

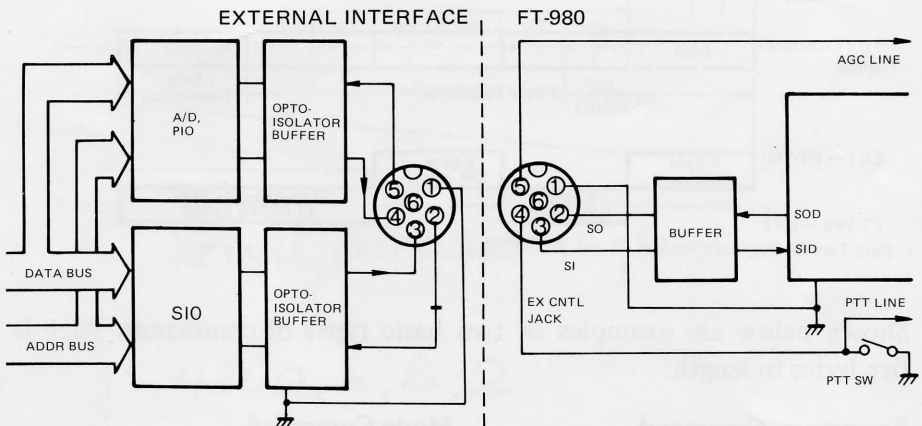
**CAT SYSTEM
SERIAL I/O DATA MANUAL
FOR THE FT-980**

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TOKYO, JAPAN**

CAT SYSTEM SERIAL I/O DATA MANUAL FOR THE FT-980

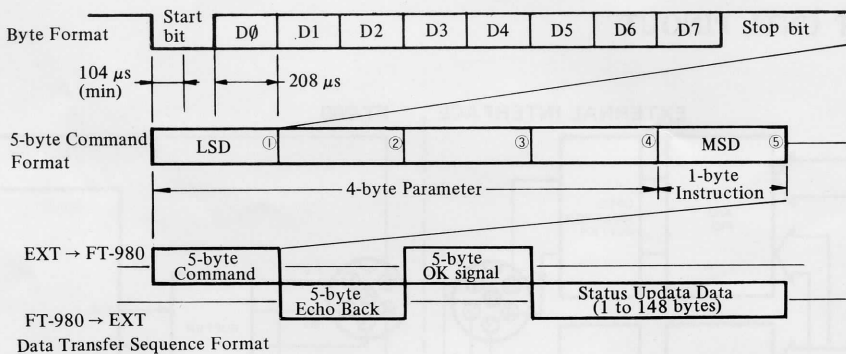
The CAT (Computer-Aided Transceiver) System in the FT-980 allows use of an external microcomputer to control most of the operating functions of the transceiver. Control signal interface is via two serial data lines, accessible through the EXT CNTL jack on the rear of the transceiver. Yaesu offers a number of different Interface Units for making the necessary data format conversions to connect some of the common brands of microcomputers. Software is provided with the Yaesu Interface Units. The EXT CNTL jack also provides access to the receiver AGC line, for application in user's programs.

EXT CNTL PINOUT



PIN	NAME	DESCRIPTION
1	GND	Common ground for signal lines and shielding.
2	SO	Serial Output: standard TTL-level data line.
3	SI	Serial Input: accepts standard TTL-level data.
4	PTT	Push-to-talk line: ground to transmit. Open circuit voltage is 13.5V DC.
5	AGC	Automatic Gain Control: analog signal output ranging from +0.4V DC during strong signal reception, to +2.6V DC when no signal is being received.
6	NC	no connection

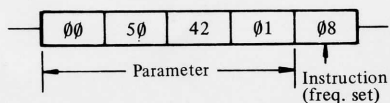
DATA TIMING FORMAT (4800 bits/second)



Shown below are examples of two basic types of commands. Each is five bytes in length.

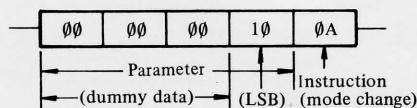
Frequency Command

(Example: to set 14.25000 MHz)



Mode Command

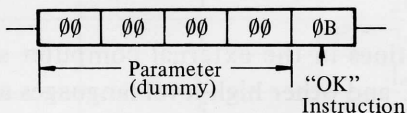
(Example: to select LSB mode)



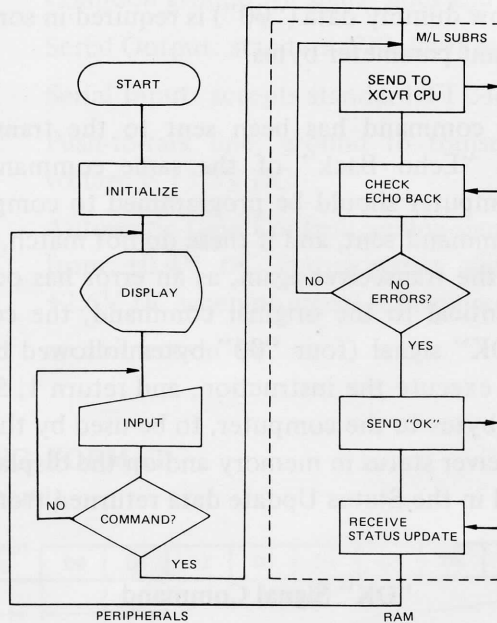
As illustrated in the Frequency Command example, frequency parameter data is sent least-significant digit first. The Mode Command example shows how dummy data ("00") is required in some commands, preceding significant parameter bytes.

Once the 5-byte command has been sent to the transceiver, it will respond with an "Echo Back" of the same command, if received correctly. The computer should be programmed to compare this Echo Back with the command sent, and if these do not match, the command must be sent to the transceiver again, as an error has occurred. If the Echo Back is identical to the original command, the computer must send a 5-byte "OK" signal (four "00" bytes followed by "0B"). The FT-980 will then execute the instruction, and return 1, 5, 6, 22 or 148 "Status Update" bytes to the computer, to be used by the computer to update the transceiver status in memory and on the display. No dummy bytes are included in the Status Update data returned from the FT-980.

"OK" Signal Command



PROGRAMMING



Data handling routines in the external computer should be in machine language, as BASIC and other high-level languages are generally too slow to handle the required routines during data transfer.

The control source (FT-980 panel or external computer) is switched by sending five "00" bytes, which constitutes the External Control ON/OFF Command. When this is sent to activate control from the computer, all status update data (148 bytes) will be returned from the FT-980. While the external computer is in control, the EXT indicator above the frequency display on the FT-980 is lit, and the related front panel controls on the FT-980 are disabled.

When five "00" bytes are sent again, to deactivate external control, transceiver status data will be lost unless specifically programmed otherwise. The FT-980 function parameters will revert to the settings of the front panel controls.

All commands must contain five bytes, so when no parameter (or a shortened parameter) is required, dummy (“00”) bytes must be inserted. Commands are exchanged in both directions, while Status Update data is unidirectional (from the FT-980 to the computer only), sent after the command has been executed by the transceiver. The length of the Status Update data depends upon the command executed, and can be 1, 5, 6, 22 or 148 bytes long.

TABLE 1. STATUS UPDATE DATA, BYTE FORMAT

Command Executed	Status Update Data Length	Status Update Bytes (see TABLE 3)
EXT CNTL ON/OFF	148	All (1–148)
STATUS CHECK	148	“ ”
+10 Hz	5	1–5
–10 Hz	5	“ ”
IF WIDTH	1	23
IF SHIFT	1	26
FSK	1	24
RPTR SPLIT	6	1–5 and 25
FREQ SET	5	1–5
LDB	1	28
+100 Hz	5	1–5
–100 Hz	5	“ ”
+5 kHz	5	“ ”
–5 kHz	5	“ ”
BAND UP	148	All (1–148)
BAND DOWN	148	“ ”
OTHERS (User Prog.)	22	1–22

TABLE 2. COMMAND BYTE CODES

Command	Instruction byte	Parameter*	Parameter info
EXT CNTL ON/OFF	00		
ALL STATUS CHECK**	01		
+10Hz	02		
-10Hz	03		
IF WIDTH	04	00 FE	7F=±0.00
IF SHIFT	05	00 1E	0F=±0.0
FSK	06	00	AS PER FSK SHIFT SWITCH
		40	425Hz
		80	850Hz
		C0	170Hz
REPEATER SPLIT		00	SEE STATUS UPDATE BYTE 25 IN TABLE 3.
		80	
		40	
		C0	
		20	
		A0	
		E0	
FREQ. SET	08	xx xx xx xx	FREQ.
LDB	09		
MEMORY CHANNEL	0A	00 0F	
MODE SELECT	0A	10	LSB
		11	USB
		12	CWW
		13	CWN
		14	AMW
		15	AMN
		16	FSK
OFFSET	0A	17	FM
		1B	

Command	Instruction byte	Parameter*	Parameter info
VFO STATUS SELECT	0A	1C	RXM
		1D	RXV
		1E	MR
		1F	VFO
GENR VFO	0A	21	
HAM VFO	0A	22	
TAB U-SET	0A	23	
TAB L-SET	0A	24	
TAB ON/OFF	0A	25	
TX CLAR	0A	26	
RX CLAR	0A	27	
MEMORY SHIFT	0A	28	
MEMORY WRITE	0A	29	
100Hz UP	0A	18	
100Hz DWN	0A	20	
5kHz UP	0A	2C	
5kHz DWN	0A	2B	
BAND UP	0A	2F	
BAND DWN	0A	2D	
"OK" SIGNAL	0B		***

* Parameter codes must include dummy bytes (00) where required to make all parameter codes 4 bytes long.
Commands requiring one parameter byte have first three bytes as dummy.

** ALL STATUS CHECK returns entire contents of status memory in FT-980.

*** The "OK" Signal is required for execution of all commands, and it is not echoed back.

TABLE 3. STATUS UPDATE BYTE CODES (from FT-980)

BYTE NO.	BYTE CODES			
1	STATUS FLAG BITS	0	TX=1 RX=0	
		1		
		2		
		3	SPLIT=1	
	CLAR	4		
		5	VFO=1 MR=0	
		6	UP=1, DWN=0	
7	ON=0, OFF=1			
2-5	OPERATING FREQUENCY			
6	MODE	00=LSB 01=USB 02=CWW 03=CWN 04=AM-W 05=AM-N 06=FSK 07=FM		
7	VFO STATUS	00=GEN 80=HAM 81=AUX1 HAM/GEN/AUX 82=AUX2 83=AUX3		
8-11	UPPER TAB (FREQ)			
12-15	LOWER TAB (FREQ)			
16	MEM CH SELECTOR POSITION (00-0F)			
17	MODE SELECTOR POSITION (00-07)			
18	XCVR OFFSET (01=SPLIT, 00=SIMP)			
19	SELECT SW	00=VFO, 02=RX M 01=MR, 03=RX V		
20	TAB FLAG	00=OFF, 80=ON		
21	CLARIFIER	RX 00=OFF, 20=ON, 40=OFF, 60=ON,	TX OFF OFF ON ON	
22	MEM SHIFT	00=OFF 01=ON		
23	IF WIDTH	00-FE (CTR=7F)		
24	FSK SHIFT	00=INT 40=425 80=850 C0=170		
25	REPEATER SPLIT CODE			
		BAND	50 70 144 220 430	
	DATA	54 74 148 226 440		
	00	+1 ±0	+0.6 +1.6	+5
	80	-1 ±0	-0.6 -1.6	-5
	40	+1 ±0	+0.6 +1.6	+7.6
	C0	-1 ±0	-0.6 -1.6	-7.6
	20	+1 ±0	+0.6 +1.6	+1.6
	A0	-1 ±0	-0.6 -1.6	-1.6
	E0	±0 ±0	±0 ±0	±0

BYTE NO.	BYTE CODES					
26	IF SHIFT	00-1E (CTR=0F)				
27	EXT CNTL	00=OFF, 01=ON				
28	LDB FLAG	00=OFF, 01=ON				
29	MODE OF SELECTED MEM CHANNEL	(same code format as BYTE No. 6)				
30	VFO STATUS OF SELECTED MEM CH	(same code format as BYTE No. 7)				
31-34	MEMORY SHIFT FREQUENCY					
35-38	MEMORY CLARIFIER FREQUENCY					
39	MODE OF SELECTED VFO	(same code format as BYTE No. 6)				
40	VFO STATUS OF SELECTED VFO	(same code format as BYTE No. 7)				
41-44	HAM VFO FREQUENCY					
45-48	GEN VFO FREQUENCY					
49-52	CLARIFIER FREQUENCY					
53-58	MEM CH1 FREQ., VFO STATUS and MODE					
59-64	" CH2 "					
65-70	" CH3 "					
71-76	" CH4 "					
77-82	" CH5 "					
83-88	" CH6 "					
89-94	" CH7 "					
95-100	" CH8 "					
101-106	" CH9 "					
107-112	" CH10 "					
113-118	" CH11 "					
119-124	" CH12 "					
125-130	" CH13 "					
131-136	" CH14 "					
137-142	" CH15 "					
143-148	" CH16 "					

* Example of CH data:
USB, HAM, 14.25000MHz is coded as
01 80 01 42 50 00

MEMO

