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F. C-5000 Communication Management Controller Installation Wiring Considerations

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

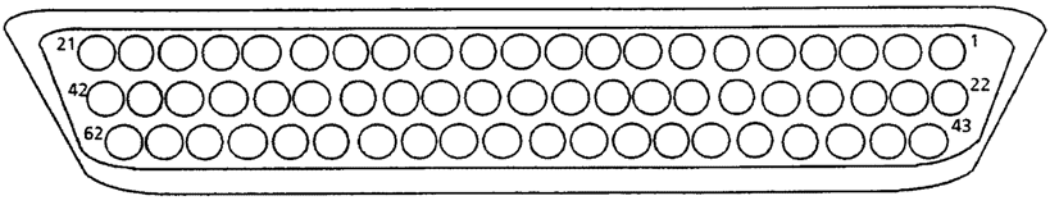

Figure 4-12. C-5000 Transceiver (FLEXCOMM I) Connector P501 or P502

(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	400 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 4-6. C-5000 Transceiver (FLEXCOMM I) Connector P501 or P502

Pin(s) - Signal Name

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

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
157.135	MHz

Unselected channel lines should exceed +8 Vdc.

1, 6, 12, 29, 43 - TONE A, B, C, D, E

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.

23 - MAIN TONE ENABLE

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.

8 - ON/OFF

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

13 - MAIN RX AUDIO DISABLE

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.

Pin(s) - Signal Name

54 - GUARD RX AUDIO DISABLE

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.

58 - MAIN SQUELCH LITE

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

48 - GUARD SQUELCH LITE

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

2 - TX POWER LITE

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

25 - SQUELCH DISABLE

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)

15, 16, 56 RESERVED SPARE

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.

Pin(s) - Signal Name

Some possible uses for these include:

- 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.

62 - CONTROL UNIT GROUND

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

41, 61 - AUDIO HI AND LO

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)

11, 33 - MIC HI AND LO/PTT

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.

39 – TX, Transceiver Or Control

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

45 - EXTERNAL ENCODE IN

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.

Pin(s) - Signal Name

21 - UNSQUELCHED MAIN AUDIO

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.

60 - UNSQUELCHED GUARD AUDIO

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

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

(1) Connector P501/P502

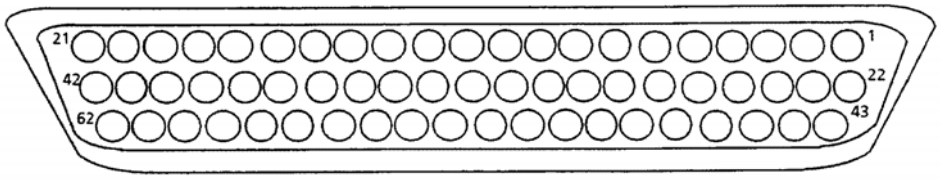

Figure 4-14. Connector P501/P502

(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, RT960OF 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 4-7. C-5000 Transceiver (RT-9600(F)/7200) Connector P50X (P501, P502, or P503)

Pin(s) - Signal Name

13, 14, 15, 16 - AUDIO AND SIDETONE HI AND LO

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.

54 - DF DISABLE

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.

19 - DF AUDIO

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.

12 - UNSQUELCHED MAIN AUDIO

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.

30 - UNSQUELCHED GUARD AUDIO

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.

26 - MAIN AUDIO INHIBIT

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

Pin(s) - Signal Name

25 - EXTERNAL GUARD AUDIO INHIBIT

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

18 - EXTERNAL CTCSS TONE IN

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.

27 - TRANSMITTER POWER SELECT

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.

65, 66 - 14V SWITCHED

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.

64 - PTT OUT

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

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H. Special Options

(1) Take_Control

Two C-5000's can be wired so that they can share the control of a RT-5000. To implement this feature, the installer must make use of the "Take_Control" feature. Please review Figure 4-16 that shows the installation of two C-5000's sharing control of two RT-5000's.

For two C-5000's to share the control of a RT-5000 the aircraft wiring must be made as follows:

a) The wiring harness should have wires going between P501 from BOTH control heads to RT-5000 #1.

b) In addition, Pin 17 from each P501 connector must go to a switch that grounds one or the other Pin 17. When the C-5000 sees a ground on Pin 17 of its P501 connector, it gives up control of the RT-5000 to the other C-5000. The display of the control head without control will indicate "NO CONTROL" on either the top or bottom line of the display depending on if it is Radio #1 or Radio #2 respectively.

NOTE: If a second RT-5000 is also being shared between the two C-5000's the same arrangement must go between P502 connectors AND A SECOND "Take_Control" switch must be installed.

NOTE: Take_Control Switches should be clearly labeled to reduce operator confusion.

(2) Microphone/Headset Configuration

Versions of the C-5000 with part numbers 31300-12XX-XXOO have the primary microphone and headset audio's ports on P500 hardwired to the radio connected to P501. The secondary Microphone and headset ports on P500 are hardwired to the radio connected to P502. The top line of the display indicates the status of the radio connected to P501 and the bottom line of the display indicates the status of the radio connected to P502.

If two C-5000's are sharing radio #1, the primary mic/headset ports of the P500 connectors must be connected together respectively and then tied into the FM1 port (or however its labeled) of the audio panel. Similarly if two C-5000's are sharing radio #2, the secondary mic/headset ports of on the P500 connectors must be connected together and then tied into the FM2 port of the audio panel.

(3) Explanation of Example System

In the example system shown in Figure 4-16 two C-5000's part number 31300-1202-1220 are sharing the control of two RT-5000's. Note the following key elements of the wiring:

a) The wires between P501 of both C-5000's are built in a "Y" configuration and run to RT-5000 #1.

b) The write between P502 of both C-5000's are built in a "Y" configuration and run to RT-5000 #2.

c) Two "Take_Control" switches (one for each transceiver) allow the operator to switch the control of a radio between control heads.

d) The primary headset/microphone audio's on P500 of each C-5000 are paralleled and connected to the FM1 position on the audio panel. The secondary headset/microphone audio's on P500 of each C-5000 are paralleled and connected to FM2 position on the audio panel.

If an operator wants to control RT-5000 #1 with C-5000 #1, they put the Take_Control switch for radio #1 in the position that grounds pin 17 of P501 on C-5000 #2. At this point, C-5000 #2 gives up control of RT-5000 #1 and displays "NO CONTROL" on the top line of its display. C-5000 #1 will now show the status of RT-5000 #1 on the top line of its display **To transmit on radio #1, the operator tunes the audio panel to FM1 and pushes the PTT switch.**

If an operator wants to control RT-5000 #1 with C-5000 #2, they put the Take_Control switch for radio #1 in the position that grounds pin 17 of P501 on C-5000 #1. At this point, C-5000 #1 gives up control of RT-5000 #1 and displays "NO CONTROL" on the top line of its display. C-5000 #2 will now show the status of RT-5000 #1 on the top line of its display **To transmit on radio #1, the operator tunes the audio panel to FMI and pushes the PTT switch.**

If an operator wants to control RT-5000 #2 with C-5000 #1, they put the Take_Control switch for radio #2 in the position that grounds pin 17 of P501 on C-5000 #2. At this point, C-5000 #2 gives up control of RT-5000 #2 and displays "NO CONTROL" on the bottom line of its display. C-5000 #1 will now show the status of RT-5000 #2 on the bottom line of its display **To transmit on radio #2, the operator tunes the audio panel to FM2 and pushes the PTT switch.**

If an operator wants to control RT-5000 #2 with C-5000 #2, they put the Take_Control switch for radio #2 in the position that grounds pin 17 of P501 on C-5000 #1. At this point, C-5000 #1 gives up control of RT-5000 #2 and displays "NO CONTROL" on the bottom line of its display. C-5000 #2 will now show the status of RT-5000 #2 on the bottom line of its display **To transmit on radio #2, the operator tunes the audio panel to FM2 and pushes the PTT switch.**

All the above boils down to the following: To use RT-5000 #1, put the "Take_Control" switch in the position so the operators control head shows the status of RT-5000 #1. To transmit, put the audio panel on FM1. Do the same for transceiver #2 except use Take_Control switch for RT-5000 #2 and then select FM2 on the audio panel.

If an operator wants to control both RT-5000's from one control head, put the Take_Control switches in the position that shows the status of both radios on the control head. Use the FM1 position on the audio panel when talking on RT-5000 #1. Use the FM2 position on the audio panel when talking on RT-5000 #2.

Other Key Points / Operational Considerations:

a) At no time can both control heads EVER tune the same transceiver. Only one control can have control of a transceiver at any time. There is no communication between the two control heads so the head without control will not show anything other than "NO CONTROL".

b) Mic/Headset audio for transceiver #1 is connected to the Primary mic/headset port of P500. To transmit on RT-5000 #1 the user must put the audio panel to the FM1 position regardless of which control head has control of transceiver #1.

c) Mic/headset audio for transceiver #2 is connected to the Secondary mic/headset port of P500. To transmit on RT-5000 #2 the user must put the audio panel to the FM2 position regardless of which control head has control of transceiver #2.

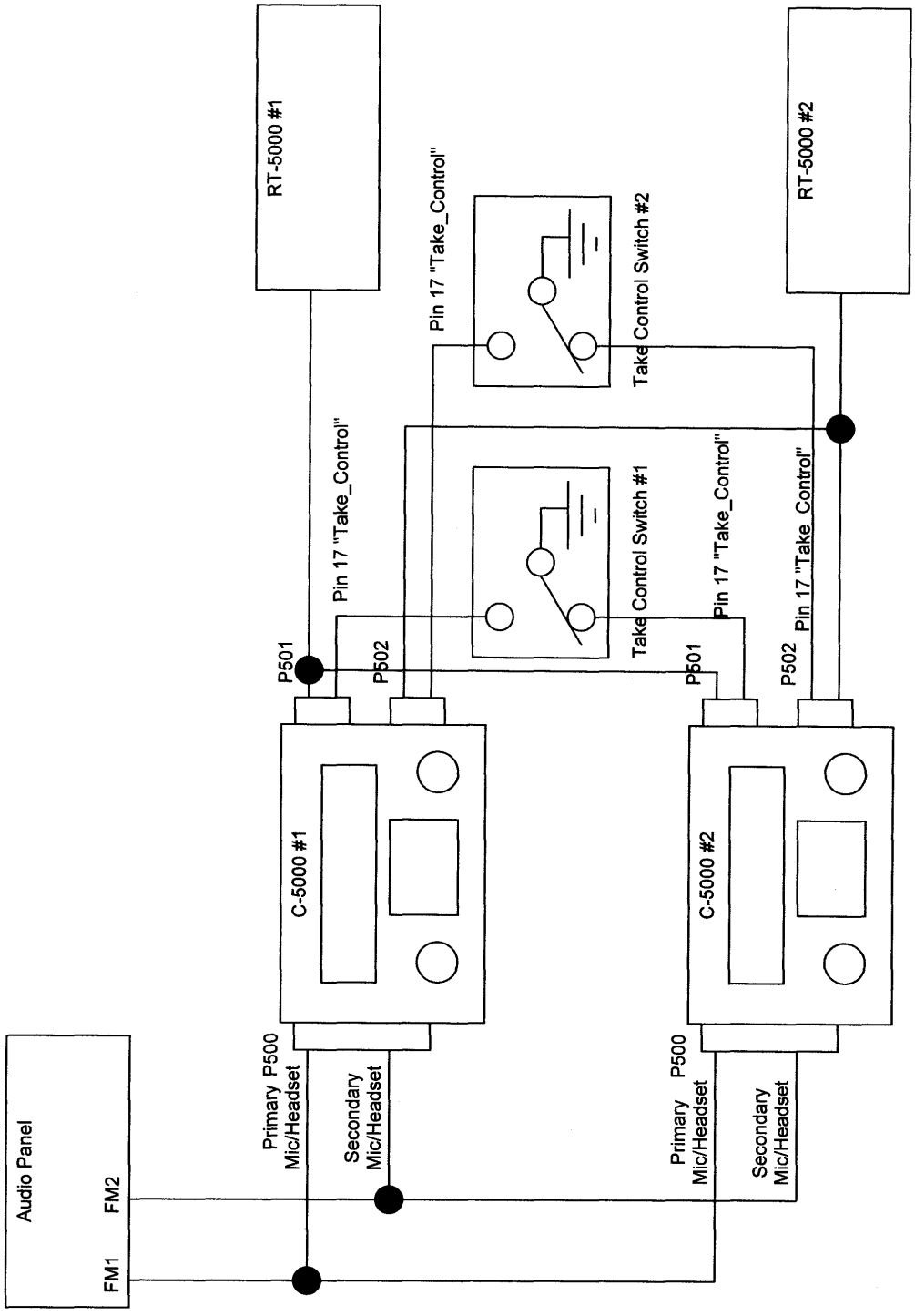

Figure 4-16 Dual C-5000/RT-5000 with Take_Control Block Diagram

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Item	Designator	Description	Wulfsberg P/N Mil Spec P/N
Radio & Control Supplies			
C-5000			
System Interface Connector	P500	D-Sub (62 Pin female, with backshell and two male jackscrews)	PN 129-215344-01
Radio Option 1: Serial Interface Connector	P501 and/or P502	D-Sub (37 Pin female, with backshell and one each female and male jackscrews) (For RT-5000 installations)	PN 129-217474-01
Radio Option 2: Parallel Interface Connector	P501 and/or P502	D-Sub (62 Pin female, with backshell and one each female and male jackscrews) (For all installations except RT-5000)	PN 129-215344-02
Rear Cloning Port (Optional)	P503 (Optional)	D-Sub (9 Pin female, with backshell and two each male jackscrews)	PN 129-2156-000
RT-5000			
Interconnect Harness	J101	Mil-Cir (55 Pin female)	PN 129-216657-01 MS3126F22-55S
KVL Data Port	J1	D-Sub (9 Pin female, with backshell)	PN 129-2156-000
Hi-Split RF Connector	J102	TNC (Plug, straight) for use with RG-393 coax) TNC (Plug, 90 degree) for use with RG-393 coax)	129-041397-01 129-011398-01
Lo-Split RF Connector	J103	N Type (Plug, straight) for use with RG-142 coax) N Type (Plug, 90 degree) for use with RG-142 coax)	129-049112-01 129-049113-01
Tray Option 1		Mounting Tray, Vertical, RT-5000	300-316605
Tray Option 2		Mounting Tray, Horizontal, RT-5000	300-316835
Shock Mounts (Recommended)		Shock Mounts, RT-5000, Vertical or Horizontal Tray	246-017812

Table 4-8. Connectors Used

Item	Designator	Description	Wulfsberg P/N Mil Spec P/N
Non RT-5000 Radio Install Supplies			
Kit	IN-210	Connector & Tray, Flexcomm™ I	149-0059-000
Connector	IN-210-1	Kit Includes: Mil-Circ, 61 Pin female, Flexcomm™ I	149-0059-001
Tray	MT-210	Kit Includes: Mounting Tray, Flexcomm™ I	300-2194-000
Adapter Cable		Single Harness to Dual Radio, Flexcomm™ I	124-041326
Antennas			
AT-50 / AT-51			
Lo-Split RF Connector	J511	N Type (Plug, straight) for use with RG-142 coax) N Type (Plug, 90°) for use with RG-142 coax)	129-049112-01 129-049113-01
Connector	J512	Mil-Circ, 10 Pin male	PN 129-217323-01 MS3126F-12-10S(SR)
AT-140			
Lo-Split RF Connector		N Type (Plug, Straight) for use with RG-142 N Type (Plug, 90°) for use with RG-142	129-049112-01 129-049113-01
AT-400			
Hi-Split RF Connector	J401	N Type (Plug, straight) for use with RG-393 coax) N Type (Plug, 90 degree) for use with RG-393 coax)	129-049115-01 129-049116-01
AT-150/AT-160			
Hi-Split RF Connector	J401	TNC (Plug, straight) for use with RG-393 coax) TNC (Plug, 90 degree) for use with RG-393 coax)	129-041397-01 129-041398-01
Lo-Split RF Connector	J402	N Type (Plug, straight) for use with RG-142 coax) N Type (Plug, 90 degree) for use with RG-142 coax)	129-049112-01 129-049113-01

Table 4-8. Connectors Used (cont'd)

Item	Designator	Description	Wulfsberg P/N Mil Spec P/N
AT-550 / AT-560 / AT-5000			
Hi-Split RF Connector	J401	TNC (Plug, straight) for use with RG-393 coax) TNC (Plug, 90 degree) for use with RG-393 coax)	129-041397-01 129-041398-01
Lo-Split RF Connector	J402	N Type (Plug, straight) for use with RG-142 coax) N Type (Plug, 90 degree) for use with RG-142 coax)	129-049112-01 129-049113-01
Connector	J403	Mil-Circ, 10 Pin male	PN 129-217323-01 MS3126F-12-10S(SR)
Tuners / Logic Converters			
FC-50 / FC-550 / FC-5000			
Connector	J1	Mil-Circ, 19 Pin female	PN 129-217321-01 MS3126F-14-19S(SR)
Connector	J2	Mil-Circ, 3 Pin female	PN 129-217324-01 MS3126F-8-33S(SR)
Connector	J3	Mil-Circ, 10 Pin male	PN 129-214346-01 MS3126F1210P
Special Supplies			
Cloning Supplies			
Kit	C-5000	Cloning Cable & RP_Win Software Kit	149-041389
Kit includes: Software Cable Software Cable	 RT-5000 RT-5000	 RP_Win Software for Windows RP Cloning Cable Motorola CPS Software, RVN4184 CPS, Standard Serial, 9 Pin	 404-041382 124-015911 Available from Motorola Available from local electronics stores
Supplies			
Adapter Cable	RT-5000	Motorola KVL to Flexcomm II Adapter Cable	152-241520

Table 4-8. Connectors Used (cont'd)

Item	Designator	Description	Wulfsberg P/N Mil Spec P/N
Flexcomm I System converting to Flexcomm II System			
Special Adapters			
Adapter Cable		Harness/Transceiver/Antenna Tuner	153-041054
Adapter Cable		C-5000 Parallel to Serial	153-041055
Adapter Cable		FC-5000 to AT-560	153-041056
Adapter Cable		RG-142 Antenna Coax	153-041057
Adapter Cable		RG-393 Antenna Coax	153-041058
Adapter Cable		Flexcomm I Transceiver to RT-5000	124-041326
Adapter Tray		Antenna Mounting	300-341192
Adapter Plate		FC-35 to FC-5000	300-341193
Adapter Plate		Single to Dual, Flexcomm I	300-341194
RT-5000 Antenna / Tuner Mating Chart			
Frequency Band	**Antenna Model**		**Tuner Model**
29.7 – 400 MHz	AT-50	Mates With	FC-50
29.7 – 400 MHz	AT-51	Mates With	FC-50
297 – 400 MHz	AT-140	Mates With	No Tuner Required
400 – 960 MHz	AT-400	Mates With	No Tuner Required
29.7 – 960 MHz	AT-150	Mates With	No Tuner Required
29.7 – 960 MHz	AT-160	Mates With	No Tuner Required
29.7 – 960 MHz	AT-550	Mates With	FC-550
29.7 – 960 MHz	AT-560	Mates With	FC-5000
29.7 – 960 MHz	AT-5000	Mates With	FC-5000

Table 4-8. Connectors Used (cont'd)

SECTION 5 – CONFIGURATION AND PROGRAMMING

1. Introduction

Refer to the Operator's Manual, P/N 150-041102, for more information.

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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.

- Verify that the Control Head DZUS mounts are fastened.
- Verify that the Radio is FIRMLY attached to the mounting tray.
- Verify that all connectors are attached at the control head, the transceivers, and antennas systems.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.

NOTE: If the C-5000 does not allow the input of the specific RT-5000 part number, use the table on the following page for alternative input options.

- 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
- 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.
- Repeat Step 9 for every transmitter in the system.

Note: When testing the RT-5000 Transceiver, verify that the radio has been put into AM mode if attempting to communicate with an Air Traffic control tower or the ATIS channel. If the radio is accidentally left in FM mode, signal quality will be severely degraded in both the transmit and receive functions.

- 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.
- 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.

RT-5000 Alternative Input Options

Actual RT-5000 Part Number	Alternate RT-5000 Part Number
0101	N/A
0201	N/A
0301	N/A
0401	N/A
0501	N/A
0611	N/A
0711	N/A
0811	N/A
0911	N/A
1011	N/A
1111	N/A
1211	N/A
1311	N/A
1411	N/A
1511	N/A
1611	N/A
1711	N/A

Continues…….

RT-5000 Alternative Input Options (cont'd)

Actual RT-5000 Part Number	Alternate RT-5000 Part Number
1811	N/A
1911	N/A
2011	N/A
2111	N/A
2211	N/A
2311	N/A
2411	N/A
2511	N/A
2611	1011
2711	1211
2811	0611
2911	0611
3011	1211
3111	1311
3211	0811
3311	0611
3411	2011

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SECTION 7 - SYSTEM CHECKOUT

1. General

This section contains a system checkout procedure to verify the operation of the C-5000 and transceiver installation. The following procedures are intended to provide sufficient exercising of the system configuration to assure that system parameter selection/control and transmit/receive functions are operating properly.

A. Terms, Definitions and Limitations

If there is only one transceiver connected to the C-5000, ignore instructions in this checkout procedure that apply to transceiver #2.

While the C-5000 is actually just the control head for multiple transceivers, this checkout procedure often refers to the C-5000 system and includes all transceivers and ancillary equipment.

The terms "C-5000" and "Control Head" are used interchangeably within this document.

The terms "transceiver", "radio", and "RT" are used interchangeably within this document.

"Main" receiver or transmitter refers to the part of the RT-5000 transceiver that can communicate over the complete bandwidth of the radio. Every Wulfsberg transceiver has a "Main" receiver/transmitter.

"Guard Receiver" refers to the single channel receiver or multi-band (29.7 to 960 MHz, RT-5000 only) receiver that may be included along with the Main transceiver. This receiver is co-located inside the radio.

"MTM Guard" is a special type Guard that incorporates up to two (2) transceiver modules that are capable of special functions such as Digital Modulation (P25), Trunking, or Encryption. RT-5000 part numbers -0611 through -2811 have this module.

"ITM" or **I**nternal **T**ransceiver **M**odule refers to the individual transceiver modules within the MTM Guard.

There can be one or two ITM's per MTM Guard. Currently, one module must be below 400 MHz (VHFXXX) and the other above 400 MHz (UHFXXX). These modules are capable of BOTH receiving and transmitting. The programming of these units must be performed with software available ONLY from Motorola.

2. System Checkout

A. General

It is absolutely essential that the installer read and understand the operation and programming capabilities of the C-5000 as documented in the C-5000 Operator's manual 150-041102 before attempting to test the installation.

The C-5000 can control up to two radio systems composed of various Wulfsberg radios. It is the responsibility of the installer to understand the capabilities of the individual transceivers and associated antenna systems. The C-5000 must be programmed with configuration information BEFORE it will properly communicate with any transceivers. This programming can be performed either with a PC (Wulfsberg Remote Programming Software and cable P/N 149-041389-0101) or using the front panel buttons and knobs. Not only is it easier to use a PC but it will also provide a backup of all configuration and channel data that is loaded in the C-5000.

B. Checkout Setup

In order to perform system checkout procedures the installer must have a means by which to transmit to and receive from the C-5000 system. While basic talk/listen tests can be performed to qualitatively verify system operation, the manufacturer recommends using calibrated test equipment that will be able to quantify the system quality. To quantitatively verify the C-5000 system the following equipment is required:

- Radio Service Monitor (communications analyzer) capable of AM/FM Modes of operation from 29.7 to 960 MHz.
- 1kHz Sinusoidal source capable of delivering .25 VRMS into a 150 Ohm load. (Most Radio Service Monitors can perform this function.)
- Thru-line Watt meter with 25 watt slugs that can handle 29.7 to 960 MHz (this requires several slugs).
- DC/AC Volt Meter
- Low Ohmage Resistance Meter capable of reading mOhm levels.

C. Checklist

The following checklist should be completed prior to performing checkout procedures.

- External system power (28 VDC, 10 Amps) available.
- All connectors are securely connected.
- Antenna(s) connected to proper transceiver RF ports.
- **C-5000 Operator's Manual has been read and understood.**

D. Checkout Procedure

(1) Check antenna bonding on each antenna in the system by measuring the resistance between the antenna and antenna ground plane using the mOhm resistance meter. No more than 5 mOhms should be measured. If this test fails, check that the mounting surface under the antenna is clear of ALL paint or similar material.

(2) Apply power to the system. If the C-5000 does not turn on automatically, press the "ON" button. If you don't know how to do this, go back at this point and read the Operator's manual. The C-5000 display will show various initialization screens and after a short time display the "HOME" page.

(3) Verify keyboard backlit dimming functions properly if the installation is set up with backlight control.

(4) At this point the C-5000 must have its configuration programmed. Using either the Wulfsberg RP software or the front panel knobs and buttons, program the required system configuration data.

(5) If either of the transceivers is an RT-5000 and has a part number with the last 4 digits greater than -05XX (e.g. -0611, -0711 etc.), the internal transceiver module(s) (ITM) must be programmed using Motorola CPS software. See the C-5000 Operator's manual for detailed instructions on how to put the RT-5000 into the mode that allows a computer to communicate with the Motorola Software. Motorola Software must be purchased from Motorola.

(5) The final programming step is to program the desired preset channels into the C-5000 using either the Wulfsberg RP software or using the front panel knobs and buttons. Start with a limited set that will test the basic operations of the system such as:

- Analog FM Modulation at a frequency in each band: 30-50, 138-174, 225-400,400-512, 806-870.
- AM Modulation at a frequency in each band: 118-137, 225-400.
- P25 or Trunking Modulation in the band specified by the radio part number.
- Encryption if available in the transceiver.

(a) On the C-5000, tune transceiver system #1 to the manual channel. Using the "EDIT" page on the C-5000 tune the manual channel for 30 MHz Rx and Tx frequency, set Tx Power to Hi, and the Bandwidth to "S", no subaudible tone. Press the "HOME" button to return to the "HOME" display page.

(b) Press the "Test" Button and verify the squelch indicator lights up and noise audio is heard in the headsets. Adjust RT #1 volume control (the small knob on the left side) so that the noise can be heard.

(c) If a single channel guard receiver or synthesized guard receiver is present (-0201, -0301, -0401, -0501), select the guard receiver and press the "TEST" button. Verify the squelch indicator lights and audio is heard.

(d) If a MTM Guard receiver is present (-0611 and higher), channel the C-5000 to a channel that uses the VHFXXX ITM, press the "TEST" button. Verify the squelch indicator lights and audio is heard.

(e) If a second transceiver is in the system, put the cursor on the bottom line, select the manual channel for RT #2 and input the same settings that were done to RT #1. Press the "Test" button to open squelch and verify the squelch indicator for transceiver #2 lights and audio is heard. If an audio panel is being used, make sure selector switches are in the correct position to hear both Primary (RT #1) and Secondary headset audio (RT #2).

3. Transmitter Tests

A. General

During transmitter verification tests, monitor any other radios or sensors that are present to determine if interference between them and the C-5000 system exists.

(1) Input a 1 kHz sinewave tone into the primary microphone port and adjust input level for .25 VRMS. **DO NOT RELY ON THE TEST EQUIPMENT SETTING - MEASURE USING AN AC VOLTMETER AT THE MICROPHONE JACK**.

(2) Set the communication analyzer to FM mode. Tune the manual channel on the C-5000 to the frequencies listed in Tables 1.0 through 1.5 (select appropriate transceiver model) and record transmit power and modulation levels at the output of the radio. This will verify the C-5000 is communicating with the transceiver and that microphone audio is getting to the transceiver at the proper level. Verify that the C-5000 indicates a transmit condition by showing the transmit indicator when the PTT is initiated. If modulation is not 3000 Hz +/ 500 Hz, adjust audio panel for more/less output. Also verify transmit frequency is correct.

(3) Remove the audio source and transmit on a selected frequency; verify that sidetone audio is heard in the headset.

(4) Connect the through line Watt meter between the radio and antenna and check forward and reflected power at each of the frequencies listed in the tables below that is appropriate for the type of transceiver being tested. The Reflected power should be less than 30% of the forward power.

(5) Perform Tests 7 - 9 on transceiver #2. Use the secondary mic/headset port for audio input/output.

B. Receiver Verification

(1) Use the communication analyzer to measure receiver sensitivity at the frequencies listed in tables 1.14-1.18 (Select the table based on appropriate transceiver model). Remember that frequencies below 400 MHz use the RT-5000 "N" RF connector and frequencies above 400 MHz use the "TNC" RF connector. Use the manual channel on the C-5000 to tune the transceiver. Verify RT #1 by varying the input signal until 12 dB sinad is measured. The signal level should be < .6μV for all FM Channels. **THE INSTALLER MAY BE REQUIRED TO PRESS THE "TEST" BUTTON TO GET AUDIO OUT OF THE RADIO**.

(2) Perform the same tests on transceiver #2 if available.

(3) With the Antennas connected to their corresponding radios, transmit with the Communications analyzer to all receivers in each radio using an antenna that is located 10-20 feet away from each C-5000 system antenna. Verify that the signal is received with good audio quality, the squelch light operates properly for each receiver.

C. Encryption Verification

(1) If any of the ITM modules use encryption, verify loading encryption keys. See C-5000 Operator's manual for instructions on how to set up the RT-5000 to receive encryption keys (KVL Load).

(2) If the ITM module is capable of performing an OTAR and the location the system checkout can access an OTARable station, test this function on all applicable ITM's.

(3) If an external encryption system is being used, select a channel that accesses the encryption unit, and test receive/transmit encryption capability. Remember to load encryption keys into the unit first. Use a handheld or communication analyzer equipped with your encryption type to communicate with the C-5000 transceivers under test.

4. Installation Checkout Data Tables and Checklist

Date: _____ **Operator:** _____

Installation Number: _____ **C-5000 Part Number:** _____**(31300-1X02-XXXX)**

Transceiver #1 Model #:
(RT-5000, RT-30, RT-138(F), RT-450, RT-406F, RT-9600, RT-7200) _____

Transceiver #1 Part Number: _____

Transceiver #2 Model #:
(RT-5000, RT-30, RT-138(F), RT-450, RT-406F, RT-9600, RT-7200) _____

Transceiver #2 Part Number: _____

Step 1:	**Antenna Conductance Test**
_____	**RT #1 Antenna Resistance (mohms)**
_____	**RT #2 Antenna Resistance (mohms)**
Step 2:	**System Power-Up Test**
_____	**C-5000 Powered On (yes/no)**
Step 3	
_____	**Keyboard Backlight OK (yes/no)**
Step 4	**C-5000 System Configuration Verification**
_____	**C-5000 System Configured (yes/no)**
Step 5	**RT-5000 ITM Information Program Verification**
_____	**RT #1 RT-5000 Programmed with ITM Information (N/A, yes/no)**
_____	**RT #2 RT-5000 Programmed with ITM Information (N/A, yes/no)**

Step 6	**C-5000 Preset Channels Program Verification**
_____	**Preset Channels Programmed into C-5000 (yes/no)**
Step 7	**Transceiver Communications and Receiver audio/indicator Tests**
_____	**RT #1 Main Receiver Squelch Test OK, Volume Adjustable**
_____	**RT #1 Guard Squelch Test OK**
_____	**RT #1 VHFXXX ITM Squelch Test OK**
_____	**RT #1 UHFXXX ITM Squelch Test OK**
_____	**RT #2 Main Receiver Squelch Test OK, Volume Adjustable**
_____	**RT #2 Guard Squelch Test OK**
_____	**RT #2 VHFXXX ITM Squelch Test OK**
_____	**RT #2 UHFXXX ITM Squelch Test OK**
Step 8	**Transceiver Transmit Power and Modulation Tests (Record Data In Tables 7-XX)**
_____	**RT #1 Main Power Output and Modulation OK**
_____	**RT #1 VHFXXX ITM Power Output and Modulation OK**
_____	**RT #1 UHFXXX ITM Power Output and Modulation OK**
_____	**RT #2 Main Power Output and Modulation OK**
_____	**RT #2 VHFXXX ITM Power Output and Modulation OK**
_____	**RT #2 UHFXXX ITM Power Output and Modulation OK**
Step 9	**Transmit Sidetone Verification**
_____	**RT #1 Transmit Sidetone OK**
_____	**RT #2 Transmit Sidetone OK**

Step 10	**Antenna Forward/Reflected Power Tests (Record Data In Tables 7-XX)**
_____	**RT #1 Antenna Forward vs. Reflected Power OK (Record Data in Tables 7-XX)**
_____	**RT #2 Antenna Forward vs. Reflected Power OK (yes/no, see data sheet)**
Step 11	**Receiver Sensitivity Tests and Squelch Opening Verification (Record Data in Tables 7-XX**
_____	**RT #1 Sensitivity Tests OK**
_____	**RT #1 Guard Receiver Sensitivity Test OK**
_____	**RT #1 VHFXXX ITM Sensitivity Test OK**
_____	**RT #1 UFHXXX ITM Sensitivity Test OK**
_____	**RT #2 Sensitivity Tests OK**
_____	**RT #2 Guard Receiver Sensitivity Test OK**
_____	**RT #2 VHFXXX ITM Sensitivity Test OK**
_____	**RT #2 UFHXXX ITM Sensitivity Test OK**
Step 12	**Over the Air Receiver Test**
_____	**RT #1 Receiver OK**
_____	**RT #1 Guard Receiver Test OK**
_____	**RT #1 VHFXXX ITM Test OK**
_____	**RT #1 UFHXXX ITM Test OK**
_____	**RT #2 Receiver OK**
_____	**RT #2 Guard Receiver Test OK**
_____	**RT #2 VHFXXX ITM Test OK**
_____	**RT #2 UFHXXX ITM Test OK**

Step 13	**Internal Encryption Keyload Verification**
_____	**RT #1 VHFXXX ITM Encryption Keyload OK**
_____	**RT #1 VHFXXX ITM Encryption Keyload OK**
_____	**RT #2 VHFXXX ITM Encryption Keyload OK**
_____	**RT #2 VHFXXX ITM Encryption Keyload OK**
Step 14	**OTAR Tests**
_____	**RT #1 VHFXXX ITM OTAR OK**
_____	**RT #1 UHFXXX ITM OTAR OK**
_____	**RT #2 VHFXXX ITM OTAR OK**
_____	**RT #2 UHFXXX ITM OTAR OK**
Step 15	**External Encryption Tests**
_____	**Encryption Unit Accepts Keyload**
_____	**Transmit Encryption OK**
_____	**Receive Encryption OK**

Transmitter Test Data Sheet

Table 7-1. RT-30 Transceiver Test Frequencies

Frequency(MHz)	Power Out (Watts)	Modulation (Hz)	Forward Power	Reflected Power
30.000				
34.110				
41.220				
45.440				
48.880				

Table 7-2. RT-138(F) Transceiver Test Frequencies

Frequency(MHz)	Power Out (Watts)	Modulation (Hz)	Forward Power	Reflected Power
138.110				
142.222				
144.445				
158.887				
160.000				
165.000				

Table 7-3. RT-406F Transceiver Test Frequencies

Frequency(MHz)	Power Out (Watts)	Modulation (Hz)	Forward Power	Reflected Power
406.110				
411.222				
422.445				
444.887				
488.000				
511.000				

Table 7-4. RT-450 Transceiver Test Frequencies

Frequency(MHz)	Power Out (Watts)	Modulation (Hz)	Forward Power	Reflected Power
450.110				
451.222				
462.445				
464.887				
468.000				
469.990				

Table 7-5. RT-5000 Transceiver Lo Split (29.7 to 399.999 MHz) Test Frequencies

Frequency(MHz)	Power Out (Watts)	Modulation (Hz)	Forward Power	Reflected Power
30.100				
50.100				
70.100				
140.100				
173.100				
225.100				
250.100				
300.100				
350.100				
*399.100				

* NOTE: Minimum transmit power is 7.9 W with the exception of above 390 MHz (5 W Minimum).

Table 7-6. RT-5000 Transceiver Hi Split (400 MHz to 959.999) Test Frequencies

Frequency(MHz)	Power Out (Watts)	Modulation (Hz)	Forward Power	Reflected Power
400.100				
450.100				
511.100				
850.100				
930.100				
*959.100				

* NOTE: Minimum transmit power is 7.9 W with the exception of above 940 MHz (5 W Minimum).

RECEIVER TEST DATA SHEET

Table 7-7. RT-30 Transceiver Test Frequencies

Frequency(MHz)	Sensitivity (.6μV)
30.000	
34.110	
41.220	
45.440	
48.880	

Table 7-8. RT-138(F) Transceiver Test Frequencies

Frequency(MHz)	Sensitivity (.6μV)
138.110	
142.222	
144.445	
158.887	
160.000	
165.000	

Table 7-9. RT-406F Transceiver Test Frequencies

Frequency(MHz)	Sensitivity (.6μV)
406.110	
411.222	
422.445	
444.887	
500.000	
511.000	

Table 7-10. RT-450 Transceiver Test Frequencies

Frequency(MHz)	Sensitivity (.6μV)
450.110	
451.222	
462.445	
464.887	
468.000	
469.990	

Table 7-11. RT-5000 Transceiver Lo Split (29.7 to 399.999 MHz) Test Frequencies

Frequency(MHz)	Sensitivity (.6μV)
30.100	
50.100	
70.100	
140.100	
173.100	
225.100	
250.100	
300.100	
350.100	
*399.100	

* NOTE: Minimum transmit power is 7.9 W with the exception of above 390 MHz (5 W Minimum).

Table 7-12. RT-5000 Transceiver Hi Split (400 MHz to 959.999) Test Frequencies

Frequency(MHz)	Sensitivity (.6μV)
400.100	
450.100	
511.100	
850.100	
930.100	
*959.100	

* NOTE: Minimum transmit power is 7.9 W with the exception of above 940 MHz (5 W Minimum).

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C-5000 COMMUNICATION MANAGEMENT CONTROLLER INSTALLATION MANUAL

APPENDIX A – CONTINUOUS AIRWORTHINESS INSTRUCTIONS FOR FLEXCOMM II SYSTEM

1. Introduction

This document contains instructions for testing a FLEXCOMM II system on a periodic maintenance cycle to assure continuous airworthiness. This document is intended to supplement the individual installation and user manuals of the Flexcomm system components. The aircraft maintenance personnel should be in possession of and refer to these manuals during inspections. The Flexcomm system includes a C-5000 control head, a RT-5000, RT-30, RT-138F, RT-450 and/or a RT-406 radio (control of non-current production units such as the RT-7200, RT-9600, and RT-9600F is possible with the C-5000 control head) and suitable antennas. The recommended maintenance cycle is one year.

2. Equipment

To perform the checkout procedures described below, you must have the following:

- o A HP 8920 Communications Service Monitor or equivalent to transmit and receive over the programmed frequencies.
- o An AT-150 or equivalent broad band antenna.
- o Miscellaneous cables and adapters.
- o A handset interfaced to the FLEXCOMM II system.
- o Four wire Ohmmeter.

NOTE: Calibration or internal LRU adjustments are only required on failure condition of the equipment under test.

3. Antenna Verification

The bonding of the antenna and the radio chassis to the airframe should be verified to have an impedance of less than 0.1 Ohm. The VSWR of the combined antenna and coax cable should be measured at the connector to the radio. The VSWR should be no more than the maximum specified antenna VSWR in the operating frequency band of the radio.

Note: On FLEXCOMM II systems with tuned antennas, power must be applied and the C-5000/RT-5000 must be tuned to the frequency of measurement to program the antenna tuner to that frequency. Antenna VSWR is valid only for those frequencies tuned. The frequencies chosen should be representative of the bands used for normal operation.

4. Transmitter Verification

A. Select the manual data entry page.

B. Set the receive frequency to the desired frequency.

C. Set the modulation mode to AM

D. Set the bandwidth to standard.

E. Set the transmit frequency to the desired test frequency.

F. Set the Service Monitor to receive the transmit frequency of the selected channel. Connect the output of the radio under test to the Service Monitor RF input port with a cable less than three feet in length (refer to the Service Monitor User's Manual).

G. Use the handset interfaced to the FLEXCOMM II system to transmit a signal, modulated from the Service Monitor.

H. Measure the output power, output frequency, and percentage modulation (kHz deviation) with the Service Monitor. Verify that the output frequency and power are within specification. Adjust or repair as necessary.

I. Repeat for FM mode (Step 3 above would be FM).

5. Receiver Verification

A. Select the manual data entry page.

B. Set the receive frequency to the test frequency.

C. Set the mode to the proper modulation (FM or AM) and bandwidth.

D. Set the Service Monitor to transmit at the frequency programmed on the test unit with a 1 kHz tone with 3 kHz deviation for FM mode, or 30% modulation for AM mode. If necessary, refer to the user's manual supplied with the Service Monitor.

E. Connect the output of the radio to the RF input port with a cable less than three feet in length. Set the output power of the Service Monitor to the specified sensitivity level of the radio under test.

F. With the proper cables, route the headset audio back into the Service Monitor. Push the test button to open the squelch and measure SINAD. SINAD should be better than 12 dB for FM or 6dB for AM.

G. Increase the RF signal by 10 dB and verify that the squelch gate opens.

H. Repeat (switch FM/AM modes at step 3) for the other mode.

6. Guard Receiver TX Verification

A. There is no manual data entry page for the guard unit. Frequencies programmed must be duplicated on the Service Monitor. Begin at step 6 in Section 4.

7. Verification of the Guard Receive Function

A. There is no manual data entry page for the guard unit. Frequencies programmed must be duplicated on the Service Monitor. Begin at Step 4 in Section 5.

8. Final System Check-out

A. Reconnect the coax cable connecting the radio to the antenna.

B. Place an AT-150 or similar broad band antenna 10 feet from the aircraft antenna. The antenna should be at the same elevation and have the same polarity as the antenna on the aircraft.

C. Connect the antenna to the Service Monitor set to receiver at the desired frequency of test.

D. Transmit over the FLEXCOMM II radio on the test frequency and measure the received signal power.

E. The insertion loss should be between –30 and –40 dB @ 150 MHz. Substitution of the receiving antenna or changes in antenna placement can significantly effect measurement results.

F. Record the actual values measured and the measurement setup. Use this information to track any degradation in the antenna system on future system checkouts.

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C-5000 COMMUNICATION MANAGEMENT CONTROLLER
INSTALLATION MANUAL

APPENDIX B
RAID OH-58 UPGRADE OVERVIEW AND CABLING INFORMATION

1. RAID OH-58 Upgrade Overview and Cabling Information

A. Scope

The following paper describes the process to upgrade the RAID OH-58 aircraft with the RT-5000 Transceiver. Wulfsberg Electronics has developed a set of adapter cables and mounting plates that allow the aircraft to modified in the field without extensive re-wiring or mechanical modification to the airframe. The estimate of time to perform the modification is less than 4 hours. **Actual AWR instructions can only be obtained via U.S. Army resources.**

B. Modification Process

Figure B-1 shows the aircraft in its current configuration. Notice the C-5000 control head controls three single band Wulfsberg transceivers, the RT-30, RT-138F, and RT-406F. Since the 29.7-50 MHz band is rarely used, it has been decided that the RT-30 can be removed and replaced by the RT-5000. The RT-5000 covers 29.7-960 MHz and thus can perform all the functions of the RT-30 plus can be the additional radio in a relay along with the RT-138F or RT-406F(e.g. body wire relay). In addition, it allows for a backup for the VHF-AM and UHF-AM radios already in the aircraft. Also, the RT-5000 has the capability of communicating on the 800 MHz "Community" channels. These are special frequencies set up in every trunking system for the purpose of communicating with non-trunking radios. In this paper, this system is labeled "**Configuration #1**" (See Figure B-2).

The federal government along with some state and local public service organizations are moving to digital communication systems known as P25 (APCO-25). There are models of the RT-5000 that can perform this digital modulation in the VHF 138-174 (Federal Government), UHF 403-470 (Federal & State/Local), UHF 450-512 (State & Local), and 800 MHz band. However, the C-5000 that is used with this model of radio is limited to controlling two transceiver systems. This system is labeled "**Configuration #2"** (See Figure B-3). Notice that the RT-138F and RT-406F have been connected in parallel with a special adapter cable Wulfsberg provides. This allows both radios to still available, however when connected in this manner, only one of the two radios can be channeled at any given time. The easiest way to think of this is that transceiver #2 is "Dual Band" radio, VHF and UHF. Note: The operator can only monitor the RT-138F or the RT-406F at any one time - not both at the same time.

To upgrade the aircraft, the user must first determine the Radio Configuration (#1 or #2) that will be needed. Second, all components must be ordered from Wulfsberg. If a C-5000 or RT-5000 needs to be upgraded, the units must be sent to Wulfsberg. Once the all the system components are delivered, the operator must perform the installation per ARMY AWR instructions. Basically this involves the following steps:

(1) Remove the RT-30 Transceiver, its mounting plate, antenna, and antenna tuner

(2) Install Adapter Cable #1

(3) Install the RT-5000 mounting tray and adapter plate. All holes lineup with existing holes of the RT-30 mounting tray so no drilling should be required.

(4) Install the FC-5000 on the adapter plate and mount in the existing holes of the previously removed RT-30 antenna tuner. No drilling should be required.

(5) Mount the new AT-560 antenna where the old RT-30 antenna was. This does require some drilling of holes (We're good but not that good).

(6) Run the two new coax cables from the radio to the antenna.

(7) Run the Antenna tuning cable from the FC-5000 to the AT-560.

(8) Install Adapter Cable #2.

(9) Configure and program the C-5000.

(10) Verify system performance via test equipment and/or flight testing.

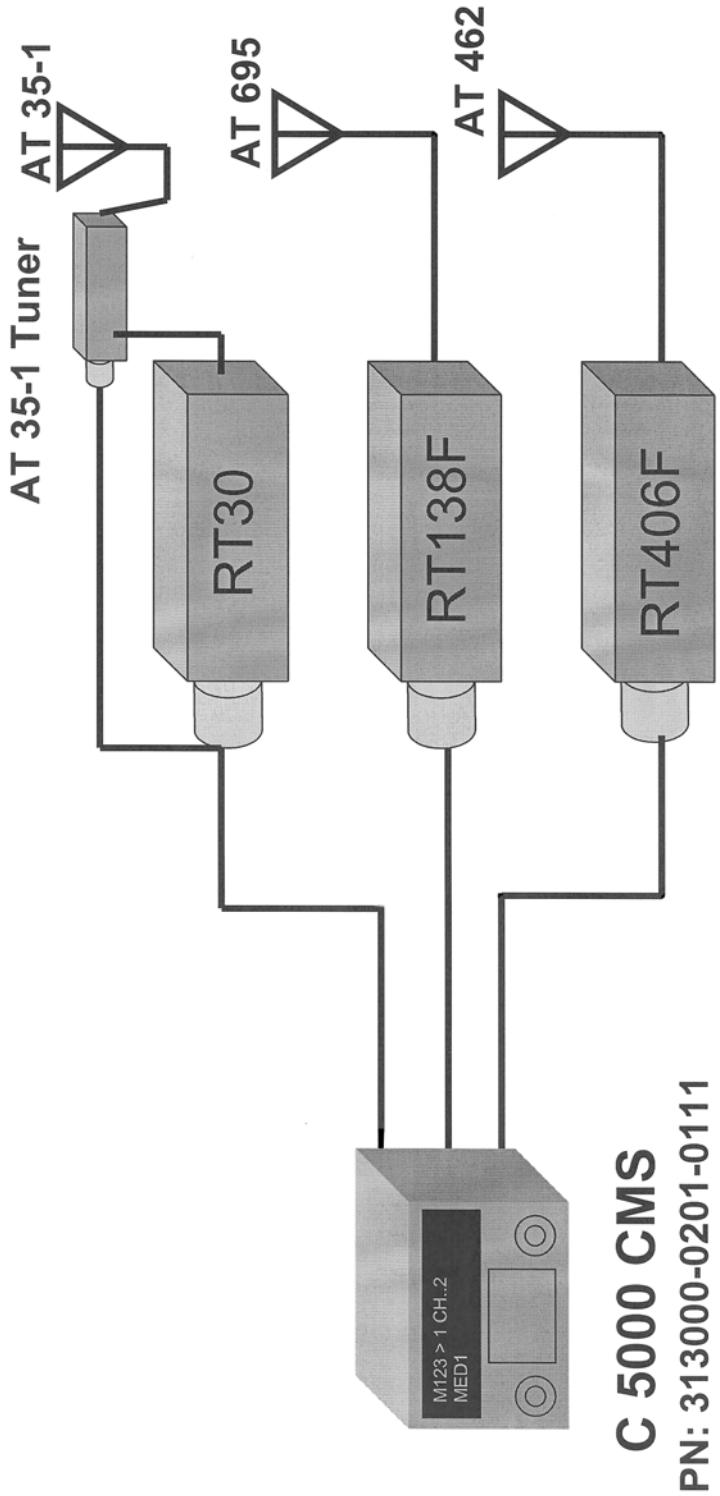

Figure B-1. Current Configuration (Basic RT-5000)

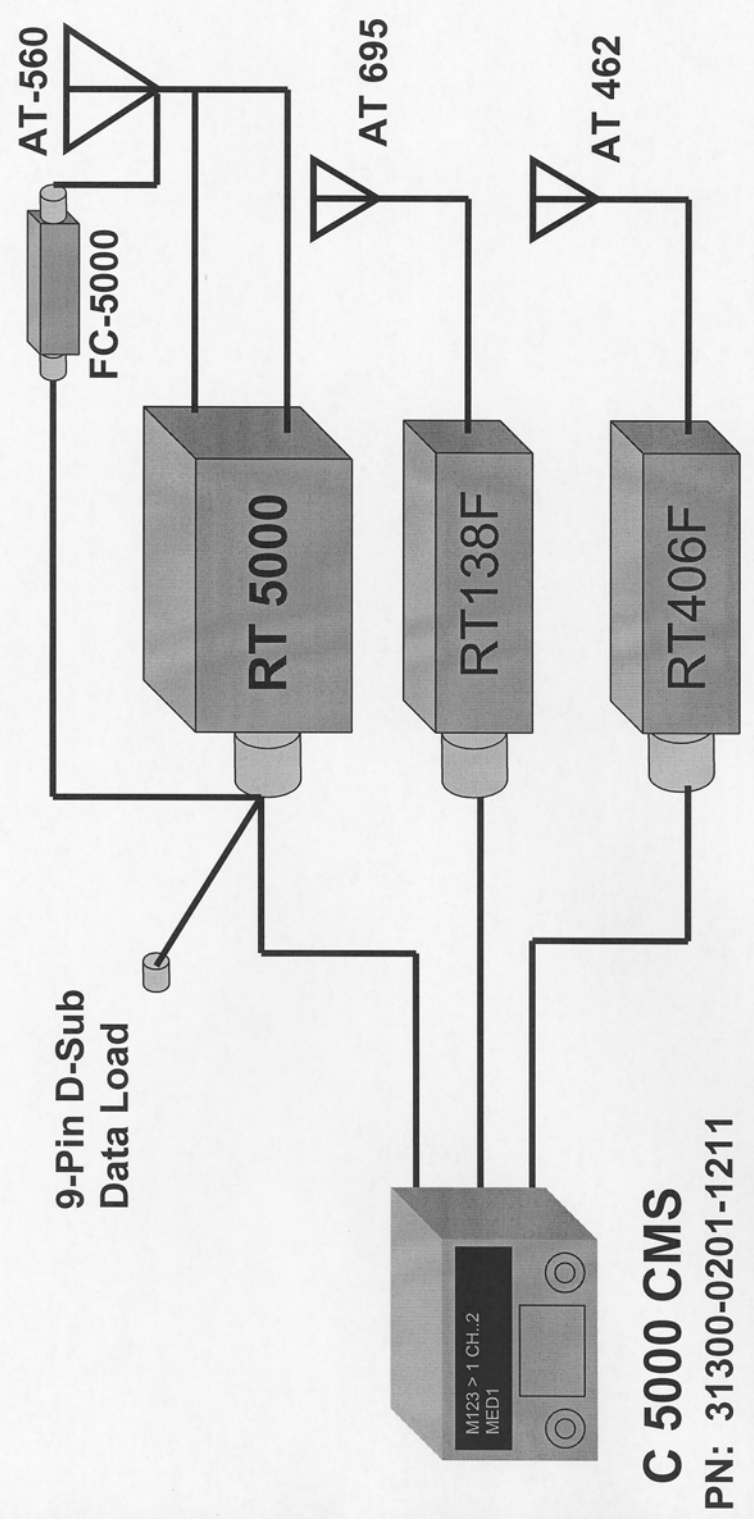

Figure B-2. Configuration #1
(Basic RT-5000)

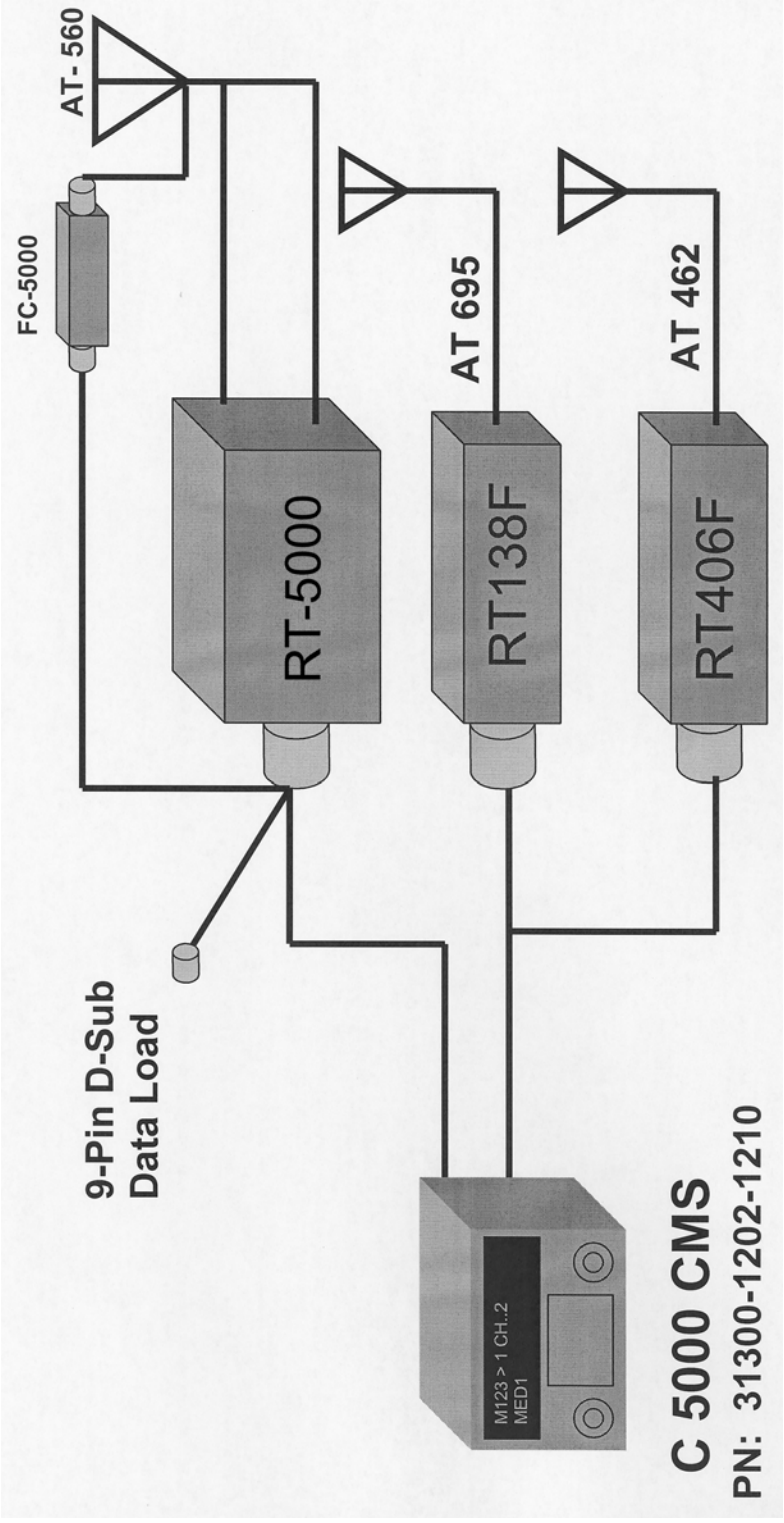

Figure B-3. Configuration #2
(VHF and/or UHF Digital RT-5000)

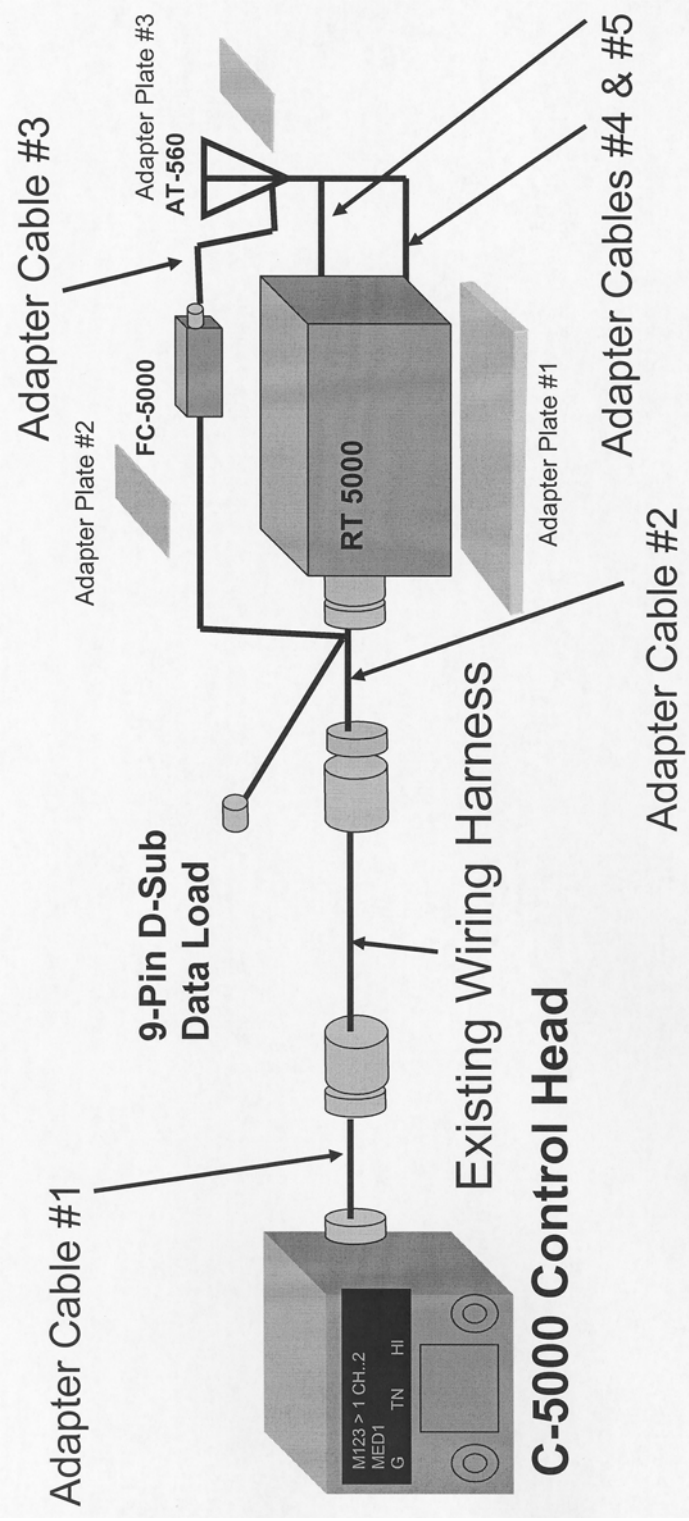

Figure B-4. Adapter Cables & Plates
(Allows use of existing harness)

2. Flexcomm I To Flexcomm II Adapter Kit / Installation Kit

Requires 1 ea of the following ten (10) items (see install instructions)

PART NUMBER	DESCRIPTION
153-041054-01	Adapter Cable, Harness/Transceiver/Antenna Tuner
153-041055-01	Adapter Cable, C-5000 Parallel to Serial
153-041056-01	Adapter Cable, FC-5000 to AT-560
153-041057-01	Adapter Cable, Coax Antenna Cable RG-142
153-041058-01	Adapter Cable, Coax Antenna Cable RG-393
300-341192-01	Adapter Mounting Tray, Flexcomm I Transceiver to RT-5000
300-341193-01	Adapter Plate, Antenna Mounting
300-341194-01	Adapter Plate, FC-35 to FC-5000
D037000Y00	Connector Backshells
124-041326-01	Adapter Cable, Single to Dual, Flexcomm I

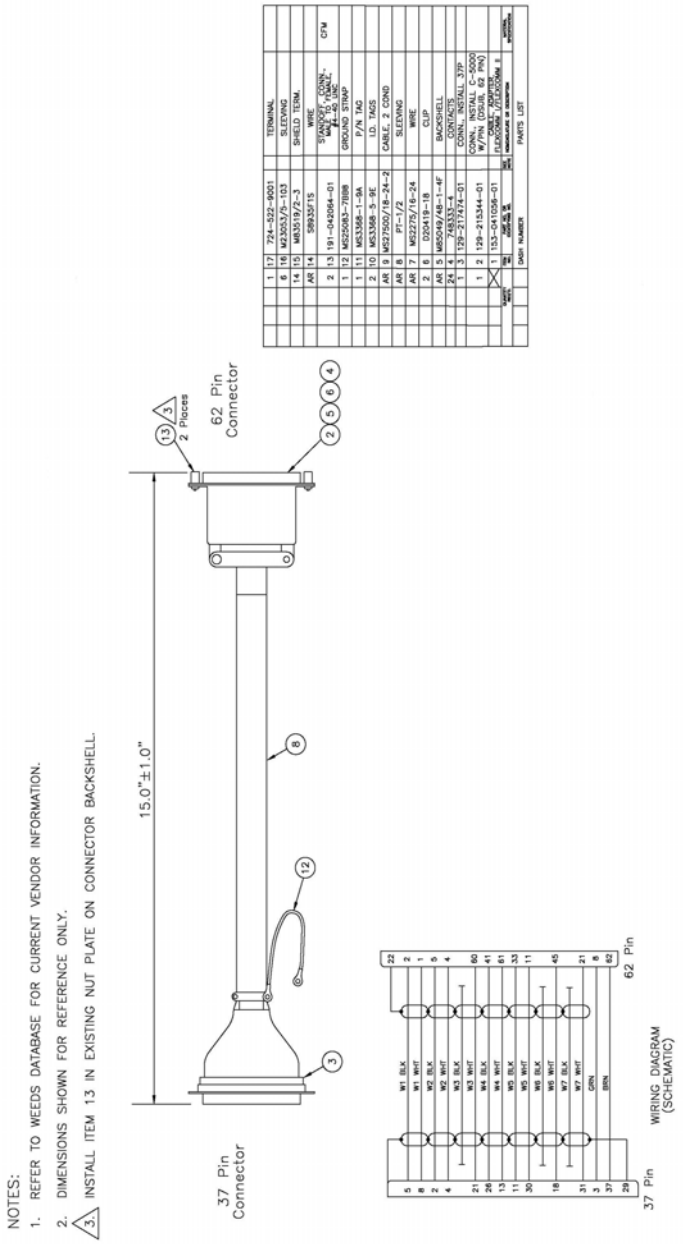

Figure B-5. FLEXCOMM I / FLEXCOMM II Cable Adapter (Sheet 1 of 1)
Dwg No. 153-041056, Rev C

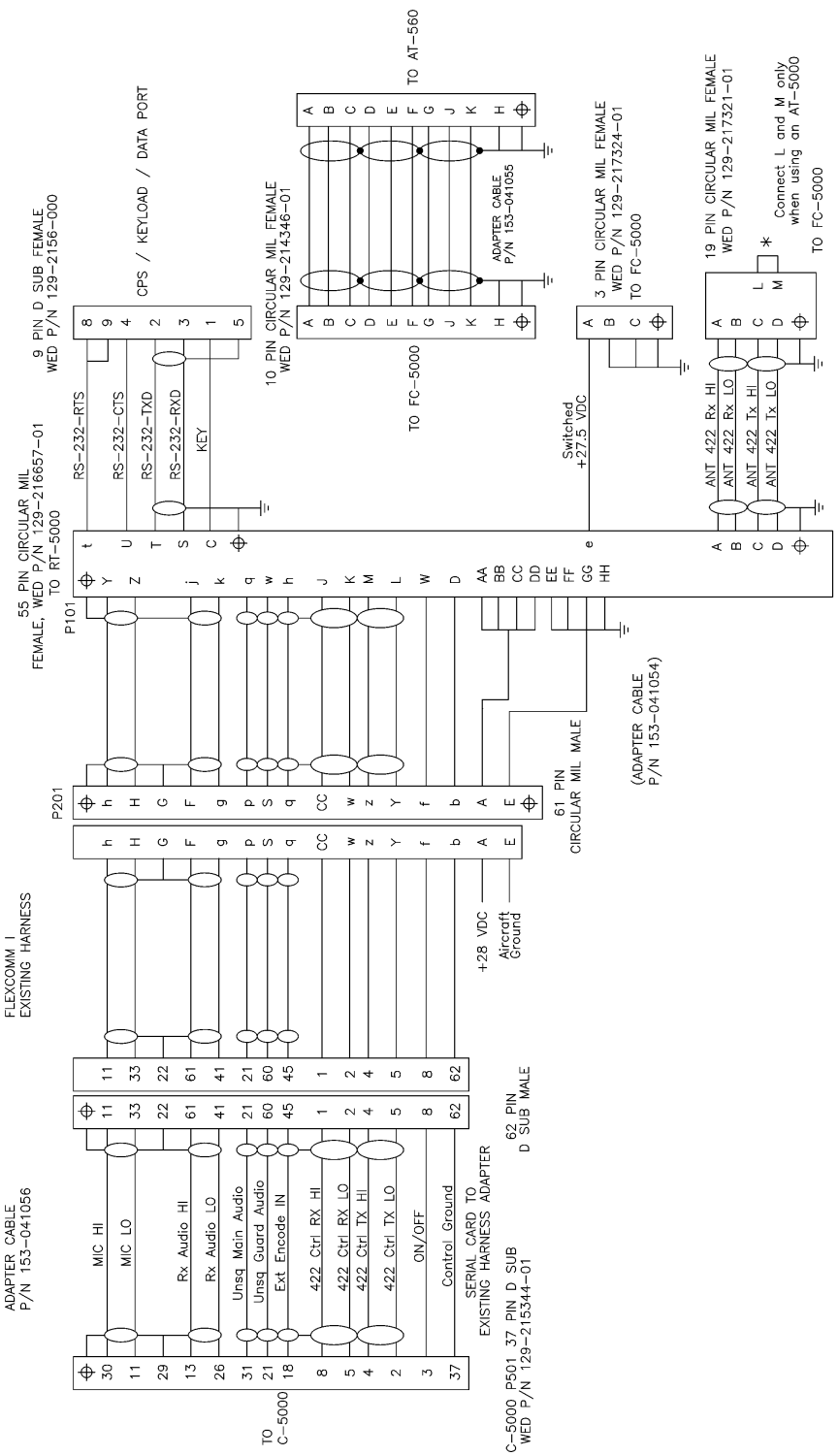

Figure B-6. Installation Wiring Diagram
FLEXCOMM I / FLEXCOMM II Cable Adapters (Sheet 1 of 1)
Dwg No. 152-241316, Rev B

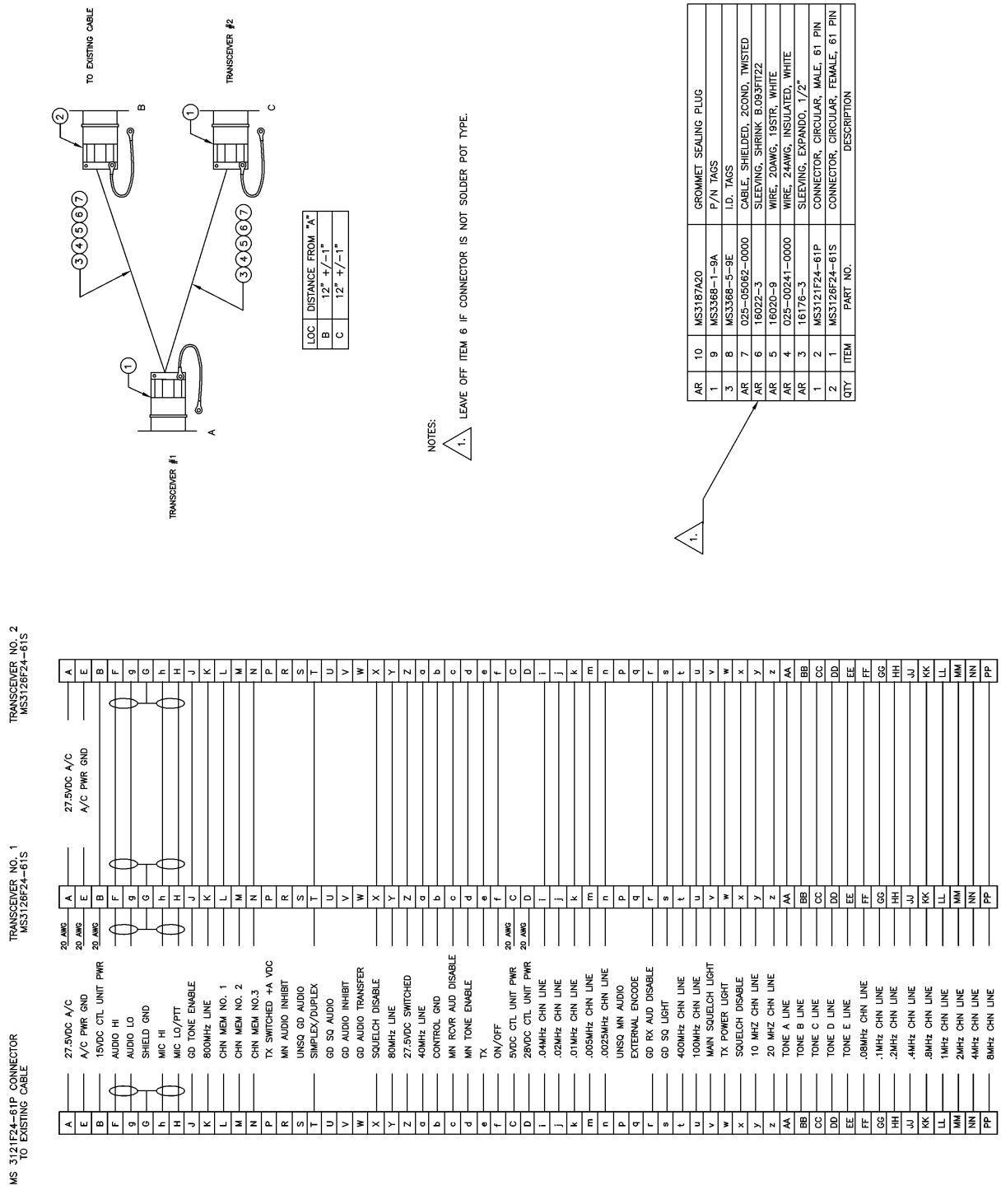

Figure B-7. Cable Assembly
FLEXCOMM I Single to Dual Cable Adapter (Sheet 1 of 1)
Dwg No. 124-041326, Rev C