

User's Guide Model 1001



NOTICE - IMPORTANT

TED MODEL 1001 OPERATIONAL LIMITATIONS

- TED Model 1001 is only suitable for use on 120/240V single-phase 60Hz services
- TED Model 1001 is only suitable for services of 200 AMPS or less. (For 400 amp service, see website for details on TED Model 1002)
- TED Model 1001 is only suitable for use with services with a single service disconnect (For services with two disconnects, see website for details on TED Model 1002)
- TED Model 1001 is only suitable for services with maximum 350 MCM Conductors
- TED Model 1001 RDU is only approved for use with the following TED accessories:
 - TED Model 1001 MTU (Measuring Transmitting Unit)
 - TED Model QX 200-CT (Current Transformers)

Use with any other product will void warranty, and may cause an electrical or fire hazard.

SAFE OPERATING RANGE AND CONDITIONS:

	RDU	MTU	CT's
Use	Indoor/Dry	Indoor/Outdoor Dry	Indoor/Outdoor Dry
Temperature	10° - 40°C	5° - 40°C	5° - 40°C
Relative Humidity	< 80%	< 90%	< 90%
Altitude	< 3,000M	< 3,000M	< 3,000M
Voltage	100-130 V	100-130 V	100-600 V

If any of the following are true, this version of TED **WILL NOT** work:

- If you have a 3-Phase service, TED Model 1001/1002 **WILL NOT** work.
- If you have 230V 50Hz service typical in most areas outside North America, TED Model 1001/1002 **WILL NOT** work.
- If your main circuit breaker or fuse panel is larger than 200 Amps, TED Model 1001 **WILL NOT** work. If it is 400Amps or less, TED Model 1002 is suitable.
- If you have more than one main circuit breaker or switch, TED Model 1001 **WILL NOT** work. If you have 2 Main Circuit Breakers of 200Amps each, TED Model 1002 is suitable.
- If your main service circuit conductors (wires) are larger than 1-inch in diameter, TED Model 1001/1002 **WILL NOT** work.
- Other TED models will be available soon for these applications. Please see our web site for details.

User's Guide

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Detailed Installation Instructions are included in your purchase. To see a typical installation diagram please see our website: www.theenergydetective.com

TED User's Guide

PART I – INTRODUCTION

TED is a new and innovative product designed to provide residential and small business owners with up-to-the-minute energy use and cost information. Electricity is one of the few products we purchase, for which we don't know the cost until weeks after we have used it. Until the development of TED, you would only find out the actual cost of the electricity purchased after the bill arrived in the mail...far too late to do anything about it.

TED is an extremely accurate, precision device. It is calibrated to be accurate to within 2%. Certain factors, however, such as the date and time the utility meter is read, the distance between the utility meter and electric panel, as well as other variables may result in monthly totals recorded by TED being slightly different than those measured by your electric utility. Therefore TED may never exactly match your utility bill.

TED displays real-time energy use and cost information in an easy-to-read and understand format.

- Current energy consumption in kilowatts (kW).
- Current energy cost in dollars and cents per hour (\$/hr).
- Energy consumed so far today in kilowatt-hours (kWh).
- Energy cost so far today in dollars and cents (\$).
- Energy consumed so far this billing cycle in kWh.
- Energy cost so far this billing cycle in \$.
- Projected energy use for current billing cycle in kWh.
- Projected energy cost for current billing cycle in \$.
- Peak electrical demand so far this billing cycle in kW.
- Peak use so far this billing cycle in \$/hr
- Current voltage in Volts (V)
- Minimum voltage this billing cycle in Volts (V)
- Maximum voltage this billing cycle in Volts (V)
- Current Energy Rate (Tariff) in dollars and cents per kilowatt hour \$/kWh
- Current Date & Time
- Timer
- Alarms
- Historical Data for 13 months

TED transmits energy data from the main electric service panel to the display unit over existing power lines, thus no new wiring is required. **TED measures true RMS energy use.**

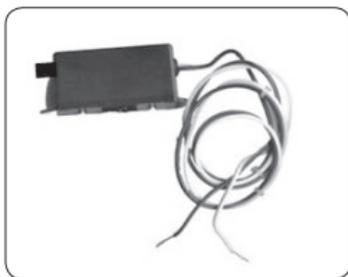
Unpacking

Unpack TED and insure that all parts are included in the package.

a) One (1) Model 1001 Receiving Display Unit (RDU) - The unit comes with the angled stabilizing stand attached, so it will sit in a viewable position on any counter top; for flush or wall mounting, the stabilizing stand can be easily removed for wall-mounting.



b) One (1) Model 1001 Measuring Transmitting Unit (MTU)



c) Two (2) Model QX200CT Current Transformers (CT's)

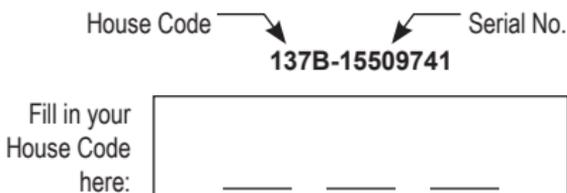


d) Detailed Installation Manual / Instruction Manual - Please Read Carefully

e) Warranty Card

SETTING THE HOUSE CODE

NOTE: TED's display unit can possibly receive data from other TED MTU's connected to the secondary side of the same utility transformer. To guard against reading your neighbor's electricity use, each MTU has a House Code from 000 to 255. This number can be found in two places: on a sticker on the MTU, and on a sticker included loose with the MTU. Place this sticker on the outside of the panel for future reference. The House Code is the three-digit number preceding the Serial Number. In the example below the House Code is 137.

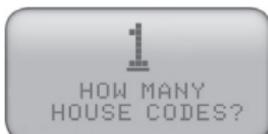


TO SET THE HOUSE CODE:

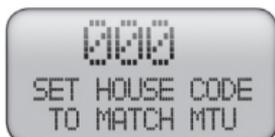
The RDU has 4 buttons on the front labeled \$, ►, ▲, and "MODE".



A. Hold the "\$" and ▲ keys down at the same time for 3 seconds and this screen should come up. You are reading the instructions, so go ahead and press the MODE key to go to the next screen.



B. If you have TED model 1001, you will only have 1 House Code. Press the MODE key to go to the next screen. If you have TED model 1002, please see the separate instructions included in your additional MTU box.



C. Use the ► and ▲ keys to change the "000" to match the House Code that you noted above. Press the MODE key when done. This will take you to the primary kW display screen.

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CONFIRM PROPER OPERATION

- A) Insure that the RDU is set to read kW and not \$/Hr (by depressing the '\$' key if necessary). NOTE: All \$/Hr readings will read zero because the energy rate charge (tariff) has not been input yet. This will be done later. Observe the RDU; it should now be showing the current kW usage in the home or business. The LED on the front of the RDU should be flashing green approximately every one second, indicating that data is being sent and received properly.
- B) If the reading is still 0 kW, check House Code Setting (See prior section on House Code details - Page 6)
- C) If the reading is still 0 kW, insure that the RDU and MTU are on the same phase. If not, change the wiring in the panel so that they are, or install a phase-coupling capacitor. If still not operating, see Troubleshooting Section. Check the polarity of the CT's by turning on a large 240V load such as an electric clothes dryer or oven. If the CT's are installed with the correct polarity, then the RDU will immediately register an increased reading of 2–6 kW. If there is little or no change, then it is likely that one of the CT's has been installed backwards. Reverse one of the CT's and try again.
- D) The kW reading can be checked by comparison with a good clamp-on multi meter. Turn off any appliances that cycle on-and-off automatically to obtain a constant reading (the higher the reading, the better – turn on lights and other constant loads). Measure the voltage from phase-to-neutral (VL) and the current in each Phase (IA and IB). The kW display should read very close to $kW = VL \times (IA + IB) / 1001$. If the reading is much lower than this, check that the CT's have been installed with the red dots facing the same direction.
- E) If still not working, refer to Troubleshooting - Appendix B.

PROGRAMMING TED 1001

Estimated Programming Setup Time:

- Home Owner: 10 – 30 minutes
- Professional Installer: 5 – 10 minutes

TED is designed so that the SETUP MODE need only be accessed upon initial setup, or when the Utility has a rate change, or when the user wants to modify any of the operational information – time and date, billing date, etc. The entered data will stay intact when unplugged or there is a power outage. As data is entered during the SETUP MODE, it is permanently stored once the MODE Key is pressed; to change data after the initial setup routine, simply repeat the Setup procedure.

- To move from digit-to-digit within a field, depress the ► key;
- To change the value, depress the ▲ arrow (press once to advance one digit, or hold down to keep advancing);
- To move from one field to another, depress the MODE Key. (HOLDING DOWN the MODE Key will Save and Exit to the main display – this should be done only when changes are complete).
- Have a copy of your most recent Electricity Bill nearby to obtain information from...you will need it.
- Refer to Appendix E “Understanding Your Electric Bill”, or Appendix F - FAQ if you are not sure how to enter your Setup Information .

SETUP MODE

(DEPRESS AND HOLD \$ AND MODE KEYS SIMULTANEOUSLY FOR 2 SECONDS)

INPUT DATE AND TIME



Use the ► and ▲ keys to change the date, then press the MODE Key.



If your locale observes Standard North American Daylight Savings Time, choose “Y” otherwise choose “N.” Use the ▲ key to toggle between “Y” and “N” and then press the MODE key. TED will automatically adjust the time based on the New Daylight Savings Time standard passed by US Congress in 2006.



Use the ► and ▲ keys to change the time, then press the MODE Key. Be CERTAIN to get the AM / PM correct.

INPUT METER-READ DATE

This information is found on your utility bill. The Meter Read Date generally will fall on the

same day each month, plus-or-minus a day; TED is designed to accurately emulate your electric bill, however, this variable (time/date the meter is read) will cause discrepancies when comparing TED to your electric bill.



Use the ► and ▲ keys to change the date, then press the MODE Key. If you enter the scheduled meter read date as 31, then TED will display values for each calendar month.

UTILITY RATES

There are more than 4,000 electric utilities across the US and Canada; most tariff schedules will be accommodated by TED, however, in the event your utility uses a tariff calculation that is not found during this setup procedure, please use one that most nearly resembles your utility's tariff schedule.



If you do not wish to change or set your rates press the MODE Key. This will take you to the Primary Display . If you do wish to change or set your rates, use the ▲ key to toggle to "Y" and then press the MODE key.



Use the ▲ key to toggle to "YES" if you wish to change or set your rates; then press the MODE Key

You will then read "PLEASE SEE INSTRUCTIONS BEFORE RATES SET." Since you are reading the Instructions, go ahead and press the MODE key to go to the next

SETTING UTILITY RATES



Initially, you will need to input a Rate Plan, so change the 'N' to a 'Y' and press Mode. (If, at a later date you wish to only *CHANGE* your rates while not changing your rate PLAN, press N).



Select your Country of operation. Press Mode when complete.

There are three types of rate categories to choose from — **Flat, Tiered, and Time-of-Use.**



1-Flat: Your utility charges a fixed amount per kWh. i.e. \$.xxxx per kWh.

2-Tiered: Your utility bill uses a tiered formula. i.e. \$.xxxx for 1st xxx kWh and \$.xxxx for 2nd xxx kWh and \$.xxxx for 3rd kWh and so on. TED will accommodate up to 5 tiers.

3-Time of Use (TOU): Your utility has different rates during different times of the day. i.e. From 8-10a.m. is \$.xxxx kWh, from 1-6pm is \$.xxxx kWh. TED will accommodate up to 5 different rates during the day.

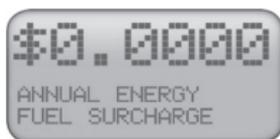
Use the ▲ key to select the rate type as described above that best matches your bill, then press the MODE Key. This section of the instructions assume you have chosen "1." If you select "2" or "3" you will follow a different screen routine...skip to the appropriate section entitled "TIERED RATES" or "TIME OF USE."



If your Utility charges different rates for Summer and Winter, use the ▲ key to change the 'N' to a 'Y' then press the MODE Key. See separate section on Summer/Winter rates for detailed explanation.



Use the ► and ▲ keys to match the rate charge shown on your utility bill, then press the MODE Key. "Annual" indicates that the rate is not seasonal and is applied throughout the year.



This is a charge billed by some, but not all utilities from time to time to recover their costs for extraordinary fuel prices. This amount is added to energy charges only and is not added to all items of the bill. Use the ► and ▲ keys to set the rate, then press the MODE Key.



For example, neighborhood street lighting costs, or any other recurring costs the Utility may pass on to the consumer. If more than one fixed fee applies, enter the sum of all fees. Use the ► and ▲ keys to set the rate, then press the MODE Key



Some utilities, in addition to a charge per kWh, have a minimum charge for electricity. This is typically a flat-fee. Use the ► and ▲ keys to set the rate, then press the MODE Key.



Charged as a percentage calculation of the entire bill. Standard with most utilities. Use the ► and ▲ keys to set the rate, then press the MODE Key



If you have successfully changed/ entered your rates, press the MODE Key. You may change your rates at any time by going through the Setup Routine again. If you want to go back to a field already entered, you will need to go through the Setup Routine again by holding the \$ and ▲ key simultaneously and pressing MODE until you reach the field you wish to modify.

Once the MODE key is pressed, Setup will be complete and TED will automatically return to the Primary Display screen.

SUMMER/WINTER RATES

Some Utilities have Summer/Winter rate programs. Any of the 3 rate categories above (Flat, Tiered, Time of Use) may have a Summer/Winter schedule. If you chose "N" to the question of Summer/Winter rates, you will see the word "Annual" throughout your programming of rates. If you select 'Y' to Summer/Winter rates, you will basically be entering your rate plan twice – once for Summer and once for Winter. Following is an explanation on setting the Summer/Winter seasons.



Using the ► and ▲ keys, select the beginning month and date of Summer as defined by your Utility. Press MODE to move to the End of Summer. Use the ► and ▲ keys to change the End date of Summer.



TED views the dates outside of the Summer dates you have entered to be Winter.

Summer/Winter rates will appear differently in the Tiered Rates as well as the Time of Use rates. See specific detail in the respective rates

TIERED RATES



Using the ▲ key, indicate how many rate tiers your utility charges. You may have up to 5 tiers. Press MODE key when finished. The number of screens following will depend on the number of Tiers you input on this screen.

The next set of screens are where you input the kWh tiers. After you have input the KWH tiers, you will then input the corresponding rates for the KWH tiers.



The kWh tiers are shown as "breaks." This is where you put in the upper-value of each tier. Ex: If tier 1 on your bill is from 0 to 150kWh, you would input "150" as Break 1. Use the ► and ▲ keys to input the upper value. Press MODE Key when finished.



The rate screens shown will correspond to the number of Rate Tiers on your bill. Each screen will allow you to enter the rate for the specified Tier.

Use the ► and ▲ keys to enter the rate for that particular Tier, then press the MODE Key.

Note the word 'Annual' to the left. This signifies that the rate you are entering is for the entire year, and not a season (Summer/Winter).



If you selected Summer/Winter rates, the word "Annual" will be replaced by both "Summer" and "Winter", allowing you to enter rates for both seasons for each Tier. Pay particular attention to this, as it can get quite confusing.

NOTE: If you do make a mistake or wish to go back to a prior screen, you must complete the Setup process by continuing on, save your changes at the last screen, then enter the Setup Routine by holding down the \$ and MODE Keys simultaneously. Press MODE until you have reached the screen you wish to change.

Upon pressing the MODE Key at the completion of your last Rate Tier screen, the next screen to appear is "Energy/Fuel Surcharge", beginning the sequence of closing screens found on Page 14.

TIME OF USE RATES

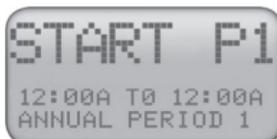
Time-of-Use rates (TOU) are designed to help both customers and utilities. The goal is to encourage customers to shift certain loads from peak periods into periods of lower cost and demand. TED will allow up to 5 TOU rates, with 2 time-periods per rate. "Off-Peak" rate does NOT count as a "rate peak." If, on your bill for example, you have 3 TOU rates, the lowest is usually termed "Off Peak." Other rates may be termed "Peak", "Super Peak" or "Critical Peak." TED simply refers to them as P1 and P2.



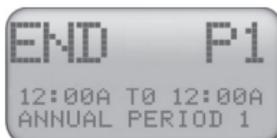
Once you have selected Time-of-Use rates as the tariff structure you are billed under, the first screen you will see is Summer/Winter rates. If you select 'Y', turn to the section titled "Summer/Winter Rate Explanation" on Page 5 to see how to program the 2 seasons. After you have reviewed that section, turn back to this point. Press MODE Key to continue.



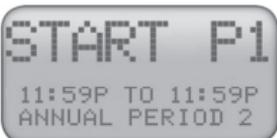
Using the ▲ key, select how many peak rates you have throughout the day. NOTE: If you have a rate of \$.10 from 9-10am and \$.10 again from 3-5pm, this is one (1) rate peak, because it is the same rate even though it is at different times.



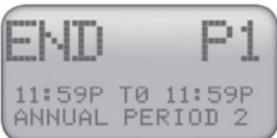
There are 2 steps to follow. During the 1st step, you will input the time period(s) for all the rate peaks corresponding with the number you entered above. Look closely at the images to the left. There are subtle, but important differences. Let's assume you said there were 2 Rate Peaks. The word "Annual" means that you did not choose Summer/Winter rates, and that this is an annual rate. If you said "Y" to Summer/Winter rates, you would follow these screens for each season.



In most cases, Period 1 will be an "a.m." period, and Period 2 will be "p.m." Make sure you change 'a.m.' and 'p.m.' appropriately.



NOTE: For each Rate Peak ("P"), there are 2 "Periods" - in case the rate occurs twice per day. Let's assume Peak Rate 1 is \$.10/kWh and occurs from 9-10am, and again from 4-6pm. The "9-10am" would be considered Period 1, and "4-6pm" would be considered Period 2. In the event P1 occurs only in the a.m., or only in the p.m., you only need to set one of the Periods correctly. The other Period needs to remain at the default values of 12:00a to 12:00a.



NOTE: Any times not included in one of the peak periods will be considered "Off-Peak" and charged at the Off-Peak rate.



If you make a mistake during this process (or anytime during the Setup Routine), hold the MODE Key down for 3 seconds. It will save all your entries up to this point. To get back into the Setup Mode again to complete your programming, simply hold the \$ and ► keys simultaneously for 3 seconds; press MODE to advance to the area you were wanting to correct or complete. You can override any prior entries at any time.



If you had entered "3" (or more) TOU rates, P2 (P3, P4) represent the subsequent Rate Peaks that will be entered. As you did for P1, you enter the Start and End for Period 1. Be certain to get 'a.m. and p.m.' correct. In the event P2 occurs only in the a.m., or only in the p.m., you only need to set one of the Periods correctly. The other Period needs to remain at the default values of 12:00a to 12:00a.

P3 represents the 3rd Rate Peak that you will enter. For this example, you had entered several screens ago that you had "2 Rate Peaks."

Upon pressing the MODE Key at the completion of your last Rate Tier screen, the next screen to appear is "Energy/Fuel Surcharge", beginning the sequence of closing screens found on Page 14. Turn to Page 14 to complete the Setup Routine.

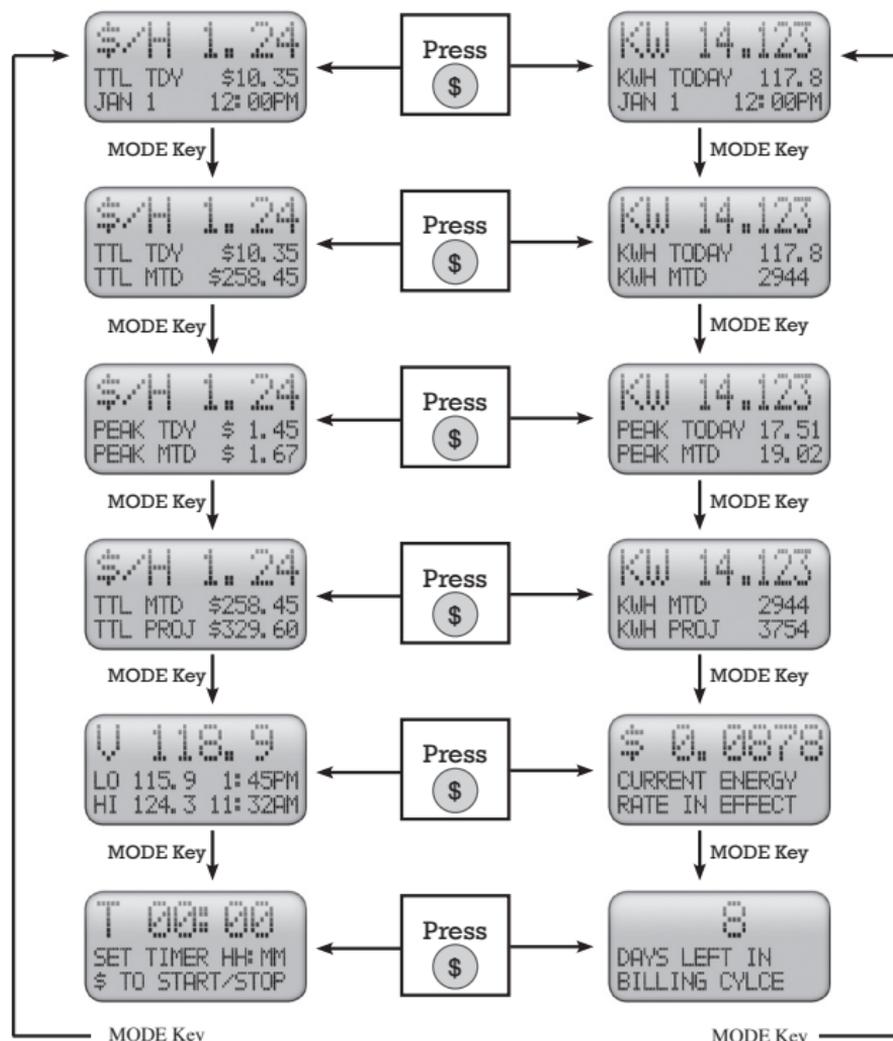
LED Operation

TED's "Alarm" Light (Light Emitting diode – LED)

1. The LED should now be flashing green once per second indicating receipt of good data packets from the MTU indicating that the power is on and that it is operating normally.
2. If the LED flashes green intermittently, TED 1001 may have a poor communication link and is probably missing data packets sent by the MTU – see Appendix B – Troubleshooting Guide for help.
3. If the LED is either off or on, but not flashing, the communication link may have been lost – see Appendix B – Troubleshooting Guide for help.
4. If you have input a Tiered-rate, the LED will change from Green to AMBER when the rates advance into the 2nd tier. As the rates advance to the 3rd tier, the LED will remain AMBER but blink twice per second. As the rate advances to the 4th tier, the LED will blink even faster. So, when you see an AMBER LED, you know you have advanced to the next rate tier, and the faster the blink, the higher the tier.

PART iii - DAY-TO-DAY OPERATION

TED should now be displaying values for both KW and \$. TED will now provide you with a wealth of information at your fingertips. The graphics below summarize how screens are linked and how to navigate between screens. The following pages provide full descriptions of each screen display. Pressing the MODE Key will advance the screens vertically. Pressing the "\$" Key will alternate the screens between the '\$' and 'KW' view.



Audible Tone

- Indicates Timer Countdown Complete. Sounds for 15 seconds, then for 2 seconds every minute as reminder, OR until reset by pressing any key.
- Indicates Alarm Parameter Exceeded. Only sounds if audible enabled "Y" in Alarm View (Screen A7). Sounds for 30 seconds, then for 10 seconds every 15 minutes for one hour, OR until reset by pressing any key.
- Audible is silenced until alarms are reset in Alarm Mode (Screen A8).

Alarm Message Screens

- When any alarm parameter is exceeded, a screen pops up explaining what the alarm was, displays the current parameter value and the alarm set parameter value.
- Pressing any key dismisses message.
- Messages will not reappear until alarms are reset in Alarm View.

Note: LED Colors and operation are not affected by any settings in Alarm View. (Will continue to flash red until value falls to below alarm parameter value or until alarm parameter setting is reset to a higher/lower value in Alarm View.)

What is TED Displaying?

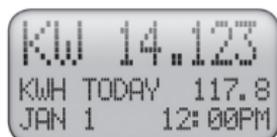
KW 14.123



This is the total power being consumed in your home or business, in kilowatts (KW) at this instant and is updated every second. In this example 14.123 kilowatts.

- Power is measured in watts and is a measure of voltage x current.
- 1,000 watts = 1 kilowatt.
- If you turn on a dryer rated at 4,000 watts and there is nothing else on, then the display will show approximately: KW 4.000
- If you turn on a 60-watt light bulb, the display will increase by KW 0.060 (display should read 4.060)
- You can look at it this way... the readings to the left of the decimal place are in kilowatts and those to the right of the decimal place are in watts.

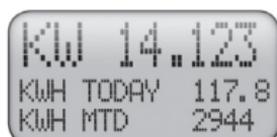
KWh TDY 117.8



This is the energy consumed since midnight in kilowatt-hours (KWh). In this example 117.8 kilowatt-hours.

- One kilowatt of power consumed over one hour = one kilowatt-hour of energy.
- This is important to know, because your utility bills you for every kilowatt-hour you use.
- If your energy rate is \$0.0878 per kilowatt hour, then you have spent \$ 10.35 so far today. Nice to know?

KWh MTD 2944



This is the energy consumed so far this billing month in kilowatt-hours (KWh)

- The billing month ends on the date that you entered during the SETUP programming and is the estimated date your utility will read your meter and calculate your next bill.
- Because of weekends, holidays and schedules, your meter will not be read on the same exact day and time every month. Therefore, TED will never likely match your electricity bill exactly.
- If you enter the METER READ DATE as 31, then TED will display values for the calendar month.

KWh PROJ 3754



This is TED's best estimate of how many kilowatt-hours of electricity you will use this billing month, based on your use so far this month.

- You may notice some fluctuations for the first couple days of the billing cycle, until TED can get a handle on your energy use

KW PEAK TODAY 16.51



This is the peak power in kilowatts (KW) consumed so far today.

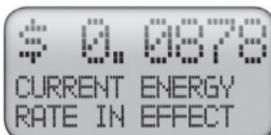
- This is actually averaged over one minute to reduce the spikes that occur when large motors are started.

KW PEAK MTD 19.02



This is the peak power consumed so far this billing month in kilowatts (KW).

\$ 0.0878 CURRENT ENERGY RATE IN EFFECT



This is the current energy rate in effect being billed by your utility in Dollars per Kilowatt Hour.

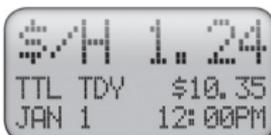
- This is the base rate and does not include any energy surcharges or taxes. This should match the rate shown on your utility bill.
- If your rates change depending on time of day, you will see this value change. **When higher rates are in effect, the green LED changes to yellow, so you can think about turning some things off until the rates go down. As the rate gets even higher, the yellow-flashing increases in speed.**
- If your rates change depending on total energy consumed, then you will notice this value change as the month goes by.

8 DAYS LEFT IN BILLING CYCLE



If your meter read date is the 17th of the month and today is the 9th of the month, then there are 8 days left in your billing cycle.

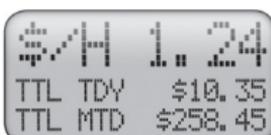
\$/H 1.24\$/H 1.24



This is your current power cost in dollars-per-hour. At this instant you are using \$1.24 per hour.

- This includes any energy surcharges or sales taxes you entered during setup.

TTL TDY \$ 10.35



This is the total cost of energy consumed since midnight: \$10.35

- This includes any energy surcharges and taxes.

TTL MTD \$ 258.45



This is the total cost of energy consumed so far this billing period. \$258.45

- This includes any energy surcharges, taxes, minimum energy charges or fixed charges.

TTL PROJ \$ 329.60



This is an estimate of what your electricity bill will be this billing period.

- TED is very aware of your usage pattern, and projects what your electricity bill is going to be.
- Since you have 8 days left in the billing cycle, and if your budget is \$300, it is time to start conserving.

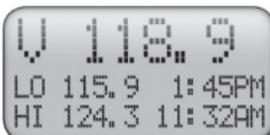
V 118.9



This is the current voltage measured at your electrical panel: 118.9 volts.

- This is a measure between one of the phases and neutral.
- The voltage between phases will be approximately double this, or 237.8 volts.
- Systems in the US and Canada are nominally 120/240 volts. Readings in the range of 115 to 125 volts are considered fairly normal.

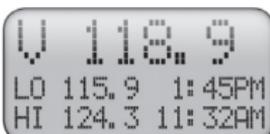
LO 115.9 1:45 PM



This is the lowest recorded voltage at your panel since midnight and the time it was recorded.

- This is actually averaged over one minute to reduce spikes caused by the starting of large motors or heavy loads.
- This value is important, as low voltages are harmful to motor-driven equipment such as pumps, fans and air conditioners.

HI 124.3 11:32 am



This is the highest recorded voltage at your panel since midnight and the time it was recorded.

- This value is important as exceedingly high voltages can reduce lamp life and damage sensitive equipment.

T 00:00:00

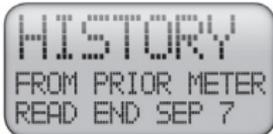


This is a timer similar to the one on most ovens and microwaves.

- Set the time in hours, minutes, or seconds using the arrow keys. Press the \$ key and the timer will begin timing down.
- The alarm LED will flash red when it reaches 0:00:00.
- If you have allowed audible alarms, the timer will beep when it reaches 0:00:00.
- MODE key will silence alarm and reset timer.

PART IV - HISTORICAL DATA

TED will begin accumulating data immediately upon the completion of Setup. You can not manually input historical data. To view the Historical Data, hold down the ► and **MODE** keys simultaneously for 2 seconds.



HISTORY
FROM PRIOR METER
READ END SEP 7

The first screen that appears indicates when your meter was last read, and considers information from that point forward to be current information, and information prior to that historical. Press **MODE** to view next screen.



SEP 7
TTL KWH 2460
TTL COST \$196.80

TED records total KWh usage as of midnight on the night of the Meter Read Date. Also shown is the cost for the usage in dollars.

Note: A significant difference may appear between your electricity bill and TED due to the actual time your meter was read, and even the actual day your meter was read. Press **MODE** to view next screen.



AUG 7
TTL KWH 3740
TTL COST \$299.20

TED will let you view the past 13 months' data.

Press **MODE** to return to the primary display

V - SETTING ALARMS

There are 6 different alarms that can be set. Any combination of the 6 alarms may be set...none, one, some, or all. Depressing the MODE Key will advance from one alarm to the next. **We recommend that you operate TED for a substantial length of time to determine which, if any, alarms you want to use based on observation of your typical readings.**

Alarm Mode

What happens in Alarm Mode

- The LED will flash red instead of green.
- A pop-up screen will tell you which alarm was exceeded.
- An audible alarm will sound for 30 seconds (unless silent alarm mode is selected).
- Pressing any key silences the audible alarm and returns to previous display.
- LED will continue to flash red until use falls below set limit.

(Hold down ▲ and MODE simultaneously for 2 seconds)

\$ PER HOUR ALARM



Once set, the alarm will sound when the Cost-Per-Hour "\$/H" figure exceeds the LIMIT set by the user. Example: If the user wishes to be notified when the \$/H exceeds \$1.20, the user will have entered "\$1.20" as the LIMIT for the alarm. Each time \$1.20 is exceeded, TED will enter Alarm Mode.

KW ALARM



Once set, the alarm will sound when the Power Usage "KW" figure exceeds the LIMIT set by the user. Example: If the user wishes to be notified when the KW exceeds 10.00, the user will have entered 10.00 as the LIMIT for the alarm. Each time 10.00KW is exceeded, TED will enter Alarm Mode.

NOTE: If your Utility is having supply problems, they may wish to advise you to keep below a certain KW during high demand periods. This is a good way to monitor the load and help out!

\$ SPENT MONTH-TO-DATE



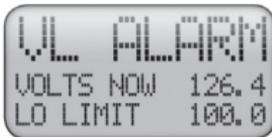
Once set, TED will enter Alarm Mode. When the total month-to-date use figure exceeds the LIMIT set by the user. If the user is on a budget, fixed income, or just wishes to keep up with monthly spending, TED's alarm scheduled at periodic intervals throughout the month (i.e. at \$50, \$75, \$100) would notify the user as the spending LIMIT is reached.

KWh MTD ALARM



Once set, TED will enter Alarm Mode when the “kWh” figure exceeds the LIMIT set by the user. Example: If the user wishes to be notified when the month-to-date kWh exceeds 1500, the user will have entered 1500 as the LIMIT for the alarm. When 1500 kWh is reached, TED will enter Alarm Mode.

LOW VOLTAGE ALARM



Once set, TED will enter Alarm Mode when the voltage drops below the LIMIT set. Example: If the user wishes to be notified if the voltage drops below 110 volts, the user will have entered “110 volts” as the LIMIT for the alarm. If the voltage drops below 110 volts, TED will enter Alarm Mode. Low voltage may cause damage to motors, compressors, and other sensitive electrical devices by putting undue strain on the motor, thus shortening the useful life.

HIGH VOLTAGE ALARM



Once set, TED will enter Alarm Mode when the voltage exceeds the LIMIT set by the user. Example: If the user wishes to be notified if the voltage exceeds 125 volts, the user will have entered “130 volts” as the LIMIT for the alarm. If the voltage reaches 130 volts, TED will enter Alarm Mode. High voltage may cause damage to sensitive electrical devices and will also shorten lamp life.

AUDIBLE ALARM



If you would like an audible alarm, choose “Y”. If you prefer Silent Alarm Mode, choose “N”. Choosing “Y” will allow alarms. Choosing “N” will stop alarms.

ALARM MESSAGE



NOTE: Regardless of the settings of the Alarm Message or the Audible Alarm, the LED Alarm indicator on the face of TED will change to red if any alarm condition is met.

Once the MODE Key is pressed, TED will return to the Primary Display.

PART VI - SPECIAL FUNCTIONS

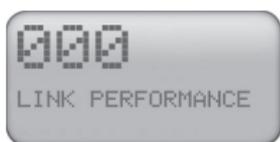
Some of the following functions can cause significant changes in TED. Please be sure to understand each screen fully before changing any of the default values. In order to access these screens, hold down the 3 buttons on the left side of the display simultaneously (\$ ▶ ▲) for 3 seconds. The following will appear:



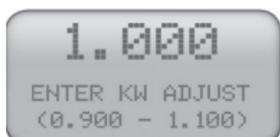
NOTE: If you wish to go through these screens without recording any changes, continue pressing the MODE Key. At the end you will be asked if you want to SAVE CHANGES Y/N? The default is "N." Change to "Y" if you do wish to record a change.



This is the House Code being transmitted from your MTU. If you have not installed your MTU yet, it will read "000." Press the MODE Key to advance to the next screen.



This number represents signal quality. It only becomes a valid number after 24 hours of operation. It should be above 70. Press the MODE Key to advance to the next screen.

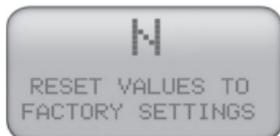


If you wish to calibrate TED to match your utility meter exactly, you may adjust this number accordingly. Change this ONLY after comparing TED with your utility meter for at least 3-4 weeks. For example, if you find that TED is reading 1.7% higher than your utility meter, adjust the 1.000 by 1.7% ($1/1.017 = 0.983$). If reading is low, change calibration factor to 1.017.

Press the MODE Key to advance to the next screen.



Change the 'N' to 'Y' if you would like to change all of your totals to zero. **NOTE:** This will zero ALL accumulated data totals. You can not specify which totals to zero out. It does not affect the Setup Data (Time, Date, etc.) or the monthly History. Once you have pressed the MODE key, TED takes approximately 1 minute to clear the registers.



Changing the 'N' to 'Y' will zero all data in TED. TED will appear to be brand new. The only remaining info will be the House Code. Pressing the MODE Key will return you to the Primary Display screen.

APPENDIX B TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	SOLUTION
I plugged the RDU in and the LED began to flash, even before the MTU was installed.	There is another TED on the line.	Insure that RDU House Code matches the MTU House Code.
MTU Green LED is not flashing once per second.	Circuit breaker not turned on	Turn on circuit breaker
	Poor connection	Check connections
	Wrong voltage	Check voltage with voltmeter between black and white conductors. Acceptable voltage range is 100 - 130 Volts.
RDU Green LED is not flashing.	MTU LED not flashing	Check MTU.
	Wrong house code	Insure house code set in RDU matches MTU.
	MTU connected to opposite phase than RDU	Change MTU connection to same phase as RDU.
	Surge suppression plug strips are causing the data signal to be lost to ground	Unplug any plug strips with surge suppression capacitors.
RDU LED flashes once per second, but every once in a while fails to flash (misses a beat).	The MTU sends data to the RDU once per second. The LED flashes every time a good packet of data is received. This should be once per second. A missed beat indicates that a packet of data was missed that second. This may signal a poor data connection or too many TED's transmitting on the line.	Check to make sure that both RDU and MTU are on the same phase. If it only skips a beat every once in a while, it is not a significant problem. TED automatically compensates for missed data transmissions.
RDU LED flashes sporadically.	Poor data connection.	Check to make sure the RDU and MTU are on the same phase. If you are in an apartment block or multi-family housing, there may be too many TED's transmitting on the line. Contact Tech Support.

APPENDIX B TROUBLESHOOTING (Continued)

SYMPTOM	POSSIBLE CAUSE	SOLUTION
RDU Green LED is flashing, but display is all zeros.	Display is set to \$ but rate setup is not complete.	Insure that RDU is set on KW not \$ display by toggling the \$ key.
		Complete rate setup procedure.
RDU is displaying a value for KW but it doesn't seem to be correct, or when I turn on an electrical load the KW display does not change appropriately.	Current Transformers are incorrectly installed.	Insure that both CT's have their red polarity dots facing the same direction.
		Insure that jaws on CT's are firmly closed together.
	Wrong house code	You are reading your neighbor's energy use. Insure that house code set in RDU matches that set in MTU.
RDU is displaying a correct value for KW but \$ display is all zeros.	Rate setup is not complete.	Complete utility rate setup.
I just installed TED and TED is displaying \$0.03 today but \$15.03 for the month to date.	You have entered a minimum monthly charge during setup.	No action required. If you entered a minimum monthly charge, then \$ Month to Date, will display the minimum charge until the minimum is exceeded. The daily total does not reflect the minimum charge
	You entered a fixed monthly charge during setup.	No action required. If you entered a fixed monthly charge, then \$ Month to Date, will display this amount plus the \$ used to day.
My utility bill didn't match TED's stored data.	TED was installed during the middle of the billing period.	No action required. TED should match your bill for the next month.
KWh use did not match my bill.	Incorrect installation or poor communication link.	Insure that MTU and CT's are installed correctly and that communication is operating correctly.

APPENDIX B TROUBLESHOOTING (Continued)

SYMPTOM	POSSIBLE CAUSE	SOLUTION
<p>KWh use matched my bill but \$ amount did not.</p>	<p>Rate setup is incorrect.</p>	<p>Insure that TED is programmed correctly. If you are not sure, send us an e-mail with a copy of your utility bill, or the name and address of the utility and the rate code in effect. TED will send you the correct setup parameters to use.</p>
<p>TED did not match my utility bill exactly.</p>	<p>This is normal. TED is designed to be accurate within $\pm 2\%$, but is usually within $\pm 1\%$. However, if you set the meter read date as the 10th of the month, then TED computes your monthly total based on a month beginning at 12:01a.m. on the 10th of the month. In fact your utility may have read your meter at 4:00 in the afternoon and if the 10th is a weekend, may have read it on the 8th, 9th, 10th or 11th. Many utilities only read your meter once every six months and simply estimate your use.</p>	<p>No action required, unless the differences can not be explained by the differences in read dates. If the difference is larger than can be explained, then is it the KWh that is incorrect or the \$ total? If the KWh is incorrect, check the installation. If the \$ is incorrect, check the setup information.</p>
<p>The LED on the RDU is flashing yellow instead of green.</p>	<p>You have entered Tiered rates - peak/offpeak rates . TED is warning you that you are now in a higher rate period.</p>	<p>Turn off lights and electrical appliances.</p>
<p>The LED on the RDU is flashing red instead of green.</p>	<p>You have exceeded an alarm parameter.</p>	<p>Turn something off, alter your use patterns, or alter your alarm settings.</p>
<p>TED was working just fine and then quit.</p>	<p>TED locked up due to spikes on the electrical line.</p>	<p>TED is a mini computer and just like your PC can lock up. If this happens, unplug the RDU, count to 15 and plug it back in. If the MTU locks up, turn off the circuit & count to 15 and turn it back on.</p>

APPENDIX E UNDERSTANDING YOUR ELECTRICITY BILL

It is important to understand how your electric utility calculates your electricity bill, to insure that TED is programmed to make the calculation in the same way and thus arrive at the same total. Unless your bill is exceedingly simple, please read the following carefully.

If you are using Simple Setup, TED uses a fairly simple set of formulas to calculate your utility bill:

As an example, lets assume your utility uses a two-tiered rate structure (TED will accept up to three tiers) where the rate for the first 500 kWh is \$0.1001 per kWh and for any over this is \$ 0.1500 per kWh. The PUC has allowed your utility an energy surcharge of \$5 because of high natural gas prices, you pay a fixed charge of \$10.00 per month for street lighting and the sales tax rate in your area is 6%. Lets assume that TED has measured your usage for the billing month at 1500 kWh. TED calculates the Month-to-Date as follows:

Energy Charge for the first 500 kWh	500 kWh x \$0.1001	\$	50.00
Energy Charge for the remaining 1001 kWh	1001 kWh x \$0.1500	\$	<u>150.00</u>
		Subtotal	\$ 200.00
Energy Surcharge		\$	<u>5.00</u>
		Subtotal	\$ 205.00
Fixed monthly charge for street lighting		\$	<u>10.00</u>
		Subtotal	\$ 215.00
Sales Tax	6%	\$	<u>15.00</u>
Total Month to Date		\$	230.00

Note that the Energy Surcharge is only added to the energy cost, but the sales tax is added to the entire bill. Highlighted items are values you enter when programming TED in SETUP mode.

There are over 4000 electric utilities and electric coops in the US and Canada. Many have rate structures which may be presented in a slightly different manner. It is important to analyze your electric bill and program TED as close as possible to match your bill. As an example, your bill might look like this:

- Delivery Charge \$0.080 per kWh
- Billing Fee \$0.010 per kWh
- Debt Retirementt \$0.020 per kWh

To program TED, simply add all these up and enter a rate of \$ 0.1100 per kWh as your energy rate.

Energy, Inc. Limited Warranty for the United States and Canada

Energy, Inc. warrants its electricity monitoring devices, TED-branded Products, and certified TED-branded accessories ("Accessories") and Energy, Inc. software contained on CD-ROMs or other tangible media ("Software") and sold for use with these Products to be free from defects in materials and workmanship under normal consumer usage for a period of one year from the date of purchase. Labor charges for removal and installation are the consumer's responsibility. During the warranty period, and upon proof of purchase, the product will be repaired using Energy, Inc. reconditioned replacement parts or the product will be replaced (with the same or a similar reconditioned/replacement model) at Energy, Inc.'s discretion. To obtain warranty service you must take or send the product, postage-paid, with a copy of your sales receipt or other proof of purchase that shows the date of purchase, to a Energy, Inc. Service Center. There will be no parts or labor charge to you. Due to the possibility of damage or loss during shipping, it is recommended when sending the product to a Energy, Inc. Service Center that you package the product securely and send it insured, return receipt requested.

The consumer shall NOT have any claim under this warranty for repair or adjustment expenses if:

- 1) The problem is caused by improper installation, operation, storage, misuse or abuse, accident or neglect, connection to improper voltage supply; physical damage to the surface of the product resulting from misuse; contact with liquid, water, rain, extreme humidity or heavy perspiration, sand, dirt or the like; extreme heat, or food; or other acts which are not the fault of Energy, Inc.
- 2) The problem is caused by fire, lightning, or other natural calamity.
- 3) The problem is caused by improper repair or adjustment made by anyone other than a Energy, Inc. Service Center.
- 4) Products or Accessories with (a) serial numbers or date tags that have been removed, altered or obliterated (b) broken seals or that show evidence of tampering, (c) mismatched board serial numbers, (d) or non-Energy, Inc. housings or parts.
- 5) The proof of purchase is not presented when requesting service.
- 6) Defects or damage resulting from the use of non-Energy, Inc. branded or certified products, accessories, or software.
- 7) The limited warranty period has expired.

Neither this limited warranty nor any other warranty, express or implied statutory or otherwise, including any implied warranty or condition of merchantability or of fitness for a particular purpose, shall extend beyond the limited warranty period. No responsibility is assumed for any incidental or consequential damages, including without limitation, damages resulting from inaccuracy or mathematical inaccuracy of the product or loss of stored data. Repair or replacement as provided under this Warranty is the consumer's exclusive remedy, and applies to new Energy, Inc. Products, Accessories, and Software purchased by consumers in the United States or in Canada, which are accompanied by this limited warranty. Energy, Inc. shall not be liable for any incidental or consequential damages for breach of any express or implied warranty or merchantability or fitness for a particular purpose on the products and is limited in duration to the duration of this Warranty. To locate the nearest Energy, Inc. Service Center, please see Energy, Inc.'s web site: www.theenergydetective.com or call (843) 766-9800.

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