



Receipt of Equipment

When the equipment is received, the outside packing case should be checked immediately for any shipping damage. If the packing case has been damaged, the local carrier should be notified at once regarding his liability. Carefully remove the unit from its packing case and inspect for damaged or missing parts.

If damage has occurred during shipment or parts are missing, a written report should be submitted to the Customer Service Department, Smith Meter Inc., Erie, Pennsylvania 16514.

Prior to installation, the unit should be stored in its original packing case and protected from adverse weather conditions and abuse.

Caution:

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this Instruction Manual, may cause interference to radio communications. It has not been tested to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Warning

These Preset Devices must be used with fail-safe backup equipment to prevent accidental runaway delivery of product. Failure to provide backup equipment could result in personal injury, property loss and equipment damage.

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Section I - Introduction

Introduction

This manual fully describes how the Smith AccuLoad II electronic preset communicates with other computing devices from a simple dumb terminal to a large computer.

Incorporated within the AccuLoad II is the ability to directly (i.e., without a modem or multiplexer) communicate with an EIA-232C and/or an EIA-485 Compatible Remote terminal or minicomputer. Depending on the communication type, certain key information from up to 16 AccuLoad IIs (32 meter positions) can be requested (polled) and if the AccuLoad IIs are so programmed, remotely authorize and release (for the driver's use) the meter position desired. The operator may also authorize specific additions, remotely set the batch volume, reset alarms, and remotely program certain AccuLoad II program codes.

In addition to its communications capability with computers, the AccuLoad II also has the capability, if so programmed, to communicate one on one with a communicating printer, sharing a printer with up to 15 other AccuLoad IIs, a smart additive injector system, or with the Smith Mass Meter through its master/slave communications capability. The AccuLoad II is designed to provide the customer with the flexibility to be able to program the unit to fit the application.

The AccuLoad II will also incorporate a Local Storage Mode option, which will be automatically engaged if polling of the AccuLoad II through communications ceases for a programmable period allowing the AccuLoad II to continue to emulate the automation system locally until the problem is corrected. The AccuLoad II will provide five programmable prompt messages with an associated data entry amount which is also programmable. While the AccuLoad II will provide a full range of communications program codes for use in an automation system; these standby features, when programmed in, will allow the AccuLoad II to continue operating if an automation communications failure occurs.

Once the maximum amount of transactions per meter position have been stored, the AccuLoad II will not permit any additional transactions on that meter position to take place while in the Local Storage Mode. While in this state, any attempt to initiate a new transaction will result in an error message in that meter position being displayed. Functional op

eration of that position may be resumed when communications has been restored to the AccuLoad II, the mode of operation is changed or the Local Storage information is cleared.

To communicate with a particular AccuLoad II unit the following communication program codes involving type, mode, address and configuration must be specified for that particular AccuLoad II unit:

AccuLoad II Rev. 0 & 1

Code Description

- 701** EIA-232 Communication Type
- 702** EIA-232 Communication Control
- 703** EIA-232 Baud Rate
- 704** EIA-485 Communication Type
- 705** EIA-485 Communication Control
- 706** EIA-485 Baud Rate
- 707** Communication Address
- 742** Communication Time-out Setting
- 743** Communications Alarm Mode Setting

Note: See Operator Reference Manual MN06038 for complete description of program codes.

AccuLoad II Rev. 2 & Up

Code Description

- 701** EIA-232 Communication Type
- 702** EIA-232 Communication Control
- 703** EIA-232 Baud Rate
- 704** EIA-232 Data Format
- 705** EIA-485 Communication Type
- 706** EIA-485 Communication Control
- 707** EIA-485 Baud Rate

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- 708 EIA-485 Data Format
- 709 Communication Address
- 742 Communication Time-out Setting
- 743 Communications Alarm Mode Setting

Note: See Operator Reference Manual MN06050L for complete description of program codes.

Standby Automation Mode

The Standby Local Storage Mode option will be incorporated automatically if the AccuLoad II Communications Polling Time-out program code is appropriately programmed. When Local Storage is in use it will allow for the retention of transaction information and will set a status flag indicating it is in the Local Storage Mode of operation. Automation functional operation may be resumed when communications have been restored to the AccuLoad II. This is accomplished when the AccuLoad II is issued a Restore Communications code (RC) which will clear the Local Storage Mode status flag and resume normal operations under the Communications Mode currently programmed. However, the restored operation will not clear the stored transaction data which can only be done through use of a communications Clear Transaction Data code (CT) or locally through diagnostics.

Operational Notes

1. When the AccuLoad II unit enters the Standby Mode the unit will retain the authorization status (if present) for the next transaction completed under the Standby Mode. Thereafter, the authorization status flag would be removed.
2. Additive selection made during Standby operation may be made manually or automatically depending on the entry made in the injector option program code.
3. When communication has been restored to the AccuLoad II before the issue of the Restore Communications code (or setting the Communication Time-out code to zero) the AccuLoad II will maintain local storage operation but will allow a Polling Only Mode of communication for diagnostic or status checking.

4. The last transaction completed at the time the unit enters the Standby Mode of operation would be logged as a local storage transaction provided the following conditions exist:
 - a. The transaction completed has not already been logged as a local storage transaction.
 - b. The transaction done status is present at the time the 'SET' key is pressed during the preset operation at the start of a transaction only. The transaction done status shows a transaction was completed and is returned via a status request communication command; it is reset when the unit is authorized by communications for a transaction.
 - c. The unit is in the Standby Mode of operation.

All transactions completed after the unit is in Standby Mode of operation will be logged as local storage transactions provided the unit is in the Standby Mode at the time of transaction completion.

The local storage transaction number will reflect the number of local storage transactions logged (i.e., stored).

The following information will be stored by the AccuLoad II (per meter position) for each transaction.

1. Data Entry for Prompt 1 (9 Digits maximum if used).
2. Data Entry for Prompt 2 (9 Digits maximum if used).
3. Data Entry for Prompt 3 (9 Digits maximum if used).
4. Data Entry for Prompt 4 (9 Digits maximum if used).
5. Data Entry for Prompt 5 (9 Digits maximum if used).
6. Raw Transaction Totals.
7. Gross Transaction Totals.
8. Gross @ Standard Temperature Transaction Totals.
9. Net Transaction Totals.
10. Mass Transaction Totals.

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11. Additive Totals for Each Transaction.
12. Transaction Date & Time of Completion.
13. Load Average Temperature.
14. Load Average Pressure.
15. Load Average Density.
16. Load Average Meter Factor.
17. Number of Batches on this Transaction (Up to Nine Batch Totals per Transaction with the additive code for each).
18. Alarm history.
19. Transaction Number.

Transactions are stored in a circular buffer. Once the memory space is filled, the information from the current transaction will overwrite the oldest transaction stored. However, standby transactions are never overwritten until they have been cleared. When a new transaction would cause the data from an uncleared standby transaction to be overwritten, that transaction is not allowed and a Storage Full Alarm is generated. At this point, the AccuLoad II will not permit any additional transactions whether in Standby or not. While in this state, any attempt to initiate a new transaction will result in an error message being displayed when the "SET" key is pressed during the preset operation. Also, if communications have been restored under the storage full condition, batch and transaction authorization will not be allowed until the stored transaction data has been cleared.

Section II - Communication Primer

Samuel F.B. Morse's dot-dash telegraph code is the earliest example of a practical, time sequential, data coding scheme for transmission of information by communication equipment. This code is considered the predecessor of the ones and zeros modern digital communication codes now used for serial data transmission of time sequenced information over a pair of wires.

Similar to Morse Code, digital codes provide a means of representing numbers, letters of the alphabet, or other special characters in a digital information system. A digital code is a pattern of binary digits or bits (zeros and ones arranged in a particular fashion). The most familiar code used for arithmetic computations in digital systems is the Binary Coded Decimal commonly known as BCD code. The BCD code is a weighted code in that a numerical weight is assigned to each bit position in the code. Using a 4 bit BCD code for an example, the left most bit has a numeric weighted value of 8, the next bit has a numeric weighted value of 4, the next to the last bit a weighted value of 2 and the last bit, a value of 1.

The total value of the coded number is equal to the sum of the numerical weights of the bits represented by the binary digit 1. Four bit BCD codes are valid only for numbers between 0 and 9. For example, the number 3 is represented by a BCD code of '0011' and the number 9 is '1001'. To represent 39 the respective BCD code is '0011 1001'.

There are many different codes used to perform specific tasks in digital systems, but the one code most widely used in digital communications systems is the American Standard Code for Information Interchange or simply ASCII code. Like other binary codes the ASCII code is a weighted code.

The ASCII code is a more complex code than BCD since it uses patterns of seven bits to represent 128 characters consisting of either higher or lowercase letters of the alphabet, punctuation characters, and control characters in addition to numbers. For example the ASCII code representation of the number 39 is '0110011 0111001'. A complete ASCII code character table is shown in Table 1.

Section II - Communication Primer

ASCII Code Table

ASCII CHARACTER	DECIMAL	HEX	BINARY
NUL	0	0	000 0000
STX	2	2	000 0010
ETX	3	3	000 0011
LF	10	A	000 1010
CR	13	D	000 1101
SP	32	20	010 0000
*	42	2A	010 1010
0	48	30	011 0000
1	49	31	011 0001
2	50	32	011 0010
3	51	33	011 0011
4	52	34	011 0100
5	53	35	011 0101
6	54	36	011 0110
7	55	37	011 0111
8	56	38	011 1000
9	57	39	011 1001
A	65	41	100 0001
B	66	42	100 0010
C	67	43	100 0011
D	68	44	100 0100
E	69	45	100 0101
F	70	46	100 0110
G	71	47	100 0111
H	72	48	100 1000
I	73	49	100 1001
J	74	4A	100 1010
K	75	4B	100 1011
L	76	4C	100 1100

Section II - Communication Primer

ASCII CHARACTER	DECIMAL	HEX	BINARY
M	77	4D	100 1101
N	78	4E	100 1110
O	79	4F	100 1111
P	80	50	101 0000
Q	81	51	101 0001
R	82	52	101 0010
S	83	53	101 0011
T	84	54	101 0100
U	85	55	101 0101
V	86	56	101 0110
W	87	57	101 0111
X	88	58	101 1000
Y	89	59	101 1001
Z	90	5A	101 1010
DEL	127	7F	111 1111

Table 1. ASCII Codes

A computer system always requires some digital data transmission between its various parts - CPU to peripherals, CPU to memory, or memory to peripherals. Data transmission to and from these devices must conform to some accepted standard. To date the only widely used transmission standards deal with serial digital data. There are essentially three organizations that issue standards that define serial digital communication interface circuits, their electrical and timing characteristics, the manner in which they operate, and the mechanical details of the appropriate connectors. These organizations are the Electronics Industries Association (EIA), the International Consultative Committee for Telephony and Telegraphy (CCITT), and the International Standards Organization (ISO). EIA Standard EIA-232 (formerly known as RS-232) is the most

popular serial interface standard. This standard is extensively used by terminals, data sets, measuring instruments, and controllers for data transmission rates up to 20,000 bits per seconds for transmission cables up to 50 feet in length. EIA-232 is a single ended voltage mode transmission system standard that defines data communication between equipment using alternating pulses which can be in one of two states - either high (logic 1) or low (logic 0). These states are often called "mark" (logic 1) or "space" (logic 0). According to EIA, the logical 1 level must be within +3.75 to +25 volts dc., while the logical 0 level must be within -3.75 to -25 volts dc. Any other voltage levels are unacceptable according to EIA standards. Figure 1 shows a typical EIA-232 bit stream as captured on an oscilloscope.

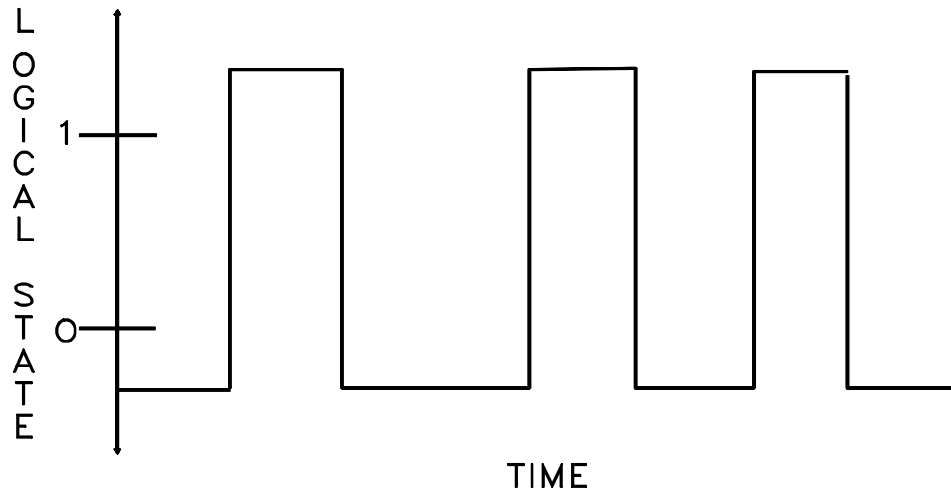


Figure 1 Typical EIA-232 Bit Stream

EIA-232 is not the only serial interface standard or system. EIA-422, 485 and 20 mA current loop are among the newer long distance current mode digital communication standards. The current mode standards are better suited for longer distance, higher speed communications than its voltage mode predecessors. Although not a revolutionary concept, the current mode system dates back to the oldest form of binary serial transmission - the telegraph. In this system a current (usually 20 mA) flows through a single loop to represent a logic level one and turns off ("open key" to represent logic zero).

Serial data is typically transmitted among or between devices in an asynchronous fashion. In asynchronous

data transmission each transmitted character is formed by using a start bit which signals the beginning of the character before the ASCII code pattern, and one or two stop bits after the code pattern signaling the end of the character. The ASCII character is described fully by seven bits with an optional parity bit in the eighth position for error control (see Figure 2). Therefore each transmitted ASCII character requires at least ten bits for complete definition. As the communication equipment receives the asynchronously transmitted characters the start and stop bits are stripped off, parity is checked, and the character itself is interpreted and treated according to whether it is alphanumeric data or control information.

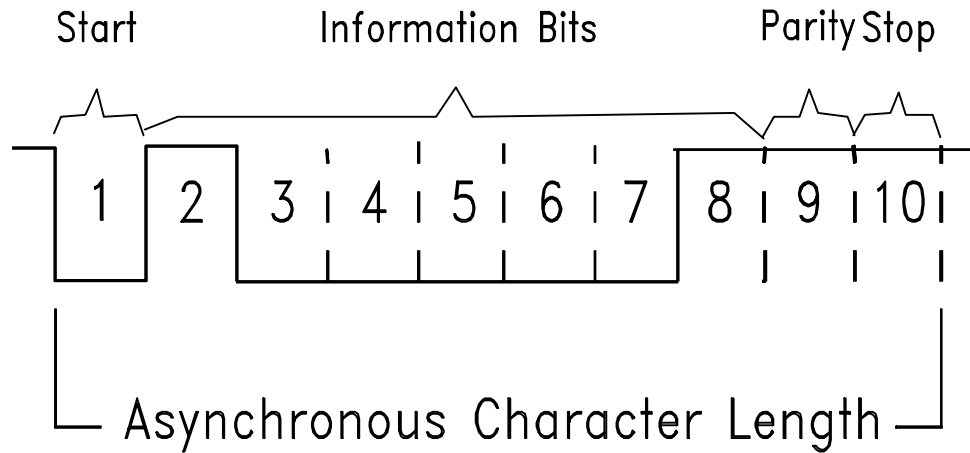


Figure 2 Asynchronous Characters are Framed by Start and Stop Bits

Baud rate and bit rate are two distinct terms used to describe the speed of data transmission. These terms are often used synonymously and cause much confusion if not completely understood. The baud is a measurement unit dating back to the days of Morse Code and it is defined as the shortest signaling element. In modern telecommunications language the data rate is more often specified in bits per second (bps) because a single change of state in a signal can represent a group of two or more data bits.

If each signal event represents only one bit condition, baud rate equals bps. Typical asynchronous serial baud rates are 110, 300, 600, 1200, 2400, 4800, and 9600 bps. To have an interactive session between two computing devices both of the devices must either be transmitting and receiving at the same baud rate or there must be an intermediate memory device (called a buffer) that accommodates the differences in speed.

Section 3 - Communication Protocol

Communication Type 1, For Terminal Mode of Operation

This character oriented protocol uses the ASCII character '*' to show the start of a message and Carriage Return - Line Feed (CR-LF) characters to terminate the message. No error checking other than parity on each character is performed.

The message format is:

*	A1 A2	text	CR	LF
---	-------	------	----	----

for an instruction to AccuLoad II, or

NL	*	A1 A2	text	CR	LF
----	---	-------	------	----	----

for a response from AccuLoad II.

Where:

* = Asterisk	Hex '2A'
text = Character string containing instructional or response information	
CR = Carriage Return	Hex '0D'
LF = Line Feed	Hex '0A'
NL = Null Character	Hex '00'
A1 A2 = AccuLoad II Address	(01 to 99)

The longest character string consists of 27 ASCII characters for the text of an instructional message sent to the AccuLoad II from a communication device and a maximum of 100 ASCII characters for the text of a response message transmitted from the AccuLoad II electronic preset controller to a communication device.

The universal or global address '00' is reserved and must not be assigned to any AccuLoad II. The address (A1 A2) always consists of two ASCII characters.

Data is formatted using ASCII characters and each character frame consists of 1 start bit, 7 or 8 data bits, none even or odd parity, and 1 stop bit (the data bits and parity are programmable in the communication directory). A maximum communication rate of 9600 baud is supported. The AccuLoad II does echo back the received character from the communication device in the Terminal Mode of operation.

Communication Type 2, For Minicomputer Mode of Operation

This character oriented protocol uses the transmission control characters STX to show the start of a message and ETX to terminate the message. A Longitudinal Redundancy Check (LRC) character follows the ETX character for additional message error detection beyond the traditional parity check done on each transmitted character.

The message format is:

STX	A1A2	text	ETX	LRC
-----	------	------	-----	-----

for an instruction to AccuLoad II, or

NL	STX	A1A2	text	ETX	LRC	PAD
----	-----	------	------	-----	-----	-----

for a response from AccuLoad II

Where:

NL = Null Character	Hex '00'
STX = Start of Text	Hex '02'
text = Character string containing instructional or response information	
ETX = End of Text	Hex '03'
LRC = Longitudinal Redundancy Check	
PAD = Pad Character	Hex '7F'
A1 A2 = AccuLoad II Address	(01 to 99)

The LRC is a 7 bit ASCII character computed as the Exclusive OR (XOR) sum of all characters following the STX and including the ETX transmission control characters.

The longest character string consists of 27 ASCII characters for the text of an instructional message sent to the AccuLoad II from a communication device and a maximum of 100 ASCII characters for the text of a response message transmitted from the AccuLoad II electronic preset controller to a communication device.

The universal or global address '00' is reserved and must not be assigned to any AccuLoad. The address (A1 A2) always consists of two ASCII characters.

Section 3 - Communication Protocol

Data is formatted using ASCII characters and each character frame consists of 1 start bit, 7 or 8 data bits, none, even or odd parity, and 1 stop bit for communication type 2, and 1 start bit, 7 or 8 data bits, none, even or odd parity, and 1 stop bit for communication type 3. (The data bits and parity are programmable in the Communication Directory). A maximum communication rate of 9600 baud is supported. There is no echo back of received characters by the AccuLoad II in the Minicomputer Mode of communications.

Text Format

Command and Response text will be shown enclosed in single quotes. Embedded spaces will be represented by an underscore character (_). Any other character representation will be described where used.

An 'OK' is used in response to any action type command that has been successfully carried out. For request only commands, a good response will report the data requested in the format shown for that command.

A 'NOXX' (XX represents a two character code) is used to show that the command has been rejected. The two character code represents the condition causing the rejection. For an expanded description of these codes, see "Appendix II" on page 151.

Time-out occurs when the command string has been entered incorrectly. Commands must be formatted exactly as stated. Invalid addresses, incomplete data, and excess data, are all causes for this to occur. A more detailed explanation follows:

INVALID ADDRESS - An AccuLoad II will ignore a command whose address does not match its own. The communication address is programmed into the AccuLoad II. See the Operator Reference manual (MN06038L for Rev. 0 and Rev. 1 and MN06050L for Rev. 2, Rev. 3 and Rev. 4) and Communications Directory for correct code.

COMPLETE DATA - The code format for each communication command has been stated above. If any portion of the command is left out a time-out will occur. The data field, however, is not required to include leading zeros and spaces and trailing spaces to fill the field.

EXCESS DATA - Commands must be formatted exactly as stated. No excess data may be inserted or added.

Communication Types

The type of communicating device that is being used in the system with an AccuLoad II is programmable and can be defined in the Communications Directory of the AccuLoad II. There are two types of communicating devices that can be used with either the EIA-232 Port or EIA-485 Port on the AccuLoad II (see Operator Reference Manual for programming details).

EIA Type Terminal - The AccuLoad II communications ports communicate with a terminal type device using a simplified communications protocol.

EIA Type Minicomputer - The AccuLoad II communications ports communicate with a minicomputer type device using a sophisticated and secure communications protocol.

***Gate City** - The AccuLoad II communication ports communicate with a Gate City additive injection system using a simplified communications protocol.

**Note: Applies to STD-16 and above firmware.*

Communication Mode Values

The amount of control that the EIA communicating device has over the AccuLoad II is programmable for various degrees of control.

0 = Polling Only - Permits the EIA-232 or EIA-485 communication device to request information only.

1 = Poll and Authorize - Permits the EIA-232 or EIA-485 communication device to request information and to authorize operation.

2 = Remote Control - Permits the EIA-232 or EIA-485 communication device to have complete control over all operations.

3 = Auto Out - Automatically prints a report at the end of each transaction.

4 = Shared Printer - Same as 3 except the printer may be shared between 16 AccuLoads.

Section 3 - Communication Protocol

5 = Smart Additive - Permits the AccuLoad II through either the EIA-232 or EIA-485 communications port to communicate with smart additive injector systems.

Note: Applies to STD-16 and above firmware.

6 = Micro-Pak Master/Slave Communications with a Micro-Pak Mass Meter - Downloads program parameters and retrieves density for use in GST and mass calculations.

Note: Applies to STD-15 and above firmware.

In this section, a simple flow chart illustrates how a computing device would communicate with AccuLoad II and vice-versa. The protocol used for communications is explained in detail in Section 3 and for clarity is not detailed in this illustration. Only references to comm and code text (listed in Section 65) are made for instructions to or responses from AccuLoad II.

Unless specified elsewhere in the manual, all messages formatted by the computing device use uppercase letters.

Assumptions used for this illustration are:

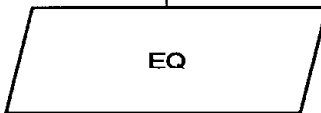
1. All AccuLoad IIs are powered-up, all internal flags have been cleared, all units are idle, and all units are correctly wired for serial communication.
2. The mode of communications is set for Poll and Authorize the AccuLoad II.

3. A maximum of 16 AccuLoad IIs are multi-dropped onto each serial communication port available at the computing device.
4. Each AccuLoad II is programmed with correct information and all have their own distinct communication address.
5. The maximum preset value is used in AccuLoad II.
6. No alarms are present.
7. For clarity, only one AccuLoad II is serviced in the illustration. All other AccuLoad IIs are polled sequentially. The actual manner of how the polling is accomplished is individually determined by how the communication handler is written for the communication device used and the priority level given to each task in the comm handler routine. The term polling in this illustration will refer to the computing device enquiring information from other AccuLoad IIs.
8. The illustration only shows communications at the computing devices end.
9. For clarity, decision trees are not illustrated.
10. AccuLoad II is programmed with standard units of measure: gallons, Degree F, GPM, PSI, etc.

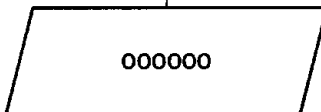
Section 4 - Using AccuLoad II Communications



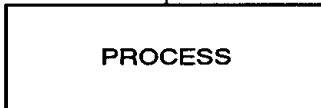
The computer sequentially asks each AccuLoad II for status. Following Processes and I/O transmissions may occur anytime during normal polling.



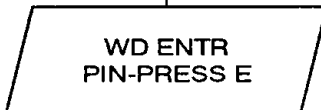
AccuLoad II is instructed to reply with the status of its operation.



The computer receives a six character response indicating an idle condition.



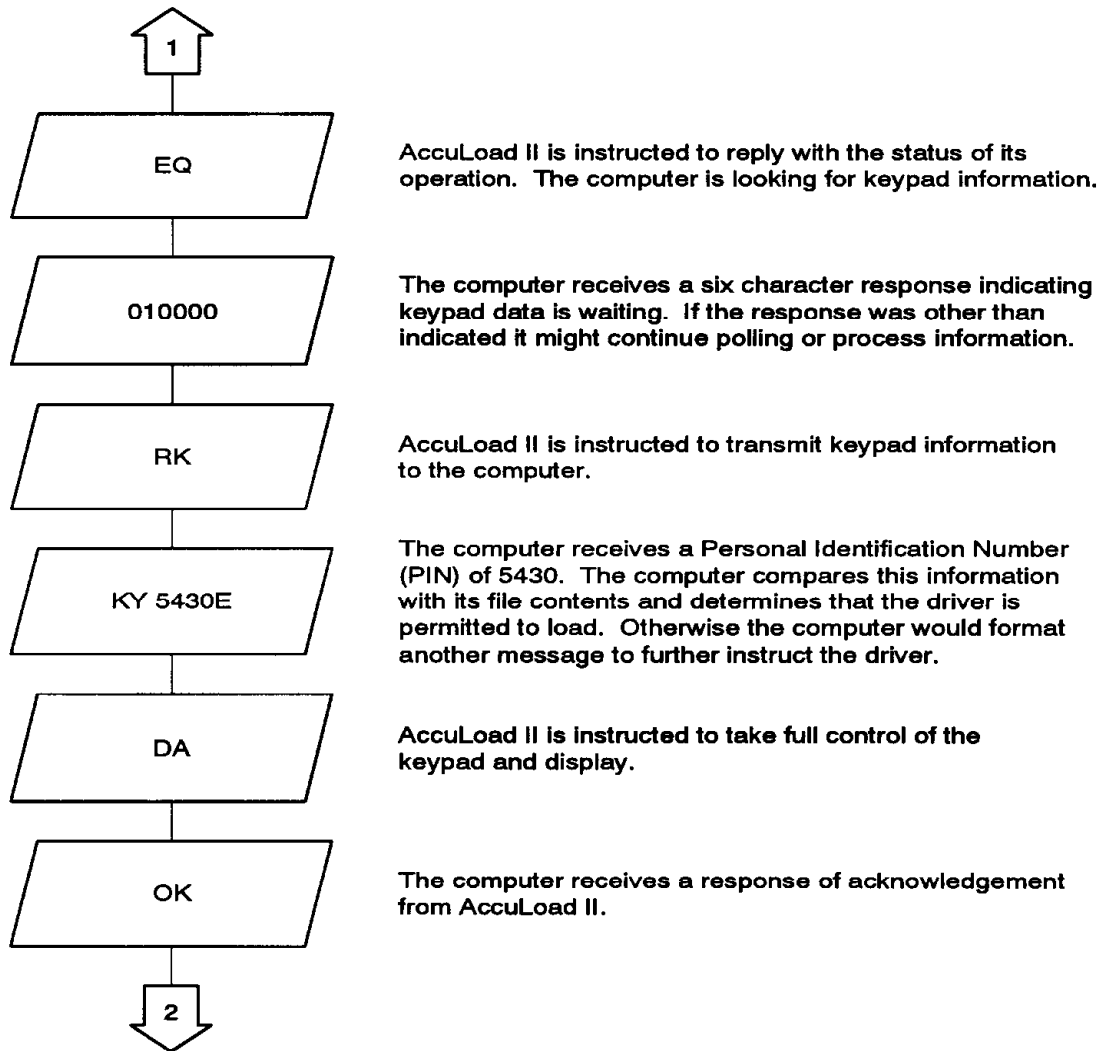
The computer processes information, sets internal flags, etc. The computer determines that a prompting message needs to be sent to AccuLoad II.



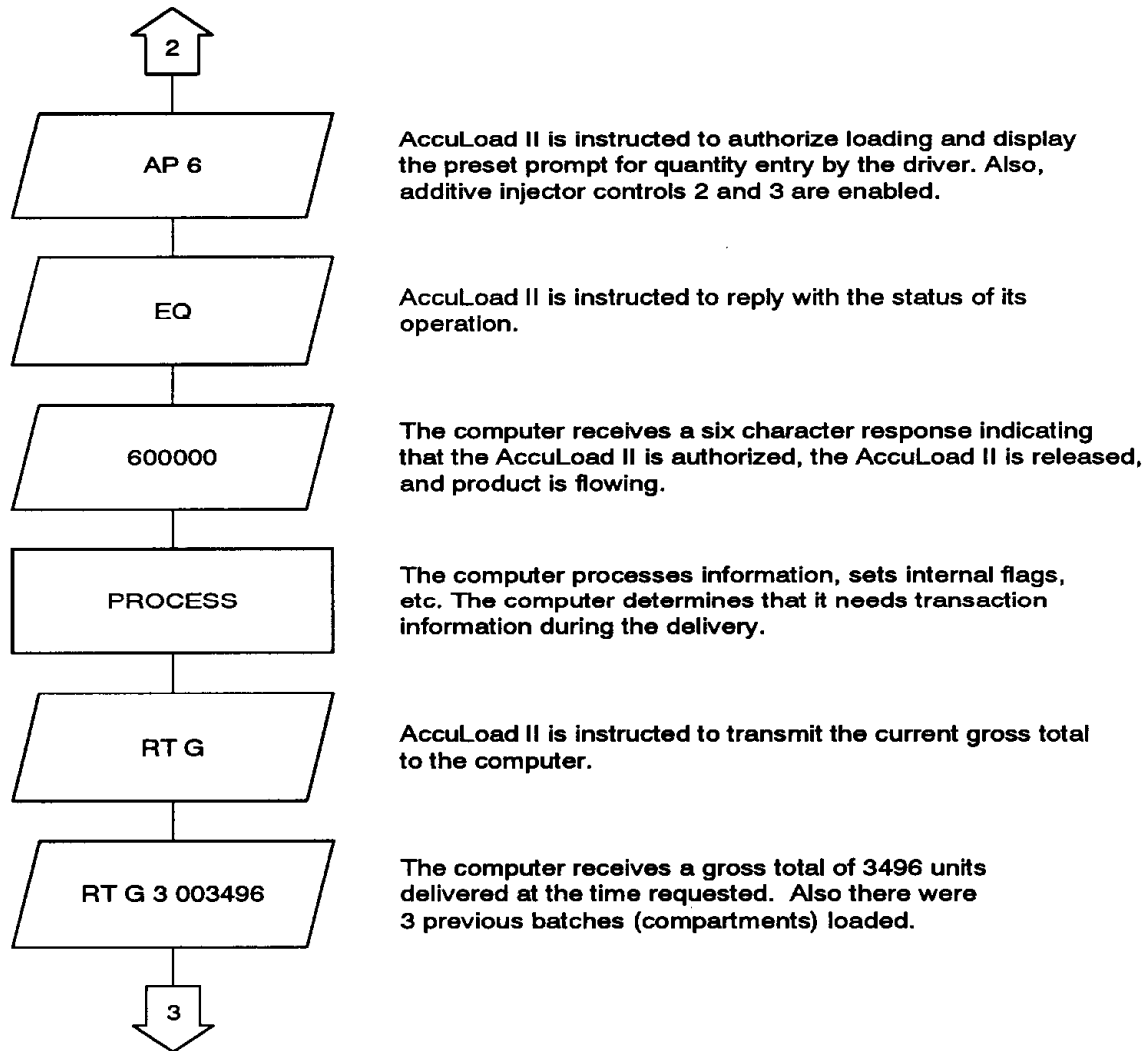
The computer instructs AccuLoad II to display the message ENTR PIN-PRESS E and enables the keypad and display.



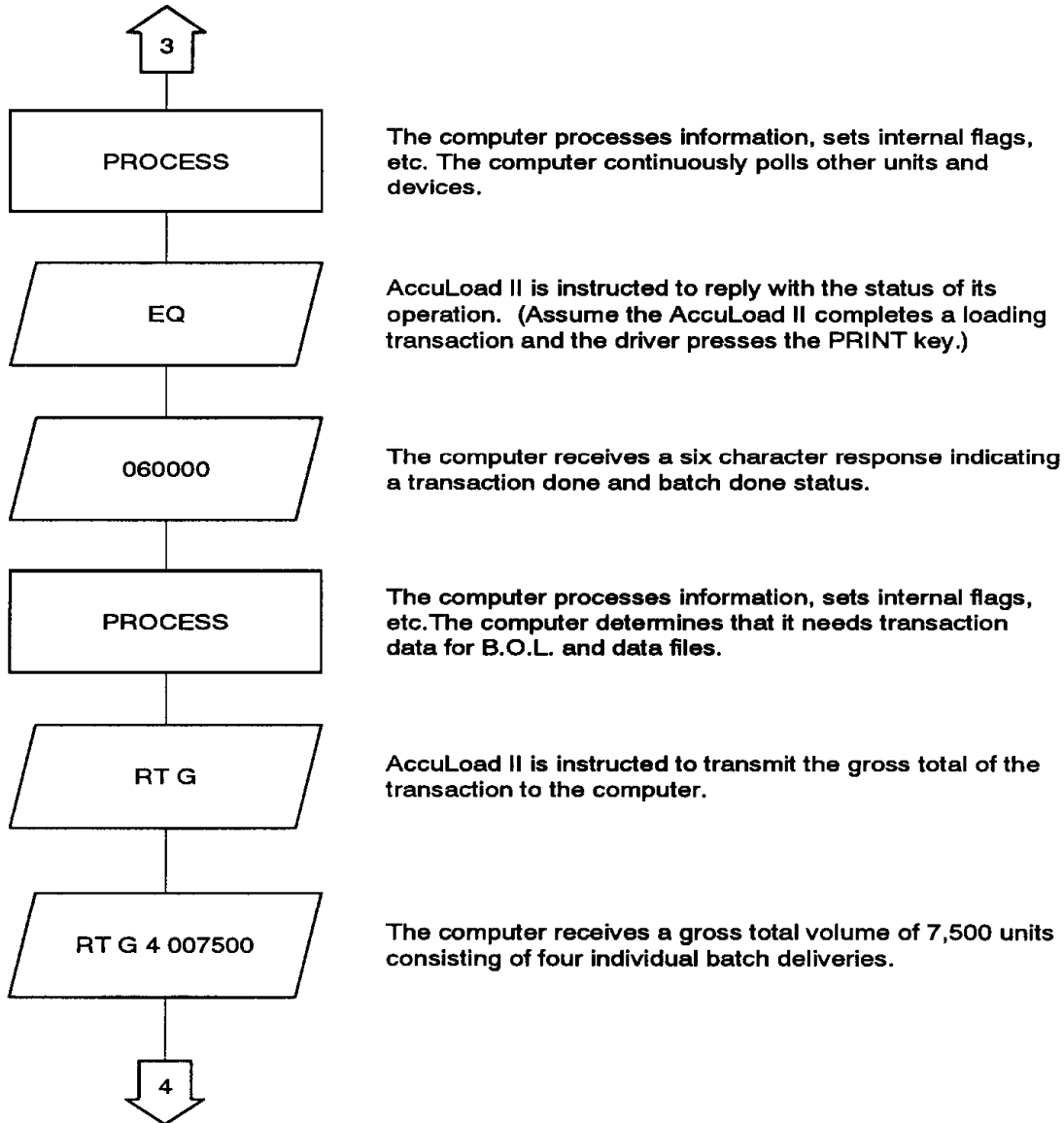
Section 4 - Using AccuLoad II Communications



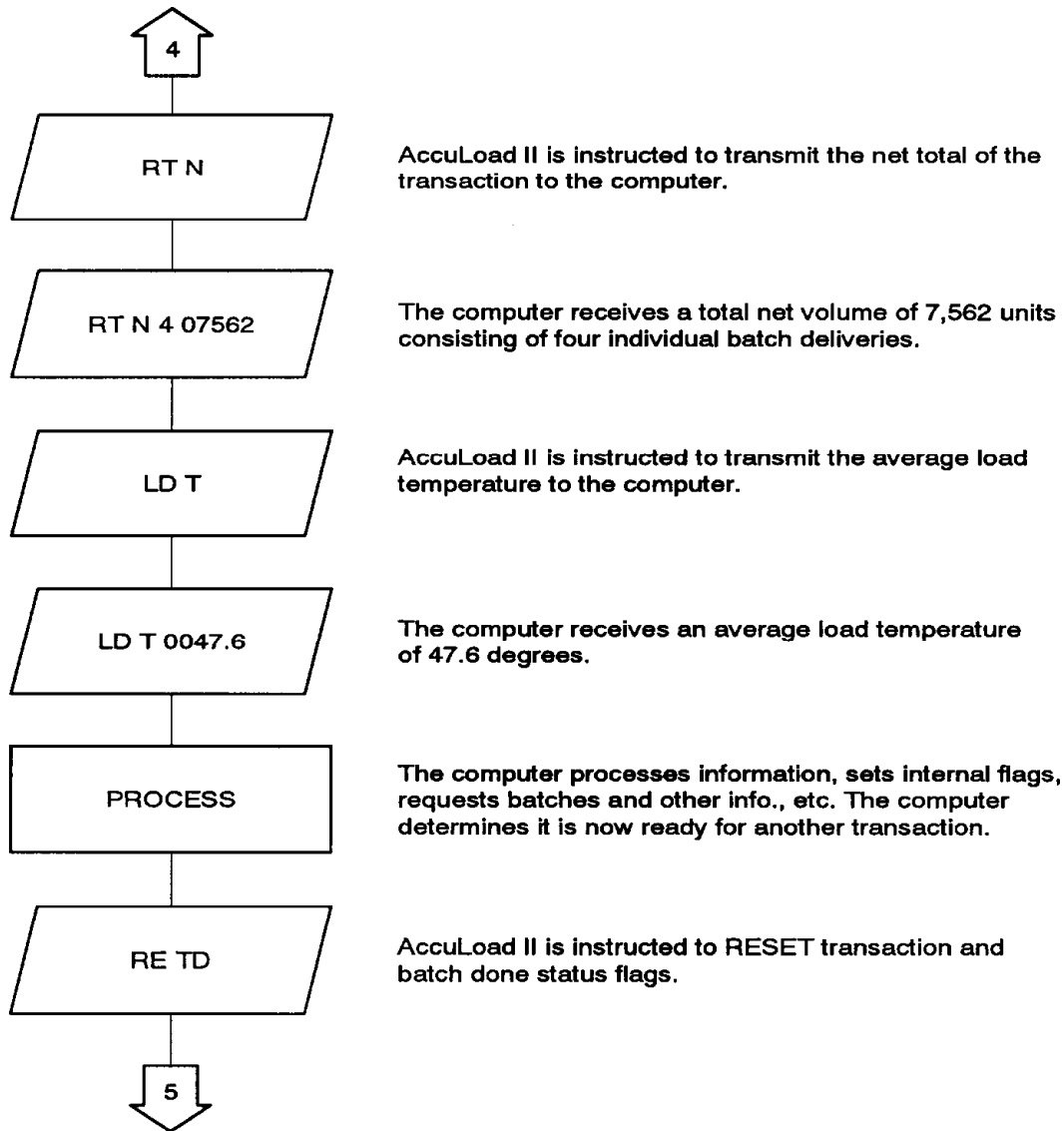
Section 4 - Using AccuLoad II Communications



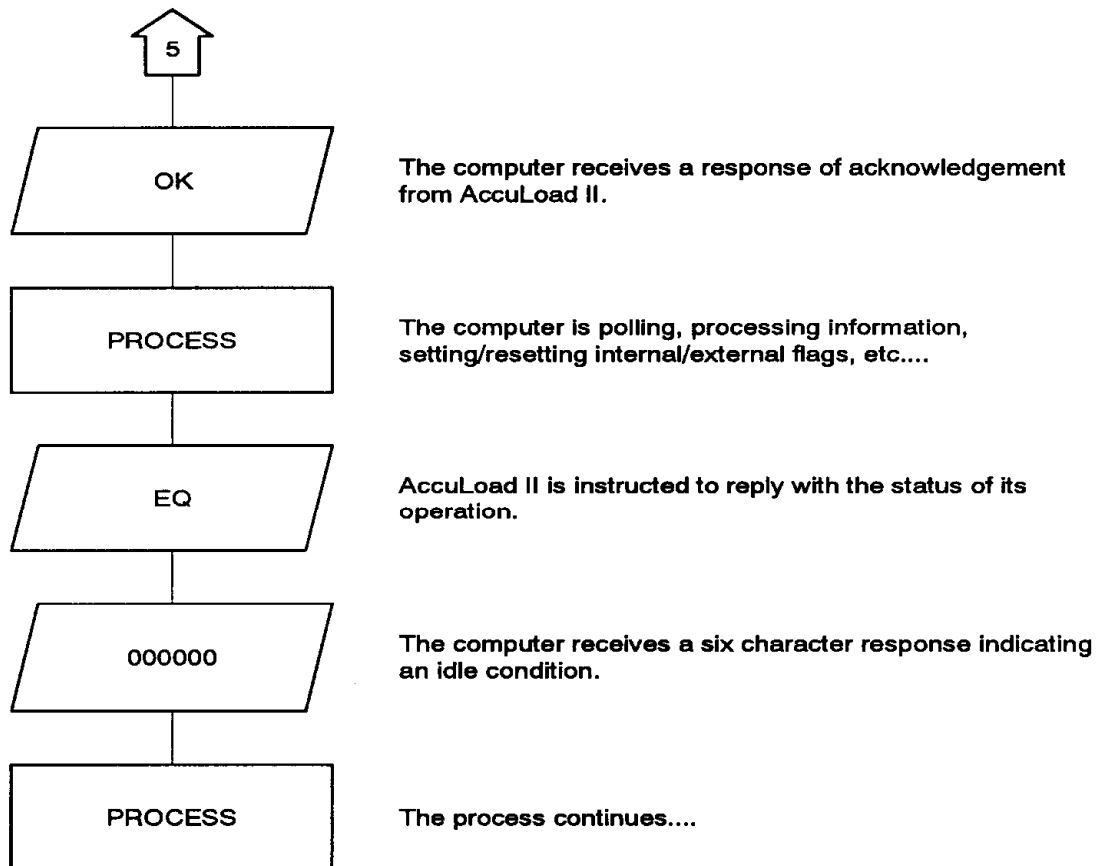
Section 4 - Using AccuLoad II Communications



Section 4 - Using AccuLoad II Communications



Section 4 - Using AccuLoad II Communications



Section 5 - Communications Diagnostics

The AccuLoad II (Rev. 2 and up firmware) provides an internal communication analyzer which can be used to diagnose the communications between the AccuLoad II and the computing device. The communication diagnostics are initiated by accessing the associated dynamic display.

The dynamic display is selected by pressing 'ENTER', 'XX' where XX is the number associated with the dynamic display to be viewed. The communication diagnostic displays are numbered from 50 through 55, see details on each display below. The display will remain displayed for the time period that is entered in program code 106 (00-99 seconds) of the General Purpose Directory. If a "00" is entered, the display will remain until the 'CLEAR' button is pressed. The AccuLoad II will continue to function normally while the display is on and other keystrokes may be entered.

Communications Dynamic Display Reference

50 - EIA-232 Comm Analyzer

This dynamic display diagnostic will show the 44 most recent characters received and transmitted by the AccuLoad II. This dynamic diagnostic will not interfere with the normal running of the communications. The 22 most recent characters will be displayed in ASCII as they are received or transmitted. These characters will scroll across the display from right to left with the most recent character appearing in the right-most position of the display.

The continuous scrolling of characters may be stopped by pressing the 'ENTER' button. This will allow the display to be frozen for closer review. Any subsequent received or transmitted characters will be ignored by this diagnostic though they will still be processed by communications. Pressing 'ENTER' again will cause characters 23 - 44 to be displayed in ASCII with the twenty-third most recent character in the right-most position of the display. Pressing 'ENTER' again will cause the most recent 11 characters to be displayed in hexadecimal with the most recent character displayed in the two right-most positions of the display. Continue to repeat this procedure to display characters 12 - 22, 23 - 33 and 34 - 44.

Transmitted characters will flash to allow them to be easily distinguished from the received characters. Some ASCII characters are not printable; these will be displayed as question marks. The pad character will be displayed as all segments lit.

A parity error will cause the "P" to be displayed in the left-most position of the display.

51 - EIA-232 Received Command

This dynamic display diagnostic will show the last complete command received by and addressed to the AccuLoad II. The first 22 characters of the command will be displayed. An additional 22 characters are stored and available for display. If the command is less than 44 characters, the remainder of the display will show blanks. This dynamic diagnostic will not interfere with the normal running of communications.

The continuous updating of the display as commands are received may be stopped by pressing the 'ENTER' button. This will allow the display to be frozen for closer review. Any subsequent received command will be ignored by this diagnostic though it will still be processed by communications. Pressing 'ENTER' again will cause characters 23 - 44 to be displayed in ASCII. Pressing 'ENTER' again will cause the first 11 characters of the command to be displayed in hexadecimal. Continue to repeat this procedure to display characters 12 - 22, 23 - 33 and 34 - 44. Some ASCII characters are not printable; these will be displayed as question marks. The pad character will be displayed as all segments lit. The null character will not be displayed.

The LRC error will cause an "L" to be displayed in the left-most position of the display.

52 - EIA-232 Transmitted Response

This dynamic display diagnostic will show the contents of the communications transmit buffer utilized by the AccuLoad II. At the time the AccuLoad II initiates a transmission, the first 22 characters of the response will be displayed. An additional 22 characters are stored and available for display. If the response is less than 44 characters, the remainder of the display will show blanks. This dynamic diagnostic will not interfere with the normal running of communications.

Section 5 - Communications Diagnostics

The continuous updating of the display as commands are received may be stopped by pressing the 'ENTER' button. This will allow the display to be frozen for closer review. Any subsequent received command will be ignored by this diagnostic though it will still be processed by communications. Pressing 'ENTER' again will cause characters 23 - 44 to be displayed in ASCII. Pressing 'ENTER' again will cause the first 11 characters of the command to be displayed in hexadecimal. Continue to repeat this procedure to display characters 12 - 22, 23 - 33 and 34 - 44. Some ASCII characters are not printable; these will be displayed as question marks. The pad character will be displayed as all segments lit.

53 - EIA-485 Comm Analyzer

This dynamic display diagnostic will show the 44 most recent characters received and transmitted by the AccuLoad II. This dynamic diagnostic will not interfere with the normal running of the communications. The 22 most recent characters will be displayed in ASCII as they are received or transmitted. These characters will scroll across the display from right to left, with the most recent character appearing in the right-most position of the display.

The continuous scrolling of characters may be stopped by pressing the 'ENTER' button. This will allow the display to be frozen for closer review. Any subsequent received or transmitted characters will be ignored by this diagnostic though they will still be processed by communications. Pressing 'ENTER' again will cause characters 23 - 44 to be displayed in ASCII with the twenty-third most recent character in the right-most position of the display. Pressing 'ENTER' again will cause the most recent 11 characters to be displayed in hexadecimal with the most recent character displayed in the two right-most positions of the display. Continue to repeat this procedure to display characters 12 - 22, 23 - 33 and 34 - 44.

Transmitted characters will flash to allow them to be easily distinguished from the received characters. Some ASCII characters are not printable; these will be displayed as question marks. The pad character will be displayed as all segments lit.

A parity error will cause the "P" to be displayed in the left-most position of the display.

54 - EIA-485 Received Command

This dynamic display diagnostic will show the last complete command received by and addressed to the AccuLoad II. The first 22 characters of the command will be displayed. An additional 22 characters are stored and available for display. If the command is less than 44 characters, the remainder of the display will show blanks. This dynamic diagnostic will not interfere with the normal running of communications.

The continuous updating of the display as commands are received may be stopped by pressing the 'ENTER' button. This will allow the display to be frozen for closer review. Any subsequent received command will be ignored by this diagnostic though it will still be processed by communications. Pressing 'ENTER' again will cause characters 23 - 44 to be displayed in ASCII. Pressing 'ENTER' again will cause the first 11 characters of the command to be displayed in hexadecimal. Continue to repeat this procedure to display characters 12 - 22, 23 - 33 and 34 - 44. Some ASCII characters are not printable; these will be displayed as question marks. The pad character will be displayed as all segments lit. The null character will not be displayed.

The LRC error will cause an "L" to be displayed in the left-most position of the display.

55 - EIA-485 Transmitted Response

This dynamic display diagnostic will show the contents of the communications transmit buffer utilized by the AccuLoad II. At the time the AccuLoad II initiates a transmission the first 22 characters of the response will be displayed. An additional 22 characters are stored and available for display. If the response is less than 44 characters, the remainder of the display will show blanks. This dynamic diagnostic will not interfere with the normal running of communications.

The continuous updating of the display as commands are received may be stopped by pressing the 'ENTER' button. This will allow the display to be frozen for closer review. Any subsequent received command will be ignored by this diagnostic though it will still be processed by communications. Pressing 'ENTER' again will cause characters 23 - 44 to be displayed in ASCII. Pressing 'ENTER' again will cause the first 11 characters of the command to be displayed in hexadecimal. Continue to repeat this procedure to display characters 12 - 22, 23 - 33 and 34 - 44. Some ASCII characters are not printable; these will be displayed as question marks. The pad character will be displayed as all segments lit.

Section 6 - Communications with S-Mass Meter

Note: *Communications with S-Mass Meter applies to STD-15 and above firmware.*

The AccuLoad II will communicate with the Micro-Pak(s) via the EIA-232 communications channel. After each command is sent, if there is no response within a reasonable time-out, the command will be reissued. If there is no response after the second attempt, an alarm will be set.

The data format and the baud rate program codes will display "Micro-Pak Interface" and no entries will be allowed. These will automatically be set to match the Micro-Pak settings.

The AccuLoad II will use the sequence number of each Micro-Pak (which is to be entered in the Program Mode) to initialize the communication address on that Micro-Pak. This address will be set internally by the AccuLoad as it need not concern the operator.

The Micro-Pak(s) will be programmed by the AccuLoad via communications. Desired parameters are entered in the Program Mode. As these are entered, the AccuLoad II will download the parameters to the Micro-Pak. When the sequence number is entered in the Program Mode, all parameters will be downloaded to the Micro-Pak as this may indicate a new Micro-Pak which requires full programming.

The AccuLoad II will retrieve the revision level and firmware date from the Micro-Pak. This information will be available via a diagnostic in the Program Mode of the AccuLoad.

The Micro-Pak may be zeroed by executing a diagnostic on the AccuLoad which sends a zero command to the Micro-Pak. This same diagnostic may be used to view the tare of the Micro-Pak.

Other diagnostics are available to display useful information that the AccuLoad retrieves from the Micro-Pak such as magnitude forward, magnitude reverse, temperature-corrected period, etc.

The AccuLoad II will continually request density from the Micro-Pak in the Run and Ready Modes. The density will be checked against the alarm limits in the AccuLoad. Two consecutive density readings outside the alarm limits will cause a density alarm to be set which will cause the AccuLoad to attempt to halt flow by closing the valve. If Run Mode Clearing is enabled, the batch may be continued after the alarm has been cleared and the error condition has been corrected. If Run Mode Clearing is not enabled, the operator will be instructed to press the "Print" key which will end the transaction. The alarm can then be cleared in the Program Mode. However, if the density is still out of range, the alarm will be set again.

The AccuLoad II will also monitor the status of the Micro-Pak in the Run and Ready Modes. An error condition in the Micro-Pak will cause an alarm to be set in the AccuLoad. These alarms will be decoded from the Micro-Pak to indicate the precise fault. The Micro-Pak alarm will cause the AccuLoad to act as with any alarm condition by attempting to halt flow by closing the valve. The clearing of this alarm will be as for other alarms on the AccuLoad II. Each alarm may be programmed as to whether that type of alarm will be clearable in the Run Mode. If Run Mode clearable, the batch may be resumed after pressing the "Clear" key. If not Run Mode clearable, the transaction must be ended and the alarm may be cleared in the Program Mode.

Section 7 - Communications with Smart Additive Injectors

Note: Communications with Smart Additive Injectors apply to STD-16 and above firmware.

The firmware has been designed with a Master/Slave type of communications, with the AccuLoad II being the master and the Additive Injector System being the slave. The AccuLoad II constantly interrogates the Additive Injector System for a change in status. The AccuLoad can be operated with communications control over the Smart Additive Injector System or with communication/pulse control. When the AccuLoad II has communication control over the Additive System, it will constantly monitor the Additive System for its status, poll the additive totals, and signal the system when to inject the additive - all through the communications line.

If the AccuLoad II is programmed for communication/pulse control, two lines have to be run between the Additive System and the AccuLoad II—one for the product pulses and one for the communications line. In this case, the AccuLoad II will constantly monitor the Additive System for its status and poll the additive totals. It will not signal the Additive System when to inject additive; this is done by the Additive System counting the pulses and injecting at the rate programmed by the AccuLoad.

Passby Communications Mode

The passby communications mode is being implemented to allow supervisory computers to communicate with smart additive injectors under the control of the AccuLoad II. Commands from the supervisory computer will be received from the AccuLoad II on one communications line, and forwarded to the Additive Injection Subsystem on the other communications line. Queries and control commands will only be permitted while the AccuLoad II is in the Ready Mode. No queries or commands will be accepted by the AccuLoad while it is in the Run Mode or the Programming Mode.

Communications from a supervisory computer to a smart additive injector will be a three-step process. First, the supervisory computer will issue a passby command to the AccuLoad II. The AccuLoad II will acknowledge receipt of the command to the supervisory computer. Next, the AccuLoad will add framing characters as required and issue the command to the smart additive injector. The additive injector will return an appropriate response to the AccuLoad. The final step occurs when the supervisory computer requests the additive's response from the AccuLoad II.

The communications scheme was developed to maintain a response time consistent with other commands sent by the supervisory computer.

Section 7 - Communications with Smart Additive Injectors

Command Code IC - Injector Command

This command is used to specify the command to be sent to a smart additive injector.

Command:

'IC_c..c'

Where IC= Injector Command command literal
c..c= command text (as shown below)

For Titan Additive Injectors

c..c= **aaatt_xxx_y..y**

Where aaa= three-digit additive injector address
tt= two-character Titan command literal
xxx= optional three-digit channel number (001)
y..y= up to 13 characters of optional parameters

For Gate City Additive Injectors

c..c= **taaay..y**

Where t= one character Gate City command (control characters)
aaa= three-digit additive injector address
y..y= up to 4 characters of optional parameters

Responses:

'OK' Good Response.

or...

'NOXX'

Where X = '01' In the Programming Mode
= '02' AccuLoad II Released
= '06' Operation Not Allowed
= '19' Option Not Installed

There will be one passby communications response buffer for each delivery position. When an 'IC' command is received by the AccuLoad II, a 'NO06' response will be moved into the appropriate response buffer. This 'NO06' response will indicate that no response has yet been received from the Additive Injector Subsystem. This will prevent the supervisory computer from issuing an immediate 'IR' command and reading an old response from a previous command which may have been issued to a different additive subsystem.

If communications with an additive subsystem has not been selected in the programming mode, this command will return a 'NO19' response, Option Not Installed.

If the specified command is valid for the AccuLoad's current mode of operation, the query or command is copied into the additive command buffer. The AccuLoad verifies the correctness of the address or the command itself. If the address is invalid, i.e, there is no additive injector with that address connected to the AccuLoad, no response will ever be received. If the command is improperly constructed or not valid for the type of additive injector selected, the additive injector will respond appropriately and the supervisory computer can decode the response given.

STX and ETX characters are added to the command. If Titan injectors are selected, the LRC is calculated and added onto the end of the command. For Gate City Injectors, a CR character is added to the end of the command.

Command Code IR - Injector Response

This command is used to retrieve the response from a passby command to an Additive Injection Subsystem.

Command:

'IR'

Response:

'IR_r..r'

where IR = Injector Response command
r..r = response text, as shown below

For Titan Additive Injectors

r..r = aaaOK
= aaaNOxx
= aaatt_xxx_y..y
= aaatt_z..z

where aaa = three digit additive injector address
OK = OK response
NOxx = numbered NO response (see Titan Communications Protocol System Specification)
tt = two-character Titan command literal
xxx = optional channel number (001)
y..y = 4 to 13 characters of qualifying parameters
z..z = 2 - 5 characters of qualifying parameters

For Gate City Additive Injectors

r..r = S_xxx_y..y_E

where S = start of string
xxx = three digit additive injector address
y..y = 4 - 38 characters of qualifying parameters
E = end of string

'NOXX'

Where XX = '01' Program Mode
'06' Operation Not Allowed (No Response Received Yet)

Command Code AP - Authorize Transaction to Preset

This command authorizes a transaction and displays the "PRESET" prompt.

Command:

'AP_X'

Where: X is the optional additive selection code. (See Table 2 on page 25.)

Responses:

'OK' AccuLoad II has been authorized for transaction.

or...

'NOXX' The transaction failed to release.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '04' Flow is Active
= '07' Wrong Control Mode
= '08' Transaction in Progress
= '09' Alarm Condition
= '10' Storage Full
= '16' Ticket Not in Printer
= '19' Option Not Installed
= '22' Print Request Pending

Remarks: If the X qualifier is not used, the Additive selection will operate as currently programmed in the AccuLoad II.

Constraints: Display and keypad are removed from minicomputer control after executing this command. The 'AP' will reset the transaction done, batch done and keypad pending flags.

Special Case: "INSERT TICKET" is displayed if required but not inserted. If auto preset option is in effect, the maximum batch amount programmed in program code 302 would be displayed.

Comm. Modes: Poll & Authorize (1).

Section 8 - Command Reference Guide

Additive Selection Code

Character		Add 1	Add 2	Add 3*	Add 4*
Char	Hex				
0	30				
1	31	X			
2	32		X		
3	33	X	X		
4	34			X	
5	35	X		X	
6	36		X	X	
7	37	X	X	X	
8	38				X
9	39	X			X
A	41		X		X
B	42	X	X		X
C	43			X	X
D	44	X		X	X
E	45		X	X	X
F	46	X	X	X	X

Table 2. Codes for AP

Note: To select Additives 3 and 4, the Additive Option must be installed. (Rev. 0 & Rev. 1 firmware). Additives 3 and 4 are standard in Rev. 2 and up.

Section 8 - Command Reference Guide

Command Code AR - Alarm Reset

This command resets one of the alarms currently flagged at the AccuLoad II.

Command:

'AR_XX'

Where: XX = Two character alarm code. (See Table 3 on pages 30).

Responses:

'AR_XX_OK' Good Response.

Where: XX = Two character alarm code.

or...

'NOXX' The alarm would not reset.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '04' Flow is Active
= '06' Operation Not Allowed
= '07' Wrong Control Mode
= '24' Ticket Alarm During Transaction

Remarks: The two character alarm code must be one of those alarms which is allowed to be reset through the communication channel. All alarms except 'DA' can be cleared through communications. The alarms that can be reset are found in Table 3 on pages 30.

Constraints: The alarm code must be allowed to be reset through communications. (See Table 3 on pages 30.) If it is allowed, it must be pending or a 'NO03' will be returned. Program code 741 must be programmed 1, 2, or 3 to allow this operation.

Special Case: A special code 'AA' may be used to reset any or all resettable alarms that are pending. If there are no resettable alarms pending, a 'NO03' will return.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

Section 8 - Command Reference Guide

Alarm Status Codes That Can Be Reset Through Communications

Code	Condition
AA	All Resettable Alarms - All resettable alarms will be reset.
AC	Additive Communications - Indicates a failure on the master/slave communications line between AccuLoad and smart additive system. <i>Note: Applies to STD-16 and above firmware.</i>
A2	232 Printer Access Cover Open - The access cover on the printer is open and has to be closed for printing to continue.
A4	485 Printer Access Cover Open - The access cover on the printer is open and has to be closed for printing to continue.
BP	Back Pressure - Back pressure per the entries set cannot be maintained during flow enough to maintain entry set in program code 501.
B2	232 Printer Buffer Overflow - The printer that is communicating with the AccuLoad II on the 232 Port has had a buffer overflow.
B4	485 Printer Buffer Overflow - The printer that is communicating with the AccuLoad II on the 485 Port has had a buffer overflow.
CM	Communications Alarm - Communications failure on one of the channels.
DP	Down Pulse Error - Consecutive down pulses are greater than or equal to the dual pulse comparator error count.
DR	Density Transducer - Density transducer failure or out-of-range condition.
D2	232 Printer Deselected - The printer that is communicating on the 232 Port has been deselected and must be put back on-line.
D4	485 Printer Deselected - The printer that is communicating on the 485 Port has been deselected and must be put back on-line.
E2	General 232 Printer Error - There is a problem with the printer that is communicating with the AccuLoad II on the 232 Port.
E4	General 485 Printer Error - There is a problem with the printer that is communicating with the AccuLoad II on the 485 Port.
F1	Additive 1 Feedback - Additive feedback errors have exceeded the limit programmed in the AccuLoad II.
F2	Additive 2 Feedback - Additive feedback errors have exceeded the limit programmed in the AccuLoad II.
F3	Additive 3 Feedback - Additive feedback errors have exceeded the limit programmed in the AccuLoad II.
F4	Additive 4 Feedback - Additive feedback errors have exceeded the limit programmed in the AccuLoad II.
HD	High Density - Density transducer is out-of-range of the high alarm setting.
HF	High Flow Alarm - Flow rate has exceeded limit set by Excess High Flow program code for more than 4 seconds.
HP	High Pressure - Pressure transducer is out-of-range of the high alarm setting.

Section 8 - Command Reference Guide

Code	Condition
HT	High Temperature - Temperature probe or transducer is out-of-range of the high alarm setting.
H2	232 Printer Hardware Failure - The printer that the AccuLoad II is communicating with on the 232 Port has failed.
H4	485 Printer Hardware Failure - The printer that the AccuLoad II is communicating with on the 485 Port has failed.
IA	Injector Alarm - Indicates that one of the injector subsystem alarms is set. Additive alarms should be requested and checked. <i>Note: Applies to STD-16 and above firmware.</i>
I2	232 Printer Not Responding - The printer that the AccuLoad II is communicating with on the 232 Port is not responding.
I4	485 Printer Not Responding - The printer that the AccuLoad II is communicating with on the 485 Port is not responding.
K1	Low Additive Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
K2	Low Additive Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
K3	Low Additive Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
K4	Low Additive Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
LD	Low Density - Density transducer is out-of-range of the low alarm setting.
LF	Low Flow Alarm - Flow rate was at or below the minimum flow rate established by Low Flow Limit program code for longer than 8 seconds.
LP	Low Pressure - Pressure transducer is out-of-range of the low alarm setting.
LT	Low Temperature - Temperature probe or transducer is out-of-range of the low alarm setting.
L1	Additive Pulse Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
L2	Additive Pulse Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
L3	Additive Pulse Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
L4	Additive Pulse Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
MD	Micro-Pak Drive - Indicates a failure with the drive A/D value from the Micro-Pak. <i>Note: This alarm applies to STD-15 firmware and above.</i>
MH	Micro-Pak High Temperature - Indicates a high temperature alarm has occurred at the Micro-Pak. <i>Note: This alarm applies to STD-15 firmware and above.</i>
ML	Micro-Pak Low Temperature - Indicates a low temperature alarm has occurred at the Micro-Pak. <i>Note: This alarm applies to STD-15 firmware and above.</i>
MM	Micro-Pak Magnitude Error - Indicates a failure with the magnitude forward or magnitude reverse A/D values from the Micro-Pak. <i>Note: This alarm applies to STD-15 firmware and above.</i>

Section 8 - Command Reference Guide

Code	Condition
MS	Master/Slave Communications - Indicates a failure with the Master Slave Communications. <i>Note: This alarm applies to STD-15 firmware and above.</i>
M1	Too Many Pulses (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
M2	Too Many Pulses (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
M3	Too Many Pulses (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
M4	Too Many Pulses (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
N1	No Pulses Detected (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
N2	No Pulses Detected (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
N3	No Pulses Detected (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
N4	No Pulses Detected (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
OA	Overrun Alarm - Volume delivered has exceeded the preset amount by at least the number of units set in the Overrun Limit program code.
O2	232 Printer Paper Out - The printer that the AccuLoad II is communicating with on the 232 Port is out of paper.
O4	485 Printer Paper Out - The printer that the AccuLoad II is communicating with on the 485 Port is out of paper.
PA	Power-fail Alarm - The unit either had a power failure or a hardware reset occurred. <i>Note: This alarm applies to STD-11 firmware and above.</i>
PC	Pulse Collision - Collision on incoming pulse stream.
PR	Pressure Transducer - Pressure transducer failure or out-of-range condition.
PS	Pulse Security - Used only with security pulse option. Shows that an excessive number of erroneous pulses have been detected, or power failure on PSC board.
PT	Pulse Transmission - Meter pulses are not being received and the valve is open, or meter pulses are being received and the valve is closed for more than what is programmed in the PT/VF time delay program code. (Will result in an immediate Valve Fault Alarm - no 10 second delay.)
P2	232 Printer Communications - The printer that the AccuLoad II is attempting to communicate with on the 232 Port is not communicating.
P4	485 Printer Communications - The printer that the AccuLoad II is attempting to communicate with on the 485 Port is not communicating.
R1	Additive Frequency Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
R2	Additive Frequency Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
R3	Additive Frequency Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>

Section 8 - Command Reference Guide

Code	Condition
R4	Additive Frequency Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
SF	Storage Full - Local storage area is full.
SP	Shared Printer - An output was attempted to the shared printer, but was unsuccessful because the shared printer remained busy longer than the programmed shared printer out alarm timer.
TK	Ticket Alarm - Ticket was cranked from ticket printer while batch loading was in progress.
TP	Temperature Probe - Short or open condition in the temperature probe circuit.
TT	Temperature Transducer - Temperature transducer failure or out-of-range condition.
U1	Unauthorize Command Failed Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
U2	Unauthorize Command Failed Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
U3	Unauthorize Command Failed Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
U4	Unauthorize Command Failed Alarm (Smart Additives Only) <i>Note: Applies to STD-16 and above firmware.</i>
VF	Valve Fault - The valve did not close within 10 seconds after receiving the signal to close.
ZF	Zero Flow - A zero flow condition has existed for longer than the programmed zero flow timer setting. <i>Note: This alarm applies to STD-13 firmware and above.</i>

Table 3. Resettable Alarms

Command Code AU - Authorize Transaction

This command authorizes a transaction at the AccuLoad II.

Command:

'AU_X'

Where: X = the optional additive selection code. (See Table 2 on 25.)

Responses:

'OK' Good Response. The AccuLoad II has been authorized for the transaction.

or...

'NOXX' The transaction was not authorized.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '04' Flow is Active
= '07' Wrong Control Mode
= '08' Transaction in Progress
= '09' Alarm Condition
= '10' Storage Full
= '19' Option Not Installed
= '22' Print Request Pending

Remarks: If the X qualifier is not used, the additive selection will operate as currently programmed in the AccuLoad II.

Constraints: The display and keypad are removed from minicomputer control after executing this command. The 'AU' will reset the transaction done, batch done and keypad pending flags.

Special Case: None.

Comm. Modes: Poll & Authorize (1).

Section 8 - Command Reference Guide

Command Code CC - Clear Configurable Report

This command clears the programmed configurable report.

Command:

'CC'

Responses:

'OK' Good Response. The configurable report has been cleared.

or...

'NOXX' Configurable Report was not cleared.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '07' Wrong Control Mode
= '08' Transaction In Progress
= '09' Alarm Condition
= '13' AccuLoad II Authorized

Remarks: None.

Constraints: This communication code applies to those units with AccuLoad II-STD Version 10 and above firmware.

Special Case: If no configurable report was programmed, the 'OK' response will still be given.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

Command Code CF - Configuration Events

This command will display the NIST Configuration Event Counter.

Command:

'CF'

Responses:

'CF Config Events XXXX' Good Response.

Where XXXX = Configuration Events Count

or...

'NOXX'

Where XX = '01' In the Programming Mode

Remarks: The configuration event counter reading is the number of times the program mode has been entered and at least one program code (X90 through X99) has been changed.

Constraints: This communication code applies to those units with the AccuLoad II-STD version 19 and above firmware.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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Command Code CL - Calibration Events

This command will display the NIST Configuration Event Counter.

Command:

'CL'

Responses:

'CL Calib Events XXXX' Good Response.

Where XXXX = Calibration Events Count

or...

'NOXX'

Where XX = '01' In the Programming Mode

Remarks: The calibration event counter reading is the number of times the program mode has been entered and at least one program code (X40 through X79 and X80 through X89 if programmed for weights and measures) has been changed. This counter also counts the number of times these codes are changed through communications.

Constraints: This communication code applies to those units with the AccuLoad II-STD version 19 and above firmware.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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Command Code CT - Clear All Saved Transactions

This command clears all transactions saved in the AccuLoad II while in the Local or Transaction Storage Mode.

Command:

'CT'

Responses:

'OK' Good Response. All standby transactions have been cleared.

or...

'NOXX' Transactions were not cleared.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '08' Transaction in Progress
= '09' Alarm Condition
= '13' AccuLoad II Authorized

Remarks: None.

Constraints: None.

Special Case: If no transactions had been saved, 'OK' response will still be given.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Command Code DA - Release Keypad and Display

This command returns the control of the keypad and display to the AccuLoad II.

Command:

'DA'

Responses:

'OK' Good Response. Keypad and display have been released to AccuLoad II and the pending keypad flag is reset.

or...

'NOXX' The keypad and display were not released.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '07' Wrong Control Mode

Remarks: None.

Constraints: None.

Special Case: The 'TO' status bit will be cleared on acceptance of the 'DA' command. See 'Authorize' Commands.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Command Code DB - Request Program Mode Directory Bit-Map

This command requests a bit-map showing which directories had programming changes made in them.

Command:

'DB'

Responses:

'**X1X2**' Good Response. Two hexadecimal characters.

Where X1 = bits 0-3 represent directories 1 through 4 respectively

Note: A one in any of bits 0-3 shows a change in the respective directory.

Where X2 = bits 0-3 represent directories 5 through 8 respectively

Note: A one in any of bits 0-3 shows a change in the respective directory.

or...

'**NOXX**'

Where XX = '01' In the Programming Mode

= '02' AccuLoad II Released

Remarks: None.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), Remote Control (2).

Command Code DS - Request Local Storage Dump

This command requests one or all the transactions stored in Local Storage memory. The response is in a multi-line format.

Command:

All Transactions Stored.

'DS'

All transactions stored (this does not include the current transaction).

'DS_III'

Transaction number III will be printed.

Where: III = the transaction number for the transaction data stored.

Responses:

'See Table 4 on pages 40' Good Response. Multi-line consisting of the transaction complete time, prompt entries, transaction number, transaction totals, number of batches, batch totals, additive selections, and load averages. This information will be printed for each transaction requested according to the format specification presented below.

or...

'NOXX' Transaction data was not received.

Where XX = '01' In the Programming Mode
= '03' Value Rejected
= '05' No Transaction in Progress or Completed

Remarks: None.

Constraints: None.

Special Case: The current transaction data will be returned if only one transaction has ever been completed.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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'DS' RESPONSE TEXT FORMAT SPECIFICATION

Data	Description
TN_TTTT_DDDDDD_AAAA_X_NNN	<p>TN = Transaction Stop Time _ = space (20 Hex) TTTT = Internal Transaction Number DDDDDD = Transaction Stop Date</p> <p><i>Note: An asterisk preceding the date (i.e., 'TN*DDDDDD_AAAA_NNN') shows that a power-fail has occurred.</i></p> <p>AAAA = Transaction Stop Time (Hours & Minutes) X = A (Standard Time) P (Standard Time – P.M.) M (Military Time) NNN = Local Storage Transaction number of this transaction data set</p>
TI_I_ppppppppp_NNN	<p>(one line for each prompt entered) TI = Show Prompts Data Entry I = prompt sequence number ppppppppp = Prompt data entry</p>
RT_R_y_vvvvvv_NNN	<p>RT = Request Transaction R = Raw y = Total number of batches vvvvvv = Total raw transaction volume</p>
RT_G_y_vvvvvv_NNN	<p>RT = Request Transaction G = Gross y = Total number of batches vvvvvv = Total gross transaction volume</p>
RT_N_y_vvvvvv_NNN	<p>RT = Request Transaction N = Gross @ standard temperature transaction volume y = Total number of batches vvvvvv = Total Gross @ standard temperature transaction volume</p>
RT_P_y_vvvvvv_NNN	<p>RT = Request Transaction P = Pressure y = Total number of batches vvvvvv = Total NTP (Net Temperature & Pressure) transaction volume</p>
RT_M_y_vvvvvv_NNN	<p>RT = Request Transaction M = Mass y = Total Number of Batches vvvvvv = Total Mass Transaction</p>

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RB_a_x_vvvvvv_NNN	<p>RB = Request Batch a = Additive selections identifier (Same as used for 'AA', 'AU' or 'AP'.) x = Batch number identifier vvvvvv = Batch volume for that batch (One line being printed for each batch completed.)</p>
LD_T_vvv.v_NNN	<p>LP = Request Average Load Parameter Value T = Temperature vvv.v = Load average temperature value</p>
LD_P_vvv.v_NNN	<p>LP = Request Average Load Parameter Value P = Pressure vvv.v = Load average pressure value</p>
LD_D_vvv.v_NNN I _t I _t	<p>LP = Request Average Load Parameter Value D = Density vvv.v = Load average density value I_t = line feed (0A Hex)</p>

Table 4. 'DS' Responses

Note: Each line will contain the AccuLoad II address and will be formatted according to the communication type selected.

Command Code DY - Request Dynamic Display Values

This command retrieves the current dynamic display value(s) from the AccuLoad II.

Command:

'DY_XX'

Where: XX = the number used to access the corresponding display through the keypad.
(See Table 5 on pages 43).

Responses:

'DY_FLOW = 600 GAL/MIN' Good Response. A 24 character response in the same format as the corresponding dynamic display requested.
See Table 5 on pages 43 for list of responses.

or...

'NOXX' Dynamic Display value not retrieved.

Where XX = '01' In the Programming Mode
= '03' Value Rejected

Remarks: None.

Constraints: None.

Special Case: An N/A in the response shows that the unit is not programmed to calculate this value.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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'DY_XX' Dynamic Display Values

Display Number ("XX")	Response
00	"DY_12:01:00 AM 10-19-88"
01	"DY_FLOW = XXXX.X GAL/MIN" = will be replaced by an * if the flow is being controlled lower than selected because of insufficient back pressure
02	"DY_FLOW = XXXX.X GAL/HR" = will be replaced by an * if the flow is being controlled lower than selected because of insufficient back pressure
03	"DY_TEMPERATURE = S XXX.XdF" Where: S = sign of the value, (-) for negative, (+) for positive d = Degree symbol F = temperature units, (F) for Fahrenheit, © for Celsius, and (*) for no temperature units selected
04	"DY_API = SXXX.X"
05	"DY_Ref Density XXXX.X LB/F3"
06	"DY_Rel Density = X.XXXX"
07	"DY_P = XXX.X VP = XXX.X"
08	"DY_METER FACTOR = X.XXXX"
09	"DY_CTL = X.XXXX"
10	"DY_CPL = X.XXXX"
11	"DY_Density XXXX.X LB/F3"
12	"DY_Raw TransactionXXXXXXXX.XX"
13	"DY_Grs TransactionXXXXXXXX.XX"
14	"DY_Gst TransactionXXXXXXXX.XX"
15	"DY_Net TransactionXXXXXXXX.XX"
16	"DY_Mas TransactionXXXXXXXX.XX"
17	"DY_Inj1 Trans X.XXX"
18	"DY_Inj2 Trans X.XXX"
19	"DY_Inj3 Trans X.XXX"
20	"DY_Inj4 Trans X.XXX"
21	"DY_Valve Requested Closed "
22	"DY_Load Avg Tmp = S XXX.X°F"
23	"DY_Load Avg Pres = XXX.X"

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24	"DY_Load Avg Dens = XXXX.X"
25	"DY_Load Avg Mfac = X.XXXX"
26	"DY_Raw Totals XXXXXXXXXX"
27	"DY_Grs Totals XXXXXXXXXX"
28	"DY_Gst Totals XXXXXXXXXX"
29	"DY_Net Totals XXXXXXXXXX"
30	"DY_Mas Totals XXXXXXXXXX"
31	"DY_Inj1 Total XXXXXXXXXX"
32	"DY_Inj2 Total XXXXXXXXXX"
33	"DY_Inj3 Total XXXXXXXXXX"
34	"DY_Inj4 Total XXXXXXXXXX"
35	"DY_J0P0W0T1V1H1F1R0Y0Z"
36	"DY_<l1 l1 l1 l1 U1 D1 P1 A1"
37	"DY_<l1 l1 l1 l1 U1 D1 P1 A1"
38	"DY_PF: 10:20:15 PM 11-25-89"
39	"DY Inj1 Prog XXX Cal XXX.XX"
40	"DY Inj 2 Prog XXX Cal XXX.XX"
41	"DY Inj 3 Prog XXX Cal XXX.XX"
42	"DY Inj 4 Prog XXX Cal XXX.XX"

Table 5. "DY" Responses

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Command Code EA - Enquire Alarms

This command requests the alarm status from the AccuLoad II (short form).

Command:

'EA' System Alarm Request
'EA_D' Additive Alarm Request

Where D = 1 (Additive)

Note: 'EA_D' applies to STD-16 and above firmware.

Responses:

'A1A2A3A4A5A6A7A8A9A10A11A12A13A14'

Good Response. Fourteen characters for System - See pages 45 through 58.

Note: Character A12 applies to STD-11 and above firmware.

Note: Character A13 applies to STD-15 and above firmware.

Note: Character A14 applies to STD-16 and above firmware.

'A1A2A3A4A5A6'

Good Response. Six characters for Additives. See pages 59 through 64.

Note: Additive alarms apply to STD-16 and above firmware.

Remarks: None.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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Response to Enquire Alarms Command Character A1

Character		System Alarms Request			
Char	Hex	High Temp Alarm (HT)	Ticket Alarm (TK)	Communications Alarm (CM)	Diagnostics Alarm (DA)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 6. Response to Command Code EA – Character 1 (System)

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Response to Enquire Alarms Command Character A2

Character		System Alarm Request			
Char	Hex	Overrun Alarm (OA)	High Flow (HF)	Temperature Probe (TP)	Low Temp Alarm (LT)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 7. Response to Command Code EA – Character 2 (System)

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Response to Enquire Alarms Command Character A3

Character		System Alarm Request			
Char	Hex	Back Pressure Alarm (BP)	Valve Fault Alarm (VF)	Pulse Transmission Alarm (PT)	Low Flow Alarm (LF)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 8. Response to Command Code EA – Character 3 (System)

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Response to Enquire Alarms Command Character A4

Character		System Alarm Request			
Char	Hex	Pulse Collision Alarm (PC)	Pressure Transducer Alarm (PR)	Low Pressure Alarm (LP)	High Pressure Alarm (HP)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 9. Response to Command Code EA – Character 4 (System)

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Response to Enquire Alarms Command Character A5

Character		System Alarm Request			
Char	Hex	Low Density Alarm (LD)	High Density Alarm (HD)	Error Alarm (DP)	Pulse Security Alarm (PS)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 10. Response to Command Code EA – Character 5 (System)

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Response to Enquire Alarms Command Character A6

Character		System Alarm Request			
Char	Hex	Storage Full Alarm (SF)	Shared Printer Alarm (SP)	Temperature Transducer Alarm (TT)	Density Transducer Alarm (DR)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 11. Response to Command Code EA – Character 6 (System)

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Response to Enquire Alarms Command Character A7

Character		System Alarm Request			
Char	Hex	Additive 4 Feedback Alarm (F4)	Additive 3 Feedback Alarm (F3)	Additive 2 Feedback Alarm (F2)	Additive 1 Feedback Alarm (F1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 12. Response to Command Code EA – Character 7 (System)

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Response to Enquire Alarms Command Character A8

Character		System Alarm Request			
Char	Hex	232 Printer Communication Alarm (P2)	232 Printer Access Cover Open Alarm (A2)	232 Printer Paper Out Alarm (O2)	232 Printer Hardware Alarm (H2)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 13. Response to Command Code EA – Character 8 (System)

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Response to Enquire Alarms Command Character A9

Character		System Alarm Request			
Char	Hex	232 Printer Not Responding Alarm (I2)	General 232 Printer Alarm (E2)	232 Printer Deselected Alarm (D2)	232 Printer Buffer Overflow Alarm (B2)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 14. Response to Command Code EA – Character 9 (System)

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Response to Enquire Alarms Command Character A10

Character		System Alarm Request			
Char	Hex	485 Printer Communication Alarm (P4)	485 Printer Access Cover Open Alarm (A4)	485 Printer Paper Out Alarm (O4)	485 Printer Hardware Alarm (H4)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 15. Response to Command Code EA – Character 10 (System)

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Response to Enquire Alarms Command Character A11

Character		System Alarm Request			
Char	Hex	485 Printer Not Responding Alarm (I4)	General 485 Printer Alarm (E4)	485 Printer Deselected Alarm (D4)	485 Printer Buffer Overflow Alarm (B4)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 16. Response to Command Code EA – Character 11 (System)

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Response to Enquire Alarms Command Character A12

Character		System Alarm Request			
Char	Hex	Micro-Pak Drive Alarm (MD)**	Master/Slave Communications Alarm (MS)**	Zero Flow Alarm (ZF)*	Power-fail Alarm (PA)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 17. Response to Command Code EA – Character 12 (System)

Note: * This bit applies to STD-13 and above firmware.

Note: ** This applies to STD-15 and above firmware.

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Response to Enquire Alarms Command Character A13

Character		System Alarm Request			
Char	Hex	Additive Communications (AC)**	Micro-Pak High Temp Alarm (MH)*	Micro-Pak Low Temp Alarm (ML)*	Micro-Pak Magnitude Alarm (MM)*
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 18. Response to Command Code EA – Character 13 (System)

Note: *These alarms apply to STD-15 and above firmware.

Note: **This alarm applies to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A14

Character		System Alarm Request			
Char	Hex	Currently Undefined	Currently Undefined	Currently Undefined	Injector Alarm (IA)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 19. Response to Command Code EA – Character 14 (System)

Note: This table applies to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A1

Character		Additive Alarm Request			
Char	Hex	Low Additive 4 Alarm (K4)	Low Additive 3 Alarm (K3)	Low Additive 2 Alarm (K2)	Low Additive 1 Alarm (K1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 20. Response to Command Code EA – Character A1 (Additive)

Note: These alarms apply to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A2

Character		Additive Alarm Request			
Char	Hex	Low Additive 4 Pulse Alarm (L4)	Low Additive 3 Pulse Alarm (L3)	Low Additive 2 Pulse Alarm (L2)	Low Additive 1 Pulse Alarm (L1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 21. Response to Command Code EA – Character A2 (Additive)

Note: These alarms apply to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A3

Character		Additive Alarm Request			
Char	Hex	Too Many Pulses Add4 Alarm (M4)	Too Many Pulses Add3 Alarm (M3)	Too Many Pulses Add2 Alarm (M2)	Too Many Pulses Add1 Alarm (M1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 22. Response to Command Code EA – Character A3 (Additive)

Note: These alarms apply to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A4

Character		Additive Alarm Request			
Char	Hex	No Pulses Detected Add4 Alarm (N4)	No Pulses Detected Add3 Alarm (N3)	No Pulses Detected Add2 Alarm (N2)	No Pulses Detected Add1 Alarm (N1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 23. Response to Command Code EA – Character A4 (Additive)

Note: These alarms apply to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A5

Character		Additive Alarm Request			
Char	Hex	Additive 4 Frequency Alarm (R4)	Additive 3 Frequency Alarm (R3)	Additive 2 Frequency Alarm (R2)	Additive 1 Frequency Alarm (R1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 24. Response to Command Code EA – Character A5 (Additive)

Note: These alarms apply to STD-16 and above firmware.

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Response to Enquire Alarms Command Character A6

Character		Additive Alarm Request			
Char	Hex	Unauthorize Failed Add4 Alarm (U4)	Unauthorize Failed Add3 Alarm (U3)	Unauthorize Failed Add2 Alarm (U2)	Unauthorize Failed Add1 Alarm (U1)
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 25. Response to Command Code EA – Character A6 (Additive)

Note: These alarms apply to STD-16 and above firmware.

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Command Code EB – End Batch

This command cancels the remaining batch volume.

Command:

'EB'

Responses:

'OK' Good Response. Batch flagged as complete if batch is in progress. Batch done pending flag set if batch is in progress. Batch authorization is removed.

Or...

'NOXX' The batch volume has not been cancelled.

Where XX = '01' In the Programming Mode
= '04' Flow is Active
= '06' Operation Not Allowed
= '07' Wrong Control Mode
= '11' Operation Out of Sequence

Remarks: None.

Constraints: "SET" will terminate the batch. If an 'EB' is sent subsequently, the response will be 'NO06'.

Special Case: Valve will be commanded to close if it has not already been commanded to do so.

Comm. Modes: Remote Control (2).

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Command Code EO – Enquire Options

This command requests the options of AccuLoad II (short form).

Command:

'EO'

Responses:

'C1C2' Good Response: Two characters C1 C2 (See Table 26 on page 67 and Table 27 on page 68).

Remarks: None.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Response to 'EO' Character C1

Character		Option			
Char	Hex	Additive Monitoring*	1 Meter	Dual Pulse	Communications
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 26. Response to Command Code EO – Character 1

Note: X shows the option is installed.

0 Additive Option installed in AccuLoad II Rev. 0 and 1.

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Response to 'EO' Character C2

Character		Option			
Char	Hex	High-speed Proving	Temperature	Pressure	Density
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 27. Response to Command Code EO – Character 2

Note: X shows the option is installed.

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Command Code EQ – Enquire

This command requests the operational status of the AccuLoad II (short form).

Command:

'EQ'

Responses:

'C1C2C3C4C5C6' Good Response: Six characters C1 C2 C3 C4 C5 C6 (See Table 28 on page 70, Table 29 on page 71, Table 30 on page 72, Table 31 on page 73, Table 32 on page 74, Table 33 on page 75).

Remarks: None.

Constraints: None.

Special Case: See notes under tables.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Section 8 - Command Reference Guide

Response to 'EQ' Enquire Character C1

Character		Condition			
Char	Hex	Programming Mode	AccuLoad II Released	Flow Active	AccuLoad II Authorized
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 28. Response to Command Code EQ – Character 1

Note: X shows an asserted condition. The AccuLoad II is considered released whenever the valve is opened and has not been commanded to close.

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Response to 'EQ' Enquire Character C2

Character		Condition			
Char	Hex	Transaction in Progress	Transaction Done	Batch Done	Keypad Waiting
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
ALARM	CONDITIONS				
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 29. Response to Command Code EQ – Character 2

Note: X shows an asserted condition.

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Response to 'EQ' Enquire Character C3

Character		Condition			
Char	Hex	Alarm On	SA Transaction Pending	Storage Full	Standby
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 30. Response to Command Code EQ – Character 3

Note: X shows an asserted condition. Some alarm conditions cannot be reset through the communication channel. (See Alarm Reset command 'AR'.)

Section 8 - Command Reference Guide

Response to 'EQ' Enquire Character C4

Character		Condition			
Char	Hex	Program Value Change	Delayed Prompt in Effect	Message Time-out	Power-fail
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 31. Response to Command Code EQ – Character 4

Note: X shows an asserted condition.

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Response to 'EQ' Enquire Character C5

Character		Condition			
Char	Hex	Ticket Tray Contact	1 st /2 nd High Flow Contact	Valve Sense Contact	Spare Contact #1
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 32. Response to Command Code EQ – Character 5

Note: X shows an asserted condition. (= ac input at contact)

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Response to 'EQ' Enquire Character C6

Character		Condition			
Char	Hex	Currently Unassigned	Currently Unassigned	Valve Sense Contact	Spare Contact #2
0	30				
1	31				X
2	32			X	
3	33			X	X
4	34		X		
5	35		X		X
6	36		X	X	
7	37		X	X	X
8	38	X			
9	39	X			X
:	3A	X		X	
;	3B	X		X	X
<	3C	X	X		
=	3D	X	X		X
>	3E	X	X	X	
?	3F	X	X	X	X

Table 33. Response to Command Code EQ – Character 6

Note: X shows an asserted condition. (= ac input at contact)

Some alarm conditions cannot be reset through the Communication channel. (See Alarm Reset Command.)

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Command Code ET – End Transaction

This command removes authorization and flags the transaction as complete.

Command:

'ET'

Responses:

'OK' Good Response. Transaction is flagged as complete if a transaction is in progress. Transaction done pending flag is set if the transaction is in progress. Authorization is removed.

Or...

'NOXX' Transaction was not ended.

Where XX = '01' In the Programming Mode
= '04' Flow is Active
= '06' Operation Not Allowed
= '07' Wrong Control Mode

Remarks: None.

Constraints: If a mechanical (i.e. local) printer is being used and the 'ET' command is issued before removal of the ticket the message 'REMOVE TICKET' will appear and remain on the AccuLoad II display until the ticket is removed. If the transaction has been ended locally by the operator then an 'ET' will return a 'NO06' response.

Special Case: 'ET' is allowed in Communications Standby Mode provided program code 702 (or 705) is currently programmed at Control Mode 2 or 3. The 'ET' command resets the 'AU' flag (i.e., removes authorization).

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Command Code FL – Read Flow Count

This command retrieves raw pulse counts from the AccuLoad II.

Command:

'FL'

Responses:

'FL_VVVVV' Good Response.

Where: VVVVV = Raw Pulse Count

Remarks: None.

Constraints: VVVVV is unfactored raw pulse count. This value is reset to zero at start and end of each transaction.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code GD – Get Date and Time

This command retrieves the current date and time from the AccuLoad II.

Command:

'GD'

Responses:

'GD_DDDDDD_HHNN_X' Good Response

Where DDDDDD = MMDDYY (Standard Time)

 = DDMMYY (Military Time)

HH = hours

NN = minutes

MM = month

DD = day

YY = year

X = A (Standard Time – A.M.)

 = P (Standard Time – P.M.)

 = M (Military Time)

or...

'NOXX' The date and time were not read from the AccuLoad II.

Where XX = '01' In the Programming Mode

 = '02' AccuLoad II Released

Remarks: If the power fails, following a restoration the response will appear as follows:

 For Standard time: 'GD*MMDDYY_HHNN_X'

 For Military time: 'GD*DDMMYY_HHNN_X'

Constraints: None.

Special Case: After the power is restored at an AccuLoad II, the date and time value at the moment of failure will be retained and the response will reflect this occurrence with an asterisk preceding the date as shown above. The response will appear in this manner until the date and time have been reset through the 'SD' command. If the date and time are invalid or have not been set, then the default date (01/01/80) and time (12:00) will be used.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code GK – Get Key

This command retrieves the last key that was pressed at the AccuLoad II keypad.

Command:

'GK'

Responses:

'GK_XX' Good Response.

Where XX = _0 through _9 for numeric keys
= "E1" or "E2" for the "ENTER" key
= "P1" or "P2" for the "PRINT" key
= "A1" or "A2" for the "START" key
= "B1" or "B2" for the "SET" key
= "C1" or "C2" for the "CLEAR" key
= "S1" or "S2" for the "STOP" key

Remarks: Two key representations are given to distinguish between two meter positions.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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Command Code GP – Get PROM Signatures

This command requests the computed CRC-16 check on each of the proms in the AccuLoad II.

Command:

'GP_NN'

Where NN = 08 for PROM #08 (Max Addr Range 00000-1FFFF)
= 09 for PROM #09 (Max Addr Range A0000-BFFFF)
= 10 for PROM #10 (Max Addr Range C0000-DFFFF)
= 11 for PROM #11 (Max Addr Range E0000-FFFFF)

Responses:

'GP_NN_SSSS' Good Response.

Where NN = 08 for PROM #08 (Max Addr Range 00000-1FFFF)
= 09 for PROM #09 (Max Addr Range A0000-BFFFF)
= 10 for PROM #10 (Max Addr Range C0000-DFFFF)
= 11 for PROM #11 (Max Addr Range E0000-FFFFF)
SSSS = four hexadecimal digit signature

or...

'NOXX' Did not read the proms.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected

Remarks: Proms #09 and #10 are optional.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code LD – Request Average Load Parameter Value

This command requests the value of one of the average load parameters from the AccuLoad II.

Command:

Current Transaction

'LD_X'

Local Storage

'LD_X_NNN'

Where X = T (avg. load temperature)

= P (avg. load pressure)

= D (avg. load density)

NNN = Number of transactions back into local storage to retrieve data.

Responses:

Current Transaction

'LD_X_VVVV.V' Good Response. (Pressure and Density)

'LD_X_SVVVV.V' Good Response. (Temperature)

Local Storage

'LD_X_VVVV.V_NNN' Good Response. (Pressure and Density)

'LD_X_SVVVV.V_NNN' Good Response. (Temperature)

Where X = T (avg. load temperature)

= P (avg. load pressure)

= D (avg. load density)

S = + or -

VVVV.V = average value

NNN = Number of transactions back into Local Storage to retrieve data.

Or...

'NOXX' The average load parameters were not read.

Where XX = '03' Value Rejected

= '05' No Transaction in Progress or Completed

= '19' Option Not Installed

Remarks: None.

Constraints: Temperature, pressure and density units are what were programmed for the AccuLoad II.
Negative temperature is possible.

Special Case: Leading digit will be a minus sign if the value is negative.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Command Code OR – Output Relay

This command will signal the additive injector relay to be on or off.

Command:

'OR_X'

Where X = code (0-F) indicating injector settings (See Table 34 on page 83).

Responses:

'OK' Good Response. Contacts have been output to.

Or...

'NOXX' The contacts were not output to.

Where XX = '01' In the Programming Mode
= '03' Value Rejected
= '06' Operation Not Allowed
= '19' Option Not Installed (Rev. 0 and Rev. 1 only)

Remarks: None.

Constraints: Rev. 0 and Rev. 1 firmware.

This command will not be allowed if the corresponding Additive Injection Pulsers (Program codes 801-804) are not set to zero (000) in the Program Mode. Relays 3 and 4 will not be output to if the Additives Option has not been installed.

Rev. 2 and up firmware.

This command will not be allowed if the corresponding additive injection pulsers (program codes 880-883) are not set to zero (000) in the Program Mode.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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Additive Injector Relay Code

Character		Relay			
Hex	Code	Additive 1	Additive 2	Additive 3*	Additive 4*
30	0	OFF	OFF	OFF	OFF
31	1	ON	OFF	OFF	OFF
32	2	OFF	ON	OFF	OFF
33	3	ON	ON	OFF	OFF
34	4	OFF	OFF	ON	OFF
35	5	ON	OFF	ON	OFF
36	6	OFF	ON	ON	OFF
37	7	ON	ON	ON	OFF
38	8	OFF	OFF	OFF	ON
39	9	ON	OFF	OFF	ON
41	A	OFF	ON	OFF	ON
42	B	ON	ON	OFF	ON
43	C	OFF	OFF	ON	ON
44	D	ON	OFF	ON	ON
45	E	OFF	ON	ON	ON
46	F	ON	ON	ON	ON

Table 34. Additive Injector Relay Code

Note: *Additives 3 and 4 will not be output to if the Additives Option is not installed. (Applies to Rev. 0 and Rev. 1 firmware only; additives 3 and 4 are standard in Rev. 2 firmware and above.)

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Command Code PB – Request Parameter Bit-Map

This command requests a bit-map that shows which parameters were changed in the specified directory.

Command:

'PB_N'

Where N = Directory number 1-8.

Responses:

'C1 through C25' Good Response. Twenty-five characters C1 through C25.

Where C1 = bits 3-0 represent parameters 01 through 03.
C2 = bits 3-0 represent parameters 04 through 07.
C3 = bits 3-0 represent parameters 08 through 11.
C4 = bits 3-0 represent parameters 12 through 15.
C5 = bits 3-0 represent parameters 16 through 19.
C6 = bits 3-0 represent parameters 20 through 23.
C7 = bits 3-0 represent parameters 24 through 27.
C8 = bits 3-0 represent parameters 28 through 31.
C9 = bits 3-0 represent parameters 32 through 35.
C10 = bits 3-0 represent parameters 36 through 39.
C11 = bits 3-0 represent parameters 40 through 43.
C12 = bits 3-0 represent parameters 44 through 47.
C13 = bits 3-0 represent parameters 48 through 51.
C14 = bits 3-0 represent parameters 52 through 55.
C15 = bits 3-0 represent parameters 56 through 59.
C16 = bits 3-0 represent parameters 60 through 63.
C17 = bits 3-0 represent parameters 64 through 67.
C18 = bits 3-0 represent parameters 68 through 71.
C19 = bits 3-0 represent parameters 72 through 75.
C20 = bits 3-0 represent parameters 76 through 79.
C21 = bits 3-0 represent parameters 80 through 83.
C22 = bits 3-0 represent parameters 84 through 87.
C23 = bits 3-0 represent parameters 88 through 91.
C24 = bits 3-0 represent parameters 92 through 95.
C25 = bits 3-0 represent parameters 96 through 99.

Note: A one shows a change in the respective parameter.

Or...

'NOXX' The request was not processed.

Where: XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected

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- Remarks:** Bit 3 of C1 (listed as parameter 00) does not represent a parameter. If this bit is set, it indicates that there has been a parameter change somewhere in the directory requested. If not set, there has been nothing changed in the directory.
- Constraints:** None.
- Special Case:** None.
- Comm. Modes:** Polling Only (0), Poll & Authorize (1) or Remote Control (2).

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Command Code PC – Change Program Code Values

This command instructs the AccuLoad II to change the value of one of the programmable entries (101 through 999) in the directory specified, provided code 741 is properly programmed to either 1 or 2.

Command:

'PC_XXX_NNN_V...V'

Where XXX = program code
NNN = table entry number (code 145* & 183 only)
V...V = new value

For Program Code 759 the format is:

'PC_759_IIIccceee'

Where III = line number
ccc = column number
eee = entry number

Responses:

'PC_XXX_NNN_A...A' **Good Response.**

Where XXX = three digit program code
NNN = table entry number (code 145* & 183 only)
A...A = 24-character value and description as displayed when accessed through the Program Mode using the AccuLoad II keypad.

or...

'NOXX' The program value was not changed.

Where XX = '01' In the Programming Mode
= '03' Value Rejected
= '06' Operation Not Allowed
= '08' Transaction in Progress
= '09' Alarm Condition
= '13' AccuLoad II Authorized
= '14' Program Code Not Used

Remarks:

The number of digits or alpha characters entered for the new program code must be EXACTLY equal to the number of digits or alpha characters required for that particular program code.

Constraints:

Only numeric data, upper or lowercase A through Z, +, -, *, and a space will be allowed in the V...V range. Also the table entry number (NNN) applies to STD Version 10 and above firmware only.

Special Case:

None.

Comm. Modes:

Poll & Authorize (1) or Remote Control (2).

**Note: Code 145 applies to STD-18 and above firmware.*

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Program Values Rev. 0 and Rev. 1 Firmware

Code	Description	Format	PV	PC	PC Ready Mode Only
100	**General Purpose Directory**				
100	Not Used				
101	Alarm Check and Reset				
102	Run Mode Alarms				
103	Ready Mode Alarms				
104	Time Set	HH.MM	X		
105	Date Set	MM-DD-YY	X		
106	Dynamic Display Time-out	NN	X		X
107	Flashing Totals Display	0-1	X		X
108-139	Not Used				
140	Protection of Codes 180-189	0-1	X	X	
141	Clear Run Mode Alarms Select	0-9	X		X
142-179	Not Used				
180	Programming Access Code	NNNN			
181	Product Message Select	9 characters A-Z (upper & lowercase) 0-9, +, -, * and space	X	X	
182-189	Not Used				
190	Meter Position Disable	0-1	X		
191-199	Not Used				
200	**Flow Control Directory**				
200	Not Used				
201	Excess Flow Rate	NN	X	X	
202	Minimum Flow Rate	NNN	X	X	
203	Valve Type	0-1	X		X
204	Low Flow Start Volume	NNNN	X	X	
205	Low Flow Start Flow Rate	NNNN	X	X	
206	Zero Flow Timer	NN	X	X	
207	First High Flow Rate	NNNN	X	X	

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208	Flow Tolerance	N	X	X	
209	Second High Flow Rate	NNNN	X	X	
210	First Trip Volume	NNNN	X	X	
211	Final Trip Volume	NN.N	X	X	
212	Final Trip Auto Adjust Limit	0-9	X	X	
213	Overrun Alarm Limit	NN	X	X	
214	Low Flow Alarm Limit	NNN	X	X	
215	Start After Stop Delay	NNN	X	X	
216	Pump Relay Time Delay	NN	X	X	
217	Valve Delay to Open	NN	X	X	
218	PT/VF Time Delay	NN	X	X	
219-239	Not Used				
240	Protection of Codes 280-289	0-1	X	X	
241	Valve Security	0-1	X	X	
242-299	Not Used				
300	**Volume Accuracy Directory**				
300	Not Used				
301	Transaction Control	0-2	X		X
302	Maximum Preset Volume	VVVVV	X		X
303	Minimum Preset Volume	VVVVV	X		X
304	Auto Preset	0-1	X		X
305	Blank Downcounter	0-1	X		X
306-339	Not Used				
340	Protection of Codes 380-389	0-1	X	X	
341	Dual Pulse Error Count	NNN	X		X
342	Dual Pulse Error Reset	0-3	X		X
343	Dual Pulse Flow Rate Cutoff	NNN	X		X
344	Display Units	3 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	

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345	Preset Delivery	0-4	X		X
346	Delivery Display	0-4	X		X
347	Corrected Delivery Display	0-4	X	X	
348	Printer Registration	0-3	X		X
349	Printer Output Resolution	NNN.N	X		X
350	Display Resolution	0-1	X		X
351	Input Resolution	NNNN	X		X
352,354,356,358	Flow Rates for Meter Factors	NNNN	X	X	
353,355,357,359	Meter Factors 1, 2, 3, & 4	N.NNNN	X	X	
360	Meter Factor % Change/Deg	N.NNNN	X	X	
361	Meter Factor Ref Temperature	NNN.N	X	X	
362	Proving Modes	0-2	X		X
363	Proving Output	0-2	X		X
364	Proving Output Units	0-4	X		X
365-389	Not Used				
390	Master Meter Factor	N.NNNN	X		
391	Linearized Factor Deviation	N.NN	X		
392	Meter Factor Variation	0-1	X		
393	Input Pulse Type	0-1	X		
394	Input Pulse Doubler	0-1	X		
395	Transmitter Type	0-3	X		
396-399	Not Used				
400	**Temperature and Density Directory**				
400	Not Used				
401-439	Not Used				
440	Protection of Codes 480-489	0-1	X	X	
441	Temperature Units	0-2	X		X
442	Reference Temperature	NNN.N	X	X	
443	Temperature Offset	SN.N	X	X	

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444	API Table & Product	00-22	X		X
445	Reference Density	SNNN.N N.NNNN, NNNN.N or .NNNN	X	X	
446	Low Temperature Alarm	SNNN	X	X	
447	High Temperature Alarm	SNNN	X	X	
448	Maintenance Temperature	SNNN.N	X	X	
449	Temp/Density Channel	0-1	X		X
450	Density Units	0-2	X		X
451	Min Temp/Density Units - 4 mA	SNNN.N	X		X
452	Max Temp/Density Units - 20 mA	SNNN.N	X		X
453	Low Density Alarm	NNNN	X	X	
454	High Density Alarm	NNNN	X	X	
455	Volume/Mass Conversion	0-4	X		X
456-499	Not Used				
500	**Pressure Directory**				
500	Not Used				
501	Minimum Back Pressure Flow Rate Setting	NNNN	X	X	
502	Differential Pressure	NNN	X	X	
503	Minimum Back Pressure Flow Rate Timer	NN	X	X	
504	BP Reduction	NN	X	X	
505	Low Pressure Alarm Setting	NNNN	X	X	
506	High Pressure Alarm Setting	NNNN	X	X	
507-539	Not Used				
540	Protection of Codes 580-589	0-1	X	X	
541	Pressure Units	0-3	X		X
542	Min Pressure Units - 4 mA	NNN.N	X		X
543	Max Pressure Units - 20 mA	NNN.N	X		X
544	Compressibility Factor	NNNNN	X	X	

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545	Maintenance Pressure	NNN.N	X	X	
546,548,550	Product Vapor Pressure	NNN.N	X	X	
547,549,551	Product Vapor Pressure Temperature	SNNN	X	X	
552-599	Not Used				
600	**Read Only Directory**				
600	Not Used				
601	Raw Non-resettable Totals	NNNNNNNNN	X		
602	Gross Non-resettable Totals	NNNNNNNNN	X		
603	Gross @ Standard Temperature Non-resettable Totals	NNNNNNNNN	X		
604	Net Non-resettable Totals	NNNNNNNNN	X		
605	Mass Non-resettable Totals	NNNNNNNNN	X		
606	Load Average Temperature	SNNN.N	X		
607	Load Average Pressure	NNN.N	X		
608	Load Average Density	NNN.N	X		
609	Load Average Meter Factor	N.NNNN	X		
610	Maximum and Used Local Storage Transactions		X		
611-639	Not Used				
640	Protection of Codes 680-689	0-1	X	X	
641-699	Not Used				
700	**Communications Directory**				
700	Not Used				
701	EIA-232 Communication Type	0-2	X		
702	EIA-232 Communication Control	0-6	X		
703	EIA-232 Baud Rate Select	0-9	X		
704	EIA-485 Communication Type	0-2	X		
705	EIA-485 Communication Control	0-4	X		
706	EIA-485 Baud Rate Select	0-9	X		
707	Communication Address	NN	X		

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708-712	Printer Output Messages	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
713-717	Permissive Messages	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
718	Meter ID	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
719	Product Description	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
720-722	HM Classification	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
723	Shared Printer Out Alarm	0-2	X		X
724	Shared Printer Out Timer	NN	X		X
725	Shared Printer Out Echo	0-1	X		X
726	First Configurable Printout Entry	LLLLCCCEEE	X		
727-739	Not Used				
740	Protection of Codes 780-789	0-1	X	X	
741	Communication Link Programming	0-3	X	X	
742	Communications Time-out	NNN	X	X	
743	Communications Alarm Mode	0-2	X	X	
744	Prompt Time-out	NNN	X	X	
745-749	Prompt Data Amount and Display Type	NN	X	X	
750	Start Key Enable/Disable	0-1	X	X	
751-779	Not Used				

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780	Number of Prompts	N	X	X	
781	Print Transaction	0-2	X		X
782	Prompts Printed	0-2	X		X
783-799	Not Used				
800	**Input/Output Directory**				
800	Not Used				
801-804	Additive Injection Pulsers	NNN	X	X	
805	Additive Injector Stop	0-2	X	X	
806	Manual/Auto Additive Injector	0-1	X		X
807	Additive Injector Output	0-1	X	X	
808,810	Permissive 1 & 2	0-2	X	X	
809,811	Permissive 1 & 2 Messages	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
812	Valve Sense Permissive Messages	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
813-839	Not Used				
840	Protection of Codes 880-889	0-1	X	X	
841-899	Not Used				
900	**Diagnostics Directory**				
900	Not Used				
901-939	Diagnostics				
940	Protection of Codes 980-989	0-1	X	X	
941-955	Diagnostics				
956-990	Not Used				
991-996	Diagnostics				
997-999	Not Used				

Table 35. Program Codes for PC Command

Note: Program codes 701-707 and X90-X99 (X representing any directory) may be requested through use of the 'PV' command but cannot be changed through use of the 'PC'.

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Program Values Rev. 2 and Up Firmware

Code	Description	Format	PV	PC	PC Ready Mode Only
100	**General Purpose Directory**				
100	Not Used				
101	Alarm Check and Reset				
102	Run Mode Alarms				
103	Ready Mode Alarms				
104	Set Time	HH.MM	X		
105	Set Date	MM-DD-YY	X		
106	Dynamic Display Time-out	NN	X		X
107	Flashing Totals Display	0-1	X		X
108-139	Not Used				
140	Protection of Codes 180-189	0-1	X	X	
141	Local Mode Alarm Clearing	0-9	X		X
142	Decimal or Comma Selection	0-1	X		
143	Alarm Relay	0-2	X		X
144	Run & Ready Mode Initialization (STD-10 and above)	0-1	X		X
145	Ready/Run Mode Clearable Alarms Selection (STD-13 and above firmware)	0-1	X		X
146-179	Not Used				
180	Programming Access Code	NNNN			
181	Product Message Select	9 characters A-Z (upper & lowercase) 0-9, +, -, * and space	X	X	
182	Auto Reset Time	NN	X	X	
183	Run & Ready Mode Customized Display (STD-10 and above)	NNN	X		X
184	Power-fail Alarm (STD-11 and above)	0-2	X	X	
185-189	Not Used				
190	Meter Position Disable	0-1	X		
191-199	Not Used				
200	**Flow Control Directory**				

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Code	Description	Format	PV	PC	PC Ready Mode Only
200	Not Used				
201	Excess Flow Rate	NN	X	X	
202	Minimum Flow Rate	NNN	X	X	
203	Valve Type	0-1	X		X
204	Low Flow Start Volume	NNNN	X	X	
205	Low Flow Start Flow Rate	NNNN	X	X	
206	Zero Flow Timer	NN	X	X	
207	First High Flow Rate	NNNN	X	X	
208	Flow Tolerance	N	X	X	
209	Second High Flow Rate	NNNN	X	X	
210	First Trip Volume	NNNN	X	X	
211	Final (Second) Trip Volume	NN.N	X	X	
212	Final (Second) Trip Auto	0-9	X	X	
213	Overrun Alarm Limit	NN	X	X	
214	Low Flow Alarm Limit	NNN	X	X	
215	Start Delay After Stop	NNN	X	X	
216	Pump Relay Time Delay	NN	X	X	
217	Valve Delay to Open	NN	X	X	
218	PT/VF Time Delay	NN	X	X	
219	Zero Flow Alarm (STD-13 and above firmware)	0-1	X	X	
220-239	Not Used				
240	Protection of Codes 280-289	0-1	X	X	
241	Valve Security	0-1	X	X	
242-299	Not Used				
300	**Volume Accuracy Directory**				
300	Not Used				
301	Transaction Control	0-4	X		X
302	Maximum Preset Volume	VVVVV	X		X
303	Minimum Preset Volume	VVVVV	X		X
304	Auto Preset	0-1	X		X
305	Blank Downcounter	0-1	X		X
306-339	Not Used				

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Code	Description	Format	PV	PC	PC Ready Mode Only
340	Protection of Codes 380-389	0-1	X	X	
341	Dual Pulse Error Count	NNN	X		X
342	Dual Pulse Error Reset	0-3	X		X
343	Dual Pulse Flow Rate Cutoff	NNN	X		X
344	Display Units	3 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
345	Preset Display	0-4	X		X
346	Delivery Display	0-4	X		X
347	Corrected Display	0-4	X	X	
348	Pulse 1 Output	0-3	X		X
349	Pulse 1 Output Resolution	NNN.N	X		X
350	Pulse 2 Output	0-3	X		X
351	Pulse 2 Output Resolution	NNN.N	X		X
352	Display Resolution	0-1	X		X
353	Input Resolution	NNNN	X		X
354,356,358,360	Flow Rates for Meter Factors	NNNN	X	X	
355,357,359,361	Meter Factors 1, 2, 3, & 4	N.NNNN	X	X	
362	Meter Factor % Change/Deg.	N.NNNN	X	X	
363	Meter Factor Reference Temperature	NNN.N	X	X	
364	Proving Modes	0-2	X		X
365	Proving Output	0-2	X		X
366	Proving Output Units	0-4	X		X
367-389	Not Used				
390	Master Meter Factor	N.NNNN	X		
391	Linearized Factor Deviation	N.NN	X		
392	Meter Factor Variation	0-1	X		
393	Input Pulse Type	0-1	X		
394	Input Pulse Doubler	0-1	X		
395	Transmitter Type	0-3	X		
396-399	Not Used				

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Code	Description	Format	PV	PC	PC Ready Mode Only
400	**Temperature and Density Directory**				
400	Not Used				
401-439	Not Used				
440	Protection of Codes 480-489	0-1	X	X	
441	Temperature Units	0-2	X		X
442	Reference Temperature	NNN.N	X	X	
443	Temperature Offset	SN.N	X	X	
444	API Table & Product	00-22	X		X
445	Reference Density	SNNN.N N.NNNN, NNNN.N or .NNNN	X	X	
446	Low Temperature Alarm	SNNN	X	X	
447	High Temperature Alarm	SNNN	X	X	
448	Maintenance Temperature	SNNN.N	X	X	
449	Density or Temperature Input	0-1	X		X
450	Density Units	0-2	X		X
451	Minimum Density or Minimum Temperature as selected in code 449	SNNN.N	X		X
452	Maximum Density or Maximum Temperature as selected in code 449	SNNN.N	X		X
453	Low Density Alarm	NNNN	X	X	
454	High Density Alarm	NNNN	X	X	
455	Volume/Mass Conversion	0-4	X		X
456	Mass Units	3 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
457	Micro-Pak Sequence Number (STD-15 and above)	NNNNN	X	X	
458	Density Transducer Constant A (STD-15 and above)	NN.NNNN	X	X	
459	Density Transducer Constant B (STD-15 and above)	SNN.NNNN	X	X	
460	Density Transducer Constant C	SNN.NNNN	X	X	

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Code	Description	Format	PV	PC	PC Ready Mode Only
	(STD-15 and above)				
461	Micro-Pak DCF Value (STD-15 and above)	NNN	X	X	
462	Pulse Output Multiplier (STD-15 and above)	0-4	X	X	
463	Micro-Pak Low Flow Pulse Output Cutoff (STD-15 and above)	NN	X	X	
464	Flow Sensor Tube Material (STD-15 and above)	0-1	X	X	
465	Flow Sensor Model (STD-15 and above)	0-1	X	X	
466	Mass Compensation factor (STD-18 and above)	N.NNNN	X	X	
467-499	Not Used				
500	**Pressure Directory**				
500	Not Used				
501	Minimum Back Pressure Flow Rate Setting	NNNN	X	X	
502	Differential Pressure	NNN	X	X	
503	Minimum Back Pressure Flow Rate Timer Setting	NN	X	X	
504	BP Reduction	NN	X	X	
505	Low Pressure Alarm	NNNN	X	X	
506	High Pressure Alarm	NNNN	X	X	
507-539	Not Used				
540	Protection of Codes 580-589	0-1	X	X	
541	Pressure Units	0-3	X		X
542	Minimum Pressure Units	NNN.N	X		X
543	Maximum Pressure Units	NNN.N	X		X
544	Compressibility Factor	NNNNN	X	X	
545	Maintenance Pressure	NNN.N	X	X	
546,548,550	Product Vapor Pressure	NNN.N	X	X	
547,549,551	Product Vapor Pressure Temperature	SNNN	X	X	
552	Vapor Pressure Calculation (STD-10 and above)	0-1	X	X	

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Code	Description	Format	PV	PC	PC Ready Mode Only
553-599	Not Used				
600	**Read Only Directory**				
600	Not Used				
601	Raw Non-resettable Totals	NNNNNNNNN	X		
602	Gross Non-resettable Totals	NNNNNNNNN	X		
603	Gross @ Standard Temperature Non-resettable Totals	NNNNNNNNN	X		
604	Net Non-resettable Totals	NNNNNNNNN	X		
605	Mass Non-resettable Totals	NNNNNNNNN	X		
606	Load Average Temperature	SNNN.N	X		
607	Load Average Pressure	NNN.N	X		
608	Load Average Density	NNN.N	X		
609	Load Average Meter Factor	N.NNNN	X		
610	Local Storage Transactions		X		
611	Injector 1 Non-resettable Totals	NNNNNNNNN	X		
612	Injector 2 Non-resettable Totals	NNNNNNNNN	X		
613	Injector 3 Non-resettable Totals	NNNNNNNNN	X		
614	Injector 4 Non-resettable Totals	NNNNNNNNN	X		
615-639	Not Used				
640	Protection of Codes 680-689	0-1	X	X	
641-699	Not Used				
700	**Communications Directory**				
700	Not Used				
701	EIA-232 Communication Type	0-3	X		
702	EIA-232 Communication Control	0-6	X		
703	EIA-232 Baud Rate	0-9	X		
704	EIA-232 Data Format	0-5	X		
705	EIA-485 Communication Type	0-3	X		
706	EIA-485 Communication Control	0-5	X		
707	EIA-485 Baud Rate	0-9	X		
708	EIA-485 Data Format	0-5	X		
709	Communication Address	NN	X		
710-714	Printer Output Messages	20 characters A-	X		X

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Code	Description	Format	PV	PC	PC Ready Mode Only
		Z (upper & lowercase), 0-9, +, -, * and space			
715-719	Prompt Messages	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
720	Meter ID	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
721	Product Description	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
722-724	HM Classification	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
725	Delivery Report (STD-9 and above)	0-1	X		X
726	Delivery Report Display (STD-9 and above)	LLLL,CCC,EEE	X		
727-739	Not Used				
740	Protection of Codes 780-789	0-1	X	X	
741	Communication Link Programming	0-3	X	X	
742	Communications Time-out	NNN	X	X	
743	Communications Alarm Mode	0-2	X	X	
744	Prompt Time-out	NNN	X	X	
745-749	Prompt Data Entry	NN	X	X	
750	Start Key Enable/Disable	0-1	X	X	
751	Shared Printer Out Alarm	0-2	X		X
752	Shared Printer Out Timer	NN	X		X
753	EIA-232 Printer Security	0-1	X		X
754	EIA-485 Printer Security	0-1	X		X
755	Shared Printer Security Alarm	0-2	X		X
756	Select Totals to Print	NNNNN	X		X
757	Select Load Averages to Print (STD-4 and above)	NNNN	X		X

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Code	Description	Format	PV	PC	PC Ready Mode Only
758	Select Additive Volumes to Print (STD-4 and above)	NNNN	X		X
759	Define Delivery Report (STD-9 and above)	LLLL,CCC,EEE			X
760	Programmable Message #1	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
761	Programmable Message #2	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X		X
762-779	Not Used				
780	Number of Prompts	N	X	X	
781	Print Transaction	0-2	X		X
782	Prompts Printed	0-2	X		X
783-799	Not Used				
800	**Input/Output Directory**				
800	Not Used				
801,804	Permissive 1 & 2	0-5	X	X	
802,805	Restart After Permissive 1 & 2	0-1	X	X	
803,806	Permissive 1 & 2 Messages	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
807	Restart After Valve Power Restored	0-1	X	X	
808	Valve Power Sense Permissive Message	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
809	Prompt Message	20 characters A-Z (upper & lowercase), 0-9, +, -, * and space	X	X	
810-839	Not Used				
840	Protection of Codes 880-889	0-1	X	X	
841,843,845,847	Additive Feedback	0-2	X	X	
842,844,8	Additive Volume	Piston Injectors	X	X	

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Code	Description	Format	PV	PC	PC Ready Mode Only
46,848		NNN.NNN Smart Injectors NNN.N			
849	Additive Injector Units	3 characters A-Z (upper or lowercase), 0-9, t, -, * and space	X	X	
850	Additive Injector Feedback Errors	NN	X	X	
851,852,853,854	Additive Feedback Delays	NNN	X	X	
855	Additive 1 Address <i>Note: Applies to STD-16 and above firmware.</i>	NNN	X		X
856	Additive 2 Address <i>Note: Applies to STD-16 and above firmware.</i>	NNN	X		X
857	Additive 3 Address <i>Note: Applies to STD-16 and above firmware.</i>	NNN	X		X
858	Additive 4 Address <i>Note: Applies to STD-16 and above firmware.</i>	NNN	X		X
859	Additive Alarm Action <i>Note: Applies to STD-16 and above firmware.</i>	0-1	X		X
860	Additive Alarm Message <i>Note: Applies to STD-16 and above firmware.</i>	20 characters	X		X
861	Additive Totals Units <i>Note: Applies to STD-16 and above firmware.</i>	0-1	X		X
862-879	Not Used				
880-883	Additive Injector Pulsers	NNN	X	X	
884	Additive Injector Stop	0-9	X	X	
885	Manual/Auto Additive Injector	0-3	X		X
886	Additive Injector Output	0-1	X	X	
887	Additive Injector Stop Volume <i>Note: Applies to STD-16 and above firmware.</i>	NNN	X	X	
888-889	Not Used				
890	Additive System Pacing Control <i>Note: Applies to STD-16 and above firmware.</i>	0-4	X	X	
891-899	Not Used				

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Code	Description	Format	PV	PC	PC Ready Mode Only
900	**Diagnostics Directory**				
900	Not Used				
901-915	Diagnostics				
916-939	Not Used				
940	Protection of Codes 980-989	0-1	X	X	
941-960	Diagnostics				
961-990	Not Used				
991-997	Diagnostics				
998-999	Not Used				

Table 36. Program Codes for PC Command

Note: 1. Program codes for 701-707 and X90-X99 (X representing any directory) may be requested through use of the 'PV' command but cannot be changed through use of the 'PC'.

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Command Code PF - Request Time of Power-fail

This command requests the time and date the last power-fail occurred.

Command:

'PF'

Responses:

'PF_DDDDDD_AAAA_X' Good Response.

Where DDDDDD = Power-fail date
 = (MMDDYY for Standard Time)
 = (DDMMYY for Military Time)
AAAA = Power-fail time (HHMM)
X = A (Standard Time - A.M.)
 = P (Standard Time - P.M.)
 = M (Military Time)

Remarks: None.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code PT - Request Printer Ticket Data

This command retrieves formatted printer ticket transaction data.

Command:

Current Transaction Only

'PT'

Local Storage Only

'PT_NNN'

Where: NNN = Number of transactions back into local storage to retrieve data.

Responses:

'See 'Product Receipt Ticket' on page 106.

Good Response.

or...

'NOXX' The transaction data was not retrieved.

Where XX = '01' In the Programming Mode
= '03' Value Rejected (PT_NNN only)
= '05' No Transaction in Progress or Completed
= '08' Transaction in Progress ('PT' only)

Remarks: None.

Constraints: Data units (for batch volumes) are what was programmed for AccuLoad II for gross or GST display units (program code 344). Used with Comm Type 1 - EIA Terminal only.

Special Case: None.

Comm. Modes Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code PV - Request Program Code Values

This command requests program value(s) from the AccuLoad II.

Command:

'PV_XXX_NNN'

Where XXX = Program code (See Table 35 on pages 87-93 and Table 36 on pages 94-103 for allowable codes.)
NNN = Table entry number (code 183 only)

Responses:

'PV_XXX_NNN_A...A' Good Response.

Where XXX = program code

NNN = table entry number (code 183 only)

A...A = 24 character value and description as displayed when accessed through Program Mode using AccuLoad II keypad.

or...

'NOXX' Program value not read.

Where XX = '01' In the Programming Mode

= '02' AccuLoad II Released

= '03' Value Rejected

= '06' Operation Not Allowed

= '14' Program Code Not Used

Remarks: None.

Constraints: Table entry (NNN) applies to STD Version 10 and above firmware.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Command Code RA - Request Alarm Status

This command requests specific alarm condition(s) from the AccuLoad II.

Command:

'RA'

Responses:

'HF OA TP' Good Response. A character string consisting of from 1 to 5 status codes separated by a single space. Each status code is two characters. All codes are detailed in Table 37.

Remarks: None.

Constraints: Alarm conditions are reported in the order in which they occurred from left to right.

Special Case: If no alarm condition is set, an 'OK' response is issued. All smart injector alarms are returned in the system response.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Alarm Status Codes

Code	Description	Condition
'AC'	Additive Communications	Indicates a failure on the master/slave communications line between AccuLoad and smart additive system. <i>Note: Applies to STD-16 and above firmware.</i>
'A2'	232 Printer Access Cover Open	The access cover on the printer must be closed so that printing may resume. <i>Note: Applies to STD-16 and above firmware.</i>
'A4'	485 Printer Access Cover Open	The access cover on the printer must be closed so that printing may resume. <i>Note: Applies to STD-16 and above firmware.</i>
'BP'	Back Pressure	Shows that the back pressure cannot be maintained for the minimum back pressure flow rate entry set.
'B2'	232 Printer Buffer Overflow	Indicates that the buffer in the printer has been overfilled. <i>Note: Applies to STD-16 and above firmware.</i>
'B4'	485 Printer Buffer Overflow	Indicates that the buffer in the printer has been overfilled. <i>Note: Applies to STD-16 and above firmware.</i>
'CM'	Communication Alarm	Shows a failure on one of the communication channels.
'DA'	Diagnostic Alarm	The twelve types are ROM error, RAM error, EEPROM error, Watchdog, display error, data retention error, display download required, control module alarm, security code violation, software version mismatch, internal temperature alarm and programming error.
'DP'	Down Pulse Error	Shows consecutive down pulses greater than or equal to the dual pulse comparator error count.
'DR'	Density Transducer	Shows density transducer failure or out-of-range condition.
'D2'	232 Printer Deselected	The printer must be put back on-line. <i>Note: Applies to STD-16 and above firmware.</i>
'D4'	485 Printer Deselected	The printer must be put back on-line. <i>Note: Applies to STD-16 and above firmware.</i>
'E2'	General 232 Printer Error	Indicates the printer is not working. <i>Note: Applies to STD-16 and above firmware.</i>
'E4'	General 485 Printer Error	Indicates the printer is not working. <i>Note: Applies to STD-16 and above firmware.</i>
'F1'	Additive 1 Feedback Error	Indicates that the AccuLoad is not receiving the feedback signal from additive injector 1. <i>Note: Applies to STD-16 and above firmware.</i>

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'F2'	Additive 2 Feedback Error	Indicates that the AccuLoad is not receiving the feedback signal from additive injector 2. Note: Applies to STD-16 and above firmware.
'F3'	Additive 3 Feedback Error	Indicates that the AccuLoad is not receiving the feedback signal from additive injector 3. Note: Applies to STD-16 and above firmware.
'F4'	Additive 4 Feedback Error	Indicates that the AccuLoad is not receiving the feedback signal from additive injector 4. Note: Applies to STD-16 and above firmware.
'HD'	Density Transducer	Shows that the density transducer is out-of-range of the high alarm setting.
'HF'	Excess High Flow	Shows that the flow rate has exceeded the flow limit set in Excess High Flow program code for more than 4 seconds.
'HP'	Pressure Transducer	Shows that the pressure transducer is out-of-range of the high alarm setting.
'HT'	Temperature Transducer	Shows that the temperature probe or transducer is out-of-range of the high alarm setting.
'H2'	232 Hardware Failure	Indicates a hardware failure in the printer. Note: Applies to STD-16 and above firmware.
'H4'	485 Hardware Failure	Indicates a hardware failure in the printer. Note: Applies to STD-16 and above firmware.
'IA'	Injector Alarm	Indicates that one of the injector subsystem alarms is set. Additive alarms should be requested and checked. Note: Applies to STD-16 and above firmware.
'I2'	232 Printer Not Responding	Indicates that the printer is not responding when the AccuLoad tries to communicate with it. Note: Applies to STD-16 and above firmware.
'I4'	485 Printer Not Responding	Indicates that the printer is not responding when the AccuLoad tries to communicate with it. Note: Applies to STD-16 and above firmware.
'K1'	Low Additive Alarm (Smart Additives Only)	Indicates that not enough additive was injected for additive 1. Note: Applies to STD-16 and above firmware.
'K2'	Low Additive Alarm (Smart Additives Only)	Indicates that not enough additive was injected for additive 2. Note: Applies to STD-16 and above firmware.
'K3'	Low Additive Alarm (Smart Additives Only)	Indicates that not enough additive was injected for additive 3. Note: Applies to STD-16 and above firmware.

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'K4'	Low Additive Alarm (Smart Additives Only)	Indicates that not enough additive was injected for additive 4. <i>Note: Applies to STD-16 and above firmware.</i>
'LD'	Density Transducer	Shows that the density transducer is out-of-range of the low alarm setting.
'LF'	Low Flow	Shows that the flow rate was at or below the minimum flow rate established by Low Flow Limit program code for longer than 8 seconds.
'LP'	Pressure Transducer	Shows that the pressure transducer is out-of-range of the low alarm setting.
'LT'	Temperature Transducer	Shows that the temperature probe or transducer is out-of-range of the low alarm setting.
'L1'	Additive Pulse Alarm (Smart Additives Only)	The additive system is not receiving meter pulses after being authorized (Additive 1). <i>Note: Applies to STD-16 and above firmware.</i>
'L2'	Additive Pulse Alarm (Smart Additives Only)	The additive system is not receiving meter pulses after being authorized (Additive 2). <i>Note: Applies to STD-16 and above firmware.</i>
'L3'	Additive Pulse Alarm (Smart Additives Only)	The additive system is not receiving meter pulses after being authorized (Additive 3). <i>Note: Applies to STD-16 and above firmware.</i>
'L4'	Additive Pulse Alarm (Smart Additives Only)	The additive system is not receiving meter pulses after being authorized (Additive 4). <i>Note: Applies to STD-16 and above firmware.</i>
'MD'	Micro-Pak Drive	Shows a failure with the drive A/D from the Micro-Pak. <i>Note: Applies to STD-15 and above firmware.</i>
'MH'	Micro-Pak High Temperature	Shows that a high temperature alarm has occurred at the Micro-Pak. <i>Note: Applies to STD-15 and above firmware.</i>
'ML'	Micro-Pak Low Temperature	Shows that a low temperature alarm has occurred at the Micro-Pak. <i>Note: Applies to STD-15 and above firmware.</i>
'MM'	Micro-Pak Magnitude Error	Shows a failure with the magnitude forward or magnitude reverse A/D values from the Micro-Pak. <i>Note: Applies to STD-15 and above firmware.</i>
'MS'	Master/Slave Communications	Indicates a failure in the Master/Slave Communications. <i>Note: Applies to STD-15 and above firmware.</i>
'M1'	Too Many Pulses Alarm (Smart Additives Only)	Indicates that too many additive flow meter pulses were detected for additive 1. <i>Note: Applies to STD-16 and above firmware.</i>

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'M2'	Too Many Pulses Alarm (Smart Additives Only)	Indicates that too many additive flow meter pulses were detected for additive 2. Note: Applies to STD-16 and above firmware.
'M3'	Too Many Pulses Alarm (Smart Additives Only)	Indicates that too many additive flow meter pulses were detected for additive 3. Note: Applies to STD-16 and above firmware.
'M4'	Too Many Pulses Alarm (Smart Additives Only)	Indicates that too many additive flow meter pulses were detected for additive 4. Note: Applies to STD-16 and above firmware.
'N1'	No Pulses Detected Alarm (Smart Additives Only)	Indicates that no additive meter pulses were detected for additive 1. Note: Applies to STD-16 and above firmware.
'N2'	No Pulses Detected Alarm (Smart Additives Only)	Indicates that no additive meter pulses were detected for additive 2. Note: Applies to STD-16 and above firmware.
'N3'	No Pulses Detected Alarm (Smart Additives Only)	Indicates that no additive meter pulses were detected for additive 3. Note: Applies to STD-16 and above firmware.
'N4'	No Pulses Detected Alarm (Smart Additives Only)	Indicates that no additive meter pulses were detected for additive 4. Note: Applies to STD-16 and above firmware.
'OA'	Overrun	Shows that the volume delivered has exceeded the preset amount by at least the number of units set in the Overrun Limit program code.
'O2'	232 Printer Paper Out	Indicates that the printer is out of paper. Note: Applies to STD-16 and above firmware.
'O4'	485 Printer Paper Out	Indicates that the printer is out of paper. Note: Applies to STD-16 and above firmware.
'PA'	Power-fail Alarm (STD-11 firmware and above)	Shows that either a power failure or a hardware reset has occurred.
'PC'	Pulse Collision	Shows a collision on the incoming pulse stream.
'PS'	Pulse Security	Used only with pulse security option. Shows that an excessive number of erroneous pulses have been detected, or a power failure on PSC board.
'PR'	Pressure Transducer	Shows pressure transducer failure or out-of-range condition.

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'PT'	Pulse Transmission	(Used with the optional Valve Position Indicator Switch) Shows that meter pulses are not being received and the valve is open, or if meter pulses are being received and the valve is closed for more than what is programmed in the PT/VF Time Delay program code. (Will result in an immediate Valve Fault Alarm - no 10 second delay.)
'P2'	232 Printer Communications	Indicates a printer communications problem. Note: Applies to STD-16 and above firmware.
'P4'	485 Printer Communications	Indicates a printer communications problem. Note: Applies to STD-16 and above firmware.
'R1'	Additive 1 Frequency Alarm (Smart Additives Only)	The additive volume is too high for the rate selected; a second dose of additive is being requested before the first dose is completed. Note: Applies to STD-16 and above firmware.
'R2'	Additive 2 Frequency Alarm (Smart Additives Only)	The additive volume is too high for the rate selected; a second dose of additive is being requested before the first dose is completed. Note: Applies to STD-16 and above firmware.
'R3'	Additive 3 Frequency Alarm (Smart Additives Only)	The additive volume is too high for the rate selected; a second dose of additive is being requested before the first dose is completed. Note: Applies to STD-16 and above firmware.
'R4'	Additive 4 Frequency Alarm (Smart Additives Only)	The additive volume is too high for the rate selected; a second dose of additive is being requested before the first dose is completed. Note: Applies to STD-16 and above firmware.
'SF'	Storage Full	Shows that the local storage area is full.
'SP'	Shared Printer	Shows an output was attempted to the shared printer but was unsuccessful because the shared printer remained busy longer than the programmed shared printer out alarm timer.
'TK'	Ticket Alarm	Shows that removal of the ticket from the local ticket printer was tried during a batch loading.
'TP'	Temperature Probe	Shows a short or open condition in the temperature probe circuit (main line probe).
'TT'	Temperature Transducer	Shows temperature transducer failure or out-of-range condition.
'U1'	Unauthorize Command Failed Alarm (Smart Additives Only)	The additive injector subsystem was not authorized at the end of the batch when the AccuLoad attempted to authorize the injector. This could mean that not enough additive was injected. Note: Applies to STD-16 and above firmware.

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'U2'	Unauthorize Command Failed Alarm (Smart Additives Only)	The additive injector subsystem was not authorized at the end of the batch when the AccuLoad attempted to authorize the injector. This could mean that not enough additive was injected. <i>Note: Applies to STD-16 and above firmware.</i>
'U3'	Unauthorize Command Failed Alarm (Smart Additives Only)	The additive injector subsystem was not authorized at the end of the batch when the AccuLoad attempted to authorize the injector. This could mean that not enough additive was injected. <i>Note: Applies to STD-16 and above firmware.</i>
'U4'	Unauthorize Command Failed Alarm (Smart Additives Only)	The additive injector subsystem was not authorized at the end of the batch when the AccuLoad attempted to authorize the injector. This could mean that not enough additive was injected. <i>Note: Applies to STD-16 and above firmware.</i>
'VF'	Valve Fault	Shows that the valve did not close within 10 seconds after receiving the signal to close.
'ZF'	Zero Flow (STD-13 and above firmware)	Indicates that the Zero Flow alarm timer has expired.

Table 37. RA Responses

Command Code RB - Request Batch

This command instructs AccuLoad II to transmit batch data.

Command:

Batch Currently in Progress

'RB'

Current Completed Transaction Only

'RB_X'

Local Storage Only

'RB_X_NNN'

Where X = Batch number requested.
NNN = Number of transactions back into local storage to retrieve data.

Responses:

Current Batch and Current Transaction

'RB_X_A_VVVVVV'

Local Storage

'RB_X_A_VVVVVV_NNN'

Where X = Batch number requested
A = Additive selection code (See Table 38 on page 118).
VVVVVV = Batch volume
NNN = Number of transactions back into local storage to retrieve data.

or...

'NOXX' The batch data was not read.

Where XX = '03' Value Rejected
= '05' No Transaction in Progress or Completed
= '18' No Transaction in Progress ('RB' only)

Section 8 - Command Reference Guide

- Remarks:** None.
- Constraints:** Transaction Volume Units are assumed to be as programmed into AccuLoad II. Data is not cleared from AccuLoad II until the next transaction is authorized or 'TD' status reset. When the 'RB_X_NNN' format is used, data is not cleared until a 'CT' command is accepted.
- Special Case:** Batch number nine contains accumulated batch amounts for subsequent batches past nine and only the additive selection made for the last subsequent batch past nine will be retained. Zero batch totals other than the first will not be counted.
- Comm. Modes:** Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Additive Selection Codes

Character Returned ('A')		Additives Selected			
Hex	Code	Additive 1	Additive 2	Additive 3*	Additive 4*
'30'	0				
'31'	1	X			
'32'	2		X		
'33'	3	X	X		
'34'	4			X	
'35'	5	X		X	
'36'	6		X	X	
'37'	7	X	X	X	
'38'	8				X
'39'	9	X			X
'41'	A		X		X
'42'	B	X	X		X
'43'	C			X	X
'44'	D	X		X	X
'45'	E		X	X	X
'46'	F	X	X	X	X

Table 38. Additive Selection Code for Command RB

Note: *To select Additives 3 and 4, Additives Option must be installed (Rev. 0 and Rev. 1 firmware). Additives 3 and 4 are standard in Rev. 2 and up firmware.

Command Code RC - Resume Communications

This command instructs AccuLoad II to resume communications from the Standby Mode.

Command:

'RC'

Responses:

'OK' Good Response. Communications have resumed and the Local Storage status flag ('SA') has been cleared.

or...

'NOXX' Communications have not been restored.

Where XX = '07' Wrong Control Mode
= '08' Transaction in Progress

Remarks: None.

Constraints: None.

Special Case: None.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Command Code RD - Request Current Transducer or Probe Value

This command requests the value of one of the probes or transducers installed and wired to the AccuLoad II.

Command:

'RD_X'

Where X = T (current temperature)
 = P (current pressure)
 = D (current density)

Responses:

'RD_X_VVVV.V' Good Response.

Where X = T (current temperature)
 = P (current pressure)
 = D (current density)
VVVV.V = current value

or...

'NOXX' The value was not read.

Where XX = '01' In the Programming Mode
 = '02' AccuLoad II Released
 = '03' Value Rejected
 = '19' Option Not Installed

Remarks: None.

Constraints: Temperature, Pressure, and Density are all individual installable options. Units are what were programmed in the AccuLoad II. Negative temperature is possible. Temperature, Pressure, and Density data is reset to zero on power-fail or if not installed.

Special Case: Leading digit of the temperature value will be a minus sign (-) if it is below zero degrees.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code RE - Reset Status Conditions

This command resets or acknowledges pending status conditions of the AccuLoad II.

Command:

'RE_XX'

Where XX = two character code as detailed below. (See Table 39.)

Responses:

'OK' Good Response. Status condition has been reset.

or...

'NOXX' The status condition has not been reset.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '06' Operation Not Allowed

Remarks: None.

Constraints: See Table 39.

Special Case: 'TD' and 'BD' status are also reset on authorize commands. When the 'PC' status is reset, the bit maps used to respond to the 'PB' and 'DB' commands will also be cleared.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

Valid Status Codes

Code	Condition
'TD'	Transaction Done Status (also resets 'BD')
'BD'	Batch Done Status
'PF'	Unit Has Power-failed
'PC'	Program Mode Value Has Changed

Table 39. Value Status Code for RE

Note: If the status code is already reset, an 'NO06' will be returned.

Section 8 - Command Reference Guide

Command Code RK - Read Keypad

This command instructs the AccuLoad II to transmit any pending data entered at the keypad.

Command:

'RK'

Responses:

'RK_NNNN....N' Good Response.

Where NNNN....N is a string of from 1 to 24 characters ending with a non-numeric terminating key represented as indicated below:

Numeric keypad data zero through nine will be represented by their ASCII character equivalents.

The Enter key ("ENTER") will be represented by the "E" ASCII character.

The Print key ("PRINT") will be represented by the "P" ASCII character.

The Start key ("START") will be represented by the "A" ASCII character.

The Set key ("SET") will be represented by the "B" ASCII character.

The Clear key ("CLEAR") and the Stop key ("STOP") have a function and therefore will not be represented on the display. If pressed, the last character entered will be cleared and another character may be entered in its place. If pressed a second time, the entire field will be cleared and entry will have to be repeated.

or...

'NOXX' Pending data was not available.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '07' Wrong Control Mode
= '17' No Keypad Data Pending

Remarks: No function key of the other meter position will be returned.

Constraints: Once a terminating key is pressed at the keypad the message 'PLEASE WAIT' will be displayed. Keypad data is not cleared from AccuLoad II until a 'WX', 'WD', or 'DA' command has been issued. After data pending, the keyboard is locked until a 'WX' or 'WD' command has been issued for prompt or a 'DA' command removes minicomputer control. If none of these occur within 3 minutes, AccuLoad II will time-out and release the keypad and display from minicomputer control.

Special Case: None.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Command Code RO - Request Options

This command requests the options that are installed in the AccuLoad II.

Command:

'RO'

Responses:

'HP PR' Good Response. A character string consisting of from 1 to 8 option codes separated by a single space. Each option code is two characters. All codes are detailed in Table 40.

Remarks: None.

Constraints: None.

Special Case: If there are no options, the code 'ZO' will be returned in response.

Comm. Modes: Polling Only (0), Poll & Authorize (1) or Remote Control (2).

Option Codes

Code	Description
AD	Additive Monitoring*
CM	Communications
DN	Density
DP	Dual Pulse
HP	High-speed Proving
PR	Pressure
TM	Single Meter
TP	Temperature

Table 40. Option Codes for RO

Note: *Additive Monitoring for Rev. 2 and up firmware, additives for Rev. 0 and Rev. 1 firmware.

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Command Code RP - Request Preset

This command requests the current preset value displayed at the AccuLoad II.

Command:

'RP'

Responses:

'RP_XXXXXX' Good Response.

Where XXXXXX = Preset value.

or...

'NOXX' The current preset value was not read.

Where XX = '01' In the Programming Mode

Remarks: The preset value is returned with leading zeroes (e.g., RP_00100). Note that in Remote Control once the batch done flag is set this command will return RP_000000.

Constraints: The preset value is only available from the AccuLoad II while the AccuLoad II is Authorized, Released, Flowing, and Transaction in Progress. RP will return the actual preset value from the time the load is started ('SA' command or pressing the 'START' key) until batch done status is set. At all other times the response to the 'RP' will be 'RP_ _ _ _ _ 0'.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Command Code RQ - Request Current Flow Rate

This command retrieves the current flow rate from the AccuLoad II.

Command:

'RQ'

Responses:

'RQ_XXXX' Good Response.

Where XXXX = current flow rate

Remarks: None.

Constraints: None.

Special Case: If flow is currently under back pressure control, the response will be 'RQ*XXXX'. The asterisk (*) shows flow is under back pressure control.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Section 8 - Command Reference Guide

Command Code RS - Request Status

This command requests the operational status of the AccuLoad II (long format).

Command:

'RS'

Responses:

'RL AU FL TP' Good Response. A character string consisting of from 1 to 20 status codes separated by a single space. Each status code is two characters. All codes are detailed in Table 41 on page 127.

Remarks:

The AccuLoad II is considered released whenever the valve is open and has not been commanded to close.

Some alarm conditions cannot be reset through the Communication channel. (See Alarm Reset command.)

When program code 209 2nd high flow is non-zero the voltage at Terminals 98 or 106 (depending on the preset position) is used to select 1st or 2nd high flow.

When program code 301 is set for any local printer option then the voltage at Terminals 100 or 108 (depending on the preset position) is used to signal end of transaction.

Constraints: None.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Request Status Codes

Code	Condition
'AL'	Alarm Condition
'AU'	Authorized
'BD'	Batch Done
'DP'	Delayed Prompt is in Effect ('WP' or 'WQ' command)
'FL'	Product is Flowing
'HC'	1st/2nd High Flow Contact Status = 0 (ac voltage present)
'KY'	Keyboard Data Waiting
'OK'	AccuLoad II Idle, No Status is Pending
'PC'	Program Mode Value has Changed
'PF'	Power-fail has Occurred Since Last Reset
'PW'	Program or Weights/Measures Mode
'RL'	AccuLoad II is Released
'SA'	Standby Mode
'SF'	Storage Full
'ST'	Standby Transaction Pending
'S1'	Spare Contact #1
'S2'	Spare Contact #2
'TD'	Transaction Done
'TO'	Display Message has Timed Out
'TP'	Transaction in Progress
'TS'	Ticket Tray Switch Contact Status = 0 (ac voltage present)
'VP'	Valve Power Contact (Valve Sense)
'VS'	Valve Sense Contact

Table 41. Status Codes for RS

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Command Code RT - Request Transaction

This command instructs AccuLoad II to transmit the transaction data.

Command:

Current Transaction Only

'RT_X'

Local Storage only

'RT_X_NNN'

Responses:

Current Transaction

'RT_X_Y_VVVVV' Good Response.

Local Storage

'RT_X_Y_VVVVV_NNN' Good Response.

Where X = R for Raw Total
= G for Gross Total
= N for Gross at Standard Temperature Total
= P for Net Temperature & Pressure
= M for Mass Totals
= 1 for Additive 1 Total
= 2 for Additive 2 Total
= 3 for Additive 3 Total
= 4 for Additive 4 Total
Y = Total Number of Batches
VVVVV = Total Transaction Volume
NNN = Number of transactions back into local storage to retrieve data.

or...

'NOXX' No transaction data was received.

Where XX = '03' Value Rejected
= '05' No Transaction in Progress or Completed
= '19' Option Not Installed

Remarks: None.

Constraints: Transaction Volume Units are assumed to be as programmed into AccuLoad II. Data is not cleared from AccuLoad II until the next transaction is started. When the 'RT_X_NNN' format is used data is not cleared until a 'CT' command is accepted.

Special Case: Requests for additive totals will return the format RT_X_YVVVVV_VVV instead of RT_X_Y_VVVVV.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

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Command Code SA - Remote Start

This command remotely starts the AccuLoad II as though the 'START' key was pressed.

Command:

'SA'

Responses:

'OK' Good Response. AccuLoad II is released for flow to begin.

or...

'NOXX' AccuLoad II is not released for remote start.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '04' Flow is Active
= '06' Operation Not Allowed
= '09' Alarm Condition
= '11' Operation Out of Sequence
= '15' Keypad and Display Under Minicomputer Control
= '20' Start after Stop Delay
= '21' Permissive Delay Active

Remarks: None.

Constraints: STOP relay must be bypassed in AccuLoad II wiring to ensure the 'SA' will be effective. Use of the 'SA' command does not lock out the possibility of starting the AccuLoad II by using the "START" key (unless the "START" key is disabled through program code 750). Flow may be initiated by using either method.

Keypad input, which occurs simultaneously with reception of the 'SA' command, (except the "STOP" key), will be ignored.

The AccuLoad II must first be authorized. Presetting a zero quantity or pressing the "STOP" key at the same time the 'SA' is received will result in a 'NO06' response. The "STOP" key has priority.

Special Case: Start after Stop Delay (program code 215) is ignored.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

Command Code SB - Set Batch

This command presets Batch Volumes for a transaction.

Command:

'SB_X_VVVVV'

Where X = Additive selection code (See Table 42 on page 131.)
VVVVV = Volume to preset (from 1 to 5 digits)

Responses:

'OK' Good Response. Batch volume has been accepted.

or...

'NOXX' The batch volume has not been set.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '04' Flow is Active
= '07' Wrong Control Mode
= '09' Alarm Condition
= '10' Storage Full
= '16' Ticket Not in Printer
= '19' Option Not Installed
= '20' Print Request Pending

Remarks: The additive selection code is not optional with this command.

Constraints: Batch volume must not exceed programmed maximum batch size and must not be below the programmed minimum batch size. Unit value must correspond to what is programmed into AccuLoad II for units of measurement.

Special Case: A command with a batch size of 0 allows the driver to select batch size. Display and keypad pending status are removed from minicomputer control after successful completion of this command. Driver may clear any preset batch size and enter a new batch volume if it is less than the preset batch size. A batch amount of zero while in the Auto Preset Mode will result in the maximum batch amount being displayed; a non-zero set batch amount will override the maximum batch amount as the auto preset amount and cannot be overridden by the driver while in the Auto Preset Mode. On receipt of this command, the keypad is returned to AccuLoad II control.

Comm. Modes: Remote Control (2).

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Additive Selection Codes

Character Returned ('A')		Additives Selected			
Hex	Code	Additive 1	Additive 2	Additive 3*	Additive 4*
'30'	0				
'31'	1	X			
'32'	2		X		
'33'	3	X	X		
'34'	4			X	
'35'	5	X		X	
'36'	6		X	X	
'37'	7	X	X	X	
'38'	8				X
'39'	9	X			X
'41'	A		X		X
'42'	B	X	X		X
'43'	C			X	X
'44'	D	X		X	X
'45'	E		X	X	X
'46'	F	X	X	X	X

Table 42. Additive Selection Code for Command SB

Note: To select additives 3 and 4, Additives Option must be installed (Rev. 0 and Rev. 1) Rev. 2 and up additives 3 and 4 are standard features.

Section 8 - Command Reference Guide

Command Code SD - Set Date and Time

This command sets the date and time in the AccuLoad II.

Command:

'SD_DDDDDD_HHNN_X'

Where DDDDDD = MMDDYY (Standard Time)
 DDDDDD = DDMMYY (Military Time)
MM = Month
DD = Day
YY = Year
HH = Hours
NN = Minutes
X = A (Standard Time - A.M.)
 = P (Standard Time - P.M.)
 = M (Military Time)

Responses:

'OK' Good Response. Time and date value accepted and seconds are reset to zero.

or...

'NOXX' The time and date were not accepted.

Where XX = '01' In the Programming Mode
 = '02' AccuLoad II Released
 = '03' Value Rejected

Remarks: None.

Constraints: Time value must be within range programmed into AccuLoad II - 0000 to 2359 for Type 0 Military, 0000 to 1259 for Type 1 Standard. Month must be within the range of 1 to 12. Day must be in the range valid for the month chosen.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Command Code SP - Remote Stop

This command instructs the AccuLoad II to stop, halting product delivery.

Command:

'SP'

Responses:

'OK' Good Response.

or...

'NOXX' The AccuLoad II was not stopped.

Where XX = '01' In the Programming Mode

Remarks: None.

Constraints: Valve and pump are shut down whether flow is present or not. If a batch is in progress, the "START" key or the Remote Start command 'SA' must be used to continue the batch. If the AccuLoad II receives the 'SP' command at the same time as a key is pressed at the keypad, the key will be ignored (except the "STOP" key).

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Section 8 - Command Reference Guide

Command Code TA - Set Transaction

This command sets the maximum transaction volume.

Command:

'TA_VVVVV'

Where VVVVV = Volume to preset (from 1 to 5 digits)

Responses:

'OK' Good Response. The transaction volume has been accepted.

or...

'NOXX' The transaction volume was not accepted.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '07' Wrong Control Mode
= '08' Transaction in Progress

Remarks: None.

Constraints: Unit value must correspond to what is programmed into AccuLoad II for units of measurement and for gross and GST preset display.

Special Case: None.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Command Code TI - Show Prompts Data Entry

This command retrieves the current or stored prompts data entered in the AccuLoad II.

Command:

Current Transaction

'TI_X'

Local Storage

'TI_X_NNN'

Where X = Prompt number (1 through 5)
NNN = Number of transactions back into local storage to retrieve data.

Responses:

Current Transaction

'TI_X_AAAAAAAAA' Good Response.

Local Storage

'TI_X_AAAAAAAAA_NNN' Good Response.

Where X = Prompt Number (1-5)
AAAAAAAA = Prompt Data Entry
NNN = Number of transactions back into local storage to retrieve data.

or...

'NOXX' No prompt data retrieved.

Where XX = '03' Value Rejected
= '05' No Transaction in Progress or Completed

Remarks: Length of this data field will always be nine characters where the last n characters represent the data entry for the prompt requested (right justified, no lead zero blanking) where n is the corresponding prompt size programmed for the prompt sequential number 'X' requested.

Constraints: The value will be rejected if the prompt number is zero or if the prompt size for that number was zero.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Command Code TN - Show Transaction Stop Date and Time

This command retrieves the Transaction Stop date and time.

Command:

Current Transaction

'TN'

Local Storage

'TN_NNN'

Where NNN = The number of transactions back into local storage to retrieve data.

Responses:

Current Transaction

'TN_IIII_DDDDDD_AAAA_X' Good Response.

If power-fail has occurred: 'TN*IIII_DDDDDD_AAAA_X'

Local Storage

'TN_IIII_DDDDDD_AAAA_X_NNN' Good Response.

If power-fail has occurred: 'TN*IIII_DDDDDD_AAAA_X_NNN'

Where IIII = Internal Transaction Number
DDDDDD = Transaction Stop Date
 = (MMDDYY for Standard Time)
 = (DDMMYY for Military Time)
AAAA = Transaction Stop Time (HHMM)
X = A (Standard Time - A.M.)
 = P (Standard Time - P.M.)
 = M (Military Time)
NNN = The number of transactions back into local storage to retrieve data.

or...

'NOXX' The transaction stop date and time were not retrieved.

Where XX = '03' Value Rejected ('TN_NNN' only)
 = '05' No Transaction in Progress or Completed
 = '08' Transaction in Progress (TN only)

Section 8 - Command Reference Guide

- Remarks:** None.
- Constraints:** During a power-fail the date and time at the time of failure will be retained.
- Special Case:** The current transaction in progress has a transaction stop date and time of all zeros until that transaction is completed.
- Comm. Modes:** Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Section 8 - Command Reference Guide

Command Code VT - Request Meter Totalizer Data from the AccuLoad II

This command requests a totalizer value from the AccuLoad II.

Command:

'VT_X'
or
'VT_X_NNN' (Version 09 firmware and above)

Where X = R for Raw Totals
 = G for Gross Totals
 = N for Gross at Standard Temperature Totals
 = P for T & P Totals
 = M for Mass Totals
 = 1 for Additive 1 Total
 = 2 for Additive 2 Total
 = 3 for Additive 3 Total
 = 4 for Additive 4 Total

 NNN = Number of transactions back into local storage to retrieve data.

Responses:

'VT_X_VVVVVVVV' Good Response.

Where X = R for Raw Totals
 = G for Gross Totals
 = N for Gross at Standard Temperature Totals
 = P for T & P Totals
 = M for Mass Totals
 = 1 for Additive 1 Total
 = 2 for Additive 2 Total
 = 3 for Additive 3 Total
 = 4 for Additive 4 Total

 VVVVVVVV = 9 Digit Totalizer Volume

or...

'NOXX' Totals were not retrieved.

Where XX = '01' In the Programming Mode
 = '02' AccuLoad II Released
 = '19' Option Not Installed

Remarks: None.

Constraints: Transaction Volume units are assumed to be the type that was programmed for the AccuLoad II. Data is updated only after completion of the transaction. Temperature, Pressure, and Density are all individual installable options.

Special Case: None.

Comm. Modes: Polling Only (0), Poll & Authorize (1), or Remote Control (2).

Section 8 - Command Reference Guide

Command Code WA - Write Message to Display to be Alternated with Present Message (as sent by 'WD', 'WX', 'WP', or 'WQ')

This command instructs the AccuLoad II to display a 40 character message alternating (split into two 20-character messages).

Command:

'WA_NNN_X...X&99' Rev. 0 through Rev. 3 firmware

'WA_NNN_X...Xd99' Rev. 4 firmware

Where X...X = An alphanumeric character string of up to 20 characters (see Remarks).

NNN = time-out value in seconds (An entry of 000 will cause the time-out value to default to what was entered for the first display message or if a non-zero entry is used, it will override the previous value entered.)

d = A required delimiter used to signify the input field. There are three different delimiters each indicating a unique handling of the input process. They are as follows:

& = Input data is entered directly with no initiator required; any function key except the "CLEAR" or the "STOP" may be used to terminate the input sequence.

[= An "ENTER" key must initiate the input sequence; any function key except the "CLEAR" or "STOP" may be used to terminate the input sequence.

] = An "ENTER" key must initiate the input sequence; only an "ENTER" key will be accepted for terminating the input sequence.

Note: The above delimiters are acceptable as part of the alphanumeric message.

99 = Represents the input field length along with an additional option which when encoded allows the operator to skip the input data and only enter the terminating key associated with the delimiter.

The input field range is 00 to 20. To encode the option, add 40 to the desired input field length.

Example: To request an input field length of 5, enter '05'. To also include the option, enter '45'. If the option is not included the operator will have to put in 5 digits and then press the terminating key; any less than 5 digits and the message "Error Press Clear" will appear on the AccuLoad II display. If the option is included, the terminating key can be pressed at any time sending data to the Host.

Section 8 - Command Reference Guide

Responses:

'OK' Good Response. Message has been accepted for the alphanumeric display (left justified).

or...

'NOXX' The message was not accepted.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '06' Operation Not Allowed
= '07' Wrong Control Mode
= '11' Operation Out of Sequence

Remarks:

The following characters can be displayed on the AccuLoad II display. (X...X part of command).

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
+ ! " # \$ % & ' () , - . / : ; < = > @ [\ ^ _ ' { } ° ? * space

Constraints:

None.

Special Case:

The 'TO' status bit will be cleared on acceptance of a 'WD', 'WA', 'WX', 'WP' or 'WQ' command. Also, keypad data pending flag and data are cleared.

Comm. Modes:

Poll & Authorize (1) or Remote Control (2).

Section 8 - Command Reference Guide

Command Code WD - Write to Display

This command instructs the AccuLoad II to display a 20 character message.

Command:

'WD_NNN_X...X&99' Rev. 0 through Rev. 3 firmware

'WD_NNN_X...Xd99' Rev. 4 firmware

Where X...X = An alphanumeric character string of up to 20 characters (see Remarks).

NNN = time-out value in seconds (An entry of 000 will cause the time-out value to default to what was entered for the first display message or if a non-zero entry is used, it will override the previous value entered.)

d = A required delimiter used to signify the input field. There are three different delimiters each indicating a unique handling of the input process. They are as follows:

& = Input data is entered directly with no initiator required; any function key except the "CLEAR" or the "STOP" may be used to terminate the input sequence.

[= An "ENTER" key must initiate the input sequence; any function key except the "CLEAR" or "STOP" may be used to terminate the input sequence.

] = An "ENTER" key must initiate the input sequence; only an "ENTER" key will be accepted for terminating the input sequence.

Note: The above delimiters are acceptable as part of the alphanumeric message.

99 = Represents the input field length along with an additional option which when encoded allows the operator to skip the input data and only enter the terminating key associated with the delimiter.

The input field range is 00 to 20. To encode the option, add 40 to the desired input field length.

Example: To request an input field length of 5, enter '05'. To also include the option, enter '45'. If the option is not included the operator will have to put in 5 digits and then press the terminating key; any less than 5 digits and the message "Error Press Clear" will appear on the AccuLoad II display. If the option is included, the terminating key can be pressed at any time sending data to the Host.

Section 8 - Command Reference Guide

Responses:

'OK' Good Response. Message has been accepted for alphanumeric display, left justified.

or...

'NOXX' The message was not accepted.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '07' Wrong Control Mode

Remarks:

The following characters can be displayed on the AccuLoad II display. (X...X part of command).

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
+ ! " # \$ % & ' () , - . / : ; < = > @ [\ ^ _ ' { } ° * space

Constraints:

None.

Special Case:

The 'TO' status bit will be cleared on acceptance of a 'WD', 'WA', 'WX', 'WP' or 'WQ' command. Also, keypad data pending flag and data are cleared.

Comm. Modes:

Poll & Authorize (1) or Remote Control (2).

Command Code WP - Write Delayed Prompt with Echo

This command sends a delayed prompt message to the AccuLoad II. This message will be displayed when the 'SET' key is pressed enabling the keypad for input.

Command:

'WP_NNN_X...X&99' Rev. 0 through Rev. 3 firmware

'WP_NNN_X...Xd99' Rev. 4 firmware

Where X...X = An alphanumeric character string of up to 20 characters (see Remarks).

NNN = time-out value in seconds (An entry of 000 will cause the time-out value to default to what was entered for the first display message or if a non-zero entry is used, it will override the previous value entered.)

d = A required delimiter used to signify the input field. There are three different delimiters each indicating a unique handling of the input process. They are as follows:

& = Input data is entered directly with no initiator required; any function key except the "CLEAR" or the "STOP" may be used to terminate the input sequence.

[= An "ENTER" key must initiate the input sequence; any function key except the "CLEAR" or "STOP" may be used to terminate the input sequence.

] = An "ENTER" key must initiate the input sequence; only an "ENTER" key will be accepted for terminating the input sequence.

Note: The above delimiters are acceptable as part of the alphanumeric message.

99 = Represents the input field length along with an additional option which when encoded allows the operator to skip the input data and only enter the terminating key associated with the delimiter.

The input field range is 00 to 20. To encode the option, add 40 to the desired input field length.

Example: To request an input field length of 5, enter '05'. To also include the option, enter '45'. If the option is not included the operator will have to put in 5 digits and then press the terminating key; any less than 5 digits and the message "Error Press Clear" will appear on the AccuLoad II display. If the option is included, the terminating key can be pressed at any time sending data to the Host.

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Responses:

'OK' Good Response. Message has been accepted and will be displayed when the "SET" key is pressed at the start of a transaction only. Sets keypad pending status once keypad input is completed.

or...

'NOXX' The message was not accepted.

Where XX = '01' In the Programming Mode
= '03' Value Rejected
= '07' Wrong Control Mode
= '08' Transaction in Progress
= '13' AccuLoad II Authorized
= '15' Keypad and Display Under Minicomputer Control

Remarks:

The following characters can be displayed on the AccuLoad II display. (X...X part of command).

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
+ ! " # \$ % & ' () , - . / : ; < = > @ [\ ^ _ ' { } ° * space

Constraints:

Cancellation occurs on receiving a 'WD', 'WX', 'DA', 'AU', 'AP', 'WQ', or 'SB' command, on power-down, or on entry into Standby Mode.

Special Case:

The 'TO' status bit will be cleared on acceptance of a 'WD', 'WA', 'WX', 'WP' or 'WQ' command. The 'DP' status bit will be set on acceptance of the 'WP' command and cleared on cancellation.

Comm. Modes:

Poll & Authorize (1) or Remote Control (2).

Command Code WQ - Write Delayed Prompt with Security Echo

This command sends a delayed prompt message to the AccuLoad II. This message is displayed when the 'SET' key is pressed enabling the keypad for input with security echo ('X').

Command:

'WQ_NNN_X...X&99' Rev. 0 through Rev. 3 firmware

'WQ_NNN_X...Xd99' Rev. 4 firmware

Where X...X = An alphanumeric character string of up to 20 characters (see Remarks).

NNN = time-out value in seconds (An entry of 000 will cause the time-out value to default to what was entered for the first display message or if a non-zero entry is used, it will override the previous value entered.

d = A required delimiter used to signify the input field. There are three different delimiters each indicating a unique handling of the input process. They are as follows:

& = Input data is entered directly with no initiator required; any function key except the "CLEAR" or the "STOP" may be used to terminate the input sequence.

[= An "ENTER" key must initiate the input sequence; any function key except the "CLEAR" or "STOP" may be used to terminate the input sequence.

] = An "ENTER" key must initiate the input sequence; only an "ENTER" key will be accepted for terminating the input sequence.

Note: The above delimiters are acceptable as part of the alphanumeric message.

99 = Represents the input field length along with an additional option which when encoded allows the operator to skip the input data and only enter the terminating key associated with the delimiter.

The input field range is 00 to 20. To encode the option, add 40 to the desired input field length.

Example: To request an input field length of 5, enter '05'. To also include the option, enter '45'. If the option is not included the operator will have to put in 5 digits and then press the terminating key; any less than 5 digits and the message "Error Press Clear" will appear on the AccuLoad II display. If the option is included, the terminating key can be pressed at any time sending data to the Host.

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Responses:

'OK' Good Response. Message has been accepted and will be displayed when the "SET" key is pressed at the start of a transaction only. Sets keypad pending status once keypad input is completed.

or...

'NOXX' The message was not received.

Where XX = '01' In the Programming Mode
= '03' Value Rejected
= '07' Wrong Control Mode
= '08' Transaction in Progress
= '13' AccuLoad II Authorized
= '15' Keypad and Display Under Minicomputer Control

Remarks:

The following characters can be displayed on the AccuLoad II display. (X...X part of command).

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
+ ! " # \$ % & ' () , - . / : ; < = > @ [\ ^ _ ' { } ° * space

Constraints:

Cancellation occurs on receiving a 'WD', 'WX', 'DA', 'AU', 'AP', 'WP', or 'SB' command, on power-down, or on entry into Standby Mode.

Special Case:

The 'TO' status bit will be cleared on acceptance of a 'WD', 'WA', 'WX', 'WP' or 'WQ' command. The 'DP' status bit will be set on acceptance of the 'WQ' command and cleared on cancellation.

Comm. Modes:

Poll & Authorize (1) or Remote Control (2).

Section 8 - Command Reference Guide

Command Code WX - Write to the Display in Security Mode

This command writes to the AccuLoad II and enables the keypad for input in an Echo 'X' or Security Mode.

Command:

'WX_NNN_X...X&99' Rev. 0 through Rev. 3 firmware

'WX_NNN_X...Xd99' Rev. 4 firmware

Where X...X = An alphanumeric character string of up to 20 characters (see Remarks).

NNN = time-out value in seconds (An entry of 000 will cause the time-out value to default to what was entered for the first display message or if a non-zero entry is used, it will override the previous value entered.)

d = A required delimiter used to signify the input field. There are three different delimiters each indicating a unique handling of the input process. They are as follows:

& = Input data is entered directly with no initiator required; any function key except the "CLEAR" or the "STOP" may be used to terminate the input sequence.

[= An "ENTER" key must initiate the input sequence; any function key except the "CLEAR" or "STOP" may be used to terminate the input sequence.

] = An "ENTER" key must initiate the input sequence; only an "ENTER" key will be accepted for terminating the input sequence.

Note: The above delimiters are acceptable as part of the alphanumeric message.

99 = Represents the input field length along with an additional option which when encoded allows the operator to skip the input data and only enter the terminating key associated with the delimiter.

The input field range is 00 to 20. To encode the option, add 40 to the desired input field length.

Example: To request an input field length of 5, enter '05'. To also include the option, enter '45'. If the option is not included the operator will have to put in 5 digits and then press the terminating key; any less than 5 digits and the message "Error Press Clear" will appear on the AccuLoad II display. If the option is included, the terminating key can be pressed at any time sending data to the Host.

Section 8 - Command Reference Guide

Responses:

'OK' Good Response. Message has been accepted for alphanumeric display, left justified. Keypad enabled for input in Echo 'X' Mode.

or...

'NOXX' Message was not accepted.

Where XX = '01' In the Programming Mode
= '02' AccuLoad II Released
= '03' Value Rejected
= '07' Wrong Control Mode

Remarks: None.

Constraints: None.

Special Case: The 'TO' status bit will be cleared on acceptance of a 'WD', 'WA', 'WX', 'WP' or 'WQ' command. Also, keypad data pending flag and data are cleared.

Comm. Modes: Poll & Authorize (1) or Remote Control (2).

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Appendix I

Command Code Summary

Code	Command	Allowable Modes
AP	Authorize Transaction to Preset	1
AR	Reset Alarms	1,2
AU	Authorize Transaction	1
CT	Clear Saved Transactions	1,2
DA	Release Keypad Display	1,2
DB	Request Directory Bit-map	0,1,2
DS	Dump Storage	0,1,2
DY	Request Dynamic Display Values	0,1,2
EA	Enquire Alarms	0,1,2
EB	End Batch	2
EO	Enquire Options	0,1,2
EQ	Enquire	0,1,2
ET	End Transaction	1,2
FL	Read Flow Count	0,1,2
GD	Get Date and Time	0,1,2
GK	Get Key	0,1,2
GP	Get PROM Signatures	0,1,2
LD	Request Load Temp, Pressure & Density	0,1,2
OR	Output Relay	0,1,2
PC	Program Change	1,2
PF	Request Time of Power-fail	0,1,2
PT	Request Printer Ticket Data	0,1,2
PV	Read Program Value	0,1,2
RA	Request Alarms	0,1,2
RB	Request Batch Data	0,1,2
RC	Resume Communications	1,2
RD	Request Current Transducer or Probe Value	0,1,2
RE	Reset Status	0,1,2

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RK	Read Keypad	1,2
RO	Request Options	0,1,2
RP	Request Preset	0,1,2
RQ	Request Current Flow Rate	0,1,2
RS	Request Status	0,1,2
RT	Request Transaction	0,1,2
SA	Remote Start	1,2
SB	Set Batch	2
SD	Set Date and Time	0,1,2
SP	Remote Stop	0,1,2
TA	Transaction Authorization	1
TI	Show Prompt Data Entry	0,1,2
TN	Transaction Completion Time	0,1,2
VT	Request Meter Total	0,1,2
WA	Write Alternating Display	1,2
WD	Write Display	1,2
WP	Write Delayed Prompt	1,2
WQ	Write Security Delayed Prompt	1,2
WX	Write Security Display	1,2

Table 43. Command Code Summary

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Appendix II

Reference for 'NOXX' Responses

XX	Description	Explanation
00	Command Non-existent	The command sent is not a valid communications command.
01	In the Programming Mode	The AccuLoad II is in the Program Mode of operation and must be returned to the READY Mode.
02	AccuLoad II Released	The AccuLoad II is released for transaction. The transaction must be terminated before the requested action will be permitted. The AccuLoad II is considered released whenever the valve is open and has not been commanded to close.
03	Value Rejected	The data sent was rejected because it was out-of-range or invalid. Check the data limitations and/or validity for the operation being requested.
04	Flow is Active	Product flow is currently in progress. The batch must be completed or stopped (via the "STOP" key or the 'SP' Command) before the operation will be allowed.
05	No Transaction in Progress or Completed	A transaction is not currently in progress or one has not yet been completed.
06	Operation Not Allowed	Operation cannot be done, or some constraint associated with the particular command is preventing its completion. Refer to 'Constraints' section for that command.
07	Wrong Control Mode	The Communication Control (program code 702 or 705) is not programmed to the mode acceptable by the particular command.
08	Transaction in Progress	There is a transaction currently in progress. The transaction must be terminated before the operation will be permitted.
09	Alarm Condition	There is an alarm condition pending. The alarm must be cleared through Program Mode entry 101 before operation will be permitted. Note: <i>Certain alarms may also be cleared via communications. See 'AR' command.</i>
10	Storage Full	The AccuLoad II is operating in Local Storage Mode and the maximum amount of transactions have been stored. Either take the unit out of Local Storage Mode or clear the storage area using the 'CT' command.
11	Operation Out of Sequence	Another operation must be performed first before the current request will be permitted.
12	Power-fail Occurred During Transaction	The transaction cannot continue since a power-fail has occurred.

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13	AccuLoad II Authorized	The AccuLoad II has been authorized for a transaction. The transaction must be terminated to permit the requested operation.
14	Program Code Not Used	The program code entered is currently not used.
15	Keypad and Display Under Minicomputer Control	The keypad and display need to be under AccuLoad II control to perform the requested operation. This can be achieved by issuing a 'DA' command.
16	Ticket Not in Printer	Ticket needs to be inserted into the printer.
17	No Keypad Data Pending	No keypad data has been entered at the AccuLoad II.
18	No Transaction in Progress	A transaction is not currently in progress.
19	Option Not Installed	The transmitted command involves an option that is not installed in this AccuLoad II or the option has been removed through the Program Mode.
20	Start After Stop Delay	Start after stop delay is in effect. Start condition cannot be activated until delay has expired.
21	Permissive Delay Active	Unit is currently pending valve power and/or permissives as described by the permissive message select Program Mode commands.
22	Print Request Pending	A print request is pending and the transaction cannot begin until the printout has completed successfully.
23	No Meter Enabled	The meter is currently disabled.
24	Ticket Alarm During Transaction	If the ticket is out during the transaction, then alarms cannot be cleared remotely.

Table 44. Reference for 'NOXX' Responses

Section 10 - Communications Glossary

Acoustic Coupler: A device that converts electrical signals into audio signals, enabling data to be transmitted over the public telephone network via a conventional telephone handset.

Address: A codes representation of the origin or destination of data.

Algorithm: A procedure for solution of a problem in a finite number of steps.

Applications Software: The applications tasks within a system make the unit conform to the unique circumstances which it must control. Each task within the applications software performs a function corresponding to an external event such as xxx etc.

ASCII (American Standard Code for Information Interchange): Pronounced 'asky'. This is a seven-bit-plus-parity code established by ANSI to achieve compatibility between data services.

Assembly Language: A machine-oriented language designed to be used to write or express statements of an assembly program. The instruction code written in an assembly language is often a mnemonic code for assembling machine language computer instructions.

Asynchronous Transmission: Transmission in which time intervals between transmitted characters may be of unequal length. Transmission is controlled by start and stop bits at the beginning and end of each character.

Attenuation: The decrease in magnitude of a signal.

Bandwidth: The range of frequencies available for signaling; the difference expressed in Hertz between the highest and lowest frequencies of a band.

Baud: Unit of signaling speed. The speed in baud is the number of discrete conditions or signal events per second. If each signal event represents only one bit condition, baud rate equals bps. When each signal event represents other than one bit (e.g., digit) baud rate does not equal bps.

BCC (Block Check Character): The result of a transmission verification algorithm accumulated over a transmission block. It is normally appended at the end (e.g., CRC, LRC).

Binary Coded Decimal Representation (BCD): A system of representing decimal numbers in which each decimal digit is represented by a combination of four digits (bits). For example the decimal value 6 is represented by 0110 in BCD; the decimal value 15 is represented by 0001 0101.

Binary Digit (bit): A numeral in the binary scale of notation. This digit may be zero or one, which is equivalent to an off or an on position value.

Bisynchronous Transmission (BSC): An IBM communications protocol which uses a defined set of control characters for synchronized transmission of binary coded data between stations in a data communications system.

Bit (Binary Digit): Contraction of "binary digit" the smallest unit of information in a binary system. A bit represents the choice between a one or zero condition.

Block: One or more records considered or transferred as a unit, particularly with reference to input and output.

Block Parity Check: In data transmission it is an error detection technique which is used in addition to parity checks. That is, in addition to bits, one or more check characters are added to each message transmitted. When received, if these characters match the one transmitted, the message is assumed correct; otherwise an error is noted.

BPS (Bits Per Second): Unit of data transmission rate.

Buffer: A storage device used to compensate for a difference in rate of data flow or event timing when transmitting data from one device to another.

Buss: One or more conductors used for transmitting signals, data, or power. Often a buss acts as a common connection between several locations.

Byte: A binary element string operated upon as a unit and usually shorter than a computer "word". Eight-bit bytes are most common. Also called a "character".

Carriage Return: In a character-by-character printing mechanism, the operation that causes the next character to be printed at the left margin.

Section 10 - Communications Glossary

Cathode Ray Tube (CRT): A television-like picture tube used in visual display terminals.

CCITT: International Telegraph and Telephone Consultative Committee (from the French, Comité Consultatif International Télégraphique et Téléphonique). An international consultative committee that sets international communications standards.

Character: The actual or coded representation of a digit, letter, or special symbol.

Clock: Shorthand term for the source(s) of timing signals used in synchronous transmission. More generally, the source(s) of timing signals sequencing electronic events.

Code: A system of symbols and rules for use in representing information.

Compiler: A computer program that prepares a machine-language program from instructions or sub-routines written in a high-level language. A compiler usually generates more than one machine instruction for each symbolic instruction.

Computer: A device capable of solving problems by accepting data, performing prescribed operations on the data under direction of a stored program, and supplying the results of these operations.

Conditioning: The addition of equipment to a leased voice grade channel to provide minimum values of line characteristics required for transmission.

Console: The part of a computer that is used for communications between operators or service personnel and the system. The console contains lights, keys, switches, and related circuits for man-machine communication. The console may be used to control the machine manually, correct errors, determine the status of machine circuits, registers and counters, determine the contents of storage, and manually revise the contents of storage.

Contention: The facility provided by the dual network or a port selector which allows multiple terminals to compete on a first-come-first-served basis for a smaller number of computer ports.

Conversational Mode: A procedure for communication between a terminal and the computer in which each entry from the terminal elicits a response from the computer and vice versa.

CPU (Central Processing Unit): Portion of a computer which directs the sequence of operations and initiates the proper commands to the computer for execution.

CR (Carriage Return): A format effector which moves the active position to the first character position of the same line.

CRC (Cyclic Redundancy Check): An error detection scheme in which the check character is generated by taking the remainder after dividing all the serialized bits in a block by a predetermined binary number.

CTS (Clear to Send): Physical modem interface control signal from data communications equipment (DCE) that indicates to the data terminal equipment (DTE) that it may begin data transmission.

Current Loop: Method of interconnecting terminals and transmitting signals, whereby a mark (binary 1) is represented by current on the line and a space (binary 0) is represented by the absence of current.

Data Integrity: A performance measure based on the rate of undetected errors.

Data Set: A device that converts the signals of a business machine to signals that are suitable for transmission over communication lines and vice versa. It may also perform other related functions.

DC (Device Control): A category of control characters primarily intended for turning on or off a subordinate device. Sample of DC characters are: DC1, DC2, DC3, etc. (See X-ON and X-OFF).

DCE (Data Communications Equipment): The equipment that provides the functions required to establish, maintain and terminate a data transmission connection (e.g., a modem).

Debugging: The process of identifying and correcting mistakes in a computer program.

DIP (Dual In-line Package): An electronic component package characterized by two rows of external connecting pins which are inserted into the holes of the printed circuit board.

Diskette: A small magnetic disk (resembles a 45-rpm record) which is sealed in a square plastic jacket and weighs less than 2 ounces.

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DTE (Data Terminal Equipment): The equipment acting as data source, data sink or both.

EIA (Electronics Industries Association): A standards organization in the U.S.A. specializing in the electrical and functional characteristics of interface equipment.

EIA-232C: Interface between data terminal equipment and data communication equipment employing unbalanced voltage digital interface circuits.

EIA-422: Electrical characteristics of balanced-voltage digital interface circuits.

Emulate: To imitate a computer system by a combination of hardware and software that allows programs written for one computer to run on another.

ETX (End of Text): A transmission control character which terminates a text.

File Maintenance: The activity of keeping a file up-to-date by adding, changing or deleting data.

Firmware: A computer program or software stored permanently in PROM or ROM or semi-permanently in EPROM.

Full-Duplex: Simultaneous, two-way, independent transmission in both directions.

Half-Duplex: Transmission in either direction, but not both directions simultaneously.

Handshaking: Exchange of predetermined signals between two devices for purposes of control.

Hardcopy: A printed copy of machine output in readable form (i.e., example, reports, listings, documents, summaries).

HDLC (High Level Data Link Control): The international standard communication protocol defined by ISO.

Header: The control information prefixed in a message text (e.g., source or destination address, sequence number or message length or type).

Hertz (Hz.): A measure of frequency or bandwidth. The same as cycles per second.

Hexadecimal Number System: The number system with the base of sixteen. In hexadecimal, the first ten digits are 0-9 and the last six digits are represented by the letters A-F.

Impact Printer: A printer forms characters by the use of print hammers that press the paper and ribbon against selected type characters as they pass in front of the paper. Type characters are commonly mounted on a moving chain or are engraved on the face of a rotating drum. Typical speeds range from 500 to 2,000 lines per minute.

ISO: International Standards Organization.

KSR (Keyboard Send/Receive): A combination teleprinter transmitter and receiver with transmission capability from keyboard only.

Line Driver: A signal converter which conditions a digital signal to ensure reliable transmission over an extended distance.

Line Turnaround: The reversing of transmission direction from sender to receiver or vice versa when using a half-duplex circuit.

Local Line, Local Loop: A channel connecting the subscriber's equipment to the line terminating equipment in the central office. Usually a metallic circuit (either 2-wire or 4-wire).

LRC (Longitudinal Redundancy Check): An error detection scheme in which the check character is a 7 bit ASCII character calculated as the exclusive (OR) sum of all characters excluding itself in the packet of transmitted information.

Magnetic Disk: A storage device of magnetically coated disks, on the surface of which information is stored in the form of magnetic spots arranged in a manner to represent binary data. These data are arranged in circular tracks around the disks, are accessible to reading and writing heads on an arm that can be moved mechanically to the desired disk and then to the desired track on that disk. Data from a given track is read or written sequentially as the disk rotates.

Magnetic Tape: An external storage medium in the form of a ferrous oxide coating on a reel of metallic or plastic tape on which bits may be recorded magnetically as a means of retaining data.

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Mark: Presence of signal. In telegraph communication a mark represents the closed condition or current flowing. A mark impulse is equivalent to a binary 1.

Message Format: Rules for the placement of such portions of a message as message heading, address text, and end of message.

Minicomputer: A computer usually weighing less than 50 pounds that contains a relatively small internal memory and that can accept peripherals such as disk storage, magnetic tape units and line printers.

Mnemonic Code: Instructions for the computer written in a form that is easy for the programmer to remember. A program written in mnemonics must be converted to machine code prior to execution.

Modem (Modulator-Demodulator): A device used to convert serial digital data from a transmitting terminal to a signal suitable for transmission over a telephone channel or to reconvert the transmitted signal to serial digital data for acceptance by a receiving terminal.

Multiplexer: A device used for division of a transmission facility into two or more subchannels either by splitting the frequency band into narrower bands (frequency division) or by allotting a common channel to several different transmitting devices, one at a time (time division).

Noise: In communication theory, an undesired disturbance in a communication system. Noise can generate errors or spurious messages. Contrast with signal.

Null Modem: A device that connects two DTE devices directly by emulating the physical connections of a DCE device.

Off-line: Pertaining to equipment or devices not under direct control of the central processing unit.

On-line: Pertaining to equipment or devices in direct communication with the central processing unit.

Operating System: The operating system supplies all services and utilities to the applications task necessary to run the system efficiently. The operating system provides priorities and schedules of the different applications tasks.

Packet: A group of binary digits, including data and call control signals, which is switched as a whole. The packet information is arranged in a specific format.

Parallel Transmission: Byte-wide data transmission that allocates a data line for each bit in a word. Transmission is usually unidirectional.

Parity Check: Addition of non-information bits to data making the number of ones in a byte (bit group) either always odd or always even. This permits detection of errors in blocks that have a single error.

Perforator: A keyboard device for punching paper tape.

Polling: A centrally controlled method of calling a number of devices (by sequential inquiry) to permit them to transmit information.

Port: An interface on a computer configured as data terminal equipment and capable of attaching a modem for communication with a remote data terminal.

Priority or Precedence: Controlled transmission of messages in order of their designated importance (e.g., urgent or routine).

Program: An explicit set of steps or instructions that directs the computer and coordinates the operation of the various hardware components.

PROM (Programmable Read Only Memory): Non-volatile memory chip that allows a program to reside permanently in a piece of hardware.

Protocol: A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.

Punched Paper Tape: A strip of paper on which characters are represented by combinations of punched holes.

Real Time:

1. Pertaining to the actual time during which a physical process takes place.
2. Pertaining to the performance of a computation during a period, short in comparison with the actual time that the related physical process takes place in order that results of the computations can be used in guiding the physical process.

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Queue: A waiting line or area.

RAM (Random Access Memory): Semiconductor read-write volatile memory. Data stored is lost if power is turned off.

Redundancy Check: A technique of error detection involving the transmission of additional data related to the basic data in such a way that the receiving terminal (by comparing the two sets of data) can determine to a certain degree of probability whether an error has occurred in transmission.

Reperforator: A device that automatically punches a paper tape from received signals.

Response Time: The elapsed time between the generation of the last character of a message at a terminal and the receipt of the first character of the reply. It includes terminal delay and network delay.

ROM (Read-only Memory): Non-volatile semiconductor memory manufactured with predefined data content (permanently stored).

RTS (Request to Send): Physical modem interface control signal from DTE, requesting clearance to transmit.

SDLC (Synchronous Data Link Control): IBM standard communication protocol superseding BSC.

Secondary Storage: A storage that principally supplements primary storage. Secondary storage devices include magnetic disk units, magnetic drums, and magnetic tape. Secondary storage is characterized by slower speed of operation and correspondingly lower cost than those related to primary storage.

Sector: A portion of a track (from a magnetic disk) whose shape is similar to a slice of pie. Each track is equally divided into sectors, in which each sector may have its own distinct address.

Selective Calling: The ability of a transmitting station to specify which of several stations on the same line is to receive a message.

Serial Transmission: A method of data transmission in which each bit of information is sent sequentially on a single data channel. Serial transmission is the normal transmission mode for data communications.

Short Haul Modem: A signal converter which conditions a digital signal to ensure reliable transmission over dc continuous private line metallic circuits without interfering with adjacent pairs in the same telephone cable.

Signal: In communication theory, an intentional disturbance in a communication system. Contrast with noise.

Simplex Transmission: Data transmission in one direction only.

Single-Address Message: A message to be delivered to only one destination.

Start Bit: In synchronous transmission the last bit or element in each character (normally a mark) to which is assigned a minimum duration during which the receiving equipment is returned to its rest condition in preparation for the reception of the next character.

Start Bit: In asynchronous transmission the first bit or element in each character (normally a space) which prepares the receiving equipment for the reception and registration of the character.

Stop Bit: In start-stop transmission the last bit or element in each character (normally a mark) to which is assigned a minimum duration, during which the receiving equipment is returned to its rest condition in preparation for the reception of the next character.

Storage: A general term for any device capable of retaining information.

STX (Start of Text): A transmission control character which precedes a text and which is used to terminate a heading.

Synchronous Transmission: Transmission in which the data characters and bits are transmitted at a fixed rate with the transmitter and receiver synchronized. Synchronous transmission eliminates the need for start and stop bits.

Table: An organized collection of data, usually arranged in an array where each item in the array is uniquely identifiable by some label or by its relative position. Items in a table are easier to locate or identify and thus provide a ready reference.

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TC (Transmission Control): Category of control characters intended to control or facilitate transmission of information over telecommunication networks. Samples of TC characters are: ACK, DLE, ENQ, EOT, ETB, ETX, NAK, SOH, STX and SYN.

Voice Grade Channel: A channel suitable for transmission of speech, digital or analog data, or facsimile, generally with a frequency range of about 300 to 3000 Hertz.

Word: A set of characters that occupies one storage location and is treated by the computer circuits as a unit and is transported as such. Word lengths are fixed or variable depending on the particular computer and program.

X-OFF (Transmitter Off, DC3): The communication control character used to instruct a terminal to suspend transmission.

X-ON (Transmitter On, DC1): The communication control character used to instruct a terminal to start or resume transmission.

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The following literature can be obtained from FMC Technologies Measurement Solutions, Inc. Literature Fulfillment at johno@gohrs.com or online at www.fmctechnologies.com/measurementsolutions. When requesting literature from Literature Fulfillment, please reference the appropriate bulletin number and title when ordering.

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Installation	Bulletin MN06037
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Installation/Operation	Bulletin MN06010
Service.....	Bulletin MN06009

Valves

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Model 210 - Installation/Operation.....	Bulletin MN03010
Model 215 - Specifications.....	Bulletin SS03010
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Model 215 - Service	Bulletin MN03007

Revisions included in MN06040L Issue/Rev. 0.7 (11/95):

- Page 33: Added CF-Configuration Events code.
- Page 34: Added CL-Calibration Events code.
- Page 86, 94: Added Code 145.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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