



**Manual**  
**Field Test Unit**  
**Model 6401**

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## 1. INTRODUCTION

The UNIDATA Field Test Unit, (FTU) model 6401B, is now supplied standard with a FTU-PROM inserted in the 28 pin DIL socket at the rear of the machine. It replaces the memory extension chips (8kB - 32kB).

The UNIDATA FTU-PROM device (Field Test Unit Programmable Read Only Memory chip) was written to enable the Field Test Unit to perform its main function - that of acting as a unit in the field that allows you to examine and change the values in the logger's memory. The FTU PROM samples 14 bytes from the logger once every logger cycle (5 seconds), so that changing values (such as the clock) may be seen. To do this the FTU must be plugged into the logger using the model 6602E PDL/FTU cable (8000 baud) cable. If the cable is not plugged in then the PROM will not display any values indicating that the FTU is unable to communicate with the logger.

### 1.1. Features

FTU-PROM is capable of displaying the logger memory in many formats and sizes. To be flexible in actual use, a number of special features have been included:

#### **1.1.1. Selectable or User defined display formats including**

- Eight Digit Raw Data Display
- Unidata Model Instrument Specific Displays
- User Definable Instrument Displays, (scaling available)

#### **1.1.2. Single Touch Command Keys**

These include commands to:

- Step through the logger memory
- Display Time
- Redraw the display
- Move to Memory Blocks Locations
- Alter the FTU baud rate
- Select Instruments for the logger input
- Turn the FTU to communication mode
- Reset the logger

- Display direct information from the logger (i.e. real-time)

### **1.1.3. Permanent Program Storage**

Being a PROM the FTU-PROM program is both incorruptible and cannot be lost. If the FTU locks up during program execution or battery power is lost the program can be restarted by simply turning the FTU off and then on.

### **1.1.4. Dedicated Operation**

The PROM is set up to begin operation at power up. However if the Canon is not required for FTU work but rather BASIC the FTU -PROM can be cancelled by pressing the ON/BREAK key.

## 2. COMMANDS

### 2.1. Display Format

The display of the FTU has three formats available. These formats can be selected at the touch of a button. Normally as many bytes as possible are displayed on the screen at all times. For example - if you were displaying the contents of the logger memory as single bytes then four bytes could be displayed per screen line, making a total of eight bytes displayed (only the top two lines of the display are used for display purposes).

The three formats available are:

#### 2.1.1. Eight byte display of the loggers current memory values

In this format the values are not scaled and as displayed as a number from 0-255. Eight values are displayed across the screen and they represent the current selected memory address location followed by the successive seven memory locations. The current memory location can be changed using keystrokes outlined later. This display format is the default when the FTU is first powered up and the logger connected.

#### EXAMPLE:

When first powered up and connected the FTU will display the following (or similar):

```
10 3 0 0
X 44 0 0
Address = 0
```

The '10' is the version of logger connected. (Memory location 0)

The '3' is the runtime of the program in the logger. (Memory location 1)

The '0's' are memory locations not used.

The 'X' represents a value that will change on your screen. This is Memory Location 4 and is where the logger shows the current clock value.

The '44' is also a changing value and is related to your loggers clock value (Memory Location 6) [See Hardware Supple-

ment 6200 for further details of the logger's memory locations].

### 2.1.2. One to Fifteen digit scaled display including appropriate Instrument/Transducer unit/s

This format is selected by clearing the display, [press SHIFT-HOME/CLR] and then pressing "I" on the keyboard. The FTU will then prompt you for the suitable UNIDATA model number. (See Model Number listings later in this manual). After entering the appropriate Model number the FTU will then prompt you with a description of the standard input channel/s for the instrument. If your instrument is connected in the standard Unidata fashion or has not been modified then press Return through the prompts. If your instrument is not standard then enter the appropriate channel over the standard one. The FTU will then respond thus:

**EXAMPLE:** (Red Thermistor Probe 6507A connected)

24C  
Address = 16

As shown the unit of each transducer is given after the scaled logger value. This value needs no further mathematical conversion.

### 2.1.3. User Defined Screen Format

This screen format allows the user to set up and save a custom designed format for a specific application. This routine is initialised by pressing the "E" key. The FTU will then prompt the user to enter in:

1. Offset, this is to select the chosen memory byte to be displayed or altered. Up to 12 bytes can be displayed on the screen at one time.

If an offset larger than 11 is chosen then previous bytes must be removed to make room for the chosen byte. This feature allows the user to skip over certain bytes and yet display others.

2. Bytes, this entry is used with certain instruments which require a 2 bytes to send all data to the logger, (i.e. Hi-Res Interface, Water Level Instrument). Most raw data instruments require only one byte. To display time in the format a 4 byte input is required.
3. Formula, this entry allows the user to select a defined formula from a list of pre defined formulas or to display the raw logger value.

Select the appropriate formula for your application from the list below:

Keystroke	Function
None	Do not display this entry
N	None - Do not use any formula on this entry
R	Red - Red thermistor formula (6507A)
Y	Yellow - Yellow thermistor formula (6507B)
V	Violet - Violet thermistor formula (6507C)
D	Direction - Use the wind direction formula
S	Use the soil moisture formula (6513A)
F	Full scale - User defined full scale entry
H	Hi-Res Entry is a 2's compliment 13 bit value
T	Time - Decode the entry as a date and time

If formulas RYVS have been selected then the FTU will respond with a prompt for the user to enter the value of the reference resistor used with the transducer.

If the formulas FH have been selected then the FTU will prompt with a line "Min value?". The minimum desired value for the scaling should then be entered. The FTU will then prompt with "Max Value?". The maximum desired value for the scaling should then be entered. The FTU will now only display values from the minimum to maximum for the selected memory location/s.

After responding to the above prompts the FTU will prompt

"Using #####"

This is a feature that enables the FTU to custom format the decimal structure and units for the displayed value.

**EXAMPLE:**

By typing the following to the USING prompt

"##.# Celsius"

The FTU will display the memory value in the format

"34.4 Celsius"

If the screen is cleared beforehand, (SHIFT-HOME), this will be the only information displayed by the FTU.

For further information on "PRINT USING" see the Canon X-07 "Basic Reference Manual" page 92.

## 2.2. Memory Addressing

There are three ways to address memory within the logger using FTU-PROM:

- a. Block number ("B")
- b. Location from start of current Block ("L")
- c. Absolute address ("A")

## 2.3. Cursor Keypad

Using the direction keys, the display may be shifted forward and backward by one value, or by a given screen step. The screen step (STEPSIZE) is usually set to one whole screen, calculated considering the size and mode that is in effect.

The default STEPSIZE can be set by pressing "S". The FTU will then respond "Step size?". The entered number will be the resultant number of memory locations that the display will skip forward or backwards to when the Up arrow or Down arrow is pressed.

This step size can be saved in a screen format file.

The SPACEBAR will reset the screen to its initial state.

## 2.4. Screen Format Files

The FTU-PROM has a feature that allows a custom designed screen format file. After designing a screen format using the "E" key the screen can be saved by pressing the "W" (write) key. The FTU will then prompt for a file name. After obtaining the file name the FTU will save the screen format and resume working. 350 Bytes of RAM are required for each screen set up. The screen formats and remaining memory can be viewed by pressing "F". To load in a new screen format press "R" followed by the filename of the desired screen format.

<p>Warning: Use of a filename containing the letters "FTU" may cause the FTU to lock up on power on.</p>
--

## 2.5. Commands To Modify Data Logger

The FTU-PROM has the ability to display and modify the data loggers memory. The appropriate commands and their functions are:

### 2.5.1. "P" - Put

This command allows the user to change the values of the loggers RAM memory. Up to eight values can be changed at one command by typing consecutive values separated by comma's.

#### EXAMPLE:

```
Press "P"
FTU responds "? "
Type 0,0,0,0
```

The value 0 will be entered in the RAM from the current address upwards. i.e. If the FTU was at address 128 the value 0 should appear in address 128 - 132.

### 2.5.2. "T" - TIME

This command enables the user to check and/or reset the logger's time and date. The Canon X-07's date and time **MUST** be set accurately for this procedure. If the Canon's time/date needs to be changed type "t" to reset it, (see below under X-07 Commands).

#### EXAMPLE:

```
Press "T"
```

FTU display responds:

```
10:58:28 10:45:21
87/05/29 87/05/28
logger canon
Press Return or Put
```

If the date on the logger side is as desired then press RETURN to exit. If not the press Put - "P" to set the logger's date to that of the Canon.

### 2.5.3. "d" - DISPLAY \*

This command causes the FTU to display current information from the logger on:

- Cycle time of the logger
- Log size (number of bytes used per log)

- Log interval in minutes and seconds
- Time of the first log, the number of logs made and the number of full days the logger has been recording

EXAMPLE:

```
Press shift-D ("d")
FTU display responds:
1 second logger
1 byte log size
1 min 0 second
log interval
First log at
12:09:00 87/05/29
3 logs 0 days
press RETURN
```

#### 2.5.4. "r" - RESET \*

This command resets the logger data storage to an original state. All data is lost and the logger starts logging immediately.

#### 2.5.5. "j" and "a" - JUMP TO LOG and ADDRESS toggle \*

These two commands are used together to view data in the logger memory. By pressing "j" the user can access specific logs. Selection of a log number will cause the FTU to display the logged data. Use of the cursor key pad will enable the user to move through the logs.

By pressing "a" the user can interchange the bottom line from an address display to that of the loggers time reading at each specific log. If the screen is cleared and set up prior to entering "j" then the FTU will display the logged data in actual units rather than raw bytes.

#### 2.5.6. "D" - DATA

This command will cause the FTU to prompt "Data Buffer (0-7)". After receiving the desired buffer number the FTU will then display information on that buffer pointer from the logger.

#### 2.5.7. "J" - JUMP to ADDRESS

Jump to address pointed to by the start, end or current pointer, (this information can be displayed by the above command). The user will be

required to enter in the desired buffer number (0-7). The user can select the current, end or start buffer by pressing "S"-start, "E"-end or "C"-current.

## **2.6. X-07 Direct Commands from FTU-PROM**

### **2.6.1. "t" - TIME**

To reset the X-07's internal clock/calendar type "t". The new date if required is entered by writing over the old date and then pressing "RETURN".

### **2.6.2. "F" - FREE**

This command will display all files held in RAM and available memory. (See X-07 manual for more details).

Pressing this key will return the X-07 to BASIC.

This command will allow the user to set the FTU's communication baud rate. The default is 8000 baud. Users of remote telemetry systems should consult their manual 6213 to decide on the correct baud rate if using a MODEM.

### **2.6.3. "s" - S300**

This command will cause the FTU-PROM to exit from normal communications with the logger and to assume a "dumb terminal" mode for communications with another terminal.

### **2.6.4. "x" - TRANSFER**

This command will allow the FTU to transfer files between itself and an IBM PC compatible using UNIDATA's PDL-FTU software version 1.5 or later. File transfer can be done in either direction. Once "x" has been pressed all commands take place from the PC. See software manual 6201 "STARLOG Software Manual" for further details.

## **2.7. Indirect and Miscellaneous Commands**

### **2.7.1. "H" - HELP**

Press "H" to view a list of all FTU-PROM commands.

### **2.7.2. "@" - INDIRECT JUMP**

Jump to the address pointed to by first 2 bytes on the screen.

### 3. SUMMARY OF COMMANDS

KEY	FUNCTION
Right arrow	Step Forward 1 byte of logger memory
Left arrow	Step Backward 1 byte of logger memory
Down arrow	Step Forward STEPSIZE bytes of logger memory
Up arrow	Step Backward STEPSIZE bytes of logger memory
S	Set the value of STEPSIZE
A	Move to a new ADDRESS of logger memory
B	Move to a new BLOCK of logger memory
L	Move to a new LOCATION within the current block
p	to the ADDRESS pointed to by the 1st 2 bytes on the screen
T	Display and set logger TIME and DATE
t	Set FTU time and date
Spacebar	Reset the FTU screen to initial state
HOME	Clear and redraw the current screen
CLR	Clear (Shift/Home) the current screen of all entries and instruments
H	Display HELP file
Q	Quit and go to BASIC
I	Select or add an instrument to the current display screen Enter the catalog number of instrument followed by the input channel of each instrument.
E	Define an entry in the current display screen (See User Defined Screen Format)
W	Write (Save) the current screen setup
R	Read a previously saved screen setup
F	Display list of current screen setups (and remaining space for new setups)

Table continued on next page.

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P	Put data into logger memory
D	Display current data buffer pointers
J	Jump to address pointed by the (S)tart, (E)nd or (C)urrent pointer
s	Set FTU to direct communication mode.
b	Set or change FTU communication baud rate
x	Transfer programs between an IBM and X-07 using PDLFTU software
j	jump to a specific log entry *
a	toggle ADDRESS display to TIME of current log entry*
r	RESET the logger ready for another recording session* ** ALL RECORDED DATA WILL BE LOST **
d	Display logger information on: Cycle time Log size Log interval Time of first log, number of logs made and the number of full days the logger has been recording.*

Footnote: \* indicates commands that require the logger to be programmed with IBM software package V#1.8 or later.

## 4. INSTALLATION AND MEMORY EXPANSION GUIDE

### 4.1. Installation and Initialisation of FTU-PROM

If your FTU has not come from the factory ready fitted with the FTU-PROM then you will need to fit and initialize the FTU.

To do this the PROM needs to be inserted into the memory expansion socket at the rear and the X-07 set up.

1. Remove the Memory Extension Cover from the back of the X-07 by removing the single screw and lifting of the small grey plastic cover. A chip socket should then be visible. Place the FTU-PROM in this socket ensuring that the notch in the chip lines up with the notch in the socket. Firmly push the chip into the socket taking care not to bend any legs.

CAUTION: THIS PROM IS A STATIC SENSITIVE DEVICE. AVOID TOUCHING THE LEGS OR EXPOSING TO STATIC CHARGES

2. Ensure that the RAM/ROM switch is set RAM.
3. Turn the FTU on
4. Type in RUN "FTU" (The FTU will switch itself off again)
5. Initialisation is now complete

The FTU will begin operation whenever turned on.

The START\$ and KEY\$ functions can be used to customize the FTU operation for your application (See BASIC reference manual).

### 4.2. Memory Expansion

The only method currently available to expand the FTU-PROM version of the Canon X-07 is to use the memory expansion card slot fitted to the back of the FTU. This will add another 8k of memory.

Fit the card as per the manufacturers instructions. If it does not operate correctly then remove it and the FTU-PROM. Reset the Canon X-07. Refit the Memory Card, initialize it and then fit the FTU-PROM.

## 5. INSTRUMENT LIST

The following Instruments are supported by the FTU-PROM and are selectable by pressing "I".

UNIDATA MODEL	DESCRIPTION
6504A	Weather Instrument - Windspeed & Direction
6504C	as above - plus Temperature and G. Radiation
6504D	as above - plus Humidity
6504E	Weather Instrument - Wind/Dir/Temp/Hum
6505B	Weather Instrument - Temperature
6505C	as above - plus Global Radiation
6505D	as above - plus Humidity
6505E	Weather Instrument - Temp & Humidity
6506A	Rainfall 0.2 mm Tipping Bucket Gauge
6507A	RED Thermistor Probe
6507B	YELLOW Thermistor Probe
6507C	VIOLET Thermistor Probe
6508A	1 metre Water Depth Probe
6508B	5 metre Water Depth Probe
6508C	10 metre Water Depth Probe
6508D	20 metre Water Depth Probe
6509B	64 metre Water Level Instrument
6513A	Soil Moisture Probe
6521A	0.5 metre Capacitive Water Depth Probe
6521B	1.0 metre Capacitive Water Depth Probe
6521C	2.0 metre Capacitive Water Depth Probe