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SCALE NONE

SHEET 1 OF 24

Wulfsberg Electronics Division

A Chelton Group Company

C-962A NARROW BAND CONTROL UNIT

Operator's Manual

Manual Number 150-040218

Revision B

August 9, 2000

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OVERVIEW

This manual contains operating and preset channel programming instructions for Wulfsberg C-962A Control Units that have been modified for narrow-band operation. Instructions for completing the narrow-band modification are provided in Wulfsberg Service Bulletin WSB C-962N-1, PN 150-040141.

The C-962A provides the control functions for the RT-9600/9600F VHF FM transceivers. RT-9600/9600F transceivers are capable of transmitting and receiving 9600 channels in the 150.000 to 173.9975 MHz band (one every 2.5 kHz). They are optionally equipped with crystal-controlled one- or two- channel Guard receiver modules that can be user-specified for any Guard frequency between 150.000 and 173.9975 MHz. They are also optionally equipped with CTCSS tones on both the Main and Guard receivers.

The C-962 has been produced in one version:

- The C-962A is designed to control RT-9600/9600F radios equipped with the Guard receiver option. Its control panel includes a selector switch that allows the user to switch between Guard channel 1 and 2.

This version can be upgraded to narrow-band operation. The C-962A narrow-band upgrade provides the following features and capabilities in addition to those of the original version:

- User–selectable narrow-band (12.5 kHz channel spacing) and wide-band (25 kHz channel spacing) operation. The original C-962A allows wide-band operation only.

  NOTE: This capability requires an RT-9600/9600F transceiver that has been modified for narrow-band operation. Modification instructions are provided in Wulfsberg Service Bulletin WSB RT-9600F-1, PN 150-040121.

- Increased number of programmable preset channels. The upgrade provides 15 memory banks that allow up to 15 presets each, for a maximum of 225. The original C-962A allows a maximum of 15 presets.
- Increased number of user-specified subaudible CTCSS tones. The upgraded C-962A can generate up to 46 Wulfsberg Group tones, 49 Technisonic Group tones, and 33 CDF (California Department of Forestry) Group tones. Unlike the original C-962A, it does not rely on the tone generating capability built into the RT-9600, which is limited to eight.

The narrow-band upgrade includes an 11-character, 5 x 7 dot-matrix LED display to accommodate its added capabilities (for example, two-digit tone codes). The original has a seven-character, seven-segment LED display. In addition, the upgrade includes two Tone Selector Thumbwheel Switches instead of one on the original.

OPERATING THE CONTROLS

This section introduces the features of the C-962A control panel. Figure 1 locates each of the controls, and Table 1 lists them with a brief description.

Main Receiver On/Off/Volume Control

To turn the equipment ON, rotate the Main Receiver On/Off/Volume Control (Figure 1, Item 8) clockwise. The Main Receiver On/Off/Volume Control is also used to set the audio level. For more accurate volume adjustment, press the Test/Load Button (Figure 1, Item 10) while adjusting the volume of the background noise.

Aircraft power must be available to the unit by operating the appropriate switches and/or circuit breakers. To hear the audio, the appropriate remote audio select switches (if any) must be in the proper position and the volume control set to the appropriate level.

Test/Load Button

The Main and Guard receivers feature an automatic squelch that allows maximum receive sensitivity without ambient RF noise tripping the squelch. When the Test/Load Button (Figure 1, Item 10) is pressed, the automatic squelch is disengaged for both the Main and Guard receivers and both receivers will have maximum sensitivity. In addition to helping adjust the audio, the Test/Load Button can be used to determine if a receive signal exists below the threshold of the automatic squelch.

The Test/Load Button is also used in the following functions:

- Selecting the memory bank (refer to *Selecting Preset Channels*, on page 7).
- Loading programmed frequencies and CTCSS tones into memory (refer to *Programming Preset Channels*, on page 10).
- Selecting the CTCSS tone group (refer to *Selecting CTCSS Tones*, on page 13).

Frequency/Tone LED Display

The Frequency LED Display (Figure 1, Item 2) normally shows the currently selected receive frequency. It shows the transmit frequency when the operator keys the mic or holds the Preset Channel Transmit/Receive Selector Switch (Figure 1, Item 5) in the **TX** position.

The Tone LED Display (Figure 1, Item 4) shows the CTCSS tone number (if any) programmed or manually selected for the currently selected channel.

Receive/Transmit LEDs

The C-962A has three receive/transmit LEDs.

- When a signal is received over the Main receiver, the yellow Main Receiver Squelch (Receive) LED (Figure 1, Item 9) lights.

- When a signal is received over the Guard receiver, the yellow Guard Receiver Squelch (Receive) LED (Figure 1, Item 11) lights.

When a signal is transmitted, the green Transmit LED (Figure 1, Item 16) lights.

Main/Guard Transmit Selector Switch

The Main/Guard Transmit Selector Switch (Figure 1, Item 15) allows the operator to transmit over the Main or Guard channel.

- To transmit using the Main channel, set the switch to **MAIN**.
- To transmit using the Guard channel, set the switch to **GUARD**.

NOTE: Also check the setting of the High/Low Transmit Power Selector Switch (Figure 1, Item 17), which determines the power output level of the transmitter (**HI** = 10 Watts, **LO** = 1 Watt).

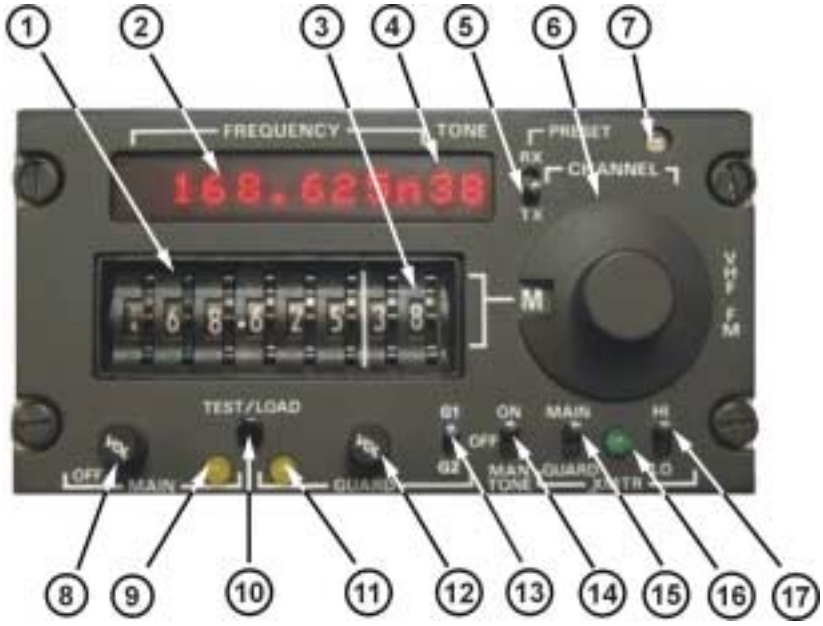

Figure 1. C-962A Control Panel

Table 1. C-962A Controls

Item No.	Control	Function
1	Manual Frequency Selector Thumbwheel Switches	Allows the operator to set the frequency for the manual channel. Allows the operator to select the frequency when programming or reprogramming a channel.
2	Frequency LED Display	Normally shows the receive frequency. Shows the transmit frequency when the mic is keyed or the Preset Transmit Channel when the Transmit/Receive Selector Switch (Item 5) is in the **TX** position.
3	Tone Selector Thumbwheel Switches	Allows the operator to manually set the CTCSS tone. Allows the operator to select the CTCSS tone when programming or reprogramming a channel.
4	Tone LED Display	Indicates the CTCSS tone number (if any) for the currently selected channel or the manual channel.
5	Preset Channel Transmit/Receive Selector Switch	Changes the display to the currently selected transmit or receive frequency. Allows the operator to specify the frequency as transmit or receive when programming or reprogramming a channel.
6	Preset Channel Selector	Allows the operator to select the manual channel or preset channels.
7	Photo-sensor	Automatically adjusts the brightness of the Transmit and Squelch (Receive) Indicator LEDs (Items 9, 11, and 16).
8	Main Receiver On/Off/Volume Control	Turns the equipment On and Off. Adjusts the Main Receiver audio level.
9	Main Receiver Squelch (Receive) LED	Lights when the Main receiver receives a signal.
10	Test/Load Button	During normal operation: Disengages the automatic squelch for both the Main and Guard receivers. During programming operation: Loads programmed frequencies and CTCSS tones into memory. Loads the selected memory bank. Loads the selected CTCSS tone group.
11	Guard Receiver Squelch (Receive) LED	Lights when the Guard receiver receives a signal.
12	Guard Receiver Volume Control	Adjusts the Guard receiver audio level.

Continues…

Table 1. C-962A Controls (Cont'd)

Item No.	Control	Function
13	Guard 1/Guard 2 Selector Switch	On a C-962A with two Guard channels, controls whether Guard channel 1 or channel 2 transmit frequency is used.
14	Tone On/Off/Manual Selection Switch	Enables/disables the automatic tone feature during receive operation.
15	Main/Guard Transmit Selector Switch	Selects transmission over the Main or Guard receiver.
16	Transmit LED	Lights when a signal is transmitted.
17	High/Low Transmit Power Selector Switch	Selects 1 Watt or 10 Watts transmitter power output.

SELECTING PRESET CHANNELS

The C-962A Narrow-Band Control Unit has 15 memory banks (Bank A through Bank O) that allow 15 preset channels per bank, for a maximum of 225.

The Frequency/Tone LED Display has 11 characters (refer to Figure 2):

- The first (leftmost) character indicates the currently selected bank or appears blank in manual mode.
- The next seven characters indicate the currently selected frequency.
- The third from last character shows a lowercase **n** when narrow-band operation is selected or appears blank for wide-band operation.
- The last two characters show the currently selected CTCSS tone (dashes appear if none are selected).

Selecting the Memory Bank

To select a different memory bank, use the following procedure:

1. Set the first (leftmost) thumbwheel switch to **B** (Bank). The Frequency/Tone LED Display indicates the currently selected bank and shows the current position of the Preset Channel Selector in parentheses; for example, **Bank = E (B)**.

2. Turn the Preset Channel Selector to the desired bank.

3. Press the Test/Load Button. The Frequency/Tone LED Display indicates that the currently selected bank and the Preset Channel Selector position are the same; for example, **Bank = D (D)**.

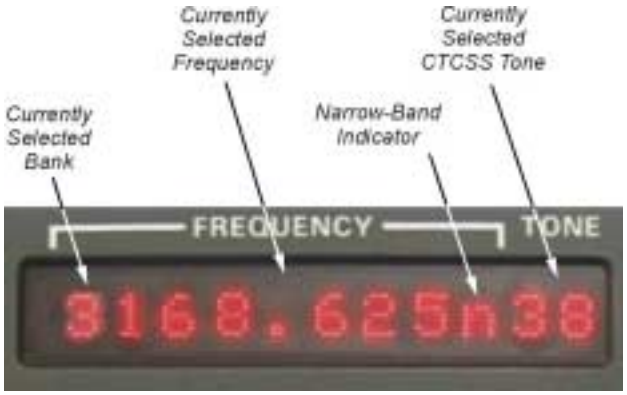

Figure 2. Frequency/Tone LED Display

4. Set the first thumbwheel back to **1** or **1n**. The Frequency/Tone LED Display indicates the receive frequency and CTCSS tone number (if any) programmed for the channel currently selected by the Preset Channel Selector.

To select a different preset channel in the memory bank, turn the Preset Channel Selector to the desired position (1 through 15). As the selector is turned to each position, the Frequency LED Display and the Tone LED Display indicate the receive frequency and CTCSS tone number (if any) programmed for that channel.

SELECTING A MANUAL FREQUENCY

To select a manual channel, the Preset Channel Selector (Figure 1, Item 6) must be set to the **M** (Manual) position. In the manual mode, the Manual Frequency Selector Thumbwheel Switches (Figure 1, Item 1) become active and are used to select the transmit and receive frequency. The radio operates in simplex mode (transmits and receives over the same frequency) when the Main/Guard Transmit Selector Switch (Figure 1, Item 15) is set to **MAIN**.

The international aircraft standard is used in the selection and display of the 0.5 kHz frequencies in the Frequency LED Display; for example:

154.320 is displayed as 154.320

154.3225 is displayed as 154.322

154.325 is displayed as 154.325

154.3275 is displayed as 154.327

The C-962A Narrow-Band Control Unit allows the operator to select narrow-band or wide-band mode. To select narrow-band, turn the first (leftmost) thumbwheel switch to the **1n** position. The third from last character in the Frequency/Tone LED Display displays a lowercase **n** when narrow-band mode is selected (refer to Figure 2). It appears blank when wide-band is selected.

In addition, the operator can manually select optional CTCSS tones using the Tone Selector Thumbwheel switch (Figure 1, Item 3) (refer to *Selecting CTCSS Tones*, on page 13). If no tones are desired, the tone selector switch should be set to the **OFF** position. In manual operation, the subaudible CTCSS tone is used on both transmit and receive when the Tone On/Off/Manual Selection Switch (Figure 1, Item 14) is set to **ON** (refer to *Disabling the Automatic Tone Feature*, on page 14). The selected tone appears in the Tone LED Display (refer to Figure 2).

OPERATING THE GUARD RECEIVERS

The RT-9600/9600F transceiver can include an optional Guard receiver module. The Guard receiver is separate from the Main receiver, and can provide one or two crystal-controlled fixed-frequency Guard channels. The C-962A control unit's Guard controls (Figure 1, Items 12, 13, and 15) control the Guard channels when a Guard receiver is installed.

NOTE: RTs equipped with the VP (Voice Privacy) interface option are limited to one Guard channel.

The operator can monitor the Guard receiver and Main receiver simultaneously or individually by setting the Main Receiver On/Off/Volume Control (Figure 1, Item 8) and/or the Guard Receiver Volume Control (Figure 1, Item 12) to audible listening levels.

If the RT-9600F transceiver has two Guard channels, the C-962A allows the operator to select the desired channel by setting the position of the Guard1/Guard 2 Selector Switch (Figure 1, Item 13).

When the Guard receiver receives a signal, the yellow Guard Receiver Squelch (Receive) LED (Figure 1, Item 11) lights.

A Guard transmit frequency can be programmed for the Guard channel (or both channels if the RT-9600F has two Guard crystals installed) (refer to *Programming Preset Channels*, on page 7). To transmit on the Guard transmit frequency, set the Main/Guard transmit Selector Switch (Figure 1, Item 15) to the **GUARD** position. The C-962A Guard 1/Guard 2 Selector Switch (Figure 1, Item 13) controls whether the Guard 1 or 2 transmit frequency is used.

The Guard receiver can operate simplex or semi-duplex. The setting of the High/Low Transmit Power Selector Switch (Figure 1, Item 17) determines the power output level of the Guard transmitter (**HI** = 10 Watts, **LO** = 1 Watt).

PROGRAMMING PRESET CHANNELS

The Main receiver transmit and receive channels and the Guard receiver transmit channels can be programmed into memory.

To program or reprogram a channel, use the following procedure:

1. Select the desired memory bank (refer to *Selecting Preset Channels*, on page 7).

2. Set the Preset Channel Selector (Figure 1, Item 6) to the channel to be programmed (refer to *Selecting Preset Channels*, on page 7).

3. Turn the Manual Frequency Selector Thumbwheel Switches (Figure 1, Item 1) to the desired receive frequency.

   Narrow-band operation is selected by turning the first (leftmost) thumbwheel switch to the **1n** position.

4. Turn the Tone Selector Thumbwheel Switches (Figure 1, Item 3) to the desired receive CTCSS tone (refer to *Selecting CTCSS Tones*, on page 13) If no tone is desired, set the switch to the **OFF** position.

5. Set the Main/Guard Transmit Selector Switch (Figure 1, Item 15) to **MAIN**.

6. Press and hold the Preset Channel Transmit/Receive Selector Switch (Figure 1, Item 5) in the **RX** position.

7. While holding the Preset Channel Transmit/Receive Selector Switch, press and release the Test/Load button (Figure 1, Item 10). The receive frequency is now loaded for the selected channel.

8. Turn the Manual Frequency Selector Thumbwheel Switches to the desired transmit frequency.

9. Turn the Tone Selector Thumbwheel Switches to the desired transmit CTCSS tone. (refer to *Selecting CTCSS Tones*, on page 13). The transmit tone can be different from the receive tone. If no tone is desired, set the switches to the **OFF** position.

10. Press and hold the Preset Channel Transmit/Receive Selector Switch in the **TX** position.

11. While holding the Preset Channel Transmit/Receive Selector Switch, press and release the Test/Load Button (Figure 1, Item 10). The transmit frequency is now loaded for the selected channel.

Repeat this procedure to program additional channels.

CHECKING PRESET CHANNEL FREQUENCIES

To check the transmit/receive frequencies and CTCSS tones programmed for a channel, use the following procedure.

CAUTION: DO NOT PUSH THE TEST/LOAD BUTTON DURING THIS PROCEDURE.

1. To check the frequencies and CTCSS tones of the Main receiver, set the Main/Guard Transmit Selector Switch (Figure 1, Item 15) to **MAIN**.

2. Switch the Preset Channel Selector (Figure 1, Item 6) to the channel to be checked (refer to *Selecting Preset Channels*, on page 7).

   NOTE: Ensure that the proper memory bank is selected.

3. To check the transmit frequency, press and hold the Preset Channel Transmit/Receive Selector Switch (Figure 1, Item 5) in the **TX** position. The Frequency LED Display and the Tone LED Display indicate the transmit frequency and CTCSS tone number (if any) programmed for that channel.

4. To check the receive frequency, press and hold the Preset Channel Transmit/Receive Selector Switch in the **RX** position. The Frequency LED Display and the Tone LED Display indicate the receive frequency and CTCSS tone number (if any) programmed for that channel.

5. To check the Guard receiver frequencies, set the Main/Guard Transmit Selector Switch to **GUARD**. If the RT has two Guard channels, use the Guard 1/Guard 2 Selector Switch to select the channel to be checked.

6. To check the Guard receiver transmit frequency, press and hold the Preset Channel Transmit/Receive Selector Switch in the **TX** position. The Frequency LED Display and the Tone LED Display indicate the transmit frequency and CTCSS tone number (if any) programmed for that channel.

7. To check the receive frequency, press and hold the Preset Channel Transmit/Receive Selector Switch in the **RX** position. The Frequency LED Display and the Tone LED Display indicate the receive frequency and CTCSS tone number (if any) programmed for that channel.

SELECTING CTCSS TONES

The narrow-band C-962A has a pair of Tone Selector Thumbwheel Switches (Figure 1, Item 3) that the operator uses to select the CTCSS tone. The left switch can be set to 0 through 6 or **OFF**; the right switch can be set to 0 through 9.

Selecting the Tone Group

The narrow-band C-962A can generate up to 46 Wulfsberg Group tones (refer to Table 2), 49 Technisonic Group tones (refer to Table 3), and 33 CDF (California Department of Forestry) Group tones (refer to Table 4).

To select the tone group, use the following procedure:

1. Set the first (leftmost) thumbwheel switch to **B** (Bank).

2. To display the currently selected tone group, press the Preset Channel Transmit/Receive Selector Switch (Figure 1, Item 5) to the **RX** position. The current selection appears in the Frequency/Tone LED Display; for example, **Tones=WFBG** indicates that Wulfsberg Group tones are selected.

3. To select a different tone group, press the Preset Channel Transmit/Receive Selector Switch to the **TX** position repeatedly to cycle through the three options.

   When the desired option appears in the Frequency/Tone LED Display (for example, **Tones? CDF**), press the Test/Load Button to select it. The question mark in the display changes to an equals sign to indicate that the group is now selected (for example, **Tones=CDF**).

4. Return the first (leftmost) thumbwheel switch to **1** or **1n** to display the currently selected frequency.

NOTE: The selected tone group is used for all stored preset channels. If a tone number is selected that is not in the selected tone group (for example, Wulfsberg Group tone number 10), the Tone LED Display shows dashes and the C-962A does not generate a tone.

Selecting Tones for Preset Channels

Receive and transmit tones are selected for preset channels during programming. Refer to *Programming Preset Channels*, on page 11.

Selecting the Tone for the Manual Channel

When the Preset Channel Selector (Figure 1, Item 6) is set to the **M** (Manual) channel, the Tone Selector Thumbwheel Switches (Figure 1, Item 3) are used to select the tone. The tones are only used in transmit mode when the manual channel is selected.

Disabling the Automatic Tone Feature

The automatic tone feature can be disabled during receive operation by setting the Tone On/Off/Manual Selection Switch to **OFF** or **MAN**.

- In the **OFF** position, the preset tone is used during transmit operation only; no tone is used during receive operation.
- In the **MAN** position, the manually selected tone is used during transmit operation; no tone is used during receive operation.

Table 2. Wulfsberg Group Tones

Tone No.	Code	Frequency (Hz)	Tone No.	Code	Frequency (Hz)
00	- -	- - - - -	35	21	179.9
01	00	67.0	36	23	186.2
02	02	71.9	37	25	192.8
03	03	74.4	38	28	203.5
04	04	77.0	39	- -	- - - - -
05	05	79.7	40	- -	- - - - -
06	06	82.5	41	2A	210.7
07	07	85.4	42	2B	218.1
08	08	88.5	43	2C	225.7
09	- -	- - - - -	44	2E	233.6
10	- -	- - - - -	45	2F	241.8
11	09	91.5	46	30	250.3
12	0A	94.8	47	2D	229.1
13	0B	97.4	48	- -	- - - - -
14	0C	100.0	49	- -	- - - - -
15	0D	103.5	50	- -	- - - - -
16	0E	107.2	51	01	69.4
17	0F	110.9	52	1A	159.8
18	10	114.8	53	1C	165.5
19	- -	- - - - -	54	1E	171.3
20	- -	- - - - -	55	20	177.3
21	11	118.8	56	22	183.5
22	12	123.0	57	24	189.9
23	13	127.3	58	26	196.6
24	14	131.8	59	- -	- - - - -
25	15	136.5	60	- -	- - - - -
26	16	141.3	61	27	199.5
27	17	146.2	62	29	206.5
28	18	151.4	63	31	254.1
29	- -	- - - - -	64	- -	- - - - -
30	- -	- - - - -	65	- -	- - - - -
31	19	156.7	66	- -	- - - - -
32	1B	162.2	67	- -	- - - - -
33	1D	167.9	68	- -	- - - - -
34	1F	173.8	69	- -	- - - - -

Table 3. Technisonic Group Tones

Tone No.	Code	Frequency (Hz)	Tone No.	Code	Frequency (Hz)
00	--	-----	35	- -	- - - - -
01	00	67.0	36	- -	- - - - -
02	02	71.9	37	- -	- - - - -
03	03	74.4	38	- -	- - - - -
04	04	77.0	39	- -	- - - - -
05	05	79.7	40	- -	- - - - -
06	06	82.5	41	- -	- - - - -
07	07	85.4	42	- -	- - - - -
08	08	88.5	43	- -	- - - - -
09	09	91.5	44	- -	- - - - -
10	0A	94.8	45	- -	- - - - -
11	0B	97.4	46	- -	- - - - -
12	0C	100.0	47	01	69.4
13	0D	103.5	48	1A	159.8
14	0E	107.2	49	1C	165.5
15	0F	110.9	50	1E	171.3
16	10	114.8	51	20	177.3
17	11	118.8	52	22	183.5
18	12	123.0	53	24	189.9
19	13	127.3	54	26	196.6
20	14	131.8	55	27	199.5
21	15	136.5	56	29	206.5
22	16	141.3	57	2A	210.7
23	17	146.2	58	2B	218.1
24	18	151.4	59	2C	225.7
25	19	156.7	60	2D	229.1
26	1B	162.2	61	2E	233.6
27	1D	167.9	62	2F	241.8
28	1F	173.8	63	30	250.3
29	21	179.9	64	- -	- - - - -
30	23	186.2	65	- -	- - - - -
31	25	192.8	66	- -	- - - - -
32	28	203.5	67	- -	- - - - -
33	- -	- - - - -	68	- -	- - - - -
34	- -	- - - - -	69	- -	- - - - -

Table 4. California Department of Forestry (CDF) Group Tones

Tone No.	Code	Frequency (Hz)	Tone No.	Code	Frequency (Hz)
00	--	-----	35	22	183.5
01	0F	110.9	36	23	186.2
02	12	123.0	37	24	189.9
03	14	131.8	38	25	192.8
04	15	136.5	39	26	196.6
05	17	146.2	40	27	199.5
06	19	156.7	41	28	203.5
07	1D	167.9	42	29	206.5
08	0D	103.5	43	2A	210.7
09	0C	100.0	44	2B	218.1
10	0E	107.2	45	2C	225.7
11	10	114.8	46	2D	229.1
12	13	127.3	47	2E	233.6
13	16	141.3	48	2F	241.8
14	18	151.4	49	30	250.3
15	00	67.0	50	31	254.1
16	01	69.4	51	- -	- - - - -
17	02	71.9	52	- -	- - - - -
18	03	74.4	53	- -	- - - - -
19	04	77.0	54	- -	- - - - -
20	05	79.7	55	- -	- - - - -
21	06	82.5	56	- -	- - - - -
22	07	85.4	57	- -	- - - - -
23	08	88.5	58	- -	- - - - -
24	09	91.5	59	- -	- - - - -
25	0A	94.8	60	- -	- - - - -
26	0B	97.4	61	- -	- - - - -
27	11	118.8	62	- -	- - - - -
28	1A	159.8	63	- -	- - - - -
29	1B	162.2	64	- -	- - - - -
30	1C	165.5	65	- -	- - - - -
31	1E	171.3	66	- -	- - - - -
32	1F	173.8	67	- -	- - - - -
33	20	177.3	68	- -	- - - - -
34	21	179.9	69	- -	- - - - -