

Optoelectronics, Inc.
DC442 Plus™
Version 1.0
Serial Interface Specification

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INTRODUCTION

This document describes the serial interface of the DC442 Plus™ Communications Decoder. The DC442 Plus™ Communications Decoder, when connected to a communications receiver, provides simultaneous decoding of 52 Continuous Tone-Controlled Squelch System (CTCSS) tones, 106 Digitally-Coded Squelch (DCS) codes, and 16 Dual-Tone Multi-Frequency (DTMF) digits, and displays them on an alphanumeric character display. In addition, the DC442 PLUS™ stores the most recent CTCSS tone and DCS code, and the 1,023 most recent DTMF digits for later recall. The DC442 PLUS™ is also capable of displaying receiver squelch status.

This document was written to assist the programmer in developing software applications for the DC442 PLUS™.

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WHAT'S NEW

Version 1.0 of the DC442 PLUS™ Communications Decoder includes several improvements over the older model DC440™. The changes are summarized below:

1. Replace proprietary ASCII serial interface with Icom CI-5 interface standard. This permits one or more DC442 PLUS™ units to share a single serial computer interface with one or more communications receivers or other devices.
2. Increase serial port data rate to 9600 bps.
3. Add a seventh mode to display and/or change the CI-5 interface address. Providing a range of CI-5 interface addresses permits multiple DC442 PLUS™ units to be connected to a single serial computer interface.
4. The READ DTMF DIGIT command now returns the next DTMF digit from the 127- digit DTMF buffer in the order received, or a special code to indicate that the buffer is empty.
5. Jumper J4 now used for power-up default CI-5 interface address selection instead of DCS polarity enable.
6. The CLEAR DTMF BUFFER command, or front panel operation, now clears the DTMF digit display immediately, rather than requiring the operator to change modes.
7. LTR decoding capability.

8. ABOUT CI-5

The serial interface on the DC442 PLUS™ Communications Decoder conforms to the Icom CI-5 interface standard. The CI-5 interface is an asynchronous, half-duplex, Transistor Transistor Logic (TTL) serial interface connected in a wire-OR (bussed) configuration. Several different devices can be connected to the bus simultaneously, and each device has its own unique address. Software developers are strongly encouraged to obtain a copy of the *Icom Communication Interface - V Reference Manual* from Icom, Inc. for detailed information on the CI-5 interface protocol. The communications parameters for the serial interface are listed in Table 1 below.

Table 1. Communications Parameters.

DATA RATE	9600 bps
START BITS	1
DATA BITS	8
PARITY	NONE
STOP BITS	1

One important thing to note about the CI-5 interface is that, as mentioned above, it is connected in a wire-OR configuration. This means that the transmit data signal and the receive data signal are connected together. Therefore, when a command is transmitted by the computer, it is automatically echoed back as received data, followed by the response to the command, if any. For example, if an eleven-byte command is transmitted to a device on the bus, which returns a six-byte response, the computer will receive a total of seventeen bytes. This configuration allows devices on the bus to monitor their own transmissions in order to detect interface collisions. A collision occurs when two or more devices transmit simultaneously. If a collision occurs, the command must be re-transmitted.

To connect the DC442 PLUS™ to a computer, a standard miniature stereo phone jack is provided on the rear panel. An internal RS-232C interface converter is provided to convert the CI-5 interface voltage levels to RS-232C levels compatible with most personal computers. A second miniature phone jack is provided on the rear panel to connect other CI-5 devices.

CONFIGURATION PARAMETERS

The DC442 PLUS™ Communications Decoder has four internal jumper sets, located on the printed circuit boards inside the cabinet. The functions of each of the jumper sets are briefly described below. Consult the DC442 PLUS™ Operator's Manual for more information.

DCS POLARITY (J1/J2)

The DCS POLARITY jumper set is located in the center of the main (horizontal) printed circuit board. When the jumper is installed over the rear two pins (the J1 position, toward the back of the DC442 PLUS™ cabinet), DCS normal polarity is selected. When the jumper is installed over the forward two pins (the J2 position, toward the front of the DC442 PLUS™ cabinet), DCS inverse polarity is selected.

SQUELCH ENABLE (J3)

The SQUELCH ENABLE jumper set is located on the switch (vertical) printed circuit board. When the jumper is installed over the lower two pins (toward the bottom of the DC442 PLUS™ cabinet), the squelch input is disabled. When the jumper is installed over the upper two pins (toward the top of the DC442 PLUS™ cabinet), the squelch input is enabled.

SQUELCH POLARITY (J3A)

The SQUELCH POLARITY jumper set is located on the switch (vertical) printed circuit board. When the jumpers are installed vertically (side by side) over the four pins, positive squelch input polarity is selected. When the jumpers are installed horizontally (one above the other) over the four pins, negative squelch input polarity is selected.

CI-5 ADDRESS SELECT (J4)

The CI-5 ADDRESS SELECT jumper set is located on the switch (vertical) printed circuit board. It is used to select the power-up default CI-5 interface address. In order to communicate with the DC442 PLUS™, the computer software must specify the currently selected CI-5 address. All addresses are specified in hexadecimal notation. When the jumper is installed over the lower two pins (toward the bottom of the DC442 PLUS™ cabinet), the power-up default CI-5 interface address is set to "A0". When the jumper is installed over the upper two pins (toward the top of the DC442 PLUS™ cabinet), the power-up default address is set to "A1". Since the CI-5 ADDRESS SELECT jumper only changes the power-up default address, the DC442 PLUS™ must be turned off and back on for a new jumper setting to take effect. Although only two different power-up default CI-5 addresses are available, any one of sixteen different addresses in the range "A0" to "AF" can be selected from the DC442 PLUS™ front panel when the CI-5 ADDRESS mode is selected.

CTCSS/DCS/DTMF DECODING

Signaling information decoded by the DC442 PLUS™ Communications Decoder is available via the CI-5 interface. If the squelch input is enabled, decoding only takes place when the squelch is open (unsquelched). If the squelch input is disabled, decoding is continuously active. If a working receiver squelch output is not connected to the DC442 PLUS™, be sure that the DC442 PLUS™ squelch input is disabled. Failure to do so may prevent the DC442 PLUS™ from decoding. Consult the DC442 PLUS™ Operator's Manual for more information.

The DC442 PLUS™ is capable of decoding 52 CTCSS tones. The specified acquisition time of the CTCSS decoder is 350 milliseconds (0.35 seconds). At times it may be faster, or, if the incoming signal is weak or noisy, it may be slower. The specific CTCSS tones decoded by the DC442 PLUS™ are listed in Table 2 below.

Table 2. CTCSS tones.

60.0	100.0	151.4	192.8
67.0	103.5	156.7	196.6
69.3	107.2	159.8	199.5
71.9	110.9	162.2	203.5
74.4	114.8	165.5	206.5
77.0	118.8	167.9	210.7
79.7	120.0	171.3	218.1
82.5	123.0	173.8	225.7
85.4	127.3	177.3	229.1
88.5	131.8	179.9	233.6
91.5	136.5	183.5	241.8
94.8	141.3	186.2	250.3
97.4	146.2	189.9	254.1

The DC442 PLUS™ is capable of decoding 106 DCS codes. The specified acquisition time of the DCS decoder is 350 milliseconds (0.35 seconds). At times it may be faster, or, if the incoming signal is weak or noisy, it may be slower. The specific DCS codes decoded by the DC442 PLUS™ are listed in Table 3 below.

Table 3. DCS codes.

017	125	251	411	565
023	131	252	412	606
025	132	255	413	612
026	134	261	423	624
031	143	263	431	627
032	145	265	432	631
036	152	266	445	632
043	155	271	446	654
047	156	274	452	662
050	162	306	454	664
051	165	311	455	703
053	172	315	462	712
054	174	325	464	723
065	205	331	465	731
071	212	332	466	732
072	223	343	503	734
073	225	346	506	743
074	226	351	516	754
114	243	356	523	
115	244	364	526	
116	245	365	532	
122	246	371	546	

The DC442 PLUS™ is capable of decoding 16 DTMF digits. The specified maximum digit rate of the DTMF decoder is 10 digits per second. The specific DTMF digits decoded by the DC442 PLUS™ are listed in Table 4 below.

Table 4. DTMF digits.

1	2	3	A
4	5	6	B
7	8	9	C
*	0	#	D

COMMAND REFERENCE

As mentioned earlier, the DC442 PLUS™ Communications Decoder conforms to the Icom CI-5 interface standard. In this section, all CI-5 command and response bytes are expressed in hexadecimal notation.

The DC442 PLUS™ recognizes twelve different commands. The commands, along with their corresponding responses, are summarized in Table 5 below.

Following the table is a detailed description of each of the commands, including examples illustrating their use. In the command descriptions, "ra" refers to the RECEIVE ADDRESS, and "ta" refers to the TRANSMIT ADDRESS.

The RECEIVE ADDRESS is the address of the DC442 PLUS™. Jumper J4 and/or the CI-5 ADDRESS mode are used to select any address in the range "A0" through "AF" as described earlier. Each device on the CI-5 bus must have its own unique address. The DC442 PLUS™ will not process any command in which the RECEIVE ADDRESS does not match its own currently selected address. However, the DC442 PLUS™ will process commands with a RECEIVE ADDRESS of "00", but all command responses will be suppressed. A RECEIVE ADDRESS of "00" has special meaning. It provides a means for a device on the CI-5 bus to transmit a command to all other devices simultaneously. However, since several simultaneous responses would cause a collision, the responses are suppressed.

The TRANSMIT ADDRESS is the address of the device which is transmitting the command to the DC442 PLUS™. In most cases, this device is a personal computer executing application software, usually referred to as the CONTROLLER. The standard address for the CONTROLLER is "E0", but any address can be used for the TRANSMIT ADDRESS. However, the TRANSMIT ADDRESS must be in the range "01" to "EF". Also, the DC442 PLUS™ will not process any command in which the TRANSMIT ADDRESS matches its own currently selected address.

Table 5. DC442 PLUS™ CI-5 Interface Command Summary.

COMMAND	SUB-COMMAND	DESCRIPTION
04	-	Read mode.
06	-	Write mode.
15	01	Read squelch status.
7F	05	Read status.
7F	06	Read CTCSS tone.
7F	07	Read DCS code.
7F	08	Read DTMF digit.
7F	09	Read identification
7F	30	Write backlight.
7F	32	Clear CTCSS tone.
7F	33	Clear DCS code.
7F	34	Clear DTMF buffer.
7F	35	Clear LTR code.
7F	36	Read LTR code.

READ MODE

Command:

FE	FE	ra	ta	04	FD
----	----	----	----	----	----

Example:

FE	FE	A0	E0	04	FD
----	----	----	----	----	----

Response:

FE	FE	ta	ra	04	md	FD
----	----	----	----	----	----	----

md is a BCD value representing the currently selected operating mode. BCD values are encoded as follows:

- 00: ALL DECODE mode
- 01: CTCSS DECODE mode
- 02: DCS DECODE mode
- 03: DTMF DECODE mode
- 04: DTMF RECALL mode
- 05: LTR DECODE mode
- 06: LTR and DTMF DECODE mode

Examples:

ALL DECODE mode

FE	FE	E0	A0	04	00	FD
----	----	----	----	----	----	----

DCS DECODE mode

FE	FE	E0	A0	04	02	FD
----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the current operating mode. This command is valid at any time.

The mode data is in the form of one byte, consisting of two BCD digits. See the examples shown above.

If the command length is incorrect, the command is ignored, and the error response is returned.

WRITE MODE

Command:

FE	FE	ra	ta	06	md	FD
----	----	----	----	----	----	----

md

 is a BCD value representing the desired operating mode. BCD values are encoded as follows:

00:	ALL DECODE mode
01:	CTCSS DECODE mode
02:	DCS DECODE mode
03:	DTMF DECODE mode
04:	DTMF RECALL mode
05:	LTR DECODE mode
06:	LTR and DTMF DECODE mode

Examples:

CTCSS DECODE mode

FE	FE	A0	E0	06	01	FD
----	----	----	----	----	----	----

DTMF RECALL mode

FE	FE	A0	E0	06	04	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	FB or FA	FD
----	----	----	----	----------	----

Examples:

OK

FE	FE	E0	A0	FB	FD
----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command selects the operating mode. This command is valid at any time.

The mode data is in the form of one byte, consisting of two BCD digits. See the examples shown above.

If the command length is incorrect, or if the received mode data is not valid, the command is ignored, and the error response is returned.

READ SQUELCH STATUS

Command:

FE	FE	ra	ta	15	01	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	15	01	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	15	01	sd	FD
----	----	----	----	----	----	----	----

sd

 is a BCD value representing the current squelch status. BCD values are encoded as follows:

- 00: Squelch closed
- 01: Squelch open
- 99: Squelch input disabled

Examples:

Squelch closed

FE	FE	E0	A0	15	01	00	FD
----	----	----	----	----	----	----	----

Squelch open

FE	FE	E0	A0	15	01	01	FD
----	----	----	----	----	----	----	----

Squelch input disabled

FE	FE	E0	A0	15	01	99	FD
----	----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the current squelch status. This command is valid at any time.

The squelch status data is in the form of one byte, consisting of two BCD digits. See the examples shown above.

If the command length is incorrect, the command is ignored, and the error response is returned.

READ STATUS

Command:

FE	FE	ra	ta	7F	05	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	05	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	7F	05	s1	s2	FD
----	----	----	----	----	----	----	----	----

s1 is a hexadecimal byte representing composite status information. Individual bits are encoded as follows:

- bit 0: BACKLIGHT 0
- bit 1: BACKLIGHT 1
- bit 2: DTMF PENDING
- bit 3: Unused, always 0
- bit 4: DTMF OVERRUN
- bit 5: CTCSS ACTIVE
- bit 6: DCS ACTIVE
- bit 7: Unused, always 0

s2 is a hexadecimal byte representing composite status information. Individual bits are encoded as follows:

- bit 0: MODE 0
- bit 1: MODE 1
- bit 2: MODE 2
- bit 3: Unused, always 0
- bit 4: SQUELCH 0
- bit 5: SQUELCH 1
- bit 6: LTR ACTIVE
- bit 7: Unused, always 0

Examples:

LCD backlight OFF, DTMF digit/s pending, DCS code active, ALL DECODE mode selected, squelch input disabled

FE	FE	E0	A0	7F	05	44	00	FD
----	----	----	----	----	----	----	----	----

LCD backlight AUTO, DTMF digit/s pending, DTMF buffer overrun, DTMF DECODE mode selected, squelch open

FE	FE	E0	A0	7F	05	15	33	FD
----	----	----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the current operating status. This command is valid at any time.

The status data is in the form of two bytes, each consisting of six status bits and two unused bits which are always cleared. The unused bits ensure that the status data always appears as valid BCD digits. The following is a discussion of the use of the status bits contained in the READ STATUS command.

S1, bits 0, 1: BACKLIGHT. These two bits collectively indicate the current LCD backlight status. The backlight status is encoded as follows:

s1, bit 1	s1, bit 0	BACKLIGHT STATUS
0	0	LCD Backlight OFF
0	1	LCD Backlight AUTO
1	0	LCD Backlight ON

The LCD backlight illuminates the front panel display.

s1, bit 2: DTMF PENDING. This bit indicates whether or not one or more DTMF digits are waiting in the 127-digit DTMF buffer. The DTMF buffer status is encoded as follows:

s1, bit 1	DTMF
0	BUFFER EMPTY
1	PENDING

If the DTMF PENDING bit is set, one or more READ DTMF DIGIT commands should be issued to read the new digits. The DTMF PENDING bit is automatically cleared when the last digit is read from the DTMF buffer. The READ DTMF DIGIT command will always return the next DTMF digit in the order received. In other words, the DTMF buffer works like a FIFO. Once the DTMF buffer is empty, the READ DTMF DIGIT command will return a "99" code to indicate that the buffer is empty. This feature eliminates the need to check the DTMF PENDING bit after each digit has been read from the buffer.

s1, bit 3: UNUSED. This bit will always be zero.

s1, bit 4: DTMF OVERRUN. This bit indicates whether or not one or more new DTMF digits have been received after the DTMF buffer is full. It is an indication that one or more DTMF digits have been lost. The DTMF buffer overrun status is encoded as follows:

s1, bit 2	DTMF
0	NORMAL
1	OVERRUN

Any digits received after the DTMF buffer becomes full will cause an equal number of the oldest digits in the buffer to be discarded. In other words, the DTMF buffer always contains the 127 most recent DTMF digits. The DTMF OVERRUN bit is cleared when a READ DTMF DIGIT command is issued. The maximum supported DTMF digit rate is approximately 10 digits per second. Therefore, the DTMF PENDING bit should be checked at least every ten seconds to avoid losing digits.

s1, bit 5: CTCSS ACTIVE. This bit indicates whether or not a valid CTCSS tone is currently being received. The CTCSS tone status is encoded as follows:

s1, bit 5	CTCSS
0	INACTIVE
1	ACTIVE

If the CTCSS ACTIVE bit is set, a READ CTCSS TONE command should be issued to read the CTCSS tone. The READ CTCSS TONE command will always return the most recent CTCSS tone, even if the tone is no longer being received, so the command should only be issued while the CTCSS ACTIVE bit is set. Note that the CTCSS ACTIVE bit does not function the way the DTMF PENDING bit does. The CTCSS ACTIVE bit is only set while a valid CTCSS tone is being received. It does not store the previous occurrence of a CTCSS tone.

s1, bit 6: DCS ACTIVE. This bit indicates whether or not a valid DCS code is currently being received. The DCS code status is encoded as follows:

s1, bit 6	DCS
0	INACTIVE
1	ACTIVE

If the DCS ACTIVE bit is set, a READ DCS CODE command should be issued to read the DCS code. The READ DCS CODE command will always return the most recent DCS code, even if the code is no longer being received, so the command should only be issued while the DCS ACTIVE bit is set. Note that the DCS ACTIVE bit does not function the way the DTMF PENDING bit does. It is only set while a valid DCS code is being received. It does not store the previous occurrence of a DCS code.

s1, bit 7: UNUSED. This bit will always be zero.

s2, bits 0 - 2: MODE. These three bits collectively indicate the currently selected operating mode. The seven operating modes are encoded as follows:

s2, bit 2	s2, bit 1	s2, bit 0	MODE
0	0	0	ALL DECODE
0	0	1	CTCSS DECODE
0	1	0	DCS DECODE
0	1	1	DTMF DECODE
1	0	0	DTMF RECALL
1	0	1	LTR DECODE
1	1	0	LTR & DTMF DECODE

s2, bit 3: UNUSED. This bit will always be zero.

s2, bits 4, 5: SQUELCH. These two bits collectively indicate the current squelch status. The squelch status is encoded as follows:

s2, bit 5	s2, bit 4	SQUELCH STATUS
0	0	Squelch input disabled
1	0	Squelch closed
1	1	Squelch open

s2, bit 6: RESERVED. This bit is reserved for future use.

S2, bit 6: LTR ACTIVE. This bit indicates whether or not a valid LTR code is currently being received. The LTR code status is encoded as follows:

s2, bit 6	LTR
0	INACTIVE
1	ACTIVE

If the LTR ACTIVE bit is set, a READ LTR CODE command should be issued to read the LTR code. The READ LTR CODE command will always return the most recent LTR code, even if the code is no longer being received, so the command should only be issued while the LTR ACTIVE bit is set. Note that the LTR ACTIVE bit does not function the way the DTMF PENDING bit does. It is only set while a valid LTR code is being received. It does not store the previous occurrence of a LTR code.

s2, bit 7: UNUSED. This bit will always be zero.

If the command length is incorrect, the command is ignored, and the error response is returned.

READ CTCSS TONE

Command:

FE	FE	ra	ta	7F	06	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	06	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	7F	06	sd	FD
----	----	----	----	----	----	----	----

Examples:

82.5 Hz

FE	FE	E0	A0	7F	06	08	25	FD
----	----	----	----	----	----	----	----	----

103.5 Hz

FE	FE	E0	A0	7F	06	10	35	FD
----	----	----	----	----	----	----	----	----

No CTCSS tone

FE	FE	E0	A0	7F	06	00	00	FD
----	----	----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the most recent CTCSS tone. This command is valid at any time.

The CTCSS data is in the form of two bytes, each consisting of two BCD digits. The order of the four BCD digits is as follows: 100 Hz digit, 10 Hz digit, 1 Hz digit, 0.1 Hz digit. See the examples shown above. A complete list of the CTCSS tones decoded by the DC442 PLUS™ is given in Table 2.

If the command length is incorrect, the command is ignored, and the error response is returned.

READ DCS CODE

Command:

FE	FE	ra	ta	7F	07	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	07	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	7F	07	sd	FD
----	----	----	----	----	----	----	----

Examples:

023

FE	FE	E0	A0	7F	07	00	23	FD
----	----	----	----	----	----	----	----	----

732

FE	FE	E0	A0	7F	07	07	32	FD
----	----	----	----	----	----	----	----	----

No DCS code

FE	FE	E0	A0	7F	07	00	00	FD
----	----	----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the most recent DCS code. This command is valid at any time.

The DCS data is in the form of two bytes, each consisting of two BCD digits. The order of the four BCD digits is as follows: unused digit (always 0), 100's digit, 10's digit, 1's digit. See the examples shown above. A complete list of the DCS codes decoded by the DC442 PLUS™ is given in Table 3.

If the command length is incorrect, the command is ignored, and the error response is returned.

READ DTMF DIGIT

Command:

FE	FE	ra	ta	7F	08	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	08	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	7F	08	sd	FD
----	----	----	----	----	----	----	----

sd

 is a BCD value representing the next DTMF digit. BCD values are encoded as follows:

00:	"0"	08:	"8"	99:	DTMF Buffer Empty
01:	"1"	09:	"9"		
02:	"2"	10:	"A"		
03:	"3"	11:	"B"		
04:	"4"	12:	"C"		
05:	"5"	13:	"D"		
06:	"6"	14:	"*"		
07:	"7"	15:	"#"		

Examples:

"3"

FE	FE	E0	A0	7F	08	03	FD
----	----	----	----	----	----	----	----

"A"

FE	FE	E0	A0	7F	08	10	FD
----	----	----	----	----	----	----	----

DTMF Buffer Empty

FE	FE	E0	A0	7F	08	99	FD
----	----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the next DTMF digit waiting in the DTMF buffer. This command is valid at any time.

The DTMF data is in the form of one byte, consisting of two BCD digits. The BCD digits are encoded as shown above. Each issuance of the READ DTMF DIGIT command causes the next digit in the DTMF buffer to be sent in the order it was received, in a First-In-First-Out (FIFO) fashion. Once the DTMF buffer is empty, the READ DTMF DIGIT command returns the DTMF Buffer Empty code. See the examples shown above.

If the command length is incorrect, the command is ignored, and the error response is returned.

READ IDENTIFICATION

Command:

FE	FE	ra	ta	7F	09	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	09	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	7F	09	id	sv	iv	FD
----	----	----	----	----	----	----	----	----	----

Example:

DC442 PLUS™, software version 1.0, interface version 1.0

FE	FE	E0	A0	7F	09	34	34	32	10	10	FD
----	----	----	----	----	----	----	----	----	----	----	----

Description:

This command instructs the unit to send the identification information. This command is valid at any time.

The identification data is in the form of five bytes, each consisting of two BCD digits. The first six BCD digits uniquely identify the device. The next two BCD digits indicate the current software version. The last two BCD digits indicate the current interface version.

If the command length is incorrect, the command is ignored, and the error response is returned.

WRITE BACKLIGHT

Command:

FE	FE	ra	ta	7F	30	bd	FD
----	----	----	----	----	----	----	----

bd

 is a BCD value representing the currently selected backlight mode. BCD values are encoded as follows:

- 00: LCD backlight OFF
- 01: LCD backlight AUTO
- 02: LCD backlight ON

Examples:

LCD backlight AUTO

FE	FE	A0	E0	7F	30	01	FD
----	----	----	----	----	----	----	----

LCD backlight OFF

FE	FE	A0	E0	7F	30	00	FD
----	----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	FB or FA	FD
----	----	----	----	----------	----

Examples:

OK

FE	FE	E0	A0	FB	FD
----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command selects the LCD backlight mode. This command is valid at any time.

The backlight data is in the form of one byte, consisting of two BCD digits. See the examples shown above. When the LCD backlight is enabled, the front panel character display is illuminated.

If the command length is incorrect, or if the received backlight data is not valid, the command is ignored, and the error response is returned.

CLEAR CTCSS TONE

Command:

FE	FE	ra	ta	7F	32	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	32	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	FB or FA	FD
----	----	----	----	----------	----

Examples:

OK

FE	FE	E0	A0	FB	FD
----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command clears the CTCSS tone. This command is valid at any time.

If the command length is incorrect, the command is ignored, and the error response is returned.

CLEAR DCS CODE

Command:

FE	FE	ra	ta	7F	33	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	33	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	FB or FA	FD
----	----	----	----	----------	----

Examples:

OK

FE	FE	E0	A0	FB	FD
----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command clears the DCS code. This command is valid at any time.

If the command length is incorrect, the command is ignored, and the error response is returned.

CLEAR DTMF BUFFER

Command:

FE	FE	ra	ta	7F	34	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	34	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	FB or FA	FD
----	----	----	----	----------	----

Examples:

OK

FE	FE	E0	A0	FB	FD
----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command clears the entire 127-digit DTMF buffer. This command is valid at any time.

If the command length is incorrect, the command is ignored, and the error response is returned.

CLEAR LTR CODE

Command:

FE	FE	ra	ta	7F	35	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	35	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	FB or FA	FD
----	----	----	----	----------	----

Examples:

OK

FE	FE	E0	A0	FB	FD
----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command clears the LTR code. This command is valid at any time.

If the command length is incorrect, the command is ignored, and the error response is returned.

READ LTR CODE

Command:

FE	FE	ra	ta	7F	36	FD
----	----	----	----	----	----	----

Example:

FE	FE	A0	E0	7F	36	FD
----	----	----	----	----	----	----

Response:

FE	FE	ta	ra	7F	36	sd	FD
----	----	----	----	----	----	----	----

Examples:

023

FE	FE	E0	A0	7F	07	00	23	FD
----	----	----	----	----	----	----	----	----

732

FE	FE	E0	A0	7F	07	07	32	FD
----	----	----	----	----	----	----	----	----

No LTR code

FE	FE	E0	A0	7F	07	00	00	FD
----	----	----	----	----	----	----	----	----

Error

FE	FE	E0	A0	FA	FD
----	----	----	----	----	----

Description:

This command instructs the unit to send the most recent LTR code. This command is valid at any time.

The LTR data is in the form of two bytes, each consisting of two BCD digits. The order of the four BCD digits is as follows: unused digit (always 0), 100's digit, 10's digit, 1's digit. See the examples shown above. A complete list of the DCS codes decoded by the DC442 PLUS™ is given in Table 3.

If the command length is incorrect, the command is ignored, and the error response is returned.

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