YAESU
The radio

FT-450D

CAT Operation Reference Book

YAESU MUSEN CO., LTD.

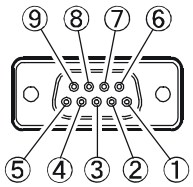
OVERVIEW

The CAT (Computer Aided Transceiver) System in the **FT-450D** 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 as single mouse clicks or keystroke operations on the computer keyboard.

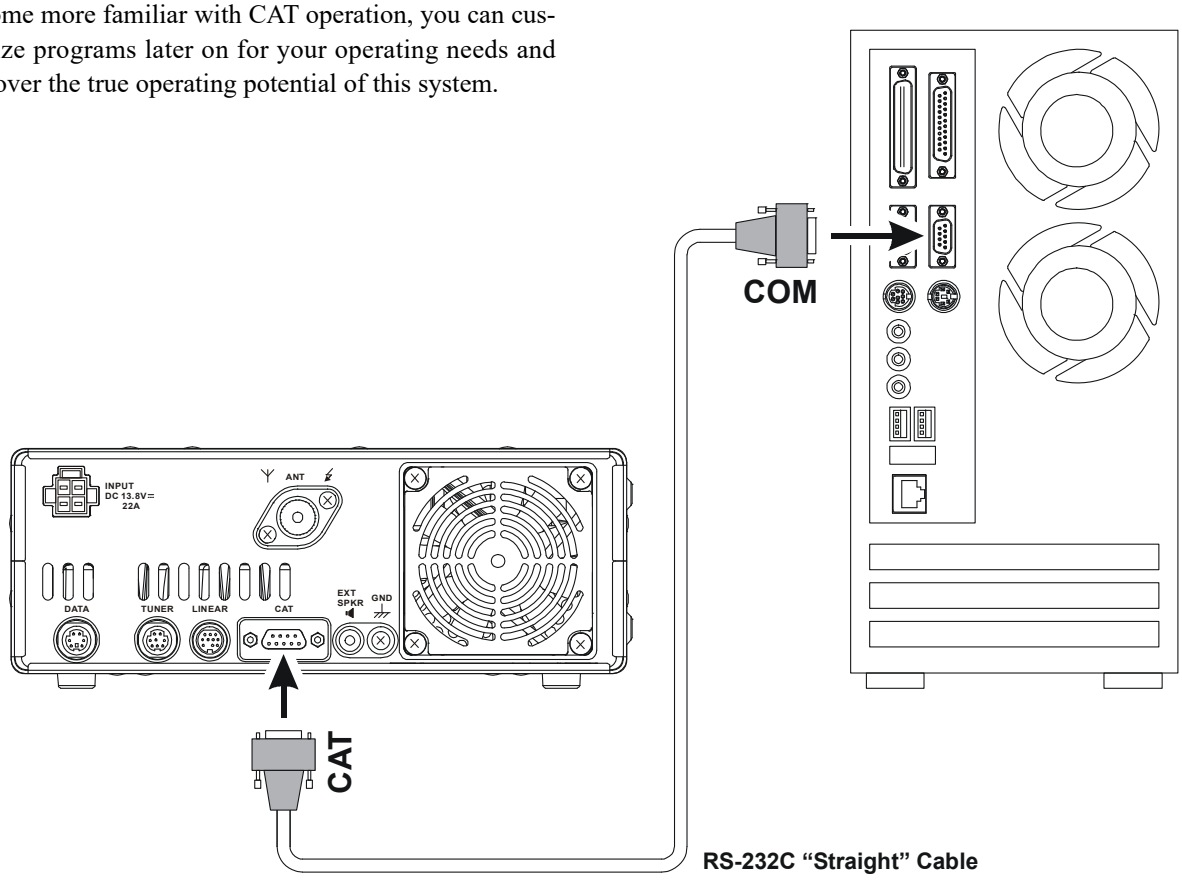
The **FT-450D** has a built-in level converter, allowing direct connection from the rear-panel **CAT** jack to the serial port of your computer without the need of any external boxes. You will need a serial cable for connection to the RS-232C (serial or COM port) connector on your computer. Purchase a ***standard serial cable*** (not the so-called "null modem" type), ensuring it has the correct gender and number of pins (some serial COM port connectors use a 9-pin rather than 25-pin configuration). If your computer uses a custom connector, you may have to construct the cable. In this case, refer to the technical documentation supplied with your computer for correct data connection.

YAESU 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 later on for your operating needs and discover the true operating potential of this system.

CAT JACK



PIN NO.	PIN NAME	I/O	FUNCTION
①	N/A	—	—
②	SERIAL OUT	Output	Outputs the Serial Data from the transceiver to the computer.
③	SERIAL IN	Input	Inputs the Serial Data from the computer to the transceiver.
④	N/A	—	—
⑤	GND	—	Signal Ground
⑥	N/A	—	—
⑦	RTS	Input	When the computer is not ready to receive data, this port goes to "L" for inhibit the transmit data from the transceiver.
⑧	CTS	Output	When the transceiver is not ready to receive data, this port goes to "L" for inhibit the transmit data from the computer.
⑨	N/A	—	—



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	**14250000**	**;**
↑	↑	↑
Command	Parameter	Terminator

There is three for the **FT-450D** Command as shown below:

Set command: Set a particular condition (to the **FT-450D**)

Read command: Reads an answer (from the **FT-450D**)

Answer command: Transmits a condition (from the **FT-450D**)

For example, note the following in the 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:
  "**FA14250000;**" (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:
  "**FA14250000;**" (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 correct parameter is "**IS0+1000**" (IF SHIFT):

IS01000;
Not enough parameters specified (No direction (+) given for the IF shift)

IS0+100;
Not enough digits (Only three frequency digits given)

IS0_+_1000;
Unnecessary characters between parameters

IS0+10000;
Too many digits (Five frequency digits given)

Note: If a particular parameter is not applicable to the **FT-450D**, 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.

CONTROL COMMAND LIST

COMMAND	FUNCTION	SET	READ	ANS.	AI	COMMAND	FUNCTION	SET	READ	ANS.	AI
AC	ANTENNA TUNER CONTROL	O	O	O	O	**MW**	MEMORY WRITE	O	X	X	X
AG	AF GAIN	O	O	O	O	**NA**	NARROW	O	O	O	O
AI	AUTO INFORMATION	O	O	O	X	**NB**	NOISE BLANKER	O	O	O	O
BD	BAND DOWN	O	X	X	X	**NR**	NOISE REDUCTION	O	O	O	O
BI	BREAK-IN	O	O	O	O	**OI**	OPPOSITE BAND INFORMATION	X	O	O	X
BP	MANUAL NOTCH	O	O	O	O	**OS**	OFFSET (REPEATER SHIFT)	O	O	O	O
BS	BAND SELECT	O	X	X	X	**PA**	PRE-AMP (IPO)	O	O	O	O
BU	BAND UP	O	X	X	X	**PB**	PLAY BACK	O	O	O	X
BY	BUSY	X	O	O	O	**PC**	POWER CONTROL	O	O	O	O
CH	CHANNEL UP/DOWN	O	X	X	X	**PS**	POWER SWITH	O	O	O	X
CN	CTCSS NUMBER	O	O	O	O	**QI**	QMB STORE	O	X	X	X
CO	CONTOUR	O	O	O	O	**QR**	QMB RECALL	O	X	X	X
CS	CW SPOT	O	O	O	O	**QS**	QUICK SPLIT	O	X	X	X
CT	CTCSS	O	O	O	O	**RA**	RF ATTENUATOR	O	O	O	O
DA	DIMMER	O	O	O	X	**RC**	CLAR CLEAR	O	X	X	X
DN	MIC DOWN	O	X	X	X	**RD**	CLAR DOWN	O	X	X	X
DS	DIMMER SWITCH	O	O	O	O	**RG**	RF GAIN	O	O	O	O
ED	ENCODER DOWN	O	X	X	X	**RI**	RADIO INFORMATION	X	O	O	O
EU	ENCODER UP	O	X	X	X	**RL**	NOISE REDUCTION LEVEL	O	O	O	O
EX	MENU	O	O	O	O	**RM**	READ METER	X	O	O	O
FA	FREQUENCY VFO-A	O	O	O	O	**RP**	RESET POWER ON	O	X	X	X
FB	FREQUENCY VFO-B	O	O	O	O	**RS**	RADIO STATUS	X	O	O	O
FS	FAST STEP	O	O	O	O	**RT**	CLAR	O	O	O	O
FT	FUNCTION TX	O	O	O	O	**RU**	CLAR UP	O	X	X	X
GT	AGC FUNCTION	O	O	O	O	**SC**	SCAN	O	O	O	O
ID	IDENTIFICATION	X	O	O	X	**SD**	SEMI BREAK-IN DELAY TIME	O	O	O	O
IF	INFORMATION	X	O	O	O	**SH**	WIDTH	O	O	O	O
IS	IF-SHIFT	O	O	O	O	**SM**	S METER	X	O	O	O
KM	KEYER MEMORY	O	O	O	X	**SQ**	SQUELCH LEVEL	O	O	O	O
KP	KEY PITCH	O	O	O	O	**ST**	STEP	O	O	O	O
KR	KEYER	O	O	O	O	**SV**	SWAP VFO	O	X	X	X
KS	KEY SPEED	O	O	O	O	**TS**	TXW	O	O	O	O
KY	CW KEYING	O	X	X	X	**TX**	TX SET	O	O	O	O
LK	LOCK	O	O	O	O	**UL**	UNLOCK	X	O	O	O
LM	LOAD MESSEGE	O	O	O	X	**UP**	MIC UP	O	X	X	X
MC	MEMORY CHANNEL	O	O	O	X	**VD**	VOX DELAY TIME	O	O	O	O
MD	MODE	O	O	O	O	**VG**	VOX GAIN	O	O	O	O
MG	MIC GAIN	O	O	O	O	**VM**	[V/M] KEY FUNCTION	O	X	X	X
MK	MODE KEY	O	X	X	X	**VR**	VOICE	O	O	O	X
ML	MONITOR LEVEL	O	O	O	O	**VS**	VFO SELECT	O	O	O	O
MR	MEMORY READ	X	O	O	X	**VV**	VFO TO VFO	O	O	O	O
MS	METER SW	O	O	O	O	**VX**	VOX	O	O	O	O

CONTROL COMMAND TABLES

AC — ANTENNA TUNER CONTROL

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

P1 0: Fixed
P2 0: Fixed
P3 0: Tuner "OFF"
1: Tuner "ON"
2: Tuning Start

AG — AF GAIN

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

P1 0: Fixed
P2 000 - 255

AI — AUTO INFORMATION

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

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

This parameter is set to "0" (OFF) automatically when the transceiver is turned "OFF."

BD — BAND DOWN

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

P1 0: VFO-A
1: VFO-B

BI — BREAK-IN

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

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

BP — MANUAL NOTCH

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

P1 0: Fixed
P2 0: Manual NOTCH "ON/OFF"
1: Manual NOTCH Position
P3 When P2=0
000: OFF
001: ON
When P2=1
001 - 199: NOTCH position move to left
200: NOTCH position move to center
201 - 400: NOTCH position move to right

BS — BAND SELECT

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

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

BU — BAND UP

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

P1 0: Fixed

BY — BUSY

	1	2	3	4	5	6	7	8	9	10
Set										
Read	B	Y	;							
Answer	B	Y	P1	P2	;					

P1 0: BUSY "OFF"
1: BUSY "ON"
P2 0: Fixed

CONTROL COMMAND TABLES

CH — CHANNEL UP/DOWN

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

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

CN — CTCSS TONE FREQUENCY

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

P1 0: Fixed
P2 00 - 49: Tone Frequency Number (See Table 1)

CO — CONTOUR

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

P1 0: Fixed
P2 0: CONTOUR "ON/OFF"
1: CONTOUR Frequency

P3 When P2=0,
-2: CONTOUR "ON" -12 dB
-1: CONTOUR "ON" -6 dB
00: CONTOUR "OFF"
01: CONTOUR "ON" +6 dB
02: CONTOUR "ON" +12 dB

When P2=1,
01 ~ 07: 250 Hz
08 ~ 13: 500 Hz
14 ~ 19: 1 kHz
20 ~ 25: 2 kHz
26 ~ 32: 4 kHz

CS — CW SPOT

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

P1 0: OFF
1: ON

CT — CTCSS

	1	2	3	4	5	6	7	8	9	10
Set	C	T	P1	P2	;					
Read	C	T	P1	;						
Answer	C	T	P1	P2	;					

P1 0: Fixed
P2 0: CTCSS "OFF"
1: CTCSS ENC/DEC "ON"
2: CTCSS ENC "ON"

DA — DIMMER

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

P1 00 - 08
P2 00: Fixed

DN — MIC DWN

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

DS — DIMMER SWITCH

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

P1 0: DIMMER "OFF"
1: DIMMER "ON"

TABLE 1

CTCSS TONE CHART

00	67.0 Hz	09	91.5 Hz	18	123.0 Hz	27	162.2 Hz	36	189.9 Hz	45	229.1 Hz
01	69.3 Hz	10	94.8 Hz	19	127.3 Hz	28	165.5 Hz	37	192.8 Hz	46	233.6 Hz
02	71.9 Hz	11	97.4 Hz	20	131.8 Hz	29	167.9 Hz	38	196.6 Hz	47	241.8 Hz
03	74.4 Hz	12	100.0 Hz	21	136.5 Hz	30	171.3 Hz	39	199.5 Hz	48	250.3 Hz
04	77.0 Hz	13	103.5 Hz	22	141.3 Hz	31	173.8 Hz	40	203.5 Hz	49	254.1 Hz
05	79.7 Hz	14	107.2 Hz	23	146.2 Hz	32	177.3 Hz	41	206.5 Hz	—	—
06	82.5 Hz	15	110.9 Hz	24	151.4 Hz	33	179.9 Hz	42	210.7 Hz	—	—
07	85.4 Hz	16	114.8 Hz	25	156.7 Hz	34	183.5 Hz	43	218.1 Hz	—	—
08	88.5 Hz	17	118.8 Hz	26	159.8 Hz	35	186.2 Hz	44	225.7 Hz	—	—

CONTROL COMMAND TABLES

ED	ENCODER DOWN										
Set	1	2	3	4	5	6	7	8	9	10	P1 0:Fixed P2 01-99: Steps
	E	**D**	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

EU	ENCODER UP										
Set	1	2	3	4	5	6	7	8	9	10	P1 0:Fixed P2 01-99: Steps
	E	**U**	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

CONTROL COMMAND TABLES

EX	MENU									
Set	1	2	3	4	5	6	7	8	nn	**
	E	X	P1	P1	P1	P2	P2	~	P2	;
Read	1	2	3	4	5	6	7	8	9	10
	E	X	P1	P1	P1	;				
Answer	1	2	3	4	5	6	7	8	nn	**
	E	X	P1	P1	P1	P2	P2	~	P2	;

P1 001-064 (MENU Number)
P2 Parameter (See Table 2)

TABLE 2

P1	FUNCTION	P2
001	EXT MNU	0: OFF 1: ON
002	AM & FMDIAL	0: DISABLE 1: ENABLE
003	APO TIME	00 (OFF) ~ 01 (hour) ~ 12 (hour)
004	BEACON TIME	000 (OFF) ~ 001 (sec) ~ 255 (sec)
005	BEACON TEXT	- - -
006	BEEP TONE	0: 440 Hz 1: 880 Hz 2: 1760 Hz
007	BEEPVOL	000 (FIX 0) ~ 100 (FIX100) or 101 (LNK-50) ~ 151 (LNK0) ~ 201 (LNK+50)
008	CAT RTS	0: DISABLE 1: ENABLE
009	CAT TIME OUT TIME	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec
010	CATRATE	1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: DATA
011	CLAR DIAL / SEL	0: DIAL 1: SEL
012	CLOCK SHIFT	0: OFF 1: ON
013	DISP CONTRAST	01 ~ 24
014	CW AUTO MODE	0: OFF 1: ON
015	CW BFO	0: USB 1: LSB 2: AUTO
016	CW DELAY	0000 (FULL) / 0030 (msec) ~ 3000 (msec)
017	CW KEY REVERSE	0: NORMAL 1: REVERSE
018	CW QSK	0: 15 msec 1: 20 msec 2: 25 msec 3: 30 msec
019	CW PADDLE	0: KEY 1: MIC
020	CWPITCH	00 - 02: 400 Hz 03 - 04: 500 Hz 05 - 06: 600 Hz 07 - 08: 700 Hz 09 - 15: 800 Hz
021	CWSPEED	04 (wpm) ~ 60 (wpm)
022	CW SIDE TONE	000 (FIX 0) ~ 100 (FIX100) or 101 (LNK-50) ~ 151 (LNK0) ~ 201 (LNK+50)
023	CW TRAINING	0: N (Numeric Character Only) 1: A (Alphabet Character Only) 2: M (Mixed: Numeric and Alphabet Character)
024	CW WEIGHT	25 (1:2.5) ~ 45 (1:4.5)
025	DATA DISP	-300 (-3000 Hz) ~ +000 (0 Hz) ~ +300 (+3000 Hz)
026	DATA MODE	0: RTTY 1: USER-L 2: USER-U
027	Not Used	---
028	Not Used	---
029	DIAL STEP	0: 1 Hz 1: 10 Hz 2: 20 Hz 3: 100 Hz 4: 200 Hz
030	DIG VOX	000 (OFF) ~ 100
031	EMERGENCY	0: OFF 1: ON
032	KEY HOLD TIME	0: 0.5 sec 1: 1.0 sec 2: 1.5 sec 3: 2.0 sec
033	LOCK MODE	0: FREQ 1: PANEL 2: ALL
034	M-TUNE	0: OFF 1: ON
035	MEMORY GROUP	0: OFF 1: ON
036	MEMORY TAG	0: TAG-OFF 1: TAG NAME
037	MIC EQ	0 ~ 9
038	MIC GAIN	0: LOW 1: NOR 2: HIGH
039	MIC AUTO SCAN	0: OFF 1: ON
040	MY BAND	See Table 3
041	MY MODE	See Table 4
042	MIC-DOWN PG	See Table 5
043	MIC-FAST PG	See Table 5
044	MIC-UP PG	See Table 5
045	METER PEAK HOLD	0: OFF 1: ON
046	PANEL'S CUSTOM SWITCH	See Table 5
047	QUICK SPLIT FREQ	-20 (kHz) ~ +00 (kHz) ~ +20 (kHz)
048	RF POWER SET	005 ~ 100
049	REPEATER SHIFT DIRECTION	0: SIMPLEX 1: +SHIFT 2: - SHIFT
050	REPEATER SHIFT OFFSET	000 (0 MHz) ~ 999 (99.9 MHz)
051	RTTY SHIFT	1: 170 Hz 2: 200 Hz 3: 425 Hz 4: 850 Hz
052	RTTY TONE	1: 1275 Hz 2: 2125 Hz
053	RTTY RX POLARITY	0: NORMAL 1: REVERSE
054	RTTY TX POLARITY	0: NORMAL 1: REVERSE
055	SCAN RESUME	00: BUSY 01 (TIME: 1 sec) ~ 10 (TIME: 10 sec)
056	SEL DIAL MODE	0: CW Sidetone Level 1: CW KEYER Speed 2: 100KHz Step 3: 1MHz Step 4: MIC GAIN Set 5: RF Power Set
057	SQL TYPE	0: OFF 1: ENC 2: ENC DEC
058	SQL/RF GAIN	0: SQL 1: RF GAIN
059	STBY BEEP	0: OFF 1: ON
060	TONE FREQ	See Table 6
061	TOT TIME	00 (OFF) ~ 01 (minute) ~ 20 (minute)
062	TUNER/ATAS	0: ATAS 1: EXT ATU 2: INT ATU 3: INTRATU 4: F TRANS
063	VOX DELAY	01 (100 msec) ~ 30 (300 msec)
064	VOXGAIN	001 ~ 255

CONTROL COMMAND TABLES

TABLE 3

MY BAND			
P2	FUNCTION	P2	FUNCTION
000	1.8 MHz “OFF”	001	1.8 MHz “ON”
010	3.5 MHz “OFF”	011	3.5 MHz “ON”
030	7 MHz “OFF”	031	7 MHz “ON”
040	10 MHz “OFF”	041	10 MHz “ON”
050	14 MHz “OFF”	051	14 MHz “ON”
060	18 MHz “OFF”	061	18 MHz “ON”
070	21 MHz “OFF”	071	21 MHz “ON”
080	24.5 MHz “OFF”	081	24.5 MHz “ON”
090	28 MHz “OFF”	091	28 MHz “ON”
100	50 MHz “OFF”	101	50 MHz “ON”

TABLE 4

MY BAND			
P2	FUNCTION	P2	FUNCTION
10	LSB “OFF”	11	LSB “ON”
20	USB “OFF”	21	USB “ON”
30	CW “OFF”	31	CW “ON”
40	FM “OFF”	41	FM “ON”
50	AM “OFF”	51	AM “ON”
60	DATA (RTTY-LSB) “OFF”	61	DATA (RTTY-LSB) “ON”
70	CW-R “OFF”	71	CW-R “ON”
80	USER-L “OFF”	81	USER-L “ON”
90	DATA (RTTY-USB) “OFF”	91	DATA (RTTY-USB) “ON”
A0	N.A.	A1	N.A.
B0	FM-N “OFF”	B1	FM-N “ON”
C0	USER-U “OFF”	C1	USER-U “ON”

TABLE 5

P2	FUNCTION	
00	MONI	Activates the Monitor function.
01	N/A	No Function.
02	P/B	Activates the Digital Voice Recorder.
03	PLAY1	Send the CW message, which is memorized in BEACON TEXT 1.
04	PLAY2	Send the CW message, which is memorized in BEACON TEXT 2.
05	PLAY3	Send the CW message, which is memorized in BEACON TEXT 3.
06	QSPL	Activates Quick Split Operation
07	SPOT	Generates a CW Spot Tone when using CW mode.
08	SQLOFF	Opens the noise squelch.
09	SWR	Transmits a 10 watts carrier (CW mode) to measure the SWR ratio.
10	TXW	Monitor the transmit frequency when Split Frequency operation is engaged.
11	VCC	Display the DC supply voltage.
12	VOICE2	Announces the current S-meter reading, operating frequency (with resolution to the displayed 100 Hz digit), and operating mode.
13	VM1MONI	Play back the voice message, which is memorized in Voice Memory 1.
14	VM1REC	Store the voice message into Voice Memory 1.
15	VM1TX	Send the voice message, which is memorized in Voice Memory 1.
16	VM2MONI	Play back the voice message, which is memorized in Voice Memory 2.
17	VM2REC	Store the voice message into Voice Memory 2.
18	VM2TX	Send the voice message, which is memorized in Voice Memory 2.
19	DOWN	Decreases the VFO frequency by one step or moves the memory channel to the next-lowest channel.
20	FAST	Set to the same function as the front panel’s [**FAST**] button.
21	UP	Increases the VFO frequency by one step or moves the memory channel to the next-highest channel.
22	DSP	Set to the same function as the front panel’s [**DSP**] button.
23	IPO/ATT	Set to the same function as the front panel’s [**IPO/ATT**] button.
24	NB	Set to the same function as the front panel’s [**NB**] button.
25	AGC	Set to the same function as the front panel’s [**AGC**] button.
26	MODEDN	Set to the same function as the front panel’s [**MODE▼**] button.
27	MODEUP	Set to the same function as the front panel’s [**MODE▲**] button.
28	DSP/SEL	Set to the same function as the front panel’s [**DSP/SEL**] button.
29	KEYER	Set to the same function as the front panel’s [**KEYER**] button.
30	CLAR	Set to the same function as the front panel’s [**CLAR**] button.
31	BANDDN	Set to the same function as the front panel’s [**BAND▼**] button.
32	BANDUP	Set to the same function as the front panel’s [**BAND▲**] button.
33	A=B	Set to the same function as the front panel’s [**A=B**] button.
34	A/B	Set to the same function as the front panel’s [**A/B**] button.
35	LOCK	Set to the same function as the front panel’s [**LOCK**] button.
36	TUNE	Set to the same function as the front panel’s [**TUNE**] button.
37	VOICE	Announce the current operating frequency (with resolution to the displayed 100 Hz digit) and operating mode.
38	MW	Copies the current operating data from the VFO into the currently selected memory channel.
39	V/M	Toggles frequency control between VFO and memory system.
40	HOME	Recall the “Home” (favorite frequency) channel.
41	RCL	Recall the QMB (Quick Memory Bank) memory.
42	VOX	Activate the VOX (automatic voice-actuated transmitter switching) feature.
43	STO	Copies operating data into QMB (Quick Memory Bank) Memory.
44	STEP	Enables the setting of the frequency step of the [**DSP/SEL**] knob by the [**DSP/SEL**] knob.
45	SPLIT	Activates split frequency operation between VFO-A and VFO-B.
46	PMS	Engages Programmable Memory Scan (PMS).
47	SCAN	Initiates the upward scanning of VFO frequencies or memory channels.
48	MENU	Engage the “Menu” mode.
49	DIMMER	Enables adjustment of the display dimmer level by the [**DSP/SEL**] knob.
50	MTR	Change the meter function in the transmit mode.

TABLE 6

CTCSS TONE CHART											
00	67.0 Hz	09	91.5 Hz	18	123.0 Hz	27	162.2 Hz	36	189.9 Hz	45	229.1 Hz
01	69.3 Hz	10	94.8 Hz	19	127.3 Hz	28	165.5 Hz	37	192.8 Hz	46	233.6 Hz
02	71.9 Hz	11	97.4 Hz	20	131.8 Hz	29	167.9 Hz	38	196.6 Hz	47	241.8 Hz
03	74.4 Hz	12	100.0 Hz	21	136.5 Hz	30	171.3 Hz	39	199.5 Hz	48	250.3 Hz
04	77.0 Hz	13	103.5 Hz	22	141.3 Hz	31	173.8 Hz	40	203.5 Hz	49	254.1 Hz
05	79.7 Hz	14	107.2 Hz	23	146.2 Hz	32	177.3 Hz	41	206.5 Hz	—	—
06	82.5 Hz	15	110.9 Hz	24	151.4 Hz	33	179.9 Hz	42	210.7 Hz	—	—
07	85.4 Hz	16	114.8 Hz	25	156.7 Hz	34	183.5 Hz	43	218.1 Hz	—	—
08	88.5 Hz	17	118.8 Hz	26	159.8 Hz	35	186.2 Hz	44	225.7 Hz	—	—

CONTROL COMMAND TABLES

FA — FREQUENCY VFO-A

	1	2	3	4	5	6	7	8	9	10
Set	F	A	P1	P1	P1	P1	P1	P1	P1	P1
	11	12	13	14	15	16	17	18	19	20
	;									
Read	1	2	3	4	5	6	7	8	9	10
	F	A	;							
Answer	1	2	3	4	5	6	7	8	9	10
	F	A	P1	P1	P1	P1	P1	P1	P1	P1
	11	12	13	14	15	16	17	18	19	20
	;									

P1 30000 - 60000000 (Hz)

FB — FREQUENCY VFO-B

	1	2	3	4	5	6	7	8	9	10
Set	F	B	P1	P1	P1	P1	P1	P1	P1	P1
	11	12	13	14	15	16	17	18	19	20
	;									
Read	1	2	3	4	5	6	7	8	9	10
	F	B	;							
Answer	1	2	3	4	5	6	7	8	9	10
	F	B	P1	P1	P1	P1	P1	P1	P1	P1
	11	12	13	14	15	16	17	18	19	20
	;									

P1 300000 - 60000000 (Hz)

FS — FAST STEP

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

P1 0: FAST Key "OFF"
1: FAST Key "ON"

FT — FUNCTION TX

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

P1 0: Transmit the Displayed Band
1: Transmit the Oppsite Band

GT — AGC FUNCTION

	1	2	3	4	5	6	7	8	9	10
Set	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	P2	;					

P1 0: Fixed P2 0: AGC "OFF"
1: AGC "FAST"
2: AGC "SLOW"
3: AGC "SLOW"
4: AGC "AUTO"

ID — IDENTIFICATION

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

P1 0244 (Fixed value)

IF — INFORMATION

	1	2	3	4	5	6	7	8	9	10
Set										
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	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			

P1 000-510 (Memory Channel) P2 VFO-A Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, −: Minus Shift
Clarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: DATA (RTTY-LSB)
7: CW-R 8: USER-L 9: DATA (RTTY-USB)
B: FM-N C: USER-U
P7 0: VFO 1: Memory 2: Memory Tune 3: Quick Memory Bank (QMB)
P8 0: CTCSS "OFF" 1: CTCSS ENC/DEC 2: CTCSS ENC
P9 Tone Number (See Table 1)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

CONTROL COMMAND TABLES

IS — IF-SHIFT

	1	2	3	4	5	6	7	8	9	10
Set	I	S	P1	-/+	P2	P2	P2	P2	;	
Read	I	S	P1	;						
Answer	I	S	P1	-/+	P2	P2	P2	P2	;	

P1 0: Fixed
P2 0000 ~ 1000 (Hz)

KM — KEYER MEMORY

	1	2	3	4	5	6	7	~	43	**
Set	K	M	P1	P2	P2	P2	P2	~	P2	;
Read	K	M	P1	;						
Answer	K	M	P1	P2	P2	P2	P2	~	P2	;

P1 1 - 3 : Beacon Text Channel Number
P2 Message Characters (up to 40 characters)

KP — KEY PITCH

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

P1 02: 400 Hz
04: 500 Hz
06: 600 Hz
08: 700 Hz
10: 800 Hz

KR — KEYER

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

P1 0: KEYER “OFF”
1: KEYER “ON”

KS — KEY SPEED

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

P1 004 - 060 (WPM)

KY — CW KEYING

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

P1 6: Beacon Text “1” Playback
7: Beacon Text “2” Playback
8: Beacon Text “3” Playback

LK — LOCK

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

P1 0: DIAL Lock “OFF”
1: DIAL Lock “ON”

LM — LOAD MESSEGE

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

P1 0: VOICE MEMORY
1: DIGITAL VOICE RECORDER

P2 When P1=0
0: VOICE MEMORY RECORDING STOP
1: VOICE MEMORY 1 RECORDING
2: VOICE MEMORY 2 RECORDING
When P1=1
0: DIGITAL VOICE RECORDER STOP
1: DIGITAL VOICE RECORDER START

MC — MEMORY CHANNEL

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

P1 001 - 504: Memory Channel Number
001 - 500: Regular Memory Channel
501: P1L Channel
502: P1U Channel
503: P2L Channel
504: P2U Channel

CONTROL COMMAND TABLES

MD — OPERATING MODE

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

P1 0: Fixed
P2 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: DATA (RTTY-LSB)
7: CW-R 8: USER-L 9: DATA (RTTY-USB)
B: FM-N C: USER-U

MG — MIC GAIN

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

P1 000 - 085: MIC GAIN “L”
086 - 170: MIC GAIN “M”
171 - 255: MIC GAIN “H”

MK — MODE KEY

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

P1 KEY 7: MODE UP
8: MODE DOWN
9: REVERSE (@CW MODE)

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: Fixed
P2 000: MONITOR “OFF”
001: MONITOR “ON”

MR — MEMORY CHANNEL READ

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

P1 Memory Channel Number P2 Memory Channel Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, –: Minus Shift
Clarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR “OFF” 1: RX CLAR “ON”
P5 0: TX CLAR “OFF” 1: TX CLAR “ON”
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: DATA (RTTY-LSB)
7: CW-R 8: USER-L 9: DATA (RTTY-USB)
B: FM-N C: USER-U
P7 0: VFO 1: Memory
P8 0: CTCSS “OFF” 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table 1)
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	;						
Read	M	S	;							
Answer	M	S	P1	;						

P1 1: ALC
2: PO
3: SWR

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	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			
Read										
Answer										

P1 Memory Channel Number P2 Memory Channel Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, –: Minus Shift
Clarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR “OFF” 1: RX CLAR “ON”
P5 0: TX CLAR “OFF” 1: TX CLAR “ON”
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: DATA (RTTY-LSB)
7: CW-R 8: USER-L 9: DATA (RTTY-USB)
B: FM-N C: USER-U
P7 0: Fixed
P8 0: CTCSS “OFF” 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table 1)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

NA — NARROW

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

P1 0: Fixed
P2 0: Bandwidth Middeum
1: Bandwidth Narrow

CONTROL COMMAND TABLES

NB — NOISE BLANKER STATUS

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

P1 0: Fixed
P2 0: Noise Blanker "OFF"
1: Noise Blanker "ON"

NR — NOISE REDUCTION

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

P1 0: Fixed
P2 0: Noise Reduction "OFF"
1: Noise Reduction "ON"

OI — OPPOSITE BAND INFORMATION

	1	2	3	4	5	6	7	8	9	10
Set										
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	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			

P1 Current Memory Channel P2 VFO-B Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, –: Minus Shift
Crarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: DATA (RTTY-LSB)
7: CW-R 8: USER-L 9: DATA (RTTY-USB)
B: FM-N C: USER-U
P7 0: VFO 1: Memory 2: Memory Tune 3: Quick Memory Bank (QMB)
P8 0: CTCSS "OFF" 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table 1)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

OS — OFFSET (REPEATER SHIFT)

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

P1 0: Fixed
P2 0: Simplex
1: Plus Shift
2: Minus Shift
※: FM mode only

PA — PRE-AMP (IPO)

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

P1 0: Fixed
P2 0: IPO "ON"
1: IPO "OFF"

PB — PLAY BACK

	1	2	3	4	5	6	7	8	9	10
Set	**P**	**B**	P1	;						
Read	**P**	**B**	;							
Answer	**P**	**B**	P1	;						

P1 0: STOP
1: VOICE MEMORY 1 PLAYBACK
2: VOICE MEMORY 2 PLAYBACK
6: DIGITAL VOICE RECODER PLAYBACK

PC — POWER CONTROL

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

P1 005 - 100

PS — POWER SWITCH

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

P1 0: POWER "OFF"
1: POWER "ON"

When the power supply becomes "ON", the dummy data is sent.
The command that makes the power supply "ON" within two seconds after wait is done for about one second is sent.

CONTROL COMMAND TABLES

QI — QMB STORE

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

QR — QMB RECALL

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

QS — QUICK SPLIT

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

RA — RF ATTENUATOR

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

P1 0: Fixed
P2 0: OFF
1: ON

RC — CLAR CLEAR

	1	2	3	4	5	6	7	8	9	10
Set	R	C	;							
Read										
Answer										

RD — CLARIFIER MINUS OFFSET

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

P1 0000 - 9999 (Hz)

RG — RF GAIN

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

P1 0: Fixed
P2 000 - 255

RI — RADIO INFORMATION

	1	2	3	4	5	6	7	8	9	10
Set										
Read	R	I	P1	;						
Answer	R	I	P1	P2	;					

P1 0: Hi-SWR
1: MIC-EQ
3: REC
4: PLAY
P2 0: OFF
1: ON

RL — NOISE REDUCTION LEVEL

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

P1 0: Fixed
P2 01 - 11

CONTROL COMMAND TABLES

RM — READ METER

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

P1 0: Depends of the Front Panel's METER Switch
1: S Meter
4: ALC Meter
5: PO Meter
6: SWR Meter
P2 000 - 255

RP — RESET POWER ON

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

Resetting the Microprocessor (Full Reset)

RS — RADIO STATUS

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

P1 0: NORMAL MODE
1: MENU MODE

RT — CLAR

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

P1 0: RX Clarifier "OFF"
1: RX Clarifier "ON"

RU — CLARIFIER PLUS OFFSET

	1	2	3	4	5	6	7	8	9	10
Set	**R**	**U**	P1	P1	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 0000 - 9999 (Hz)

SC — SCAN

	1	2	3	4	5	6	7	8	9	10
Set	**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	;						

P1 0: Scan "OFF"
1: Scan "ON" (Upward)
2: Scan "ON" (Downward)

SD — CW BREAK-IN DELAY TIME

	1	2	3	4	5	6	7	8	9	10
Set	**S**	**D**	P1	P1	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	P1	P1	;			

P1 0000: Full Break-in
0030 - 3000 (msec)

SH — WIDTH

	1	2	3	4	5	6	7	8	9	10
Set	**S**	**H**	P1	P2	P2	;				
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	P3	P3	;				

P1 0:Fixed
P2 00 - 10 (Narrow)
11 - 21 (Normal)
22 - 31 (Wide)
P3 00 (Narrow)
16 (Normal)
31 (Wide)

SM — S-METER READING

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

P1 0: Fixed
P2 000 - 255

CONTROL COMMAND TABLES

SQ — SQUELCLH LEVEL

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

P1 0: Fixed
P2 000 - 255

ST — STEP

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

	FM	AM	LSB/USB/CW		FM
P1 0:	5.0 kHz	2.5 kHz	1.0 kHz	P1 6:	25.0 kHz
1:	6.25 kHz	5.0 kHz	2.5 kHz	7:	50.0 kHz
2:	10.0 kHz	9.0 kHz	5.0 kHz		
3:	12.5 kHz	10.0 kHz			
4:	15.0 kHz	12.5 kHz			
5:	20.0 kHz	25.0 kHz			

SV — SWAP VFO

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

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)

UL — PLL UNLOCK STATUS

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

P1 0: PLL "Lock"
1: PLL "Unlock"

UP — MIC UP

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

VD — VOX DELAY TIME

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

P1 0100 - 3000 mS (100 mS multiples)

VG — VOX GAIN

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

P1 000 - 255

CONTROL COMMAND TABLES

VM	[V/M] KEY FUNCTION										
Set	1	2	3	4	5	6	7	8	9	10	Toggles the frequency control between the VFO and Memory system.
	V	**M**	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

VR	VOICE										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VOICE “OFF” 1: VOICE 1 “ON” 2: VOICE 2 “ON”
	V	**R**	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	V	**R**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**R**	P1	;							

VS	VFO SELECT										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VFO-A 1: VFO-B
	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	;							

VV	VFO TO VFO										
Set	1	2	3	4	5	6	7	8	9	10	Copy the displayed VFO data to the opposite VFO.
	V	**V**	;								
Read	1	2	3	4	5	6	7	8	9	10	
	V	**V**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**V**	;								

VX	VOX STATUS										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VOX “OFF” 1: VOX “ON”
	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	;							

YAESU
The radio

1710-B