DL3500-DH-485/MODBUS
COMMUNICATION CONTROLLER APPLICATION NOTE

This application note contains information on the DL3500-Modbus to DH-485 interface. The DL3500 model contains two modes of operation, Modbus Master and Modbus Slave, which are selectable by the PC Configuration Software. The latest version is available on the web at http://www.equustek.com/downloads.html
The information contained in this application note is supplementary information specific to Modbus not contained in the regular User's Guide.

Master or Slave mode?
This application note is divided into two parts Modbus Master and Modbus Slave modes; they correspond to the mode the DL3500 is going to be on the Modbus Network, and which side DH-485 or Modbus the commands will be initiated on.
Master mode is used when a device on the DH-485 network is going to initiate all communications with one or many Modbus slave devices. **Please Refer to DL3500-DH-485/Modbus Master Application note.**
Slave mode is used when a device on Modbus network is going to initiate all communications with one or many SLC's, PLC's or other DH-485 devices. **Please Refer to DL3500-DH-485/Modbus Slave Application note.**

The application notes generally assume that a SLC or other DH-485 device which can originate commands to Modbus via a DL3500 in master mode, or responding to Modbus commands via a DL3500 in slave mode. Only devices capable of transmitting DH-485 message commands in PLC5 (or PLC3) format and able to receive DH-485 message commands in PLC5 format can be used with the DL3500-Modbus/DH-485 including SLC's, MicroLogix's, ControlLogix's and HMIs as well as other intelligent devices.

Due to differences between DH-485 and Modbus protocols and the universal design of the DL3500 there are differences between the lengths of messages, error handling and addressing which have to be carefully considered by the Systems Designer, Programmer and Installer.

CAUTION:
Incorrect configuration may result in unsafe operation, damage to equipment or safety hazard to personnel.
Read the DL3500 User's Guide and the appropriate application notes carefully before putting a DL3500 on-line.
The hardware and software must be fully tested off-line in a safe "TEST" environment prior to putting the unit on-line in an operational environment.

DL3500-DH-485 MODBUS MASTER TO A-B DH-485 CONFIGURATION
Use this option when the is required to be the master on a Modbus network.

The Modbus Master Application notes contain configuration information for the DL3500-DH-485 protocol and should be used in conjunction with the DL3500 User's Guide.

DL3500-DH-485 MODBUS SLAVE TO A-B DH-485 CONFIGURATION
Use this protocol when the is required to be a slave device on a Modbus network.

The Modbus Master Application notes contain configuration information for the DL3500-DH-485 protocol and should be used in conjunction with the DL3500 User's Guide.

NOTES:

1. The unit that you have received can be configured as Modbus Master or Modbus Slave. Ensure that you understand and carefully follow the specific configuration procedures for the Modbus protocol.

2. **There are significant differences between the configuration, programming and operational requirements of Modbus Master and Modbus Slave protocols.**

3. If you configure the DL3500 for Modbus Master Operation it must be the only master on the Modbus network. A station on DH-485 originates commands to the DL3500-DH-485 Modbus Master that then re-transmits them over Modbus to a Modbus Slave device. Other intelligent DH-485 devices capable of initiating DH-485 messages in PLC5 (or PLC3) format and able to receive PLC5 message commands could also be used as the DH-485 "master".

4. Be sure to fully test the hardware and software off-line to ensure that you understand its configuration and operation. Prior to putting the DL3500 on-line in an production process, the operation of the complete system should be fully tested on-line in a safe "test" environment.

5. Due to differences between DH-485, Modbus and the hardware and software there are differences between the lengths of messages, error handling and addressing which have to be carefully considered by the Systems Designer, Programmer and Installer.

6. Additional literature regarding DH-485, Modbus and PLC products can be obtained from Modicon and A-B. Suggested reference materials for A-B DH-485 protocol is shown in section 1.7 of the User's Guide.

CAUTION:

Incorrect configuration may result in unsafe operation, damage to equipment or safety hazard to personnel.
Read the DL3500 User's Guide and the appropriate application notes carefully before putting a DL3500 on-line.
The DL3500 hardware and software must be fully tested off-line in a safe "TEST" environment prior to putting the unit on-line in an operational environment.

Contact Technical Support if you need further information or assistance.

TECHNICAL SUPPORT
Tel : (604) 266-8547
Or E-Mail: info@equustek.com

The following table provides a reference between the different radixes used for your reference):

DECIMAL TO OCTAL TO HEXADECIMAL ADDRESS CONVERSION TABLE

DEC	OCT	HEX	DEC	OCT	HEX	DEC	OCT	HEX	DEC	OCT	HEX
00	00	00	16	20	10	32	40	20	48	60	30
01	01	01	17	21	11	33	41	21	49	61	31
02	02	02	18	22	12	34	42	22	50	62	32
03	03	03	19	23	13	35	43	23	51	63	33
04	04	04	20	24	14	36	44	24	52	64	34
05	05	05	21	25	15	37	45	25	53	65	35
06	06	06	22	26	16	38	46	26	54	66	36
07	07	07	23	27	17	39	47	27	55	67	37
08	10	08	24	30	18	40	50	28	56	70	38
09	11	09	25	31	19	41	51	29	57	71	39
10	12	0A	26	32	1A	42	52	2A	58	72	3A
11	13	0B	27	33	1B	43	53	2B	59	73	3B
12	14	0C	28	34	1C	44	54	2C	60	74	3C
13	15	0D	29	35	1D	45	55	2D	61	75	3D
14	16	0E	30	36	1E	46	56	2E	62	76	3E
15	17	0F	31	37	1F	47	57	2F	63	77	3F

MODBUS MASTER APPLICATION NOTE

DL3500-Modbus/DH-485 - MASTER PROTOCOL

The information contained in this application note is for the Modbus Master protocol only, and is supplementary to the information in the User's Guide. To use the DL3500 in Modbus Slave Mode follow the procedures in the Modbus Slave application notes. **There are significant differences between the configuration, programming and operational requirements of Modbus Master and Modbus Slave protocols.**

INDEX FOR MODBUS MASTER MODE

1.0 GENERAL

The DL3500 can be configured as a Modbus network "Master". In this mode it enables SLC's and other devices on a DH-485 network to initiate various commands to read and write coils, inputs and registers of slave devices on a Modbus network. The Modbus interface can be set for RS232 or RS422/RS485. Typical DH-485 stations that can communicate with Modbus via the DL3500 include devices such as PLC3's, PLC5's, SLC5/03's, PCs, HMIs and other intelligent OEM devices. **(Now referred to as PLC's in this document)**
<u>**Communication between Modbus and the DL3500 must be initiated from a DH-485 PLC.**</u>

The DL3500 must be the only Master on the Modbus network and does not require a Modbus address. The DL3500 is an active station on DH-485 and requires a unique DH-485 station address number**. The DL3500 can accept PLC3 Word Range Read/Write or PLC5 Typed Read/Write message commands from any station on the DH-485 network.**

The Destination Data Table Address or TAG is normally used to address a specific File and Word in another PLC on the network. This address is interpreted by the DL3500 in a specific way and permits data to be mapped from a PLC and a Modbus slave device. This allows the PLC programmer to directly address a specific register in a Modbus slave device without any previous configuration being necessary in the DL3500.

1.1 ADDRESS MAPPING BETWEEN A-B AND MODBUS

The design of the DL3500 Modbus Master and the PLC message command structure allows the DL3500 to use the contents of the Destination Data Table Address in the PLC for direct address mapping to Modbus. The DL3500 decodes the Destination DT Address to access to various Modbus Slave stations, commands and addresses. The actual Modbus station number and addresses ranges that can be accessed depends on the PLC type, DH-485 message type and Programming software used.

In the configuration software the type of PLC used is selected. See below.

Modbus Parameters-DL32 V3.1

Destination (Target) Data Table Address Decoding Options for PLC5 Type commands (Used by SLC's and PLC's):
- SLC's-(NXYY:Z) – If allowed to enter 999:9999 to have access to all Modbus registers and Coils for slaves 1-99.
  - Also used for PLC's and other devices
- SLC's-(NXYZ:Z) – if allowed to enter 999:999 to have access to all Modbus registers and Coils for slaves 1-9.
  - Also used for PLC's and other devices
- MicroLogix's and SLC's-(NYXZ:Z) – If only allowed to enter 255:255 to have access to Modbus registers and Coils from 1 to 9255, for slaves 1-3.
  - Note: Registers and Coils – 1-255, 1000-1255, 2000-2255, etc
  - Y =0 for Slave 1, 1 for Slave 2, 2 for Slave 3

1.1.1 DESTINATION DATA TABLE ADDRESS FORMAT

If a PLC is being used to generate messages for the DL3500 to convert and send to a Modbus network, values are entered into the Destination Data Table Address of the PLC's DH-485 Message Command in the format below. MMI's and other applications would have a similar destination address structure for reading and writing data to from a PLC - refer to OEM application specific documentation.

The usual format of destination data table address (DDTA) is: **X y : z**

When communicating with another PLC over DH-485, the DDTA has the following meaning:
- X = File type (single alphabetic character)
- y = File number (0 - 63, 0-255, 0 - 999 and 0 - 9999 depends on PLC type)
- z = Word number (0 - 255, 0 - 999 or 0 - 9999 depends on PLC type)

If the same destination address is received by a DL3500 Modbus Master, the DDTA means the following:
- X = Modbus Command i.e. Modbus commands 01 to 06, 15 and 16 (depends on if you are accessing Coils., Status words or Registers.
- y = Modbus slave station address i.e. max Modbus range 1 - 255
- z = Modbus (bit/register) address i.e. max Modbus range 1 - 9999)
    - z = Sub-function code for Modbus 08 Diagnostic Command

NOTE: Using PLC3 and PLC5 have slightly different definitions for the Xy portion.

PLC3 commands:
- **allow the X to be sent as different file type to designate different Modbus Address Ranges and Commands. I.E. N=4x registers, B=0x coils**

PLC5 commands:
- **do not allow the X to be sent as different file types so the y:z has to be decoded to access the different Modbus Addresses (registers and coils)**

1.2   DH-485 AND MODBUS COMMANDS

1.2.1   DH-485 MESSAGE COMMANDS

The DL3500-DH-485 set to Modbus Master Mode can generate Modbus protocol functions on receipt of the following DH-485 message commands:
- PLC-3 Word Range Read or Word Range Write Commands
- PLC-5 Typed Read or Typed Write Commands
- PLC-5 Word Range Read and Writes

A-B PLC's can generate the following commands:
- SLC's   - PLC-5 Typed Read/Write Commands
- PLC-3   - PLC-3 Word Range Read/Write Commands
- PLC-5   - PLC-3 Word Range Read/Write Commands and PLC-5 Typed Read/Write Commands

1.2.2   MODBUS COMMANDS

The Modbus commands and addresses that can be generated depend on the specific DH-485 message command received. The DL3500-DH-485 in Master Mode is designed to work with DH-485 message commands including PLC-5 Typed Read and Write and PLC-3 Word Range Read and Write. Use the PLC-3 Word Range Read and Write commands whenever possible because the larger address field of these commands provides the additional flexibility necessary to generate the full range of Modbus commands and addresses.

1.2.3   PLC-3 WORD RANGE COMMANDS (PLC-3's and 5's)

MODBUS DATA AND CONTROL COMMANDS USING PLC-3 WORD RANGE READ / WRITE COMMANDS

On receiving a PLC-3 Word Range Read or Word Range Write Message Command (MC) a DL3500 Modbus Master decodes the command's Destination Data Table Address (DDTA) File type (character). Then, dependent on whether the DH-485 message is a read or a write it can generate the following Modbus command as below:

DATA HIGHWAY PLUS				MODBUS			
		Destination D.T. Address					
MC R / W	**File Type**	**Dec File Value**	**Dec Word Value**	**Modbus Command**	**Description**	**Slave Address**	**Data Address**
Read	B	1-255	1-9999	01	Read Coil Status	1 -255	00001 - 09999
Read	F	1-255	1-9999	02	Read Input Status	1 - 255	10001 - 19999
Read	N	1-255	1-9999	03	Read Holding Registers	1 - 255	40001 - 49999
Read	S	1-255	1-9999	04	Read Input Registers	1 - 255	30001 - 39999
Write	F	1-255	1-9999	05	Force Single Coil	1 - 255	00001 - 09999 **Note 1**
Write	S	1-255	1-9999	06	Pre-set Single Register	1 - 255	40001 - 49999
Write	B	1-255	1-9999	15	Force Multiple Coils	1 - 255	00001 - 09999
Write	N	1-255	1-9999	16	Pre-set Multiple Registers	1 - 255	40001 - 49999
Write F, S, B & N		0	1-9999	5, 6, 15 & 16	Broadcast Command	1 - 255	x0001 - x9999

NOTE:
> **1.** For the Modbus 05 command set the first word of data in the PLC data table to FF00 (hex) to turn the coil **ON** and 0000 to turn the coil **OFF**.

1.2.3.1 MODBUS DIAGNOSTICS COMMANDS

MODBUS DIAGNOSTIC COMMANDS USING PLC-3 WORD RANGE R/W COMMANDS

DATA HIGHWAY PLUS   **MODBUS**

MC R / W	File Type	Destination D.T. Address Dec File Value	Dec Word Value	Modbus Cmd	Sub-Function Code	Diagnostic Command Function
Read	D	00	Data Value	08	00	Return Data Query (Loop-back)
Write	D	00	00 / 255	08	01	Restart Communications
Read	D	09	02	08	02	Return Diagnostic Register
Write	D	01	Char (dec)	08	03	Change ASCII Input Delimiter
Write	D	09	04	08	04	Force Listen Only Mode
Write	D	09	10	08	10	Clear Counters and Diagnostic Registers
Read	D	09	11	08	11	Return Bus Message Count
Read	D	09	12	08	12	Return Bus Communication Error Count
Read	D	09	13	08	13	Return Bus Exception Error Count
Read	D	09	14	08	14	Return Slave Message Count
Read	D	09	15	08	15	Return Slave No Response Count
Read	D	09	16	08	16	Return Slave NAK Count
Read	D	09	17	08	17	Return Slave Busy Count
Read	D	09	18	08	18	Return Bus Character Overrun Count
Read	D	09	19	08	19	Return IOP Overrun Count (884)
Write	D	09	20	08	20	Clear Overrun Counter and Flag (884)

1.2.4 PLC-5 TYPED R/W & WORD RANGE R/W (PLC-5's and SLC's)

MODBUS DATA AND CONTROL COMMANDS USING PLC-5 TYPED READ / WRITE COMMANDS

On receiving a PLC-5 Typed Read or Word Range Write Message Command (MC) a DL3500-DH-485 Modbus Master decodes the command's Destination Data Table Address (DDTA) File type (character). Then, dependent on whether the DH-485 message is a read or a write it can generate the following Modbus command:

1.2.4.1 PLC5 TYPED COMMANDS USING NXYY:Z DECODE

Used if allowed to enter 999:9999, this will allow access to all Modbus registers and Coils for slaves 1-99.

X- Modbus Command	YY- Slave Address	Modbus Read Command	Modbus Write Command	Modbus Registers for Read	Modbus Registers for Write
4	01-99	3	16	4X	4X
0	01-99	1	15	0X	0X
1	01-99	2	5	1X	0X
8	01-99	8	8	Diagnostic	Diagnostic
3	01-99	4	6	3X	4X

NOTES:
- **Z = 0-9,999 for the Modbus Register.**
- **Leave out Leading 0's in Destination Data Table**

1.2.4.2 PLC5 TYPED COMMANDS USING NXYZ:Z DECODE

Used if allowed to enter 999:999, this will allow access to all Modbus registers and Coils for slaves 1-9.

X- Modbus Command	Y- Slave Address	Modbus Read Command	Modbus Write Command	Modbus Registers for Read	Modbus Registers for Write
4	1-9	3	16	4X	4X
0	1-9	1	15	0X	0X
1	1-9	2	5	1X	0X
8	1-9	8	8	Diagnostic	Diagnostic
3	1-9	4	6	3X	4X

NOTES:
- **Z = 0-9,999. The ones digit of the XYZ is used for the Thousands digit of the Modbus Register**
- **Leave out Leading 0's in Destination Data Table**

1.2.4.3 PLC5 TYPED COMMANDS USING NYXZ:Z DECODE

Used if allowed to enter 255:255, this will allow access to certain Modbus registers and Coils for slaves 1-3.

Y- Slave Address	X- Modbus Command	Modbus Read Command	Modbus Write Command	Modbus Registers for Read	Modbus Registers for Write
0-2	4	3	16	4X	4X
0-2	0	1	15	0X	0X
0-2	1	2	5	1X	0X
0-2	8	8	8	Diagnostic	Diagnostic
0-2	3	4	6	3X	4X

NOTES:
- **MicroLogix's and SLC's-(NYXZ:Z) – If only allowed to enter 255:255 to have access to Modbus registers and Coils from 1 to 9255, for slaves 1-3.**
  - **Note: Registers and Coils – 1-255, 1000-1255, 2000-2255, etc**
  - **Y =0 for Slave 1, 1 for Slave 2, 2 for Slave 3**
- **Leave out Leading 0's in Destination Data Table**

1.2.4.4 MODBUS DIAGNOSTIC COMMANDS

MODBUS DIAGNOSTIC COMMANDS USING PLC-5 TYPED READ / WRITE COMMANDS

A) Diagnostic Write Commands

Write diagnostic Sub functions 1, 3, 4, 10, and 20
Use the following PLC3 Address: **DXyyy: ZZZZ**
Where: X = 0,1, and 9 & yyy - Slave address
       ZZZZ depends on the particular sub function – See below
       If X = 0 then the Write sub function is 1 and ZZZZ is the Data
         X = 1 then the Write sub function is 3 and ZZZZ is the Data
         X = 9 then the Write sub function depends on ZZZZ equal to 4, 10, and 20.

B) Diagnostic Read Commands

Read diagnostic Sub functions 0, 2, and 11 through 19
Use the following PLC3 Address: **DXyyy: ZZZZ**
Where: X = 0, 1, and 9 & yyy - Slave address
       ZZZZ depends on the particular sub function – See below
       If X = 0 then the Read sub function is and ZZZZ is the Data
         X = 9 then the Read sub function depends on ZZZZ equal to 2 and 11 through 19.

1.2.5 BROADCAST COMMAND

A-B's DH-485 network does not typically support Broadcast. However, using a PLC message command with the Destination Data Table Address containing a File Address of 0 in the write commands specified in sections 1.3.1 and 1.3.2 above will generate a Modbus Broadcast command to all Modbus Slave stations. The DL3500-DH-485 will not get an "ACK" response to a Broadcast command from any Modbus slave device.

NOTE: THIS IS NOT SUPPORTED FOR SECTION 1.2.4.3
THE PLC5 TYPED COMMANDS USING NYXZ:Z DECODE OPTION

1.3 DH-485 MESSAGE COMMAND

To read and write to slave devices on Modbus it is necessary to program DH-485 message instructions in one (or more) active PLCs on the DH-485 network. You can use either PLC-3, PLC-5 Word Range Read / Write or PLC-5 Typed Read / Write communication commands.

```
MESSAGE INSTRUCTION DATA ENTRY FOR CONTROL BLOCK N99 : 0

Communication Command                    PLC-5 Typed Read / Write
                                         (or  PLC-3 Word Range Read / Write)
PLC-5 Data Table Address:                N 100 : 000
Size in Elements:                        100
Local/Remote:                            LOCAL
    Remote Station:                      N/A
    Link ID:                             N/A
    Remote Link Type:                    N/A
Local Node Address:                      01
Destination Data Table Address:          N 1 : 1
```

Entering either a "PLC-5 Typed Read" or "PLC-3 Word Range Read" in the "Communication Command" block of the message instruction to the DL3500-DH-485 Modbus Master and an "N" as the Destination Data Table Address File type character will cause a Modbus function code of "03" to be generated if the message command is sent to the DH-485 station address of a DL3500-DH-485 set to Modbus Master mode. Entering a "PLC-5 Typed Write" or "PLC-3 Word Range Write" Master and an "N" as the Destination Data Table Address File type character will cause the DL3500-DH-485 to generate a Modbus function code of "16".

Enter the starting address of the A-B File : Word(s) to be used for read or write in the "PLC-5 Data Table Address" block of the DH-485 message instruction. Enter the number of words or registers to be transmitted in the "Size in Elements" field of the message function block. Enter the DH-485 station address configured in the DL3500-DH-485 in the "Local Node Address" field.

The Modbus command, Modbus slave station address and Modbus start address are entered in the "Destination Data Table" field. See above sections on the decoding of the DDTA.

Check that the Modbus Slave Station address and Modbus Registers required can be entered into the specific PLC's Destination Data Table Address field using PLC programming software.

1.3.1 A-B SLC TO MODBUS EXAMPLE

Devices such as SLC's can initiate PLC-5 Typed Read and Write commands to the DL3500-DH-485 over the DH-485. The Dl3500 then issues an appropriate Modbus read or write command to read or write the data to a Slave device on a Modbus Network.

For example a SLC initiates a PLC-5 Type Read command using an N File type in the DDTA - this is translated to a Modbus Read Holding Register command (03). This command reads data from the Modbus Slave 4xxxx register address (es) specified in the DDTA and writes it to the file / word(s) specified in the PLC-5 Data Table Address. Conversely a PLC-5 Type Write command generates a Modbus Pre-set Multiple Holding Registers command (16) which reads data from the SLC file / word(s) specified and writes it to a Modbus Slave station's 4xxxx register(s).

Modbus Slave Address	Modbus Command Code	Modbus Command Description	Modbus Address Range
1-99	03	Read Holding Register	40001 - 49999
1-99	16	Pre-set Multiple Holding Registers	40001 - 49999
0	16	Broadcast Pre-set Mult Hldg Regs	

1.3.1.1 DH-485 TO MODBUS HOLDING REGISTERS (4X) EXAMPLES

Using NXYY:Z (Section 1.2.4.1)

PLC-5 DH-485 MESSAGE INSTRUCTION   **MODBUS NETWORK MESSAGES GENERATED**

COMMN CMD	SIZE IN ELEMENTS	DESTN DT ADDR FILE:WORD	SLAVE ADDR	FUNCTION CODE	REG ADDR START	REG ADDR END
WRITE	1	N 401 : 1	1	16	40001	40001
READ	10	N 410 : 100	10	03	40100	40109
WRITE	100	N 490 : 9800	90	16	49800	49899
WRITE	20	N 0 : 200	0	16	40200	40219

1.4   COMMUNICATIONS SEQUENCE

The DL3500-DH-485 receives message commands from a PLC over its DH-485 port, converts them to the appropriate Modbus message and sends them out on its serial port. The Modbus Slave response is received, translated into an appropriate DH-485 response and then returned to the originating PLC.

Modbus Master/Slave protocol does not permit multiple messages on the Modbus network. The DL3500 processes one message at a time out of its Modbus port, although it can handle multiple requests from PLC's on the DH-485 network, the programmer should ensure a response is received before initiating another request. The DL3500 unit will respond to the DH-485 interface with appropriate error messages in the event of detectable errors on Modbus such as timeouts.

1.5   MODBUS MESSAGE DATA LENGTH CONSIDERATIONS

The following shows the maximum number of holding registers that can be sent or received in a single Modbus message when using the DL3500 gateway. The limits are because of the different structure of Modbus and A-B DH-485 protocols, and also due to the internal memory structure of the DL3500.
- Up to 100 Modbus Holding Registers can be read in a single transaction
- Up to 100 Modbus Holding Registers can be written in a single transaction

1.6   MODBUS MASTER USING BM85 MODBUS PLUS / MODBUS BRIDGE MUX

The DL3500-DH-485 Modbus Master will also communicate with Modicon PLCs and other devices on Modbus Plus when connected to one of the four Modbus ports of a NW-BM85-000 Modbus Plus/Modbus Network Bridge Mux (see DL3500 users guide for cable drawings).

If PLCs and other stations on DH-485 are required to initiate communications with one or more Modicon PLCs on Modbus Plus then the BM85's Bridge Mux port connecting it to the DL3500-DH-485 must be configured in **Slave mode**.

The serial communications parameters for the Bridge Mux Modbus port interface to the DL3500-DH-485 must be the same as those set in the DL3500.

1.7   DH-485 AND MODBUS - GENERAL

Each addressed slave station must be a unique address on Modbus and the DL3500-DH-485 must be the only Master Station on the Modbus network. Any station on the DH-485 network can be a "Master" that can address any Modbus Slave Station from 1 - 255. This means that effectively the Modbus network can have multiple A-B PLC Modbus Masters with the DL3500 acting as a traffic cop.

Modbus (Slave) station address numbers may be the same as DH-485 station address numbers provided that all Slave Station addresses are unique on Modbus, and all DH-485 network addresses are unique on the DH-485 network.

2.0   MODBUS MASTER NETWORK APPLICATIONS

2.0.1   MASTER TO MODBUS SLAVE NETWORK

MODBUS SLAVE NETWORK

```
+-------------+        +-------------+        +-------------+   MODBUS
|  Modicon    |        |   Modbus    |        |   DL3500    |   MASTER
|   PLC       |        |   Slave     |        |   Master    |
|  Addr 03    |        |  Addr 05    |        |             |
+-------------+        +-------------+        +-------------+
                                                  DH-485
                                                  STN  01
```

DH-485

```
+-------------+        +-------------+        +-------------+
|   A-B       |        |    PC       |        |   A-B       |
|  SLC-5/03   |        |    HMI      |        |  SLC-5/03   |
|   Stn 3     |        |   Stn 4     |        |   Stn 5     |
+-------------+        +-------------+        +-------------+
```
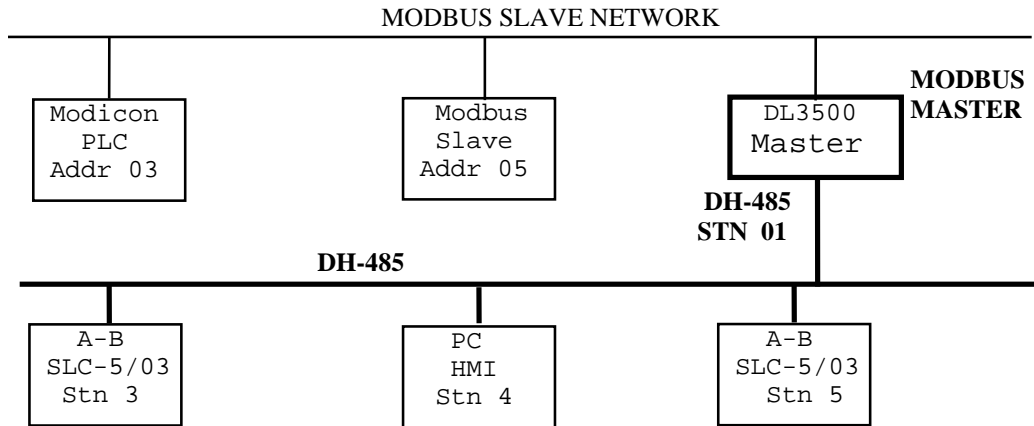
NOTE:

PLC5s, SLC5/03s and HMIs on the A-B DH-485 network can be programmed to communicate with any Slave device on the Modbus Slave network. Modbus and DH-485 addresses can be the same.
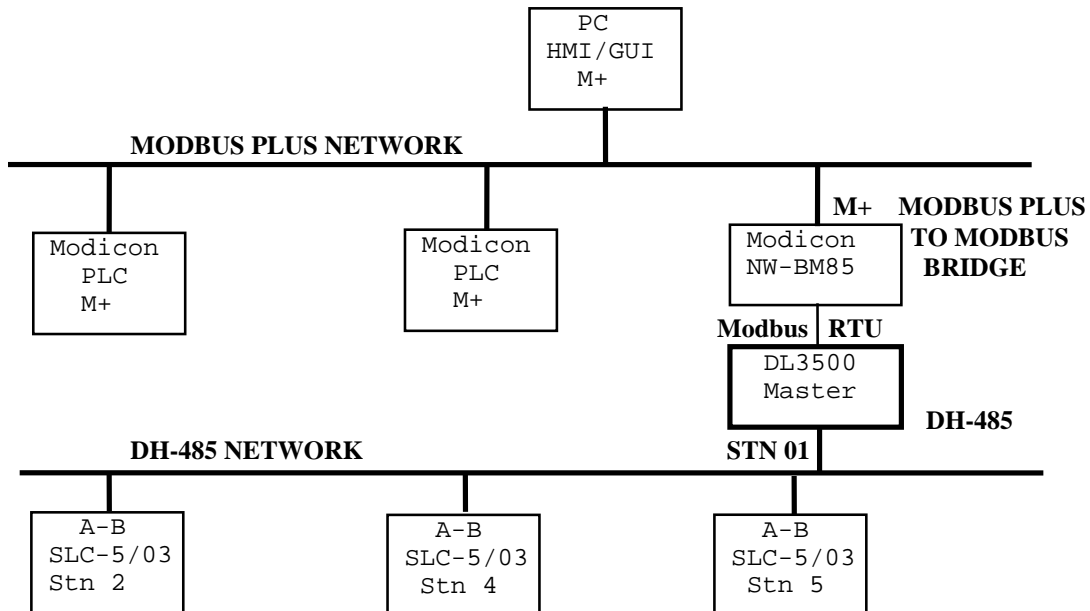
2.0.2   MASTER TO MODBUS PLUS VIA BM85 MODBUS BRIDGE

```
                        +-------------+
                        |    PC       |
                        |  HMI/GUI    |
                        |    M+       |
                        +-------------+
```

MODBUS PLUS NETWORK

```
+-------------+        +-------------+        +-------------+   M+   MODBUS PLUS
|  Modicon    |        |  Modicon    |        |  Modicon    |        TO MODBUS
|   PLC       |        |   PLC       |        |  NW-BM85    |        BRIDGE
|   M+        |        |   M+        |        |             |
+-------------+        +-------------+        +-------------+
                                              Modbus | RTU
                                              +-------------+
                                              |   DL3500    |
                                              |   Master    |   DH-485
                                              +-------------+
```

DH-485 NETWORK   **STN 01**

```
+-------------+        +-------------+        +-------------+
|   A-B       |        |    A-B      |        |   A-B       |
|  SLC-5/03   |        |  SLC-5/03   |        |  SLC-5/03   |
|   Stn 2     |        |   Stn 4     |        |   Stn 5     |
+-------------+        +-------------+        +-------------+
```

NOTE:

PLC5s, SLC5/03s and HMIs on the DH-485 network can be programmed to communicate with any station on the Modbus Plus network