Documentation Update DU2

Allen-Bradley
Data Highway II Asynchronous-Device Interface
(Cat. No. 1779-KFL, -KFLR)

When to Use This Document

Use this document with the:

- **Data Highway II Asynchronous-Device Interface User's Manual** (Publication 1779-6.5.1)
- **Data Highway II Asynchronous-Device Interface User's Manual** Document Update (Publication 1779-6.5.1-DU1)

What This Document Contains

This document provides information on changes and corrections to the 1779-KFL, -KFLR, Series A, Revision E. The following pages contain:

- Information about Product Enhancements
- Corrections to the First Document Update to the User Manual
- Corrections to the User's Manual

Product Enhancements

The following features are now available for the 1779-KFL:

- Supervisory Mode
- Node Management
- Error Counters
- Full-Duplex Flow Control

Supervisory mode provides the data frame you need to include the source address when sending messages across Data Highway II. This message format is described in the section entitled **Supervisory Message Format**.

Node Management accesses the same message set as Station Management but uses fewer parameters. Node Management is described in more detail in the section entitled **Corrections to Chapter 13**.

Error counters help you to monitor and troubleshoot your network through the 1779-KFL. To find out more about error counters, refer to the section entitled **Addition of Appendix D**.

Full-duplex flow control enables a host device connected to a 1779-KFL, -KFLR interface to control the flow of data between it and the interface. To find out more about full-duplex flow control, refer to the section entitled **Full-Duplex Flow Control**.

Correction to 1779-6.5.1-DU1

On Page 2, under the Heading Page 4-7, Communication Mode, after the Mode Selection Table

Delete the first paragraph, labeled **Important**.

On Page 10, in Table 9.A, under Byte 10

Change the bits for series and revision levels from:

Bits 0-3	*to*	Bits 0-4 (for Revision Level)
Bits 4-7	*to*	Bits 5-7 (for Series Level)

Corrections to the User's Manual

The following sections contain corrections by chapter and page number.

Correction to Table of Contents

After the listing for Appendix C

Add:	**D**	**Error Counters**

Corrections to Chapter 4

On page 4-6

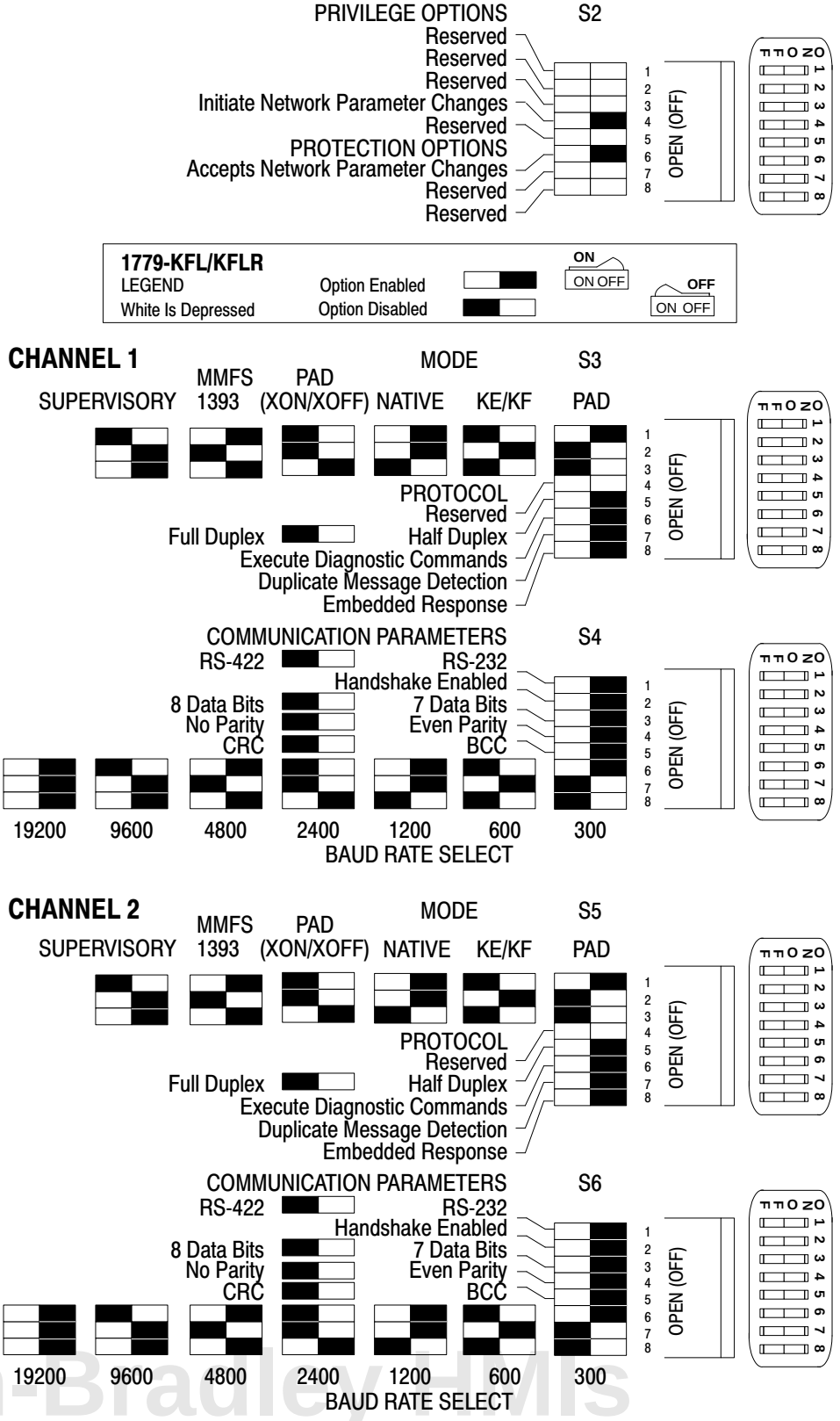
Replace:	Figure 4.4 Host-Board Switches
with:	The figure on the next page.

On Page 4-9, under Handshake

Add the following sentence to the end of this section:

Handshaking is only available on a channel where the RS-232-C port is enabled.

Figure 4.4
Corrected Host-Board Switches

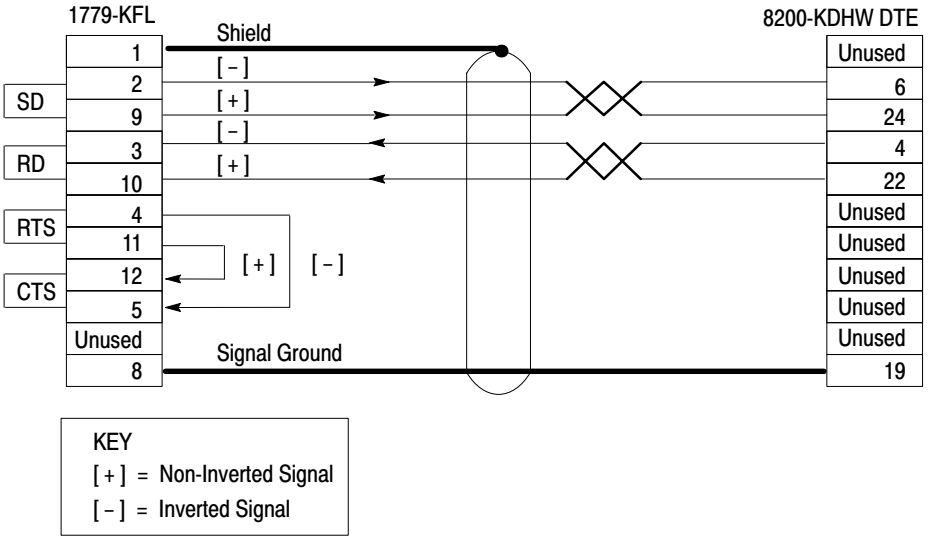


On Page 4-16

Replace: Figure 4.11 — RS-422 DTE to RS-422 DTE

with: The figure below:

Figure 4.11
RS-422 DTE to RS-422 DTE (Handshaking Must Be Set to OFF)



Corrections to Chapter 8

On Page 8-3, after the Station Management Message Set (and after the MMFS/1393 Message Set—New Add Per DU1)

Add the following new section:

Supervisory Message Set

Supervisory mode gives you the same capabilities as Native mode except that Time-Critical commands are not accessible. In addition, Supervisory mode has a different message format (refer to **Supervisory Message Formats** in this document).

Corrections to Chapter 9

On page 9-17, in Table 9.C

Replace Bytes 11 and 12 with the following:

Byte	Bit	Value	Meaning
11			Not Used
12	3	0 1	Initiate Network Parameter Changes Enabled Initiate Network Parameter Changes Disabled
	5	0 1	Accept Network Parameter Changes Enabled Accept Network Parameter Changes Disabled

Also in Table 9.C, under Bytes 14 and 16, Bits 0-2, add:

Byte	Bit	Value	Meaning
14	0-2	1 2	Supervisory Mode 2MMFS 1393 Mode
16	0-2	1 2	Supervisory Mode 2MMFS 1393 Mode

Corrections to Chapter 13

On Page 13-8, in Table 13.A

*At the end of the section labeled **For 1779-KFL Interfaces Only**, add the following parameters:*

Parameter	Parameter ID (Hex)	Target Layer Value (Hex)	Data Size (Bytes)	Default Data (Hex)
CH 1 WNAK Retry Timer	17	0A	02	00 00
CH 2 WNAK Retry Timer	17	0A	02	00 00

*Also on Page 13-8, **at the bottom of Table 13.A**, add the following parameters:*

Parameter	Parameter ID (Hex)	Target Layer Value (Hex)	Data Size (Bytes)	Default Data (Hex)
Time-Critical Retry	00	0D	01	00
Supervisory Retry	01	0D	01	03
Time-Critical Retry Timer	02	0D	02	00 03 (30 ms)
Supervisory Retry Timer	03	0D	02	00 03 (30 ms)

On Page 13-11

At the end of the Parameter section, after PAD Destination Link, add the following new descriptions:

WNAK Retry Timer — Determines the amount of time before the interface will attempt to continue sending data to the receiver. Data field is two bytes long. Time base is 10 ms. Default value is 00 00, valid entries are 00 00 to FF FF (10 min. 54 sec.).

Time-Critical Retries — Determines the number times the interface will attempt time-critical commands that have not been successful. Data field is one byte long. Default is 0, valid entries are 00 to FF.

Supervisory Retries — Determines the number of times the interface will attempt supervisory commands that have not been successful. Data field is one byte long. Default is 0, valid entries are 00 to FF.

Time-Critical Retry Timers — Determines the amount of time between attempts of time-critical commands. Data field is two bytes long. Time base is 10 ms. Default value is 00 03 (30 ms), valid entries are 00 00 to FF FF (10 min. 54 sec.).

Supervisory Retry Timers — Determines the amount of time between attempts of supervisory commands. Data field is two bytes long. Time base is 10 ms. Default value is 00 03 (30 ms), valid entries are 00 00 to FF FF (10 min. 54 sec.).

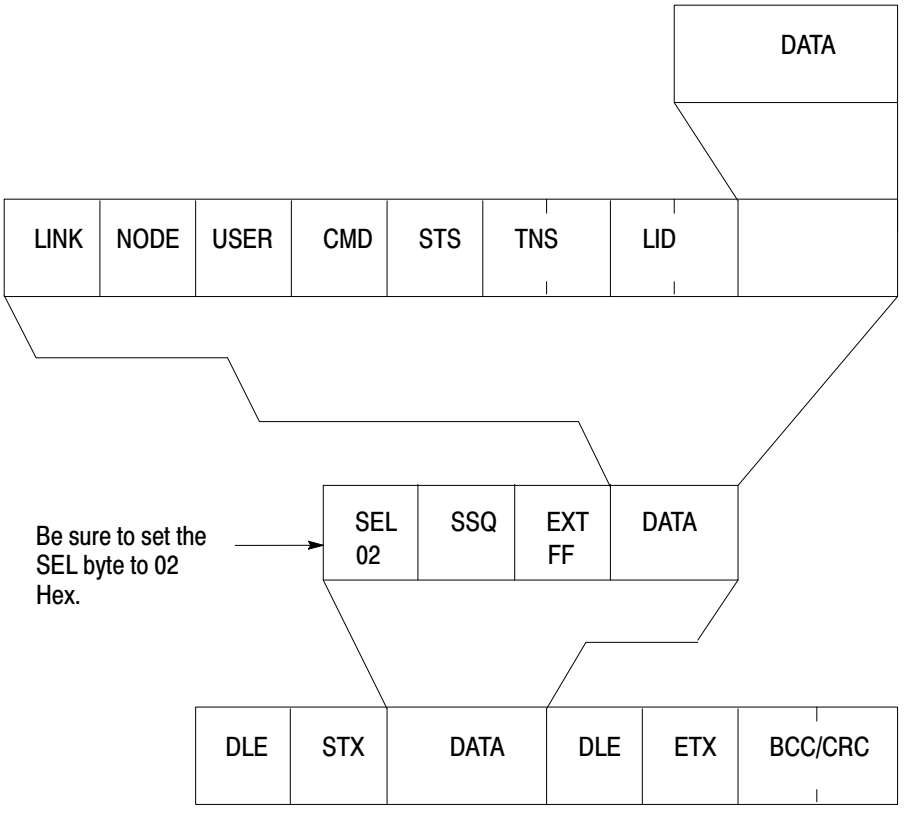
On Page 13-17

In front of Chapter Summary, add the following new section (Node Management Parameters) and Tables 13.B and 13.C:

Node Management Parameters

Node Management simplifies Station Management by combining the Parameter ID and the Target Layer value into one two-byte value called the **Location ID (LID)**. The LID consists of the Target Layer value in the first byte and the Parameter ID in the second.

The message format for Node Management is shown below:



Refer to Table 13.B for a list of Node Management parameters, their Location IDs, sizes and default values.

Table 13.B
Node Management Parameters

Parameter	Location ID (LID) (Hex)	Data Size (Bytes) (Decimal)	Default Data (Hex)
For All Interfaces			
Host-Board ID	00 00	Up to 16	ASCII String
MAC-Board ID	02 03	Up to 16	ASCII String
Token-Hold Factor	02 45	1	01
Node Address	02 40	1	01
For 1779-KFL Only			
Number of ENQs	0A 12	1	03
Number of Attempts	0A 11	1	03
Response Timer	0A 13	2	00 64 (1 s)
Remote-Reply Timer	0A 10	2	0B B8 (30 s)
Host-Reply Timer	0A 14	2	07 D0 (20 s)
Remote-TC Reply Timer	0A 15	2	03 E8 (10 s)
Host-TC Reply Timer	0A 16	2	01 F4 (5 s)
For 1779-KFL, -KFM Only			
PAD Character Timer	0B 10	2	05 (50 ms)
PAD Destination Link	0B 11	1	00
PAD Destination Node/User	0B 12	2	00 00
Station Address	00 01	3	00 00 00
TC Retry Count	0D 00	1	00
Supervisory Retry Count	0D 01	1	03
TC Retry Timer	0D 02	2	00 03
Supervisory Retry Timer	0D 03	2	00 03
For 1779-KFM Only			
Remote-Reply Timer	0C 13	2	0B B8
Host-Reply Timer	0C 14	2	07 D0
Remote-Reply Timer	0C 15	2	03 E8
Host-TC-Reply Timer	0C 16	2	01 F4

Node Management error codes are explained in Table 13.C. They are returned in the extended error status byte that follows the TNS byte in the reply. The status byte will contain an E0 (hex) if an error has occurred.

Table 13.C
Extended Status Error Codes

Code	Meaning
1	Data Field of the Command Message Exceeds the Specified Size (Refer to Table 12.B)
2	Inconsistent Packet Size Based on Information Given
3	Location ID Does Not Exist
4	Illegal Message Type
5	Illegal Location ID
6	Illegal Location ID Value
7	Retry Message—Node Management Utility Busy
8	Message Timed Out
9	Invalid Node Management Command
A	Illegal Node Address
B	Illegal Link Identification
D	Cannot Write to Parameter—Switch Protected

Corrections to Appendix A

On Page A-2, in Table A.A, under Status Codes 20 and 2F

Replace the words: local interface
with: either local or remote interface

Also in Table A.A, add the following status codes:

Status Code	Meaning
02	Destination station fails to respond.
36	Bad source link address in response.
37	Message timeout; execution time exceeds preset value.
F5	Bad source node address detected at destination node.

On Page A-3, in Table A.C

Replace: Status Code B0
with: Status Code 00

Also in Table A.C, add the following status codes:

Status Code	Meaning
BD	Value used in user field to specify the immediate access block is greater than 0F hex.
BE	Invalid CMD-field value.
BF	Size of block to write is too large.

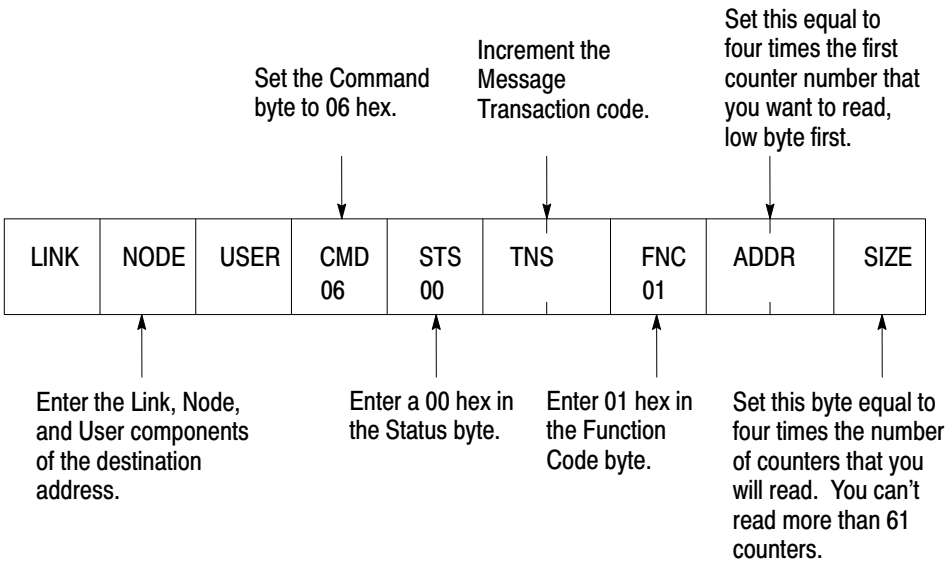
Addition of Appendix D

Add the information contained in the remaining pages of this Documentation Update to your manual as Appendix D.

Error Counters

Chapter Objectives

Error counters can provide you with a statistical summary of your network's activity. At each Data Highway II interface (except the 1779-KP5 Data Highway II/Data Highway Plus interface), a set of counters is stored in memory to keep track of that node. You can access these counters by using the following command format:

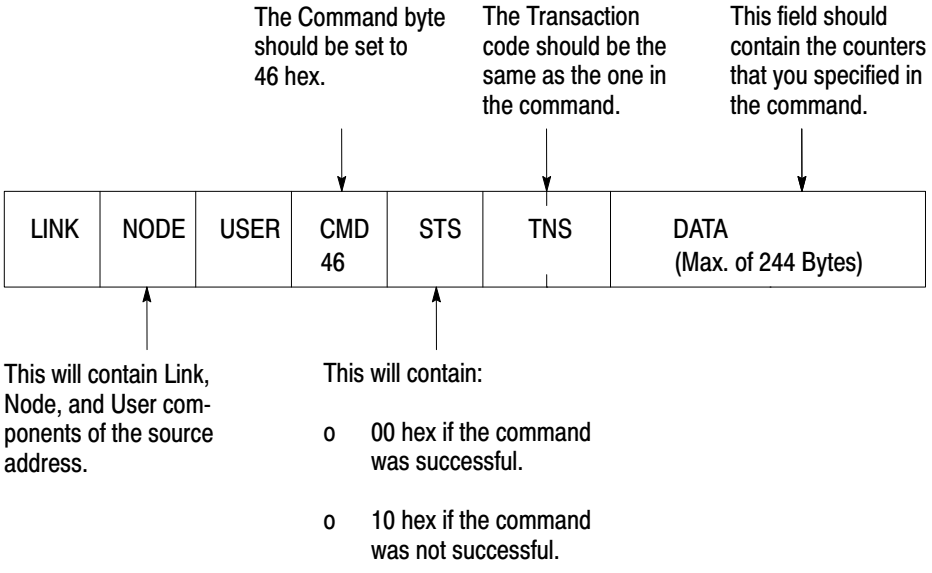


Each counter takes up four bytes. There are:

- 508 Counter Bytes (127 Counters) in the 1779-KP2 and 1779-KP3
- 320 Counter Bytes (80 Counters) in the 1779-KFL and 1779-KFM

Be sure that the sum of the address (the starting counter byte) and the size (the number of counter bytes to be read) does not exceed the number of available counter bytes in the interface you are reading from. If it does, you will receive an error.

The reply will come in the following format:



Refer to Chapter 9 (the **"**Diagnostic Read**"** section) in the 1779-KFL Asynchronous-Interface User's Manual for more information.

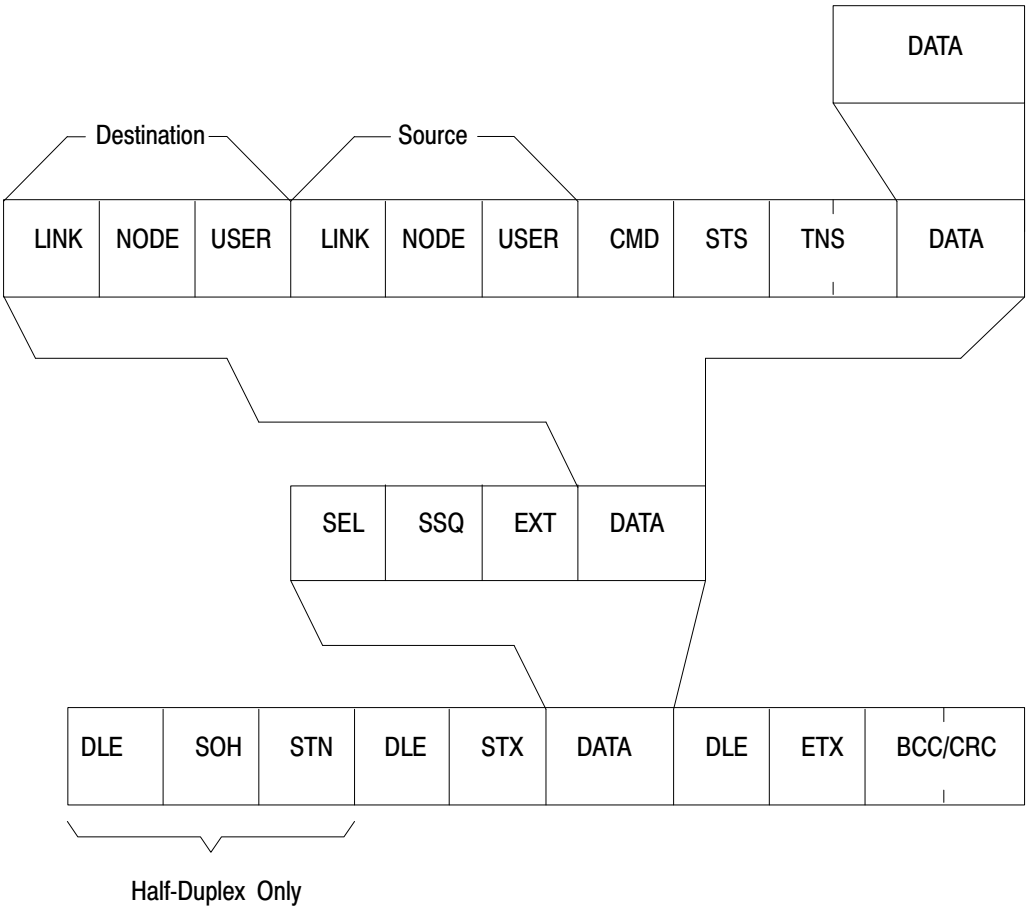
Refer to Table D.A for a description of each error counter.

Table D.A
Error Counters

This Counter #: (Hex)	Counts the Number of:	And Is Accessible in the 1779-			
		KP2:	KP3:	KFL:	KFM:
Data Highway Commands					
0	Data Highway commands sent.	X	X	X	X
1	Expected Data Highway replies received.	X	X	X	X
3	Data Highway commands for which a reply was received.	X	X	X	X
5	Data Highway replies from the wrong source.	X	X	X	X
8	Data Highway commands for which no reply was received.	X	X		
PAD Commands					
17	PAD commands sent.			X	X
18	Expected PAD replies received.			X	X
19	PAD commands for which a reply was received.			X	X
Remote Command Blocks					
30	Commands with an invalid RCB block number.	X	X		
31	RCB commands with invalid block size.	X	X		
33	RCB commands with invalid command data.	X	X		
34	RCB commands with invalid block format.	X	X		
35	RCB access attempts with password violation.	X	X		
45	Message Timeouts.	X	X	X	X
Time-Critical Commands					
50	Currently active time-critical jobs.	X	X		
51	Time-critical commands initiated without data.	X	X		
53	Time-critical write commands that failed to get data from the processor.	X	X		
54	Immediate read commands initiated.	X	X		
55	Update-immediate commands initiated.	X	X		
56	Update-immediate commands that failed to get data from the processor.	X	X		
57	Time-critical commands for which a link-layer confirmation was received.	X	X		
58	Time-critical command confirmations matching commands initiated.	X	X		
59	Time-critical commands without confirmation.	X	X		
5A	Time-critical commands received.	X	X		
5D	Time-critical replies that match up with a command.	X	X		
5E	Read-immediate commands for which link-layer confirmation was received.	X	X		
5F	Read-immediate command confirmations matching commands initiated.	X			
60	Properly sized read-immediate commands.	X	X		
61	Failed read-immediate commands.	X	X		
62	Times an immediate area was set inactive.	X	X		
63	Update-immediate commands for which link-layer confirmation was received.	X	X		
64	Update-immediate command confirmations matching commands initiated.	X	X		
65	Failed update-immediate commands.	X	X		
66	Completions reported for an outgoing transaction.	X	X		
67	Times data was returned with a reply for a time-critical command.	X	X		
68	Data returned with a reply for a time-critical command could not be written into memory.	X	X		
69	Time-critical errors.	X	X		
6A	Time-critical commands that were reset.	X	X		
6B	Time-critical commands received by the responder.	X	X		
6E	Valid time-critical commands received.	X	X		
79	Time-critical replies for which confirmations were received.	X	X		
7A	Time-critical replies that did not reach their destination.	X	X		
7B	Time-critical transactions that timed out.	X	X		
7D	Time-critical timeouts occurring when user timer was disabled.	X	X		

Supervisory Message Format

The message format for Supervisory mode is shown below:



Full-Duplex Flow Control

Full-duplex flow control uses a new response code in the full-duplex data-link layer to control when the 1779-KFL, -KFLR interface can send messages to the host device. This feature helps prevent unnecessary data loss when the receiving device's message sink is full.

The use of flow control is outlined in the steps below:

1. When the host device's message sink is full, a response code of DLE WNAK (hex 10 13) is sent to the interface. This indicates that the last message was not accepted and prevents the interface from sending any more messages.

2. If the interface receives a message from the network, it places it in its buffer.

3. If the buffer fills, the interface stops accepting new messages by sending DLE NAK responses (hex 10 15) to the initiating node.

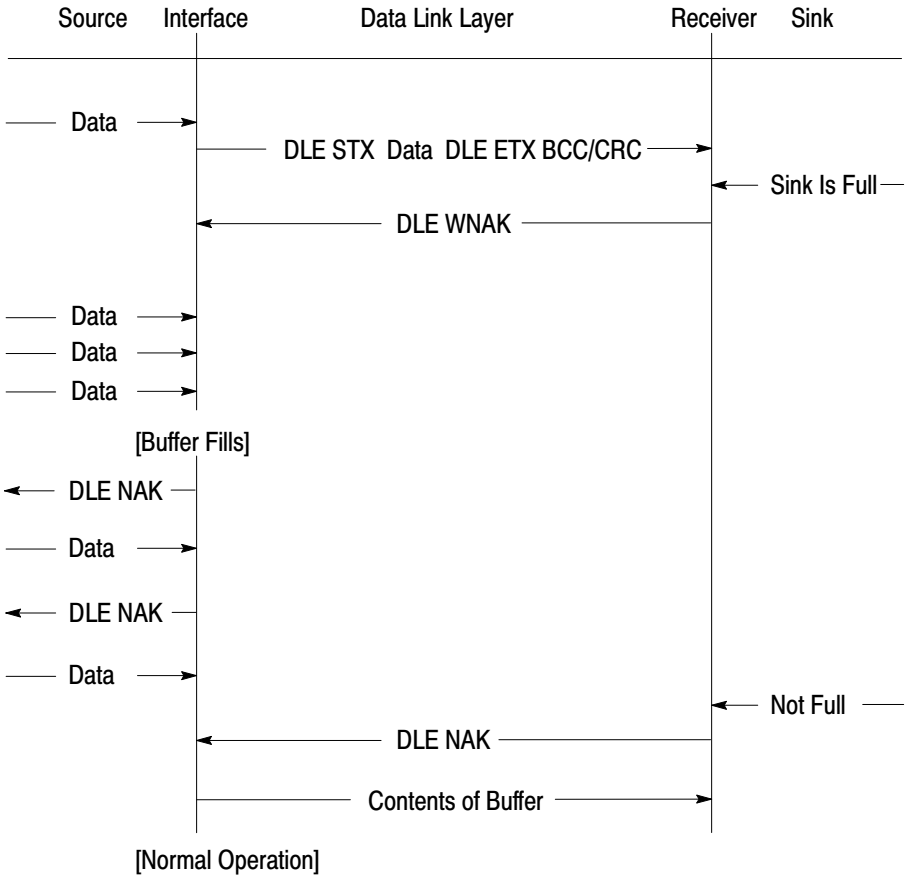
4. If a timeout has been set for WNAK (the default is no timeout) and the WNAK times out before the host device can process enough data to clear the message sink, the host device responds with another WNAK. This restarts the process at Step 1.

5. When the host device has finished processing enough data to clear the message sink, it sends a DLE NAK to the interface. This causes the interface to send messages stored in its buffer.

6. Communications continue as they did before the message sink was full.

This process is shown on the following page:

Message Transfer with WNAK and Interface Buffer Fills



If you have set a timeout for the WNAK, it may timeout any time after you send it. In that case, the interface will begin sending messages again. If the message sink is still full, the host device will reply with another WNAK.

To implement full-duplex flow control, you must program it into the receiving module of your driver software. The driver should check to see if the message sink is full and should send a response code of DLE WNAK if it is. This will cause the interface to stop sending messages. When the sink is emptied, a code of DLE NAK should be sent. This will cause the interface to start sending messages again. Another method to prompt the interface to start sending messages is to set the timeout for the WNAK. When the command times out, the interface will start sending again.

ALLEN-BRADLEY
A ROCKWELL INTERNATIONAL COMPANY

With offices in major cities worldwide

WORLD HEADQUARTERS
1201 South Second Street
Milwaukee, WI 53204 USA
Tel: (414)382-2000
Telex: 43 11 016
FAX: (414)382-4444

EUROPE/INDIA/ MIDDLE EAST/AFRICA HEADQUARTERS
Allen-Bradley Europa B.V.
Amsterdamseweg 15
1422 AC Uithoorn
The Netherlands
Tel: (31)2975/68811
Telex: 884 18042
FAX: (44)2975/60222

ASIA/PACIFIC HEADQUARTERS
Allen-Bradley (Hong Kong) Limited
2901 Great Eagle Center
23 Harbour Road
G.P.O. Box 9797
Wanchai, Hong Kong
Tel: (852)5-739391
Telex: 780 64347
FAX: (852)5-745326

CANADA HEADQUARTERS
Allen-Bradley Canada Limited
135 Dundas Street
Cambridge, Ontario N1R 5X1
Canada
Tel: (519)623-1810
Telex: 069 59317
FAX: (519)623-8930

LATIN AMERICA HEADQUARTERS
1201 South Second Street
Milwaukee, WI 53204 USA
Tel: (414)382-2000
Telex: 43 11 016
FAX: (414)382-2400

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