Indicates radio 1 is receiving.
- 2** – Indicates radio 2 is receiving.

Encryption Status Field – This field displays the encryption indicator symbol (ϕ) when encryption is turned on, or a blank if encryption is turned off.

Channel Selection Field – This field displays the currently selected channel.

Direct Mode Status Field – This field displays the direct mode indicator symbol (→) when the current channel is a direct channel, or the channel has been forced to be a direct channel by pressing the DIR button.

Alphanumeric Identifier Field – This field displays the 12 character name of the currently selected channel, unless the manual channel is selected, in which case the manual channel's receive frequency will be displayed.



You can always get back to the HOME PAGE by pressing the HOME button one or more times.



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Turning the System On and Off

To power the C-5000 ON, press and hold the ON button for approximately one second. Several version number and copyright pages appear on the display while the unit performs a selftest and initializes the attached radio systems. When initialization is complete, the HOME PAGE will appear on the display.

To power the C-5000 OFF, press and hold the ON button for several seconds. The following message flashes on the display several times:

!!! USE CAUTION !!!
TURNING SYSTEM OFF

Continue to hold the ON button until the message stops flashing and the display turns off.

Setting the Display Brightness

When you first power ON the C-5000, the display is at its maximum brightness. To adjust the brightness level, ensure you are on the HOME PAGE, then press the DIM button. The display will appear as follows.

← UP	CHANGE DISPLAY
← DOWN	BRIGHTNESS

Press the UPPER SOFT KEY to brighten the display. Press the LOWER SOFT KEY to dim the display. Press the HOME button to return to the HOME PAGE.

Setting the Volume Level

When you first power ON the C-5000, the volume level will be reset to the level that was active when the unit was powered down. You can change the volume level as follows.

Radio 1

- Place the cursor on the top line of the display.
- Tune to a channel with activity on it or press the TEST button. This will unquiet the radio, allowing you to hear the current volume level.
- Rotate the INNER VOLUME knob clockwise to increase the volume level, or counterclockwise to decrease the volume level.

Radio 2

- Place the cursor on the bottom line of the display.

- Tune to a channel with activity on it or press the TEST button. This will unsquelch the radio, allowing you to hear the current volume level.
- Rotate the OUTER VOLUME knob clockwise to increase the volume level, or counterclockwise to decrease the volume level.

Selecting a Preset Channel Using the Cursor/Value Knob

When the C-5000 first powers on, the selected channels will be reset to those that were active when the unit was powered down. To select a different preset channel, do one of the following:

- Move the cursor under the least significant digit of the channel number you want to change. The illustration below shows a user preparing to change the channel for radio 1.



- Turn the VALUE knob clockwise to select the next available channel with a higher number. Turn the VALUE knob counterclockwise to select the next available channel with a lower number. Keep turning the VALUE knob until the desired channel is selected.

You can also increment the channel number by 10's and 100's. You do this by placing the cursor under the 10's or 100's digit and turning the VALUE knob as described above. The following illustration depicts the cursor under the 10's digit. The 100's digit would be one to the left of the 10's digit.



Selecting a Channel Using the Keypad

Occasionally, it is desirable to select a preset channel by entering its number via the keypad, rather than dialing it in with the cursor/value knobs. This can be performed as follows.

- Place the cursor under any digit of the channel number you want to change.
- Press the NUM button. The following illustration depicts the display after the NUM button has been pressed while radio 1 was under cursor control.



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1	CHAN = . . 0 < ENTER >
2	φ . . 1 TACTICAL - 001

- Input the channel number using the keypad buttons.
- Press the ENTER button.

The input channel number will be selected, assuming it was a valid channel. If you input an invalid channel number, the display will reappear as depicted above, giving you the opportunity to input a valid channel number. You can press the HOME button to cancel the input operation and return to the HOME PAGE.

Selecting a Channel by Alphanumeric Identifier

It is sometimes desirable to select a preset channel by name as opposed to number. This can be performed as follows.

- Place the cursor under the alphanumeric identifier field of the radio you want to tune the channel on. The following illustrating shows the cursor under radio 1's alphanumeric identifier field.

1	1 2 3 → <u>L</u> U K E A F B T W R 1
2	φ . . 1 TACTICAL - 001

- Rotate the VALUE knob clockwise to select the next channel in alphabetic order. Turning the VALUE knob counterclockwise will select the previous channel in alphabetic order. Continue to turn the VALUE knob until the desired channel is displayed.

NOTE:

- 1) The manual channel cannot be selected this way.
- 2) The cursor will not move under the alphanumeric identifier field if the manual channel is selected.

Selecting the Manual Channel

The manual channel is used to tune channels not already programmed as presets into the C-5000's memory. Each radio has its own manual channel. The manual channel is located at channel number 0, and is displayed as ".M". You can select the manual channel by either entering channel 0 from the keypad, or by dialing it in using the cursor/value knobs. The following illustration depicts a C-5000 with the manual channel for radio 1 selected.

1	.	.	<u>M</u>	1	5	6	.	2	0	0						
2	ϕ	.	.	1	T	A	C	T	I	C	A	L	-	0	0	1

The manual channel's frequency is displayed in place of the alphanumeric identifier for preset channels. Once the manual channel is selected, press the EDIT button to edit the channel information. The C-5000 automatically stores the manual channel information on power down.

Using the Direct/Repeat Feature

The C-5000 supports both direct and repeat modes of operation. Any preset channel that has identical transmit and receive frequencies is considered a direct channel. If the transmit and receive frequencies are different, the C-5000 considers the channel a repeater channel. Repeater channels can be temporarily changed into direct channels by pressing the DIR button. This will temporarily copy the receive frequency into the transmit frequency. The direct mode indicator will light. The following illustration shows radio 1 in direct mode.

Direct Mode Indicator

1	1	2	<u>3</u>	→	L	U	K	E	A	F	B	T	W	R	1	
2	ϕ	.	.	1	T	A	C	T	I	C	A	L	-	0	0	1

NOTE: Pressing the DIR button on a direct channel has no effect.

Receiving/Transmitting

Receiving

The C-5000 is constantly monitoring its radios for reception. When a signal is received, the C-5000 will light the receive indicator for the receiving radio, and route the audio to the operator's headset (Assuming the associated intercom switch is selected). The following illustration depicts Radio #1 receiving.

RX Indicator

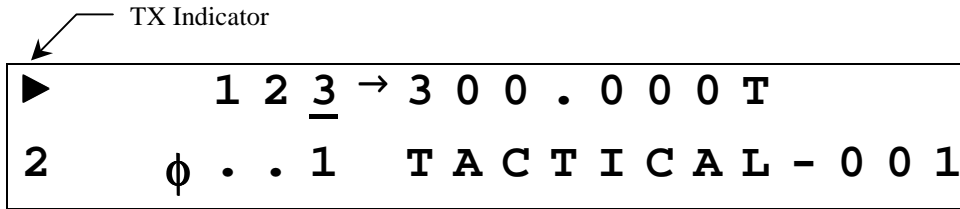
1	1	2	<u>3</u>	→	L	U	K	E	A	F	B	T	W	R	1	
2	ϕ	.	.	1	T	A	C	T	I	C	A	L	-	0	0	1

Transmitting

To transmit on a radio system, select the appropriate source on your audio panel, and key the microphone. Transmission will begin on the radio's currently selected channel. During the transmission, the radio's transmit indicator will light, and the channel's transmit frequency will be displayed. The following illustration depicts radio 1 transmitting.



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Enabling/Disabling Transceivers

Disabling (Turning Off) a Transceiver

- Place the cursor under the R/T status indicator. The following illustration shows the cursor under Radio #1's status indicator.



- Rotate the VALUE knob once in either direction. The display will indicate the radio has been turned off, as the following illustrates.



Enabling (Turning On) a Transceiver

- Place the cursor under the radio's status indicator. The following illustration shows the cursor under Radio #2's status indicator.



- Rotate the VALUE knob once in either direction. The display will indicate the radio has been turned on, as the following illustrates.

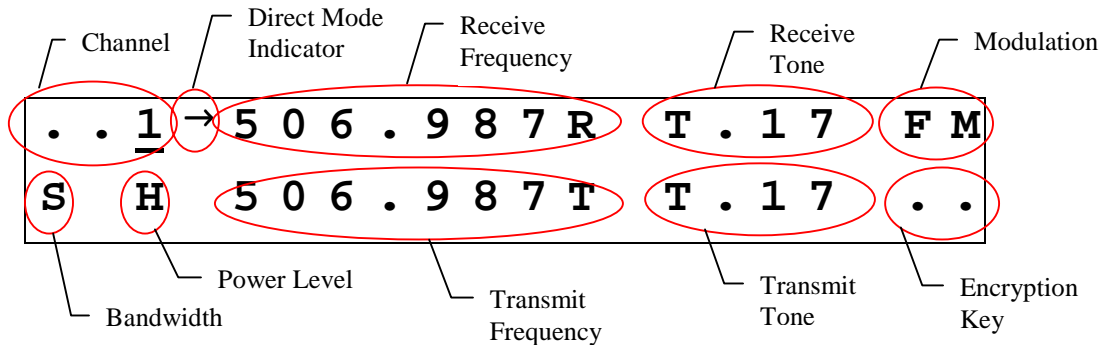
1	1 2 3 →	L U K E A F B	T W R 1
<u>2</u>	φ . . 1	T A C T I C A L	- 0 0 1



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Using The Edit Page

The EDIT PAGE allows the operator to temporarily change properties of a preset channel, and permanently change properties of a manual channel. Precisely which properties can be changed varies with channel and radio type. For example, transmit power can only be changed on RT-5000 radios, because the other radios do not have variable power capability. The following illustration is an example of what the EDIT PAGE looks like. Your C-5000's display may appear differently depending on the currently selected channel and its associated properties.



Channel Identifier field – This displays the currently selected channel, i.e. the channel you are editing.

Direct Mode Status Field – This field displays the direct mode indicator symbol (→) when the current channel is a direct channel, or the channel has been forced to be a direct channel by way of the DIR button.

Receive Frequency Field – This field displays the current channel's receive frequency.

Receive Tone Field – This field displays the current channel's receive tone.

Modulation Type Field – This field displays the current channel's modulation type. The modulation types are displayed as AM, FM, P (P25), and TK (trunking).

Channel Bandwidth Field – This field displays the current channel's bandwidth. Bandwidths are displayed as S (standard), W (wide), X (extra wide), and N (narrow).

Transmit Power Level Field – This field displays the current channel's transmit power level. Power level is displayed as HI for high power or LO for low power.

Transmit Frequency Field – This field displays the current channel's transmit frequency.

Transmit Tone Field – This field displays the current channel's transmit tone.

Encryption Key Field – This field displays the current channel's transmit encryption key. The encryption key will display as a number between 1 and 16, or ".." if no key has been specified for the channel.

Editing a Preset Channel

To temporarily change the properties of a preset channel, do the following.

- On the HOME PAGE, select the preset channel you want to edit.
- Press the EDIT button to load the channel into the EDIT PAGE.
- Move the cursor under the field containing the channel property you want to edit.
- Use the VALUE knob to change the property to the desired value.
- Press the HOME button to return to the HOME PAGE. The changes will remain in effect until the channel is changed.

NOTE:

The cursor cannot be moved under channel property fields that are not editable.

Editing a Manual Channel

To change the properties of a manual channel, do the following.

- On the HOME PAGE, select the manual channel you want to edit.
- Press the EDIT button to display the EDIT PAGE.
- Move the cursor under the field containing the channel property you want to edit.
- Use the VALUE knob to change the property to the desired value.
- Press the HOME button to return to the HOME PAGE and save the manual channel's current state.

NOTE:

The cursor cannot be moved under channel property fields that are not editable.

Changing PL & DPL (CTCSS and DCS) Tones

The C-5000 supports both CTCSS (PL) and DCS (DPL) tones. The tone used by a channel can be temporarily overridden on the EDIT PAGE. You can select any valid tone, or turn tones off. (Channels programmed to use the ITM of a Guard receiver module in a RT-5000 cannot be changed)

Turning Tones Off

- Move the cursor under the "T" of the receive tone field, as depicted below.

.	.	1	5	0	6	.	9	8	7	R	<u>T</u>	.	1	7	F	M
S	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	

- Rotate the VALUE knob clockwise once. The receive tone field will show "..." as depicted below.



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.	.	1	5	0	6	.	9	8	7	R	<u>T</u>	.	.	.	F	M
S	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	.

- Press the ENTER button to move the cursor under the “T” of the transmit tone field.
- Rotate the VALUE knob clockwise once. The transmit tone field will show “...” as depicted below.

.	.	1	5	0	6	.	9	8	7	R	T	.	.	.	F	M
S	H	5	0	9	.	9	8	7	T	<u>T</u>

Selecting a CTCSS Tone

- Move the cursor under the least significant digit of the tone field you want to change. The illustration below assumes we want to change the receive tone.

.	.	1	5	0	6	.	9	8	7	R	T	.	1	<u>7</u>	F	M
S	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	.

- Rotate the VALUE knob clockwise to increment the tone, or counterclockwise to decrement the tone. Keep rotating the VALUE knob until the desired tone is displayed.

NOTE: Appendix A lists the frequencies associated with the Wulfsberg CTCSS tone numbers.

Selecting a DCS Tone

- Move the cursor under the most significant digit of the tone field you want to change. The illustration below assumes we want to change the receive tone.

.	.	1	5	0	6	.	9	8	7	R	T	.	1	7	F	M
S	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	

- Rotate the VALUE knob clockwise to increment the tone, or counterclockwise to decrement the tone. Continue rotating the VALUE knob until the most significant digit is that of the desired tone.
- Move the cursor under the least significant digit of the tone, as illustrated below.

.	.	1	5	0	6	.	9	8	7	R	T	0	2	<u>3</u>	F	M
S	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	

- Rotate the VALUE knob clockwise to increment the tone, or counterclockwise to decrement the tone. Keep rotating the VALUE knob until the desired tone is displayed.



A “0-7” in the first position means you are selecting a DCS tone. This is a special kind of tone rarely used.

Changing Transmit Power

The C-5000 supports the selection of high and low transmit power. Normally high power is used, however, if interference or other transmit issues are experienced, low power may be selected to help remedy the issue. If you have a radio that supports multiple power levels, such as the RT-5000, you can alter the power setting from the EDIT PAGE as follows.

- Move the cursor under the transmit power field, as depicted below.

.	.	1	5	0	6	.	9	8	7	R	T	.	1	7	F	M
S	<u>H</u>	5	0	9	.	9	8	7	T	T	.	1	7	.	.	

- Rotate the VALUE knob clockwise once. The power indicator will toggle between high and low with each turn of the VALUE knob.

Changing Modulation Type

The modulation type can be only be changed on the manual channel, and can only toggle between AM and FM. To change the manual channel’s modulation type, do the following.

- Move the cursor under the modulation field, as depicted below.



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.	.	1	5	0	6	.	9	8	7	R	T	.	1	7	<u>F</u>	M
S	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	

- Rotate the VALUE knob clockwise once. The modulation indicator will toggle between AM and FM. (118-136 MHz and 225-400 MHz are normally AM frequencies. All other frequencies are usually FM)

Changing Receiver Bandwidth

The receiver bandwidth can only be changed on the manual channel. To change the manual channel's receiver bandwidth, do the following.

- Move the cursor under the bandwidth field, as depicted below.

.	.	1	5	0	6	.	9	8	7	R	T	.	1	7	F	M
<u>S</u>	H	5	0	9	.	9	8	7	T	T	.	1	7	.	.	

- Rotate the VALUE knob in either direction. Each turn of the VALUE knob will select the next bandwidth option in the list. Turn the VALUE knob until the desired bandwidth symbol is displayed. The available options are as follows.

N – Narrow – 12.5 kHz

S – Standard - 25 kHz

W – Wide – 35 kHz

X – Extra Wide – 70 kHz

UNLESS SPECIFICALLY INSTRUCTED OTHERWISE, ALWAYS SELECT "S".

Enhanced System Features

Phone Patch Mode

The C-5000 can patch into the phone system using both DTMF and pulse dialing. This requires equipment on the ground, such as a transceiver and an interface box, to connect the base station radio to the telephone lines. This is NOT a cellular phone.

- From the HOME PAGE, select the radio and channel. Press the MENU button. The following display page will appear.

```
← D T M F           S E L E C T   P H O N E
← P U L S E       D I A L I N G   M O D E
```

- Press the UPPER SOFT KEY to select DTMF dialing, or the LOWER SOFT KEY to select pulse dialing. In either case, the next display page will appear, and will look similar to the following. This example shows the dialing operation being performed on radio 1, channel 1.

```
← S E N D   1   . . 1
← H O M E   # - _
```

- Input the digits you want to dial using the keypad. Alpha characters can be input by turning the VALUE knob until the desired character is displayed, then pressing the ENTER button. Pressing the ENTER button while a blank is displayed inputs a ½ second delay. As soon as you begin input, the display will change slightly. The following depicts a sample entry.

```
← S E N D   1   . . 1
← C L R     # - 1 2 3 4 5 6 7 8 * 9 0 #
```

- Press the UPPER SOFT KEY to dial the displayed data, or the LOWER SOFT KEY to erase the displayed data.
- Press the HOME button (**LOWER SOFT BUTTON !!!!!**) to return to the HOME PAGE.

Simulcast Operation

Simulcast Mode allows you to transmit simultaneously to two other locations that have radios tuned to different frequencies. At the same time, the Main RT systems and Guard Receivers are able to receive on their currently selected channels. You can establish simulcast operation as follows.



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- Ensure you are on the HOME PAGE.
- Select the desired channel for radio 1.
- Select the desired channel for radio 2.
- Press the MODE button until the following display page appears.

P R E S S E N T E R B U T T O N
F O R S I M U L C A S T M O D E

- Press the ENTER button. The following illustrates the SIMULCAST PAGE for radio 1 on channel 1 and radio 2 on channel 2.

S I M U L C A S T M O D E
1 . . 1 2 . . 2

- Press the HOME button to exit simulcast mode and return to the HOME PAGE.
- Use either RT1 or RT2 mic position on the audio selector panel and initiate a transmission. Both Radios will transmit at the same time.

Relay Operation

Relay Mode allows your aircraft's C-5000-based transceiver system to function as a cross-band repeater. If a Relay Mode link is established between two locations, a message received from one location is automatically retransmitted to the other. You can establish relay operation as follows.

- Ensure you are on the HOME PAGE.
- Select the desired channel for radio 1.
- Select the desired channel for radio 2.
- Press the MODE button until the following display page appears.

P R E S S E N T E R B U T T O N
F O R R E L A Y M O D E

- Press the ENTER button. The following illustrates the RELAY PAGE for radio 1 on channel 1 and radio 2 on channel 2.

R E L A Y M O D E
1 . . 1 2 . . 2

- Press the HOME button to exit relay mode and return to the HOME PAGE.

Relay/Simulcast Operation

Relay-Simulcast mode combines the functions of Relay Mode and Simulcast Mode. It allows you to establish an automatic radio link with two other locations that have radios tuned to different frequencies in different frequency bands, and allows you to transmit to those same locations simultaneously. You can establish relay/simulcast operation as follows.

- Ensure you are on the HOME PAGE.
- Select the desired channel for radio 1.
- Select the desired channel for radio 2.
- Press the MODE button until the following display page appears.

P R E S S E N T E R B U T T O N
F O R R E L A Y / S I M U L C A S T

- Press the ENTER button. The following illustrates the RELAY/SIMULCAST PAGE for radio 1 on channel 1 and radio 2 on channel 2.

R E L A Y / S I M U L C A S T M O D E
1 . . 1 2 . . 2

- Press the HOME button to exit relay/simulcast mode and return to the HOME PAGE.



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Repeater Operation

Repeater mode allows the C-5000-based system to act as an airborne repeater, providing a radio link between two ground locations that transmit and receive in the same frequency band. You can establish repeater operation as follows.

- Ensure you are on the HOME PAGE.
- Select the desired channel for radio 1.
- Press the MODE button until the following display page appears.

```
P R E S S   E N T E R   B U T T O N
F O R   R E P E A T E R   M O D E
```

- Press the ENTER button. The following illustrates the REPEATER PAGE for radio 1 on channel 1 and radio 2 on channel 2.

```
      R E P E A T E R   M O D E
1      . . 1   2   R C V
```

- Press the HOME button to exit repeater mode and return to the HOME PAGE.

NOTE: Repeater operation on channels that use the Guard module in the transceiver must cannot accomplished using this method. Any P25 or Encryption capable channels cannot be setup in repeater mode unless special channels are programmed. The following procedure should be followed under this condition:

- 1) Select the repeater channel on RT #1.
- 2) Press DIR button to put RT #1 into direct mode.
- 3) Select the repeater channel alternate on RT #2.
- 4) Enter into repeater mode using the procedure above.

Encryption Features

Turning Encryption On and Off

Put the cursor on the top or bottom line depending on which radio is to be selected. Press the PVT button to toggle encryption on and off. If the C-5000 has been configured to control an RT-5000 with an encryption module and the preset channel being used has been set up for encryption, the privacy indicator will light.

NOTE:

Encryption can only be turned on for channels that have been pre-programmed with an encryption key. Three error beeps will sound if the channel has not been setup for encryption.

Changing the channel will automatically reset the encryption setting to OFF. The encryption device in the RT-5000 will still decode encrypted messages i.e. the encryption ON/OFF affects only the transmit and not the receive function of the encryption unit.

Selecting an Encryption Key

The preset encryption key (sometimes called KEYMAT) for a channel can be temporarily changed as follows.

- Ensure you are on the HOME PAGE, and the cursor is on the line of the radio you wish to select and encryption capable channel is also selected.
- Press the KEY button. The following illustrates the display when the KEY button was pressed with the cursor on the top line, i.e. on radio 1. If the KEY button is pressed on a channel that has not been preset to use encryption, three warning beeps will sound.

T X K E Y = <u>P</u> S E T < E N T E R >
2 ϕ . . 1 T A C T I C A L - 0 0 1

- Rotate the VALUE knob to change the encryption key. A value of “PSET” indicates you want to use the channel’s preset encryption key. A numeric value (1-16) indicates you want to override the preset key with the specified key.
- Press the ENTER button to accept the displayed key. The display will return to the HOME PAGE.
- When transmitting, if encryption keys are properly loaded, a tone at the start of the transmission will be generated by the radio and heard by the operator. Begin speaking AFTER the tone or part of your transmission will be lost.
- When transmitting in the encrypted mode, if you hear a continuous warble tone, this indicates that the encryption key(s) have not been loaded. Either manually enter encryption keys or perform an OTAR if your system has that capability.
- The newly selected KEYMAT WILL REMAIN even if the channel is changed in effect until power down.



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Performing an OTAR

- Ensure you are on the HOME PAGE, and the cursor is on the line of the radio you wish to select and an OTAR capable channel is also selected.
- Press the OTAR button. The following illustrates the display when the OTAR button was pressed with radio 1 under cursor control.

1	ENTER = START OTAR
2	φ . . 1 TACTICAL - 001

- Press the ENTER button to initiate the OTAR process. The status of the OTAR will be displayed on the radio's display line. Status messages include "OTAR REQUESTED", "OTAR IN PROGRESS", "OTAR ABORTING", "OTAR COMPLETE", and "OTAR FAILED". The following illustrates the display with an OTAR in progress.

1	OTAR IN PROGRESS
2	φ . . 1 TACTICAL - 001

- When the OTAR is finished, the display will indicate its success or failure. The following illustrates the display after a successful OTAR.

1	OTAR COMPLETE
2	φ . . 1 TACTICAL - 001

- Press the HOME button to acknowledge the completion of the OTAR and return to normal HOME PAGE operation.
- Normal OTAR operations take 10 – 30 seconds depending on signal strength and channel availability.

The OTAR process can be aborted by pressing the HOME button while the "OTAR IN PROGRESS" message is being displayed. Doing so will send the abort command to the digital transceiver, and display a status message like the following.

```

1      O T A R   A B O R T I N G
2      ϕ . . 1   T A C T I C A L - 0 0 1

```

NOTE: The OTAR process will automatically time-out after 2 minutes of unsuccessful OTAR attempts.

Erasing Encryption Keys

It may be desirable to erase the encryption keys contained in a RT-5000 transceiver. For example, prior to sending the unit in for service. This can be accomplished as follows.

- Ensure you are on the HOME PAGE, and the cursor is on an encryption capable channel.
- Press the PROG button. You will be prompted to enter a password, as follows.

```

E N T E R   P A S S W O R D   2
# = . . . .   < E N T E R >

```

- Input the appropriate password using the keypad and press the ENTER button.
- Press the MODE button until the following display page appears.

```

P R O G :   2 = N E X T       3 = B A C K
< E N T E R > =   K E Y   E R A S E

```

- Press the ENTER button to invoke the KEY ERASE PAGE, depicted below.

```

← S T A R T   K E Y   E R A S E
R A D I O =  1        I T M = V H F 1 3 8

```

- Use the cursor/value knobs to select the radio and digital receiver module you want to erase the encryption keys from. Press the UPPER SOFT KEY to initiate the erase process. The display will appear similar to the following.



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```

← E N D           K E Y   E R A S E
R A D I O   # 1   K E Y S   E R A S E D
  
```

- Press the UPPER SOFT KEY to acknowledge the key erase is complete. The display will return to the main KEY ERASE PAGE, allowing you to select another radio and/or digital transceiver module to erase.
- When finished erasing the keys from all desired modules, press the HOME button to return to the HOME PAGE.

Manually Loading Encryption Keys

It may be desirable to manually load the encryption keys contained in a RT-5000 digital transceiver. This can be accomplished as follows.

- Ensure you are on the HOME PAGE, and the cursor is on an encryption capable channel.
- Press the PROG button. You will be prompted to enter a password, as follows.

```

E N T E R   P A S S W O R D   2
# = . . . . < E N T E R >
  
```

- Input the appropriate password using the keypad and press the ENTER button.
- Press the MODE button until the following display page appears.

```

P R O G :   2 = N E X T       3 = B A C K
< E N T E R > =   K V L   L O A D
  
```

- Press the ENTER button to invoke the KVL LOAD PAGE, depicted below.

```

← S T A R T   K V L   L O A D
R A D I O = 1           I T M = V H F 1 3 8
  
```

- Use the cursor/value knobs to select the radio and desired Internal Transceiver Module (ITM) you want to load the encryption keys. The RT-5000 can have up to two modules covering two frequency bands per unit. Only available options will be displayed. Once the desired radio and ITM have been selected, press the UPPER SOFT KEY to initiate the load process. The display will appear similar to the following.

← E N D	K V L	L O A D
R A D I O	# 1	I N K V L M O D E

- Connect the Key-loader device to the transceiver data port. Load the desired keys using the procedure for the key-loader as prescribed its manufacturer.
- Press the UPPER SOFT KEY to acknowledge the key load is complete. The display will return to the main KVL LOAD PAGE, allowing you to select another radio and/or digital transceiver module to load.
- When finished loading the keys to all desired modules, press the HOME button to return to the HOME PAGE.



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Programming Preset Channels

WARNING: CONFIGURING THE C-5000 MUST BE PERFORMED BEFORE PRESET CHANNELS ARE PROGRAMMED FOR THE UNIT TO OPERATE PROPERLY !!!!

Programming Preset Channels Using the Front Panel

Although Wulfsberg highly recommends using the PC based Remote Programmer software to program preset channels for the C-5000, they can be programmed from the front panel. The process is as follows.

- Ensure you are on the HOME PAGE.
- Press the PROG button. If the C-5000 has been programmed to require a password to enter this mode, you will be prompted to enter a password, as follows.

```
ENTER PASSWORD 2
# = . . . < ENTER >
```

- Input the appropriate password using the keypad and press the ENTER button.
- Press the MODE button until the following display page appears.

```
PROG : 2 = NEXT 3 = BACK
< ENTER > = CHANNELS
```

- Press the ENTER button to invoke the CHANNEL MAIN MENU PAGE, depicted below.

```
PROG : CHANNEL
2 = ADD 3 = CHG 4 = DEL
```

- Press the MODE button to add a new channel or the EDIT button to modify an existing channel. The pages are nearly identical for both functions. The illustrations that follow assume we are adding a channel, i.e. we pressed the MODE button.

```

P R O G :   2 = N E X T       3 = B A C K
A D D - . . 1

```

- Use the cursor/value knobs to select the number for the new channel. **Only available channel numbers will be displayed.** Press the MODE button to go to the next menu page.

```

P R O G :   2 = N E X T       3 = B A C K
R / T   S Y S   #   =   1

```

- Use the cursor/value knobs to select the radio this channel is being programmed for. Press the MODE button to go to the next menu page.
- If both radios are RT-5000's with the same part number, both radios will be able to use any channel. In this case, set this value to "1".

```

P R O G :   2 = N E X T       3 = B A C K
C H A N   I D = . . . . . .

```

- Use the cursor/value knobs to input the alphanumeric identifier for the channel being programmed. This identifier can be a maximum of 12 characters in length. Turning the VALUE knob will enumerate all the characters available for the identifier. Press the MODE button to go to the next menu page.

```

P R O G :   2 = N E X T       3 = B A C K
C H A N N E L   T Y P E =   F M

```

- Use the cursor/value knobs to input the modulation type for the channel being programmed. This can be AM, FM, P (P25), or TK (trunking). Press the MODE button to go to the next menu page.

```

P R O G :   2 = N E X T       3 = B A C K
Z O N E =   . .   C H A N N E L =   . .

```

- Use the cursor/value knobs to input the zone and channel number for a RT-5000 digital transceiver channel. Leave these fields blank if you are not programming a digital transceiver channel. Press the MODE button to go to the next menu page.



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- IF THE CHANNEL IS TO BE PROGRAMMED FOR THE INTERNAL TRANSCEIVER MODULE IN THE RT-5000, THE ZONE AND CHANNEL MUST MATCH THE ZONE, CHANNEL, AND FREQUENCY INFORMATION PROGRAMMED INTO THE ITM.

```
PROG : 2 = NEXT      3 = BACK
RX  FREQ = 0 0 0 . 0 0 0
```

- Use the cursor/value knobs or the keypad to input the channel's receive frequency. Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
RX  TONE = . . .
```

- Use the cursor/value knobs to input the channel's receive tone. Refer to the section on changing tones via the EDIT PAGE for details on specifying DCS and CTCSS tones. Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
TX  FREQ = 0 0 0 . 0 0 0
```

- Use the cursor/value knobs or the keypad to input the channel's transmit frequency. Specifying a transmit frequency of 000.000 indicates the channel is a receive-only channel. Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
TX  TONE = . . .
```

- Use the cursor/value knobs to input the channel's transmit tone. Refer to the section on changing tones via the EDIT PAGE for details on specifying DCS and CTCSS tones. Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
TX  POWER = H I
```

- Use the cursor/value knobs to input the channel's transmit power as HI or LO. Press the MODE button to go to the next menu page.

```
P R O G :   2 = N E X T       3 = B A C K
E N C R Y P T I O N   T Y P E =  C  L R
```

- Use the cursor/value knobs to input the channel's encryption type. This option can be CLR (no encryption), EXT (external encryption), STD (internal encryption on internal transceiver module), or OTAR (internal encryption with OTAR capability on internal transceiver module). Press the MODE button to go to the next menu page.

```
P R O G :   2 = N E X T       3 = B A C K
E N C R Y P T I O N   K E Y =   .  . 
```

- Use the cursor/value knobs to input the channel's encryption key. This page will only appear if applicable, i.e. an encryption type of STD or OTAR was specified above. Press the MODE button to go to the next menu page.

```
P R O G :   2 = N E X T       3 = B A C K
R X   B A N D W I D T H =    S  T D
```

- Use the cursor/value knobs to input the channel's receive bandwidth. Valid options are STD (standard), NARROW, WIDE, and X-WIDE (extra wide). Press the MODE button to go to the next menu page. **Normal setting is STD.**

```
P R O G :   2 = N E X T       3 = B A C K
4 = A D V A N C E D   F E A T U R E S
```

- Typically, the previous channel properties are all you need to specify. Pressing the MODE button will skip over the "advanced features" menu pages to the page that lets you permanently save your channel.
- Channels using an ITM in the RT-5000 will NEVER require the user to input advanced information.
- Press the DIM button to continue with the "advanced features".

```
P R O G :   2 = N E X T       3 = B A C K
2 N D   I F   I N J E C T I O N =    H  I
```

- Use the cursor/value knobs to input the channel's second I.F. Injection as HI or LO. The default is HI. Press the MODE button to go to the next menu page.



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```
PROG : 2 = NEXT      3 = BACK
3RD I F I N J E C T I O N = H I
```

- Use the cursor/value knobs to input the channel's third I.F. Injection as HI or LO. **The default is LO.** Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
R X A U D I O P H A S E = 0
```

- Use the cursor/value knobs to input the channel's receive audio phase as 0 or 180. The default is 0. Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
T X A U D I O P H A S E = 0
```

- Use the cursor/value knobs to input the channel's transmit audio phase as 0 or 180. The default is 0. Press the MODE button to go to the next menu page.

```
PROG : 2 = NEXT      3 = BACK
T X D E V I A T I O N = 5 . 0 K H Z
```

- Use the cursor/value knobs to input the channel's transmit deviation. This can be 3.0KHz, 5.0KHz, 4.0KHz, or 5.6KHz. The default is 5.0KHz. Press the MODE button to go to the next menu page.

```
PROG : 2 = SAVE      3 = BACK
. . 1 P R E S E T C H A N 1
```

- Press the MODE button to permanently save the channel and return to the CHANNEL MAIN MENU PAGE. You may also review your changes by pressing the EDIT button, or cancel the operation by pressing the HOME button.

Configuring the C-5000

Configuring the C-5000

Although Wulfsberg highly recommends using the PC based Remote Programmer software to specify the C-5000's configuration, it can be specified from the front panel. The process is as follows.

- Ensure you are on the HOME PAGE.
- Press the PROG button. You will be prompted to enter a password, as follows.

```
ENTER PASSWORD 2
# = . . . . < ENTER >
```

- Input the appropriate password using the keypad and press the ENTER button.
- Press the MODE button until the following display page appears.

```
PROG : 2 = NEXT 3 = BACK
< ENTER > = CFG SYSTEM
```

- Press the ENTER button. You will be prompted to enter a password, as follows.

```
ENTER PASSWORD 1
# = . . . . < ENTER >
```

- Input the appropriate password and press the ENTER button. The display will appear as follows.

```
SETUP : 2 = NEXT 3 = BACK
C5000 P / N = 1 2 2 0
```

- Use the cursor/value knobs to input the last four digits of your C-5000's part number. Press the MODE button to display the next menu page.



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```
S E T U P :   2 = N E X T   3 = B A C K
E N T E R = S E T U P   R A D I O   # 1
```

- You can press the ENTER button to configure radio 1. Refer to the sections on configuring RT-5000 and non-RT-5000 radios for details on these sub-menu pages. Press the MODE button to display the next menu page.

```
S E T U P :   2 = N E X T   3 = B A C K
E N T E R = S E T U P   R A D I O   # 2
```

- You can press the ENTER button to configure radio 2. Refer to the sections on configuring RT-5000 and non-RT-5000 radios for details on these sub-menu pages. Press the MODE button to display the next menu page.

```
S E T U P :   2 = N E X T   3 = B A C K
E N T E R = C H G   P A S S W O R D   1
```

- You can press the ENTER button to change the system configuration password. Refer to the section on changing passwords for details on these sub-menu pages. Press the MODE button to display the next menu page.

```
S E T U P :   2 = N E X T   3 = B A C K
E N T E R = C H G   P A S S W O R D   2
```

- You can press the ENTER button to change the programming password. Refer to the section on changing passwords for details on these sub-menu pages. Press the MODE button to display the next menu page.

```
S E T U P :   2 = N E X T   3 = B A C K
E N T E R = S E T U P   M I S C .
```

- You can press the ENTER button to change miscellaneous system properties, such as system encryption, side-tones, and de-emphasis. Refer to the section on miscellaneous configuration options for details on these sub-menu pages. Press the MODE button to display the next menu page.

```
SYSTEM SETUP MODE
HOME = EXIT      2 = REVIEW
```

- Press the HOME button to exit system configuration, or the MODE button to review current settings.

Configuring the C-5000 to Control an RT-5000

This section drills down into the radio setup sub-menu pages. Refer to the section on configuring the C-5000 for details on how to reach these menu pages. This section assumes the C-5000 part number you entered indicated an RT-5000 was present for Radio #1. We pick up at the following display page.

```
SETUP : 2 = NEXT 3 = BACK
ENTER = SETUP RADIO #1
```

- Press the ENTER button to begin configuring the RT-5000.

```
SYS #1 : 2 = NEXT 3 = BACK
RT - 5000 P / N = 0 7 0 3
```

- Use the cursor/value knobs to input the last four digits of your RT-5000's part number. Press the MODE button to display the next menu page.

```
SYS #1 : 2 = NEXT 3 = BACK
ENTER = SETUP GUARD #1
```

- This page will only display if RT-5000 part number entered indicates a Guard receiver is present. Pressing the ENTER button invokes the preset channel programming menu pages for the Guard channel. Refer to the section on programming a preset channel for details since programming a Guard channel is very similar to programming a preset channel.

```
SYS #1 : 2 = NEXT 3 = BACK
RADIO MODE = 1
```

- This page will only display if RT-5000 part number entered indicates an ITM is present. Use the cursor/value knobs to select a value of 1 or 2. Mode 1 indicates that the ITM should act as part of the main transceiver, i.e. the two transceivers appear to be a single unit. Mode 2 indicates that the ITM should not act as part of the main, i.e. behave as a Guard receiver. . Press the MODE button to display the next menu page.



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```
← I N C          2 = N E X T    3 = B A C K  
← D E C    S Q U E L C H    L V L = 1 6 0
```

- This page allows you to set the RT-5000's squelch level. Press the UPPER SOFT KEY to increase the squelch level, or the LOWER SOFT KEY to decrease squelch level. The squelch level determines the signal strength required by the RT-5000 to open its audio gates, allowing you to hear what it is receiving. The larger the number, the stronger the required signal. Press the MODE button to display the next menu page.

```
S E T U P    R A D I O    # 1  
H O M E = E X I T          2 = R E V I E W
```

- Press the HOME button to exit the radio setup menu pages, or press the MODE button to review the current settings.

Configuring the C-5000 to Control A Non RT-5000

This section drills down into the radio setup sub-menu pages. Refer to the section on configuring the C-5000 for details on how to reach these menu pages. This section assumes the C-5000 part number you entered indicated a Flitecomm or Flexcomm I radio was present on radio #2. We pick up at the following display page.

```
S E T U P :    2 = N E X T    3 = B A C K  
E N T E R = S E T U P    R A D I O    # 2
```

- Press the ENTER button to begin configuring the radio.

```
S Y S    # 2 : 2 = N E X T    3 = B A C K  
R T - 3 0    P R E S E N T -  N  O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-30 is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
      R T - 1 1 8   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-118 is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
      R T - 1 3 8   P R E S E N T - Y E S
```

- Use the cursor/value knobs to tell the C-5000 if an RT-138 is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
      R T - 1 3 8 F   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-138F is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
      R T - 4 5 0   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-450 is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
      R T - 4 0 6 F   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-406F is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
      R T - 9 6 0 0 F   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-9600F is present. Press the MODE button to display the next menu page.



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```
S Y S   # 2 : 2 = N E X T   3 = B A C K  
R T - 9 6 0 0   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-9600 is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K  
R T - 7 2 0 0   P R E S E N T - N O
```

- Use the cursor/value knobs to tell the C-5000 if an RT-7200 is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K  
G U A R D   # 1   P R E S E N T - Y E S
```

- Use the cursor/value knobs to tell the C-5000 if a Guard is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K  
E N T E R = S E T U P   G U A R D   # 1
```

- This page only appears if a guard is present. Press the ENTER button to configure the first Guard channel. Refer to the preset channel programming section for details on the menu pages that appear. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K  
G U A R D   # 2   P R E S E N T - Y E S
```

- This page only appears if a second Guard is possible. Use the cursor/value knobs to tell the C-5000 if a second Guard is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
E N T E R = S E T U P   G U A R D   # 2
```

- This page only appears if a second guard is present. Press the ENTER button to configure the second Guard channel. Refer to the preset channel programming section for details on the menu pages that appear. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
T O N E   B O A R D   C T C S S - N O
```

- Use the cursor/value knobs to tell the C-5000 if a CTCSS tone board is present. Press the MODE button to display the next menu page.

```
S Y S   # 2 : 2 = N E X T   3 = B A C K
T O N E   B O A R D           D C S - N O
```

- Use the cursor/value knobs to tell the C-5000 if a DCS tone board is present. Press the MODE button to display the next menu page.

```
S E T U P   R A D I O   # 2
H O M E = E X I T           2 = R E V I E W
```

- Press the HOME button to exit the radio setup menu pages, or press the MODE button to review the current settings.

Setting Passwords

This section drills down into the password setup sub-menu pages. Refer to the section on configuring the C-5000 for details on how to reach these menu pages. This section assumes we want to change password 1. The process is the same for password 2. We pick up at the following display page.

```
S E T U P :   2 = N E X T   3 = B A C K
E N T E R = C H G   P A S S W O R D   1
```

- Press the ENTER button to begin the password changing process. The display will appear as follows.



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```

ENTER NEW PASSWORD 1
# = . . . . < ENTER >
  
```

- Use the keypad to input the new password, and press the ENTER button.

```

< BACK VERIFY INPUT
# = . . . . < ENTER >
  
```

- Use the keypad to re-input the new password, and press the ENTER button. This second entry is for verification. If you entered an inconsistent password, your input will be erased, and you may try again. Once you have entered the same password on both pages, it will be changed, and the display will revert to the following.

```

SETUP : 2 = NEXT 3 = BACK
ENTER = CHG PASSWORD 1
  
```

Setting Miscellaneous Configuration Options

This section drills down into the miscellaneous setup sub-menu pages. Refer to the section on configuring the C-5000 for details on how to reach these menu pages. We pick up at the following display page.

```

SETUP : 2 = NEXT 3 = BACK
ENTER = SETUP MISC .
  
```

- Press the ENTER button to begin configuring miscellaneous options.

```

SETUP : 2 = NEXT 3 = BACK
SYSTEM ENCRYPT - NO
  
```

- Use the cursor/value knobs to tell the C-5000 if external encryption is available (Future function). This option pertains only to a separate encryption device, i.e. one that is not part of the C-5000 or any of the transceivers. A KY-58 device is a typical example. Press the MODE button to display the next menu page.

```
S E T U P :   2 = N E X T   3 = B A C K
C - 5 0 0 0   S I D E T O N E   - N O
```

- This page only appears if system encryption is available. Use the cursor/value knobs to tell the C-5000 if it should use side-tones. Press the MODE button to display the next menu page.

```
S E T U P :   2 = N E X T   3 = B A C K
C - 5 0 0 0   D E E M P H   - N O
```

- This page only appears if system encryption is available. Use the cursor/value knobs to tell the C-5000 if it should use de-emphasis. Press the MODE button to display the next menu page.

```
                M I S C   S E T U P
H O M E = E X I T           2 = R E V I E W
```

- Press the HOME button to exit the miscellaneous configuration menu pages, or the MODE button to review current settings.

Configuring the C-5000 Using a PC

Wulfsberg highly recommends using the PC based Remote Programmer (RP) software to specify the C-5000's configuration. The Remote Programmer software offers several advantages over using the C-5000's front panel.

- Allows you to specify a C-5000's configuration in less time.
- Enhanced error checking reduces the likelihood of specifying an incorrect configuration.
- A configuration can be specified once and loaded to multiple C-5000's, saving huge amounts of data entry time.
- Configurations can be saved, archived, and backed-up, reducing the likelihood of lost data.
- Configurations can be sucked out of C-5000's as well, saving data entry time on existing configurations.

Refer to the Remote Programmer software's user manual for details on how to specify C-5000 configurations in RP.

Downloading a Configuration from RP into the C-5000

The C-5000 continuously polls the data port on the front panel for incoming data, so all the user has to do is initiate the download from RP. Refer to RP's user manual for details on how to initiate a download. Once the communication channel is open, the C-5000's display will change to the following.



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```
MEMORY TRANSFER
RECEIVING BLOCK = 000
```

The 3-digit hexadecimal number to the right of the display on the lower line will increment from 000 to 1FFF while the download is in progress. When the download is complete, the C-5000 will automatically restart so it can pick up the new configuration.

Uploading a Configuration from the C-5000 into RP

The C-5000's current configuration can be uploaded into the RP software as follows.

- From the HOME page, press the PROG button, and enter the appropriate password.
- Press the MODE button until the following display page appears.

```
PROG : 2 = NEXT 3 = BACK
< ENTER > = RP LOAD
```

- Press the ENTER button to display the following page.

```
MEMORY TRANSFER
< START SENDING
```

- Ensure the serial cable is connected to both the PC and the C-5000. Ensure the RP software is ready to receive data. Refer to RP's user manual for details on how to prepare RP to receive data. Press the LOWER SOFT button on the C-5000 to initiate the transfer. Once the communication channel is open, the C-5000's display will change to the following.

```
MEMORY TRANSFER
SENDING BLOCK = 000
```

- The 3-digit hexadecimal number to the right of the display on the lower line will increment from 000 to 1FFF while the upload is in progress. When the upload is complete, the C-5000's display will return to the following.

P R O G : 2 = N E X T 3 = B A C K
< E N T E R > = R P L O A D

- Press the HOME button to return to the HOME PAGE.

You will most likely want to save the uploaded data to a disk file on the PC. Refer to RP's user manual for details on how to do this.



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RSS SOFTWARE DESCRIPTION AND PROGRAMMING

Before You Begin

To program the ITM inside the RT-5000 the user must use a DOS based PC (the slower the better!) and Motorola's RSS software. Users must obtain their own copies of the Software as Wulfsberg cannot supply it. The programming of the ITM requires three basic steps. First, enter the information that has to do with the setup of the way the RT-5000 communicates with the ITM. Second enter channel information, or what Motorola call "Personalities", and finally assign the personalities to Zone and Channels. Doing all of this is NOT for the faint of heart. In fact, it is best to enlist the help of an experienced RSS programmer.

There are almost uncountable numbers of "system" options in Motorola products that make programming this system very tedious at best. If your agency uses Motorola XTS-3000 model handhelds, the simplest way to get started is to use an archive from a known properly programmed XTS-3000. Then make the necessary changes and then program ITM.

Alternatively, the ITM comes from the factory with all the necessary information loaded in it for basic operation. The user only needs to load system information such as USER ID's etc., personalities, and zone/channel allocation. Once an archive for an ITM is established, it can be cloned to other ITM's in other RT-5000's

The RSS software only allows the programmer to see and change functions that are available with the hardware it is trying to program. As such, not all of the screens listed will be seen for every model of ITM.

The following are descriptions of what may be found on each page of the software. At any time, you may press F1 to access the online help screen for the page that you are currently viewing. Notice that all screens follow the same format – the upper left box describes where you are in the software, the upper right box gives brief help and error messages, while the lower box describes what each "F" key does on that page:

KEYBOARD INFO – This is accessed by pressing F1 then F2 from any page. Notice that the UP/DOWN arrows are used to change a value or selection while the TAB and SHIFT-TAB keys are used to navigate around a menu.

Main Menu Operations

MAIN MENU – This is the first screen that is shown when the software is started. Make sure that you execute the ASTROP version and NOT the ASTROM (which is for Mobile-Vehicle Radios). From this page, all other sections of the software may be accessed.

F3 GET/SAVE/PROGRAM/CLONE – Gateway to the submenu for Archive loading from Disk or from radio, Archive Saving to disk or to a radio, and cloning from one radio into another.

F4 CHANGE/VIEW – Gateway to the submenus for viewing or changing the makeup of the Archive that is currently loaded into active memory.

F5 PRINT – Gateway to the submenu that controls the Print function for the Archive that is currently loaded into active memory. Since this is a DOS based program, printing is best accomplished using an older Dot Matrix printer.

F6 FILE MAINTENANCE – Gateway to the submenu that allows BASIC Archive file maintenance on disk. (Remember, this is a DOS based program!)

F9 SETUP – Gateway to submenu for setting up the program. Includes such items as file locations and colors of the screen.

Some areas that will NOT be used:

F2 SERVICE – This is used by service personnel align the receiver and transmitter of the ITM.

F8 FLASH UPGRADE – this is used by technicians to perform updates to the radio feature set.

GET/SAVE/PROGRAM MENU – Displayed by pressing F3 at the MAIN MENU. The following actions are performed here:

F2 READ DATA – This is how you will draw the Archive information out of an existing ITM's codeplug inside an RT-5000. **There is NO need for the RIB (Radio Interface Box).** The RIB technology has been designed into the RT-5000. All that is required is a DB9 female to DB9 Female Cable connected to the serial port of the PC and to the Transceiver programming connector in the aircraft. To start the download, attach the cable, setup the C-5000 for RSS programming (Described elsewhere), and press F2 on this menu. You will see a status bar as the software reads the data from the ITM Codeplug. REMEMBER, there is a separate codeplug inside each ITM inside each RT-5000! Once read, the data will reside in active memory and, if changed, must either be reloaded into the ITM codeplug OR saved to an archive file on disk.

F3 GET CODEPLUG DATA – This menu selection leads to the list of available Archive files on disk. It tries to locate these files in the Directory (Old DOS term for FOLDER) where the RSS program was setup to locate the Archive files.

F5 CLONE RADIO – This is the Gateway to the CLONE Radio feature that allows copying an Archive load that is resident in active memory into another ITM radio Codeplug.

F7 SAVE CODEPLUG DATA – This leads to submenu that allows saving an Archive file to disk.

F8 PROGRAM DATA – Like the F2 function, this is used to program an Archive from active memory into an ITM Codeplug. As with F2, the RIB is not required since the technology is built into the RT-5000 hardware. Simply attach the DB-9 cable between the PC and the Aircraft Transceiver programming connector, setup the C-5000 for RSS programming (Described Elsewhere), and press the F8 button. A progress bar will appear indicating the progress of the load.

F9 RADIO PROGRAM HISTORY – Shows a submenu of the history of the current Archive that is resident in active memory.

ARCHIVE FILES – Displayed by pressing F3 → F3 from the Main Menu. This screen is used to select an Archive from Disk to load into active memory. Functions include:

F2 CHANGE ARCHIVE – Allows you to re-enter the complete Archive path shown at the top of the main display box. Used to find Archives in different directories or drives.

F5 DELETE SELECTED – WARNING – there is NO Undo!

F6 CHDIR UP – Move UP one level in the directory structure on the disk (DOS !!!)

F7 CHDIR DOWN – Move DOWN one level in the directory structure on the disk (DOS !!!)

F8 GET ARCHIVE – Loads the Archive under the highlight into resident active memory for further viewing, editing, or downloading into a radio codeplug.

NEW TRUNKING IDS - Displayed by pressing F3 → F5 from the Main Menu. This is the main screen for CLONING the Archive currently loaded in active memory into other ITM codeplugs. Although the modules



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installed in the RT-5000 support Trunking, not all applications use it, thus there are several items here that will not be used.

To perform a CLONE, have an Archive loaded into resident memory. Set up the C-5000 per instructions located elsewhere in this document to make it ready to communicate with the RSS program. Connect the PC to the RT System programming port (a DB-9 connector located somewhere in the aircraft.) Go to this screen and press F3 to enter the target ITM's MDC UID and ASTRO ID (Only for applicable systems See Below). Then, back on this screen, press F2 to read the target ITM's serial number. Finally, press F8 to activate the CLONE. A status bar will appear indicating progress of the load.

F2 READ SERIAL NUMBER – This is used to read the serial number from an ITM codeplug just prior to activating the CLONE feature.

F3 CONV ID – Gateway to submenus for entering MDC UID and ASTRO ID.

F4 LIMITED CLONE –

F6 DUPLICATE II/Iii – Not Used

F7 SAVE FILE – Same as F7 on the GET/SAVE/PROGRAM MENU

F8 – PROGRAM RADIO – Final step in the CLONE Process. Press this when appropriate data is ready to be downloaded into target ITM codeplug.

MDC DATA CLONING – Displayed by pressing F3 → F5 → F3 from the Main Menu. This screen is a submenu of the CLONE Screen and is used to enter the MDC UID for the target ITM codeplug that is about to be CLONED into. Currently, the only required entry is the PRIMARY ID. Leave the other two fields at all “0”s. The MDC UID should be obtained from your network administrator.

F2 READ SERIAL NUMBER – Same as the F2 on the NEW TRUNKING ID Screen

F4 ASTRO ID – Gateway to the submenu for ASTRO ID Entry .

ASTRO RADIO DATA CLONING – Displayed by pressing F3 → F5 → F3 → F4 from the Main Menu. This is used to enter the ASTRO ID for the target ITM codeplug that is about to be CLONED into. Currently, there should only be one field to enter the ASTRO ID, which should be obtained from a system administrator. Press F10 to exit back to the NEW TRUNKING ID Screen to proceed with the CLONE operation.

SAVE CODEPLUG DATA TO ARCHIVE FILE – Displayed by pressing F3 → F7 from the Main Menu. This is used to save an Archive to the Hard Disk. Your only options here are to change the location of where the file is saved to using the F2 Key, and to assign a name (REMEMBER – DOS has an 8.3 naming convention, which means that the Archive name can contain 8 characters, followed by a “.”, followed by three additional characters. Windows type file names DO NOT WORK!). Press the F8 key when ready to write the Archive to disk that is currently resident in active memory. A status message will appear in the upper right hand box indicating successful writing to disk.

PROGRAMMING HISTORY – Displayed by pressing F3 → F9 from the Main Menu. This is a general information screen pertaining to the Archive that is currently loaded into active memory. The only thing you can do here is to recalculate the size of the Archive by pressing F2. There is no information on this screen that would be of value to Aviation personnel.

CHANGE / VIEW MENU – Displayed by pressing F4 from the Main Menu. This is a multi-level sub-menu that will lead to all sections of the software that control changes or modifications to the codeplug archive. See entries

following this section for further explanation. The TRUNKING Systems Option listed under F4 on this menu are not used at this time.



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RADIO WIDE CONFIGURATION MENU – Displayed by pressing F4 → F3 from the Main Menu. This is the next level of submenu that leads to items that will affect the overall operation of the radio. Currently the PHONE LISTS and OPTIONS (F4) section and the SCAN LIST and OPTIONS (F5) features are not enabled in the RT-5000. The remaining selections will be detailed in the following sections.

RADIO WIDE OPTIONS – Displayed by pressing F4 → F3 → F2 from the Main Menu. There are several options on this page that affect the overall operation of the radio, and there are several submenus that branch further below this page. If a further explanation for any entry is desired, simply highlight that entry and press F1. **NOTE: These are necessary to allow integration of the ITM with the C-5000/RT-5000 system.**

Minimum Volume – 75	Block Pending CA/PC - Disabled
Alert Tones – Enabled	Rotary Switch - Channel
Alert Tone Volume Offset - -12	Mute Tone Operation – Keypad Tones
Self Test Alert Tone – Disabled	Short Keypress Duration - 50
Low Battery	Long Keypress Duration - 1000
TX Chirp – DISABLED	Maximum Channels - 255
Stndby Chirp – 60	Home Mode Selection - Disabled
LED – Enabled	Secure Hardware Equipped - Yes
Out of Range – No Indication	

AUDIO GAIN OPTIONS – Displayed by pressing F4 → F3 → F2 → F3 from the Main Menu. This page controls the Transmit Gain in the various radio modes. All settings on this page should be OFF and should not be changed.

DIGITAL AUDIO OPTIONS – Displayed by pressing F4 → F3 → F2 → F4 from the Main Menu. This page controls Audio indicators that the radio may generate under certain instances of strong or weak signal when operating in the digital mode. Currently, all entries should be set to DISABLED and should not be changed.

RADIO WIDE SECURE OPTIONS – Displayed by pressing F4 → F3 → F2 → F6 from the Main Menu. The settings on this page control the overall behavior of the radio when operating in the secure mode. NOTE: Some of these settings may and will vary depending on the encryption system. Settings should be as follows:

Ignore Sec/Clr Switch When Strapped – NO
XL Encryption – YES
TX Clear Alert Tones – Disabled
Periodic Keyfail Alert Tone – Enabled
Non-XL Scan Unsilence Duration – 275
XL Scan Unsilence Duration – 875
Auto Login – Disabled
Infinite Key Retention – Enabled
OTAR – Enabled
Proper Code Enhancer – Enabled

HARDWARE ENCRYPTION MULTIKEY SCREEN – Displayed by pressing F4 → F3 → F2 → F6 → F3 from the Main Menu. This screen controls the number of User Selectable Encryption Keys, the CKR (Common Key Reference) and Key Names.

MORE MULTIKEY PARAMETERS – Displayed by pressing F4 → F3 → F2 → F6 → F6 from the Main Menu. This page controls additional items necessary for the OTAR and secure functions to operate properly. These are necessary to allow integration of the ITM module with the RT-5000 Flexcomm system. DO NOT make changes to these unless instructed. Further definition of each entry may be obtained by pressing F1 with the entry highlighted on screen. Settings should be as follows:
Display on Secure Switch Select – KEY NAME

Display on PTT – KEY NAME
 Display on Mode Change – KEY NAME
 Key ID Receive Hang Time – 0
 Key ID Transmit Hang Time – 0
 CKR Key Management – ENABLED
 Migrate from Securenet – ENABLED
 Keypad User Selectable – ENABLED
 Erase Previous Keypad On User Change – DISABLED

OTAR SIGNALLING OPTIONS – Displayed by pressing F4 → F3 → F2 → F6 → F7 from the Main Menu. This page controls whether the radio is OTAR capable or not in both the MDC (Analog) or ASTRO (Digital) modes

MDC OTAR OPTIONS – Displayed by pressing F4 → F3 → F2 → F6 → F7 → F4 from the Main Menu. This page controls all radio settings specifically applicable to MDC (Analog) OTAR operations.

ASTRO OTAR OPTIONS – Displayed by pressing F4 → F3 → F2 → F6 → F7 → F5 from the Main Menu. This page controls all ASTRO (Digital) specific OTAR settings

RADIO WIDE EMERGENCY OPTIONS – Displayed by pressing F4 → F3 → F2 → F7 from the Main Menu. This menu is for setting up the emergency features of the ITM. The Silent Alarm feature should remain set to DISABLED.

SURVEILLANCE MODE – Displayed by pressing F4 → F3 → F2 → F8 from the Main Menu. ALL the settings should remain set to NO.

RADIO WIDE OPTIONS – Displayed by pressing F4 → F3 → F2 → F9 from the Main Menu. This menu is listed as MORE OPTIONS on the initial Radio Wide Options Page. These are necessary to allow integration of the ITM with the RT-5000 system. DO NOT make changes to these unless instructed. Further definition of each entry may be obtained by pressing F1 with the entry highlighted on screen. Settings should be as follows:

Ultra Narrow IF Filter – 7.8 Khz	Evacuation Tone - DISABLED
Cyclic Keying – DISABLED	Soft Power Off - DISABLED
Rotary Light Time – 5	Backlight While In VA - DISABLED
Auto Rotary Light – DISABLED	<u>NUM</u> <u>Time Out Table</u>
Factory Overrides – DISABLED	1 Infinite
	2 30
	3 60
	4 120

RADIO WIDE FEATURES CONFIGURATION MENU – Displayed by pressing F4 → F3 → F3 from the Main Menu. The menu entry leading to this menu on the RADIO WIDE CONFIGURATION MENU is listed as BUTTONS, SWITCHES, MENU ITEMS. This is a nested submenu leading to other screens that control radio wide features. The submenus are described in the following paragraphs.

RADIO WIDE BUTTON CONFIGURATION – Displayed by pressing F4 → F3 → F3 → F2 from the Main Menu. These settings should remain as shown below:

<u>Button</u>	<u>Conventional</u>	<u>Trunking</u>
Orange Button	Unprogrammed	Unprogrammed
16 Pos Rotary	Channel Select	Channel Select
Side Button 1	Monitor	Unprogrammed
Side Button 2	Unprogrammed	Unprogrammed
Side Button 3	Unprogrammed	Unprogrammed

HAND HELD CONTROL HEAD BUTTON CONFIGURATION – Displayed by pressing F4 → F3 → F3 → F2 → F2 from the Main Menu. ALL entries should remain set to UNPROGRAMMED.



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RADIO WIDE SWITCH CONFIGURATION – Displayed by pressing F4 → F3 → F3 → F3 from the Main Menu. Settings should be as follows:

<u>Switch Labels</u>	<u>Conventional Feature</u>	<u>Trunking Feature</u>
Two Position Concentric		
Position A	Secure TX Select	Secure TX Select
Position B	Clear TX Select	Clear TX Select
Three Position Toggle		
Position A	TX Low Power	TX Low Power
Position B	Blank	Blank
Position C	Blank	Blank

RADIO WIDE MENU ITEM CONFIGURATION – Displayed by pressing F4 → F3 → F3 → F4 from the Main Menu. This menu sets up some very critical items in order for the RT-5000 to communicate with the ITM.

******VERY IMPORTANT****: THESE SETTINGS MUST BE EXACTLY AS SHOWN !!!!!**

For ITM's without encryption set up as follows:

#	Conv Item	#	Conv Item	#	Trunk Item	#	Trunk Item
1	ZONE	1	ZONE	1	ZONE		
2	CHAN	2	CHAN	2	CHAN		
3	MUTE	3	MUTE	3	MUTE		
4	KEY	4		4			
5	ERAS	5		5			
6	REKY	6		6			
7	DIR	7		7			
8	DIR	8		8			

For ITM's without encryption set up as follows:

#	Conv Item	#	Conv Item	#	Trunk Item	#	Trunk Item
1	ZONE	1	ZONE	1	ZONE		
2	CHAN	2	CHAN	2	CHAN		
3	MUTE	3	MUTE	3	MUTE		
4	DIR	4		4			
5	DIR	5		5			
6	DIR	6		6			
7	DIR	7		7			
8	DIR	8		8			

PHONE CONFIGURATION – Displayed by pressing F4 → F3 → F4 from the Main Menu. There is no provision for phone operations. Therefore, the Man Acc Live Dialing should be set to DISABLED and the Phone Num Display Format set to NONE. Further menus below this screen are not applicable.

SCAN LIST – Displayed by pressing F4 → F3 → F5 from the Main Menu. This menu and its sub-menu is used to configure Scan. The Scan feature is not available. Do not make changes to this screen.

RADIO WIDE DISPLAY OPTIONS – Displayed by pressing F4 → F3 → F6 from the Main Menu. This screen controls various aspects of the display on the ITM. Although there is no actual display, these settings are necessary

to allow the integration to function correctly. Further definition of each entry may be obtained by pressing F1 with the entry highlighted on screen. Settings should be as follows:

Text Justification – LEFT	Alt Display Time - 1000
Channel Size – 9	Temp Msg Display Time - 1000
Zone Text Size – 3	Display Light Time - 5
Slow Scroll Delay – 1000	Auto Light - DISABLED
Fast Scroll Delay – 250	Emergency Receive - DISABLED
Slow Scroll Count – 3	Display SYS/SUB - DISABLED
Talkgroup	Radio Lock - DISABLED
Display on Mode Change – DISABLED	
Display on Receive – DISABLED	
Display on PTT – DISABLED	

CONVENTIONAL MENU – Displayed by pressing F4 → F6 from the Main Menu. This is the primary submenu leading to all aspects of programming for Conventional type channels, whether they are Analog or Digital (ASTRO). The following paragraphs detail the screens accessible from this menu.

CONVENTIONAL RADIO WIDE OPTIONS – Displayed by pressing F4 → F6 → F2 from the Main Menu. This page contains settings that affect all Conventional channels throughout the radio. Two key settings here are the Monitor Type and Latch Enable Timer. They MUST be set to Open Squelch and Disabled respectively for the TEST feature to function properly on the C-5000 control head. Other settings should remain as listed below:

Monitor Type – OPEN SQUELCH
 Latch Enable Tone – ENABLED
 Latch Enable Timer – DISABLED
Smart PTT Retry Timer – 275
Smart PTT Quick Key Timer – 500
Hub Defeats PL – DISABLED
Direct Frequency Enabled - DISABLED

Personality Programming (Conventional Analog FM Personalities)

CONVENTIONAL PERSONALITY – Displayed by pressing F4 → F6 → F3 from the Main Menu. All the aspects of any given channel are assigned to a personality numbered 1 through 255. The following three sections will show similar screen shots for each example mentioned above.

Personality Number – This is the sequential number of all personalities programmed into the radio. There are 255 personalities available.

Receive Only – This makes the personality a RECEIVE ONLY channel. This is useful for channels like National Weather and ATIS frequencies. Normally this will be DISABLED except on those special channels mentioned above.

Direct / Talkaround – This selection is ONLY available if a pair of frequencies is entered below signifying that this is a repeater frequency. It controls whether or not this personality may be placed into DIRECT or Talkaround mode. Since the C-5000 is capable of actuating this feature, ALL repeater personalities should have this feature ENABLED.

Time Out Timer – There are 4 available Transmit Time-Out Timers – when transmitting continuously beyond the time specified, the transmit function stops and the user hears a bonk in the speaker. Leave this set to 1-INFINITE.



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Scan List – this selects the scan list to associate with this personality – since Scan is not enabled in the Flexcomm system, leave this set to NONE.

Hot Keypad (DTMF) – Leave this feature DISABLED.

Phone Operation – Leave this DISABLED

Signalling – This controls whether the channel can function as a secure channel. Set this to MDC for all channels that will need voice privacy. Set to NONE for non-secure channels.

MDC System# - Controls what MDC system the radio is operating in .

PTT ID – This setting controls whether or not the UID is transmitted each time the radio is keyed.

RX Voice/Signal Type – This controls whether the channel is capable of operating on Analog, Digital, or both. For Analog only channels, set this to NON-ASTRO.

TX Voice/Signal Type – See above.

Frequency – This is where the actual Receive and Transmit frequencies are entered. **NOTE: The C-5000 PRESET CHANNEL MUST BE PROGRAMMED WITH THIS INFORMATION IN ORDER TO OPERATE PROPERLY.**

Squelch Type – This is used to set the squelch type. CSQ is used to set Carrier Squelch (Radio Unmutes whenever ANY signal is heard on the frequency. DPL is Digital Private Line and is not used. PL is normal Private Line and is the setting used whenever an actual PL tone code is to be entered. Additionally, the Transmit Squelch type has the setting of DISABLED which means that NO PL Tone Code is transmitted.

Code – This is where the actual PL Tone Frequency OR Tone Code is entered. Only one format need be entered as the software will translate frequency into code and vice versa.

DPL Invert – Used for Digital PL – Not used at this time.

CONVENTIONAL SECURE PERSONALITY – Displayed by pressing F4 → F6 → F3 → F6 from the Main Menu. This page is the sample setup for a secure Analog Personality.

Voice Secure/Clear Strapping – Controls whether the particular personality is forced to CLEAR or Secure transmit. For all personalities needing secure, set this to SELECT. For those personalities never needing secure, set this to CLEAR.

Voice Key Strapping – This allows the user to select among the several encryption keys available after an OTAR process to use for transmitting. It should be set to SELECT.

Voice Key Selection – This setting defines the Default or Preset encryption key for this particular personality.

XL Transmit – controls XL style encryption for transmission. Not used – leave DISABLED.

Scan Select – Leave set to NON-XL

Scan Holdoff Strapping – Leave set to BOTH

OTAR TX – This field controls whether or not OTARs may be conducted on this personality.



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Personality Programming (Conventional P25 Personalities)

CONVENTIONAL SECURE PERSONALITY – Displayed by pressing F4 → F6 → F3 → F6 from the Main Menu. This page is the sample setup for a secure Digital Repeater Personality.

Voice Secure/Clear Strapping – Controls whether the particular personality is forced to CLEAR or Secure transmit. For all personalities needing secure, set this to SELECT. For those personalities never needing secure, set this to CLEAR.

Voice Key Strapping – This allows the user to select among the several encryption keys available after an OTAR process to use for transmitting. It should be set to SELECT.

Voice Key Selection – This setting defines the Default or Preset encryption key for this particular personality. For most USCS personalities, this would be set to “1”. It may be set to “2” for INTEROP type personalities or some special key for special use channels. You will note the appropriate CKR (Common Key reference) from the Hardware Encryption Multikey Screen will automatically appear next to the key number.

Echo Mute Time – Controls how long the radio will remain muted after de-keying the transmitter. Leave set to “0”

DES XL TX Default – Controls XL Encryption – Leave set to DISABLED.

ASTRO OTAR – Enables ASTRO (Digital) OTAR on this personality – leave ENABLED.

OTAR TX – This field controls whether or not OTAR information may be transmitted on this personality. NORMALLY, Repeater channels are usable for conducting OTAR.

CONVENTIONAL PERSONALITY OPTIONS – Displayed by pressing F4 → F6 → F3 → F9 from the Main Menu. This menu controls various additional options for the particular personality:

Smart PTT – This feature is not enabled – Leave set to DISABLED

Tx Power Level – This function is controlled by the Wulfsberg Software. Leave set to HIGH.

Busy LED – Not used – May be left ENABLED

Unmute Type / Mute Type – Leave set to default of UNMUTE, OR MUTE

RX Unmute Delay – Controls how long the radio waits to unmute after reception of valid signal. Leave set to 2 (100 ms) ms.

Reverse Burst TOC – Leave set to ENABLED to signal the receiving radio that transmission is about to end and to mute the speaker. (Factory Default)

Squelch (Fine Tune) – Leave set to “4” until/unless experience dictates a higher setting.

Second LO Side Injection – Leave set to DISABLED

Surveillance Mode – Not used in the Flexcomm integration – leave DISABLED.

RX Emphasis – Leave set to ENABLED (Default)

TX Emphasis – Leave set to ENABLED (Default)

TX Deviation – Transmitter Deviation – Leave set to 2.5 Khz for Digital 12.5 Khz channel spacing.

TX Deviation T/A and Channel Spacing are set automatically.

ASTRO CONVENTIONAL PERSONALITY OPTIONS – Displayed by pressing F4 → F6 → F3 → F9 → F6 from the Main Menu. This page is only accessible on ASTRO personalities and controls items specific to Digital Narrow Band operations. With two exceptions (RX and TX Network Ids), the following settings should remain as standard:

Astro System = 1	Adaptive Power = DISABLED
Digital Modulator Type – C4FM	RX Unmute Rule – Normal Squelch
Call Alert Decode – DISABLED	Emergency Revert – Selected Channel
Call Alert Encode – DISABLED	RX Network ID = xxxxxx
Selective Call Decode – DISABLED	TX Network ID = xxxxxx
Selective Call Encode – DISABLED	Direct Network ID = xxxxxx
	Late Entry Fast Unmute – DISABLED
	Talkgroup – DISABLED

MDC CONFIGURATION MENU – Displayed by pressing F4 → F6 → F4 from the Main Menu. This page depicts a submenu leading to configuration screens for the MDC operations of the radio. Available sub-menus are shown at the bottom of the screen.

MDC SYSTEMS – Displayed by pressing F4 → F6 → F4 → F3 from the Main Menu. This menu controls the setup for MDC (Analog) operations. With the exception of the Primary ID, the settings shown on this screen must remain as depicted. The Primary ID is the Unique ID (UID) assigned to the radio, by radio serial number, when it is first established in the radio network. No two radios may have the same UID.

MDC System – 1

Primary ID – (AS ASSIGNED PER SERIAL NUMBER)	Emergency – DISABLED
Secondary ID – 00000000	
Variable ID – 000	
Leading PTT-ID – ENABLED	
PTT ID Sidetone – ENABLED	
(This controls the tone generated during TX on personalities that transmit the PTT ID.)	
Trailing PTT ID – DISABLED	
Radio Check – ENABLED	
Radio Inhibit – ENABLED	
Status – DISABLED	

Message – DISABLED

MDC SYSTEM OPTIONS – Displayed by pressing F4 → F6 → F4 → F3 → F9 from the Main Menu. This menu controls the timers and settings of the MDC Analog operation. There should be no need to change any of these settings:

MDC System – 1

System Pretime – 600
ACK Pretime – 500
Preamble during Pretime – DISABLED
Inter packet Time – 100
Limited Patience – 60



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DOS (Data Squelch) – ENABLED
 Operation – 1200-1800 Khz
 Coast Time – 267.00
 Sel Call Reset – Auto w/Carr
 Auto Reset Time – 5

CALL LIST TABLE – Displayed by pressing F4 → F6 → F4 → F4 from the Main Menu. This table is for setting up group and individual calling in an MDC Analog system. It is not used blank.

ASTRO CONFIGURATION MENU – Displayed by pressing F4 → F6 → F5 from the Main Menu. This menu is the lead in menu to configure all aspects of ASTRO operations for the radio. Options and sub-menus are as depicted.

ASTRO RADIO WIDE – Displayed by pressing F4 → F6 → F5 → F2 from the Main Menu. All of the settings on this page should remain as shown unless directed otherwise:

Max CAI Data TX Attempts – 4	NUM	DATA GROUP ID
Max CAI Packet Size – 512	1	10000000
CAI Data Response Timer – 3300	2	10000000
CAI Data Min Response Timer – 700	3	10000000
Data Frame Sync Seek Period – 750	4	10000000
Data TX Short Random Range – 50	5	10000000
Data TX Long Random Range – 2000	6	10000000
Data TX Resp Random Range – 1000	7	10000000
Data TX Limited Patience – Infinite	8	10000000

ASTRO SYSTEMS - Displayed by pressing F4 → F6 → F5 → F3 from the Main Menu. This screen configures the particulars of ASTRO Digital operations. All of the settings should remain as depicted EXCEPT the Individual ID. This is the ASTRO ID assigned to the radio by serial number when it is first brought on line in the radio network. It must be unique to the radio.

Astro System – 1

Individual ID – (As assigned per serial number)

Emergency – Enabled
 Emergency Type – Alarm Only
 Acknowledge Alert Tone – Enabled

Preamble Length – 80
 Status – DISABLED

Revert Table

NUM	ZONE	CHANNEL
1	1	1
2	1	1
3	1	1

Message – ENABLED

ASTRO SYSTEM OPTIONS - Displayed by pressing F4 → F6 → F5 → F3 → F9 from the Main Menu. This screen allows entry of additional options and configurations for the ASTRO Mode of operation. All of these settings should remain as shown below:

Astro System – 1
 Talkgroup Hangtime – 0.0000

Emergency
 Priority TX Inhibit – DISABLED

Limited Patience – 53

Polite Retries – 5
 Impolite Retries – 15

Radio Inhibit – DISABLED
Radio Check – DISABLED
CAI Data Registration – ENABLED

Global TX Multiplier – DISABLED
TX Multiplier – 1
Silent Override w/Mon – DISABLED

ASTRO CALL LISTS – Displayed by pressing F4 → F6 → F5 → F4 from the Main Menu. This menu configures group and selective calling features. It is not implemented and therefore should remain blank.

ASTRO CONVENTIONAL TALKGROUPS – Displayed by pressing F4 → F6 → F5 → F6 from the Main Menu. This entire menu is used to configure Conventional ASTRO mode talkgroups, much like trunking. This feature is not supported at this time and therefore this menu should remain empty. Any data shown on the menu is the factory default and may remain.

CONVENTIONAL MESSAGE ALIAS LIST – Displayed by pressing F4 → F6 → F8 from the Main Menu. This is used to configure various short messages to send via the radio. It is not supported in the Flexcomm integration. Any entry showing on this screen is the factory default and may remain.

CONVENTIONAL STATUS ALIAS LIST - Displayed by pressing F4 → F6 → F9 from the Main Menu. This is used to configure various short status messages to send via the radio. It is not supported in the Flexcomm integration. Any entry showing on this screen is the factory default and may remain.

ZONE / TALKGROUP (CHANNEL) ASSIGNMENT – Displayed by pressing F4 → F8 from the main menu. This menu is used to assign any of the possible 255 Personalities to a specific zone and channel. The radio module has the capability of 16 zones each containing 16 channels. While each personality **MUST** be assigned to at least one zone/channel location, there is no requirement that all zone/channel locations be filled.

NOTE: One VERY CRITICAL requirement for the proper integration of the ITM with the Wulfsberg system is that the personality assigned to Zone 1 Channel 1 MUST BE A REPEATER. Any repeater personality will fulfill this requirement.

“F” Keys are used to add additional zones (up to 16) and additional channels (up to 16) within each existing zone. Zones may be given an alpha-numeric name, though this is not required in the C-5000 integration. Additionally, each channel location within a zone may be given an alpha-numeric name. Although it has no functionality in the C-5000 integration, the channel locations within a zone should be labeled with the proper name of the frequencies that are loaded into the respective personality. This will aid greatly in viewing printouts of the codeplug data. If a given zone has more than 8 channels assigned to it, use the page up or page down buttons to slew the display screen to the opposing set of 8 channels within the zone. “F” Keys are also used to move between zones, although you may also place the cursor under the ZONE NUMBER entry and either use the up/down arrow keys or enter a specific zone number to view. All zone/channel entries will be CONV which stands for Conventional (as opposed to Trunking). The Personality Number is derived in the Conventional Personalities section of the RSS software (Main Menu – F4 → F6 → F3). A record must be kept during programming as to what frequency set (channel) is assigned to what zone/channel location.

To add an additional zone, press F2 and then F3. This adds a new zone to the end of the existing zones. If it is desired to insert a new zone between two existing zones, press F2 followed by F2. New zones may also be copied from existing zones by entering the source zone number in the field that states DEFAULT DATA after pressing F2 to add the zone. Zones may be deleted using the F5 key. As with zones, channels may be added to the end of existing channels, inserted between existing channels, and copied from existing channels.

When adding new channels, first generate a new channel location using the F6 key. Then TAB to the CHANNEL NAME and enter the proper name of the channel. Next, TAB twice to the PERSONALITY NUMBER field and enter the specific number of the personality where the channel frequency and related information have been previously entered. Continue to enter new channels until all 16 channel locations in the current zone are full. As the actual display of the ITM is not used, personalities may be assigned to zones and channels sequentially beginning with zone 1 - channel 1 on through zone 16 - channel 16.



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PRINT MENU – Displayed by pressing F5 from the Main Menu. This menu lists the various printouts that the RSS software can generate. The most simplistic printer available will be the best to use. If an old Dot Matrix is available, use that. Simply hook up a printer, and with an Archive resident in memory, press the applicable “F” key shown below. The following printouts are possible:

F3 – Lists the Radio wide buttons, switches, Display Options, Scan and Phone Options

F4 – Related to Trunking – Not applicable to USCS Aviation.

F6 – All Conventional type parameters, all personalities, MDC settings, and ASTRO settings

F8 – List of all Zones and Channels

F9 – Data Summary – Probably the most useful printout, as it gives basic frequency settings of each personality.

FILE MAINTENANCE MENU – Displayed by pressing F6 from the Main Menu. This menu is a VERY CRUDE file maintenance menu for creating new directories on the PC Hard Disk or for Deleting Archive files. It would be MUCH better to ignore this capability and perform all file maintenance tasks inside of Windows using Explorer. Functions available include:

F2 – Create a new directory. (That’s DOS-speak for FOLDER!) - Press this, followed by entry of new directory path, followed by F2 again to finish the directory creation

F5 – Delete Archive file. Press this and the screen will change to a listing of Archive files currently stored on the PC Hard Disk. Highlight the file to be deleted and press F5 again.

SERVICE SOFTWARE CONFIGURATION – Displayed by pressing F9 from the Main Menu. This is the gateway to further menus that allow configuration of the software on the PC. It will cover such things as file locations on the hard disk and colors of the display screen.

F3 – Go to the PC CONFIGURATION Screen

F7 – Go to the SCREEN Color Configuration Screen

CONFIGURE PATHS AND PORT – Displayed by pressing F9 → F3 from the Main Menu. This screen allows configuration of the RSS Software, and testing of the communications between the PC and the ITM. These settings need only be made one time after the software is initially installed and should not require further adjustment. Leave MEMORY OPTIMIZATION = DISABLED. This is used on VERY old PCs. Adjust the COMM PORT setting for the one you will use where the interface cable will be attached to the PC leading to the RT-5000. This is typically COM 1 on a laptop, but may be COM 2. When finished, press F8 to save the configuration to the PC Hard Disk.

SCREEN COLORS – Displayed by pressing F9 → F7 from the Main Menu. This screen allows the various menu entries and highlights on other screens to assume different colors. Simply move the highlight to the area that is to be changed and use the up and down arrows to see what colors are available. As the different color combinations are selected, the screen immediately shows the results. When all the colors have been setup as desired, press the F8 key to save the selections to the PC Hard Disk. The program will then use the selected color patterns until changed.

Glossary

AM – Acronym for “Amplitude Modulation”. In this type of modulation, the amplitude of the signal is varied in proportion to the voice or data input signal. The signal quality can be severely degraded because of lightning or man made electrical noise. AM is only used in the frequency ranges 108 to 152 MHz and 225 to 400 MHz. All air traffic control functions use AM modulation.

Audio Phase – The RT-5000 can invert the phase of the audio signal during transmit or receive. This is sometimes necessary for DPL systems to work.

Bandwidth – A term used to describe the amount of frequency a channel has to transmit a signal. Two of the most common FM channel bandwidths are 12.5 kHz (Narrow) and 25 kHz (Standard). Some special signals, such as military encryption, work best when using 35 kHz (Wide) or 70 kHz (Extra-wide) channels. All of these bandwidths are available in the RT-5000.

Channel – A group of radio characteristics, such as receive & transmit frequencies, modulation, power levels, etc.

CMC – An acronym for Communication Management Controller. The C-5000 is a CMC.

CTCSS – Acronym for “Continuous Coded Squelch System”.

DCS – Acronym for “Digital Coded Squelch”

DES – Acronym for “Digital Encryption Standard”. This is an algorithm by which signals are encrypted.

Deviation – The amount of peak change the RF signal varies from the carrier in proportion to the amplitude of the voice signal.

DPL – Acronym for “Digital Private Line”. Also known as DCS.

DTMF – Dual Tone Multiple Frequency. On a telephone keypad, each row and column have unique audio tones that are sent when a button is pushed. At the receiver, a decoder listens for a row tone and a column tone and can determine from that, which button has been pushed.

Direct – Also known as simplex, car-to-car, and talk-around. This mode of operation allows you to bypass the repeater and talk directly to another radio. Transmit and receive frequencies are the same.

Encryption – Method by which a signal is “scrambled” so that other listeners cannot understand what is being transmitted.

Encryption Key – When encrypting a transmission, the algorithm used to scramble the information requires both the transmitting and receiving devices to have a number. This number is called an Encryption Key. Some systems are limited to one key and others are capable of having multiple keys.

Flexcomm I – First generation of Flexcomm control heads and transceivers. This includes the C-1000 control head and RT-30, RT-138(F), RT-450, RT-406F transceivers.

Flexcomm II – Second generation of Flexcomm control heads and transceivers. This includes the C-5000 control head and RT-5000 multi-band transceiver.

FM – Acronym for “Frequency Modulation”. In this type of modulation, the frequency of the signal is varied from its center point in proportion to the amplitude of the voice or data signal. Most importantly, this type of modulation is not affected by lightning or other atmospheric noise.



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Guard Receiver – Second receiver added to the transceiver to monitor a specific frequency. Some common “guard” frequencies are 121.5, 243, Marine channel 16, and Marine channel 70. However, this optional function can also be used to monitor a dispatch channel, or an important tactical frequency. Some Guard receivers have a single frequency that is set in hardware. Other options, available only in the RT-5000, are a programmable dual channel receiver and a multi-band P25/Trunking compatible unit.

IF Injection – In a superhetrodyne receiver, high frequency signals are progressively lowered in frequency until only the audio is left. This is done by multiplying the RF Signal by a sinewave either above or below the RF carrier. Mathematically this results in an “Intermediate Frequency” (IF) frequency that is the sum and difference of the two signals. The RT-5000 has the capability of having either High (Above) or Low (Below) the signal frequency. What this means is if you have a signal interfering with the desired signal, sometimes the interference can be eliminated by switching either the 2nd or 3rd injection setting.

Interoperability – The ability for different radio systems to communicate with each other directly. For example, when one manufacturer’s radio products will communicate with another’s, they are said to be “Interoperable”.

ITM – “Internal Transceiver Module”. This is the module that is physically placed in the Guard Receiver slot in the RT-5000. This is the part of the radio that can perform P25, encryption, and Motorola Trunking. Each ITM covers a specific frequency band – 138-174, 403-470, 450-520, and 800 MHz. Up to two ITM’s can be put into one RT-5000 however one must be below 400 MHz and one above 400 MHz.

KEYMAT – Another name for encryption key.

KVL – Acronym for Key Variable Loader. It is a Motorola product for loading encryption keys into an encryption capable radio.

Main Receiver – Full function receiver located in every transceiver.

Manual Channel – A special preset channel that allows the operator to manipulate channel information “on the fly” without going into programming mode. On the C-5000 this special channel is labeled “..M” and is located at channel 0.

MODE 1 – Operational mode of the C-5000/RT-5000 system where the operator does not know there is a main and guard located in the transceiver. This simplifies the user interface dramatically. However, only one receiver, the main or the ITM module in the Guard is in operation at one time so only one channel is monitored.

MODE 2 – Operational mode of the C-5000/RT-5000 system where the main and guard receiver are both monitoring frequencies at the same time. The user interface is more complex in that the user must select using the silver “soft” buttons on the C-5000 which channel to display and transmit on.

OTAR – Acronym for “Over The Air Re-key”. Method by which the Encryption Key is transmitted over the radio channel, hence “over the air”.

P25 – Digital Modulation Standard.

Page – The contents of the display. Sometimes called a screen or view.

PL – Acronym for “Private Line”. Also known as CTCSS or sub-audible tone.

Preset Channel – A channel that has been programmed into the memory of a control head or transceiver.

Private – Another name for encryption.

Repeat – This mode of operation uses a ground or air based repeater to retransmit your signal to another radio. Transmit and receive frequencies are different.

RP - Acronym for “Remote Programmer”. Wulfsberg’s software to program the C-5000 with channel information via a connector of the front of the C-5000 is called the RP Software. It is recommended that this method is used whenever possible to program the C-5000 memory. While front panel programming is available for emergencies, using the RP software is less prone to operator errors and automatically provides for memory backup in case on control head failure.

RSS – Acronym for “Radio Service Software”. A PC application used for configuring, uploading, and downloading information into the RT-5000’s Internal Transceiver Modules.

RT System – Another way of saying Receiver/Transmitter System. Most often, the term refers to a single transceiver. However, because the Flexcomm I transceivers can be ganged together and controlled as one radio, it can refer to more than one transceiver. The C-5000 can control up to two RT systems.

RX – Abbreviation for “Receive”

Shadow Key – Special encryption key used to encrypt the keys received during the OTAR process.

Squelch level – Signal level at which the radio will detect a strong enough signal has been detected by the radio and audio is allowed to go to the user.

Transceiver – A radio containing both a transmitter and a receiver, co-located in one box.

Trunking – A term used to describe a communication system that automatically assigns an available channel to the operator. This type of system can improve channel use to the point that more conversations are going on than channels available. There are many different Trunking systems available. Most are proprietary to each manufacturer. In other words, system built by different radio manufacturers will NOT communicate with each other. Only the P25 Trunking standard guarantees interoperability.

TX – Abbreviation for “Transmit”.

Volume – Loudness of a voice signal.



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Appendix A – CTCSS (PL) Tone Codes

C-5000 TONE CODE	TONE FREQ (HZ)	EIA TONE CODE	C-5000 TONE CODE	TONE FREQ (HZ)	EIA TONE CODE
01	67.0	XZ	35	179.9	6B
02	71.9	XA	36	186.2	7Z
03	74.4	WA	37	192.8	7A
04	77.0	XB	38	203.5	M1
05	79.7	SP	39	N/A	N/A
06	82.5	YZ	40	N/A	N/A
07	85.4	YA	41	210.7	
08	88.5	YB	42	218.1	
09	N/A	N/A	43	225.7	
10	N/A	N/A	44	233.6	
11	91.5	ZZ	45	241.8	
12	94.8	ZA	46	250.3	
13	97.4	ZB	47	229.1	
14	100.0	1Z	48	150.0	
15	103.5	1A	49	N/A	N/A
16	107.2	1B	50	N/A	N/A
17	110.9	2Z	51	69.4	
18	114.8	2A	52	159.8	
19	N/A	N/A	53	165.5	
20	N/A	N/A	54	171.3	
21	118.8	2B	55	177.3	
22	123.0	3Z	56	183.5	
23	127.3	3A	57	189.9	
24	131.8	3B	58	196.6	
25	136.5	4Z	59	N/A	N/A
26	141.3	4A	60	N/A	N/A
27	146.2	4B	61	199.5	
28	151.4	5Z	62	206.5	
29	N/A	N/A	63	254.1	
30	N/A	N/A	64	Reserved	
31	156.7	5A	65	Reserved	
32	162.2	5B	66	Reserved	
33	167.9	6Z	67	Reserved	
34	173.8	6A	68	Reserved	

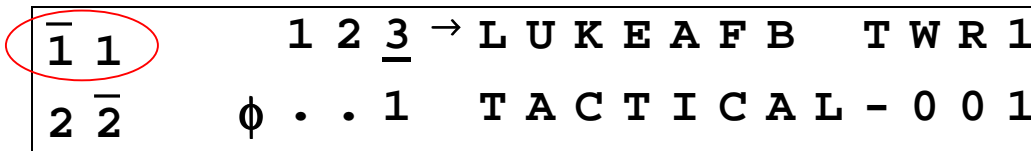


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Setting the Active Transceiver

You can toggle the active transceiver for a radio between Main and Guard by pressing the soft keys. The UPPER SOFT key toggles the active transceiver for radio 1. The LOWER SOFT key toggles the active transceiver for radio 2. The following sequence of illustrations demonstrates this process for radio 1.

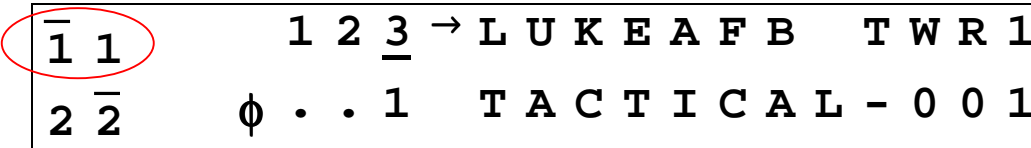
The Main transceiver is currently active.



Pressing the UPPER SOFT key makes the digital transceiver (Guard) active.



Pressing the UPPER SOFT key again makes the Main transceiver active.



Selecting Preset Channels

Selecting preset channels in Mode 2 is conceptually the same as in Mode 1. If an MTM Guard receiver is active, the user can only select preset channels programmed for an ITM, and the main transceiver will only allow you to select channels programmed for a main transceiver. A ramification of this is that you cannot select the manual channel while the Guard receiver is active.

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SECTION 6 -SYSTEM VERIFICATION PROCEDURE

1. General

The following procedure is written for the purpose of verifying the installation of the C-5000 and associated radio systems. It assumes the user has basic knowledge of the operation of the C-5000 in order to perform this procedure. If need be, review the C-5000 operations manual before beginning the procedure. This procedure can be performed without the use of complex test equipment such as audio generators and communication analyzers but does require some kind of transceiver (another aircraft or a handheld) to generate and decode signals.

2. Verify that the Control Head DSUZ mounts are fastened.
3. Verify that the Radio is **FIRMLY** attached to the mounting tray.
4. Verify that all connectors are attached at the control head, the transceivers, and antennas systems.
5. Apply power to the system. Push the "Power ON" button on the C-5000 if necessary. The display should light up with the normal startup message screen (copyright Wulfsberg Electronics etc.). If no errors are found, the display will show the normal operational page.
6. Verify that the C-5000 keypad brightness changes when changing the cockpit panel light. This will only change the keypad brightness, not the display. To verify that the display brightness can be adjusted, use the display brightness adjustment procedure listed in the operations manual.
7. **Load or verify that the C-5000 configuration information has been loaded into the C-5000. This step must be performed or the system will not operate properly.**
Information such as what number and type of transceivers are installed must be entered into the C-5000 configuration. If the RP Software (a PC Based program) is available, use it to download a database of preset channels and system configuration into the C-5000.
8. If an RT-5000 transceiver with an MTM Guard receiver(P/N 400-015525-0611 and higher) is in the system, load channel and frequency information into the transceiver using the Motorola RSS software.
9. Press each button on the C-5000 and verify its function is performed. In addition, verify that the cursor/value knobs turn properly and the "ENTER" button functions.
10. Select Transceiver #1 using the audio panel and the C-5000. Select a valid preset channel for Transceiver #1 or use the manual channel to select valid receive/transmit frequencies. Make sure all necessary switches on the audio panel are enabled. Verify all volume pots on the audio panel are at a normal level. Press the TEST button on the C-5000 keypad. The squelch indicator for Transceiver #1 should light and audio noise should be heard in the headset. Adjust the inner (Small) left volume knob up or down to the desired volume level.
11. Perform Step 6 for all Transceivers in the system. This will verify that all radios are connected, powered up, and able to send audio to the control head.



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12. Using a signal generator or a known available channel, verify that all transceivers can receive normal signals. Standard signals that may be used are air traffic control tower or ATIS frequencies for AM channels (RT-5000 only) and NOAA weather channels for VHF FM frequencies. Verify the frequencies above
13. Select Transceiver #1 using the audio panel and attempt to transmit to a known good receiver (Both the transmitter and the receiver must be using the same frequency). Press the aircraft PTT switch and verify that the C-5000 display shows a transmit condition and that the receiver detects a valid voice signal.
14. Repeat Step 9 for every transmitter in the system.

Please note that when testing the RT-5000 Transceiver, verify that the radio has been put into AM mode if attempting to communicate with a Air Traffic control tower or the ATIS channel. If the radio is accidentally left in FM mode, signal quality will be severely degraded in the both the transmit, and receive functions.

15. If possible take a flight test and determine performance at various altitudes and distances. There is no possible way to predict actual performance since variables such as antenna placement, coax quality, ground station quality are different for every installation. **The key issue is to determine if the system will function acceptably for the user's application.**
16. Verify that the Transceivers in the system do not interfere with each other and other systems on the aircraft such as AM COMS and GPS receivers. If interference exists, adjust antenna locations to maximize distance (horizontal and vertical) between antenna systems.