

# MTX Node Ring Notes

## Node Variables

Name	Address	Description
IDSELF	F000	Name of node
ASCIND	F00C	Numeric node identifier as hex string
RINDEX	F00E	Numeric node identifier as a byte value
RNGFLG	F00F	03 = In operation
RCVFLG	F010	Receiver status: 0 = Not in packet 1 = Start of packet received 2 = Data packet 3 = Data packet, >=5 characters, first byte of ID matches 4 = Data packet, not addressed to node 5 = Data packet >=5 characters, addressed to node 6 = Control or program packet
TFLAG	F011	Transmit status
TMRFLG	F012	Timer flag
PTYPE	F013	Return packet type
SYNFLG	F014	Packet syntax flag: 0 = No error 2 = Declared packet length does not match received length 4 = Checksum error 8 = Packet type 5, length not 3 bytes
RCIND	F015	receiver buffer pointer
RPOINT	F017	no. of chars. in receiver buffer
RCERR	F018	special receive condition flag
FRMERR	F019	packet framing error flag: Non zero if start of packet received part way.
TINDEX	F01A	transmitter buffer pointer
MRKFLG	F01C	transmitter mark flag
TCOUNT	F01D	counter for timer
TCNST	F01F	ring time constant
ABTFLG	F021	abort flag
	F022	
SUSPFLG	F023	set while ring suspended
PROGFLG	F024	non-zero during program loading
RNGERR	F025	set during recovery from ring error
RCMMD	F026	ring executive command byte, set by NI
RETFLG	F027	return packet code

<b>Name</b>	<b>Address</b>	<b>Description</b>
	F028	
	F029	
CTBFLG	F02A	set while NI is writing to CTBUF
TKNFLG	F02B	set while node has token
TKNHLD	F02C	hold token if set
TCOMMAND	F02D	transmitted data packet token
RNGSTAT	F02E	ring status for NODE STAT
NRING	F02F	number of nodes in ring
NSEND	F030	number of sender nodes
NDTYP	F031	Node type: 2 = Master node
ACCEPT	F032	data accept flags
ENABLE	F033	Command enable flags. Set to FF if master packet received.
CTBCNT	F034	no. of entries in CTB
CRBCNT	F035	no. of entries in CRB
RSENDER	F036	last data received sender no.
RTYPE	F037	last data received type
ERRSTAT	F038	Error trapping status
ERRNUM	F039	Error number [copy of ERRFLG]
GSBFLG	F03A	GOSUB flag
ADBAUD	F03B	channel A default baud rate
CTCAD	F03C	channel A baud rate
MAILCNT	F03D	number of entries in mail box
IRSTAT	F03E	Copy of INSRCV for NODE STAT
NNSTAT	F03F	Copy of NEWNAME for NODE STAT
PKTCNT	F040	Non-token packet counter
TKNCNT	F041	Token counter
INSRCV	F042	instruction received flag
NEWNAME	F043	new name flag
JTYPE	F044	received packet type
ENTER	F045	enter ring on next token, if set
	F046	
	F047	
	F049	
	F04A	

<b>Name</b>	<b>Address</b>	<b>Description</b>
	F04C	
ERRTRAP	F04E	zero if error trap off
ERRFLG	F04F	
ERRLIN	F050	line number to GOTO on error
NLIST	F052	first byte in identifier space
LSTBAS	F054	bottom of list space
SRCND	F057	source node for data packet
PKTFLG	F058	data packet no. flag
DSPCNT	F059	offset for display buffer
SCRNFLG	F05A	flag for display screen
TIMEFLG	F05B	flag for time on display screen
RUNFLG	F05C	flag for auto-run after program load
	F05D	
OLDCALC	F064	stores (CALCST)
	F066	
CRBBEG	F068	
	F06A	
CTBPTR	F06C	next free byte in Command Transmitter Buffer
CRBPTR	F06E	next free byte in Command Receiver Buffer
TXPEND	F070	Pointer to pending transmission command
MBXBOT	F072	pointer to first byte below mailbox
	F074	
	F076	
	F078	
	F07A	
	F07C	
PRNTFLG	F07E	mail print flag
PRNDVC	F07F	printer device flag
	F080	
CHAR	F081	character to be printed
	F0BF	Start of NODE code in RAM
	F0EF	
NODEPG	F189	NODE ROM page (modifies data value of a LD A,nn instruction)
	F2FB	End of NODE code in RAM
CTCBD	F2FD	Baud rate for channel B (CTC counter value)
IDSLFA	F2FE	End of node names list

Name	Address	Description
CTBUF	F300	Command Transmitter Buffer (256 bytes)
CRBUF	F400	Command Receive Buffer (512 bytes)
TRBUF	F600	Transmit buffer
RCVBUF	F700	Receive buffer
DSPBUF	F800	Node variable: Node message buffer
DSPTXT	F802	Start of text in message buffer
DSPTIM	F820	Location of time in message buffer

## Transmit Command Packet

This specifies data to be assembled for transmission. CTBPTR or TXPEND gives location of this data

Offset	Size	Contents
0	1	Length of packet
1	1	Destination ID
2	*	Data to be included in packet header
	3	Address and page of data to send
	3	Length of data to send

## Packet Format

### Control Packets

Offset	Length	Content	Description
0	1	0x02	Start of packet
1	1	Packet type	0x30 ("0") = Suspend ring 0x31 ("1") = Initiate packet 0x32 ("2") = Master packet 0x33 ("3") = Identifier packet (gives name of node) 0x34 ("4") = Enter packet (join all nodes to ring) 0x35 ("5") = Null packet (next character is EOP) 0x37 ("7") = Ring abort / ring error 0x38 ("8") = Master abort / master error
4	12	Source Name	Name of sending node
16	2	Source ID	ID of sending node (hex encoded)
18	2	Hop count?	Number of nodes in the ring?
*	4	Checksum	Hex encoded 16 bit value = minus sum of the packet contents, including packet type

Offset	Length	Content	Description
*	1	0x1A	End of packet (EOP)

## Program & Data Packets

Offset	Length	Content	Description
0	1	0x02	Start of packet
1	1	Packet type	0x39 (“9”) = Broadcast (to all nodes) 0x41 (“A”) = Unicast (to specific node)
2	2	Packet length	Hex encoded
4	2	Destination ID	
6	2	Source ID	
8	4	Packet Number	High bit is last packet flag
12	*	Data	Hex encoded binary data
*	4	Checksum	Hex encoded 16 bit value = minus sum of the binary length and binary data
*	1	0x1A	End of packet

## Data for CALL command

Offset	Length	Content	Description
0	1	0x8E	CALL command
1	2	Address	Address to call
3	1	Page	ROM/RAM page to call
4	2	Parameter	Value to pass in HL
6	1	0x01	Length of dummy data
7	1	Dummy	Dummy data required by TCB

## Data for EXT command

Offset	Length	Content	Description
0	1	0x8F	EXT command
1	1	Accept	The data accept bits
2	1	Enable	The command enable bits
3	1	0x01	Length of dummy data
4	1	Dummy	Dummy data required by TCB

## Data for FLAG command

Offset	Length	Content	Description
0	1	0x90	FLAG command
1	1	Flag	The flag to set

Offset	Length	Content	Description
2	1	0x01	Length of dummy data
3	1	Dummy	Dummy data required by TCB

### Data for MESSAGE command

Offset	Length	Content	Description
0	1	0x91	MESSAGE command
1	1	Length	Length of message
2	*	Message	Text of message (max. 30 characters)

### Data for MSEND command

Offset	Length	Content	Description
0	1	0x93	MSEND command or response to MRCV request
1	1	Mode	0x00 = MSEND 0x01 = Response to MRCV
2	2	Address	Source address
4	1	Page	ROM/RAM page of source
5	2	Address	Destination address
7	1	Source	Destination page
8	2	Length	Length of memory to transfer
10	1	Block length	Length of data in this packet (max. 64 bytes)
11	1	Data	Block of data (multiple packets sent if necessary to transfer all data)

### Data for SEND command

Offset	Length	Content	Description
0	1	0x93	SEND command or response to RCV request
1	1	Mode	0x00 = SEND 0x01 = Response to RCV
2	8	Source	Source variable name (type encoded – first letter at end, with high bit set), followed by a space
10	8	Destination	Destination variable name (type encoded – first letter at end, with high bit set), followed by a space
18	2	Length	Length of source variable
		Block length	Length of data in this packet (max. 64 bytes)
		Data	Block of data (multiple packets sent if necessary to transfer all data)

### Data for MRCV command

Offset	Length	Content	Description
0	1	0x99	MRCV command

Offset	Length	Content	Description
2	2	Address	Source address
4	1	Page	ROM/RAM page of source
5	2	Address	Destination address
7	1	Source	Destination page
8	2	Length	Length of memory to transfer
10	1	0x01	Length of dummy data
11	1	Dummy	Dummy data required by TCB

### Data for Acknowledge packet

Offset	Length	Content	Description
0	1	0xA9	Acknowledge data receipt
2	1	0x01	Length of dummy data
3	1	Dummy	Dummy data required by TCB

## Example Ring Traffic

### Ring Initiation (Two nodes over named pipes)

#### At node "Alpha"

Type in: node name,"alpha"

Transmit 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

119ALPHA 0101FC5D

Receive 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

119ALPHA 0102FC5C

Transmit 61 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

219ALPHA 0201FC5B

Receive 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

219ALPHA 0202FC5A

Receive 17687 <Ctrl+Z>, 527 NULL packets, 0 Out of packet characters

Receive Ring Packet:

319BETA 0201FC84

Transmit 19675 <Ctrl+Z>, 528 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

319BETA 0202FC83

## At node "Beta"

Receive 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

119ALPHA 0101FC5D

Transmit 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

119ALPHA 0102FC5C

Receive 61 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

219ALPHA 0201FC5B

Transmit 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

219ALPHA 0202FC5A

Type in: node name,"beta"

Transmit 17687 <Ctrl+Z>, 527 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

319BETA 0201FC84

Receive 19675 <Ctrl+Z>, 528 NULL packets, 0 Out of packet characters

Receive Ring Packet:

319BETA 0202FC83

## Testing Commands (Two nodes over named pipes)

Type in: node name,"alpha"

Transmit 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

119ALPHA 0101FC5D

Receive 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

119ALPHA 0102FC5C

Transmit 139 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

219ALPHA 0201FC5B

Receive 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

219ALPHA 0202FC5A

Type in: node enter

Transmit 11741 <Ctrl+Z>, 361 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

419ALPHA 0101FC5A

Receive 19043 <Ctrl+Z>, 361 NULL packets, 0 Out of packet characters

Receive Ring Packet:

419ALPHA 0102FC59

Receive 0 <Ctrl+Z>, 0 NULL packets, 0 Out of packet characters

Receive Ring Packet:

3192 0201FD0E

Transmit 88 <Ctrl+Z>, 1 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

3192 0202FD0D

Receive 13336 <Ctrl+Z>, 325 NULL packets, 0 Out of packet characters



Receive Ring Packet:

A1701020100A90100FF3B

Transmit 569 <Ctrl+Z>, 1 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

A450201018097B401000000100000100F000A00902254455354494E4722FF40F981

Receive 0 <Ctrl+Z>, 1 NULL packets, 0 Out of packet characters

Receive Ring Packet:

A1701020100A90100FF3B

Transmit 699 <Ctrl+Z>, 1 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

A270201018098B40100C00101000001FFFC46

Receive 0 <Ctrl+Z>, 1 NULL packets, 0 Out of packet characters

Receive Ring Packet:

A1701020100A90126FF15

Type in: node suspend

Transmit 41058 <Ctrl+Z>, 778 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

019ALPHA 0101FC5E

Receive 18599 <Ctrl+Z>, 778 NULL packets, 0 Out of packet characters

Receive Ring Packet:

019ALPHA 0102FC5D

Type in: node cont

Type in: node ext,"beta",255,255

Transmit 77103 <Ctrl+Z>, 897 NULL packets, 0 Out of packet characters

Transmit Ring Packet:

A1B020101808FFFFFF0100FCD3

Receive 36865 <Ctrl+Z>, 897 NULL packets, 0 Out of packet characters

Receive Ring Packet:

A1701020100A90119FF22