





## ***Receipt of Equipment***

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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, FMC Technologies Measurement Solutions, Inc., Erie, Pennsylvania 16514.

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

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### ***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.***

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### ***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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### ***United States NIST Handbook 44 UR.3.5.1. and UR.3.5.2.***

For compliance to United States NIST Handbook 44 UR.3.5.1. and UR.3.5.2. invoices printed using a mechanical numeric-only printer (e.g., Smith Load Printer) must contain in preprinted form, the following information:

- a. Volume corrected to 60 degrees F
- b. API/C of E \_\_\_\_\_
- c. Temperature \_\_\_\_\_
- d. Gross Volume \_\_\_\_\_

where the API/C of E, temperature, and gross volume may be hand-written on the ticket. Refer to Handbook 44, UR.3.5.1. and UR.3.5.2. for current requirements.

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# Section I – Introduction

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## ***Product Description***

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The Smith Meter™ AccuLoad II is a microprocessor-based electronic preset delivery system designed to simultaneously control the loading of petroleum or chemical products through two separate loading arms.

The AccuLoad II is designed to provide dependable service over a wide range of operating conditions. It is easy to operate and maintain, provides optimum measurement accuracy, display of current actual conditions, is easy to communicate with, and performs many loading system control functions.

Ease of operation and service permits rapid training of operators and service personnel. All entries into AccuLoad II are made quickly and easily through the rugged external keypad that is shared by both preset positions. Every keystroke is monitored and assistance is provided by auto prompting displays. Built-in "Help Messages" provide valuable information to aid in the programming of the instrument without resorting to a thick manual. Service is simplified with self diagnostics that show parameters in need of adjustment or hardware that is malfunctioning.

Optimum measurement accuracy is attained through the continuous linearization of the meter factor with changes in flow rates. Volumetric correction is calculated directly from published API equations providing precise volumetric measurement results. Precise automatic temperature, pressure compensation, and density correction are also available in the instrument.

The dynamic displays of the current actual operating conditions of the system provide the operator with valuable information while the system is operating. Some of the information that is available through the dynamic displays are the non-resettable totals along with the following:

- Current Time and Date
- Current Flow Rate (units/min.)
- Current Flow Rate (units/hour)
- Current Temperature
- Current API
- Reference Density
- Relative Density at Reference
- Current Pressure and Vapor Pressure
- Current Meter Factor
- Current CTL
- Current CPL
- Current Density
- Current Raw Transaction Totals

- Current Gross Transaction Totals
- Current Gross at Standard Temperature Transaction Totals
- Net Transaction Totals
- Mass Transaction Totals
- Injector Transaction Totals \*
- Current Valve Status & Commanded Position
- Load Average Temperature
- Load Average Pressure
- Load Average Density
- Load Average Meter Factor
- Raw Non-resettable Totals \*
- Gross Non-resettable Totals \*
- Gross at Standard Temperature Non-resettable Totals \*
- Net Non-resettable Totals \*
- Mass Non-resettable Totals \*
- Additive Injector Non-resettable Totals \*
- Input Module Status \*
- Contact Output Status (Side 1) \*\*
- Contact Output Status (Side 2) \*\*
- Last Power Failure - Time and Date \*
- Additive Injector Rates \*\*\*
- Communication Diagnostics

**Note:** \* AccuLoad II-STD Rev. 02 and above firmware  
\*\* AccuLoad II-STD Rev. 05 and above firmware  
\*\*\* AccuLoad II-STD Rev. 06 and above firmware

Significant communication capability is available from the standard AccuLoad II. The instrument is programmable for Polling, Polling and Authorization or complete Remote Control via communications. The EIA-232 communication port can be used to multi-drop up to 32 meter positions to an ASCII printer for printing load tickets or it can be used to network up to 32 meter positions to an automation system. Also available is an additional communication port that is EIA-485 interfascable. When used with a smart printer (one that will signal when it is out of paper, cover is open etc.,) the AccuLoad II can alarm and display the reason for the printer not working. The "speak when spoken to" protocol of AccuLoad II is modeled after the ISO Standard 1155. This allows quick access by an automation computer for operational and transaction information. The AccuLoad II also has a built-in communication analyzer to aid in the development and troubleshooting of communications. The AccuLoad II-STD revision 16 and above firmware also has the capability of communicating directly with the new additive injector systems from Gate City (Blend Pak) and Titan Industries (PAC-3). Using either the EIA-232 or EIA-485 communication ports the AccuLoad II will communicate with the Additive Injector System throughout the batch or the transaction requesting the status of the injector and the volume of additive that has been injected. Also developed

# Section I – Introduction

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with the additive communications is a pass-through mode of communications that will allow the supervisory computer to talk directly to the additive system through the AccuLoad. For additional information on the AccuLoad II communications, see the Communications Manual (Bulletin MN06040). Several loading system control functions are provided by AccuLoad II: Additive Injection, Pump Control, Alarm Control, Valve Control, Back Pressure Control, and Automatic Adjustment of Final Trip Point.

- Up to four different additive injectors can be simultaneously paced or controlled through communications per preset position.
- AccuLoad II, if so programmed, will automatically calculate and adjust the additive pulse output to be stopped at the first trip point of the product with the same number of pulses as if the additive output were stopped at the end of the batch.\*\*\*
- The AccuLoad II will monitor and totalize the volume of additive injected by the four additive injectors if the additive monitoring option is purchased.\*
- A contact is available to start and stop a pump or other electrically operated equipment as well as program codes that will set the time delay of that start or stop.
- A programmable alarm contact is available. It can be closed on a Valve Fault, on any alarm or not at all depending on how it is programmed.
- The AccuLoad II contains the intelligence to control a Smith Model 210 or 215 Digital Control Valve which will provide low flow start and multi-stage shut-down.
- AccuLoad II contains the intelligence to automatically reduce the flow of product and ensure the flow is within the pumping capabilities of the system.
- AccuLoad II, if so programmed, will automatically adjust the final trip point of the batch (preset).

Critical functions such as: minimum flow rate, excess flow rate, temperature detection, preset volume overrun and memory retention are monitored by internal circuits. Any failure will signal closure of the valve. Should the valve fail to close within 10 seconds after having been signalled, a contact is closed. This can be wired through external relays to shut off the pump and/or kill power circuits.

**Note:** \* AccuLoad II-STD Rev. 02 and above firmware  
\*\*\* AccuLoad II-STD Rev. 06 and above firmware

Environmental fluctuations within specified limits have virtually no effect on the operation of this control system. AccuLoad II is available in an explosion-

proof housing for hazardous locations or a non-explosion-proof housing for non-hazardous or general purpose locations. (See Bulletin SS06012 for Specifications.)

## ***How To Use This Manual***

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This manual is to be used for AccuLoad II-STD Release 1 and Release 2 firmware. If a feature or statement applies to only a certain release firmware, it will be noted.

This manual is divided into seven sections: Introduction, Operations, Dynamic Displays, Program Mode, Program Codes, Index and Related Publications.

"Operations" describes the daily operation of AccuLoad II and what is required of an operator to effectively load the product.

"Dynamic Displays" describes the information that can be displayed by AccuLoad II while in the "READY" state or in the Run Mode.

"Program Mode" describes how to get into the Program Mode, Program Directory Selection, Program Code Selection, how to change a program parameter and how to view the Help Messages.

"Program Codes Section" gives an outline description of each program code available in the instrument. For a brief description of each code, the information or options required for each code, and a place to record the parameters entered in each preset position see Bulletin AB06023 for Release 1 firmware and Bulletin AB06029 for Release 2 Firmware. For detailed information on each code see Bulletin MN06038 for Release 1 firmware and Bulletin MN06050L for Release 2 firmware.

The examples presented in this manual are for clarity and your convenience. The values might vary for your particular installation and/or operation.

## Section I – Introduction

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### ***Before Beginning Operations***

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Before actual operations begin, it is essential that valid entries are made for all program codes. To assist in programming the AccuLoad II, a Programming Workbook (Bulletin AB06023 or AB06029) is available for recording the values entered in the program for each preset position. Access to the program codes is limited to authorized personnel by use of a security code and two contact closures. The first contact closure will allow the operator to view all program codes and change the program codes that have a second digit of zero through three. The second contact closure is required to change the program codes that have a second digit of four through seven. This additional security is for Weights & Measures purposes. A program code with the second digit of eight will be programmable in either the Program or Weights and Measures protection mode. Any program code with a second digit of nine has a special high-security protection. This requires the second contact closure and an external jumper to be attached to test points 9 and 10 on the computer board.

The AccuLoad II contains two side by side 1 line by 24 character, 5X7 dot matrix vacuum fluorescent displays. When powered on, both displays will illuminate. The left-hand display (preset position 1) will show if the status of the internal memories (Ram, Data, ROMs) are good or bad. Then it will show that the instrument is being initialized. The right-hand display (preset position 2) will display the message:



**Please Standby**

After the testing is complete and the instrument is initialized, both displays (preset position 1 and preset position 2) will read as follows before the product ID is programmed in the instrument:



**SMITH Ready 12:52:16**

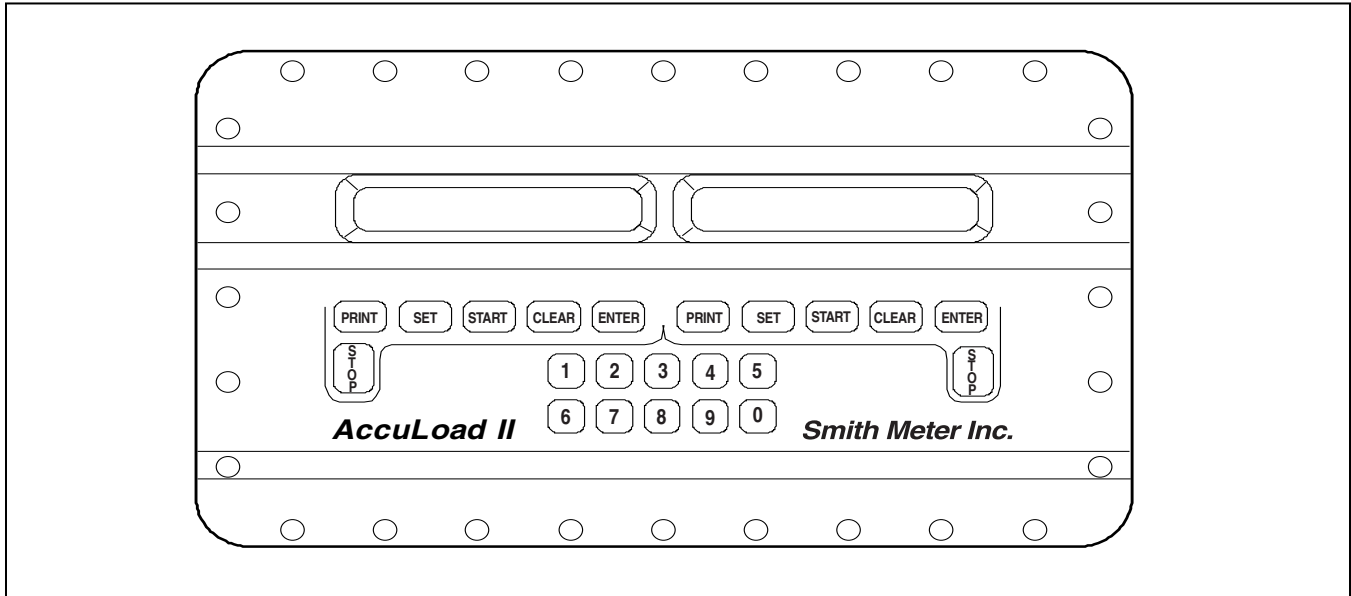
Be sure that AccuLoad II is functioning properly and that the operator has read and understands the instructions contained in this manual.

## Section II – Operations

### Run Mode

This is the normal driver controlled mode of operation where a preset volume of product is preset into AccuLoad II. The flow is then initiated, controlled, and stopped by AccuLoad II at the end of the batch.

All preset and control operations can be performed either locally through the keypad or through communications. The operation described in this section is based on AccuLoad II being operated locally through the keypad. For information on operating through communications refer to the AccuLoad II Communications Manual MN06040.



### Keypad Functions

The pushbuttons on the keypad perform the following preset functions in the Run Mode:

- 0-9** Used for presetting the quantity to be delivered.
- CLEAR** Used to clear incorrect entries and to exit from the dynamic displays.
- ENTER** Used for dynamic displays only.
- PRINT** Signals completion of transaction when "Print Key" option is selected in program code 301.
- SET** Used to initiate the preset sequence.
- START** Used to start the delivery providing all external permissive senses are satisfied.
- STOP** Used to stop the delivery at any time.

### Overview

The "RUN" Mode for each preset position permits the operator to select and start the preset volume and to observe the dynamic variables such as flow rate, temperature, volume correction factors, transaction totals and non-resettable totals. Normal start-up, flow control and shut-down sequences, along with operator requested stops, will be independent for each preset position.

Preset volumes can not be entered simultaneously to both preset positions since the numeric keypad is shared by both preset positions. In any mode of operation with AccuLoad II, the data entered through the numeric keypad is assumed to be associated with the last preset position function key pressed. For example, if the "SET" button is pressed for preset position 1 any keypad data entered will be assumed to be for preset position 1 until the next function button is pressed.

Product delivery is controlled by several program code entries made for each preset position. Functions such as: first high flow rate, second high flow rate, low flow start, first and second trip points will be automatically controlled and monitored per their

## Section II – Operations

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program entries. Safety and volume accuracy functions such as: excess high flow, low flow, overrun and temperature probe failure are also monitored per their program values. If at any time a fatal alarm occurs (one that causes AccuLoad II to shut-down) while in the Ready State or the Run Mode, AccuLoad II will attempt to shut-down the flow and a message indicating an alarm condition will alternate with the current display.

When the delivery is completed, depending on how AccuLoad II is programmed, the transactions for the preset position used could be ended by removal of the ticket from the ticket printer, pressing the "PRINT" button associated with that preset position, or by a communication command. If the "STOP" button for the preset position is pressed during flow the display, depending on how the unit is programmed, will show:



100 Restart in 5

OR



Press Start to Continue

If the STOP/START delay is programmed, the preset position will display "100 Restart in 5" where 100 is the volume of product that has been delivered and the 5 is the number of seconds (that have been programmed in code 215) before the operator can restart the batch. Once the time-out has been reached, the display will then read "Press Start to Continue". The operator can then press "START" and continue the batch. If program code 215 is programmed to disable the time-out, the display will read "Press Start to Continue" as soon as the operator presses "STOP". Then it will then alternate with the preset display.

### ***Master/Slave S-Mass Meter Communications (Rev. 15 and above firmware)***

A feature has been added to the AccuLoad II-STD firmware that provides master/slave communication through the EIA-232 communications port (if so programmed) to an S-Mass meter equipped with the Micro-Pak Electronics. The communication interface is used to program the Micro-Pak and to retrieve the density of the product being metered which will be used in GST and mass calculations. In order to initiate communications between the AccuLoad II and the S-Mass meter, program code 702 must be pro-

grammed to option 6 and program codes 457 through 465 must be properly programmed. The Micro-Pak sequence number is used to program the address for the communications between the instruments.

### ***Master/Slave Smart Additive Communications (Rev. 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.

The AccuLoad communications package has also been designed with a pass-through communications mode. In this mode of operation the supervisory computer can talk to the Additive Injector System through the communication lines that have been run to the AccuLoad II and from the AccuLoad to the Additive Injector Systems(s).

### ***Meter Position Disabled/Not Installed***

The AccuLoad II will contain the necessary software and hardware to operate two meter positions. This may be confusing to an operator if only one of the meter positions is currently connected and operating. For this reason program code 190 can be programmed to disable the meter position not currently connected or in use. This program code will be under the High-security Mode. When selected, the meter not in use will display the following message:

## Section II – Operations

**Meter Position Not Used**

If the AccuLoad II has been purchased as a single preset position either preset position #1 or preset position #2 can be programmed as the operating position. The display on the preset position not being used will display the following message:

**Meter Position Not Used**

**Note:** The position programmed must match the position that has been wired as the operating preset position.

### Remote Start/Stop

Two spare permissive sense contacts are supplied in AccuLoad II that can be used for Remote Start/Remote Stop operations (codes 808 and 810 for Release 1 and Codes 801 and 804 for Release 2). To use these permissive sense contacts as Remote Start or Remote Stop, hardware jumpers must be installed on the keypad and computer boards in the proper position for correct operation. When AC power is applied to the contacts AccuLoad II will respond as though the "START" or "STOP" button has been pressed. (See the Installation Manual MN06037 for jumper positioning.)

### Quad OPV

The optional Quad OPV is a hardware option that provides for a dual pulse output per each preset position. The pulse rates and type of pulses are programmable. The pulse rates are programmable between 000.1 and 999.1 units per pulse with a maximum frequency of 500 Hz.

The programmable options for the type of pulses are Raw, Gross, Gst, Net, and Mass. Each pulse can be selected on type and rate. For programming the pulse type and rates, see program codes 348 and 349 for Release 1 and codes 348 through 351 for Release 2. (For installation details see the Installation Manual MN06037.)

**Note:** Release 1 pulse outputs (type and rate) are not independently programmable.

### Additive Monitoring (Release 2 and above Firmware)

The additive injector feedback option provides the AccuLoad II with the capability to monitor the addi-

tive products that are being injected. The AccuLoad II monitors the injector feedback switches for a change of state and counts the errors and alarms if no change is detected within a programmable period. The additive feedback option uses the following inputs when installed:

<b>Injector 1</b>	1st/2nd High Flow
<b>Injector 2</b>	Printer Tray
<b>Injector 3</b>	Spare #1
<b>Injector 4</b>	Spare #2

**Note:** See program codes 841 through 854 for programming the additive feedback option.

### Additive Injector Selection

#### Stand-alone Mode

When the AccuLoad II is in the Stand-alone Mode of operation, the additive selection can be programmed to be either automatic or manual, depending on how code 806 has been programmed (Release 1 firmware) or 885 has been programmed (Release 2 firmware).

<b>Code</b>	<b>Description</b>
<b>885*</b>	Manual/Auto Additive Injector Option must be programmed to either:

"0" for auto injectors - the additive outputs that are programmed in the AccuLoad II will automatically be selected for each batch.

"2" for manual injectors prompting at the beginning of each batch.

"3" for manual injectors prompting at the beginning of each transaction.

**Note:** Code 806 for Release 1 firmware.

The operation will be as follows for manual selection (code 2 or 3):

1. The driver or operator presses the "SET" key. The AccuLoad II will prompt the driver or operator as follows:

**Select Injector#1 0 =OFF**

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- The driver or operator is required to enter a '1' to select the additive. If selected, the display would read:

Select Injector#1 1 =ON

**Note:** If an error was made in selecting the additive to be "on", pressing "CLEAR" will select the additive "off".

- After additive injector #1 has been selected to either "on" or "off" press "ENTER". The following will be displayed:

Select Injector#2 0 =OFF

- The driver or operator repeats steps two and three until all the programmed additive outputs have been selected as either "ON" or "OFF". Press "ENTER" to store the additives that have been selected. The display will read:

Injectors on = #1,2,3,4

indicating which of the additive outputs have been selected. If none of the additives have been selected the display will read:

No Injectors Selected

**Note:** If the selections are incorrect press "CLEAR" and the original display will be displayed (see step 1) and the process can begin again.

**Note:** Any additive output that has a zero entry programmed in its corresponding program code will always be disabled and will not appear in the selection process.

- Once the driver or operator verifies that the additives that have been selected and are displayed in step four are correct press "ENTER". The display will light up momentarily and then go to the preset display.

UNLEADED P

GAL

When the additives are selected the loading process is the same as previously described.

### Standby Mode

When the AccuLoad II is in the Standby Mode of operation, the additive selection can be programmed to be either automatically or manually selected depending on how the unit is programmed. The following program codes must be programmed correctly for additive selection in the Standby Mode.

### Communications EIA-232

Code	Description
701	EIA-232 Communication Type must be programmed to either:  "1" EIA Type Terminal.  "2" EIA Type Minicomputer.
702	EIA-232 Communication Control must be programmed to either:  "2" Poll and Authorize.  "3" Remote Control.

**Note:** If programmed "2" Poll and Authorize the additive will be selected for each transaction. If programmed "3" Remote Control the additive will be selected for each batch.

742	Communications Time-out must have a value other than "000" programmed into it.
743	Communications Alarm Mode must be programmed to either:  "0" Standby Mode.  "2" Standby and Communication Alarm.
885*	Manual/Auto Additive Injection Option must be programmed to either:  "0" for auto injectors where the additives that are programmed in the AccuLoad II will automatically be selected for each batch.  4 transaction or batch depending on how code 702 is programmed.

**Note:** Release 2 firmware, code 806 for Release 1 firmware.

### Communications EIA-485 (Release 1 firmware)

## Section II – Operations

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Code	Description
704	EIA-485 Communication Type must be programmed to either:  "1" EIA Type Terminal.  "2" EIA Type Minicomputer.
705	EIA-485 Communication Control must be programmed to either:  "2" Poll and Authorize.  "3" Remote Control.

**Note:** If programmed "2" Poll and Authorize the additive will be selected for each transaction. If programmed "3" Remote Control the additive will be selected for each batch.

742	Communications Time-out must have a value other than "000" programmed into it.
743	Communications Alarm Mode must be programmed to either:  "0" Standby Mode.  "2" Standby and Communication Alarm.
806	Manual/Auto Additive Injection Option must be programmed to either:  "0" for auto injectors where the additives that are programmed in the AccuLoad II will automatically be selected for each batch.  "1" for manual injectors at the beginning of each transaction or batch depending on how code 702 is programmed.

### **Communications EIA-485 (Release 2 firmware)**

Code	Description
705	EIA-485 Communication Type must be programmed to either:  "1" EIA Type Terminal.  "2" EIA Type Minicomputer.
706	EIA-485 Communication Control must be programmed to either:  "2" Poll and Authorize.  "3" Remote Control.

**Note:** If programmed "2" Poll and Authorize the additive will be selected for each transaction. If programmed "3" Remote Control the additive will be selected for each batch.

742	Communications Time-out must have a value other than "000" programmed into it.
743	Communications Alarm Mode must be programmed to either:  "0" Standby Mode.  "2" Standby and Communication Alarm.
885	Manual/Auto Additive Injection Option must be programmed to either:  "0" for auto injectors where the additives that are programmed in the AccuLoad II will automatically be selected for each batch.  "1" for manual injectors at the beginning of each transaction or batch depending on how code 702 is programmed.

The driver or operator selection of the additives is the same as is described in the Stand-alone Mode (see above).

## Section II – Operations

### Local Ticket Printer

(See Flow Chart 1 on Page 12)

The description for operation with a local ticket printer described below assumes that the additive injectors are selected for automatic (code 885) and that the permissive senses are met.

Before operation the display will read:

```
UNLEADED Ready 1:07:58
```

where Unleaded is the product name which is programmable in code 181 of the General Directory. When the operator presses "SET" the display will either prompt:

```
* Please Insert Ticket *
```

*Note:* This prompt is programmable in the 800 Program Directory.

or if the ticket has been inserted before the "SET" button being pressed, AccuLoad II will display:

```
UNLEADED P GAL
```

A predetermined volume to be loaded is entered at the keypad. AccuLoad II will check this volume against the maximum preset volume (program code 302) and the minimum preset volume (program code 303) when the operator presses 'START'. If the volume is more than the minimum preset volume and less than the maximum preset volume, AccuLoad II will signal the valve to open to start the product flowing. If the volume is less than the minimum preset volume allowable, the message "Preset Batch Volume is below the Minimum required. Press CLEAR to CONTINUE" will scroll across the display until the "CLEAR" button is pressed. If the volume is more than the maximum preset volume allowable, the message "Preset Batch Volume exceeds the Maximum Permitted. PRESS CLEAR to CONTINUE" will scroll across the display until the "CLEAR" button is pressed. Press "CLEAR" again to clear the volume entered from the display. Another entry can then be made using a volume that is between the minimum and maximum allowable preset volume as programmed.

If all the permissive senses are met and an allowable preset volume is entered AccuLoad II, when the operator presses 'START', the valve will be signaled to open to begin loading the product. The volume entered is now locked into that preset position and all of the loading controls, except "STOP" and the Dynamic Displays, are inhibited.

At this time, the left and right-hand sides of the display become counters. The first through the sixth positions become an upcounter (delivery counter). The seventh position becomes a space. The eighth through tenth positions display the units of measurement. The eleventh position becomes a space. The twelfth through the seventeenth positions continuously display the original preset volume. The eighteenth position becomes a space. The nineteenth through the twenty-fourth positions become a downcounter (preset counter).

```
11000 Gal P99999 88000
```

If AccuLoad II is programmed for a blank downcounter (code 305), the last five positions will be blanked during the loading of the product.

```
11000 Gal P99999
```

AccuLoad II can be programmed (code 347) so that the preset display, delivery display, or both will alternate at a two second rate with the current correction being applied to the delivered volume (i.e., Grs, Raw, Gst @ Ref. Temp, Net @ Ref. Temp, or Mass). For example:

```
11000 Gal P99999 88000
```

will alternate with:

```
11000 Gal<Gst 60F 88000
```

if the current correction being applied to the delivery is Gross at Standard Temperature and the programmed reference temperature is 60 degrees Fahrenheit.

## Section II – Operations


When the product being loaded reaches a predetermined (First Stage Trip - Code 210) value, the valve is signaled to close. If a Smith Model 210 or 215 valve is being used, the flow will ramp-down in multiple steps to assist the valve in preventing line shock. When the preset quantity is nearly reached, a final trip (code 211) occurs signaling the valve to close completely. If so programmed, AccuLoad II will automatically adjust the final stage trip point (code 212) to assure accurate delivery of the preset quantity for each load. The AccuLoad II will also control the opening and closing of the standard two-stage closure valves such as the Smith Model 296 or 299.

During normal loading, if the need arises to stop flow, the red "STOP" key can be pressed to close the valve. At this point the current batch delivery may be terminated by pressing the "SET" button. The preset display will appear and a new preset batch can be entered or the transaction may be terminated. To return the system to normal loading (i.e., return to the volume remaining to be delivered), press 'START'. If the "Start After Stop Delay" is programmed (code 215) the display will read:




899 Restart in 10

(i.e., code 215 is programmed for 10 seconds) when the 10 seconds have elapsed the display will alternate between the preset display:



899 Gal P 1000 101

and



Press Start to Continue

until the 'START' button is pressed to resume the load. This reopens the valve to load the remainder of the preset volume.

**Caution: The "STOP" button is for operator convenience only and is not intended to be used as an "Emergency Stop" or as a substitute for an emergency stop device.**


If a power failure is experienced, any transaction in process will not be allowed to continue. The valve will close and remain closed until after power is restored. The display will go through the initialization process and then read:



Press Start to Continue


the operator then can restart the load to complete the batch by pressing 'START'.

Before Power Failure:



100 Gal P 1000 900

As Power Fails (left display):



\*\*\* Low Line Voltage \*\*\*

As Power Fails (right display):



\*\* Please Standby \*\*

After Power Returns:



Press Start to Continue

The operator can print a ticket for either a single or a multiple batch transaction. The upcounter display will accumulate the total delivery until the transaction is terminated by printing the ticket, regardless of the number of preset batches, 5 digits up to 99,999 volume units.

Flow Chart 1 is a sample of the operator procedure that is required when loading with an AccuLoad II and a local ticket printer. Please note that the flow charts are shown with the permissive senses programmed to be used for the beginning of the transaction only and not constant (see program codes 801 and 804 for Release 2 firmware and codes 808 and 810 for Release 1 firmware). If they are programmed as constant any time the contact is broken AccuLoad II would shut the system down. The flow chart is also shown with the restart after the permissives are reconnected. Being programmed in manual mode, the operator has to press "START" to continue. The unit can be programmed to automatically start when the permissives are reconnected.

## Section II – Operations

---

### **Remote Ticket Printer** **(See Flow Chart 2 on Page 13)**

---

When operating with a remote ticket printer or a shared printer, AccuLoad II ignores the tray switch contact and the following occurs:

1. The AccuLoad II switches from:



UNLEADED Ready 8:07:15

to:



UNLEADED P Ga1

when the "SET" button is pressed. The operator then presets the volume of product required for the transaction.

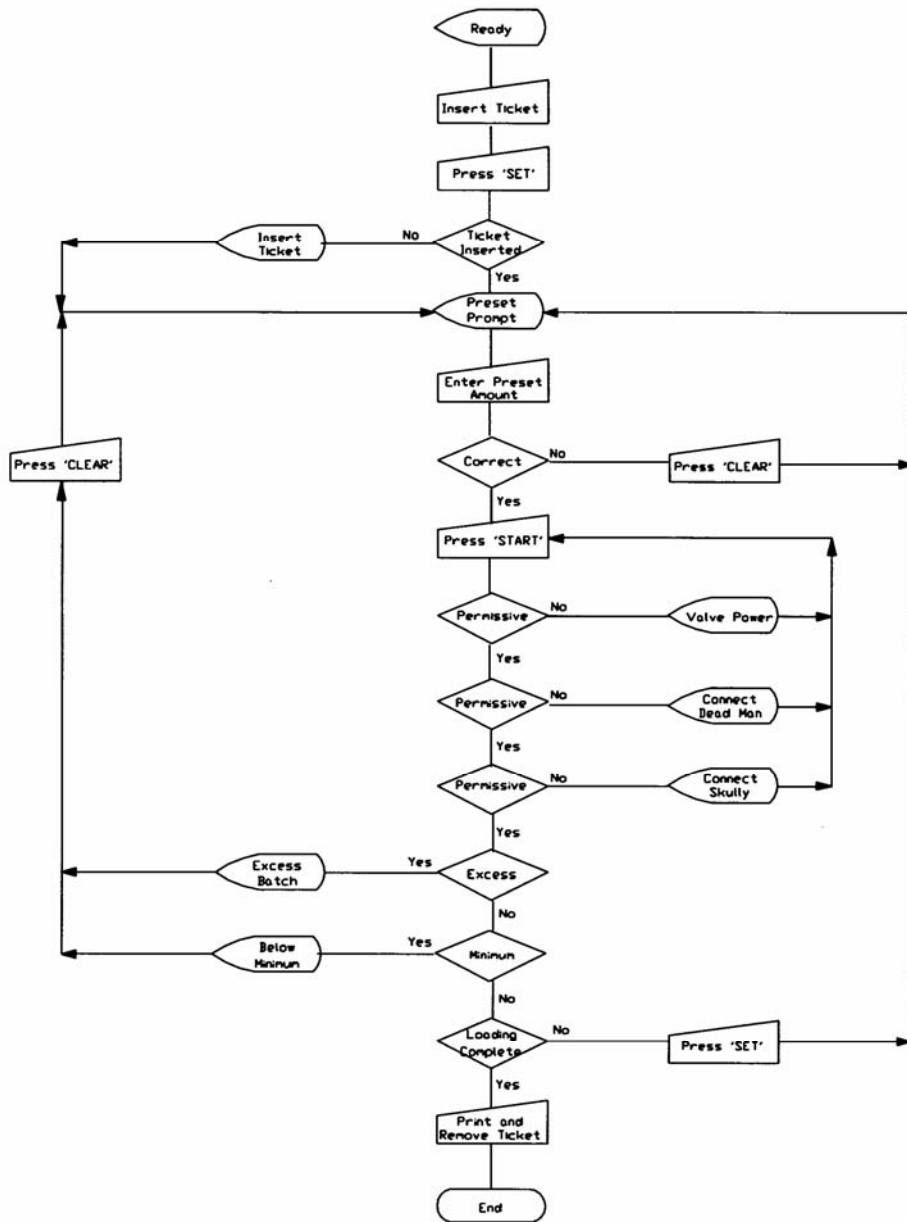
2. To complete a transaction the operator presses the "PRINT" button. When the "PRINT" button is pressed the display will return to:



UNLEADED Ready 8:15:15

All other operations for the Remote Printer or the Shared Printer are the same as described for operation with the Local Printer.

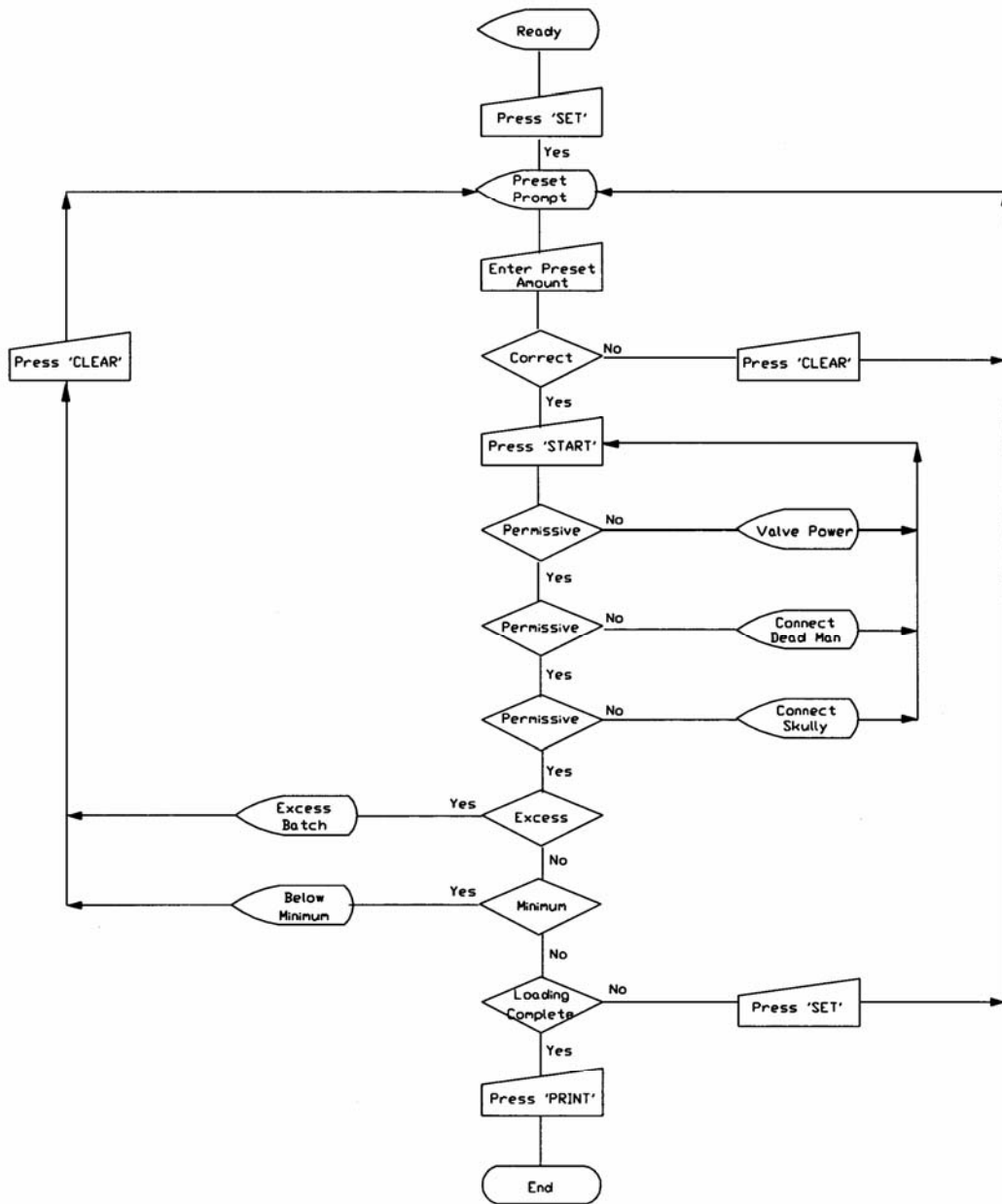
## Section II – Operations



Flow Chart 1

Loading with a Local Ticket Printer

## Section II – Operations



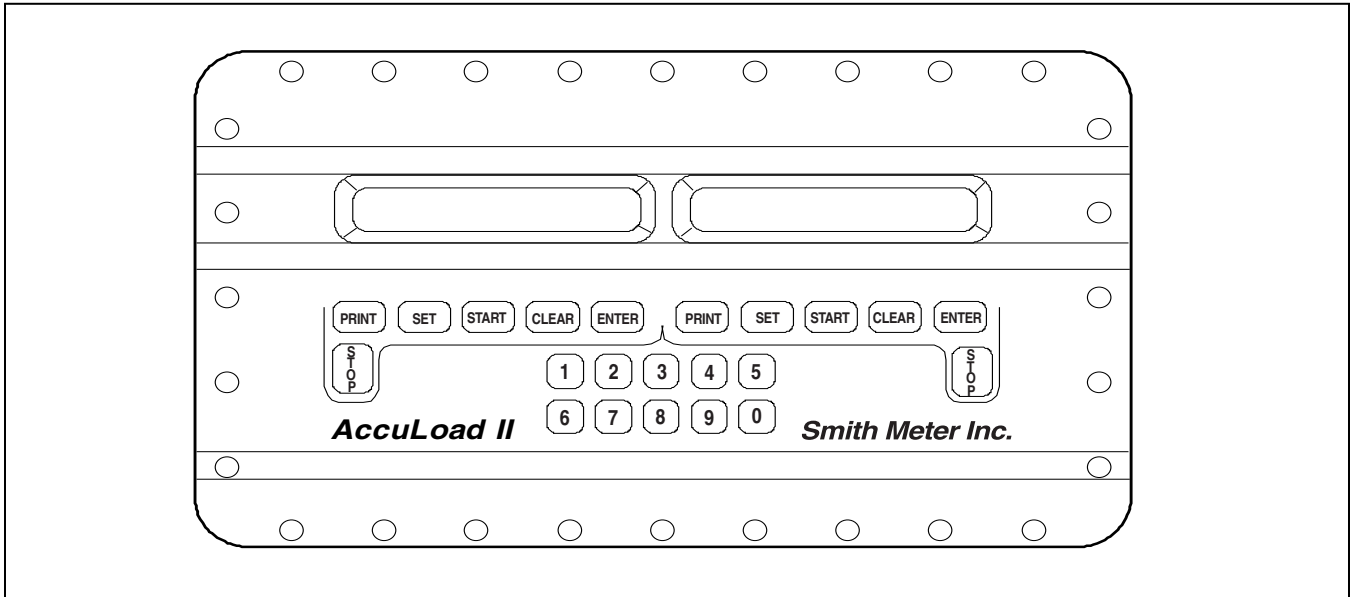
Flow Chart 2  
Loading with a Remote Ticket Printer

## Section III – Dynamic Displays

This section describes informational displays which can be viewed while in the Run Mode. These displays are "dynamic" in the sense that the displayed values reflect current actual conditions. They will continuously update while being viewed.

A dynamic display is selected by pressing "ENTER", 'XX' where XX is the number of the dynamic display

to be viewed. 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.



### Keypad Functions

The pushbuttons on the keypad perform the following functions when accessing the dynamic displays:

Key	Description
<b>0-9</b>	Used to enter the dynamic display number for preset positions 1 and 2.
<b>CLEAR</b>	Used to exit the dynamic display for preset position 1 or 2.
<b>ENTER</b>	Used to enter the dynamic display desired for viewing for preset position 1 or 2 and for sequencing through the displays in order.

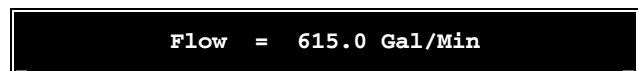
**Note:** The pushbuttons not listed above are not used for viewing the dynamic displays.

### Entry to Dynamic Displays

1. To select a dynamic display (i.e., 00) press "ENTER", '00'.



2. To step through the dynamic displays press "ENTER".



3. Press "ENTER".



4. To revert to the preset display press "CLEAR".



## Section III – Dynamic Displays

### Dynamic Display Reference

#### 00 - Time & Date

The current time and date will be displayed.

9:20:05 AM 10-31-98

#### 01 - Flow Rate (Units/Min)

The current flow rate in units per minute will be displayed.

*Note: An "\*" before the flow rate shows the flow is being controlled lower than selected because back pressure or auto flow control is not sufficient to maintain the desired flow.*

Flow = 600.0 Gal/Min

#### 02 - Flow Rate (Units/Hr)

The current flow rate in units per hour will be displayed.

*Note: An "\*" before the flow rate shows the flow is being controlled lower than selected because back pressure or auto flow control is not sufficient to maintain the desired flow.*

Flow = 3600.0 Gal/Hr

#### 03 - Temperature

The current temperature being measured and used for compensation will be displayed.

Temperature = + 78.5°F

#### 04 - API

The current API being used for compensation will be displayed.

API = + 19.9

#### 05 - Reference Density

The current reference density being used will be displayed.

Ref Density = 933.7

#### 06 - Relative Density

The current relative density being used will be displayed.

Rel Density = 0.9346

#### 07 - Pressure and Vapor Pressure

If used, the current pressure and vapor pressure will be displayed.

P = 45.0 VP = 10.0

#### 08 - Meter Factor

The current meter factor being used to correct the raw volume to the gross volume will be displayed.

Meter Factor = 1.0376

#### 09 - Temperature Correction

The current correction for temperature on liquid factor being used to correct the gross volume to the gross @ standard temperature volume will be displayed.

CTL = 0.9927

#### 10 - Correction for Pressure on Liquid

The current correction factor being used to correct the Gst (gross @ standard temperature) volume to a net volume which is based on the current pressure will be displayed.

CPL = 1.0110

## Section III – Dynamic Displays

### 11 - Density

The current density being used will be displayed.

Density	48.65
---------	-------

### 12 - Raw Volume

The raw transaction volume that is currently being loaded will be displayed.

Raw Transaction	192.75
-----------------	--------

### 13 - Gross Volume

The gross volume that is currently being loaded will be displayed.

Grs Transaction	200.00
-----------------	--------

### 14 - Gross @ Standard Temperature Volume

The gross @ standard temperature compensated volume that is currently being loaded will be displayed.

Gst Transaction	198.54
-----------------	--------

### 15 - Net Transaction

The net volume that is currently being loaded will be displayed.

Net Transaction	200.72
-----------------	--------

### 16 - Mass Transaction

The mass that is currently being loaded will be displayed.

Mas Transaction	1669
-----------------	------

### 17 - Additive Injector #1 Volume \*

The additive injector #1 transaction volume that is currently being loaded will be displayed.

Inj1 Trans	10.950
------------	--------

### 18 - Additive Injector #2 Volume\*

The additive injector #2 transaction volume that is currently being loaded will be displayed.

Inj2 Trans	15.050
------------	--------

### 19 - Additive Injector #3 Volume\*

The additive injector #3 transaction volume that is currently being loaded will be displayed.

Inj3 Trans	20.950
------------	--------

### 20 - Additive Injector #4 Volume \*

The additive injector #4 transaction volume that is currently being loaded will be displayed.

Inj4 Trans	13.950
------------	--------

### 21 - Valve Position

The status of the current valve position will be displayed.

Valve Requested Open
----------------------

### 22 - Load Average Temperature

The load average temperature for the current transaction will be displayed.

Load Avg Tmp = + 75.0°F
-------------------------

## Section III – Dynamic Displays

### 23 - Load Average Pressure

The load average pressure for the current transaction will be displayed.

Load Avg Pres = 43.0

### 24 - Load Average Density

The load average density for the current transaction will be displayed.

Load Avg Dens = 48.61

### 25 - Load Average Meter Factor

The load average meter factor for the current transaction will be displayed.

Flow = 615.0 Gal/Min

### 26 - Raw Non-resettable Totals

The raw non-resettable totals for the product will be displayed.

Raw Totals 000019846

### 27 - Gross Non-resettable Totals

The gross non-resettable totals for the product will be displayed.

Grs Totals 000019907

### 28 - Gross @ Standard Temperature Non-resettable Totals

The gross @ standard temperature non-resettable totals for the product will be displayed.

Gst Totals 000019243

### 29 - Net Non-resettable Totals

The net non-resettable totals for the product will be displayed.

Net Totals 000016564

### 30 - Mass Non-resettable Totals

The mass non-resettable totals for the product will be displayed.

Mass Totals 000041903

### 31 - Additive Injector #1 Non-resettable Totals \*

The additive injector #1 non-resettable totals for the injected product will be displayed.

Inj1 Total 000001342

### 32 - Additive Injector #2 Non-resettable Totals \*

The additive injector #2 non-resettable totals for the injected product will be displayed.

Inj2 Total 000001432

### 33 - Additive Injector #3 Non-resettable Totals \*

The additive injector #3 non-resettable totals for the injected product will be displayed.

Inj3 Total 000001032

## Section III – Dynamic Displays

### 34 - Additive Injector #4 Non-resettable Totals \*

The additive injector #4 non-resettable totals for the injected product will be displayed.

Inj4 Total      000000532

### 35 - Input Module Status \*

The status of the input modules in the AccuLoad II will be displayed.

JOPOWOT1V1H1F1ROYOZ0

- Where: 0 = Closed  
 1 = Open  
 J = Test Points 9 & 10  
 P = Program Mode  
 W = Weights & Measures Mode  
 T = Ticket Printer Tray Switch  
 V = Valve Stem Switch (04A or 05R)  
 H = 1st/2nd High Flow Contact  
 F = Ticket Printer Feedback  
 R = Valve Power  
 Y = Spare #1  
 Z = Spare #2

### 36 - Contact Output Status (Side 1) \*\*

The status of the contact output modules for side 1 in the AccuLoad II will be displayed.

<I1 I1 I1 I1 U1 D1 P1 A1

- Where: 0 = Closed  
 1 = Open  
 I = Injector #1  
 I = Injector #2  
 I = Injector #3  
 I = Injector #4  
 U = Upstream Solenoid  
 D = Downstream Solenoid  
 P = Pump  
 A = Alarm

### 37 - Contact Output Status (Side 2) \*

The status of the contact output modules for side 1 in the AccuLoad II will be displayed.

>I1 I1 I1 I1 U1 D1 P1 A1

- Where: 0 = Closed  
 1 = Open  
 I = Injector #1  
 I = Injector #2  
 I = Injector #3  
 I = Injector #4  
 U = Upstream Solenoid  
 D = Downstream Solenoid  
 P = Pump  
 A = Alarm

### 38 - Last Power Failure \*

The last time the AccuLoad II experienced a power failure will be displayed.

PF: 3:04:36 PM 11-08-89

### 39 - Additive Injector #1 Rate \*\*\*

The current programmed additive pulse rate for end of batch stopping of the additive pulse output #1 and the recalculated additive pulse output for shutting down at the first trip point will be displayed.

INJ1 Prog XXX Cal XXX.XX

### 40 - Additive Injector #2 Rate \*\*\*

The current programmed additive pulse rate for end of batch stopping of the additive pulse output #2 and the recalculated additive pulse output for shutting down at the first trip point will be displayed.

INJ2 Prog XXX Cal XXX.XX

## Section III – Dynamic Displays

---

### **41 - Additive Injector #3 Rate \*\*\***

The current programmed additive pulse rate for end of batch stopping of the additive pulse output #3 and the recalculated additive pulse output for shutting down at the first trip point will be displayed.

```
INJ3 Prog XXX Cal XXX.XX
```

### **42 - Additive Injector #4 Rate \*\*\***

The current programmed additive pulse rate for end of batch stopping of the additive pulse output #4 and the recalculated additive pulse output for shutting down at the first trip point will be displayed.

```
INJ4 Prog XXX Cal XXX.XX
```

### **50, 51, 52, 53, 54, 55 - Communications Diagnostics \***

These real time diagnostics are used to facilitate diagnoses of communication problems while the AccuLoad II is being controlled remotely. For a detailed description of the displays, refer to the AccuLoad II Communications Manual (Bulletin MN06040).

**Note:** \* AccuLoad II-STD Release 2 and above firmware.  
\*\* AccuLoad II-STD Rev. 05 and above firmware.  
\*\*\* AccuLoad II-STD Rev. 06 and above firmware.

## Section IV – Program Mode

### Keypad Data Entry

All programming information is entered via the keypad. The program codes for AccuLoad II are divided into nine directories as follows:

Code	Description
100	General Purpose Directory
200	Flow Control Directory
300	Volume Accuracy Directory
400	Temperature & Density Directory
500	Pressure Directory
600	Read Only Data Directory
700	Communications Directory
800	Inputs & Outputs Directory
900	Diagnostics Directory

These directories are then subdivided into three sections. Under program protection are the codes that are low security items or those which do not affect volume accuracy (i.e., the status of the various alarms, accumulative totalizers, date and time and various other read only codes). The second digit of these codes will always be zero through three. The criteria for entering the Program Mode in preset position 1 or 2 and changing a parameter under this protection will consist of the following:

1. The program contact is closed.
2. The access code for the respective preset position has been correctly entered.

The Weights and Measures codes are high-security items or those which are involved in volume accuracy. The second digit of these codes will always be four through seven. The criteria for entering the Program Mode and changing these codes in preset position 1 or 2 will consist of the following:

1. The program contact is closed.
2. The Weights and Measures contact is closed.
3. The access code for the respective preset position has been correctly entered.

**Note:** *These codes can be viewed while program contact is closed but can not be changed.*

Program codes that have a second digit of eight can be protected by either the program contact or by both the program contact and the Weights and Measures contact. The security requirements of these codes may vary under various Weights and Measures agencies' guidelines. The criteria for entering the Program Mode and changing these codes

in preset position 1 or 2 will vary depending on how code X40 is programmed, where X equals the directory number of the codes.

Under the special High-security Mode of protection are codes whose use may be sensitive under various Weights and Measures agencies' guidelines or affect volume accuracy. The second digit of these codes will always be a nine. The criteria for entering the Special High-security Mode and programming the codes in preset position 1 or 2 will consist of the following:

1. The program contact is closed.
2. The Weights and Measures contact is closed.
3. The access code for the respective meter position has been correctly entered.
4. A board level hardware jumper is installed between TP9 and TP10 on the computer board. These points are located on the lower left half of the board.

**Note:** *The program contact and the Weights and Measures contact are shared by both preset positions.*

**EXAMPLE**      1 - 2 - 1

Where: 1 = Directory Number  
2 = Code Protection  
1 = Number

The pushbuttons on the keypad perform the following functions while the instrument is in the Program Mode:

**0 - 9**            Used to enter the access code, program codes and data entries for preset positions 1 and 2.

**CLEAR**            Used for clearing incorrect entries for preset position 1 or 2, getting from a program code to the directory (i.e., code 105 to 100), for getting to an exit point, or used to stop the scrolling display.

**ENTER**            Used to enter the Program Mode security access code, to enter program data for preset position 1 or 2, and for exiting the Program Mode.

## Section IV – Program Mode

<b>SET</b>	Used for stepping through the program codes in sequence for preset position 1 or 2.
<b>PRINT</b>	Used for Help Messages for preset position 1 or 2.
<b>STOP</b>	Not used in Program Mode.

### Entry to Program Mode

1. Close the Program Mode contact (unless already permanently wired closed). This will provide the first step for access to program codes with a second digit of zero through three.

**Note:** Weights & Measures codes can be viewed but not changed unless the Weights and Measures contact is also closed either before entry into Program Mode or while in the Program Mode.

```
Product Ready 1:10:31
```

2. Press "ENTER", "ENTER". This clears the display.

3. Enter the four digit access code ('0000' preset at factory). For security any digit entered will be displayed as an 'X'.

```
XXXX
```

4. Press "ENTER". This checks for the proper access code. If this is correct, the following will be displayed:

```
Enter Dir or Program #
```

**Note:** If an incorrect access code was entered, the following prompt will appear:

```
** Error Press Clear **
```

5. Press "CLEAR". The display will return to "READY".

```
Unleaded Ready 1:10:31
```

6. Repeat Steps 2, 3 and 4 to re-enter the Program Mode.

### Program Directory Selection

Once in the Program Mode the directories can be accessed either by a three digit code or by pressing "SET" "SET". This action will enter the instrument into the first program directory. The other directories can then be stepped through sequentially by continuing to press "SET".

### Specific Directory Selection

To enter the directory using its three digit program code the following steps have to be observed:

1. The following prompt is displayed when entry is made into the Program Mode:

```
Enter Dir or Program #
```

2. Enter the directory number required (i.e., 200).

```
Enter Dir or Program 200
```

**Note:** If an error is made when entering the number of the directory required the "CLEAR" button can be pressed to clear the wrong number and a new number can then be entered.

3. Press "ENTER".

```
200 Flow Control Dir
```

4. Press "CLEAR" to get to the exit prompt.

```
Press Enter to Exit
```

5. Press "CLEAR" again to get to the directory entry prompt.

```
Enter Dir or Program #
```

## Section IV – Program Mode

6. Enter the new directory number (i.e., 400).

```
Enter Dir or Program 400
```

7. Press "ENTER".

```
400 Temp & Density Dir
```

### **Sequential Directory Selection**

To enter the directory using the "SET" button the following steps have to be observed:

1. The following prompt is displayed when entry is made into the Program Mode:

```
Enter Dir or Program #
```

2. Press "SET" to get the exit prompt.

```
Press Enter to Exit
```

3. Press "SET" again and the first directory will be displayed.

```
100 General Purpose Dir
```

4. Press "SET" again and the second directory will be displayed.

```
200 Flow Control Dir
```

5. Press "SET" again and the third directory will be displayed.

```
300 Volume Accuracy Dir
```

Repeat step 5 until the directory required is reached.

### **Exiting A Directory**

To exit a directory and to enter the next directory follow the steps listed below.

1. From the last program code in the directory.

```
190 0 Meter Enabled
```

2. Press "SET".

```
Press Enter to Exit Dir
```

3. Press "ENTER".

```
200 Flow Control Dir
```

### **Program Code Selection**

Once in the Program Mode, the codes can be accessed either by the three digit number, going to the directories and then into the code using the second and third digits, or sequentially once in the program codes.

*Note: Weights & Measures codes can be viewed but not changed unless the Weights and Measures contact was closed before entry into the Program Mode.*

1. From the entry to the Program Mode.

```
Enter Dir or Program #
```

2. Enter the desired program code using the keypad (i.e., 106).

```
Enter Dir or Program 106
```

3. Press "ENTER".

```
106 00 Dynamic Time-out
```

## Section IV – Program Mode

- If another code is required press "CLEAR". The following display will appear:

```
100 General Purpose Dir
```

- Press "CLEAR" again.

```
Press Enter to Exit
```

- Press "CLEAR" again.

```
Enter Dir or Program #
```

- Enter the new code (i.e., 210).

```
Enter Dir or Program 210
```

- Press "ENTER".

```
210 0000 1st Trip Point
```

**Note:** If a code that is currently unassigned (e.g., '135') is entered, the following prompt will appear:

```
135 Invalid Program Code
```

### Second and Third Digit Selection

If it is desired to review or change a code that is in same directory that has been accessed, the following steps should be followed:

- From the directory.

```
200 Flow Control Dir
```

- Press "ENTER".

```
200 Enter Program #
```

- Enter the second and third digit of the code required (i.e., 10).

```
200 Enter Program 10
```

- Press "ENTER".

```
210 0000 1st Trip Point
```

- To access another code in the same directory, press "CLEAR" to get back to the directory.

```
200 Flow Control Dir
```

- Press "ENTER".

```
200 Enter Program #
```

- Enter the second and third digit of the code required (i.e., 41).

```
200 Enter Program 41
```

- Press "ENTER".

```
241 0 No Valve Security
```

Repeat steps five through eight for each code that is required to be accessed.

### Sequential Code Selection

If it is desired to review the codes in numerical sequence, press "SET" to advance by one code rather than entering the program code.

- From the Entry into the Program Mode.

```
101 No Alarms Present
```

- Press "SET" ...

```
102 No Alarms Present
```

- Press "SET" ...

```
103 No Alarms Present
```

## Section IV – Program Mode

4. Press "SET" again ...

104 1:50 AM Time

5. Press "SET" again ...

105 01-05-91 Date

Etc...

**Note:** When using this method of stepping through the program codes, the instrument will skip invalid codes and only display the valid codes.

### EXAMPLE:

107 0 Flash No Totals

Press "SET".

140 0 Weights & Measures

**Note:** If "SET" is pressed and held AccuLoad II will scroll through the program codes.

### Exiting Program Mode

To return to the Run Mode, either open the Program Mode contact and press "SET" or follow the steps listed below.

1. From the program code or directory.

200 Flow Control Dir

2. Press "CLEAR".

Press Enter to Exit

3. Press "ENTER".

UNLEADED Ready 17:33:33

### Changing Program Code Parameters

The program codes represent parameters that can be changed to either enhance the performance of AccuLoad II or can be changed because of application changes. There are three types of parameters in AccuLoad II, the codes that require numerical data, the codes where choices have to be made on option 1, 2, 3 etc., and the codes where alphanumeric data is entered. Once a code has been selected, its programmed contents can be changed by entering a new value through the keypad.

### Numeric Data

The numeric data is entered via the keypad just as numbers are entered on a calculator. The number of digits for each entry is listed in the Programming Workbook and the Operator Reference Guide.

**EXAMPLE:** To change the parameters for the high flow rate:

1. View the contents of code 207 via one of the methods previously described.

207 0600 High Flow Rate

2. To specify a new First High Flow Rate enter the rate required (i.e., 1800).

207 0600 High Flow R 450

3. Press "ENTER" to store the new value, the display will read as follows while data is being stored:

207 \*\* STORING DATA \*\*

4. After the data is stored, the display will then read:

207 0450 High Flow Rate

**Note:** If an incorrect value is entered on the screen and has not been stored, the value can be cleared by pressing "CLEAR" twice and a new value can then be entered.

## Section IV – Program Mode

### Options

The codes that have several options (i.e., 1, 2, 3, etc.) are changed by entering the number that correlates to the option that is required for the application. The options available are listed in the Programming Workbook and in the Operator Reference Manual.

**EXAMPLE:** To change the parameters for the transaction control:

1. View the contents of code 301 via one of the methods previously described.

```
301 0 Local Tray Switch
```

2. To specify a different option, enter the new one digit number of the option desired (i.e., 1).

```
301 0 Local Tray Switch1
```

3. Press "ENTER" to store the new option, the display will read **\*\* STORING DATA \*\*** while the new option is being stored.

```
301 ** STORING DATA **
```

4. After the data is stored the display will then read:

```
301 1 Print Key
```

**Note:** An entry other than '0' through '4' will result in an error message being scrolled across the display "Fatal: Entry is out of specified range". Press "CLEAR" to stop the scrolling message and to return to the original display. Press "CLEAR" again to clear the number that was in error and then retry.

### Alphanumeric Data

The codes that require alphanumeric data entered in them are the codes that will display Product Messages, Prompt Messages or Permissive Messages on the displays of AccuLoad II. They will provide information to be printed out on the Bill of Lading Emulation. When adding or changing information in these alphanumeric program codes, the keys listed below perform the following functions:

Key	Description
-----	-------------

"ENTER"	Enters the data into the instrument's memory.
"1"	Positions the cursor so that it is pointing at the character to be changed or added.
"2"	Increments the character one position.
"3"	Decrements the character one position.
"4"	Increments the character from one block of characters to another (Ex: changing from uppercase letters to lowercase letters). The blocks of characters that are available in the AccuLoad II are as follows:

- 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

1. View the contents of code 181 via one of the methods previously described.

```
181 = PROD MSG
```

2. To change/add information press "1". This will position the cursor so that it is pointing to the position to be changed.

```
181 < = PROD MSG
```

3. To add the description "Unleaded" as the Product Message press "4". This will advance the blocks of characters to "A".

```
181 A< = PROD MSG
```

## Section IV – Program Mode

4. Press "4" to advance the blocks of characters to "a".

```
181 a< = PROD MSG
```

5. Press "3" to decrement the character.

```
181 z< = PROD MSG
```

6. Repeat step 5 until the desired letter is displayed "U".

```
181 U< = PROD MSG
```

7. Press "1" to move the cursor to the next position.

```
181 U< = PROD MSG
```

8. Press "4" until the group of characters that is desired is displayed (i.e., 0).

```
181 U0< = PROD MSG
```

9. Press "3" to decrement the character.

```
181 Uz< = PROD MSG
```

10. Repeat step 9 until the desired letter is displayed "n".

```
181 Un< = PROD MSG
```

11. Press "1" to move the cursor to the next position.

```
181 Un< = PROD MSG
```

12. Press "4" until the group of characters that is required is displayed (i.e., a).

```
181 Una< = PROD MSG
```

13. Press "2" to increment the character.

```
181 Unb< = PROD MSG
```

14. Repeat step 13 until the desired letter is displayed "l".

```
181 Unl< = PROD MSG
```

15. Continue advancing and changing/adding characters until the desired message is displayed.

```
181 Unleaded = PROD MSG
```

16. Advance the arrow (press "1") until only the message is displayed. The arrow will wrap if "1" is continued to be pressed.

```
181 U<leaded = PROD MSG
```

17. Press "ENTER" to store the message. The display will read as follows while the data is being stored:

```
181 ** Storing Data **
```

18. After the data is stored the display will then read:

```
181 Unleaded = PROD MSG
```

**Note:** If "ENTER" is not pressed, the data will not be stored in memory and will revert to the previous display.

## Section IV – Program Mode

---

### ***Viewing the Help Messages***

---

The AccuLoad II features unique Help Messages which allow the operator to have at his fingertips the ability to review what is required or what the options are for an individual program code by simply pressing the "PRINT" key while in the Program Mode. The Help Messages will scroll across the display when the "PRINT" key is pressed. The message will continue to scroll across the display until the "CLEAR" key is pressed.

**EXAMPLE:** To view the Help Message for program code 301 (Transaction Control):

1. View the contents of code 301 via one of the methods previously described.

```
301 0 Local Tray Switch
```

2. To view the Help Message press the "PRINT" key. The message will scroll across the display.

```
Select method of Transac
```

```
tion Control: Remote, Lo
```

```
cal, Print.
```

3. To return to the program code, press the "CLEAR" key.

```
301 0 Local Tray Switch
```

**Note:** A description of the content and range of entries for the individual codes can be found in the Operator Reference Manual.

## Section V – Program Codes

### ***Program Codes***

This table lists all the program codes that are found in the Program Mode of AccuLoad II. The table gives the code number and a brief description of each code.

This table is to be used for a quick reference. It lists all the program codes that are found in the Program Mode of the AccuLoad II-STD. If more information is

required, refer to the Programming Workbook (AB06023 for STD Revision 0 and 1 firmware and AB06029 for STD Revision 2 and above firmware) or the Operator Reference Manual (MN06038 for STD Revision 0 and 1 firmware and MN06050L for STD Revision 2 and above firmware). In the following table Release 1 indicates STD Revision 0 and 1 firmware and Release 2 indicates STD Revision 2 and above firmware.

<b>Command Code Summary</b>		
<b>Code</b>	<b>Description</b>	<b>Release</b>
<b>100</b>	<b>General Purpose Directory</b>	<b>1,2</b>
101	Alarm Check/Reset	1,2
102	Run Mode Alarms	1,2
103	Ready Mode Alarms	1,2
104	Set Time	1,2
105	Set Date	1,2
106	Dynamic Display Time-out	1,2
107	Flashing Totals	1,2
108-139	Unassigned at Present	
140	Protection of Program Codes 180-189	1,2
141	Local Mode Alarm Clearing	1,2
142	Decimal or Comma	2
143	Alarm Relay	2
144	Run & Ready Mode Initialization <i>Note: AccuLoad II-STD Revision 10 firmware and above.</i>	2
145	Ready/Run Mode Clearable Alarms Selection <i>Note: AccuLoad II-STD Revision 13 firmware and above.</i>	2
146	Second Alarm Output <i>Note: This code applies to STD-23 and above firmware.</i>	2
147-179	Unassigned at Present	
180	Programming Access Code	1,2
181	Product Message	1,2
182	Auto Reset Timer	2
183	Run & Ready Mode Customized Display <i>Note: AccuLoad II-STD Revision 10 firmware and above.</i>	2
184	Power-fail Alarm <i>Note: AccuLoad II-STD Revision 11 firmware and above.</i>	2

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185-189	Unassigned at Present	
190	Meter Position Disable	1,2
191-199	Unassigned at Present	
<b>200</b>	<b>Flow Control Directory</b>	<b>1,2</b>
201	Excess Flow Rate	1,2
202	Minimum Flow Rate	1,2
203	Valve Type	1,2
204	Low Flow Start Volume	1,2
205	Low Flow Start Rate	1,2
206	Zero Flow Timer	1,2
207	First High Flow Rate	1,2
208	Flow Tolerance	1,2
209	Second High Flow Rate	1,2
210	First Trip Volume	1,2
211	Final (Second) Trip Volume	1,2
212	Final (Second) Trip Auto	1,2
213	Overrun Alarm Limit	1,2
214	Low Flow Rate Alarm Limit	1,2
215	Start Delay After Stop	1,2
216	Pump Relay Time Delay	1,2
217	Valve Delay to Open	1,2
218	PT/VF Time Delay	1,2
219	Zero Flow Alarm <i>Note: AccuLoad II-STD Revision 13 firmware and above.</i>	2
220-239	Unassigned at Present	
240	Protection of Program Codes 280-289	1,2
241	Valve Security	1,2
242-299	Unassigned at Present	
<b>300</b>	<b>Volume Accuracy Directory</b>	<b>1,2</b>
301	Transaction Control	1,2
302	Maximum Preset Volume	1,2
303	Minimum Preset Volume	1,2
304	Auto Preset	1,2
305	Blank Downcounter	1,2
306-339	Unassigned at Present	

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340	Protection of Program Codes 380-389	1,2
341	Dual Pulse Error Count	1,2
342	Dual Pulse Error Reset	1,2
343	Dual Pulse Flow Rate Cutoff	1,2
344	Display Units	1,2
345	Preset Display	1,2
346	Delivery Display	1,2
347	Corrected Display	1,2
348	Printer 1 Registration	1,2
349	Printer 1 Output Resolution	1,2
350	Display Resolution	1
350	Printer 2 Registration	2
351	Input Resolution	1
351	Printer 2 Output Resolution	2
352	Flow Rate for Meter Factor #1	1
352	Display Resolution	2
353	Meter Factor #1	1
353	Input Resolution	2
354	Flow Rate For Meter Factor #2	1
354	Flow Rate for Meter Factor #1	2
355	Meter Factor #2	1
355	Meter Factor #1	2
356	Flow Rate for Meter Factor #3	1
356	Flow Rate for Meter Factor #2	2
357	Meter Factor #3	1
357	Meter Factor #2	2
358	Flow Rate for Meter Factor #4	1
358	Flow Rate for Meter Factor #3	2
359	Meter Factor #4	1
359	Meter Factor #3	2
360	Meter Factor % Change/Deg.	1
360	Flow Rate for Meter Factor #4	2
361	Meter Factor Reference	1
361	Meter Factor #4	2
362	Proving Modes	1

## Section V – Program Codes

362	Meter Factor % Change/Deg.	2
363	Proving Output	1
363	Meter Factor Reference	2
364	Proving Output Units	1
364	Proving Modes	2
365	Proving Output	2
366	Proving Output Units	2
367	Dual Pulse Inverted Timer <i>Note: This code applies to STD-21 and above firmware</i>	2
368-389	Unassigned at Present	
390	Master Meter Factor	1,2
391	Linearized Factor Deviation	1,2
392	Meter Factor Variation	1,2
393	Input Pulse Type	1,2
394	Input Pulse Doubler	1,2
395	Transmitter Type	1,2
396-399	Unassigned at Present	
<b>400</b>	<b>Temperature &amp; Density Directory</b>	<b>1,2</b>
401-439	Unassigned at Present	
440	Protection of Program Codes 480-489	1,2
441	Temperature Units	1,2
442	Reference Temperature	1,2
443	Temperature Offset	1,2
444	API Table & Product	1,2
445	Reference Density	1,2
446	Low Temperature Alarm	1,2
447	High Temperature Alarm	1,2
448	Maintenance Temperature	1,2
449	Density or Temperature Input	1,2
450	Density Units	1,2
451	Minimum Density or Temperature	1,2
452	Maximum Density or Temperature	1,2
453	Low Density Alarm	1,2
454	High Density Alarm	1,2
455	Volume/Mass Conversion	1,2

## Section V – Program Codes

456	Mass Units	2
457	Micro-Pak Sequence Number <i>Note: This code applies to STD-15 and above firmware.</i>	2
458	Density A Coefficient <i>Note: This code applies to STD-15 and above firmware.</i>	2
459	Density B Coefficient <i>Note: This code applies to STD-15 and above firmware.</i>	2
460	Density C Coefficient <i>Note: This code applies to STD-15 and above firmware.</i>	2
461	Micro-Pak DCF Value <i>Note: This code applies to STD-15 and above firmware.</i>	2
462	Micro-Pak Pulse Output Multiplier <i>Note: This code applies to STD-15 and above firmware.</i>	2
463	Micro-Pak Low Flow Pulse Output Cutoff <i>Note: This code applies to STD-15 and above firmware.</i>	2
464	Flow Sensor Tube Material <i>Note: This code applies to STD-15 and above firmware.</i>	2
465	Flow Sensor Model <i>Note: This code applies to STD-15 and above firmware.</i>	2
466	Mass Compensation Factor <i>Note: This code applies to STD-18 and above firmware.</i>	2
467	MicroPak Drive Alarm Timer <i>Note: This code applies to STD-20 and above firmware</i>	2
468-499	Unassigned at Present	
<b>500</b>	<b>Pressure Directory</b>	<b>1,2</b>
501	Minimum Back Pressure Timer	1,2
501	Minimum Back Pressure Flow Rate	1,2
502	Differential Pressure	1,2
503	Minimum Back Pressure Timer	1,2
504	BP Reduction	1,2
505	Low Pressure Alarm	1,2
506	High Pressure Alarm	1,2
507-539	Unassigned at Present	
540	Protection of Program Codes 580-589	1,2
541	Pressure Units	1,2
542	Minimum Pressure Units	1,2
543	Maximum Pressure Units	1,2
544	Compressibility Factor	1,2
545	Maintenance Pressure	1,2
546	Low Vapor Pressure (P1)	1,2

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547	Low Product Vapor Pressure (P2) Temperature	1,2
548	Middle Vapor Pressure (P2)	1,2
549	Middle Product Vapor (P2) Temperature	1,2
550	High Vapor Pressure (P3)	1,2
551	High Product Vapor (P3) Temperature	1,2
552	Vapor Pressure Calculation <i>Note: AccuLoad II-STD Revision 5 firmware and above.</i>	2
553-599	Unassigned at Present	
<b>600</b>	<b>Read Only Directory</b>	<b>1,2</b>
601	Raw Non-resettable Totals	1,2
602	Gross Non-resettable Totals	1,2
603	Gross at Standard Temperature Non-resettable Totals	1,2
604	Net Non-resettable Totals	1,2
605	Mass Non-resettable Totals	1,2
606	Load Average Temperature	1,2
607	Load Average Pressure	1,2
608	Load Average Density	1,2
609	Load Average Meter Factor	1,2
610	Local Storage Transactions	1,2
611	Additive Injector #1 Non-resettable Totals	2
612	Additive Injector #2 Non-resettable Totals	2
613	Additive Injector #3 Non-resettable Totals	2
614	Additive Injector #4 Non-resettable Totals	2
615-639	Unassigned at Present	
640	Protection of Program Codes 680-689	1,2
641-699	Unassigned at Present	
<b>700</b>	<b>Communications Directory</b>	<b>1,2</b>
701	EIA-232 Communication Type	1,2
702	EIA-232 Communication Control	1,2
703	EIA-232 Baud Rate	1,2
704	EIA-485 Communication Type	1
704	EIA-232 Data Format	2
705	EIA-485 Communication Control	1
705	EIA-485 Communication Type	2
706	EIA-485 Baud Rate	1

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706	EIA-485 Communication Control	2
707	Communication Address	1
707	EIA-485 Baud Rate	2
708	Printer Output Message #1	1
708	EIA-485 Data Format	2
709	Printer Output Message #2	1
709	Communication Address	2
710	Printer Output Message #3	1
710	Printer Output Message #1	2
711	Printer Output Message #4	1
711	Printer Output Message #2	2
712	Printer Output Message #5	1
712	Printer Output Message #3	2
713	Prompt Message #1	1
713	Printer Output Message #4	2
714	Prompt Message #2	1
714	Printer Output Message #5	2
715	Prompt Message #3	1
715	Prompt Message #1	2
716	Prompt Message #4	1
716	Prompt Message #2	2
717	Prompt Message #5	1
717	Prompt Message #3	2
718	Meter ID	1
718	Prompt Message #4	2
719	Product Description	1
719	Prompt Message #5	2
720	HM Classification	1
720	Meter ID	2
721	HM Classification	1
721	Product Description	2
722	HM Classification	1
722	HM Classification	2
723	Shared Printer Out Alarm	1
723	HM Classification	2

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724	Shared Printer Out Timer	1
724	HM Classification	2
725	Shared Printer Out Security Select	1
725	Delivery Report <i>Note: AccuLoad II-STD Revision 9 firmware and above.</i>	2
726	Shared Printer Security Alarm	1
726	Delivery Report Display <i>Note: AccuLoad II-STD Revision 9 firmware and above.</i>	2
727-739	Unassigned at Present	
740	Protection of Program Codes 780-789	1,2
741	Communication Link Programming	1,2
742	Communications Time-out	1,2
743	Communications Alarm Mode	1,2
744	Prompt Time-out	1,2
745	Prompt Data Entry #1	1,2
746	Prompt Data Entry #2	1,2
747	Prompt Data Entry #3	1,2
748	Prompt Data Entry #4	1,2
749	Prompt Data Entry #5	1,2
750	Start Key Enable/Disable	1,2
751	Shared Printer Out Alarm	2
752	Shared Printer Out Timer	2
753	EIA-232 Printer Security	2
754	EIA-485 Printer Security	2
755	Shared Printer Security Alarm	2
756	Volumes to be Printed <i>Note: AccuLoad II-STD Revision 4 firmware and above.</i>	2
757	Load Averages to be Printed <i>Note: AccuLoad II-STD Revision 4 firmware and above.</i>	2
758	Additive Volumes to be Printed <i>Note: AccuLoad II-STD Revision 4 firmware and above.</i>	2
759	Define Delivery Report <i>Note: AccuLoad II-STD Revision 9 firmware and above.</i>	2
760	Programmable Message #1 <i>Note: AccuLoad II-STD Revision 16 firmware and above.</i>	2
761	Programmable Message #2 <i>Note: AccuLoad II-STD Revision 16 firmware and above.</i>	2
762	Volumetric Totals Printed Resolution <i>Note: This code applies to STD-22 and above firmware.</i>	2

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763-779	Unassigned at Present	
780	Number of Prompts	1,2
781	Print Transaction	1,2
782	Prompts Printed	1,2
783-799	Unassigned at Present	
<b>800</b>	<b>Inputs &amp; Outputs Directory</b>	<b>1,2</b>
801	Additive Injector #1	1
801	Permissive Sense #1	2
802	Additive Injector #2	1
802	Restart After Permissive Sense #1 Met	2
803	Additive Injector #3	1
803	Permissive Sense #1 Message	2
804	Additive Injector #4	1
804	Permissive Sense #2	2
805	Additive Injector Stop	1
805	Restart After Permissive Sense #2 Met	2
806	Manual/Auto Additive Injector	1
806	Permissive Sense #2 Message	2
807	Additive Injector Output	1
807	Restart After Valve Power Restored	2
808	Permissive Sense #1	1
808	Valve Power Sense Permissive Message	2
809	Permissive Sense #1 Message	1
809	Prompt Message (Ticket Tray)	2
810	Permissive Sense #2	1
811	Permissive Sense #2 Message	1
812	Valve Power Sense Permissive Message	1
813-839	Unassigned at Present	
840	Protection of Program Codes 880 to 889	1,2
841	Additive Injector #1 Feedback	2
842	Additive Injector #1 Volume	2
843	Additive Injector #2 Feedback	2
844	Additive Injector #2 Volume	2
845	Additive Injector #3 Feedback	2

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846	Additive Injector #3 Volume	2
847	Additive Injector #4 Feedback	2
848	Additive Injector #4 Volume	2
849	Additive Injector Units	2
850	Additive Injector Feedback Errors	2
851	Additive Injector #1 Feedback Delay	2
852	Additive Injector #2 Feedback Delay	2
853	Additive Injector #3 Feedback Delay	2
854	Additive Injector #4 Feedback Delay	2
855	Additive Injector #1 Address <i>Note: Applies to Rev. 16 and above firmware.</i>	2
856	Additive Injector #2 Address <i>Note: Applies to Rev. 16 and above firmware.</i>	2
857	Additive Injector #3 Address <i>Note: Applies to Rev. 16 and above firmware.</i>	2
858	Additive Injector #4 Address <i>Note: Applies to Rev. 16 and above firmware.</i>	2
859	Additive Alarm Action <i>Note: Applies to Rev. 16 and above firmware.</i>	2
860	Additive Alarm Message <i>Note: Applies to Rev. 16 and above firmware.</i>	2
861	Additive Totals Units <i>Note: Applies to Rev. 16 and above firmware.</i>	2
862-879	Unassigned at Present	
880	Additive Injector #1	2
881	Additive Injector #2	2
882	Additive Injector #3	2
883	Additive Injector #4	2
884	Additive Injector Stop	2
885	Manual/Auto Additive Injector	2
886	Additive Injector Output	2
887	Additive Injector Stop Volume <i>Note: Applies to Rev. 16 and above firmware.</i>	2
888-889	Unassigned at Present	
890	Additive System and Pacing <i>Note: Applies to Rev. 16 and above firmware.</i>	2
891-899	Unassigned at Present	
<b>900</b>	<b>Diagnostics Directory</b>	<b>1,2</b>

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901	Diagnostic - Display Test	1,2
902	Diagnostic - Keypad Test	1,2
903	Diagnostic - RTD Test	1,2
904	Diagnostic - 4-20 mA Channel 1	1,2
905	Diagnostic - 4-20 mA Channel 2	1,2
906	Diagnostic - Internal Temperature	1,2
907	Diagnostic - Power Supply Test	1,2
908	Diagnostic - CRC Test	1,2
909	Diagnostic - AccuLoad II Model Number	1,2
910	Diagnostic - ACM Model Number	1,2
911	Diagnostic - System Messages <i>Note: STD-05 and above firmware.</i>	2
912	Diagnostic - Micro-Pak Revision Number Display <i>Note: This code applies to STD-15 and above firmware.</i>	2
913	Diagnostic - Micro-Pak Magnitude Display <i>Note: This code applies to STD-15 and above firmware.</i>	2
914	Diagnostic - Micro-Pak Drive Display <i>Note: This code applies to STD-15 and above firmware.</i>	2
915	Diagnostic - Micro-Pak Tube Clock Period Display <i>Note: This code applies to STD-15 and above firmware.</i>	2
916	Diagnostic Calibration Event Counter <i>Note: STD-19 and above firmware.</i>	2
917	Diagnostic Configuration Event Counter <i>Note: STD-19 and above firmware.</i>	2
918-939	Unassigned at Present	1,2
940	Protection of Program Codes 980-989	
941	Diagnostic - Communication Test EIA-232 No Echo Back	1,2
942	Diagnostic - Communication Test EIA-232 With Echo	1,2
943	Diagnostic - Communication Test EIA-485 No Echo Back	1,2
944	Diagnostic - Communication Test EIA-485 With Echo	1,2
945	Diagnostic - SINGL CH-INV-1X-ACT-U	1,2
946	Diagnostic - SINGL CH-INV-2X-ACT-U	1,2
947	Diagnostic - DUAL CH-INV-1X-ACT-U	1,2
948	Diagnostic - DUAL CH-INV-1X-ACT-U	1,2
949	Diagnostic - DUAL CH-INV-2X-ACT-U	1,2
950	Diagnostic - DUAL CH-INV-1X-ACT-U	1,2
951	Diagnostic - DUAL CH-INV-1X-ACT-D	1,2

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952	Diagnostic - Contact Input Test	1,2
953	Diagnostic - High-Speed Prover	1,2
954	Diagnostic - Ticket Printer #1 Test	1,2
955	Diagnostic - Clear Local Storage	1
955	Diagnostic - Ticket Printer #2 Test	2
956	Diagnostic - Clear Local Storage	2
957	Diagnostic - Contact Output Test <i>Note: AccuLoad II-STD Revision 5 firmware and above.</i>	2
958	Diagnostic - Clear Configurable Report <i>Note: AccuLoad II-STD Revision 10 firmware and above.</i>	2
959	Diagnostic - Zero the Micro-Pak <i>Note: This code applies to STD-15 and above firmware.</i>	2
960	Diagnostic - Display/Set Tare for the Micro-Pak <i>Note: This code applies to STD-15 and above firmware.</i>	2
961-990	Unassigned at Present	
991	Diagnostic - Relay Test	1,2
992	Diagnostic - RAM Test	1,2
993	Diagnostic - Power-up	1,2
994	Diagnostic - See Service Manual	1,2
995	Diagnostic - See Service Manual	1,2
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**Table 1. Command Code Summary**

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## Section VII – Related Literature

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

### **AccuLoad II-STD**

Specifications .....	Bulletin SS06012
Installation .....	Bulletin MN06037
Operator Guide .....	Bulletin MN06041
Operator Reference (Release 1) .....	Bulletin MN06038
Operator Reference (Release 2) .....	Bulletin MN06050L
Program Workbook (Release 1) .....	Bulletin AB06023
Program Workbook (Release 2) .....	Bulletin AB06029
Communications .....	Bulletin MN06040L

### **Load Printer**

Specifications .....	Bulletin SS06004
Installation/Operation .....	Bulletin MN06010
Service Bulletin MN06009	

### **Valves**

Model 210 Specifications .....	Bulletin SS03009
Model 210 Installation/Operation .....	Bulletin MN03010
Model 215 Specifications .....	Bulletin SS03010
Model 215 Installation/Operation .....	Bulletin MN03006
Model 215 Service .....	Bulletin MN03007

Revisions included in MN06041 Issue/Rev. 1.2 (6/99):  
Added Program Codes 146, 367, 467, and 762 in Section V  
Converted document from WordPerfect to Word format  
Incorporated Updates MN06041U7, MN06041U8, MN06041U9, MN06041U10

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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#### **Headquarters:**

1803 Gears Road, Houston, TX 77067 USA, Phone: 281/260-2190, Fax: 281/260-2191

#### **Gas Measurement Products:**

**Erie, PA USA** Phone 814/898-5000  
**Thetford, England** Phone (44) 1842-82-2900  
**Kongsberg, Norway** Phone (47) 32/286-700  
**Buenos Aires, Argentina** Phone 54 (11) 4312-4736

#### **Liquid Measurement Products:**

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**Slough, England** Phone (44) 1753-57-1515  
**Ellerbek, Germany** Phone (49) 4101-3040  
**Barcelona, Spain** Phone (34) 93/201-0989

**Moscow, Russia** Phone (7) 495/564-8705  
**Melbourne, Australia** Phone (61) 3/9807-2818  
**Beijing, China** Phone (86) 10/6500-2251  
**Singapore** Phone (65) 6861-3011  
**Chennai, India** Phone (91) 44/450-4400

#### **Integrated Measurement Systems:**

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**Kongsberg, Norway** Phone (47) 32/286-700  
**San Juan, Puerto Rico** Phone 787/274-3760  
**United Arab Emirates, Dubai** Phone 971 +4/331-3646

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