

# ***Illinois Mutual Aid Guide***

This profile is intended as an annex to the various CARMA County Profiles produced recently. These frequencies are not usually listed in individual Profiles unless needed as part of a channel plan. These may or may not be used in your area, but should be monitored during any serious incident.

Police, Fire and other emergency services agencies in Illinois rely on a variety of Mutual Aid channels to coordinate activities. Large events rarely involve a single agency and usually require the assistance of multiple agencies. Most Mutual Aid radio traffic is “Intra-Discipline”, in that Police talk to police and Fire talks to fire. While this remains a serious issue there are plans to allow more inter-discipline communications using many of the frequencies listed here.

There are many Mutual Aid groups and associations in and around Illinois. The best known is MABAS, the Mutual Aid Box Alarm System. This was started in the northwest suburbs as a local group of fire departments to allow for orderly move-up of equipment to fires and other events, and has grown to become the basis for Mutual Aid statewide. The MABAS format has also been adopted by neighboring states and it’s premise is going national.

## ***Mutual Aid Box Alarm System (MABAS)***

MABAS is an organization of most fire departments in Illinois, as well as departments in adjoining areas of neighboring states. MABAS provides for the orderly move up of fire and EMS resources as incidents escalate. Most operations are on 154.265, known as IFERN (Interagency Fire Emergency Radio Network). Fireground and tactical operations are on several frequencies that vary by area, but most are on 153.830.

MABAS has been adopted by the State of Illinois as the model for mutual aid operations statewide. It’s structure and protocols have been adopted by neighboring states. Its principal ideas were adopted by NIPAS, which is the police mutual aid organization. This in turn was adopted by ILEAS, the statewide police mutual aid organization. In these days of Homeland Security, MABAS has been seen as an ideal model for the orderly utilization of resources.

MABAS is broken up into several Divisions that can consist of an area as small as several suburbs or a dozen rural counties. As MABAS expands to cover more of the Midwest some existing Divisions will separate into smaller units. MABAS has a Board of Directors that meets regularly and puts forth guidelines and protocols. Several working groups work on issues like radio communications and other important details.

See the MABAS websites at <http://www.mabas.org/> and <http://www.mabasradio.org> for more information.

**MABAS and Fireground Channels:** PL's are as dictated by the MABAS board, many radios are not yet programmed for them. PL's were supposed to be used on these channels by January 2006. Monitors are advised to listen in CSQ mode until it is determined that all users are actually transmitting the assigned PL's. MABAS alerts are broadcast on IFERN (154.265) with Plectron codes 1082 Hz. (1.5 sec.) and 701.0 Hz. (3.5 sec.)

154.2650	210.7	IFERN	Interagency Fire Emergency Radio Network
153.8300	69.3	Red Fireground	(Main Fireground channel)
154.2800	74.4	White Fireground	(Still used as South Suburban Mutual Aid by some)
154.2950	85.4	Blue Fireground	
154.2725	94.8	Black Fireground	
154.2875	136.5	Gray Fireground	
153.8375	91.5	Gold Fireground	
154.3025	67.0	IFERN2	Alternate Mutual Aid Base/Mobile
150.7900			"Green Fireground" (Proposed but never officially adopted, used in some areas.)
155.0550			IREACH Illinois Radio Emergency Answering Channel, used at many incidents

**MABAS Divisions:** MABAS divisions outside the suburban Chicago area usually consists of a county or several counties. Each Division has a Headquarters dispatch point and may have a backup as well.

<u>Div</u>	<u>Location</u>	<u>Div</u>	<u>Location</u>
1	Cook (NW)	36	Peoria Co.
2	Kane (North)	37	Iroquois Co.
3	Cook (N), Lake (SE)	38	Lee Co.
4	Lake Co.	39	Henry Co.
5	McHenry Co.	40	Vermilion Co.
6	DeKalb Co.	41	McLean Co.
7	Kankakee Co.	42	Tazewell Co.
8	Boone, Winnebago	43	Rock Island Co.
9	City of Chicago	44	Menard, Cass, Morgan, Scott, Schuyler, Adams, Pike, Brown
10	DuPage (S), Cook (W)	45	Jackson, Williamson, Johnson
11	Cook (W)	46	Macon Co.
12	DuPage	47	Bond, Fayette, Clinton, Union, Washington, Marion, Perry, Franklin, Saline, Gallatin, Pope, Wayne, Clay, Richland
13	Kane (S)	48	Sangamon Co.
14	Kendall Co.	49	JoDaviess Co.
15	Will (W), Grundy (E)	50	Christian Co.
16	DuPage (SW)	51	Logan Co.
17	Stephenson Co.	52	Wabash Co.
18	Ogle Co.	53	Fulton Co.
19	Cook (SW), Will (NE)	54	Effingham, Jasper
20	Cook (W)	55	McDonough Co.
21	Cook (SW)	56	Montgomery Co.
22	Cook (SE)	57	Bureau County
23	Livingston Co.	101	Kenosha Co. (WI)
24	Cook (S)	102	Racine Co. (WI)
25	LaSalle Co.	103	Walworth Co. (WI)
26	Douglas Co.	104	Rock Co. (WI)
27	Will (NE), Cook (S)	105	Green Co. (WI)
28	Champaign Co.	106	Waukesha Co. (WI)
29	Carroll Co.	107	Milwaukee Co. (WI)
30	Whiteside Co.	108	Grant Co. (WI)
31	Knox Co.	201	St. Joseph Co. (IN)
32	St. Clair, Monroe	301	City of St. Louis (MO)
33	Woodford Co.		
34	Randolph Co.		
35	Madison Co.		

**StarCom21**

In the near future Motorola's long awaited StarCom21 system will be deployed statewide. This is an 800 & 700 MHz statewide, digital trunked system employing CQPSK modulation within the APCO25 digital standards. It's being marketed as a leased radio system to every agency in the state. Motorola will own the infrastructure and administer the system, the State Police will hold the FCC Licenses, and individual agencies and users will own or lease the mobile and portable radios.

Some local agencies are investigating it as an alternative to refurbishing or upgrading their existing system. Current users include McLean County and WesCom. ISP District Chicago current GE-EDACS 800 MHz trunked analog system will likely be evolved into StarCom21 as well as the Illinois Tollway's 800 system.

The new St. Clair County trunked system is tied-in to the StarCom system although they own their own infrastructure.

The Illinois Terrorism Task Force (ITTF) has arranged to offer a StarCom21 radio to each Law Enforcement agency and Fire District in the state to foster interoperability. These radios would be capable of operations on several statewide talkgroups for drills and emergency situations. Routine use would require paying the monthly airtime charges (currently quoted as \$53 per month) but emergency and practice operations would not be charged.

See the CARMA State Radio profile as well as the several StarCom websites for frequency details. As this system is still under development the frequencies in use will vary dramatically. The upcoming rebanding of the 800 MHz. band will also affect StarCom frequencies. Several talkgroups on the new StarCom21 system are dedicated to Mutual Aid purposes. "Statewide" talkgroups work on all towers while "Regional" talkgroups only work on local towers.

30328	IESMA Statewide	30300	ITTF Region 1
30329	ILEAS Statewide	30301	ITTF Region 2
30330	MABAS Statewide	30302	ITTF Region 3
30331	Public Health Statewide	30303	ITTF Region 4
30332	ITTF Incident 1 Statewide	30304	ITTF Region 5
30333	ITTF Incident 2 Statewide	30305	ITTF Region 6
30334	ITTF Incident 2 Statewide	30306	ITTF Region 7
		30307	ITTF Region 8
		30320	ITTF Region 9
		30321	ITTF Region 10
		30322	ITTF Region 11
		30323	ITTF Region 12
		30324	ITTF Region 13
		30325	ITTF Region 14
		30326	ITTF Region 15
		30335	ITTF Region 16
		30336	ITTF Region 17
		30337	ITTF Region 18
		30338	ITTF Region 19

<http://www.radioreference.com/modules.php?name=RR&sid=2324> is the RadioReference.com site with the most up-to-date frequency info.

Also see <http://groups.yahoo.com/group/STARCOM21> for a Yahoo Group dedicated to monitoring StarCom21.

**Wisconsin Mutual Aid Frequencies.** (“MARC”)

Wisconsin is starting to follow the MABAS plan started in Illinois. The Mutual Aid Radio Channels (MARC) will continue.

151.2800	136.5	“MARC 1”	Repeats 153.8450	
151.2800	136.5	“MARC 2”	Simplex	
154.0100	71.9	“MARC 3”	(Fireground)	(Fire)
154.1300	82.5	“MARC 4”	(Fireground)	(Fire)
156.0000	136.5	“WEM Car”	Wisconsin Emergency Management Car to Car	(EMA)
155.4750	156.7	“WISPERN”	Wisconsin State Patrol Emergency Radio Network	(Police)
155.3700	146.2	“Point”	Point to Point	(Police)
155.2800	D156	EMS Coordination Channel		(EMS)
854.9875	D125	MABAS Red 800		
856.2625	D125	MABAS White 800		
860.2625	D125	MABAS Blue		

**Medical Helicopters**

There are several medical helicopter services in the state of Illinois. Most operations involving public safety agencies are going to be on the various Mutual Aid channels in this document. Listed here are the most common channels used. Medical helicopters in this area are usually operated by hospitals or medical corporations. Most are equipped with programmable radios that allow operations on almost any VHF or UHF public safety frequency as well as the VHF aero band. Preprogrammed in most radios will be most mutual aid and common dispatch channels, especially for areas that use the copters regularly.

155.0550	000.0	IREACH	Suggested for use at highway accidents and other situations	
154.2650	210.7	IFERN	Still used for many incidents	
155.4000		MERCI400	Suggested for use by agencies assigned to MERCI340	
155.3400		MERCI340	Suggested for use by agencies assigned to MERCI400	
150.7900	000.0	“FG-Green”	Used in Lake County	
156.8000	000.0	Marine Channel 16		
151.2800	136.5	WI MARC	Mutual Aid Radio Channel, used in Wisconsin	

**Flight for Life** is run by the Northern Illinois Medical Center (NIMC) and works the northern IL and southern WI area, with many operations into the Milwaukee area.

155.2200	77.0	Dispatch (McHenry and Milwaukee)		
155.4000	77.0	NIMC base		
463.1750	136.5	Used to contact NIMC, Mob on 468.1750 (Med-8)		
463.1750	167.9	Milwaukee copter, Mob on 468.1750 (Med-8) (local use)		
462.9750	167.9	Milwaukee copter, Mob on 467.9750 (Med-9) (Long Distance)		
462.6125	79.7	FRS channel used in portables		
129.2750	AM	Milwaukee Flight Following		
123.0500	AM	Old Copter CTAF in Chicago area		
123.0250	AM	New Copter CTAF in Chicago area		

**LifeStar** currently uses the A-Beep Lockport LTR trunked system (ID 0-08-010) or 0-11-010, Home Channel 472.2625, on the Chicago system

**Air Angels** is based in Bolingbrook (Clow) and is owned by Reach Air Medical Services.

463.4750	162.2	Main Ops		
123.0750	AM	Air Operations		
469.9500	D047	Simplex		

**University of Chicago Aeromedical Network (UCAN)**

461.9000	88.5	Operations		
129.4750	AM	Air Operations		

**AirMed 1** (Superior Ambulance Co.) (DuPage Airport)

472.8625	110.9			
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**I-Tac, V-Tac & U-Tac:**

There are Mutual Aid channels on the VHF, UHF and 800 bands, all use PL 156.7, although PL should not be used on the V-Call and U-Call channels. If used in Digital (APCO25) mode then Network Access Code (NAC) #293 may be used.

I-Tac and U-Tac channels use the regular 45 and 5 MHz repeater offsets and can be used in Simplex mode also. VHF channels are simplex only. The VHF and UHF are not yet in general use but the 800 MHz. ITAC channels are. VHF and UHF channels should be used in Narrowband only. With the proposed 800 MHz. Rebanding supposed to take place in the coming years, the ITAC frequencies would move down 15 MHz. each.

<u>Current ITAC Channels</u>	<u>Future ITAC</u>	<u>V-Tac Channels:</u>	<u>U-TAC Channels:</u>
I-Call 866.0125	(851.0125)	V-Call 155.7525	U-Call 453.2125
I-TAC1 866.5125	(851.5125)	V-Tac 1 151.1375	U-Tac 1 453.4625
I-TAC2 867.0125	(852.0125)	V-Tac 2 154.4525	U-Tac 2 453.7125
I-TAC3 867.5125	(852.5125)	V-Tac 3 158.7375	U-Tac 3 453.8625
I-TAC4 868.0125	(853.0125)	V-Tac 4 159.4725	

**700 MHz. Itinerant and Mutual Aid Channels:**

Several frequencies have been reserved for itinerant and mutual aid use in the new 700 MHz. band. Since this region of spectrum is evolving these could change.

764.05625      764.06875      775.99375      794.05625      794.06875      805.99375

**Police, EMA & Local Government Aid Channels:**

155.3700	000.0	Point to Point	Base stations only (Except Wisconsin)
155.4750	000.0	ISPERN	Illinois State Police Emergency Radio Network
155.0550	000.0	IREACH	Illinois Radio Emergency Answering Channel
155.0250	000.0	ESMARN	Emergency Service Mutual Aid Radio Network
045.4400	103.5	EMA	ESDA/EMA Statewide Channel
045.3600	103.5	IESRN	IL Emergency Services Radio Network
045.5600	103.5	EMA	ESDA/EMA
470.9625	192.8	APERN	Area Police Emergency Network (North Shore towns)

**MERCI and MED Channels**

PL's for MED, MERCI and Extender channels vary with the area involved. PL 210.7 is supposed to be present in all MERCI radios for Statewide use. Each hospital is assigned a PL for med units to contact it. MERCI Channels not normally assigned in an area are encouraged to be used for medical helicopter operations. Otherwise IREACH (155.0550) should be used.

155.2800	MERCI280	Hospital emergency channel
155.3400	MERCI340	Ambulance-Hospital (South)
155.4000	MERCI400	Ambulance-Hospital (North)
155.4600		State Police Contact channel, pair with 155.3400, PL 225.7

463.0000 (468.0000)	MED 1	463.1250 (468.1250)	MED 6
463.0250 (468.0250)	MED 2	463.1500 (468.1500)	MED 7
463.0500 (468.0500)	MED 3	463.1750 (468.1750)	MED 8
463.0750 (468.0750)	MED 4	462.9500 (467.9500)	MED 9
463.1000 (468.1000)	MED 5	462.9750 (467.9750)	MED 10

Mobile Extender frequencies for MED channels:

458.0250      458.0750      458.1250      458.1750

**Northern Illinois Police Alarm System (NIPAS)** has a 4 pronged mission: First, it provides for an orderly move-up of police resources in a similar fashion to MABAS. "Car Plans" are used to determine which departments provide personnel to a specified incident just like MABAS Box Cards. Second, NIPAS provides a "Mobile Field Force" (MFF) used to provide trained officers for riot and crowd control as well as other situations. Thirdly, NIPAS provides a pool of special resources available to its members such as interpreters, surveillance equipment and other specialized items that individual departments may need occasionally and another department may have.

Most visible of the NIPAS operations is the Emergency Services Team (EST). EST is a highly trained SWAT type team that can provide hostage rescue and negotiation, entry units and marksmen. Members in NIPAS include dozens of suburban police departments all over the Chicago area, mostly in the north, northwest and west suburbs. Communications for NIPAS operations, except for EST and MFF is provided by the local departments or handled by existing channels such as ISPERN (155.475) or IREACH (155.055).

**Combined Agency Response Team (CART)** is a group of south suburban area fire departments sharing resources for Technical Rescues such as Confined Spaces and trench collapses.

155.1675      155.2725      155.2125      155.3025      465.5750

**North Regional Major Crimes Task Force (NORTAF)      (See Norcom)**

NORTAF, the North Regional Major Crimes Task Force investigates major crimes, such as homicides and kidnappings for and by it's members. Most communications for NORTAF are on cellular phones or the local channels of the agencies involved. Member agencies include the members of Norcom as well as Evanston and Wheeling.

**Suburban Mutual Assistance Response Team** is an association of ESDA/EMA units in the south suburbs that uses MABAS style alarm assignments. Most operations are on 155.025 (ESMARN) with a DPL code of 662.

**5<sup>th</sup> District Tac Team      (Evergreen Park Area)**

477.1750      470.3250      476.4750      476.8250      477.9000

**ALERTS** has migrated to a "multi-frequency" reuse system. MDT's scan for the strongest signal and could use any of the following:

857.7375   858.4375   859.4375   859.4625   859.7375   866.3625   866.3875   866.4875  
866.8625   866.9125   866.9875   867.3625   867.4375   867.8625   867.9625

**I-WIN** is the Illinois Wireless Information Network. It operates using encrypted data protocols on dedicated frequencies from cellular telephone tower sites using CDMA and EV-DO protocols. The I-WIN system is capable of transferring small files, including images. It's compatible with remote fingerprint scanning and bar code reader technologies and can be easily interfaced with GPS receivers to provide automatic vehicle location data. Most departments using I-WIN aren't yet exploiting all of its capabilities.

**Old Low Band Mutual Aid Channels:** Several frequencies once used for Mutual Aid are no longer in use:

045.8800      Old Low Band Fire Mutual Aid Channel      (Some use remains in WI)  
045.8600      Old Low Band Police Mutual Aid Channel      (Some use remains in WI)  
039.4600      Old Low Band Point to Point      (Rarely if ever used anymore downstate)  
039.5000      Old Low Band Sheriff's Net      (Occasionally still used downstate)

**ARRL Wilderness Protocol Channels:**

The Amateur Radio Relay League (ARRL) has set up a system where ham operators trapped in the wilderness will call on specified frequencies on the hour, using "Long Tone Zero" (LiTZ) which means 10 seconds of the DTMF code 0 as an alert tone. Emergency calls would be made on the nationwide Simplex calling channels in the VHF/UHF bands.

052.5250      146.5200      446.0000      223.5000      1294.5000

**Homeland Defense, Federal Aid and Terrorism Response**

In the wake of the September 11<sup>th</sup> terrorist attacks new agencies have been formed within the auspices of the Illinois Emergency Management Agency (IEMA), including the Illinois Terrorism Task Force, the Statewide Terrorism Information Center and other organizations. MABAS has also become heavily involved in response planning, including statewide and even inter-state level responses to major incidents. Local, County, State and federal agencies are heavily involved at every level. Four groups of frequency plans have been developed by the federal government to provide interoperability between federal agencies, and between federal and other agencies:

**Law Enforcement Response Plans:**

Frequencies 167.0875 MHz and 414.0375 MHz are designated as National Calling Channels for initial contact. Initial contact communications will be established using analog FM emission (11KF3E). Frequencies will be identified in mobile and portable radios as follows with CTCSS frequency 167.9 Hz and/or Network Access Code (NAC) \$68F:

VHF PLAN			UHF PLAN		
ID	Mobile TX	Mobile RX	ID	Mobile TX	Mobile RX
Calling	167.0875	167.0875 (Simplex)	Calling	414.0375	414.0375 (Simplex)
Inop 1	162.0875	167.0875	Inop 1	418.9875	409.9875
Inop 2	162.2625	167.2500	Inop 2	419.1875	410.1875
Inop 3	162.8375	167.7500	Inop 3	419.6125	410.6125
Inop 4	163.2875	168.1125	Inop 4	414.0625	414.0625 (Simplex)
Inop 5	163.4250	168.4625	Inop 5	414.3125	414.3125 (Simplex)
Inop 6	167.2500	167.2500 (Simplex)	Inop 6	414.3375	414.3375 (Simplex)
Inop 7	167.7500	167.7500 (Simplex)	Inop 7	409.9875	409.9875 (Simplex)
Inop 8	168.1125	168.1125 (Simplex)	Inop 8	410.1875	410.1875 (Simplex)
Inop 9	168.4625	168.4625 (Simplex)	Inop 9	410.6125	410.6125 (Simplex)

**Incident Response Plans:**

Frequencies 169.5375 MHz, paired with 164.7125 MHz, and 410.2375 MHz, paired with 419.2375 MHz, are designated as the calling channels for initial contact and will be identified in the radio. Initial contact will be established using analog FM emission. CTCSS will not be used on the calling channels to ensure access by stations from outside the normal area of operation. As required PL's may be used on operations channels.

VHF PLAN			UHF PLAN		
ID	Mobile TX	Mobile RX	ID	Mobile TX	Mobile RX
Calling	164.7125	169.5375	Calling	419.2375	410.2375
VHF 1	165.2500	170.0125	UHF 1	419.4375	410.4375
VHF 2	165.9625	170.4125	UHF 2	419.6375	410.6375
VHF 3	166.5750	170.6875	UHF 3	419.8375	410.8375
VHF 4	167.3250	173.0375	UHF 4	413.1875	413.1875
VHF 5	169.5375	169.5375	UHF 5	413.2125	413.2125
VHF 6	170.0125	170.0125	UHF 6	410.2375	410.2375
VHF 7	170.4125	170.4125	UHF 7	410.4375	410.4375
VHF 8	170.6875	170.6875	UHF 8	410.6375	410.6375
VHF 9	173.0375	173.0375	UHF 9	410.8375	410.8375

The Illinois Terrorism Task Force is continuing to attempt to provide their version of interoperability radios to local agencies. Frequencies will include 155.055 (IREACH), 155.475 (ISPERN), 155.340 (MERCY) and others.

**FEMA (Federal Emergency Management Agency)**

FEMA works with local officials during large scale emergencies like tornadoes or attacks.

138.5750      118.8      FEMA Chicago Office (Channel A5)      Repeats 141.950  
140.9250      118.8      FEMA Chicago Office (Channel C5)      Simplex

UHF FEMA Urban Search & Rescue Nets:

408.5125      409.4875      410.4875      410.5125      413.2125  
416.0375      416.8125      416.9375      417.5875      417.6625

VHF FEMA Nets and Channel Assignments (All use PL 118.8)

<b>“A” Bank (Repeaters)</b>			<b>“B” Bank (T/A)</b>		<b>“C” Bank (Simplex)</b>	
<u>Output</u>	<u>Input</u>	<u>Name</u>	<u>Frequency</u>	<u>Name</u>	<u>Frequency</u>	<u>Name</u>
140.0250	143.0000	A1	140.0250	B1	140.9000	C1
139.8250	143.0000	A2	139.8250	B2	142.9250	C2
139.9500	143.2500	A3	139.9500	B3	142.9250	C3
139.4500	142.4250	A4	139.4500	B4	142.4000	C4
138.5750	141.9500	A5	138.5750	B5	140.9250	C5
139.9500	142.9750	A6	139.9500	B6	143.6250	C6
140.0250	143.0000	A7	140.0250	B7	140.9000	C7
138.5750	141.9500	A8	138.5750	B8	140.9250	C8
139.8250	143.0000	A9	139.8250	B9	142.3750	C9
139.9500	141.2500	A10	139.9500	B10	142.3750	C10
138.2250	141.8750	A11	138.2250	B11	141.7250	C11

Local area air defense is performed by the Air National Guard and coordinated by NORAD’s Northeast Air Defense System at Rome, New York, through a vast system of remote communications sites. Air to Air communications employ 138.000 to 144.000 MHz, 25 KHz steps in AM Mode. Coordination employs UHF military aircraft frequencies in the 225.000 to 399.975 MHz band in AM Mode. Frequencies used to date include:

225.8000      237.1500      252.9000      263.0000      282.4750      303.1000  
313.6000      328.0000      355.2000      369.9000

228.9000      238.5000      260.9000      273.6000      282.6000      311.0000  
320.6000      335.9500      364.2000      370.9000

235.9000      243.0000      261.2000      282.4250      303.0000      311.2000  
321.0000      346.2500      364.8000      388.9050

**FEMA HF Disaster Net (With Channel Numbers):**

2.3200 F01      6.0490 F16      11.9940 F31      14.9080 F46      21.9190 F61  
2.3600 F02      6.1060 F17      12.0090 F32      15.4640 F47      22.9830 F62  
2.3770 F03      6.1080 F18      12.1290 F33      15.5090 F48      23.0280 F63  
2.4450 F04      6.1510 F19      12.2160 F34      15.5320 F49      23.3900 F64  
2.6580 F05      6.1760 F20      12.2190 F35      15.7080 F50      23.4510 F65  
3.3410 F06      6.8090 F21      13.4460 F36      16.2010 F51      23.5500 F66  
3.3790 F07      7.3480 F22      13.6330 F37      16.4300 F52      23.8140 F67  
3.3880 F08      7.4280 F23      13.7440 F38      17.5190 F53      24.0080 F68  
4.6030 F09      9.4620 F24      13.7800 F39      17.6490 F54      24.2820 F69  
4.7800 F10      10.1940 F25      13.7830 F40      18.7440 F55      24.5260 F70  
5.2110 F11      10.1940 F27      14.4500 F41      19.7570 F56      24.8190 F71  
5.3780 F12      10.4930 F26      14.7760 F42      19.9690 F57  
5.4020 F13      11.7210 F28      14.8360 F43      20.0270 F58  
5.8210 F14      11.8010 F29      14.8850 F44      20.0630 F59  
5.9610 F15      11.9570 F30      14.8990 F45      21.8660 F60