

Sadelco SIGNAL LEVEL METERS

MINIMAX & MINIMAX-M

Operator's Manual

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KEYPAD SUMMARY AND SETUPS

Tune a Channel Number	n (n=ch number), CH/FRQ
Tune a Frequency	n (n=frq number with a decimal point), CH/FRQ
Tune a Digital Channel*	From any Channel, Press DIG
Verify Current Channel Plan	PLAN (ESC/CLR to return to tuning)
Select a New Channel Plan	PLAN, n (n=plan number), ENT or PLAN, UP/DOWN, ENT
Program a Favorite Channel	tune channel, FAV, n (n=fav slot number), ENT
Recall a Favorite Channel	n (n=fav slot number), FAV
Erase a Favorite Channel	n (n=fav slot number), FAV, decimal, ESC/CLR
Erase All Favorite Channels	0, FAV, decimal, ESC/CLR
Adjust the Volume	VOL, UP or DOWN, ESC/CLR
Beep ON/OFF	VOL, decimal, ESC/CLR
Disable Auto Shutoff	decimal, 00, ENT
Auto Shutoff 5 minutes	decimal, 05, ENT
Auto Shutoff 10 minutes	decimal, 10, ENT
View Software Date & Rev	decimal, 80, ENT
View Serial Number	decimal, 81, ENT
View Last Factory Cal Date	decimal, 82, ENT
Disable Power-Out Key	decimal, 98, ENT
(Minimax-M Only)	
Select dBmV or dBuV	decimal, 99, ENT

** Minimax-M Models Only - During digital channel measurement, use microammeter scales only for relative peaking. Use LCD readout for absolute value of signal level.*

INTRODUCTION

The Minimax and Minimax-M hand-held meters incorporate state of the art technology to make signal level measurement faster and easier than ever before. Auto-calibration, using a built-in white noise source, corrects every measurement for frequency response, attenuator setting, and temperature. Keypad tuning, an autoranging attenuator and digital readouts allow novice users to take accurate, foolproof readings with minimal training.

The full keypad provides instant access to all channels and frequencies. Dedicated keys for all functions eliminate the need to look up hidden commands or menus. Advanced features include C/N, Hum, Favorite Channel Programming, and Δ Picture-Audio.

Minimax-M Models have been tailored for the MMDS installer. An extra battery provides switchable 18 V power at the F connector for powering the downconverter and a microammeter makes antenna alignment easy. A special channel plan designed for MMDS is standard on these models.

All models are programmed with the most commonly used channel plans. Additional standard and custom plans are also available.

MINIMAX & MINIMAX-M SPECIFICATIONS

FREQUENCY RANGE

MINIMAX 600 & M600	47 - 600 MHz
MINIMAX 800 & M800	5 - 872 MHz

STANDARD CHANNEL PLANS

MINIMAX 600, 800:	EIA, HRC, IRC, AIR (VHF, UHF, FM)
MINIMAX M600, M800:	EIA, HRC, IRC, AIR (VHF, UHF, FM), MMDS
Custom channel plans available on request.	

TUNING INCREMENTS:

Frequency Mode: 125 KHz
Channel Mode: 6, 7, or 8 MHz

FREQUENCY ACCURACY: +/- 20 KHz

IF BANDWIDTH: 280 KHz at 3 dB points

ADJACENT CHANNEL REJECTION: 40 dB or better

FM SELECTIVITY:

Will distinguish 2 FM signals of similar amplitude 300 KHz apart

MEASUREMENT RANGE:

MINIMAX Models:	-30 to +50 dBmV (+30 to +110 dBuV)
MINIMAX-M Models:	-20 to +40 dBmV (+40 to +100 dBuV)

AMPLITUDE ACCURACY: Includes frequency response, log linearity and attenuator
+/- 1.0 dB at 77° F (+/- 0.5 dB typical)
+/- 2.0 dB from 0 - 120° F (+/- 1.0 dB typical)

AUTO-CALIBRATION:

Each measurement computer corrected for level, attenuator setting and temperature.
Internal Calibrator: +/- 0.25 dB, 4.5 - 872 MHz White Noise Source

AUTORANGING ATTENUATOR:

Range: MINIMAX: 40 dB, MINIMAX-M: 20 dB
Input: 75 ohm, user replaceable F81 connector
BNC available by special order

DISPLAY:

All Models
Digital LCD: Indicates channel, frequency, and signal level in dBmV (switchable to dBuV)

MINIMAX-M Models only:

Analog Microammeter: Indicates real time signal level for easy antenna orientation,
+/- 1.5 dB

MINIMAX & MINIMAX-M SPECIFICATIONS (Continued)

FEATURES:

Power Out: Extra large battery provides switchable 18V at F connector (MINIMAX-M Models only)

C/N: Range >50 dB with external preselector, Accuracy +/- 2 dB

Hum: 0.5 - 5%, +/- 0.3%, detects all hum up to 600 Hz

Favorite Channels: 9 User Programmable Channels

△PA: Calculates and displays difference between Picture and Audio carriers of same channel .

Audio: Adjustable volume, waterproof mylar speaker

Illumination: Switchable lights for both LCD and Microammeter

Battery Test: Shows battery voltage and elapsed time

Power Supply: Replaceable nicad packs provides > 16 hrs of normal intermittent use

Electronic Shutoff: User adjustable - 5 min, 10 min., continuous

Digital Channel Measurement: Measures average digital power, Accuracy +/-1.8 dB

DIMENSIONS: MINIMAX: 8.5"L x 4" W x 2.5" D, 21 cm x 10 cm x 6 cm

MINIMAX-M: 8.5"L x 4" W x 3.0" D, 21 cm x 10 cm x 7.6 cm

WEIGHT: MINIMAX: 3.1 lbs, 1.4 Kg, including case and batteries

MINIMAX-M: 4.5 lbs, 2.0 Kg, including case and batteries

ACCESSORIES SUPPLIED:

MINIMAX Models:

Water resistant cordura nylon case Part No. CASE002

AC 110 V Charger/Adaptor Part No. T60

Nicad Batteries Part No. BAT02/BAT03

Operator's Manual Part No. ST1003A

MINIMAX-M Models:

Water resistant cordura nylon case Part No. CASE003

AC 110 V Charger/Adaptor Part No. T60

Nicad Batteries Part No. BAT05

Operator's Manual Part No. ST1003A

OPTIONS:

Model SH2 Strand Hook

Model T60E 220 V Charger/Adaptor

Specifications Subject to change without notice.

INITIAL STARTUP

Unpack and inspect the instrument for any visible defects or damage. Claims for shipping damage must be made by the receiver. Make sure to save all packaging materials.

Press and hold ON/OFF key. Make sure to hold the ON/OFF key for one second to allow the meter to lock on.

The LCD Window will briefly display the software rev and then PASS. The meter will perform an Autocalibration and tune to the last channel or frequency tuned before it was shut off.

To adjust volume, Press VOL, UP or DOWN, ESC/CLR.

BATTERY OPERATION AND CHARGING

MINIMAX models are powered by 15 AA high energy nicad batteries. The 15 cells are split into one pack of 7 and one pack of 8. MINIMAX-M models are powered by 15 Sub-C high energy nicad batteries (1 pack). The batteries in your new meter may not be fully charged when you receive it.

Check the battery voltage before using your meter and recharge if necessary.

Charge time is approximately 14 hours.

Use only the proper Sadelco Charger:

AC Charger: T60 for 110V
T60E for 220V

The operating voltage range is approximately 20 Volts to 15 Volts. At 17 Volts, the meter will beep and begin flashing a Lo Bat warning. Under average operating conditions, you will have about 30 minutes left for both models. When the charger is plugged in, the display will show 24 V.

TO CHECK THE BATTERY VOLTAGE

Disconnect the charger.

Minimax Models:

Press the BAT key. The battery voltage will be displayed on the left side of the display.

The Minimax will operate for a minimum of 3.5 hours continuously with a full charge. (> 16 hours of normal intermittent use)

Minimax-M Models:

Press the HUM/BAT key. The Battery voltage will be displayed on the left side of the display. If this key is held down for 3 seconds, the HUM mode will be activated. To escape, press ESC/CLR.

With the power out on, the Minimax-M will operate for a minimum of 4 hours continuously with a full charge (>16 hours of normal intermittent use), or 7 hours with the power out off.

Use of lights, maximum volume, or extremely cold temperature will reduce operating times.

BATTERY OPERATION AND CHARGING (Continued)

USING THE ELAPSED TIME INDICATOR

To help maximize battery power, we have included an elapsed time indicator which appears on the right side of the LCD whenever battery voltage is displayed.

After fully charging the meter, reset the timer to zero by pressing: decimal point, BAT. Now, whenever the meter is used, the operating time is accumulated.

After every 30 minutes of elapsed time, the meter will beep and display the total elapsed time and the battery voltage for 4 seconds.

AUTOMATIC SHUTOFF

To increase the effective battery life, all Minimax and Minimax-M models are equipped with an automatic shutoff circuit. It is factory set at 5 minutes. Any keypad entry during the 5 minutes resets the clock. To turn the meter on after an auto shutoff, press and hold the ON/OFF key.

To deactivate the auto shutoff:	Press decimal point, 00, ENT
To change setting to 10 minutes:	Press decimal point, 10, ENT
To return to 5 minutes:	Press decimal point, 05, ENT

AUTO-CALIBRATION

Using Sadelco's patented white noise calibration technology in conjunction with stored correction tables, auto-calibrations are performed every two minutes of operation.

Auto-calibrations are also performed:

- when the meter is turned on
- when a new channel is tuned
- when the autoranging attenuator switches pads in or out
- when the internal temperature changes more than 8 degrees

You may notice a momentary delay and hear the clicking of the attenuator during an Auto-calibration. The display is frozen during this time.

SIGNAL LEVEL MEASUREMENT

GENERAL PROCEDURE

1. Turn power ON.
2. Check battery.
3. Connect RF signal to input.
4. Select Channel or Frequency via keypad.
5. Select Picture or Audio carrier using Δ PA Key.
6. Read signal level on right side of LCD display.
(The microammeter also indicates level on MINIMAX-M models)

AUTORANGING ATTENUATOR

The autoranging attenuator eliminates the need to manually switch pads in or out to bring the signal level in range. You will hear some clicking as the relays are switched in and out. If the RF signal is above or below the meter's range, the LCD will indicate this by flashing Or (Over Range) or Ur (Under Range). On MINIMAX-M Models, the microammeter will automatically change ranges as necessary. LEDs indicate the proper scale to read. If the RF signal is above or below the meter's range, the microammeter will peg right or left respectively.

CHANNEL PLAN SELECTION

Refer to Appendix A for a list of standard channel plans programmed into your meter.

Additional standard and custom plans are available from the factory.

Press the PLAN key to view the current channel plan on the LCD.

To select another plan:

1. Press the PLAN key.
2. Enter the number of the Plan or scroll to another plan using the UP/DOWN keys.
3. Press the ENT key.
4. The meter will tune to Channel 2 Picture carrier of the new plan.

TUNING BY CHANNEL NUMBER

1. Press the desired channel number. Leading zeros such as 02 are not necessary.
2. Press CH/FRQ.

By not using a decimal point, the meter automatically tunes to either the Picture or Audio Carrier of the channel number that was entered. The display will indicate the channel number followed by a P for Picture or an A for Audio and the signal level.

Example: CH 2P -8.7

If an invalid channel number is selected, the meter defaults to the previously tuned channel or frequency.

AUTOMATIC Δ PA CALCULATION

To automatically toggle between Picture and Audio carriers of the same channel and calculate the Δ (difference) between them:

1. Tune to a Picture carrier.
2. Press the Δ PA key to switch to the Audio carrier.
3. Press the Δ PA key again to calculate and display the Δ PA.
4. Press the Δ PA key again to return to the Picture carrier.

Note: the Δ PA function can not be activated in the digital channel mode.

TUNING BY FREQUENCY

1. Enter the desired frequency number including a decimal point.
2. Press CH/FRQ.

The meter will tune and display frequencies in 125 KHz steps. If the entered frequency does not fall on one of the 125 KHz steps, the meter will tune to and display the closest step. Offsets up to +/-40 KHz are read with negligible error.

You must enter a decimal point even for frequencies that are whole numbers such as 54.00 MHz. The decimal point tells the meter to tune to a frequency instead of a channel. You do not have to enter zeros after the decimal point.

TUNING USING THE UP/DOWN KEYS

The UP/DOWN keys function in all three tuning modes: Channel, Frequency, and Favorite Channel.

In the Channel Mode, each press of the UP or DOWN key initiates a 6 MHz shift to the next carrier (7 MHz or 8 MHz in some European Tables).

In the Frequency Mode, each press of the UP or DOWN key initiates a 125 KHz shift.

TUNING USING THE UP/DOWN KEYS (*Continued*)

In the Favorite Channel Mode, each press of the Up or Down key initiates a jump to the next programmed channel or frequency.

In all modes, when the top or bottom of the tuning range is reached, it will loop around continuously.

SWITCHING BETWEEN CHANNEL AND FREQUENCY

When tuned to a channel, pressing the CH/FRQ key will display the frequency of that channel and switch the meter to the Frequency Mode.

When tuned to a frequency, pressing the CH/FRQ key will display the channel number of that frequency and switch the meter to the Channel Mode. If no channel number exists for a particular frequency, the meter will tune to either the closest picture or audio carrier depending on which mode the Δ PA is in.

TUNING SUB BAND, UHF, AND SPECIAL CHANNELS

Some channel plans contain more than one channel with the same channel number. In order to provide direct keypad access to all channels, we have added an additional number in front of the channel number in some cases. Refer to Appendix A for complete channel listings.

Sub Band channels, T07 - T13 can be accessed directly by entering 707 - 713.

In the MMDS Channel Plan, UHF Channels 14 - 70 are selected directly by entering 914 - 970.

In the AIR Channel Plan, UHF Channels are selected by entering 14 - 70.

For example:

The MMDS Channel Plan contains:

Channel Name	Channel No.	Keypad Entry	Frequency
MDS1	Channel 14	14	123.25 MHz
UHF14	Channel 14	914	471.25 MHz
A1	Channel 24	24	223.25 MHz
UHF24	Channel 24	924	531.25 MHz

The EIA Channel Plan contains:

Channel Name	Channel No.	Keypad Entry	Frequency
T07	Channel 7	707	7.00 MHz
VHF7	Channel 7	7	175.25 MHz
T13	Channel 13	713	43.00 MHz
VHF13	Channel 13	13	211.25 MHz

USING THE MMDS POWER OUT FACILITY

All MINIMAX-M models come equipped with an extra large built-in battery that provides a switchable 18V DC power supply out of the F connector.

This feature is used to power MMDS antenna mounted downconverters during installation. **Do not activate this feature when connected to a CATV or MATV system.**

To activate, Press the DOWN/CONV key. PWR OUT LED lights, 18V is present at the F connector.

To deactivate, Press the DOWN/CONV key again

DISABLING MMDS POWER OUT

To prevent accidental activation when connected to a CATV or MATV system:

Press decimal point, 98, ENT.

Repeat to enable Power Out Key.

HUM MEASUREMENT

On MINIMAX-M models, the HUM function shares a key with the BAT check. This requires the operator to hold the key down for 3 seconds to activate HUM. During this 3 seconds, the battery condition is displayed. On the MINIMAX models, the HUM key is separate so it needs only to be pressed to activate HUM.

Measurement of HUM (low frequency disturbance) can be made on any active audio carrier or unmodulated CW signal. A minimum signal level of -20 dBmV for the Minimax and -11 dBmV for the Minimax-M is required for Hum measurement.

To measure HUM:

1. Tune to the Picture or Audio carrier of the channel you wish to measure or tune to the frequency of the CW signal.
2. Press HUM (Hold for 3 seconds on MINIMAX-M models).
3. HUM will be displayed in %. (If Hum is >6%, the display will flash 6%).
4. Press ESC/CLR to return to signal level measurement mode.

Note: If you tune to a picture carrier using a channel number, the meter automatically switches to the corresponding audio carrier before making the HUM measurement. If you tune to a picture carrier using a frequency number, the meter remains at that frequency and attempts to measure HUM. This feature allows HUM measurement of a CW signal at any frequency but will give incorrect HUM measurements if the entered frequency is an active picture carrier.

Note: Hum cannot be activated in the digital channel measurement mode.

VISUAL CARRIER TO NOISE RATIO

Noise measurements on active cable systems are effected by many factors such as carrier sidebands, harmonic products, and spurious beats.

Ideal measurements are made by using a band pass filter to isolate the channel being tested and by shutting off the carrier before making the noise measurement. Refer to the NCTA recommended practices for guidelines on making the best measurements under various conditions.

Use of a low noise preamplifier is recommended when signal levels are below +20 dBmV.

Method One

This is the preferred method when conditions permit.

1. Connect a band pass filter between the test point and the meter.
2. Tune to the desired picture carrier using channel number or frequency.
3. Press the C/N key. The meter stores the carrier level.
4. If you tuned using a channel number the meter will switch to the corresponding frequency and begin to flash. If you tuned using a frequency, the meter will remain in the frequency mode and begin to flash.
5. Shut off the carrier.
6. Press the ENT key. The meter reads the noise level, adds a correction factor, calculates and displays the C/N ratio.
7. Press ESC/CLR to return to the signal level mode.

Method Two

If you cannot turn off the carrier.

1. Connect a band pass filter between the test point and the meter.
2. Tune to the desired picture carrier using channel number or frequency.
3. Press the C/N key. The meter stores the carrier level.
4. If you tuned using a channel number the meter will switch to the corresponding frequency and begin to flash. If you tuned using a frequency, the meter will remain in the frequency mode and begin to flash.
5. Use the UP/DOWN keys or number keys and CHN/FRQ to search for the lowest noise level near the channel. This is often 1.5 MHz below the carrier but will depend on the shape of your filter.
6. When you have found the lowest noise reading, press ENT. The meter reads the noise level, adds a correction factor, calculates and displays the C/N ratio.
7. Press ESC/CLR to return to the signal level mode.

VISUAL CARRIER TO NOISE RATIO (Continued)

Method Three

When you cannot shut off the carrier and you do not have a band pass filter.

1. Locate a channel that does not have another channel below it, or where there is a band guard. Tune to the picture carrier of that channel using channel number or frequency.
2. Press the C/N key. The meter stores the carrier level.
3. If you tuned using a channel number the meter will switch to the corresponding frequency and begin to flash. If you tuned using a frequency, the meter will remain in the frequency mode and begin to flash.
4. Use the UP/DOWN keys or number keys and CHN/FRQ to search for the lowest noise level near the channel. This is often 1.5 MHz below the carrier.
5. When you have found the lowest noise reading, press ENT. The meter reads the noise level, adds a correction factor, calculates and displays the C/N ratio.
6. Press ESC/CLR to return to the signal level mode.

DIGITAL CHANNEL MEASUREMENT MODE

This Minimax is equipped with a digital channel measurement facility. It is activated by a quick press of the CN/DIG key.

Note: If this key is held down, the Carrier to Noise function will be activated. To exit the Carrier to Noise function, press ESC/CLR.

To Measure a Digital Channel: From any channel, Press (do not hold) "CN/DIG". The display will flash "digtL on", then "di" followed by the channel number and the signal level.

During digital channel measurements, the LCD readout is automatically corrected to show the average power level of a 6 MHz digital channel.

The microammeter (Minimax-M models only) is not corrected during digital channel reading and thus shows a lower, incorrect level. Use the microammeter only for peaking during digital channel reading.

The Minimax remains in the Digital Mode until the CN/DIG key is pressed again.

Once in the Digital Mode:

- Tune other digital channels using either the UP/DOWN or number keys followed by CH.
- All Favorite Channels are measured as digital even if they were programmed in the analog mode.
- The Δ PA and HUM functions cannot be activated.
- The Minimax remains in the digital mode after shutoff and restart.

To return to normal analog channel reading: Press (do not hold) "CN/DIG".

The display will flash "digtL OFF"

Note: To activate Carrier to Noise measurement, Press and Hold the CN/DIG key.

FAVORITE CHANNEL PROGRAMMING

GENERAL INFORMATION

The MINIMAX can store up to 9 favorite channels in each channel plan. You may store channel numbers and/or frequencies in any order and combination.

Favorite channels can be programmed in the normal analog channel mode or digital channel measurement mode. Favorite channels are measured as either digital, if in the digital mode, or analog, if in the normal analog mode.

To enter the Favorite Channel Mode, you must first program one or more favorite channels, and then recall one of them.

Once in the Favorite Channel Mode, pressing the UP/DOWN keys will switch in the next programmed favorite channel. Any unprogrammed slots will be skipped and the unit will loop from the highest to the lowest slot.

You can perform the C/N, Hum, CH/FRQ, and Δ PA functions using your favorite channels. You can also change the Optional User Settings for the Auto shutoff, Volume, Beep ON/OFF, and dBmV - dBuV in the Favorite Channel Mode.

To exit the Favorite Channel Mode, press ESC, tune a channel using a valid channel number followed by CH/FRQ, or select a new channel plan.

Note: When in the digital channel measurement mode all favorite channels are measured as digital even if they were programmed in the normal analog mode.

PROGRAMMING FAVORITE CHANNELS AND FREQUENCIES

1. Tune the meter to the channel or frequency you wish to store.
2. Select the Favorite Slot (1 - 9) you wish to store it in, press FAV, then press ENT.

Example: Store CH 2 Picture, EIA (Table 1) into Favorite Slot #1.

Make sure the desired Channel Plan has been selected.

Enter 2

Enter CHN/FRQ

Enter Δ PA to select Picture if necessary

Enter FAV

Enter 1

Enter ENT

Example: Store 67.250 MHz into Favorite Slot #2

Enter 67.250

Enter CH/FRQ

Enter FAV

Enter 2

Enter ENT

Repeat the above procedures to program additional Favorite Channels.

Note: Programming a Favorite Channel does not switch the meter into the Favorite Channel Mode. This can only be done by recalling a previously programmed Favorite Channel.

ERASING FAVORITE CHANNELS

To change the frequency or channel in a particular Favorite Channel Slot, just reprogram over the old information.

To erase a Favorite Channel completely, enter the number of the slot (1-9), FAV, decimal point, CLR.

To erase all Favorite Channels in a channel table at once enter 0, FAV, decimal point, CLR.

RECALLING FAVORITE CHANNELS

Enter the Favorite Channel number (1-9)

Enter FAV

You may now use the UP/DOWN keys to recall other favorite channels or you may recall them by repeating the above procedure with a new FAV channel number.

ERROR CODES

1. F---Err

This code appears if the user tries to recall a Favorite Channel Number which has not been programmed. Meter defaults to previously tuned channel.

2. Error Chn

This code appears if the user tries to switch to Channel from a Frequency which has no associated channel. Meter defaults to previously tuned Frequency.

3. Error tbl

This code appears if the meter cannot access the previously selected channel table. Minimax will default to Table 1-EIA. Minimax-M will default to Table 5 dS1. User must reselect desired channel plan if other than default plan.

4. Ur - Under Range

This code appears if the signal level is too low (or nonexistent) to measure.

5. Or - Over Range

This code appears if the signal level is too high to measure. An external attenuator pad can be used to bring the signal level into range.

6. Error -Hu

This code appears if the signal level is too low (below -20 dBmV for Minimax and below -11 dBmV for Minimax-M) to measure hum.

7. Error +Hu

This code appears if the signal level is too high (above +50 dBmV for Minimax and above +40 dBmV for Minimax-M) to measure hum.

WARRANTY POLICY

Sadelco warrants all instruments against defects in material and workmanship for a period of twelve months after shipment. Sadelco will repair or replace any assembly or component (except batteries) found to be defective under normal use during this period. Sadelco's obligation under this warranty is limited solely to repairing any such instrument which, in Sadelco's opinion, proves to be defective within the scope of the warranty when returned to the factory. Transportation to the factory is to be prepaid by the purchaser. Return transportation via UPS surface will be provided by Sadelco. Should the customer request an alternate shipping method, the customer will be solely responsible for any charges in excess of UPS surface rates.

This warranty does not apply to any products repaired or altered by any persons not authorized by Sadelco, or not in accordance with instructions furnished by Sadelco. If the instrument is defective as a result of misuse, improper repair, or abnormal conditions of operation, the warranty will become void. In doubtful cases we will contact the purchaser for repair authorization. Please notify us if an estimate is required.

Sadelco assumes no responsibility for its products being used in a hazardous manner either alone or in conjunction with other equipment. Sadelco assumes no liability for secondary damages and, in any event, Sadelco's liability for breach of warranty under any contract or otherwise shall not exceed the purchase price of the specific product shipped and against which a claim is made.

An RMA number is not required to return either warranty or repair units to Sadelco. However, Sadelco assumes no liability for any product in transit to Sadelco. Please make sure to include a description of the problem or symptom along with your complete company name, address, telephone, fax, and contact person.

For Warranty or Repair service return to:

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APPENDIX A

CHANNEL TABLES

APPENDIX A: CHANNEL PLANS

Listed below are the standard channel plans for various MINIMAX and MINIMAX-M models. Not all models contain all plans. Models with limited frequency ranges contain only the appropriate portions of the plans.

Since some plans have more than one channel with the same channel number, the first column lists the keypad entry for direct access to a channel and the second column lists the channel number as it is displayed on the LCD.

Additional standard and custom channel plans are available from the factory.

Plan 1 - EIA (NTSC, NCTA)

Standard USA cable channel plan

Plan 2 - HRC

Picture and audio carriers are offset 1.25 MHz lower than EIA Plan 1.

Exception Channels 5 & 6 which are 0.75 MHz higher. Channel 1 added.

Plan 3 - IRC

Same as EIA Plan 1 except channels 5 & 6 which are offset 2 MHz higher.

Channel 1 added.

Plan 4 - AIR

Standard USA over the air VHF & UHF channels

Plan 5 - MMDS1 (display indicates DS1)

Standard USA over the air VHF & UHF, MMDS channels 24 - 54 (A1 - G4), MDS1 channel 14, and MDS2 channel 99.

Plan 6 - Custom

Plan 7 - Custom

Plan 8 - Custom

Plan 9 - Custom

EIA CHANNEL PLAN
Plan 1

Display=EIA

Keypad Entry	Channel Display	Picture	Audio
707	C i07	7.00	11.50
708	C i08	13.00	17.50
709	C i09	19.00	23.50
710	C i10	25.00	29.50
711	C i11	31.00	35.50
712	C i12	37.00	41.50
713	C i13	43.00	47.50
2	Ch 2	55.25	59.75
3	Ch 3	61.25	65.75
4	Ch 4	67.25	71.75
5	Ch 5	77.25	81.75
6	Ch 6	83.25	87.75
95	Ch 95	91.25	95.75
96	Ch 96	97.25	101.75
97	Ch 97	103.25	107.75
98	Ch 98	109.25	113.75
99	Ch 99	115.25	119.75
14	Ch 14	121.25	125.75
15	Ch 15	127.25	131.75
16	Ch 16	133.25	137.75
17	Ch 17	139.25	143.75
18	Ch 18	145.25	149.75
19	Ch 19	151.25	155.75
20	Ch 20	157.25	161.75
21	Ch 21	163.25	167.75
22	Ch 22	169.25	173.75
7	Ch 7	175.25	179.75
8	Ch 8	181.25	185.75
9	Ch 9	187.25	191.75
10	Ch 10	193.25	197.75
11	Ch 11	199.25	203.75
12	Ch 12	205.25	209.75
13	Ch 13	211.25	215.75
23	Ch 23	217.25	221.75
24	Ch 24	223.25	227.75
25	Ch 25	229.25	233.75
26	Ch 26	235.25	239.75
27	Ch 27	241.25	245.75
28	Ch 28	247.25	251.75
29	Ch 29	253.25	257.75
30	Ch 30	259.25	263.75
31	Ch 31	265.25	269.75
32	Ch 32	271.25	275.75
33	Ch 33	277.25	281.75
34	Ch 34	283.25	287.75
35	Ch 35	289.25	293.75
36	Ch 36	295.25	299.75

Keypad Entry	Channel Display	Picture	Audio
37	Ch 37	301.25	305.75
38	Ch 38	307.25	311.75
39	Ch 39	313.25	317.75
40	Ch 40	319.25	323.75
41	Ch 41	325.25	329.75
42	Ch 42	331.25	335.75
43	Ch 43	337.25	341.75
44	Ch 44	343.25	347.75
45	Ch 45	349.25	353.75
46	Ch 46	355.25	359.75
47	Ch 47	361.25	365.75
48	Ch 48	367.25	371.75
49	Ch 49	373.25	377.75
50	Ch 50	379.25	383.75
51	Ch 51	385.25	389.75
52	Ch 52	391.25	395.75
53	Ch 53	397.25	401.75
54	Ch 54	403.25	407.75
55	Ch 55	409.25	413.75
56	Ch 56	415.25	419.75
57	Ch 57	421.25	425.75
58	Ch 58	427.25	431.75
59	Ch 59	433.25	437.75
60	Ch 60	439.25	443.75
61	Ch 61	445.25	449.75
62	Ch 62	451.25	455.75
63	Ch 63	457.25	461.75
64	Ch 64	463.25	467.75
65	Ch 65	469.25	473.75
66	Ch 66	475.25	479.75
67	Ch 67	481.25	485.75
68	Ch 68	487.25	491.75
69	Ch 69	493.25	497.75
70	Ch 70	499.25	503.75
71	Ch 71	505.25	509.75
72	Ch 72	511.25	515.75
73	Ch 73	517.25	521.75
74	Ch 74	523.25	527.75
75	Ch 75	529.25	533.75
76	Ch 76	535.25	539.75
77	Ch 77	541.25	545.75
78	Ch 78	547.25	551.75
79	Ch 79	553.25	557.75
80	Ch 80	559.25	563.75
81	Ch 81	565.25	569.75
82	Ch 82	571.25	575.75
83	Ch 83	577.25	581.75

Keypad Entry	Channel Display	Picture	Audio
84	Ch 84	583.25	587.75
85	Ch 85	589.25	593.75
86	Ch 86	595.25	599.75
87	Ch 87	601.25	605.75
88	Ch 88	607.25	611.75
89	Ch 89	613.25	617.75
90	Ch 90	619.25	623.75
91	Ch 91	625.25	629.75
92	Ch 92	631.25	635.75
93	Ch 93	637.25	641.75
94	Ch 94	643.25	647.75
100	Ch100	649.25	653.75
101	Ch101	655.25	659.75
102	Ch102	661.25	665.75
103	Ch103	667.25	671.75
104	Ch104	673.25	677.75
105	Ch105	679.25	683.75
106	Ch106	685.25	689.75
107	Ch107	691.25	695.75
108	Ch108	697.25	701.75
109	Ch109	703.25	707.75
110	Ch110	709.25	713.75
111	Ch111	715.25	719.75
112	Ch112	721.25	725.75
113	Ch113	727.25	731.75
114	Ch114	733.25	737.75
115	Ch115	739.25	743.75
116	Ch116	745.25	749.75
117	Ch117	751.25	755.75
118	Ch118	757.25	761.75
119	Ch119	763.25	767.75
120	Ch120	769.25	773.75
121	Ch121	775.25	779.75
122	Ch122	781.25	785.75
123	Ch123	787.25	791.75
124	Ch124	793.25	797.75
125	Ch125	799.25	803.75
126	Ch126	805.25	809.75
127	Ch127	811.25	815.75
128	Ch128	817.25	821.75
129	Ch129	823.25	827.75
130	Ch130	829.25	833.75
131	Ch131	835.25	839.75
132	Ch132	841.25	845.75
133	Ch133	847.25	851.75
134	Ch134	853.25	857.75
135	Ch135	859.25	863.75
136	Ch136	865.25	869.75

HRC CHANNEL PLAN
Plan 2

Display=hrc

Keypad Entry	Channel Display	Picture	Audio
707	C t07	7.00	11.50
708	C t08	13.00	17.50
709	C t09	19.00	23.50
710	C t10	25.00	29.50
711	C t11	31.00	35.50
712	C t12	37.00	41.50
713	C t13	43.00	47.50
2	Ch 2	54.00	58.50
3	Ch 3	60.00	64.50
4	Ch 4	66.00	70.50
1	Ch 1	72.00	76.50
5	Ch 5	78.00	82.50
6	Ch 6	84.00	88.50
95	Ch 95	90.00	94.50
96	Ch 96	96.00	100.50
97	Ch 97	102.00	106.50
98	Ch 98	108.00	112.50
99	Ch 99	114.00	118.50
14	Ch 14	120.00	124.50
15	Ch 15	126.00	130.50
16	Ch 16	132.00	136.50
17	Ch 17	138.00	142.50
18	Ch 18	144.00	148.50
19	Ch 19	150.00	154.50
20	Ch 20	156.00	160.50
21	Ch 21	162.00	166.50
22	Ch 22	168.00	172.50
7	Ch 7	174.00	178.50
8	Ch 8	180.00	184.50
9	Ch 9	186.00	190.50
10	Ch 10	192.00	196.50
11	Ch 11	198.00	202.50
12	Ch 12	204.00	208.50
13	Ch 13	210.00	214.50
23	Ch 23	216.00	220.50
24	Ch 24	222.00	226.50
25	Ch 25	228.00	232.50
26	Ch 26	234.00	238.50
27	Ch 27	240.00	244.50
28	Ch 28	246.00	250.50
29	Ch 29	252.00	256.50
30	Ch 30	258.00	262.50
31	Ch 31	264.00	268.50
32	Ch 32	270.00	274.50
33	Ch 33	276.00	280.50
34	Ch 34	282.00	286.50
35	Ch 35	288.00	292.50

Keypad Entry	Channel Display	Picture	Audio
36	Ch 36	294.00	298.50
37	Ch 37	300.00	304.50
38	Ch 38	306.00	310.50
39	Ch 39	312.00	316.50
40	Ch 40	318.00	322.50
41	Ch 41	324.00	328.50
42	Ch 42	330.00	334.50
43	Ch 43	336.00	340.50
44	Ch 44	342.00	346.50
45	Ch 45	348.00	352.50
46	Ch 46	354.00	358.50
47	Ch 47	360.00	364.50
48	Ch 48	366.00	370.50
49	Ch 49	372.00	376.50
50	Ch 50	378.00	382.50
51	Ch 51	384.00	388.50
52	Ch 52	390.00	394.50
53	Ch 53	396.00	400.50
54	Ch 54	402.00	406.50
55	Ch 55	408.00	412.50
56	Ch 56	414.00	418.50
57	Ch 57	420.00	424.50
58	Ch 58	426.00	430.50
59	Ch 59	432.00	436.50
60	Ch 60	438.00	442.50
61	Ch 61	444.00	448.50
62	Ch 62	450.00	454.50
63	Ch 63	456.00	460.50
64	Ch 64	462.00	466.50
65	Ch 65	468.00	472.50
66	Ch 66	474.00	478.50
67	Ch 67	480.00	484.50
68	Ch 68	486.00	490.50
69	Ch 69	492.00	496.50
70	Ch 70	498.00	502.50
71	Ch 71	504.00	508.50
72	Ch 72	510.00	514.50
73	Ch 73	516.00	520.50
74	Ch 74	522.00	526.50
75	Ch 75	528.00	532.50
76	Ch 76	534.00	538.50
77	Ch 77	540.00	544.50
78	Ch 78	546.00	550.50
79	Ch 79	552.00	556.50
80	Ch 80	558.00	562.50
81	Ch 81	564.00	568.50
82	Ch 82	570.00	574.50
83	Ch 83	576.00	580.50

Keypad Entry	Channel Display	Picture	Audio
84	Ch 84	582.00	586.50
85	Ch 85	588.00	592.50
86	Ch 86	594.00	598.50
87	Ch 87	600.00	604.50
88	Ch 88	606.00	610.50
89	Ch 89	612.00	616.50
90	Ch 90	618.00	622.50
91	Ch 91	624.00	628.50
92	Ch 92	630.00	634.50
93	Ch 93	636.00	640.50
94	Ch 94	642.00	646.50
100	Ch100	648.00	652.50
101	Ch101	654.00	658.50
102	Ch102	660.00	664.50
103	Ch103	666.00	670.50
104	Ch104	672.00	676.50
105	Ch105	678.00	682.50
106	Ch106	684.00	688.50
107	Ch107	690.00	694.50
108	Ch108	696.00	700.50
109	Ch109	702.00	706.50
110	Ch110	708.00	712.50
111	Ch111	714.00	718.50
112	Ch112	720.00	724.50
113	Ch113	726.00	730.50
114	Ch114	732.00	736.50
115	Ch115	738.00	742.50
116	Ch116	744.00	748.50
117	Ch117	750.00	754.50
118	Ch118	756.00	760.50
119	Ch119	762.00	766.50
120	Ch120	768.00	772.50
121	Ch121	774.00	778.50
122	Ch122	780.00	784.50
123	Ch123	786.00	790.50
124	Ch124	792.00	796.50
125	Ch125	798.00	802.50
126	Ch126	804.00	808.50
127	Ch127	810.00	814.50
128	Ch128	816.00	820.50
129	Ch129	822.00	826.50
130	Ch130	828.00	832.50
131	Ch131	834.00	838.50
132	Ch132	840.00	844.50
133	Ch133	846.00	850.50
134	Ch134	852.00	856.50
135	Ch135	858.00	862.50
136	Ch136	864.00	868.50

IRC CHANNEL PLAN
Plan 3

Display=irc

Keypad Entry	Channel Display	Picture	Audio
707	C t07	7.00	11.50
708	C t08	13.00	17.50
709	C t09	19.00	23.50
710	C t10	25.00	29.50
711	C t11	31.00	35.50
712	C t12	37.00	41.50
713	C t13	43.00	47.50
2	Ch 2	55.25	59.75
3	Ch 3	61.25	65.75
4	Ch 4	67.25	71.75
1	Ch 1	73.25	77.75
5	Ch 5	79.25	83.75
6	Ch 6	85.25	89.75
95	Ch 95	91.25	95.75
96	Ch 96	97.25	101.75
97	Ch 97	103.25	107.75
98	Ch 98	109.25	113.75
99	Ch 99	115.25	119.75
14	Ch 14	121.25	125.75
15	Ch 15	127.25	131.75
16	Ch 16	133.25	137.75
17	Ch 17	139.25	143.75
18	Ch 18	145.25	149.75
19	Ch 19	151.25	155.75
20	Ch 20	157.25	161.75
21	Ch 21	163.25	167.75
22	Ch 22	169.25	173.75
7	Ch 7	175.25	179.75
8	Ch 8	181.25	185.75
9	Ch 9	187.25	191.75
10	Ch 10	193.25	197.75
11	Ch 11	199.25	203.75
12	Ch 12	205.25	209.75
13	Ch 13	211.25	215.75
23	Ch 23	217.25	221.75
24	Ch 24	223.25	227.75
25	Ch 25	229.25	233.75
26	Ch 26	235.25	239.75
27	Ch 27	241.25	245.75
28	Ch 28	247.25	251.75
29	Ch 29	253.25	257.75
30	Ch 30	259.25	263.75
31	Ch 31	265.25	269.75
32	Ch 32	271.25	275.75
33	Ch 33	277.25	281.75
34	Ch 34	283.25	287.75
35	Ch 35	289.25	293.75

Keypad Entry	Channel Display	Picture	Audio
36	Ch 36	295.25	299.75
37	Ch 37	301.25	305.75
38	Ch 38	307.25	311.75
39	Ch 39	313.25	317.75
40	Ch 40	319.25	323.75
41	Ch 41	325.25	329.75
42	Ch 42	331.25	335.75
43	Ch 43	337.25	341.75
44	Ch 44	343.25	347.75
45	Ch 45	349.25	353.75
46	Ch 46	355.25	359.75
47	Ch 47	361.25	365.75
48	Ch 48	367.25	371.75
49	Ch 49	373.25	377.75
50	Ch 50	379.25	383.75
51	Ch 51	385.25	389.75
52	Ch 52	391.25	395.75
53	Ch 53	397.25	401.75
54	Ch 54	403.25	407.75
55	Ch 55	409.25	413.75
56	Ch 56	415.25	419.75
57	Ch 57	421.25	425.75
58	Ch 58	427.25	431.75
59	Ch 59	433.25	437.75
60	Ch 60	439.25	443.75
61	Ch 61	445.25	449.75
62	Ch 62	451.25	455.75
63	Ch 63	457.25	461.75
64	Ch 64	463.25	467.75
65	Ch 65	469.25	473.75
66	Ch 66	475.25	479.75
67	Ch 67	481.25	485.75
68	Ch 68	487.25	491.75
69	Ch 69	493.25	497.75
70	Ch 70	499.25	503.75
71	Ch 71	505.25	509.75
72	Ch 72	511.25	515.75
73	Ch 73	517.25	521.75
74	Ch 74	523.25	527.75
75	Ch 75	529.25	533.75
76	Ch 76	535.25	539.75
77	Ch 77	541.25	545.75
78	Ch 78	547.25	551.75
79	Ch 79	553.25	557.75
80	Ch 80	559.25	563.75
81	Ch 81	565.25	569.75
82	Ch 82	571.25	575.75
83	Ch 83	577.25	581.75

Keypad Entry	Channel Display	Picture	Audio
84	Ch 84	583.25	587.75
85	Ch 85	589.25	593.75
86	Ch 86	595.25	599.75
87	Ch 87	601.25	605.75
88	Ch 88	607.25	611.75
89	Ch 89	613.25	617.75
90	Ch 90	619.25	623.75
91	Ch 91	625.25	629.75
92	Ch 92	631.25	635.75
93	Ch 93	637.25	641.75
94	Ch 94	643.25	647.75
100	Ch100	649.25	653.75
101	Ch101	655.25	659.75
102	Ch102	661.25	665.75
103	Ch103	667.25	671.75
104	Ch104	673.25	677.75
105	Ch105	679.25	683.75
106	Ch106	685.25	689.75
107	Ch107	691.25	695.75
108	Ch108	697.25	701.75
109	Ch109	703.25	707.75
110	Ch110	709.25	713.75
111	Ch111	715.25	719.75
112	Ch112	721.25	725.75
113	Ch113	727.25	731.75
114	Ch114	733.25	737.75
115	Ch115	739.25	743.75
116	Ch116	745.25	749.75
117	Ch117	751.25	755.75
118	Ch118	757.25	761.75
119	Ch119	763.25	767.75
120	Ch120	769.25	773.75
121	Ch121	775.25	779.75
122	Ch122	781.25	785.75
123	Ch123	787.25	791.75
124	Ch124	793.25	797.75
125	Ch125	799.25	803.75
126	Ch126	805.25	809.75
127	Ch127	811.25	815.75
128	Ch128	817.25	821.75
129	Ch129	823.25	827.75
130	Ch130	829.25	833.75
131	Ch131	835.25	839.75
132	Ch132	841.25	845.75
133	Ch133	847.25	851.75
134	Ch134	853.25	857.75
135	Ch135	859.25	863.75
136	Ch136	865.25	869.75

OVER-THE AIR CHANNEL PLAN

Plan 4

Display=Air

	Keypad Entry	Channel Display	Picture	Audio
VHF	2	Ch 2	55.25	59.75
VHF	3	Ch 3	61.25	65.75
VHF	4	Ch 4	67.25	71.75
VHF	5	Ch 5	77.25	81.75
VHF	6	Ch 6	83.25	87.75
VHF	7	Ch 7	175.25	179.75
VHF	8	Ch 8	181.25	185.75
VHF	9	Ch 9	187.25	191.75
VHF	10	Ch 10	193.25	197.75
VHF	11	Ch 11	199.25	203.75
VHF	12	Ch 12	205.25	209.75
VHF	13	Ch 13	211.25	215.75
UHF	14	Ch 14	471.25	475.75
UHF	15	Ch 15	477.25	481.75
UHF	16	Ch 16	483.25	487.75
UHF	17	Ch 17	489.25	493.75
UHF	18	Ch 18	495.25	499.75
UHF	19	Ch 19	501.25	505.75
UHF	20	Ch 20	507.25	511.75
UHF	21	Ch 21	513.25	517.75
UHF	22	Ch 22	519.25	523.75
UHF	23	Ch 23	525.25	529.75
UHF	24	Ch 24	531.25	535.75
UHF	25	Ch 25	537.25	541.75
UHF	26	Ch 26	543.25	547.75
UHF	27	Ch 27	549.25	553.75
UHF	28	Ch 28	555.25	559.75
UHF	29	Ch 29	561.25	565.75
UHF	30	Ch 30	567.25	571.75
UHF	31	Ch 31	573.25	577.75
UHF	32	Ch 32	579.25	583.75
UHF	33	Ch 33	585.25	589.75
UHF	34	Ch 34	591.25	595.75
UHF	35	Ch 35	597.25	601.75
UHF	36	Ch 36	603.25	607.75
UHF	37	Ch 37	609.25	613.75
UHF	38	Ch 38	615.25	619.75
UHF	39	Ch 39	621.25	625.75
UHF	40	Ch 40	627.25	631.75

	Keypad Entry	Channel Display	Picture	Audio
UHF	41	Ch 41	633.25	637.75
UHF	42	Ch 42	639.25	643.75
UHF	43	Ch 43	645.25	649.75
UHF	44	Ch 44	651.25	655.75
UHF	45	Ch 45	657.25	661.75
UHF	46	Ch 46	663.25	667.75
UHF	47	Ch 47	669.25	673.75
UHF	48	Ch 48	675.25	679.75
UHF	49	Ch 49	681.25	685.75
UHF	50	Ch 50	687.25	691.75
UHF	51	Ch 51	693.25	697.75
UHF	52	Ch 52	699.25	703.75
UHF	53	Ch 53	705.25	709.75
UHF	54	Ch 54	711.25	715.75
UHF	55	Ch 55	717.25	721.75
UHF	56	Ch 56	723.25	727.75
UHF	57	Ch 57	729.25	733.75
UHF	58	Ch 58	735.25	739.75
UHF	59	Ch 59	741.25	745.75
UHF	60	Ch 60	747.25	751.75
UHF	61	Ch 61	753.25	757.75
UHF	62	Ch 62	759.25	763.75
UHF	63	Ch 63	765.25	769.75
UHF	64	Ch 64	771.25	775.75
UHF	65	Ch 65	777.25	781.75
UHF	66	Ch 66	783.25	787.75
UHF	67	Ch 67	789.25	793.75
UHF	68	Ch 68	795.25	799.75
UHF	69	Ch 69	801.25	805.75
UHF	70	Ch 70	807.25	811.75
UHF	71	Ch 71	813.25	817.75
UHF	72	Ch 72	819.25	823.75
UHF	73	Ch 73	825.25	829.75
UHF	74	Ch 74	831.25	835.75
UHF	75	Ch 75	837.25	841.75
UHF	76	Ch 76	843.25	847.75
UHF	77	Ch 77	849.25	853.75
UHF	78	Ch 78	855.25	859.75
UHF	79	Ch 79	861.25	865.75
UHF	80	Ch 80	867.25	871.75

USA MMDS/AIR CHANNEL PLAN									
Plan 5					Display=ds1				
Keypad	Channel	Picture	Audio		Keypad	Channel	Picture	Audio	
Entry	Display				Entry	Display			
VHF	2 Ch 2	55.25	59.75		UHF	925 C U25	537.25	541.75	
VHF	3 Ch 3	61.25	65.75		UHF	926 C U26	543.25	547.75	
VHF	4 Ch 4	67.25	71.75		UHF	927 C U27	549.25	553.75	
VHF	5 Ch 5	77.25	81.75		UHF	928 C U28	555.25	559.75	
VHF	6 Ch 6	83.25	87.75		UHF	929 C U29	561.25	565.75	
MDS2	99 Ch 99	117.25	121.75		UHF	930 C U30	567.25	571.75	
MDS1	14 Ch 14	123.25	127.75		UHF	931 C U31	573.25	577.75	
VHF	7 Ch 7	175.25	179.75		UHF	932 C U32	579.25	583.75	
VHF	8 Ch 8	181.25	185.75		UHF	933 C U33	585.25	589.75	
VHF	9 Ch 9	187.25	191.75		UHF	934 C U34	591.25	595.75	
VHF	10 Ch 10	193.25	197.75		UHF	935 C U35	597.25	601.75	
VHF	11 Ch 11	199.25	203.75		UHF	936 C U36	603.25	607.75	
VHF	12 Ch 12	205.25	209.75		UHF	937 C U37	609.25	613.75	
VHF	13 Ch 13	211.25	215.75		UHF	938 C U38	615.25	619.75	
A1	24 Ch 24	223.25	227.75		UHF	939 C U39	621.25	625.75	
B1	25 Ch 25	229.25	233.75		UHF	940 C U40	627.25	631.75	
A2	26 Ch 26	235.25	239.75		UHF	941 C U41	633.25	637.75	
B2	27 Ch 27	241.25	245.75		UHF	942 C U42	639.25	643.75	
A3	28 Ch 28	247.25	251.75		UHF	943 C U43	645.25	649.75	
B3	29 Ch 29	253.25	257.75		UHF	944 C U44	651.25	655.75	
A4	30 Ch 30	259.25	263.75		UHF	945 C U45	657.25	661.75	
B4	31 Ch 31	265.25	269.75		UHF	946 C U46	663.25	667.75	
C1	32 Ch 32	271.25	275.75		UHF	947 C U47	669.25	673.75	
D1	33 Ch 33	277.25	281.75		UHF	948 C U48	675.25	679.75	
C2	34 Ch 34	283.25	287.75		UHF	949 C U49	681.25	685.75	
D2	35 Ch 35	289.25	293.75		UHF	950 C U50	687.25	691.75	
C3	36 Ch 36	295.25	299.75		UHF	951 C U51	693.25	697.75	
D3	37 Ch 37	301.25	305.75		UHF	952 C U52	699.25	703.75	
C4	38 Ch 38	307.25	311.75		UHF	953 C U53	705.25	709.75	
D4	39 Ch 39	313.25	317.75		UHF	954 C U54	711.25	715.75	
E1	40 Ch 40	319.25	323.75		UHF	955 C U55	717.25	721.75	
F1	41 Ch 41	325.25	329.75		UHF	956 C U56	723.25	727.75	
E2	42 Ch 42	331.25	335.75		UHF	957 C U57	729.25	733.75	
F2	43 Ch 43	337.25	341.75		UHF	958 C U58	735.25	739.75	
E3	44 Ch 44	343.25	347.75		UHF	959 C U59	741.25	745.75	
F3	45 Ch 45	349.25	353.75		UHF	960 C U60	747.25	751.75	
E4	46 Ch 46	355.25	359.75		UHF	961 C U61	753.25	757.75	
F4	47 Ch 47	361.25	365.75		UHF	962 C U62	759.25	763.75	
G1	48 Ch 48	367.25	371.75		UHF	963 C U63	765.25	769.75	
H1	49 Ch 49	373.25	377.75		UHF	964 C U64	771.25	775.75	
G2	50 Ch 50	379.25	383.75		UHF	965 C U65	777.25	781.75	
H2	51 Ch 51	385.25	389.75		UHF	966 C U66	783.25	787.75	
G3	52 Ch 52	391.25	395.75		UHF	967 C U67	789.25	793.75	
H3	53 Ch 53	397.25	401.75		UHF	968 C U68	795.25	799.75	
G4	54 Ch 54	403.25	407.75		UHF	969 C U69	801.25	805.75	
UHF	914 C U14	471.25	475.75		UHF	970 C U70	807.25	811.75	
UHF	915 C U15	477.25	481.75		UHF	971 C U71	813.25	817.75	
UHF	916 C U16	483.25	487.75		UHF	972 C U72	819.25	823.75	
UHF	917 C U17	489.25	493.75		UHF	973 C U73	825.25	829.75	
UHF	918 C U18	495.25	499.75		UHF	974 C U74	831.25	835.75	
UHF	919 C U19	501.25	505.75		UHF	975 C U75	837.25	841.75	
UHF	920 C U20	507.25	511.75		UHF	976 C U76	843.25	847.75	
UHF	921 C U21	513.25	517.75		UHF	977 C U77	849.25	853.75	
UHF	922 C U22	519.25	523.75		UHF	978 C U78	855.25	859.75	
UHF	923 C U23	525.25	529.75		UHF	979 C U79	861.25	865.75	
UHF	924 C U24	531.25	535.75		UHF	980 C U80	867.25	871.75	