



FT-710

CAT Operation Reference Manual

YAESU MUSEN CO., LTD.

CAT (Computer Aided Transceiver) Operation

Overview

The CAT (Computer Aided Transceiver) System in the **FT-710** transceiver provides control of frequency, VFO, memory, and other settings such as dual-channel memories and diversity reception using an external personal computer. This allows multiple control operations to be fully automated with single mouse clicks, or keystroke operations on the computer keyboard.

YAESU MUSEN does not produce CAT System operating software due to the wide variety of personal computers and operating systems in use today. However, the information provided in this chapter explains the serial data structure and opcodes used by the CAT system. This information, along with the short programming examples, is intended to help you start writing programs on your own. As you become more familiar with CAT operation, you can customize programs for your operating needs and utilize the full operating potential of this system.

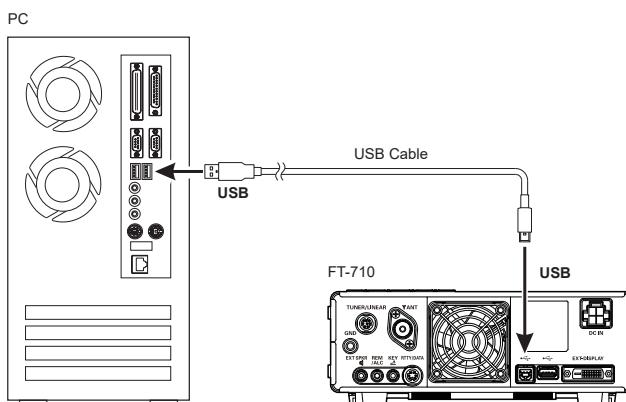
Using the USB Cable (CAT-1 / CAT-2)

The **FT-710** transceiver has a built-in USB to Dual UART Bridge, allowing direct connection from the rear-panel USB jack to the USB jack of a computer without the need for an interface device, simply use a USB cable to connect to the USB jack on the computer.



To connect to a PC using a USB cable, a Virtual COM port driver must be installed on the PC.

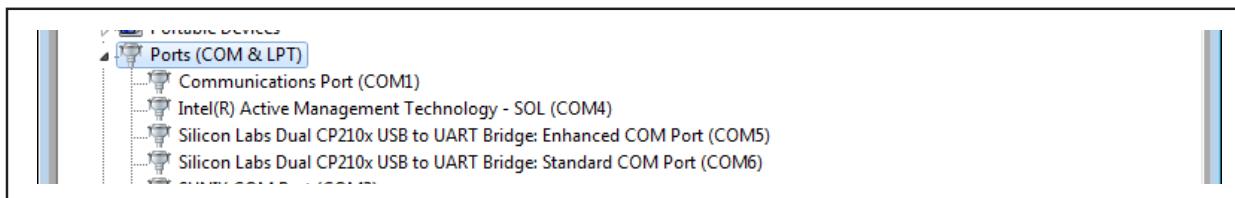
Visit the Yaesu website <http://www.yaesu.com/> to download the Virtual COM port driver and Installation Manual.



How to Confirm the Installation, and the COM Port Number

After the FT-710 and computer are connected, confirm that the virtual COM driver has been installed successfully:

1. Press and hold the ON/OFF switch to turn the transceiver ON.
2. Connect the transceiver and PC with a commercially available USB cable (A-B).
3. Open the “Device Manager” screen in Windows.
4. On the Device Manager screen, double-click “Port (COM & LPT)”.



“Silicon Labs Dual CP210x USB to UART Bridge : Enhanced COM Port (COM**)"

“Silicon Labs Dual CP210x USB to UART Bridge : Standard COM Port (COM**)"

*(The number in the “(COM**)” portion may vary from computer to computer.)

The above example indicates that COM5 can be used for CAT communications (CAT-1), while COM6 can be used for TX control (PTT, CW Keying, Digital Mode Operation) or CAT communications (CAT-2).

When performing software port configuration, select the COM port numbers that were confirmed using the procedure above.



If a “!” or “X” is displayed for the port on the Device Manager, uninstall and reinstall the virtual COM driver.

CAT (Computer Aided Transceiver) Operation

The FT-710 contains two virtual COM ports, an Enhanced COM Port and a Standard COM Port.

These ports offer the following functions:

- **Enhanced COM Port (CAT-1):** CAT Communications (Frequency and Communication Mode Settings)
- **Standard COM Port (CAT-2):** TX Controls (PTT control, CW Keying, Digital Mode Operation) or CAT Communications (Frequency and Communication Mode Settings)*

When performing software port configuration, select the COM port numbers that were confirmed using the procedure above, use the two confirmed COM port numbers for each software function. The frequency and communication mode and PTT control can be set from the software, and CW keying, digital communication, etc. can be performed simultaneously.

***NOTE:** (When using a standard COM port (CAT-2) for CAT communication (setting frequency, communication mode, etc.) and using hardware flow control by RTS or DTR, be sure to set the following menu items to “**OFF**” (factory default) or set to “**DAKY**” to disable PTT control by RTS or DTR.)

Menu Item	Menu Function	Available Settings (Default: Bold)
RADIO SETTING	MODE SSB	OFF / RTS / DTR / DAKY
	MODE AM	OFF / RTS / DTR / DAKY
	MODE FM	OFF / RTS / DTR / DAKY
	MODE PSK/DATA	OFF / RTS / DTR / DAKY
	MODE RTTY	OFF / RTS / DTR / DAKY
CW SETTING	MODE CW	OFF / RTS / DTR / DAKY
	PC KEYING	OFF / RTS / DTR / DAKY
PRESET	PRESET1 - 5	OFF / RTS / DTR / DAKY

- !**
- If a transceiver with a different serial number is connected and turned on, different COM port numbers will be assigned to it, making it possible to perform individual COM port configurations for separate transceivers.
 - When using the USB cable for TX control, the transceiver may switch to the transmit mode when the computer is started.
 - Always close the application on the computer before disconnecting the USB cable.

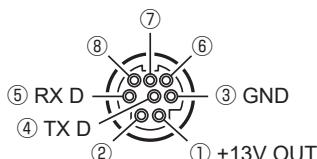
CAT (Computer Aided Transceiver) Operation

Using the RS-232C (CAT-3)

The TUNER/LINEAR jack on the rear panel can be used for CAT communication (5V TTL level serial communication). Set to "CAT-3" in the setting menu [OPERATION SETTING] → [GENERAL] → [TUN/LIN PORT SELECT]. (Factory setting: EXT-TUNER)

- Since the serial communication of this jack is 5V TTL level, it cannot be directly connected to the RS-232C terminal of the PC.
- The connection cable must be prepared by yourself using the optional band data cable CT-58 (mini DIN 8-pin to DIN 8-pin).
- CAT communication cannot be used simultaneously with an external antenna tuner or linear amplifier.

TUNER/LINEAR Jack



(as viewed from rear panel)

Pin No.	Pin Name	I/O	Function
①	+13V	—	13 VDC output linked to radio ON
②	N/A	—	—
③	GND	—	Signal Ground
④	TXD	Output	Outputs the Serial Data from the transceiver to the PC (5V TTL)
⑤	RXD	Input	Inputs the Serial Data from the PC to the transceiver (5V TTL)
⑥	N/A	—	—
⑦	N/A	—	—
⑧	N/A	—	—

Communication Parameters

- Asynchronous communication
- Baud rate: 38400bps* (CAT-1, CAT-3 terminals) or 4800bps* (CAT-2 terminal)
- Start bit: 1
- Data bits: 8
- Stop bits: 1 or 2* (CAT-2: 1 (Fixed))
- Paritybits: None

*(Factory default)

CAT communication settings can be changed using the following menu items.

Menu Item	Menu Function	Available Settings (Default: Bold)
OPERATION SETTING	CAT-1 RATE	4800 / 9600 / 19200 / 38400 / 115200 (bps)
	CAT-1 TIME OUT TIMER	10 / 100 / 1000 / 3000 (msec)
	CAT-1 CAT-3 STOP BIT	1bit / 2bit
	CAT-2 RATE	4800 / 9600 / 19200 / 38400 / 115200 (bps)
	CAT-2 TIME OUT TIMER	10 / 100 / 1000 / 3000 (msec)
	CAT-3 RATE	4800 / 9600 / 19200 / 38400 / 115200 (bps)
	CAT-3 TIME OUT TIMER	10 / 100 / 1000 / 3000 (msec)

CAT (Computer Aided Transceiver) Operation

Control Command

A computer control command is composed of an alphabetical command, various parameters, and the terminator that signals the end of the control command.

Example: Set the VFO-A frequency to 14.250000 MHz.

FA 014250000 ;
↑ ↑ ↑
Command Parameter Terminator

There are three commands for the **FT-710** as shown below:

- Set** command: Set a particular condition (to the **FT-710**)
- Read** command: Reads an answer (from the **FT-710**)
- Answer** command: Transmits a condition (from the **FT-710**)

For example, note the following case of the FA command (Set the VFO-A frequency):

- To set the VFO-A frequency to 14.250000 MHz, the following command is sent from the computer to the transceiver:
“**FA014250000;**” (Set command)
- To read the VFO-A frequency, the following command is sent from the computer to the transceiver:
“**FA;**” (Read command)
- When the Read command above has been sent, the following command is returned to the computer:
“**FA014250000;**” (Answer command)

Alphabetical Commands

A command consists of 2 alphabetical characters.

You may use either lower or upper case characters. The commands available for this transceiver are listed in the “PC Control Command Tables” on the following pages.

Parameters

Parameters are used to specify information necessary to implement the desired command.

The parameters to be used for each command are predetermined. The number of digits assigned to each parameter is also predetermined. Refer to the “Control Command List” and the “Control Command Tables” to configure the appropriate parameters.

When configuring parameters, be careful not to make the following mistakes.

For example,

when the correct parameter is “**IS00+1000**” (IF SHIFT):

- IS001000;**
Not enough parameters specified (No direction (+) given for the IF shift)
- IS00+100;**
Not enough digits (Only three frequency digits given)
- IS00_+1000;**
Unnecessary characters between parameters
- IS00+10000;**
Too many digits (Five frequency digits given)

Note: If a particular parameter is not applicable to the **FT-710**, the parameter digits should be filled using any character except the ASCII control codes (00 to 1Fh) and the terminator (;).

Terminator

To signal the end of a command, it is necessary to use a semicolon (;). The digit where this special character must appear differs depending on the command used.

CAT (Computer Aided Transceiver) Operation

CAT Control Command List

Command	Function	Set	Read	Ans.	AI
AB	VFO-A TO VFO-B	O	X	X	X
AC	ANTENNA TUNER CONTROL	O	O	O	O
AG	AF GAIN	O	O	O	O
AI	AUTO INFORMATION	O	O	O	X
AM	VFO-A TO MEMORY CHANNEL	O	X	X	X
AO	AMC OUTPUT LEVEL	O	O	O	O
AS	AESS	O	O	O	X
AV	ANTI VOX LEVEL	O	O	O	O
BA	VFO-B TO VFO-A	O	X	X	X
BC	AUTO NOTCH (DNF)	O	O	O	O
BD	BAND DOWN	O	X	X	X
BI	BREAK-IN	O	O	O	O
BM	VFO-B TO MEMORY CHANNEL	O	X	X	X
BP	MANUAL NOTCH	O	O	O	O
BS	BAND SELECT	O	X	X	X
BU	BAND UP	O	X	X	X
CF	CLAR (Clarifier)	O	O	O	O
CH	CHANNEL UP/DOWN	O	X	X	X
CN	CTCSS NUMBER	O	O	O	O
CO	CONTOUR/APF	O	O	O	O
CS	CW SPOT	O	O	O	O
CT	CTCSS	O	O	O	O
DA	LCD CONTRAST/ DIMMER	O	O	O	X
DN	DOWN	O	X	X	X
DT	DATE AND TIME	O	O	O	X
EO	ENCODE OFFSET	O	X	X	X
EX	MENU	O	O	O	O
FA	FREQUENCY VFO-A	O	O	O	O
FB	FREQUENCY VFO-B	O	O	O	O
FN	FINE TUNING	O	O	O	O
FT	FUNCTION TX	O	O	O	O
GP	GP OUT A/B/C/D	O	O	O	X
GT	AGC FUNCTION	O	O	O	O
ID	IDENTIFICATION	X	O	O	X
IF	INFORMATION (VFO-A)	X	O	O	O
IS	IF SHIFT	O	O	O	O
KM	KEYER MEMORY	O	O	O	X
KP	KEY PITCH	O	O	O	O
KR	KEYER	O	O	O	O
KS	KEY SPEED	O	O	O	O
KY	CW KEYING	O	X	X	X
LK	LOCK	O	O	O	O
LM	LOAD MESSAGE	O	O	O	X
MA	MEMORY CHANNEL TO VFO-A	O	X	X	X
MB	MEMORY CHANNEL TO VFO-B	O	X	X	X
MC	MEMORY CHANNEL	O	O	O	X
MD	MODE	O	O	O	O

Command	Function	Set	Read	Ans.	AI
MG	MIC GAIN	O	O	O	O
ML	MONITOR LEVEL	O	O	O	O
MR	MEMORY READ	X	O	O	X
MS	METER SW	O	O	O	O
MT	MEMORY CHANNEL WRITE/TAG	O	O	O	X
MW	MEMORY WRITE	O	X	X	X
MX	MOX SET	O	O	O	O
NA	NARROW	O	O	O	O
NB	NOISE BLANKER	O	O	O	O
NL	NOISE BLANKER LEVEL	O	O	O	O
NR	NOISE REDUCTION (DNR)	O	O	O	O
OI	OPPOSITE BAND (VFO-B) INFORMATION	X	O	O	O
OS	OFFSET (Repeater Shift)	O	O	O	O
PA	PRE-AMP (IPO)	O	O	O	O
PB	PLAY BACK	O	O	O	X
PC	POWER CONTROL	O	O	O	O
PL	SPEECH PROCESSOR LEVEL	O	O	O	O
PR	SPEECH PROCESSOR	O	O	O	O
PS	POWER SWITCH	O	O	O	X
QI	QMB STORE	O	X	X	X
QR	QMB RECALL	O	X	X	X
RA	RF ATTENUATOR	O	O	O	O
RG	RF GAIN	O	O	O	O
RI	RADIO INFORMATION	X	O	O	O
RL	NOISE REDUCTION (DNR) LEVEL	O	O	O	O
RM	READ METER	X	O	O	O
SC	SCAN	O	O	O	O
SD	SEMI BREAK-IN DELAY TIME	O	O	O	O
SF	SUB DIAL	O	O	O	O
SH	WIDTH	O	O	O	O
SM	S METER	X	O	O	X
SQ	SQUELCH LEVEL	O	O	O	O
SS	SPECTRUM SCOPE	O	O	O	O
ST	SPLIT	O	O	O	O
SV	SWAP VFO	O	X	X	X
TS	TXW	O	O	O	O
TX	TX SET	O	O	O	O
UP	UP	O	X	X	X
VD	VOX DELAY TIME	O	O	O	O
VE	FIRMWARE VERSION	X	O	O	X
VG	VOX GAIN	O	O	O	O
VM	[V/M] KEY FUNCTION	O	X	X	X
VS	VFO SELECT	O	O	O	O
VX	VOX	O	O	O	O
ZI	ZERO IN	O	X	X	X

CAT (Computer Aided Transceiver) Operation

AB	VFO-A TO VFO-B									
Set	1	2	3	4	5	6	7	8	9	10
	A	B	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

AC	ANTENNA TUNER CONTROL									
Set	1	2	3	4	5	6	7	8	9	10
	A	C	P1	P2	P3	;				
Read	1	2	3	4	5	6	7	8	9	10
	A	C	;							
Answer	1	2	3	4	5	6	7	8	9	10
	A	C	P1	P2	P3	;				

P1 0: (Fixed)
 P2 0: Internal or External Antenna Tuner
 1: -
 2: ATAS
 P3 P2=0 (Antenna Tuner):
 0: Tuner "OFF" (Tuning Stop)
 1: Tuner "ON"
 2: Tuning Start
 P2=2 (ATAS):
 0: Tuning Stop
 1: Tuning frequency up (50 msec)
 2: Tuning frequency down (50 msec)
 3: Tuning Start

AG	AF GAIN									
Set	1	2	3	4	5	6	7	8	9	10
	A	G	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	A	G	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	A	G	P1	P2	P2	P2	;			

P1 0: (Fixed)
 P2 000 - 255

AI	AUTO INFORMATION									
Set	1	2	3	4	5	6	7	8	9	10
	A	I	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	A	I	;							
Answer	1	2	3	4	5	6	7	8	9	10
	A	I	P1	;						

NOTES:
 • When the status of the radio changes, the Read value of the AI applicable command (see "CAT Control Command List" (page 5)) is automatically sent to the PC.
 • Set ON/OFF for each CAT-1, CAT-2, and CAT-3.
 • This parameter is set to "0" (OFF) automatically when the transceiver is turned "OFF".

AM	VFO-A TO MEMORY CHANNEL									
Set	1	2	3	4	5	6	7	8	9	10
	A	M	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

AO	AMC OUTPUT LEVEL									
Set	1	2	3	4	5	6	7	8	9	10
	A	O	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	A	O	;							
Answer	1	2	3	4	5	6	7	8	9	10
	A	O	P1	P1	P1	;				

P1 001-100: AMC OUTPUT LEVEL

AS	AESS									
Set	1	2	3	4	5	6	7	8	9	10
	A	S	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	A	S	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	A	S	P1	P2	P2	P2	;			

P1 1: AESSION LEVEL
 2: AESSION-CF (Cut off frquecnly)
 P2 P1=1 (AESSION LEVEL):
 P2: 000 - 100
 P1=2 (AESSION-CF (Cut off frquecnly)):
 001: 700Hz
 002: 1000Hz

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AV	ANTI VOX LEVEL									
Set	1	2	3	4	5	6	7	8	9	10
	A	V	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	A	V	;							
Answer	1	2	3	4	5	6	7	8	9	10
	A	V	P1	P1	P1	;				

P1 001-100: ANTI VOX LEVEL

BA	VFO-B TO VFO-A									
Set	1	2	3	4	5	6	7	8	9	10
	B	A	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

BC	AUTO NOTCH									
Set	1	2	3	4	5	6	7	8	9	10
	B	C	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	B	C	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	B	C	P1	P2	;					

P1 0: (Fixed)
P2 0: Auto Notch "OFF"
1: Auto Notch "ON"

BD	BAND DOWN									
Set	1	2	3	4	5	6	7	8	9	10
	B	D	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 0: MAIN BAND
1: SUB BAND

BI	BREAK-IN									
Set	1	2	3	4	5	6	7	8	9	10
	B	I	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	B	I	;							
Answer	1	2	3	4	5	6	7	8	9	10
	B	I	P1	;						

P1 0: Break-in "OFF"
1: Break-in "ON"

BM	VFO-B TO MEMORY CHANNEL									
Set	1	2	3	4	5	6	7	8	9	10
	B	M	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

BP	MANUAL NOTCH									
Set	1	2	3	4	5	6	7	8	9	10
	B	P	P1	P2	P3	P3	P3	;		
Read	1	2	3	4	5	6	7	8	9	10
	B	P	P1	P2	;					
Answer	1	2	3	4	5	6	7	8	9	10
	B	P	P1	P2	P3	P3	P3	;		

P1 0: (Fixed)
P2 0: Manual NOTCH "ON/OFF"
1: Manual NOTCH Frequency
P3 P2=0
 000: "OFF"
 001: "ON"
P2=1
 001 - 320 (NOTCH Frequency : x 10 Hz)

BS	BAND SELECT									
Set	1	2	3	4	5	6	7	8	9	10
	B	S	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 00: 1.8 MHz 06: 18 MHz
01: 3.5 MHz 07: 21 MHz
02: 5 MHz 08: 24.5 MHz
03: 7 MHz 09: 28 MHz
04: 10 MHz 10: 50 MHz
05: 14 MHz 11: 70 MHz/GEN

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BU	BAND UP									
Set	1	2	3	4	5	6	7	8	9	10
	B	U	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 0: MAIN BAND
1: SUB BAND

CF	CLAR ON/OFF										
Set	1	2	3	4	5	6	7	8	9	10	11
	C	F	P1	P2	P3	P4	P5	P6	P7	P8	;
Read	1	2	3	4	5	6	7	8	9	10	11
	C	F	P1	P2	P3	;					
Answer	1	2	3	4	5	6	7	8	9	10	11
	C	F	P1	P2	P3	P4	P5	P6	P7	P8	;

P1 0: MAIN BAND
1: SUB BAND
P2 0: (Fixed)
P3 0: CLAR Setting
1: CLAR Frequency
P3=1 (CLAR Frequency):
P4 + / -
P5-P8 0000 - 9999 Hz
P3=0 (CLAR Setting):
P4 0: RX CLAR OFF
1: RX CLAR ON
P5 0: TX CLAR OFF
1: TX CLAR ON
P6-P8 0: (Fixed)

CH	CHANNEL UP/DOWN										
Set	1	2	3	4	5	6	7	8	9	10	
	C	H	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

P1 0: Memory Channel "UP"
1: Memory Channel "DOWN"

CN	CTCSS TONE FREQUENCY										
Set	1	2	3	4	5	6	7	8	9	10	
	C	N	P1	P2	P3	P3	P3	;			
Read	1	2	3	4	5	6	7	8	9	10	
	C	N	P1	P2	;						
Answer	1	2	3	4	5	6	7	8	9	10	
	C	N	P1	P2	P3	P3	P3	;			

Table 1 (CTCSS Tone Chart)

000	67.0 Hz	009	91.5 Hz	018	123.0 Hz	027	162.2 Hz	036	189.9 Hz	045	229.1 Hz
001	69.3 Hz	010	94.8 Hz	019	127.3 Hz	028	165.5 Hz	037	192.8 Hz	046	233.6 Hz
002	71.9 Hz	011	97.4 Hz	020	131.8 Hz	029	167.9 Hz	038	196.6 Hz	047	241.8 Hz
003	74.4 Hz	012	100.0 Hz	021	136.5 Hz	030	171.3 Hz	039	199.5 Hz	048	250.3 Hz
004	77.0 Hz	013	103.5 Hz	022	141.3 Hz	031	173.8 Hz	040	203.5 Hz	049	254.1 Hz
005	79.7 Hz	014	107.2 Hz	023	146.2 Hz	032	177.3 Hz	041	206.5 Hz	-	-
006	82.5 Hz	015	110.9 Hz	024	151.4 Hz	033	179.9 Hz	042	210.7 Hz	-	-
007	85.4 Hz	016	114.8 Hz	025	156.7 Hz	034	183.5 Hz	043	218.1 Hz	-	-
008	88.5 Hz	017	118.8 Hz	026	159.8 Hz	035	186.2 Hz	044	225.7 Hz	-	-

CO	CONTOUR										
Set	1	2	3	4	5	6	7	8	9	10	
	C	O	P1	P2	P3	P3	P3	P3	;		
Read	1	2	3	4	5	6	7	8	9	10	
	C	O	P1	P2	;						
Answer	1	2	3	4	5	6	7	8	9	10	
	C	O	P1	P2	P3	P3	P3	P3	;		

P1 0: (Fixed)
P2 0: CONTOUR "ON/OFF"
1: CONTOUR FREQ
P2=1 0010 - 3200
(CONTOUR Frequency:10 - 3200Hz)
2: APF "ON/OFF"
P2=2 0000: APF "OFF"
0001: APF "ON"
P2=3 0000 - 0050 (APF Frequency: -250 - 250 Hz)

CS	CW SPOT										
Set	1	2	3	4	5	6	7	8	9	10	
	C	S	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	C	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	S	P1	;							

CAT (Computer Aided Transceiver) Operation

CT	CTCSS										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN BAND 1: SUB BAND P2 0: CTCSS "OFF" 1: CTCSS ENC "ON" / DEC "ON" 2: CTCSS ENC "ON" / DEC "OFF"
	C	T	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	P1 00: (Fixed) P2 00 - 20: TFT Display Contrast P3 00 - 20: TFT Display Brightness Level P4 00 - 20: LED Indicators Brightness Level
	C	T	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	P1 00: (Fixed) P2 00 - 20: TFT Display Contrast P3 00 - 20: TFT Display Brightness Level P4 00 - 20: LED Indicators Brightness Level
	C	T	P1	P2	;						

DA	DIMMER										
Set	1	2	3	4	5	6	7	8	9	10	P1 00: (Fixed) P2 00 - 20: TFT Display Contrast P3 00 - 20: TFT Display Brightness Level P4 00 - 20: LED Indicators Brightness Level
	D	A	P1	P1	P2	P2	P3	P3	P4	P4	
Read	1	2	3	4	5	6	7	8	9	10	P1 00: (Fixed) P2 00 - 20: TFT Display Contrast P3 00 - 20: TFT Display Brightness Level P4 00 - 20: LED Indicators Brightness Level
	D	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	P1 00: (Fixed) P2 00 - 20: TFT Display Contrast P3 00 - 20: TFT Display Brightness Level P4 00 - 20: LED Indicators Brightness Level
	D	A	P1	P1	P2	P2	P3	P3	P4	P4	

DN	MIC DOWN										
Set	1	2	3	4	5	6	7	8	9	10	
	D	N	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

DT	DATE AND TIME										
Set	1	2	3	4	5	6	7	~	n-1	n	P1 0: Date 1: Time (UTC) P2 P1=0 yyyymmdd (Year/Month/Date) P1=1 hhmmss (Hour/Minute/Second, 24 hour time system)
	D	T	P1	P2	P2	P2	P2	~	P2	;	
Read	1	2	3	4	5	6	7	8	9	10	P1 0: Date 1: Time (UTC) P2 P1=0 yyyymmdd (Year/Month/Date) P1=1 hhmmss (Hour/Minute/Second, 24 hour time system)
	D	T	P1	;							
Answer	1	2	3	4	5	6	7	~	n-1	n	P1 0: Date 1: Time (UTC) P2 P1=0 yyyymmdd (Year/Month/Date) P1=1 hhmmss (Hour/Minute/Second, 24 hour time system)
	D	T	P1	P2	P2	P2	P2	~	P2	;	

EO	ENCODER OFFSET										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) 0: MAIN Dial 1: FUNC Knob 2: STEP+MCH/DSP Knob P3 +: UP -: DOWN P4 P2 = 0 (MAIN dial) 0: Hz 1: kHz 2: MHz P2 = 1 or 2 0: (Fixed) P5 000 - 999 (Offset Frequency: 000 - 999 Hz / 000 - 999 kHz / 000 - 999 MHz)
	E	O	P1	P2	P3	P4	P5	P5	P5	;	
Read	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) 0: MAIN Dial 1: FUNC Knob 2: STEP+MCH/DSP Knob P3 +: UP -: DOWN P4 P2 = 0 (MAIN dial) 0: Hz 1: kHz 2: MHz P2 = 1 or 2 0: (Fixed) P5 000 - 999 (Offset Frequency: 000 - 999 Hz / 000 - 999 kHz / 000 - 999 MHz)
Answer	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) 0: MAIN Dial 1: FUNC Knob 2: STEP+MCH/DSP Knob P3 +: UP -: DOWN P4 P2 = 0 (MAIN dial) 0: Hz 1: kHz 2: MHz P2 = 1 or 2 0: (Fixed) P5 000 - 999 (Offset Frequency: 000 - 999 Hz / 000 - 999 kHz / 000 - 999 MHz)

EX	MENU										
Set	1	2	3	4	5	6	7	8	9	~	P1 : 01 - 04, 05 P2 : 01 - 05 P3 : 01 - 26 P4 : Parameter (See Table 2)
	E	X	P1	P1	P2	P2	P3	P3	P4	~	
Read	1	2	3	4	5	6	7	8	9	10	P1 : 01 - 04, 05 P2 : 01 - 05 P3 : 01 - 26 P4 : Parameter (See Table 2)
	E	X	P1	P1	P2	P2	P3	P3	;		
Answer	1	2	3	4	5	6	7	8	9	~	P1 : 01 - 04, 05 P2 : 01 - 05 P3 : 01 - 26 P4 : Parameter (See Table 2)
	E	X	P1	P1	P2	P2	P3	P3	P4	~	

CAT (Computer Aided Transceiver) Operation

Table 2 (MENU Chart)

P1	P2	P3	Function	P4	Digits
01 (MODE SSB)	01 (MODE SSB)	01	AF TREBLE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		02	AF MIDDLE TONE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		03	AF BASS GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		04	AGC FAST DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		05	AGC MID DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		06	AGC SLOW DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		07	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		08	LCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		09	HCUT FREQ	00: OFF 01: 700 Hz - 17: 4000 Hz (50 Hz steps)	2
		10	HCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		11	USB OUT LEVEL	000 - 100	3
		12	REAR OUT LEVEL	000 - 100	3
		13	TX BPF SEL	0: 50 - 3050 1: 100 - 2900 2: 200 - 2800 3: 300 - 2700 4: 400 - 2600 (Hz)	1
		14	MOD SOURCE	0: MIC 1: USB 2: REAR (RTTY/DATA Jack) 3: AUTO	1
		15	USB MOD GAIN	000 - 100	3
		16	REAR MOD GAIN	000 - 100	3
		17	RPTT SELECT	0: OFF 1: RTS 2: DTR 3: DAKY	1
		18	NAR WIDTH	00: 300 01: 400 02: 600 03: 850 04: 1100 05: 1200 06: 1500 07: 1650 08: 1800 09: 1950 10: 2100 11: 2250 12: 2400 13: 2450 14: 2500 15: 2600 16: 2700 17: 2800 18: 2900 19: 3000 20: 3200 21: 3500 22: 4000 (Hz)	2
		19	CW AUTO MODE	0: OFF 1: 50MHz 2: ON	1
02 (MODE AM)	02 (MODE AM)	01	AF TREBLE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		02	AF MIDDLE TONE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		03	AF BASS GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		04	AGC FAST DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		05	AGC MID DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		06	AGC SLOW DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		07	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		08	LCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		09	HCUT FREQ	00: OFF 01: 700 Hz - 17: 4000 Hz (50 Hz steps)	2
		10	HCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		11	USB OUT LEVEL	000 - 100	3
		12	REAR OUT LEVEL	000 - 100	3
		13	TX BPF SEL	0: 50 - 3050 1: 100 - 2900 2: 200 - 2800 3: 300 - 2700 4: 400 - 2600	1
		14	MOD SOURCE	0: MIC 1: USB 2: REAR (RTTY/DATA Jack) 3: AUTO	1
		15	USB MOD GAIN	000 - 100	3
		16	REAR MOD GAIN	000 - 100	3
		17	RPTT SELECT	0: OFF 1: RTS 2: DTR 3: DAKY (RTTY/DATA Jack)	1
01 (RADIO SETTING)	01 (RADIO SETTING)	01	AF TREBLE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		02	AF MIDDLE TONE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		03	AF BASS GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		04	AGC FAST DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		05	AGC MID DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		06	AGC SLOW DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		07	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		08	LCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		09	HCUT FREQ	00: OFF 01: 700 Hz - 17: 4000 Hz (50 Hz steps)	2
		10	HCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		11	USB OUT LEVEL	000 - 100	3
		12	REAR OUT LEVEL	000 - 100	3
		13	MOD SOURCE	0: MIC 1: USB 2: REAR (RTTY/DATA Jack) 3: AUTO	1
		14	USB MOD GAIN	000 - 100	3
		15	REAR MOD GAIN	000 - 100	3
		16	RPTT SELECT	0: OFF 1: RTS 2: DTR 3: DAKY (RTTY/DATA Jack)	1
		17	RPT SHIFT	0: - 1: SIMPLEX 2: +	1
		18	RPT SHIFT(28MHz)	0 - 1000 kHz (P4 = 0000 - 1000, 10 kHz/step)	4
		19	RPT SHIFT(50MHz)	0 - 4000 kHz (P4 = 0000 - 4000, 10 kHz/step)	4
03 (MODE FM)	03 (MODE FM)	20	ENC/DEC	0: OFF 1: ENC 2: TSQ	1
		21	TONE FREQ	00: 67.0 - 49: 254.1Hz	2
		01	AF TREBLE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		02	AF MIDDLE TONE GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		03	AF BASS GAIN	-20 -00 (or +00) -+10 (P4 = -20 -00 or +00 - +10)	3
		04	AGC FAST DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		05	AGC MID DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		06	AGC SLOW DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		07	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		08	LCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		09	HCUT FREQ	00: OFF 01: 700 Hz - 17: 4000 Hz (50 Hz steps)	2
		10	HCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		11	USB OUT LEVEL	000 - 100	3
		12	REAR OUT LEVEL	000 - 100	3
		13	TX BPF SEL	0: 50 - 3050 1: 100 - 2900 2: 200 - 2800 3: 300 - 2700 4: 400 - 2600	1
		14	MOD SOURCE	0: MIC 1: USB 2: REAR (RTTY/DATA Jack) 3: AUTO	1
		15	USB MOD GAIN	000 - 100	3
		16	REAR MOD GAIN	000 - 100	3
		17	RPTT SELECT	0: OFF 1: RTS 2: DTR 3: DAKY (RTTY/DATA Jack)	1
04 (MODE PSK/DATA)	04 (MODE PSK/DATA)	18	NAR WIDTH	00: 50 01: 100 02: 150 03: 200 04: 250 05: 300 06: 350 07: 400 08: 450 09: 500 10: 600 11: 800 12: 1200 13: 1400 14: 1700 15: 2000	2
		19	PSK TONE	0: 1000Hz 1: 1500Hz 2: 2000Hz	1
		20	DATA SHIFT (SSB)	0 - 3000 Hz (P4 = 0000 - 3000, 10 Hz steps)	4

CAT (Computer Aided Transceiver) Operation

Table 2 (MENU Chart)

P1	P2	P3	Function	P4	Digits
01 (RADIO SETTING)	05 (MODE RTTY)	01	AF TREBLE GAIN	-20 -00 (or +00) +10 (P4 = -20 -00 or +00 - +10)	3
		02	AF MIDDLE TONE GAIN	-20 -00 (or +00) +10 (P4 = -20 -00 or +00 - +10)	3
		03	AF BASS GAIN	-20 -00 (or +00) +10 (P4 = -20 -00 or +00 - +10)	3
		04	AGC FAST DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		05	AGC MID DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		06	AGC SLOW DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		07	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		08	LCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		09	HCUT FREQ	00: OFF 01: 700 Hz - 67: 4000 Hz (50 Hz steps)	2
		10	HCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		11	USB OUT LEVEL	000 - 100	3
		12	REAR OUT LEVEL	000 - 100	3
		13	RPTT SELECT	0: OFF 1: RTS 2: DTR 3: DAKY (RTTY/DATA Jack)	1
		14	NAR WIDTH	00: 50 01:100 02: 150 03: 200 04: 250 05: 300 06: 350 07: 400 08: 450 09: 500 10: 600 11: 800 12: 1200 13: 1400 14: 1700 15: 2000 16: 2400 17: 3000 18: 3200 19: 3500 20: 4000 (Hz)	2
		15	MARK FREQUENCY	1: 1275 Hz 2: 2125 Hz	1
		16	SHIFT FREQUENCY	1: 170 Hz 2: 200 Hz 3: 425 Hz 4: 850 Hz	1
		17	POLARITY-TX	0: NOR 1: REV	1
02 (CW SETTING)	01 (MODE CW)	01	AF TREBLE GAIN	-20 -00 (or +00) +10 (P4 = -20 -00 or +00 - +10)	3
		02	AF MIDDLE TONE GAIN	-20 -00 (or +00) +10 (P4 = -20 -00 or +00 - +10)	3
		03	AF BASS GAIN	-20 -00 (or +00) +10 (P4 = -20 -00 or +00 - +10)	3
		04	AGC FAST DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		05	AGC MID DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		06	AGC SLOW DELAY	20 - 4000 msec (P4= 0020 - 4000, 20 msec/step)	4
		07	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		08	LCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		09	HCUT FREQ	00: OFF 01: 700 Hz - 67: 4000 Hz (50 Hz steps)	2
		10	HCUT SLOPE	0: 6 dB/oct 1: 18 dB/oct	1
		11	USB OUT LEVEL	000 - 100	3
		12	REAR OUT LEVEL	000 - 100	3
		13	RPTT SELECT	0: OFF 1: RTS 2: DTR 3: DAKY (RTTY/DATA Jack)	1
		14	NAR WIDTH	00: 50 01:100 02: 150 03: 200 04: 250 05: 300 06: 350 07: 400 08: 450 09: 500 10: 600 11: 800 12: 1200 13: 1400 14: 1700 15: 2000 16: 2400 17: 3000 18: 3200 19: 3500 20: 4000 (Hz)	2
		15	PC KEYING	0: OFF 1: RTS 2: DTR 3: DAKY (RTTY/DATA Jack)	1
		16	CW BK-IN TYPE	0: SEMI 1: FULL	1
		17	CW WAVE SHAPE	0: 4 msec 1: 6 msec 2: 8 msec	1
		18	CW FREQ DISPLAY	0: DIRECT FREQ 1: PITCH OFFSET	1
		19	QSK DELAY TIME	0: 15 msec 1: 20 msec 2: 25 msec 3: 30 msec	1
		20	CW INDICATOR	0: OFF 1: ON	1
03 (OPERATION SETTING)	02 (KEYER)	01	KEYER TYPE	0: OFF 1: BUG 2: ELEKEY-A 3: ELEKEY-B 4: ELEKEY-Y 5: ACS	1
		02	KEYER DOT/DASH	0: NOR 1: REV	1
		03	CW WEIGHT	2.5 - 4.5 (P4 = 25 - 45)	2
		04	NUMBER STYLE	0: 1290 1: AUNO 2: AUNT 3: A2NO 4: A2NT 5: 12NO 6: 12NT	1
		05	CONTEST NUMBER	0001 - 9999	4
		06	CW MEMORY 1	0: TEXT 1: MESSAGE	1
		07	CW MEMORY 2	0: TEXT 1: MESSAGE	1
		08	CW MEMORY 3	0: TEXT 1: MESSAGE	1
		09	CW MEMORY 4	0: TEXT 1: MESSAGE	1
		10	CW MEMORY 5	0: TEXT 1: MESSAGE	1
		11	REPEAT INTERVAL	1 - 60 sec (P4 = 01 - 60)	2
		01	BEEP LEVEL	000 - 100	3
		02	RF/SQL VR	0: RF 1: SQL 2:SQL (FM MODE only)	1
		03	TUN/LIN PORT SELECT	0: EXT-TUNER 1: LINEAR 2: CAT-3 3: GPO	1
		04	TUNER TYPE SELECT	0: INT 1: INT (FAST) 2: EXT 3: ATAS	1
03 (OPERATION SETTING)	01 (GENERAL)	05	CAT-1 RATE	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4:115200 bps	1
		06	CAT-1 TIME OUT TIMER	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec	1
		07	CAT-1 CAT-3 STOP BIT	0: 1 bit 1: 2 bit	1
		08	CAT-2 RATE	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4:115200 bps	1
		09	CAT-2 TIME OUT TIMER	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec	1
		10	CAT-3 RATE	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4:115200 bps	1
		11	CAT-3 TIME OUT TIMER	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec	1
		12	QMB CH	0: 5ch 1: 10ch	1
		13	BAND STACK	0: OFF 1: ON	1
		14	MEM GROUP	0: OFF 1: ON	1
		15	TX TIME OUT TIMER	00: OFF 01: 01 min - 30: 30 min (P4= 00 - 30)	2
		16	MIC SCAN	0: OFF 1: ON	1
		17	MIC SCAN RESUME	0: PAUSE 1: TIME	1
		18	REF FREQ ADJ	-25 - +00 (or -00) - +25 (P4= -25 - +00 or -00 - +25)	3
		19	KEYBOARD LANGUAGE	00: JAPANESE 01: ENGLISH(US) 03: FRENCH 04: FRENCH(CA) 06: PORTUGUESE 07: PORTUGUESE(BR) 09: SPANISH(LATAM) 10: ITALIAN 08: SPANISH	2
		20	MIC P1		
		21	MIC P2	00:LOCK 01:QMB 02:A/B 03:V/M 04:TUNER	
		22	MIC P3	05:VOX/MOX 06:MODE 07:ZIN SPOT 08:SPLIT 09:FINE	
		23	MIC P4	10:NAR 11:NB 12:DNR 13:FREQ UP 14:FREQ DOWN	
		24	MIC UP	15:BAND UP 16:BAND DOWN 17 ATT 18:PO 19:DNF	
		25	MIC DOWN	20:AGC	
		26	SCU-LAN10	0: OFF 1: ON	1

CAT (Computer Aided Transceiver) Operation

Table 2 (MENU Chart)

P1	P2	P3	Function	P4	Digits
03 (OPERATION SETTING)	02 (RX-DSP)	01	IF NOTCH WIDTH	0: NARROW 1: WIDE	1
		02	NB REJECTION	0: LOW 1: MID 2: HIGH	1
		03	NB WIDTH	0: NARROW 1: MEDIUM 2: WIDE	1
		04	APF WIDTH	0: NARROW 1: MEDIUM 2: WIDE	1
		05	CONTOUR LEVEL	-40 - -00 (or +00) - +20 (P4 = -40 - -00 or +00 - +20)	3
		06	CONTOUR WIDTH	01 - 11	2
	03 (TX AUDIO)	01	AMC RELEASE TIME	0: FAST 1: MID 2: SLOW	1
		02	PRMTRC EQ1 FREQ	00 : OFF 01: 100 Hz - 07: 700 Hz (100 Hz steps)	2
		03	PRMTRC EQ1 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		04	PRMTRC EQ1 BWTH	00 - 10	2
		05	PRMTRC EQ2 FREQ	00: OFF 01: 700 Hz - 09: 1500 Hz (100 Hz steps)	2
		06	PRMTRC EQ2 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		07	PRMTRC EQ2 BWTH	00 - 10	2
		08	PRMTRC EQ3 FREQ	00 : OFF 01: 1500 Hz - 18: 3200 Hz (100 Hz steps)	2
		09	PRMTRC EQ3 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		10	PRMTRC EQ3 BWTH	00 - 10	2
		11	PPRMTTRC EQ1 FREQ	00 : OFF 01: 100 Hz - 07: 700 Hz (100 Hz steps)	2
		12	PPRMTTRC EQ1 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		13	PPRMTTRC EQ1 BWTH	00 - 10	2
		14	PPRMTTRC EQ2 FREQ	00: OFF 01: 700 Hz - 09: 1500 Hz (100 Hz steps)	2
		15	PPRMTTRC EQ2 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		16	PPRMTTRC EQ2 BWTH	00 - 10	2
		17	PPRMTTRC EQ3 FREQ	00 : OFF 01: 1500 Hz - 18: 3200 Hz (100 Hz steps)	2
		18	PPRMTTRC EQ3 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		19	P PRMTRC EQ3 BWTH	00 - 10	2
	04 (TX GENERAL)	01	HF MAX POWER	5 - 100 (P4 = 005 - 100)	3
		02	50M MAX POWER	5 - 100 (P4 = 005 - 100)	3
		03	70M MAX POWER	5 - 50 (P4 = 005 - 050)	3
		04	AM MAX POWER	5 - 25 (P4 = 005 - 025)	3
		05	VOX SELECT	0: MIC 1: USB 2: REAR (RTTY/DATA Jack)	1
		06	EMERGENCY FREQ TX	0: OFF 1: ON	1
		07	TX INHIBIT	0: OFF 1: ON	1
		08	METER DETECTOR	0: AVERAGE 1: PEAK	1
	05 (TUNING)	01	SSB/CW DIAL STEP	0: 5 1: 10 2: 20 (Hz)	1
		02	RTTY/PSK DIAL STEP	0: 5 1: 10 2: 20 (Hz)	1
		03	CH STEP	0: 1 1: 2.5 2: 5 3: 10 (kHz)	1
		04	AM CH STEP	0: 2.5 1: 5 2: 9 3: 10 4: 12.5 5: 25 (kHz)	1
		05	FM CH STEP	0: 5 1: 6.25 2: 10 3: 12.5 4: 20 5: 25 (kHz)	1
		06	MAIN STEPS PER REV.	0: 50 1: 100 2: 200	1
04 (DISPLAY SETTING)	01 (DISPLAY)	01	MY CALL	Up to 12 characters	12
		02	MY CALL TIME	0: OFF 1: 1 2: 2 3: 3 4: 4 5: 5 (sec)	1
		03	POP-UP TIME	0: FAST 1: MID 2: SLOW	1
		04	SCREEN SAVER	0: OFF 1: 15 2: 30 3: 60 (min)	1
		05	DIMMER LED	00 - 20	2
		06	MOUSE POINTER SPEED	00 - 20	2
	02 (SCOPE)	01	RBW	0: HIGH 1: MID 2: LOW	1
		02	SCOPE CTR	0: FILTER 1: CARRIER POINT	1
		03	2D DISP SENSITIVITY	0: NORMAL 1: HI	1
		04	3DSS DISP SENSITIVITY	0: NORMAL 1: HI	1
	03 (VFO IND COLOR)	01	VMI COLOR VFO-A	0: BLUE 1: GREEN 2: WHITE 3: NONE	1
		02	VMI COLOR VFO-B	0: BLUE 1: GREEN 2: WHITE 3: NONE	1
		03	VMI COLOR MEMORY	0: BLUE 1: GREEN 2: WHITE 3: NONE	1
		04	VMI COLOR CLAR	0: RED 1: NONE	1
	04 (EXT-MONITOR)	01	EXT DISPLAY	0: OFF 1: ON	1
		02	PIXEL	0: 800x480 1: 800x600	1
06 (EXTENSION SETTING)	01 (PRESET1)	01	PRESET NAME	Up to 12 characters	12
		02	CAT-1 RATE	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4: 115200 bps	1
		03	CAT-1 TIME OUT TIMER	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec	1
		04	CAT-1 CAT-3 STOP BIT	0: 1 bit 1: 2 bit	1
	02 (PRESET2)	05	AGC FAST DELAY	20 - 4000 (P4 = 0020 - 4000, 20 msec steps)	4
		06	AGC MID DELAY	20 - 4000 (P4 = 0020 - 4000, 20 msec steps)	4
		07	AGC SLOW DELAY	20 - 4000 (P4 = 0020 - 4000, 20 msec steps)	4
	03 (PRESET3)	08	LCUT FREQ	00: OFF 01: 100 Hz - 19: 1000 Hz (50 Hz steps)	2
		09	LCUT SLOPE	0: 6dB/oct 1: 18dB/oct	1
	04 (PRESET4)	10	HCUT FREQ	00: OFF 01: 700Hz - 67: 4000Hz (50 Hz steps)	2
		11	HCUT SLOPE	0: 6dB/oct 1: 18dB/oct	1
	05 (PRESET5)	12	USB OUT LEVEL	000 - 100	3
		13	REAR OUT LEVEL	000 - 100	3
		14	TX BPF SEL	0: 50 - 3050 1: 100 - 2900 2: 200 - 2800 3: 300 - 2700 4: 400 - 2600 Hz	1
		15	MOD SOURCE	0: MIC 1: USB 2: REAR (RTTY/DATA Jack) 3: AUTO	1
		16	USB MOD GAIN	000 - 100	3
		17	REAR MOD GAIN	000 - 100	3
		18	RPTT SELECT	0: OFF 1: RTS 2:DTR 3:DAKY (RTTY/DATA Jack)	1

CAT (Computer Aided Transceiver) Operation

FA	FREQUENCY VFO-A											
Set	1	2	3	4	5	6	7	8	9	10	11	12
	F	A	P1	;								
Read	1	2	3	4	5	6	7	8	9	10	11	12
	F	A	;									
Answer	1	2	3	4	5	6	7	8	9	10	11	12
	F	A	P1	;								

FB	FREQUENCY VFO-B											
Set	1	2	3	4	5	6	7	8	9	10	11	12
	F	B	P1	;								
Read	1	2	3	4	5	6	7	8	9	10	11	12
	F	B	;									
Answer	1	2	3	4	5	6	7	8	9	10	11	12
	F	B	P1	;								

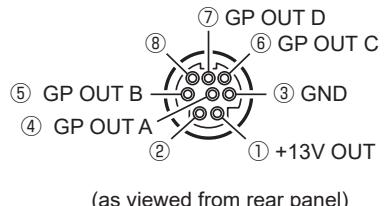
FN	FINE TUNING											
Set	1	2	3	4	5	6	7	8	9	10		
	F	N	P1	;								
Read	1	2	3	4	5	6	7	8	9	10		
	F	N	;									
Answer	1	2	3	4	5	6	7	8	9	10		
	F	N	P1	;								

FT	FUNCTION TX											
Set	1	2	3	4	5	6	7	8	9	10		
	F	T	P1	;								
Read	1	2	3	4	5	6	7	8	9	10		
	F	T	;									
Answer	1	2	3	4	5	6	7	8	9	10		
	F	T	P1	;								

GP	GP OUT											
Set	1	2	3	4	5	6	7	8	9	10		
	G	P	P1	P2	P3	P4	;					
Read	1	2	3	4	5	6	7	8	9	10		
	G	P	;									
Answer	1	2	3	4	5	6	7	8	9	10		
	G	P	P1	P2	P3	P4	;					

P1 0: MAIN Band Transmitter: TX
1: SUB Band Transmitter: TX

TUNER/LINEAR Jack



(as viewed from rear panel)

GT	AGC FUNCTION											
Set	1	2	3	4	5	6	7	8	9	10		
	G	T	P1	P2	;							
Read	1	2	3	4	5	6	7	8	9	10		
	G	T	P1	;								
Answer	1	2	3	4	5	6	7	8	9	10		
	G	T	P1	P3	;							

P1 0: (Fixed)
P1 0: AGC "OFF"
P1 0: AGC "FAST"
P1 0: AGC "MID"
P1 0: AGC "SLOW"
P1 0: AGC "AUTO - FAST"
P1 0: AGC "AUTO - MID"
P1 0: AGC "AUTO - SLOW"
P3 0: AGC "OFF"
P3 0: AGC "FAST"
P3 0: AGC "MID"
P3 0: AGC "SLOW"
P3 0: AGC "AUTO - FAST"
P3 0: AGC "AUTO - MID"
P3 0: AGC "AUTO - SLOW"

ID	IDENTIFICATION											
Set	1	2	3	4	5	6	7	8	9	10		
Read	1	2	3	4	5	6	7	8	9	10		
	I	D	;									
Answer	1	2	3	4	5	6	7	8	9	10		
	I	D	P1	P1	P1	P1	;					

CAT (Computer Aided Transceiver) Operation

IF	INFORMATION VFO-A																							
Set	1	2	3	4	5	6	7	8	9	10														
Read	1	2	3	4	5	6	7	8	9	10														
	I	F	;																					
Answer	1	2	3	4	5	6	7	8	9	10														
	I	F	P1	P1	P1	P2	P2	P2	P2	P2														
	11	12	13	14	15	16	17	18	19	20														
	P2	P2	P2	P2	P3	P3	P3	P3	P3	P4														
	21	22	23	24	25	26	27	28	29	30														
	P5	P6	P7	P8	P9	P9	P10	;																
	P1	000: VFO or MT or QMB (3 Bytes) 001 - 099: (Memory Channel) P1L - P9U: (PMS) 5xx: (5MHz BAND) EMG: (EMERGENCY CH)	P2	VFO-A Frequency (Hz) (9 Bytes)	P3	Clarifier Direction +: Plus Shift, -: Minus Shift (1 Bytes)	P4	Clarifier Offset: 0000 - 9990 (Hz) (4 Bytes)	P5	0: RX CLAR "OFF" 1: RX CLAR "ON"	P6	0: TX CLAR "OFF" 1: TX CLAR "ON"	P7	MODE 0:- 1: LSB 2: USB 3: CW-U 4: FM 5: AM 6: RTTY-L 7: CW-L 8: DATA-L 9: RTTY-U A: DATA-FM B: FM-N C: DATA-U D: AM-N E: PSK F: DATA-FM-N	P8	0: VFO 1: Memory Channel 2: Memory Tune 3: Quick Memory Bank (QMB)	P9	4: - 5: PMS	P10	0: OFF 1: CTCSS ENC/DEC 2: CTCSS ENC	P11	00: (Fixed)	P12	00: Simplex 1: Plus Shift 2: Minus Shift

IS	IF-SHIFT									
Set	1	2	3	4	5	6	7	8	9	10
	I	S	P1	P2	P3	P4	P4	P4	P4	;
Read	1	2	3	4	5	6	7	8	9	10
	I	S	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	I	S	P1	P2	P3	P4	P4	P4	P4	;
	P1	0: (Fixed)	P2	0: (Fixed)	P3	+ / -	P4	0 - 1200 Hz (20 Hz steps)		

KM	KEYER MEMORY									
Set	1	2	3	4	5	6	7	~	n-1	n
	K	M	P1	P2	P2	P2	P2	~	P2	;
Read	1	2	3	4	5	6	7	8	9	10
	K	M	P1	;						
Answer	1	2	3	4	5	6	7	~	n-1	n
	K	M	P1	P2	P2	P2	P2	~	P2	;
	P1	1 - 5 : Keyer Memory Channel Number	P2	Message Characters (up to 50 characters)						

KP	KEY PITCH									
Set	1	2	3	4	5	6	7	8	9	10
	K	P	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10
	K	P	;							
Answer	1	2	3	4	5	6	7	8	9	10
	K	P	P1	P1	;					
	P1	00: 300 Hz - 75: 1050 Hz (10Hz steps)								

KR	KEYER									
Set	1	2	3	4	5	6	7	8	9	10
	K	R	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	K	R	;							
Answer	1	2	3	4	5	6	7	8	9	10
	K	R	P1	;						
	P1	0: CW KEYER "OFF" 1: CW KEYER "ON"								

KS	KEY SPEED									
Set	1	2	3	4	5	6	7	8	9	10
	K	S	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	K	S	;							
Answer	1	2	3	4	5	6	7	8	9	10
	K	S	P1	P1	P1	;				
	P1	004 - 060 (WPM)								

KY	CW KEYING									
Set	1	2	3	4	5	6	7	8	9	10
	K	Y	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10
	P1	0: CW TEXT Memory 1: CW MESSAGE Memory	P2	0: STOP						
		1: CW TEXT/MESSAGE Memory "1" Playback		2: CW TEXT/MESSAGE Memory "2" Playback						
		3: CW TEXT/MESSAGE Memory "3" Playback		4: CW TEXT/MESSAGE Memory "4" Playback						
		5: CW TEXT/MESSAGE Memory "5" Playback								

CAT (Computer Aided Transceiver) Operation

LK	LOCK									
Set	1	2	3	4	5	6	7	8	9	10
	L	K	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	L	K	;							
Answer	1	2	3	4	5	6	7	8	9	10
	L	K	P1	;						

P1 0: Lock "OFF"
1: Lock "ON"

LM	LOAD MESSAGE									
Set	1	2	3	4	5	6	7	8	9	10
	L	M	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	L	M	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	L	M	P1	P2	;					

P1 0: MESSAGE (DVS) 1: RECORD
P2 P1=0 (MESSAGE)
0: Play Stop/ Recording Stop
1: Select CH "1"
2: Select CH "2"
3: Select CH "3"
4: Select CH "4"
5: Select CH "5"
P1=1 (RECORD)
0: Recording Stop
1: Recording Start

MA	MEMORY CHANNEL TO VFO-A									
Set	1	2	3	4	5	6	7	8	9	10
	M	A	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

MB	MEMORY CHANNEL TO VFO-B									
Set	1	2	3	4	5	6	7	8	9	10
	M	B	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

MC	MEMORY CHANNEL									
Set	1	2	3	4	5	6	7	8	9	10
	M	C	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	M	C	;							
Answer	1	2	3	4	5	6	7	8	9	10
	M	C	P1	P1	P1	;				

P1 001-099: (Memory Channel)
P1L -P9U: (PMS)
5xx: (5MHz BAND)
EMG: (EMERGENCY CH)

MD	OPERATING MODE									
Set	1	2	3	4	5	6	7	8	9	10
	M	D	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	M	D	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	M	D	P1	P2	;					

P1 0: MAIN Band
1: SUB Band
P2 MODE 0:- 1: LSB 2: USB 3: CW-U 4: FM 5: AM
6: RTTY-L 7: CW-L 8: DATA-L 9: RTTY-U A: DATA-FM
B: FM-N C: DATA-U D: AM-N E: PSK F: DATA-FM-N

MG	MIC GAIN									
Set	1	2	3	4	5	6	7	8	9	10
	M	G	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	M	G	;							
Answer	1	2	3	4	5	6	7	8	9	10
	M	G	P1	P1	P1	;				

P1 000 - 100

CAT (Computer Aided Transceiver) Operation

ML	MONITOR LEVEL									
Set	1	2	3	4	5	6	7	8	9	10
	M	L	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	M	L	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	M	L	P1	P2	P2	P2	;			

P1 0: MONI "ON/OFF"
 1: MONI Level
 P2 P1=0
 000: MONI "OFF"
 001: MONI "ON"
 P1=1
 000 - 100

MR	MEMORY CHANNEL READ									
Set	1	2	3	4	5	6	7	8	9	10
Read	1	2	3	4	5	6	7	8	9	10
	M	R	P0	P0	P0	;				
Answer	1	2	3	4	5	6	7	8	9	10
	M	R	P1	P1	P1	P2	P2	P2	P2	P2
	11	12	13	14	15	16	17	18	19	20
	P2	P2	P2	P2	P3	P3	P3	P3	P3	P4
	21	22	23	24	25	26	27	28	29	30
	P5	P6	P7	P8	P9	P9	P10	;		

P0 001 - 099: (Memory Channel)
 P1L - P9U: (PMS)
 5xx: (5MHz BAND)
 EMG: (EMERGENCY CH)
 P1 000: VFO or MT or QMB (3 Bytes)
 001 - 099: (Memory Channel)
 P1L - P9U: (PMS)
 5xx: (5MHz BAND)
 EMG: (EMERGENCY CH)
 P2 Frequency (Hz) (9 Bytes)
 P3 Clarifier Direction +: Plus Shift, -: Minus Shift,
 Clarifier Offset: 0000 - 9990 (Hz) (5 Bytes)
 P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
 P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
 P6 MODE 0:- 1: LSB 2: USB 3: CW-U 4: FM 5: AM
 6: RTTY-L 7: CW-L 8: DATA-L 9: RTTY-U A: DATA-FM
 B: FM-N C: DATA-U D: AM-N E: PSK F: DATA-FM-N
 P7 0: VFO 1: Memory Channel 2: Memory Tune 3: Quick Memory Bank (QMB)
 4: - 5: PMS
 P8 0: OFF 1: CTCSS ENC/DEC 2: CTCSS ENC
 P9 00: (Fixed)
 P10 0: Simplex 1: Plus Shift 2: Minus Shift

MS	METER SW									
Set	1	2	3	4	5	6	7	8	9	10
	M	S	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	M	S	;							
Answer	1	2	3	4	5	6	7	8	9	10
	M	S	P1	P2	;					

P1 0: PO
 1: COMP
 2: ALC
 3: VDD
 4: ID
 5: SWR
 P2 0: (Fixed)

MT	MEMORY CHANNEL TAG WRITE									
Set	1	2	3	4	5	6	7	8	9	10
	M	T	P0	P0	P0	P1	P2	P2	P2	P2
Read	11	12	13	14	15	16	17	18	19	
	P2	P2	P2	P2	P2	P2	P2	P2	;	
Answer	1	2	3	4	5	6	7	8	9	10
	M	T	P0	P0	P0	;				

P0 001 - 099: (Memory Channel)
 P1L - P9U: (PMS)
 5xx: (5MHz BAND)
 EMG: (EMERGENCY CH)
 P1 0: Memory Tag "OFF"
 1: Memory Tag "ON"
 P2 TAG Characters (up to 12 characters) (ASCII code)

MW	MEMORY CHANNEL WRITE									
Set	1	2	3	4	5	6	7	8	9	10
	M	W	P1	P1	P1	P2	P2	P2	P2	P2
Read	11	12	13	14	15	16	17	18	19	20
	P2	P2	P2	P2	P3	P3	P3	P3	P4	
Answer	21	22	23	24	25	26	27	28	29	30
	P5	P6	P7	P8	P9	P9	P10	;		

P1 000: -
 001 - 099: (Memory Channel)
 P1L - P9U: (PMS)
 P2 Frequency (Hz) (9 Bytes)
 P3 Clarifier Direction +: Plus Shift, -: Minus Shift
 Clarifier Offset: 0000 - 9990 (Hz) (5 Bytes)
 P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
 P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
 P6 MODE 0:- 1: LSB 2: USB 3: CW-U 4: FM 5: AM
 6: RTTY-L 7: CW-L 8: DATA-L 9: RTTY-U A: DATA-FM
 B: FM-N C: DATA-U D: AM-N E: PSK F: DATA-FM-N
 P7 0: VFO 1: Memory Channel 2: Memory Tune 3: Quick Memory Bank (QMB)
 4: - 5: PMS
 P8 0: OFF 1: CTCSS ENC/DEC 2: CTCSS ENC
 P9 00: (Fixed)
 P10 0: Simplex 1: Plus Shift 2: Minus Shift

CAT (Computer Aided Transceiver) Operation

NA		NARROW									
Set		1	2	3	4	5	6	7	8	9	10
		N	A	P1	P2	;					
Read		1	2	3	4	5	6	7	8	9	10
		N	A	P1	;						
Answer		1	2	3	4	5	6	7	8	9	10
		N	A	P1	P2	;					

NB		NOISE BLANKER STATUS									
Set		1	2	3	4	5	6	7	8	9	10
		N	B	P1	P2	;					
Read		1	2	3	4	5	6	7	8	9	10
		N	B	P1	;						
Answer		1	2	3	4	5	6	7	8	9	10
		N	B	P1	P2	;					

NL		NOISE BLANKER LEVEL									
Set		1	2	3	4	5	6	7	8	9	10
		N	L	P1	P2	P2	P2	;			
Read		1	2	3	4	5	6	7	8	9	10
		N	L	P1	;						
Answer		1	2	3	4	5	6	7	8	9	10
		N	L	P1	P2	P2	P2	;			

NR		NOISE REDUCTION									
Set		1	2	3	4	5	6	7	8	9	10
		N	R	P1	P2	;					
Read		1	2	3	4	5	6	7	8	9	10
		N	R	P1	;						
Answer		1	2	3	4	5	6	7	8	9	10
		N	R	P1	P2	;					

OI		OPPOSITE BAND INFORMATION (VFO-B)									
Set		1	2	3	4	5	6	7	8	9	10
Read		1	2	3	4	5	6	7	8	9	10
		O	I	;							
Answer		1	2	3	4	5	6	7	8	9	10
		O	I	P1	P1	P1	P2	P2	P2	P2	P2
		11	12	13	14	15	16	17	18	19	20
		P2	P2	P2	P2	P3	P3	P3	P3	P3	P4
		21	22	23	24	25	26	27	28	29	30
		P5	P6	P7	P8	P9	P9	P10	;		

P1 000: VFO or MT or QMB (3 Bytes)
 001 - 099: (Memory Channel)
 P1L - P9U: (PMS)
 5xx: (5MHz BAND)
 EMG: (EMERGENCY CH)
 P2 VFO-B Frequency (Hz) (9 Bytes)
 P3 Clarifier Direction +: Plus Shift, -: Minus Shift
 Clarifier Offset: 0000 - 9990 (Hz) (5 Bytes)
 P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
 P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
 P6 MODE 0:- 1: LSB 2: USB 3: CW-U 4: FM 5: AM
 6: RTTY-L 7: CW-L 8: DATA-L 9: RTTY-U A: DATA-FM
 B: FM-N C: DATA-U D: AM-N E: PSK F: DATA-FM-N
 P7 0: VFO 1: Memory Channel 2: Memory Tune 3: Quick Memory Bank (QMB)
 4: - 5: PMS
 P8 0: OFF 1: CTCSS ENC/DEC 2: CTCSS ENC
 P9 00: (Fixed)
 P10 0: Simplex 1: Plus Shift 2: Minus Shift

*: This command can be activated only with an FM mode.

OS		OFFSET (REPEATER SHIFT)									
Set		1	2	3	4	5	6	7	8	9	10
		O	S	P1	P2	;					
Read		1	2	3	4	5	6	7	8	9	10
		O	S	P1	;						
Answer		1	2	3	4	5	6	7	8	9	10
		O	S	P1	P2	;					

P1 0: MAIN Band
 1: SUB Band
 P2 0: Simplex
 1: Plus Shift (+ Offset)
 2: Minus Shift (- Offset)

PA		PRE-AMP (IPO)									
Set		1	2	3	4	5	6	7	8	9	10
		P	A	P1	P2	;					
Read		1	2	3	4	5	6	7	8	9	10
		P	A	P1	;						
Answer		1	2	3	4	5	6	7	8	9	10
		P	A	P1	P2	;					

CAT (Computer Aided Transceiver) Operation

PB	PLAY BACK									
Set	1	2	3	4	5	6	7	8	9	10
	P	B	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	P	B	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	P	B	P1	P2	;					

P1 0: (Fixed)
 P2 0: MESSAGE Playback / Recording Stop
 1: MESSAGE CH "1" Playback Start
 2: MESSAGE CH "2" Playback Start
 3: MESSAGE CH "3" Playback Start
 4: MESSAGE CH "4" Playback Start
 5: MESSAGE CH "5" Playback Start

PC	POWER CONTROL									
Set	1	2	3	4	5	6	7	8	9	10
	P	C	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	P	C	;							
Answer	1	2	3	4	5	6	7	8	9	10
	P	C	P1	P1	P1	;				

PL	SPEECH PROCESSOR LEVEL									
Set	1	2	3	4	5	6	7	8	9	10
	P	L	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	P	L	;							
Answer	1	2	3	4	5	6	7	8	9	10
	P	L	P2	P2	P2	;				

PR	SPEECH PROCESSOR									
Set	1	2	3	4	5	6	7	8	9	10
	P	R	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	P	R	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	P	R	P1	P2	;					

PS	POWER SWITCH									
Set	1	2	3	4	5	6	7	8	9	10
	P	S	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	P	S	;							
Answer	1	2	3	4	5	6	7	8	9	10
	P	S	P1	;						

QI	QMB STORE									
Set	1	2	3	4	5	6	7	8	9	10
	Q	I	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

QR	QMB RECALL									
Set	1	2	3	4	5	6	7	8	9	10
	Q	R	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

RA	RF ATTENUATOR									
Set	1	2	3	4	5	6	7	8	9	10
	R	A	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	R	A	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	R	A	P1	P2	;					

P1 0: (Fixed)
 P2 0: OFF
 1: 6dB
 2: 12dB
 3: 18dB

CAT (Computer Aided Transceiver) Operation

RG	RF GAIN									
Set	1	2	3	4	5	6	7	8	9	10
	R	G	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	R	G	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	R	G	P1	P2	P2	P2	;			

RI	RADIO INFORMATION										
Set	1	2	3	4	5	6	7	8	9	10	11
Read	1	2	3	4	5	6	7	8	9	10	11
	R	I	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	11
	R	I	P1	P2	P3	P4	P5	P6	P7	P8	;

RL	NOISE REDUCTION LEVEL (DNR)										
Set	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	P2	P2	;					

RM	READ METER										
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	R	M	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	M	P1	P2	P2	P2	P3	P3	P3	;	

SC	SCAN										
Set	1	2	3	4	5	6	7	8	9	10	
	S	C	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	S	C	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	C	P1	;							

SD	CW BREAK-IN DELAY TIME										
Set	1	2	3	4	5	6	7	8	9	10	
	S	D	P1	P1	;						
Read	1	2	3	4	5	6	7	8	9	10	
	S	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	D	P1	P1	;						

SF	SUB DIAL FUNCTION										
Set	1	2	3	4	5	6	7	8	9	10	
	S	F	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	S	F	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	S	F	P1	P2	;						

CAT (Computer Aided Transceiver) Operation

SH	WIDTH									
Set	1	2	3	4	5	6	7	8	9	10
	S	H	P1	P2	P3	P3	;			
Read	1	2	3	4	5	6	7	8	9	10
	S	H	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	S	H	P1	P2	P3	P3	;			

Table 3 (Bandwidth Chart)					
Command		Bandwidth			
P3		LSB / USB	CW / DATA-L / DATA-U / PSK	AM-N	AM / FM-N / D-FM-N
00	(Default)	(Default)*	(Default)*	-	-
01	300 Hz	50 Hz	6000 Hz (Fixed)	-	-
02	400 Hz	100 Hz	-	9000 Hz (Fixed)	-
03	600 Hz	150 Hz	-	-	16000 Hz (Fixed)
04	850 Hz	200 Hz	-	-	-
05	1100 Hz	250 Hz	-	-	-
06	1200 Hz	300 Hz	-	-	-
07	1500 Hz	350 Hz	-	-	-
08	1650 Hz	400 Hz	-	-	-
09	1800 Hz	450 Hz	-	-	-
10	1950 Hz	500 Hz	-	-	-
11	2100 Hz	600 Hz	-	-	-
12	2250 Hz	800 Hz	-	-	-
13	2400 Hz	1200 Hz	-	-	-
14	2450 Hz	1400 Hz	-	-	-
15	2500 Hz	1700 Hz	-	-	-
16	2600 Hz	2000 Hz	-	-	-
17	2700 Hz	2400 Hz	-	-	-
18	2800 Hz	3000 Hz	-	-	-
19	2900 Hz	3200 Hz	-	-	-
20	3000 Hz	3500 Hz	-	-	-
21	3200 Hz	4000 Hz	-	-	-
22	3500 Hz	-	-	-	-
23	4000 Hz	-	-	-	-

*(The default bandwidth varies depending on the selected mode.)

SM	S-METER READING									
Set	1	2	3	4	5	6	7	8	9	10
Read	1	2	3	4	5	6	7	8	9	10
	S	M	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	S	M	P1	P2	P2	P2	;			

SQ	SQUELCH LEVEL									
Set	1	2	3	4	5	6	7	8	9	10
	S	Q	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	S	Q	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	S	Q	P1	P2	P2	P2	;			

CAT (Computer Aided Transceiver) Operation

ST	SPLIT									
Set	1	2	3	4	5	6	7	8	9	10
	S	T	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	S	T	;							
Answer	1	2	3	4	5	6	7	8	9	10
	S	T	P1	;						

SV	SWAP VFO									
Set	1	2	3	4	5	6	7	8	9	10
Read	S	V	:							
Answer	1	2	3	4	5	6	7	8	9	10

Changes the VFO-A and VFO-B

TS	TXW									
Set	1	2	3	4	5	6	7	8	9	10
	T	S	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	T	S	;							
Answer	1	2	3	4	5	6	7	8	9	10
	T	S	P1	;						

P1 0: TXW "OFF"
1: TXW "ON"

TX	TX SET									
Set	1	2	3	4	5	6	7	8	9	10
	T	X	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	T	X	;							
Answer	1	2	3	4	5	6	7	8	9	10
	T	X	P1	;						

P1 0: RADIO TX "OFF", CAT TX "OFF"
 1: RADIO TX "OFF", CAT TX "ON"
 2: RADIO TX "ON", CAT TX "OFF" (Answer)

CAT (Computer Aided Transceiver) Operation

UP	MIC UP									
Set	1	2	3	4	5	6	7	8	9	10
	U	P	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

VD	VOX DELAY TIME / DATA VOX DELAY TIME									
Set	1	2	3	4	5	6	7	8	9	10
	V	D	P1	P1	P1	P1	;			
Read	1	2	3	4	5	6	7	8	9	10
	V	D	;							
Answer	1	2	3	4	5	6	7	8	9	10
	V	D	P1	P1	P1	P1	;			

P1 00: 30 msec 01: 50 msec 02: 100 msec 03: 150 msec 04: 200 msec

05: 250 msec 06: 300 msec - 33: 3000 msec (06 - 33: 10 msec multiples)

NOTE: VD command sets individual parameter values with the setting values "MIC" and "USB or REAR" in the menu items [OPERATION SETTING] → [TX GENERAL] → [VOX SELECT].

VE	FIRMWARE VERSION									
Set	1	2	3	4	5	6	7	8	9	10
Read	1	2	3	4	5	6	7	8	9	10
	V	E	;							
Answer	1	2	3	4	5	6	7	8	9	10
	V	G	P1	P2	P2	P2	P2	;		

P1 0: MAIN CPU 1: DISPLAY CPU 2: SDR 3: DSP

P2 XX-XX (Binary Coded Decimal)

VG	VOX GAIN									
Set	1	2	3	4	5	6	7	8	9	10
	V	G	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	V	G	;							
Answer	1	2	3	4	5	6	7	8	9	10
	V	G	P1	P1	P1	;				

P1 000 - 100

VM	VFO / MEMORY CHANNEL									
Set	1	2	3	4	5	6	7	8	9	10
	V	M	;		;					
Read	1	2	3	4	5	6	7	8	9	10
	V	M	;							
Answer	1	2	3	4	5	6	7	8	9	10
	V	M	P1	P1	P1	;				

VS	VFO SELECT									
Set	1	2	3	4	5	6	7	8	9	10
	V	S	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	V	S	;							
Answer	1	2	3	4	5	6	7	8	9	10
	V	S	P1	;						

P1 0: MAIN Band: VFO-A / SUB Band: VFO-B

1: MAIN Band: VFO-B / SUB Band: VFO-A

VX	VOX STATUS									
Set	1	2	3	4	5	6	7	8	9	10
	V	X	P1	;		;				
Read	1	2	3	4	5	6	7	8	9	10
	V	X	;							
Answer	1	2	3	4	5	6	7	8	9	10
	V	X	P1	;						

P1 0: VOX "OFF"

1: VOX "ON"

XT	TX CLAR									
Set	1	2	3	4	5	6	7	8	9	10
	X	T	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	X	T	;							
Answer	1	2	3	4	5	6	7	8	9	10
	X	T	P1	;						

CAT (Computer Aided Transceiver) Operation

ZI	ZERO IN									
Set	1	2	3	4	5	6	7	8	9	10
	Z	I	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

(CW AUTO ZERO IN Function)
P1 0: Fixed



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