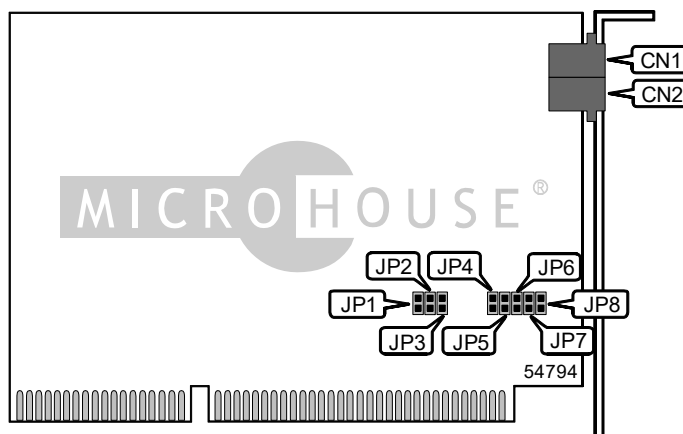


# CARDINAL TECHNOLOGIES, INC.

## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

<b>Card Type</b>	Modem (synchronous/asynchronous)
<b>Chip Set</b>	TI
<b>Maximum Modem Rate</b>	33.6Kbps
<b>Maximum Fax Rate</b>	14.4Kbps
<b>Data Modulation Protocol</b>	Bell 103A/212A, ITU-T V.21, V.22, V.22bis, V.23, V.32, V.32bis, V.34,
<b>Fax Modulation Protocol</b>	ITU-T V.17, V.21CH2, V.27ter, V.29
<b>Error Correction/Compression</b>	MNP5, V.42, V.42bis
<b>Fax Class</b>	Class I
<b>Data Bus</b>	8-bit ISA
<b>Card Size</b>	Half-length, half-height card



CONNECTIONS			
Function	Label	Function	Label
Line in	CN1	Line out	CN2

PLUG & PLAY SELECTION								
Setting	JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8
Plug & Play	Open	Open	Open	Open	Open	Open	Open	Open

SERIAL PORT ADDRESS			
Setting	JP1	JP2	JP3
COM1 (3F8h)	Closed	Closed	Closed
COM2 (2F8h)	Open	Closed	Closed
COM3 (3E8h)	Closed	Open	Closed
COM4 (2E8h)	Open	Open	Closed

INTERRUPT					
Setting	JP4	JP5	JP6	JP7	JP8
2	Closed	Open	Open	Open	Open
3	Open	Closed	Open	Open	Open
4	Open	Open	Closed	Open	Open
5	Open	Open	Open	Closed	Open
7	Open	Open	Open	Open	Closed

MISCELLANEOUS TECHNICAL NOTES
Note: The modem can be upgraded to 56Kbps via Flash ROM from Cardinal Technologies, Inc.

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# CARDINAL TECHNOLOGIES, INC.

## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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SUPPORTED COMMAND SET	
Basic AT Commands	
AT, +++, A/	
A, B, E, F, H, M, O, P, T, V, X	
&G, &T, &W, &Z	
S Registers	
S0, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S18, S25, S38	
<b>Note:</b> See MHI Help File for full command documentation.	

## PROPRIETARY AT COMMAND SET

ADDITIONAL RESULT CODES	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &An [cmds]
<b>Description:</b>	Enables or disables additional result code subsets
Command	Function
&A0	ARQ result codes disabled
í &A1	ARQ result codes enabled
&A2	V.32 modulation indicator added
&A3	Protocol indicators added

BREAK HANDLING	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Yn [cmds]
<b>Description:</b>	Sets destructive/nondestructive break handling
Command	Function
&Y0	Destructive break not sent
&Y1	Expedited, destructive break sent
&Y2	Expedited, non-destructive break sent

DATA SET READY (DSR)	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Sn [cmds]
<b>Description:</b>	Selects DSR options
Command	Function
í &S0	DSR forced high
&S1	DSR high only while modem is handshaking or connected

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# CARDINAL TECHNOLOGIES, INC.

## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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CONNECTION SPEED LOWER LIMIT	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Un [cmds]
<b>Description:</b>	Sets slowest allowed connection speed if &N is set to 1 or higher.
Command	Function
&U0	No minimum connect speed.
&U1	Set minimum connect speed to 300bps.
&U2	Set minimum connect speed to 1200bps.
&U3	Set minimum connect speed to 2400bps.
&U4	Set minimum connect speed to 4800bps.
&U5	Set minimum connect speed to 7200bps.
&U6	Set minimum connect speed to 9600bps.
&U7	Set minimum connect speed to 12Kbps.
&U8	Set minimum connect speed to 14.4Kbps.
&U9	Set minimum connect speed to 16.8Kbps.
&U10	Set minimum connect speed to 19.2Kbps.
&U11	Set minimum connect speed to 21.6Kbps.
&U12	Set minimum connect speed to 24Kbps.
&U13	Set minimum connect speed to 26.4Kbps.
&U14	Set minimum connect speed to 28.8Kbps.
&U15	Set minimum connect speed to 31.2Kbps.
&U16	Set minimum connect speed to 33.6Kbps.

CONNECTION SPEED UPPER LIMIT	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Nn [cmds]
<b>Description:</b>	Sets required connection speed if &U is set to 0; otherwise, sets fastest allowed connection speed.
Command	Function
&N0	No maximum connect speed.
&N1	Fixed link rate of 300bps.
&N2	Fixed link rate of 1200bps.
&N3	Fixed link rate of 2400bps.
&N4	Fixed link rate of 4800bps.
&N5	Fixed link rate of 7200bps.
&N6	Fixed link rate of 9600bps.
&N7	Fixed link rate of 12Kbps.
&N8	Fixed link rate of 14.4Kbps.
&N9	Fixed link rate of 16.8Kbps.
&N10	Fixed link rate of 19.2Kbps.
&N11	Fixed link rate of 21.6Kbps.
&N12	Fixed link rate of 24Kbps.
&N13	Fixed link rate of 26.4Kbps.
&N14	Fixed link rate of 28.8Kbps.
&N15	Fixed link rate of 31.2Kbps.
&N16	Fixed link rate of 33.6Kbps.

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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DATA CARRIER DETECT (DCD)	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &C <i>n</i> [cmds]
<b>Description:</b>	Selects whether the DCD option is enabled or disabled
Command	Function
&C0	DCD override enabled
&C1	DCD enabled after carrier signal detected

DATA TERMINAL READY (DTR)	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &D <i>n</i> [cmds]
<b>Description:</b>	Selects modem response to DTR
Command	Function
&D0	DTR override
&D1	DTR toggle causes online command mode
i &D2	Normal DTR operations
&D3	Resets on receipt of DTR

DIAL	
<b>Type:</b>	Immediate
<b>Format:</b>	AT [cmds] D<#> [cmds]
<b>Description:</b>	Dials telephone number according to any modifiers included in the string
<b>Note:</b>	Any combination of modifiers can be used to produce the desired dial functions in sequence.
Command	Function
DL	Re-dial last number
DP	Pulse dialing enabled
DR	Answer mode enabled; originate mode disabled following handshake initiation.
DS= <i>n</i>	Dial stored telephone number <i>n</i>
DT	Tone dialing enabled/Pulse dialing disabled
DW	Dialing resumed following dial tone detection
D,	Dialing paused for amount of time specified in S8 register
D"WXYZ"	Optional method of denoting telephone numbers. Letters enclosed in quotes are interpreted as numbers according to the system found on a telephone keypad.
D!	Flash function initiated. Modem commanded to go off-hook for specified time before returning on-hook.
D@	Wait for Quite Answer function enabled. Modem waits until a "quiet answer," a ring-back signal followed by silence up to the time specified in S7, is received prior to executing the rest of the dial string.
D/	Delays 125 ms. Before proceeding with dial string
D^	Calling tone enable/disable for current call only
D;	Modem returned to idle state after dialing. The semicolon can only be placed at the end of the dial command.
D&	Waiting for AT&T "bong" tone

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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DISCONNECT	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] Yn [cmds]
<b>Description:</b>	Commands disconnection configuration
Command	Function
Y0	Profile 0 in NVRAM
Y1	Profile 1 in NVRAM

ERROR CONTROL	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Mn [cmds]
<b>Description:</b>	Sets error control for connections at 1200bps and higher
Command	Mode
&M0	Error control disabled
&M1	Automatic selection of error control and non-error control
&M2	Enable error control link
&M3	Speaker on until modem connects
i &M4	Normal/ARQ mode.
&M5	ARQ mode

FACTORY DEFAULT PROFILE	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &F [cmds]
<b>Description:</b>	Sets values in active profile to values found in the default profile
Command	Function
&F0	Standard factory configuration
&F1	Factory configuration1; hardware flow control template
&F2	Factory configuration 2; software flow control template

FLOW CONTROL	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Kn [cmds]
<b>Description:</b>	Enables/disables flow control
Command	Line Type
&K0	Flow control disabled
&K1	Hardware, RTS/CTS flow control enabled
&K2	Software, XON/XOFF flow control enabled
i &K3	Transparent software, XON/XOFF flow control enabled

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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HELP	
<b>Type:</b>	Immediate
<b>Format:</b>	<i>n</i> \$
<b>Description:</b>	Displays help for commands.
Command	Function
\$	Display help screen for single letter AT commands
&\$	Display help screen for extended commands
D\$	Display help screen for dial commands
S\$	Display help screen for S-registers

PULSE DIALING RATIO	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &P <i>n</i> [cmds]
<b>Description:</b>	Selects pulse dial make/break ratio
Command	Function
&P0	39/61ms at 10pps (North America)
&P1	33/67ms at 10pps (Europe)

RECEIVE DATA FLOW CONTROL	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &I <i>n</i> [cmds]
<b>Description:</b>	Enables RD flow control options
Command	Function
i&I0	Software flow control disabled
&I1	XON/XOFF signals passed through local modem
&I2	XON/XOFF signals trapped by local modem

REPEAT PREVIOUS COMMAND	
<b>Type:</b>	Immediate
<b>Format:</b>	A>
<b>Description:</b>	Repeats previous command continuously.

REPORT INFORMATION	
<b>Type:</b>	Immediate
<b>Format:</b>	AT [cmds] I <i>n</i> [cmds]
<b>Description:</b>	Displays information requested
Command	Function
I0	Reports four digit product code
I1	Reports firmware checksum
I2	Reports RAM checksum
I3	Reports ID string
I4	Reports current modem settings
I5	Reports NVRAM settings
I6	Reports data connection information
I7	Reports manufacturer and model information

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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RESULT CODES	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] Qn [cmds]
<b>Description:</b>	Enables modem to send result codes to the DTE
Command	Function
iQ0	Result code sending enabled
Q1	Result code sending disabled
Q2	Result code sending only in originate mode

RTS	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Rn [cmds]
<b>Description:</b>	Selects RTS/CTS options
Command	Function
&R0	Reserved
i &R1	RTS ignored
&R2	Received data to computer only on RTS

SERIAL PORT RATE	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &Bn [cmds]
<b>Description:</b>	Manages the serial port rate
Command	Function
i &B0	Serial speed follows connect speed
&B1	Serial speed locked
&B2	Fixed in ARQ mode, variable in non-ARQ mode

SOFT RESET	
<b>Type:</b>	Immediate
<b>Format:</b>	AT [cmds] Zn [cmds]
<b>Description:</b>	Restores modem profiles previously saved in non-volatile RAM using the &W command.
Command	Function
Z0	Restore setting to profile selected by ATY command
Z1	Restore setting NVRAM profile 0
Z2	Restore setting NVRAM profile 1
Z3	Restores setting to factory default profile 0
Z4	Restores setting to factory default profile 1
Z5	Restores setting to factory default profile 2

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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TRANSMIT DATA FLOW CONTROL	
<b>Type:</b>	Configuration
<b>Format:</b>	AT [cmds] &H <i>n</i> [cmds]
<b>Description:</b>	Enables TD flow control options
Command	Function
í &H0	Flow control disabled
&H1	CTS hardware flow control enabled
&H2	Software flow control enabled
&H3	Hardware and software flow control enabled

### S(STATUS) -REGISTERS

BIT-MAPPED REGISTER S13		
<b>Format:</b>	AT [cmds] S13= <i>n</i> [cmds]	
<b>Range:</b>	0-174	
<b>Unit:</b>	Bit-mapped	
<b>Description:</b>	Controls reset, dial mode	
Bit	Value	Function
0	0	Unidentified
	1	Resets when DTR drops
1	0	Unidentified
	1	Resets non-MNP transmit buffer from 1.5K to 128bytes
2	0	Unidentified
	1	Sets backspace key to delete
3	0	Unidentified
	1	On DTR signal, auto dials number stored at NVRAM position 0
4	0	Unidentified
	1	At power on/reset, auto dials number stored at NVRAM position 0
5	0	Enables V.32bis ASL mode
	1	Disables V.31bis ASL mode
6	0	Enables quick retrains
	1	Disables quick retrains
7	0	Unidentified
	1	Disconnect on escape code

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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BIT-MAPPED REGISTER S15		
<b>Format:</b>	AT [cmds] S15= <i>n</i> [cmds]	
<b>Unit:</b>	Bit-mapped	
<b>Description:</b>	Disable/Enable MNP	
Bit	Value	Function
0	0	Enable ARQ/MNP for V.22
	1	Disable ARQ/MNP for V.22
1	0	Enable ARQ/MNP for V.22bis
	1	Disable ARQ/MNP for V.22bis
2	0	Enable ARQ/MNP for V.32/V.32bis/V.32terbo
	1	Enable ARQ/MNP for V.32/V.32bis/V.32terbo
3	0	Enable MNP handshake
	1	Disable MNP handshake
4	0	Enable MNP level 4
	1	Disable MNP level 4
5	0	Enable MNP level 3
	1	Disable MNP level 3
6	0	MNP compatibility
	1	MNP incompatibility
7	0	Enable V.42 operation
	1	Disable V.42 operation

TEST MODES		
<b>Type:</b>	Register	
<b>Format:</b>	AT [cmds] S16= <i>n</i> [cmds]	
<b>Unit:</b>	Bit-mapped	
<b>Description:</b>	Controls touch tone dialing test.	
Bit	Value	Function
0	0	Reserved
1	0	Touch tone dialing test not in progress
	1	Touch tone dialing test in progress
2	0	Test pattern generation not in progress
	1	Test pattern generation in progress
3-7	0	Reserved

INACTIVITY TIMER	
<b>Type:</b>	Register
<b>Format</b>	AT [cmds] S19= <i>n</i> [cmds]
<b>Unit:</b>	10 seconds
<b>Description:</b>	Maximum duration of DTE and DCE inactivity allowed prior to initiating hang-up process.
<b>Note:</b>	S19=0 disables the timer and allows indefinite inactivity.

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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BREAK LENGTH	
<b>Type:</b>	Register
<b>Format:</b>	AT [cmds] S21= <i>n</i> [cmds]
<b>Unit:</b>	10ms
<b>Description:</b>	Sets duration of breaks sent from the modem to the computer
<b>Note:</b>	Applies to MNP or V.42 mode only.

FLOW CONTROL CHARACTER - XON	
<b>Type:</b>	Register
<b>Format:</b>	AT [cmds] S22= <i>n</i> [cmds]
<b>Range:</b>	0-255
<b>Unit:</b>	ASCII
<b>Description:</b>	Sets the character used to represent XON

FLOW CONTROL CHARACTER - XOFF	
<b>Type:</b>	Register
<b>Format:</b>	AT [cmds] S23= <i>n</i> [cmds]
<b>Range:</b>	0-255
<b>Unit:</b>	ASCII
<b>Description:</b>	Sets the character used to represent XOFF

BIT-MAPPED REGISTER S27		
<b>Format:</b>	AT [cmds] S27= <i>n</i> [cmds]	
<b>Range:</b>	0-255	
<b>Unit:</b>	Bit-mapped	
<b>Description:</b>	Enables/disables modulation protocols	
Bit	Value	Function
0	0	Disable ITU-T modulation at 300bps for overseas calls: in V.21 mode, the modem answers both overseas and domestic calls, but only originates V.21 calls
	1	Enable ITU-T modulation at 300bps for overseas calls: in V.21 mode, the modem answers both overseas and domestic calls, but only originates V.21 calls
1	0	Disable unencoded modulation in V.32 mode
	1	Enable unencoded modulation in V.32 mode
2	0	Enable V.32 modulation
	1	Disable V.32 modulation
3	0	Enable 2100Hz answer tone
	1	Disable 2100Hz answer tone
4	0	Disable V.23 fallback mode
	1	Enable V.23 fallback mode
5	0	Enable V.32bis mode
	1	Disable V.32bis mode
6	0	Reserved
7	0	Enable codes
	1	Disable codes and enters software compatibility mode

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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CONNECTION TIME	
<b>Type:</b>	Register
<b>Format</b>	AT [cmds] S28= <i>n</i> [cmds]
<b>Unit:</b>	.1 second
<b>Description:</b>	Sets V.32 duration
Command	Function
S28=0	Eliminates the V.32 answer tone for a faster connection
S28=8	Times are in .1 second
S28=255	Disable connections except V.32 at 9600bps

FALLBACK TIMER	
<b>Type:</b>	Register
<b>Format</b>	AT [cmds] S29= <i>n</i> [cmds]
<b>Range:</b>	0-255
<b>Unit:</b>	.01 second
<b>Description:</b>	Sets the duration of the V.21 answer mode fallback timer

BIT-MAPPED REGISTER S32		
<b>Format:</b>	AT [cmds] S32= <i>n</i> [cmds]	
<b>Range:</b>	0-255	
<b>Description:</b>	Select setup for 28.8 and higher speed modems	
Bit	Value	Function
0	0	Disable V.8 call indicate
	1	Enable V.8 call indicate
1	0	Disable V.8 mode
	1	Enable V.8 mode
2	0	Enable V.FC modulation
	1	Disable V.FC modulation
3	0	Enable V.34 modulation
	1	Disable V.34 modulation
4	0	Enable V.34+ modulation
	1	Disable V.34+ modulation
5-7	0	Reserved

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## CONNECTA 33.6K INTERNAL FAX MODEM (2420)

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BIT-MAPPED REGISTER S33		
<b>Format:</b>		AT [cmds] S33= <i>n</i> [cmds]
<b>Range:</b>		0-255
<b>Description:</b>		Disable/enable data rates
Bit	Value	Function
0	0	Enable 2400 symbol rate
	1	Disable 2400 symbol rate
1	0	Enable 2743 symbol rate
	1	Disable 2743 symbol rate
2	0	Enable 2800 symbol rate
	1	Disable 2800 symbol rate
3	0	Enable 3000 symbol rate
	1	Disable 3000 symbol rate
4	0	Enable 3200 symbol rate
	1	Disable 3200 symbol rate
5	0	Enable 3429 symbol rate
	1	Disable 3429 symbol rate
6	0	Reserved
7	0	Enable shaping
	1	Disable shaping

BIT-MAPPED REGISTER S34		
<b>Format:</b>		AT [cmds] S34= <i>n</i> [cmds]
<b>Range:</b>		0-255
<b>Description:</b>		Disable/enable trellis encoding
Bit	Value	Function
0	0	Enable 8S-2D trellis encoding
	1	Disable 8S-2D trellis encoding
1	0	Enable 16S-4D trellis encoding
	1	Disable 16S-4D trellis encoding
2	0	Enable 32S-2D trellis encoding
	1	Disable 32S-2D trellis encoding
3	0	Enable 64S-4D trellis encoding
	1	Disable 64S-4D trellis encoding
4	0	Reserved
5	0	Enable TX level deviation
	1	Disable TX level deviation
6	0	Enable pre-emphasis
	1	Disable pre-emphasis
7	0	Enable pre-coding
	1	Disable pre-coding

BIT-MAPPED REGISTER S41		
<b>Format:</b>		AT [cmds] S41= <i>n</i> [cmds]
<b>Range:</b>		0-255
<b>Description:</b>		Enable/disable distinctive ring
Bit	Value	Function
0	0	Disable distinctive ring
	1	Enable distinctive ring
1-7	0	Reserved