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Specification Overview

The Smith Electronic Crude Oil Gathering System consists of three components: a TCP cab-mounted flow computer, an optional transceiver for RF communications, and the routing and dispatch data processing software. The heart of the system is the TCP-CO microprocessor-based flow computer, specifically designed for the custody transfer of crude oil at production lease sites. The TCP-RAD data processing software is a Windows-based application designed to streamline and organize the routing and dispatch of tank trucks for crude oil gathering tank collection operations. The optional transceiver transmits data between the TCP-RAD and TCP-CO.

The Smith TCP-CO is a microprocessor-based, fully programmable, electronic truck-mounted computer designed for the recording of crude oil transported by truck between oil tank (producer) and pipeline, which is considered a custody transfer.

This manual describes the installation, operation, and program mode operations for the TCP-CO. It defines in detail the mounting configurations for the mass meter, as well as the various menus and sub-menus in the Main and Program Mode menus. It also defines in detail the hardware keypad interface; how to enter the Program Mode; and how to make numeric, option, and alphanumeric entries into the TCP-CO.

Keypad Interface

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

0 - 9	Used to enter access codes, parameters, and data entries.
ARROW	(←↑→↓) Used to locate the display cursor on a numeric or option parameter that requires programming. Used to select alphanumeric characters from a list to form a text entry.
CLEAR	Used for clearing incorrect entries, getting from a program code to the directory, and for getting to an exit point.

ENTER	Used to enter a selection from a list indicated by a cursor on the menu, and to enter data into memory.
NEXT	If there are more parameters and menus than are currently shown on a display, MORE... will appear at the bottom of the display. Pressing the NEXT key will allow the operator to view these remaining entries, one display at a time. NEXT scrolls through all defined stops in operations mode.
MENU	Used to display the main directory of the program mode if in program mode; otherwise, used to display the main menu.
START	Not used in program mode; used to initiate truck loading in operations mode.
STOP	Used to set the security level for a programmed parameter in program mode. In operations mode, STOP will terminate loading.
+/-	Used to change the sign on numeric entries.
./PRINT	This dual-function key serves as a decimal point entry key in the program mode. In operations mode, it is used to end the load and print a receipt.
F1	Function key, performs various functions undefined by other keys.
F2	Function key, performs various functions undefined by other keys.

TCP-RAD System Requirements

The TCP-RAD will operate on IBM PC-compatible (386 or better) computers operating in a Windows environment (3.0 or later) with at least 2 M of memory and one 3-1/2" floppy disk drive. The hard drive should have at least 3 M of free disk space.

The installation section of this manual describes the requirements for installing the TCP-CO crude oil gathering system on a truck. The TCP-CO system includes the ST Mass Meter, a Flow Switch, the TCP-CO electronics and the transceiver (if using RF communications). The mass meter and the Flow Switch are mounted on the back of the truck cab as shown in Figure 4. The TCP-CO electronics is mounted inside the truck cab and the RF Transceiver (if used) is mounted in the control room (non-hazardous conditions).

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication.

This equipment has been shipped with all accessories, approved by Smith Meter, that are necessary for proper operation. Changes or modifications to the equipment not expressly approved by Smith Meter could void the user's authority to operate the equipment.

Operation of this equipment in a residential area or operating non-approved modified equipment is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

It is the user's responsibility to ensure that the intended application and location of this equipment is non-hazardous (ordinary location). Ensure that all national and local codes are observed.

Mechanical

The mechanical installation of the system involves four parts: the electronics, the meter, the meter support and the Flow Switch.

Electronics

Installation of the TCP-CO

1. Locate the TCP-CO unit in the truck cab where it is easily accessible for wiring using the hardware provided.
2. If using the optional RF communications to communicate with the control room, the TCP-CO should be located so that it is on a "line of sight" path to the transceiver.
3. For details on the wiring of the unit, see Figure 6.

Installation of the RF Transceiver (optional)

The RF Transceiver, if used, should be located next to the computer in the control room. If the radio frequency communications is not used, a communication line can be wired from the TCP-CO to the computer. When using the radio frequency communications the transceiver should be located so that there is a line of sight between the transceiver and the TCP-CO unit. The maximum communication distance for the RF communications is 100 feet.

1. Locate the AC power adapter and shielded serial cable supplies with the RF Transmitter.
2. Position the RF Transceiver in a "line of sight" path to the TCP-CO location.
3. Plug the AC power adapter into the power jack on the rear of the RF Transmitter.
4. Connect the RF Transmitter to the control room PC using the shielded serial cable.
5. Plug the AC power adapter into a 110 Vac outlet.
6. Verify that the "POWER" LED on the front of the RF Transceiver is on.
7. Turn on the PC and verify that the computer starts properly.
8. Installation of the RF Transceiver is complete.

Note: A "line of sight" path is usually a visual path between the antenna of the RF Transmitter and the truck. If the building is a metal structure or metal was used in the framing of the building, then the RF Transmitter will work best when placed in a window. The window should not have an embedded metal safety grid. This type of window will significantly reduce the effective range of communications.

Section II - Installation

Meter

1. The meter should be mounted to the truck frame as shown in Figure 4, Meter Mounting.
2. The mounting support and piping as shown in Figure 5 is supplied as a system with the metering package. The assembly should be mounted to the truck frame so that it is two inches above the frame. When this two-inch space has been established, the truck frame and angles supplied should be drilled and bolted to the frame. See figures 5 and 6.
3. Parts that are supplied as part of the meter installation kit are as follows:
 - 1 - Mounting support
 - 2 - 1/2-inch angle mounts
 - 1 - 2 inch ST Mass Meter
 - 1 - Flow Switch Model Q-5SS
 - 4 - Mounting Bolts (angle mounts to support)
 - 8 - Mounting Bolts (mounting ST Mass Meter to support)
 - 2 - Gaskets
 - 1 - Spanner wrench for meter electronics
 - 1 - 1/2" pipe plug
 - 1 - 1/2" NPT street elbow
4. Mount the ST Mass Meter as shown in Figure 4. (See Figure 7 for wiring.)

Flow Switch

1. The Flow Switch is to be mounted in the one-inch threaded on the downstream side of the meter. The arrow on the bottom of the Flow Switch casting indicates the direction of flow. Turn the Flow Switch until tight and the arrow on the body casting is pointed in the direction of the flow.
2. The gasket seal located between the main body casting and the lid casting is a Teflon composition which is subject to a slight creep for a short period after the application of the initial clamping load. All gaskets are properly clamped before shipment; however, during shipping and storage the gaskets may compress, allowing the body-lid clamp bolts to become slightly loose. Tighten these bolts before assembling the flow switch in the system. No further creep of the gasket will occur after the second tightening.

TCP-RAD Installation

To install the TCP-RAD computer program:

1. Insert the TCP-RAD diskette into the 3-1/2" floppy drive.
2. From the Program Manager, click on FILE or hold down the ALT key and type "F" to select FILE.
3. Type "R" or click on RUN to select RUN.
4. On the command line, type A:\setup and press ENTER or click on OK. If not using the A drive, replace "A" with the letter of the drive containing the TCP-RAD installation disk.
5. The next screen will display the TCP-RAD name and Smith Meter logo in the upper left-hand corner, with the box on the next page in the center.

The Source Drive is the drive that is being used to load the TCP-RAD computer program. If installing from the diskette, the source drive would be A: or B:. If the files were copied to a hard drive, the selections will allow the choice of the hard drive designations.

The Destination Drive is the drive that the program is to reside on and run from.

Install to Directory: The directory on the computer under which the program will be installed. The default is TCP-RAD. If a different directory is desired, the default can be changed. Using either the mouse or the TAB key, move the cursor to this location and rename the directory.

Space Required: The number of free bytes required to load the program.

Space Available: The number of free bytes available on the drive that has been selected for loading the program.

6. The buttons on the right-hand side of the window are used to install the program, remove the program from the computer, or cancel the installation of the program.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication.

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