YAESU

FT-2000

CAT Operation

Reference Book

VERTEX STANDARD CO., LTD.

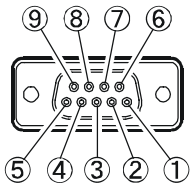
OVERVIEW

The CAT (Computer Aided Transceiver) System in the **FT-2000** 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.

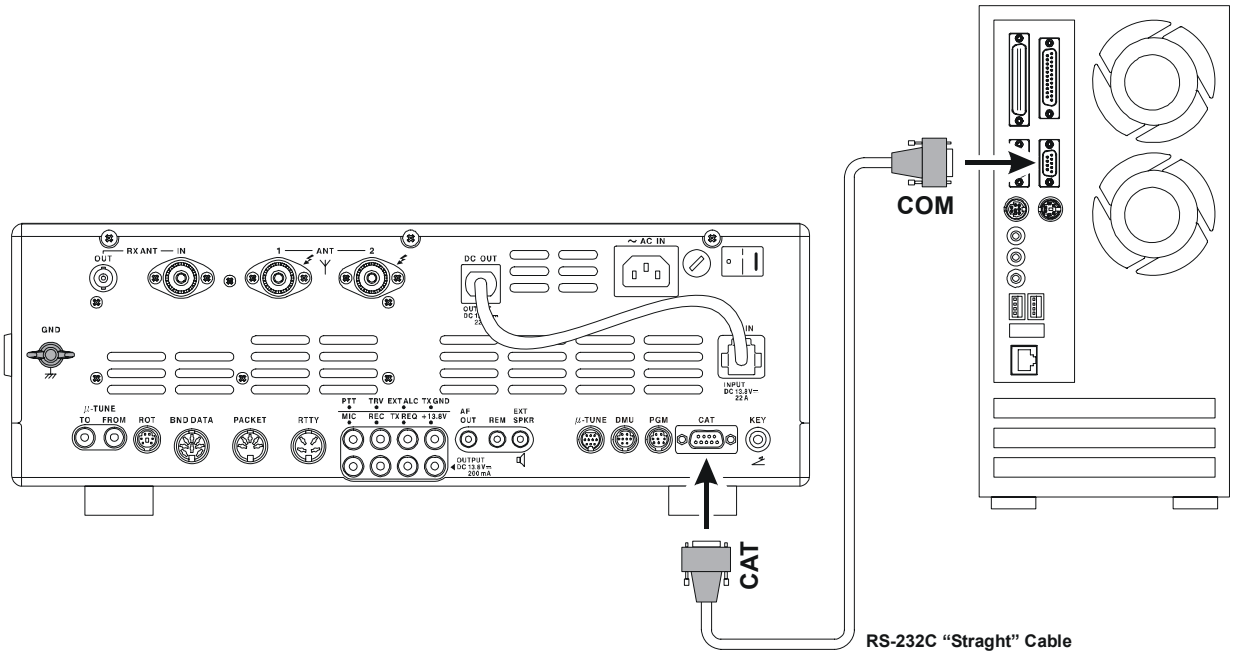
The **FT-2000** has a built-in level converter, allowing direct connection from the rear-panel **CAT** jack to the serial port of your computer without the need of any external boxes. You will need a serial cable for connection to the RS-232C (serial or COM port) connector on your computer. Purchase 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.

Vertex Standard 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 main band (VFO-A) frequency to 14.250000 MHz.

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

There is three for the **FT-2000** Command as shown below:

Set command: Set a particular condition (to the **FT-2000**)

Read command: Reads an answer (from the **FT-2000**)

Answer command: Transmits a condition (from the **FT-2000**)

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

- ❒ To set the main band (VFO-A) frequency to 14.250000 MHz, the following command is sent from the computer to the transceiver:
  "**FA14250000;**" (Set command)
- ❒ To read the main band (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-2000**, 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
AB	VFO-A TO VFO-B	O	X	X	X	**MR**	MEMORY READ	X	O	O	X
AC	ANTENNA TUNER CONTROL	O	O	O	O	**MS**	METER SW	O	O	O	O
AG	AF GAIN	O	O	O	O	**MW**	MEMORY WRITE	O	X	X	X
AI	AUTO INFORMATION	O	O	O	X	**MX**	MOX SET	O	O	O	O
AM	VFO-A TO MEMORY CHANNEL	O	X	X	X	**NA**	NARROW	O	O	O	O
AN	ANTENNA NUMBER	O	O	O	O	**NB**	NOISE BLANKER	O	O	O	O
BC	AUTO NOTCH	O	O	O	O	**NL**	NOISE BLANKER LEVEL	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	X
CH	CHANNEL UP/DOWN	O	X	X	X	**PL**	SPEECH PROCESSOR LEVEL	O	O	O	O
CN	CTCSS NUMBER	O	O	O	O	**PR**	SPEECH PROCESSOR	O	O	O	O
CO	CONTOUR	O	O	O	O	**PS**	POWER SWITH	O	O	O	X
CS	CW SPOT	O	O	O	O	**QI**	QMB STORE	O	X	X	X
CT	CTCSS	O	O	O	O	**QR**	QMB RECALL	O	X	X	X
DA	DIMMER	O	O	O	X	**QS**	QUICK SPLIT	O	X	X	X
DN	DOWN	O	X	X	X	**RA**	RF ATTENUATOR	O	O	O	O
DP	DISPLAY	O	O	O	O	**RC**	CLAR CLEAR	O	X	X	X
DS	DIMMER SWITCH	O	O	O	O	**RD**	CLAR DOWN	O	X	X	X
ED	ENCORDER DOWN	O	X	X	X	**RF**	ROOFING FILTER	O	O	O	O
EK	ENT KEY	O	X	X	X	**RG**	RF GAIN	O	O	O	O
EU	ENCORDER UP	O	X	X	X	**RI**	RADIO INFORMATION	X	O	O	O
EX	MENU	O	O	O	O	**RL**	NOISE REDUCTION LEVEL	O	O	O	O
FA	FREQUENCY VFO-A	O	O	O	O	**RM**	READ METER	X	O	O	X
FB	FREQUENCY VFO-B	O	O	O	O	**RO**	ROTATOR	O	O	O	X
FK	FUNCTION KEY	O	X	X	X	**RS**	RADIO STATUS	X	O	O	O
FR	FUNCTION RX	O	O	O	O	**RT**	CLAR	O	O	O	O
FS	FAST STEP	O	O	O	O	**RU**	CLAR UP	O	X	X	X
FT	FUNCTION TX	O	O	O	O	**SC**	SCAN	O	O	O	O
GT	AGC FUNCTION	O	O	O	O	**SD**	SEMI BREAK-IN DELAY TIME	O	O	O	O
ID	IDENTIFICATION	X	O	O	X	**SF**	SUB-DIAL FUNCTION	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	X
KM	KEYER MEMORY	O	O	O	X	**SQ**	SQUELCH LEVEL	O	O	O	O
KP	KEY PITCH	O	O	O	O	**SV**	SWAP VFO	O	X	X	X
KR	KEYER	O	O	O	O	**TS**	TXW	O	O	O	O
KS	KEY SPEED	O	O	O	O	**TX**	TX SET	O	O	O	O
KY	CW KEYING	O	X	X	X	**UL**	UNLOCK	X	O	O	O
LK	LOCK	O	O	O	O	**UP**	UP	O	X	X	X
LM	LOAD MESSEGE	O	O	O	X	**VD**	VOX DELAY TIME	O	O	O	O
MA	MEMORY CHANNEL TO VFO-A	O	X	X	X	**VF**	VRF FILTER	O	O	O	O
MC	MEMORY CHANNEL	O	O	O	X	**VG**	VOX GAIN	O	O	O	O
MD	MODE	O	O	O	O	**VM**	[V/M] KEY FUNCTION	O	X	X	X
MG	MIC GAIN	O	O	O	O	**VS**	VFO SELECT	O	O	O	O
MK	MODE KEY	O	X	X	X	**VX**	VOX	O	O	O	O
ML	MONITOR LEVEL	O	O	O	O	**XT**	TX CLAR	O	O	O	O

CONTROL COMMAND TABLES

AB — VFO-A TO VFO-B

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

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: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
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."

AM — VFO-A TO MEMORY CHANNEL

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

AN — ANTENNA NUMBER

	1	2	3	4	5	6	7	8	9	10
Set	A	N	P1	P2	;					
Read	A	N	P1	;						
Answer	A	N	P1	P3	P4	;				

P1 0: Fixed
P2 1: ANT "1"
2: ANT "2"
5: ANT "RX"
P3 1: ANT "1"
2: ANT "2"
P4 0: ANT "RX" "OFF"
1: ANT "RX" "ON"

BC — AUTO NOTCH

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

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

BD — BAND DOWN

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

P1 0: Main (VFO-A) Band
1: Sub (VFO-B) Band

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"

CONTROL COMMAND TABLES

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 LEVEL
P3 When P2=0
000: OFF
001: ON
When P2=1
001 - 400 (NOTCH Frequency : x 10 Hz)

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 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: GEN

BU — BAND UP

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

P1 0: Main (VFO-A) Band
1: Sub (VFO-B) Band

BY — BUSY

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

P1 0: Main (VFO-A) Band BUSY "OFF"
1: Main (VFO-A) Band BUSY "ON"
P2 0: Sub (VFO-B) Band BUSY "OFF"
1: Sub (VFO-B) Band BUSY "ON"

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: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
P2 0 - 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 LEVEL
P3 When P2=0,
000: CONTOUR "OFF"
001: CONTOUR "ON"
When P2=1,
01 - 40 (CONTOUR Frequency)

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

TABLE

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

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: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
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 - 07: VFD Backlight Brightness Level
P2 00 - 15: Meter (except VFD) Brightness Level

DN — MIC DWN

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

DP — DISPLAY

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

P1 0: World Clock Display
1: Band Scope Display
2: AF Oscilloscope/Spectrum Analyzer Display
3: Log Book Display
4: Temperature/SWR Display
5: Rotator Display
6: Memory Channel List Display

※: This command does not activates when the optional Data Managemnt Unit is not attached.

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"

ED — ENCORDER DOWN

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

P1 0: MAIN ENCORDER
1: SUB ENCORDER
P2 01-99: Steps

EK — ENT KEY

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

EU — ENCORDER UP

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

P1 0: MAIN ENCORDER
1: SUB ENCORDER
P2 01-99: Steps

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 : 001-136 (MENU Number)
P2 : Parameter
See Table 2 and Table 3

TABLE 2

P1	FUNCTION	P2
001	AGC FAST DELAY TIME	0020 ~ 4000 msec (20 msec/step)
002	AGC FAST PEAK HOLD TIME	0000 ~ 2000 msec (20 msec/step)
003	AGC MID DELAY TIME	0020 ~ 4000 msec (20 msec/step)
004	AGC MID PEAK HOLD TIME	0000 ~ 2000 msec (20 msec/step)
005	AGC SLOW DELAY TIME	0020 ~ 4000 msec (20 msec/step)
006	AGC SLOW PEAK HOLD TIME	0000 ~ 2000 msec (20 msec/step)
007	DISPLAY COLOR	0: COOL BLUE 1: CONTRAST BLUE 2: FLASH BLUE 3: CONTRAST UMBER 4: UMBER
008	METER DIMMER	00 ~ 15
009	DISPLAY DIMMER	00 ~ 07
010	TUNING OFFSET INDICATOR	0: CLARIFIER OFFSET 1: CW TUNIG METER 2: VRF PEAK POSITION
011	S-METER PEAK HOLD	0: OFF 1: 0.5 sec 2: 1.0 sec 3: 2.0 sec
012	ROTATOR STARTING POINT	0: 0° 1: 90° 2: 180° 3: 270°
013	ROTATOR NEEDLE PRECISELY	00 ~ 30° (0 ~ –30°, 2° step)
014	QMB MAKER	0: OFF 1: ON
015	VOICE MEMORY AUDIO OUTPUT LEVEL	000 ~ 100
016	VOICE MEMORY AUDIO TX LEVEL	000 ~ 100
017	CW BEACON	000 (OFF) ~ 255 sec
018	CONTEST NUMBER STYLE	0: 1290 1: AunO 2: Aunt 3: A2nO 4: A2nt 5: 12nO 6: 12nt
019	CONTEST NUMBER	0000 ~ 9999
020	CW MEMORY “1” MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
021	CW MEMORY “2” MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
022	CW MEMORY “3” MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
023	CW MEMORY “4” MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
024	CW MEMORY “5” MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
025	ANTENNA SELECTION MODE	0: BAND 1: STACK
026	BEEP LEVEL	000 ~ 255
027	CAT BAUD RATE	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps
028	CAT TIME-OUT TIMER	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec
029	CAT RTS PORT	0: OFF 1: ON
030	MEMORY GROUP	0: OFF 1: ON
031	QUICK SPLIT TUNING OFFSET	–20 ~ +00 (or –00) ~ +20 kHz
032	VFO TRACK	0: OFF 1: BAND 2: FREQUENCY
033	TX TIME OUT TIMER	0: OFF 1: 5 min 2: 10 min 3: 15 min 4: 20 min 5: 25 min 6: 30 min
034	TRANSVERTER FREQUENCY DISPLAY	30 ~ 49 MHz
035	µ-TUNE DIAL	0: STEP-2 1: STEP-1 2: OFF
036	SUB (VFO-B) BAND NB LEVEL	1000: NB KNOB 0000 ~ 0100 (FIX)
037	SUB (VFO-B) BAND CW NARROW FILTER	0: 1200 Hz 1: 500 Hz 2: 300 Hz
038	MIC SCAN	0: OFF 1: ON
039	SCAN RESUME	0 PAUSE 1: TIME
040	VOX ANTI-TRIP LEVEL	000 ~ 100
041	FREQUENCY ADJUST	–25 ~ +00 (or –00) ~ +25
042	SUB (VFO-B) BAND IF SHIFT (LSB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
043	SUB (VFO-B) BAND IF SHIFT (USB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
044	SUB (VFO-B) BAND IF SHIFT (CW-LSB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
045	SUB (VFO-B) BAND IF SHIFT (CW-USB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
046	SUB (VFO-B) BAND IF SHIFT (RTTY-LSB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
047	SUB (VFO-B) BAND IF SHIFT (RTTY-USB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
048	SUB (VFO-B) BAND IF SHIFT (PKT-LSB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
049	SUB (VFO-B) BAND IF SHIFT (PKT-USB)	–1000 ~ +0000 (or –0000) ~ +1000 Hz
050	AM MIC GAIN	1000: MIC KNOB 0000 ~ 0100 (FIX)
051	AM MIC SELECT	0: MIC JACK 1: DATA JACK 2: N.C.
052	FRONT PANEL KEY JACK TYPE	0: OFF 1: BUG 2: IAMBIC KEYER W/O ACS 3: IAMBIC KEYER W/ACS
053	FRONT PANEL KEY JACK WIRING	0: NORNAL 1: REVERSE
054	REAR PANEL KEY JACK TYPE	0: OFF 1: BUG 2: IAMBIC KEYER W/O ACS 3: IAMBIC KEYER W/ACS
055	REAR PANEL KEY JACK WIRING	0: NORNAL 1: REVERSE
056	CW AUTO MODE	0: OFF 1: 50 MHz ONLY 2: ON
057	CW BFO INJECTION SIDE	0: USB 1: LSB 2: AUTO
058	CW BREAK-IN MODE	0: SEMI BREAK-IN 1: FULL BREAK-IN
059	CW CARRIER WAVE FORM SHAPE	0: 1 msec 1: 2 msec 2: 4 msec 3: 6 msec
060	CW WEIGHT	25 (1:2.5) ~ 45 (1:4.5)
061	CW FREQUENCY DISPLAY	0: DIRECT FREQUENCY 1: PITCH OFFSET
062	CW PC KEYING	0: OFF 1: ON
063	CW QSK TIME	0: 15 msec 1: 20 msec 2: 25 mesc 3: 30 msec
064	AFSK MODE DATA INPUT PORT	0: DATA JACK 1: N.C.
065	AFSK MODE DATA INPUT LEVEL	000 ~ 100
066	AFSK MODE DATA OUTPUT BAND	0: MAIN (VFO-A) BAND 1: SUB (VFO-B) BAND
067	AFSK MODE DATA OUTPUT LEVEL	000 ~ 100
068	PSK MODE VOX DELAY TIME	0030 ~ 3000 msec
069	PSK MODE VOX GAIN	000 ~ 100
070	PACKET MODE FREQUENCY DISPLAY OFFSET	–3000 ~ +0000 (or –0000) ~ +3000 Hz (10 Hz/step)
071	PACKET MODE CARRIER POINT FREQUENCY	–3000 ~ +0000 (or –0000) ~ +3000 Hz (10 Hz/step)
072	FM MIC GAIN	1000: MIC KNOB 0000 ~ 0100 (FIX)
073	FM MIC SELECT	0: MIC JACK 1: DATA JACK 2: N.C.
074	28 MHz REPEATER SHIFT	0000 ~ 1000 kHz (10 Hz/step)
075	50 MHz REPEATER SHIFT	0000 ~ 4000 kHz (10 Hz/step)

CONTROL COMMAND TABLES

TABLE 3

P1	FUNCTION	P2
076	RTTY MODE RX POLARITY (MARK/SPACE)	0: NORNAL 1: REVERSE
077	RTTY MODE TX POLARITY (MARK/SPACE)	00.: NORNAL 1: REVERSE
078	RTTY MODE DATA OUTPUT BAND	0: MAIN (VFO-A) BAND 1: SUB (VFO-B) BAND
079	RTTY MODE DATA OUTPUT LEVEL	000 ~ 100
080	RTTY MODE SHIFT FREQUENCY	1: 170 Hz 1: 200 Hz 2: 425 Hz 3: 850 Hz
081	RTTY MODE MARK FREQUENCY	1: 1275 Hz 2: 2125 Hz
082	SSB MODE MIC SELECT	0: MIC JACK 1: DATA JACK 2: N.C.
083	SSB MODE TX BPF BANDWIDTH	0: 50 - 3000 Hz 1: 100 - 2900 Hz 2: 200 - 2800 Hz 3: 300 - 2700 Hz 4: 400 - 2600 Hz 5: 3000WB
084	MAIN (VFO-A) BAND LSB CARRIER POINT	–200 ~ +000 (or –000) ~ +200 Hz (10 Hz/step)
085	MAIN (VFO-A) BAND USB CARRIER POINT	–200 ~ +000 (or –000) ~ +200 Hz (10 Hz/step)
086	SUB (VFO-B) BAND LSB CARRIER POINT	–200 ~ +000 (or –000) ~ +200 Hz (10 Hz/step)
087	SUB (VFO-B) BAND USB CARRIER POINT	–200 ~ +000 (or –000) ~ +200 Hz (10 Hz/step)
088	AGC GAIN CURVE	0: NORMAL 1: SLOPED
089	HEADPHONE MODE	0: SEPARATE 1: COMBINE 1 2: COMBIN 2
090	CONTOUR GAIN	–40 ~ +00 (or –00) ~ +20 dB
091	CONTOUR WIDTH	01 ~ 11
092	IF NOTCH WIDTH	0: NARROW 1: WIDE
093	DSP CW FILTER PASSBAND CHARACTER	0: SOFT 1: SHARP
094	DSP CW FILTER SHAPE FACTOR	0: STEEP 1: MEDIUM 2: GENTLE
095	DSP CW NARROW FILTER BANDWIDTH	00: 25 Hz 01: 50 Hz 02: 100 Hz 03: 200 Hz 04: 300 Hz 05: 400 Hz 06: 500 Hz 07: 800 Hz 08: 1200 Hz 09: 1400 Hz 10: 1700 Hz 11: 2000 Hz
096	DSP PSK FILTER PASSBAND CHARACTER	0: SOFT 1: SHARP
097	DSP PSK FILTER SHAPE FACTOR	0: STEEP 1: MEDIUM 2: GENTLE
098	DSP PSK FILTER BANDWIDTH	0: 25 Hz 1: 50 Hz 2: 100 Hz 3: 200 Hz 4: 300 Hz 5: 400 Hz
099	DSP RTTY FILTER PASSBAND CHARACTER	0: SOFT 1: SHARP
100	DSP RTTY FILTER SHAPE FACTOR	0: STEEP 1: MEDIUM 2: GENTLE
101	DSP RTTY FILTER BANDWIDTH	0: 25 Hz 1: 50 Hz 2: 100 Hz 3: 200 Hz 4: 300 Hz 5: 400 Hz
102	DSP SSB FILTER PASSBAND CHARACTER	0: SOFT 1: SHARP
103	DSP SSB FILTER SHAPE FACTOR	0: STEEP 1: MEDIUM 2: GENTLE
104	DSP SSB NARROW FILTER BANDWIDTH	00: 200 Hz 01: 400 Hz 02: 600 Hz 03: 850 Hz 04: 1100 Hz 05: 1350 Hz 06: 1500 Hz 07: 1650 Hz 08: 1800 Hz 09: 1950 Hz 10: 2100 Hz 11: 2250 Hz
105	SPECTRUM SCOPE SCAN START FREQUENCY (1.8 MHz)	01800 ~ 01999 (1.800 MHz ~ 1.999 MHz)
106	SPECTRUM SCOPE SCAN START FREQUENCY (3.5 MHz)	03500 ~ 03999 (3.500 MHz ~ 3.999 MHz)
107	SPECTRUM SCOPE SCAN START FREQUENCY (5.0 MHz)	05250 ~ 05499 (5.250 MHz ~ 5.499 MHz)
108	SPECTRUM SCOPE SCAN START FREQUENCY (7.0 MHz)	07000 ~ 07299 (7.000 MHz ~ 7.299 MHz
109	SPECTRUM SCOPE SCAN START FREQUENCY (10 MHz)	10100 ~ 10149 (10.100 MHz ~ 10.149 MHz)
110	SPECTRUM SCOPE SCAN START FREQUENCY (14 MHz)	14000 ~ 14349 (14.000 MHz ~ 14.349 MHz)
111	SPECTRUM SCOPE SCAN START FREQUENCY (18 MHz)	18000 ~ 18199 (18.000 MHz ~ 18.199 MHz
112	SPECTRUM SCOPE SCAN START FREQUENCY (21 MHz)	21000 ~ 21449 (21.000 MHz ~ 21.449 MHz)
113	SPECTRUM SCOPE SCAN START FREQUENCY (24.5 MHz)	24800 ~ 24989 (24.800 MHz ~ 24.989 MHz)
114	SPECTRUM SCOPE SCAN START FREQUENCY (28 MHz)	28000 ~ 29699 (28.000 MHz ~ 29.699 MHz)
115	SPECTRUM SCOPE SCAN START FREQUENCY (50 MHz)	50000 ~ 53999 (50.000 MHz ~ 53.999 MHz)
116	MAIN TUNING DIAL KNOB DIALSTEP	0: 1 Hz 1: 10 Hz
117	MAIN TUNING DIAL KNOB CW FINE TUNING	0: OFF 1: ON
118	SUB VFO-B KNOB MHz STEP	0: 0.1 MHz 1: MHz
119	MICROPHNE [UP]/[DOWN] KEY AM STEP	0: 2.5 kHz 1: 5 kHz 2: 9 kHz 3: 10 kHz 4:12.5 kHz
120	MICROPHNE [UP]/[DOWN] KEY FM STEP	0: 5 kHz 1: 6.25 kHz 2: 10 kHz 3: 12.5 kHz 4: 25 kHz
121	MAIN TUNING DIAL KNOB DIALSTEP (FM MODE)	0: 10 Hz 1: 100 Hz
122	MY BAND SELECT	0: OFF 1: ON P2(6): 1.8 MHz P2(7): 3.5 MHz P2(8): 5 MHz P2(9): 7 MHz P2(10): 10 MHz P2(11): 14 MHz P2(12): 18 MHz P2(13): 21 MHz P2(14): 24.5 MHz P2(15): 28 MHz P2(16): 50 MHz P2(17): GENERAL P2(17): TRANSVERTER Example: P2 = 1101010101100 (My Band = 1.8/3.5/7/14/21/28/50 MHz)
123	MIC EQUAQLIZER CENTER FREQUENCY (LOW RANGE)	0: OFF 1: 100 Hz 2: 200 Hz 3: 300 Hz 4: 400 Hz 5: 500 Hz 6: 600 Hz 7: 700 Hz
124	MIC EQUAQLIZER GAIN (LOW RANGE)	–10 ~ +00 (or –00) ~ +10
125	MIC EQUAQLIZER BANDWIDTH (LOW RANGE)	1 ~ 10
126	MIC EQUAQLIZER CENTER FREQUENCY (MID RANGE)	0: OFF 1: 700 Hz 2: 800 Hz 3: 900 Hz 4: 1000 Hz 5: 1100 Hz 6: 1200 Hz 7: 1300 Hz 8: 1400 Hz 9: 1500 Hz
127	MIC EQUAQLIZER GAIN (MID RANGE)	–10 ~ +00 (or –00) ~ +10
128	MIC EQUAQLIZER BANDWIDTH (MID RANGE)	01 ~ 10
129	MIC EQUAQLIZER CENTER FREQUENCY (HIGH RANGE)	00: OFF 01: 1500 Hz 02: 1600 Hz 03: 1700 Hz 04: 18000 Hz 05: 1900 Hz 06: 2000 Hz 07: 2100 Hz 08: 2200 Hz 09: 2300 Hz 10: 2400 Hz 11: 2500 Hz 12: 2600 Hz 13: 2700 Hz 14: 2800 Hz 15: 2900 Hz 16: 3000 Hz 17: 3100 Hz 18: 3200 Hz
130	MIC EQUAQLIZER GAIN (HIGH RANGE)	–10 ~ +00 (or –00) ~ +10
131	MIC EQUAQLIZER BANDWIDTH (HIGH RANGE)	01 ~ 10
132	BIAS LEVEL	NO FUNCTION
133	MAXIMUM OUTPUT POWER LIMIT	0: 10 W 1: 20 W 2: 50 W 3: 100 W
134	RF PWR KNOB FUNCTION	0: ALL MODE 1: CARRIER
135	TX-GND JACK	0: DISABLE 1: ENABLE
136	TUNER DRIVEING POWER	0: 10 W 1: 20 W 2: 50 W 3: 100 W
137	VOX OPERATION	0: MIC INPUT 1: DATA INPUT
138	EMERGENCY CHANNEL	0: DISABLE 1: ENABLE

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
	P1	P1	P1	;						
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	P1	P1	;						

P1 300000 - 60000000 (Hz)

FK — FUNCTION KEY

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

P1 1: F1
2: F2
3: F3
4: F4
5: F5
6: F6
7: F7

FR — FUNCTION RX

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

P1 0: Main (VFO-A) Band Receiver: RX, Sub (VFO-B) Band Receiver: "OFF"
1: Main (VFO-A) Band Receiver: Mute, Sub (VFO-B) Band Receiver: "OFF"
2: Main (VFO-A) Band Receiver: RX, Sub (VFO-B) Band Receiver: RX
3: Main (VFO-A) Band Receiver: Mute, Sub (VFO-B) Band Receiver: RX

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: Main (VFO-A) Band Transmitter: TX
1: Sub (VFO-B) Band Transmitter: TX

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	P3	;					

P1 0: Main (VFO-A) Band
1: Sub (VFO-B) Band
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"

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 0251 (Fixed value)

CONTROL COMMAND TABLES

IF — INFORMATION

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

P1 000-117 (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: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-U
P7 0: VFO 1: Memory 2: Memory Tune 3: Quick Memory Bank (QMB) 4: QMB-MT
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

IS — IF-SHIFT

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

P1 0:Fixed
P2 −1000 ~ +1000 Hz

KM — KEYER MEMORY

Set	1	2	3	4	5	6	7	~	53	**
	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	~	53	**
	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 07: 650 Hz 14: 1000 Hz
01: 350 Hz 08: 700 Hz 15: 1050 Hz
02: 400 Hz 09: 750 Hz
03: 450 Hz 10: 800 Hz
04: 500 Hz 11: 850 Hz
05: 550 Hz 12: 900 Hz
06: 600 Hz 13: 950 Hz

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: KEYER "OFF"
1: 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	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 1: Keyer Memory "1" Playback 6: Message Keyer "1" Playback
2: Keyer Memory "2" Playback 7: Message Keyer "2" Playback
3: Keyer Memory "3" Playback 8: Message Keyer "3" Playback
4: Keyer Memory "4" Playback 9: Message Keyer "4" Playback
5: Keyer Memory "5" Playback A: Message Keyer "5" Playback

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: DIAL Lock "OFF"
1: DIAL Lock "ON"

CONTROL COMMAND TABLES

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: DVS 1: P. B

P2 When P1=0
0: DVS (Recording Stop)
1: DVS (CH "1" Recording Start/Stop)
2: DVS (CH "2" Recording Start/Stop)
3: DVS (CH "3" Recording Start/Stop)
4: DVS (CH "4" Recording Start/Stop)
5: DVS (CH "5" Recording Start/Stop)

When P1=1
0: P.B (Recording Stop)
1: P.B (Recording Start)

MA — MEMORY CHANNEL TO VFO-A

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

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 000 - 117: Memory Channel Number
000 - 099: Regular Memory Channel
100: P1L
101: P1U
〃
116: P9L
117: P9U

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: Main (VFO-A) Band
1: Sub (VFO-B) Band
P2 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-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 - 255

MK — MODE KEY

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

P1 KEY 0: LSB
1: USB
2: CW
3: AM
4: FM
5: RTTY
6: PKT

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 When P1=0
000: MONI "OFF"
001: MONI "ON"
When P1=1
001 - 255

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: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-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

CONTROL COMMAND TABLES

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 0: COMP
1: ALC
2: PO
3: SWR
4: ID
5: VDD

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	**M**	**W**	;							
Answer	**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	;			

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: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-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

MX — MOX SET

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

P1 0: MOX "OFF"
1: MOX "ON"

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: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
P2 0: OFF
1: ON

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: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
P2 0: Noise Blanker "OFF"
1: Noise Blanker "ON"
2: Noise Blanker (Wide) "ON"

NL — NOISE BLANKER LEVEL

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

P1 0: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
P2 000 - 255

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: Main Band (VFO-A) Receiver
1: Sub Band (VFO-B) Receiver
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	**O**	**I**	;							
Answer	**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: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-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

CONTROL COMMAND TABLES

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: Main (VFO-A) Band
1: Sub (VFO-B) Band
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
1: AMP 1
2: AMP 2

PB — PLAY BACK

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

P1 0: DVS
1: P.B

P2 When P1=0
0: DVS
1: DVS (CH "1" Playback Start)
2: DVS (CH "2" Playback Start)
3: DVS (CH "3" Playback Start)
4: DVS (CH "4" Playback Start)
5: DVS (CH "5" Playback Start)

When P1=1
0: P.B (Playback Stop)
1: P.B (Playback Start)

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 000 - 255

PL — SPEECH PROCESSOR LEVEL

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

P1 000 - 255

PR — SPEECH PROCESSOR

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

P1 0: Speech Processor "OFF"
1: Speech Processor "ON"

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"

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										

CONTROL COMMAND TABLES

QS — QUICK SPLIT

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

	1	2	3	4	5	6	7	8	9	10
Set	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: 6 dB
2: 12 dB
3: 18 dB

RC — CLAR CLEAR

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

RD — CLAR MINUS OFFSET

	1	2	3	4	5	6	7	8	9	10
Set	R	D	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)

RF — ROOFING FILTER

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

P1 0:Fixed
P2 0: AUTO
1: 15 kHz
2: 6 kHz
3: 3 kHz
P3 1: 15 kHz
2: 6 kHz
3: 3 kHz
4: AUTO - 15 kHz
5: AUTO - 6kHz
6: AUTO - 3 kHz

RG — RF GAIN

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

P1 0: Main (VFO-A) Band Receiver
1: Sub (VFO-B) Band Receiver
P2 000 - 255

RI — RADIO INFORMATION

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

P1 0: Hi-SWR
1: MIC-EQ
2: CLASS-A
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	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	;				

P1 0:Fixed
P2 01 - 15

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 knob
1: S Meter (Main)
2: S Meter (Sub)
3: COMP Meter
4: ALC Meter
5: PO Meter
6: SWR Meter
7: ID Meter
8: VDD Meter
P2 0 - 255

CONTROL COMMAND TABLES

RO — ROTATOR

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

P1 0: OFF
1: Counter Clockwise
2: Clockwise
3: SPEED 1 % UP
4: SPEED 1 % DOWN
P2 DIRECTION (0 - 450)
P3 SPEED (0 - 100 %)

RS — RADIO STATUS

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

P1 0: RX Clarifier “OFF”
1: RX Clarifier “ON”

RU — RX CLARIFIER PLUS OFFSET

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

P1 0000 - 9999 (Hz)

SC — SCAN

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

P1 0000: Full Break-in
0001 - 5000 mS

SF — SUB VFO-B KNOB FUNCTION

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

P1 0: BAND (VFO-A)
1: MHz (VFO-A)
2: GRP
3: MCH
4: BAND (VFO-B)
5: MHz (VFO-B)
6: FAST (VFO-B)
7: A/B
8: Off (Read only)

SH — WIDTH

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

P1 0:Fixed
P2 00 (Counter Clockwise) - 31 (Clockwise), 16 (Center)

SM — S-METER READING

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

P1 0: Main (VFO-A) Band S-meter
1: Sub (VFO-B) Band S-meter
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: Main (VFO-A) Band
1: Sub (VFO-B) Band
P2 000 - 255

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 — 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 0000 - 5000 mS (20 mS multiples)

VF — VRF FILTER

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

P1 0: Fixed
P2 0: OFF
1: ON
2: Default set
P3 +: Plus Shift
–: Minus Shift
P4 0 - 9 (Step)
P5 000 - 255
P6 0: VRF
1: µTUNE

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	VFO-A TO 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	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	;							

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	;							

XT	TX CLAR										
Set	1	21	3	4	5	6	7	8	9	10	P1 0: TX CLAR “OFF” 1: TX CLAR “ON”
	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	;							

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