



IC-FR5000 Series Sales Handbook

NXDN™ CAI-based IDAS™

IDAS™
ICOM DIGITAL ADVANCED SYSTEM



IDAS™ single-site conventional



IDAS™ multi-site conventional



IDAS™ single-site trunking



IDAS™ multi-site trunking

USA/EXP Version

Version 1.4
December 2011

Foreword

This handbook is designed to provide detailed information about the IC-FR5000/IC-FR6000 series VHF and UHF FM Repeaters, based on the Rev.2.20 for the main firmware and the Rev. 2.30 for the IDAS™ Digital unit. Plus, the UC-RF5000 Trunking/Network Controller is based on the Rev.1.10 (#01), Rev.2.12 (#02) and Rev.3.11 (#03) for the main CPU, and Rev.3.3 (#01/#02/#03) for the sub CPU.

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Handbook Revisions

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Company Profile

Icom, the wireless communication experts

Icom Incorporated. is a corporation located in Osaka, Japan, and is a manufacturer of wireless communication products. Since Icom's establishment in 1954, we have had a long record as a trusted manufacturer of land mobile radio, amateur radio, marine radio, navigation products, aviation radio and communication receivers.



Quality & Reliability

Icom quality and Icom reliability

Over 50 years of engineering and production excellence is a part of every Icom product. Using the latest equipment, Icom radios are designed and built to pass rigorous in-house tests as well as environmental tests to the US Military standard 810 specifications. Icom Inc holds ISO9001:2008 certification.



Production

Made in Japan quality

Icom is a rare example of an electronics manufacturer that has not shifted production to lower cost countries, but kept its production base 100% in Japan. The Wakayama Icom plant has an advanced production system to produce flexible volume/multi-model wireless communication products.



Icom brand

Icom, world brand name

Icom is today recognized as a reliable communication equipment brand name around the world. Our land mobile radios are used by many professional organizations all over the world, like the United States Department of Defense and the U.S. Marine Corps, who chose Icom as the first Japanese corporation to supply radios to them.



Network

Icom's worldwide network

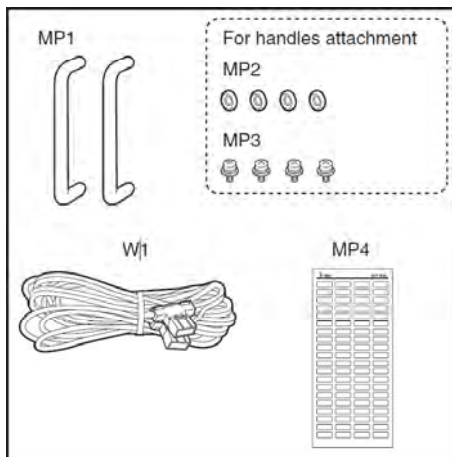
Icom's products are sold in over 80 countries in the world. Icom has an international sales and service network around the world, including sales subsidiaries in the U.S., Australia, Germany, Spain and China. Icom is there to support and service our products and your communication needs.



VHF FM Repeater
IC-FR5000
UHF FM Repeater
IC-FR6000

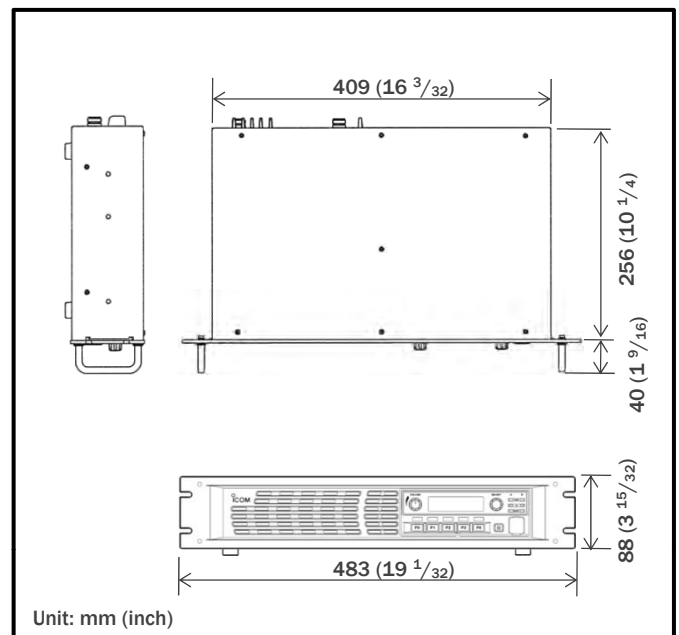


Supplied Accessories



W1	DC Power Cable (OPC-1784)	1
MP1	3063 Handle	2
MP2	3063 H-Spacer	4
MP3	Setscrew (C) (4x12 ZK3)	4
MP4	3063 Key Seal	1

Dimensions



IDAS™ Multi-site Trunking System compatible

The IP-linked multi-site IDAS™ network is now available in the trunking mode. This is designed for high volume, wide area communication, sharing up to 48 sites x 30 channels, to manage large fleets.

Superior receiver performance

The IC-FR5000 series has class leading receiver performance of selectivity and intermodulation rejection. It improves the quality of the repeater service, even under congested band situations.

Two RF modules in one unit

The IC-FR5000 series has an internal space for installing another RF unit. Two RF modules* can be installed and can be programmed and operated independently. LEDs on the front panel show the status of the channels.



UR-FR5000/UR-FR6000
Channel Module

Two RF units can be installed in the unit. (The left side is for the optional module.)

50 watts output at 50% duty cycle, 25W 100% duty cycle operation

Employing a high stability ± 0.5 ppm oscillator and high performance power amplifier, the IC-FR5000 series provides a reliable 100% duty cycle operation with an output of 25 watts. When operated at the high power setting of 50 watts, the repeater operates with a 50% duty cycle.

32 channel capacity and 5 programmable buttons

The 12-digit dot-matrix display, 5 programmable buttons, 32 memory channels and internal speaker allow you to use the repeater as a simple base station, or to check repeater activity.

D-SUB 25-pin accessory connector

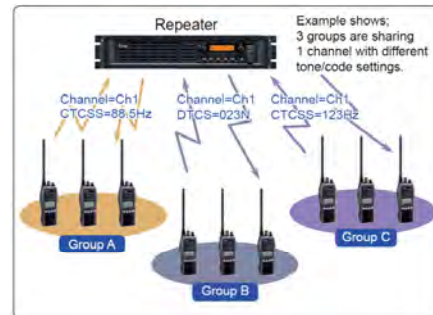
The IC-FR5000 series has a programmable D-SUB 25-pin accessory connector to connect various trunking controllers or external remote control devices. Also, modulation and demodulation signals can be input/output from the D-SUB connector.

19-inch rack mount, 2U height low profile design

The IC-FR5000 series is only 2U high. This low profile configuration allows you to stack multiple units in an industry standard 19-inch rack and provides great space efficiency.

Multiple CTCSS, DTCS tone and RAN code decode

The IC-FR5000 series decodes multiple CTCSS and DTCS as well as digital RAN (Radio Access Number) codes on a per channel basis (up to 16 tones/codes) and downlinks the received signal with a specified tone/code. This function is useful for sharing a channel with multiple groups and provides quiet standby while other groups are using that channel.



Voice scrambler

The built-in inversion type* voice scrambler provides secure conversation. When a more secure system is required, the 32 code non-rolling type voice scrambler UT-109R* or the 1020 code rolling type UT-110R* are available as an option. In the IDAS™ digital mode, the system provides secure communication using a 15-bit digital voice scrambler (about 32,000 keys).

* These voice scramblers are available in only the analog mode. The scrambler system of the UT-109R and 110R are not compatible with each other.

Built-in audio compander (For only the analog mode)

The built-in audio compander improves the signal-to-noise ratio and provides clear audio.

Other features

- Wide Frequency coverage: 136-174MHz for VHF, 350-400MHz, 400-470MHz, 450-512MHz, or 450-520MHz for UHF
- PTT priority setting (Local Mic., external PTT or repeater operation)
- Built-in 5-Tone and DTMF encoder/decoder*
- DTMF remote control from a remote location over the air or over a phone line with DTMF
- CW ID transmitter
- Programmable wide/narrow (25/12.5, 30/15kHz analog channel spacing*).

The FM wide 25KHz channel spacing became unavailable in the USA version models, from firmware revision number 2.1 on.

- Normal and priority scan
- Convenient key assignment stickers supplied
- Quick and easy programming from a PC
- Beat cancel capability
- Low voltage alert

*For only the analog mode

IDAS™ system features & migration path from analog to digital.



IDAS™ is Icom's digital land mobile radio system using the NXDN™ common air interface. IDAS™ offers a complete system of handheld radios, mobile radios, repeaters, network interface/trunking controller, remote communicator and various accessories. IDAS™ is a complete digital solution that system owners and managers can grow into as their own time and budgets allow.



Spectrum Efficiency

The IDAS™ system utilizes 6.25kHz narrowband FDMA technology. This system is not only spectrum efficient, but meets the FCC 2011 mandated narrowband deadline for radio equipment.



Secure Conversation

The digital modulation/demodulation makes it difficult to decode the IDAS™ digital signals using the current scanner receivers at this time. The digital voice scrambler adds security to your conversations.



Audio Quality and Coverage

When compared to an analog FM signal, digital easily outperforms analog in audio clarity at the fringes of the communication range. This provides more reliable audio over a greater total area, even when the coverage footprint is the same as analog FM.



Flexible IP Network

The IDAS™ system integrates IP network capability in the conventional/trunking system and extends your communication coverage. The RC-FS10 remote communicator creates an IP-based virtual radio on a PC, and works as a simple dispatcher.



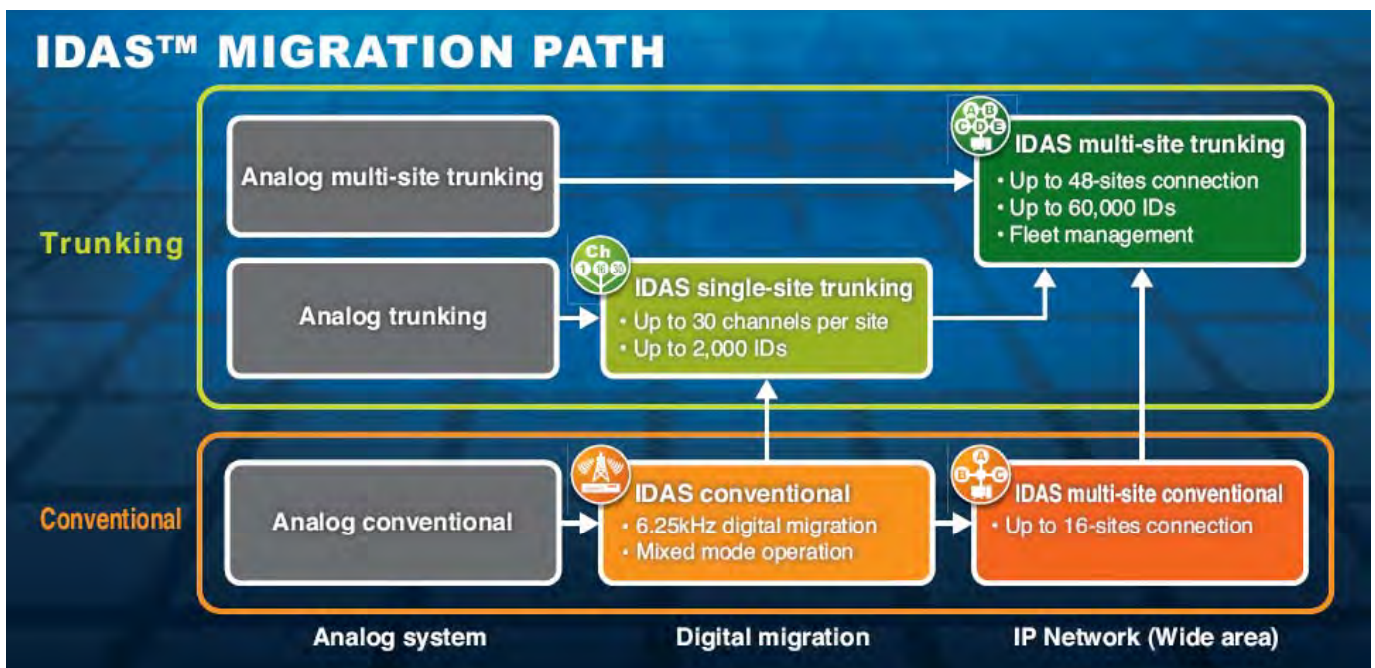
IDAS™ single-site/multi-site trunking

The IDAS™ single-site/multi-site trunking conforms to the NXDN™ type-D trunking protocol. The IDAS™ trunking is a distributed system which does not use a dedicated control channel. It is an affordable digital trunking solution for high volume users.



Flexible Migration Path

The IDAS™ conventional system allows you to scale migration to narrow band digital at your own pace and needs, while running your existing analog system. The IDAS™ radios can receive both analog and IDAS™ conventional mode signals on a single channel.



◆ IDAS™ Function Comparison:

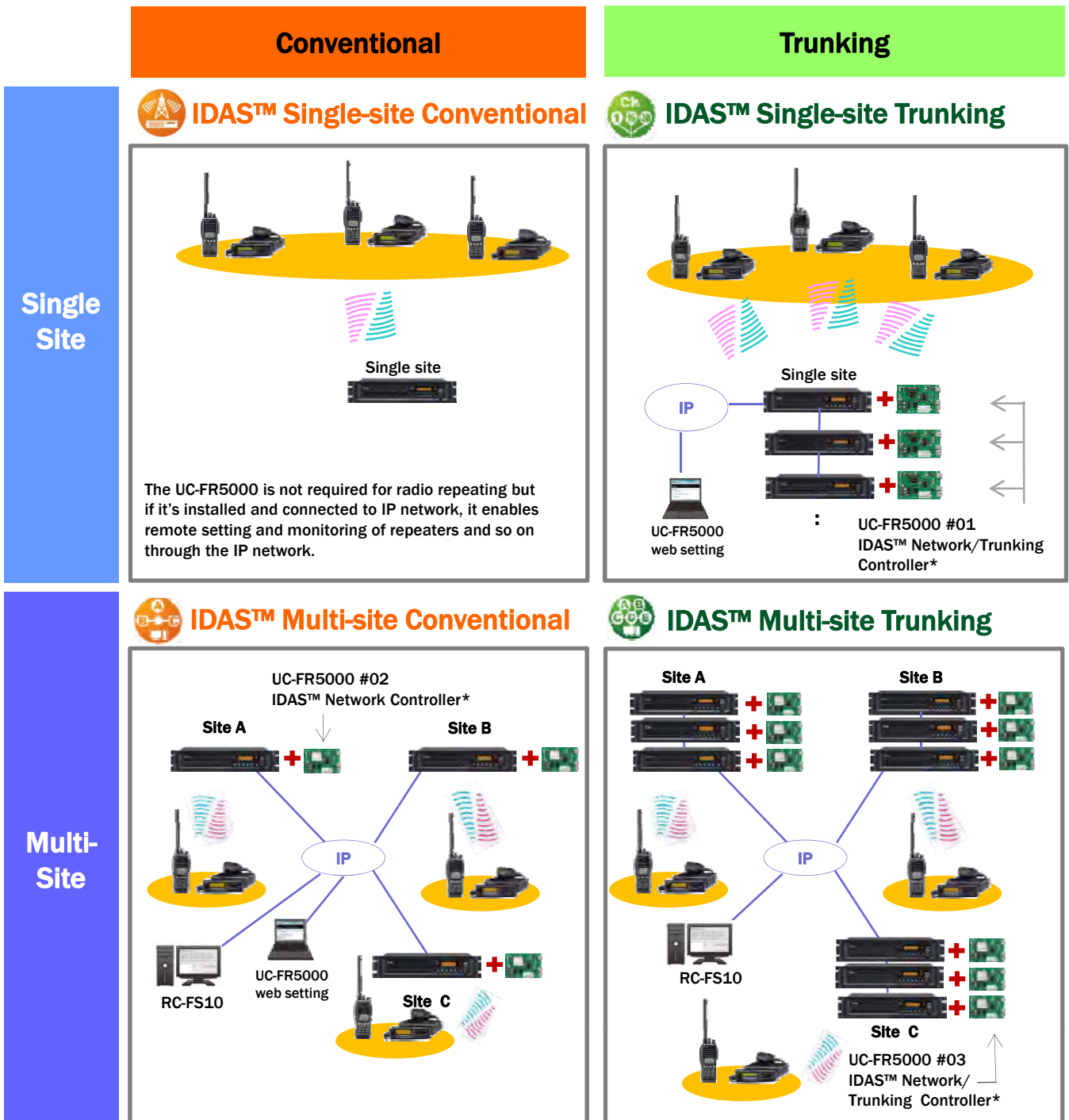
This shows the functions available in NXDN™ CAI based IDAS™ handhelds, mobiles, RC-FS10 and repeaters.

Models Functions	IC-F3161D IC-F4161D	IC-F3101D IC-F4101D	IC-F5061D IC-F6061D	IC-F5121D IC-F6121D	RC-FS10	IC-FR5000 IC-FR6000 (Base mode)
IDAS™ Multi-site Conventional	✓ (Rev.2.0 or later)	✓	✓ (Rev.2.0 or later)	✓	✓	✓
IDAS™ Single-site Trunking	✓ (Rev.2.4 or later)	✓	✓ (Rev.2.4 or later)	✓	✓ (Rev.2.0 or later)	—
IDAS™ Multi-site Trunking	✓ (Rev.4.0 or later)	—	✓ (Rev.4.0 or later)	—	✓ (Rev.2.0 or later)	—
PTT ID	✓	TX Only	✓	✓	✓	✓
Individual List	✓ (Max.500 IDs)	—	✓ (Max. 500 IDs)	✓ (Max. 500 IDs)	✓ (Max. 500 IDs)	✓ (Max. 500 IDs)
Talkgroup List	✓ (Max.500 IDs)	—	✓ (Max. 500 IDs)	✓ (Max. 500 IDs)	✓ (Max. 500 IDs)	✓ (Max. 500 IDs)
Log for Individual Call	✓	—	✓	✓	✓	—
Block Decode	✓	✓	✓	✓	✓	✓
RAN Code	✓	✓	✓	✓	✓	✓
Status	✓	TX Only*1	✓	✓	✓	✓
SDM(Short Data Message)	✓	—	✓	✓	✓	✓
Call Alert	✓	RX Only	✓	✓	✓	✓
Radio Check	✓	RX Only	✓	RX Only	✓	✓
Stun/Revive/Kill	✓	RX Only	✓	RX Only	TX Only	TX Only
Emergency	✓	TX Only	✓	✓ (No ACK TX)	✓	RX Only*3
Remote Monitor	✓	RX Only	✓	RX Only	TX Only	TX Only
Digital Voice Scrambler	✓	✓	✓	✓	✓	✓
GPS Position Reporting	✓	TX Only*2	✓	✓	RX Only	—
GPS microphone	HM-170GP	HM-171GP	—	—	—	—

*1 Power ON/OFF status only. TX: Transmit RX: Receive *2 The IC-F3100D series does not accept a status call including a "GPS request status".

*3 This is only for the individual call. In an Emergency function, no ACK is transmitted in the group call.

IDAS™ IP integration has evolved to work with the IDAS™ multi-site trunking system. IDAS™ is now capable of being configured into various systems, from conventional to trunking in single-site or multi-site. The IC-FR5000 IDAS™ repeaters support the IDAS™ high and entry class terminals of the IC-F3160/D, IC-F3100/D series handhelds and of the IC-F5060/D and IC-F5120D series mobile radios. Now that the architecture of the IP integrated systems is completed, we are sure to offer the best solution to meet the customers' requirements.



* Please see the next page for more information about the UC-FR5000 Network/Trunking Controllers.

2-4-2 IP Network/Trunking Controllers

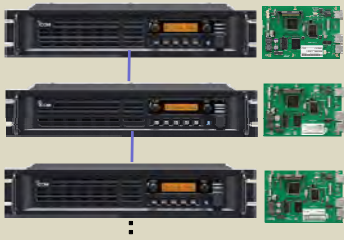
To connect the IDAS™ radios to the IP network, or to use the trunking function, it is necessary to install the UC-FR5000 IP Network/Trunking controller into the repeaters (or RF units). This unit serves both as an interface to the IP network and as a single-site/multi-site trunking controller. As illustrated below and organized in the chart, there are currently three versions of the **UC-FR5000 (#01/#02/#03) IP Network /Trunking Controllers** to be chosen, depending on the system. The use of a compact flash card will upgrade the existing controller to a higher version to fit into a different system.

IDAS™ Single-site Conventional




The UC-FR5000 is not required for radio repeating but if it's installed and connected to IP network, it enables remote setting and monitoring of repeaters and so on through the IP network.

IDAS™ Single-site Trunking



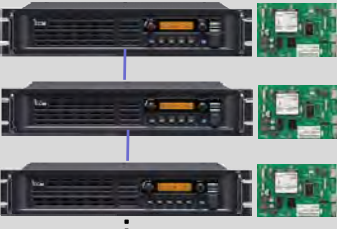
UC-FR5000 #01

IDAS™ Multi-site Conventional






UC-FR5000 #02
or
UC-FR5000 #01 + CF-FR5000MC#02

IDAS™ Multi-site Trunking



UC-FR5000 #03
or
UC-FR5000 #01 or #02 + CF-FR5000MT#04

□ IDAS™ IP Network/Trunking Controller Chart – Capability to enable the system.

System \ Version	UC-FR5000#01 	UC-FR5000#02 	UC-FR5000#03 
IDAS™ Single-site Conventional	/		
IDAS™ Single-site Trunking	✓	✓	✓
IDAS™ Multi-site Conventional	✓ (+CF-FR5000MC#02)	✓	✓
IDAS™ Multi-site Trunking	✓ (+CF-FR5000MT#04)	✓ (+CF-FR5000MT#04)	✓

✓ = Capable A compact flash card is required to upgrade the controller.

2-5 Function and Specifications

2-5-1 VHF FM Repeaters

Model No.		IC-FR5000	IC-FR5000
Version		#01	#03
Destinations		USA-01	EXP-01
Type Approval		FCC	Local T/A
Function Comparison			
CTCSS		✓	✓
DTCS		✓	✓
2-Tone		-	-
5-Tone		✓	✓
DTMF Autodial		✓	✓
DTMF Decoder		✓	✓
6.25kHz digital		✓	✓
IDAS™ Multi-site Trunking		UC-FR5000 #03 ^{*1}	UC-FR5000 #03 ^{*1}
IDAS™ Multi-site Conventional		UC-FR5000 #02 ^{*2}	UC-FR5000 #02 ^{*2}
IDAS™ Single-site Trunking		UC-FR5000 #01 ^{*3}	UC-FR5000 #01 ^{*3}
SPECIFICATIONS			
GENERAL	Frequency Range (MHz)		136 ~ 174
	Number of channels		32
	Channel Spacing (kHz)		6.25, 12.5, 7.5, 15, 30 ^{*4} 6.25, 12.5, 25
	Type of emission (*VHF EXP version only)		16K0F3E, 11K0F3E/F7E/F7D/F7W, 8K50F3E* 4K00F1E/F1D/F3E
	PLL channel step (Unit: kHz)		2.5, 3.125
	Frequency stability		+/- 0.5ppm
	Antenna impedance		50Ω (Type-N x 2)
	Operating temperature range		-30°C to +60°C; -22°F to +140°F
	Power supply requirement		13.6V DC (Negative ground)
	Current drain	Tx	50W
Rx		Stand-by	500mA (typical), 400mA(FAN,LCD backlight off)
		Max. audio	1.9A (typical)
Dimensions (W × H × D) (projections not included)		483 × 88 × 260mm, 19.02 × 3.46 × 10.24inch	
Weight		5.6kg; 12.3lb	
TX	RF output power (High)		50 watts adjustable to 5 watts (25 watts at 25°C, 100% duty cycle)
	Maximum frequency deviation		Wide: +/-5.0kHz Narrow: +/-2.5kHz
	Spurious emissions		80dB (typical)
	Adjacent channel power		Wide:76dB (typical), Narrow: 69dB (typical), Digital: 65 dB (typical)
	FM hum and noise		Wide: 52dB (typical) Narrow: 49dB (typical)
	FSK error		Digital 5% Max.
	Audio harmonic distortion		1% (typical) (40% deviation)
	Microphone impedance		600Ω (8 pin modular)
RX	Sensitivity		Wide/Narrow:0.30μV (typical) at 12dB SINAD Digital:0.25μV (typical) at 5% BER
	Adjacent channel selectivity		Wide:80dB (typical), Narrow:56dB (typical), Digital:63dB (typical)
	Spurious response		Wide/Narrow:90dB (typical), Digital:90dBμV (typical).emf
	Intermodulation rejection		Wide/Narrow:78dB (typical), Digital:75dBμV(typical).emf
	Hum and noise ratio		Wide:52dB (typical), Narrow:50dB (typical), Digital:66dB (typical)
	Audio output power		4 watts (typical) at 5% distortion with a 4Ω load
	External speaker connector		2 conductor 3.5 (d)mm/(1/8"), 4Ω

Specifications are measured in accordance with TIA-603-B (for Wide and Narrow) or EN 300 166 (Digital) for IC-FR5000. All stated specifications are subject to change without notice or obligation. UR-FR5000 series has the same specification except for Dimensions:176(W) x 60(H) x 194(D)mm and weight:2.2Kg.

Note*¹: Or the UC-FR5000#01 or #02 controller with the CF-FR5000MT#04 compact flash card is also usable.

Note*²: Or the UC-FR5000#01 controller with the CF-FR5000MC#02 compact flash card is also usable.

Note*³: Or the UC-FR5000#02 or #03 is also usable.

Note*⁴: The FM wide 25KHz channel spacing became unavailable from firmware revision number 2.1 on.

Model No.	IC-FR6000	IC-FR6000	IC-FR6000	IC-FR6000	IC-FR6000	
Version	#01	#11	#08	#03	#13	
Destinations	USA-01	USA-02	EXP-03	EXP-01	EXP-02	
Type Approval	FCC	FCC	Local T/A	Local T/A	Local T/A	
Function Comparison						
CTCSS	✓	✓	✓	✓	✓	
DTCS	✓	✓	✓	✓	✓	
2-Tone	-	-	-	-	-	
5-Tone	✓	✓	✓	✓	✓	
DTMF Autodial	✓	✓	✓	✓	✓	
DTMF Decoder	✓	✓	✓	✓	✓	
6.25kHz digital	✓	✓	✓	✓	✓	
IDAS™ Multi-site Trunking	UC-FR5000#03*1	UC-FR5000#03*1	UC-FR5000#03*1	UC-FR5000#03*1	UC-FR5000#03*1	
IDAS™ Multi-site Conventional	UC-FR5000#02*2	UC-FR5000#02*2	UC-FR5000#02*2	UC-FR5000#02*2	UC-FR5000#02*2	
IDAS™ Single-site Trunking	UC-FR5000#01*3	UC-FR5000#01*3	UC-FR5000#01*3	UC-FR5000#01*3	UC-FR5000#01*3	
SPECIFICATIONS						
GENERAL	Frequency Range (MHz)	400 ~ 470	450 ~ 512	350 ~ 400	400 ~ 470	450 ~ 520
	Number of channels	32				
	Channel Spacing (kHz)	6.25, 12.5 *4		6.25, 12.5, 25		
	Type of emission	16K0F3E, 11K0F3E/F7E/F7D/F7W, 4K00F1E/F1D/F3E				
	PLL channel step (Unit: kHz)	2.5, 3.125				
	Frequency stability	+/- 0.5ppm				
	Antenna impedance	50Ω (Type-N x 2)				
	Operating temperature range	-30°C to +60°C; -22°F to +140°F				
	Power supply requirement	13.6V DC (Negative ground)				
	Current drain	Tx	50W			
Rx		Stand-by	500mA (typical), 400mA (FAN,LCD backlight off)			
		Max. audio	1.9A (typical)			
Dimensions (projections not included)	483 × 88 × 260mm / 19.02 × 3.46 × 10.24inch (W × H × D)					
Weight	5.6kg; 12.3lb					
TX	RF output power (High)	50 watts adjustable to 5W (25W at 25°C, 100% duty cycle)				
	Maximum frequency deviation	Wide: +/-5.0kHz Narrow: +/-2.5kHz				
	Spurious emissions	80dB (typical)				
	Adjacent channel power	Wide:73 dB (typical), Narrow: 67dB (typical), Digital 65 dB (typical)				
	FM hum and noise	Wide: 50dB (typical) Narrow: 45dB (typical)				
	Audio harmonic distortion	1% (typical) (40% deviation)				
	FSK error	5% Max. (Digital)				
	Microphone impedance	600Ω (8 pin modular)				
RX	Sensitivity	Wide/Narrow:0.25μV (typical) at 12dB SINAD, Digital:0.25μV (typical) at 5% BER				
	Adjacent channel selectivity	Wide:78dB (typical), Narrow: 56dB (typical), Digital: 63dB (typical)				
	Spurious response	Wide/Narrow:70dB (typical), Digital:65dBμV (typical) emf				
	Intermodulation rejection	Wide/Narrow:70dB (typical), Digital:65dBμV (typical) emf				
	Hum and noise ratio	Wide:50dB (typical), Narrow:45dB (typical), Digital:55dB (typical)				
	Audio output power	4 watts (typical) at 5% distortion with a 4Ω load				
	External speaker connector	2 conductor 3.5 (d)mm (1/8"), 4Ω				

Specifications are measured in accordance with TIA-603-B (for Wide and Narrow) or EN 300 166 (Digital) for IC-FR6000. All stated specifications are subject to change without notice or obligation. UR-FR6000 series has the same specification except for Dimensions: 176 (W) x 60 (H) x 194 (D) mm and weight: 2.2Kg.

Note*1: Or the UC-FR5000#01 or #02 controller upgraded with the CF-FR5000MT#04 compact flash card is also usable.

Note*2: Or the UC-FR5000#01 controller upgraded with the CF-FR5000MC#02 compact flash card is also usable.

Note*3: The UC-FR5000#02 or #03 controller is also usable.

Note*4: The FM wide 25KHz channel spacing became unavailable from firmware revision number 2.1 on.

Some optional accessories may not be available in some countries.

EXTERNAL SPEAKERS



SP-5 :
Large external speaker.
Input impedance : 4 Ω
Max. input power : 6 watts



SP-10 :
Mid sized external speaker.
Input impedance : 4 Ω
Max. input power : 5 watts



SP-22 :
Compact and easy-to-install external speaker.
Input impedance : 4 Ω
Max. input power : 7 watts

MICROPHONE



HM-152 :
Regular hand microphone.



SM-26 :
Desktop microphone

SCRAMBLER UNIT



UT-109R :
Voice scrambler unit, Non-rolling type (32 codes maximum).



UT-110R :
Voice scrambler unit, Rolling type (1020 codes maximum).

CLONING KIT



OPC-1122U :
CLONING CABLE (USB type) Consists of;
• OPC-1122U 250mm
• OPC-1637 (USB cable) 1500mm
• CD (USB driver software)



CS-FR5000 :
Software to program the IC-R5000/FR6000 series VHF/UHF FM REPEATERS.

CHANNEL MODULE



- **UR-FR5000 VHF CHANNEL MODULE** 136~174MHz, 50 watts
- **UR-FR6000 UHF CHANNEL MODULE** 350~400MHz, 400~470MHz, 450~512MHz, 450~520MHz, 50 watts

TRUNKING / NETWORK CONTROLLER BOARD			COMPACT FLASH CARD*	
UC-FR5000 #01 IP Network/Trunking Controller for IDAS™ Single-site trunking	UC-FR5000 #02 IP Network/Trunking Controller for IDAS™ Multi-site conventional (The CF-FR5000MC #02 is preinstalled.)	UC-FR5000 #03 IP Network/Trunking Controller for IDAS™ Multi-site Trunking (The CF-FR5000MT #04 is preinstalled.)	CF-FR5000MC #02 IDAS™ Multi-site conventional upgrading software for UC-FR5000 #01	CF-FR5000MT #04 IDAS™ Multi-site trunking upgrading software for UC-FR5000 #01 or #02

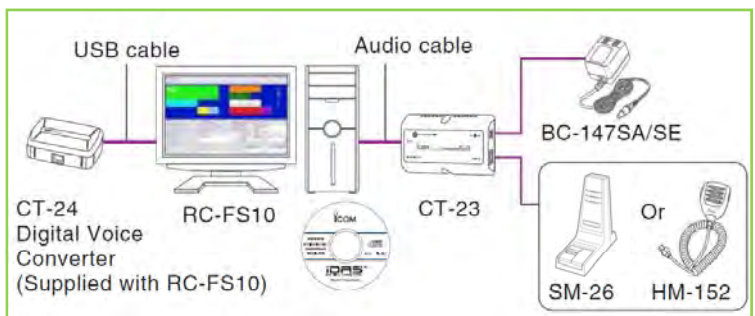
NOTE *: See page 26 on how to insert a CF card into UC-FR5000 #01.

RC-FS10 Remote Communicator

RC-FS10 REMOTE COMMUNICATOR PACKAGE	ADAPTER	AC ADAPTER
<p>RC-FS10: Remote Communicator Software (CD), Multi-site Trunking compatible version</p>	<p>CT-24: USB Vocoder & Dongle Supplied with RC-FS10</p>	<p>BC-147SA/SE AC adapter for CT-23</p>

DESKTOP MIC.	HAND MIC.
<p>SM-26: Desktop microphone for dispatcher.</p>	<p>HM-152: Regular hand microphone.</p>

■ Connection diagram



❑ Unpacking

After unpacking, immediately report any damage to the delivering carrier or dealer. Keep the shipping cartons.

For a description and a diagram of accessory equipment included with the IC-FR5000/FR6000 series, see 'Supplied accessories' on page 6 of this handbook.

❑ Selecting a location

Select a location for the repeater that allows adequate air circulation, free from extreme heat, cold, or vibrations, and away from TV sets, TV antenna elements, radios and other electromagnetic sources.

❑ Antenna connection

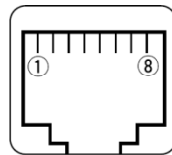
For radio communications, the antenna is of critical importance, along with output power and sensitivity. Select antenna(s), such as a well-matched 50 Ω antenna, and feedline. 1.5:1 or better of Voltage Standing Wave Ratio (VSWR) is recommended for the desired band. Of course, the transmission line should be a coaxial cable.

CAUTION: Protect the repeater from lightning by using a lightning arrestor.

NOTE: There are many publications covering proper antennas and their installation. Check with your local dealer for more information and recommendations

❑ Front panel connections

MICROPHONE CONNECTOR (Front panel view)



- ① +8 V DC output (Max. 15 mA)
- ② Output port for PC programming
- ③ NC
- ④ M PTT (Input port for TX control)
- ⑤ Microphone ground
- ⑥ Microphone input
- ⑦ Ground
- ⑧ Input port for PC programming

Caution: DO NOT short pin 1 to ground as this can do damage to the internal 8 V regulator. DC voltage is applied to pin 1 for microphone operation. Only Icom microphones are recommended.

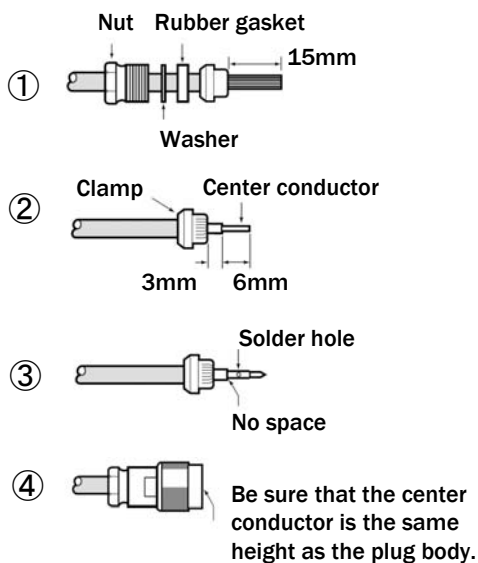
HM-152
HAND
MICROPHONE
(Optional)



SM-26
DESKTOP
MICROPHONE
(Optional)



TYPE-N CONNECTOR INSTALLATION EXAMPLE



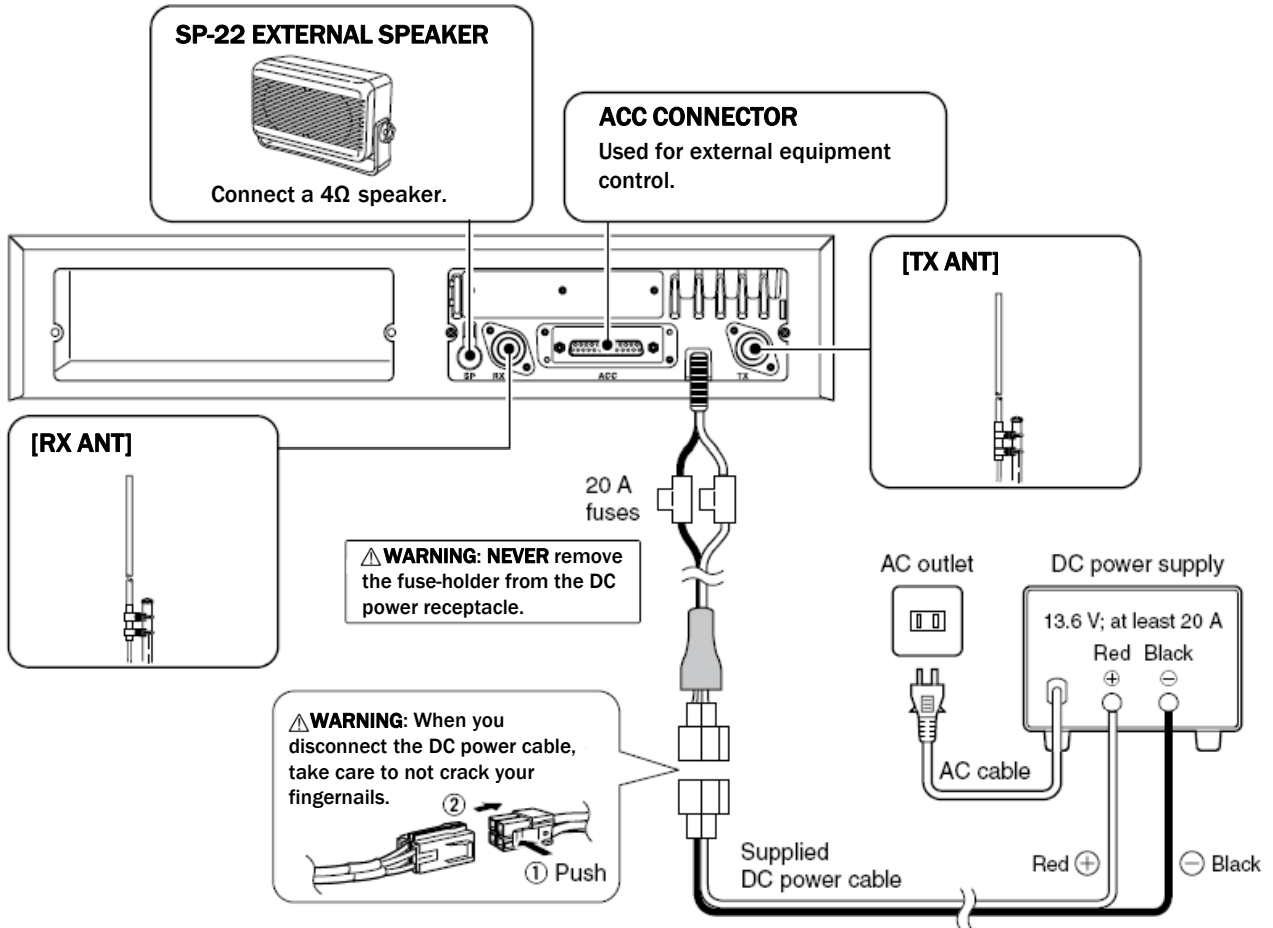
Slide the nut, flat washer, rubber gasket and clamp over the coaxial cable, then cut the end of the cable evenly.

Strip the cable and fold the braid back over the clamp.

Soft solder the center conductor. Install the center conductor pin and solder it.

Carefully slide the plug body into place aligning the center conductor pin on the cable. Tighten the nut onto the plug body.
15 mm (19/32 in) 6 mm (1/4 in) 3 mm (1/8 in)

❑ Rear panel connections



❑ Power supply connection

Make sure the repeater's power is turned OFF when connecting the DC power cable.

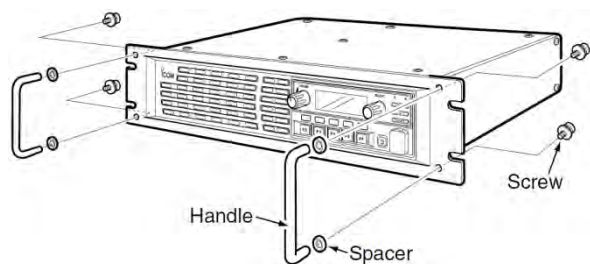
CAUTION: Voltages greater than 16 V DC will damage the repeater. Check the source voltage before connecting the power cable.

❑ Mounting the repeater

◆ Using the supplied handle

The supplied handles are used to mount the repeater into a 19 inch rack. The handles can be installed on the repeater's front panel.

① Attach the supplied handles to each side of the repeater's front panel with the spacers, then tighten the screws.



② The completed installation should look like this.

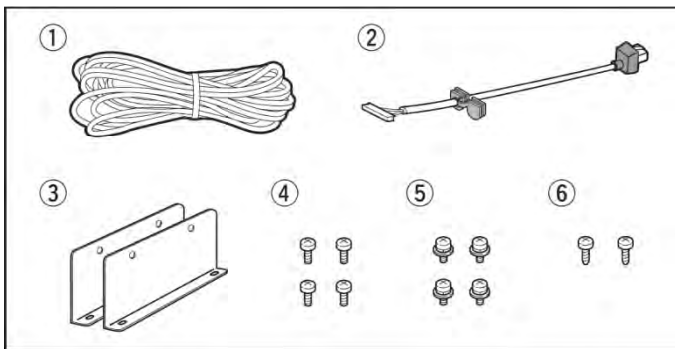


□ UR-FR5000/UR-FR6000 CHANNEL EXTENSION MODULES

SUPPLIED ACCESSORIES

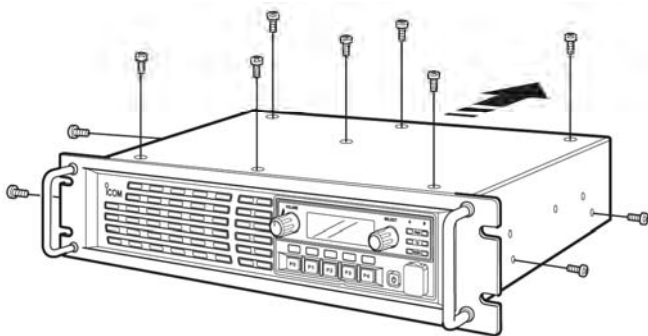
- ① DC power cable 1
- ② Control cable 1
- ③ Angle brackets 2
- ④ Screws (M4 × 8 mm) 4
- ⑤ Set screws (M3 × 6 mm) 4
- ⑥ Tapping screws (M3 × 8 mm) 2

1 mm = 1/32 inch

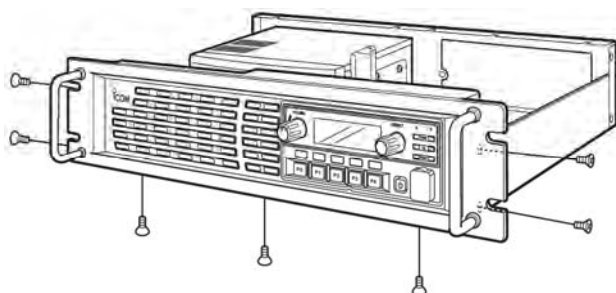


OPENING CASE

① Remove 7 screws on the top and 2 screws on both sides of the repeater, then slide off the top cover in the direction of the arrow.

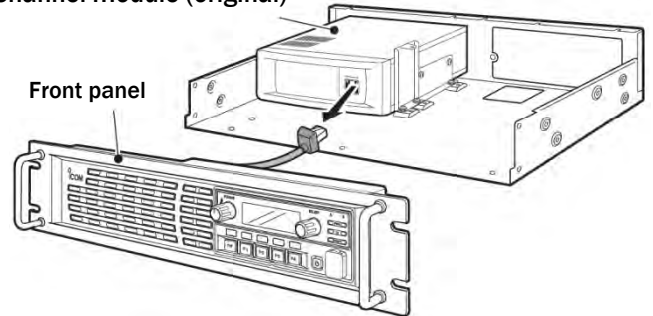


② Remove the 3 screws on the bottom and 2 screws on both sides of the repeater frame.

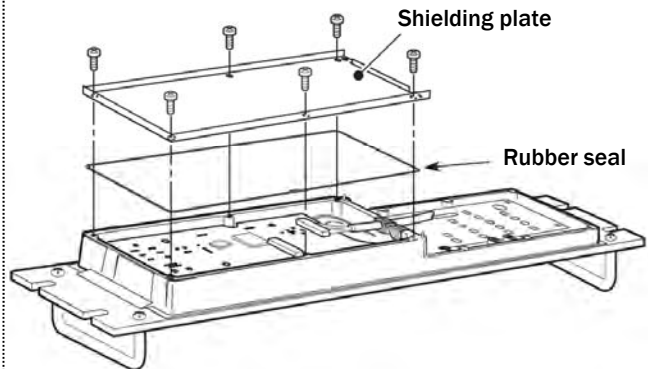


③ Disconnect the control cable on the original channel module, then remove the front panel.

Channel module (original)



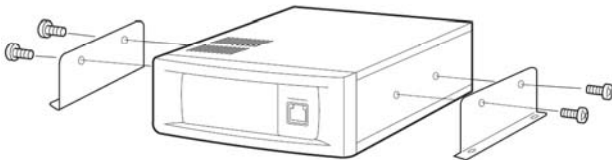
④ Remove the 6 screws on the shielding plate, then remove the plate and rubber seal.



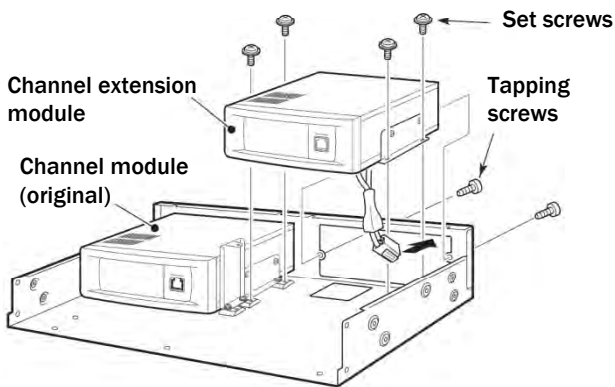
INSTALLATION

- Install the UR-FR5000 or UR-FR6000(channel extension module)

- ① Attach the angle brackets to each side of the channel extension module, and attach them with the M4 × 8 screws.

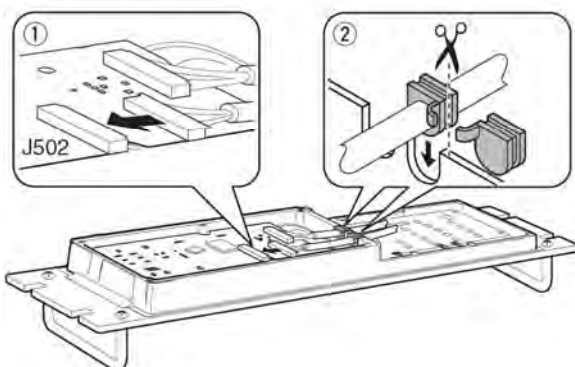


- ② Install the channel extension module using the M3 x 8 tapping screws and the M3 x 6 Set screws.



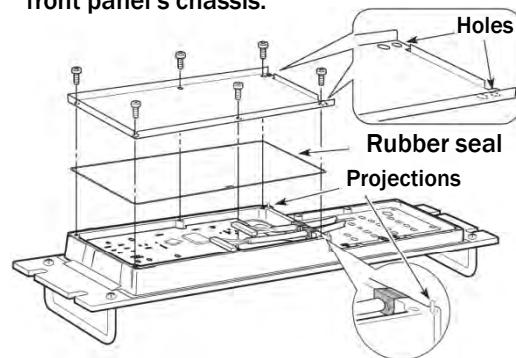
- Connect the control cable

- ① Connect the control cable to J502 on the front board, as shown below.
- ② Separate the rubber caps of the control cables, then insert the caps to the front panel's chassis.

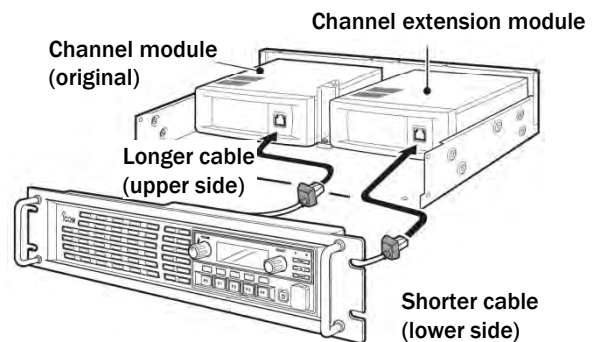


ASSEMBLE THE UNIT

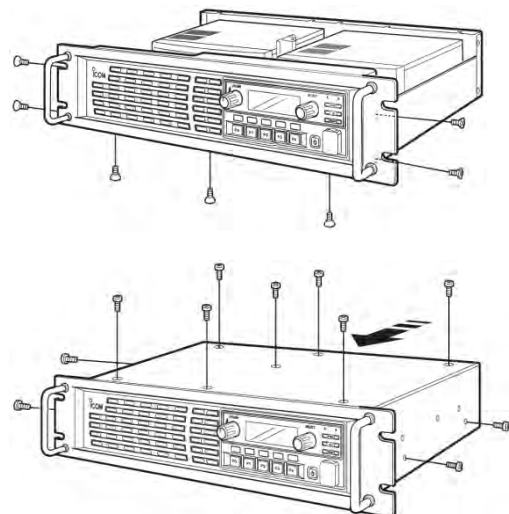
- ① Reattach the rubber seal and shielding plate on the front panel, then tighten the 6 screws.
 - Make sure the rubber seal is properly seated in the groove of the chassis.
 - Be sure to match the correct positions of the shielding plate holes and the projections on the front panel's chassis.



- ② Connect the control cables to the channel modules.



- ③ Return the front panel, top cover and screws to their original positions.



■ CONFIGURATIONS

The controller enables the repeater to be used in the following modes, depending on its configurations.

	Single-site Conventional	Single-site Trunking	Multi-site Conventional	Multi-site Trunking
UC-FR5000 #01	✗	✓	✓ CF-FR5000MC #02 is required	✓ CF-FR5000MT #04 is required
UC-FR5000 #02	✗	✓	✓	✓ CF-FR5000MT #04 is required
UC-FR5000 #03	✗	✓	✓	✓

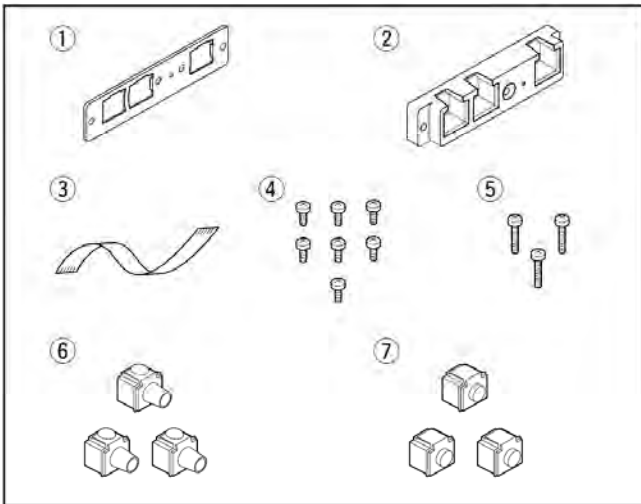
= Upgradable with a CF card ✓ = Workable

NOTES ✕:

Basically, the single-site conventional is usable without a UC-FR5000, but in the following cases, a UC-FR5000#01, #02 or #03 will be required.

- ① When setting up repeater remotely using an IP connection.
- ② When using an RC-FS10 remote communicator for a single site.

■ SUPPLIED ACCESSORIES

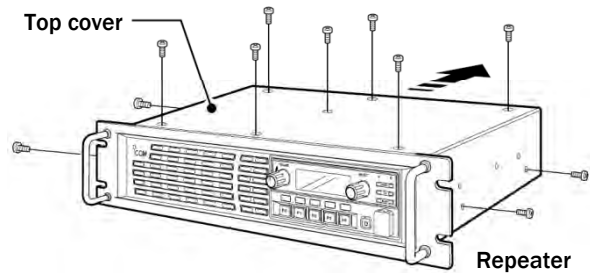


- ① Rear Panel 1
- ② Rear Panel holder 1
- ③ Flat Cable 1
- ④ Screws (M3 × 8 mm) 7
- ⑤ Screws (M3 × 12 mm) 3
- ⑥ Dust protectors 3
- ⑦ Connector caps 3

1 mm = 1/32 inch

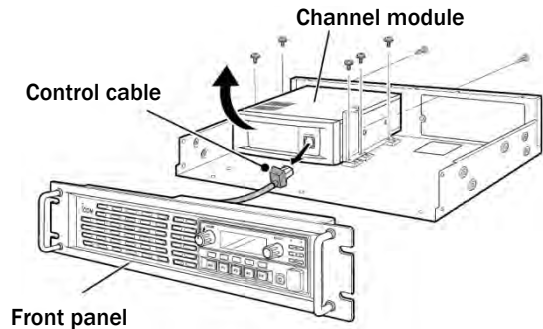
■ OPENING CASE

- ① Unscrew the 7 screws on the top, and the 2 screws on both sides of the repeater, then slide the top cover off in the direction of the arrow.

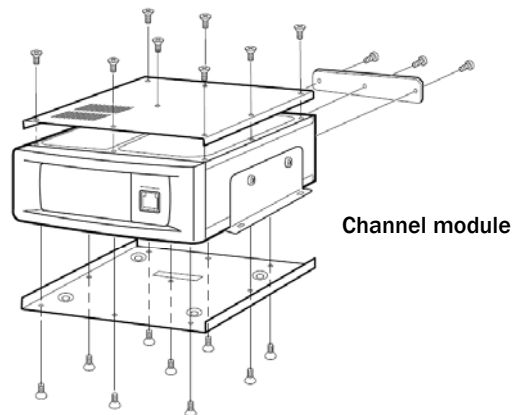


- ② Disconnect the control cable from the channel module. Then, unscrew the 7 screws which attach the channel module to the repeater chassis, and remove it.

The front panel is removed in this illustration so the detail is easier to see. You can remove the channel module without removing the front panel of the repeater.



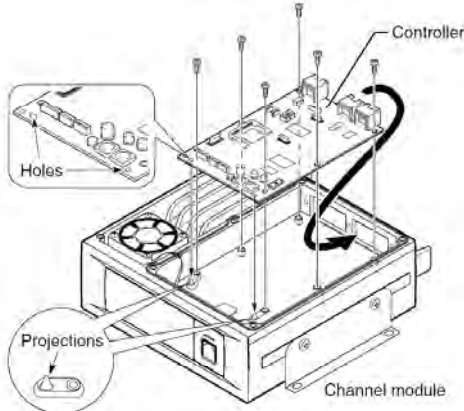
- ③ Unscrew the 8 screws on the top, the 9 screws on the bottom, and the 3 screws on the rear of the channel module. Then remove each cover.



• **Installing the UC-FR5000 #01 or #02 or #03**

Install the controller into the channel module using 6 of the 7, M3 × 8 screws.

• Be sure to match the holes in the controller to the projections on the channel module's chassis.

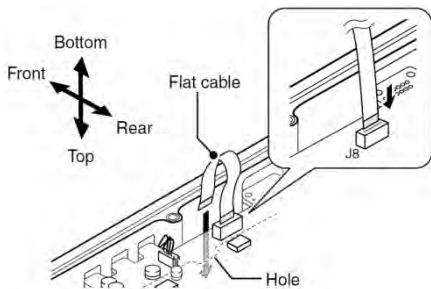


• **Connecting the flat cable**

Make sure to insert the flat cable correctly, and not upside down.

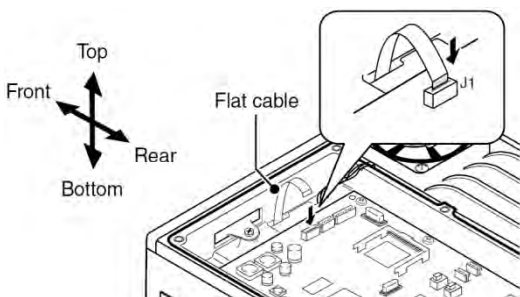
① Turn the channel module upside down.

Insert one side of the flat cable into J8 on the PCB of the channel module. Then, carefully pass the flat cable through the hole of the channel module's chassis to the top side, as shown below.



② Turn over the channel module.

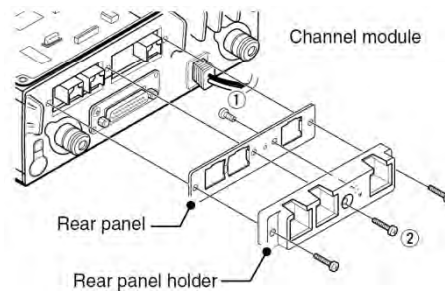
Carefully pull out the other end of the flat cable from the hole, and then insert it into J1 on the controller, as shown below.



• **Attaching the rear panel**

① Attach the rear panel to the rear panel holder using 1 of the 7, M3 × 8 screws.

② Attach the rear panel and holder set to the channel module using the 3, M3 × 12 screws.



✓ **For your information**

When you have installed a UR-FR5000 or UR-FR6000 series channel extension module, you can install up to 2 controllers in the repeater. You can then control each channel module from a console in the conventional or trunking operating mode.

■ **CF CARD**

The UC-FR5000 #02, IDAS™ Multi-site Conventional Controller, comes with a **CF-FR5000MC #02** CF card. The UC-FR5000 #03, IDAS™ Multi-site Trunking Controller, comes with a **CF-FR5000MT #04** CF card.

Model name	UC-FR5000 #01	UC-FR5000 #02	UC-FR5000 #03
For	IDAS™ Single-site trunking	IDAS™ Multi-site conventional	IDAS™ Multi-site trunking
CF card inserted in slot		CF-FR5000MC #02 *	CF-FR5000MT #04 *

* The CF cards are inserted in the card slots on the UC-FR5000 boards. These CF cards are optional accessories to upgrade the UC-FR5000 #01 or #02 to multi-site conventional/trunking mode.

CAUTION!

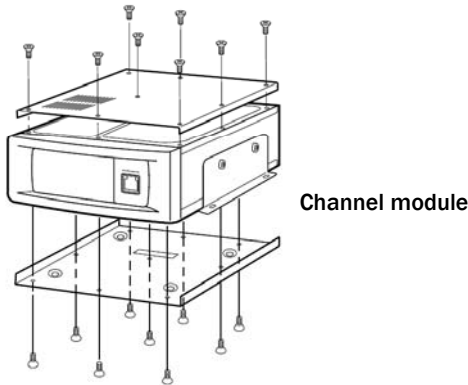
Insert the CF card into only the UC-FR5000. Inserting the CF card into other equipment may corrupt the card's data.

NEVER turn OFF the repeater while the data is being transferred. Otherwise, the data on the CF card may become corrupted. When no CF card is inserted, the controller cannot be used in the Multi-site Conventional or Trunking mode.

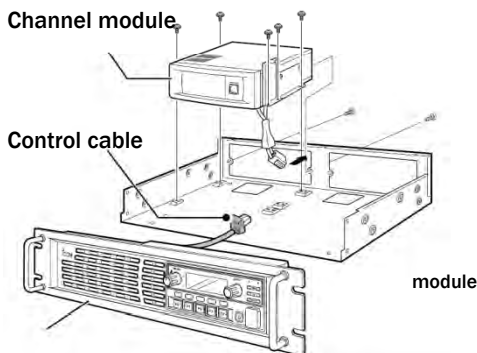
See page 26 for the details on how to insert the card into the board.

■ Assembling the unit

- ① Re-attach the top and bottom covers of the channel module, and then tighten all the screws, as shown below.



- ② Re-install the channel module and the screws to their original positions, and then connect the control cable of the repeater's front panel to the channel module.



- ③ Re-attach the top cover of the repeater, and then install the 7 screws on the top and the 2 screws on both sides of the repeater.

■ CONNECTION

CAT-5 straight cables and a Hub (or a router) are required for connection (purchase optionally).

BE SURE to cover each connected cable with a supplied dust protector. Even if the cable has its own cover, replace it with the supplied dust protector.

KEEP the connector caps attached when the connectors are not in use, to avoid bad contacts from dust and moisture.

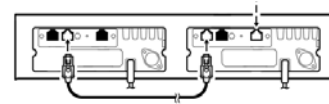
Each controller has a LAN connector and two BUS connectors.

① [LAN] connector

For an Ethernet connection, connect one end of the cable to the controller and the other end to an Ethernet (LAN) port of a console, through a Hub (or a router). In the single-site trunking mode operation, "one" of the controllers must be connected to the network. In the multi-site trunking mode, "all" the controllers must be connected to the network.

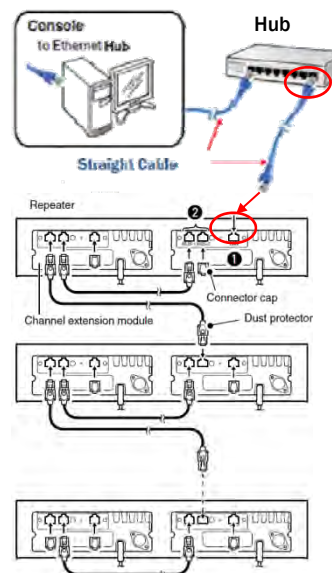
② [BUS] connectors (BUS-1, BUS-2)

For data communication between the controllers in the trunking mode, either BUS-1 or BUS-2 can be used. They enable the controllers to be "daisy-chained" together, and form a network that allows trunking and other data to pass among them.



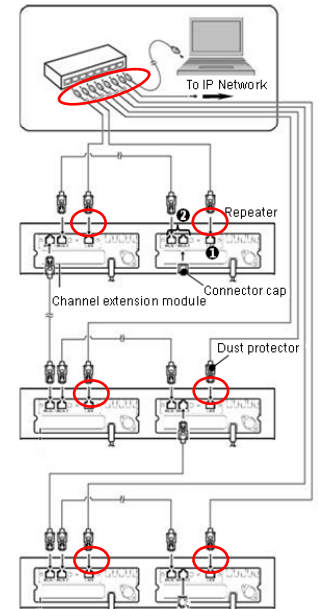
*The illustration shown below is an example of connection in the IDAS™ trunking mode.

IDAS™ Single-site Trunking



The LAN cable must be connected to the "one" of the daisy-chained channel extension modules.

IDAS™ Multi-site Trunking



The LAN cable must be connected to "all" of the daisy-chained channel extension modules.

Internet Explore 6.0 or later is required to properly open the setting screen of the controller. The following instructions are when using Internet Explorer 7.0. You need to activate JavaScript to open the side menu and help window of the setting screen.

■ Accessing the setting screen

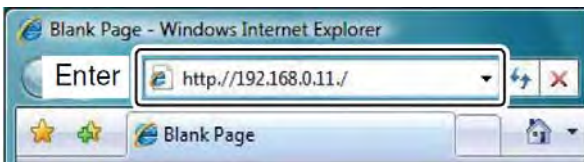
It takes typically 2 to 3 minutes for the controller to start up the software. Please wait to launch the web browser until the operating system is up and running.

- ① Connect the controller to a console with a CAT-5 straight cable (See “Connection” on page 22), and then turn ON the repeater.
- ② Before accessing the setting screen, change the console IP address to 192.168.0.XXX* The Subnet mask should be 255.255.255.0.
*Input 1 to 254 (except 11) instead of XXX.

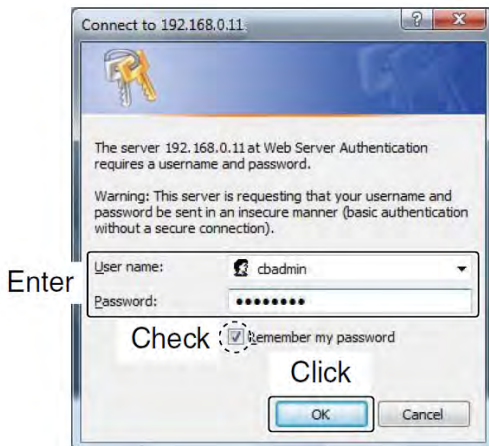
- ③ Open your web browser, and enter “http: // 192.168.0.11/” into the address bar (default IP address of the UCFR5000).

Ask your system administrator for details.

• After pushing the [Enter] key, the login authentication screen appears.



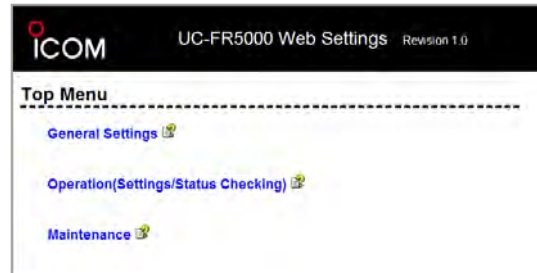
- ④ Enter “cbadmin” (the default user name) and “ucfr5000” (the default password) in their respective input field in the login authentication screen. If you want the screen to remember not only the user name but also the password, check the box, “Remember my password”.
- The opening screen appears after clicking the [OK] button.



You can change the user name and password in the setting screen. Refer the screen’s help window for details.

❖ Top Menu (As of December 2011)

UC-FR5000 #01 Web Settings (Rev.1.1)

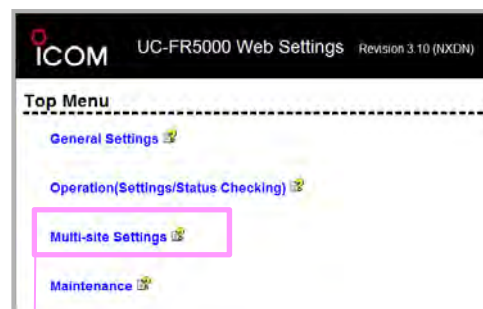


UC-FR5000 #02 Web Settings (Rev.2.12)



This item appears when the operation mode is set to be “Conventional”.

UC-FR5000 #03 Web Settings (Rev.3.10)



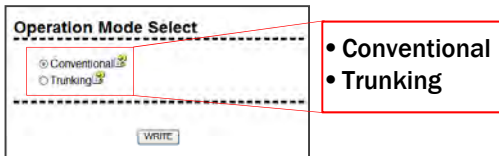
This item appears when the operation mode is set to be “Conventional” or “Multi-site Trunking”.

➤ General Setting

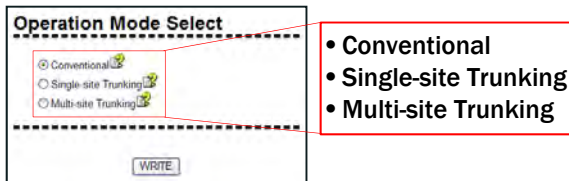
General Settings are designed to do the following:

- Select the operating mode for the controller.

UC-FR5000 #01/#02



UC-FR5000 #03



- Configure the controller to connect to the network.

NOTE : If “Trunking”/Single-site Trunking is selected, the “Multi-site Settings” item disappears from the Top Menu.

➤ Operation Setting

Operation Settings are designed to...

- Configure the operating system for each of Conventional and Trunking operating mode.

Note : Toggle the operating mode in the General Settings - Operating mode.

➤ Multi-site Setting (UC-FR5000 #02/#03 only)

First set the operating mode as “Conventional” in the UC-FR5000 #02 or “Multi-site Trunking” in the UC-FR5000 #03.

Multi-site Settings is designed to...

- Configure the controller to connect to the network and to enable Multi-site operation.

➤ Maintenance

Maintenance is designed to...

- Maintain the controller.
- Set the user name and password.

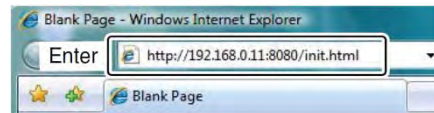
■ Opening the help windows

The setting screen of the controller has a help window to describe functions and settings. When you don't understand the meaning of an item or how to configure the controller, click a question mark icon on the screen to open the help window.

■ Initialization

From a console, you can reset all settings to the factory default, including the network settings of the controller.

- ① Connect the controller to a console, and then turn ON the repeater.
- ② Open your web browser, and enter the initialize address into the address bar.
 - Initialize address:
http://(IP address):8080/init.html
 - When the IP address of the controller is 192.168.0.11*, enter “<http://192.168.0.11:8080/init.html>” as the initialize address.
 - The IP address is an example only. Check the IP address of the controller.
 - The initialize screen appears after pushing the [Enter] key.



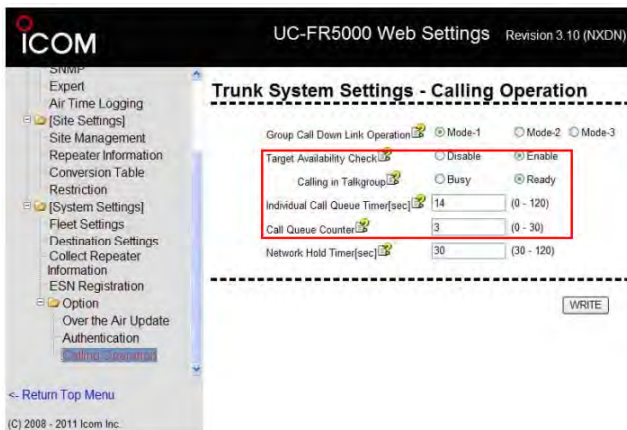
- ③ Check the “Yes, I agree.” box, then click the [Reset] button to initialize the settings.

For more details on how to set up the function, please refer to the **Quick Guide-UC-FR5000 Web Setting**.

The UC-FR5000 #03 controller for multi-site trunking has recently been revised to 3.1 and the following new functions have been added.

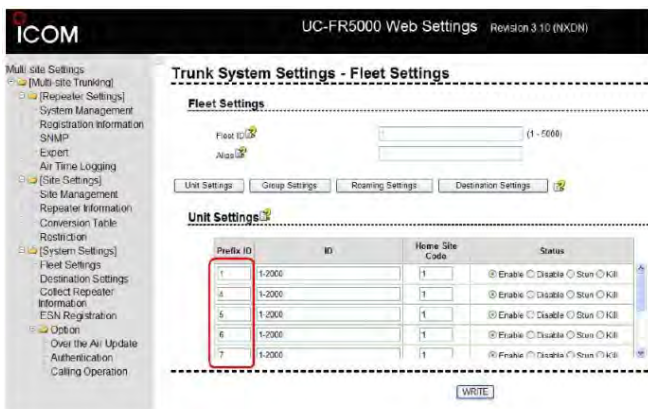
❖ Target Availability Check function

When a radio makes individual/group call, the availability of a call target radio (group) is checked before the system actually downlinks the call. This function notifies the caller of the call target's situation by looking up the system's internal table of on-going communications. When the call target radio is occupied in conversation, the system notifies the caller that the radio (or group) is busy. In a situation where the radio (or group) is not busy, but all channels are used, you may set the radio to wait for a while in a call queue line. Or you can let the caller radio wait until a channel becomes available.



❖ Ability to include more than 2000 terminal radios in a fleet

More than 2000 radios may be included in the same fleet by allowing Prefix ID free entry. This should be useful for users who have to use many radios in one fleet.



The Compact Flash or CF card will upgrade your UC-FR5000 TRUNKING/NETWORK CONTROLLER and enable IDAS™ Multi-site Conventional mode use. Please read these instructions carefully before using the CF card.

■ PRECAUTIONS

⚠ WARNING! Turn OFF the repeater before inserting the CF card into the UC-FR5000. Otherwise, a fire, electric shock may occur, or the data on the CF card may become corrupted.

CAUTION: NEVER insert the CF card into the UC-FR5000 if dust or dirt is on the connector. This may cause the CF card, and the UC-FR5000, to malfunction.

CAUTION: NEVER touch the connector part of the CF card directly. It may cause a breakdown of the internal circuit by static electricity.

CAUTION: NEVER turn OFF the repeater while the data is being transferred. Otherwise, the data on the CF card may become corrupted.

CAUTION: Use the CF card only in the UC-FR5000. Inserting the CF card into other equipment may corrupt the card's data.

NEVER keep the CF card in areas with extremely high temperatures, high humidity, or in direct sunlight.

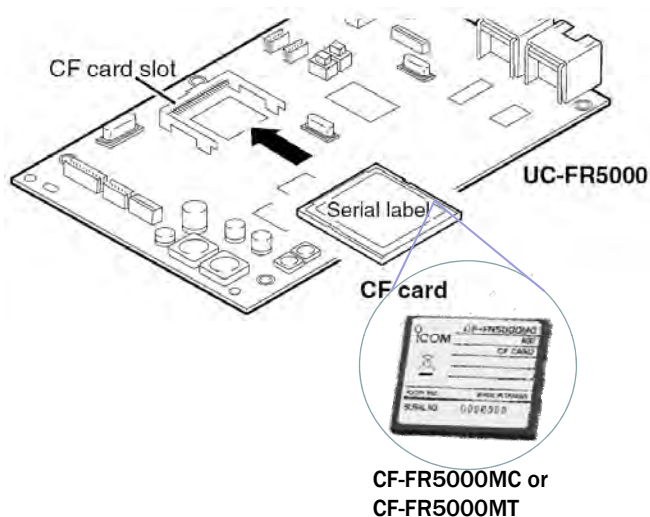
DO NOT submerge the CF card in water, or get it wet.

DO NOT bend the CF card.

DO NOT drop or strike the CF card against another object.

■ INSERTION AND REMOVAL

• Insertion



Be sure to insert the CF card with the serial label facing up. Slowly insert the CF card into the CF card slot of the UC-FR5000.

- If the CF card seems to jam, or is too tight, carefully remove it. Ensure that the card is properly oriented and that there are no obstructions in the sides of the card insertion slots, then reinsert the card.

• Removal

Hold the edge of the CF card, and slowly pull it out. When no CF card is inserted, the UC-FR5000 cannot be used in the Multi-site Conventional mode, even after the upgrade.

■ UPGRADE

To upgrade the UC-FR5000, and enable the IDAS™ Multi-Site Conventional or Multi-site Trunking mode, insert the CF card, and then perform the following steps. The following instructions are for reference only. Please refer to the UC-FR5000's help file for details.

- ① Access the setting screen of the UC-FR5000.
 - The opening screen appears.

Refer to the UC-FR5000's instruction manual for information on how to access the setting screen.

- ② Click "Maintenance" in the Top Menu.
 - The Maintenance menu appears on the left side of the screen.
- ③ Click "Application Add-on" in the Maintenance menu.
- ④ Select "by on board CF Card" in the Application Package, then click **[CHECK]**.
 - The Application Package list appears.
- ⑤ Select "ucfr5000_application"(Rev.2.0) or "CrossBusy application"(Rev.2.1) from the list, then click **[Add]**.
 - A confirmation screen appears.
- ⑥ After carefully reading the warning text on the confirmation screen, check the "Yes, I agree" box. Then click **[Start]**.
 - The installation starts to upgrade the UC-FR5000 firmware. "Now Adding, Please Wait..." appears during the installation.
- ⑦ After the installation is completed, "Finish." appears, then click **[OK]**.
 - The installed application appears on the Application list.
- ⑧ Turn OFF the repeater, then turn it ON again.
 - The upgrade process is now complete.

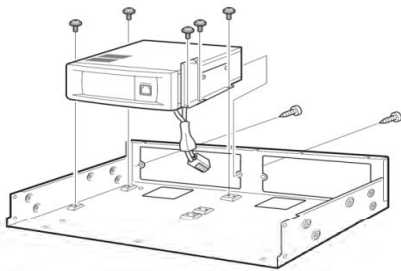
DISASSEMBLY INSTRUCTION

1. Removing the front panel

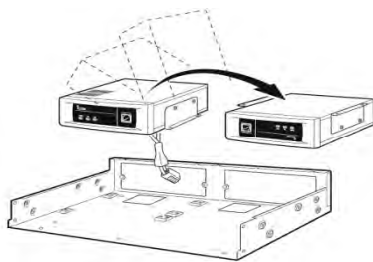
NOTE: Please see the case opening procedure
3-1-2 UR-FR5000/FR6000 installation

2. Removing the MAIN UNIT assembly

- ① Unscrew the 5 screws which secures the MAIN UNIT assembly.

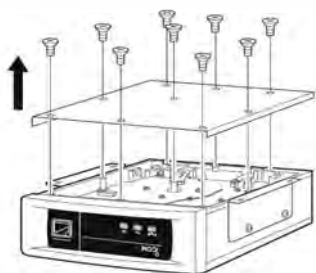


- ② Turn the MAIN UNIT assembly upside down.



3. Removing the MAIN UNIT

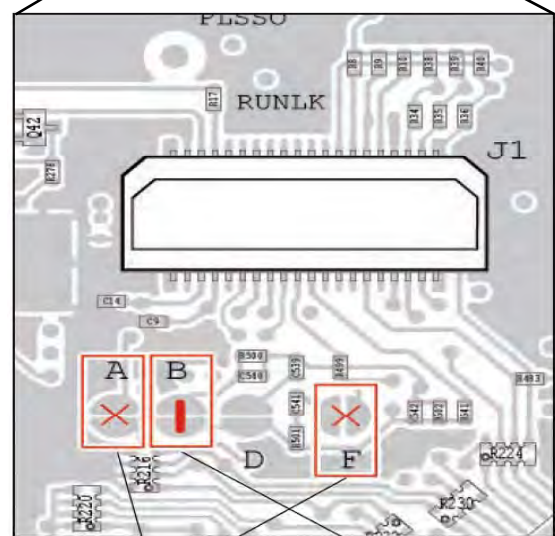
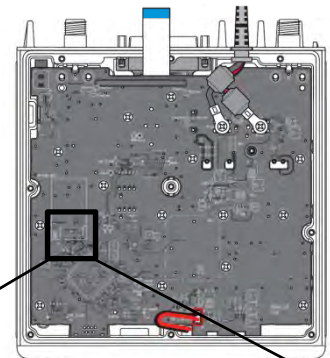
- ① Unscrew the 9 screws, and remove the cover.



INSTALLATION of a UT-109R or UT-110R

NOTE: The installation of the scrambler units into the UR-FR5000/FR6000 is also based on this instruction.

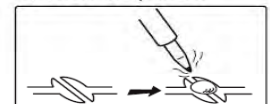
- ① Disassemble the repeater until the MAIN UNIT is exposed. (See 1-3 above)
- ② Modify the patterns on the MAIN UNIT, as shown in the upper right column.



A and F; Cut the pattern

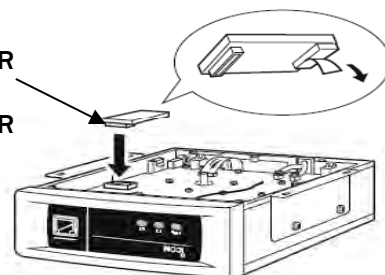


B; Short the pattern



- ③ Remove the protective paper on the optional unit, and connect the unit to J1.

UT-109R
or
UT-110R



- ④ Replace the cover, screws, and so on to reassemble the main unit.

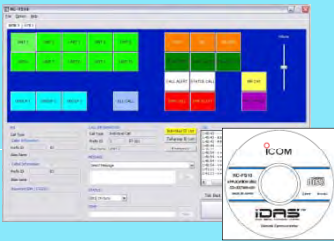





NOTE: When uninstalling the scrambler unit
Be sure to return the disconnected or connected points to their original states, otherwise no TX modulation or AF output is possible.

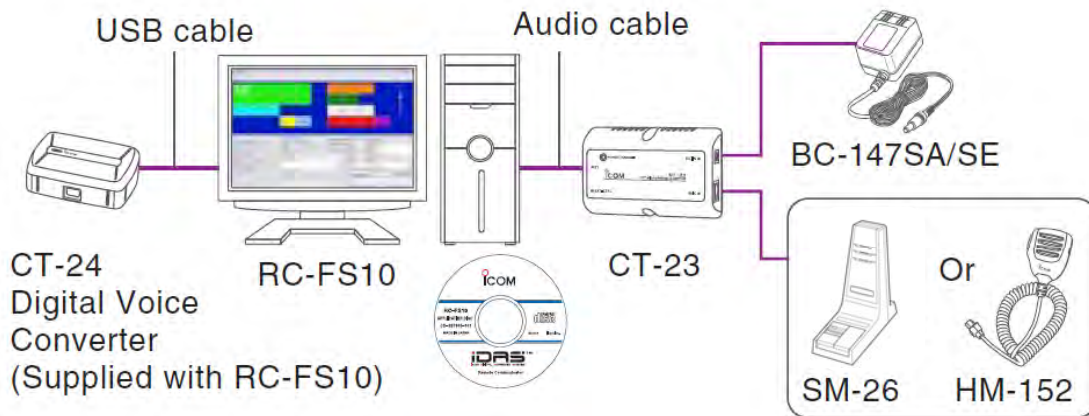
3-2 System Option IDAS™ Remote Communicator

Multi-site Trunking Compatible Version (Revision 2.0 or later)

The RC-FS10 Remote Communicator creates a virtual radio or a simple dispatcher on a Windows®-based PC. It provides remote access to the IDAS™ NXDN™ repeaters through an IP network, and to communicate with IDAS™ NXDN™ radio terminals, even from outside of the radio coverage area.

In addition to the capability to work with the IDAS™ multi-site conventional system, the new version of the RC-FS10 has been designed to be compatible with the IDAS™ multi-site trunking system. The RC-FS10 can also be used as a single-site system, monitoring different user groups on different bands.

RC-FS10 Remote Communicator Package	OPTIONS
 <p>RC-FS10 Software CD & Screen image Multi-site Trunking Compatible Version</p>	 <p>SM-26 Desktop Mic.</p>
 <p>CT-24 USB Vocoder Unit (supplied with the RC-FS10)</p>	 <p>HM-152 Hand Mic.</p>
	 <p>CT-23 Mic adaptor</p>
	 <p>BC-147SA/SE AC adaptor for CT-23</p>



- The RC-FS10 remote communicator works only with the conventional and the multi-site trunking system. It is not compatible with the single-site trunking system.
- The **CT-23** connects an **HM-152** or **SM-26** microphone audio (RJ-45 jack) and sends PTT/Monitor signals to the 3.5mm stereo jack to connect to a PC. A stereo jack cable is supplied with the CT-23. A **BC-147SA/SE** AC adaptor, is also required.
- A third-party PC headset or microphone may be used with the RC-FS10 instead of a SM-26/HM-152+CT-23.
- The **CT-24** digital voice converter is a USB device which converts microphone audio to an IDAS™ compatible digital signal. The remote communicator software will not work if the CT-24 is not connected. The CT-24 works as a vocoder, and also as a dongle, to reject unauthorized software copies by using unique ESN. One CT-24 can be shared with up to 8 sites.
- Up to **8 remote communicators** can be connected to a repeater. Each virtual PC can handle one voice path at the same time.
- The **RC-FS10SDK** allows you to develop IDAS™ compatible applications. A non disclosure agreement is required.

■ **RC-FS10 Remote Communicator Software, “Compatible with Multi-site Trunking” – Functions on Screen**
Virtual Radio/Dispatch Software for an IDAS™ NXDN™ Multi-Site Trunking & Conventional System.
Here are the functions that the operator can control on the PC display. (See the installation on the next page.)

① Site tab

Up to 8 systems can be programmed. Click the tab button to select the site for audio transmission and reception.

② Function buttons

Up to 40 function buttons are programmable. Individual call, group call, selective call, all call, stun, revive, kill, remote monitor, radio check, call alert, status call, status polling, emergency call, emergency alert, emergency, base (repeater) memory channel and repeater status are programmable.

③ Selective call

When the Selective call button is clicked, the selective call setting screen pops up and you can address the destination ID.

A dialog box titled "Selective Call" with a close button (X). It contains a "Call Type" dropdown menu set to "Individual Call", a "Prefix ID" text box containing "1", and an "ID" text box containing "201". At the bottom are "OK" and "Cancel" buttons.

④ Individual ID List and Talkgroup List

The Individual ID List and Talkgroup List show all the individual ID and group ID names. You can select the destination ID and make a call from the list.

Individual ID	Transmitted Call	Received Call
1001	1	UNIT 1
1002	1	UNIT 2
1003	1	UNIT 2

The main software interface for RC-FS10. It features a top menu bar (File, Option, Help) and a "SITE 1 | SITE 2" tab. The central area contains a grid of function buttons: UNIT 1-10, GROUP 1-3, STUN, ERG, REVIVE, R MONITOR, RADIO CHECK, CALL ALERT, STATUS CALL, STATUS POLL, EMR CALL, EMR ALERT, EMERGENCY, and PTT. Below this is a "CALL INFORMATION" section with fields for Call Type, Caller Information, Prefix ID, ID, and Alias Name. A "MESSAGE" section has a dropdown menu and a "Clear" button. A "LOG" section displays a list of system events. At the bottom, there are "Talk Back Lock" and "PIT TOGGLE MODE" buttons.

⑩ Repeater Status

When the Repeater Status button is clicked, status information of the repeaters is displayed. The status information contains power supply voltage, PLL lock voltage, temperature and cooling fan status.

⑪ PTT Button

The log area displays communication and operation logs. The log file is automatically stored in a designated folder.

⑤ ANI

The ANI area displays caller and called ID/name information for easy recognition.

⑦ Short Data Message

Up to 10 short data messages are programmable for quick selection. You can rewrite the message in the box.

⑧ Status Call and DTMF

⑨ Communication Log

The log area displays communication and operation logs. The log file is automatically stored in a designated folder.

User Authentication

A login system provides three levels of user access control for protecting the network settings and use of the system itself.

A dialog box titled "LOGIN" with a close button (X). It contains the text "Enter User Name and Password" and two input fields: "User Name:" and "Password:". At the bottom are "OK" and "Cancel" buttons.

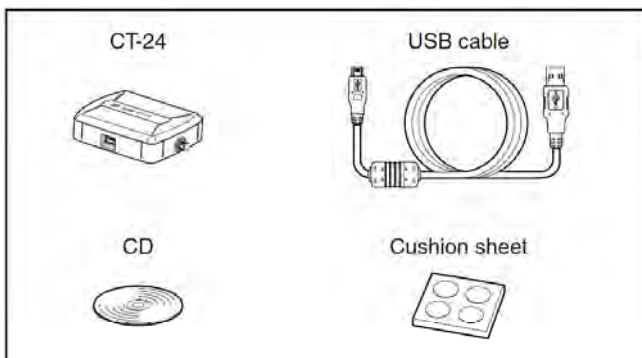


NOTE : The application examples of the RC-FS10 can be seen in the 5-4 and 5-5 (pp.74-78).

■ RC-FS10 Installation

The Remote Communicator creates a virtual radio and simple dispatcher control panel on a Windows PC. This allows you to access and communicate with repeaters, and transceivers on your IDAS™ IP Network. Before installation, please read these instructions carefully.

Operating System	Microsoft® Windows® XP SP3 or later (32-bit), Microsoft® Windows Vista® SP2 or later (32-bit/64-bit), Microsoft Windows® 7 (32-bit/64-bit)
CPU	Intel® Pentium® 4 1.6GHz CPU or better, or equivalent CPU
Memory	512 MB or higher for Windows® XP
	1 GB or higher for Windows Vista® and Windows® 7
HDD	100 MB of disk space
Audio	DirectSound compatible sound card that covers the frequency response range of up to 20 kHz, with a sampling rate of 48 kHz.
Display Resolution	1024 x 768 pixels or more
Other Hardware	CD-ROM drive, USB 1.1 or 2.0 port, 10 Mbps or faster Ethernet interface USB 1.1 or 2.0 port Speaker or headset microphone



These Instructions are based on using Windows Vista. The displayed screens, indications or operations may differ slightly from the instructions, depending on your system configuration or Windows operating system.

CAUTION: NEVER expose the CT-24 to rain, snow or any liquids. This will damage the CT-24.

DO NOT use or place the CT-24 in areas with temperatures below 0°C (+32°F) or above +40°C (+104°F).

DO NOT use harsh solvents such as benzine or alcohol to clean the CT-24, because they can damage its surfaces.

DO NOT allow the PC to go into the sleep or standby mode while using the RC-FS10. Otherwise, it might not work properly after the PC resumes normal activity.

CONNECT the CT-24 to only the PC or an adequate self-powered USB hub. Otherwise, it may not work properly.

Menu Screen

When the CD is inserted into the CD drive, the menu screen automatically appears.

- If no menu screen appears, double-click the "AutoRun.exe" on the CD.
- To read the instructions on the CD, Adobe® Reader® is required. If you have not installed the reader, please download it from Adobe Systems Incorporated's website.
- When you want to close the menu screen, click "Exit."



Step 1: USB DRIVER INSTALLATION

When installing the USB driver, log in as the **administrator**.

- ① Make sure Windows has completed its start-up, and no other applications are running.
- ② Insert the CD into the CD drive.
- ③ Click "Install USB driver" on the menu screen.

If "User Account Control" appears, click **[Continue]**.

- ④ "Welcome to USB InstallShield Wizard for Icom CT-24 USB Driver Setup" appears. Click **[Next>]**.



- ⑤ “Destination Folder” appears. Click **[Next>]**.
- If desired, click **[Change...]** to select another destination folder before clicking **[Next>]**.



- ⑥ “Ready to Install the Program” appears. Click **[Install]** to start the installation.

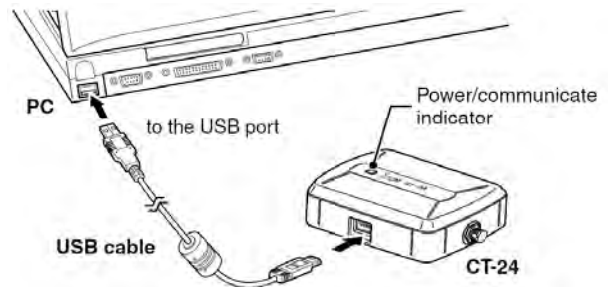


- ☞ If “Windows Security” appears, click **[Install]**

- ⑦ “InstallShield Wizard Completed” appears. Click **[Finish]**.



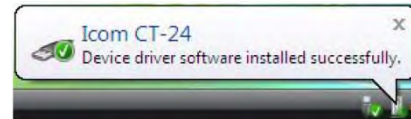
- ⑧ After the InstallShield Wizard is complete, connect the CT-24 to the PC through the USB cable.
- The power/communicate indicator lights green.



- ⑨ After connecting the CT-24, “Installing device driver software” appears.



- ⑩ After “Icom CT-24” appears, the USB driver installation process is complete.



- Restarting the PC may be required, depending on your configuration.
- You can uninstall the USB driver using the “Uninstall a program” in the Windows Control Panel.

Step 2: RC-FS10 APPLICATION INSTALLATION

- ☞ When installing the application, log in as the administrator.

- ① Make sure Windows has completed its start-up, and no other applications are running.
 - ② Insert the CD into the CD drive.
 - ③ Click “Install RC-FS10” on the menu screen.
- ☞ If “Open File-Security Warning” appears, click **[Run]**.

- ④ “Welcome to the InstallShield Wizard for Icom RC-FS10” appears. Click **[Next>]**.

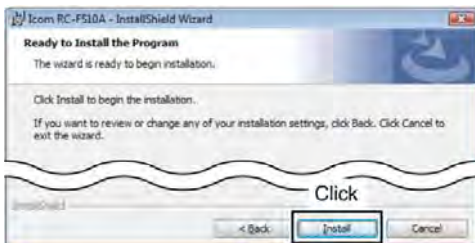


- ⑤ “Destination Folder” appears. Click **[Next>]**.

- If desired, click **[Change...]** to select another destination folder before clicking **[Next>]**.



- ⑥ “Ready to Install the Program” appears. Click **[Install]** to start the installation.



- If “User Account Control” appears, click **[Allow]**.

- ⑦ After the installation has been completed, the “InstallShield Wizard Completed” appears. Click **[Finish]**.

- If desired, check the “Launch the program” box to start the application, before clicking **[Finish]**.



- ⑧ Eject the CD.

- ⑨ ‘RC-FS10’ appears in the Icom folder, which is on the program menu, and an ‘RC-FS10’ shortcut icon appears on the desktop.

- You can uninstall the application using the “Uninstall a program” in the Windows Control Panel.

Step 3: ACCESSING THE SETTING SCREEN

When first using the RC-FS10, some setup is required.

- Connect the CT-24, a speaker or headset, and a microphone before you start the application. Without them, you cannot operate the RC-FS10 properly.

- ① Select ‘RC-FS10A’ in the Icom folder, which is on the program menu, or double click the shortcut icon to start the application.
- ② Click **[Option]** in the Top menu, and then select **[Setting...]** to access the setting screen.
 - Login authentication is required.



- ③ Enter your user name and password, and then click **[OK]**. The user name and password are different, depending on the user authority. The default settings and the authorities are as shown below.

User authority	Default user name and password	Configurable settings
Super User	super_user	All settings
Power User	power_user	All settings except for Network and IP Command
User	User	Only ANI settings.

- You can change the user name and password in the Common Setting screen.

Please refer to the Help file of the RC-FS10 for help with the function or setting meanings. To open the help file, click **[Help]** in the Top Menu, and select **[Contents]**.

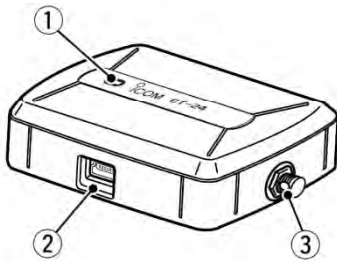
INFORMATION ON THE CT-24

The CT-24 utilizes an enhanced AMBE+2™ vocoder, and was designed to be used exclusively with the RC-FS10. You can control up to 8 repeaters at one RC-FS10 installation.

Panel Description

① Power/communicate indicator

- Lights **green** when the power is ON.
- Lights **orange** during communication.



② USB port

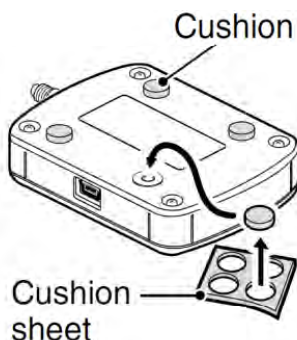
Connects a USB cable.

③ Multi secure holder

- To prevent the theft of the CT-24:
Secure it to the PC by attaching a security cable through the holder hole.
- To facilitate carrying:
Run a strap through the holder hole.

Attaching cushions

Attach the 4 adhesive cushions to the bottom of the CT-24.



When disconnecting the CT-24 from the PC

Before disconnecting the CT-24, **BE SURE** to click the “safely remove hardware” icon in the taskbar.

Specifications

- Power supply voltage : 5 V \pm 10% (supplied from the PC's USB port)
- Current drain : Less than 200 mA
- Interface : USB 2.0
- Operating temperature range : 0 °C to 40 °C; +32 °F to +104 °F
- Relative humidity : 5% to 95%
- Dimensions : 70 (W) \times 21 (H) \times 50 (D) mm;
(Projections not included) 2.8 (W) \times 0.8 (H) \times 2 (D) inch
- Weight (approx.) : 44 g; 1.6 oz
- USB cable length : Approximately 1.5 m; 5 feet

OPTION

CT-23 PTT MICROPHONE ADAPTER

Allows you to connect an Icom microphone, such as the SM-25 or SM-26, to the PC in your IDAS™ system. A BC-147 series AC adapter is optionally required as the power supply.

PRECAUTIONS

⚠ WARNING! NEVER connect an AC adapter to the CT-23 other than the specified one. This may cause a fire or damage the CT-23.

CAUTION: NEVER connect a microphone to the CT-23 other than the specified one. Other microphones may have different pin assignments, and could damage the CT-23 or the microphone.

CAUTION: NEVER expose the CT-23 to rain, snow or any liquids. This may damage the CT-23.

CAUTION: NEVER let metal, wire, etc. touch any connector part of the CT-23.

DO NOT use or place the CT-23 in areas with temperatures below 0° C (+32° F) or above +40° C (+104° F).

DO NOT use harsh solvents such as benzene or alcohol to clean the CT-23, because they can damage its surfaces.

Information

Output audio from the CT-23 includes high pitch tones that humans can hardly hear. However, when you playback any recorded audio while using the CT-23, it might be better to not turn the volume too high.

FEATURES

Make Land Mobile microphones usable for IDAS™ system

When the SM-26 stand microphone or the HM-152 hand microphone is connected to a Remote Communicator (PC) through the CT-23, you can take full advantage of its microphone function in your IDAS™ system.

POWER/TRANSMIT indicator

The CT-23 has a POWER/TRANSMIT indicator on the top panel, which enables you to see the operating status at a glance.

External switch is connectable

When an external switch is connected, you can use it as a substitute of the microphone's [PTT] and [MONITOR] switches.

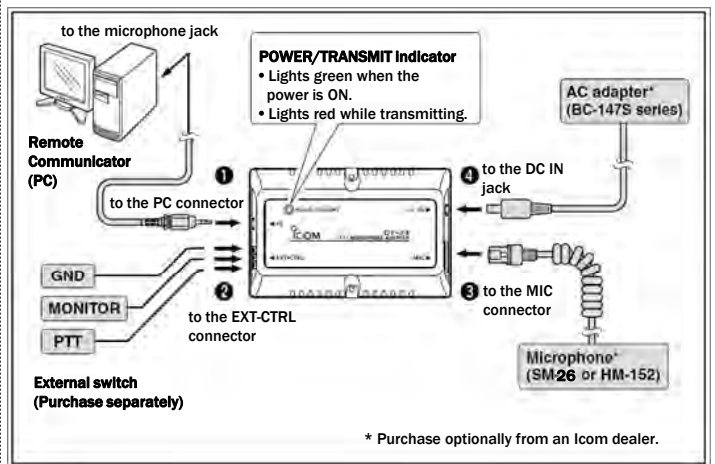
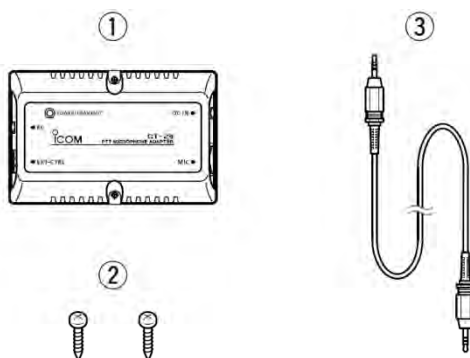
Easy connections

The CT-23 has 4 different types of connectors for safe, easy connection.

SUPPLIED ITEMS

Item Qty.

- ① CT-23..... 1
- ② Self tapping screws..... 2
- ③ Audio cable..... 1



Connect the components to the CT-23 in the following order:

① PC connection

Connect the microphone jack of the Remote Communicator (PC) to the PC connector, using the supplied audio cable.

The sound card of the PC must cover the frequency response range of up to 20 kHz, and have a sampling rate of 48 kHz, for the PTT and monitor functions to operate correctly.

② External switch connection

If desired, connect a optionally purchased external switch to the EXT-CTRL connector, for remote PTT and Monitor switch operation.

③ Microphone connection

Connect the SM-26 or HM-152 to the MIC connector.

You can use the following functions for your IDAS™ system, depending on the microphone.

- PTT function [SM-26, HM-152]
- Monitor function [SM-26]
- The microphone ON hook (mute) and OFF hook (unmute) functions [HM-152]

Connect the hanger to the CT-23's ground, to use the functions.

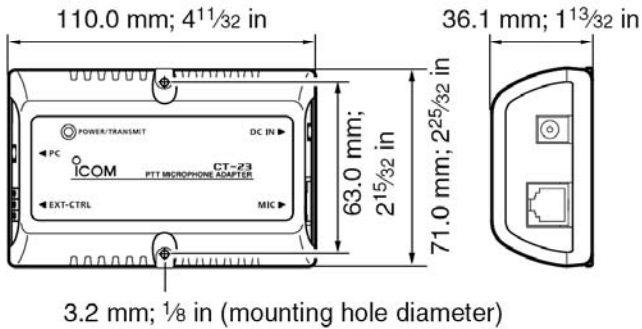
④ AC adapter connection

Connect one of the AC adapters in the BC-147S series that matches your AC voltage requirements.

- The POWER/TRANSMIT indicator lights green.
- Be sure to connect the AC adapter last.

Information

When the HM-152 is connected, you can transmit the microphone audio not only with the microphone's [PTT] switch, but also with the Remote Communicator's [PTT] button, or an external switch.



Mount the CT-23 by inserting the 2 supplied screws through the mounting holes and screwing them into a solid flat surface.

INFORMATION

You may experience the following problems with the CT-23, depending on the sound card of the PC.

- If the [PTT] switch of the microphone or the external switch doesn't work.
 - ➔ Disable the filtering system of the sound card.
- If the CT-23 produces a disturbing noise.
 - ➔ Disable the Mic boost of the sound card.

For setting details, refer to the equipment manual, or contact the sound card or PC manufacturer.

SPECIFICATIONS

- Power Supply voltage : 12 V DC (supplied from the AC adapter)
- Operating temp. range : 0 °C to +40 °C; +32 °F to +104 °F
- Relative humidity : 5% to 95%
- Weight (approx.) : 93 g; 3.28 oz
- Maximum Length of the audio cable: Approximately 1 m; 3 ft, 3 and 38 inches

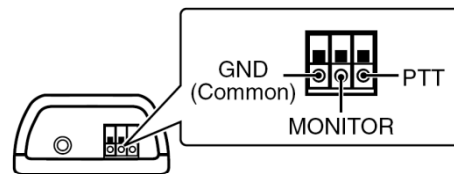
EXT-CTRL CONNECTOR

The PTT function is activated when the PTT switch is closed, and the monitor function is activated when the MONITOR switch is closed. To control the monitor function from the external switch, connect the specified microphone to the CT-23.

Specifications

Open terminal voltage	3.3 V DC
Terminal current when ON	Max1 mA
Connector type	One-touch terminal (3 poles)

- Use wires with a diameter of 0.4 to 1.2 mm; 1/32 to 1/16 inches.



System Option IDAS™ Remote Communicator

■ The new RC-FS10 remote communicator functions (Revision 2.0)

This is a list of the RC-FS10 remote communicator functions. Colored in yellow are the added functions in firmware revision number 2.0.

• RC-FS10 Functions List (Revision 2.0)

Common	Individual call
	Group Call
	All Call
	Voice Call
	Call Alert
	Radio Check
	Status Message/Status Poll
	Message (SDM)
	Remote Monitor
	Stun/Kill/Revive
	Emergency Call/Alert
	Send with Voice Call
	Encryption
	Caller ID/Name Display
	Talk Back
	ID List
	Call Log
	TOT
	Late Entry
	Sharing a CT-24
Conventional	Digital-SQL
	Busy Channel Lockout
	Block Decode
	Monitor
	Packet Encryption
	Message Trunking
	Beep On Receive
	Target Availability Check
	ATB Ring Back
	Priority Monitor
	Block Mode
	Broadcast Call

These functions were added in the firmware revision 2.0.

■ What is new ?

○ Multi-site trunking system compatible.

The original version of the RC-FS10 remote communicator can work only with a conventional system. However, from the firmware revision number 2.0, it became compatible with the multi-site trunking system as well.

NOTE: The RC-FS10 is *not* compatible with the single-site trunking system.

○ Sharing a CT-24

Another outstanding feature of the new RC-FS10 is that it can share one CT-24 to monitor up to 8 sites. That is, there is no need to buy a CT-24 for each site, anymore.

■ Operation

Please refer to the “IDAS™ Quick Guide on the RC-FS10 Demonstration” for details.

In order to activate the following functions, the PC commands need be sent to the repeaters.

• Repeater Status

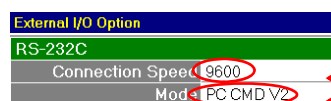
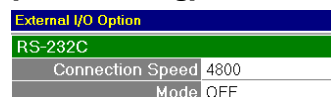
This function is to request and display the repeater’s status, such as power-supply voltage, PLL lock voltage, temperature and fan condition.

• Base memory channel (Base MR-CH)

This button enables the Remote Communicator to transmit a signal to change signals in operation. The Base MR-CH can be selected while in the **conventional** mode.

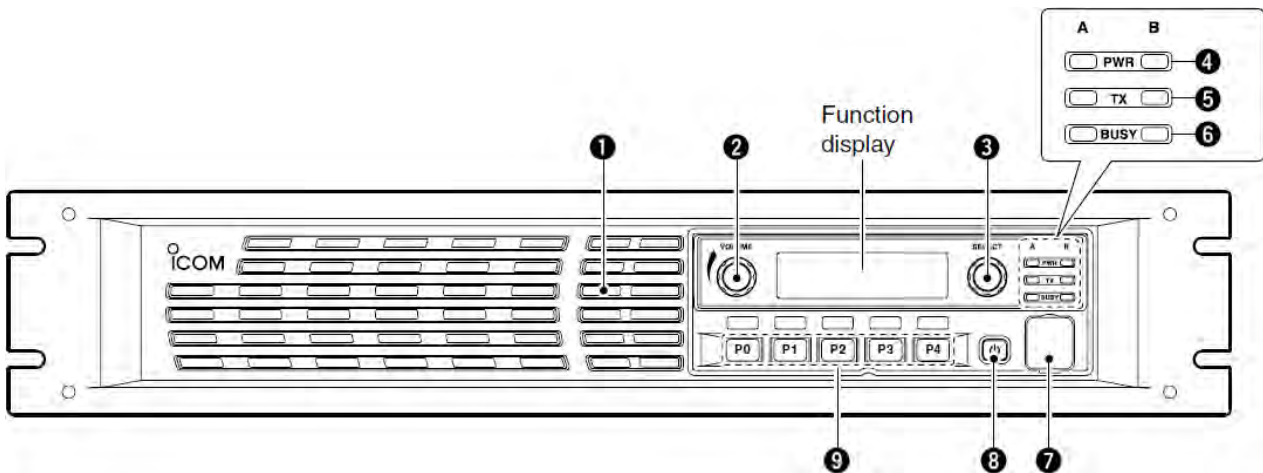
Therefore, please be sure to set up the serial port of the repeater first.

External I/O – Option - RS-232C
[Default setting]



Select **9600** for Connection Speed and **PC CMD V2** for Mode.

Note: Operation of the functions described below may depend on the repeater programming.



① INTERNAL SPEAKER

Outputs received signal audio.

② VOLUME CONTROL [VOLUME]

Adjusts the audio output level.

③ SELECTOR DIAL [SELECT]

Rotate to adjust the squelch threshold level, or select the operating channel, depending on the presetting.

④ POWER INDICATOR [POWER]

➔ 'A' module's LED lights green while the repeater power is turned ON.

When a channel extension module is installed:

- ➔ The selected 'A' or 'B' module's LED lights green while the repeater power is turned ON.
- ➔ The un-selected 'A' or 'B' lights orange while the repeater power is turned ON.

⑤ TRANSMIT INDICATOR [TX]

Lights red while transmitting.

⑥ BUSY INDICATOR [BUSY]

Lights green while receiving a signal, or when the noise squelch is open.

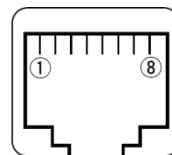
About [PWR], [TX] and [BUSY] indicator:

The 'A' and 'B' module's LED indicates the [PWR], [TX], and [BUSY] functions. The 'A' LED corresponds to the original module and the 'B' LED corresponds to the extended module.

⑦ MICROPHONE CONNECTOR [MIC]

This 8-pin modular jack accepts an optional microphone.

KEEP the [MIC] connector cover attached to the repeater when a microphone is not used.



- ① +8 V DC output (Max. 15 mA)
- ② Output port for PC programming
- ③ NC
- ④ M PTT (Input port for TX control)
- ⑤ Microphone ground
- ⑥ Microphone audio input
- ⑦ Ground
- ⑧ Input port for PC programming

⑧ POWER SWITCH [POWER]

- ➔ Push to turn ON the repeater power.
- ➔ Push and hold for 3 seconds to turn OFF the repeater power.

When a channel module is installed:

- ➔ While the repeater power is turned ON, push to select the desired module to operate the repeater as the base station.
 - The power LED of the selected module unit lights green.

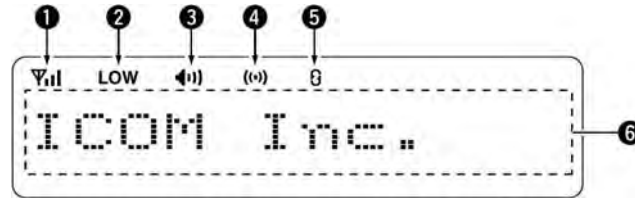
⑨ DEALER-PROGRAMMABLE KEYS

Various functions can be programmed by your dealer.

Ask your dealer for details.

- Because these keys are programmable, the functions are unique to each unit.

➤ Function display



① SIGNAL STRENGTH INDICATOR

Indicates relative signal strength level.

② LOW POWER INDICATOR

Appears when Low output power is selected.

③ AUDIBLE INDICATOR

Appears when the channel is in the 'audible' (unmuted) condition mode.

④ COMPANDER INDICATOR

Appears when the Compander function is activated.

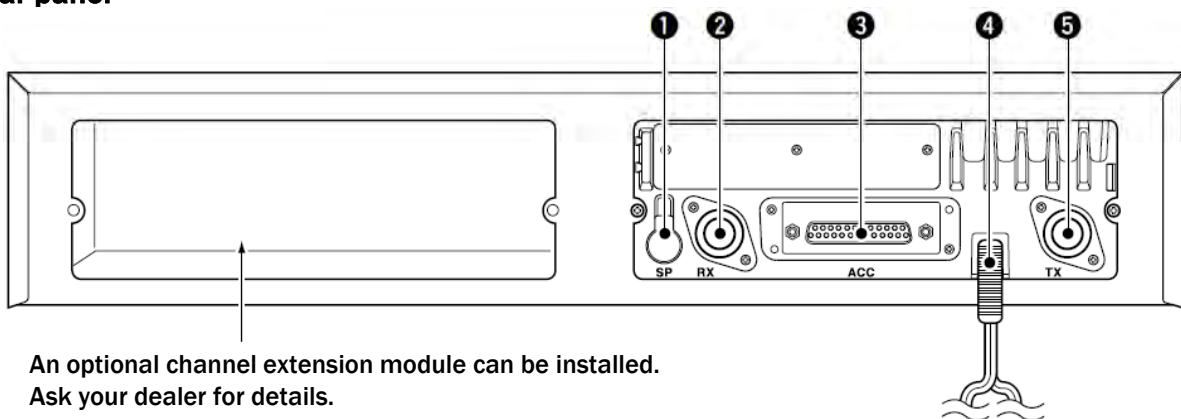
⑤ SCRAMBLER/ENCRYPTION INDICATOR

Appears when the voice scrambler/encryption function is activated.

⑥ ALPHANUMERIC DISPLAY

Shows a variety of text or code information.

☐ Rear panel



An optional channel extension module can be installed.
Ask your dealer for details.

① EXTERNAL SPEAKER CONNECTOR [SP]

Connect the optional SP-22 speaker.

② RECEIVE ANTENNA CONNECTOR [RX]

Connect a receive antenna.

③ ACCESSORY CONNECTOR [ACC]

Connect to an accessory plug.

- See page 17 for accessory connector information.

④ DC POWER RECEPTACLE

Connect the DC power cable from this connector to an external 13.6 V DC power source.

⑤ TRANSMIT ANTENNA CONNECTOR [TX]

Connect a 50 ohm transmit antenna.

□ Key Assign

Assign a function to each programmable key; [Dial]/[P0]/[P1]/[P2]/[P3] and [P4].

The functions you can assign to [DIAL] are limited.

For [Dial]

Key & Display Assign	
Key	Conventional
Dial	CH Up/Down
P0	Null
P1	CH Up/Down
P2	SQL Level Up/Down
P3	Null
P4	Null

- **Null**
No function.
- **CH Up/Down**
Rotate to select a channel after selecting a specific function using other keys.[DIAL].
- **SQL Level Up/Down** Rotate to select the SQL level.

For [P0]/[P1]/[P2]/[P3] and [P4]

Key & Display Assign	
Dial	Null
P0	Null
P1	CH Up CH Down
P2	Scan A Start/Stop
P3	Scan B Start/Stop
P4	Scan Add/Del(Tag)
	Prio A
	Prio A (Rewrite)
	Prio B
	Prio B (Rewrite)
	MR-CH 1
	MR-CH 2
	MR-CH 3
	MR-CH 4
	Moni
	Light
	Lock
	High/Low
	Wide/Narrow
	Scrambler/Encryption
	Compander
	Hook Scan
	User Set Mode
	OPT1 Out
	OPT2 Out
	OPT3 Out
	OPT1 Momentary
	OPT2 Momentary
	OPT3 Momentary
	Digital Button
	Reset
	Ext.CH Sel Mode
	TX Disable

- **Null**
No function.
- **CH Up/Down**
Push to select a channel after selecting a specific function using other keys.
- **Scan A Start/Stop**
- This key operation depends on the Power ON Scan setting in the Common screen.

When Power ON scan function is turned "OFF";
Push to start or cancel a scan.

When Power ON scan function is turned "ON";
Push to pause scanning, then resumes scanning after the time period specified in **Auto Reset Timer** ends.

- Push and hold this key for 1 second to display the scan group, then push [CH Up] or [CH Down] to select the desired group.

- **Scan B Start/Stop**

- Push to start and cancel scanning operation. When scan is canceled by other than this key, scan resumes after the time period specified in **Auto Reset Timer**.

- Push and hold this key for 1 second to display the scan group, then push [CH Up] or [CH Down] to select the desired group.

- **Scan Add/Del (Tag)**

- The channel can be added to or deleted from the selected scanning list.

1. Push to display the scan list, then push [CH Up] or [CH Down] to select the desired list.

2. Push to add the channel to, or delete it from the selected scanning list.

3. Push and hold for 1 second to exit the scan list selection mode.

- While a scan is paused by detecting a signal on a channel other than a primary or secondary channel, push this key to clear the channel from the scan list.
- When **Nuisance Delete** is turned "ON" in the Scan Setting screen, the cleared channel is added back to the scan list after the scan is canceled.

- **Prio A, Prio B**

Push to select the priority A/B channel programmed in **Atr** in the Memory CH screen.

- **Prio A (Rewrite), Prio B (Rewrite)**

- Push to select the priority A/B channel programmed in **Atr** in the Memory CH screen.

- Push for 1 second to reassign the A/B operating channel.

- **MR-CH 1/2/3/4**

Push to select memory channels 1 to 4.

- **Moni**

Push to open any squelches and deactivate any mutes.

- **Light**
Push to turn the backlight ON for 5 seconds when **Backlight** is turned "OFF" in the Set Mode screen.
- **Lock**
Push and hold for 1 second to toggle the key lock function ON or OFF.
When this function is assigned to any programmable key, the key lock function is turned "ON" after 1 minute has passed without a key operation.
- **High/Low**
Push to toggle the transmit output power level from the independent settings of each channel.
The selectable level is specified in the **RF Pwr** setting in the Memory CH screen.
 - The [**High/Low**] selects Low1 only when "Low1" is selected in **RF Pwr**.
 - The [**High/Low**] toggles the output power level between Low1 and Low2 when "Low2" is selected in **RF Pwr**.
 - The [**High/Low**] toggles the output power level between Low1, Low2 and High when "High" is selected in **RF Pwr**.
- **Wide/Narrow**
Push to temporarily toggle "Wide" or "Narrow" channel spacing operation for both transmit and receive. Once the channel is changed, the bandwidth returns to the original setting.
The original bandwidth is programmed in **Wide/Narrow** in the Memory CH screen.
- **Scrambler/Encryption**
Push to toggle the voice scrambler/encryption function ON or OFF.
- **Compander**
Push to turn the compander function ON or OFF.
The compander function reduces noise components from the transmit audio to provide clear communications.
- **Hook Scan**
When the **On Hook (Scan)** function is turned "ON" in the Key & Display Assign screen, push this key to temporarily disable On Hook (Scan) function.
Push this key again to enable On Hook (Scan) function.
- **User Set Mode**
 - Push and hold for 1 second to enter the User Set Mode. The User Set Mode is used to program infrequently changed function values or options, without using a PC.
 - After entering the User Set Mode, push this key momentarily to select the function. Then, push [**CH Up**] or [**CH Down**] to change the setting.
 - Push and hold for 1 second to exit the User Set Mode.
- **OPT1/2/3 Out**
This key's function is exclusive for use with non-Icom units.
When [**OPT 1/2/3 Out**] is selected, the active level selection screen will appear. Select the correct H or L setting for the connected unit.
*The repeater has 3 optional ports inside for these outputs.
The selected H or L active level is output when this key is pushed.
- **OPT1/2/3 Momentary**
This key's function is exclusive for use with non-Icom units.
Select [**OPT 1/2/3 Momentary**], and then, active level selection screen will appear so that the users can see if the setting is correctly made for the connected unit.
*Option connectors inside the repeater have 3 ports each for these outputs. OPT1/2/3 outputs the selected active level H or L while this key is pushed.
- **Ext.CH Sel Mode**
Push to toggle the MCH Select function ON or OFF.
When the function is turned "ON", you can go to the desired memory channel with only an External I/O operation. Assign the MCH Select function to the **D-Sub 25 pin-Function** in the Port Setting screen, and the desired memory channel to the **Ext CH No.** in the CH Switch Table screen. When the function is turned "OFF", you can move to the desired memory channel without an External I/O operation.
- **Reset** for digital mode operation (Rev.1.7 or later)
If the destination unit ID and call type have been manually changed, push to reset them back to the default.
If the Talk Back function is activated, push to cancel it.
While in the application, message and status message mode, push to return to the stand-by mode.
In this case, the transceiver resets the destination unit ID, call type and Talk Back function, as described above.
- **TX Disable**
Push to toggle the TX disable function ON or OFF.
When the TX disable function is turned "ON", each item that is set to "Enable" in **TX Disable Selection** in the Key & Display Assign screen is disabled.

Display

• **Opening Text**

Enter an opening message of up to 12 characters to appear on the LCD for 2 second when turning the repeater ON.
Leave this item blank to not display a message.

• **Opening Beep** (Selectable only when **Opening Text** is programmed, as described above)

Set the opening beep function to sound a beep when the opening text is displayed on the LCD.

OFF	No beep sounds, even when the opening text is displayed on the LCD.
Short	1 high beep sounds.
Long	A long beep sounds while the time the opening text is displayed on the LCD.

• **Label**

Enter a label of the desired up to 12 characters. When "Label" or "MR CH + Label" is selected in **Display Mode**, the programmed label will be displayed on the LCD.

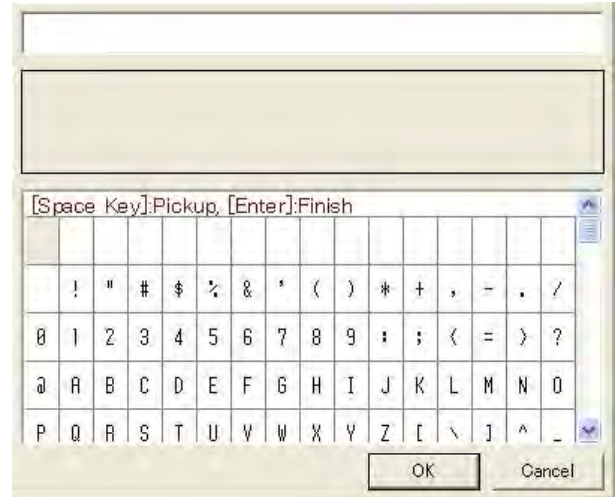
• **Display Mode**

Select the display indication from MR CH, Label, or MR CH + Label.

MR CH	Displays the selected memory channel's programmed text. When no text is programmed, the memory channel number is displayed.
Label	Display the programmed label in Label . When no label is programmed, the selected operating channel number or programmed text is displayed.
MR CH + Label	Displays the programmed label in Label and the programmed text. When no label is programmed, the selected operating channel number or programmed text is displayed.

Text setting for Opening Text and Label

Right click to display the [Edit... Enter] menu and click [Edit... Enter].



- Double click the desired character in the table or push [Space] to pick up the character.
- Push [Enter] to finish editing.

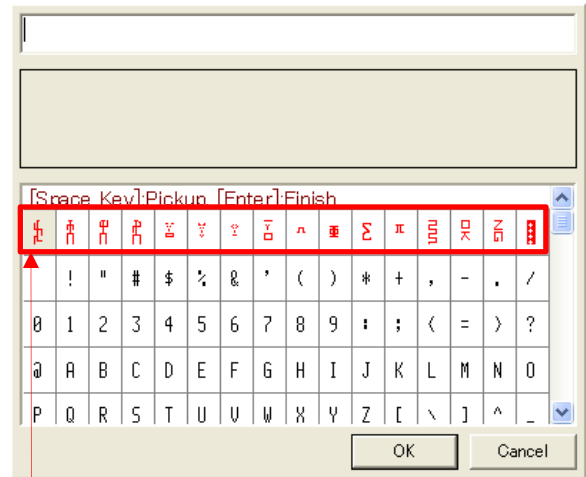
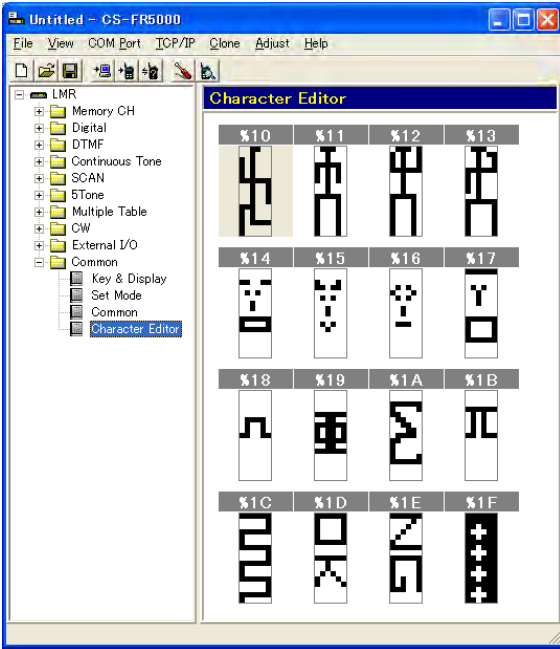
Usable characters are listed below.

	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
a	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
\	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
P	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
!	!	■	■	■	-	-	■	■	■	■	▶	◀	▲	▼	
Б	Г	Д	Ж	З	И	Й	Л	П	У	Ф	Х	Ц	Ш	Щ	Ъ
!	i	φ	£	¥	!	§	3	0	a	«	»	9	0	-	
°	±	2	3	μ	¶	.	1	0	»	¼	½	¾	¿		
À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

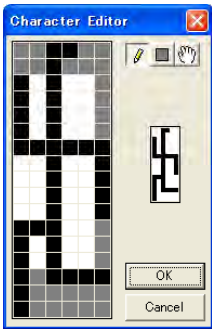
- You can use and make original characters using the Character Editor Screen.

• **Character editor**

- You can make an original character in the Character Editor Screen.



Up to 16 characters are editable and displayed here. See the left side of this page for details on how to edit the characters.



Up to 16 original characters or symbols can be edited in this sheet.

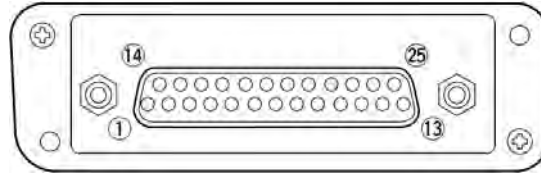
Double click the desired thumbnail (%10 to %1F) to display on the Character Editor screen.

To edit a character, select either (pen) or (box fill) and blacken the segments as you like.

To erase the segments, right-click the segments you want to erase.

When is selected, you can slide the segments in all directions.

□ Accessory connector *1



Pin No.	Pin Name	Description	Specification
1	NC	No connection	—
2	TXD*2	Output terminal for serial communication data.	—
3	RXD*2	Input terminal for serial communication data.	—
4	RTS*2	Output terminal for request-to-send data.	—
5	CTS*2	Input terminal for clear-to-send data.	—
6	NC	No connection	—
7	GND	Serial/digital signal ground	—
8	MOD IN	Modulator input from an external terminal unit.	Input level: 300 mV rms
9	DISC OUT	Output terminal for AF signals from the AF detector circuit. Output level is fixed, regardless of the [AF] control setting.	Output level: 300 mV rms
10	EXT. D/A	The desired function can be assigned.* (Default: Null)	—
11	VCC	13.6 V DC output	Output current: Less than 1 A
12	EXT. A/D	Customize A/D input (Not used)	—
13	NC	No connection	—
14	GND	Ground	—
15	EXT.I/O 15	A desired function can be assigned.* (Default: Null)	+5 V pull up, Active = L
16	EXT.I/O 16	A desired function can be assigned.* (Default: PO Monitor Output)	+5 V pull up, Active = L
17	EXT.I/O 17	A desired function can be assigned.* (Default: Busy Output)	+5 V pull up, Active = L
18	EXT.I/O 18	A desired function can be assigned.* (Default: Null)	+5 V pull up, Active = L
19	EXT.I/O 19	A desired function can be assigned.* (Default: EPTT Input)	+5 V pull up, Active = L
20	DATA IN	Input terminal for data.	—
21	EXT.I/O 21	A desired function can be assigned.* (Default: Analog Audible Output)	+5 V pull up, Active = L
22	AF OUT	The AF detector Output.	—
23	EXT.I/O 23	A desired function can be assigned.* (Default: Mic Mute Output)	+5 V pull up, Active = L
24	EXT.I/O 24	A desired function can be assigned.* (Default: Null)	+5 V pull up, Active = L
25	EXT.I/O 25	A desired function can be assigned.* (Default: Mic Hanger Output)	+5 V pull up, Active = L

*1 The desired function can be assigned using the optional CS-FR5000 cloning software.

NOTE: When connecting the repeater to a PC or other external equipment, please carefully note the function of Pins 2, 3, 4, and 5 and connect them to the PC/external equipment correctly.

▶Pin No.2 (TXD)/No.4 (RTS) are to receive data from the PC/external equipment.

▶Pin No.3 (RXD)/No.5(CTS) are to transmit data from a repeater to the PC/external equipment.

Port Setting : Assign a function to each port;

For [Ext.I/O 15 to 25]

• **In/Out**

Set the type of the assignable function to Input or Output.

• **Active Logic** (Available when "Output" is selected Input/Output as above)

Set the active logic for the D-sub 25 pin output to High or Low.

Function-When "Input" is selected in In/Out

• **Null**

No function.

• **MCH Select : 1/2/3/4/5**

You can select the desired memory channel with the function. Activate the desired MCH Selects assigned ports to make the Ext CH No. You can make the Ext CH No. one of the 32 preset memory channels. (see the table below) [0]: Hi-Z, [1]: 0 V

MCH Select : 1	+ 1 CH
MCH Select : 2	+ 2 CH
MCH Select : 3	+ 4 CH
MCH Select : 4	+ 8 CH
MCH Select : 5	+ 16 CH

CH	MCH Select					CH	MCH Select				
	5	4	3	2	1		5	4	3	2	1
1	0	0	0	0	0	17	1	0	0	0	0
2	0	0	0	0	1	18	1	0	0	0	1
3	0	0	0	1	0	19	1	0	0	1	0
4	0	0	0	1	1	20	1	0	0	1	1
5	0	0	1	0	0	21	1	0	1	0	0
6	0	0	1	0	1	22	1	0	1	0	1
7	0	0	1	1	0	23	1	0	1	1	0
8	0	0	1	1	1	24	1	0	1	1	1
9	0	1	0	0	0	25	1	1	0	0	0
10	0	1	0	0	1	26	1	1	0	0	1
11	0	1	0	1	0	27	1	1	0	1	0
12	0	1	0	1	1	28	1	1	0	1	1
13	0	1	1	0	0	29	1	1	1	0	0
14	0	1	1	0	1	30	1	1	1	0	1
15	0	1	1	1	0	31	1	1	1	1	0
16	0	1	1	1	1	32	1	1	1	1	1

• **EPTT**

When the port is activated, the External PTT (EPTT) function is turned "ON".

• **Repeat Disable**

When the port is activated, repeater operation is disabled.

• **TX Disable**

When the port is activated, transmission is disabled.

• **Mic Mute**

When the port is activated, the microphone is muted.

• **Ext. Key**

You can use the port as a customized key. The same functions in the Key Assign are assignable to the port.

Function-When "Output" is selected in In/Out

• **Null**

No function.

• **Busy**

Works while receiving a carrier signal that is stronger than the SQL level.

• **Analog Audible**

Works when the mute is released by receiving an analog signal.

• **Digital Audible**

Works when the mute is released by receiving a digital signal.

• **Mic Mute**

Works while the microphone's mute is released.

• **Hanger**

Works while the microphone is put on its hanger (Hook-on).

• **PTT**

Works while pushing the microphone's [PTT] or Ext.PTT (EPTT).

• **TX**

Works while the repeater is transmitting.

• **Low Voltage 1/2**

Works when the repeater's voltage is lower than the Low Voltage 1/2 in the Common screen.

• **Over Voltage**

Works when the repeater's voltage is too high.

• **Final Protect**

Works when the final protect is selected.

• **Fan State**

Works if the FAN works improperly.

• **RX/TX Unlock**

Works if the RX/TX PLL unlocks.

• **P0/1/2/3/4 Monitor**

Outputs the customized key (P0 to 4) condition when each key is pushed.

For [Ext. D/A 10]

The Analog Output port can output an Analog signal to the D/A port.

• **Null**

No function.

• **Power-supply Voltage**

Outputs the VIN (proportionate to the power-supply voltage).

• **Temperature**

Outputs the TEMPS (proportionate to the temperature).

• **RSSI**

Outputs the SD (proportionate to the received signal's RSSI voltage).

□ Getting started

- This cloning software is designed to perform data setting and cloning for the IC-FR5000/IC-FR6000 series VHF/UHF FM REPEATERS.
- **HELP WINDOW:** CS-FR5000 has a help window to describe functions and operation.

□ System requirements

To use this program, the following hardware and software are required:

PC

- Microsoft® Windows® 2000/XP or Microsoft® Windows Vista® is installed
- With USB port

Other item

Optional OPC-1122U* CLONING CABLE (USB type)

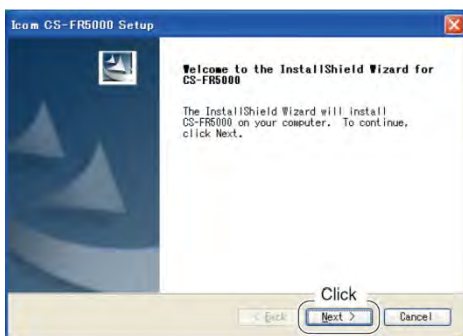
NOTE:

To use the OPC-1122U, USB type cloning cable, USB driver installation is necessary. The driver is supplied with the OPC-1122U. See the OPC-1122U instruction manual for the installation details.

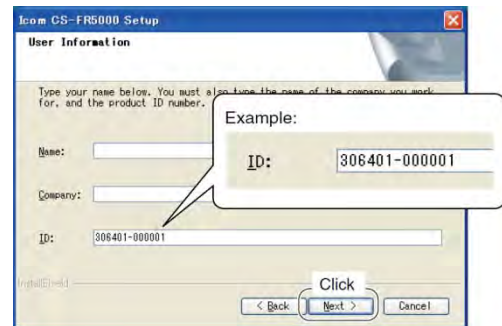
*The USB driver, supplied with the OPC-1122U, is not supported by 64 bit for Microsoft® Windows Vista®.

□ Software Installation

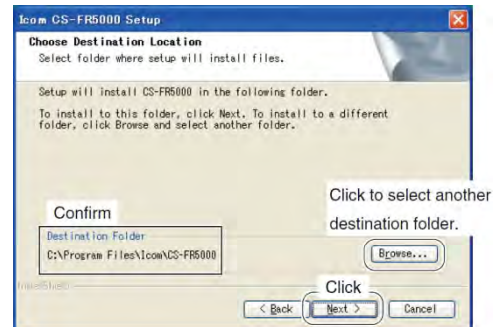
- ① Quit all applications when Windows is running.
- ② Insert the CD into the appropriate CD drive.
- ③ Double-click the "Setup.exe" contained in the CD.
- ④ The "Welcome to the InstallShield Wizard for CS-FR5000" will appear as below. Click [Next>].



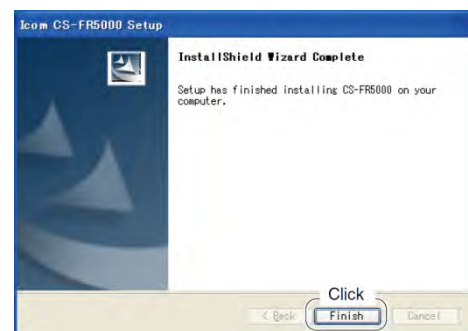
- ⑤ The "User Information" will appear as below, then type your name, your company name and the product ID number with the following manner. Then click [Next >].
 - ID number: 306401-(6 digit serial number)
 - e.g. the serial number on the CD is 000001, enter "306401-000001" as the ID number.



- ⑥ "Choose Destination Location" will appear as shown below. Then click [Next>] to install the software into the destination folder. For example, C:\Program Files\Icom\CS-FR5000
 - If desired, Click [Browse...] to select another destination folder before clicking [Next >].



- ⑦ After the installation is completed, "InstallShield Wizard Complete" will appear as below. Then click [Finish].



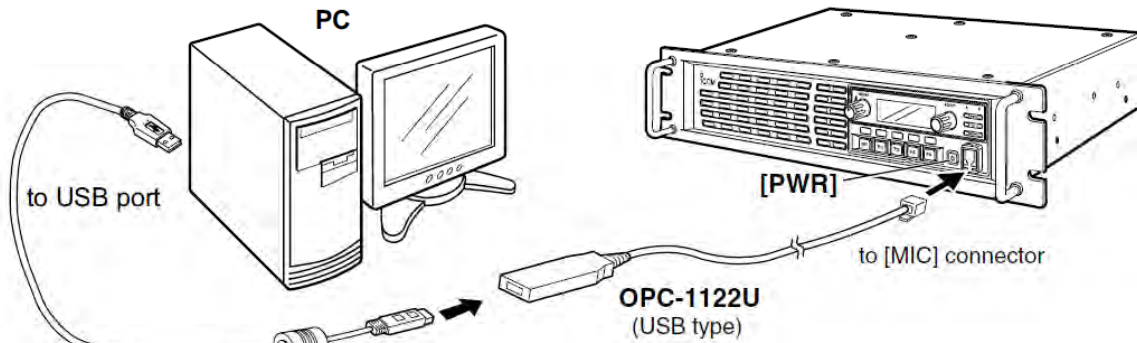
- ⑧ Eject the CD.
- ⑨ Program group 'CS-FR5000' appears in the 'Programs' folder of the start menu, and the 'CS-FR5000' shortcut icon appears on the desktop screen.
 - To uninstall the cloning software, select the "Control Panel" in the start menu, and click the "Add or Remove Programs." Then, select the program group 'Icom CS-FR5000' and click [Remove].

Note 1: Icom distributes cloning software by CD or license. Therefore, some information here may not apply as written, for example, an ID number.

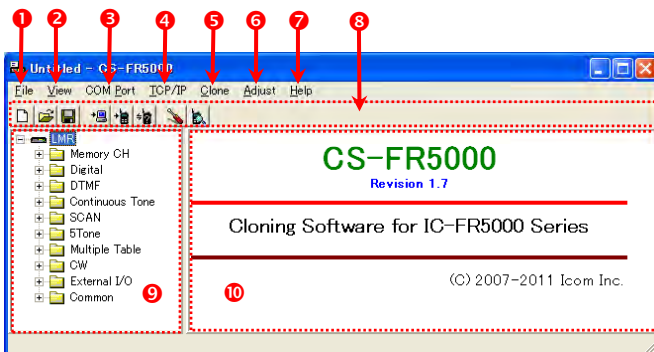
☐ Connections

All cloning operations are performed from the computer's mouse or keyboard—the steps required on the receiver side are;

- ① First, connect the cloning cable, as illustrated below.
- ② Push [PWR] to turn power ON.



☐ Screen description



① FILE MENU [File]

Used for saving memory channel contents, printing displayed information, quitting programs and so on.

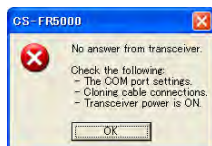
② VIEW MENU [View]

- Select the displayed font size and language.
- Turn the Toolbar ON or OFF.

③ COM PORT MENU [COM Port]

- Setting box, and selecting the Port (1 to 4 and More).
- Set the transfer speed to Normal or High.

NOTE: When the COM port is not set correctly, this message appears.



④ TCP/IP

- Enter the IP address of the controller, and then click [OK].
- Enter the Repeater Control Port number which has been set in the controller to between 1024 and 65535, and then click [OK].

⑤ CLONING MENU [Clone]

Click to display the cloning menu and cloning information dialog box.

⑥ ADJUST MENU [Adjust]

Click to display the adjust menu and the I/O Check dialog box.

⑦ HELP MENU [Help]

Click to display the help contents and cloning software revision information.

⑧ TOOL BAR

Shortcut buttons appear on the tool bar when the tool bar is turned ON in the [View] menu.

⑨ TREE VIEW SCREEN

Click the icon you want to edit.

⑩ CONTENTS LIST SCREEN

Display the contents list.

☐ Programming information

- We recommend that you read out all the repeater's data before you start entering or editing parameters, even when the repeater is factory fresh. This avoids rare glitches which might cause programming errors when writing back the new parameters.

- Double click the desired cell in the contents list screen directory, or right-click the cell to display the edit menu. Then click [Edit... Enter] to select and change the setting.
- Click [Help] to display the help screen for the item.

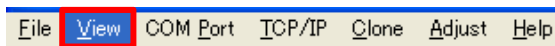
Edit...	Enter
Copy	Ctrl+C
Paste	Ctrl+V
Up	Ctrl+Up
Down	Ctrl+Down
Clear	
Delete	Del
Insert	Ins
Help	

(Edit menu)

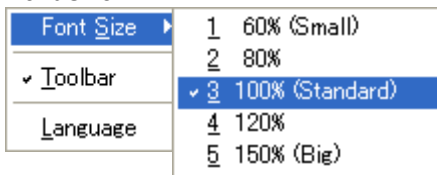
☐ Menu bar

Before starting to set the software items, please open up each item in the menu bar and make sure that all the adjustments were properly made.

◆ View



➤ Font Size



➤ Toolbar



Select the desired font size from 60% to 150%.

60% (Small)

				Frequency (MHz)	
CH	Atr	Inh	Operation Mode	RX	TX
1-1	AB	Inh	Repeat	140.000000	145.000000

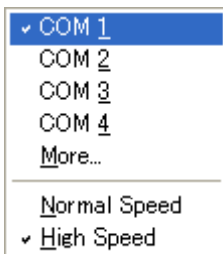
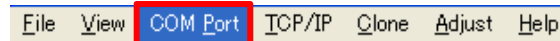
150% (Big)

CH	Atr	Inh	Opera

Click to show the Toolbar or to hide it.



◆ COM Port



➤ More....



Select the desired COM port.

Select Normal Speed, if a clone error occurs at High Speed.

Normal speed (N)	9600bps
High Speed (H)	38400bps

When <More...> is selected, the "COM Port" dialog box appears as shown to the left side.

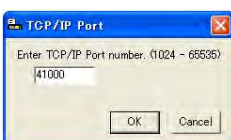
Enter the COM port number 1-256, and then click [OK].

◆ TCP/IP



IP Address (I)

Enter the IP address of the controller, and then click [OK].



Port (P)

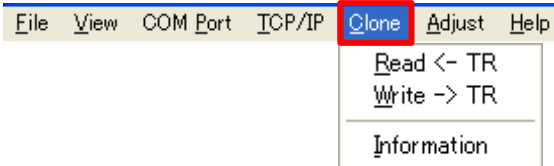
Enter the Repeater Control Port number, which has been set the controller, to between 1024 and 65535, and then click [OK].

This menu is used when the repeater is equipped with an optional UC-FR5000 controller. These settings enable cloning operations over the internet, such as reading or writing data between the repeater and the PC, checking the repeater's information, and adjustments.


NOTE:

While you are configuring the settings of the UC-FR5000 using a web browser, it is not possible to read or write the data between PC and the repeater on the internet, and an error dialog box will appear. In that case, please try again.


◆ Clone



Connect the PC and repeater with an OPC-1122U optional cloning cable, to read and write data between them.

Read (R) <- TR 

Reads the data from the repeater.

Write (W) -> TR 

Writes the data to the repeater.

NOTE:

- If the cloning software has an item displaying a "⚠", the setting will be automatically changed to the valid value when the programmed data is written into the repeater.
- If the cloning software has an item displaying an "✘", you cannot write the data to the repeater.

Information (I) 

"Information" allows you to read the connected repeater type, and so on, without reading all the cloning data. You can also check whether the repeater has an optional controller, UC-FR5000.

Cloning Items

Common Setting

Key & Display

Assign one of several functions to the Dealer assignable keys, set the beep audio frequency, Display conditions, select the transmit output power, and so on.

Common

Set common items such as Clone Comment (1)/(2), Security, Auto Reset, TOT, Lockout, Repeater Hold Timer, PTT Encode Tone, EPPT Delay Timer, RS-232, Scrambler, Low Voltage 1 and 2 value, Beat Cancel, Wide Band Width, Front Speaker, and Digital Function.

Set Mode

To set the following items in the repeater's User Set Mode to "Inhibit" or "Enable", and to adjust the appropriate settings.

The items includes Backlight, LCD Contrast, Fan, Beep, SQL Level, AF Min Level, Mic Gain, Signal Moni, System info, LCD Check, Information, and Key Check.

	Value	Enable/Inhibit
Backlight	Auto	Enable
LCD Contrast	50	Enable
Fan	Auto	Enable
Beep	OFF	Enable
SQL Level	2	Enable
AF Min Level	0	Enable
Mic Gain	3	Enable
Signal Moni	ON	Enable
System Info	----	Inhibit
LCD Check	----	Inhibit
Information	----	Inhibit
Key Check	----	Inhibit

Memory CH

The 'Memory CH' window allows you to edit the channel information. Editable items such as RX/TX Frequency, Time-Out-Timer, Scan List, CW ID, TX C.Tone, Wide/Narrow, Compander, 5-Tone setting, Digital Setting, Scrambler/Encryption OFF/ON/Inhibit and so on.

CH	Atr	Inh	Operation Mode	Frequency (Mhz)		TOT	
				RX	TX	TX Inh	Local Mic
1-1	AS						
1-2							

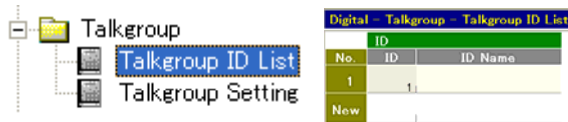
Digital*

➤ Individual ID List



Set the Individual ID to between 0 and 65519, or 65535. And then Enter Individual ID names of up to 12 characters.

➤ Talk-group ID List



Set the Talk-group ID to between 0 and 65519, or 65535 (decimal number).

➤ Talk-group setting



Select the block decode for the talkgroup ID to Inhibit or Enable. Enter the desired decimal number respectively.

➤ Status List



Enter up to a 12 characters to be displayed on the LCD when a matched status message is received.

➤ Status Setting



Select "Enable" to transmit status request calls. Select "Enable" to request the targeted station to send back an acknowledgement.

➤ SDM List



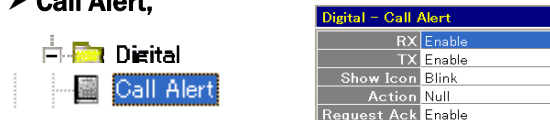
Enter SDM (Short Data Message) of up to a 12-characters. Up to 10 messages can be stored.

➤ SDM Setting



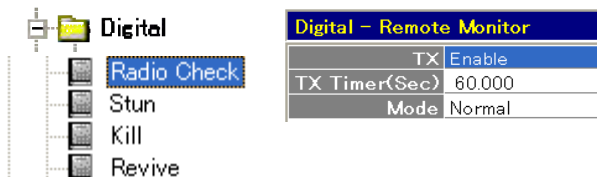
Select "Enable" to receive SDMs. Select "Enable" to request the targeted station to send back an acknowledgement.

➤ Call Alert,



Call Alert calls allow you to notify another user who may be away from the station that you want to talk. Select "Enable" to activate this function.

➤ Radio Check, Stun, Kill, Revive



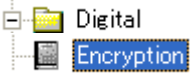
Select "Enable" to activate these functions.

➤ Remote Monitor



Remote Monitor calls allow you to send a signal that requires a targeted station to transmit its microphone audio. Select "Enable" to activate this function.

➤ Encryption



Digital - Encryption	
No.	Encryption Key(Dec)
1	1
2	1
3	1

A total of 63 encryption codes can be programmed. Enter an encryption Key between 0001 and 7FFF (hexadecimal number) into each Key field.

➤ Option



ANI

Set the display options of the Talkgroup ID and Unit ID and so on.

ANI	
Talkgroup Display on Mode Change	OFF
Talkgroup Display on Receive	OFF
Unit ID Display on Receive	OFF
Extended Display Timer(Sec)	2,000
Talkgroup Display on PTT	OFF

- ❖ Programmable duration of displaying the Unit ID and Talk-group ID indication (New).
The extended display time can be selected to between 0 and 25.5 seconds.

Talk-back (Digital / Analog)

Talk Back	
Talk Back Timer(Sec)	25.500
RX Type	Normal
Talk Back Beep	OFF

- ❖ Enter the time length to activate the Talk Back function to between 0 and 25.5 seconds (NEW).

Config

- ❖ Improvement in Individual or Talk-group mode selection (NEW)
You can set the default call type to either Talk-group or Individual.

Config	
Ack TX Delay(Sec)	0.100
Ack RX Wait(Sec)	0.800
Attempt No.	5
Call Type	Talkgroup
Call Type Reset	ON
Reset Timer(Sec)	OFF
Data Decode Comparison	OFF

➤ Expert



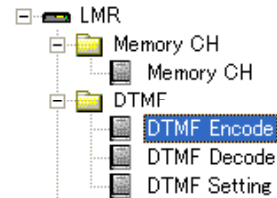
Set All Call, Synchronization, Timer and Counter.

Digital - Expert	
All Call	
TX All Call Inhibit	
RX All Call Inhibit	
Synchronization	
FSSB Attack	24
FSSB Attack	10
Synchronization Establishment Parameter	
bit error allowance (0x5)	2
Synchronization Establishment Parameter	
counter (0x5)	2
Synchronization Establishment Parameter	
bit error allowance (0x3)	3
Synchronization Error Parameter	
bit error allowance (0x2)	2
Synchronization Error Parameter	
counter (0x7)	5
Resynchronization Parameter	
offset counter	0
Timer & Counter	
LETGSec3	0.015
Detect Lag Timer(Sec)	0.100
RAN Decode Compare	1
RAN Decode Delay Count	2

DTMF

➤ DTMF Encode

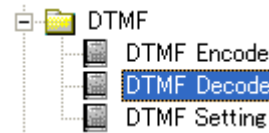
Program several DTMF acknowledges codes of up to 24 digits.



DTMF Encode	
No.	Code
1	
2	
3	

➤ DTMF Decode

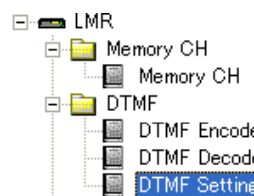
Program a DTMF code for DTMF decode of up to 24 digits.



DTMF Decode			
No.	Code	Action	Act
1		Null	OFF
2		Null	OFF
3		Null	OFF

➤ DTMF Setting

Set PTT Delay, No tone Timer, *# Timer, DTMF Timer, 1st Timer, ANI Display Timer, Decode with C. Tone, and so on.

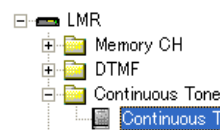


DTMF Setting	
Timer	
PTT Delay(Sec)	0.800
No tone Timer(Sec)	0.160
DTMF Timer(Sec)	0.100
First Timer(Sec)	0.100
* # Timer(Sec)	0.100
ANI Display Timer(Sec)	2.000
Decode with C.Tone	OFF

Continuous Tone

➤ Continuous Tone

Set the Tone Burst, Tone Burst Timer, User CTCSS req, TX DTCS Inverse and RX DTCS Inverse. The Digital mode must be enabled to use this functionality.



Continuous Tone - Setting	
Tone Burst	No tone
Tone Burst Timer(Sec)	0.300
User CTCSS	
Freq (Hz)	88.5
TX DTCS Inverse	Normal
RX DTCS Inverse	Normal

SCAN

➤ Scan List

A total of 17 scanning lists are available for a wide variety of flexible scanning.

Scan List	Name	Priority	Channel	TX CH	Fast Scan	Slow Scan	Monitor	Group	Repeat
1									
2									
3									
4									
5									
6									
7									

➤ Scan Setting

Set the timer for Watch, Watch Unmatch, Resume, Talk Back, Fast Scan, Slow Scan, and set the functions such as Power ON Scan, Nuisance Delete, Mode Dependent Scan, Monitor Key Action, and Talk Back Timer Beep.

Scan Setting		
Timer		
Watch	(Sec)	5.000
Watch Unmatch	(Sec)	5.000
Resume	(Sec)	3.000
Talk Back	(Sec)	10.000
Fast Scan	(Sec)	0.100
Slow Scan	(Sec)	0.500
Power ON Scan		OFF
Nuisance Delete		OFF
Mode Dependent Scan		OFF
Monitor Key Action		Cancel
Talk Back Timer Beep		OFF

5Tone

➤ RX Code CH

Set RX Code and RPT.

5Tone RX Code CH		
CH	RX Code	RPT
1	11111	Null
2	22222	Null
3	33333	Null
4	44444	Null
5	55555	Null
6	66666	Null
7	77777	Null
8	88888	Null
G	----	Null

➤ RX Code Setting

Enter the codes in the Compare Digit.

5Tone RX Code Setting	
Compare Digit	12345

➤ TX Code CH

Enter the codes in the TX Code.

5Tone TX Code CH	
CH	TX Code
1	11111
2	22222
3	33333
4	44444
5	55555
6	66666
7	77777

➤ TX Code Setting

Set Long Tone Timer, Link R/1/2 Timer, Lead Out Delay Timer, ABC Decode Timer, and so on.

5Tone TX Code Setting	
Timer	
Long Tone	(Sec) 0.700
Link R	(Sec) 0.800
Lead out Delay	(Sec) 0.100
Special Tone	
Group	A
Repeat	E

➤ Format

Set the Tone Period for a tone encoder, Notone Timer and Tone Length.

5Tone Format			
Format	Tone Period (Sec)	No tone Timer (Sec)	Tone Length (Sec)
USER	0.100	0.160	0.150
CCIR	0.100	0.160	0.150
ZVEI1	0.070	0.100	0.100
ZVEI2	0.070	0.100	0.100
DZVEI	0.070	0.100	0.100
EEA	0.040	0.060	0.060
EEA2	0.040	0.060	0.060
DAPL	0.100	0.160	0.150
EIA	0.033	0.060	0.060
DTMF	0.050	0.080	----

➤ User Tone

Set the encode tone frequency, the lower and higher edge of the tone decode frequency range. And, you can check the 'Auto' check-box so that the recommended decode frequencies are automatically set.

5Tone User Tone			
Tone No.	Encode (Hz)	Decode Low (Hz)	Decode High (Hz)
0	1981.0	1921.6	2040.4
1	1124.0	1090.3	1157.7
2	1197.0	1161.1	1232.9
3	1275.0	1236.8	1313.3
4	1358.0	1317.3	1398.7
5	1448.0	1402.6	1489.4

Multiple Table

Enter up to 16 C.Tone and/or RAN codes in each Multi Table.

Multiple Table				
Table No. 1				
No.	Type	Decode	Encode	
1	Analog			
2	Analog			
3	Analog			
4	Analog			
5	Analog			
6	Analog			
7	Analog			
8	Analog			
9	Analog			
10	Analog			
11	Analog			
12	Analog			
13	Analog			
14	Analog			
15	Analog			
16	Analog			

CW

Program up to a 32-digit CW ID, set the Interval time, select the Standard Word, set the CW speed and so on.

CW Setting	
CW ID	Code
Interval(Min)	30
Standard Word	PARIS
Speed(Word/Min)	20
Audio Frequency(Hz)	800
Encode with C.Tone	

External I/O

Channel Switch Table

Assign a transceiver's memory channel to each external channel number.

CH Switch Table	
Ext CH No	Move CH
0	Null
1	CH-1
2	CH-2
3	CH-3
4	CH-4
5	CH-5

Port Setting of D-Sub 25 pin

Assign a function to [Ext. I/O 15 to 25] and [Ext. D/A 10] ports.

Port Setting			
D-Sub 25 pin			
Port	In/Out	Function	Active Logic
Ext.I/O 15	Input	Null	Low
Ext.I/O 16	Output	P0 Monitor	Low
Ext.I/O 17	Output	Busy	Low
Ext.I/O 18	Output	Null	Low

❖ "Cross Busy" function (NEW)

Please select "Cross Busy" in the Ext. I/O 15.

Port Setting			
D-Sub 25 pin			
Port	In/Out	Function	Active Logic
Ext.I/O 15	Input	Null	Low
Ext.I/O 16	Output	Null	
Ext.I/O 17	Output	MCH Select : 1	
Ext.I/O 18	Output	MCH Select : 2	
Ext.I/O 19	Input	MCH Select : 3	
Ext.I/O 21	Output	MCH Select : 4	
Ext.I/O 23	Output	MCH Select : 5	
Ext.I/O 24	Output	EPTT	
Ext.I/O 25	Output	Repeat Disable	
Ext.D/A 10	Output	TX Disable	
		Mic Mute	
		Cross Busy	
		Ext. Key	Select Key Function

NOTE: The UC-FR5000 Web setting is also required.

➤ Option

Set Ext PTT, Ext OUT and RS-232C.

External I/O Option	
Ext PTT(EPTT)	
EPTT Delay Timer(Sec)	OFF
Tone Mute EPTT	OFF
Ext OUT	
AUX Delay Timer(Sec)	10.000
RS-232C	
Connection Speed	4800
Mode	OFF

The Clone Information screen of the new CS-FR5000 release can show the IP address of the UC-FR5000 installed in the repeater.

Clone Information	
SERIAL NO	3080201400
Model	LMR
	UC-FR5000 Series
Revision(Main)	1.8
Sum(Main)	\$8F28
Revision(DSP)	1.6
Sum(DSP)	\$9528
Comment	comment 1
	comment 2
Option	Front Panel (EADC)
	UC-FR5000 (192.168.44.67)

NOTE: The above instructions are for reference only. Please refer to the HELP file of the cloning software for the function or setting details.

➤ Latest firmware revision table

This table shows the latest revision number of the radio and the programming software.

Model Name	Firmware type	Latest Revision*
IC-FR5000 series repeaters (NXDN™ CAI-based IDAS™)	Main	2.2
	DSP	2.3
CS-FR5000 #11 EXP-02	—	1.7

*As of December 2011.

□ Receiving and transmitting

➤ Repeater operation

Ask your dealer for details of the repeater's programming.

- ➔ When the power is turned ON, the [PWR] LED lights green.
- ➔ The [TX] and [BUSY] indicators light simultaneously while transmitting and receiving a signal.
 - The [TX] LED lights red.
 - The [BUSY] LED lights green.

NOTE : A power amplifier protector is built-in to the repeater. When the repeater temperature becomes extremely high due to the frequently access to the repeater, the protector is activated to reduce the transmit output power level. The output power will return to the normal level when the repeater has cooled down.

➤ Base station operation

Receiving

- ① Push [POWER] to turn ON the power.
- ② Set the audio and squelch levels.
 - ➔ First, rotate [SELECT]^{*1} fully counterclockwise.
 - ➔ Rotate [VOLUME] to adjust the audio output level.
 - ➔ Rotate [SELECT]^{*1} clockwise until the noise disappears.
- ③ Push [CH Up]^{*2} or [CH Down]^{*2} to select the desired channel.
 - When a signal is received, the [BUSY] LED lights green and audio is heard from the speaker.
 - Further adjustment of [VOLUME] to a comfortable listening level may be necessary at this point.

^{*1}When the [SQL Level Up/Down] key function is assigned to [SELECT].

^{*2}When the [CH Up]/[CH Down] key functions are assigned.

Transmitting

- ① Take the microphone OFF hook.
- ② Wait for the channel to become clear.
- ③ Push [PTT] to transmit, then speak into the microphone at your normal voice level.
- ④ Release [PTT] to receive.

IMPORTANT:

To maximize the audio quality of the transmitted signal:

- (1) Pause briefly after pushing [PTT].
- (2) Hold the microphone 1 to 2 inch (2.5 to 5 cm) from your mouth, then speak into the microphone at a normal voice level.

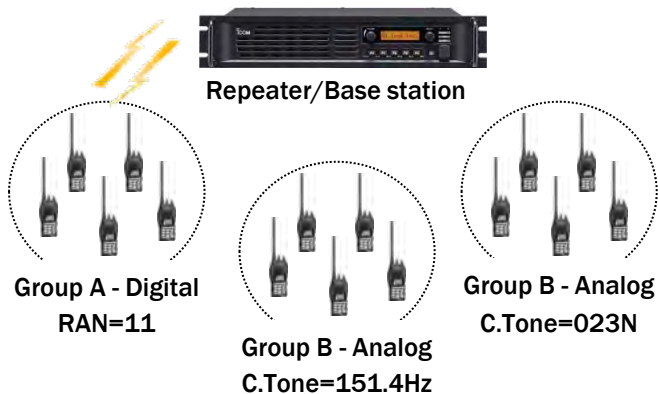
*Some functions that are available in the analog base station mode are not available in the digital base station mode.

❑ Multiple table function

The IC-FR5000/FR6000 allows relaying communication between multiple groups with one repeater. When group separation is made with a continuous tone, this feature can be used in both the analog and digital modes.

• Operation

- The C. Tone and RAN code is set for each group.
- When Group A is using the repeater, one of the other groups cannot use it.
- When the Group A relay is finished, the other groups can then use the repeater.



➤ Multiple table setup

Enter up to 16 C. Tone and/or RAN codes in each Multi Table.

• Table No.

Select the desired Multi Table number between 1 and 16. When the number is selected in **Multi Table No.** in the Memory CH screen, the specified C. Tones and/or RAN codes are used as the encoder and decoder on the channel.

NOTE:

- When "Analog" is selected in **CH Type** in the Memory CH screen, only the assigned C. Tones are selectable.
- When "Digital" is selected in **CH Type** in the Memory CH screen, only the assigned RAN codes are selectable.

• Type

Select either the analog or digital signaling type.

Analog	The desired CTCSS frequency or DTCS code can be set in Decode and Encode (FM mode operation).
Digital	The desired RAN code can be set in Decode and Encode (Digital mode operation).

• Decode/Encode

Enter the desired C. Tone and/or RAN codes for the Decode and Encode columns.

NOTE:

When "Simplex/Semi-Duplex" is selected in the **Operation Mode** in the Memory CH screen, only C. Tone and/or RAN codes specified in Encode columns are used.

When "Analog" is selected in Type

Select the desired CTCSS frequency from the list, or enter a 3-digit DTCS code with polarity, N (Normal) or I (Inverse), for **Decode** and **Encode** respectively.

When "Digital" is selected in Type

Set the desired RAN (Radio Access Number) to between 00 and 63 to separate the repeater from the same/adjacent channel station according to the assigned code for **Decode** and **Encode** respectively.

The repeater selectively accesses one of several repeaters within overlapping coverage areas allowing the user to listen to a specific repeater.

"00" (decimal number) is a special code, and matches to any RAN.

➤ Memory Channel setup

• Operation Mode

Set the channel usage to Repeat, Full-Duplex or Simplex.

Repeat :Repeat	For repeater operation.
Full-Duplex :Full-Duplex	For base station operation in the full-duplex mode.
Simplex :Semi-Duplex/Simplex	For base station operation in the simplex mode.

NOTE:

When "Repeat" or "Full-Duplex" is selected, enter the different frequencies in the RX and TX columns. Otherwise, the setting cannot be correctly activated.

• Multi Table No.

Select the desired Multi Table number between 1 and 16 and OFF.

Up to 16 C. Tones and/or RAN codes assigned in the table can be decoded and encoded on the channel. Multi Table setting in the Multiple Table screen must be specified to use the function.

NOTE:

- When "Analog" is selected in **CH Type**, only the assigned C. Tones in the selected Multi Table are usable.
- When "Digital" is selected in **CH Type**, only the assigned RAN codes in the selected Multi Table are usable.

❑ PC Command

The IC-FR5000 series has a D-SUB 25-pin accessory connector for connecting LTR™/PassPort™ trunking* controllers or other external devices. An operating channel can be controlled by the input signal from the D-SUB 25-pin connector. A PC command protocol is available to the manufacturers who produce external devices to control Icom transceivers and/or repeaters by signing an NDA.

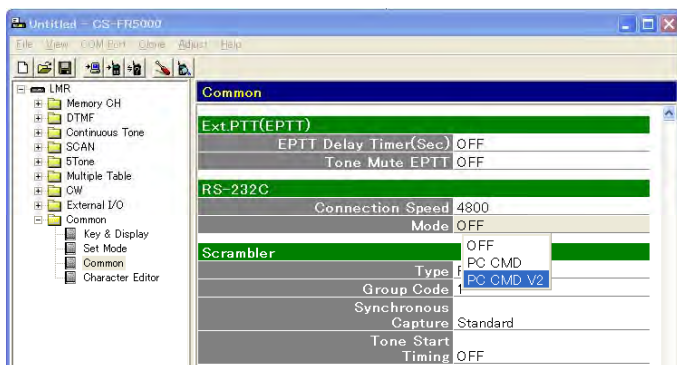
➤ Connection



Connect the RS-232 terminal on a PC to the D-Sub 25pin connector on the rear of IC-FR5000.

➤ Setting of the Cloning Software

- Set the RS-232 mode [Common > RS-232C]
Mode: PC CMD V2
- The Initial set up value of the connection Speed is 4800bps. This can be changed to match the speed of the Terminal software.



❑ Operation with a Hyper Terminal

The Hyper Terminal software comes with Windows® 2000 or Windows® XP. Hyper Terminal software is not supplied with Window Vista®.

➤ Hyper Terminal setup

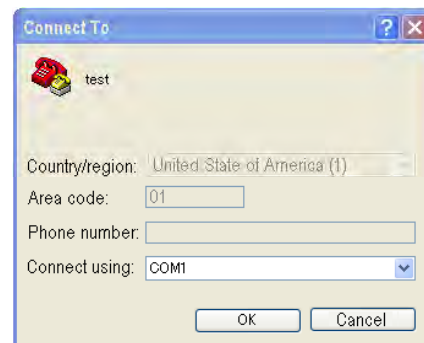
1. Name and Icon setup

When starting the Hyper Terminal software, the screen below will be displayed. Type a name and select an icon from the list then click the OK button.



2. Set up the PC and radio connection

- Select COM1 – COM2(255 max) of the “Connect using”.

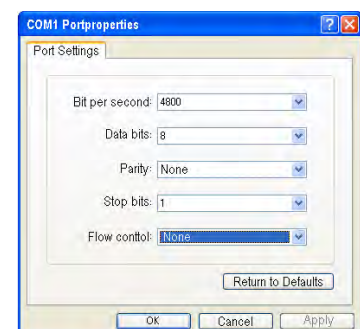


• Detail of COM port setup

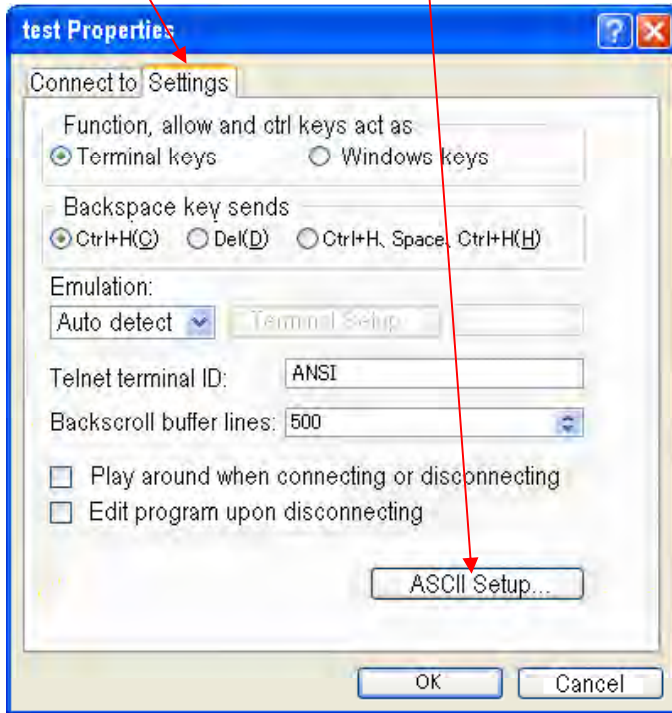
NOTE: The speed should be matched with the cloning software settings.

Set each port setting parameter as below.

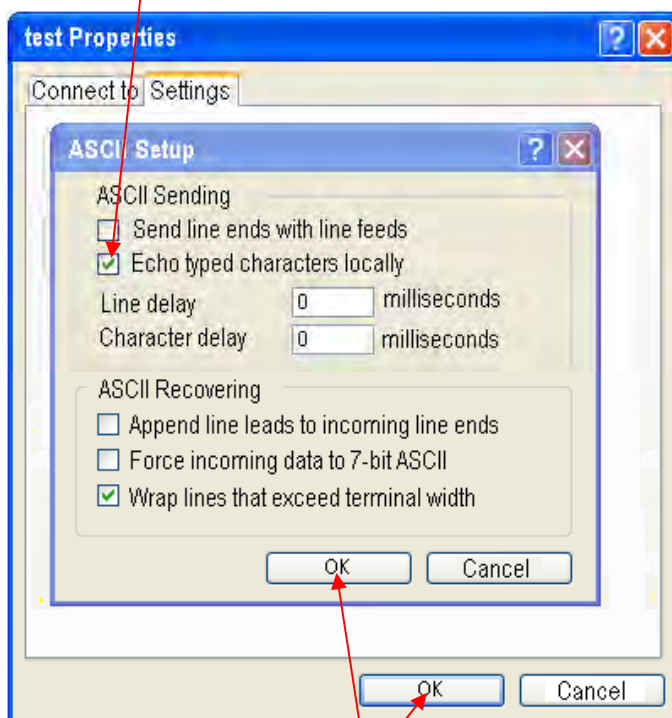
- Data=8bit
- Parity=None
- Stop=1bit
- Flow=None



- Open the Properties window and select the **Settings** sheet, then click **ASCII Setup** to open the ASCII Setup window.



- Select Echo typed characters locally by clicking the **checkbox**.



- Close the windows by clicking the **“OK”** buttons.

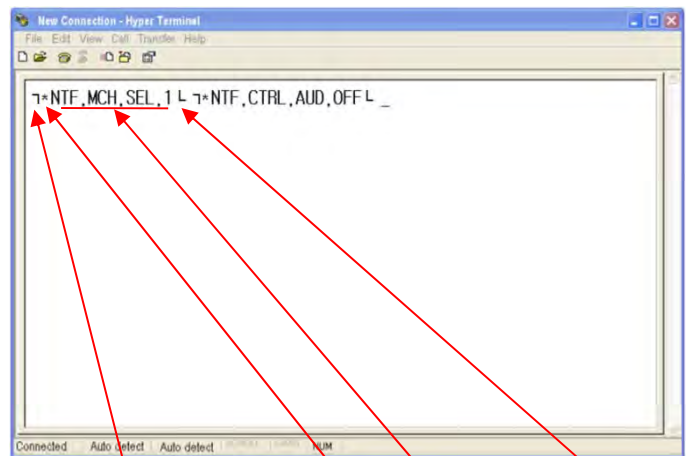
Operation

Receiving the PC command

When the Hyper terminal software starts, it is always in the receiving mode. With the PC and repeater connected, turn the repeater power ON. The following display appears.

[Memory ch=1], [Audible=off]

NOTE: For details, see the PC Command Expansion (V2) specification sheet.



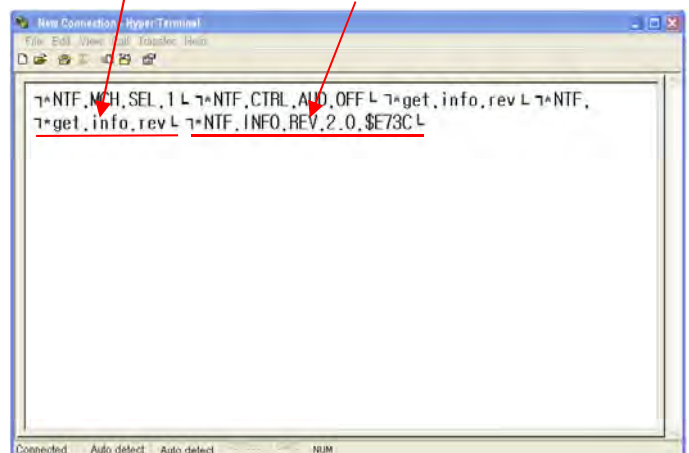
Start [STX], V2 Command [*], COMMAND, Stop [EXT]

Transmitting the PC command

Below is an example of reading the revision number from the radio.

COMMAND=GET, INFO, REV

Enter STX(CTRL+B) * GET, INFO, REV ETX(CTRL+C) from PC then STX * NTF, INFO, REV, 2.0, \$E73C EXT will be returned from the radio.



NOTE: Revision number and check sum differ on each radio.

Scan List

A total of 16 scanning lists are available for a wide variety of flexible scanning options.

➤ Display Text

Enter text of up to 12-characters to display a message, and/or display the scan list during scanning.

➤ Scan Type

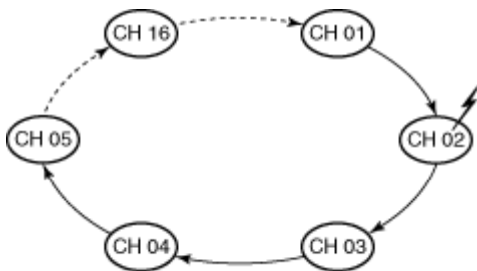
Set the scanning type of each scan list. Scan OFF, Normal Scan and Priority Scan are selectable. The watch time period, the power ON scan function and so on are programmed in the Scan Setting screen.

Scan OFF:

Scanning is turned OFF.

Normal Scan:

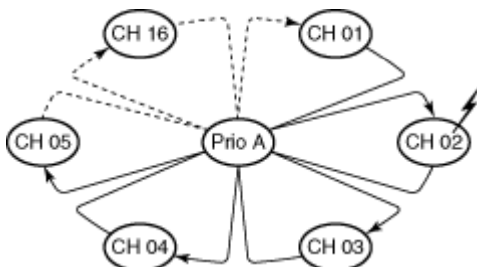
Normal scan. Sequentially scan all selected channels.



Priority Scan:

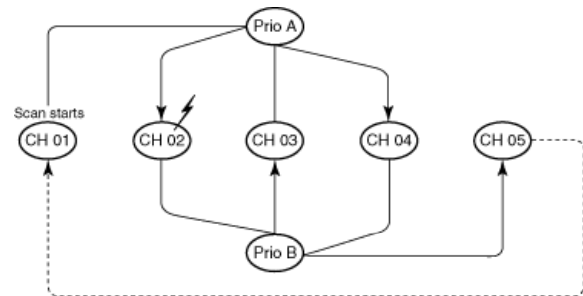
Priority scan. "Primary CH" and "Secondary CH" are used as the priority channel. The selected channels are sequentially scanned while monitoring "Primary CH" and "Secondary CH." When a scan is paused on "Primary CH," other channels are not monitored.

When "Secondary CH" is not set:



When a signal is detected on a channel other than "Primary CH", the scan pauses until the signal disappears, and "Primary CH" is continuously monitored. The scan moves and pauses on "Primary CH," if a signal is detected on it.

When "Secondary CH" is set:



- When a signal is detected on a channel other than "Primary CH" or "Secondary CH", the scan pauses until the signal disappears and "Primary CH" and "Secondary CH" continue to be alternately monitored. The scan moves and pauses on "Primary CH" or "Secondary CH" if the signal is detected on it.
- When a signal is detected on "Secondary CH", the scan pauses until the signal disappears, and "Primary CH" is continuously monitored. Scan moves and pauses on "Primary CH" if the signal is detected on it.

* "Prio A" means "Primary CH," and "Prio B" means "Secondary CH."

NOTE: The scanning channels are selected in **Scan List** in in the Memory CH screen.

The compatibility of the previous and current scan mode

The previous scan mode	The current scan mode							
	Scan Type	Primary CH	Secondary CH	TX CH	Talk Back	TX action	Cancel CH	
Scan OFF	Scan OFF	-	-	-	-	-	-	
Mode1	Normal	Normal	-	Last CH	-	Cancel	TX CH	
Mode1	RSelA	Normal	-	Start CH	ON	Pause	Start CH	
Mode2	Prio-A	Priority	Prio-A	-	Prio-A	ON	Cancel	TX CH/TB
Mode2	Prio-AB	Priority	Prio-A	Prio-B	Prio-A	ON	Cancel	TX CH/TB
Mode2	RSel	Priority	Start CH	-	Start CH	ON	Cancel	TX CH/TB
Mode2	RSelA	Priority	Start CH	-	Start CH	ON	Pause	Start CH
Mode3	Prio-A	Priority	Prio-A	-	Prio-A	OFF	Cancel	TX CH
Mode3	Prio-AB	Priority	Prio-A	Prio-B	Prio-A	OFF	Cancel	TX CH
Mode3	RSel	Priority	Start CH	-	Start CH	OFF	Cancel	TX CH
Mode3	RSelA	Priority	Start CH	-	Start CH	OFF	Pause	Start CH

➤ Primary CH (Available when "Priority Scan" is selected in Scan Type.)

Select the desired channel as the primary channel. The selected channel is monitored during a priority scan.

Prio-A CH	The priority A channel is used as the primary channel.
Prio-B CH	The priority B channel is used as the primary channel.
Start CH	The Scan start channel is used as the primary channel.
CH Number Select	The selected channel is used as the primary channel.

➤ **Secondary CH** (Available when "Priority Scan" is selected in **Scan Type**.)
 Select the desired channel as a secondary channel. The selected channel is monitored during a priority scan. The secondary channel has a lower priority than the primary channel.

Disable	The secondary channel is not used.
Prio-A CH	The priority A channel is used as the secondary channel.
Prio-B CH	The priority B channel is used as the secondary channel.
Start CH	The Scan start channel is used as the secondary channel.
CH Number Select	The selected channel is used as the secondary channel.

➤ **TX CH** (Available when "Normal Scan" or "Priority Scan" is selected in **Scan Type**.)
 Select the desired channel as a transmission channel.

Last CH	Transmission is made on the last busy channel. If there are no busy channels, the scan start channel is selected for transmission.
Prio-A CH	Transmission is made on the priority A channel.
Prio-B CH	Transmission is made on the priority B channel.
Start CH	Transmission is made on the scan start channel.
CH Number Select	Transmission is made on the selected channel.

➤ **Talk Back** (Selectable when "Normal Scan" or "Priority Scan" is selected in **Scan Type**.)
 Select ON or OFF in the talk back function. If "Last CH" is selected in **TX CH**, this function is not selectable.

ON	The signal on the channel that the scan stopped last is transmitted. This function works when transmitting while the scan stops, or while the talk back timer is ON*. (After the resume timer ends.)
OFF	The channel selected in the TX CH is always used for transmission.

• Talk back timer is set in **Talk Back (Sec)** in the Scan Setting screen.

➤ **TX Action** (Available when "Normal Scan" or "Priority Scan" is selected in **Scan Type**.)
 Select the scan option when you transmit while scanning.

Cancel Scan	The scan is canceled and transmission is made on the channel that is selected in TX CH. If Talk Back is turned ON, and transmission is made within the talk back timer time, the signal is transmitted on the last busy channel.
Pause Scan	The scan is paused until the signal disappears, and then resumes after the resume timer time* has passed.

* Resume timer is set in **Resume (Sec)** in the Scan Setting screen.

➤ **Cancel CH** (Selectable when "Normal Scan" or "Priority Scan" is selected in **Scan Type**.)
 Select the desired channel type that is selected when the scan is cancelled (except by transmitting.)

Start CH	The scan start channel is automatically selected.
Start CH/Talk Back	The scan start channel is automatically selected when scan is canceled during scanning. The last busy channel is automatically selected when scan is canceled while receiving a signal, or while scanning within the talk back timer time (after the resume time has passed).
TX CH	The channel that is selected in TX CH is automatically selected.
TX CH/Talk Back	The channel that is selected in TX CH is automatically selected when the scan is canceled during scanning. The last busy channel is automatically selected when the scan is canceled while receiving a signal, or while scanning within the talk back timer time (after the resume time has passed).

➤ **Text**
 Select the text indication capability from OFF, Text or Start CH during scan.

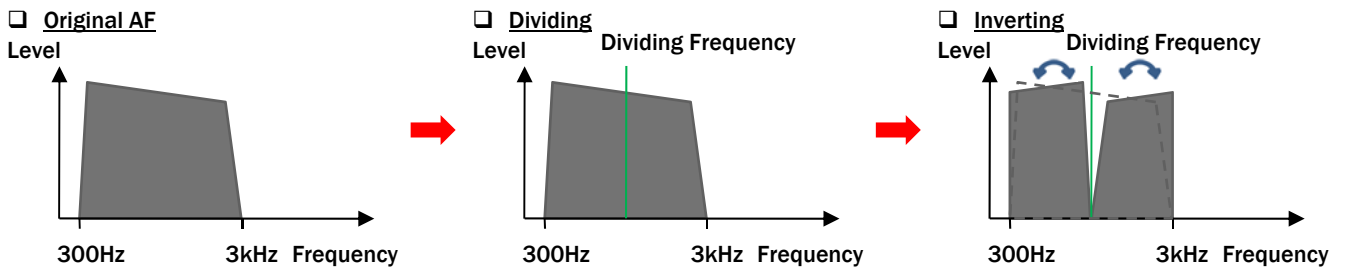
OFF	The text display is turned OFF.
Text	The text display is turned ON. The channel's text that is programmed in Display Text as above is displayed during a scan.
Start CH	The text display is turned ON. The scan start channel's text is displayed during a scan.

Voice scrambling function

The optional voice scrambler unit provides high performance private communication between stations with the same scrambler code. Choose the 32 code non-rolling-type voice scrambler UT-109R or the 1020 code rolling type UT-110R.

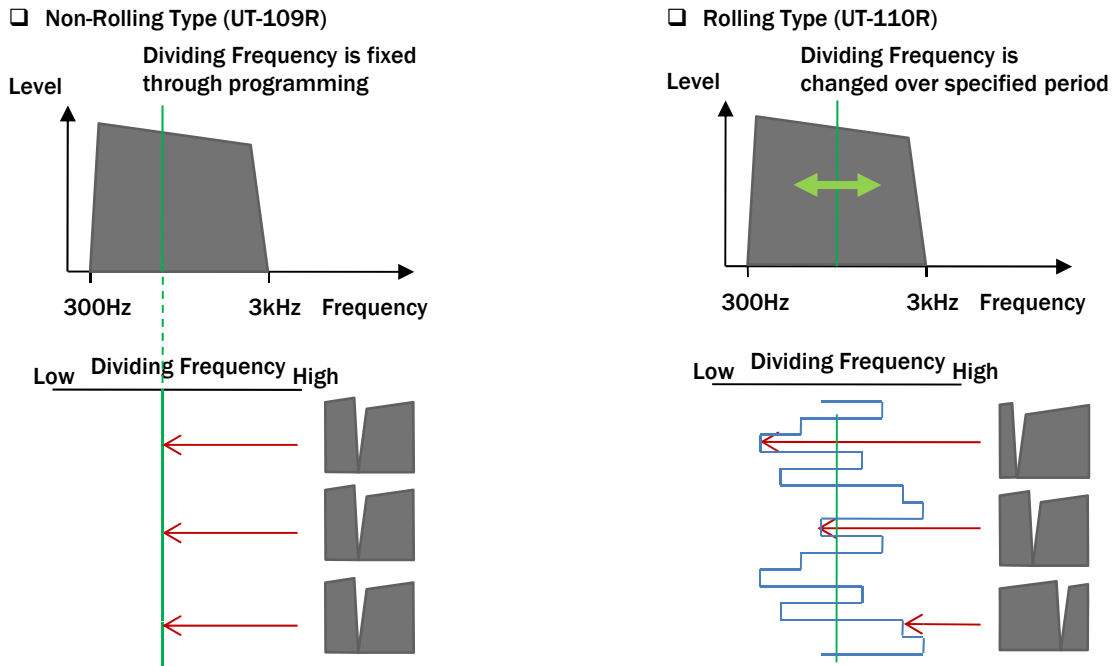
Variable Split and Frequency Inversion

This is the scrambling system employed in the UT-109R and UT-110R. The audio frequency band is divided at a specified frequency (dividing frequency) and the high and low audio frequencies in each band are inverted. The divide frequency is programmable with the cloning software.



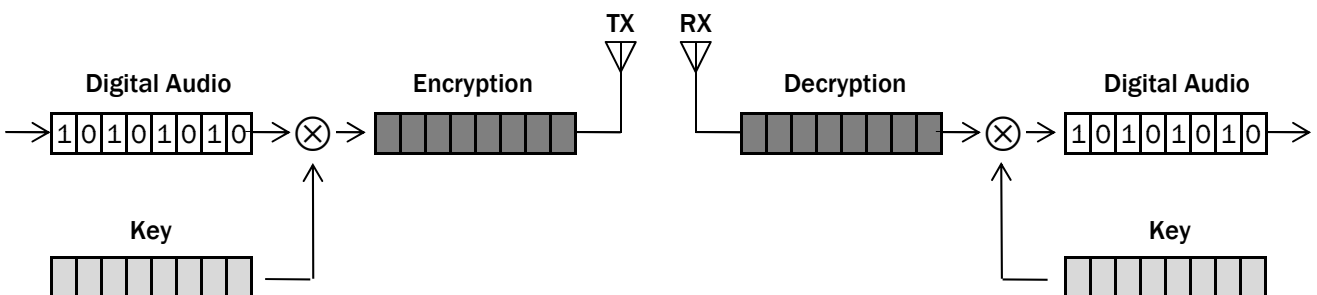
Difference between rolling and non-rolling types

The rolling type (in fact, a hopping type is used for the UT-110R) is an additional feature which provides higher communication security. It changes the divided frequency over a specified period.



Digital Voice Encryption Function

The IDAS™ system provides a 15-bit key (about 32,000 keys) encryption for secure communication.



➤ Memory Channel - Scrambler/Encryption

This item is unavailable for repeater operation.
(Unavailable when **Repeat** or **Full-Duplex** is selected.)

• ON/OFF

Turn the voice Scrambler/Encryption function ON or OFF as an initial setting.

OFF	Turn OFF the voice Scrambler/Encryption function.
ON	Turn ON the voice Scrambler/Encryption function.
Inh	Inhibit the voice Scrambler/Encryption function selection by the user.

NOTE:

- The Scrambler/Encryption function can be manually toggled by pushing the **[Scrambler/Encryption]** key, if this function is assigned to a key in the Key & Display Assign screen.

- **Type** (Unavailable when "**Digital**" is selected in **CH Type**.) Set the desired voice scrambler type to UT- (UT-109/110), Inv (Inversion) or Oth (Other-T).

UT-	The optional UT-109R/UT-110R VOICE SCRAMBLER UNIT.
Inv	Internal voice scrambler is set to Inversion.
Oth	Other voice scrambler unit.

- **Code** (Selectable when "UT-" or "Oth" is selected in **Type**.) Program scrambler codes. Selectable codes:

Non-rolling type (UT-109R)	1 to 32
Rolling type (UT-110R)	1 to 255

*Set the voice scrambler type as either Rolling or Non-rolling, in the Common screen.

Inv	The code setting will be invalid.
Oth	1 to 16

NOTE:

- The optional UT-110R or UT-109R VOICE SCRAMBLER UNIT is required.
- First set the **Scrambler-Group code** in the common screen.

- **Encryption Key List No.** (Not selectable when "**Analog**" is selected in **CH Type**.)

Select the desired Encryption Key List No. between 1 and 63 for Digital mode operation.

The **Encryption Key (Hex)** settings in the Encryption screen must be specified to use the function.

➤ Common - Scrambler

• Type

Set the voice scrambler type as Rolling or Non-rolling. As Rolling type and Non-rolling type scramblers have different code settings, and are not compatible. By selecting the Non-rolling type in this item, you can use the UT-109R, or UT-110R as a Non-rolling type.

Selectable value: Rolling or Non-rolling

NOTE:

1. This item is invalid for frequency inversion types.
2. When "Non-rolling type" is selected, the setting for scrambler below will be invalid.

• Group Code

Set the Scrambler Group code number.
Selectable number: 1 to 4

• Synchronous Capture

The "Synchronous capture mode" is useful when communicating through a repeater. However, because of voice components, the repeater cannot maintain a synchronous mode, in rare cases. Normally it is best to set this item to "Standard".

Selectable value: Standard (normal operation) or Continuous (repeater operation)

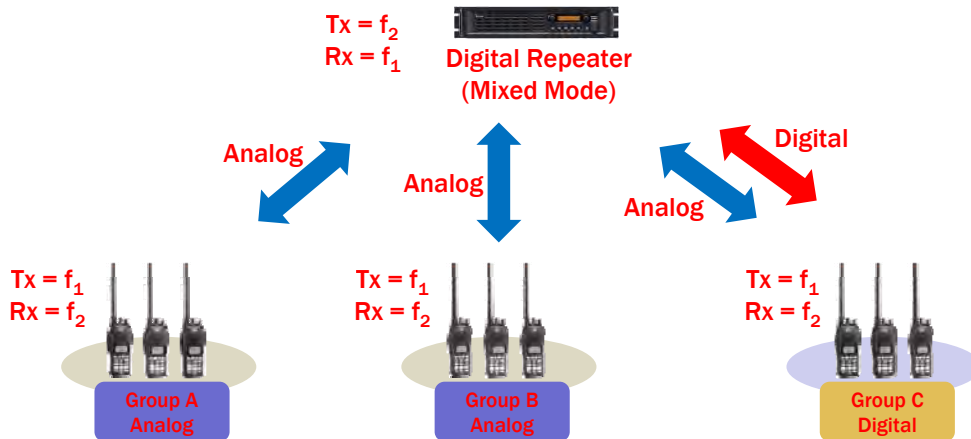
• Tone Start Timing

Tone Start Timing selects the synchronous tone signal transmission delay time. Set the delay time when the other party's repeater has a power save mode.
Selectable values: OFF (default), 300 ms, 600 ms and 1100 ms.



Digital – Analog Mixed mode operation

- Primarily operate in the Analog mode.
- All Radios can communicate in the Analog mode.
- Digital radios operates in the Digital mode with SCAN and TALKBACK ON.
- Digital radios TX in the Analog mode when receiving from Analog radios.
- Digital repeaters operates in the Mixed mode.



Frequency

- f_1 : Uplink (both Digital & Analog radios)
- f_2 : Downlink (both Digital & Analog radios)

This is an example of Digital and Analog mixed mode operation when introducing digital system components into an existing analog system. This system primarily operates in the Analog mode while utilizing the digital features that communicate between digital radios.

Cloning Software Setup (REPEATER) Memory CH

- **CH Type**
Select the Mixed-Ana or Mixed Digi operating mode.
- **Multi Table No.**
Select the desired Multi Table number 1 to 16 or OFF.

Memory CH		Multi Table No.
CH	CH Type	
1- 1	Mixed-Ana	1

System requirement (One site)

Descriptions	Model Number	Quantity
UHF Digital Repeater	IC-FR6000	
TX Antenna		
RX Antenna		

Multiple Table

- **Type**
Select the Analog or Digital signaling type.
- **Analog**
Set the Desired CTCSS frequency or DTCS code in **Decode** and **Encode** (FM mode).
- **Digital**
Set the desired RAN code in **Decode** and **Encode** (Digital mode).
- **Decode/Encode**
Enter the desired C.Tone and/or RAN code for Decode and Encode columns, respectively.

Multiple Table			
Table No. 1			
No.	Type	Decode	Encode
1	Digital	1	<-
2	Analog	88.5	<-

Cloning Software Setup (TRANSCEIVER)

Scan - Scan List

- **Scan Type**

Set the scanning type to the "Normal" Scan.

Scan List		
List	Display Text	Scan Type
F	Via Repeater	Normal

- **Talk Back**

Set the transmit talk back function to "ON".

Scan List		
List	TX CH	Talk Back
F	Prio-B	ON

- **TX Action**

Select "Pause Scan" for scan action.

- **Cancel CH**

Select "Start CH" for the channel type of scan start channel.

Scan List		
List	TX Action	Cancel CH
F	Pause	Start

Scan - Scan Setting

- **Mode Dependent Scan**

Set the Mode Dependent Scan function to ON.

Scan Setting	
Power ON Scan	OFF
Nuisance Delete	OFF
Mode Dependent Scan	ON
Monitor Key Action	Cancel
Talk Back Timer Beep	OFF

Memory CH - Main

- **C.Tone - RX/TX**

Enter the CTCSS frequency or DTCS code for both receive and transmit.

Zone 1: Main		
C.Tone		
CH	RX	TX
1- 7	88.5	<-

- **Scan List**

Select the desired scan lists to include the channel in.

1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	Z
																✓
<input type="button" value="OK"/> <input type="button" value="Cancel"/>																

- **Assign**

Select the scan list to assign for auto scan.

- **Auto Scan**

Set the auto scan function to ON.

Zone 1: Main (Left CH - 496)					
Scan List					
CH	Scan List	Inc	Assign	Sel Inh	Auto Scan
1- 5	G	Inc	Scan List-G	i	ON

Migration path

1. Introduce a digital system into a current network, step by step.
2. Operate in the analog and digital modes on the same frequencies.
3. Communicate in the digital mode, within the digital groups.
4. Communicate between a digital group and the analog group in the analog mode.

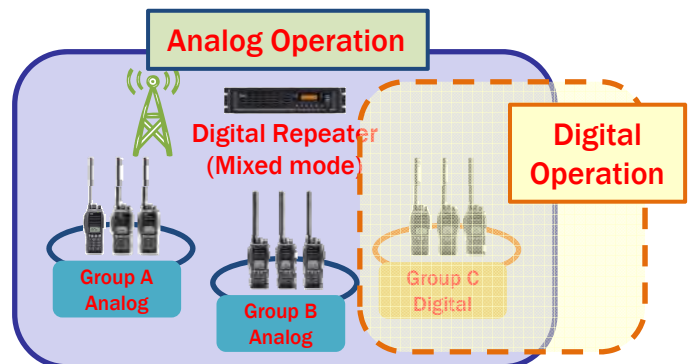
Original Network – Analog only operation



Phase 1: Introduce a digital system into Group C

Introduce a partial digital system into an existing analog network

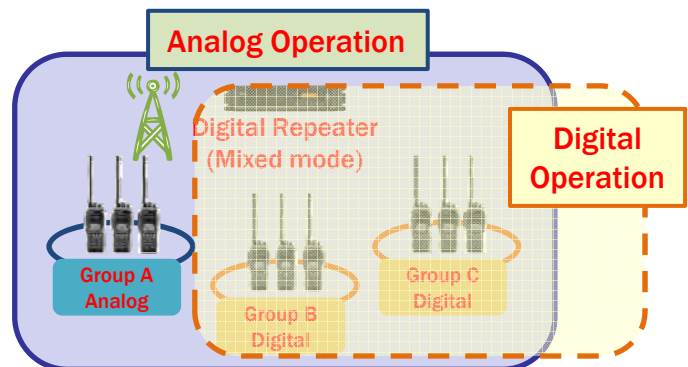
- Replace the analog transceivers in Group C with digital ones.
- Replace the analog repeater with a digital one.
- Set the repeater channel type to the Mixed mode.
- Set Talk Back to ON in the scan list setting for the transceivers in Group C to transmit an analog signal when receiving from Groups A and B.



Phase 2: Expand the digital system into Group B

Expand the digital system into a mixed operating network by doing the following:

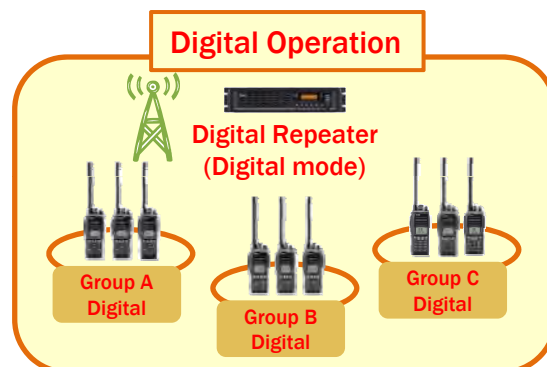
- Replace the analog transceivers in Group B with digital ones.
- Set Talk Back to ON in the scan list setting for the transceivers in Group B to transmit an analog signal when receiving from Group A



Phase 3: Extend the digital system into the Group A

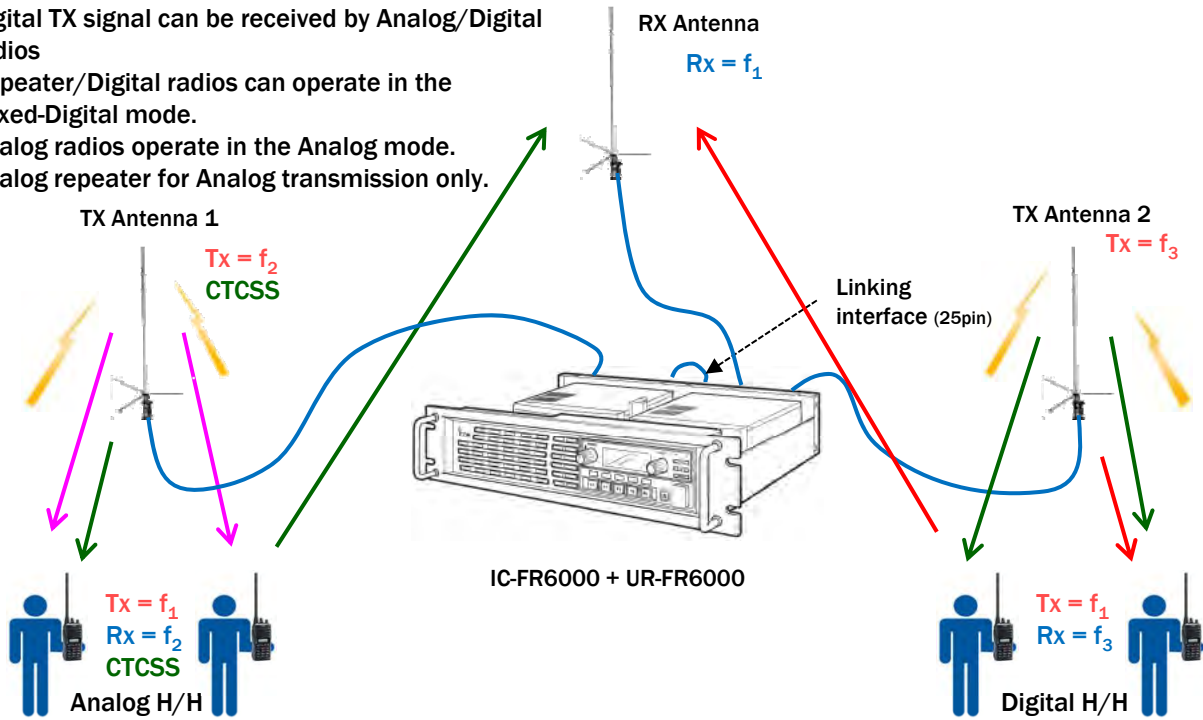
Convert to a full digital network from a mixed operating network by doing the following:

- Replace the analog transceivers in Group A with digital ones.
- Cancel Analog operation



Digital - Analog / Analog - Analog Cross mode connection

- Analog TX signal can be received by Analog/Digital radios.
- Digital TX signal can be received by Analog/Digital radios
- Repeater/Digital radios can operate in the Mixed-Digital mode.
- Analog radios operate in the Analog mode.
- Analog repeater for Analog transmission only.



- Analog modulated signal from an analog area
- Digital modulated signal from digital area
- Analog modulated signal from digital area

Frequency

- f_1 : Uplink (both Digital & Analog)
- f_2 : Analog Downlink
- f_3 : Digital or Analog Downlink

This is an example of Digital and Analog cross mode operation. The IDAS™ radios (including the repeater) can receive both analog mode and digital mode signals on a single channel. This function is useful when introducing digital system components into an existing analog system. It allows the system operator to communicate with analog only terminals while utilizing the digital features as required.

System requirement (One site)

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
UHF RF Module	UR-FR6000	
TX Antenna		
RX Antenna		
Multi Coupler		
Interface Cable	25p to 25p	

Connection example



Connect two repeaters by an interface cable (25p to 25p).

These interface cables are not sold as Icom accessories, therefore please assemble the interface cable by yourself. The connection description is as follows;

Analog Repeater (25pin)			Digital Repeater (25pin)	
Pin Description	Pin No.		Pin No.	Pin Description
MODIN	8	↔	22	AFOUT
EPTT	19	↔	21	*Mixed Audible
GND	7,14	↔	7,14	GND

*Note: Mixed Audible has been available from Rev.1.5.

➤ Repeater Setting

1. Frequency and operating mode setting

Analog Repeater

RX=TX = f2

Memory CH							
				Frequency (MHz)			
CH	Atr	Inh	Operation Mode	RX	TX	TX Inh	Text
1- 1	AB		Simplex	463.300000	<-		CHANNEL 1

Operating Mode = Simplex

Digital Repeater

RX = f1 TX = f3

Memory CH							
				Frequency (MHz)			
CH	Atr	Inh	Operation Mode	RX	TX	TX Inh	Text
1- 1	AB		Repeat	453.675000	463.675000		CHANNEL 4

Operating Mode = Repeat

2. Channel Type and CTCSS/DTCS setting

Analog Repeater

CH Type = Analog

Memory CH						
			CW ID		FM	
CH	CH Type	Auto Reset	ON/OFF	Offset	Multi Table No.	TX C.Tone
1- 1	Analog	Tim-B		---	1	74.4

Necessary to setup when using CTCSS/DTCS.

Digital Repeater

CH Type = Mixed-Digital

Memory CH						
			CW ID		FM	
CH	CH Type	Auto Reset	ON/OFF	Offset	Multi Table No.	TX C.Tone
1- 1	Mixed-Digit	Tim-B		---		---

3. AF Min Level setting

Set Mode		
	Value	Enable/Inhibit
Backlight	Auto	Enable
LCD Contrast	50	Enable
Fan	Auto	Enable
Beep	OFF	Enable
SQL Level	9	Enable
AF Min Level	1	Enable
Mic Gain	3	Enable
Signal Moni	ON	Enable
LCD Check	----	Inhibit
Information	----	Inhibit
Key Check	----	Inhibit

← AF Min Level = 0 inhibits the Audible output mode, therefore set the AF Min Level to 1

4. External I/O Port Setting

Port Setting			
D-Sub 25 pin			
Port	In/Out	Function	Active Logic
Ext.I/O 15	Input	Null	Low
Ext.I/O 16	Output	P0 Monitor	Low
Ext.I/O 17	Output	Busy	Low
Ext.I/O 18	Input	Repeat Disable	Low
Ext.I/O 19	Input	EPTT	High
Ext.I/O 21	Output	Analog Audible	High
Ext.I/O 23	Output	Digital Audible	High
Ext.I/O 24	Output	Null	Low
Ext.I/O 25	Output	Hanger	Low
Ext.D/A 10	Output	RSSI	

5-1. CTCSS setting

When using CTCSS in the Analog repeater mode.

Analog Repeater

Memory CH				Multiple Table			
				Table No. 1			
				FM			
CH	Multi Table No.	TX C.Tone	W/N	No.	Type	Decode	Encode
1- 1	1	79.7	W	1	Analog	79.7	<-
				2	Digital	25	<-
1- 2	1	---	W	3	Analog		
				4	Analog		

Note: The Digital Repeater setup is not required.

Note: In order to add CTCSS to the modulation input from the D-SUB 25pin connector, the TX C.Tone setting is necessary in addition to the Multiple table setting.

5-2. RAN setting

When using RAN in the Digital repeater mode.

Note: The Analog Repeater setup is not required

Digital Repeater

Multiple Table			
Table No. 1			
No.	Type	Decode	Encode
1	Analog	79.7	<-
2	Digital	25	<-
3	Analog		
4	Analog		

Memory CH				
Digital				
CH	TX RAN	Unit ID	Talkgroup ID List No.	Squelch Type
1- 1	---	---	---	---
1- 2	25	500	1	RAN

➤ Analog Transceiver Setting

1. Frequency Setting

RX = f2
TX = f1

Zone 1: (Left CH - 496)

Frequency (MHz)		C.Tone						
CH	RX	TX	Tx Inh	W/N	SQL Tight	RX	TX	Text
1-1	463.300000	453.675000		W		79.7	<-	ANALOG(FM)

Necessary to setup when using CTCSS.

2. CH Type setting

CH Type = Analog

Zone 1: (Left CH - 496)

2Tone		Digital							
CH	CH Type	Auto Reset	CH Mute	TX	RX C.No	Log	RX RAN	TX RAN	Unit ID
1-1	Analog	Tim-B	OR						

➤ Digital Transceiver Setting

1. Frequency Setting

RX = f3
TX = f1

Zone 1: (Left CH - 496)

Frequency (MHz)		C.Tone						
CH	RX	TX	Tx Inh	W/N	SQL Tight	RX	TX	Text
1-1	463.675000	453.675000		W				DIGITAL

2. CH Type setting

CH Type = Mixed-Digi

Zone 1: (Left CH - 496)

2Tone		Digital							
CH	CH Type	Auto Reset	CH Mute	TX	RX C.No	Log	RX RAN	TX RAN	Unit ID
1-1	Mixed-Digi	Tim-B	OR				25	<-	110

Necessary to setup when using RAN

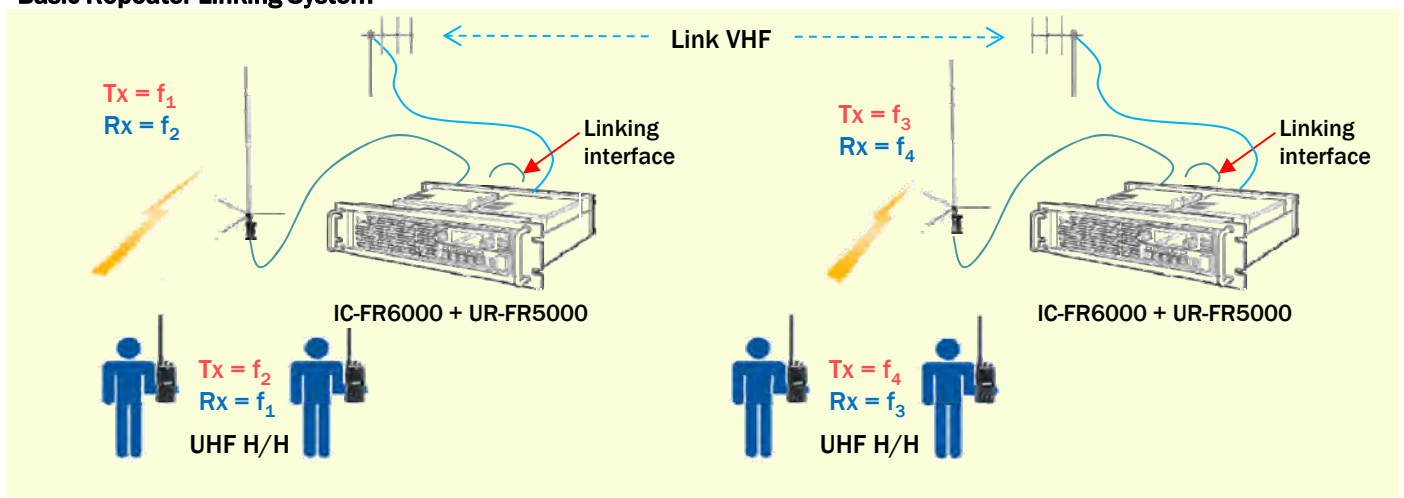
5-3 Repeater Linking System

5-3-1 Analog Repeater Linking System (1)

CAUTION : This is “Analog Use” Only. Icom does not guarantee the audio quality converted from Analog to Digital.



Basic Repeater Linking System



This is an advanced plan to upgrade the repeater site to a linked system. An ICOM repeater also works as a base station (simplex), therefore this system is more versatile. Usable as a linked repeater, cross-band repeater, and more.

System requirement (One site)

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	1
UHF Antenna		
Duplexer		
VHF RF Module	UR-FR5000	1
VHF Antenna		
Duplexer		
Interface Cable	25p to 25p	1

When you cannot afford to set another RF unit to add an antenna, please use a mobile radio, instead. See page 72, 73 for details.

NOTE : *1 If you want the repeater to send signals only when the CTCSS matches, select “Analog Audible” in the function cell for pin 21.

*2 See page 73, to set the desired level.

Connection example



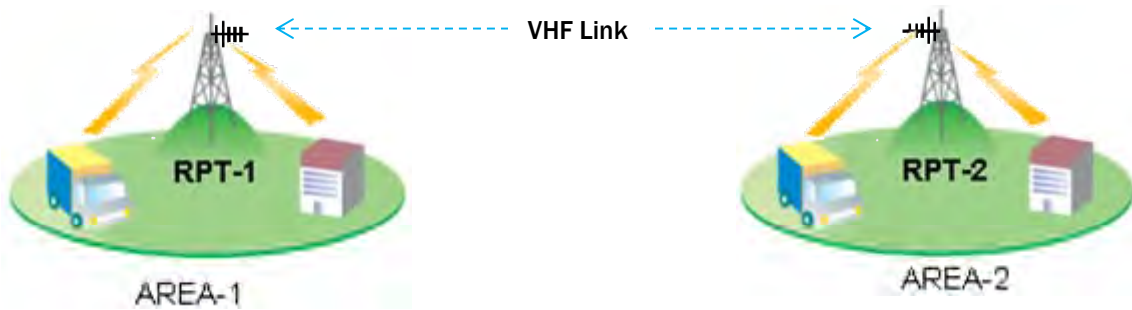
Connect two repeaters with a 25 to 25 pin interface cable.

These interface cables are not sold as Icom accessories, therefore please assemble them by yourself. The pin layout is as follows;

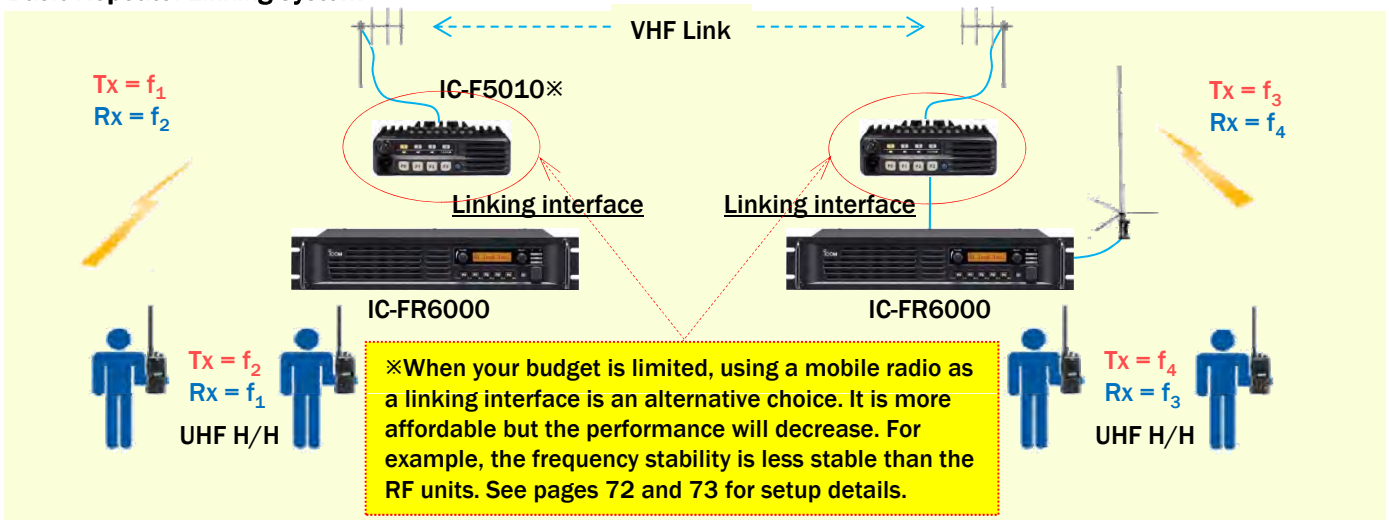
Repeater (25pin)			Repeater (25pin)	
Pin Description	Pin No.		Pin No.	Pin Description
BUSY OUT	17* ¹	↔	19	EPPT IN
MOD IN	8	↔	22	AF OUT
AF OUT* ²	22	↔	8	MOD IN
EPPT	19	↔	17	BUSY OUT
GND	7,14	↔	7, 14	GND

5-3-2 Analog Repeater Linking System (2)

CAUTION : This is "Analog Use" Only. Icom does not guarantee the audio quality converted from Analog to Digital.



Basic Repeater Linking System



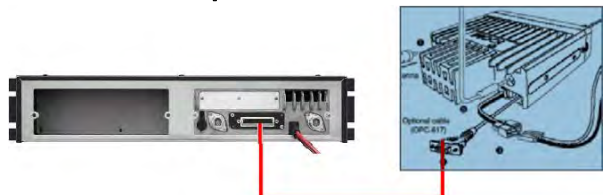
A repeater extends the communications service area and it is very useful for two-way communications. Everyone thinks that the service area should be as wide as possible, like a cellular phone system. Now the service area can be extended with Icom repeaters!

This is a basic plan to upgrade the repeater site to a link system. This plan is suitable for linking two or more repeater sites. When a subscriber transmits, the repeater re-transmits the received signal. At the same time, the received signal is sent to another repeater site, through a VHF mobile radio. These VHF radios work as link radios between repeater sites.

System requirements (One site)

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	1
UHF Antenna		
Duplexer		
VHF Mobile Radio	IC-F5010 series	1
VHF Antenna		
Power Supply		
Duplexer		
ACC Cable	OPC-1939 (15p) or OPC-2078 (25p)	1
Interface Cable	25p to 15p (or 25p)	1

Connection example



Connect two repeaters by an interface cable*.
 *A 25pin-15pin interface cable for the OPC-1939 or
 *A 25pin-25pin interface cable for the OPC-2078

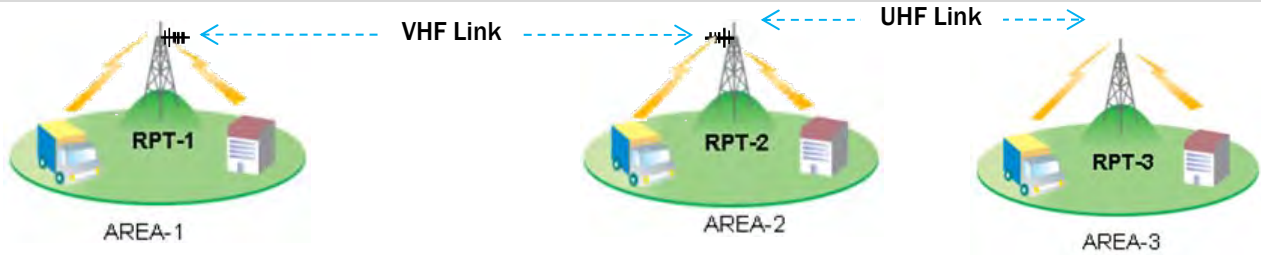
These interface cables are not sold as Icom accessories, therefore please assemble the interface cable by yourself. The connection diagram is as follows;

Repeater (25pin)			OPC-1939 [15pin] or OPC-2078 [25pin] in ()	
Pin Description	Pin No.		Pin No.	Pin Description
BUSY OUT	17* ¹	↔	14(19)	PPT CONT IN
MOD IN	8	↔	2(9)	DET AF OUT [DISC]
AF OUT* ²	22	↔	13(8)	MOD IN
EPPT	19	↔	4(2)	BUSY OUT
GND	7,14	↔	1,3,8 (7,14)	GND

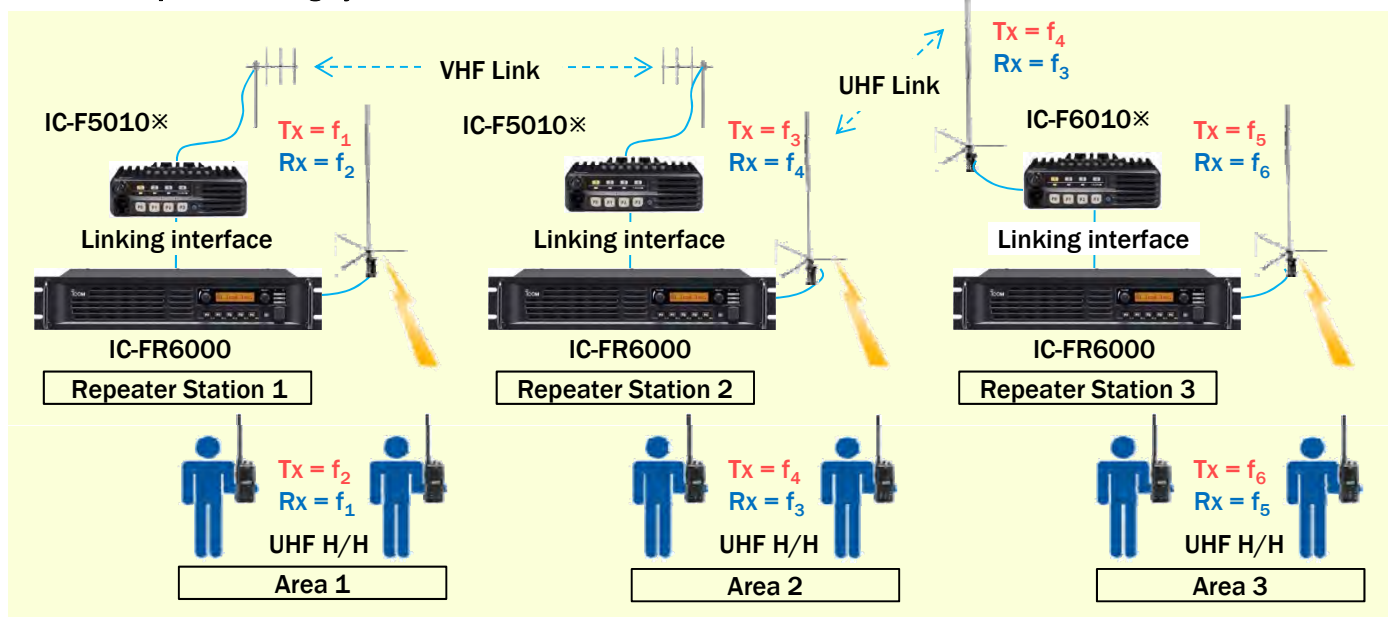
NOTE : *¹ If you want the repeater to send signals only when the CTCSS matches, select "Analog Audible" in the function cell for pin 21. *² See page 73 to set the desired level.

5-3-3 Analog Repeater Linking System (3)

CAUTION : This is "Analog Use" Only. Icom does not guarantee the audio quality converted from Analog to Digital.

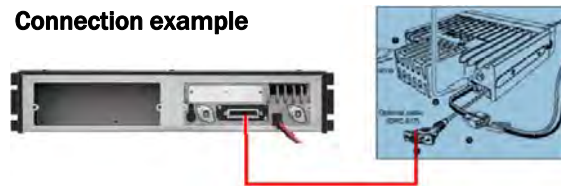


Advanced Repeater Linking System



This is an advanced plan to upgrade the repeater site to a linked system. This plan is suitable for linking three repeater sites. When a subscriber transmits, the repeater re-transmits a received signal. At the same time, the received signal is sent to other repeaters, through VHF mobile radios and UHF mobile radios. These VHF and UHF radios work as link radios between repeater sites.

Connection example



Connect two repeaters by an interface cable*.
 *A 25pin-15pin interface cable for the OPC-1939 or
 *A 25pin-25pin interface cable for the OPC-2078

System requirement (One site)

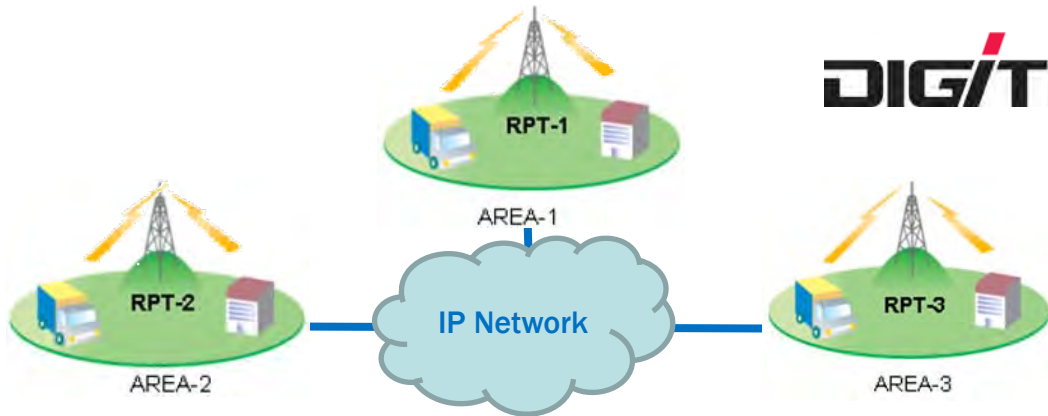
Descriptions	Model number	Quantity
UHF Repeater	IC-FR6000	1
UHF Antenna		
Duplexer		
VHF Mobile Radio	IC-F5010 series	2
VHF Antenna		
UHF Mobile Radio	IC-F6010 series	1
UHF Antenna		
Power Supply		
Duplexer		
ACC Cable	OPC-1939 (15p) or OPC-2078 (25p)	3
Interface Cable		3

These interface cables are not sold as Icom accessories, therefore please assemble the interface cable by yourself. The connection diagram is as follows;

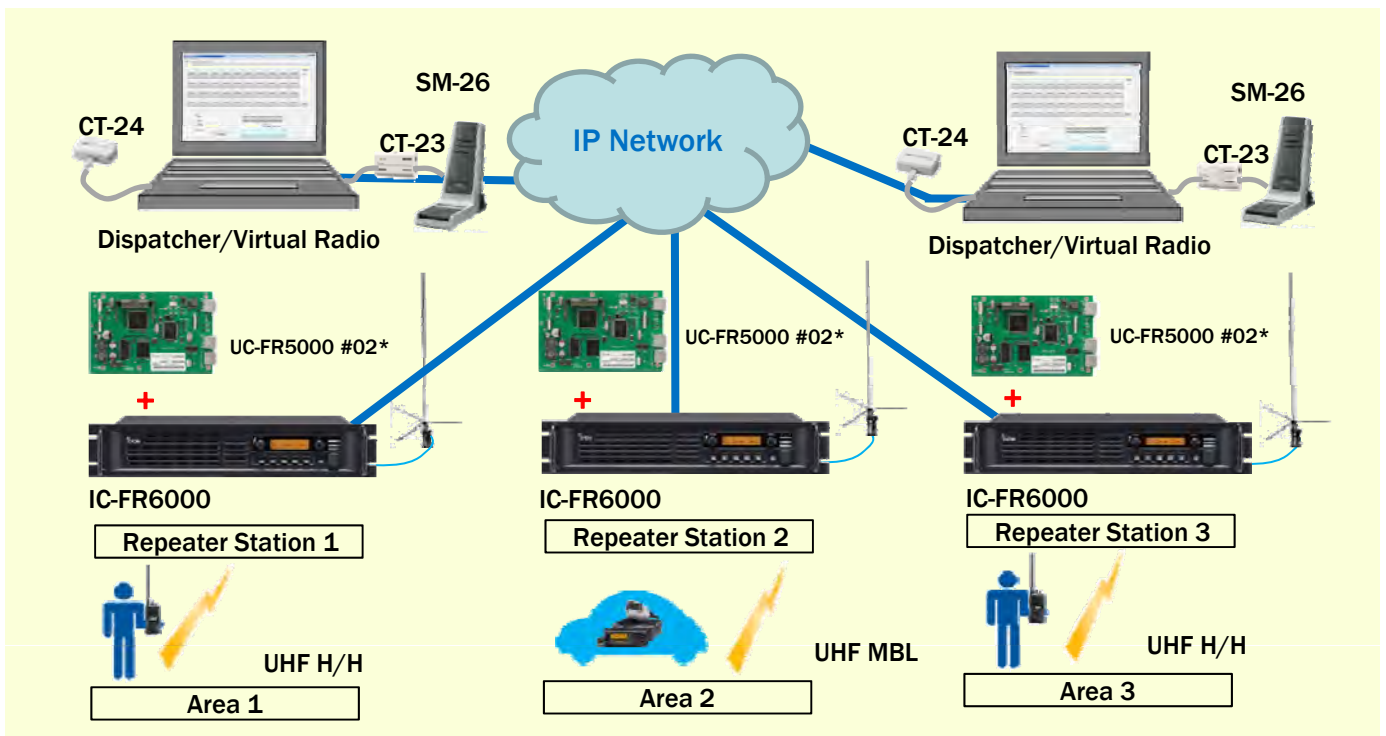
Repeater (25pin)			OPC-1939 [15pin] or OPC-2078 [25pin] in ()	
Pin Description	Pin No.		Pin No.	Pin Description
BUSY OUT	17* ¹	↔	14(19)	PPT CONT IN
MOD IN	8	↔	2(9)	DET AF OUT [DISC]
AF OUT* ²	22	↔	13(8)	MOD IN
EPPT	19	↔	4(2)	BUSY OUT
GND	7,14	↔	1,3,8 (7,14)	GND

NOTE : *¹ If you want the repeater to send signals only when the CTCSS corresponds, please select "21", Analog Audible. *² See page 73 to set the desired level.

5-3-4 IDAS™ Repeater Linking System

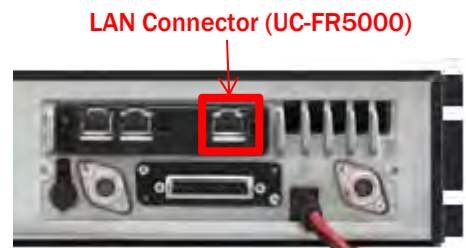


IDAS™ Conventional IP Network Linking System



This is a repeater linking system connecting up to 16 IDAS™ repeaters. The IDAS™ Remote Communicator enables the operator to control the network from any place an IP network is available. The benefits over an analog repeater systems are no expensive microwave or UHF/VHF link, easy installation and no sound degradation.

Connection example



UC-FR5000 <Rear>

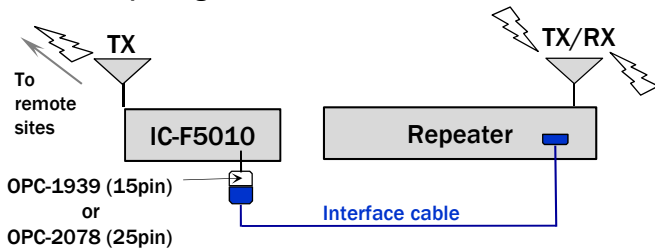
Connect the repeater and IP network with an ethernet cable.

***NOTE:** Use the UC-FR5000 #02 controller. or the UC-FR5000 #01 with the compact flash card, CF-FR5000 #02 inserted.

System requirement (One site)

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	1
Network Controller	UC-FR5000*	1
UHF Antenna		
Duplexer		
Power Supply		
Remote Controller Package	RC-FS10	1
Desktop Microphone	SM-26	1
Interface Cable	Ethernet Cable	1

The Mobile Radios can serve as a "link" to a remote site when connected to the repeaters, as illustrated on pages 69 and 70. It transmits or receives signals from remote sites. It is less costly than using the RF units. The low-tier IC-F5010 series mobile radios may be suitable for this purpose, in terms of cost. Here is an overall setup image.



Here are the procedures on how to set up the IC-F5010 series radios for the purpose of linking sites.

1. Preparation

Following items are required per one site.

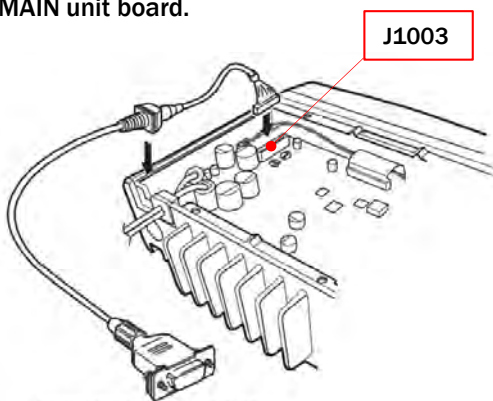
Transceivers	IC-F5010(VHF) or IC-F6010(UHF)	1 set
ACC cable	OPC-1939 or OPC-2078	1 pc
Interface cable	D-sub 15pin for OPC-1939 or D-sub 25pin for OPC-2078	1 pc

*Required tools:

- Screw driver •Soldering iron •a PC with CS-F5010 cloning software •OPC-1122U cloning cable.

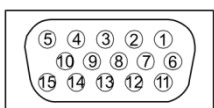
2. Cable connection

Connect the OPC-1939 or OPC-2078 cable to the MAIN unit board.

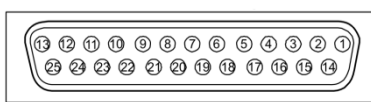


OPC-1939/OPC-2078

■ Pin Assignment



OPC-1939 (15pin)

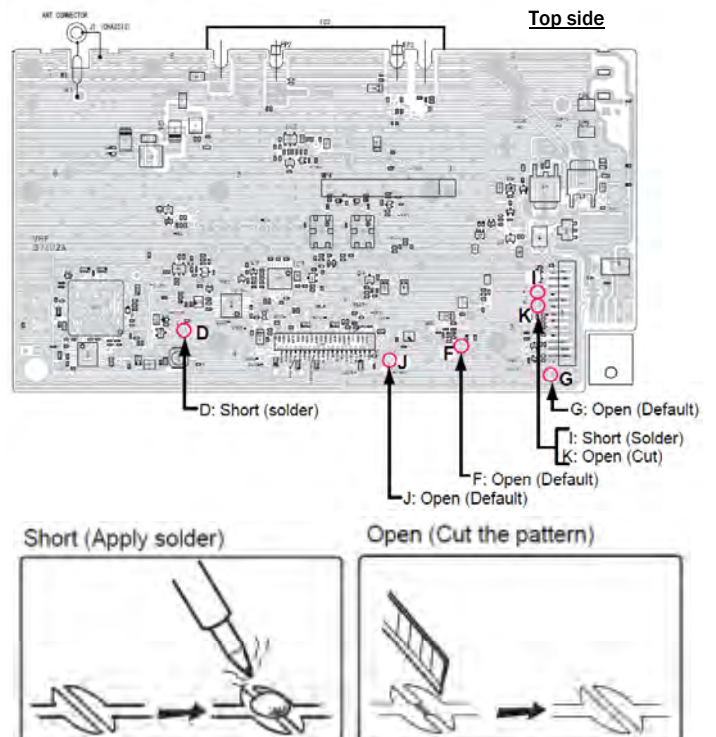


OPC-2078 (25pin)

OPC-1939 15pin	OPC-2078 25 pin	Description
1	7	GND common
2	9	DISC
3	14	GND (IN shield)
4	2	Ext. I/O 4(2) (SERIAL)
6	15	Ext. I/O 6(15) (IGSW)
7	22	Ext. I/O 7(22) (AFO)
8	14	GND (DISC shield)
10	3	Ext. I/O 10(3) (SERIAL)
11	10	Ext. I/O 11(10) (HORN)
12	14	GND (AF shield)
13	8	Mod IN
14	19	Ext. I/O 14(19) (EPTT)
15	11	VCC

3. Adjustments of the Main Unit

Solder or cut the patterns on the MAIN Unit board as shown below.



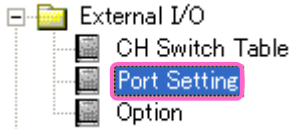
Coffee beans setting for Analog and Analog repeater

	Coffee beans	Default	Setting
D	Ex Mod (Analog)	Open	Short
F	Ex Mod VCO	Open	---
G	Mic AFO	Open	---
I	EAFO	Open	Short
J	Ex Mod (Digital)	Open	---
K	EX I/O 7 AFO	Short	Open

4. Programming Software Configuration

① CS-F5010 (for mobile radios)

Set the parameters in the Port Setting.

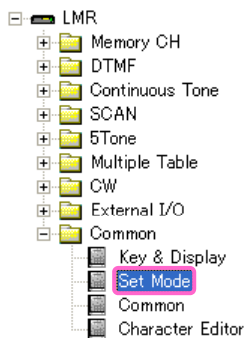


Port Setting				
D-Sub 15 pin (25pin)				
Port	Purpose	In/Out	Function	Active Logic
Ext./O 4 (2)	Ext./O	Output	Busv	Low
Ext./O 6 (15)	Ext./O	Input	Dimmer	High
Ext./O 7 (22)	Ext./O	Input	Null	Low
Ext./O 10 (3)	Ext./O	Input	Null	Low
Ext./O 11 (10)	Ext./O	Output	Horn	Low
Ext./O 14 (19)	EPTT	---	---	---

Choose "EPTT" Choose "Ext. I/O" Choose "Output" Choose "Busv" Choose "Low"

② CS-FR5000 (for repeaters)

Adjust "AF Min. Level"



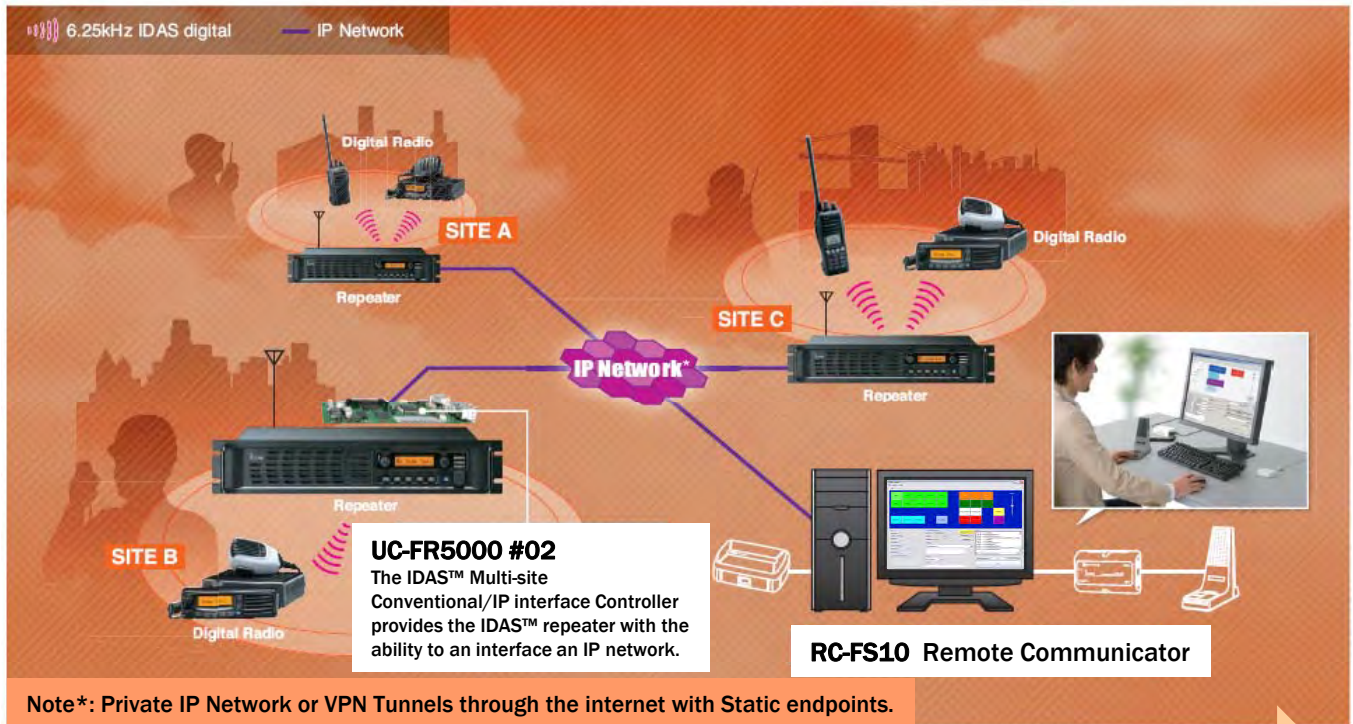
	Value	Enable /Inhibit
Backlight	Auto	Enable
LCD Contrast	50	Enable
Fan	Auto	Enable
Beep	OFF	Enable
SQL Level	2	Enable
AF Min Level	50	Enable
Mic Gain	3	Enable
Signal Moni	ON	Enable
System Info	----	Inhibit
LCD Check	----	Inhibit
Information	----	Inhibit
Key Check	----	Inhibit

Select the audible volume level in "AF Min Level" in the CS-FR5000 Set Mode. Otherwise, no voice can be heard when the volume knob gets turned to the minimum setting.



IDAS™ multi-site conventional

IDAS™ conventional IP networks link up to 16 repeater sites



Please turn the page for application examples.

Communication Link for distant location

An IDAS™ conventional IP network can extend your communication coverage. It lets you connect dispersed sites, and allows you to communicate like a single site.

Up to 16 repeaters (RF units) can be connected over an IP Network

With the optional UC-FR5000 #02, up to 16 IDAS™ repeaters can be linked with each other. An IDAS™ terminal radio user can communicate with other IDAS™ terminal radio users within the reach of each repeater site, and/or with the RC-FS10 remote communicator that serves as a virtual dispatch station on the network.

When an analog signal is uplinked to a repeater, it is downlinked to the local site. However it is not possible to relay that analog signal over the IP network.

Narrow Bandwidth requirement

By using the AMBE+2™ vocoder compression, an IDAS™ multi-site conventional requires only about 13kbps bandwidth per single voice path. It generally means a DSL class line is sufficient for the IDAS™ multi-site conventional.

RC-FS10 Remote Communicator Software

The remote communicator creates an IP-based virtual radio on a PC and works as a simple dispatch. IDAS™ communication features can be used with the remote communicator software.

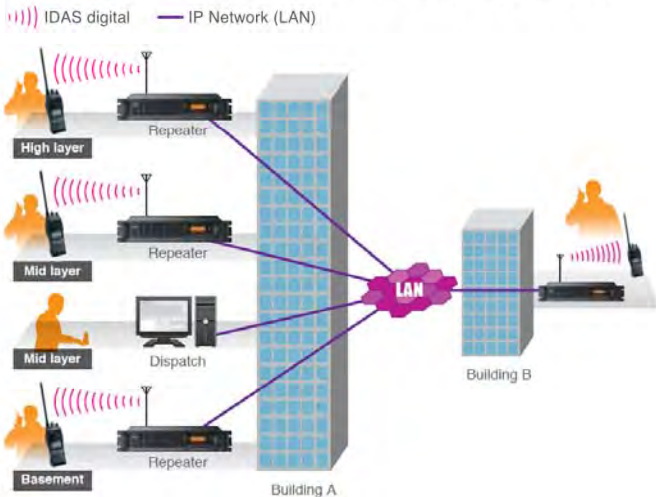
Compatible with wide range of IDAS™ radios

Both high and entry class radios can be used as terminals for the IDAS™ multi-site conventional system.

- IC-F3060/D, IC-F3100D series handheld radios.
- IC-F5060/D, IC-F5120D series mobile radios.

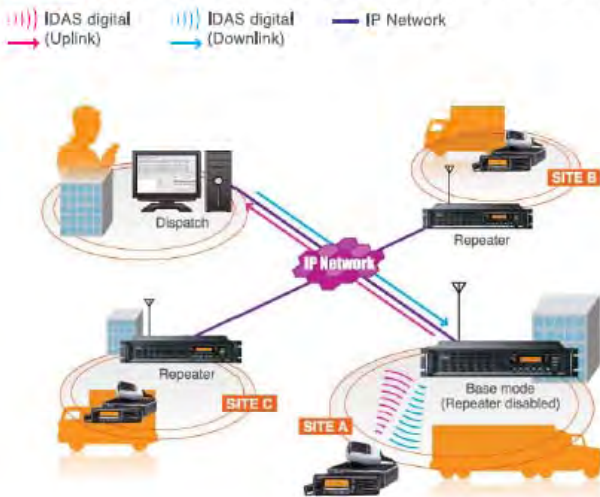
Application examples

CASE 1 Intra-building and inter-building solution



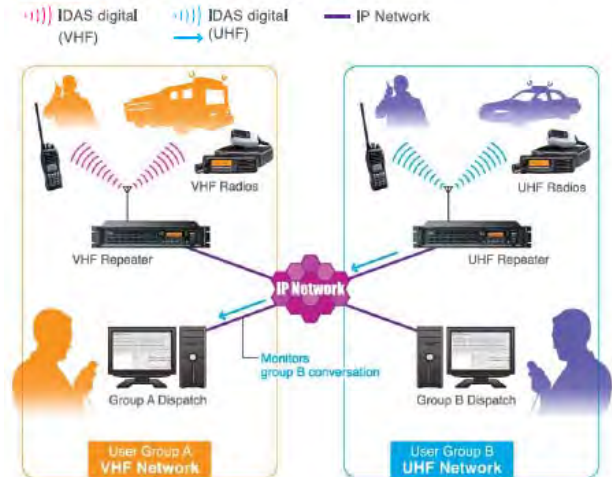
With an IDAS™ conventional IP network system, it is possible to have radio communications all the way from the basement to the top floor, all in stable digital audio. Already deployed LAN cables can be used in an in-building solution.

CASE 2 Remote base station over IP network



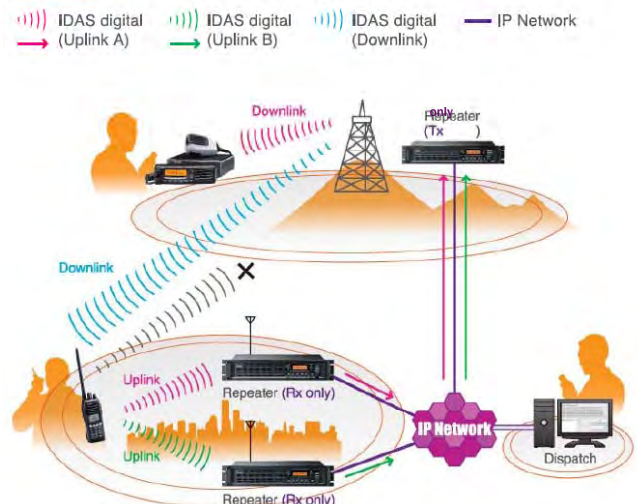
In base mode operations with an IDAS™ conventional IP network system, the uplinked voice from IDAS™ radios will not be repeated to other IDAS™ terminal radios, but only sent to the assigned RC-FS10 remote communicator through the IP network. The uplink from the RC-FS10 remote communicator will be downlinked from the IDAS™ repeaters. This mode may not be used to communicate between terminals, but for use in a simplex channel system.

CASE 3 Crossband repeater



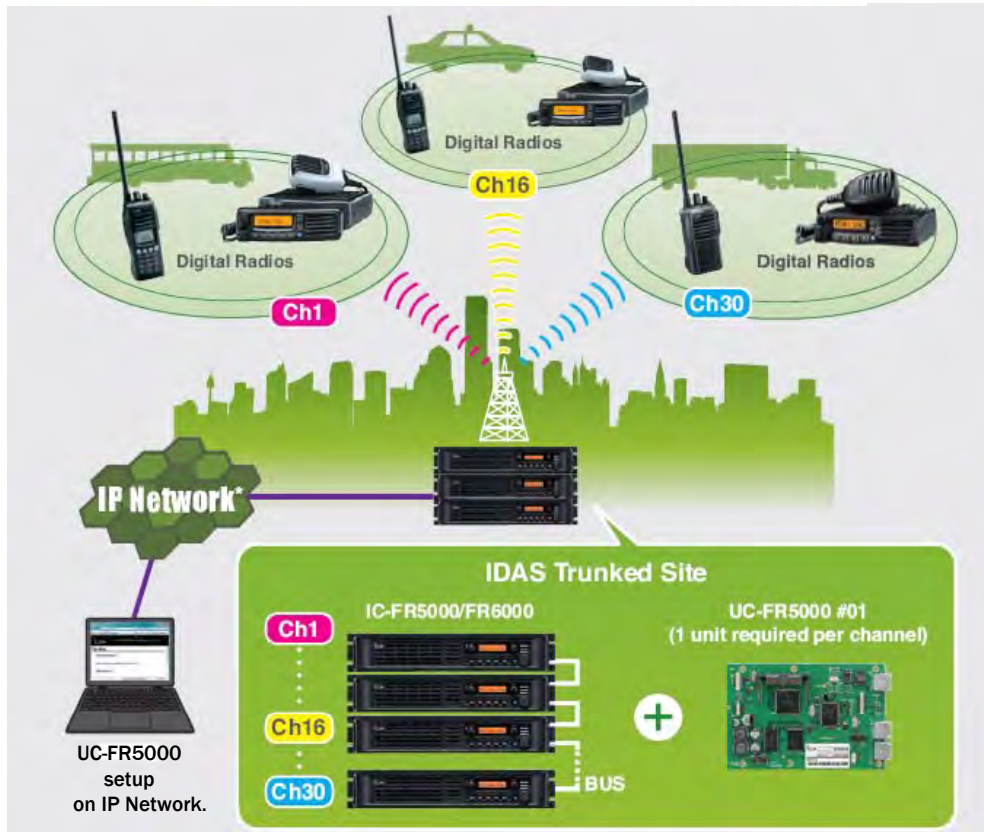
Different agencies might use different bands. For example, a police department might be using UHF while a fire department uses VHF. An IDAS™ conventional IP network establishes a crossband repeater system so everyone can communicate with each other.

CASE 4 Receiver voting operation



IDAS™ receiver voting enables users to make stable communication using the IDAS™ handheld and mobile radios. The IDAS™ networked receivers are distributed in the communication area, where IDAS™ repeaters' transmission is inhibited and used as receivers. Each receiver receives a signal from a terminal radio and transfers it to the repeater site, and the repeater relays the best signal or transfers it to the RC-FS10 remote communicator. The UC-FR5000 has a built-in voting function, so an external voter device is not required.

IDAS™ single-site trunking



NOTE: Private IP Network or VPN Tunnels through the Internet with Static endpoints.

Shares up to 30 channels with a large number of users

IDAS™ single-site trunking

IDAS™ single-site trunking provides an affordable digital trunked radio system. Selective call, group call, status message and short data message can be used over an IDAS™ trunking system.

Up to 30 repeaters (RF units) in a system

IDAS™ single-site trunking can have up to 30 repeaters (RF units) per site. All of the connected repeaters can be configured from a web browser using an IP network. All trunked channels can be used for voice traffic channels, so that a large number of users can share them effectively.

Up to 2,000 IDs

The system has an ability to handle up to 2,000 individual ID codes and 2,000 group ID codes per home channel.

Secondary Home Channel

If the home repeater fails, the radio automatically chooses a secondary repeater/channel for backup operation.

Area bit setting

If there are two IDAS™ trunking systems using the same frequency within a close area, the area bit setting allows the trunked radios to identify its own repeater site.

Other features

- Unit ID authentication

Compatible with a wide range of IDAS™ radios

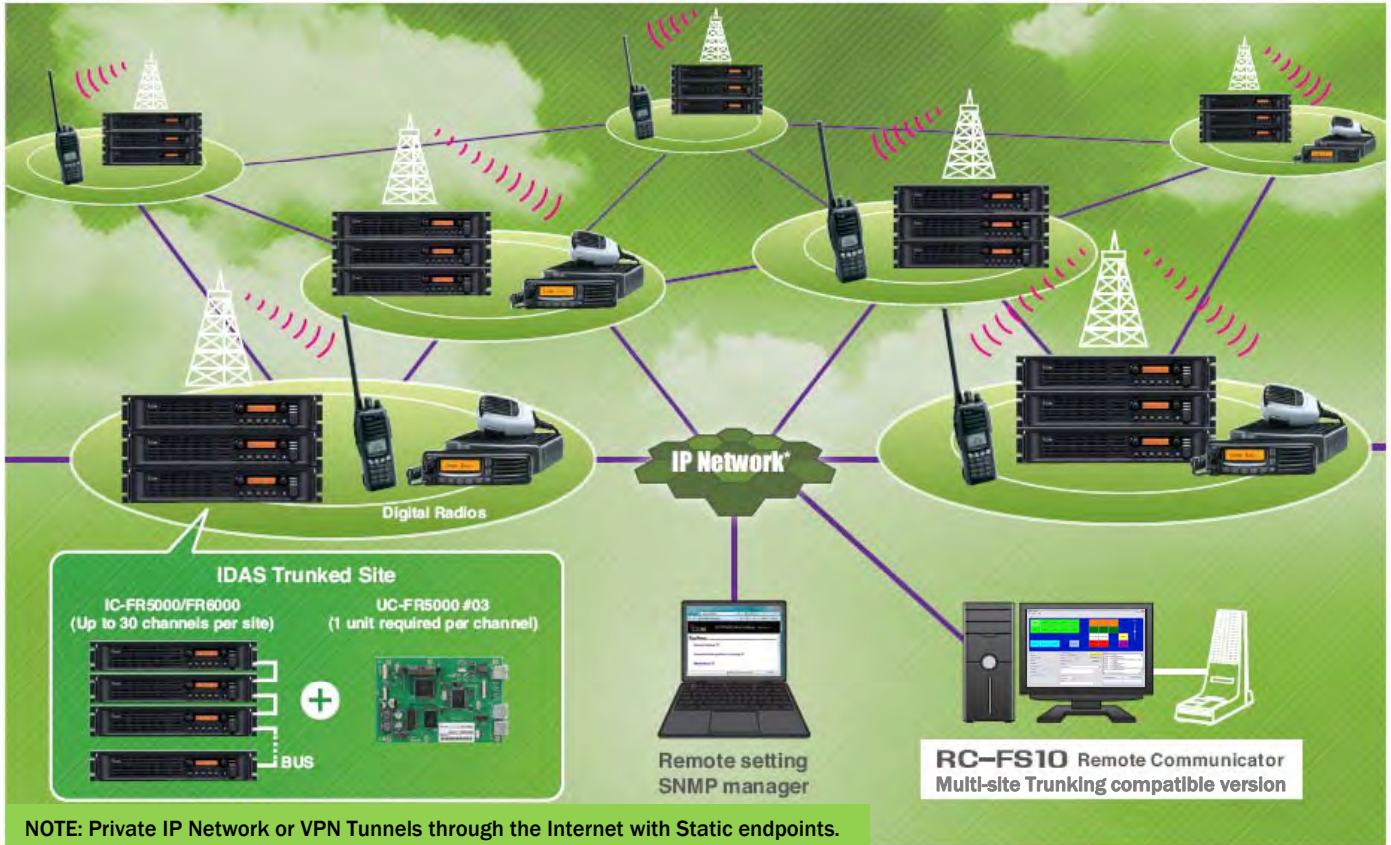
Both high and entry class radios can be used as terminals for the IDAS™ multi-site conventional system.

- IC-F3060/D, IC-F3100D series handheld radios.
- IC-F5060/D, IC-F5120D series mobile radios.



IDAS™ multi-site trunking features

IDAS™ multi-site trunking for high volume, wide area communication



Shares up to 48 sites x 30 channels for managing large fleets.

Distributed control channel

The IDAS™ trunking uses a distributed logic system which does not use a dedicated control channel. All trunked channels can be used for voice traffic channels to be shared more effectively with a large number of users.

Up to 48 IDAS™ trunked sites can be connected over an IP network

The IDAS™ multi-site trunking can have up to 30 repeaters (RF units) per site, and up to 48 trunked sites can be interlinked over the IP network. An IDAS™ terminal radio user can communicate with other IDAS™ terminal radio users working under the interlinked trunked sites.*

*Up to 16 preset sites can be downlinked simultaneously for a group call.

Up to 60,000 individual ID and 60,000 group ID numbers

In the IDAS™ multi-site trunking, the combination of prefix ID and individual ID (or group ID) codes is used as a unique identifier. The IDAS™ multi-site trunking can have up to 30 prefix ID codes per system and up to 2,000 individual ID codes and 2,000 group ID codes per prefix ID. In total, up to 60,000 individual IDs and 60,000 group ID numbers can be used in a system.

Automatic site roaming

When a user turns on a radio, or moves from one site to another site, the radio automatically starts the hunt scan and registers its own ID information to the repeater site. No user interaction is required.

RC-FS10 Remote Communicator, New Version

The remote communicator for the multi-site trunking has been released as the RC-FS10 #15 EXP. (The firmware revision number: 2.0 or later).

Fleet management

The fleet management allows the system manager to control a user group in a fleet. Users can be assorted into up to 5,000 fleets, and the system manager can enable or disable the use of the system for any fleet.

Fleet (1-5000)	Alias name	Prefix ID (1-30)	Individual ID (1-2000)	Group ID (1-2000)	Status
1	Security A	1	1-10,31-400	1-20	Enable
2	Taxi B	1	11-30	21-25	Enable
3	Bus C	2	1-30	1-30	Disable
4	Truck D	2	1001-1005	51-53	Enable

The system manager can enable or disable the use of the system for any fleet. (The above example shows the Fleet 3 is disabled.)

Integrated system for clean and simple installation

The IDAS™ multi-site trunking requires only the UC-FR5000 #03 IP Network/Trunking Controller which can be installed into the IC-FR5000 series repeater; no external server and no extra rack space is required.

ESN authentication

IDAS™ multi-site trunking can refuse to register an unauthorized terminal radio to the repeater site by using the electronic serial number (ESN) or individual ID of the radio.

Over the air update

IDAS™ repeater sites can update terminal radios' content with new system information, like added channels and new sites, over the air without interrupting use of the radio.

Call priorities

Even while the radio is receiving a lower priority call, it can also receive a higher priority call. The priority is given based on the following order, from high (1) to low (7).

- (1) Emergency Group Call (set "E" at Atr)
- (2) Priority Group Call
- (3) Broadcast Group Call
- (4) Individual Calls
- (5) Group Call
- (6) All Call (ID:2047)
- (7) Block Mode

SNMP system monitoring

When used with a third party SNMP manager software, the MIB (Management Information Base) of the trunked site can be remotely monitored. The system manager can efficiently manage the multi-site trunked sites over the network.

RC-FS10 Remote Communicator for multi-site trunking*

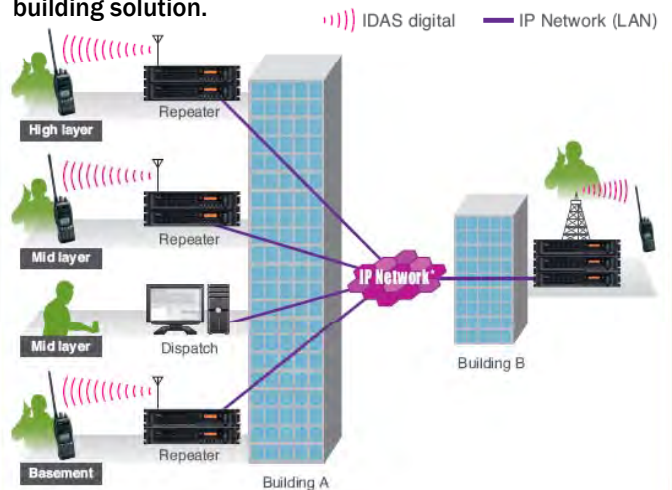
The remote communicator software creates an IP-based virtual radio on a PC, and works as a simple dispatch. IDAS™ communication features can be used with the remote communicator software. (*The firmware revision number of the compatible models is 2.0 or later.)

Other features

- Load-leveling for trunk-out channels.
- Restriction control can limit transmission from the terminal radios in case there is too much traffic.

Application example — Intra-building and inter-building solution

With an IDAS™ multi-site trunking, it is possible to have radio communications all the way from the basement to the top floor, all in stable digital audio. Already deployed LAN cables can be used in an in-building solution.



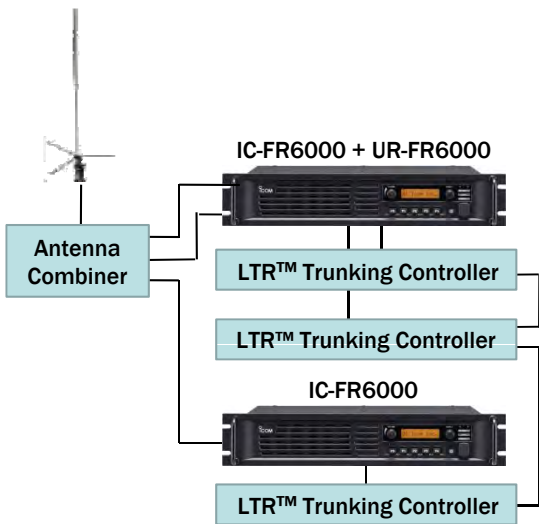
NOTE: Private IP Network or VPN Tunnels through the Internet with Static endpoints.

5-6 LTR™ Trunking System

5-6-1 Single-site LTR™ Trunking System

All diagrams in this section show a 3 channel system.

The Single-site LTR™ Trunking System

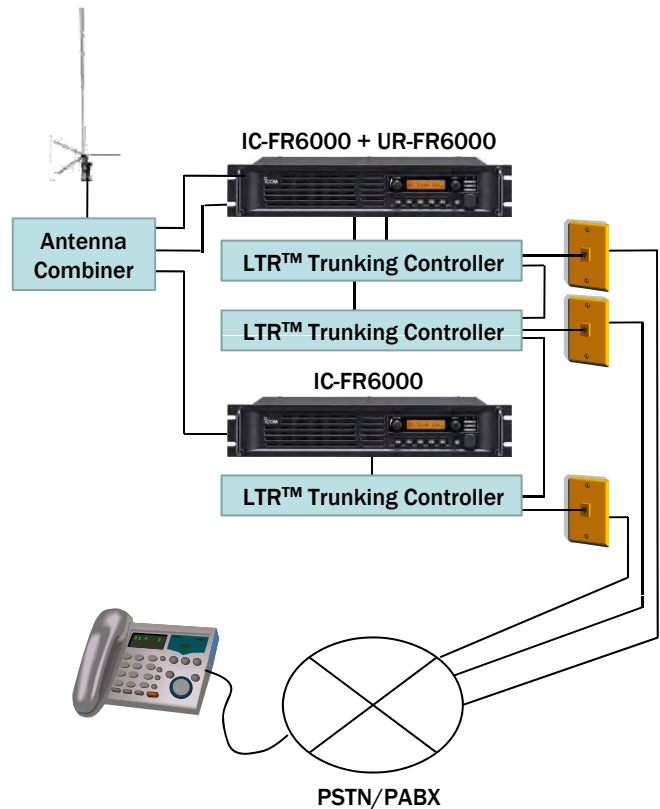


The IC-FR6000 series has D-SUB 25 pin/modular interfaces for external controllers such as the LTR™, PassPort™ and MPT1327. LTR™ is a signalling standard for trunked private land mobile radio systems. It defines the protocol rules for communication between a trunking system controller and users' radio units. This plan is an example of single trunking repeater site .

System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Trunking Controller		

The Single-site LTR™ Trunking System with Telephone Line Connection



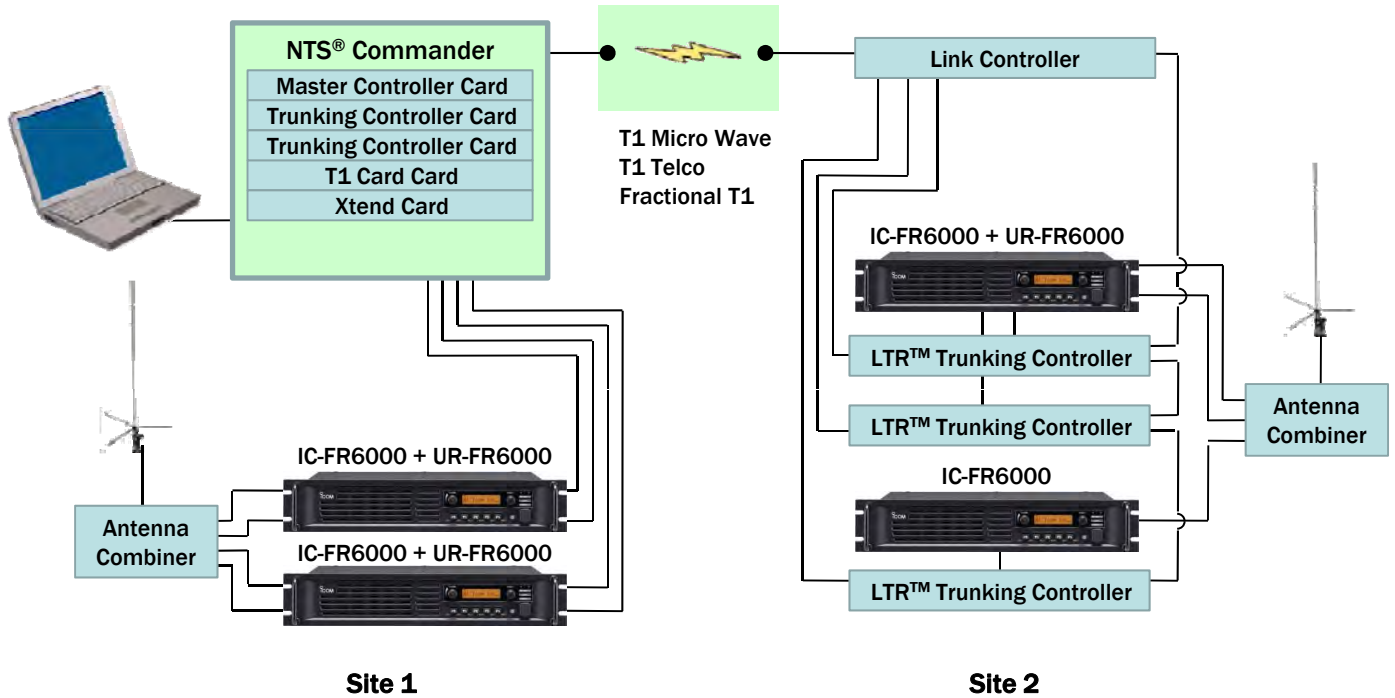
This is an example of adding a telephone to upgrade a single trunking repeater site.

System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Trunking Controller		
PSTN or PABX		

5-6-2 Digital Networked LTR™ or PassPort™ Trunking System

Digital Networked LTR™ or PassPort™ Trunking System



This is an example of adding a digital network to upgrade a single trunking repeater site.

Site 1 system requirements

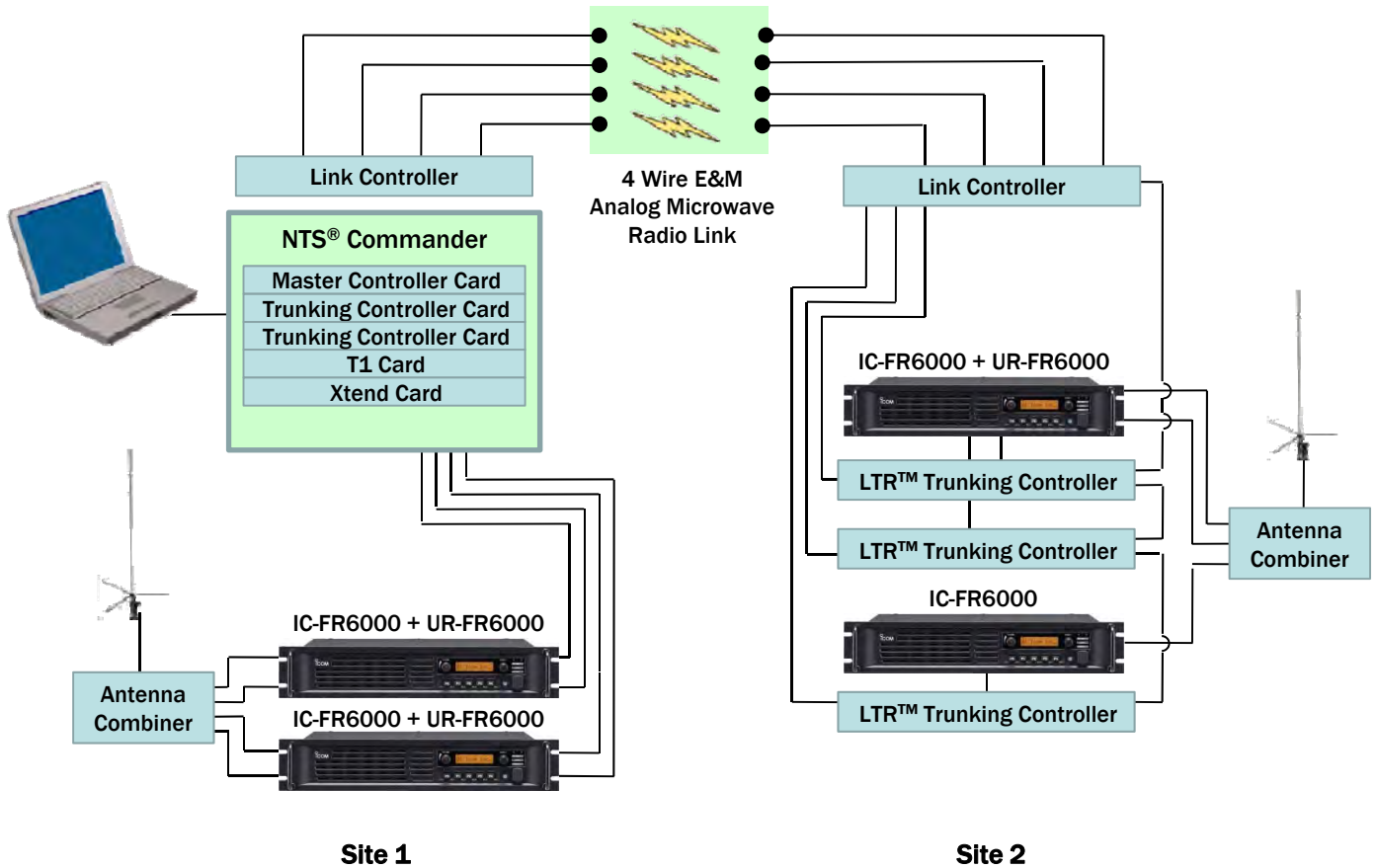
Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
NTS® Commander		
Master Controller Card		
Trunking Controller Card		
T1 Card		
Xtend Card		
PC		

Site 2 system requirements

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Trunking Controller		
Link Controller		

5-6-3 Analog Networked LTR™ or PassPort™ Trunking System

Analog Networked LTR™ or PassPort™ Trunking System



This is an example of adding an analog network to upgrade a single trunking repeater site.

Site 1 system requirements

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Link Controller		
NTS® Commander		
Master Controller Card		
Trunking Controller Card		
T1 Card		
Xtend Card		
PC		

Site 2 system requirements

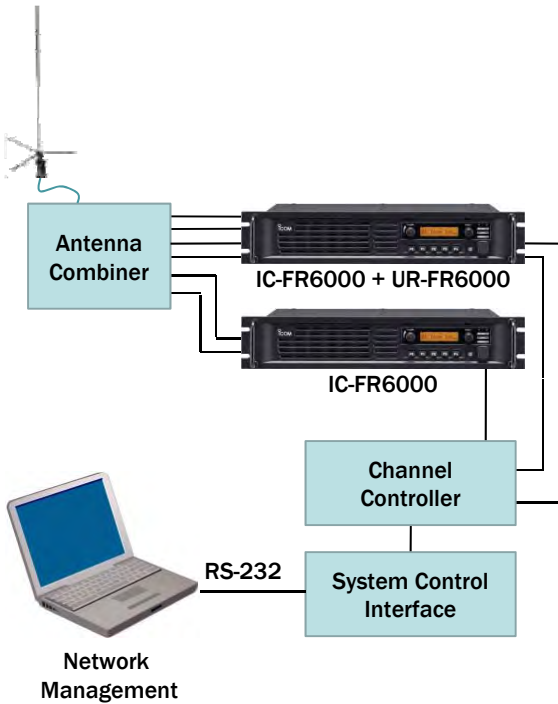
Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Trunking Controller		
Link Controller		

5-7 MPT1327 Trunking System

5-7-1 Single-site Trunking System

All diagrams in this section show a 3 channel system.

The Single-site Trunking System



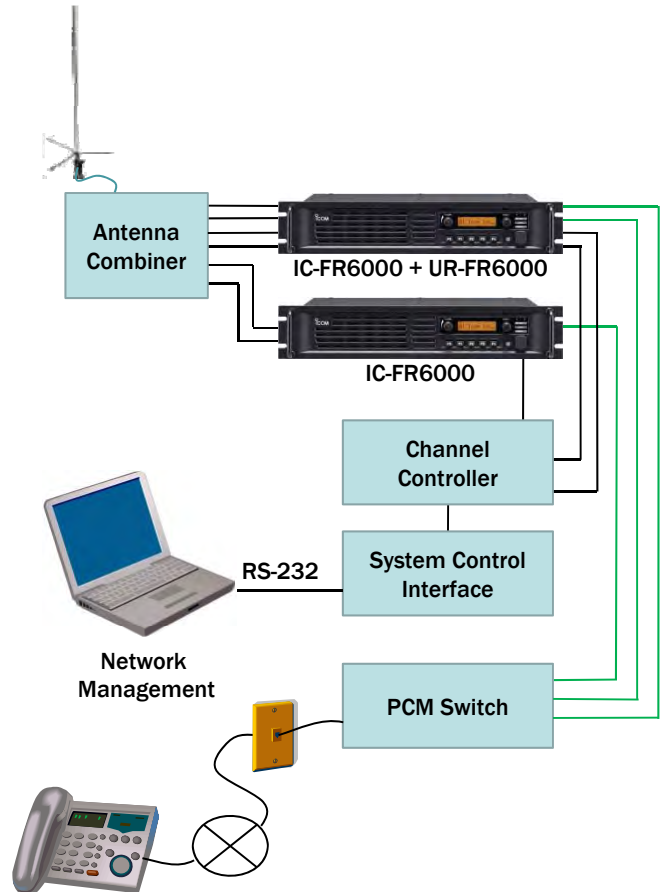
The IC-FR5000/IC-FR6000 series has D-SUB 25 pin/modular interfaces for external controllers such as PassPort™ and MPT1327. MPT1327 is a signalling standard for trunked private land mobile radio systems. It defines the protocol rules for communication between a trunking system controller (TSC) and users' radio units.

This is a basic plan to upgrade the repeater site to a trunking system. This plan is an example of a single trunking repeater site.

System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Channel Controller		
System Control IF		
PC		
Management Software		

The Single-site Trunking System with telephone line connection

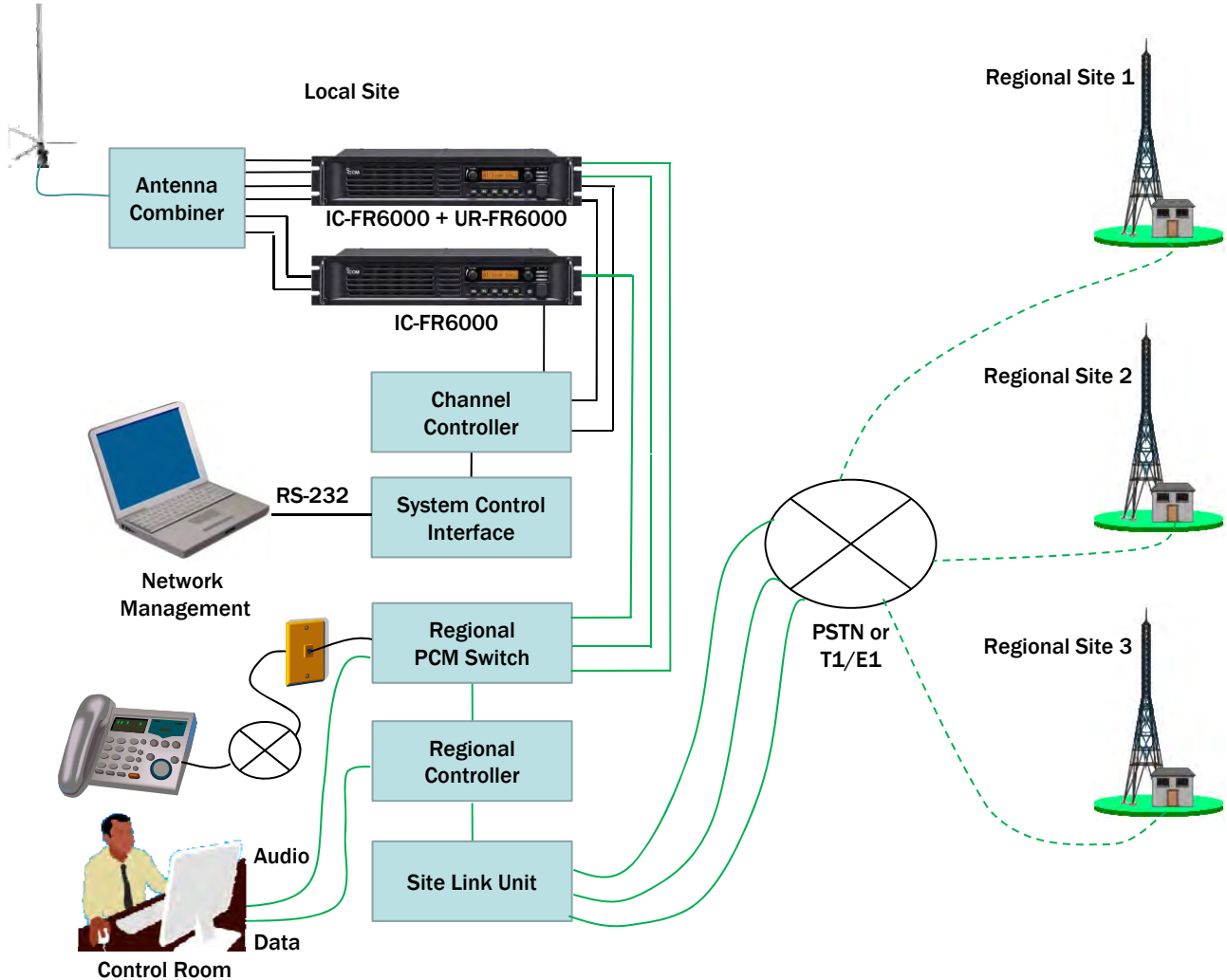


This is an example of adding a telephone to upgrade a single trunking repeater site.

System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Channel Controller		
System Control IF		
PC		
Management Software		
PCM Switch		
PSTN or PABX		

Regional Trunking System



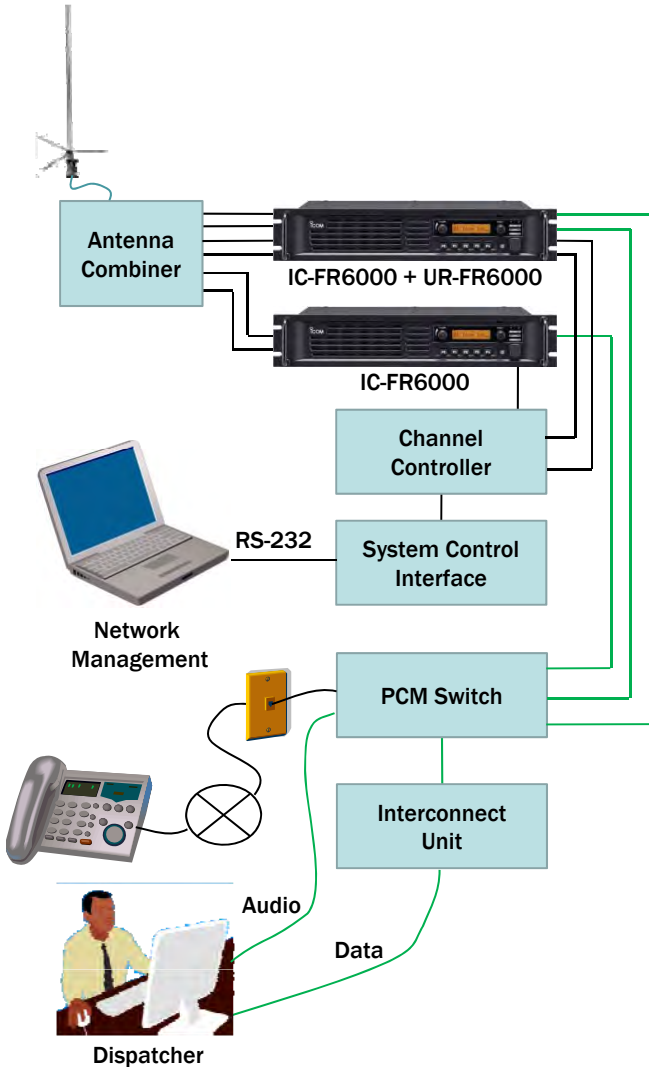
This is a plan to upgrade to a site linked regional trunking system.

System requirement for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Channel Controller		
System Control IF		
PC		
Management Software		
Regional PCM Switch		
Regional Controller		
PSTN/PABX or T1/E1		

5-7-3 MPT1327 Trunking System with telephone line

The Single-site Trunking System with telephone line.

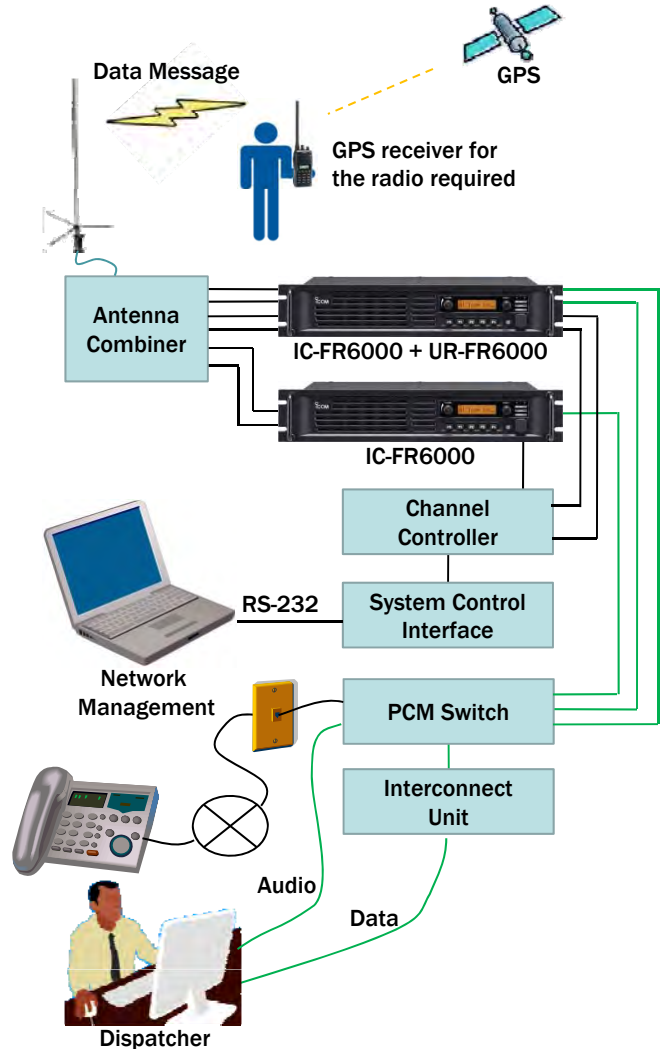


This is an example of adding a telephone and data connection to upgrade a single trunking repeater site.

System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Channel Controller		
System Control IF		
PC		
Management Software		
PCM Switch		
Interconnect Unit		
PSTN or PABX		

The Single-site Trunking System with telephone line connection and Vehicle and Personnel Tracking



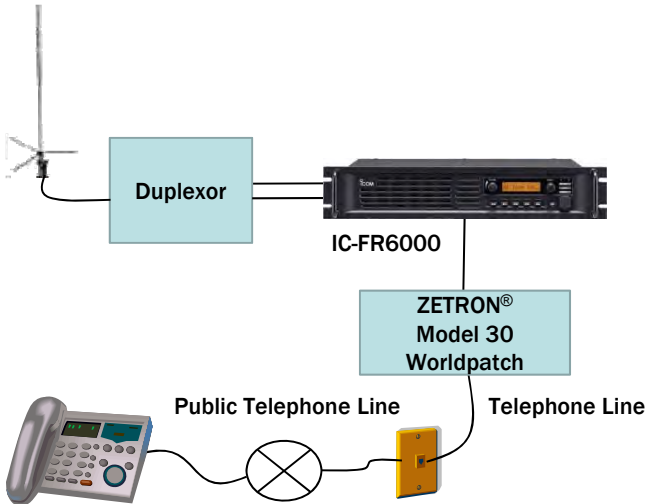
This is an example of adding a telephone and data connection to upgrade a single trunking repeater site. It also enables expansion to Vehicle and Personnel Tracking.

System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
Channel Module Unit	UR-FR6000	
UHF Antenna		
Antenna Combiner		
Channel Controller		
System Control IF		
PC		
Management Software		
PCM Switch		
Interconnect Unit		
Mapping Software		
PSTN or PABX		

5-8 Phone Patch and Tone Remote

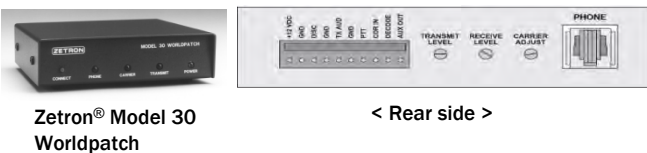
Basic Repeater to Phone Line Connecting System



This is an example of a telephone connection added to a single repeater site. The repeater can be connected to the telephone line using an external phone patch. When a subscriber transmits DTMF dialing codes, they are sent to the telephone line to connect the phone.

➤ Repeater and Worldpatch Connection

Repeater (25pin)			Worldpatch (10pin)	
Pin Description	Pin No.		Pin No.	Pin Description
AF OUT	22	↔	3	DISC
MOD IN	8	↔	5	TX AUD
EXT.I/O 18	18	↔	7	PTT
EXT.I/O 15	15	↔	8	COR IN
VCC	11	↔	1	+12 VDC
GND	14	↔	2	GND
GND (Shield)	7	↔		

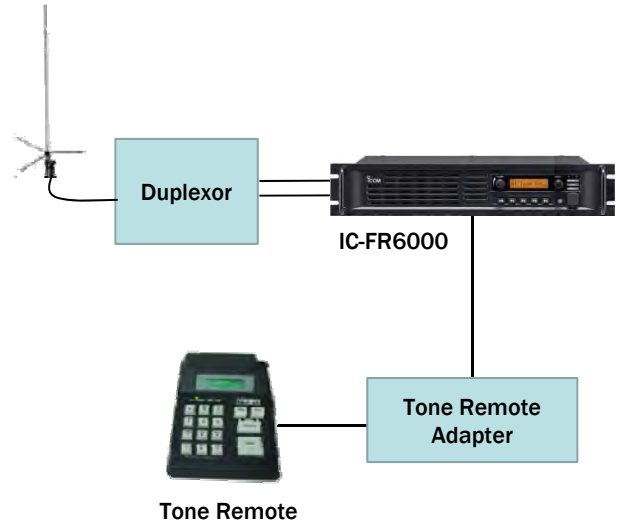


System requirements for one site

Descriptions	Model Number	Quantity
UHF Repeater	IC-FR6000	
UHF Antenna		
Antenna Combiner		
ZETRON Worldpatch		

NOTE: The above connections are for reference only.

Tone Remote System



This is an example of a Tone Remote Controller added to a single repeater site.

➤ Repeater and Tone Remote Adaptor connection

Repeater (25pin)			Tone Remote Adaptor	
Pin Description	Pin No.		Pin No.	Pin Description
+13.6V OUT	11	↔		+12V IN
AF OUT	22	↔		RX IN
MOD IN	8	↔		TX OUT
EPPT	19	↔		PTT OUT
Key Moni	17*	↔		MONITOR OUT
GND	7,14	↔		GND
MCH Select :1	15*	↔		F1
MCH Select :2	16*	↔		F2
MCH Select :3	23*	↔		F3
MCH Select :4	24*	↔		F4
MCH Select :5	25*	↔		F5

* The desired functions can be assigned to External I/O 15 to 25.

System requirements for one site

Descriptions	Model Number	Quantity
Repeater	IC-FR6000	
Antenna		
Antenna Combiner		
Tone Remote Adaptor		
Tone Remote		

5-9 IDAS™ V2 PC Command

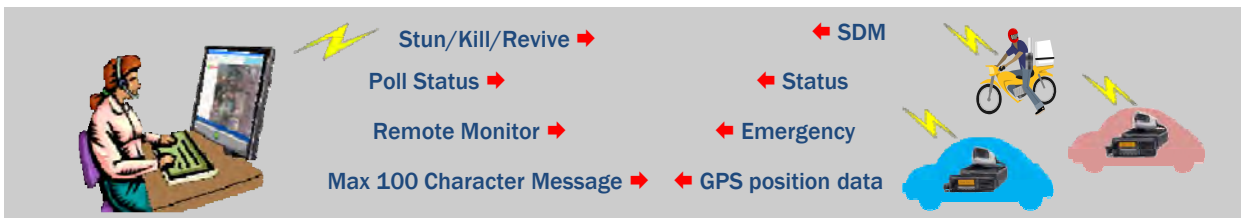
■ V2 PC Commands support IDAS™ transceivers

This table shows the availability of PC commands in analog and IDAS™ transceivers. The V1 PC Command supports only the analog mode while **V2 PC Command** supports both analog and digital modes.

	Analog (BIIS)	IDAS™
V1 PC Command	✓	N/A
V2 PC Command	✓	✓

NOTE: The latest version of V2 PC Command is Rev.1.6.

Using V2 PC Command, operators can control IDAS™ transceivers as illustrated below. Please refer to the next page for details of V2 PC commands.

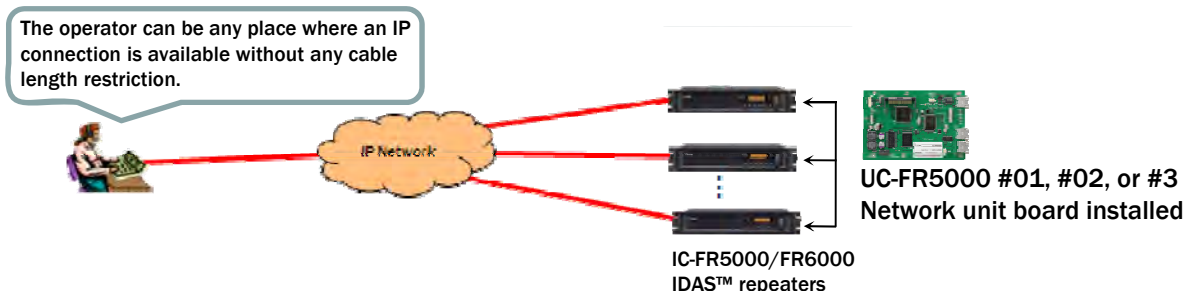


■ Operation of PC Command

To send V2 PC commands, connect a RS-232 cable between the PC and the D-Sub 25 pin Serial Port connector on the rear of the repeater.



In IP Network where IDAS™ repeaters are connected through an IP, an ethernet cable is used to connect the PC and the IP network. As there is no need to set the PC near the repeater, operators can send commands to the selected repeater from any place where an IP connection is available.



NOTE

After installing the UC-FR5000 into the repeater, the serial port at the rear of the repeater cannot be used to send serial commands.

□ V2 PC Command Rev.1.6

There are many of PC commands that enable you to control a radio from an IP-connected PC in a remote place. The latest revision number is Rev. 1.6, as of December 2011. A Non-disclosure agreement shall be made with Icom to use these commands.

Category	General Information
CMD	Common settings
	Reply for unknown or illegal command
	Automatic report ON/OFF
INFO	Radio Information related
	Obtain firmware recognition information
	Obtain firmware recognition information (DSP Unit)
	Obtain firmware recognition information (Front Unit)
	Obtain coning comment
UI	Obtain Electronic Serial Number
	User Interface related
	User operation (Reset SW) control
	User operation (AF Volume) control
	User operation (PTT) control
	User operation (KEY) control
MCH	LCD, TEXT control (specify text content)
	Memory CH selection, Memory CH-dependent setting temporary change
	Memory CH selection
	C. Tone control
	Wide/narrow control
	RF Power control
SETM	Compander control
	Scrambler control
CTRL	User set Mode equivalent operation
	SQL Level control
	For internal state controls and hardware controls
	Transmit/Receive control
	Audible report
	SQL report
	RSSI report
	Digital RX report
	Automatic BER reporting
	BER reporting
	UNLK report
	UNLK report (TX)
	UNLK report (RX)
	Repeater function control (only for repeater)
	MMUT control
	RMUT control
	AFON control
	AUX1 control
	AUX2 control
	AUX3 control
	AUX4 control
	Obtain power supply voltage
	Obtain temperature
Obtain PLL lock voltage (TX)	
Obtain PLL lock voltage (RX)	
Obtain irregular power supply voltage state information	
Obtain irregular temperature information	
Obtain irregular FAN status information (applicable only for radios with a fan)	

5T	System dependent (only for 5 Tone)
	Call request (TX Code CH based)
	Call report (RX Code CH based)
	Call request (specifying each digit)
2T	Call report (specifying each digit)
	System dependent (only for 2 Tone)
DTMF	Call request (TX Code CH based)
	Call report (RX Code CH based)
	System dependent (only for DTMF)
	Call request (Code CH based)
NXDN™ CAI- based IDAS™	Call report (Code CH based)
	Call request (Specifying each digit)
	Call report (specifying each digit)
	System dependent (IDAS™ commands)
	Control currently set ID
	Voice Call Report
	Status Request
	Status Report
	Status Poll Request
	Message Request
	SDM, GPS etc. Message Report
	Call Alert Request
	Call Alert Report
	Stun Request
	Stun Report
	Kill Request
	Kill Report
	Revive Request
	Revive Report
	Remote Monitor Request
	Radio Check Report
	Emergency RX Report
	Man Down RX Report
Set/obtain RAN information	
RAN RX information report	
Automatic reporting of RX Encryption	
ACK control	

NOTE :

- PC commands for IDAS™ dPMR™ are omitted from the above table.

☐ Troubleshooting

The following chart is designed to help correct problems which are not equipment malfunctions.

If you are unable to locate the cause of a problem or solve it through the use of this chart, contact the nearest Icom Dealer or Service Center

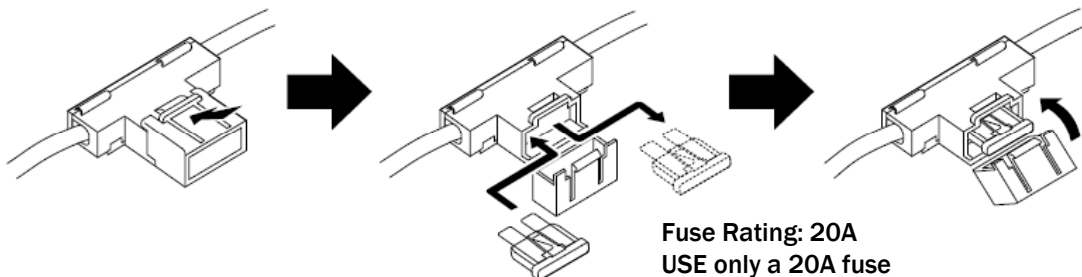
PROBLEM	POSSIBLE CAUSE	SOLUTION
Power does not come on when the [POWER] switch is turned ON.	<ul style="list-style-type: none"> • DC power cable is improperly connected. • Fuse is blown. 	<ul style="list-style-type: none"> • Reconnect the DC power cable correctly. • Check the cause, repair it, then replace the fuse with a new, rated one.
No sounds from the speaker.	<ul style="list-style-type: none"> • Volume level is too low. • The squelch is closed. • The audio mute function is activated. • A selective call or squelch function is activated, such as 5 tone call or tone squelch. • The front speaker is set to OFF. 	<ul style="list-style-type: none"> • Rotate [VOLUME] clockwise to obtain a suitable listening level. • While in the base operating mode, rotate [SELECT] counterclockwise to open the squelch. (When the [SQL Level Up/Down] key function is assigned) to [SELECT].) • Push [MONI], if assigned, to turn the audio mute function OFF. • Turn OFF the appropriate function. • Turn ON the front speaker using the optional CS-FR5000 cloning software.
Sensitivity is low and only strong signals are audible.	<ul style="list-style-type: none"> • The antenna feedline or the antenna connector has a poor contact or it is short-circuit. 	<ul style="list-style-type: none"> • Check and reconnect, or replace if necessary, the antenna feedline or antenna connector.
Received audio is unclear or distorted.	<ul style="list-style-type: none"> • Optional voice scrambler is turned OFF. • Scrambler code is not set correctly. 	<ul style="list-style-type: none"> • Turn ON the optional voice scrambler. • Reset the scrambler code.
Output power is too low.	<ul style="list-style-type: none"> • Output power is set to Low. • Power amplifier protection circuit is activated. 	<ul style="list-style-type: none"> • Push [HIGH/LOW], if assigned, to select the High power. • Cool down the repeater or stop accessing it until it has cooled down.
No contact possible with another station.	<ul style="list-style-type: none"> • The other station is using tone squelch. • While in the base operating mode, the repeater is set to duplex. 	<ul style="list-style-type: none"> • Turn ON the tone squelch function. • Set the repeater to simplex, when the other transceiver is set to simplex.

☐ Fuse replacement

If a fuse blows or the repeater stops functioning, try to find the source of the problem, repair it, and replace the damaged fuse with a new, rated fuse.

CAUTION: DISCONNECT the DC power cable from the repeater. Otherwise, there is danger of electric shock and/or equipment damage.

◇ Line fuse replacement

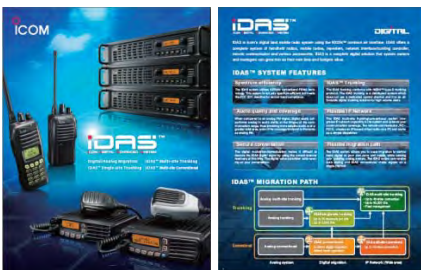
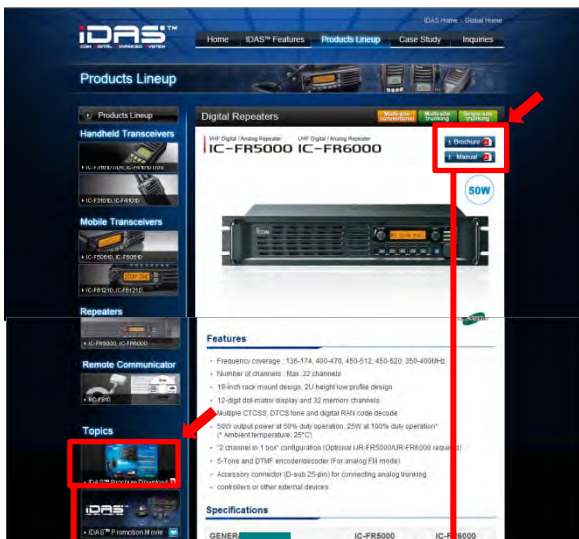


➤ The following catalogs and information regarding the NXDN™ -CAI-based IDAS™ radios are available on the Icom web site. URL: <http://www.icom.co.jp/world/index.html>

< Home Page >



< NXDN™ CAI-based IDAS™ Page >



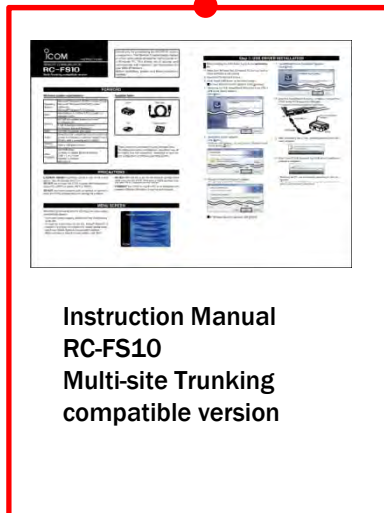
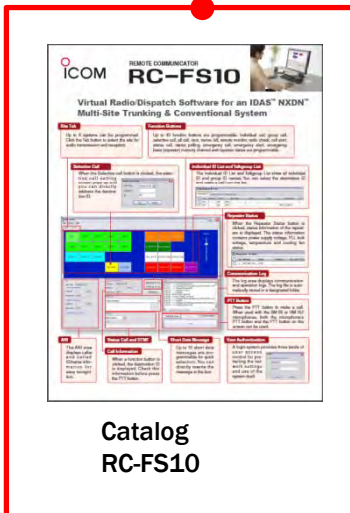
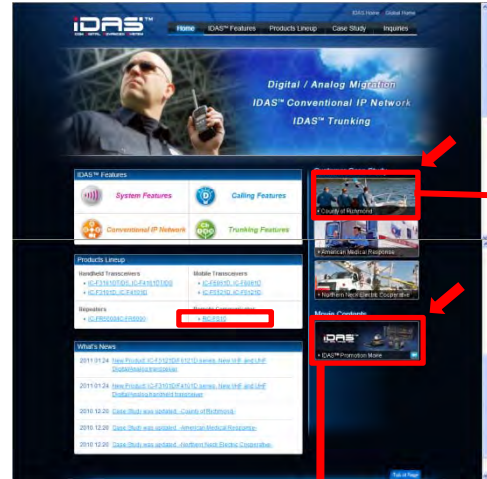
NXDN™ CAI-based IDAS™ Catalog
 IC-F3160D series RC-FS10
 IC-F3100D series
 IC-F5060D series
 IC-F5120D series
 IC-FR5000 series



Catalog
 IC-FR5000
 IC-FR6000



Instruction Manual
 IC-FR5000
 IC-FR6000



RC-FS10 Remote Communicator

IDAS™ Video



➤ The following instruction manuals are available on the Icom web site.

URL: <http://www.icom.co.jp/world/index.html>

< Home Page >



< Support Center Page >



Instruction manual IC-FR5000 IC-FR6000	Instruction manual UC-FR5000 CF-FR5000MC	Instruction manual UR-FR5000 UR-FR6000	Instruction manual RC-FS10 Remote Communicator CT-23 PTT MIC Adapter

➤ The following service manuals and other material are available upon request through local Icom Distributors in your region.



Service Manual
IC-FR5000/IC-FR5100



Service Manual
IC-FR6000/IC-FR6100



Service Manual
UR-FR5000/UR-FR5100



Service Manual
UR-FR6000/UR-FR6100



Catalog
Professional Communication
LMR



Catalog
MDC1200
Compatible models



Banner
Digital Migration
with IDAS™



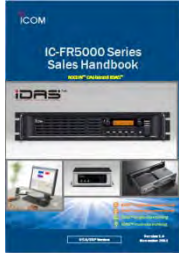
Poster
IDAS™
Flexible Digital
Migration



AD
Digital Migration
with IDAS™
Now with Trunking

A-2 Handbooks, Guides and Other Material

➤ The following handbooks, guides and other material are available upon request through local Icom Distributors in your region.



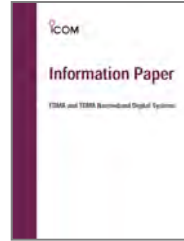
Sales Handbook
IC-FR5000
series IDAS™
(Ver.1.4)



Sales Handbook
IC-F3161/D/
IC-F3163 series
IDAS™ (Ver.1.4)



Sales Handbook
IC-F5061/D/
IC-F5063 series
IDAS™ (Ver.2.5)



Information Paper
FDMA vs TDMA*



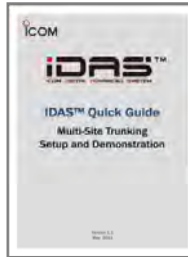
Information paper
High Quality,
Reliability and
Global
sustainability



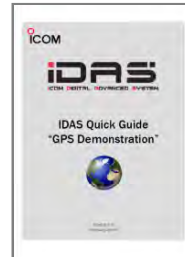
Quick Guide
IDAS™
Basic
Demonstration
(Ver.1.3)



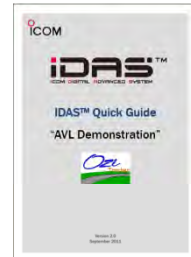
Quick Guide
IDAS™
Trunking
Demonstration
(Ver.1.0)



Quick Guide
IDAS™
Multi-site Trunking
Setup and
Demonstration
(Ver.1.1)



Quick Guide
IDAS™ GPS
Demonstration
(Ver.1.0)



Quick Guide
IDAS™ AVL
Demonstration
(Ver.2.0)



Quick Guide
RC-FS10
Demonstration
(Ver.1.0)



Quick Guide
UC-FR5000
Web setting
(Ver.2.0)



Application Note
Conventional IP
Network with
RC-FS10,
memory channel
selection
(AN1017)



Application Note
Conventional IP
Network with
RC-FS10,
RAN selection
button
(AN1015)



Application Note
Conventional IP
Network,
Emergency &
Selectable Site
Bridge System
(AN1012)



Application Note
Split Dispatch
System
(AN1009)



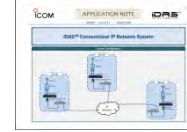
Application Note
Drop Link System
with RC-FS10
(AN1007)



Application Note
Receiver Voting
System
(AN1003)



Application Note
System with
RC-FS10
(AN1002)



Application Note
System
(AN1001)



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