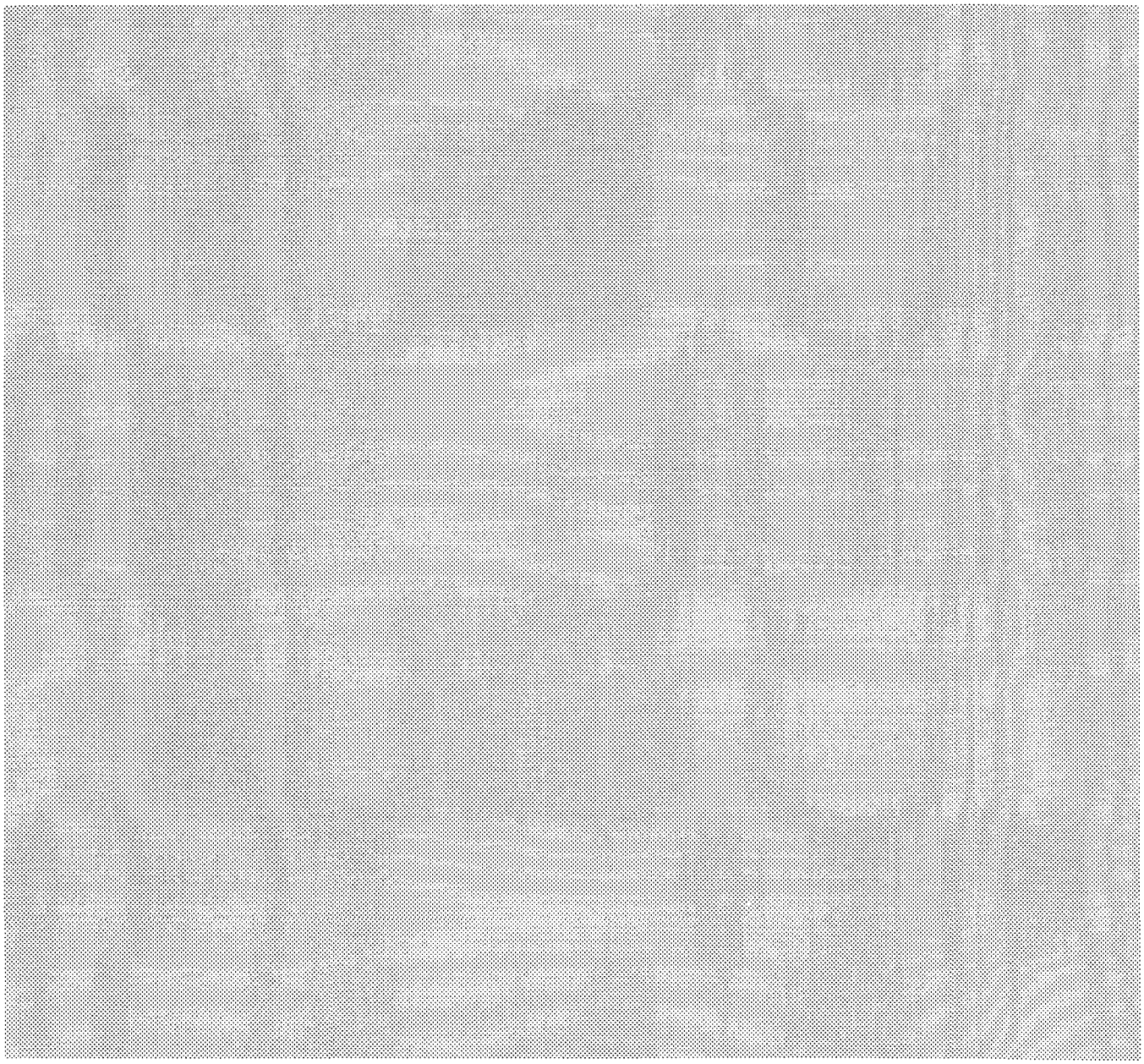
MagneTek

GPD 503 - ASCII
Serial Communications



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1 — INTRODUCTION

This manual describes the set-up and protocol for the ASCII Communication Kit, Model No. DS001. The kit provides a general purpose Serial Communication Board Interface option (hereinafter called the SCB) which allows for communication between a GPD 503 and a computer/device which generates ASCII string communications.

Each GPD 503 requiring this ASCII serial communication must have its own DS001 kit installed. Serial communication includes READ, WRITE, DIAGNOSTICS, and OPERATION STATUS commands. Operation and Frequency commands can be sent to multiple drives simultaneously via the BROADCAST feature of this option. This kit supports RS-232, RS-422, and RS-485 connectivity. Communication BAUD rates up to 19.2K are achievable.

Application programming **is not provided** with this kit. A sample QuickBasic program has been included in Appendix 2 of this manual to aid the user in establishing the proper protocol between the computer device and the GPD 503 drive.

If, however, MagneTek's optional DOS Software Interface program (Model No. DS002) was purchased, the user should refer instead to Section 9 of this manual for appropriate operation.

Complete understanding of GPD 503 programming and operation is required before attempting serial communication operation. A full discussion of GPD 503 programming and operation is covered in the GPD 503 technical manual TM 4231.

The serial communication kit consists of:

- PC board which mounts at option connector 2CN inside the GPD 503 drive.
- One set of EPROMs for installation on the GPD 503's Control PCB (required to support serial communication).

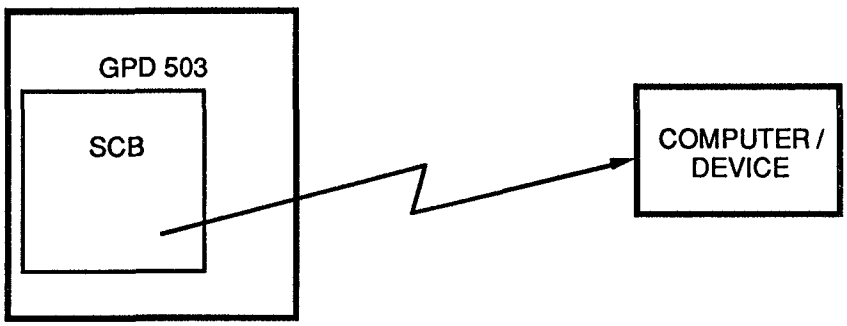


Figure 1. ASCII Communication Setup

Simple Start-up Steps

The following is a brief overview of how the information in this manual should be used for installation and start-up of this kit to enable serial communications operation.

		Reference
Step 1.	Remove AC input power to drive.	—
Step 2.	Install kit hardware and connect as required. (Drive EPROMs, Interface Board, wiring)	Section 3
Step 3.	Set DIPSWs on Interface Board for desired operation.	Section 4
Step 4.	Replace the drive cover.	—
Step 5.	Apply power to the drive.	—
Step 6.	If EPROM's were replaced, perform Sn-03 drive Reset sequence.	See GPD 503 technical manual TM 4231
Step 7.	Set constants related to serial communication.	Section 5
Communication with the host computer/device is now possible.		Sections 6 thru 9

2 — SPECIFICATIONS

1 SCB option interface PC board allowing high performance serial communication capabilities. The setting of the SCB PC EPROM U4 (NST600110 SCB) provides RS-232, RS422, or RS485 communications. The following communication method can be selected by DIPSW:

- Baud Rate: 2400 / 4800 / 9600 / 19200 bps selectable.
- Data Bit: 7-bit / 8-bit selectable.
- Parity: Parity provided / not provided, even / odd parity selectable.
- Stop Bit: 1 / 2 bit selectable.

Available read/write data:

- Operation command, frequency reference, fault contents, drive internal status,
- Un-01 to 08 monitoring, An-XX, bn-XX, Cn-XX, Sn-XX.

DP-RAM self-diagnosis function provided (checking at power supply ON). Communication section self-diagnosis (hereinafter call loop test) provided. Actual conduct is dependent upon DIPSW setting.

Typical use of the three communication schemes are as follows:

- RS-232 - Point-to-point communication 50' max.
- RS-422 - Point-to-point communication 4000' max.
- RS-485 - Multidrop (multiple devices) communication 4000' max (total cable length)

2 GPD 503 EPROMs. If drive EPROMs U5 and U6, are respectively part numbered NSG615145H and NSG615145L, or lower, replace them with those provided in this kit.

(U5): NSG615285H
(U6): NSG615285L

Otherwise, leave the existing EPROMs in the drive.

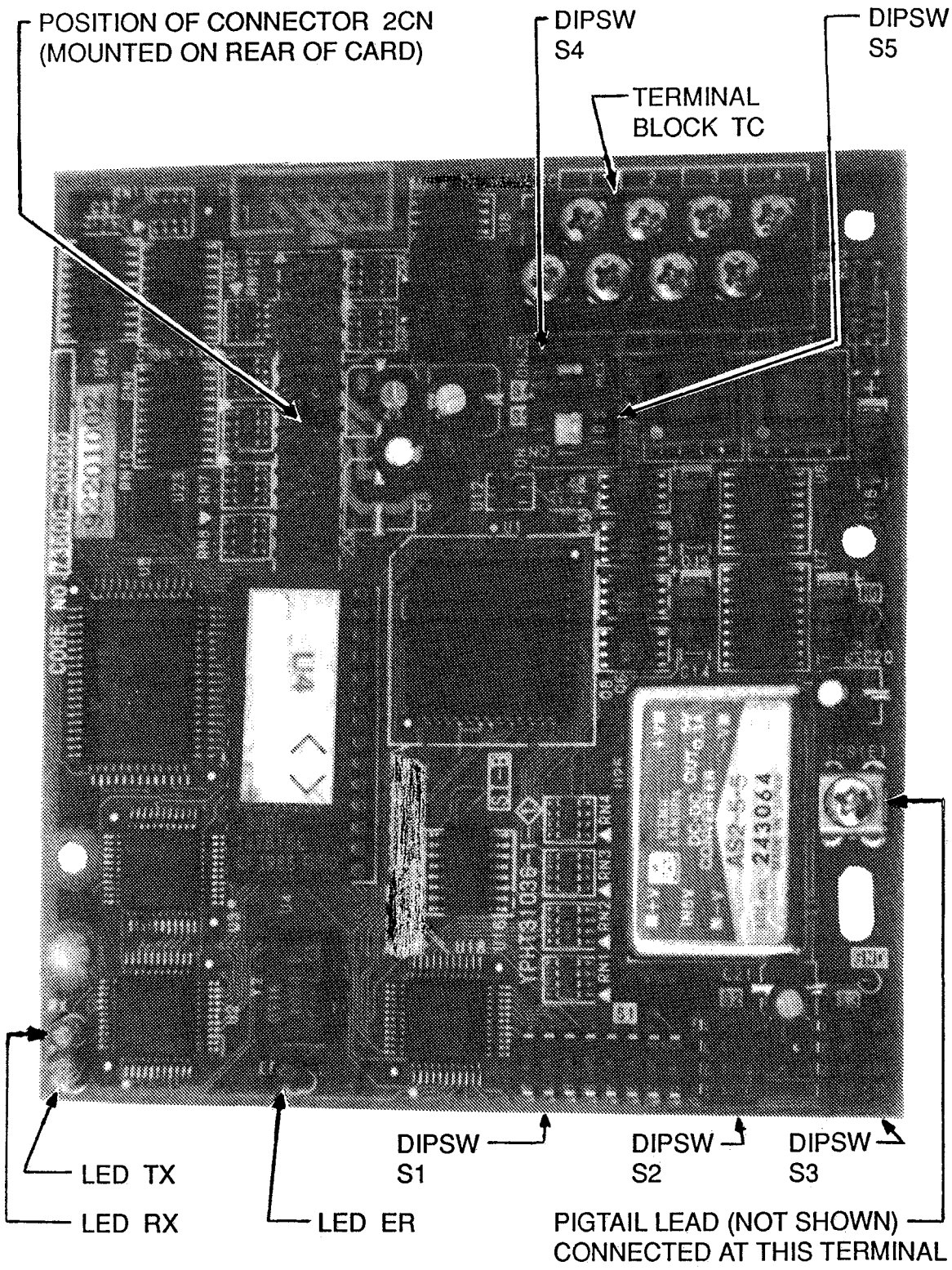


Figure 2. SCB Serial Communications Interface Card
(shown larger than actual size)

3 — INSTALLATION

Installation of GPD 503 EPROMs and SCB Card

CAUTION: Ensure that input power to the GPD 503 is turned off, and the CHARGE lamp inside unit is off, before installing EPROMs and SCB PC board.

Step 1. Remove front cover from GPD 503 chassis.

If drive EPROMs U5 and U6, are respectively part numbered NSG615145H and NSG615145L, or lower, replace them with those provided in this kit. Otherwise, leave the existing EPROMs in the drive and proceed directly to Step 3.

Step 2. Carefully remove existing EPROM U5 from the Control PCB; install kit EPROM U5 in its place. Carefully remove existing EPROM U6 from the Control PCB; install kit EPROM U6 in its place. When installing Control PCB EPROMs, ensure that the notch is oriented to the left, and that all pins of the EPROM fit properly and are firmly seated.

IMPORTANT: After replacing EPROMs, a Sn-03 Reset sequence must be performed.

Step 3. Installation of SCB Card. Orient the SCB card as shown in Figure 2. Position connector 2CN (on the back side of the card) to mate with matching connector 2CN on the Control PCB, also aligning the three holes on the right side of the SCB with the tips of plastic standoffs present on the Control PCB. Press carefully until firmly seated.

Due to its physical size, once the SCB Card is installed, options which must be mounted at connector 3CN cannot be used.

Route the green pigtail lead from the SCB to the lower left corner of the Control PCB. Pull the connector end of the existing pigtail lead off male pin "E" on the Control PCB. Fit the ring lug of the SCB pigtail lead over the pin, and press the GPD 503 Control PCB pigtail connector back into place.

Data Link System

- CONTROL PROCEDURE: Asynchronous System
- COMMUNICATION SPEED: DIPSW selected bps (up to 19.2K)
- NUMBER OF GPD 503s: Maximum 31
- TRANSMISSION DISTANCE:
  RS-232 - 50' max.
  Point-to-point communication

  RS-422 - 4000' max.
  Point-to-point communication

  RS-485 - 4000' max total cable length
  Multidrop (multiple devices) communication

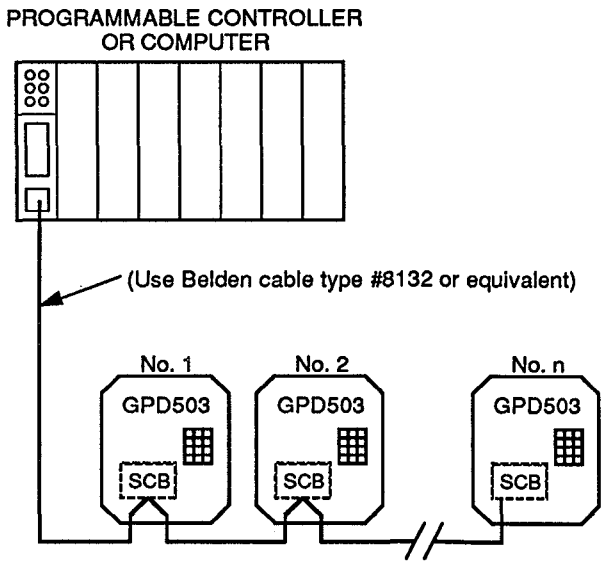
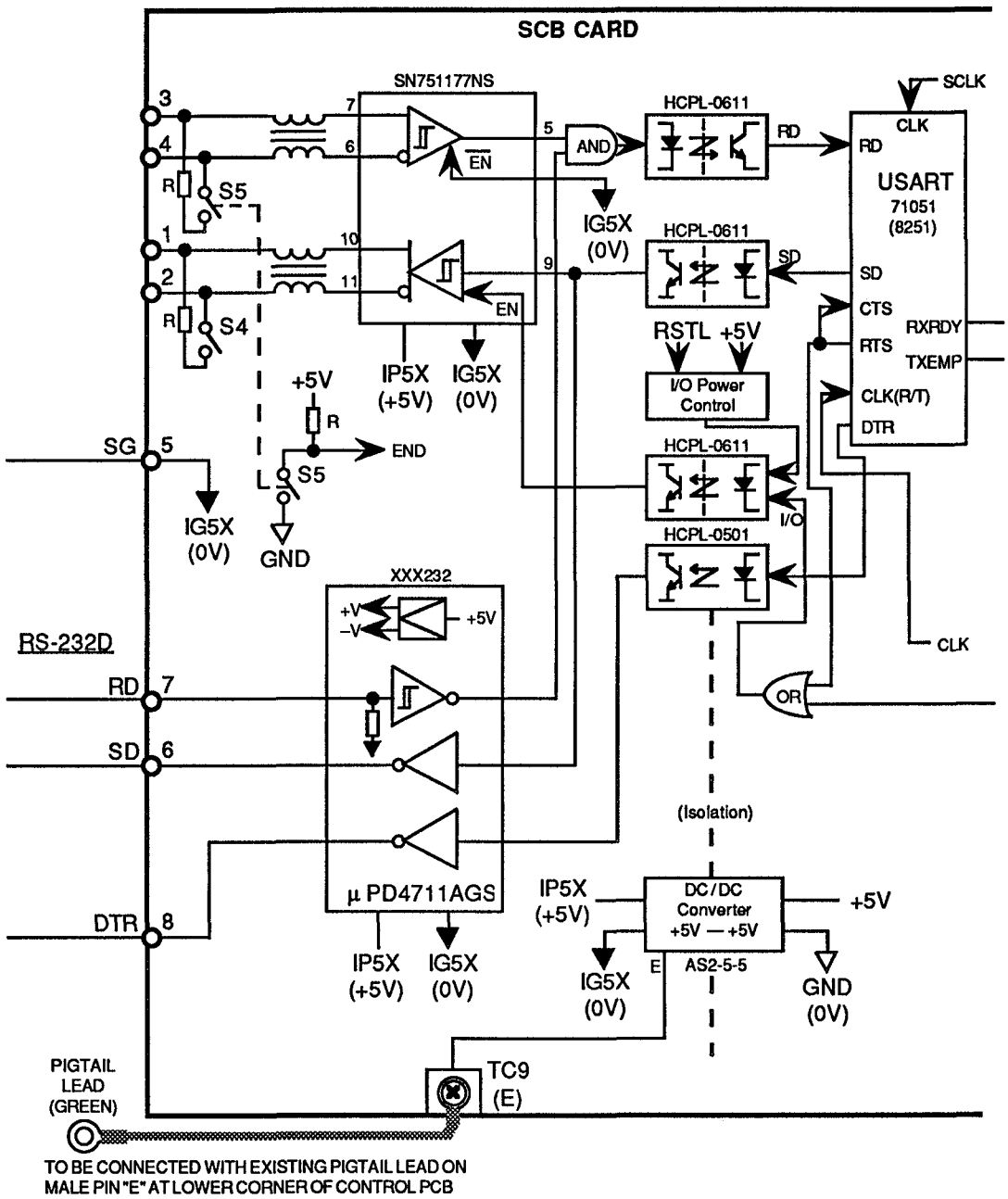


Figure 3. Serial Communication Data Link

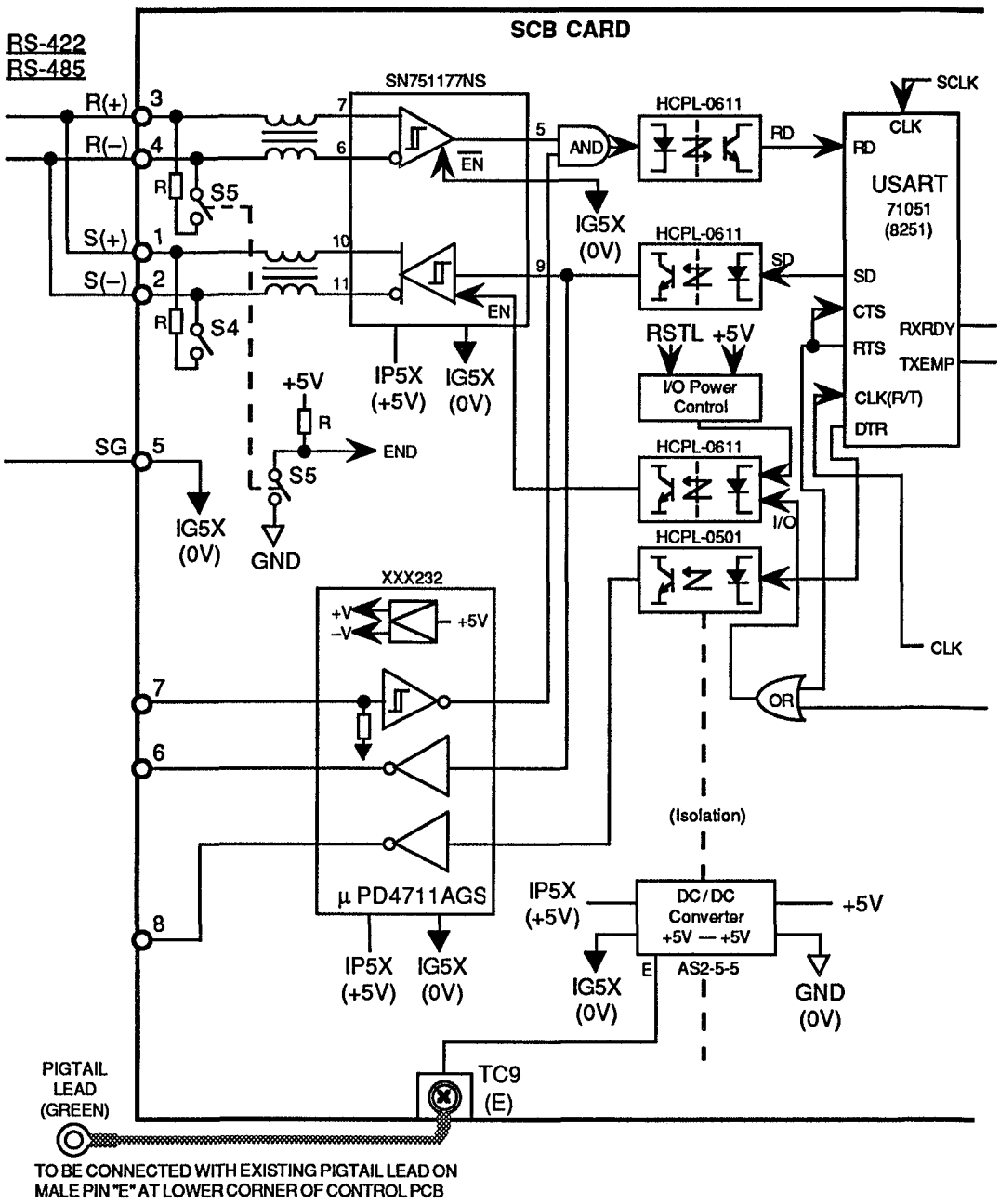
Serial Communication Connections

Refer to Figure 4 or Figure 5. Complete the required wiring connections to terminals of the SCB for the type of serial communication that will be used.



NOTE: O INDICATES TERMINAL OF TERMINAL BLOCK TC.

Figure 4. RS-232D Serial Communication Connections to SCB Card



NOTE: O INDICATES TERMINAL OF TERMINAL BLOCK TC.

Figure 5. RS-422 / RS-485 Serial Communication Connections to SCB Card

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4 — SCB COMMUNICATION SET-UP

SCB set-up is accomplished via five DIP switches (DIPSW) and drive constants Sn-04 & Sn-08. All SCB DIPSW settings should be made with AC power off.

DIPSW S1

Only switches S1-6 and -7 can be changed while power is applied to the GPD 503.

Table 1

S1 SWITCH	DESCRIPTION
1	Binary Coded Decimal (BCD) representation of Drive Address (See Table 2)
2	
3	
4	
5	
6	OFF: Loop test stop (1) ON: Loop test start. (1)
7	OFF: Communication error contents hold (2) ON: Communication error contents reset
8	OFF: Fault data automatic transmission not provided (3) ON: Fault data automatic transmission provided

NOTES:

(1) When S1-6 is set to "ON" while the drive is powered up, the loop test (55 (Hex), AA (Hex), B1 (Hex) read/write) is conducted with the ER LED blinking. If the loop test is not successful, the ER LED lights steady. To determine the cause of loop test fault, examine the binary transmission error contents stored in the data code 70 (Hex) (see Table 3); this data is reset to all zeros when 1S-7 is set to "ON", or when the fault reset command is received.

(2) When S1-7 notch is "OFF", the transmission error data is held in the drive. When S1-7 is set to "ON", the transmission error data (contents of data code 70 (Hex)) is cleared to all zeros.

(3) When S1-8 is "ON", the fault contents generated in the drive are automatically transmitted to the computer from the SCB.

Table 3

BIT	NAME	DESCRIPTION
0	BCC error	BCC fault of data sent from computer
1	Data length fault	EXT (03) cannot be received
2	Numerical error	Other than ASCII code received
3	Parity error	Parity error occurred
4	Overrun error	Overrun error occurred.
5	Frame error	Framing error occurred.
6	Time-out	Time-out detection time is 2 seconds during loop test Detection time during normal operation differs depending on communication speed
7 to 15	Not used	

Table 2

ADDRESS (DRIVE NO.)	S1 SWITCH 5	4	3	2	1
	BINARY VALUE				
	2^4 (= 16 when "ON")	2^3 (= 8 when "ON")	2^2 (= 4 when "ON")	2^1 (= 2 when "ON")	2^0 (= 1 when "ON")
(DO NOT USE)	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	0
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

0 = S1 switch is "OFF" 1 = S1 switch is "ON"

DIPSW S2

Individual switches of this DIPSW cannot be changed during operation.

Table 4

<table>
<tr><th>S2 SWITCH</th><th>DESCRIPTION</th></tr>
<tr><td>1 - 2</td><td>Communication Speed Setting
<table>
<tr><th>1</th><th>2</th><th>Baud Rate (bps)</th><th>Time-out Detection Time</th></tr>
<tr><td>OFF</td><td>OFF</td><td>2400</td><td>10 seconds</td></tr>
<tr><td>ON</td><td>OFF</td><td>4800</td><td>5 seconds</td></tr>
<tr><td>OFF</td><td>ON</td><td>9600</td><td>2.5 seconds</td></tr>
<tr><td>ON</td><td>ON</td><td>19200</td><td>2.5 seconds</td></tr>
</table></td></tr>
<tr><td>3</td><td>OFF: 2-wire connection (RTS control provided; RS422, RS485)
ON: 4-wire connection (RTS control not provided; RS232D)</td></tr>
<tr><td>4</td><td>OFF: Transmission time-out detection enabled. (1)
ON: Transmission time-out detection not enabled.</td></tr>
</table>

NOTES:
(1) If the SCB does not receive a data transmission for a period of time equal to the Time-out Detection Time, a communication error will occur.

DIPSW S3

Individual switches of this DIPSW cannot be changed during operation.

Table 5

S3 SWITCH	DESCRIPTION
1	OFF Stop-bit = 2 bits. ON Stop-bit = 1 bit.
2	OFF Parity check provided. ON Parity check not provided.
3	OFF Even parity. ON Odd parity.
4	OFF Data = 8 bits. ON Data = 7 bits.

DIPSW S4, S5

Both switches (see SCB circuit detail in Figure 5) are active when RS-422 or RS-485 communication is used. Set both switches to "OFF" position on ALL BUT THE LAST drive when multiple drives are connected. Set both switches to the "ON" position on the last drive.

When RS-232D communication is desired, these switches are not used. Therefore, both switches should remain in the "OFF" position, as shown in Figure 4.

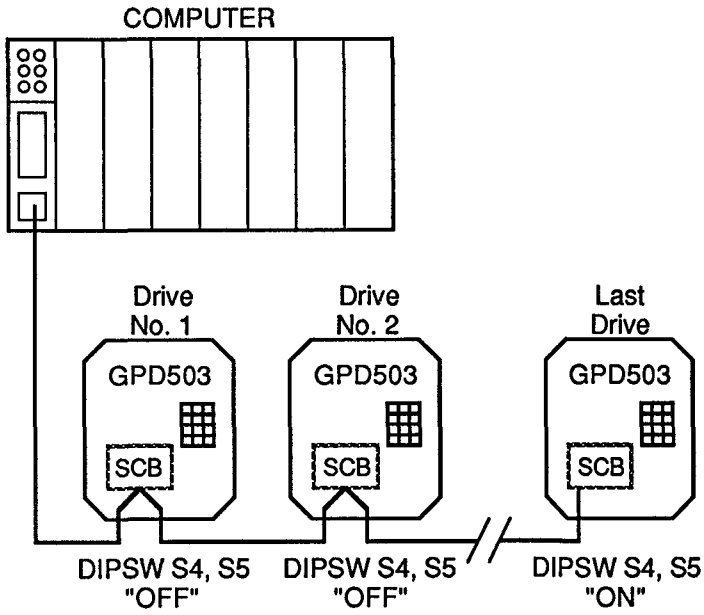

Figure 6. RS-422 or RS-485 DIPSW Setting

Operating Functions

Table 6

ITEM	MODE		
	Via Comm. Link	Drive Terminals	Digital Operator
Run command	Programmable (1)	Programmable (1)	Programmable (1)
Frequency reference	Programmable (2)	Programmable (2)	Programmable (2)
Monitor	Y	N/A	Y
Data write-in	(3)	N/A	Y
Data read-out	Y	Y	Y
Multifunction sequence function	Y	Y	Y
External fault (emergency fault)	Y	Y	Y
Inverter fault reset	Programmable (1)	Programmable (1)	Programmable (1)
Inverter initialization	(3)	Y	Y
Stop	Y	Y	Y

NOTES
(1) (Y)=Yes, (N)=No can be selected for run command by GPD 503 Sn-08 setting.
(2) (Y)=Yes, (N)=No can be selected for frequency reference by GPD 503 Sn-08 setting.
(3) Data cannot be written in while the GPD 503 is receiving a run command.
For frequency reference (data link system) and reference setting constants An-01 to An-09, data can be written or the settings can be changed while the GPD 503 is running.
For application constants bn-01 to bn-12, writing or changing a setting is possible while the GPD 503 is running per the Sn-03 setting.

If a comm link fault occurs, operation from the computer is not possible and the GPD 503 operates according to Sn-08 setting (process selection after communication error.)

5 — SETTING OF CONSTANTS

Selection of Operation Command and Frequency Reference Source

The speed frequency reference is determined by the 1st digit of Sn-04 and Sn-08.

The source of drive operation command is determined by the 2nd digit of Sn-04 and Sn-08.

Change constants Sn-04 and Sn-08 only when the GPD 503 is in a stopped condition.

Sn-03 2-Wire Reset of 1110 :	Sn-04 = 0011 Sn-08 = 0100
Sn-03 3-Wire Reset of 1111 :	Sn-04 = 0011 Sn-08 = 0100

These default settings select operation and frequency control from serial communication option.

- **Select frequency reference source**

Sn-04 1st digit=1: An-01 is to be main speed reference.
Sn-04 1st digit=0: Analog frequency reference input from external terminal 13 (0-10 Vdc) or 14 (4-20 mA) is to be main speed reference.
Sn-08 1st digit=0: Frequency reference received from the computer is to be main speed reference. Digital Operator REMOTE REF LED lights. Sn-04 1st digit setting does not matter.
Sn-08 1st digit=1: Digital Operator frequency reference ("F" display) is to be main speed reference. Sn-04 setting determines if the reference comes from the Digital Operator or analog reference.

- **Initializing communication (wait process performed by GPD 503)**

Whenever power is applied to the GPD 503 after installation of the ASCII Communication Kit, the installed EPROMs will initialize, recognize the presence of the SCB, and prepare the drive for serial communication. This is indicated by the blinking ***"CALL"*** display on the Digital Operator while the drive is waiting for the computer/device to establish communication. When correct communication is established, "***CALL***" is no longer displayed, and the GPD 503 drive Operation Ready bit is changed to 1.

- **Select source of drive operation command (START/STOP, FWD/REV, etc.)**

Sn-04 2nd digit=0: Drive operation command input from the external terminals.
Sn-04 2nd digit=1: Drive operation command input from the Digital Operator.
Sn-08 2nd digit=0: Drive operation command received from the computer. Digital Operator REMOTE SEQ LED lights. Sn-04 2nd digit setting does not matter.
Sn-08 2nd digit=1: Drive operation command from the GPD 503, according to Sn-04 2nd digit).

Table 7

Functions Available by Communication Link / Computer	MODE		
	Computer Sn-08 2nd digit=0 Sn-04 2nd digit=X (3)	External Terminal Sn-08 2nd digit=1 Sn-04 2nd digit=0	Digital Operator Sn-08 2nd digit=1 Sn-04 2nd digit=1
Operation command source	Y	N	N
Fault reset	Y	Y	Y
Operation status monitoring	Y	Y	Y
Change (write) (1)	Y (1)	Y (1)	Y (1)
Read Constant	Y	Y	Y
Multifunction input	Effective (2)	Effective	Effective

NOTES:
(1) Sn-XX and Cn-XX constants cannot be written to from the drive Digital Operator or from the computer while the GPD 503 is running.
(2) Logic "OR" of command input from external terminals 3 to 8 and command input from computer. (See "Write Data • Operation Command" in Section 6.)
(3) X=Setting does not matter.

Communication Error Detection

Drive reaction to a communication error is determined by the 3rd and 4th digits of Sn-08.

Sn-08 = 00XX: "***bUS***" is displayed on the Digital Operator, the fault contact closes, and the motor decelerates to a stop per bn-02 deceleration time.

Sn-08 = 01XX: "***bUS***" is displayed on the Digital Operator, the fault contact closes, and the motor coasts to stop.

Sn-08 = 10XX: "***bUS***" is displayed on the Digital Operator, the fault contact closes, and the motor decelerates to stop per bn-04 deceleration time.

Sn-08 = 11XX: "***bUS***" is displayed (blinking) on the Digital Operator. The fault contact does not close, and the drive continues to run at its last state.

NOTES:

1. If a communication error occurs, data code 69 (Hex) (GPD 503 status) bit 15 becomes 1. The contents of the communication error is held in data code 70 (Hex) until S1-7 is set to "ON", or until a fault reset command is received.
2. If the time interval between data transmissions exceeds the Time-out Detection Time, the SCB changes the BUS ERROR signal to HIGH, indicating a communication error has occurred. The Time-out Detection Time of time-over depends upon the communication speed selected by DIPSW S2 (see description of DIPSW S2 in Section 4).

If the drive is programmed for operation commands or speed reference from the serial communication link, and the BUS ERROR signal is HIGH for 0.1 second or more, the drive processes the communication error according to the setting of the 3rd and 4th digits of Sn-08.

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Operation from Computer

1. With input power OFF, install kit EPROMs and the SCB in the GPD 503 .
2. Set the GPD 503 station address and communication method via the SCB DIPSWs.
3. Connect communication cable between the computer and SCB terminal block TC.
4. Apply power to the GPD 503.
5. Perform Sn-03 drive Reset sequence (see technical manual Tm 4231).
6. Set the operation mode (1st and 2nd digits of Sn-04 and Sn-08) and drive response to a communication error (Sn-08 3rd and 4th digits).

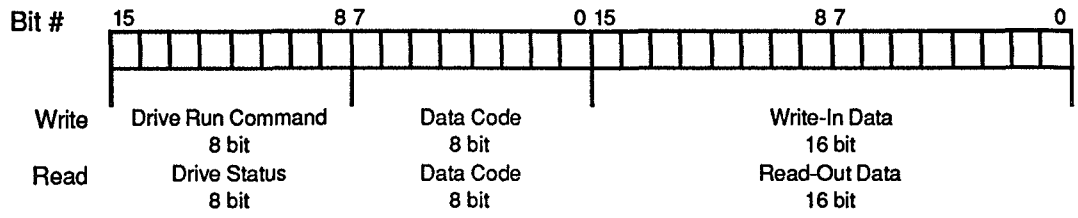
- **Message Format**

Message Format (example) [—ADDRESS 8BIT—] [—DATA—] [—BCC—]

To determine [—BCC—] see "How to Determine BCC" in Section 6.

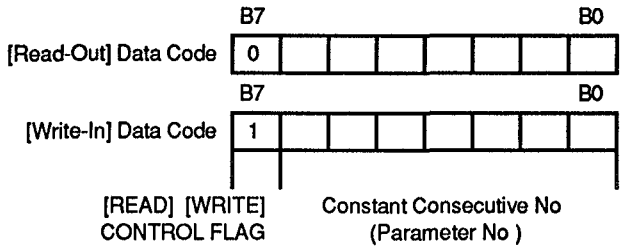
- **Data Section of Message**

32 Bit Configuration:

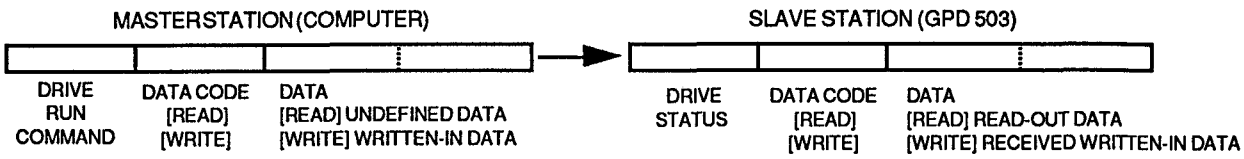


- **Data Code - [8 bits]**

Data codes set all constants of Sn-XX, Cn-XX, An-XX, bn-XX and Un-XX with consecutive numbers 0 – 127 (00 – 7F (Hex)) and indicate data (read-out) or (write-in) mode by the MSB (most significant bit).



- **Data Code Communication Method Between Primary and Secondary Stations (Cyclic Transmission)**



The Data code which is returned from the GPD 503 is the same as the data code specified by the computer during read/write operations.

Data transmission is completed when the data code received from the GPD 503 is the same as the data code written by the the computer.

6 — COMMUNICATION PROCEDURES

Communication Protocol Format

In this section:

(Computer → GPD 503) indicates a "WRITE" operation (computer "WRITES"/sends data to GPD 503).

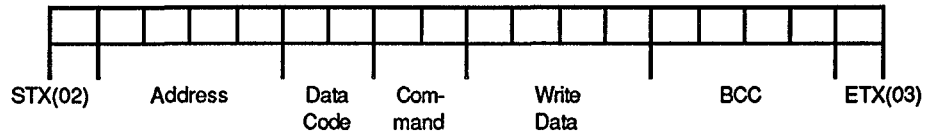
(Computer ← GPD 503) indicates a "READ" operation (computer "READS"/receives data from GPD 503).

Write Data

- **Communication Format**

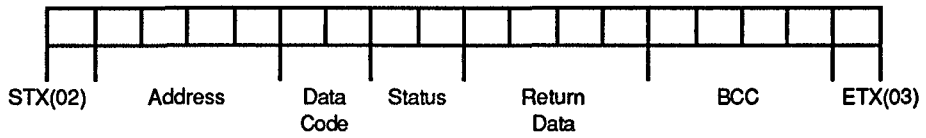
NOTE: Refer to Appendix for description of data codes.

(Computer → GPD 503)



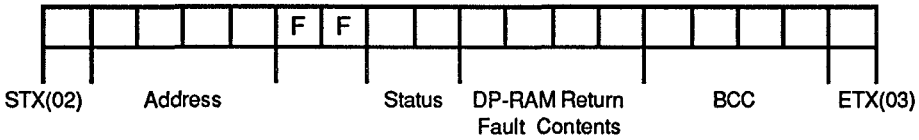
Condition 1 – Successful communication

GPD 503 returns following data (Computer ← GPD 503)



Condition 2 – Unsuccessful communication

SCB DP-RAM returns following data (Computer ← GPD 503)



If a communication error occurs during a write command operation, no information is returned by the GPD 503. See "Communication Error Detection" in Section 5 for additional information.

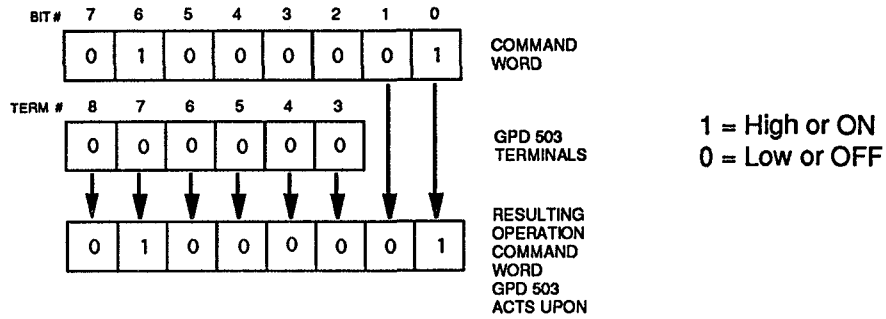
The computer must issue an ENTER command (data code = FDH) before the GPD 503 will act upon any programming or command change.

- **Operation Command**

BIT	DESCRIPTION	
0	1: Run (RUN), 0: Stop (STOP)	
1	1: Reverse run (REV), 0: Forward run (FWD)	
2	External Fault (Eb)	Drive output shut-off, fault contact closes.
3	Fault Reset (RESET)	Initiate fault reset sequence
4	Multifunction Reference 1	(initial setting: multi-step speed reference 1) Sn-15 determines function
5	Multifunction Reference 2	(initial setting: multi-step speed reference 2) Sn-16 determines function
6	Multifunction Reference 3	(initial setting jogging command) Sn-17 determines function
7	Multifunction Reference 4	(initial setting: external BB) Sn-18 determines function

NOTE: The GPD 503 will act on a command which is the result of command word bits 0 thru 7 above written by the computer logically OR'ed with the status of drive terminals 3 thru 8.

EXAMPLE: Internal Logical OR Operation



Command word explanation:
Drive Run
Multifunction Ref 3

DRIVE TERMINAL	INPUT CONTROL SIGNAL FUNCTION	
	2-WIRE CONTROL	3-WIRE CONTROL
3	External Fault	External Fault
4	Fault Reset	Fault Reset
5	Auto / Manual Select	FWD / REV Select
6	Multi-Step Frequency Select	Auto / MAnual Select
7	Jog Speed	Multi-Step Frequency Select
8	Coast Stop (External Base Block)	Jog Speed

- **Status**

BIT	DESCRIPTION	
0	1 Run (RUN), 0: Stop (STOP)	
1	1 Reverse run (REV), 0 Forward run (FWD)	
2	1: Drive operation ready (1)	
3	Fault	
4	1. Data setting error (2)	
5	Multifunction Output Setting	(initial setting running) by Sn-20 setting
6	Multifunction Output Setting	(initial setting zero-speed) by Sn-21 setting
7	Multifunction Output Setting	(initial setting: frequency coincidence) by Sn-22 setting

NOTES:

(1) BIT 2: Drive Operation Ready.

- BIT 2 = 0
  - (a) When the GPD 503 is placed in the PROGRAM mode via the Digital Operator, or
  - (b) If the GPD 503 is in the stopped condition and the computer issues a WRITE command for the Cn-XX or Sn-XX constants, thus entering PROGRAM mode.

  Programming of An-XX or bn-XX constants during running is permitted, and WILL NOT reset BIT.
- BIT 2 = 1 indicates that the GPD 503 is ready for operation.
  - (a) When the GPD 503 is returned to the DRIVE mode via the Digital Operator, or
  - (b) When the computer issues an ENTER command (required for the GPD 503 to act upon ANY programming change).

(2) BIT 4: Data setting error.

BIT 4 = 1 when data link status (Drive Return data code [69]) BITS 1 to 5 become 1 (communication error).

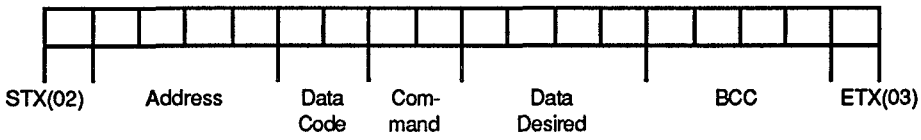
- **Contents of DP-RAM write fault**

If a DP-RAM write fault occurs, the GPD 503 changes the data code to FF (Hex) and sends the contents of DP-RAM write error to the computer. The contents of this DP-RAM write fault is the same as data code 69, Data Link Status. For details, refer to "Data Link Status Monitor".

Read Data (computer instructs drive to return requested data)

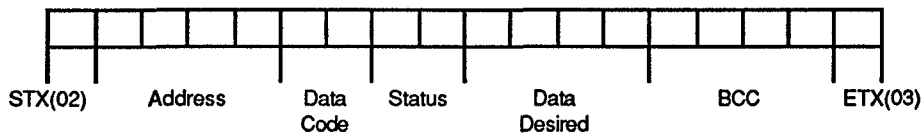
- **Communication Format**

(Computer → GPD 503)



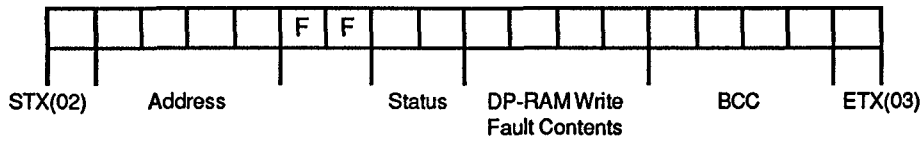
Condition 1 – Successful Communication

Data to be returned after normal completion (Computer ← GPD 503)



Condition 2 – Unsuccessful Communication

Data to be returned at DP-RAM write fault (Computer ← GPD 503)

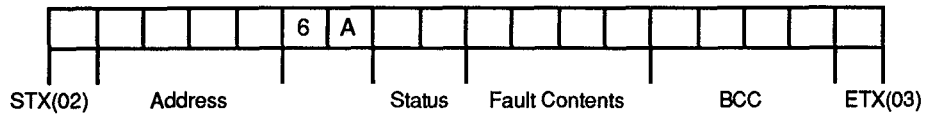


NOTE: The contents of an operation command, status, or DP-RAM write fault is the same as a data write situation.

Automatic Fault Sending Process

When DIPSW S1-7 is set to "ON", the contents of a fault is automatically sent from the GPD 503 to the computer.

When a fault occurs (Computer ← GPD 503)



Example of Read/Write Data and How to Determine BCC

(Computer ← GPD 503)

Address	01
Data Code	E5
Status	A5
Return Data	1234

(Computer → GPD 503)

Address	01
Data Code	E5
Operation Code	01
Write Data	1234

Read/write data items other than STX and ETX are sent in order after being converted to ASCII. The order of read/write data is from top to bottom and left to right, and all data is in hexadecimal format (base 16).

(Computer ← GPD 503)

STX	02			
Address	31	30	30	30
Data code and status	35	41	35	45
Return data	34	33	32	31
BCC	30	39	37	46
ETX	03			

(Computer → GPD 503)

STX	02			
Address	31	30	30	30
Data code and command	31	30	35	45
Write data	34	33	32	31
BCC	34	33	37	46
ETX	03			

BCC is sent by converting exclusive OR obtained by binary data to ASCII

Address	0	0	0	1
Data code and status	E	5	A	5
Return data	1	2	3	4
BCC	F	7	9	0

Address	0	0	0	1
Data code and command	E	5	0	1
Write data	1	2	3	4
BCC	F	7	3	4

- **Exclusive OR Function (Determination of BCC)**

The exclusive OR is a binary summation. A digit in the binary sum will be a 1 if ONLY ONE of the values being added has a 1 for that digit; otherwise, the digit in the sum will be a 0.

For Write Operation:

Address :	(HEX) = 0 0 0 1 ;	(binary) =	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 1
Data code & command :	(HEX) = E 5 0 1 ;	(binary) =	1 1 1 0	0 1 0 1	0 0 0 0	0 0 0 1
Write data :	(HEX) = 1 2 3 4 ;	(binary) =	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0
BCC		(binary) =	1 1 1 1	0 1 1 1	0 0 1 1	0 1 0 0
		(HEX) =	F	7	3	4

For Read Operation:

Address :	(HEX) = 0 0 0 1 ;	(binary) =	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 1
Data code & status :	(HEX) = E 5 A 5 ;	(binary) =	1 1 1 0	0 1 0 1	1 0 1 0	0 1 0 1
Return data :	(HEX) = 1 2 3 4 ;	(binary) =	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0
BCC		(binary) =	1 1 1 1	0 1 1 1	1 0 0 1	0 0 0 0
		(HEX) =	F	7	9	0

Table 8

BINARY TO HEX CONVERSION	
BINARY	HEX
0 0 0 0	0
0 0 0 1	1
0 0 1 0	2
0 0 1 1	3
0 1 0 0	4
0 1 0 1	5
0 1 1 0	6
0 1 1 1	7
1 0 0 0	8
1 0 0 1	9
1 0 1 0	A
1 0 1 1	B *
1 1 0 0	C
1 1 0 1	D **
1 1 1 0	E
1 1 1 1	F

* Appears as " ***b*** " on Digital Operator.

** Appears as " ***d*** " on Digital Operator.

Write to a Constant

The following describes the procedures when An-XX, bn-XX, Cn-xx or Sn-XX, constants are written from the computer to the GPD 503.

An-XX, bn-XX: Setting possible during drive running.
Sn-XX, Cn-XX: Setting possible during stop condition.

1. Write to a constant.

   (When the returned data code from the drive is FF, it indicates that the write operation was **not** successful.)

2. Write the ENTER command (data code = FD (Hex)) to the drive.

3. Read communication link status (data code = 69 (Hex)) and check that the data is all zeros.

NOTE: After Cn-XX or Sn-XX is written to the drive, the GPD 503 Operation Ready signal becomes zero. Drive operation cannot be performed unless the drive receives the ENTER command and the communication link status of data code location 69 (Hex) is zero.

EXAMPLE: Figure 7 illustrates the procedure to change the setting of Cn-01.

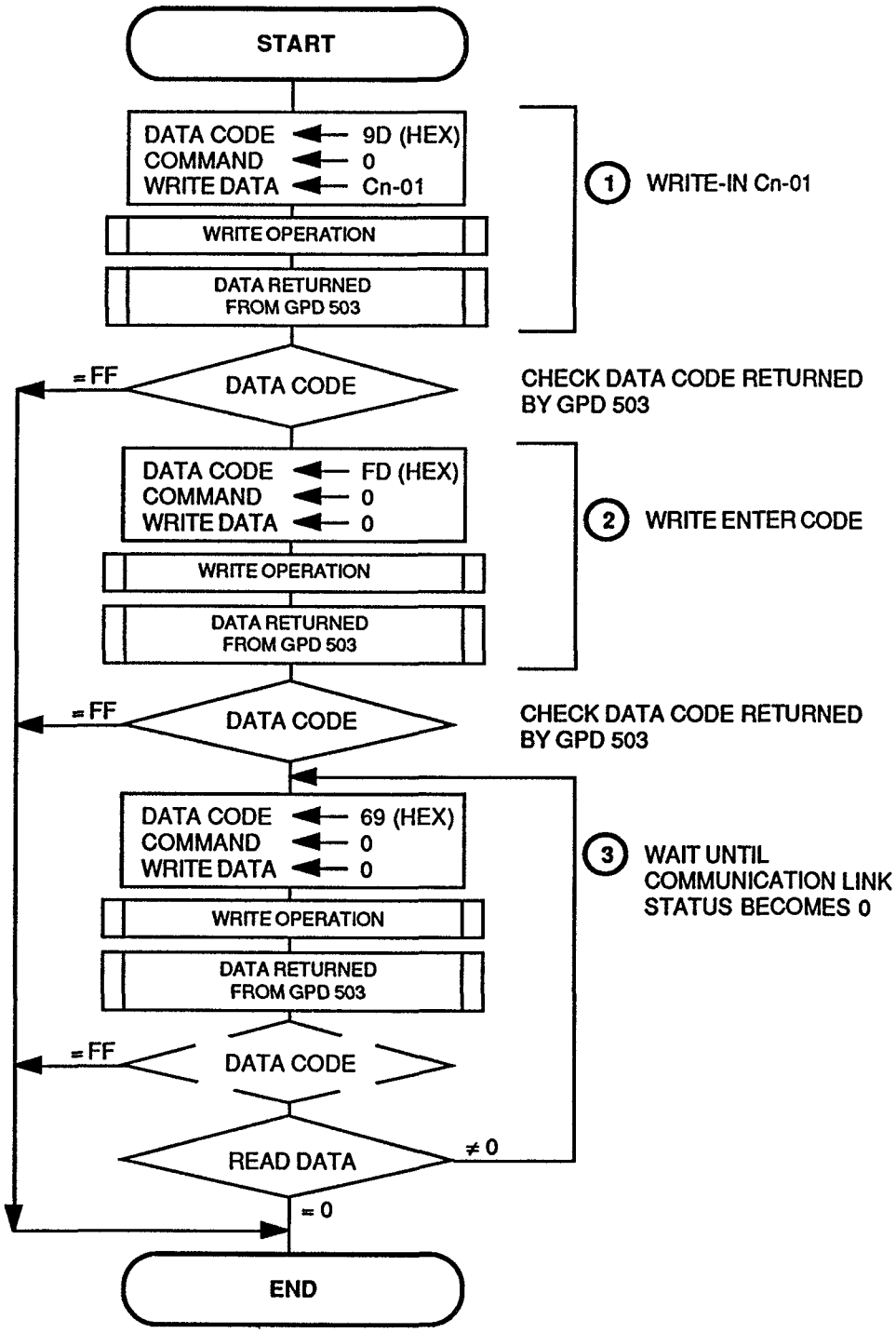
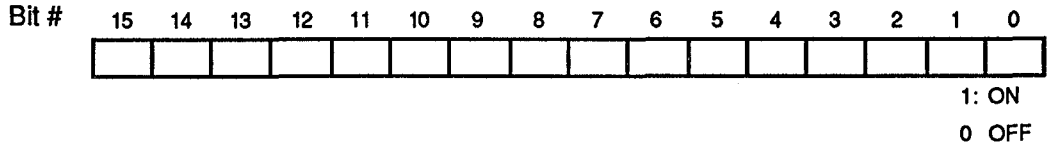


Figure 7. Operation For Writing to Cn-01

Drive Status Monitor (GPD 503 → Computer)

Data Code		Data			
Read (HEX)	Write (HEX)	Data Name	Data Range	Data Range (HEX Conversion)	Byte
67	–	GPD 503 STATUS	16-bit data	0000-____	2

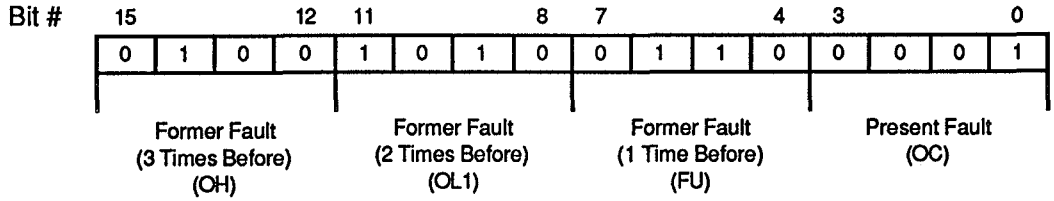


Bit No.	FUNCTION	CONTENTS
0	Running	1: Running
1	Zero speed	1: Zero speed
2	Frequency coincidence	1: Frequency ref – Cn-22 ≤ output frequency ≤ frequency ref + Cn-22.
3	Desired frequency coincidence	1. Frequency coincidence and Cn-21 – Cn-22 ≤ output frequency ≤ Cn-21 – Cn-22
4	Frequency detection 1	1: Output frequency ≤ Cn-21
5	Frequency detection 2	1: Output frequency ≥ Cn-21
6	Drive operation ready	1: Drive operation ready
7	Undervoltage detecting	1: Undervoltage detecting
8	Output shutting off	1: Drive output baseblocking
9	Frequency reference mode	0: Running by optional frequency ref (when option provided) 1: Running by drive run command
10	Operation command mode	0: Running by optional run command (when option provided) 1: Running by Drive run command
11	Overtorque detection	1: Overtorque detection
12	Frequency reference missing	1: Frequency reference missing
13	Braking resistor fault	1: Braking resistor overheating or braking transistor fault
14	Fault	1: Fault (excluding CPF00, CPF01)
15	Reserved	0:

Fault Contents Monitor (GPD 503 → Computer)

Data Code		Data			
Read (HEX)	Write (HEX)	Data Name	Data Range	Data Range (HEX Conversion)	Byte
68	–	FAULT CONTENTS	16-bit data (4 bit x 4)	0000-____	2

1. Typical Fault History Data Format



2. Fault Contents

Data	Contents
0000	No Fault
0001	Overcurrent (OC)
0010	Overvoltage (OV)
0011	Drive overload (OL2)
0100	Drive overheat (OH)
0101	— Reserved —
0110	Fuse blown (FU)
0111	Braking transistor fault, resistor overheat

Data	Contents
1000	External fault (EFx)
1001	Control circuit fault (CPFxx)
1010	Motor overload (OL1)
1011	— Reserved —
1100	Power loss (including momentary power loss) (UV)
1101	— Reserved —
1110	— Reserved —
1111	— Reserved —

Drive Run Command (Computer → GPD 503)

EXAMPLE:
Forward Run Command

Bit #	15	14	13	12	11	10	9	8
	0	0	0	0	0	0	0	0

8 – 1: Run (RUN); 0: Stop (STOP)
9 – 1: Reverse run (REV); 0: Forward run (FWD)
10 – External fault (EB) Drive output OFF, fault contact close
11 – Fault reset (RESET)
12 – Multifunction input 1 (initial setting : multi-step speed ref. 1) Set by Sn-15.
13 – Multifunction input 2 (initial setting : multi-step speed ref. 2) Set by Sn-16.
14 – Multifunction input 3 (initial setting : jogging ref.) Set by Sn-17.
15 – Multifunction input 4 (initial setting : external baseblock) Set by Sn-18.

Whether bit 8 (RUN/STOP), 9 (REV/FWD) or 11 (RESET) command is effective, is determined by the setting of Sn-08 (run mode selection 5).

Bit 10 (EB) results from logical OR operation of command set by communication link and GPD 503 external reference input.

Bits 12-D15 (multifunction inputs 1-4) function is the result of the logical OR operation of communication link command and GPD 503 external terminals 5 to 8 multifunction contact reference input.

Drive Status (GPD 503 → Computer)

EXAMPLE:
Forward Running

Bit #	15	14	13	12	11	10	9	8
	0	0	0	0	0	0	1	0

8 – 1: Run (RUN); 0: Stop (STOP)
9 – 1: Reverse run (REV); 0: Forward run (FWD)
10 – 1: GPD 503 Operation Ready : GPD 503 not ready (1)
11 – Fault
12 – 1: Data error (2)
13 – Multifunction output setting (initial setting : Running) Set by Sn-20.
14 – Multifunction output setting (initial setting : Zero-speed) Set by Sn-21.
15 – Multifunction output setting (initial setting : Frequency coincidence) Set by Sn-22.

NOTES:

(1) Bit 10

- Bit 10 = 0. A "Not Ready" condition exists when a system constant (Sn-XX) or control constant (Cn-XX) write command is received via the communication link while the GPD 503 is in PROGRAM mode set by the Digital Operator, or the GPD 503 has stopped and the PROGRAM mode is entered.
- Bit 10 = 1. An "Operation Ready" condition exists when the drive is placed in the DRIVE mode by the Digital Operator, or when the PROGRAM mode is completed via communication link. "Operation Ready" signal is maintained regardless of reference setting constant (An-XX) or application constant (bn-XX) setting. (DRIVE mode)

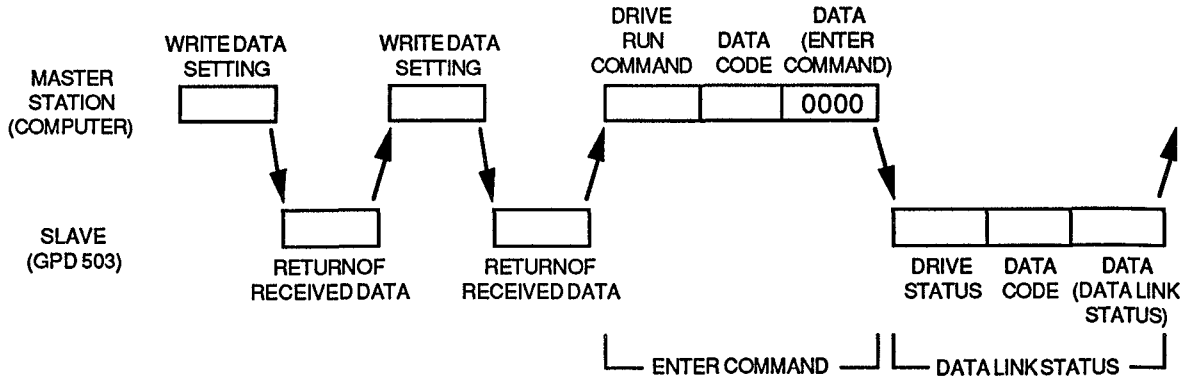
(2) Bit12 - Data Error - Read data code [69] : "Data Error" Bit 12 = 1 when data link status bits 1-6 = 1, indicating that a comm link error has occurred.

Enter Command : ENTER (Computer → GPD 503)

"ENTER COMMAND" data is added at the end of the data string, when the GPD 503 constants of An–XX, bn–XX, Cn–XX, or Sn–XX are set or changed by the computer write process.

Data Code		Data			
Read (HEX)	Write (HEX)	Data Name	Data Range	Data Range (HEX Conversion)	Byte
–	FD	ENTER COMMAND	0	0000	2

Bit #	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

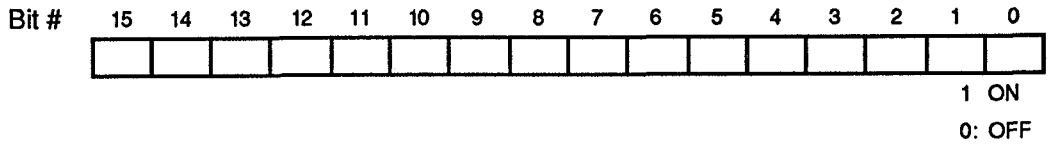


Data Link Status Monitor (GPD 503 → Computer)

Response to a data error occurrence during a write operation.

0: Data Write Processing. When the next constant write operation (An-XX, bn-XX, Cn-XX, or Sn-XX write data code) occurs, bit 0 = 1, and the data shown below is sent back to the computer.

Data Code		Data			
Read (HEX)	Write (HEX)	Data Name	Data Range	Data Range (HEX Conversion)	Byte
69	–	DATA LINK STATUS	16-bit data	0000-____	2



Bit No.	ITEM	ERROR CONTENTS
0	Data write processing	Receiving data processing
1	Write mode error	Write-in data code other than specified has been received during drive running.
2	Data code error	Data code which is not registered has been received.
3	Setting range error A (Upper/lower limit fault)	Write data other than setting range have been received.
4	Setting range error B (Suitability fault)	Write data which cannot obtain suitability have been received. (V/f setting, etc.)
5	NV-RAM write-in error	NV-RAM write-in fault (BCC error)
6	Enter command not received	If the enter command is not received within 5 seconds of the constant write data code, Bit 6 = 1.
7	BCC ERROR	BCC error of DP-RAM
8	Time-out	Time-out of DP-RAM access
9	— Reserved —	0:
10	— Reserved —	0:
11	— Reserved —	0:
12	— Reserved —	0:
13	— Reserved —	0:
14	— Reserved —	0:
15	— Reserved —	0:

Data Link Status Monitor (Continued)

1: Write Mode Error. When the system constant (Sn-XX) or control constant (Cn-XX) write data code occurs while the GPD 503 is running, the data shown is sent back to the computer.

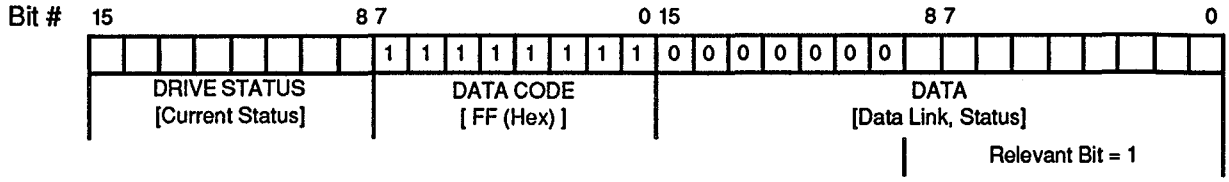
2: Data Code Error. When a data code that is not registered is received, the data shown is sent back to the computer.

3: Setting Range Error A (Upper/lower Limit Fault). When the constant data set from the sequencer is not within the specified setting range, the data shown is sent back to the sequencer.

4: Setting Range Error B (Suitability Fault). When the suitability of the constant data sent from the computer and operator is not within specifications, the data shown is sent back to the computer. (kVA selection, V/f setting, carrier frequency setting, etc.)

5: NV-RAM Write Error. When a NV-RAM BCC referencing error occurs, the GPD 503 drive operation becomes disabled. Bit 10 will change from 1 to zero, indicating a "Drive Not Ready" condition.

6: Enter Command Not Received. If the enter command is not received within 5 seconds after the constant write data code is received, Bit 6 = 1. When the enter command is received in time, Bit 6 = zero.



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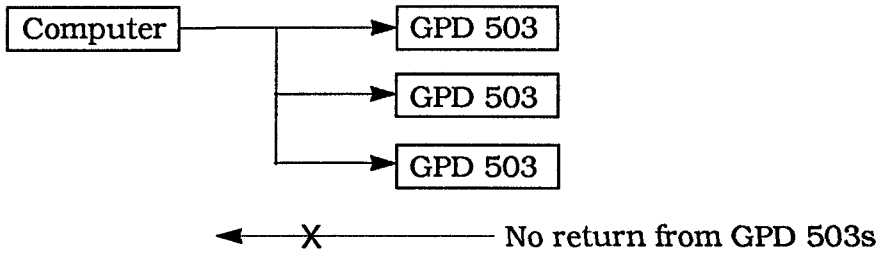
7 — BROADCAST CAPABILITY

The computer can write the same contents of the operation command or frequency reference to every connected GPD 503. This transmission method is called "BROADCASTING". As shown below, the computer sends data to each GPD 503 but they do not return the data for verification. Whenever in broadcast mode, DIPSW S2, switch 4, must be set to ON to avoid a communication time-out error.

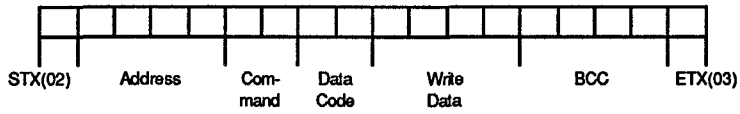


Write Data

Set the broadcast data address to "0000". The drive/SCB address set by DIPSW S1 does not change. Effective data in the broadcast mode consists **only** of the following data codes. If the computer sends any data other than E4, E5, or E6, an error will occur.

Data Code	Data Contents
E4	Only operation command is effective (data can be undefined)
E5	Frequency reference
E6	Frequency reference (auxiliary)

- **Broadcast mode data format (Computer → GPD 503s)**



Care must be taken to ensure that the broadcast data is not overwritten with different command data which would cause the broadcast data to be lost.

Since the GPD 503 has only one operation command receiving buffer, the LATEST DATA received becomes effective for the 8-bit operation command.

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8 — TROUBLESHOOTING

Alarm Displays

If any of the following alarm conditions occur, its contents are displayed on the Drive's Digital Operator for a minimum of 0.5 seconds. Drive operation continues, and the Fault contact will not change state. OPE is checked when the power supply is turned on and PRGM mode is changed to DRIVE mode.

DISPLAY	ITEM	DESCRIPTION
Uu blinks	Undervoltage being detected	Internal monitor of DC bus voltage indicates that input AC power is below the Undervoltage Detection level, while the GPD 503 is in the stopped condition.
ou blinks	Overvoltage during stopping	Internal monitor of DC bus voltage indicates that input AC power is excessively high, while the GPD 503 is in stopped condition.
oH2 blinks	External overheat	External temperature monitoring circuit(s) detected an overtemperature condition and produced an input signal.
oL3 blinks	Overtorque being detected	GPD 503 output torque exceeds the set Overtorque Detection level, and the GPD 503 is programmed for continued operation at overtorque detection.
EF blinks	FWD and REV command fault	FWD Run and REV Run commands are both closed for more than 500 ms Removing one command will allow drive operation.
bb blinks	During external base block	Base block command at multi-function terminal is active, shutting off GPD 503 output (motor coasting). Temporary condition, cleared when input command is removed.
EF3 blinks	Terminal 3 external fault being detected	A fault condition has occurred in the external circuit(s) monitored by the contact providing input to the indicated terminal. The terminal is programmed to allow continued operation after receiving fault input.
EF5 blinks	Terminal 5 external fault being detected	
EF6 blinks	Terminal 6 external fault being detected	
EF7 blinks	Terminal 7 external fault being detected	
EF8 blinks	Terminal 8 external fault being detected	
CAll blinks	Transmission ready	The GPD 503 (with SCB card installed) is powered up and ready to receive serial communication transmissions from the computer.
oPE01	kVA Constant setting fault	Sn-01 has been changed from correct factory setting.
oPE02	Constant setting range fault	An-XX, bn-XX, Cn-XX, or Sn-XX setting range fault.
oPE03	Sn-15 thru -18 setting fault	Sn-15 to -18 (multi-function input) set value fault.
oPE10	V/f constant setting fault	Cn-02 thru -08 (V/f data) setting fault.
oPE11	Carrier frequency setting fault	One of the following conditions was detected: • Cn-23 > 5 kHz and Cn-24 ≤ 5 kHz • Cn-25 > 6 and Cn-24 > Cn-23
Err	Constant write-in fault	Temporary display, in Program mode, indicating that constant setting was not written into EPROM memory.

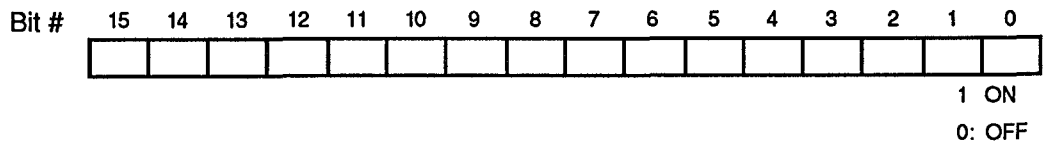
Fault Displays

If any of the following faults occur, its contents are displayed on the drive's Digital Operator, the fault contact closes, and the GPD 503 causes the motor to coast to a stop. When multiple faults occur simultaneously, the faults are displayed in the order of the table below.

DISPLAY	ITEM	DESCRIPTION
Uu1	Undervoltage (PUV)	Occurs 2 seconds after detection of low voltage. (See "Undervoltage" specification in GPD 503 technical manual, under "Protective Functions" in Appendix 2.
Uu2	Undervoltage (CUV)	Control circuit voltage levels drop below acceptable levels during operation.
Uu3	Underoltage (MC-ANS FAULT)	Main circuit magnetic contactor does not operate correctly.
oC	Overcurrent	GPD 503 output current exceeds 200% of GPD 503 rated current, or ground fault has occurred, with ground current exceeding 50% of GPD 503 rated current.
ou	Overvoltage	Detection level: Approx. 400V for 230V GPD 503; Approx. 800V for 460V GPD 503 (700V if Cn-01 < 400). Reset level: 385V.
FU	Fuse Blown	DC bus fuse has cleared. Check for short circuit in output, and check main circuit transistors.
oH	Heat Sink Over Heat	Fin temperature exceeds 90° C (194° F).
oL1	Motor Overload	Thermal motor overload protection (electronic overload) has tripped.
oL2	Drive Overload	GPD 503 overload protection has tripped. I2t of 112%; 150% at 60Hz max.
oL3	Overtorque Detection	GPD 503 output torque exceeds the set Overtorque Detection level, and GPD 503 is programmed for coast to stop at overtorque detection.
rr	Braking Transistor fault	Dynamic Braking transistor has failed.
rH	Braking Resistor fault	Dynamic Braking resistor unit has overheated.
EF3	External fault terminal 3	A fault condition has occurred in the external circuit(s) monitored by the contact providing input to the indicated terminal. GPD 503 is in the Stop mode.
EF5	External fault terminal 5	
EF6	External fault terminal 6	
EF7	External fault terminal 7	
EF8	External fault terminal 8	
CPF02	Base block circuit fault	GPD 503 failure.
CPF03	NV-RAM (S-RAM fault)	GPD 503 failure.
CPF04	NV-RAM (BCC or Code No. fault)	GPD 503 failure.
CPF05	A/D Converter fault in CPU	GPD 503 failure.
CPF06	Option connection fault	Improper installation or wiring of option card.

Fault Contents (GPD 503 → Computer)

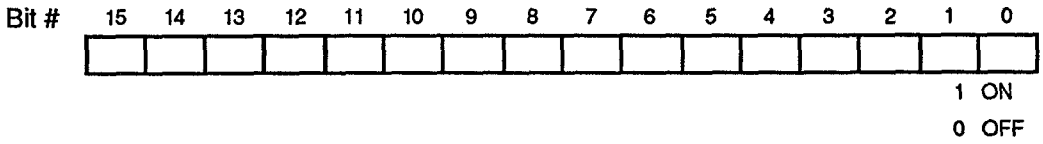
Data Code		Data			
Read (HEX)	Write (HEX)	Data Name	Data Range	Data Range (HEX Conversion)	Byte
6A	–	FAULT CONTENTS	16-bit data	0000-____	2



Bit No.	ITEM	ERROR CONTENTS
0	Overcurrent	Including grounding.
1	Overvoltage	Detection level: Approx. 400V for 230V GPD 503; Approx. 800V for 460V GPD 503 (700 if Cn-01 < 400). Reset level: 385V.
2	Drive Overload	GPD 503 output torque exceeds the set Overtorque Detection level, and GPD 503 is programmed for coast to stop at overtorque detection.
3	Drive Overheat	
4	— Reserved —	
5	Fuse Blown	DC bus fuse has cleared. Check for short circuit in output. Check main circuit transistors.
6	— Reserved —	
7	External Fault	
8	Hardware fault	
9	Motor Overload	Thermal motor overload protection (electronic overload) has tripped.
10	— Reserved —	
11	Braking Resistor or Braking Transistor Fault	Dynamic Braking Resistor or Transistor has overheated.
12	Power Loss	0:
13	— Reserved —	0:
14	— Reserved —	0:
15	— Reserved —	0:

Fault Data (GPD 503 → Computer)

Data Code		Data			
Read (HEX)	Write (HEX)	Data Name	Data Range	Data Range (HEX Conversion)	Byte
70	–	Transfer Error Contents	16-bit data	0000-____	2
71	–	DP-RAM Self-Diagnosis Fault Address	16-bit data	0000-____	2
72	–	DP-RAM Self-Diagnosis Fault Data (Lower 8 bit write-in data higher 8 bit read-out data)	16-bit data	0000-____	2
73	–	Status of DIPSW Bits 0- 7: Status of 1S Bits 8-11: Status of 2S Bits 12-15: Status of 3S	16-bit data	0000-____	2



Data Code = 70 Transfer Error Contents

Bit No.	ITEM	ERROR CONTENTS
0	BCC Error	BCC fault of data sent from PLC.
1	Data Length Fault	ETX (o3) cannot be received.
2	Numerical Error	Other than ASCII code received.
3	Parity Error	Parity error has occurred.
4	Overrun Error	Overrun error has occurred.
5	Frame Error	Frame error has occurred.
6	Time-out	Time-out error has occurred.
7	— Reserved —	
8	— Reserved —	
9	— Reserved —	
10	— Reserved —	
11	— Reserved —	
12	— Reserved —	
13	— Reserved —	
14	— Reserved —	
15	— Reserved —	

LEDs

The three LEDs on the SCB (see Figure 2) – not visible with the drive cover in place – provide status indication for the serial communication system, as listed in Table 9.

Table 9

LED	DESCRIPTION
ER	DURING NORMAL OPERATION: extinguished when normal data is received; lights when a communication error occurs. DURING LOOP TEST: blinks while loop test is running; lights steady when a communication error occurs.
TX	Blinks or lights steady during data transmission.
RX	Blinks or lights steady during data receiving.

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9 — DOS SOFTWARE INTERFACE (OPTIONAL COMPUTER SOFTWARE)

The DOS Software Interface program (hereinafter referred to as DSI) provides a convenient preprogrammed communication interface between a computer device and the GPD 503 drive.

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INTRODUCTION

General features of the DSI (DS002) software.

- This is a "stand alone" program specifically written for MS-DOS PC machines.
- This program is not a windows based program. It is an MS-DOS based program with "window-like" features.
- Clicking on the box icon in the upper left hand corner of an active window will escape out of that window.
- Click and drag on the upper double line portion of an active window will allow you to drag the open window within the screen.
- This program only supports PC control of GPD 503 AC drives when the drive has a MagneTek model #DS001 Serial Communication Interface Kit installed. Each drive must have a separately priced #DS001 kit installed in order to communicate to this program.
- This DS002 program does not support external I/O capability.
- Due to differences in PC capability and processor speeds of the various computers compatible with this program: Control and Update response may be reduced if more than five GPD 503 drives are connected.
- If "Real Time" control is desired, this program should NOT be used.
- PC must be dedicated for running this program.

DOS Software Interface; Model No. DS002. When used with the ASCII Communication Kit # DS001, this software package provides a ready to use IBM compatible user interface allowing the user to control up to 31 GPD 503 drives from one IBM compatible computer via RS485 communication. Each drive can be individually addressed or all connected drives can be addressed.

PC requirements for use with DOS Software Interface:

- XT, AT 286, 386, or 486 machine compatible.
- DOS version 2.10 or later.
- Minimum 640K RAM.
- One free serial port for drive communication link.
- Mouse or trackball is required. Two serial ports must be available.
- Any type of monitor (VGA color monitor is recommended).

This software provides the ability to READ or WRITE, operation commands (Start / Stop / Direction), monitor drive status, fault diagnostics, and setup parameters.

- GPD 503 must have DS001 Serial Communication Interface installed.
- Program has default configuration using COMM #2 PC communication port.

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REQUIRED MAGNETEK AC DRIVE INFORMATION

Any file to be downloaded to a MagneTek AC drive must be compatible with the AC drive; it must be for the correct model, EPROM # and control wiring configuration.

The model is easily obtained from the AC drive's front cover or nameplate.

The control wiring configuration (either 2-wire) or 3-wire) can be verified by consulting the AC drive's Technical Manual.

The EPROM # can be obtained by one of two methods:

- With the AC drive powered up, use the Digital Operator mode to examine the contents of constant Un-10.
- With the AC drive powered down, and its CHARGE lamp on, remove the AC drive's front cover and look for the number marked on the EPROM IC.

In most cases, when you run the DSI program, you will be performing serial communication procedures between the computer and a MagneTek AC drive. This requires that the Serial Communication Cable be in place between the computer and the drive.

PRELIMINARY SET-UP

IMPORTANT
Make cable connections *before* booting up the computer.

The cable supplied with the DS002 kit allows quick connection between a computer and one SCB serial communication card via RS-232 point-to-point communications. If RS-422 or RS-485 communications is desired, user must supply cable and hook up according to Section 3 of this manual.

One end has a 9-pin D-shell connector, the other has three spade lugs connected.

Reference to Figure 2 in this manual for the terminal locations on the SCB communication card.

Connect the BLACK wire to terminal #5 on the SCB card.
Connect the WHITE (CLEAR) wire to terminal #6 on SCB card.
Connect the RED wire to terminal #7 on SCB card.

(Be careful to look at the wire colors and not the lug insulator colors.)

If you wish to have the DSI program stored on your hard disk drive, you must perform the installation procedures on page 48.

INSTALLING THE DSI PROGRAM ON HARD DRIVE

1. After the computer is booted up, insert the appropriate (3.5" or 5.25") Program diskette into a floppy disk drive.
2. Activate the appropriate drive by typing its letter after the DOS prompt, followed by a colon, the pressing ENTER.
3. After the drive prompt appears, enter copy command to install program onto your hard drive. The file name is "DSI.exe"

STARTING THE DSI PROGRAM

The method of starting the DSI program depends on the type of drive being used.

- From hard disk drive:

1. At the DOS prompt, type the drive's letter, followed by a colon, then press ENTER.
2. The DSI program has the ability to run from either the COMM #1 port or the COMM #2 port.
   - To run program from the COMM #1 port: From the hard drive prompt, type "DSI 1", then press ENTER.
   - To run program from the COMM #2 port: From the hard drive prompt, type "DSI 2", then press ENTER.

- From a floppy disk drive:

1. After the computer is booted up, insert one of the provided Program diskettes into a compatible floppy disk drive.
2 Activate the appropriate floppy disk drive by typing its drive letter, followed by a colon, then press ENTER.
3. The DSI program has the ability to run from either the COMM #1 port or the COMM #2 port.
   - To run program from the COMM #1 port: From the DOS prompt, type "DSI 1", then press ENTER.
   - To run program from the COMM #2 port: From the DOS prompt, type "DSI 2", then press ENTER.

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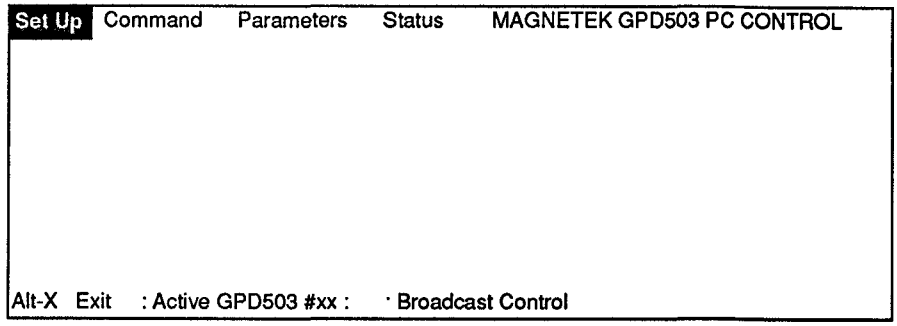
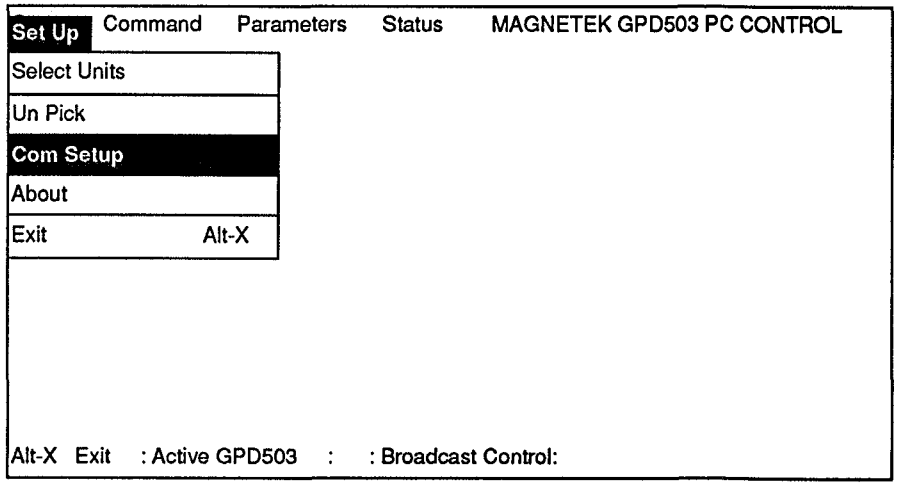
INITIAL MAIN MENU SCREEN

Shows Drive No. Program is commanding.
Program can Monitor drive other than active #.
Initially "xx" until "Select Units" is accomplished.

Atl-X or Exit
Returns to DOS Selection



Highlight desired selection then use mouse to click on desired selection.



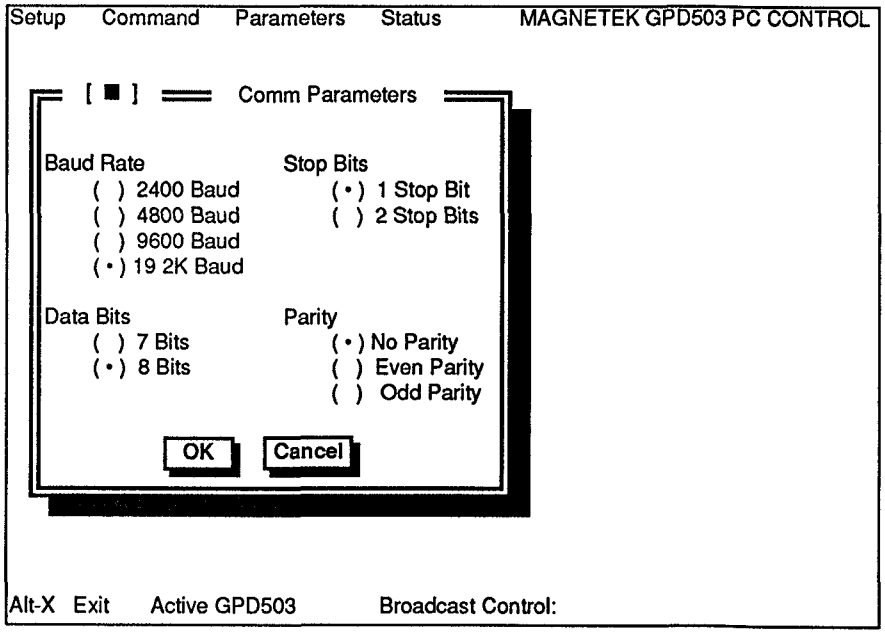
Allows user set up program for a variety of comm configurations.

Default communication setup is shown.

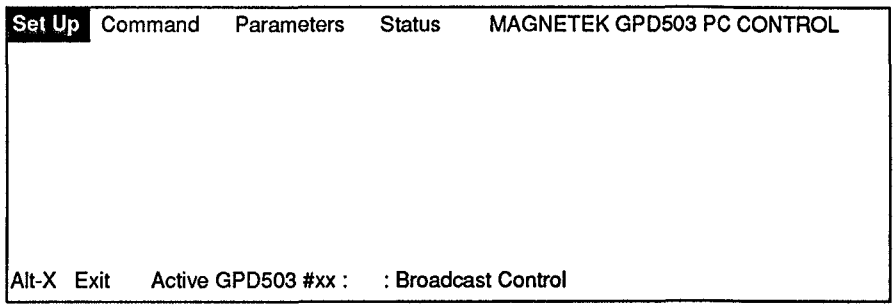
Note:
Serial Communication Board - (SCB - DOS) must be set up per this screen or communication will not occur! Comm port default is : Comm port #2.

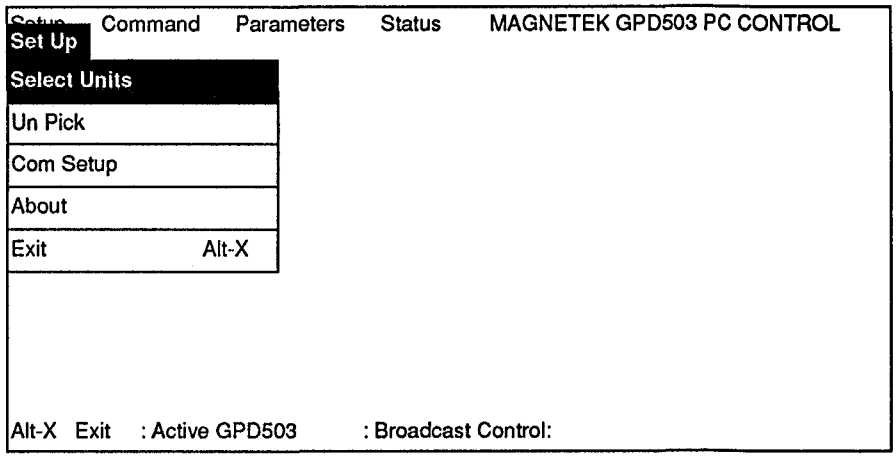
Click **OK** to confirm setup or change setup, then click **OK.**

Cancel To escape from screen without changing settings



Highlight desired selection then use mouse to click on desired funcction.



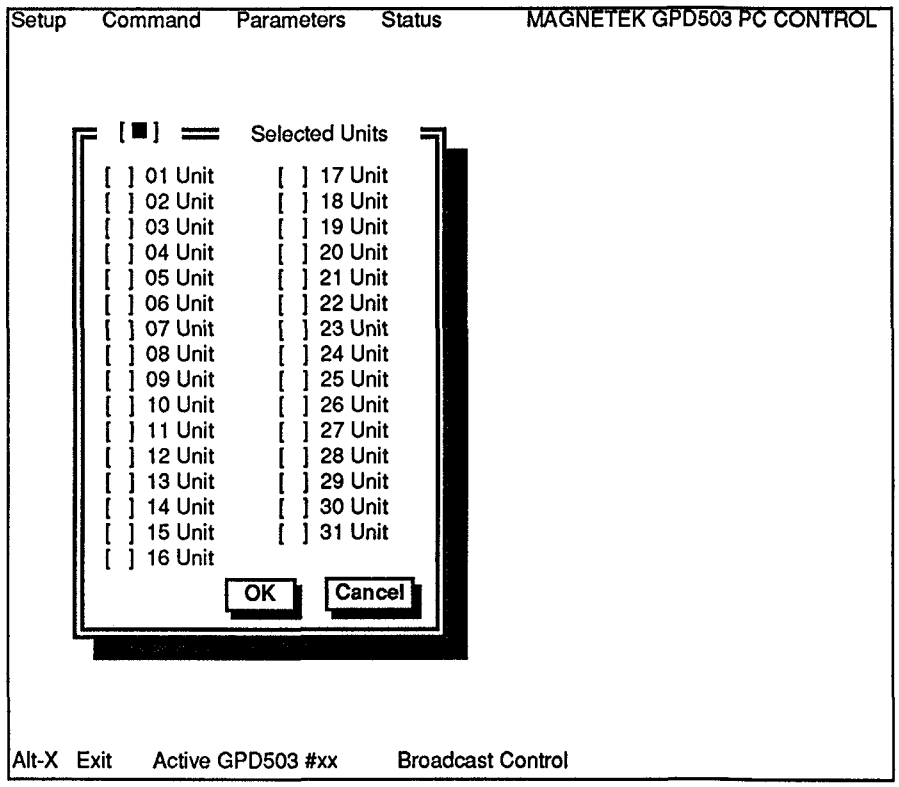


Click in brackets to select all GPD 503 addresses connected to PC then click on **OK** Box.

Click on ESC icon [■] to escape to screen, or press ESC key.

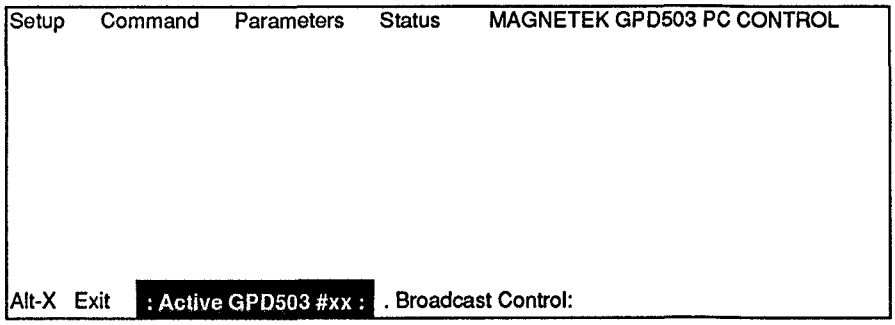
Note:
Lowest No. unit selected will be initial "active GPD503#___"
To make another "selected unit" **active,** click on "Active GPD503 #xx".

Whenever drive is initally selected; the program sends a stop command to that selected drive.

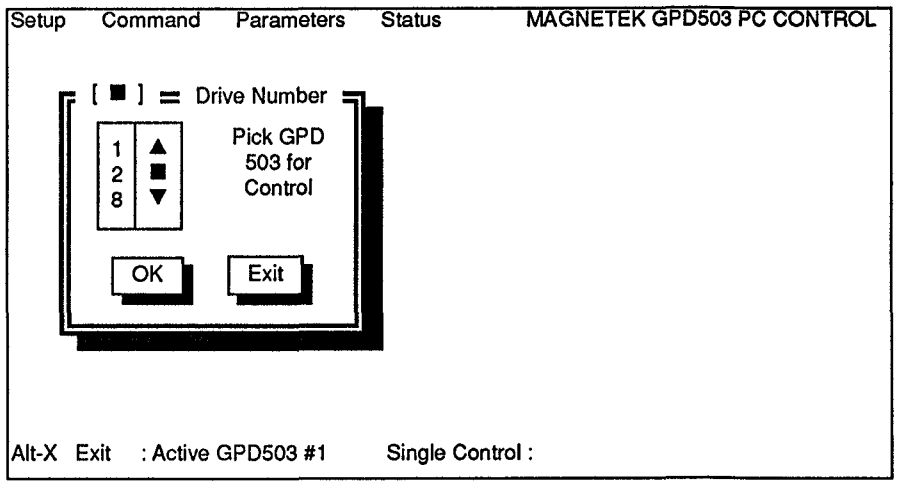


ACTIVE GPD503 #XX SELECTION SCREEN

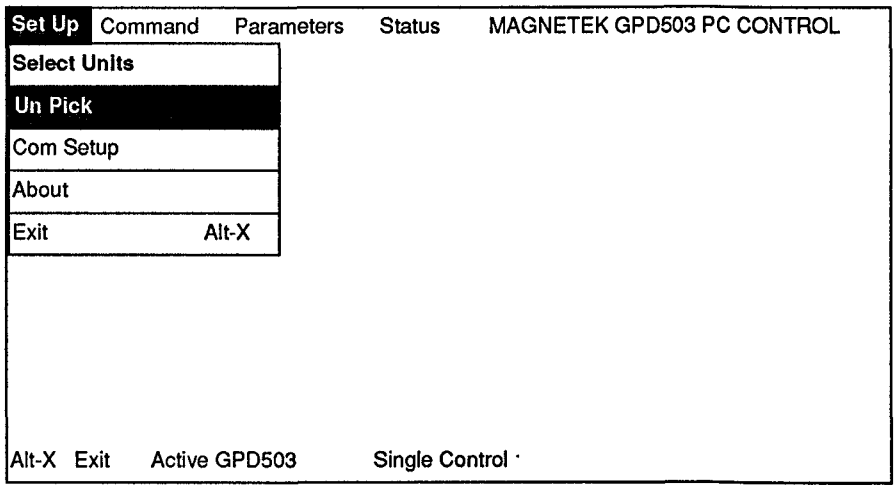
Highlight desired drive to be active then click on **OK** and notice Active GPD 503 changes to show that desired drive #__ is now active . . . a drive must be "active" for the program to send commands to the drive.



When finished, click on the **OK** box. You will return to main menu.



To monitor up to four (4) Un values of the one active drive, select Un pick Function.

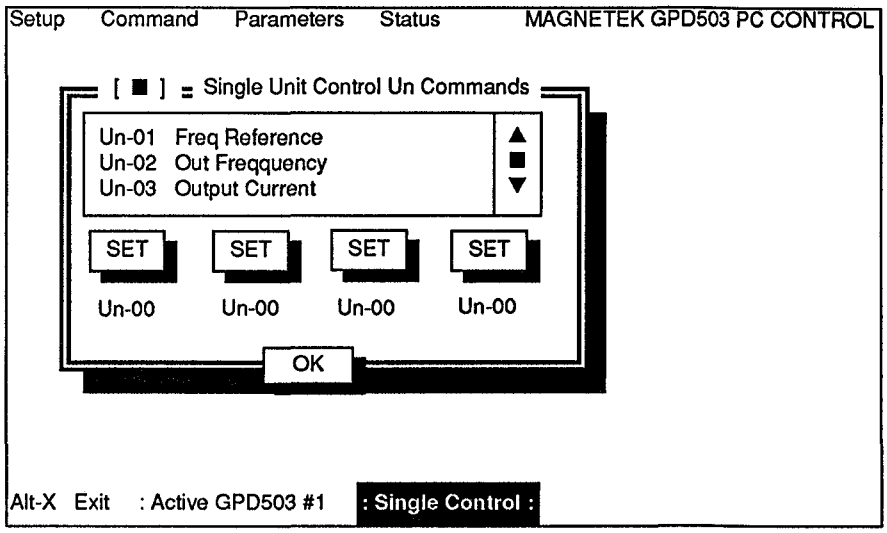


Click on ▲ or ▼ to highlight a desired Un, then select **SET.**

Repeat 3 more times.

Click on **OK.**

Select **SINGLE CONTROL.**



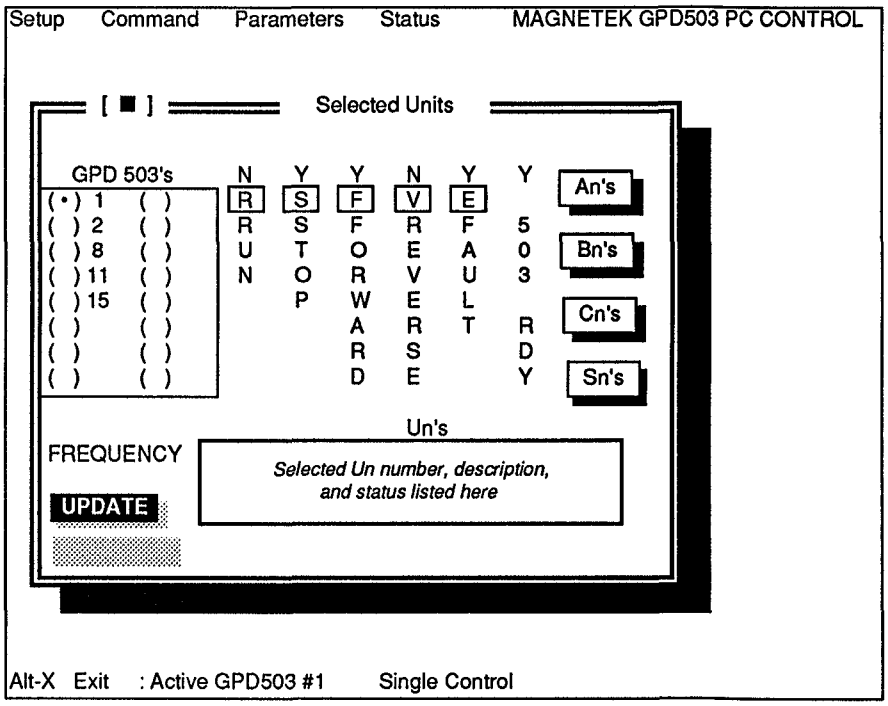
Click on Box to perform function:

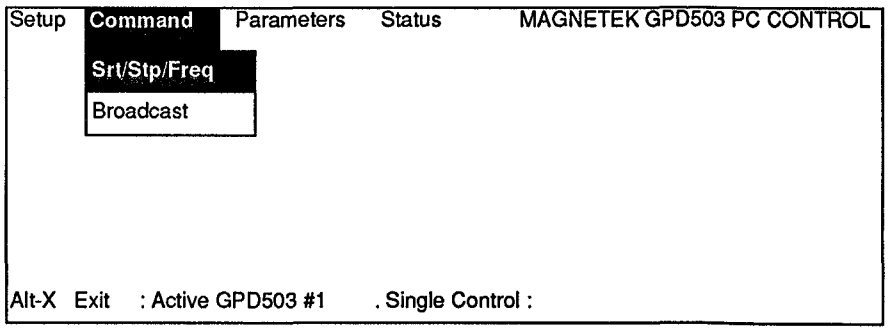
R S F V E

Select drive # to monitor the 4 Un's selected in Un pick screen Click under UPDATE to enter new command frequency. Then click on UPDATE or press enter key.

Active GPD 503 can be fault reset when "**E**" icon box is clicked on when symbol above
"**E**" = "Y" meaning active 503 is in faulted state.

Indicates status of FNC
"**Y**" = Yes (selected/active)
"**N**" = No (not selected/not active)

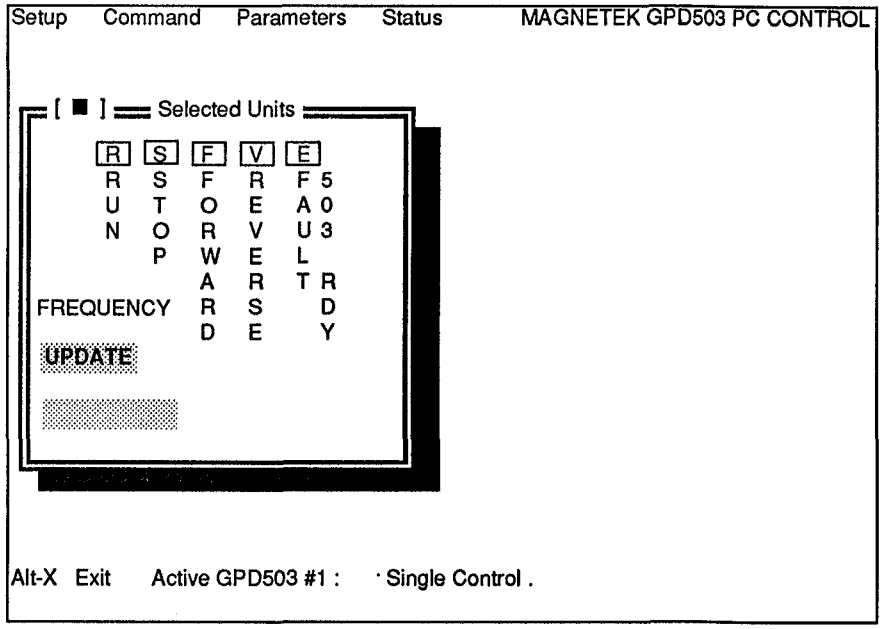




Boxes above commands shows status of the 5 functions

Click on box below frequency to enter new frequency reference. Cursor will blink. Use "backspace key" to move to left most digit and enter value of desired frequency ref.

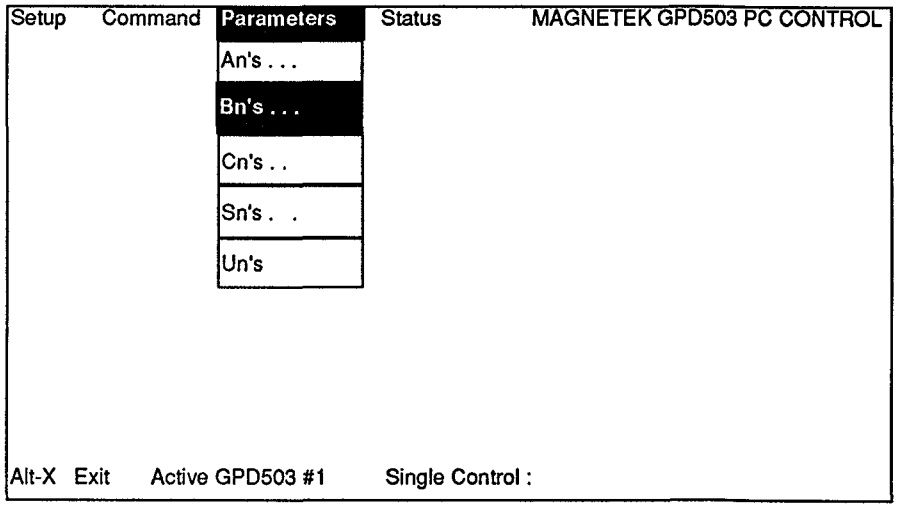
Remember: If value is out of GPD 503 range or certain parameter limits, data may not be acted on.



Click on Desired Box to send command to active GPD 503

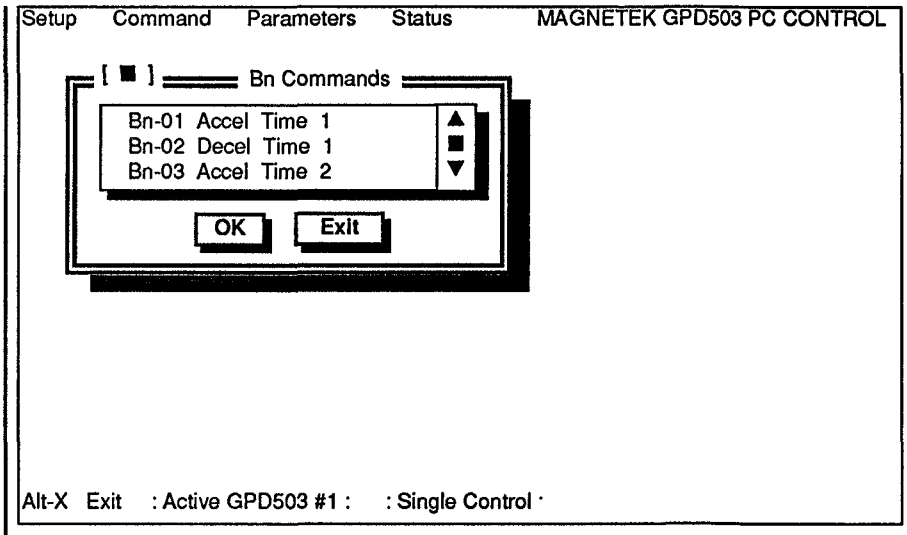
- [R] = Run
- [S] = Stop
- [F] = Forward
- [V] = Reverse
- [E] = Fault reset sequence initiated

To select desired parameter group, click on parameter group name i.e.: An, Bn, Cn, Sn, Un



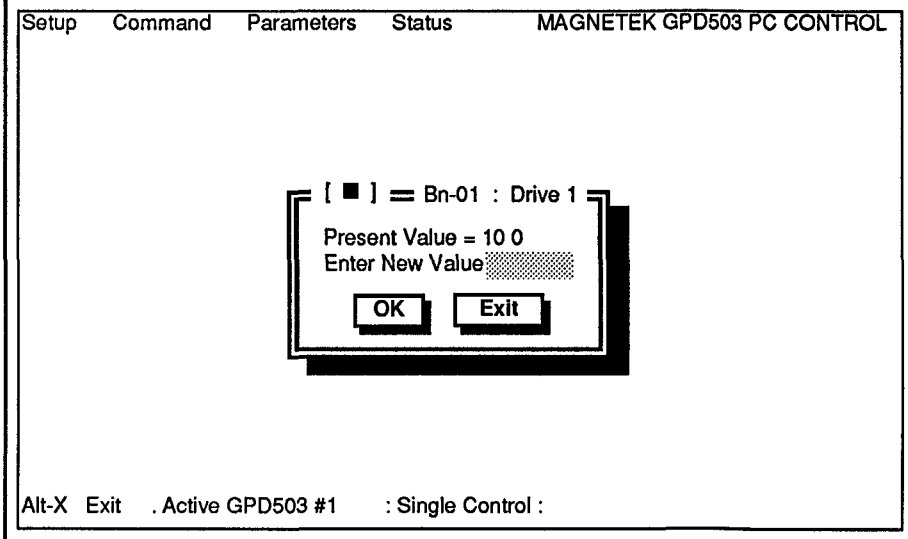
The following procedure should be followed for all parameter changes.

Highlight desired Bn parameter then click on **OK** icon box use ▲ ▼ to get to desired location.

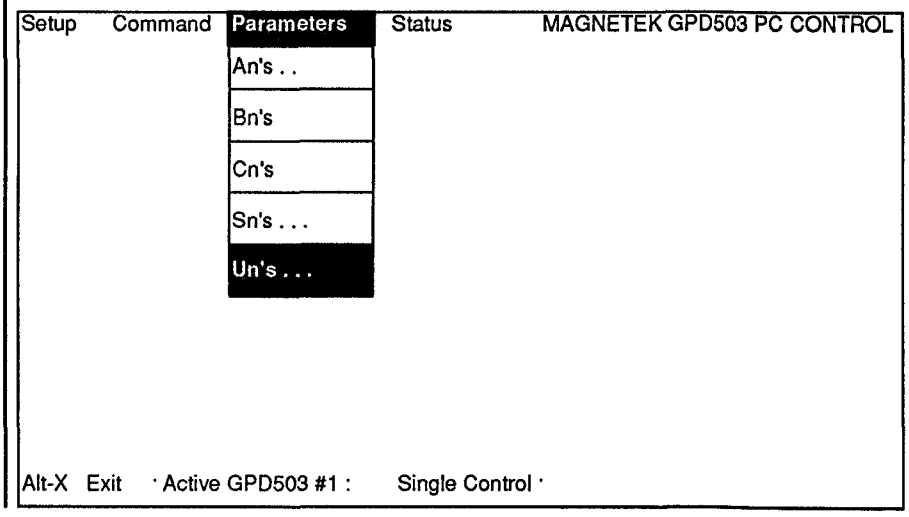


If present value is correct click on **OK.**

To change value enter new value and click on Exit. This return you to screen above. After all changes have been made, click on **Exit** on screen. Only then are the *new values* acted on by the GPD 503.

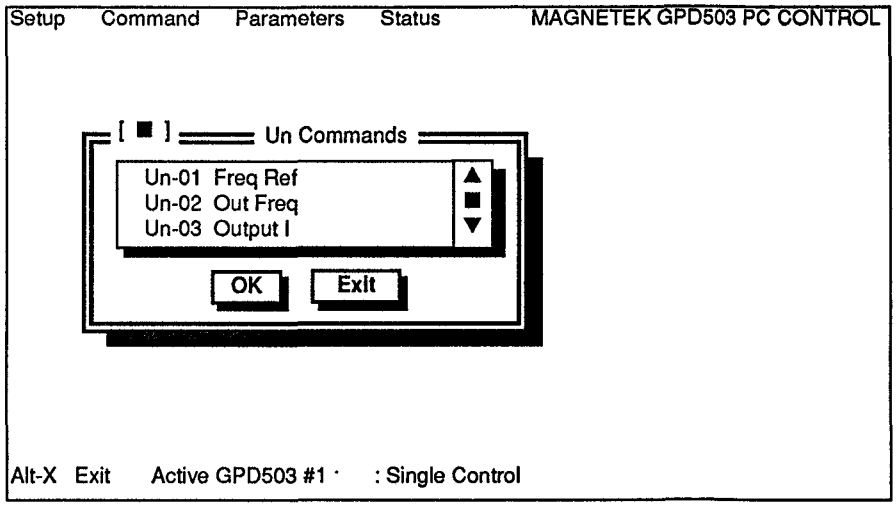


To select desired parameter group, click on parameter group name i.e.: An, Bn, Cn, Sn, Un



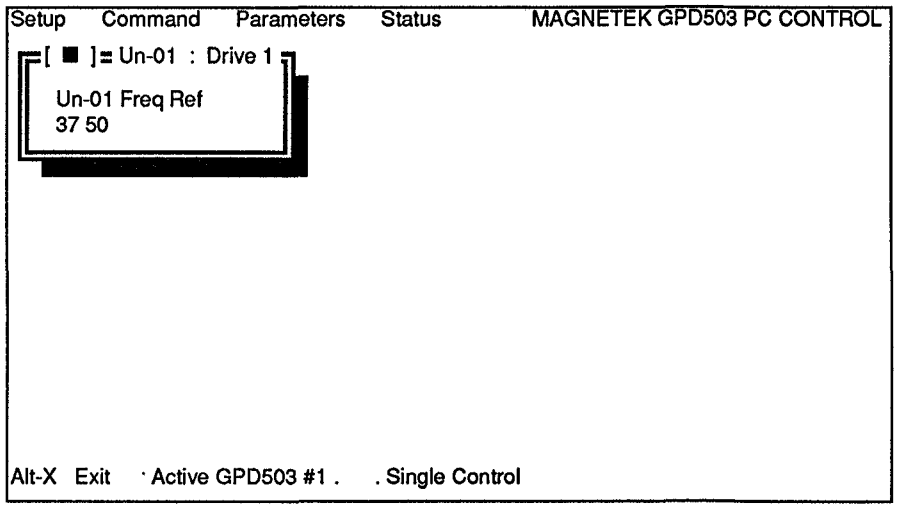
Select desired Un to monitor on screen.

Highlight desired Un-XX constant to monitor then click on "set" box #1 notice that Un-XX constant selected is displayed under "set" box. Repeat this procedure for up to 4 Un constants.

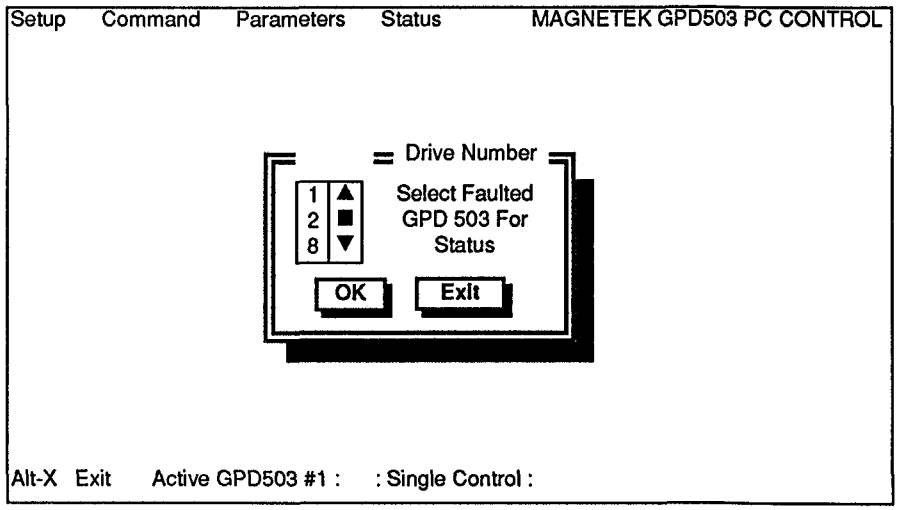


Display after Un-01 Freq Ref is selected.

Drive 1 is active drive.
Frequency Ref is displayed.
Click & Drag on top right = Double bar of box to move this "window" in screen.
You can monitor up to 4 Un's for each drive on the screen.
Ex. 3 drives are connected to PC up to 12 Un's (4 from each) can be monitored at the same time.

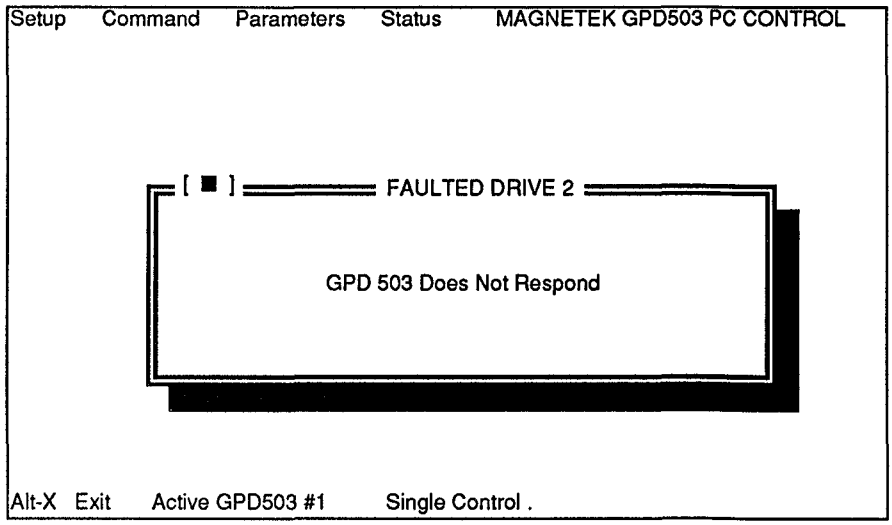


Select desired drive for fault status then click on **OK**.

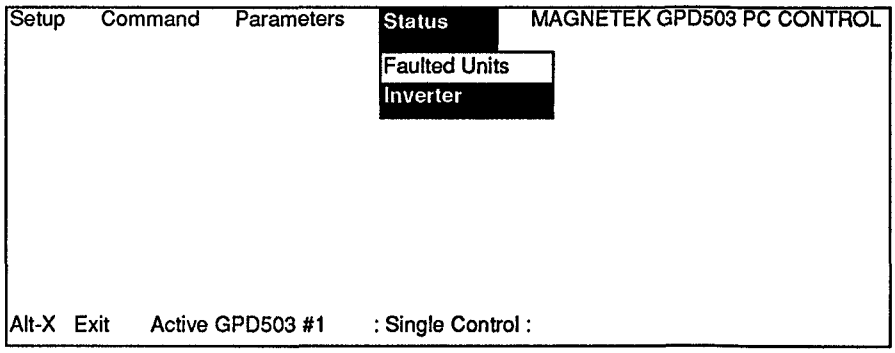


Display of Fault Messages

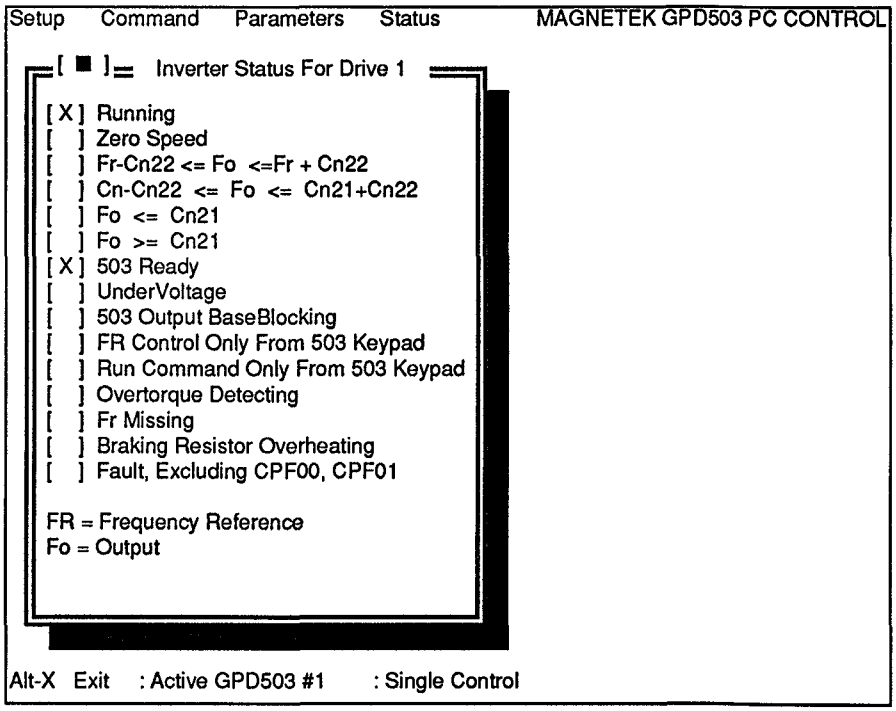
Click on icon [■] to escape.



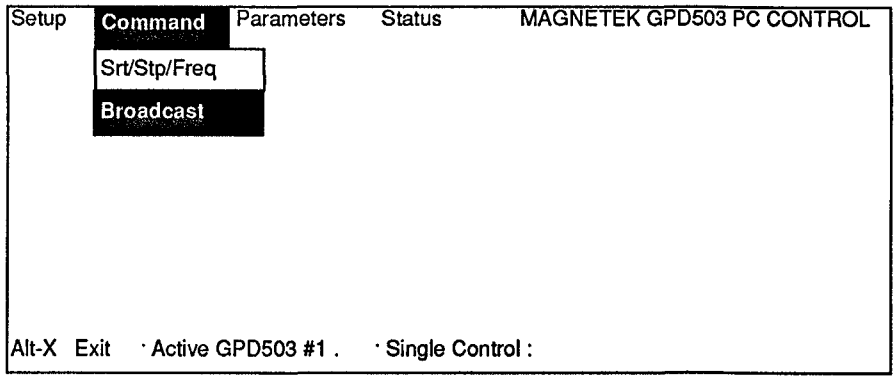
Select Desired Function.



Active drive status display. To escape, click on ESC icon or press ESC key.

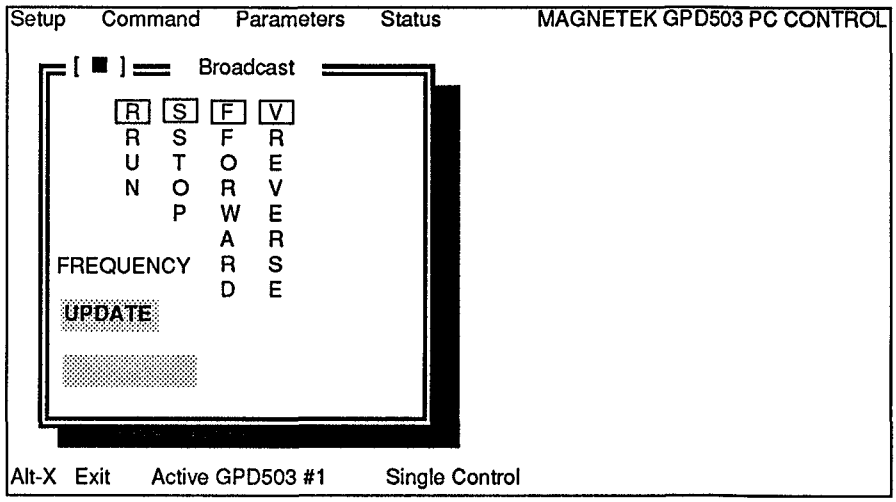


Broadcast Command



Command can be sent to all drives by clicking on one of these icons.

Frequency reference can also be sent to all GPD 503 drives.



Click on Desired Box to send command to active GPD 503

[R] = Run
[S] = Stop
[F] = Forward
[V] = Reverse

IMPORTANT!

The BROADCAST command will be sent to ALL connected drives.

DIPSW S2 switch 4 must be set to ON. - See table 4, in Section 4 of this manual.

If commands different from the BROADCAST command are being sent to the active GPD 503. The next scan of the program will send the previous existing commands (the operating commands that were sent just prior to the BROADCAST command) to the active GPD503. All other connected GPD503 drives will continue to operate according to the BROADCAST command.

Care must be taken to ensure that this operating situation is acceptable for your needs.

If BROADCASTING is desired, no specific drive can be selected. If any drives are selected you must first "unselect" all drives then select broadcast functions.

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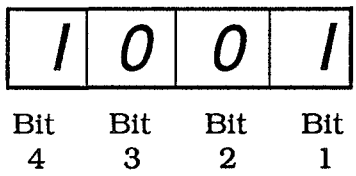
Appendix 1 — DATA CODES

This appendix contains listings of Read and Write (HEX) codes assigned to each constant in the GPD 503, after the installation of the Serial Communication EPROMs. The definitions of data for each constant are also given. Since some constants are changed or added to accommodate serial communication, these listing supersede those in the GPD 503 technical manual, TM 4231.

The example below identifies the bit numbering in 4-bit (i.e. 4-digit) constant settings.

Display on Digital Operator:



System Constants Sn-XX

Data Code			Data							
Read HEX	Write HEX	Data No.	Data Name		BIT No.	Set Data	Function		Initial Setting	Byte
–	–	Sn-01	kVA Selection		–	00~FF	Inverter capacity selection			1
02	82	Sn-02	V/f Selection		–		V/f pattern selection		01	1
03	83	Sn-03	Operator Status		1 2 3 4	0000: An-, bn-, Sn-, Cn- setting/reading possible 0101: An- setting/reading, bn-, Sn-, Cn- reading possible 1110: NV-RAM initialization (for 2-WIRE sequence) 1111: NV-RAM initialization (for 3-WIRE sequence)		0 (0000)	05
04	84	Sn-04	Operation Mode Selection 1	Oper-ation Method Select	1	0	External terminals 13, 14 analog input is main speed frequency reference		3 (0011)	05
						1	Frequency reference 1 (An-01) is main speed frequency reference			
					2	0	External terminal run command effective.			
						1	Operator run command effective			
				Stop Method Select	3 4	00: Ramp to stop 01: Coast to stop 10: Full range DC injection 11: Coast to stop (timer function)				
05	85	Sn-05	Operation Mode Selection 2		1	0	Operator STOP key effective during running by external terminal (communication function)		0 (0000)	05
						1	Operator STOP key ineffective during running by external terminal (communication function)			
					2	0	REV run possible			
						1	REV run impossible			
					3	0	Sequence reference double-reading			
						1	Sequence reference single-reading			
					4	0	Analog monitor output (terminals 21, 22) is in proportion to output frequency			
						1	Analog monitor output (terminals 21, 22) is in proportion to output current			
06	86	Sn-06	Operation Mode Selection 3		1 2	00: Soft start S-curve characteristics 0 2 sec 01: Soft start S-curve characteristics ineffective 10: Soft start S-curve 0 5 sec 11: Soft start S-curve 1 0 sec			0 (0000)	05
					3	0	Main speed frequency reference normal characteristics (0-100% at 0~10V)			
						1	Main speed frequency reference inverted characteristics (0~100% at 10~0V)			
					4	0	Stop due to missinmg frequency reference command			
						1	Operation Continued with 80% reference at frequency reference missing			

System Constants Sn-XX (continued)

Data Code			Data					
Read HEX	Write HEX	Data No.	Data Name	BIT No.	Set Data	Function	Initial Setting	Byte
07	87	Sn-07	Operation Mode Selection 4 (Operation Detection)	1	0	Overtorque detection ineffective	0 (0000)	0 5
					1	Overtorque detection effective		
				2	0	Detects only at speed coincidence		
					1	Detects during running		
				3	0	Operation continued after overtorque detected.		
					1	Coasting to stop by overtorque dected.		
				4	0	Not used		
					1	Not used.		
08	88	Sn-08	Operation Mode Selection 5 (Communication Error)	1	0	Operated by comm link speed reference (when option provided)	4 (0100)	0.5
					1	Operated by other speed reference		
				2	0	Operated by comm link operation command (when option provided)		
					1	Operated by operation command at GPD 503		
				3	Response to comm error detection (when option is installed) 00: Deceleration to stop (decel time 1:bn-02) 01: Coasting to stop 10: Deceleration to stop (decel time 2:bn-04) 11: Continuous operation			
				4				
09	89	Sn-09	Operation Mode Selection 6	1	0	Not used	0 (0000)	0 5
					1	Not used		
				2	0	Not used		
					1	Not used		
				3	0	Not used		
					1	Not used		
				4	0	Not used		
					1	Not used		
0A	8A	Sn-10	Protective Characteristics Selection 1 (Stall Prevention)	1	0	Stall preventive function during accel effective.	0 (0000)	0 5
					1	Stall preventive function during accel ineffective.		
				2	0	Stall preventive function during decel effective		
					1	Stall preventive function during decel ineffective		
				3	0	Stall preventive function during run effective		
					1	Stall preventive function during run ineffective		
				4	0	Decel time for stalling during running is "decel time 1" (bn-02 set value)		
					1	Decel time for stalling during running is "decel time 2" (bn-04 set value)		

System Constants Sn-XX (continued)

Data Code			Data					
Read HEX	Write HEX	Data No.	Data Name	BIT No.	Set Data	Function	Initial Setting	Byte
0B	8B	Sn-11	Protective Characteristics Selection 2	1	0	Built-in braking resistor not provided. (overheat protection ineffective)	0 (0000)	0 5
					1	Built-in braking resistor provided. (overheat protection effective)		
				2	0	Fault contact open during fault retry operation		
					1	Fault contact closed during fault retry operation		
				3	0	Operation stopped due to momentary power loss detected		
					1	Operation continues after recovery from momentary power loss.		
				4	0	Not used		
					1	Not used		
0C	8C	Sn-12	Protective Characteristics Selection 3 (Exterminal Fault Signal Input Terminal 3)	1	0	External fault signal NO contact input	4 (0100)	0.5
					1	External fault signal NC contact input		
				2	0	External fault signal is always detected		
					1	External fault signal is detected only when running		
				3	Process selection at external fault signal detection. 00: Deceleration to stop (decel time 1:bn-02) 01: Coasting to stop 10: Deceleration to stop (decel time 2:bn-04) 11: Continuous operation			
				4				
0D	8D	Sn-13	Protective Characteristcs Selection 4	1	Not used		0 (0000)	0.5
				2	Not used			
				3	Not used			
				4	Not used.			
0E	8E	Sn-14	Protective Characteristics Selection 5 (Motor Protection)	1	0	Electronic thermal motor protection effective.	0 (0000)	0 5
					1	Electronic thermal motor protection ineffective		
				2	0	Electronic thermal characteristics applied for variable torque.		
					1	Electronic thermal characteristics applied for constant torque.		
				3	Not used			
				4	Not used.			
0F	8F	Sn-15	Multifunction Contact Input (Terminal 5) Function Selection	–	00-FF	Selects multifunction input terminal 5 function (multi-step speed reference 1)	03	1
10	90	Sn-16	Multifunction Contact Input (Terminal 6) Function Selection	–	00-FF	Selects multifunction input terminal 6 function (multi-step speed reference 2)	04	1
11	91	Sn-17	Multifunction Contact Input (Terminal 7) Function Selection	–	00-FF	Selects multifunction input terminal 7 function (multi-step speed reference 3)	06	1

System Constants Sn-XX (continued)

Data Code			Data					
Read HEX	Write HEX	Data No.	Data Name	BIT No.	Set Data	Function	Initial Setting	Byte
12	92	Sn-18	Multifunction Contact Input (Terminal 8) Function Selection	–	00-FF	Selects terminal 8 function (external base block)	08	1
13	93	Sn-19	Aux Analog Ref Input (Aux) Function Selection	–	00-0F	Selects terminal 16 function	F	05
14	94	Sn-20	Multifunction Contact Output 1 (Terminals 9, 10) Function Selection	–	00-F	Selects multifunction contact (terminals 9 & 10) function	0	05
15	95	Sn-21	Multifunction PHC Output 2 (Terminal 25) Function Selection	–	00-F	Selects multifunction open collector (terminal 25) function	1	05
16	96	Sn-22	Multifunction PHC Output 3 (Terminal 26) Function Selection	–	00-F	Selects multifunction open collector (terminal 26) function	2	05
–	–	Sn-23	–	–	–	–	–	–
–	–	Sn-24	–	–	–	–	–	–
–	–	Sn-25	–	–	–	–	–	–
–	–	Sn-26	–	–	–	–	–	–
–	–	Sn-27	–	–	–	–	–	–
–	–	Sn-28	–	–	–	–	–	–

Control Constants Cn-XX

DATA CODE			DATA						
Read HEX	Write HEX	Data No	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
1D	9D	Cn-01	Input Voltage	0 1V	0 0~255 0 (230V) 0 0~510 0 (460V)	230 460	0000~09F6(230V) 0000~13EC(460V)	08FC(230V) 11F8(460V)	2
1E	9E	Cn-02	Max Frequency	0 1Hz	50 0 ~ 400 0	(2)	01F4 ~ 0FA0	(2)	2
1F	9F	Cn-03	Max Voltage	0 1V	0 0~255 0 (230V) 0 0~510 0 (460V)	(2)	0000~09F6(230V) 0000~13EC(460V)	(2)	2
20	A0	Cn-04	Max Voltage Frequency	0 1Hz	0 0 ~ 400 0	(2)	0000 ~ 0FA0	(2)	2
21	A1	Cn-05	Intermediate Output Freq	0 1Hz	0 0 ~ 400 0	(2)	0000 ~ 0FA0	(2)	2
22	A2	Cn-06	Intermediate Output Freq Voltage	0 1V	0 0~255 0 (230V) 0 0~510 0 (460V)	(2)	0000~09F6(230V) 0000~13EC(460V)	(2)	2
23	A3	Cn-07	Min Output Frequency	0 1Hz	0 0 ~ 400 0	(2)	0000 ~ 0FA0	(2)	2
24	A4	Cn-08	Min Output Frequency Voltage	0 1V	0 0~255.0 (230V) 0 0~510 0 (460V)	(2)	0000~09F6(230V) 0000~13EC(460V)	(2)	2
25	A5	Cn-09	Motor Rated Current	0 1A	(4)	(1)	(4)	(1)	2
26	A6	Cn-10	DC Braking Start Frequency	0 1Hz	0 0 ~ 10 0	(2)	00 ~ 64	(2)	1
27	A7	Cn-11	DC Braking Current	1%	0 ~ 100 (6)	50	00 ~ 64 (6)	32	1
28	A8	Cn-12	DC Braking Time at Stop	0 1sec	0 0 ~ 25 5	0 0	00 ~ FF	05	1
29	A9	Cn-13	DC Braking Time at Start	0 1sec	0 0 ~ 25 5	0 0	00 ~ FF	00	1
2A	AA	Cn-14	Freq Ref Upper Limit	1%	0 ~ 109	100	00 ~ 6D	64	1
2B	AB	Cn-15	Freq. Ref. Lower Limit	1%	0 ~ 109	0	00 ~ 6D	00	1
2C	AC	Cn-16	Setting Prohibit Freq 1	0 1Hz	0 0 ~ 400 0	0 0	0000 ~ 0FA0	0000	2
2D	AD	Cn-17	Setting Prohibit Freq 2	0 1Hz	0 0 ~ 400 0	0 0	0000 ~ 0FA0	0000	2
2E	AE	Cn-18	Setting Prohibit Freq 3	0 1Hz	0 0 ~ 400 0	0 0	0000 ~ 0FA0	0000	2
2F	AF	Cn-19	Setting Prohibit Freq. Range	0 1Hz	0 0 ~ 35 5	1 0	00 ~ FF	0A	1
30	B0	Cn-20	Operator Display Mode	1	0 ~ 39999	0	0000 ~ 9C3F	0000	2
31	B1	Cn-21	Desired Frequency Coincidence Mode	0 1Hz	0 0 ~ 400 0	0 0	0000 ~ 0FA0	0000	2
32	B2	Cn-22	Frequency Coincidence Detection Width	0 1Hz	0 0 ~ 25 5	2 0	00 ~ FF	14	1
33	B3	Cn-23	Carrier Freq Upper Limit	0 1kHz	0 4 ~ 15 0	15 0 (3)	04 ~ 96	96 (3)	1
34	B4	Cn-24	Carrier Freq Lower Limit	0 1kHz	0 4 ~ 15 0	15 0 (3)	04 ~ 96	96 (3)	1
35	B5	Cn-25	Carrier Frequency Proportional Gain	1	0 ~ 99	0 (3)	00 ~ 63	00 (3)	1
36	B6	Cn-26	Overtorque Detection Level	1%	30 ~ 200	160	1E ~ C8	A0	1
37	B7	Cn-27	Overtorque Detection Time	0 1sec	0 0 ~ 25 5	0 1	00 ~ FF	01	1

NOTES:

(1) Initial value differs depending on GPD 503 capacity (Sn-01 set value).
(2) Initial value differs depending on V/F (Sn-02 set value).
(3) Initial value differs depending on main circuit element (IGBT or BTR).
(4) Setting range is 10-200% of GPD 503 rated current.
(5) Motor rated current (Cn-09) is 100% level.
(6) Carrier frequency : 8 kHz when set value is 50% or less;
1 kHz when set value is 50% or more.

Control Constants Cn-XX (continued)

DATA CODE			DATA						
Read HEX	Write HEX	Data No.	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
38	B8	Cn-28	Stall Prevention Level During Accel	1%	30 ~ 200	170	1E ~ C8	AA	1
39	B9	Cn-29	Stall Prevention Limit During Accel	1%	30 ~ 200	50	1E ~ C8	32	1
3A	BA	Cn-30	Stall Prevention Level During Running	1%	30 ~ 200	160	1E ~ C8	A0	1
3B	BB	Cn-31	Motor Cable-to-Cable Resistance	0 001Ω	0 000 ~ 65 535	(1)	0000 ~ FFFF	(1)	2
3C	BC	Cn-32	Torque Compensation Iron Loss	1W	0 ~ 65535	(1)	0000 ~ FFFF	(1)	2
3D	BD	Cn-33	Torque Compensation Limit	1V	0 ~ 50 (230V) 0 ~ 100 (460V)	(1)	00 ~ 32 (230V) 00 ~ 64 (460V)	(1)	1
3E	BE	Cn-34	Motor No-Load Current	1%	0 ~ 99 (5)	30	00 ~ 63 (5)	1E	1
3F	BF	Cn-35	Slip Compensation Primary Lag Time	0 1sec	0 0 ~ 25 5	2 0	00 ~ FF	14	1
40	C0	Cn-36	No of Fault Retry Operations	1	0 ~ 10	0	00 ~ 0A	00	1
41	C1	Cn-37	Momentary Power Loss Assurance Time	0 1sec	0 0 ~ 2 0	(1)	00 ~ 14	(1)	1
42	C2	Cn-38	Speed Search Level	1%	0 ~ 200	150	00 ~ C8	96	1
43	C3	Cn-39	Speed Search Time	0 1sec	0 0 ~ 25.5	2 0	00 ~ FF	14	1
44	C4	Cn-40	Min Base block Time	0 1sec	0 0 ~ 2 0	(1)	00 ~ 14	(1)	1
45	C5	Cn-41	V/F During Speed Search	1%	0 ~ 100	100	00 ~ 64	64	1
46	C6	Cn-42	Voltage Recovery Time	0 1sec	0 1 ~ 2 0	0 3	01 ~ 14	03	1

NOTES:

(1) Initial value differs depending on GPD 503 capacity (Sn-01 set value).
(2) Initial value differs depending on V/F (Sn-02 set value).
(3) Initial value differs depending on main circuit element (IGBT or BTR).
(4) Setting range is 10-200% of GPD 503 rated current.
(5) Motor rated current (Cn-09) is 100% level.
(6) Carrier frequency : 8 kHz when set value is 50% or less;
1 kHz when set value is 50% or more.

Reference Setting Constants An-XX

DATA CODE			DATA						
Read HEX	Write HEX	Data No.	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
47	C7	An-01	Frequency Reference 1	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
48	C8	An-02	Frequency Reference 2	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
49	C9	An-03	Frequency Reference 3	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
4A	CA	An-04	Frequency Reference 4	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
4B	CB	An-05	Frequency Reference 5	0 1Hz	0 00 ~ 400 00	0.00	0000 ~ 9C40	0000	2
4C	CC	An-06	Frequency Reference 6	0 1Hz	0.00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
4D	CD	An-07	Frequency Reference 7	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
4E	CE	An-08	Frequency Reference 8	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0000	2
4F	CF	An-09	Jogging Freq. Reference	0 1Hz	0 00 ~ 400 00	0 00	0000 ~ 9C40	0258	2

NOTE: Cn-20 determines the value of the set unit displayed on the Digital Operator. It is factory preset to 0.01 Hz.

Application Constants bn-xx

DATA CODE			DATA						
Read HEX	Write HEX	Data No.	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
50	D0	bn-01	Accel Time 1	0 1sec	0 0 ~ 6000 0	10 0	0000 ~ EA60	0064	2
51	D1	bn-02	Decel Time 1	0 1sec	0 0 ~ 6000 0	10 0	0000 ~ EA60	0064	2
52	D2	bn-03	Accel Time 2	0 1sec	0.0 ~ 6000 0	10 0	0000 ~ EA60	0064	2
53	D3	bn-04	Decel Time 2	0 1sec	0 0 ~ 6000 0	10 0	0000 ~ EA60	0064	2
54	D4	bn-05	Frequency Reference Gain	0 1%	0 0 ~ 1000 0	100 0 10V=100%	0000 ~ 2710	03E8	2
55	D5	bn-06	Frequency Reference Bais	1%	-100 ~ 100	0	9C ~ 64	00	1
56	D6	bn-07	Torque Compensation Gain	0 1	0 0 ~ 9 9	1.0	00 ~ 63	0A	1
57	D7	bn-08	Motor Rated Slip	0 1%	0 0 ~ 9 9	0 0	00 ~ 63	00	1
58	D8	bn-09	Energy Saving Level Gain	1%	0 ~ 200	80	00 ~ C8	50	1
59	D9	bn-10	Monitor No After Power Supply Turned On	1	1 ~ 3	1	01 ~ 03	01	1
5A	DA	bn-11	AO Option CH1 Output Gain	0 01	0 00 ~ 2 55	1 00	00 ~ FF	64	1
5B	DB	bn-12	AO Option CH2 Output Gain	0 01	0 00 ~ 2 55	0 50	00 ~ FF	32	1

Monitoring Data – Un-XX (GPD 503 → Computer)

DATA CODE			DATA						
Read HEX	Write HEX	Data No.	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
5C	–	Un-01	Frequency Reference	0 01Hz	0 0 ~ 6000 0	10.0	0000 ~ EA60	0064	2
5D	–	Un-02	Output Frequency	0.01Hz	0 0 ~ 6000 0	10 0	0000 ~ EA60	0064	2
5E	–	Un-03	Output Current	0 1A	0 0 ~ 6000.0	10 0	0000 ~ EA60	0064	2
5F	–	Un-04	Voltage Reference	1V	0 0 ~ 6000 0	10.0	0000 ~ EA60	0064	2
60	–	Un-05	DC Voltage (VPN)	1V	0 0 ~ 1000 0	100 0 10V=100%	0000 ~ 2710	03E8	2
61	–	Un-06	Output Power (±)	0 1kW	-100 ~ 100	0	9C ~ 64	00	1
62	–	Un-07	Multifunction Input Terminal Status	–	0.0 ~ 9.9	1 0	00 ~ 63	0A	1
63	–	Un-08	Multifunction Output Terminall Status	–	0 0 ~ 9 9	0 0	00 ~ 63	00	1

Frequency Reference (Data Link System) *

DATA CODE		DATA						
Read HEX	Write HEX	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
65	E5	Frequency Reference	0 01Hz	0 0 ~ 400 00	0 00	0000 ~ 9C40	0000	2

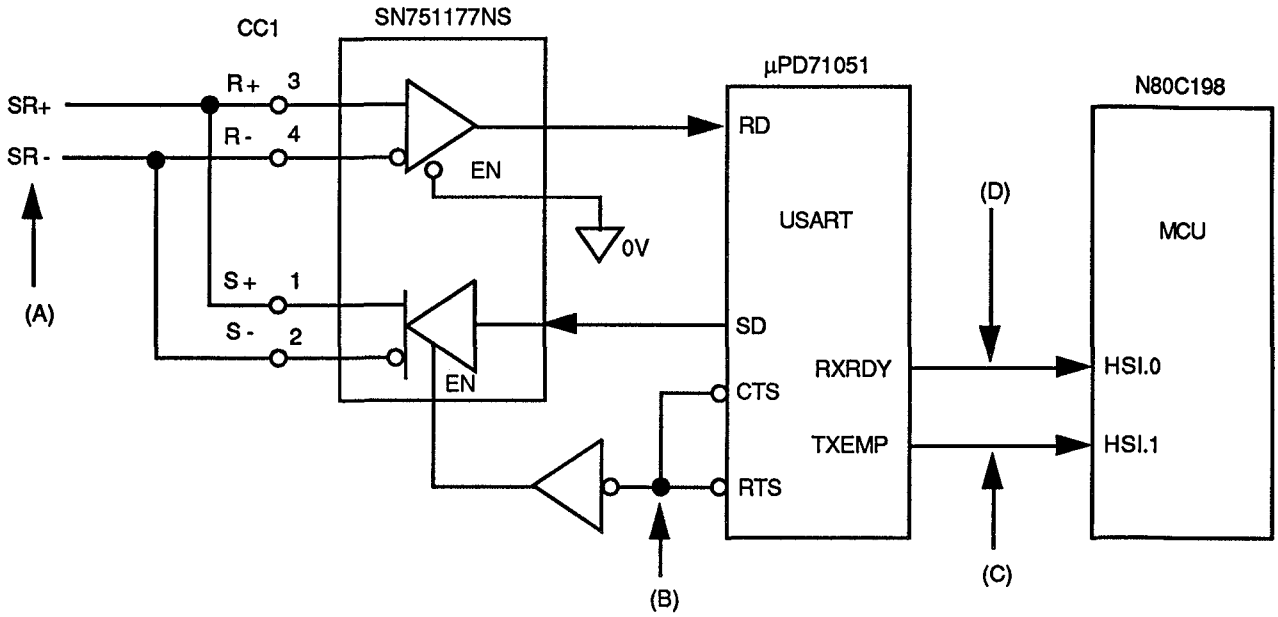
DATA CODE		DATA						
Read HEX	Write HEX	Data Name	Set Unit	Setting Range	Initial Value	Setting Range Input Data (HEX)	Initial HEX Setting	Byte
–	E6	Frequency Reference (SUB)	0 01Hz	0 0 ~ 400 00	0 00	0000 ~ 9C40	0000	2

* ENTER command is not necessary.

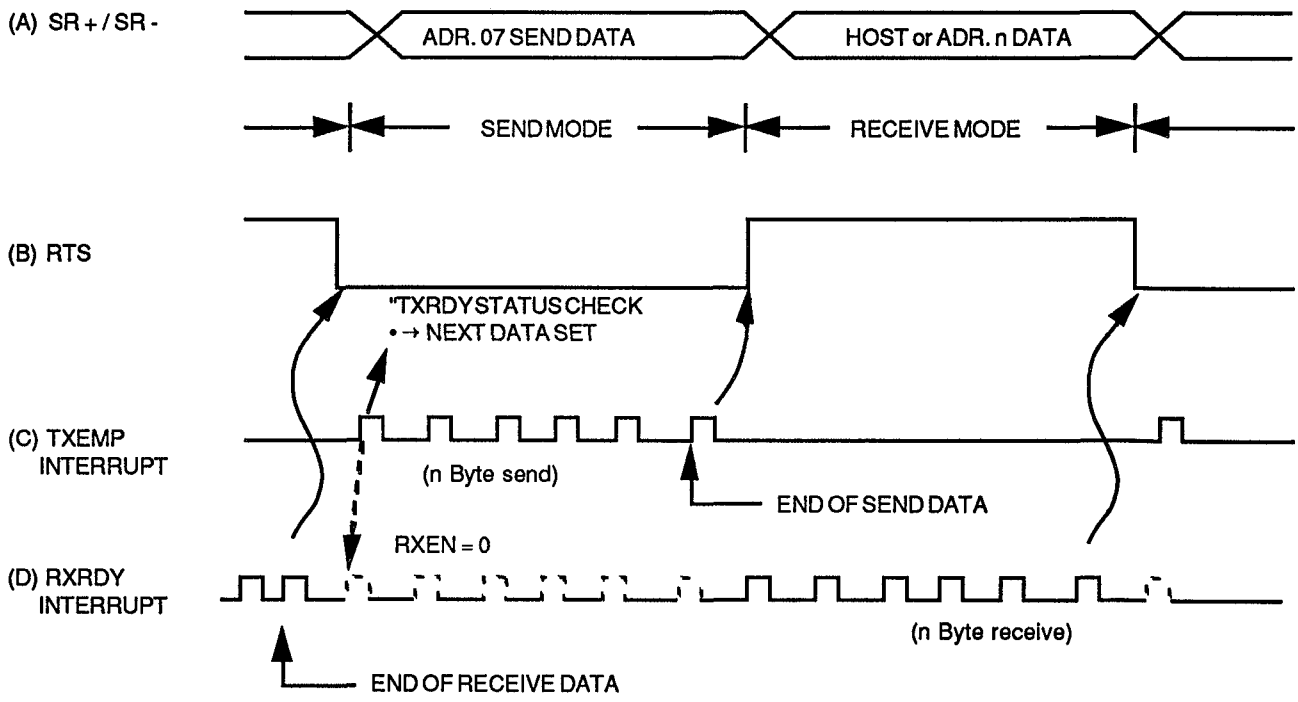
Decimal to Hex to ASCII Converter

DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII
0	00	NUL	32	20	SP	64	40	@	96	60	'
1	01	SOH	33	21	!	65	41	A	97	61	a
2	02	STX	34	22	"	66	42	B	98	6261	b
3	03	ETX	35	23	#	67	43	C	99	63	c
4	04	EOT	36	24	$	68	44	D	100	64	d
5	05	ENQ	37	25	%	69	45	E	101	65	e
6	06	ACK	38	26	&	70	46	F	102	66	f
7	07	BEL	39	27	'	71	17	G	103	67	g
8	08	BS	40	28	(	72	18	H	104	68	h
9	09	HT	41	29	)	73	19	I	105	69	I
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E		78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C	|
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	^	126	7E	~
31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

RS-485 Data Send / Receive – Bus Control 2-Wire System



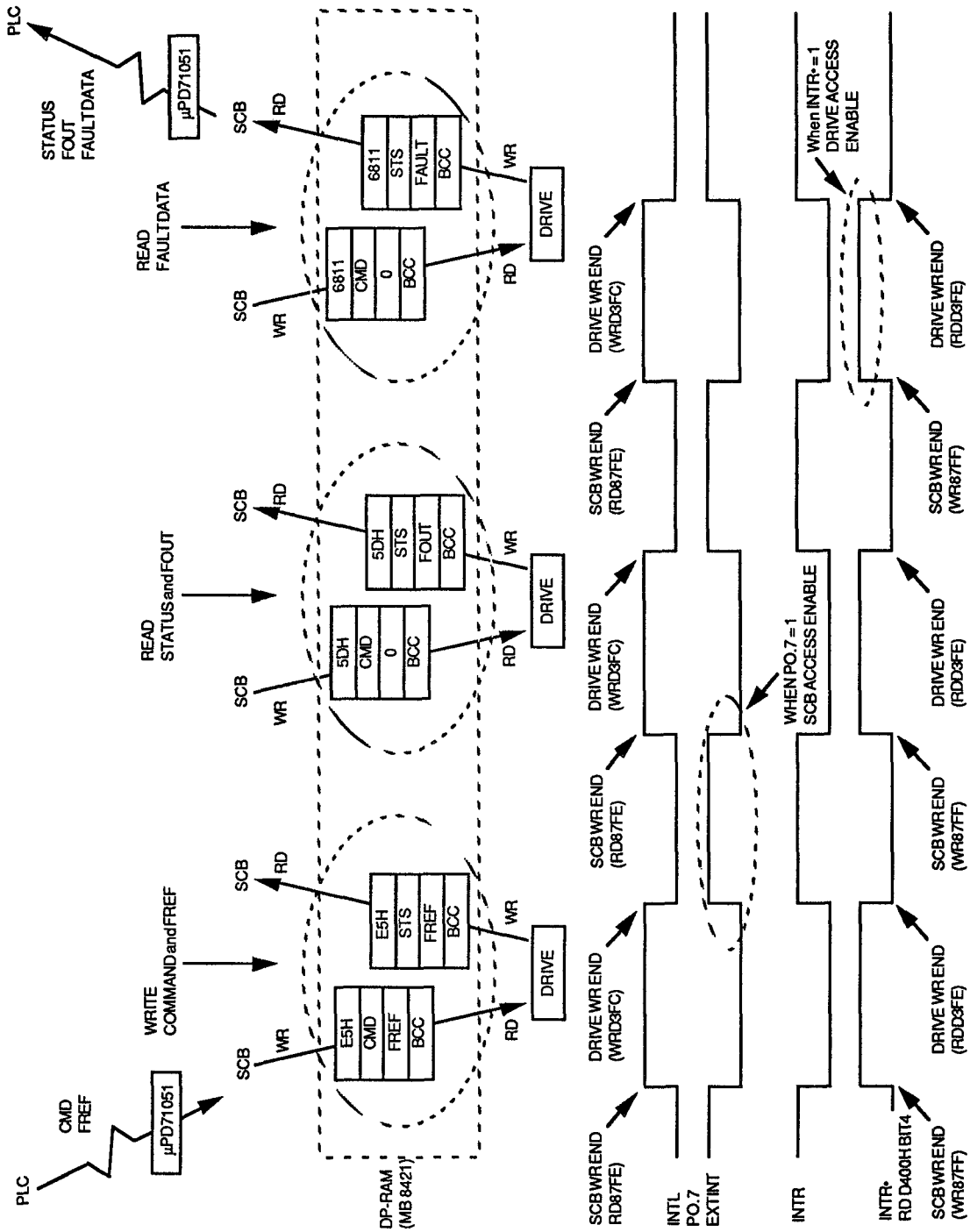
EXAMPLE: STATION ADDRESS (ADR) 07



Time-Chart of Transmission Process

Example:

Receive Data (Computer→ GPD 503) COMMAND and FREF
Transfer Data (Computer← GPD 503) STATUS, FOUT and FAULT DATA.

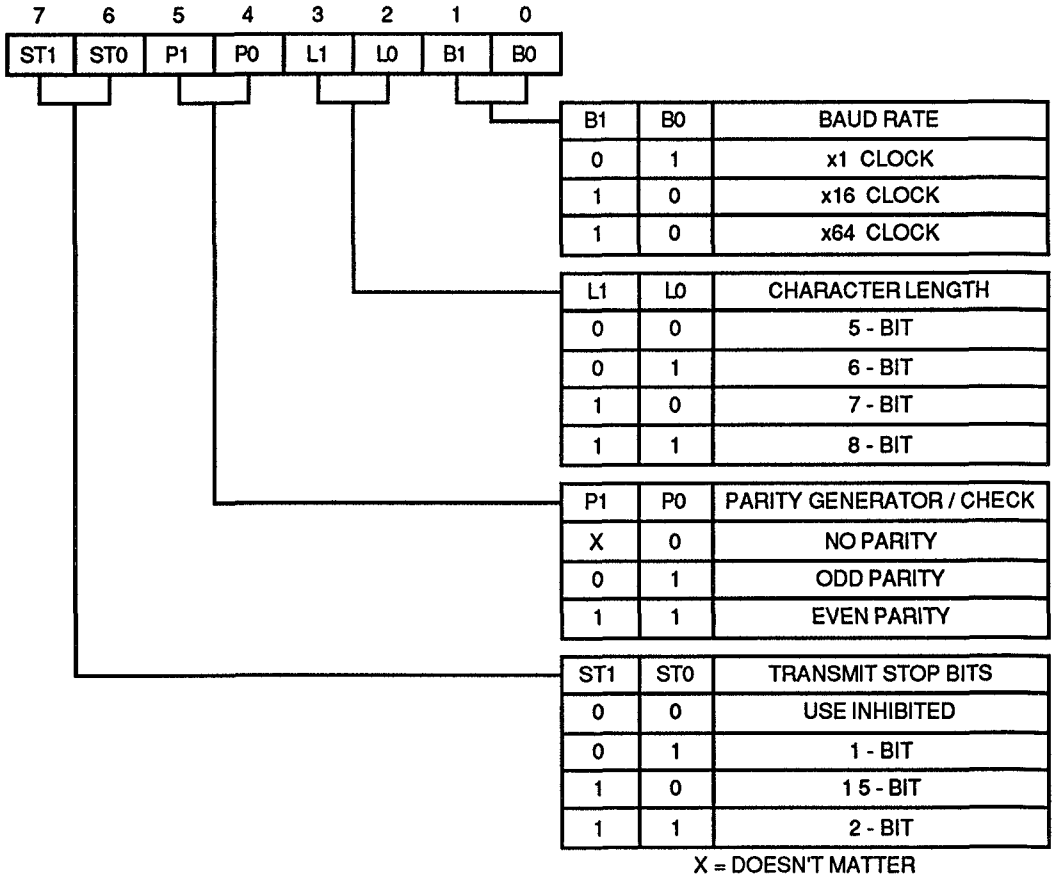


μPD71051 Register Function

Memory Address (hex)	Access Mode	Register	Function
A000	Read	Receive Data Buffer	Read Receive Data
A001	Read	Status Register	Read Status
A000	Write	Transmit Data Buffer	Write Transmit Data
A001	Write	Control Word Register	Write Mode Word
A001	Write	Control Word Register	Command Word Format

Commands and Operation

Commands are issued to the μPD71051 by command words in order to control μPD71051's transmission and reception operations. A command word is written with ADR. A001(H), following the mode setting by a mode word.



B1	B0	BAUD RATE
0	1	x1 CLOCK
1	0	x16 CLOCK
1	0	x64 CLOCK

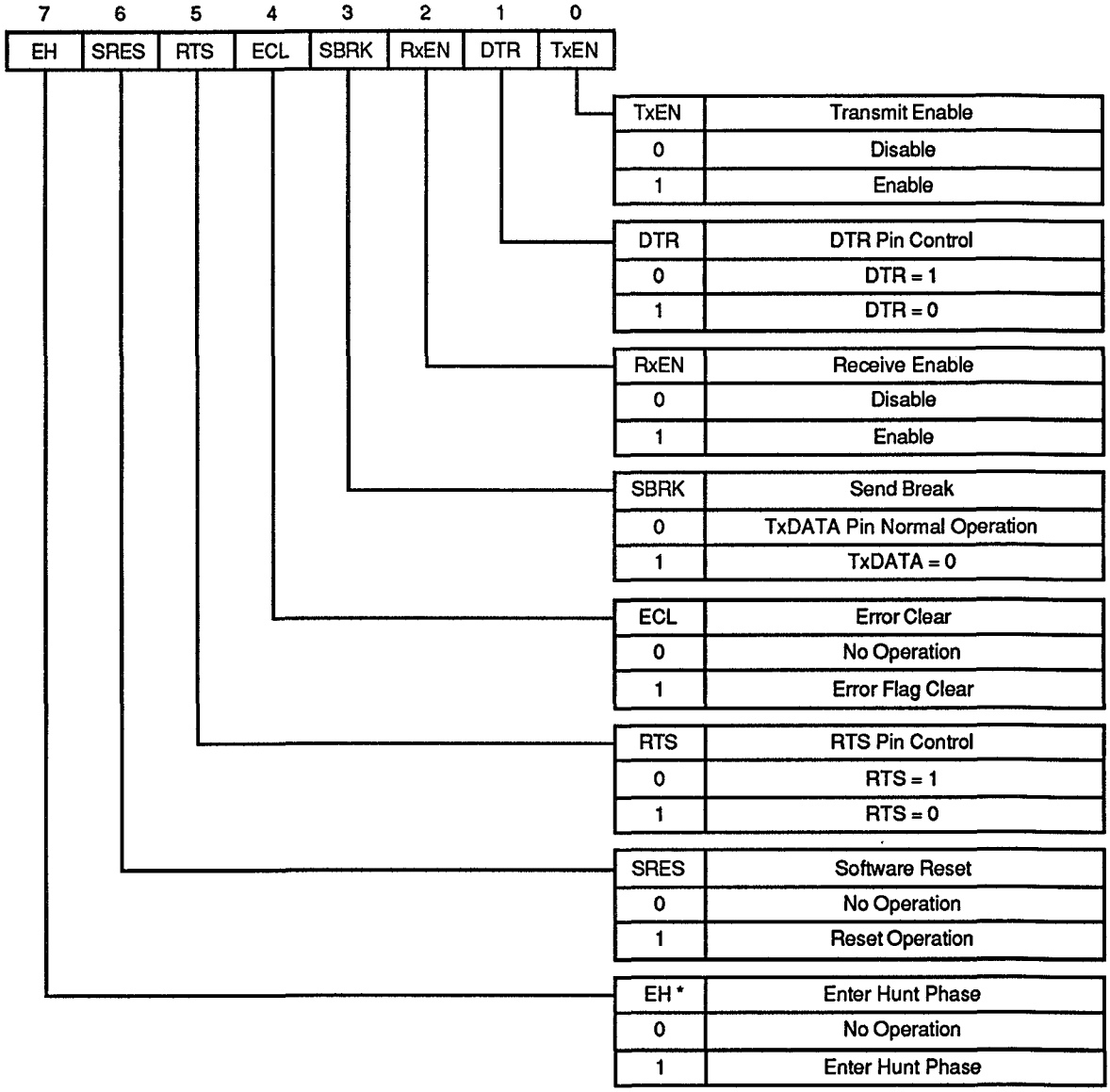
L1	L0	CHARACTER LENGTH
0	0	5 - BIT
0	1	6 - BIT
1	0	7 - BIT
1	1	8 - BIT

P1	P0	PARITY GENERATOR / CHECK
X	0	NO PARITY
0	1	ODD PARITY
1	1	EVEN PARITY

ST1	ST0	TRANSMIT STOP BITS
0	0	USE INHIBITED
0	1	1 - BIT
1	0	1 5 - BIT
1	1	2 - BIT

X = DOESN'T MATTER

μPD71051 Register Function



* The EH bit is effective only in the sync mode. It is not effective in the asynchronous mode.

μPD71054 Timer / Counter Mode and Function : Only Write-In

Memory Address (hex)	Access Mode	Timer/Counter and Register	Setting Mode	Input Clock	Function
C000	Write	Timer / Counter 0	Mode 3	9 8304 Mhz (1)	Baud Rate Generator (2) Set Data : Baud Rate x 16
C001	Write	Timer / Counter 1	Mode 2	2 Mhz	Real Time Clock (Interrupt) Binary Count 32 768ms max
C002	Write	Timer / Counter 2	Mode 0	2 Mhz	Watch Dog Timer Binary Count 32 768ms max.
C003	Write	Control Word Register	—	—	Control Word Format (3)

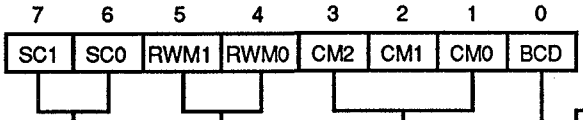
NOTES:

(1) ES Card - 10 MHz

(2) Maximum baud rate at baud rate x 16 and asynchronous mode.

(3) Control Word Format

DC ~ 136.5kbit/sec



BCD	Binary or BCD
0	Binary count (16 bits)
1	BCD count (4 digits)

CM2	CM1	CM0	Count Mode
0	0	0	Mode 0
0	0	1	Mode 1
X	1	0	Mode 2
X	1	1	Mode 3
1	0	0	Mode 4
1	0	1	Mode 5

RWM1	RWM0	Read / Write Mode
0	0	Count latch command
0	1	Lower byte
1	0	Higher byte
1	1	Lower – higher

SC1	SC0	Select Counter or Multiple Latch Command
0	0	Timer / Counter 0
0	1	Timer / Counter 1
1	0	Timer / Counter 2
1	1	Multiple latch command

X = DOESN'T MATTER

μPD71055 I/O Port Function (2-1)

Memory Address (hex)	Port No.	BIT No.	Signal Name	Access Mode	Active Level	Function
E000 (Read)	Port 0 8255 Port A	P00	SW1-1	Read (Input)	Switch On = 0 (L) Off = 1 (H)	Station Address 2^0
		P01	SW1-2			Station Address 2^1
		P02	SW1-3			Station Address 2^2
		P03	SW1-4			Station Address 2^3
		P04	SW1-5			Station Address 2^4
		P05	SW1-6			
		P06	SW1-7			
		P07	SW1-8			
E001 (Read)	Port 1 8255 Port B	P10	SW2-1	Read (Input)	Switch On = 0 (L) Off = 1 (H)	BPS Select 1
		P11	SW2-2			BPS Select 2
		P12	SW2-3			BPS Select 3
		P13	SW2-4			BPS Select 4
		P14	SW2-5			Mode Select 1
		P15	SW2-6			Mode Select 2
		P16	SW2-7			Mode Select 3
		P17	SW2-8			Mode Select 4

μPD71055 I/O Port Function

Memory Address (hex)	Port No.	BIT No.	Signal Name	Access Mode	Active Level	Function
E002 (Write)	Port 2 8255 Port C	P20	Bus Error	Write (Output) P24 ~ P27 Data "0" Set	1 (H) Data Set = 1	Serial Communication Error 0.1 second min.
		P21	DPAE		1 (H) Data Set = 1	Dual Port Ram Access Error 0.1 second min
		P22	51RST		1 (H) Data Set = 1	IC : μ PD71051 (USART) Reset H Reset
		P23	Bus Error Led		1 (H) Data Set = 1	Serial Communication Error Led
		P24	—		Data Set = 0	NOT USED
		P25	—		Data Set = 0	NOT USED
		P26	—		Data Set = 0	NOT USED
		P27	—		Data Set = 0	NOT USED

μPD71055 Command Register

Memory Address (hex)	Access Mode	BIT No.	Set Data	Function
E003 (Write)	Write	0	0	Port 2, Bit 0~3 : Output Mode
		1	1	Port 1, Bit 0~7 : Input Mode
		2	0	Mode 0 Select
		3	0	Port 2, Bit 4~7 Output Mode
		4	1	Port 0, Bit 0~7 : Input Mode
		5	0	Mode 0 Select
		6	0	
		7	1	Mode Select (Command Select)

92 (Hex) (Fixed)

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Appendix 2 — SAMPLE ASCII PROGRAM

INTRODUCTION

This appendix contains a complete sample program written for using the ASCII Communication Kit.

PROGRAM LISTING

```
'**********************************************

'This is a simple communication utility that talks to a GPD 503 controller
'via the SCB board.  At present, the baud rate is set at 2400 baud and
'control of the GPD 503 is limited to RUN, STOP, FORWARD, REVERSE,
'and FREQUENCY.  This utility uses function keys for operator inputs.  Up to
'31 drives can be addressed and selected from the operator screen but
'only one drive is communicated with at a time.  Communication is only from
'master to slave (computer to GPD 503), and data sent back from drive is
'not checked.

'**************************

Compiler:  QB4.5

'**************************

History:

'**********************************************

DECLARE SUB DecToHex (decimal&, digit0$, digit1$, digit2$, digit3$)

DECLARE FUNCTION HCONV! (StringTo Conv$)


DIM Drive$(20, 32)

DIM Frequency&(32)


'predefinitions

OPEN "COM2:2400,N,8,1,BIN,RS,OP0,DS0" FOR OUTPUT AS 3

STX$ = CHR$(2)

ETX$ = CHR$(3)


FOR PortNumber = 1 TO 31

Drive$(0, PortNumber) = "1"

Drive$(1, PortNumber) = "0"

Drive$(2, PortNumber) = "0"
```

```
Drive$(3, PortNumber) = "0"
Drive$(4, PortNumber) = "0"
Drive$(5, PortNumber) = "0"
Drive$(6, PortNumber) = "5"
Drive$(7, PortNumber) = "E"
Frequency&(PortNumber) = 0
Next PortNumber

PortNumber = 1

'Display Setup
CL$
LOCATE 2, 1: PRINT "GPD 503 COMMUNICATION UTILITY"
LOCATE 2, 1: PRINT "Version 1.0"

'Setup function keys
LOCATE 22, 1: PRINT "  F1    F2       F3       F4       F5       F6      F7      F10"
LOCATE 23, 1: PRINT "Stop   Run   Forward  Reverse  Lower    Raise   Set     Exit"
LOCATE 24, 1: PRINT "                                 Freq.    Freq    Port#"
ON KEY(1) GOSUB DriveStop
ON KEY(2) GOSUB DriveRun
ON KEY(3) GOSUB DriveForward
ON KEY(4) GOSUB DriveReverse
ON KEY(7) GOSUB DrivePort
ON KEY(10) GOSUB UtilityExit
ON KEY(5) GOSUB LowerFreq
ON KEY(6) GOSUB RaiseFreq
ON TIMER(2) GOSUB UpDate
KEY(1) ON: KEY(2) ON: KEY(3) ON: KEY(4) ON: KEY(5) ON: KEY(10) ON: TIMER ON
KEY(6) ON: KEY(7) ON
```

```
Frequency&(PortNumber) = 0

ON TIMER(1) GOSUB UpDate

DO UNTIL 1 <> 1
    LOCATE 7, 1
    PRINT "PortNumber: "; Drive$(1, PortNumber); Drive$(0, PortNumber)
    PRINT "Run / Stop: ";
        IF ASC(Drive$(4, PortNumber)) AND &H1 THEN
            PRINT "Run"
            ELSE
            PRINT "Stop"
        END IF
    PRINT "Frequency: "; Frequency&(PortNumber)

    PRINT "Forward / Reverse: ";
        IF (ASC(Drive$(4, PortNumber))) AND &H2 THEN
            PRINT "Reverse"
            ELSE
            PRINT "Forward"
        END IF

LOOP

UpDate:

'construct data stream or calculate BCC

CALL DecToHex(Frequency&(PortNumber) * 100, Drive$(8, PortNumber), Drive$(9, PortNumber), Drive$(10, PortNumber),
Drive$(11, PortNumber)

DATA0& = HCONV(Drive$(0, PortNumber)) + (16 * HCONV(Drive$(1, PortNumber)))

DATA0& = (DATA0& + (256 * HCONV(Drive$(2, PortNumber))) + (4096 * HCONV(Drive$(3, PortNumber))) AND &HFFFF
```

```
DATA1& = HCONV(Drive$(4,PortNumber)) + 16 * HCONV(Drive$(5, PortNumber))

DATA1& = (DATA1& + 256 * HCONV(Drive$(6, PortNumber)) = 4096 * HCONV(Drive$(7, PortNumber))) AND &HFFFF


DATA2& = HCONV(Drive$(8, PortNumber)) + 16 • HCONV(Drive$(9, PortNumber))

DATA2& = (DATA2& + 256 * HCONV(Drive$(10, PortNumber)) + 4096 * HCONV(Drive$(11, PortNumber))) NAD &HFFFF


bcc0& = (DATA0& XOR DATA1& XOR DATA2&)


CALL DecToHex(bcc0&, Drive$(12, PortNumber), Drive$(13, PortNumber), Drive$(14, PortNumber), Drive$(15, PortNumber))


DRIVE1$ = STX$ + Drive(0, PortNumber) + Drive$(1, PortNumber) + Drive$(2, PortNumber) + Drive$(3, PortNumber) +
Drive$(4, PortNumber)

DRIVE1$ = DRIVE1$ + Drive$(5, PortNumber) + Drive$(6, PortNumber) + Drive$(7, PortNumber) + Drive$(8, PortNumber) +
Drive$(9, PortNumber)

DRIVE1$ = DRIVE1$ + Drive$(10, PortNumber) + Drive$(11, PortNumber) + Drive$(12, PortNumber) + Drive$(13, PortNumber)
+ Drive$(14, PortNumber)

DRIVE1$ + DRIVE1$ + DRIVE$(15, PortNumber) + ETX$


'Sent data

    PRINT #3, DRIVE1$


RETURN


DriveStop:

Drive$(4, PortNumber) = CHR$(ASC(Drive$(4, PortNumber)) AND &HFE)

RETURN


DriveRun:

Drive$(4, PortNumber) = CHR$(ASC(Drive$(4, PortNumber)) OR &H1)

RETURN


DriveForward:

Drive$(4, PortNumber) = CHR$(ASC(Drive$(4, PortNumber)) AND &HFD)

RETURN
```

```
DriveReverse:
Drive$(4, PortNumber) = CHR$(ASC(Drive$(4, PortNumber)) OR &H2)
RETURN

DrivePort:      'get drive PortNumber from operator
Xaxis = CSRLIN
Yaxis = POS(0)
Status = 0
DO
    LOCATE 13, 35: PRINT "                                    ";
    LOCATE 12, 35: PRINT "Enter Drive PortNumber [ 1 to 31]"
    LOCATE 13, 35: INPUT "", PortNumber
        IF PortNumber > 31 OR PortNumber < 1 THEN
        LOCATE 13, 35: PRINT "Error Value Out Of Range ";
        ELSE Status = 1
        END IF
LOOP WHILE Status = 0

LOCATE 12, 35: PRINT "                                    ";
LOCATE 13, 35: PRINT "                                    ";
digit0 = (INT(PortNumber - ((INT(PortNumber / 100)) * 10))) + 48
Drive$(1, PortNumber) = CHR$(INT(PortNumber / 10) + 48)

IF digit0 > 57 THEN
    Drive$(0, PortNumber) = CHR$(digit0 + 7)
    ELSE
    Drive$(0, PortNumber) = CHR$(digit0)
    END IF
LOCATE Xaxis, Yaxis          'if CPU was displaying frequency at time of interrupt
                             ' this insures it completes screen update correct
RETURN
```

```
LowerFreq:
IF Frequency&(PortNumber) > 0 THEN Frequency&(PortNumber) = Frequency&(PortNumber) – 1
RETURN

RaiseFreq:
IF Frequency&(PortNumber) < 60 THEN Frequency&(PortNumber) = Frequency&(PortNumber) + 1
RETURN

UtilityExit:
CLOSE 3
CLS
END
RETURN


'*************************************************
'Converts decimal integers less or = to 65535 to 4 digit ASCII hex digits  *
'inputs: decimal&                                                          *
'outputs: digit0$, digit1$, digit2$, digit3$                              *
'*************************************************
SUB DecToHex (decimal&, digit0$, digit1$, digit2$, digit3$)

IF decimal& >= 4096 THEN
    digit3 = INT(decimal& / 4096)
    decimal& = decimal& - digit3 * (4096)
    END IF

IF decimal& >= 256 THEN
    digit2 = INT(decimal& / 256)
    decimal& = decimal& - digit2 * (256)
    END IF
```

```
IF decimal& >= 16 THEN
    digit1 = INT(decimal& / 16)
    decimal& = decimal& - digit1 * (16)
    END IF

digit0 = INT(decimal&)

IF digit3 >= 10 THEN
    digit3$ = CHR$(digit3 + 55)
    ELSE digit3$ = CHR$(digit3 + 48)
    END IF

IF digit2 >= 10 THEN
    digit2$ = CHR$(digit2 + 55)
    ELSE digit2$ = CHR$(digit2 + 48)
    END IF

IF digit1 >= 10 THEN
    digit1$ = CHR$(digit1 + 55)
    ELSE digit1$ = CHR$(digit1 + 48)
    END IF

IF digit0 >= 10 THEN
    digit0$ = CHR$(digit0 +55)
    ELSE digit0$ = CHR$(digit0 + 48)
    END IF

END SUB
```

```
*********************************************
'Converts a ASCII hex digit to a decimal                    *
'inputs: StringToConv$                                      *
'outputs: HCONV                                             *
*********************************************
FUNCTION HCONV (StringToConv$)

DecValue = ASC(StringToConv$)
IF DecValue > 57 THEN
    DecValue = DecValue - 55
    ELSE
        DecValue = DecValue - 48
    END IF
HCONV = DecValue

END FUNCTION
```

GPD 503 / ASCII

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