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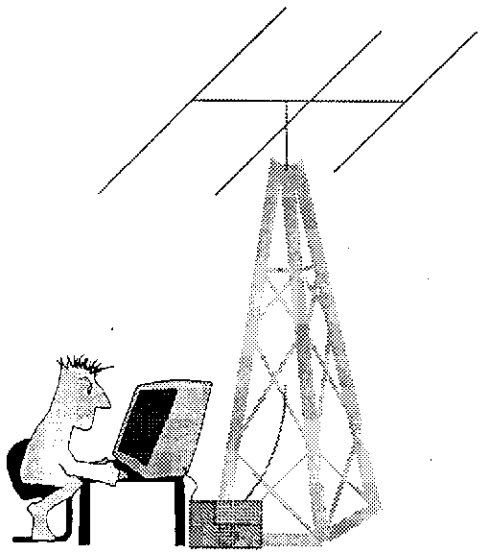
ALINCO

HF Desktop Transceiver DX-77
User's Guide to Computer Controlled Operation



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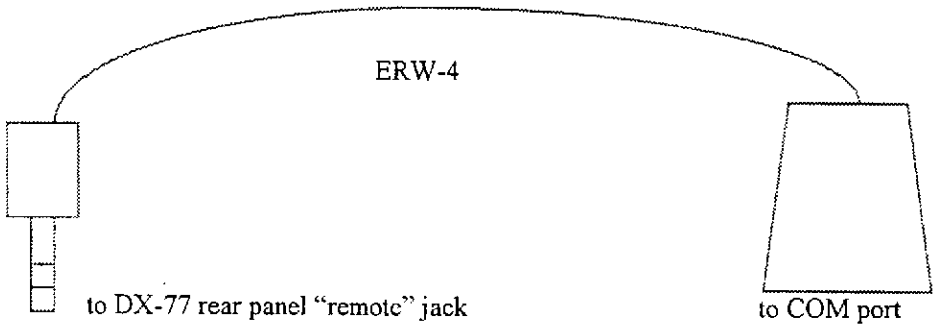
1. Introduction

The HF Transceiver DX-77 offers serial data control capability from a computer. Parameters such as transmit and receive frequencies, mode, power, RF gain, filter, etc. can be controlled using a terminal software. No special software is required, thus commonly available terminal software such as Windows™-terminal, HyperTerminal, or ProComm will work fine. Before proceeding with the computer control, please read the DX-77 Instruction Manual carefully and familiarize yourself with the functions and front panel operations of the DX-77 first.

Note!: Operation from the radio's front panel should be refrained while under computer control.

2. Serial Port Connections

For serial port connection, the optional Alinco ERW-4 cable is used for communications between the DX-77 and a computer. Plug the 3.5mm diameter stereo plug of the ERW-4 to the "remote" jack on the rear panel of the DX-77, and the RS232 DB-25 end to your computer's COM port. Run your terminal application and configure the communication parameters for the COM port to 9600 baud, 8 data bits, *2 stop bits*, and no parity.



Place the DX-77 within your sight so that the status of the radio can be monitored constantly.

3. Command Strings

Once the radio is connected to your computer through the ERW-4 and a terminal software is running with the correct configuration, alphanumeric key entries on the computer keyboard are put through to DX-77 and the radio is standing-by for command strings of correct format. The data format consists of *UPPER CASE* ASCII characters, as follows:

"AL" + [command] + [data]

When the above format string is entered followed by carriage-return, the command is immediately executed in DX-77 and the new setting is effected immediately. The [command] part string consists of 2 bytes ASCII characters of *UPPER CASE* and the [data] part string is numbers of various length. The commands can be categorized into two types: those that input data into the DX-77 and those that tells the DX-77 to output current status data. The former are described in Sections 3.1 to 3.21 and the latter in Sections 3.22 and onwards.

Data Input Commands

3.1 Transmit Frequency

Transmitting frequency for currently displaying VFO or Memory can be input using the command 0A (zero "A"). To enter the transmitting frequency, enter the prefix AL, followed by the programming code 0A, followed by 6 to 10 digit numerics designating a frequency in Hertz order. (Note: Not MHz, nor kHz, but Hz). For the frequency digits, the higher order zeroes may be omitted but smaller order zeroes may not be omitted, so that the designation is always in the unit of Hertz. Then hit the carriage return key. If the frequency input is out of the transmitter range, the radio will respond ERROR.

Example: To input 21.145MHz, enter AL0A0021145000 .
or enter AL0A21145000

Note: Although the entry must include up to the last digit (i.e. Hz order), the last digit will always be considered as 0, regardless of what is entered. This is because the DX-77's frequency resolution is 10Hz.

3.2 Receive Frequency

Receiving frequency for currently displaying VFO or memory can be input using the command 0B (zero "B"). To enter the receiving frequency, enter the prefix AL, followed by the programming code 0B, followed by 6 to 10 digit numerics designating a frequency in Hertz order. (Note: Not MHz, nor kHz, but Hz). Note that for the frequency digits, the higher order zeroes may be omitted but smaller order zeroes may not be omitted, so that the designation is always in the unit of Hertz. Then hit the carriage return key. If the frequency input is out of the receiver range, the radio will respond ERROR.

Example: To input 7.013MHz, enter AL0B0007013000
or enter AL0B7013000

Note: Although the entry must include up to the last digit (i.e. Hz order), the last digit will always be considered as 0, regardless of what is entered. This is because the DX-77's frequency resolution is 10Hz.

3.3 VFO Mode

The VFO Mode can be selected using the command "1A". To select the VFO mode, enter the prefix AL, followed by the programming code 1A, followed by one numeric 1 or 2, specifying VFO-A or VFO-B. Then hit the carriage return key.

Example: To select VFO-B, enter AL1A2

3.4 Memory Mode

The Memory Mode can be selected using the command "1B". To select the memory mode, enter the prefix AL, followed by the programming code 1B, followed by numeric 0. Then hit the carriage return key. The radio will respond ERROR if no memory channel has been programmed and memory mode cannot be accessed.

Example: To select the memory mode, enter AL1B0

3.5 Channel Display

The DX-77 can be put into Channel Display mode where only the channel number and without the frequency is indicated on the display. To set into Channel Display, enter the prefix AL, followed by the programming code 1D, followed by one numeric 0 or 1 specifying the normal frequency mode or the channel display mode respectively. Then hit the carriage return key.

Example: To show channel numbers only, enter AL1D1
To come back to frequency display, enter AL1D0

3.6 UP/DOWN

The UP and DOWN key operations can be done using the command "2A". To input UP/DOWN operation, enter the prefix AL, followed by the programming code 2A, followed by one numeric 0 or 1 specifying UP or DOWN respectively. Then hit the carriage return key.

Example: To input UP operation, enter AL2A0

3.7 Check Transmit Frequency

Pressing and holding the FUNC key on the DX-77 allows momentary reception of transmitting frequency for checking. This operation can be done using the command "2B". To do this, enter the prefix AL, followed by the programming code 2B, followed by one numeric 0 or 1 specifying stop or start of receiving respectively. Then hit the carriage return key. *Note: For this command, you must always input the stop command line once the check-transmit operation is done otherwise the radio will not automatically recover to normal receiving frequency.*

Example: To start reception of transmitting frequency, enter AL2B1
To stop reception of transmitting frequency, enter AL2B0

3.8 Transmitter Output Power

Transmitter output power can be set to High or LOW using the command 2C. To set the power output, enter the prefix AL, followed by the programming code 2C, followed by one numeric 0 or 1 specifying HI or LOW respectively. Then hit the carriage return key.

Example: To set to LOW power, enter AL2C1

3.9 Scanning

Scanning can be started and stopped using the command 2D. For scanning, enter the prefix AL, followed by the programming code 2D, followed by one numeric 0, 1, or 2 specifying stop, start-upward, or start-downward of scanning. Then hit the carriage return key. *Note: It is recommended to input the stop scanning command line every time after inputting the start scanning command.*

Example: To start scanning upwards, enter AL2D1
To stop scanning, enter AL2D0

3.10 Priority

The priority function can be activated using the command 2E. Note that, since this function will scan between VFO and a memory channel, at least one memory channel has to be programmed before activating this function. To toggle the priority function, enter the prefix AL, followed by the programming code 2E, followed by one numeric 0 or 1 specifying OFF or ON. Then hit the carriage return key. *Note: It is recommended that the stop scanning command line is always input after inputting the priority command.*

Example: To start the priority function, enter AL2E1
To stop the priority function, enter AL2E0

3.11 Split

The split operation can be activated/deactivated using the command 2F. To toggle the split operation, enter the prefix AL, followed by the programming code 2F, followed by one numeric 0 or 1 specifying OFF or ON. Then hit the carriage return key.

Example: To start the split operation, enter AL2F1

3.12 Mode (modulation)

The mode can be changed using the command 2G. For each mode a numeric switch is assigned. To set a mode, enter the prefix AL, followed by the programming code 2G, followed by one numeric 0 to 5 specifying the mode (0:LSB, 1:USB, 2:CWL, 3:CWU, 4:AM, 5:FM). Then hit the carriage return key.

Example: To select and set FM, enter AL2G5

3.13 RF Gain

The DX-77 has four levels of RF gain, which can be set using the command 2H. To set RF Gain, enter the prefix AL, followed by the programming code 2H, followed by two numerics, each 0 or 1, specifying the RF Gain level (00: 0dB; 01: +10dB; 10: -20dB; 11: -10dB). Then hit the carriage return key.

Example: To set RF Gain at +10dB, enter AL2H01

3.14 AGC

The receiver AGC recovery speed can be toggled to Fast or Slow using the command 2I. To set AGC, enter the prefix AL, followed by the programming code 2I, followed by two numerics 01 or 02 specifying FAST or SLOW respectively. Then hit the carriage return key.

Example: To set AGC to Slow, enter AL2I02

3.15 Filter

The filter can be toggled ON/OFF using the command 2J. To set the filter, enter the prefix AL, followed by the programming code 2J, followed by two numerics 00 or 01 specifying Narrow or Wide. Then hit the carriage return key.

Example: To turn on the narrow filter, enter AL2J00

3.16 Noise Blanker

The noise blanker can be toggled ON and OFF using the command 2K. To set the Noise Blanker, enter the prefix AL, followed by the programming code 2K, followed by one numeric 0 or 1 specifying OFF or ON respectively. Then hit the carriage return key.

Example: To turn ON the noise blanker, enter AL2K1

3.17 CTCSS encoder

The CTCSS (PL tone) encoder can be set using the command 2L. To set the tone encoder frequency, enter the prefix AL, followed by the programming code 2L, followed by two numerics according to Table-1 in Appendix. Then hit the carriage return key. *Note that this will not activate the tone encoder yet; only the tone frequency has been set.* To toggle the tone encoder ON and OFF, enter the prefix AL, followed by the programming code 2L, followed by numerics 00 or 51 specifying OFF or ON. Then hit the carriage return key.

Example: To set the encoder's tone frequency to 88.5Hz, enter AL2L09
To turn the set tone encoder ON, enter AL2L51

3.18 TUNE

The TUNE operation for an automatic antenna tuner can be activated using the command 2M. Proper connection between the automatic tuner and DX-77 is a prerequisite; for details, refer to DX-77 Instruction Manual. To start tuning, enter the prefix AL, followed by the programming code 2N, followed by one numeric 1. Then hit the carriage return key. If a proper tuner could not be detected, the radio will respond FAIL. If the tuning time exceeds its limit (typically for having improper antenna element on the tuner), the radio will respond TIMEOUT.

Example: To start tuning the antenna with an automatic antenna tuner,
enter AL2M1

3.19 SELECT

Pressing the SELECT key on the DX-77's front panel moves the cursor (▼) above the frequency digits. This action can be replaced with the use of the command 2O (numeric 2 and the letter O, not the numeric zero). To select the cursor position, enter the prefix AL, followed by the programming code 2O, followed by one numeric as follows:

cursor position	numeric
No cursor:	0
Cursor on 100kHz digit:	1
Cursor on 1MHz digit:	2
Cursors on 10MHz and 1MHz digits:	3
Cursor on memory channel digit:	4

Then hit the carriage return key.

Example: To set cursor on 1MHz digit, enter AL2O2

3.20 Memory Channel Call Up

A memory channel of your choice can be called up using the command 2V. Note that this command is accepted only when in the memory mode, and an attempt to use the command while in the VFO mode will result in responding ERROR. To call up a memory channel, enter the prefix AL, followed by the programming code 2V, followed by two numerics 00 to 99 indicating the channel number. Then hit the carriage return key. Upon calling up the requested channel, the radio will respond OK. If the requested channel number is unprogrammed, the radio will respond NO DATA.

Example: To call up channel 34, enter AL2V34

3.21 Set Data

The data/parameters in the set-up items for the DX-77 can be programmed using the command 2W. To program data, enter the prefix AL, followed by the programming code 2W, followed by one UPPER CASE ASCII character A to P specifying the data type, followed by one or two numerics specifying the data value, as below.

ASCII	Type	Value
A	Beep	0:OFF 1:ON
B	PTT Lock	0:OFF 1:ON
C	Speech Proc.	0:OFF 1:ON
D	Keyer	0:OFF 1:ON
E	SSB Auto	0:OFF 1:ON
F	Group Scan	0:OFF 1:ON
G	Mem.overwrite prot.	0:OFF 1:ON
H	Mem.freq.access prot.	0:OFF 1:ON
I	SSB Step	0: 1kHz, 1: 2.5kHz, 2: 0.1kHz, 3: 0.5kHz
J	AM Step	0: 1kHz, 1: 2.5kHz, 2: 5kHz, 3: 9kHz 4: 10kHz
K	FM Step	0: 2.5kHz, 1: 5kHz, 2: 10kHz, 3: 12.5kHz 4: 20kHz
L	Scan Pause	0: non-stop 1: 2 sec. 2: 4 sec. 3: 6 sec. 4:off 5::no-limit
M	Side tone	0:800Hz, 1:850Hz..(50Hz step).. 4:1000Hz, 5:400Hz, 6:450Hz ... 12:750Hz
N	Break-In	0:auto 1: 1 sec., 2: 2 sec., ... 7: 7 sec., 8:full
O	Dimmer	0:off, 1: level-1, 2: level-2 ... 5: level-5
P	Keyer Speed	00: 20 wpm, 01: 21wpm, ... 30:50 wpm, 31:6 wpm ... 44:19 wpm

Example: To set the keyer speed at 40 wpm, enter AL2WP20

Data Output Commands

3.22 S-meter read

The S-meter reading can be output upon entering the command 3A. Note that just a momentary S-meter reading on the instance this command is entered, is output. To obtain the S-meter reading, enter the prefix AL, followed by the programming code 3A, followed by one numeric 0 or 1 specifying the output in LCD segment number or A/D converted value between 000 to 255. (In either case, the number is preceded by "M1:".) Then hit the carriage return key. For reference only, relative S-meter reading would be approximately as follows:

S-level	0	1	2	3	4	5	6	7	8	9	+20	+40	+60
Segment		01	03	05	07	09	11	13	15	17	20	23	26
A/D value	028	036	042	050	058	066	074	082	090	132	174	216	255

Example: To output S-meter reading in segment number, enter AL3A0
The DX-77 responds "M1:01" if the S reading is 1.

3.23 PTT Status read

The PTT status can be output upon entering the command 3B. If the PTT is pressed (i.e. the radio is in transmit mode) the response will be SEND. If the PTT is not pressed (i.e. the radio is in receive mode) the response will be REV. To obtain the PTT status, enter the prefix AL, followed by the programming code 3B. Then hit the carriage return key.

Example: To output the PTT status, enter AL3B
The DX-77 responds "REV" for receive or "SEND" for transmit.

3.24 Squelch Status

The command 3C tells the DX-77 to output the squelch status; that is, whether it is open or closed. To obtain the squelch status, enter the prefix AL, followed by the programming code 3C. Then hit the carriage return key. If the squelch is open, the response will be OPEN; if the squelch is closed, the response will be CLOSE.

Example: To obtain the squelch status, enter AL3C
The DX-77 responds "OPEN" for open squelch, or "CLOSE" for closed squelch.

3.25 RIT Status

The command 3D tells the DX-77 to output the status of RIT; the amount of offset with the RIT knob, either in the unit of Hz or in an A/D converted value. To obtain the RIT status, enter the prefix AL, followed by the programming code 3D, followed by one numeric 0 or 1 specifying whether the response should be in Hertz or in A/D value. Then hit the carriage return key. The resolution of the Hertz response will be 10Hz and prefixed with "+" or " - " indicating the offset direction. The A/D value will be three digit; 000 for -1000Hz, about 127 for 0Hz, and 255 for +1000Hz.

Example: To obtain the RIT status in Hz, enter AL3D0
The DX-77 responds "-620" if the RIT is offset by -620Hz.

3.26 Current Memory-channel Number read

The command 3E tells the DX-77 to output the current memory-channel number, i.e. from 00 to 99. Note that the response will be ERROR if the radio is in VFO mode. To obtain the current memory-channel number, enter the prefix AL, followed by the programming code 3D. Then hit the carriage return key.

Example: To obtain the memory-channel number, enter AL3E
The DX-77 responds "08" if the current memory channel is 08

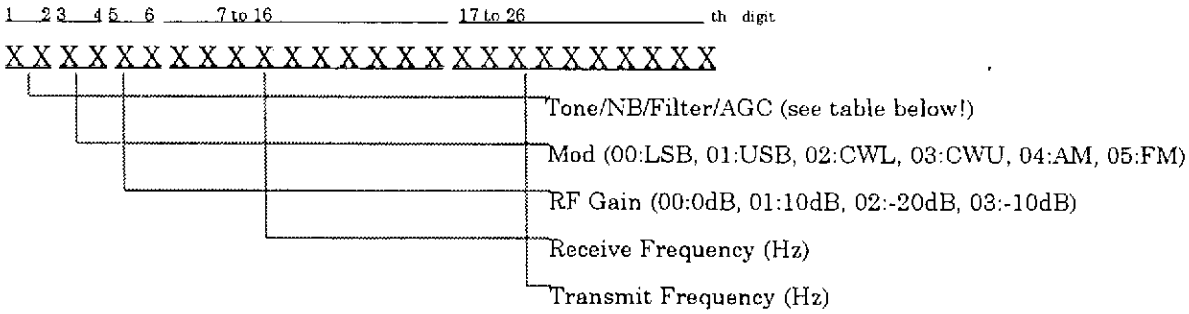
3.27 Memory/VFO -mode read

The command 3G tells the DX-77 to output the current mode, either VFOA, VFOB, or Memory. To obtain the current VFO/Memory mode, enter the prefix AL, followed by the programming code 3G. Then hit the carriage return key.

Example: To obtain the mode VFOA, VFOB, or Memory, enter AL3G
The DX-77 responds VFOA, if in VFOA.

3.28 Current Data read

The command 3H tells the DX-77 to output multiple information in one string. To get the current radio data information, enter the prefix AL, followed by the programming code 3H. Then hit the carriage return key. The output string, consisting of 26 numerics contains the following informations: Tone On/Off, Noise Blanker On/Off, Filter Nar/Wide, AGC Fast/Slow, Modulation, RF Gain, Receive Frequency, and Transmit Frequency.



! First two digit reference table:

	00	01	02	03	04	05	06	07	09	0D
Tone	off	off	off	off	off	off	off	off	on	on
NB	off	off	off	off	on	on	on	on	off	on
Filter	wide	wide	nar	nar	wide	wide	nar	nar	wide	wide
AGC	slow	fast	slow	fast	slow	fast	slow	fast	fast	fast

(*Note: Some settings are mode dependent; for example, if the tone is ON, the only possible mode is FM .*)

Example: To get current data, enter AL3H
If the response is, for example, 05010300142394400007197040
it means that Tone is OFF, NB is ON, Filter is Wide, AGC-F, USB,
RFgain at -10dB, receive freq. 14.239440MHz, and transmit freq.
7.197040MHz

3.29 Split read

Whether the radio is in Split operation mode or not can be determined with the command 3I. To obtain the information, enter the prefix AL followed by the programming code 3I. Then hit the carriage return key. If the split operation is set, the response will be ON; if not the response will be OF.

Example: To see whether the radio is in split operation, enter AL3I
If the DX-77 is in split operation mode, the response will be ON.

3.30 Transmitter Output read

Whether the radio is in High power or Low power mode can be determined with the command 3J. To obtain the information, enter the prefix AL followed by the programming code 3J. Then hit the carriage return key. If in High power mode, the response will be H, otherwise the response will be L.

Example: To see whether the radio is in High power mode, enter AL3J
If the DX-77 is in high power mode, the response will be H.

3.31 SELECT Position read

The position of the cursor (▼) that moves with the press of the SELECT key can be read with the command 3K. To read the position, enter the prefix AL followed by the programming code 3K. Then hit the carriage return key. The response will be one digit number indicating the cursor position:

0: no cursor
1: on 100kHz digit
2: on 1MHz digit
3: on 10MHz and 1MHz digit (amateur band switch)
4: on memory channel digit

4. Command Summary Table

Data Input Commands

Operation	Code	Numeric digits	Properties
transmit frequency	0A	6 to 10	freq. in Hz
receive frequency	0B	6 to 10	freq. in Hz
VFO mode	1A	1	1=VFOA, 2=VFOB
memory mode	1B	1	0=memory mode
channel display	1D	1	0=normal, 1=ch, 2=ch&frq
up/down	2A	1	0=up, 1=down
monitor	2B	1	0=off, 1=on
transmitter output	2C	1	0=Low, 1=High
scan	2D	1	0=off, 1=up, 2=down
split	2F	1	0=off, 1=on
modulation	2G	1	0=LSB, 1=USB, 2=CWL, 3= CWL, 4=AM, 5=FM
RF gain	2H	2	00=0dB, 01=+10dB, 10=-20dB, 11=-10dB
AGC	2I	2	01=fast, 02=slow
filter	2J	2	00=narrow, 01=wide
noise blanker	2K	1	0=off, 1=on
tone encoder	2L	2	00=off, 01=67.0 ... 51=on
tune	2N	1	0=off, 1=on
select	2O	1	0=nil, 1=100k, 2=1MHz, 3=band, 4=channel
memory call up	2V	2	memory ch. Number 00 to 99
set data	2W	1char.+ 1 or 2	A to P, 0 for OFF, 1for ON, etc. (see Section 3.21)

Data Output Commands

Operation	Code	Numeric	Response
S-meter read	3A	0 or 1	0=LCD segment, 1=A/D value
PTT status	3B	-	REV for receive, SEND for transmit
RIT status	3D	0 or 1	0=Hz, 1= (A/D value)
current mem.-ch. read	3E	-	00 to 99
mem/VFO mode read	3G	-	VFOA, VFOB, MEMO
current data read	3H	-	Tone/NB/Filter/AGC/mode/RFGain/RXfreq/TXfreq
split read	3I	-	ON / OF
transmitter output read	3J	-	H / L
cursor position read	3K		0:nil, 1:100kHz, 2:1MHz, 3:band, 4:memory

Appendix

Table 1. **Tone Frequency Chart** (ref: Section 3.17)

data	tone (Hz)	data	tone (Hz)	data	tone (Hz)
00	off	17	114.8	34	179.9
01	67.0	18	118.8	35	183.5
02	69.3	19	123.0	36	186.2
03	71.9	20	127.3	37	189.9
04	74.4	21	131.8	38	192.8
05	77.0	22	136.5	39	196.6
06	79.7	23	141.3	40	199.5
07	82.5	24	146.2	41	203.5
08	85.4	25	151.4	42	206.5
09	88.5	26	156.7	43	210.7
10	91.5	27	159.8	44	218.1
11	94.8	28	162.2	45	225.7
12	97.4	29	165.5	46	229.1
13	100.0	30	167.9	47	233.6
14	103.5	31	171.3	48	241.8
15	107.2	32	173.8	49	250.3
16	110.9	33	177.3	50	254.1

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