YAESU
The radio

FT-710

CAT Operation Reference Manual

YAESU MUSEN CO., LTD.

CAT (Computer Aided Transceiver) Operation

Overview

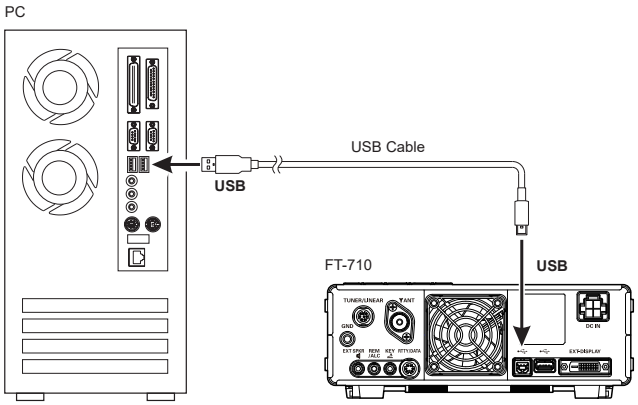
The CAT (Computer Aided Transceiver) System in the **FT-710** transceiver provides control of frequency, VFO, memory, and other settings such as dual-channel memories and diversity reception using an external personal computer. This allows multiple control operations to be fully automated with single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

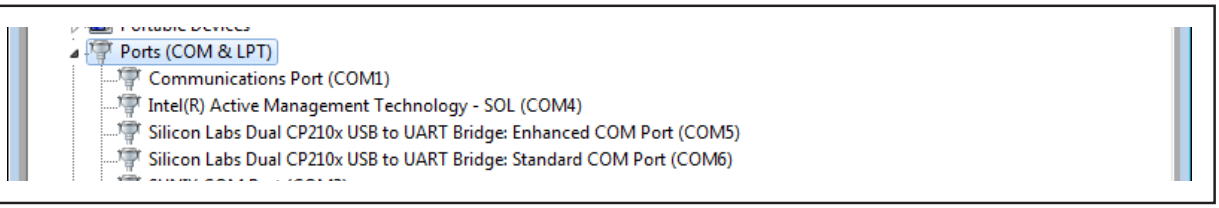
To connect to a PC using a USB cable, a Virtual COM port driver must be installed on the PC.
Visit the Yaesu website http://www.yaesu.com/ to download the Virtual COM port driver and Installation Manual.



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	RPTT SELECT	**OFF** / RTS / DTR / DAKY
	MODE AM	RPTT SELECT	**OFF** / RTS / DTR / DAKY
	MODE FM	RPTT SELECT	**OFF** / RTS / DTR / DAKY
	MODE PSK/DATA	RPTT SELECT	**OFF** / RTS / DTR / DAKY
	MODE RTTY	RPTT SELECT	**OFF** / RTS / DTR / DAKY
CW SETTING	MODE CW	RPTT SELECT	**OFF** / RTS / DTR / DAKY
		PC KEYING	**OFF** / RTS / DTR / DAKY
PRESET	PRESET1 - 5	RPTT SELECT	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

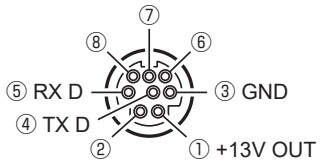
Using the RS-232C (CAT-3)

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	GENERAL	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)

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
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
MG	MIC GAIN	O	O	O	O

Command	Function	Set	Read	Ans.	AI
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	;						

P1 0: Auto Information "OFF"
1: Auto Information "ON"

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

CAT (Computer Aided Transceiver) Operation

AV	**ANTI VOX LEVEL**										
Set	1	2	3	4	5	6	7	8	9	10	P1 001-100: ANTI VOX LEVEL
	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	;					

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	P1 0: (Fixed) P2 0: Auto Notch “OFF” 1: Auto Notch “ON”
	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	;						

BD	**BAND DOWN**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN BAND 1: SUB BAND
	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	

BI	**BREAK-IN**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Break-in “OFF” 1: Break-in “ON”
	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	;							

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	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)
	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	;			

BS	**BAND SELECT**										
Set	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
	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	

CAT (Computer Aided Transceiver) Operation

BU	**BAND UP**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN BAND 1: SUB BAND
	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	

CF	**CLAR ON/OFF**											
Set	1	2	3	4	5	6	7	8	9	10	11	P1 0: MAIN BAND 1: SUB BAND P2 0: (Fixed) P3 0: CLAR Setting 1: CLAR Frequency 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) P3=1 (CLAR Frequency): P4 + / - P5-P8 0000 - 9999 Hz
	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	;	

CH	**CHANNEL UP/DOWN**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Memory Channel “UP” 1: Memory Channel “DOWN”
	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	

CN	**CTCSS TONE FREQUENCY**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN BAND 1: SUB BAND P2 0: (Fixed) P3 000 - 049: Tone Frequency Number (See Table 1)
	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	P1 0: (Fixed) P2 0: CONTOUR “ON/OFF” 1: CONTOUR FREQ 2: APF “ON/OFF” 3: APF FREQ P3 P2=0 0000: CONTOUR “OFF” 0001: CONTOUR “ON” P2=1 0010 - 3200 (CONTOUR Frequency:10 - 3200Hz) P2=2 0000: APF “OFF” 0001: APF “ON” P2=3 0000 - 0050 (APF Frequency: -250 - 250 Hz)
	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	;		

CS	**CW SPOT**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: CW SPOT “OFF” 1: CW SPOT “ON”
	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		
	C	**T**	P1	;								
Answer	1	2	3	4	5	6	7	8	9	10		
	C	**T**	P1	P2	;							

DA	**DIMMER**											
Set	1	2	3	4	5	6	7	8	9	10	11	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	11	
	D	**A**	;									
Answer	1	2	3	4	5	6	7	8	9	10	11	
	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	
	D	**T**	P1	;							
Answer	1	2	3	4	5	6	7	~	n-1	n	
	D	**T**	P1	P2	P2	P2	P2	~	P2	;	

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

Table 2 (MENU Chart)					
P1	**P2**	**P3**	**Function**	**P4**	**Digits**
01 (RADIO SETTING)	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 - 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	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)	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	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
	03 (MODE FM)	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	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
		20	ENC/DEC	0: OFF 1: ENC 2: TSQ	1
		21	TONE FREQ	00: 67.0 - 49: 254.1Hz	2
	04 (MODE PSK/DATA)	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	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
		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 16: 2400 17: 3000 18: 3200 19: 3500 20: 4000 (Hz)	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 1: 200 Hz 2: 425 Hz 3: 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 mesc 3: 30 msec	1
		20	CW INDICATOR	0: OFF 1: ON	1
	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
03 (OPERATION SETTING)	01 (GENERAL)	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
		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) 02: ENGLISH(UK) 03: FRENCH 04: FRENCH(CA) 05: GERMAN 06: PORTUGUESE 07: PORTUGUESE(BR) 08: SPANISH 09: SPANISH(LATAM) 10: ITALIAN	2
		20	MIC P1	00:LOCK 01:QMB 02:A/B 03:V/M 04:TUNER 05:VOX/MOX 06:MODE 07:ZIN_SPOT 08:SPLIT 09:FINE 10:NAR 11:NB 12:DNR 13:FREQ UP 14:FREQ DOWN 15:BAND UP 16:BAND DOWN 17 ATT 18:IPO 19:DNF 20:AGC	2
		21	MIC P2		
		22	MIC P3		
		23	MIC P4		
		24	MIC UP		
		25	MIC DOWN		
		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	P PRMTRC EQ1 FREQ	00 : OFF 01: 100 Hz - 07: 700 Hz (100 Hz steps)	2
		12	P PRMTRC EQ1 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		13	P PRMTRC EQ1 BWTH	00 - 10	2
		14	P PRMTRC EQ2 FREQ	00: OFF 01: 700 Hz - 09: 1500 Hz (100 Hz steps)	2
		15	P PRMTRC EQ2 LEVEL	-20 - -00 (or +00) - +10 (P4 = -20 - -00 or +00 - +10)	3
		16	P PRMTRC EQ2 BWTH	00 - 10	2
		17	P PRMTRC EQ3 FREQ	00 : OFF 01: 1500 Hz - 18: 3200 Hz (100 Hz steps)	2
		18	P PRMTRC 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) 02 (PRESET2) 03 (PRESET3) 04 (PRESET4) 05 (PRESET5)	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
		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
		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
		10	HCUT FREQ	00: OFF 01:700Hz - 67:4000Hz (50 Hz steps)	2
		11	HCUT SLOPE	0: 6dB/oct 1: 18dB/oct	1
		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	P1 000030000 - 075000000 (Hz)
	F	**A**	P1	P1	P1	P1	P1	P1	P1	P1	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	P1	P1	P1	P1	P1	P1	P1	P1	;	

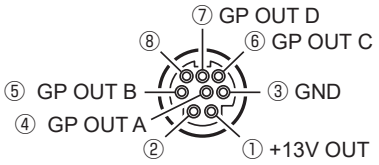
FB	FREQUENCY VFO-B												
Set	1	2	3	4	5	6	7	8	9	10	11	12	P1 000030000 - 075000000 (Hz)
	F	**B**	P1	P1	P1	P1	P1	P1	P1	P1	P1	;	
Read	1	2	3	4	5	6	7	8	9	10	11	12	
	F	**B**	;										
Answer	1	2	3	4	5	6	7	8	9	10	11	12	
	F	**B**	P1	P1	P1	P1	P1	P1	P1	P1	P1	;	

FN	FINE TUNING										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: "OFF" 1: Fine Tuning "ON" 2: Fast Tuning "ON"
	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	P1 0: MAIN Band Transmitter: TX 1: SUB Band Transmitter: TX
	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	P1 0: GP OUT A "LOW" 1: GP OUT A "HIGH" P2 0: GP OUT B "LOW" 1: GP OUT B "HIGH" P3 0: GP OUT C "LOW" 1: GP OUT C "HIGH" P4 0: GP OUT D "LOW" 1: GP OUT D "HIGH" *5V TTL Level, Max. 3 mA Set to "**GP OUT**" in the setting menu [**OPERATION SETTING**] → [**GENERAL**] → [**TUN/LIN PORT SELECT**]. (Factory setting: "EXT-TUNER")
	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	;				

TUNER/LINEAR Jack



(as viewed from rear panel)

GT	AGC FUNCTION										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) P2 0: AGC "OFF" 1: AGC "FAST" 2: AGC "MID" 3: AGC "SLOW" 4: AGC "AUTO" P3 0: AGC "OFF" 1: AGC "FAST" 2: AGC "MID" 3: AGC "SLOW" 4: AGC "AUTO - FAST" 5: AGC "AUTO - MID" 6: AGC "AUTO - SLOW"
	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	;						

ID	IDENTIFICATION										
Set	1	2	3	4	5	6	7	8	9	10	P1 0800 (Fixed)
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)
Clarifier Offset: 0000 - 9990 (Hz) (4 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

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

LM	LOAD MESSAGE										
Set	1	2	3	4	5	6	7	8	9	10	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
	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	;						

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

MD	OPERATING MODE										
Set	1	2	3	4	5	6	7	8	9	10	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
	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	;						

MG	MIC GAIN										
Set	1	2	3	4	5	6	7	8	9	10	P1 000 - 100
	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	;					

CAT (Computer Aided Transceiver) Operation

ML — MONITOR LEVEL

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

	1	2	3	4	5	6	7	8	9	10
Set										
Read	**M**	**R**	P0	P0	P0	;				
Answer	**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

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

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

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

	1	2	3	4	5	6	7	8	9	10
Set	**M**	**W**	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	;		
Read										
Answer										

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	P1 0: (Fixed) P2 0: OFF 1: ON
	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	P1 0: (Fixed) P2 0: Noise Blanker “OFF” 1: Noise Blanker “ON”
	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	P1 0: (Fixed) P2 000 - 010
	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	P1 0: (Fixed) P2 0: Noise Reduction “OFF” 1: Noise Reduction “ON”
	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	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
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	;			

OS	**OFFSET (REPEATER SHIFT)**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN Band 1: SUB Band P2 0: Simplex 1: Plus Shift (+ Offset) 2: Minus Shift (- Offset) *: This command can be activated only with an FM mode.
	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	;						

PA	**PRE-AMP (IPO)**										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) P2 0: IPO 1: AMP 1 2: AMP 2
	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	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
	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	;						

PC	**POWER CONTROL**										
Set	1	2	3	4	5	6	7	8	9	10	P1 005 - 100
	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	P1 001 -100 P2 000: "OFF", 001 -100
	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	P1 0: Speech Processor 1: Parametric Microphone Equalizer P2 1: "OFF" 2: "ON"
	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	P1 0: POWER "OFF" 1: POWER "ON"
	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	P1 0: (Fixed) P2 0: OFF 1: 6dB 2: 12dB 3: 18dB
	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	;						

CAT (Computer Aided Transceiver) Operation

RG	RF GAIN										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) P2 000 - 255
	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	P1 0: (Fixed) P2 0: Normal 1: Hi-SWR P3 0: Stop 1: Recording 2: Playing P4 0: RX 1: TX 2: TX INHIBIT P5 0: (Fixed) P6: 0: Antenna tuner: Tuning stopped 1:Antenna tuner: Tuning P7: 0: Scan Stop 1:Scanning 2:Scan Pause P8: 0: SQL Closed 1: SQL Open (BUSY)
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	P1 0: (Fixed) P2 01 - 15
	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	P1=0 P2: Meter 000 - 255 P3: 000 (Fixed) P1= 1: S (Main Band) 2: - 3: COMP 4: ALC 5: PO 6: SWR 7: IDD 8: VDD P2: 000 - 255 P3: 000 (Fixed)
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	P1 0: Scan “OFF” 1: Scan “ON” (UP ward) 2: Scan “ON” (DOWN ward)
	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	00: 30 01: 50 02: 100 03: 150 04: 200 05: 250 06: 300 - 33: 3000 (msec) ***NOTE:*** 06 to 33: 100 msec steps
	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	P1 0: FUNC knob 1: DSP knob P2 P1=0 0: - 1: SCOPE LEVEL 2: PEAK 3: COLOR 4: CONTRAST 5: DIMMER 6: M-GROUP 7: MIC GAIN 8: PROC LEVEL 9: AMC LEVEL A: VOX GAIN B: VOX DELAY C: ANTI VOX D: RF POWER E: MONI LEVEL F: CW SPEED G: CW PITCH H: BK-DELAY P1=1 0: - 1: SHIFT 2: WIDTH 3: NOTCH 4: CONTOUR 5: APF
	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	;						

SH	WIDTH										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: (Fixed) P2 0: (Fixed) P3 00 - 23 (See Table 3)
	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	FM / DATA-FM
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	P1 0: (Fixed) P2 000 - 255
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	P1 0: (Fixed) P2 000 - 100
	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

SS — SPECTRUM SCOPE

	1	2	3	4	5	6	7	8	9	10
Set	S	S	P1	P2	P3	P4	P5	P6	P7	;
Read	S	S	P1	P2	;					
Answer	S	S	P1	P2	P3	P4	P5	P6	P7	;

P1 0: (Fixed)

P2 0: SPEED 1: PEAK 2: MARKER 3: COLOR 4: LEVEL 5: SPAN
6: MODE 7: AF-FFT/OSCILLOSCOPE

P2=0 (SPEED):
P3 0: SLOW1 1: SLOW2 2: FAST1 3: FAST2 4: FAST3 5: STOP
P4 - P7: 0: (Fixed)

P2=1 (PEAK):
P3 0: LV1 1: LV2 2: LV3 3: LV4 4: LV5
P4 - P7: 0: (Fixed)

P2=2 (MARKER):
P3 0: MARKER "OFF" 1: MARKER "ON"
P4 - P7: 0: (Fixed)

P2=3 (COLOR):
P3 0: COLOR-1 - A: COLOR-11
P4 - P7: 0: (Fixed)

P2=4 (LEVEL):
P3 - P7: -30.0 - -00.0 or +00.0 - +30.0 (0.5 dB steps, 5 bytes)

P2=5 (SPAN):
P3 0: 1 kHz 1: 2 kHz 2: 5 kHz 3: 10 kHz 4: 20 kHz 5: 50 kHz
6: 100 kHz 7: 200 kHz 8: 500 kHz 9: 1 MHz
P4 - P7: 0: (Fixed)

P2=6 (MODE):
P3 0: 3DSS CENTER 1: 3DSS CURSOR 2: 3DSS FIX
3: W/F CENTER (EXPAND) 4: W/F CENTER (NORMAL) 5: -
6: W/F CURSOR (EXPAND) 7: W/F CURSOR (NORMAL) 8: -
9: W/F FIX (EXPAND) A: W/F FIX (NORMAL)
P4 - P7: 0: (Fixed)

P2=7 (AF-FFT/OSCILLOSCOPE):
P3 0: AF-FFT (ATT=0dB) 1: AF-FFT (ATT=10dB) 2: AF-FFT (ATT=20dB)
P4 0: OSC Level (ATT=0dB) 1: OSC Level (ATT=10dB) 2: OSC Level (ATT=20dB)
P5 0: OSC Time (1 msec) 1: OSC Time (3 msec) 2: OSC Time (10 msec)
3: OSC Time (30 msec) 4: OSC Time (100 msec) 5: OSC Time (300 msec)
P6 - P7: 0: (Fixed)

ST — SPLIT

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

P1 0: SPLIT "OFF"
1: SPLIT "ON"

SV — SWAP VFO

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

Changes the VFO-A and VFO-B

TS — TXW

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

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

TX — TX SET

	1	2	3	4	5	6	7	8	9	10
Set	T	X	P1	;						
Read	T	X	;							
Answer	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**	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	V	**E**	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
Answer	1	2	3	4	5	6	7	8	9	10

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	;						

P1 0: TX CLAR “OFF”
1: TX CLAR “ON”

ZI	ZERO IN										
Set	1	2	3	4	5	6	7	8	9	10	(CW AUTO ZERO IN Function) P1 0: Fixed
	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	

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