Harris Radio RF-350 (RT-1446/URC)
Control Protocol
Dale Chidester NJ7C/AAR9WI
18 AUG 2006

RS-232 Interface:

Radio Remote Control Interface (A1A19, Located behind display panel, p/n 10088-6000)

Set S-1 to position 9 (ADAPT) Set S-2 to Position 1 (RS-232) [To use with Harris RF-7210 Adaptive controller, S-2 should be set to position 2 (RS-422.)] Set S-5 to 4 wire audio input/output. Radio should be in REMOTE mode.

NOTE: This information is for radios with firmware REV 604. (There are 3 EPROM chips on the left side of the main control board. The main control board is visible looking into the radio with the front panel tilted down.)

Computer:

Set com port for 9600 Baud, 7-bit data, odd parity, 1 stop bit, xon-xoff or no handshake. Jumpers (pins 4 to 6 and pins 7 to 8) on 9 pin connector are necessary for standard PC serial ports to transmit and receive data.

Wiring:

Computer (COMx)	**Radio J9 (Remote)**
9 pin female D connector	**25 pin Female D connector**
2 (input)	3 (output)
3 (output)	2 (input)
5 (Ground)	7 (Ground)
4-Jump to 6	12 Audio Line Out (-)
	13 Audio Line Out (+)
7-Jump to 8	24 Audio Line In (+)
	25 Audio Line In (-)

Note the polarity of the audio lines. 13 is positive (signal out) and 25 is negative (gnd in,) but they are both the last ones in the row on the connector.

General:

All commands end with an end of line character which is line feed (Hex 0A, Dec 10, Ctl-J)

Deadman synch is usually capital U (Hex 55, Dec 85) at an interval of less than ~15 seconds (RF-7210 does this about every 3 seconds.)

Status Request/Wakeup prompt is question mark, ? (Hex 46, Dec 70)

After initial powerup or deadman timeout, output a question mark (?) followed by a line feed (Hex 0A, Dec 10, Ctl-J) or a synch character (U) to wake the radio up. The synch character should not be followed by a line feed. Either of these strings will result in the radio dumping it's status string:

#0<$0<&0<*0<"0<'0<(1<,0<Ax<Mx<R1<Z0<E0<O1<T1<U<Fxxxxxxx<X00x<^0<G00<)0<.<

Character count is 73. Where < is line feed, x is a numeric digit, Ax is the AGC setting, Mx is the mode, Fxxxxxxx is the frequency, X00x is the status (X000 = okay, X002 = dead man timed out.) IF the status has timed out (X002), the above string will be followed by X000< raising the character count to 78.

Command	Action	Argument(s)	Results
A	Set AGC	1	Turn AGC OFF
		2	SLOW
		3	MEDIUM
		4	FAST
M	Mode	1	USB
		2	LSB
		3	AME
		4	CW

NOTES: The previous two commands, A and/or M, must be followed by a F command. Frequency command can be used without A or M, with both, or with either singly. Switching to CW mode turns the side-tone on (S1<) and turns the audio input off (H4<). Switching back out of CW mode, turns side-tone off (S0<) and restores audio-input mode.

F Set Frequency 7 digits Fxxxxxxx< confirms change of frequency.

Note: If the frequency command is used after a channel command has been used to set the frequency, C;;< is also output after the confimation of the change. If the A or M commands are used before the frequency change, their confirmations (Ax< and/or Mx<) are output before the frequency change confirmation. Going in or out of mode 4 (CW) causes S1<H4< and S0<H1< respectively, to be appended to the confirmation string. Some examples follow:

Command	Response	Action
A2<M2<F1234567<	A2<M2<F1234567<	AGC=slow, LSB, freq=12,345.67 kHz
A1<F0222222<	A1<F0222222<	AGC=off, freq= 2,222.22 kHz
M1<F1010101<	M1<F1010101<	USB, freq=10,101.01 kHz
Changing to CW Mode:		
A4<M4<F1233210<	A4<M4<F1233210<S1<H4<	AGC=fast, CW, freq=12,332.10 kHz
Changing from CW mode:		
M3<F0102550<	M3<F0102550<S0<H1<	AME, freq=10,255.50 kHz

Note: extra output characters going to/from CW mode.

"Normal" Commands: (These work about the way you'd expect.)

C	Set Channel	00 – 49	Select channel, echoes Cxx<
(	Mute	0	Audio OFF
		1	Audio ON
B	Set BFO	000 – 099	Negative offset from1000 Hz, 10 Hz steps
		101-199	Positive offset from 1000 Hz, 10 Hz steps
		100	Turns BFO OFF, echos B100<

Note: 000 is -1000 Hz offset which gives zero beat for USB and CW signals.

G	RF Gain	00	Set RF Gain to maximum

		63	Set RF Gain to minimum

Note: Values between 63 and 0 set RF Gain accordingly.

O	Power Amp Control	1	Turns off. Displays O1<$0< @< will also turn the Amp on.
		2	Turns on. Displays #2<$0< Then Displays O3< when ready
		4	Operate. Displays O4<T2< when ready to tune

Note: Next K tunes Amp. Displays *1<K< then T3<T4<K<*0 when tuned up.

, (comma)	Enable BPF	0	Echoes: ,0<
	Bypass BPF	1	Echoes: B100<I0<H1<,1<

Note: Bypassing the band pass filter (BPF) is useful for scanning. Two Ch/sec maximum.

‘ (apostrophe)	Disable Ext PTT	0	Echoes: ‘0<
	Enable ExtPTT	1	Echoes: ‘1<

Note: In REMOTE mode, MIC PTT and back panel PTTs are only enabled when MIC or PATCH audio input is selected and Ext PTT is enabled. When keyed by an external PTT, a K< is sent by the radio. When unkeyed, a U< is sent. Any U synch character is returned as a K while the external PTT is keyed (0v.)

“	Enable Remote audio	0	Echoes: “0<
	Enable Local audio	1	Echoes: “1<

Note: Normally, when the radio is in REMOTE mode only the audio to/from the J9 REMOTE connector works (“0.) When “1 (Enable Local audio) is set, the J9 REMOTE audio is switched off and audio input to the radio is from whatever is currently selected (MIC, AUD2 or PATCH.)

The following commands simply change the current setting to the next value (like pushing the button on the panel.) They return the command letter and the new setting followed by a line feed.

D	Meter Display	1	AUDIO
		2	LINE
		3	PATCH
		4	FWD
		5	REV
		6	VSWR
H	Set Audio Source	1	Mike
		2	Audio 2
		3	Patch
		4	OFF (CW)
I	Clipping	0	OFF
		1	ON
S	Side tone	0	OFF
		1	ON
V	VOX	0	OFF
		1	Voice
		2	Data
Z	Runs Self Test		

Miscellaneous observations.

L	? Load Channel?	xx	Displays:Pxx<100000001< (See P)
P	? Program Channel?	xx	Displays Pxx<10000001<

Examples of Control Strings: (< indicates a line feed character, lower case x indicates a digit)
Startup/Reinitialize: ?< or ?U
Response from Radio:
#0<$0<&0<*0<”0<’0<(1<,0<Ax<Mx<R1<Z0<E0<O1<T1<U<Fxxxxxxx<X00x<^0<G00<)0<.<
Where: Ax is the AGC setting, Mx is the mode, Fxxxxxxx is the frequency, X00x is the status (000 = okay, 002 = dead man timed out.) IF the status is timed out (X002), the above string will be followed by X000< raising the character count to 78.

Function	**String**	**Response from Radio**	**Comments**
Deadman Synch	U	U<	Normal response to U
		X000<U<	Response to U after timeout (X002<)
	K	K<	Transmit mode.
		X000<K<	Response to K after timeout (X002<)

Note: The deadman synch character (U or K) should not be followed by a line feed. Using K for sych will start and retain transmit mode until a U stops transmission. If keyed from external PTT, a sent U synch will be returned as a K.

When REMOTE mode is selected by pressing 2nd and down arrow, the following string is output:
R1<”0<’0<
When REMOTE mode is deselected (same procedure as above) the following string is output:
R0<”1,’1<,0<)0<X000<

Several functions are available without being in the remote mode:

String	**Action**
?<	Get status String: #0<$0<&0<*0<”1<’1<(1<,0<Ax<Mx<R0<Z0<E0<O1<T1<U<Fxxxxxxx<X000<^0<)0<.<
Fxxxxxxx<	Change Frequency
Mx<Fxxxxxxx<	Change Mode and Frequency

Note: AGC cannot be set, xcvr cannot be keyed, etc. without being in remote mode. Response strings vary depending on mode changes, input parameters, etc.

Notes by Jim Corenman on radios with REV 601E EPROM chips.

The return-string for the "?" command is a bit different, but also ends with a "." and LF.

There is not Gxx<, so this string can be used to determine if 601 or 604 version chips are installed.

The "A", "M", "," and "" commands work the same way as the front-panel buttons (i.e. cycle to next mode and reply with the new mode), and "A" and "M" can be sent anytime (they

don't have to be followed by the "Fxxxxxxx" command). Sending "M1" puts the radio is some sort of dysfunctional LSB-mode, while "M" alone (with a LF) steps from USB to LSB, etc.

Changing mode and freq also appears to reset AGC back to the default for that mode (e.g. AGC-slow for USB/LSB), so it is necessary to send "A" command after the mode/freq commands.

Changing to CW enables Ext PTT, but switching to another mode from CW disables Ext PTT.